

REPORT NO. MGA-96-N011

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

FORD MOTOR COMPANY
1996 MERCURY VILLAGER MINIVAN
NHTSA NO. MT0207

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: January 8, 1996

Report Date: January 19, 1996

FINAL REPORT

Prepared For:

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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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16. Abstract A 56 kph (35 mph) frontal barrier impact using a 30 load cell barrier was conducted on a 1996 Mercury Villager Minivan at the MGA Proving Grounds and Crash Test Center in Burlington, WI. on January 8, 1996. The barrier impact velocity was 56.0 kph (34.8 mph), and the ambient temperature at the time of impact was 21°C. The post-test maximum static crush was 602 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 405 and the 3 msec. Clip (Chest g's) was 46 g's. The left and right femur loads for the driver were 5073 and 4914 Newtons, respectively. The passenger's HIC was 861 and the 3 msec Clip was 51 g's. The left and right femur maximum loads were 7254 and 3638 Newtons respectively.					
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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 1996 Mercury Villager Minivan at a velocity of 56.0 kph (34.8 mph). The test was performed at the MGA Proving Grounds and Crash Test Center on January 8, 1996. 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, right/left femur load cells, right/left lower leg sensors, and right/left feet accelerometers. 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 111 channels of data were recorded on 10 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 405 and the maximum chest (CLIP) deceleration over 3 milliseconds was 46 g's. The maximum chest displacement was 32 mm. The left and right femur loads were 5073 and 4914 Newtons respectively.

The right front passenger's head struck the inflated airbag. The passenger HIC was 861 and maximum chest (CLIP) deceleration over 3 milliseconds was 51 g's. The maximum chest displacement was 38 mm. The left and right femur loads were 7254 and 3638 Newtons respectively.

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1996/Mercury/Villager/Minivan

NHTSA No.: MT0207 VIN.: 4M2DV11W5TDJ02445

Body color: Green Date of Manufacture: 10/95

Engine: 6 Cylinders; C.I.D.; 3.0 Liters;
 X Gas; Diesel; Turbocharged

 Longitudinal; X Transverse

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

Final Drive: X Front Wheel; Rear Wheel; Four Wheel

Odometer Reading: 107 miles

 X A/C; X P/S; X P/B; X P/wdo;
 P/seats; X Tilt Wheel; X Cruise Control;

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

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 241 kPa (35 Psi) Rear 241 kPa (35 Psi)

Recommended Tire Size: P205/75R15S

Recommended Cold Tire Pressure: Front 241 kPa (35 Psi) Rear 241 kPa (35 Psi)

Tires on Vehicle: P205/70R15S; Manufacturer: General

Number of Occupants: 2 Front; 2 Rear; 3 3rd Seat; 7 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) = 585.1 kg. (A)

No. of Occupants x 68.0 kg. = 476.0 kg. (B)

Rated Cargo Weight (RCW) A-B = 109.1 kg.

GVWR 2470 kg. GAWR: Front 1232 kg.; Rear 1270 kg.

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

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

Right Front = 511.7 kg Right Rear = 365.1 kg

Left Front = 516.2 kg Left Rear = 358.8 kg

TOTAL FRONT WEIGHT = 1027.9 kg (58.7% of Total Vehicle Weight)

TOTAL REAR WEIGHT = 723.9 kg (41.3% of Total Vehicle Weight)

TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 1751.8 kg

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight 1751.8 kg

VCW = Vehicle Capacity Weight 585.1 kg

DSC = Designated Seating Capacity 7 RCW = VCW - 68 (DSC) = 109.1 kg

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

Target Test Weight = 2012.5 kg

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:

Right Front = 559.3 kg Right Rear = 466.8 kg

Left Front = 533.9 kg Left Rear = 449.1 kg

TOTAL FRONT WEIGHT = 1093.2 kg (54.4% of Total Vehicle Weight)

TOTAL REAR WEIGHT = 915.9 kg (45.6% of Total Vehicle Weight)

TOTAL TEST WEIGHT = 2009.1 kg

Weight of ballast secured in vehicle trunk area = 98.4 kg

Vehicle components removed to meet target weight: Rear seats, spare tire and jack

VEHICLE ATTITUDE (all dimensions in mm):

Delivered Attitude: RF 779 LF 776 RR 791 LR 787

Test Attitude: RF 770 LF 776 RR 751 LR 755

Wheel Base: 2855 mm; C.G. = 1302 mm rearward of front wheel C/L

Remarks: None Noted

* 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: January 8, 1996 Time of Test: 4:18 p.m.
Ambient Temperature: 21 °C (Spec. Range = 18.8 to 25.6°C)
Temperature in Occupant Compartment: 21. ° C
Windshield Molding Temperature: 21. ° C
Required Impact Velocity Range: 55.5 to 57.1 kph
Impact Velocity: primary = 56.0 kph; secondary = 56.2 kph
Distance From Front Bumper to Barrier Face When
Entering Speed Trap: 1305 mm
Exiting Speed Trap: 300 mm

VEHICLE REBOUND AND CRUSH (mm):

Vehicle Length: Pre-test = R 4609 C_L 4764 L 4616
Post-test = R 4158 C_L 4162 L 4141
Crush = R 451 C_L 602 L 475

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

R 737 mm C_L 803 mm L 803 mm

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Airbag</u>	<u>Airbag and headrest</u>
Chest	<u>Airbag</u>	<u>Airbag</u>
Abdomen	<u>No contact</u>	<u>No contact</u>
Left Knee	<u>Dashboard</u>	<u>Dashboard</u>
Right Knee	<u>Dashboard</u>	<u>Dashboard</u>

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

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

	<u>Front</u>	
<u>Seat Movement</u>	<u>Left</u>	<u>Right</u>
Seat Back Movement	<u>0</u>	<u>0</u>
Seat Shift (mm)	<u>4 forward</u>	<u>4 forward</u>

Glazing Damage

Backlight/Windshield Windshield cracked

Other Notable Impact Effects: None

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

POST TEST AIRBAG DATA

Vehicle Yr/Make/Model/Body Style: 1996/Mercury/Villager/Minivan

NHTSA No.: MT0207 VIN: 4M2DV11W5TDJ02445

- A. Number of Vent Holes: Driver 2; Passenger 2
- B. Size of Vent Holes: Driver 45 mm; Passenger 25 mm
- C. Total Vent Area; Driver 15.9 cm² Passenger 4.9 cm²
- D. Deflated Airbag Length and Width Dimensions or, if Round, Diameter
Driver; Length __, Width __, Diameter 610 mm
Passenger; Length 700 mm, Width 742, Diameter __ mm
- E. Is the Airbag Tethered?
Driver; __ Yes; X No; If yes, record length of tether __ mm
Passenger; __ Yes; X No, If yes, record length of tether __ mm

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.:

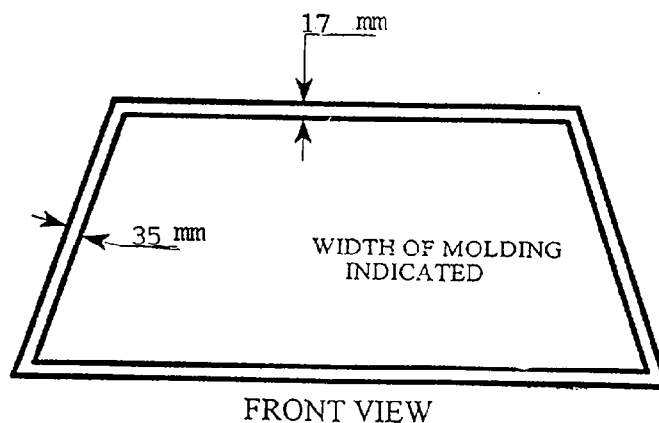
Windshield set in rubber molding with glue

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	2273	2273	100%
LEFT SIDE	2273	2273	100%
TOTAL	4546	4546	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 ½" 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= 1307 mm

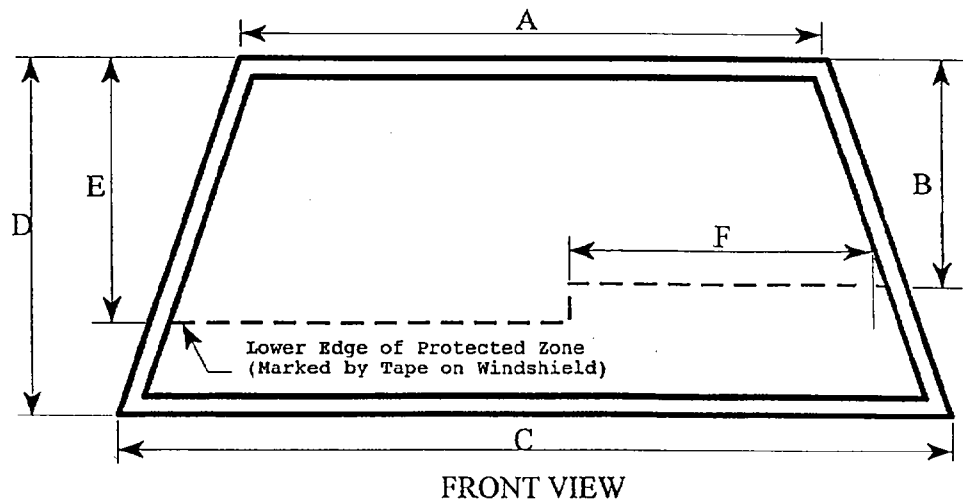
B= 495 mm

C= 1743 mm

D= 748 mm

E= 567 mm

F= 593 mm



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.: MT0207 Test Date: January 8, 1996

Vehicle Mfgr./Make/Model: Mercury/Villager/Minivan

Usable Capacity of Vehicle's Fuel Tank: 75.7 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:

70.4 Liters which is 93 % of the stated USABLE CAPACITY.

TEST VEHICLE IMPACT TYPE: X Frontal (35 mph)

___ Oblique (30 mph) with ___° barrier face first
contacting (driver/passenger) side

___ Rear Moving Barrier (30 mph)

____ Side Impact MDB (33.2 mph)

FUEL SPILLAGE MEASUREMENT:

1. From impact until vehicle motion ceases
2. For 5 minute period after vehicle motion ceases
3. For next 25 minutes

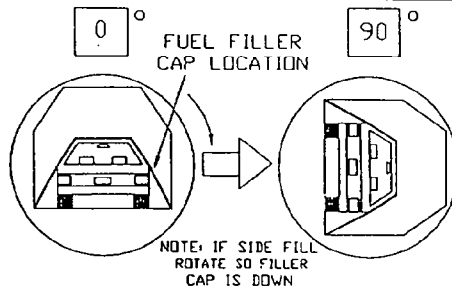
ACTUAL	MAX ALLOWED
0	1 OZ
0	5 OZ
0	1 oz./1 MIN

SOLVENT SPILLAGE DETAILS: None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° - 90°

Vehicle NHTSA ID No.: MT0207



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 50 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 50 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
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III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
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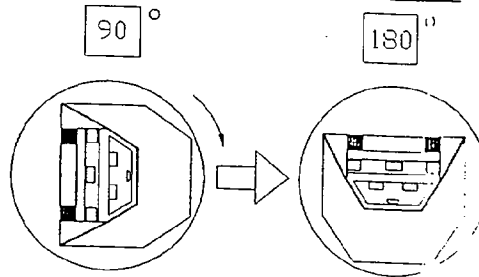
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 90° - 180°

Vehicle NHTSA ID No.: MT0207



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 30 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 30 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
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III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
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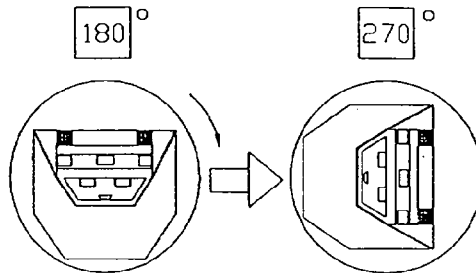
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 180° - 270°

Vehicle NHTSA ID No.: MT0207



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 20 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 20 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
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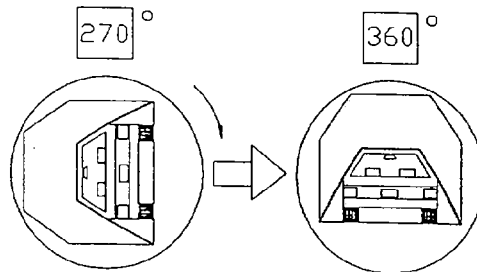
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 270° - 360°

Vehicle NHTSA ID No.: MT0207



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 40 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 40 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
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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: 1996/Mercury/Villager/Minivan

VEH. NHTSA NO.: MT0207 TEST DATE: January 8, 1996

MAX. ACCELERATION VALUES: (g's)	DRIVER #065	PASSENGER #066
Head Channel X	-49.6 @ 75 msec.	-65.6 @ 75 msec.
Head Channel Y	3.4 @ 87 msec.	13.8 @ 82 msec.
Head Channel Z	21.1 @ 68 msec.	25.5 @ 63 msec.
HEAD RESULTANT	51.9 @ 71 msec.	67.6 @ 72 msec.
Chest Channel X	-46.4 @ 63 msec.	-52.8 @ 63 msec.
Chest Channel Y	-6.3 @ 57 msec.	6.8 @ 60 msec.
Chest Channel Z	-13.4 @ 99 msec.	13.6 @ 70 msec.
CLIP	46	51
TIME INTERVAL (msec) [0.003 seconds minimum]	$t_1 = 62.0$ $t_2 = 65.0$	$t_1 = 70.3$ $t_2 = 73.3$

HEAD INJURY CRITERIA (HIC)
VALUES:

HIC	405	861
$t_1 =$ (msec)	48.6	56.0
$t_2 =$ (msec)	84.6	91.8
Avg. Accel. t_1 to t_2 (g's)	41.7	56.6

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

MAX. COMPRESSIVE FEMUR FORCES:

Left Side (N)	5073	7254
Right Side (N)	4914	3638

MAXIMUM SEAT BELT FORCES:

Lap Belt (N)	4651	7342
Shoulder Belt (N)	7465	7437

HYBRID III NECK, CHEST AND PELVIS DATA SHEET

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1996/Mercury/Villager/Minivan

VEHICLE NHTSA NO.: MT0207 TEST DATE: January 8, 1996

MAXIMUM VALUES	DRIVER DUMMY #066	PASSENGER DUMMY #065
Neck Load X (N)	583 @ 137 msec.	745 @ 63 msec.
Neck Load Y (N)	-172 @ 139 msec.	372 @ 128 msec.
Neck Load Z (N)	-2062 @ 67 msec.	-3154 @ 73 msec.
Neck Moment X (NM)	-8.5 @ 199 msec.	-16.4 @ 58 msec.
Neck Moment Y (NM)	38.2 @ 147 msec.	-45.5 @ 86 msec.
Neck Moment Z (NM)	13.8 @ 91 msec.	15.2 @ 188 msec.
Chest Deflection X (mm)	32	38
Time of Max. Occurrence	69 msec.	71 msec.
Pelvis X Acceleration (g's)	-59.1 @ 56 msec.	-80.4 @ 59 msec.
Pelvis Y Acceleration (g's)	-12.9 @ 65 msec.	7.5 @ 59 msec.
Pelvis Z Acceleration (g's)	-16.8 @ 98 msec.	-19.5 @ 79 msec.
Pelvis Resultant (g's)	64.2 @ 50 msec.	82.6 @ 59 msec.

PART 572 DUMMY IN-VEHICLE POSITION

Vehicle NHTSA No.: MT0207 Vehicle: 1996 Mercury Villager Minivan

SEAT TYPE:

 Bench
 X Bucket
 Split Bench

ADJUSTER TYPE:

Driver: X Manual
 Power

 Passenger: X Manual
 Power

BUCKET SEAT BACK TYPE:

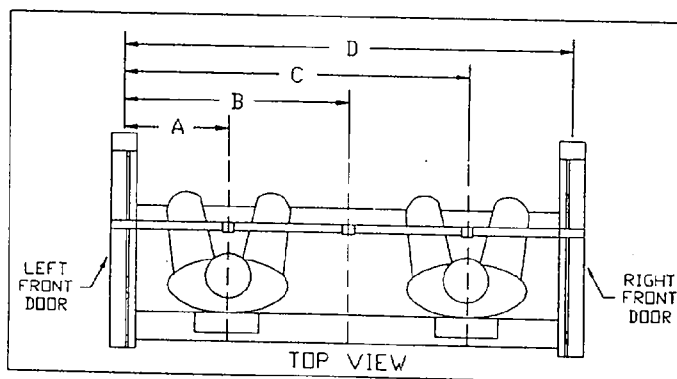
 Fixed
 X Adjustable Reclining

DRIVER SEAT POSITION

8th detent of 17 detents (1st locking position is 0)

PASSENGER SEAT POSITION

8th detent of 17 detents (1st locking position is 0)



065 DUMMY ID 066

A = Left Door to Driver Centerline	<u>446</u> mm
B = Left Door to Center Passenger Centerline	<u>853</u> mm
C = Left Door to Right Passenger Centerline	<u>1262</u> mm
D = Left Door to Right Door	<u>1705</u> mm

FRONT SEAT MEASUREMENT TABLE

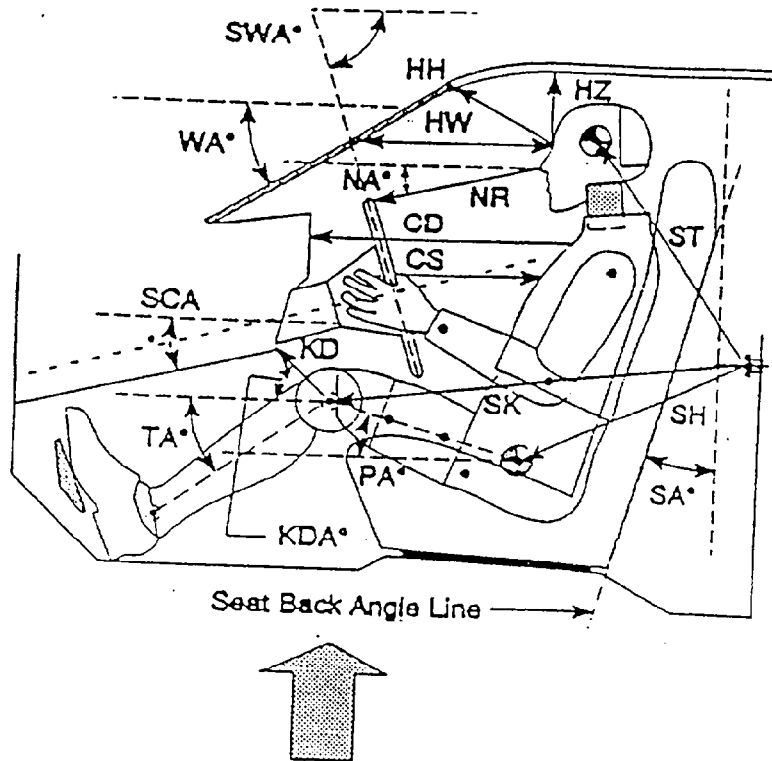
Units (mm)

	DRIVER (Serial #065)	PASSENGER (Serial #066)
WA°	31.2°	
SWA°	26.2°	N/A
SCA°	25.8°	N/A
SA°	12th notch rearward (1st is zero)	12th notch rearward (1st is zero)
HZ	184	170
HH	392	360
HW	591	570
HR	267	272
NR	366 Angle (NA) 16.4°	N/A
CD	537	505
CS	277	N/A
RA	178	N/A
KDL	217 Angle (KDA) 15.7°	185
KDR	132	181 Angle 13°
PA°	22.6°	22.8°
TA°	46.3°	45.4°
KK	296	254
ST*	651 Angle 161°	662 Angle 18.7°
SK*	692 Angle 86.4°	699 Angle 92.4°
SH*	284 Angle 95.2°	307 Angle 94.9°
SHY	270	290
HS	306	320
HD	159	165
AD	124	140

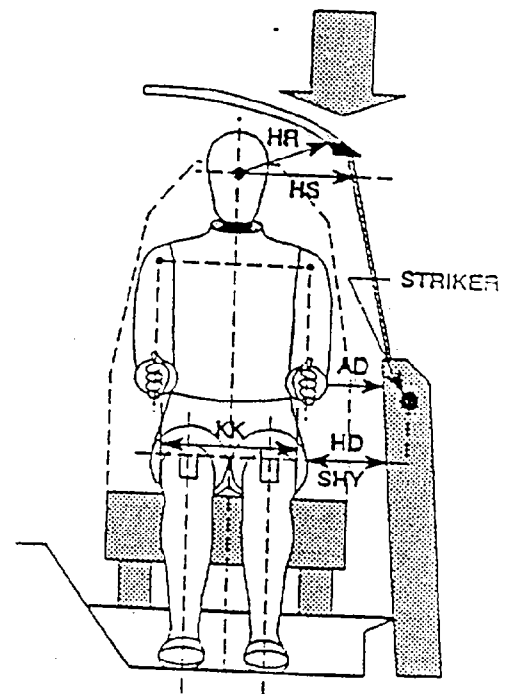
N/A = Not Applicable

* Angles measured from vertical

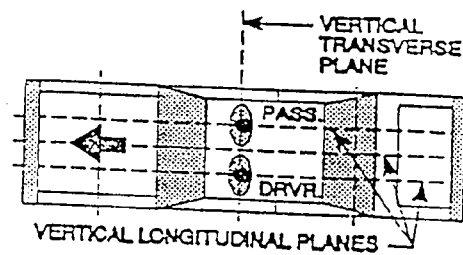
FRONT SEAT MEASUREMENTS



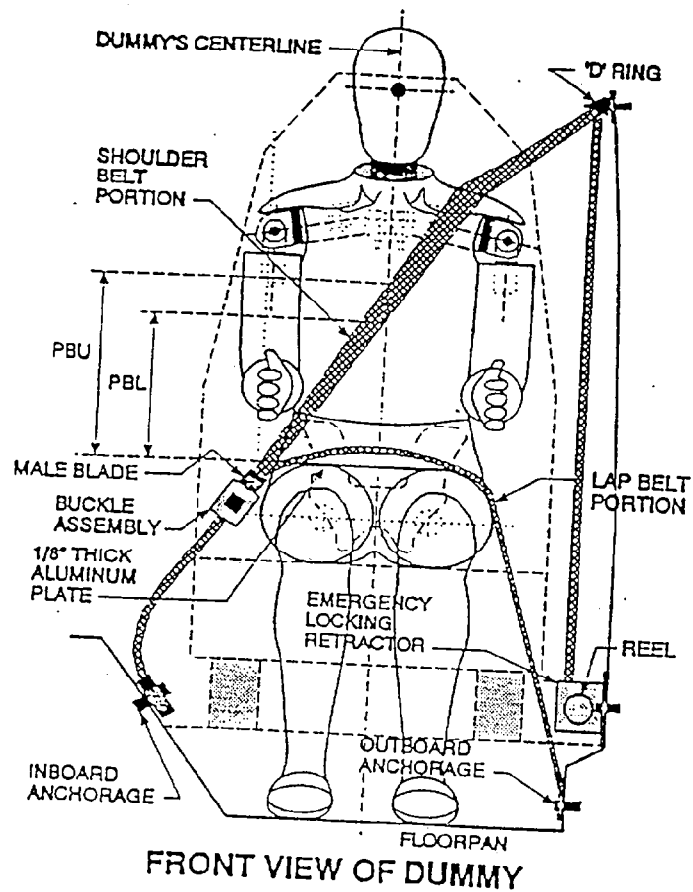
- AD - Arm to Door
- HD - H-Point to Door
- HR - Head to Side Header
- HS - Head to Side Window
- KK - Knee to Knee
- SHY - Striker to H-Point (Y-Direction)



- 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	360	358
PBL --	Top surface of alum. plate to belt lower edge	285	276

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:

	<u>Driver</u>	<u>Passenger</u>
Length from trim above retractor reel to "D" ring as measured on dummy.	<u>755 mm</u>	<u>755 mm</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>1005 mm</u>	<u>1012 mm</u>
Lap belt length as measured on Part 572 Dummy.	<u>960 mm</u>	<u>966 mm</u>

SHOULDER BELT SPOOL-OFF DATA:

As determined by film analysis	<u>38 mm</u>	<u>28 mm</u>
As determined mechanically	<u>24 mm</u>	<u>25 mm</u> at retractor
	<u>54 mm</u>	<u>46 mm</u> at D-ring
As determined electronically	<u>46 mm</u>	<u>37 mm</u>

BELT STRETCH DATA:

Measured electronically between shoulder belt load cell and the "D" ring.	<u>NR</u>	<u>NR</u>
Measured mechanically	<u>NR</u>	<u>NR</u>

RETRACTOR LOCK-UP TIME:

As determined by shoulder belt spool-off observed in on-board cameras	<u>61 msec</u>	<u>56 msec</u>
---	----------------	----------------

NR Not Recorded

CAMERA LOCATIONS

VEH. NHTSA NO.: MT0207 ; TEST DATE: January 8, 1996 ; TIME: 4:18 p.m.

VEH. YEAR/MAKE/MODEL/BODY STYLE: 1996/Mercury/Villager/Minivan

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	1180	9460	1690	90°	8990	25	1351
3	Steering Column Top	2270	8970	1560	90°	8500	25	1015
4	Steering Column Bottom	2270	8930	1030	90°	8460	25	816
5	Left Driver Close-up	1720	8910	1420	90°	8440	50	1015
6	Left Angle	5000	6020	2070			50	1099
7	Driver Onboard						25	1015
8	Passenger Onboard						25	NT
9	Right Overall	2560	8950	1470	90°	8480	13	1053
10	Right Front	1000	9000	1610	90°	8530	25	1130
11	Right Passenger Close-up	1710	2640	1350	90°	2170	50	816
12	Right Angle		6000	2050			50	1235
13	Top View Wide	2395	0	5250			8	1015
14	Top Driver	-390	335	2470			13	909
15	Top Passenger	-340	-380	2470			13	976
16	Pit Engine	1200	0	3185			13	1020
17	Fuel Tank	2950	0	3185			13	893

*** COORDINATES:**

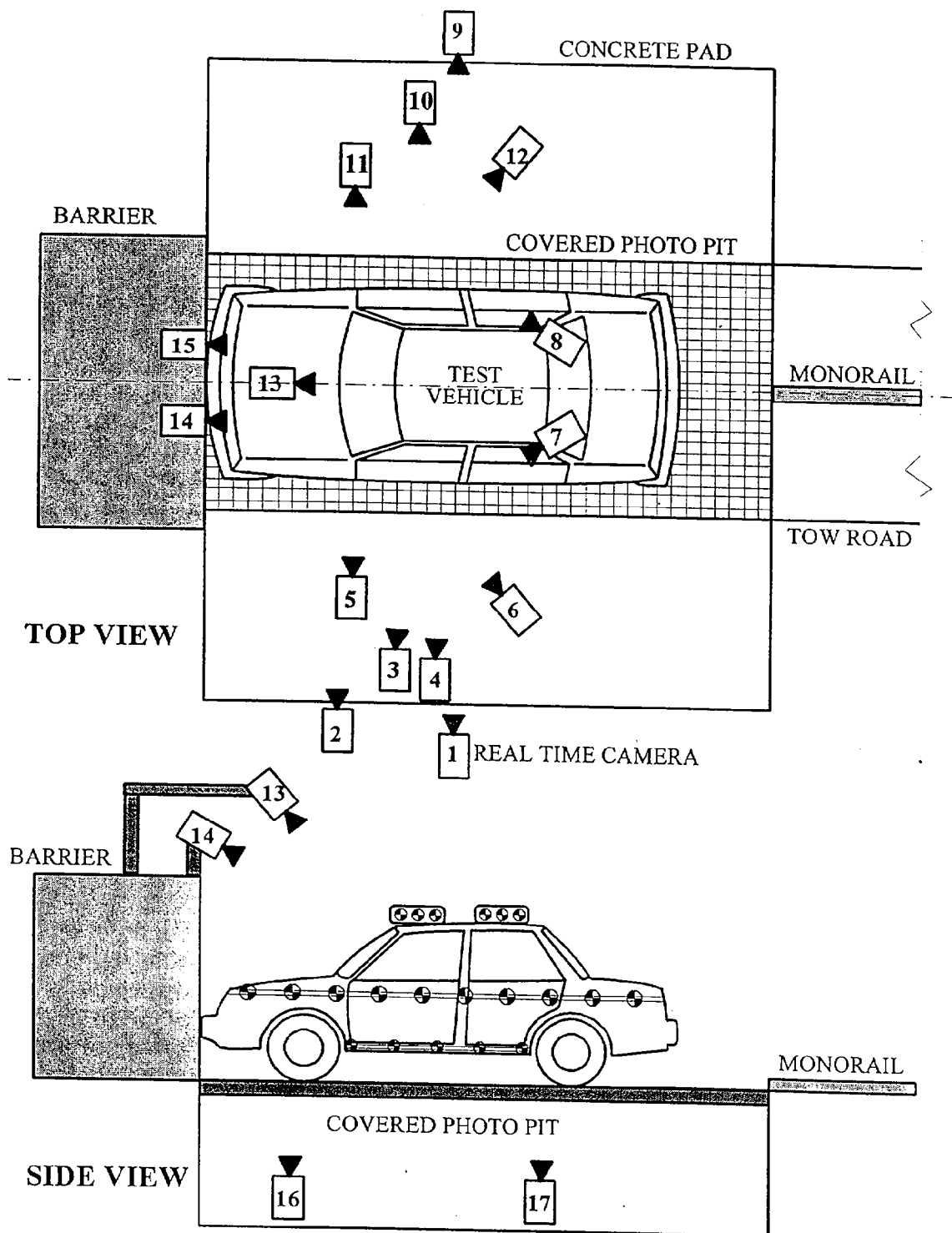
+X = film plane rearward of barrier

+Y = film plane to left of monorail centerline

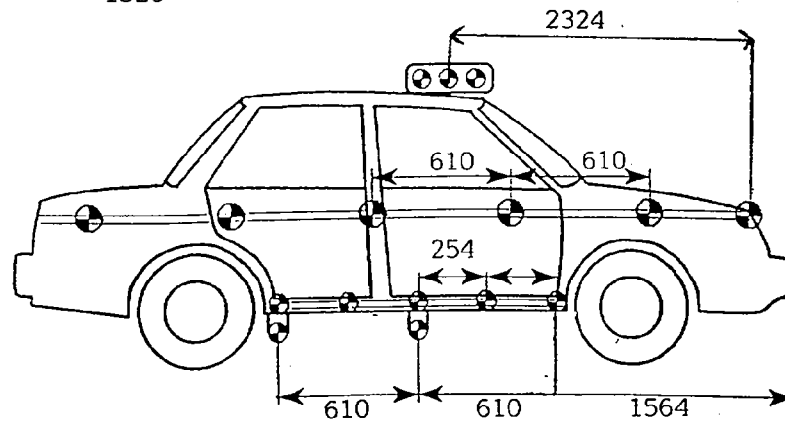
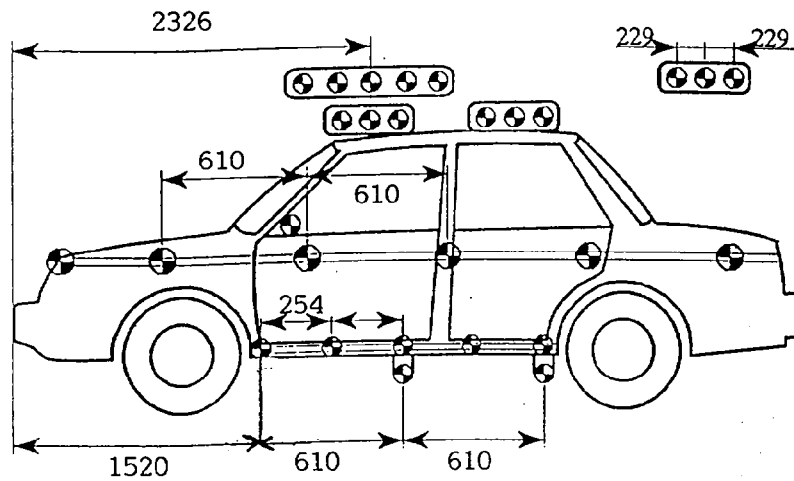
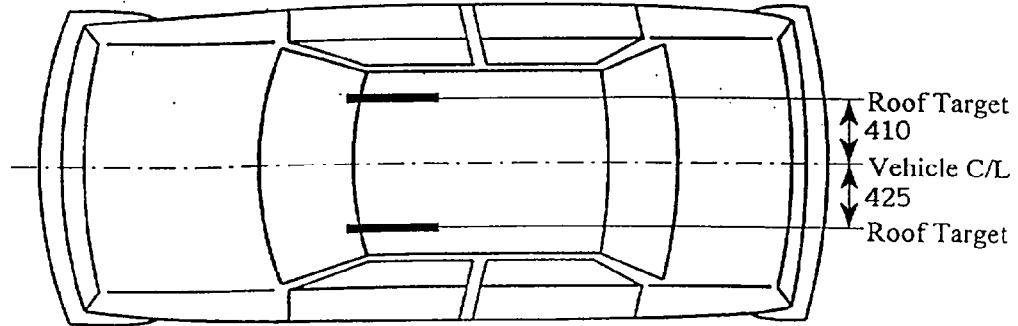
+Z = film plane to above ground level

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

CAMERA LOCATIONS (Cont'd)



VEHICLE TARGET LOCATIONS



(DIMENSIONS IN MM)

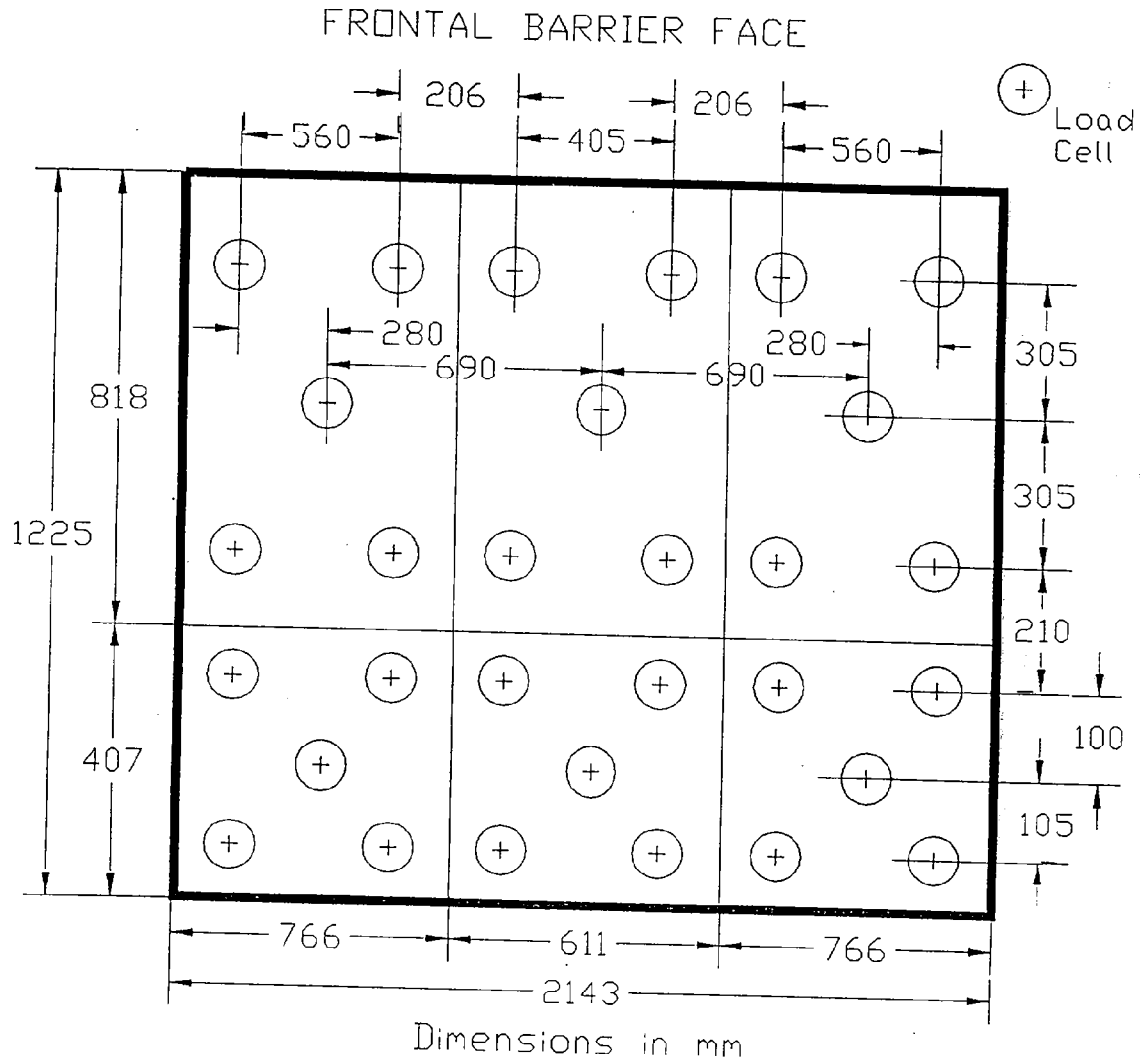
LOAD CELL LOCATIONS ON FIXED BARRIER

30 Load Cells

6 Rows

9 Columns

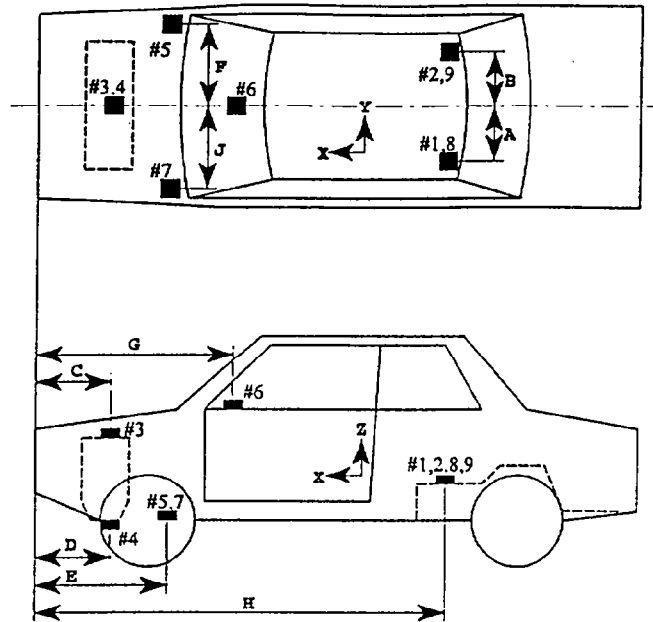
6 Groupings (5 cells/group)



The following data is presented in Appendix B:

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

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



Units: (mm)

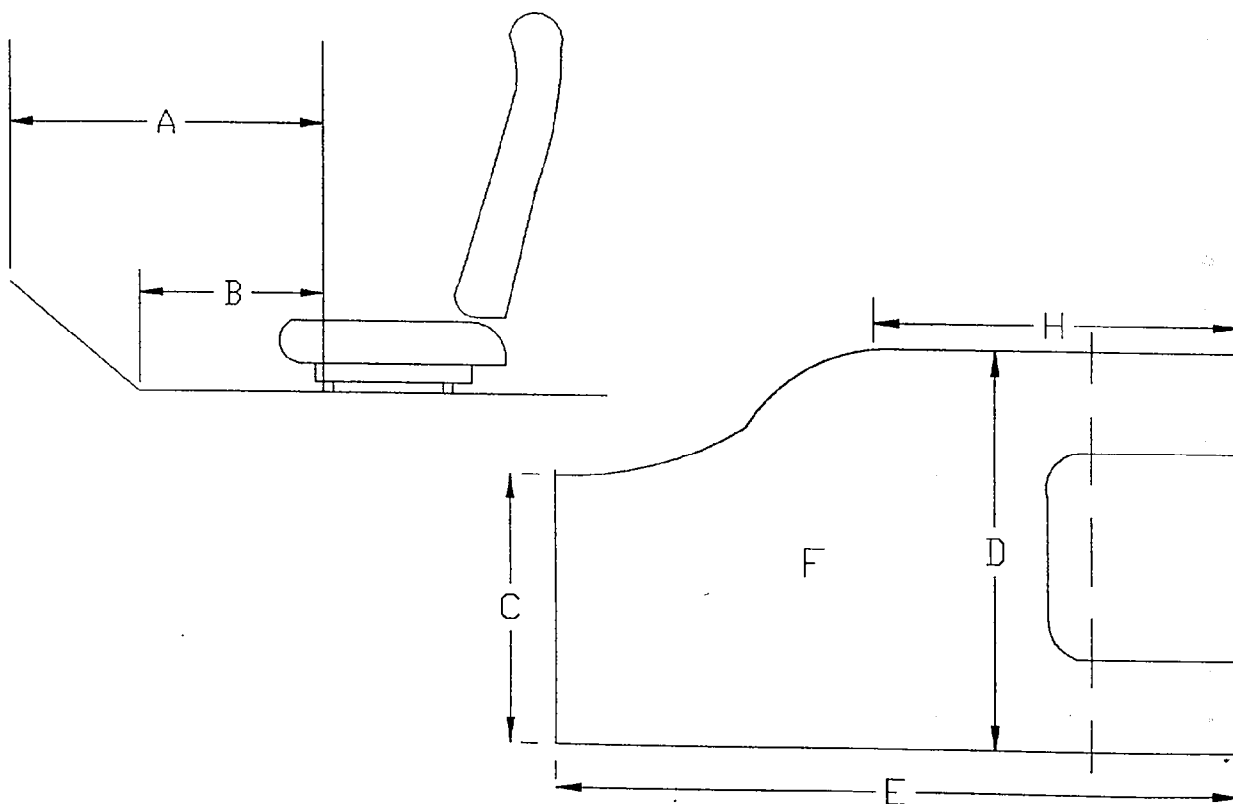
Dimension	Length
A	475
B	482
C	652
D	830
E	1085
F	730
G	1546
H	2744
J	730

