V2299

REPORT NO. MGA-96-N006
NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

HYUNDAI MOTORS
1995 HYUNDAI ACCENT
NHTSA NO. MS0504

MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105

Test Date: June 30, 1995

Report Date: July 26, 1995

Final Report

Prepared For:

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

16. Abstract

A 56 kph (35 mph) frontal barrier impact using a 30 load cell barrier was conducted on a 1995 Hyundai Accent 4 Door at the MGA Proving Grounds and Crash Test Center in Burlington, WI. on June 30, 1995.

The barrier impact velocity was 56.0 kph (34.8 mph), and the ambient temperature at the time of impact was 22°C. The post-test maximum static crush was 471 mm.

The test vehicle appeared to comply with the requirements of the following Federal Motor Vehicle Safety Standards:

1. FMVSS 212, "Windshield Mounting"
2. FMVSS 219 (partial), "Windshield Zone Intrusion"
3. FMVSS 301, "Fuel System Integrity"

With regard to FMVSS 208, "Occupant Crash Protection" injury criteria, the driver's HIC was 928 and the 3 msec. Clip (Chest g's) was 57 g's. The left and right femur loads for the driver were 4337 and 3243 Newtons, respectively. The passenger's HIC was 348 and the 3 msec Clip was 57 g's. The left and right femur maximum loads were 4771 and 4762 Newtons respectively.

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

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APPROVED BY: Nikki Walter

Nikki Walter
MGA Research Corporation

FINAL REPORT ACCEPTED BY:

Manager, New Car Assess. Program (NCAP)

DEC 14 1995

Date of Report Acceptance

Contracting Officer's Tech. Rep. (COTR)

DEC 14 1995

Date of Report Acceptance

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SECTION 1

PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY'96 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 Hyundai Accent 4 Door Sedan at a velocity of 56.0 kph (34.8 mph). The test was performed at the MGA Proving Grounds and Crash Test Center on June 30, 1995. 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, chest displacement transducer, neck load cell, and right/left femur load cells, and right/left lower leg sensors. Seat belt load cells were also on the driver and passenger shoulder and lap belts to measure dummy torso and pelvic section loading. Calibrated ATDs, driver (serial No. 065), and the right front passenger (Serial No. 066), were used for this test. Certification details, along with instrumentation calibration data, are found in Appendix C and D.

The 87 channels of data were recorded on 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 928. The maximum chest (CLIP) deceleration over 3 milliseconds was 57 g's. The maximum chest displacement is 33 mm. The left and right femur loads were 4337 and 3243 Newtons respectively.

The right front passenger's head struck the inflated airbag. The passenger HIC was 348 and maximum chest (CLIP) deceleration over 3 milliseconds was 57 g's. The maximum chest displacement is 31 mm. The left and right femur loads were 4771 and 4762 Newtons respectively.

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1995/Hyundai/Accent/4 Door Sedan

NHTSA No.: MS0504 VIN.: KMHVF14N4SU151902

Body color: Mauve Date of Manufacture: 1/95

Engine: 4 Cylinders; __C.I.D.; 1.5 Liters;

X Gas; __Diesel; __Turbocharged

__Longitudinal; X Transverse

Transmission: 3 Speed; __Manual; __Automatic; X Overdrive

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

Odometer Reading: 104 miles

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

__P/seats; __Tilt Wheel; __Cruise Control;

Type of Occupant Restraint: Type II belts and driver and passenger airbags

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 221 kPa (32 Psi) Rear 221 kPa (32 Psi)

Recommended Tire Size: *

Recommended Cold Tire Pressure: Front * kPa (* Psi) Rear * kPa (* Psi)

Tires on Vehicle: P175/70R13 ; Manufacturer: Uniroyal

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

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

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

Vehicle Capacity Weight (VCW) = 385.6 kg. (A)

No. of Occupants x 68.0 kg. = 340.2 kg. (B)

Rated Cargo Weight (RCW) A-B = 45.4 kg.

GVWR 1435 kg. GAWR: Front 790 kg.; Rear 730 kg.

* Could not find tire placard on vehicle

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

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

Right Front = 310.3 kg Right Rear = 192.8 kg

Left Front = 329.8 kg Left Rear = 192.8 kg

TOTAL FRONT WEIGHT = 640.1 kg (62.4% of Total Vehicle Weight)

TOTAL REAR WEIGHT = 385.6 kg (37.6% of Total Vehicle Weight)

TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 1025.7 kg

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight 1025.7 kg

VCW = Vehicle Capacity Weight 385.6 kg DSC = Designated Seating Capacity 5

RCW = VCW - 68 (DSC) = 45.4 *kg

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

Target Test Weight = 1222.7 kg

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:

Right Front = 368.3 kg Right Rear = 242.7 kg

Left Front = 362.4 kg Left Rear = 240.0 kg

TOTAL FRONT WEIGHT = 730.7 kg (60.2% of Total Vehicle Weight)

TOTAL REAR WEIGHT = 482.7 kg (39.8% of Total Vehicle Weight)

TOTAL TEST WEIGHT = 1213.4 kg

Weight of ballast secured in vehicle bed area = 0 kg

Vehicle components removed to meet target weight: Rear deck lid, right rear taillight, rear bumper assembly, rear seat belts, back seats, side mirrors, cargo area trim, rear speakers, and muffler

VEHICLE ATTITUDE (all dimensions in mm):

Delivered Attitude: RF 632 LF 628 RR 626 LR 621

Test Attitude: RF 617 LF 615 RR 599 LR 601

Wheel Base: 2400 mm; C.G. = 955 mm rearward of front wheel C/L

*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: June 30, 1995 Time of Test: 1:00 p.m.

Ambient Temperature: 22.0 °C (Spec. Range = 18.8 to 25.6°C)

Temperature in Occupant Compartment: 22.0°C

Windshield Molding Temperature: 22.0°C

Required Impact Velocity Range: 55.5 to 57.1 kph

Impact Velocity: primary = 56.0 kph; secondary = 56.3 kph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 1305 mm

Exiting Speed Trap: 305 mm

VEHICLE REBOUND AND CRUSH (mm):

Vehicle Length: Pre-test = R 3759 C_L 3916 L 3758

Post-test = R 3373 C_L 3445 L 3376

Crush = R 386 C_L 471 L 382

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

R 505 mm C_L 482 mm L 532 mm

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	to airbag	to airbag
Chest	no contact	no contact
Abdomen	no contact	no contact
Left Knee	to dash and steering column	to dash
Right Knee	to dash and steering column	to dash

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	Front		Rear	
Post-Test Door Opening	Left	Right	Left	Right
(without use of tools)	opened	opened	opened	opened

	Front		Rear	
Seat Movement	Left	Right	Left	Right
Seat Back Movement	none	none	N/A	N/A
Seat Shift (mm)	Ø	Ø	N/A	N/A

Glazing Damage

Backlight/Windshield Windshield cracked

Other Notable Impact Effects: None

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

POST TEST AIRBAG DATA

Vehicle Year/Make/Model/Body Style: 1995/Hyundai/Accent/4 Door Sedan

NHTSA: MS0504 ; Test Date: 6-30-95 ;

A. Number of Vent Holes: Driver 2 ; Passenger 2

B. Size of Vent Holes: Driver 22 mm ; Passenger 55 mm dia.

C. Total Vent Area; Driver 760 mm^2 ; Passenger 4752 mm^2

D. Deflated Airbag Length and Width Dimensions or, if Round, Diameter

Driver; Length ___ mm, Width ____, Diameter 662 mm

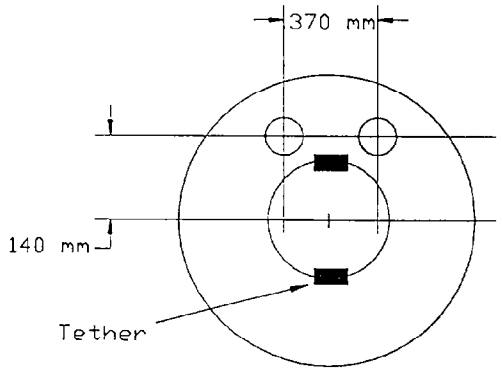
Passenger; Length 667 mm, Width 875 mm, Diameter ____

E. Is the Airbag Tethered?

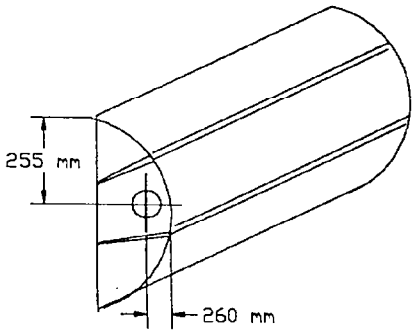
Driver; X Yes; __ No; If yes, record length of tether 265 mm

Passenger; X Yes; __ No; If yes, record length of tether 464 mm

Driver Airbag



Passenger Airbag



F. Part Numbers and Manufacture Name of Airbag and Gas Generator

Driver; Mfr * ; Airbag TB64306B0109 ; Gen 1X3EX43UBNX

Passenger; Mfr * ; Airbag * ; Gen HCPS5011210103

* Information could not be found on airbag assembly

[2] Two tethers

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

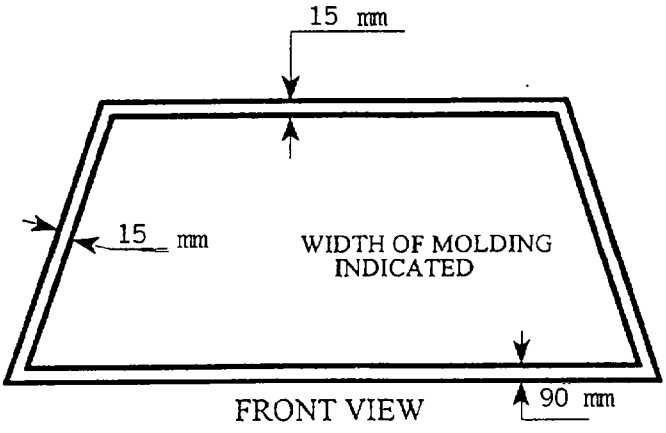
Details of windshield mounting such as retention method, trim type, etc.:
Windshield set in rubber molding with glue

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	1952	1952	100%
LEFT SIDE	1950	1950	100%
TOTAL	3902	3902	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 surface of the instrument panel, including padding, and drawing the locus of points on the inner surface of the windshield contactable by the sphere across the width of the instrument panel. From the outermost 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= 1022 mm

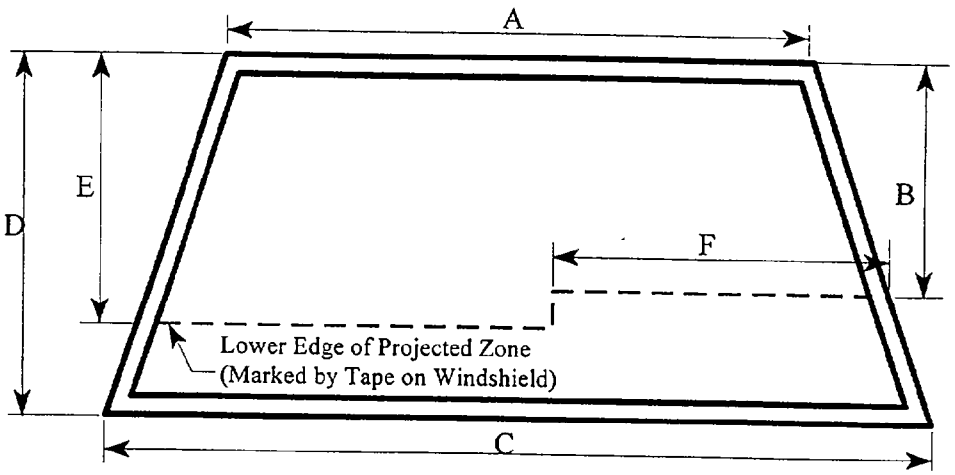
B= 473 mm

C= 1415 mm

D= 736 mm

E= 497 mm

F= 576 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.: MS0504 Test Date: June 30, 1995

Vehicle Mfgr./Make/Model: Hyundai/Accent/4 Door Sedan

Usable Capacity of Vehicle's Fuel Tank: 45.0 Liters
(figure furnished by vehicle manufacturer)

TEST REQUIREMENTS:

Drain the test vehicle's fuel system and operate the engine until the fuel system is dry. Add Stoddard solvent, which has been dyed purple, until 92-94% of the stated usable capacity is reached. Operate the engine to assure the Stoddard solvent is present throughout the entire fuel system.

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

41.9 Liters which is 93.0 % 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)

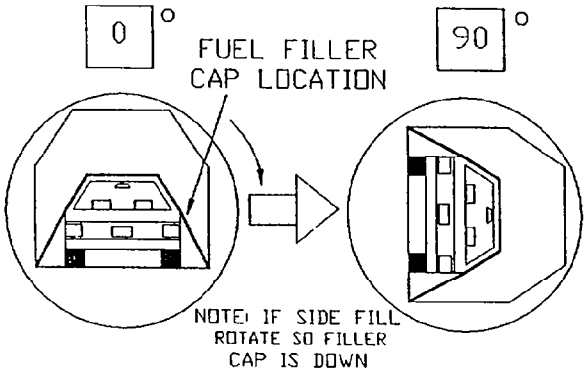
FUEL SPILLAGE MEASUREMENT:

	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.: MS0504



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:

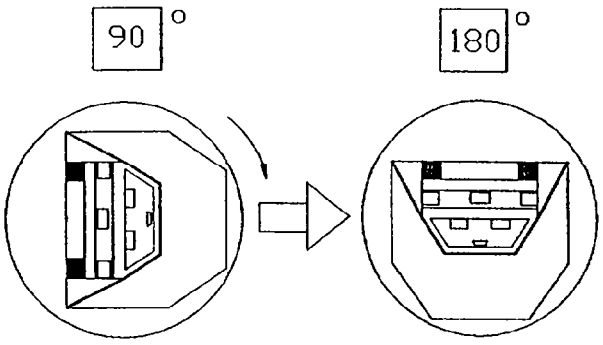
0	0	0	0

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: 90° - 180° Vehicle NHTSA ID No.: MS0504



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 28 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 28 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:

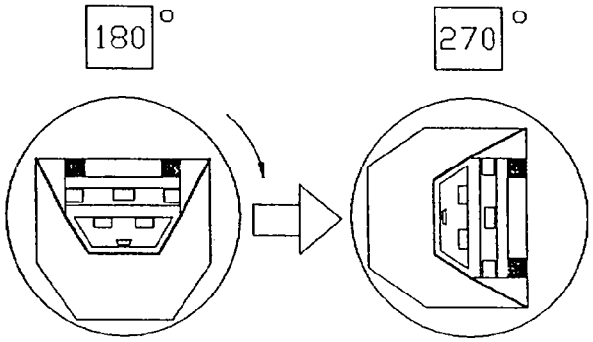
0	0	0	0

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.: MS0504



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 22 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 22 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:

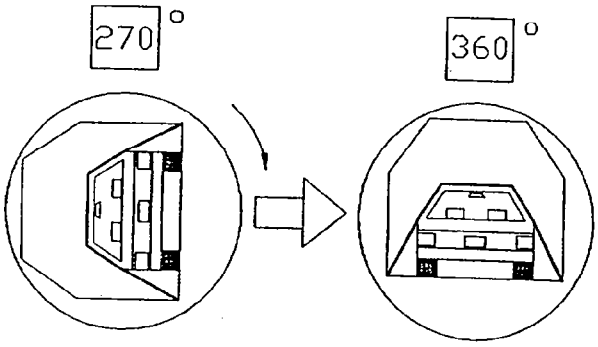
0	0	0	0

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.: MS0504



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 47 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 47 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0

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

IV. SOLVENT SPILLAGE LOCATIONS(S): None

SECTION 4

OMI FINAL DATA

Occupant and Vehicle Information

I. OMI DATA

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

II. OVR DATA

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

III. AID DATA

1. Accident Investigation Damage Data Summary

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

VEH. YR./MAKE/MODEL/BODY STYLE: 1995/Hyundai/Accent/4 Door Sedan

VEH. NHTSA NO.: MS0504 TEST DATE: June 30, 1995

MAX. ACCELERATION VALUES: (g's)	DRIVER #065	PASSENGER #066
Head Channel X	-84.7 @ 73 msec.	-42.3 @ 67 msec.
Head Channel Y	-13.6 @ 72 msec.	-24.2 @ 79 msec.
Head Channel Z	22.5 @ 53 msec.	19.0 @ 96 msec.
HEAD RESULTANT	86.2 @ 73 msec.	47.9 @ 74 msec.
Chest Channel X	-57.1 @ 68 msec.	-61.6 @ 63 msec.
Chest Channel Y	-8.5 @ 57 msec.	-10.8 @ 56 msec.
Chest Channel Z	-20.5 @ 62 msec.	-6.2 @ 76 msec.
CHEST RESULTANT (CLIP)	57.1	57.3
TIME INTERVAL (msec) [0.003 seconds minimum]	t_1 = 67.8 t_2 = 70.9	t_1 = 61.6 t_2 = 64.7

HEAD INJURY CRITERIA (HIC) VALUES:

HIC	928	348
t_1 = (msec)	52.4	52.9
t_2 = (msec)	84.5	88.9
Avg. Accel. t_1 to t_2 (g's)	60.9	39.3

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

MAX. COMPRESSIVE FEMUR FORCES:

Left Side (N)	4337	4771
Right Side (N)	3243	4762

MAXIMUM SEAT BELT FORCES:

Lap Belt (N)	5643	5289
Shoulder Belt (N)	5834	6151

HYBRID III NECK, CHEST AND PELVIS DATA SHEET

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1995/Hyundai/Accent/4 Door Sedan

VEHICLE NHTSA NO.: MS0504 TEST DATE: June 30, 1995

MAXIMUM VALUES	DRIVER DUMMY #065	PASSENGER DUMMY #066
Neck Load X (N)	-968 @ 66 msec.	-277 @ 107 msec.
Neck Load Y (N)	151 @ 160 msec.	-290 @ 58 msec.
Neck Load Z (N)	1354 @ 57 msec.	4444 @ 82 msec.
Neck Moment X (NM)	12.3 @ 79 msec.	18.0 @ 106 msec.
Neck Moment Y (NM)	-64.1 @ 65 msec.	-35.3 @ 119 msec.
Neck Moment Z (NM)	-14.4 @ 88 msec.	-29.6 @ 84 msec.
Chest Deflection X (mm)	32.6	31.3
Time of Max. Occurrence	76 msec.	84 msec.
Pelvis X Acceleration (g's)	-46.6 @ 54 msec.	-70.4 @ 54 msec.
Pelvis Y Acceleration (g's)	-13.1 @ 69 msec.	-16.6 @ 167 msec.
Pelvis Z Acceleration (g's)	-44.7 @ 57 msec.	-40.6 @ 62 msec.
Pelvis Resultant (g's)	59.6 @ 57 msec.	71.2 @ 54 msec.

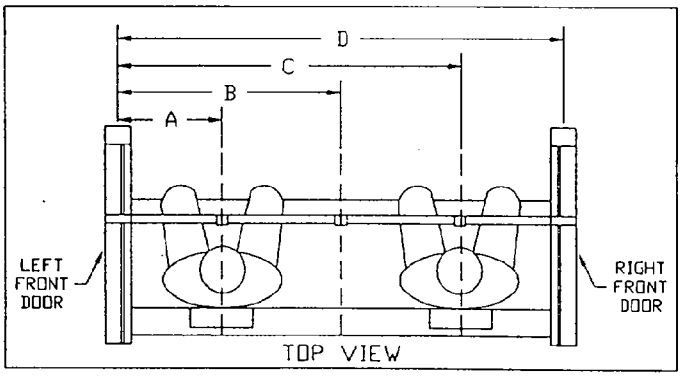
PART 572 DUMMY IN-VEHICLE POSITION

Vehicle NHTSA No.: MS0504 Vehicle: 1995 Hyundai Accent 4 Door Sedan

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

Driver Seat Position
8th notch rearward of 14 notches

Passenger Seat Position
8th notch rearward of 14 notches



065 DUMMY ID 066

A	= Left Door to Driver Centerline	402 mm
B	= Left Door to Center Passenger Centerline	718 mm
C	= Left Door to Right Passenger Centerline	1048 mm
D	= Left Door to Right Door	1436 mm

FRONT SEAT MEASUREMENT TABLE

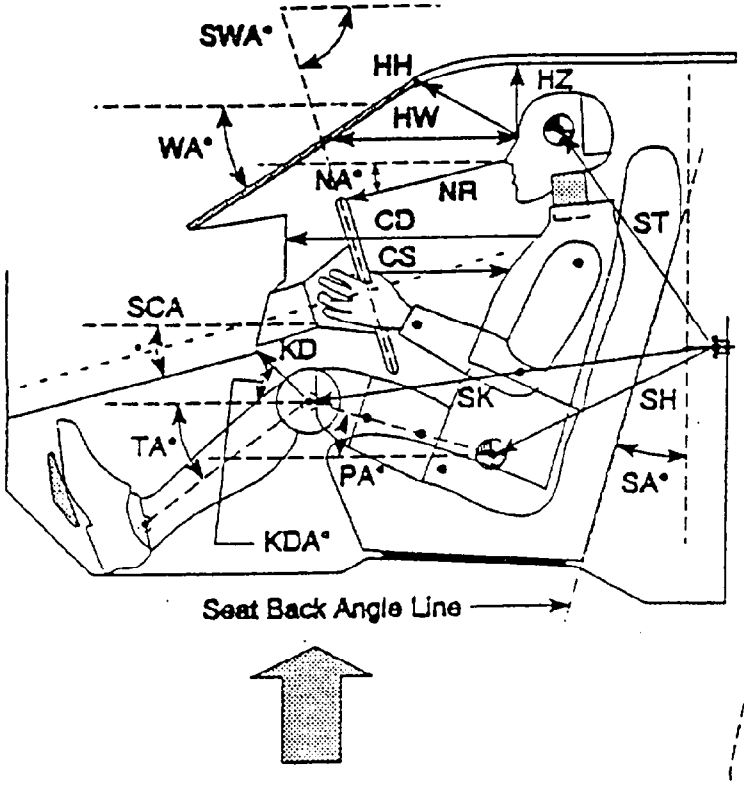
Units (mm)

	DRIVER (Serial #Ø65)	PASSENGER (Serial #Ø66)
WA°	31.2°	
SWA°	25.Ø°	N/A
SCA°	24.Ø°	N/A
SA°	14.5°	14.Ø°
HZ	164	151
HH	318	333
HW	5Ø4	496
HR	211	197
NR	454 Angle 1Ø.4°	N/A
CD	552	623
CS	351	N/A
RA	222	N/A
KDL	22Ø Angle 17.8°	21Ø
KDR	218	21Ø Angle 16.3°
PA°	23.8°	23.4°
TA°	44.Ø°	32.9°
KK	332	231
ST*	538 Angle 86.1°	539 Angle 87.8°
SK*	54Ø Angle Ø°	552 Angle -4.8°
SH*	21Ø Angle -4Ø.7°	191 Angle -46.6°
SHY	244	237
HS	274	268
HD	174	176
AD	1Ø2	12Ø

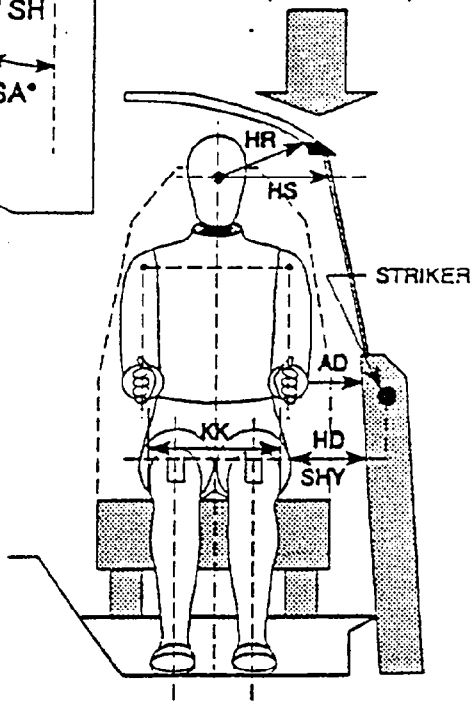
N/A = Not Applicable

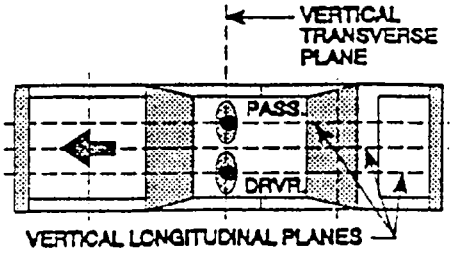
* Angles measured from horizontal

FRONT SEAT MEASUREMENTS



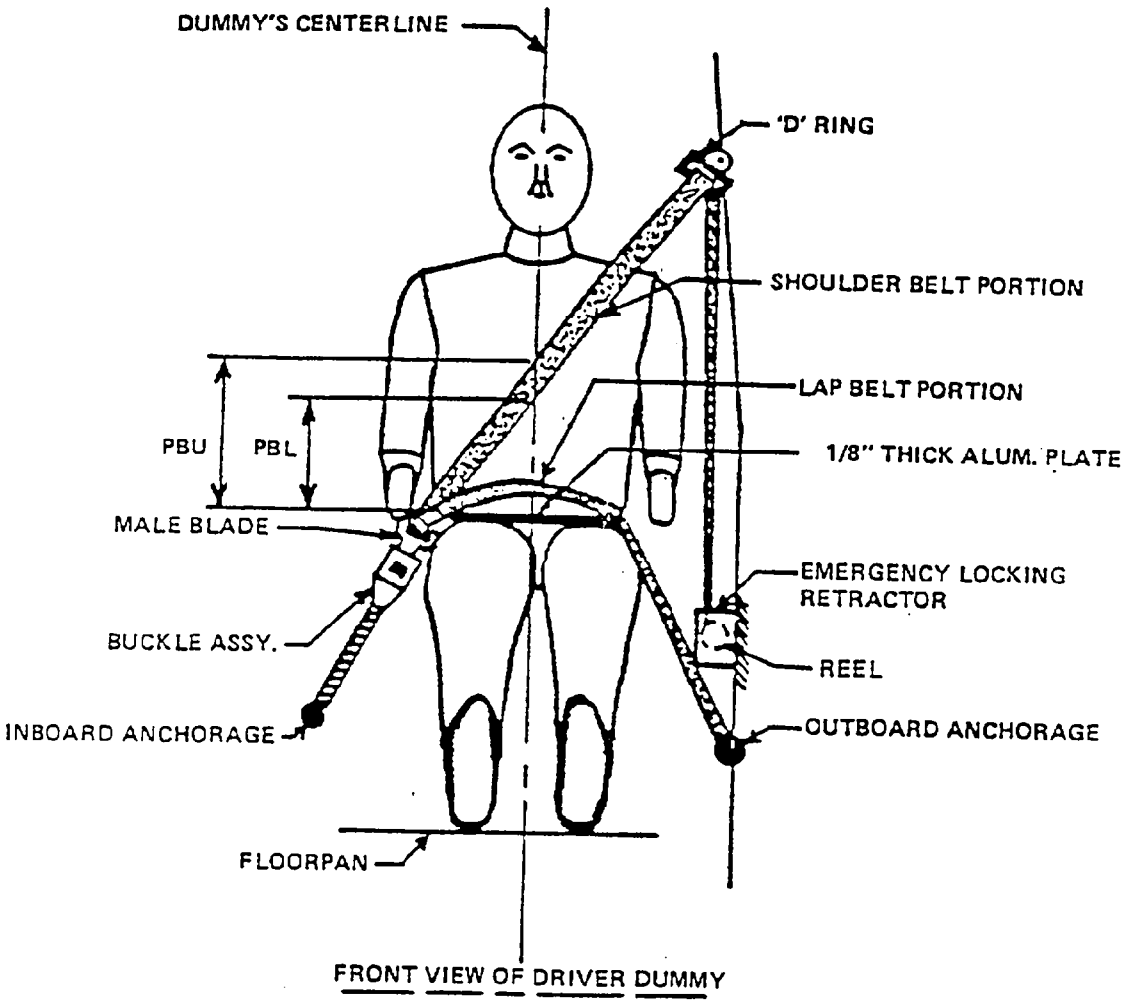
AD - Arm to Door
HD - H-Point to Door
HR - Head to Side Header
HS - Head to Side Window
KK - Knee to Knee
SHY- Striker to H-Point (Y Direction)





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	340	335
PBL -- Top surface of alum. plate to belt lower edge	260	255

Note: Adjustable "D" ring set in the 2nd position from the highest.

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:	Driver	Passenger	
Length from trim above retractor reel to "D" ring as measured on dummy.	1680 mm	1675 mm	
Shoulder belt length as measured on Part 572 Dummy.	750 mm	745 mm	
Lap belt length as measured on Part 572 Dummy.	755 mm	755 mm	
SHOULDER BELT SPOOL-OFF DATA:			
As determined by film analysis	91 mm	112 mm	
As determined mechanically	128 mm	131 mm	at retractor
	149 mm	148 mm	at D-ring
As determined electronically	N/R	N/R	
BELT STRETCH DATA:			
Measured electronically between shoulder belt load cell and the "D" ring.	N/R	N/R	
Measured mechanically	N/R	N/R	
RETRACTOR LOCK-UP TIME:			
As determined by shoulder belt spool-off observed in on-board cameras	57 msec	61 msec	

N/R = Not recorded

CAMERA LOCATIONS

VEH. NHTSA NO.: MS0504 ; TEST DATE: June 30, 1995 ; TIME: 1:00 p.m.

VEH. YEAR/MAKE/MODEL/BODY STYLE: 1995/Hyundai/Accent/4 Door Sedan

CAMERA POSITION NO.	VIEW	CAMERA POSITIONS (mm.)*			ANGLE (deg)	FILM PLANE TO HEAD TARGET (mm)	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Left Side View	-	-	-	-	-		
2	Left Front View	1100	7600	1170	90°	7230	25	1010
3	Steering Column Top	1870	7410	1565	90°	7040	25	1000
4	Steering Column Bottom	1860	7420	1035	90°	7050	25	1020
5	Left Driver Close-up	1490	7100	1090	90°	6730	50	971
6	Left Angle	5000	7000	2060			50	9090
7	Driver Onboard						35	1000
8	Passenger Onboard						35	1000
9	Right Overall	2020	-5970	1495	90°	5600	13	1010
10	Right Front	1600	-5750	1125	90°	5380	25	1005
11	Right Passenger Close-up	1220	-6360	1125	90°	5990	50	847
12	Right Angle	4950	-6960	2125			50	1250
13	Top View Wide	170	0	5230			8	1000
14	Top Driver	420	340	2640			13	1010
15	Top Passenger	360	-370	2570			13	952
16	Pit Engine	1180	0	-3185			13	909
17	Fuel Tank	2705	0	-3145			13	1010

* COORDINATES:

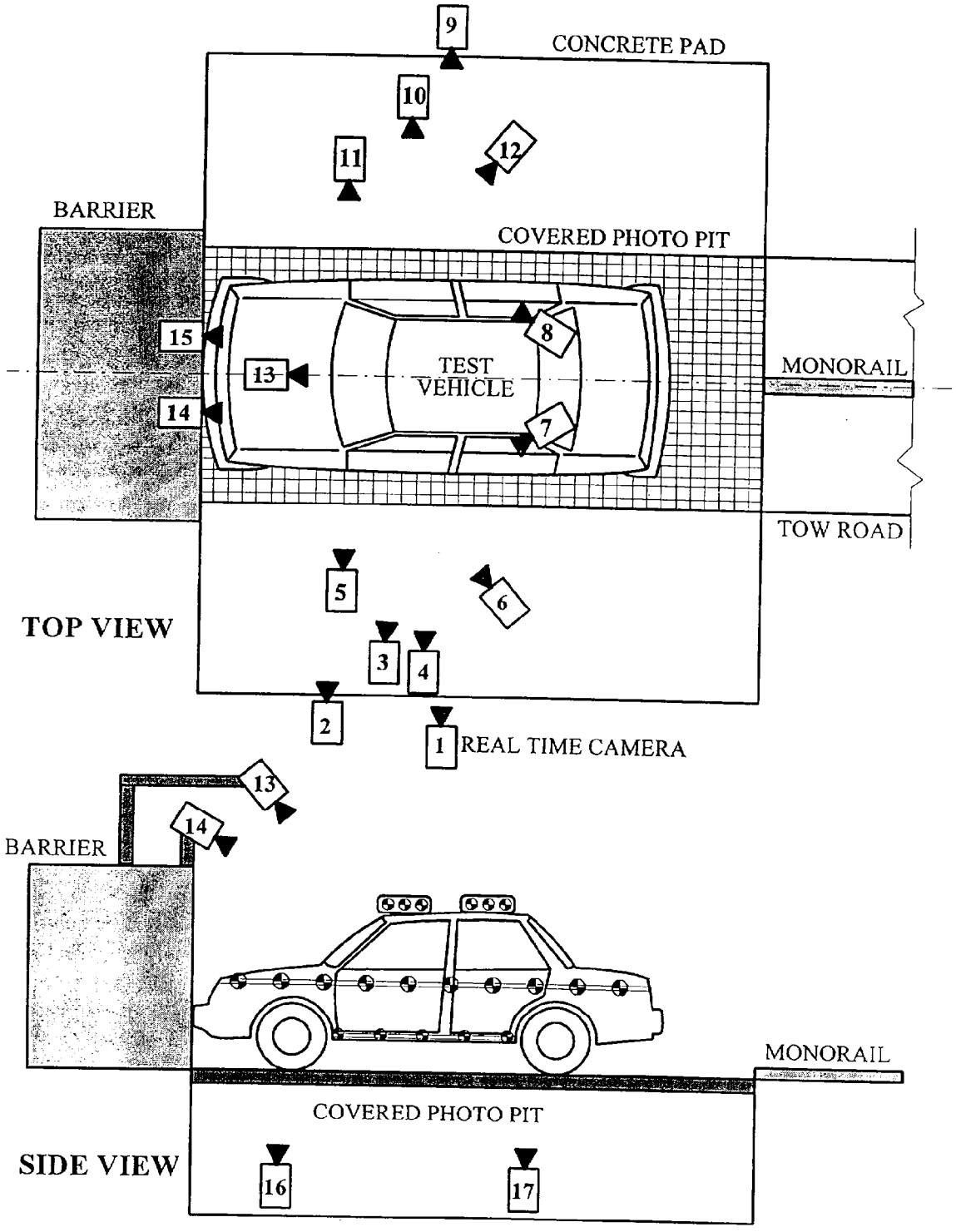
+X = film plane rearward of barrier

+Y = film plane to left of monorail centerline

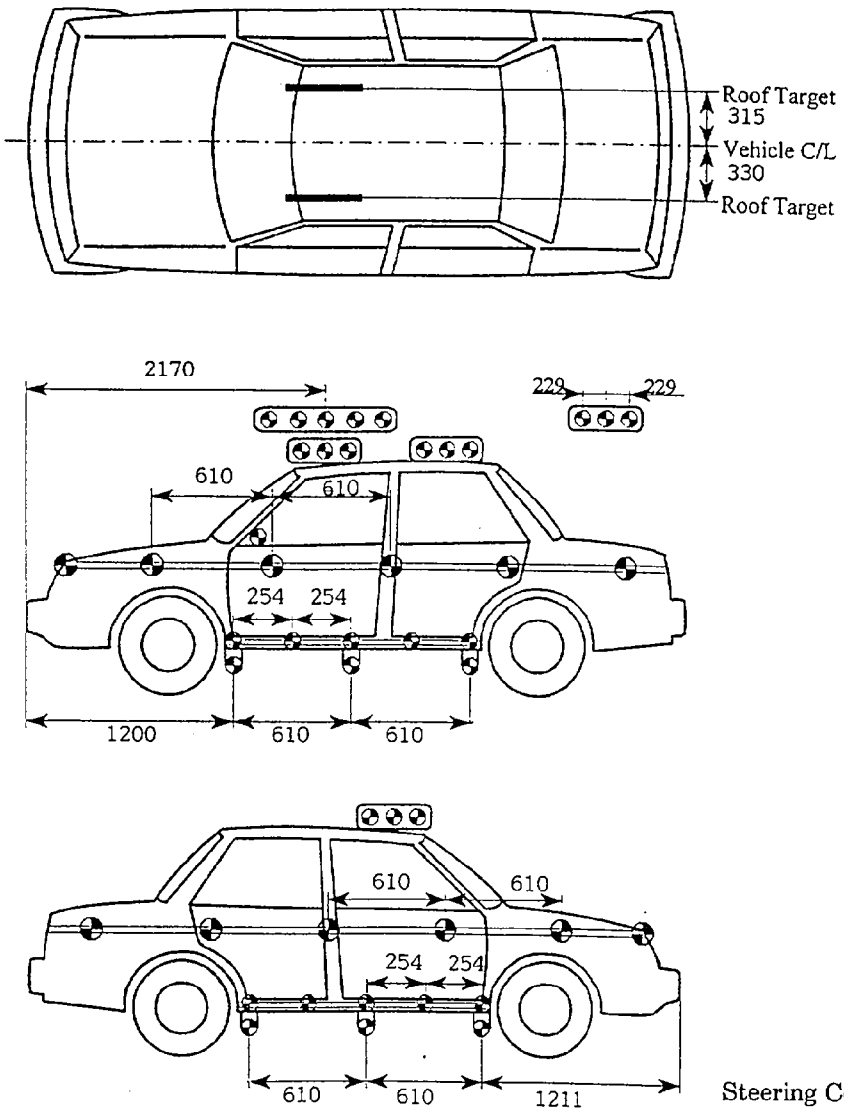
+Z = film plane to above ground level

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

CAMERA LOCATIONS (Cont'd)



VEHICLE TARGET LOCATIONS



Steering Column Target

X = 2353 (from rear)

Y = 315 (from centerline)

Z = 914 (from floor)

(DIMENSIONS IN MM)

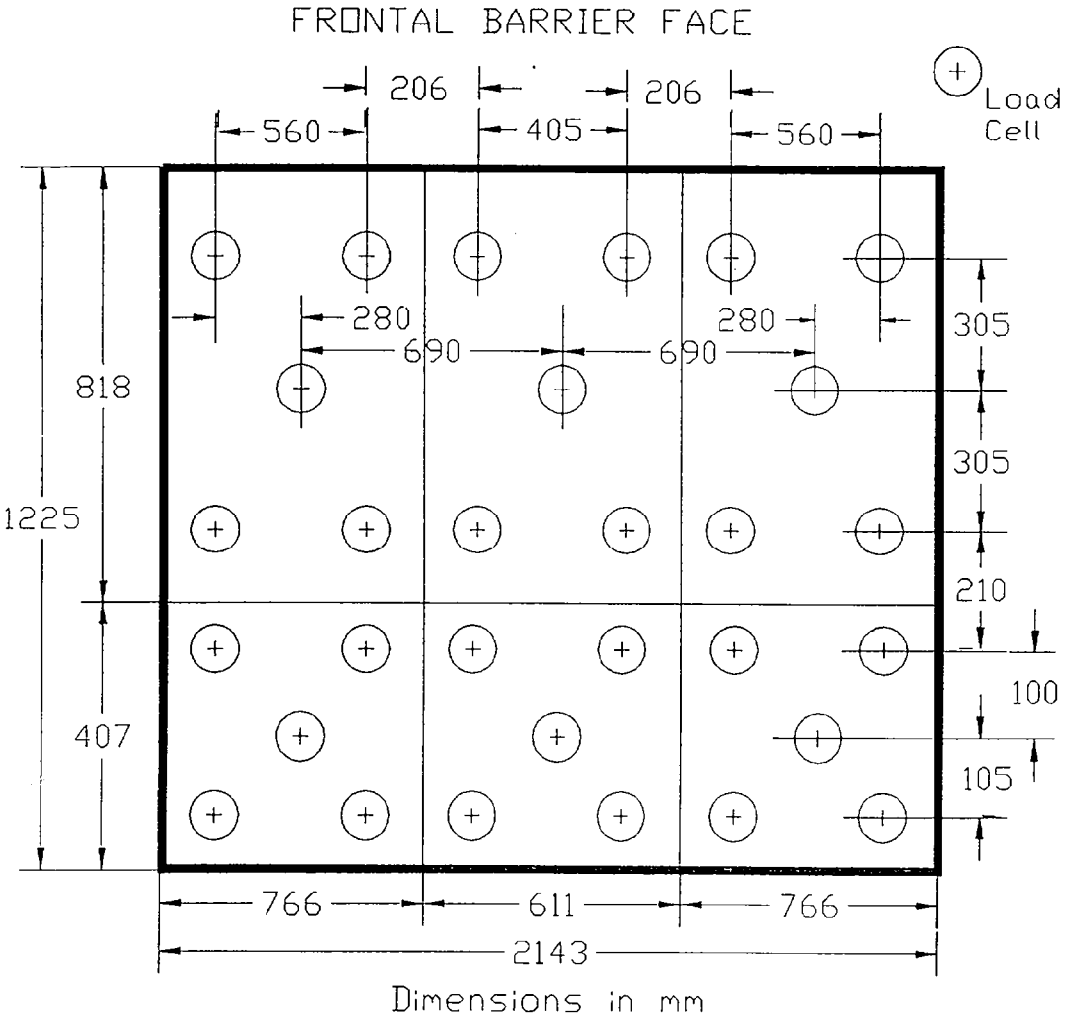
LOAD CELL LOCATIONS ON FIXED BARRIER

30 Load Cells

6 Rows

9 Columns

6 Groupings (5 cells/group)

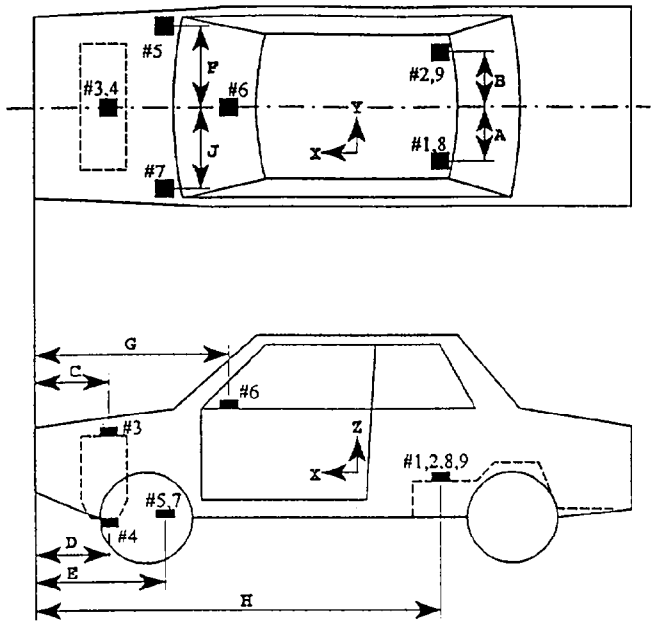


The following data is presented in Appendix B:

(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)

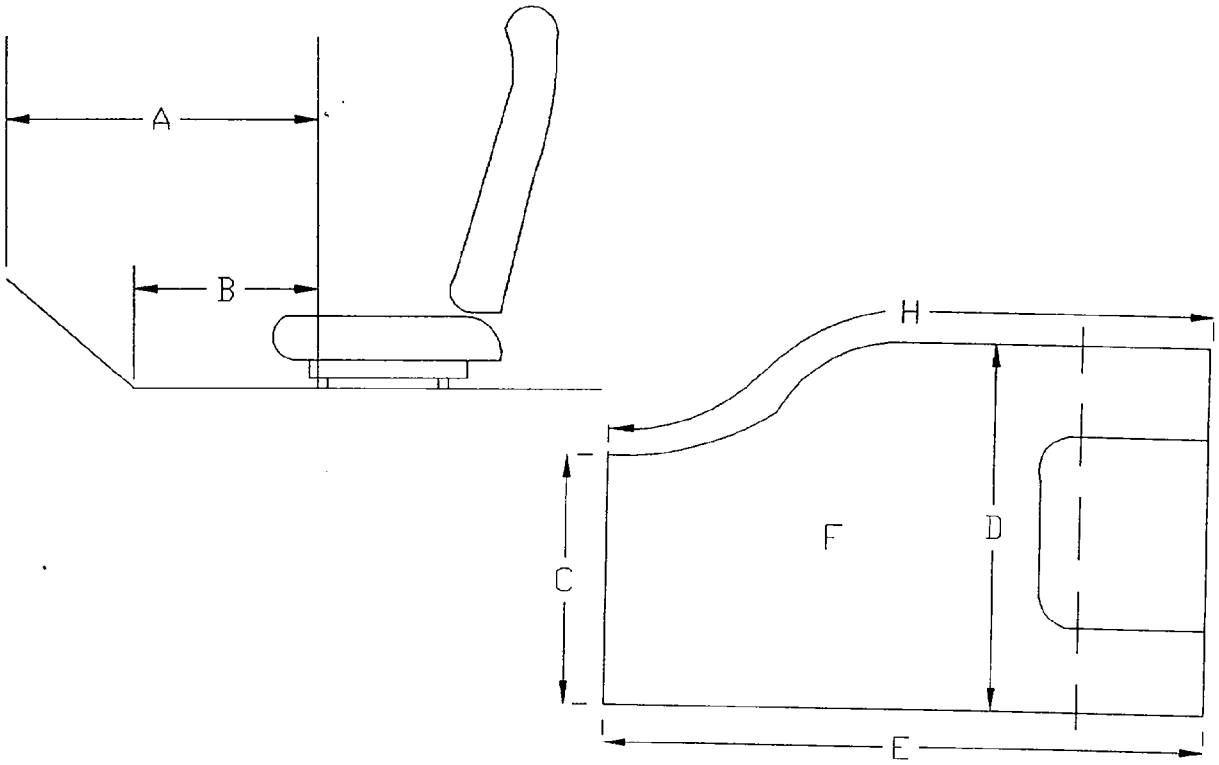
Dimension	Length
A	605
B	612
C	829
D	633
E	695
F	609
G	1007
H	2578
J	609

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

TEST VEHICLE MEASUREMENTS

STATIC FOOTWELL DEFORMATION

Driver's Side



Units = mm

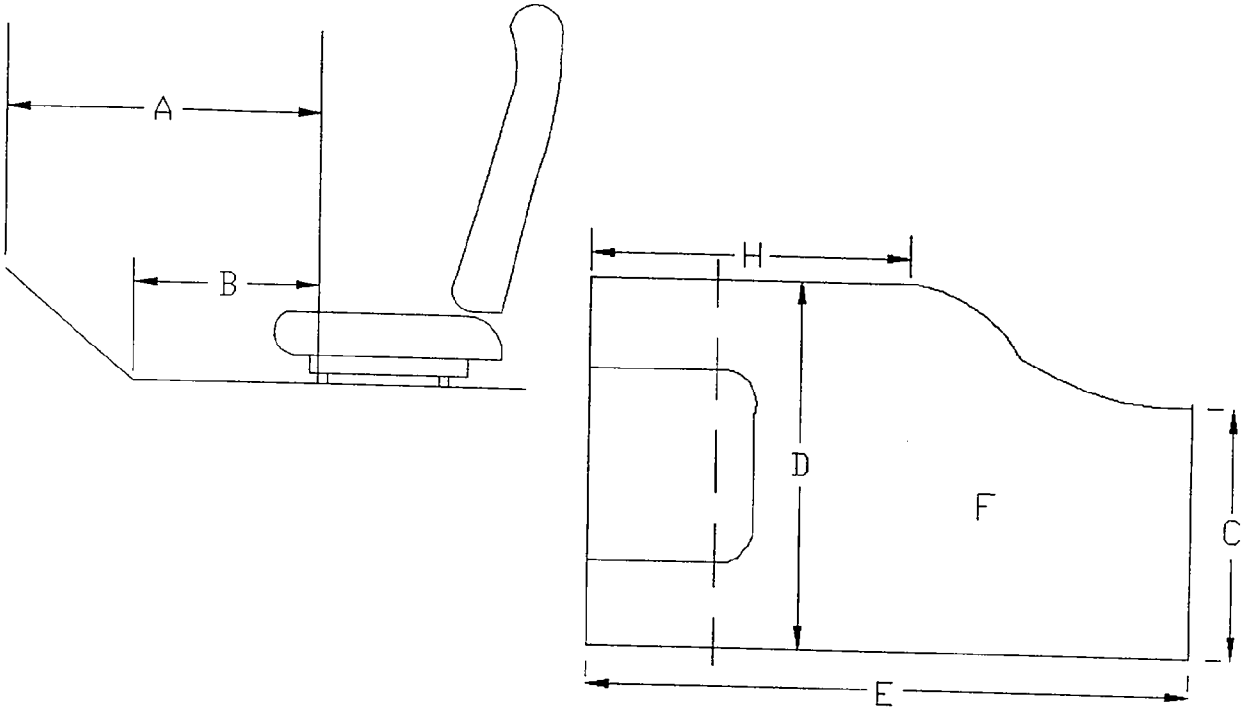
MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A*	2061	1920	141
B*	1879	1685	194
C	347	325	22
D	522	535	-13
E	2040	1830	210
H	1542	1560	-18
F (cm^2)	8864	7869	995

* These measurements were taken from the C-Post rather than the seat track.

TEST VEHICLE MEASUREMENTS

STATIC FOOTWELL DEFORMATION

Passenger's Side

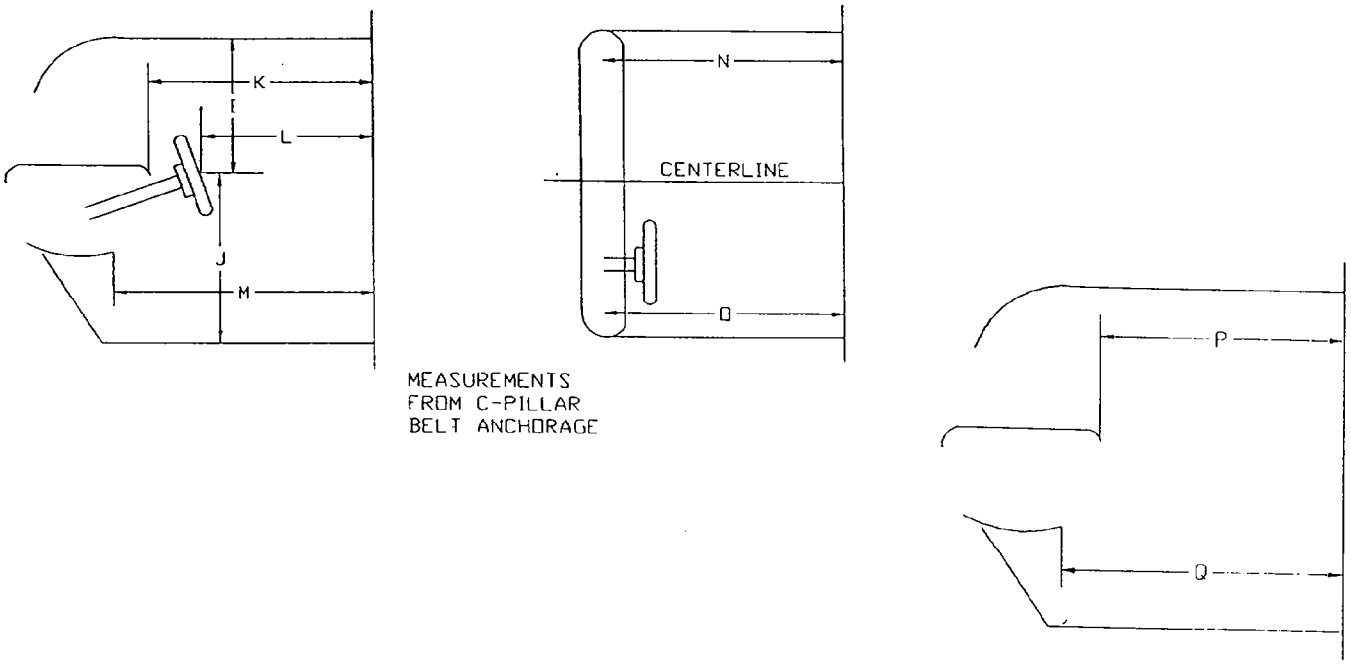


Units = mm

MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	2061	1880	181
B	1791	1750	41
C	447	450	-3
D	535	530	5
E	1881	1852	29
H	1585	1577	8
F (cm^2)	9236	9075	161

TEST VEHICLE MEASUREMENTS (Cont'd)

STATIC PASSENGER COMPARTMENT INTRUSION



Units = mm

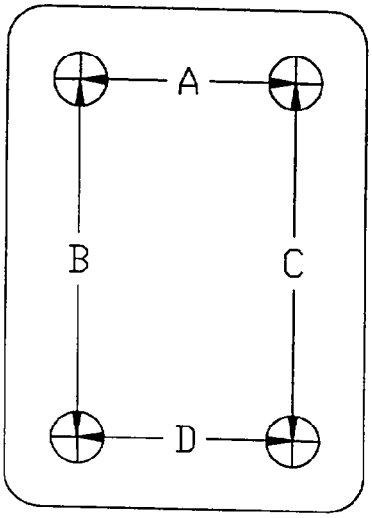
MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
I	408	N/R	N/A
J	655	N/R	N/A
K	1550	1550	0
L	1367	N/R	N/A
M	1778	N/R	N/A
N	1738	1697	41
O	1731	1712	19
P	1607	1560	47
Q	1761	N/R	N/A

N/R = Not recordable because steering column was removed by customer
N/A = Not applicable

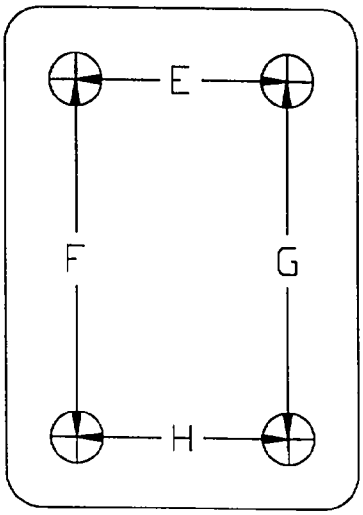
TEST VEHICLE MEASUREMENTS (Cont'd)

UNDERBODY FLOORBOARD DEFORMATION

DRIVER'S SIDE



PASSENGER'S SIDE



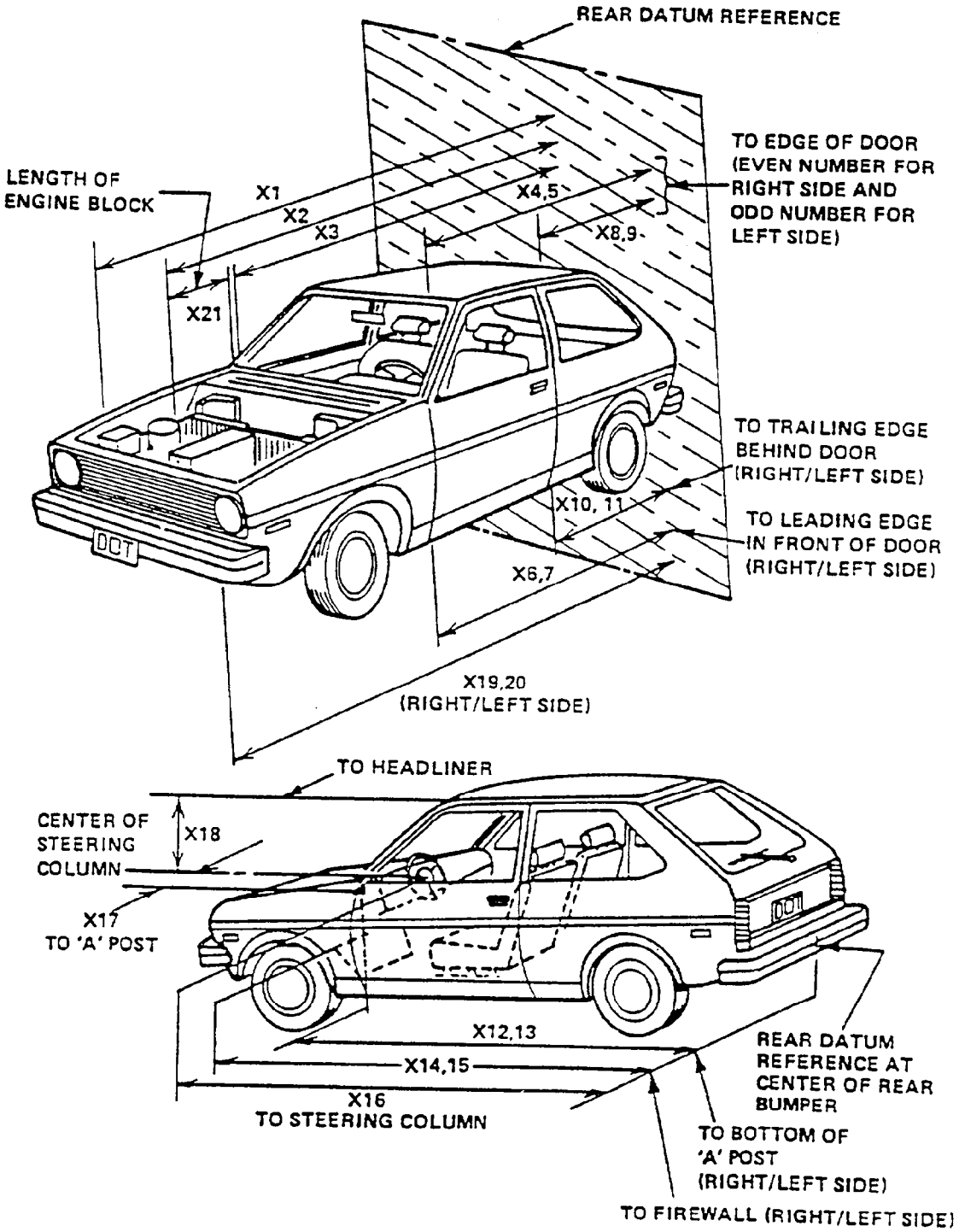
MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	372	364	8
B	482	421	61
C	475	275	200
D	362	368	-6
E	426	423	3
F	464	323	141
G	439	439	0
H	347	359	-12

TEST VEHICLE MEASUREMENTS (Cont'd)

No.	MEASUREMENT DESCRIPTION:	Pre-Test (mm)	Post-Test (mm)	Diff. (mm)
X1	Total Length of Test Vehicle at Centerline	3916	3445	471
X2	Rear Surface of Vehicle to Front of Engine	3422	3Ø48	374
X3	Rear Surface of Vehicle to Firewall	2947	2865	82
X4	Rear Surface to Upr. Leading Edge of Rt. Door	261Ø	2577	33
X5	Rear Surface to Upr. Leading Edge of Left Door	26Ø8	2559	49
X6	Rear Surface to Lwr. Leading Edge of Rt. Door	2632	2636	-4
X7	Rear Surface to Lwr. Leading Edge of Left Door	2633	2627	6
X8	Rear Surface to Upr. Trailing Edge of Rt. Door	1644	16Ø2	42
X9	Rear Surface to Upr. Trailing Edge of Left Door	1638	1596	42
X1Ø	Rear Surface to Lwr. Trailing Edge of Rt. Door	1663	1665	-2
X11	Rear Surface to Lwr. Trailing Edge of Left Door	1663	1655	8
X12	Rear Surface to Bottom of A Post on Rt. Side	263Ø	2626	4
X13	Rear Surface to Bottom of A Post on Left Side	2633	26Ø7	26
X14	Rear Surface to Firewall on Right Side	2933	2822	111
X15	Rear Surface to Firewall on Left Side	2941	2875	66
X16	Rear Surface to Steering Column	2198	N/R	N/A
X17	Center of Steering Column to A Post	291	N/R	N/A
X18	Center of Steering Column to Headlining	435	N/R	N/A
X19	Rear Surface to Right Side of Front Bumper	3759	3373	386
X2Ø	Rear Surface to Left Side of Front Bumper	3758	3376	382
X21	Length of Engine Block	379	38Ø	-1

N/R = Not recordable because steering column was removed by customer

N/A = Not applicable


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

ACCIDENT INVESTIGATION DIVISION DATA

FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: Hyundai/Accent/4 Door Sedan

VEH. NHTSA NO.: MS0504 ; VIN: KMHVF14N4SU151902

MODEL YEAR: 1995 ; BUILD DATE: 1/95 ; TEST DATE: June 30, 1995

VEH. SIZE CATEGORY: Subcompact ; TEST WEIGHT: 1213.4 kg

VEH. WHEELBASE: 2400 mm ; FRONT OVERHANG: 760 mm ; OVERALL WIDTH: 1628 mm

ACCELEROMETER DATA:

LOCATION: As per measurements on pages 4-13

CALIBRATION PROCEDURE: As per MGA Calibration Procedure

LINEARITY: >99.9% ; INTEGRATION ALGORITHM: Trapezoidal

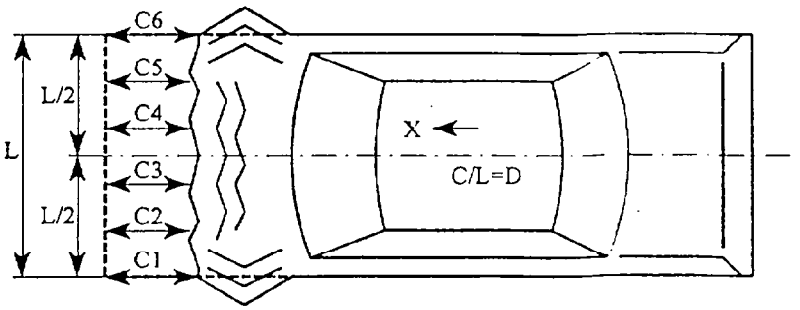
VEH: IMPACT SPEED: 56.0 kph ; TIME OF SEPARATION: 81 msec

VELOCITY CHANGE: 50.8 kph

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE: F (Frontal)

CRUSH DEPTH DIMENSIONS:

C1 = 382 mm
C2 = 441 mm
C3 = 464 mm
C4 = 468 mm
C5 = 459 mm
C6 = 386 mm



MIDPOINT OF DAMAGE: D = Vehicle Centerline (Longitude)

LENGTH OF DAMAGED REGION: L = 1401 mm

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (Cont'd)

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

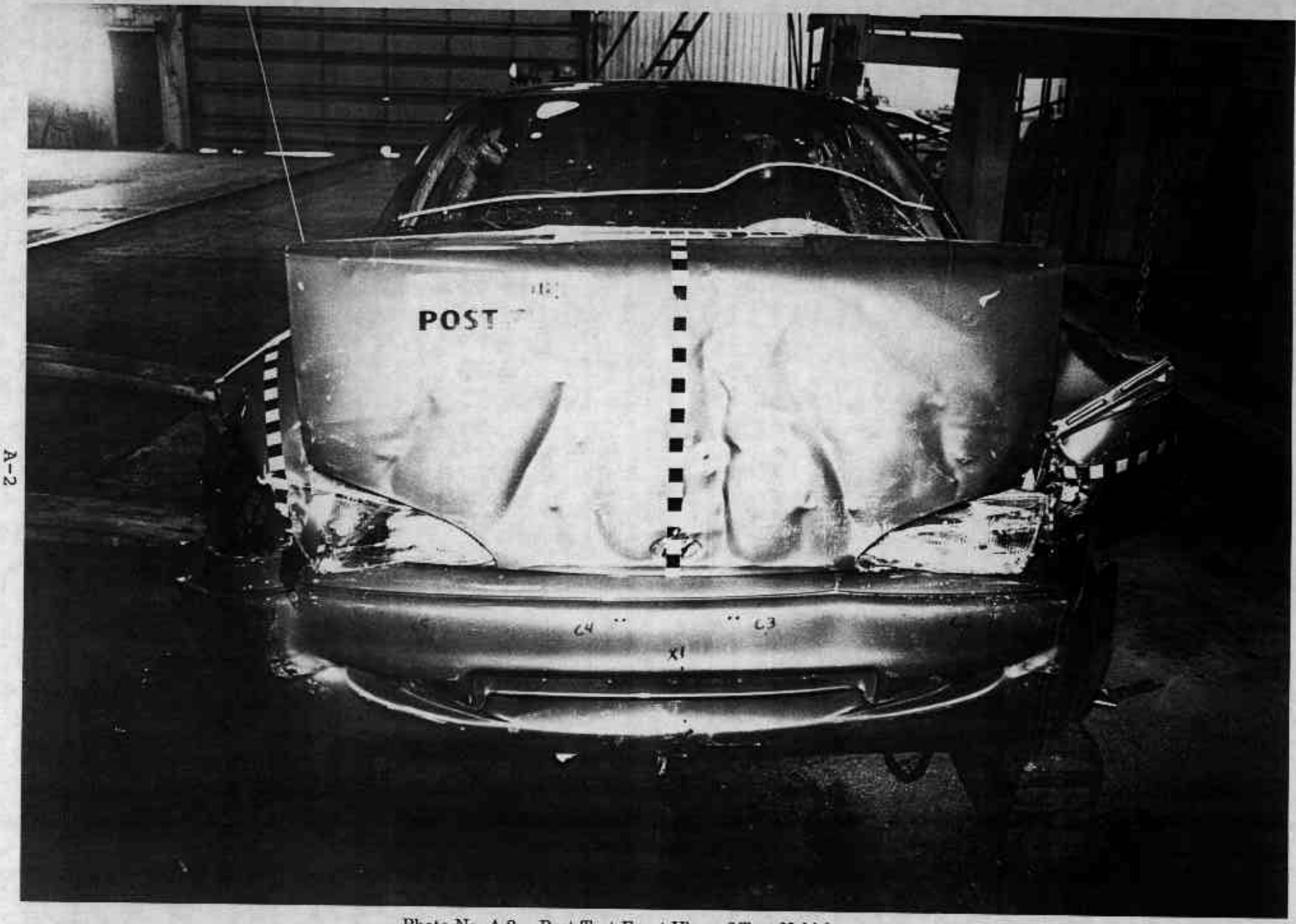


Photo No. A-2 - Post-Test Front View of Test Vehicle

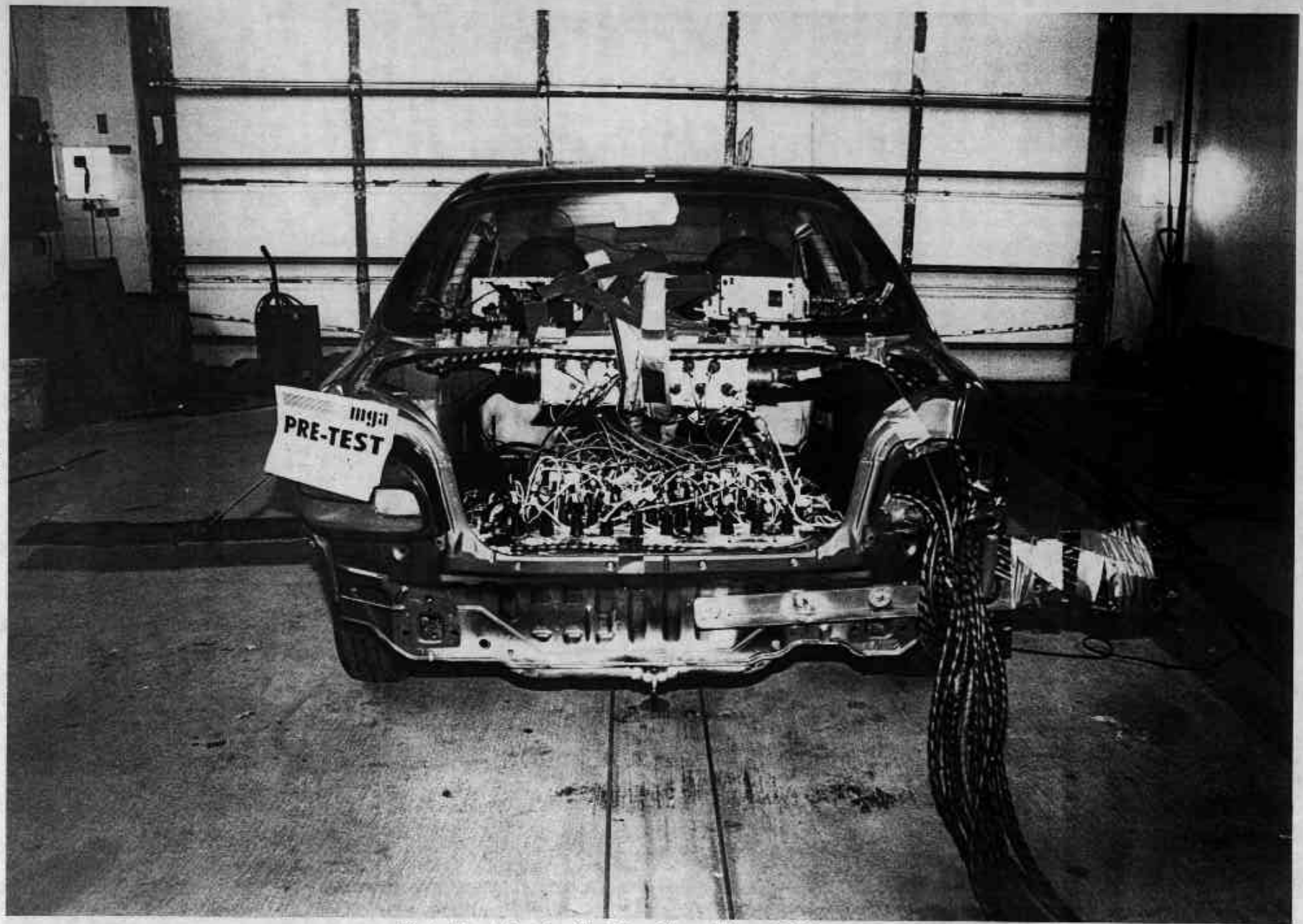


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

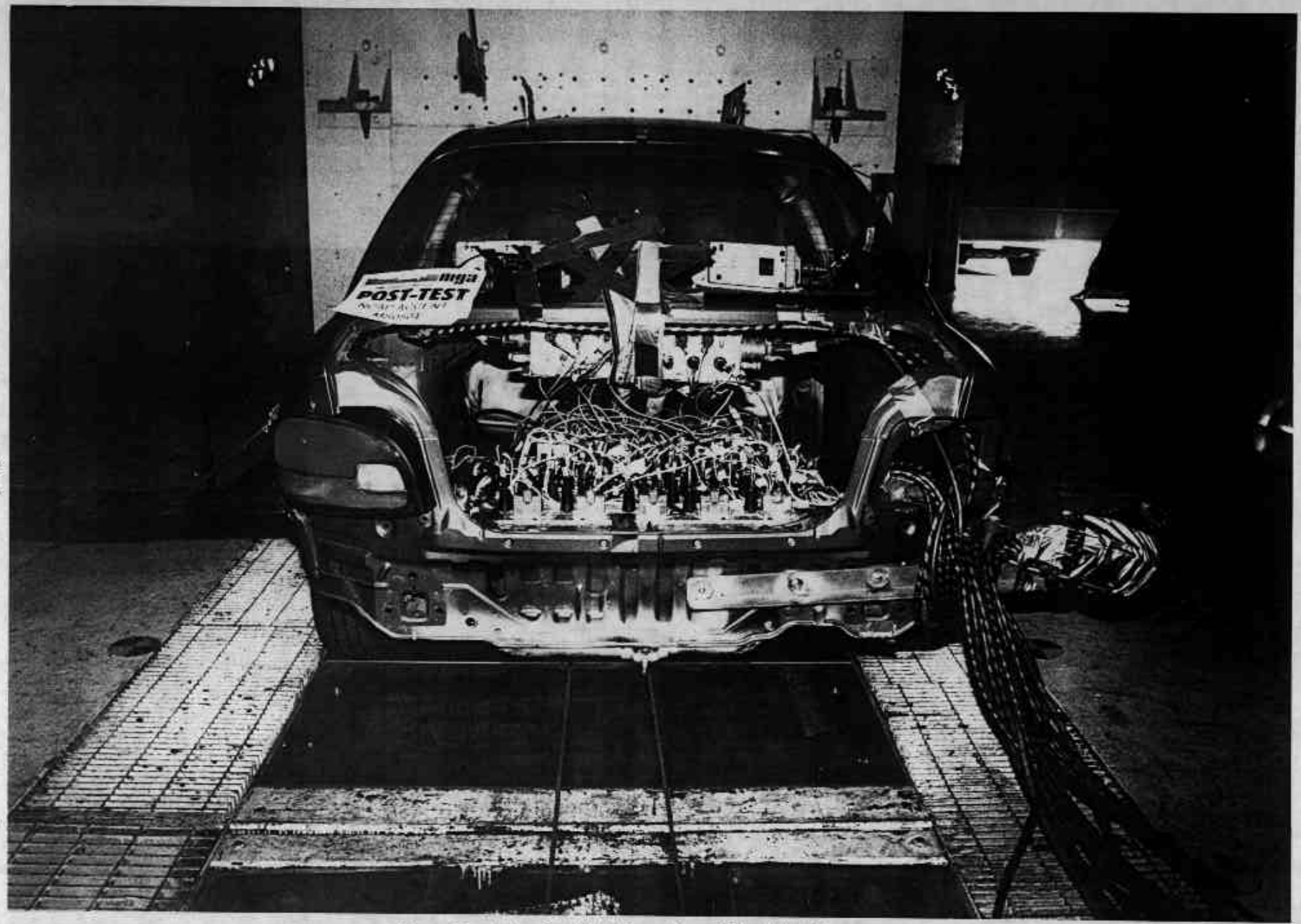
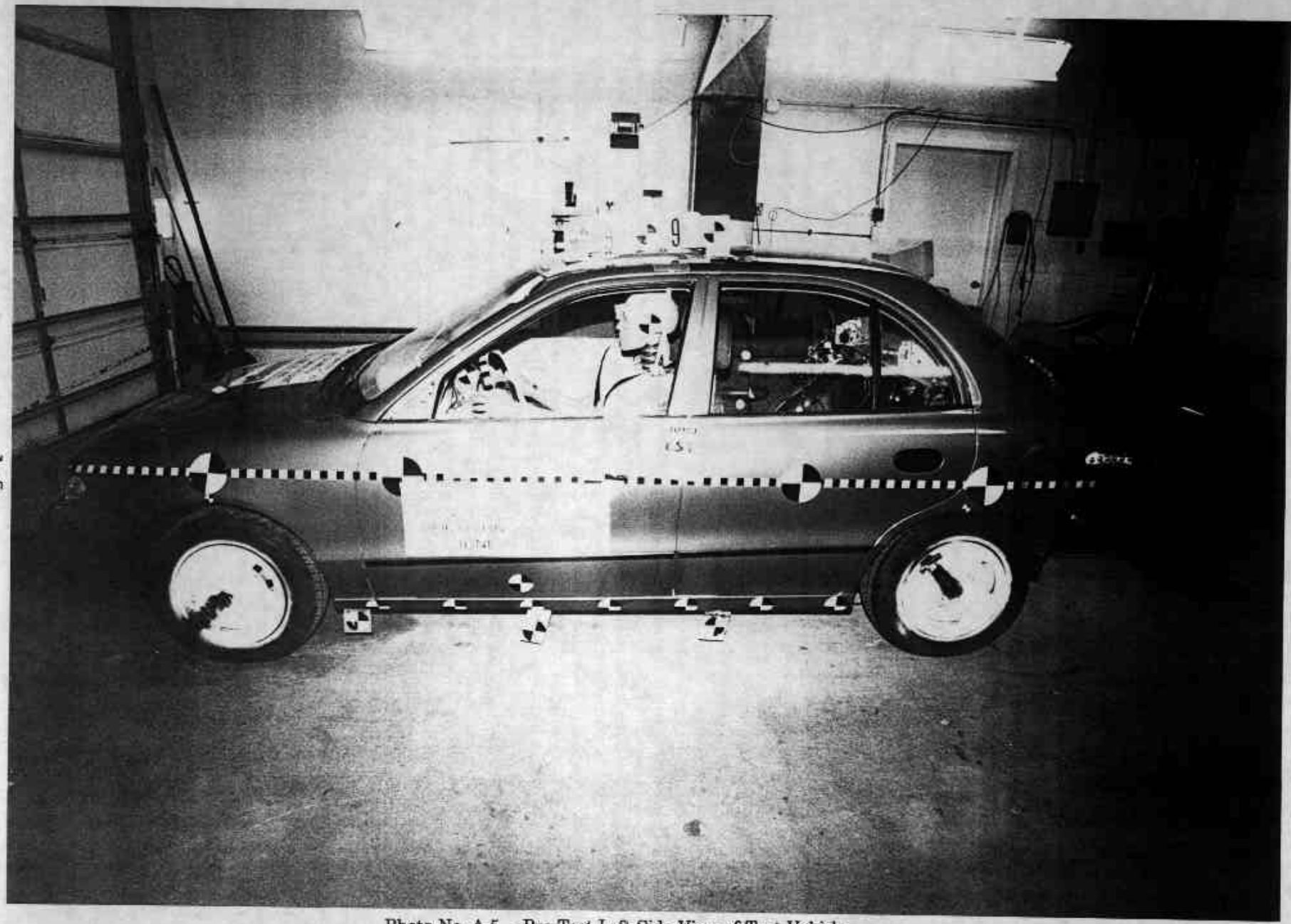


Photo No. A-4 - Post-Test Rear View of Test Vehicle



A-5

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

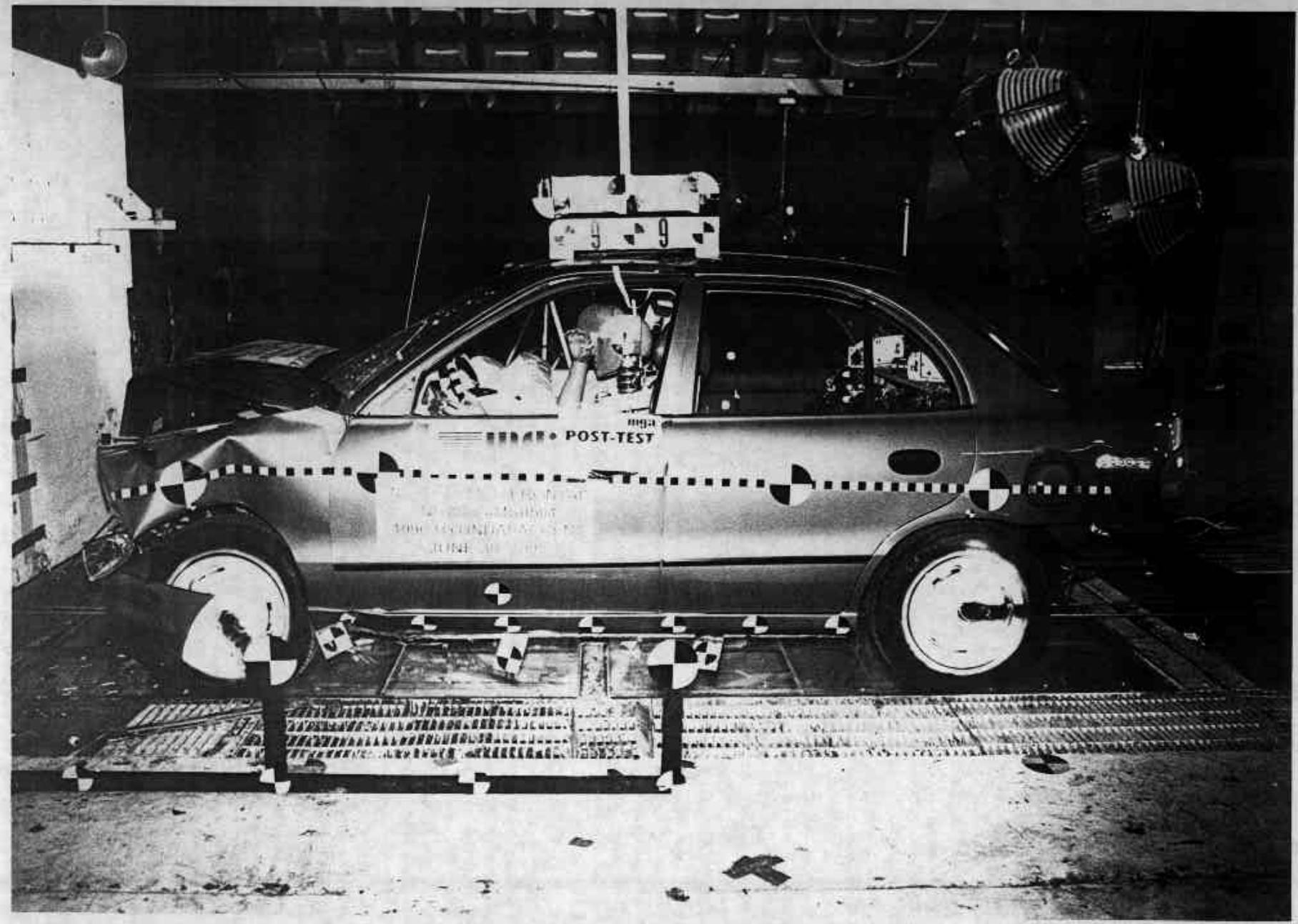


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

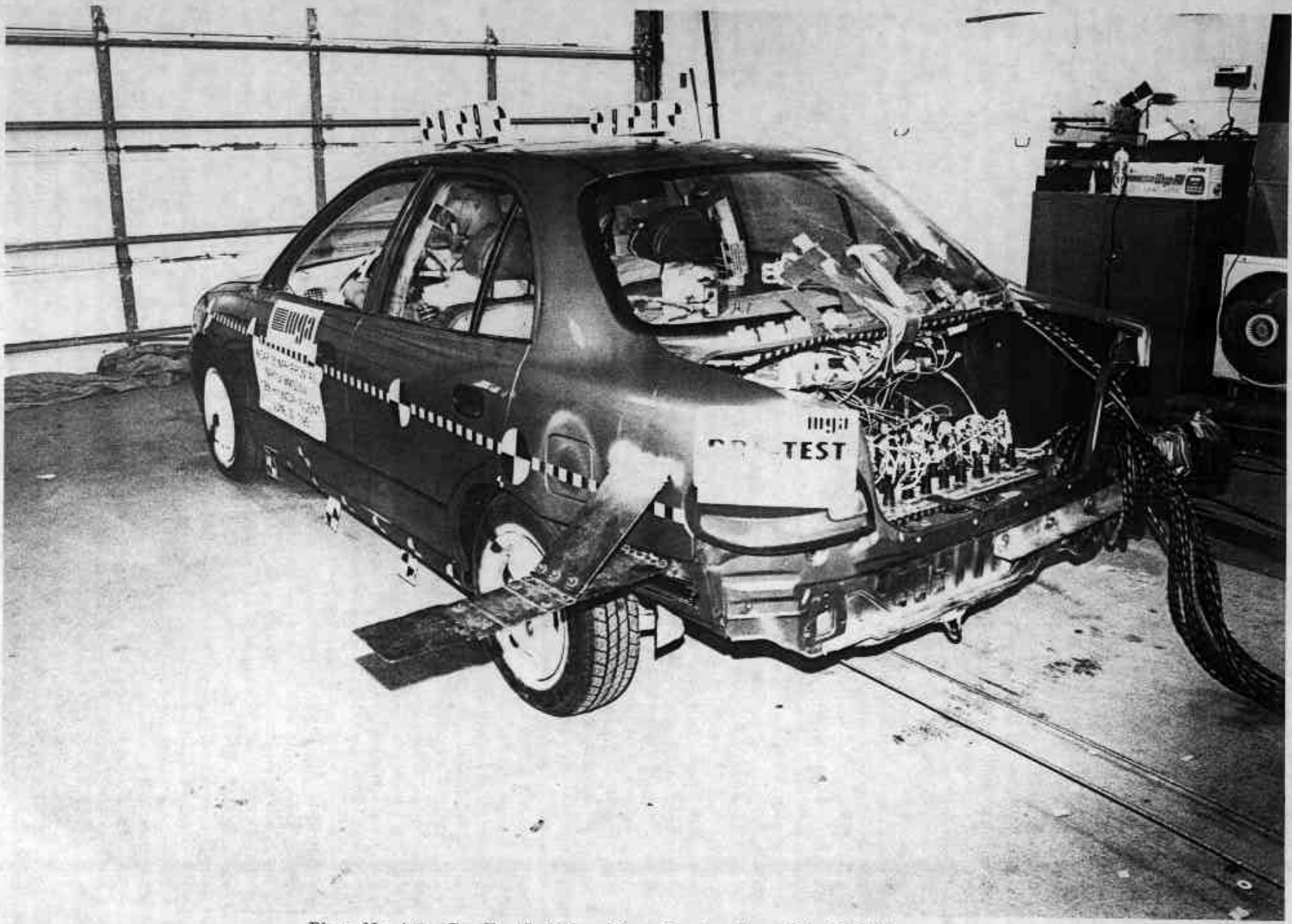


Photo No. A-7 - Pre-Test Left Rear Three-Quarter View of Test Vehicle

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

A-9

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

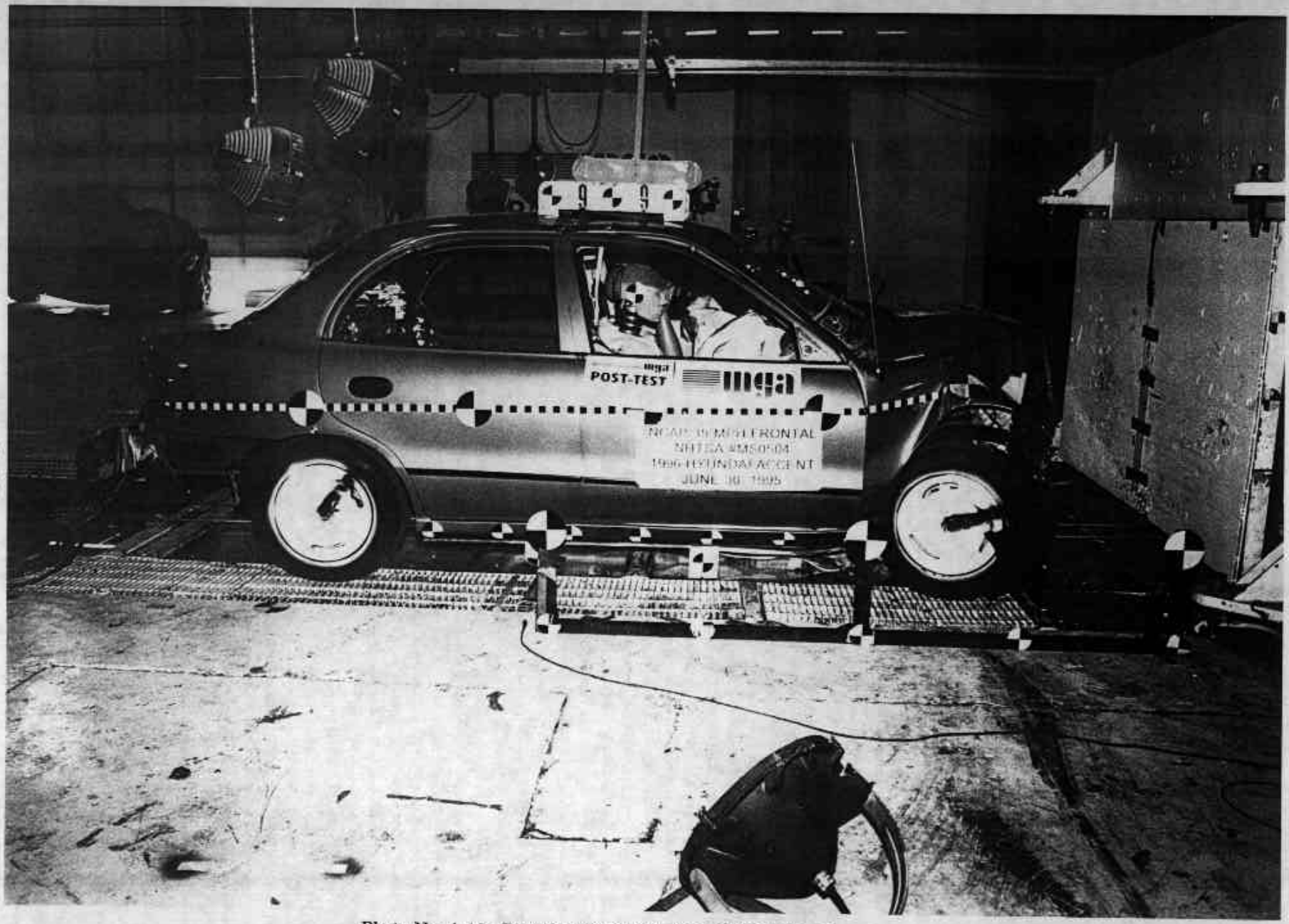
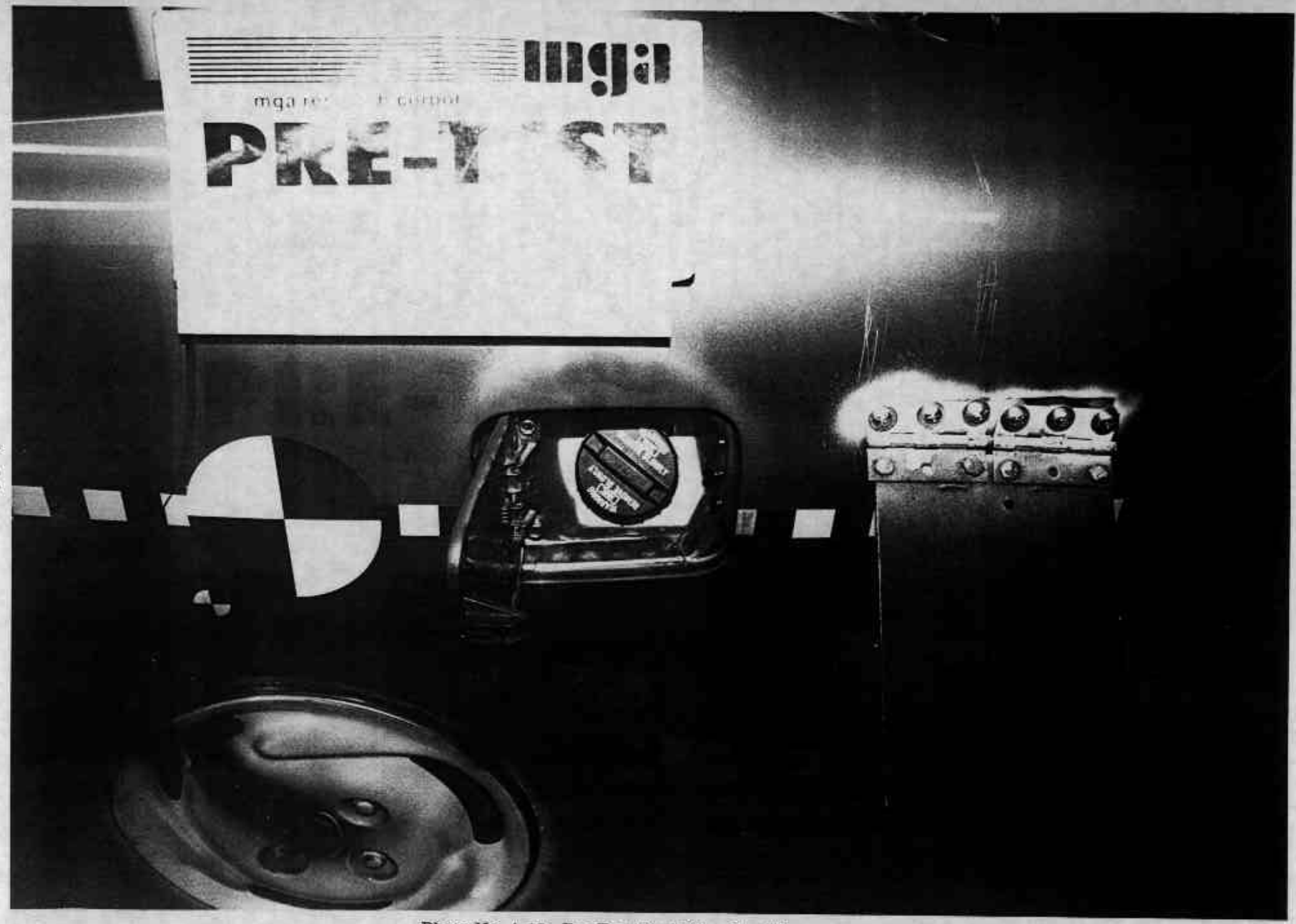


