DOT V1800

REPORT NO. MGA-90-N008

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

Mitsubishi
1993 Mitsubishi Mirage
4 Door
NHTSA NO. MP5600

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105

December 9, 1992

FINAL REPORT

Prepared For:

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF MARKET INCENTIVES
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Room No. 5313 (NRM-22)
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PREPARED BY: John Fleck
John Fleck
MGA Research Corporation

APPROVED BY: Rudy H. Arendt
Rudy H. Arendt
MGA Research Corporation

FINAL REPORT ACCEPTED BY:

Manager, New Car Assess. Program
(NCAP)

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Contracting Officer's Tech. Rep. (COTR)

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TECHNICAL REPORT STANDARD TITLE PAGE

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NHTSA New Car Assessment Program (NCAP) 1993 Frontal Barrier Impact test on 1993 Mitsubishi Mirage 4 Door to indicant requirements FMVSS No. 208, 212, 219 (partial) and 301.	December 9, 1992
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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 1993 Mitsubishi Mirage at the MGA Proving Grounds Crash Test Facility in Burlington, Wisconsin on November 23, 1992.

The barrier impact velocity was 55.62 kph (34.6 mph), and the ambient temperature at the time of impact was 20° C. The post-test average crush was 509 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 919 and the 3 msec Clip (Chest g's) was 48.6. The left and right femur maximum loads for the driver were 3144 N and 6068 N, respectively. The passenger's HIC was 561 and the 3 msec Clip (Chest g's) was 43.6. The left and right femur maximum loads for the passenger were 2482 N and 1958 N, 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., SW, Wash. DC 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 48 kph 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 TEST NUMBER MNØ2Ø3

A load cell barrier consisting of 3Ø load cells was impacted by a 1993 Mitsubishi Mirage 4 Door at a velocity of 55.62 kph (34.57 mph). The test was performed at the MGA Proving Grounds and Crash Test Center on November 23, 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. 466) and the right-front passenger ATD (Serial No. 465) 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 driver HIC was 919.4 and maximum chest deceleration over 3 milliseconds was 48.6 g's. The left and right femur loads were 3144 and 6Ø68 newtons respectively.

The right front passenger's HIC was 561.4 and maximum chest deceleration over 3 milliseconds was 43.6 g's. The left and right femur load were 2482 and 1958 newtons respectively.

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1993 Mitsubishi Mirage 4 Door

NHTSA No.: MP5600 VIN.: JA3CA26A7PU008023

Body color: Blue Date of Manufacture: 6/92

Engine: 4 Cylinders; ___C.I.D.; 1.5 liters; ___CC

X Gas; ___Diesel; ___Turbocharged

___Longitudinal; X Transverse

Transmission: 3 Speed; ___ Manual; X Automatic; ___Overdrive

Final Drive: ___Front Wheel; ___Rear Wheel; ___Four Wheel

Date Received: 10/92 Odometer Reading: 102

X A/C; ___P/S; ___P/B; ___P/wdo; ___ Tilt Wheel

___P/seats; ___Cruise Control

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

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 2.15 kg/cm^2 Rear 2.15 kg/cm^2

Recommended Tire Size: P155/80R13

Recommended Cold Tire Pressure: Front 2.15 kg/cm^2 Rear 2.15 kg/cm^2

Tires on Vehicle: P155/80R13 ; Manufacturer: Michelin

Number of Occupants: 2 Front; 3 Rear; ___3rd Seat; 5 TOTAL

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

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

Vehicle Capacity Weight (VCW) = 372 kg. (A)

No. of Occupants x 67.5 kg. = 337.5 kg. (B)

Rated Cargo Weight (RCW) A-B = 34.5 kg.

GVWR 1538 kg. GAWR: Front 823.5 kg. Rear 783.9 kg.

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

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

Right Front = 295.7 kg. Right Rear = 193.1 kg.

Left Front = 293.4 kg. Left Rear = 184.5 kg.

TOTAL FRONT WEIGHT = 589.1 kg. (60.9% of Total Vehicle Weight)

TOTAL REAR WEIGHT = 377.6 kg. (39.1% of Total Vehicle Weight)

TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 966.7 kg.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight 966.7 kg.

VCW = Vehicle Capacity Weight 372 kg.

DSC = Designated Seating Capacity 5

RCW = VCW - 67.5 (DSC) = 34.5 *kg.

Target Test Weight = UDW + RCW + (2 dummies x 73.8 kg./dummy)

Target Test Weight = 1148.8 kg.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:

Right Front = 335.3 kg. Right Rear = 243.9 kg.

Left Front = 333.0 kg. Left Rear = 234.5 kg.

TOTAL FRONT WEIGHT = 668.3 kg. (58.3% of Total Vehicle Weight)

TOTAL REAR WEIGHT = 478.4 kg. (41.7% of Total Vehicle Weight)

TOTAL TEST WEIGHT = 1146.7 kg.

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

Vehicle components removed to meet target weight: Rear seat, all rear panels, spare tire, rear bumper, rear door glass, rear belts, trunk deck

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 661 mm LF 663 mm RR 628 mm LR 631 mm

Test Attitude: RF 645.0 mm LF 645 mm RR 595 mm LR 595 mm

Wheel Base: 2463 mm.; C.G. = 962.5 mm rearward of front wheel C/L

Remarks: None

*light trucks and MPVs RCW is 135 kgs. or manufacturer's value, whichever is less

POST-IMPACT DATA:

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

Date of Test: November 23, 1992 Time of Test: 4:30 p.m.

Ambient Temperature: 20 °C (Spec. Range = 18.8 to 25.6°C)

Temperature in Occupant Compartment: 23 °C

Windshield Molding Temperature: 23 °C

Required Impact Velocity Range: 55.5 to 57.1 kph

Impact Velocity: primary = 55.6 kph, secondary = 55.6 kph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 1250 mm

Exiting Speed Trap: 250 mm

VEHICLE REBOUND AND CRUSH (mm):

Vehicle Length:	Pre-test =	R	4090	C_L	4280	L 4090
	Post-test =	R	3590	C_L	3732	L 3610
	Crush =	R	500	C_L	548	L 480

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

R 500 mm C_L 442 mm L 480 mm

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	to steering wheel rim & hub	Chin to Chest
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

	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	None	None	N/A	N/A
Seat Shift (inches)	None	None	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

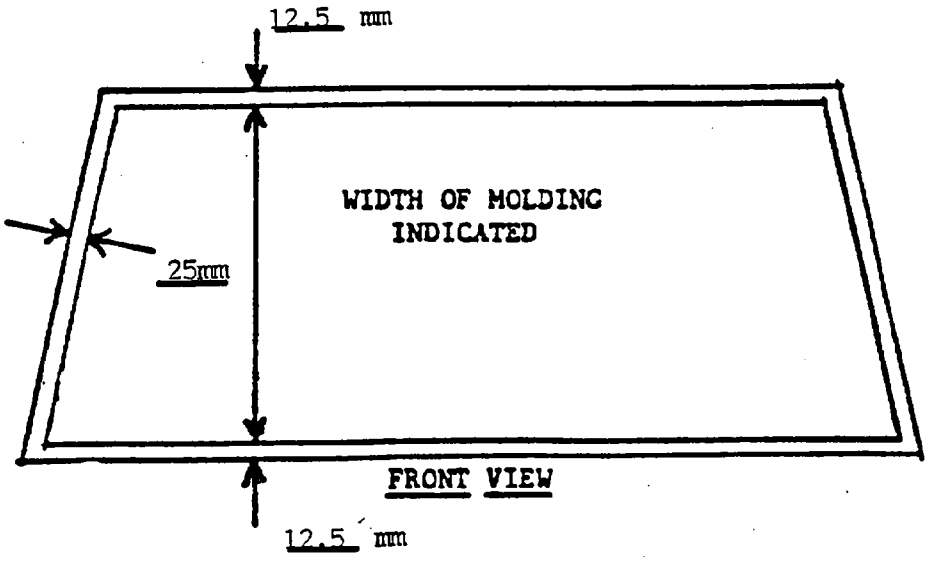
Details of windshield mounting such as retention method, trim type, etc.:
Steel trim with glue retention

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 (mm)	POST-TEST (mm)	PERCENT RETENTION
RIGHT SIDE	2061	2061	100%
LEFT SIDE	2011	2011	100%
TOTAL	4072	4072	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= 1075 mm

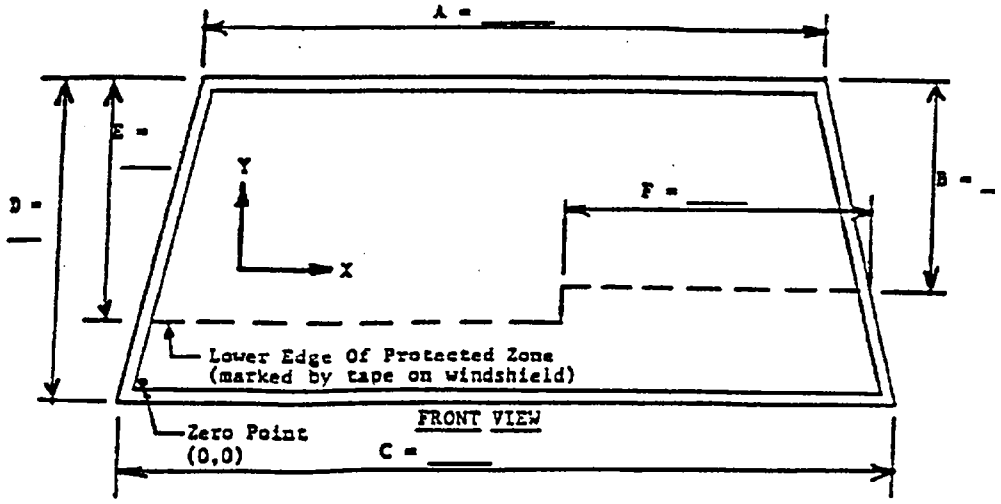
B= 470 mm

C= 1466 mm

D= 719 mm

E= 509 mm

F= 640 mm



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.: MP5600 TEST DATE: November 23, 1992

VEHICLE MAKE/MODEL/BODY STYLE: 1993 Mitsubishi Mirage 4 Door

USABLE CAPACITY OF VEHICLE'S FUEL TANK: 50 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:

46.7 Liters Which is 93 % 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.
Ø to 9Ø° (filler cap down)	N/A	N/A	N/A	N/A
9Ø° to 18Ø°	N/A	N/A	N/A	N/A
18Ø to 27Ø°	N/A	N/A	N/A	N/A
27Ø to 36Ø°	N/A	N/A	N/A	N/A

Solvent Spillage Location(s):

N/A

* Not Applicable - test not performed as per NHTSA COTR

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

VEH. YR./MAKE/MODEL/BODY STYLE: 1993 Mitsubishi Mirage 4 Door

VEH. NHTSA NO.: MP5600 TEST DATE: November 23, 1992

MAXIMUM ACCELERATION VALUES: (g's)	DRIVER DUMMY #466	PASSENGER DUMMY #465
Head Channel X	-171.9	-23.0
Head Channel Y	-32.5	29.2
Head Channel Z	117.9	47.1
HEAD RESULTANT	216.9	54.8
Chest Channel X	-51.8	-45.1
Chest Channel Y	-10.9	25.7
Chest Channel Z	10.7	-13.7
CHEST RESULTANT (CLIP)	48.6	43.6
TIME INTERVAL (msec) [0.003 seconds minimum]	t_1 = 92.7 t_2 = 95.7	t_1 = 91.1 t_2 = 94.1

HEAD INJURY CRITERIA (HIC) VALUES:

HIC	919.4	561.4
t_1 = (msec)	85.1	82.3
t_2 = (msec)	121.1	118.3
Avg. Accel. t_1 to t_2 (g's)	57.9	47.6

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

MAXIMUM FEMUR FORCES:

Right Side (N)	-6068	-1958
Left Side (N)	-3144	-2482

MAXIMUM SEAT BELT FORCES:

Lap Belt (N)	4620	6817
Shoulder Belt (N)	8843	10229

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: 1993 Mitsubishi Mirage 4 Door

VEHICLE NHTSA NO.: MP5600 TEST DATE: November 23, 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

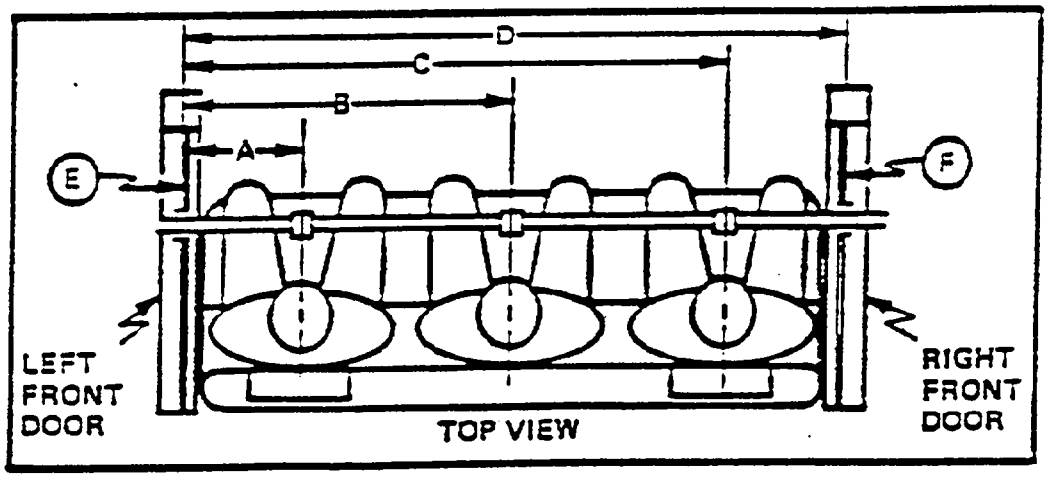
NOTE: All values listed must occur during primary impact event.
* For Hybrid III Dummy Application Only

PART 572 DUMMY IN-VEHICLE POSITION

Test No.: MP5600 Vehicle: 1993 Mitsubishi Mirage

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

Seat notch ___13___ from rear Seat notch ___13___ from rear



___466___ **DUMMY ID** ___465___

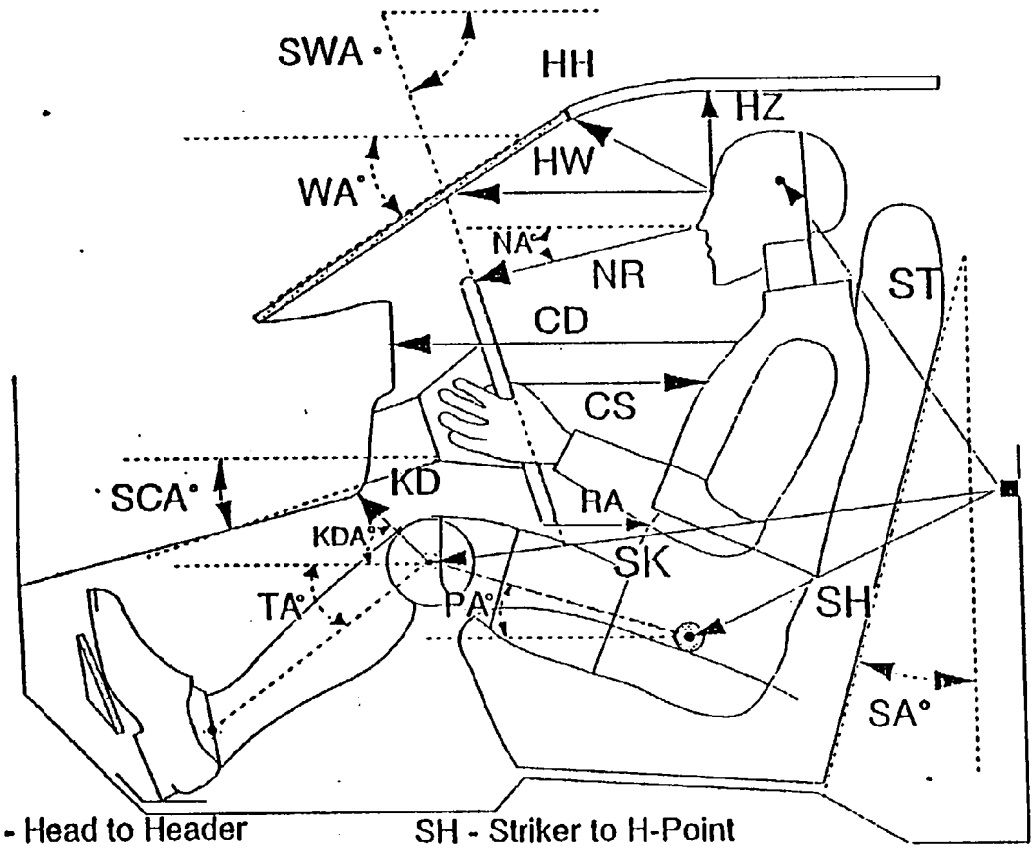
A	= Left Door to Driver Centerline	___375___ mm
B	= Left Door to Center Passenger Centerline	___722___ mm
C	= Left Door to Right Passenger Centerline	___1075___ mm
D	= Left Door to Right Door	___1455___ mm
E,F	= Window Glass Height (Right and Left Must Be Equal)	

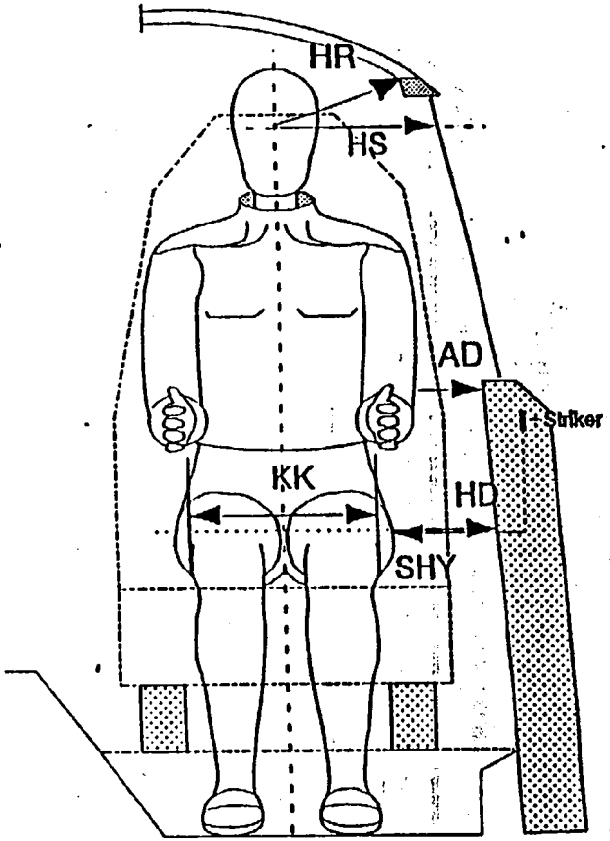
FRONT SEAT MEASUREMENT TABLE

Units (mm)

	DRIVER (Serial #) 466	PASSENGER (Serial #) 465
WA°	31	NA
SWA°	66	NA
SCA°	24	NA
SA°	23	23
HZ	177	167
HH	396	375
HW	601	577
HR	220	218
NR	466 Angle (NA)	14°
CD	565	600
CS	376	
RA	219	
KDL	202 Angle (KDA) 21°	186
KDR	212	212 Angle (KDA) 27°
PA°	14°	9°
TA°	38°	31°
KK	305	265
ST	515 Angle 87°	524 Angle 85°
SK	581 Angle 5°	595 Angle 8°
SH	233 Angle 37°	245 Angle 38°
SHY	213	207
HS	238	242
HD	165	169
AD	100	102

DUMMY MEASUREMENTS FOR FRONT SEAT PASSENGERS

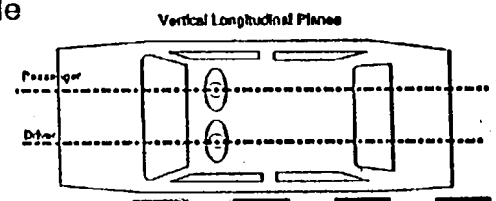


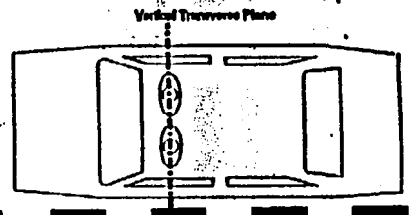


HH - Head to Header
HW - Head to Windshield
HZ - Head to Roof
NR - Nose to Rim
CS - Steering Wheel to Chest
CD - Chest to Dash
RA - Rim to Abdomen
KDL/KDR - Knee to Dash
KDA - Knee to Dash Angle

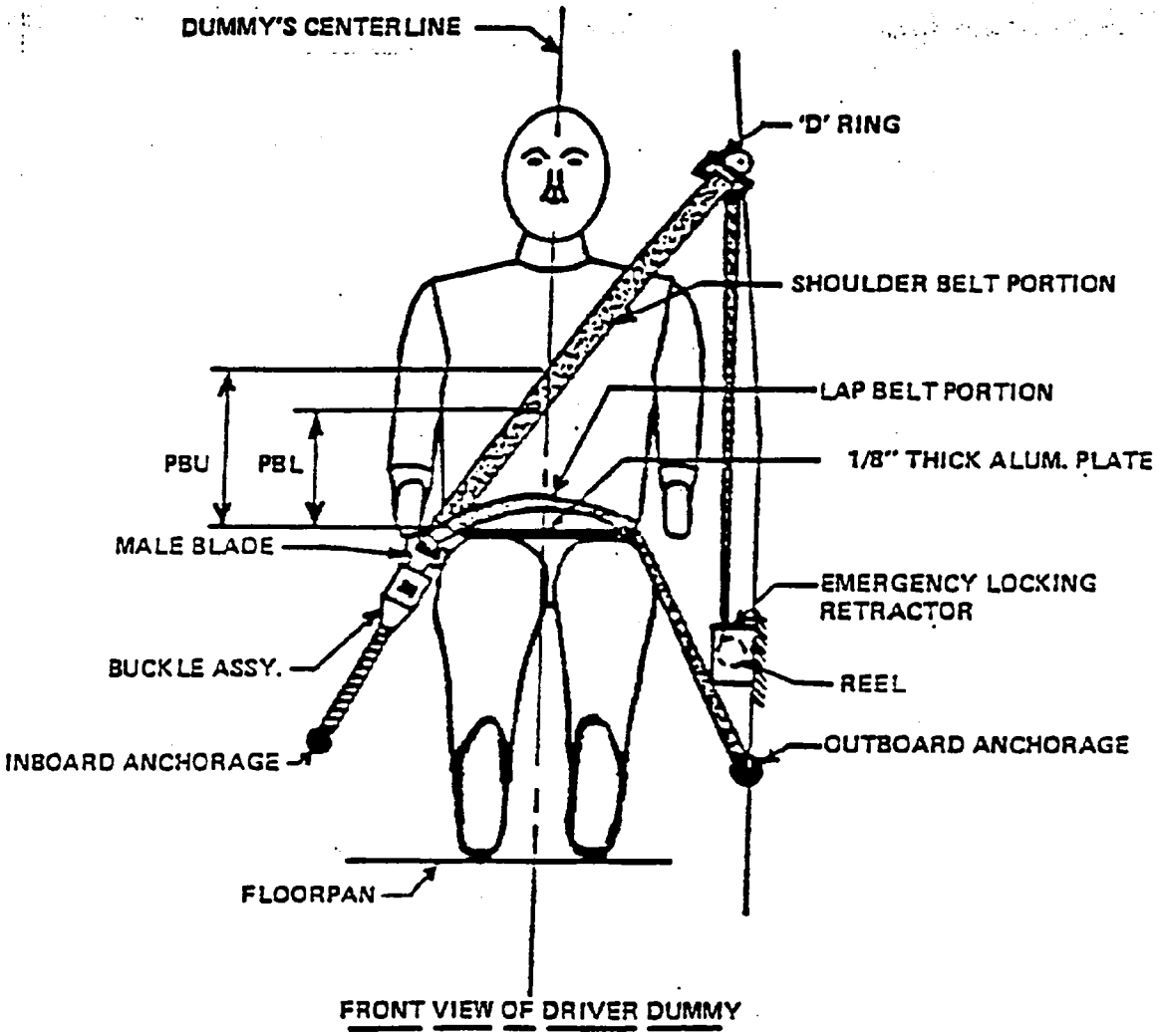
SH - Striker to H-Point
SK - Striker to Knee
ST - Striker to Head
NA - Nose to Rim Angle
TA - Tibial Angle
PA - Pelvic Angle
SA - Seat Back Angle
SCA - Steering Column Angle
SWA - Steering Wheel Angle
WA - Windshield Angle

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





SEAT BELT POSITIONING DATA



(illustration)

	DRIVER DUMMY	PASSENGER DUMMY
PBU -- Top surface of alum. plate to upper edge (inches)	342 mm	342 mm
PBL -- Top surface of alum. plate to belt lower edge (inches)	260 mm	265 mm
LAP BELT TENSION (lbs.)	< .5 kg.	< .5 kg.
SHOULDER BELT TENSION (lbs.)	1.8 kg.	1.8 kg.

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.	862 mm	885 mm
Lap belt length as measured on Part 572 Dummy.	868 mm	888 mm
SHOULDER BELT SPOOL-OFF DATA:		
As determined by film analysis	2 mm	2.5 mm
As determined mechanically	35 mm	30 mm
As determined electronically	*	*
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	2.4 mm	1.3 mm
Measured mechanically	0	0
RETRACTOR LOCK-UP TIME:		
As determined by shoulder belt spool-off observed in on-board cameras	30 msec	30 msec

* No room available for transducer mounting.

CAMERA LOCATIONS

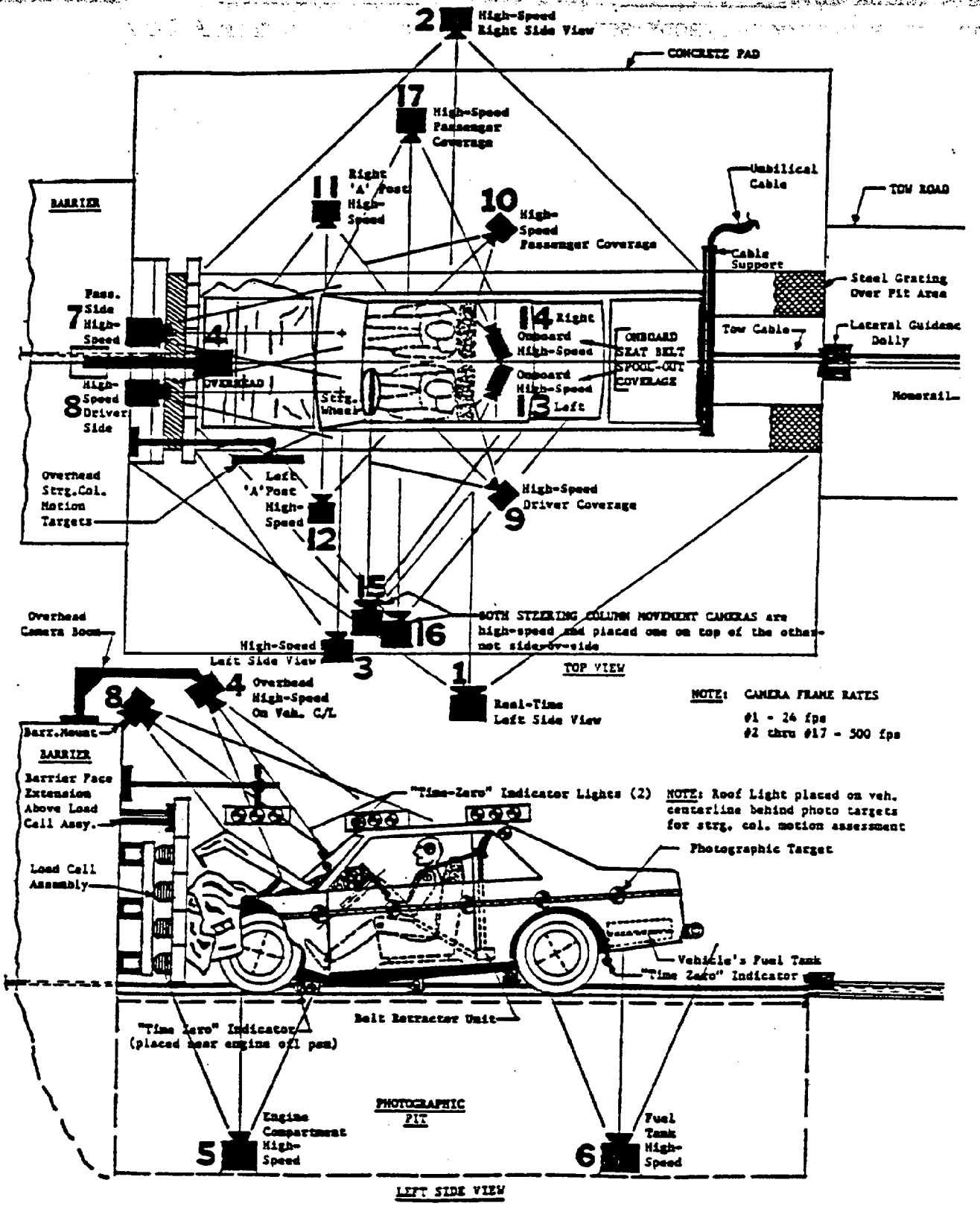
VEH. NHTSA NO.: MP5600 ; TEST DATE: November 23, 1992; TIME: 4:30 pm

VEH. YEAR/MAKE/MODEL/BODY STYLE: 1993 Mitsubishi Mirage 4 Door

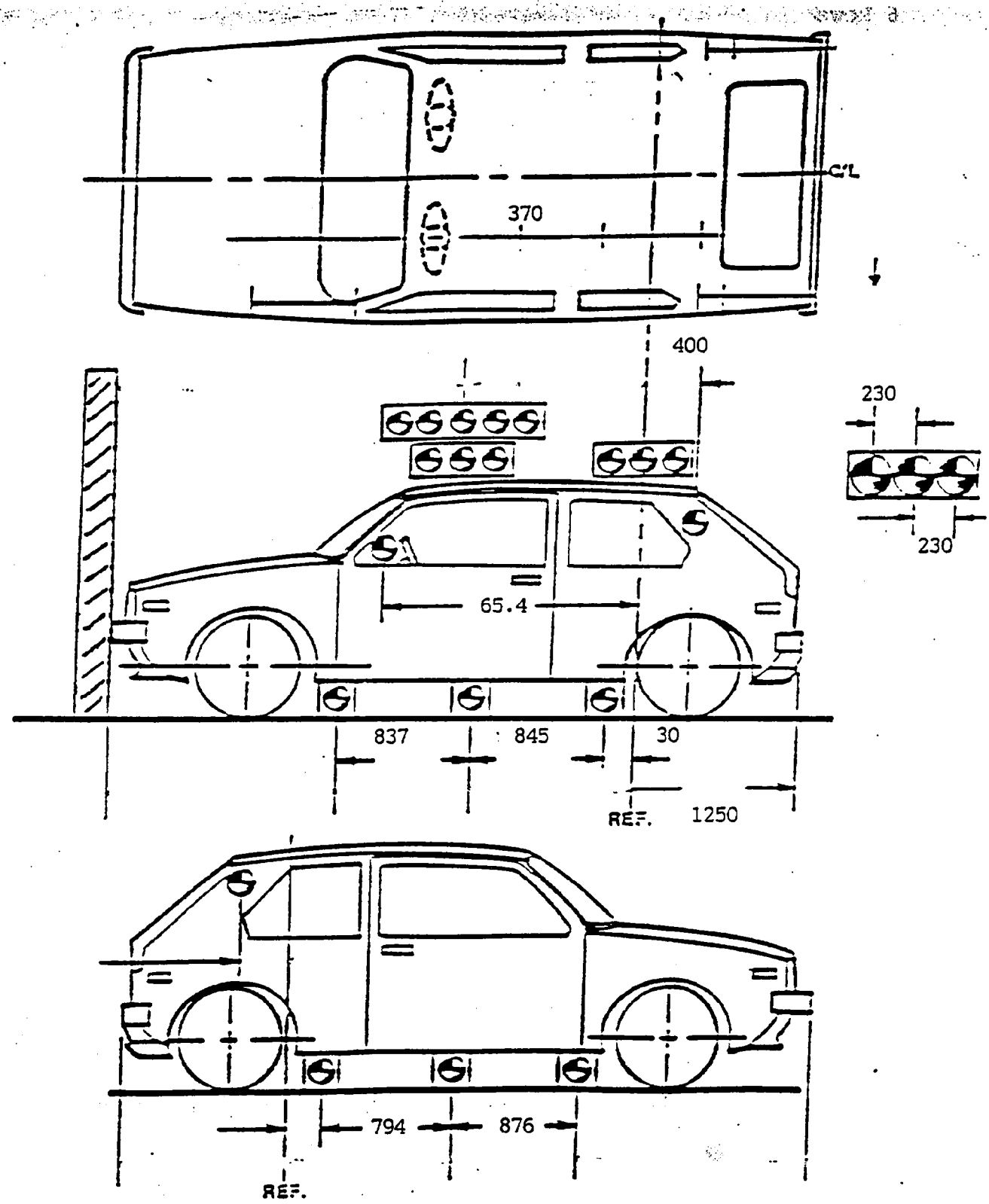
CAMERA NO.	VIEW	CAMERA POSITIONS (in.)*			ANGLE (deg)	FILM PLANE TO HEAD TARGET (in.)	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Left Side View	-	-	-	-	-	20	24
2	Right Side View	2133	7544	1143	90	7198	13	957
3	Left Side View	787	7518	1066	90	7162	25	1015
4	Overhead	900	0	4440		N/A	13	1026
5	Pit-Engine	950	0	-2650	90	N/A	13	1000
6	Pit-Fuel Tank	2540	0	-3070	90	N/A	13	N/A
7	Front-Passenger	-380	-200	2740	35	N/A	13	1015
8	Front-Driver	-380	+200	2740	35	N/A	13	1010
9	Left Side-Driver	4800	5283	1575	50°	N/A	50	1020
10	Right Side-Passenger	5309	4902	1676	50°	N/A	50	1015
11	Right Side-"A" Post	1346	5766	1016	90	5410	35	996
12	Left Side-"A" Post	1397	5994	1041	90	5638	35	866
13	Onboard-Left Side	-	-	-	-	-	13	1005
14	Onboard-Right Side	-	-	-	-	-	13	816
15	Left Side-Steering Col.	1930	7188	1524	90	6832	25	1015
16	Left Side-Steering Col.	1930	7188	1016	90	6832	25	823
17	Right Side-Passenger	939	4749	1143	90	4403	13	667

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

CAMERA REQUIREMENTS FOR 35 MPH FRONTAL BARRIER IMPACT ASSESSMENT PROGRAM TEST



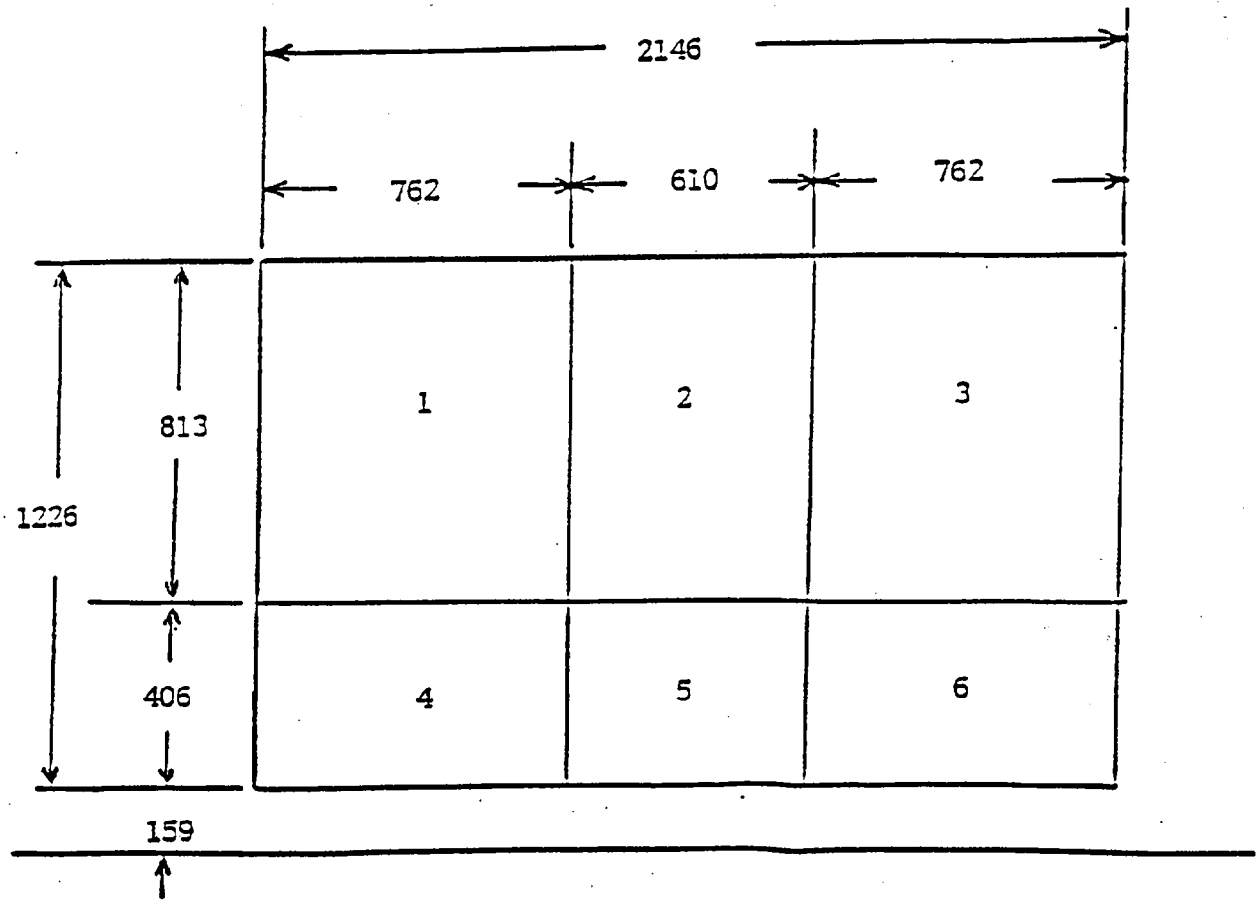
VEHICLE TARGET LOCATIONS



(DIMENSIONS IN MM)

LOAD CELL LOCATIONS ON FIXED BARRIER

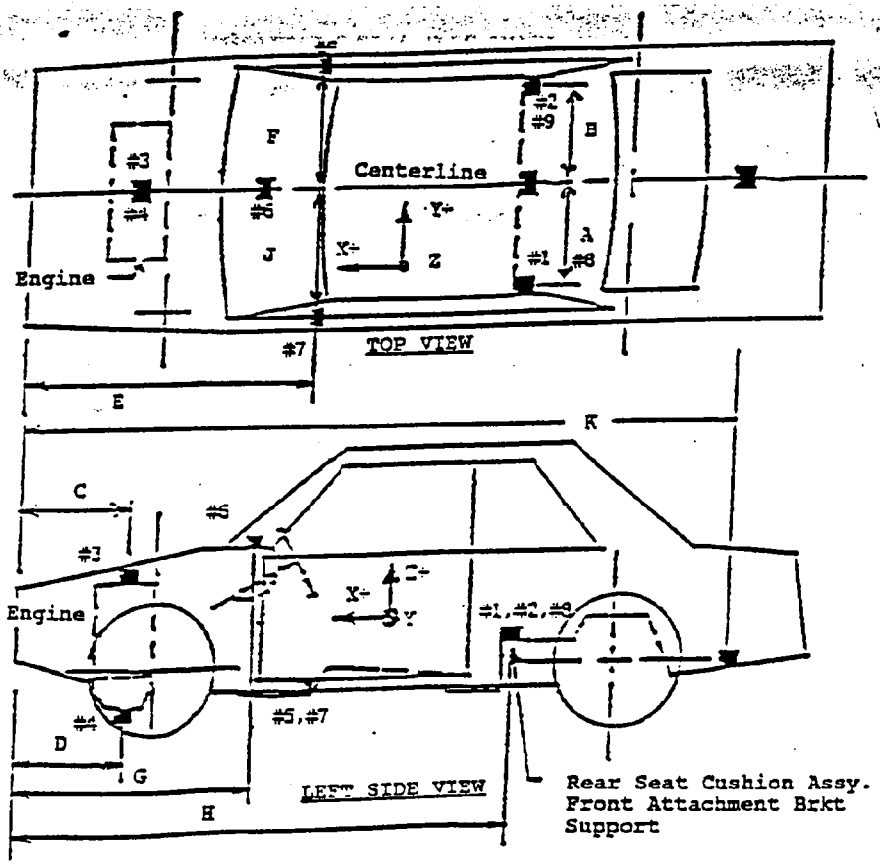
30 Load Cells
6 Rows
9 Columns
6 Groupings (5 cells/group)



The following data is presented in Appendix B:

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

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



Units: (mm)

Dimension	Length
A	530
B	550
C	925
D	900
E	1550
F	710
G	NR
H	2805
J	710

NR = Not Recorded

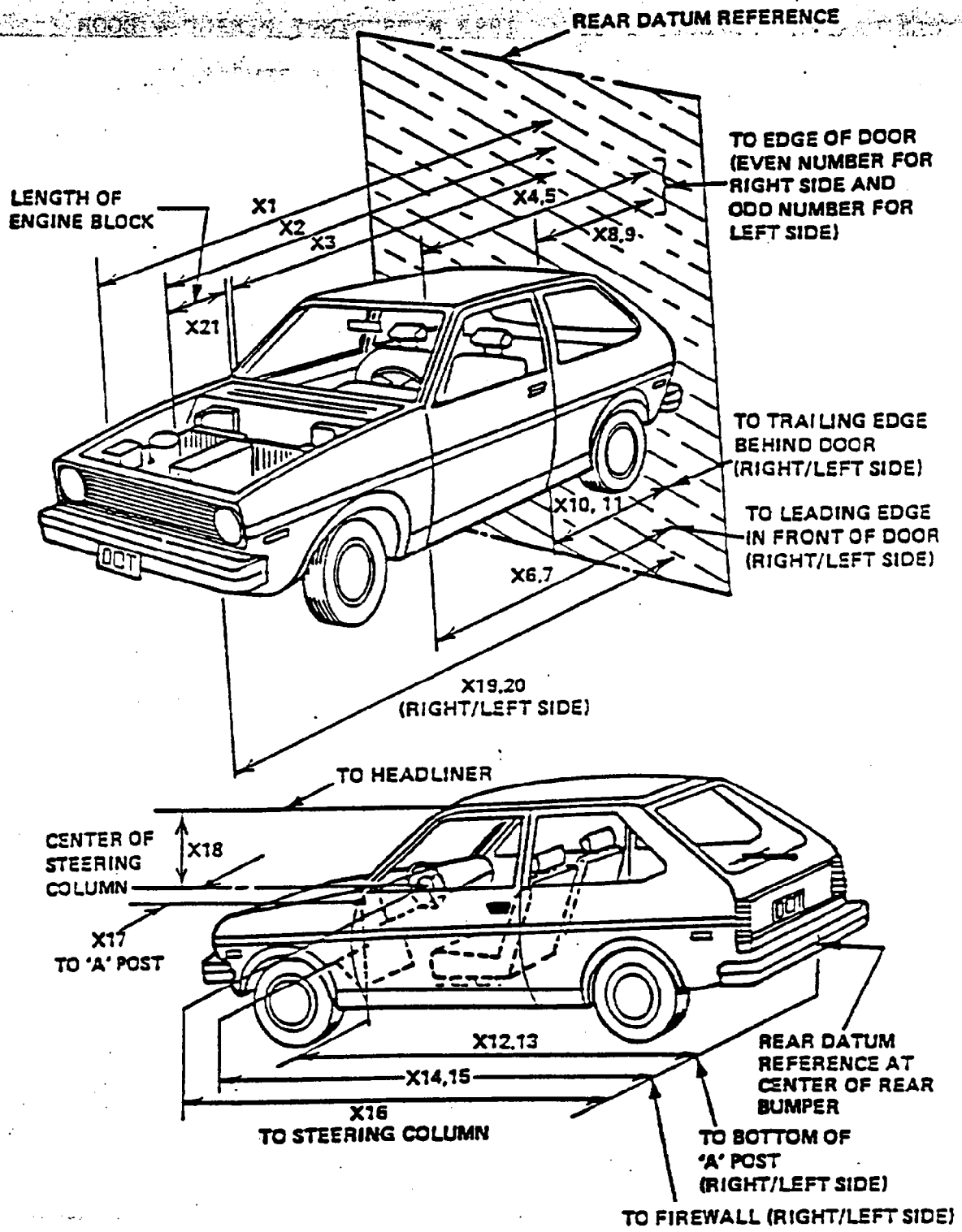
ACCELEROMETER	ACCELEROMETER LOCATION	DIRECTION
1 and 8	Left Rear Seat Crossmember	X
2 and 9	Right Rear Seat Crossmember	X
3	Top of Engine	X
4	Bottom of Engine	X
5	Right Side Brake Caliper	X
6	Instrument Panel	X
7	Left Disc Brake Caliper	X

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

TEST VEHICLE MEASUREMENTS

No.	MEASUREMENT DESCRIPTION:	Pre-Test (mm)	Post-Test (mm)	Diff. (mm)
X1	Total Length of Test Vehicle at Centerline	4280	3732	548
X2	Rear Surface of Vehicle to Front of Engine	3710	3452	258
X3	Rear Surface of Vehicle to Firewall	3190	3012	178
X4	Rear Surface to Upr. Leading Edge of Rt. Door	2910	2897	13
X5	Rear Surface to Upr. Leading Edge of Left Door	2919	2919	0
X6	Rear Surface to Lwr. Leading Edge of Rt. Door	2910	2878	32
X7	Rear Surface to Lwr. Leading Edge of Left Door	2914	2904	10
X8	Rear Surface to Upr. Trailing Edge of Rt. Door	1850	1828	22
X9	Rear Surface to Upr. Trailing Edge of Left Door	1850	1847	3
X10	Rear Surface to Lwr. Trailing Edge of Rt. Door	1845	1814	31
X11	Rear Surface to Lwr. Trailing Edge of Left Door	1850	1836	14
X12	Rear Surface to Bottom of `A' Post on Rt. Side	2910	2901	9
X13	Rear Surface to Bottom of `A' Post on Left Side	2914	2910	4
X14	Rear Surface to Firewall on Right Side	3150	3125	25
X15	Rear Surface to Firewall on Left Side	3151	3128	23
X16	Rear Surface to Steering Column	2475	2454	21
X17	Center of Steering Column to `A' Post	460	455	5
X18	Center of Steering Column to Headlining	435	435	0
X19	Rear Surface to Right Side of Front Bumper	4090	3590	500
X20	Rear Surface to Left Side of Front Bumper	4090	3610	480
X21	Length of Engine Block	405	405	0

*Refer to following page for No. locations


REAR DATUM REFERENCE
TO EDGE OF DOOR (EVEN NUMBER FOR RIGHT SIDE AND ODD NUMBER FOR LEFT SIDE)
LENGTH OF ENGINE BLOCK
X1
X2
X3
X4,5
X8,9
X21
TO TRAILING EDGE BEHIND DOOR (RIGHT/LEFT SIDE)
X10, 11
TO LEADING EDGE IN FRONT OF DOOR (RIGHT/LEFT SIDE)
X6,7
X19,20 (RIGHT/LEFT SIDE)
TO HEADLINER
CENTER OF STEERING COLUMN
X18
X17 TO 'A' POST
X12,13
X14,15
X16 TO STEERING COLUMN
REAR DATUM REFERENCE AT CENTER OF REAR BUMPER
TO BOTTOM OF 'A' POST (RIGHT/LEFT SIDE)
TO FIREWALL (RIGHT/LEFT SIDE)

ACCIDENT INVESTIGATION DIVISION DATA

FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: 1993 MITSUBISHI MIRAGE 4 DOOR

VEH. NHTSA NO.: MP5600 ; VIN: JA3CA26A7PU008023

MODEL YEAR: 1993 ; BUILD DATE: 6/92 ; TEST DATE: 11/23/93

VEH. SIZE CATEGORY: COMPACT ; TEST WEIGHT: 1146.7 kg.