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



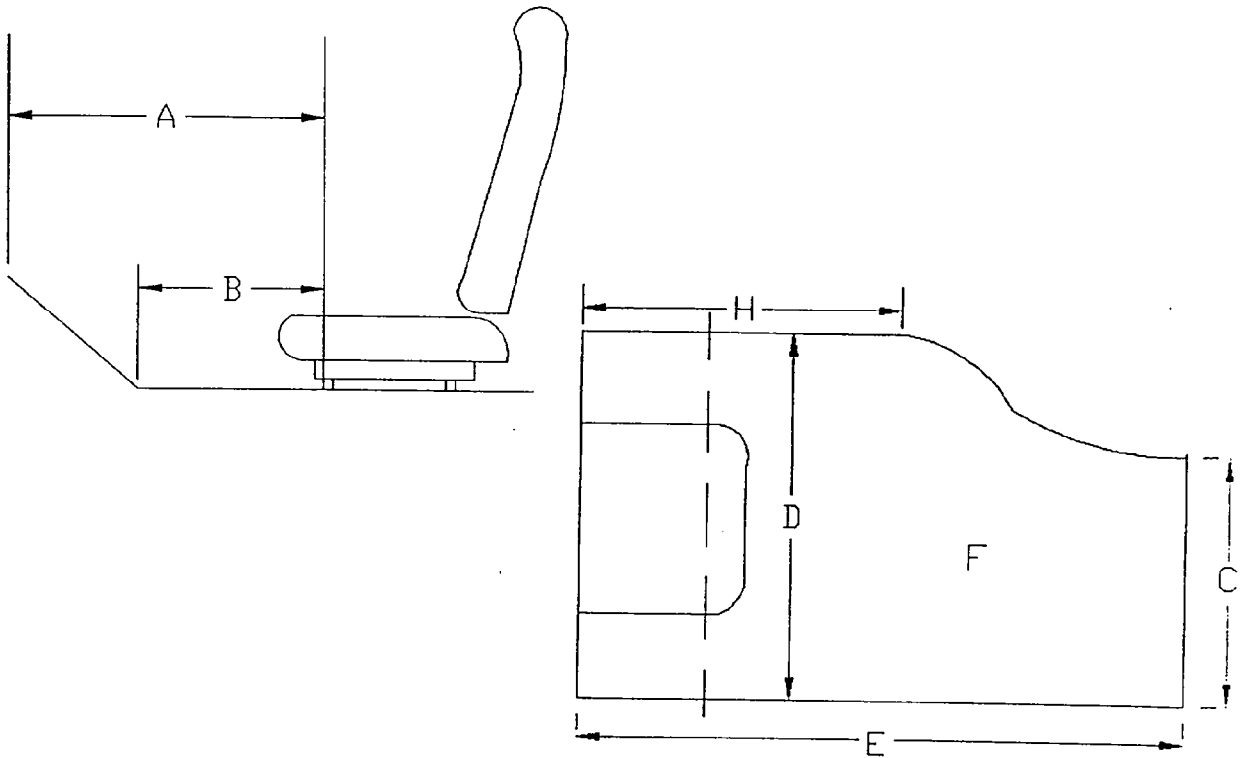
Units = mm

MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	824	643	181
B	550	501	49
C	520	497	23
D	515	514	1
E	2256	2169	87
H	1990	1718	272
F (cm ²)	17,540	10,964	6576

TEST VEHICLE MEASUREMENTS (Cont'd)

STATIC FOOTWELL DEFORMATION

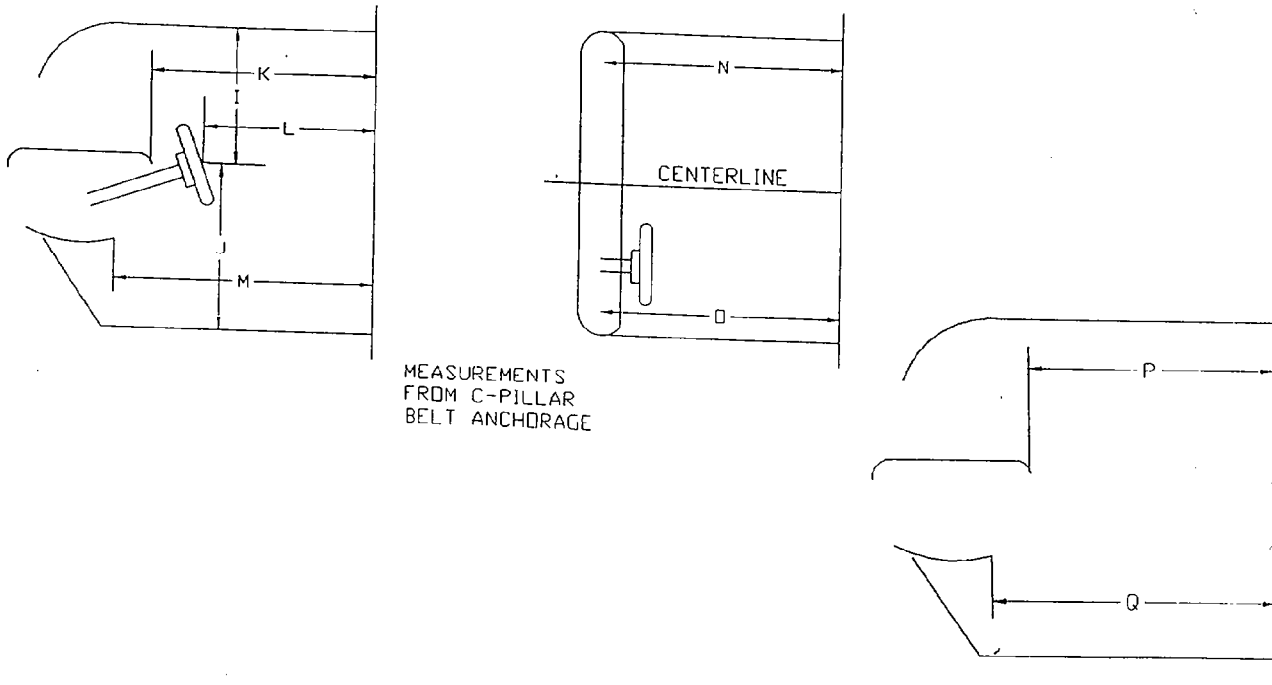
Passenger's Side



Units = mm

MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	864	649	215
B	575	557	18
C	560	532	28
D	514	512	2
E	2184	2103	81
H	1962	1939	23
F (cm ²)	11,728	10,978	750

TEST VEHICLE MEASUREMENTS (Cont'd)
 STATIC PASSENGER COMPARTMENT INTRUSION



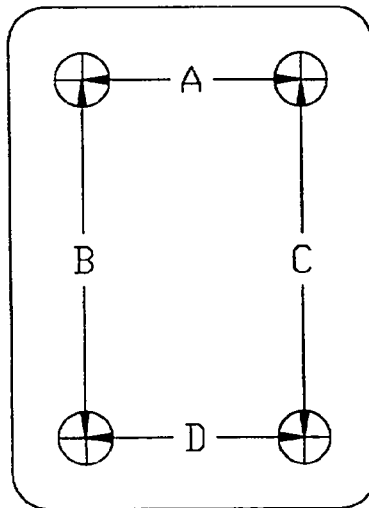
Units = mm

MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
I	493	391	102
J	722	836	114
K	1920	1921	-1
L	1672	1684	-12
M	2108	2016	92
N	2156	2112	44
O	2136	2104	32
P	1898	1887	11
Q	2072	1958	114

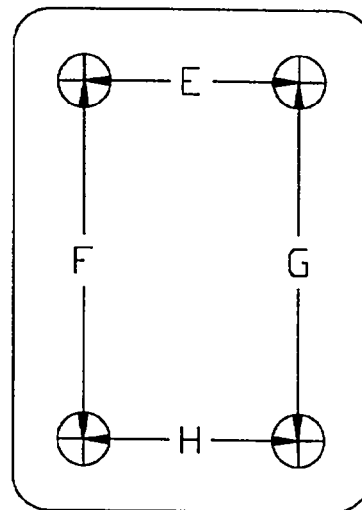
TEST VEHICLE MEASUREMENTS (Cont'd)

UNDERBODY FLOORBOARD DEFORMATION

DRIVER'S SIDE



PASSENGER'S SIDE



MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	420	414	6
B	354	352	2
C	342	335	7
D	410	409	1
E	570	548	22
F	326	316	10
G	330	329	1
H	568	567	1

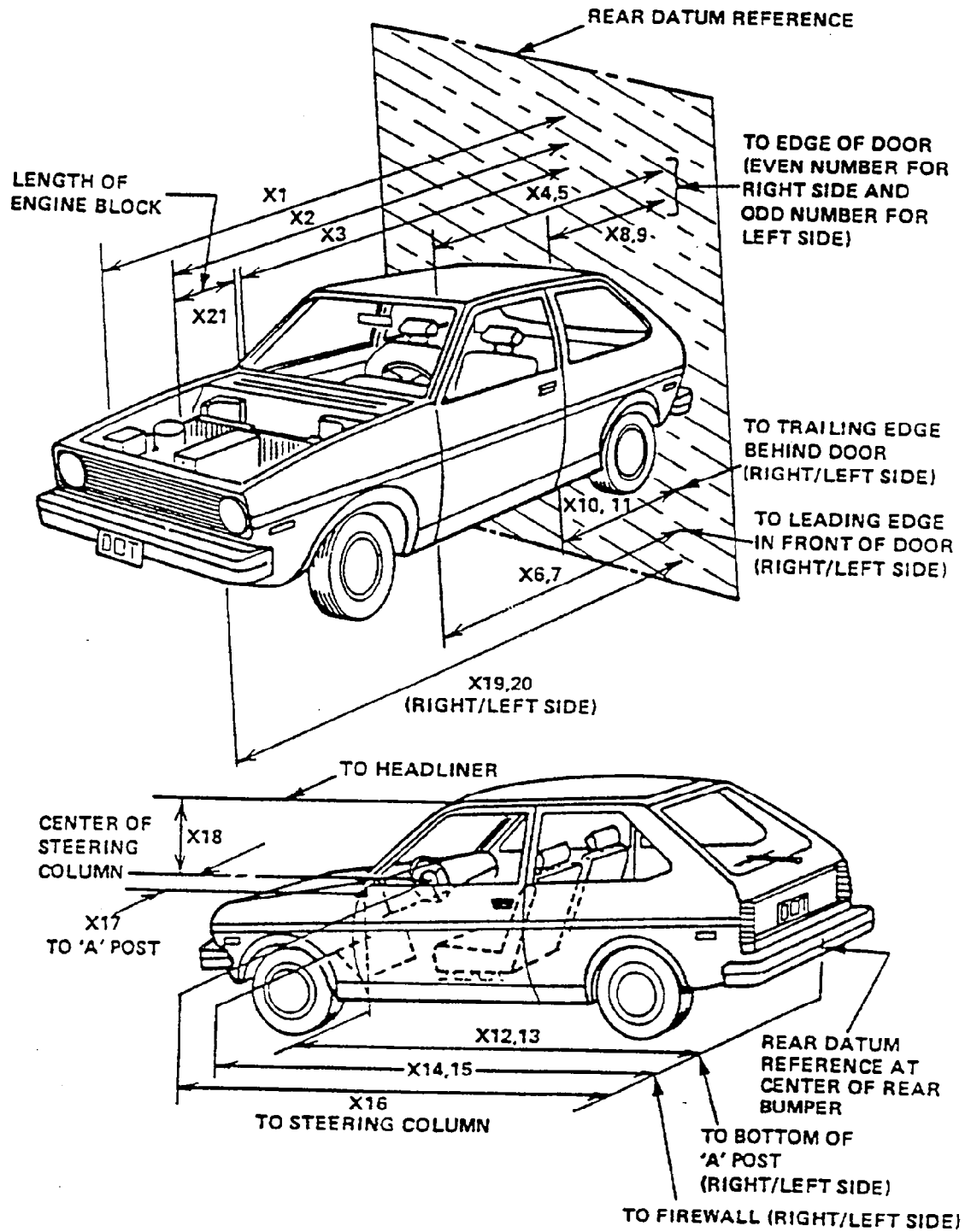
NR = Not Recordable

N/A = Not Applicable

TEST VEHICLE MEASUREMENTS (Cont'd)

No.	MEASUREMENT DESCRIPTION:	Pre-Test (mm)	Post-Test (mm)	Diff. (mm)
X1	Total Length of Test Vehicle at Centerline	4764	4162	602
X2	Rear Surface of Vehicle to Front of Engine	4209	3998	211
X3	Rear Surface of Vehicle to Firewall	3814	3546	268
X4	Rear Surface to Upr. Leading Edge of Rt. Door	3373	3403	-30
X5	Rear Surface to Upr. Leading Edge of Left Door	3369	3386	-17
X6	Rear Surface to Lwr. Leading Edge of Rt. Door	3270	3291	-21
X7	Rear Surface to Lwr. Leading Edge of Left Door	3265	3265	0
X8	Rear Surface to Upr. Trailing Edge of Rt. Door	2171	2202	-31
X9	Rear Surface to Upr. Trailing Edge of Left Door	2162	2176	-14
X10	Rear Surface to Lwr. Trailing Edge of Rt. Door	2180	2198	-18
X11	Rear Surface to Lwr. Trailing Edge of Left Door	2174	2164	10
X12	Rear Surface to Bottom of A-Post on Rt. Side	3285	3297	-12
X13	Rear Surface to Bottom of A-Post on Left Side	3271	3269	2
X14	Rear Surface to Firewall on Right Side	3737	3673	64
X15	Rear Surface to Firewall on Left Side	3703	3667	36
X16	Rear Surface to Steering Column	2812	2871	-59
X17	Center of Steering Column to A-Post	398	343	55
X18	Center of Steering Column to Headlining	435	336	99
X19	Rear Surface to Right Side of Front Bumper	4609	4158	451
X20	Rear Surface to Left Side of Front Bumper	4616	4141	475
X21	Length of Engine Block	420	420	0

TEST VEHICLE MEASUREMENTS (Cont'd)



ACCIDENT INVESTIGATION DIVISION DATA
FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: 1996/Mercury/Villager/Minivan

VEH. NHTSA NO.: MT0207; VIN: 2M2DV11W5TDJ02445

MODEL YEAR: 1996; BUILD DATE: 10/95; TEST DATE: January 8, 1996

VEH. SIZE CATEGORY: Special Purpose; TEST WEIGHT: 2009.1 kg

VEH. WHEELBASE: 2855 mm; FRONT OVERHANG: 1010 mm; OVERALL WIDTH: 1881 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: 151 msec

VELOCITY CHANGE: 66.5 kph

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

CRUSH DEPTH C1 = 475 mm

DIMENSIONS: C2 = 542 mm

C3 = 579 mm

C4 = 620 mm

C5 = 534 mm

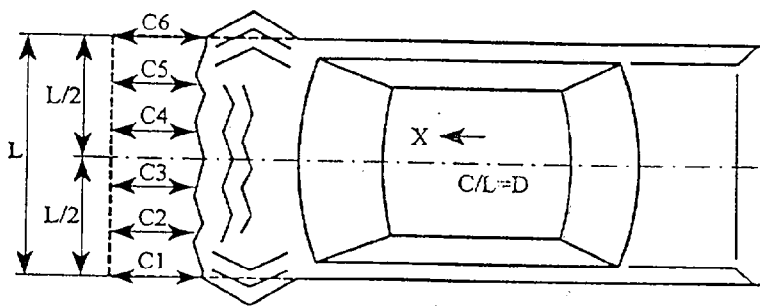
C6 = 451 mm

MIDPOINT OF D = Vehicle Centerline

DAMAGE: (Longitude)

LENGTH OF L = 1380 mm

DAMAGED REGION:



APPENDIX A
PHOTOGRAPHS

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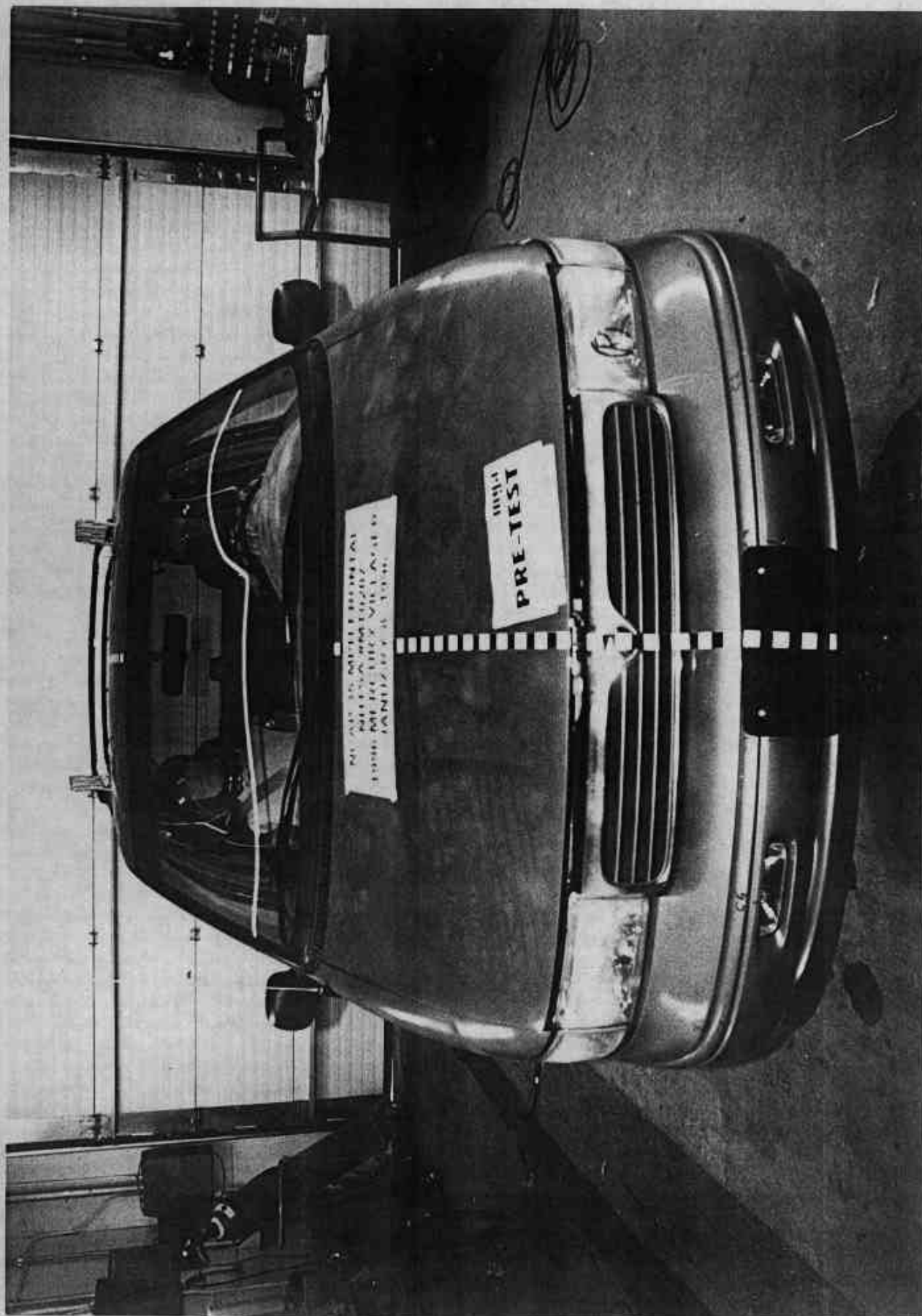


Photo No. A-1 - Pre-Test Front View of Test Vehicle

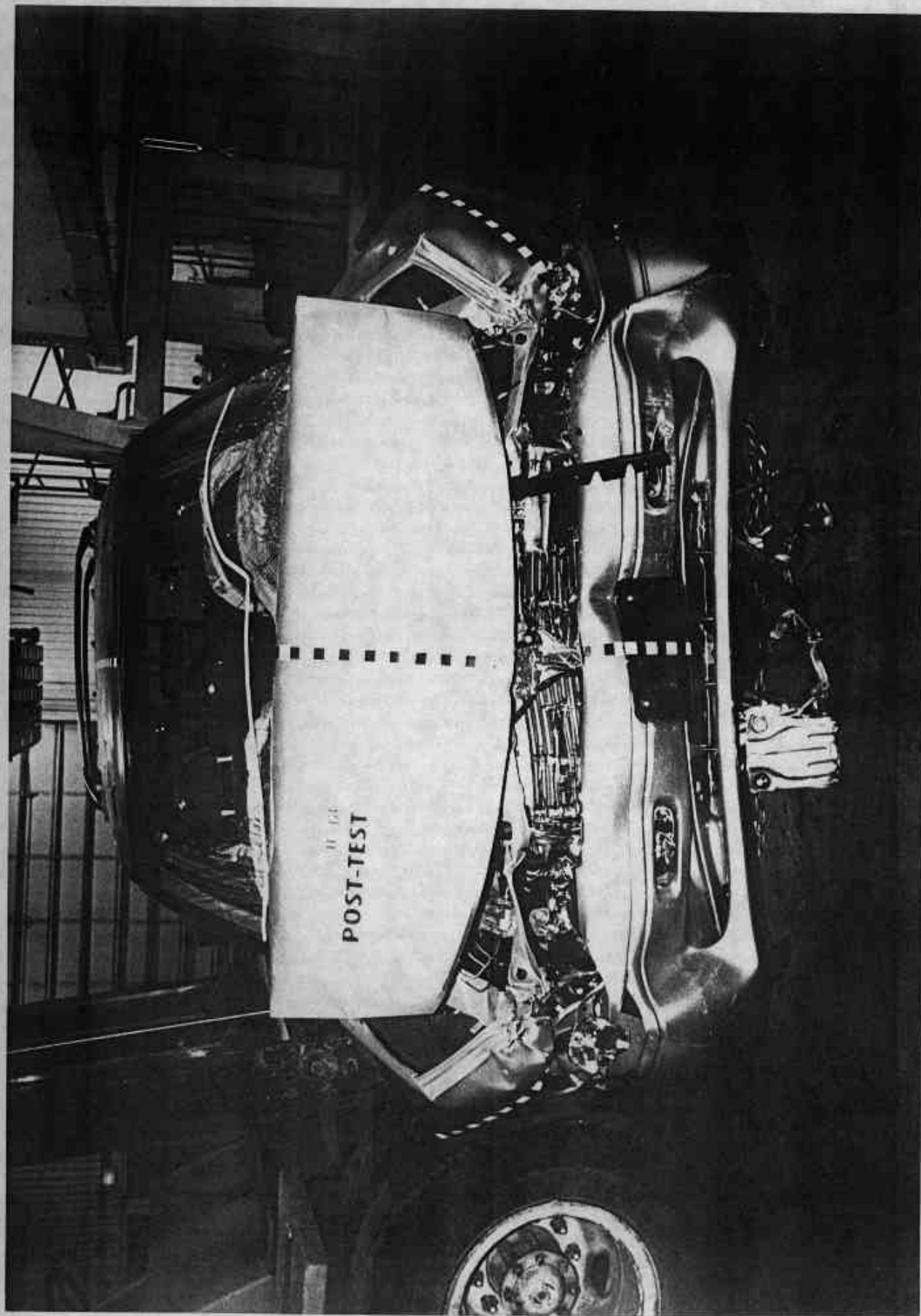


Photo No. A-2 - Post-Test Front View of Test Vehicle

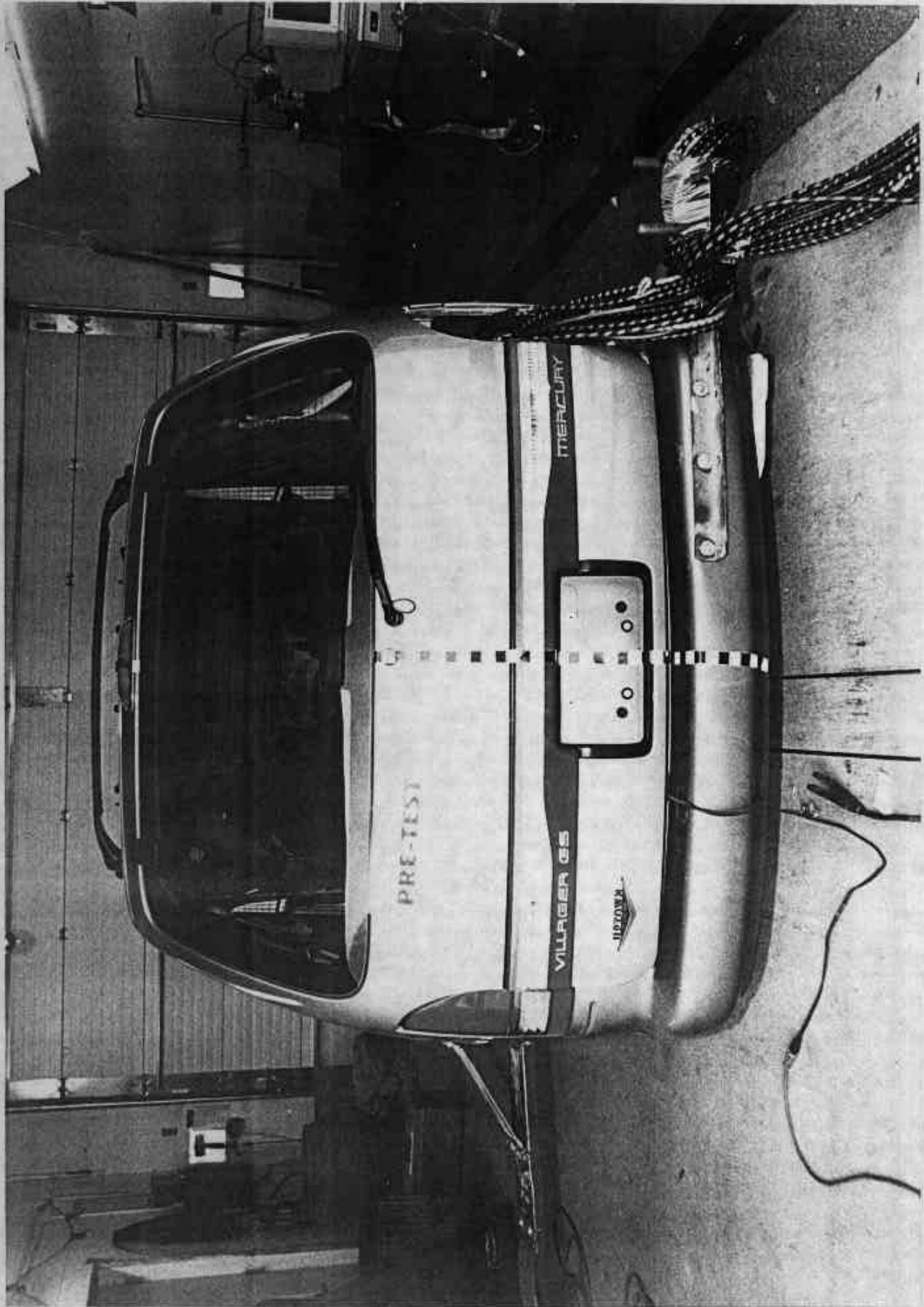


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

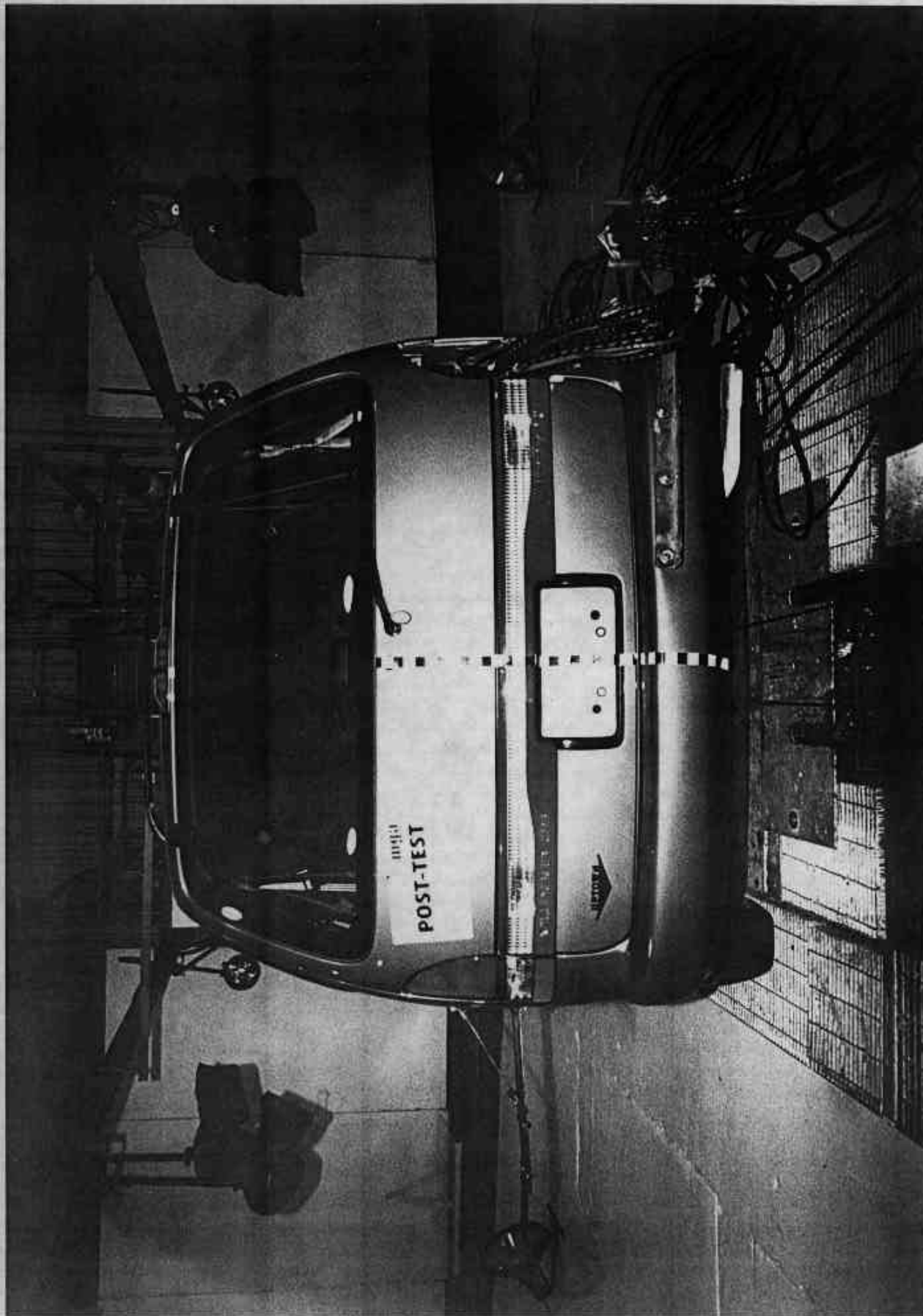
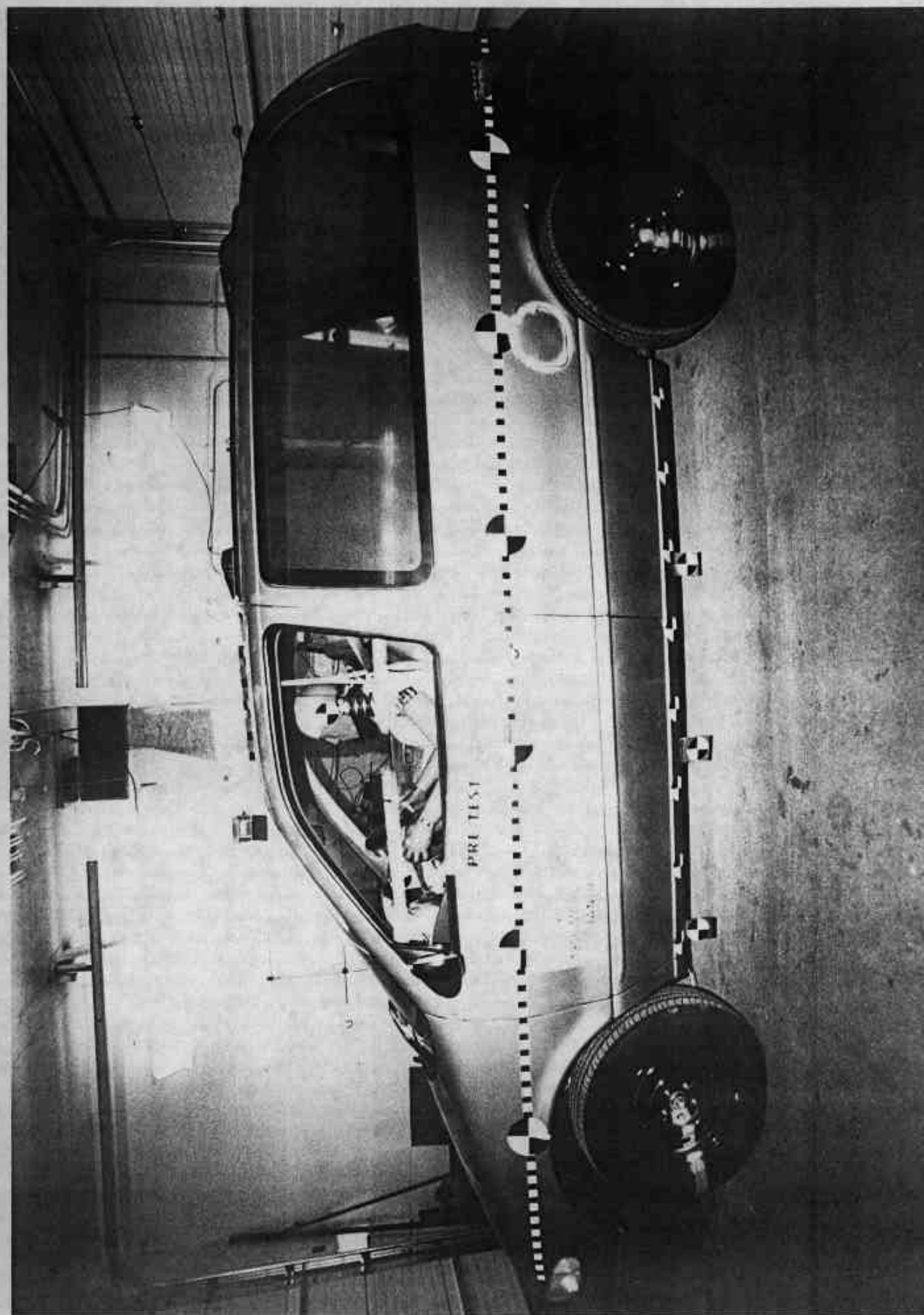
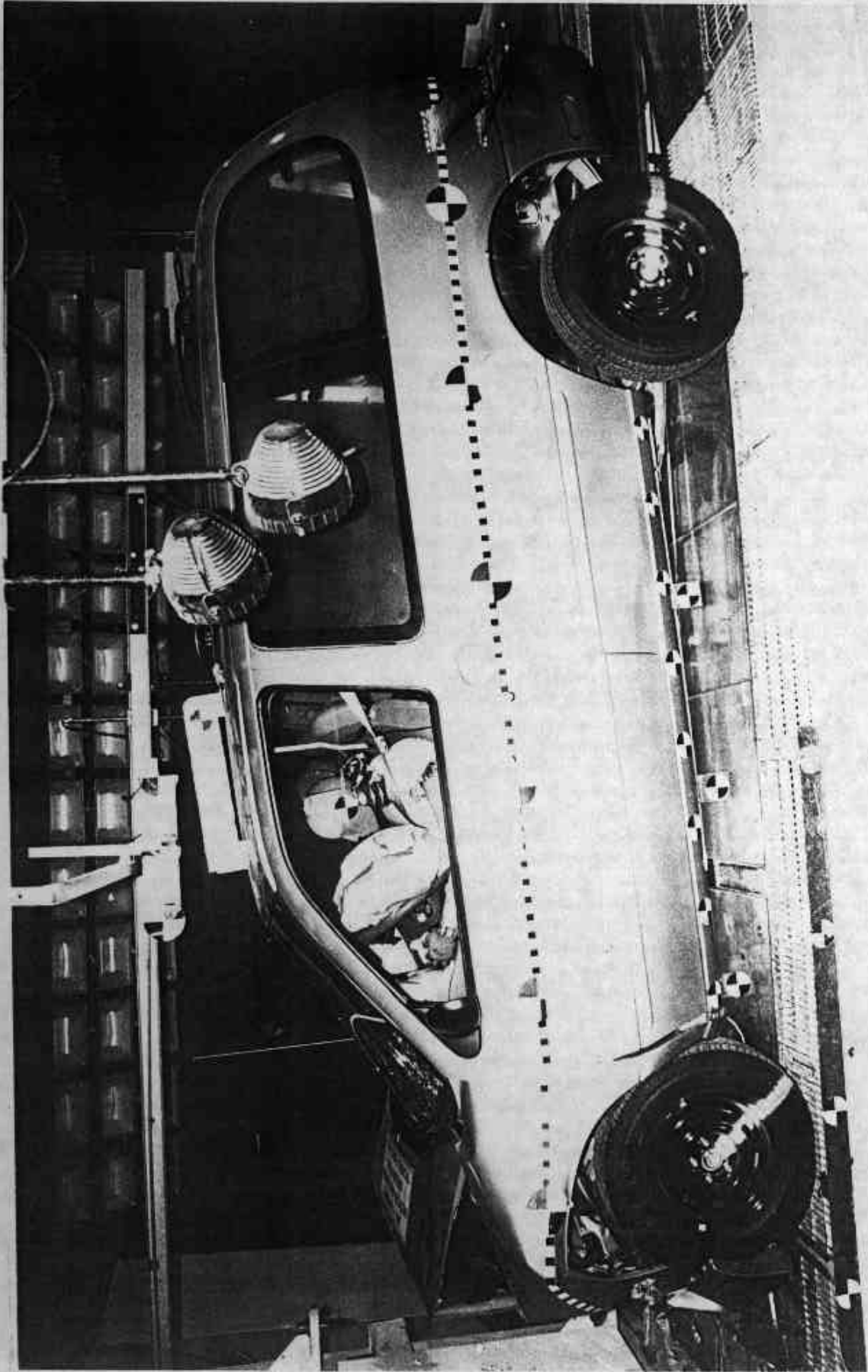


