V2193

REPORT NO. MGA-95-N010

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

General Motors Corporation
1995 Oldsmobile Aurora
4 Door
NHTSA NO. MS0106

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105

Test Date: December 9, 1994

Report Date: December 23, 1994

FINAL REPORT

Prepared For:

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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APR 17 1995

Date of Report Acceptance

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APR 17 1995

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SECTION 1

PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY'95 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-90-D-12121. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 48 kph (30 mph) FMVSS 208/212/219/301-75 requirements.

The 56 kph (35 mph) frontal barrier impact test was conducted in accordance with the National Highway Traffic Safety Administration (NHTSA) Indicant Test Procedure for New Car Assessment Program (NCAP) dated January 1, 1990. Data for FMVSS No. 212, "Windshield Mounting", FMVSS No. 219 (Partial), "Windshield Zone Intrusion", FMVSS No. 301-75, "Fuel System Integrity," as well as occupant performance data are provided herein.

SECTION 2

SUMMARY OF FRONTAL BARRIER IMPACT TEST

A load cell barrier consisting of 30 load cells was impacted by a 1995 Oldsmobile Aurora 4-Door at a velocity of 55.8 kph (34.7 mph). The test was performed at the MGA Proving Grounds and Crash Test Center on December 9, 1994. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 16 high speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 572E, 50th percentile male anthropomorphic test devices (ATDs) were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with head and chest primary and redundant triaxial accelerometers, pelvis triaxial accelerometers, neck load cell, and right/left femur load cells. The driver was also instrumented with right and left lower leg sensors. Seat belt load cells were also on the driver's and passenger's shoulder and lap belts to measure dummy torso and pelvic section loading. The driver ATD (Serial No. 66) and the right-front passenger ATD (Serial No. 65) were calibrated prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C and D.

The 77 channels of data were recorded on 8 computers. Appendix B contains the vehicle, load cell barrier and dummy response data traces.

The driver's head struck the inflated airbag. The driver HIC was 687. The maximum chest deceleration over 3 milliseconds was 58 g's. The left and right femur loads were 3576 and 6231 Newtons respectively.

The right front passenger's head struck the inflated airbag and the HIC was 936 and maximum chest deceleration over 3 milliseconds was 53 g's. The left and right femur loads were 5874 and 2497 Newtons respectively.

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1995/Oldsmobile/Aurora/4 Door

NHTSA No.: MS0106 VIN.: 1G3GR62C5S4115235

Body color: Light Teal Date of Manufacture: 9/94

Engine: 8 Cylinders; __C.I.D.; 4.0 Liters;

X Gas; __Diesel; __Turbocharged

__Longitudinal; X Transverse

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

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

Odometer Reading: 90 miles

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

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

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

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 2.1 kg/cm^2 (30 Psi) Rear 2.1 kg/cm^2 (30 Psi)

Recommended Tire Size: P235/60R16

Recommended Cold Tire Pressure: Front 2.1 kg/cm^2 (30 Psi) Rear 2.1 kg/cm^2 (30 Psi)

Tires on Vehicle: P235/60R16 ; 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 Power; __Lever

Vehicle Capacity Weight (VCW) = 420.0 kg. (A)

No. of Occupants x 68.0 kg. = 340.0 kg. (B)

Rated Cargo Weight (RCW) A-B = 80.0 kg.

GVWR 2246 kg. GAWR: Front 1237 kg.; Rear 1009 kg.

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

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

Right Front = 567 kg Right Rear = 342 kg

Left Front = 566 kg Left Rear = 336 kg

TOTAL FRONT WEIGHT = 1133 kg (63 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 678 kg (37 % of Total Vehicle Weight)

TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 1811 kg

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight 1811 kg

VCW = Vehicle Capacity Weight 420 kg DSC = Designated Seating Capacity 5

RCW = VCW - 68 (DSC) = 80 *kg

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

Target Test Weight = 2043 kg

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:

Right Front = 598 kg Right Rear = 421 kg

Left Front = 606 kg Left Rear = 416 kg

TOTAL FRONT WEIGHT = 1204 kg (59 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 837 kg (41 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 2041 kg

Weight of ballast secured in vehicle trunk area = 34 kg

Vehicle components removed to meet target weight: Rear seat back and cushion, spare tire, jack, and trunk carpet.

VEHICLE ATTITUDE (all dimensions in mm):

Delivered Attitude: RF 732 LF 738 RR 749 LR 760

Test Attitude: RF 722 LF 727 RR 732 LR 740

Wheel Base: 2898 mm; C.G. = 1188 mm rearward of front wheel C/L

Remarks: None

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

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

POST-IMPACT DATA:

Type of Test: 35 mph Frontal Impact Impact Angle: 90°

Date of Test: December 9, 1994 Time of Test: 5:45 p.m.

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

Temperature in Occupant Compartment: 21° C

Windshield Molding Temperature: 21° C

Required Impact Velocity Range: 55.5 to 57.1 kph

Impact Velocity: primary = 55.8 kph; secondary = 55.7 kph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 1200 mm

Exiting Speed Trap: 200 mm

VEHICLE REBOUND AND CRUSH (mm):

Vehicle Length: Pre-test = R 4952 C_L 5215 L 4945

Post-test = R 4536 C_L 4657 L 4571

Crush = R 416 C_L 558 L 374

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

R 720 mm C_L 634 mm L 745 mm

VISIBLE DUMMY CONTACT POINTS:

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

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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

	Front		Rear	
Seat Movement	Left	Right	Left	Right
Seat Back Movement	Ø	Ø	N/A	N/A
Seat Shift (mm)	6	Ø	N/A	N/A

Glazing Damage

Backlight/Windshield Cracked windshield

Other Notable Impact Effects: None

SECTION 3

SUMMARY OF RESULTS FOR-------

FMVSS 212, "Windshield Mounting"

FMVSS 219 (Partial), "Windshield Zone Intrusion"

FMVSS 301-75, "Fuel System Integrity"

FMVSS NO. 212, "WINDSHIELD MOUNTING", DATA SHEET

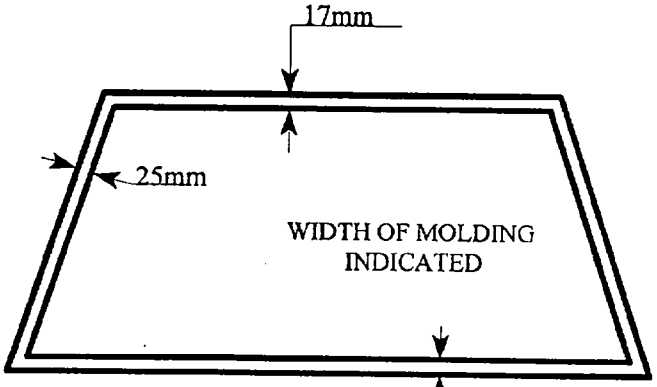
Details of windshield mounting such as retention method, trim type, etc.:
Windshield set in rubber molding within windshield frame

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

FMVSS 212 TEST DATA:

	WINDSHIELD PERIPHERY		
	PRE-TEST (mm)	POST-TEST (mm)	PERCENT RETENTION
RIGHT SIDE	2227	2227	100%
LEFT SIDE	2227	2227	100%
TOTAL	4454	4454	100%

AREA OF RETENTION FAILURE: None



FAILURE DETAILS: None

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

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. Draw the locus of points on the inner surface of the windshield contacted by the sphere across the width of the instrument panel. From the outermost contact points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and 1/2" distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection onto the outer surface of the windshield of this line.

FMVSS 219 TEST DATA:

A= 1155 mm

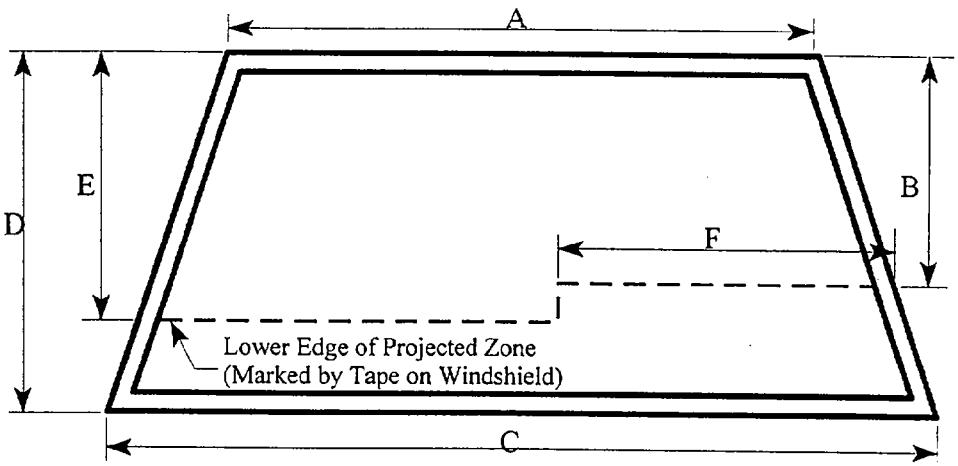
B= 375 mm

C= 1630 mm

D= 835 mm

E= 545 mm

F= 850 mm



FRONT VIEW

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

NONE

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

FMVSS NO. 301

TEST VEHICLE NHTSA NO.: MS0106 Test Date: December 9, 1994

Vehicle Mfgr./Make/Model: 1995/Oldsmobile/Aurora/4 Door

Usable Capacity of Vehicle's Fuel Tank: 75.7 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:

69.6 Liters which is 92 % of the stated USABLE CAPACITY.

TEST VEHICLE IMPACT TYPE:

- X Frontal (35 mph)
- ___ Oblique (30 mph) with ___° barrier face first contacting (driver/passenger) side
- ___ Rear Moving Barrier (30 mph)
- ___ Side Impact MDB (33.2 mph)

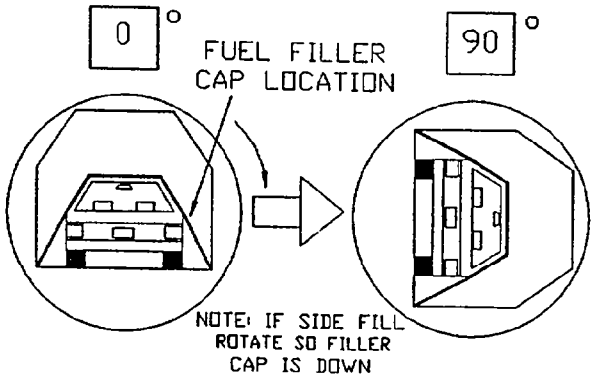
FUEL SPILLAGE MEASUREMENT:

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

SOLVENT SPILLAGE DETAILS: None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° - 90° Vehicle NHTSA ID No.: MS0106



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 40 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 40 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

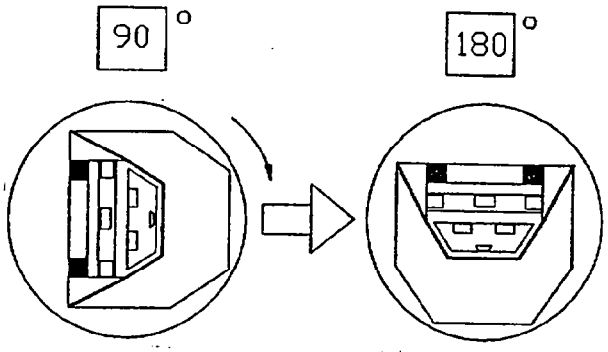
0	0	0	0

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

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 90° - 180° Vehicle NHTSA ID No.: MS0106



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 43 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 43 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

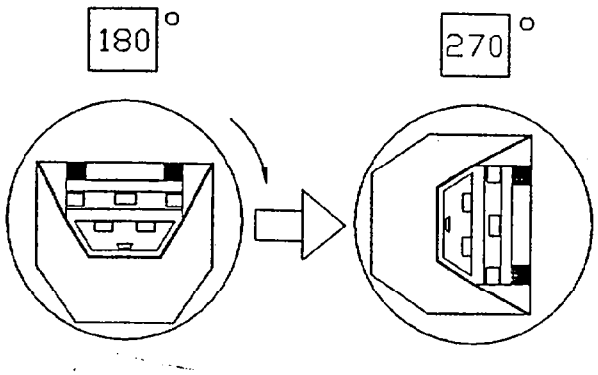
0	0	0	0

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

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 180° - 270° Vehicle NHTSA ID No.: MS0106



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 14 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 14 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

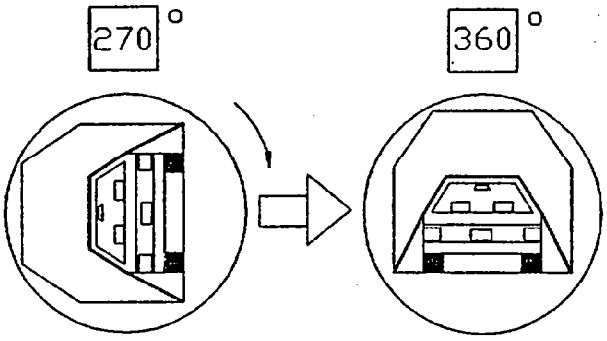
0	0	0	0

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

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 270° - 360° Vehicle NHTSA ID No.: MS0106



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 27 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 27 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0

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

IV. SOLVENT SPILLAGE LOCATIONS(S): None

SECTION 4

OMI FINAL DATA

Occupant and Vehicle Information

I. OMI DATA

1. Dummy Injury Criteria Data Summary
2. Dummy Positioning Data
3. Seat Belt Positioning Data
4. Seat Belt Performance Assessment Data
5. Camera Locations
6. Vehicle Target Locations

II. OVR DATA

1. Load Cell Barrier Data
2. Vehicle Accelerometer Data
3. Test Vehicle Measurements

III. AID DATA

1. Accident Investigation Damage Data Summary

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

VEH. YR./MAKE/MODEL/BODY STYLE: 1995/Oldsmobile/Aurora/4 Door

VEH. NHTSA NO.: MS0106 TEST DATE: December 9, 1994

MAX. ACCELERATION VALUES: (g's)	DRIVER # 66	PASSENGER # 65
Head Channel X	-67.5	97.1
Head Channel Y	17.2	64.5
Head Channel Z	24.5	-44.2
HEAD RESULTANT	67.5	123.4
Chest Channel X	-58.7	-53.6
Chest Channel Y	8.4	13.6
Chest Channel Z	-16.5	18.3
CHEST RESULTANT (CLIP)	57.7	53.4
TIME INTERVAL (msec) [0.003 seconds minimum]	t_1 = 70.4 t_2 = 73.3	t_1 = 83.6 t_2 = 86.7

HEAD INJURY CRITERIA (HIC) VALUES:

HIC	687.3	936.0
t_1 = (msec)	61.2	75.5
t_2 = (msec)	94.6	111.5
Avg. Accel. t_1 to t_2 (g's)	53.1	58.3

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

MAX. COMPRESSIVE FEMUR FORCES:

Left Side (N)	3576	5874
Right Side (N)	6231	2497

MAXIMUM SEAT BELT FORCES:

Lap Belt (N)	5644	7537
Shoulder Belt (N)	8281	13393

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, CHEST AND PELVIS DATA SHEET

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1995/Oldsmobile/Aurora/4 Door

VEHICLE NHTSA NO.: MSØ1Ø6 TEST DATE: December 9, 1994

MAXIMUM VALUES	DRIVER DUMMY #66	PASSENGER DUMMY #65
Neck Load X (N)	-1126.8	1342.5
Neck Load Y (N)	-438.1	-1624.1
Neck Load Z (N)	-1839.5	-3917.5
Neck Moment X (N.M)	8.4	-83.5
Neck Moment Y (N.M)	73.6	14Ø.3
Neck Moment Z (N.M)	11.Ø	95.2
Chest Deflection X (mm)	34.5	43.1
Time of Max. Occurrence	76 msec.	61 msec.
Pelvis X Acceleration (g's)	-64.6	-58.7
Pelvis Y Acceleration (g's)	2Ø.8	-8.5
Pelvis Z Acceleration (g's)	36.9	*
Pelvis Resultant (g's)	67.5	--

* No valid data collected

PART 572 DUMMY IN-VEHICLE POSITION

Vehicle NHTSA No.: MS0106 Vehicle: 1995/Oldsmobile/Aurora/4 Door

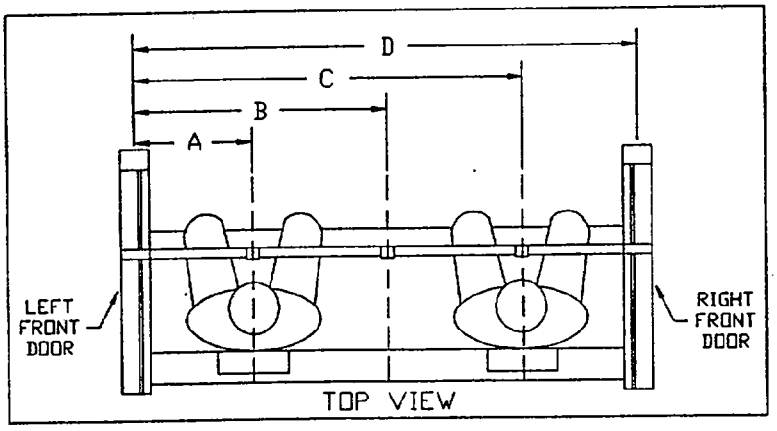
SEAT TYPE:	ADJUSTER TYPE:	BUCKET SEAT BACK TYPE:
____Bench	Driver: ___Manual	____Fixed
__X__Bucket	__X__Power	__X__Adjustable Reclining
____Split Bench		
	Passenger: ___Manual	
	__X__Power	

Driver

Adjusted to the mid position

Passenger

Adjusted to the mid position



__66__ DUMMY ID __65__

A	= Left Door to Driver Centerline	__432__ mm
B	= Left Door to Center Passenger Centerline	__810__ mm
C	= Left Door to Right Passenger Centerline	__1198__ mm
D	= Left Door to Right Door	__1620__ mm

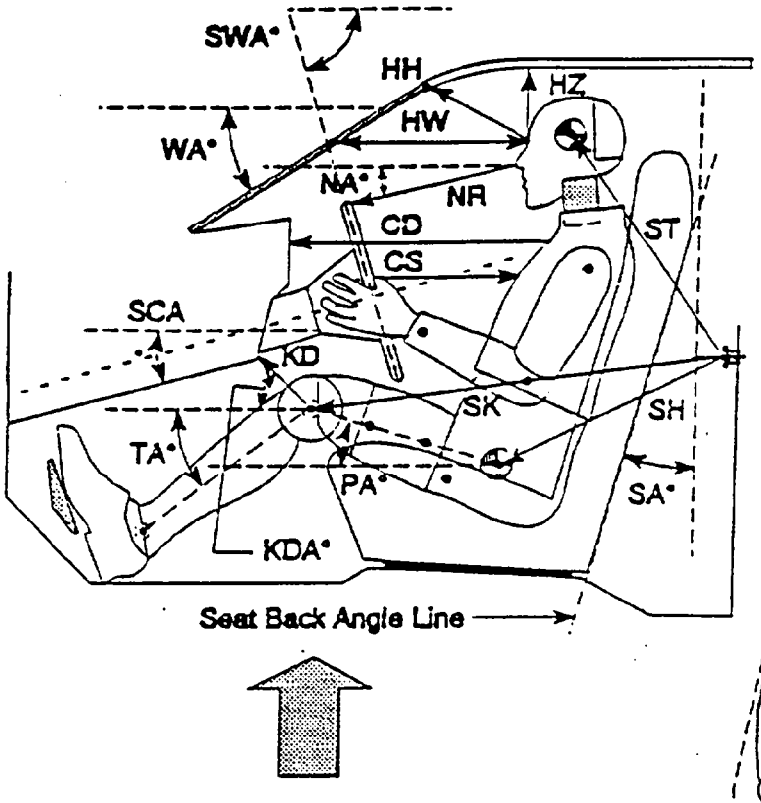
FRONT SEAT MEASUREMENT TABLE

Units (mm)

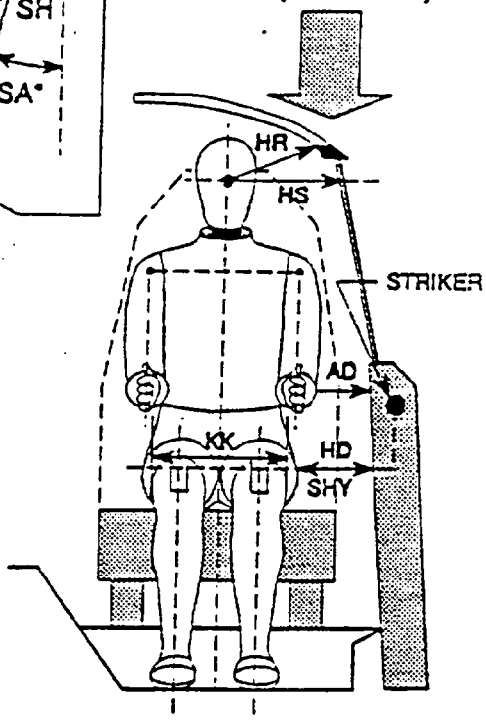
	DRIVER (Serial #66)	PASSENGER (Serial #65)
WA°	24.4°	
SWA°	70.0°	N/A
SCA°	20.3°	N/A
SA°	26.0°	26.0°
HZ	142	144
HH	364	347
HW	590	602
HR	252	226
NR	425 Angle 9.3°	N/A
CD	455	545
CS	348	N/A
RA	242	N/A
KDL	212 Angle 23.8°	157
KDR	190	176 Angle 17.5°
PA°	24.4°	22.8°
TA°	26.6°	33.2°
KK	267	247
ST	550 Angle 84.2°	533 Angle 84.5°
SK	574 Angle -0.6°	595 Angle 1.2°
SH	224 Angle -30.5°	233 Angle -30.1°
SHY	272	273
HS	340	291
HD	212	154
AD	110	109

N/A = Not Applicable

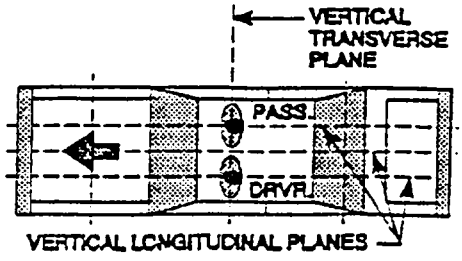
FRONT SEAT MEASUREMENTS



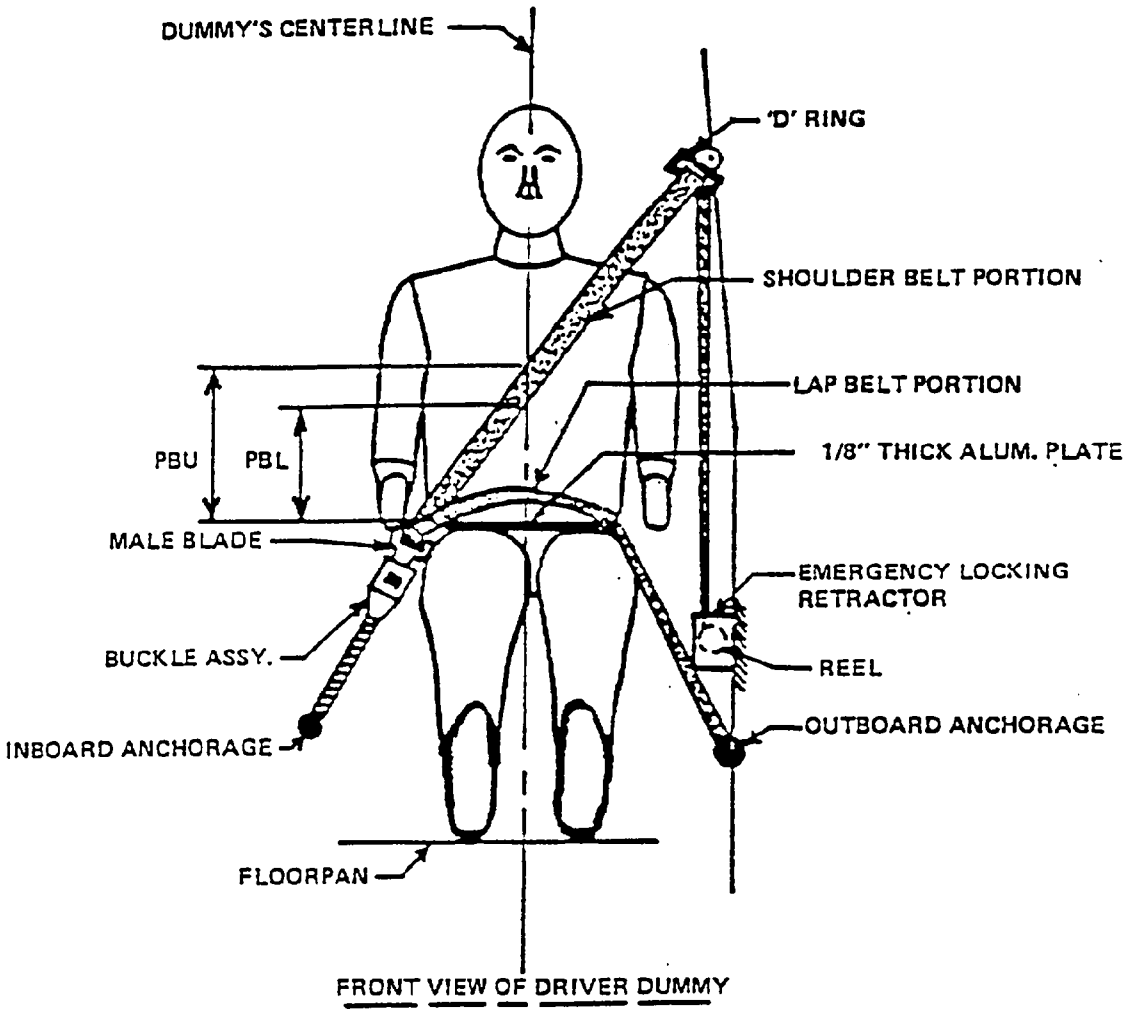
AD - Arm to Door
HD - H-Point to Door
HR - Head to Side Header
HS - Head to Side Window
KK - Knee to Knee
SHY- Striker to H-Point (Y Direction)



CD	-	Chest to Dash
CS	-	Steering Wheel to Chest
HH	-	Head to Header
HW	-	Head to Windshield
HZ	-	Head to Roof
KDA	-	Knee to Dash Angle
KDL	-	Left Knee to Dash
KDR	-	Right Knee to Dash
NA	-	Nose to Rim Angle
NR	-	Nose to Rim
PA	-	Pelvic Angle
RA	-	Rim to Abdomen
SA	-	Seat Back Angle
SCA	-	Steering Column Angle
SH	-	Striker to H-Point
SK	-	Striker to Knee
ST	-	Striker to Head
SWA	-	Steering Wheel Angle
TA	-	Tibial Angle
WA	-	Windshield Angle



SEAT BELT POSITIONING DATA



(illustration)

Dimension = mm

		DRIVER DUMMY	PASSENGER DUMMY
PBU --	Top surface of alum. plate to upper edge	335	331
PBL --	Top surface of alum. plate to belt lower edge	255	259

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

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:	Driver	Passenger	
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	208 mm	207 mm	
Shoulder belt length as measured on Part 572 Dummy.	800 mm	797 mm	
Lap belt length as measured on Part 572 Dummy.	639 mm	645 mm	
SHOULDER BELT SPOOL-OFF DATA:			
As determined by film analysis	51 mm	39 mm	
As determined mechanically	60 mm	47 mm	at retractor
	70 mm	41 mm	at D-ring
As determined electronically*	NR	NR	
BELT STRETCH DATA:			
Measured electronically between shoulder belt load cell and the "D" ring.	NR	NR	
Measured mechanically**	NR	NR	
RETRACTOR LOCK-UP TIME:			
As determined by shoulder belt spool-off observed in on-board cameras	75 msec	50 msec	

NR = Not Recorded

* The potentiometer was not installed in this test due to limited space. Instead, two cubes for each belt were mounted to measure the webbing spoolout.

** The belt strain thread was not used in this test.

CAMERA LOCATIONS

VEH. NHTSA NO.: MS0106 ; TEST DATE: December 9, 1994; TIME: 5:45 p.m.

VEH. YEAR/MAKE/MODEL/BODY STYLE: 1995/Oldsmobile/Aurora/4 Door

CAMERA POSITION NO.	VIEW	CAMERA POSITIONS (mm.)*			ANGLE (deg)	FILM PLANE TO HEAD TARGET (mm)	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Left Side View	-	-	-	-	-		
2	Left Front View	1200	8230	1270	90°	7838	25	935
3	Steering Column Top	2300	7770	1560	90°	7378	25	781
4	Steering Column Bottom	2290	7750	1010	90°	7358	25	939
5	Left Driver Close-up	1840	7070	1190	90°	6678	50	820
6	Left Angle	4490	5060	1970	50°		35	1190
7	Driver Onboard						35	1000
8	Passenger Onboard						35	1010
9	Right Overall	2560	-8100	1190	90°	7711	13	1042
10	Right Front	1860	-6270	1160	90°	5881	25	1042
11	Right Passenger Close-up	1730	-6770	1215	90°	6381	50	NR
12	Right Angle	4010	-5340	2135	50°		35	870
13	Top View Wide	400	0	4350			13	1058
14	Top Driver	-320	350	2380			13	870
15	Top Passenger	-280	-440	2430			13	1087
16	Pit Engine	1440	0	-3125			13	1005
17	Fuel Tank	2930	0	-3105			13	926

* COORDINATES:

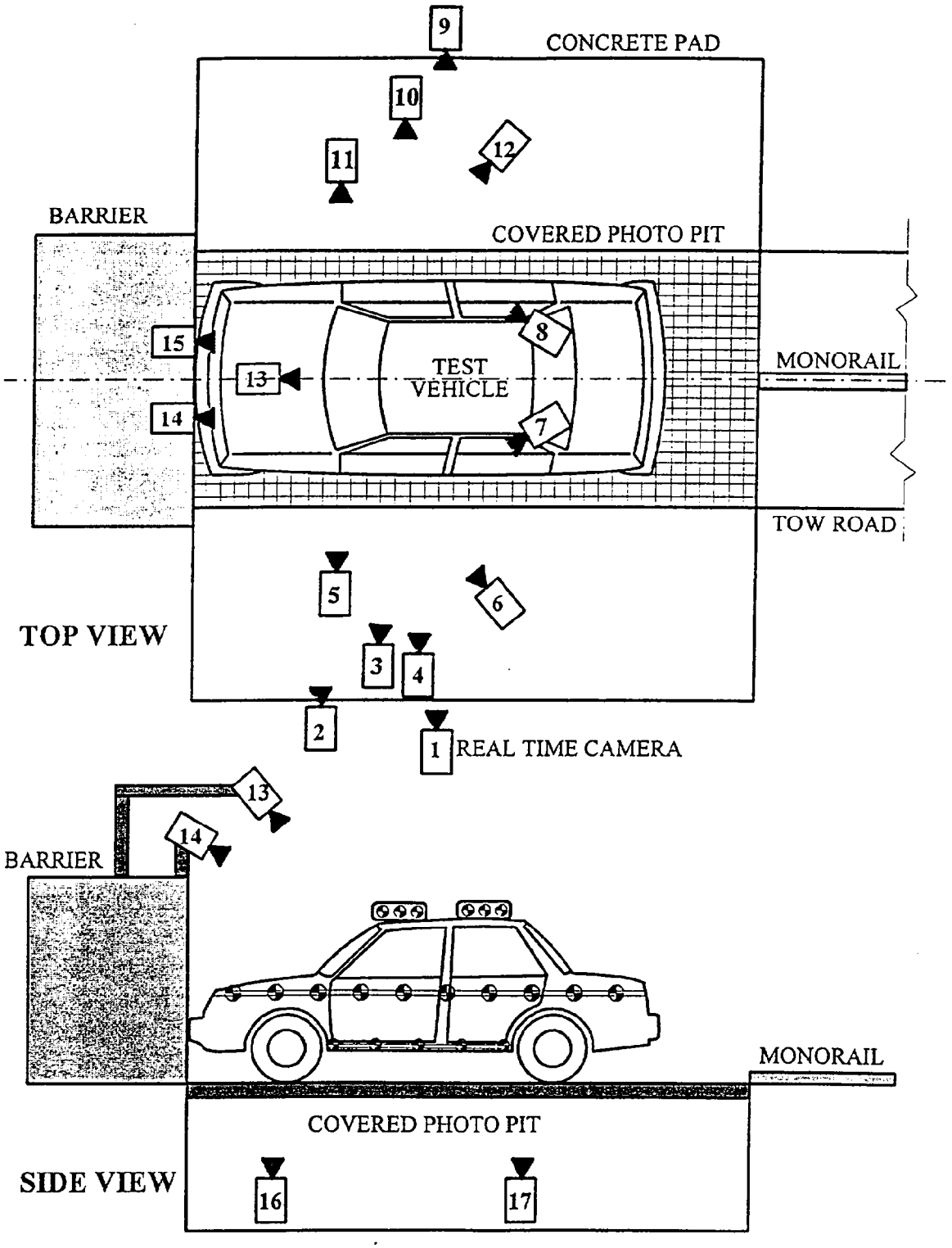
+X = film plane rearward of barrier

+Y = film plane to left of monorail centerline

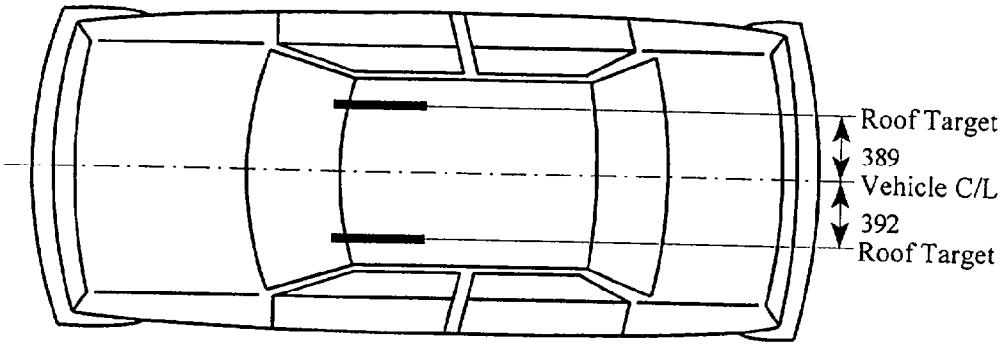
+Z = film plane to above ground level

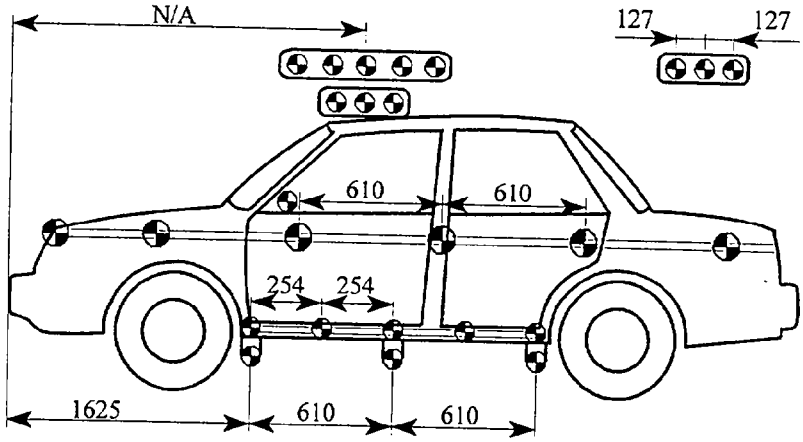
ORIGIN: For X and Y it is the Impact Point. For Z it is the Floor.

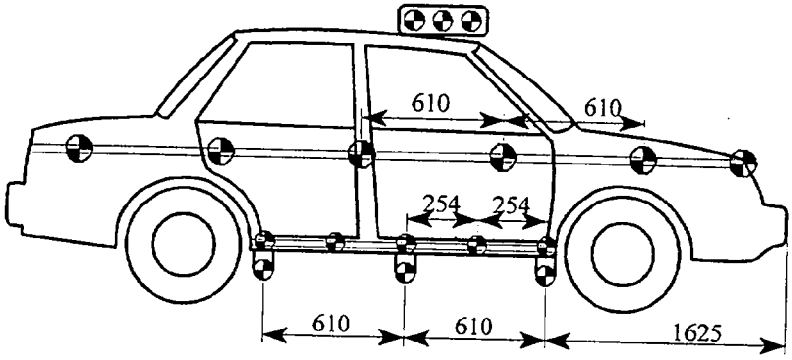
CAMERA LOCATIONS (Cont'd)



VEHICLE TARGET LOCATIONS







(DIMENSIONS IN MM)

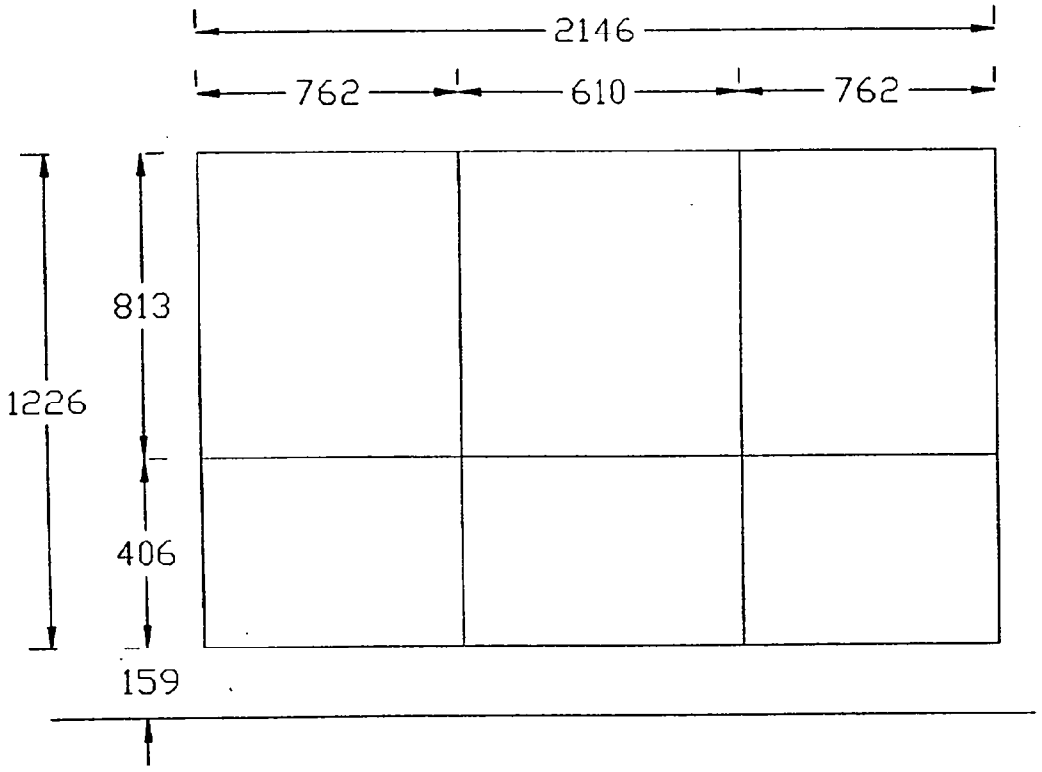
LOAD CELL LOCATIONS ON FIXED BARRIER

30 Load Cells

6 Rows

9 Columns

6 Groupings (5 cells/group)

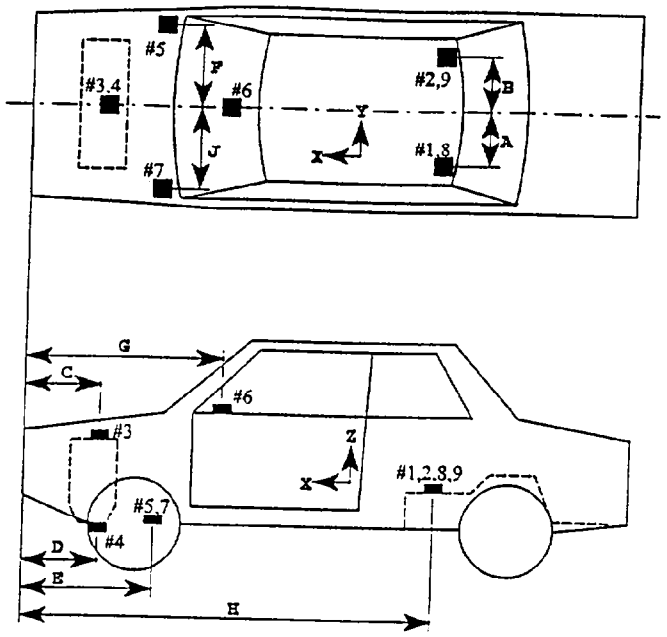


The following data is presented in Appendix B:

(1) Total or Sum of 30 individual load cells

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

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



Units: (mm)

Dimension	Length
A	690
B	700
C	720
D	893
E	1070
F	740
G	1841
H	3175
J	740

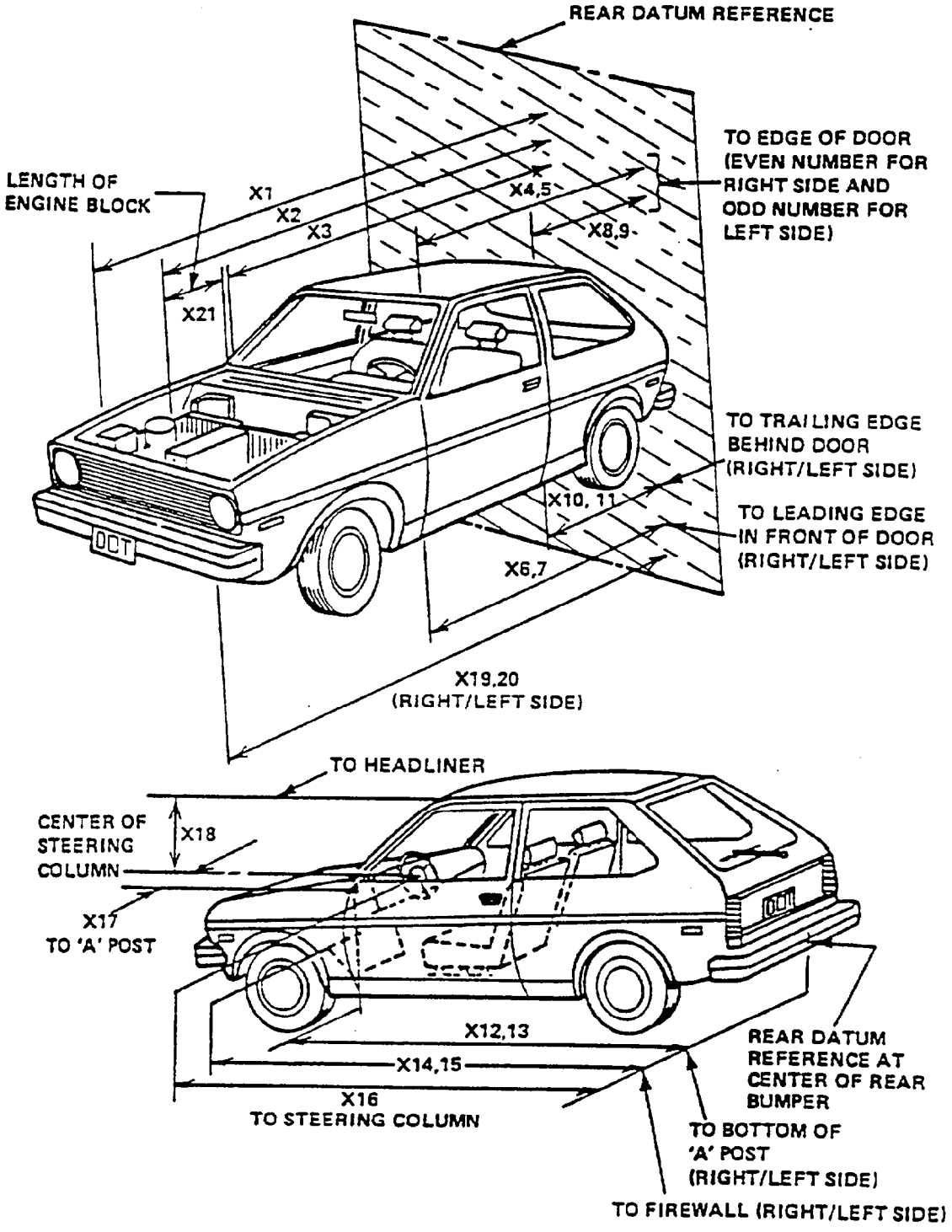
ACCEL. NO.	ACCELEROMETER	DIRECTION
1 and 8	Left Rear Seat Crossmember	X
2 and 9	Right Rear Seat Crossmember	X
3	Top of Engine	X
4	Bottom of Engine	X
5	Right Side Brake Caliper	X
6	Instrument Panel	X
7	Left Disc Brake Caliper	X

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

TEST VEHICLE MEASUREMENTS

No.	MEASUREMENT DESCRIPTION:	Pre-Test (mm)	Post-Test (mm)	Diff. (mm)
X1	Total Length of Test Vehicle at Centerline	5215	4657	558
X2	Rear Surface of Vehicle to Front of Engine	4570	4307	263
X3	Rear Surface of Vehicle to Firewall	3903	3882	21
X4	Rear Surface to Upr. Leading Edge of Rt. Door	3537	3500	37
X5	Rear Surface to Upr. Leading Edge of Left Door	3534	3523	11
X6	Rear Surface to Lwr. Leading Edge of Rt. Door	3513	3500	13
X7	Rear Surface to Lwr. Leading Edge of Left Door	3506	3493	13
X8	Rear Surface to Upr. Trailing Edge of Rt. Door	2418	2409	9
X9	Rear Surface to Upr. Trailing Edge of Left Door	2414	2400	14
X10	Rear Surface to Lwr. Trailing Edge of Rt. Door	2413	2404	9
X11	Rear Surface to Lwr. Trailing Edge of Left Door	2409	2395	14
X12	Rear Surface to Bottom of 'A' Post on Rt. Side	3521	3528	-7
X13	Rear Surface to Bottom of 'A' Post on Left Side	3515	3515	0
X14	Rear Surface to Firewall on Right Side	3868	3860	8
X15	Rear Surface to Firewall on Left Side	3882	3868	14
X16	Rear Surface to Steering Column	3005	3010	-5
X17	Center of Steering Column to 'A' Post	347	320	27
X18	Center of Steering Column to Headlining	402	380	22
X19	Rear Surface to Right Side of Front Bumper	4952	4536	416
X20	Rear Surface to Left Side of Front Bumper	4945	4571	374
X21	Length of Engine Block	550	550	0

TEST VEHICLE MEASUREMENTS



ACCIDENT INVESTIGATION DIVISION DATA

FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: 1995/Oldsmobile/Aurora/4 Door

VEH. NHTSA NO.: MS0106 ; VIN: 1G3GR62C5S4115235

MODEL YEAR: 1995 ; BUILD DATE: 9/94 ; TEST DATE: December 9, 1994

VEH. SIZE CATEGORY: Mid Size ; TEST WEIGHT: 2041 kg

VEH. WHEELBASE: 2898 mm ; FRONT OVERHANG: 1160 mm ; OVERALL WIDTH: 1851 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: 55.8 kph ; TIME OF SEPARATION: 78 msec

VELOCITY CHANGE: 64.1 kph

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:

F (Frontal)

CRUSH DEPTH DIMENSIONS:

C1 = 374 mm

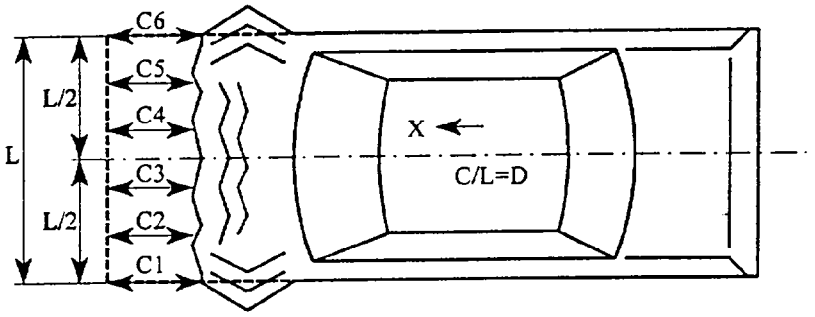
C2 = 471 mm

C3 = 514 mm

C4 = 507 mm

C5 = 451 mm

C6 = 416 mm



MIDPOINT OF DAMAGE: D = Vehicle Centerline (Longitude)

LENGTH OF DAMAGED REGION: L = 1530 mm

APPENDIX A

PHOTOGRAPHS

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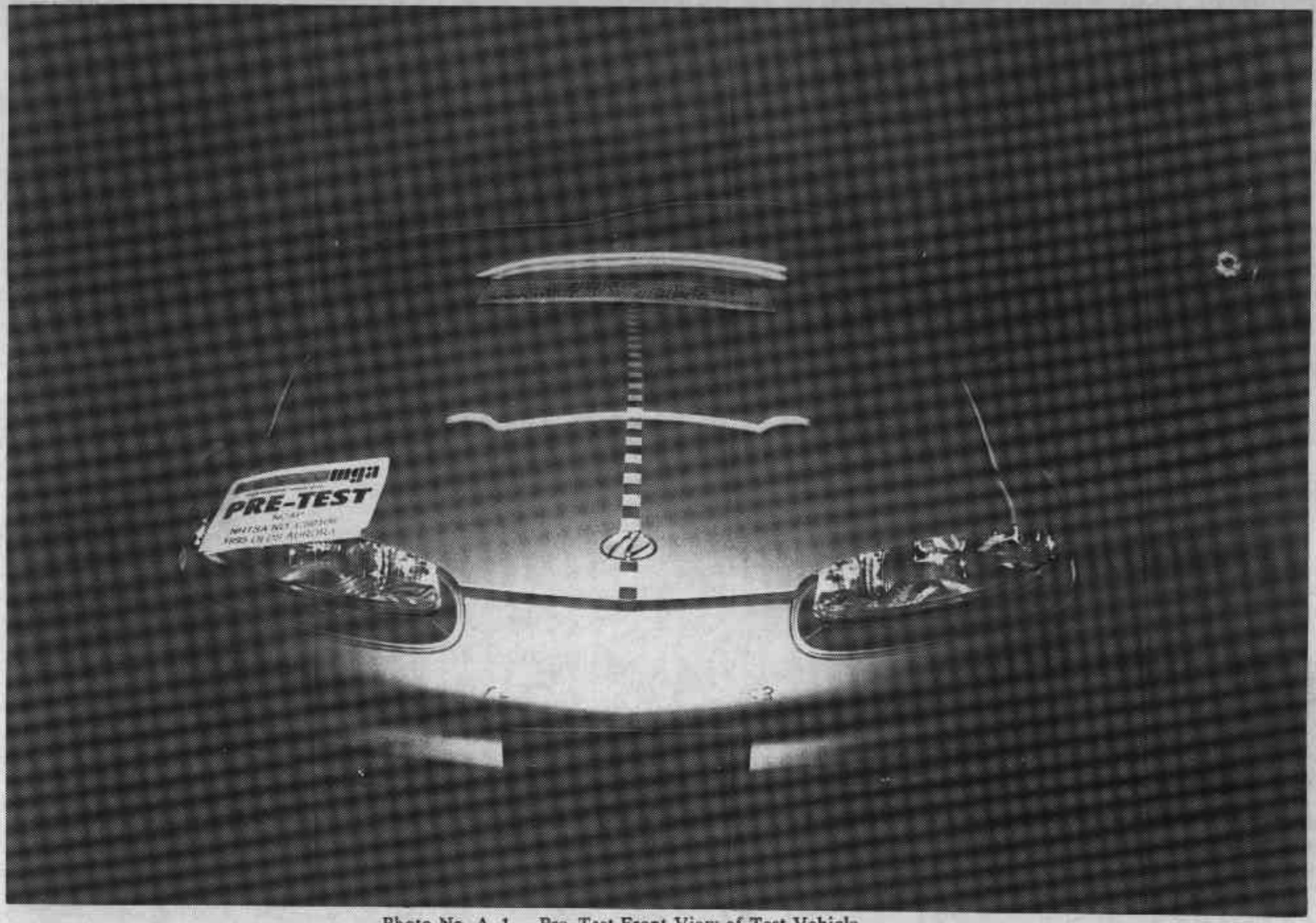