VEH. WHEELBASE: 2463 mm ; FRONT OVERHANG: 650 mm ; OVERALL WIDTH: 1415 mm

ACCELEROMETER DATA:

LOCATION: As per measurements on pages 4-13

CALIBRATION PROCEDURE: As per MGA Calibration Procedure

LINEARITY: >99.9% ; INTEGRATION ALGORITHM: Trapezoidal

VEH: IMPACT SPEED: 55.6 ; TIME OF SEPARATION: 80 msec

VELOCITY CHANGE: 64.4 kph

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:

F (Frontal)

CRUSH DEPTH DIMENSIONS:

C1 = 480 mm

C2 = 578 mm

C3 = 633 mm

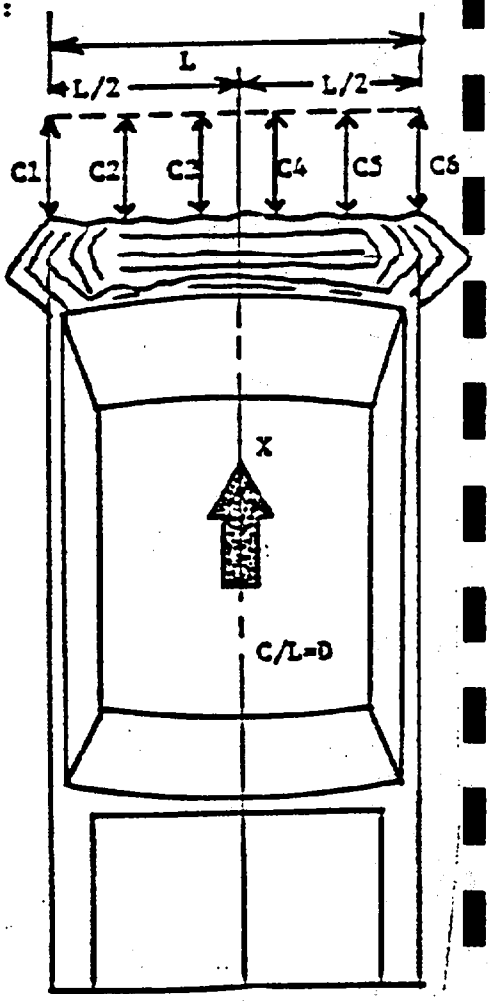
C4 = 633 mm

C5 = 578 mm

C6 = 500 mm

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

LENGTH OF DAMAGED REGION: L = 1415 mm



APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (Cont'd)