Photo No. A-1Ø - Post-Test Right Side View of Test Vehicle

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

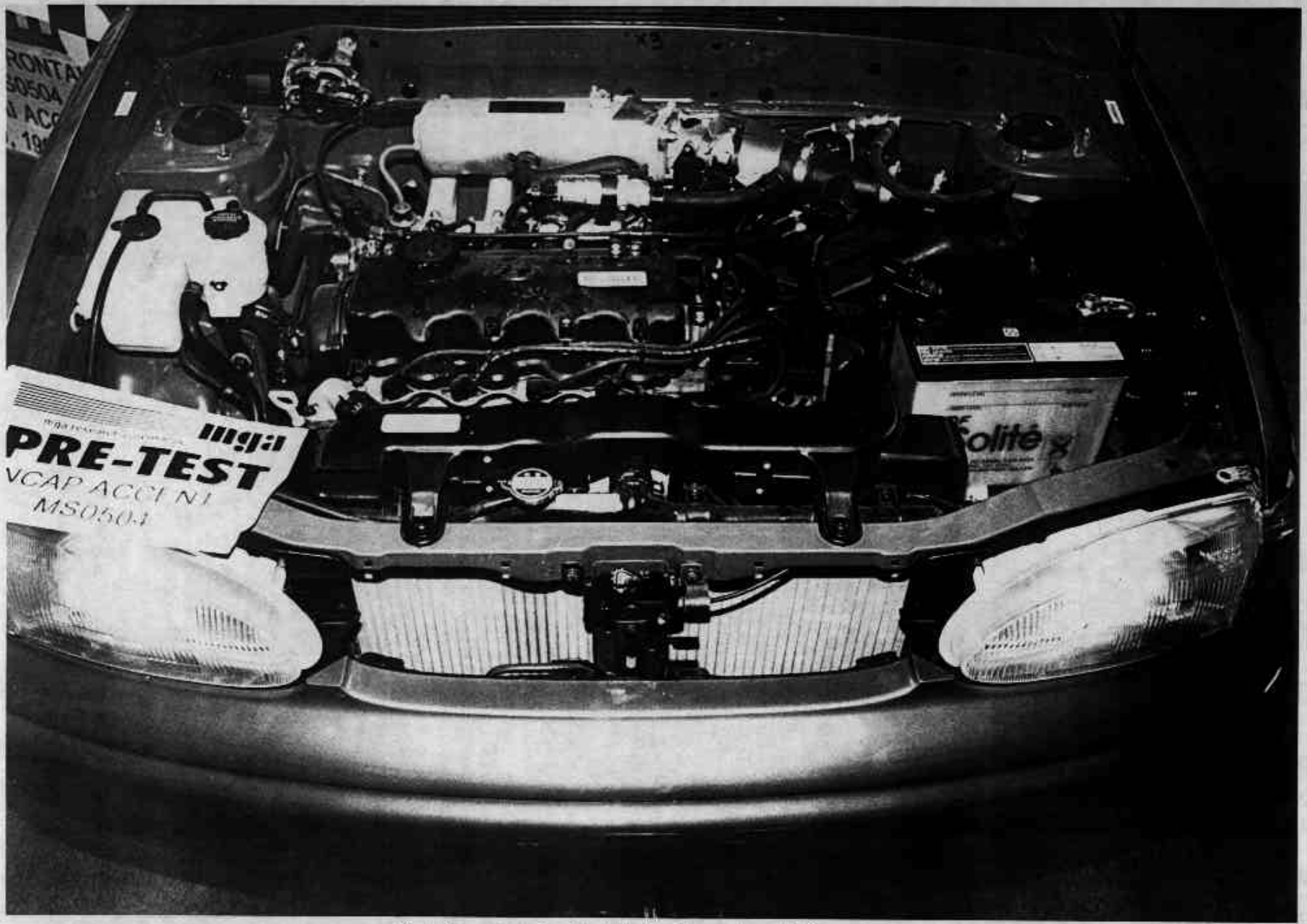
A-12

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



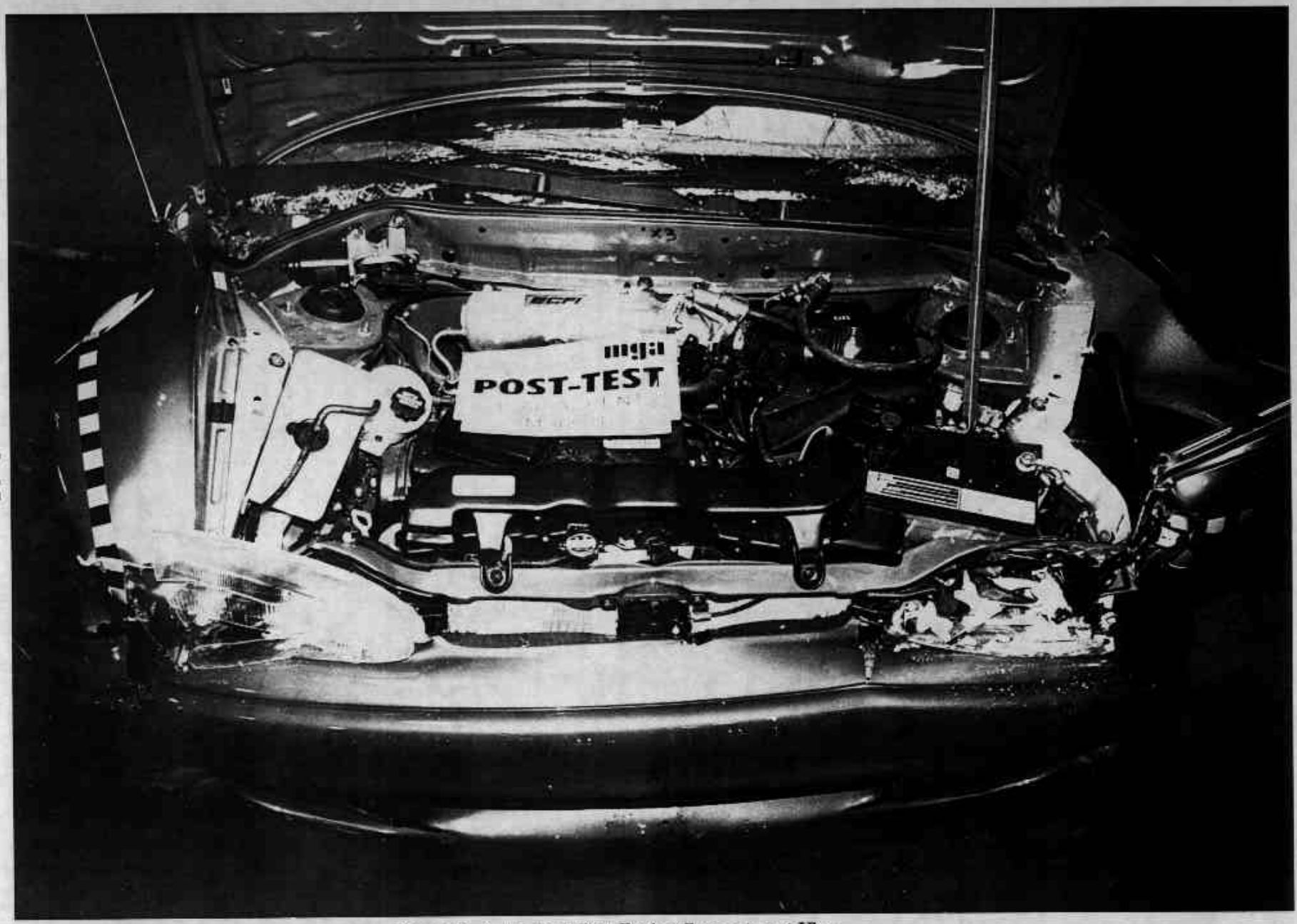
A-13

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



A-14

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



A-15

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

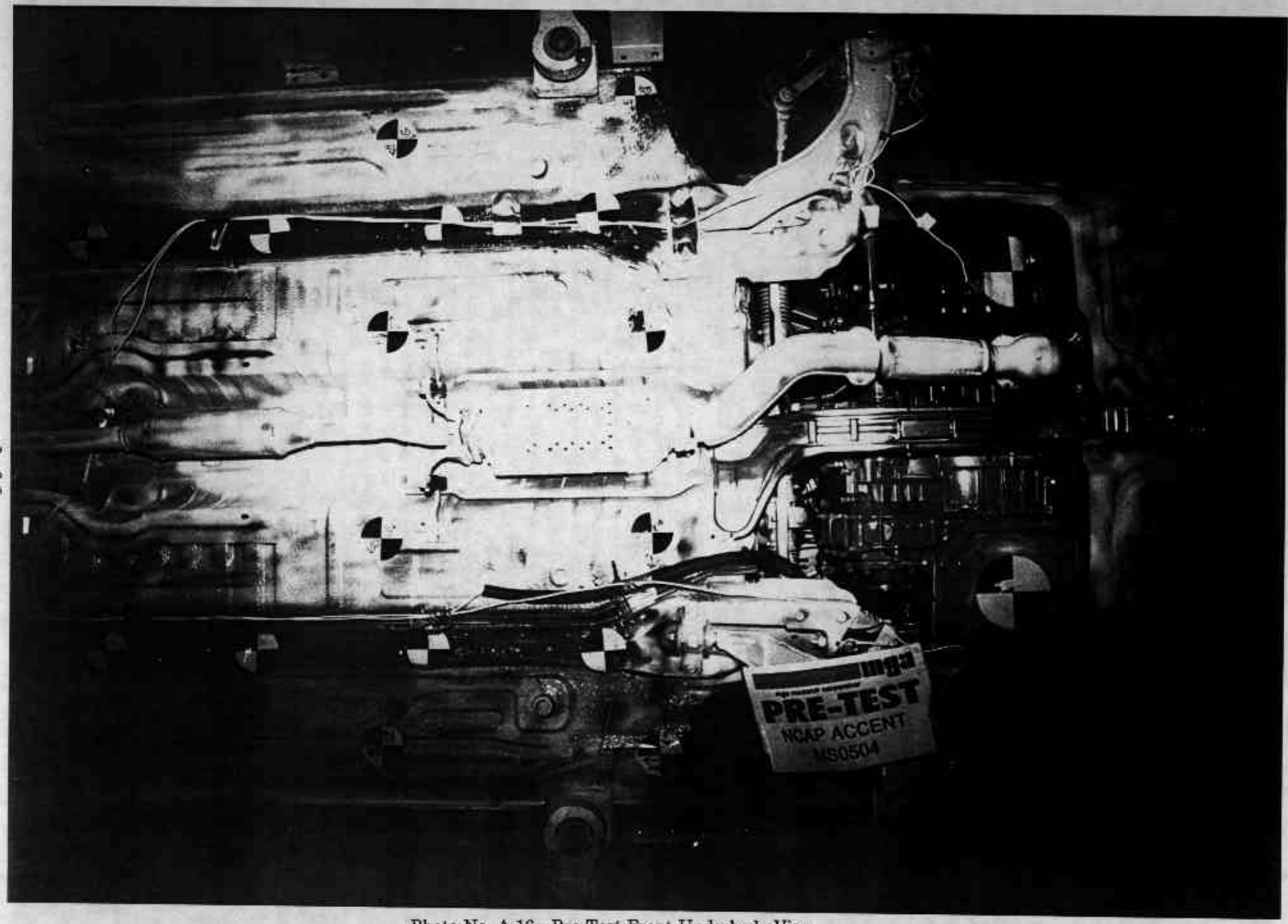


Photo No. A-16 - Pre-Test Front Underbody View

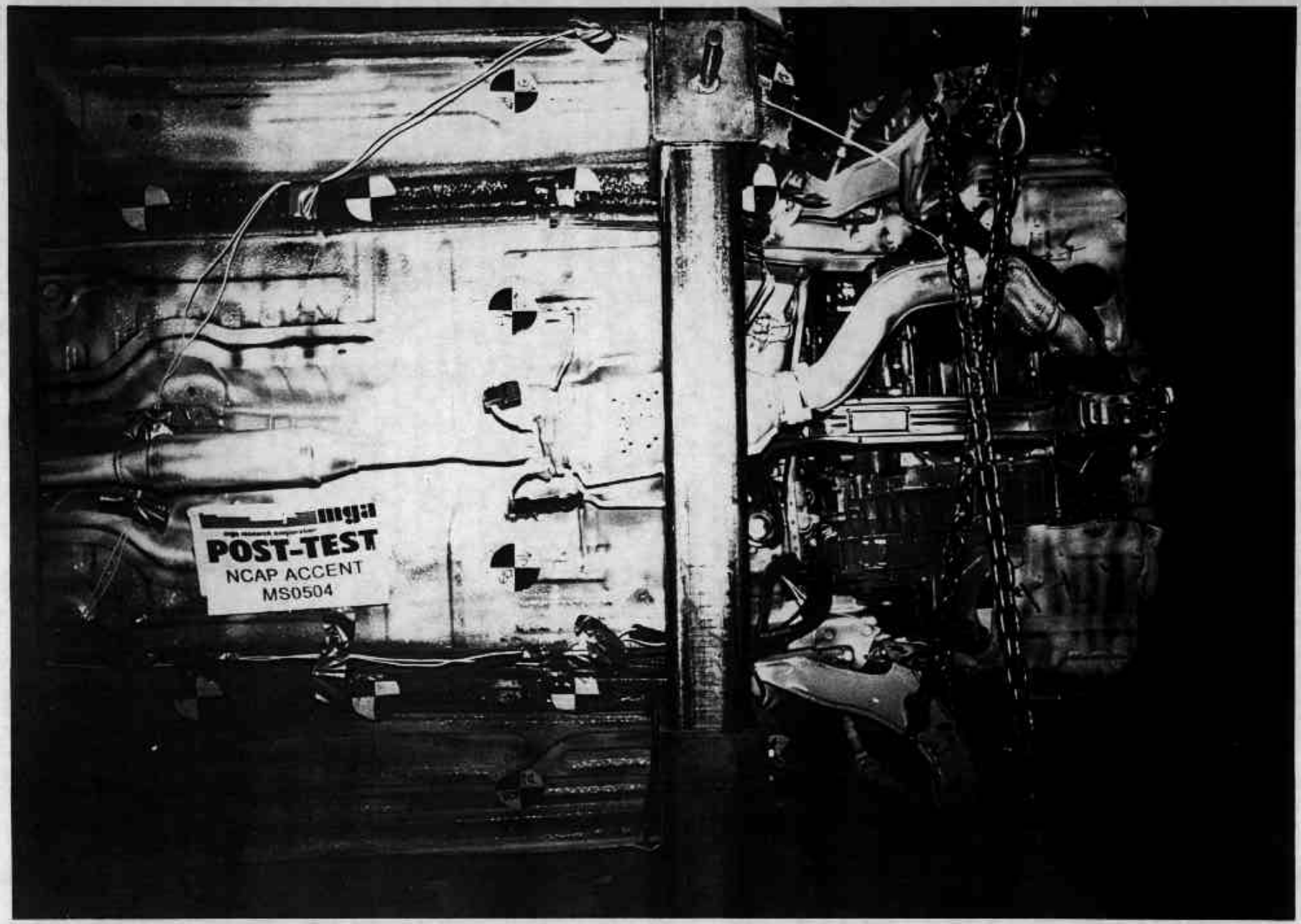


Photo No. A-17 - Post-Test Front Underbody View

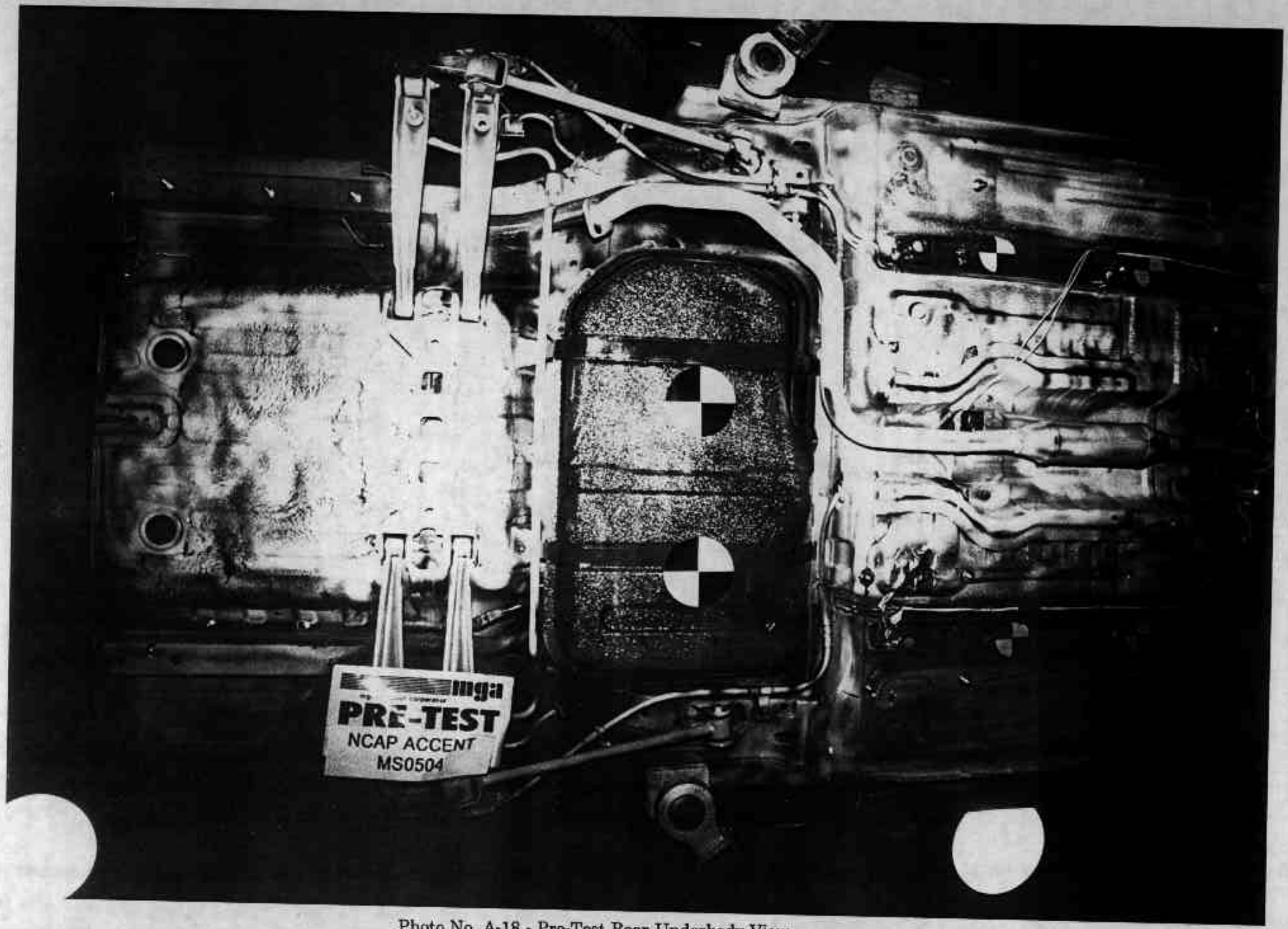


Photo No. A-18 - Pre-Test Rear Underbody View

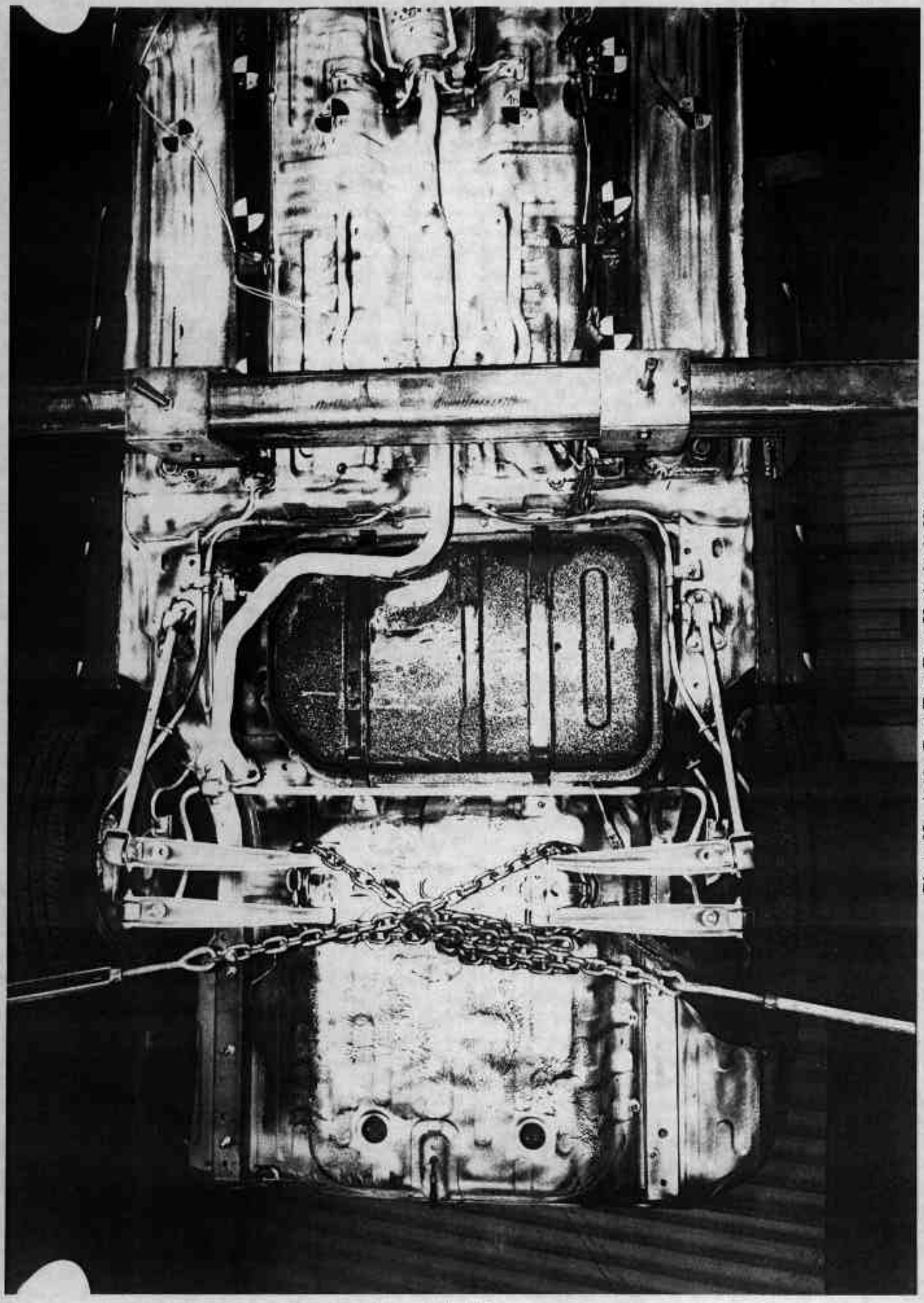


Photo No. A-19 - Post-Test Rear Underbody View

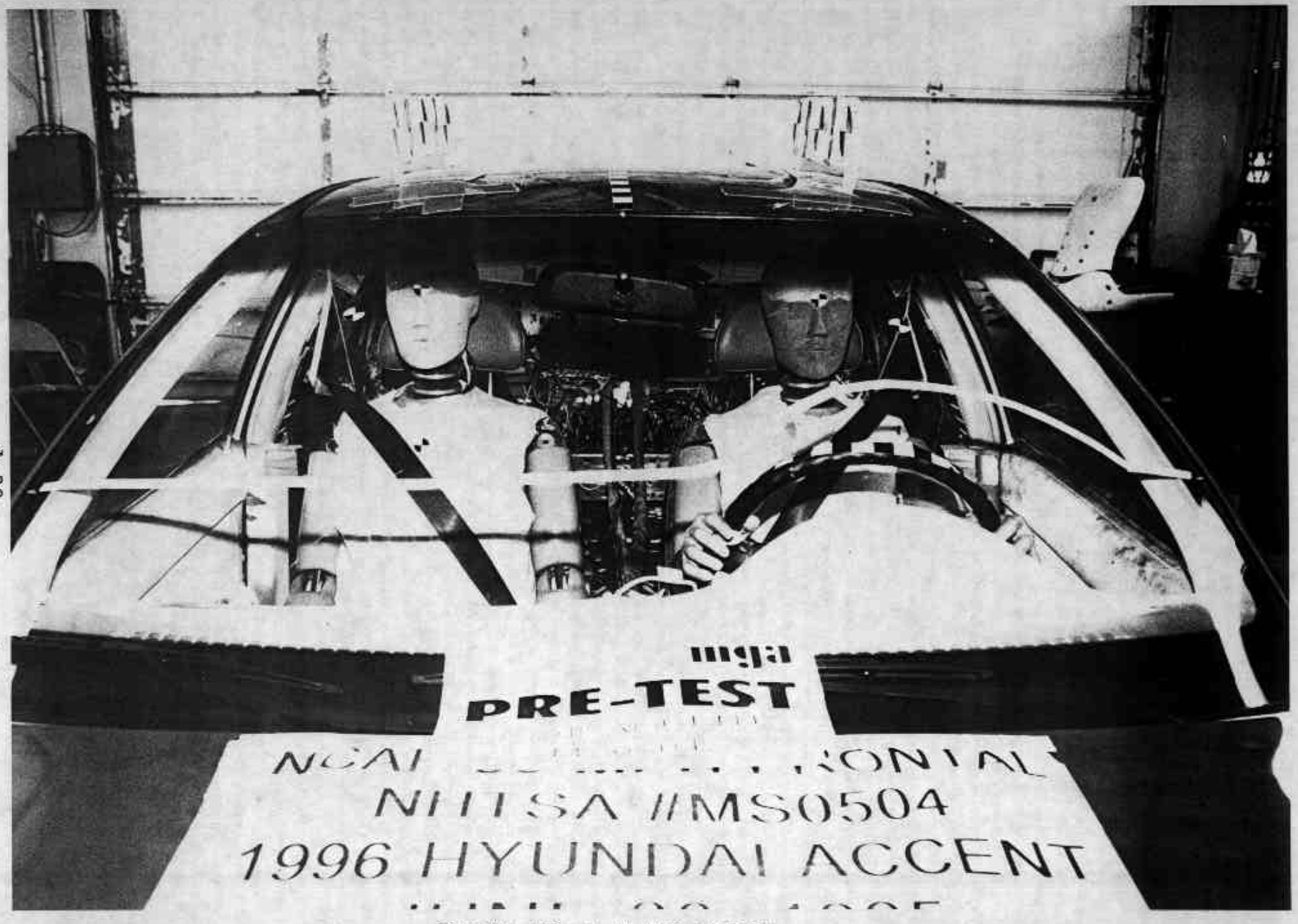
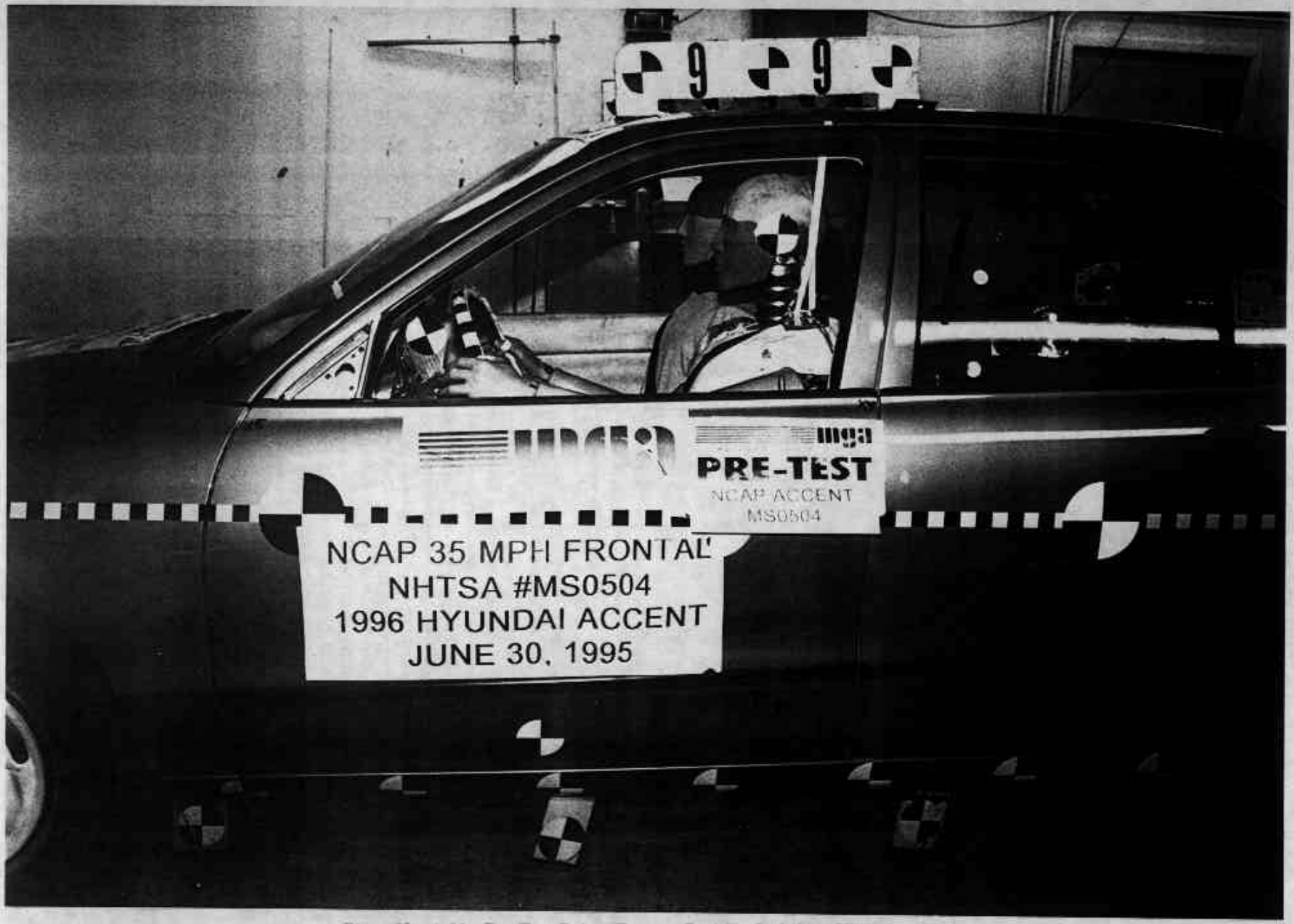


Photo No. A-20 - Pre-Test Windshield View

A-21

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

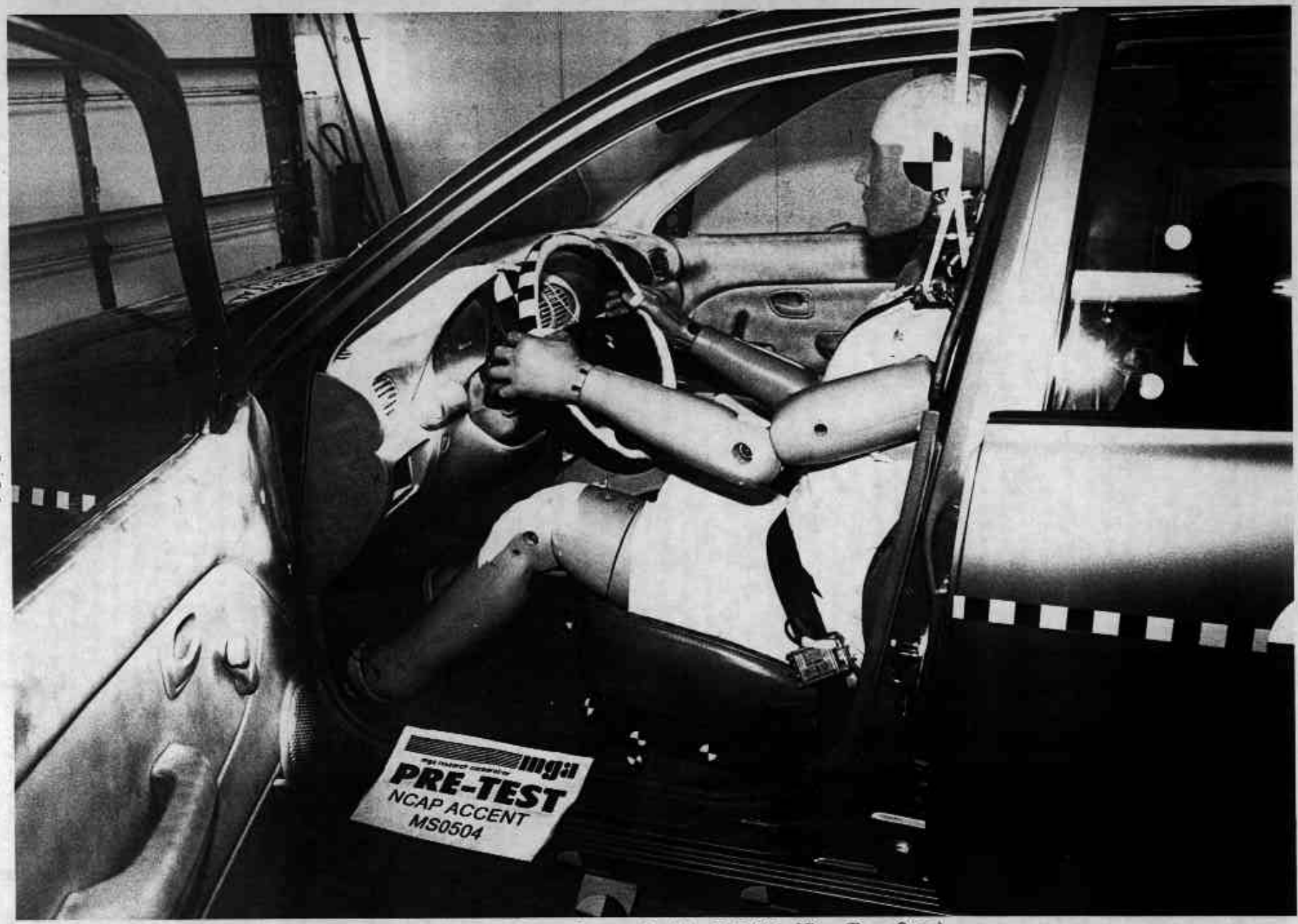


A-22

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

A-23

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



A-24

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

A-25

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

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

A-30

Photo No. A-30 - Pre-Test Driver Windshield View

A-31

Photo No. A-31 - Post-Test Driver Windshield View

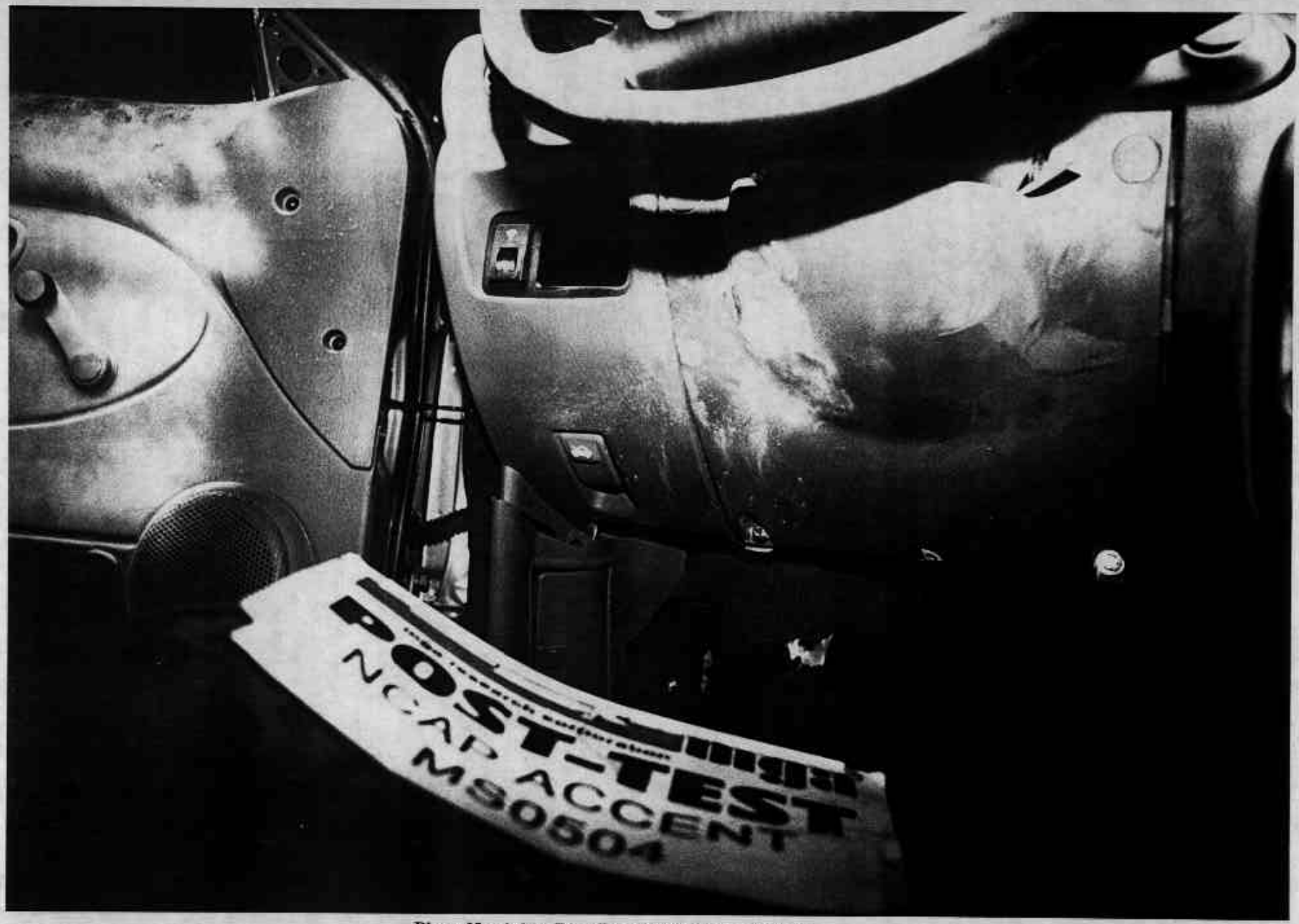


Photo No. A-32 - Post-Test Driver Knee Contact

Photo No. A-33 - Post-Test Driver Airbag Contact

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

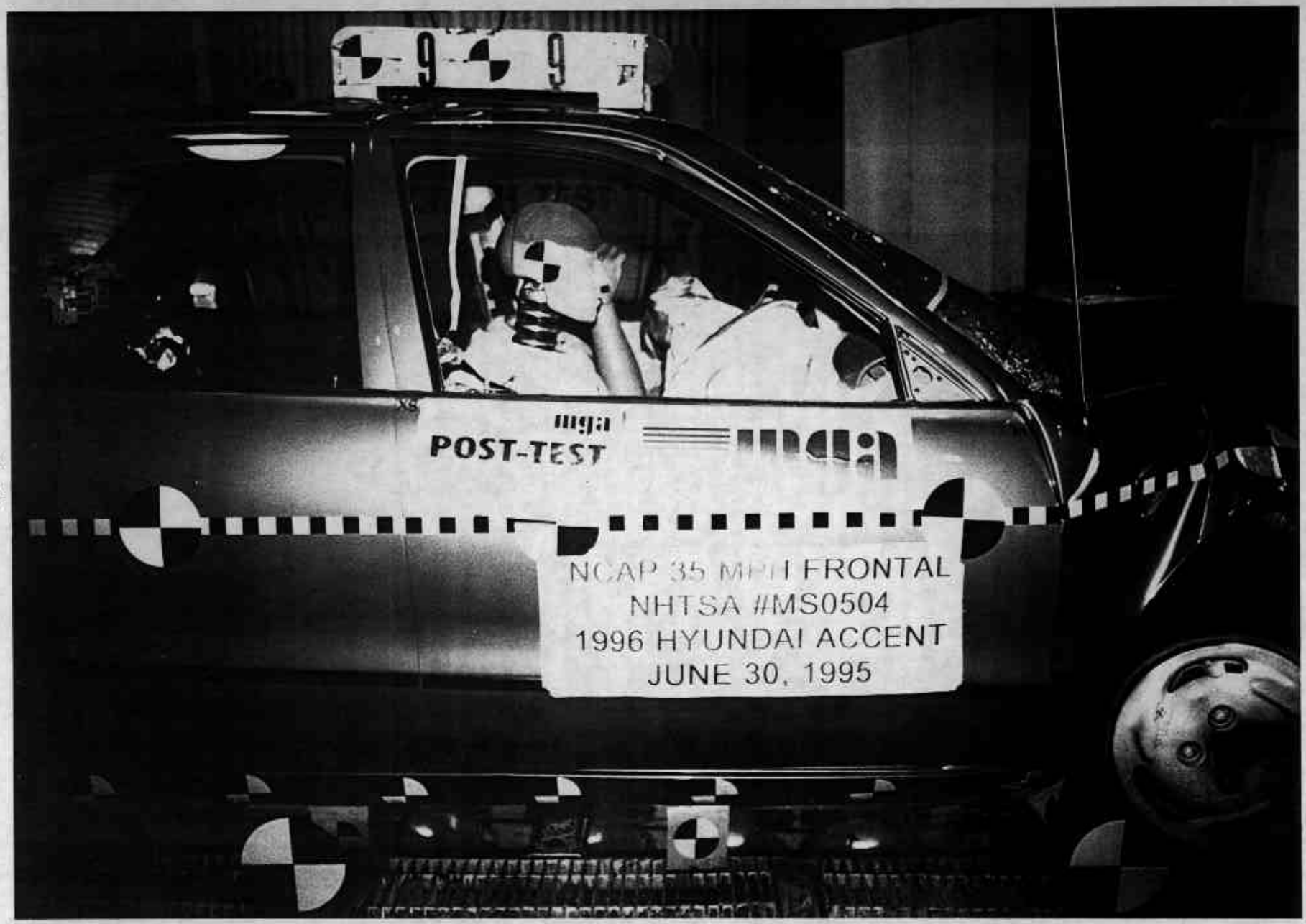


Photo No. A-35 - Post-Test Passenger Dummy Position Right Side View

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

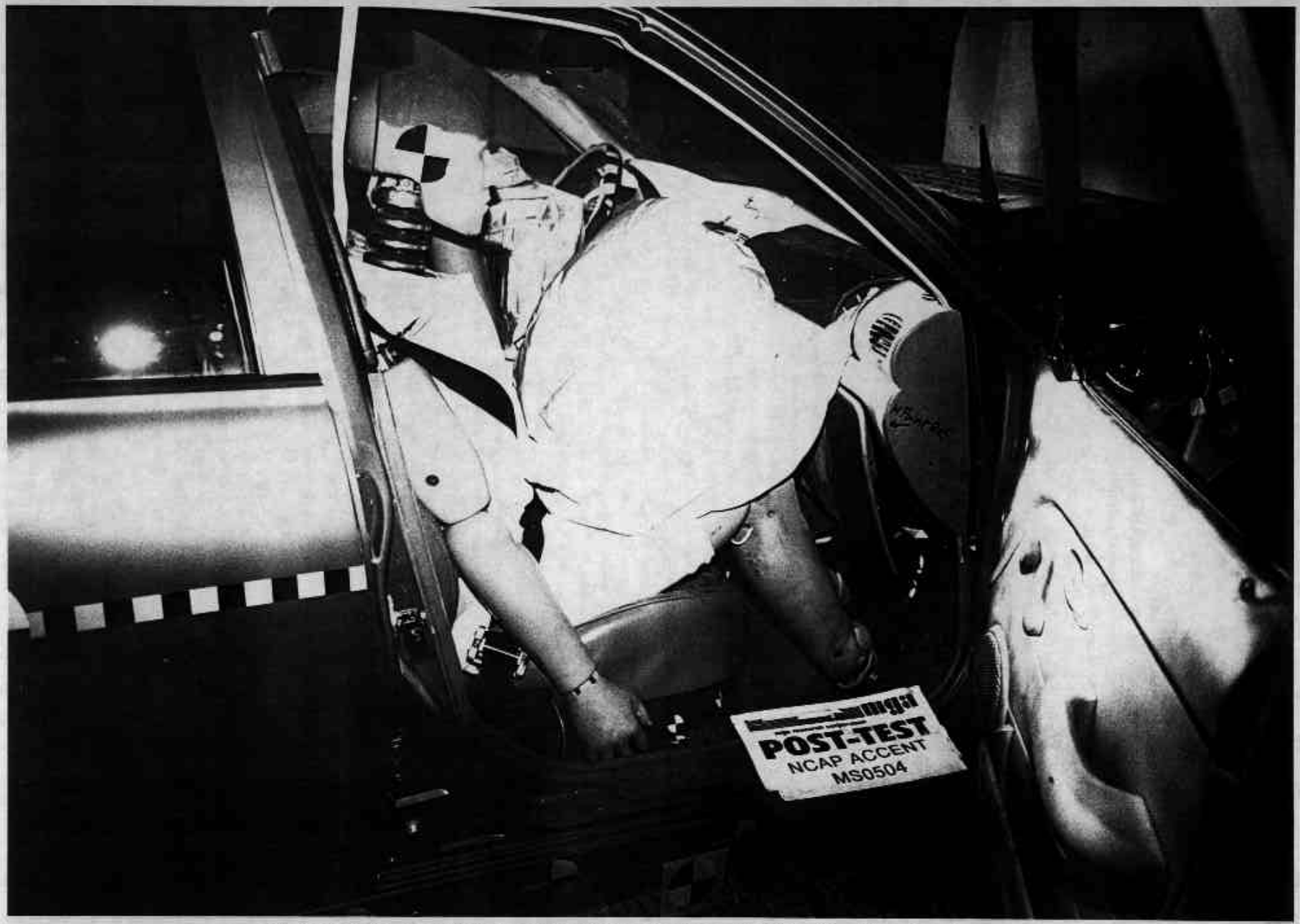


Photo No. A-37 - Post-Test Passenger Dummy Position Right Side View (Door Open)

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

Photo No. A-39 - Post-Test Passenger Seat Position View

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

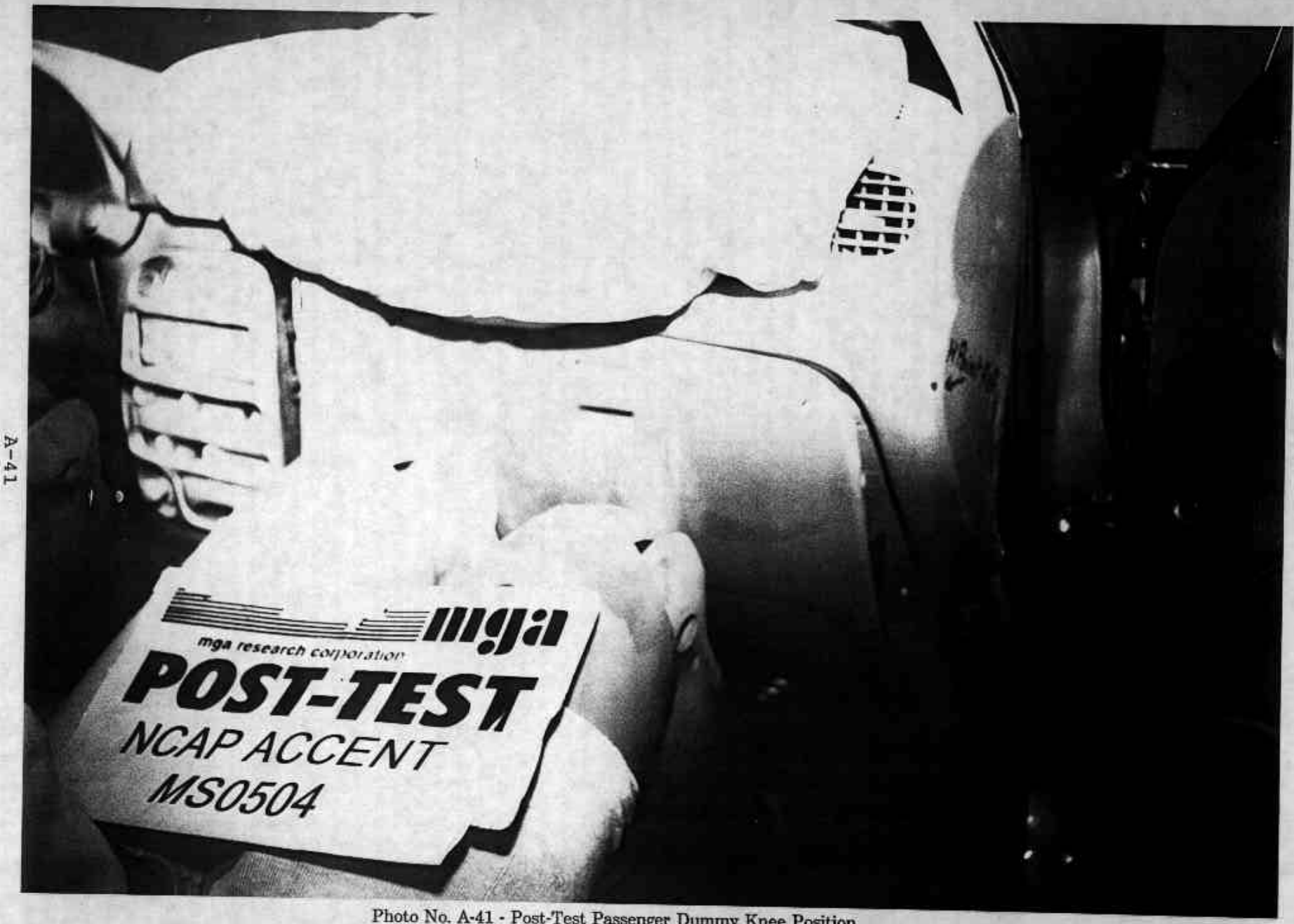


Photo No. A-41 - Post-Test Passenger Dummy Knee Position

Photo No. A-42 - Pre-Test Passenger Windshield View

Photo No. A-43 - Post-Test Passenger Windshield View

Photo No. A-44 - Post-Test Passenger Knee Contact

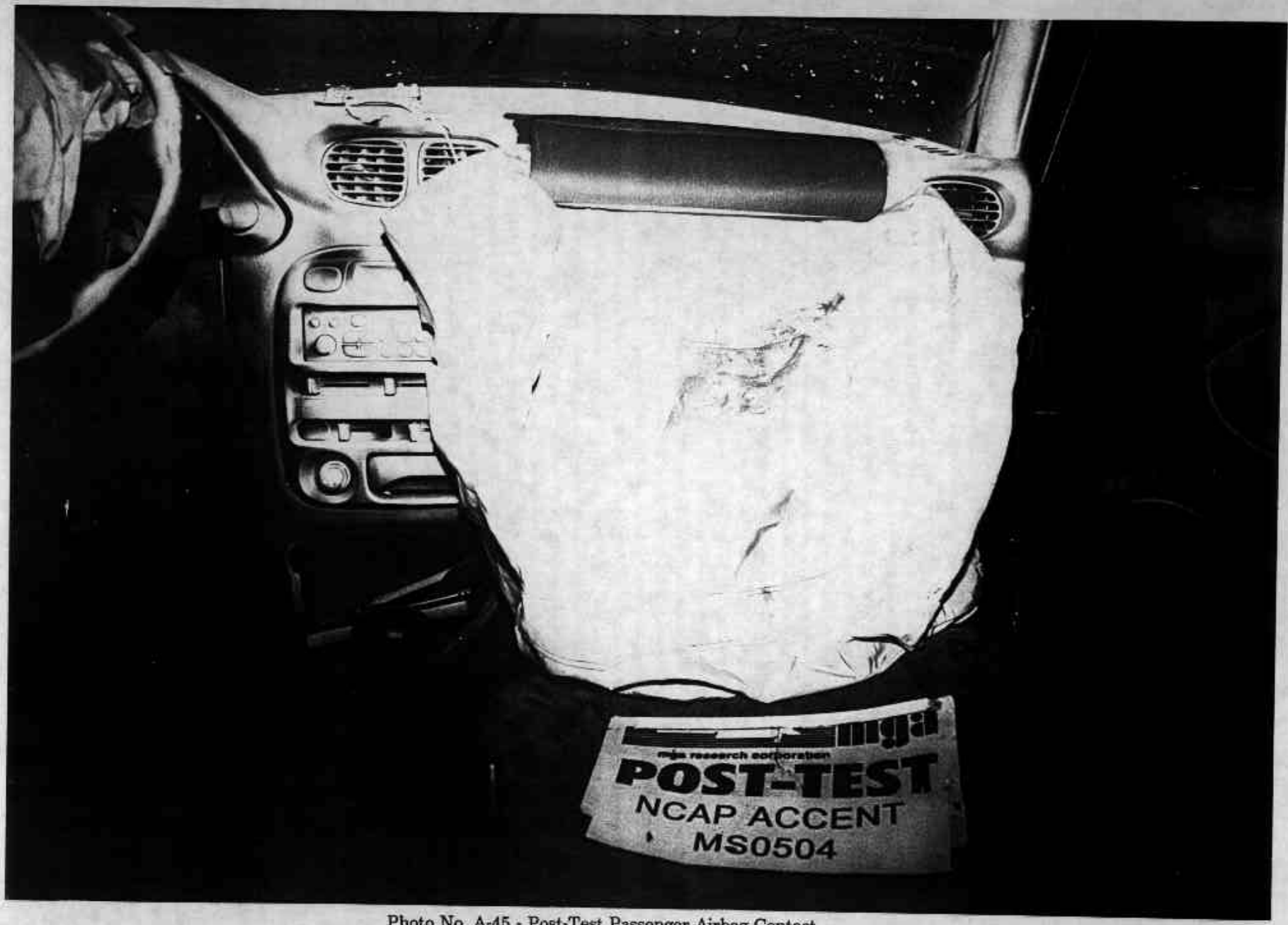
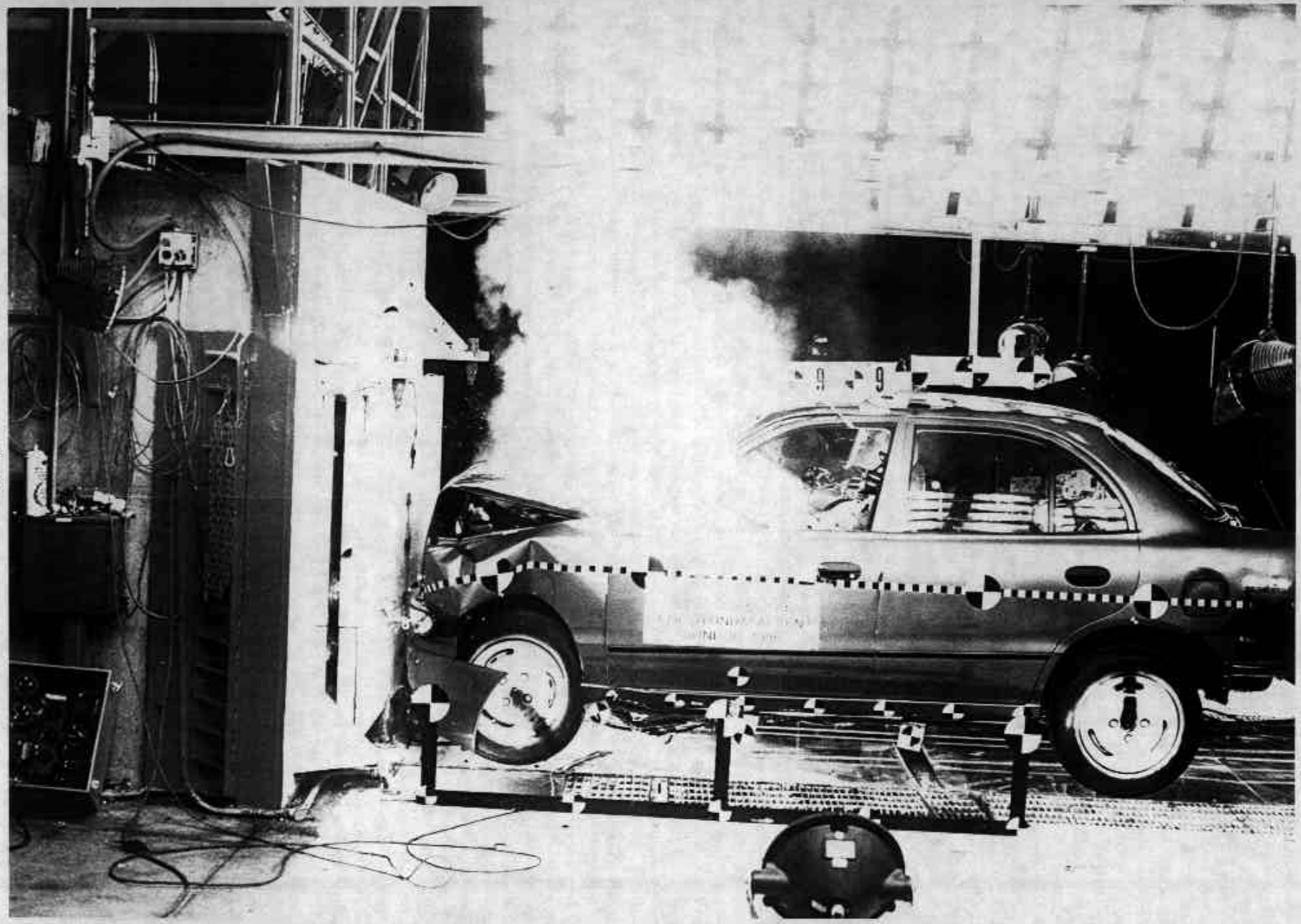
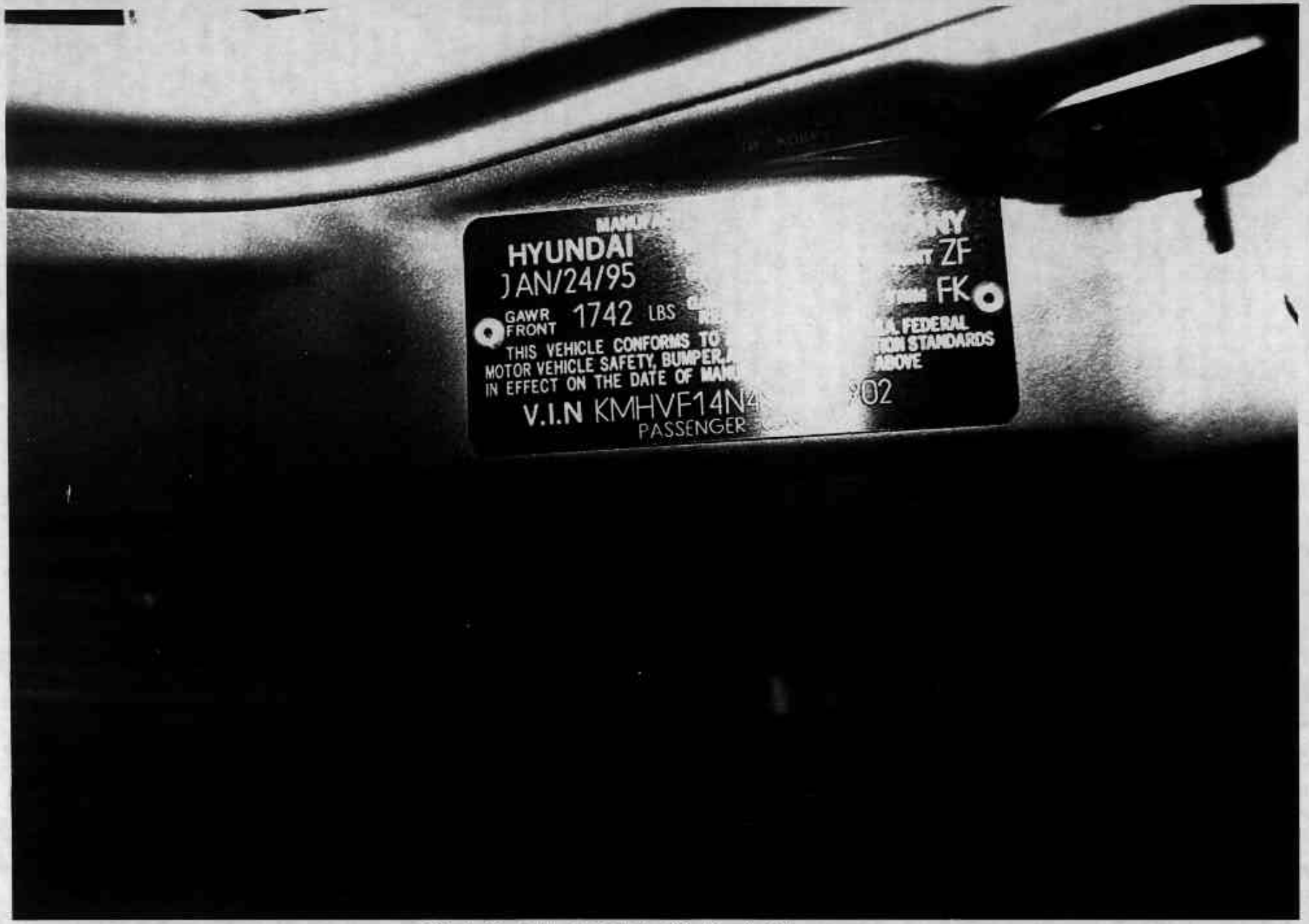


Photo No. A-45 - Post-Test Passenger Airbag Contact



A-46

Photo No. A-46 - Vehicle Impact



A-47

Photo No. A-47 - Vehicle Certification Label

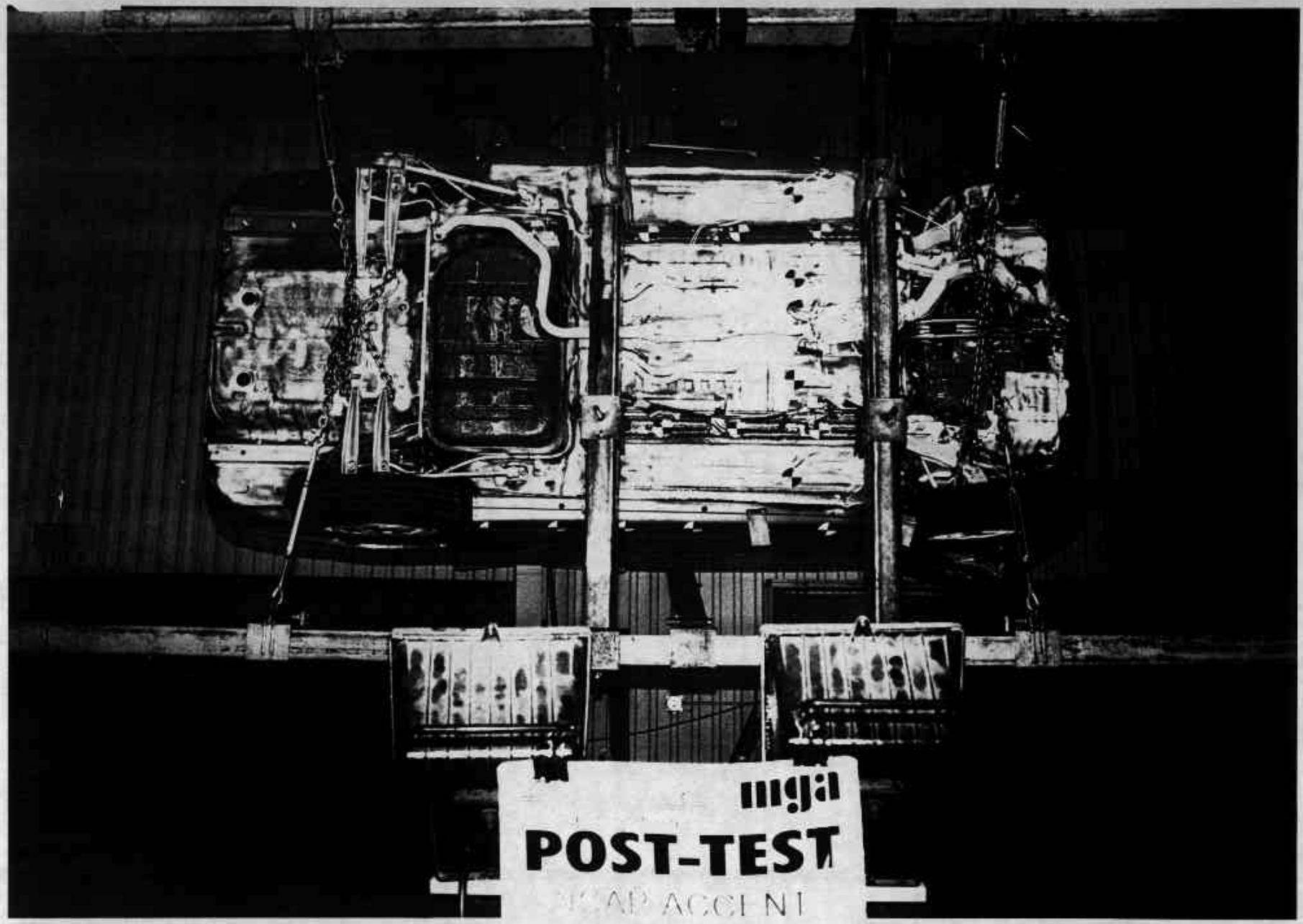


Photo No. A-48 - Rollover 90°

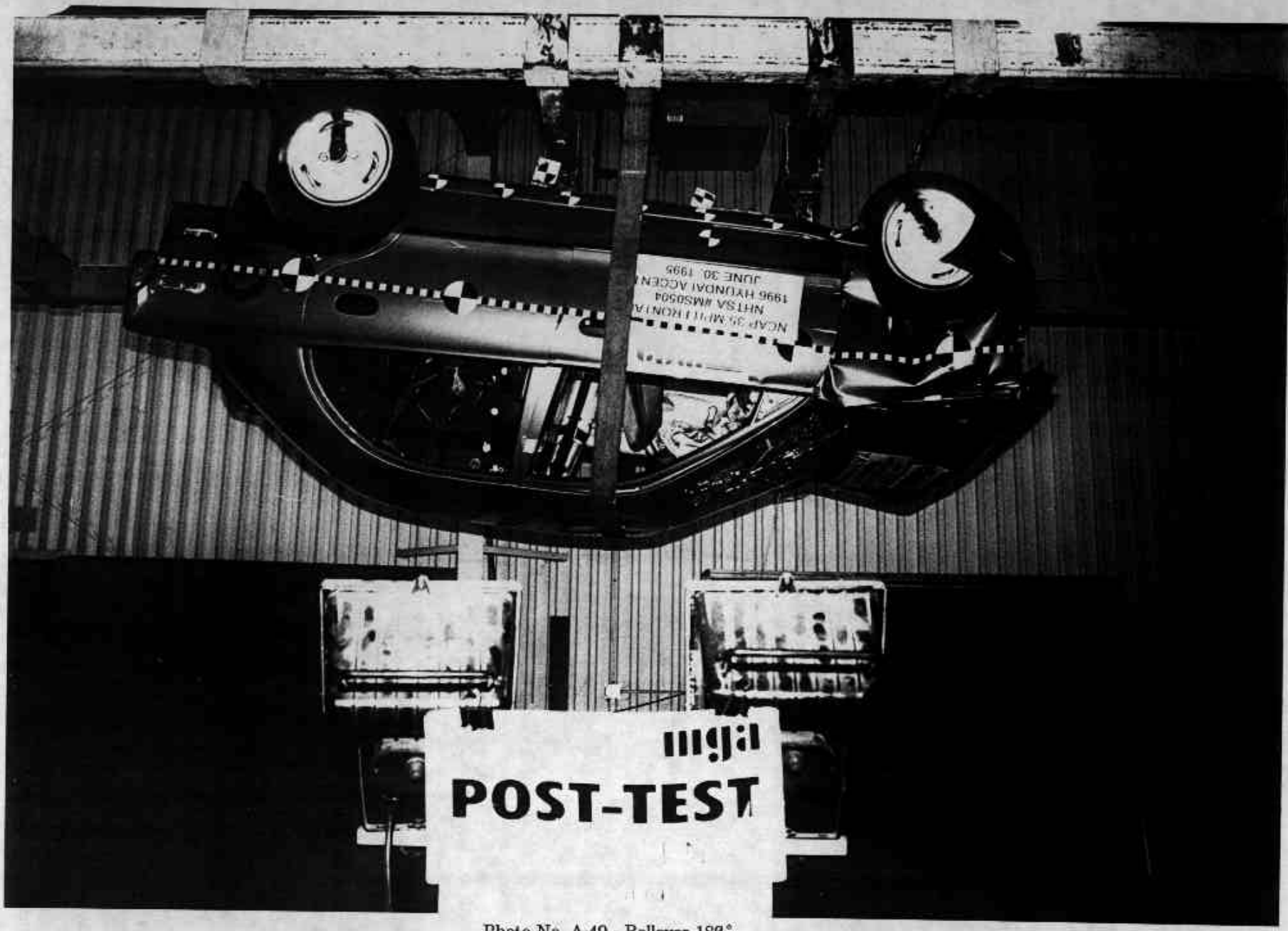


Photo No. A-49 - Rollover 180°

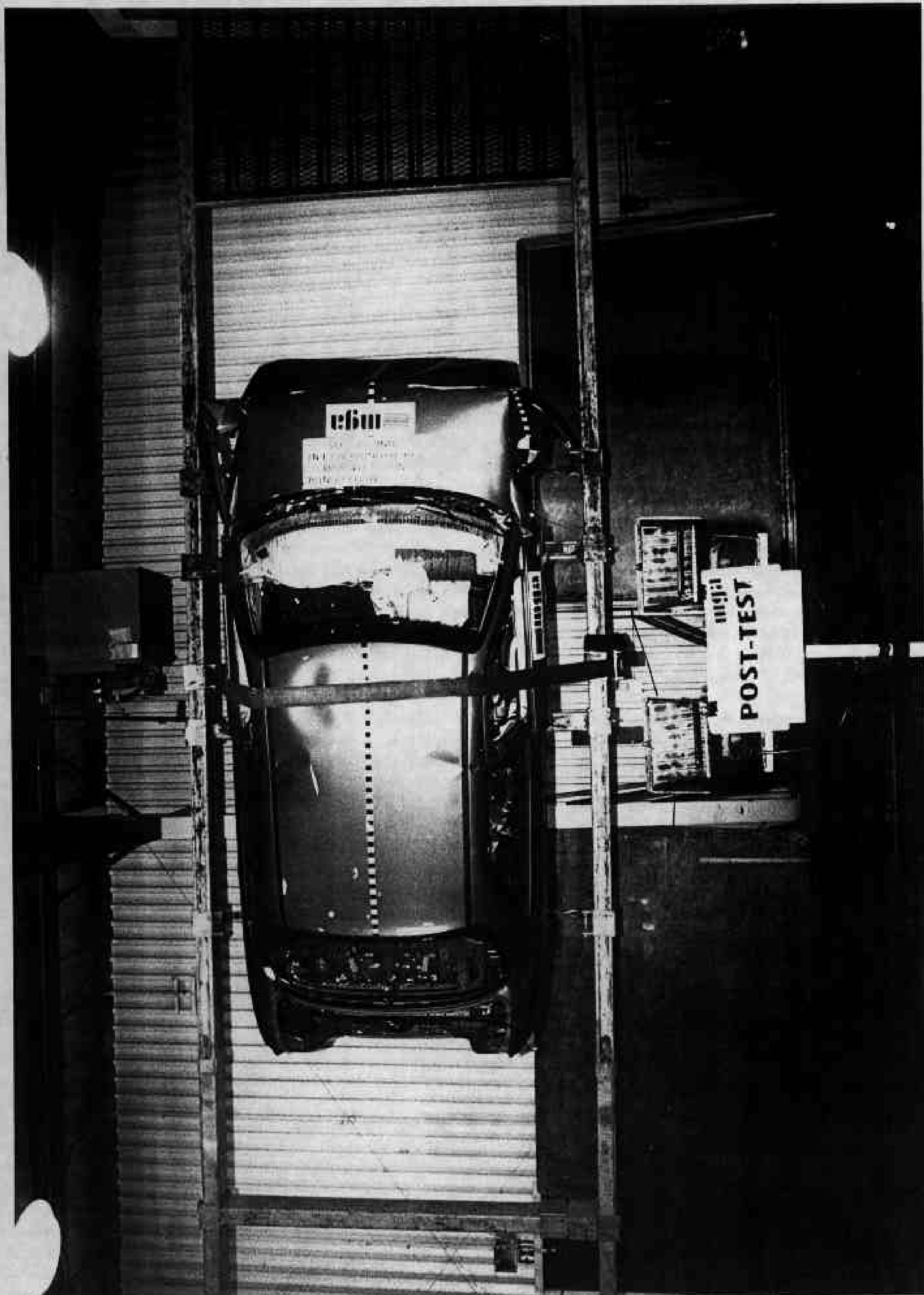


Photo No. A-50 - Rollover 270°

Photo No. A-51 - Rollover 360°

APPENDIX B

Vehicle, Load Cell Barrier and Dummy Response Data

1995 Hyundai Accent 4 Door Sedan

NHTSA NO.: MS0504

VEHICLE DATA FILTER CHANNEL CLASS

Head Accelerations 1000 (1650 Hz)

Chest Accelerometers 180 (300 Hz)

Vehicle Accelerometers 60 (100 Hz)

Barrier Load Cells 60 (100 Hz)

Femur Load Cells 600 (1000 Hz)

Lap and Torso Belts 60 (100 Hz)

* Data not valid between 30.6 and 40.3 msec.

* Data not valid between 51.7 and 61.5 msec.