Photo No. A-1 - Pre-Test Front View of Test Vehicle

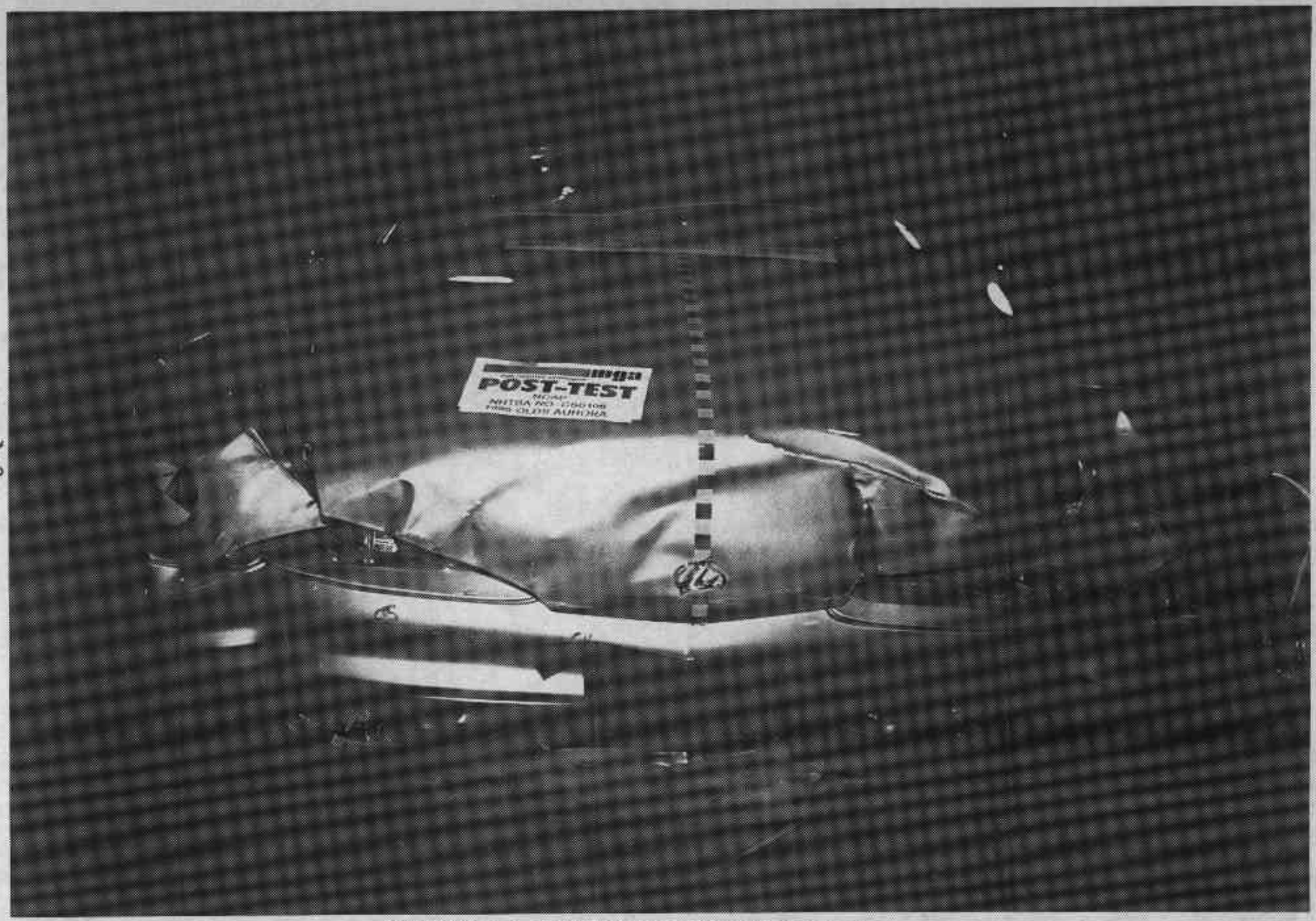

Photo No. A-2 - Post-Test Front View of Test Vehicle

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

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

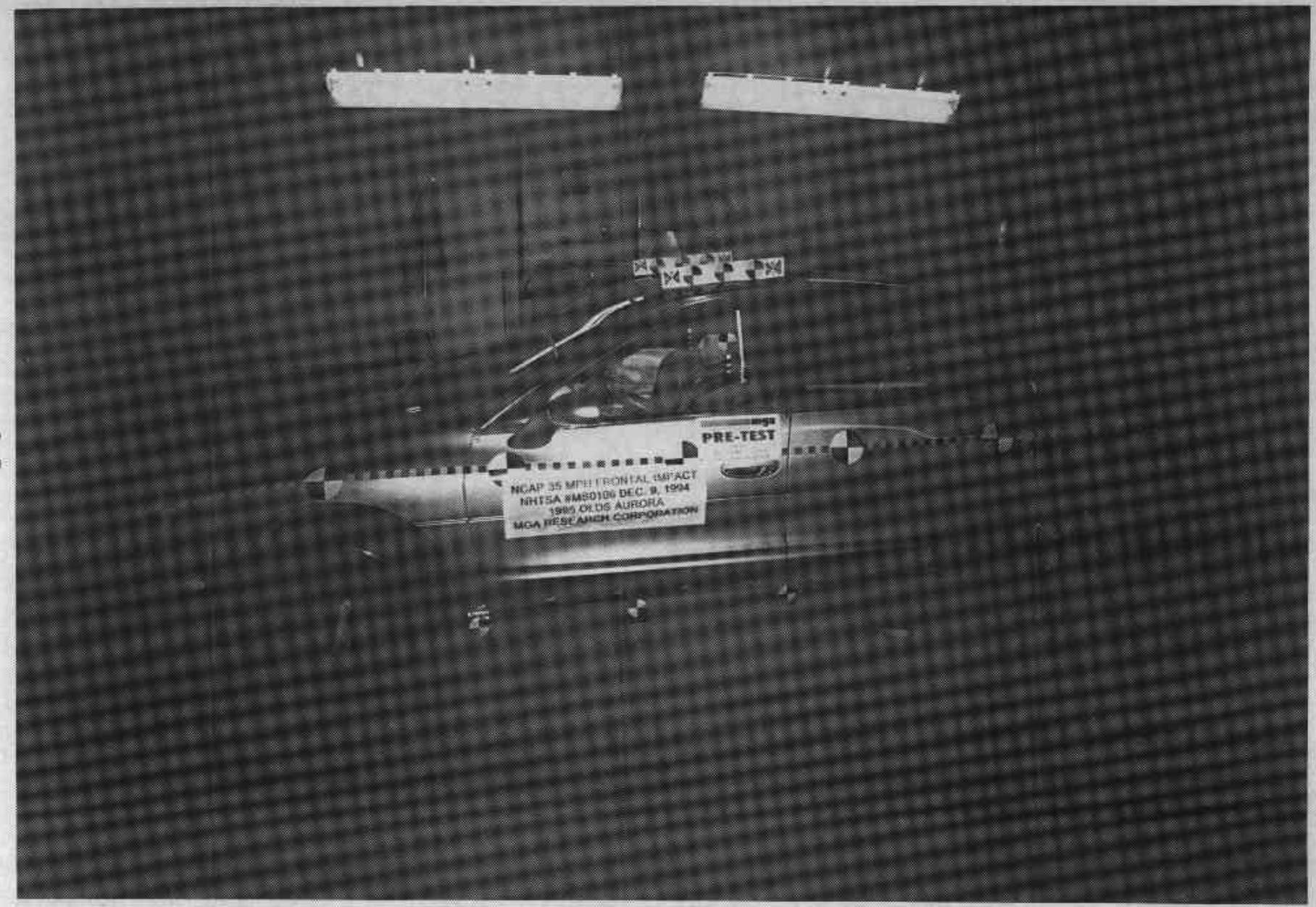

Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

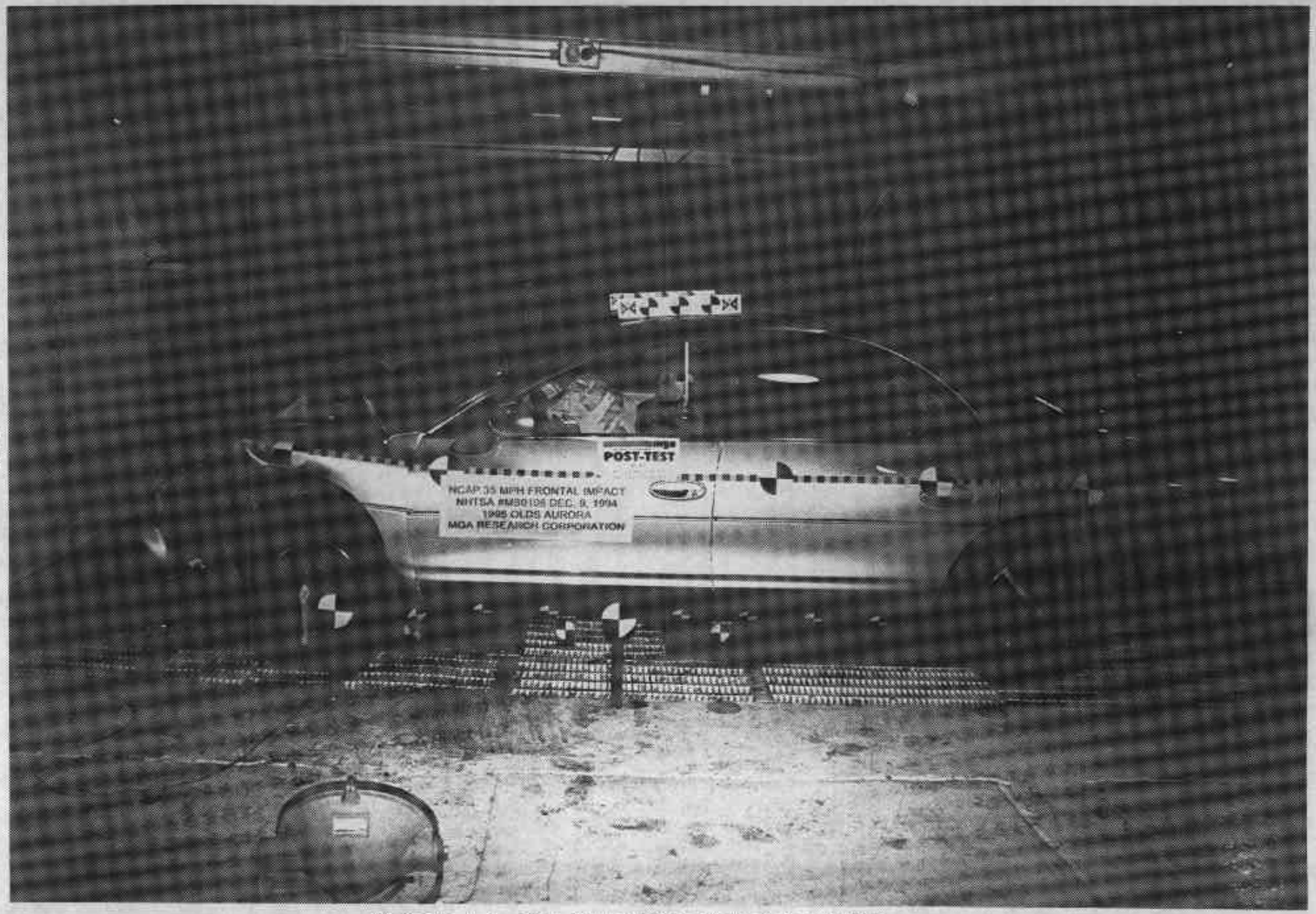

Photo No. A-6 - Post-Test Left Side View of Test Vehicle

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

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

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

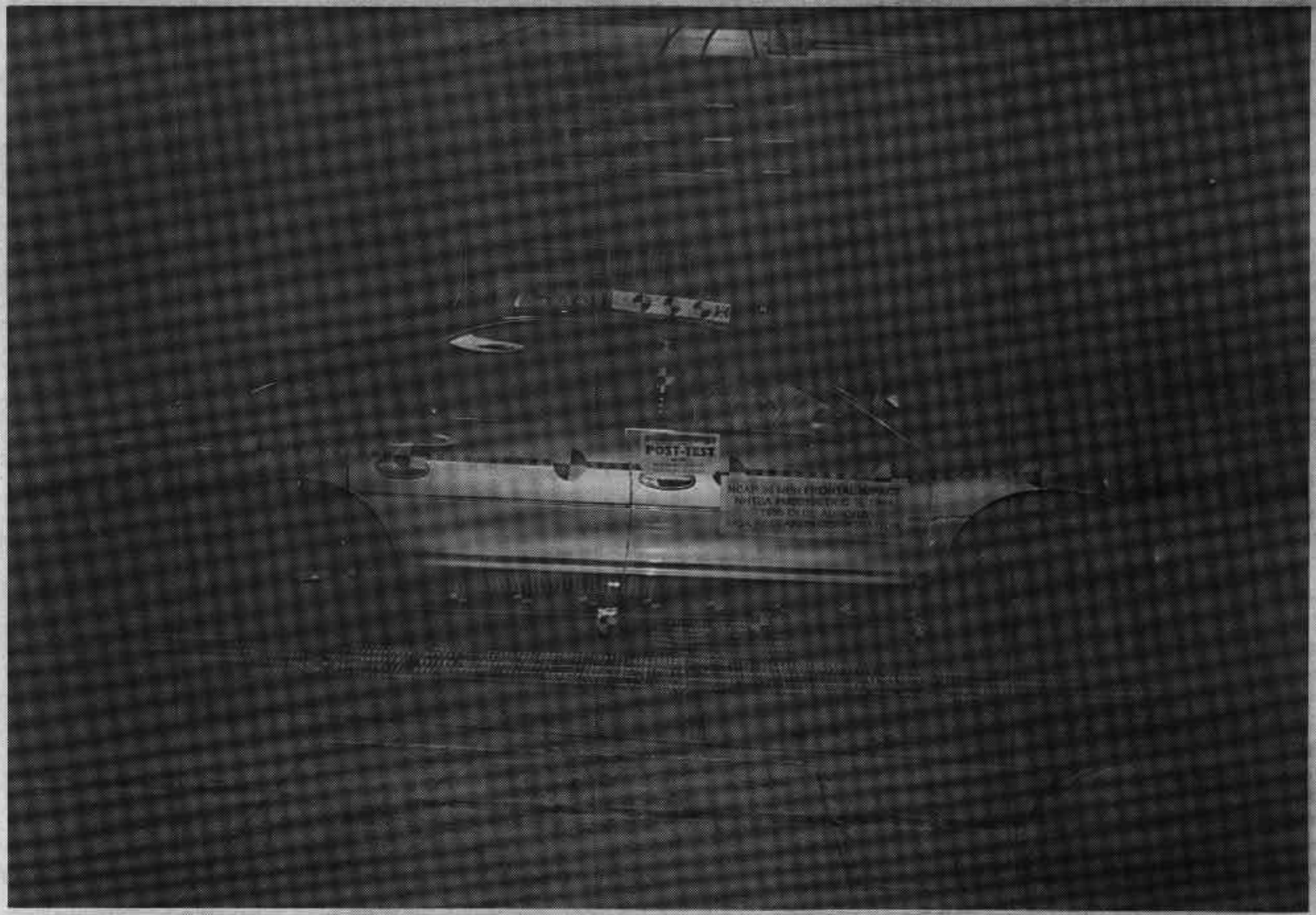

Photo No. A-10 - Post-Test Right Side View of Test Vehicle

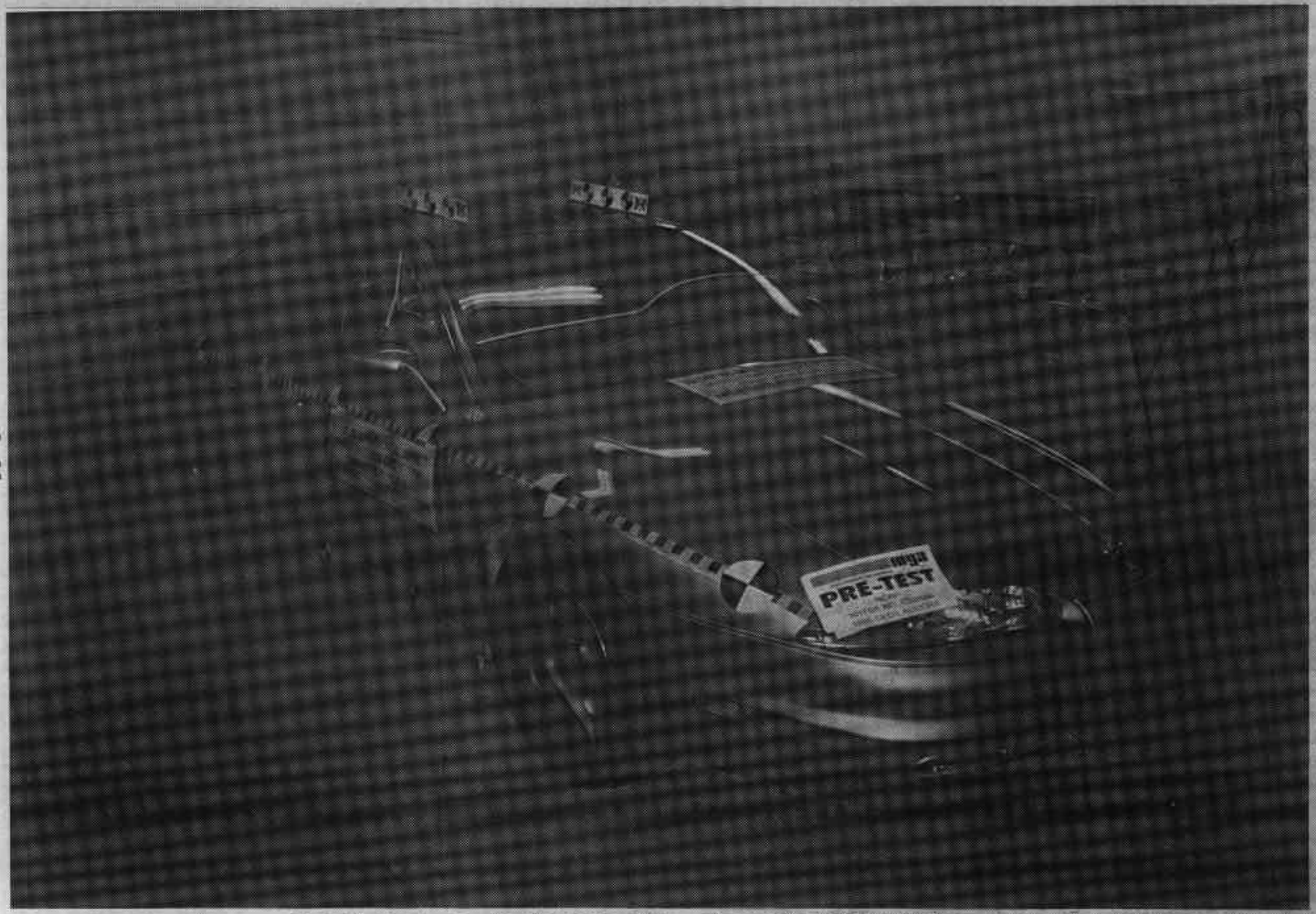

Photo No. A-11 - Pre-Test Right Front Three-Quarter View of Test Vehicle

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

Photo No. A-13 - Pre-Test Fuel Filler Cap View

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

Photo No. A-15 - Post-Test Engine Compartment View

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

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

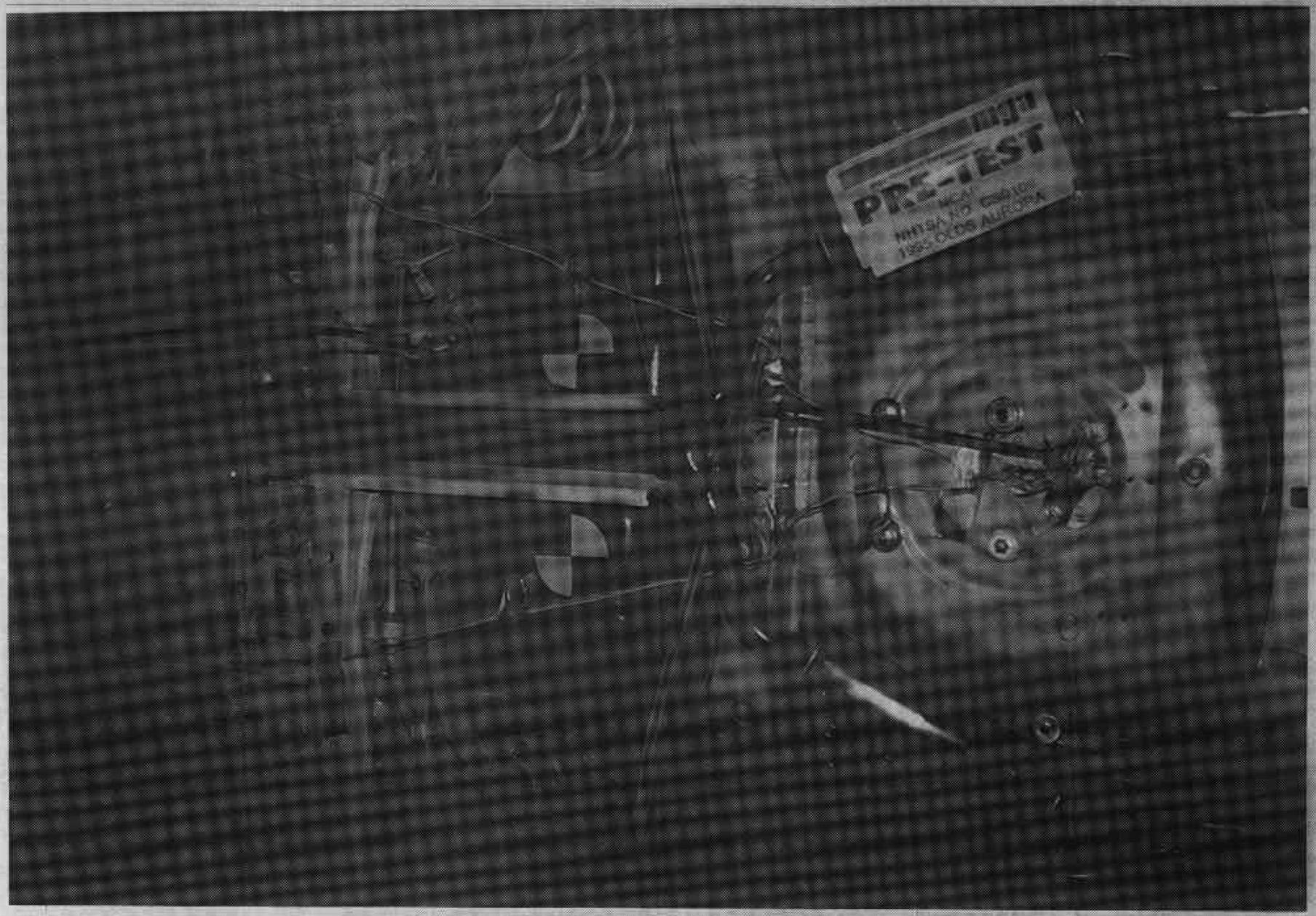

Photo No. A-18 - Pre-Test Rear Underbody View

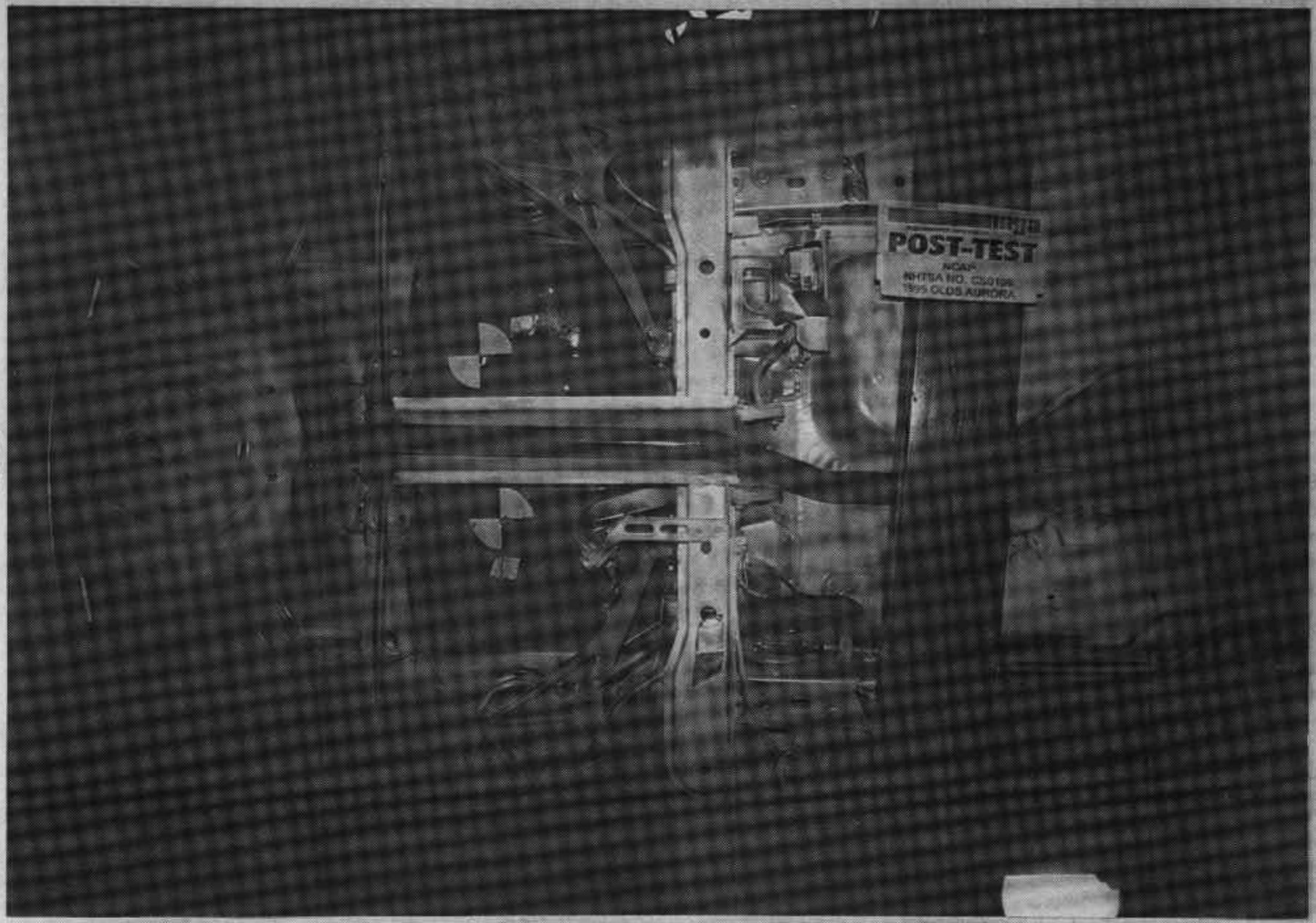

Photo No. A-19 - Post-Test Rear Underbody View

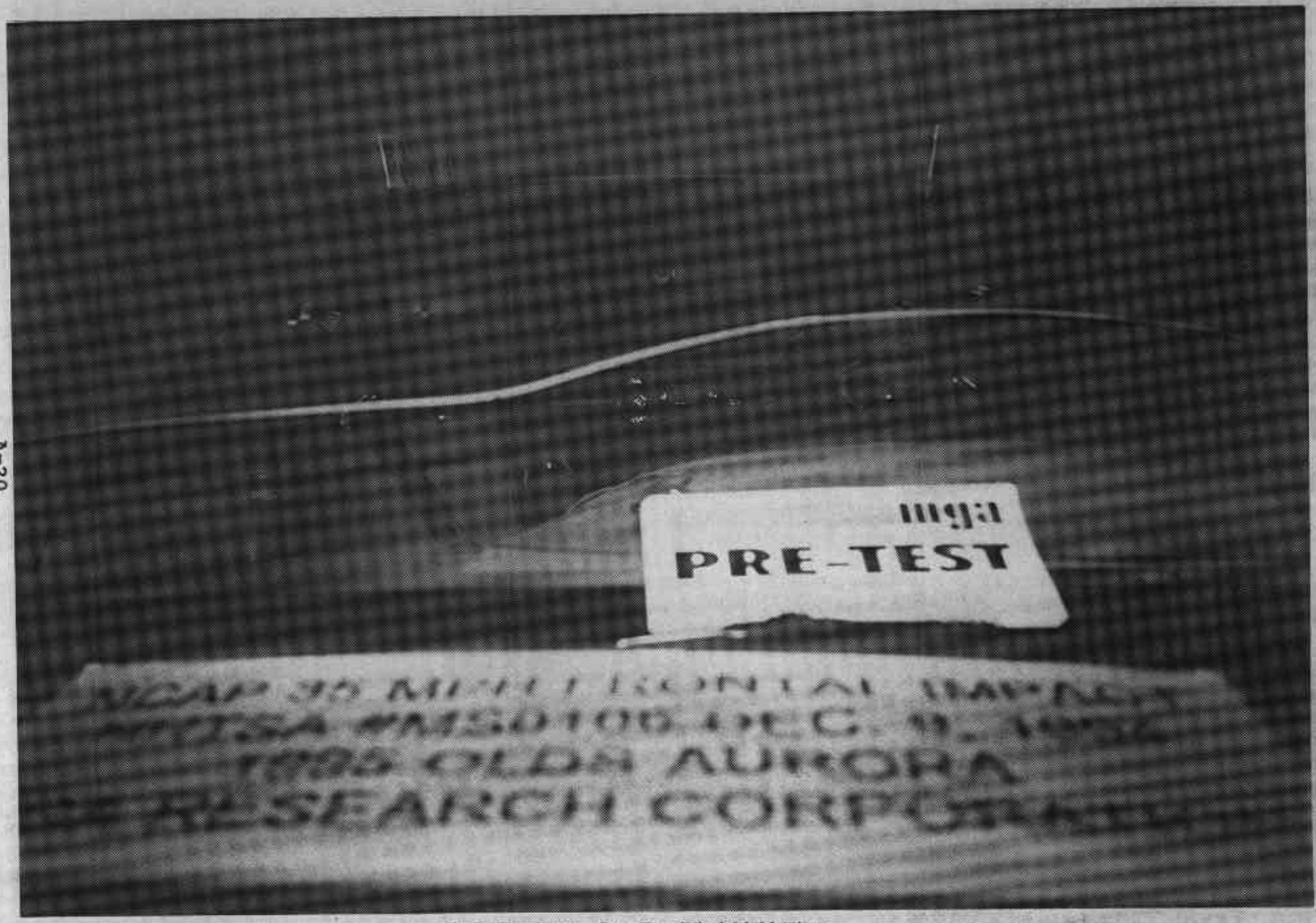

Photo No. A-20 - Pre-Test Windshield View

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

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

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

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

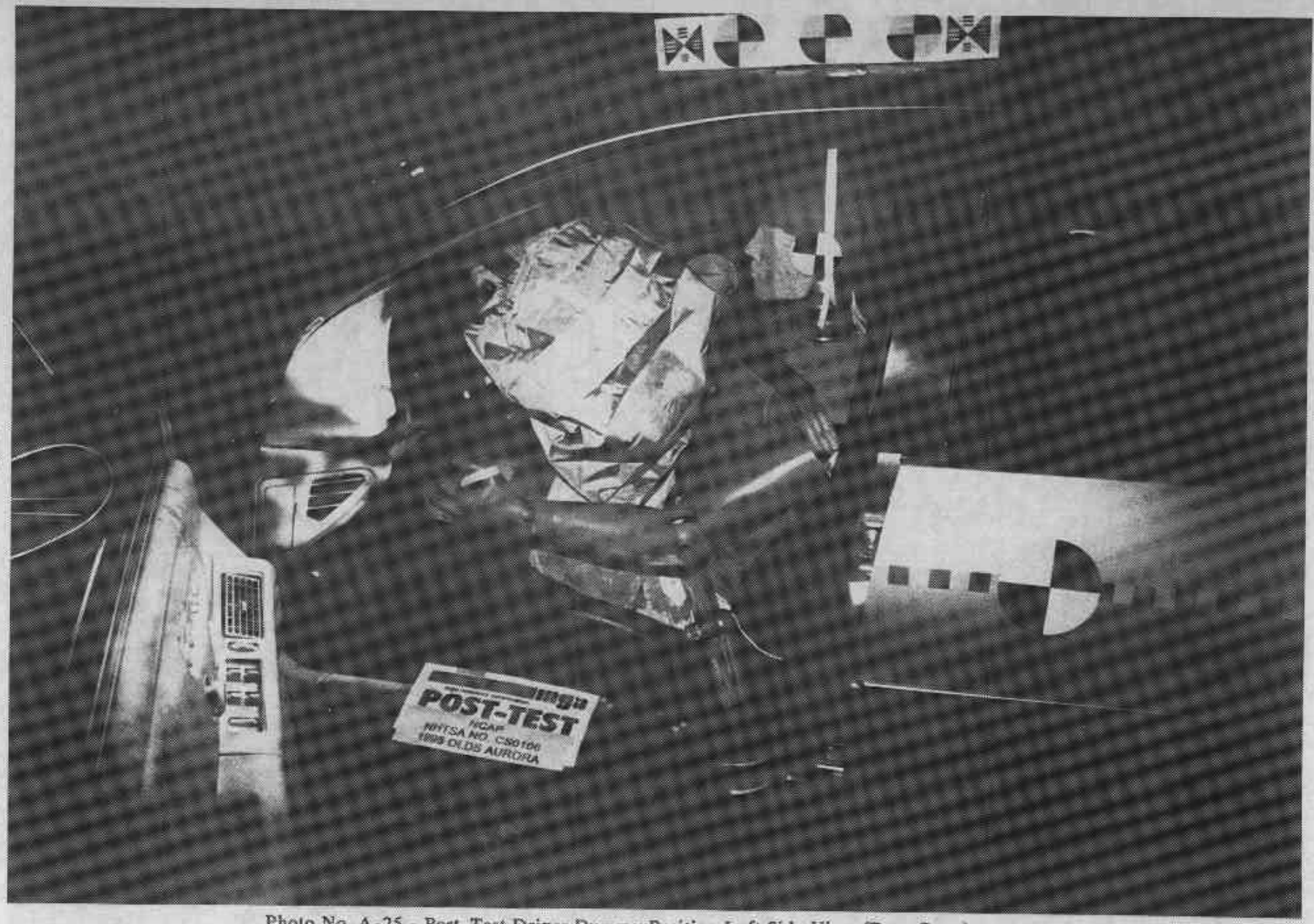

Photo No. A-25 - Post-Test Driver Dummy Position Left Side View (Door Open)

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

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

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

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

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

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

Photo No. A-32 - Pre-Test Passenger Dummy Position Right Side View

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

Photo No. A-34 - Pre-Test Passenger Dummy Position Right Side View (Door Open)

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

Photo No. A-36 - Pre-Test Passenger Seat Position View

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

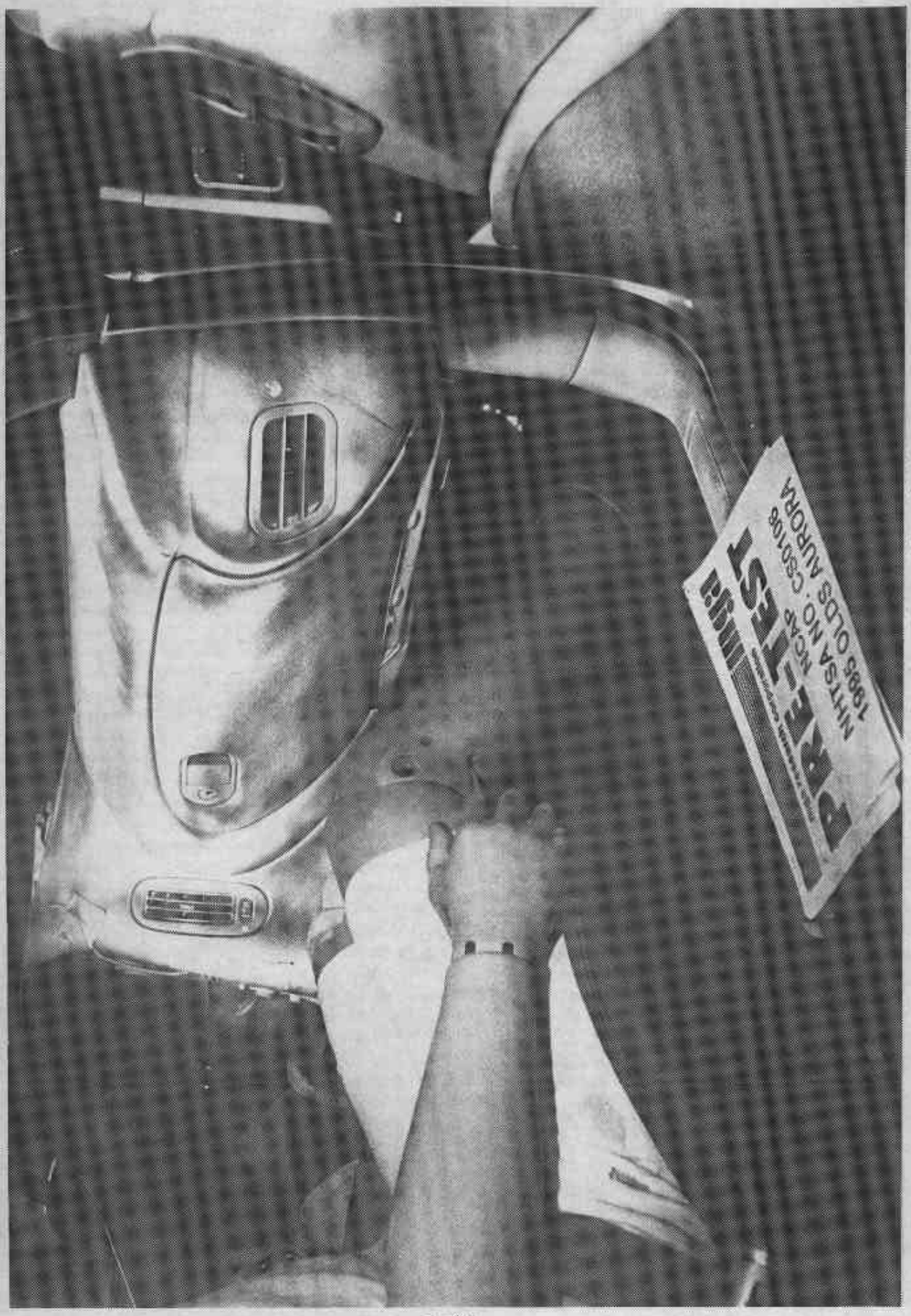
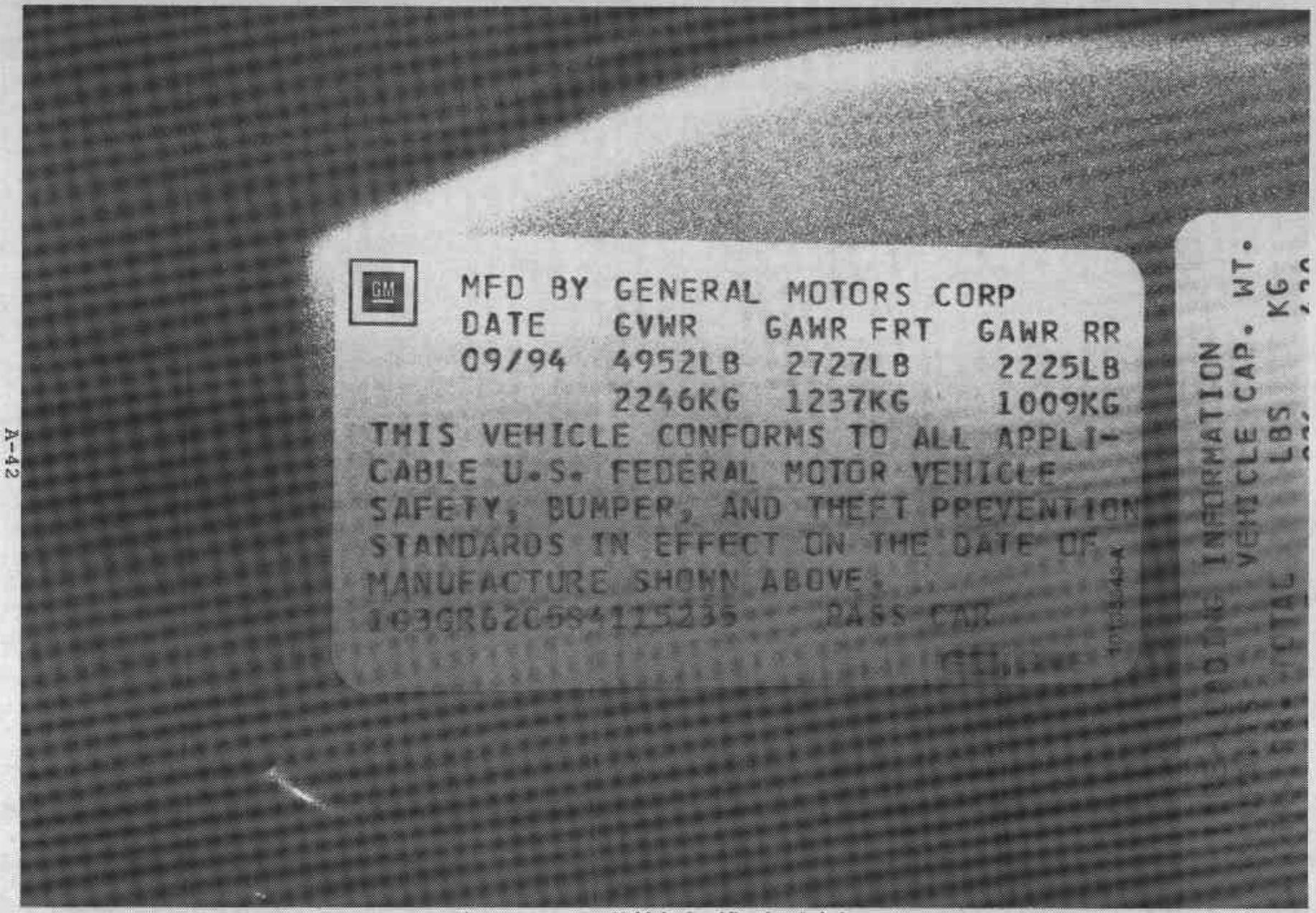


Photo No. A-38 - Pre-Test Passenger Dummy Knee Position

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

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

Photo No. A-40 - Post-Test Passenger Dummy Airbag Contact



A-42

Photo No. A-42 - Vehicle Certification Label

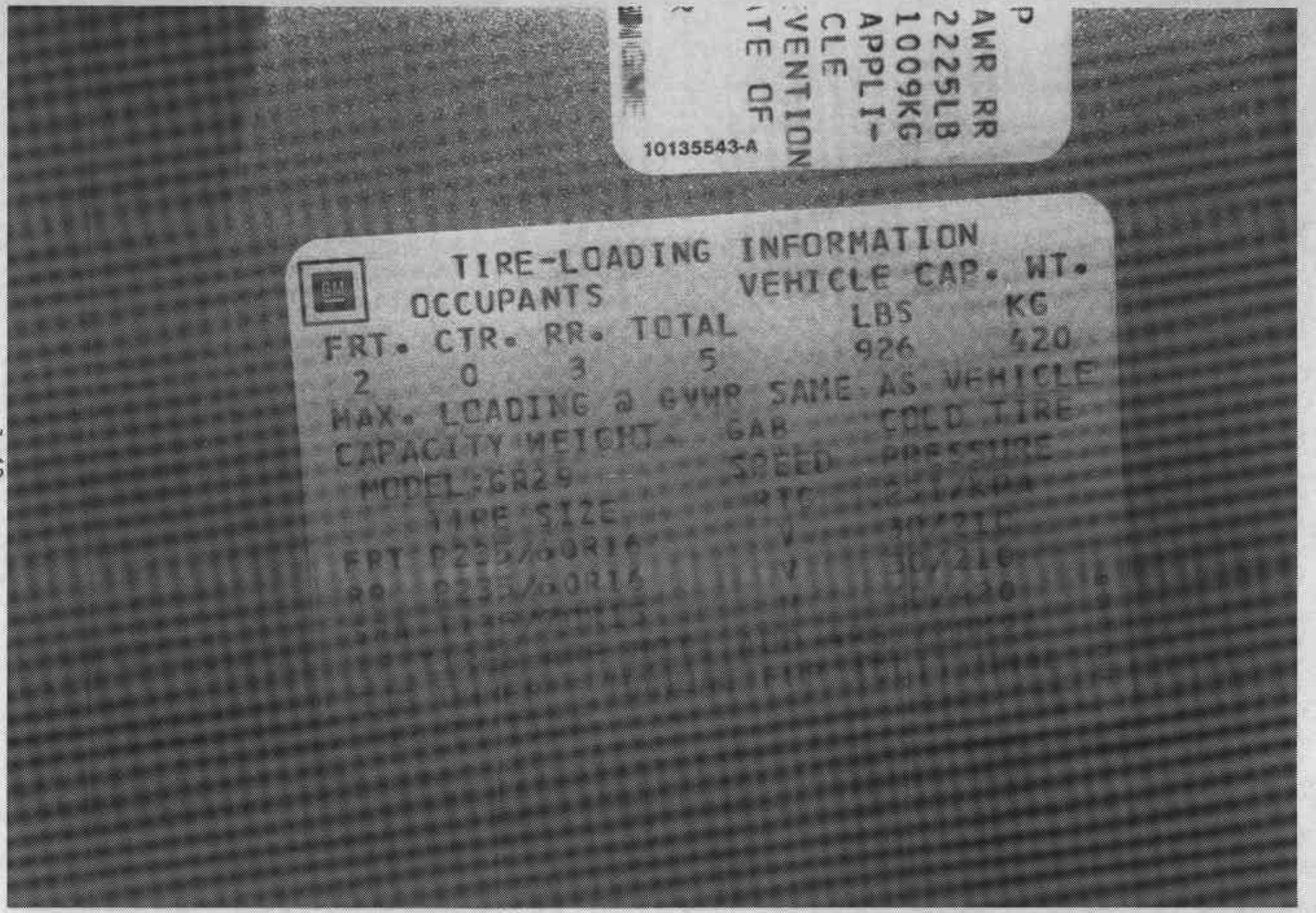


Photo No. A-43 - Tire Placard

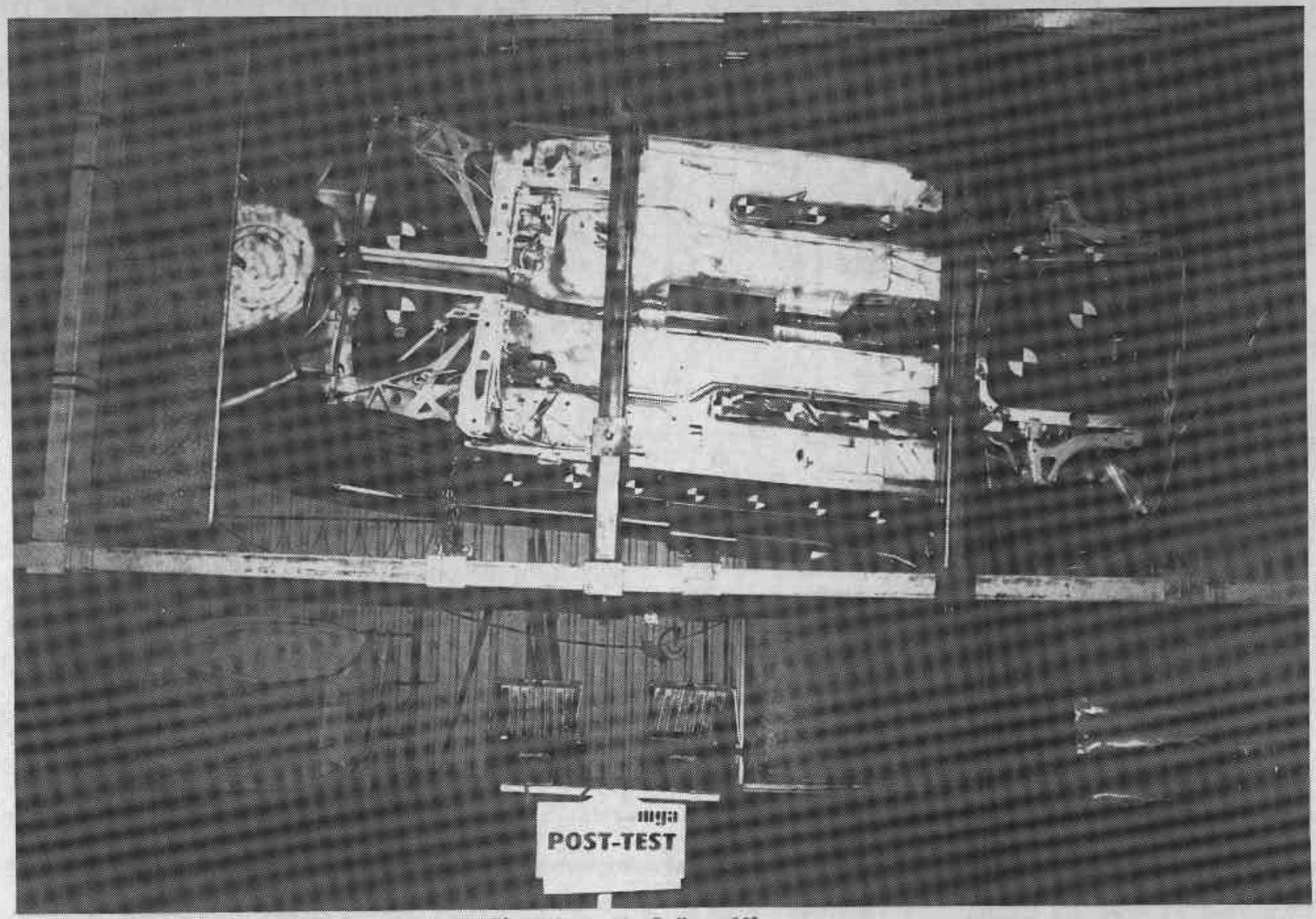


Photo No. A-44 - Rollover 90°

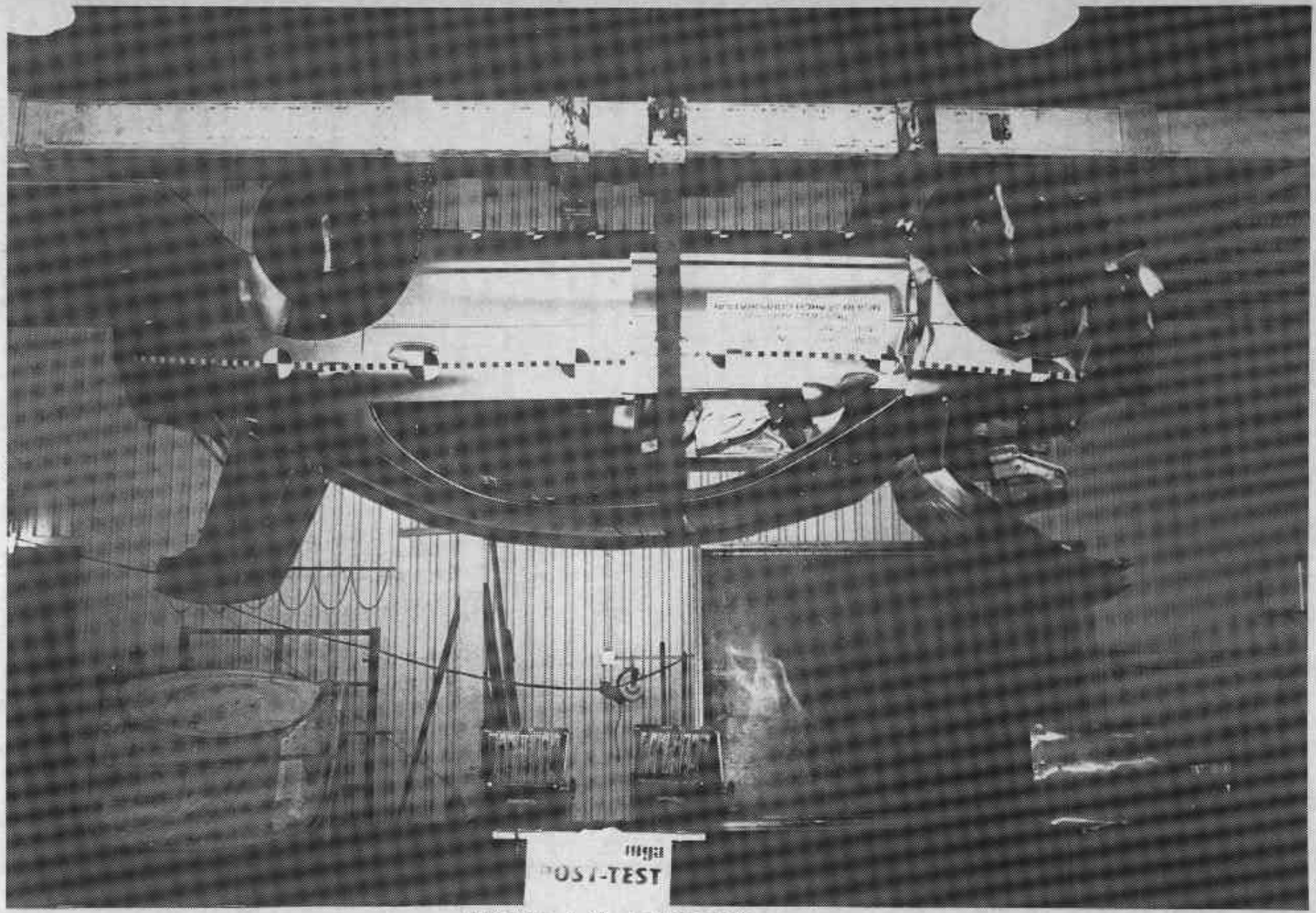


Photo No. A-45 - Rollover 180°

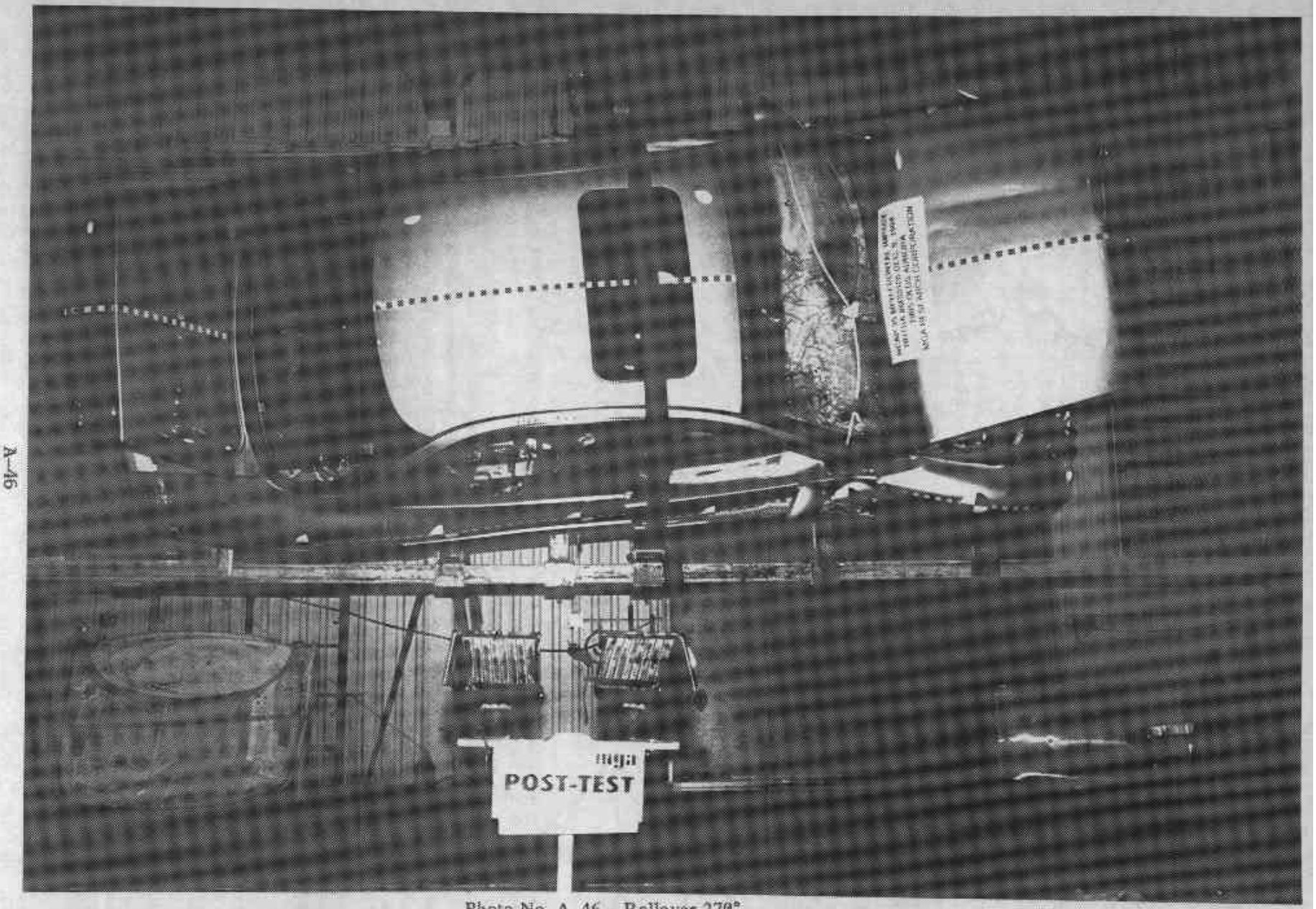


Photo No. A-46 - Rollover 270°

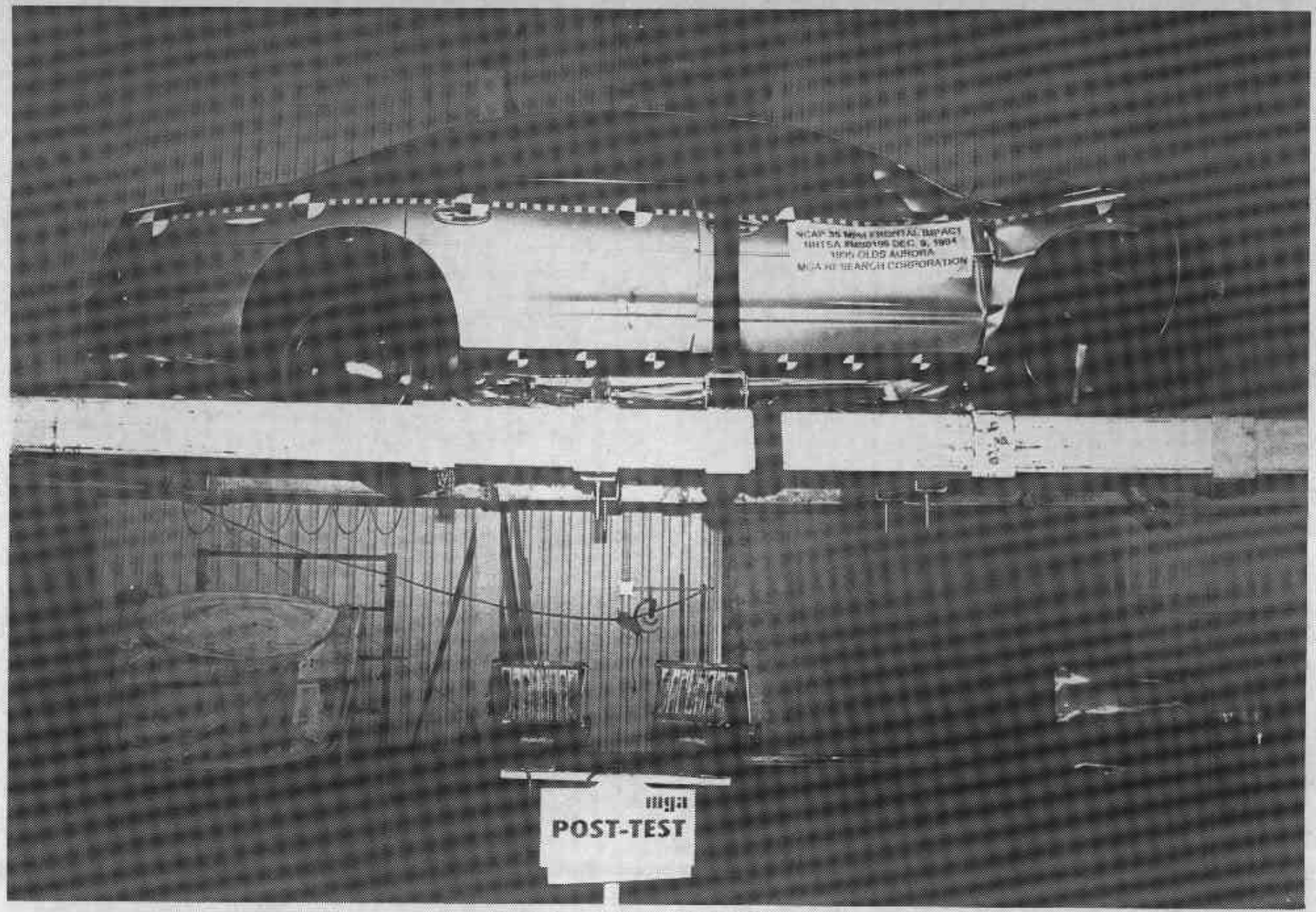


Photo No. A-47 - Rollover 360°

APPENDIX B

Vehicle, Load Cell Barrier and Dummy Response Data

1995 Oldsmobile Aurora 4-Door

NHTSA NO.: MS0106

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)

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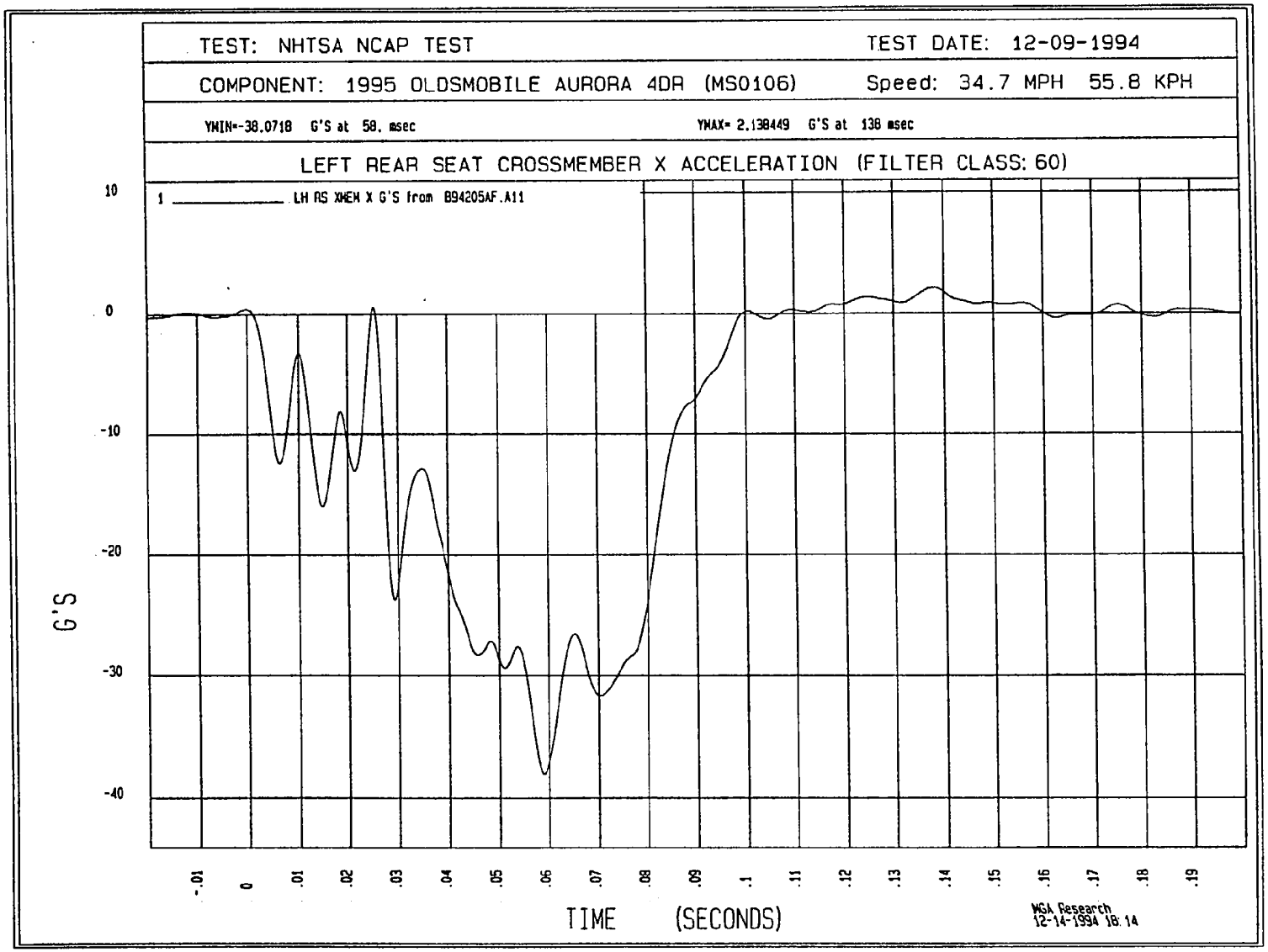

Figure B-1 - Left Rear Seat Crossmember X Acceleration vs. Time

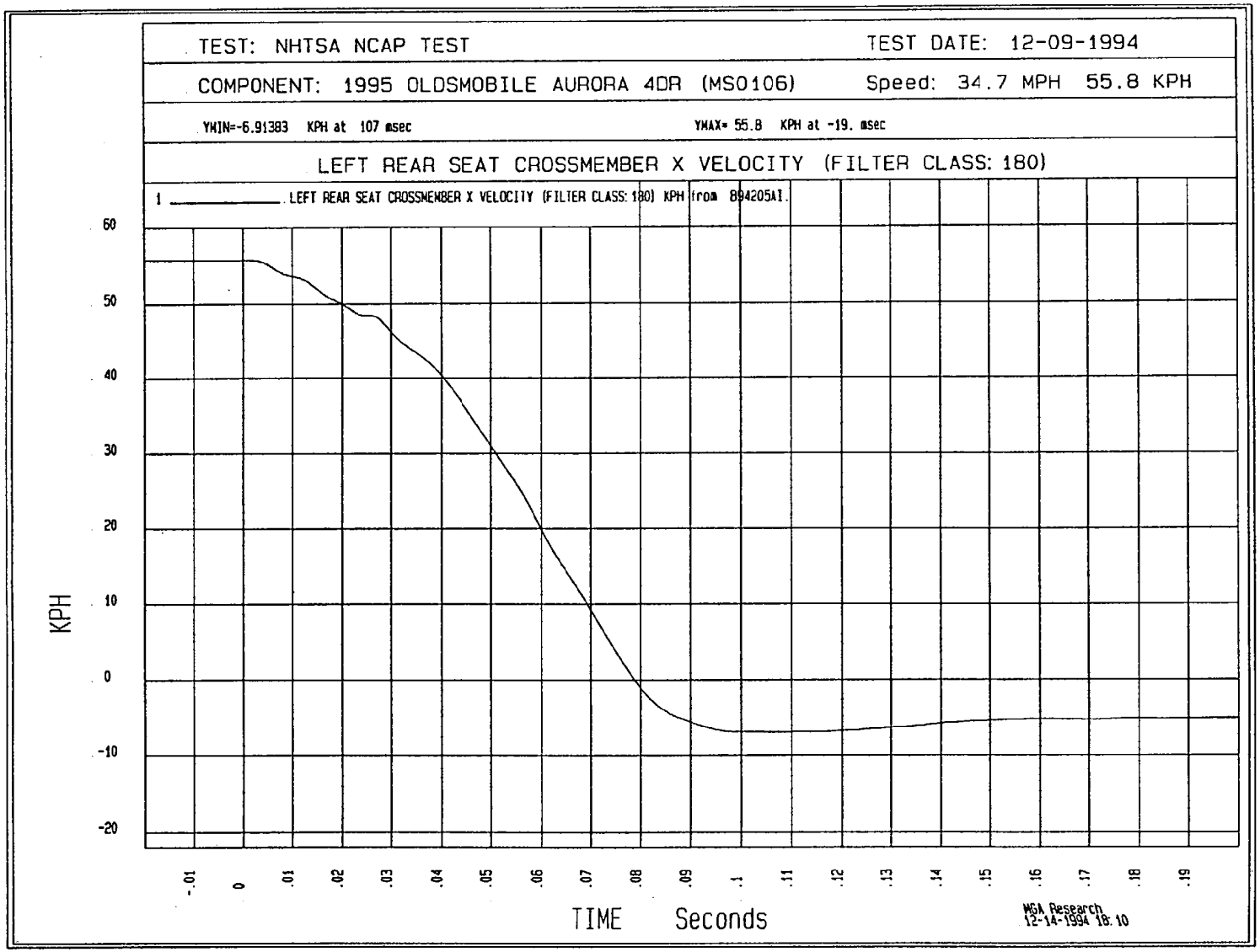

Figure B-2 - Left Rear Seat Crossmember X Velocity vs. Time

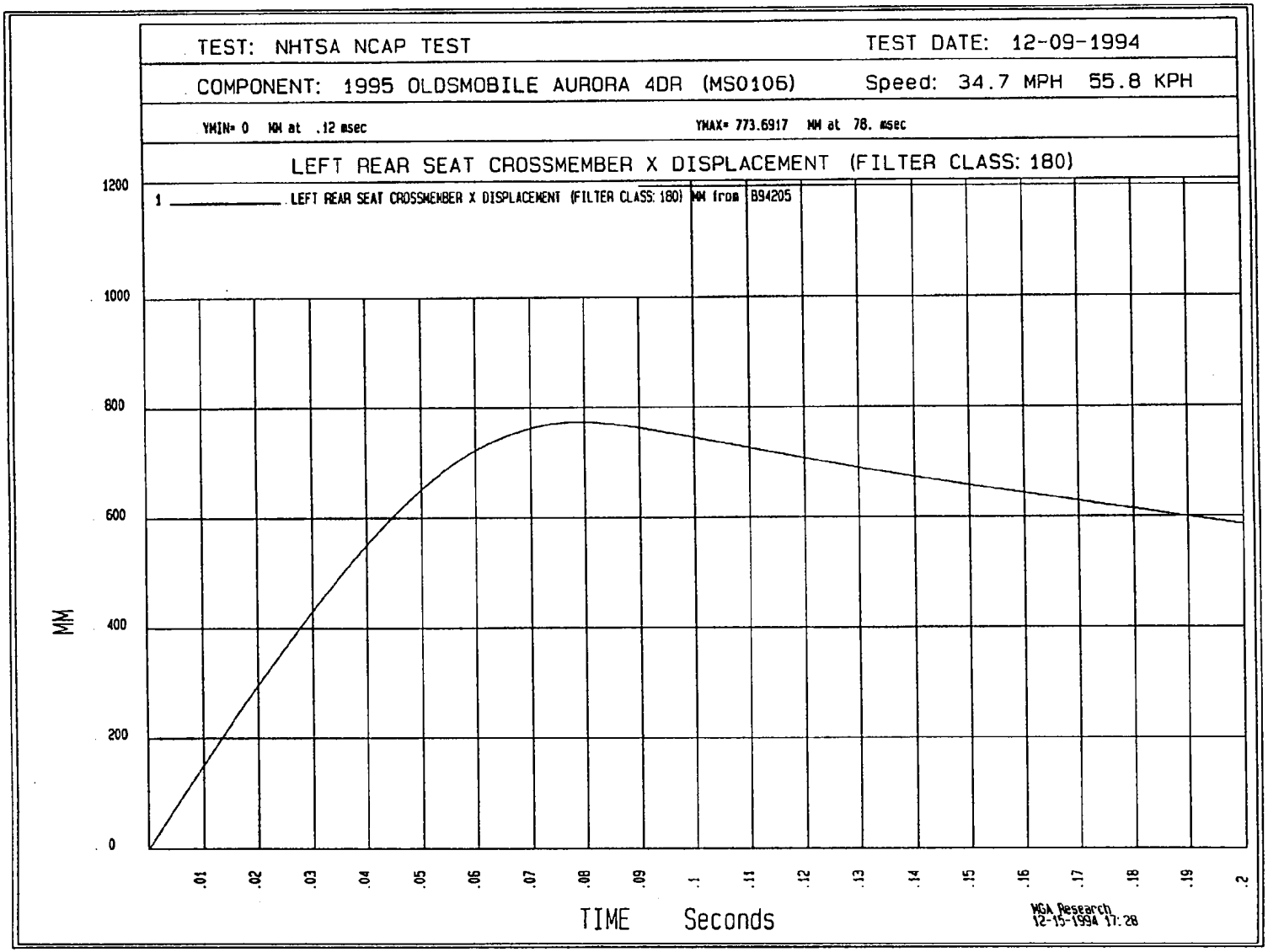

Figure B-3 - Left Rear Seat Crossmember X Displacement vs. Time

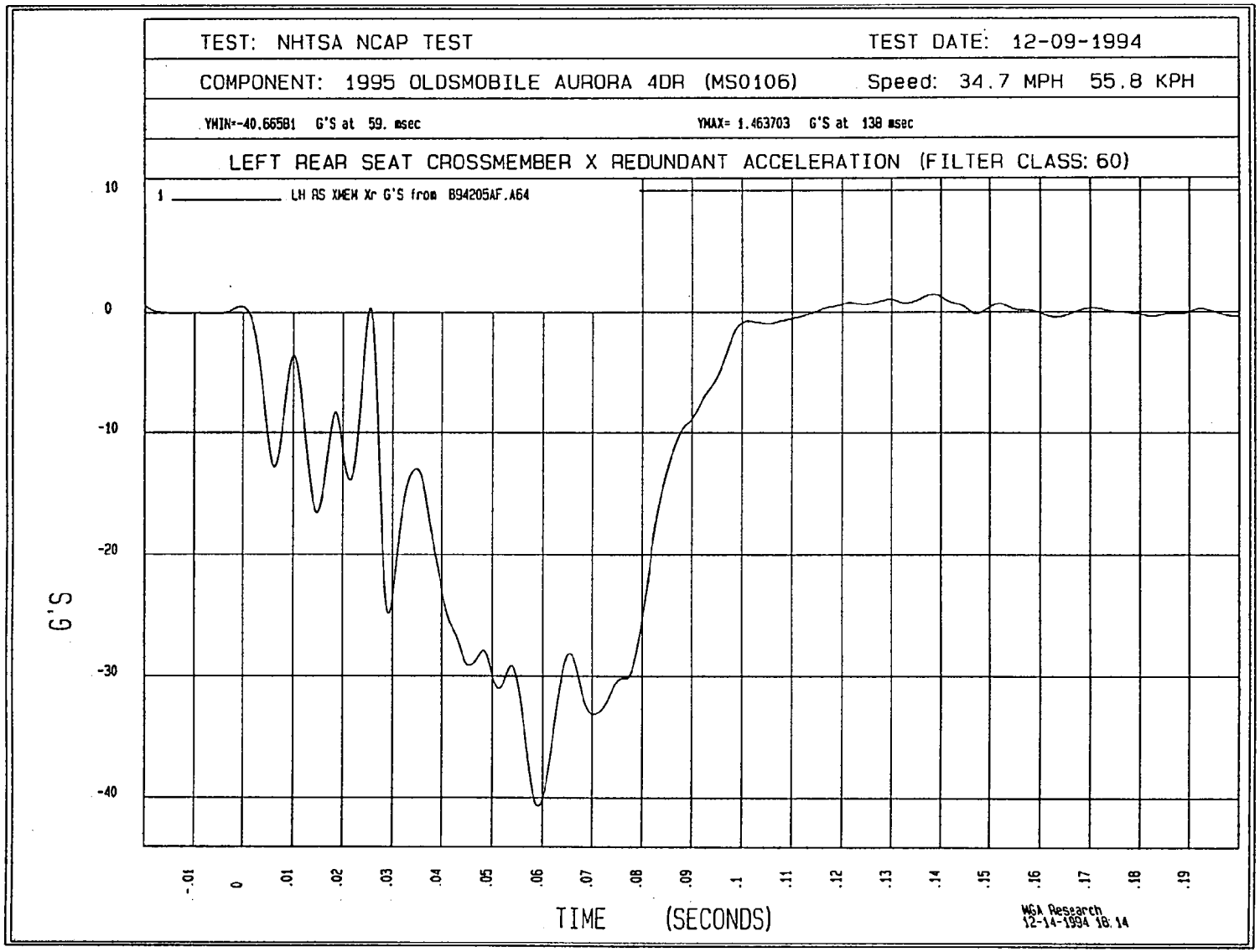

Figure B-4 - Left Rear Seat Crossmember X Redundant Acceleration vs. Time

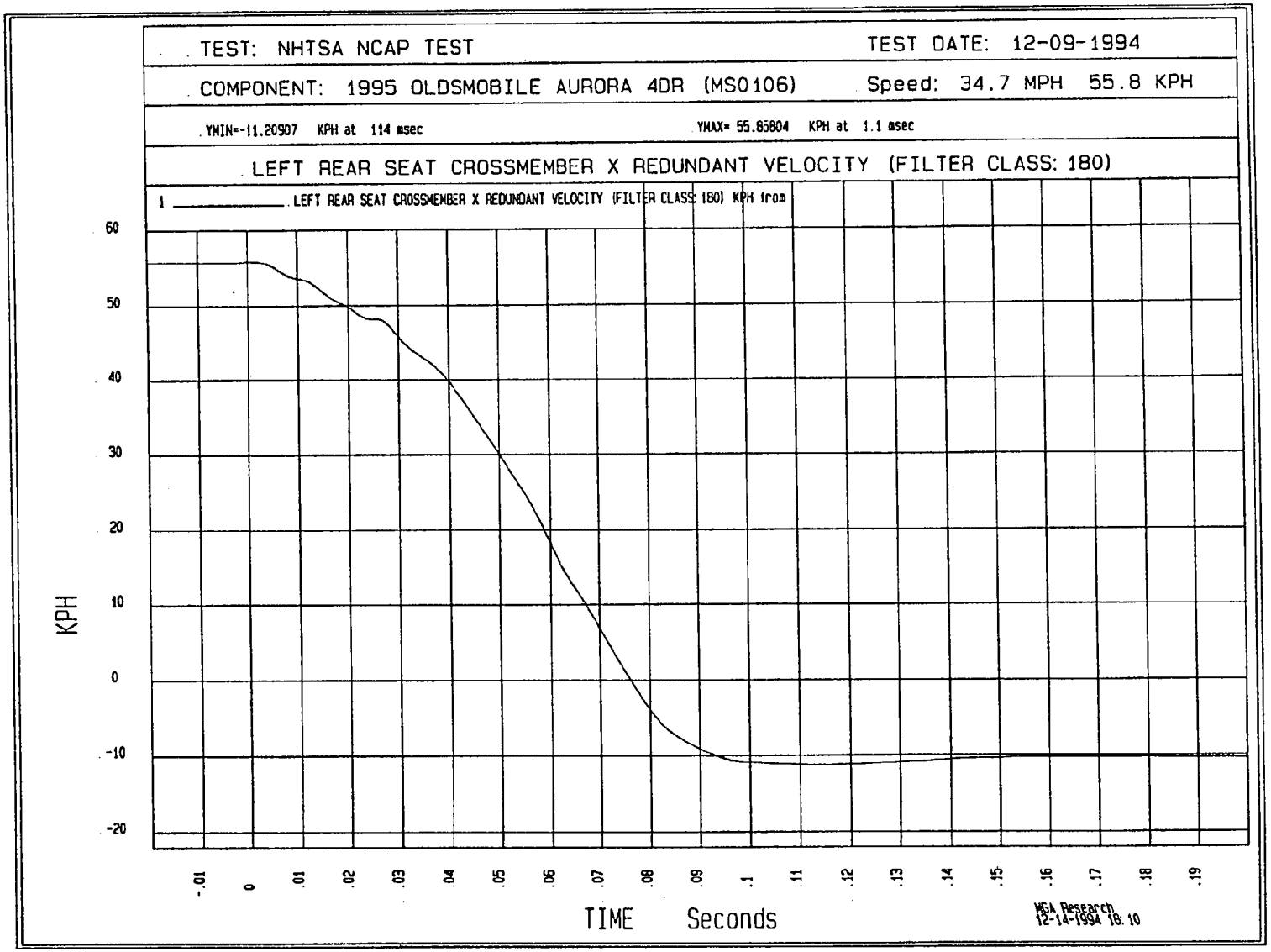

Figure B-5 - Left Rear Seat Crossmember X Redundant Velocity vs. Time

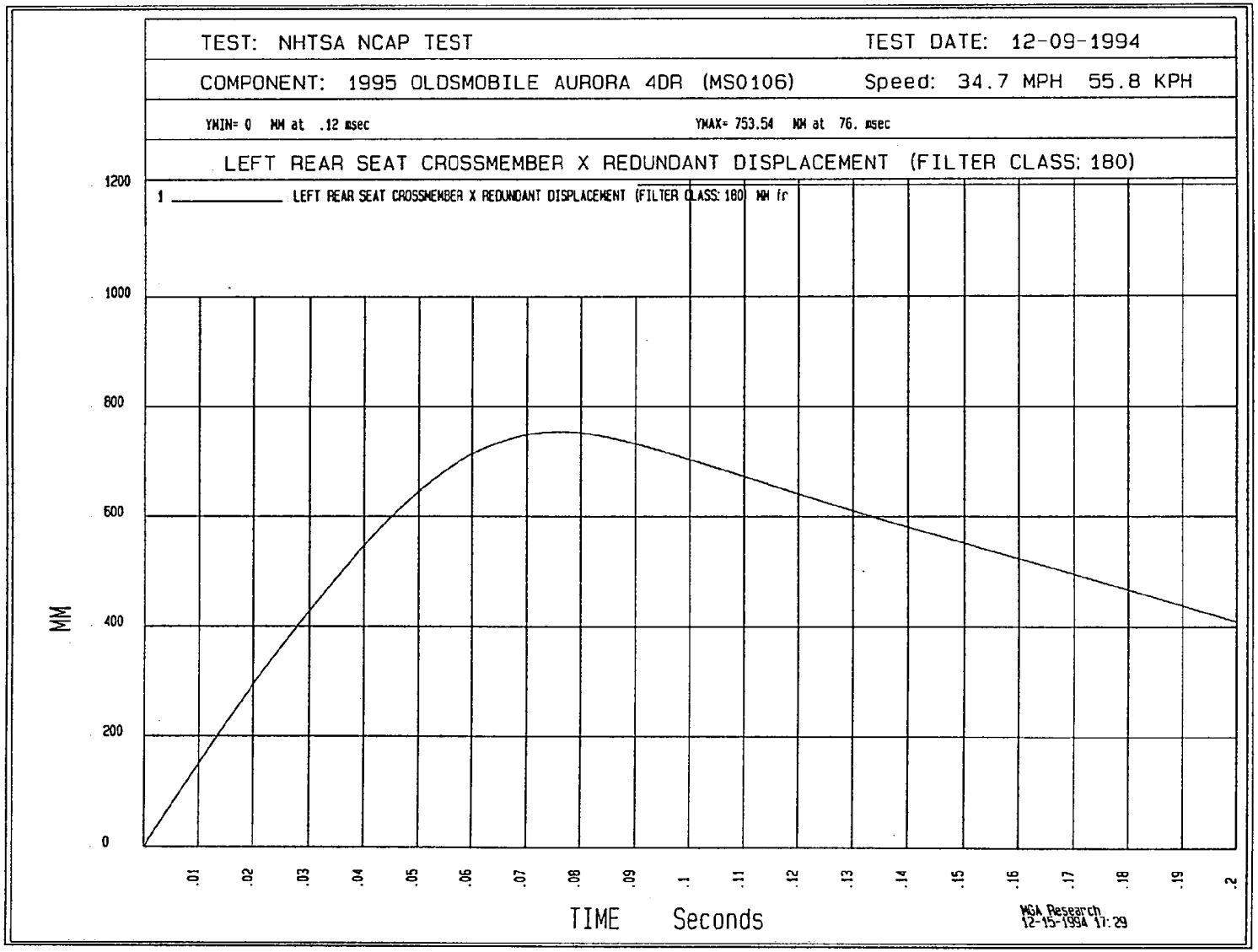

Figure B-6 - Left Rear Seat Crossmember X Redundant Displacement vs. Time

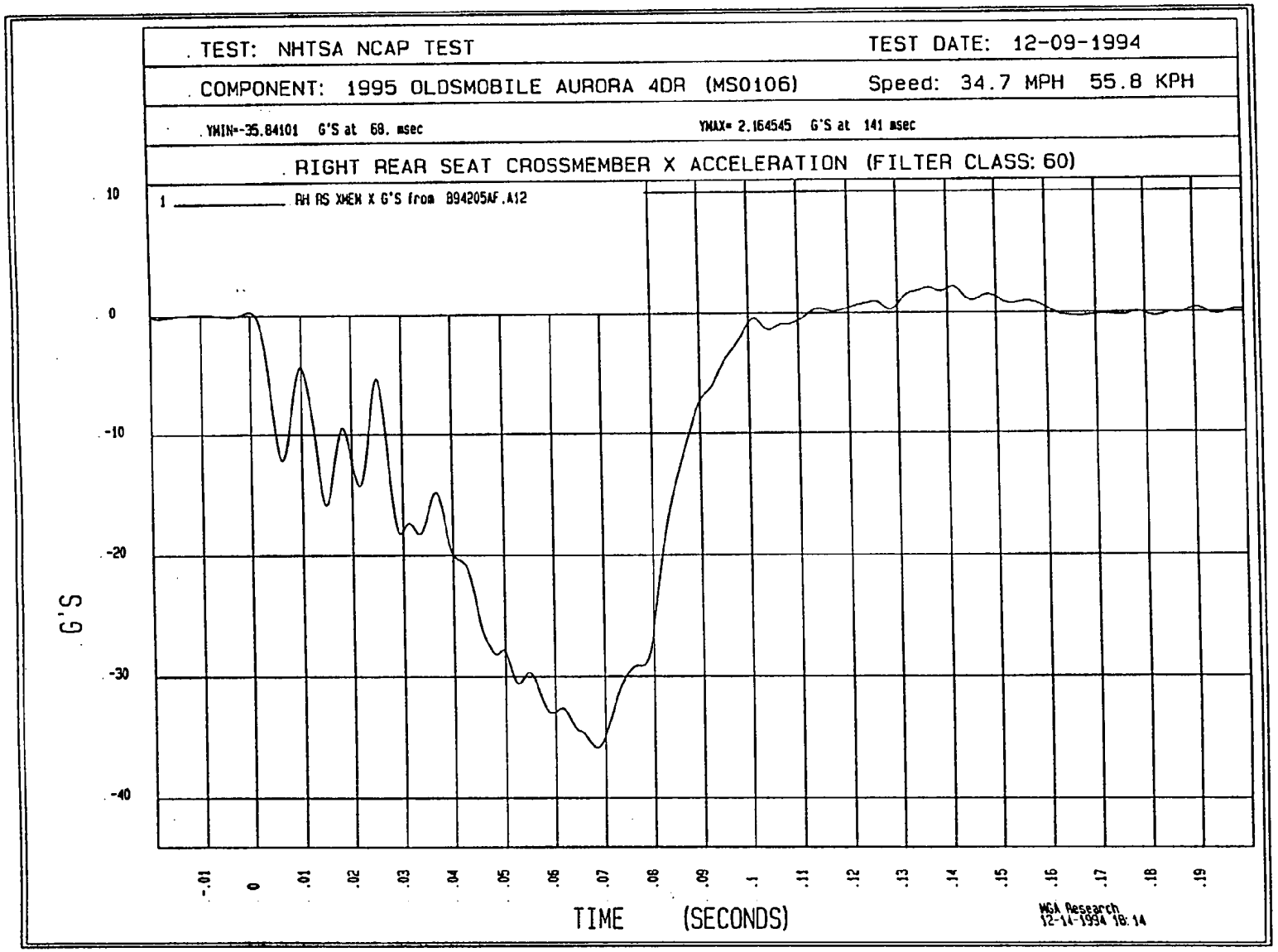

Figure B-7 - Right Rear Seat Crossmember X Acceleration vs. Time

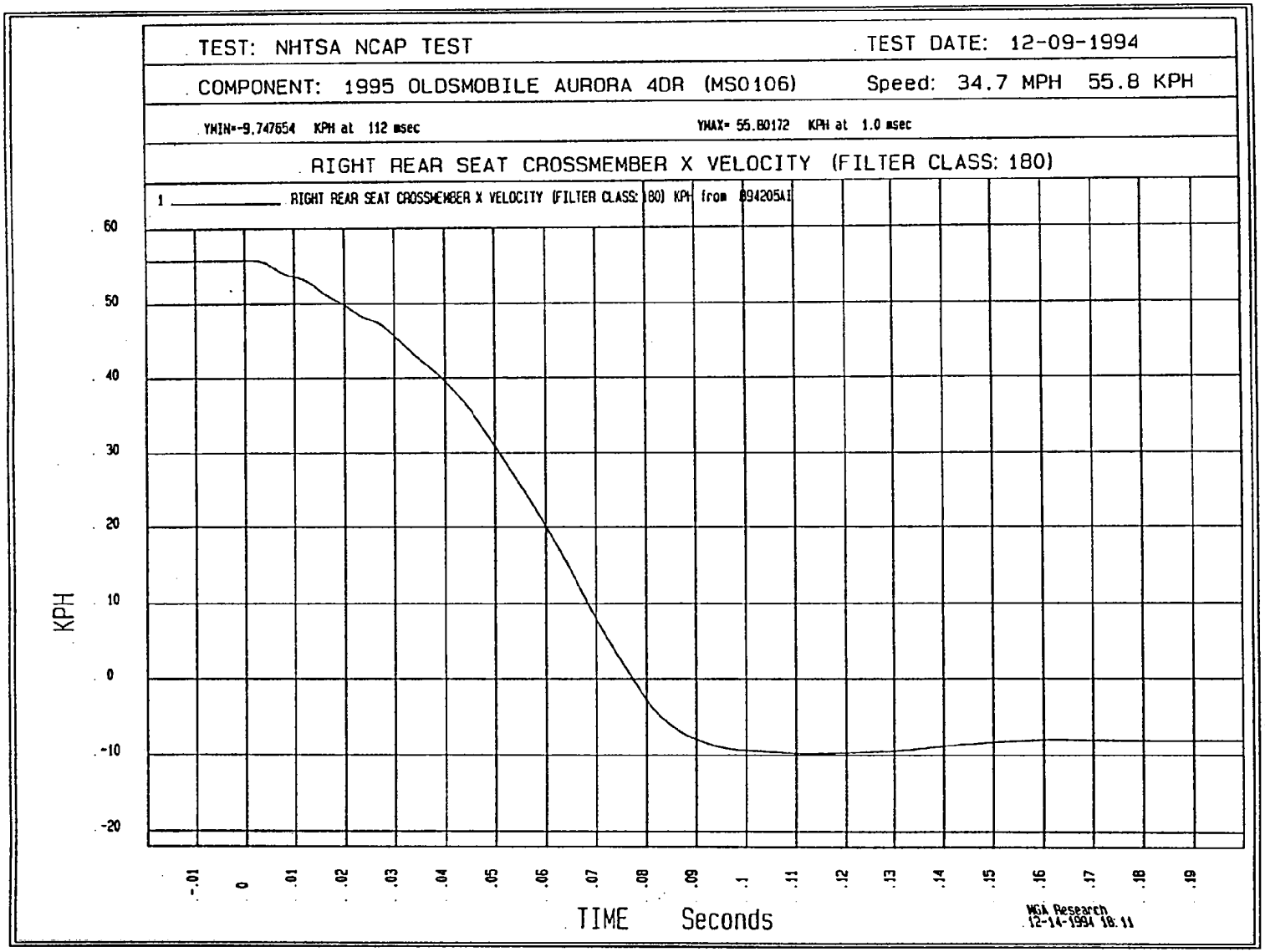

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Figure B-8 - Right Rear Seat Crossmember X Velocity vs. Time

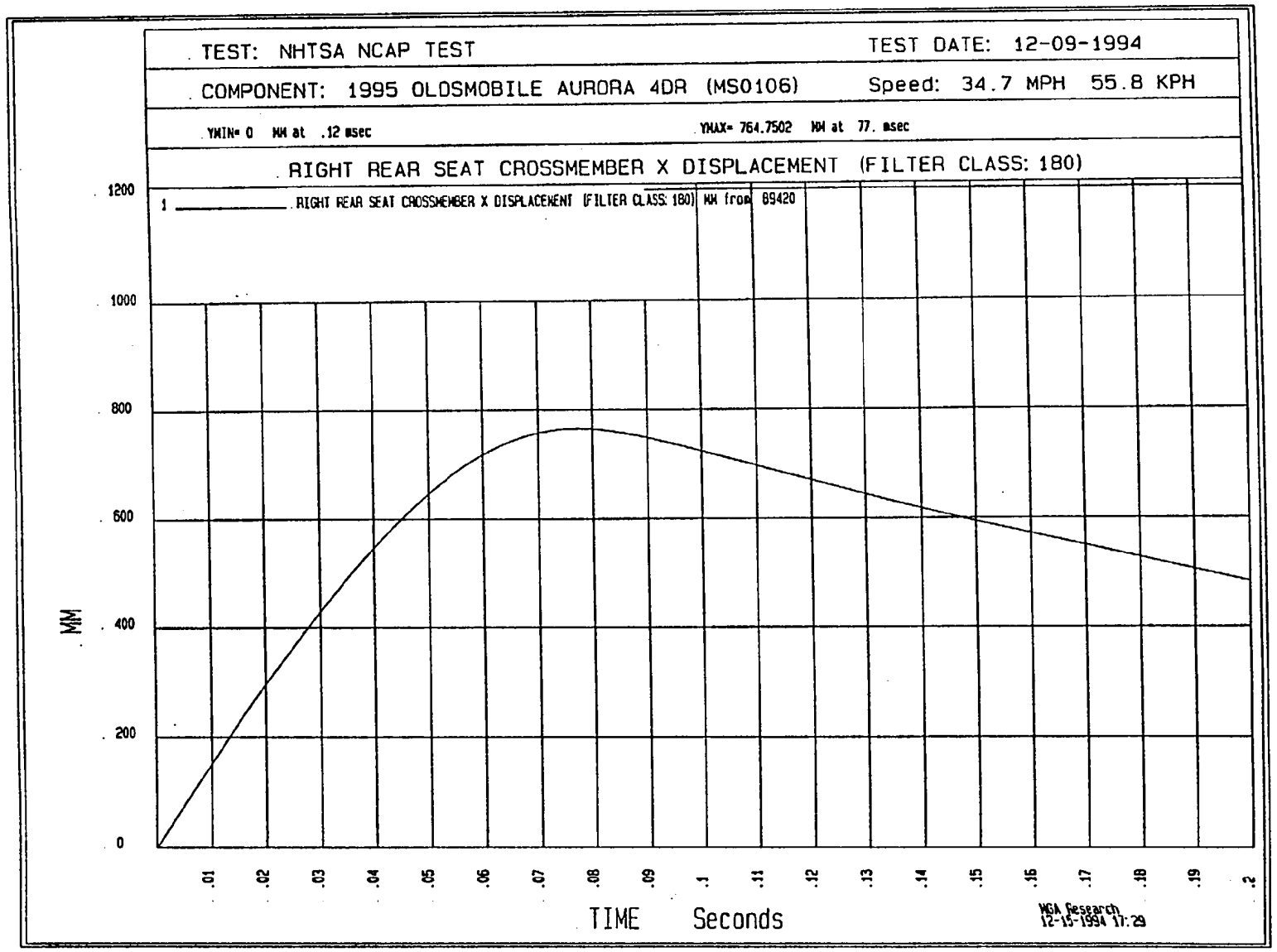

Figure B-9 - Right Rear Seat Crossmember X Displacement vs. Time

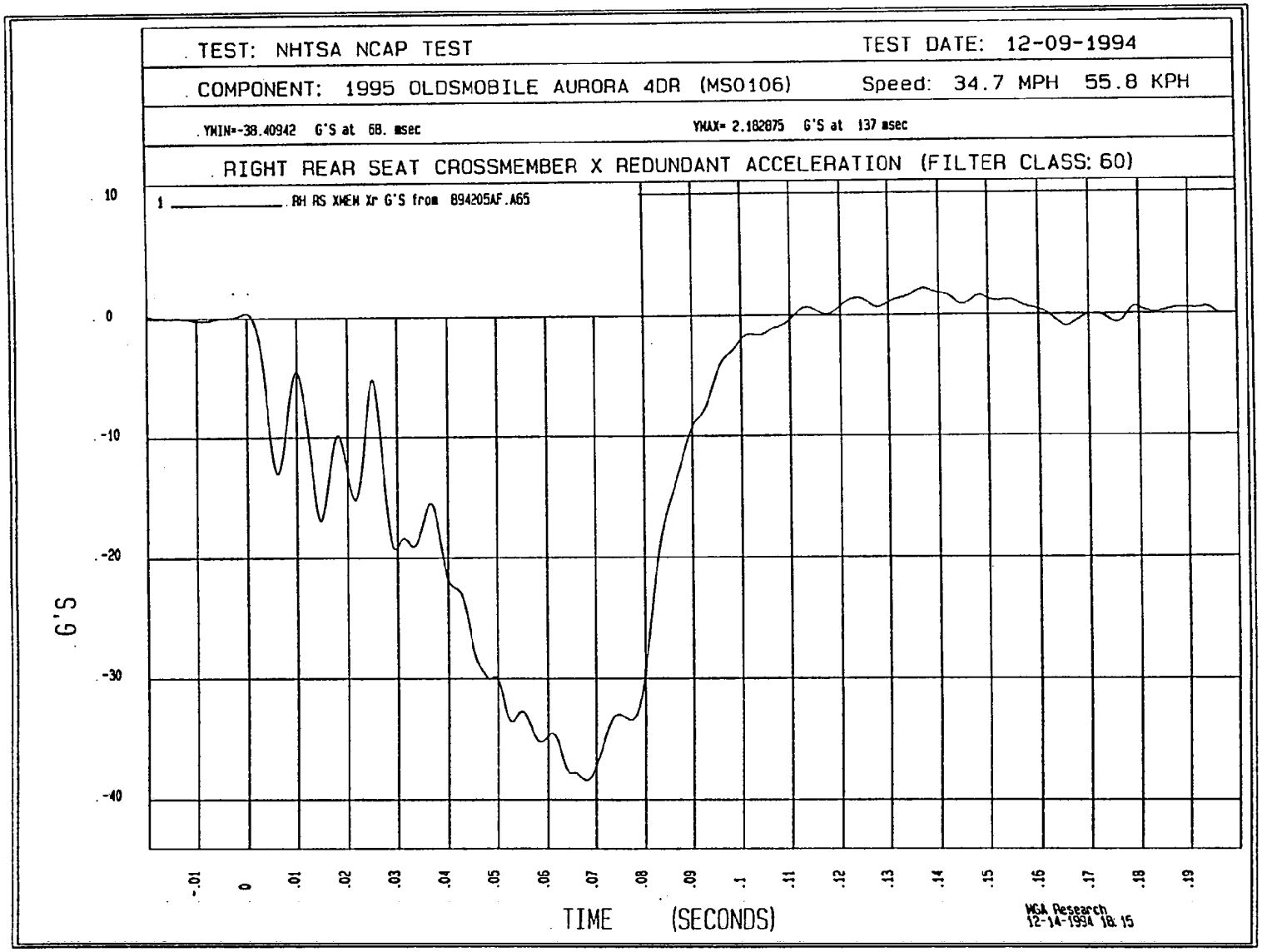

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Figure B-10 - Right Rear Seat Crossmember X Redundant Acceleration vs. Time