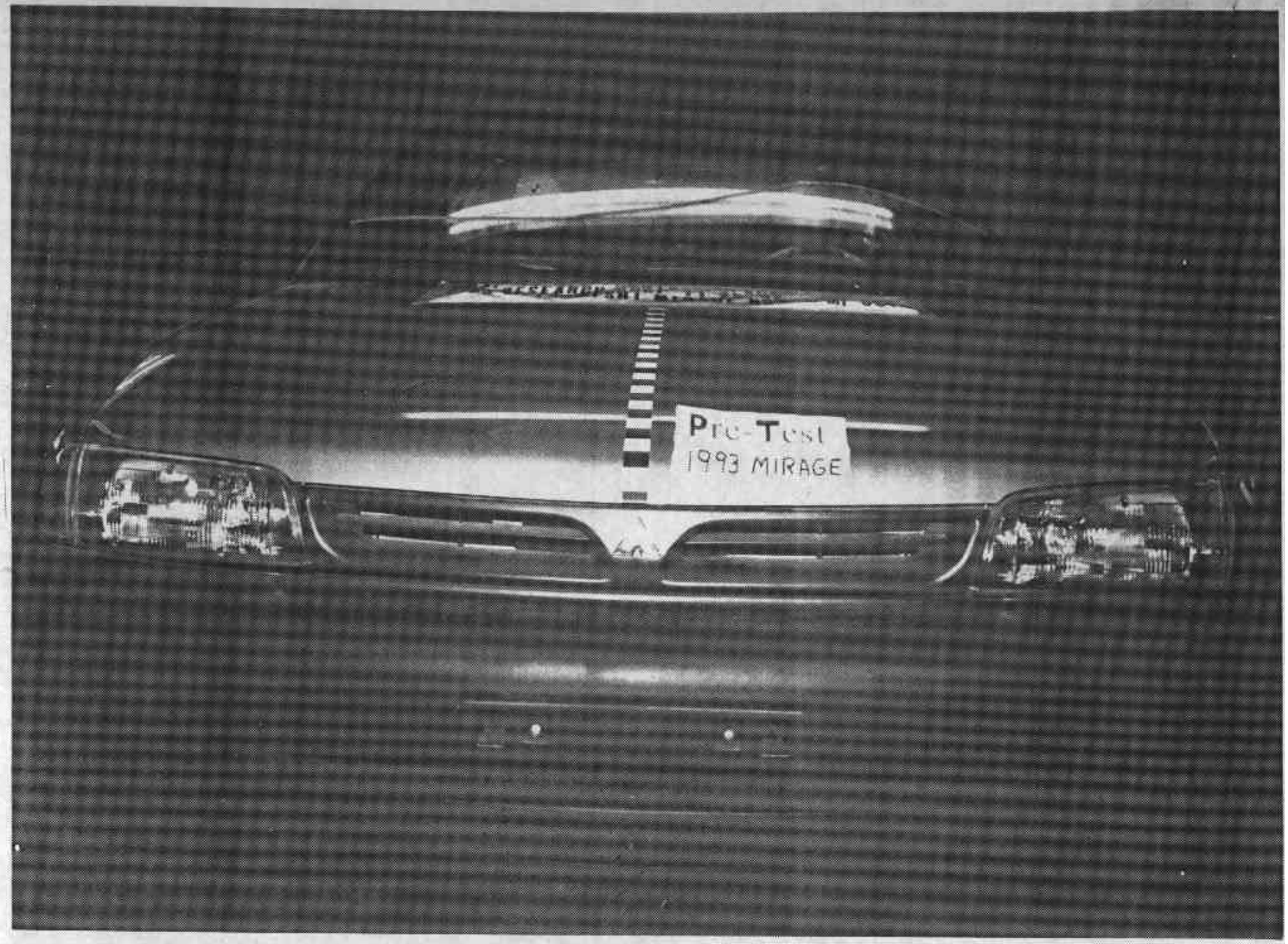


Photo No. 1 - Pre-Test Front View

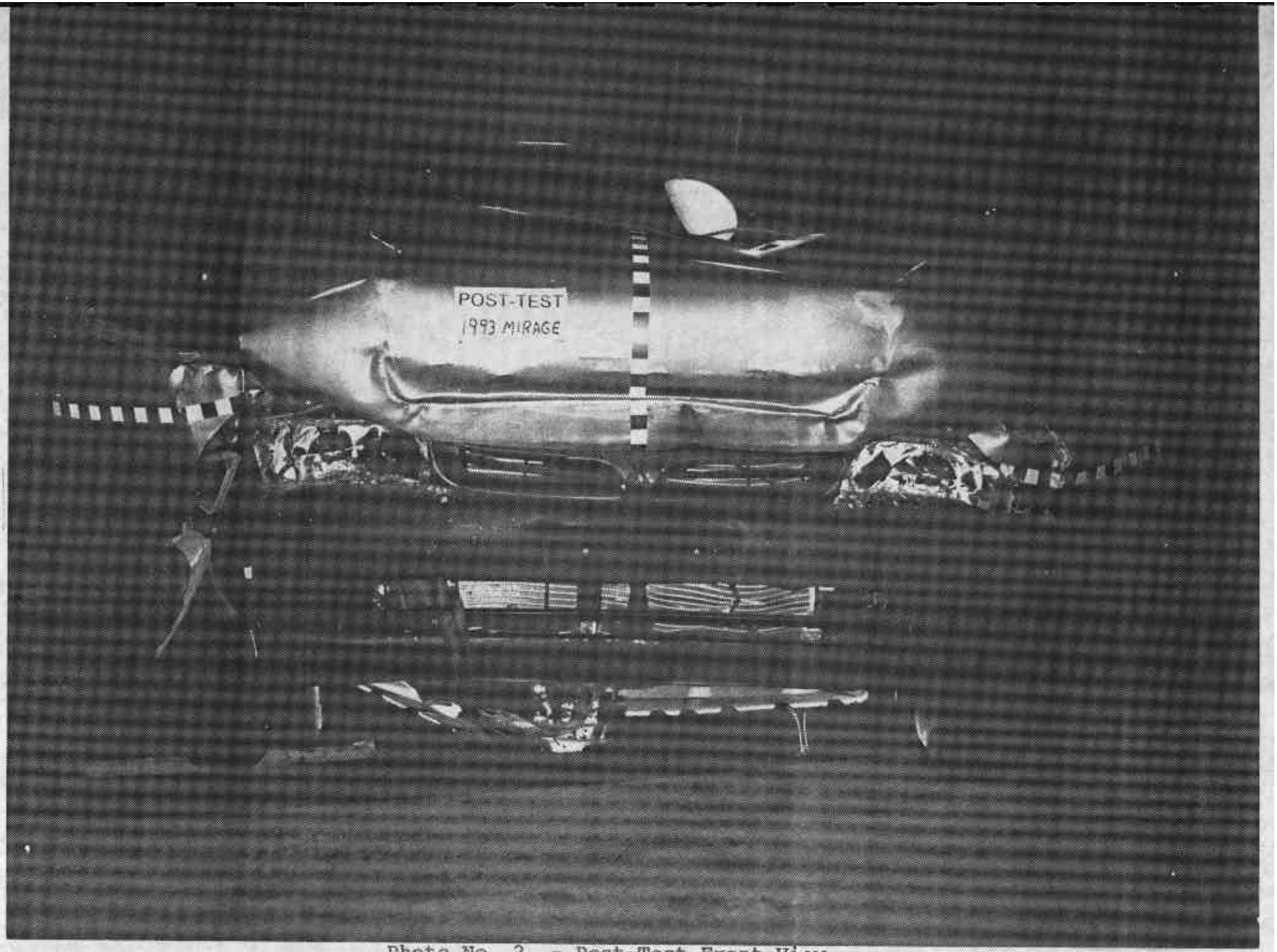


Photo No. 2 - Post-Test Front View

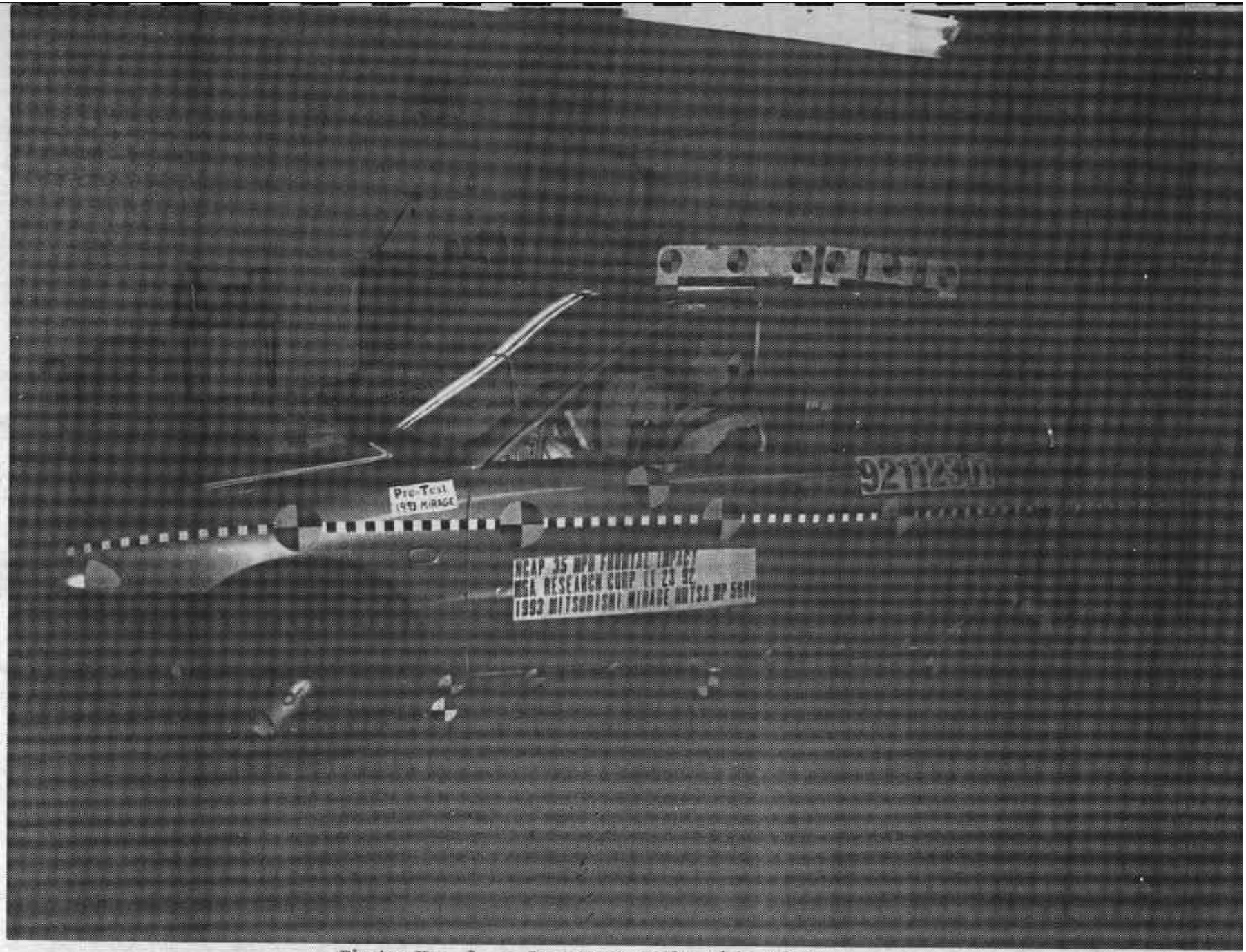


Photo No. 3 - Pre-Test Left Side View

Photo No. 4 - Post-Test Left Side View

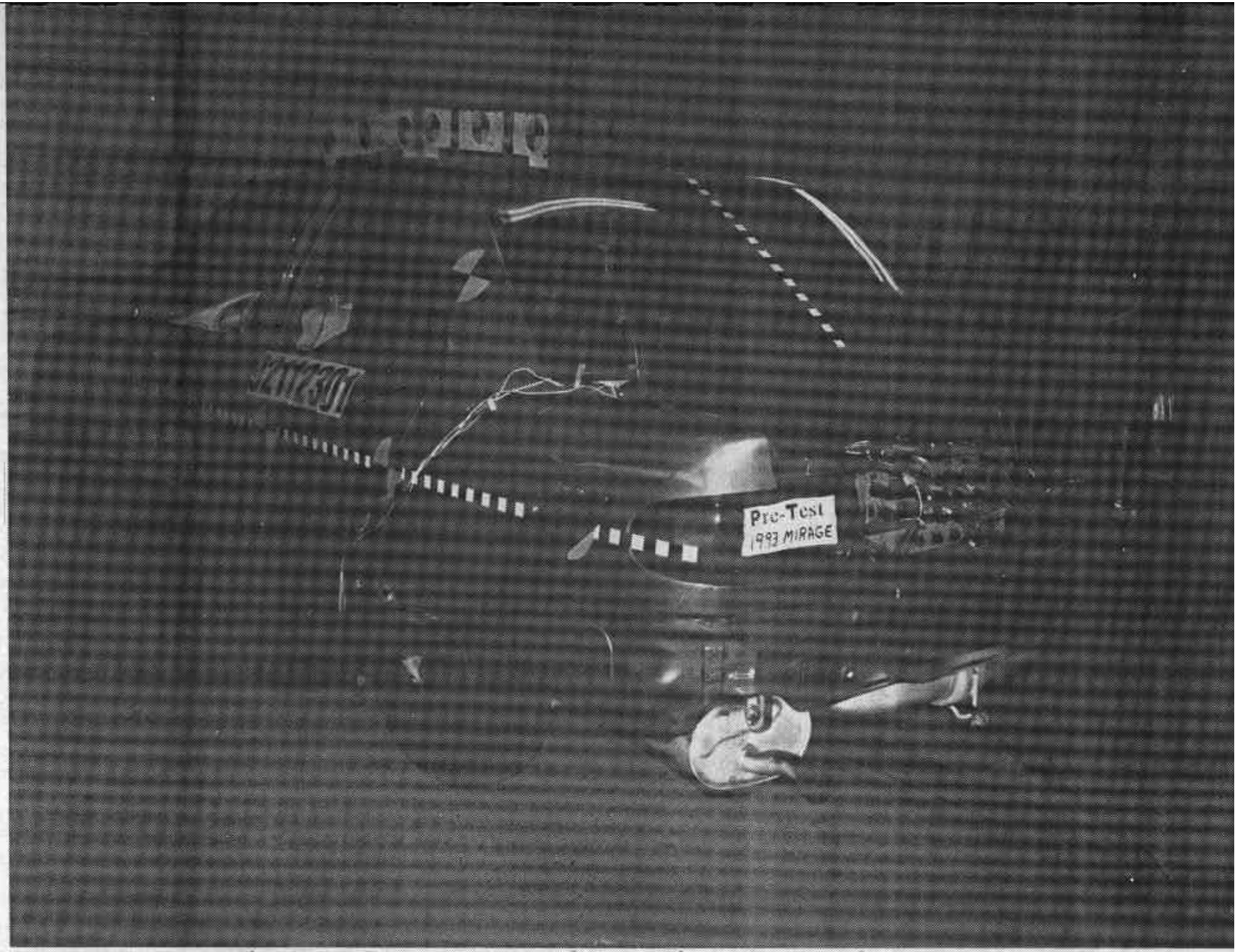


Photo No. 5 - Pre-Test Left Rear Three-Quarter View

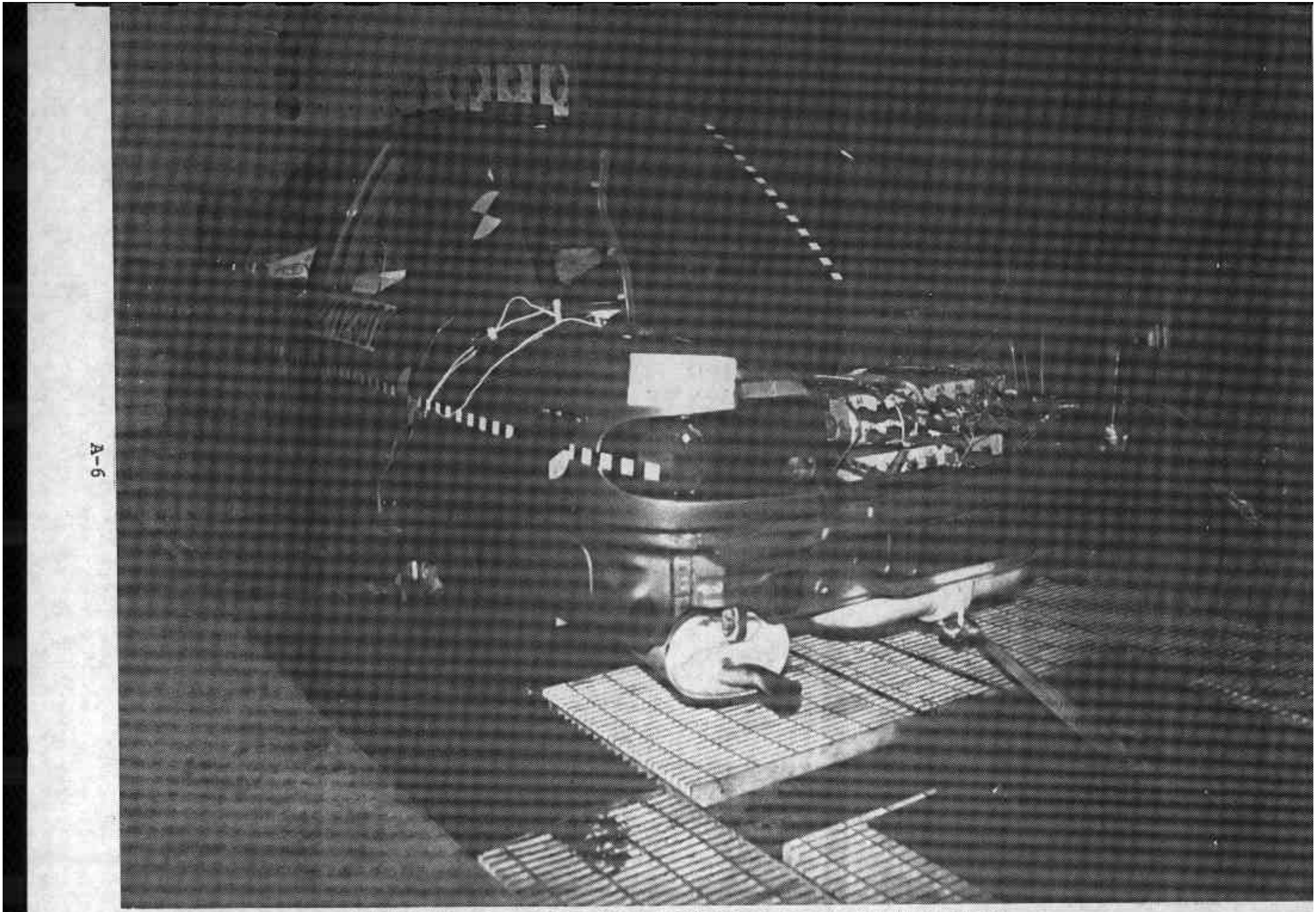


Photo No. 6 - Post-Test Left Rear Three-Quarter View

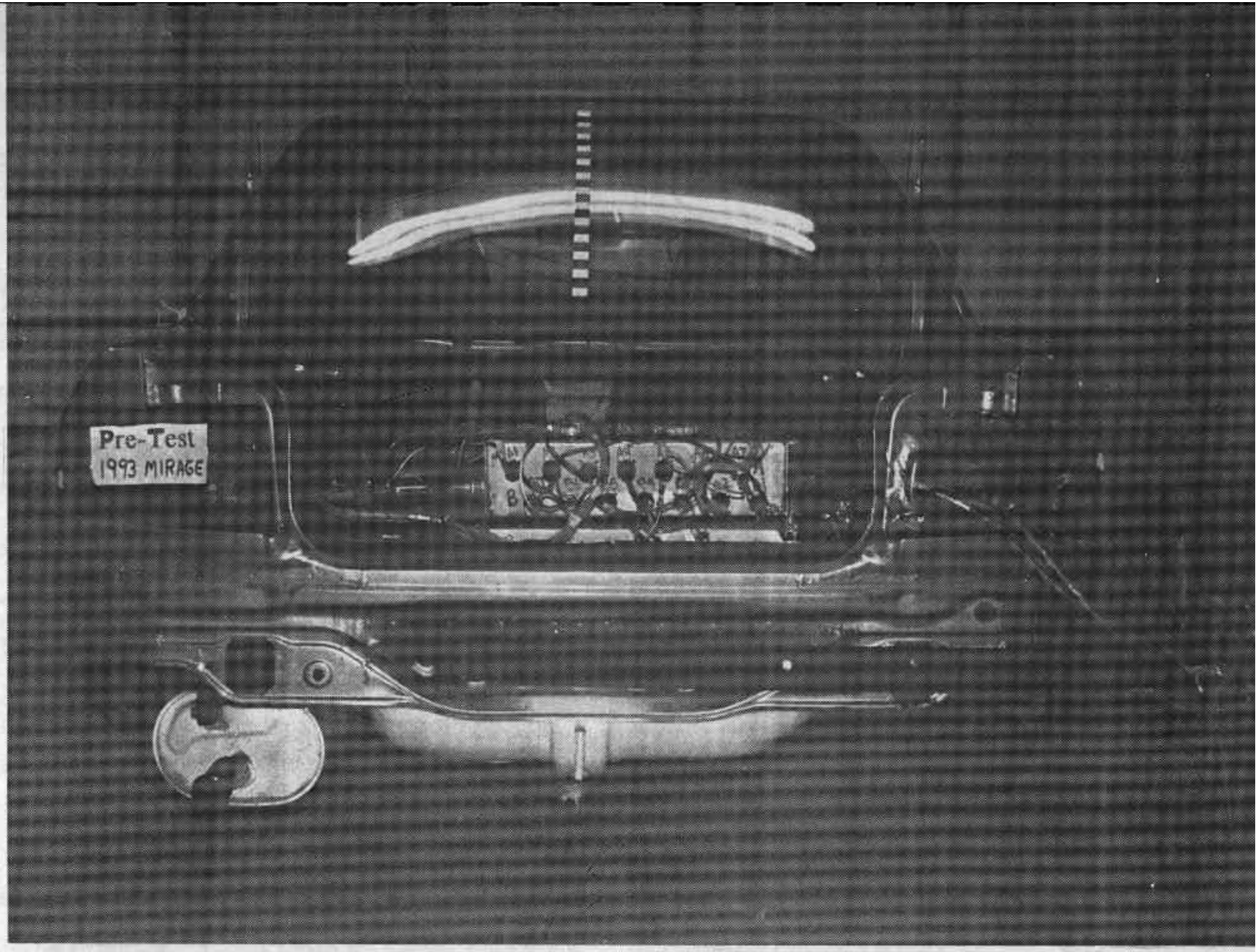


Photo No. 7 - Pre-Test Rear View

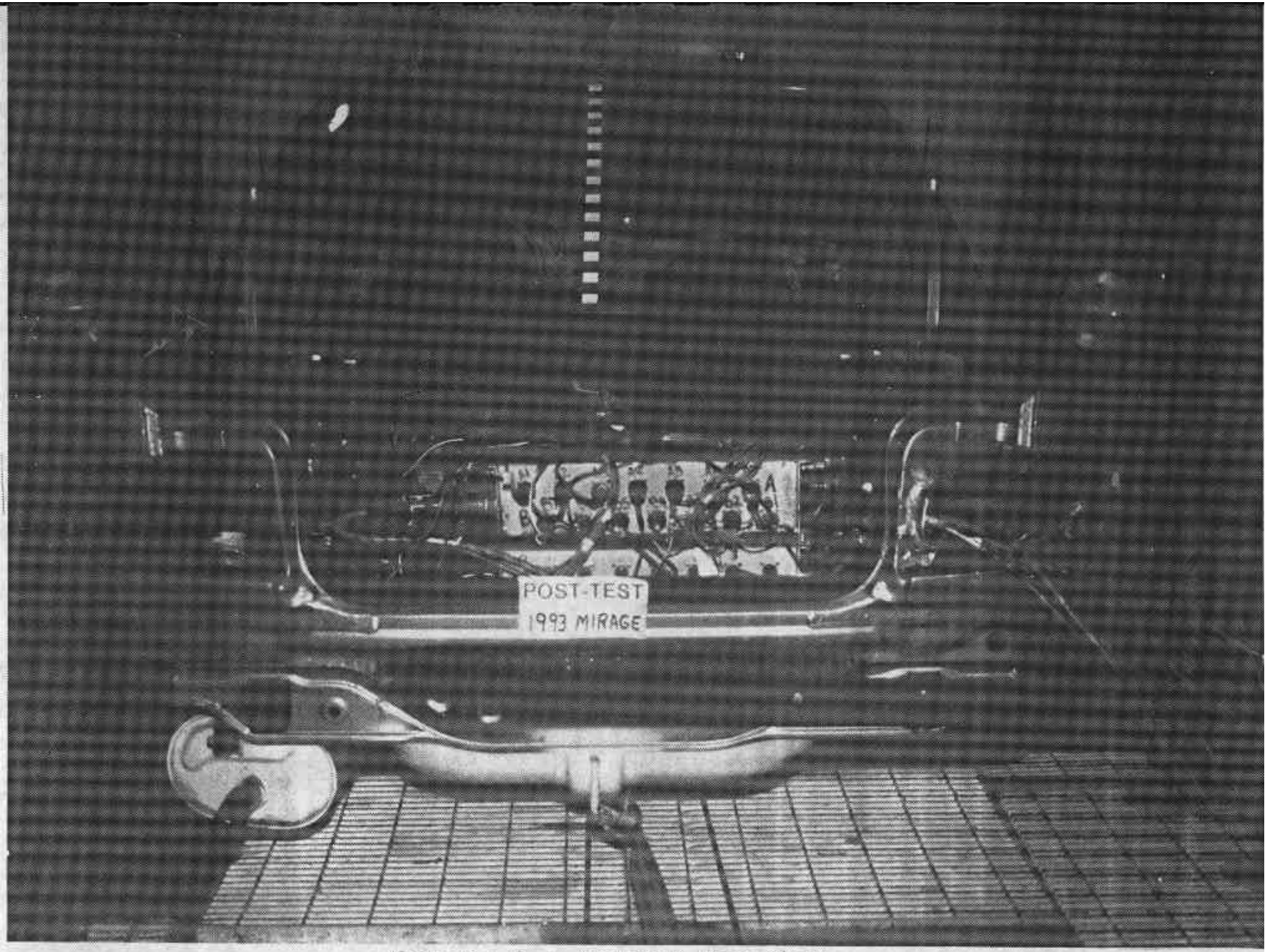


Photo No. 8 - Post-Test Rear View

Photo No. 9 - Pre-Test Right Side View

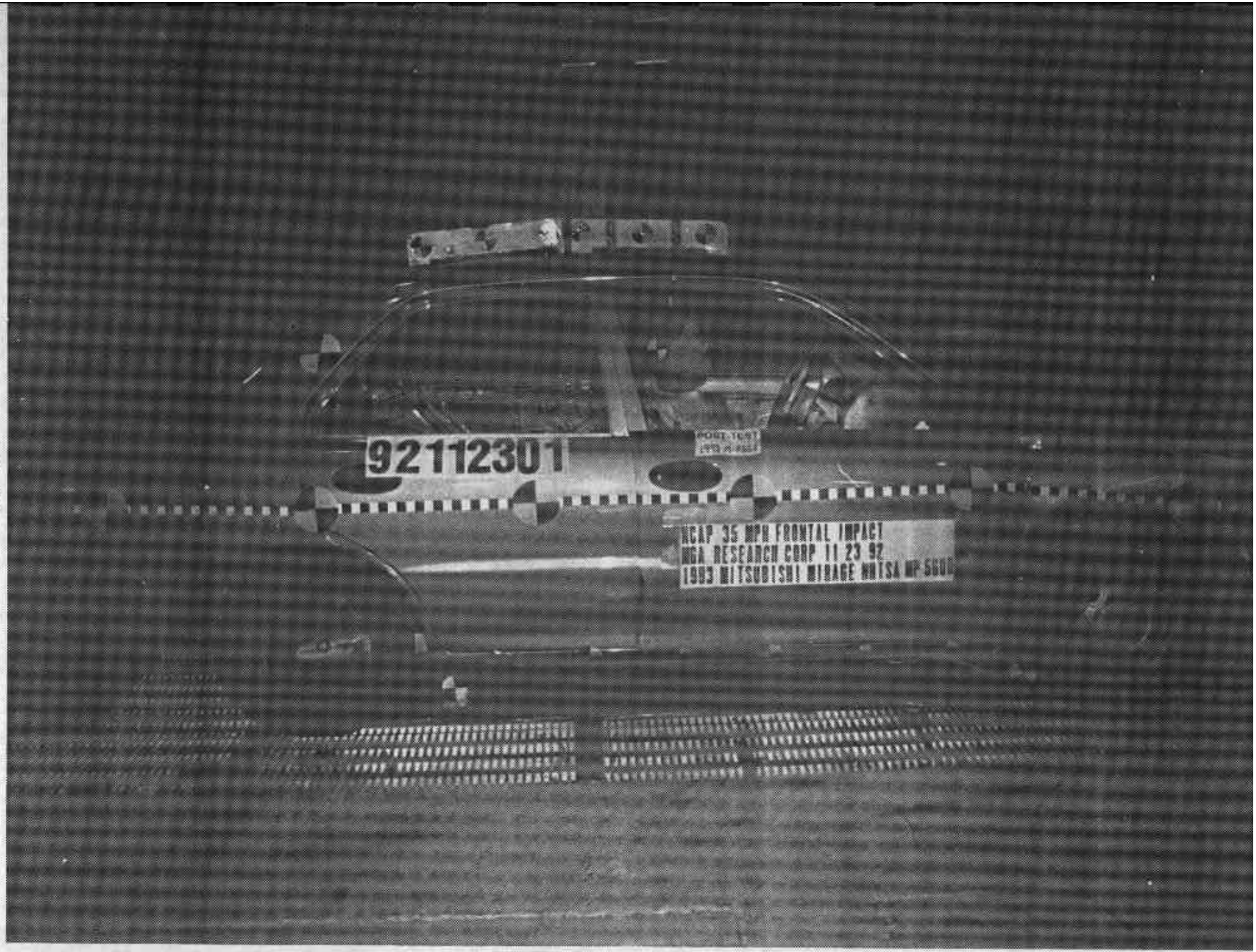


Photo No. 10 - Post-Test Right Side View

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

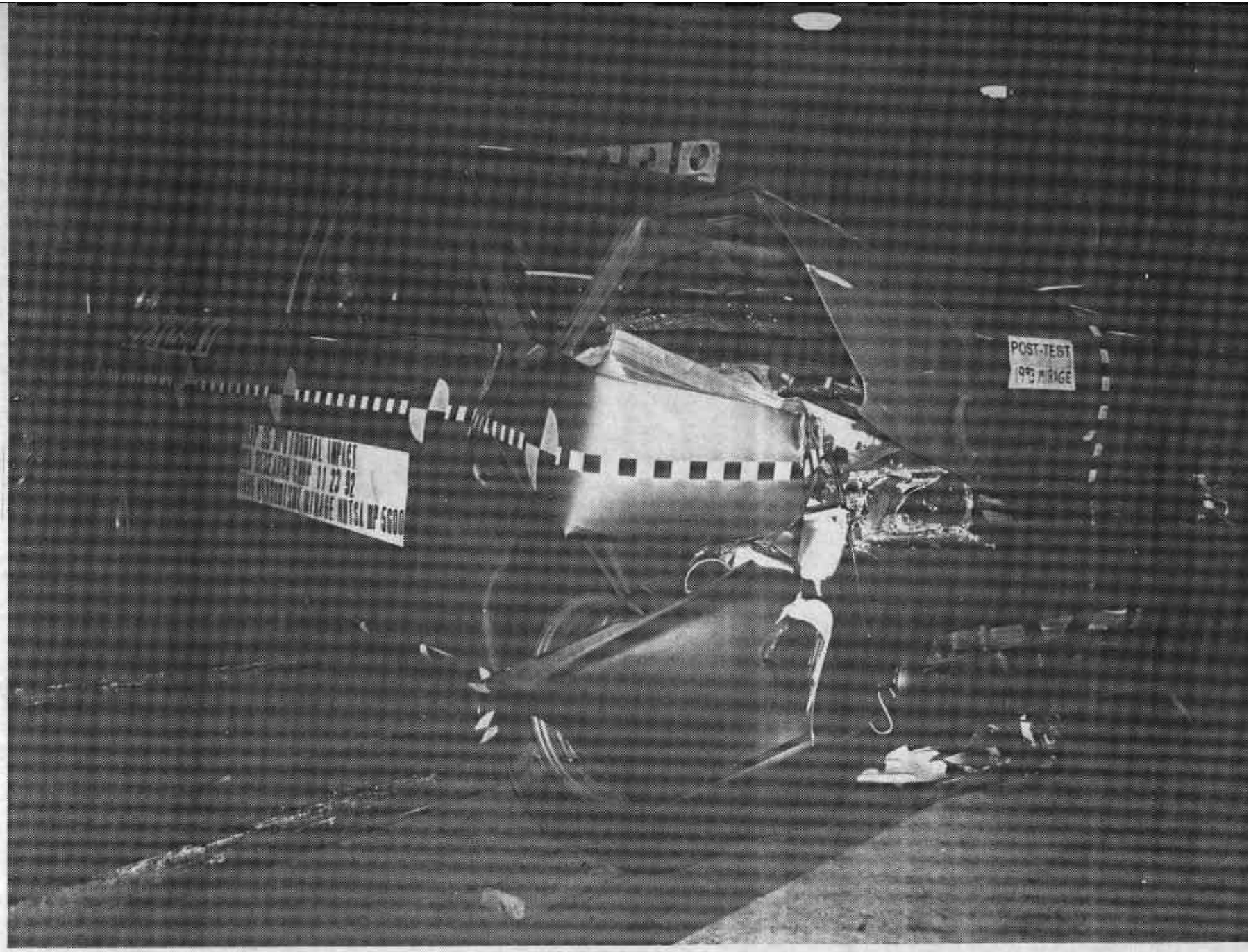


Photo No. 12 - Post-Test Right Front Three-Quarter View

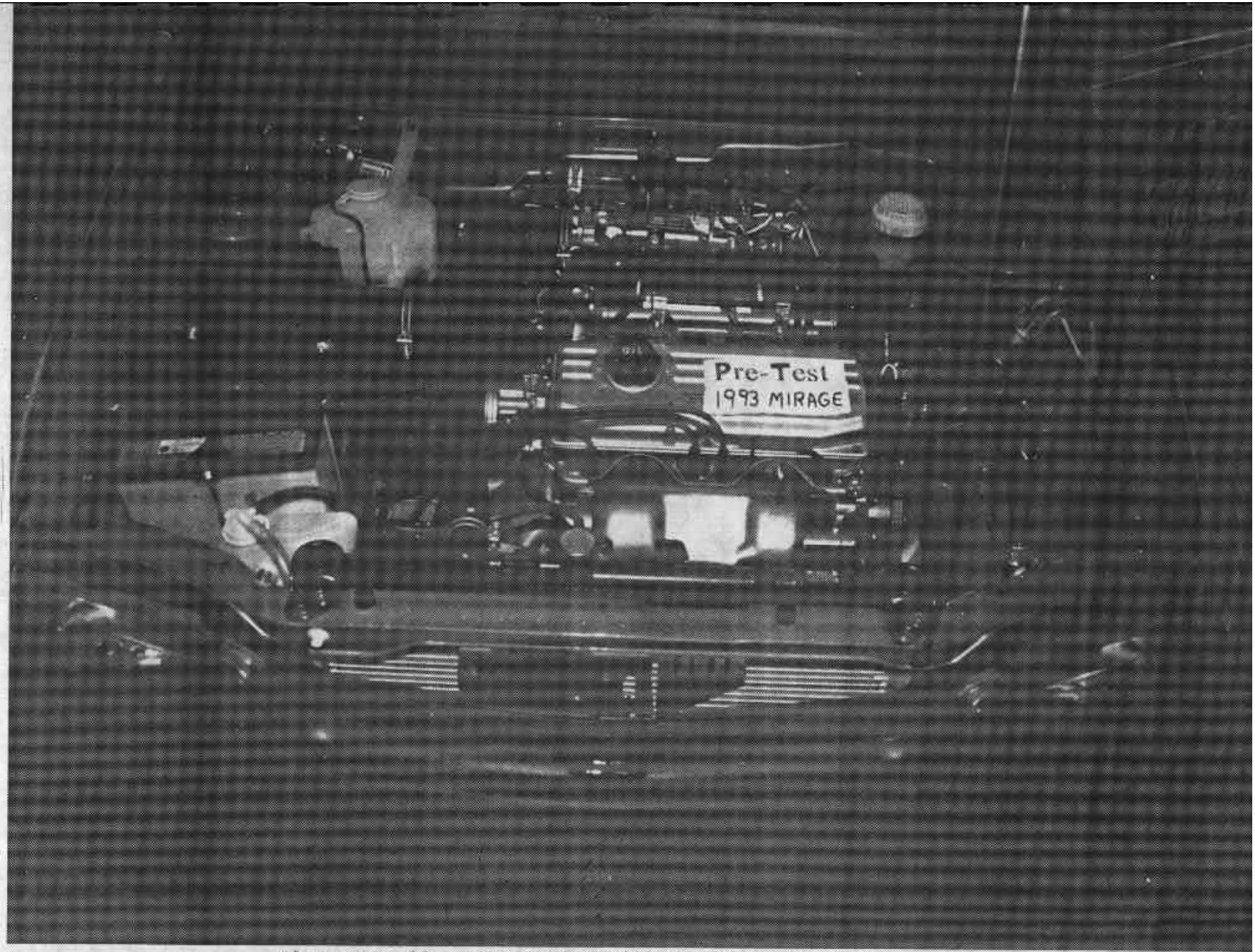


Photo No. 13 - Pre-Test Engine Compartment View

Photo No. 14 - Post-Test Engine Compartment View

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

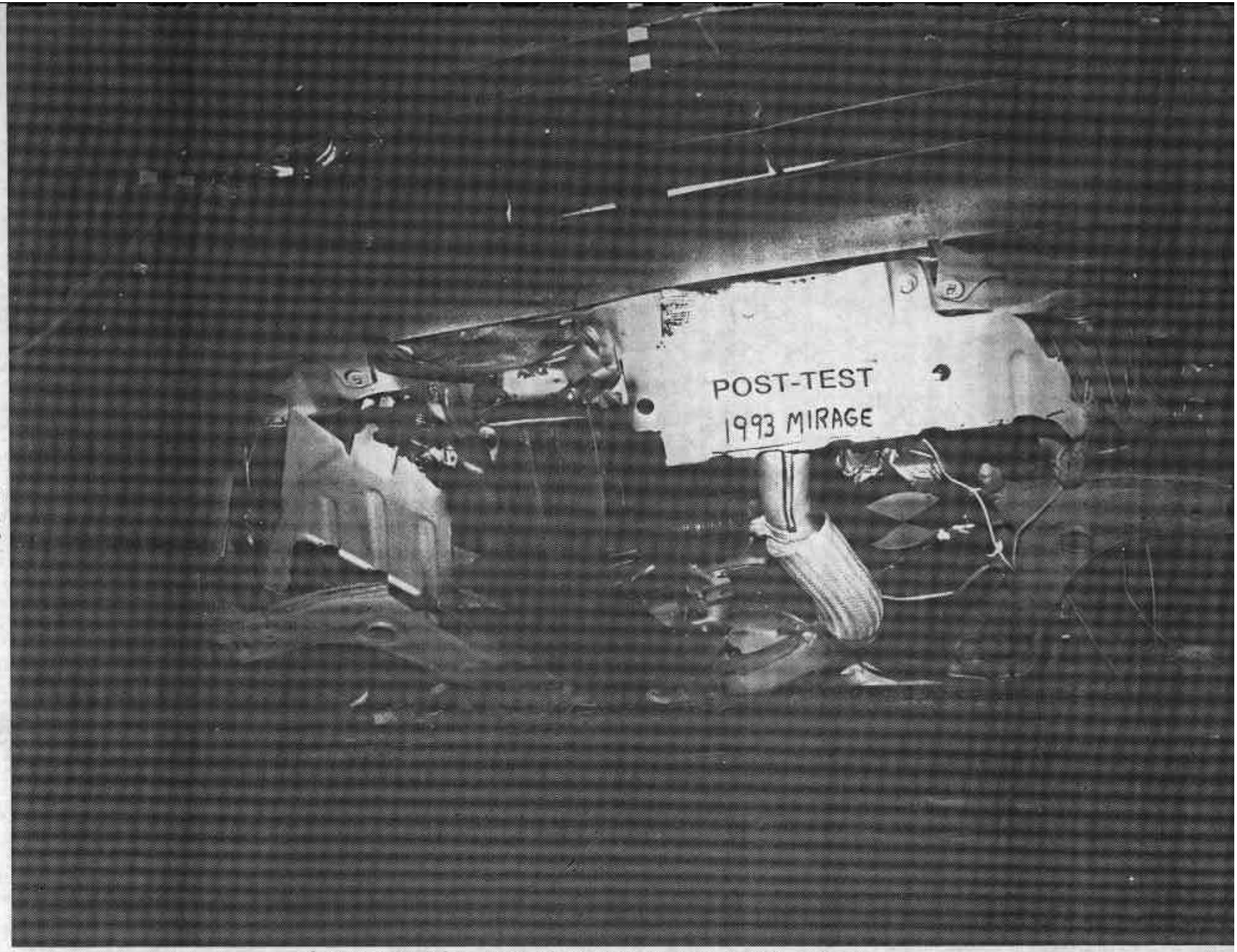


Photo No. 16 - Pre-Test Front Underbody View

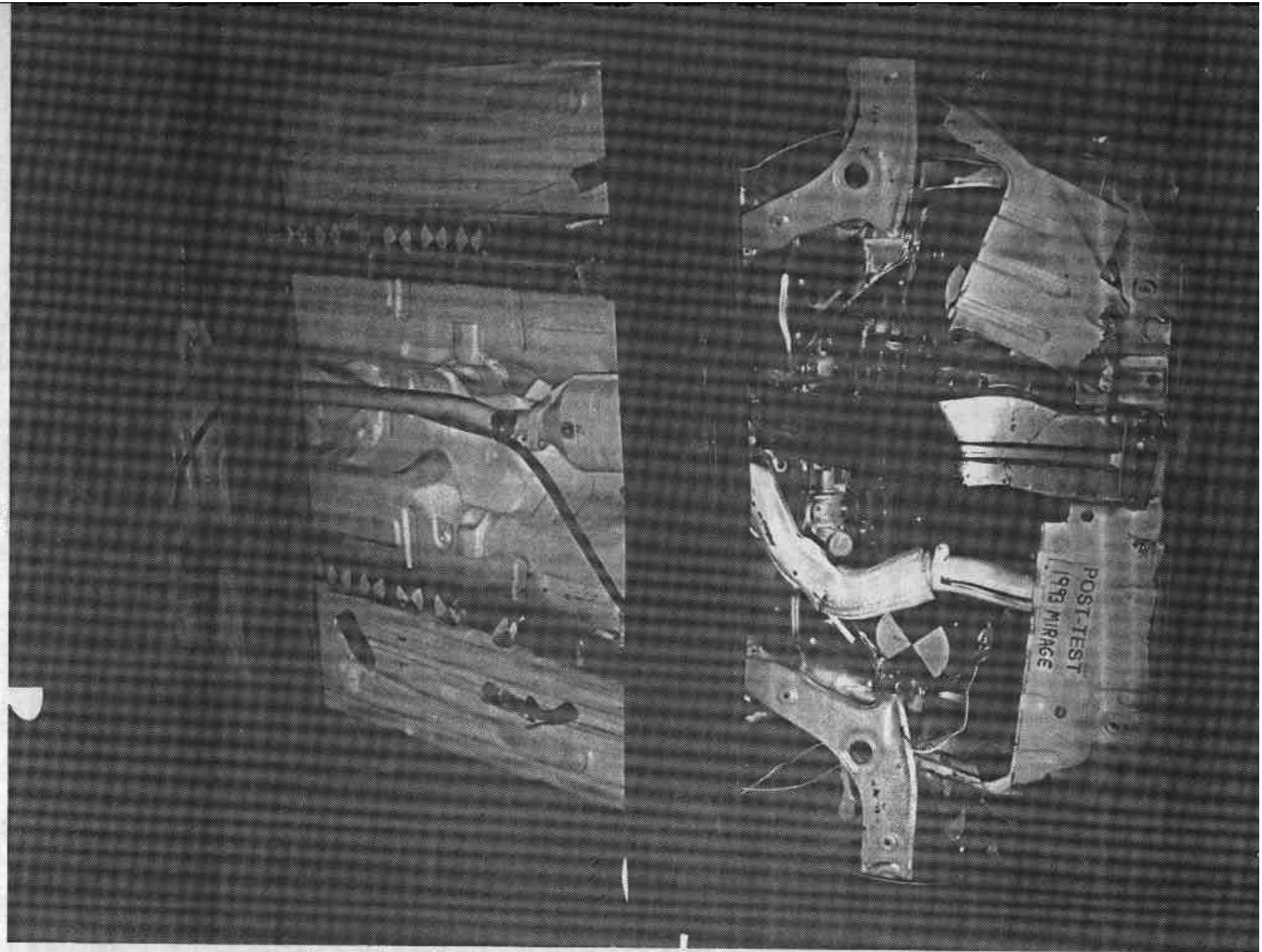


Photo No. 17 - Post-Test Center Underbody View

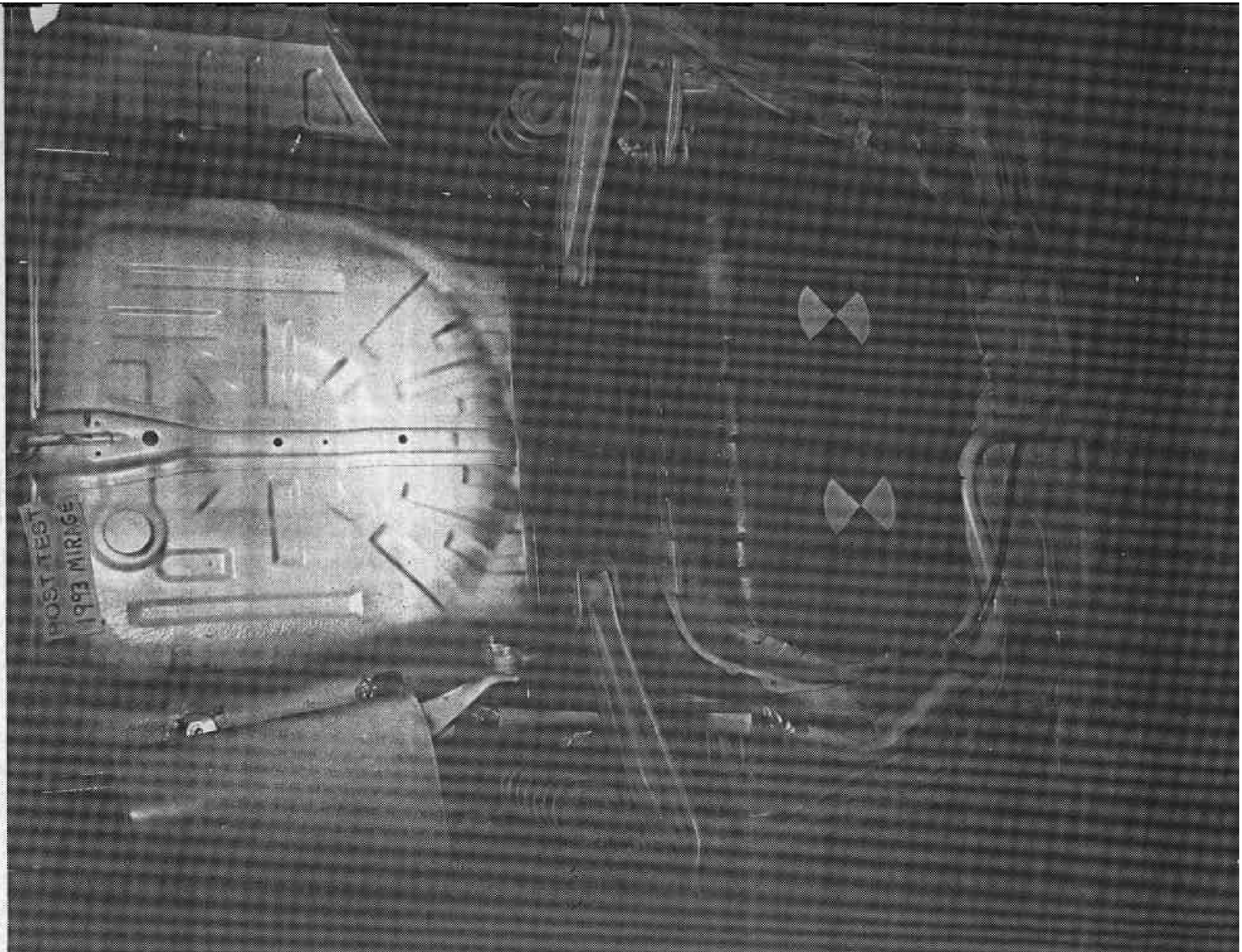


Photo No. 18 - Post-Test Rear Underbody View

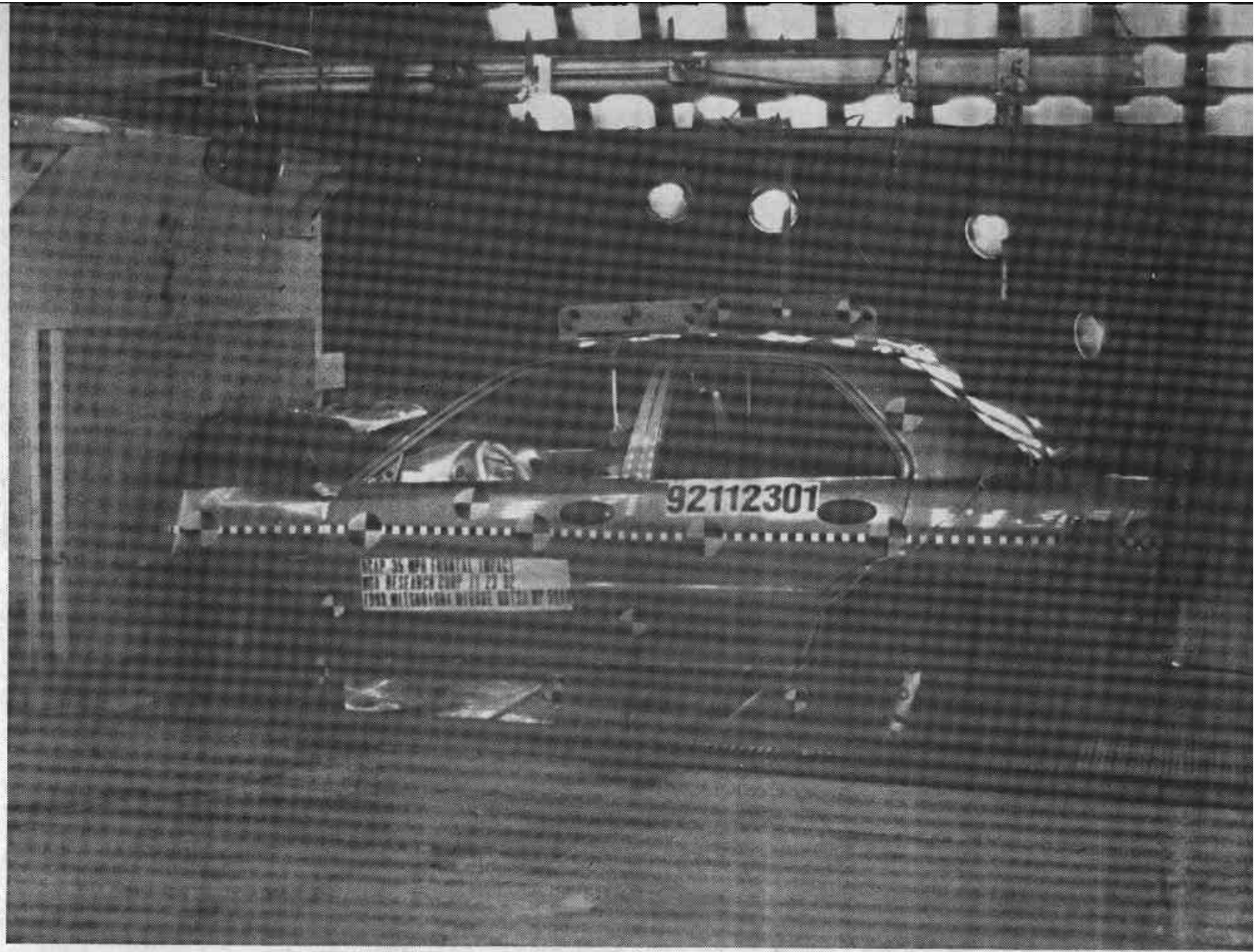


Photo No. 19 - Vehicle Impact

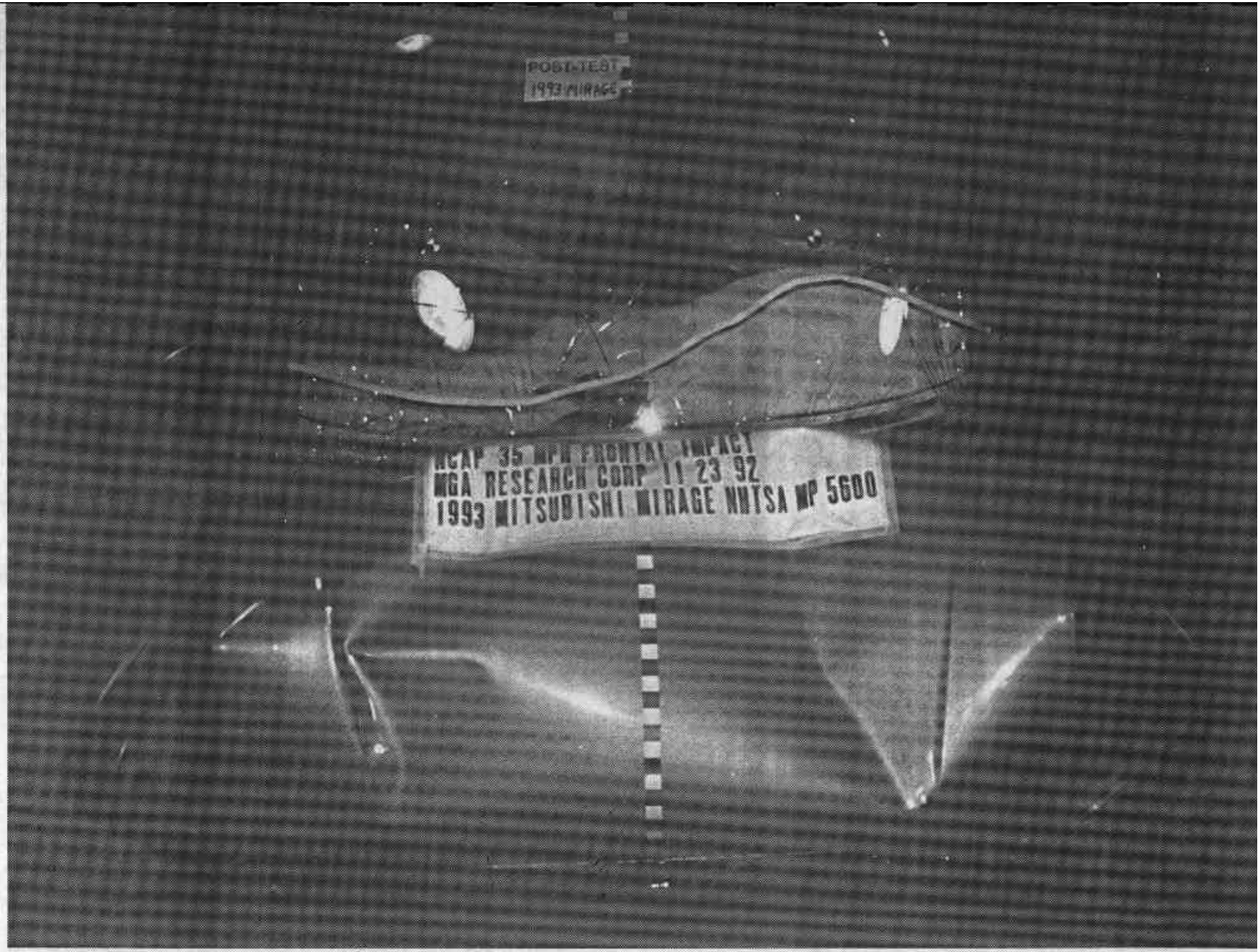


Photo No. 20 - Post-Test Front Top View

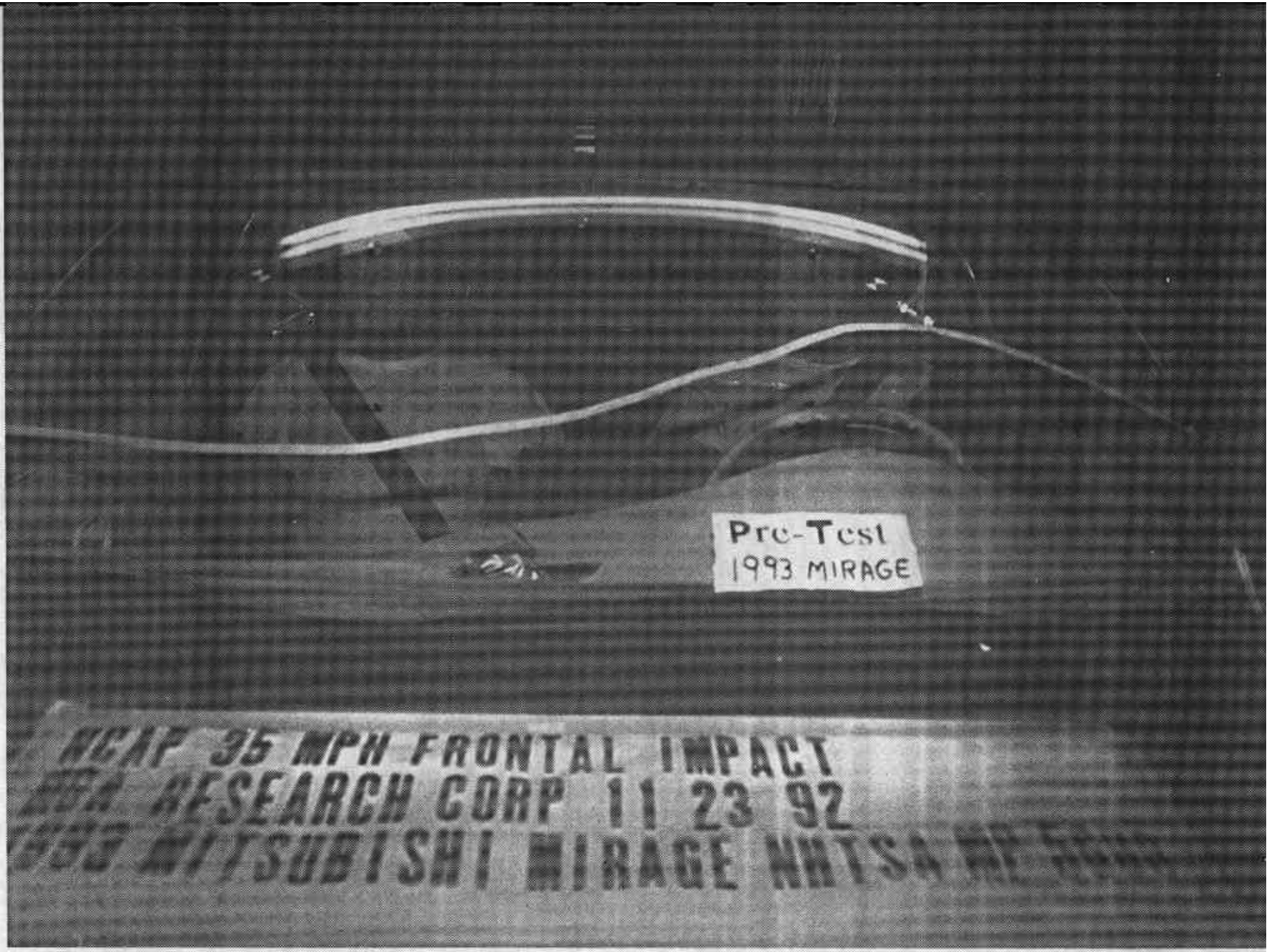


Photo No. 21 - Pre-Test Windshield View

Photo No. 22 - Post-Test Windshield View

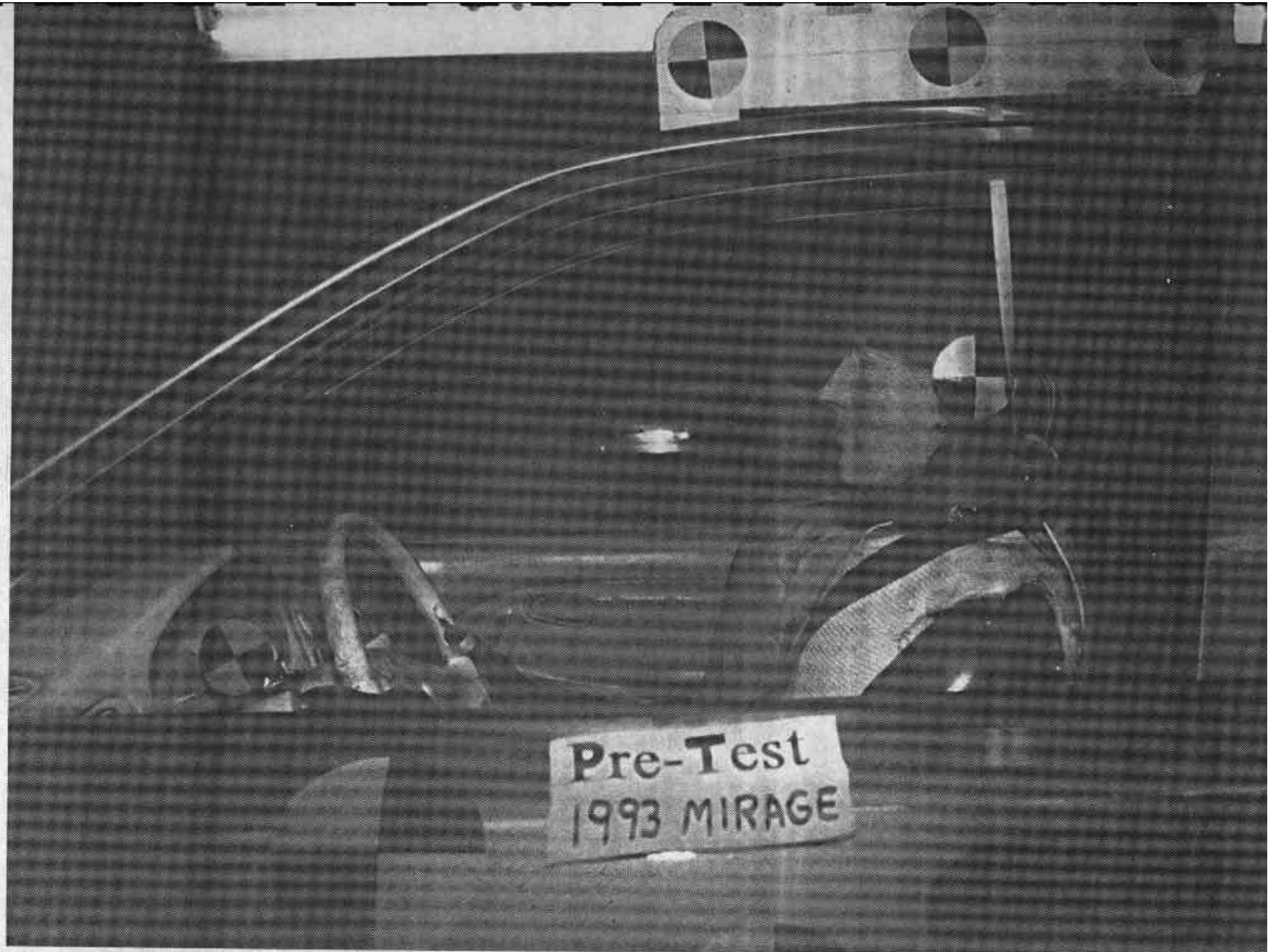


Photo No. 23 - Pre-Test Driver Dummy Position View

Photo No. 24 - Post-Test Driver Dummy Position View

Photo No. 25 - Pre-Test Driver Dummy Three-Quarter View

Photo No. 26 - Post-Test Driver Dummy Three-Quarter View

Photo No. 27 - Pre-Test Driver Dummy Position View
(Door Open)

Photo No. 28 - Post-Test Driver Dummy Postion View
(Door Open)

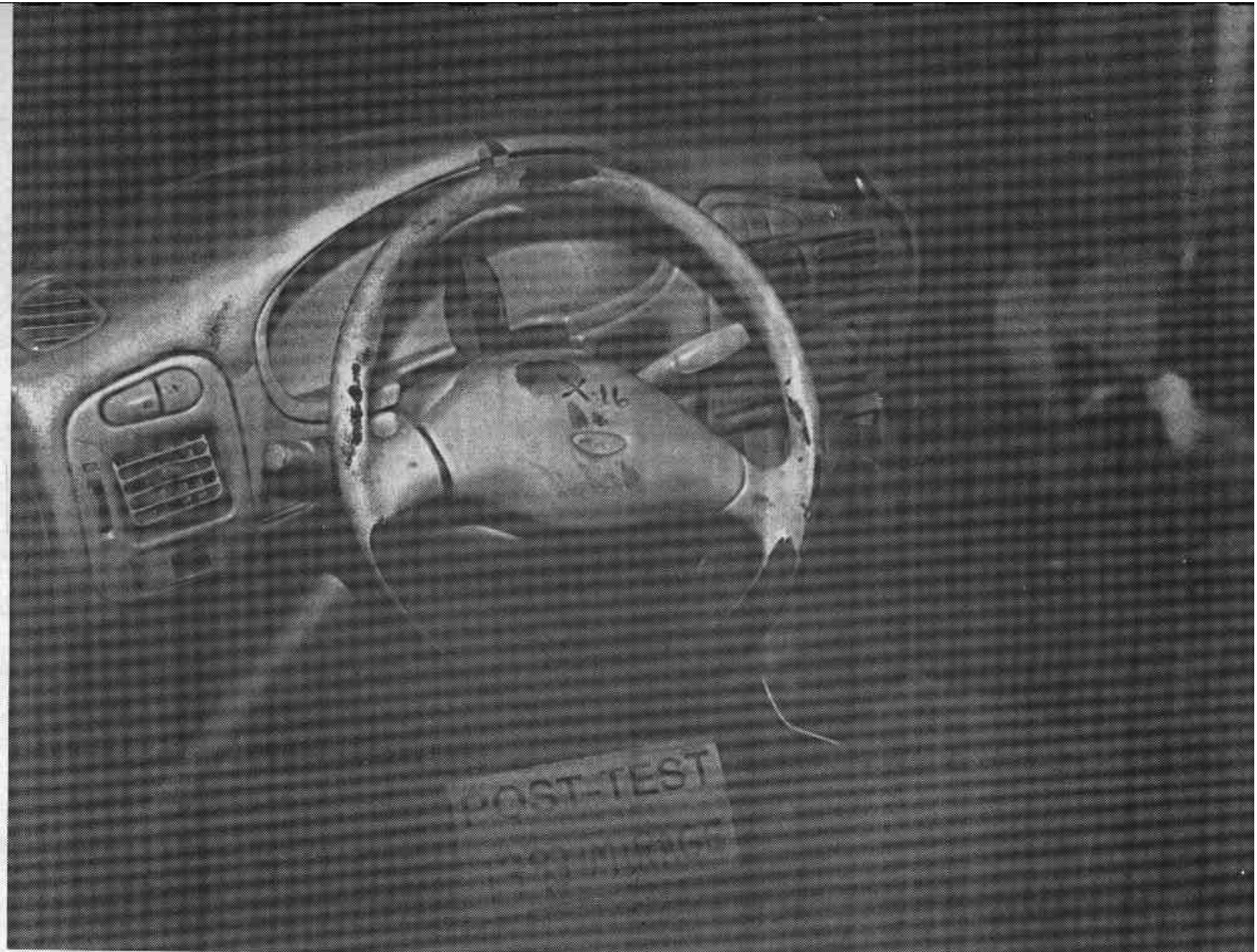


Photo No. 29 - Post-Test Steering Wheel Impact

Photo No. 30 - Post-Test Head Impact

Photo No. 31 - Pre-Test Driver Seat Postion View

Photo No. 32 - Post-Test Driver Seat Postion View

Photo No. 33 - Post-Test Rear Dummy Position View

Photo No. 34 - Pre-Test Passenger Dummy Position View

Photo No. 35 - Post-Test Passenger Dummy Position View

Photo No. 36 - Pre-Test Passenger Dummy Position View
(Door Open)

Photo No. 37 - Post-Test Passenger Dummy Position View
(Door Open)