** Spike in data at approximately 50 msec.

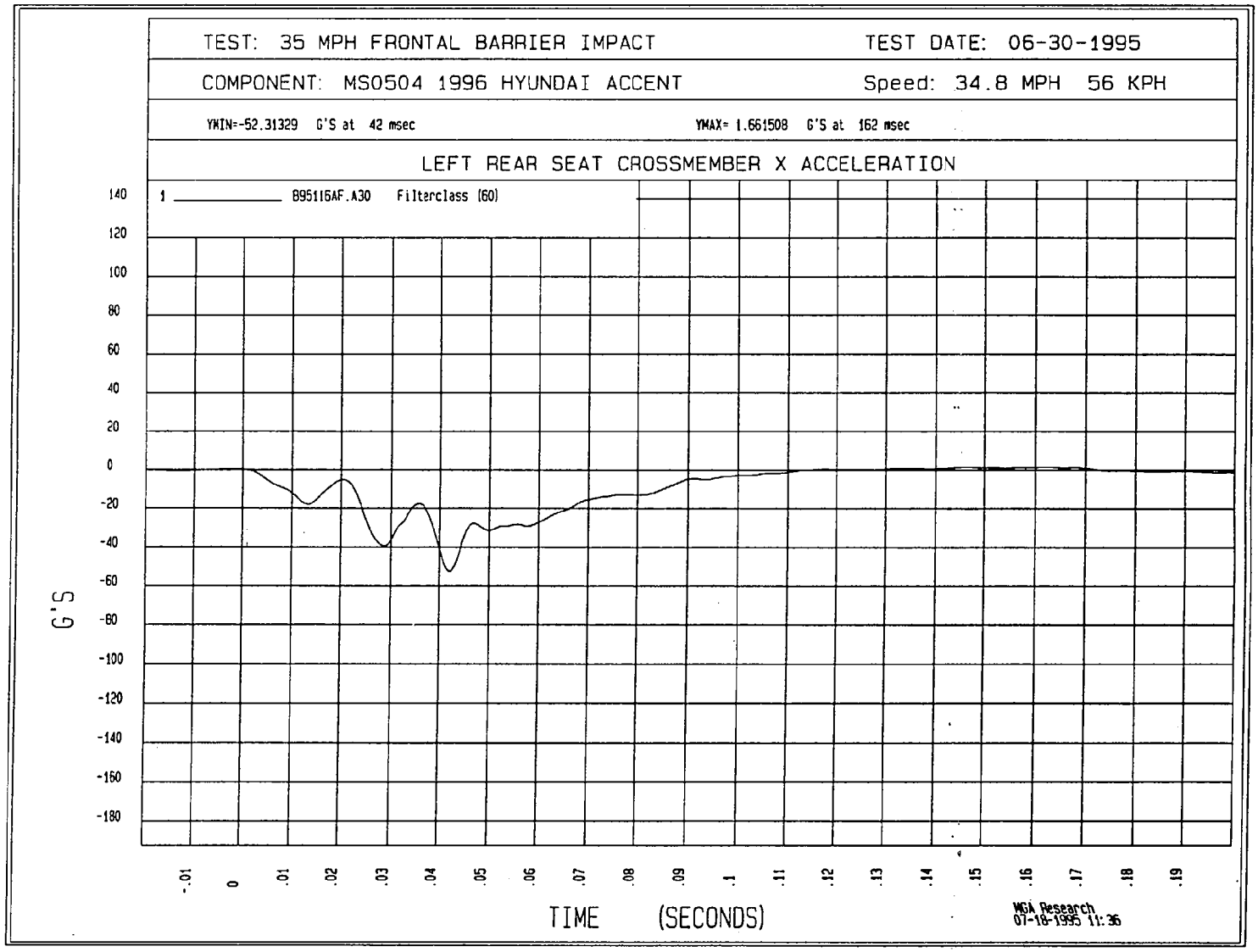


Figure B-1 - Left Rear Seat Crossmember X Acceleration vs. Time

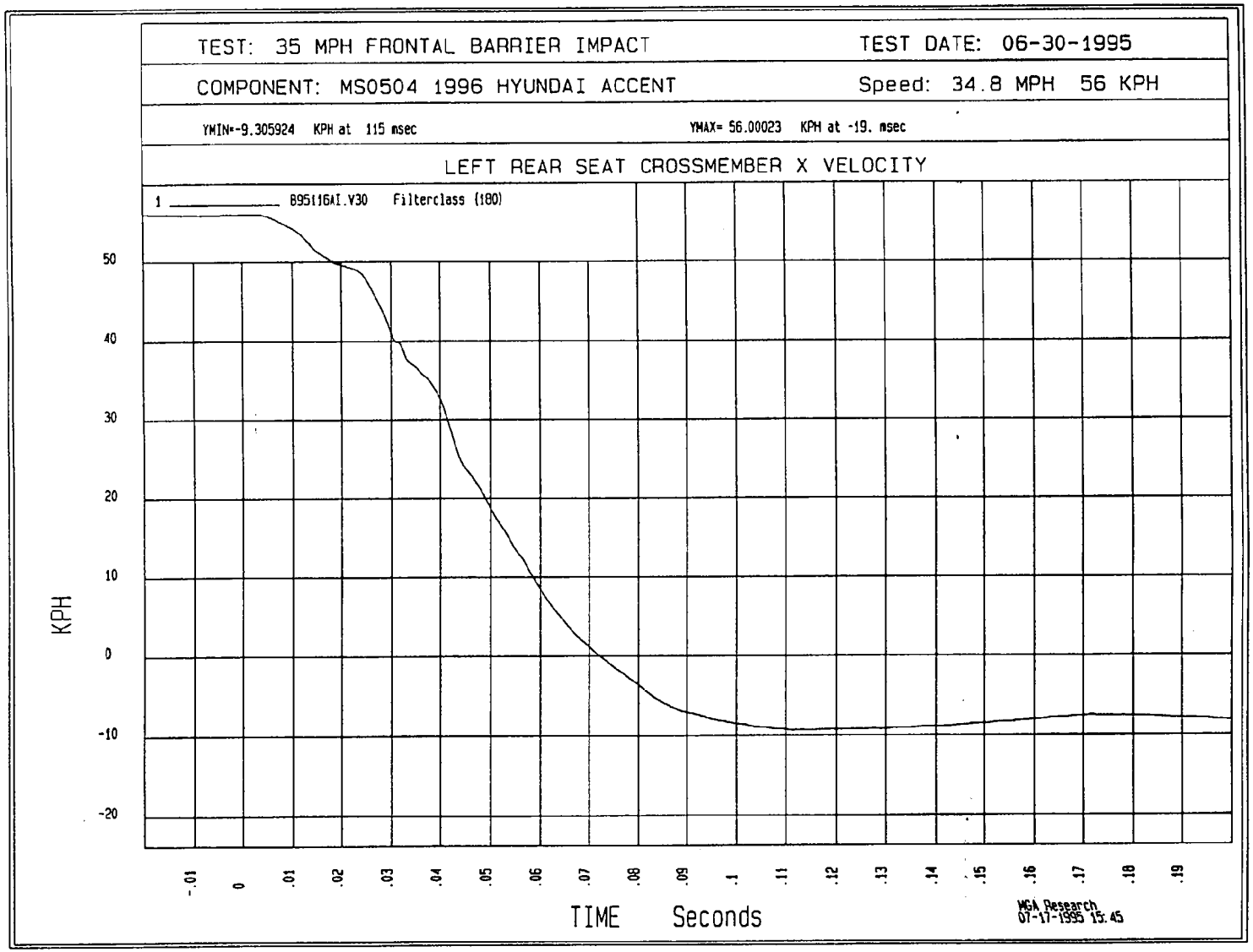


Figure B-2 - Left Rear Seat Crossmember X Velocity vs. Time

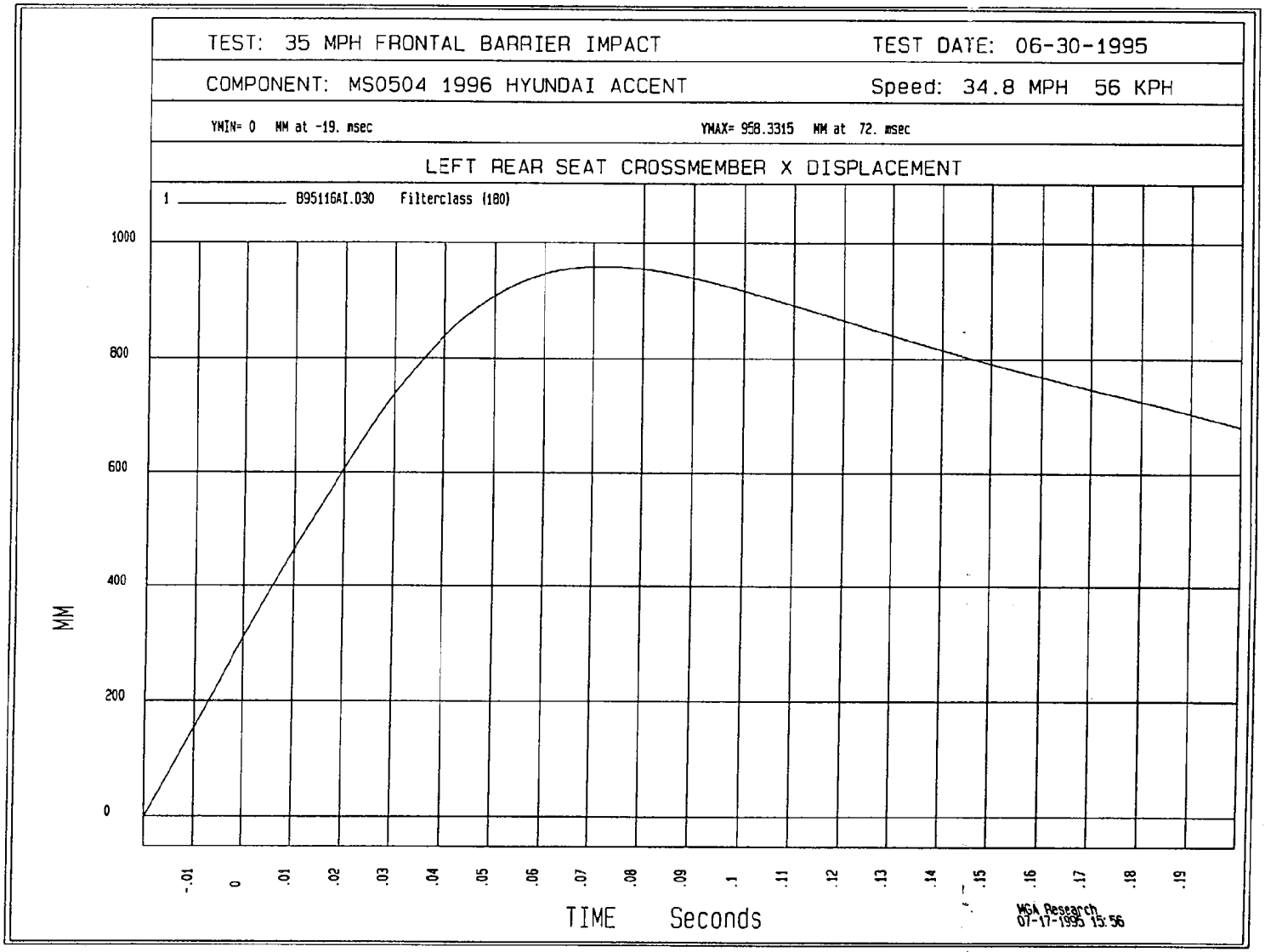


Figure B-3 - Left Rear Seat Crossmember X Displacement vs. Time

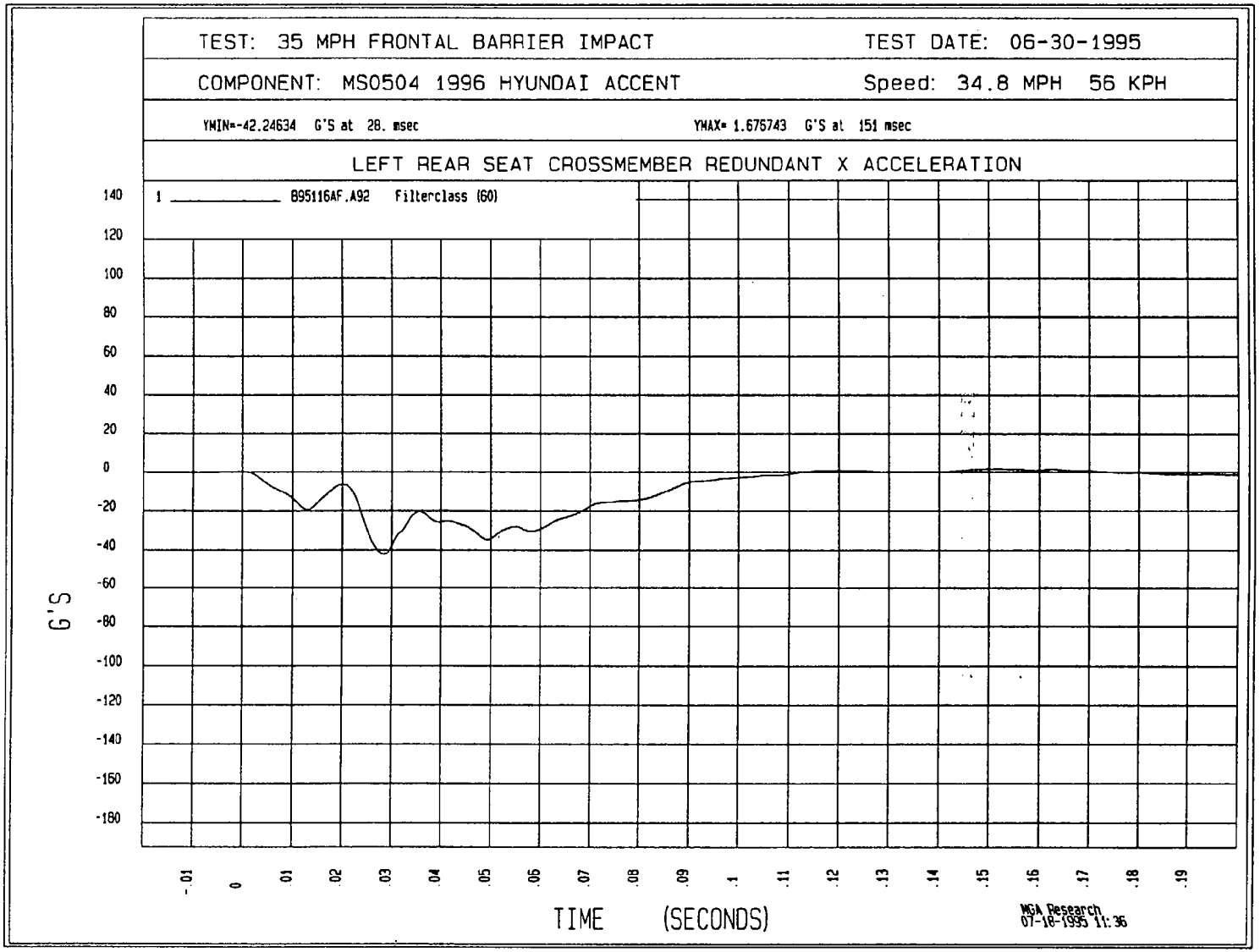


Figure B-4 - Left Rear Seat Crossmember Redundant X Acceleration vs. Time

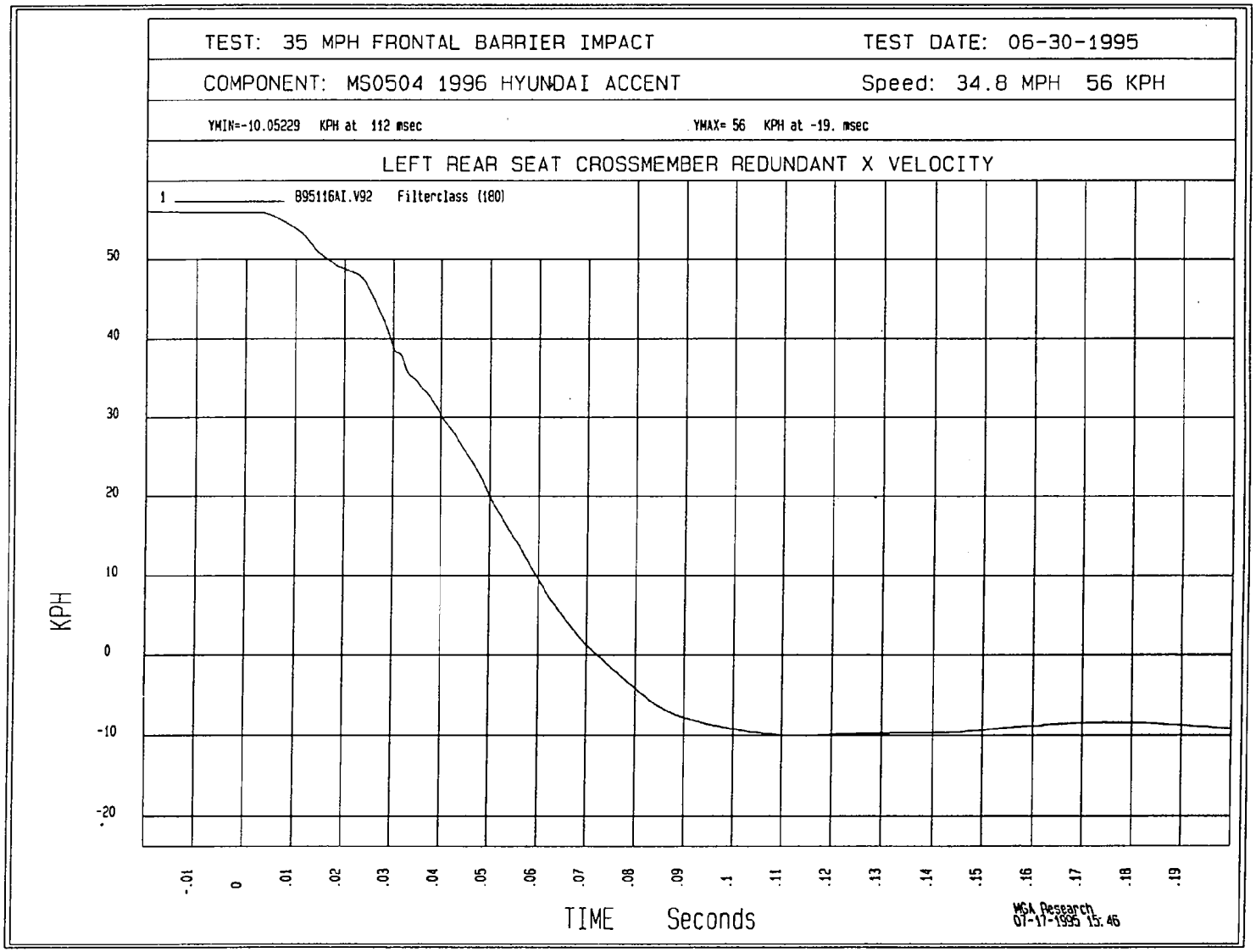


Figure B-5 - Left Rear Seat Crossmember Redundant X Velocity vs. Time

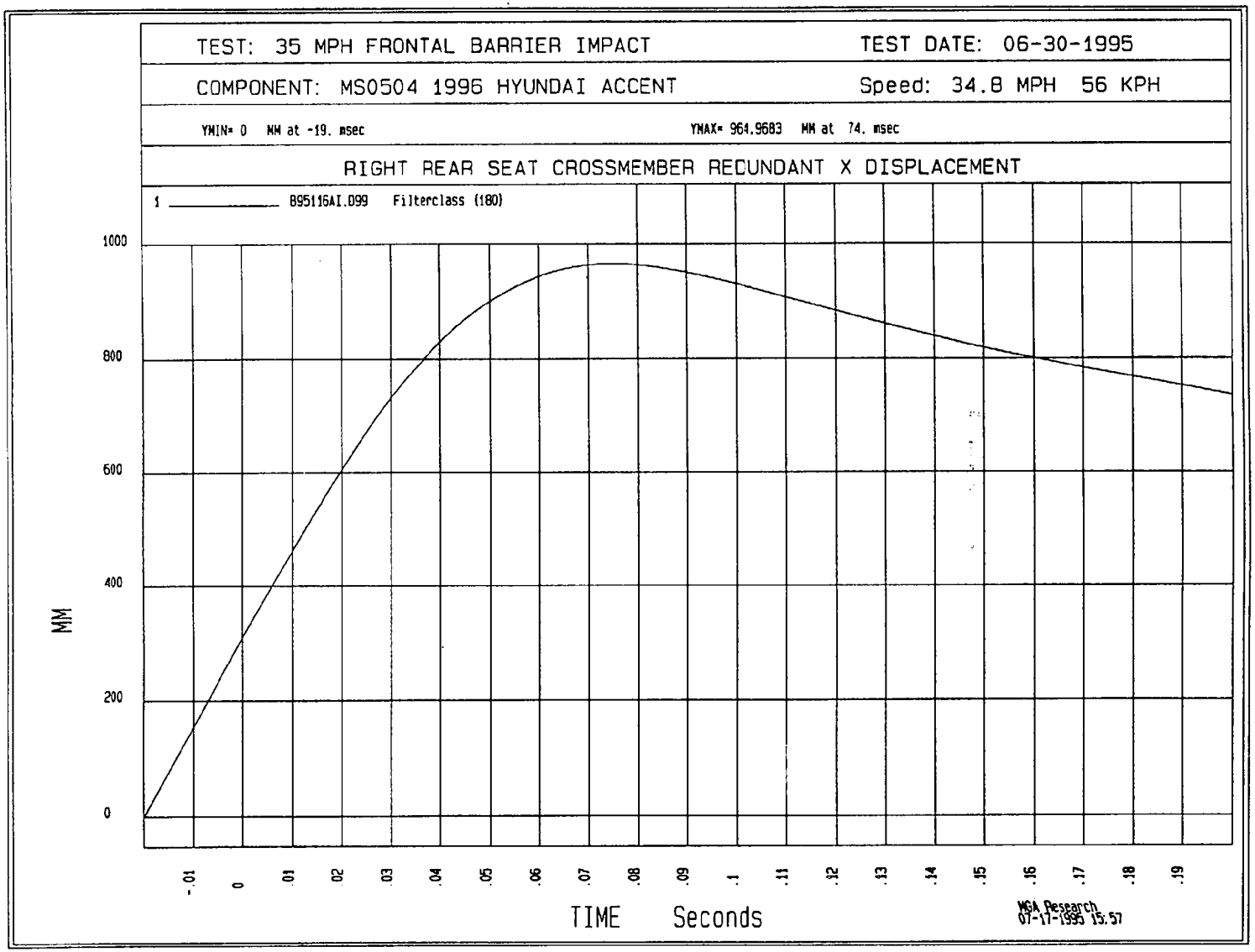


Figure B-6 - Left Rear Seat Crossmember Redundant X Displacement vs. Time

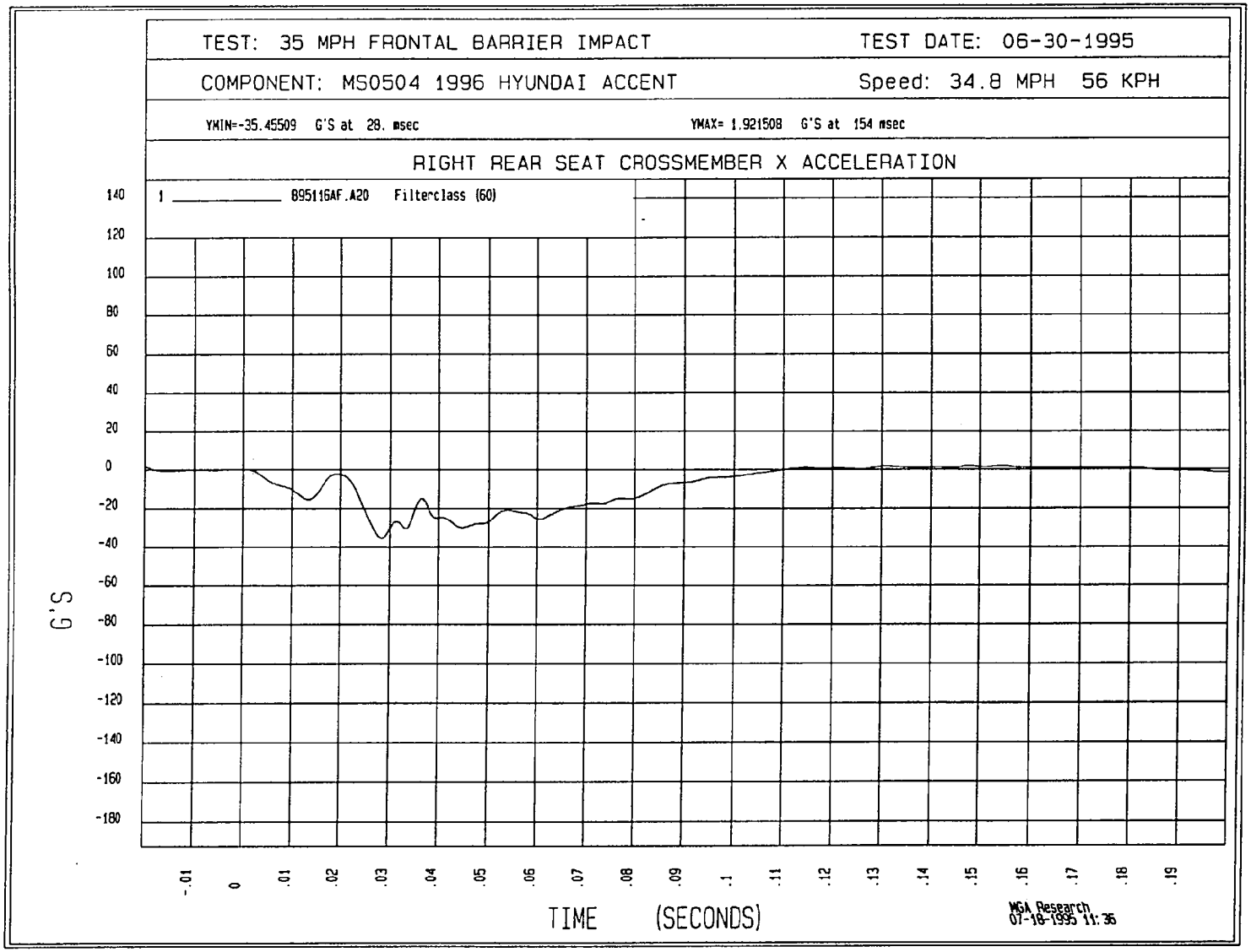


Figure B-7 - Right Rear Seat Crossmember X Acceleration vs. Time

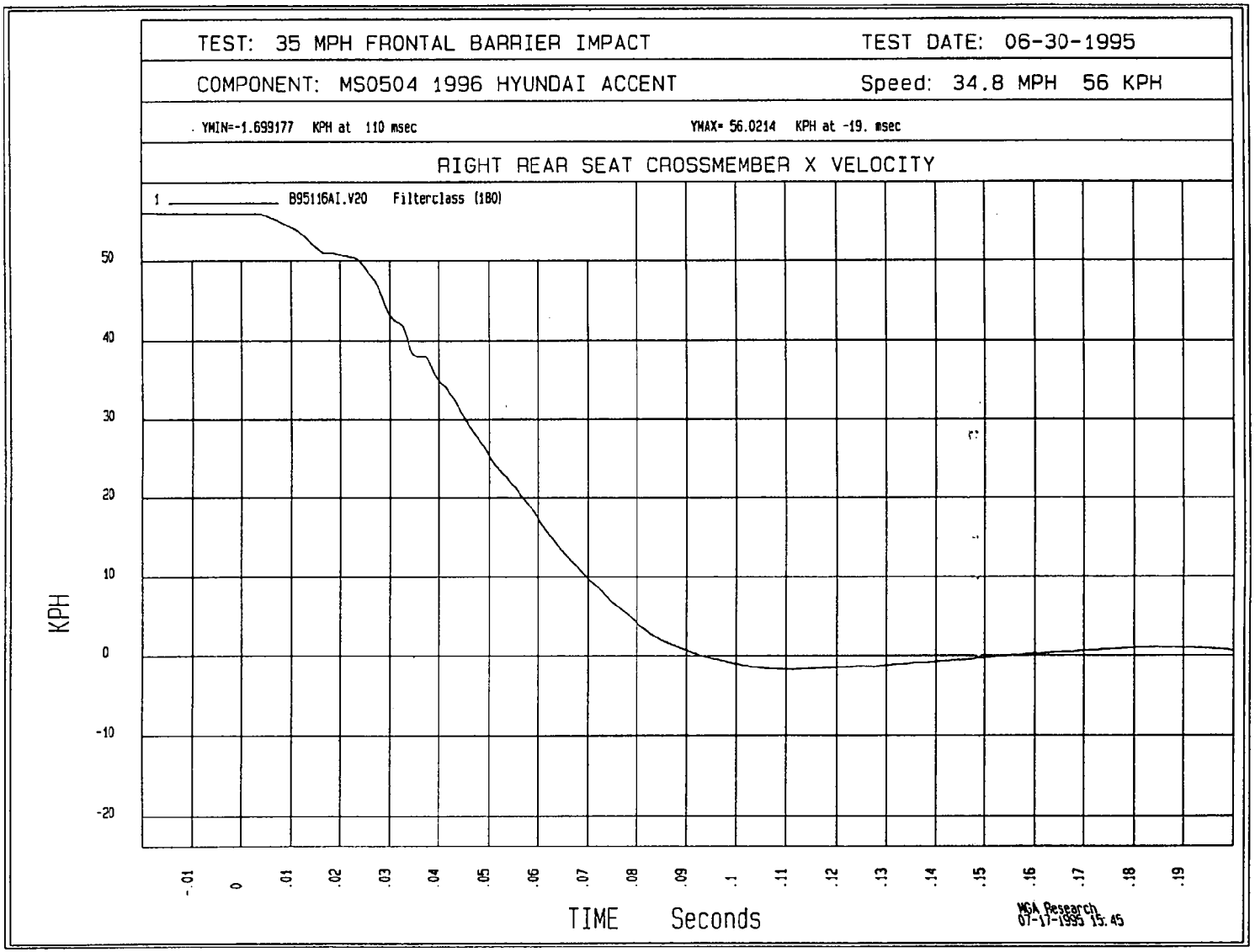


Figure B-8 - Right Rear Seat Crossmember X Velocity vs. Time

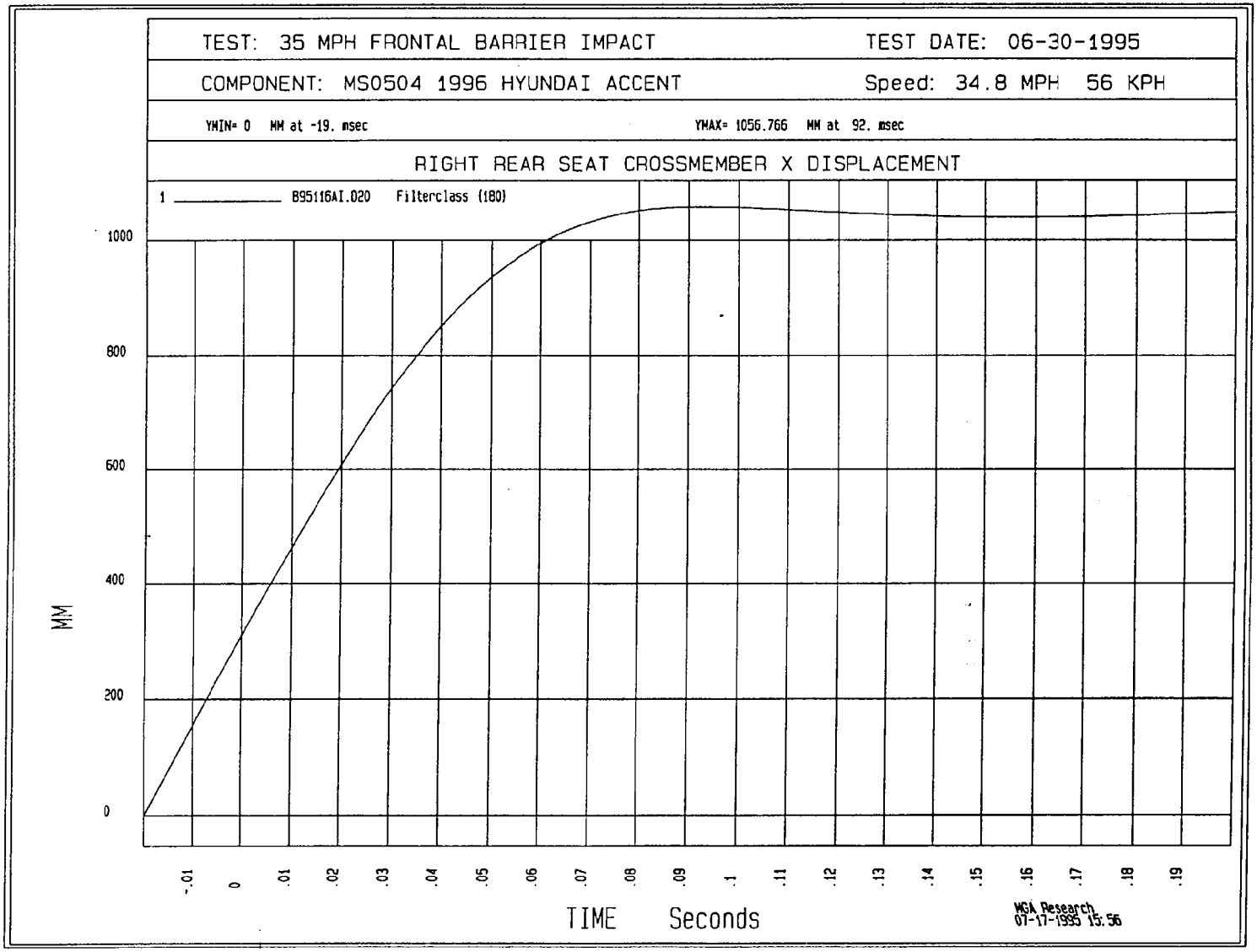


Figure B-9 - Right Rear Seat Crossmember X Displacement vs. Time

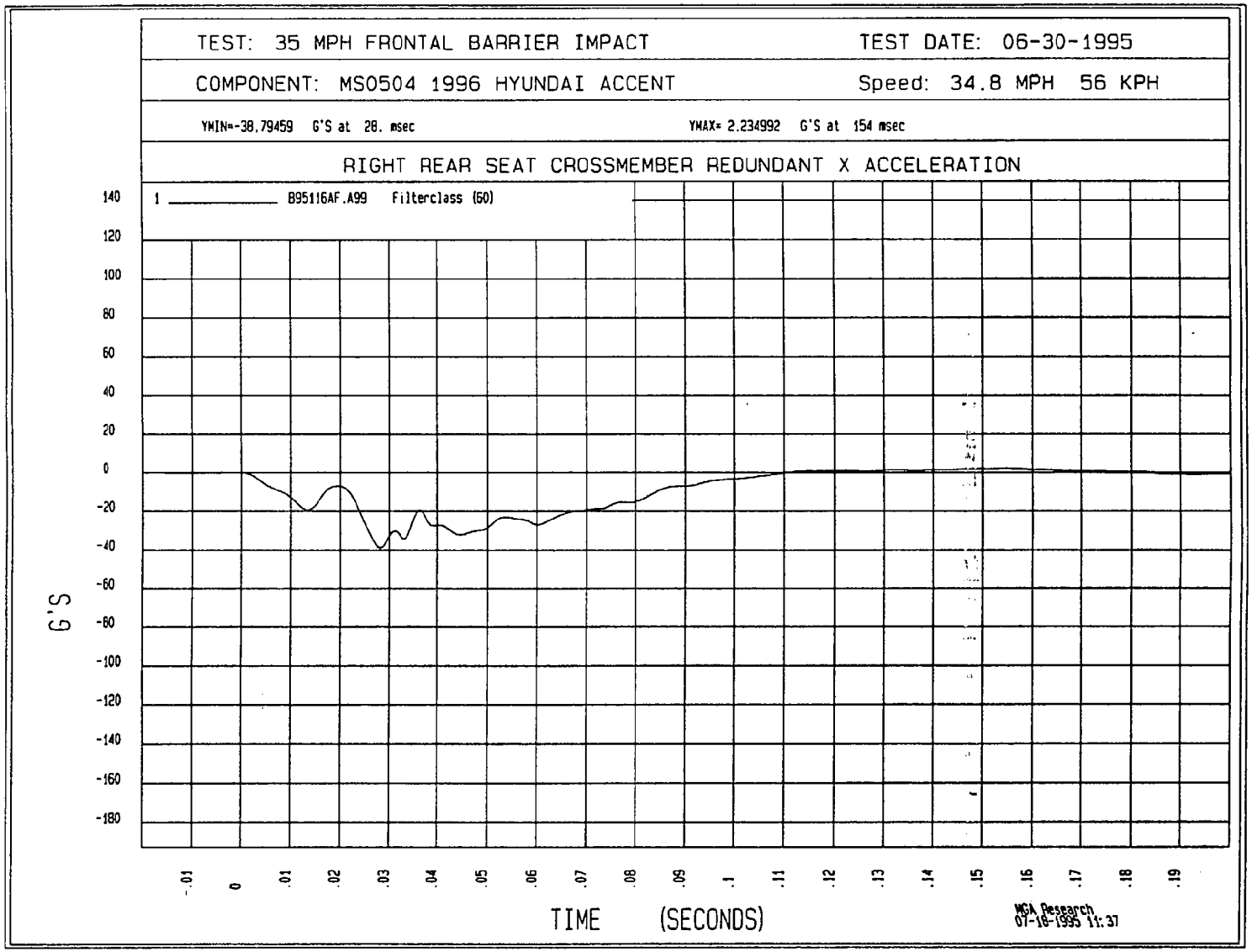


Figure B-1Ø - Right Rear Seat Crossmember Redundant X Acceleration vs. Time

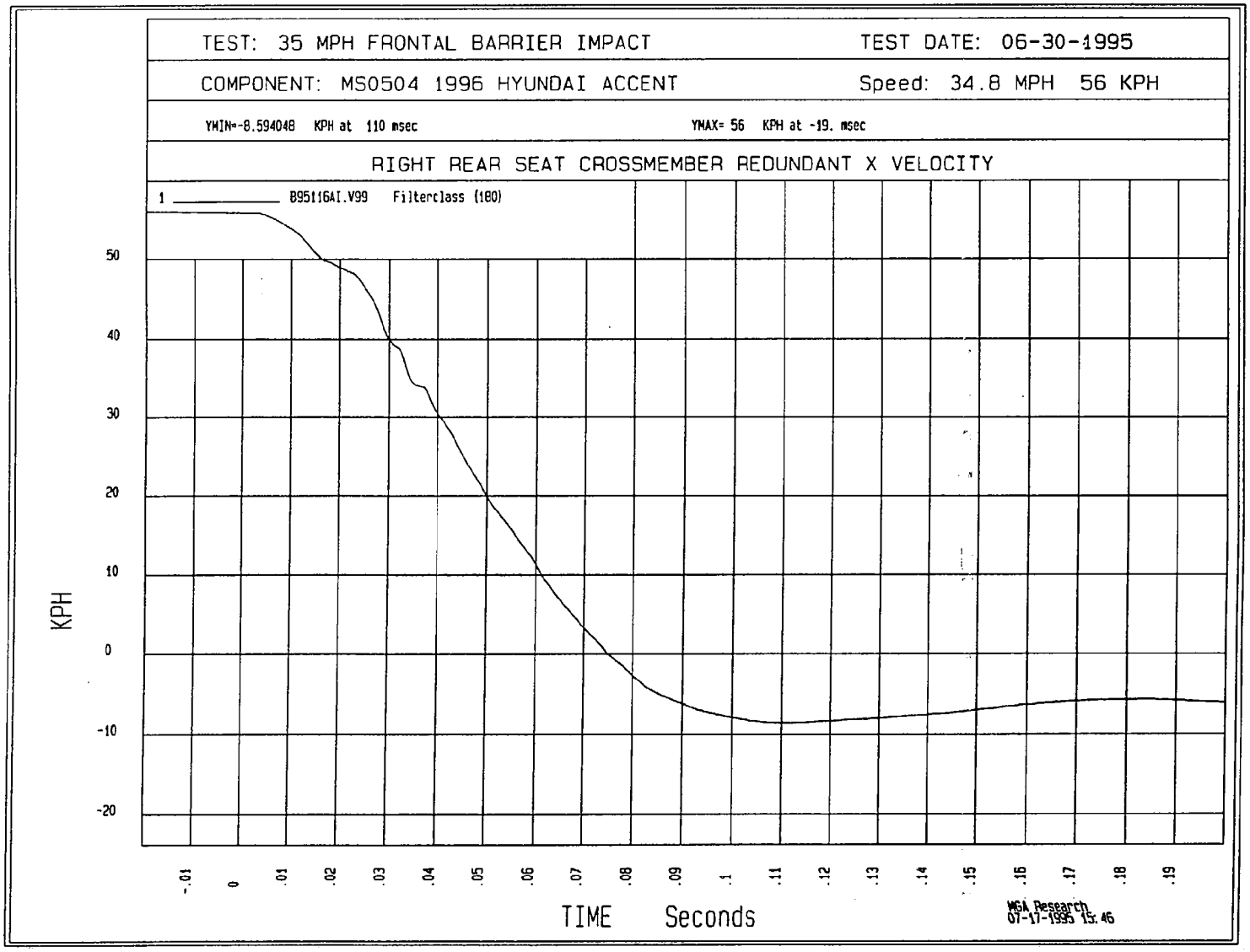


Figure B-11 - Right Rear Seat Crossmember Redundant X Velocity vs. Time

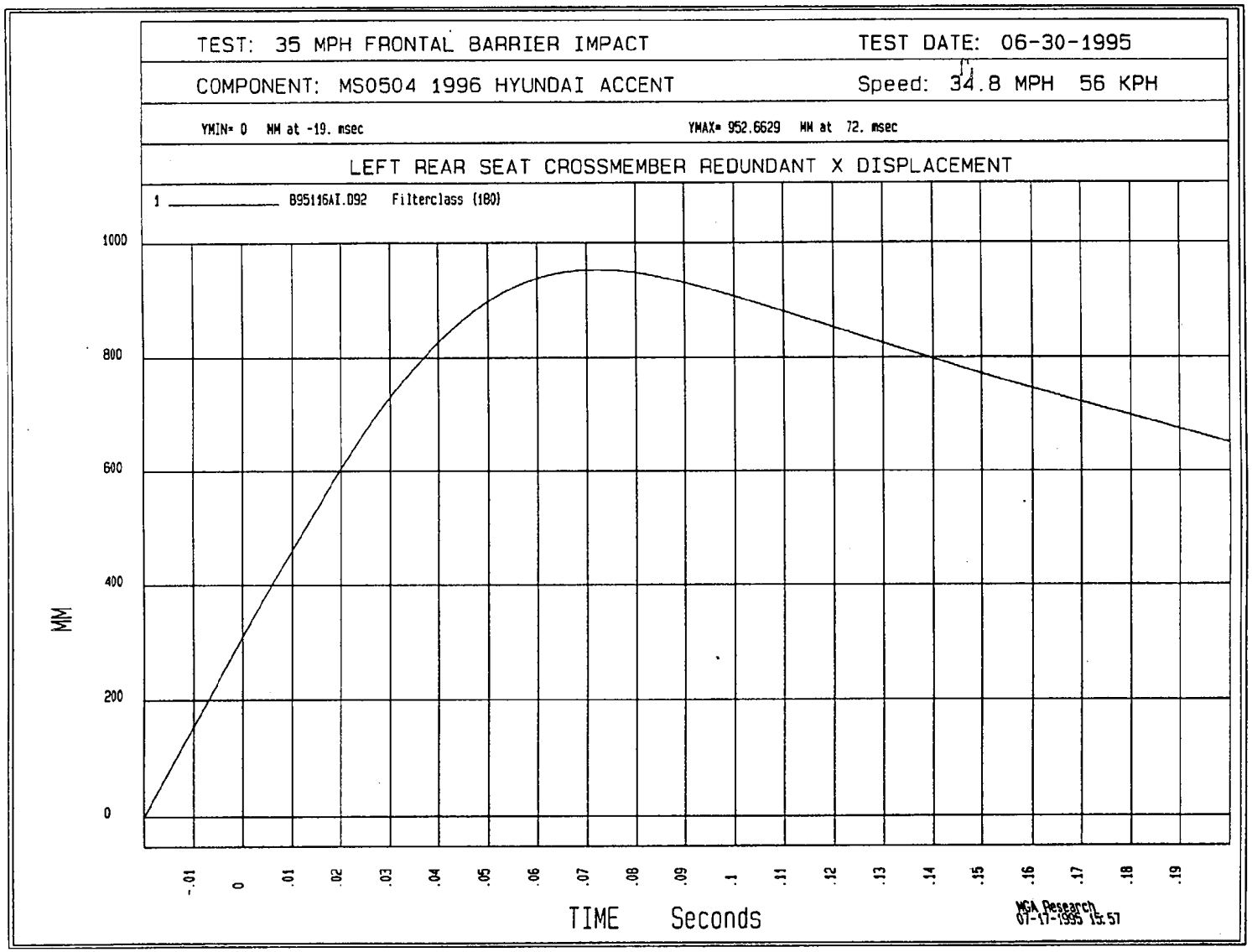


Figure B-12 - Right Rear Seat Crossmember Redundant X Displacement vs. Time

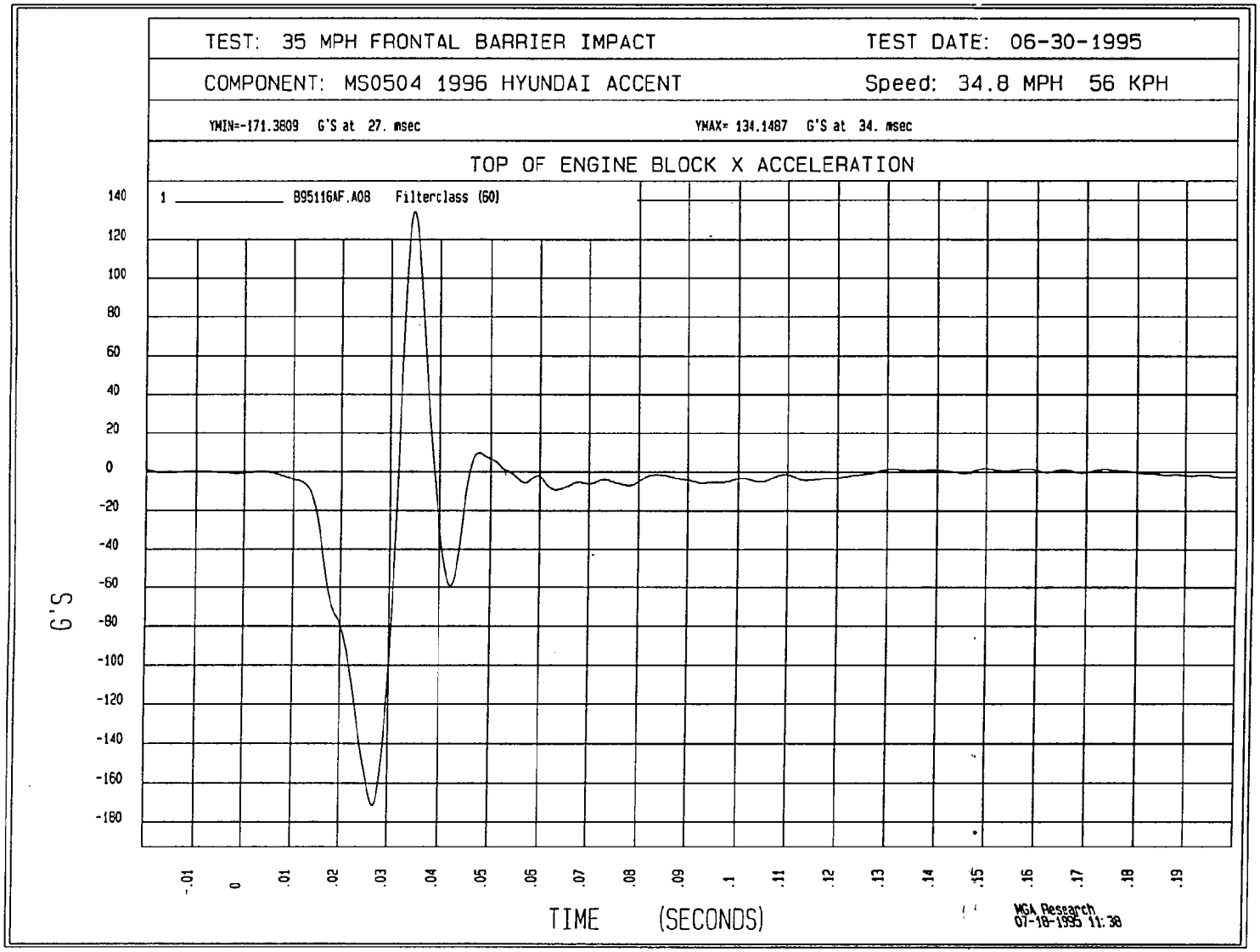


Figure B-13 - Top of Engine Block X Acceleration vs. Time

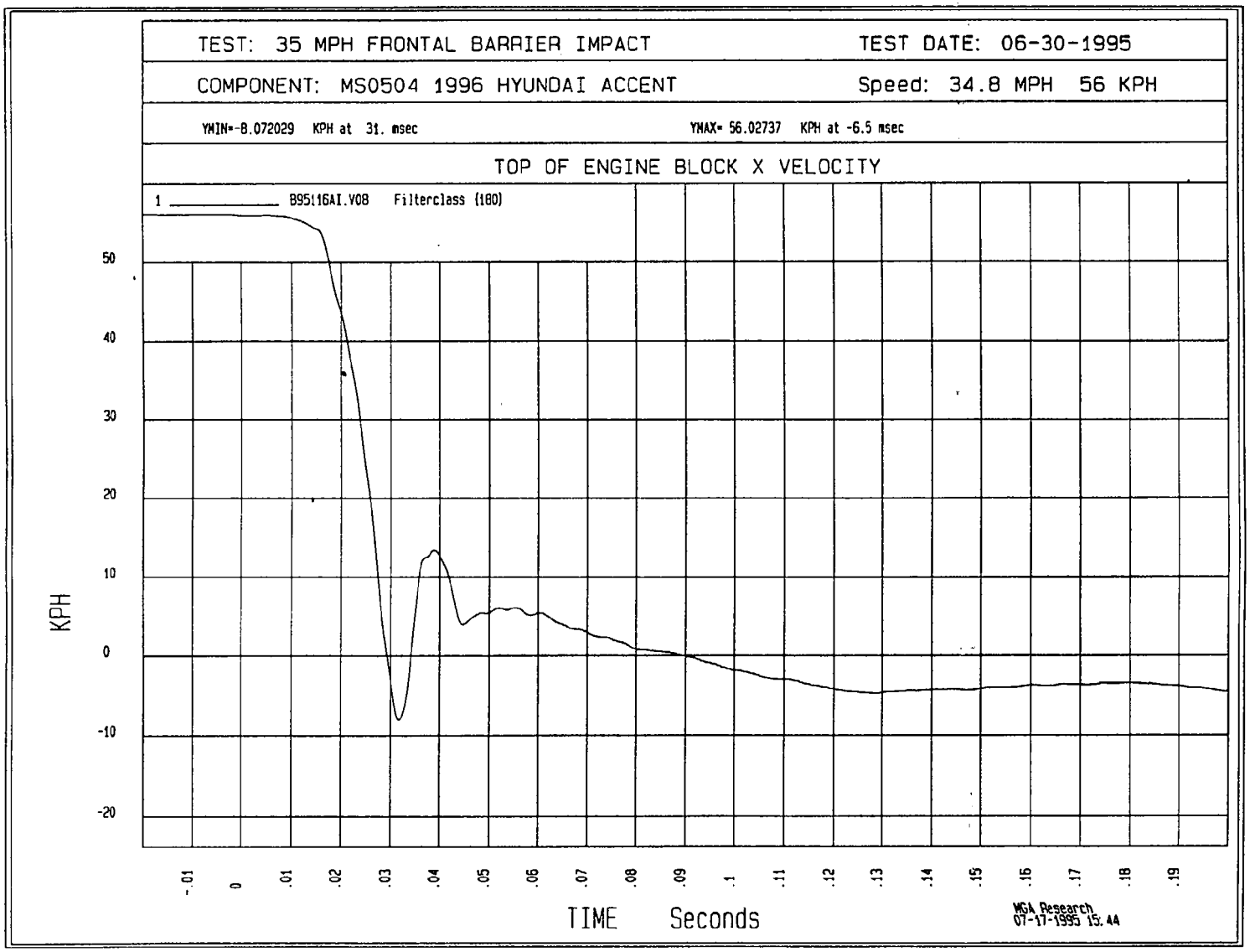


Figure B-14 - Top of Engine Block X Velocity vs. Time

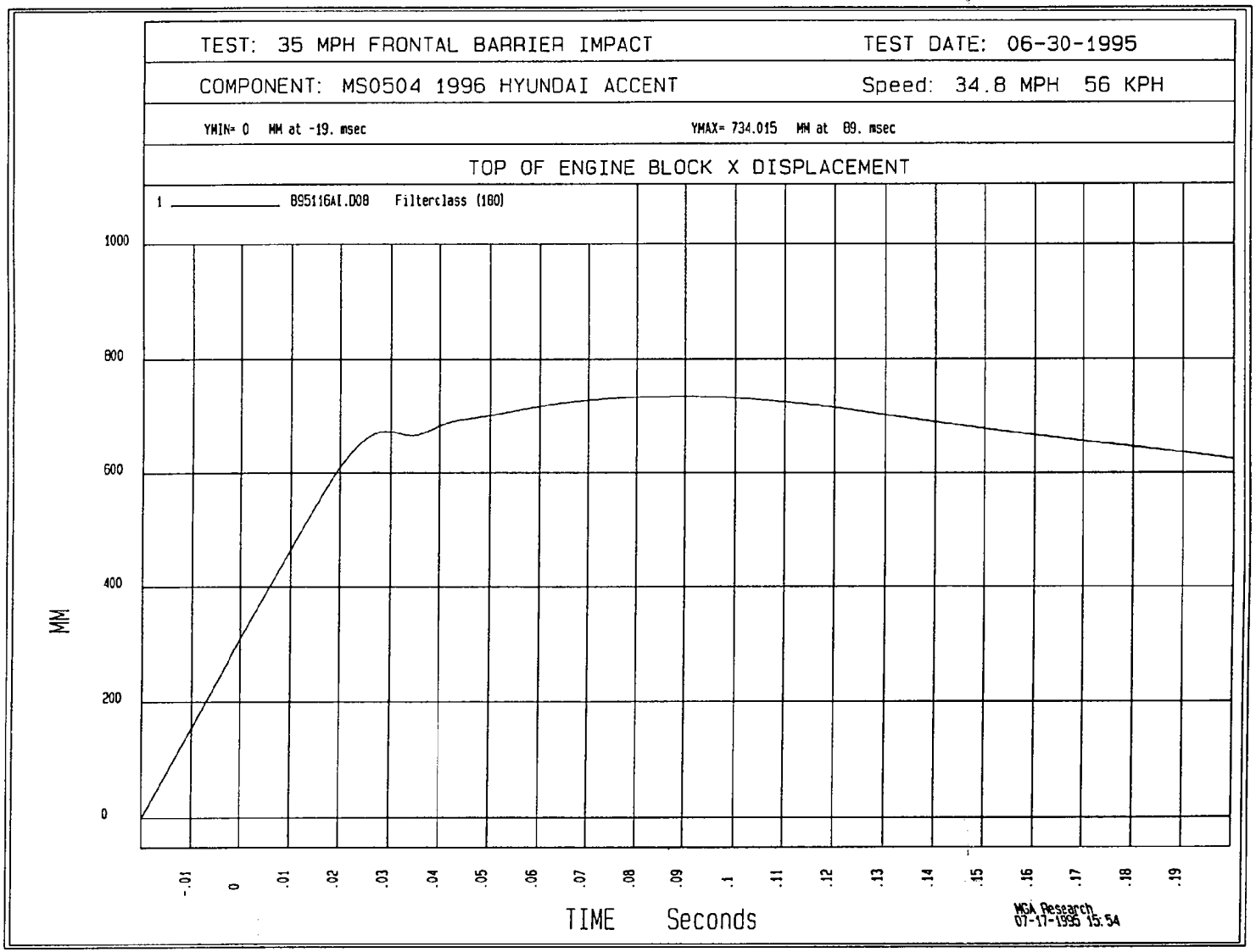


Figure B-15 - Top of Engine Block X Displacement vs. Time

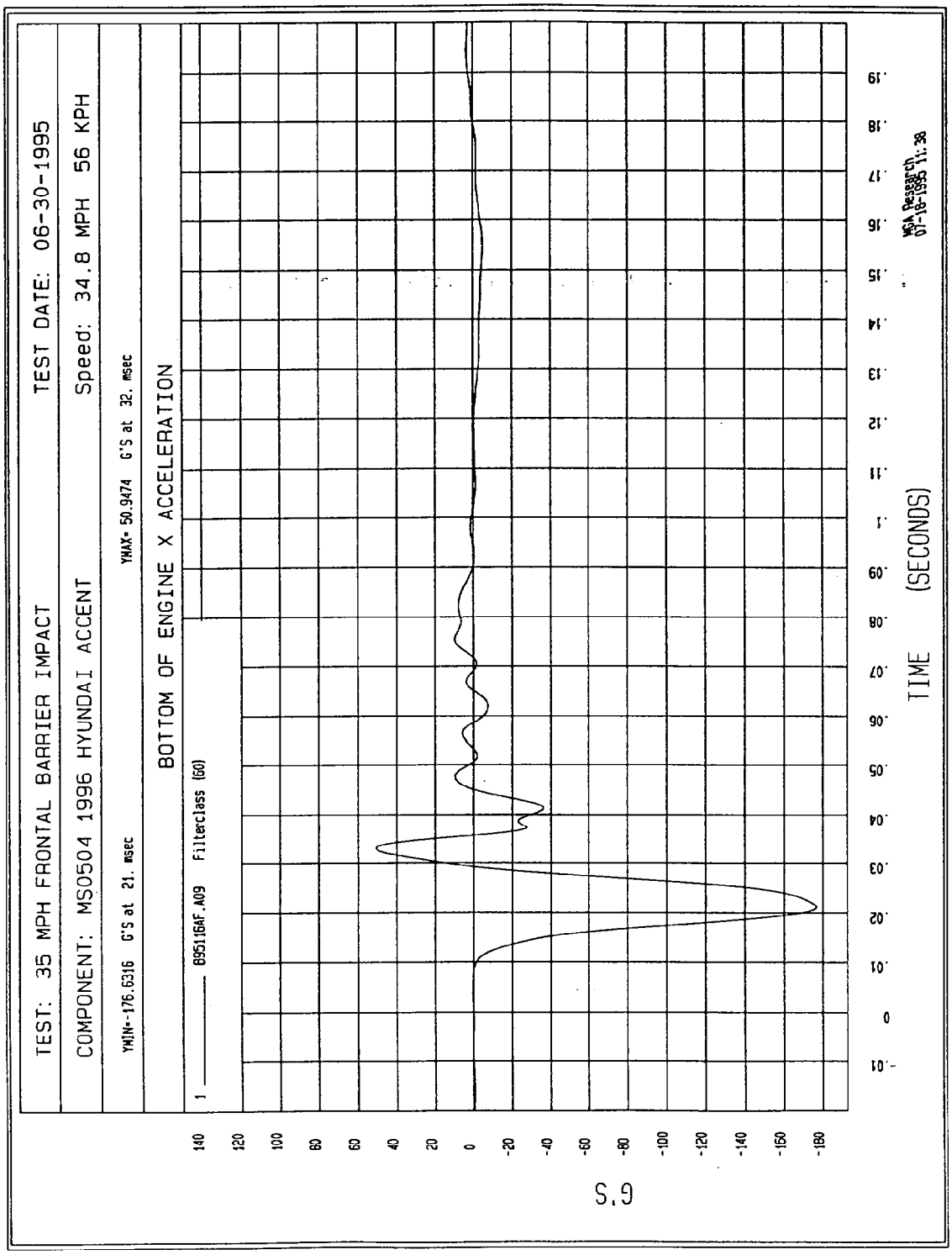


Figure B-16 - Bottom of Engine X Acceleration vs. Time

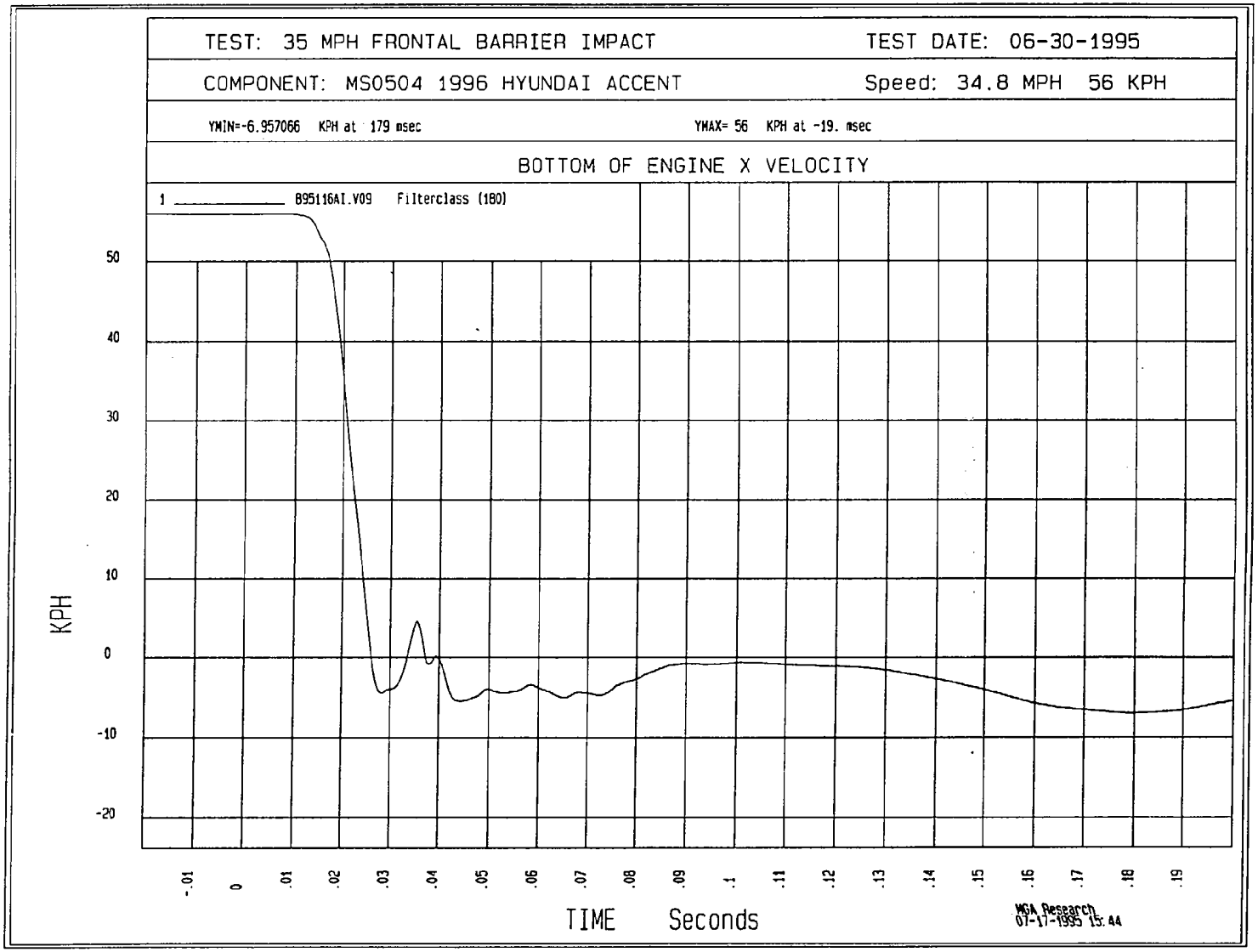


Figure B-17 - Bottom of Engine X Velocity vs. Time

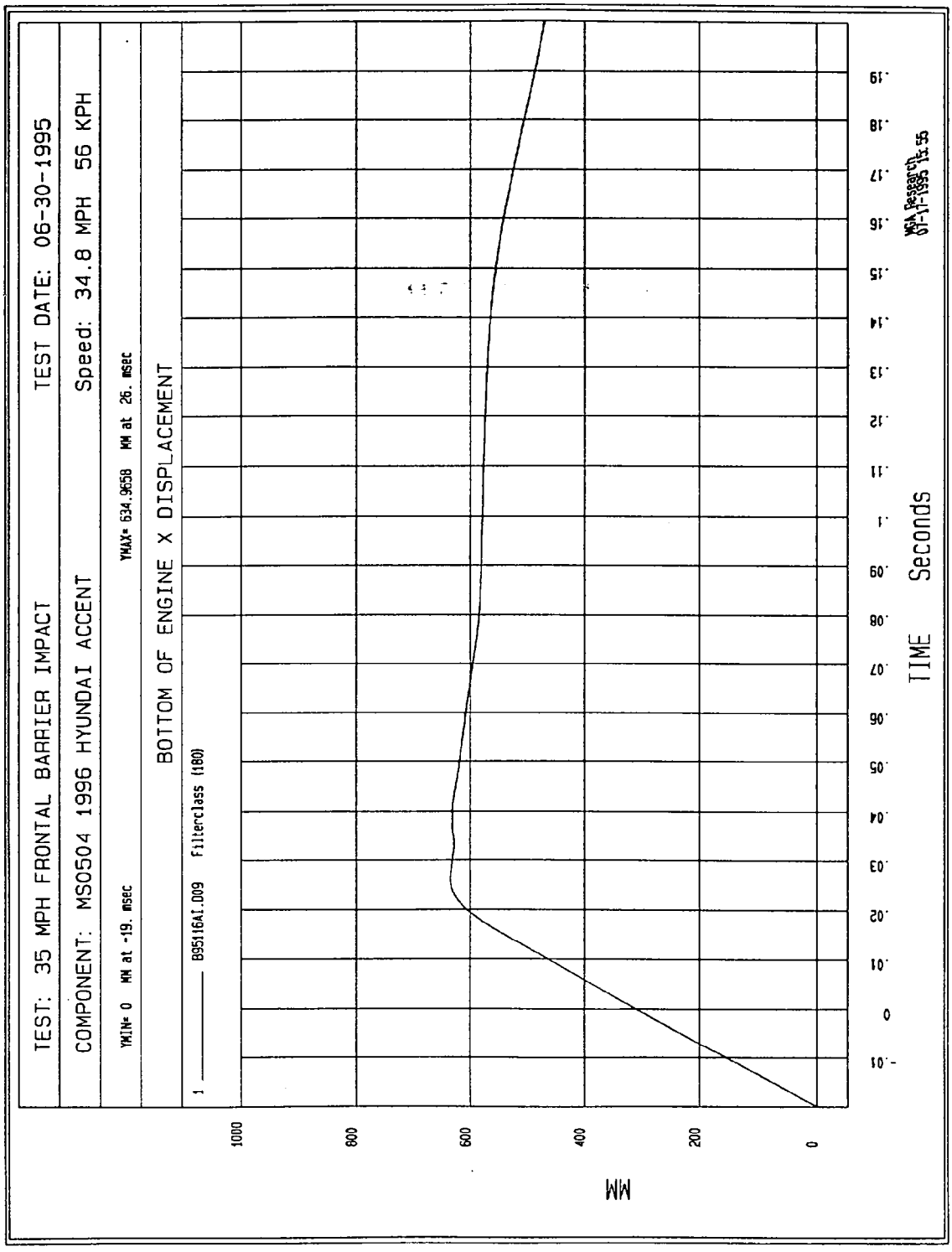


Figure B-18 - Bottom of Engine X Displacement vs. Time

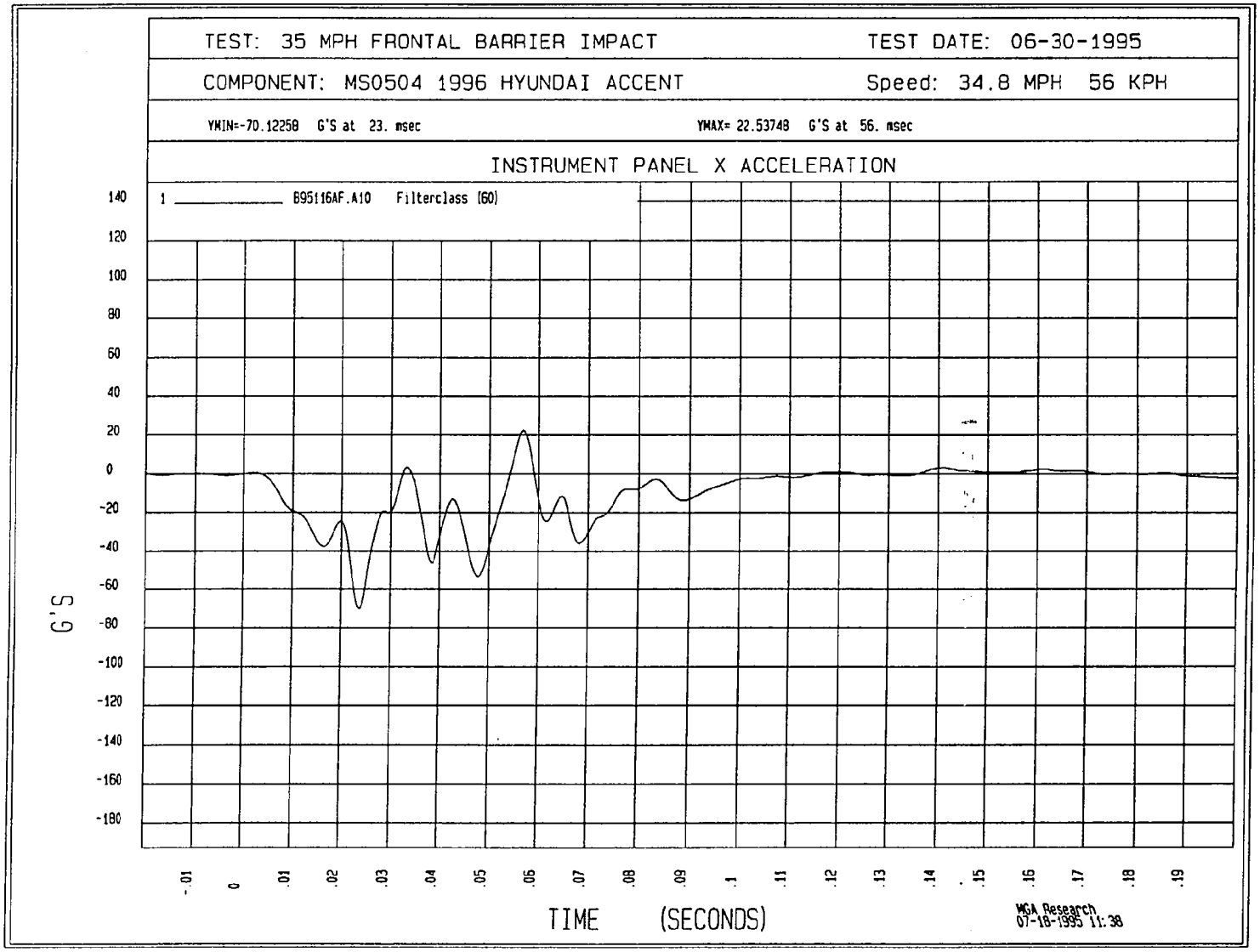


Figure B-19 - Instrument Panel X Acceleration vs. Time

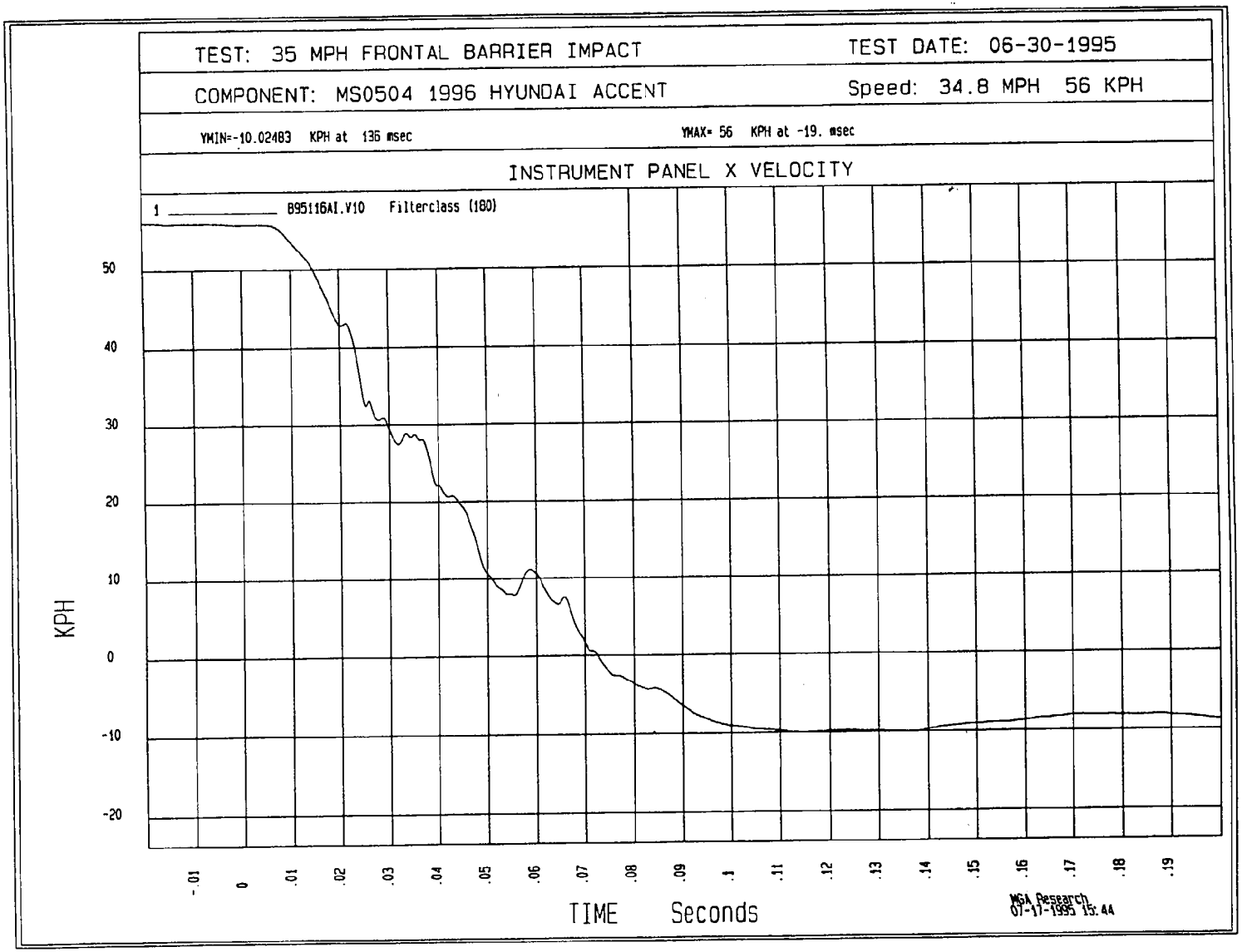


Figure B-2Ø - Instrument Panel X Velocity vs. Time

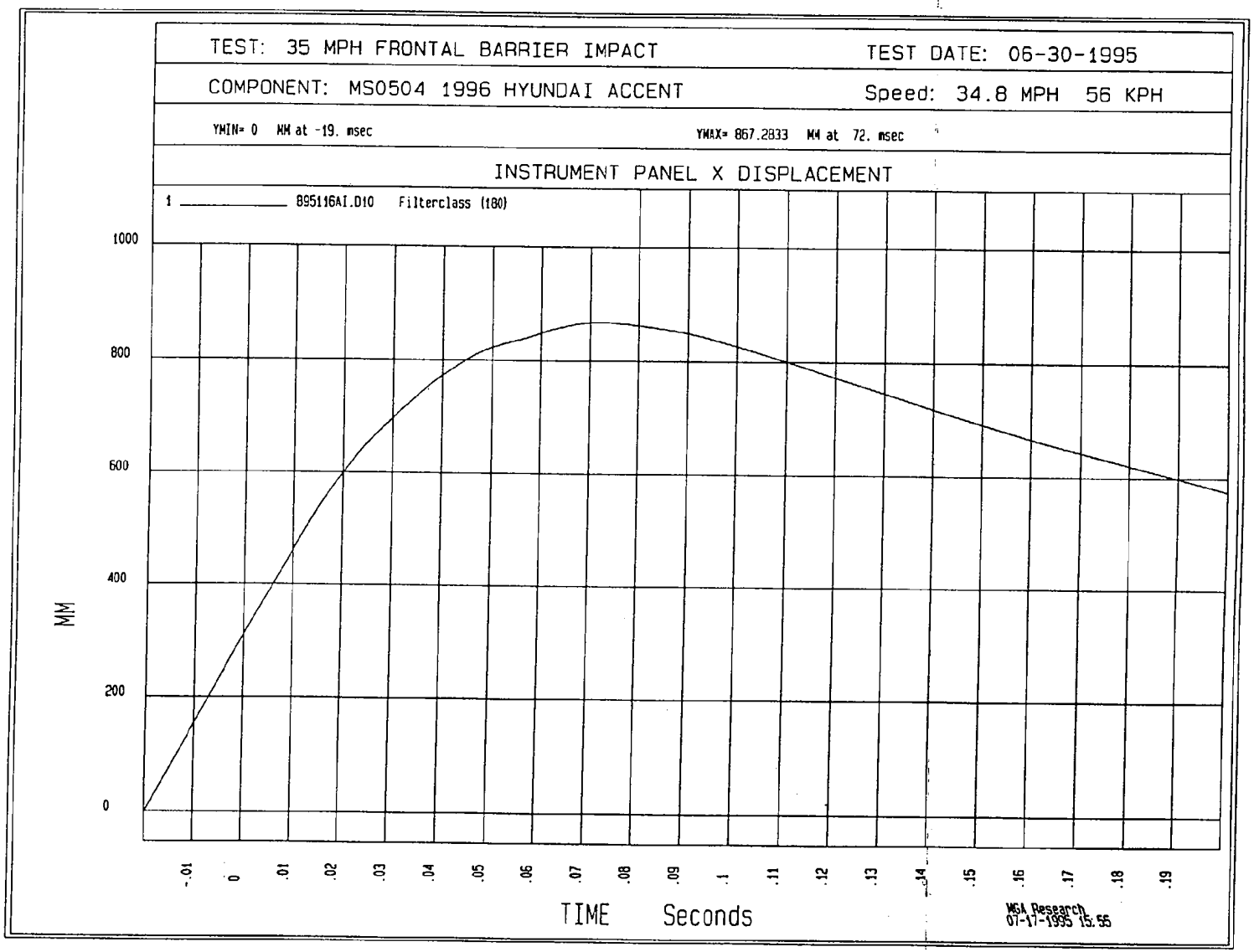


Figure B-21 - Instrument Panel X Displacement vs. Time

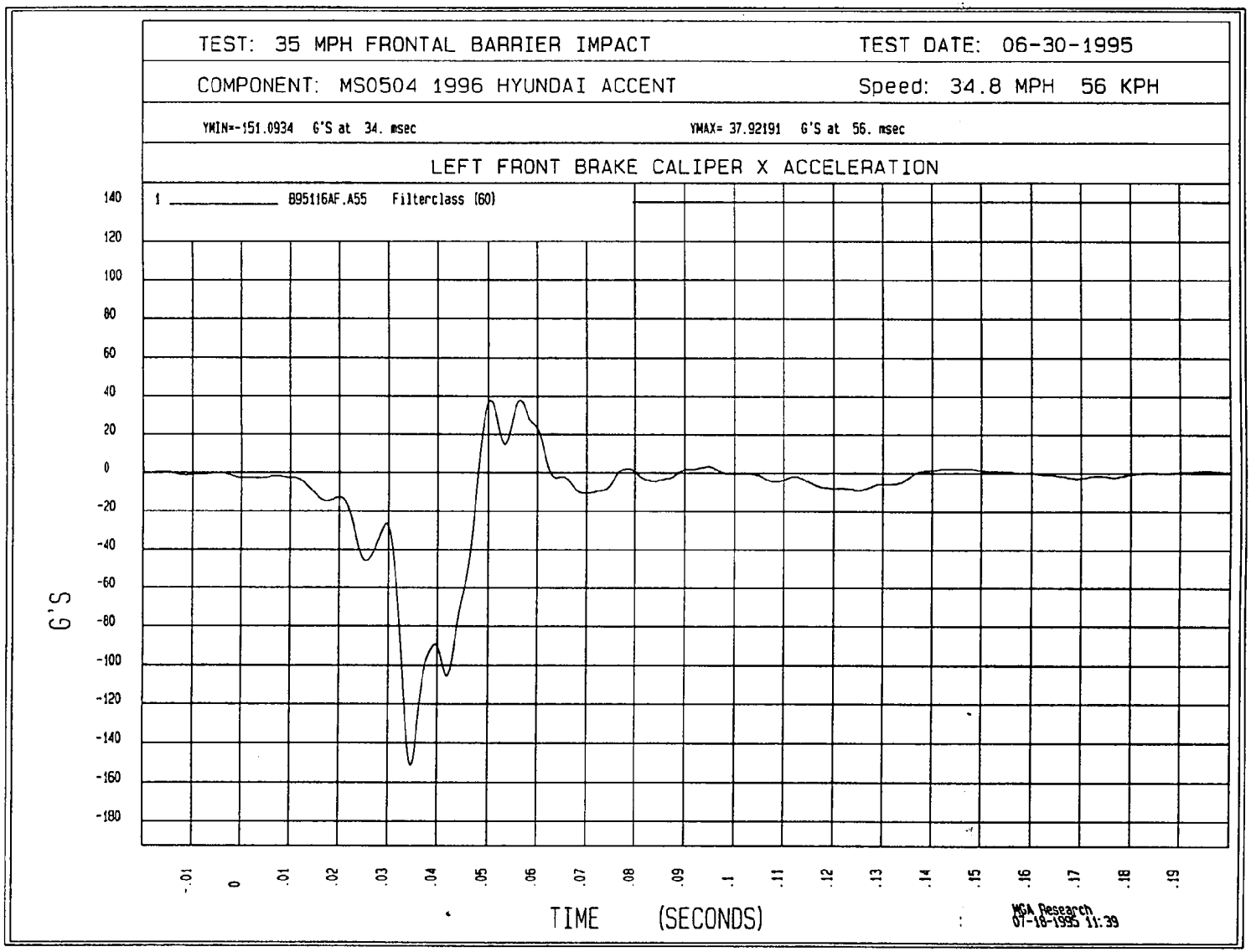


Figure B-22 - Left Brake Caliper X Acceleration vs. Time

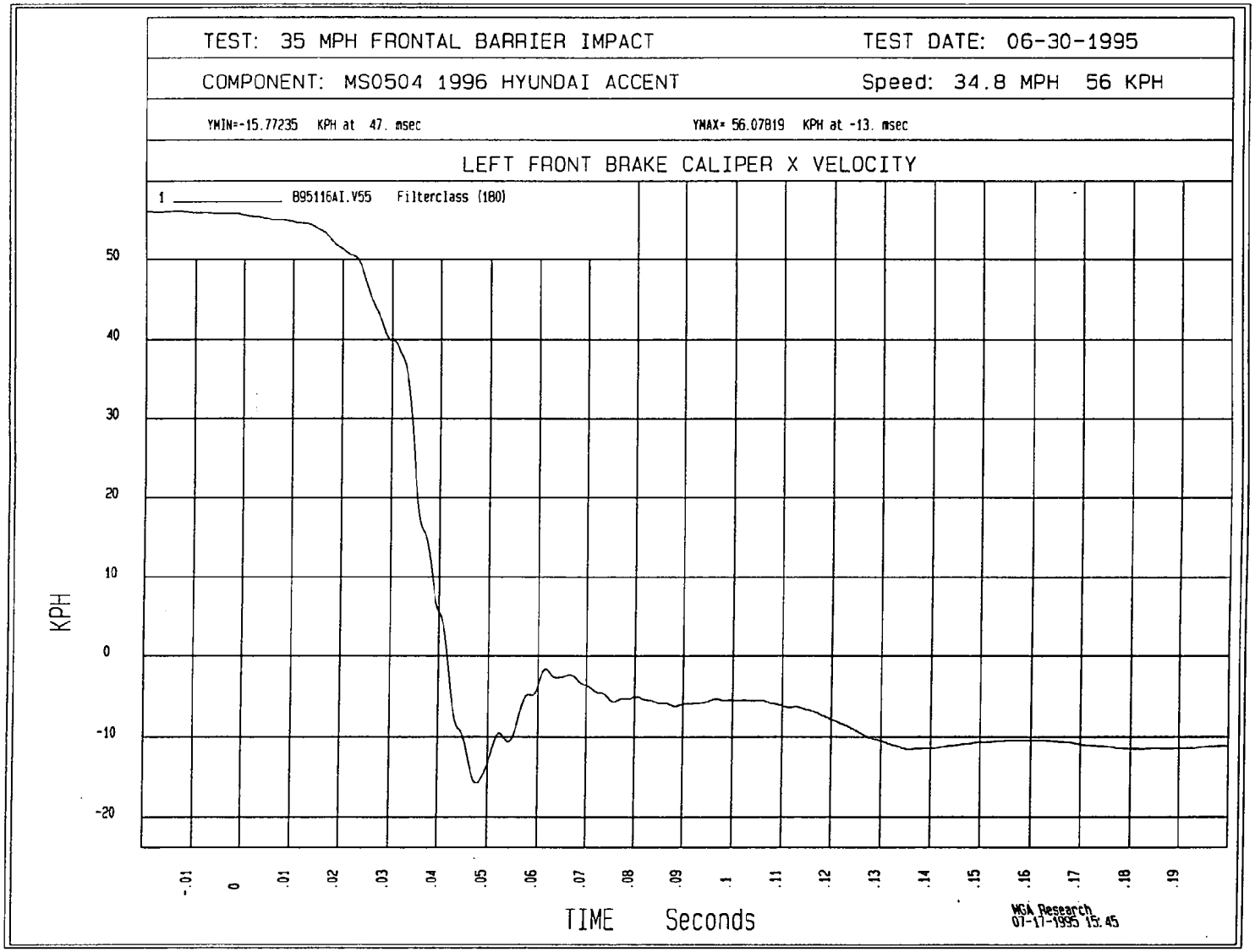


Figure B-23 - Left Brake Caliper X Velocity vs. Time

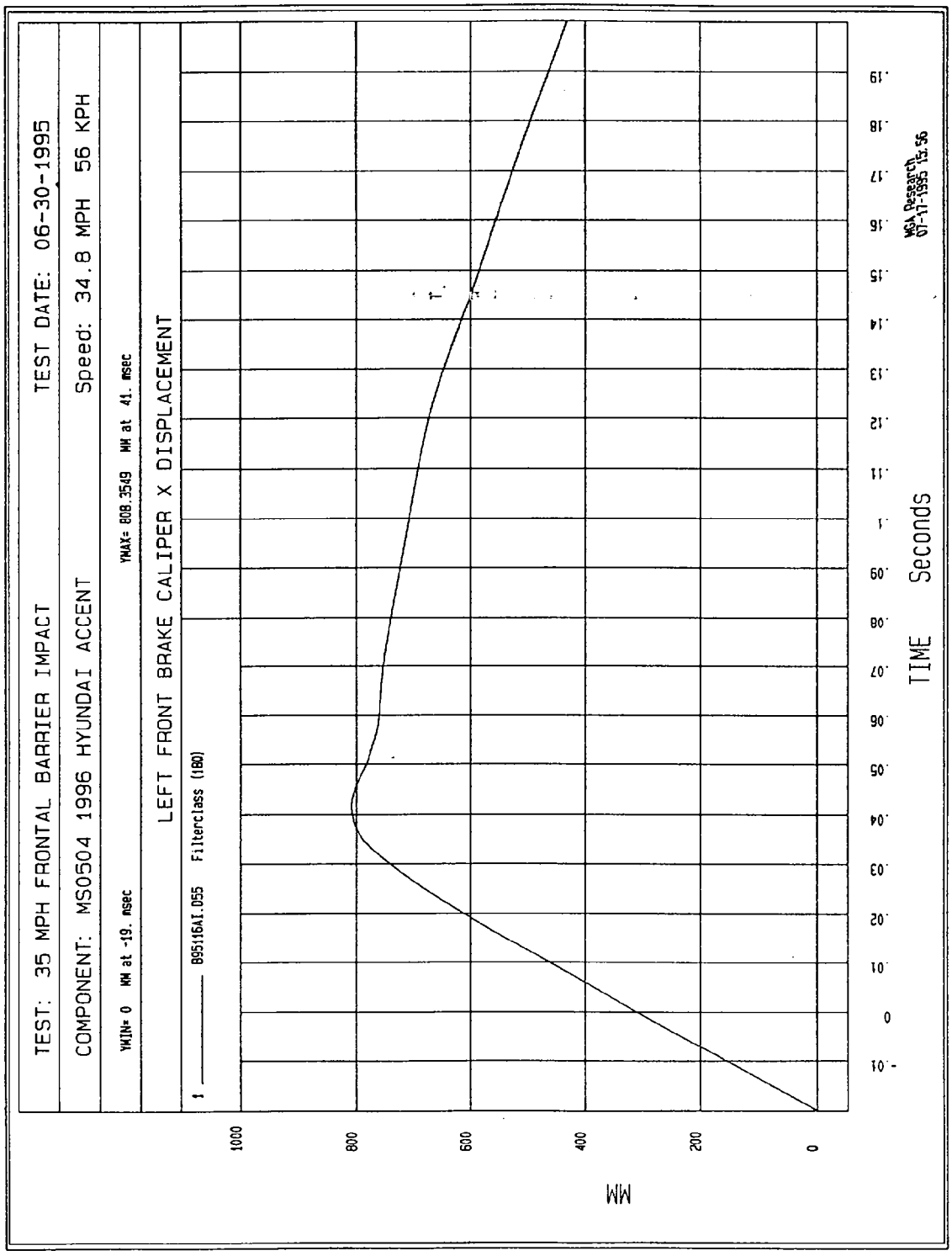


Figure B-24 - Left Brake Caliper X Displacement vs. Time

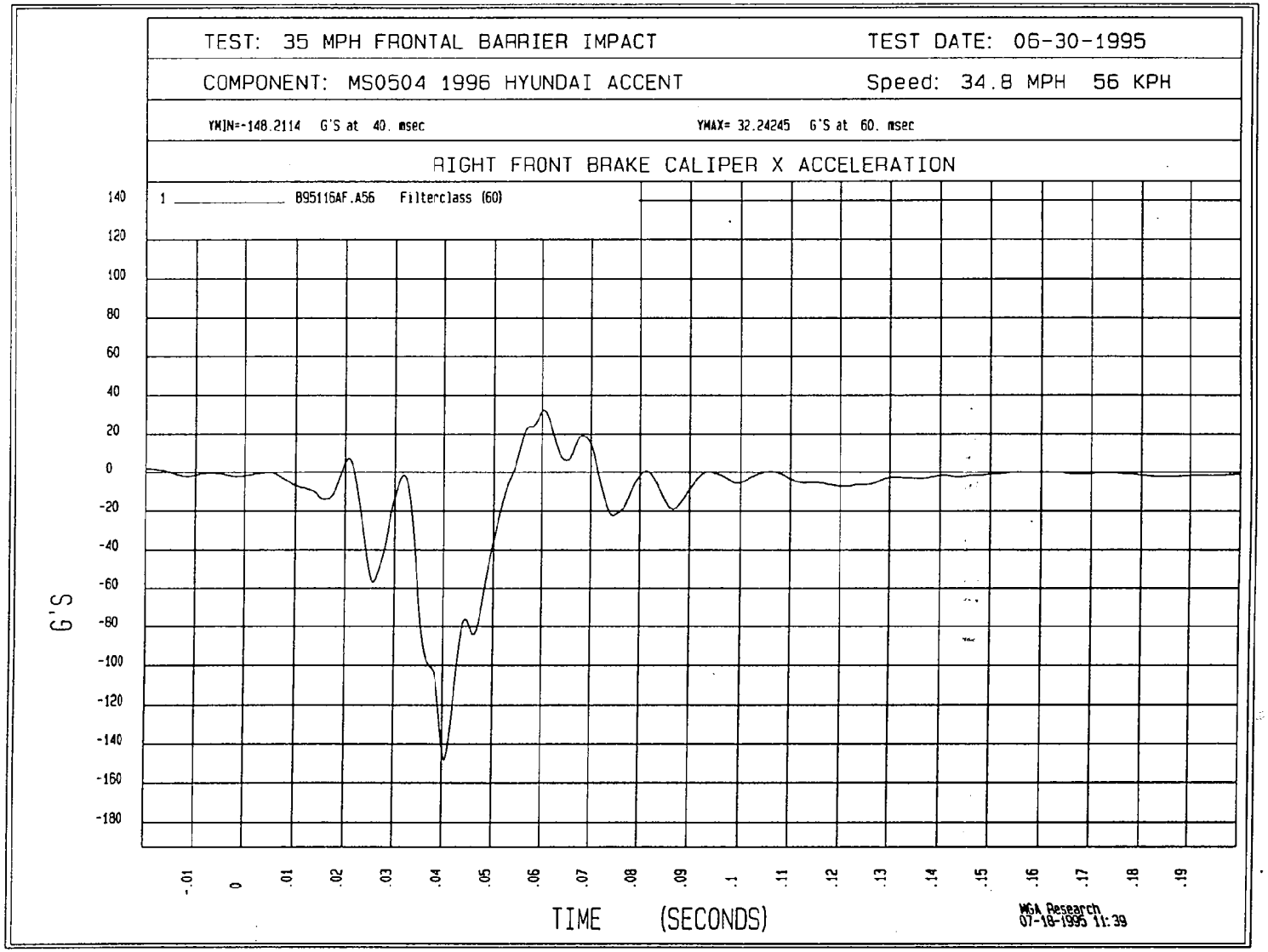


Figure B-25 - Right Brake Caliper X Acceleration vs. Time

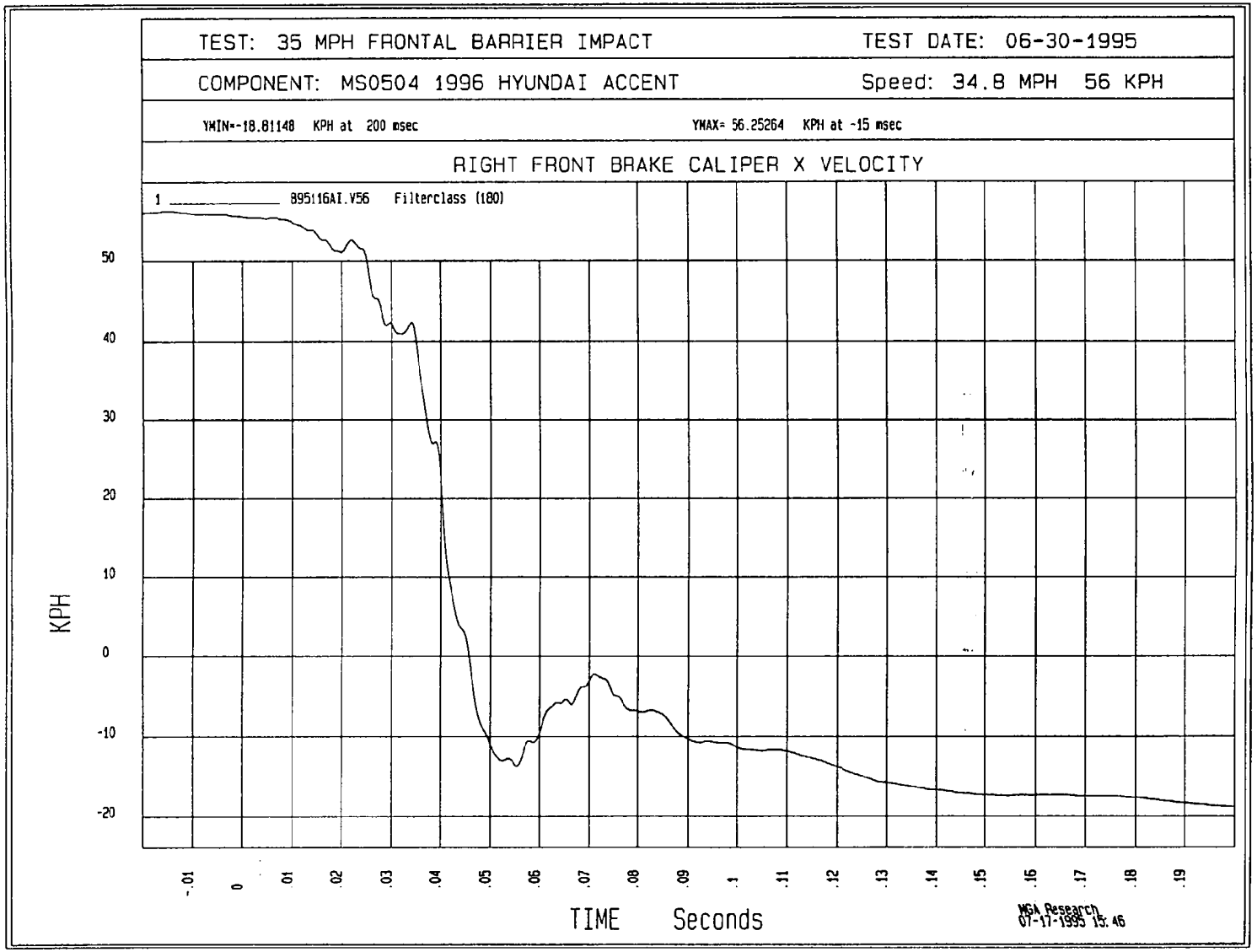


Figure B-26 - Right Brake Caliper X Velocity vs. Time

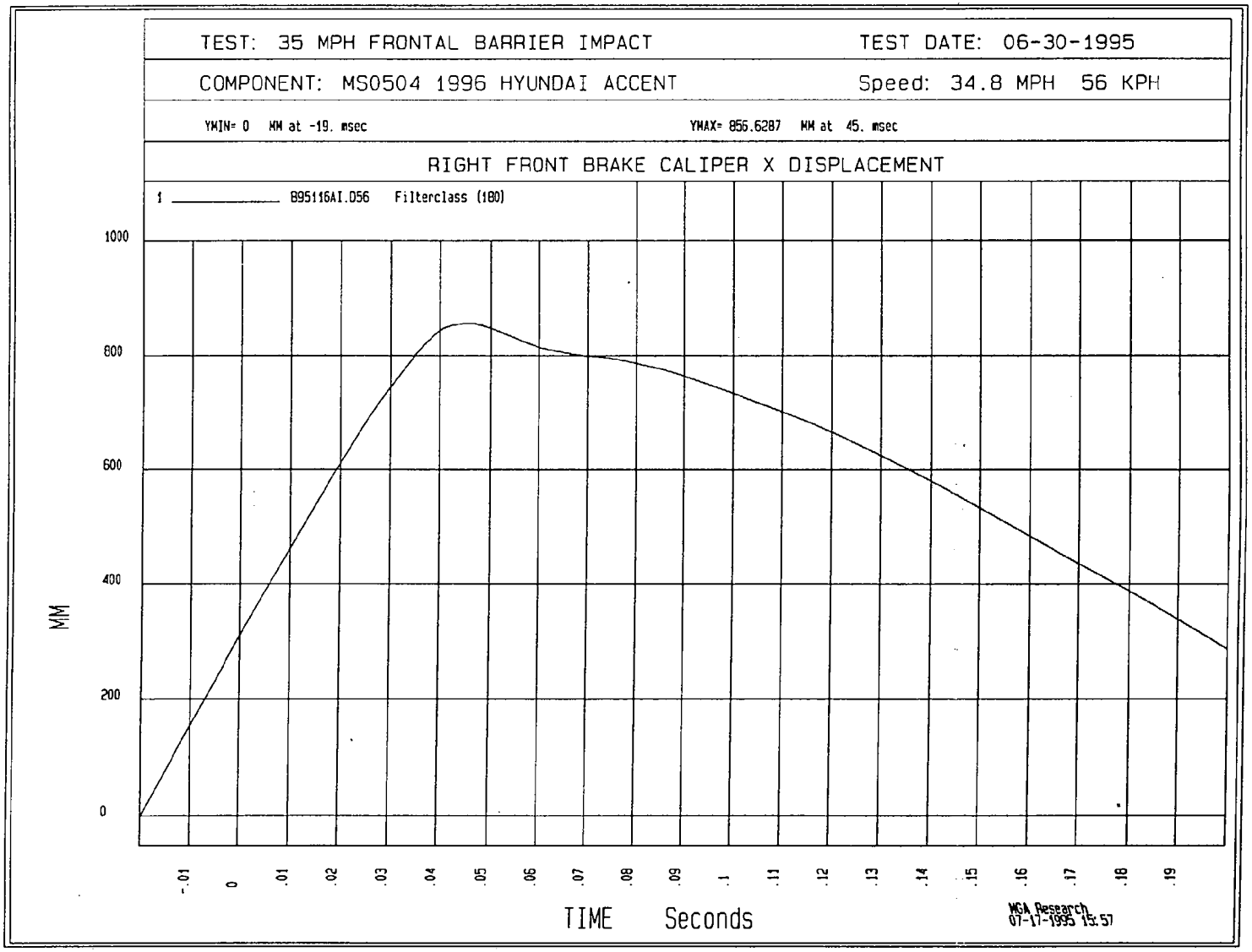


Figure B-27 - Right Brake Caliper X Displacement vs. Time

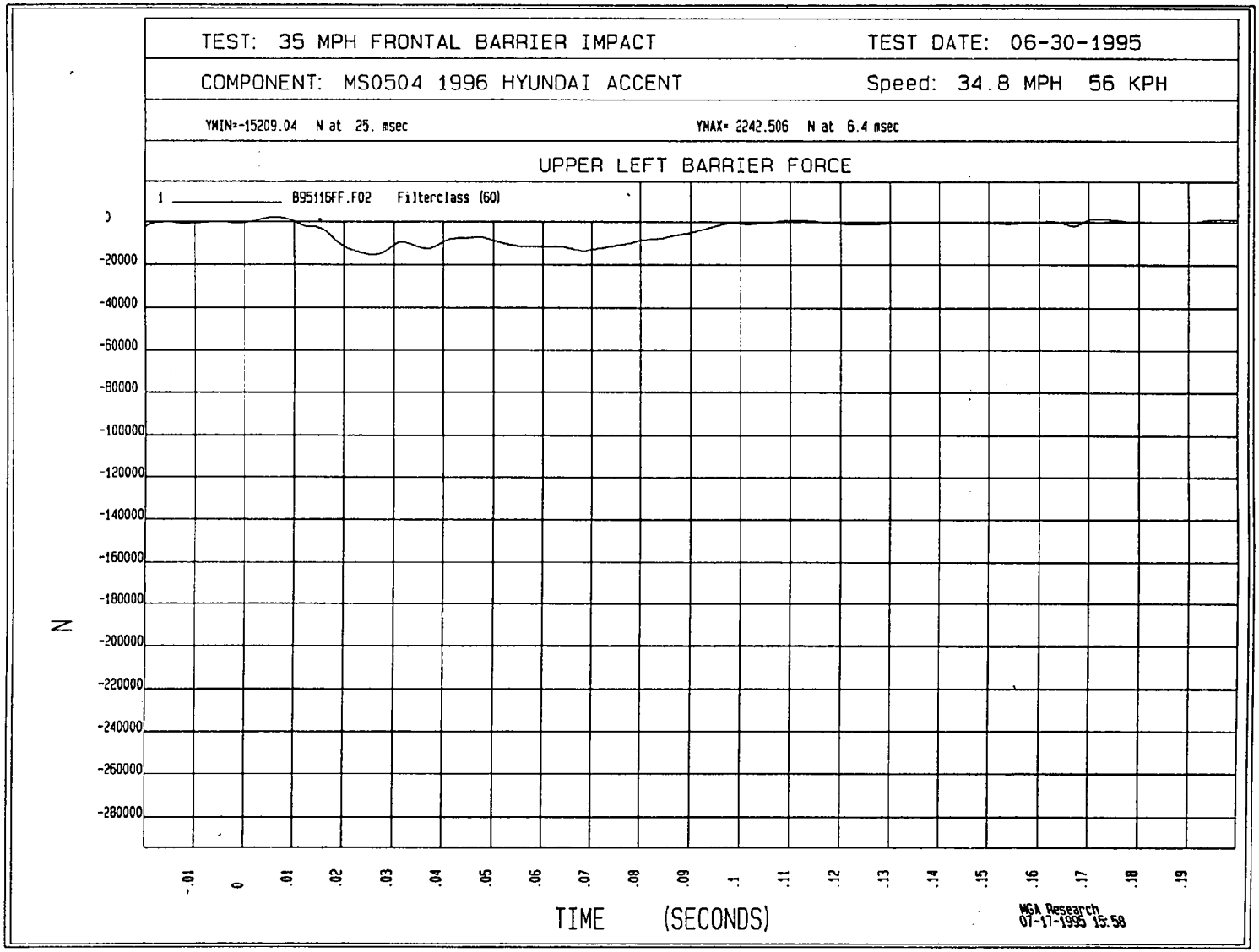


Figure B-28 - Upper Left Barrier Force vs. Time

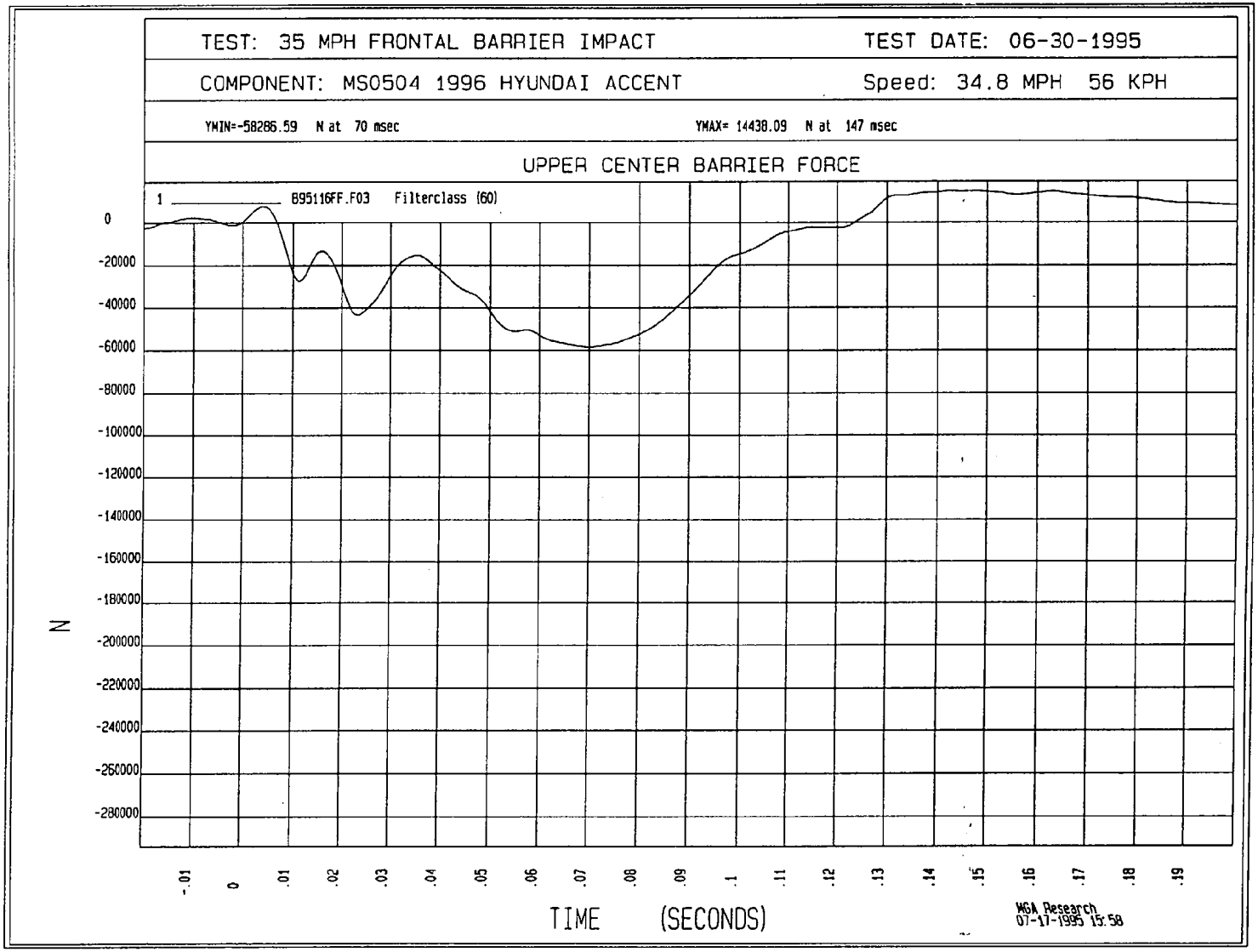


Figure B-29 - Upper Center Barrier Force vs. Time

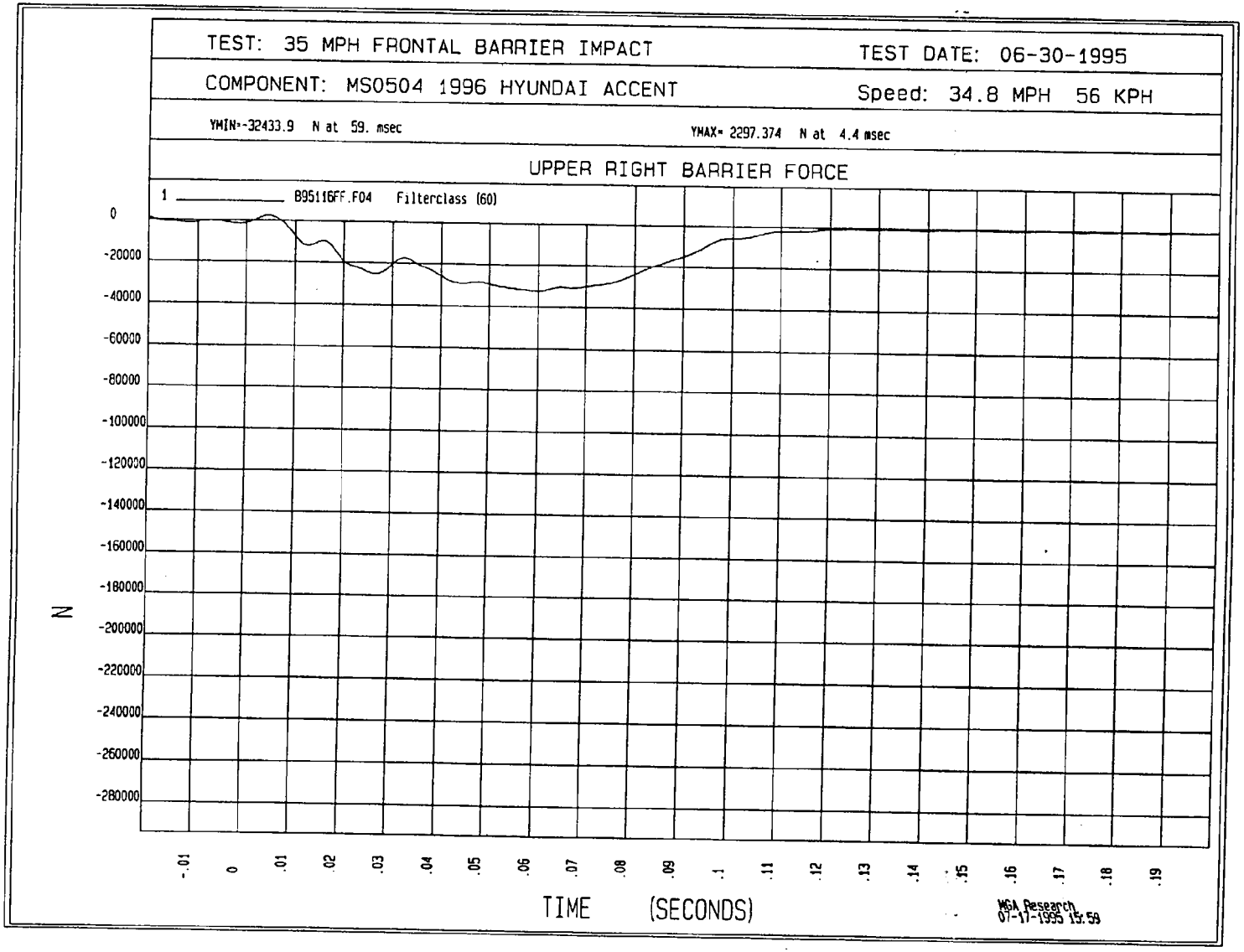


Figure B-30 - Upper Right Barrier Force vs. Time

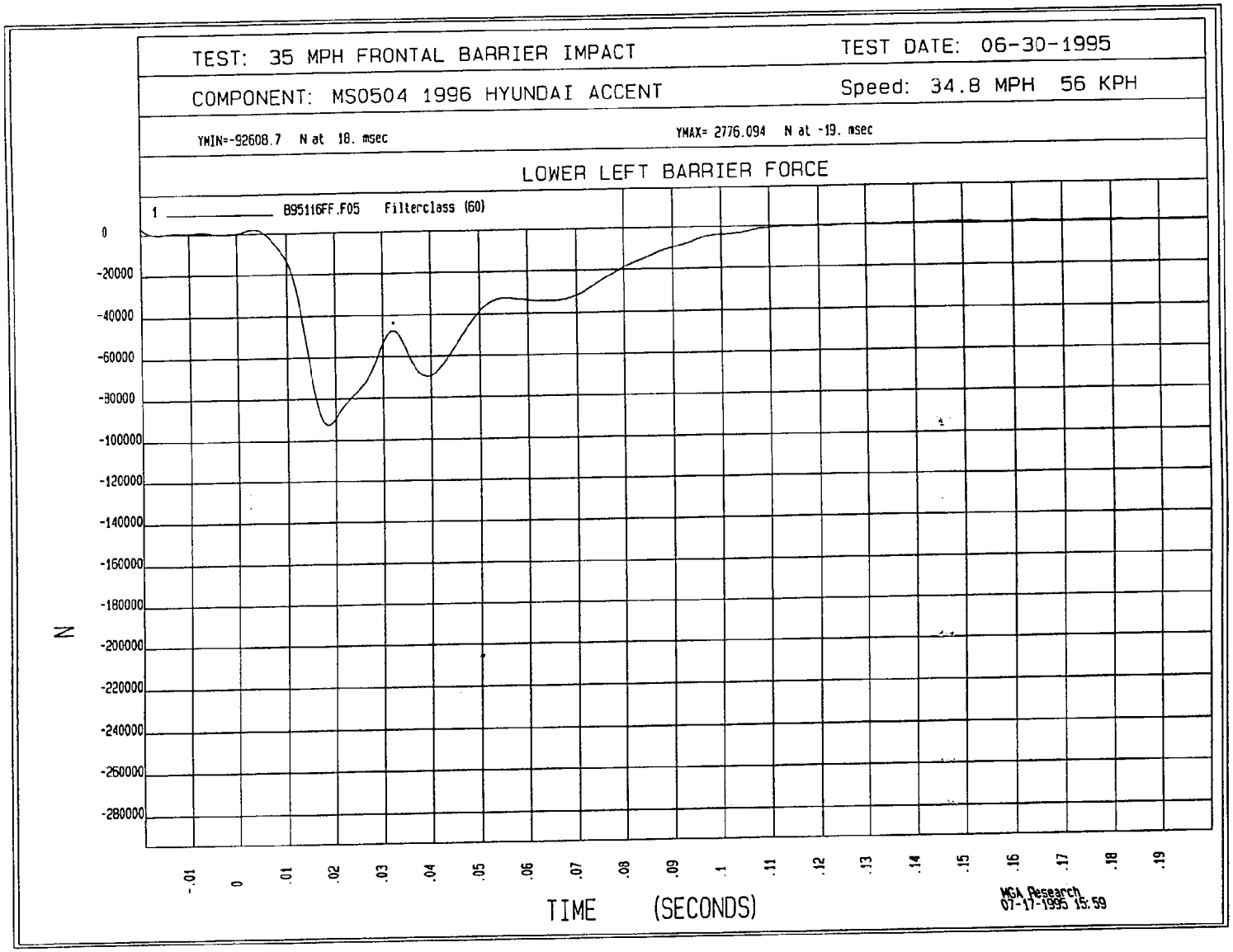


Figure B-31 - Lower Left Barrier Force vs. Time

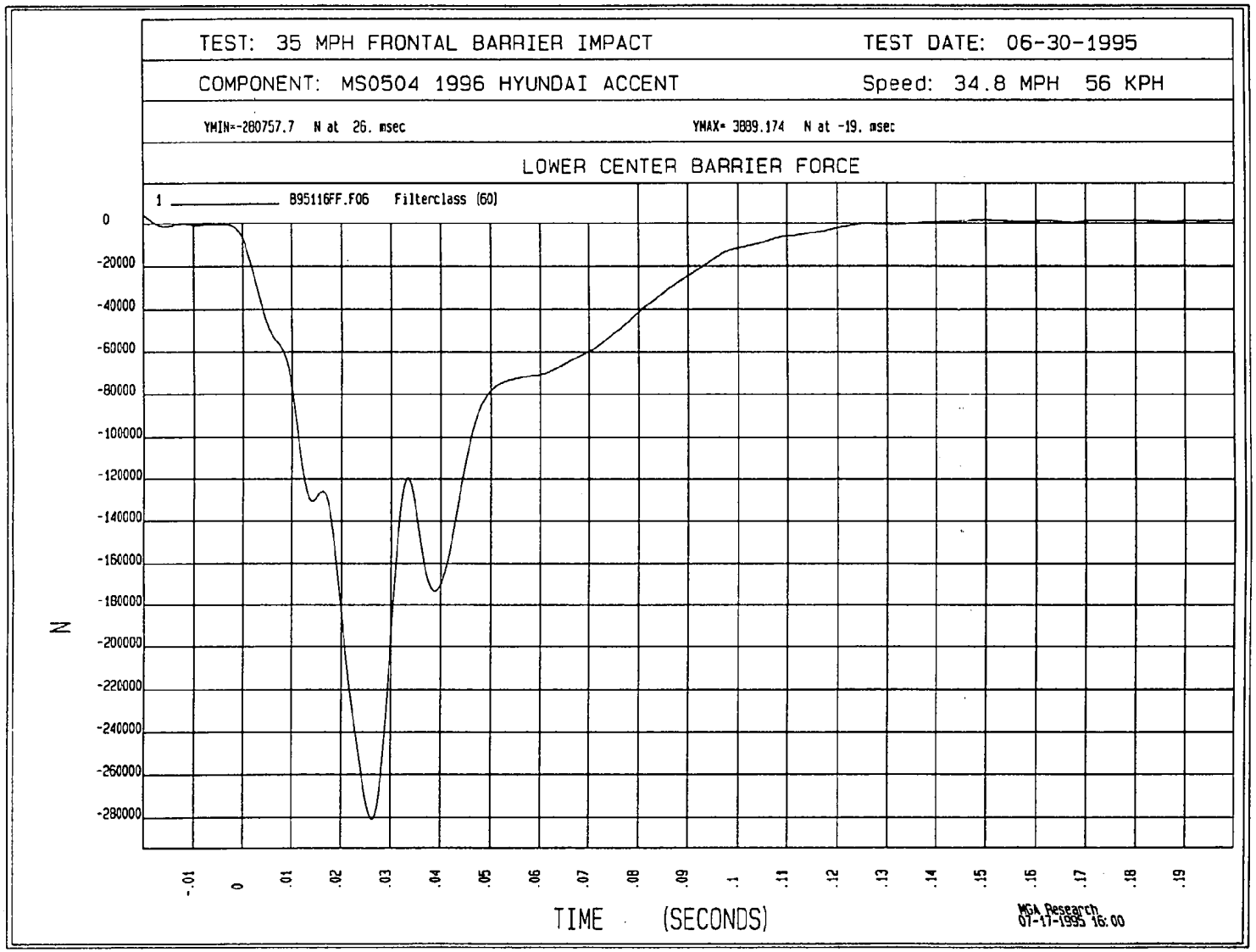


Figure B-32 - Lower Center Barrier Force vs. Time

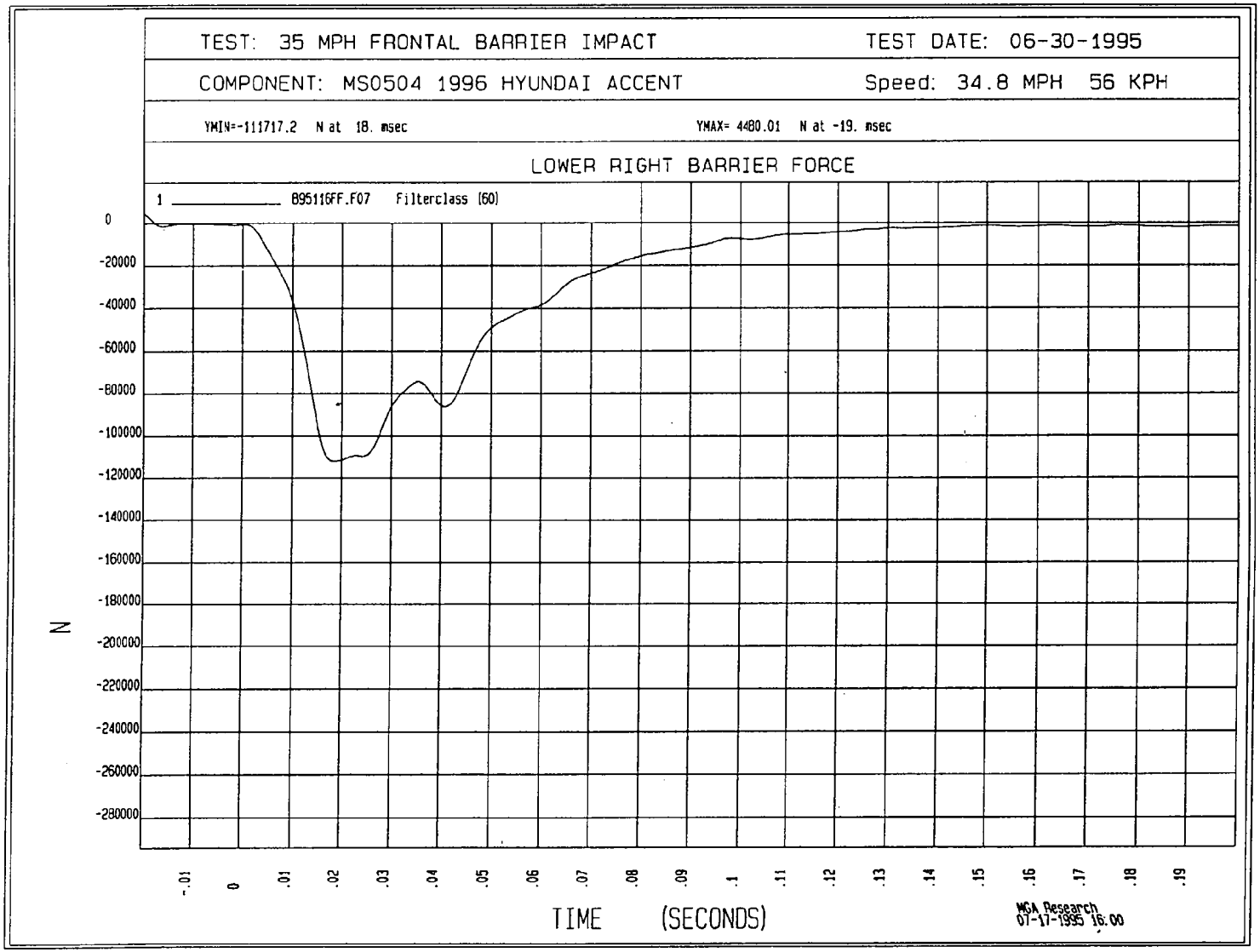


Figure B-33 - Lower Right Barrier Force vs. Time

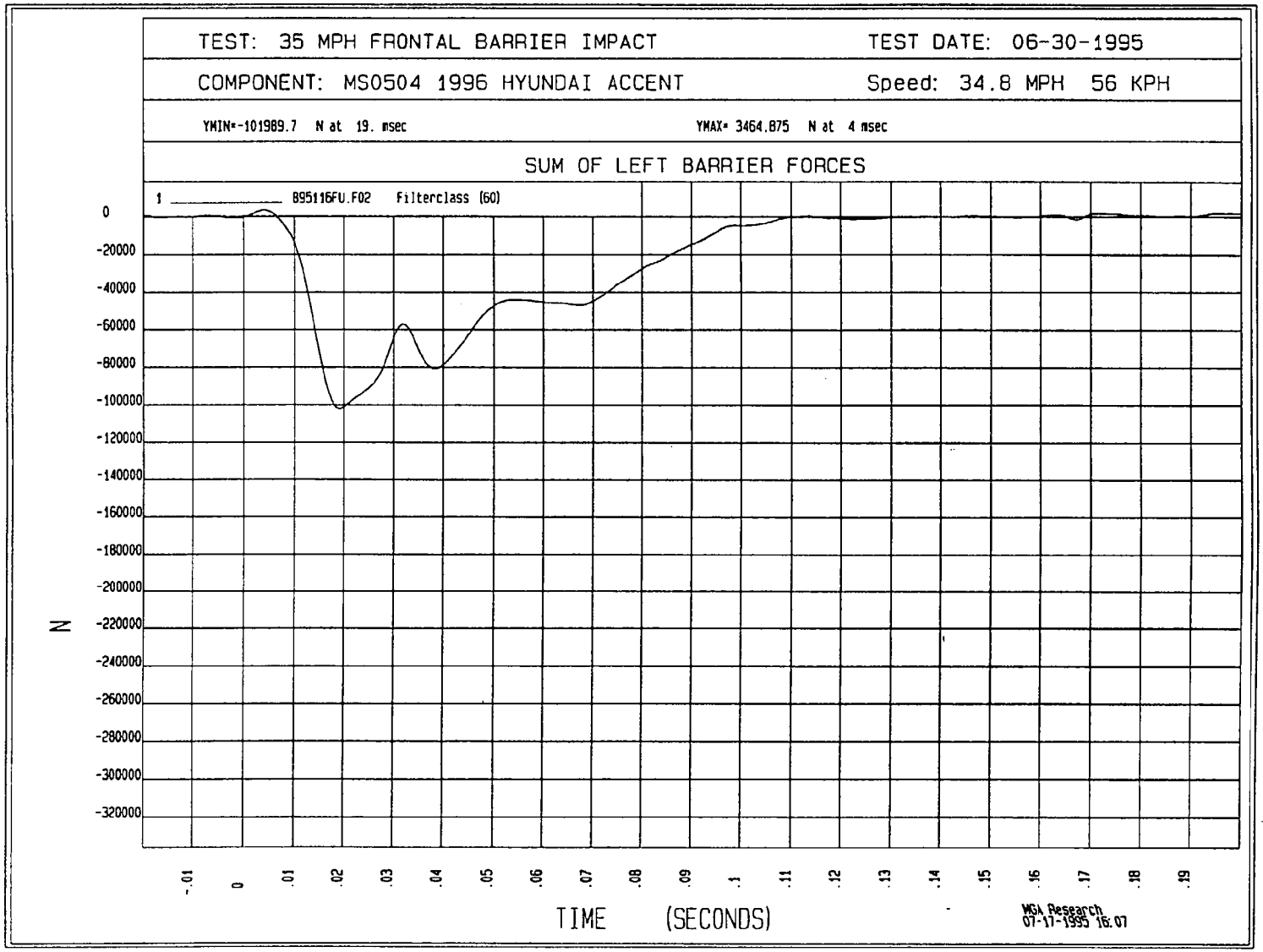


Figure B-34 - Sum of Left Barrier Forces vs. Time

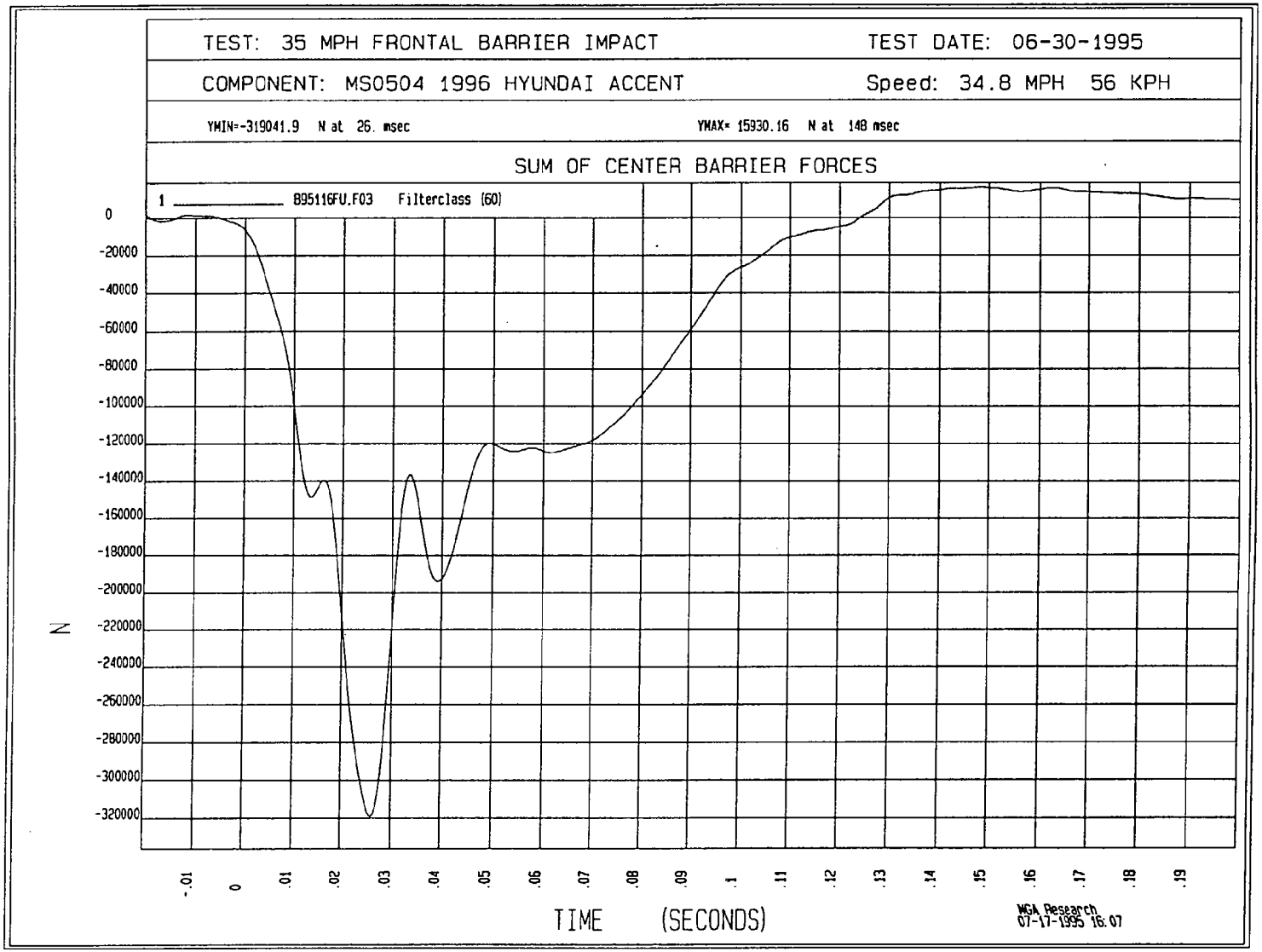


Figure B-35 - Sum of Center Barrier Forces vs. Time

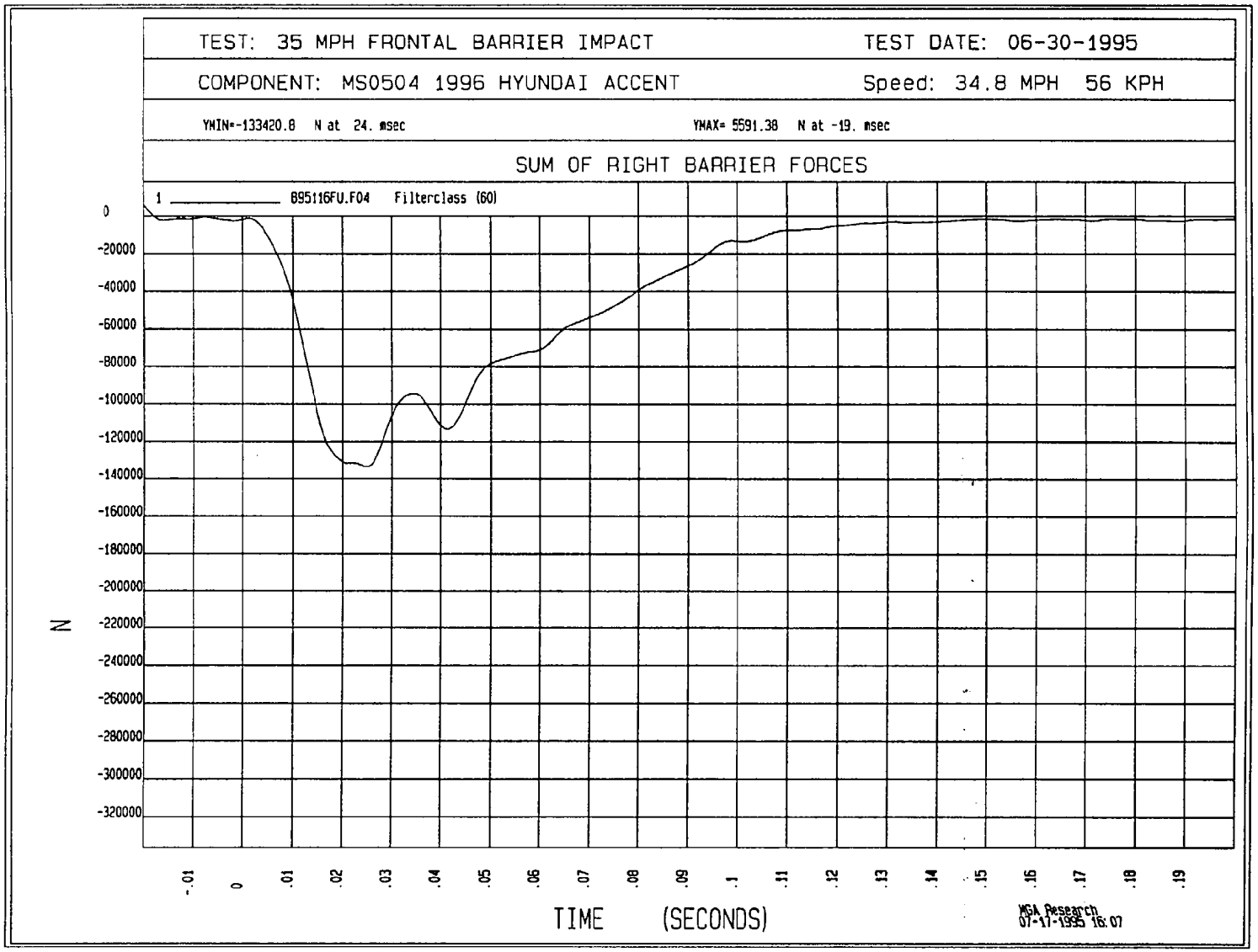


Figure B-36 - Sum of Right Barrier Forces vs. Time

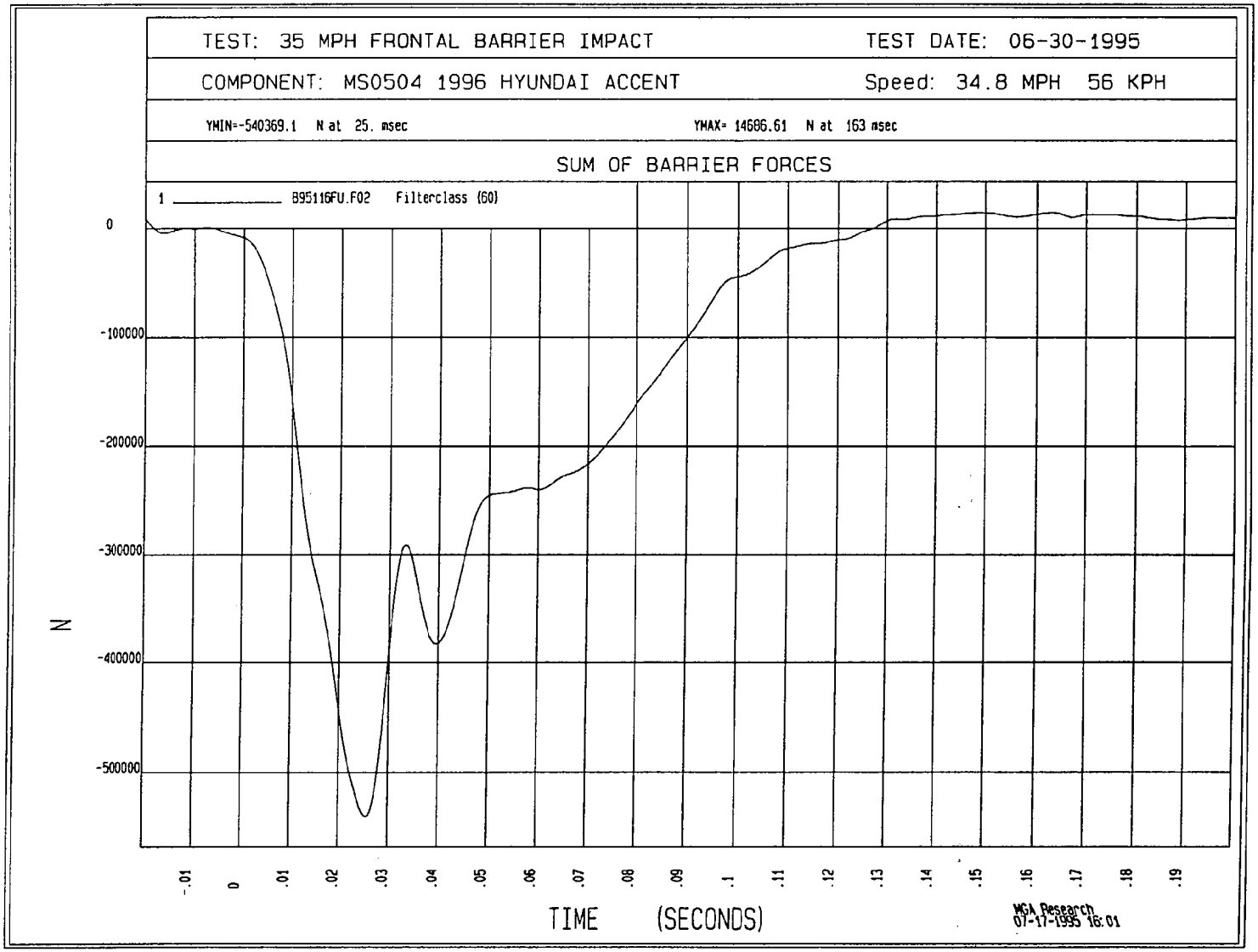


Figure B-37 - Sum of Barrier Forces vs. Time

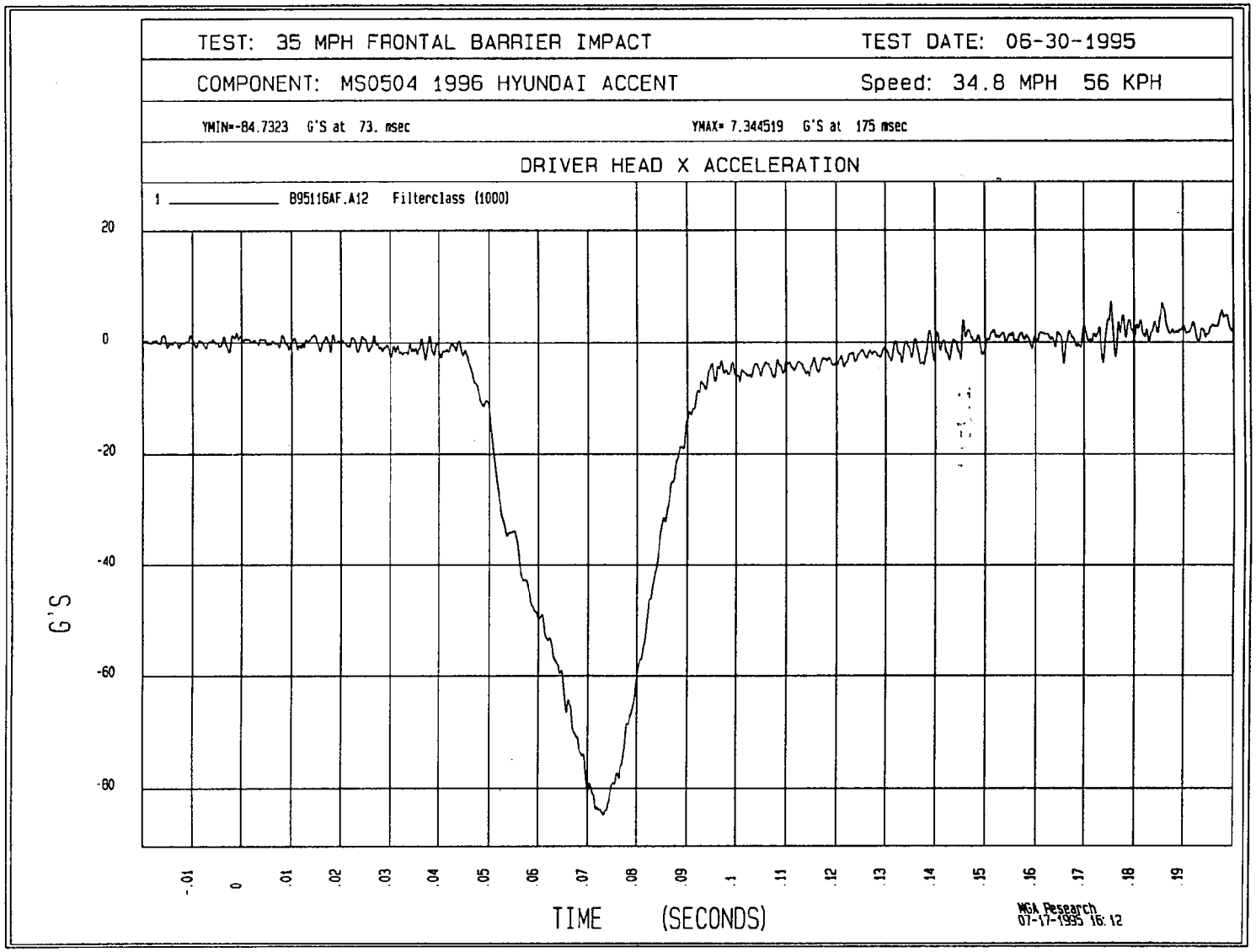


Figure B-38 - Driver Head X Acceleration vs. Time

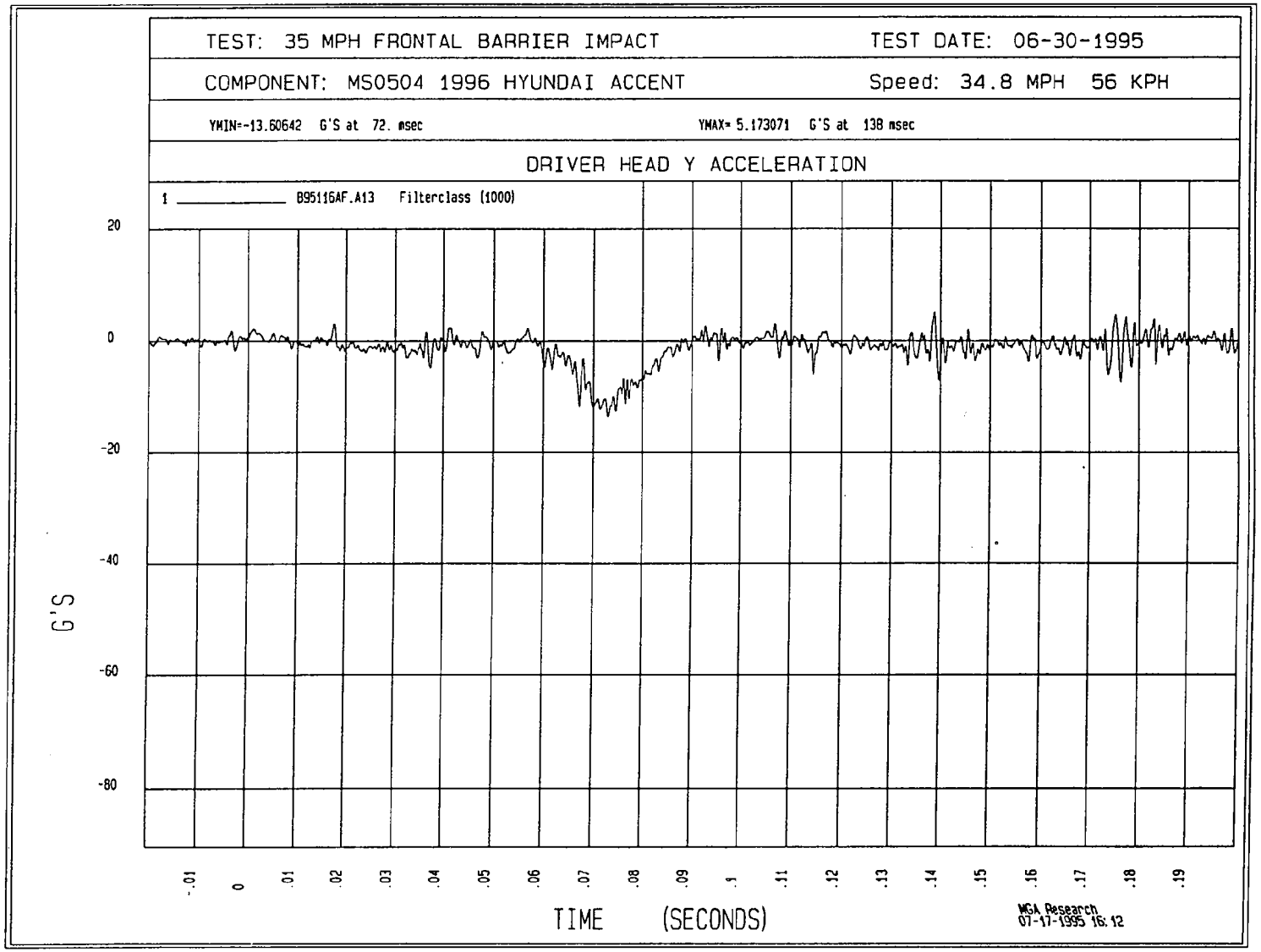


Figure B-39 - Driver Head Y Acceleration vs. Time

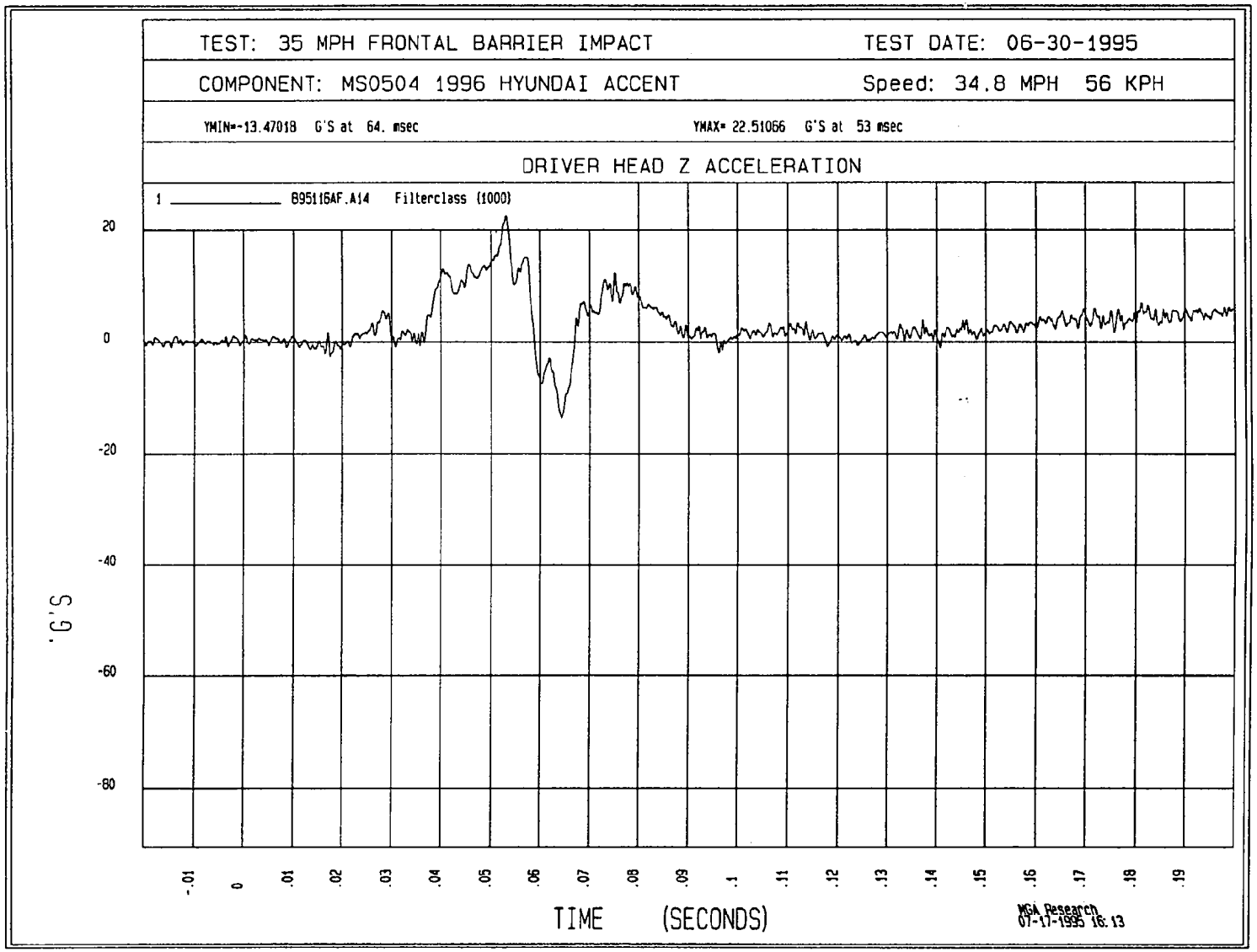


Figure B-4Ø - Driver Head Z Acceleration vs. Time

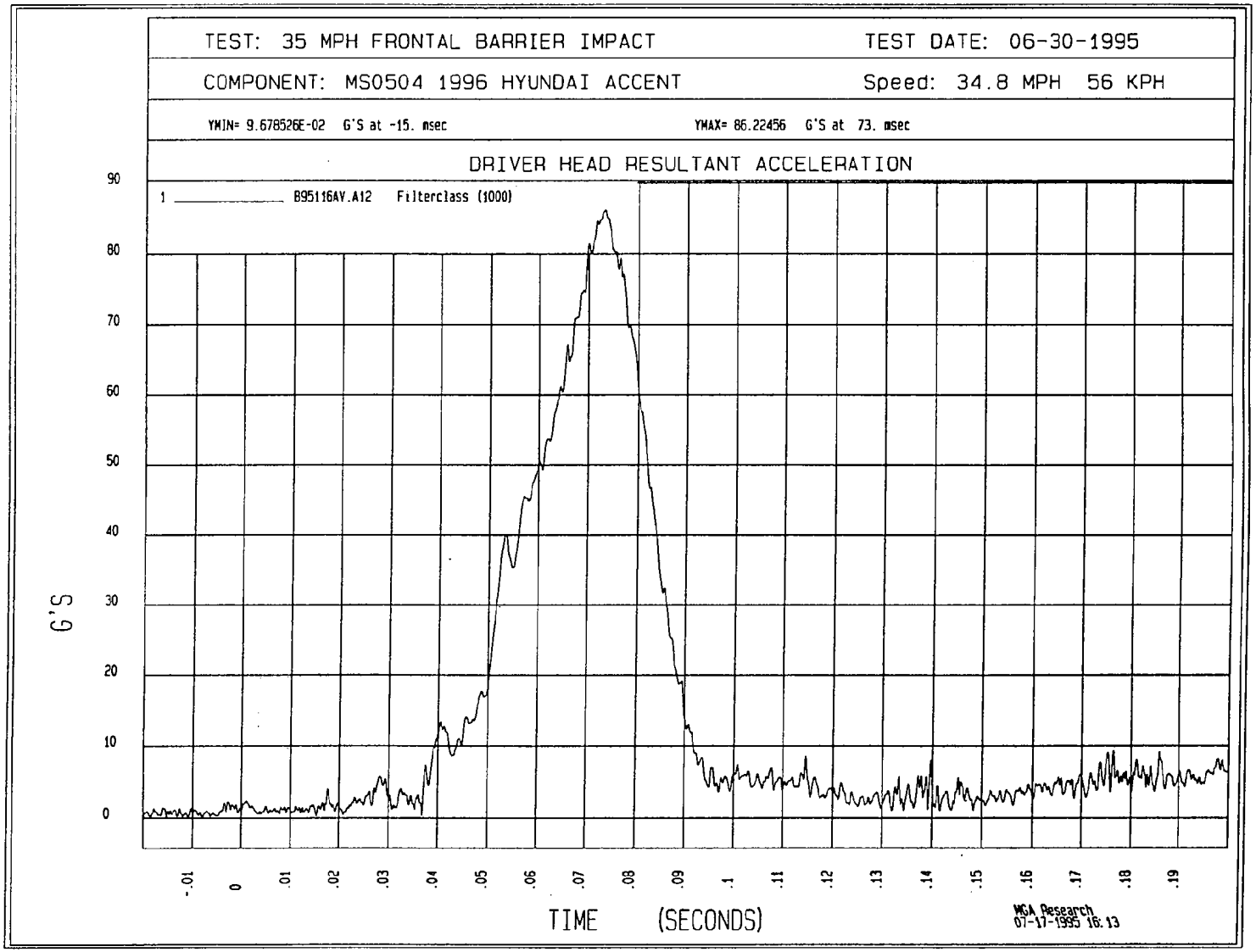


Figure B-41 - Driver Head Resultant Acceleration vs. Time

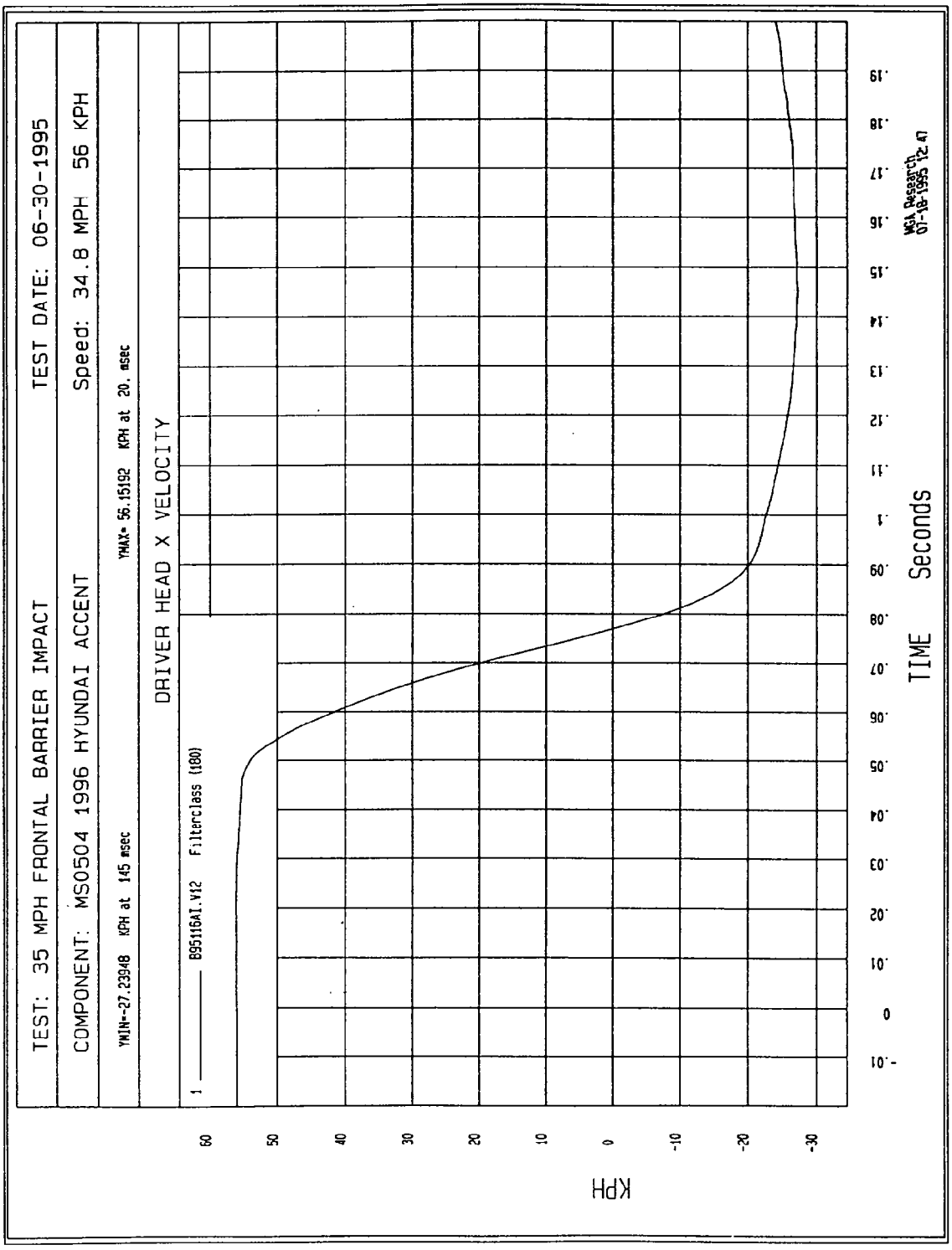


Figure B-42 - Driver Head X Velocity vs. Time

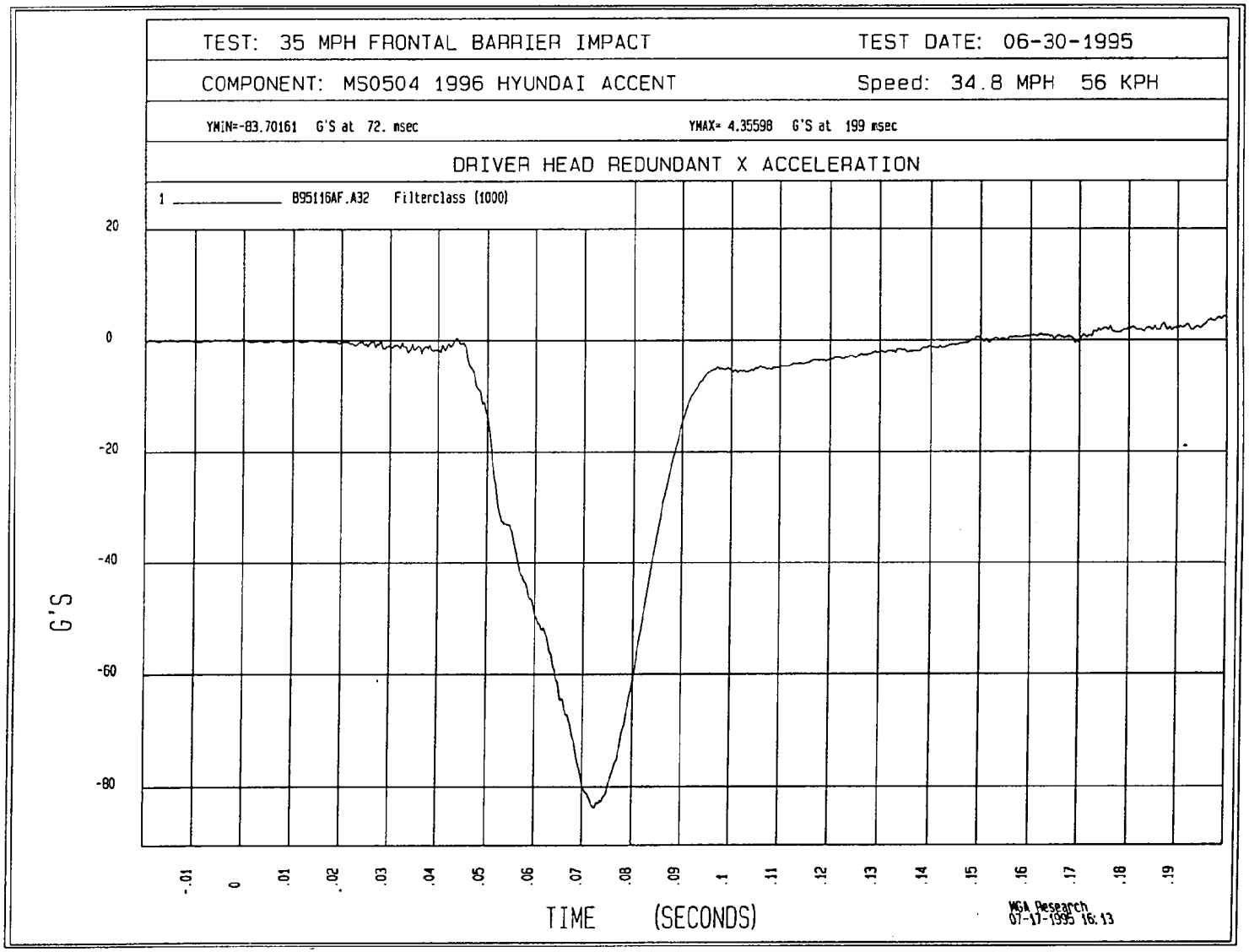


Figure B-43 - Driver Head Redundant X Acceleration vs. Time

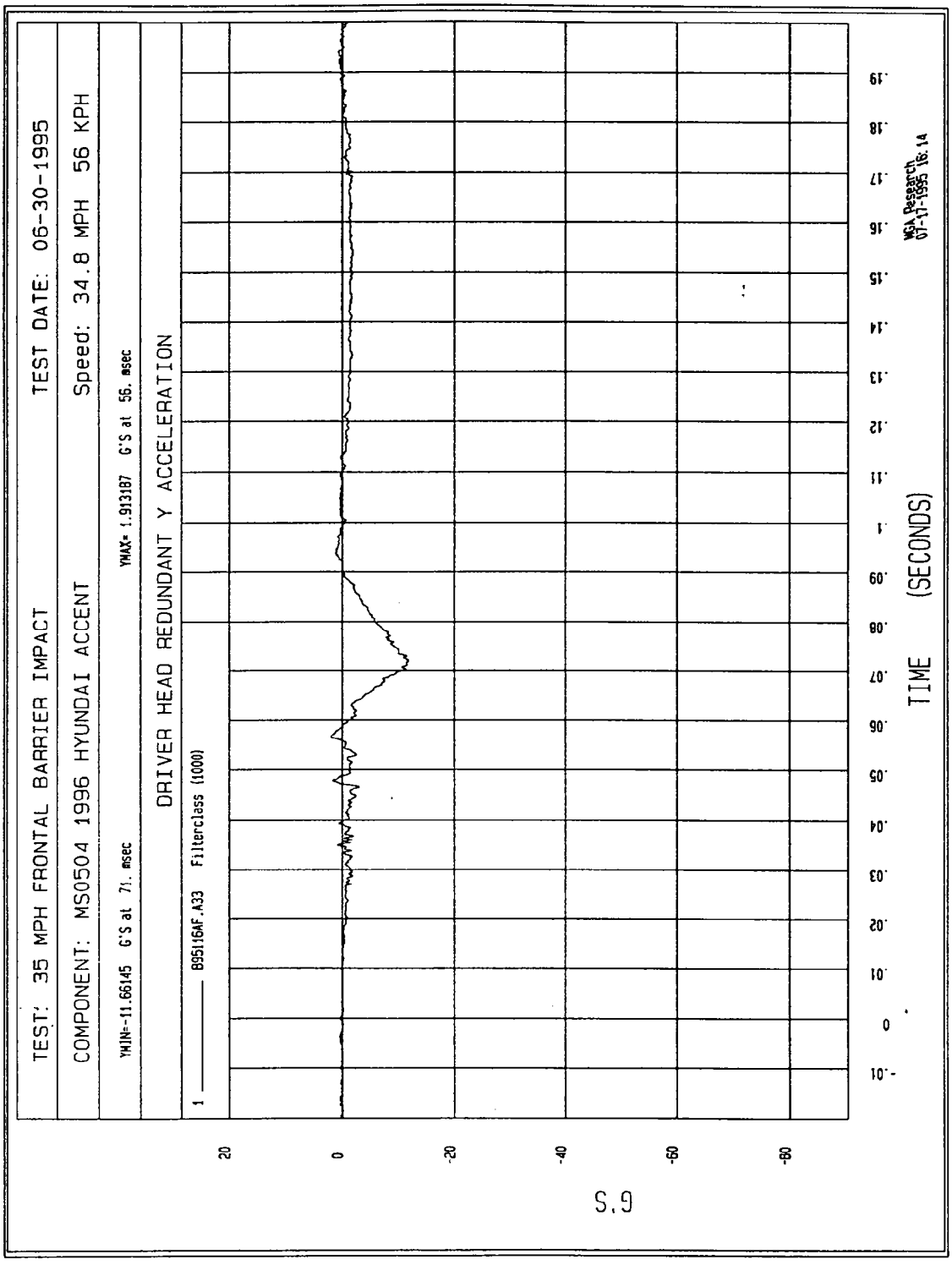


Figure B-44 - Driver Head Redundant Y Acceleration vs. Time

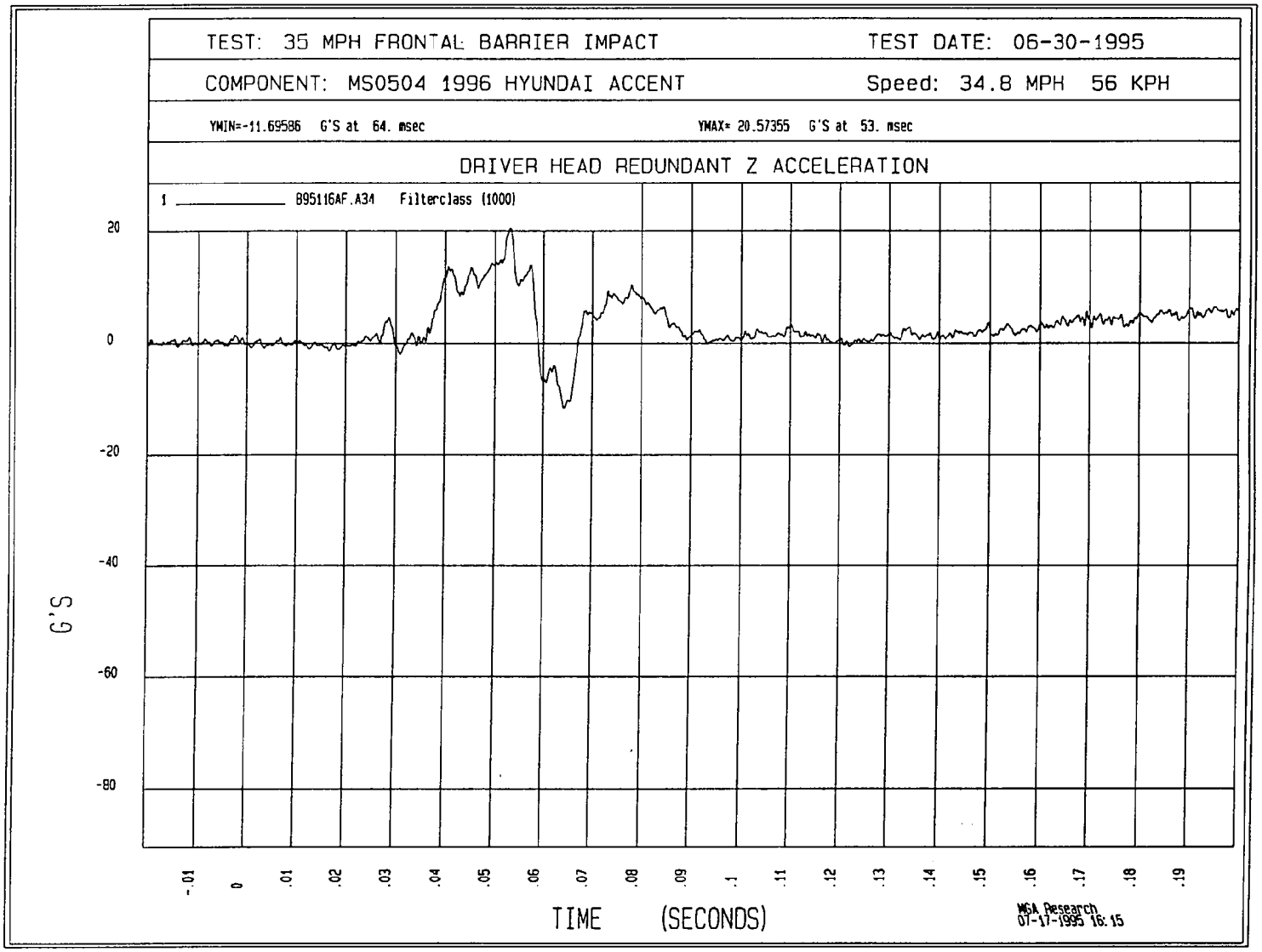


Figure B-45 - Driver Head Redundant Z Acceleration vs. Time

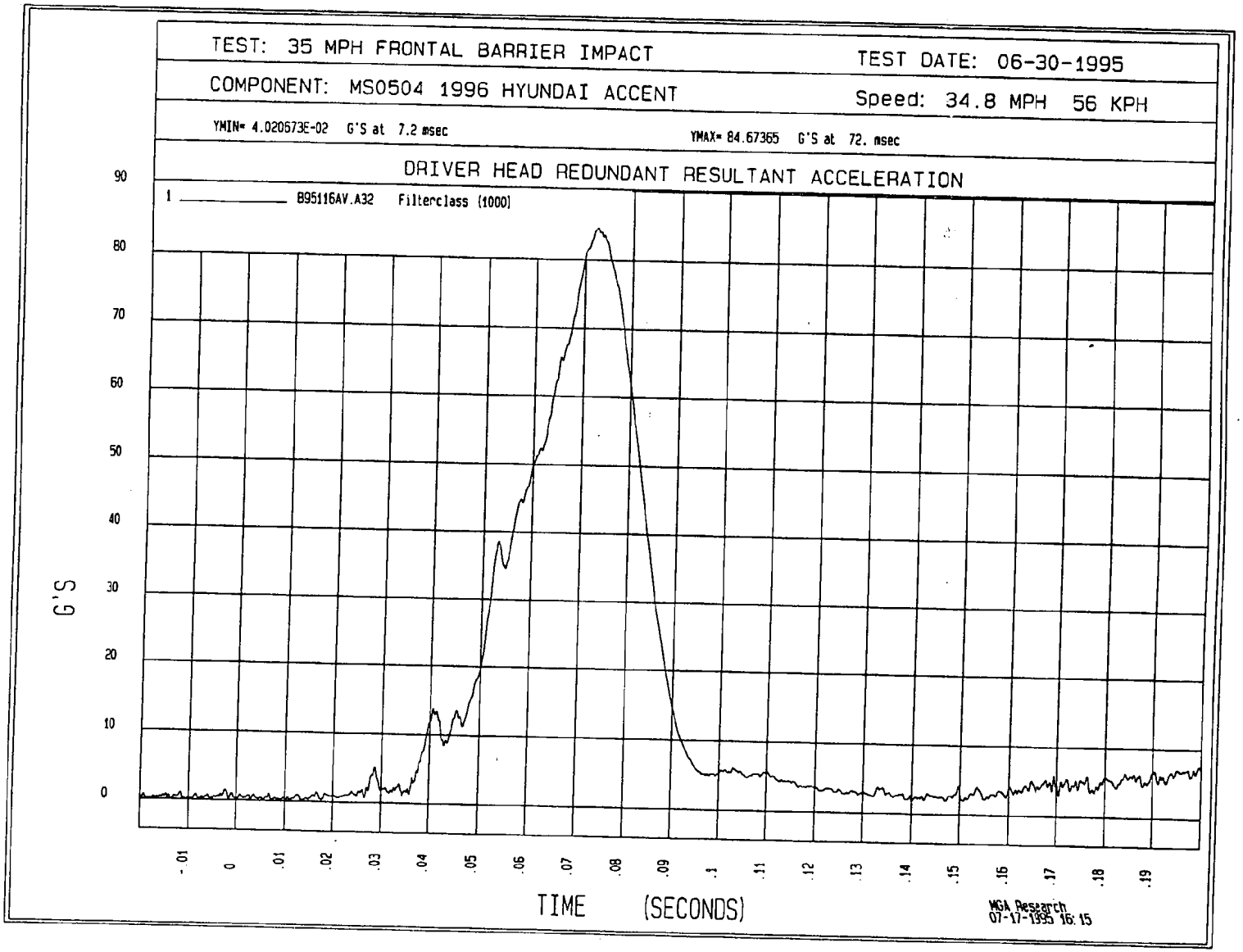


Figure B-46 - Driver Head Redundant Resultant Acceleration vs. Time

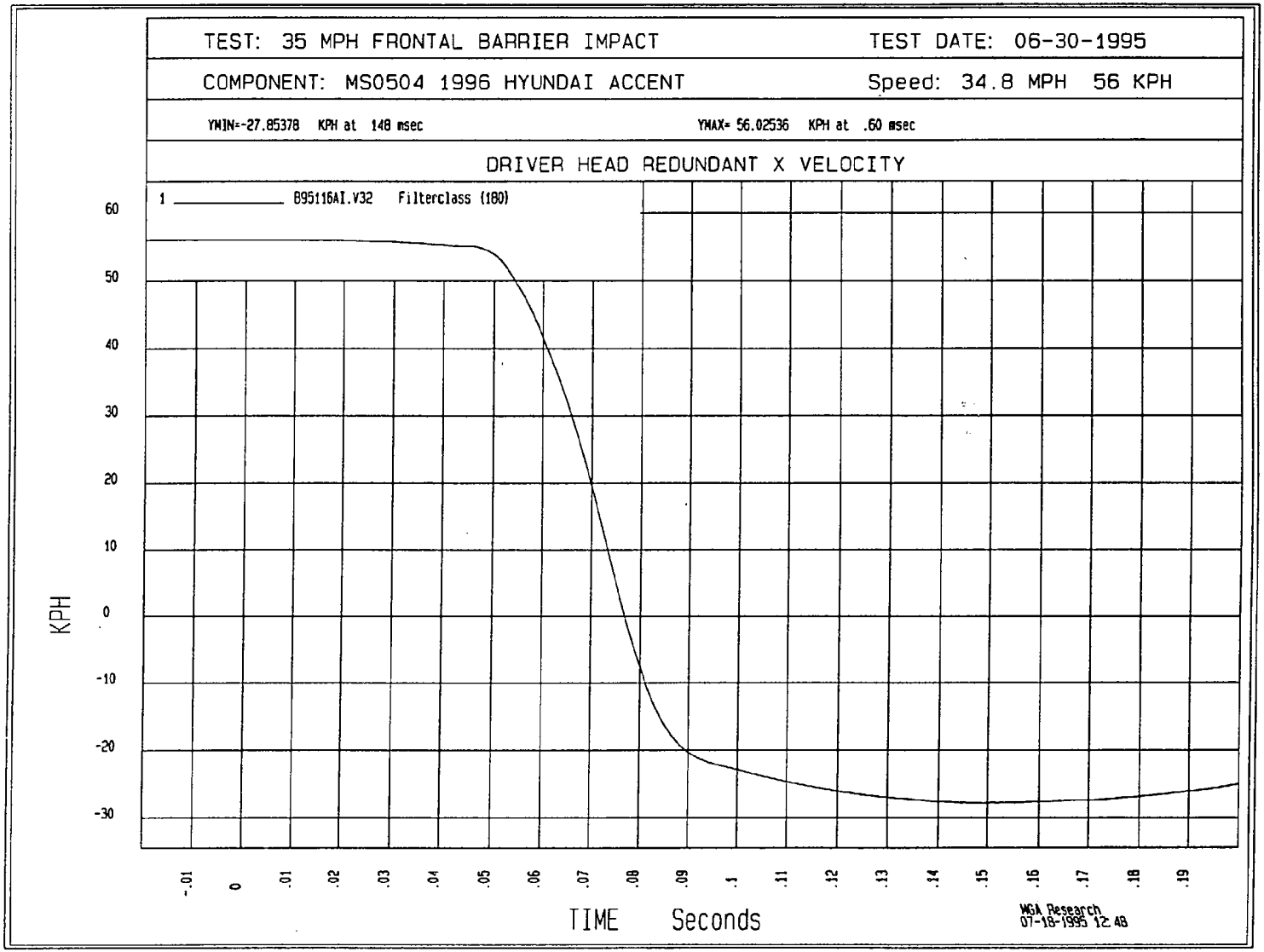


Figure B-47 - Driver Head Redundant X Velocity vs. Time

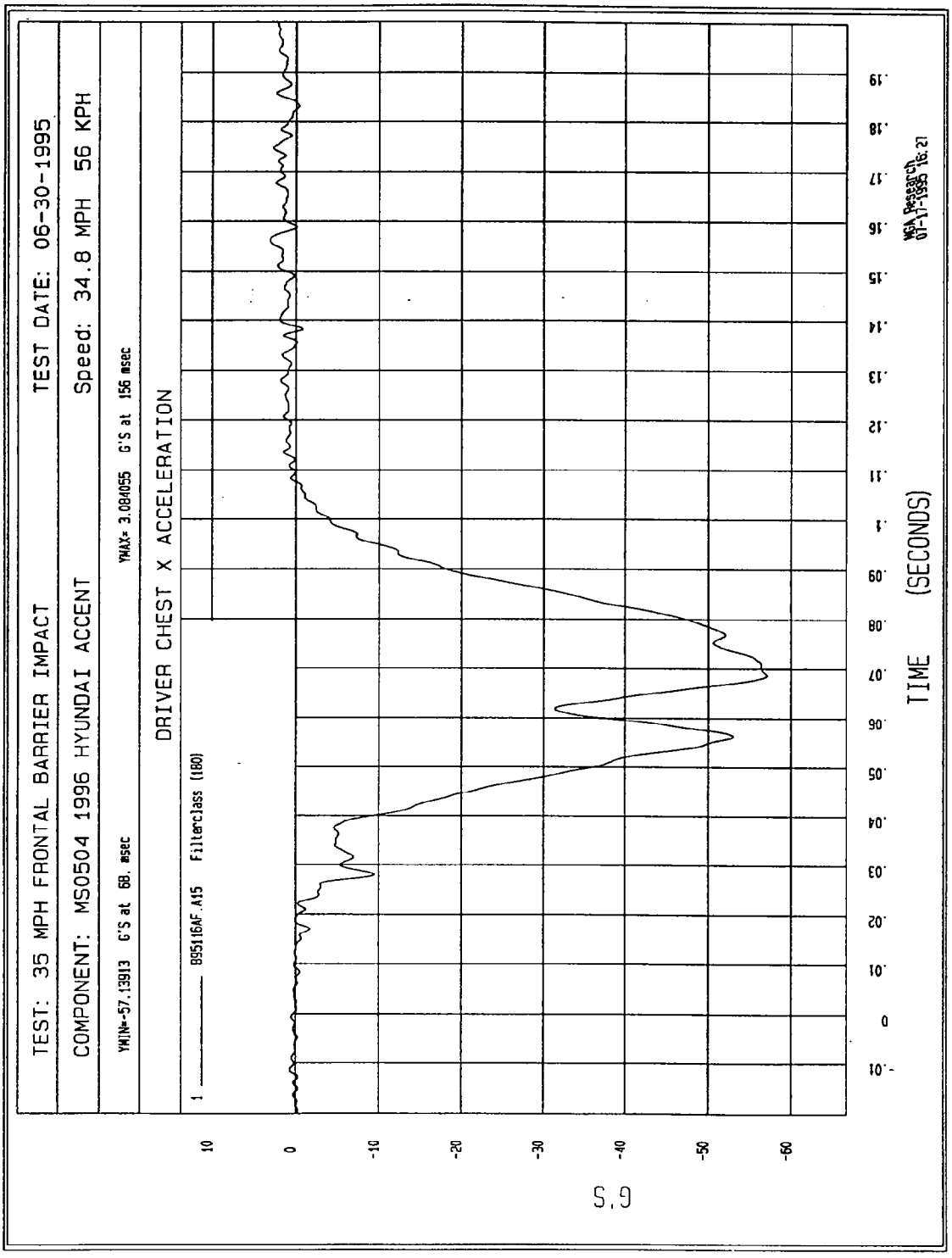


Figure B-48 - Driver Chest X Acceleration vs. Time

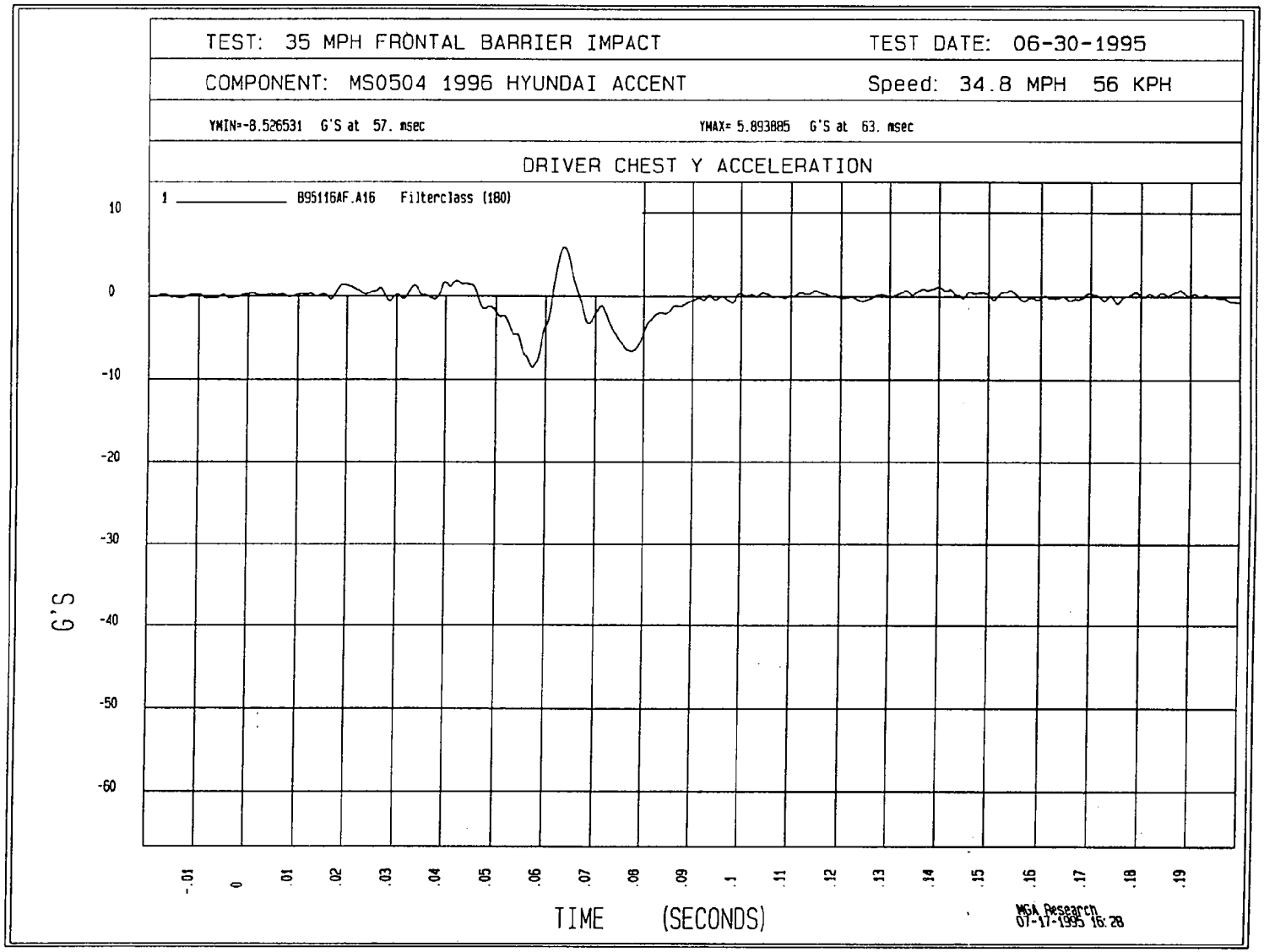


Figure B-49 - Driver Chest Y Acceleration vs. Time

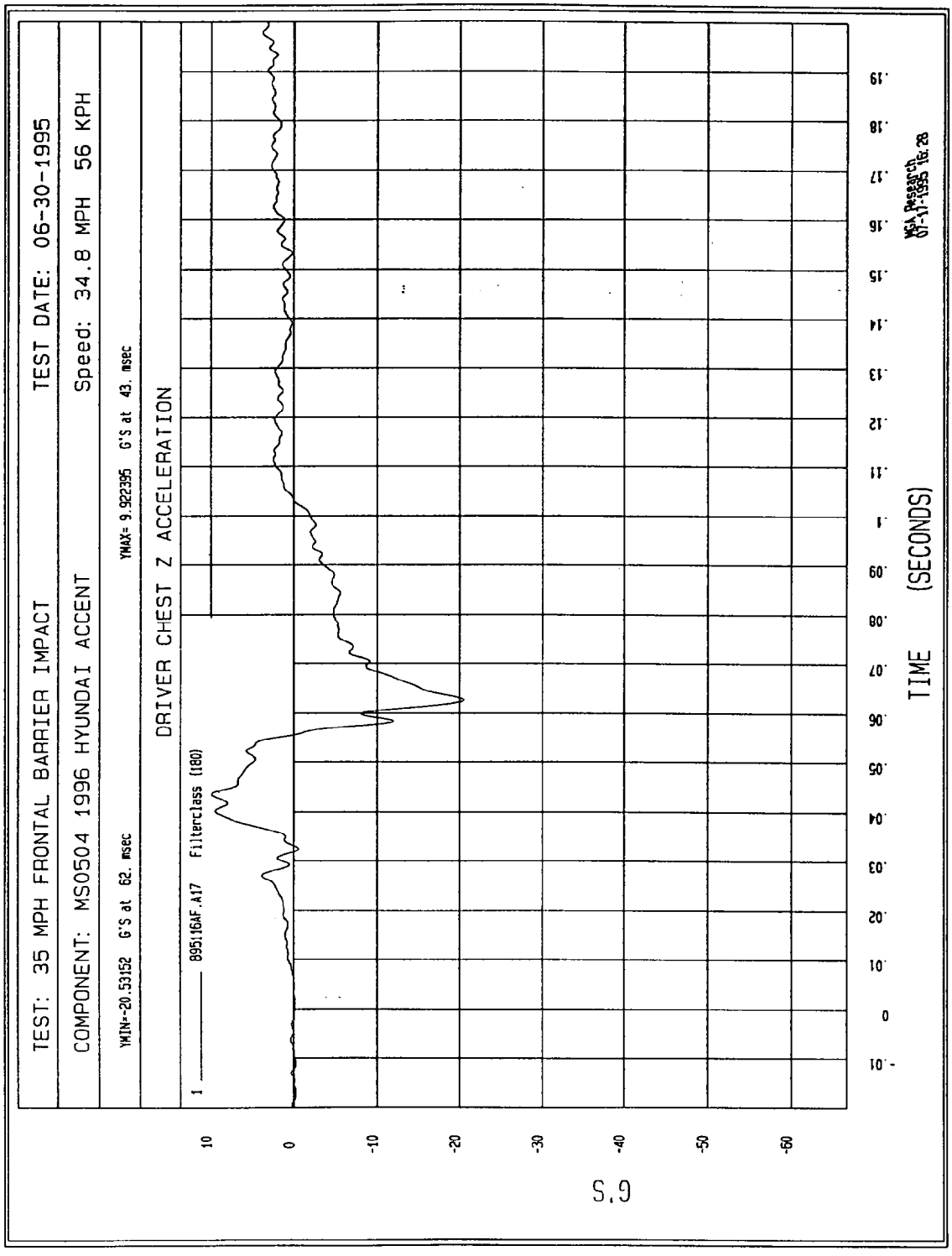


Figure B-50 - Driver Chest Z Acceleration vs. Time

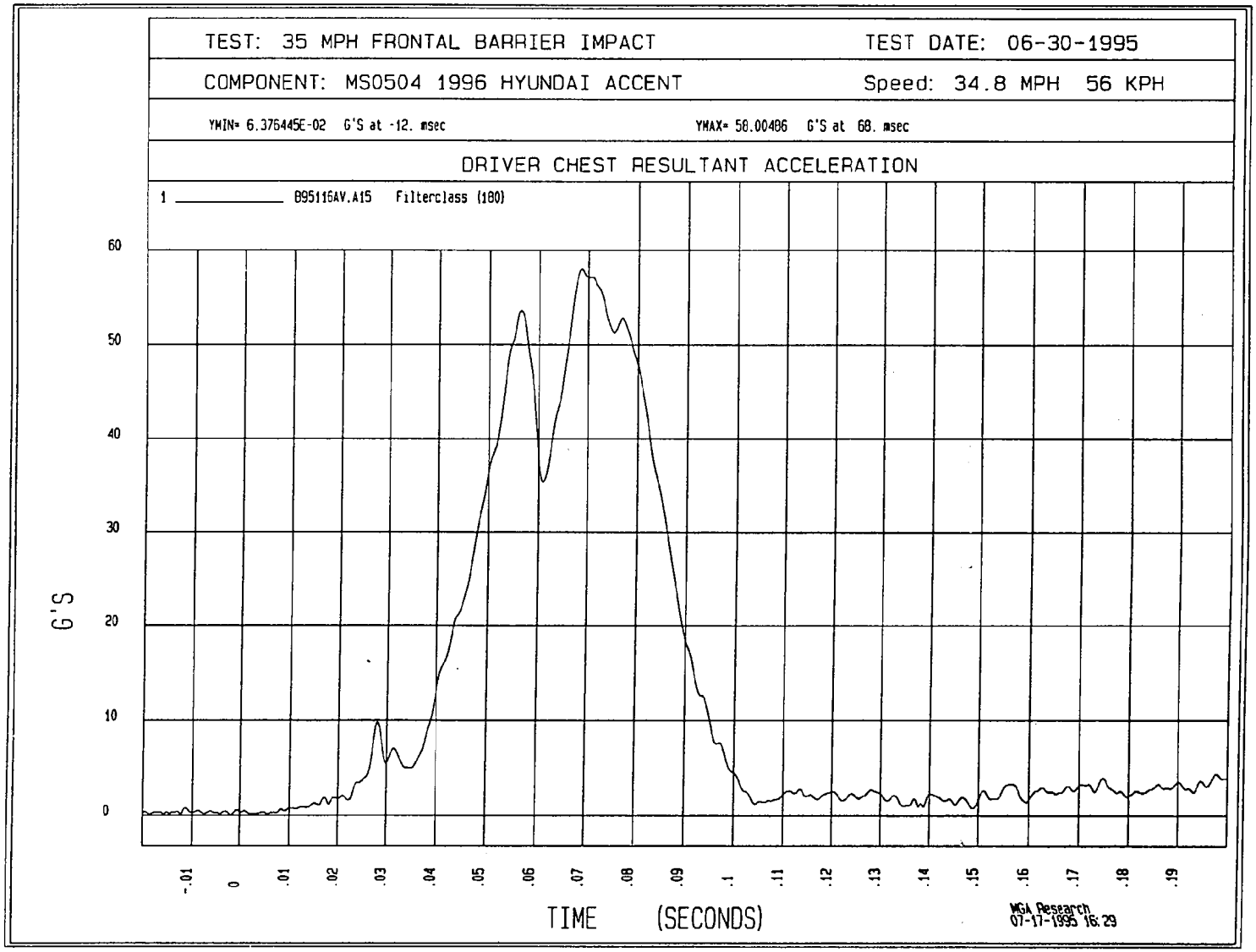


Figure B-51 - Driver Chest Resultant Acceleration vs. Time

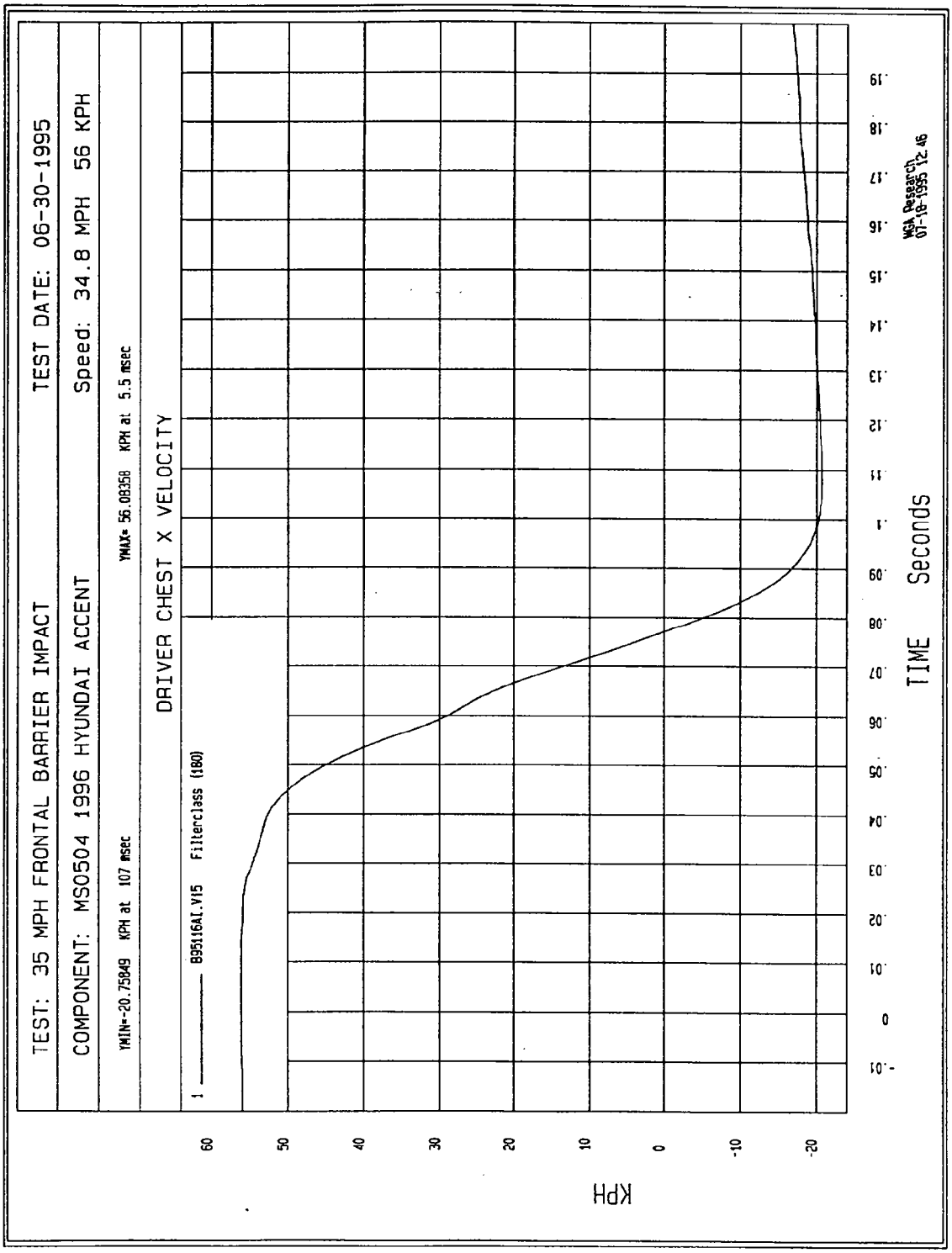


Figure B-52 - Driver Chest X Velocity vs. Time

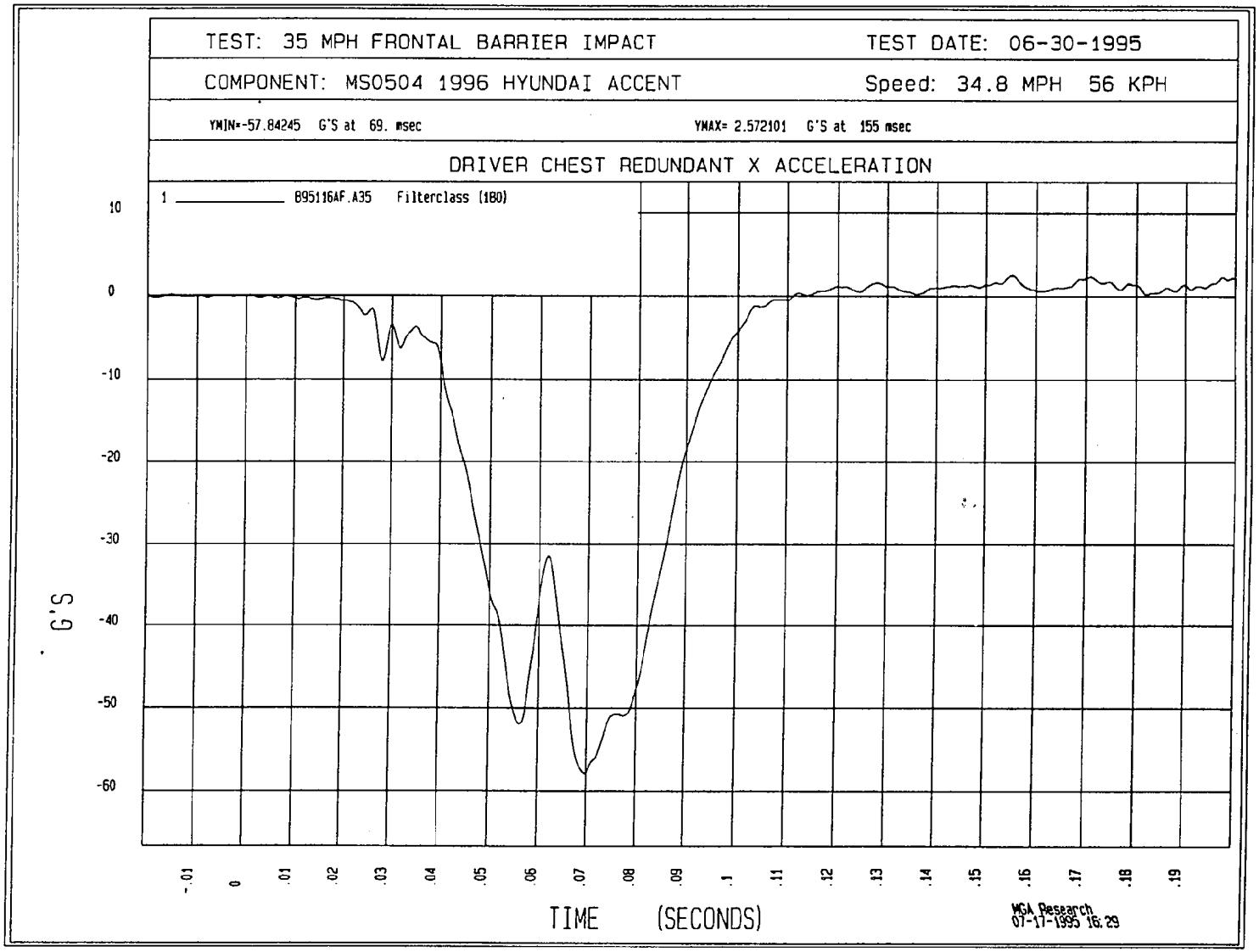


Figure B-53 - Driver Chest Redundant X Acceleration vs. Time

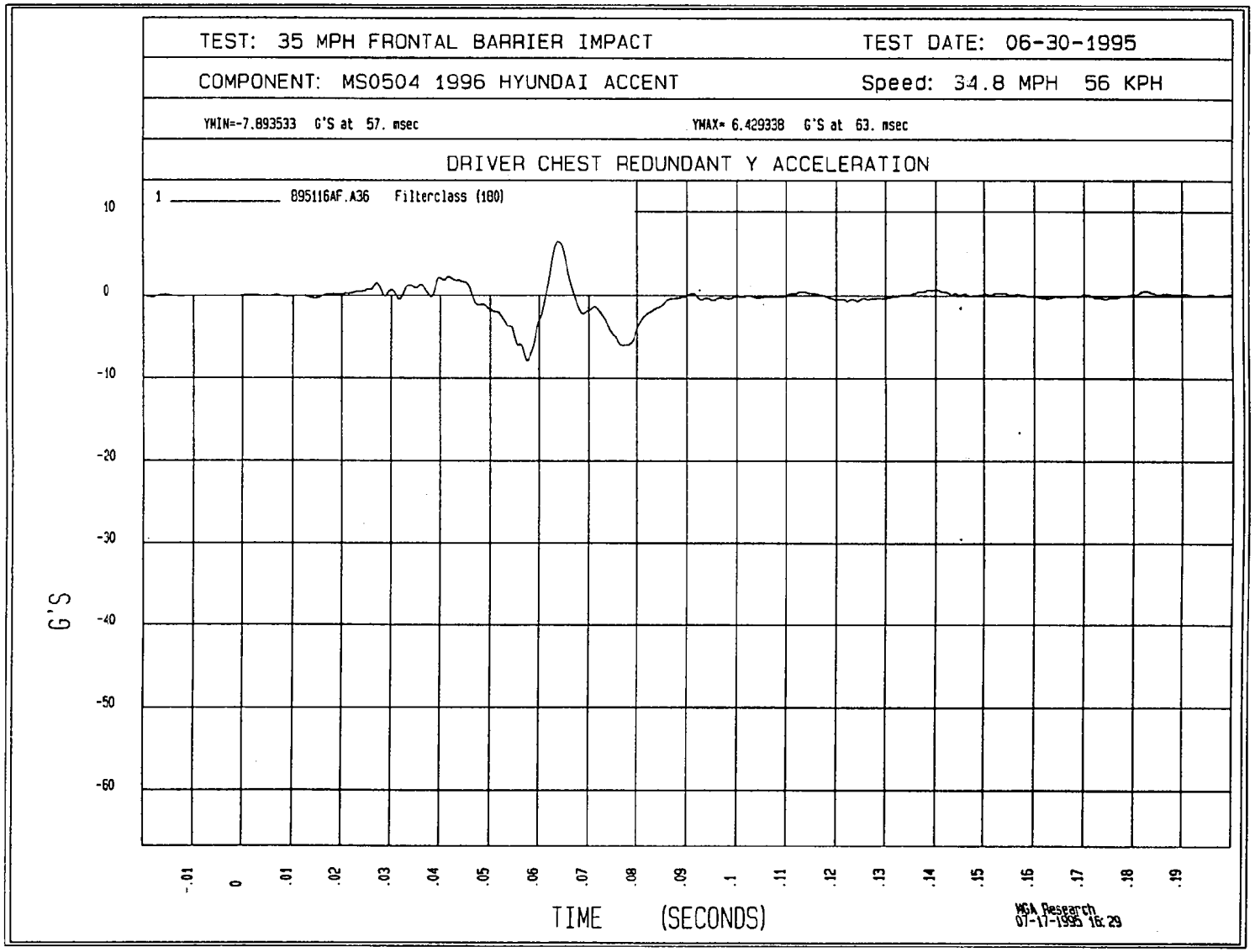


Figure B-54 - Driver Chest Redundant Y Acceleration vs. Time

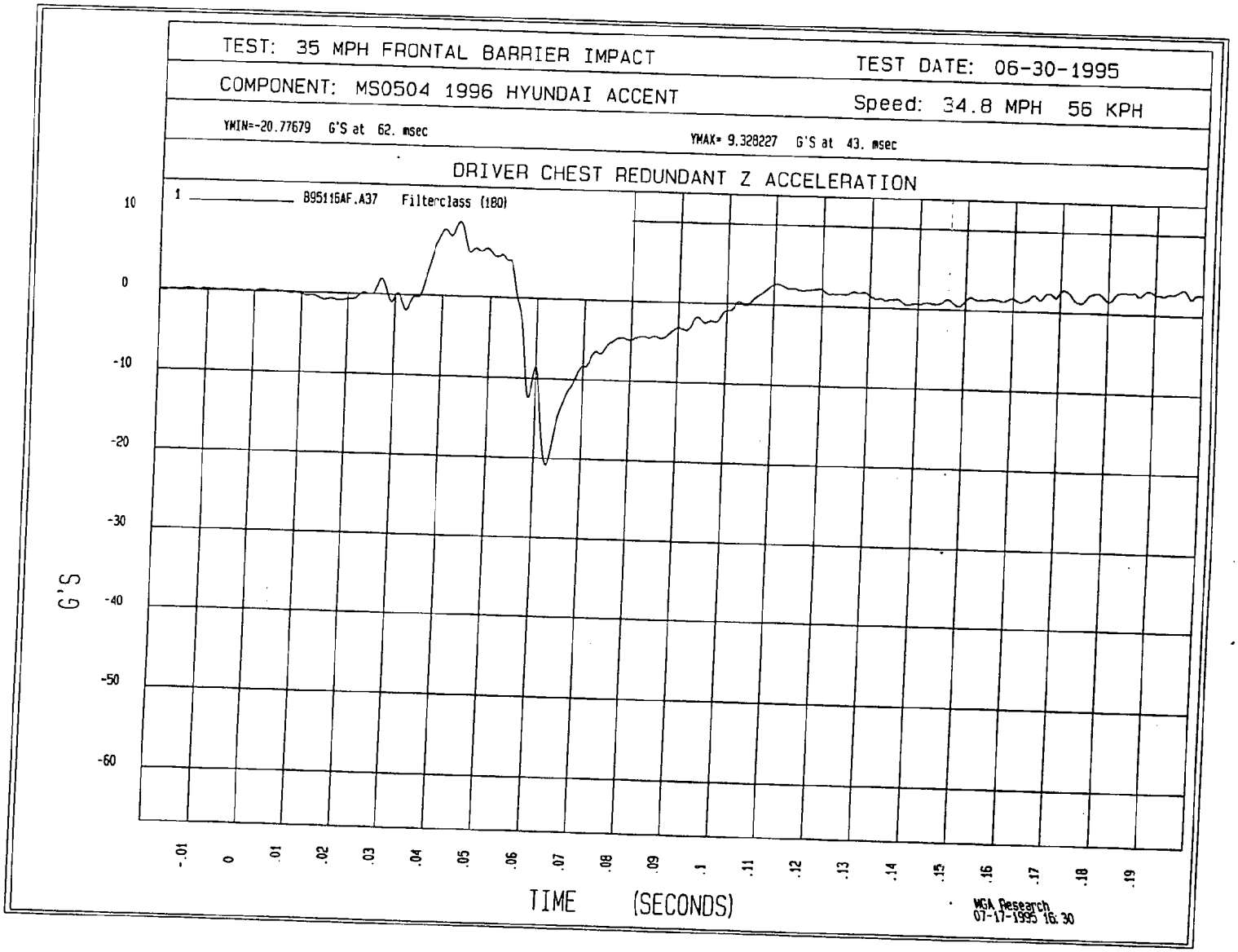


Figure B-55 - Driver Chest Redundant Z Acceleration vs. Time

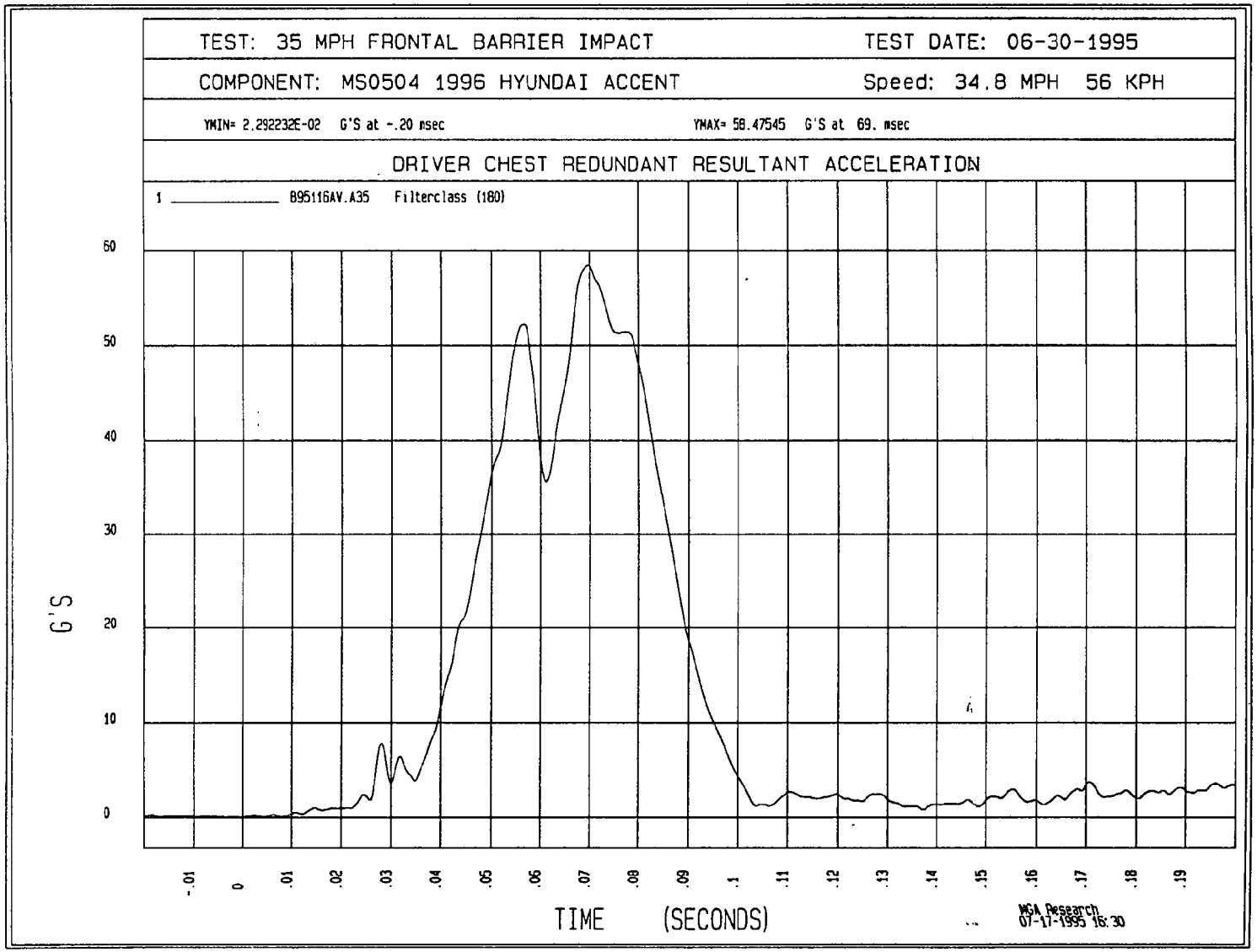


Figure B-56 - Driver Chest Redundant Resultant Accel. vs. Time

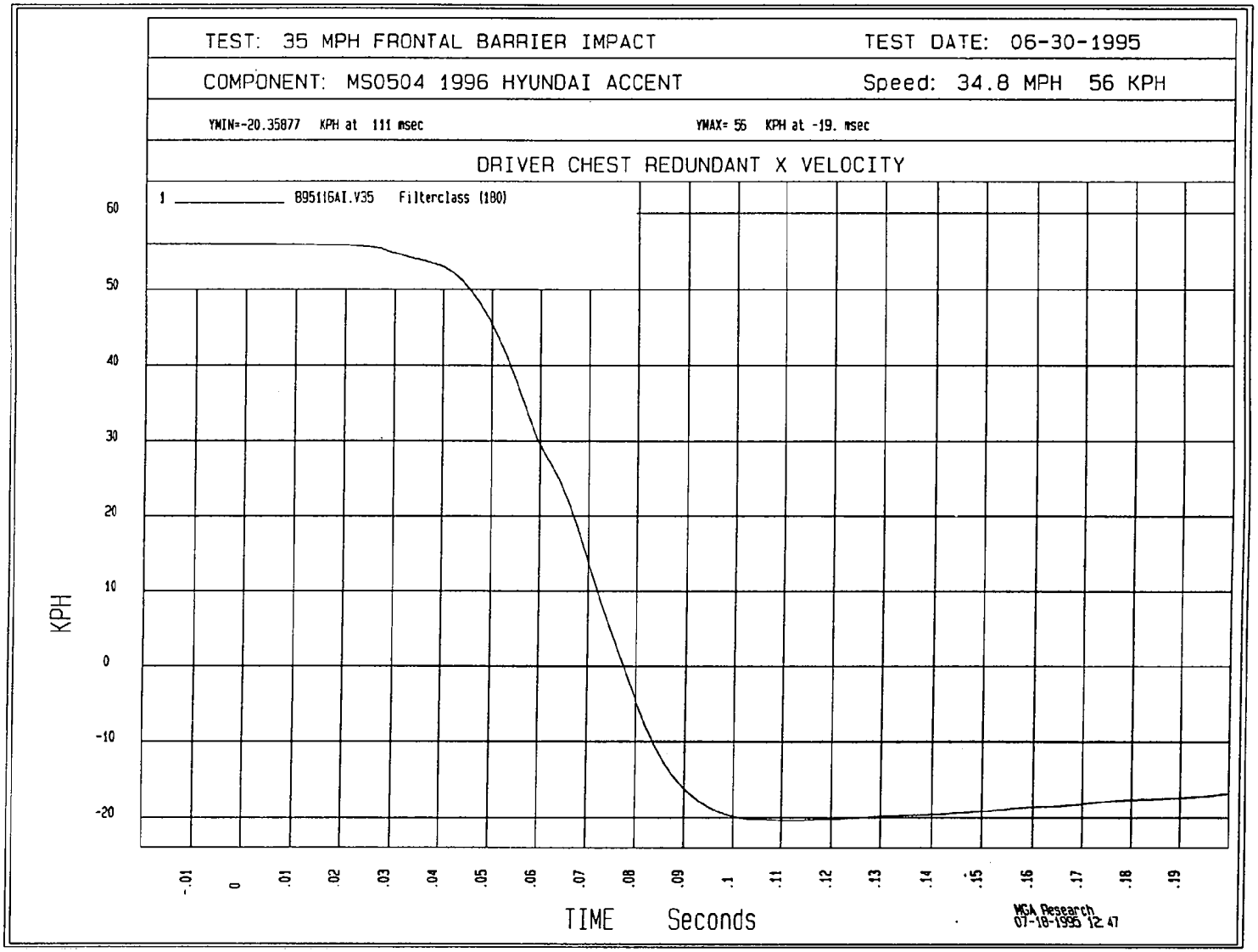


Figure B-57 - Driver Chest Redundant X Velocity vs. Time

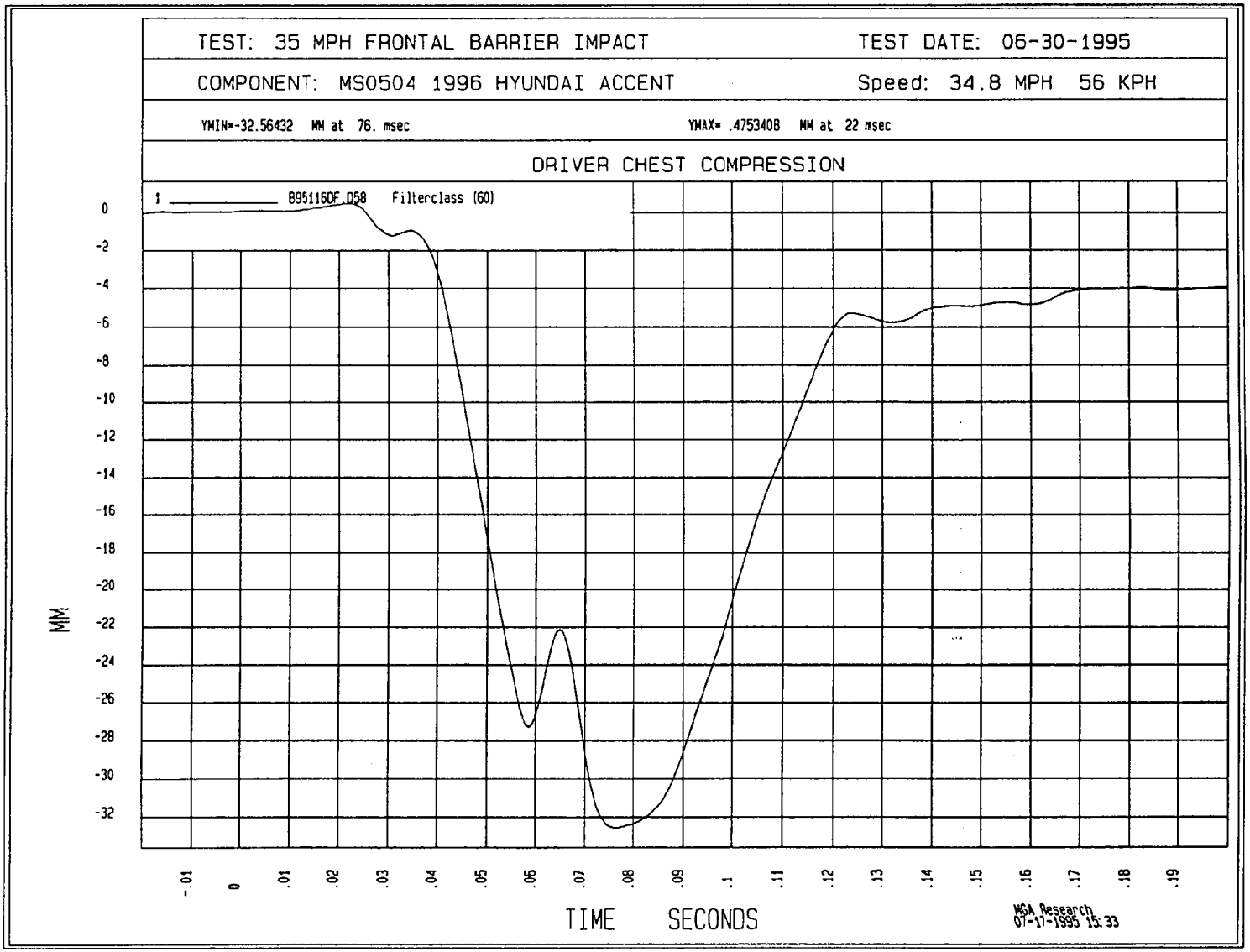


Figure B-58 - Driver Chest Compression vs. Time

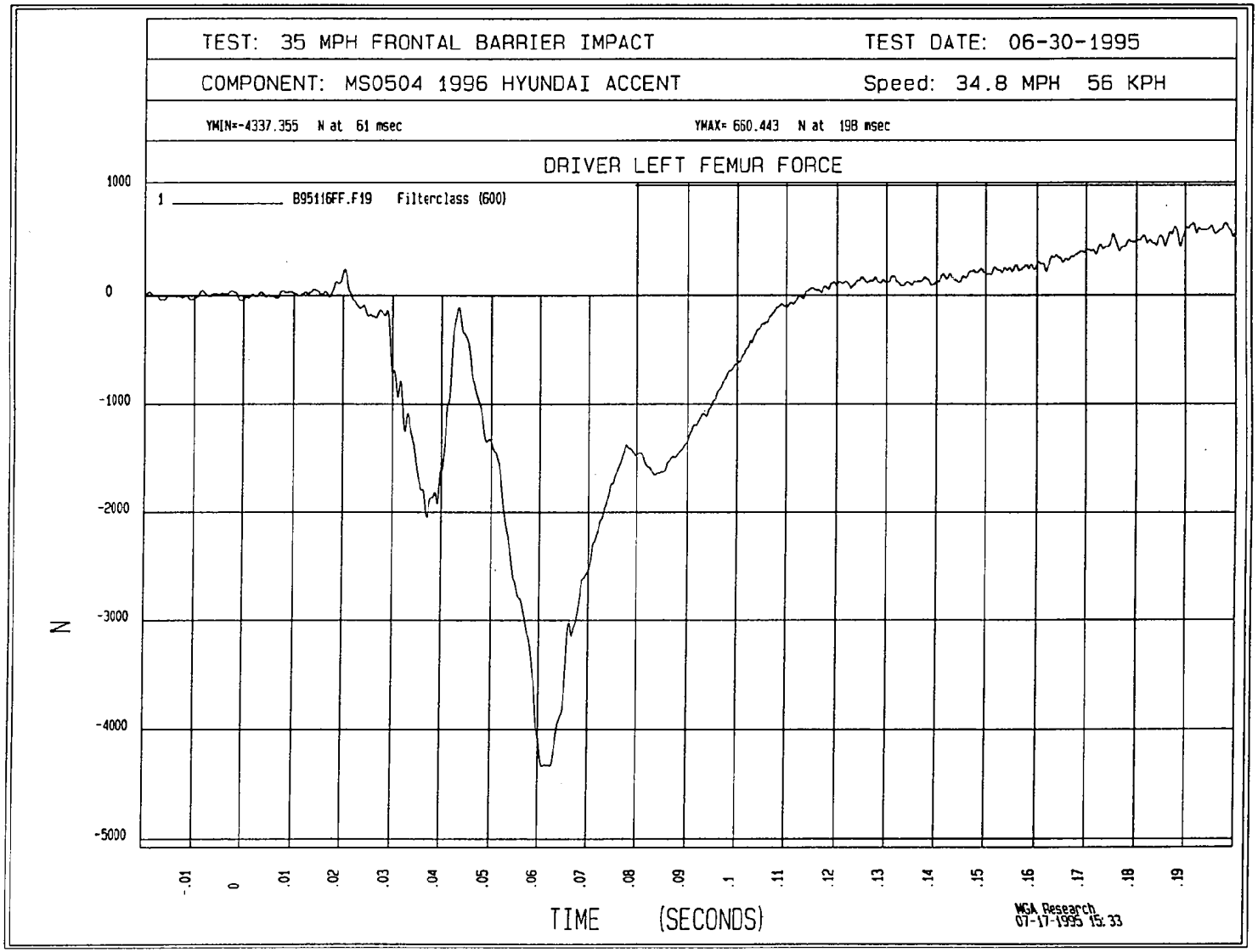


Figure B-59 - Driver Left Femur Force vs. Time

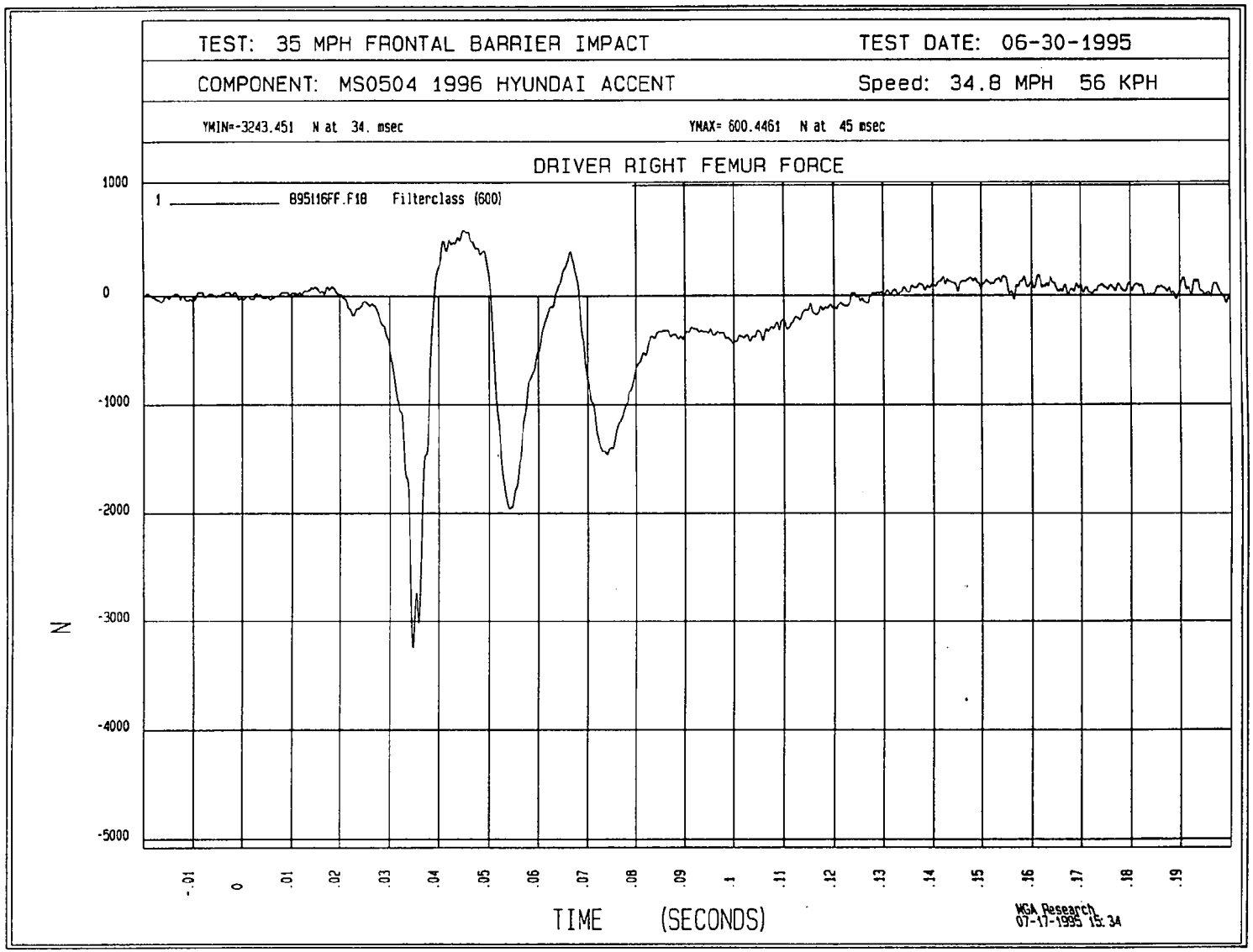


Figure B-6Ø - Driver Right Femur Force vs. Time

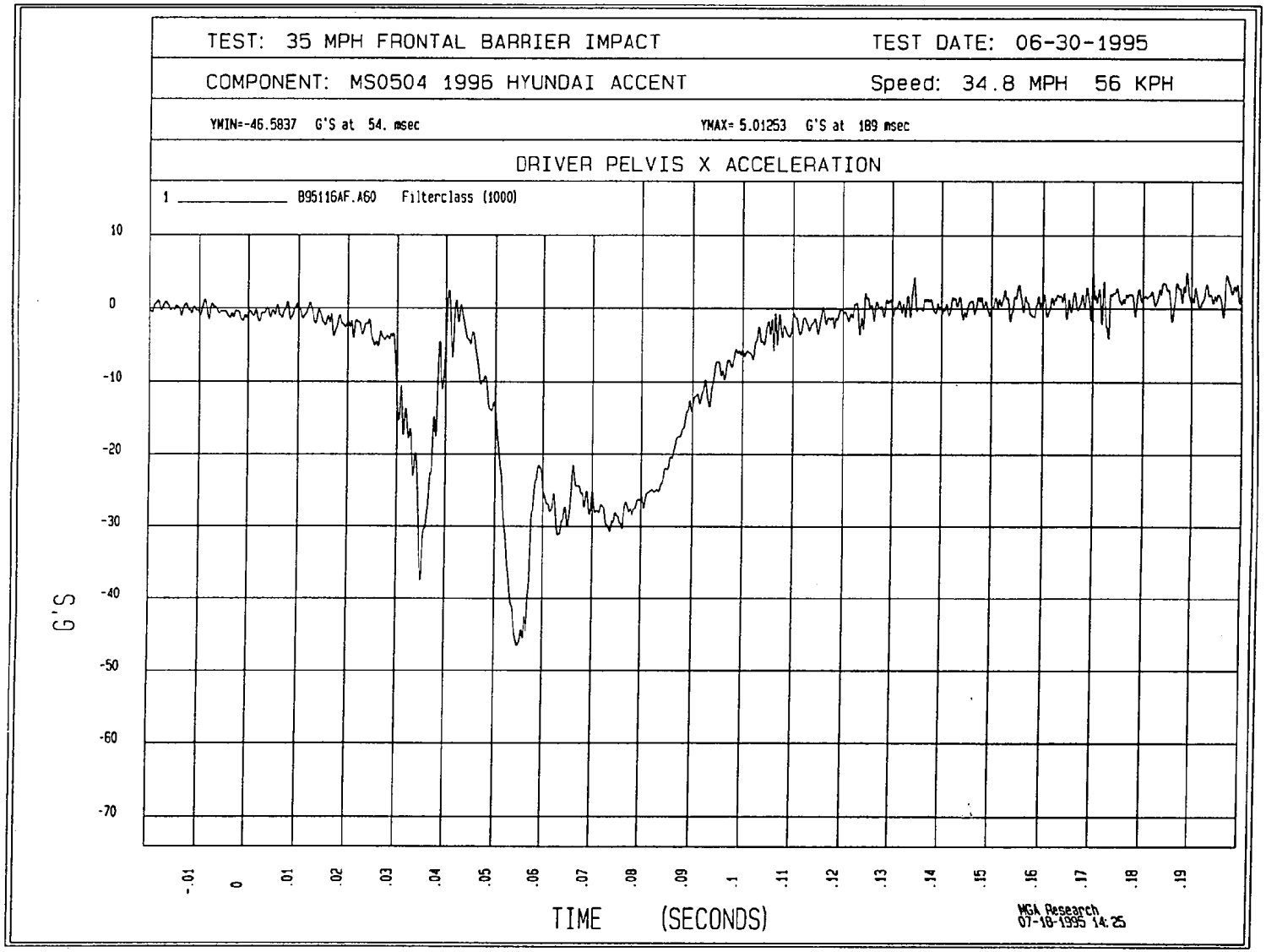


Figure B-61 - Driver Pelvis X Acceleration vs. Time

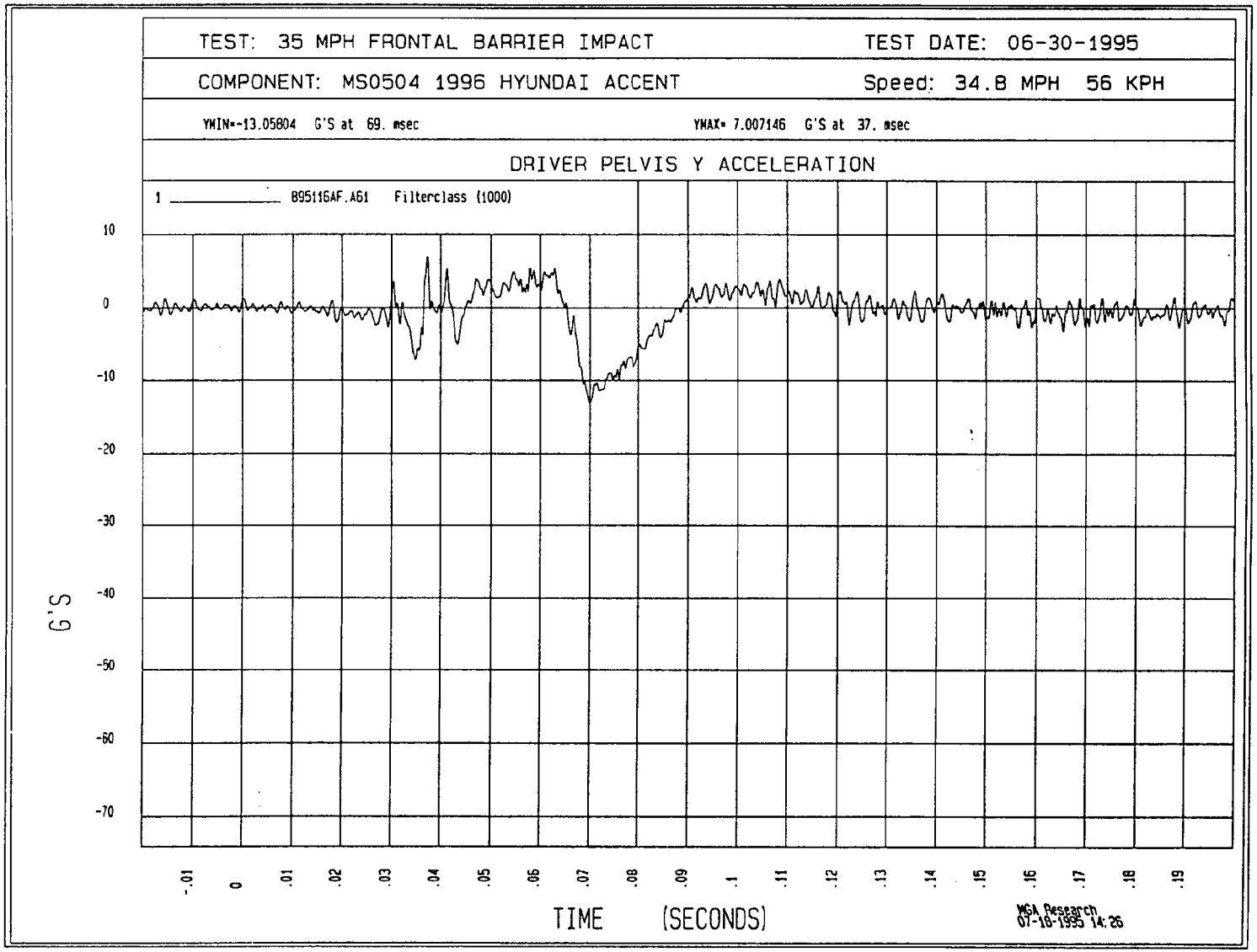


Figure B-62 - Driver Pelvis Y Acceleration vs. Time

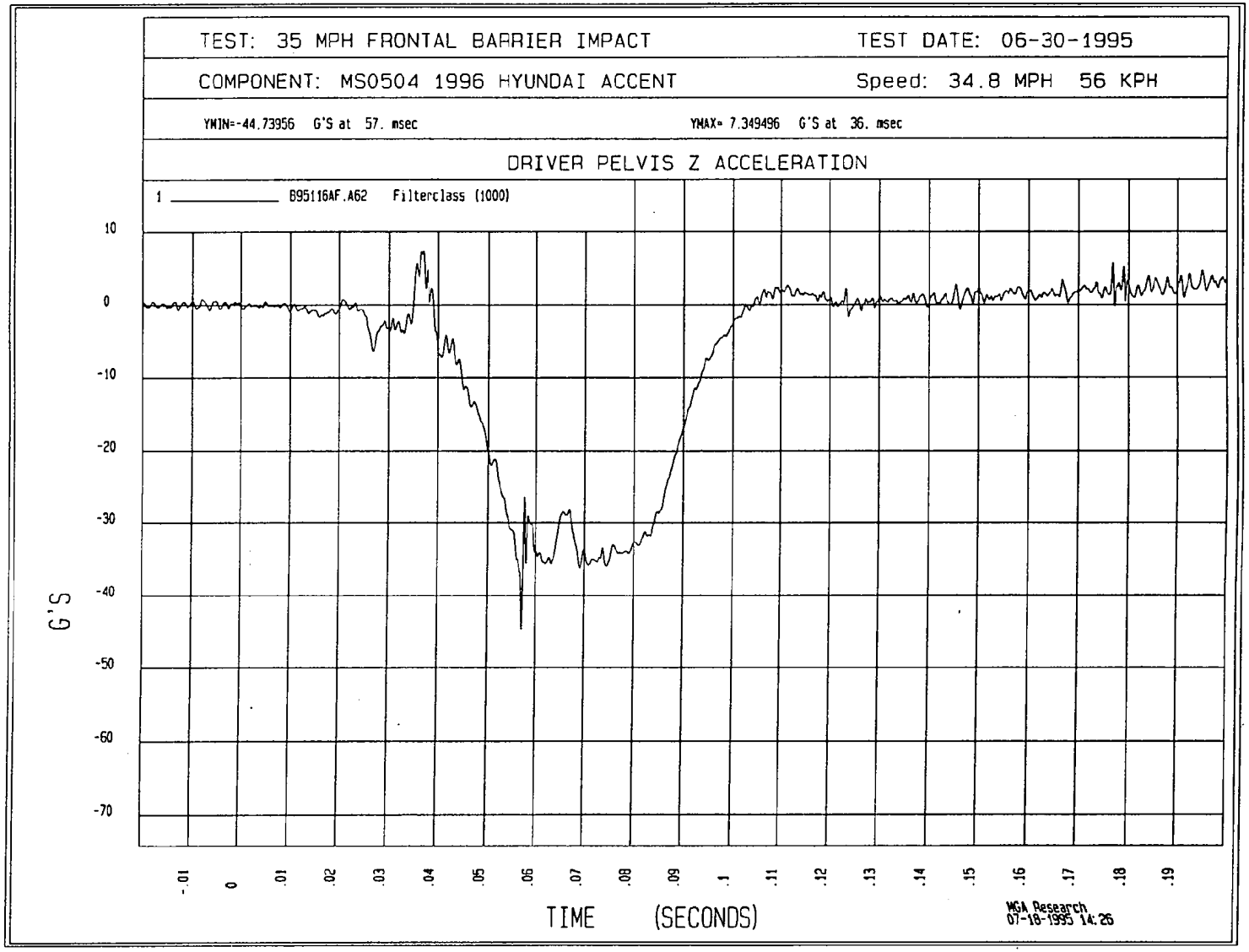