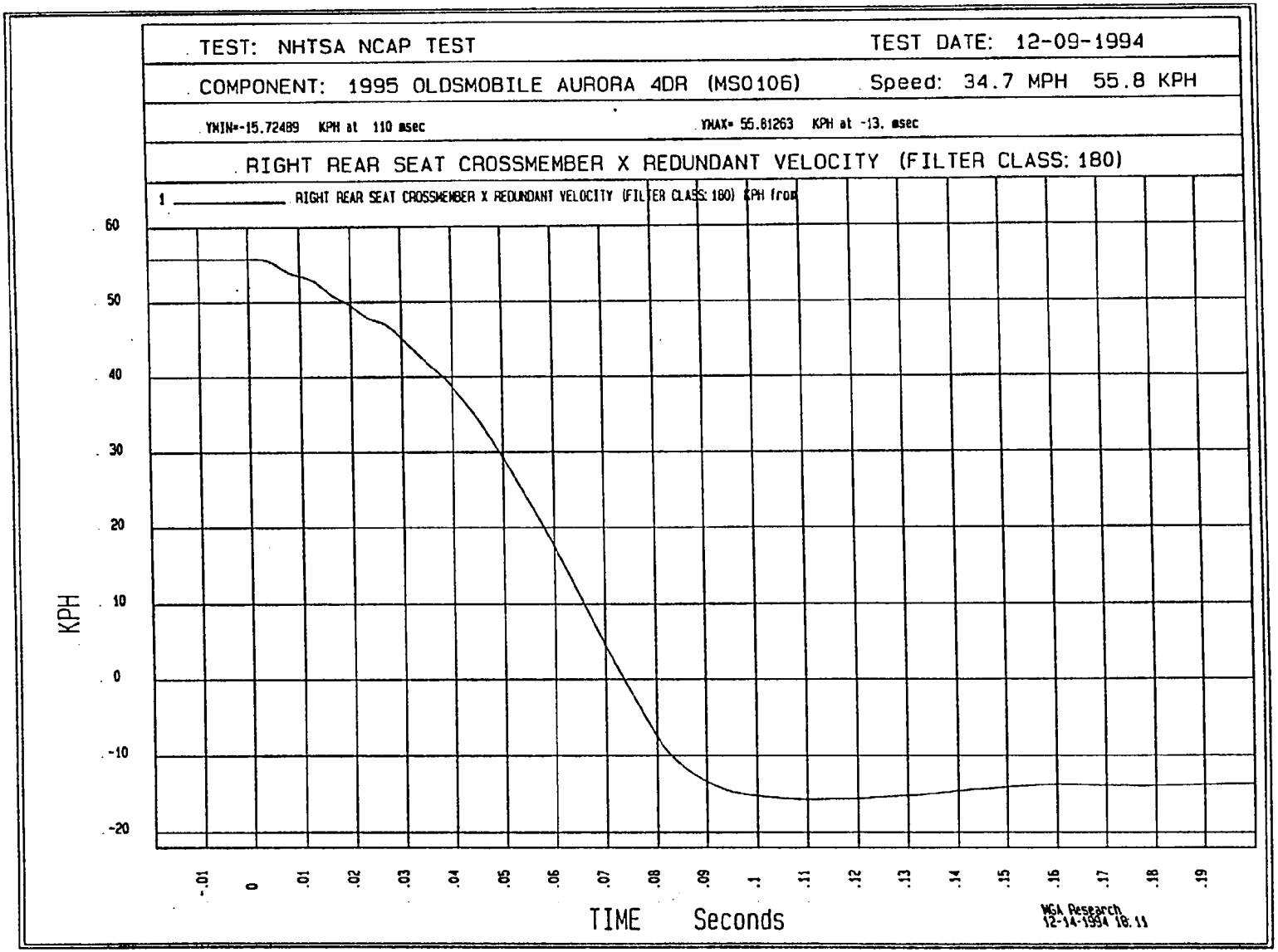

Figure B-11 - Right Rear Seat Crossmember X Redundant Velocity vs. Time

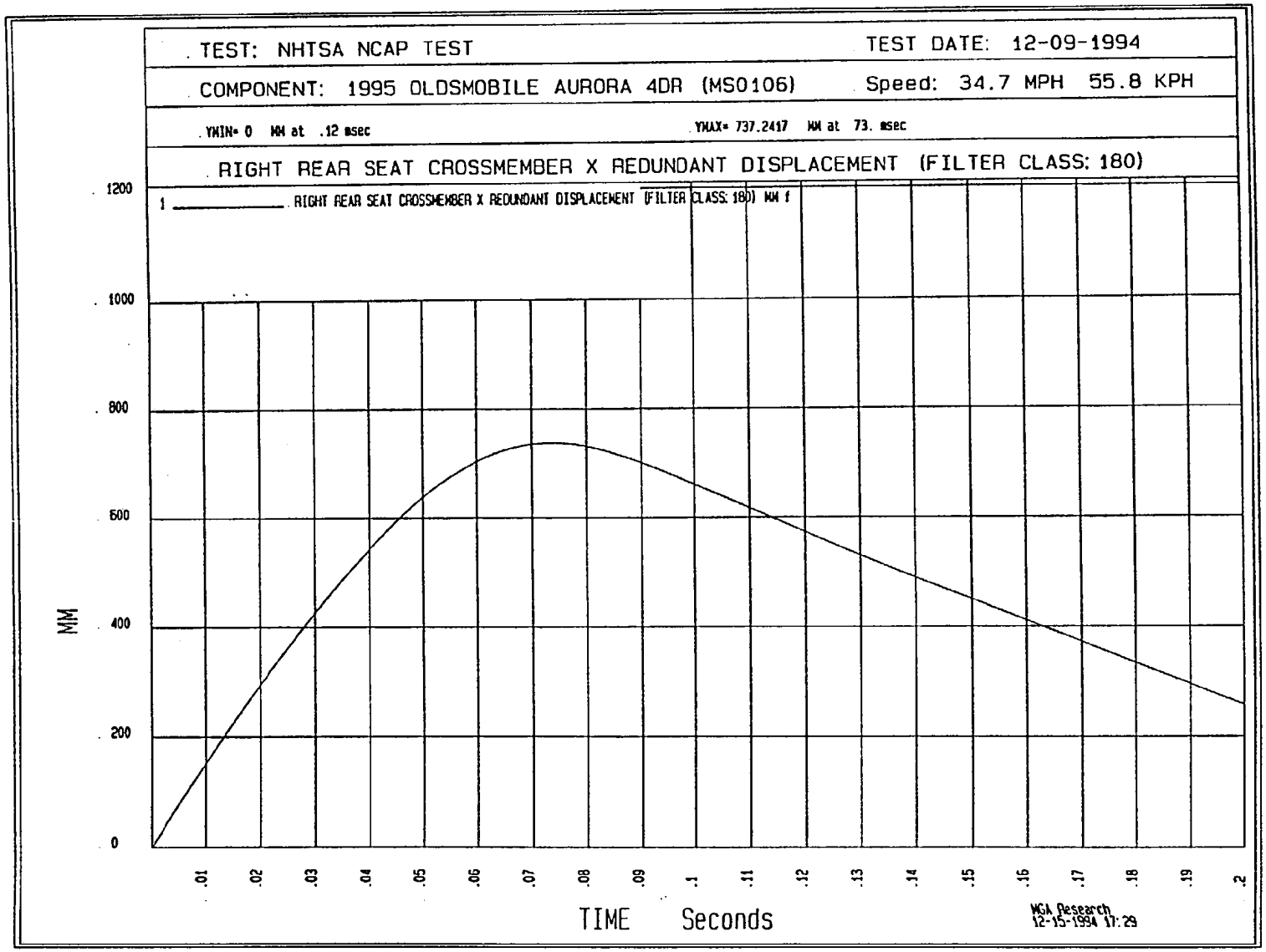

Figure B-12 - Right Rear Seat Crossmember X Redundant Displacement vs. Time

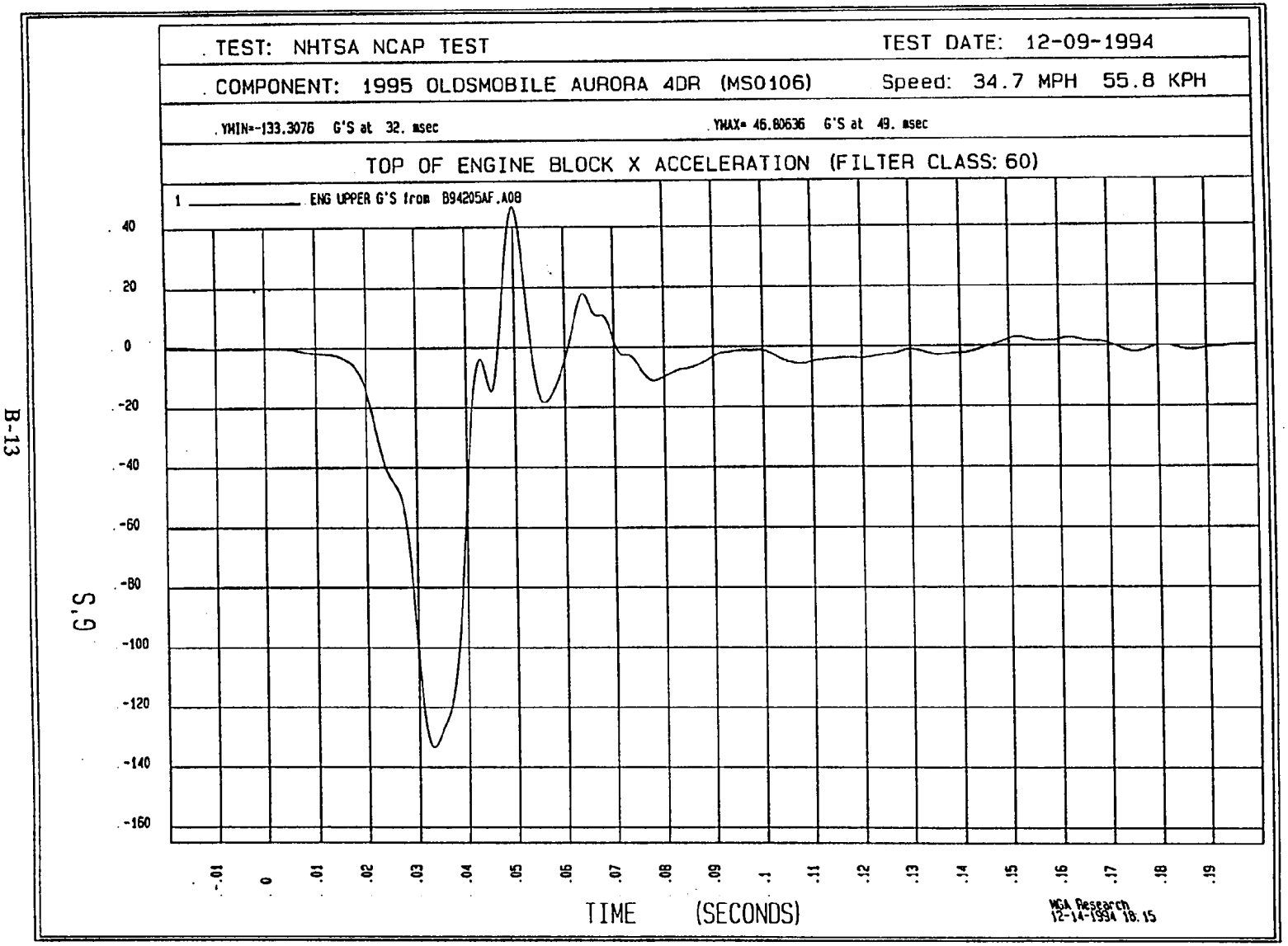

Figure B-13 - Top of Engine Block X Acceleration vs. Time

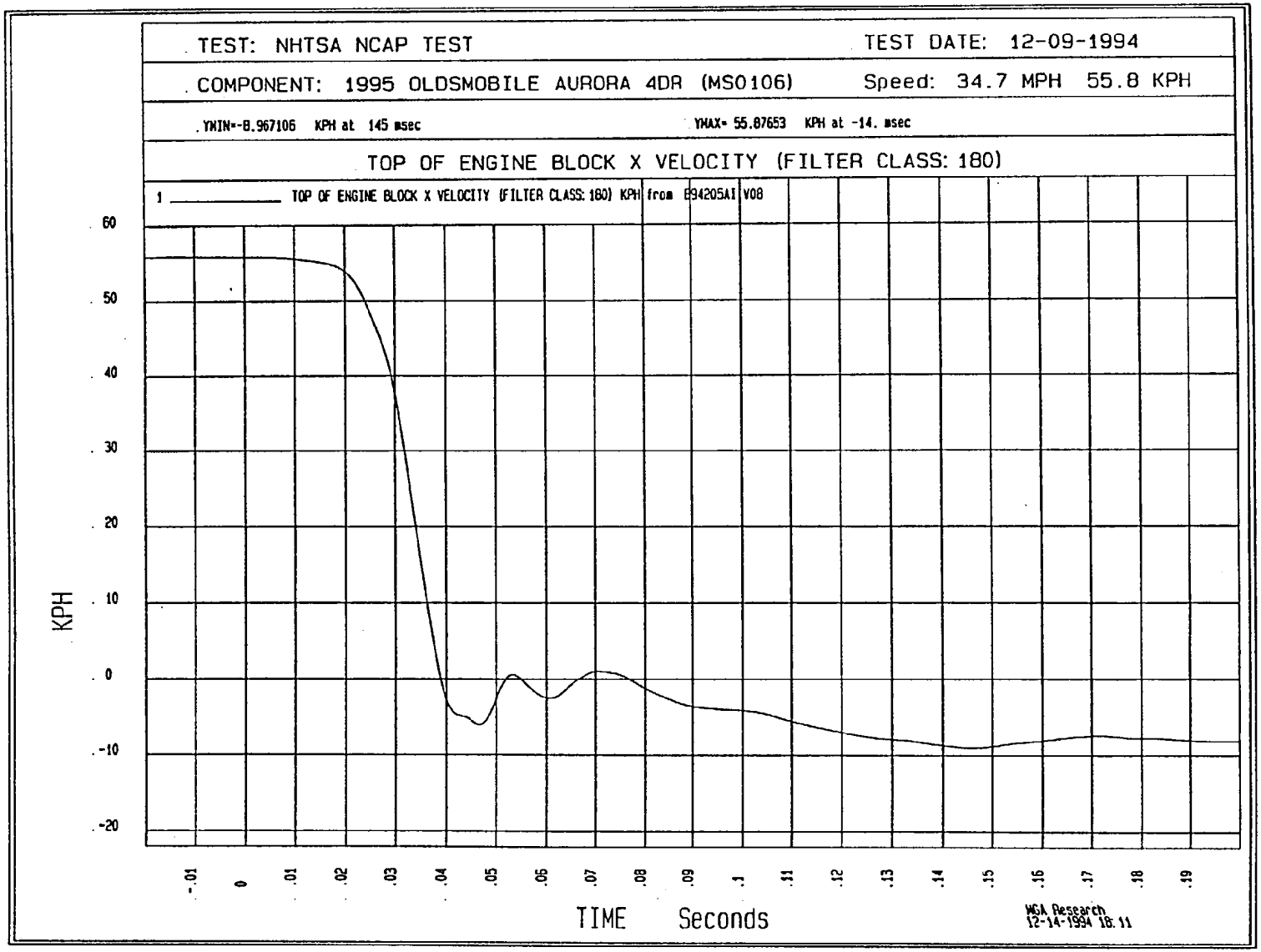

Figure B-14 - Top of Engine Block X Velocity vs. Time

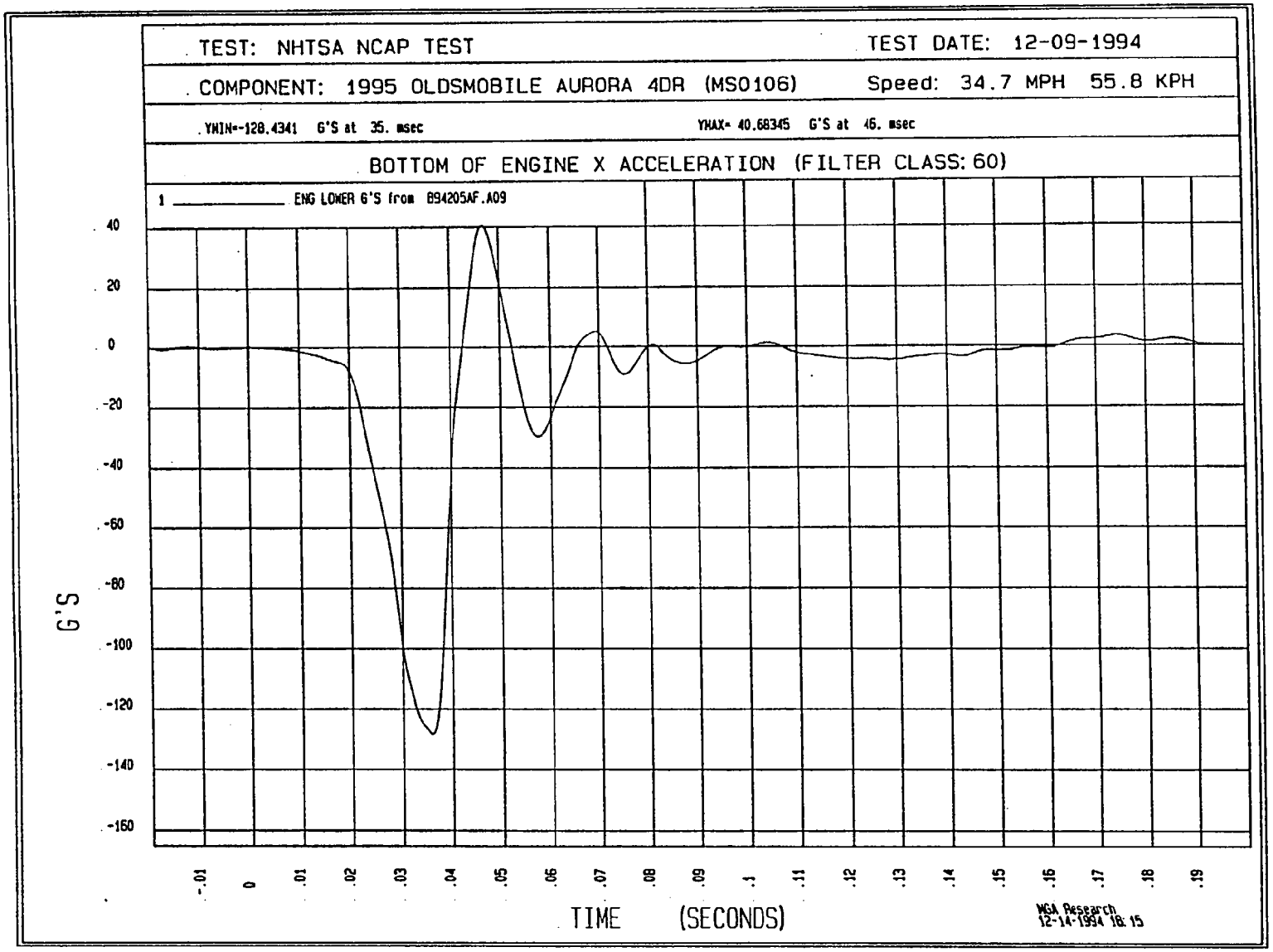

Figure B-15 - Bottom of Engine X Acceleration vs. Time

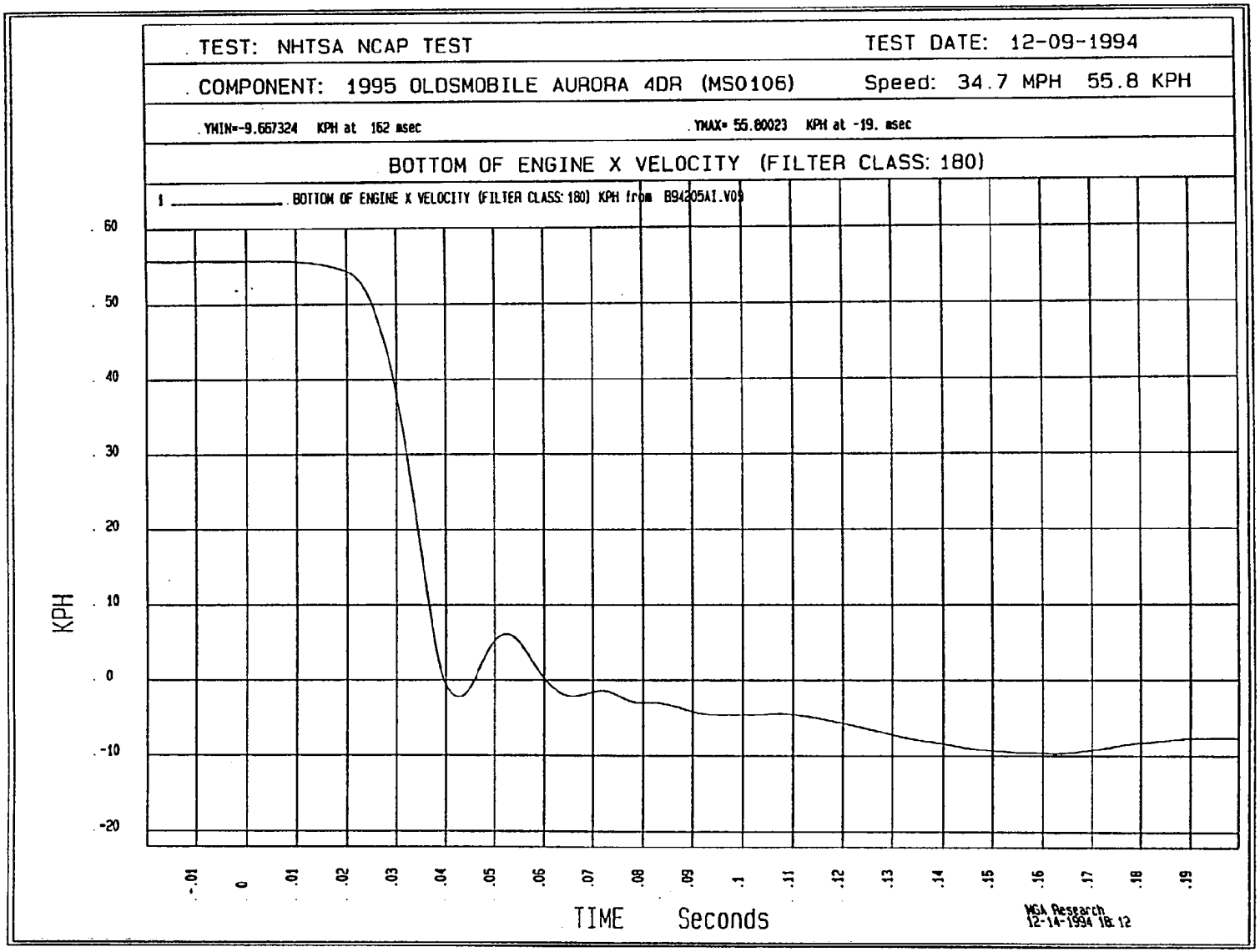

Figure B-16 - Bottom of Engine X Velocity vs. Time

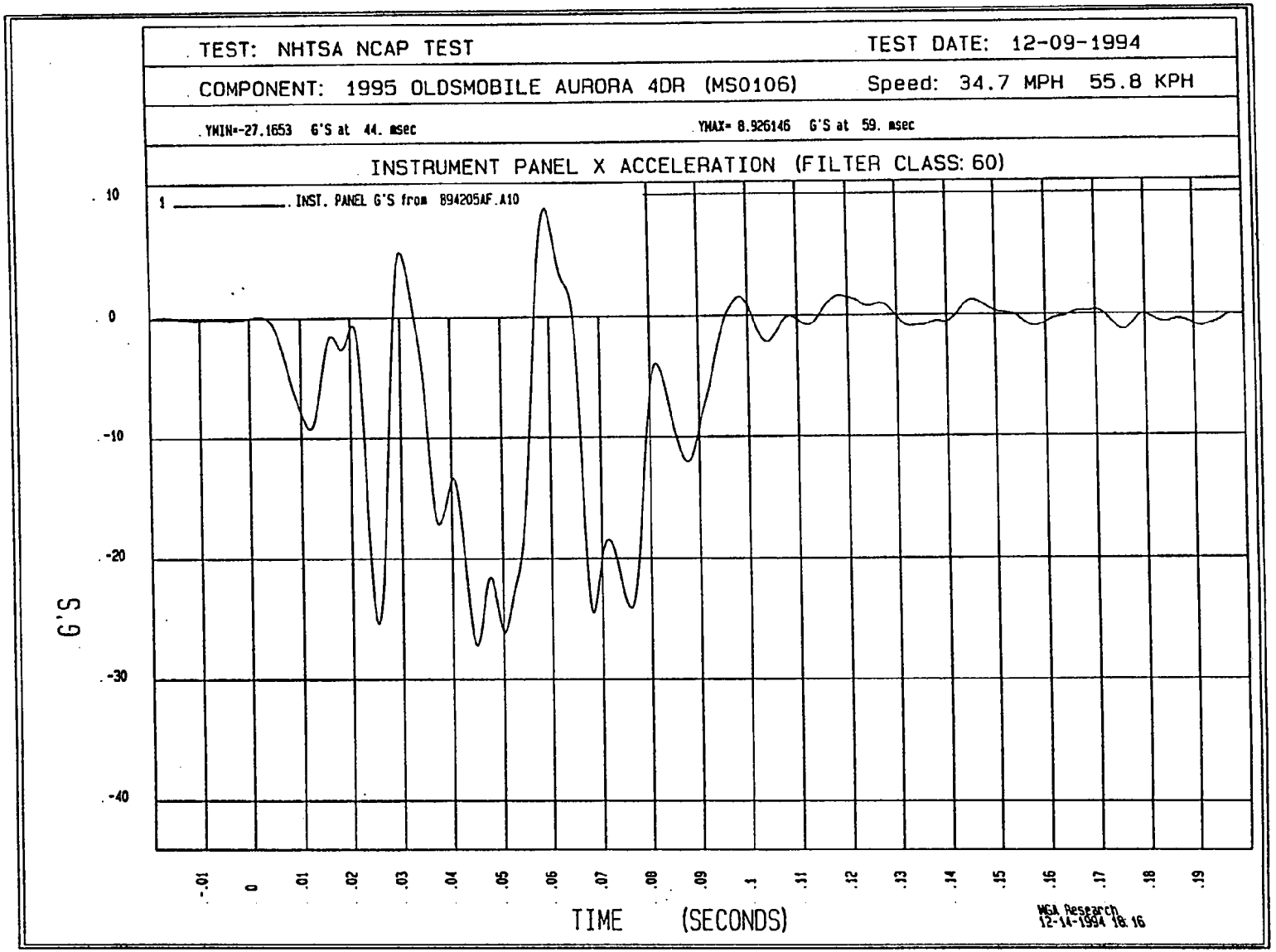

Figure B-17 - Instrument Panel X Acceleration vs. Time

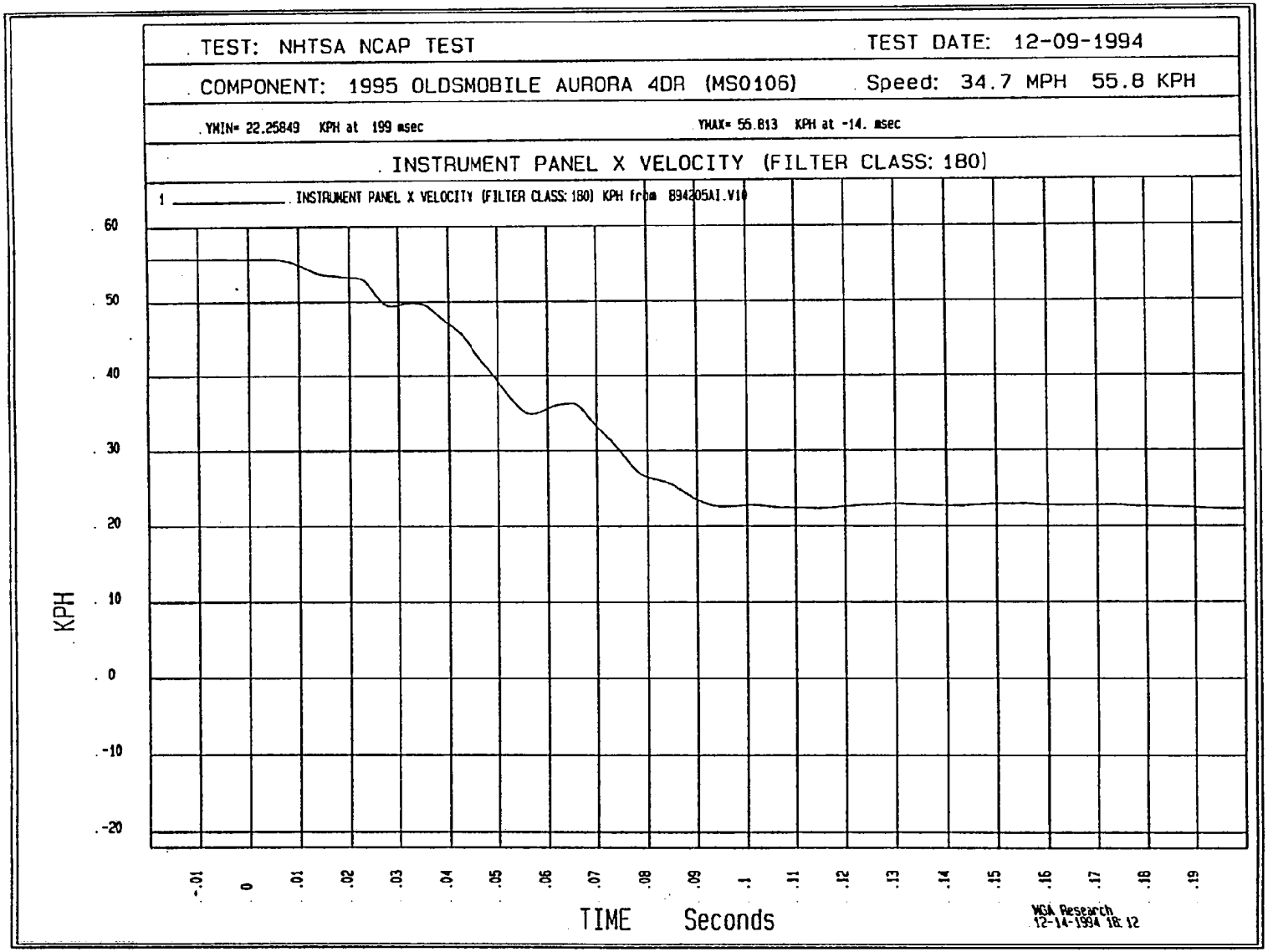

Figure B-18 - Instrument Panel X Velocity vs. Time

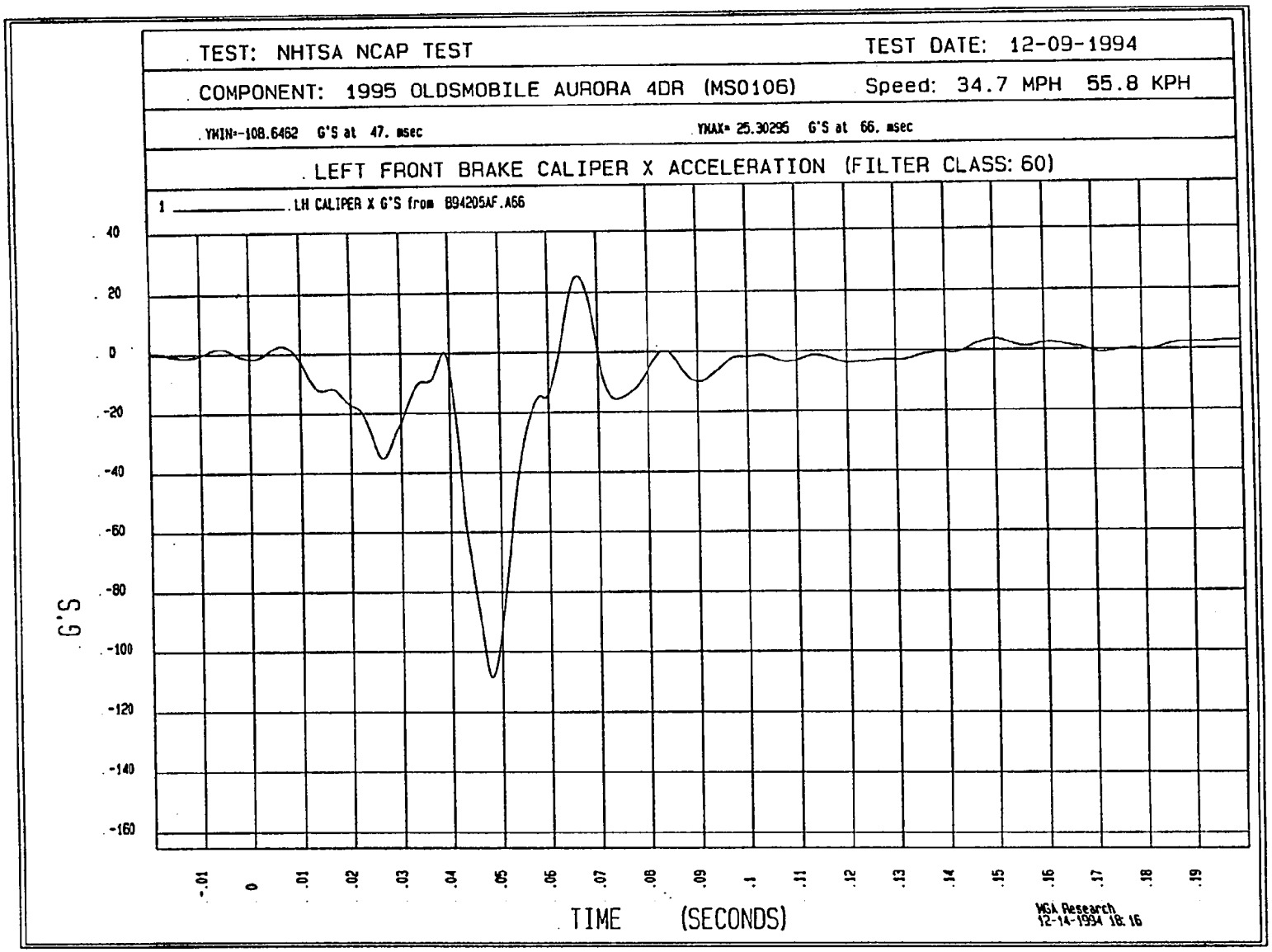

Figure B-19 - Left Brake Caliper X Acceleration vs. Time

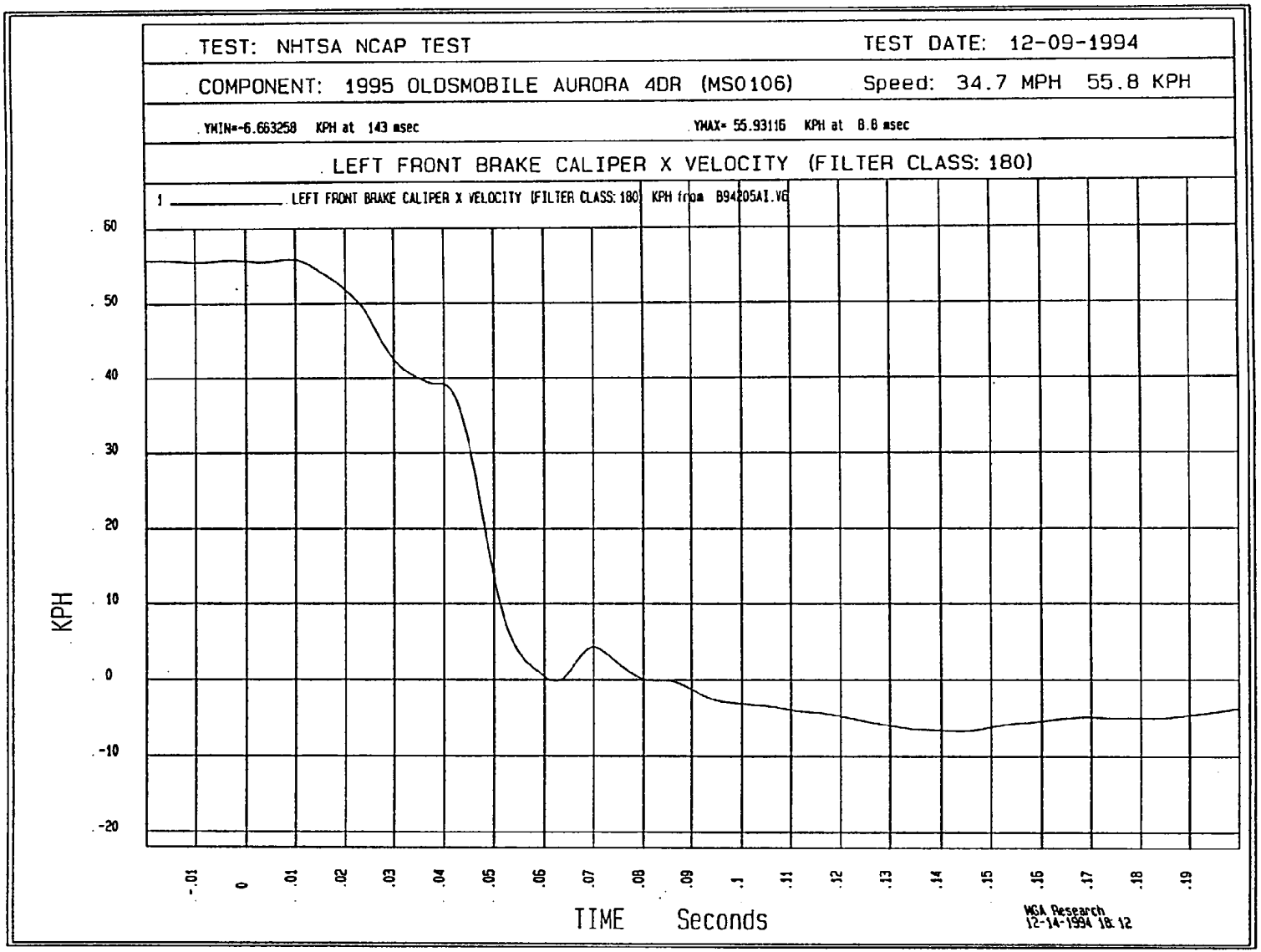

Figure B-20 - Left Brake Caliper X Velocity vs. Time

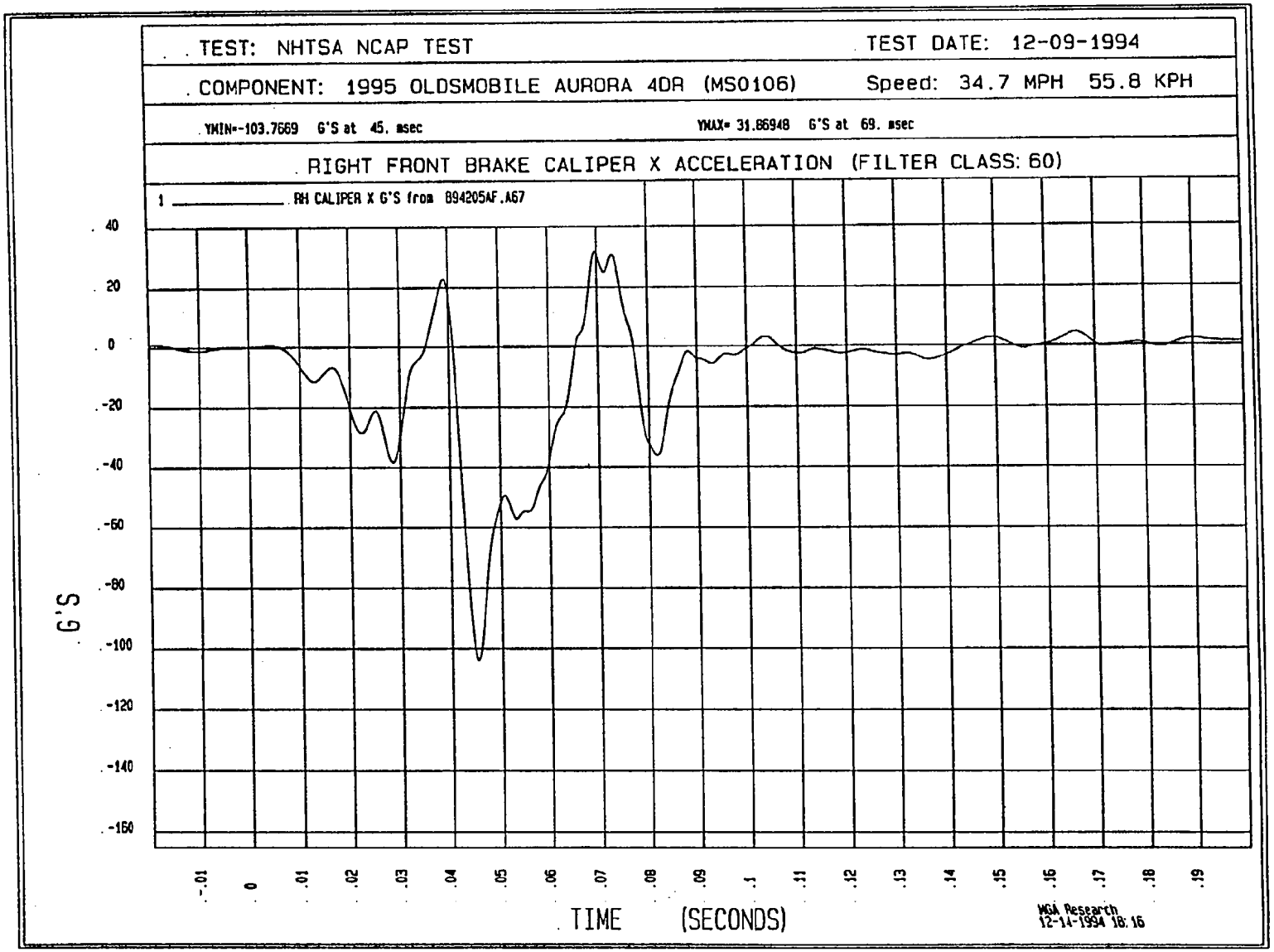

Figure B-21 - Right Brake Caliper X Acceleration vs. Time

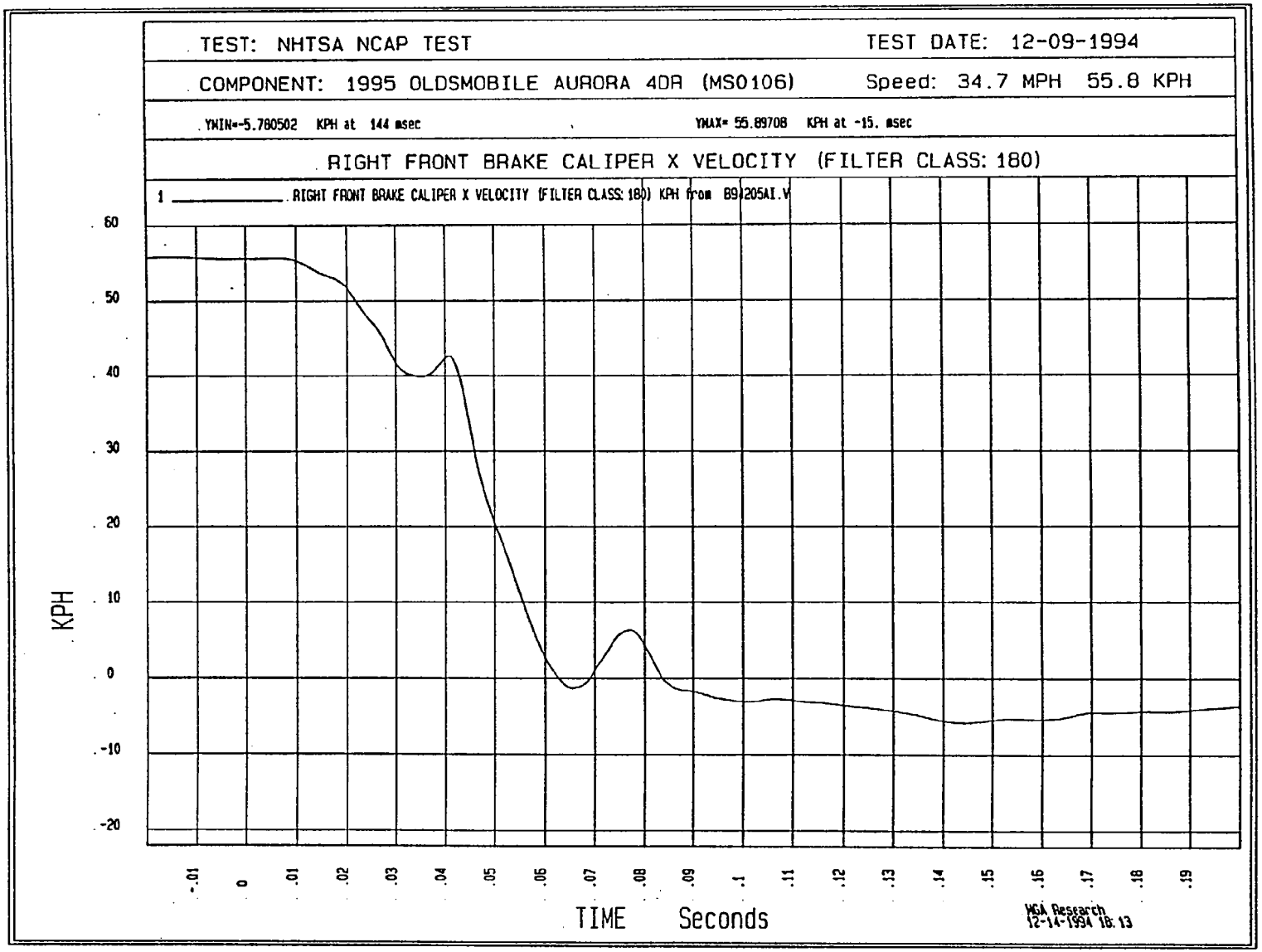

Figure B-22 - Right Brake Caliper X Velocity vs. Time

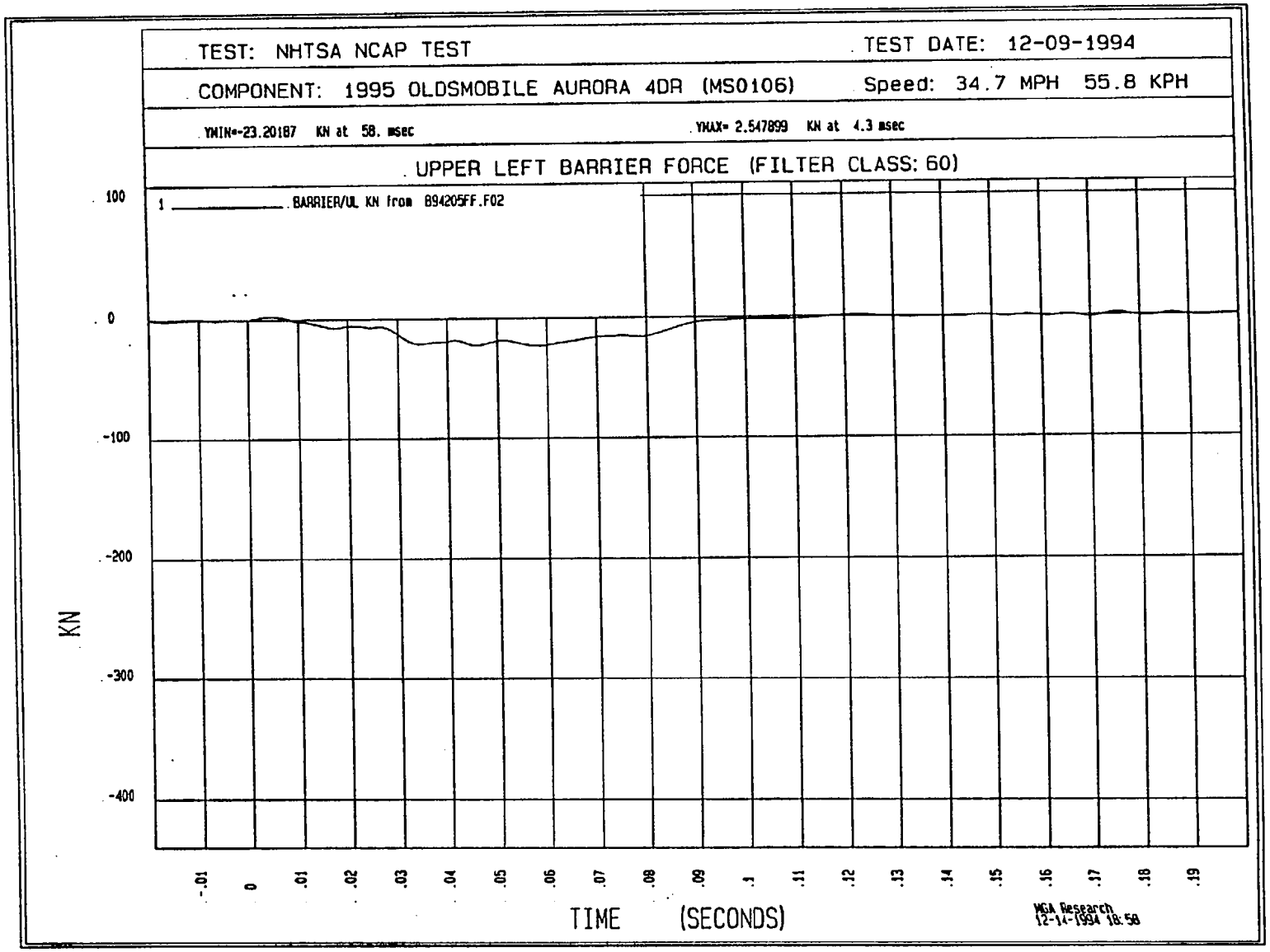

Figure B-23 - Upper Left Barrier Force vs. Time

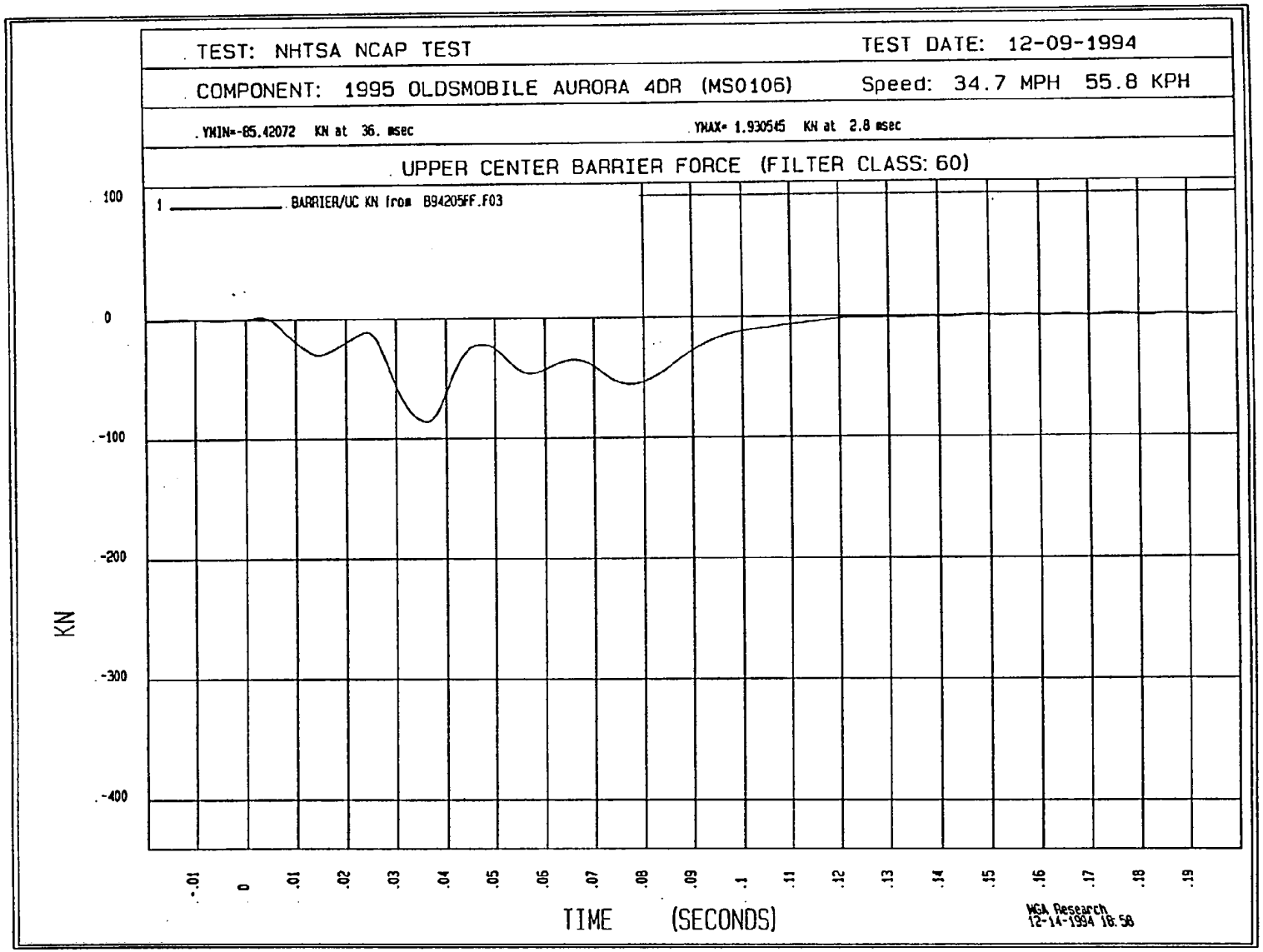

Figure B-24 - Upper Center Barrier Force vs. Time

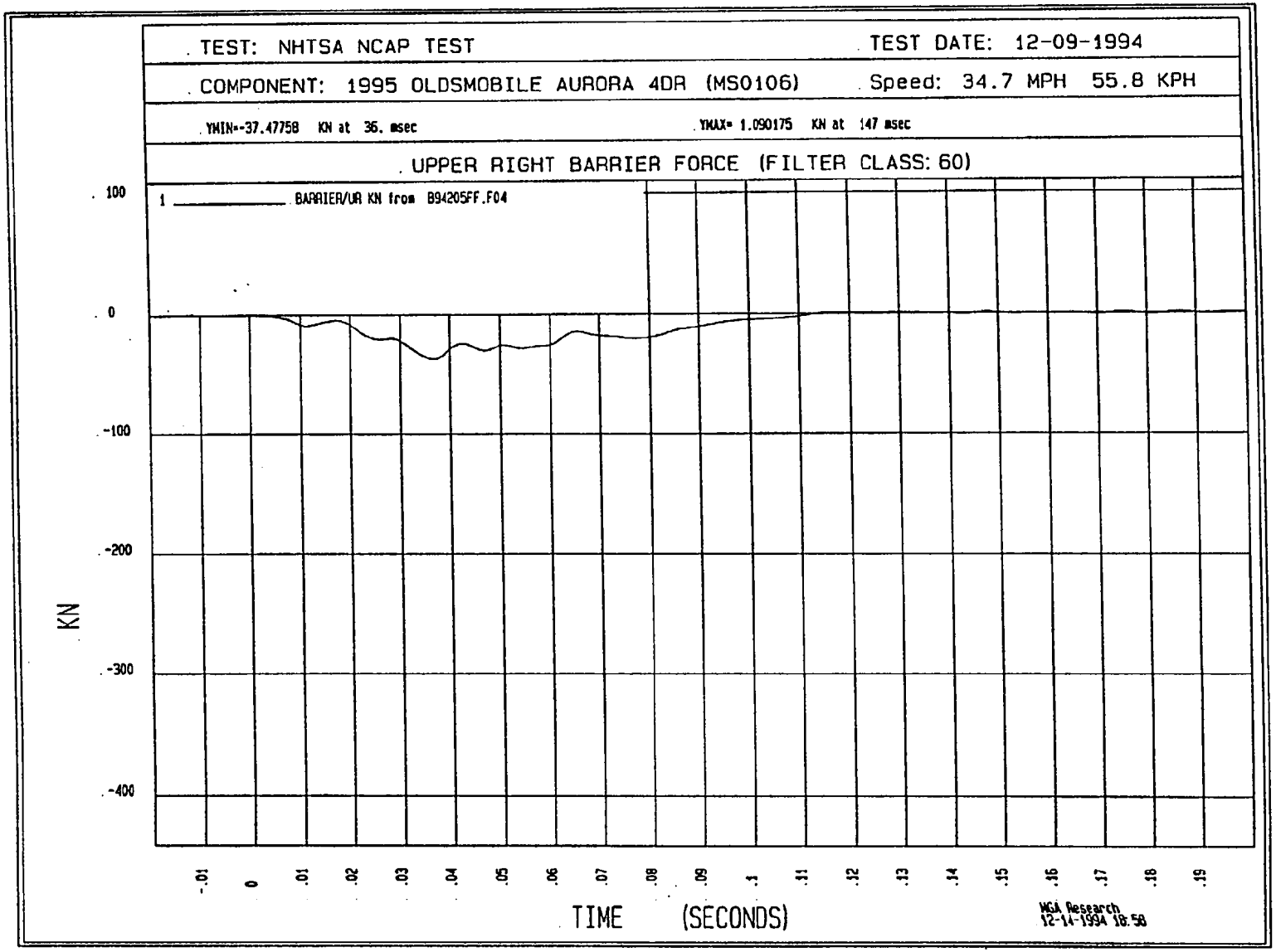

Figure B-25 - Upper Right Barrier Force vs. Time

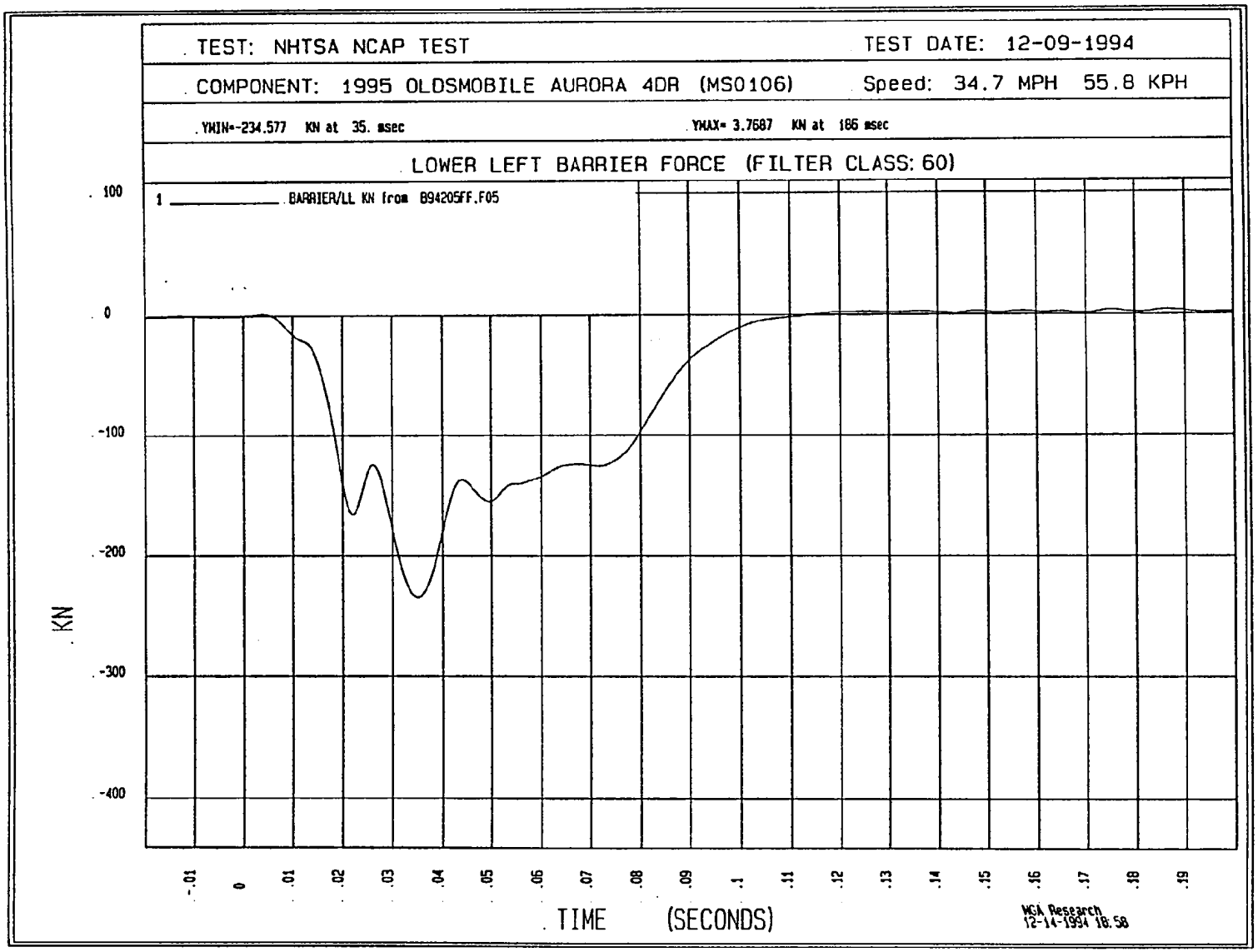

Figure B-26 - Lower Left Barrier Force vs. Time

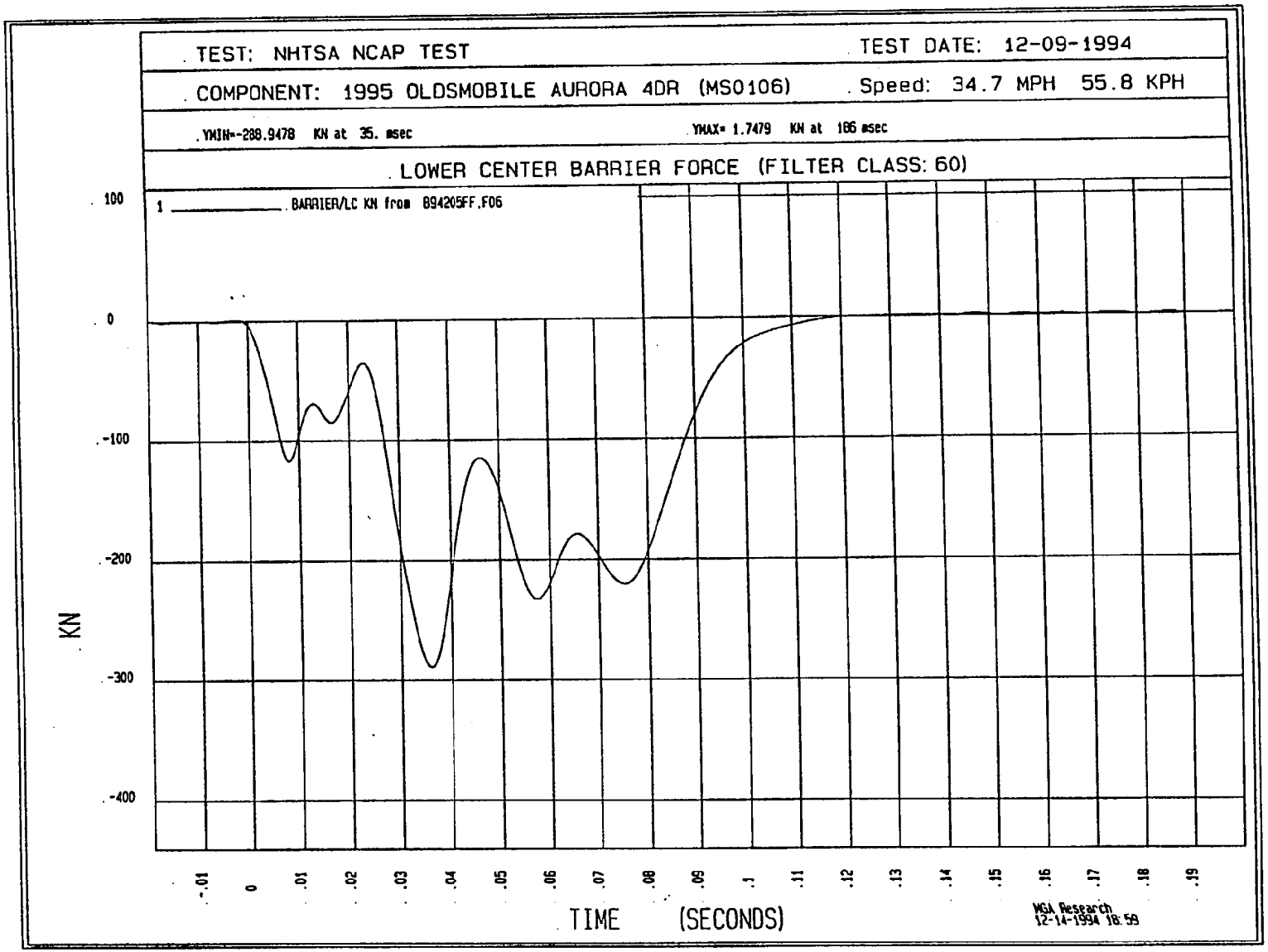

Figure B-27 - Lower Center Barrier Force vs. Time

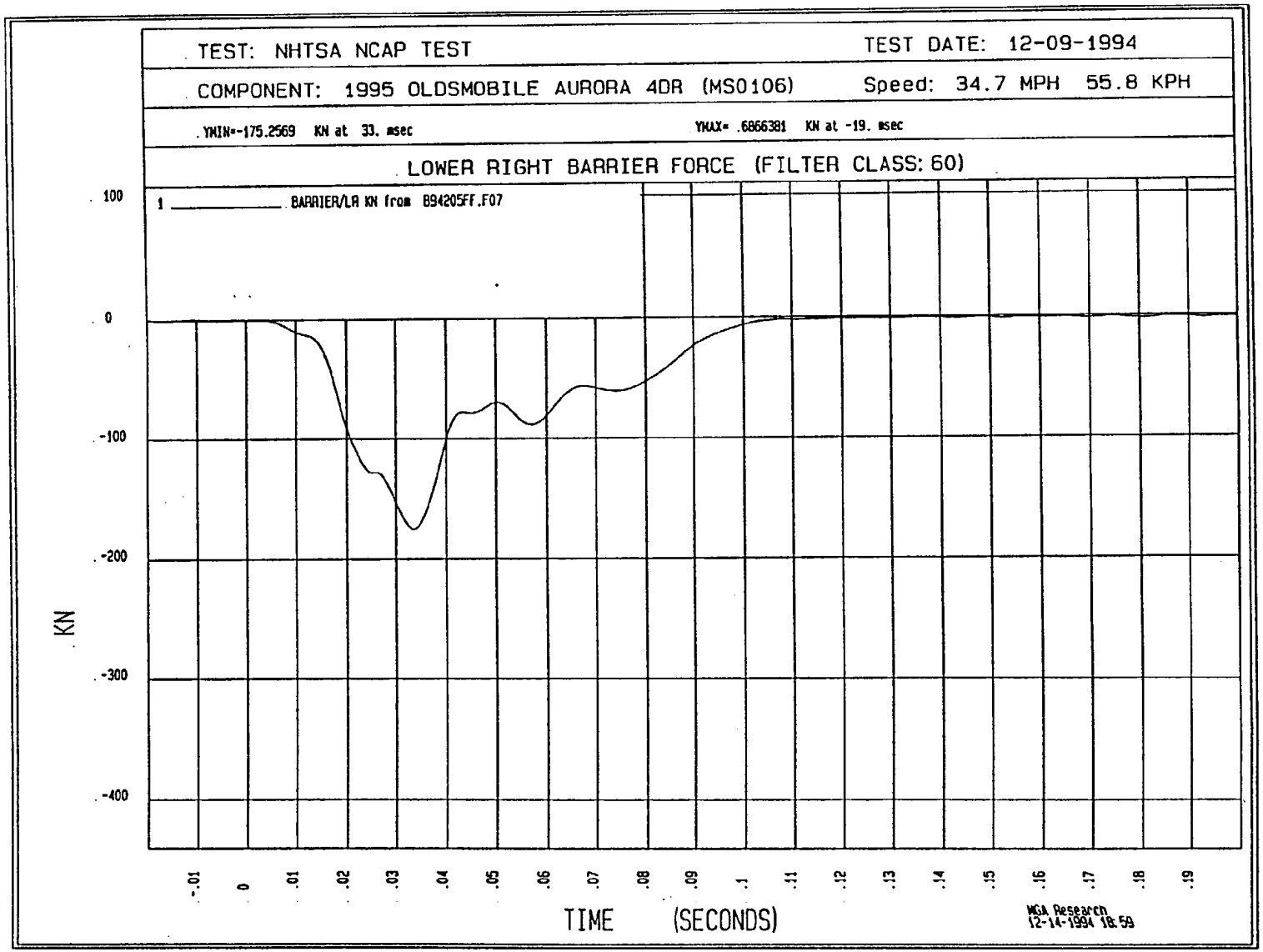

Figure B-28 - Lower Right Barrier Force vs. Time

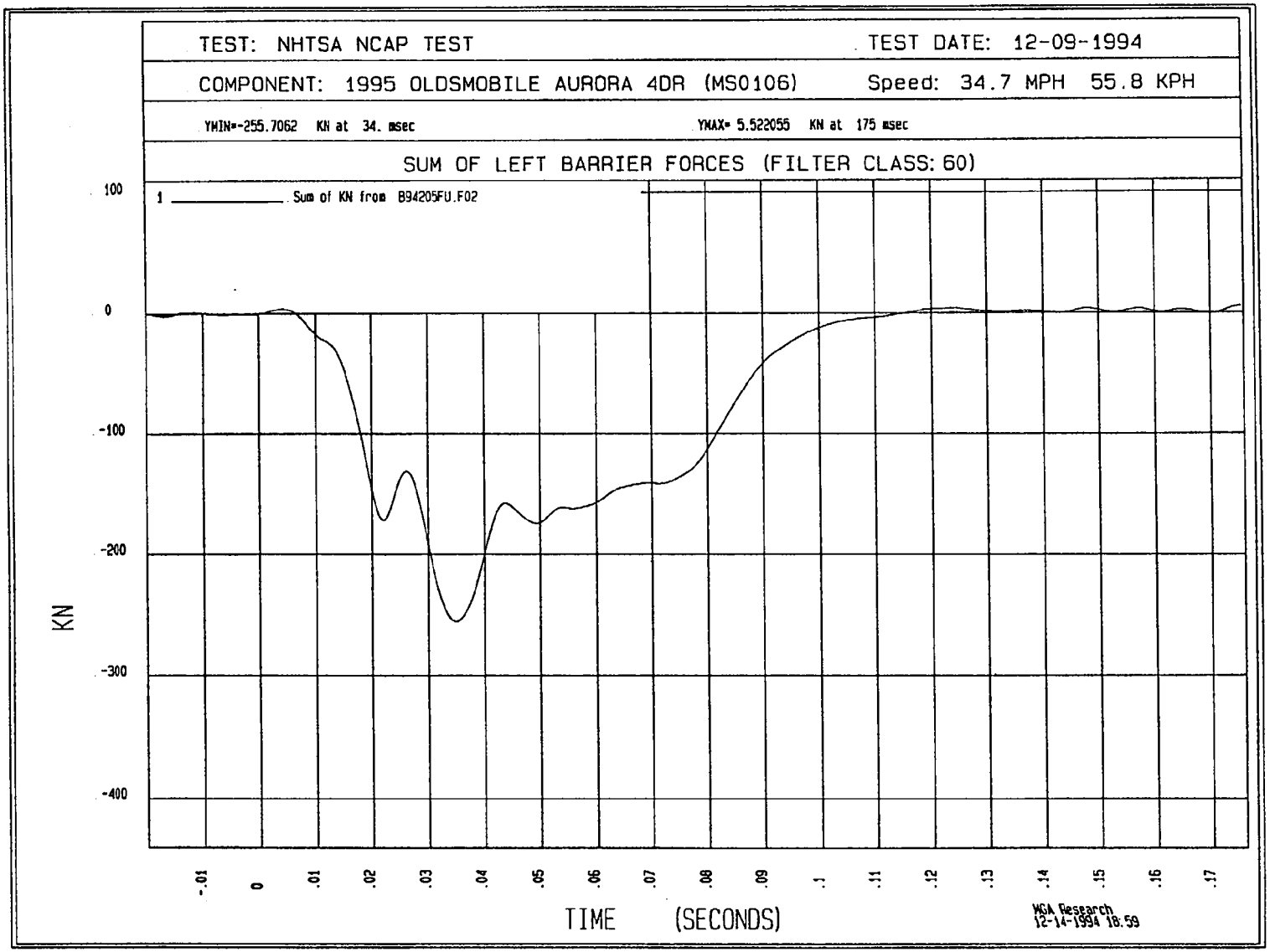

Figure B-29 - Sum of Left Barrier Forces vs. Time

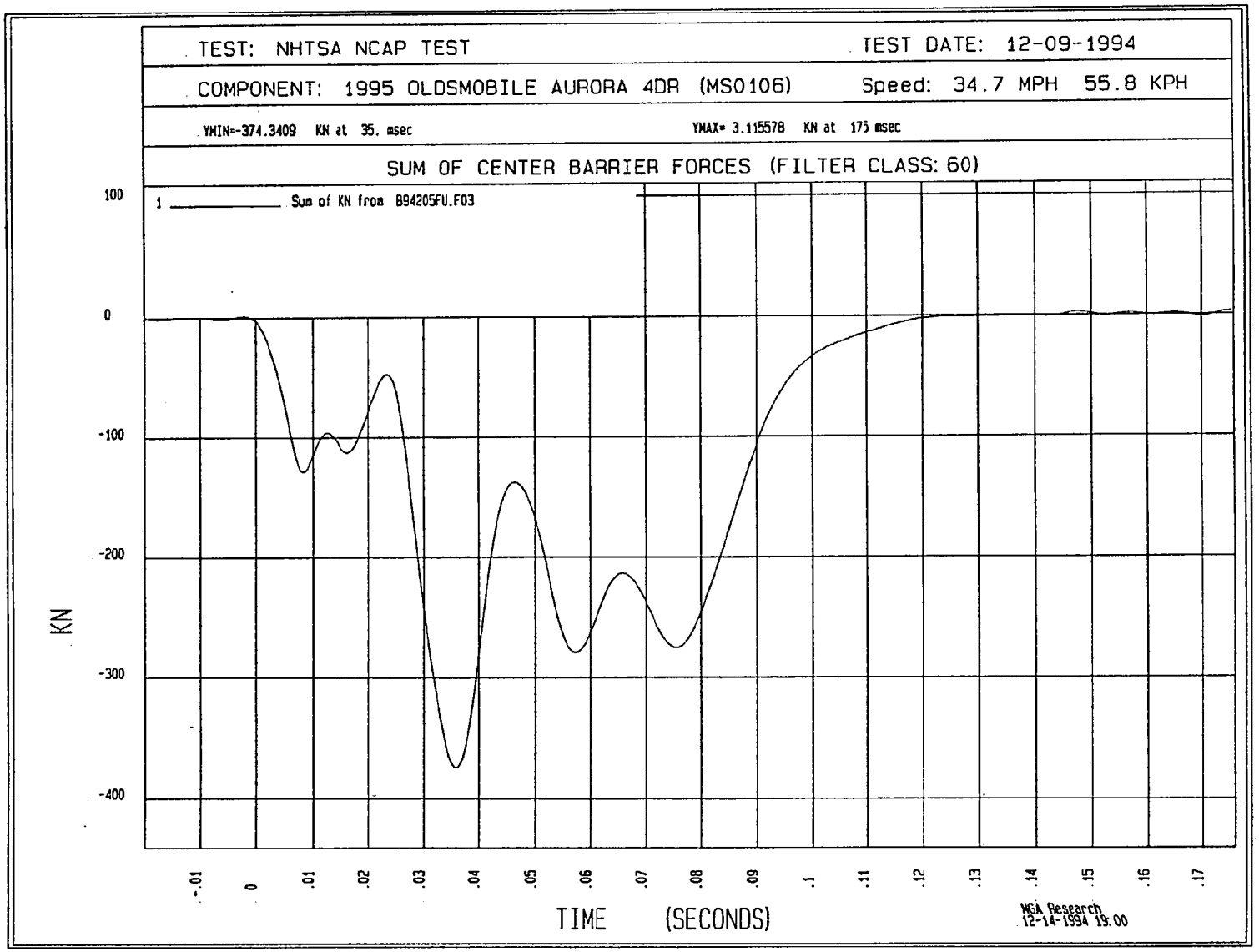

Figure B-30 - Sum of Center Barrier Forces vs. Time

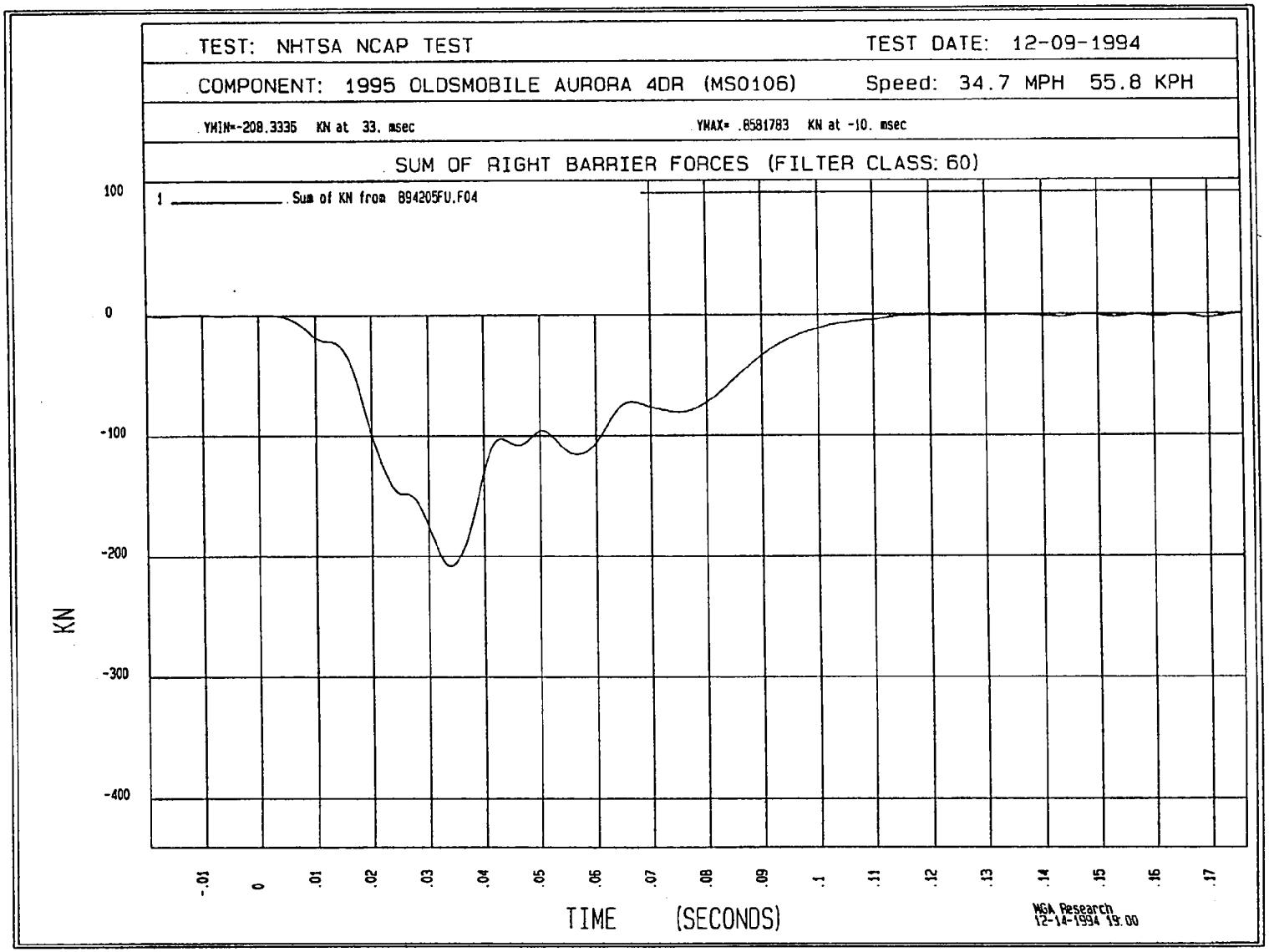

Figure B-31 - Sum of Right Barrier Forces vs. Time