Photo No. 38 - Post-Test Passenger Dummy Rear Head View

Photo No. 39 - Post-Test Passenger Dummy Knee Contact Area

Photo No. 40 - Post-Test Passenger Dummy Head Contact

Photo No. 41 - Pre-Test Passenger Seat Position View

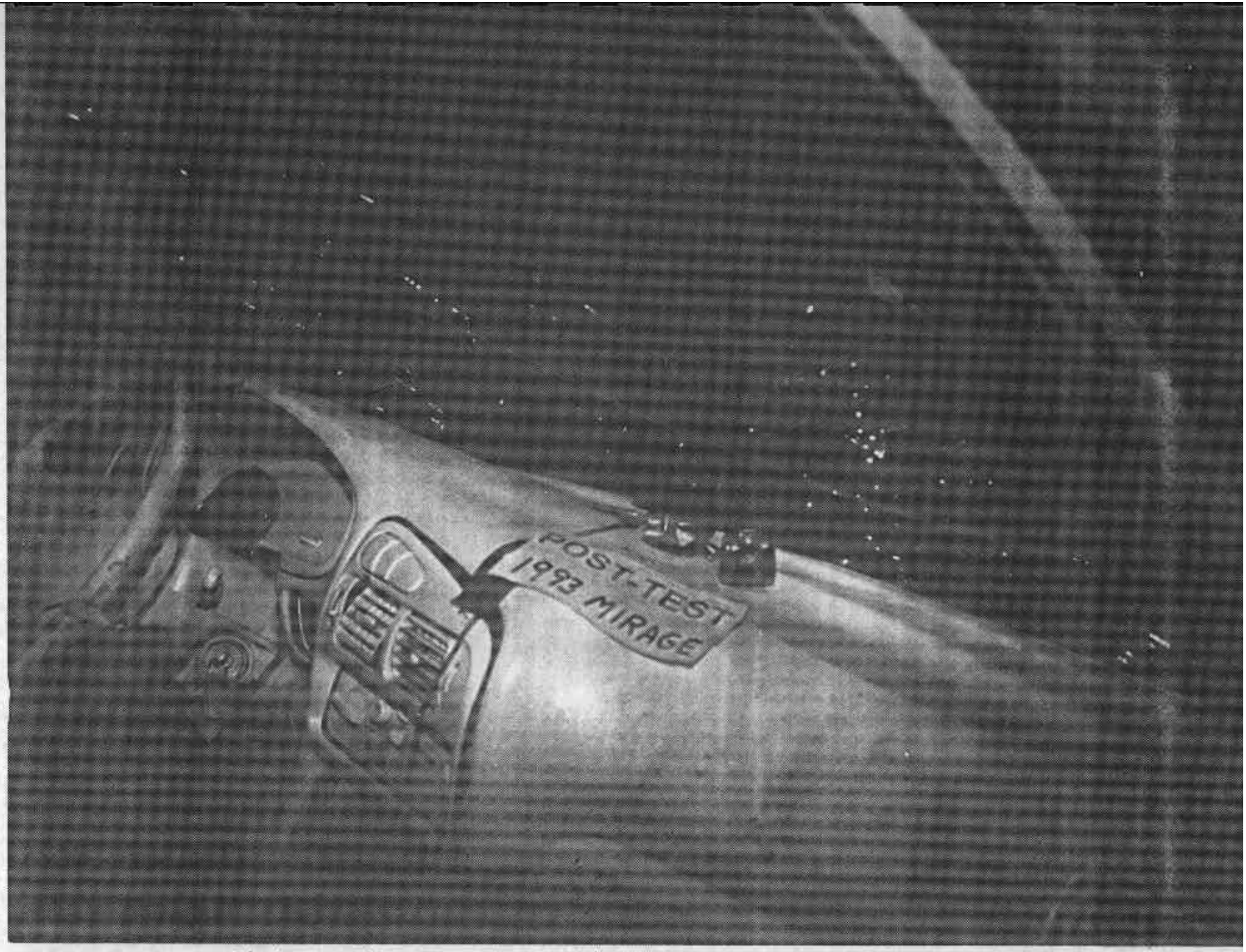


Photo No. 42 - Post-Test Vehicle Instrument Panel View

APPENDIX B

Vehicle, Load Cell Barrier and Dummy Response Data

1993 MITSUBISHI MIRAGE 4 DOOR

NHTSA NO.: MP6500

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 Wire Cut at 70 msec

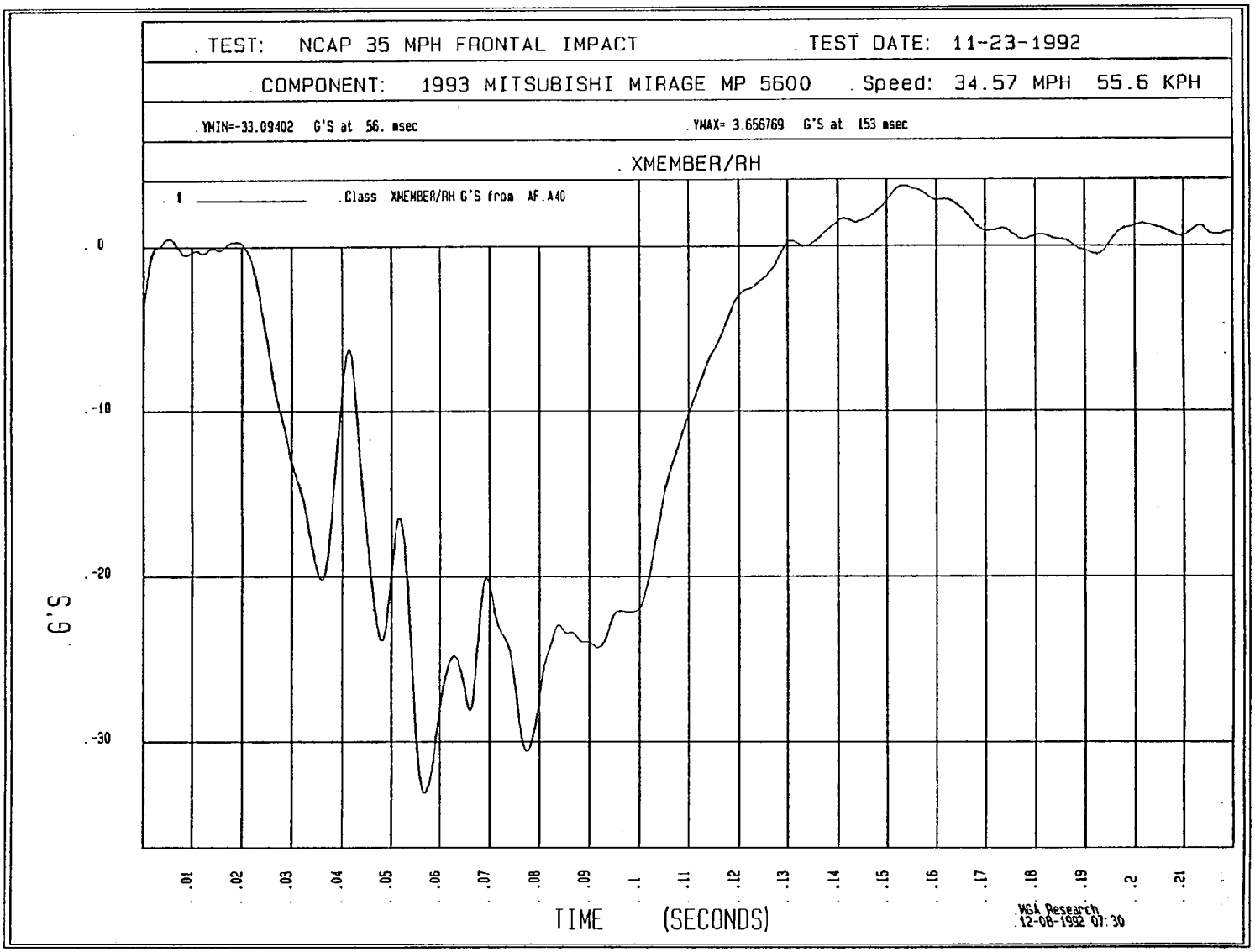


Figure B-1 - Right Rear Seat Crossmember X Acceleration vs. Time

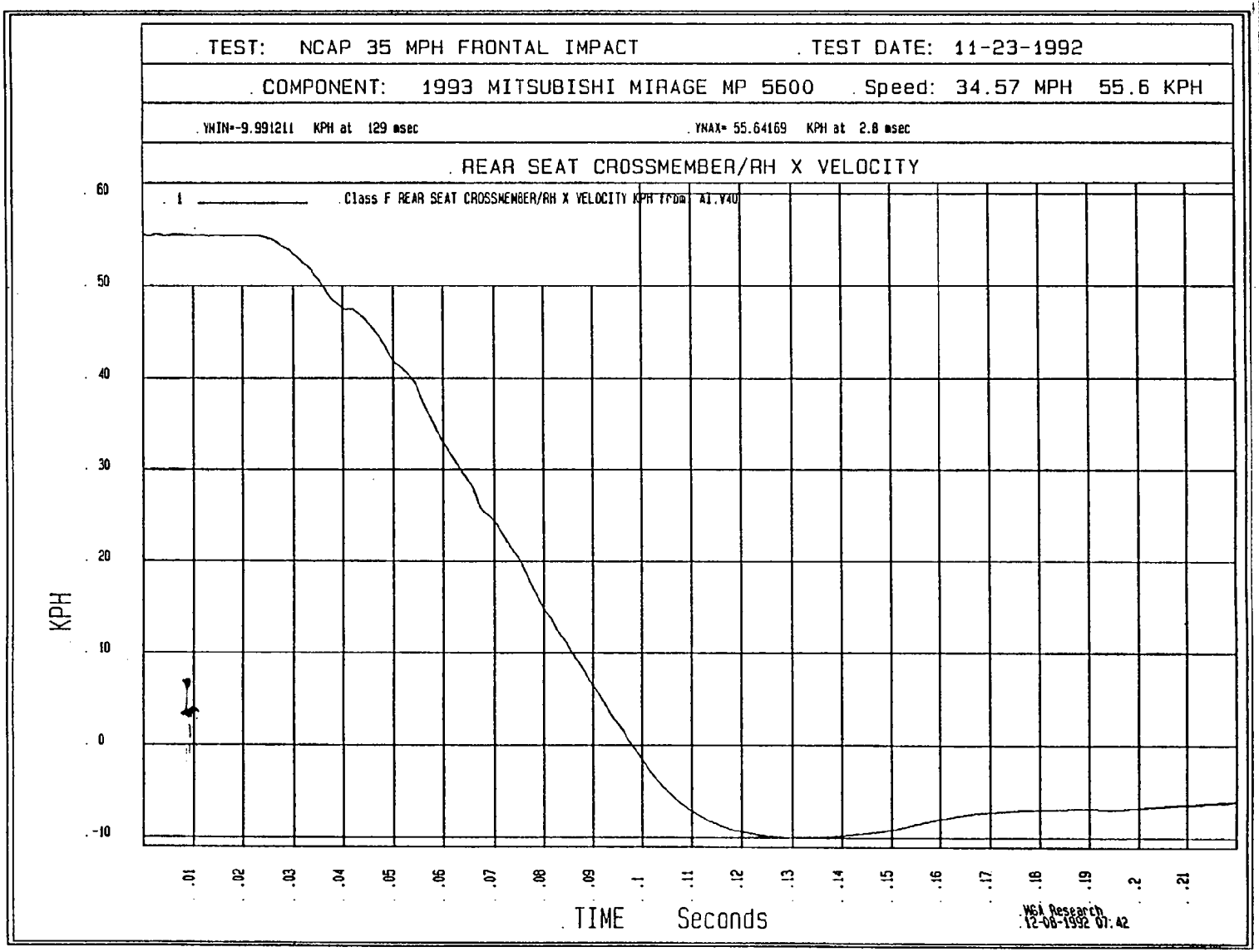


Figure B-2 - Right Rear Seat Crossmember X Velocity vs. Time

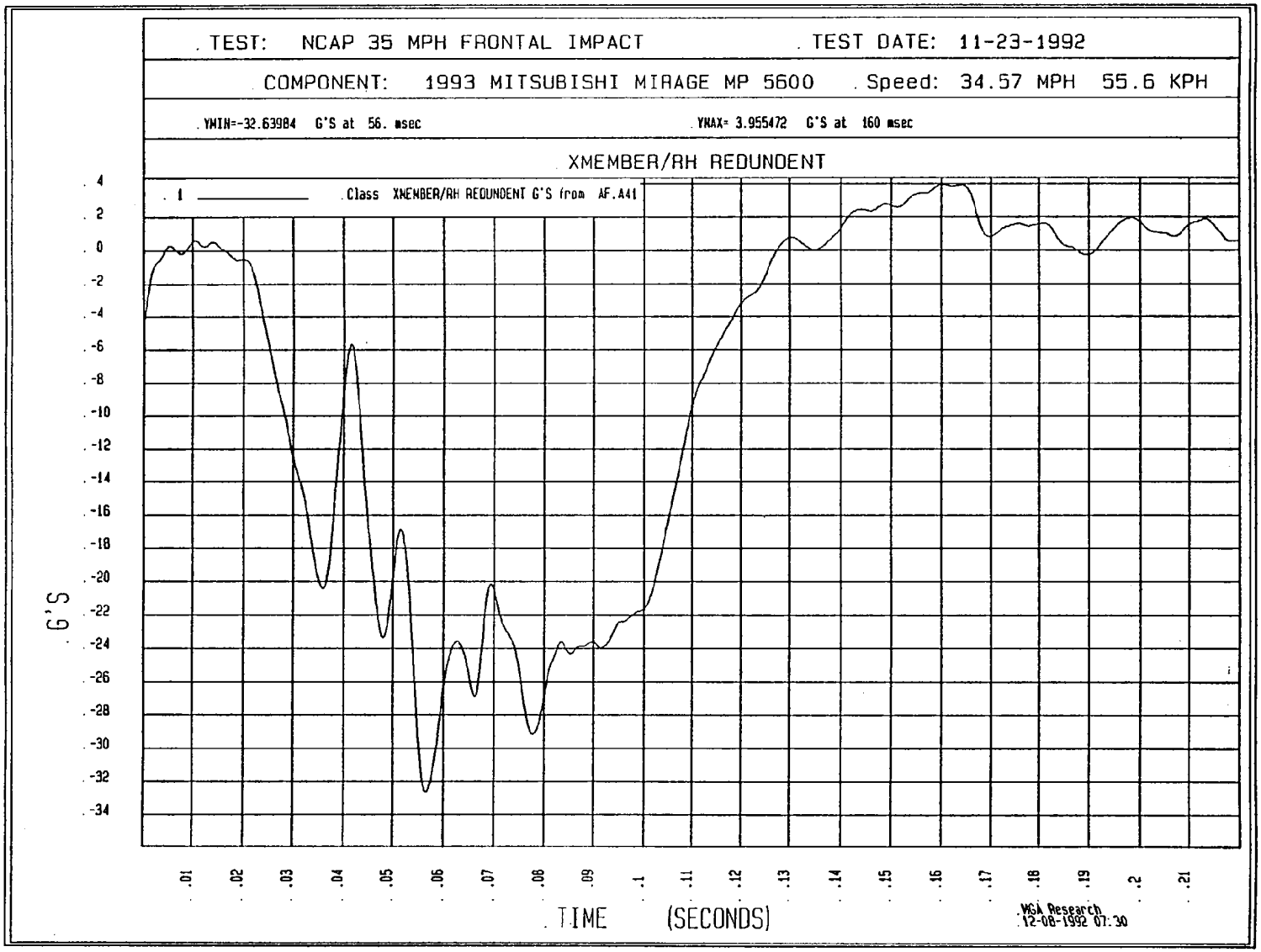


Figure B-3 - Right Rear Seat Crossmember Acceleration vs. Time

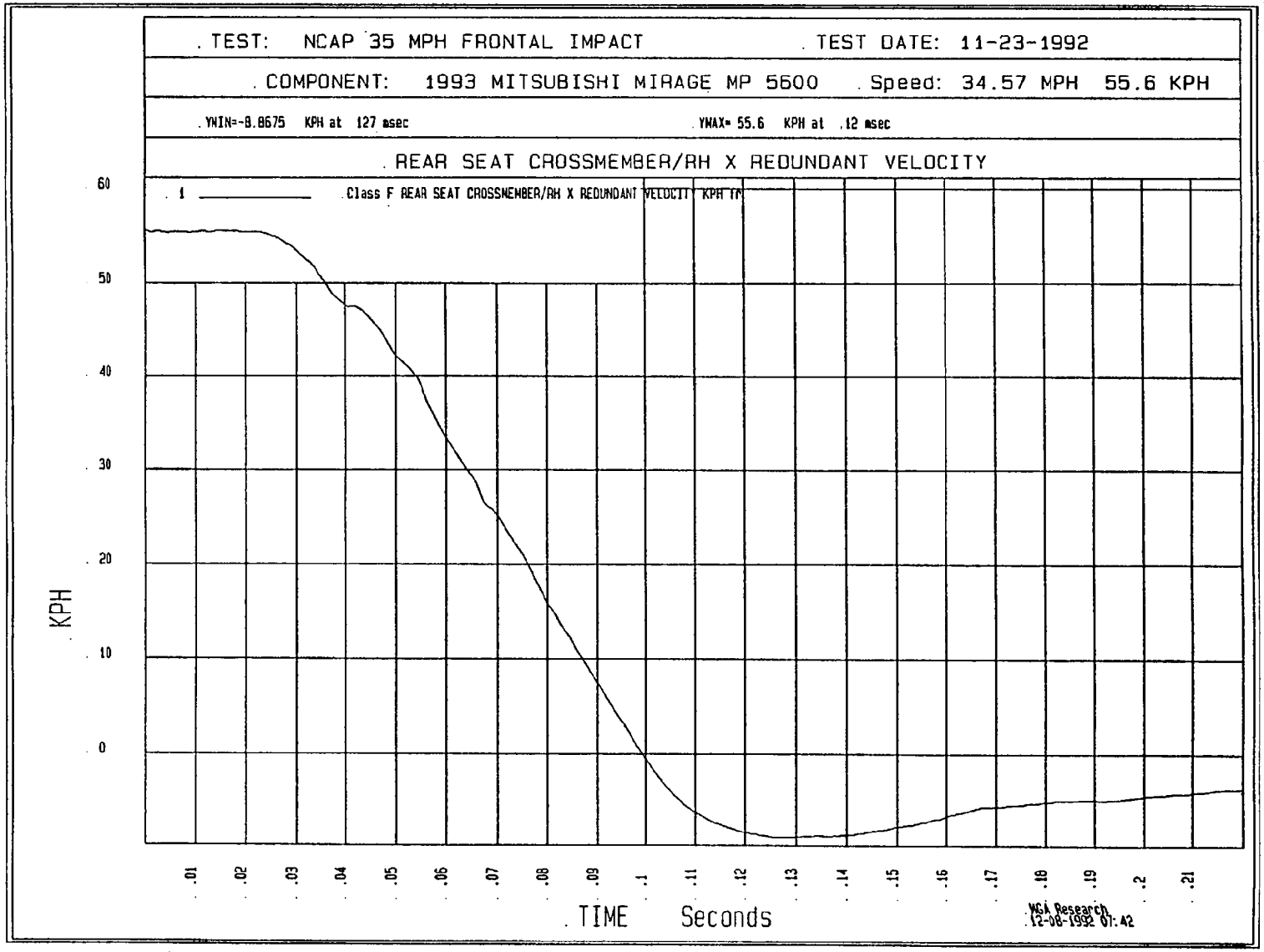


Figure B-4 - Right Rear Seat Crossmember X Redundant Velocity vs. Time

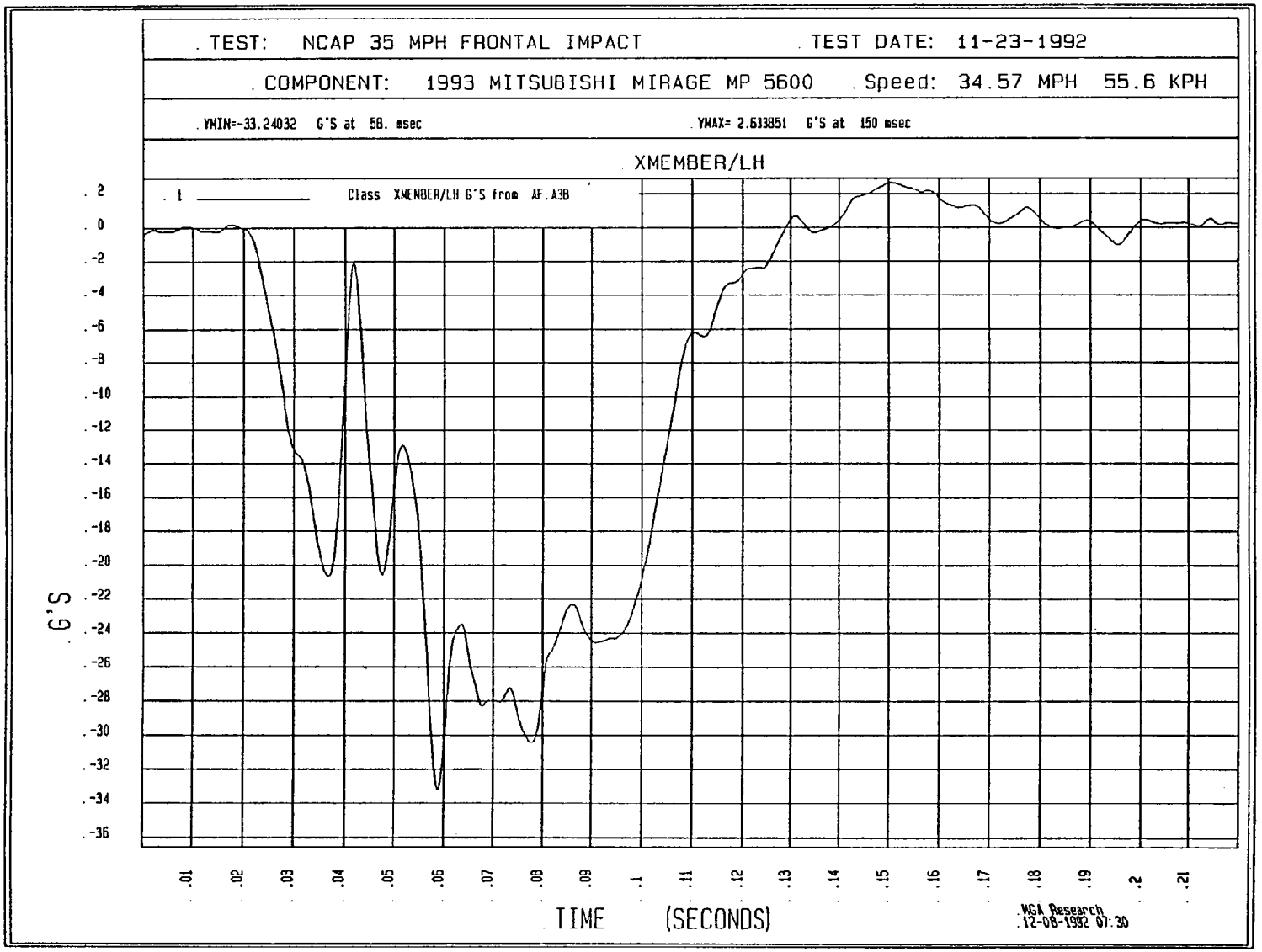


Figure B-5 - Left Rear Seat Crossmember X Acceleration vs. Time

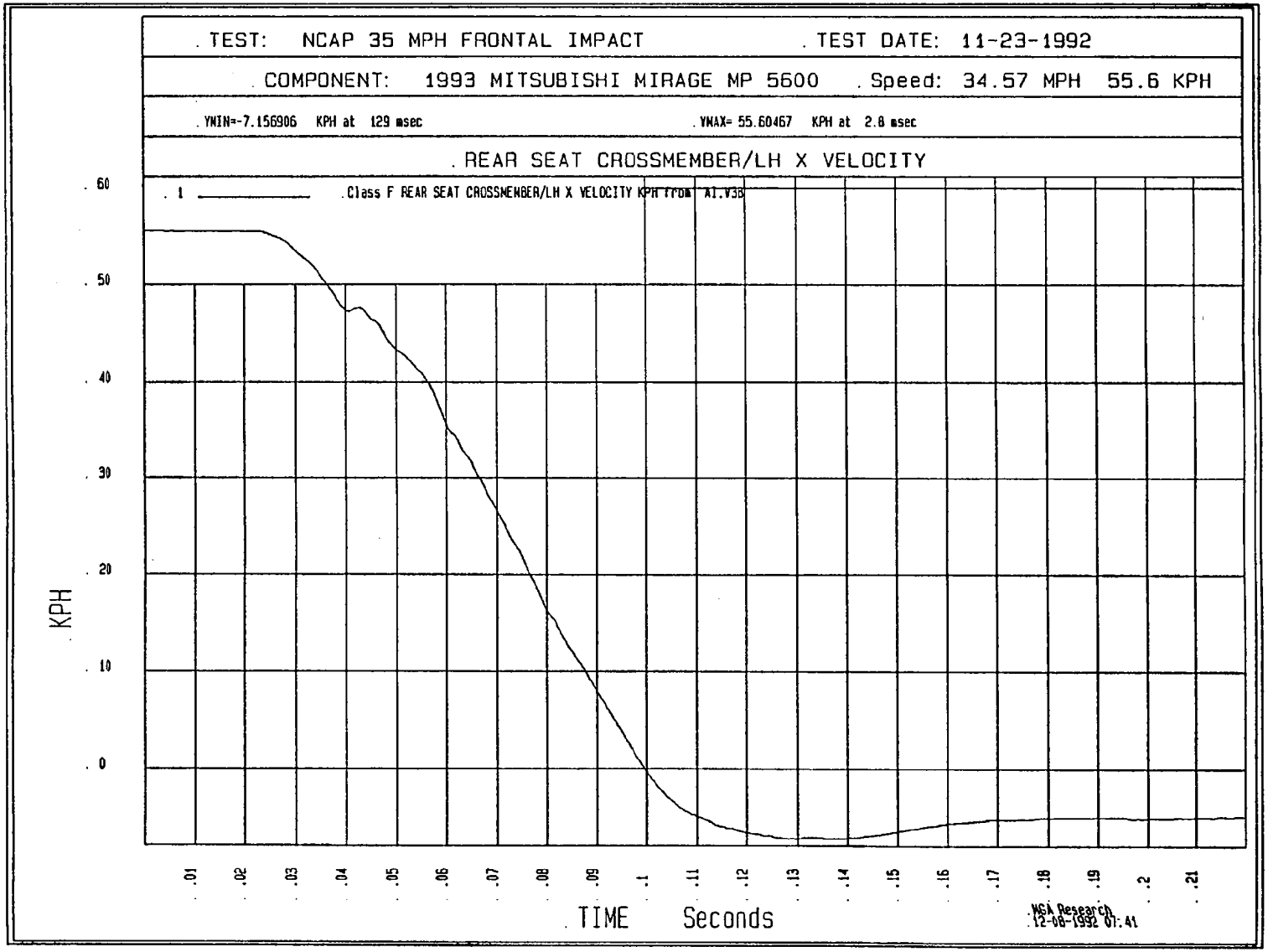


Figure B-6 - Left Rear Seat Crossmember X Velocity vs. Time

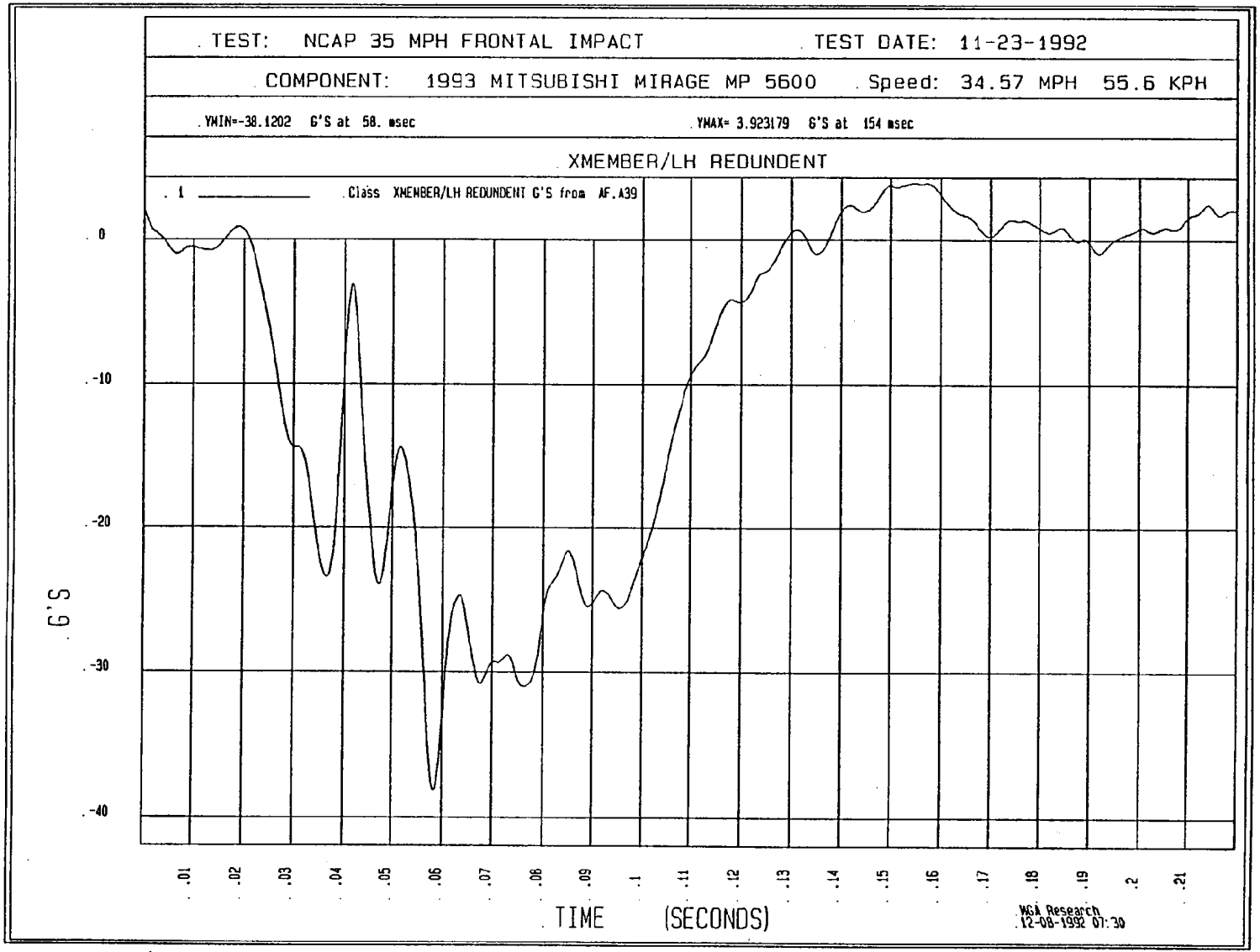


Figure B-7 - Left Rear Seat Crossmember X Redundant Acceleration vs. Time

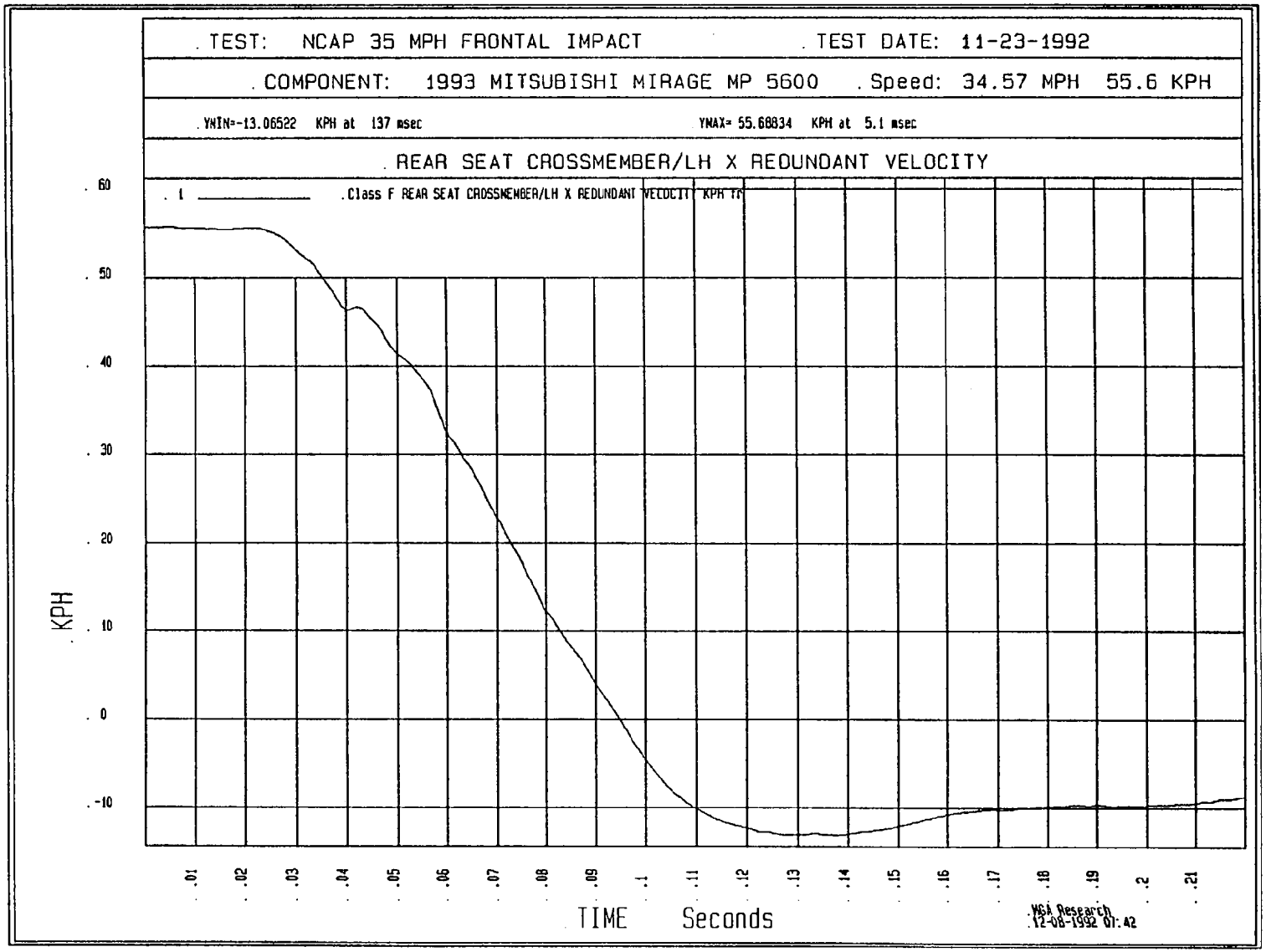


Figure B-8 - Left Rear Seat Crossmember X Redundant Velocity vs. Time

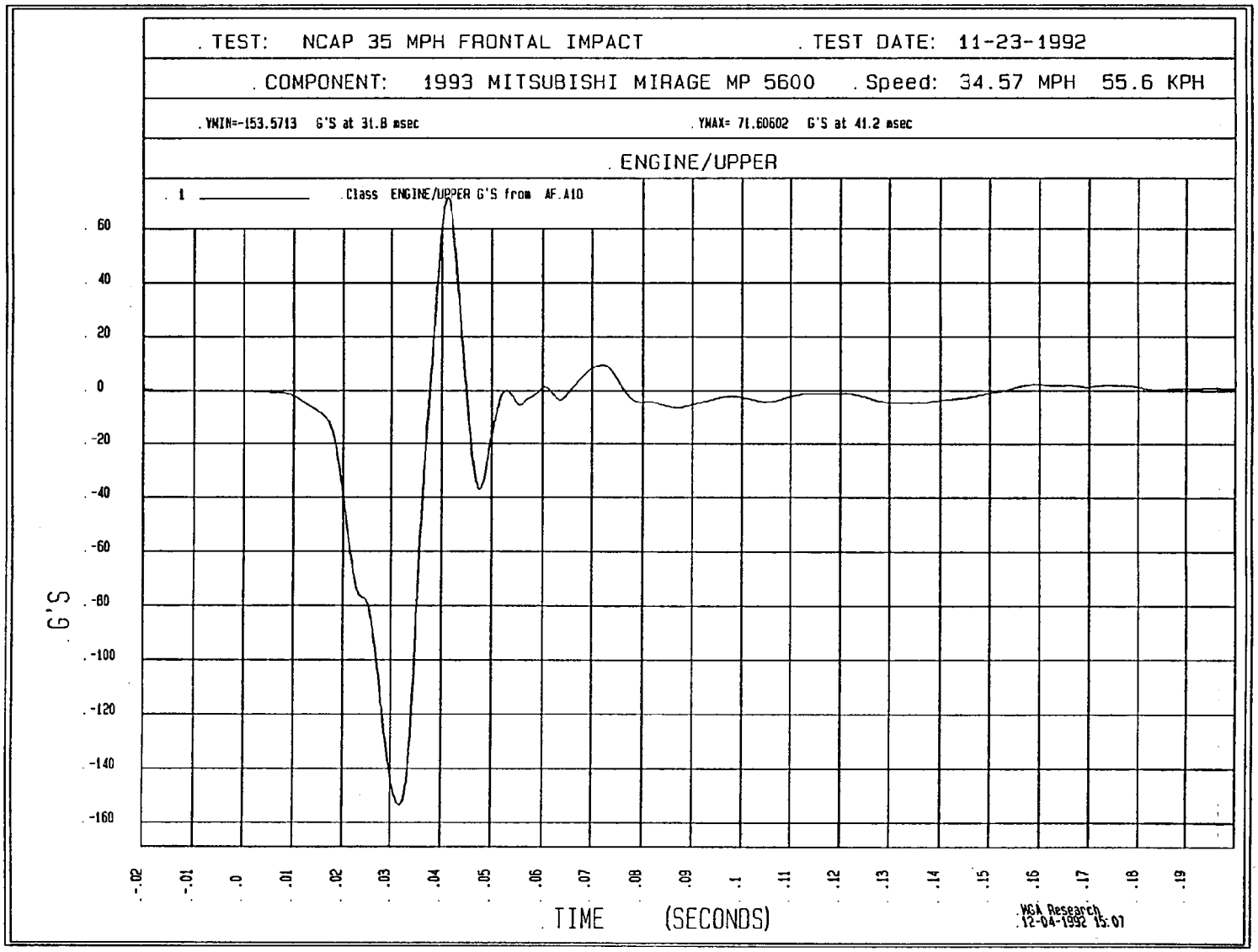


Figure B-9 - Top of Engine Block X Acceleration vs. Time

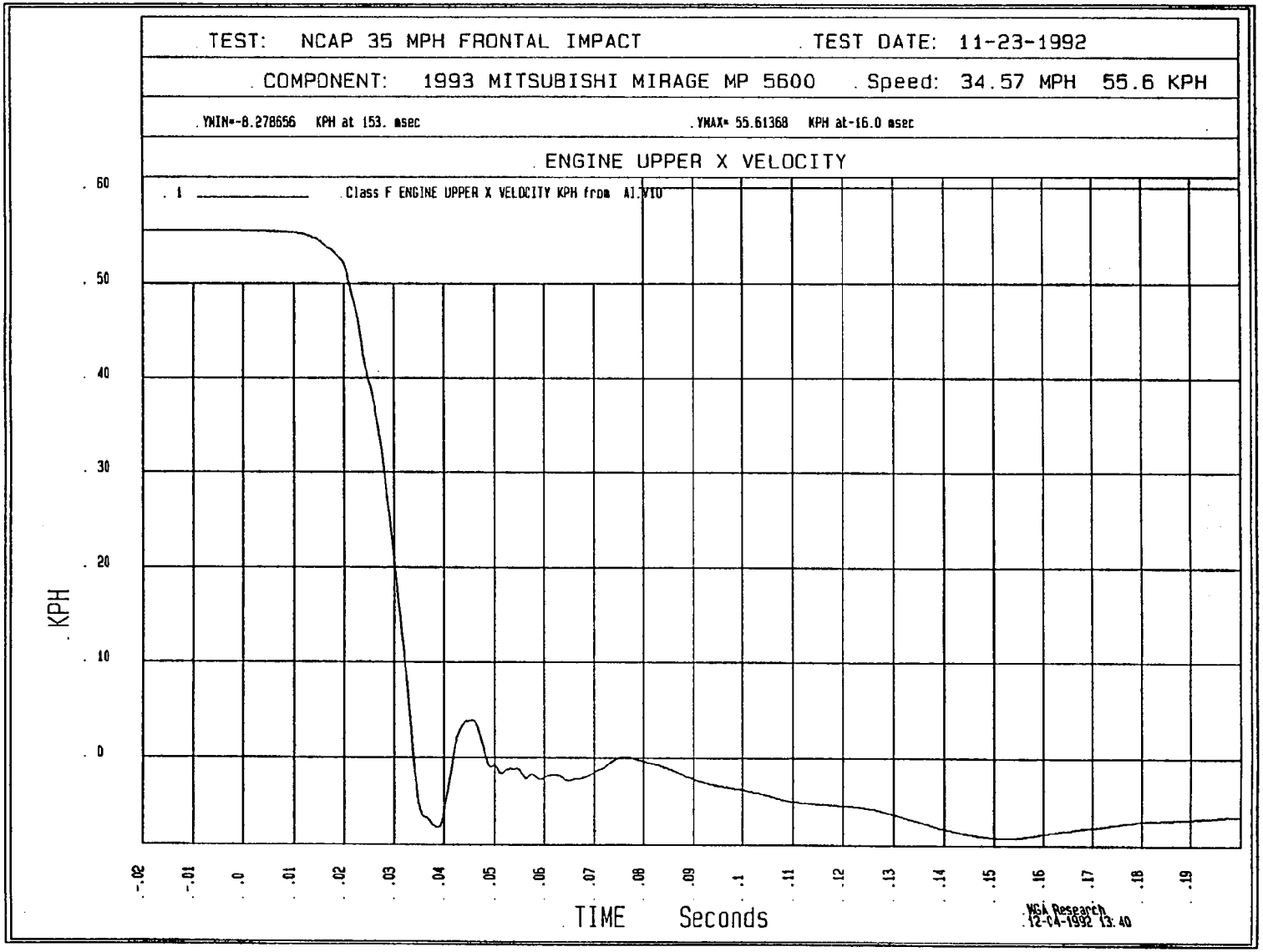


Figure B-10 - Top of Engine Block X Velocity vs. Time

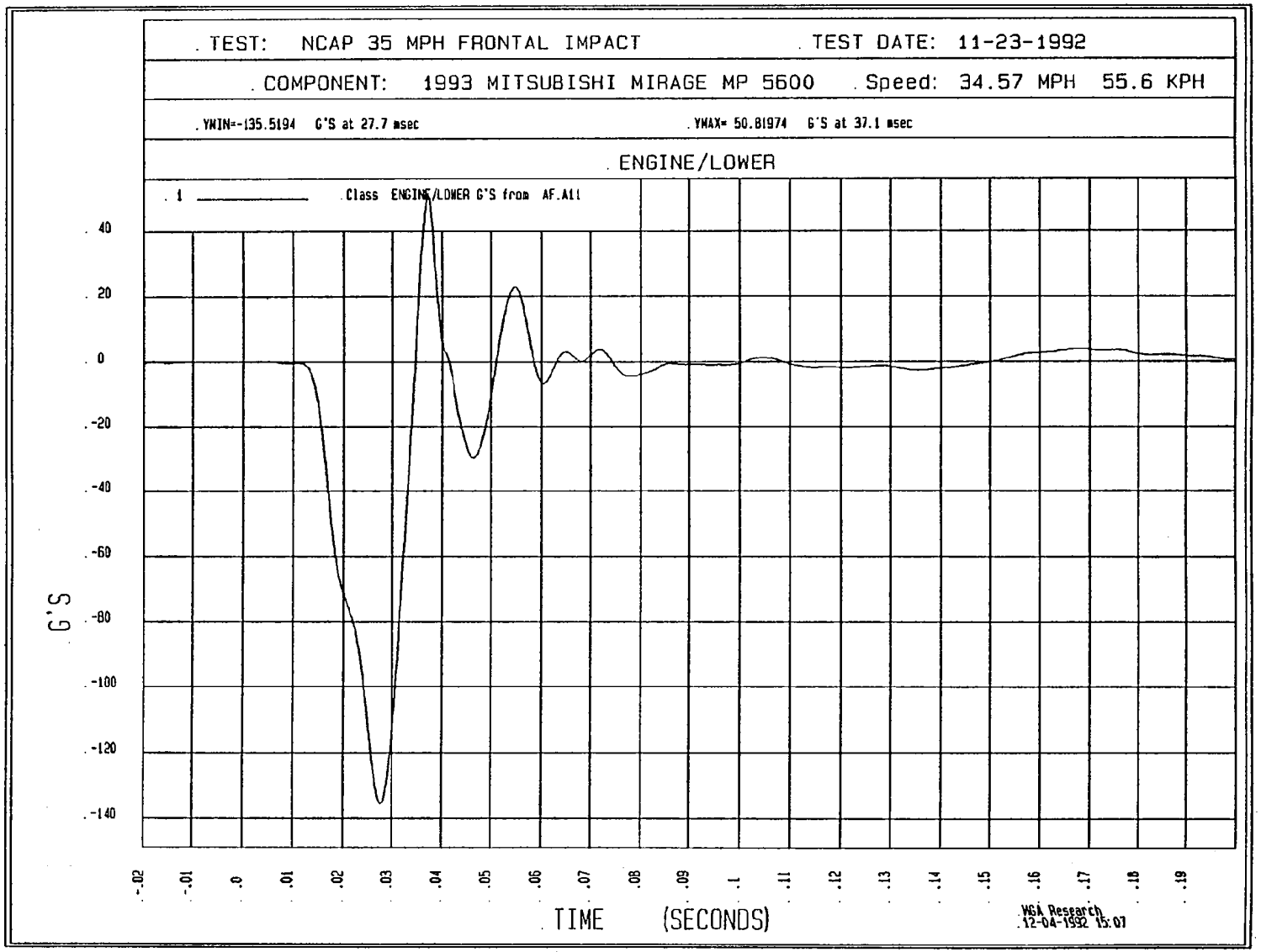


Figure B-11 - Bottom of Engine Block X Acceleration vs. Time

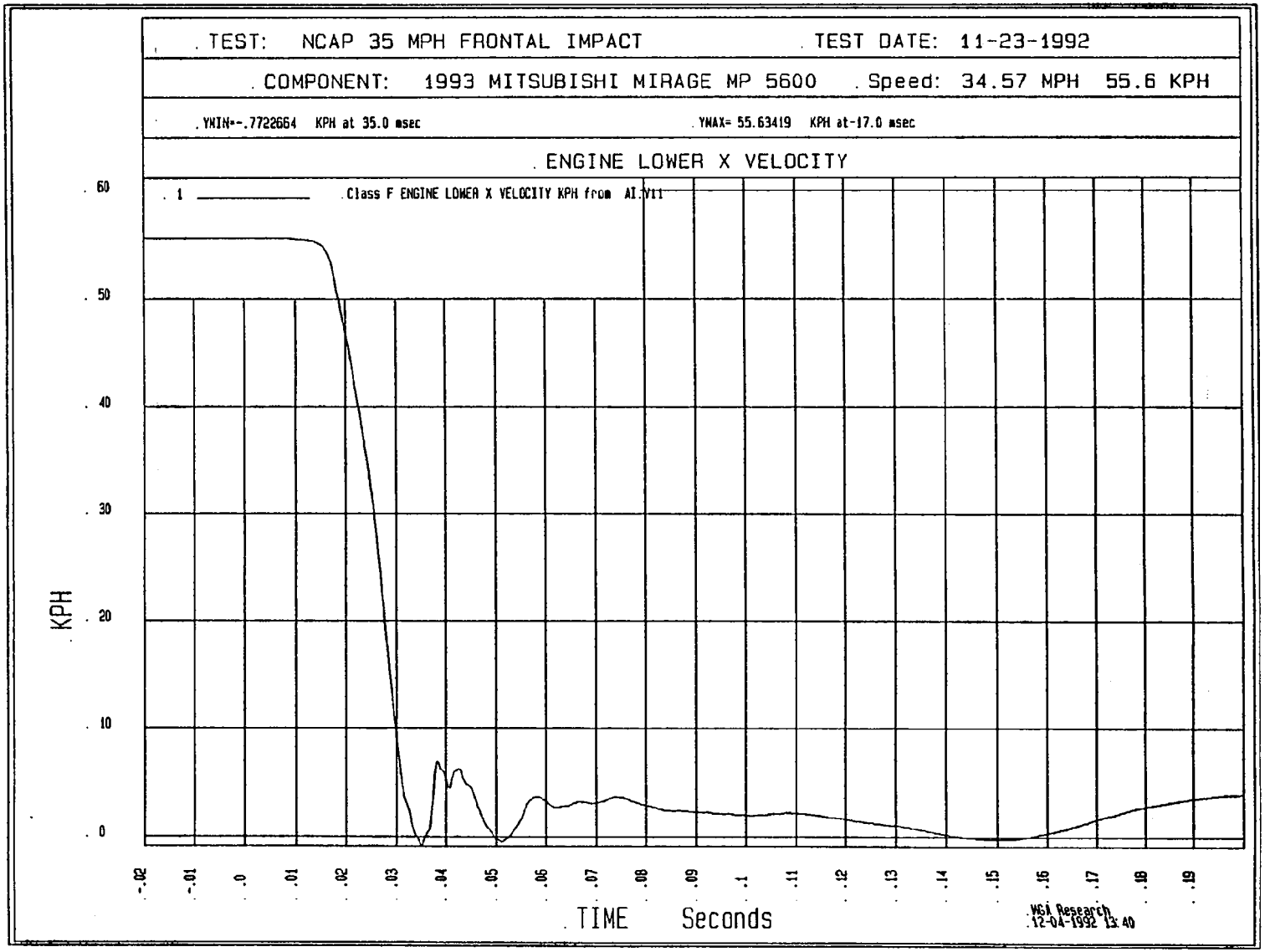


Figure B-12 - Bottom of Engine Block X Velocity vs. Time

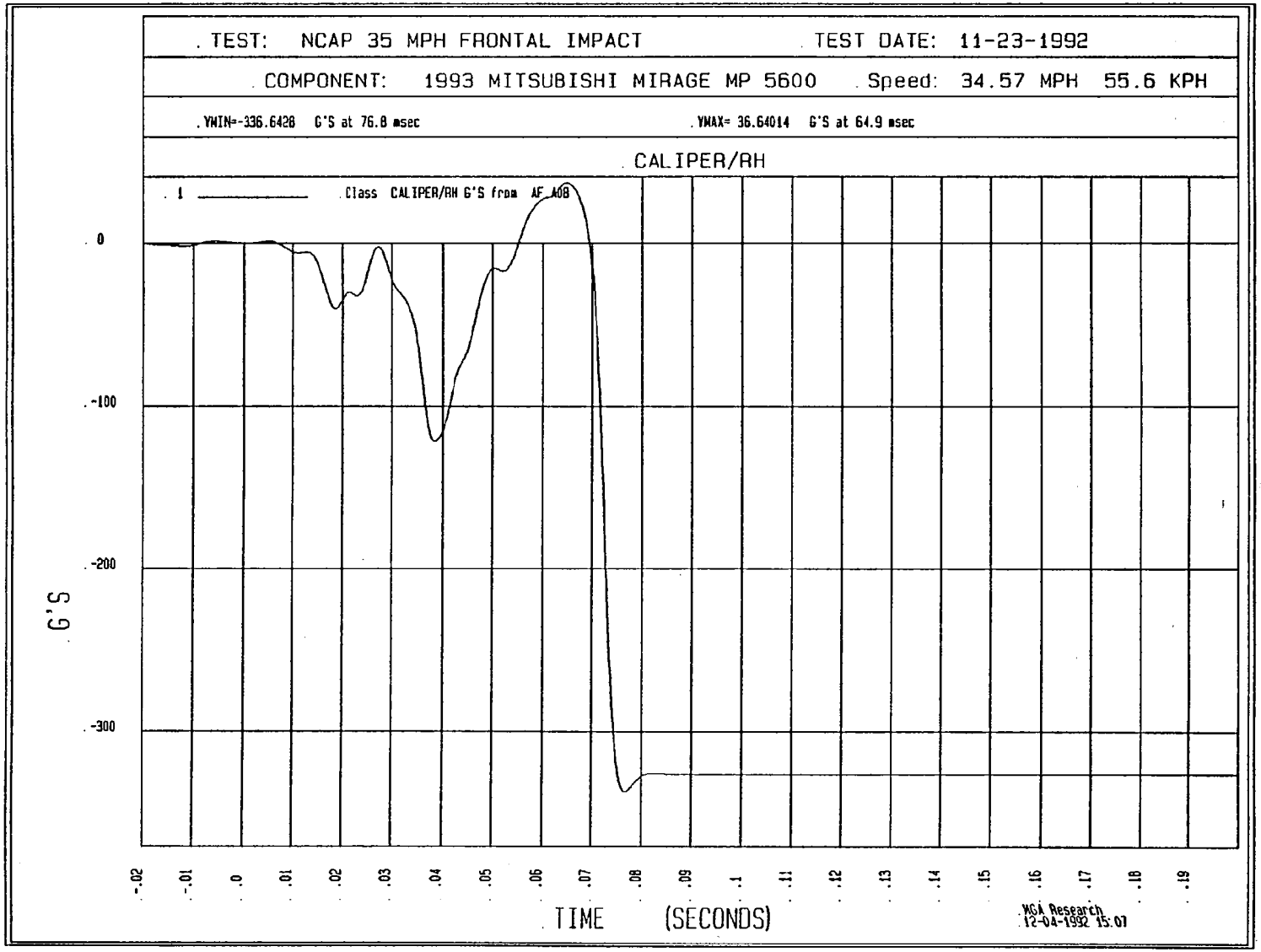


Figure B-13 - Right Front Disc Brake Caliper X Acceleration vs. Time
* Data Wire Cut at 70 msec