Photo No. A-4 - Post-Test Rear View of Test Vehicle



A-5

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



A-6

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

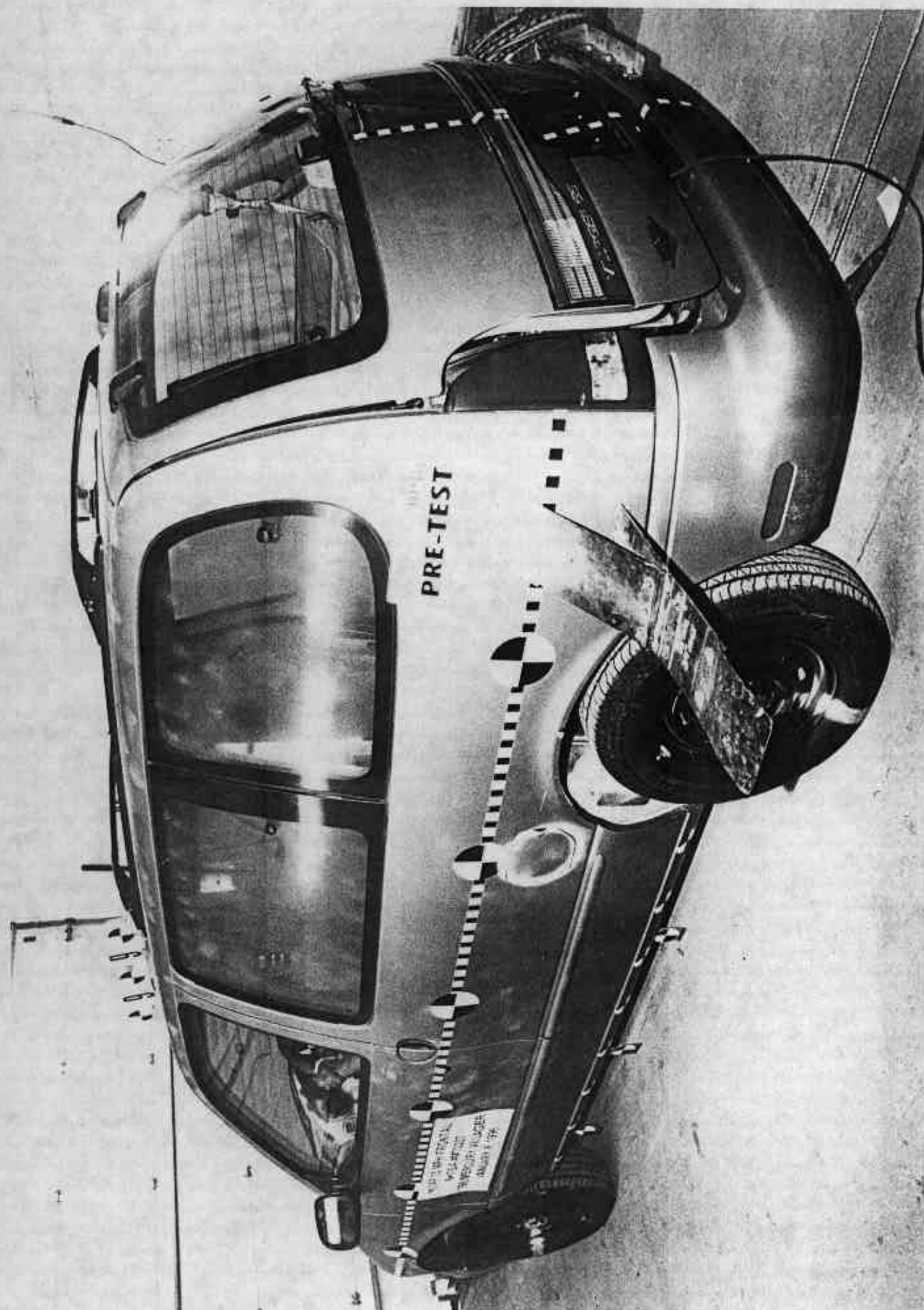


Photo No. A-7 - Pre-Test Left Rear Three-Quarter View of Test Vehicle

A-7

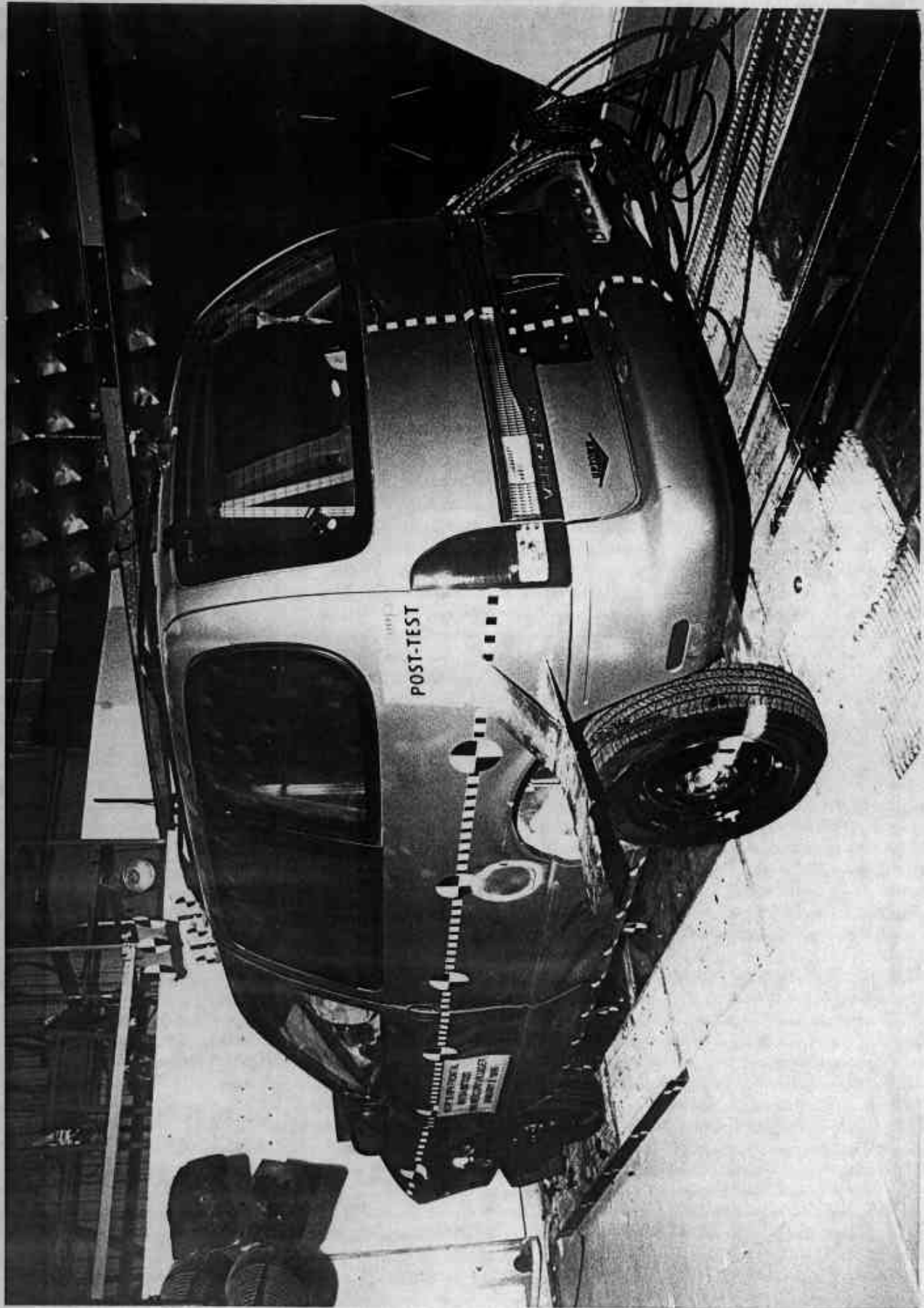


Photo No. A-8 - Post-Test Left Rear Three-Quarter View of Test Vehicle

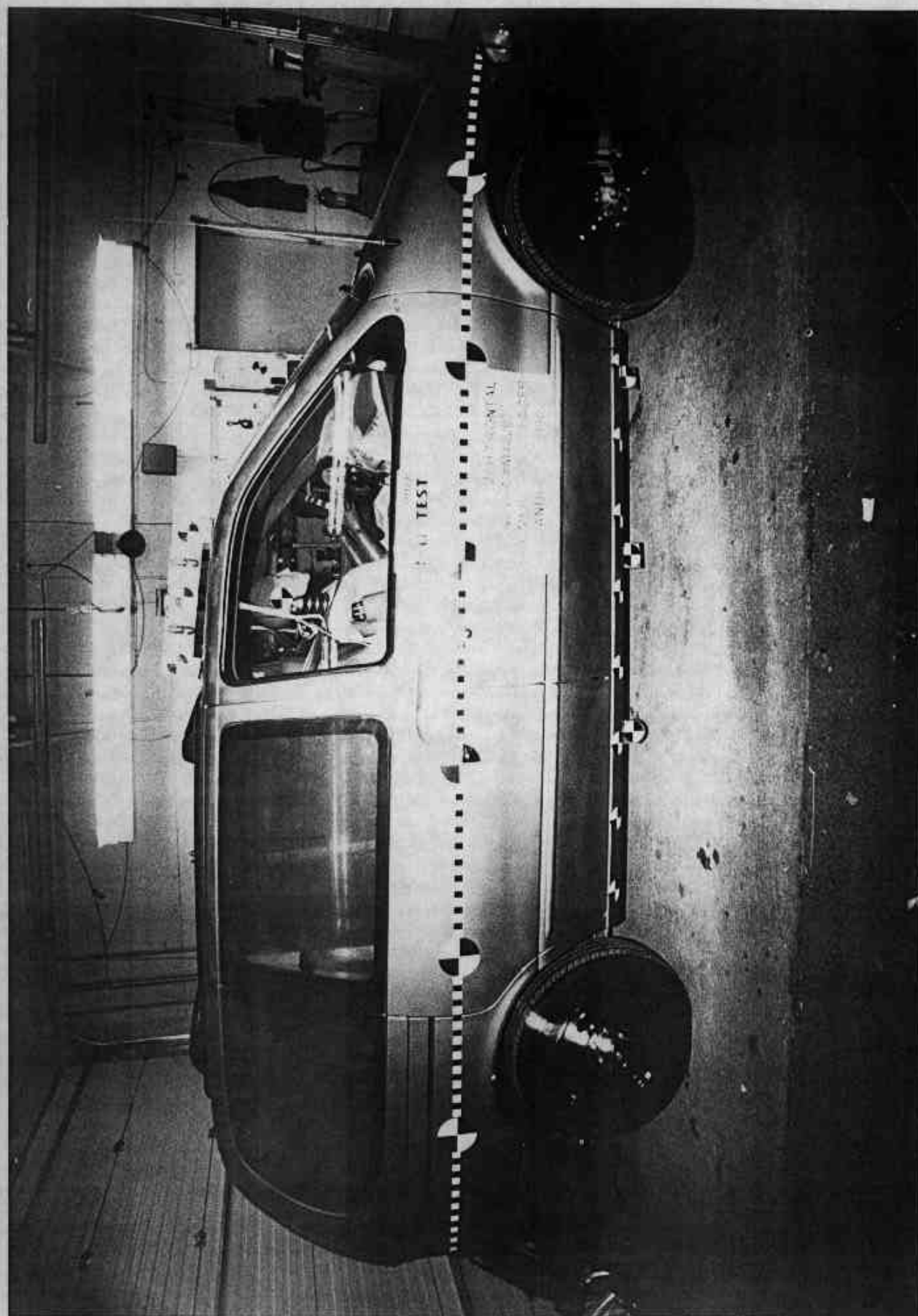


Photo No. A-9 - Pre-Test Right Side View of Test Vehicle

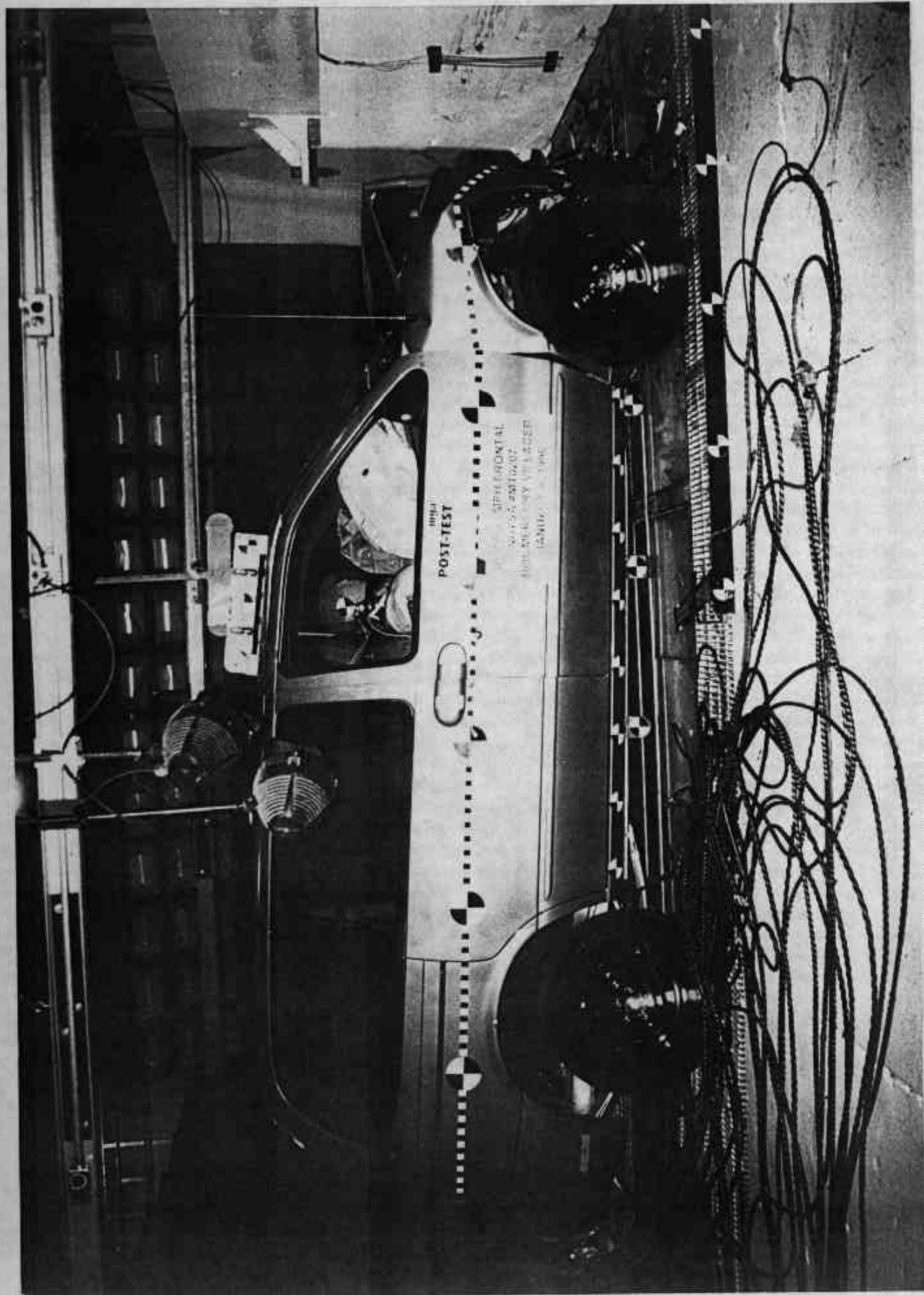


Photo No. A-10 - Post-Test Right Side View of Test Vehicle

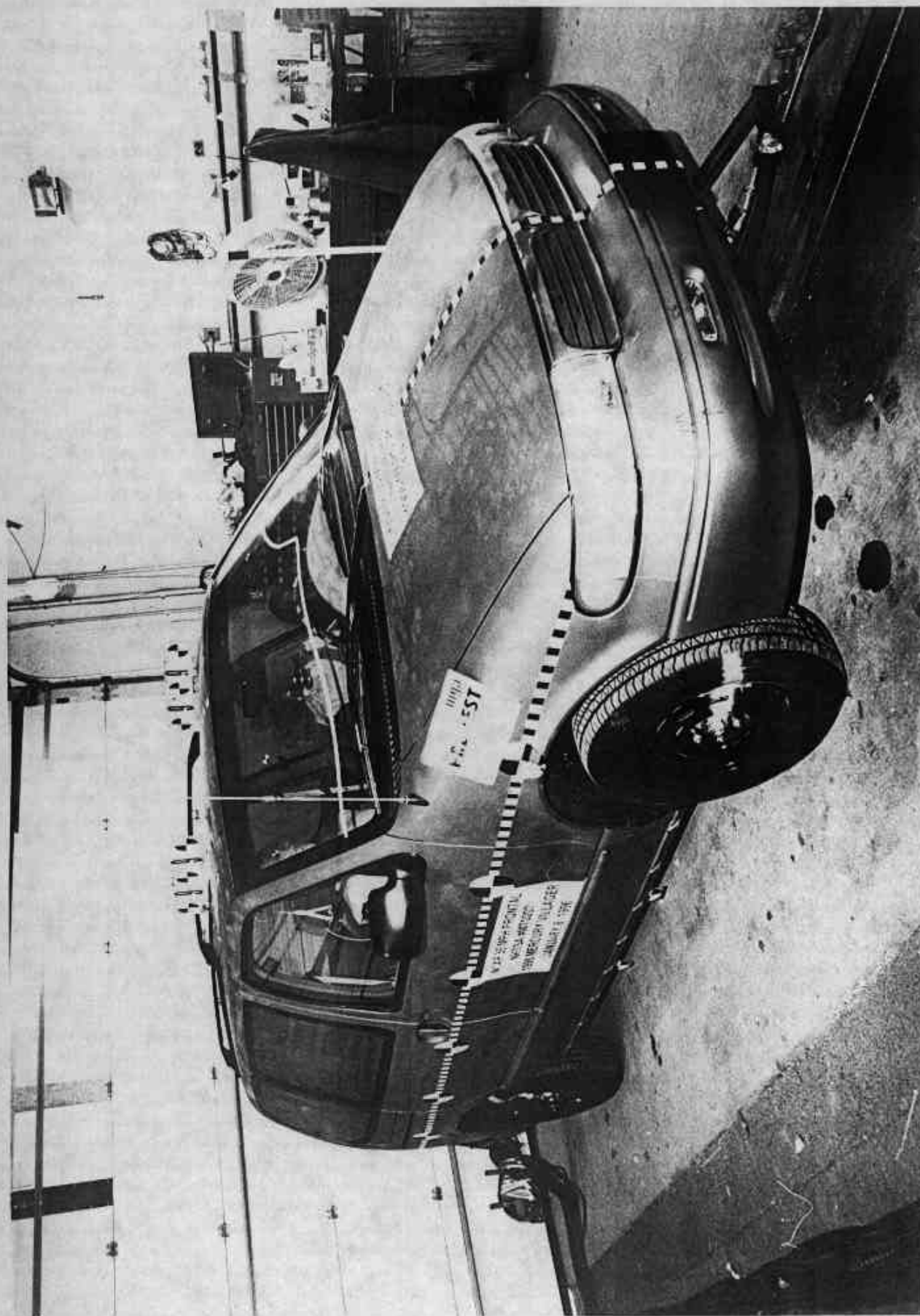


Photo No. A-11 - Pre-Test Right Front Three-Quarter View of Test Vehicle

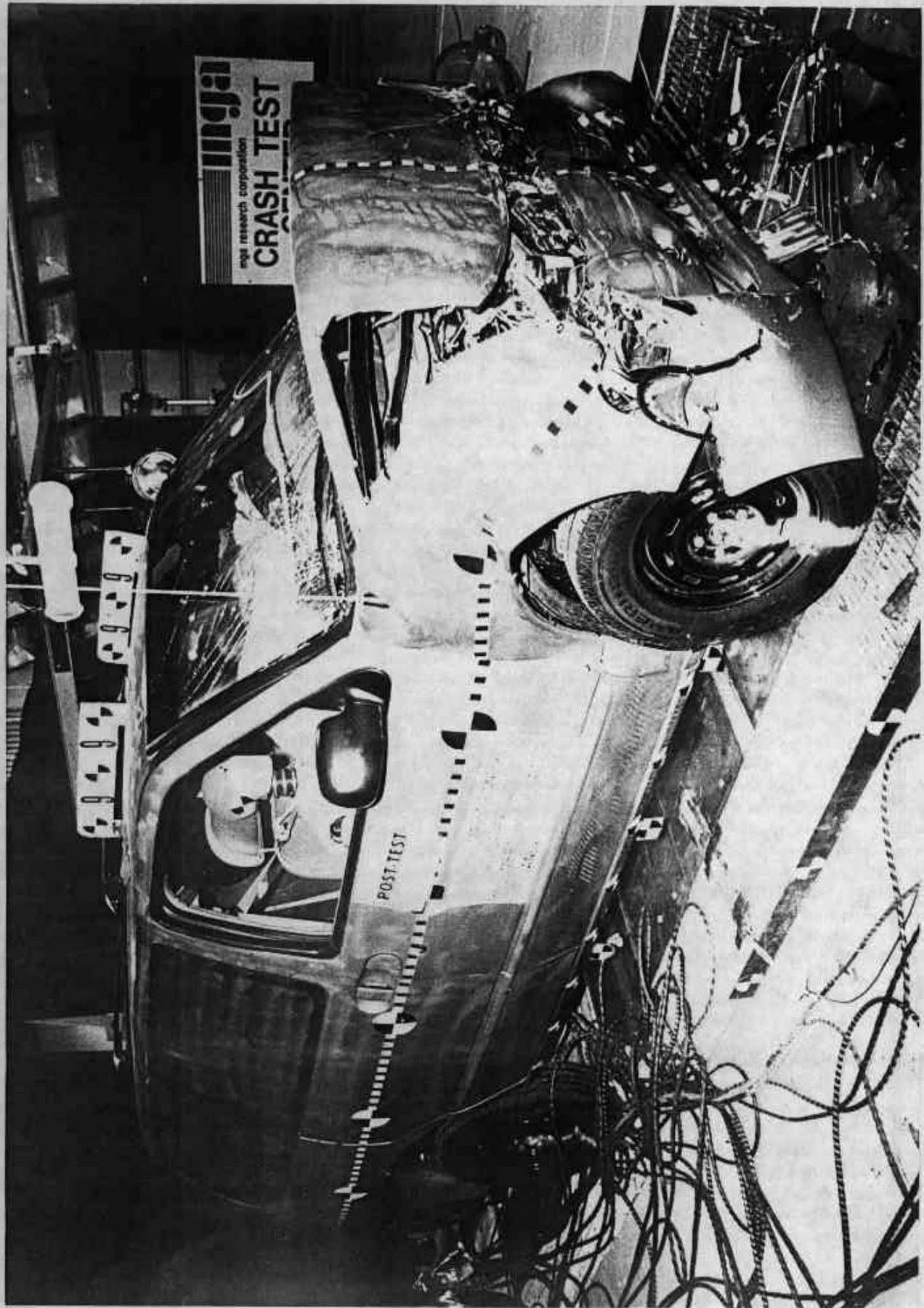


Photo No. A-12 - Post-Test Right Front Three-Quarter View of Test Vehicle

A-12

11111111

PRE-TEST

1993 MERCURY VILLAGE

#MT0267



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

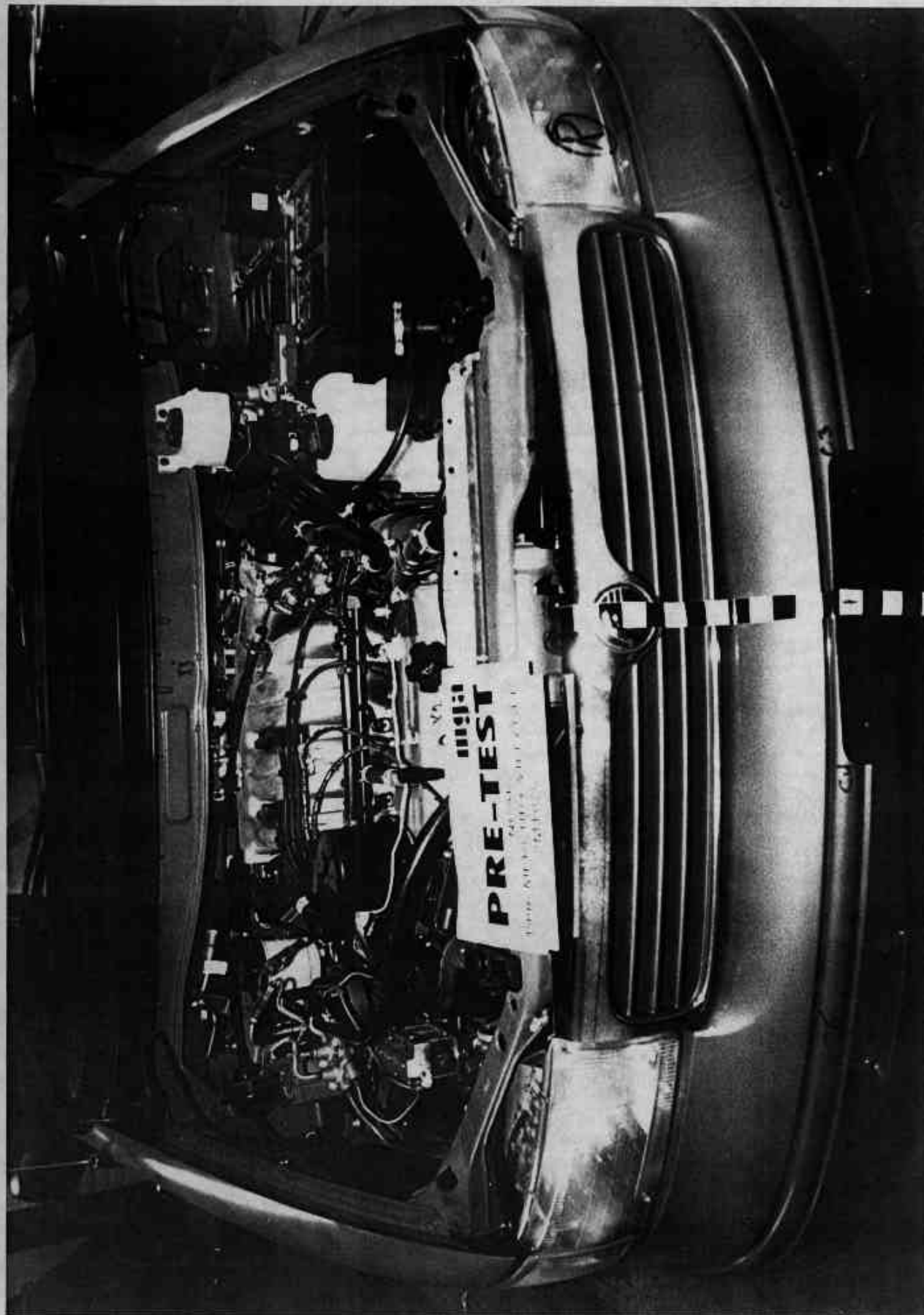


Photo No. A-14 - Pre-Test Engine Compartment View

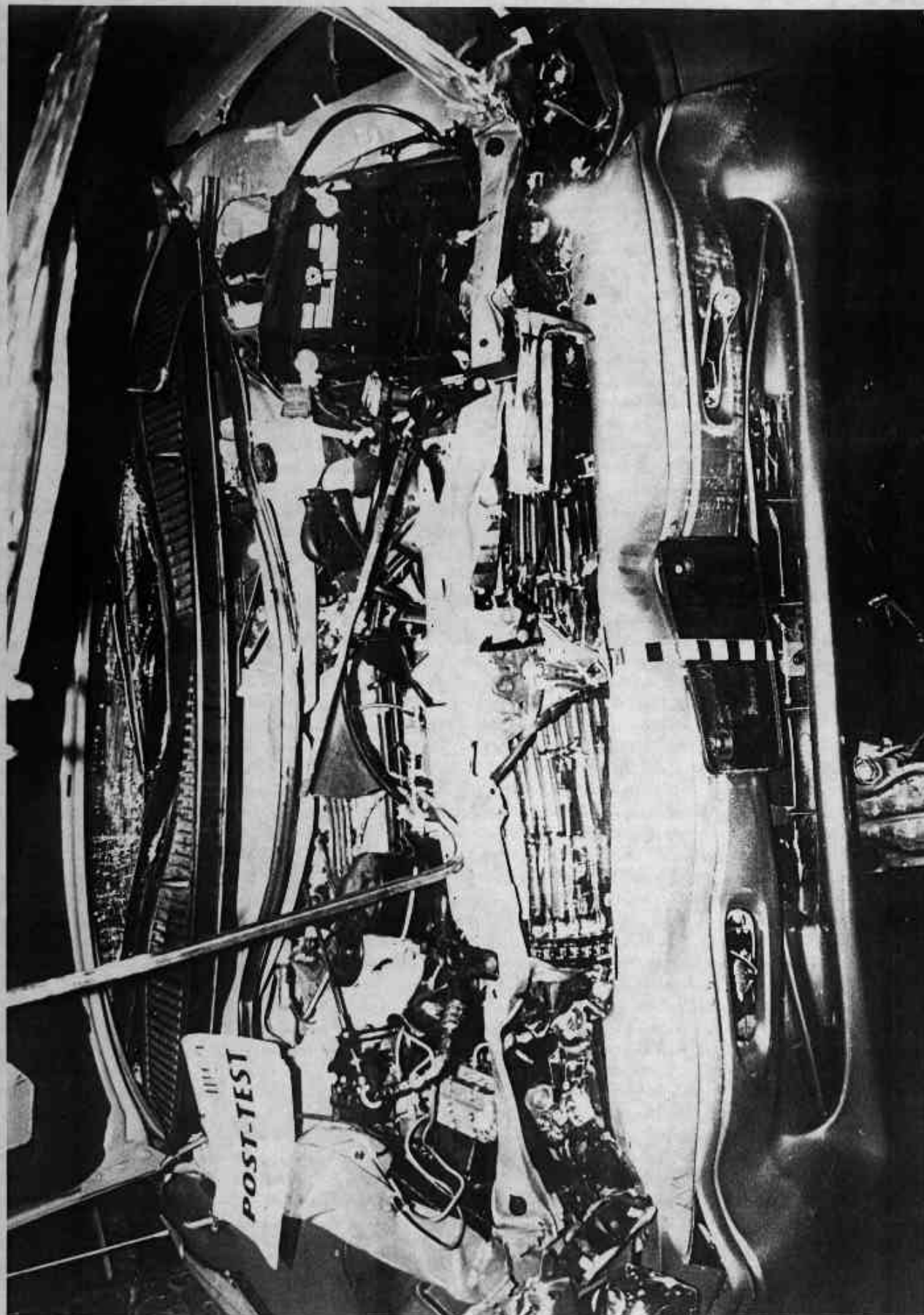


Photo No. A-15 - Post-Test Engine Compartment View

A-15

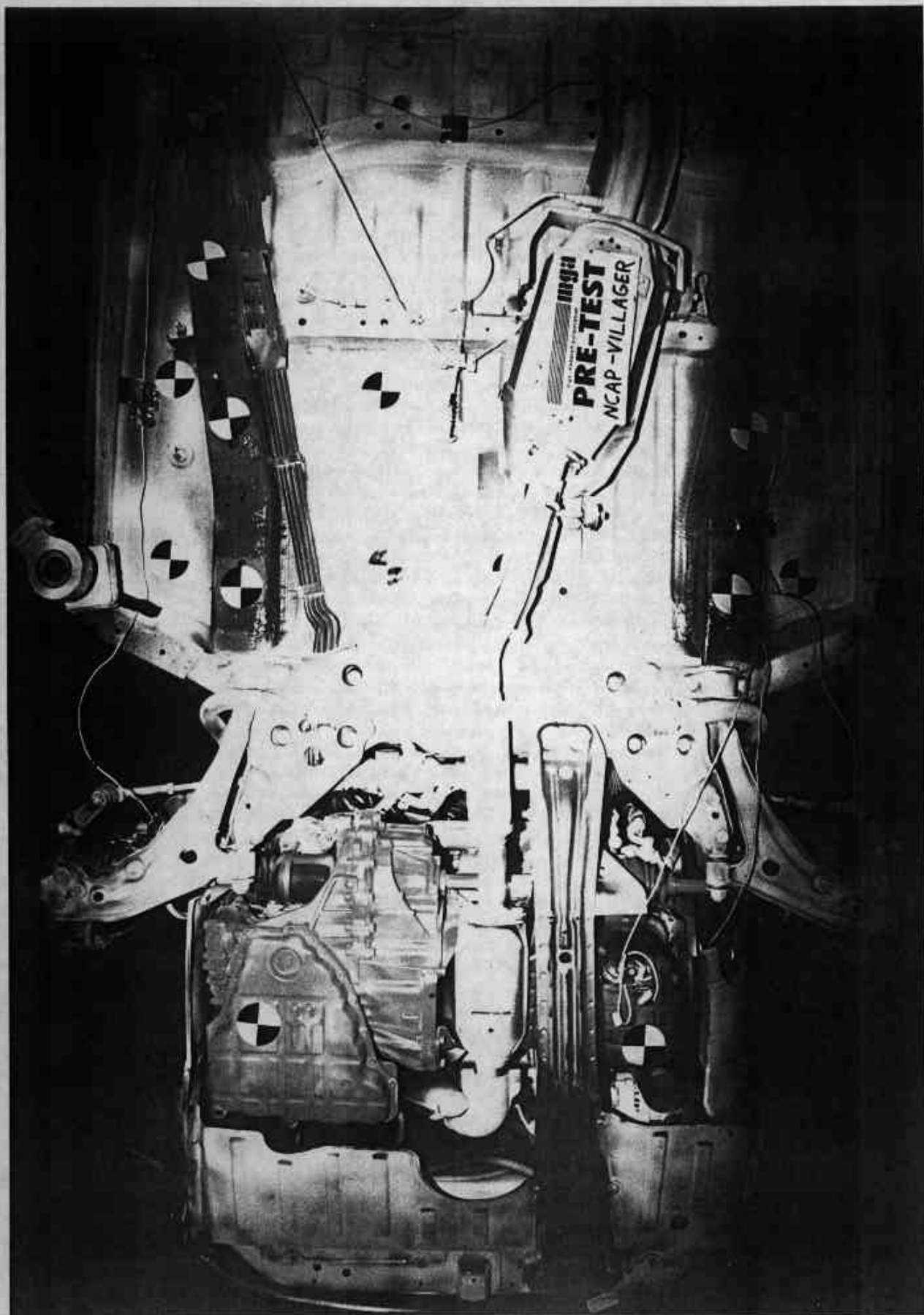


Photo No. A-16 - Pre-Test Front Underbody View

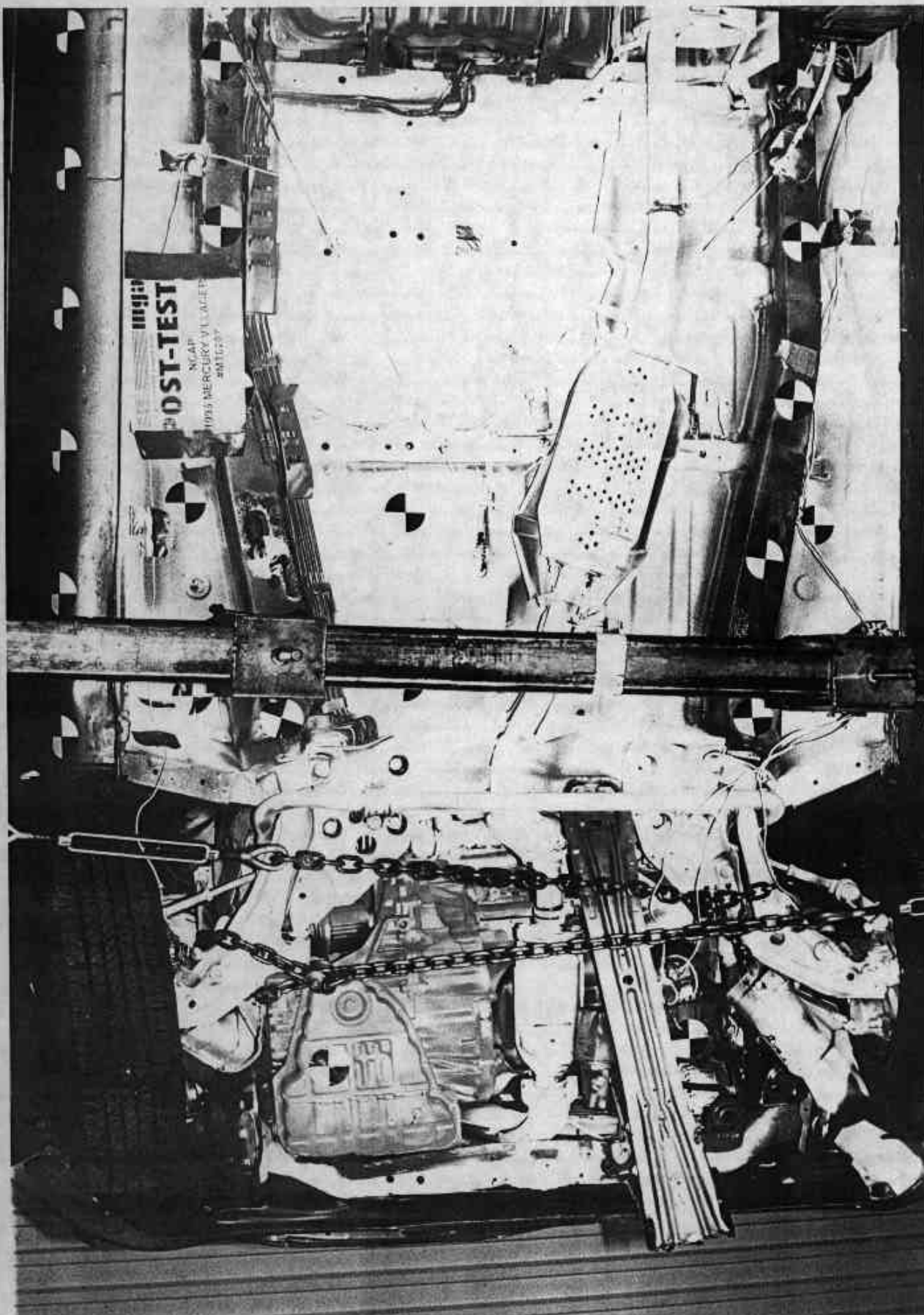


Photo No. A-17 - Post-Test Front Underbody View

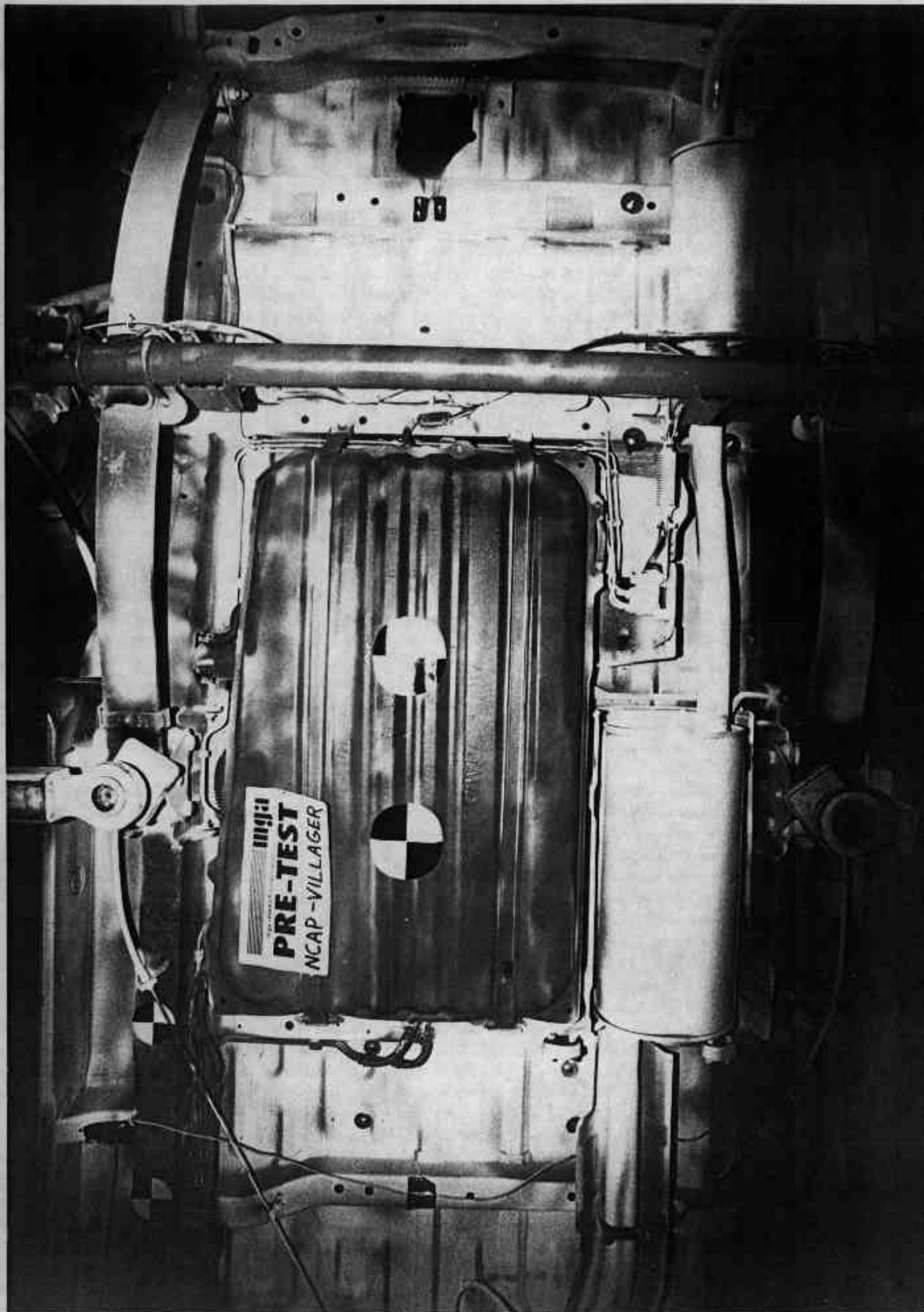


Photo No. A-18 - Pre-Test Rear Underbody View

A-18

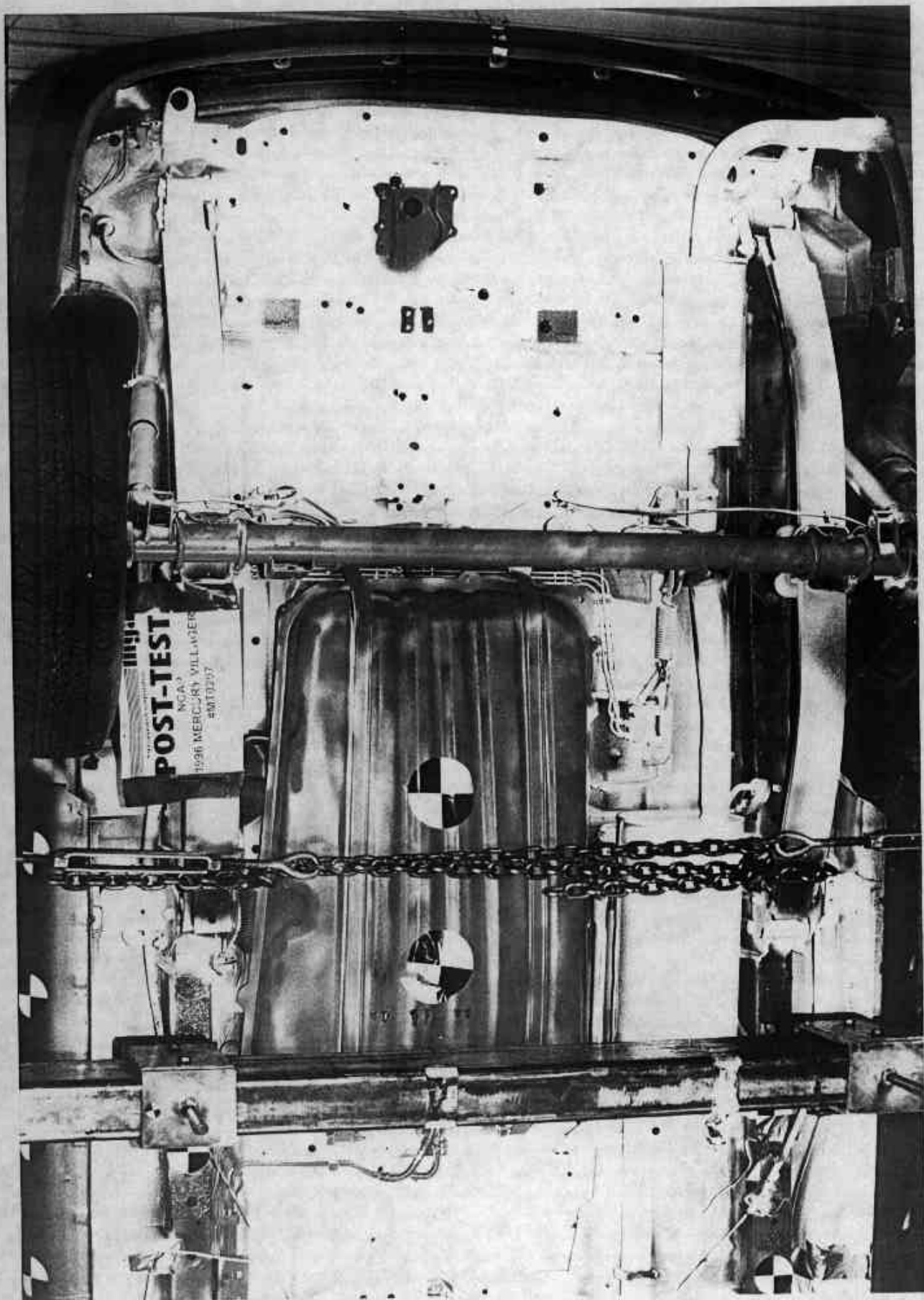