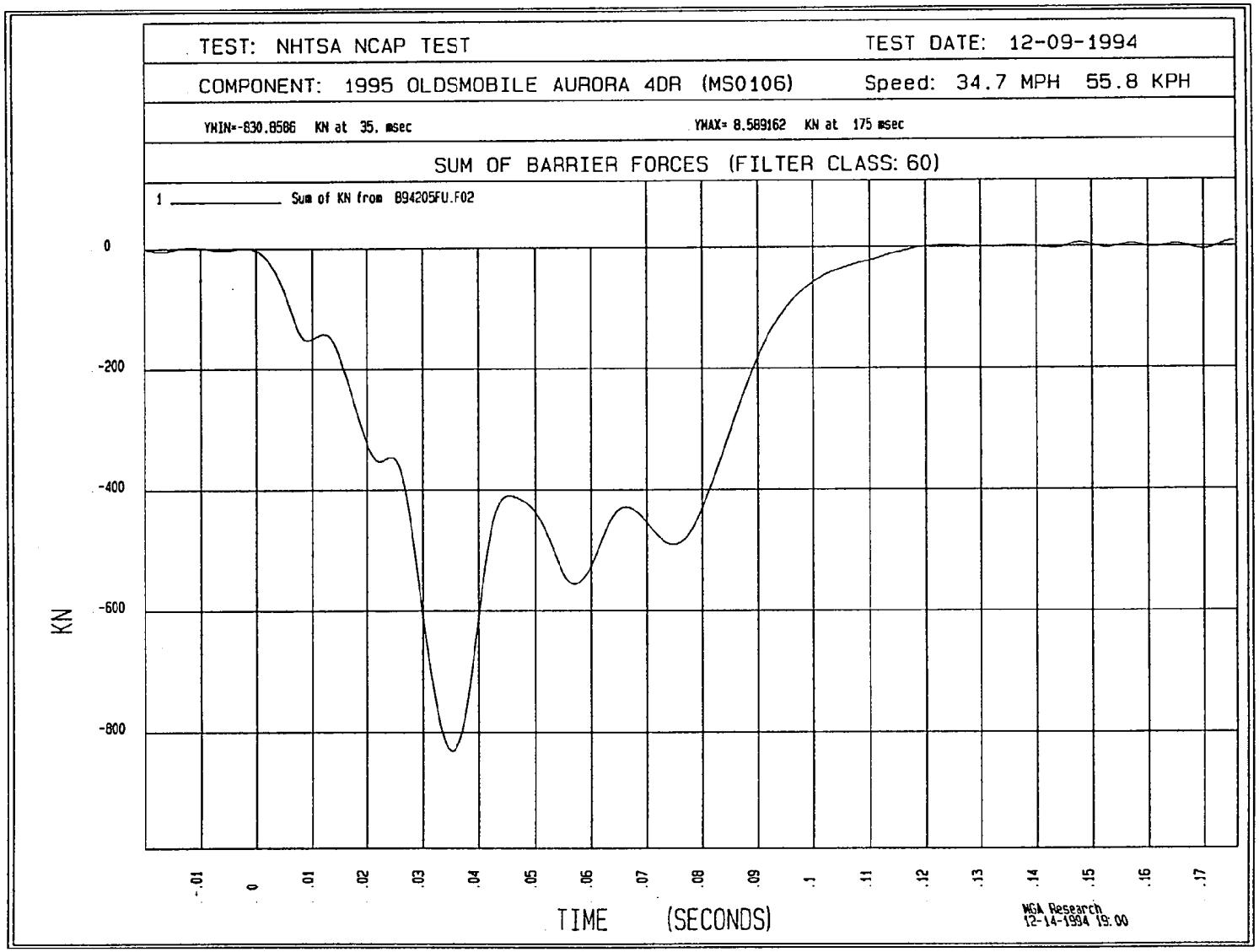

Figure B-32 - Sum of Barrier Forces vs. Time

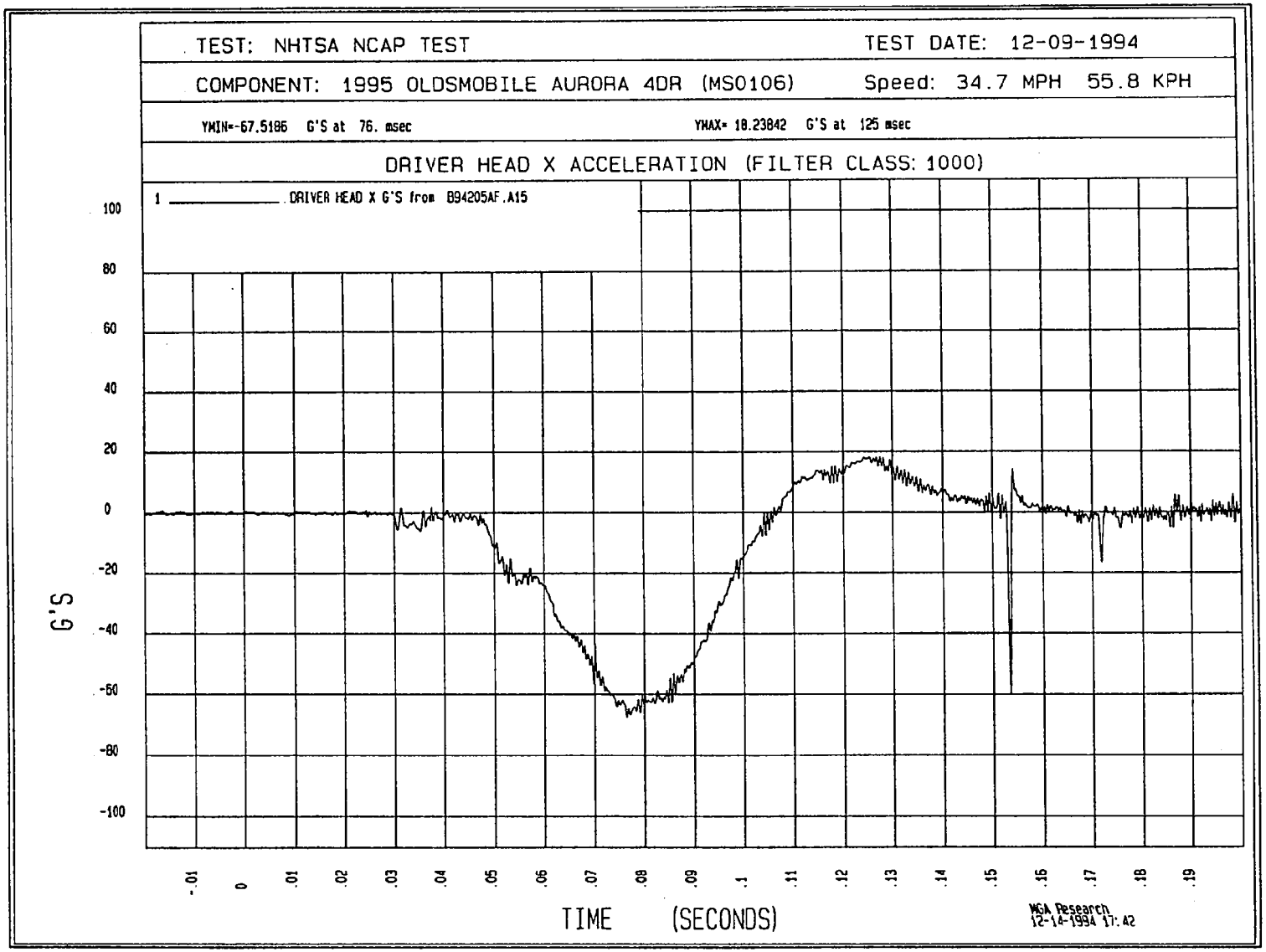

Figure B-33 - Driver Head X Acceleration vs. Time

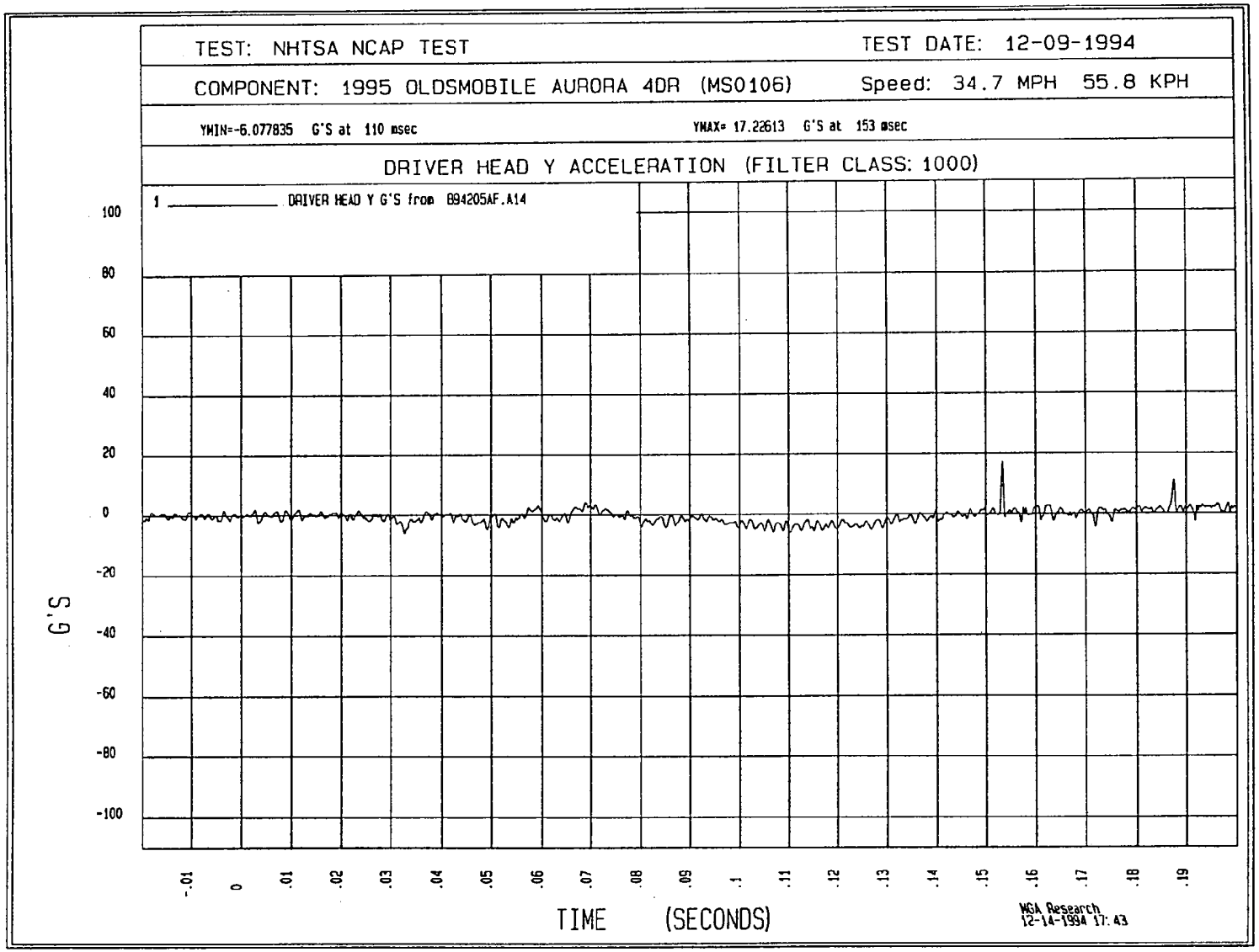

Figure B-34 - Driver Head Y Acceleration vs. Time

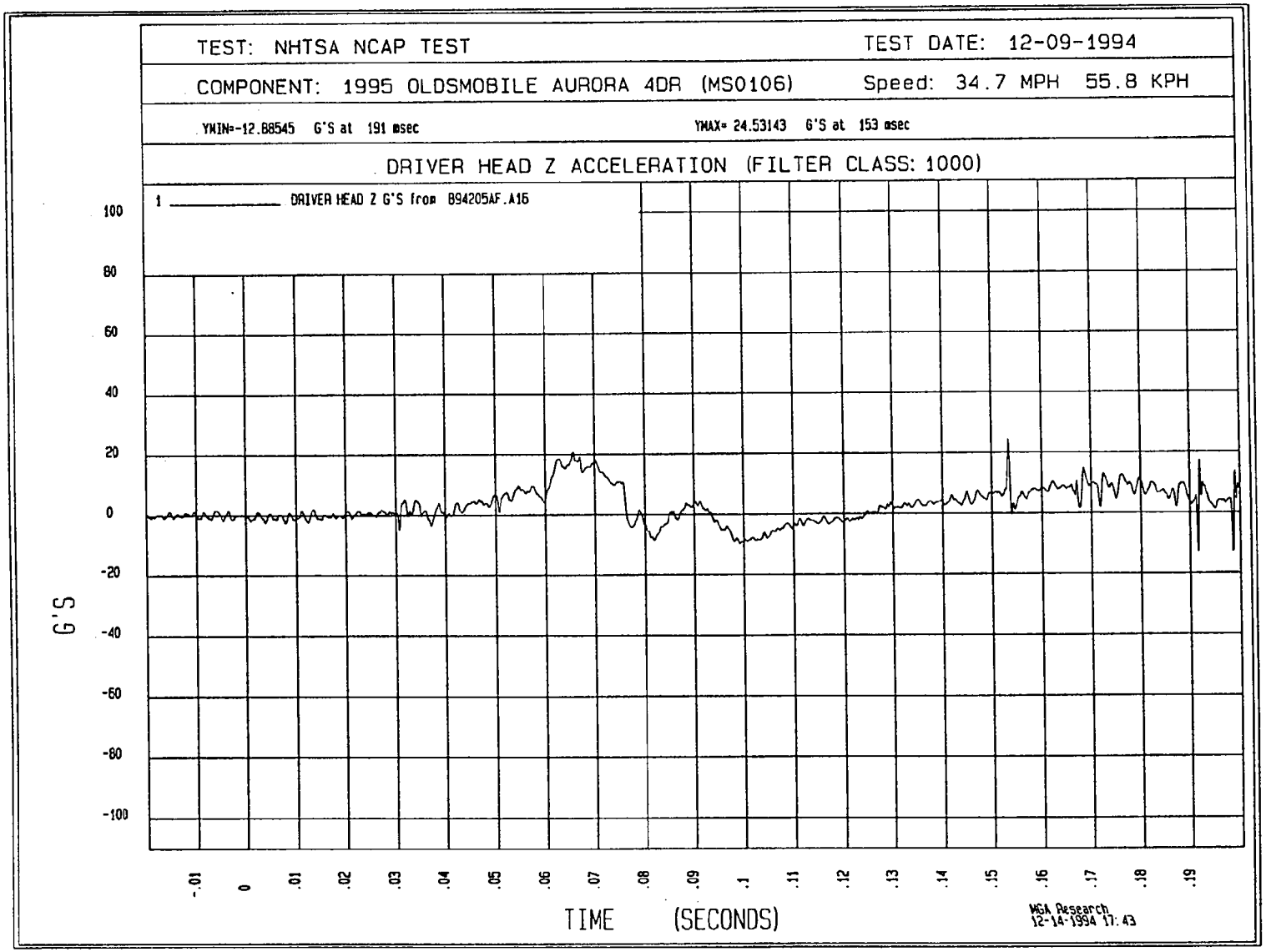

Figure B-35 - Driver Head Z Acceleration vs. Time

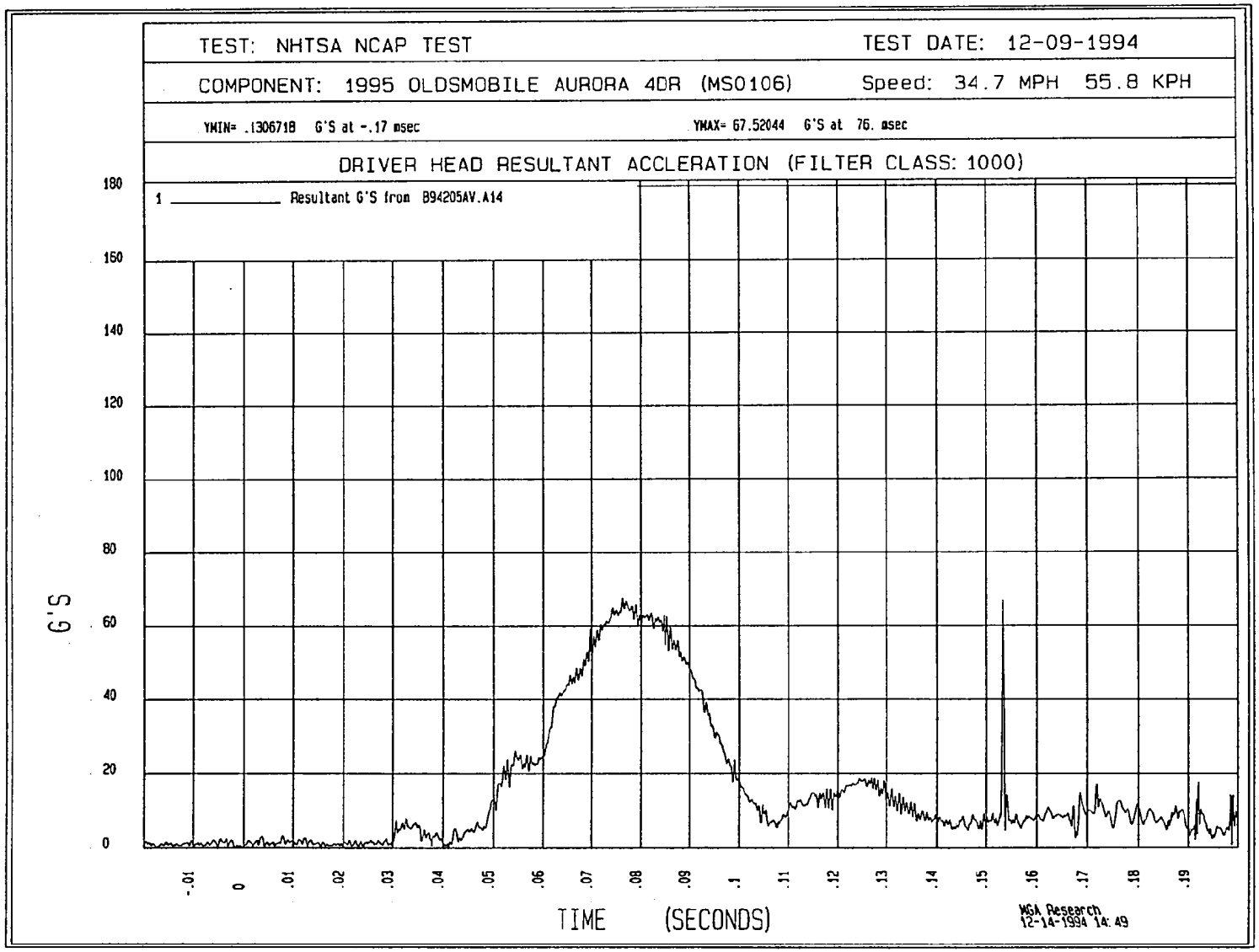

Figure B-36 - Driver Head Resultant Acceleration vs. Time

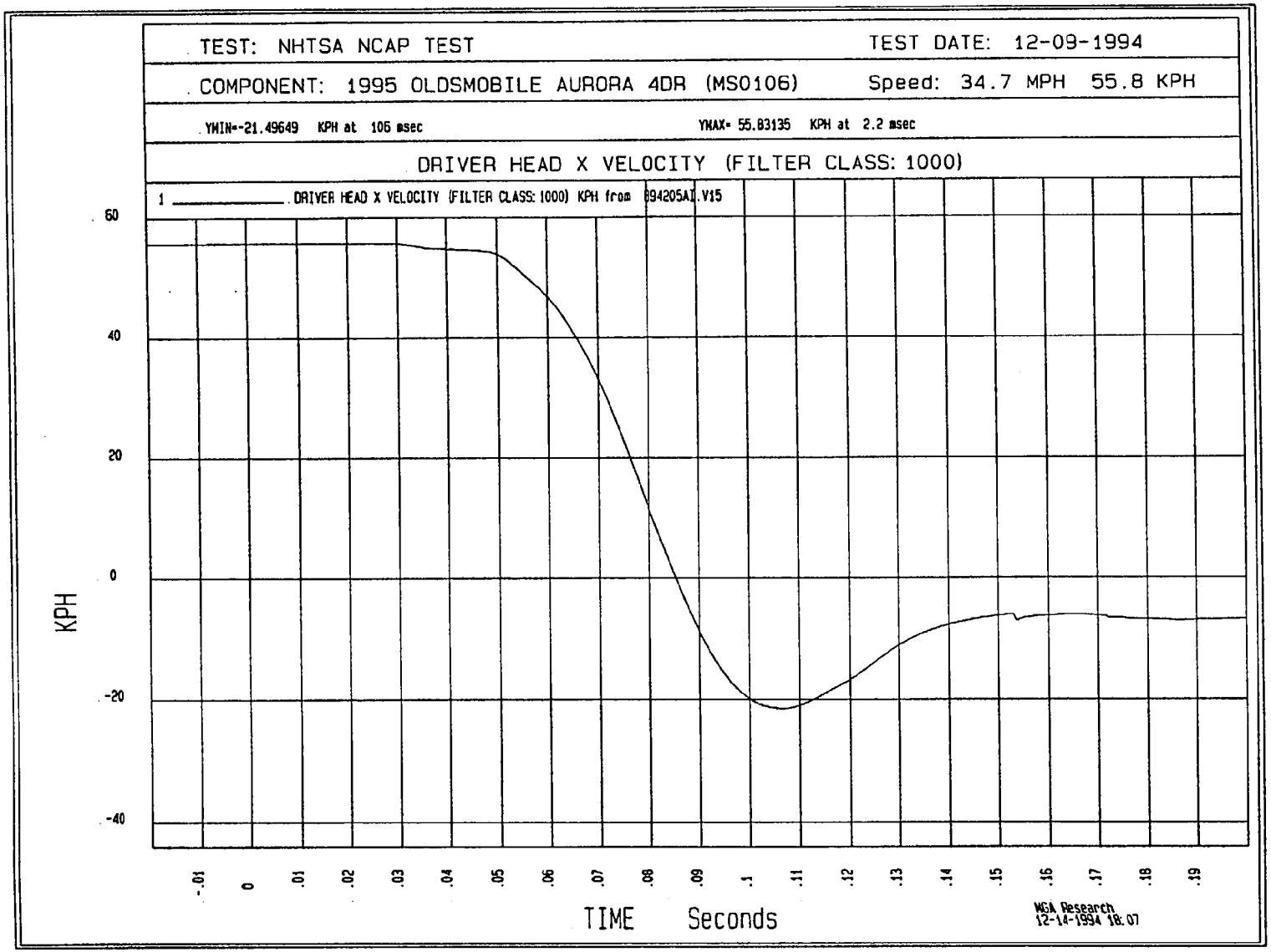

Figure B-37 - Driver Head X Velocity vs. Time

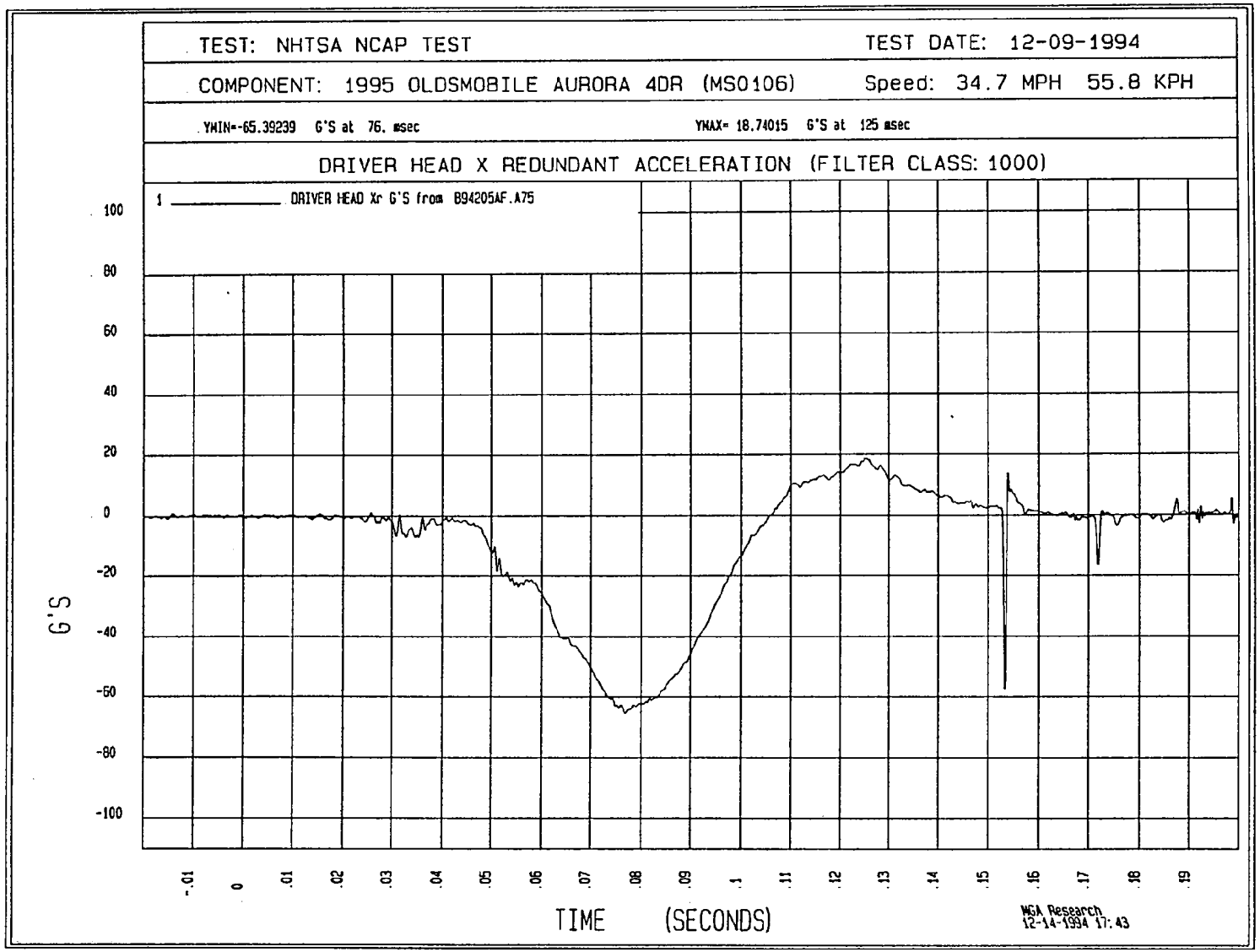

Figure B-38 - Driver Head X Redundant Acceleration vs. Time

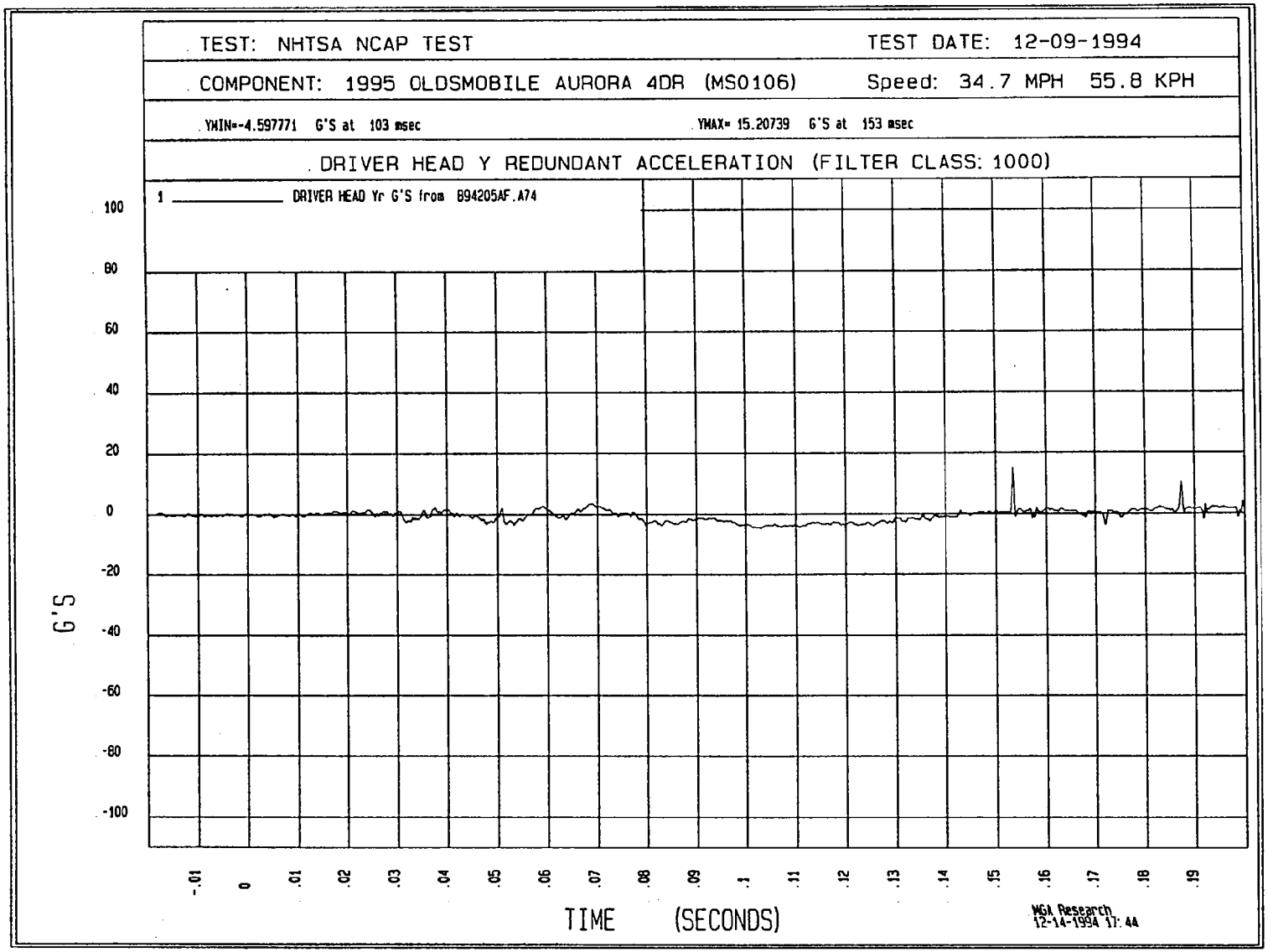

Figure B-39 - Driver Head Y Redundant Acceleration vs. Time

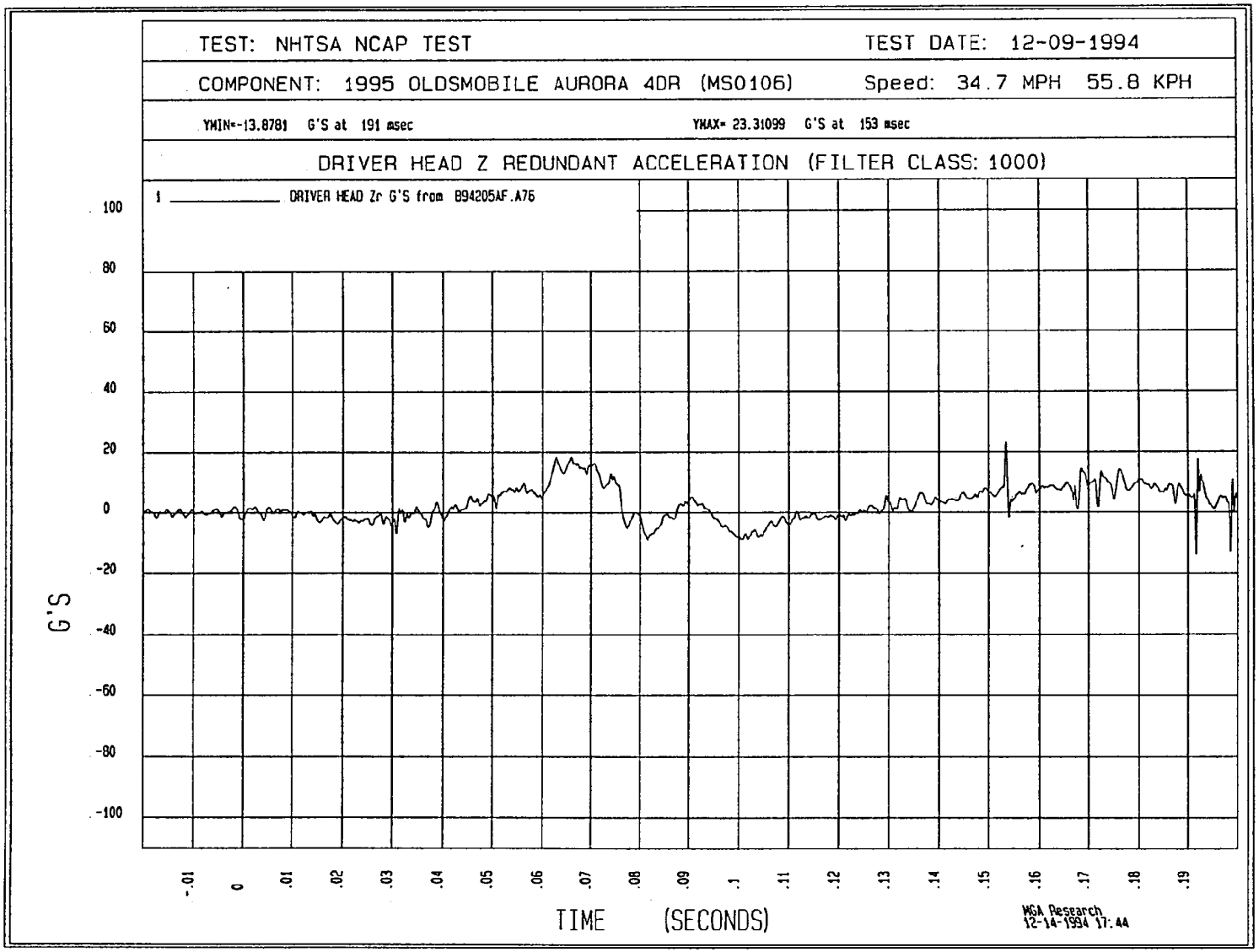

Figure B-40 - Driver Head Z Redundant Acceleration vs. Time

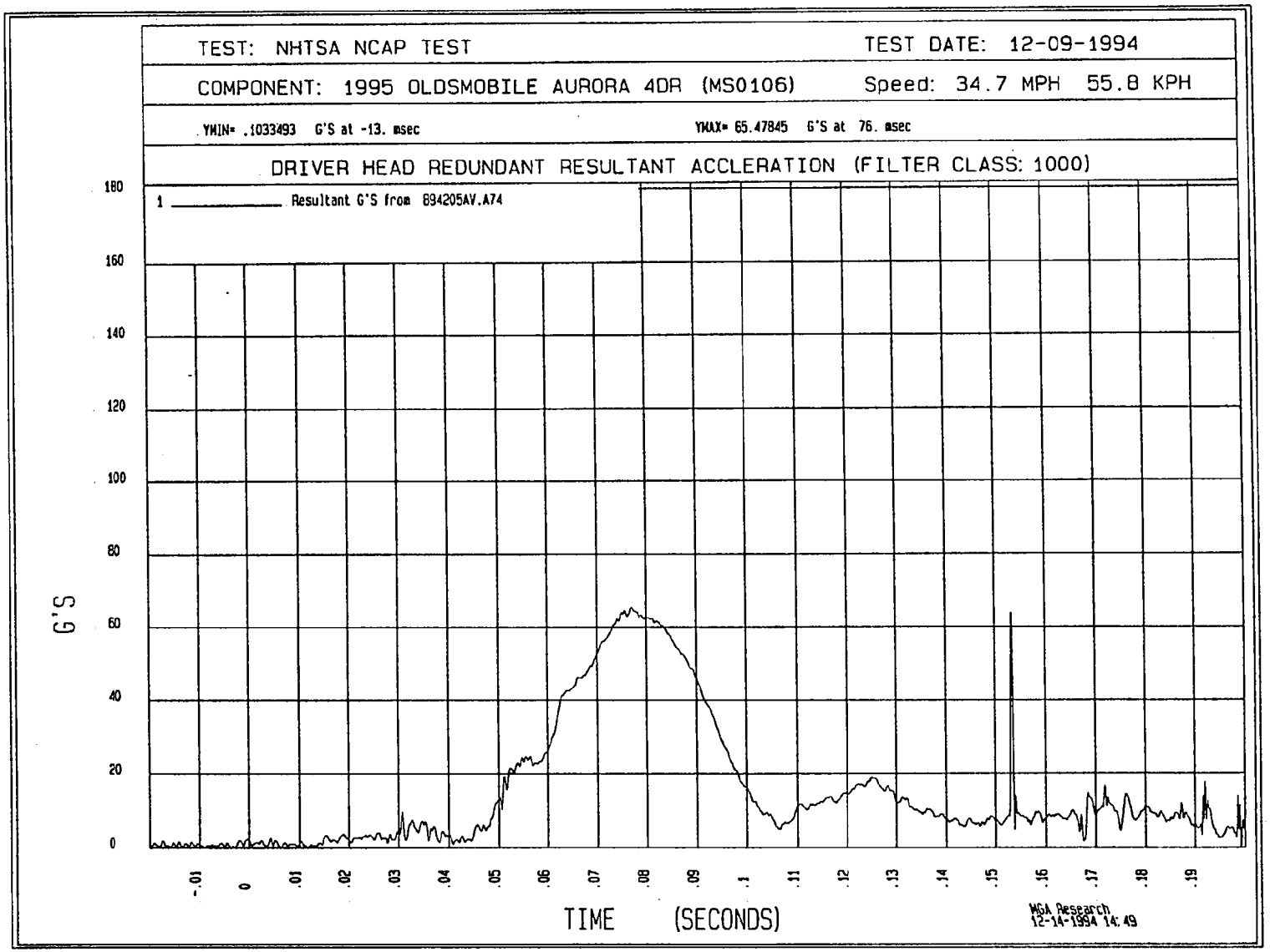

Figure B-41 - Driver Head Redundant Resultant Accel. vs. Time

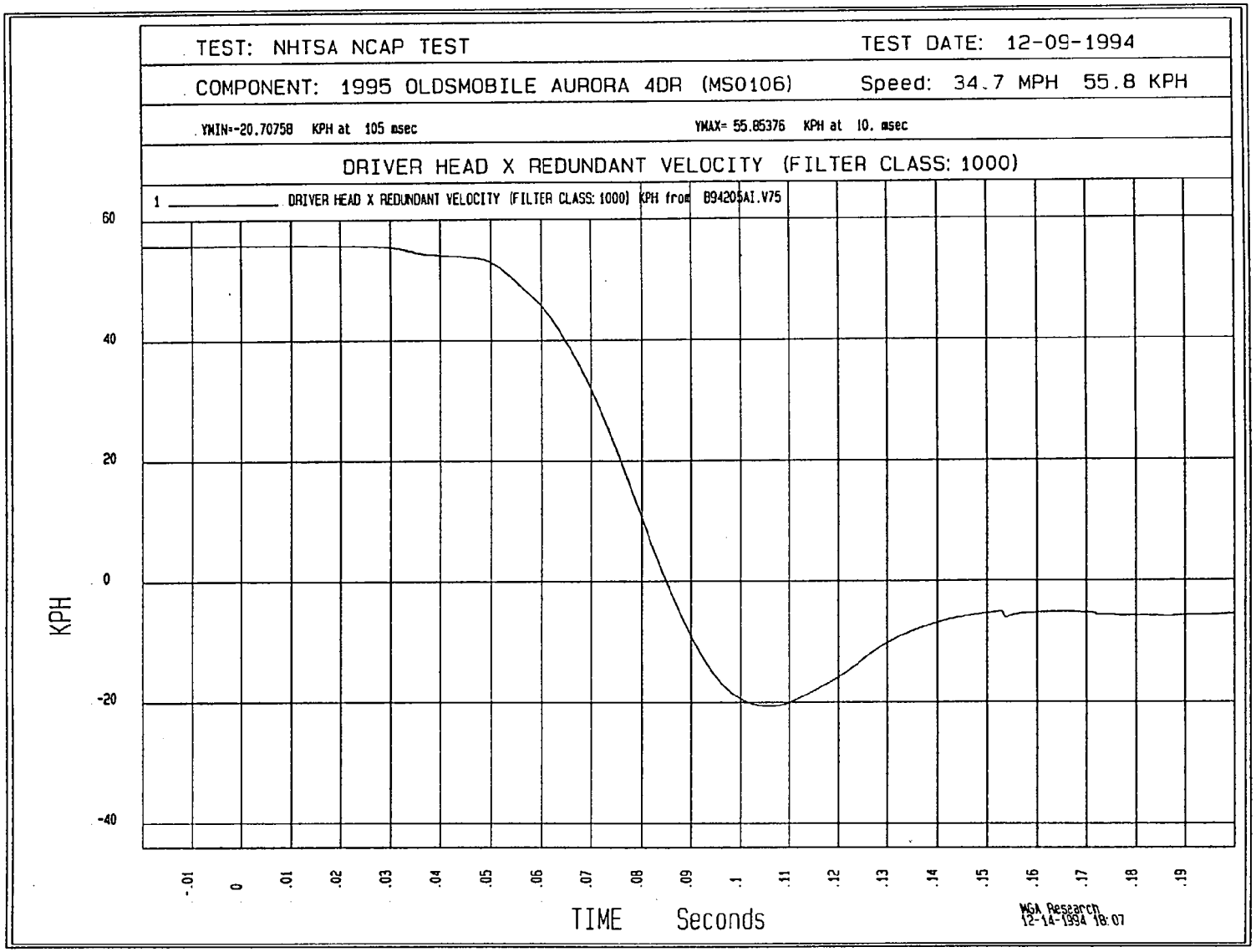

Figure B-42 - Driver Head X Redundant Velocity vs. Time

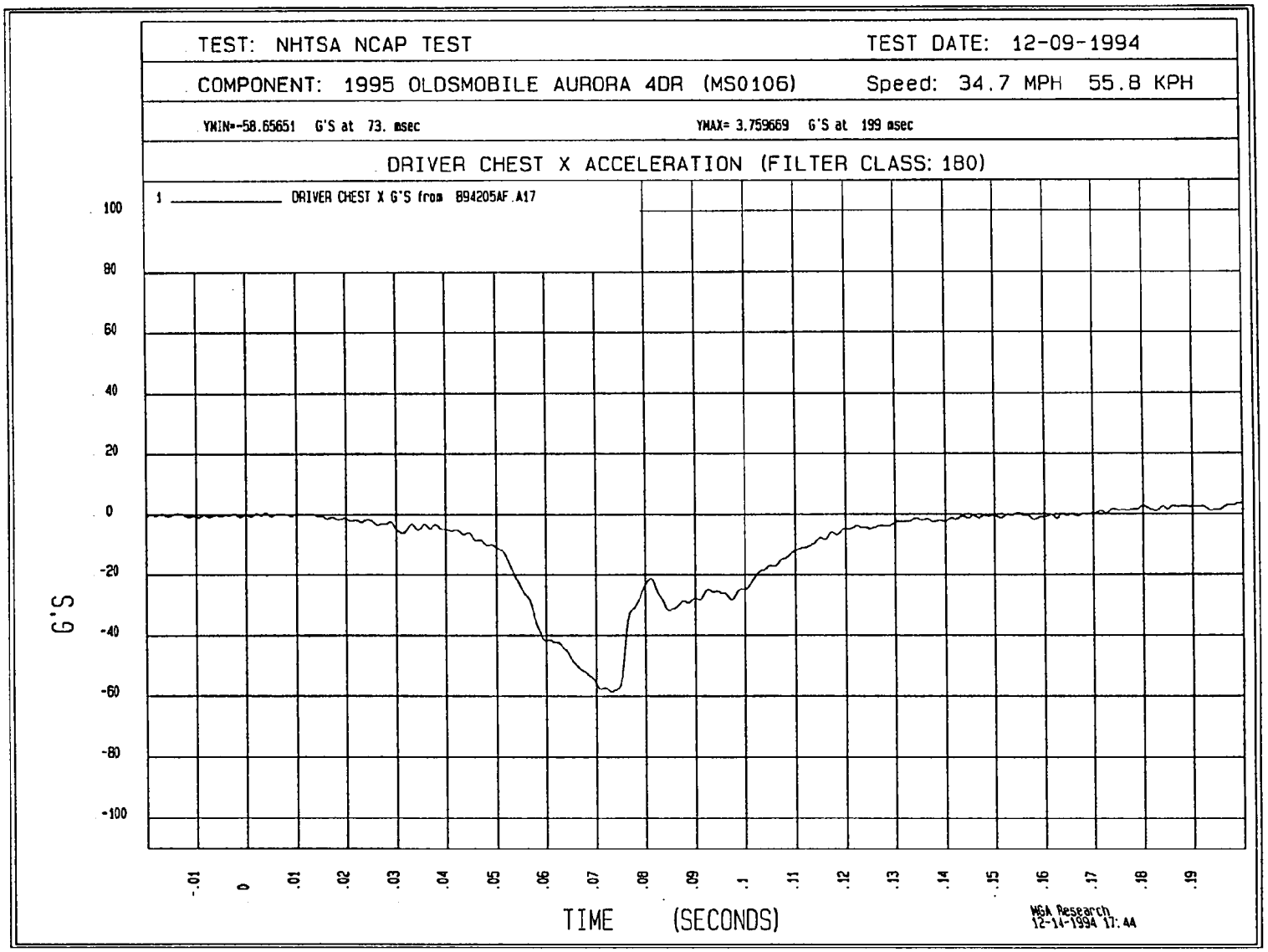

Figure B-43 - Driver Chest X Acceleration vs. Time

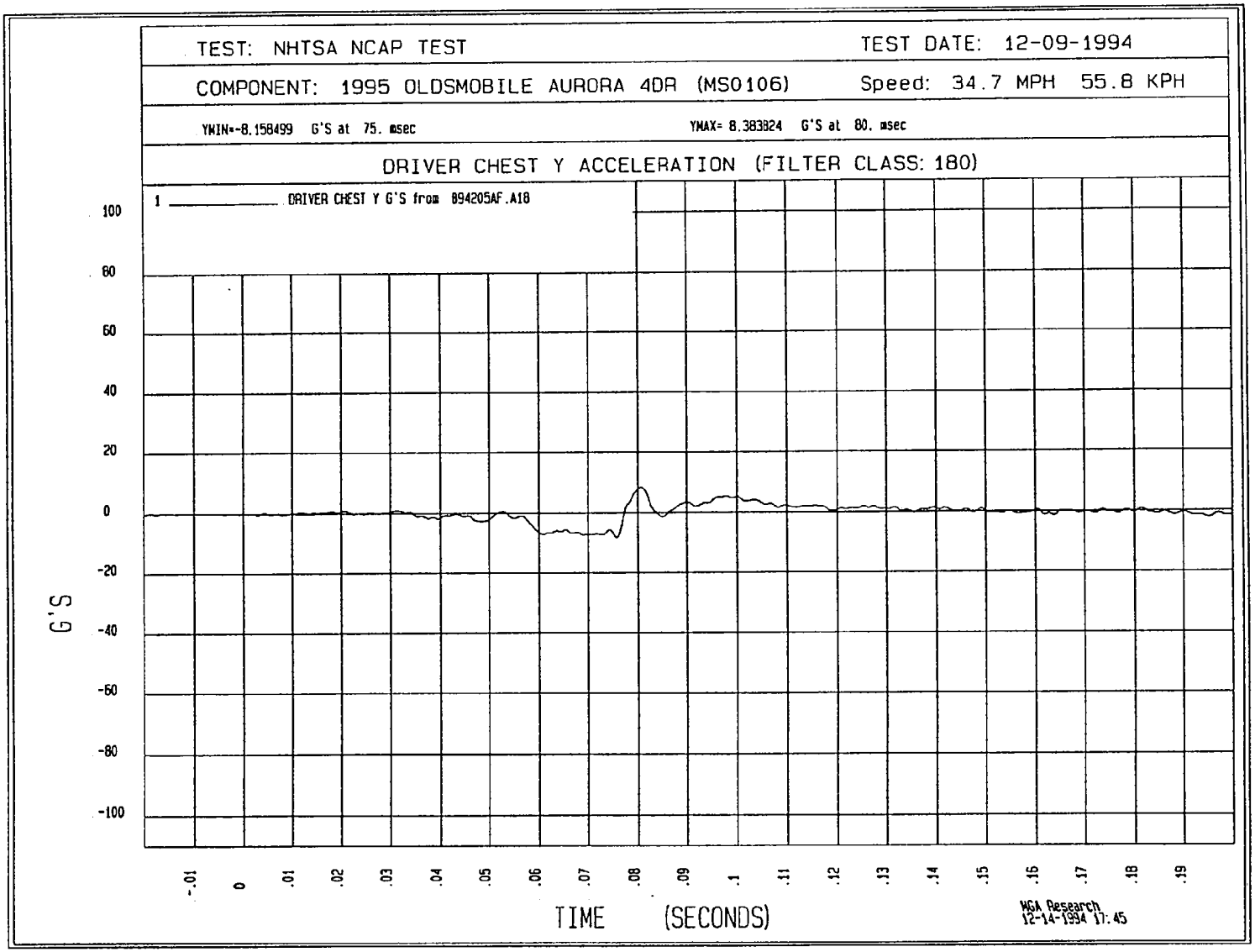

Figure B-44 - Driver Chest Y Acceleration vs. Time

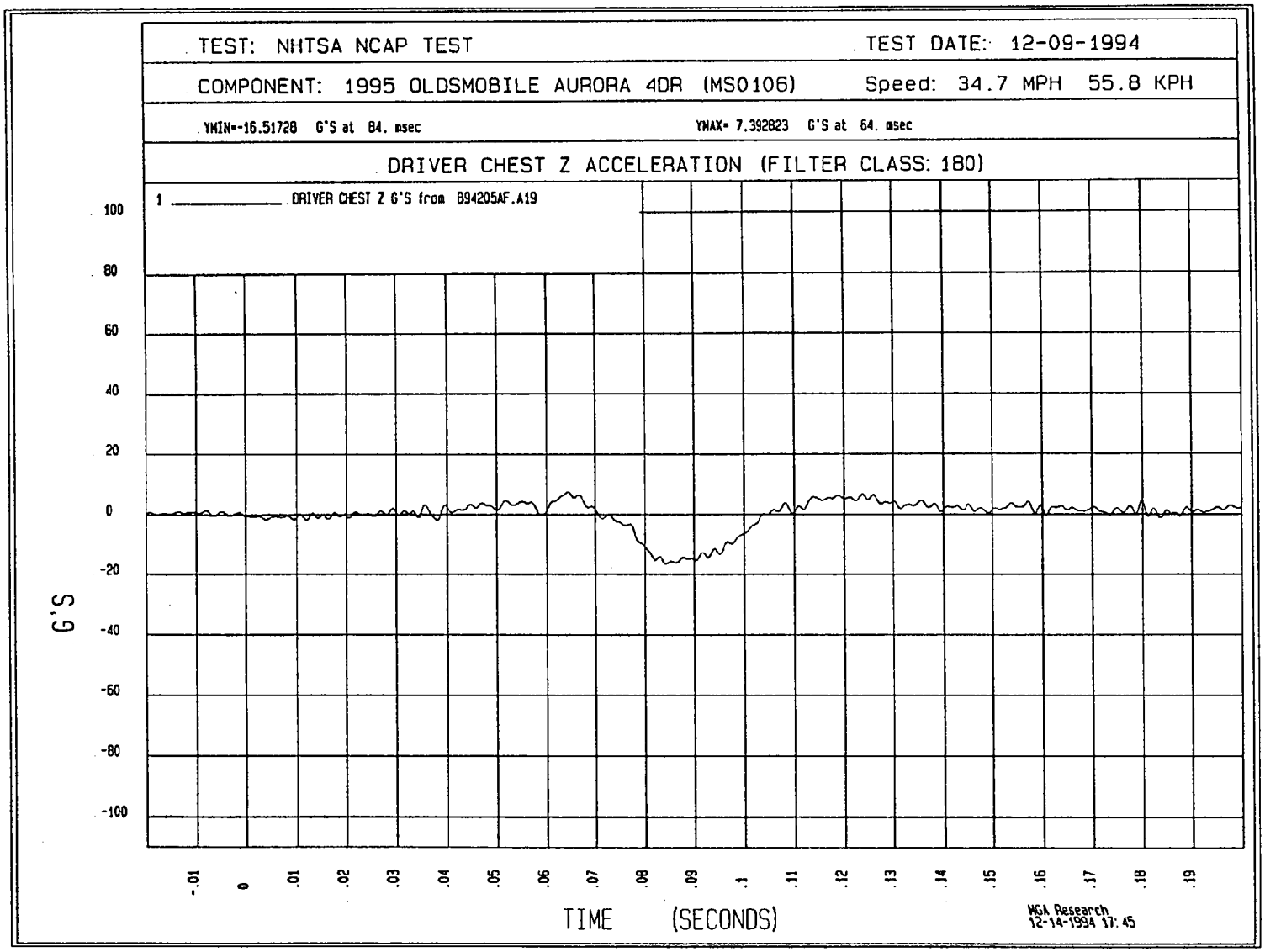

Figure B-45 - Driver Chest Z Acceleration vs. Time

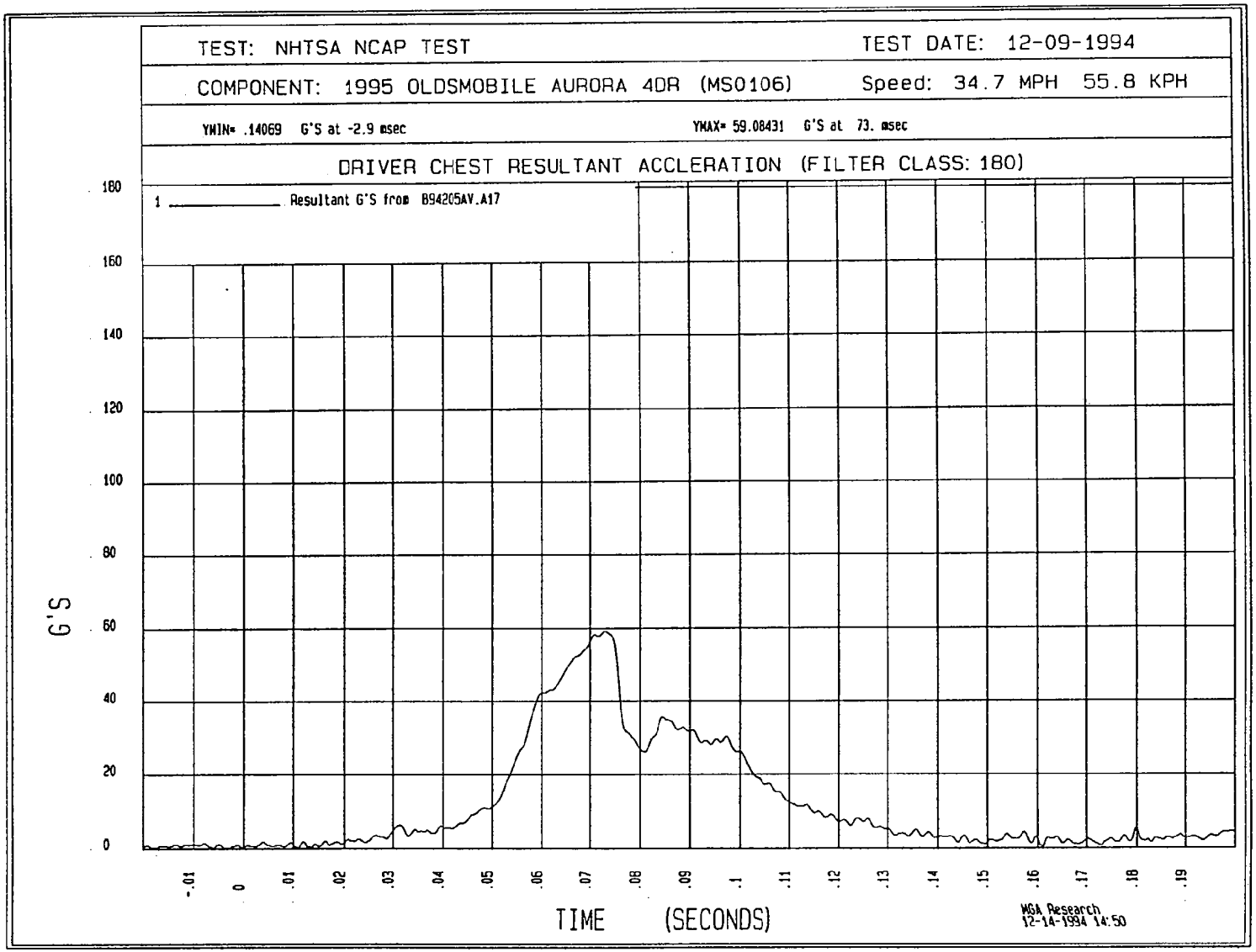

Figure B-46 - Driver Chest Resultant Accel. vs. Time

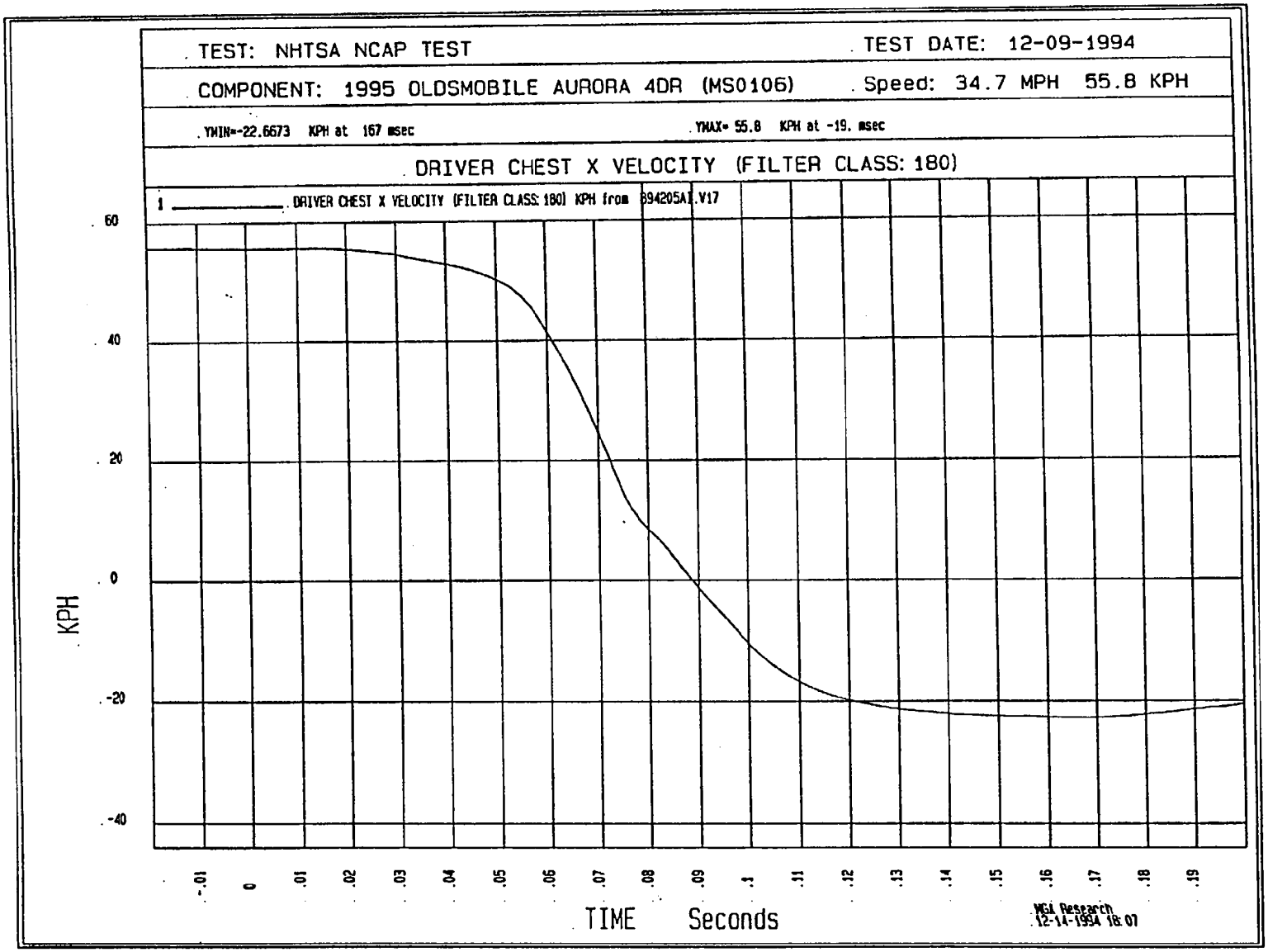

Figure B-47 - Driver Chest X Velocity vs. Time

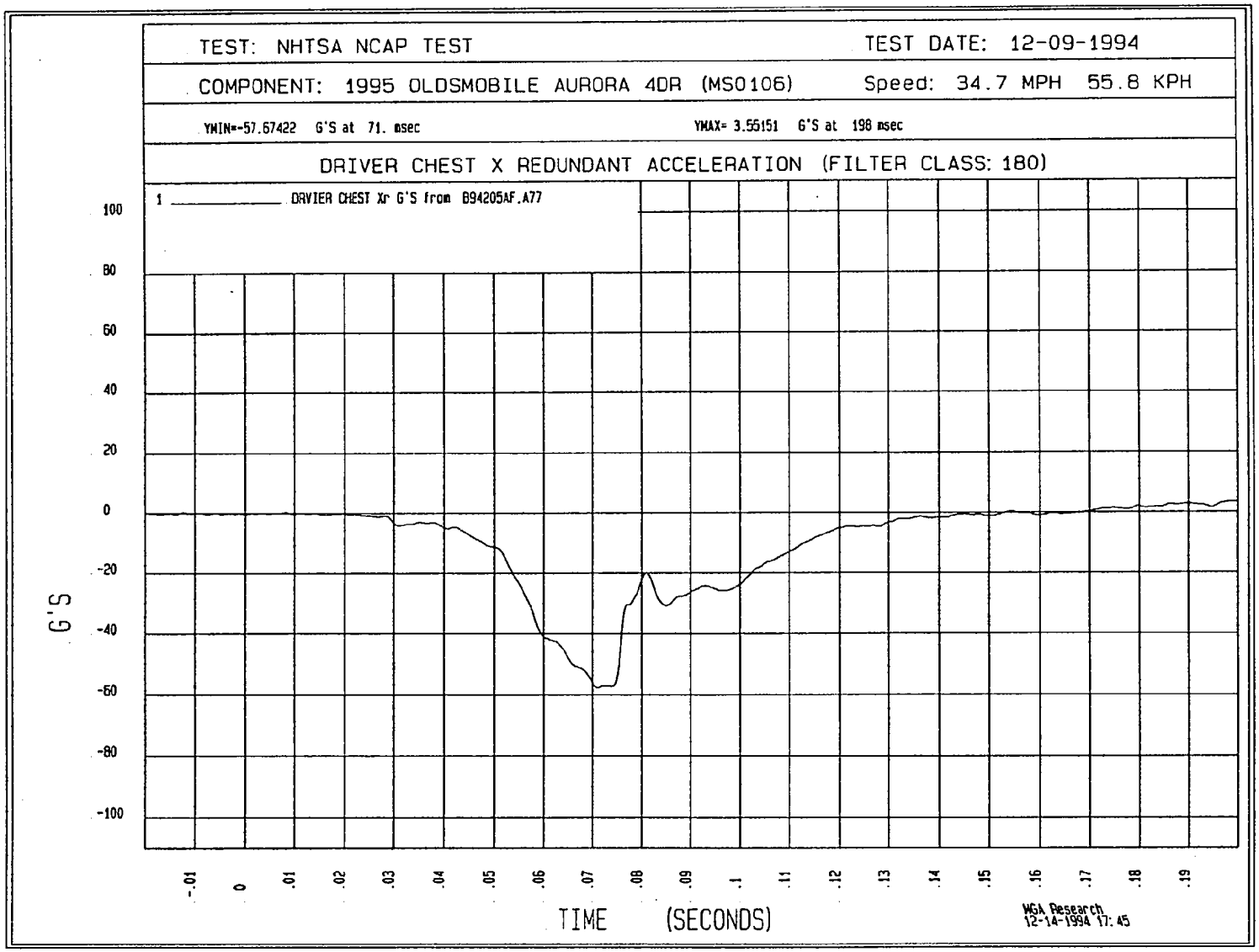

Figure B-48 - Driver Chest X Redundant Acceleration vs. Time

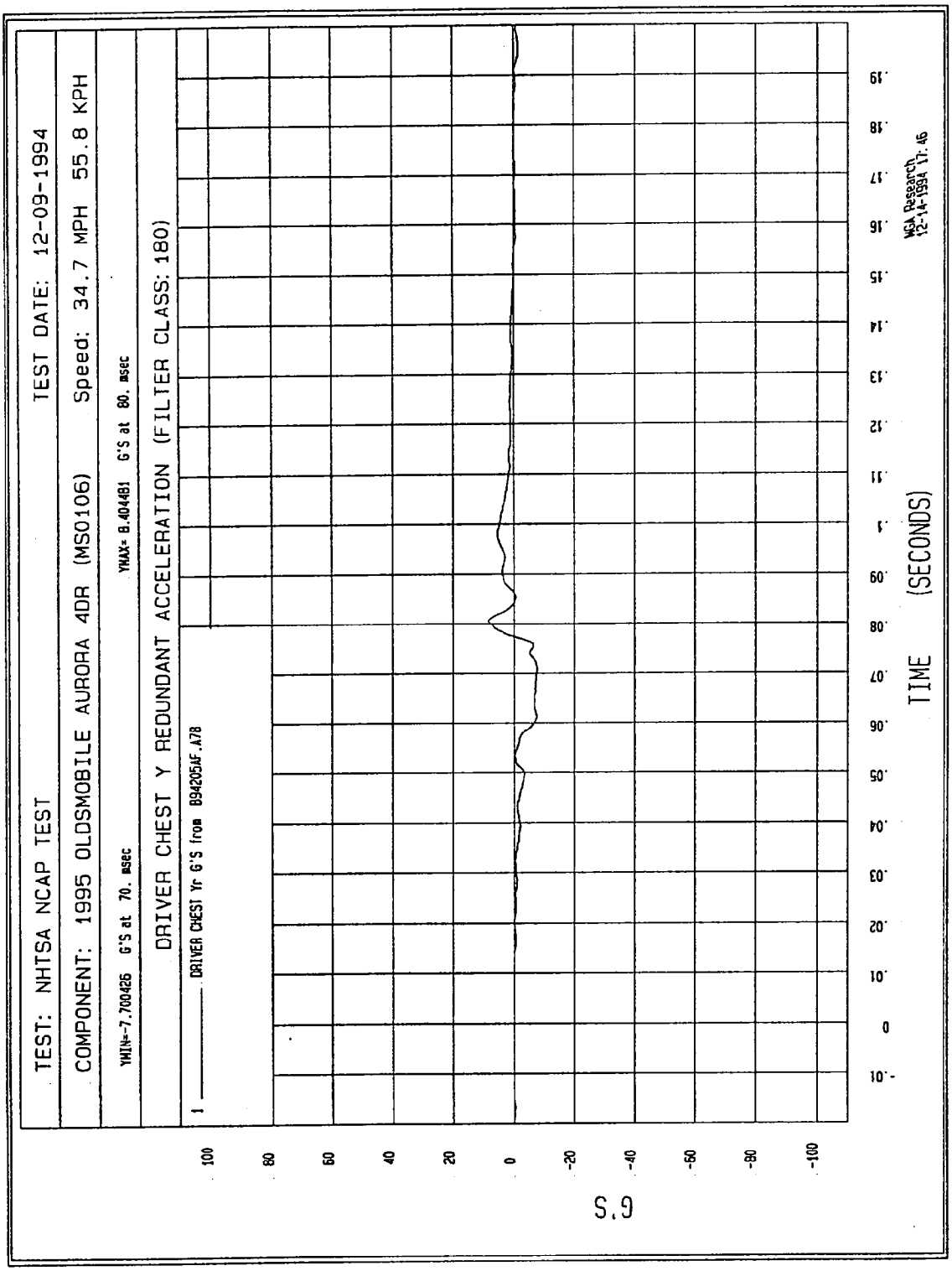

Figure B-49 - Driver Chest Y Redundant Acceleration vs. Time

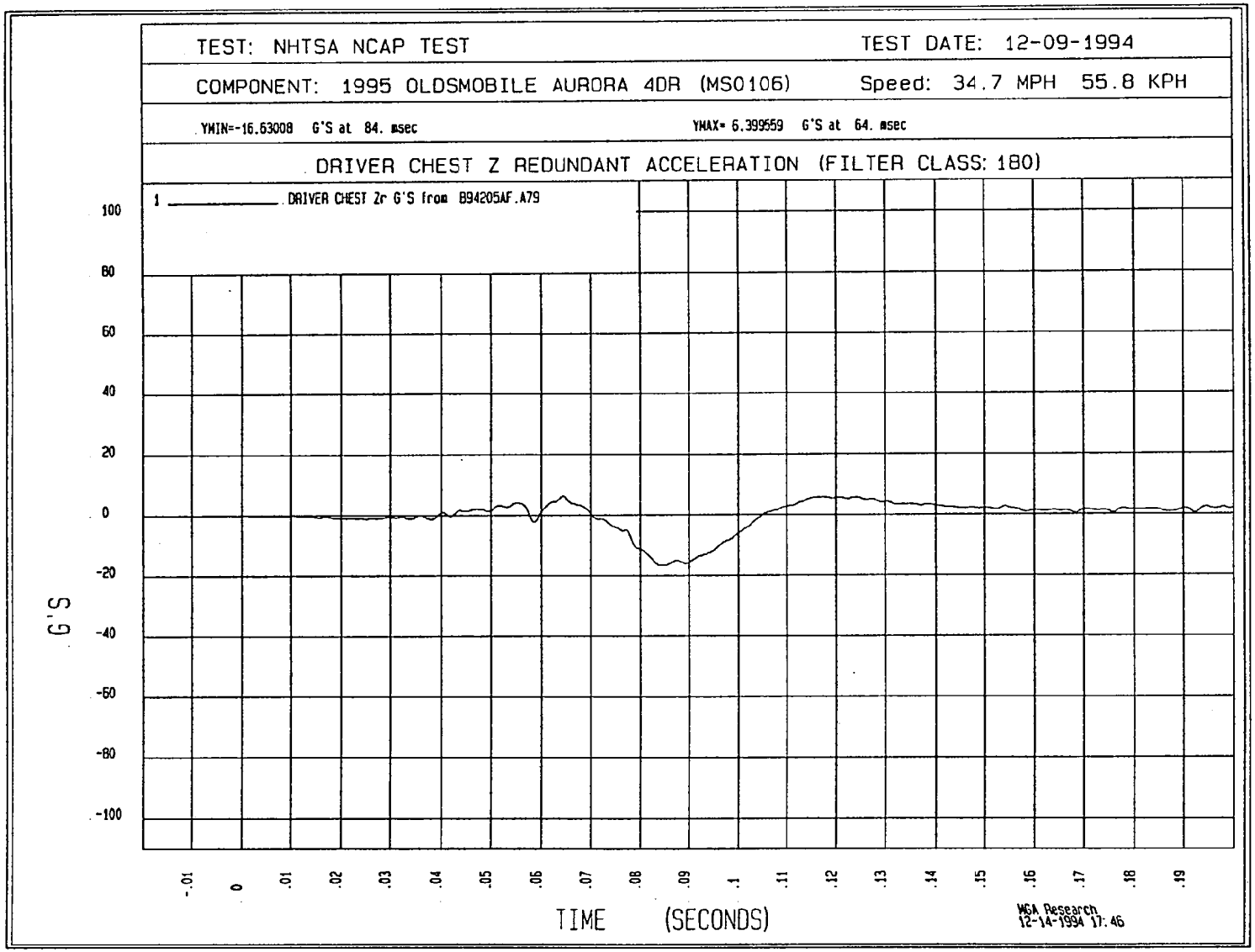

Figure B-5Ø - Driver Chest Z Redundant Acceleration vs. Time

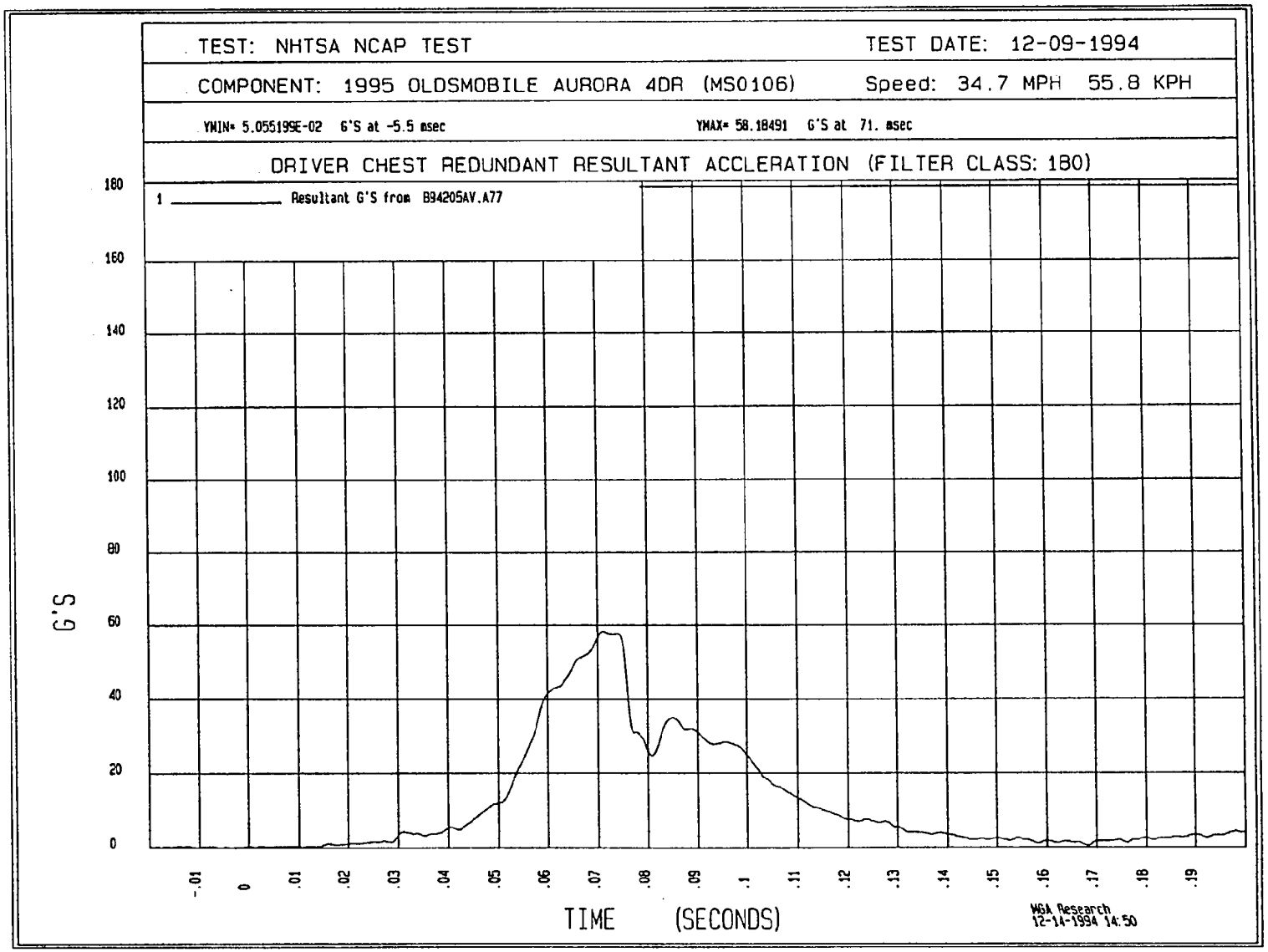

Figure B-51 - Driver Chest Redundant Resultant Accel. vs. Time

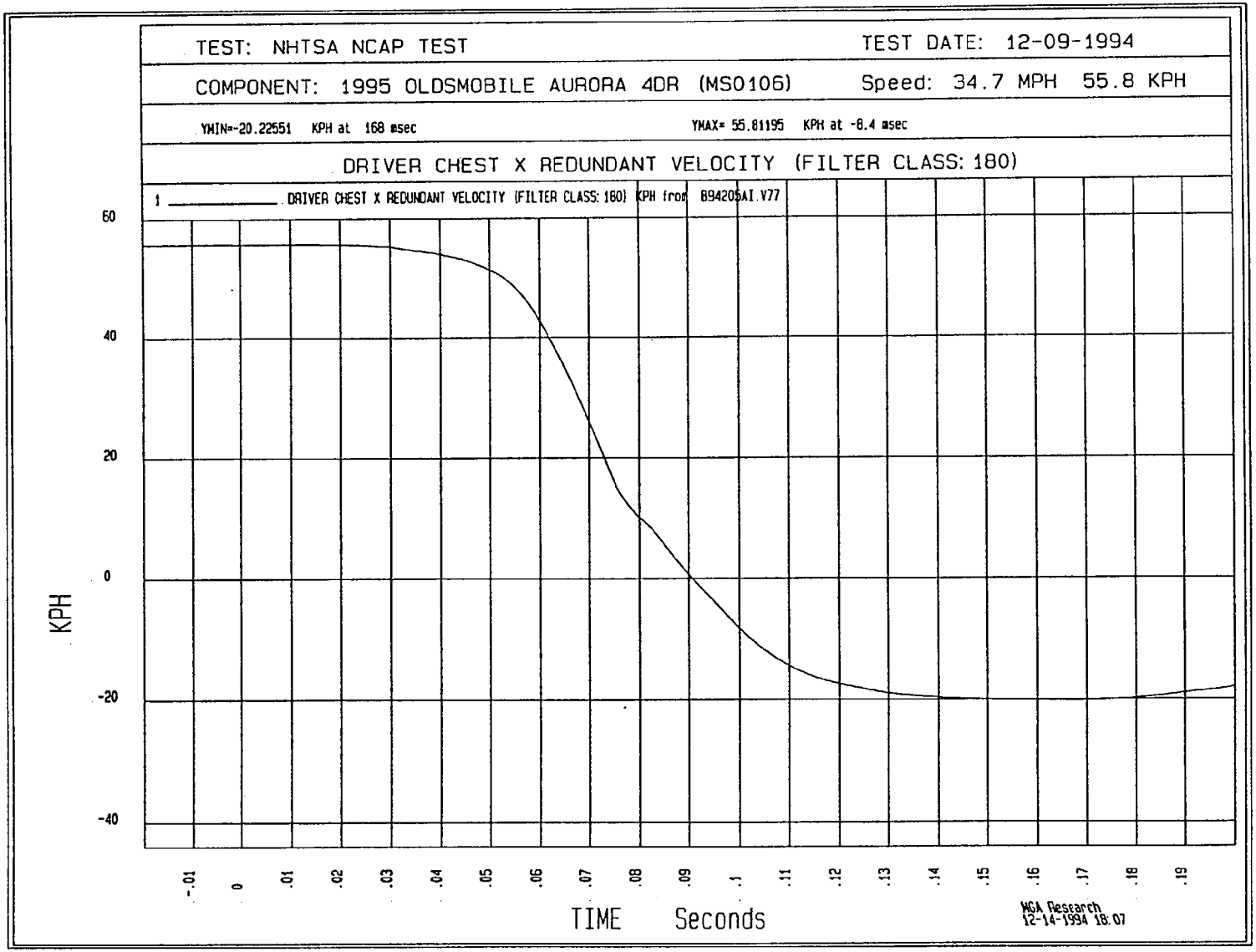