Figure B-63 - Driver Pelvis Z Acceleration vs. Time

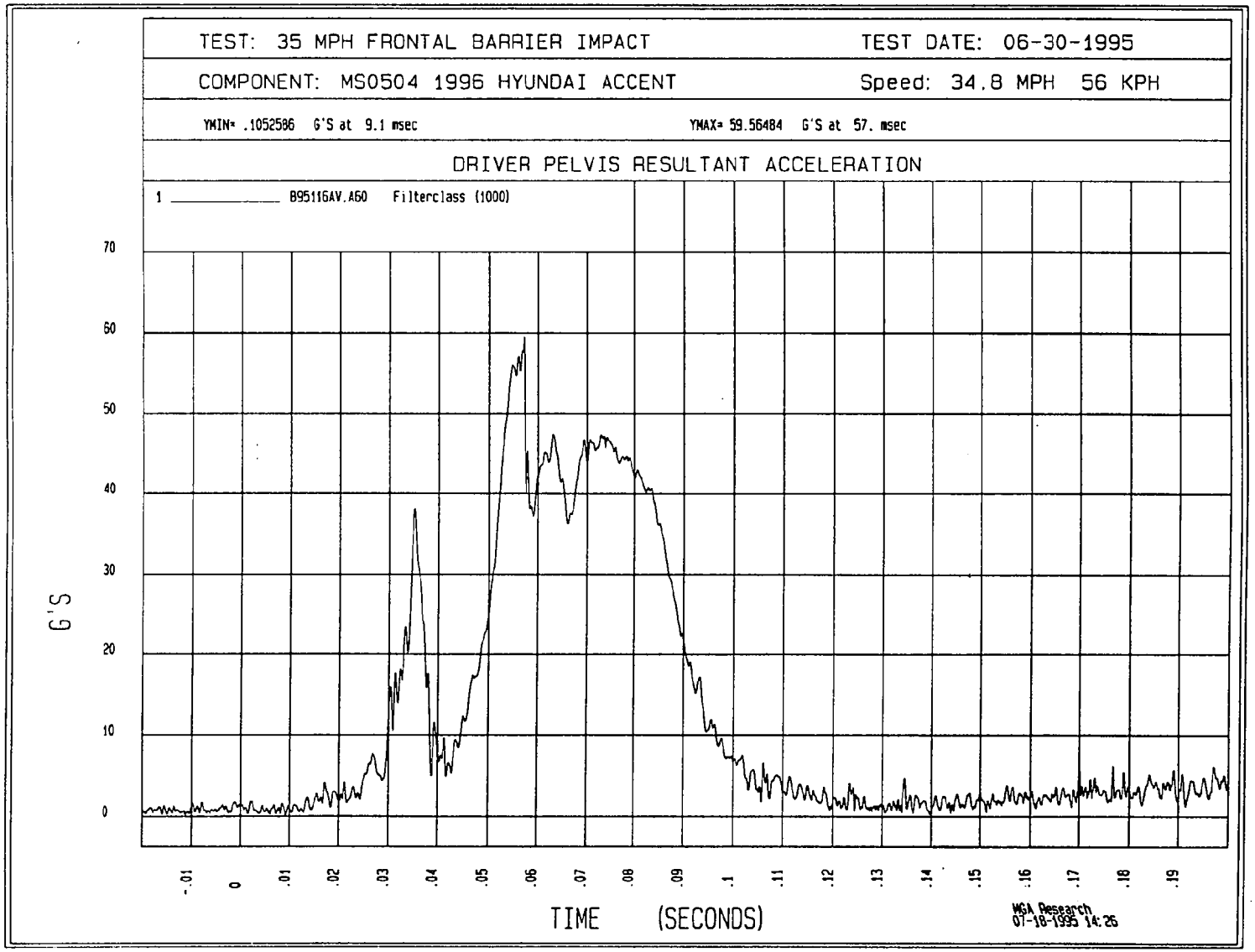


Figure B-64 - Driver Pelvis Resultant Acceleration vs. Time

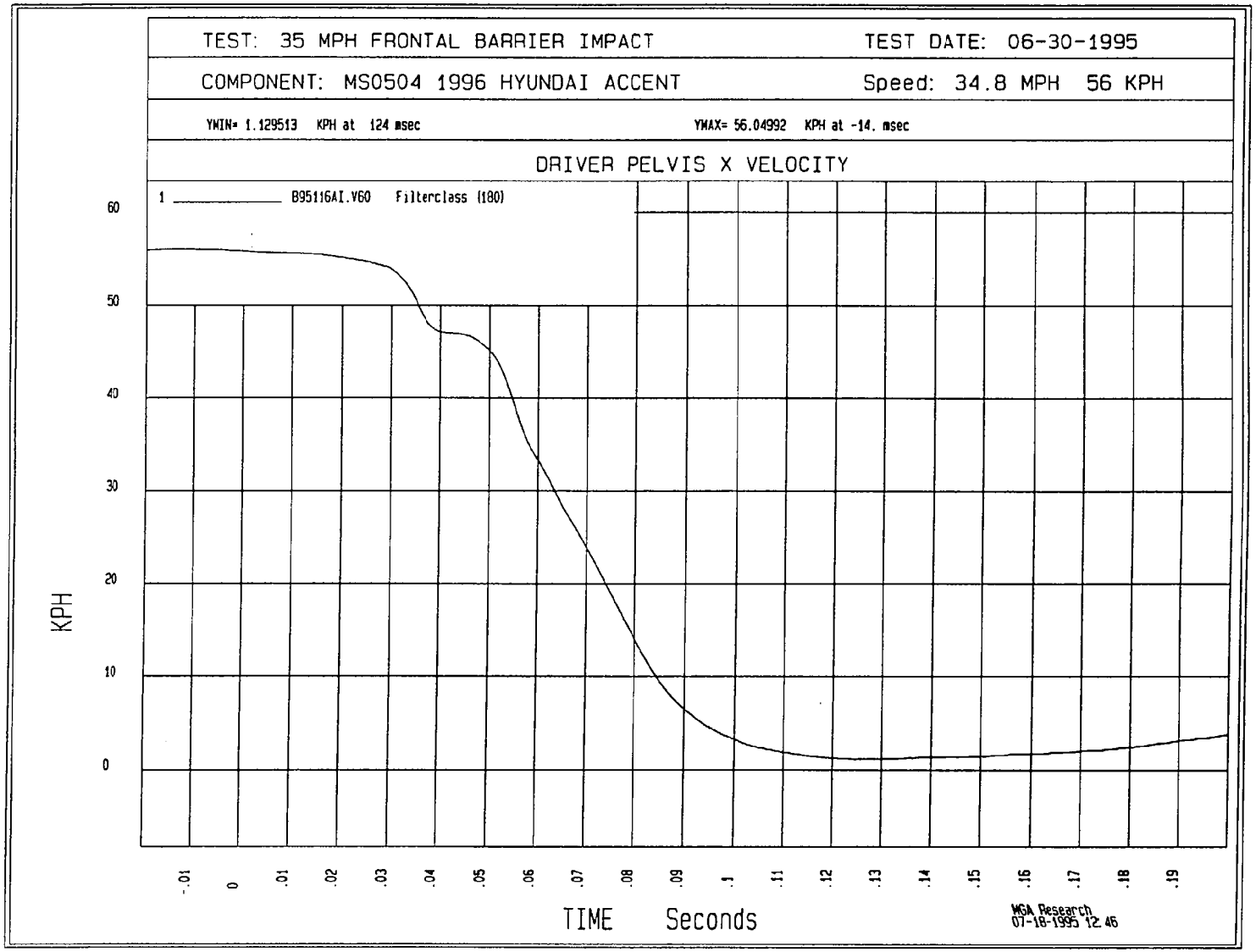


Figure B-65 - Driver Pelvis X Velocity vs. Time

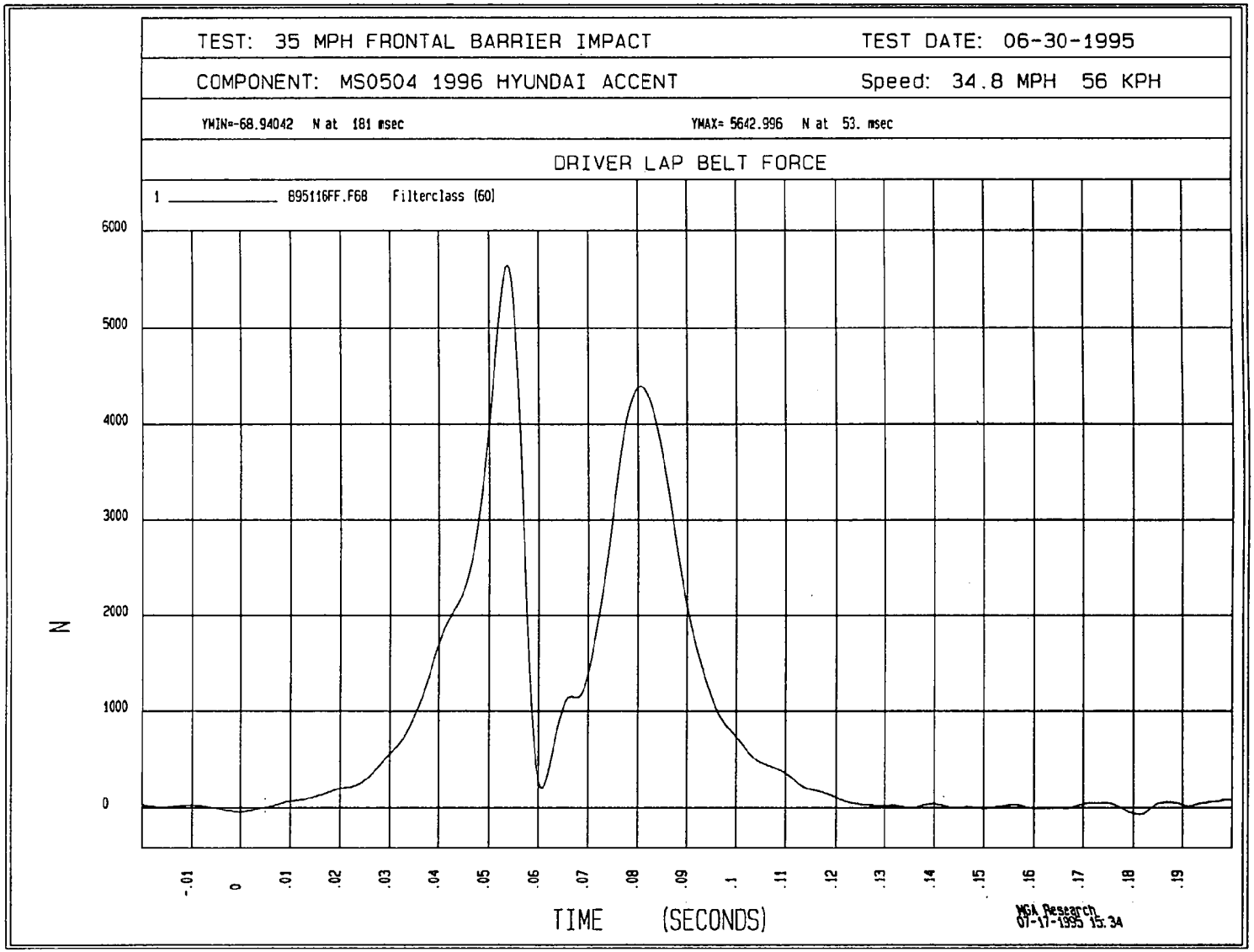


Figure B-66 - Driver Lap Belt Force vs. Time

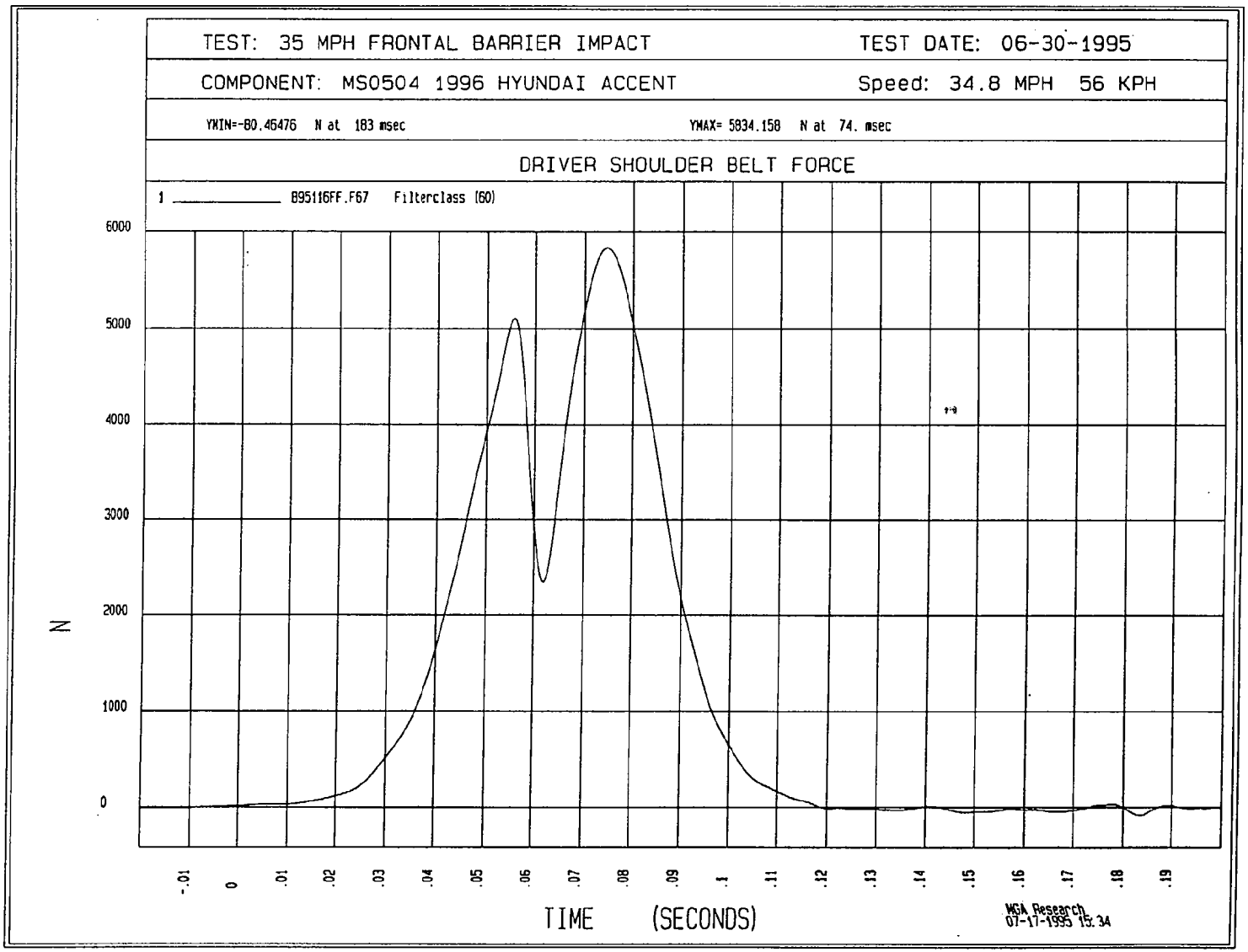


Figure B-67 - Driver Shoulder Belt Force vs. Time

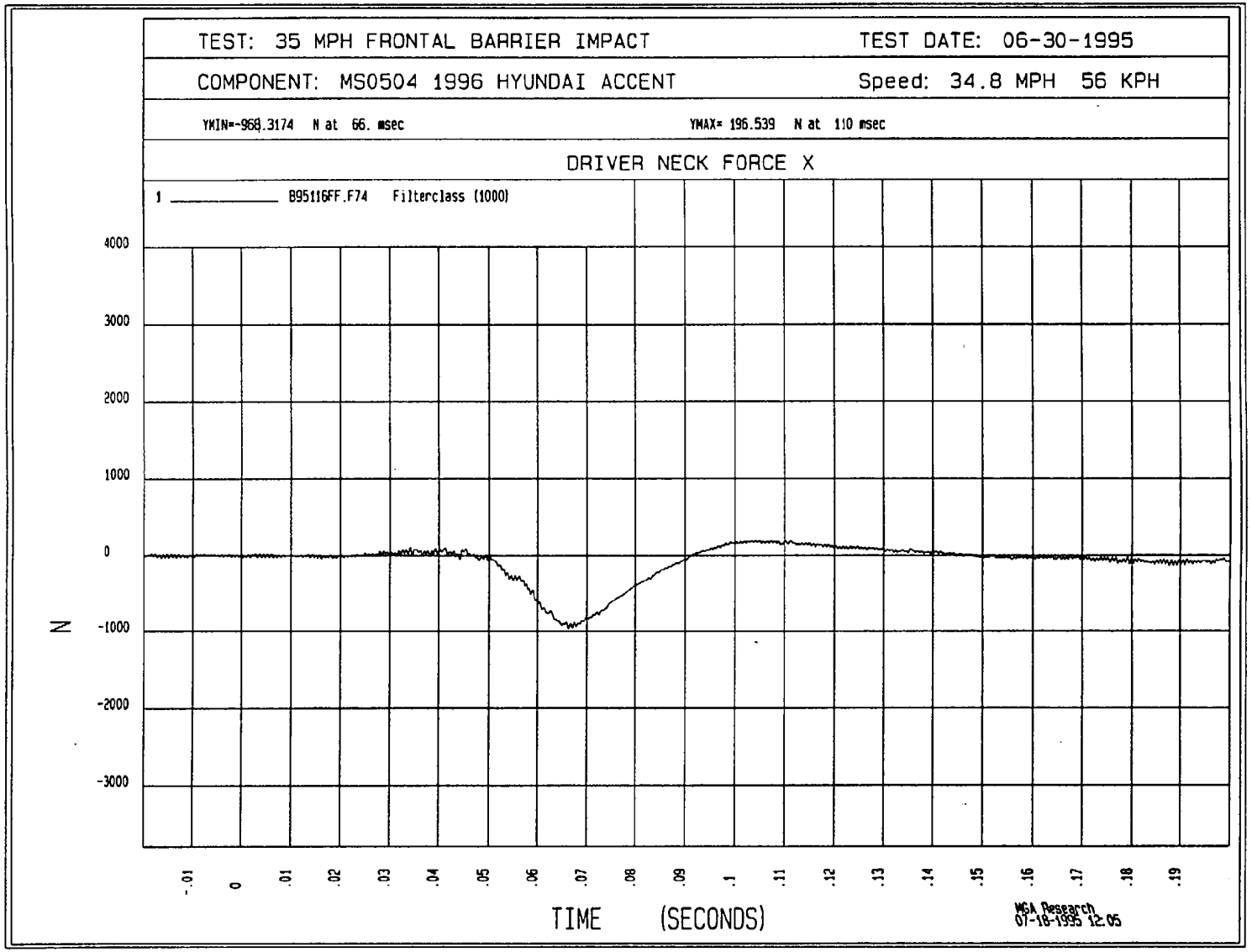


Figure B-68 - Driver Neck Force X vs. Time

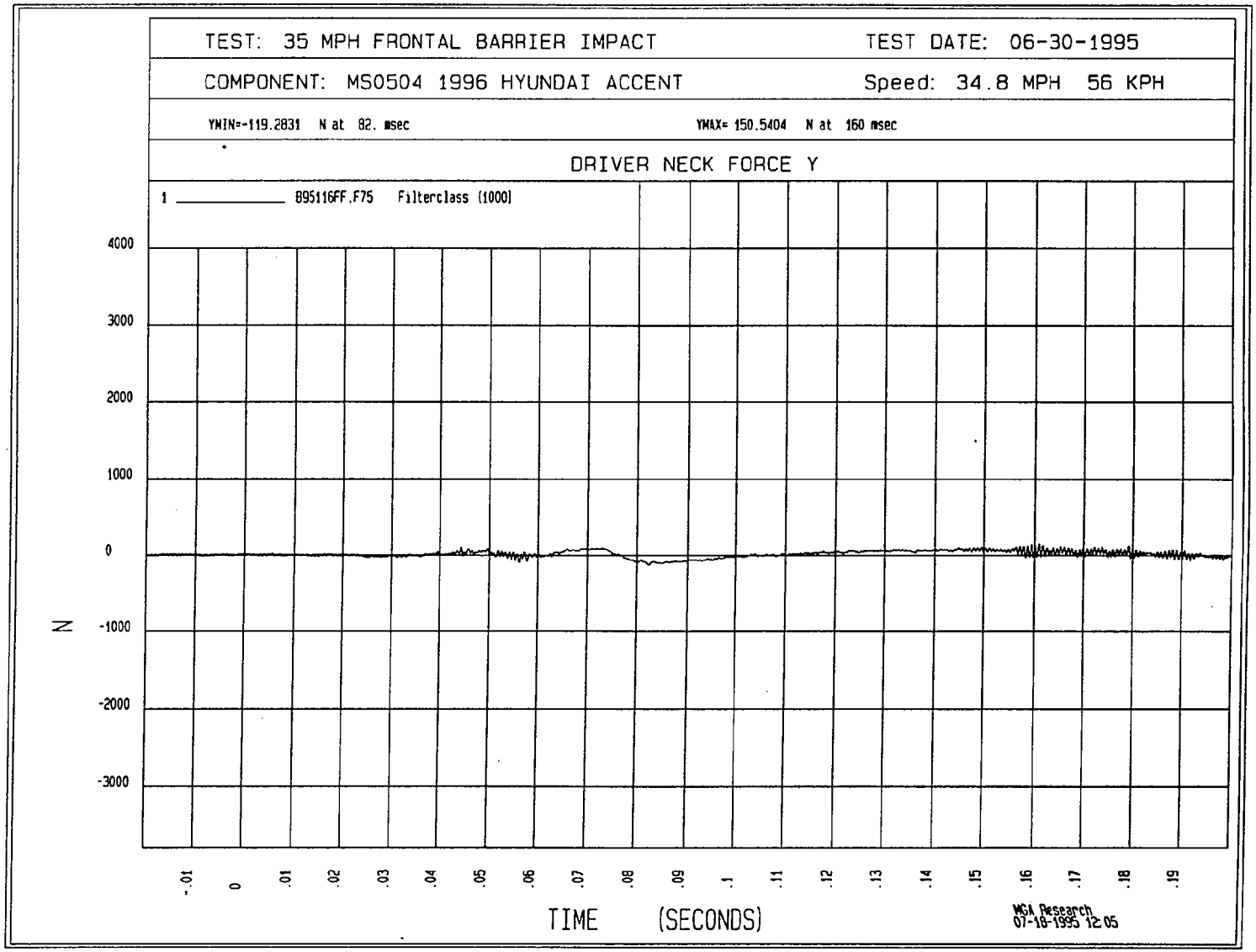


Figure B-69 - Driver Neck Force Y vs. Time

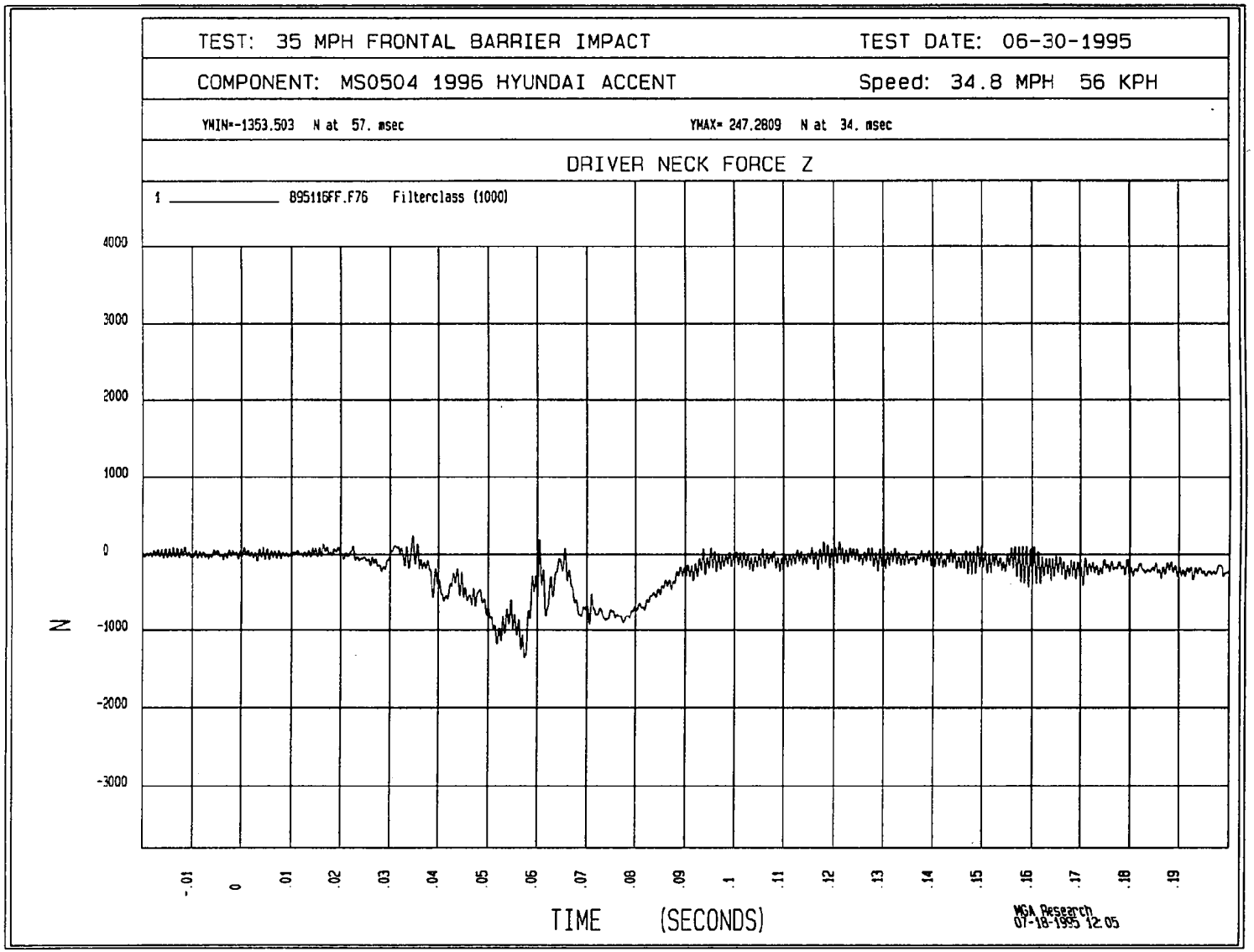


Figure B-7Ø - Driver Neck Force Z vs. Time

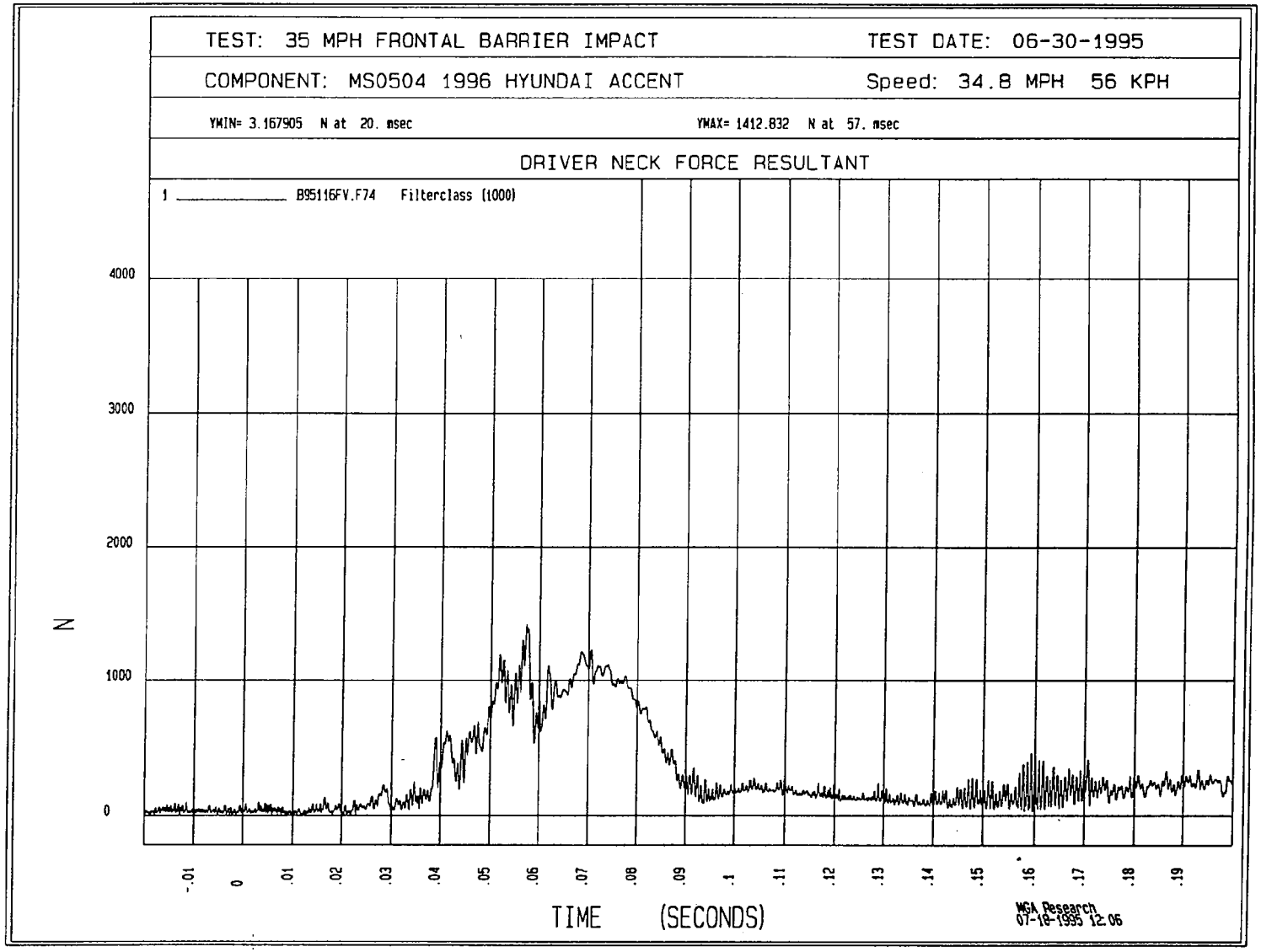


Figure B-71 - Driver Neck Force Resultant vs. Time

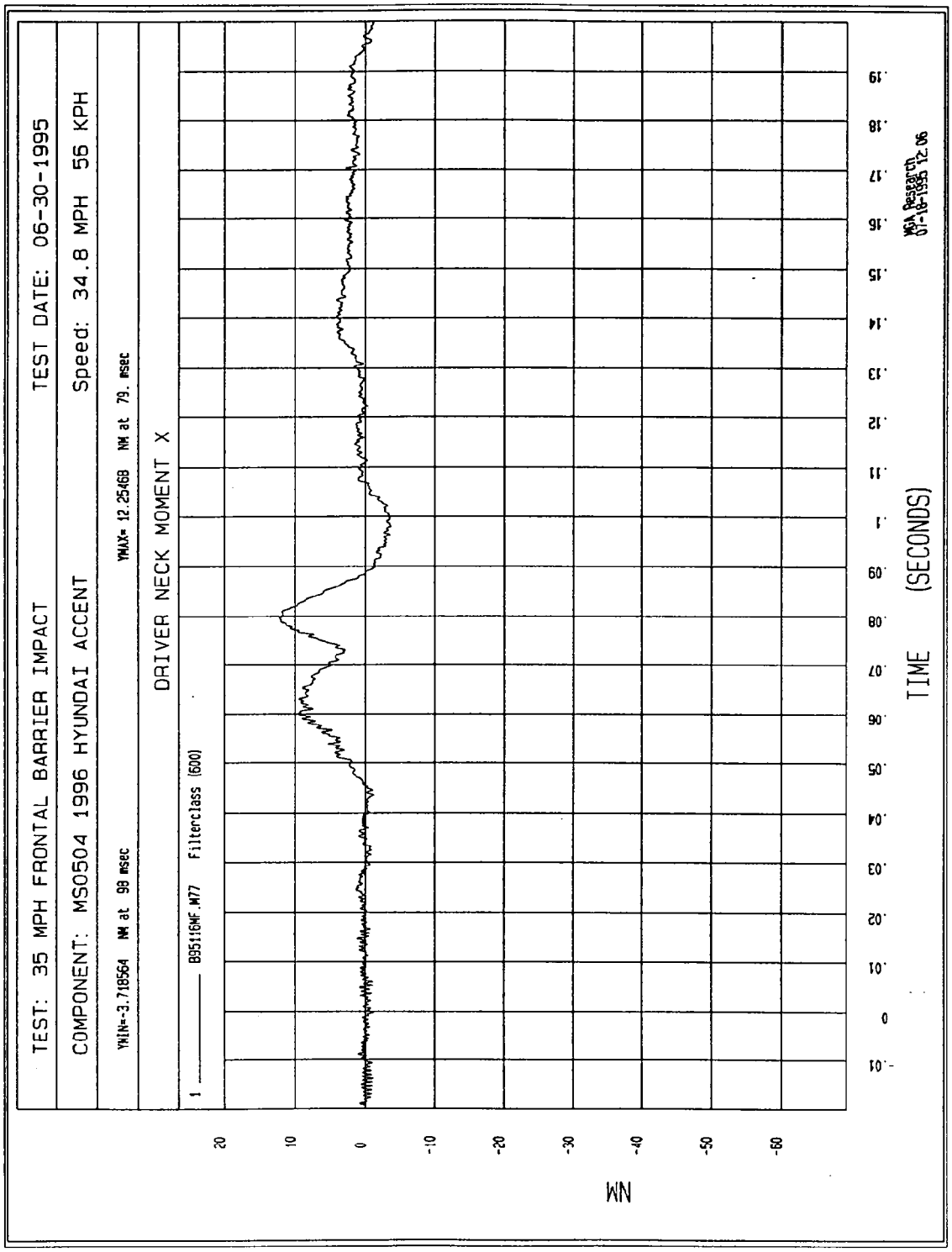


Figure B-72 - Driver Neck Moment X vs. Time

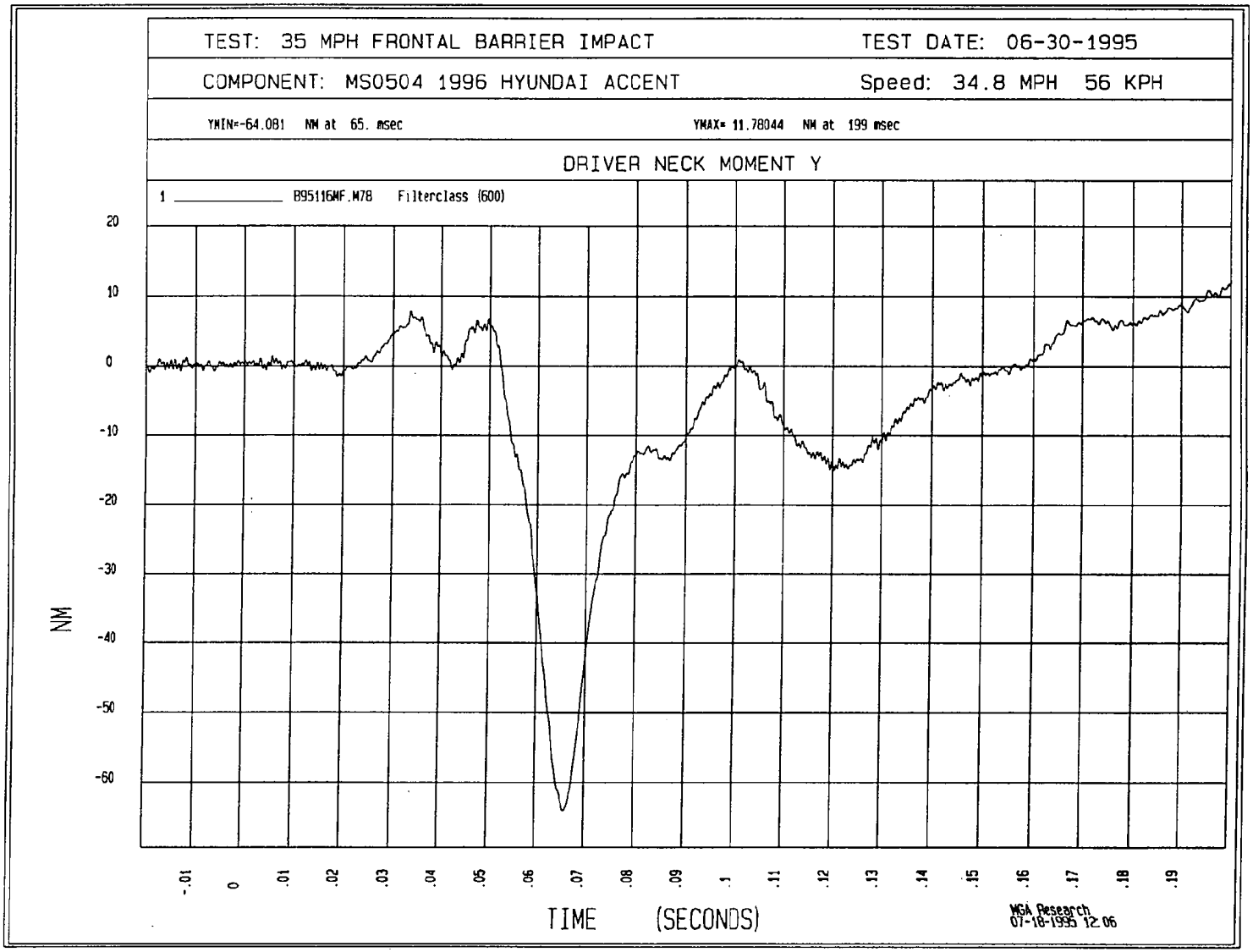


Figure B-73 - Driver Neck Moment Y vs. Time

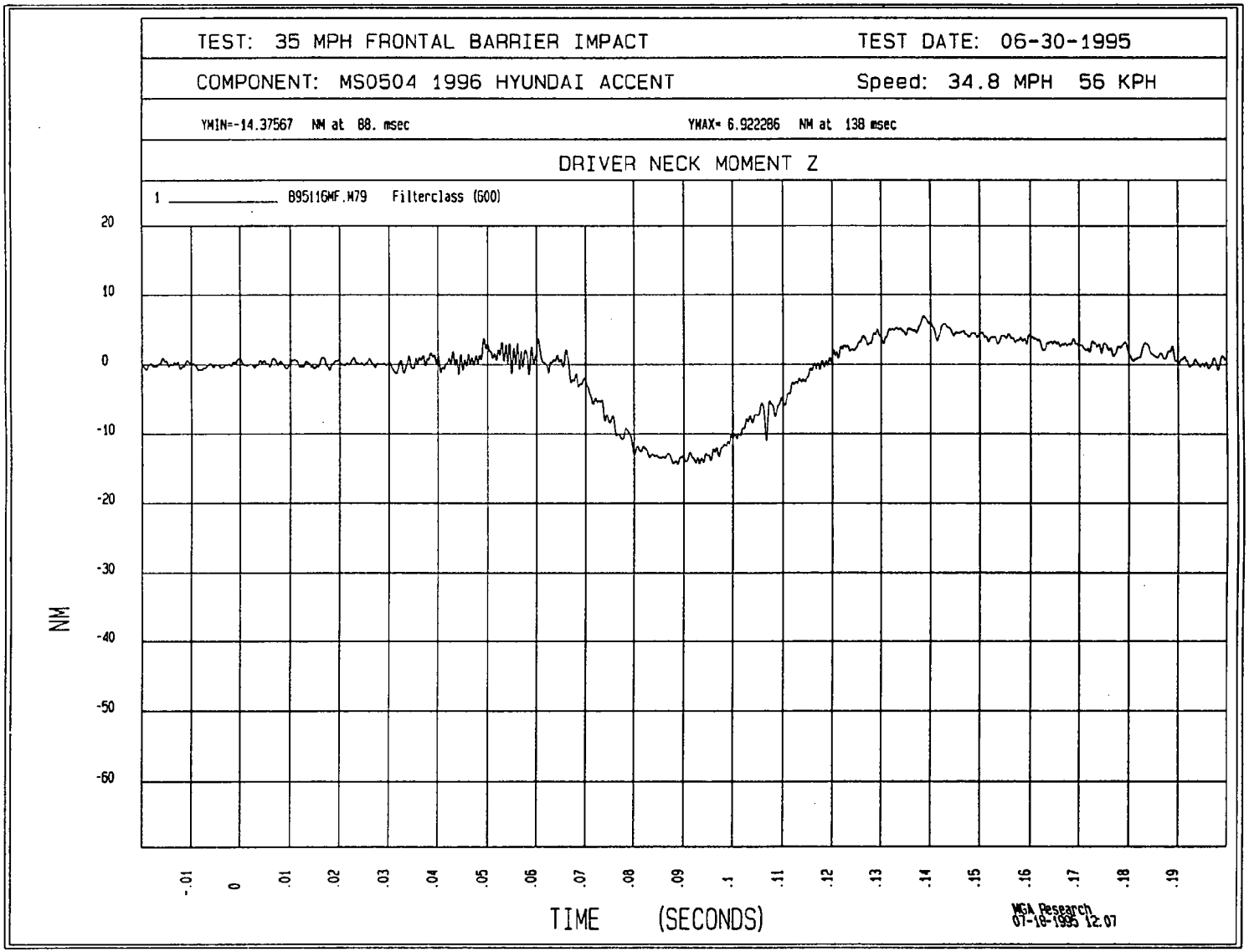


Figure B-74 - Driver Neck Moment Z vs. Time

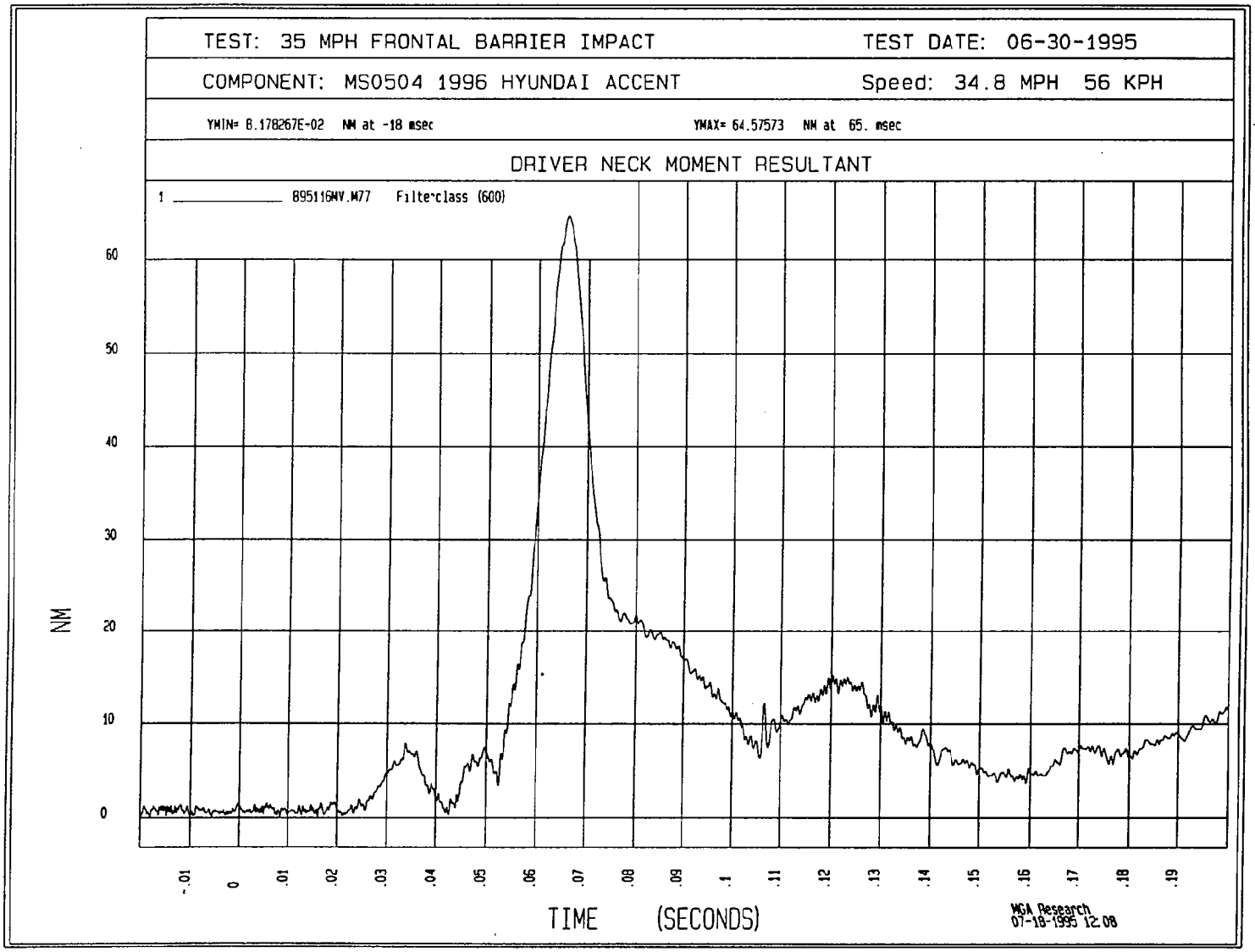


Figure B-75 - Driver Neck Moment Resultant vs. Time

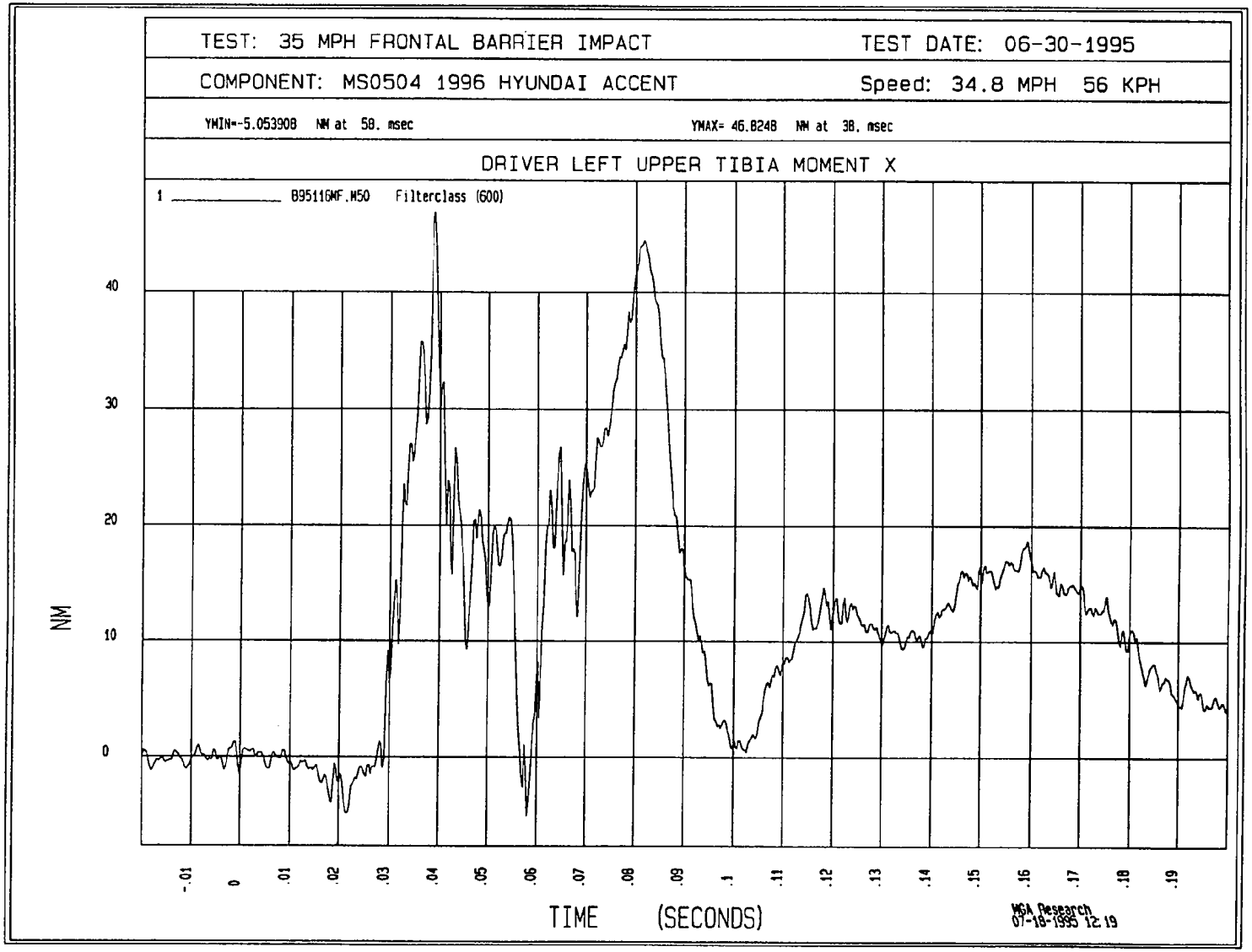


Figure B-76 - Driver Left Upper Tibia Moment X vs. Time

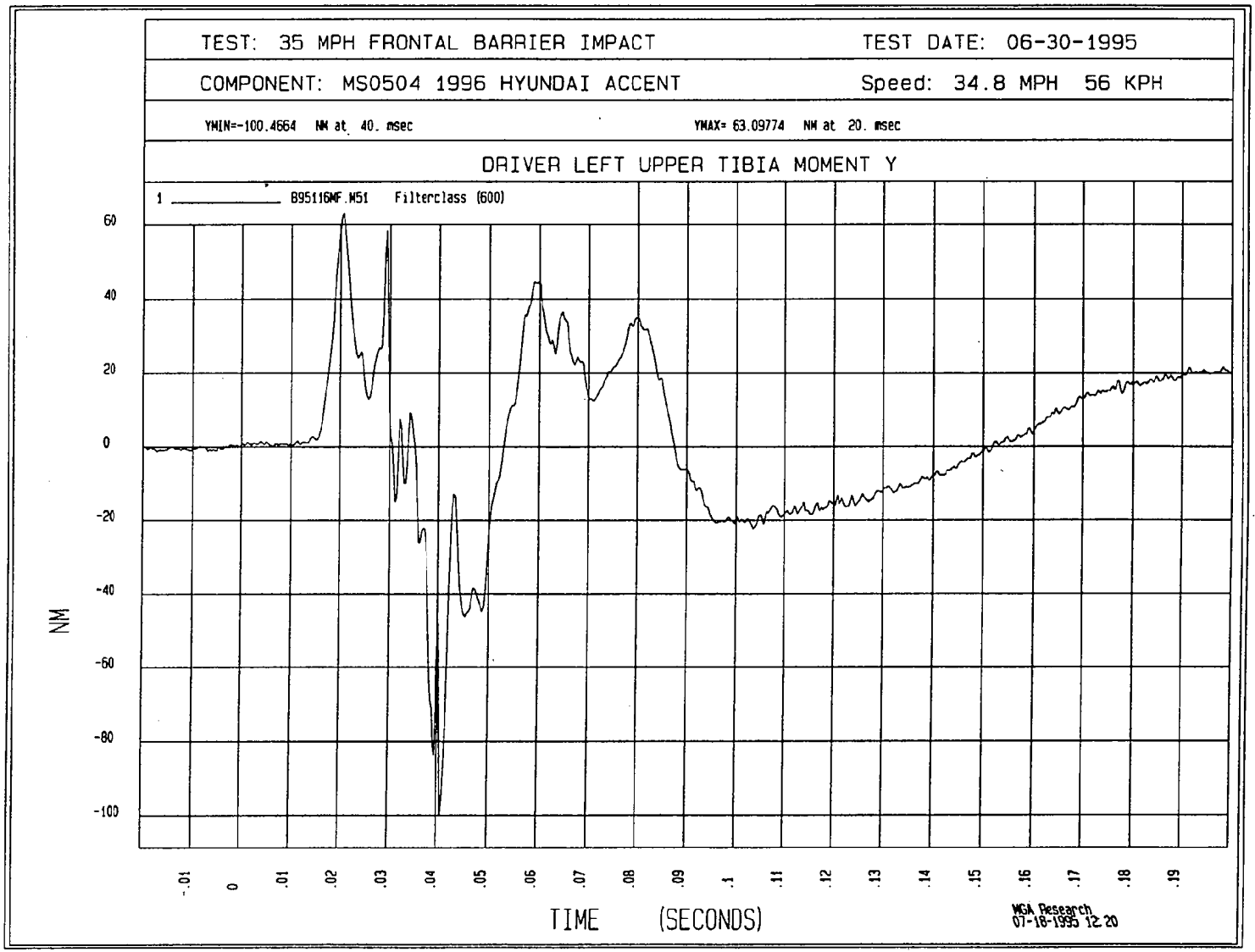


Figure B-77 - Driver Left Upper Tibia Moment Y vs. Time

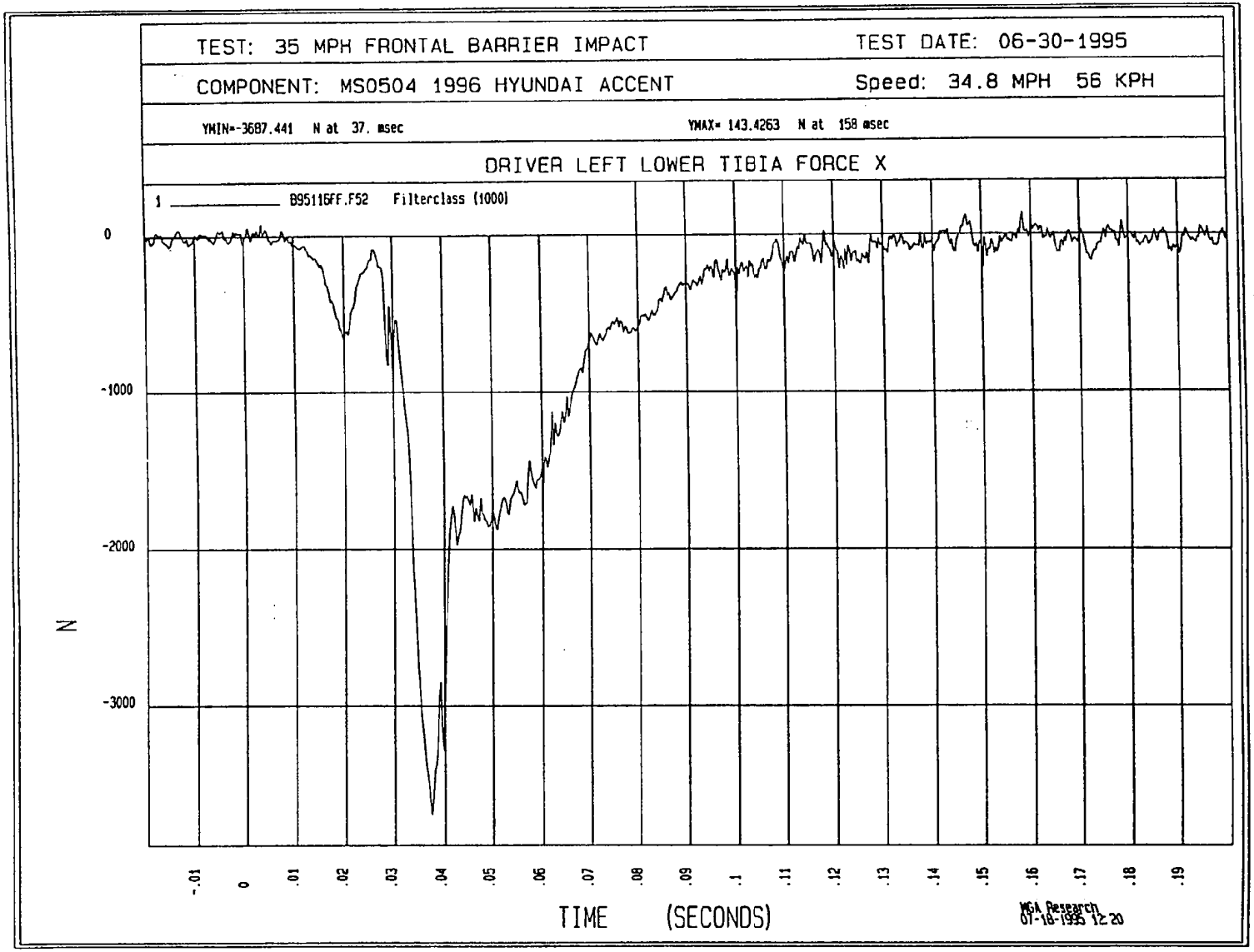


Figure B-78 - Driver Left Lower Tibia Force X vs. Time

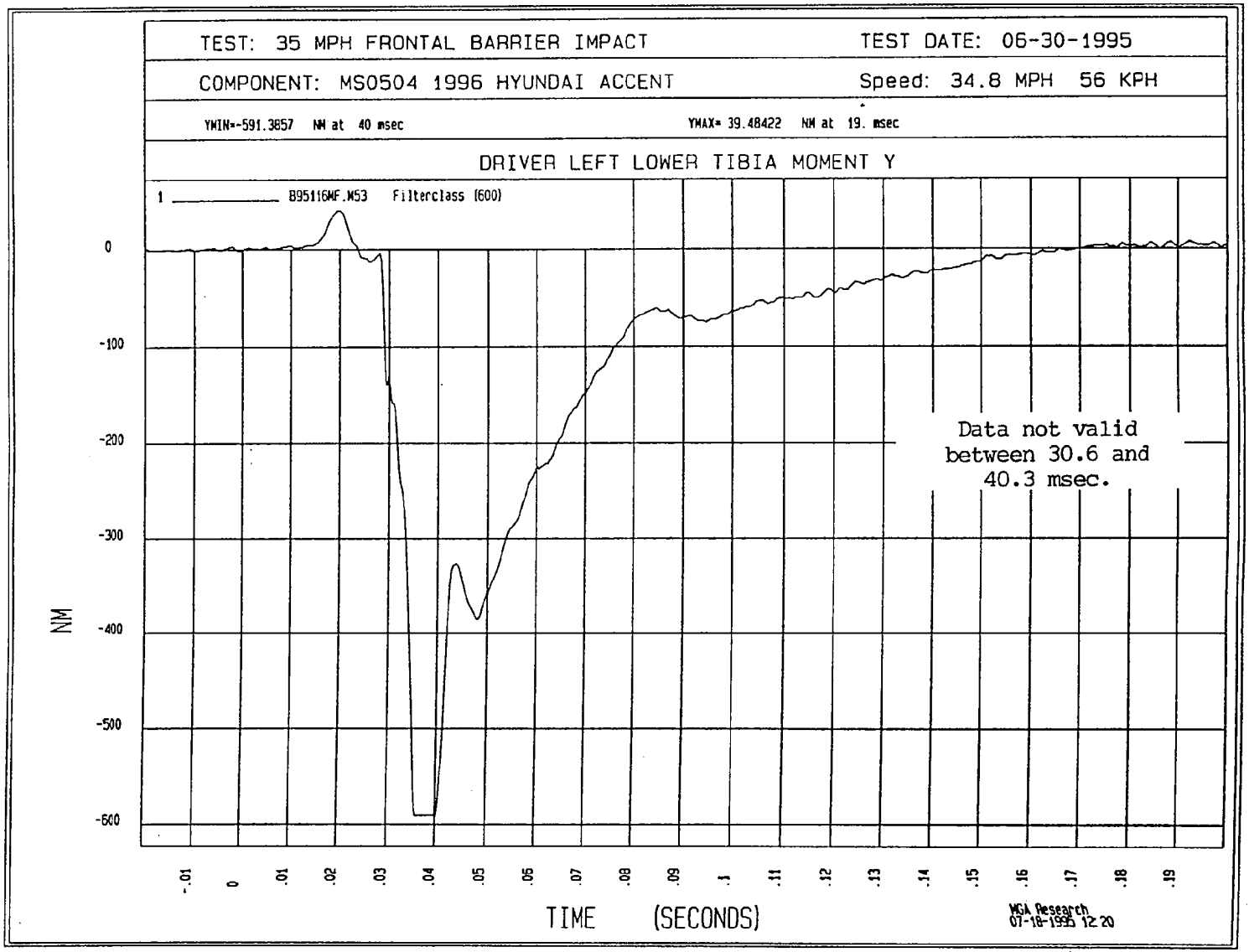


Figure B-79 - Driver Left Lower Tibia Moment Y vs. Time

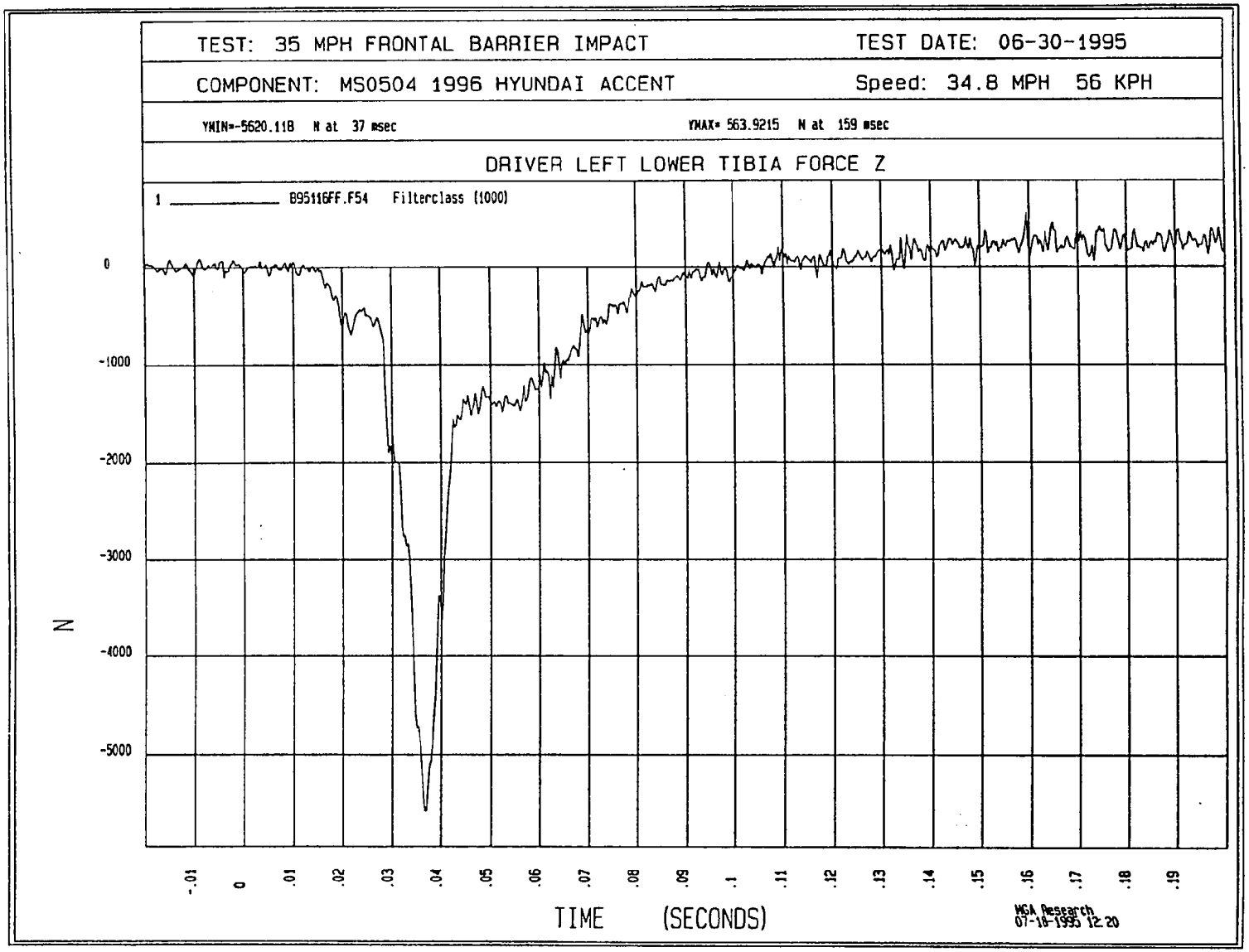


Figure B-8Ø - Driver Left Lower Tibia Force Z vs. Time

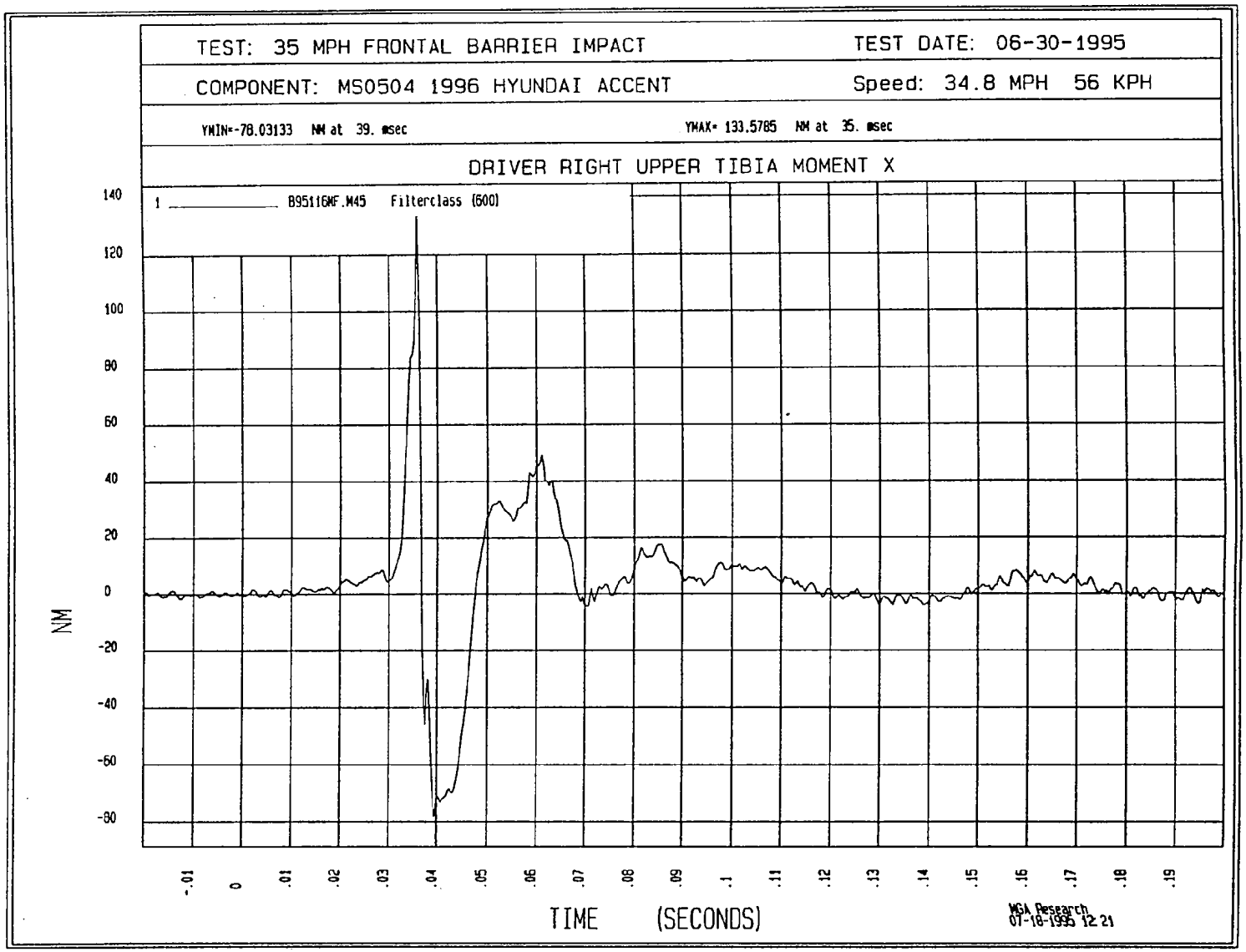


Figure B-81 - Driver Right Upper Tibia Moment X vs. Time

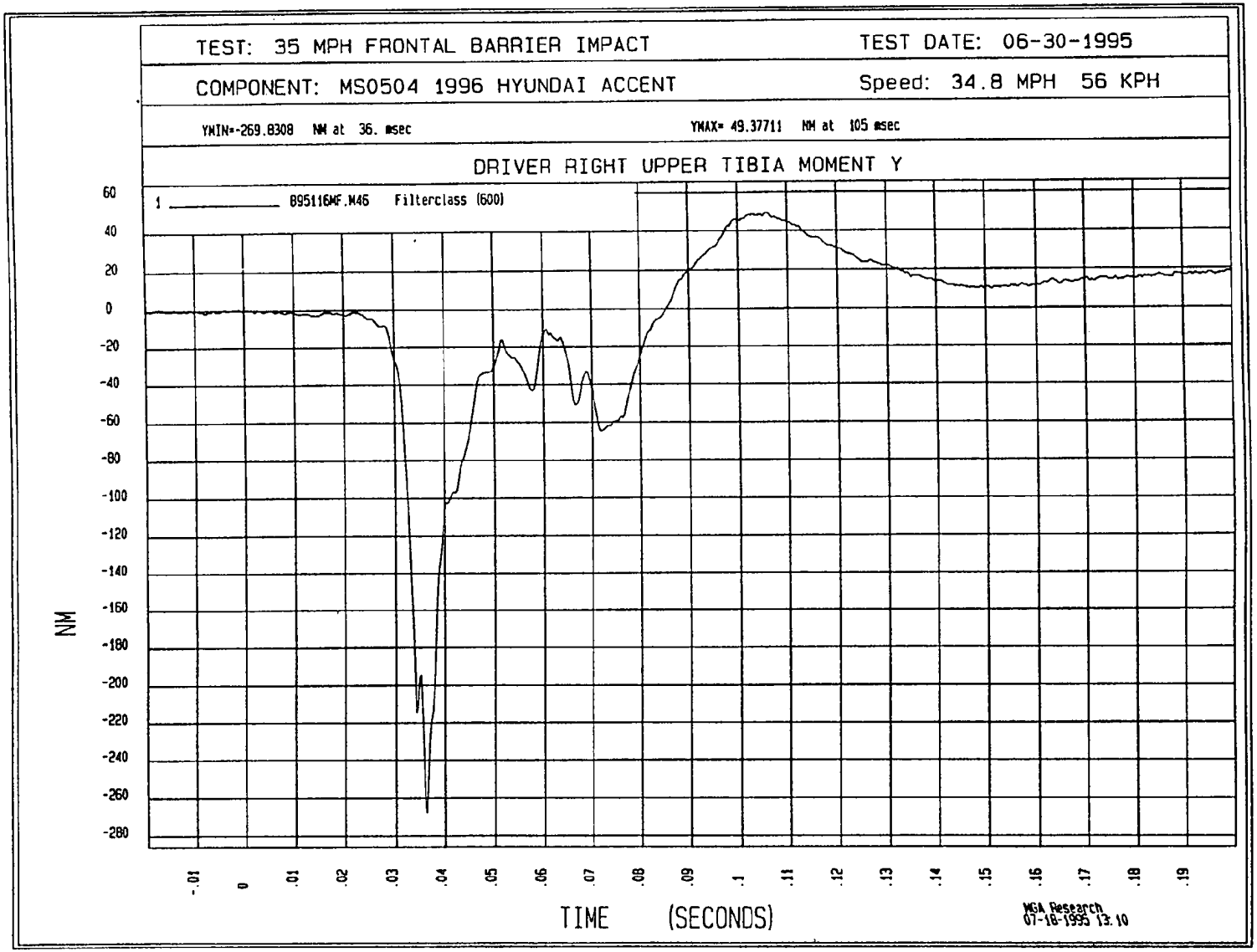


Figure B-82 - Driver Right Upper Tibia Moment Y vs. Time

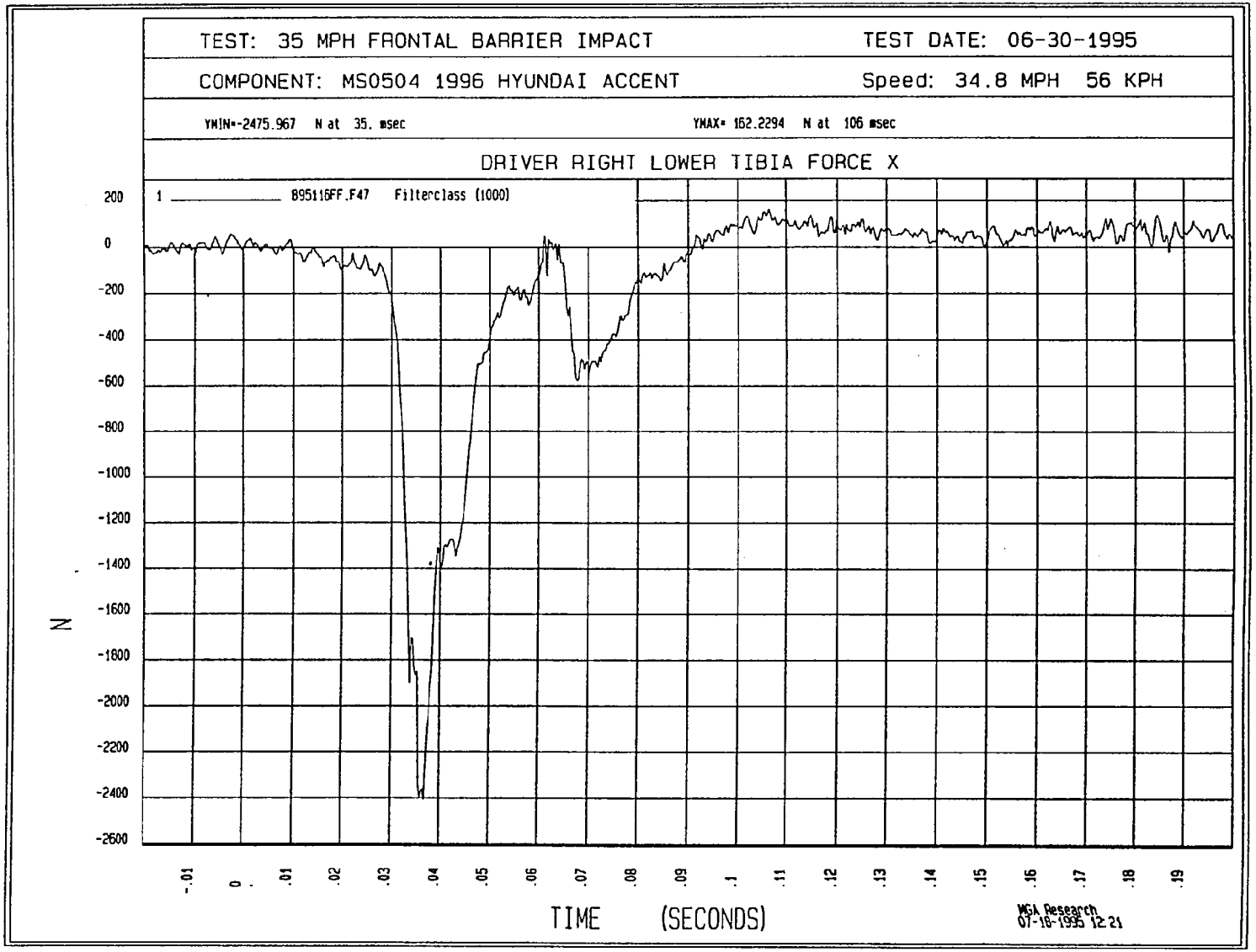


Figure B-83 - Driver Right Lower Tibia Force X vs. Time

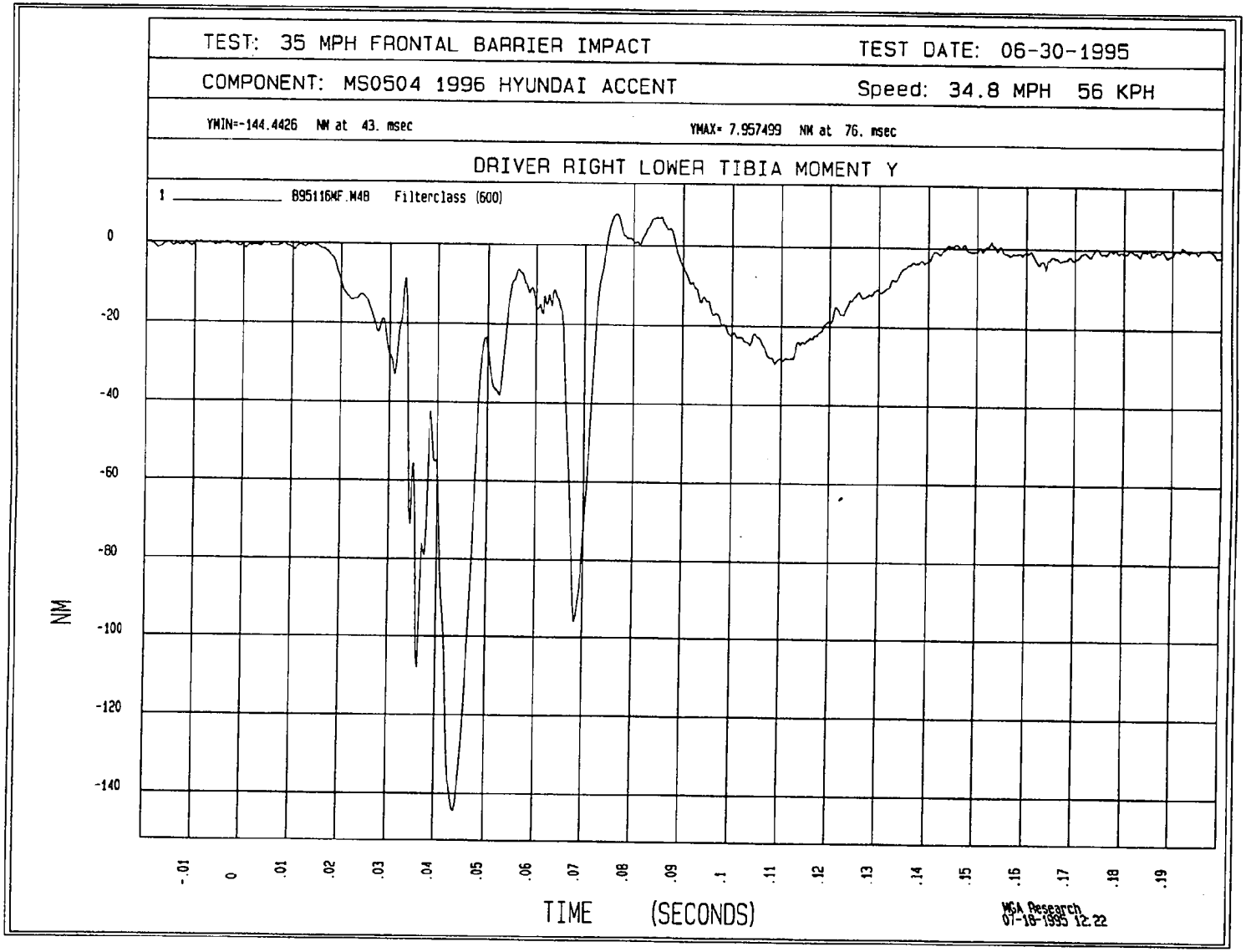


Figure B-84 - Driver Right Lower Tibia Moment Y vs. Time

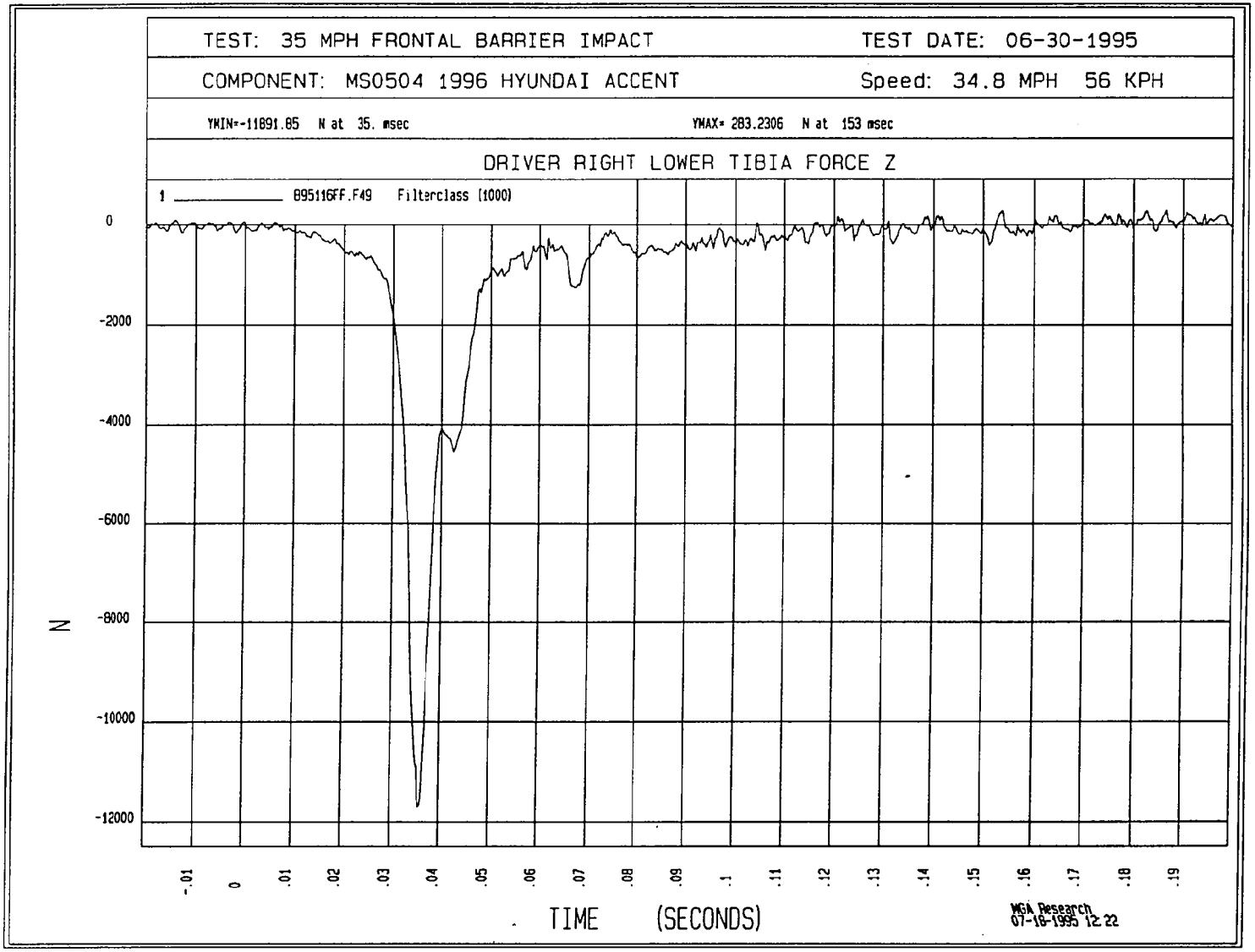


Figure B-85 - Driver Right Lower Tibia Force Z vs. Time

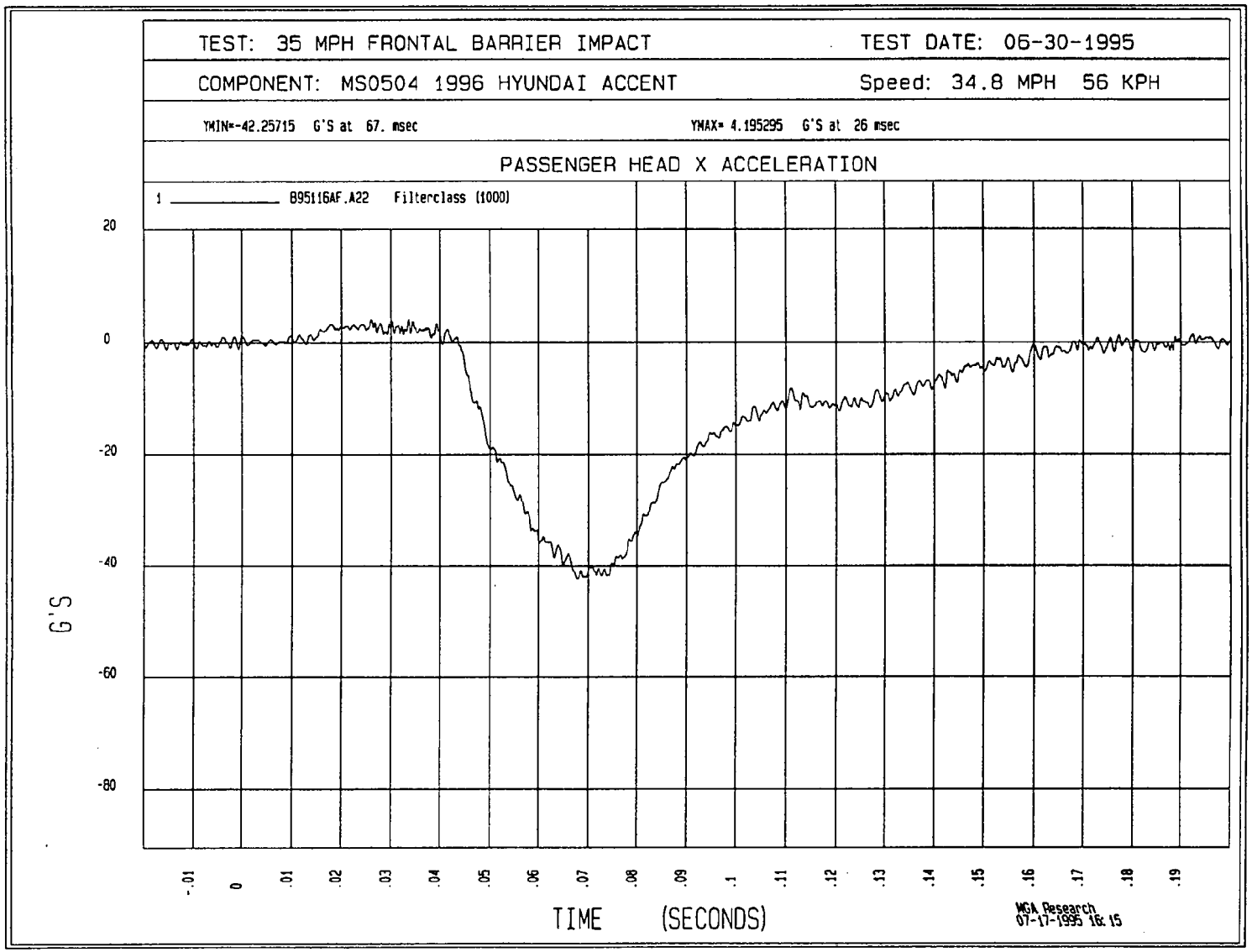


Figure B-86 - Passenger Head X Acceleration vs. Time

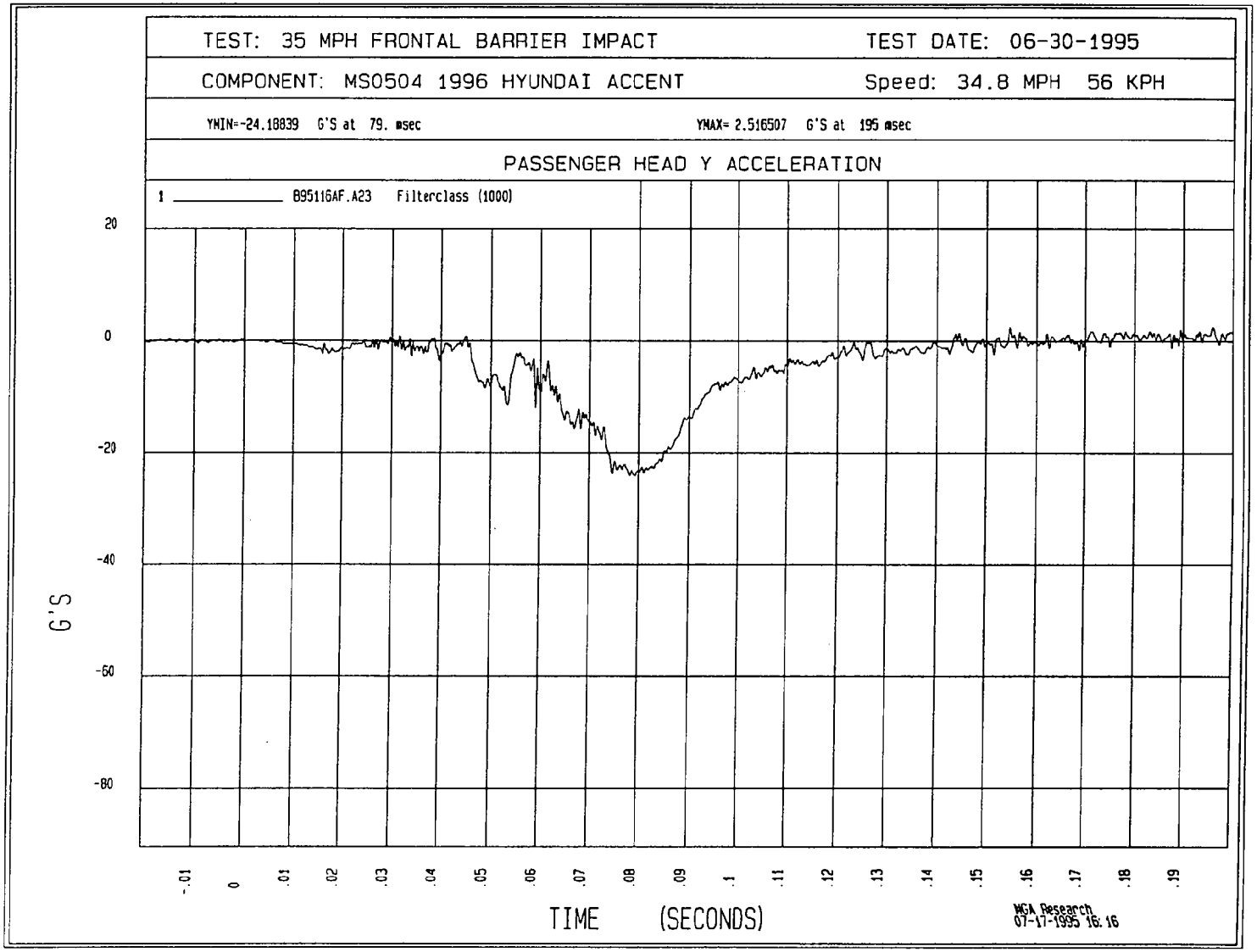


Figure B-87 - Passenger Head Y Acceleration vs. Time

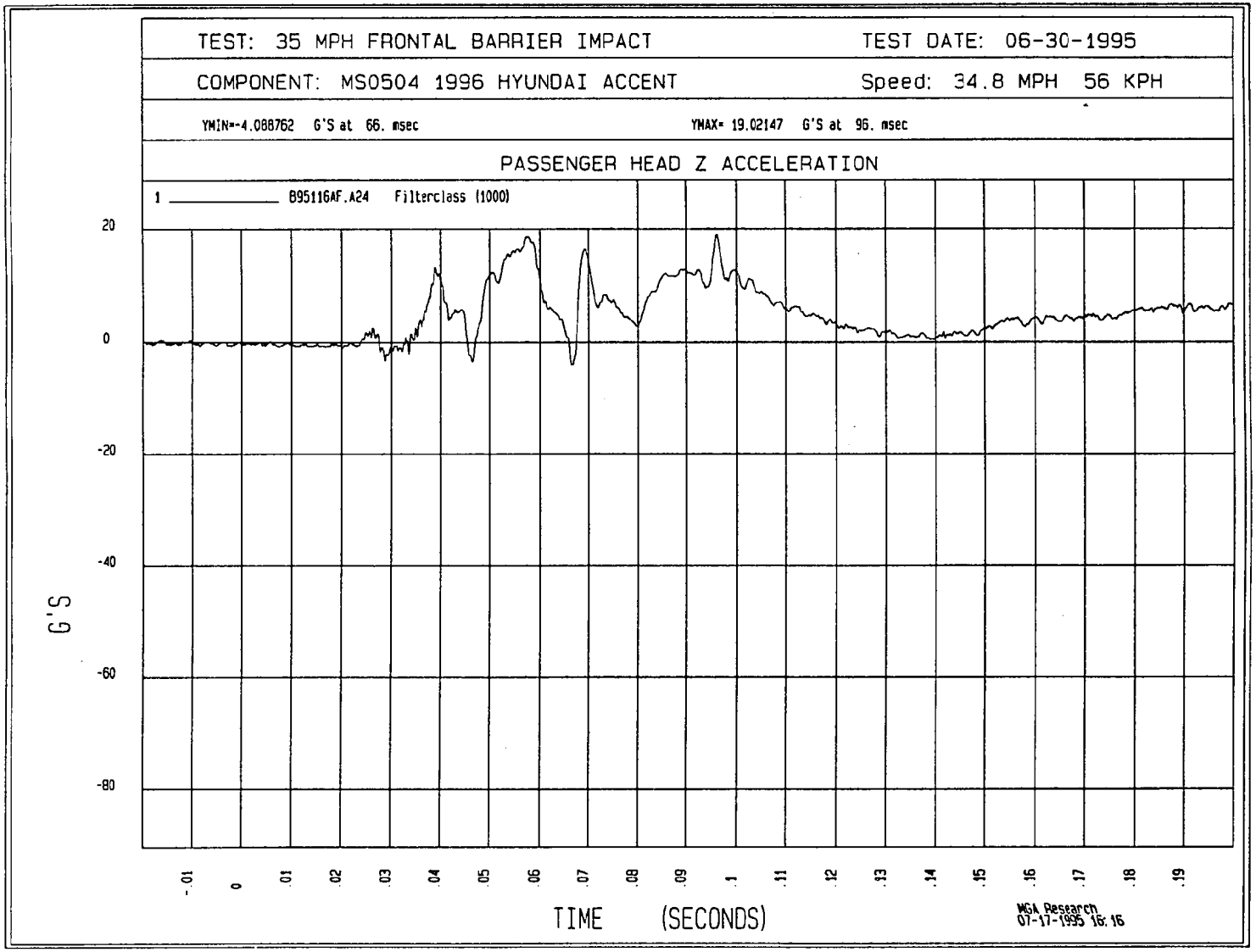


Figure B-88 - Passenger Head Z Acceleration vs. Time

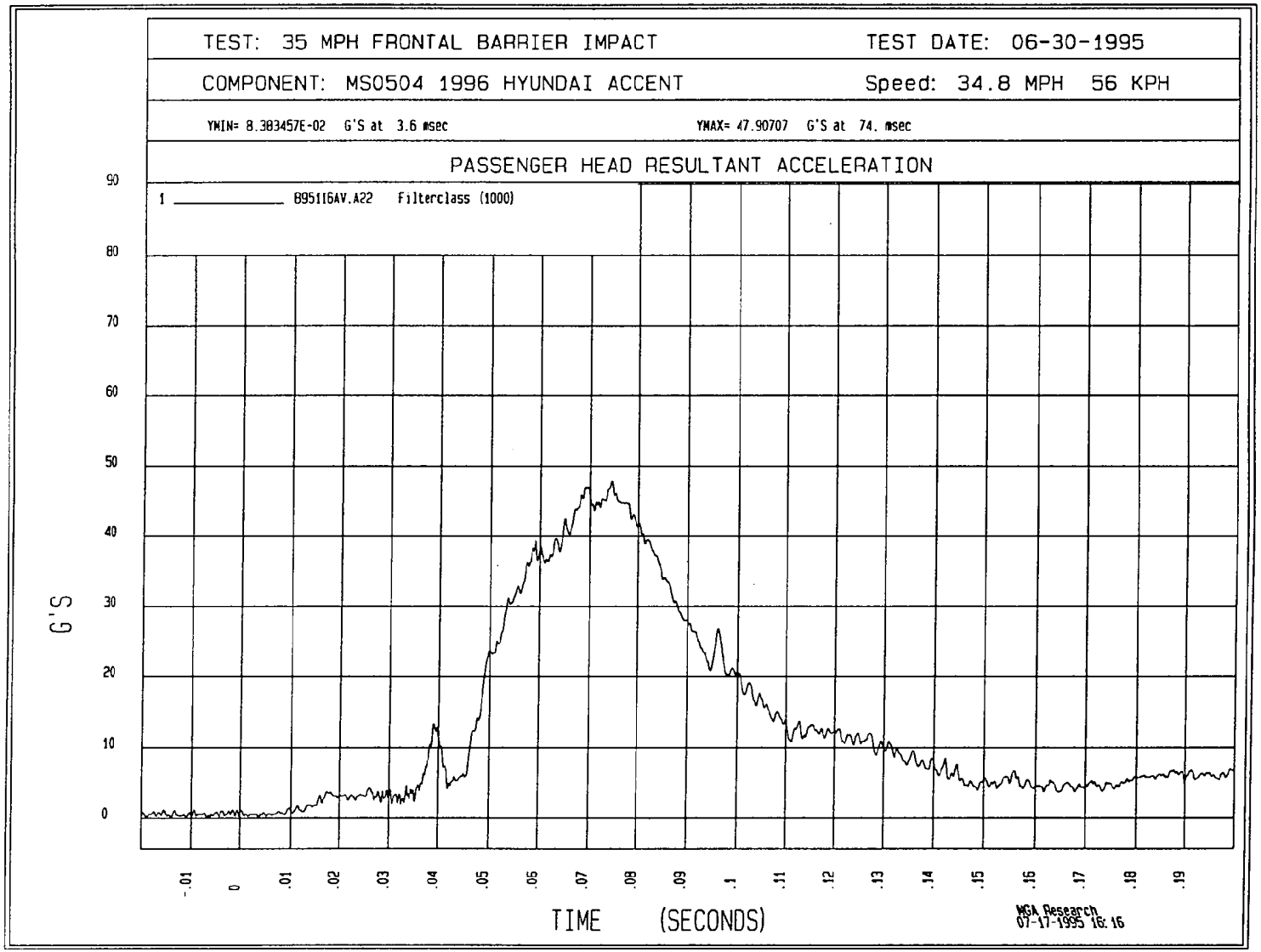


Figure B-89 - Passenger Head Resultant Acceleration vs. Time

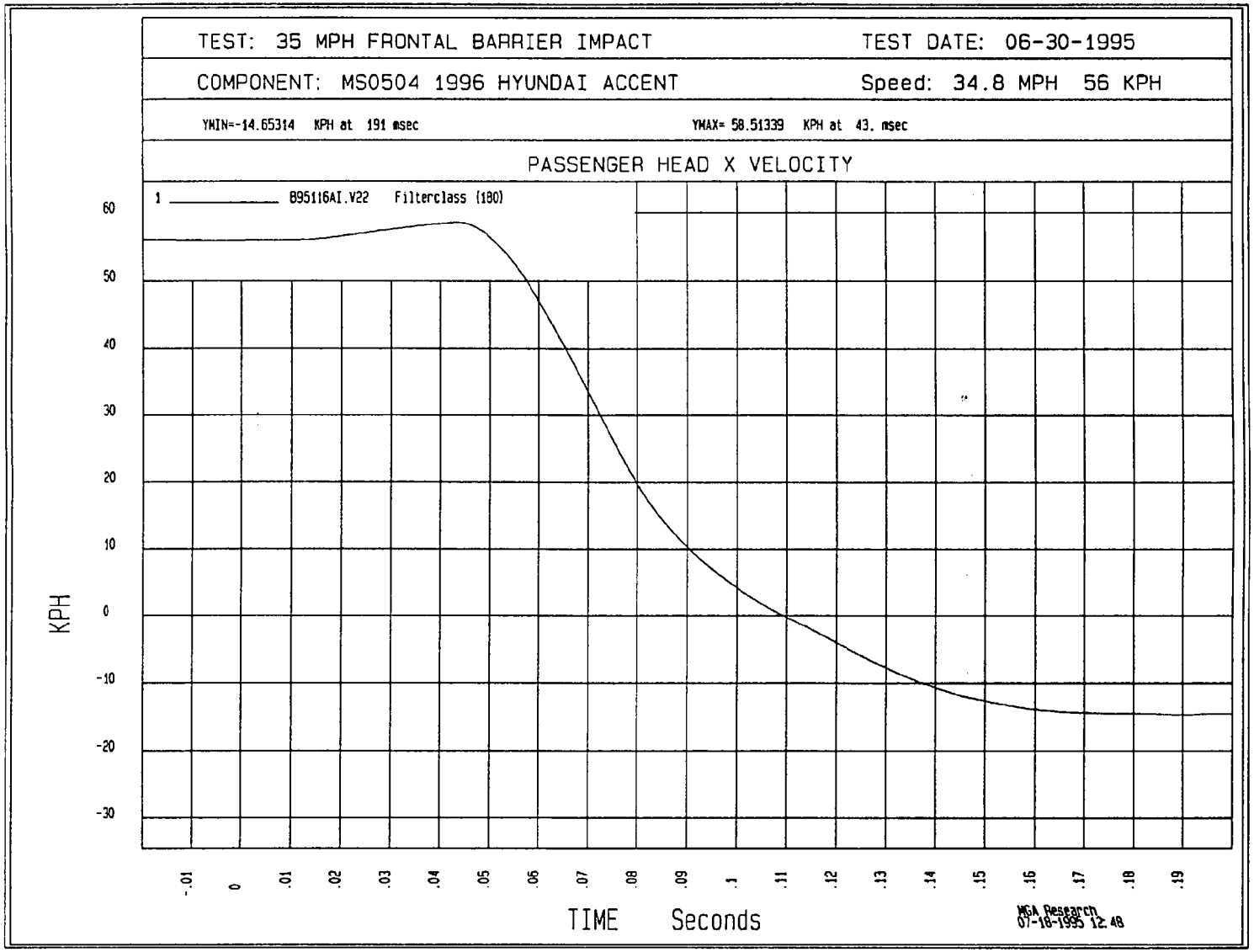


Figure B-9Ø - Passenger Head X Velocity vs. Time

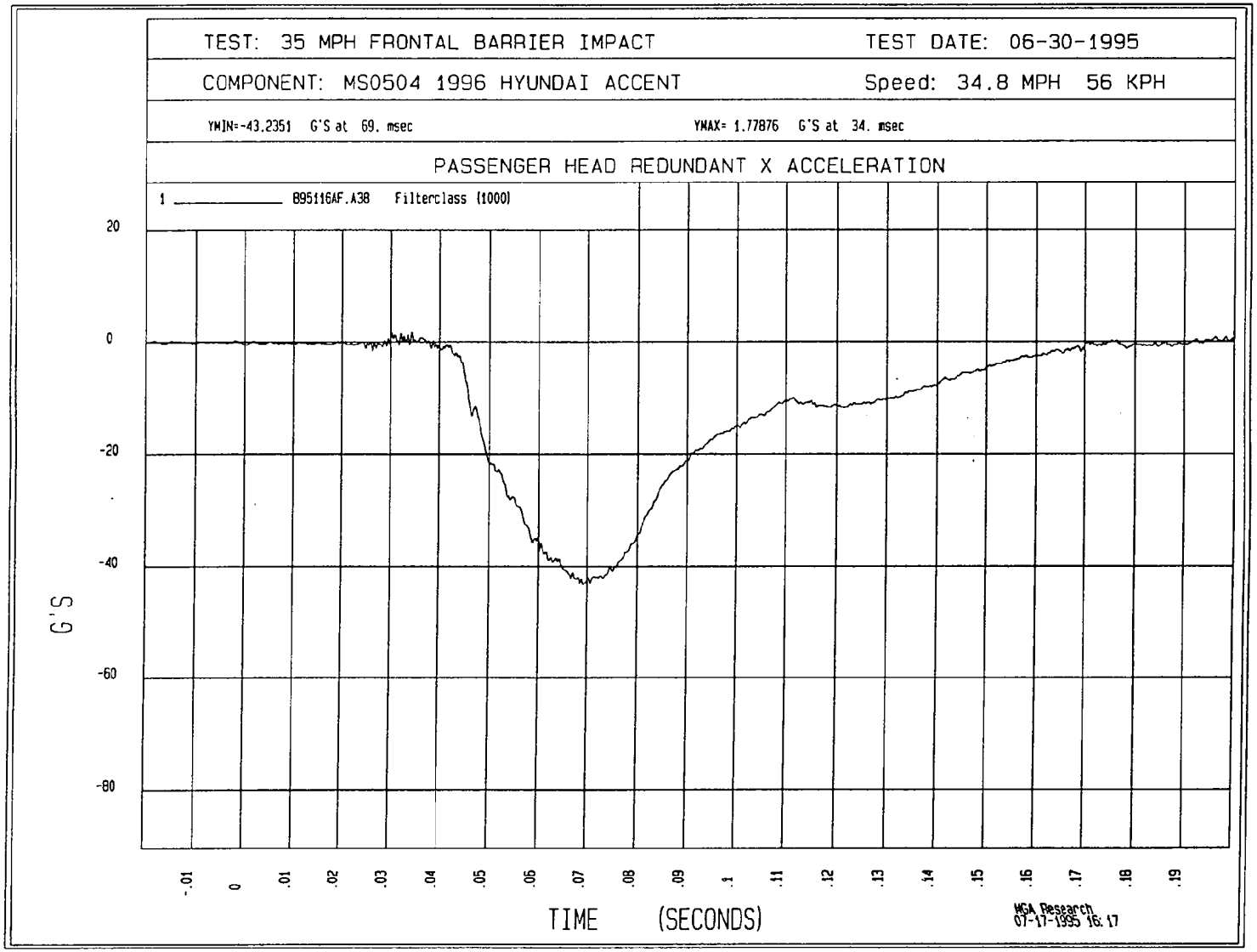


Figure B-91 - Passenger Head Redundant X Acceleration vs. Time

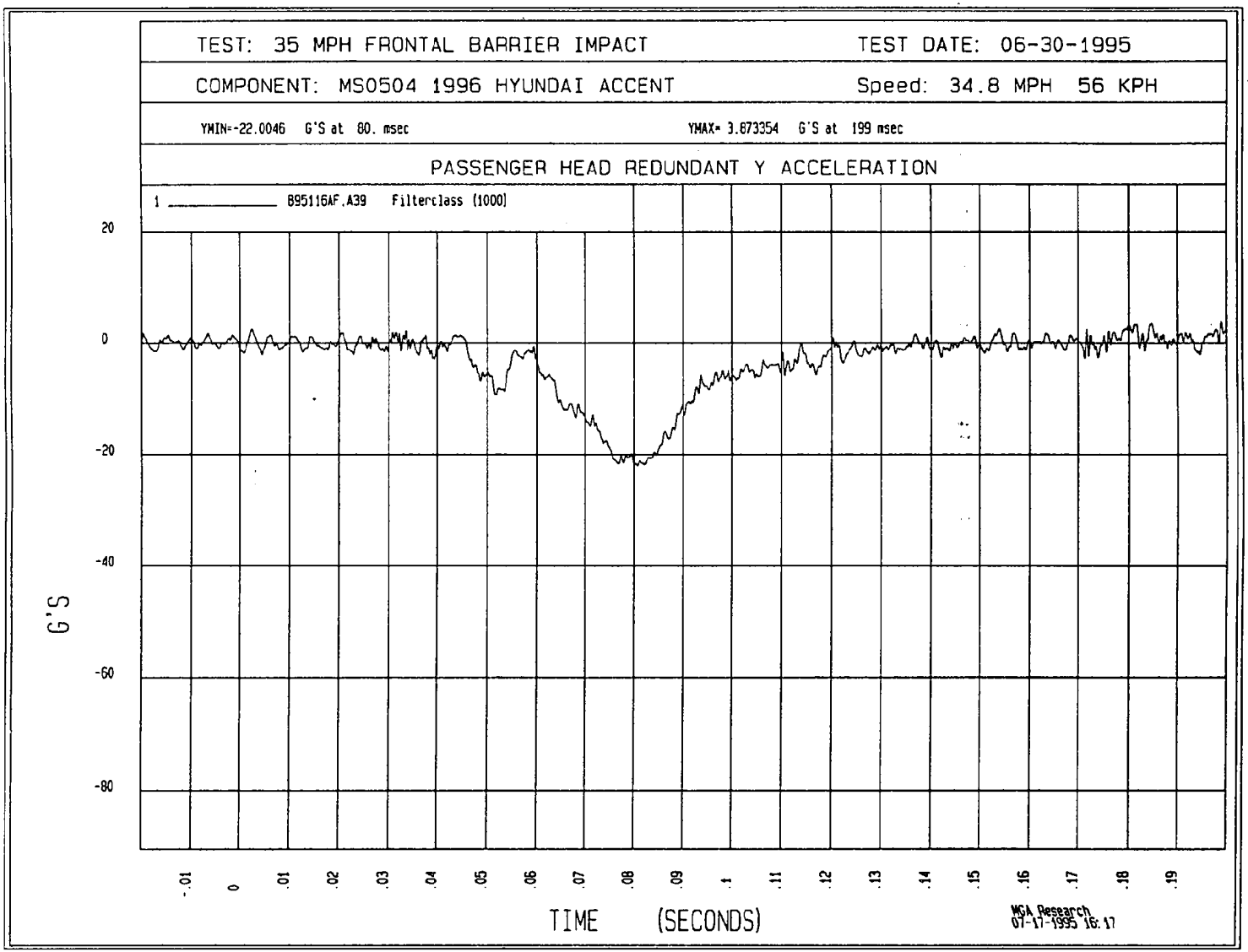


Figure B-92 - Passenger Head Redundant Y Acceleration vs. Time

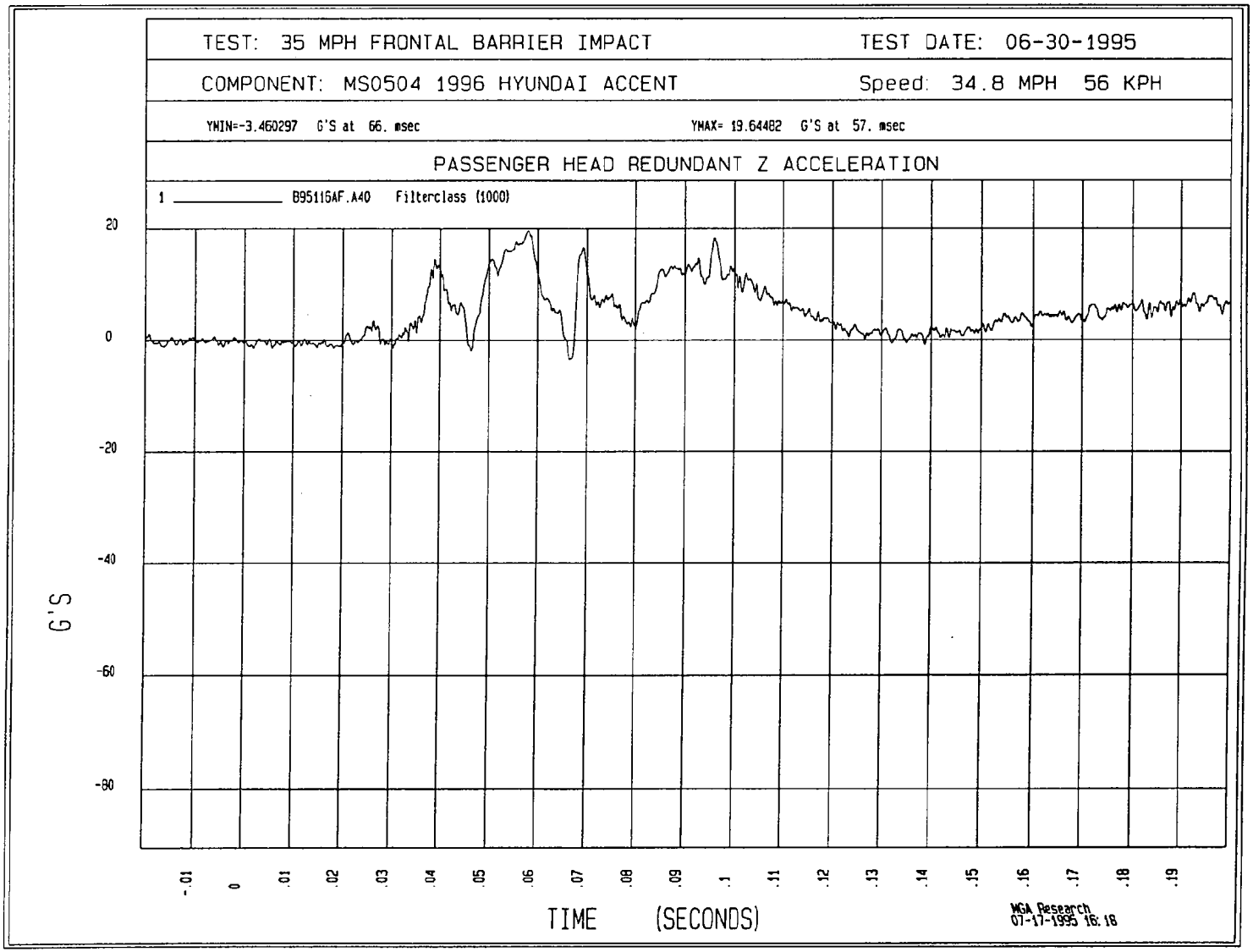


Figure B-93 - Passenger Head Redundant Z Acceleration vs. Time

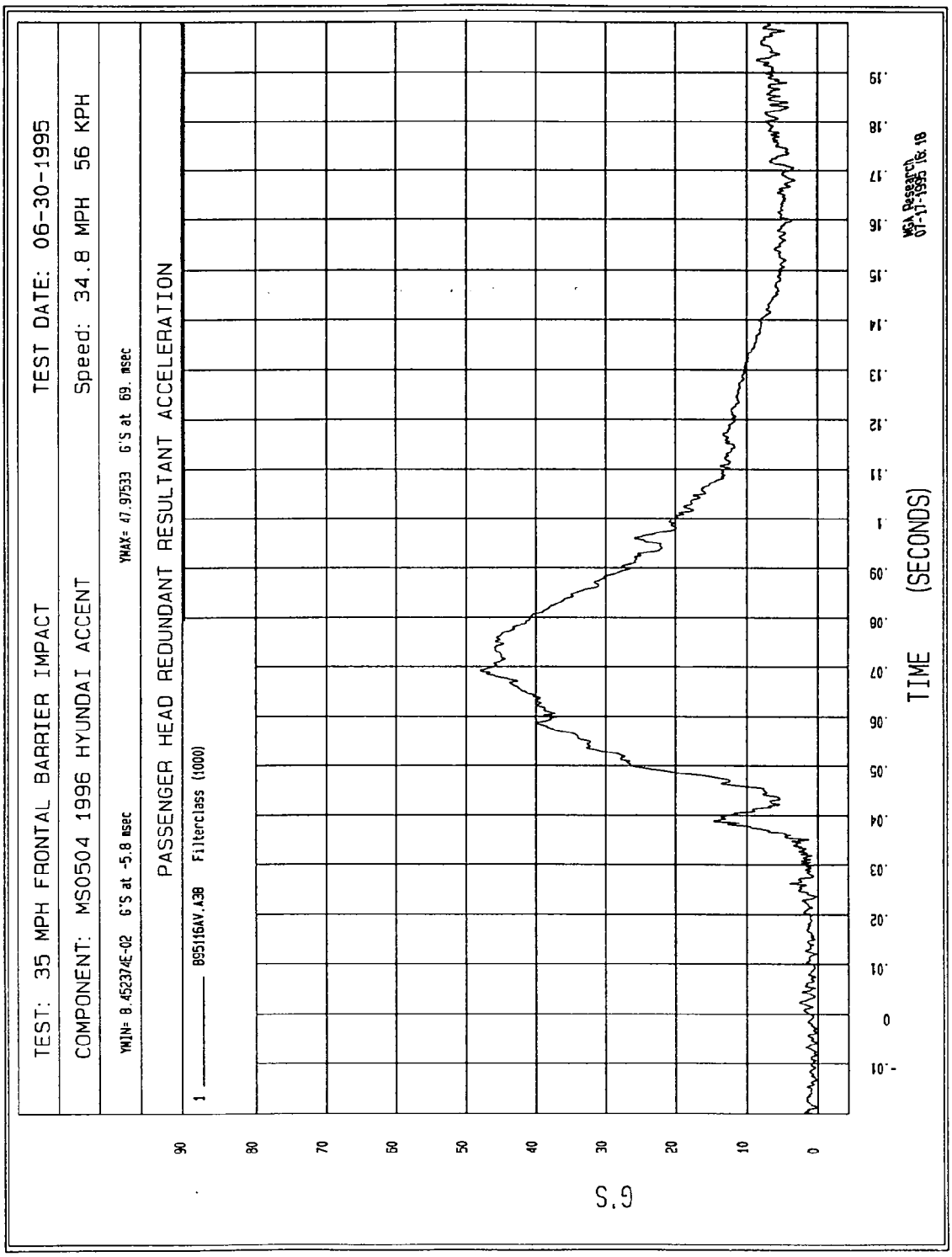


Figure B-94 - Passenger Head Redundant Resultant Accel. vs. Time

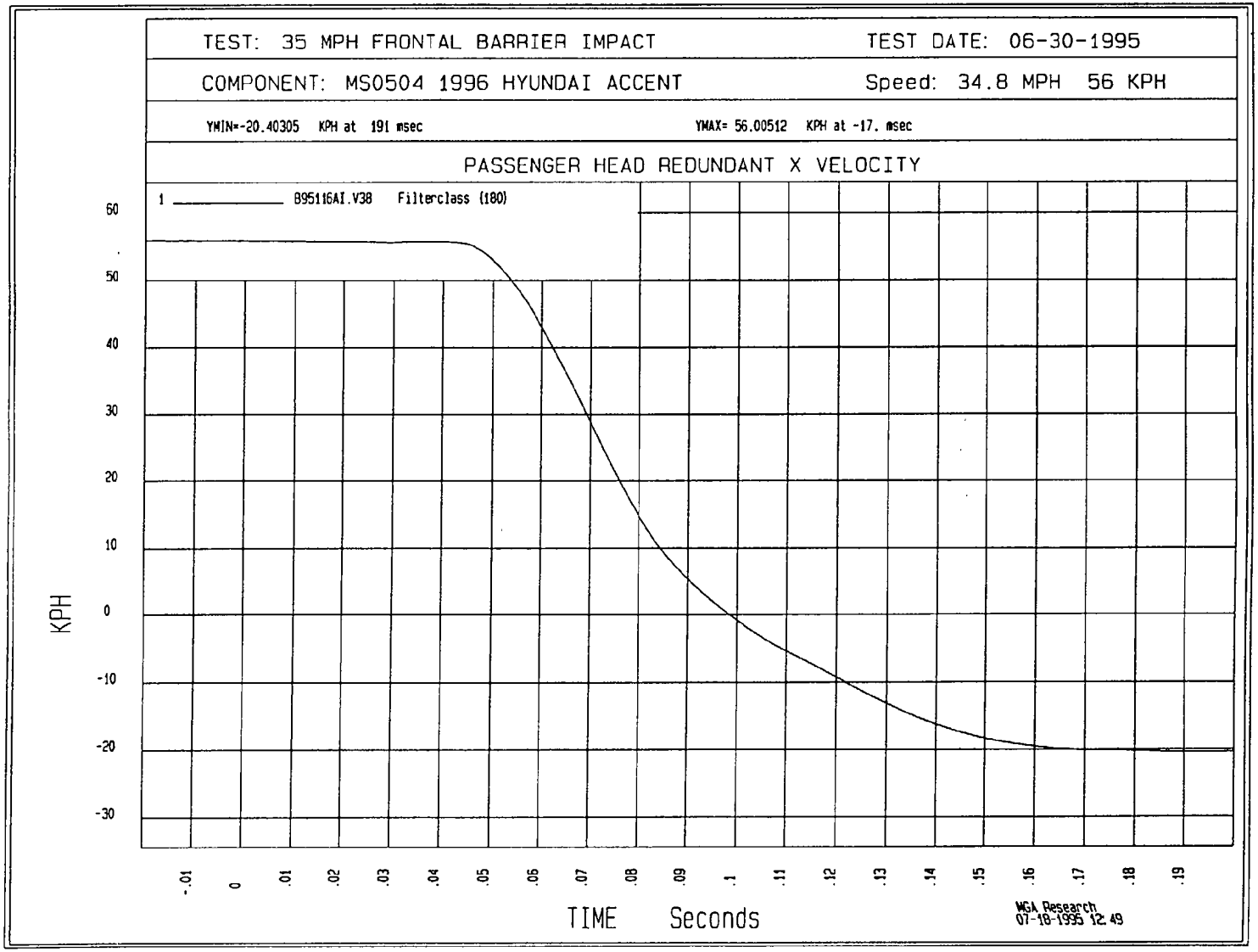


Figure B-95 - Passenger Head Redundant X Velocity vs. Time

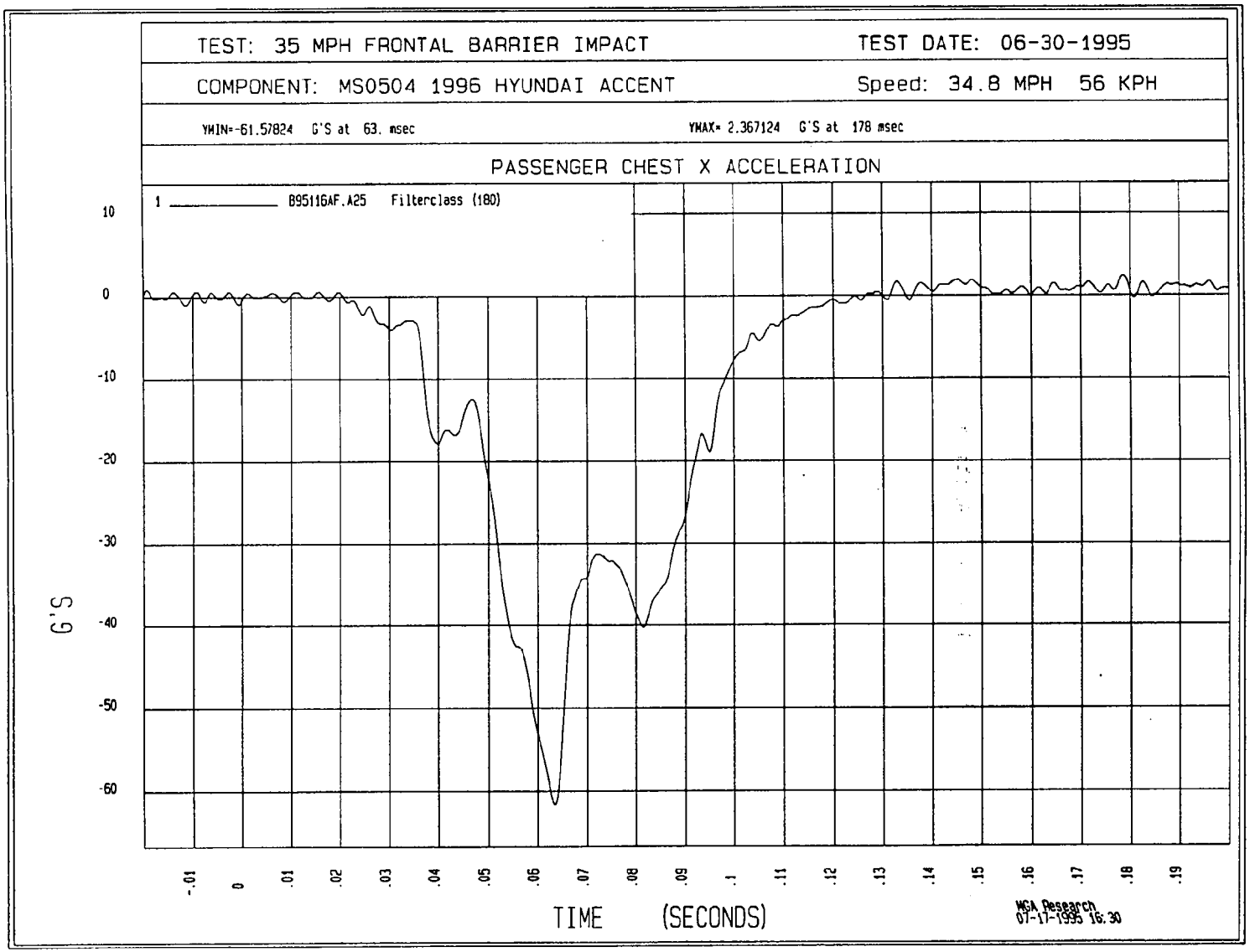


Figure B-96 - Passenger Chest X Acceleration vs. Time

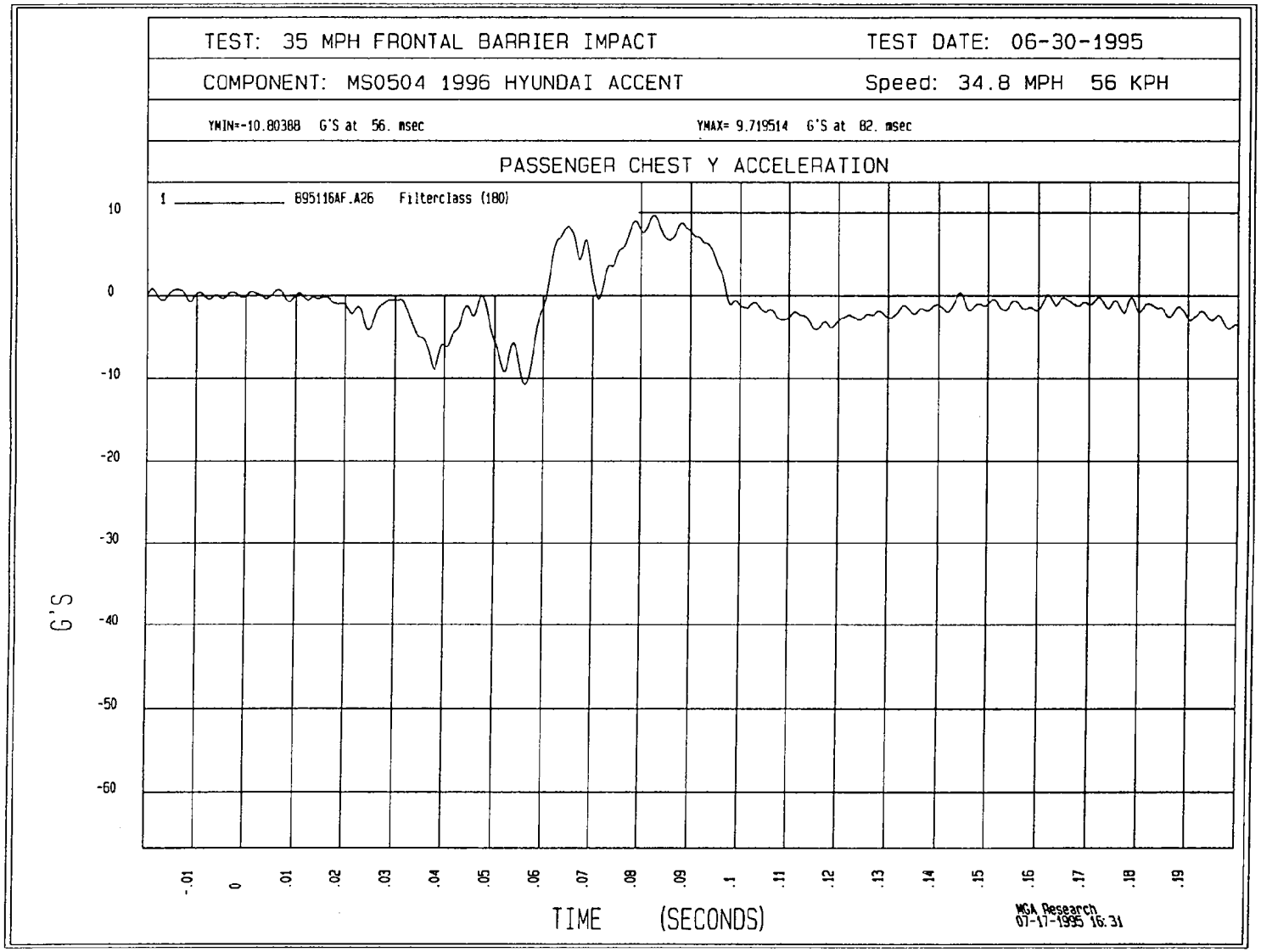


Figure B-97 - Passenger Chest Y Acceleration vs. Time

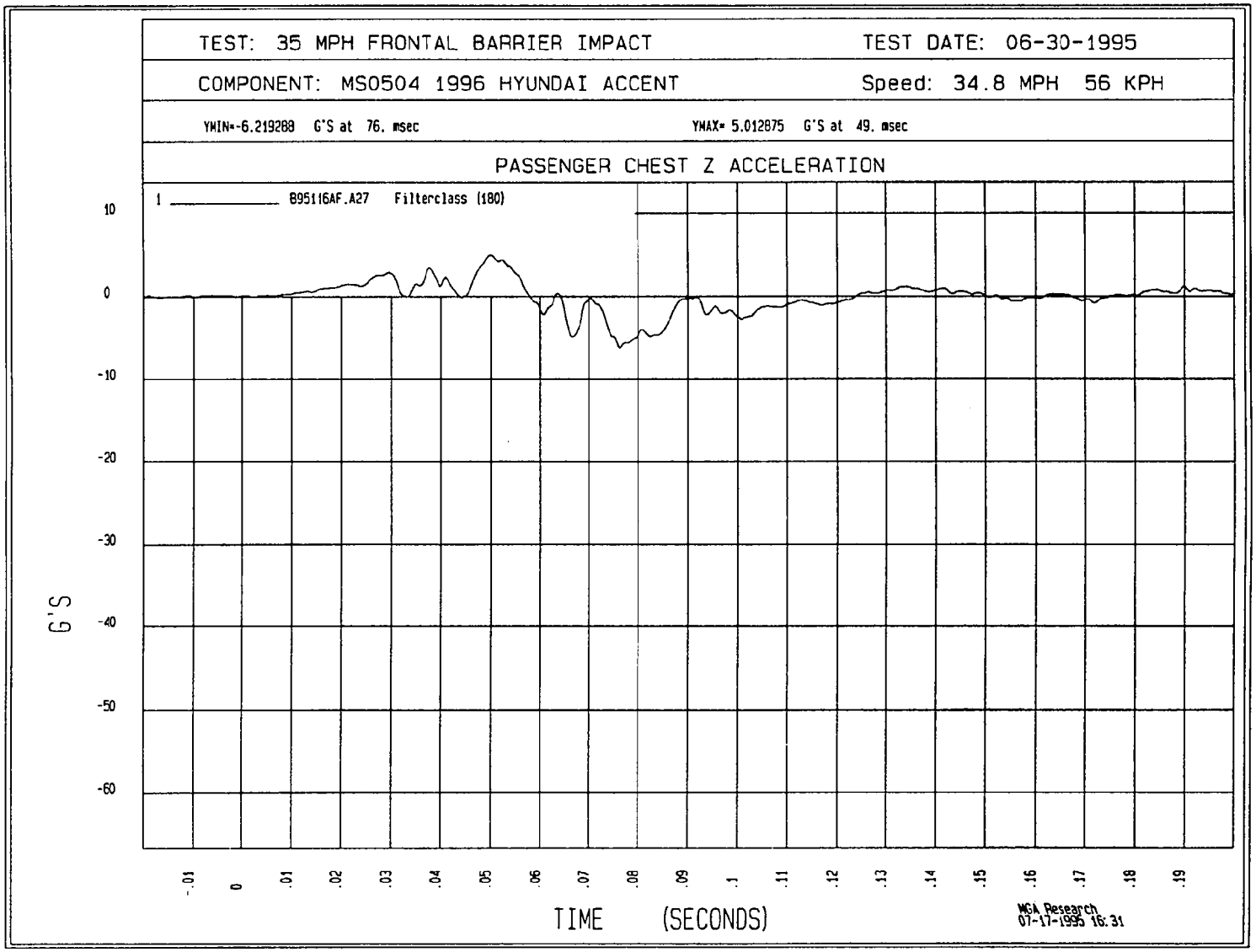


Figure B-98 - Passenger Chest Z Acceleration vs. Time

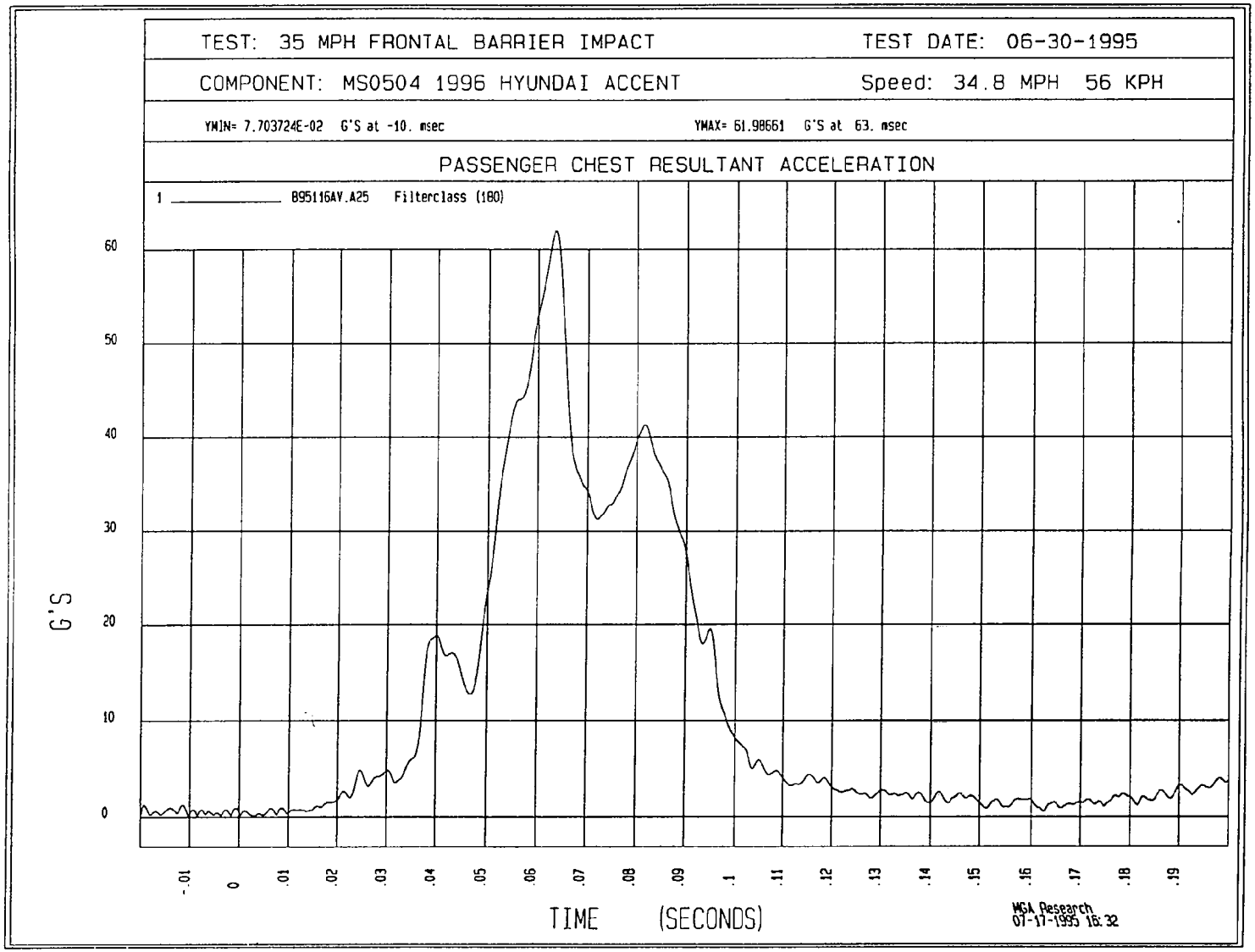


Figure B-99 - Passenger Chest Resultant Accel. vs. Time

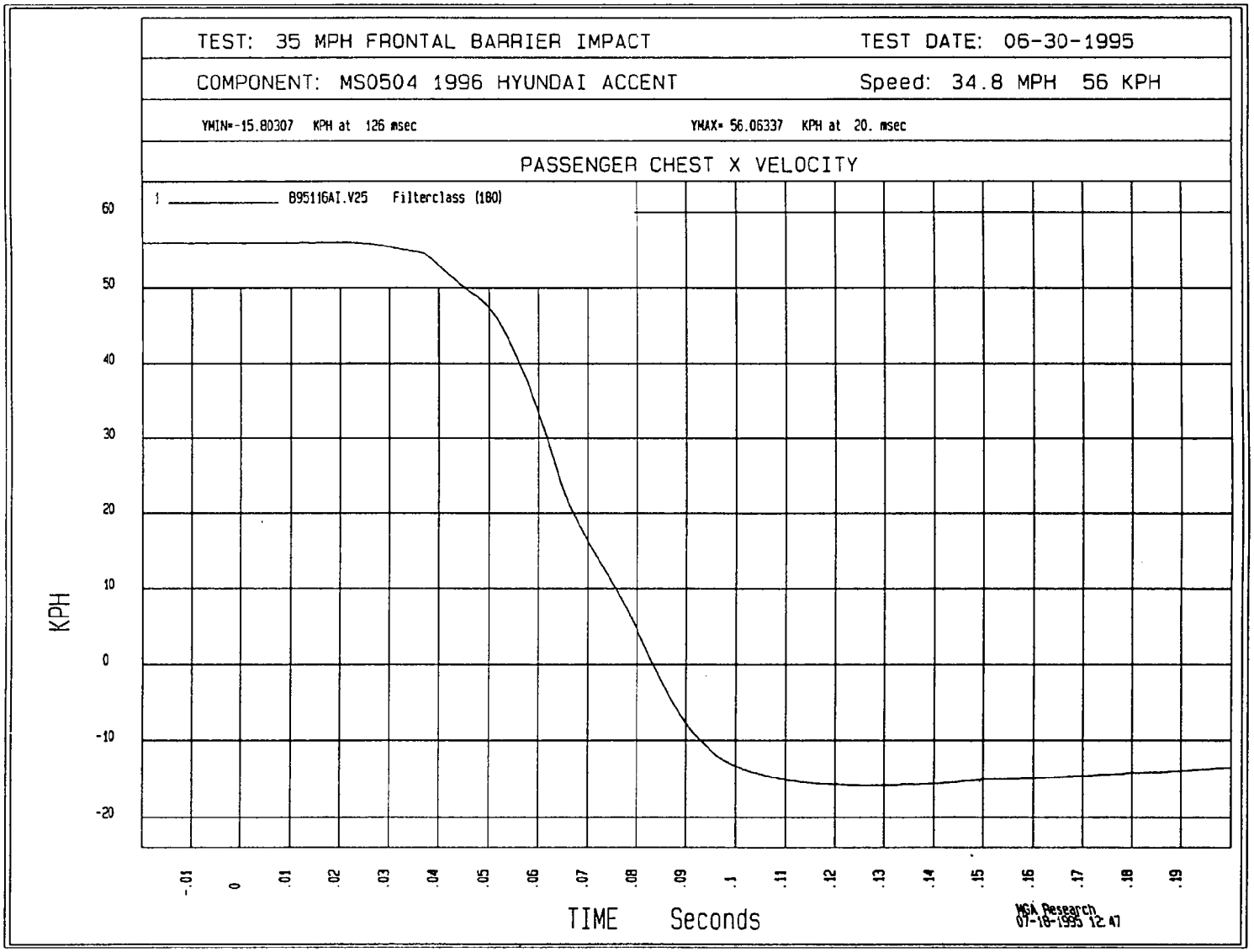


Figure B-100 - Passenger Chest X Velocity vs. Time

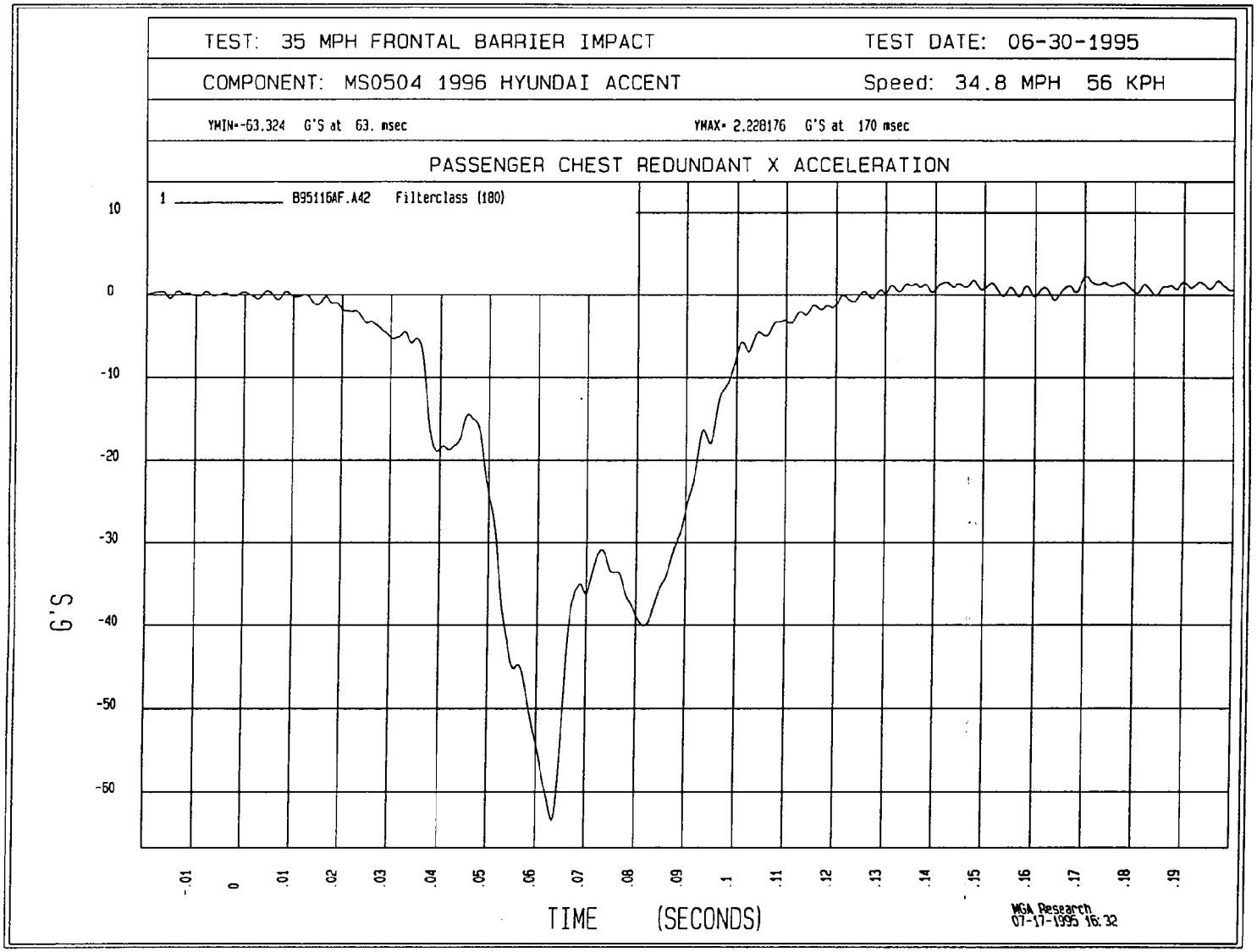


Figure B-101 - Passenger Chest Redundant X Acceleration vs. Time

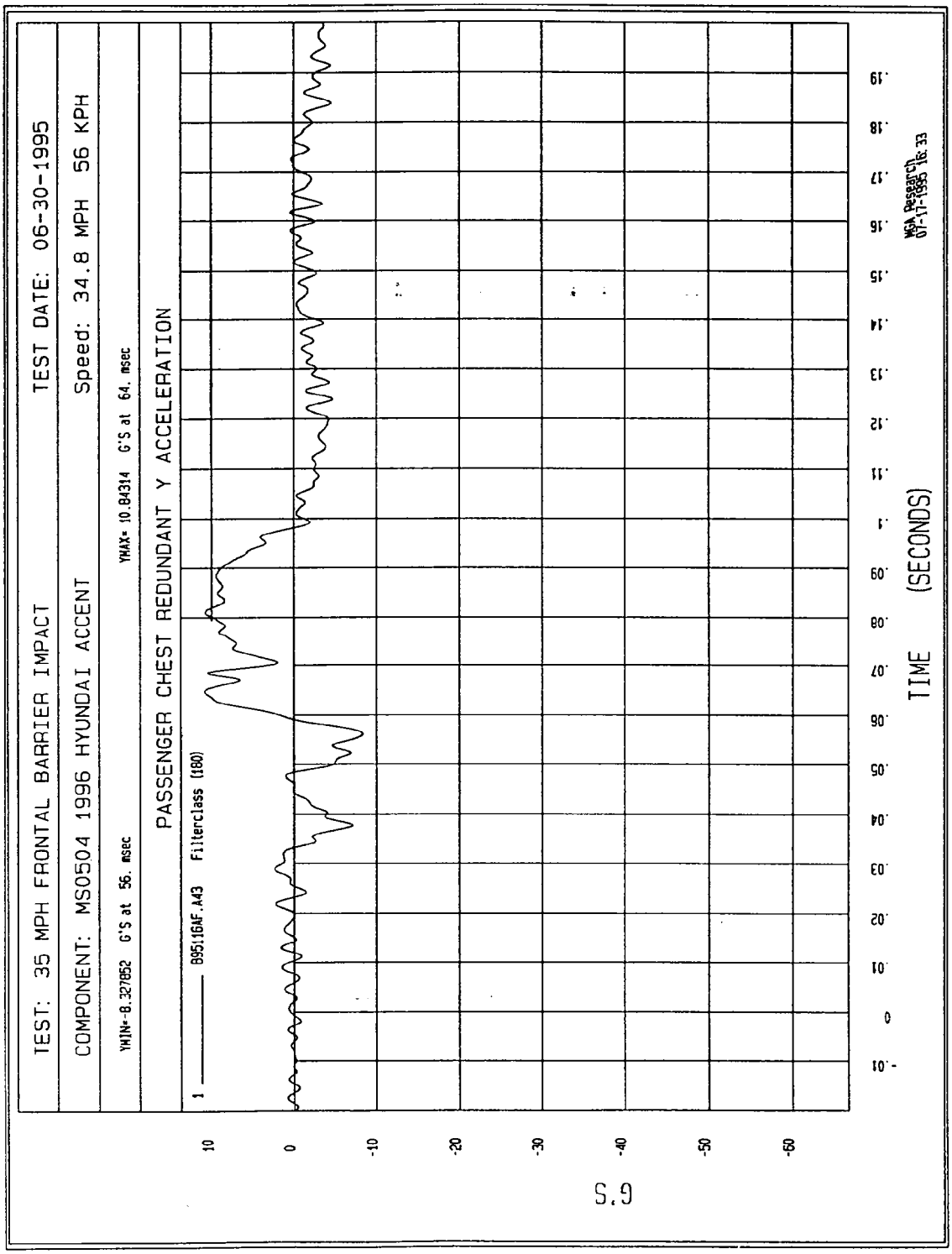


Figure B-102 - Passenger Chest Redundant Y Acceleration vs. Time

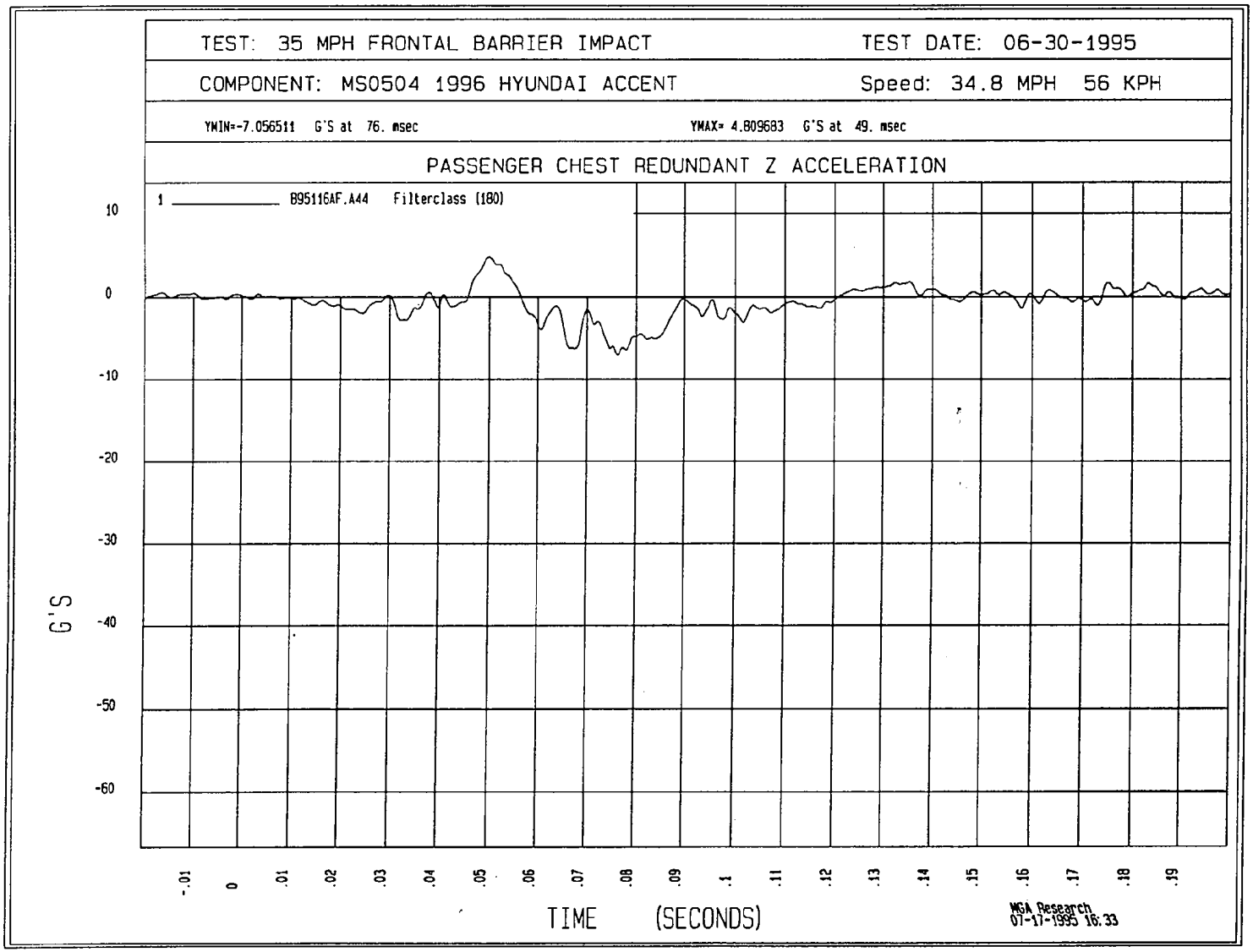


Figure B-1Ø3 - Passenger Chest Redundant Z Acceleration vs. Time

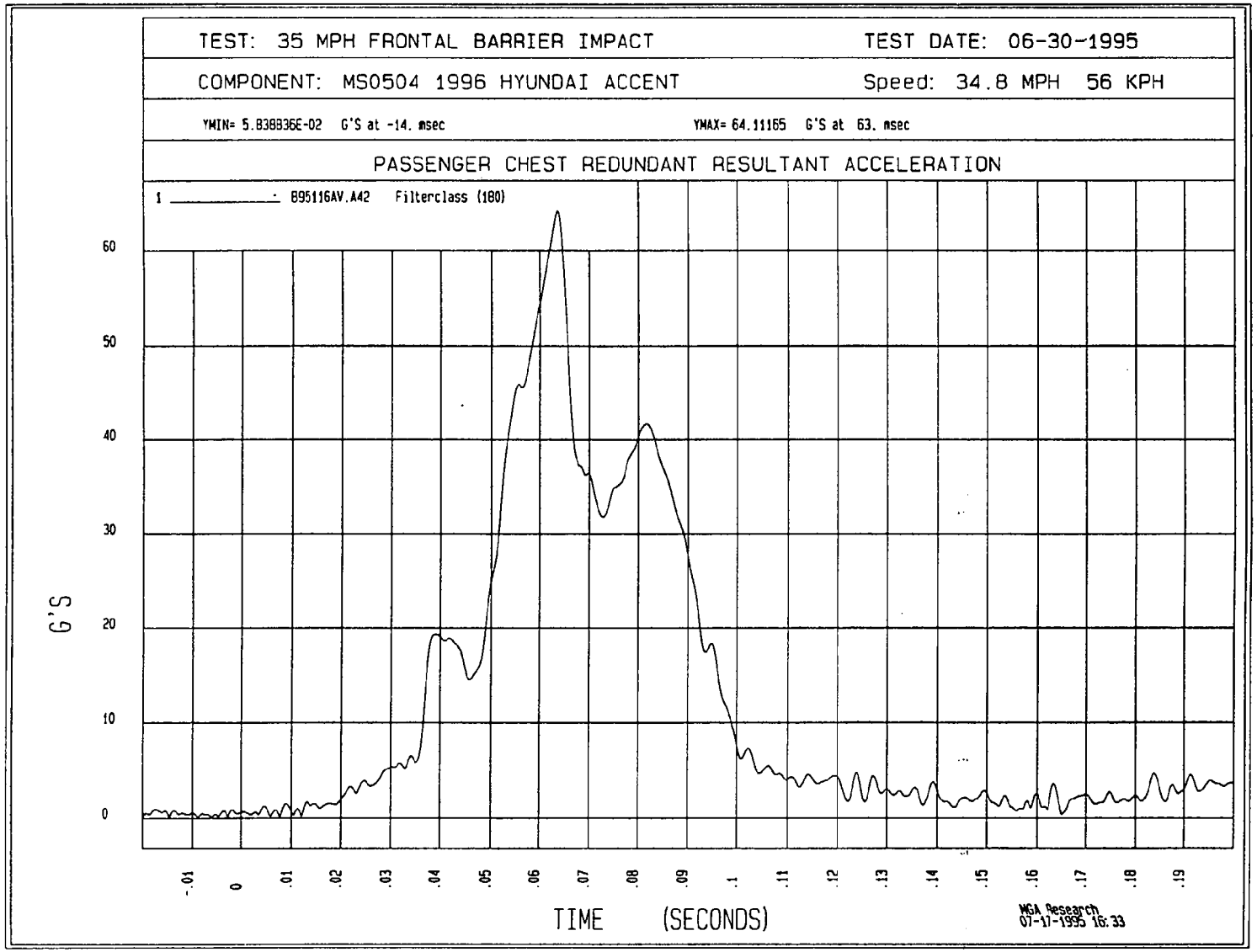


Figure B-104 - Passenger Chest Redundant Resultant Accel. vs. Time

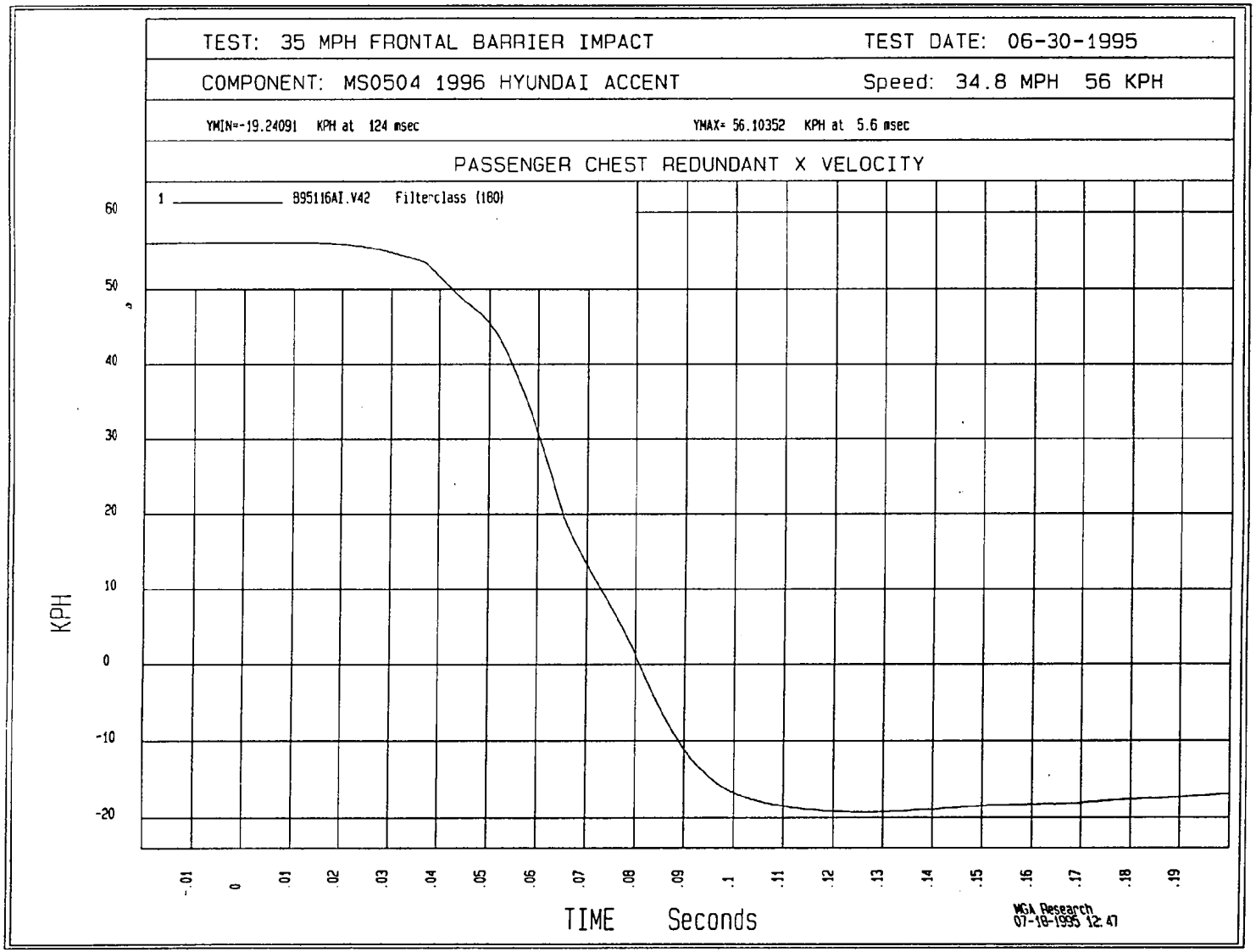


Figure B-1Ø5 - Passenger Chest Redundant X Velocity vs. Time

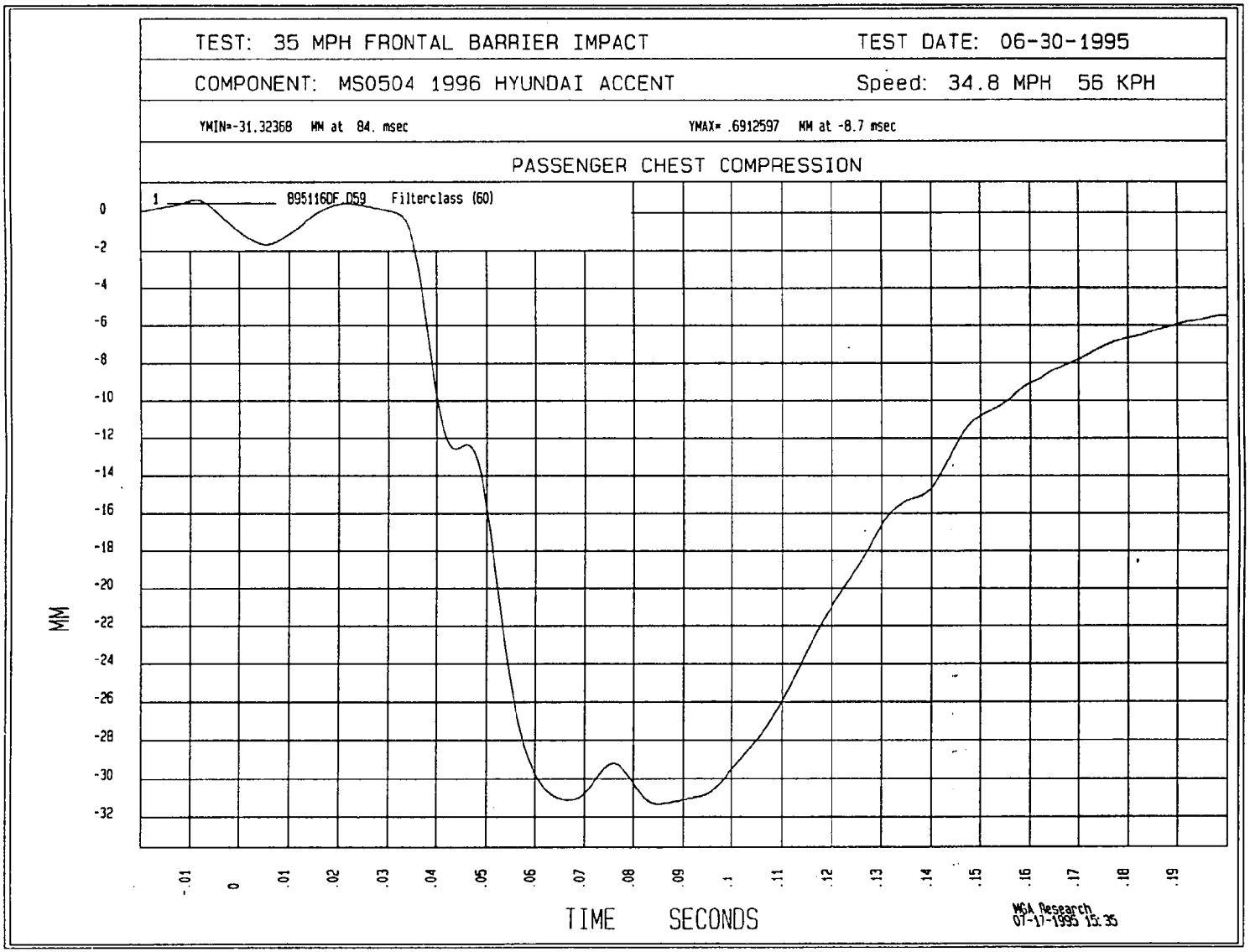


Figure B-106 - Passenger Chest Compression vs. Time

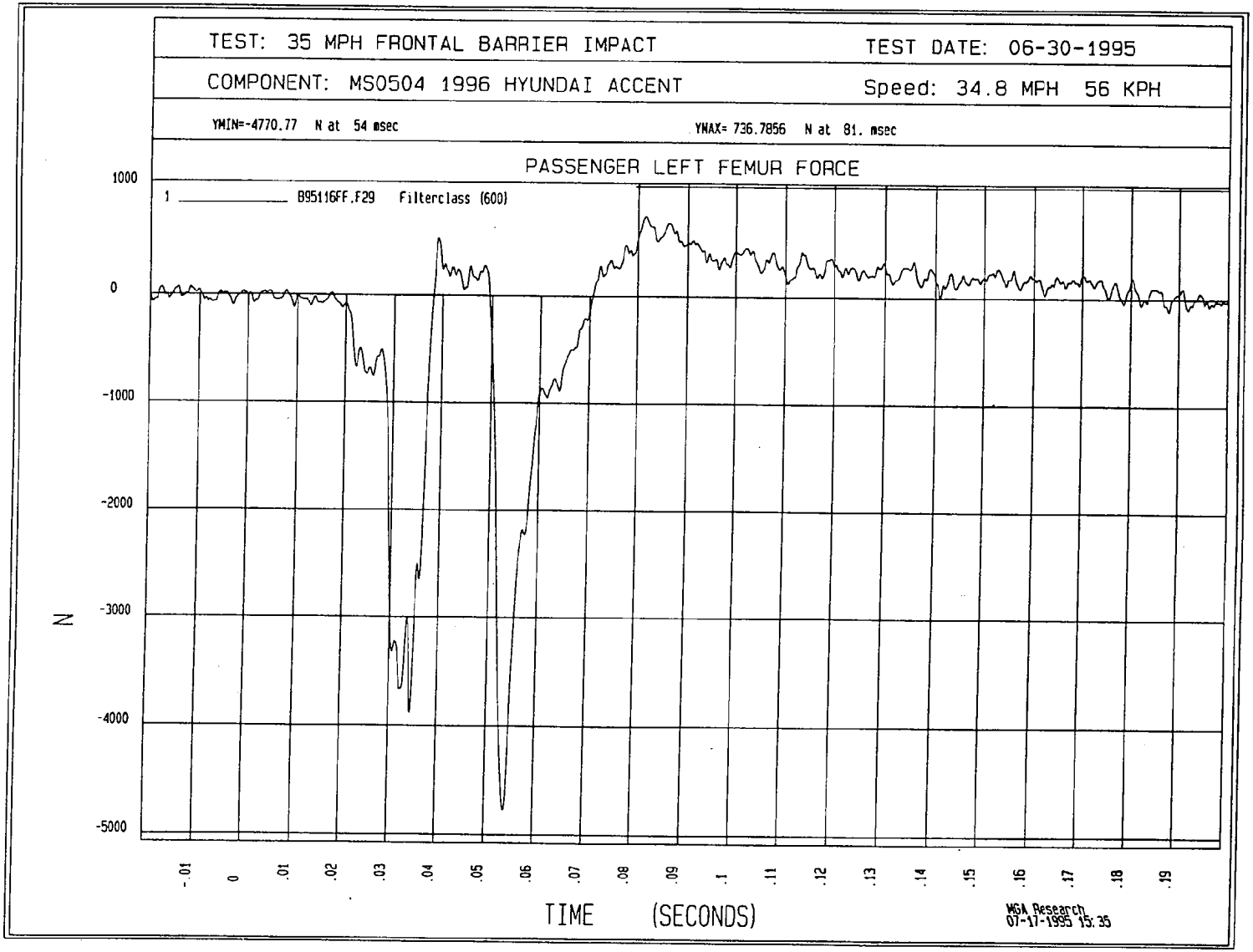


Figure B-107 - Passenger Left Femur Force vs. Time

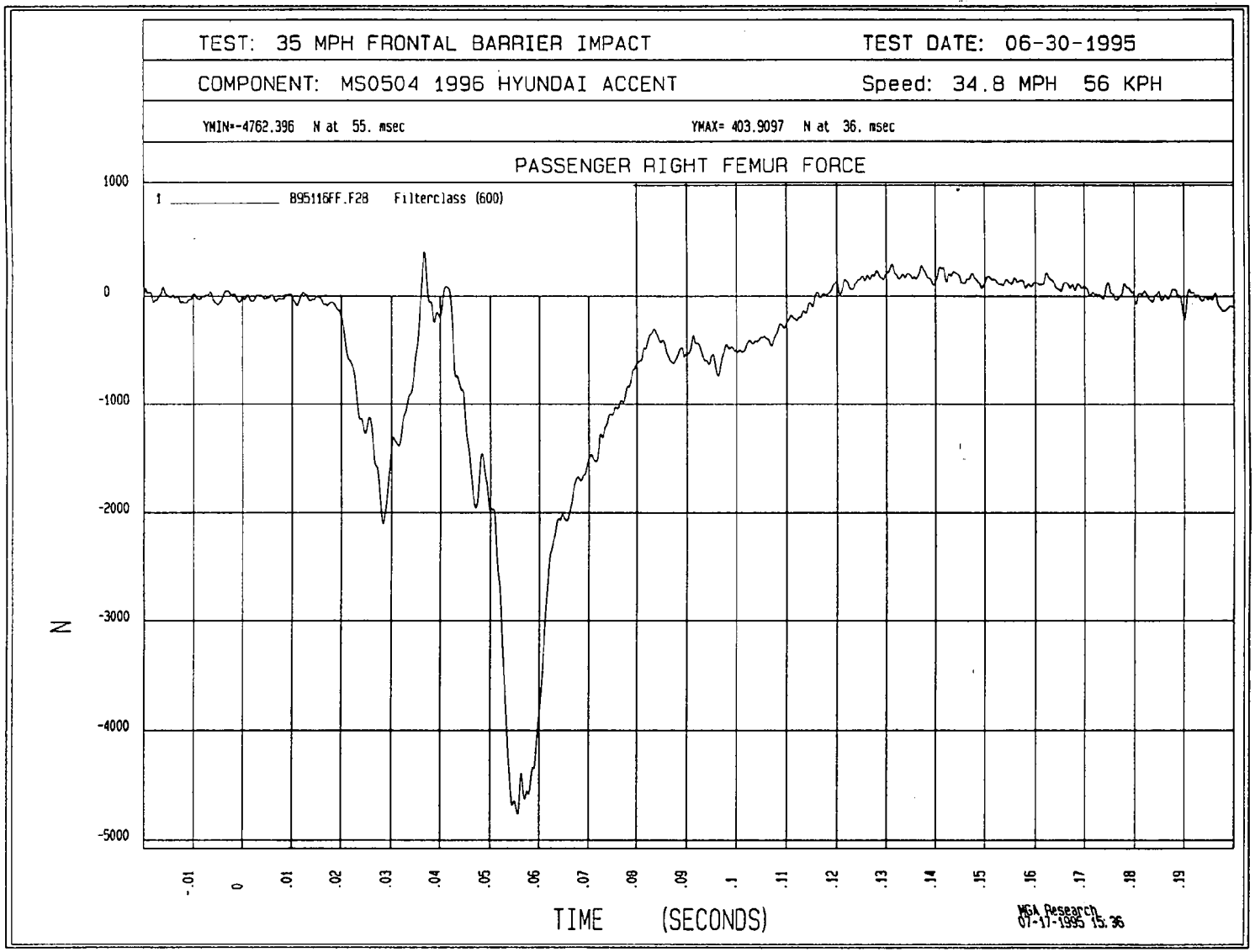


Figure B-108 - Passenger Right Femur Force vs. Time

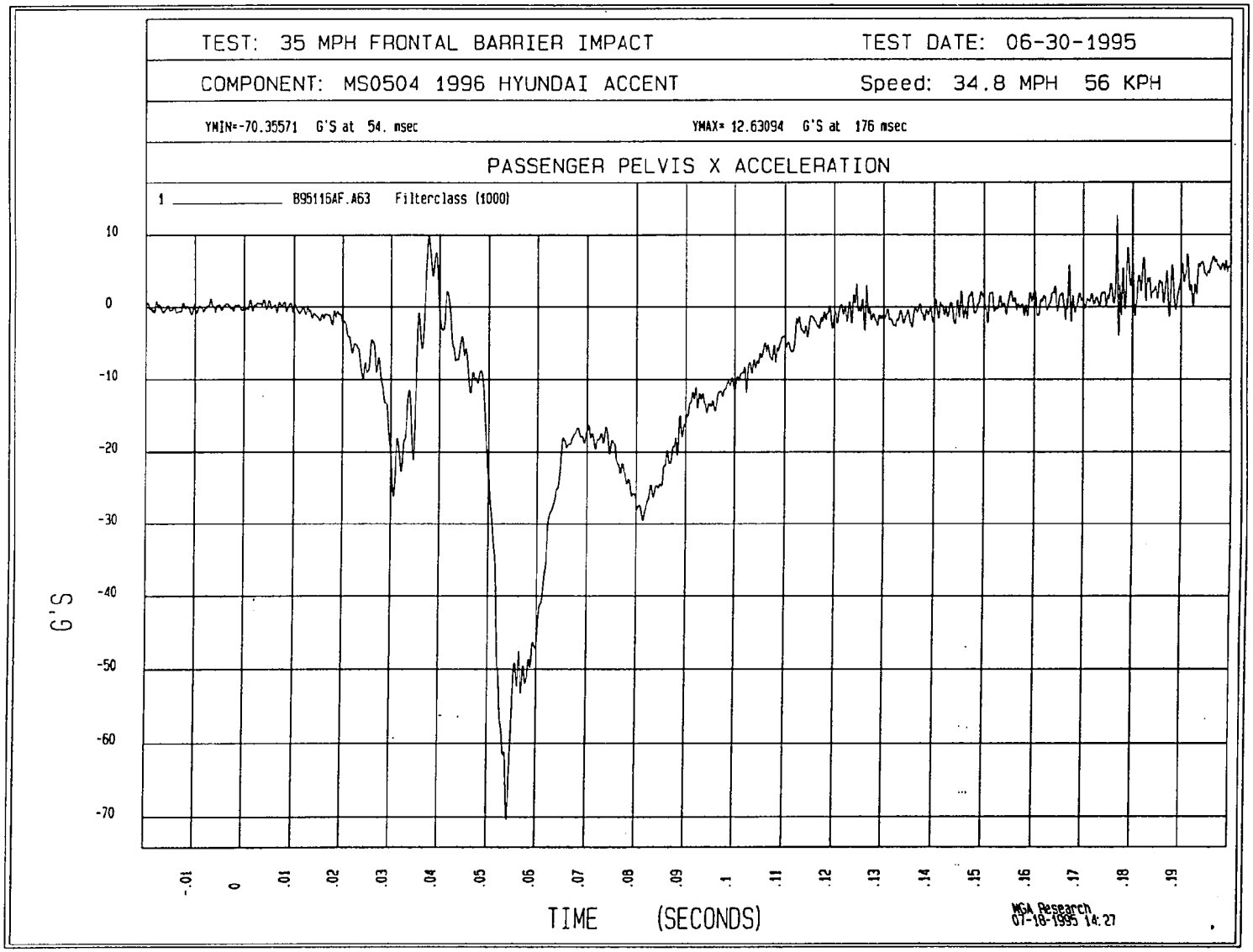


Figure B-109 - Passenger Pelvis X Acceleration vs. Time

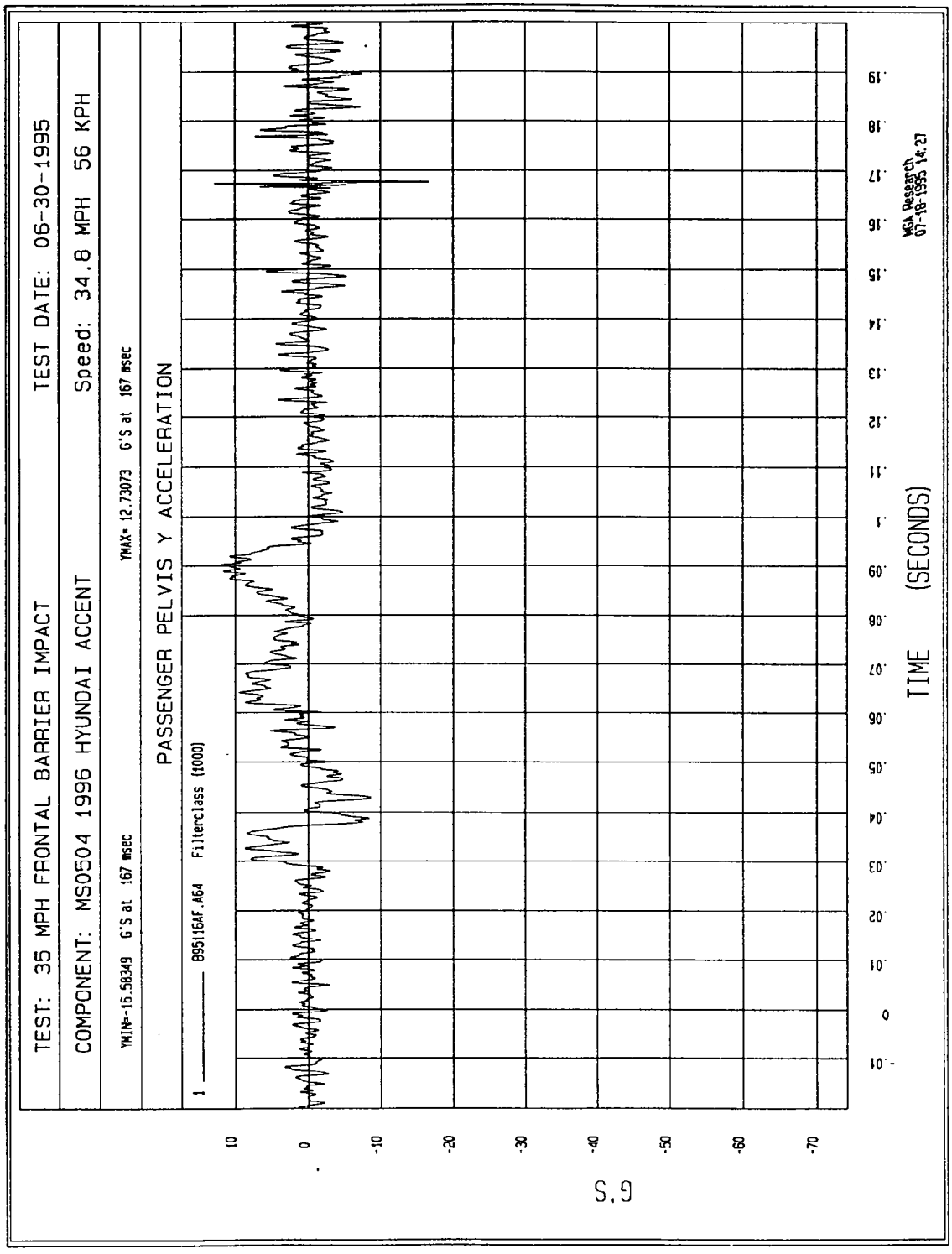


Figure B-110 - Passenger Pelvis Y Acceleration vs. Time

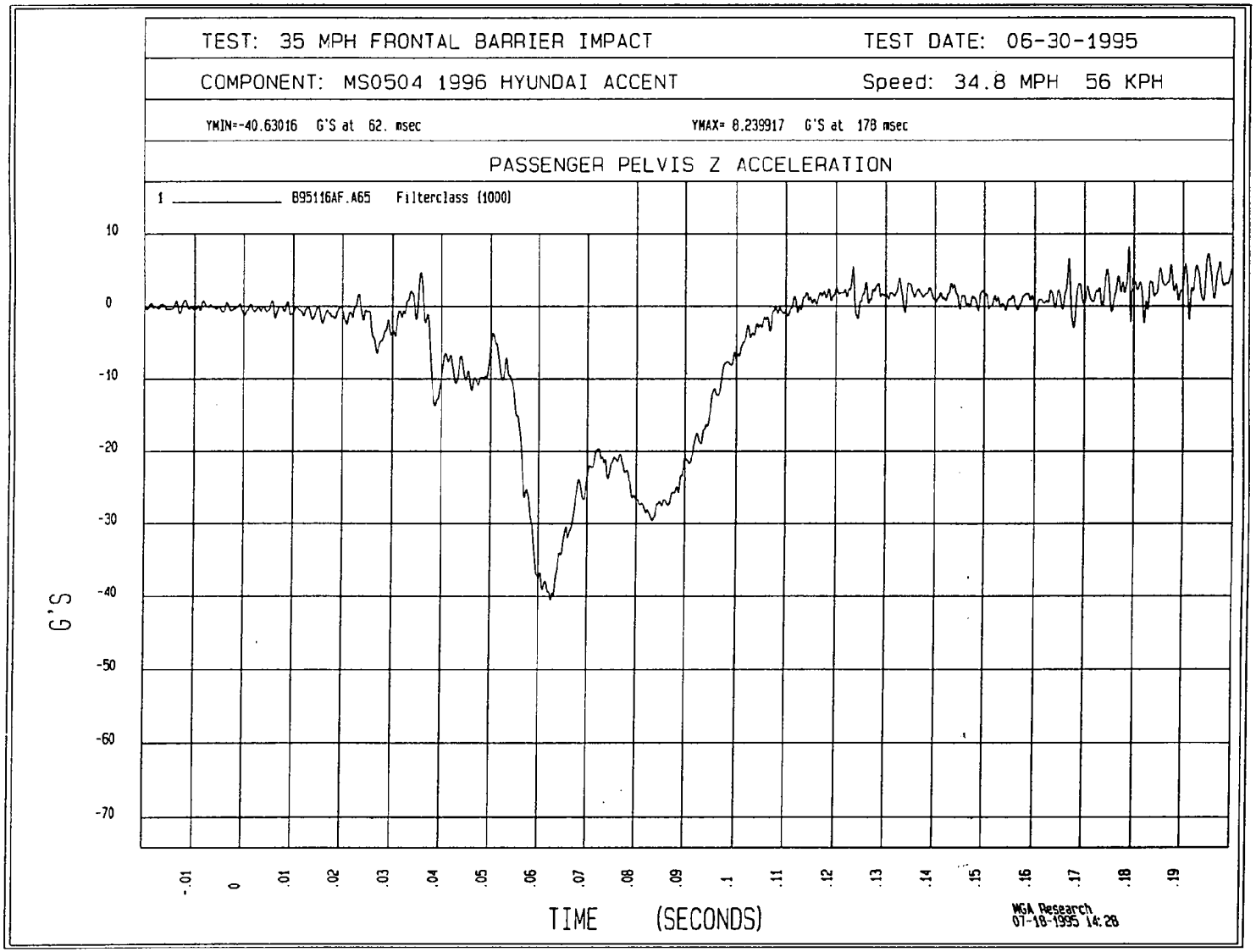


Figure B-111 - Passenger Pelvis Z Acceleration vs. Time

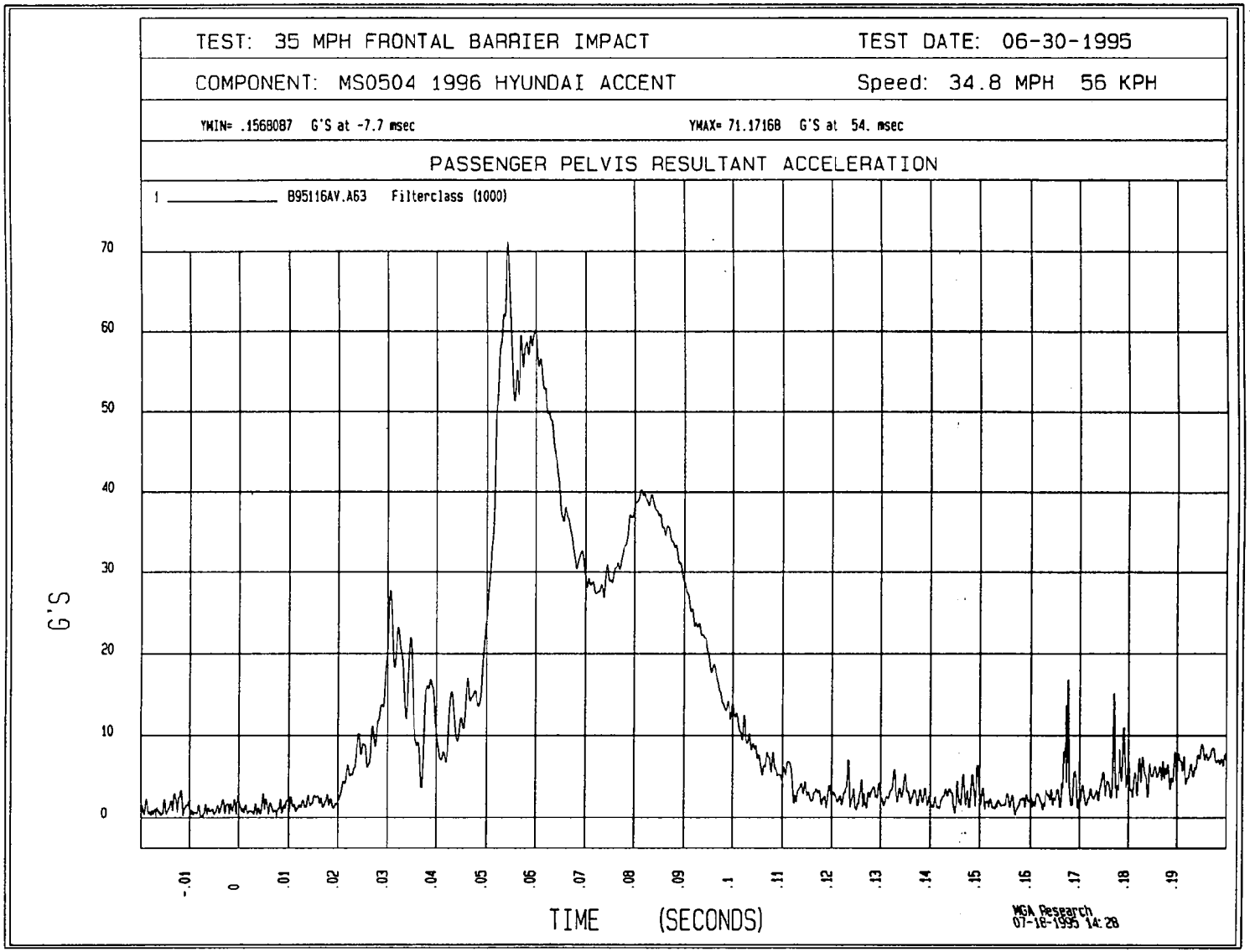


Figure B-112 - Passenger Pelvis Resultant Acceleration vs. Time

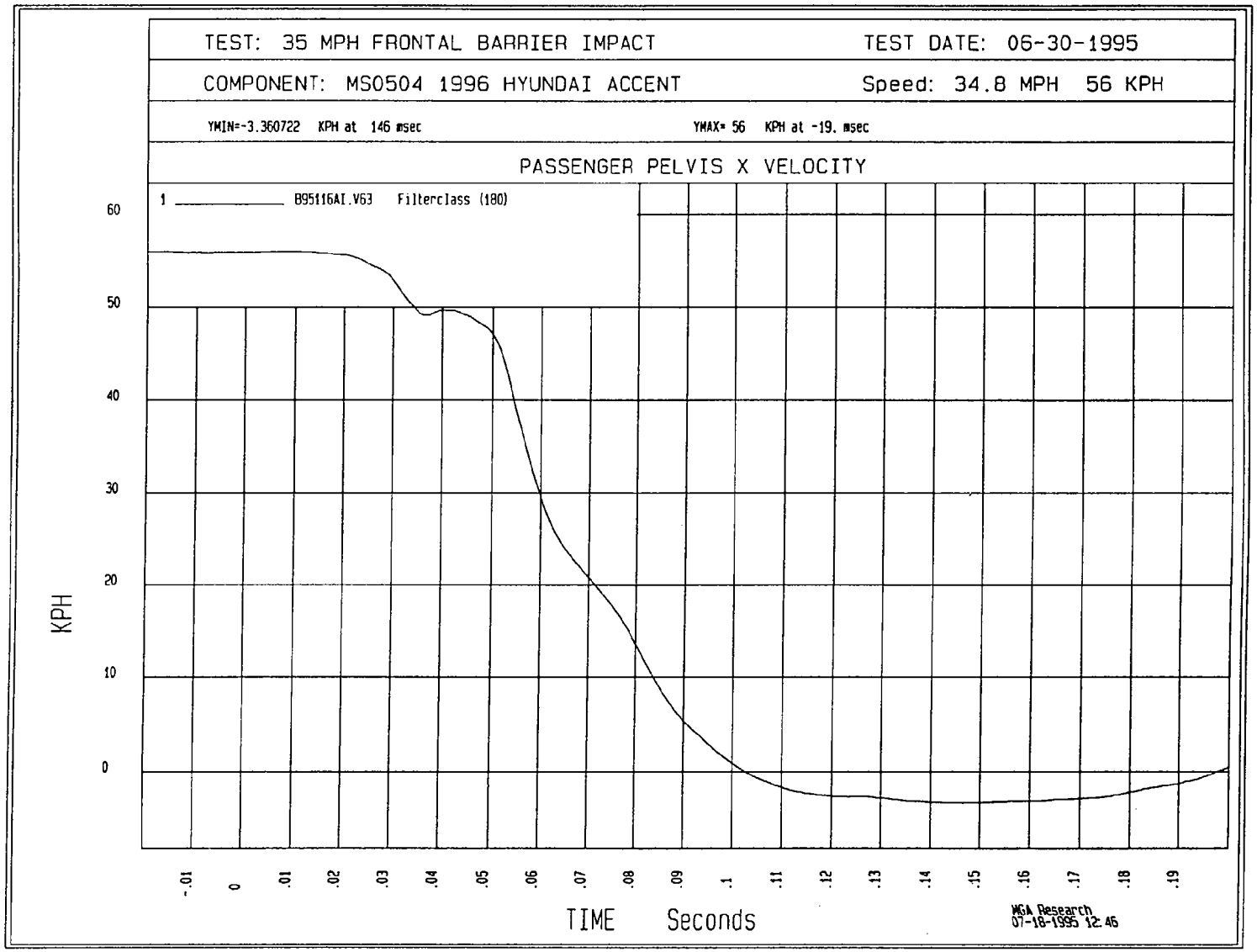


Figure B-113 - Passenger Pelvis X Velocity vs. Time

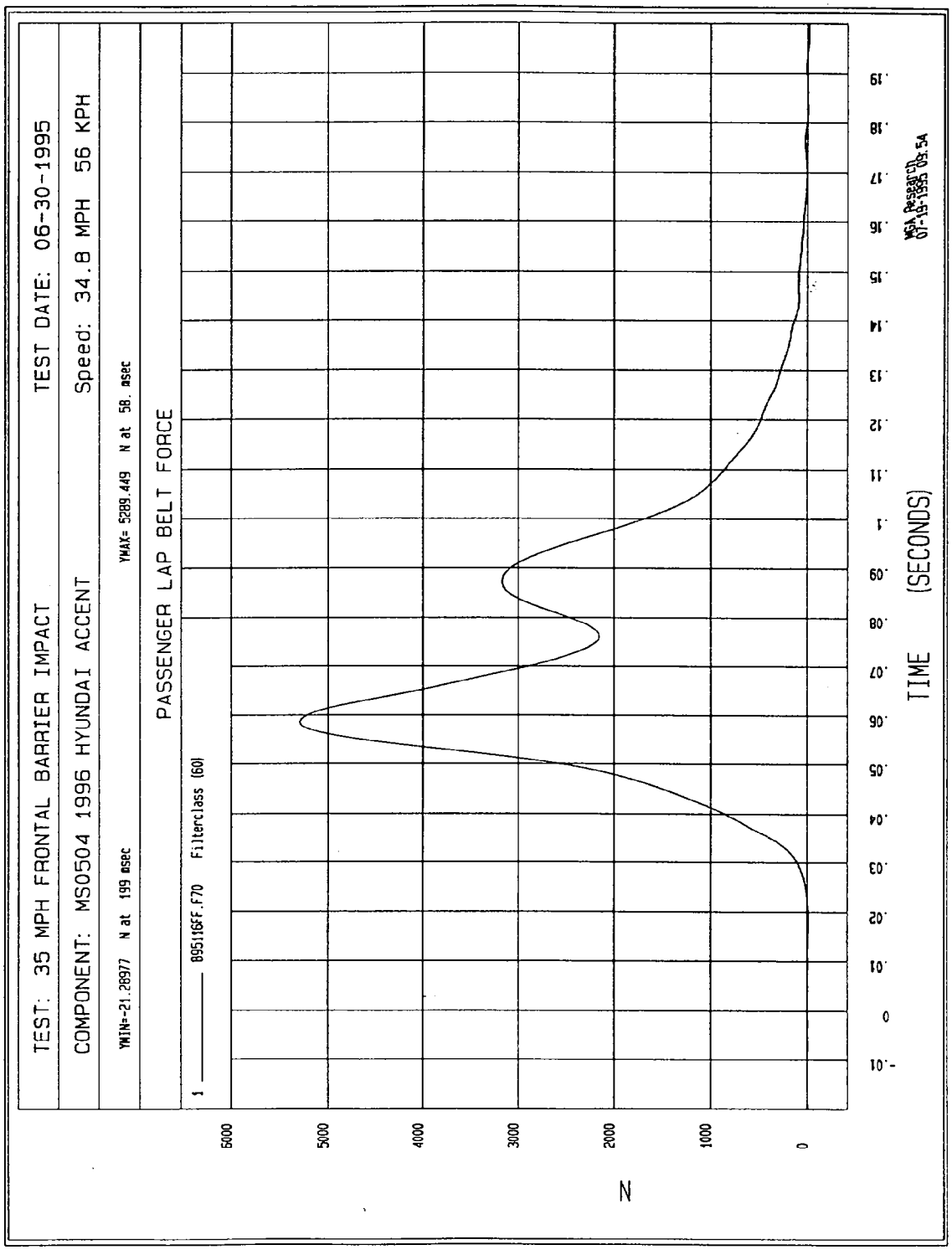


Figure B-114 - Passenger Lap Belt Force vs. Time

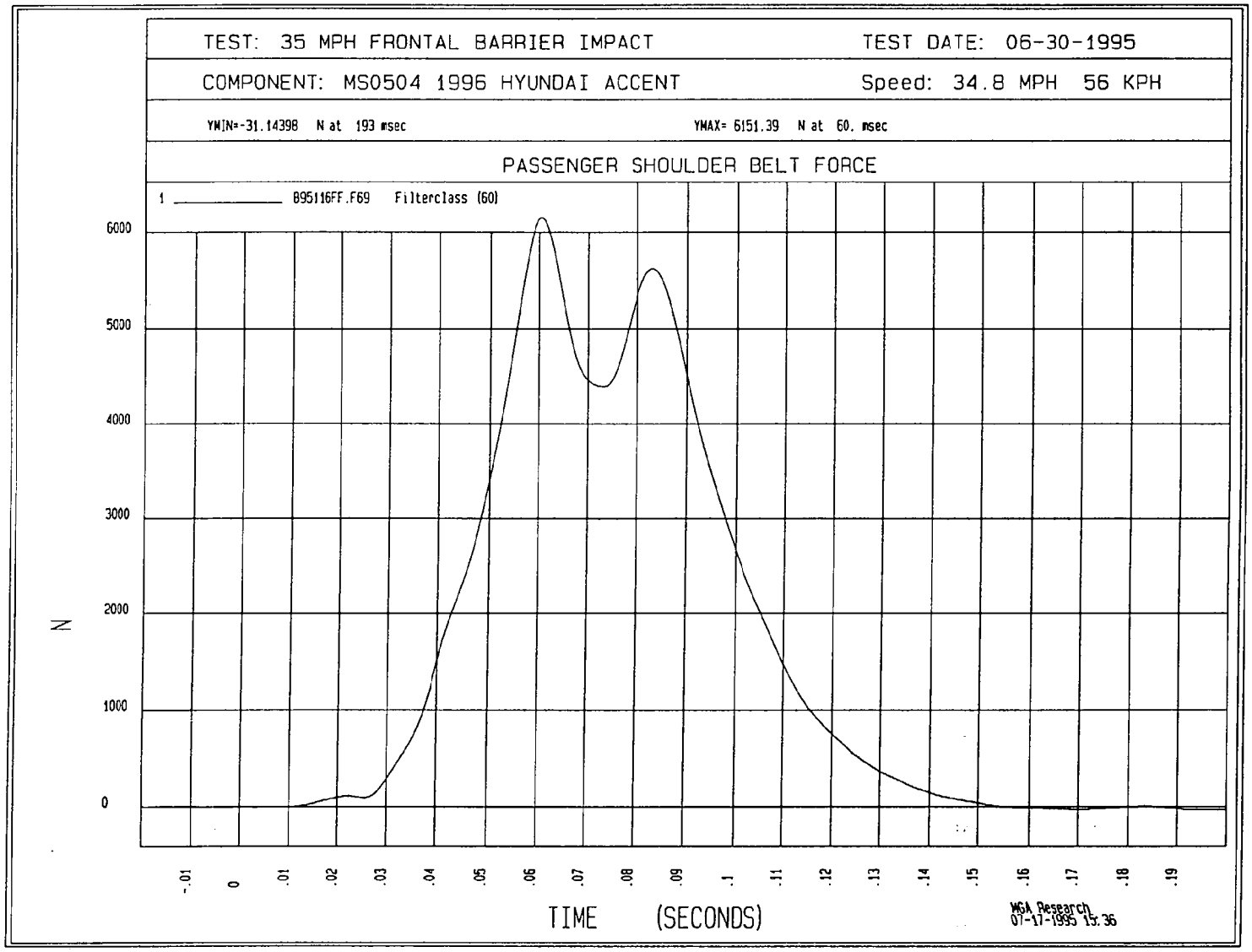


Figure B-115 - Passenger Shoulder Belt Force vs. Time

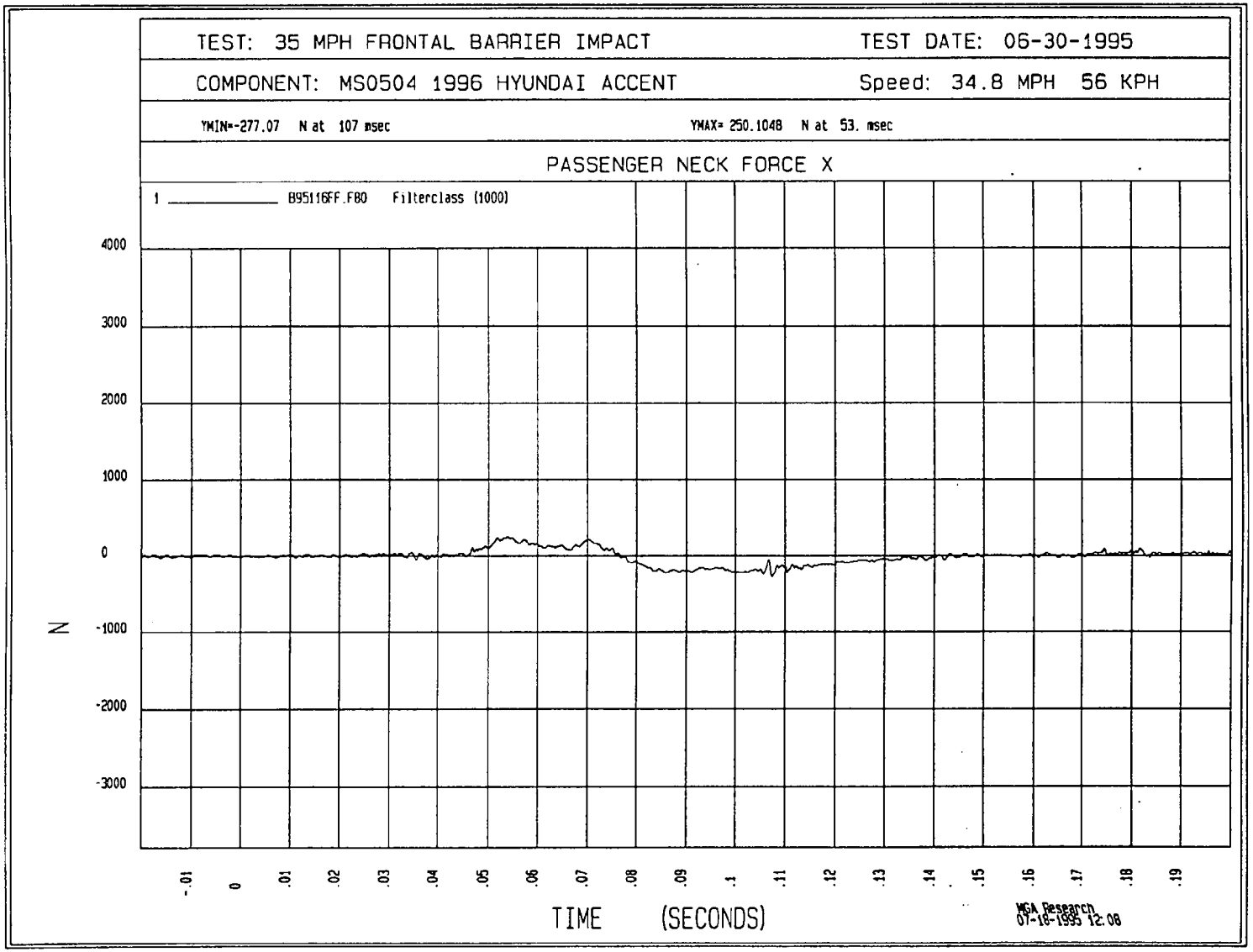


Figure B-116 - Passenger Neck Force X vs. Time

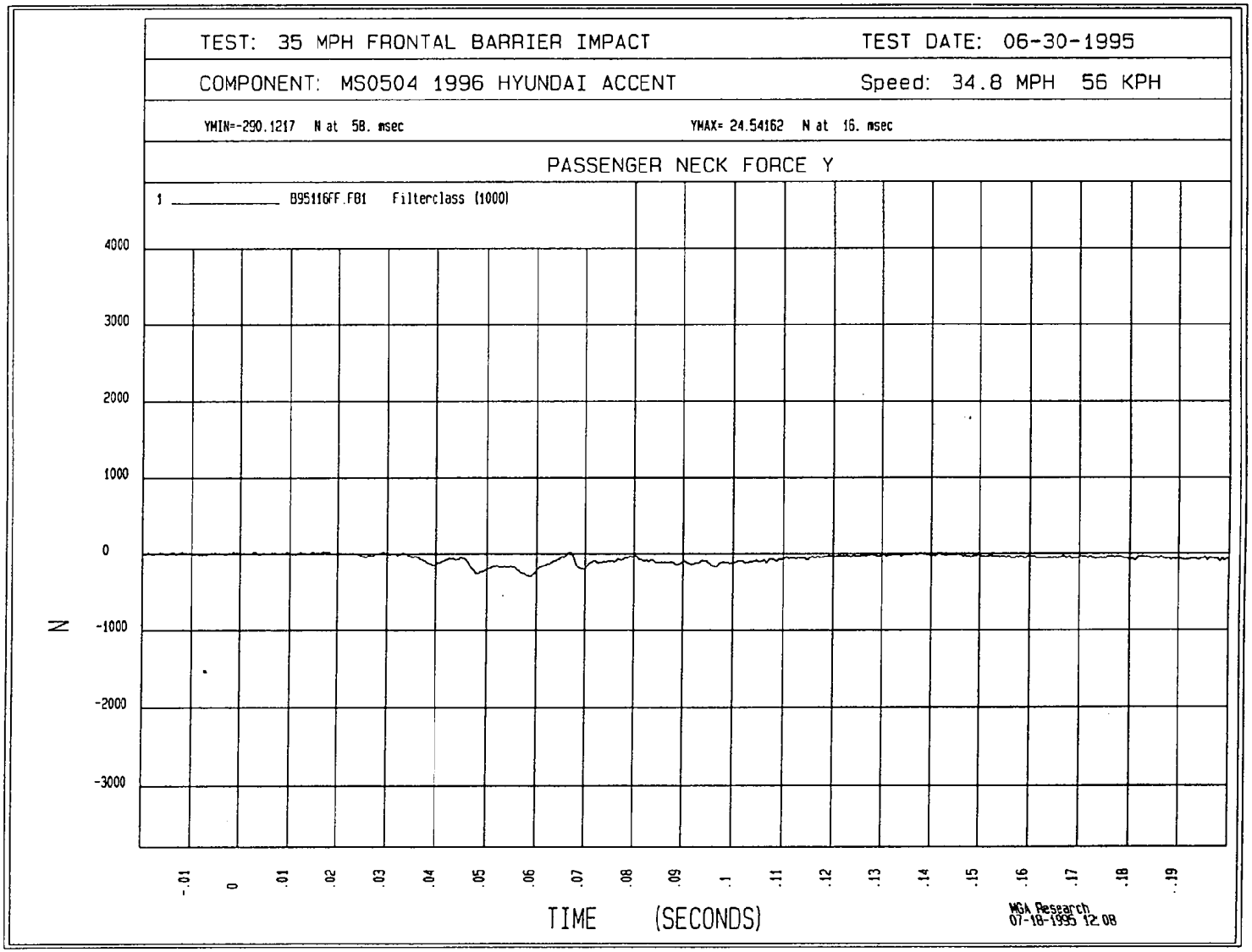


Figure B-117 - Passenger Neck Force Y vs. Time

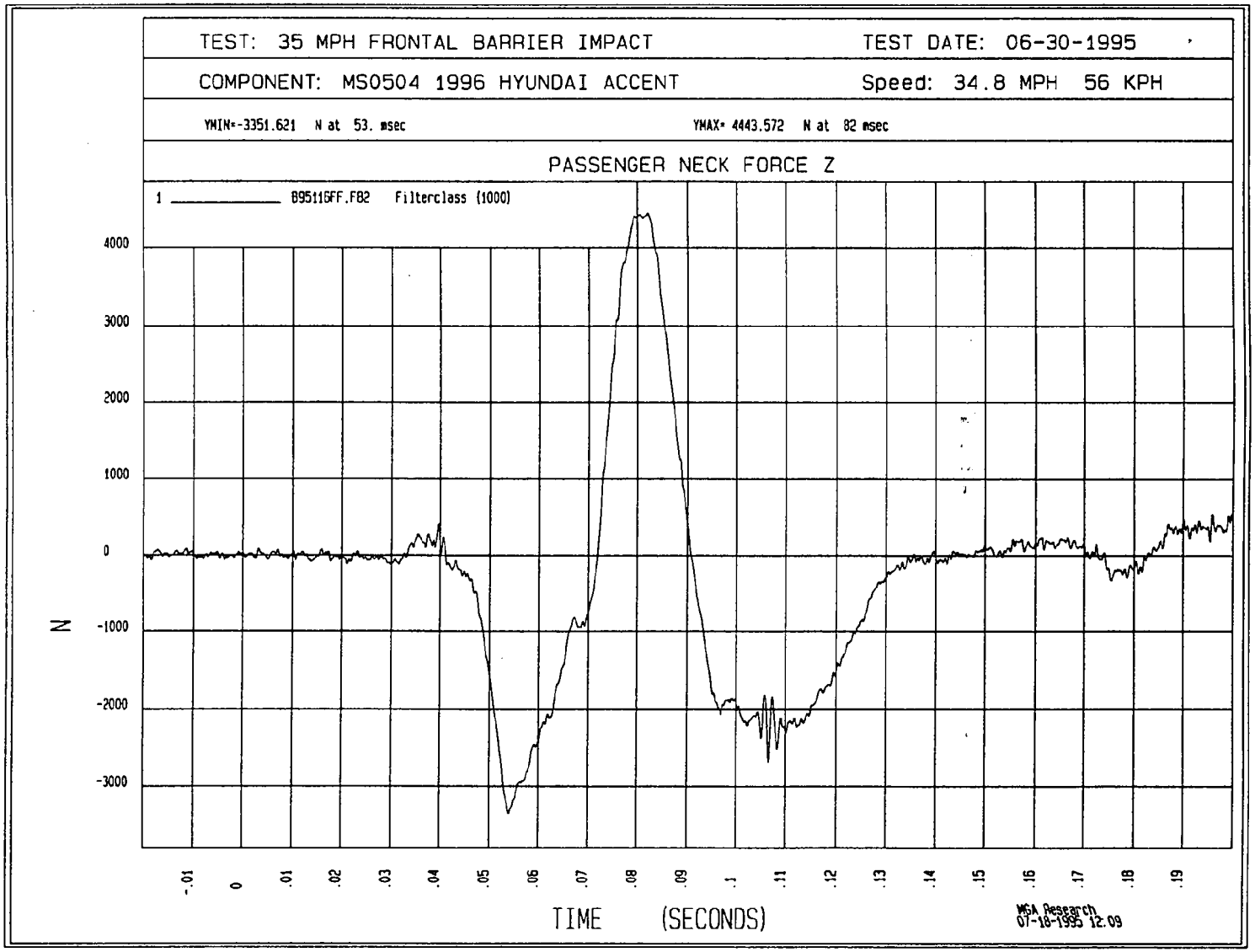


Figure B-118 - Passenger Neck Force Z vs. Time

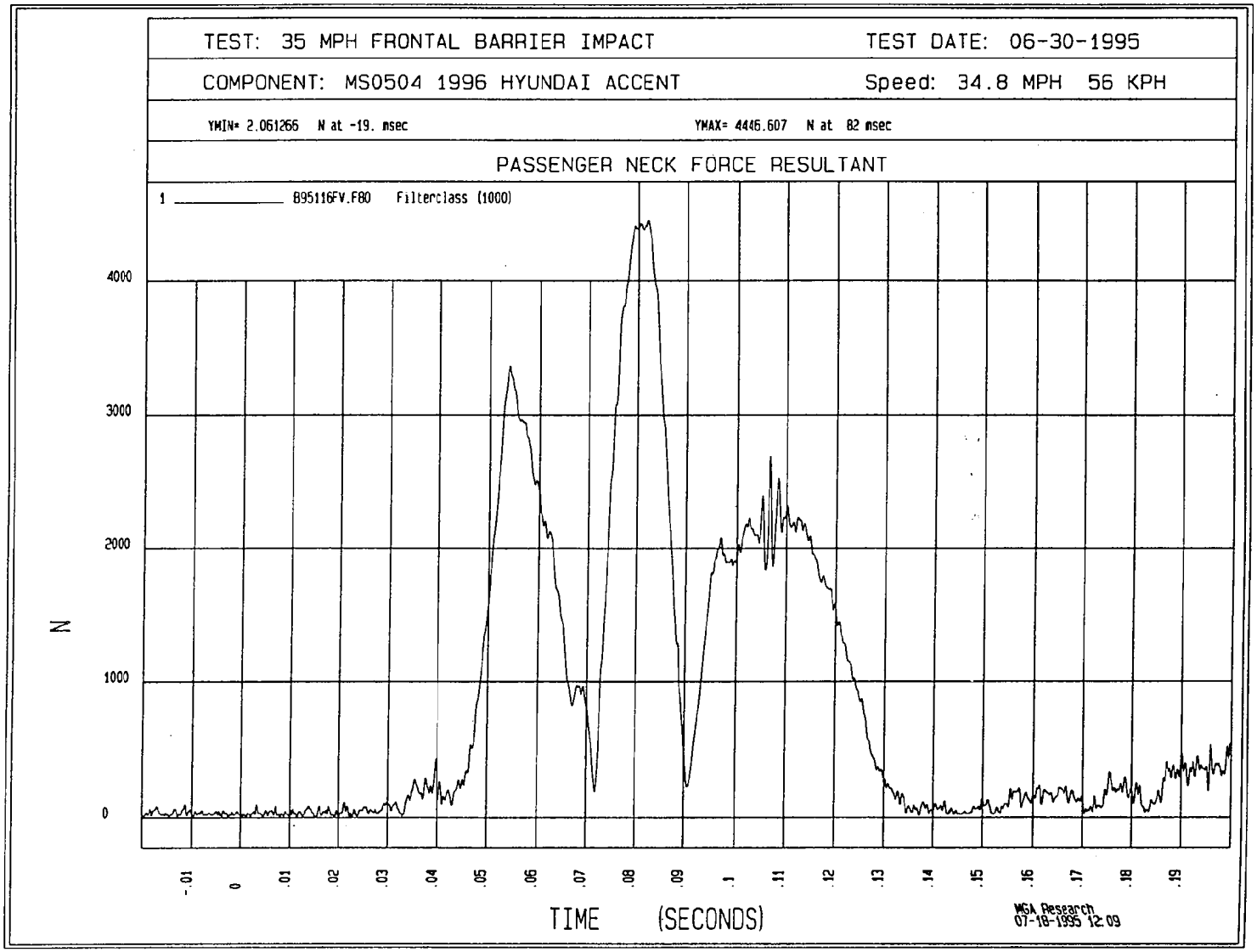


Figure B-119 - Passenger Neck Force Resultant Acceleration vs. Time

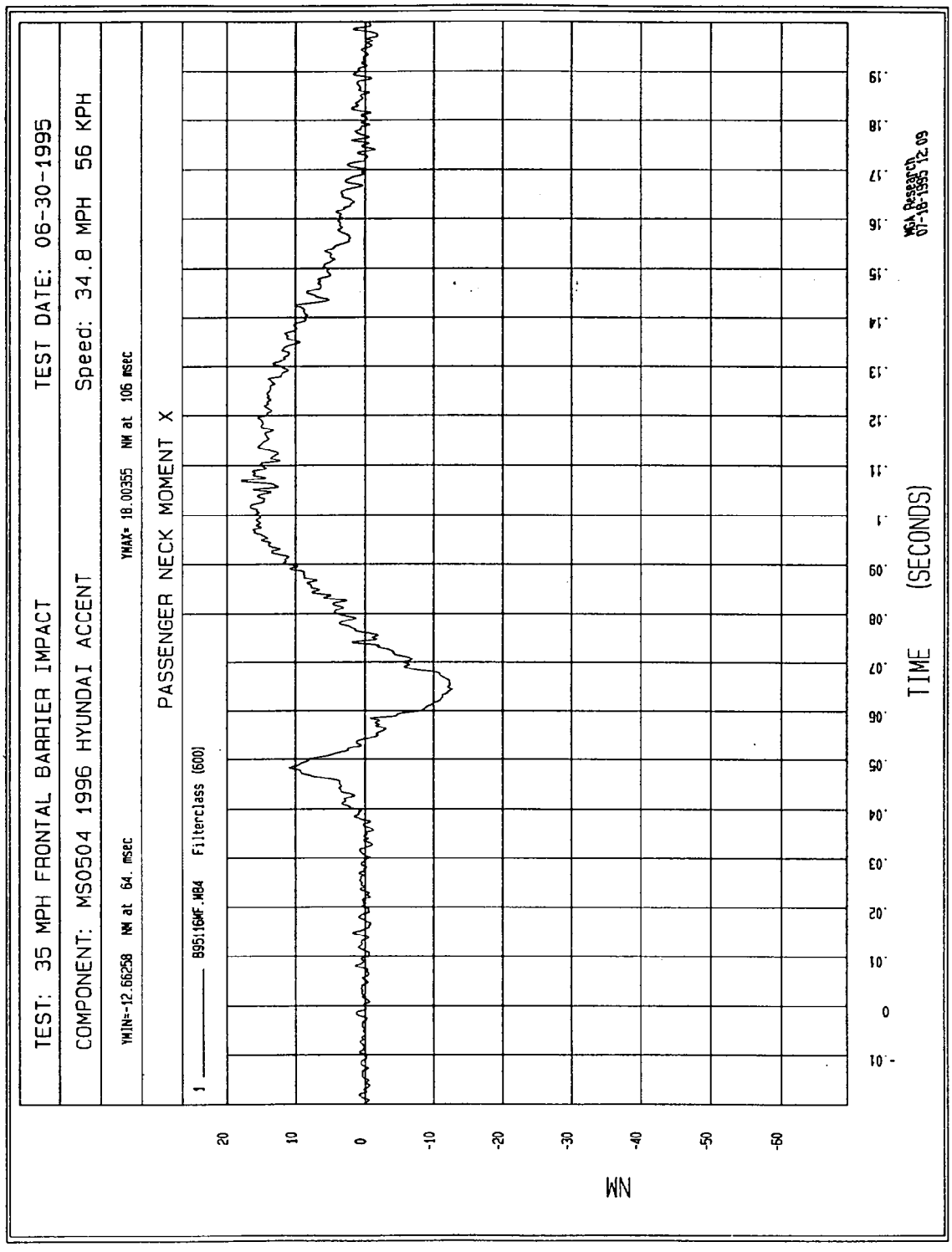


Figure B-120 - Passenger Neck Moment X vs. Time

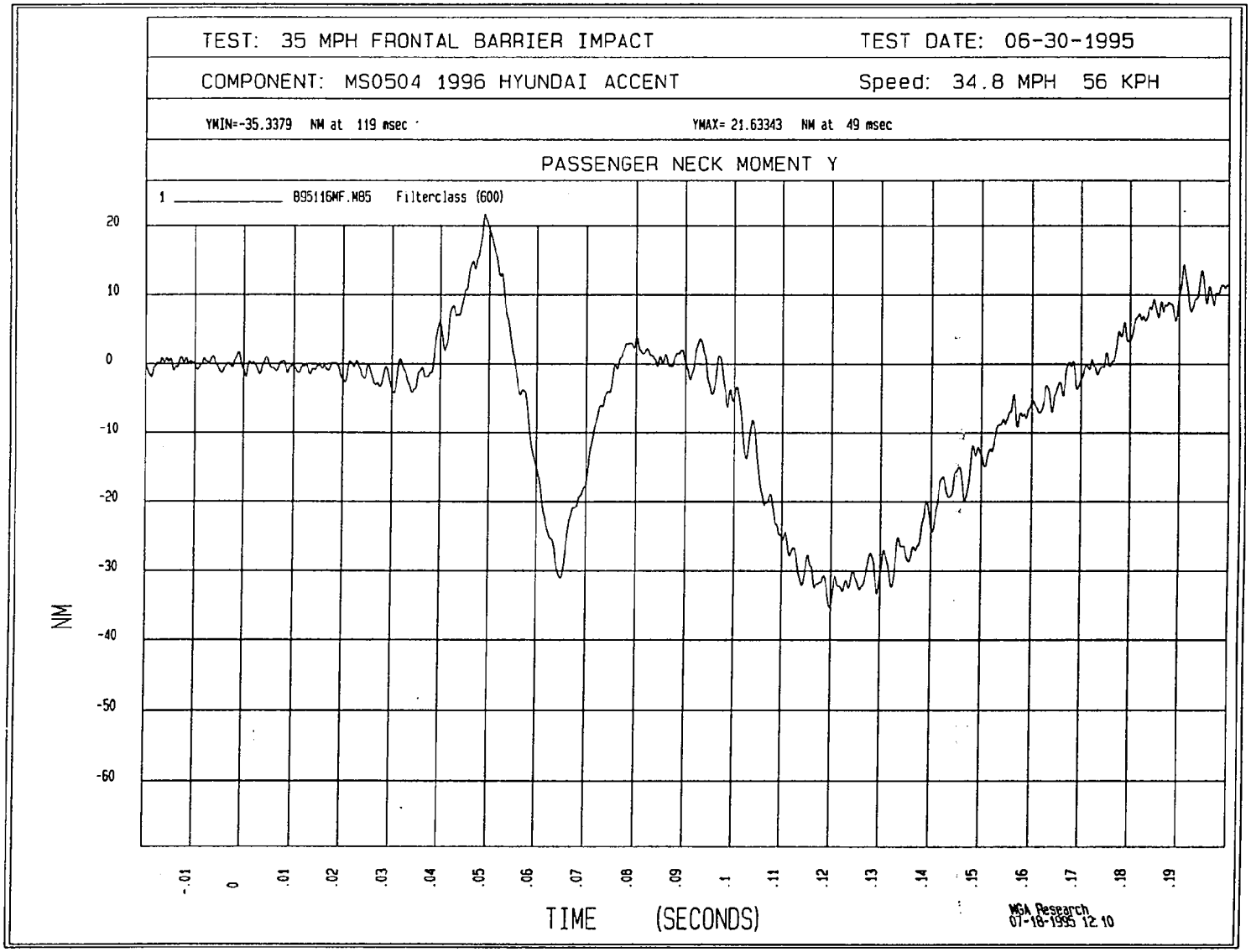


Figure B-121 - Passenger Neck Moment Y vs. Time

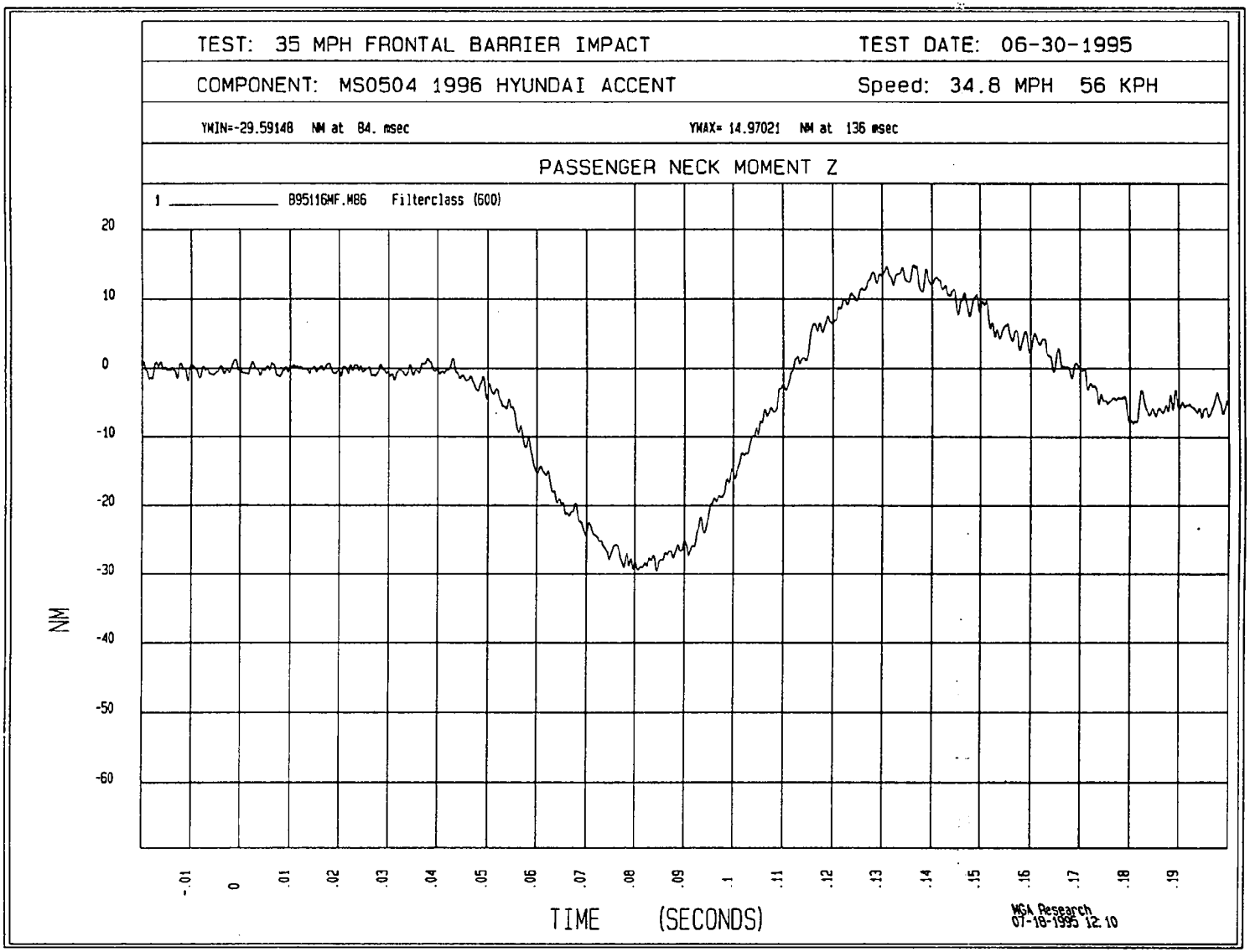


Figure B-122 - Passenger Neck Moment Z vs. Time

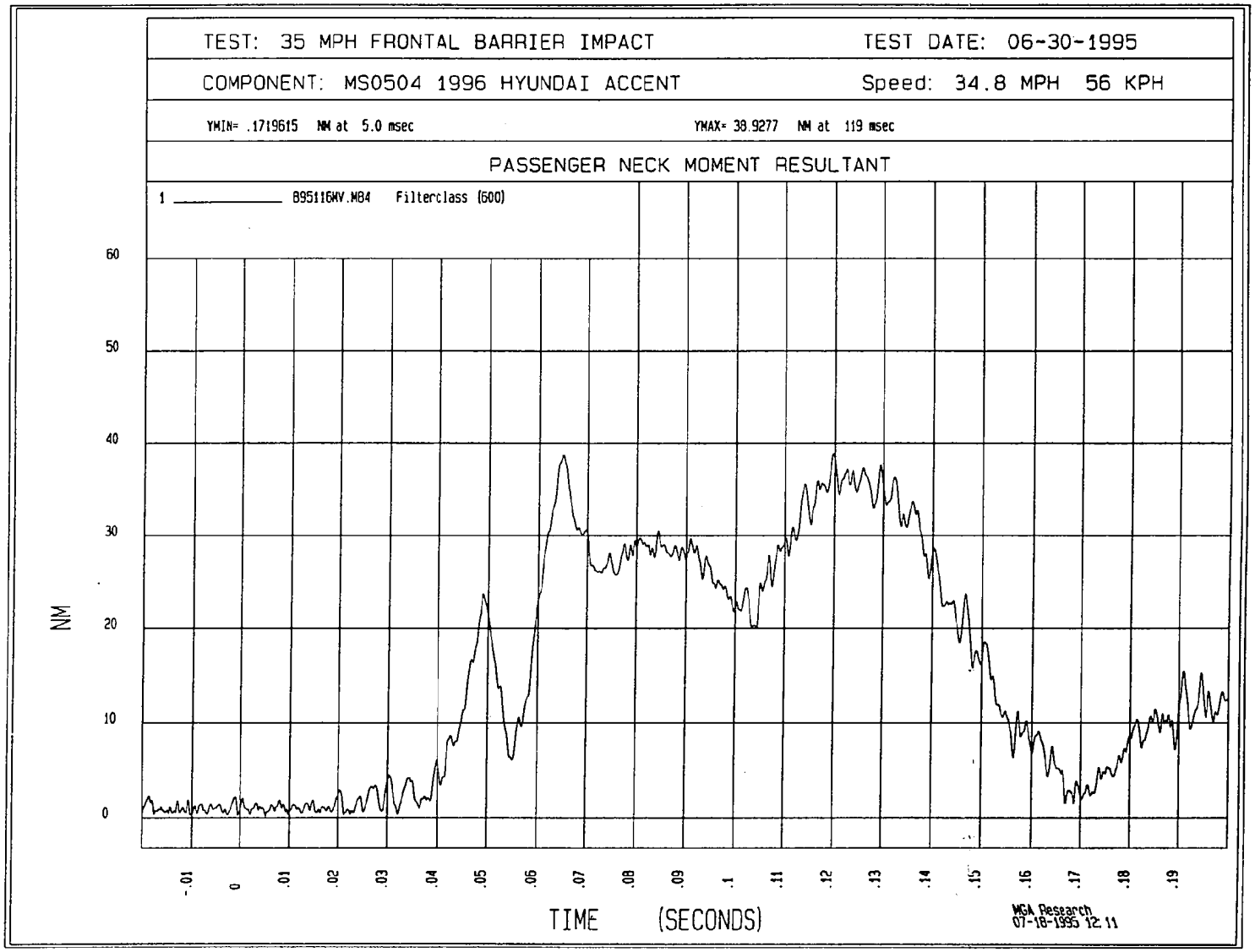


Figure B-123 - Passenger Neck Moment Resultant Accel. vs. Time

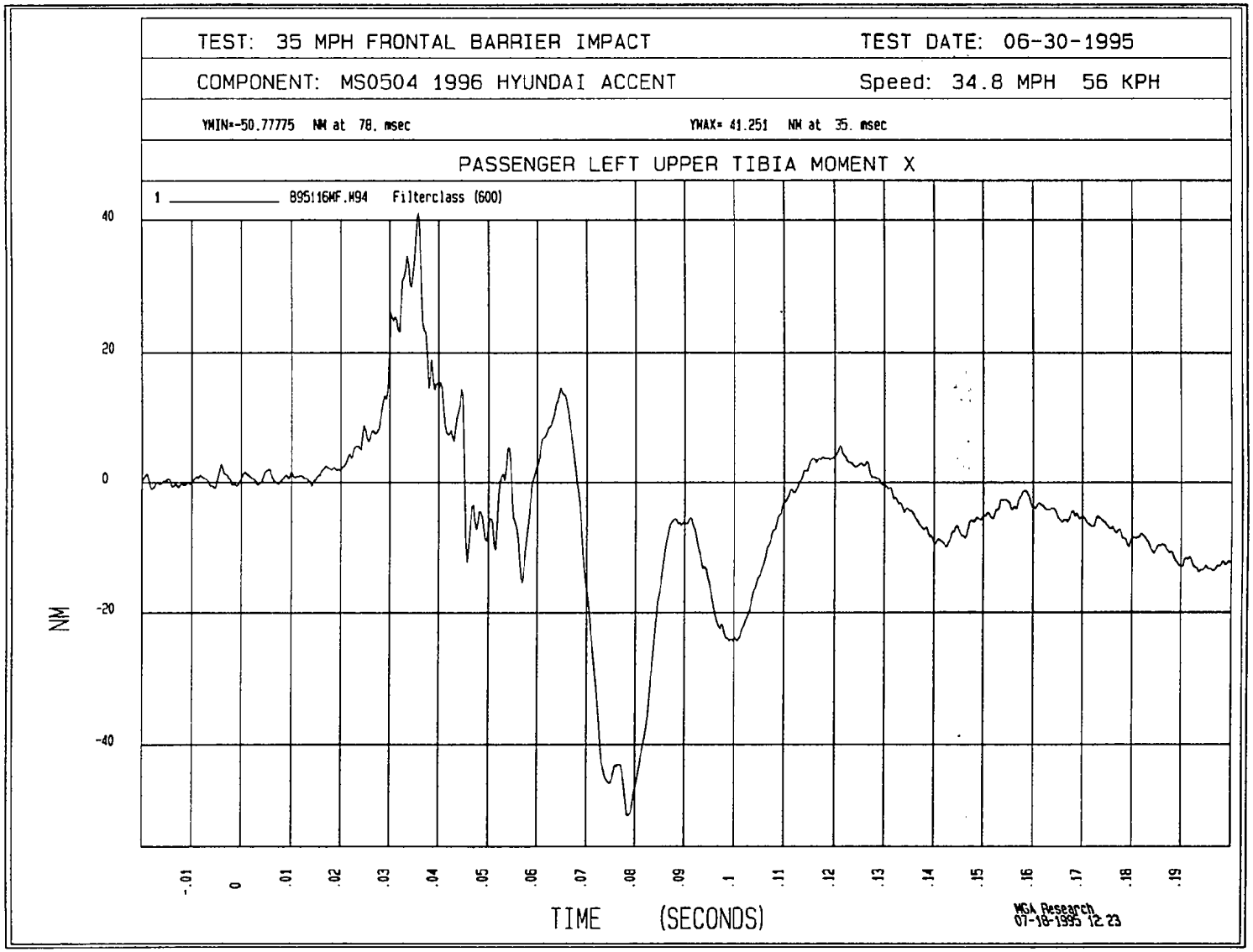


Figure B-124 - Passenger Left Upper Tibia Moment X vs. Time

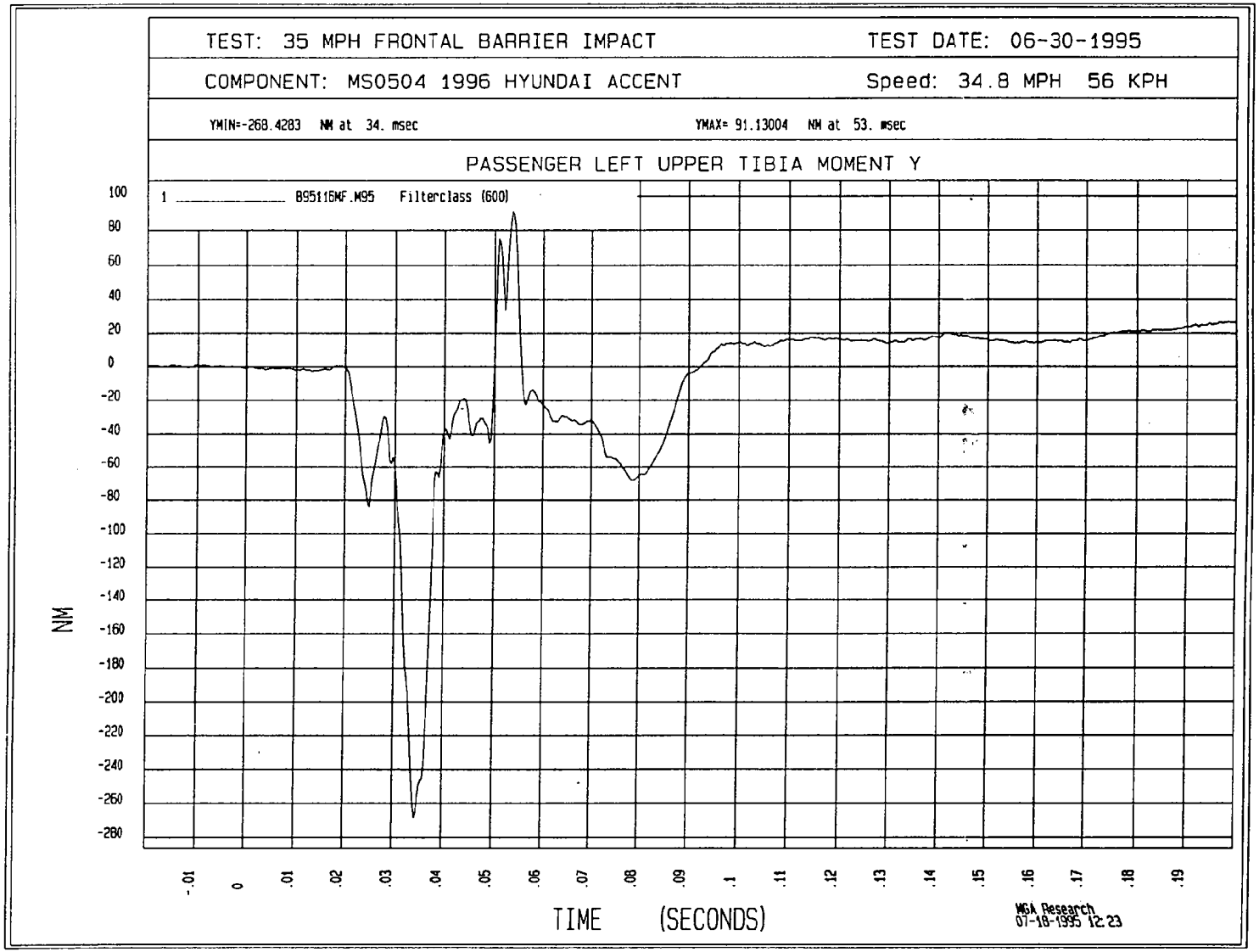


Figure B-125 - Passenger Left Upper Tibia Moment Y vs. Time

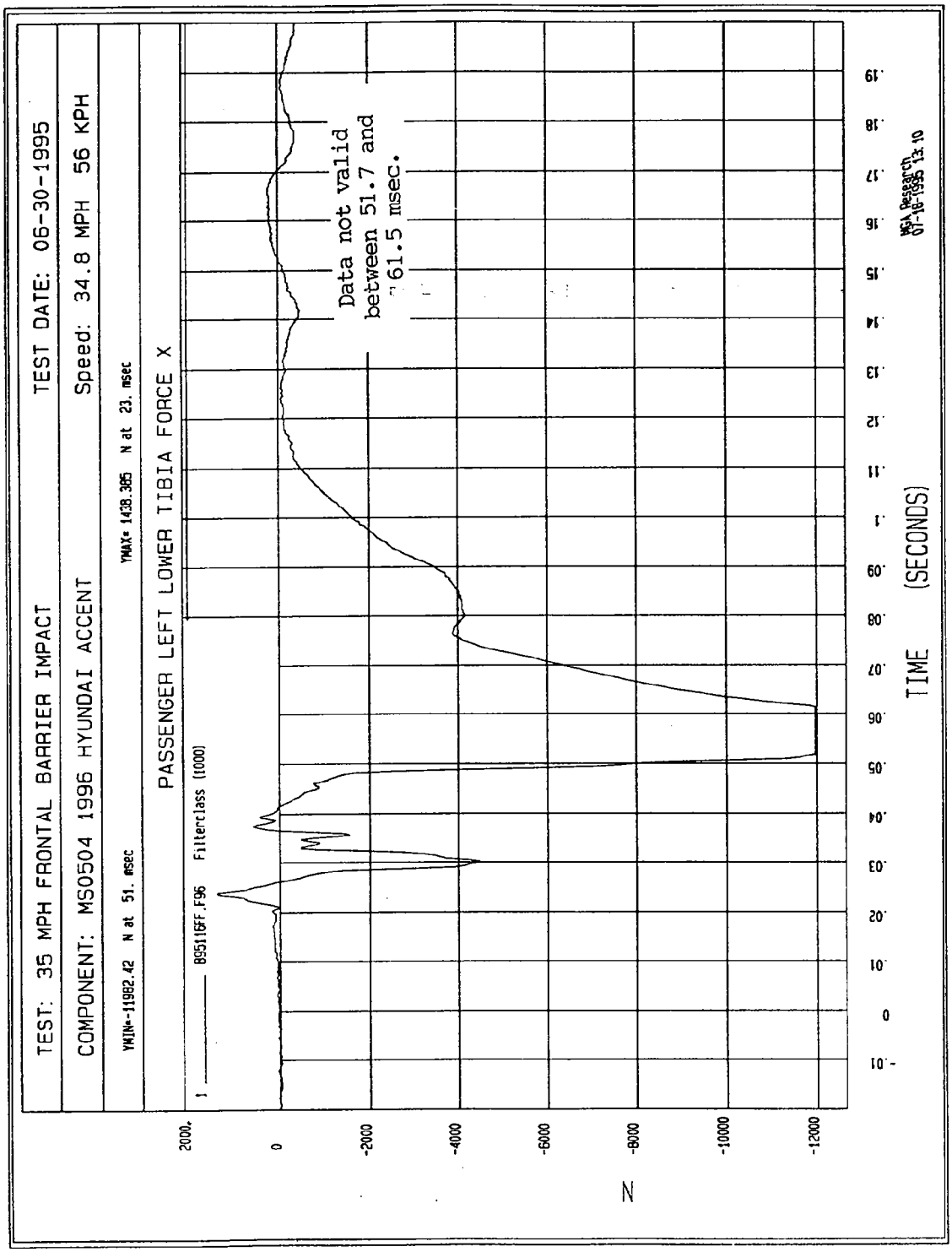


Figure B-126 - Passenger Left Lower Tibia Force X vs. Time

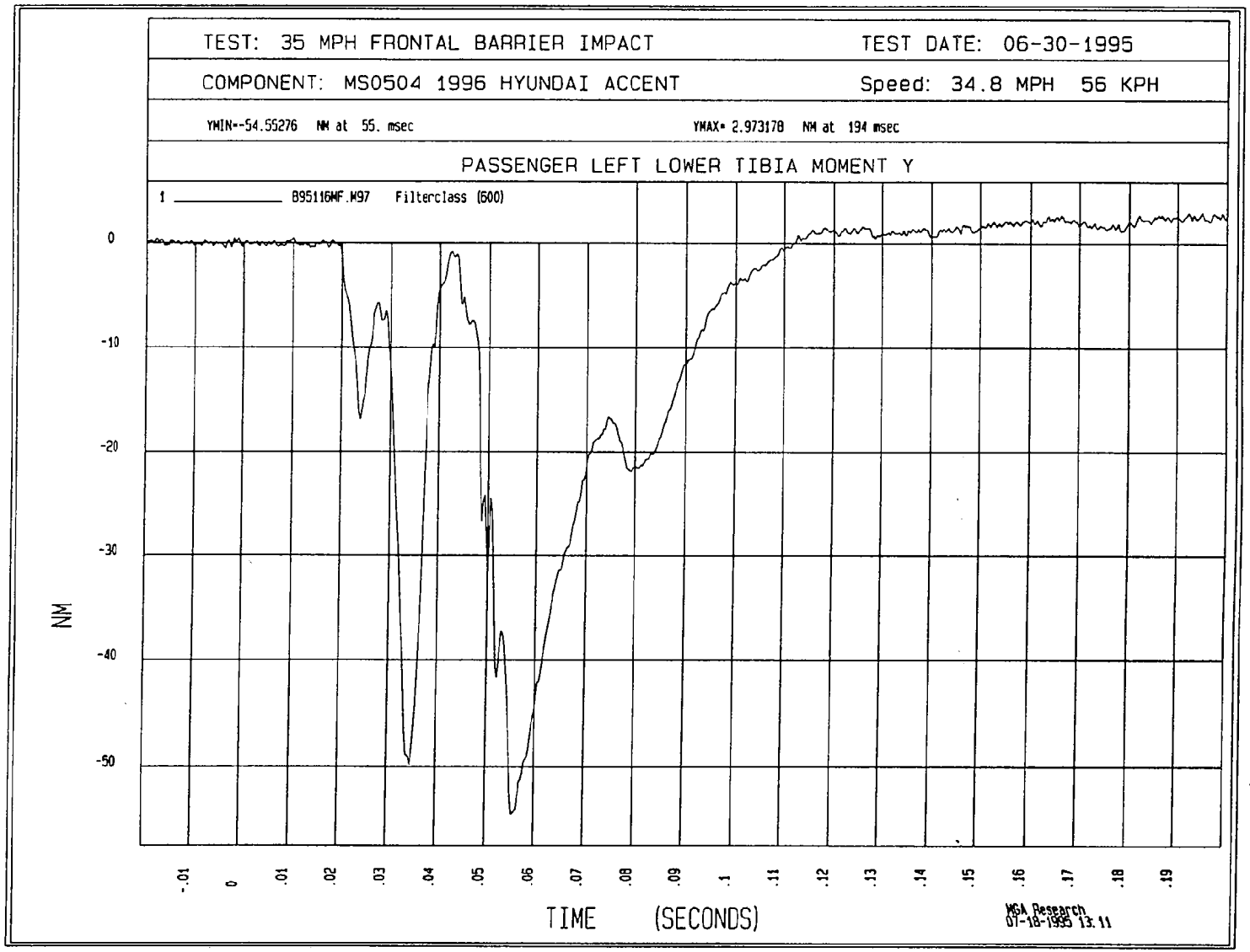