Photo No. A-19 - Post-Test Rear Underbody View

A-19

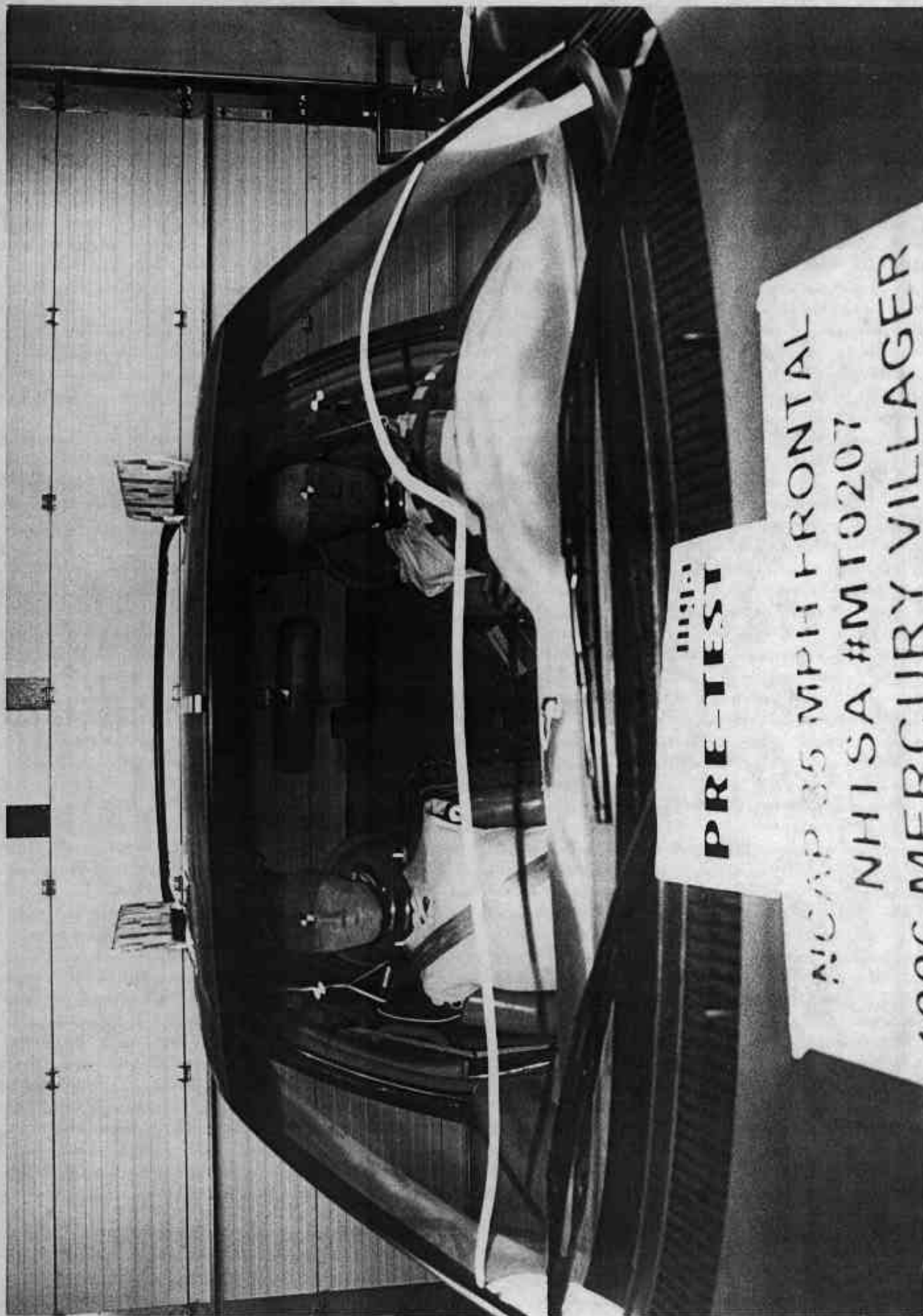
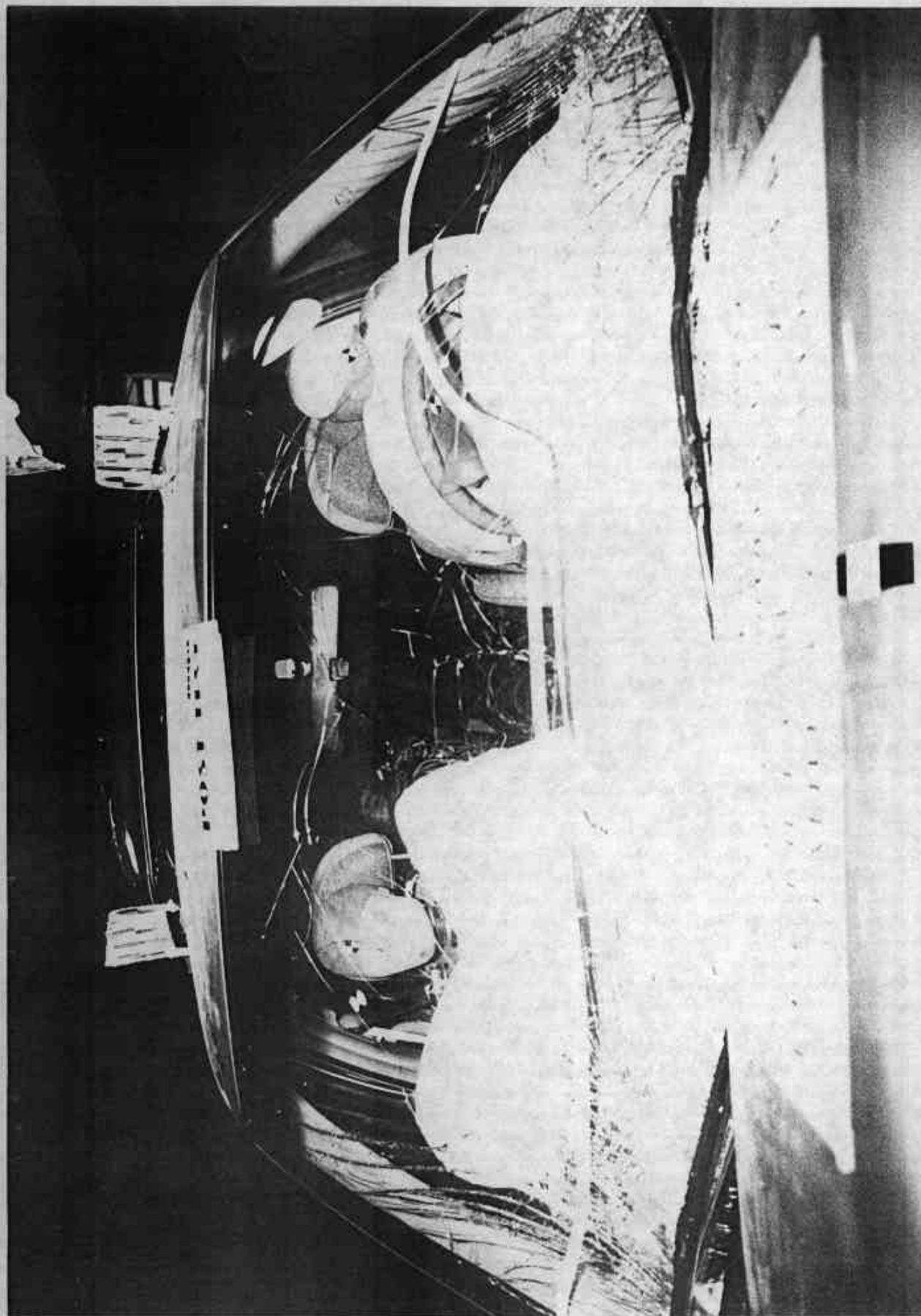


Photo No. A-20 - Pre-Test Windshield View



A-21

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

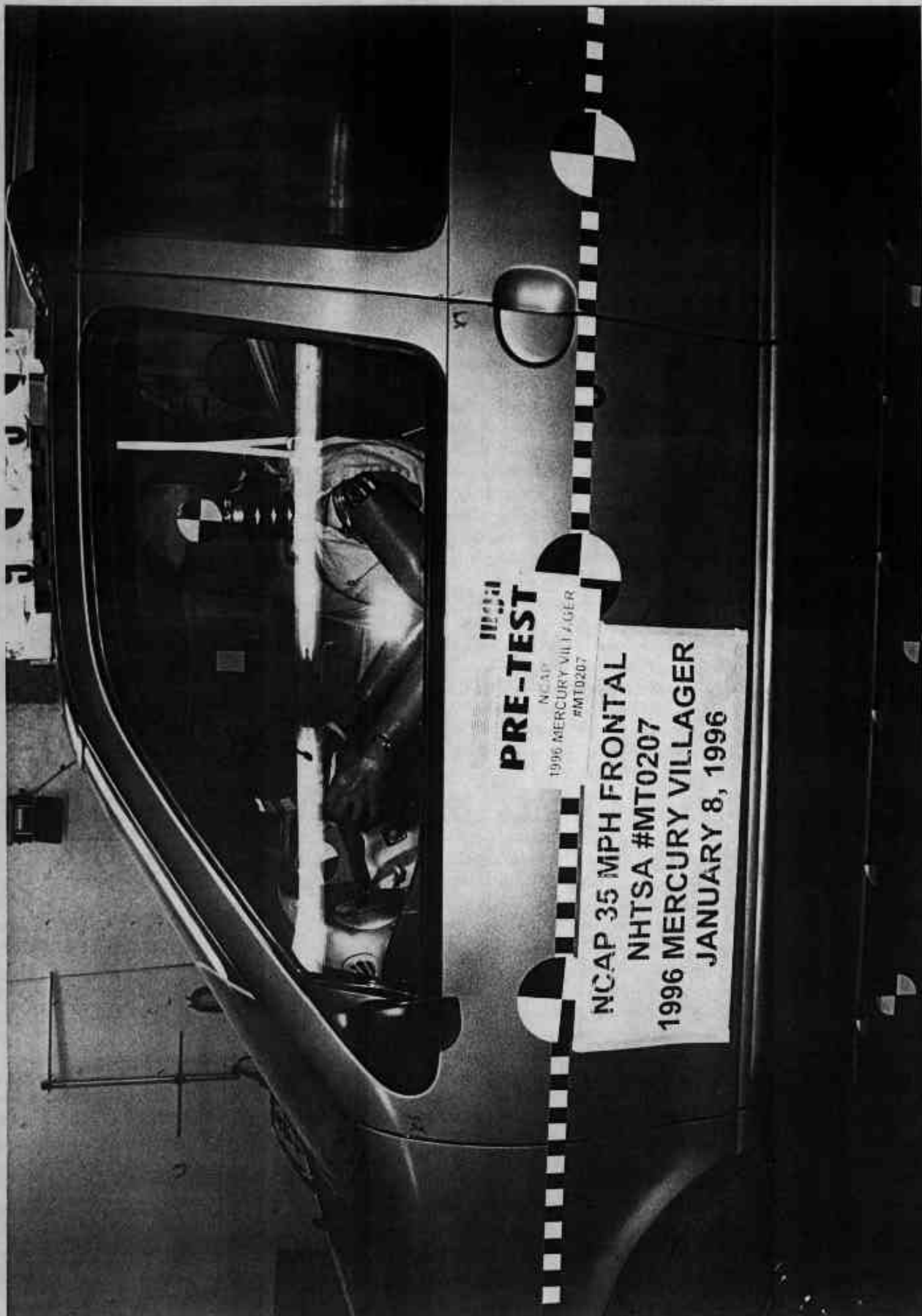


Photo No. A-22 - Pre-Test Driver Dummy Position Left Side View



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

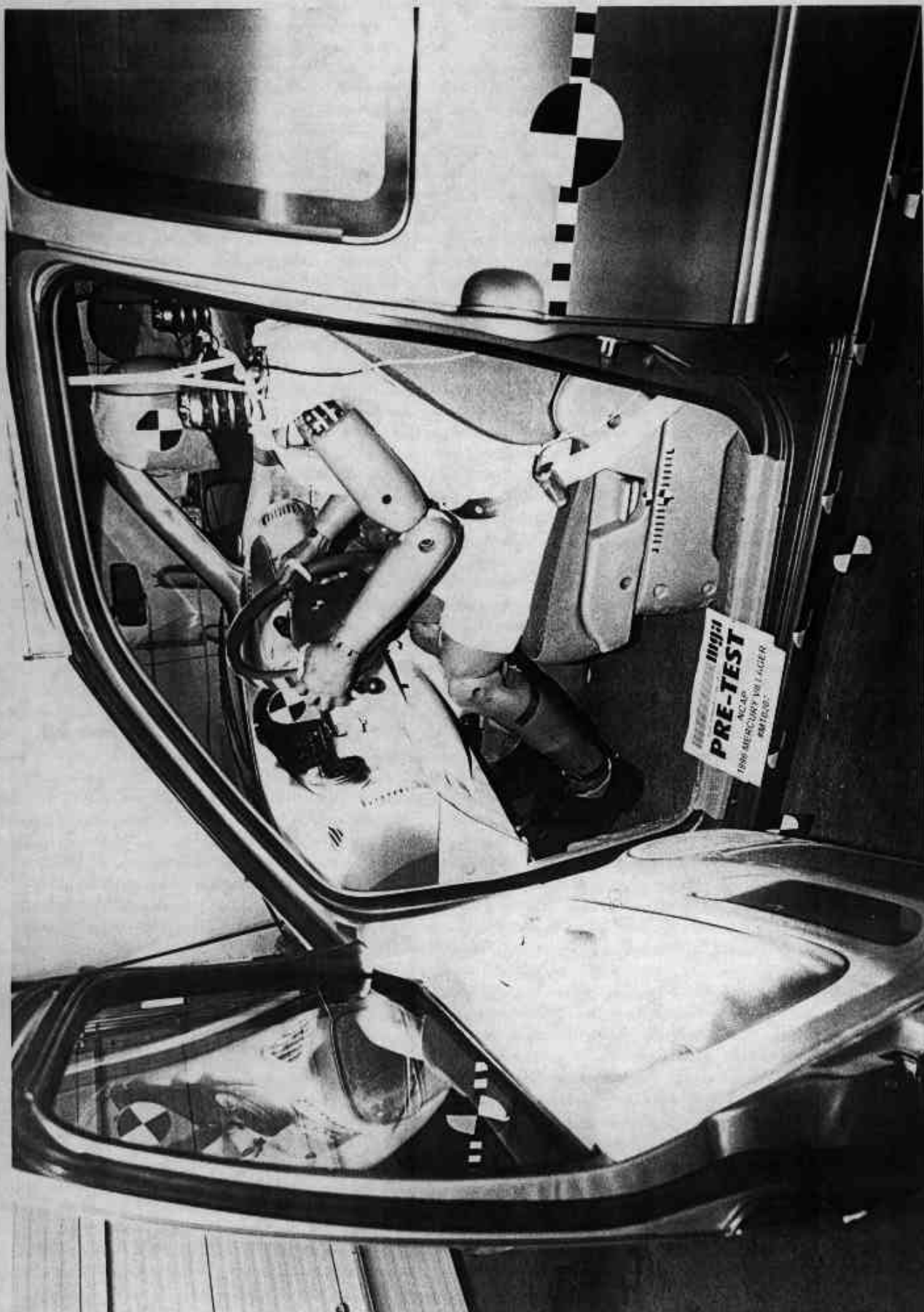


Photo No. A-24 - Pre-Test Driver Dummy Position Left Side View (Door Open)



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

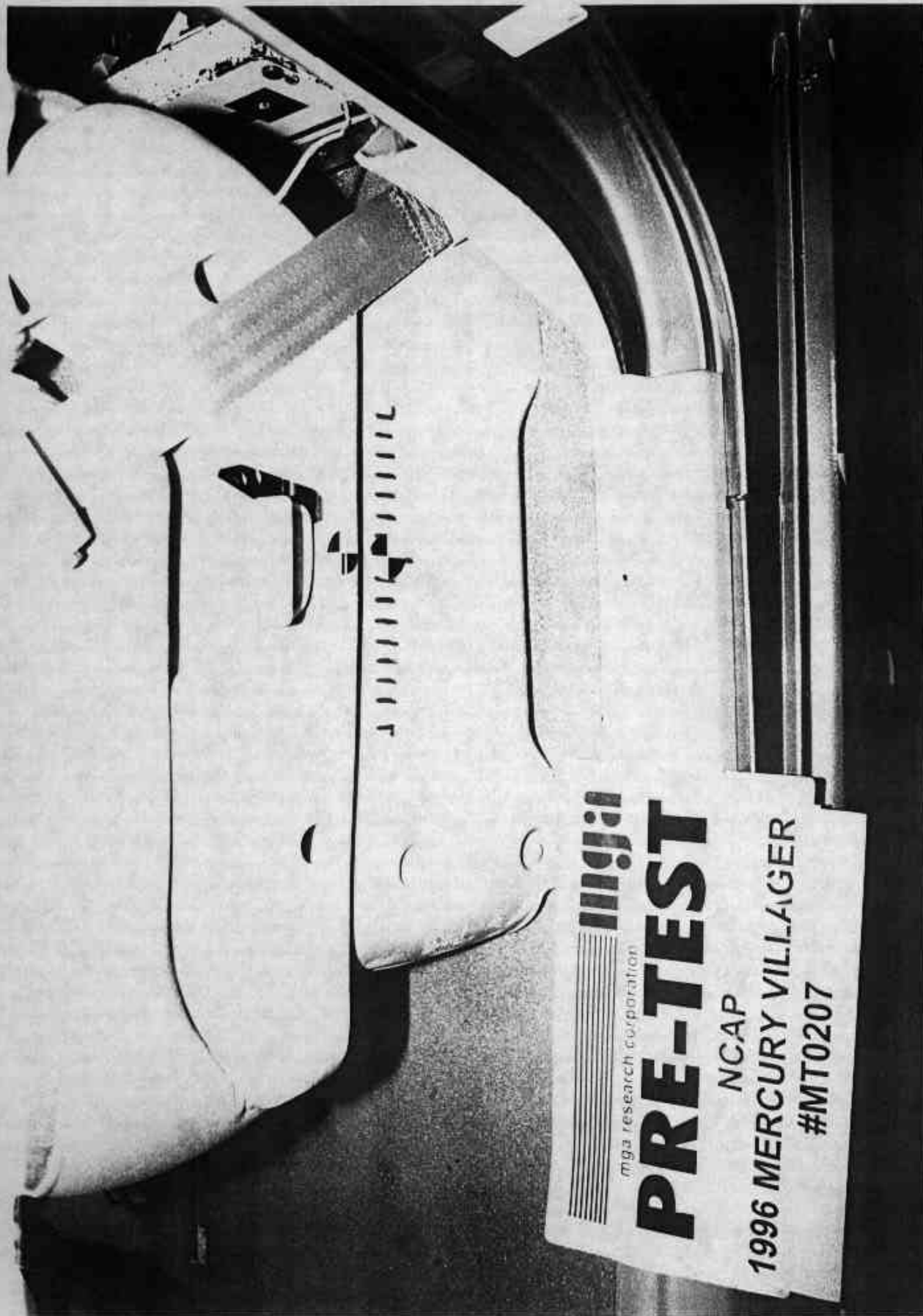


Photo No. A-26 - Pre-Test Driver Seat Position View



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

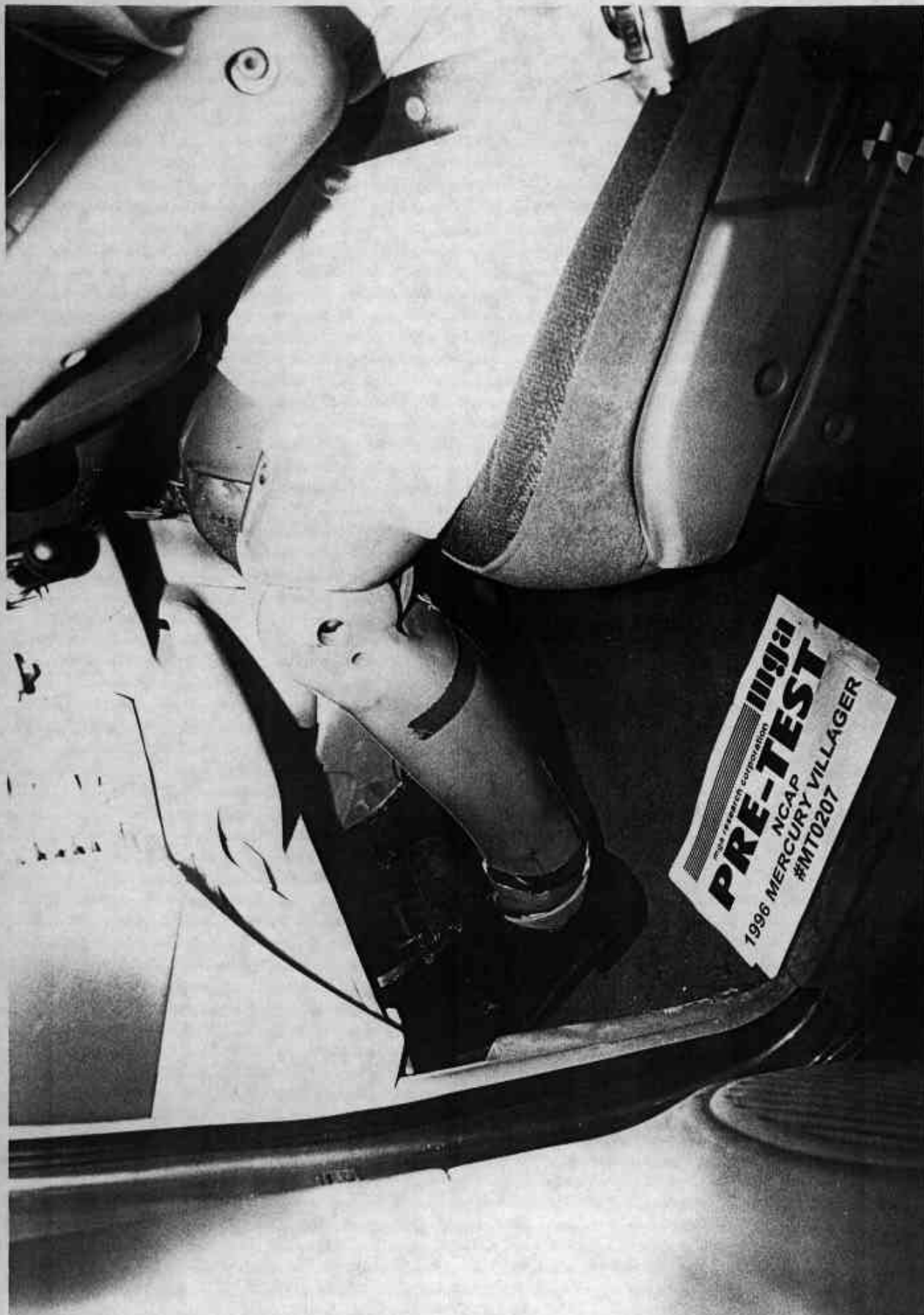


Photo No. A-28 - Pre-Test Driver Dummy Knee Position



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

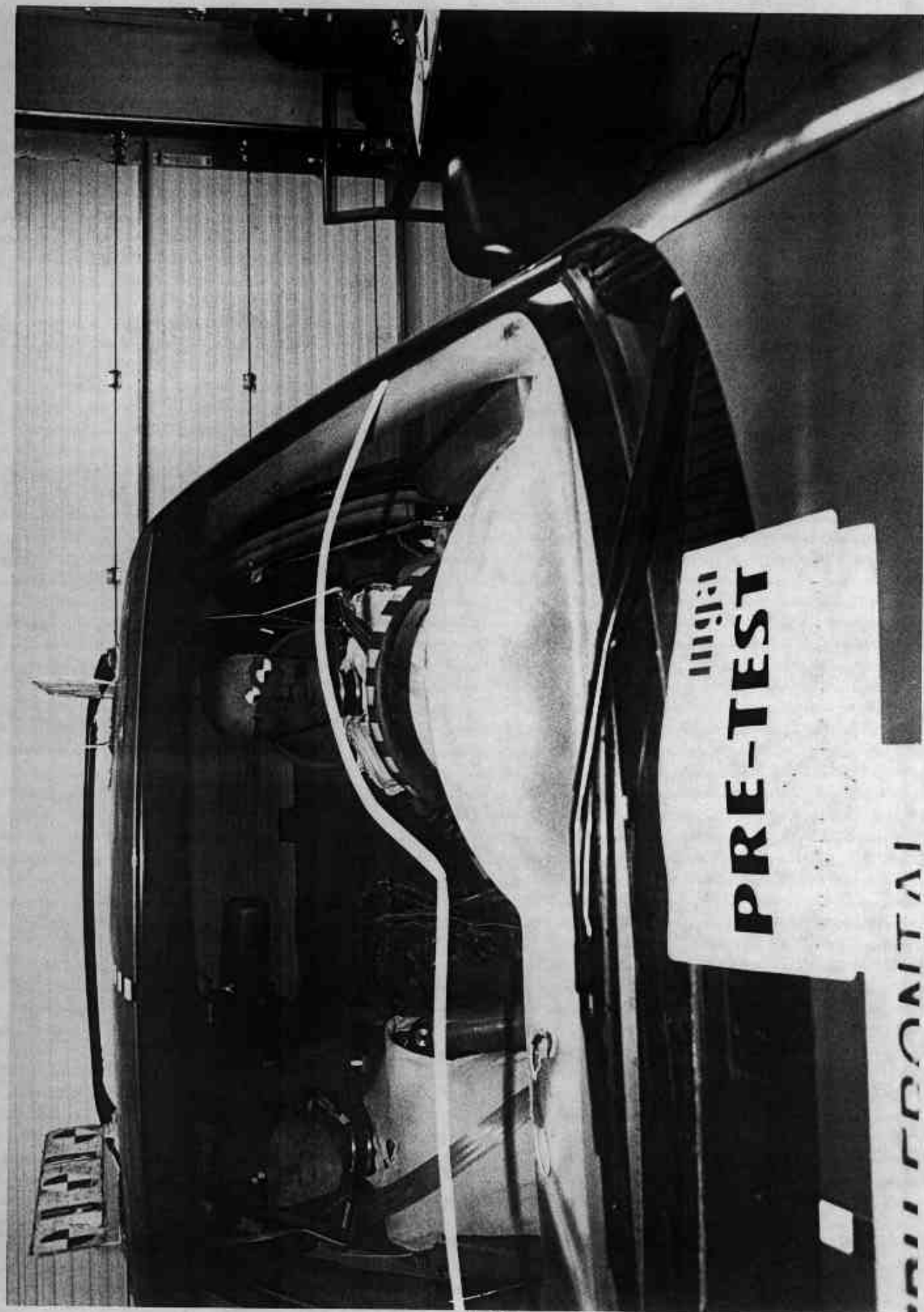


Photo No. A-30 - Pre-Test Driver Windshield View

A-30



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

A-31



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



A-33

Photo No. A-33 - Post-Test Driver Knee Contact View

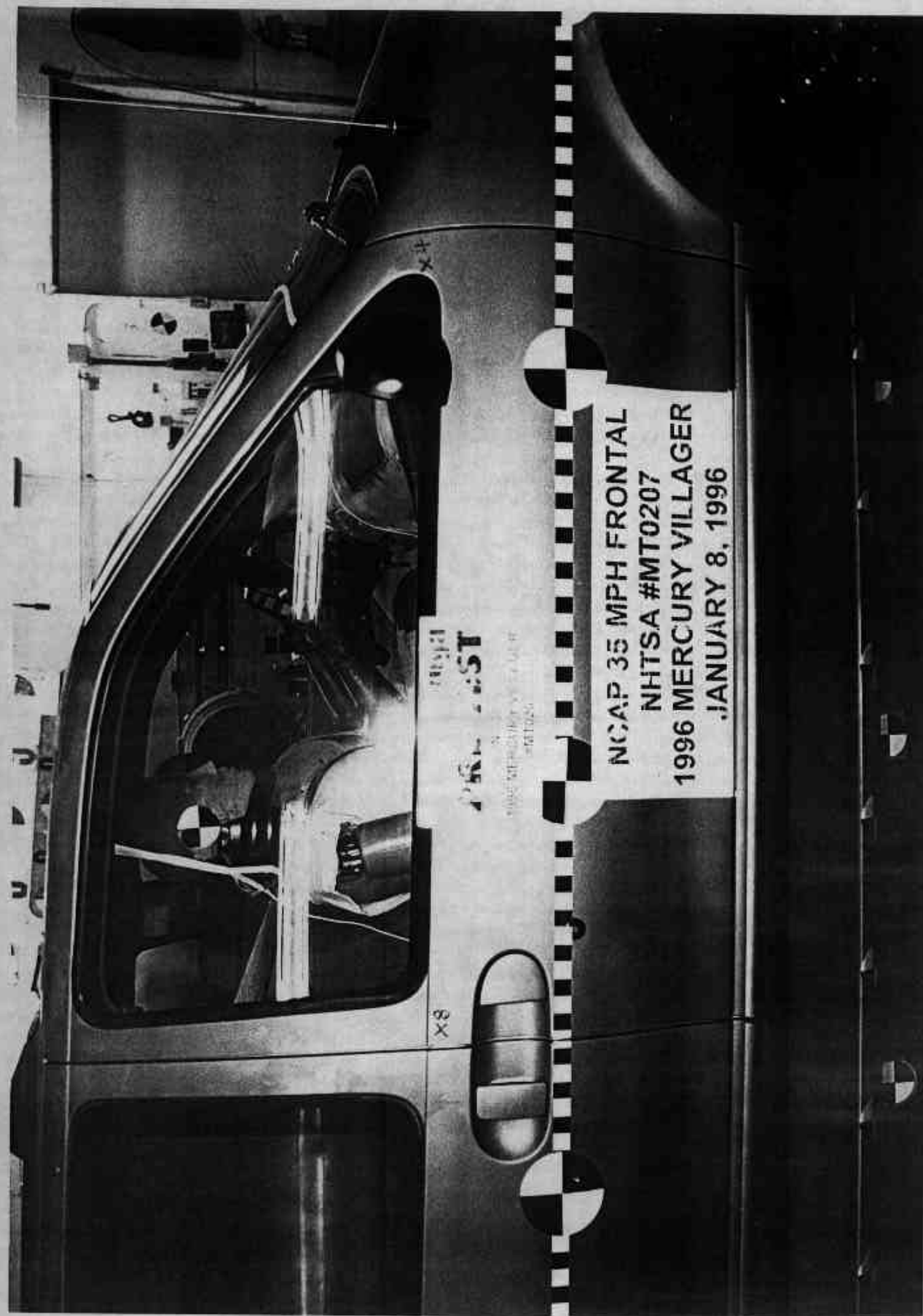


Photo No. A-34 - Pre-Test Passenger Dummy Position Right Side View

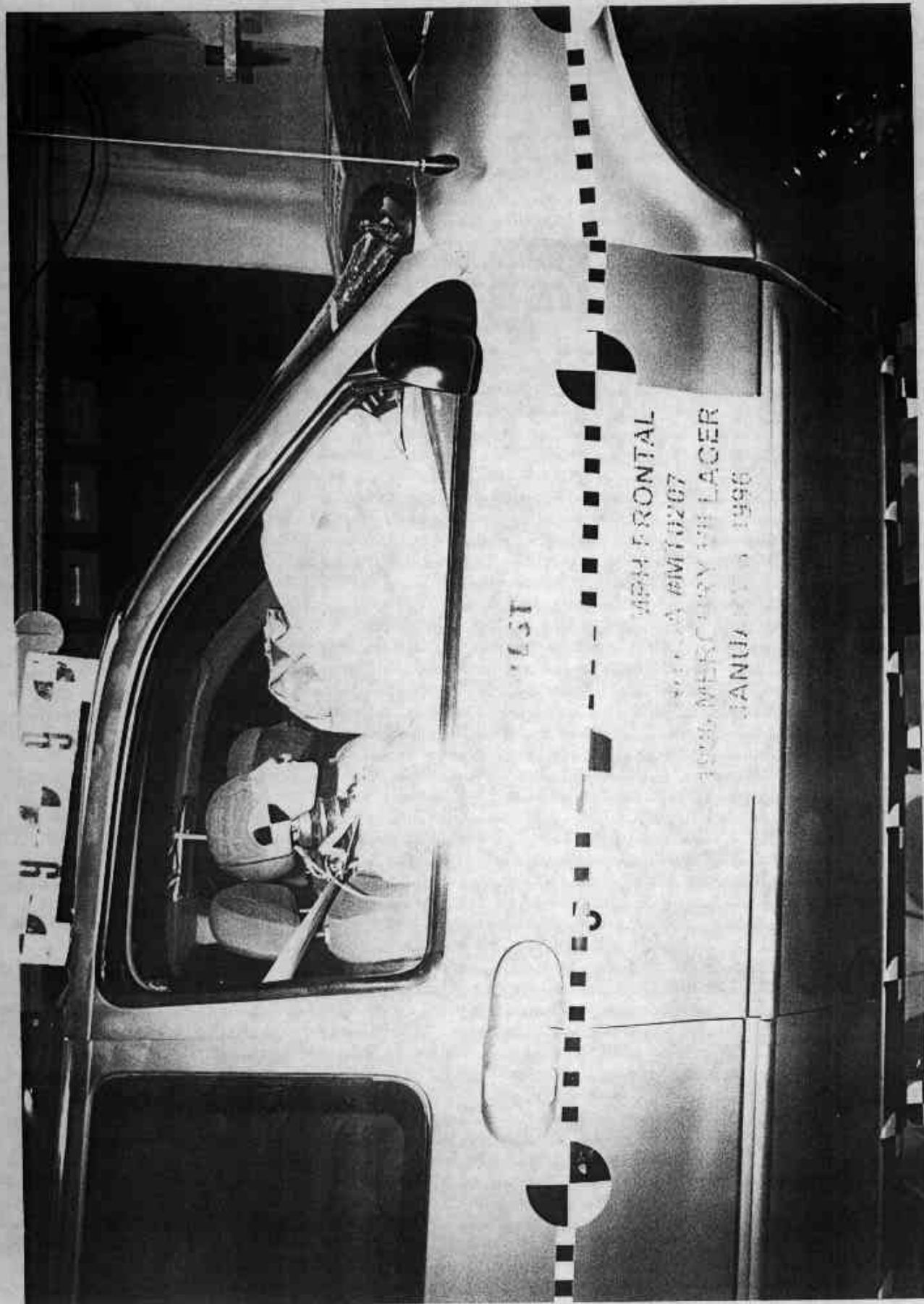


Photo No. A-35 - Post-Test Passenger Dummy Position Right Side View

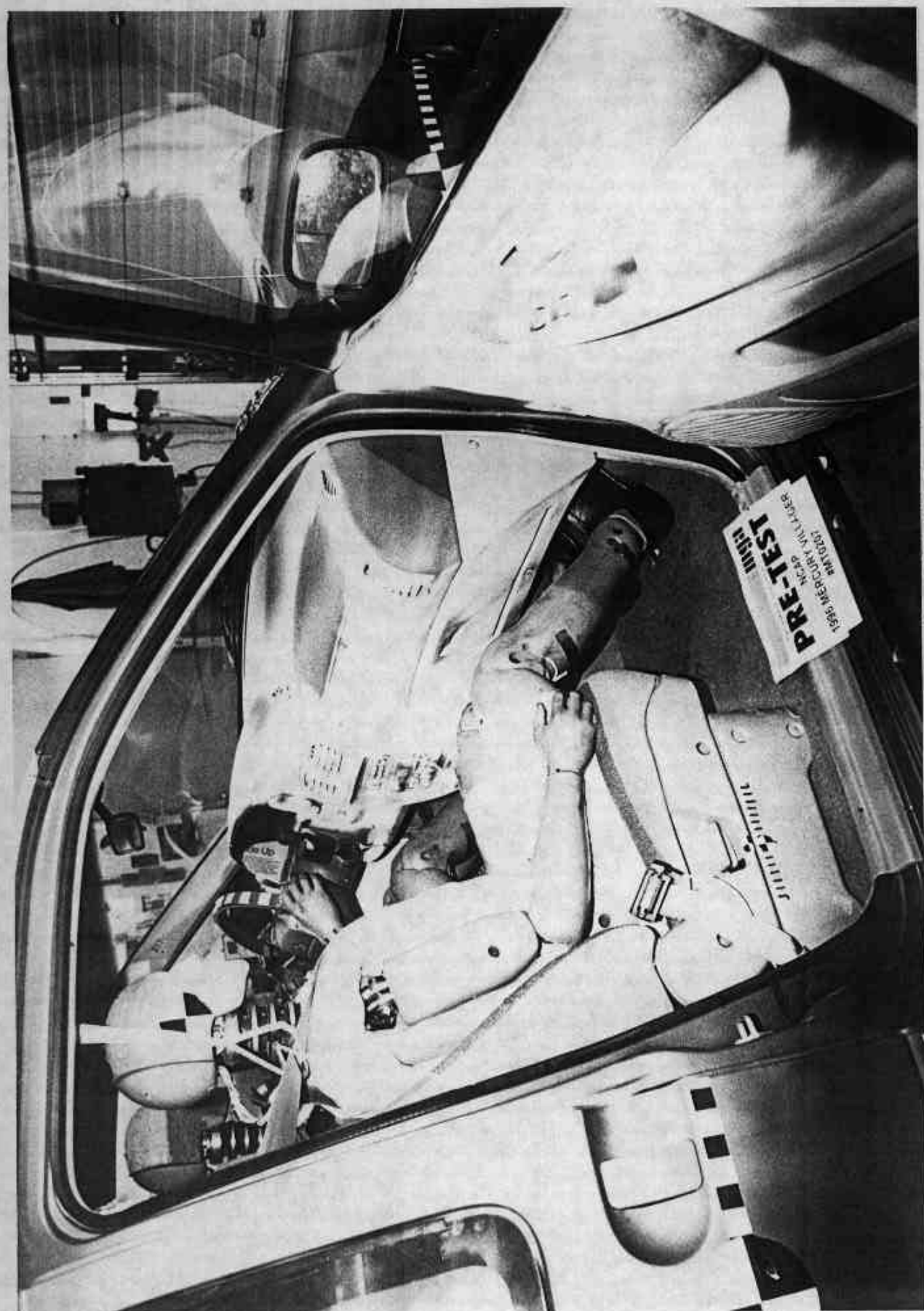


Photo No. A-36 - Pre-Test Passenger Dummy Position Right Side View (Door Open)