Figure B-52 - Driver Chest X Redundant Velocity vs. Time

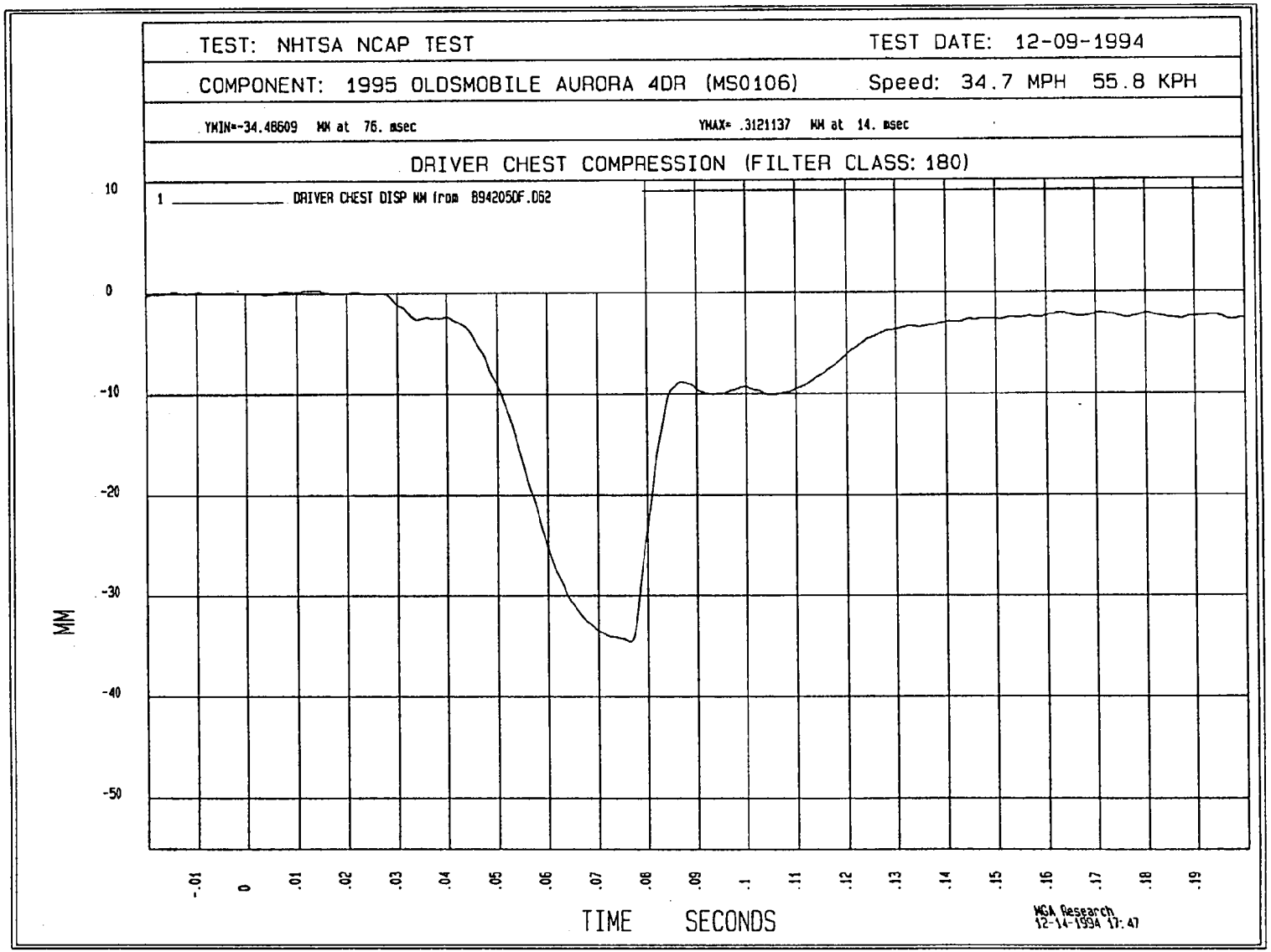

Figure B-53 - Driver Chest Compression vs. Time

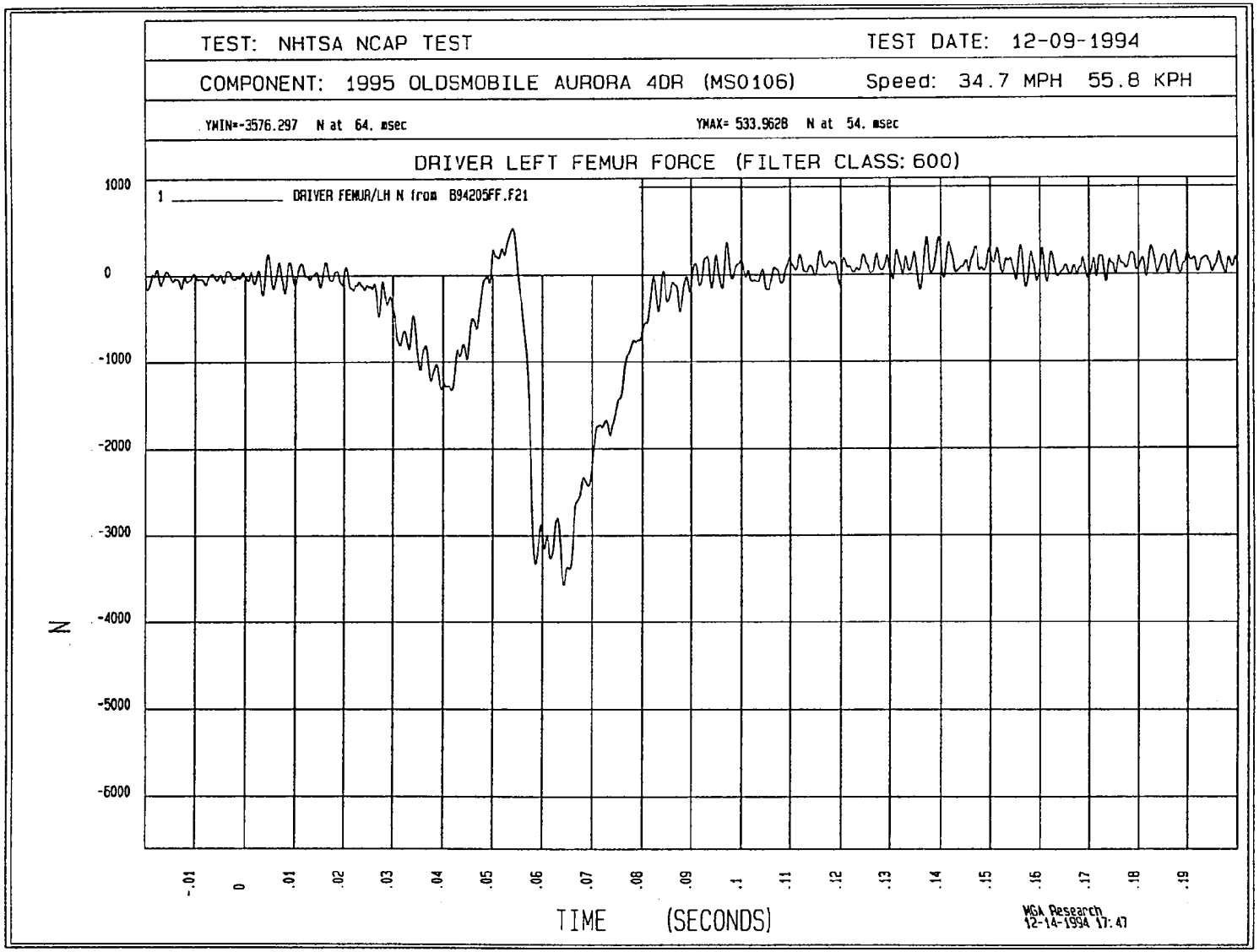

Figure B-54 - Driver Left Femur Force vs. Time

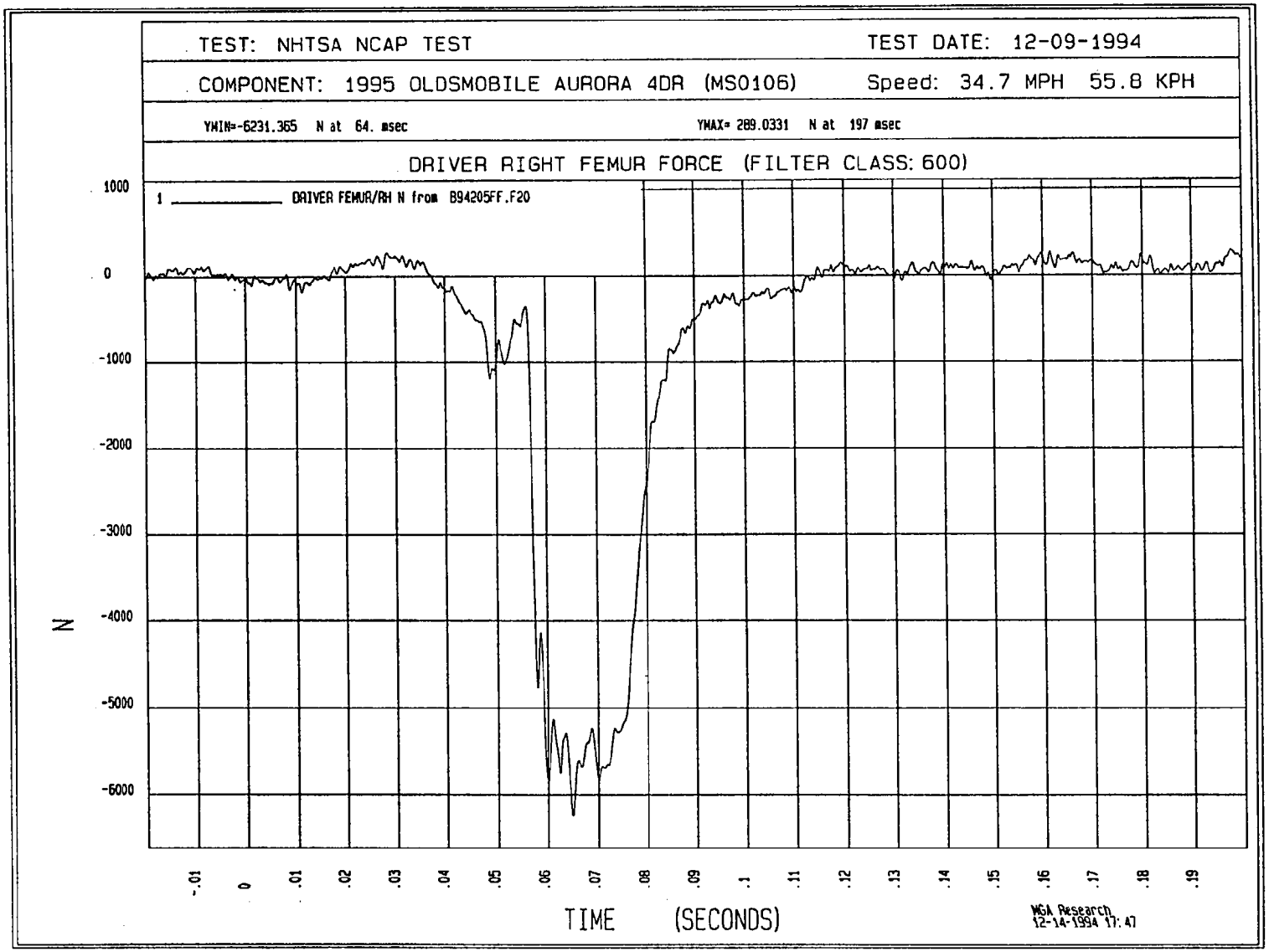

Figure B-55 - Driver Right Femur Force vs. Time

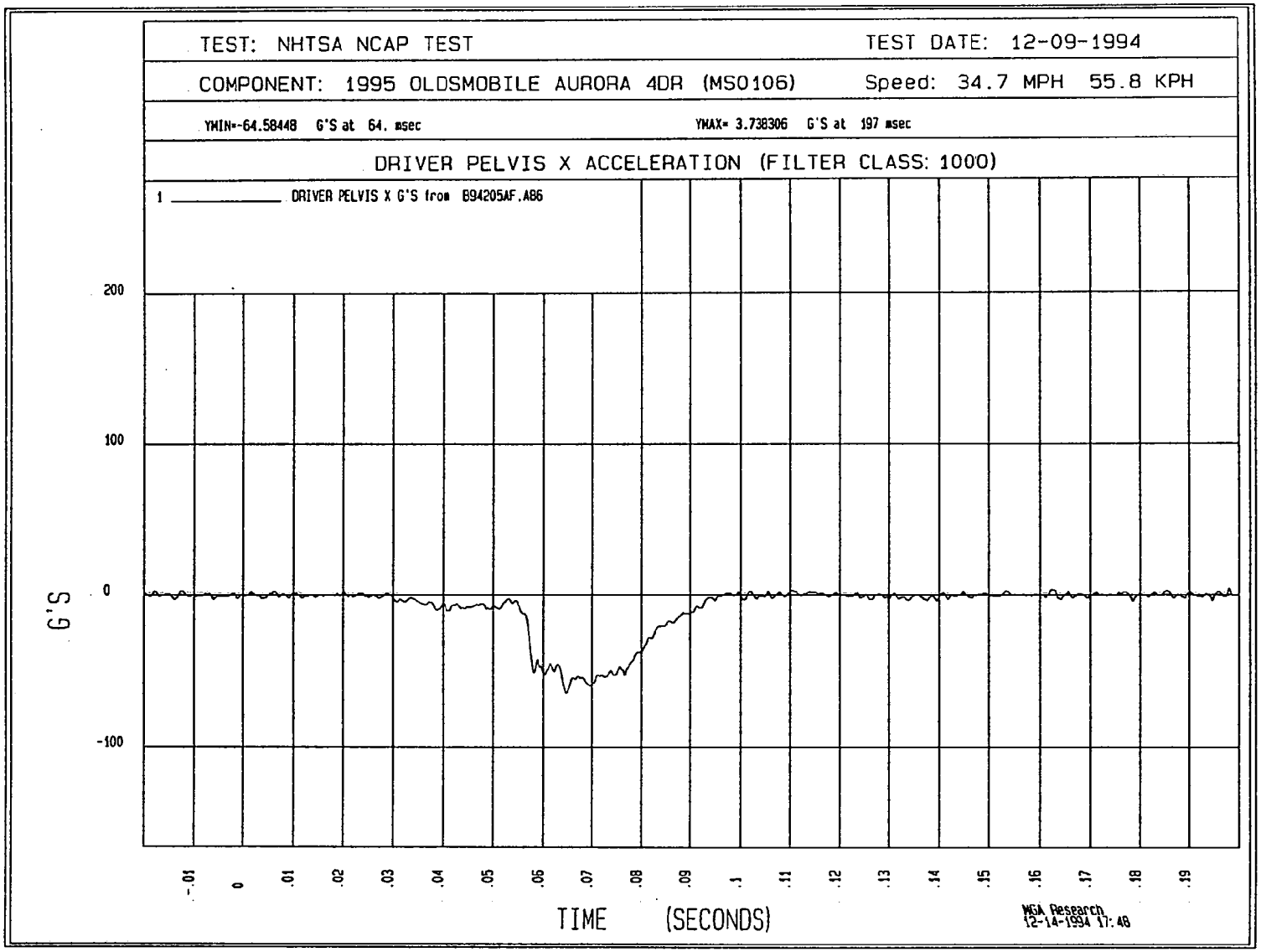

Figure B-56 - Driver Pelvis X Acceleration vs. Time

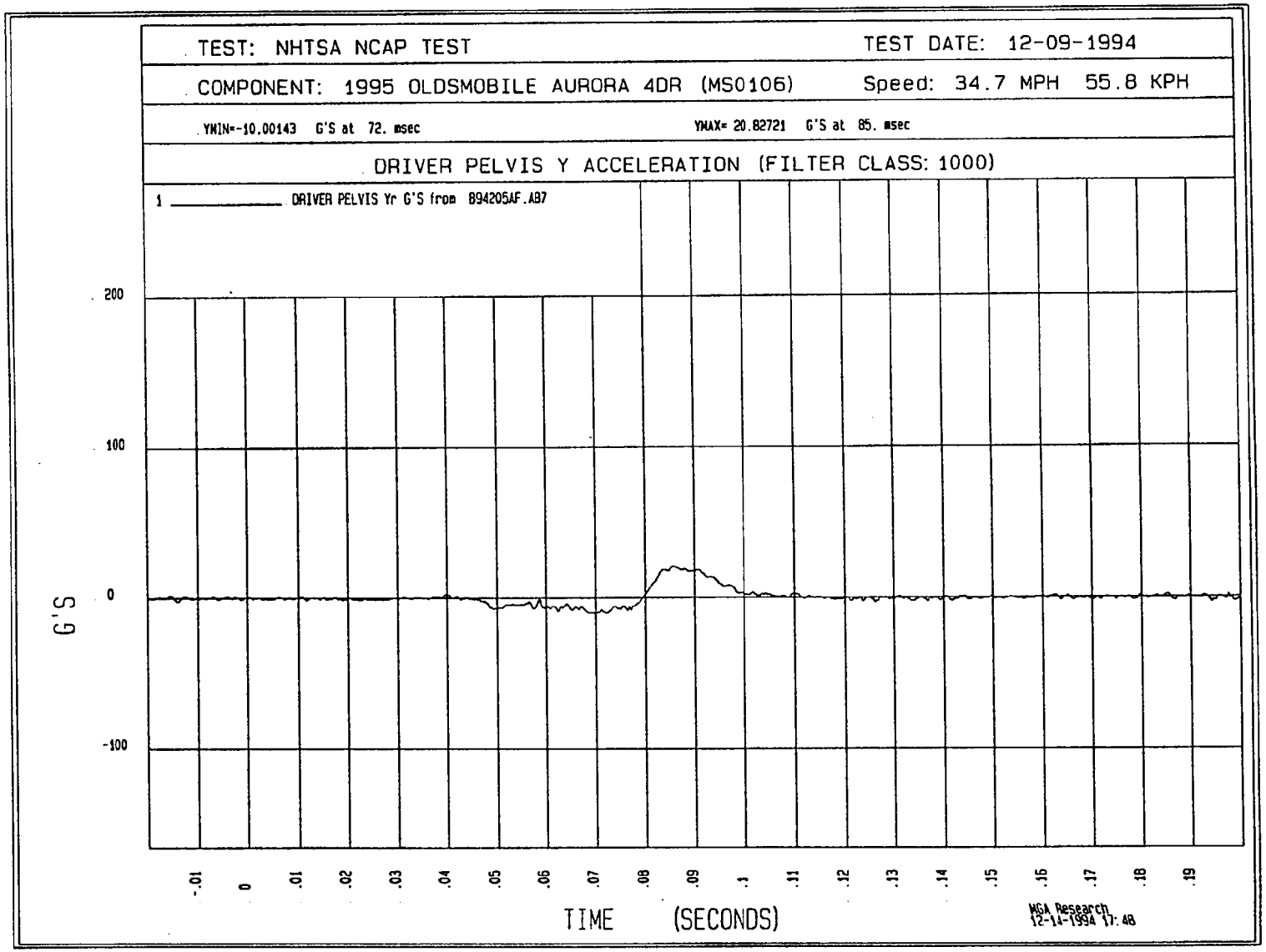

Figure B-57 - Driver Pelvis Y Acceleration vs. Time

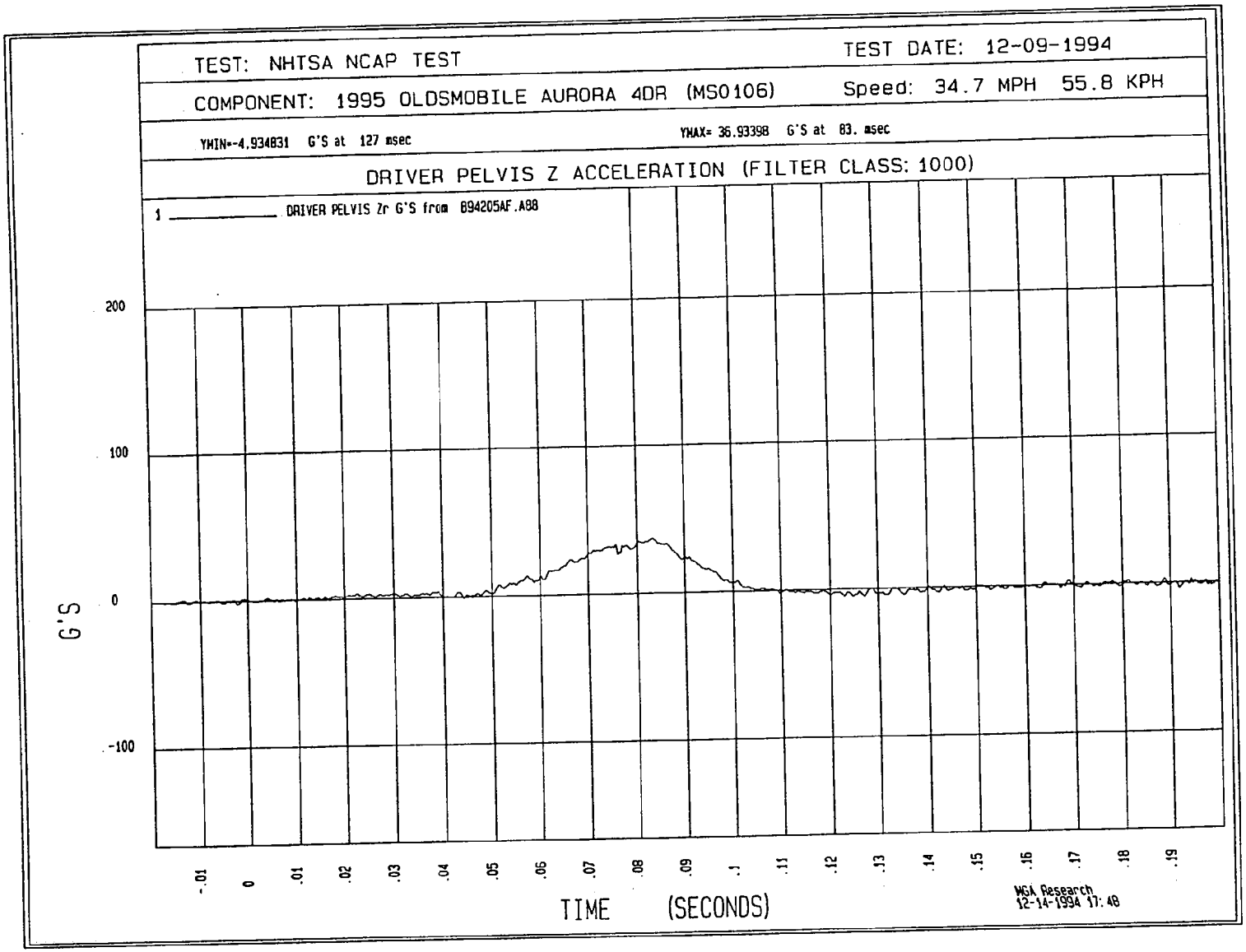

Figure B-58 - Driver Pelvis Z Acceleration vs. Time

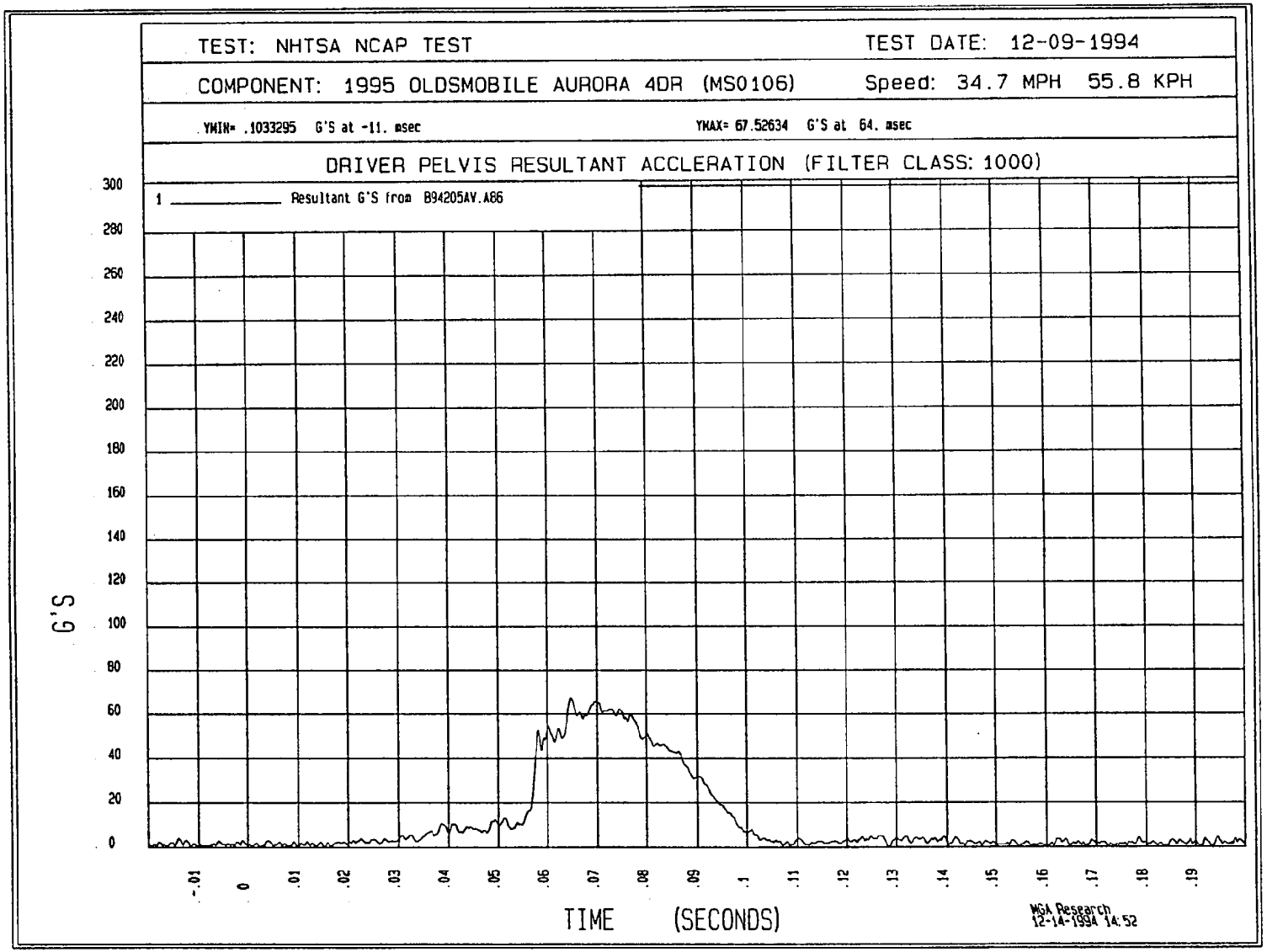

Figure B-59 - Driver Pelvis Resultant Acceleration vs. Time

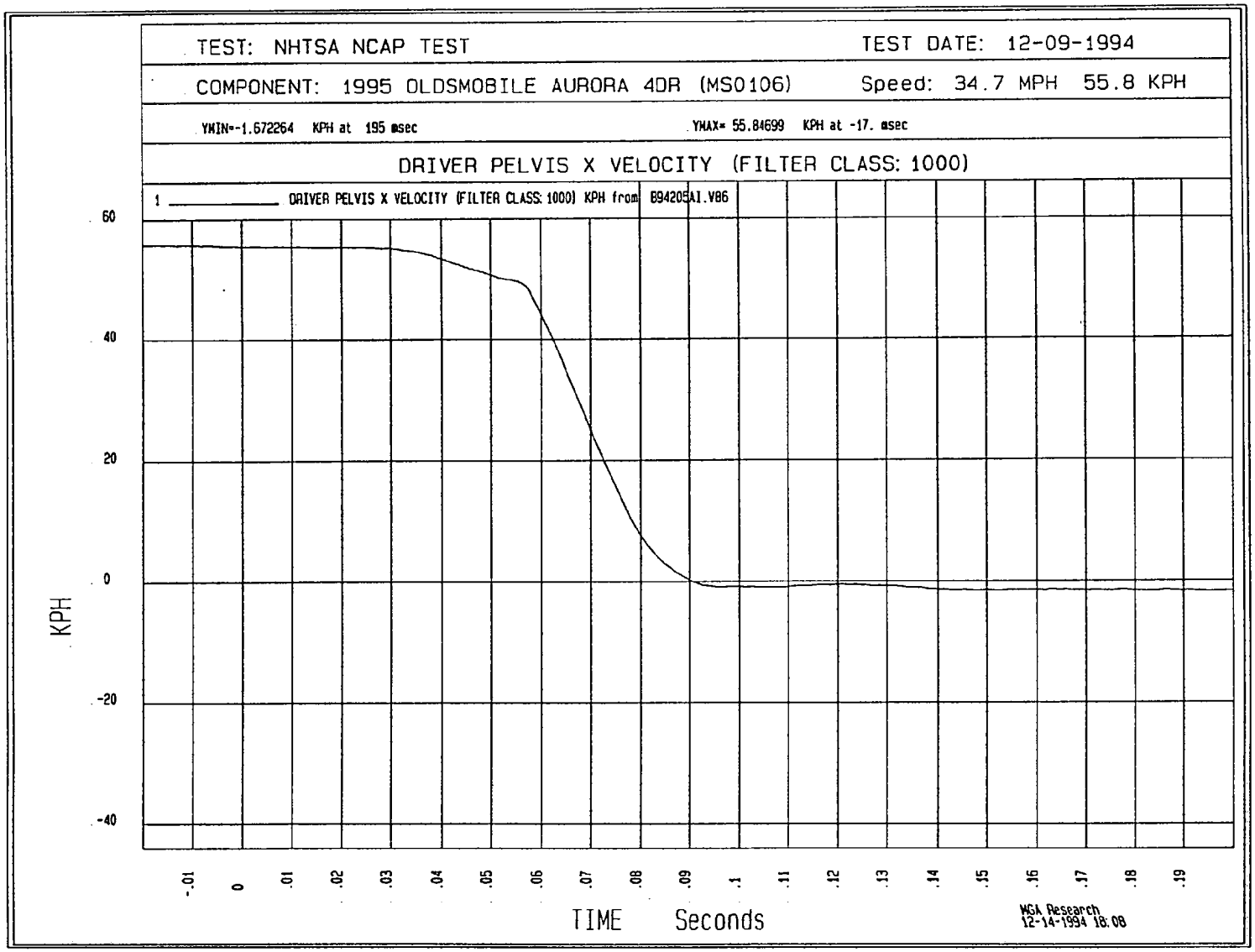

Figure B-60 - Driver Pelvis X Velocity vs. Time

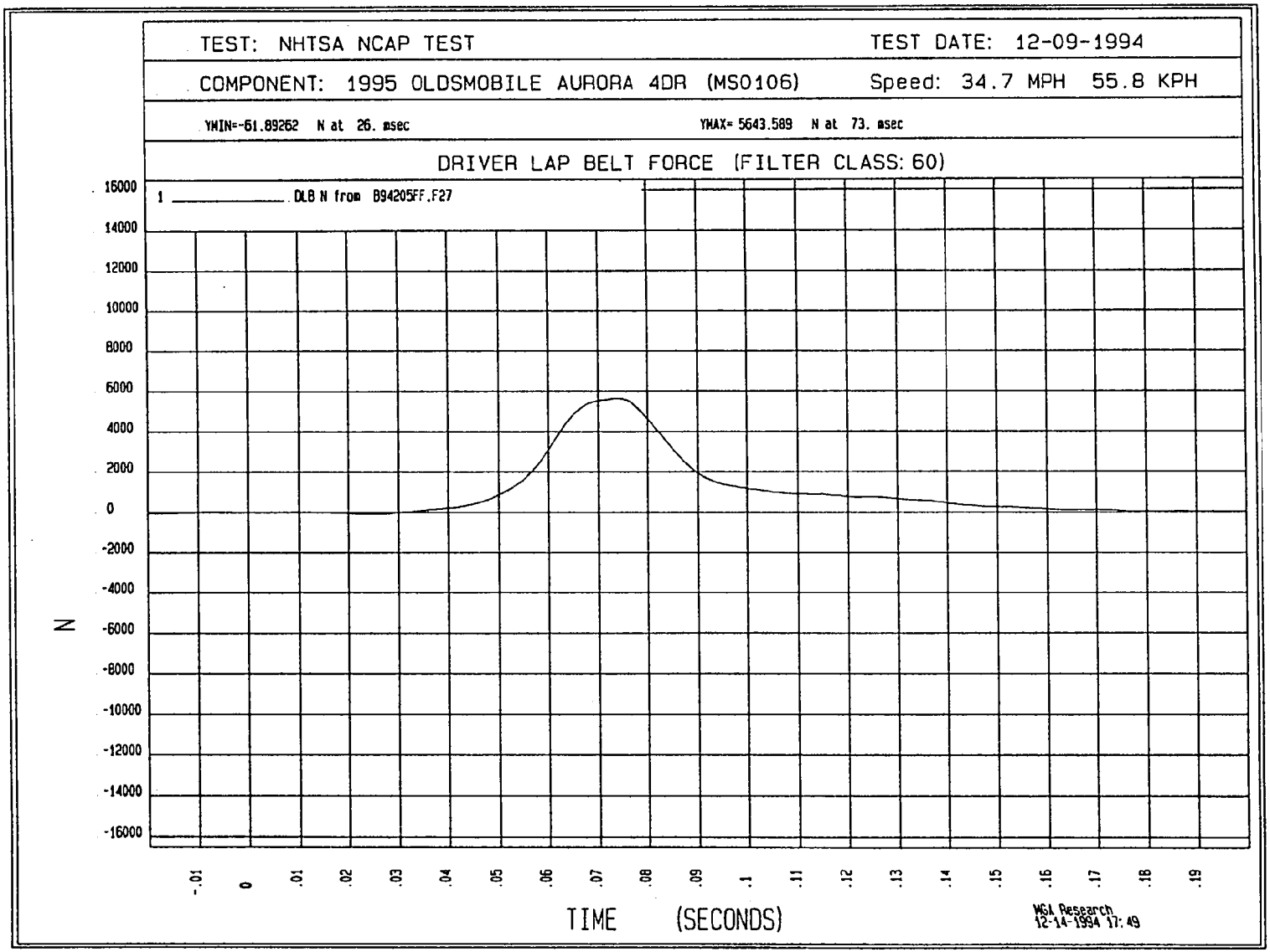

Figure B-61 - Driver Lap Belt Force vs. Time

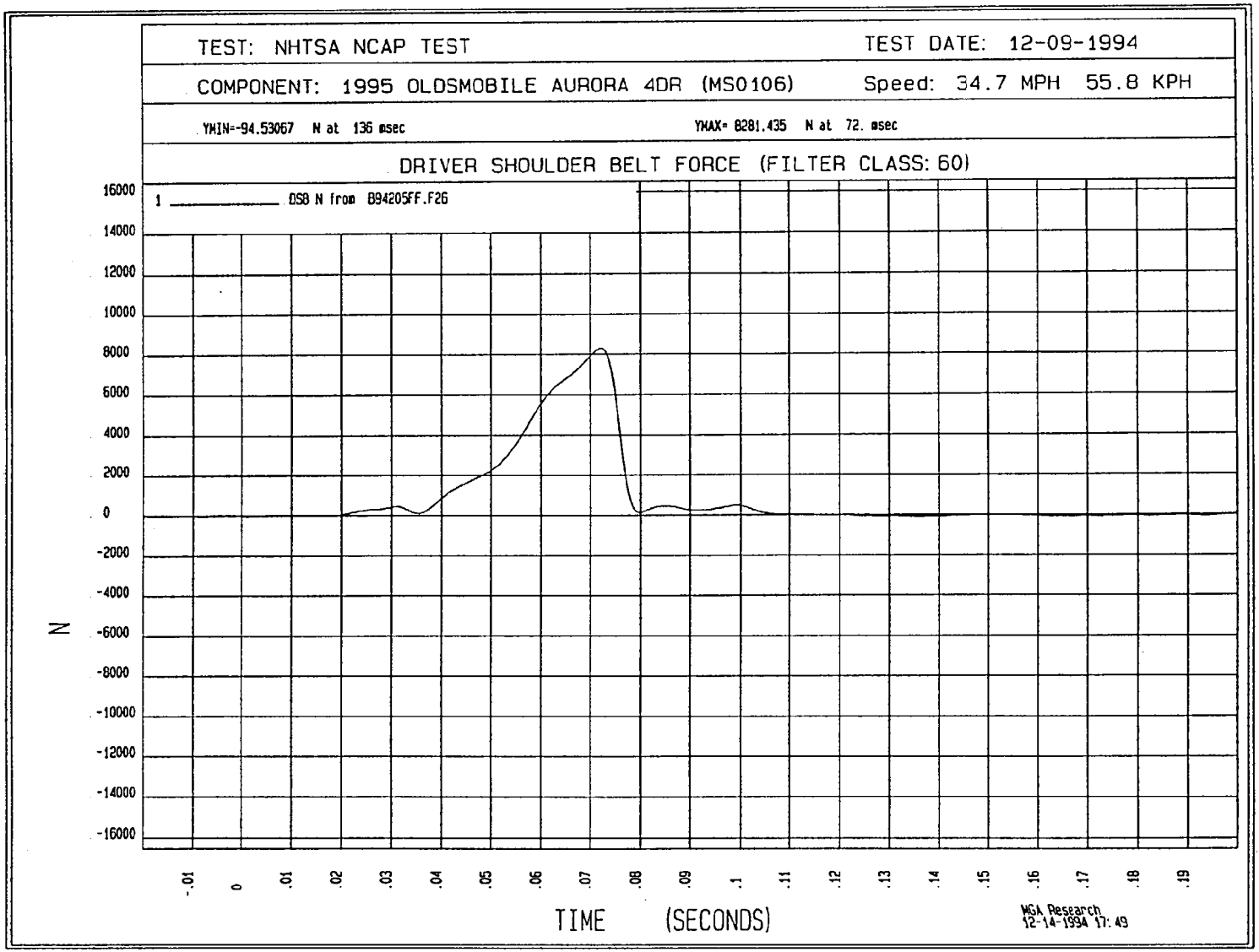

Figure B-62 - Driver Shoulder Belt Force vs. Time

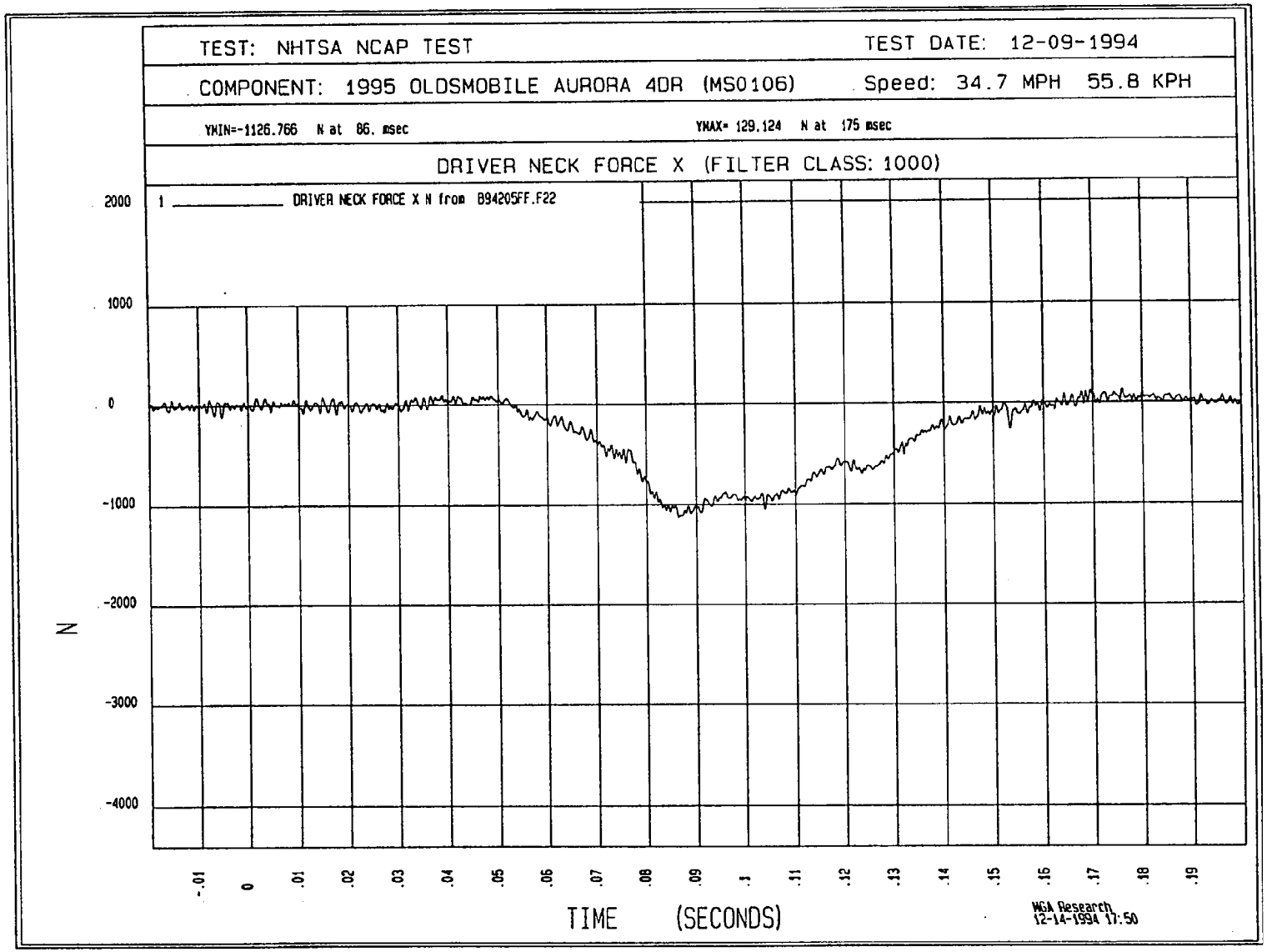

Figure B-63 - Driver Neck Force X vs. Time

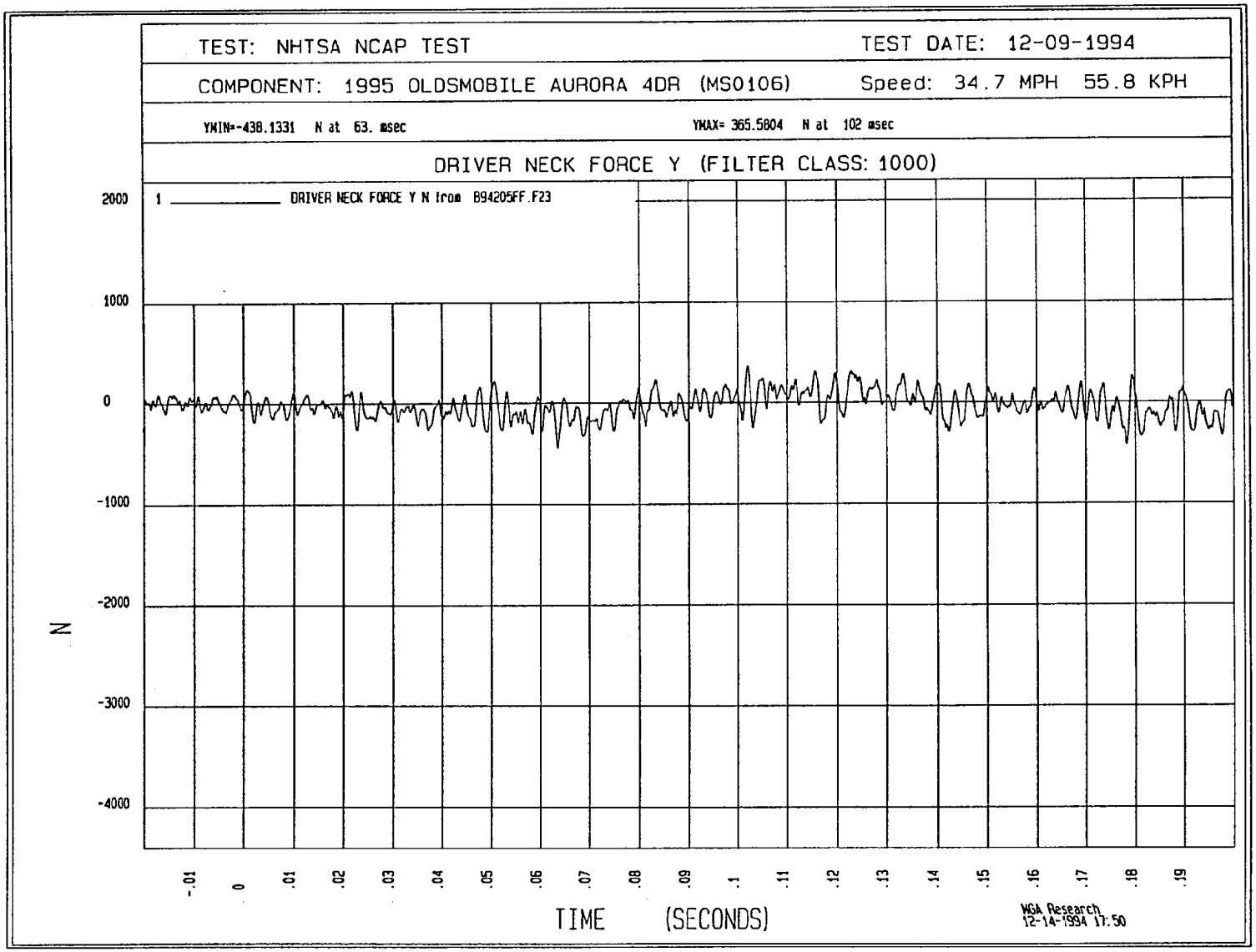

Figure B-64 - Driver Neck Force Y vs. Time

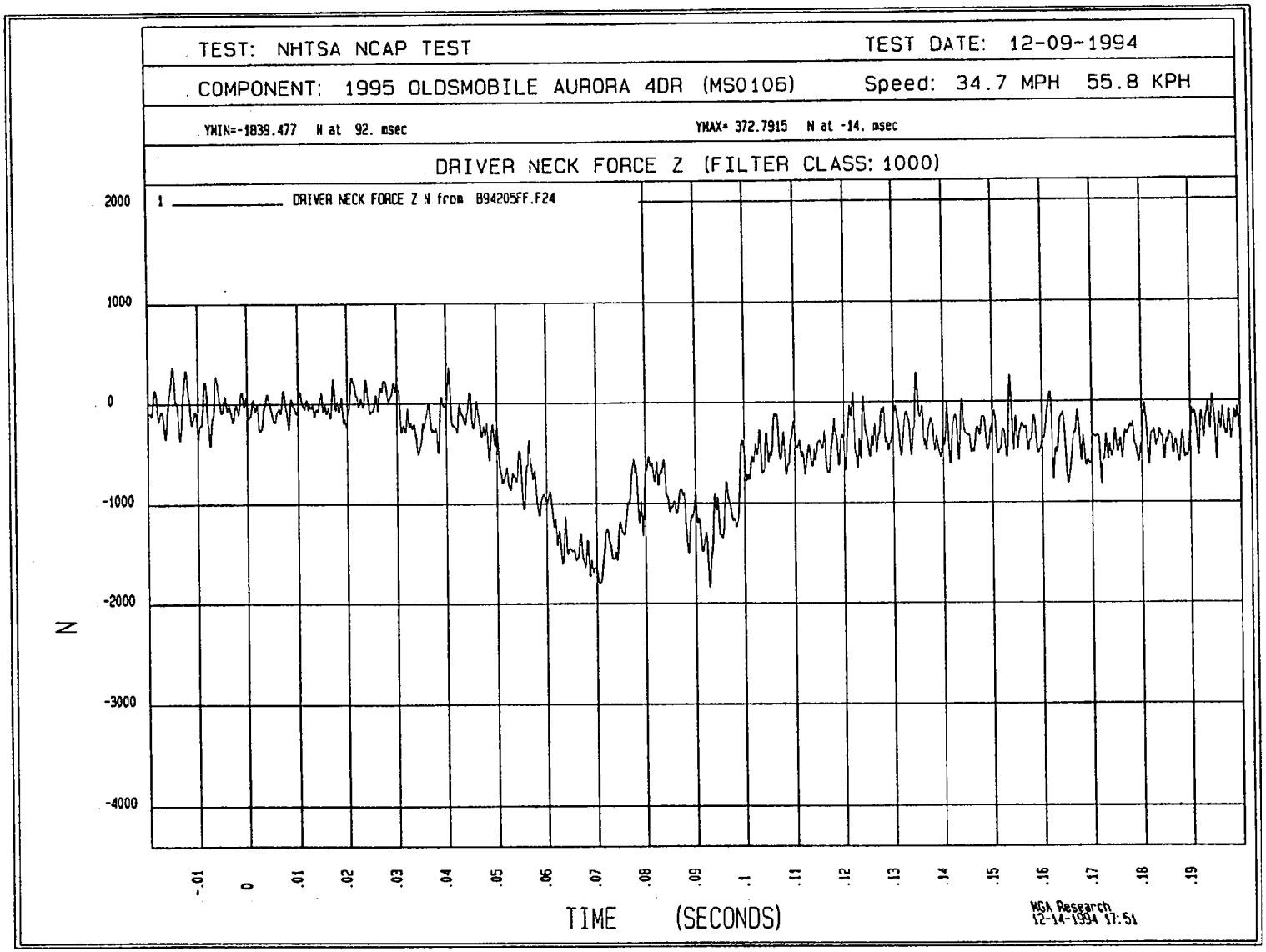

Figure B-65 - Driver Neck Force Z vs. Time

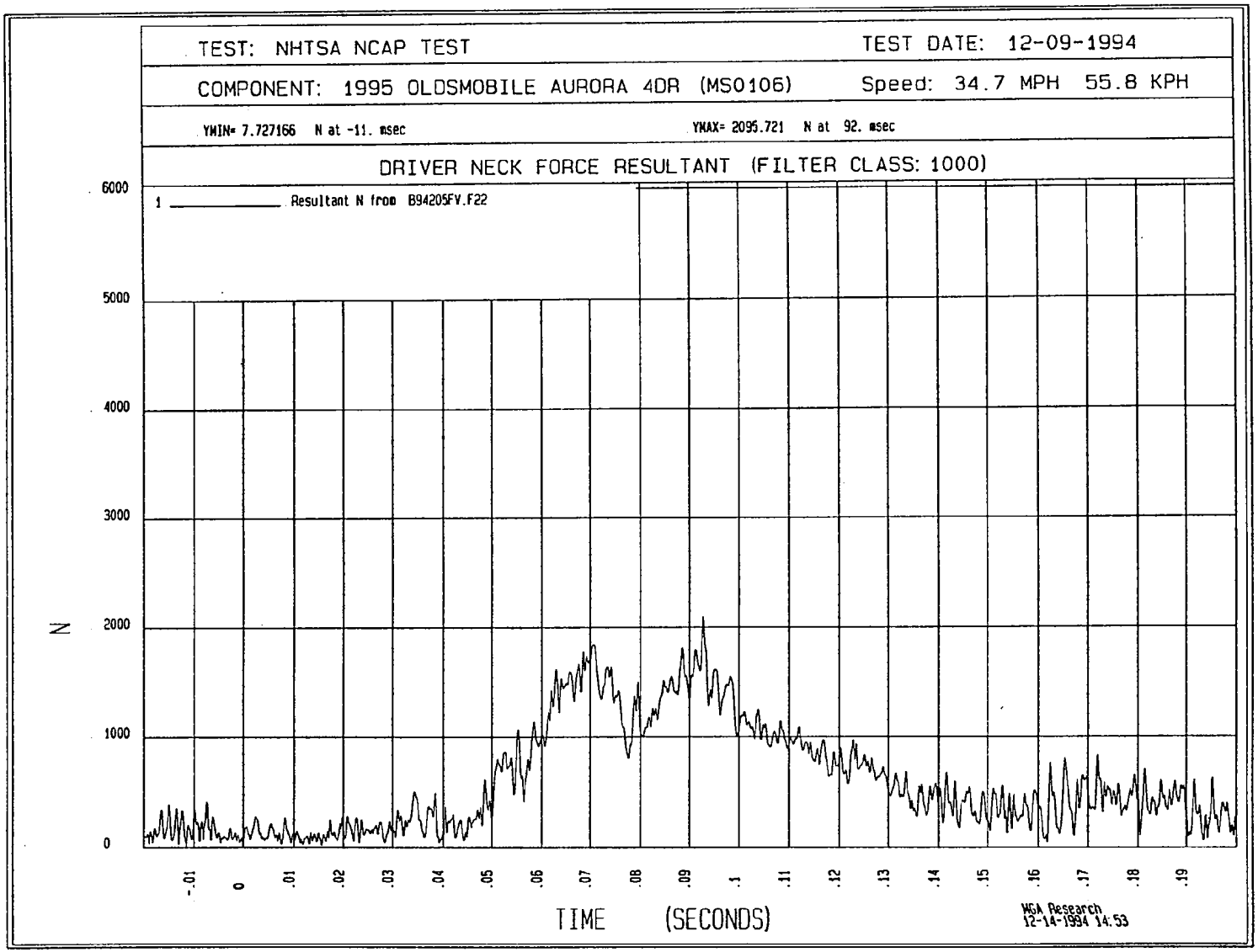

Figure B-66 - Driver Neck Force Resultant vs. Time

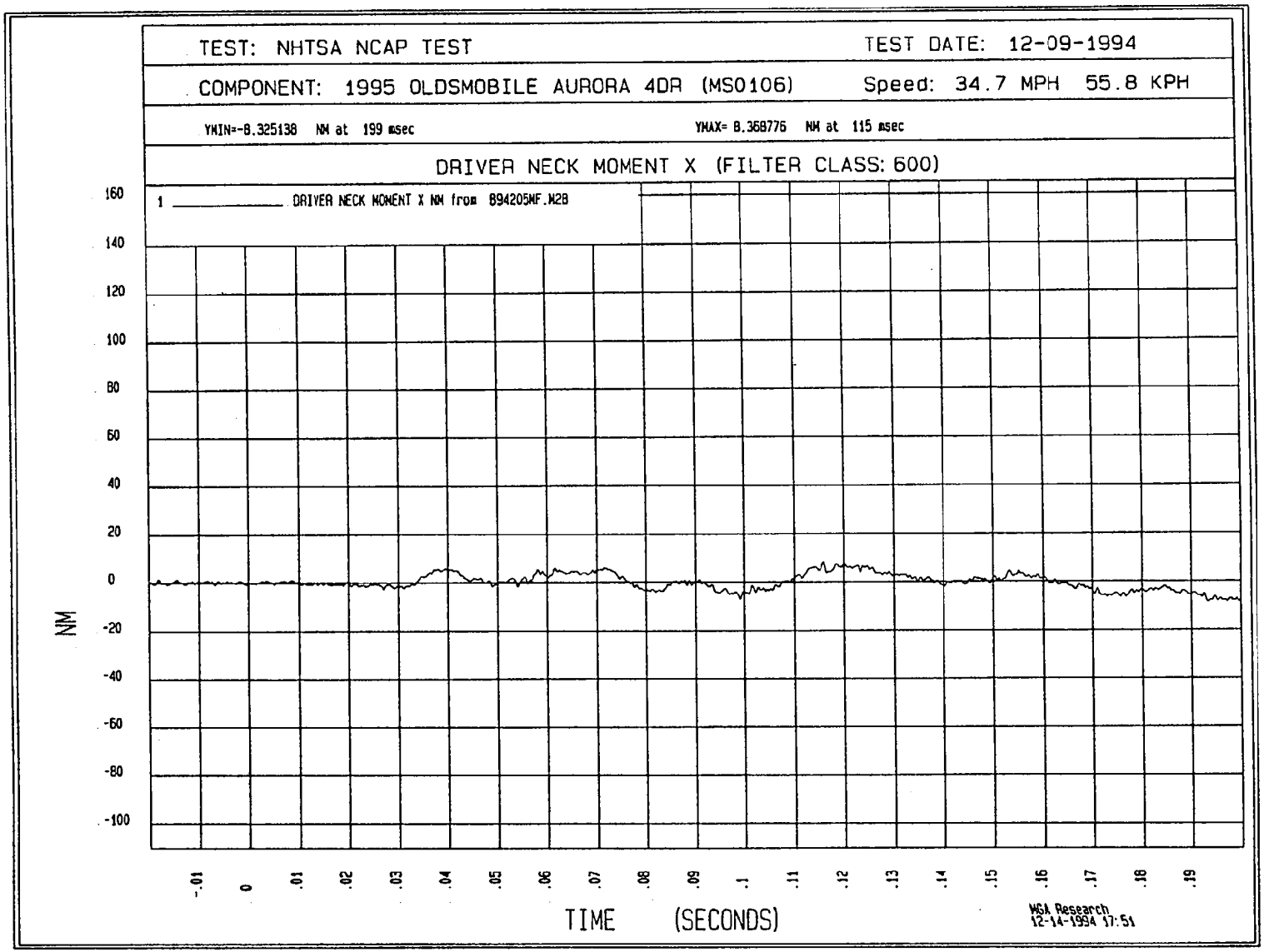

Figure B-67 - Driver Neck Moment X vs. Time

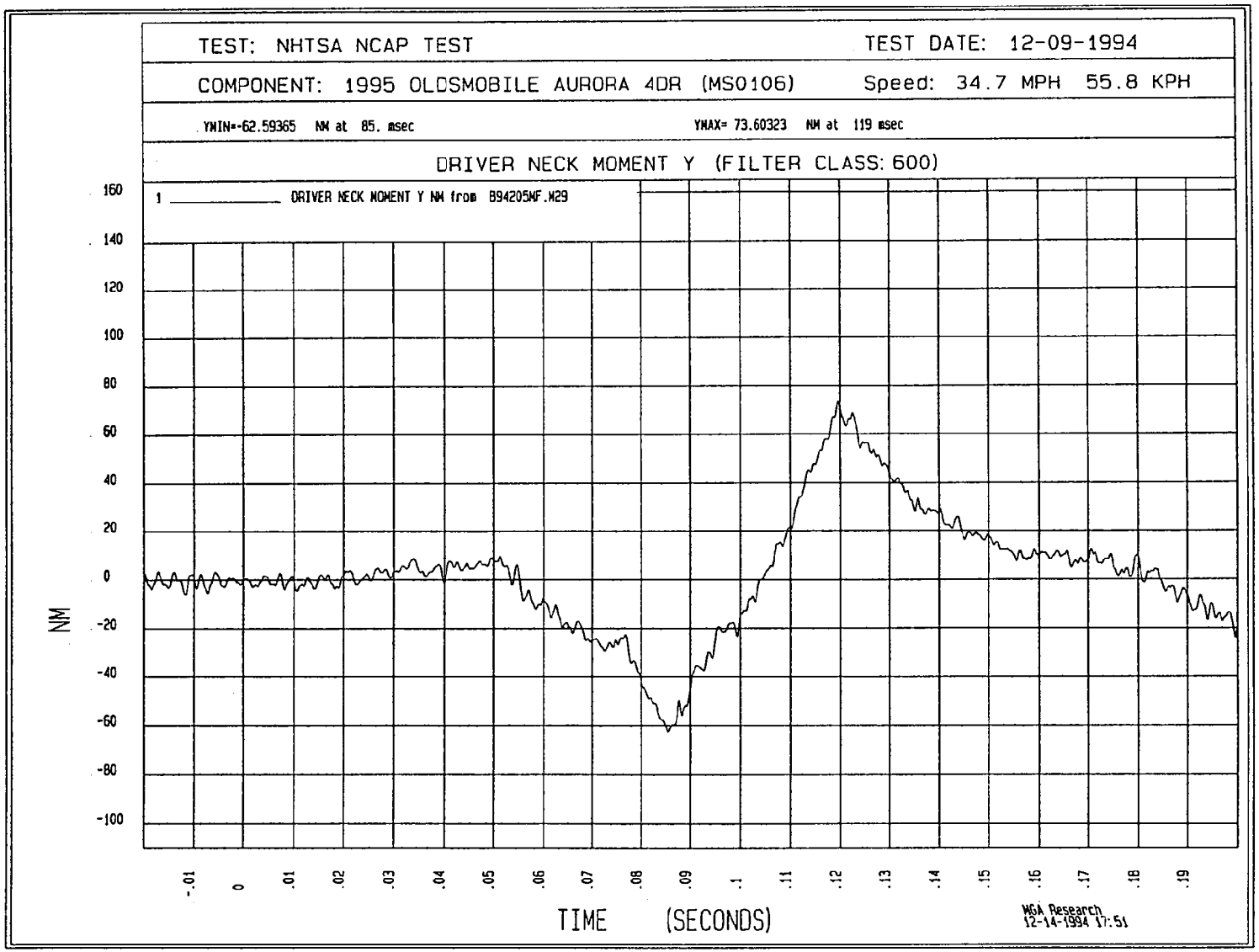

Figure B-68 - Driver Neck Moment Y vs. Time

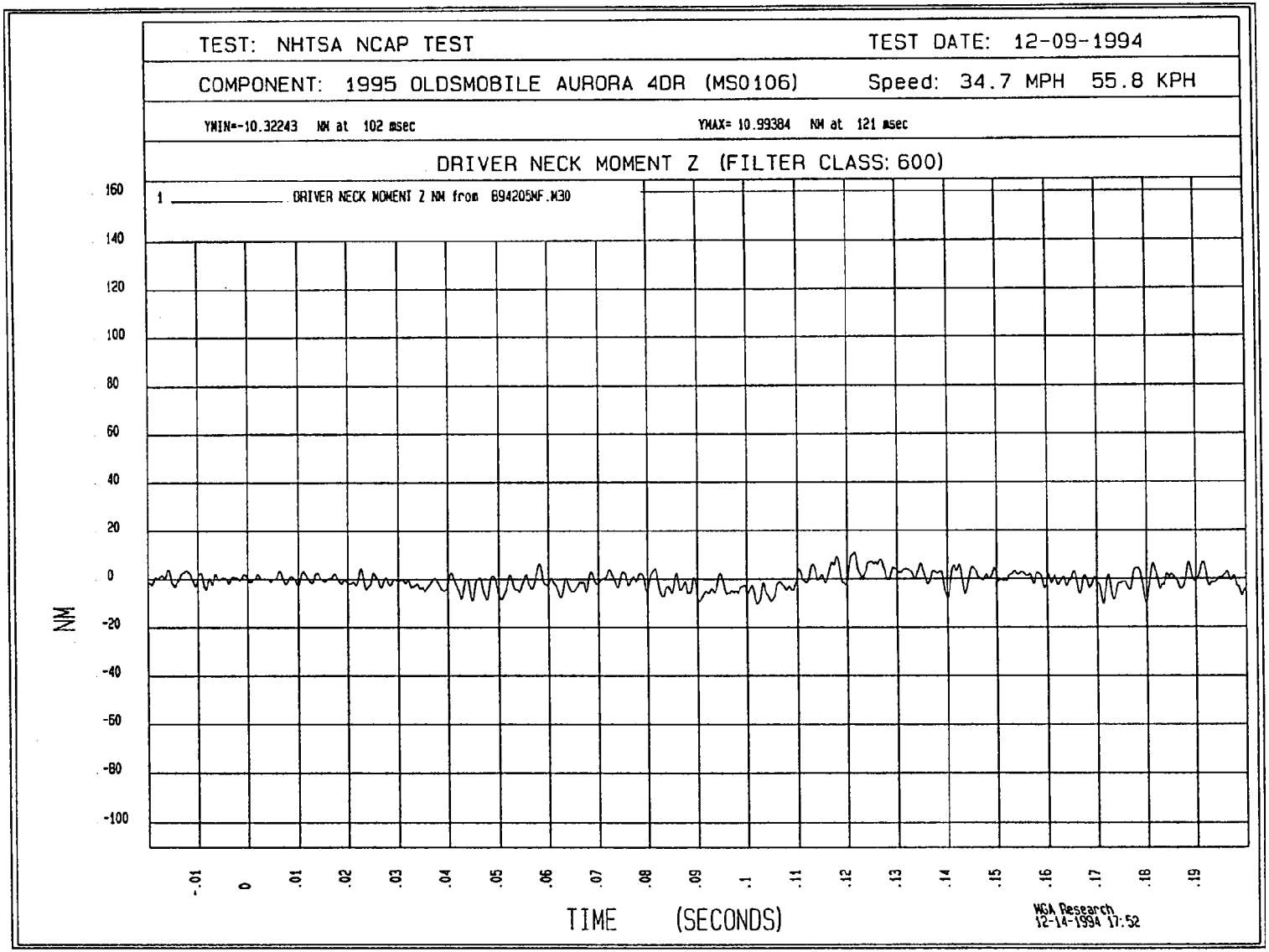

Figure B-69 - Driver Neck Moment Z vs. Time

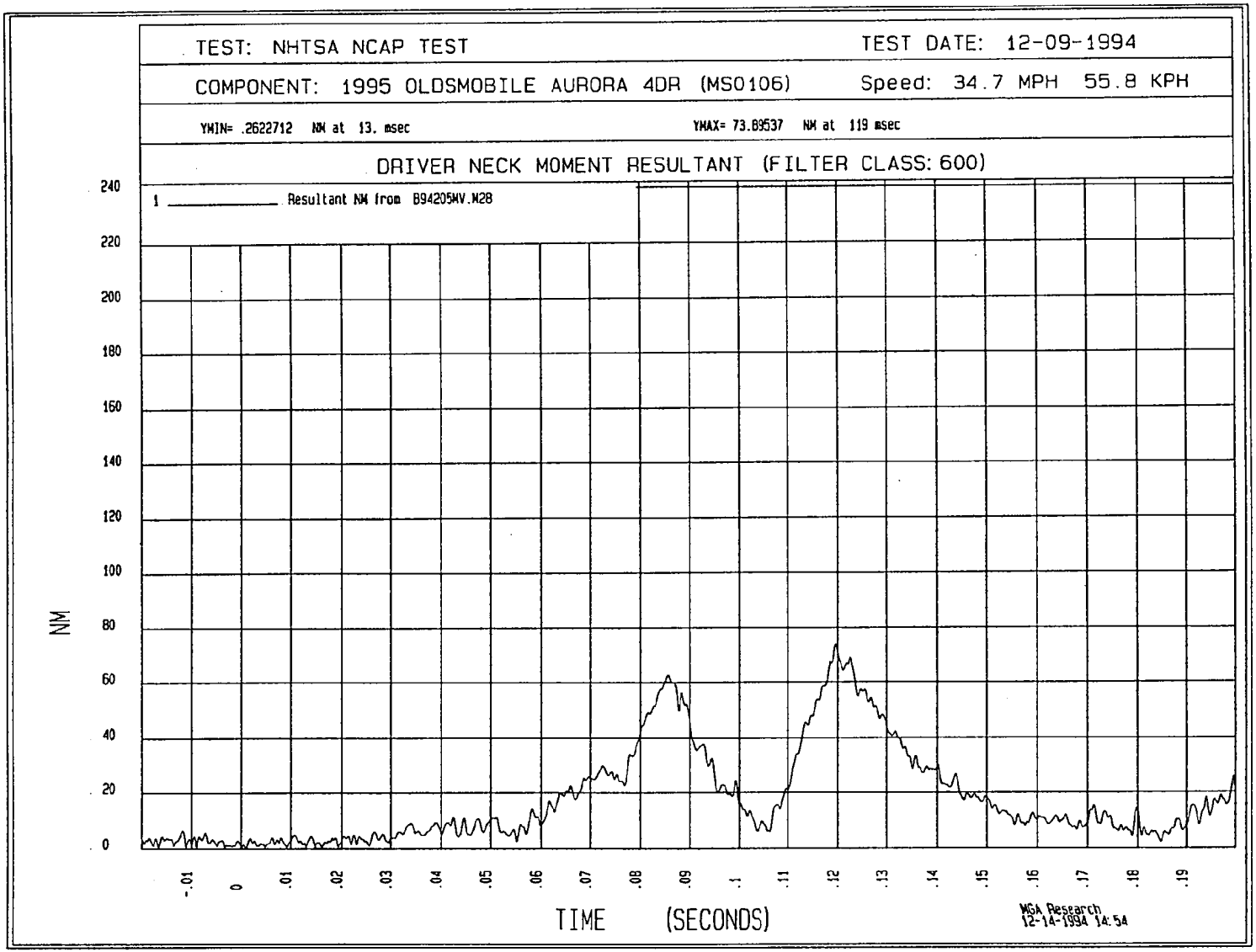

Figure B-7Ø - Driver Neck Moment Resultant vs. Time

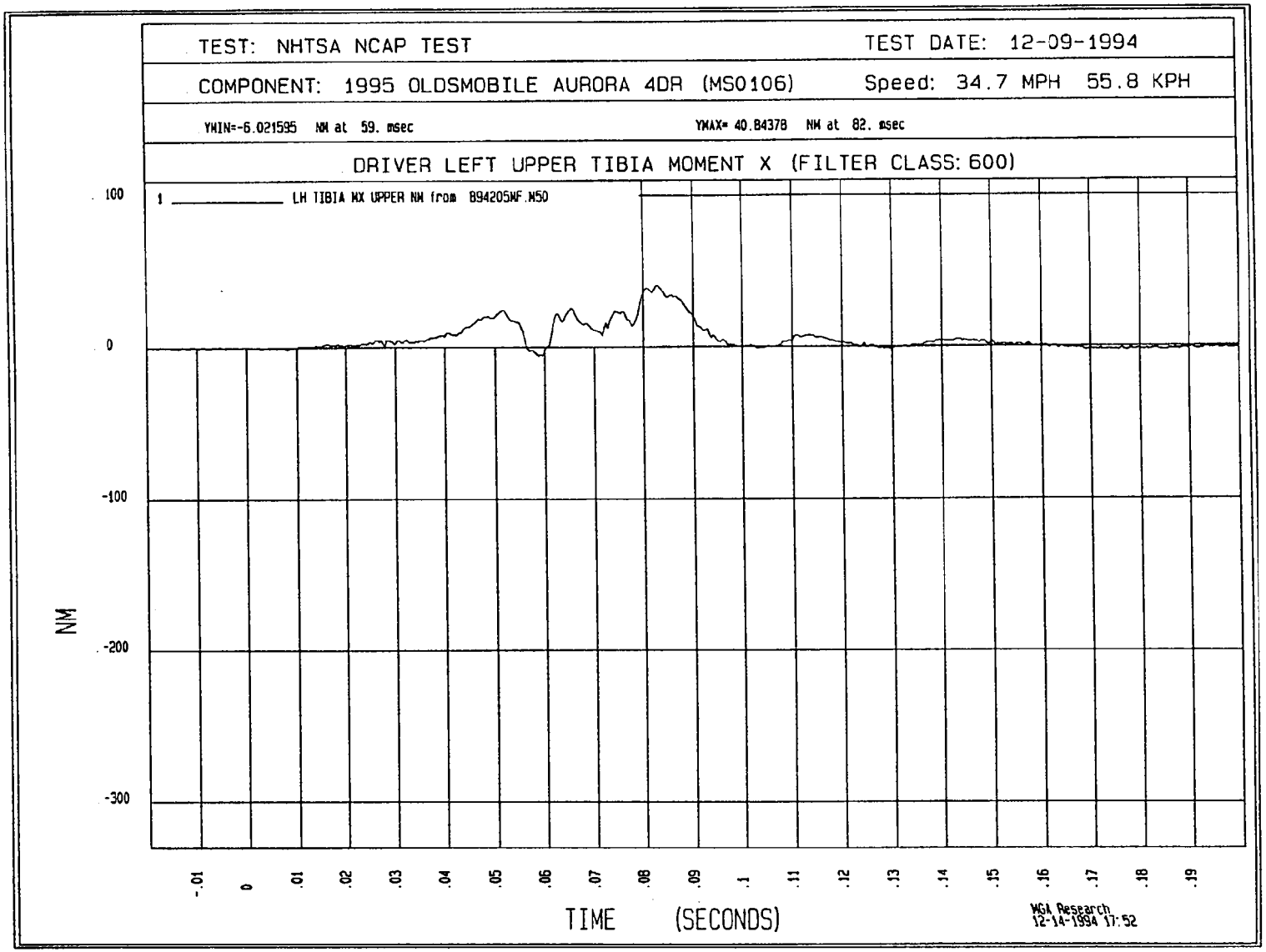

Figure B-71 - Driver Left Upper Tibia Moment X vs. Time

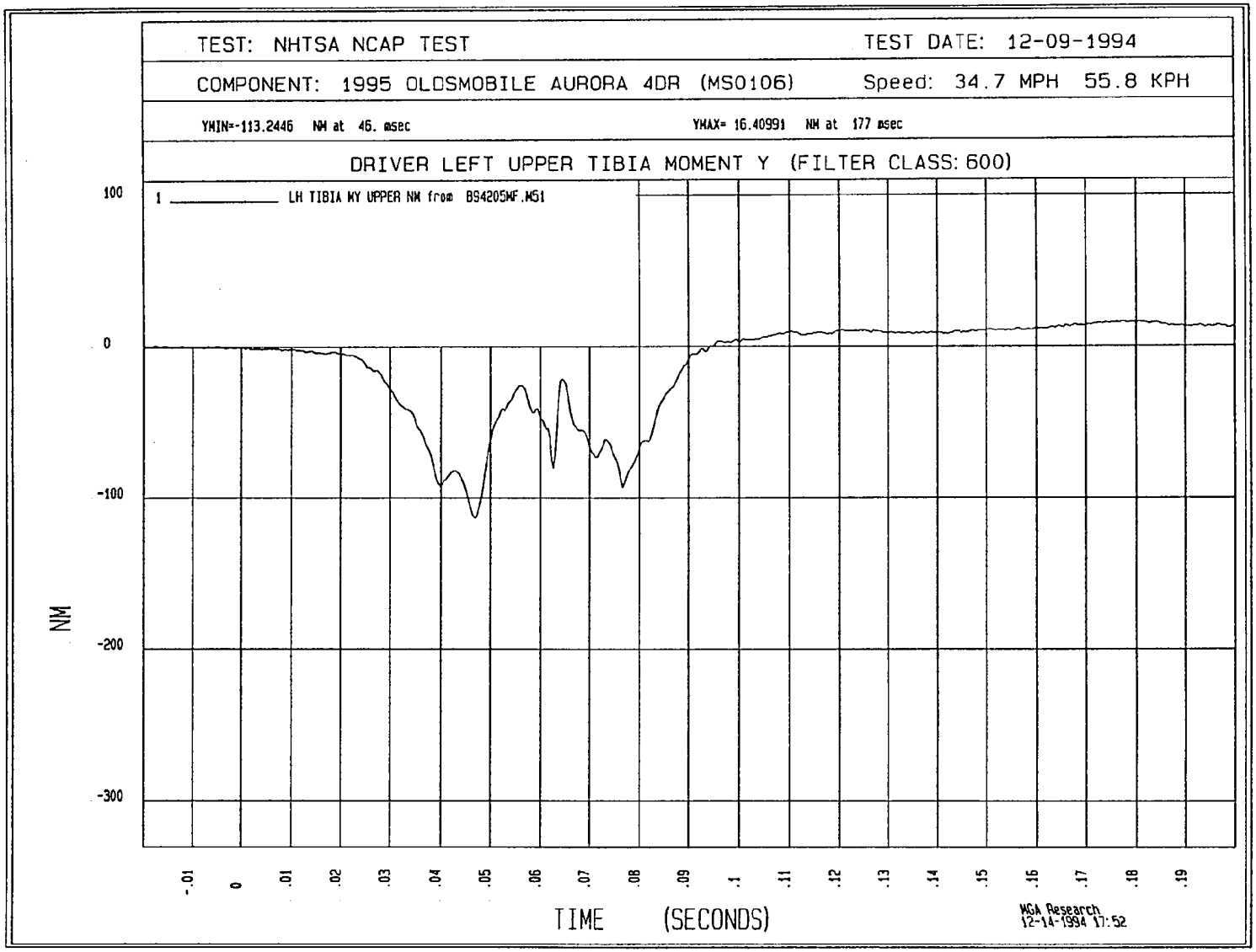

Figure B-72 - Driver Left Upper Tibia Moment Y vs. Time

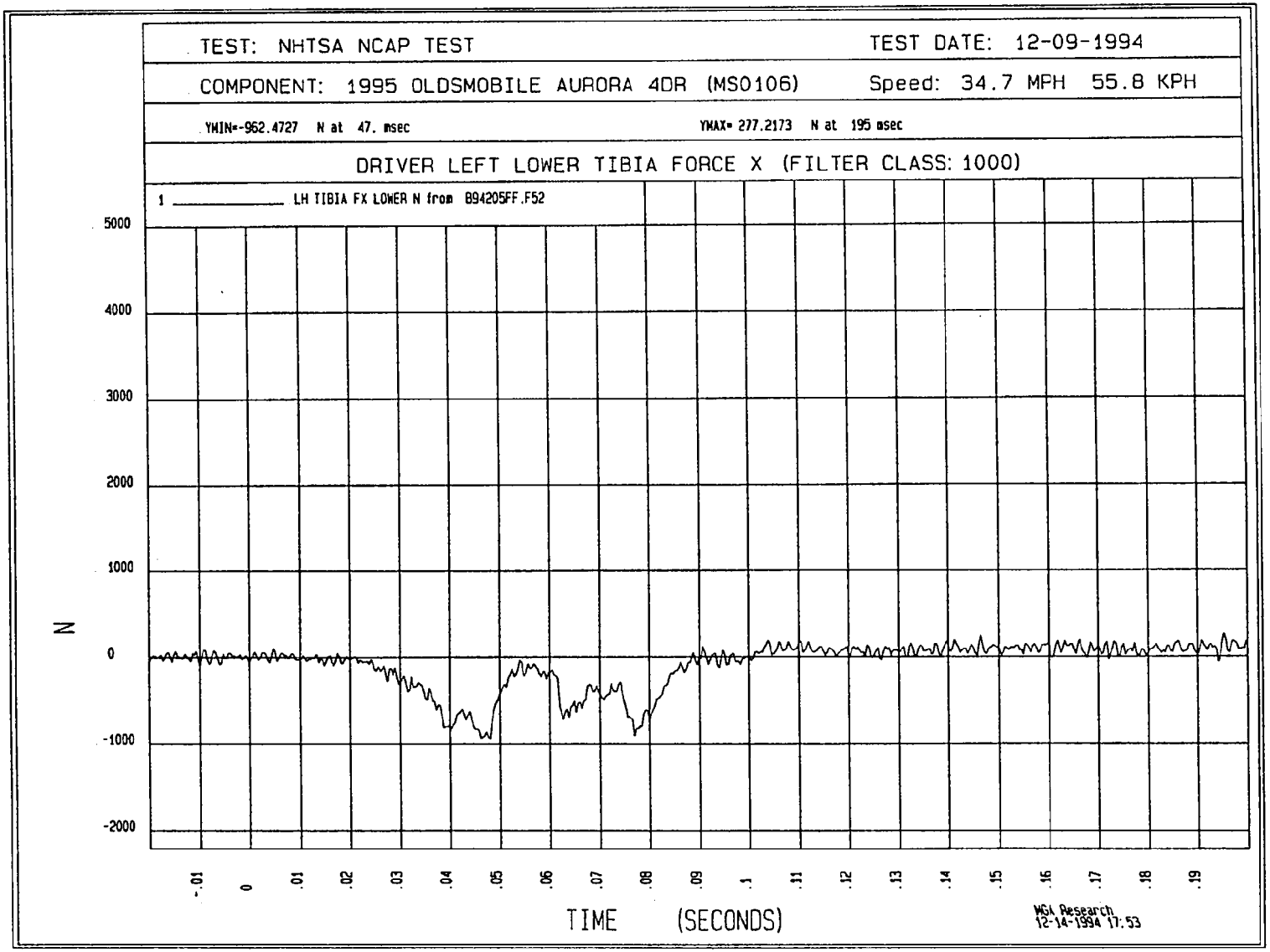

Figure B-73 - Driver Left Lower Tibia Force X vs. Time

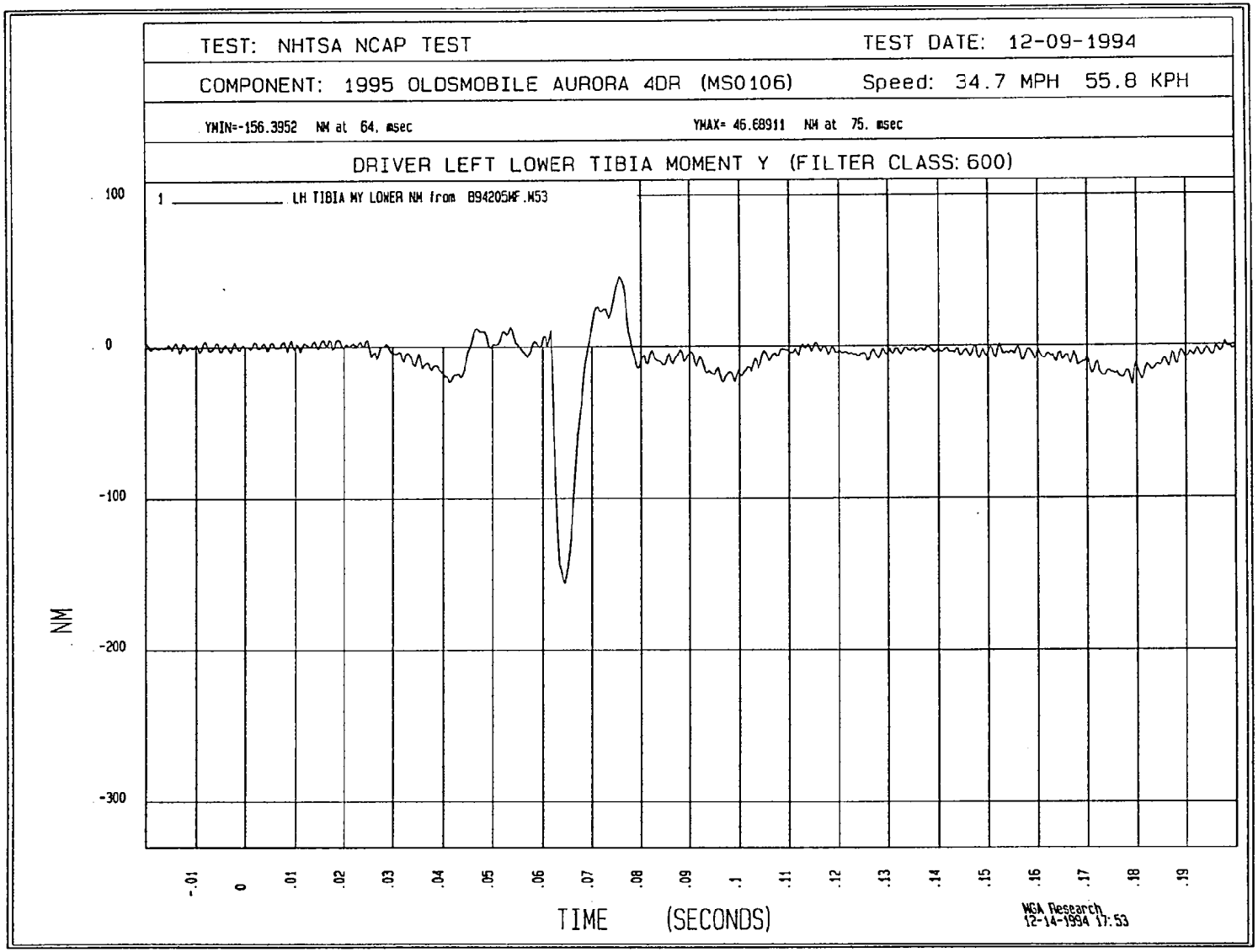