Figure B-127 - Passenger Left Lower Tibia Moment Y vs. Time

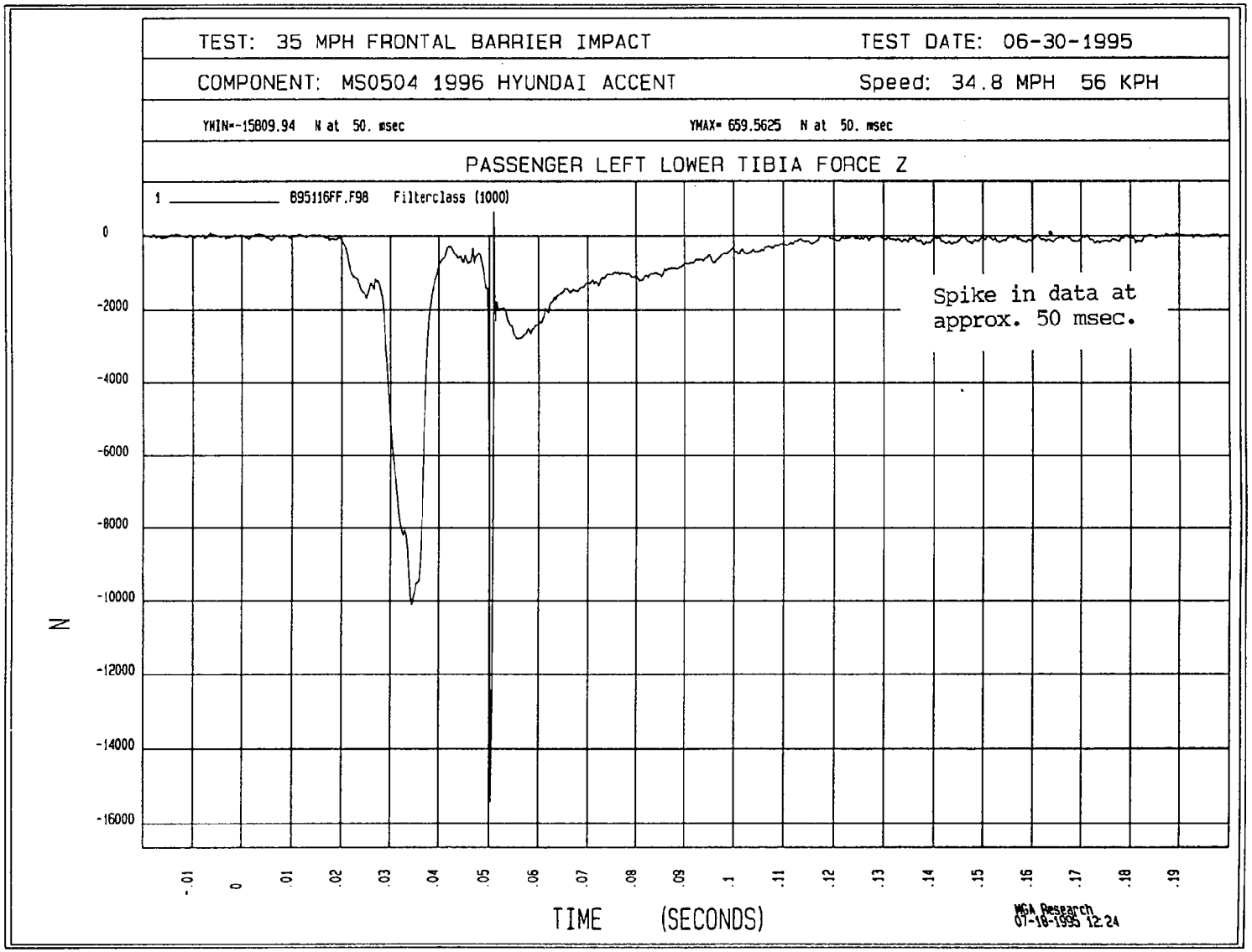


Figure B-128 - Passenger Left Lower Tibia Force Z vs. Time

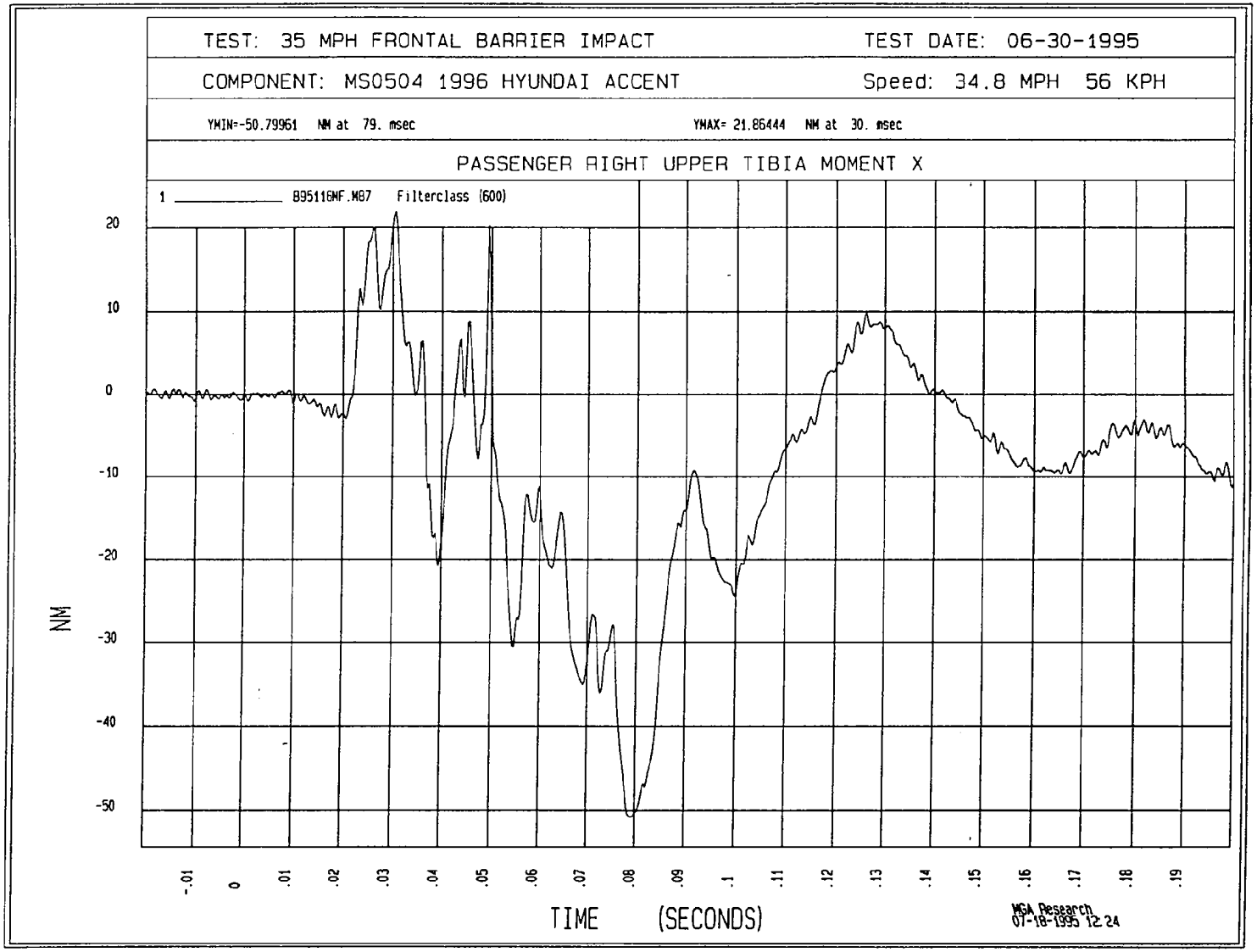


Figure B-129 - Passenger Right Upper Tibia Moment X vs. Time

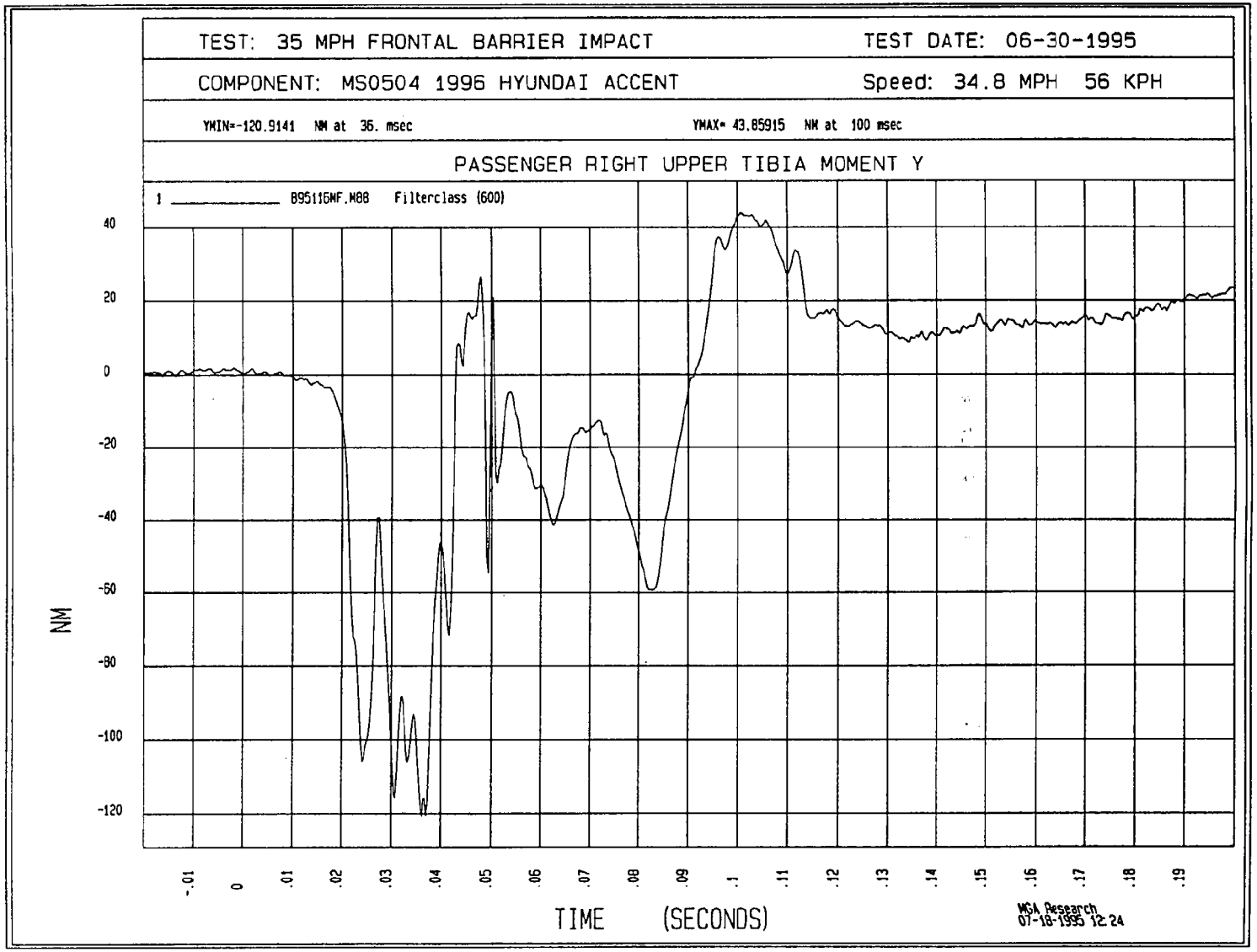


Figure B-13Ø - Passenger Right Upper Tibia Moment Y vs. Time

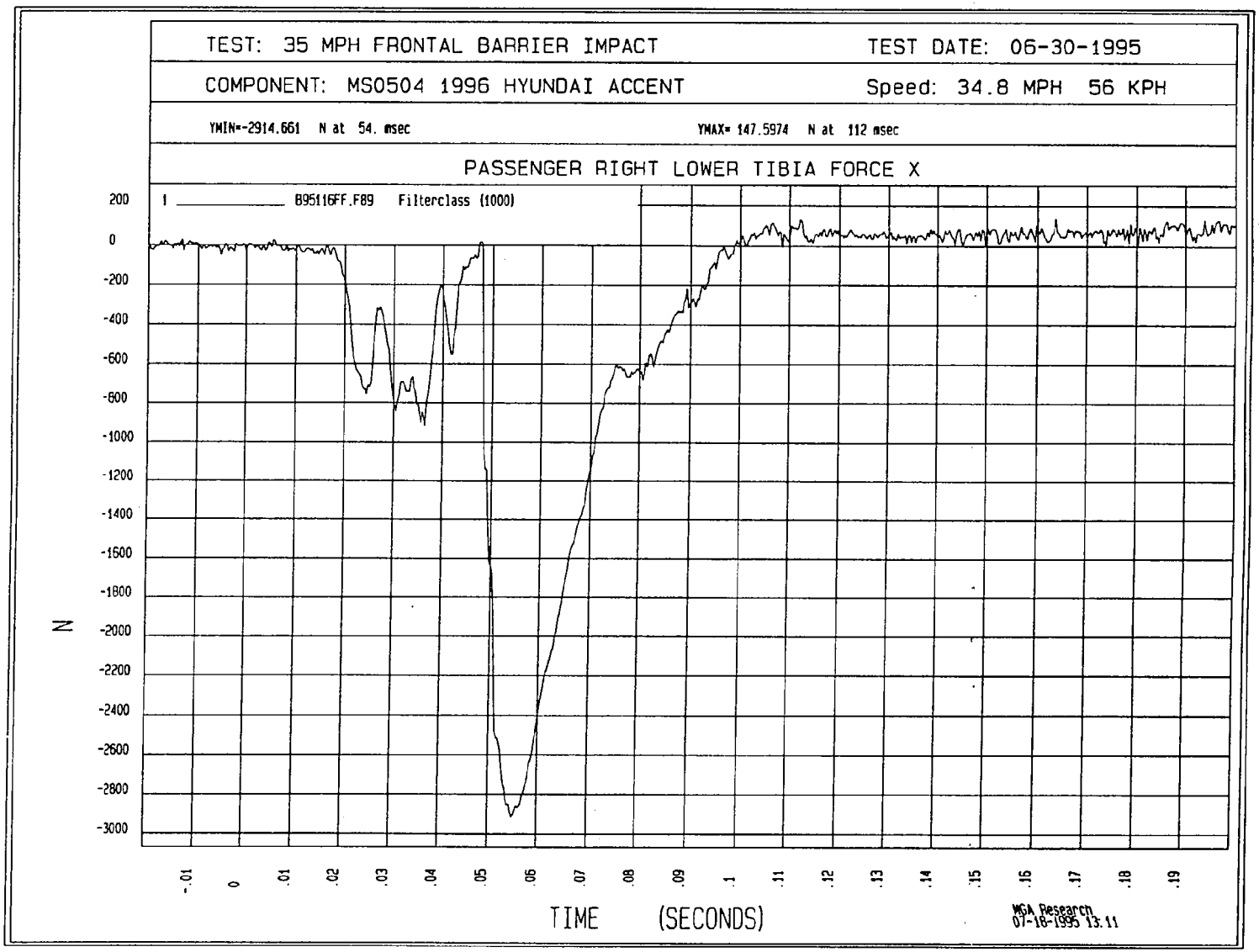


Figure B-131 - Passenger Right Lower Tibia Force X vs. Time

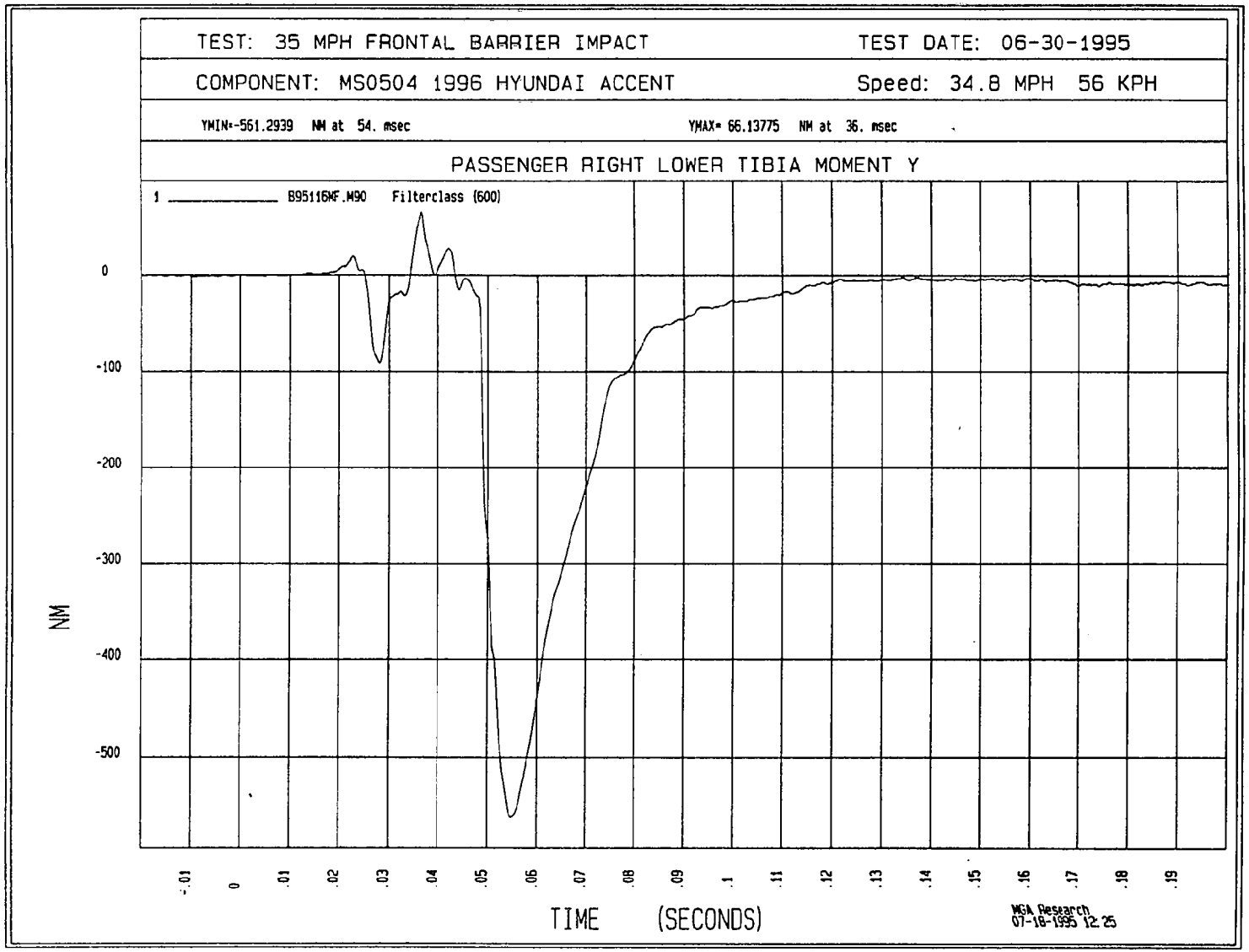


Figure B-132 - Passenger Right Lower Tibia Moment Y vs. Time

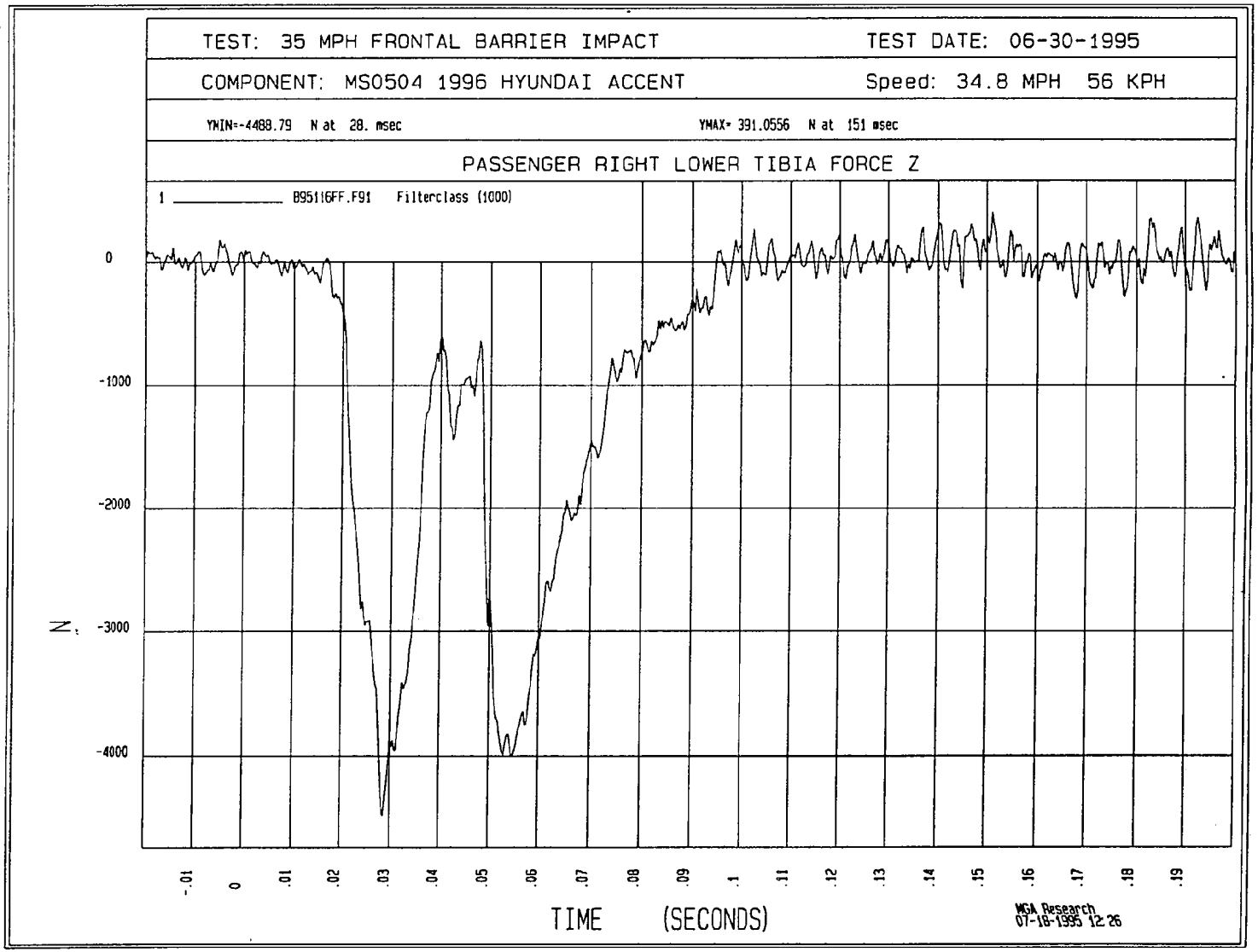


Figure B-133 - Passenger Right Lower Tibia Force Z vs. Time

APPENDIX C

Dummy Configuration & Performance Verification Data

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 065 DUMMY CALIBRATION BY: Al Chalmers

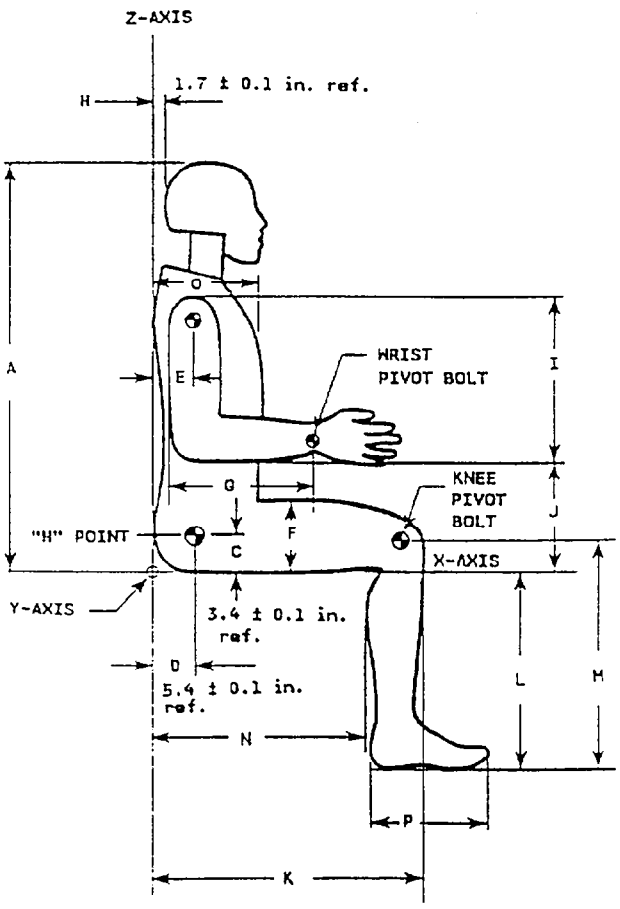
I.CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 06-09-95

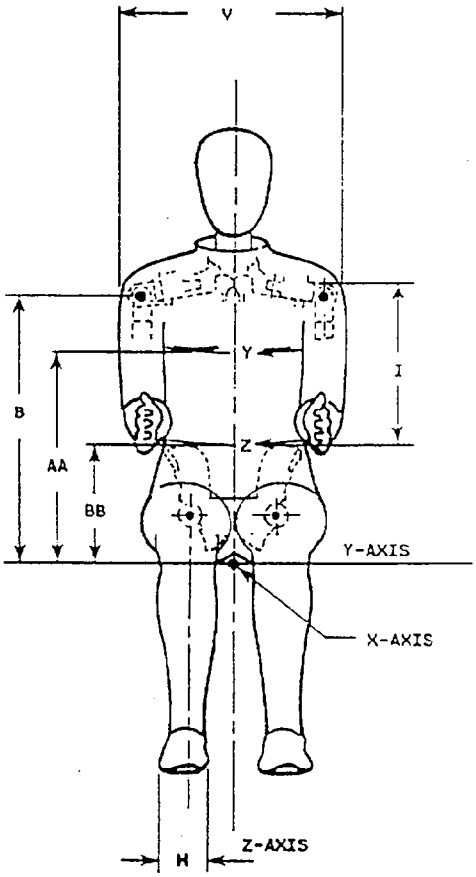
DESCRIPTION	SPECIFICATION (inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.9
B - Shoulder Pivot Height	19.9 - 20.5	20.5
C - "H" Point Height	3.3 - 3.5	3.5
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1	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.: 065 DUMMY CALIBRATION BY: Al Chalmers

VERIFICATION DATE: 06-09-95

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

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	230
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	23.0
Pendulum Deceleration	10 MS	22.50 - 27.50 G	22.71
	20 MS	17.60 - 22.60 G	21.00
	30 MS	12.50 - 18.50 G	15.92
Max. Pendulum G Above 30 MS		29.0 G MAX	15.9
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	39
D Plane Rotation	MAX	64 - 78 DEG.	73
	TIME	57 - 64 MS	62
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	115
Moment About Occipital Condyle	MIN.	65 - 80 FT.LBS	72
	TIME	47 - 58 MS	52
Positive Moment - Time Curve Decay Time to Zero		97 - 107 MS	103

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	19.94
Pendulum Deceleration	10 MS	17.20 - 21.20 G	18.79
	20 MS	14.00 - 19.00 G	17.46
	30 MS	11.00 - 16.00 G	13.39
Max. Pendulum G Above 30 MS		22 G Max	13
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	42
D Plane Rotation	MAX	81 - 106 DEG.	100
	TIME	72 - 82 MS	77
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	157
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-49.5
	TIME	65 - 79 MS	72
Positive Moment - Time Curve Decay Time to Zero		120 - 148 MS	142

4.0 CHEST IMPACT TESTS

	SPECIFICATION	MEASUREMENT
Probe Speed	21.6 to 22.4 F/S	21.8
Peak Deflection	2.50 to 2.86 IN.	2.53
Peak Resistive Force	1160 to 1325 LBS.	1292
Internal Hysteresis	69 to 85%	70

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.	1064

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	7.0
Maximum Force	1060 - 1300 LBS.	1104

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 066 DUMMY CALIBRATION BY: Al Chalmers

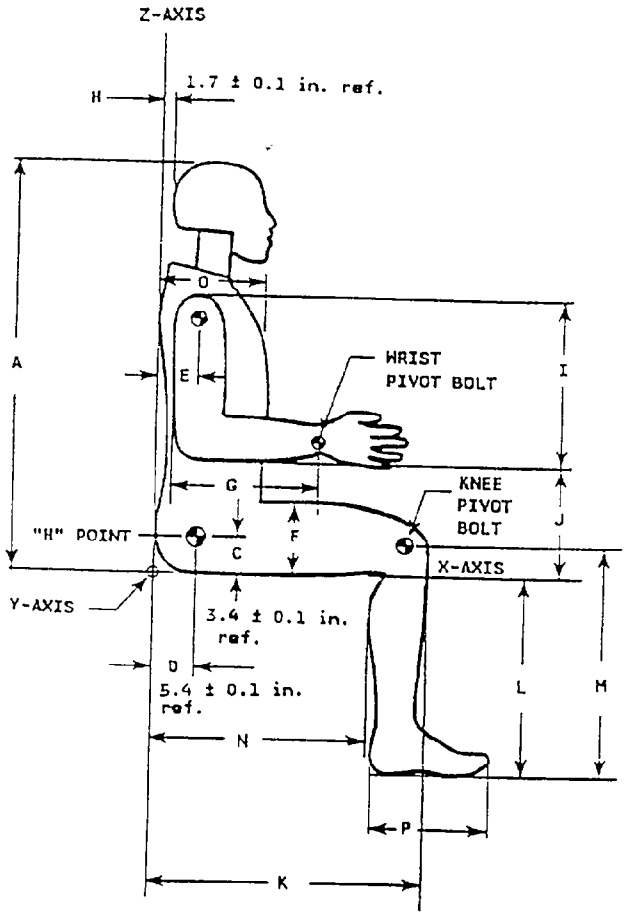
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 06-09-95

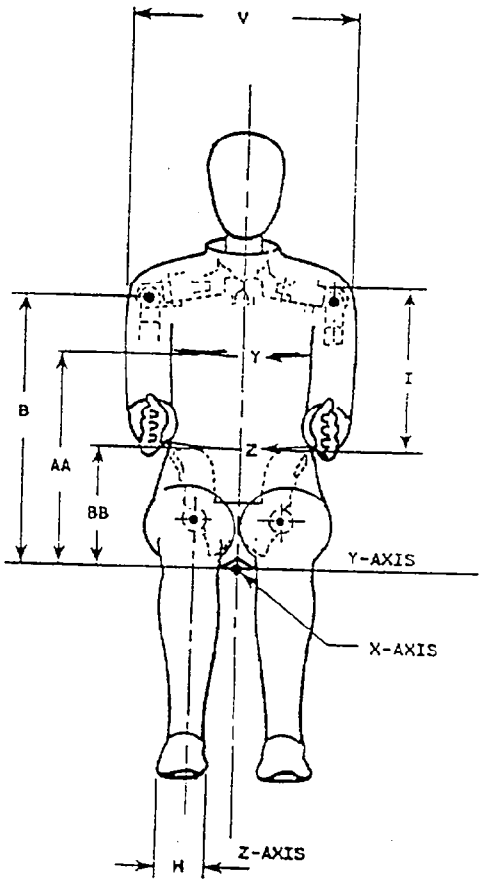
DESCRIPTION	SPECIFICATION (Inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.8
B - Shoulder Pivot Height	19.9 - 20.5	20.5
C - "H" Point Height	3.3 - 3.5	3.5
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1	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.: 066 DUMMY CALIBRATION BY: Al Chalmers

VERIFICATION DATE: 06-09-95

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

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	261
Peak Lateral Acceleration	15 G. MAX	6
Is Acceleration Curve Unimodal	within 10% of peak	Yes

2.0 NECK FLEXION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		22.6 - 23.4 FT/SEC	23.0
Pendulum Deceleration	10 MS	22.50 - 27.50 G	23.00
	20 MS	17.60 - 22.60 G	20.72
	30 MS	12.50 - 18.50 G	14.13
Max. Pendulum G Above 30 MS		29.0 G MAX	14.1
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	39
D Plane Rotation	MAX	64 - 78 DEG.	74
	TIME	57 - 64 MS	59
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	116
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.Ø NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.5Ø - 2Ø.3Ø F/S	19.97
Pendulum Deceleration	1Ø MS	17.2Ø - 21.2Ø G	18.23
	2Ø MS	14.ØØ - 19.ØØ G	16.Ø9
	3Ø MS	11.ØØ - 16.ØØ G	12.74
Max. Pendulum G Above 3Ø MS		22 G Max	13
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	45
D Plane Rotation	MAX	81 - 1Ø6 DEG.	1Ø1
	TIME	72 - 82 MS	78
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	158
Moment About Occipital Condyle	MIN.	-59.Ø/-39.Ø FT LBS	-48.3
	TIME	65 - 79 MS	72
Positive Moment - Time Curve Decay Time to Zero		12Ø - 148 MS	145

4.Ø CHEST IMPACT TESTS

	SPECIFICATION	MEASUREMENT
Probe Speed	21.6 to 22.4 F/S	21.9
Peak Deflection	2.5Ø to 2.86 IN.	2.52
Peak Resistive Force	116Ø to 1325 LBS.	1318
Internal Hysteresis	69 to 85%	73

5.Ø KNEE IMPACT TESTS

LEFT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.Ø F/S	6.9
Maximum Force	1Ø6Ø - 13ØØ LBS.	1Ø73

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.Ø F/S	6.9
Maximum Force	1Ø6Ø - 13ØØ LBS.	1Ø79

APPENDIX D

Dummy, Vehicle and Laboratory Calibration Data

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 065

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	AAMN8	Endevco	02/05/95
Head Y	ACC61	Endevco	01/11/95
Head Z	ACCW9	Endevco	02/02/95
Head X Redundant	AJ621	Endevco	02/02/95
Head Y Redundant	AJ619	Endevco	02/02/95
Head Z Redundant	AHY54	Endevco	02/02/95
Chest X	ACC78	Endevco	02/07/95
Chest Y	ACCE6	Endevco	02/07/95
Chest Z	ACCY3	Endevco	02/07/95
Chest X Redundant	AJ9J7	Endevco	02/07/95
Chest Y Redundant	AJ7A2	Endevco	02/07/95
Chest Z Redundant	AJ819	Endevco	02/07/95
Right Femur Load Cell	259	Denton	02/13/95
Left Femur Load Cell	260	Denton	02/13/95
Pelvis X	ALB87	Endevco	02/10/95
Pelvis Y	AGNB3	Endevco	02/10/95
Pelvis Z	AJ834	Endevco	02/10/95

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 065

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Load Cell X	442	Denton	01/14/95
Neck Load Cell Y	442	Denton	01/14/95
Neck Load Cell Z	442	Denton	01/14/95
Neck Moment X	442	Denton	01/14/95
Neck Moment Y	442	Denton	01/14/95
Neck Moment Z	442	Denton	01/14/95
Chest Deflection Gauge	065	Servo	03/13/95
Lap Belt Load Cell	690	Lebow	04/12/95