A-36

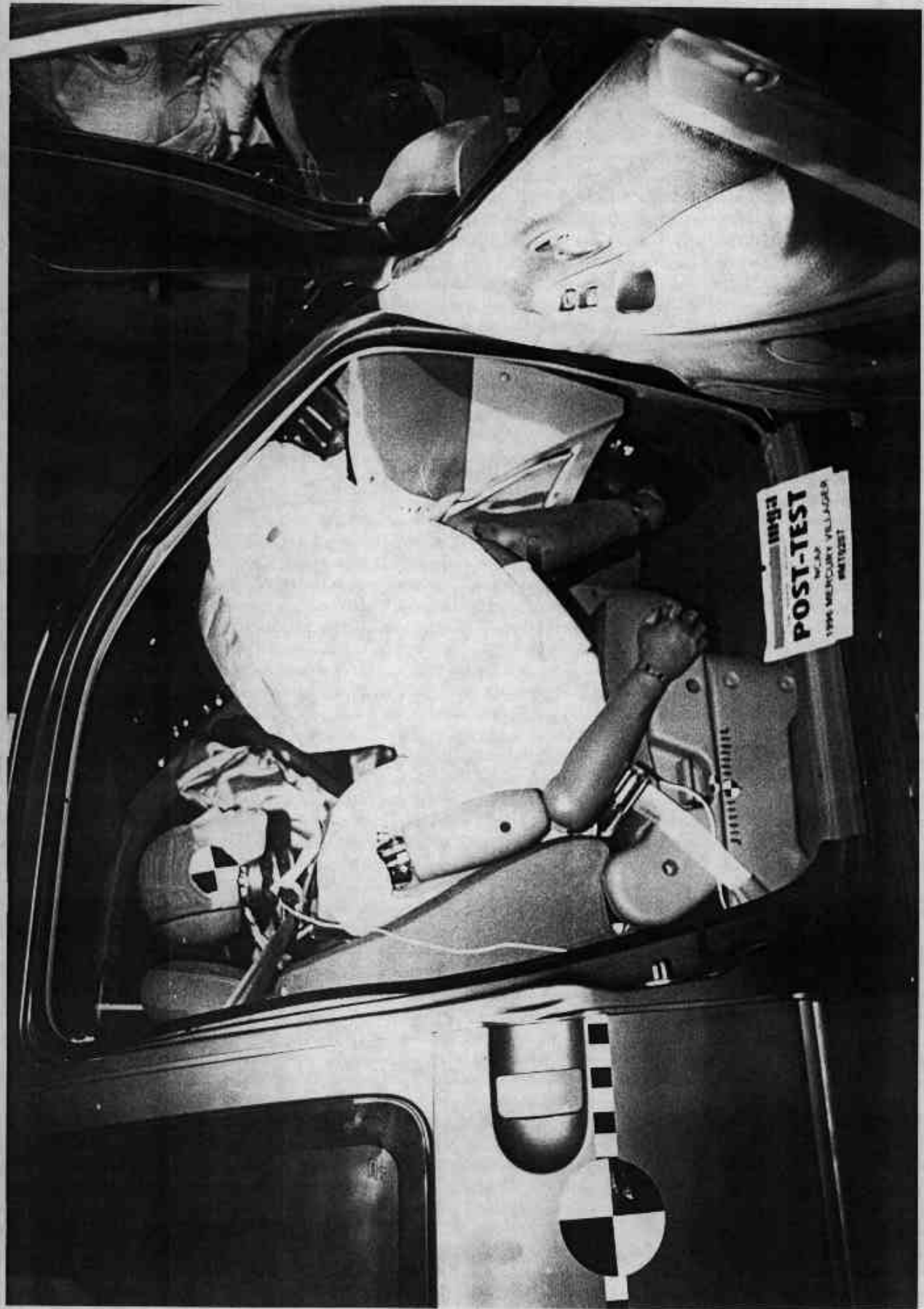
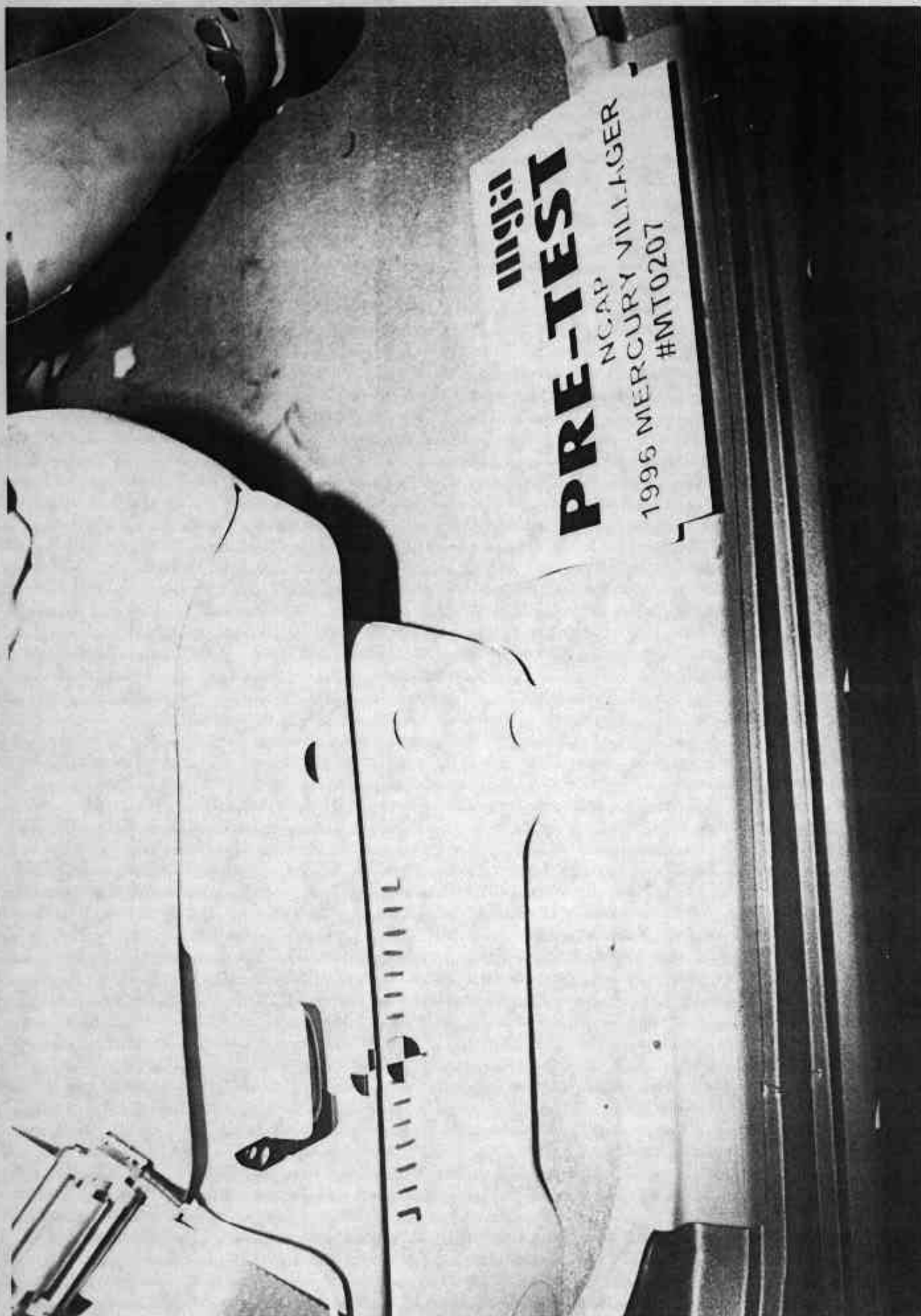


Photo No. A-37 - Post-Test Passenger Dummy Position Right Side View (Door Open)

A-37



A-38

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

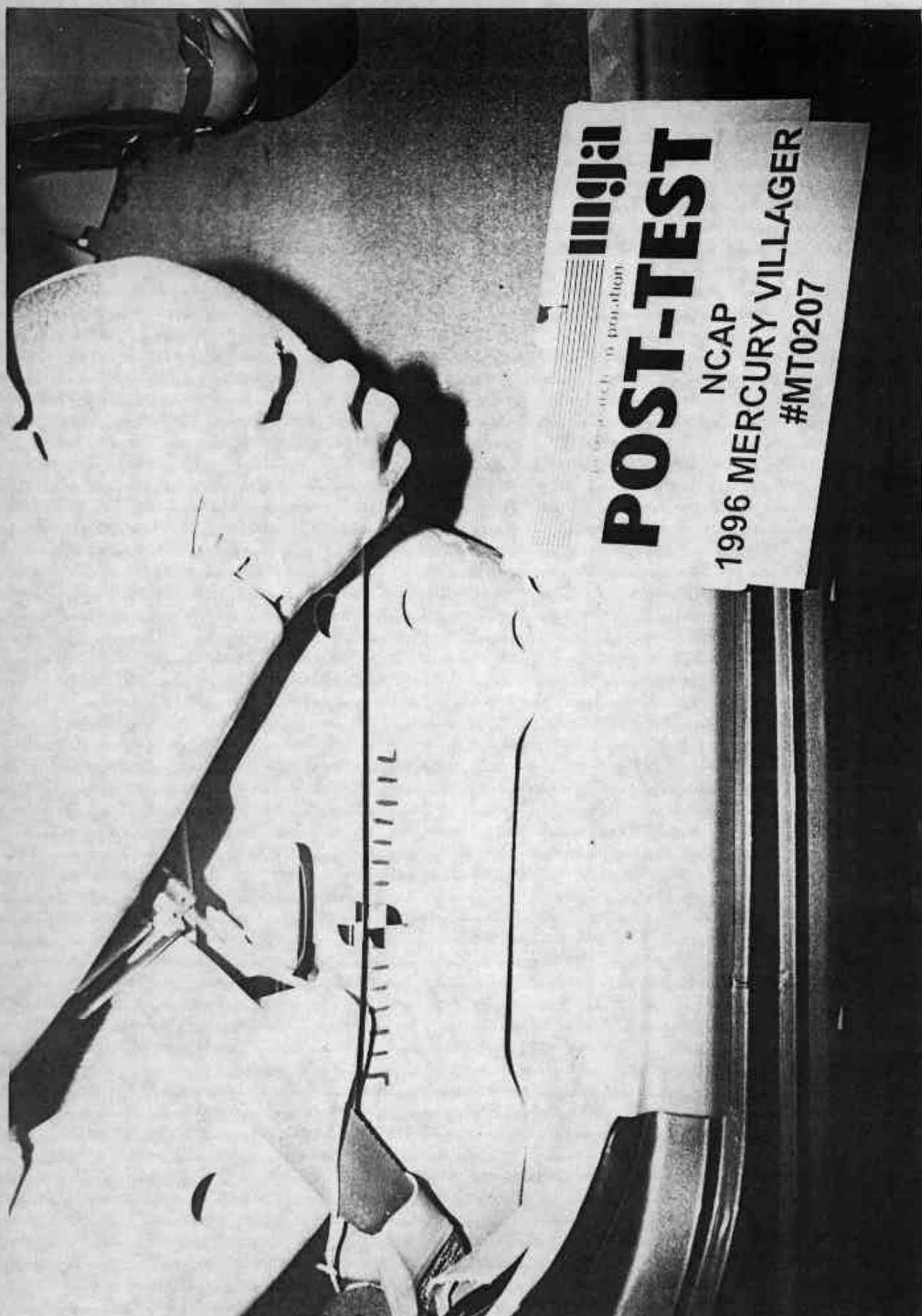


Photo No. A-39 - Post-Test Passenger Seat Position View

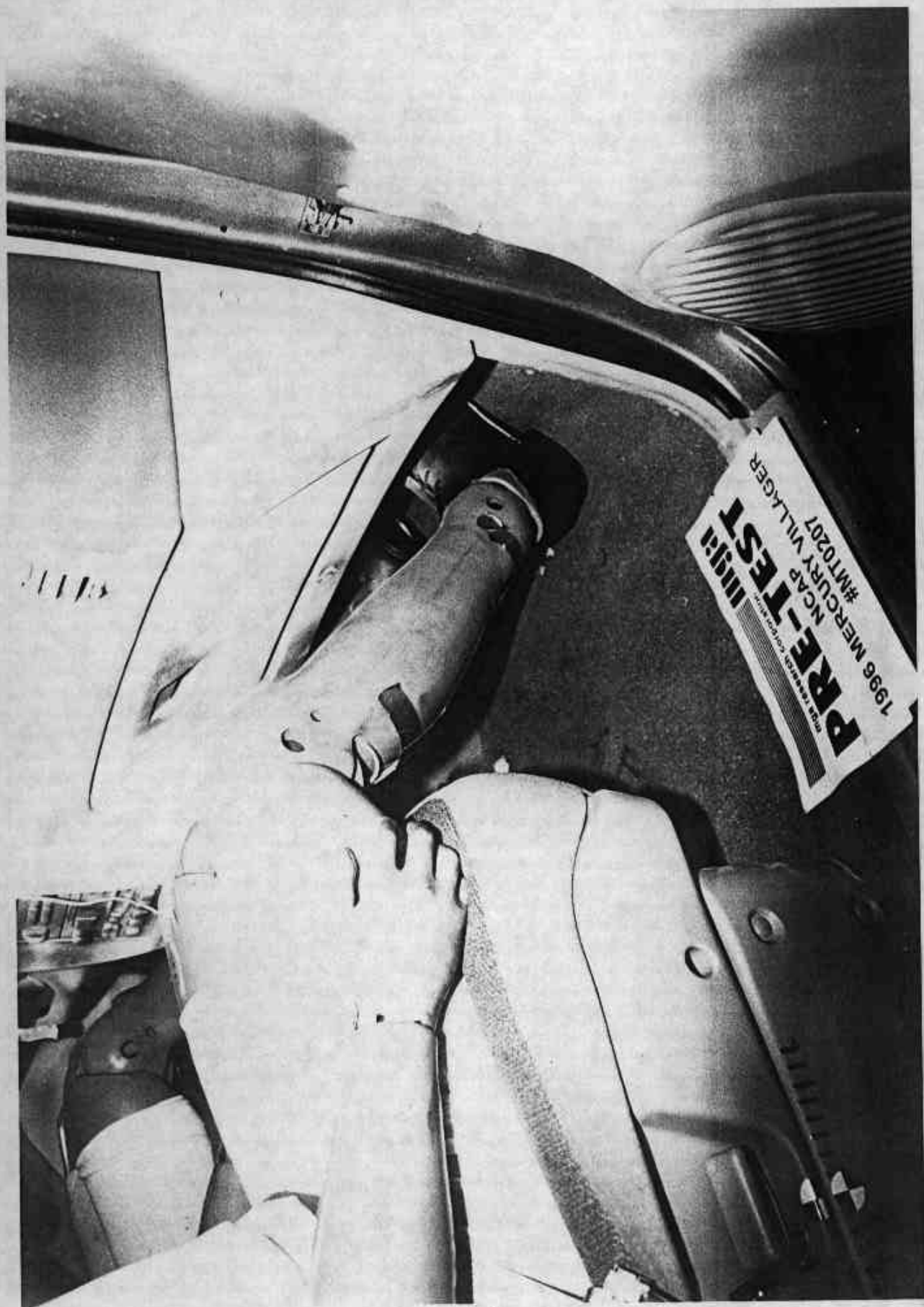


Photo No. A-40 - Pre-Test Passenger Dummy Knee Position



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

A-41



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

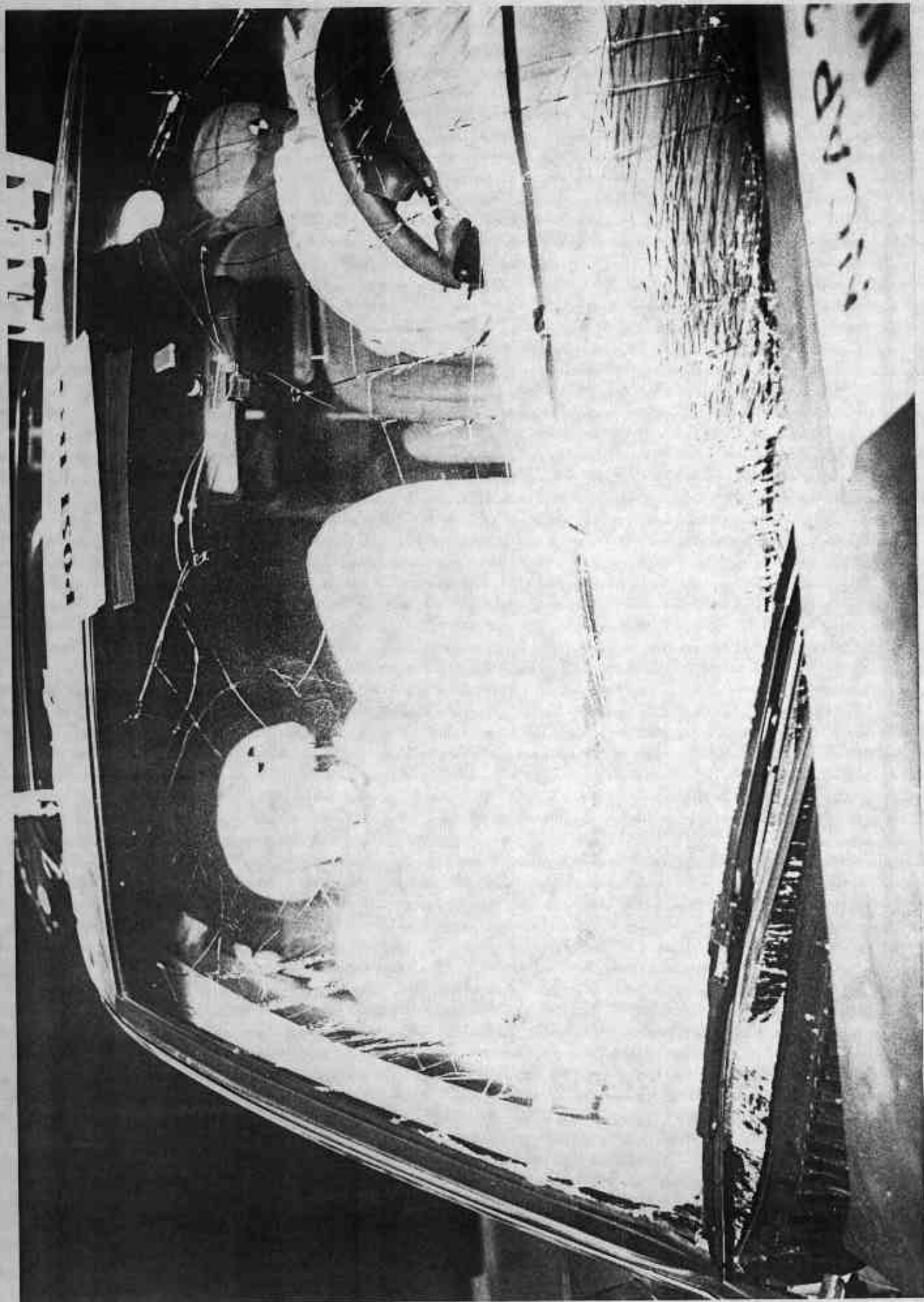


Photo No. A-43 - Post-Test Passenger Windshield View

A-43



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

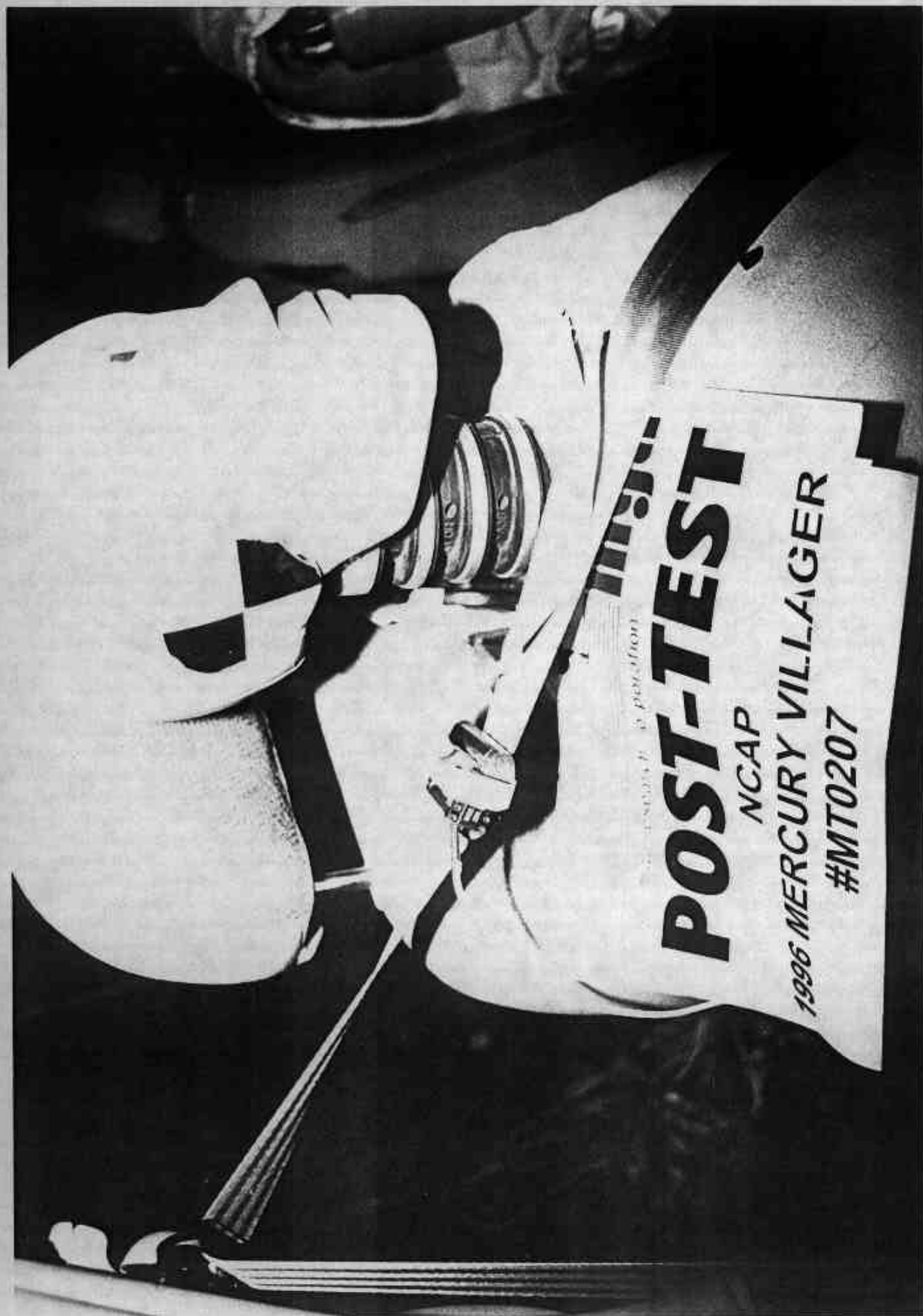


Photo No. A-45 - Post-Test Passenger Head Contact View



Photo No. A-46 - Post-Test Passenger Knee Contact View



MFD. BY FORD MOTOR CO. IN U.S.A. DATE: 10/95
GVW: 5445LB / 2469KG REAR GVW: 2900LB 1270KG
FRONT GVW: 2716LB 1231KG WITH P205/75RX158 TIRES
W/TH P205/75RX158 TIRES 15X5.5JJ RIMS
15X5.5JJ RIMS AT 35 PSI COLD AT 35 PSI COLD
THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE
SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.
VIN: 4M2DV11W5TDJ02445 TYPE MPV

F0122
T0145



EXT. PAINT COLORS: EE
BODY K8

CALIBRATION
ETALONNAGE
6AAAC00

FEXA-RECOR- MMA

Photo No. A-47 - Vehicle Certification and Tire Placard

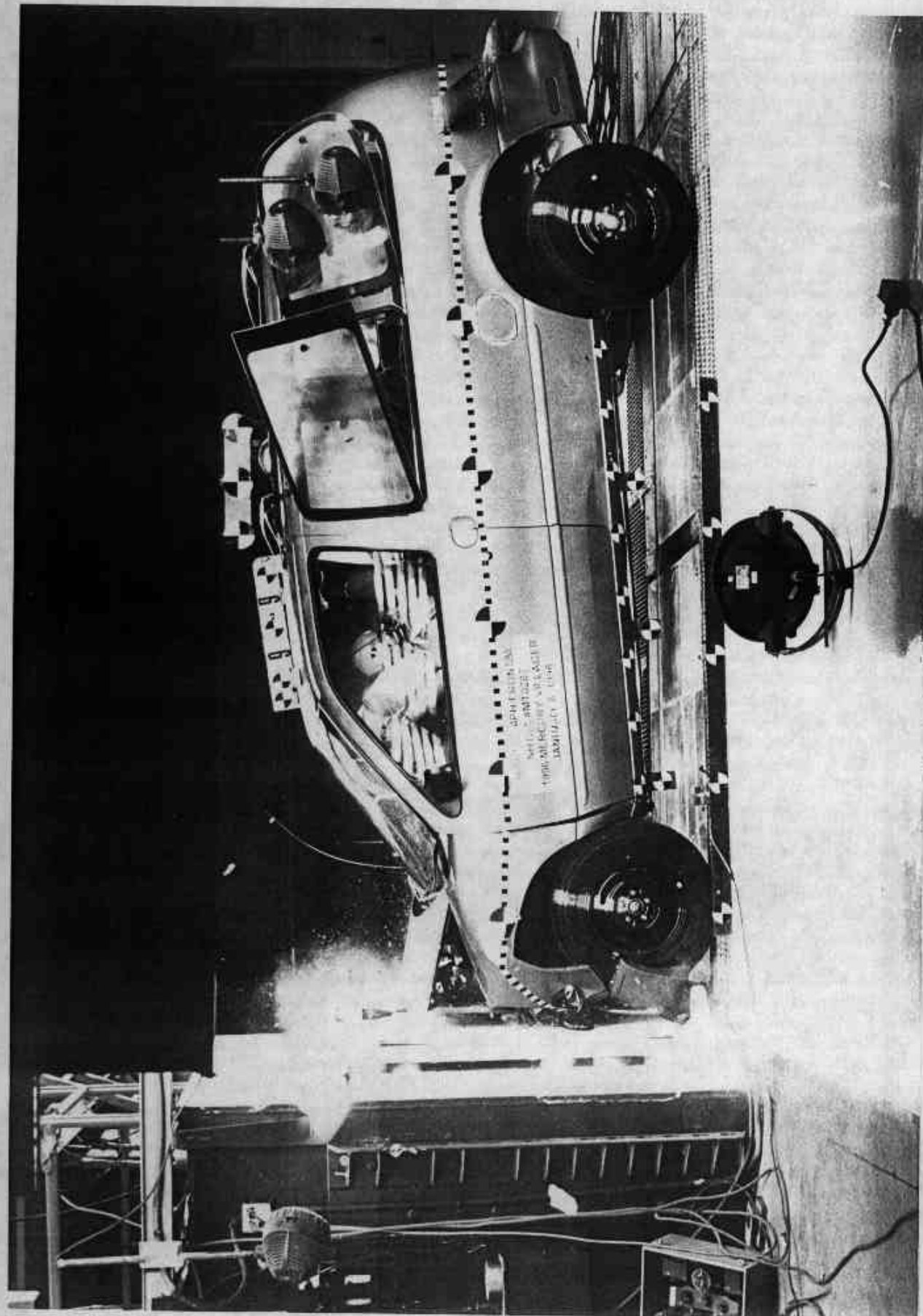
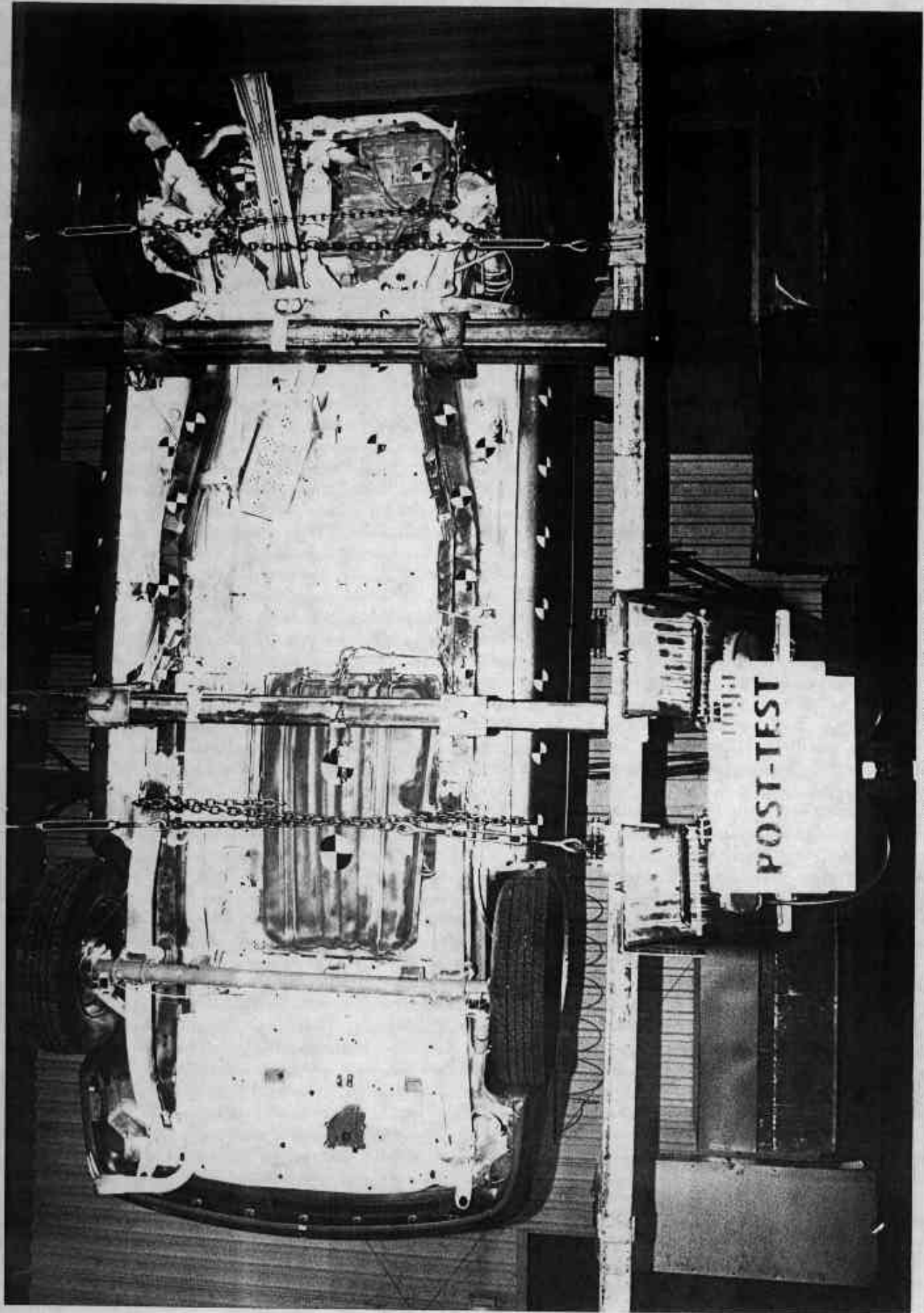


Photo No. A-48 - Vehicle Impact

A-48



A-49

Photo No. A-49 - Rollover 90°

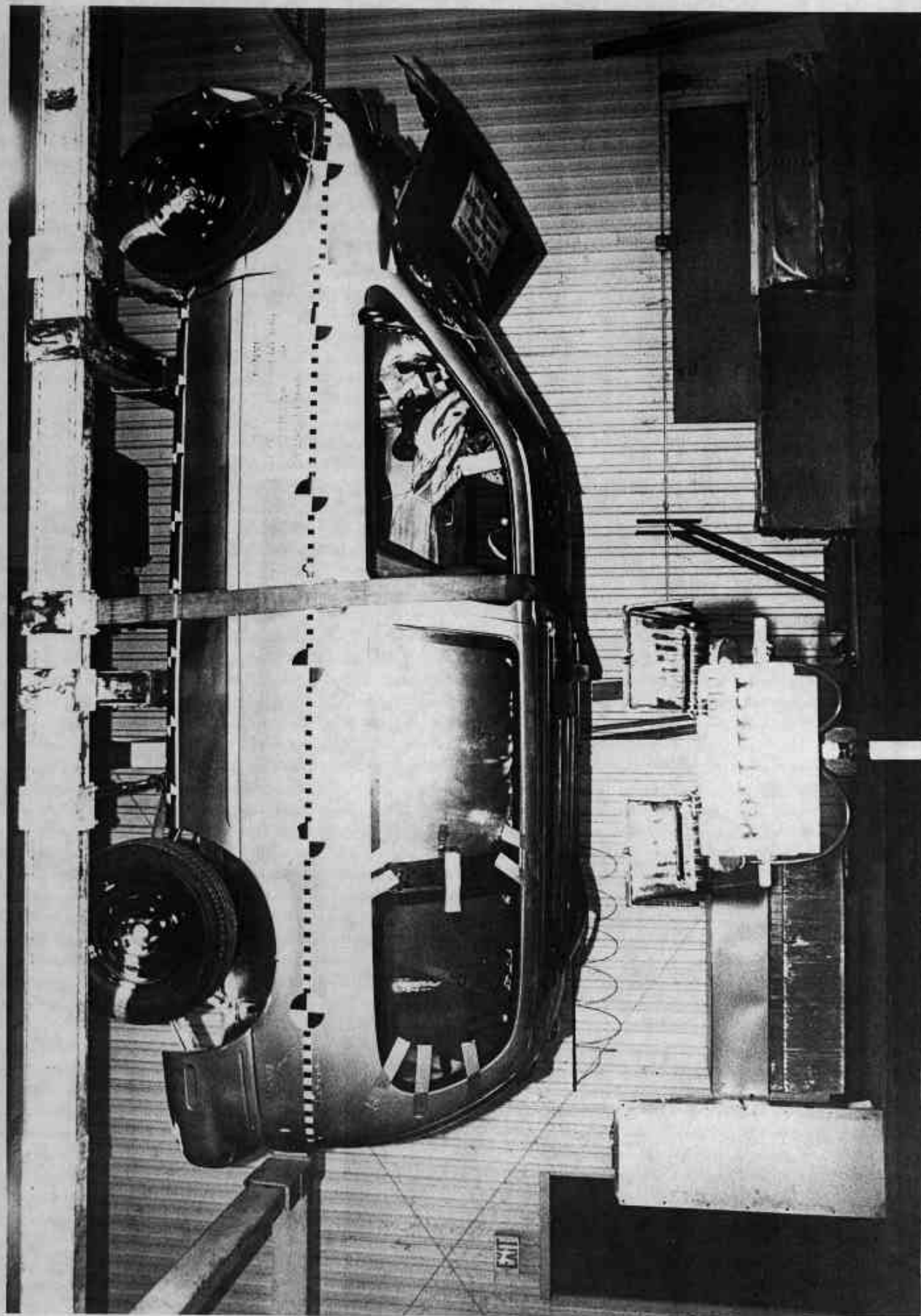


Photo No. A-50 - Rollover 180°

A-50

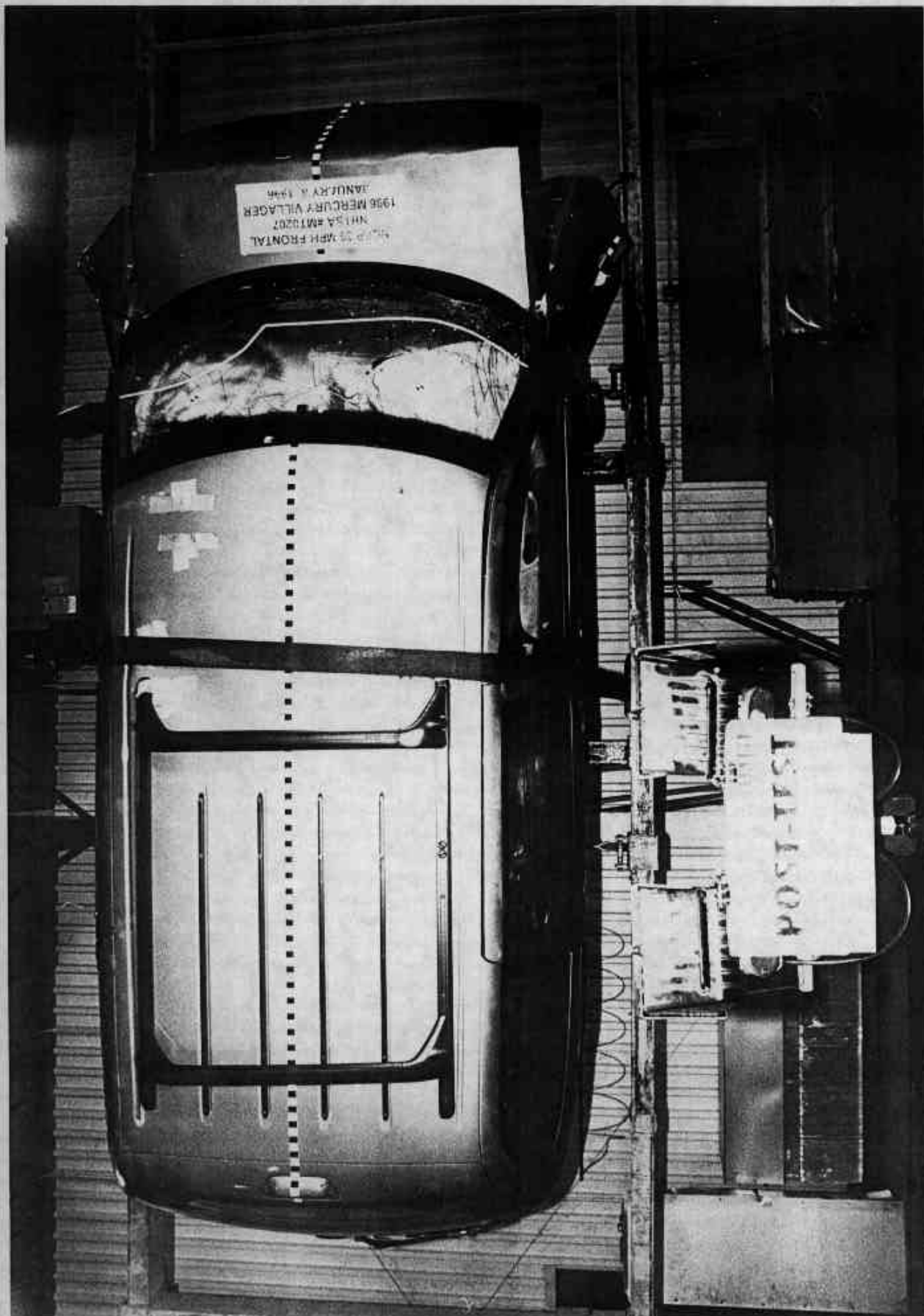


Photo No. A-51 - Rollover 270°

A-51

APPENDIX B

Vehicle, Load Cell Barrier and Dummy Response Data

1996 Mercury Villager
NHTSA NO.: MT0207

VEHICLE DATA FILTER CHANNEL CLASS

Head Accelerations 1000 (1650 Hz)

Chest Accelerations 180 (300 Hz)

Vehicle Accelerations 60 (100 Hz)

Barrier Load Cells 60 (100 Hz)

Femur Load Cells 600 (1000 Hz)

Lap and Torso Belts 60 (100 Hz)

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* Data not valid after approximately 43 msec.