Figure B-74 - Driver Left Lower Tibia Moment Y vs. Time

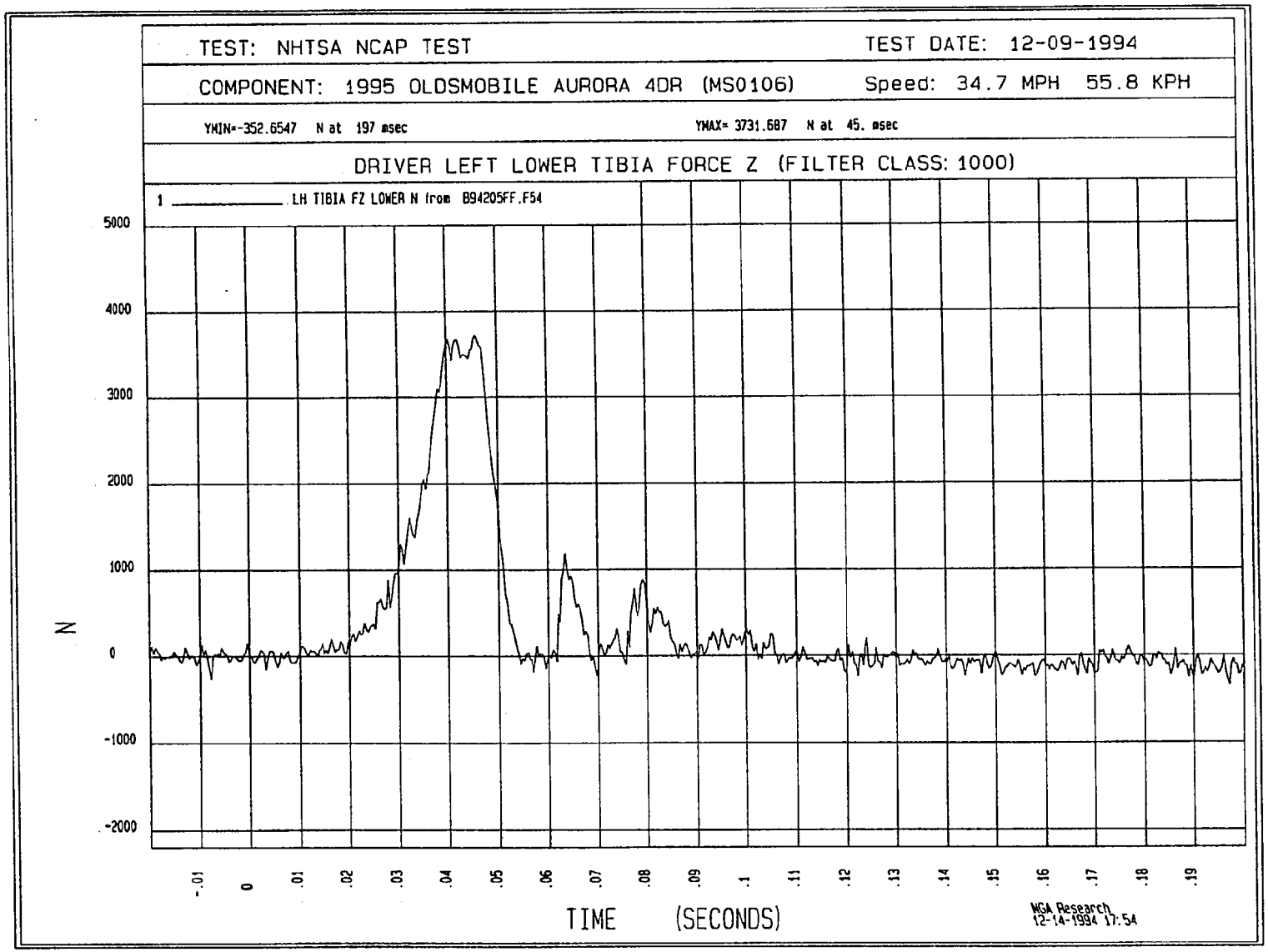

Figure B-75 - Driver Left Lower Tibia Force Z vs. Time

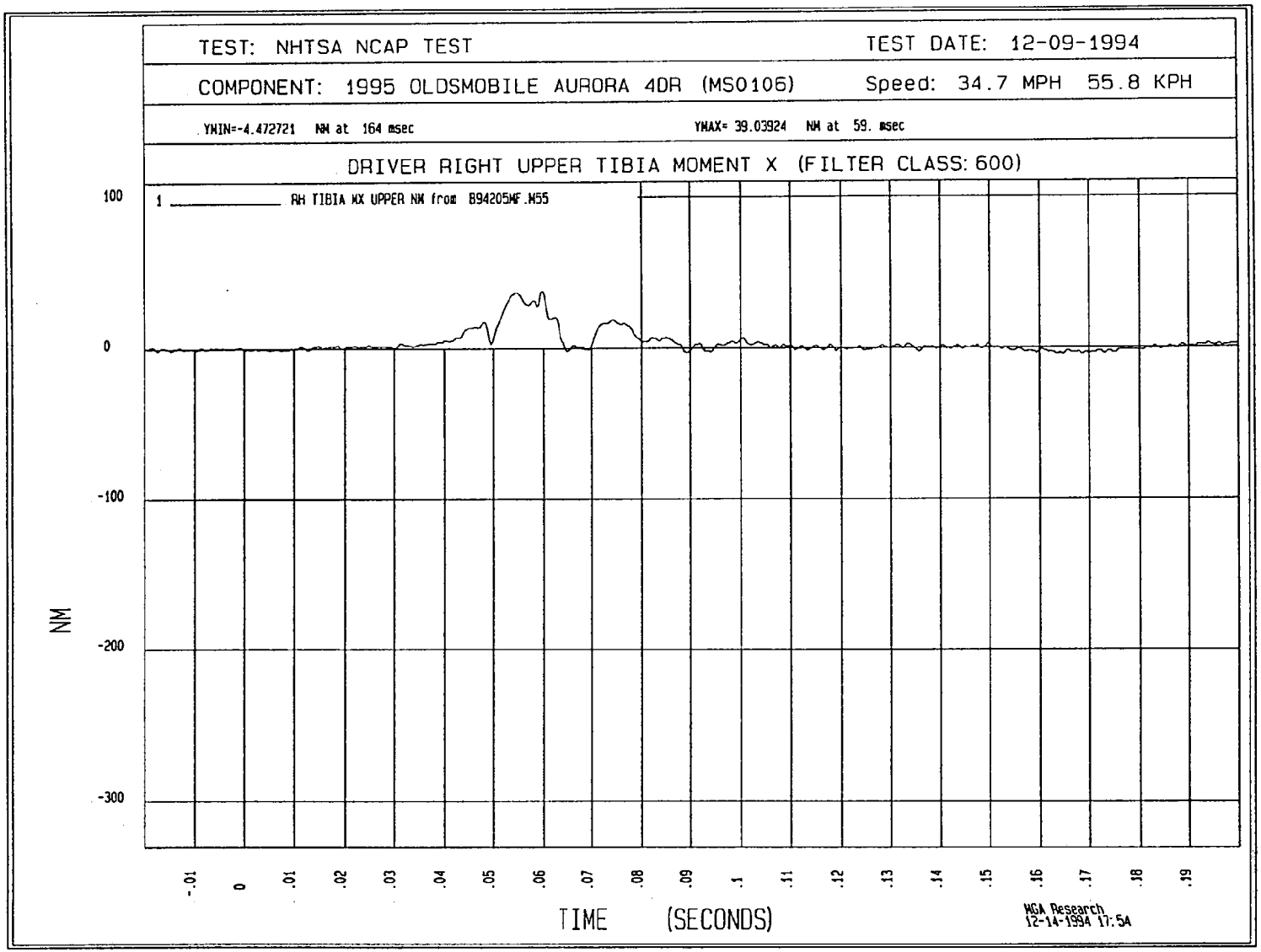

Figure B-76 - Driver Right Upper Tibia Moment X vs. Time

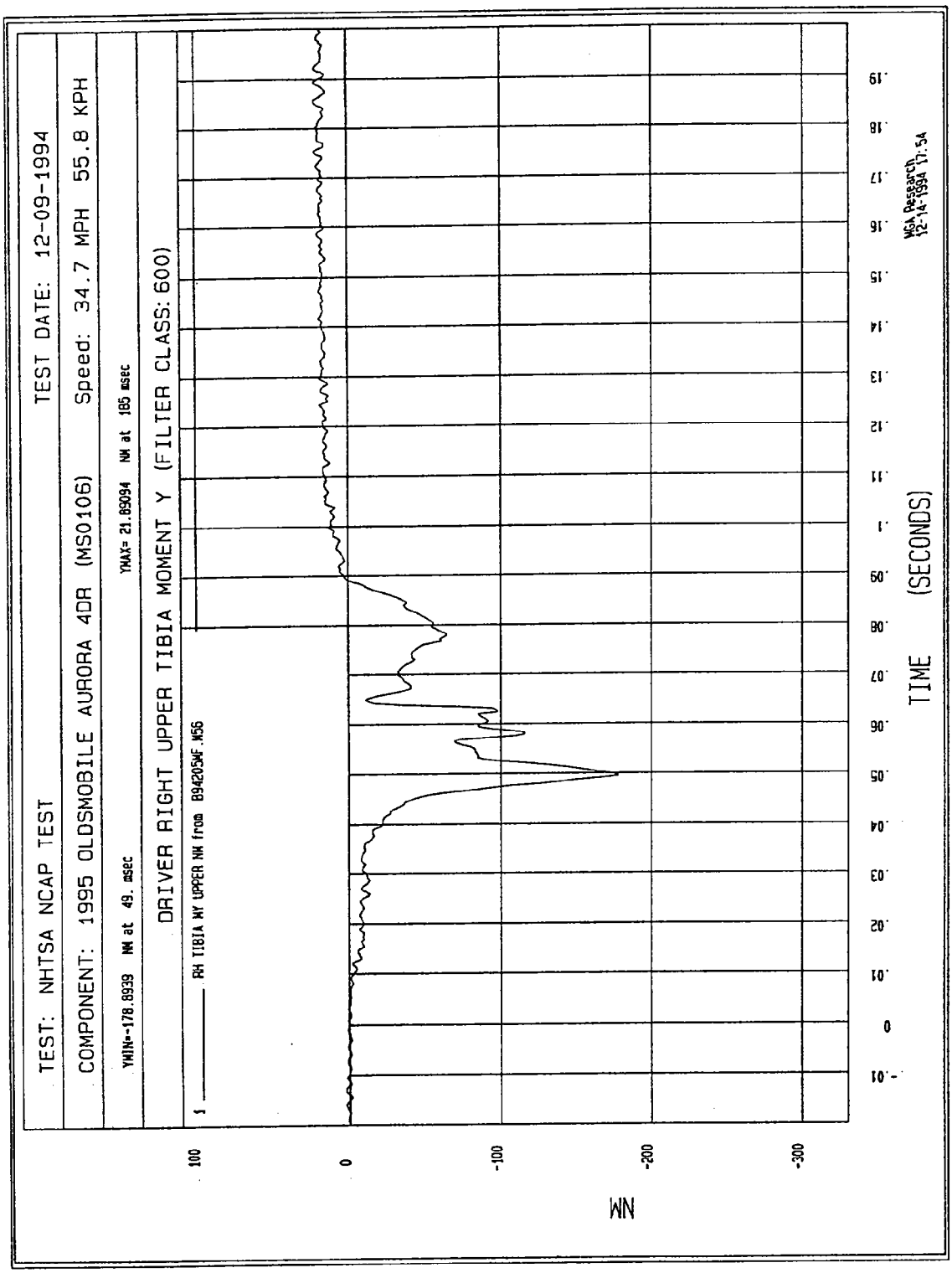

Figure B-77 - Driver Right Upper Tibia Moment Y vs. Time

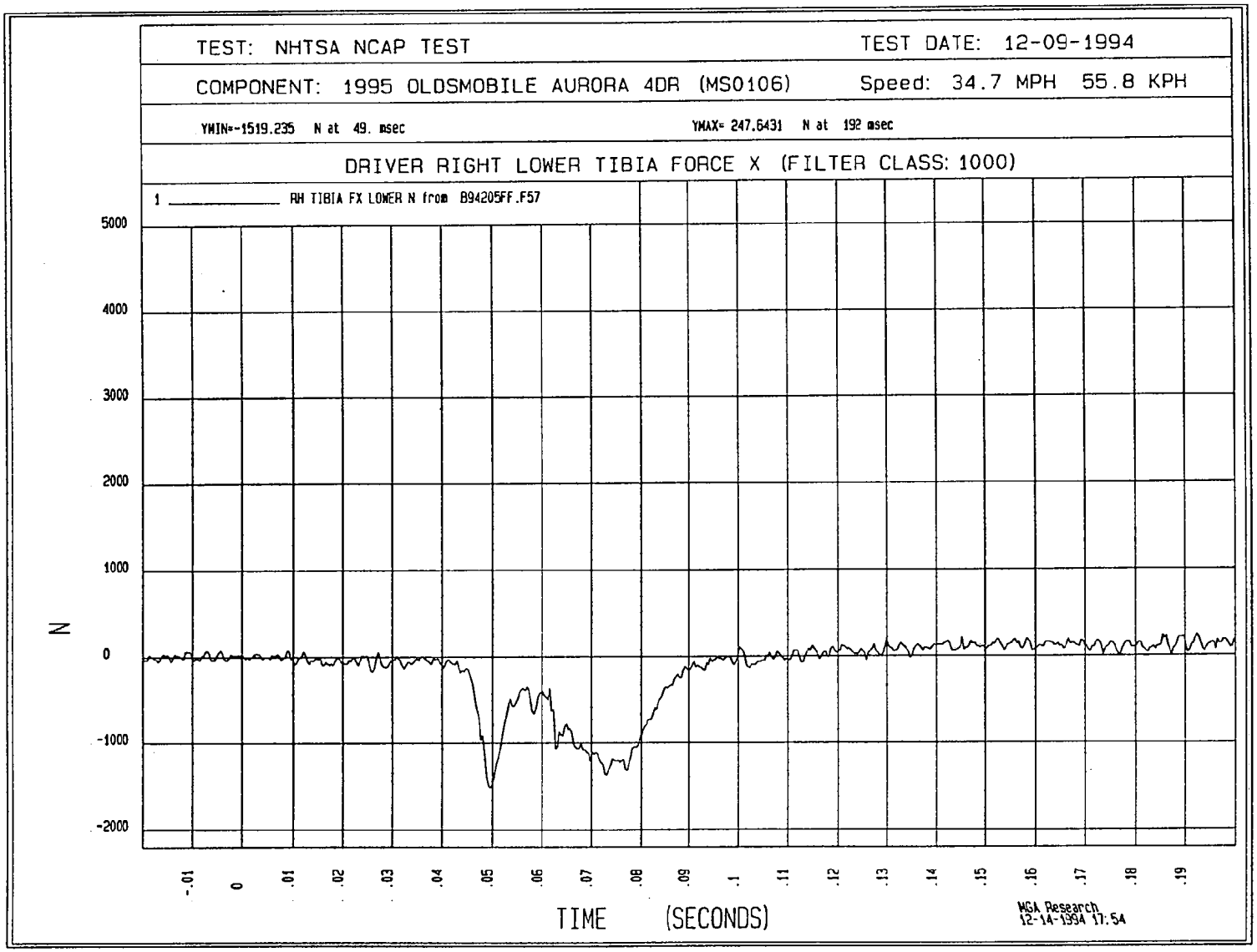

Figure B-78 - Driver Right Lower Tibia Force X vs. Time

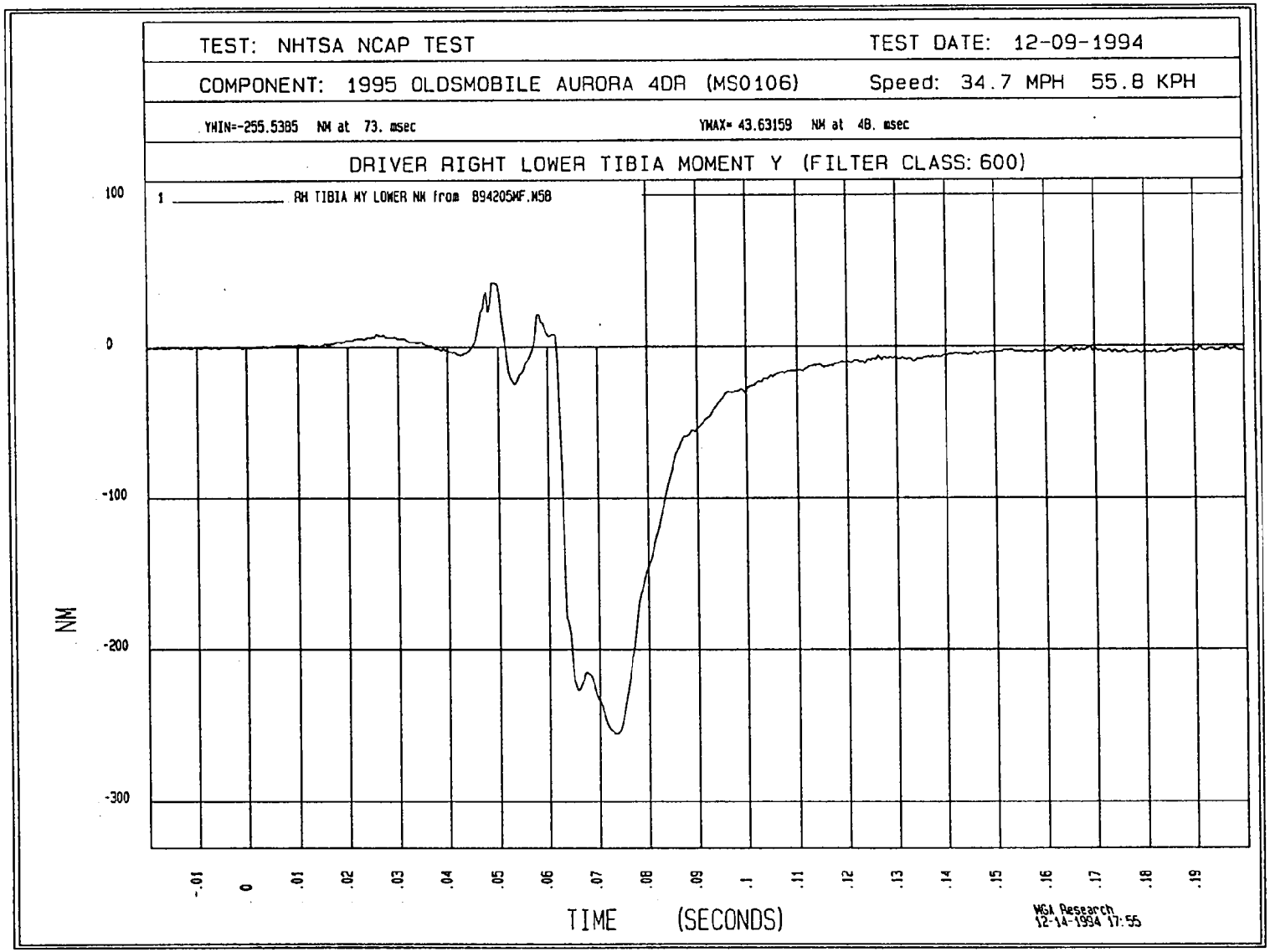

Figure B-79 - Driver Right Lower Tibia Moment Y vs. Time

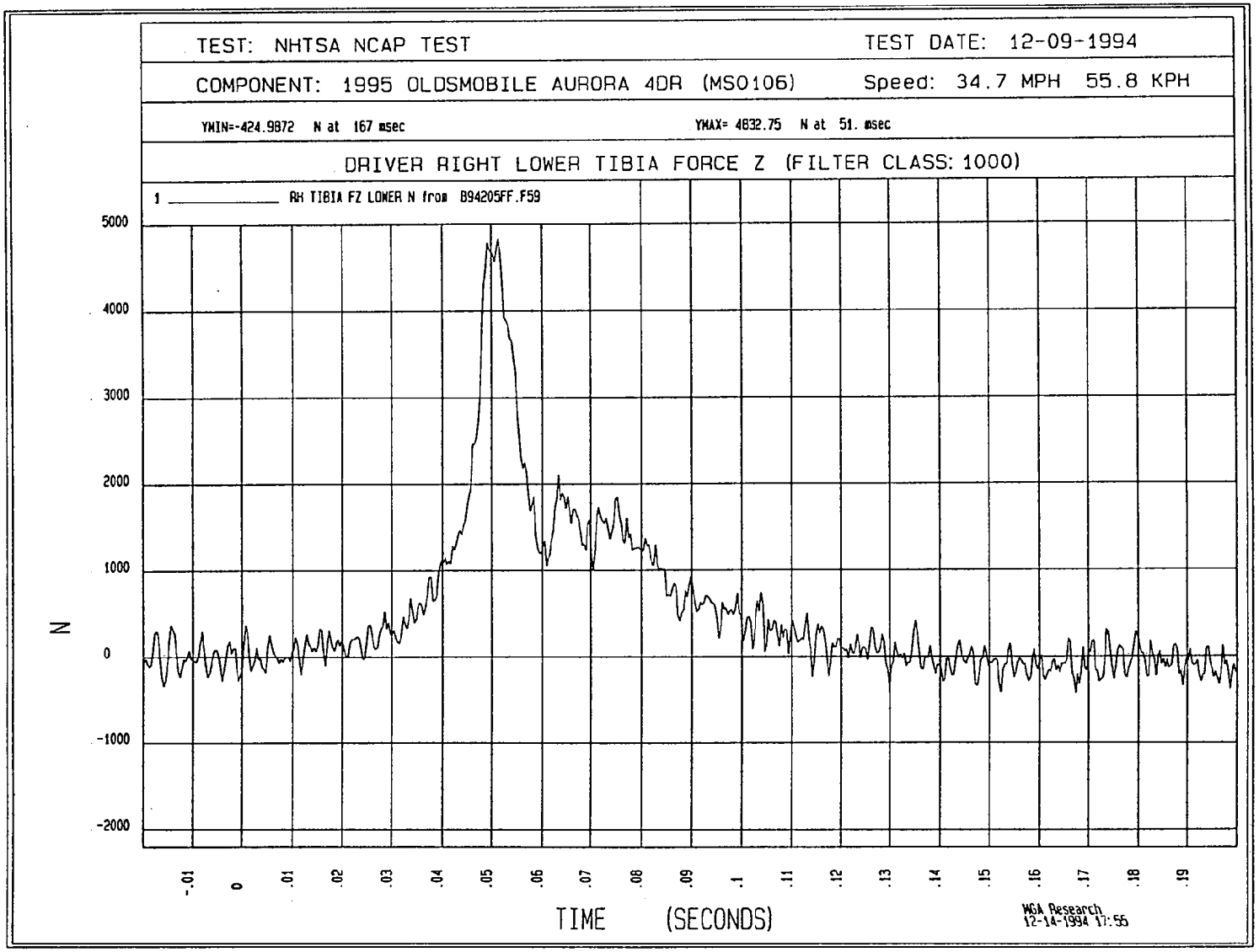

Figure B-8Ø - Driver Right Lower Tibia Force Z vs. Time

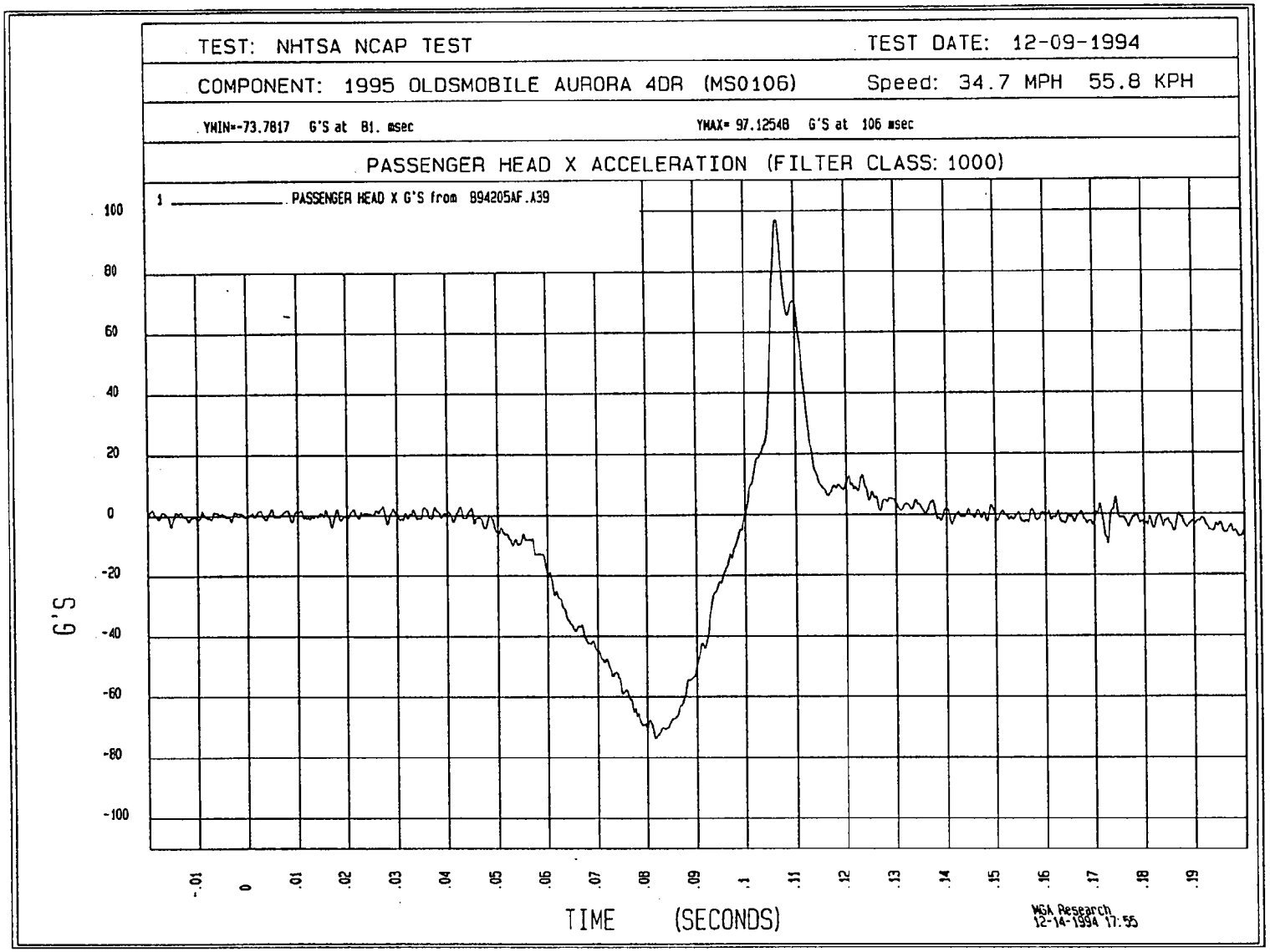

Figure B-81 - Passenger Head X Acceleration vs. Time

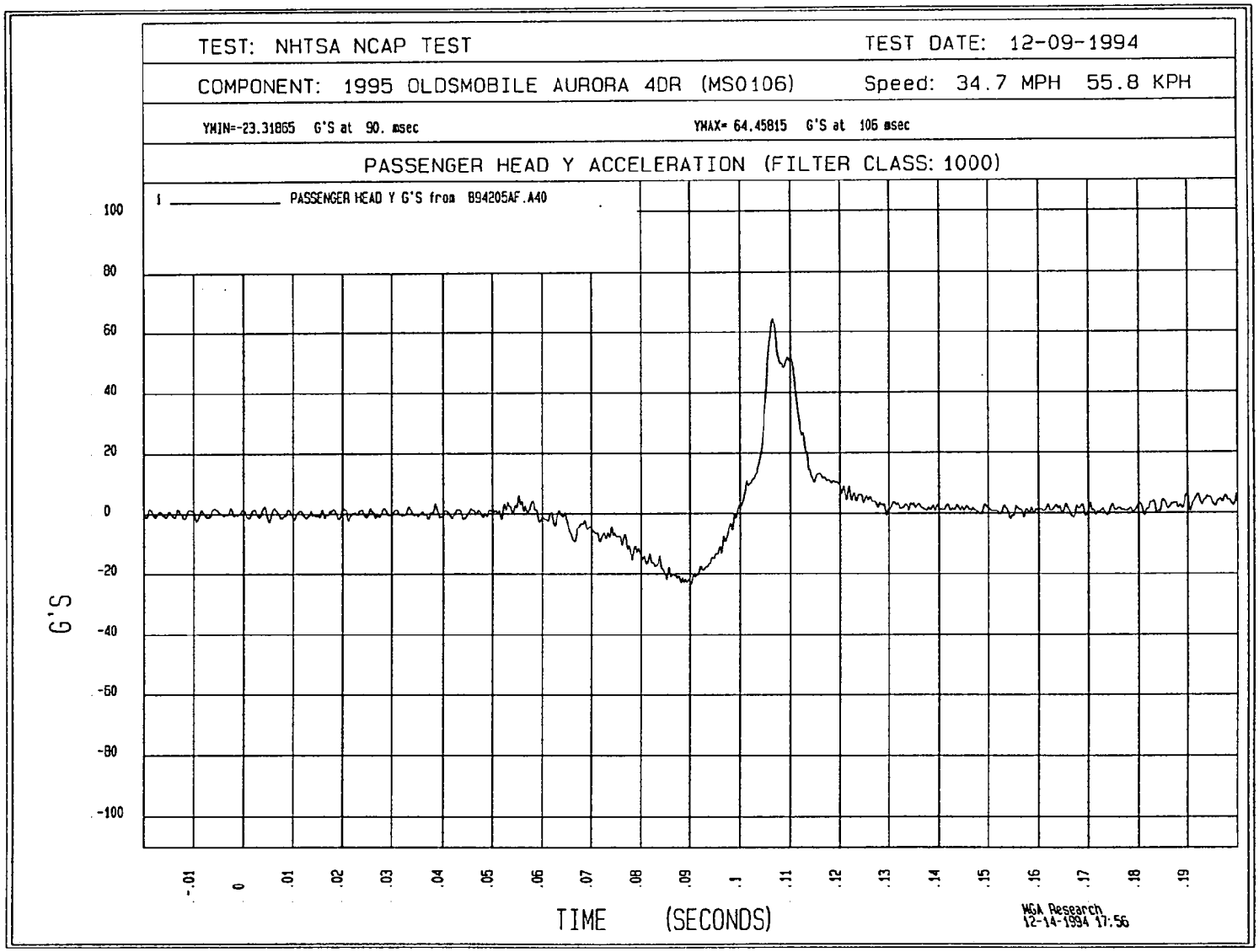

Figure B-82 - Passenger Head Y Acceleration vs. Time

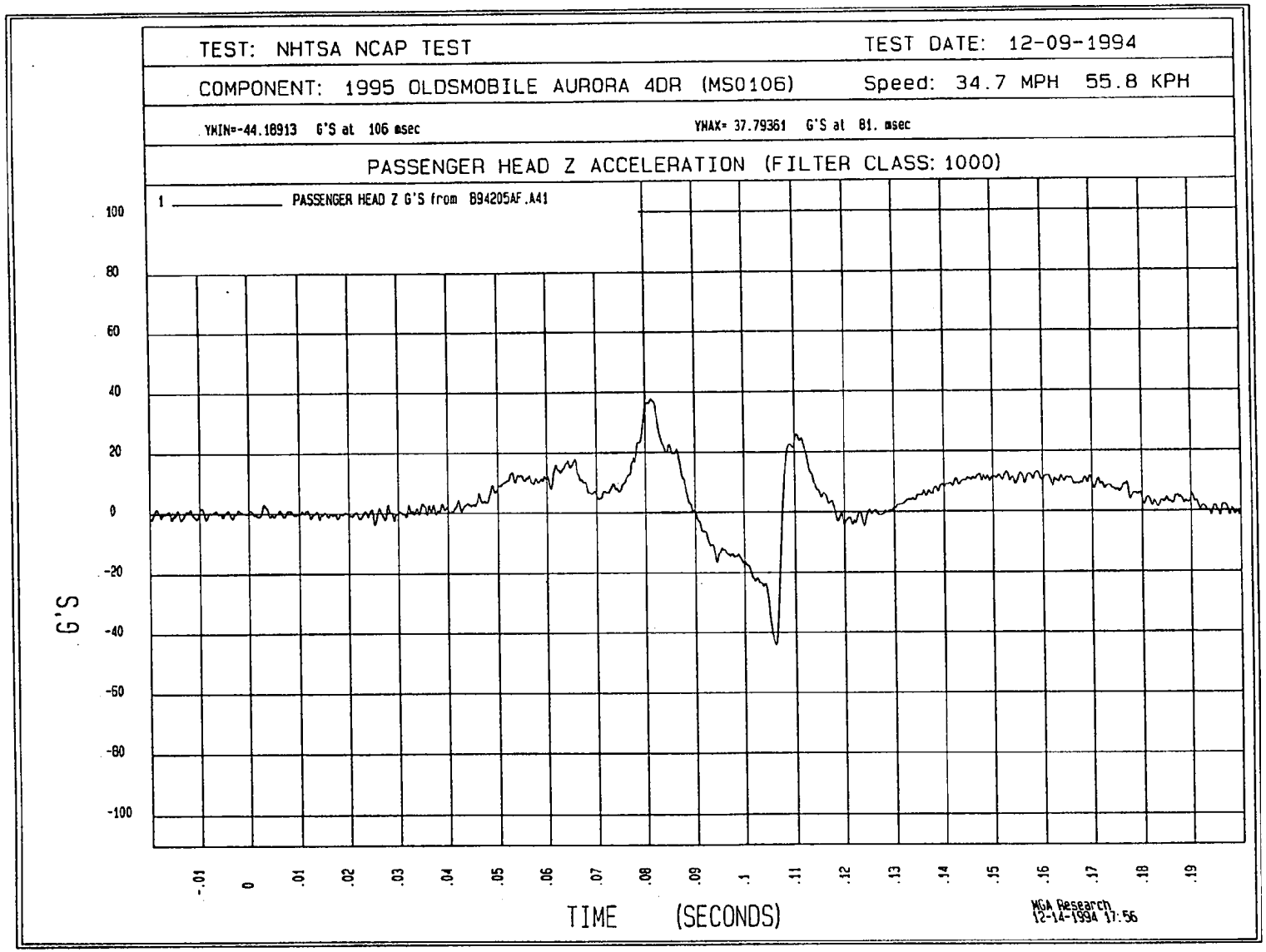

Figure B-83 - Passenger Head Z Acceleration vs. Time

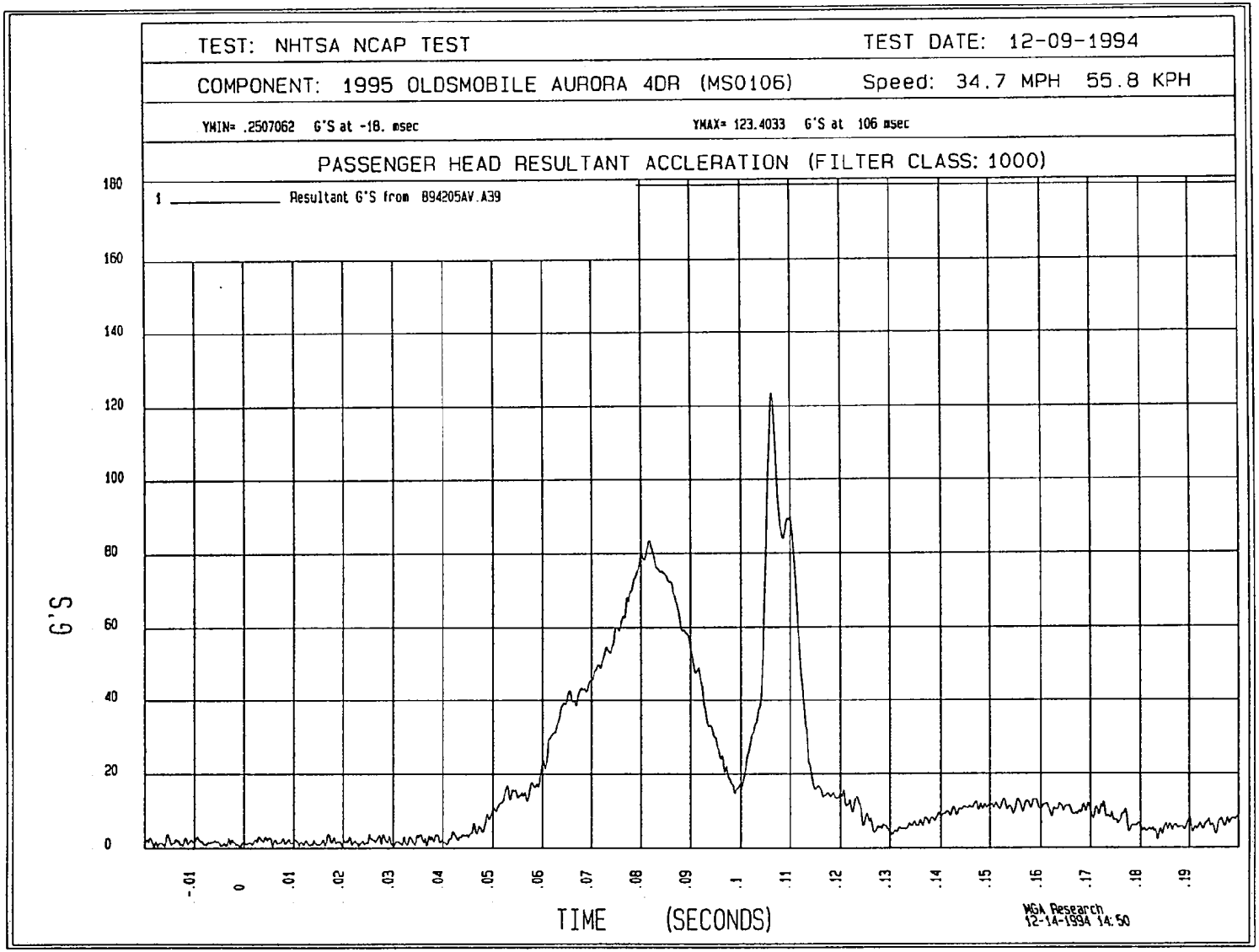

Figure B-84 - Passenger Head Resultant Acceleration vs. Time

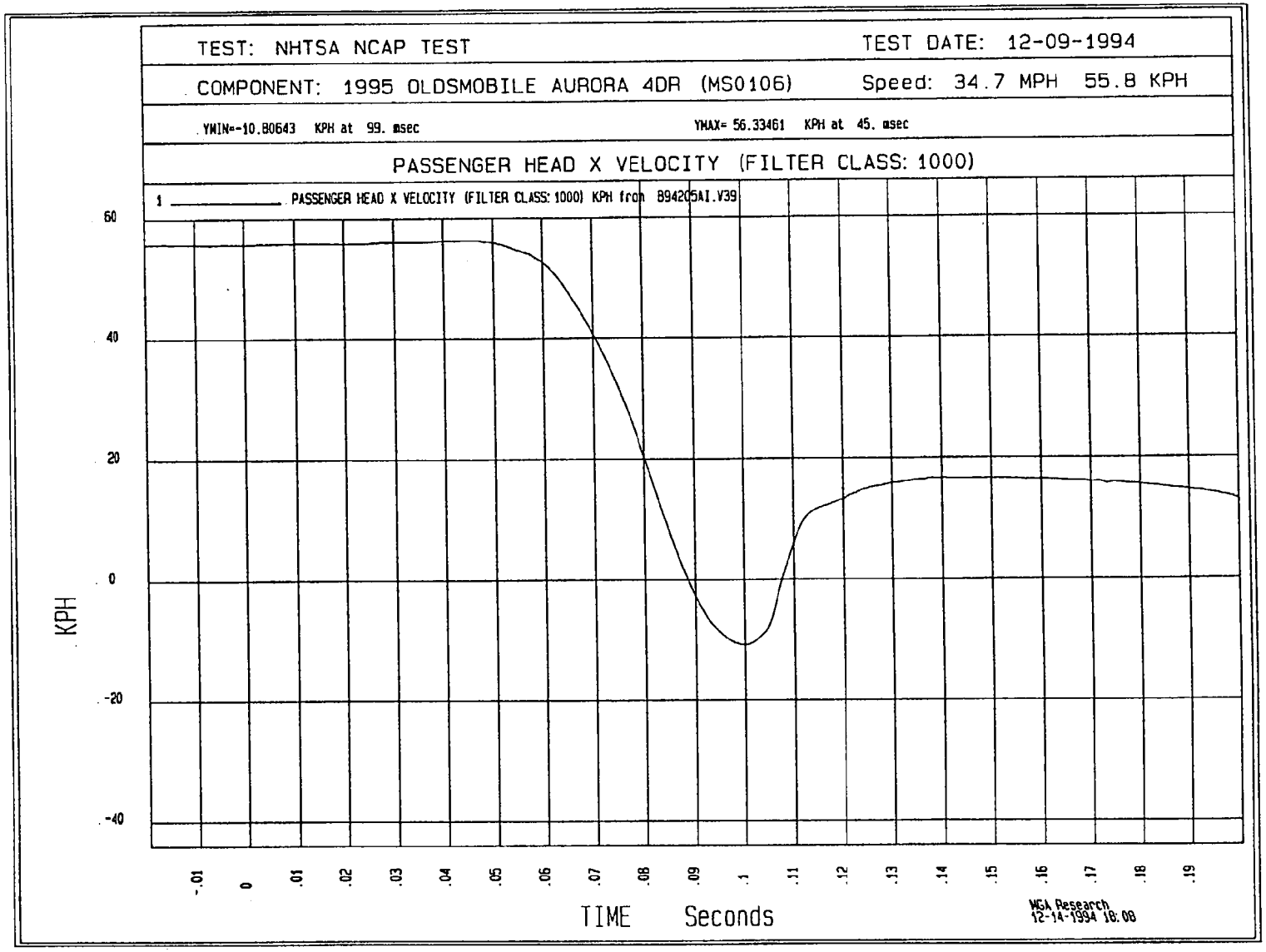

Figure B-85 - Passenger Head X Velocity vs. Time

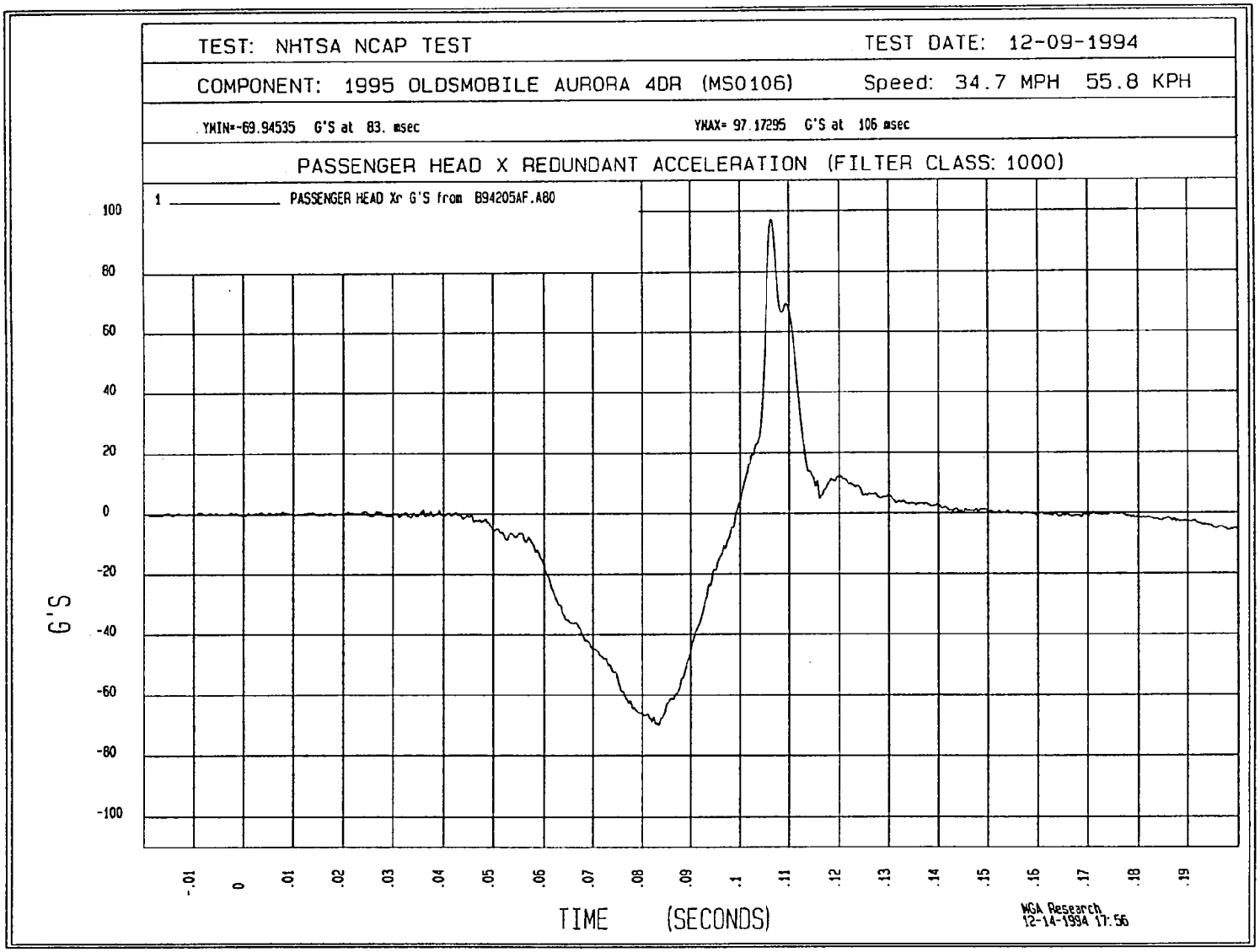

Figure B-86 - Passenger Head X Redundant Acceleration vs. Time

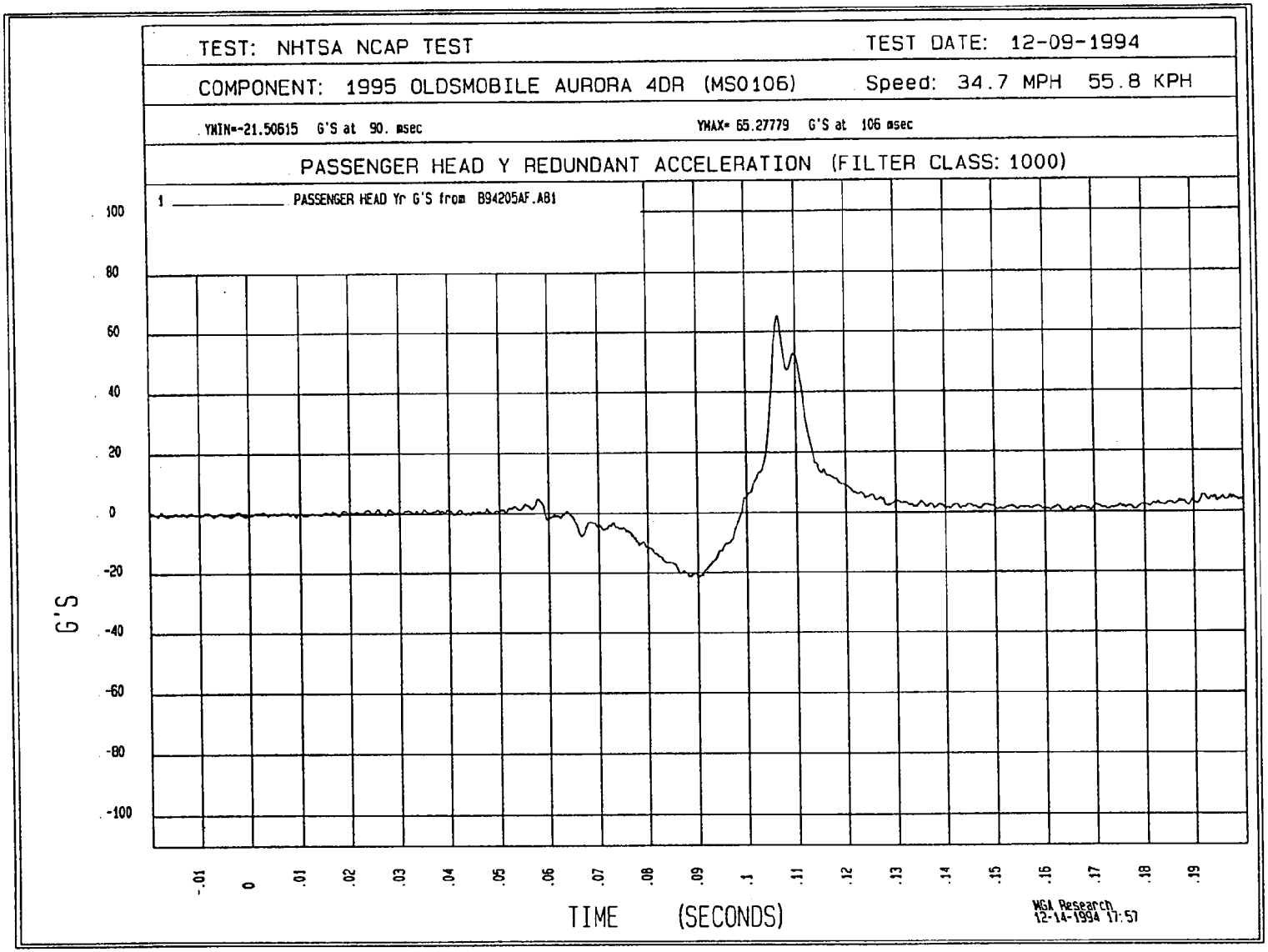

Figure B-87 - Passenger Head Y Redundant Acceleration vs. Time

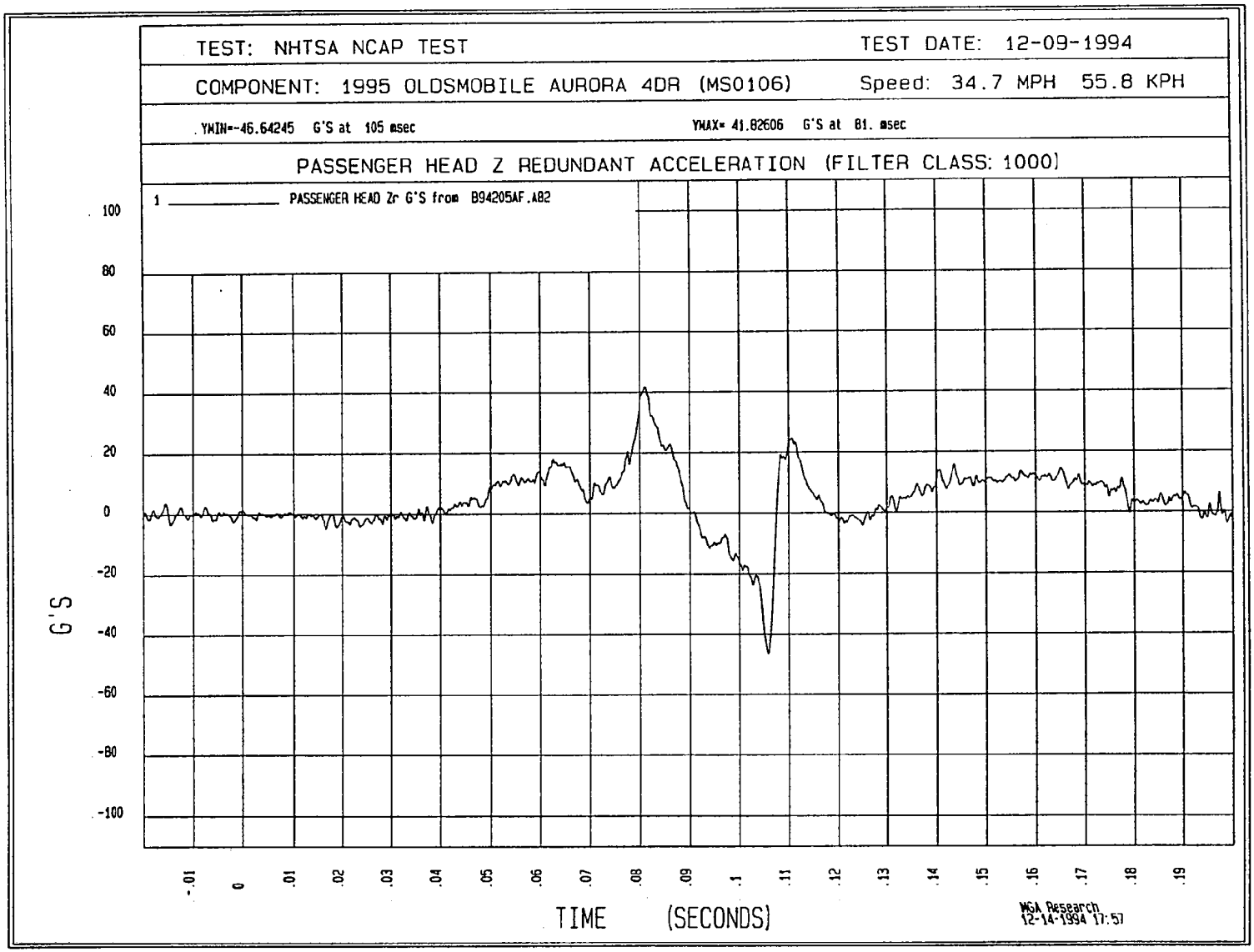

Figure B-88 - Passenger Head Z Redundant Acceleration vs. Time

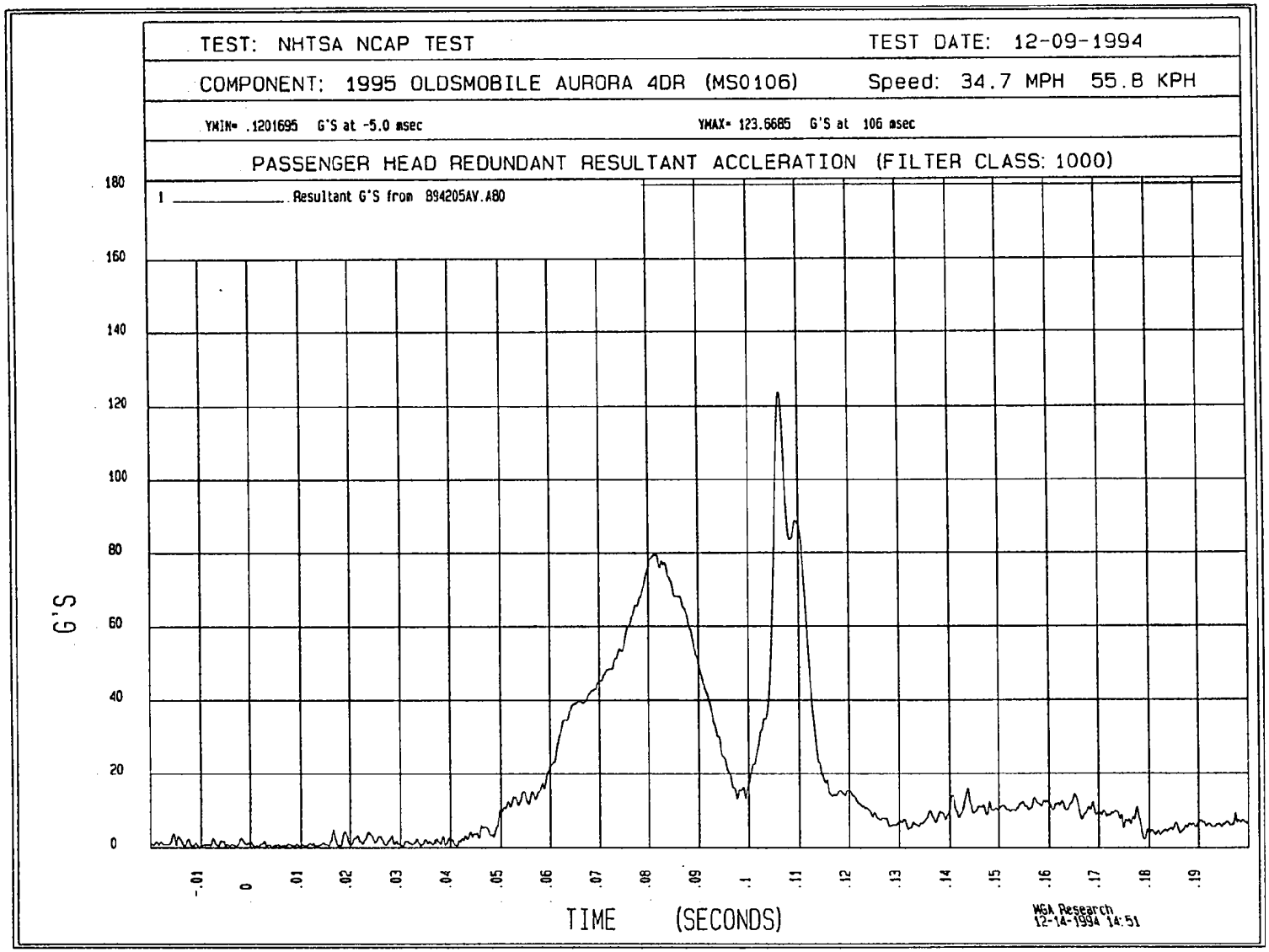

Figure B-89 - Passenger Head Redundant Resultant Accel. vs. Time

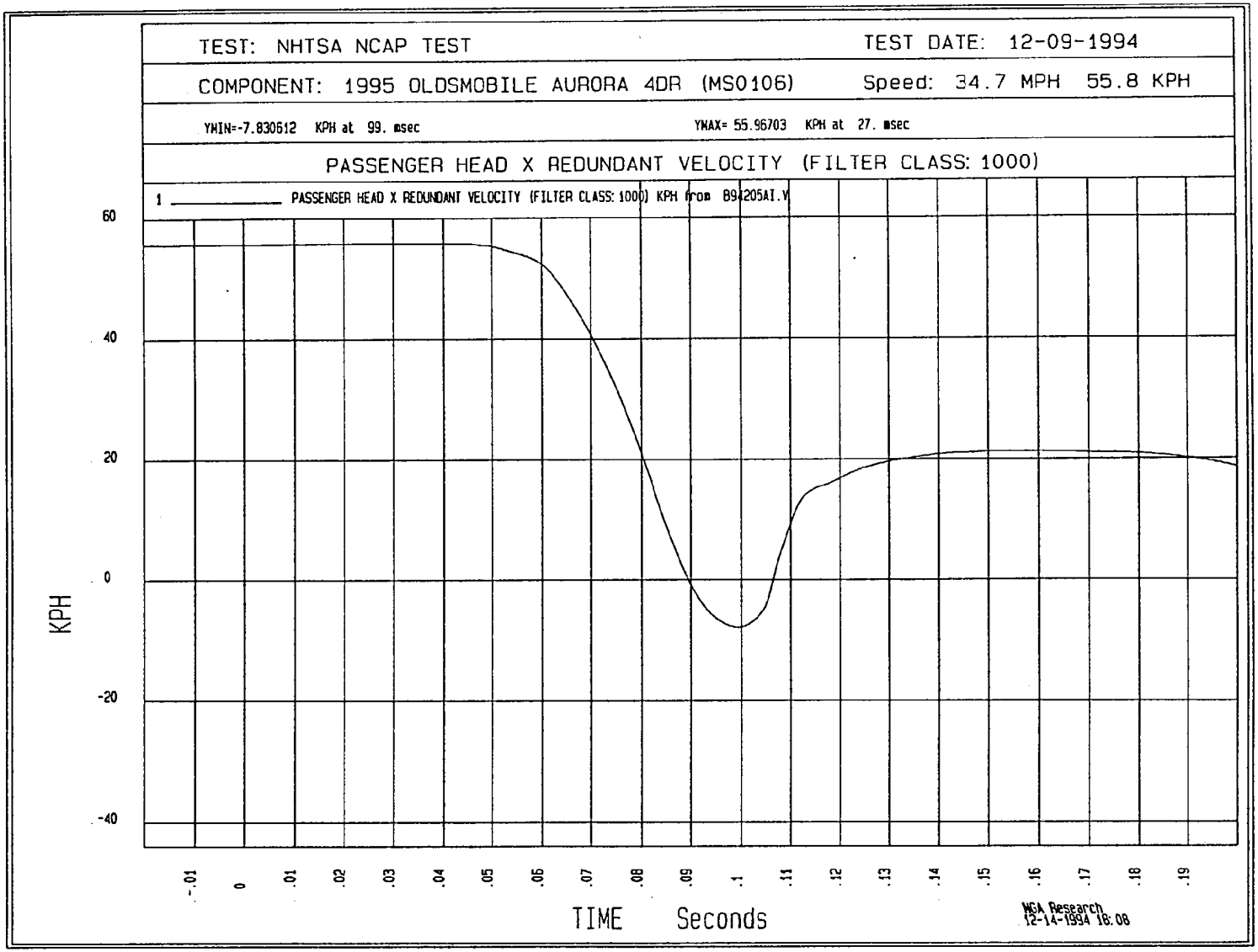

Figure B-9Ø - Passenger Head X Redundant Velocity vs. Time

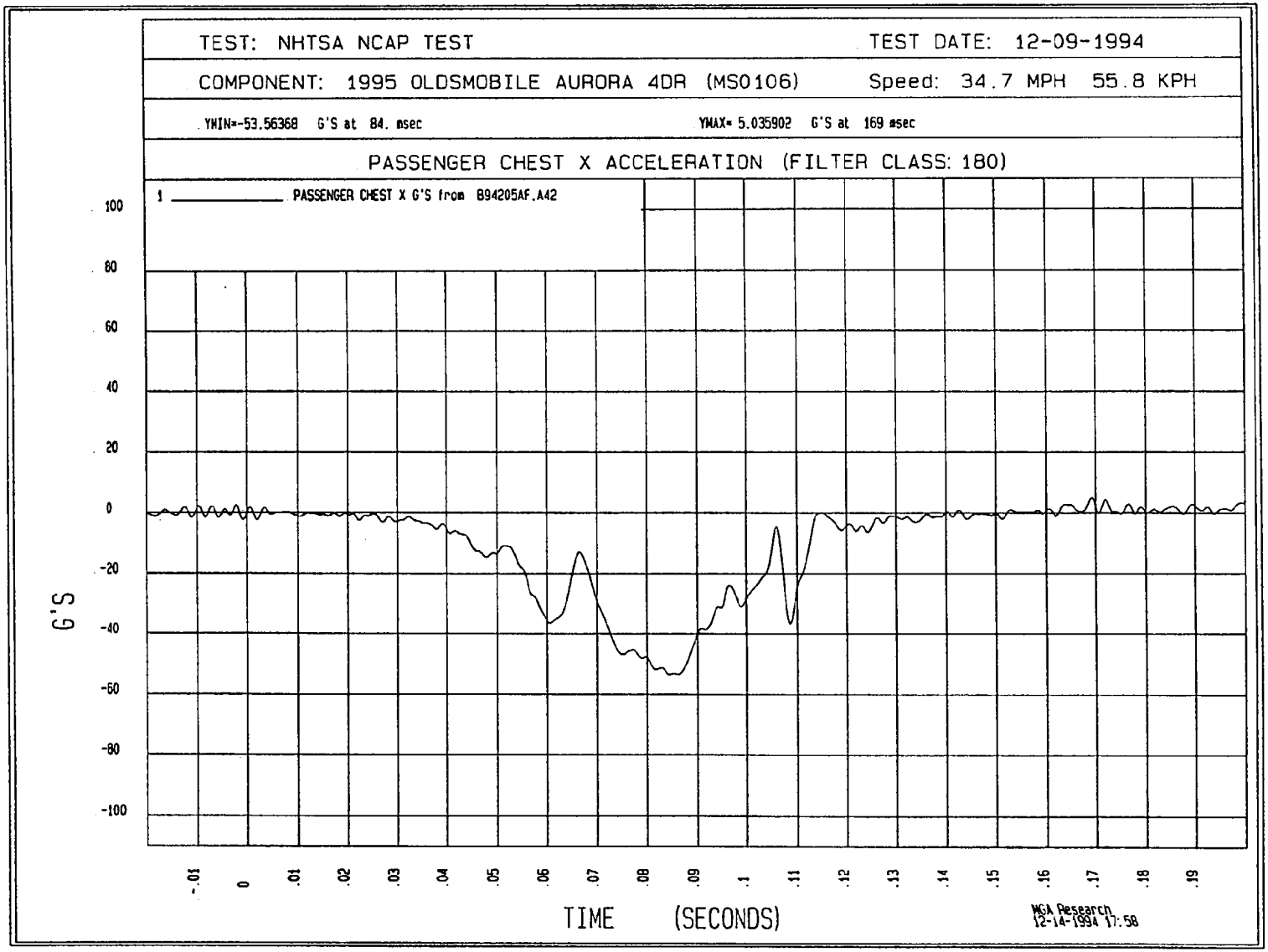

Figure B-91 - Passenger Chest X Acceleration vs. Time

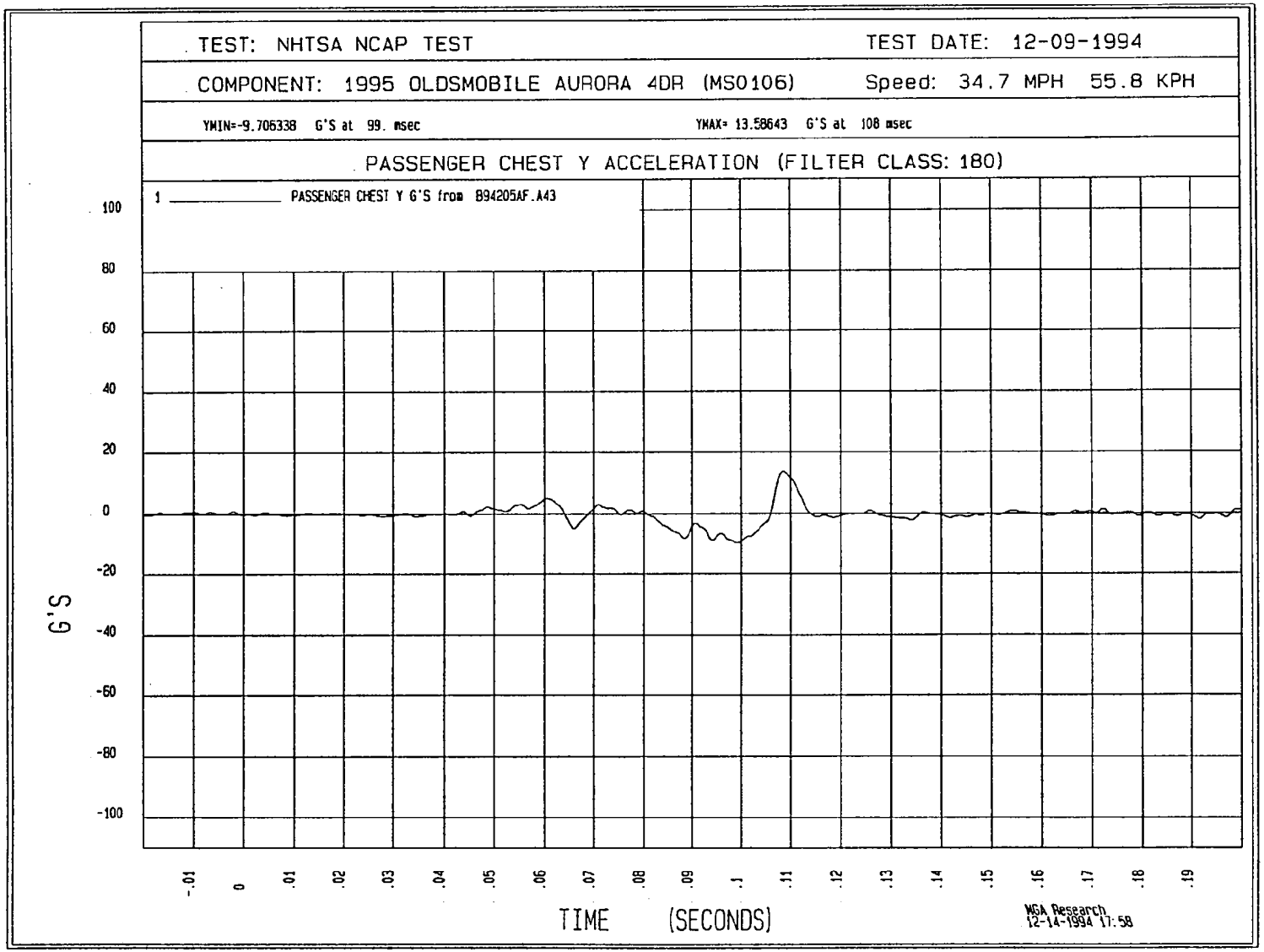

Figure B-92 - Passenger Chest Y Acceleration vs. Time

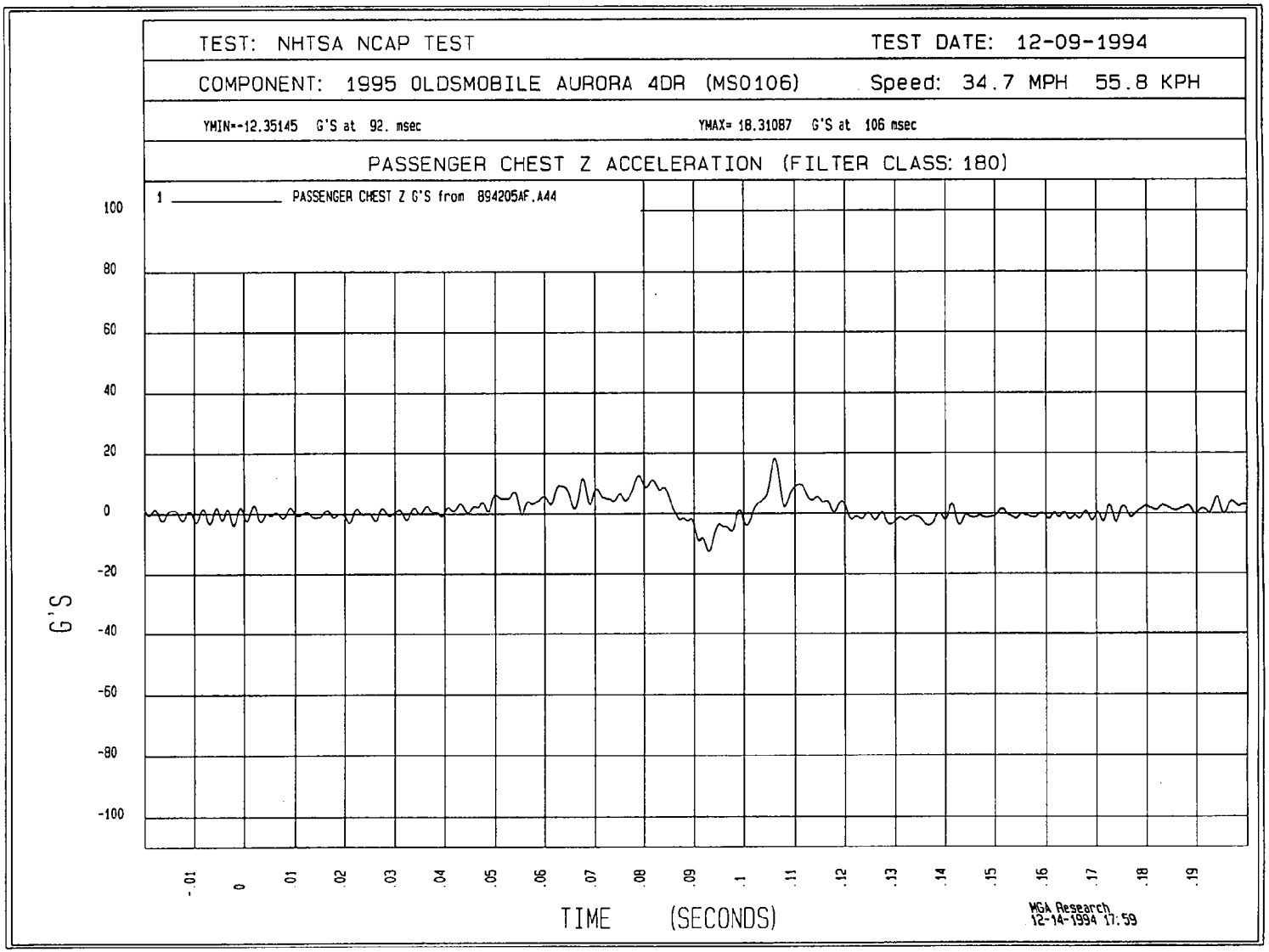

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Figure B-93 - Passenger Chest Z Acceleration vs. Time