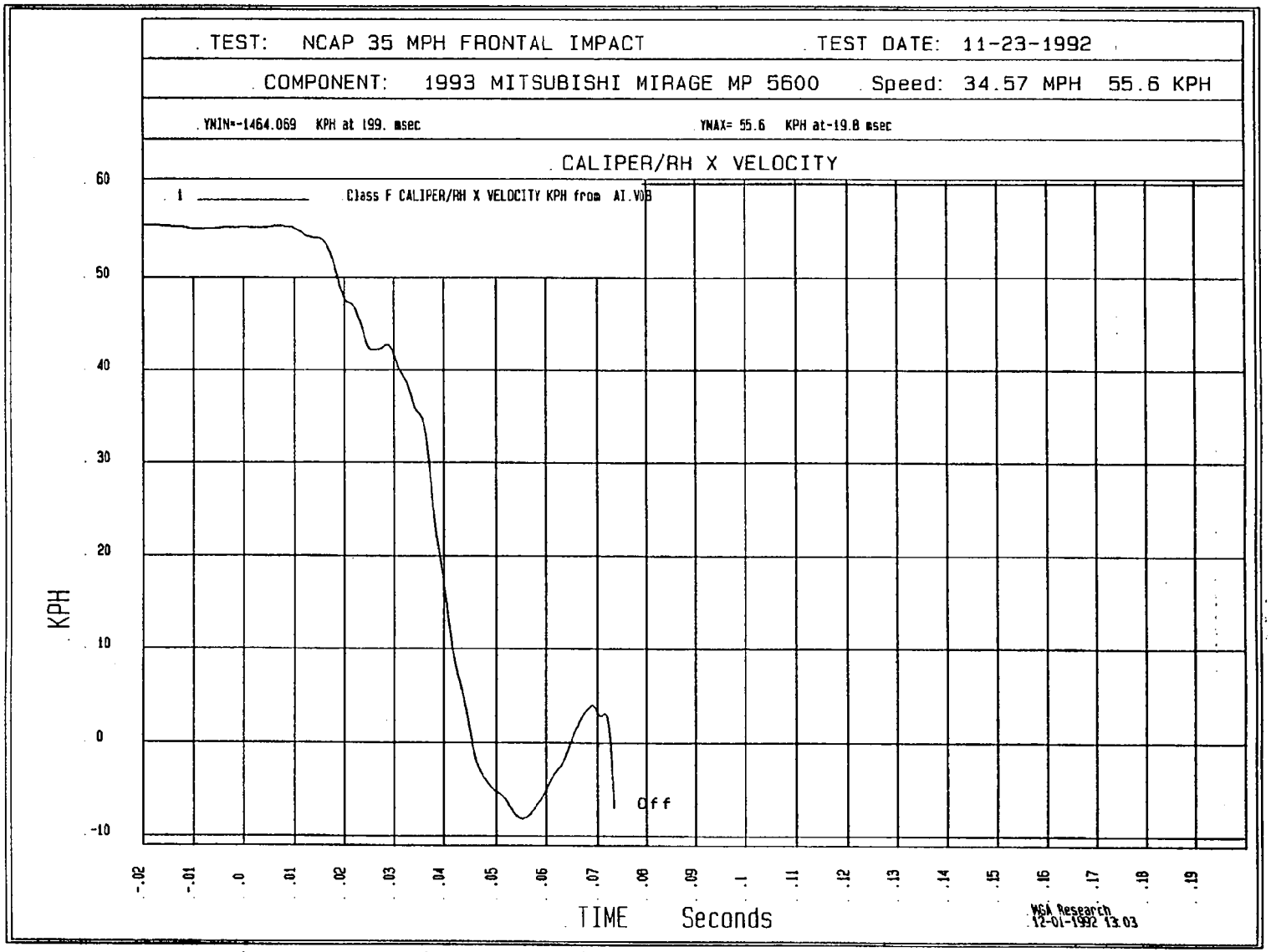


Figure B-14 - Right Front Disc Brake Caliper X Velocity vs. Time

* Data Wire Cut at 70 msec

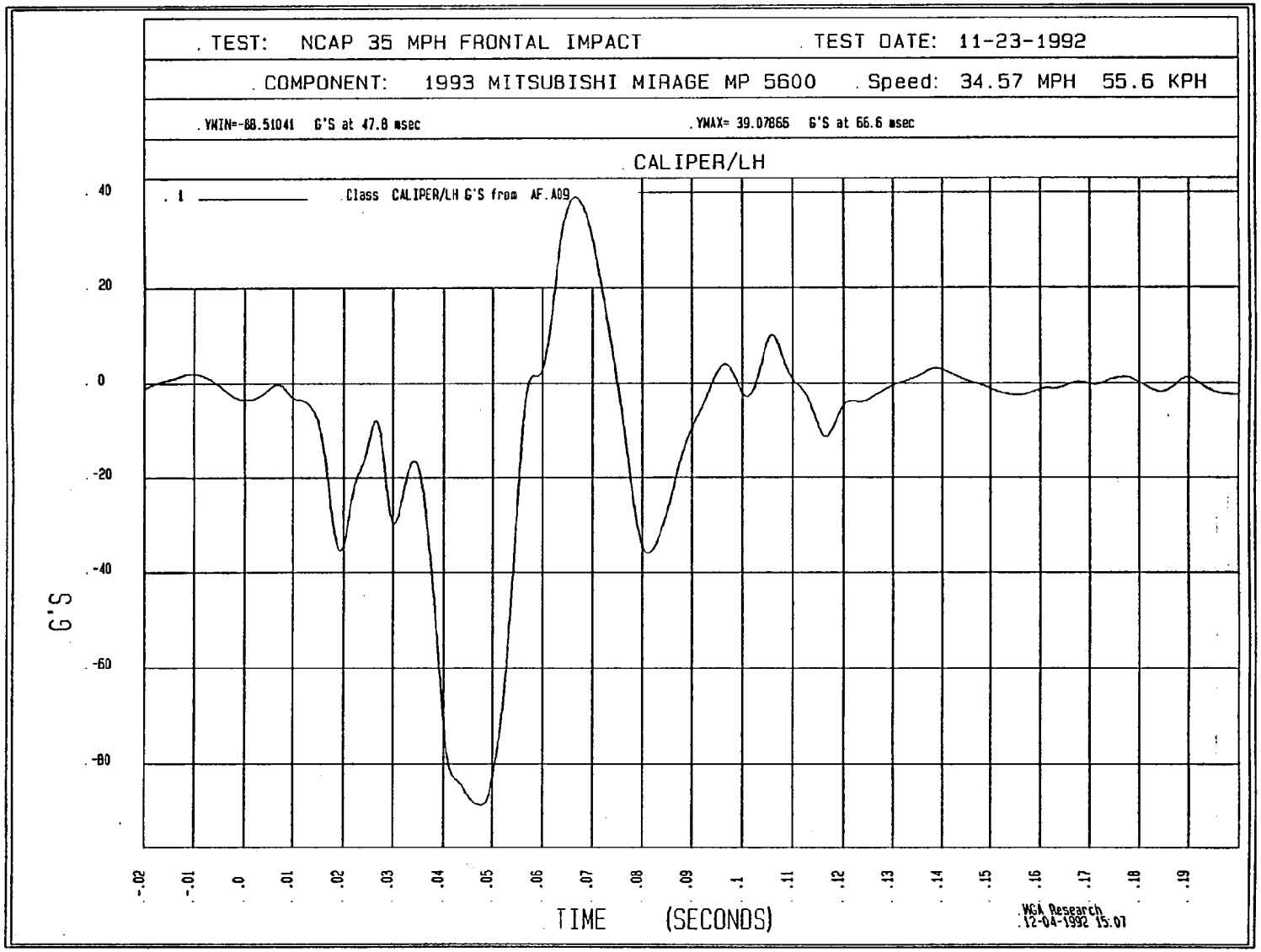


Figure B-15 - Left Front Disc Brake Caliper X Acceleration vs. Time

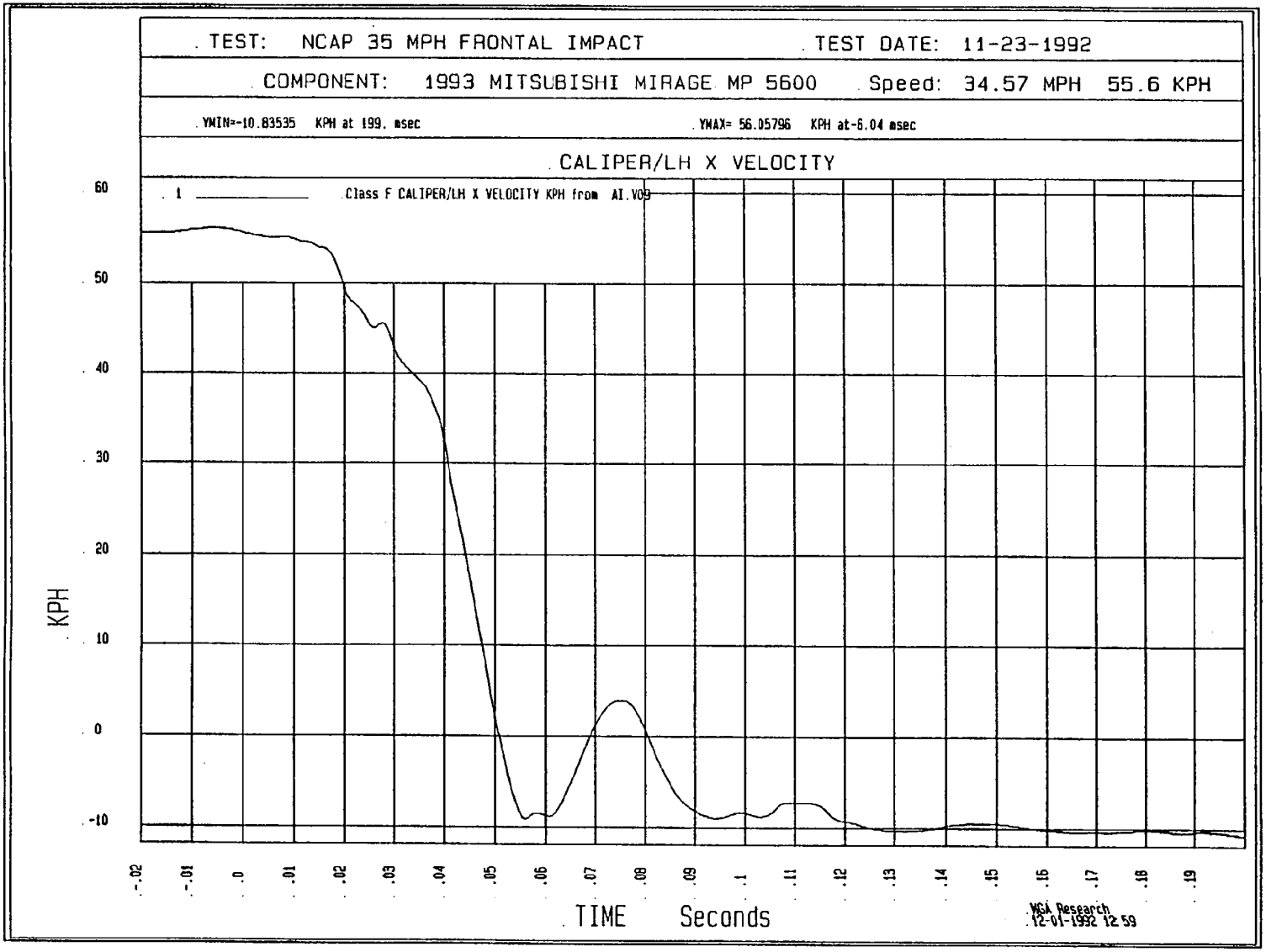


Figure B-16 - Left Front Disc Brake Caliper X Velocity vs. Time

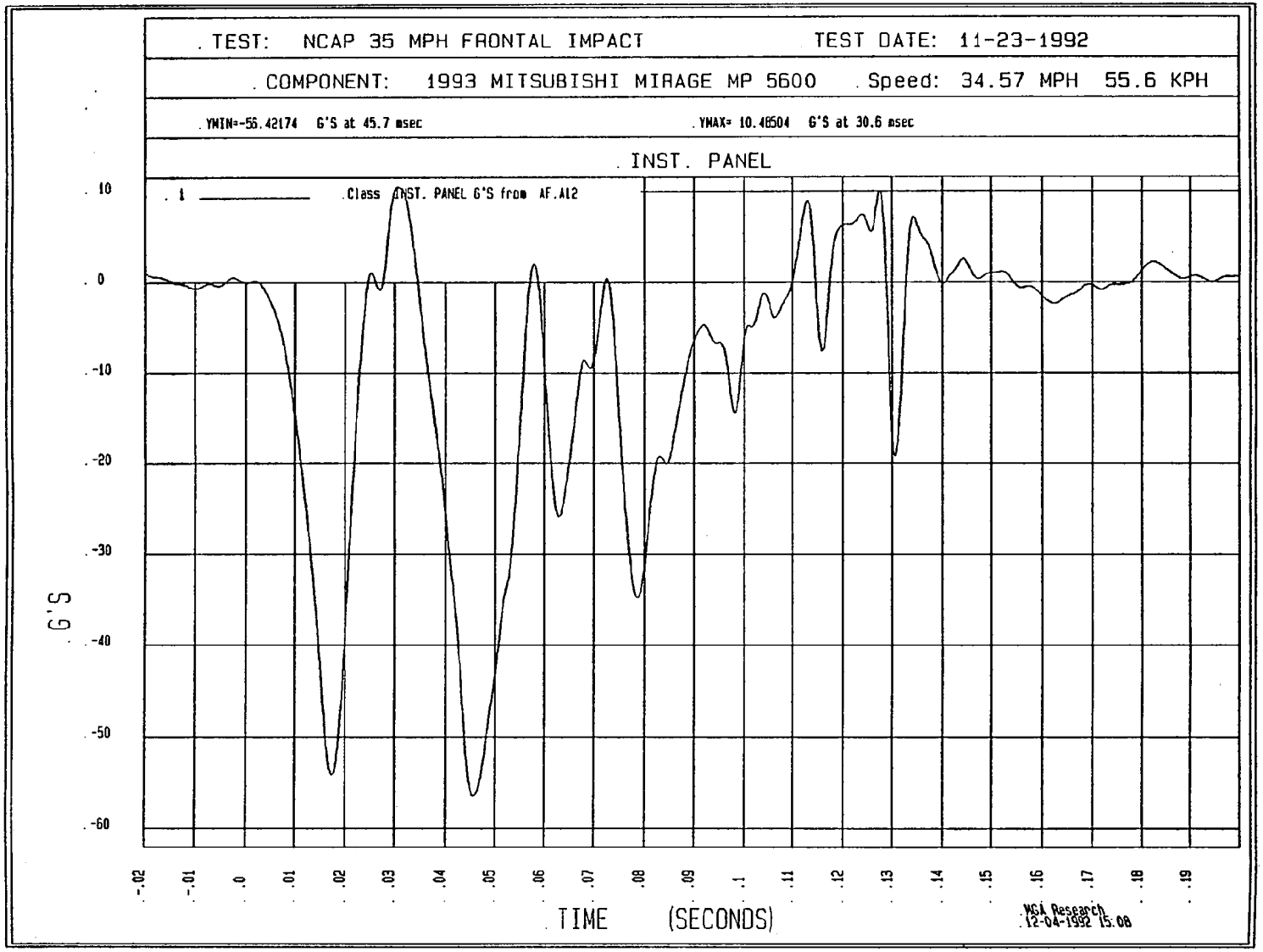


Figure B-17 - Center of Instrument Panel Top Surface X Acceleration vs. Time

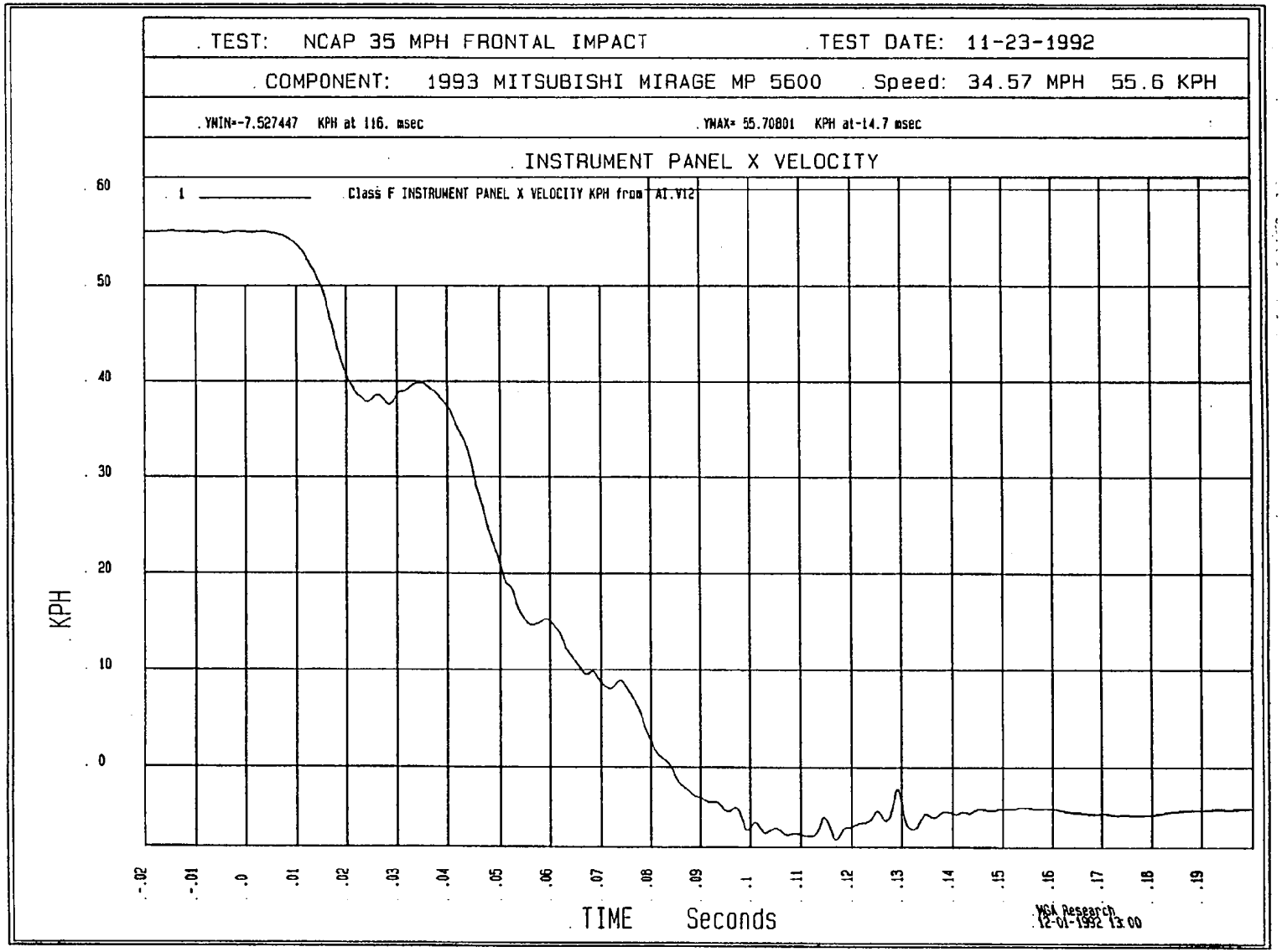


Figure B-18 - Center of Instrument Panel Top Surface X Velocity vs. Time

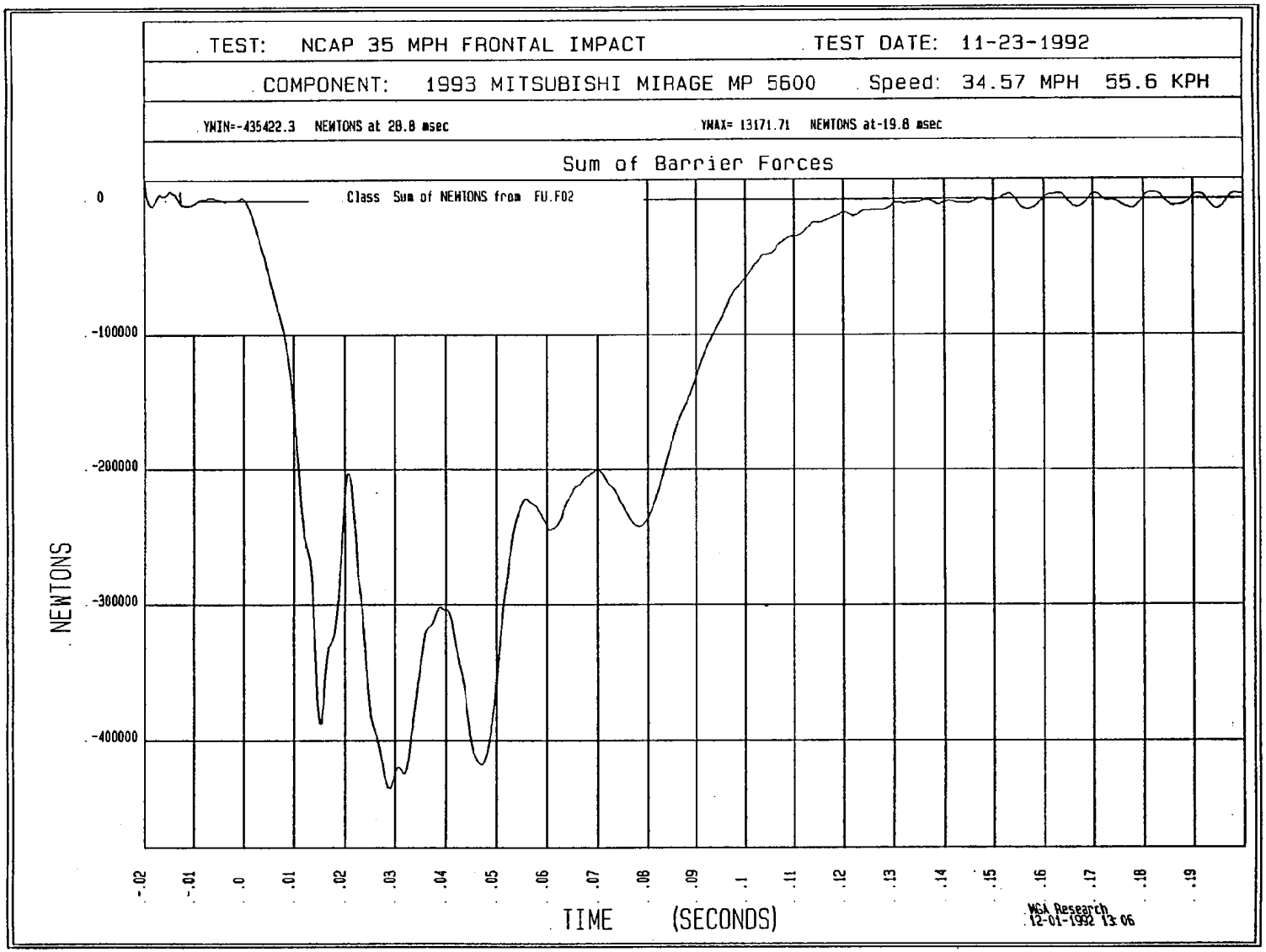


Figure B-19 - Sum of Barrier 6 Load Cells Force vs. Time

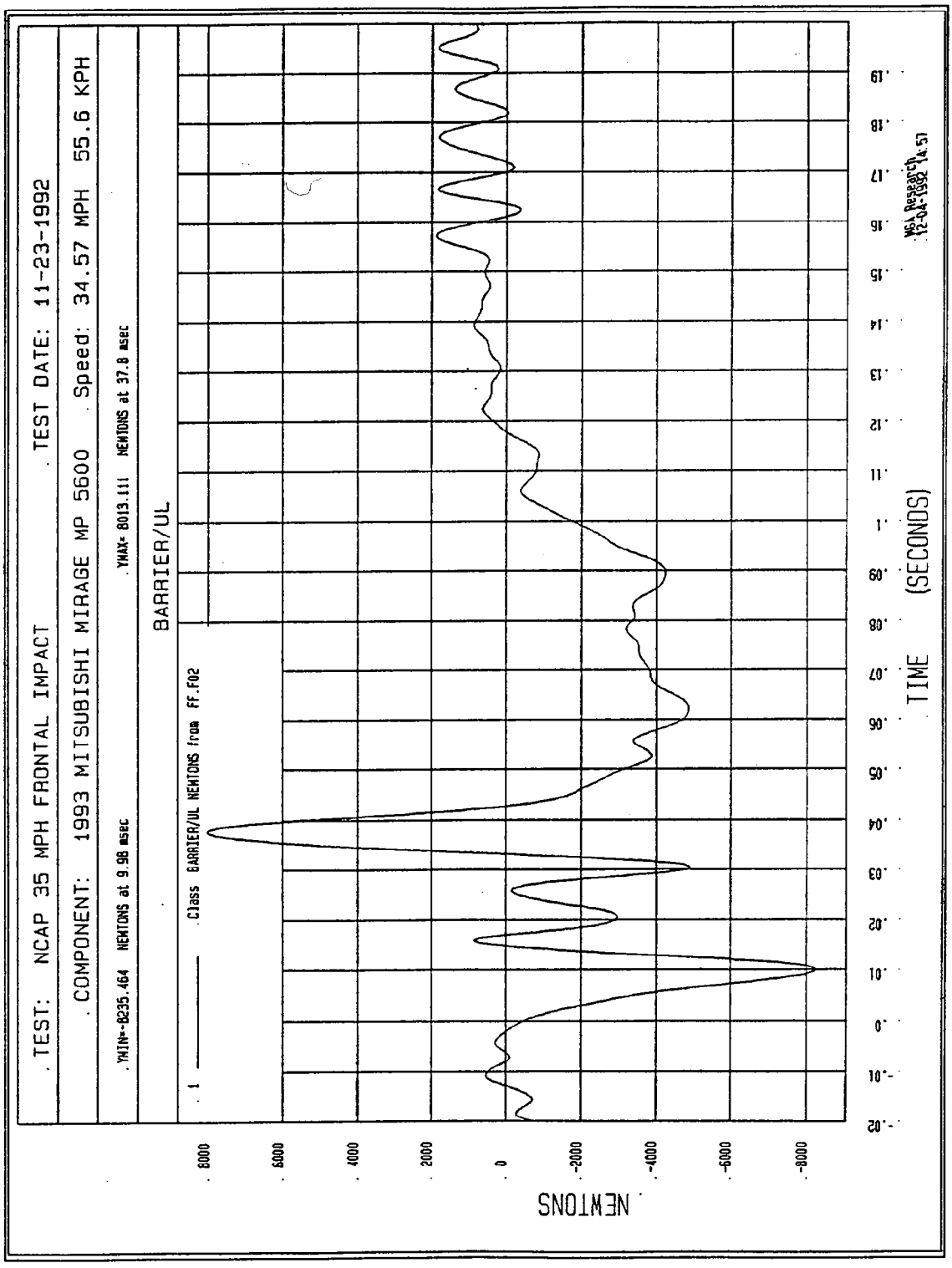


Figure B-20 - Sum of Load Cells A1-B3 Force vs. Time

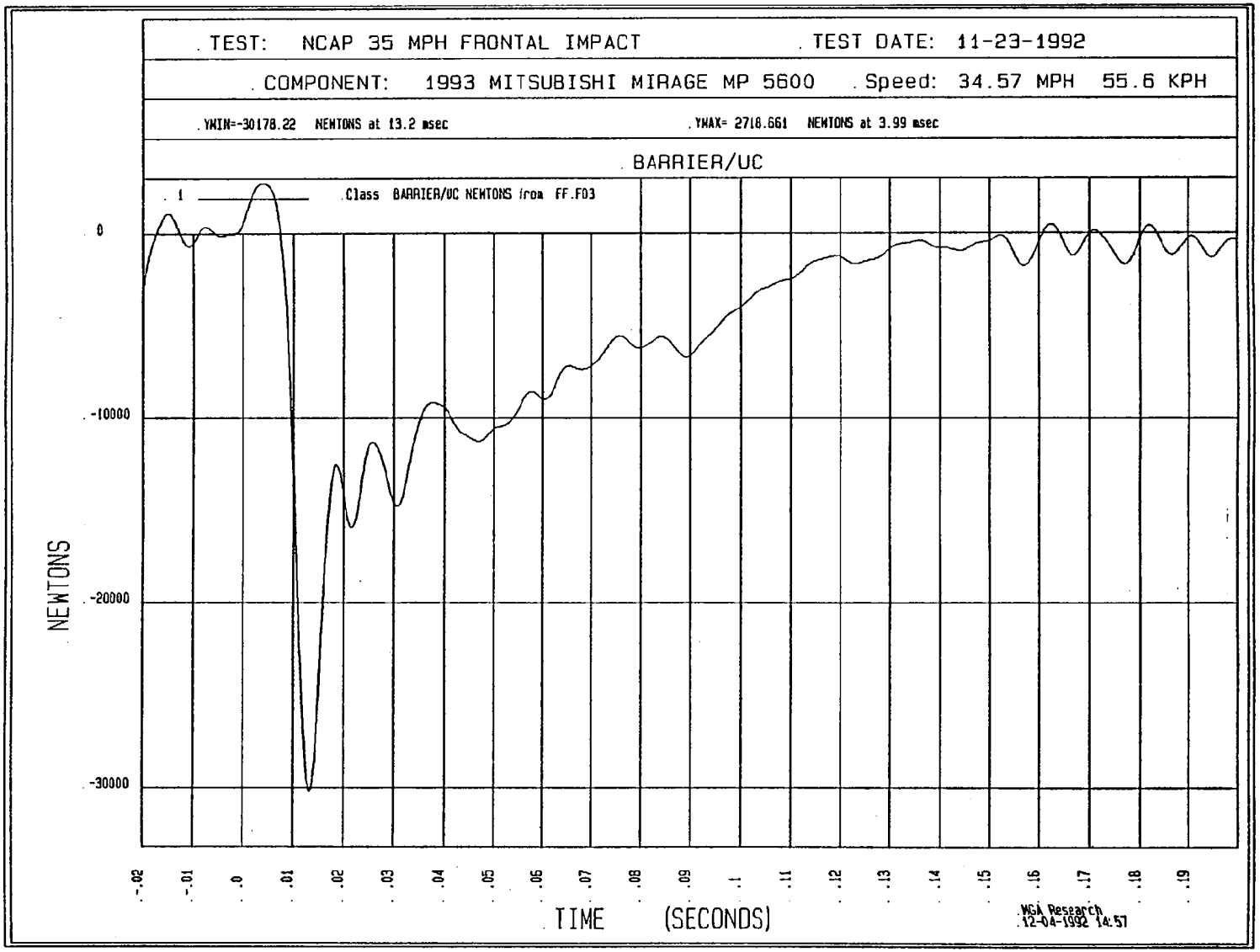


Figure B-21 - Sum of Load Cells A4-B6 Force vs. Time

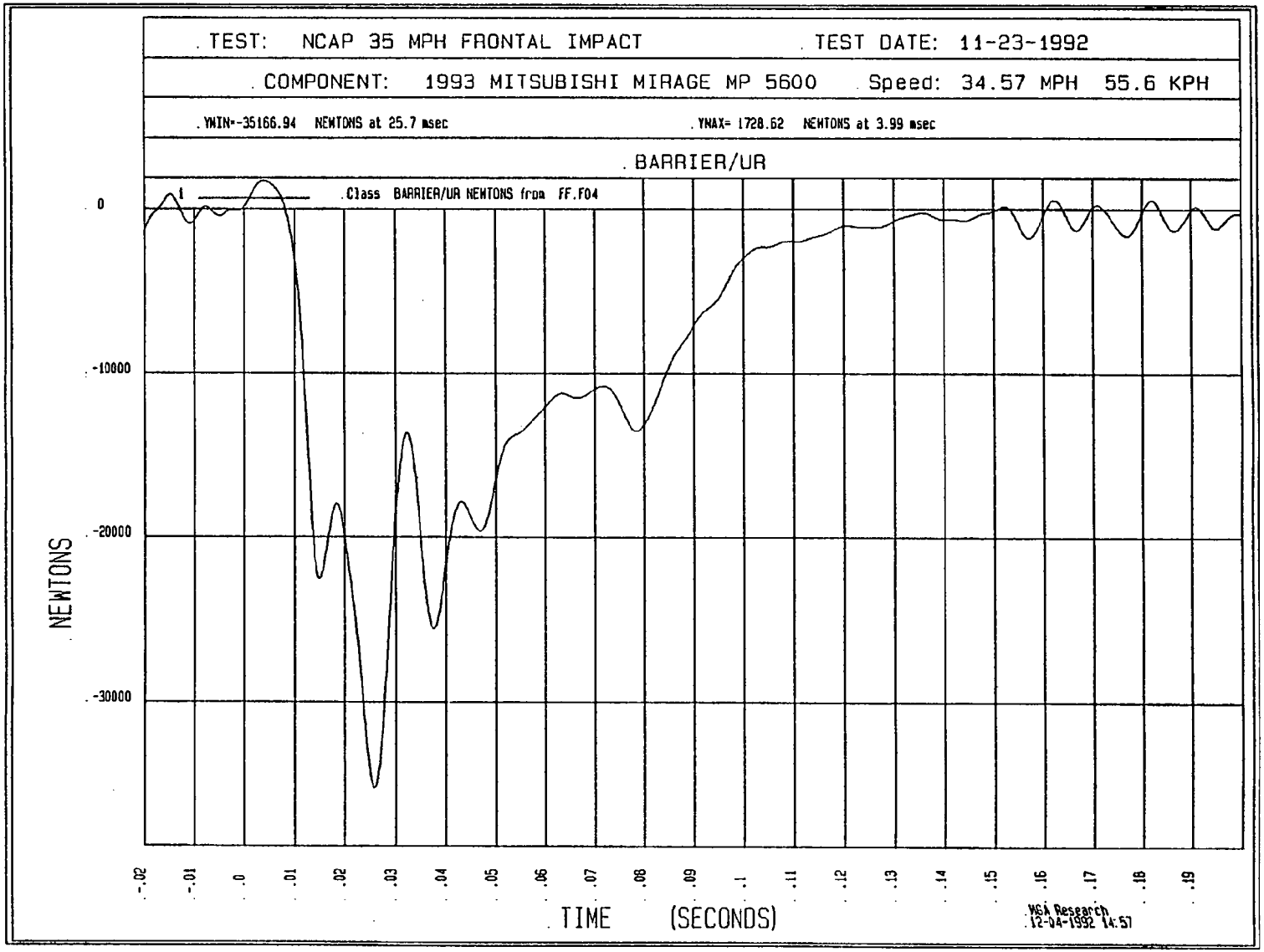


Figure B-22 - Sum of Load Cells A7-B9 Force vs. Time

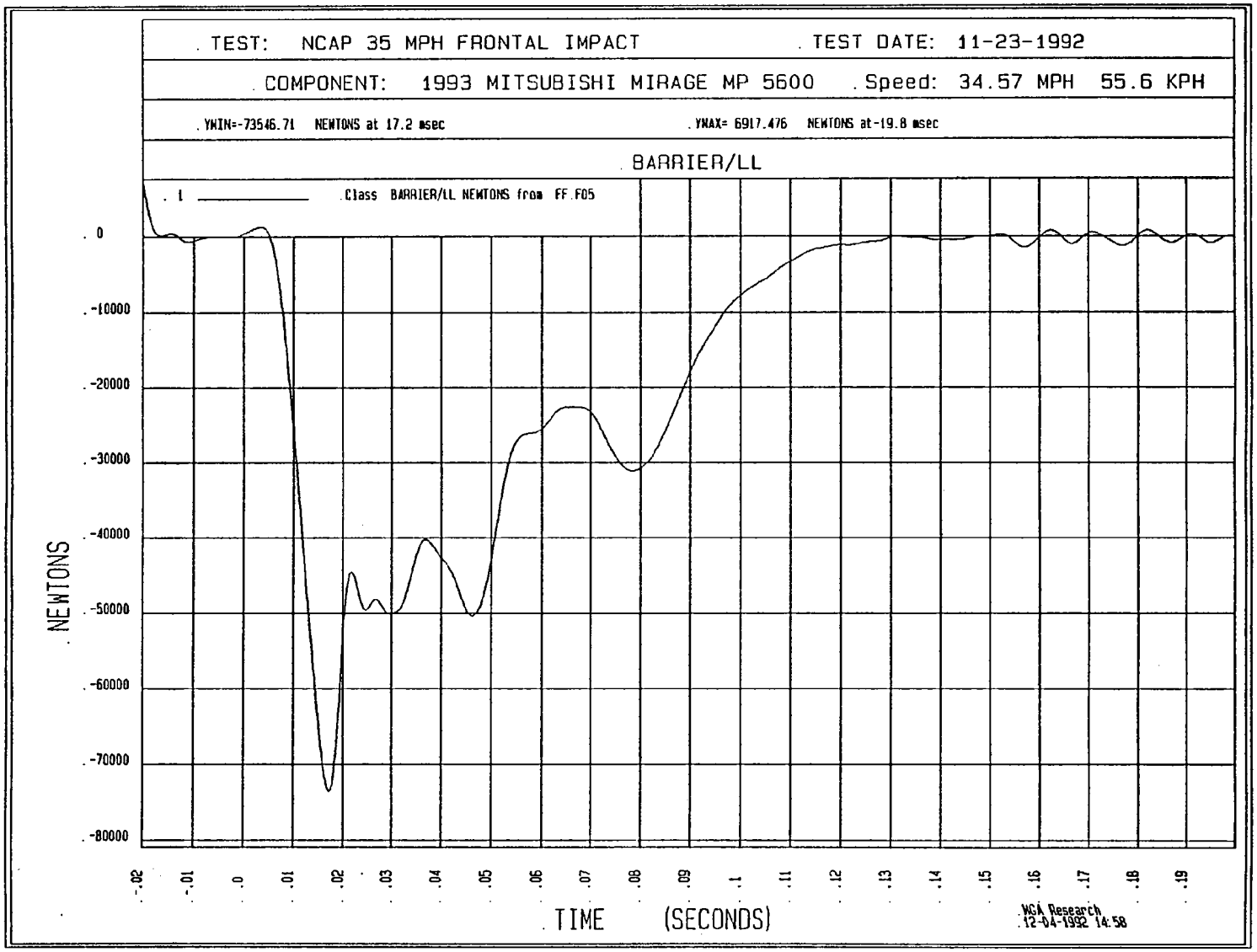


Figure B-23 - Sum of Load Cells C1--D3 Force vs. Time

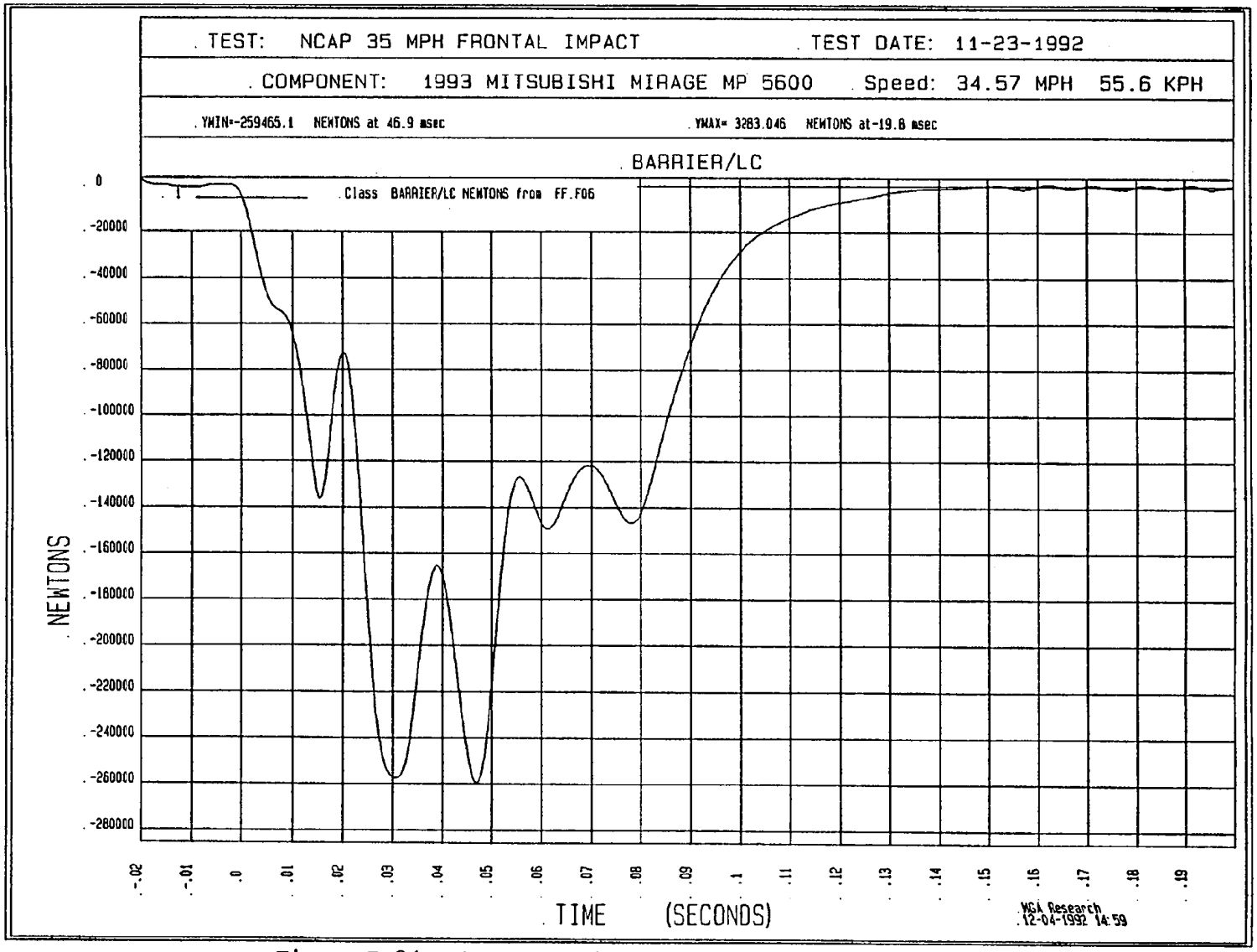


Figure B-24 - Sum of Load Cells C4-D6 Force vs. Time

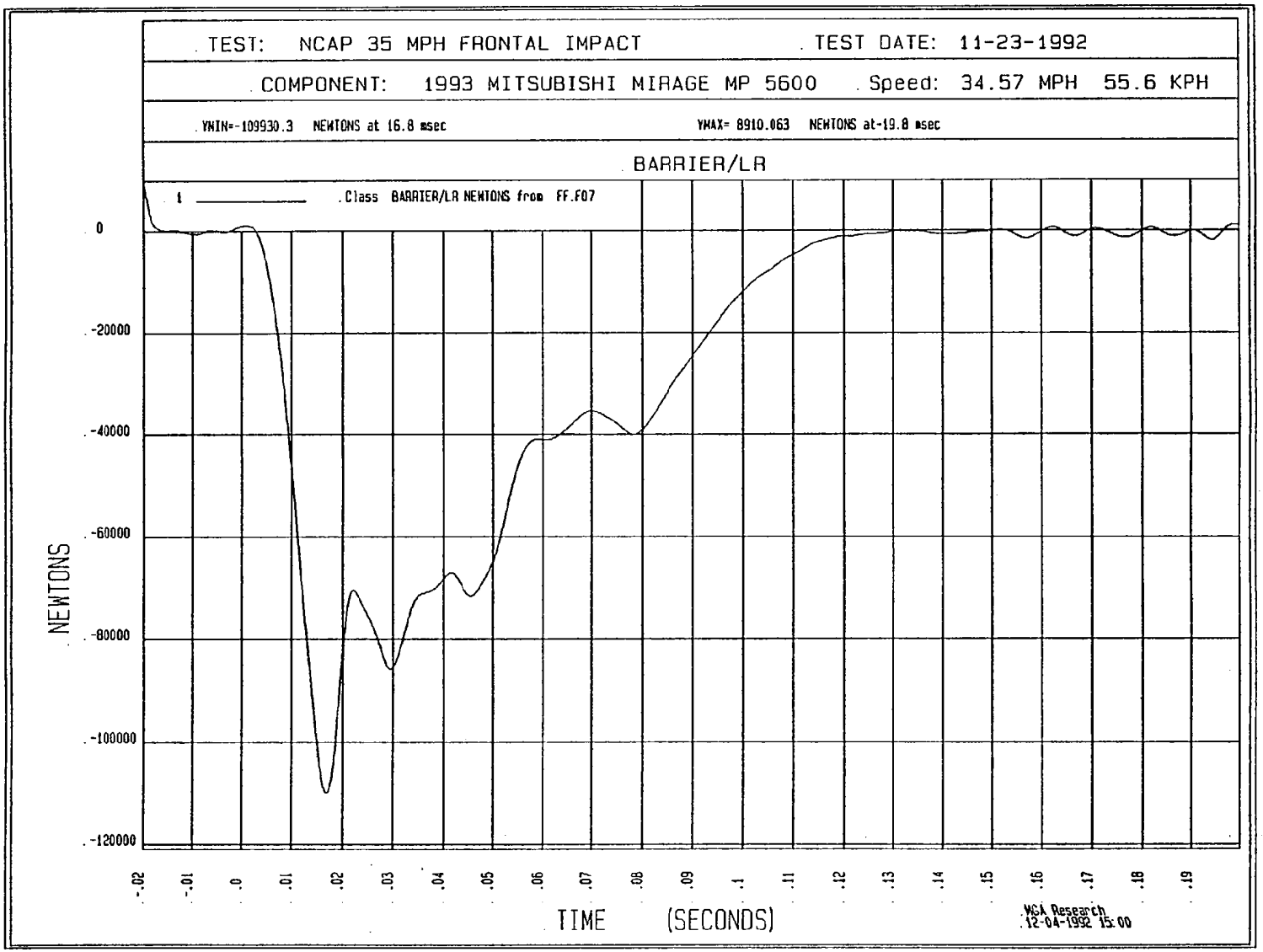


Figure B-25 - Sum of Load Cells C7-D9 Force vs. Time

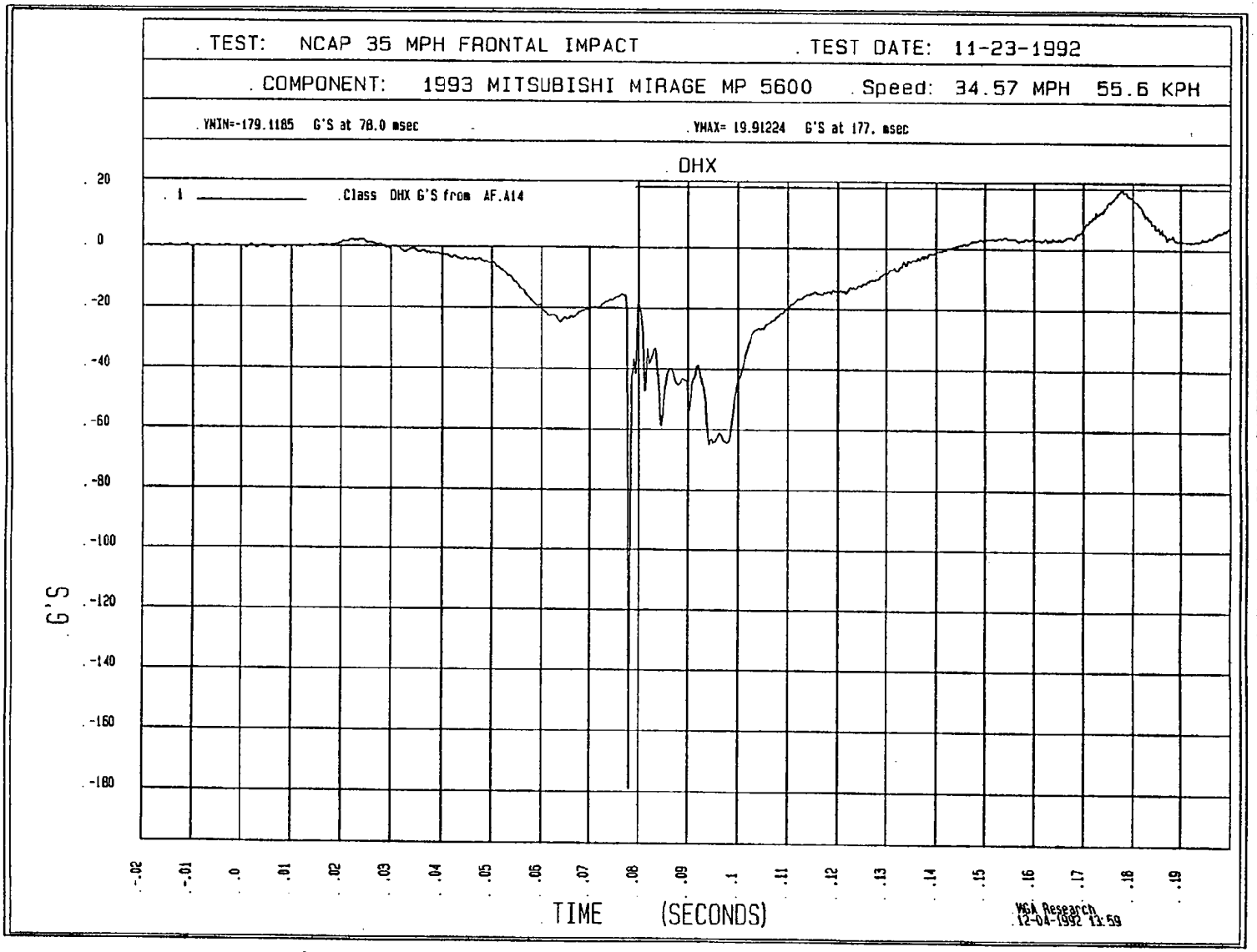


Figure B-26 - Driver Head X Acceleration vs. Time

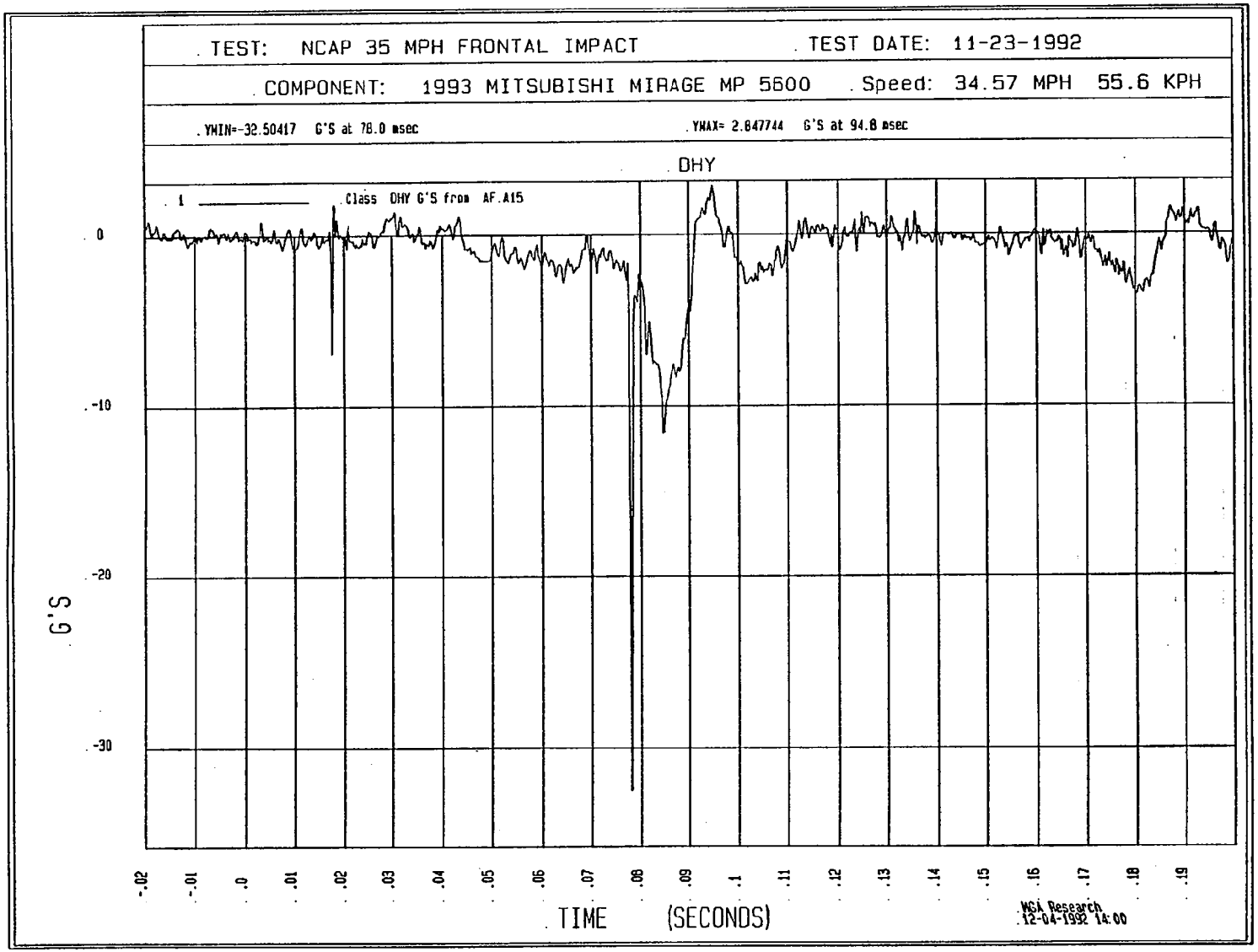


Figure B-27 - Driver Head Y Acceleration vs. Time

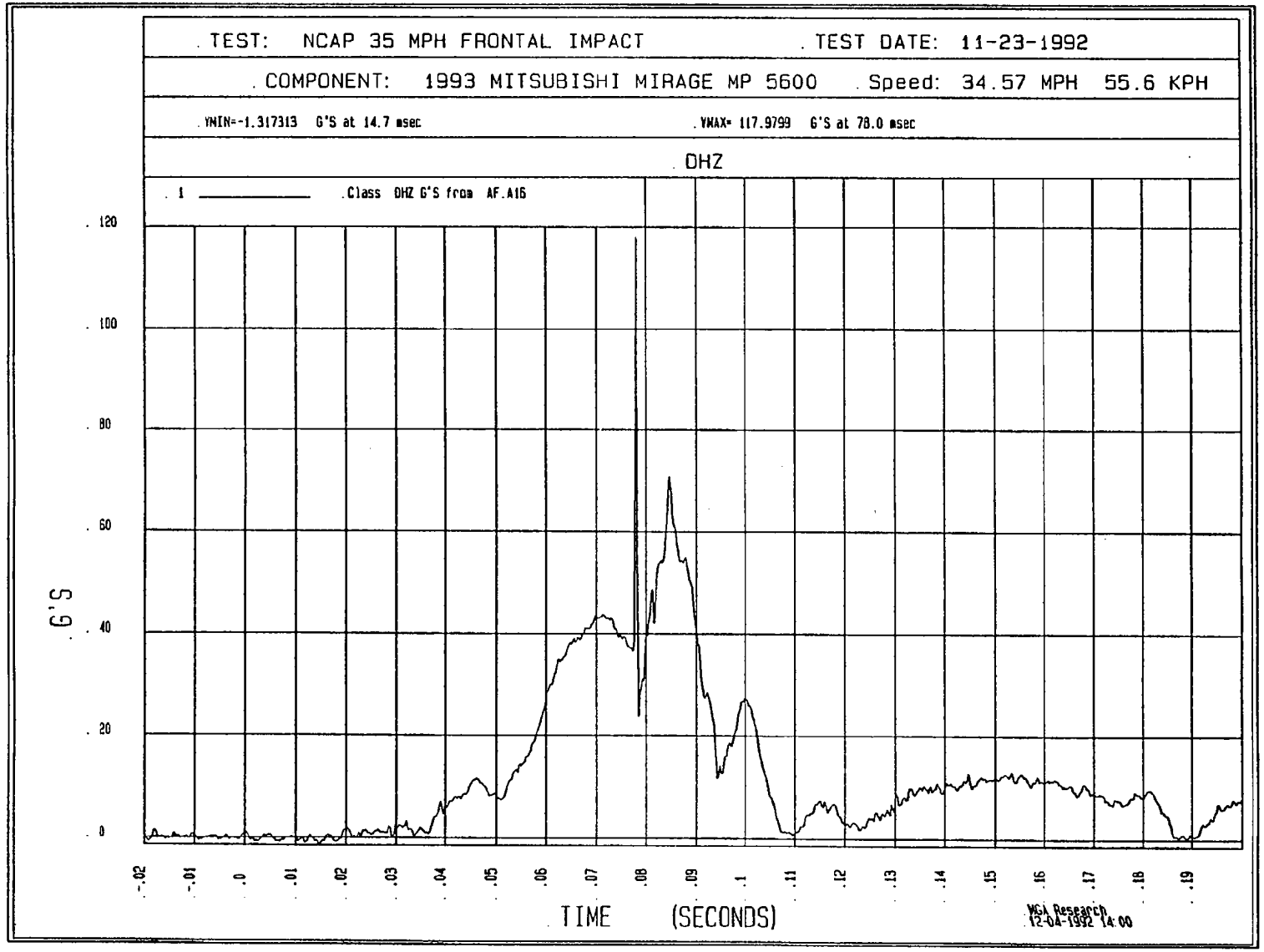


Figure B-28 - Driver Head Z Acceleration vs. Time

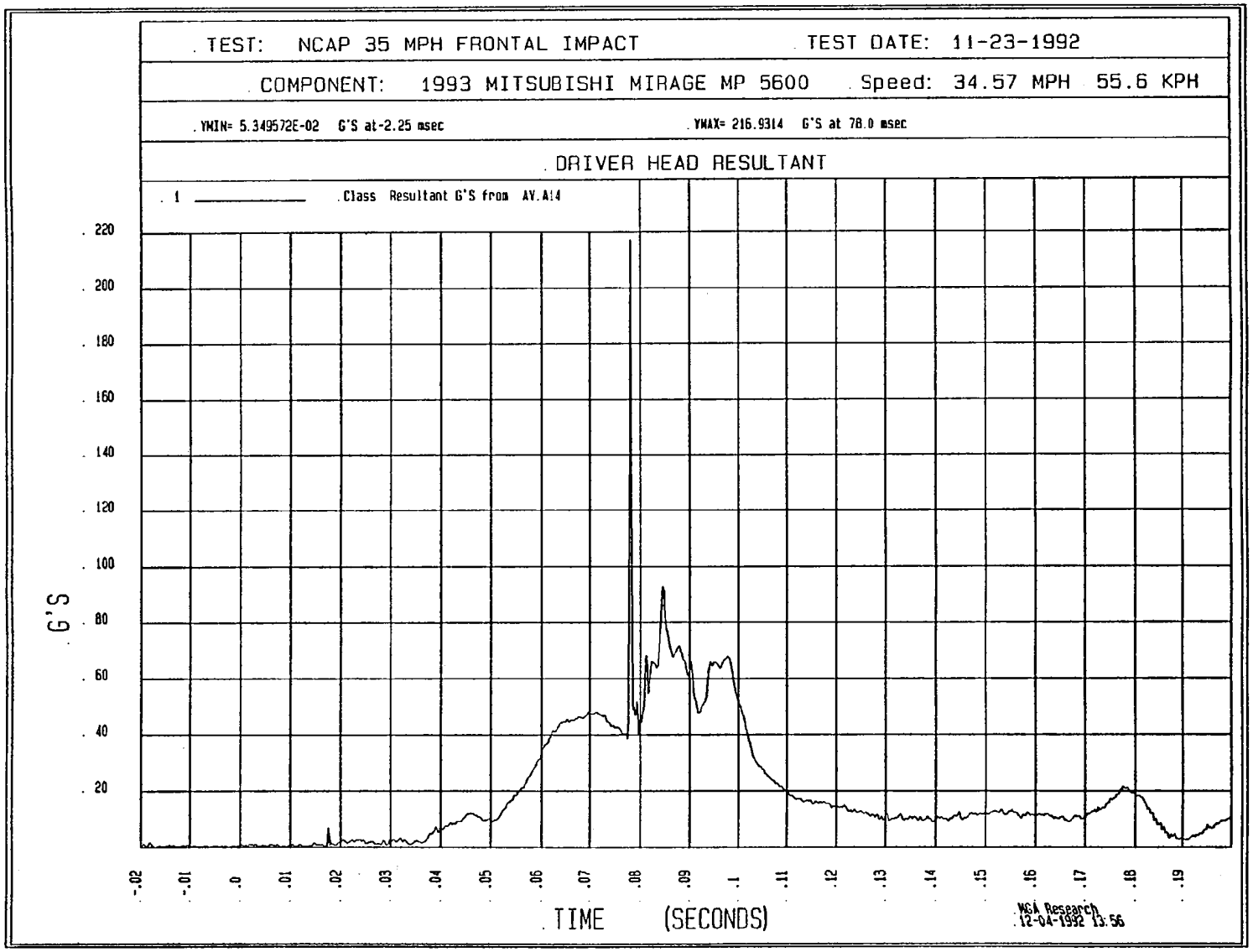


Figure B-29 - Driver Head Resultant Acceleration vs. Time

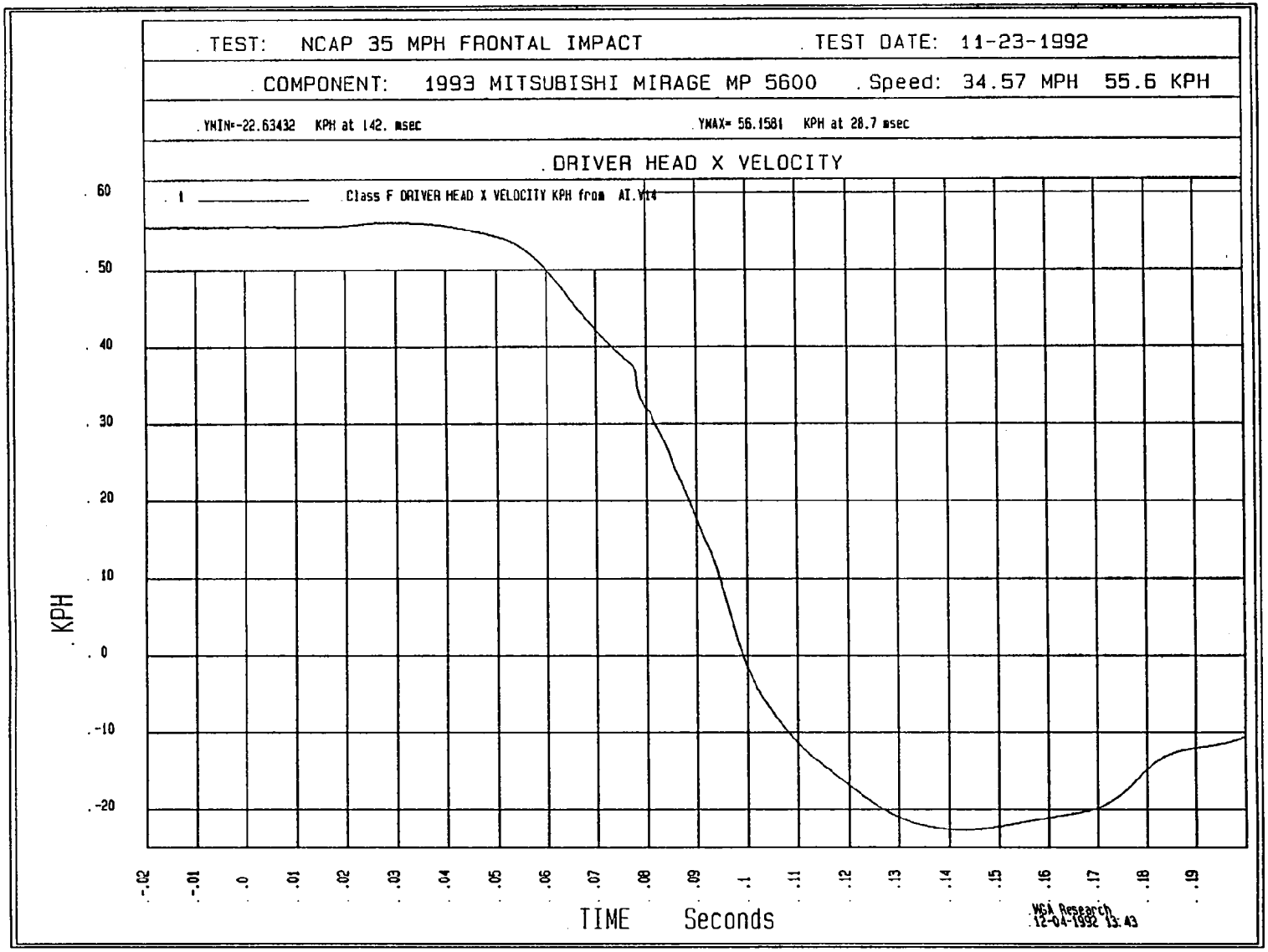


Figure B-30 - Driver Head X Velocity vs. Time

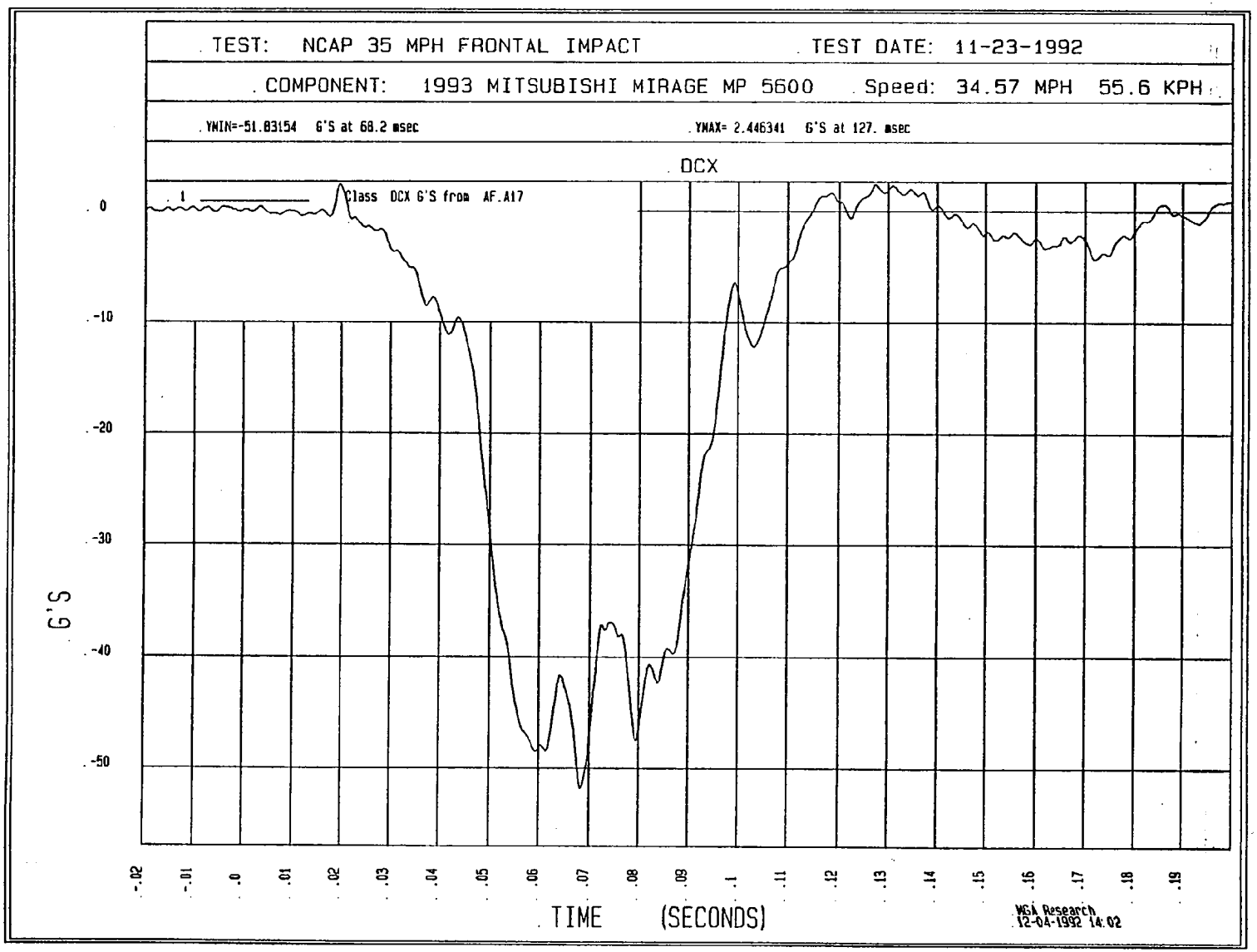


Figure B-31 - Driver Chest X Acceleration vs. Time

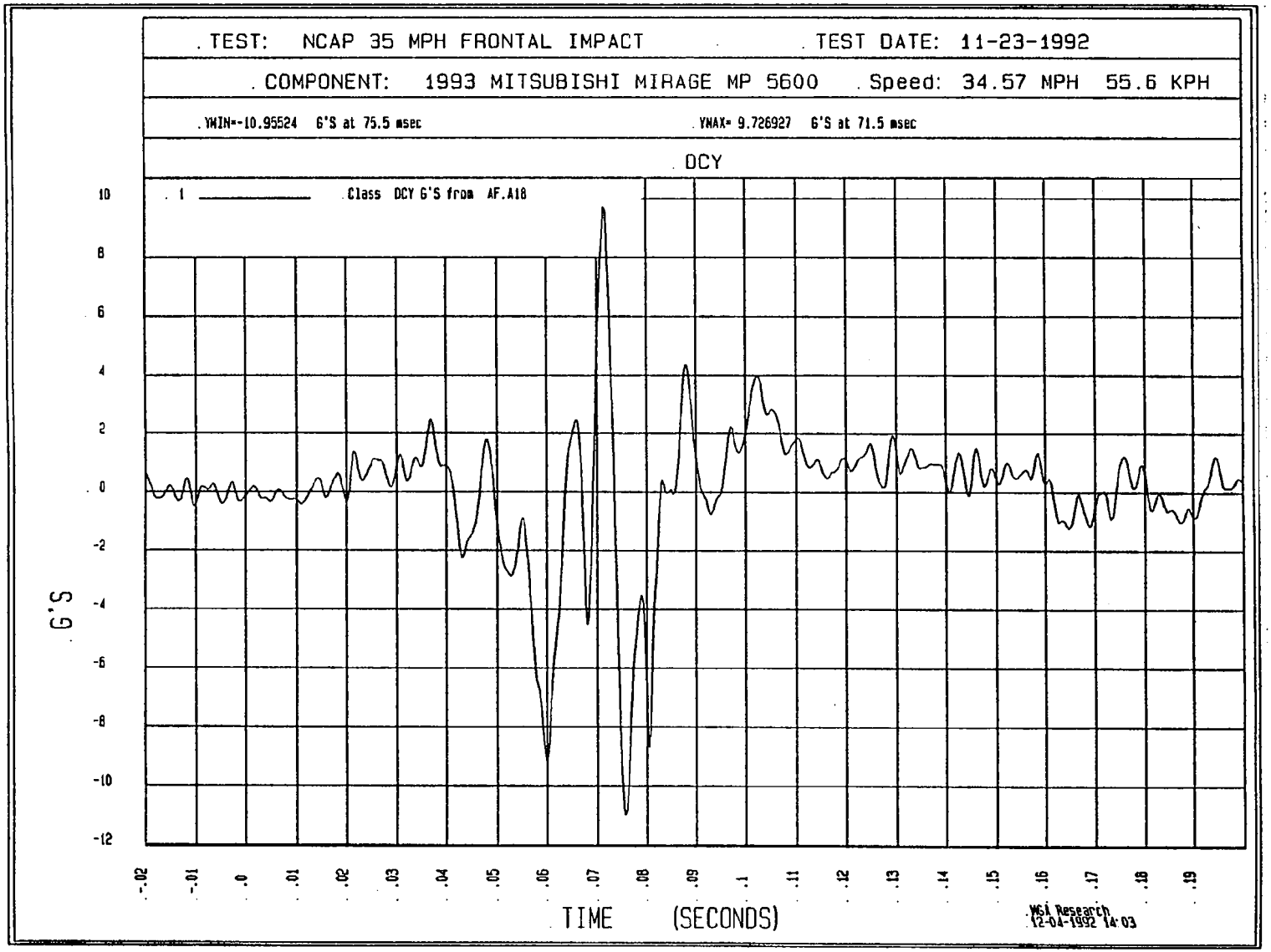


Figure B-32 - Driver Chest Y Acceleration vs. Time

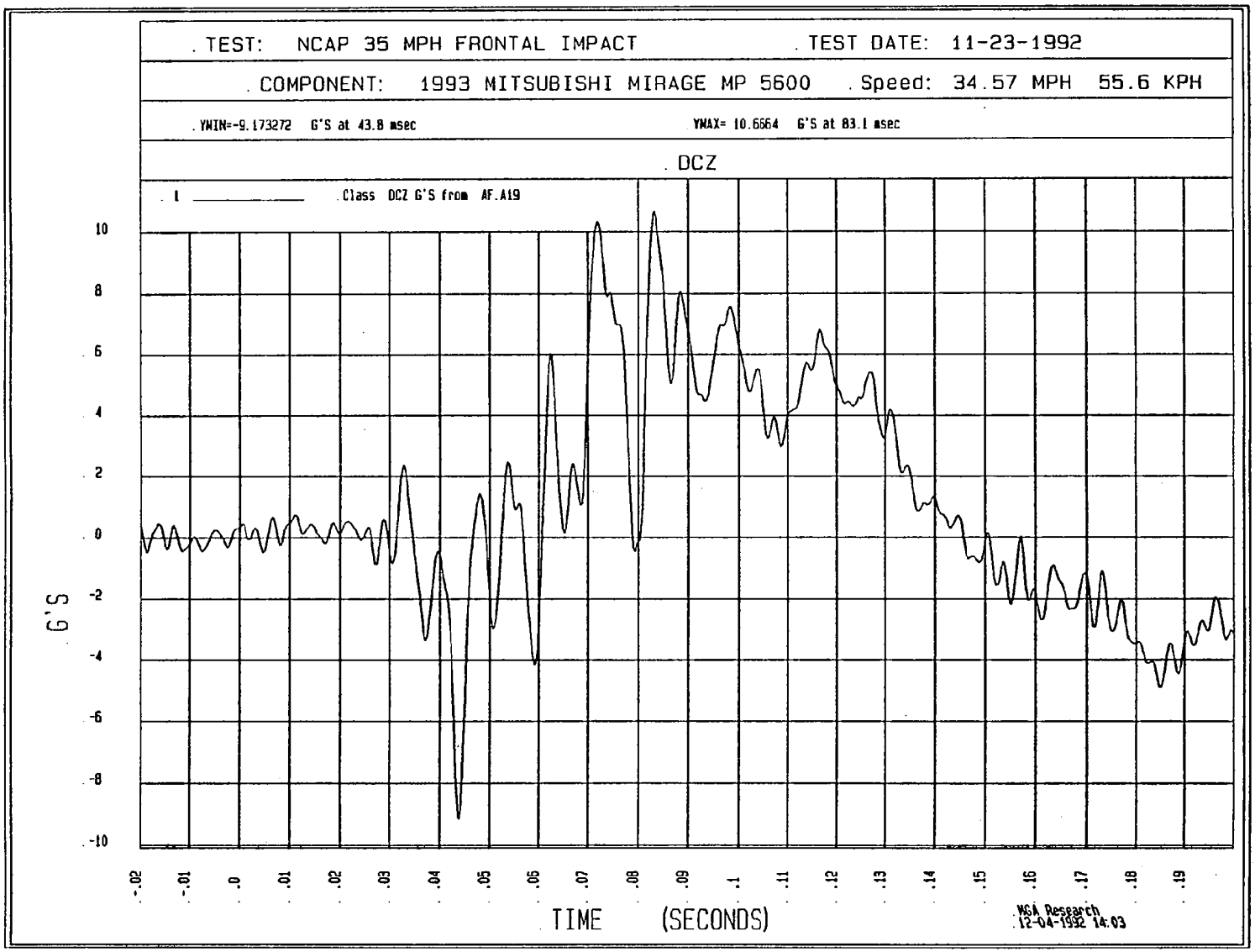


Figure B-33 - Driver Chest Z Acceleration vs. Time

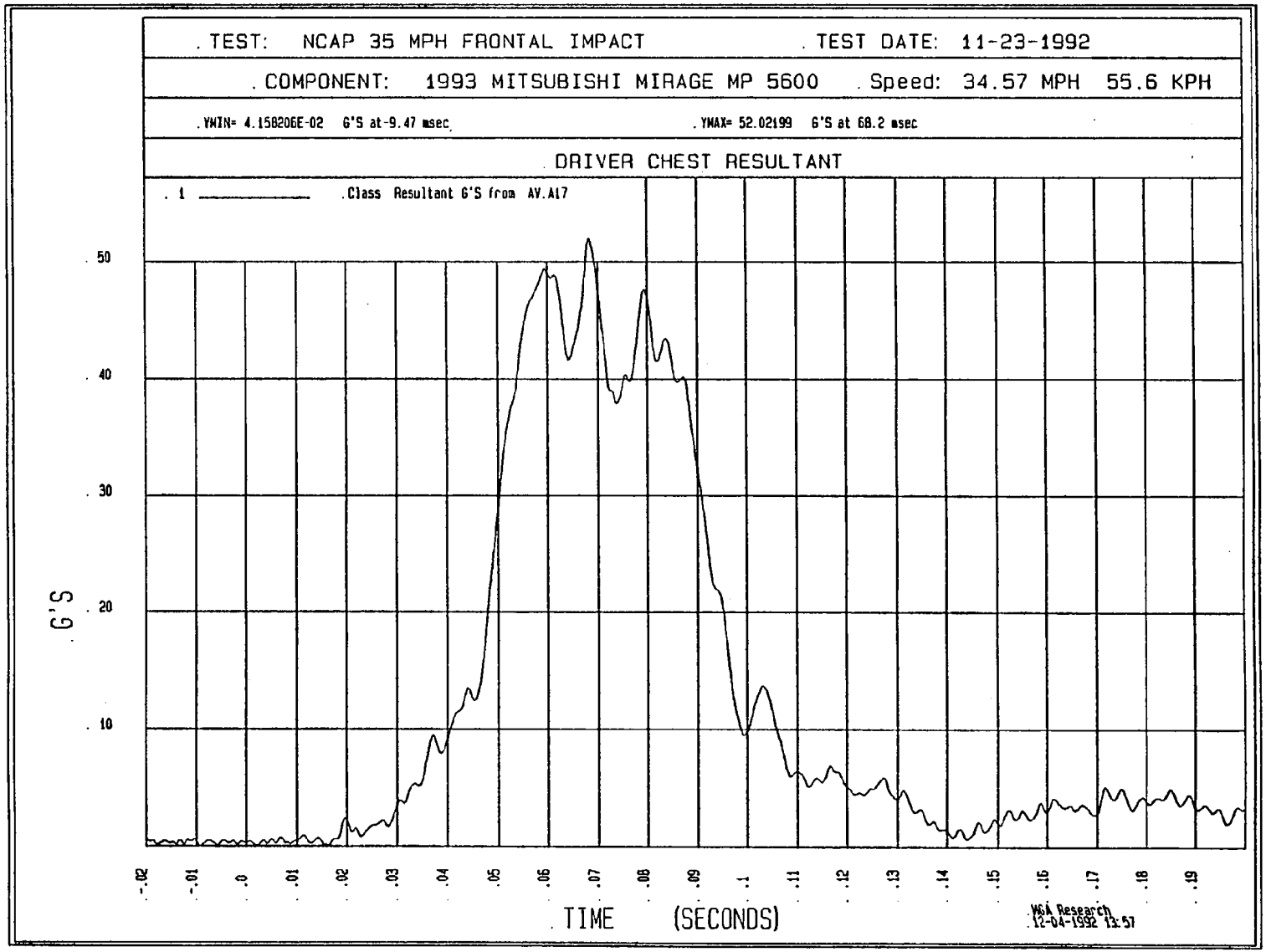


Figure B-34 - Driver Chest Resultant Acceleration vs. Time

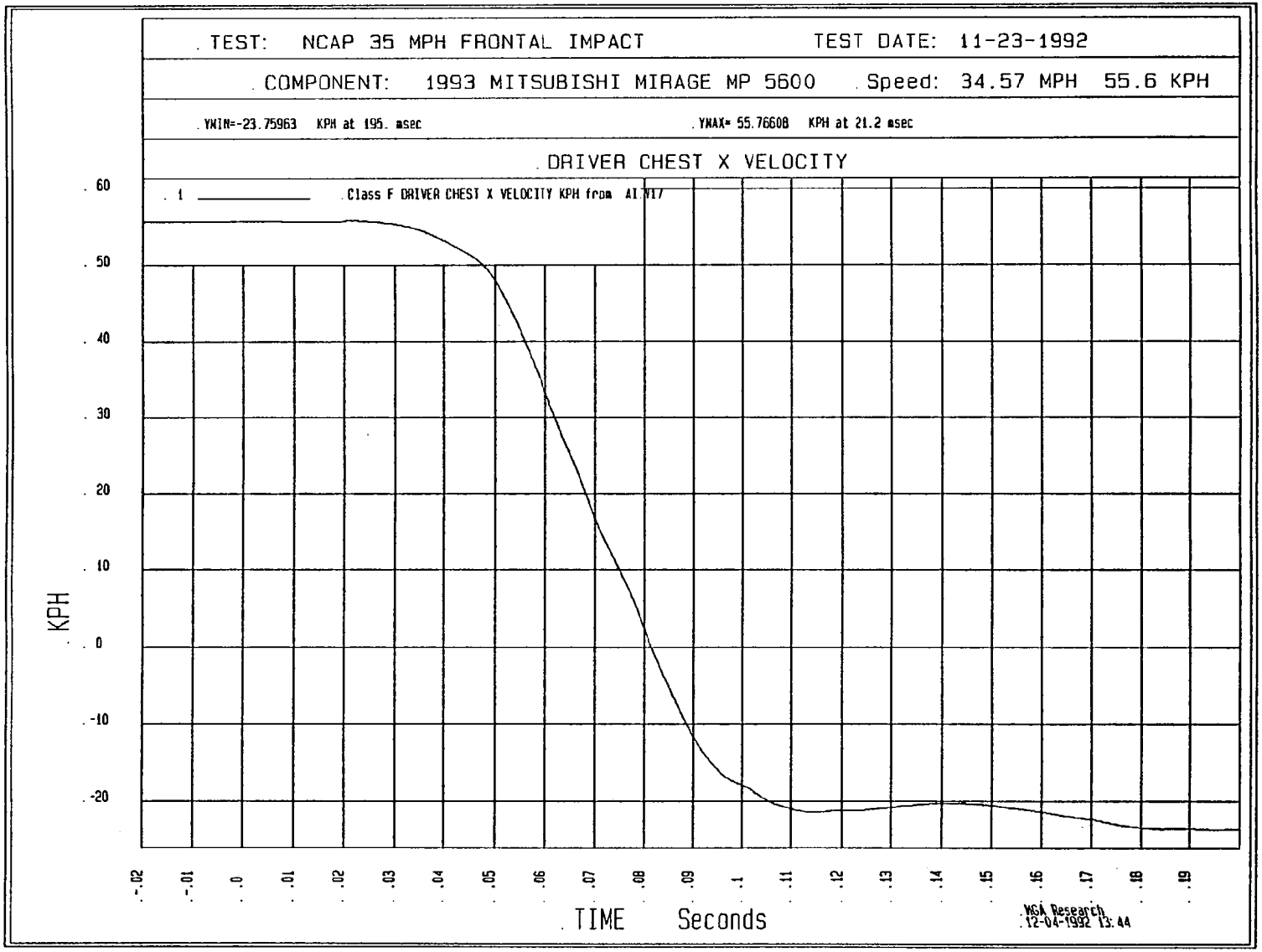


Figure B- 35- Driver Chest X Velocity vs. Time

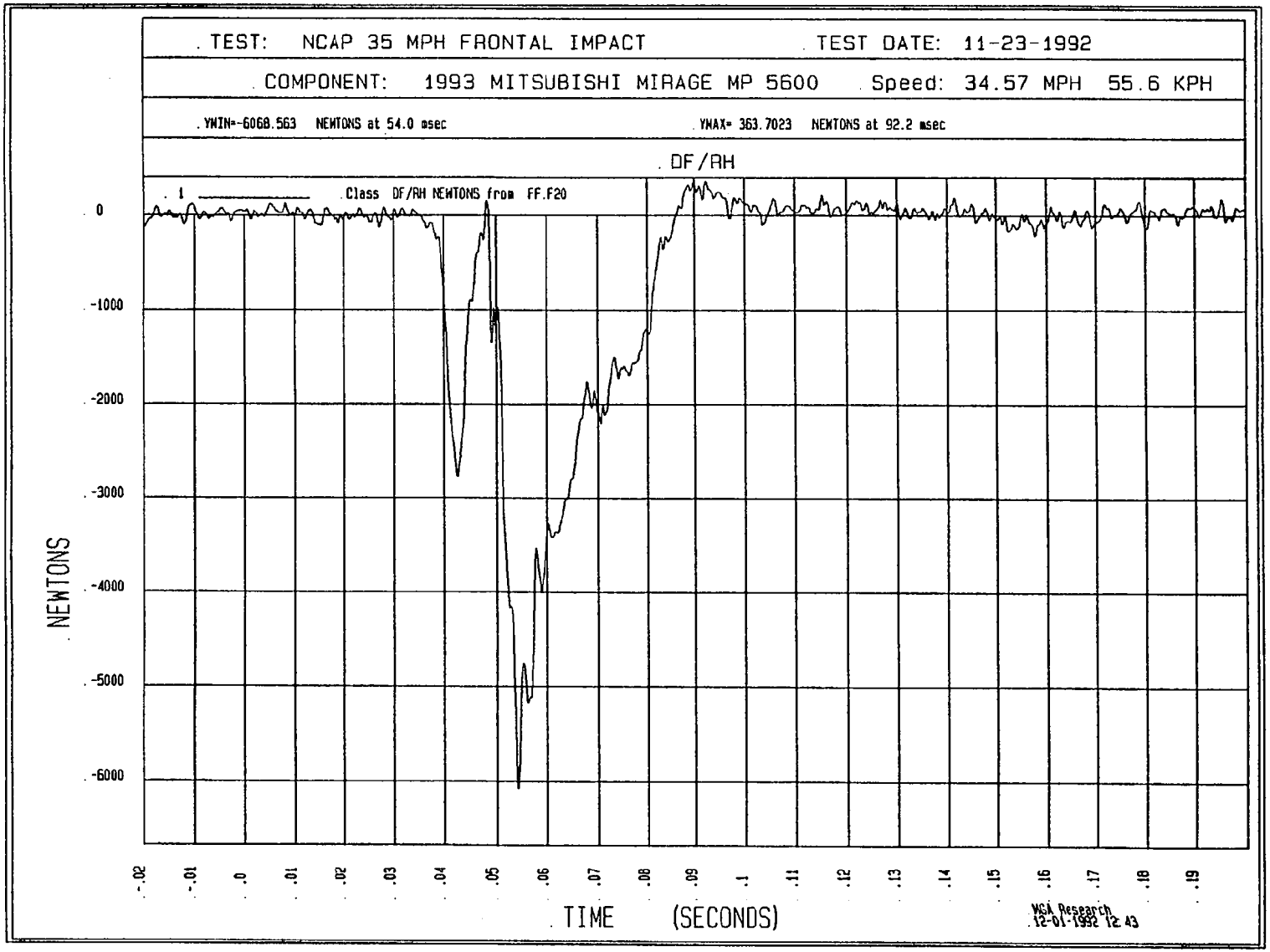


Figure B-36 - Driver Right Femur Force vs. Time

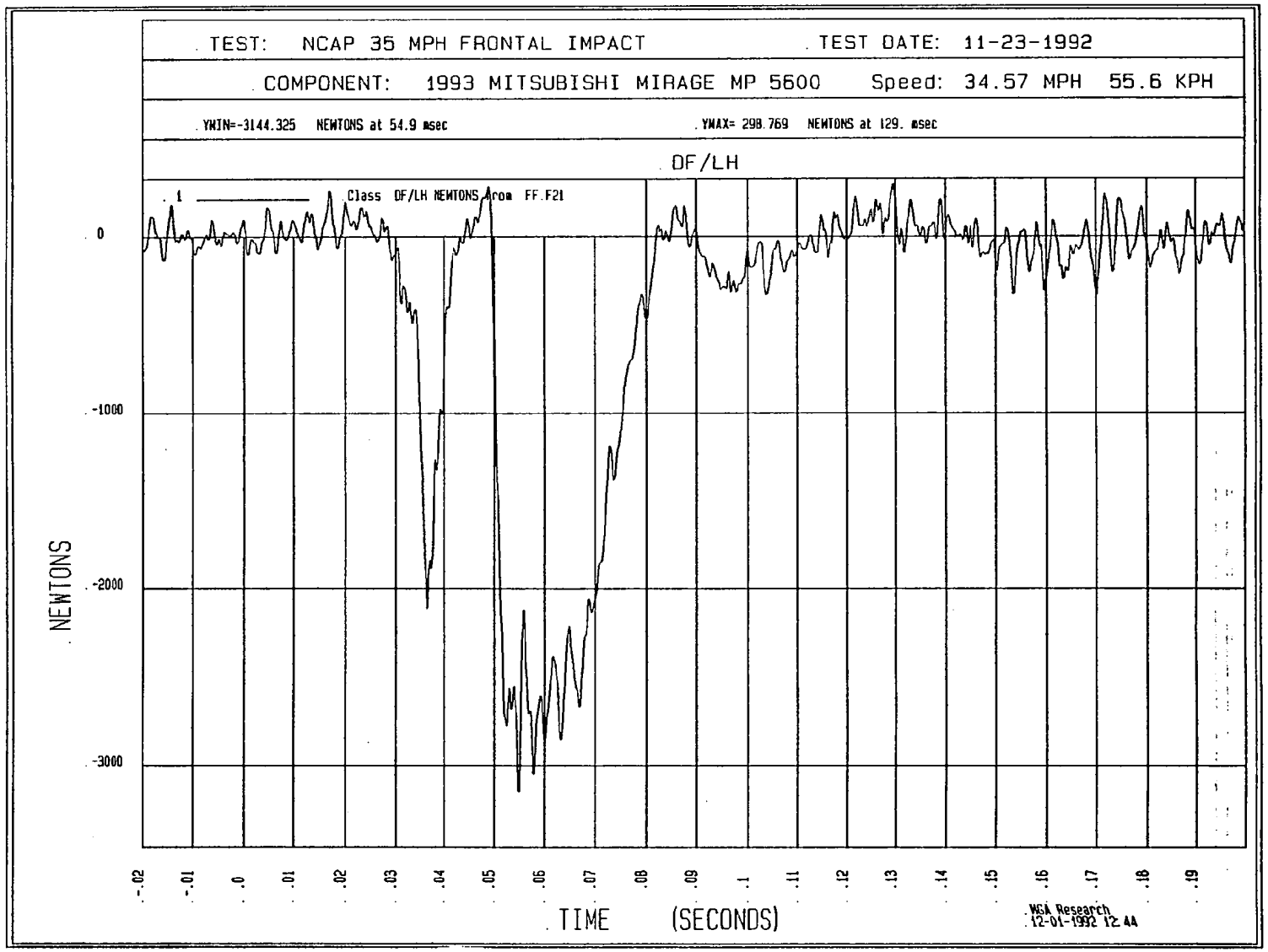


Figure B-37 - Driver Left Femur Force vs. Time

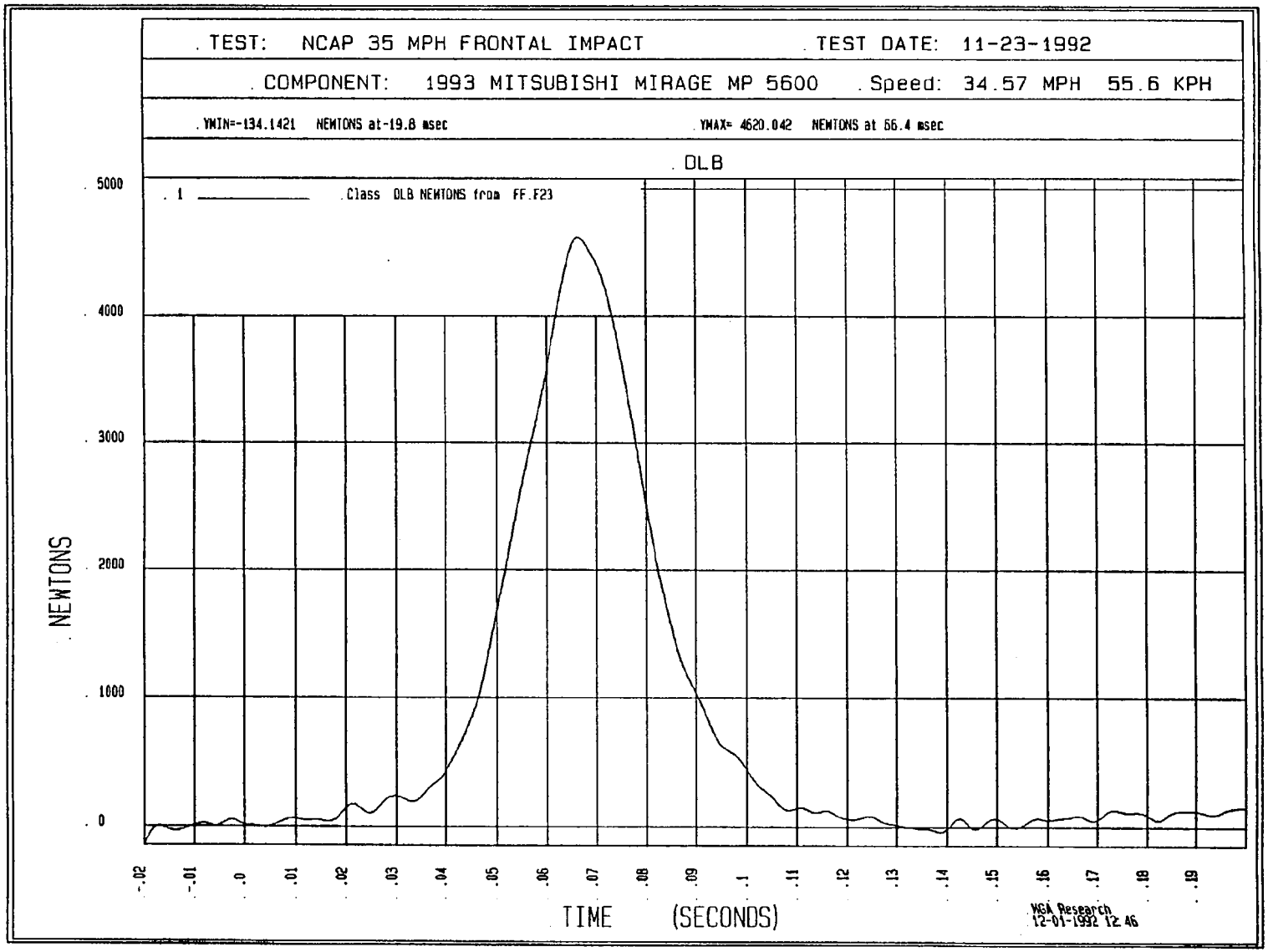


Figure B-38 - Driver Lap Belt Force vs. Time

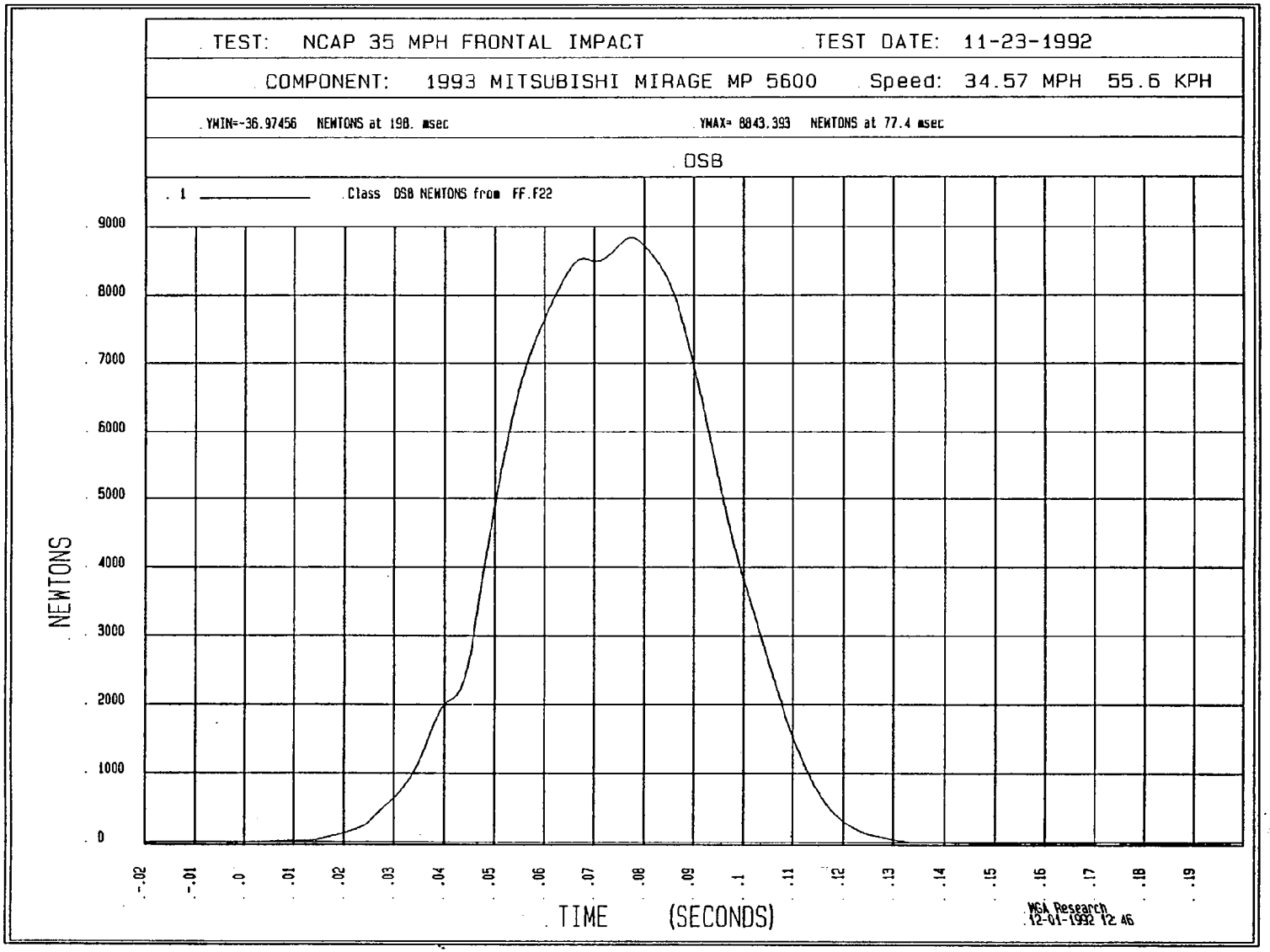


Figure B- 39- Driver Torso Belt Force vs. Time

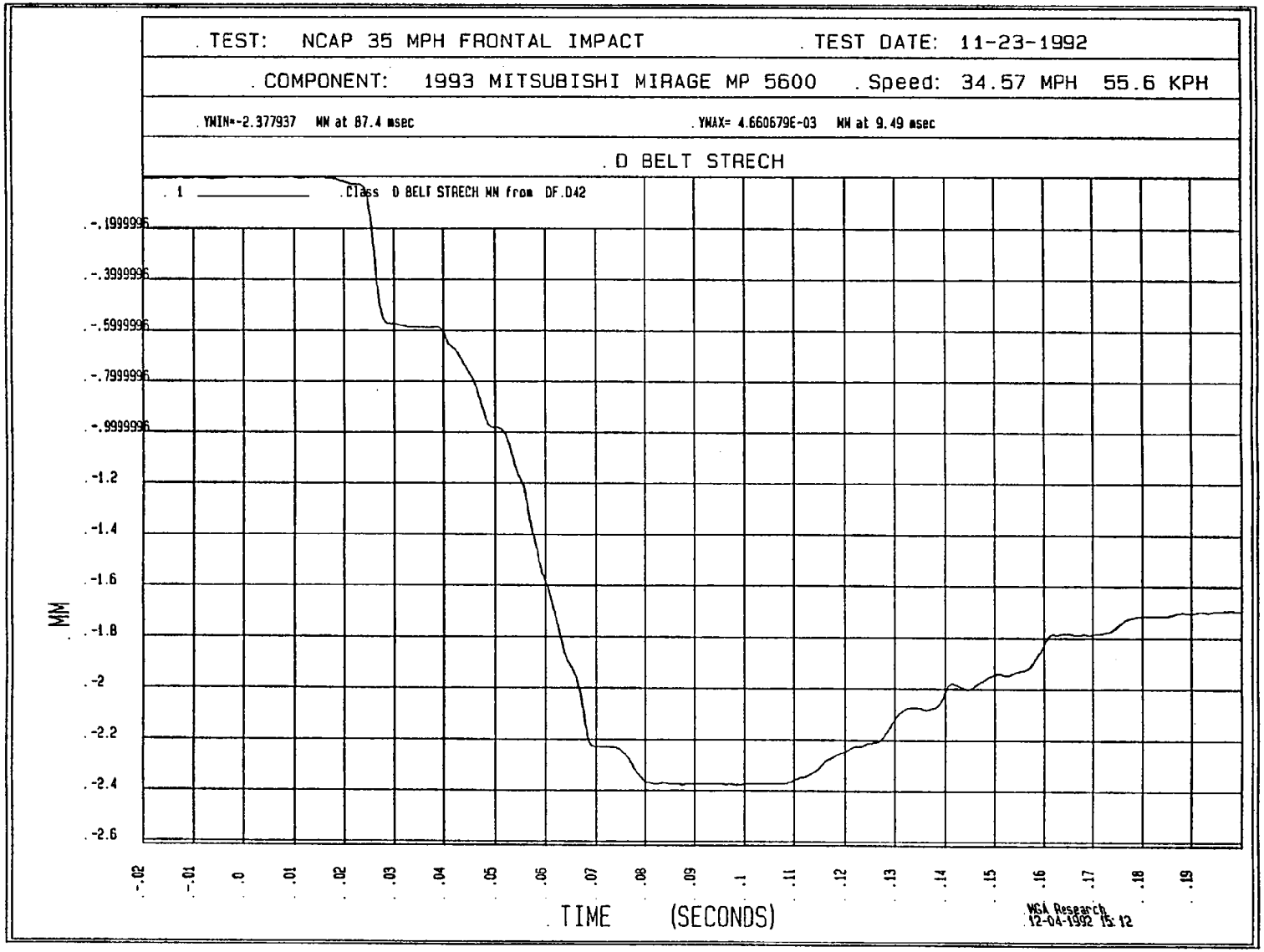


Figure B-40 - Driver Torso Belt Stretch vs. Time

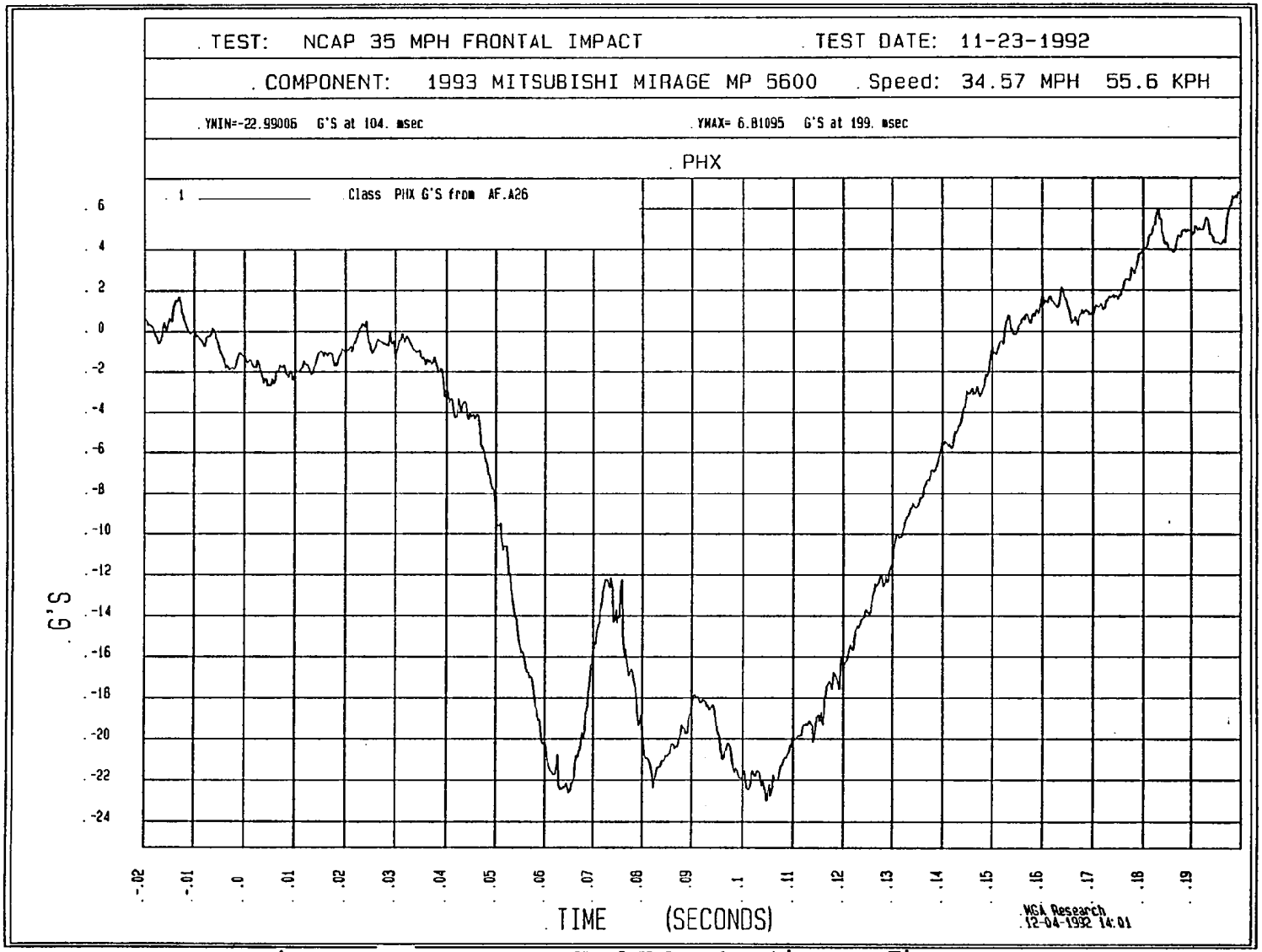


Figure B-41 - Passenger Head X Acceleration vs. Time

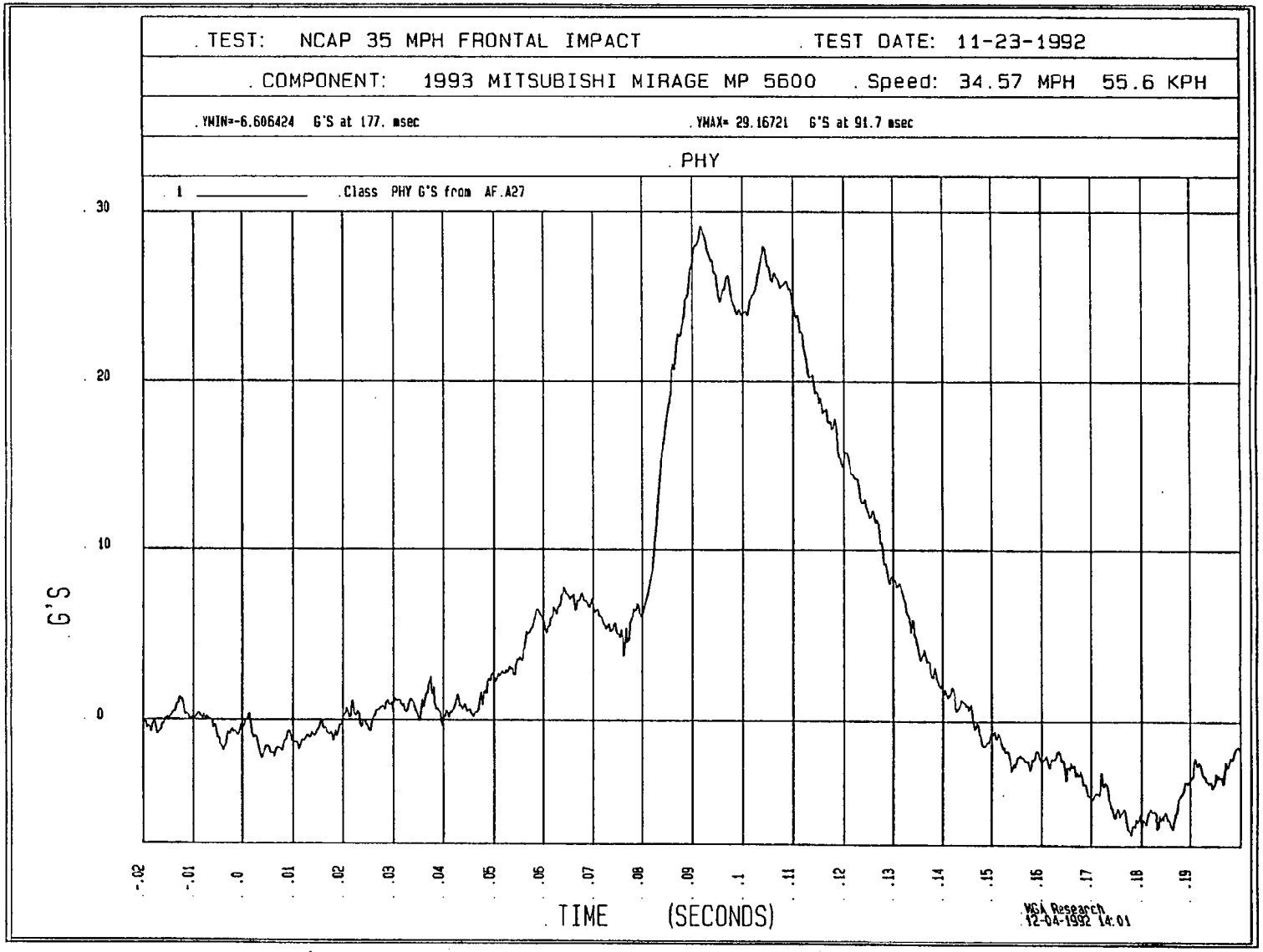


Figure B-42 - Passenger Head Y Acceleration vs. Time

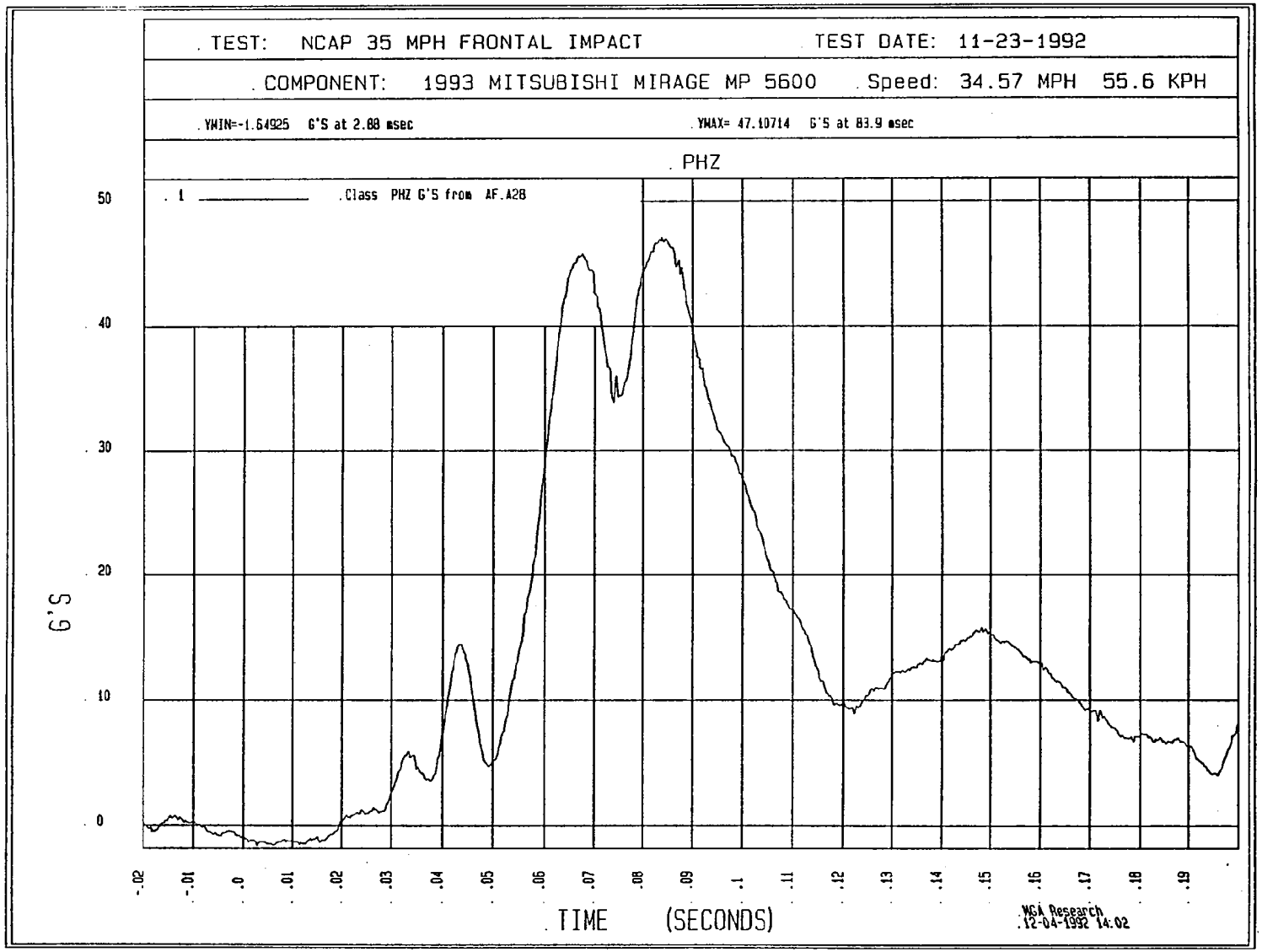


Figure B-43 - Passenger Head Z Acceleration vs. Time

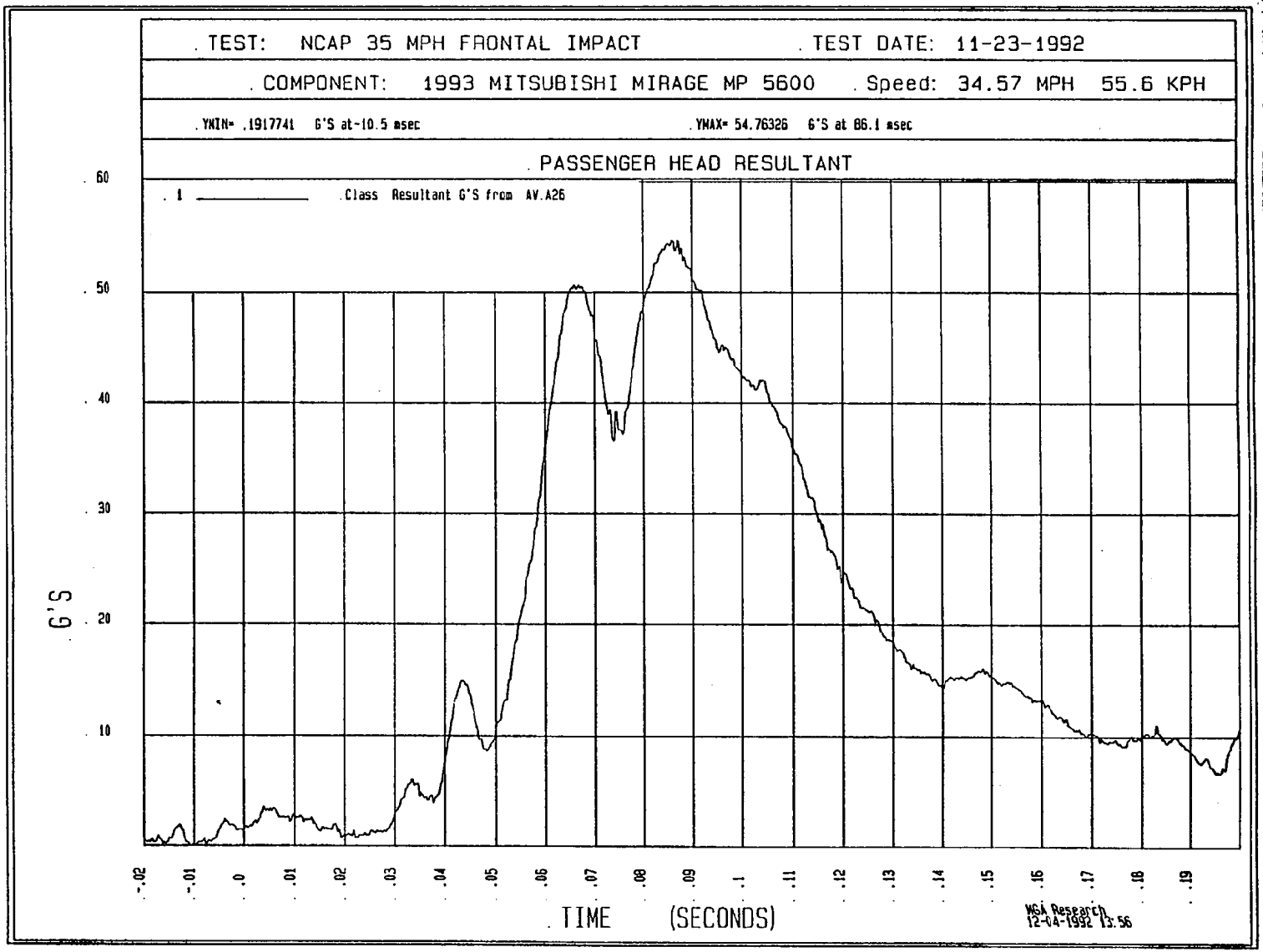


Figure B- 44 - Passenger Head Resultant Acceleration vs. Time

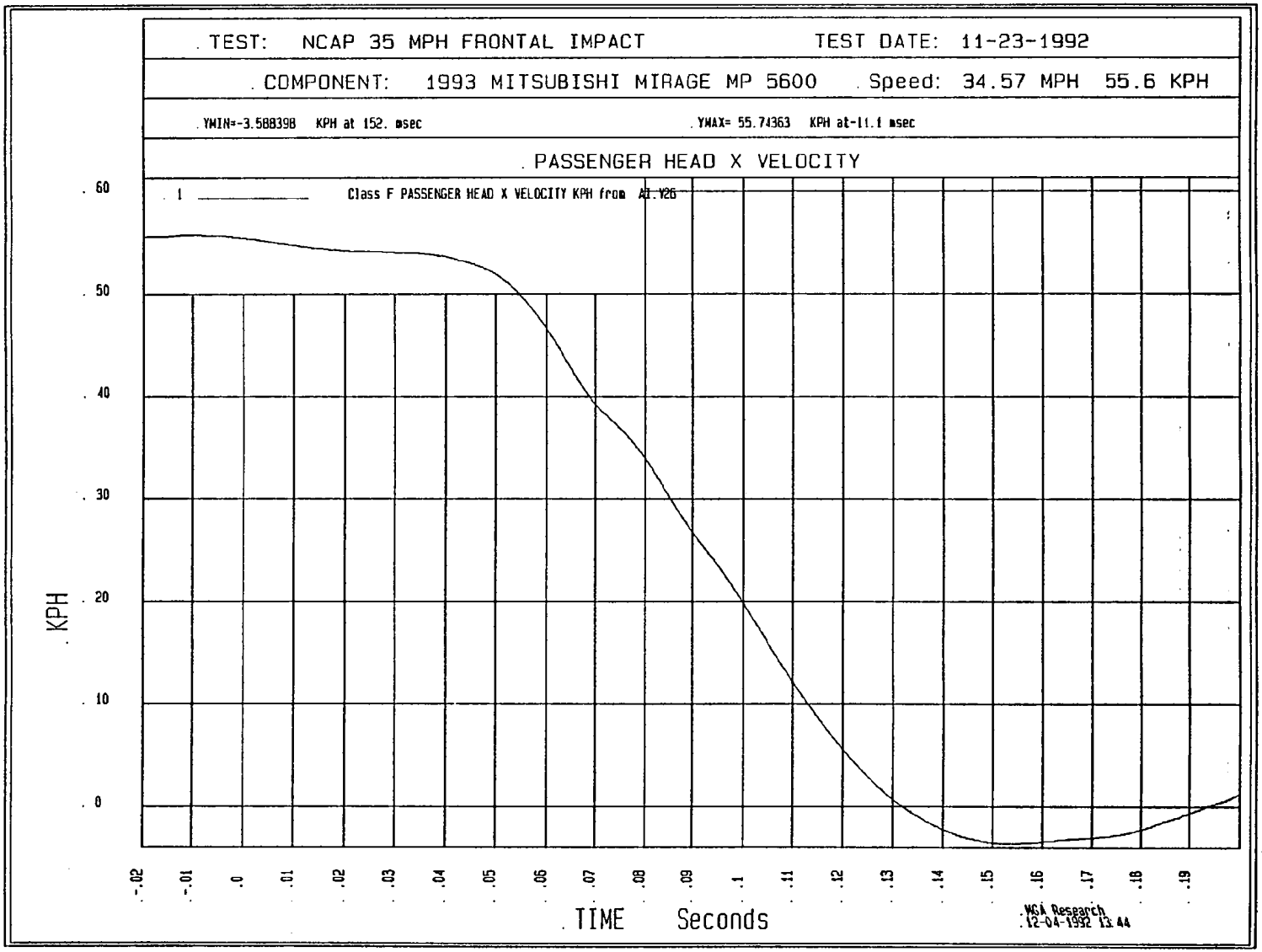


Figure B- 45 · Passenger Head X Velocity vs. Time

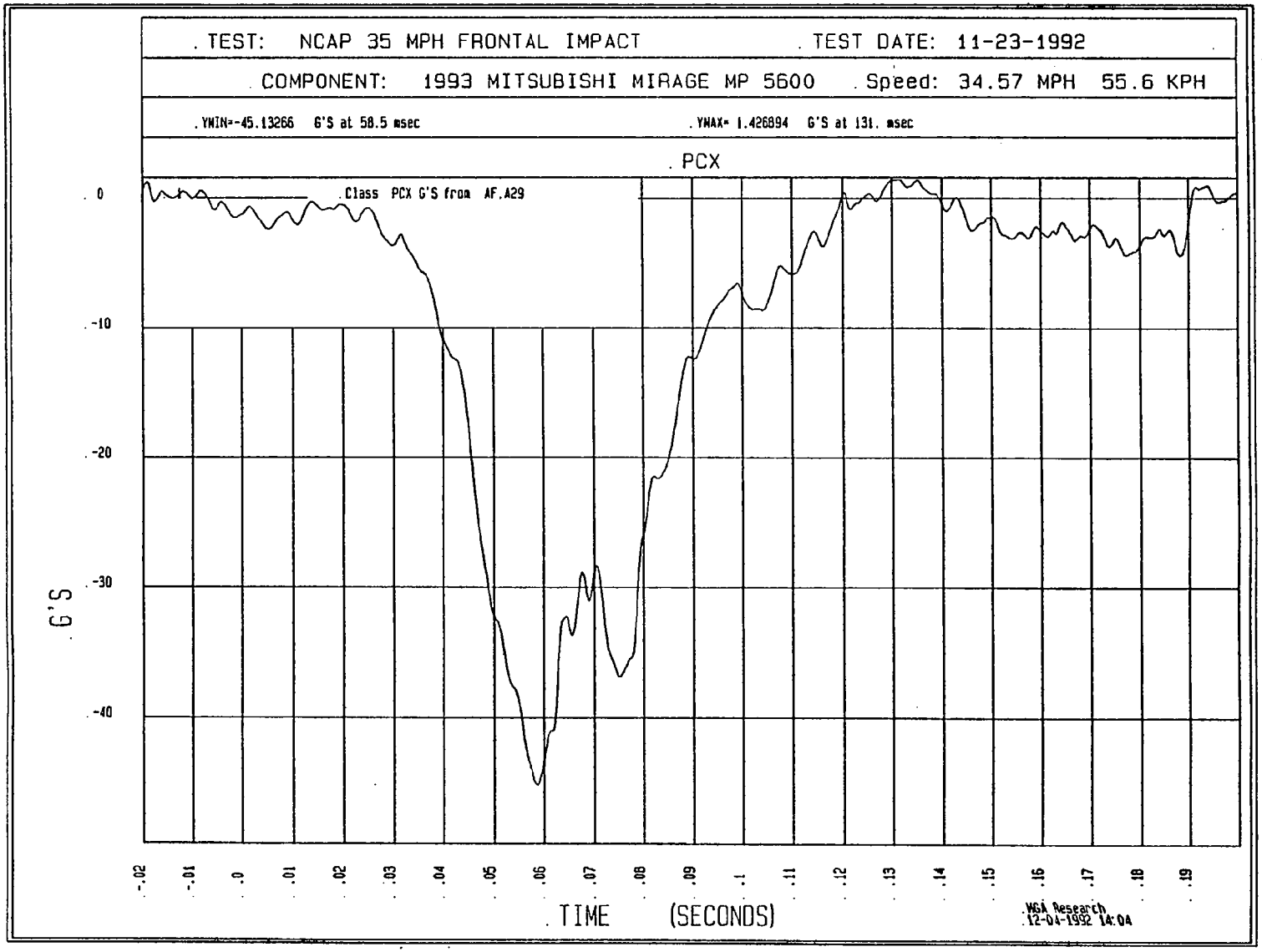


Figure B-16 Passenger Chest X Acceleration vs. Time

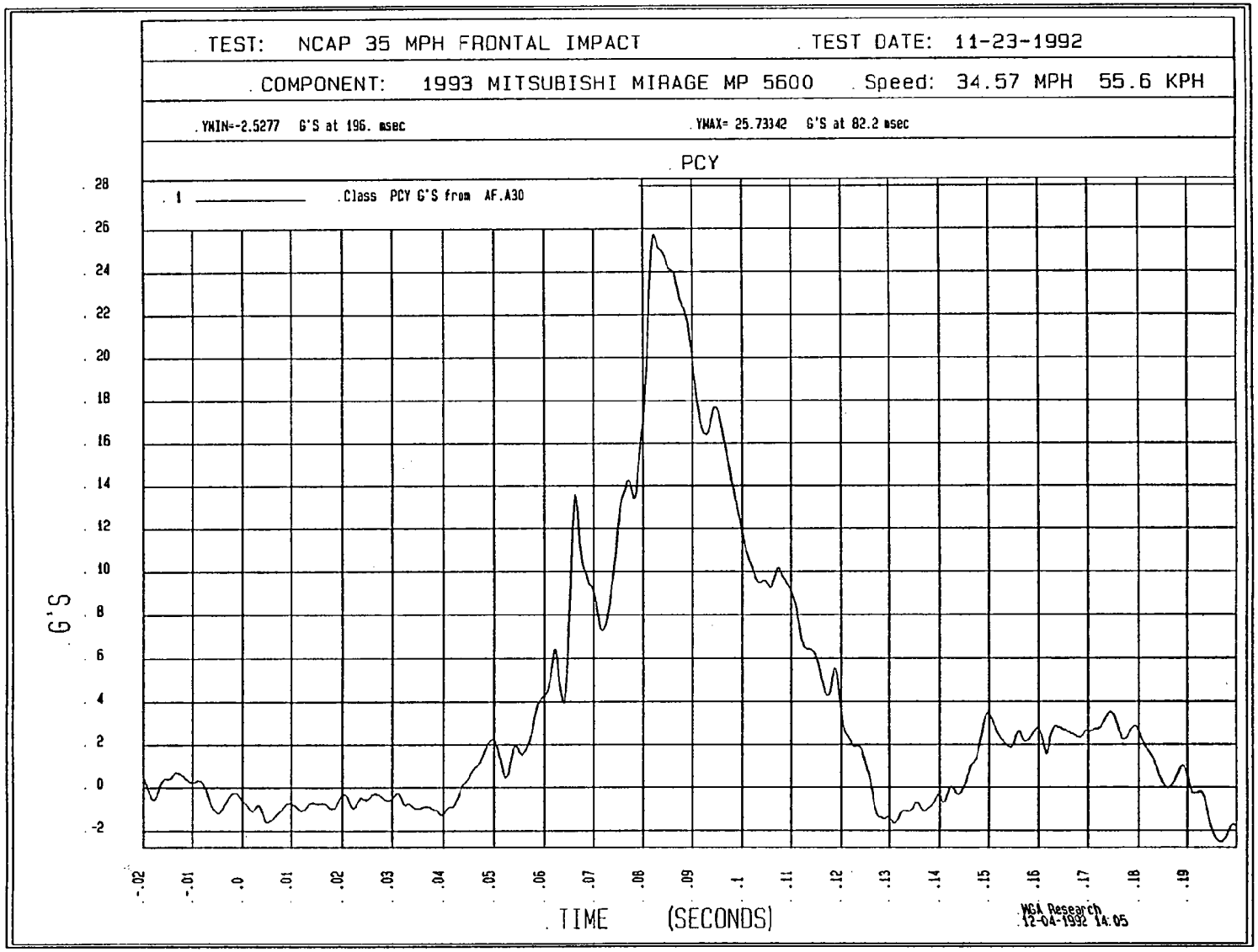


Figure B- 47· Passenger Chest Y Acceleration vs. Time

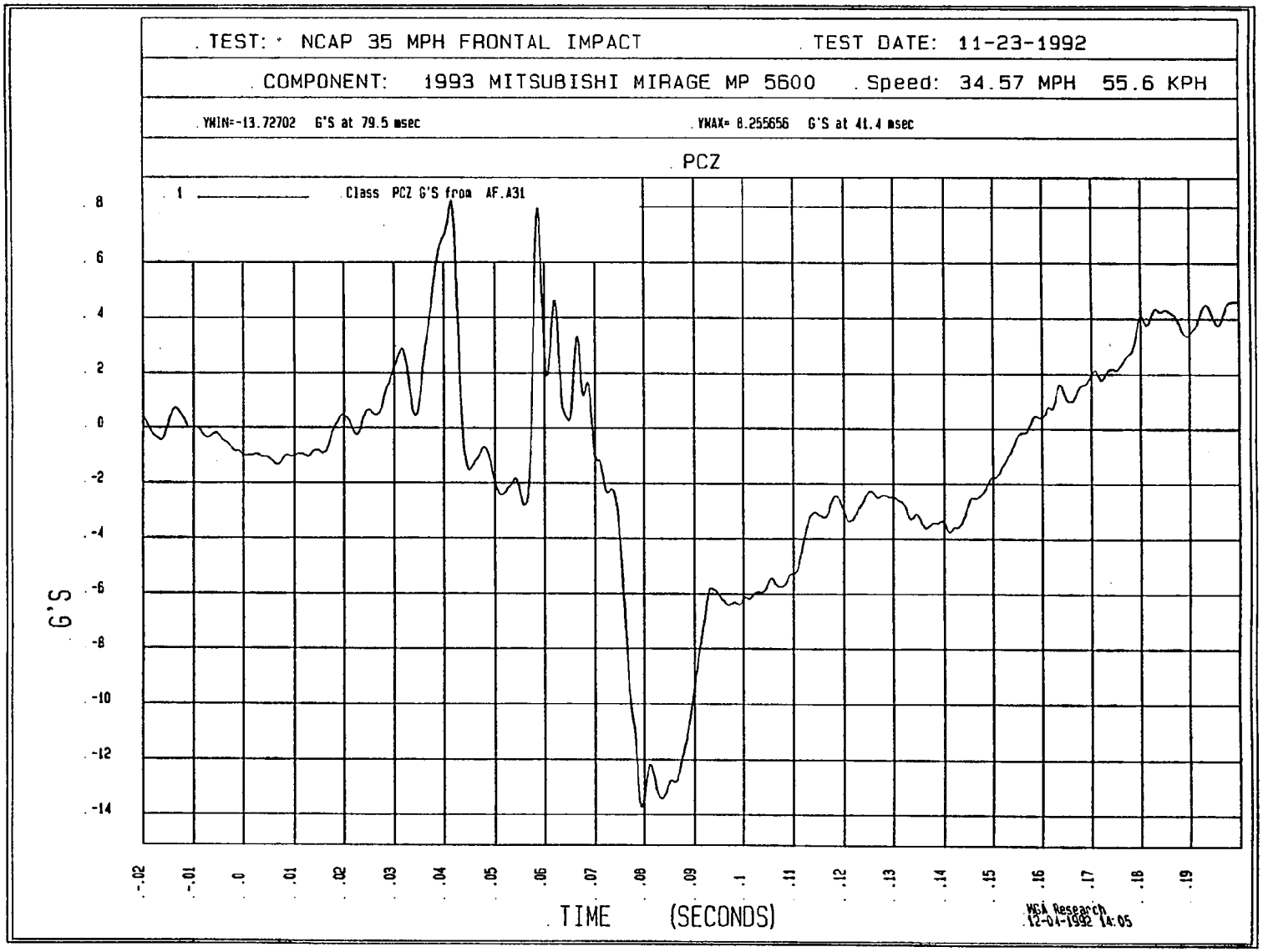


Figure B-48 - Passenger Chest Z Acceleration vs. Time

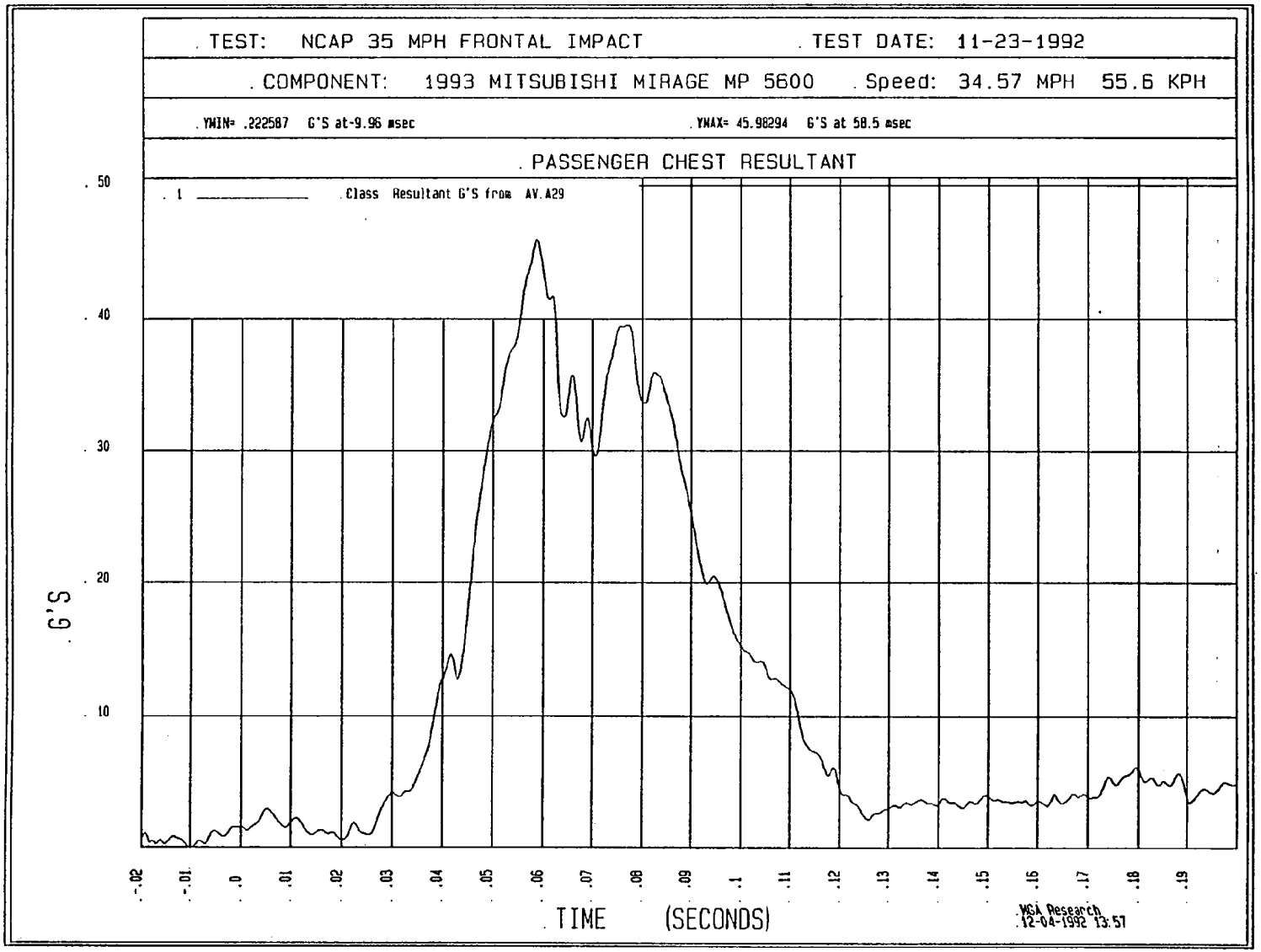


Figure B-49 - Passenger Chest Resultant Acceleration vs. Time

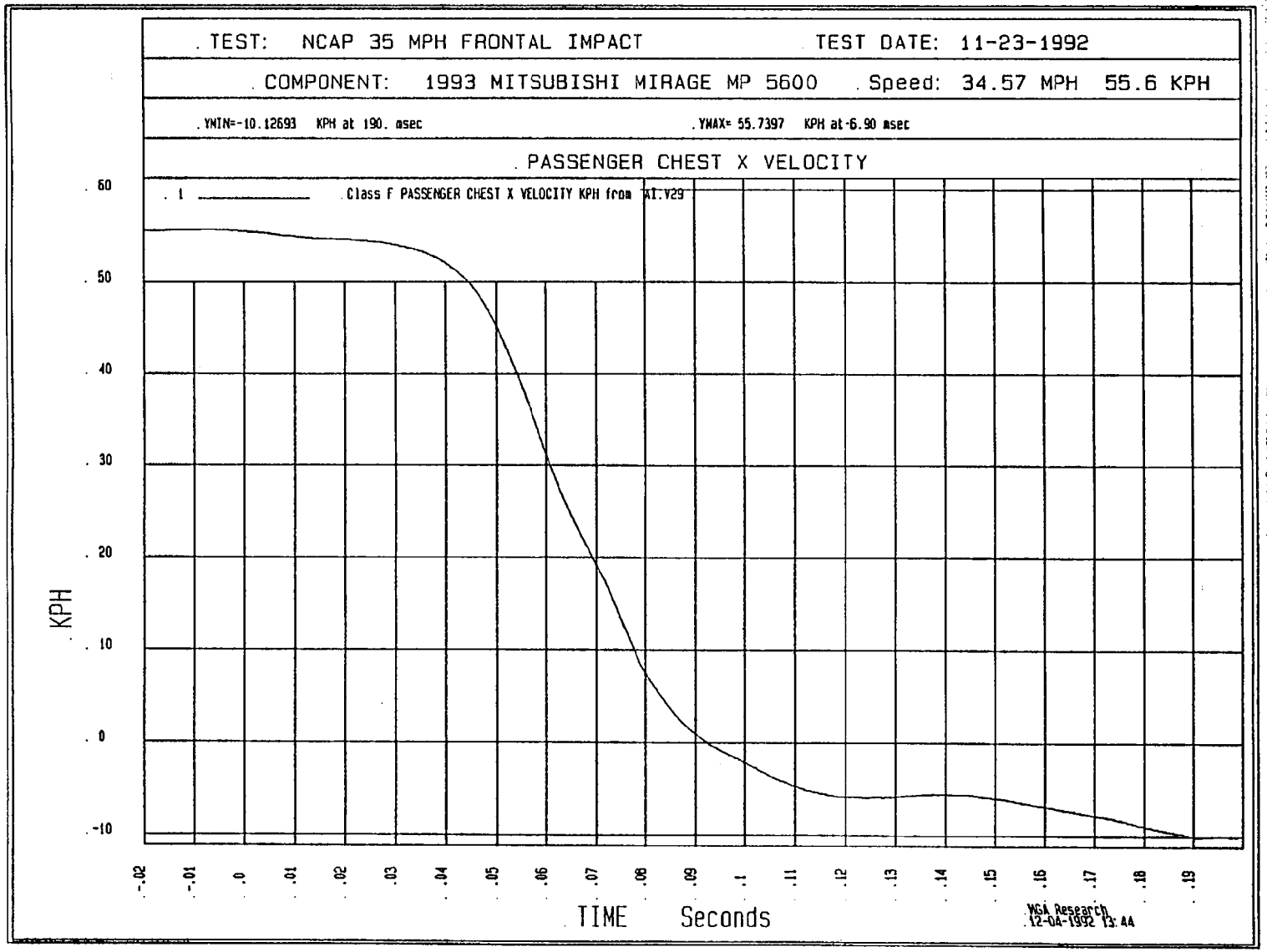


Figure B- 50 - Passenger Chest X Velocity vs. Time

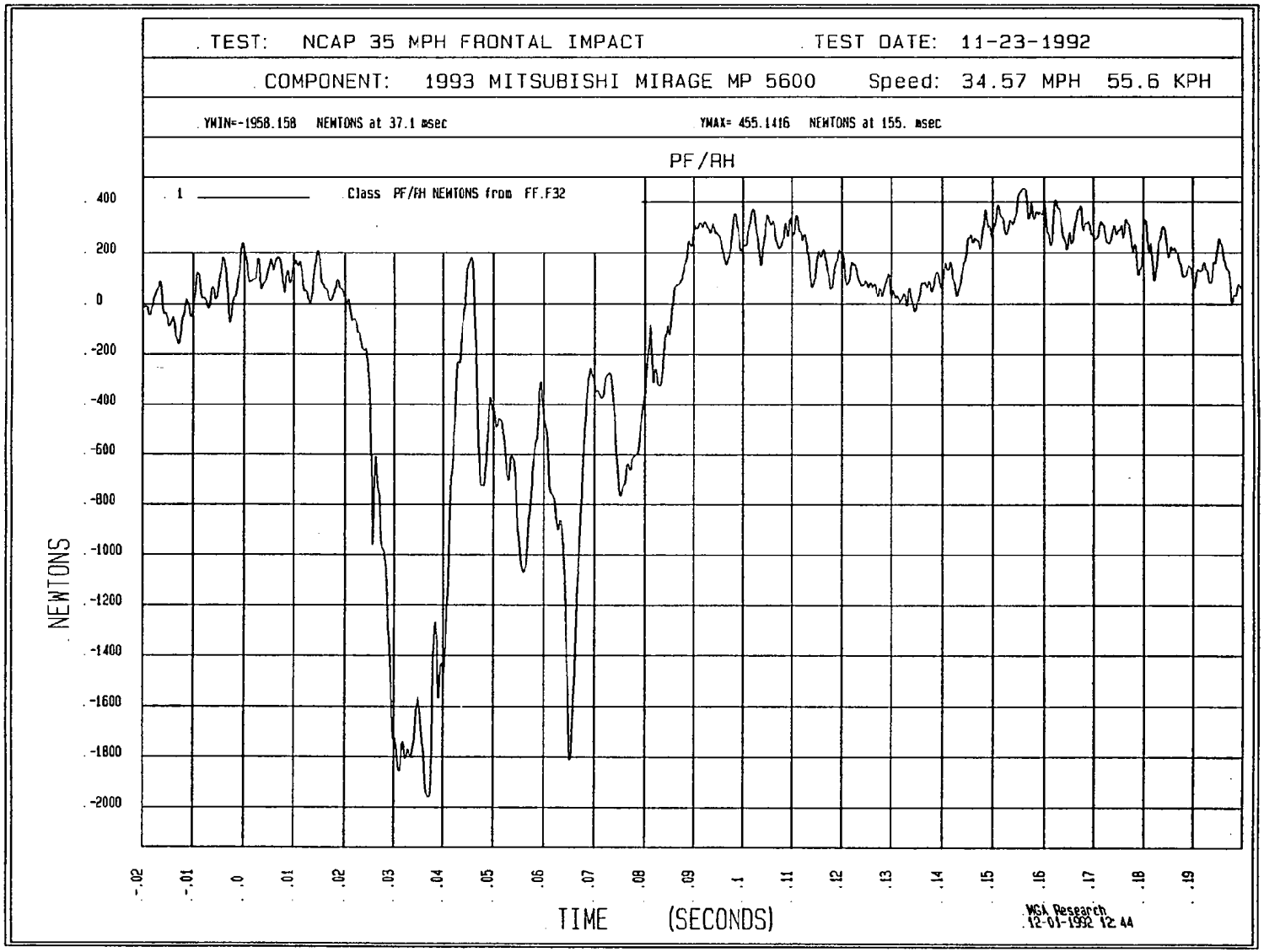


Figure B-51- Passenger Right Femur Force vs. Time

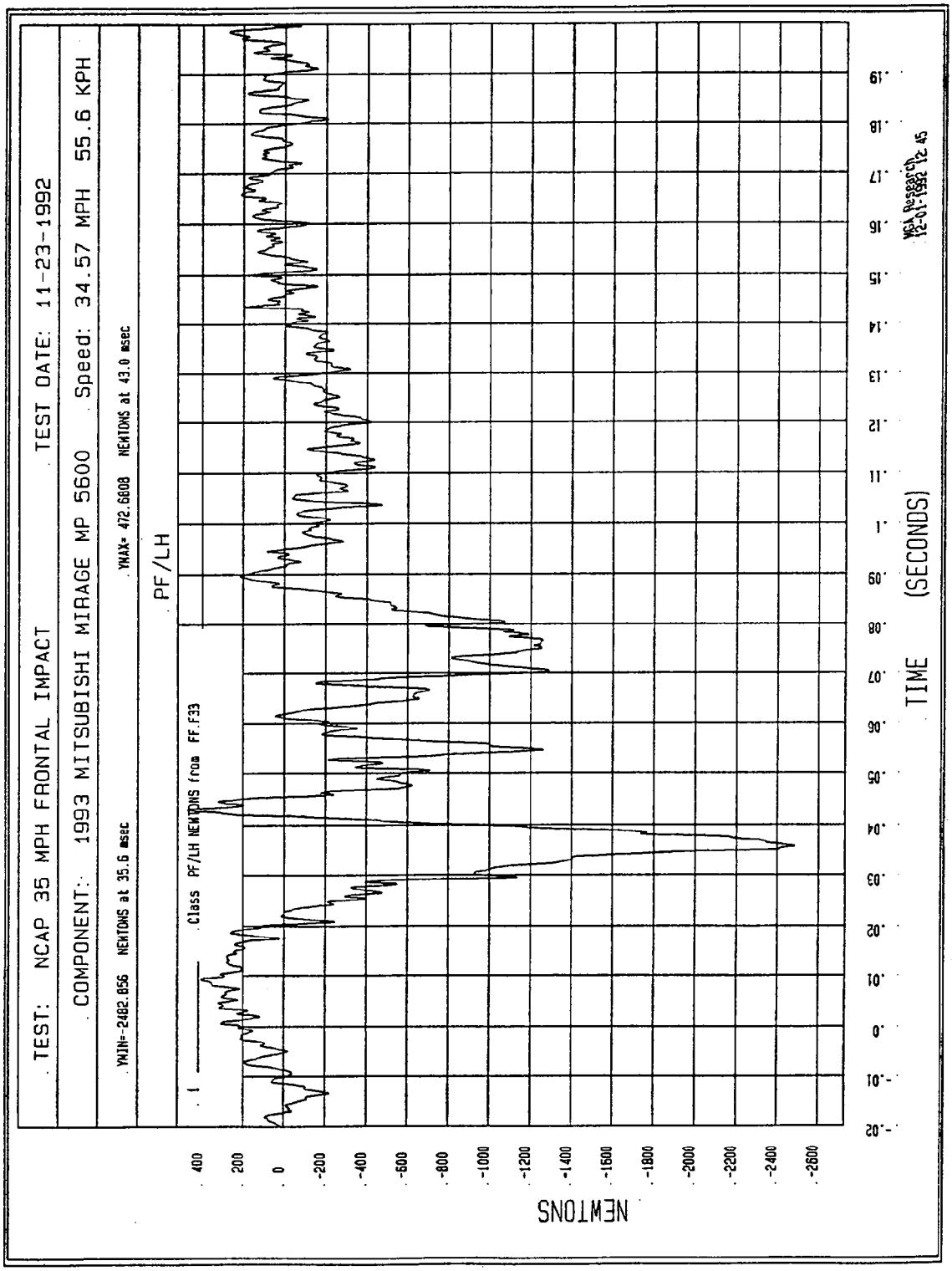


Figure B-52 - Passenger Left Femur Force vs. Time

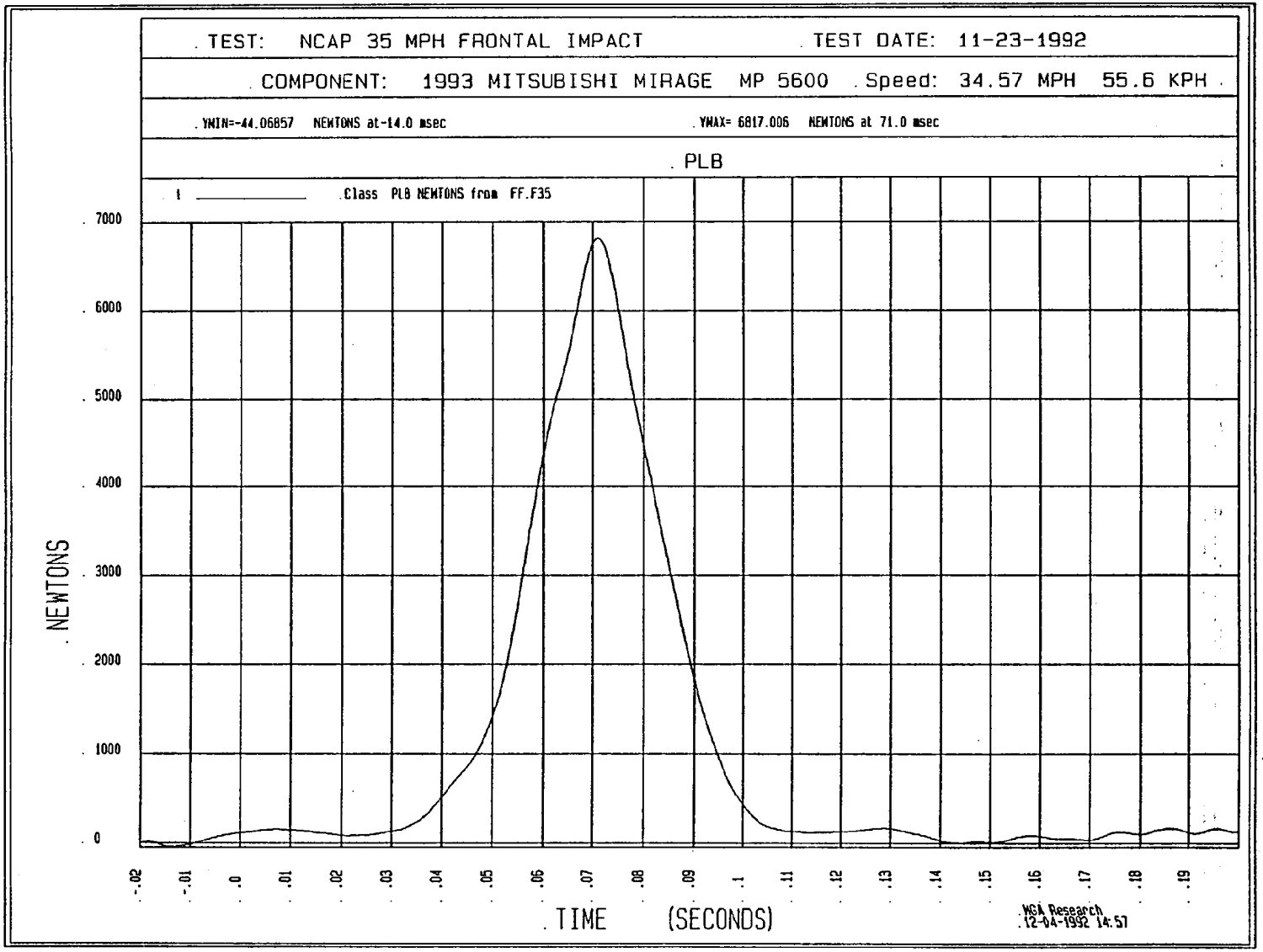


Figure B-53 - Passenger Lap Belt Force vs. Time

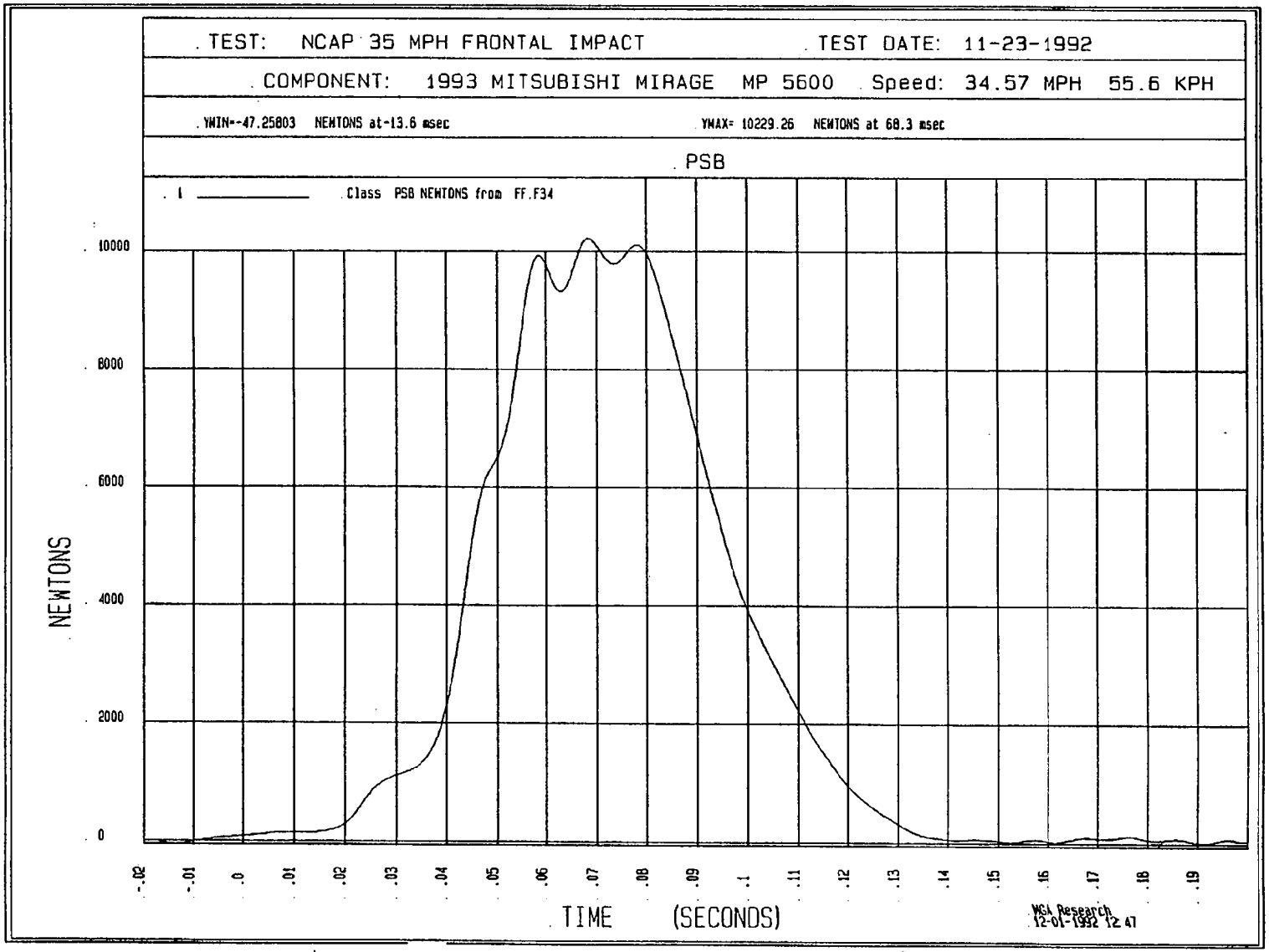


Figure B-54 - Passenger Torso Belt Force vs. Time

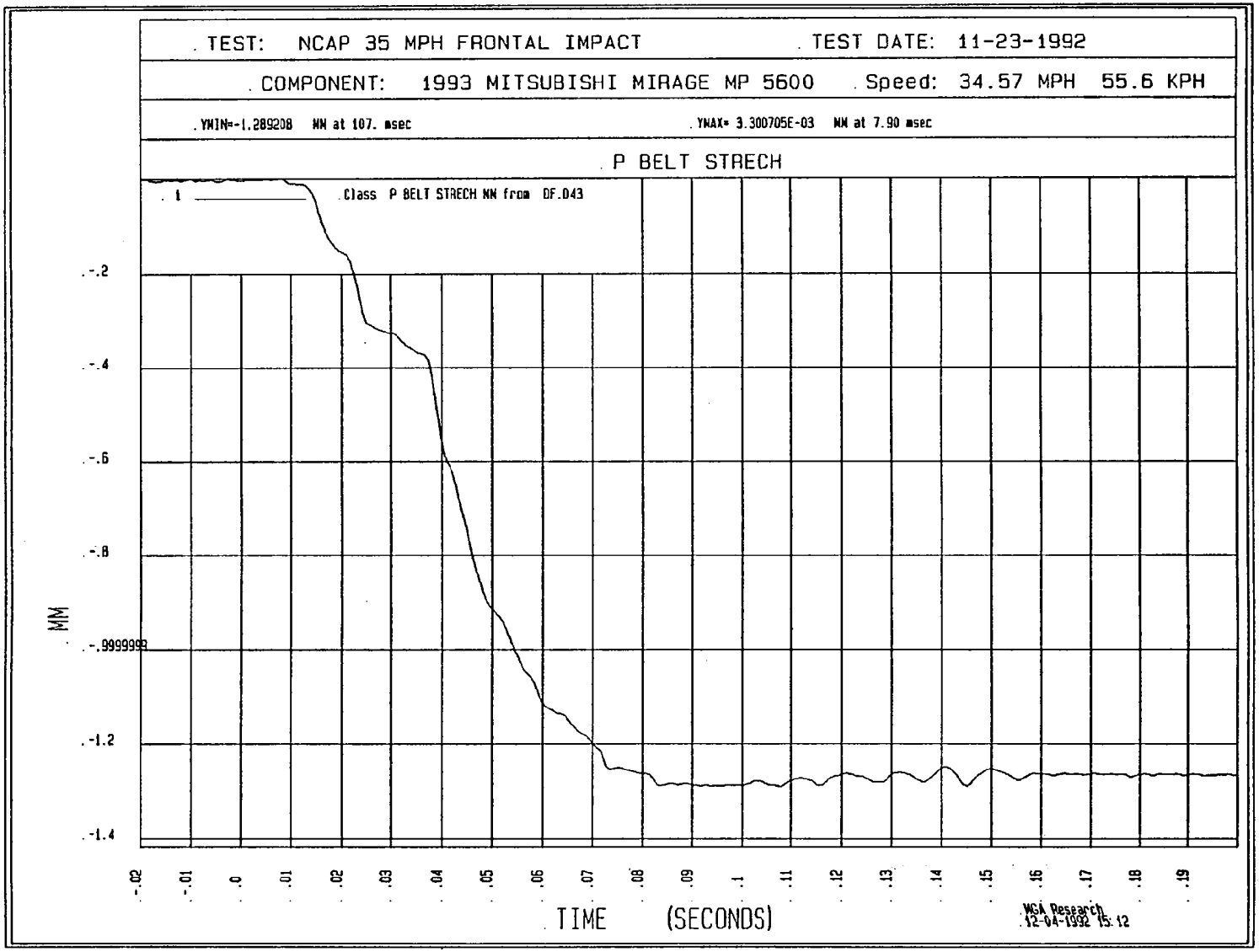


Figure B-55 - Passenger Torso Belt Stretch vs. Time

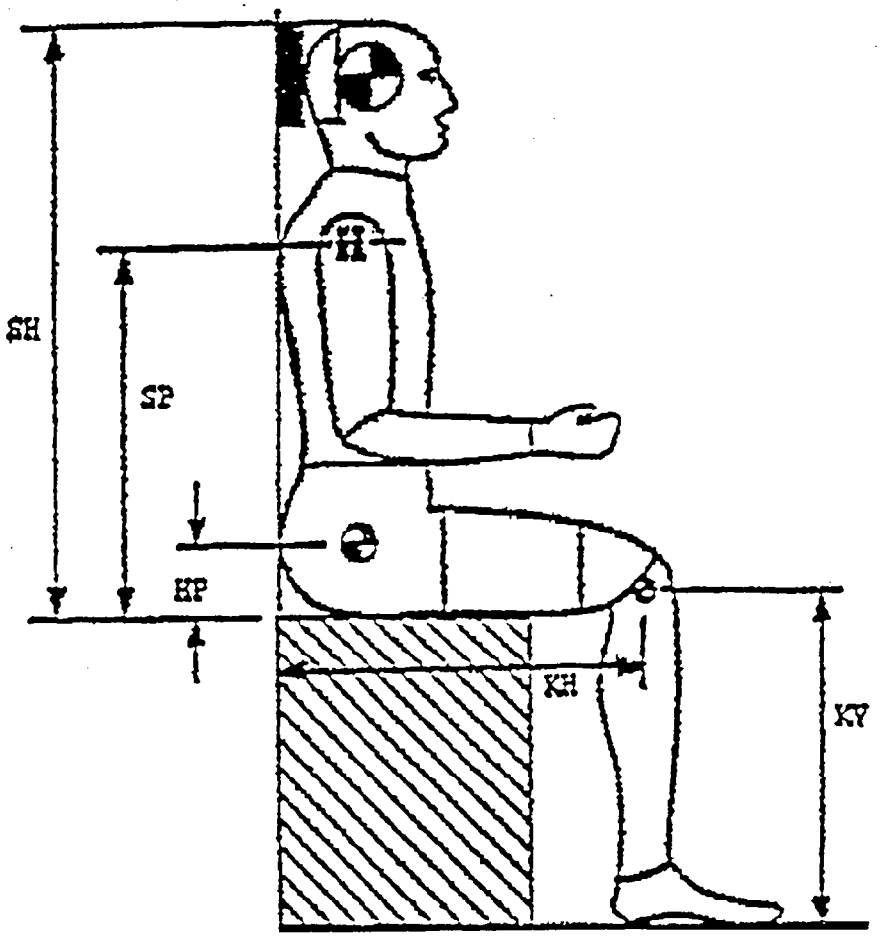
APPENDIX C

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: 11-03-92

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

II. PERFORMANCE VERIFICATION DATA

DUMMY NO.: 465 DUMMY CALIBRATION BY: R.D & G.B
VERIFICATION LABORATORY TEMPERATURE (66° - 78°F): 67°

		SPECIFICATION	MEASUREMENT
HEAD DROP TEST			
A. Peak Resultant Acc.		210 to 260 g's	234
B. Peak Lateral Acc.		< 10 g's	6
C. Time above 100 g.		0.9 to 1.5 msec.	1.3
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	23.3
C. Peak Resultant Head Acc.		26 g maximum	25.6
D. Pendulum Decel ($t_2 - t_1$)		$\leq$ = 3 ms	2.6
E. Pendulum Decel ($t_3 - t_2$)		25 to 30 ms	28.2
F. Pendulum Decel ($t_4 - t_3$)		$\leq$ = 10 ms	3.7
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
30°	Time	25.6 to 34.4 ms	27.6
	Displ.	2.1 to 3.1 in	2.5
60°	Time	40.3 to 51.7 ms	41.9
	Displ.	4.3 to 5.3 in	4.8
Maximum (68°)	Time	53.2 to 66.8 ms	56.3
	Displ.	5.0 to 6.0 in	5.6
60°	Time	67.0 to 83.0 ms	68.8
	Displ.	4.3 to 5.3 in	4.9
30°	Time	85.4 to 104.6 ms	87.9
	Displ.	2.1 to 3.1 in	2.4
0°	Time	101.0 to 123.0 ms	101.5
	Displ.	0 to 0.5 in	0.3

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	26.7
Force @ 0.75 in	36.7 to 49.8 lbs	39.5
Force @ 1.0 in	50 to 63 lbs	58.1
Force @ 1.3 in	73 to 88 lbs	82.7

	SPECIFICATION	MEASUREMENT
LUMBAR FLEXION TEST		
A. Force @ 20°	22 to 34 lbs	30.3
B. Force @ 30°	34 to 46 lbs	42.2
C. Force @ 40°	46 to 58 lbs	56.2
D. Return Angle	12° Maximum	8.6

	SPECIFICATION	MEASUREMENT
CHEST IMPACT TESTS		
A. High Speed		
(1) Probe Speed	21.78 to 22.22 fps	21.83
(2) Peak Deflection	1.7 in. (maximum)	1.08"
(3) Peak Resistive Force	2250 lbs. (maximum)	2,187.2 lbs.
(4) Internal Hysterisis	50% to 70%	55.5%
B. Low Speed		