Data Plot

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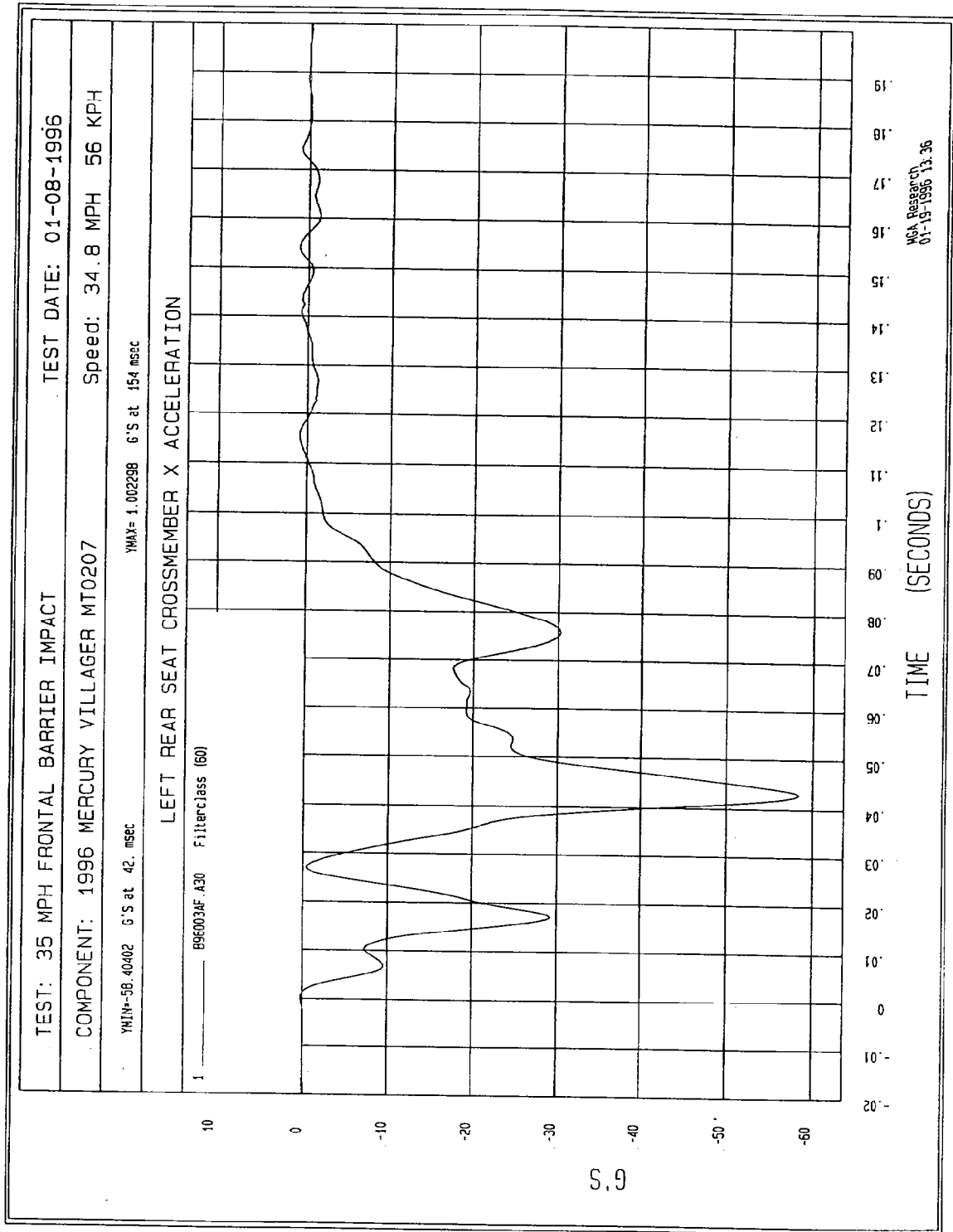
Figure B-147 - Passenger Right Foot Heel Z Acceleration vs. Time

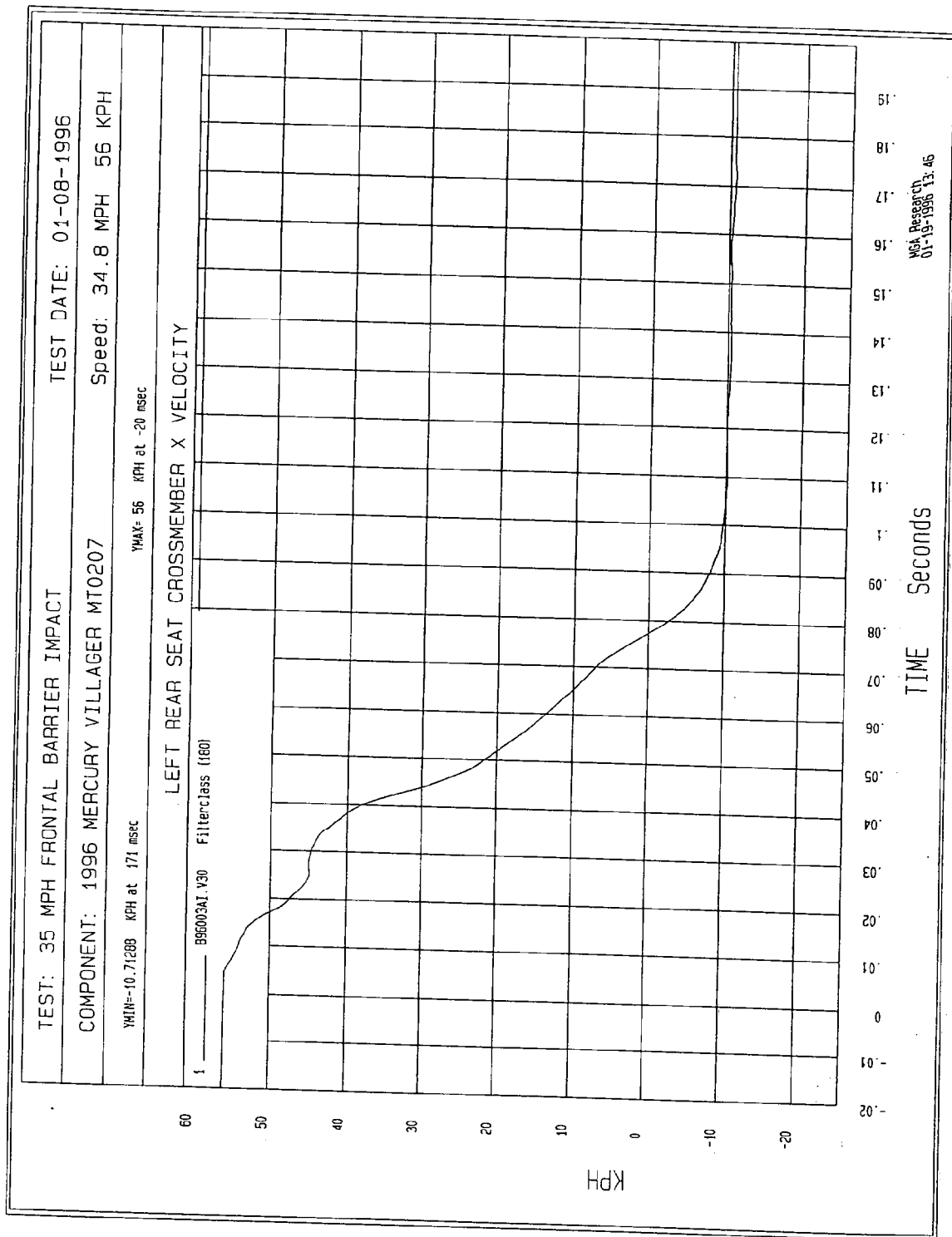
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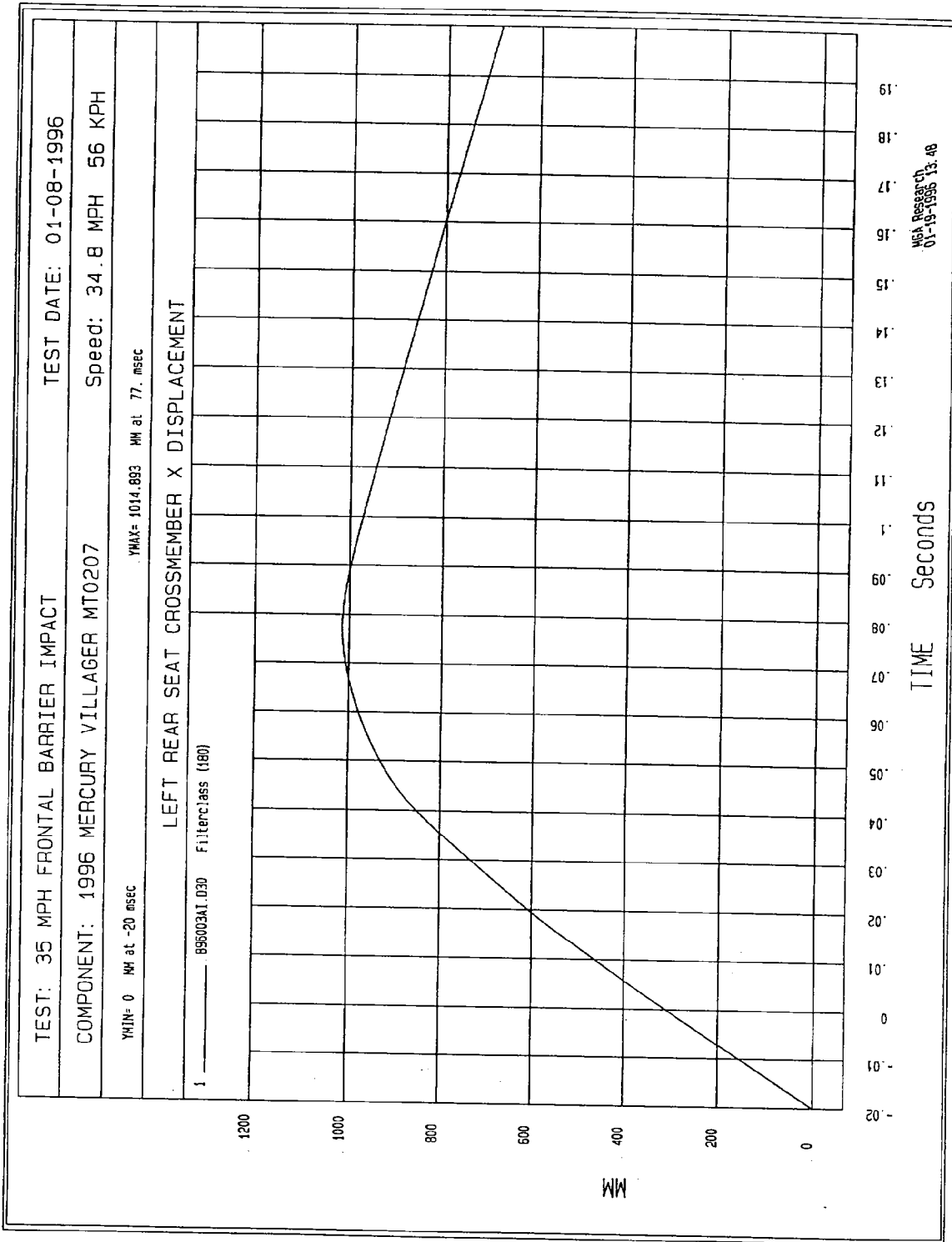
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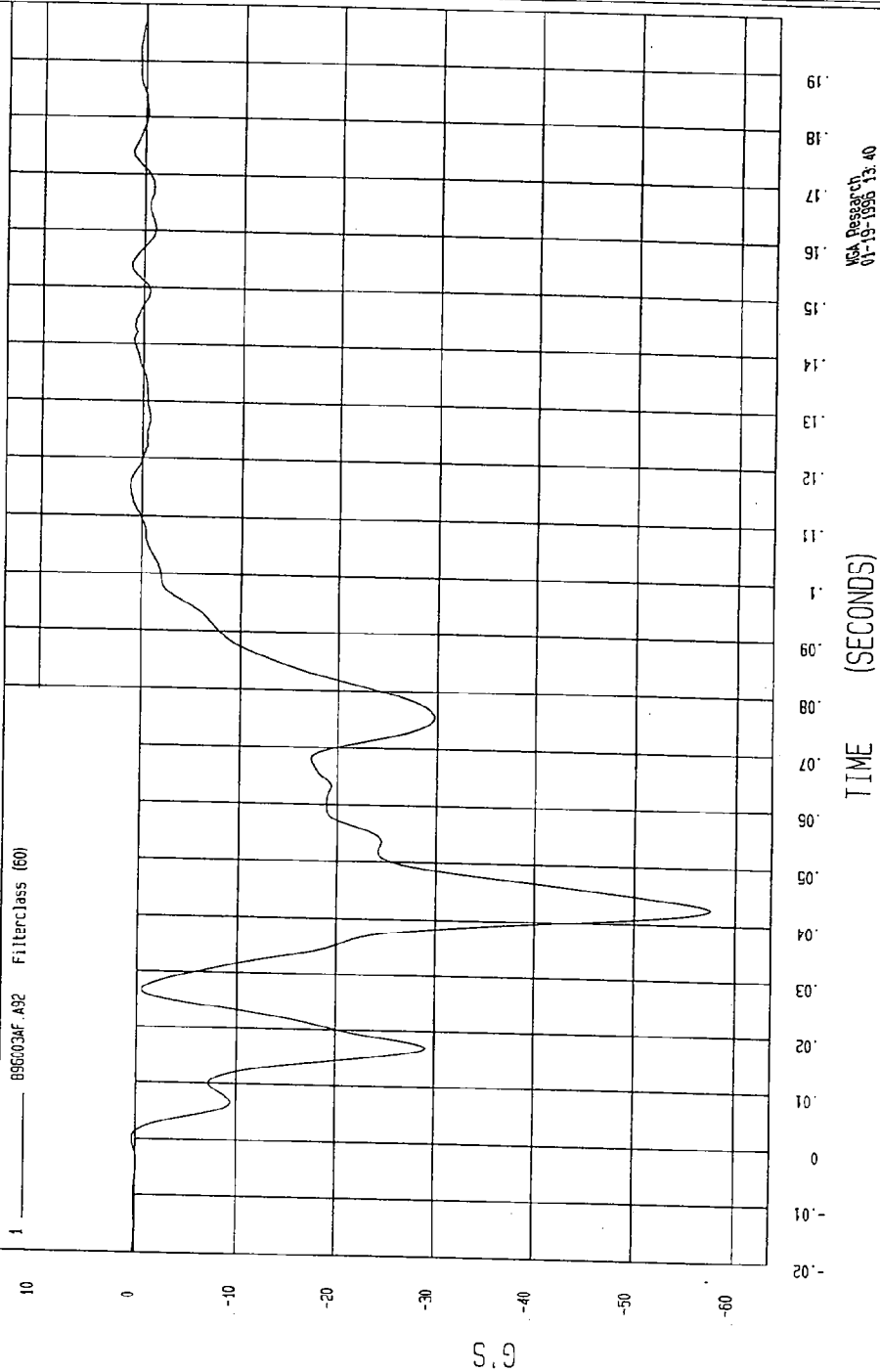


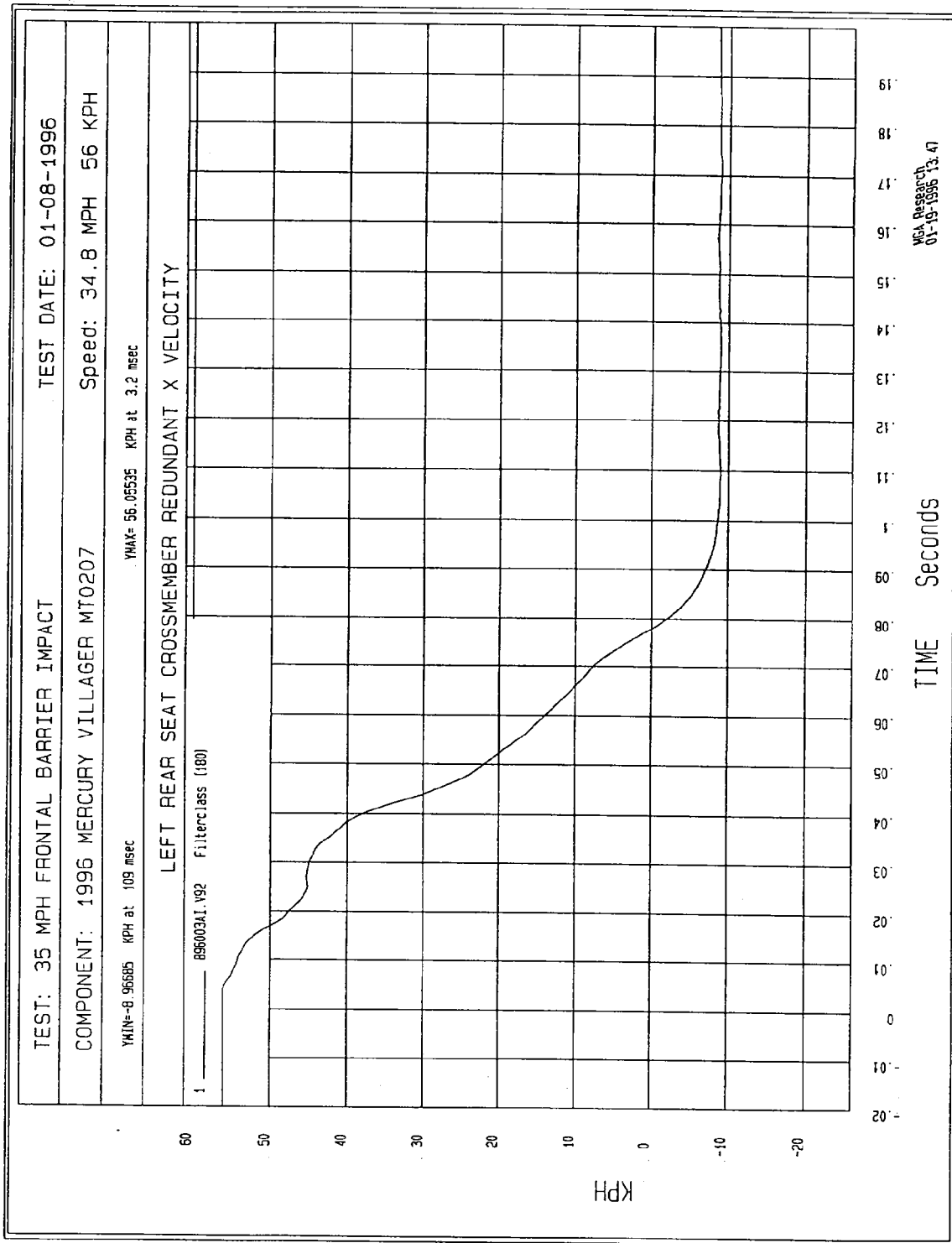
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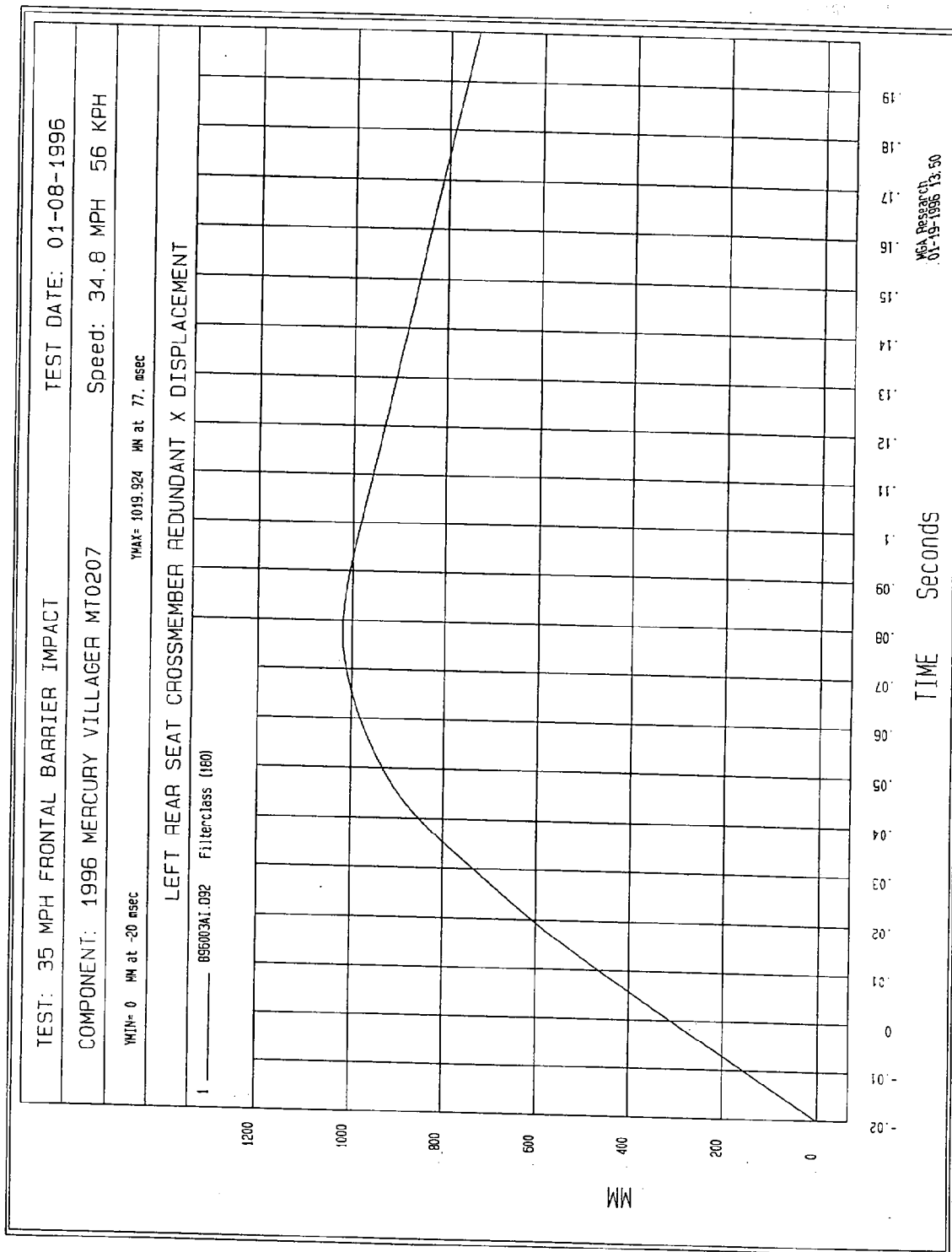
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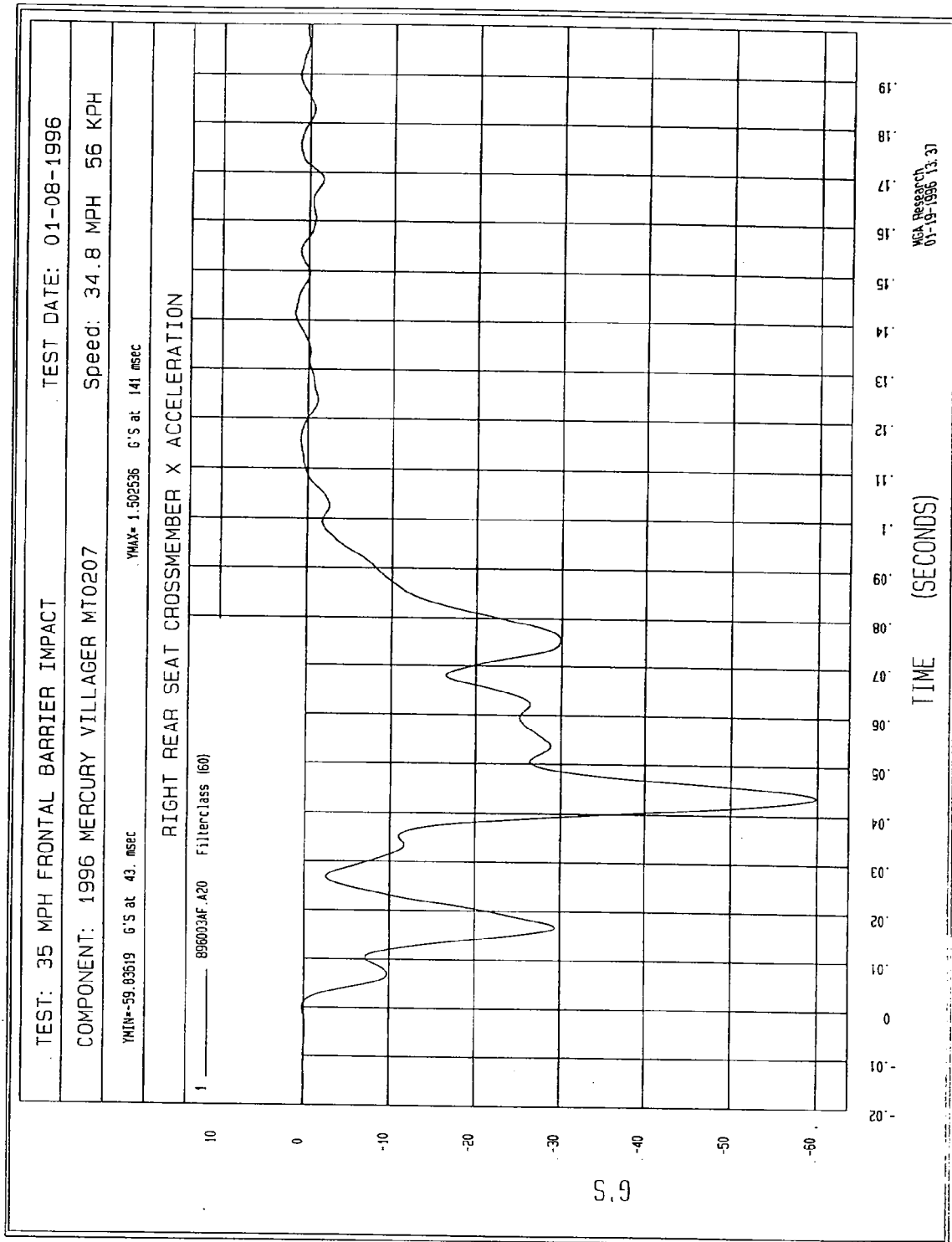
YMAX= 1.174126 6'S at 114 msec

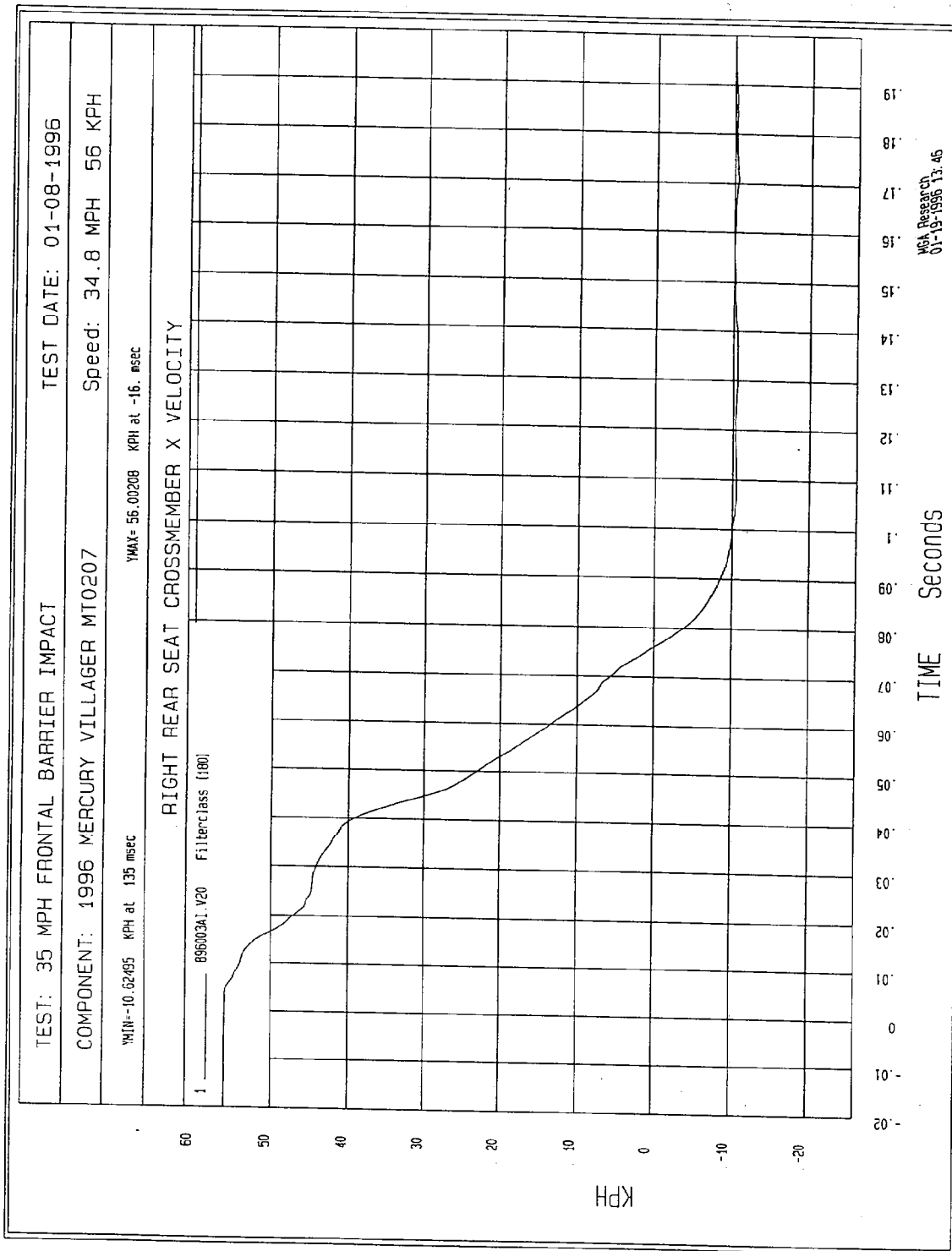
LEFT REAR SEAT CROSSMEMBER REDUNDANT X ACCELERATION

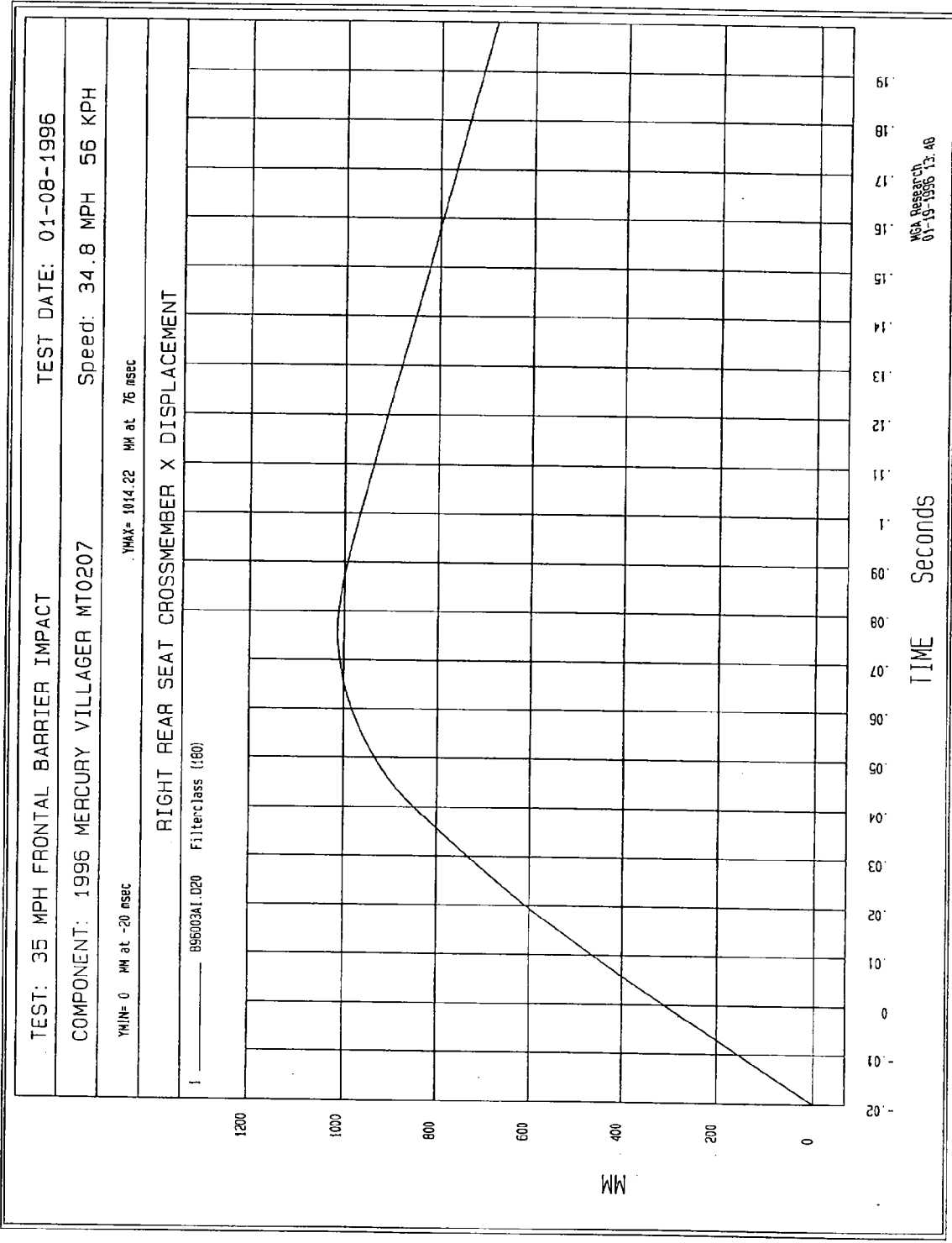
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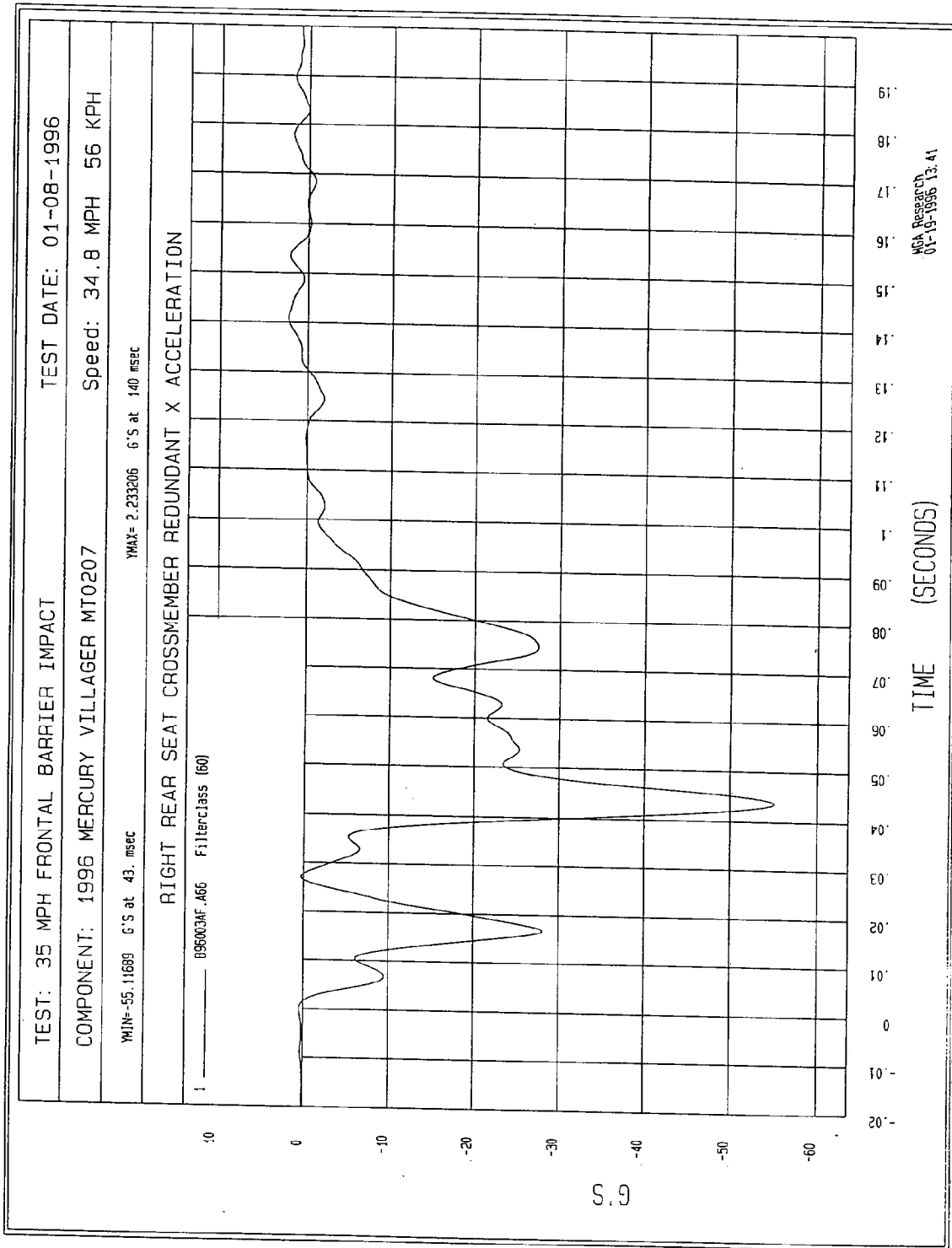