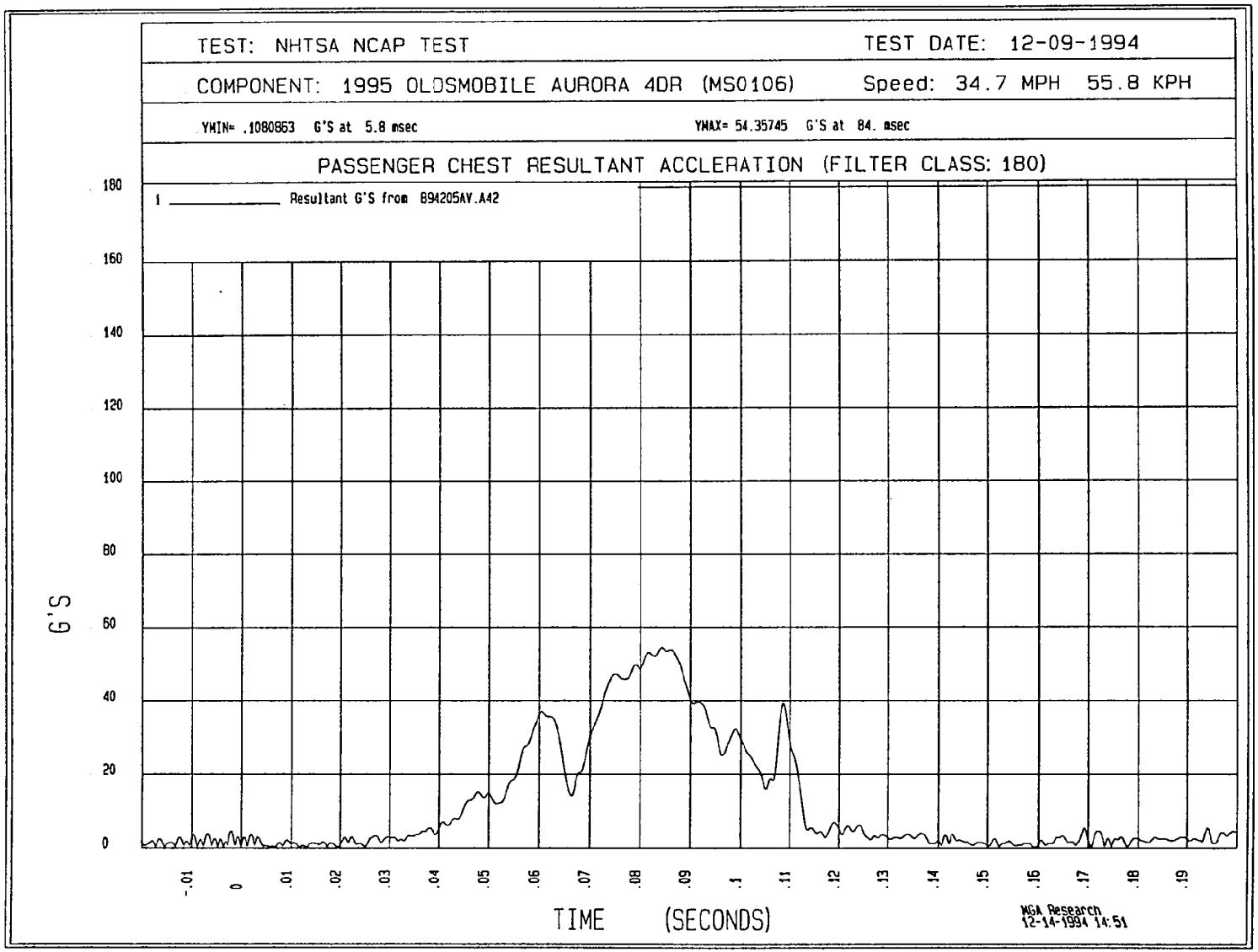


Figure B-94 - Passenger Chest Resultant Accel. vs. Time

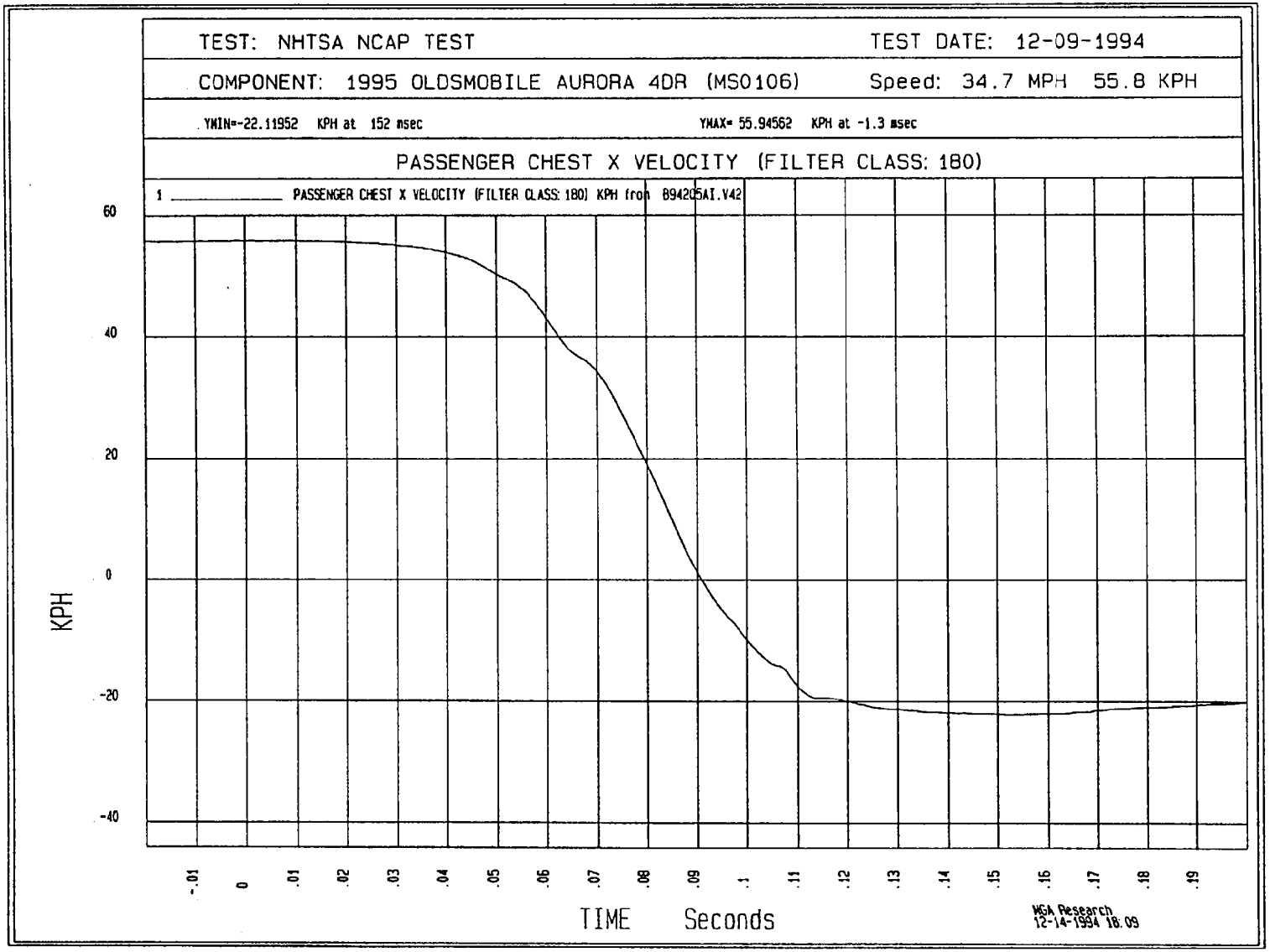


Figure B-95 - Passenger Chest X Velocity vs. Time

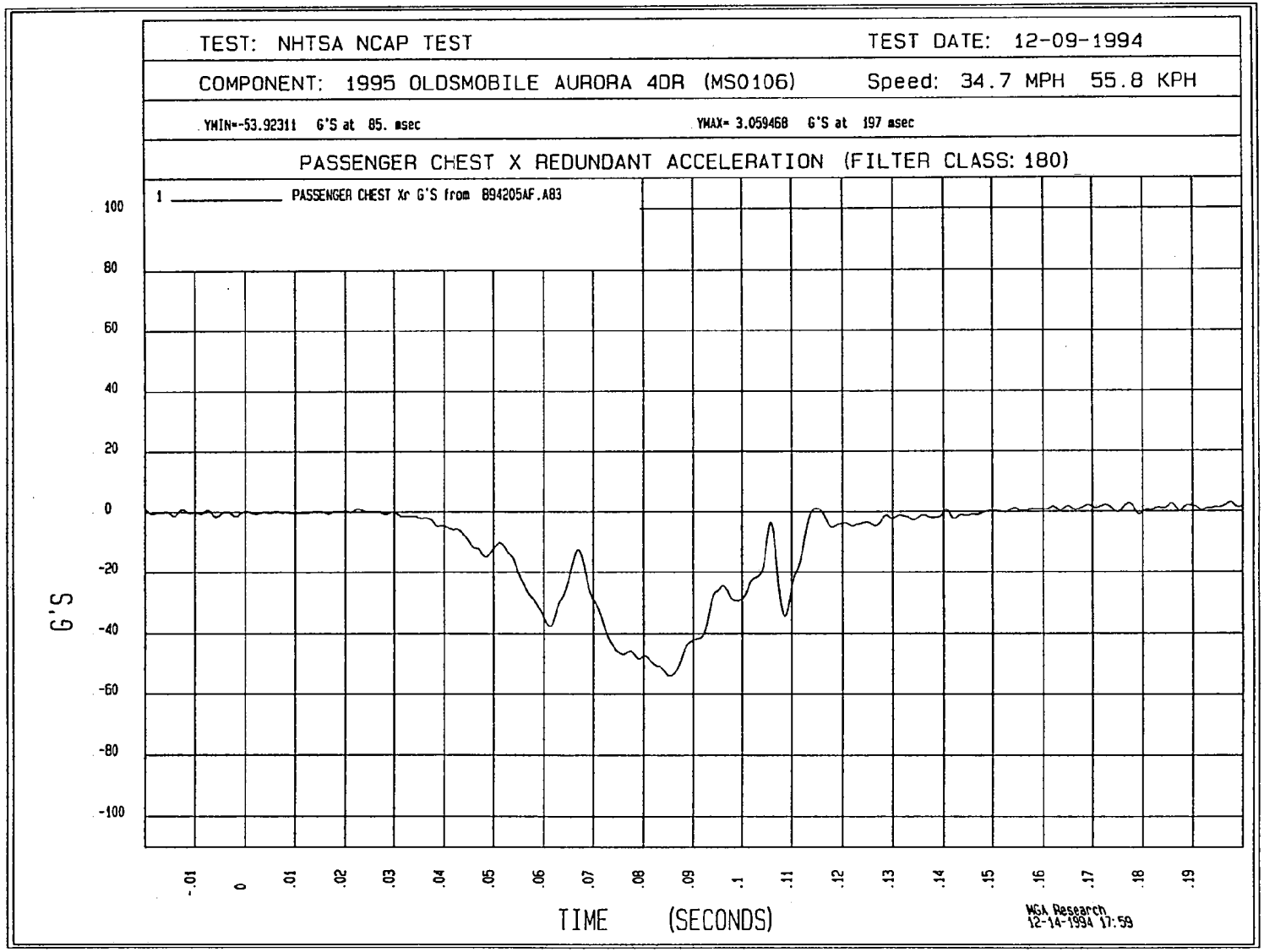


Figure B-96 - Passenger Chest X Redundant Acceleration vs. Time

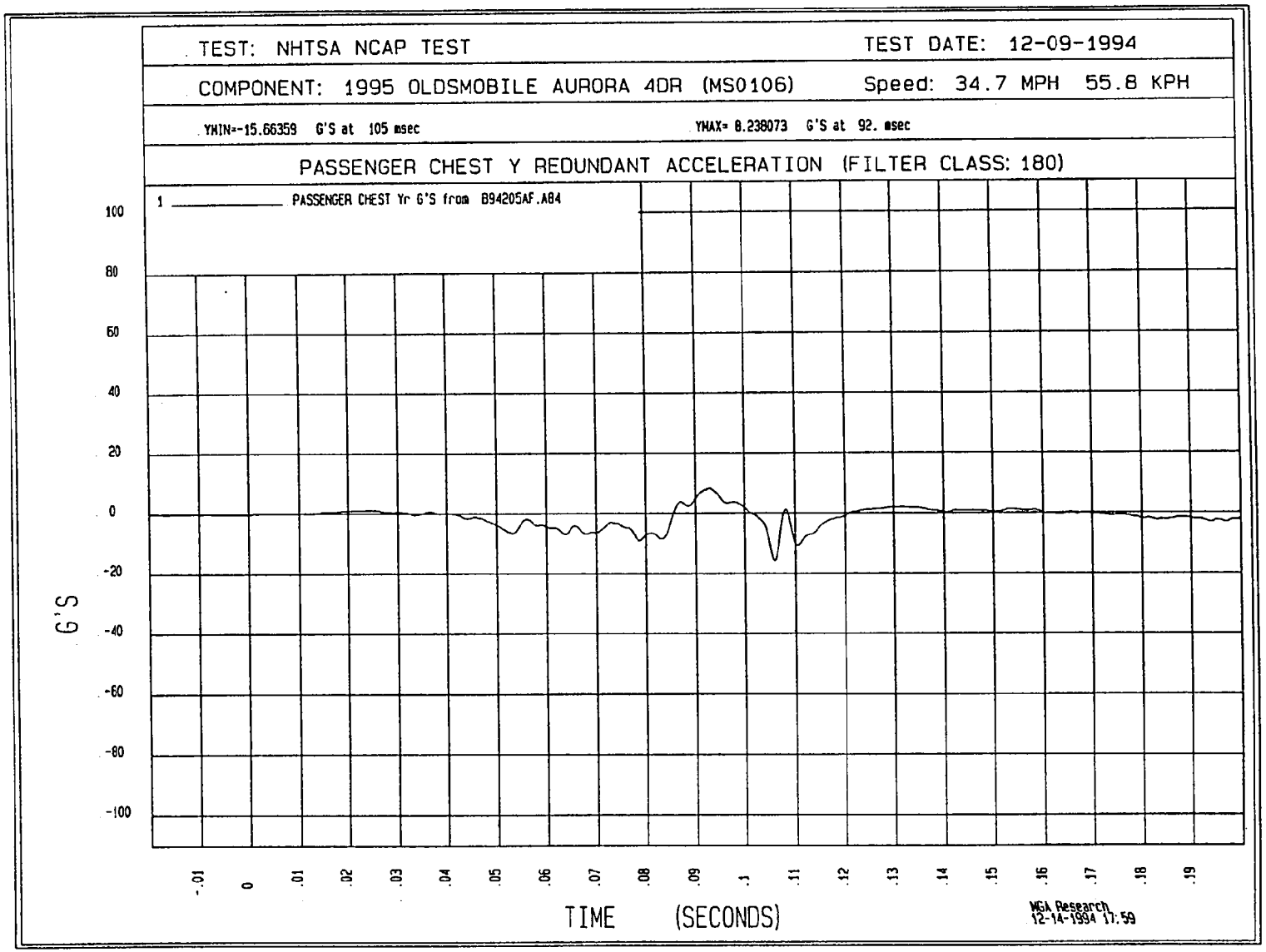


Figure B-97 - Passenger Chest Y Redundant Acceleration vs. Time

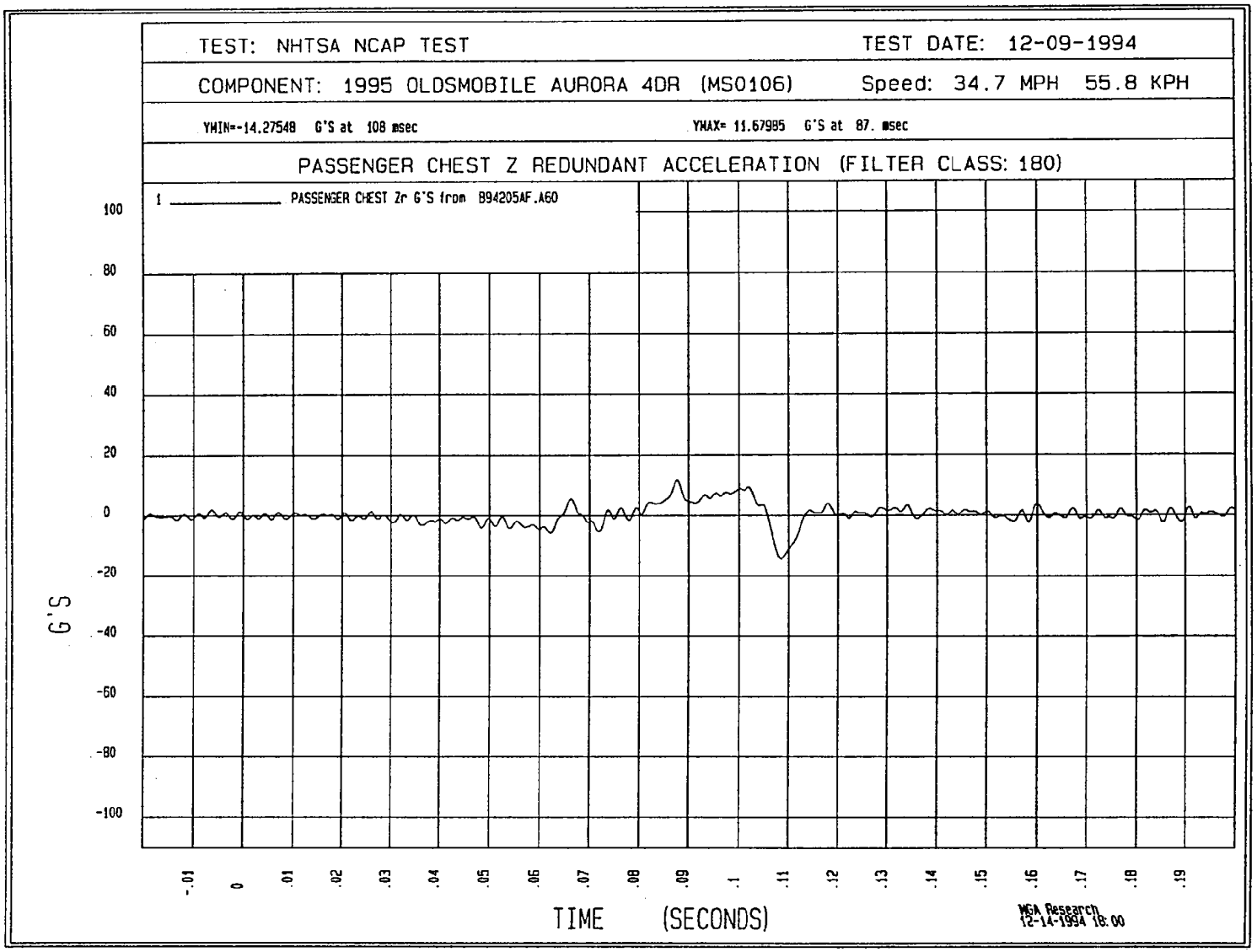


Figure B-98 - Passenger Chest Z Redundant Acceleration vs. Time

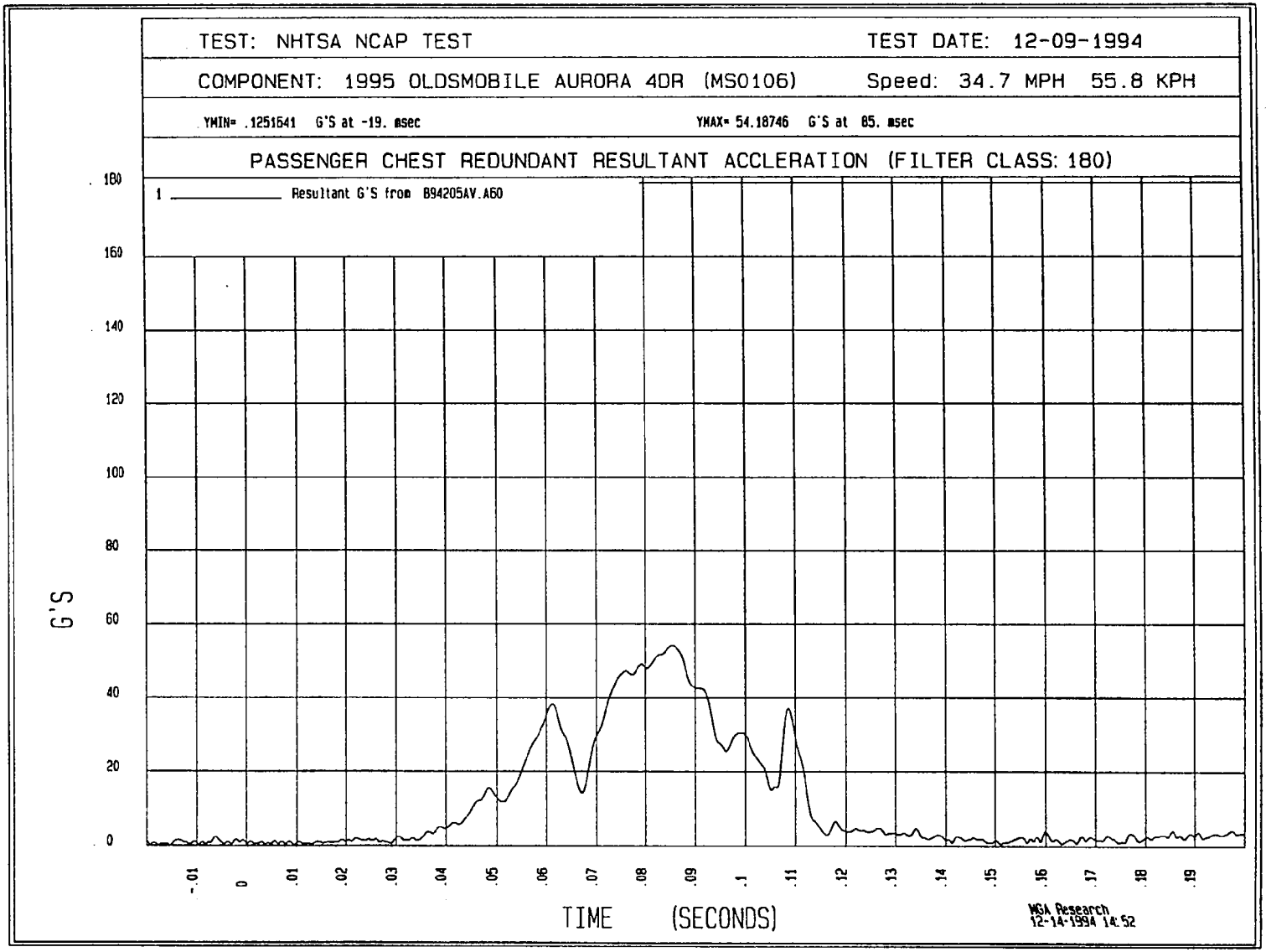


Figure B-99 - Passenger Chest Redundant Resultant Accel. vs. Time

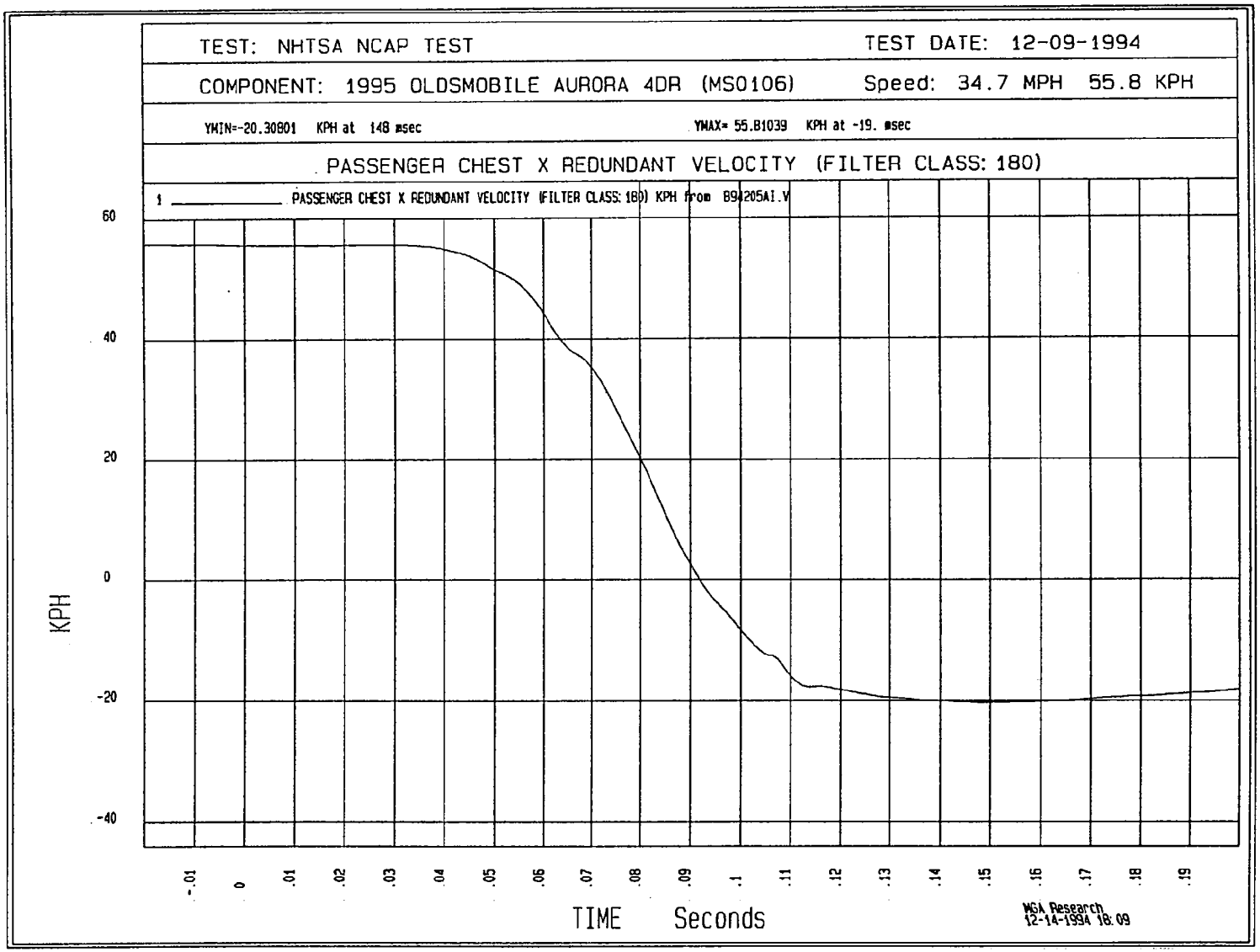


Figure B-100 - Passenger Chest X Redundant Velocity vs. Time

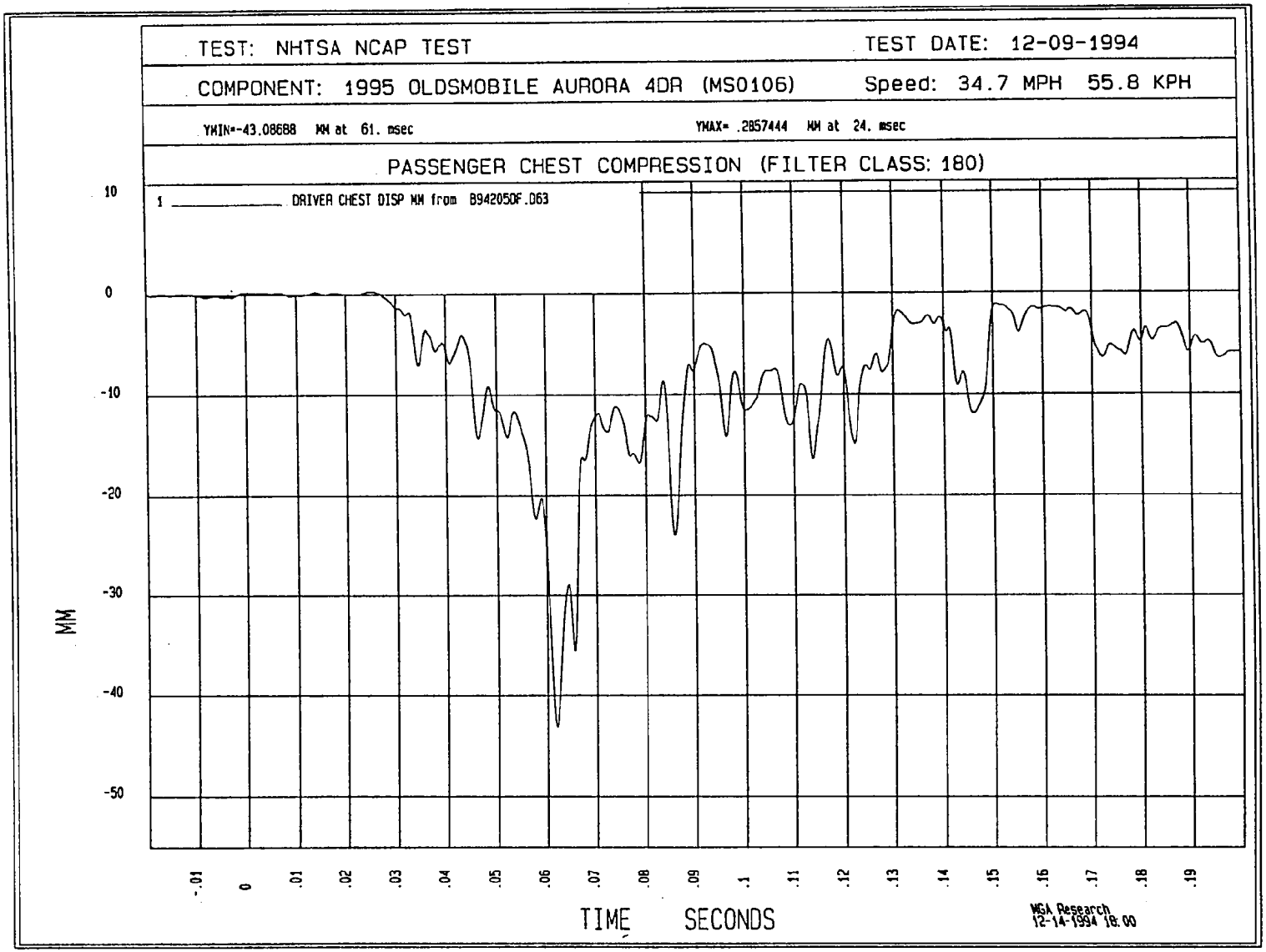


Figure B-101 - Passenger Chest Compression vs. Time

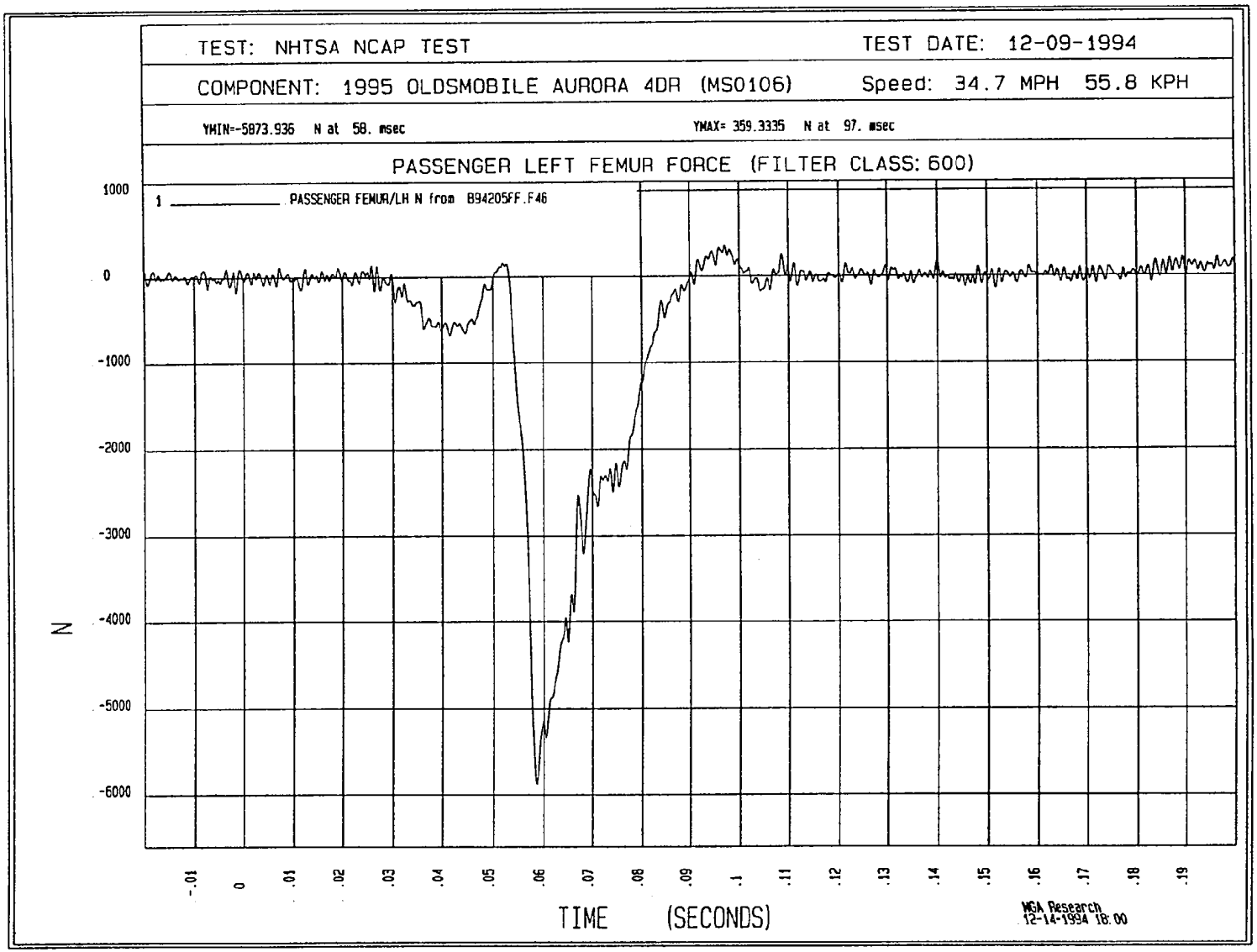


Figure B-102 - Passenger Left Femur Force vs. Time

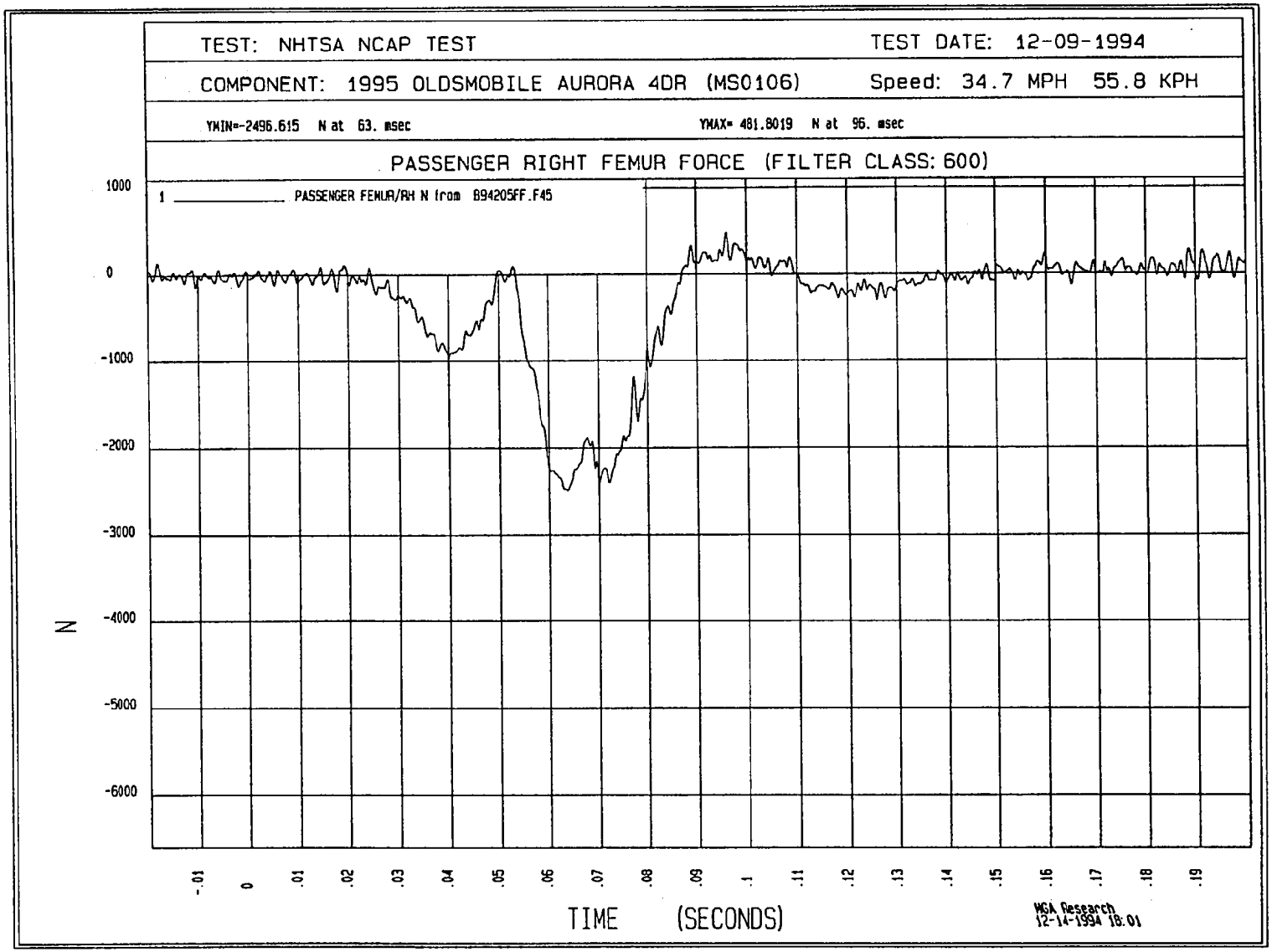


Figure B-103 - Passenger Right Femur Force vs. Time

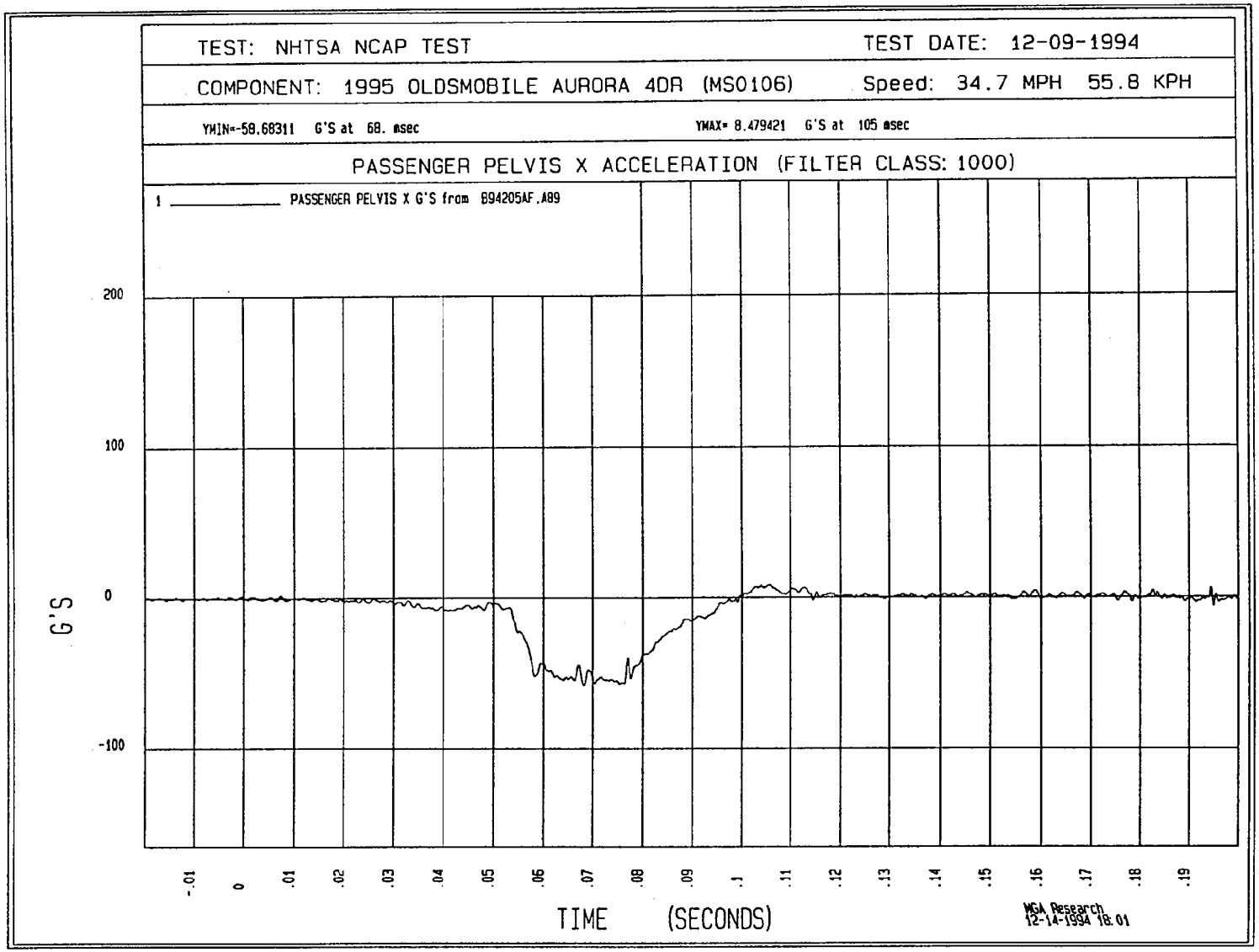


Figure B-104 - Passenger Pelvis X Acceleration vs. Time

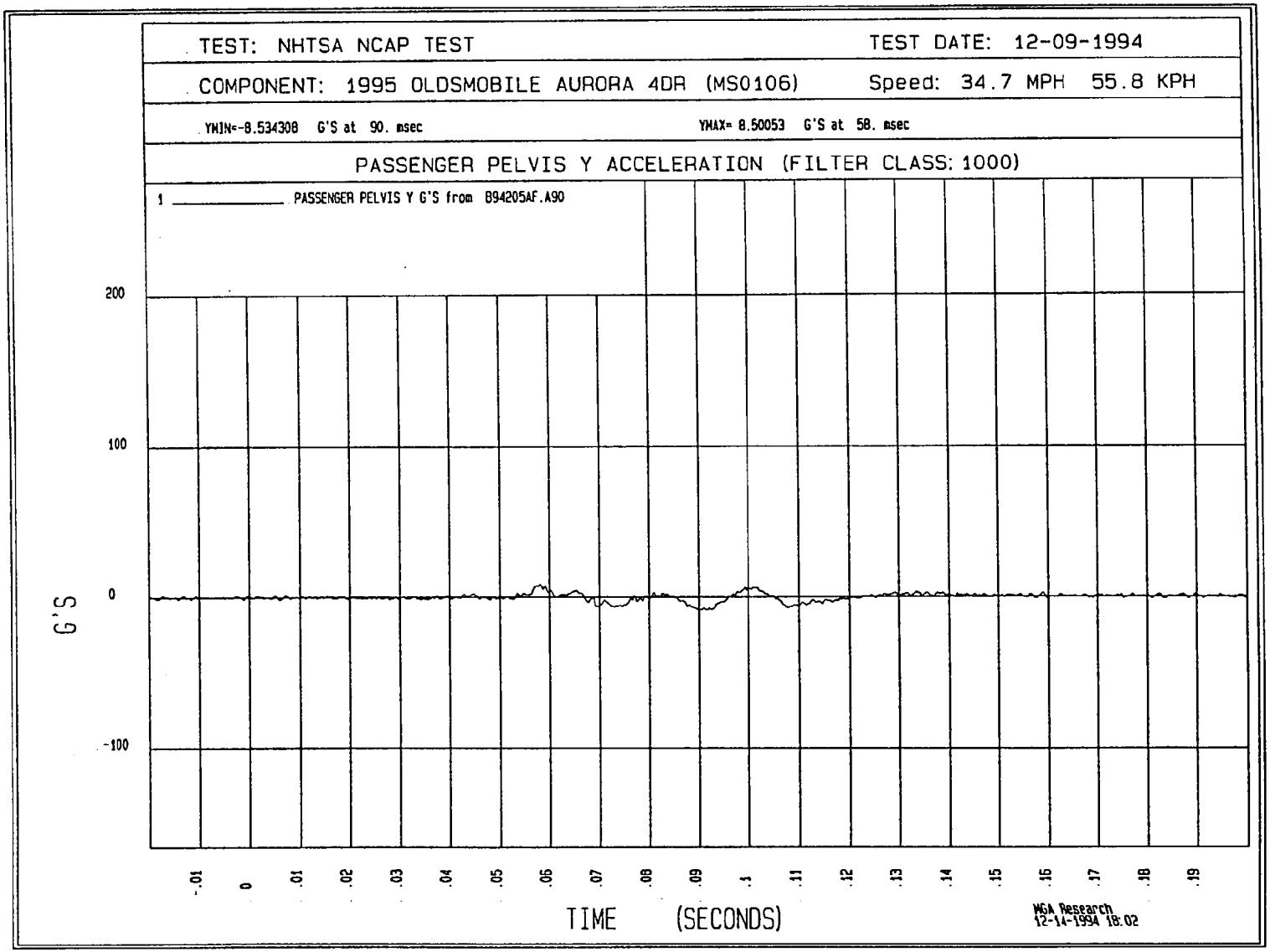


Figure B-105 - Passenger Pelvis Y Acceleration vs. Time

NO VALID DATA COLLECTED

Figure B-106 - Passenger Pelvis Z Acceleration vs. Time

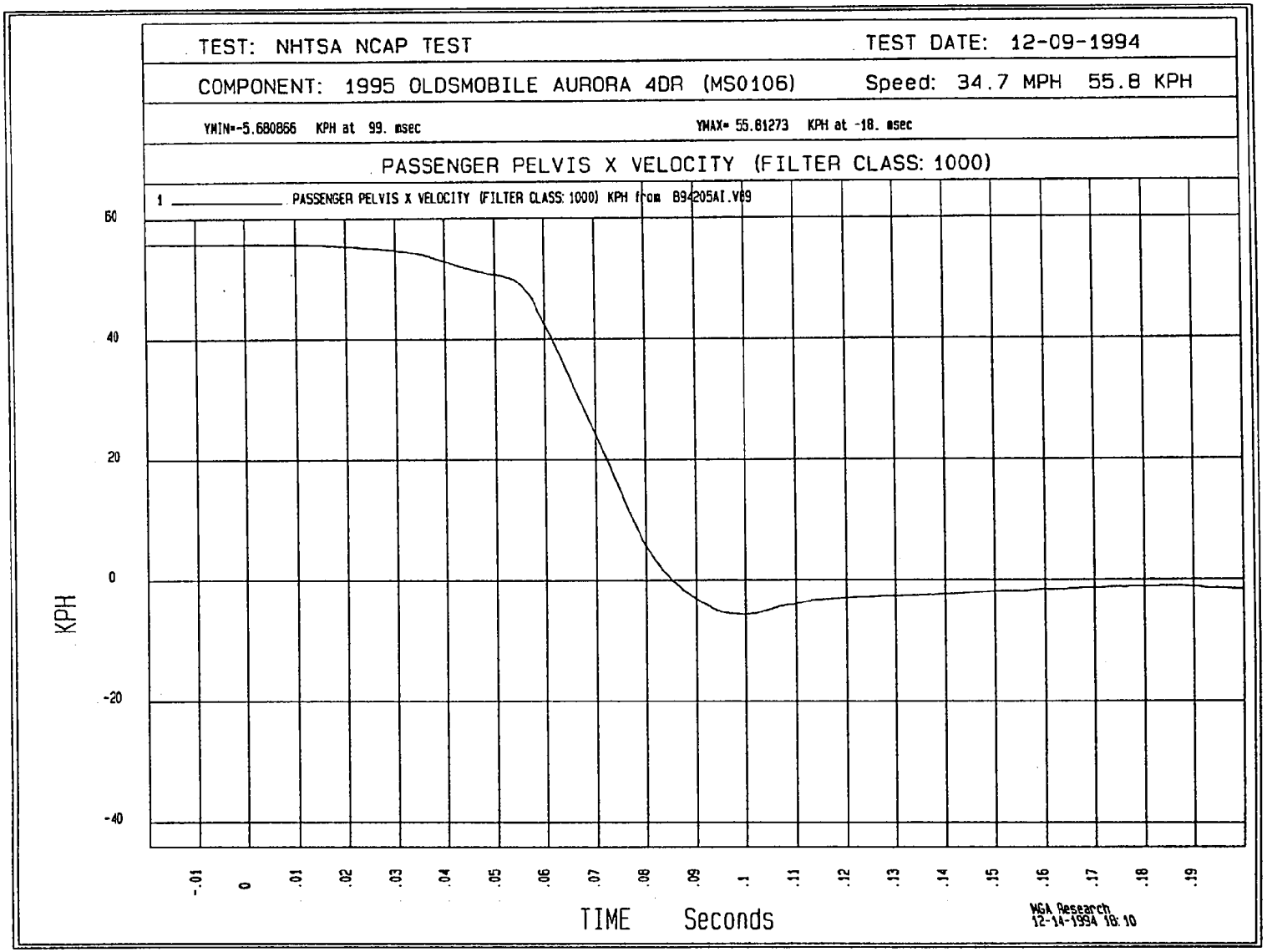


Figure B-107 - Passenger Pelvis X Velocity vs. Time

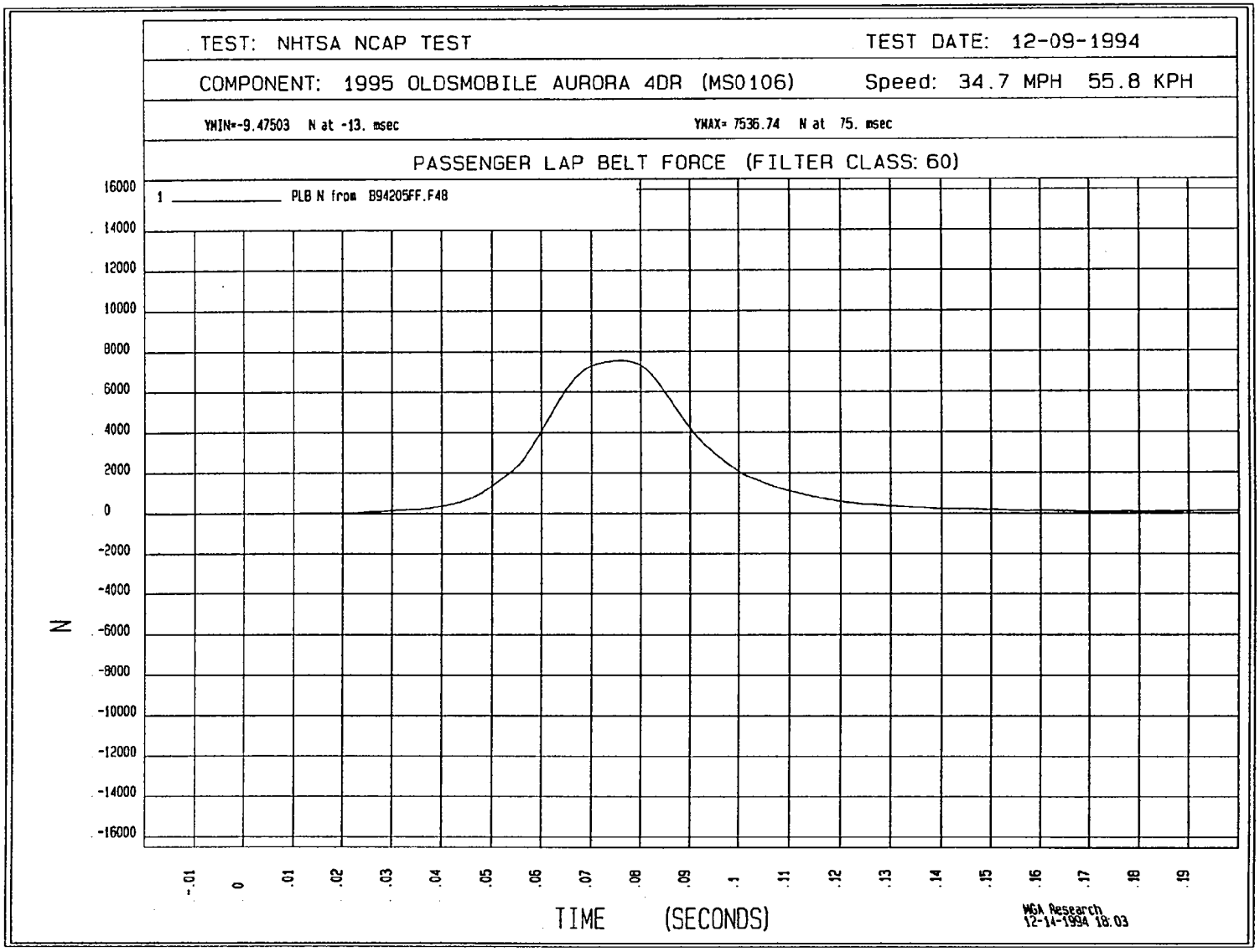


Figure B-108 - Passenger Lap Belt Force vs. Time

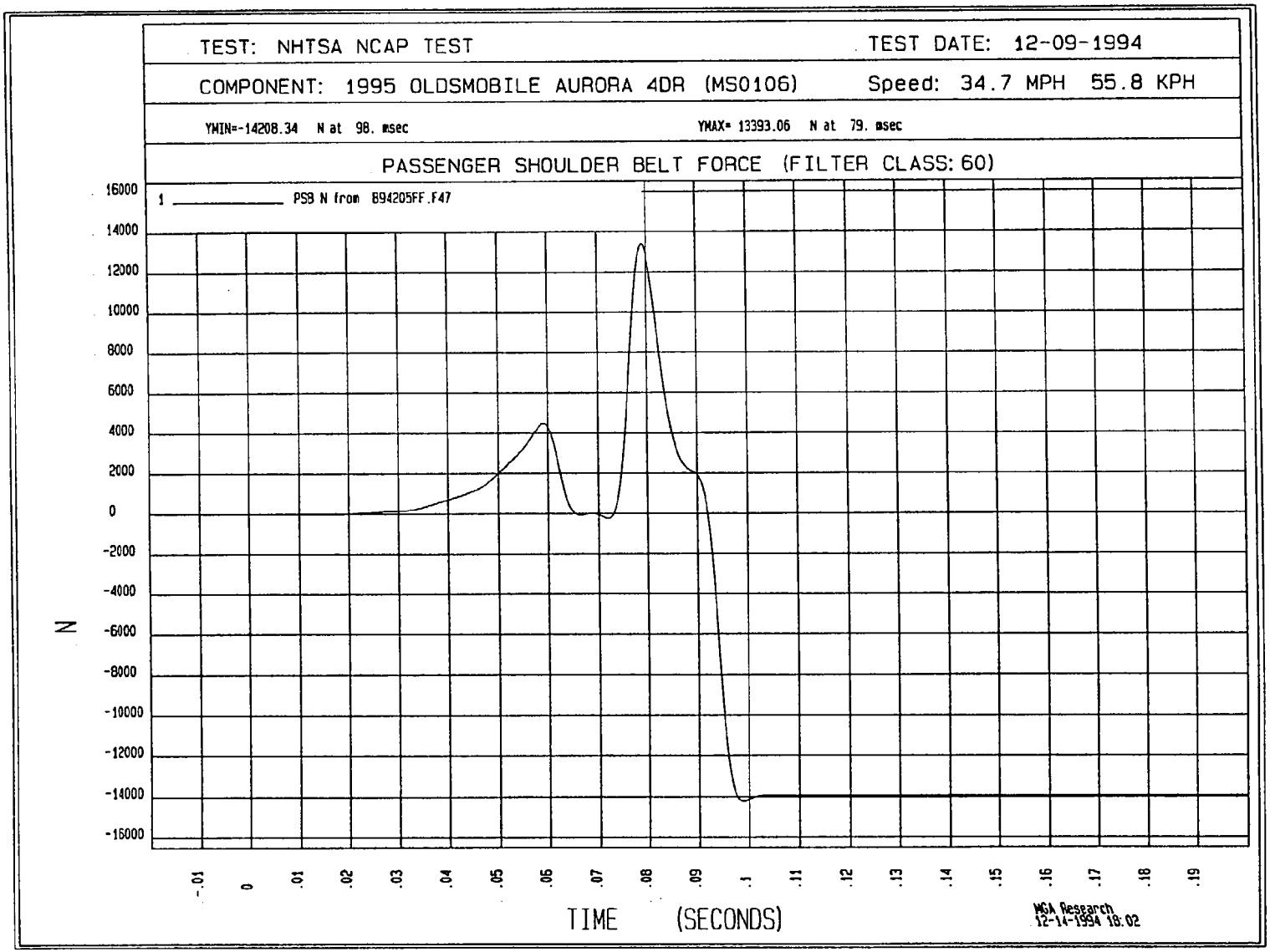


Figure B-109 - Passenger Shoulder Belt Force vs. Time

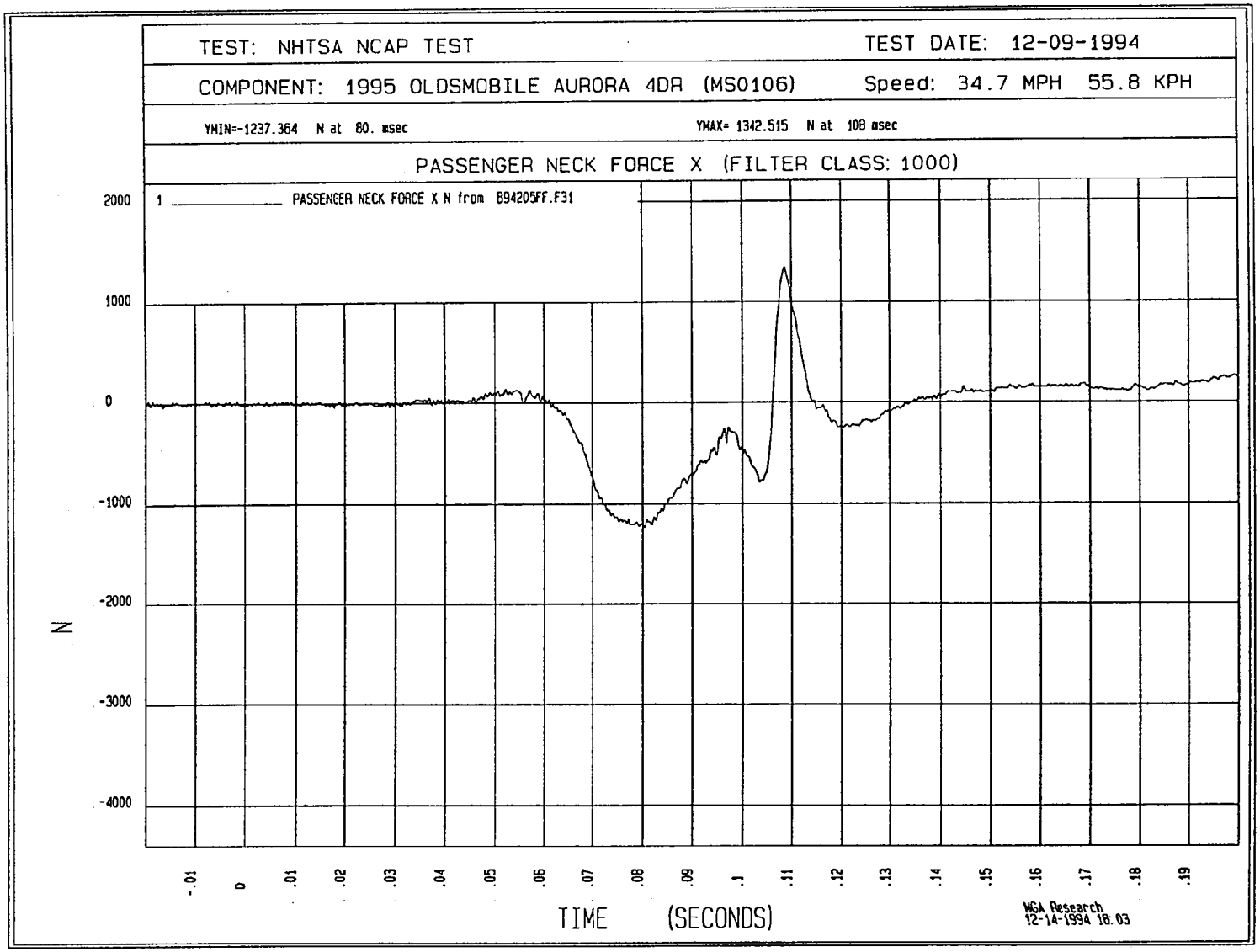


Figure B-11Ø - Passenger Neck Force X vs. Time

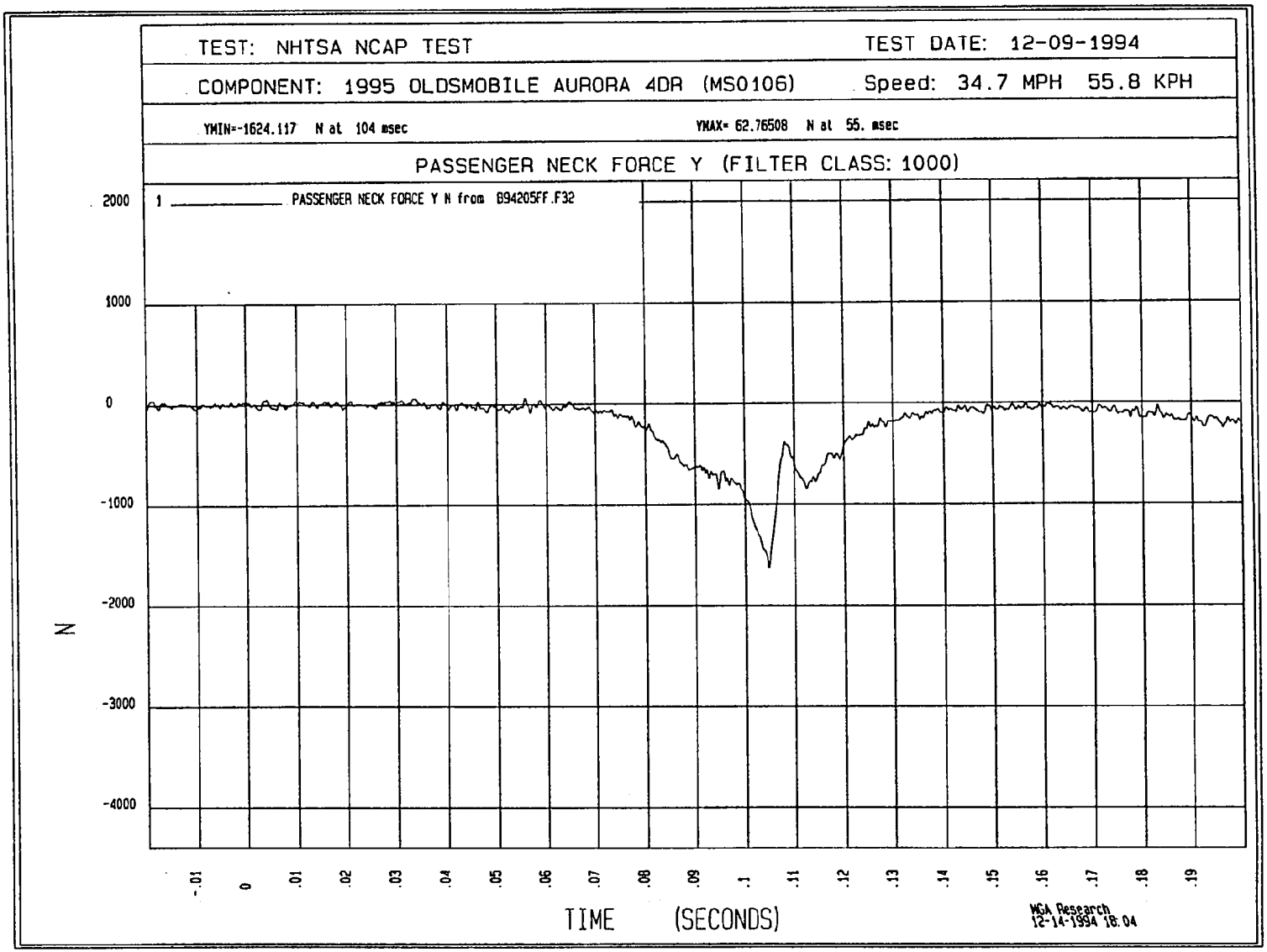


Figure B-111 - Passenger Neck Force Y vs. Time

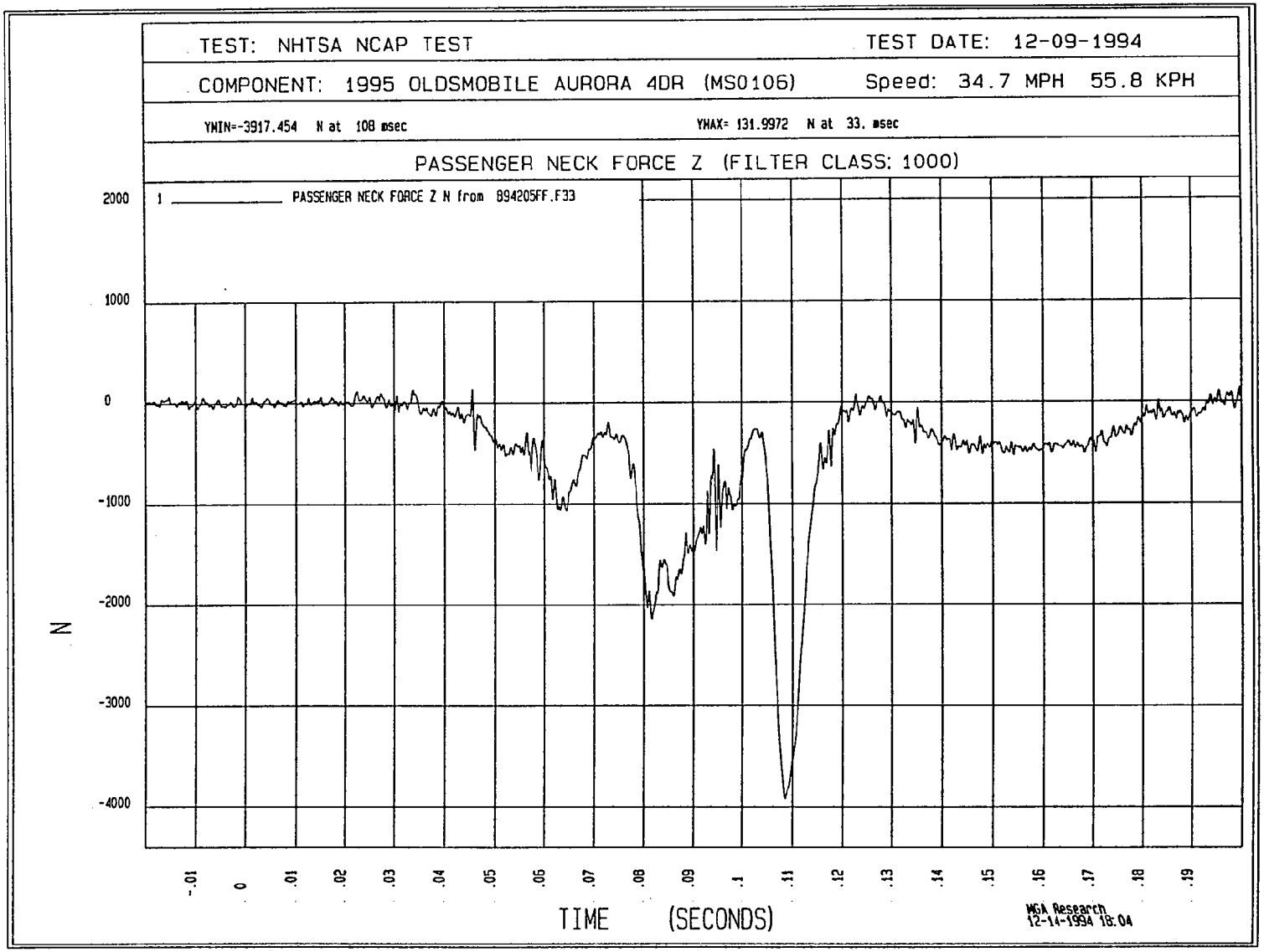


Figure B-111- Passenger Neck Force Z vs. Time

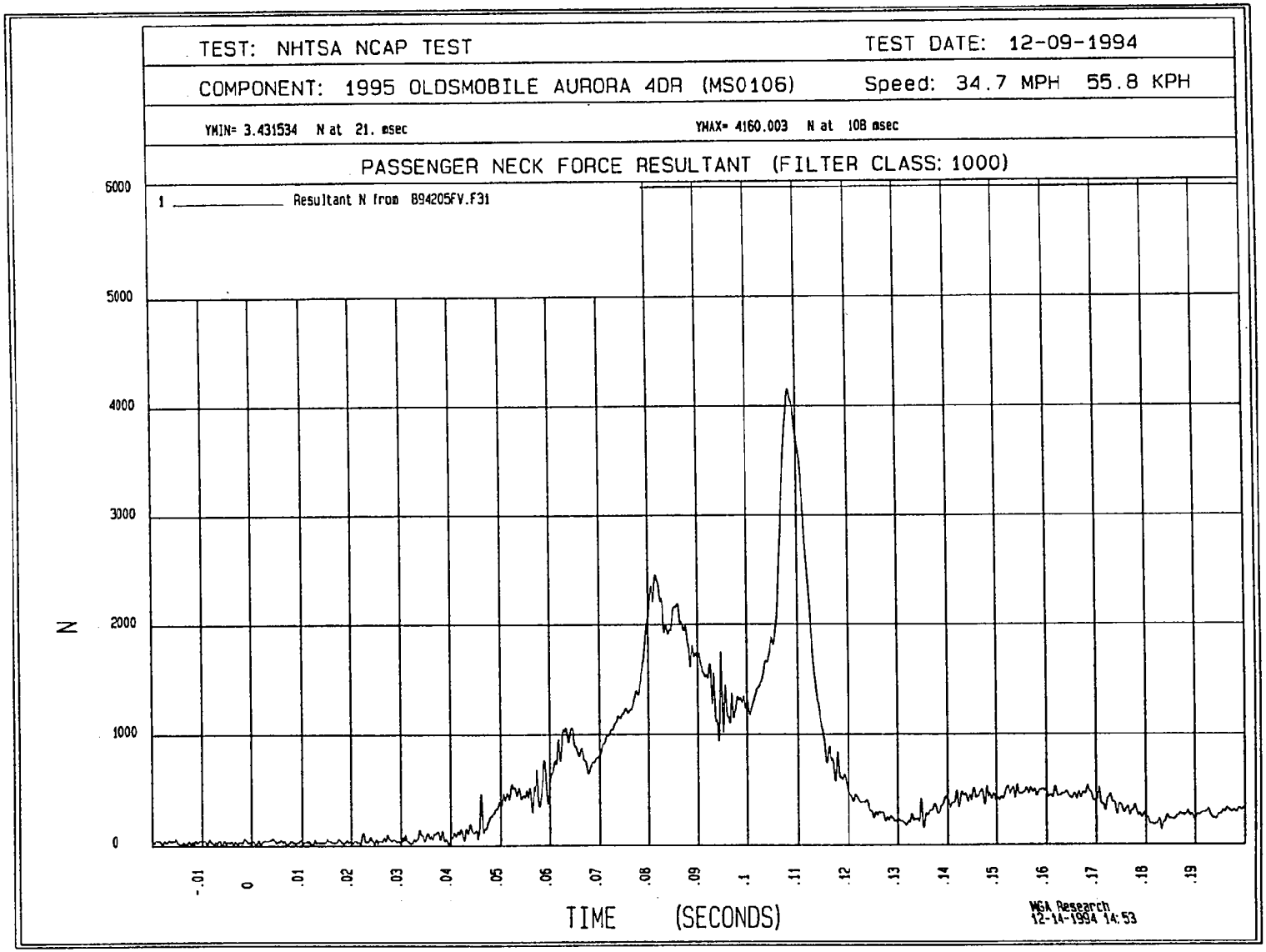


Figure B-113 - Passenger Neck Force Resultant Acceleration vs. Time

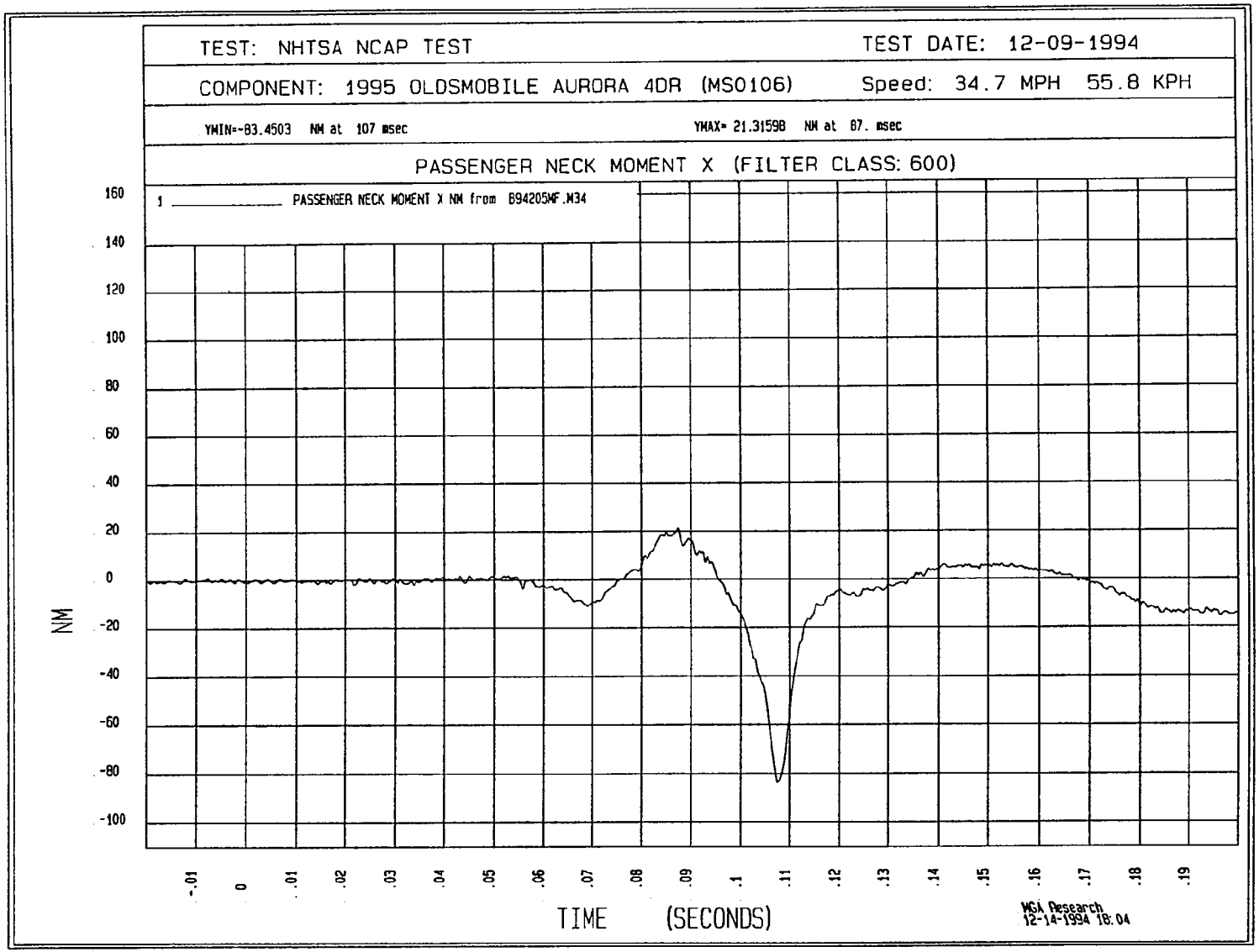


Figure B-114 - Passenger Neck Moment X vs. Time

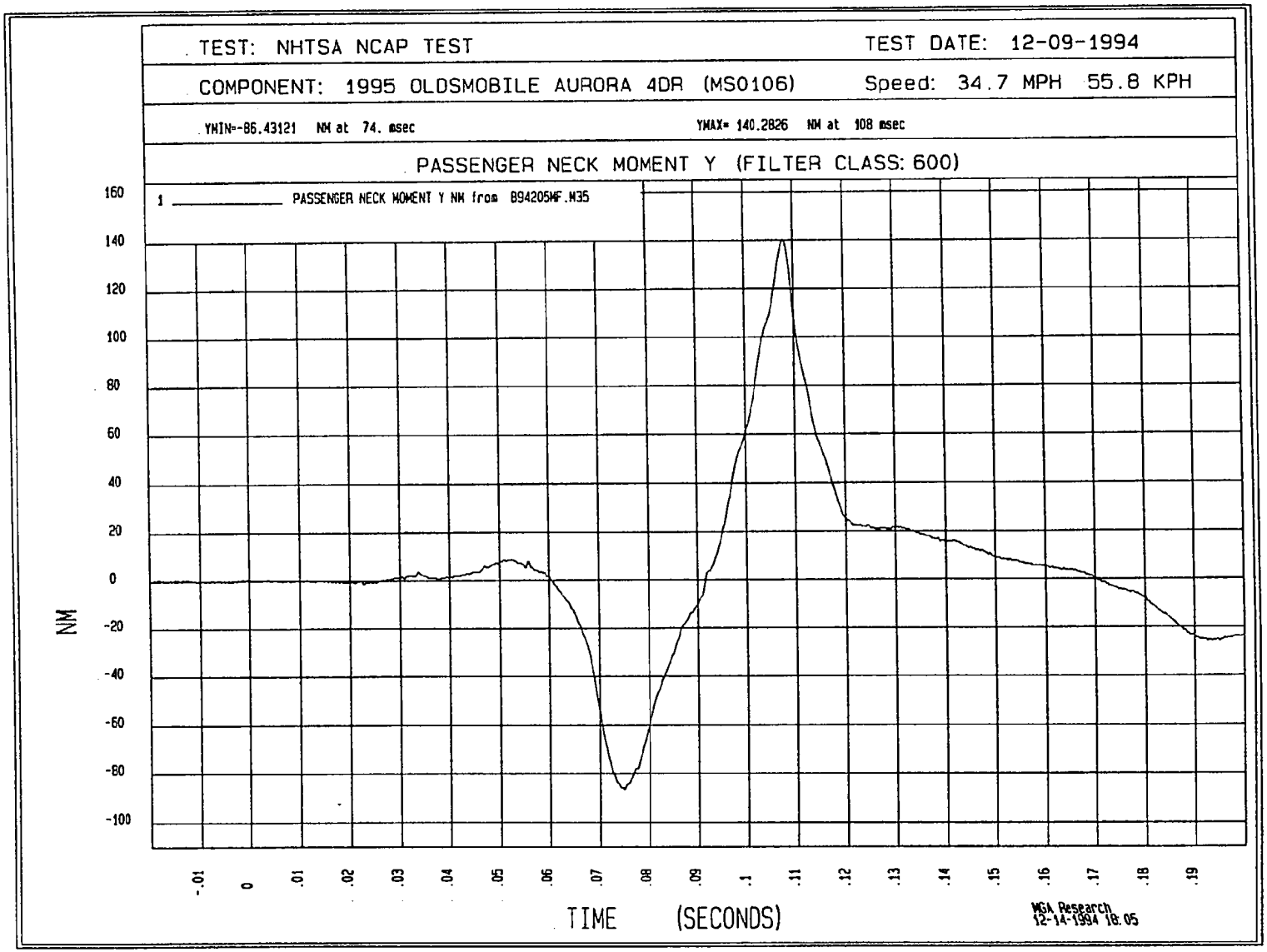


Figure B-115 - Passenger Neck Moment Y vs. Time

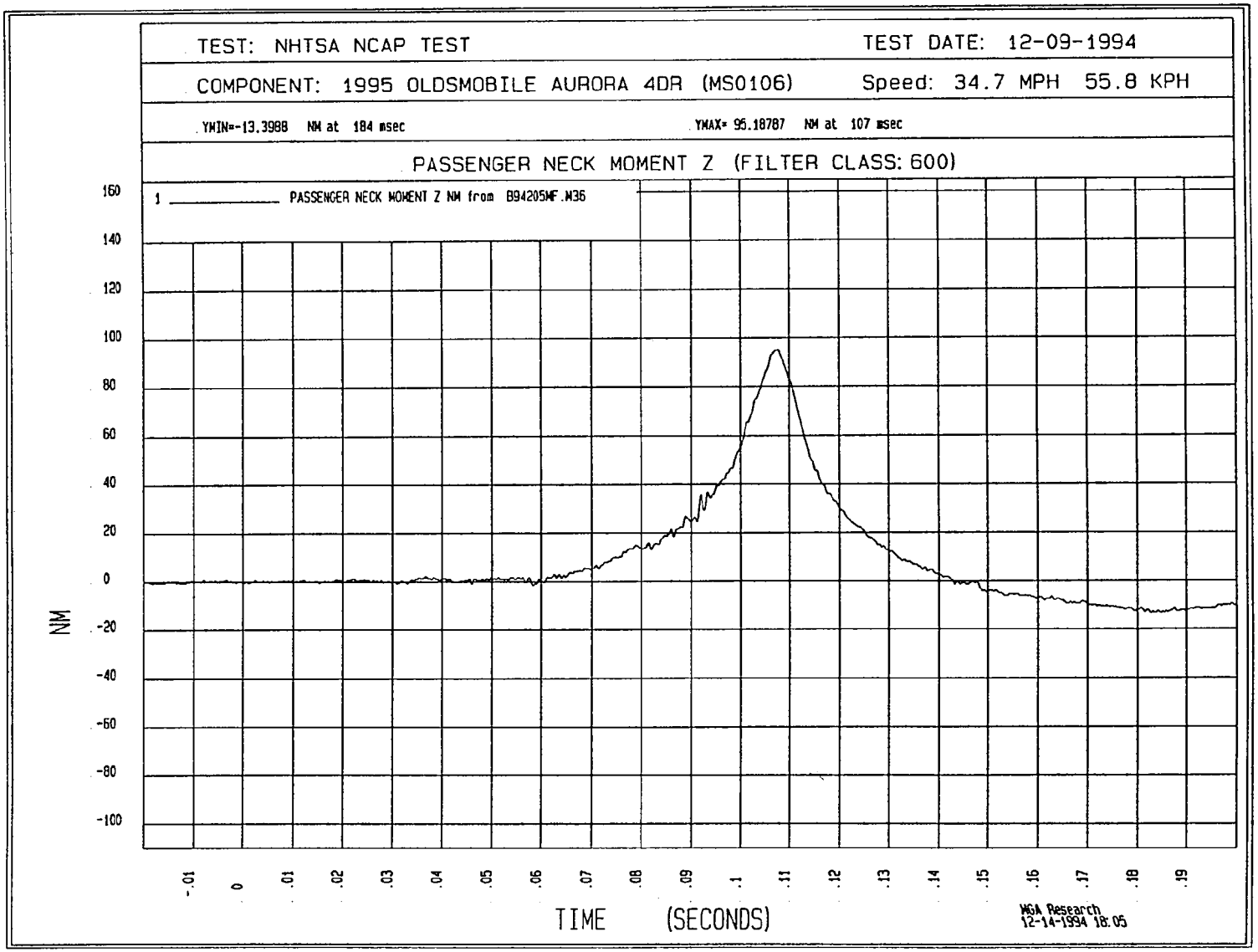


Figure B-116 - Passenger Neck Moment Z vs. Time

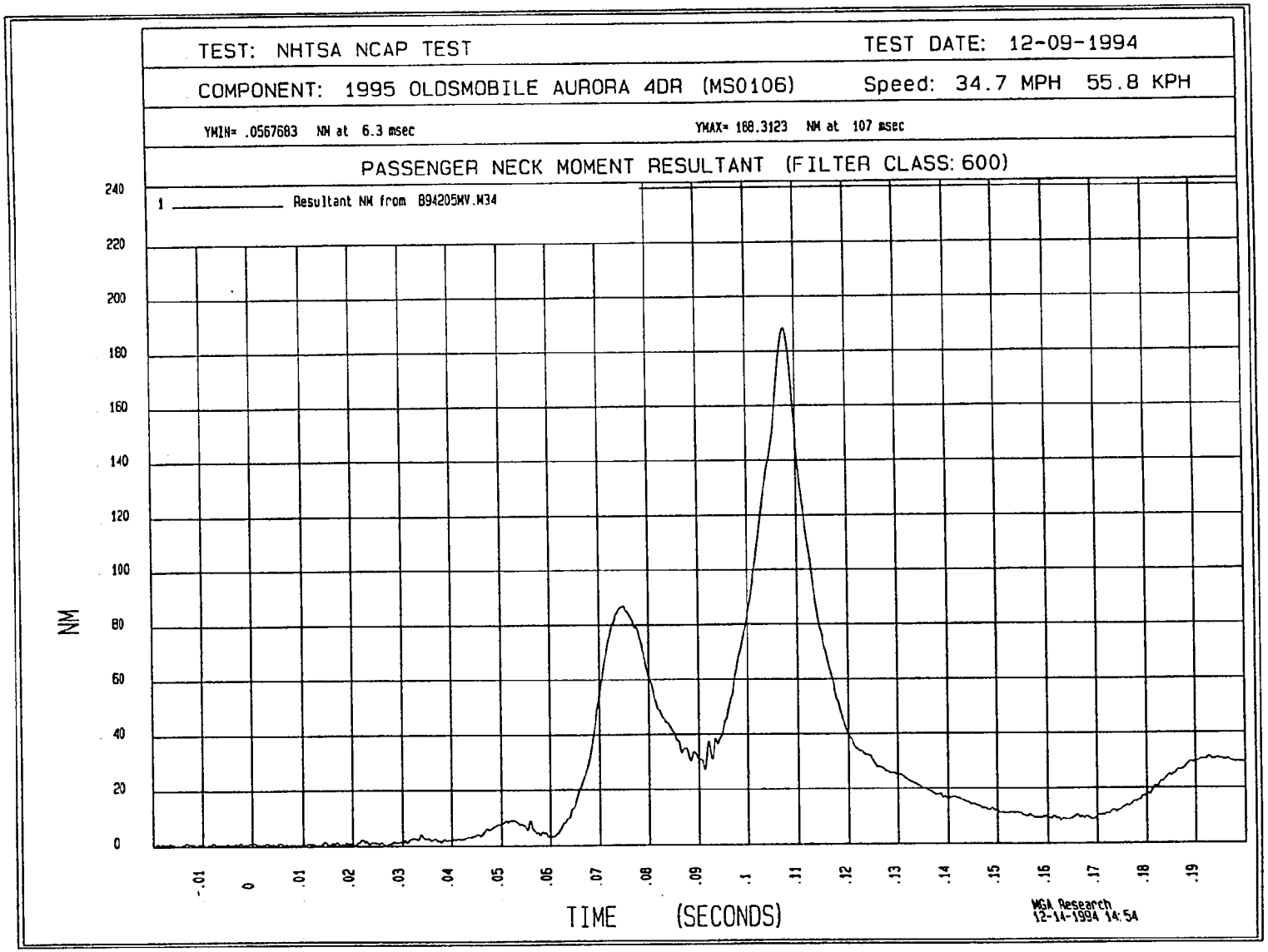


Figure B-117 - Passenger Neck Moment Resultant Acceleration vs. Time

APPENDIX C

Dummy Configuration & Performance Verification Data

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 066 DUMMY CALIBRATION BY: Rod McClelland & Al Chalmers

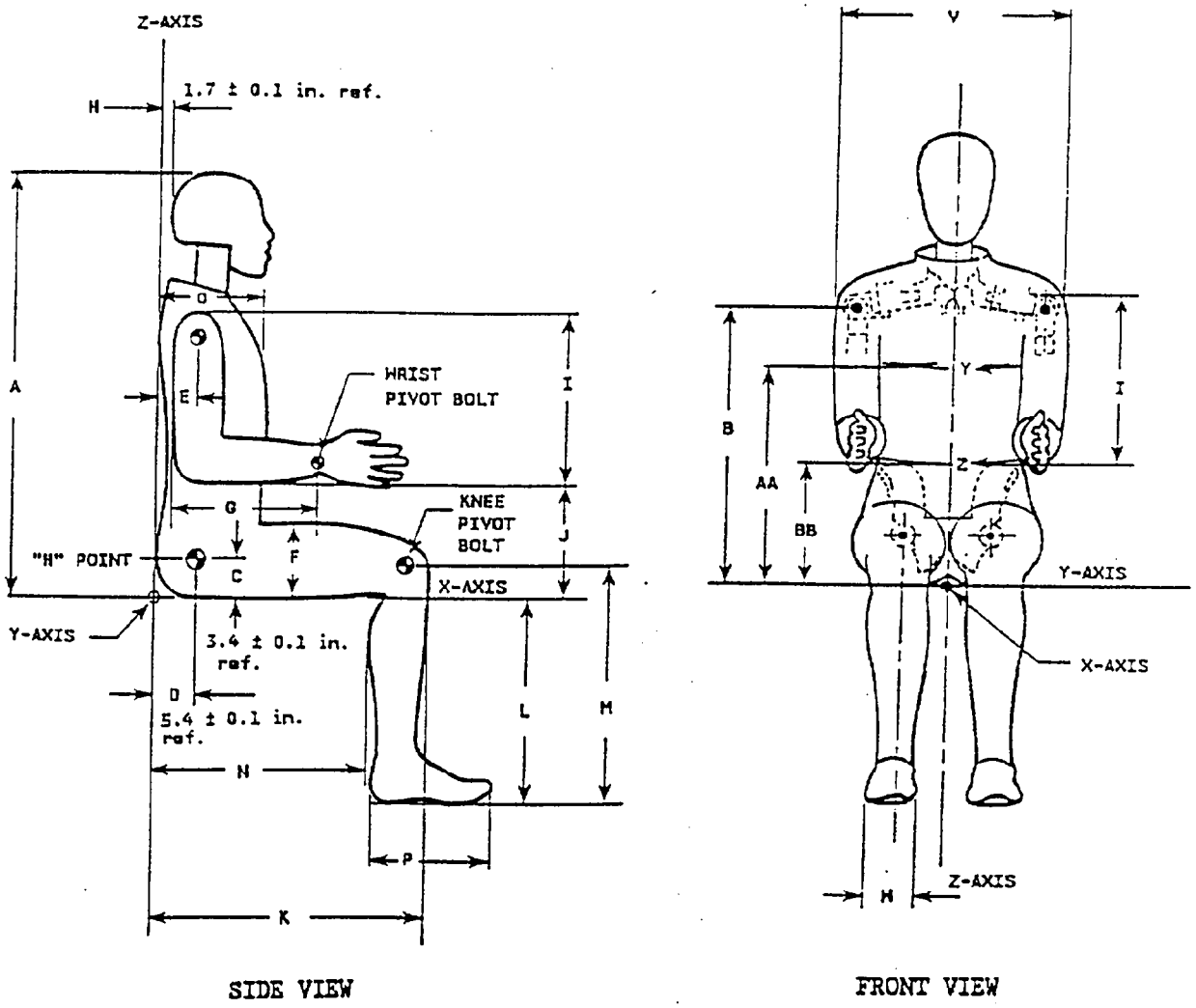
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 08-31-94

DESCRIPTION	SPECIFICATION (inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.9
B - Shoulder Pivot Height	19.9 - 20.5	20.5
C - "H" Point Height	3.3 - 3.5	3.5
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1	6.1
G - Back of Elbow to Wrist Pivot	11.4 - 12.0	11.5
H - Skull Cap Skin to Backline	1.6 - 1.8	1.7
I - Shoulder - Elbow Length	13.0 - 13.6	13.0
J - Elbow Rest Height	7.5 - 8.3	8.0
K - Buttock to Knee Length	22.8 - 23.8	23.5
L - Popliteal Height	16.9 - 17.9	17.0
M - Knee Pivot Height	19.1 - 19.9	19.5
N - Buttock Popliteal Length	17.8 - 18.8	18.5
O - Chest Depth at 3rd Rib	8.4 - 9.0	8.8
P - Foot Length	9.9 - 10.5	10.3
V - Shoulder Breadth	16.6 - 17.2	16.8
W - Foot Breadth	3.6 - 4.2	4.0
Y - Chest Circumference	38.2 - 39.4	39.0
Z - Waist Circumference	32.9 - 34.1	33.5

Note: (See next page for external dimensions)

HYBRID III EXTERNAL DIMENSIONS



SIDE VIEW

FRONT VIEW

Note: Figure is referenced to the erect seated position. The curved lumbar does not allow the hybrid III to be positioned in a perfect erect attitude.

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET

DUMMY NO.: 66 DUMMY CALIBRATION BY: Rod McClelland & Al Chalmers

VERIFICATION DATE: 08-31-94

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

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	227
Peak Lateral Acceleration	15 G. MAX	8
Is Acceleration Curve Unimodel	within 10% of peak	Yes

2.0 NECK FLEXION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		22.6 - 23.4 FT/SEC	22.9
Pendulum Deceleration	10 MS	22.50 - 27.50 G	24.28
	20 MS	17.60 - 22.60 G	19.65
	30 MS	12.50 - 18.50 G	13.69
Max. Pendulum G Above 30 MS		29.0 G MAX	15.2
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	39
D Plane Rotation	MAX	64 - 78 DEG.	77
	TIME	57 - 64 MS	59
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	118
Moment About Occipital Condyle	MIN.	65 - 80 FT.LBS	71
	TIME	47 - 58 MS	52
Positive Moment - Time Curve Decay Time to Zero		97 - 107 MS	105

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	20.06
Pendulum Deceleration	10 MS	17.20 - 21.20 G	18.36
	20 MS	14.00 - 19.00 G	15.54
	30 MS	11.00 - 16.00 G	13.33
Max. Pendulum G Above 30 MS		22 G Max	13
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	44
D Plane Rotation	MAX	81 - 106 DEG.	101
	TIME	72 - 82 MS	77
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	161
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-49.7
	TIME	65 - 79 MS	72
Positive Moment - Time Curve Decay Time to Zero		120 - 148 MS	146

4.0 CHEST IMPACT TESTS

	SPECIFICATION	MEASUREMENT
Probe Speed	21.6 to 22.4 F/S	21.6
Peak Deflection	2.50 to 2.86 IN.	2.57
Peak Resistive Force	1160 to 1325 LBS.	1283
Internal Hysteresis	69 to 85%	71

5.0 KNEE IMPACT TESTS

LEFT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	7.0
Maximum Force	1060 - 1300 LBS.	1194

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	7.0
Maximum Force	1060 - 1300 LBS.	1184

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 065 DUMMY CALIBRATION BY: Rod McClelland & Al Chalmers

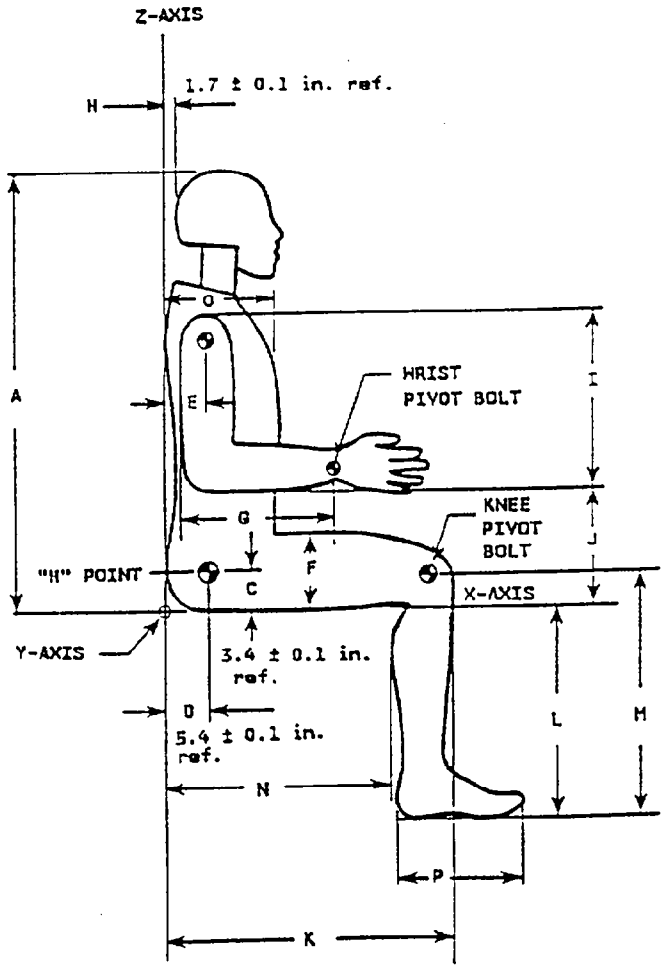
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 08-31-94

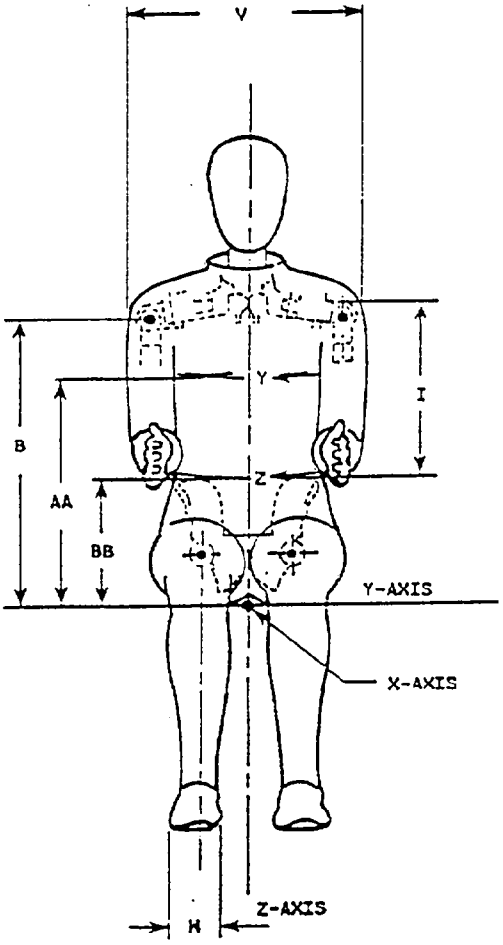
DESCRIPTION	SPECIFICATION (Inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.8
B - Shoulder Pivot Height	19.9 - 20.5	20.5
C - "H" Point Height	3.3 - 3.5	3.5
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1	6.1
G - Back of Elbow to Wrist Pivot	11.4 - 12.0	11.5
H - Skull Cap Skin to Backline	1.6 - 1.8	1.7
I - Shoulder Elbow Length	13.0 - 13.6	13.0
J - Elbow Rest Height	7.5 - 8.3	8.0
K - Buttock Knee Length	22.8 - 23.8	23.5
L - Popliteal Height	16.9 - 17.9	17.0
M - Knee Pivot Height	19.1 - 19.9	19.5
N - Buttock Popliteal Length	17.8 - 18.8	18.5
O - Chest Depth at 3rd Rib	8.4 - 9.0	8.8
P - Foot Length	9.9 - 10.5	10.3
V - Shoulder Breadth	16.6 - 17.2	16.8
W - Foot Breadth	3.5 - 4.2	4.0
Y - Chest Circumference	38.2 - 39.4	39.0
Z - Waist Circumference	32.9 - 34.1	33.5

Note: (See next page for external dimensions)

HYBRID III EXTERNAL DIMENSIONS



SIDE VIEW



FRONT VIEW

Note: Figure is referenced to the erect seated position. The curved lumbar does not allow the hybrid III to be positioned in a perfect erect attitude.

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

DUMMY NO.: 65 DUMMY CALIBRATION BY: Rod McClelland & Al Chalmers

VERIFICATION DATE: 08-31-94

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

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	254
Peak Lateral Acceleration	15 G. MAX	2
Is Acceleration Curve Unimodal	within 10% of peak	Yes

2.0 NECK FLEXION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		22.6 - 23.4 FT/SEC	22.9
Pendulum Deceleration	10 MS	22.50 - 27.50 G	22.57
	20 MS	17.60 - 22.60 G	20.95
	30 MS	12.50 - 18.50 G	15.85
Max. Pendulum G Above 30 MS		29.0 G MAX	15.8
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	40
D Plane Rotation	MAX	64 - 78 DEG.	72
	TIME	57 - 64 MS	59
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	114
Moment About Occipital Condyle	MIN.	65 - 80 FT.LBS	73
	TIME	47 - 58 MS	51
Positive Moment - Time Curve Decay Time to Zero		97 - 107 MS	103

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	20.08
Pendulum Deceleration	10 MS	17.20 - 21.20 G	18.69
	20 MS	14.00 - 19.00 G	16.10
	30 MS	11.00 - 16.00 G	11.53
Max. Pendulum G Above 30 MS		22 G Max	12
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	45
D Plane Rotation	MAX	81 - 106 DEG.	100
	TIME	72 - 82 MS	76
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	161
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-46.6
	TIME	65 - 79 MS	72
Positive Moment - Time Curve Decay Time to Zero		120 - 148 MS	146

4.0 CHEST IMPACT TESTS

	SPECIFICATION	MEASUREMENT
Probe Speed	21.6 to 22.4 F/S	21.7
Peak Deflection	2.50 to 2.86 IN.	2.85
Peak Resistive Force	1160 to 1325 LBS.	1312
Internal Hysteresis	69 to 85%	72

5.0 KNEE IMPACT TESTS

LEFT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	7.0
Maximum Force	1060 - 1300 LBS.	1231

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	7.0
Maximum Force	1060 - 1300 LBS.	1161

APPENDIX D

Dummy, Vehicle and Laboratory Calibration Data

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 66

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ACCH1	Endevco	07/28/94
Head Y	ACCT6	Endevco	07/28/94
Head Z	AAMW5	Endevco	07/28/94
Head X Redundant	AH1E2	Endevco	07/07/94
Head Y Redundant	AJ9D2	Endevco	10/19/94
Head Z Redundant	AJ7K3	Endevco	09/12/94
Chest X	ACCY1	Endevco	07/28/94
Chest Y	ACCC8	Endevco	07/28/94
Chest Z	ACCT7	Endevco	07/28/94
Chest X Redundant	AJ9D4	Endevco	10/18/94
Chest Y Redundant	AJ9F3	Endevco	10/18/94
Chest Z Redundant	AJ9D9	Endevco	10/18/94
Right Femur Load Cell	261	Denton	08/01/94
Left Femur Load Cell	262	Denton	11/11/94
Pelvis X	AJ9L3	Endevco	10/17/94
Pelvis Y	AJ9E0	Endevco	10/18/94
Pelvis Z	AJ821	Endevco	10/14/94

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 66

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Load Cell X	443	Denton	Ø7/14/94
Neck Load Cell Y	443	Denton	Ø7/14/94
Neck Load Cell Z	443	Denton	Ø7/14/94
Neck Moment X	443	Denton	Ø7/14/94
Neck Moment Y	443	Denton	Ø7/14/94
Neck Momemt Z	443	Denton	Ø7/14/94
Chest Deflection Gauge	Ø66	Servo	Ø8/31/94
Lap Belt Load Cell	212	GSE	Ø8/Ø4/94
Torso Belt Load Cell	663	Lebow	1Ø/26/94

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 66

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Right Tibia Moment X	040	Denton	10/18/94
Upper Right Tibia Moment Y	040	Denton	10/18/94
Lower Right Tibia Moment Y	034	Denton	10/18/94
Lower Right Tibia Force X	034	Denton	10/18/94
Lower Right Tibia Force Z	034	Denton	10/18/94
Upper Left Tibia Moment X	023	Denton	10/18/94
Upper Left Tibia Moment Y	023	Denton	10/18/94
Lower Left Tibia Moment Y	019	Denton	10/18/94
Lower Left Tibia Force X	019	Denton	10/18/94
Lower Left Tibia Force Z	019	Denton	10/18/94

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 65

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	AAMN8	Endevco	07/28/94
Head Y	ACC70	Endevco	07/28/94
Head Z	ACCW9	Endevco	07/28/94
Head X Redundant	AH0A5	Endevco	06/20/94
Head Y Redundant	AHY91	Endevco	06/20/94
Head Z Redundant	AHTY4	Endevco	06/20/94
Chest X	ACC78	Endevco	07/12/94
Chest Y	ACCE6	Endevco	07/12/94
Chest Z	ACCY3	Endevco	07/12/94
Chest X Redundant	AJ9J7	Endevco	10/19/94
Chest Y Redundant	AJ7A2	Endevco	10/17/94
Chest Z Redundant	AJ819	Endevco	10/13/94
Right Femur Load Cell	259	Denton	08/01/94
Left Femur Load Cell	260	Denton	08/01/94
Pelvis X	AJ9D8	Endevco	10/18/94
Pelvis Y	AJ9D6	Endevco	10/18/94
Pelvis Z	AJ816	Endevco	10/17/94

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 65

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Load Cell X	442	Denton	Ø7/14/94
Neck Load Cell Y	442	Denton	Ø7/14/94
Neck Load Cell Z	442	Denton	Ø7/14/94
Neck Moment X	442	Denton	Ø7/14/94
Neck Moment Y	442	Denton	Ø7/14/94
Neck Momemt Z	442	Denton	Ø7/14/94
Chest Deflection Gauge	Ø65	Servo	Ø8/31/94
Lap Belt Load Cell	211	GSE	1Ø/26/94
Torso Belt Load Cell	691	Lebow	1Ø/26/94

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	MGA014	Entran	06/02/94
Right Rear Seat Crossmember X	MGA073	Entran	05/24/94
Top of Engine Block X	ED47	Endevco	06/23/94
Bottom of Engine X	AJ9E1	Endevco	10/14/94
Left Brake Caliper X	X06	Endevco	11/10/94
Right Brake Caliper X	A13	Endevco	10/30/94
Instrument Panel X	AH5D9	Endevco	10/25/94
Redundant Left Rear Seat Crossmember X	MGA119	Entran	11/04/94
Redundant Right Rear Seat Crossmember X	MGA155	Entran	06/30/94

	LABORATORY INSTRUMENTS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Bending Pendulum Accelerometer	AGH90	Endevco	09/01/94
Neck Bending Rotary Potentiometer	019	Lebow	08/29/94
Neck Bending Rotary Potentiometer	018	Lebow	08/29/94
Femur/Chest/Thorax Probe Accelerometer	403069	Sensotec	10/24/94
Abdomen Compression Force Gauge	N/A	Transducers Inc.	N/A

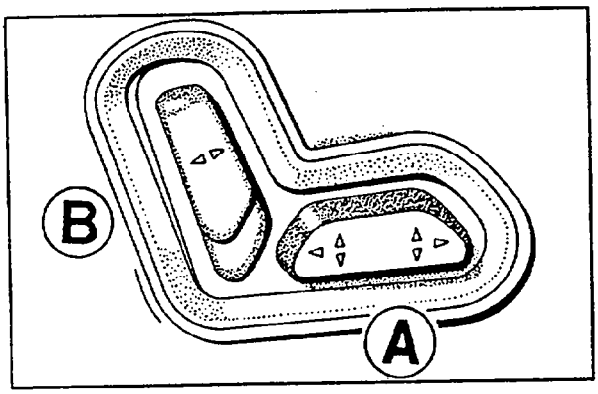
APPENDIX E

Vehicle Owner's Occupant Restraint System Instructions

Here you'll find information about the seats in your Aurora and how to use your safety belts properly. You can also learn about some things you should *not* do with air bags and safety belts.

Seats and Seat Controls

This part tells you about the seats--how to adjust them, and also about reclining seatbacks and head restraints.



To Adjust the Six-Way Power Seats

Horizontal Control (A): Raise the front of the seat by raising the forward edge of the button. Lower the front of the seat by lowering the forward edge of the button. Move the seat forward by moving the whole button toward the front of the vehicle.

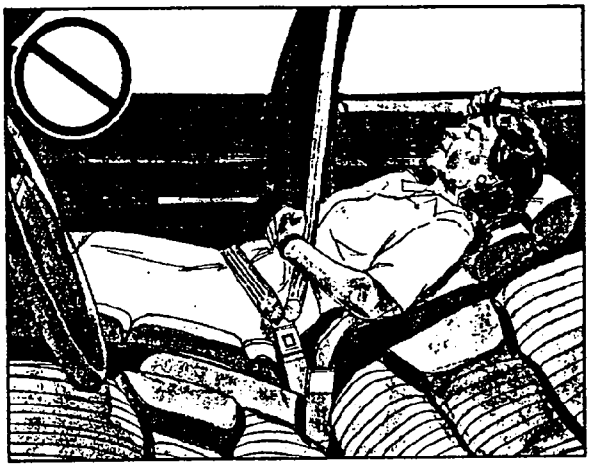
Raise the rear of the seat by raising the rear edge of the button. Lower the rear of the seat by lowering the rear edge of the button. Move the seat back by moving the whole button toward the rear of the vehicle.

Moving the whole button up or down raises or lowers the whole seat.

Vertical Control (B): Move the recliner rearward by moving the button toward the rear of the vehicle. Move the recliner forward by moving the button toward the front of the vehicle.

Reclining Front Seatbacks

The vertical control described previously in this section reclines the front seatbacks.



But don't have a seatback reclined if your vehicle is moving.

⚠ CAUTION:

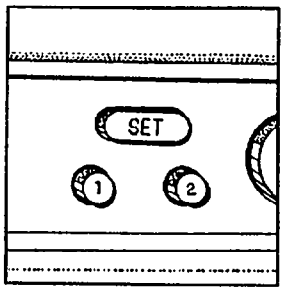
Sitting in a reclined position when your vehicle is in motion can be dangerous. Even if you buckle up, your safety belts can't do their job when you're reclined like this.

The shoulder belt can't do its job because it won't be against your body. Instead, it will be in front of you. In a crash you could go into it, receiving neck or other injuries.

The lap belt can't do its job either. In a crash the belt could go up over your abdomen. The belt forces would be there, not at your pelvic bones. This could cause serious internal injuries.

For proper protection when the vehicle is in motion, have the seatback upright. Then sit well back in the seat and wear your safety belt properly.

Memory Function

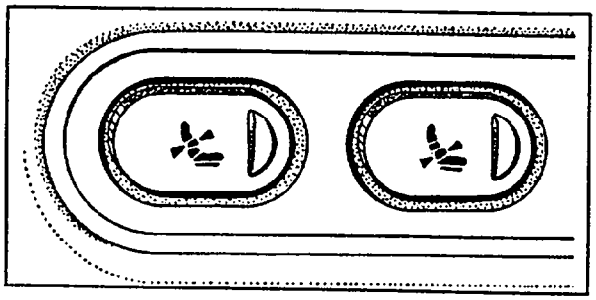


The memory function controls both the driver's seat and outside mirror positions. First position the seat and mirrors where you want them. Next, press the SET button. Within five seconds, press either the 1 or 2 button.