Torso Belt Load Cell	657	Lebow	04/21/95

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 065

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Right Tibia Moment X	040	Denton	04/14/95
Upper Right Tibia Moment Y	040	Denton	04/14/95
Lower Right Tibia Moment Y	034	Denton	04/13/95
Lower Right Tibia Force X	034	Denton	04/13/95
Lower Right Tibia Force Z	034	Denton	04/13/95
Upper Left Tibia Moment X	023	Denton	04/14/95
Upper Left Tibia Moment Y	023	Denton	04/14/95
Lower Left Tibia Moment Y	019	Denton	04/13/95
Lower Left Tibia Force X	019	Denton	04/13/95
Lower Left Tibia Force Z	019	Denton	04/13/95

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 066

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ACCY6	Endevco	03/17/95
Head Y	ACCH1	Endevco	03/17/95
Head Z	AAMW5	Endevco	03/17/95
Head X Redundant	AJ9D2	Endevco	03/17/95
Head Y Redundant	AH1E2	Endevco	03/17/95
Head Z Redundant	AJ7K3	Endevco	03/17/95
Chest X	ACCY1	Endevco	02/02/95
Chest Y	ACCC8	Endevco	02/02/95
Chest Z	ACCT7	Endevco	02/02/95
Chest X Redundant	AJ9D4	Endevco	02/06/95
Chest Y Redundant	AJ9F3	Endevco	02/02/95
Chest Z Redundant	AJ9D9	Endevco	02/06/95
Right Femur Load Cell	261	Denton	02/13/95
Left Femur Load Cell	262	Denton	02/13/95
Pelvis X	ALDY8	Endevco	02/10/95
Pelvis Y	ALEK9	Endevco	02/10/95
Pelvis Z	ALE80	Endevco	02/10/95

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 066

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Load Cell X	443	Denton	01/14/95
Neck Load Cell Y	443	Denton	01/14/95
Neck Load Cell Z	443	Denton	01/14/95
Neck Moment X	443	Denton	01/14/95
Neck Moment Y	443	Denton	01/14/95
Neck Momemt Z	443	Denton	01/14/95
Chest Deflection Gauge	066	Servo	01/31/95
Lap Belt Load Cell	625	Lebow	04/13/95
Torso Belt Load Cell	624	Lebow	04/21/95

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 066

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Right Tibia Moment X	036	Denton	06/05/95
Upper Right Tibia Moment Y	036	Denton	06/05/95
Lower Right Tibia Moment Y	040	Denton	06/05/95
Lower Right Tibia Force X	040	Denton	06/05/95
Lower Right Tibia Force Z	040	Denton	06/05/95
Upper Left Tibia Moment X	039	Denton	06/05/95
Upper Left Tibia Moment Y	039	Denton	06/05/95
Lower Left Tibia Moment Y	033	Denton	06/05/95
Lower Left Tibia Force X	033	Denton	06/05/95
Lower Left Tibia Force Z	033	Denton	06/05/95

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	L15-GØ3	Entran	Ø4/11/95
Right Rear Seat Crossmember X	JØ7-X14	Entran	Ø2/14/95
Top of Engine Block X	C25-AØ6	Entran	Ø4/28/95
Bottom of Engine X	E25-GØ6	Entran	Ø6/26/95
Left Brake Caliper X	E25-GØ6	Entran	Ø6/26/95
Right Brake Caliper X	E25-G12	Entran	Ø6/26/95
Instrument Panel X	B12-GØ2	Entran	Ø4/26/95
Redundant Left Rear Seat Crossmember X	E13-D12	Entran	Ø6/Ø9/95
Redundant Right Rear Seat Crossmember X	C25-AØ8	Entran	Ø4/26/95

	LABORATORY INSTRUMENTS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Bending Pendulum Accelerometer	AGH9Ø	Endevco	Ø3/23/95
Neck Bending Head Rotary Potentiometer	Ø18	Spectrol	Ø3/13/95
Neck Bending Pendulum Rotary Potentiometer	Ø19	Spectrol	Ø3/13/95
Chest Probe Accelerometer	4Ø3Ø71	Sensotec	Ø1/11/95
Knee Impact Accelerometer	MGAØØ1	Entran	Ø4/21/95

APPENDIX E

Vehicle Owner's Occupant Restraint System Instructions

AB090A1-A
SEAT BELT PRECAUTIONS

All occupants of the vehicle must wear their seat belts at all times. Note that this vehicle is equipped with a Supplemental Restraint (Airbag) System as discussed beginning on page 1-14. The seat belts must be used in conjunction with the supplemental airbag system. Your states laws may require that some or all occupants of the vehicle use seat belts. The possibility of increased injury or severity of injury in an accident will be increased if this elementary safety precaution is not observed. In addition, the following recommendations are made:

AB090B1-A
Infant or Small Child

Some states require the use of child restraint systems for infants and small children. Whether this is required by law or not, it is strongly recommended that a child restraint seat or infant restraint system be placed in the rear seat and used for infants or small children weighing less than 40 pounds. Information about the use of such restraints is included beginning on page 1-10. Such restraints must only be used in the rear seat.

NOTE:

Small children are best protected in an accident when properly restrained by a child restraint system that meets the requirements of the Federal Motor Vehicle Safety Standards.

ZB090C2-A
Larger Children

It is recommended that larger children occupy the rear seat and wear their seat belts. If the child is in the front seat, the child should be securely restrained by the seat belt. Under no circumstances should the child be allowed to stand or kneel on the seat. Children are afforded the most safety in the event of an accident when they are restrained by a proper child restraint system in the rear seat

ZB090D2-A
Pregnant Women

The use of a seat belt is recommended for pregnant women to lessen the chance of injury in an accident. When a seat belt is used, the lap belt portion should be placed as low and snugly as possible on the hips, not across the abdomen. For specific recommendations, consult a physician.

ZB090E1-A
Injured Person

A seat belt should be used when an injured person is being transported. When this is necessary, you should consult a physician for recommendations.

ZB090F1-A
One Person Per Belt

Two people (including children) should never attempt to use a single seat belt. This could increase the severity of injuries in case of an accident.

ZB090G1-A
Do Not Lie Down

To reduce the chance of injuries in the event of an accident, and to achieve maximum effectiveness of the restraint system, all passengers should be sitting up and the front seats should be in an upright position when the car is moving. A seat belt cannot operate properly if the person is lying down in the rear seat or if the front seat is at or near a fully reclined position.

ZB090H2-A
CARE OF SEAT BELTS

Seat belt systems should never be disassembled or modified. In addition, care should be taken to assure that seat belts and belt hardware are not damaged by seat hinges, doors or other abuse.

WARNING:

When you return the rear seatback to its upright position after the rear seatback was folded down, be careful not to damage the seat belt webbing or buckle. Be sure that the webbing or buckle does not get caught or pinched in the rear seat.

ZB090I1-A
Periodic Inspection

It is recommended that all seat belts be inspected periodically for wear or damage of any kind. Parts of the system that are damaged should be replaced as soon as possible.

ZB090J1-A
Keep Belts Clean and Dry

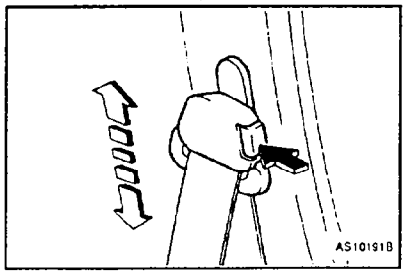
Seat belts should be kept clean and dry. If belts become dirty, they can be cleaned using a mild soap solution and warm water. Bleach, dye, strong detergents or abrasives should not be used because they may damage and weaken the fabric.

ZB090K1-A
When to Replace Seat Belts

The entire seat belt assembly or assemblies should be replaced if the vehicle has been involved in an accident. This should be done even if no damage is visible. Additional questions concerning seat belt operation should be directed to your Hyundai Dealer.

AB090Z1-B
HEIGHT ADJUSTABLE FRONT SEAT SHOULDER BELT (If Installed)

You can adjust the height of the shoulder belt anchor to one of the 4 positions.



If the height of the adjusting seat belt is too near your neck, you will not be getting the most effective protection.

To adjust the height of seat belt anchor, lower or raise the height adjuster into an appropriate position when the height adjuster knob is pulled up.

Release the button the lock the ancher into position. Try to slide the releasing the button the make sure that it has locked into position

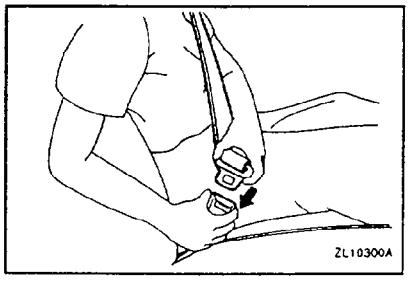
WARNING:

The height adjuster must be in the lock position when the vehicle is moving.

ZB090T3-B
SEAT BELTS (3-Point Type)

To Fasten Your Belt

To fasten your seat belt, pull it out of the retractor and insert the metal tab into the buckle. There will

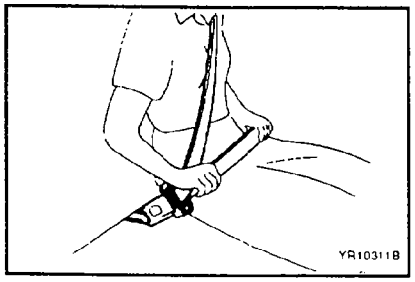


be an audible "click" when the tab locks into the buckle.
The seat belt automatically adjusts to the proper length only after the lap belt is adjusted manually so that it fits snugly around your hips. If you lean forward in a slow, easy motion, the belt will extend and let you move around. If there is a sudden stop or impact; however, the belt will lock into position. It will also lock if you try to lean forward too quickly.

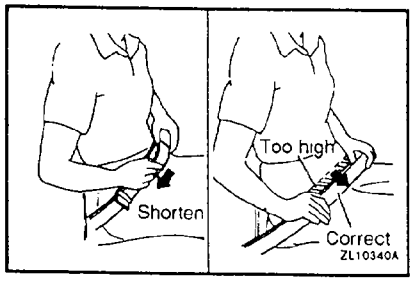
NOTE:
If the driver's seat belt is not fastened when the ignition key is in the "ON" position, the seat belt warning light will flash and the warning chime will sound for approximately six seconds.

AB090U1-A
Adjusting Your Seat Belt

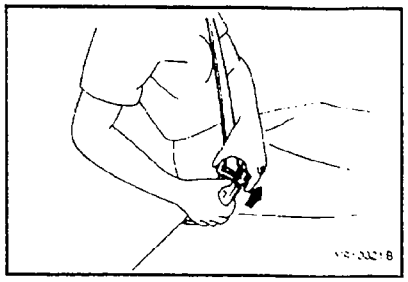
WARNING:
You should place the lap belt portion as low as possible and snugly across your hips, not on your waist. If the lap belt is located too high and on your waist, it may increase the chance of injury in the event of a collision. Both arms should not be under or over the shoulder belt. Rather, one should be over and the other under, as shown in the illustration.



ZB090X2-A
Adjusting Your Seat Belt
With a 2-point static type seat belt, the length must be adjusted manually so it fits snugly around your body. Fasten the belt and pull on the loose end to tighten. The belt should be placed as low as possible on your hips, not on your waist. If the belt is too high, it could increase the possibility of your being injured in an accident because you could slide under it.

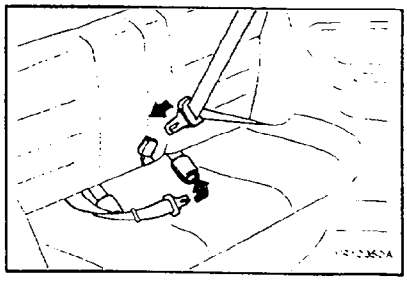


ZB090V1-A
To Release the Seat Belt
The seat belt is released by pressing the release button in the locking buckle. When it is released, the belt should automatically draw back into the retractor.
If this does not happen, check the belt to be sure it is not twisted, then try again.

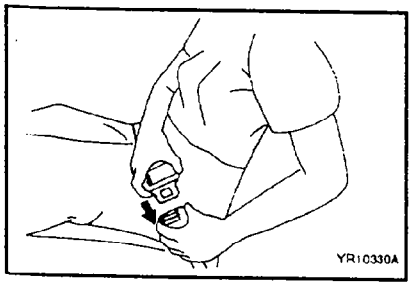


ZB090V1-A
To Release the Seat Belt
When you want to release the seat belt, press the button in the locking buckle.

WARNING:
The center lap belt latching mechanism is different from those for the rear seat shoulder belts. When fastening the rear seat shoulder belts or the center lap belt, make sure they are inserted into the correct buckle to obtain protection from the seat belt system and assure proper operation.



ZB090W2-A
SEAT BELTS
(2-Point Static Type) (Rear Seat Center)
To Fasten Your Seat Belt
To fasten a 2-point static type seat belt, insert the metal tab into the locking buckle. There will be an audible "click" when the tab locks into the buckle. Check to make sure the belt is properly locked and that the belt is not twisted.



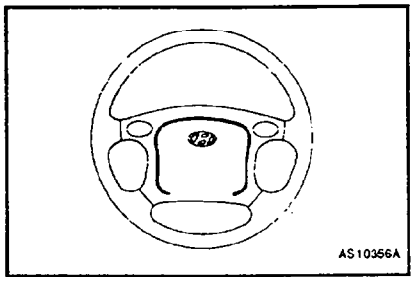
JB100A1-A
CHILD RESTRAINT SYSTEM
Children riding in the car should sit in the rear seat and be restrained to minimize the risk of injury in an accident, sudden stop or sudden maneuver. According to accident statistics provided by the National Highway Traffic Safety Administration (NHTSA), children are safer when properly restrained in the rear seating positions than in the front seat. Larger children should use one of the seat belts provided.
For smaller children, we strongly recommend the use of a commercially available child restraint system that meets the requirements of the Federal Motor Vehicle Safety Standards, (FMVSS), because it offers the most protection against injury or death. All states now have laws which require that small children must be seated in a child passenger seat restraint system. Check local laws. All child restraint systems are designed to be secured by lap belts or the lap belt portion of a lap-shoulder belt.
Children could be injured in a crash if their restraints are not properly secured. For small children and babies we strongly recommend a child seat or infant seat. Before buying a particular child restraint system, make sure it fits your car seat and seat belts, and fits your child. Follow all the instructions provided by the manufacturer when installing the child restraint system.

YB150A2-A

Supplemental Restraint (Airbag) System

Your Hyundai is equipped with a Supplemental Restraint (Airbag) System. The indications of the system's presence are the letters "SRS Air Bag" embossed on the airbag pad cover in the steering wheel and the passenger's side front panel pad above the glove box.