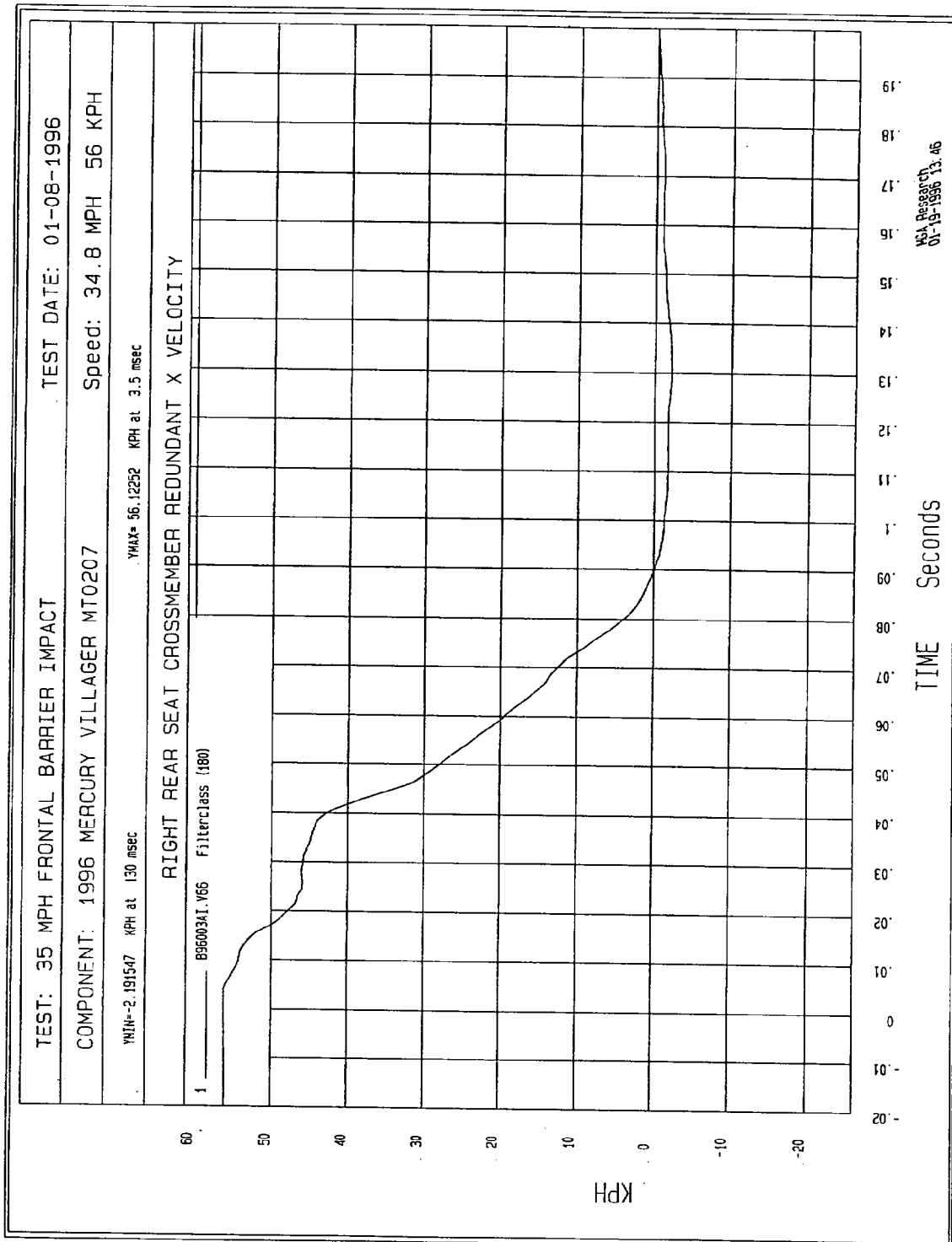


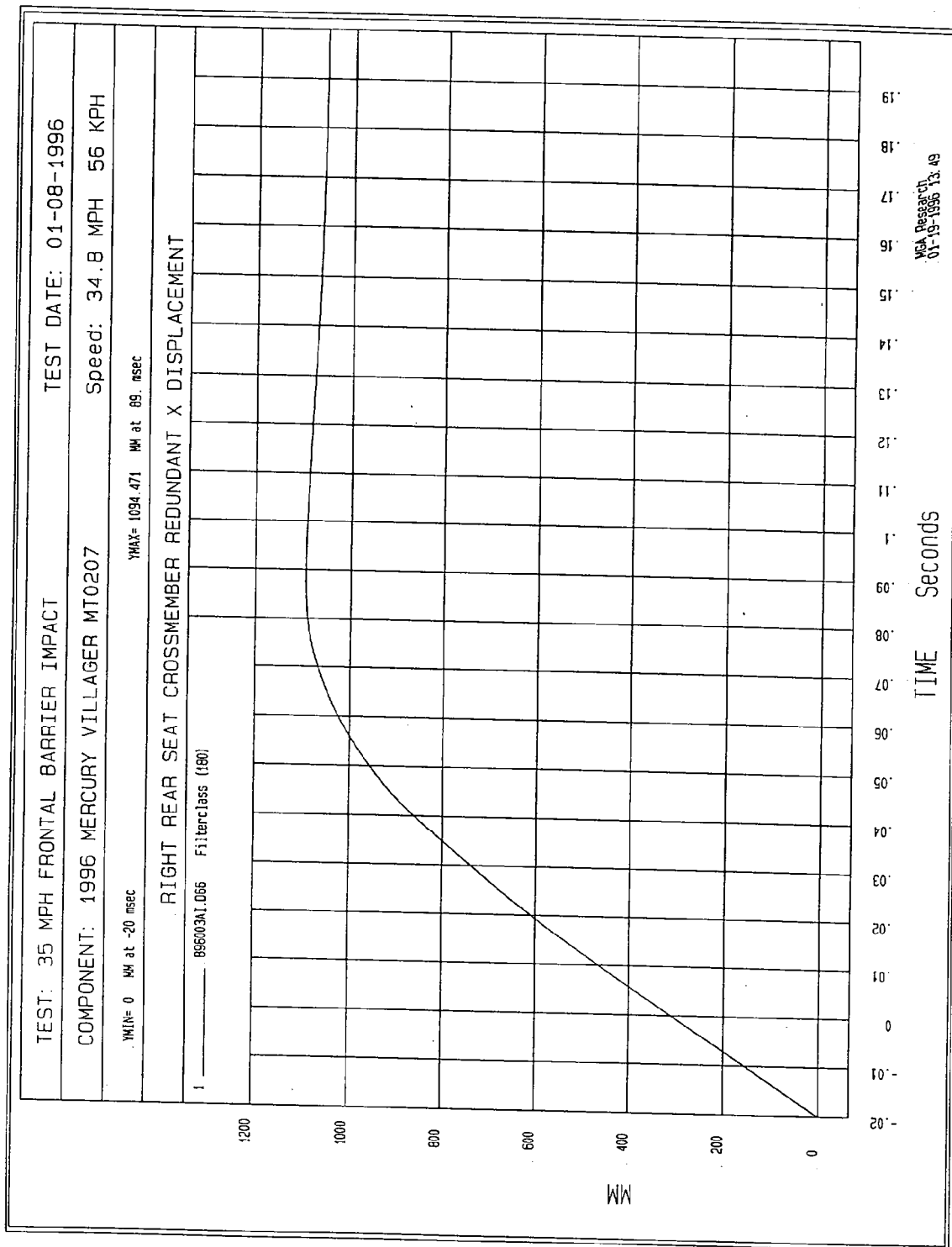


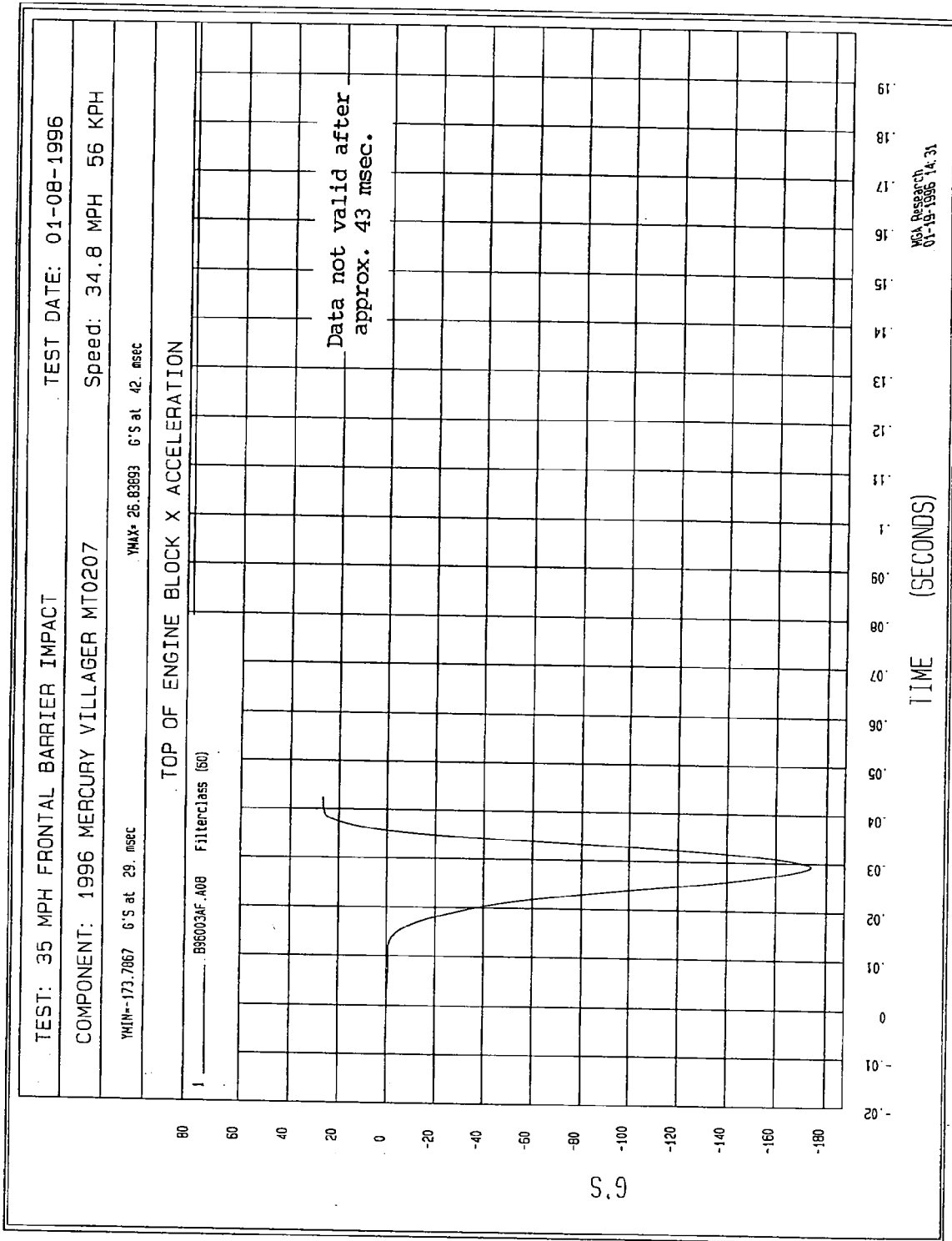


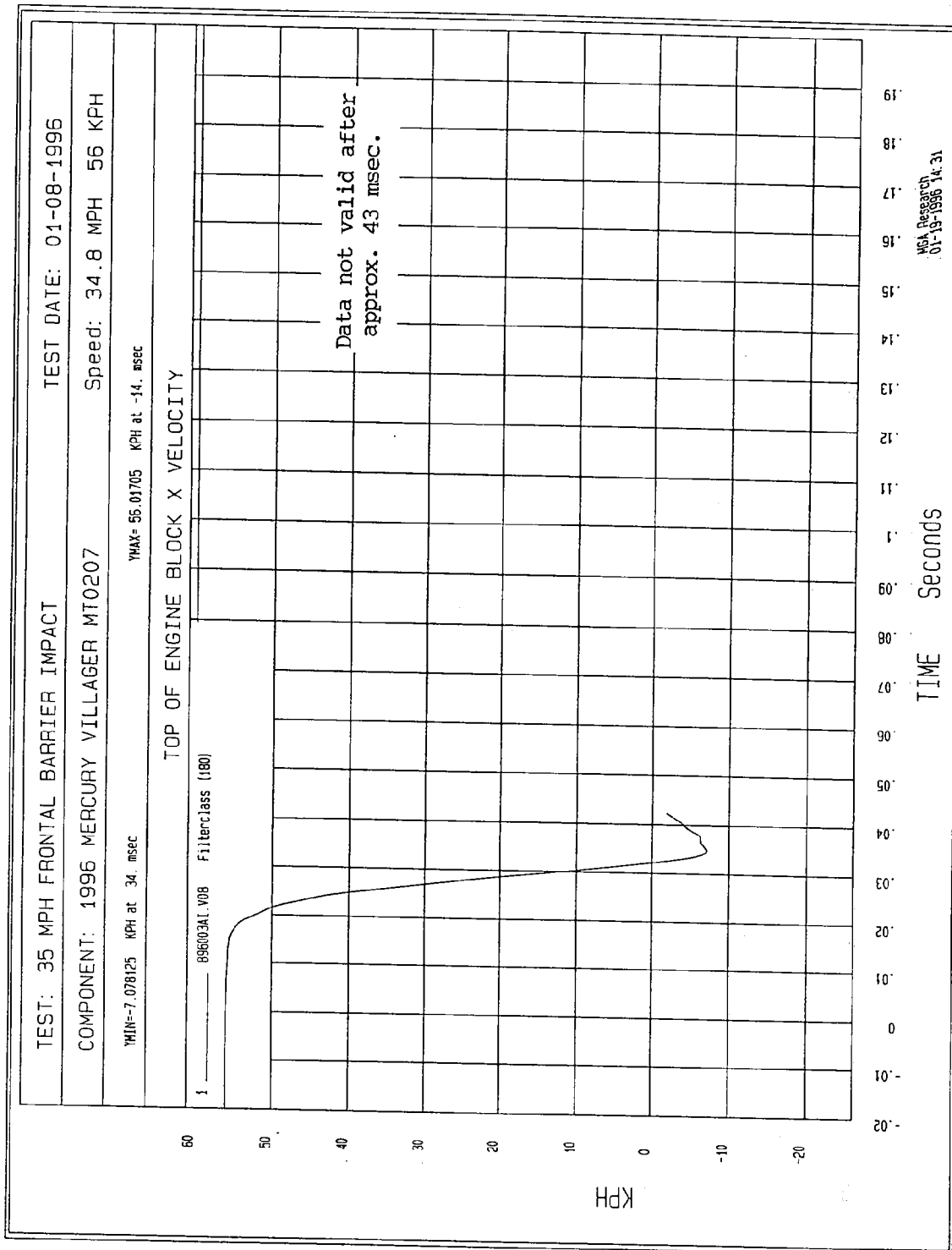


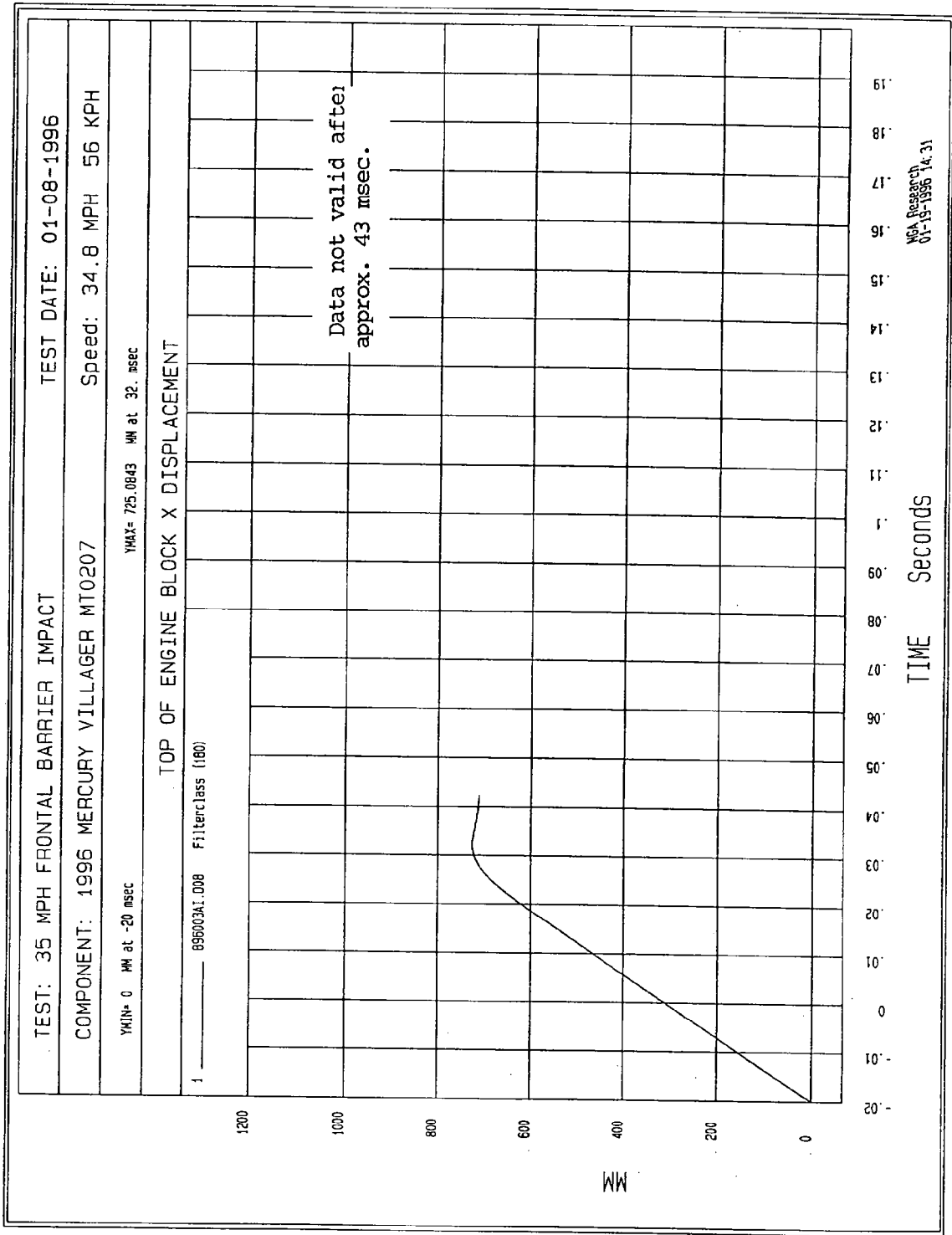


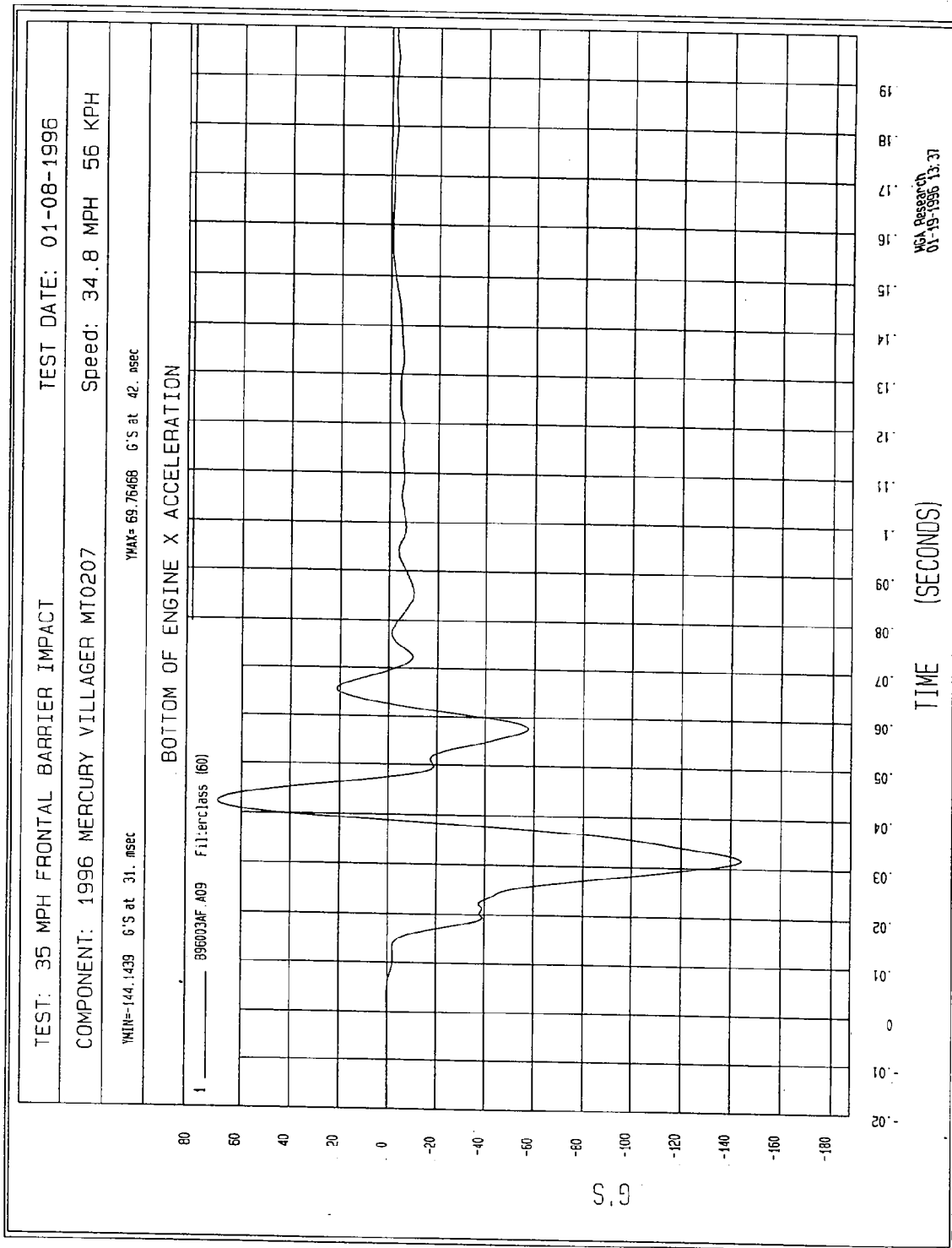


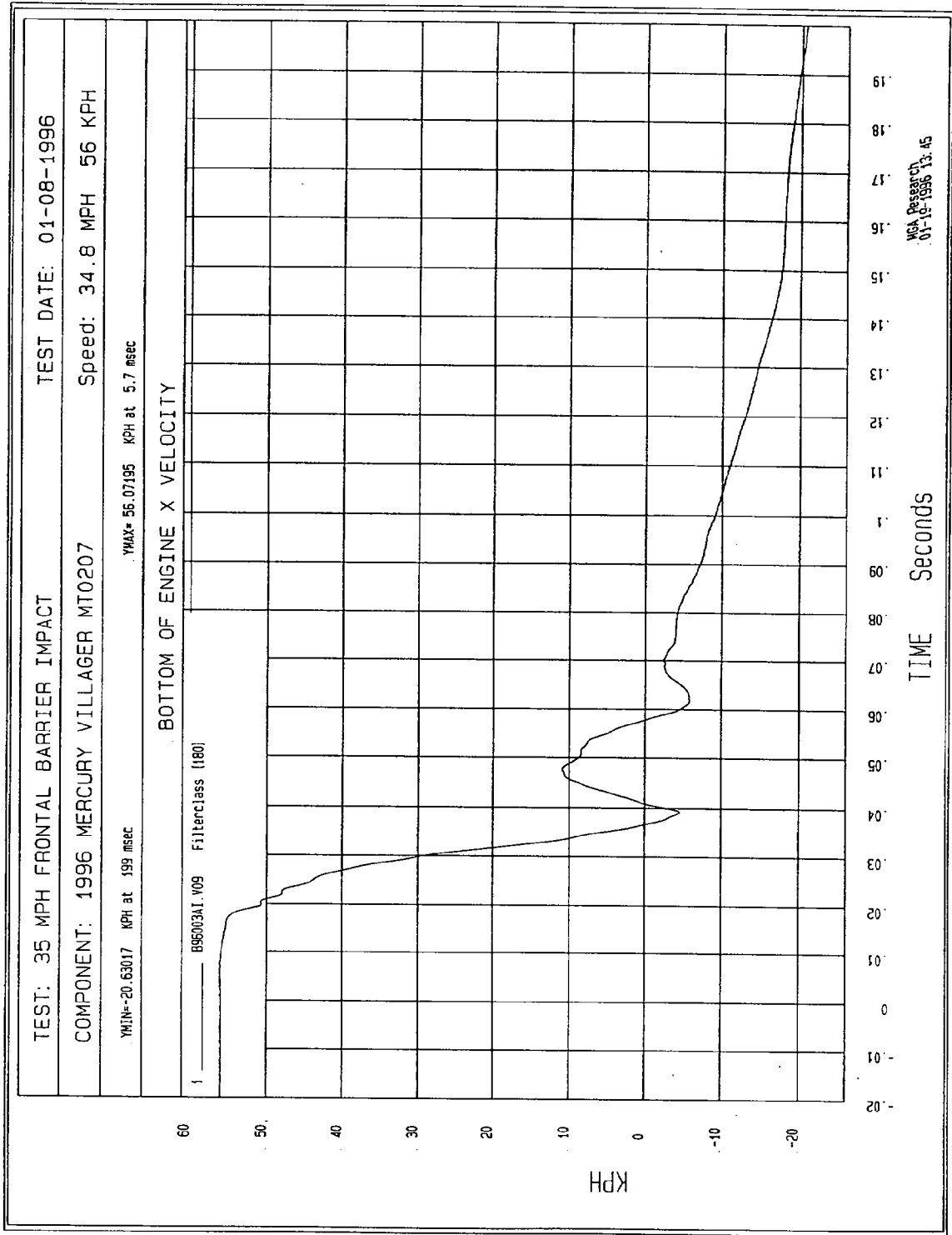


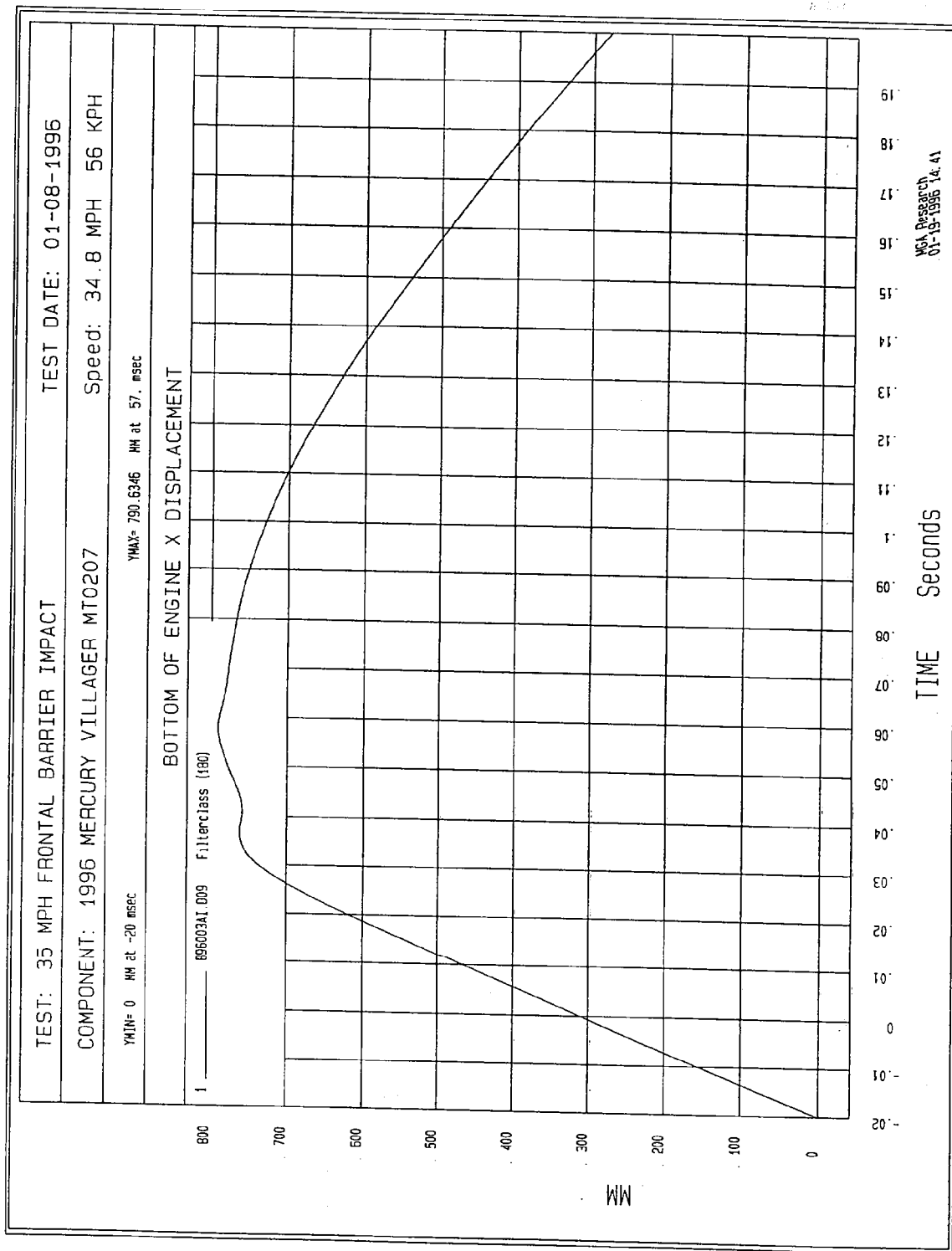


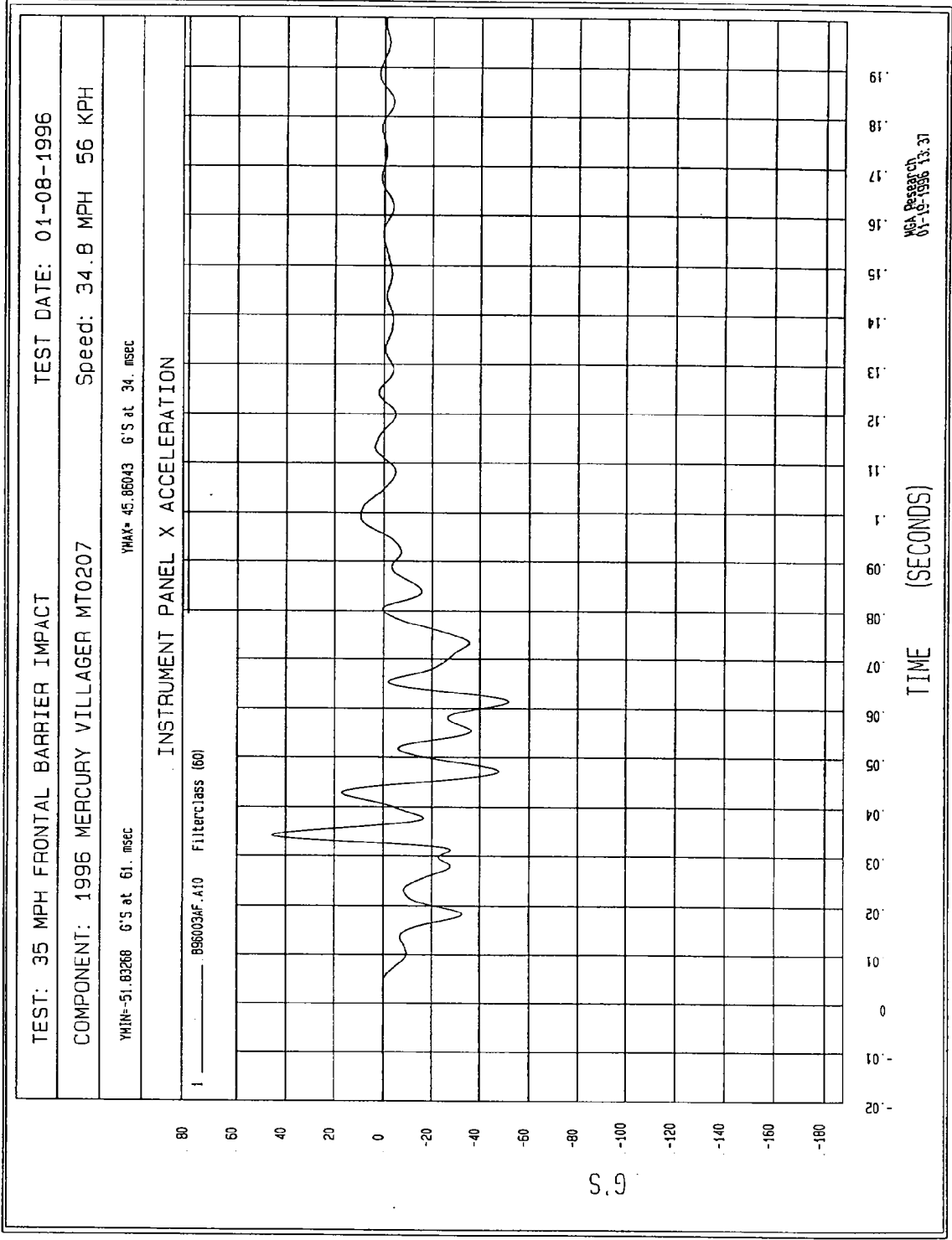


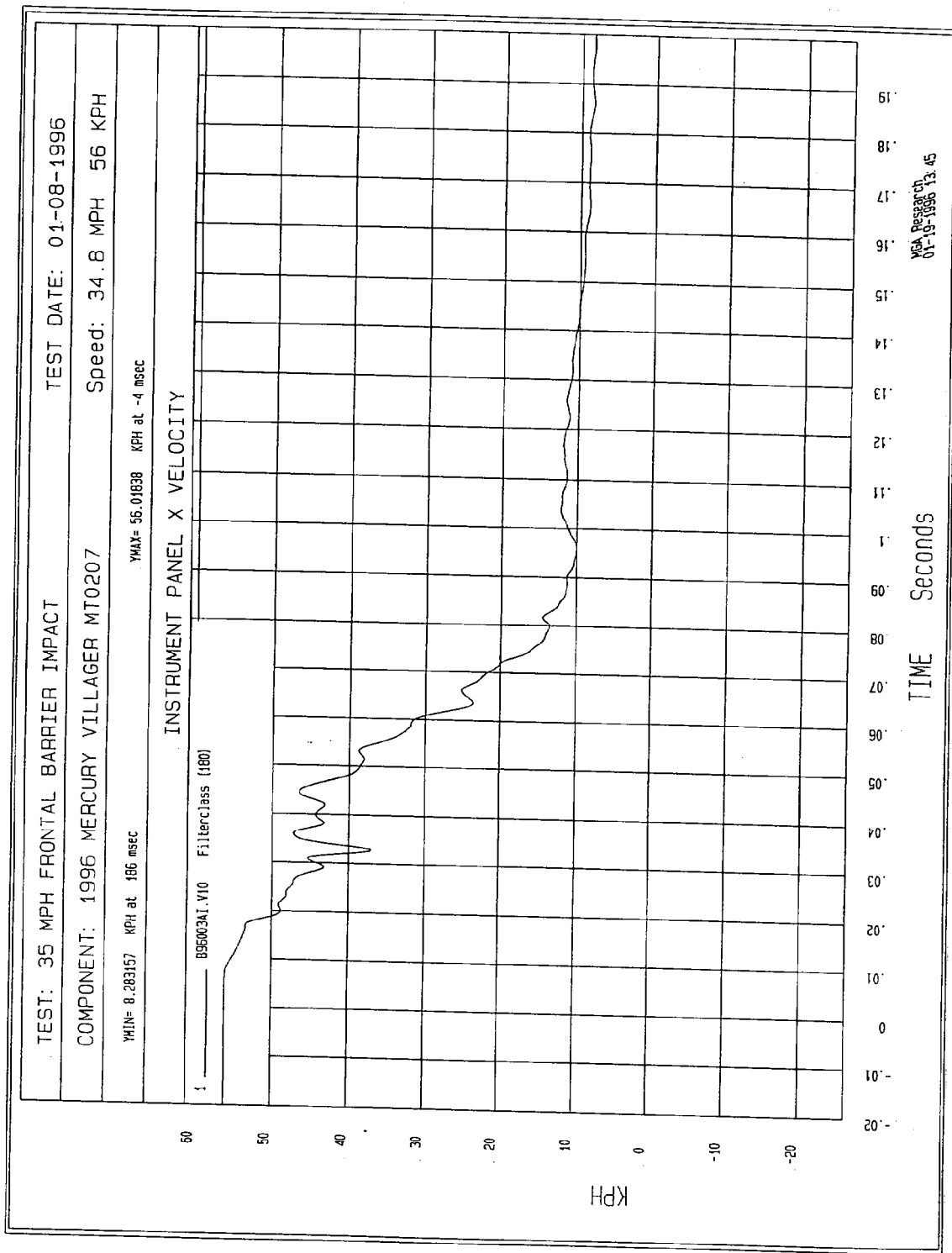


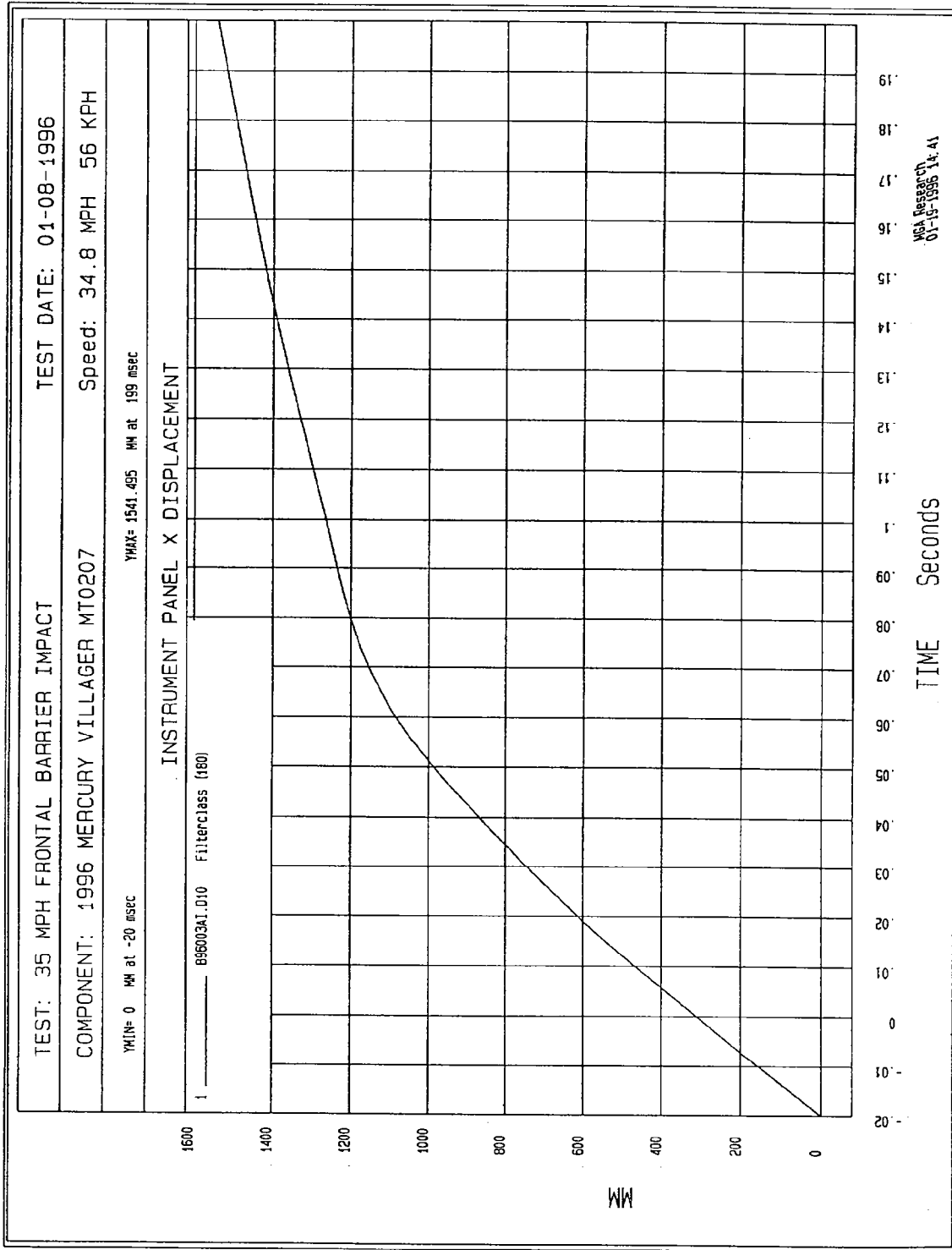


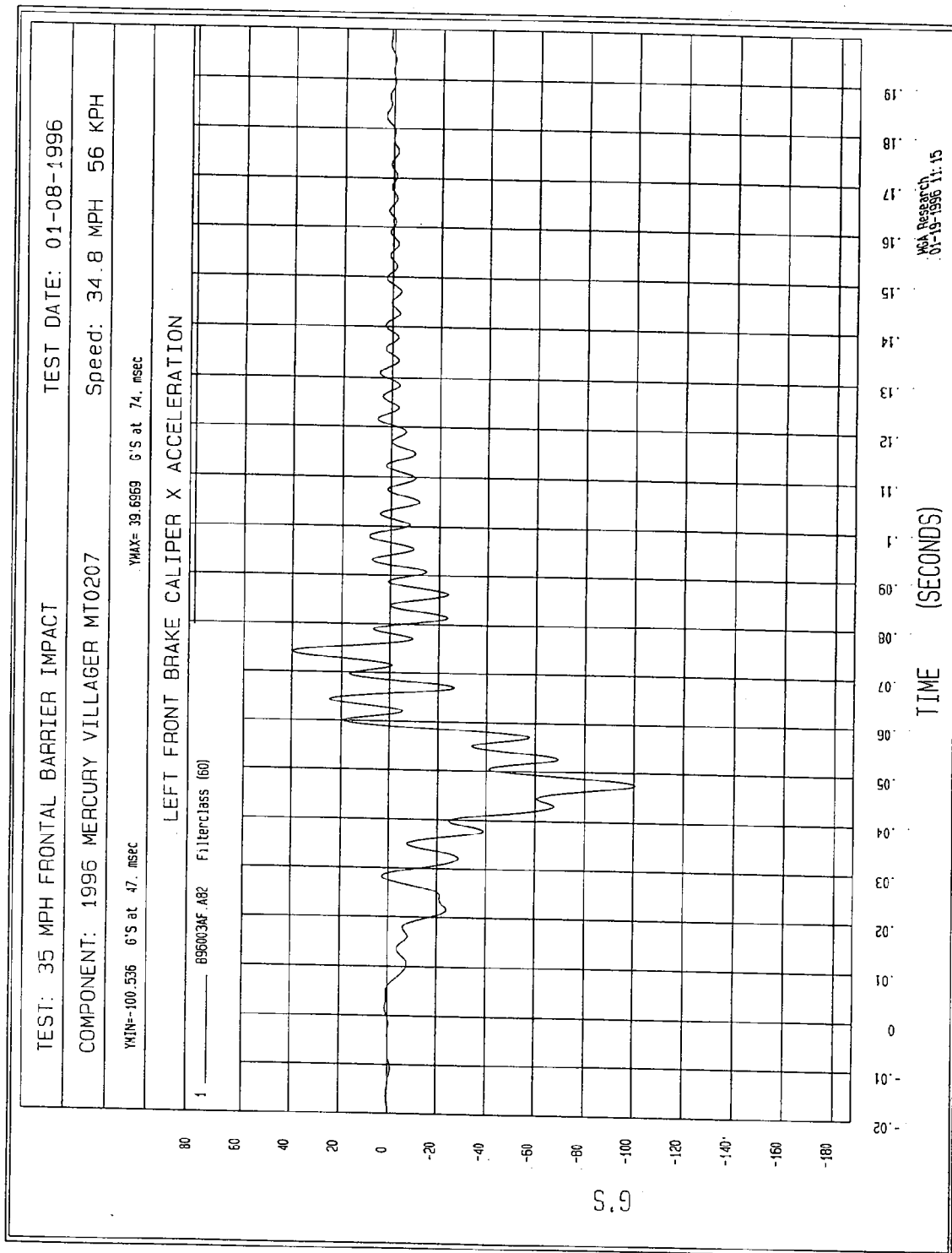