The seat and memory positions will be stored for the number pressed. Repeat the procedure to store another position with the other number if desired. To adjust the seat and mirrors to the stored position, press the number corresponding to the position. The memory function will only work with the gearshift in PARK (P).

To stop the automatic movement, move the seat bottom switch in any direction. For easier exiting, press the 1 and 2 buttons at the same time to move the seat completely down and back.

Lumbar Controls

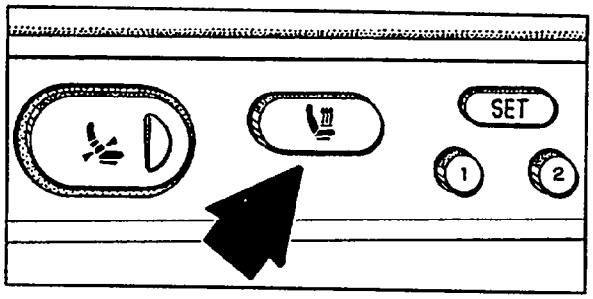


The rear lumbar control adjusts upper lumbar support; the front control adjusts lower lumbar support.

Press the front of the switch to increase support. Press the back of the switch to decrease support.

NOTE: The driver and passenger cannot inflate or deflate their lumbar supports at the same time.

Heated Seats (Option)



This feature will quickly heat the lower cushions and lower back of the driver and front passenger seats for added comfort.

Press the button once to turn the heater on high. The HI indicator light below the button will glow. Press it again to turn the heater on low. The LO indicator light below the button will glow. Press it a third time to turn the heater off. The heater will turn off automatically when the ignition is turned off.

Head Restraints

Slide the head restraint up or down so that the top of the restraint is closest to the top of your ears. This position reduces the chance of a neck injury in a crash.

The head restraints tilt forward and rearward also.

There are four different positions. Just grasp the top of the restraint and move it forward the way you want it to go until you hear a click. It will then be locked into that position until you need to move it again. Pulling it forward past the last position will allow the headrest to return to its full rear position.

Safety Belts: They're for Everyone

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

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

⚠ CAUTION:

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

Your vehicle has a light that comes on as a reminder to buckle up. (See "Safety Belt Reminder Light" in the Index.)

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

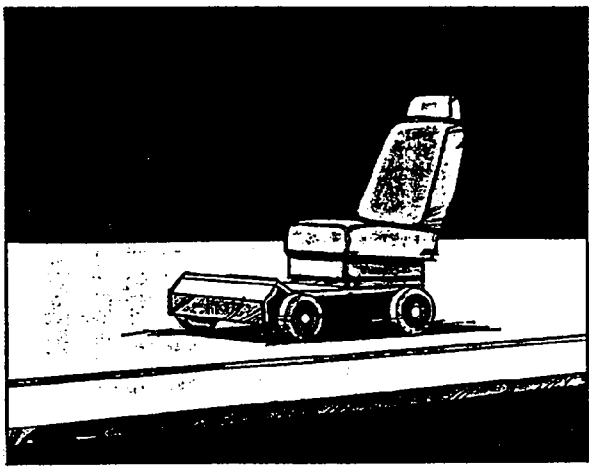
You never know if you'll be in a crash. If you do have a crash, you don't know if it will be a bad one.

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

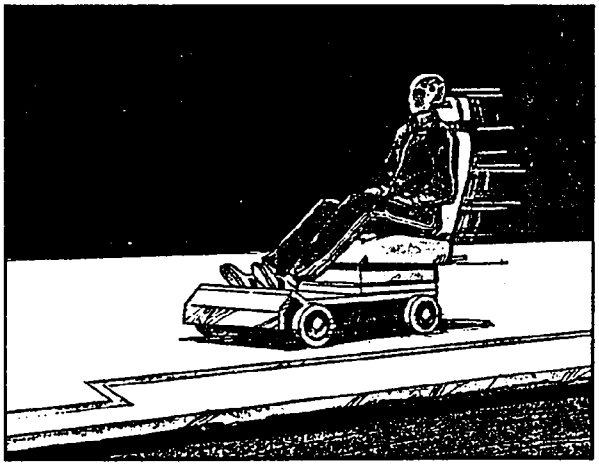
After more than 25 years of safety belts in vehicles, the facts are clear. In most crashes buckling up does matter ... a lot!

Why Safety Belts Work

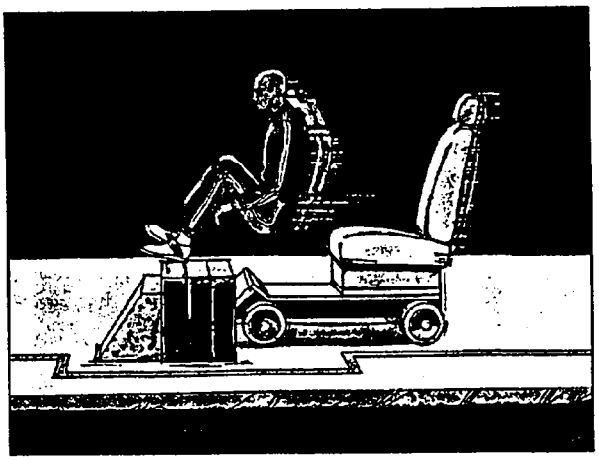
When you ride in or on anything, you go as fast as it goes.



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



Put someone on it.

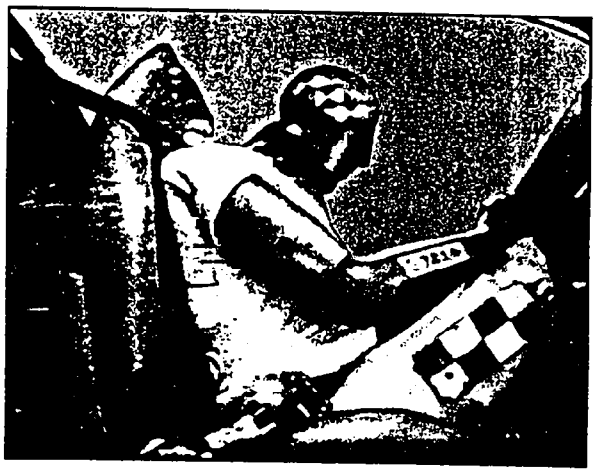


Get it up to speed. Then stop the vehicle. The rider doesn't stop.

The person keeps going until stopped by something.

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

or the instrument panel ...



or the safety belts!

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

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

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

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

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

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

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

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

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

Safety belts are for everyone.

How to Wear Safety Belts Properly

Adults

This part is only for people of adult size.

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

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

We'll start with the driver position.

Driver Position

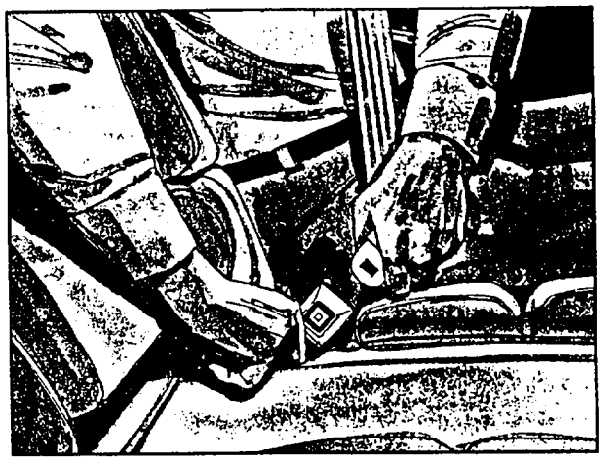
This part describes the driver's restraint system.

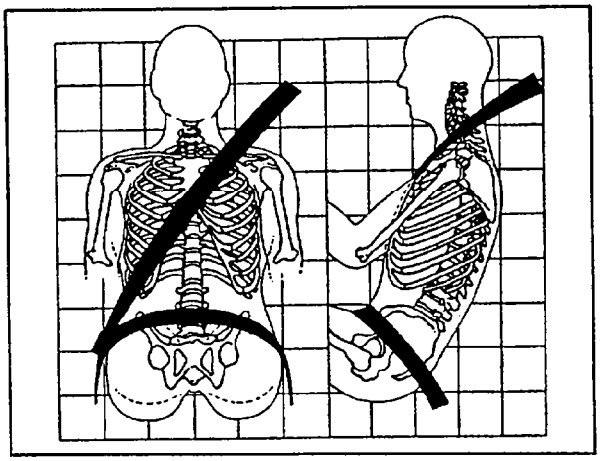
Lap-Shoulder Belt

The driver has a lap-shoulder belt. The shoulder portion of the belt has an energy management loop. It is designed to open and help protect you in certain crashes. If it opens, you will see a label on the safety belt that says to replace the belt. Be sure to do so. If you don't, the safety belt won't work properly and won't protect you in another crash. For more information on replacing safety belts after a crash, see "Replacing Safety Belts" in the Index.

Here's how to wear the lap-shoulder belt properly.

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





3. Pick up the latch plate and pull the belt across you. Don't let it get twisted.
4. Push the latch plate into the buckle until it clicks.

   Pull up on the latch plate to make sure it is secure. If the belt isn't long enough, see "Safety Belt Extender" at the end of this section.

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

The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.

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

Shoulder Belt Tightness Adjustment

Your car has a shoulder belt tightness adjustment feature. If the shoulder belt seems too tight, adjust it before you begin to drive.

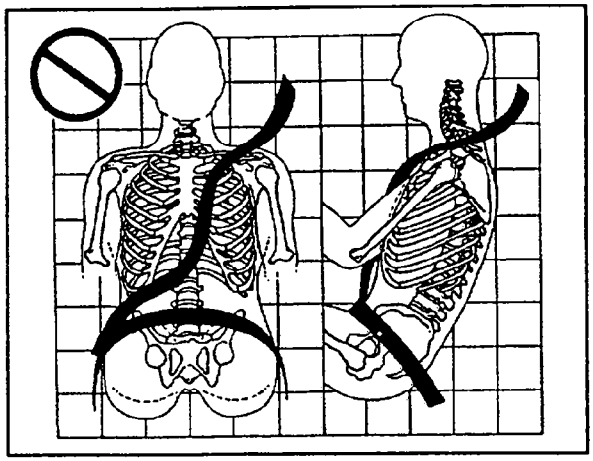
1. Sit well back in the seat.
2. Start pulling the shoulder belt out.

3. Just before it reaches the end, give it a quick pull.
4. Let the belt go back all the way. You should hear a slight clicking sound. If you don't, the adjustment feature won't set, and you'll have to start again.

5. Now you can add a small amount of slack. Lean forward slightly, then sit back. If you've added more than 1 inch (25 mm) of slack, pull the shoulder belt out as you did before and start again.

If you move around in the vehicle enough, or if you pull out the shoulder belt, the belt will become tight again. If this happens, you can reset it.

Q: **What's wrong with this?**

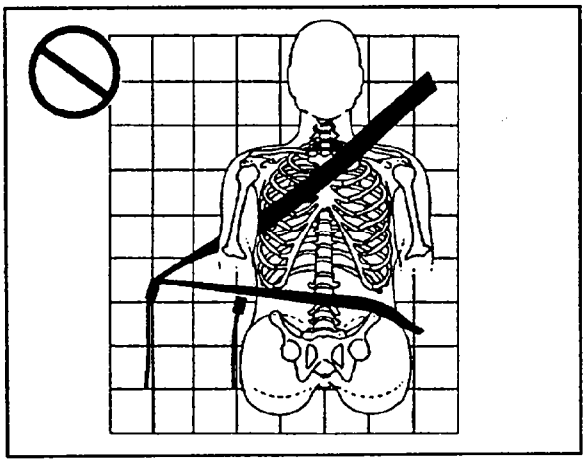


A: The shoulder belt is too loose. It won't give nearly as much protection this way.

⚠ CAUTION:

You can be seriously hurt if your shoulder belt is too loose. In a crash you would move forward too much, which could increase injury. The shoulder belt should fit against your body. Don't allow more than 1 inch (25 mm) of slack.

Q: **What's wrong with this?**

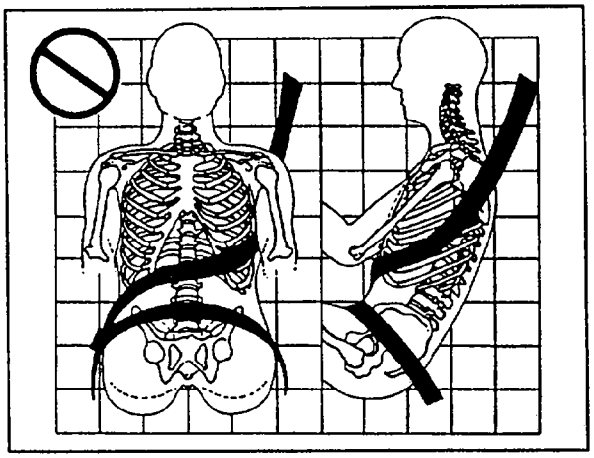


A: The belt is buckled in the wrong place.

⚠ CAUTION:

You can be seriously injured if your belt is buckled in the wrong place like this. In a crash, the belt would go up over your abdomen. The belt forces would be there, not at the pelvic bones. This could cause serious internal injuries. Always buckle your belt into the buckle nearest you.

Q: What's wrong with this?

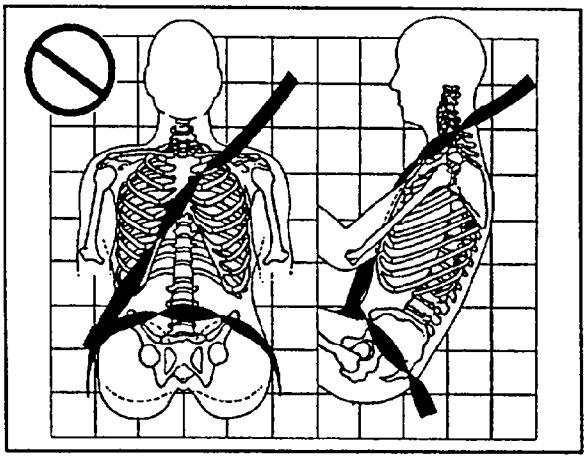


A: The shoulder belt is worn under the arm. It should be worn over the shoulder at all times.

⚠ CAUTION:

You can be seriously injured if you wear the shoulder belt under your arm. In a crash, your body would move too far forward, which would increase the chance of head and neck injury. Also, the belt would apply too much force to the ribs, which aren't as strong as shoulder bones. You could also severely injure internal organs like your liver or spleen.

Q: What's wrong with this?



A: The belt is twisted across the body.

⚠ CAUTION:

You can be seriously injured by a twisted belt. In a crash, you wouldn't have the full width of the belt to spread impact forces. If a belt is twisted, make it straight so it can work properly, or ask your retailer to fix it.

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

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

Supplemental Restraint System (SRS)

This part explains the Supplemental Restraint System (SRS), or air bag system.

Your Aurora has two air bags -- one air bag for the driver and another air bag for the right front passenger.

Here are the most important things to know about the air bag system:

⚠ CAUTION:

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

⚠ CAUTION:

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

⚠ CAUTION:

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

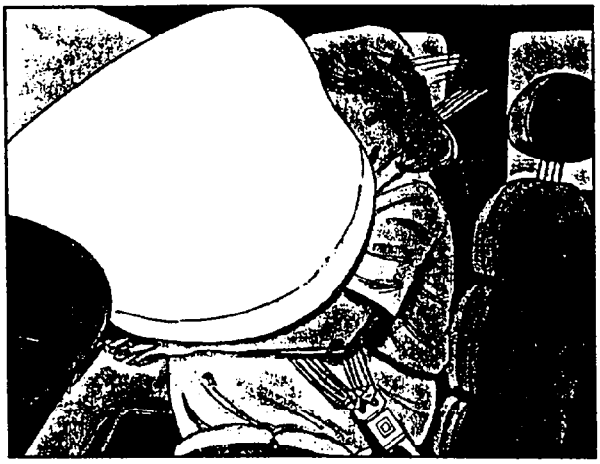
AIR BAG

There is an air bag readiness light on the instrument panel, which shows AIR BAG. The system checks the air bag's electrical system for malfunctions. The light tells you if there is an electrical problem. See "Air Bag Readiness Light" in the Index for more information.

How the Air Bag System Works

Where is the air bag?

The driver's air bag is in the middle of the steering wheel.



The right front passenger's air bag is in the instrument panel on the passenger's side.

⚠ CAUTION:

Don't put anything on, or attach anything to, the steering wheel or instrument panel. Also, don't put anything (such as pets, or objects) between any occupant and the steering wheel or instrument panel. If something is between an occupant and an air bag, it could affect the performance of the air bag -- or worse, it could cause injury.

When should an air bag inflate?

The air bag is designed to inflate in moderate to severe frontal or near-frontal crashes. The air bag will inflate only if the impact speed is above the system's designed "threshold level." If your vehicle goes straight into a wall that doesn't move or deform, the threshold level is about 8 to 11 mph (13 to 18 km/h). The threshold level can vary, however, with specific vehicle design, so that it can be somewhat above or below this range. If your vehicle strikes something that will move or deform, such as a parked car, the threshold level will be higher. The air bag is not designed to inflate in rollovers, side impacts, or rear impacts, because inflation would not help the occupant.

It is possible that in a crash only one of the two air bags in your Aurora will deploy. This is rare, but can happen in a crash just severe enough to make an air bag inflate.

In any particular crash, no one can say whether an air bag should have inflated simply because of the damage to a vehicle or because of what the repair costs were. Inflation is determined by the angle of the impact and the vehicle's deceleration. Vehicle damage is only one indication of this.

What makes an air bag inflate?

In a frontal or near-frontal impact of sufficient severity, the air bag sensing system detects that the vehicle is suddenly stopping as a result of a crash. The sensing system triggers a chemical reaction of the sodium azide sealed in the inflator. The reaction produces nitrogen gas, which inflates the air bag. The inflator, air bag, and related hardware are all part of the air bag modules packed inside the steering wheel and in the instrument panel in front of the right front passenger.

How does an air bag restrain?

In moderate to severe frontal or near-frontal collisions, even belted occupants can contact the steering wheel or the instrument panel. The air bag supplements the protection provided by safety belts. Air bags distribute the force of the impact more evenly over the occupant's upper body, stopping the occupant more gradually. But air bags would not help you in many types of collisions, including rollovers and rear and side impacts, primarily because an occupant's motion is not toward the air bag. Air bags should never be regarded as anything more than a supplement to safety belts, and then only in moderate to severe frontal or near-frontal collisions.

What will you see after an air bag inflates?

After the air bag inflates, it quickly deflates. This occurs so quickly that some people may not even realize the air bag inflated. Some components of the air bag module in the steering wheel hub for the driver's air bag, or the instrument panel for the right front passenger's bag, will be hot for a short time, but the part of the bag that comes into contact with you will not be hot to the touch. There will be some smoke and dust coming from vents in the deflated air bags. Air bag inflation will not prevent the driver from seeing or from being able to steer the vehicle, nor will it stop people from leaving the vehicle.

⚠ CAUTION:

When an air bag inflates, there is dust in the air. This dust could cause breathing problems for people with a history of asthma or other breathing trouble. To avoid this, everyone in the vehicle should get out as soon as it is safe to do so. If you have breathing problems but can't get out of the vehicle after an air bag inflates, then get fresh air by opening a window or door.

In many crashes severe enough to inflate an air bag, windshields are broken by vehicle deformation. Additional windshield breakage may also occur from the right front passenger air bag.

- The air bags are designed to inflate only once. After they inflate, you'll need some new parts for your air bag system. If you don't get them, the air bag system won't be there to help protect you in another crash. A new system will include air bag modules and possibly other parts. The service manual for your vehicle covers the need to replace other parts.

- Your vehicle is equipped with a diagnostic module, which records information about the air bag system. The module records information about the readiness of the system, when the sensors are activated and driver's safety belt usage at deployment.
- Let only qualified technicians work on your air bag system. Improper service can mean that your air bag system won't work properly. See your retailer for service.

NOTICE:

If you damage the cover for the driver's or the right front passenger's air bag, they may not work properly. You may have to replace the air bag module in the steering wheel or both the air bag module and the instrument panel for the right front passenger's air bag. Do not open or break the air bag covers.

Servicing Your Air Bag-Equipped Aurora

Air bags affect how your Aurora should be serviced. There are parts of the air bag system in several places around your vehicle. You don't want the system to inflate while someone is working on your vehicle. Your Aurora retailer and the 1995 Aurora Service Manual have information about servicing your vehicle and the air bag system. To purchase a service manual, see "Service and Owner Publications" in the Index.

The air bag system does not need regular maintenance.

⚠ CAUTION:

For up to 2 minutes after the ignition key is turned off and the battery is disconnected, an air bag can still inflate during improper service. You can be injured if you are close to an air bag when it inflates. Avoid wires wrapped with yellow tape, or yellow connectors. They are probably part of the air bag system. Be sure to follow proper service procedures, and make sure the person performing work for you is qualified to do so.