(1) Probe Speed	13.86 to 14.14 fps	13.94 ft/sec.
(2) Peak Deflection	1.1 in. (maximum)	.79"
(3) Peak Resistive Force	1450 lbs. (maximum)	1381.7 lbs.
(4) Internal Hysteresis	50% to 70%	59.6%

PART 572 DUMMY CONFIGURATION AND PERFORMANCE (CONT.)

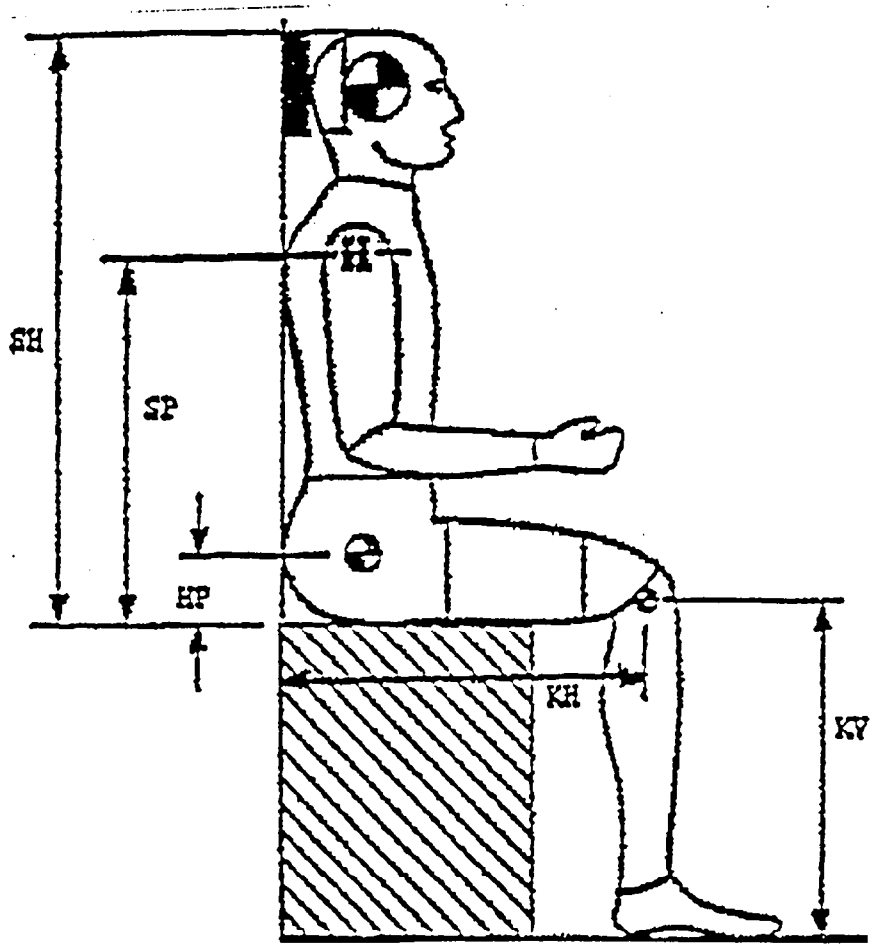
	SPECIFICATION	MEASUREMENT
KNEE IMPACT TESTS		
A. Right Side		
(1) Probe Speed	6.67 to 7.04 fps	7.02
(2) Maximum Force	1850 to 2500 lbs.	2090.2
(3) Time Above 1000 lbs.	1.7 msec. (minimum)	2.122
B. Left Side		
(1) Probe Speed	6.67 to 7.04 fps	7.02
(2) Maximum Force	1850 to 2500 lbs.	2190.9
(3) Time Above 1000 lbs.	1.7 msec. (minimum)	1.981

RD#1.P572/dmd

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 466 DUMMY CALIBRATION BY: R. D. & G. B.

I. CONFIGURATION VERIFICATION DATA



DATE OF VERIFICATION: 11-05-92

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: R. D. & G. B.
VERIFICATION LABORATORY TEMPERATURE (66° - 78°F): 68°

		SPECIFICATION	MEASUREMENT
HEAD DROP TEST			
A. Peak Resultant Acc.		210 to 260 g's	258
B. Peak Lateral Acc.		< 10 g's	5
C. Time above 100 g.		0.9 to 1.5 msec.	1.2
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	25.5
D. Pendulum Decel ($t_2 - t_1$)		$\leq$ = 3 ms	2.4
E. Pendulum Decel ($t_3 - t_2$)		25 to 30 ms	28
F. Pendulum Decel ($t_4 - t_3$)		$\leq$ = 10 ms	4.6
G. Max Head Rotation		63 to 73°	70°
H. Chordal Displacement Head Rotation Angle			
0°	Time	-2 to 2 ms	0
	Displ.	-0.5 to 0.5 in	0
30°	Time	25.6 to 34.4 ms	28.7
	Displ.	2.1 to 3.1 in	2.6
60°	Time	40.3 to 51.7 ms	41.6
	Displ.	4.3 to 5.3 in	4.5
Maximum (69°)	Time	53.2 to 66.8 ms	57.3
	Displ.	5.0 to 6.0 in	5.5
60°	Time	67.0 to 83.0 ms	69.6
	Displ.	4.3 to 5.3 in	4.9
30°	Time	85.4 to 104.6 ms	87.4
	Displ.	2.1 to 3.1 in	2.6
0°	Time	101.0 to 123.0 ms	101.1
	Displ.	0 to 0.5 in	0.4

	SPECIFICATION	MEASUREMENT
ABDOMINAL COMPRESSION TEST (Preload = 10 lbs.)		
Force @ 0.5 in	23.3 to 36.5 lbs	25.4
Force @ 0.75 in	36.7 to 49.8 lbs	39.5
Force @ 1.0 in	50 to 63 lbs	56
Force @ 1.3 in	73 to 88 lbs	83

	SPECIFICATION	MEASUREMENT
LUMBAR FLEXION TEST		
A. Force @ 20°	22 to 34 lbs	28.1
B. Force @ 30°	34 to 46 lbs	44.0
C. Force @ 40°	46 to 58 lbs	47.9
D. Return Angle	12° Maximum	7.3°

	SPECIFICATION	MEASUREMENT
CHEST IMPACT TESTS		
A. High Speed		
(1) Probe Speed	21.78 to 22.22 fps	21.82 ft/sec.
(2) Peak Deflection	1.7 in. (maximum)	1.41"
(3) Peak Resistive Force	2250 lbs. (maximum)	2180.86 lbs.
(4) Internal Hysterisis	50% to 70%	55.8%
B. Low Speed		
(1) Probe Speed	13.86 to 14.14 fps	13.92 ft/sec
(2) Peak Deflection	1.1 in. (maximum)	.82"
(3) Peak Resistive Force	1450 lbs. (maximum)	1433.42 lbs.
(4) Internal Hysteresis	50% to 70%	64.8%

PART 572 DUMMY CONFIGURATION AND PERFORMANCE (CONT.)

	SPECIFICATION	MEASUREMENT
KNEE IMPACT TESTS		
A. Right Side		
(1) Probe Speed	6.67 to 7.04 fps	6.97
(2) Maximum Force	1850 to 2500 lbs.	1,935
(3) Time Above 1000 lbs.	1.7 msec. (minimum)	1.7
B. Left Side		
(1) Probe Speed	6.67 to 7.04 fps	7.02
(2) Maximum Force	1850 to 2500 lbs.	1911.3
(3) Time Above 1000 lbs.	1.7 msec. (minimum)	2.2

RD#1.P572/dmd

APPENDIX D

Dummy, Vehicle and Laboratory Calibration Data

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 465

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	EA71	Endevco	11/6/92
Head Y	A06M	Endevco	11/6/92
Head Z	A55D	Endevco	11/6/92
Chest X	ACC00	Endevco	11/11/92
Chest Y	A82D	Endevco	11/11/92
Chest Z	A99L	Endevco	11/11/92
Right Femur Load Cell	950	GSE	11/4/92
Left Femur Load Cell	947	GSE	11/11/92
*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	663	Eaton	11/3/92
Torso Belt Load Cell	661	GSE	11/3/92
Spool-Out Potentiometer	N/A		
Belt Stretch Transducer	02	Bourns	11/23/92

*Hybrid III use only.

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 466

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ED47	Endevco	11/06/92
Head Y	EH45	Endevco	11/06/92
Head Z	DR22	Endevco	11/06/92
Chest X	A43M	Endevco	11/11/92
Chest Y	A87M	Endevco	11/11/92
Chest Z	A07M	Endevco	11/11/92
Right Femur Load Cell	957	GSE	11/4/92
Left Femur Load Cell	932	GSE	11/11/92
*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	690	GSE	11/3/92
Torso Belt Load Cell	211	Lebow	11/3/92
Spool-Out Potentiometer	N/A		
Belt Stretch Transducer	01	Bourns	11/23/92

*Hybrid III use only.

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	5220074	Kyowa	7/14/92
Right Rear Seat Crossmember X	2270040	Kyowa	7/15/92
Top of Engine X	MGA031	Entran	9/15/92
Bottom of Engine X	MGA011	Entran	8/21/92
Left Brake Caliper X	MGA003	Entran	8/21/91
Right Brake Caliper X	MGA006	Entran	8/21/92
Instrument Panel X	5220093	Kyowa	9/03/92
Redundant Left Rear Seat Crossmember X	295847	Sensotec	7/01/92
Redundant Right Rear Seat Crossmember X	5220088	Kyowa	9/06/92

	LABORATORY INSTRUMENTS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Bending Pendulum Accelerometer	1740035	Kyowa	6/15/92
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	MGA077	Entran	10/1/92
Lumbar Flexion Force Guage	Custom Fab.	-	PRIOR TO USE
Lumbar Flexion Rotation Gauge	Custom Fab.	-	PRIOR TO USE
Abdomen Compression Displacement Gauge	4856160	CIC	10/1/92
Abdomen Compression Force Gauge	49710	Transducers Inc.	10/1/92

APPENDIX E

Vehicle Owner's Occupant Restraint System Instructions

Seat belts

ND06A-AC

Seat belts are installed in your car for the protection of the driver and passengers.
Always use the seat belts. In the event of an accident, injury to the driver and passengers may be reduced if seat belts are properly used.

NOTE
Legislation in your state may require seat belt usage, but even if not required they should always be used. The following pages contain the recommended procedure for fastening, adjusting, and wearing of the belts for comfort and safety.

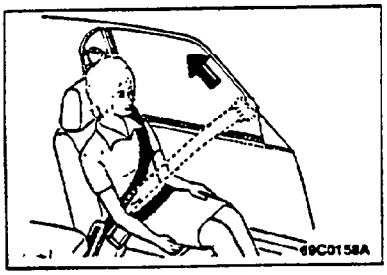
WARNING
(1) Never use one seat belt for more than one occupant.
(2) Never wear the shoulder belt under the arm or otherwise out of position.