The Hyundai SRS consists of airbags installed under the pad covers in the center of the steering wheel and the passenger's side front panel above the glove box. The purpose of the SRS is to provide the vehicle's driver and/or the front passenger with additional restraint than that offered by the seat-belt system alone, in case of a frontal impact of sufficient severity.



NOTE:

Be sure to read information about the SRS on the labels provided on the backside of the sun visors and in the glove box.

WARNING:

As its name implies, the SRS is designed to work with, and be supplemental to, the driver's and the passenger's three point seat belt systems and is not a substitute for them. Therefore, your seat belts must be worn at all times while the vehicle is in motion. In addition, the airbags deploy only in certain frontal impact conditions severe enough to likely cause significant injury to the vehicle occupants.

The SRS is designed to deploy the airbags only when an impact is sufficiently severe and when the impact angle is less than 30° from the forward longitudinal axis of the vehicle and will not deploy in side, rear or rollover impacts.

For maximum safety protection in all types of crashes, all occupants including the driver should always wear their seat belts whether or not an airbag is also provided at their seating position to minimize the risk of severe injury or death in the event of a crash. Do not sit or lean unnecessarily close to the airbag while the vehicle is in motion.

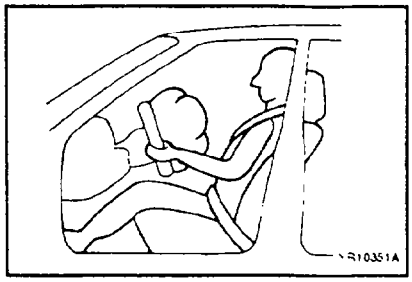
YB150B1-A

SRS Components and Functions

The SRS consists of the following components:

- Driver's Side Airbag Module
- Passenger's Side Airbag Module
- Knee Bolster
- SRS Service Reminder Indicator (SRI)
- SRS Control Module (SRSCM)

The SRSCM continually monitors all elements while the ignition is "ON" to determine if a frontal or near-frontal impact is severe enough to require airbag deployment.



The SRS service reminder indicator (SRI) on the instrument panel will blink for about 6 seconds after the ignition key is turned to the "ON" position or after the engine is started, after which the SRI should go out.

The airbag modules are located both in the center of the steering wheel and in the front passenger's panel above the glove box. When the SRSCM detects a considerable impact to the front of the vehicle, it will automatically deploy the airbags.

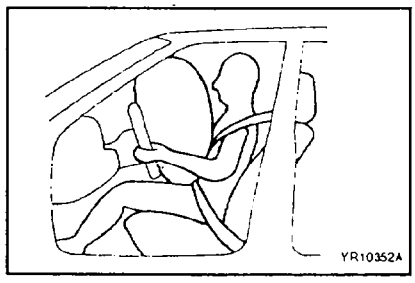
Upon deployment, tear seams molded directly into the pad covers will separate under pressure from the expansion of the airbags. Further opening of the covers then allows full inflation of the airbags.

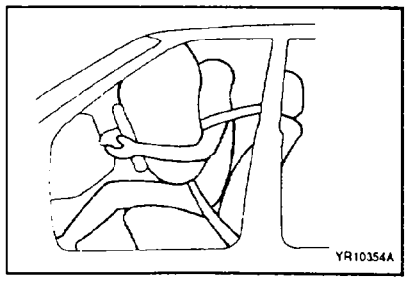
A fully inflated airbag in combination with a properly worn seat belt slows the driver's or the passenger's forward motion, thus reducing the risk of head or chest injury.

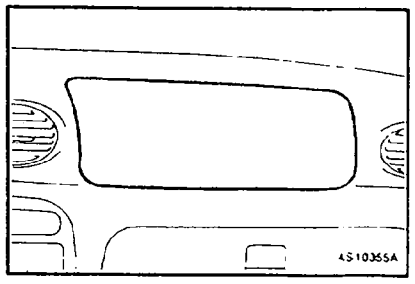
After complete inflation, the airbag immediately starts deflating, enabling the driver to obtain forward visibility.

WARNING:

- **When the SRS is activated, there may be a loud noise and fine dust will be released through the instruments.**
  These conditions are normal and are not hazardous.
  However, the fine dust generated during airbag deployment may cause skin irritation. Be sure to wash your hands and face thoroughly with lukewarm water and a mild soap after an accident in which the airbags were deployed.
- **The SRS can function only when the ignition key is in the "ON" position. If the SRS SRI does not come on, or continuously remains on, after flashing for about 6 seconds when the ignition key is turned to the "ON" position, or after the engine is started, or comes on while driving, the SRS is not working properly.**

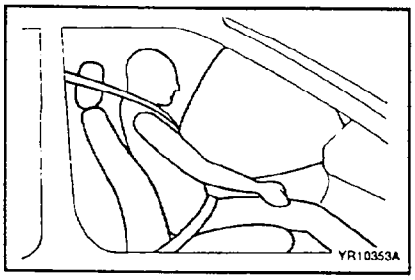






If this occurs, have your vehicle immediately inspected by your Hyundai dealer.

- **Before you replace a fuse or disconnect a battery terminal, turn the ignition key to the "LOCK" position or remove the ignition key.**
  Never remove or replace fuse No.15 when the ignition key is in the "ON" position. Failure to heed this warning will cause the SRS SRI to illuminate.



YB150C1-A

SRS Care

- The SRS is virtually maintenance-free and so there are no parts you can safely service by yourself. The entire SRS system must be inspected by an authorized Hyundai dealer 10 years after the date that the vehicle was manufactured.
- Any work on the SRS system, such as removing, installing, repairing, or any work on the steering wheel must be performed by a qualified Hyundai technician.
  Improper handling of the airbag system may result in serious personal injury.

WARNING:

- **Modification to SRS components or wiring, including the addition of any kind of badges to the pad covers or modifications to the body structure, can adversely affect SRS performance and lead to possible injury.**
- **For cleaning the airbag pad covers, use only a soft, dry cloth or one which has been moistened with plain water. Solvents or cleaners could adversely affect the airbag covers and proper deployment of the system.**
- **No objects should be placed over or near the airbag modules on the steering wheel, instrument panel, and the front passenger's panel above the glove box, because any such object could cause harm if the vehicle is in a crash severe enough to cause the airbags to inflate.**
- **If the airbags inflate, they must be replaced by an authorized Hyundai dealer.**
- **Do not tamper with or disconnect SRS wiring, or other components of the SRS system. Doing so could result in injury, due to accidental firing of the airbags or by rendering the SRS inoperative.**
- **Do not install a child restraint system in the front passenger seat position.**
  A child restraint system must never be placed in the front seat. The infant or baby could be severely injured by an airbag deployment in case of an accident.
- **If components of the airbag system must be discarded, or if the vehicle must be scrapped, certain safety precautions must be observed. Your Hyundai dealer knows these precautions and can give you the necessary information. Failure to follow these precautions and procedures could increase the risk of personal injury.**
- **If you sell your vehicle, be sure to inform the new owner of these important points and make certain that this manual is transferred to the new owner.**