Always wear both the seat and shoulder belt and in the proper position.
(3) Do not make any modifications that could change the effectiveness of the seat belts.
(4) Never attempt to repair or replace the seat belt assemblies on your own.
All repairs and replacements should be made by an authorized dealer.

Front seat belt restraint system

ND06B-GC

The front seat belt restraint system consists of the automatic shoulder belt and the manual seat belt. This system is designed to provide comfort and safety by automatic fastening and unfastening of the shoulder belt as well as automatic retraction of the belts during normal car operation.
Sensing devices inside the belt retractors (for shoulder and seat belts) are designed to lock the retractors in the event of an abrupt change in car motion.

WARNING
For the most effective restraint, both the shoulder belt and the seat belt should be worn. The seat belt should be worn so that it is across the thighs and snug against the hips, not across the waist or abdomen. The shoulder belt should never be worn behind the body, under the arm or otherwise out of position.



Automatic shoulder belt

ND06D-M

The shoulder belt moves automatically to the set position (fasten) when a door is closed and the ignition key is turned to the "ON" position.
When the door is opened, the shoulder belt automatically moves to the off (unfastened) position.
For the driver's seat the shoulder belt automatically moves to the set-off position when the ignition key is removed from the ignition.

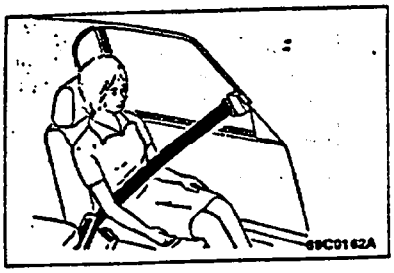
Seat belt reminder / warning light and buzzer
The seat belt reminder / warning light will illuminate or blink on and off and/or the buzzer will sound in the following instances.

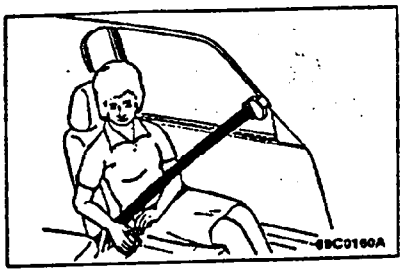
(1) LAP BELT REMINDER LIGHT AND BUZZER
When the ignition key is turned to the "ON" position, the reminder light in the instrument cluster will illuminate for about 6 seconds. If the driver does not fasten his/her lap belt, the buzzer will also sound for about 6 seconds intermittently. The buzzer will immediately stop sounding, however, when the lap belt is fastened.

(2) SHOULDER BELT INSTALLATION REMINDER LIGHT
While the shoulder belt moves automatically to the set position (fasten), when the door is closed and the ignition key is turned to the "ON" position, the shoulder belt reminder light will blink on and off during that time.

(3) SHOULDER BELT RELEASE BUCKLE WARNING LIGHT AND BUZZER
If the release button for the shoulder belt at the driver's seat side is accidentally pressed, the buzzer will sound for about 6 seconds and the warning light will also blink on and off continuously for about 1 minute; for the belt at the passenger seat side, the warning light will illuminate for about 1 minute.
If this happens, again buckle the shoulder belt. The buzzer will stop when the belt is buckled, and the warning light will go off.

(4) SHOULDER BELT RELEASE REMINDER BUZZER
When the door is opened and the sliding anchor begins to move to release the shoulder belt, the buzzer sounds for about 1 second.





Front seat belt instructions

1. Get in the car, close the door and adjust the seat position.

> ***WARNING***
> **To minimize risk of personal injury in event of a collision or sudden stop, both the driver and passenger seatbacks should always be in a nearly upright position while the car is in motion. The protection provided by the seat belts may be reduced significantly when the seatback is reclined. There is greater risk that the passenger will slide under the belt resulting in serious injury when the seatback is reclined.**

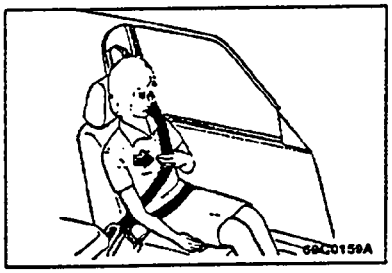
2. Grasp the seat belt latch plate and pull the webbing, then push the latch plate into the buckle until a "click" is heard.

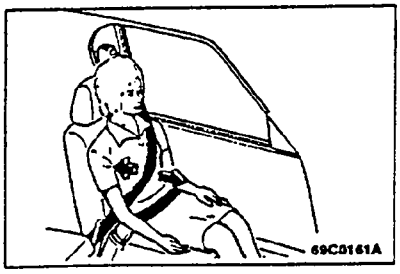
> ***WARNING***
> **(1) Always position the lap portion of belt as low on the hips as possible.**
> **(2) The seat belts must not be twisted when worn.**

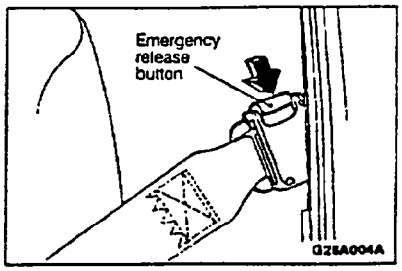
NOTE
For instruction on how to install a child restraint system to the front passenger's seat, see "Installing an infant carrier to the front passenger's seat" on page 32.

3. Turn the ignition key to the "ON" position; the shoulder belt will move automatically to the set (fasten) position.

> ***WARNING***
> **Keep hands and fingers away from the shoulder belt anchor while it is moving.**
> **Be careful that the shoulder and seat belts do not cross. If they do, the seat belt could injure the abdomen in the event of sudden braking or a collision.**







4. Pull up the shoulder belt and seat belt slightly to be sure that there is no excess slack or tightness in the belts. The belts will retain a small amount of looseness necessary for comfort during driving. If a belt is too tight, pull it up slightly and let it return. The belts will not tighten during normal use; therefore you can set them once for safe, comfortable snugness.

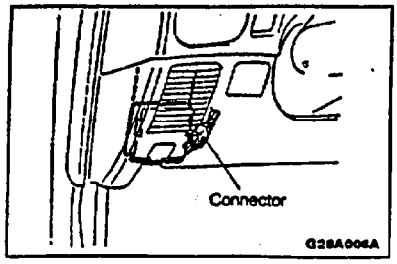
> ***WARNING***
> **Be sure the seat belt position is fitted snugly and as low as possible around the hips, not around the waist.**
> **Failure to do so may increase the chance or severity of injury in the event of a collision.**

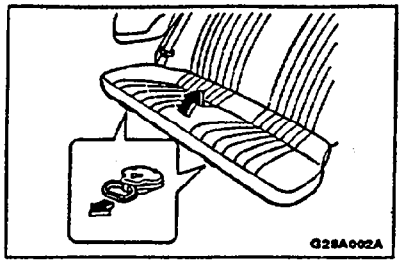
5. The belts will allow unrestricted movement under normal conditions.
The belts will lock in the event of an abrupt change in car motion.

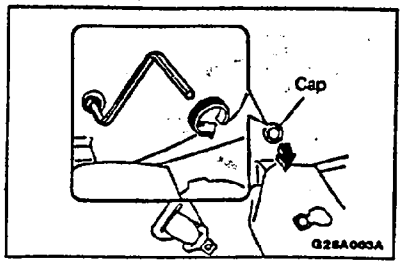
> ***WARNING***
> **Be sure to lock all doors before driving. Locking the doors, and properly using the seat belts provided will minimize the risk of injury or ejection in an accident.**

Emergency release button
If the shoulder belt sliding anchor is locked in an emergency, push the emergency release button to release the shoulder belt. Use this button only when the shoulder belt prevents you from leaving the car in an accident.

> ***⚠ CAUTION***
> **To maintain the normal shoulder belt restraint, do not press the emergency release button except in an emergency.**







Manual operation of automatic shoulder belts

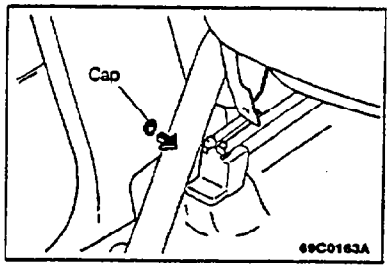
If the automatic shoulder belt sliding anchor stops before its movement is complete and does not move farther, follow the steps below to turn the motor manually, move the sliding anchor to the installation position, and then attach the shoulder belt to the buckle. Before driving, be sure your belt is properly fastened. Before the motor is turned manually, remove the fuse block and disconnect the connector (1-pole type) at the rear side of the fuse block.

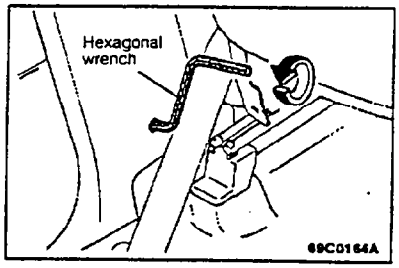
WARNING

If the fusible link is not disconnected, an injury might be caused if the motor starts.

2-DOOR MODELS

1. Pull out the lock knob at the lower part of the rear seat cushion, and then lift the cushion.
2. Remove the cap.
3. Insert the wrench (included with the car's tools) into the trim hole; turn the wrench counterclockwise so as to move the sliding anchor to the fastened position.





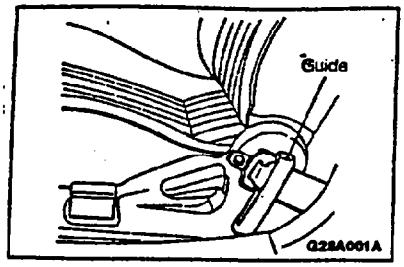
4-DOOR MODELS

1. Remove the cap on the center pillar.
2. Insert the wrench (included with the car's tools) into the trim hole; turn the wrench counter clockwise so as to move the sliding anchor to the fastened position.

NOTE

(1) If the movement of the sliding anchor of the shoulder belt is not smooth (if, for example, dirt or other foreign material increases the sliding resistance of the sliding anchor, etc.), or if it stops before its movement is complete, request an authorized dealer to check the belt; if the problem cannot be resolved, the shoulder belt must be replaced as a complete assembly.

(2) If the outside air temperature is low, the time required for the operation of the sliding anchor will become longer; this is not a malfunction. If the temperature increases, this time will become shorter.



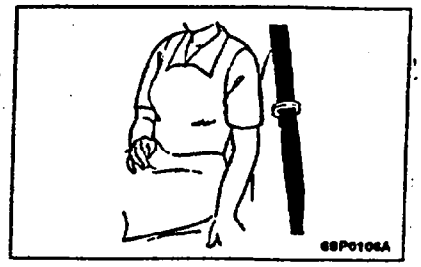
(3) In order to maintain smooth operation of the seat belt, be sure that the latch plate is at the stowed position.
If the belt does not fully retract, pull it out and check for kinks or twists. Then make sure that it remains untwisted as it retracts.
(4) If the shoulder belt and/or seat belt becomes frayed or otherwise damaged, have the belts replaced by an authorized dealer as a complete assembly.

Seat unibelt restraint system

ND06E-IB

Both sides of the rear seat are equipped with a UNIBELT system which uses a single belt and an emergency locking retractor.
This system is designed to provide comfort and safety by permitting full extension and automatic retraction of the belts during normal car operation. A sensing device inside the belt retractor is designed to lock the retractor in the event of an abrupt change in car motion.

NOTE
For instruction on how to install a child restraint system to the rear seat, see "Installing a child restraint system to a UNIBELT" on page 30.



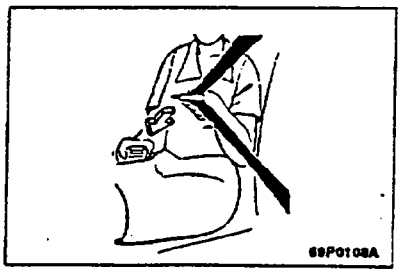
Unibelt instructions

ND06D-AE

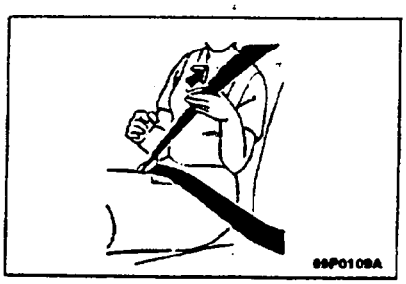
1. Get in the car and sit in the normal correct posture.

WARNING
To minimize risk of personal injury in event of a collision or sudden stop, both the driver and passenger seatbacks should always be in a nearly upright position while the car is in motion. The protection provided by the seat belts may be reduced significantly when the seatback is reclined.
There is greater risk that the passenger will slide under the belt resulting in serious injury, when the seatback is reclined.

2. Grasp the movable latch plate and slide it up the webbing as far as necessary so that it will be easy to pull across your body.
After a couple of tries, this will become an automatic one-handed operation.



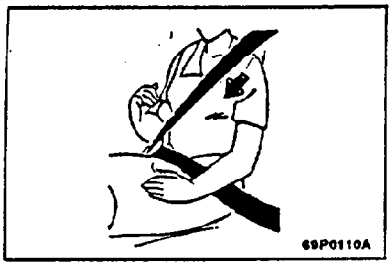
3. Pull the webbing, and move the movable latch plate toward the buckle. This system will not lock up if you stop or hesitate, so relax and continue to "buckle-up".
Push the latch plate into the buckle until a "click" is heard.



4. Pull up on the shoulder belt to ensure that there is no slack in the seat belt. The seat belt will not tighten during use; therefore, you can set it once for safe, comfortable snugness.

WARNING
Be sure the seat belt portion is fitted snugly and as low as possible around the hips, not around the waist.
Failure to do so may increase the chance or severity of injury in the event of a collision.

Seat and seatbelt

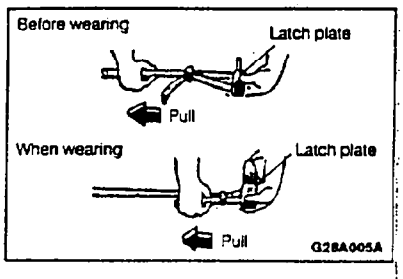


5. Check the belt slackness. The belt will retain the small amount of slack necessary for comfort when you return to your normal seating position. If the belt is still too tight, pull out "6 or 8" of webbing, let it return to your chest, and repeat the above motion.

6. The shoulder belt will allow unrestricted movement under normal conditions. The belt will lock in the event of an abrupt change in car motion. To release the belt, push the button on the buckle. To return the belt to its stowed position, pull the shoulder belt down slightly and release immediately.

WARNING

Be sure to lock all doors before driving. Locking the doors and properly using the seat belts provided will minimize the risk of injury or ejection in an accident.



Rear seat lap belt

ND06C-C0

Center belt

The center belt should be adjusted by holding the belt and latch plate at right angles to each other, and then pulling the belt as illustrated above to a snug fit around the occupant.

NEVER USE THE SAME LAP BELT ON MORE THAN ONE PERSON AT A TIME.

NOTE

The buckle and plate of the center lap belt are marked with "CENTER". Be sure to check the marking before wearing the center lap belt. The outboard restraint system buckle and center restraint system tongue are not compatible and will not engage with one another.