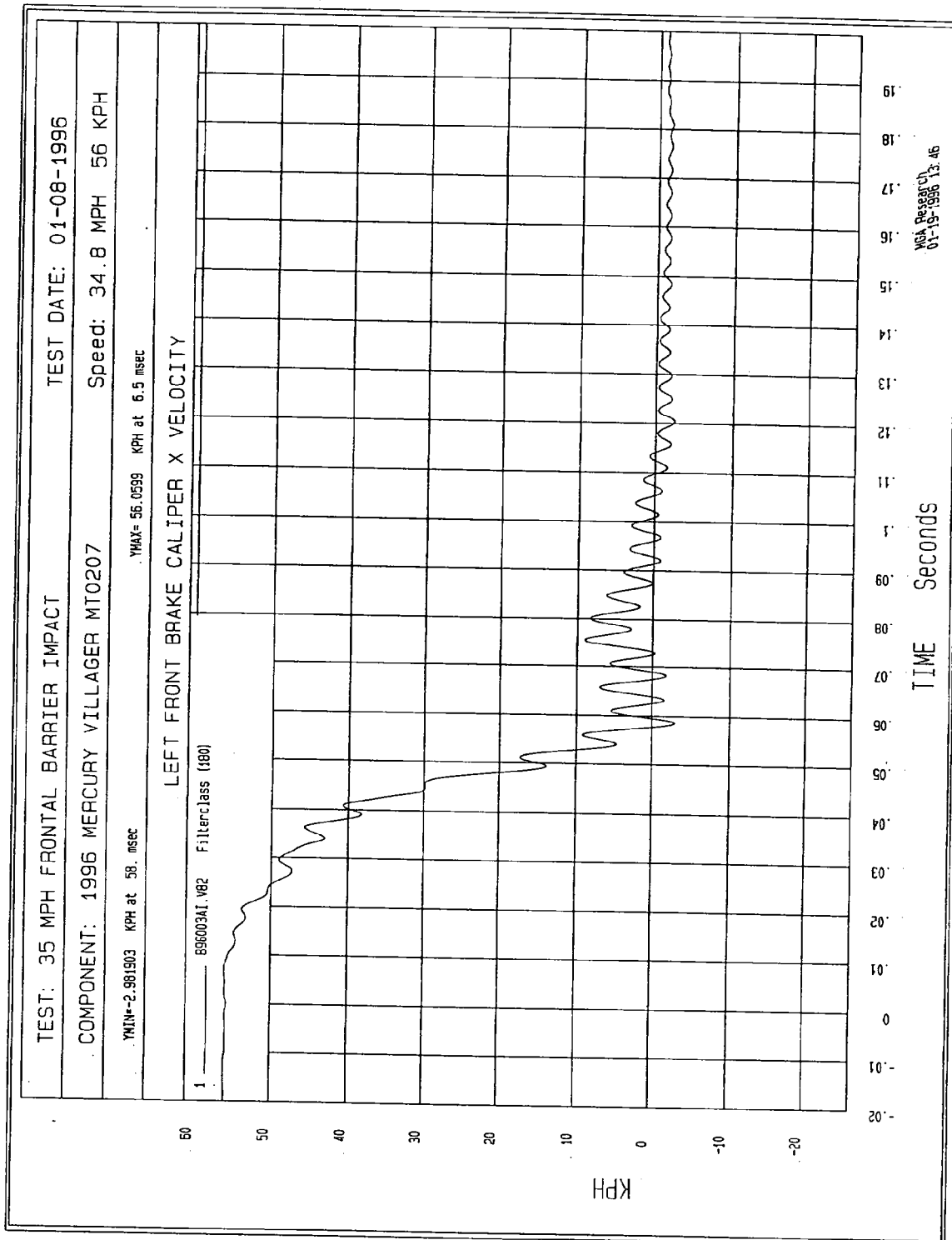


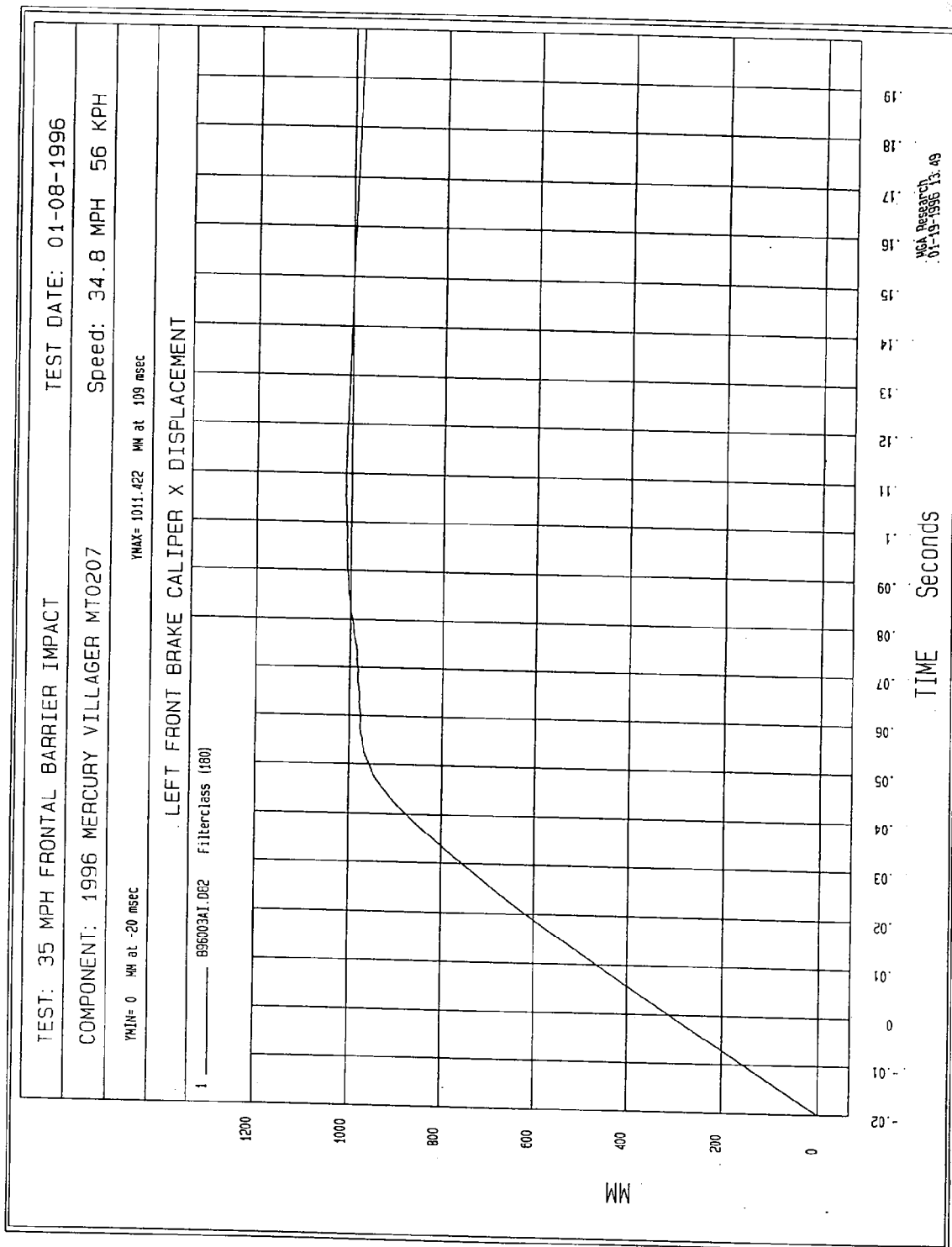


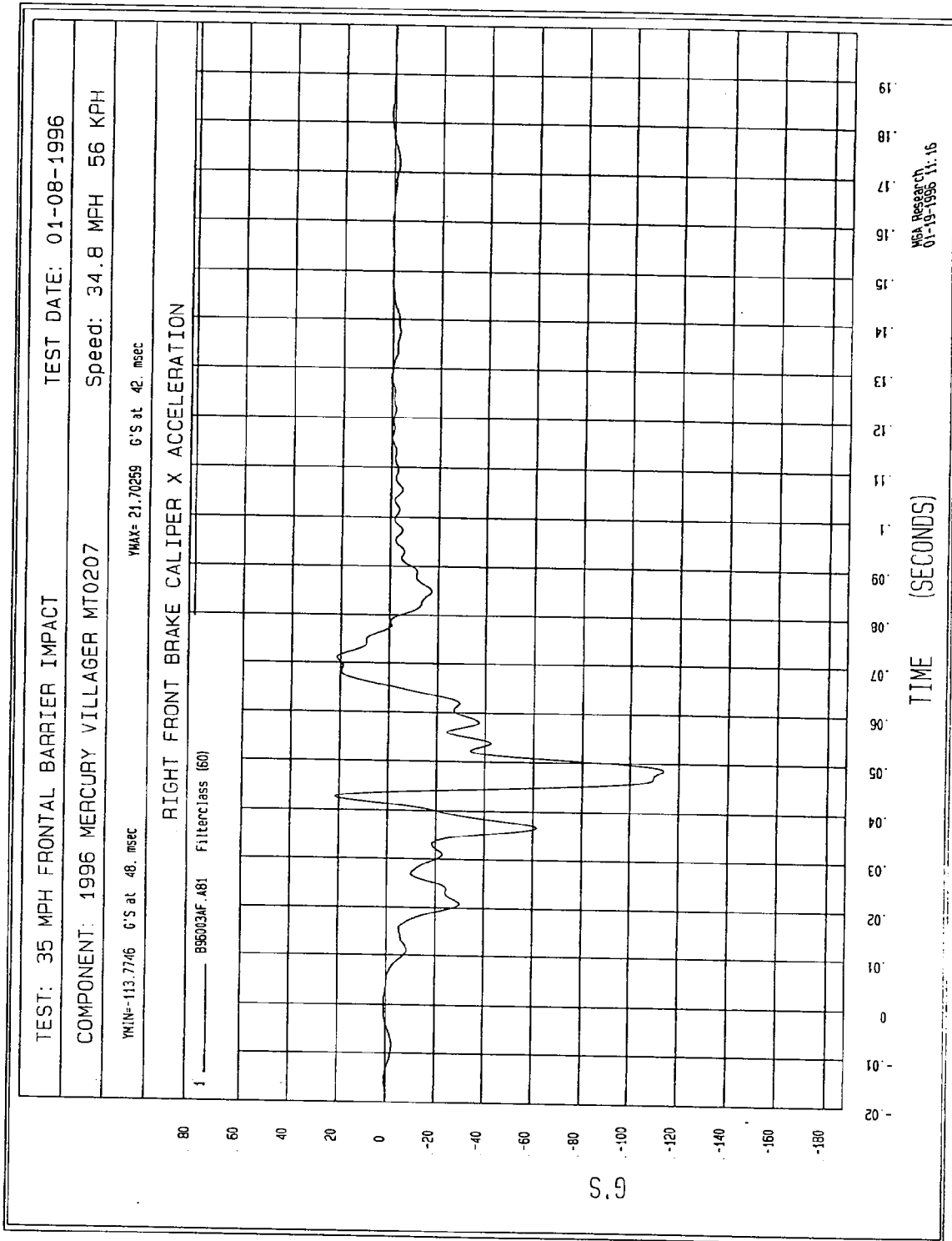


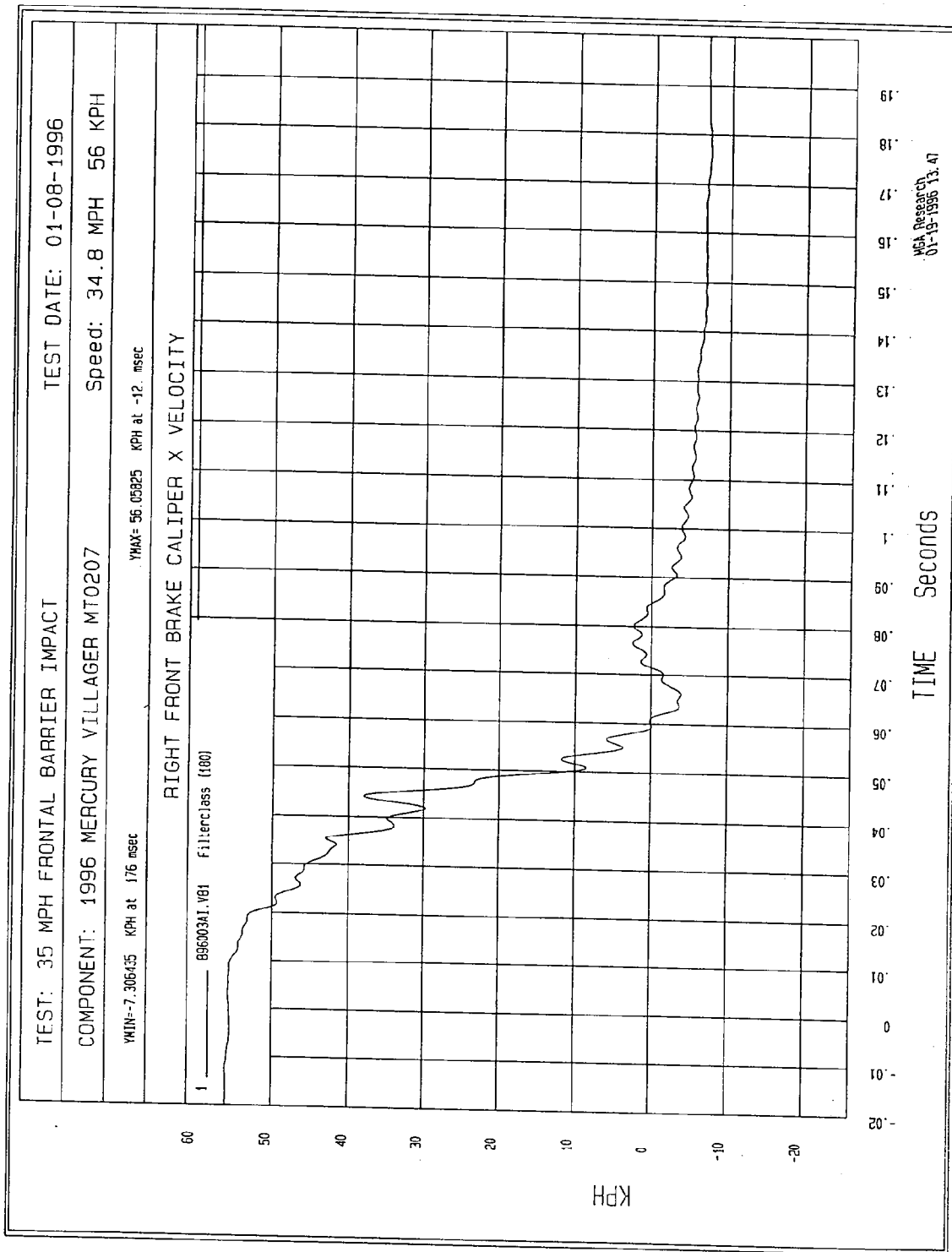


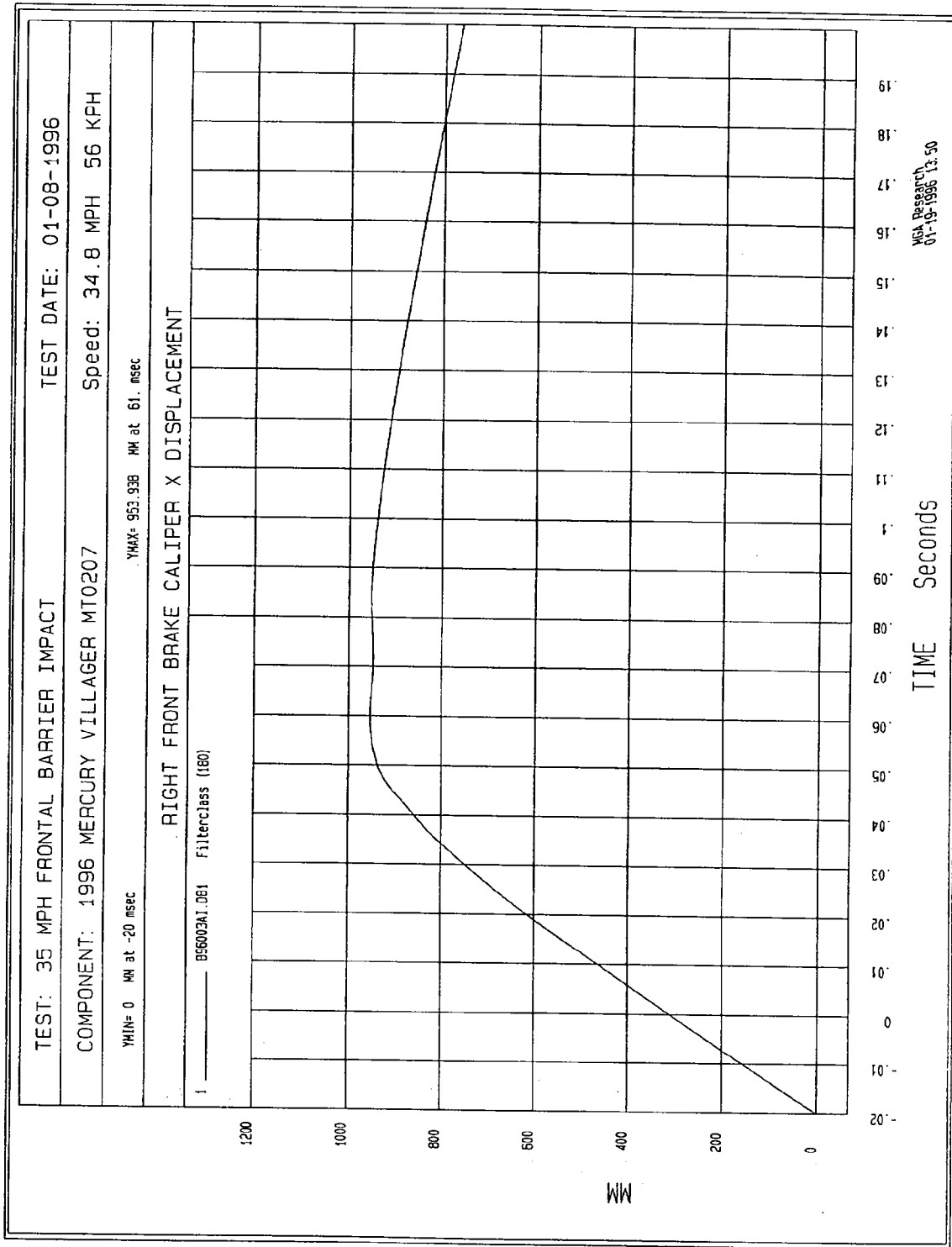


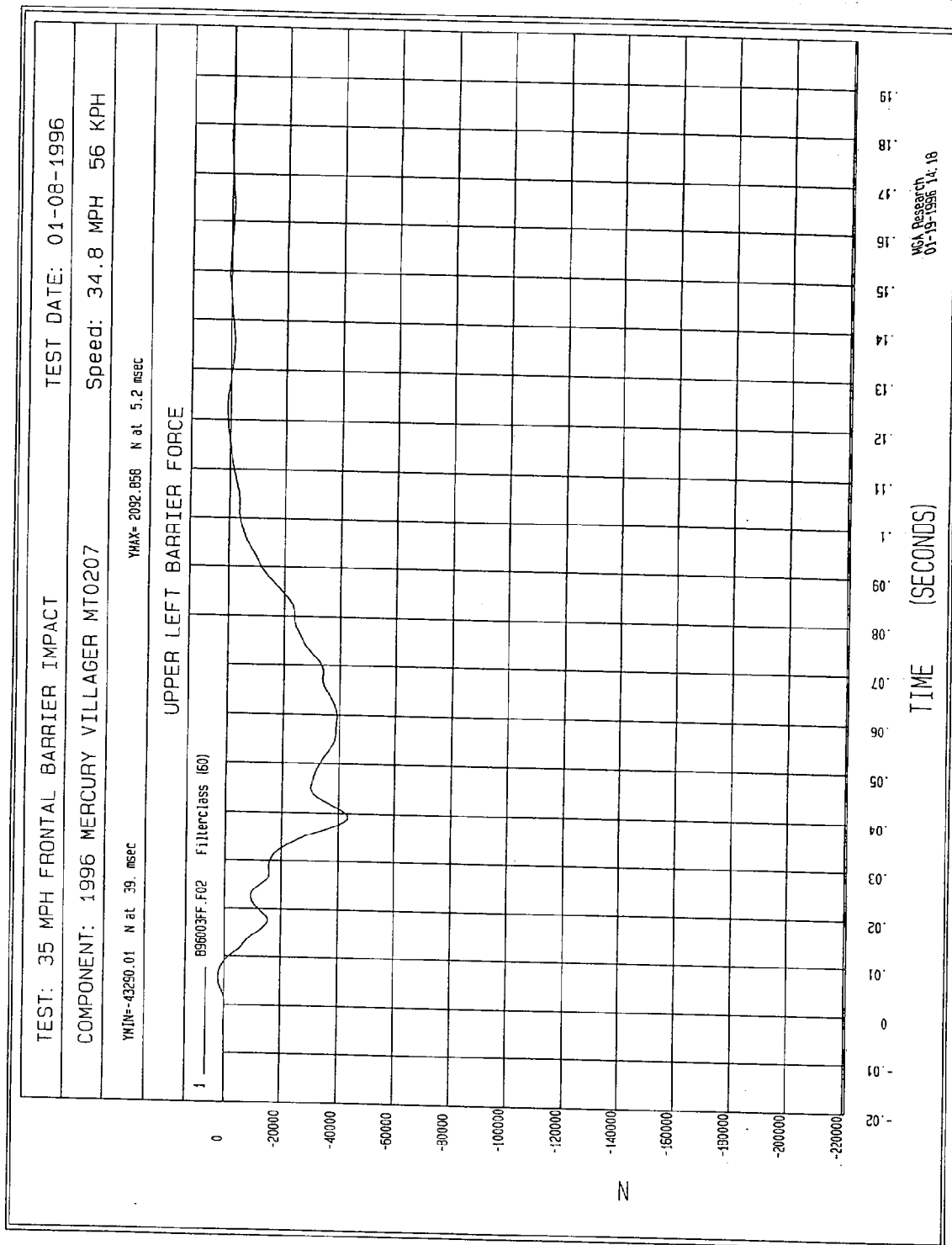


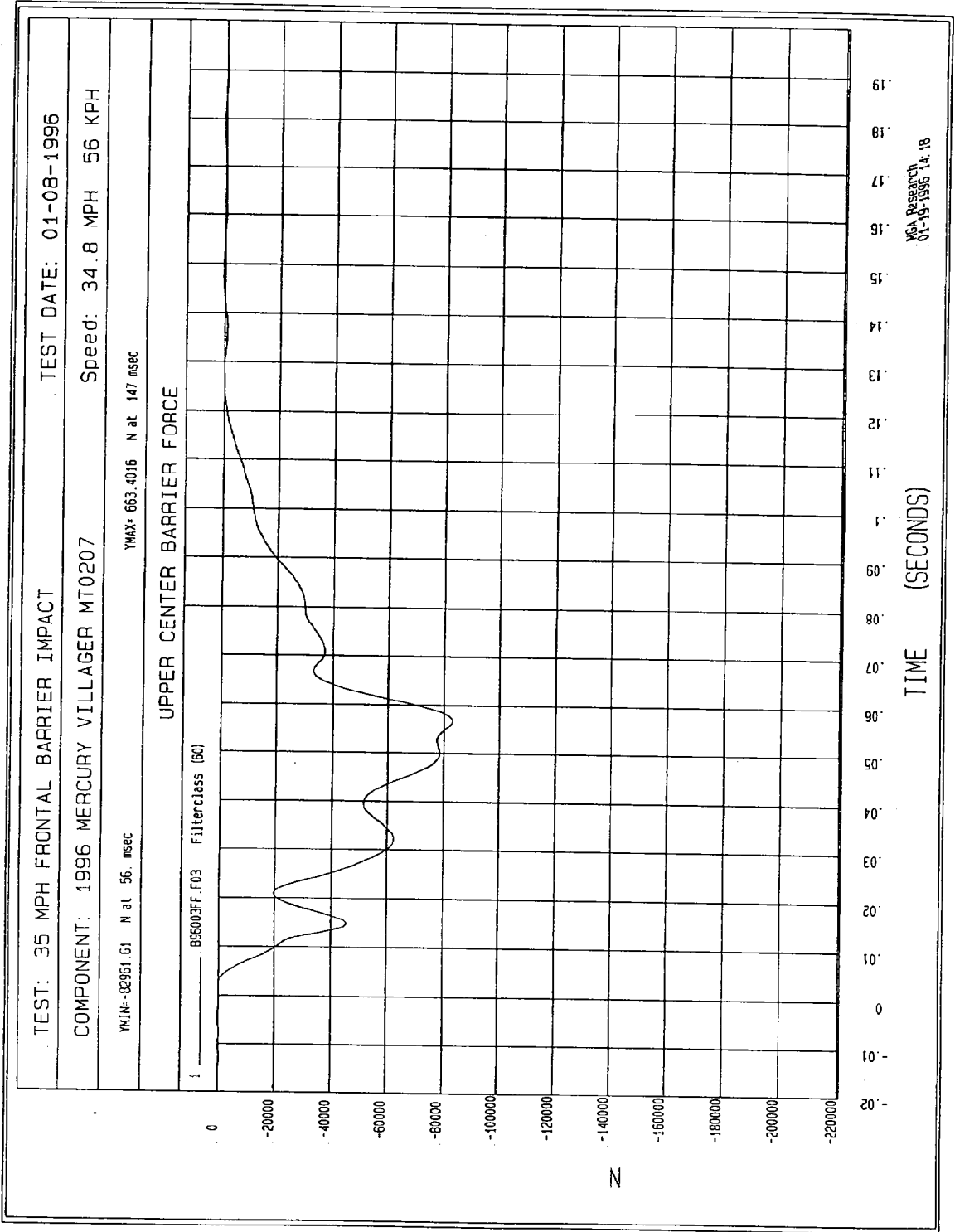


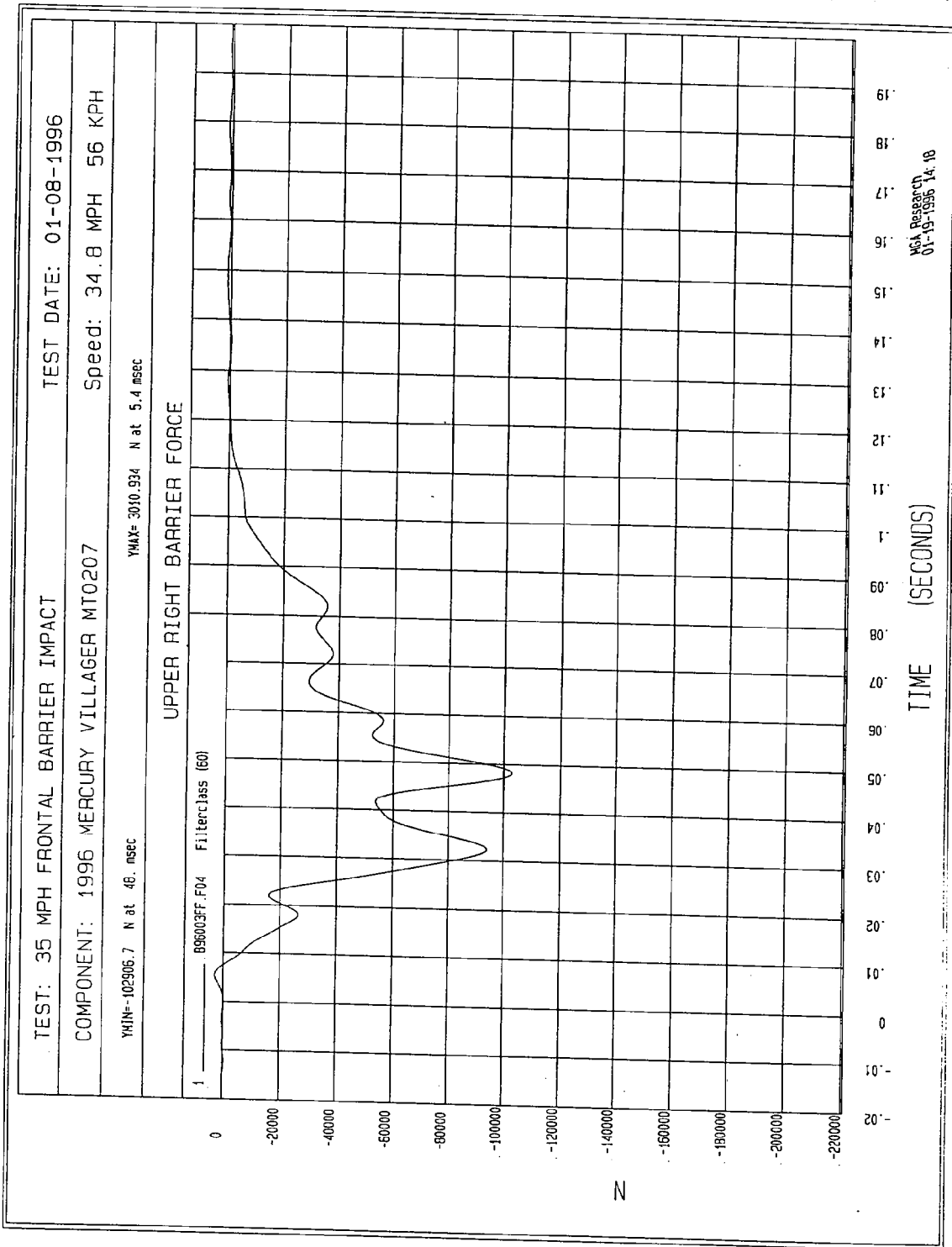


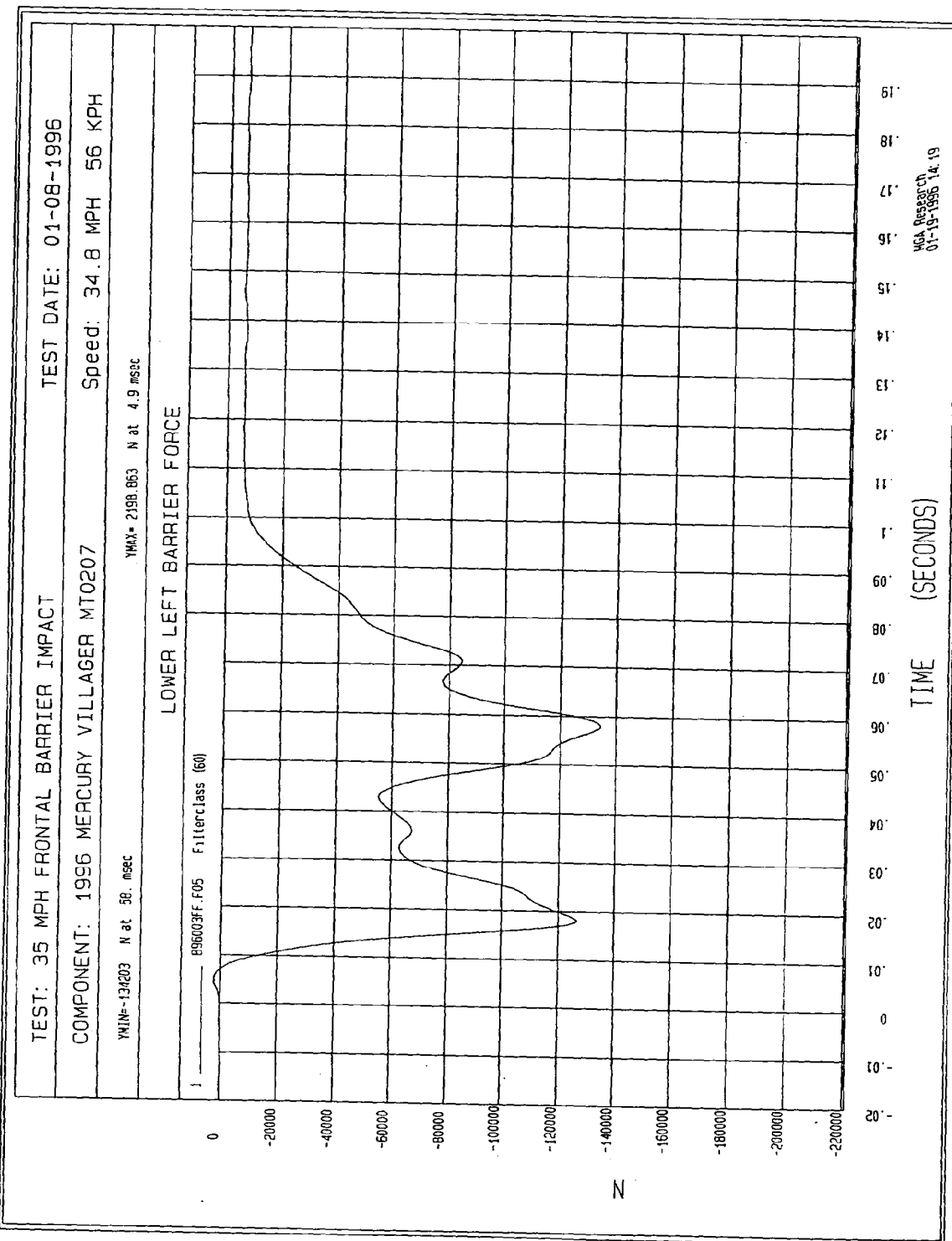


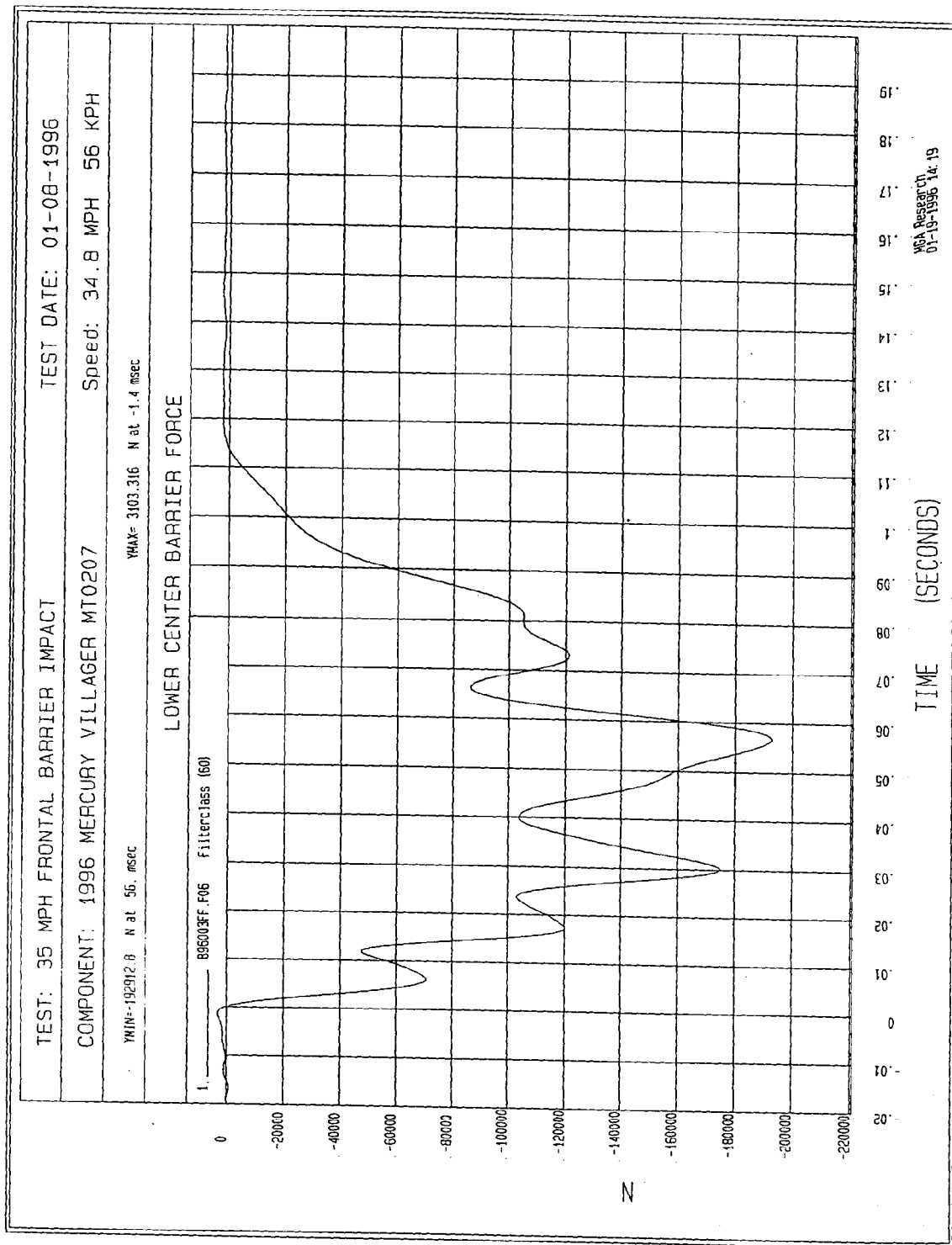


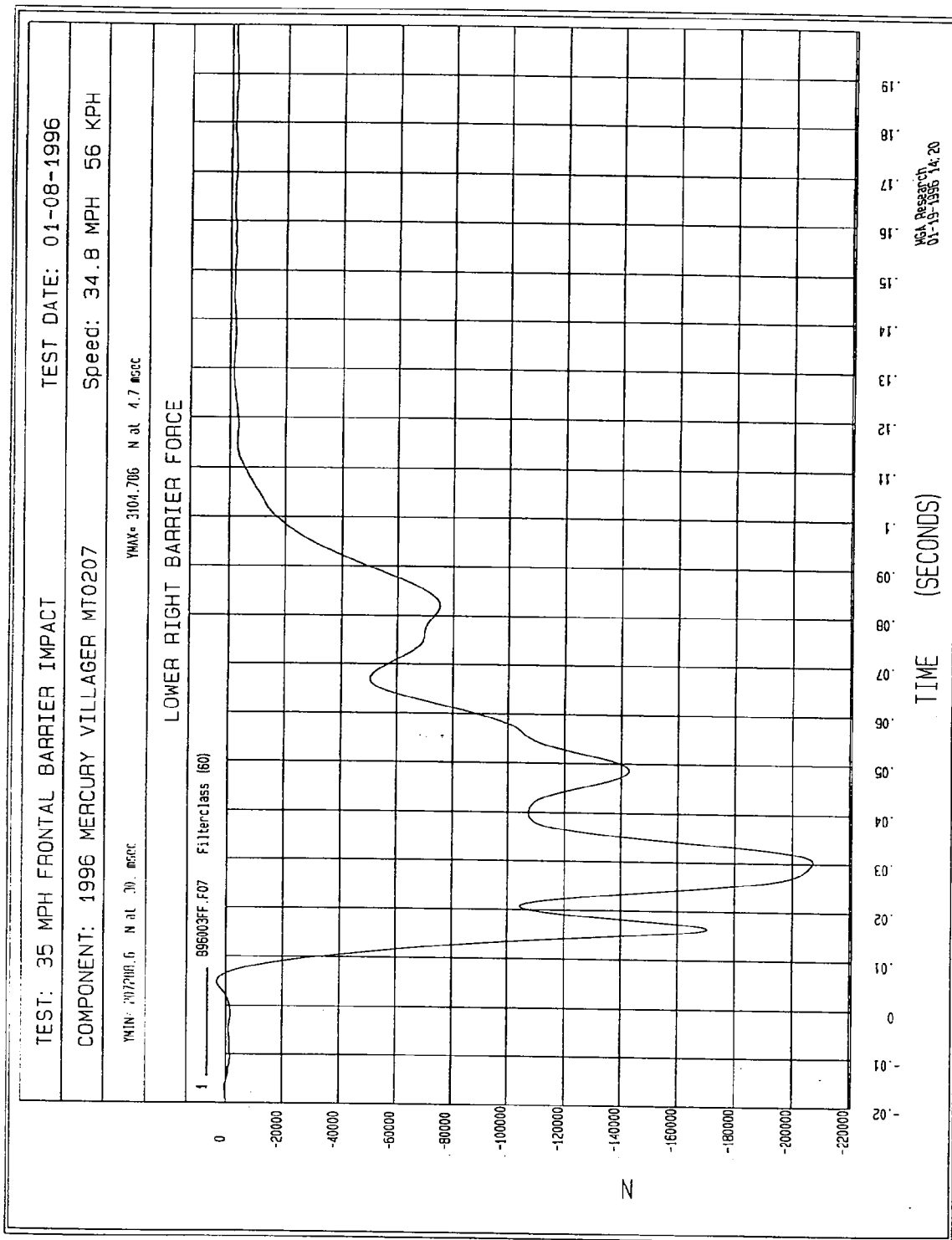


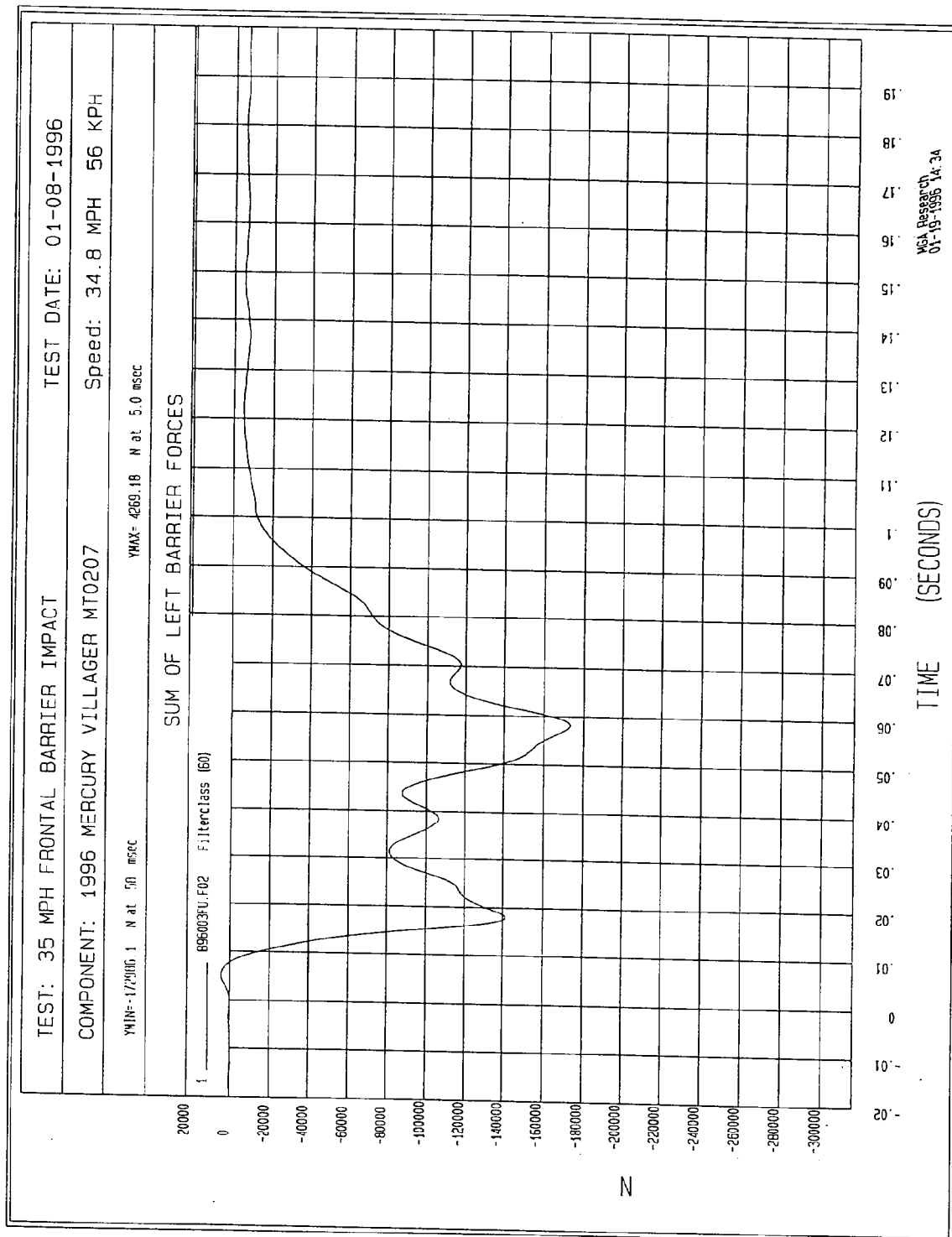


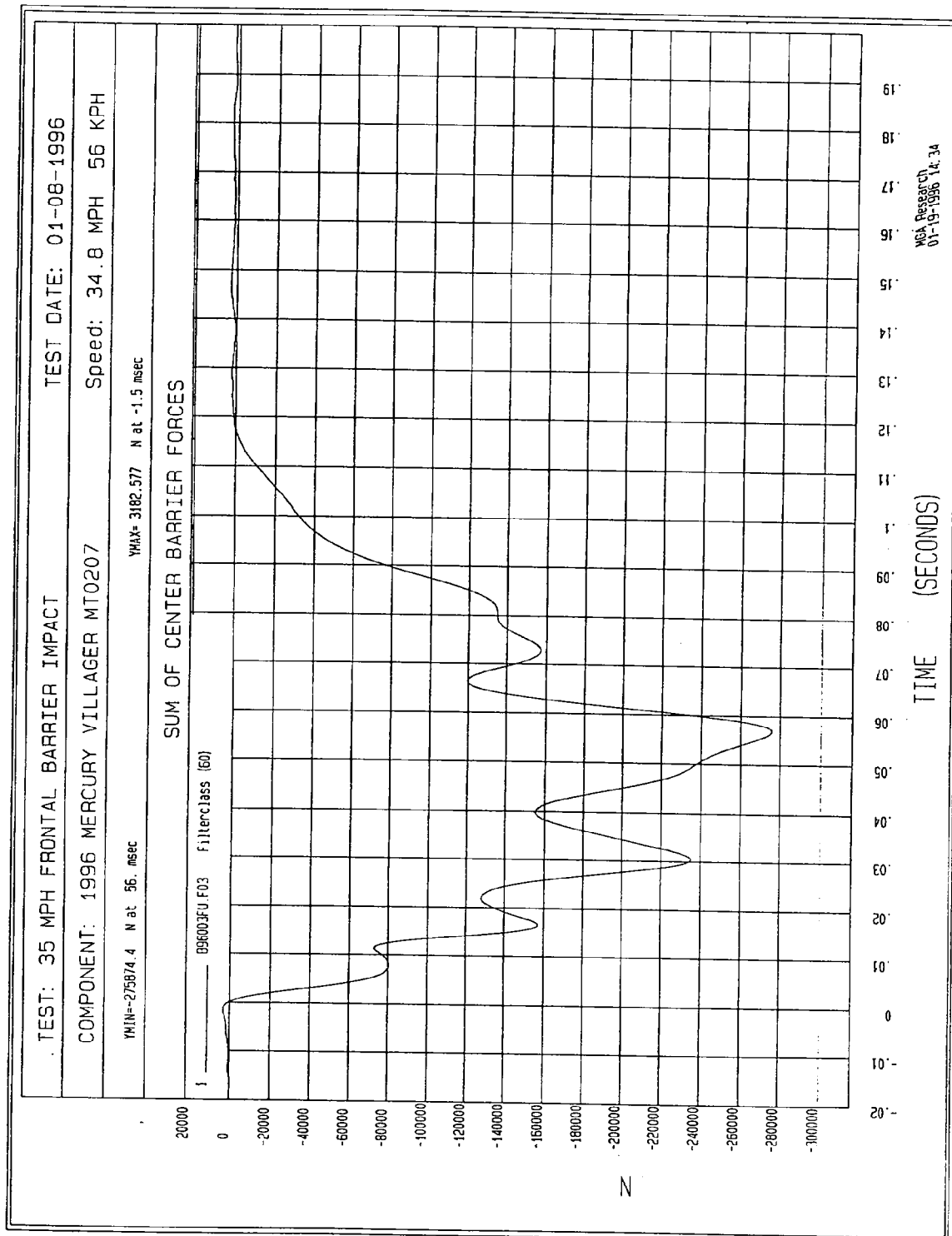


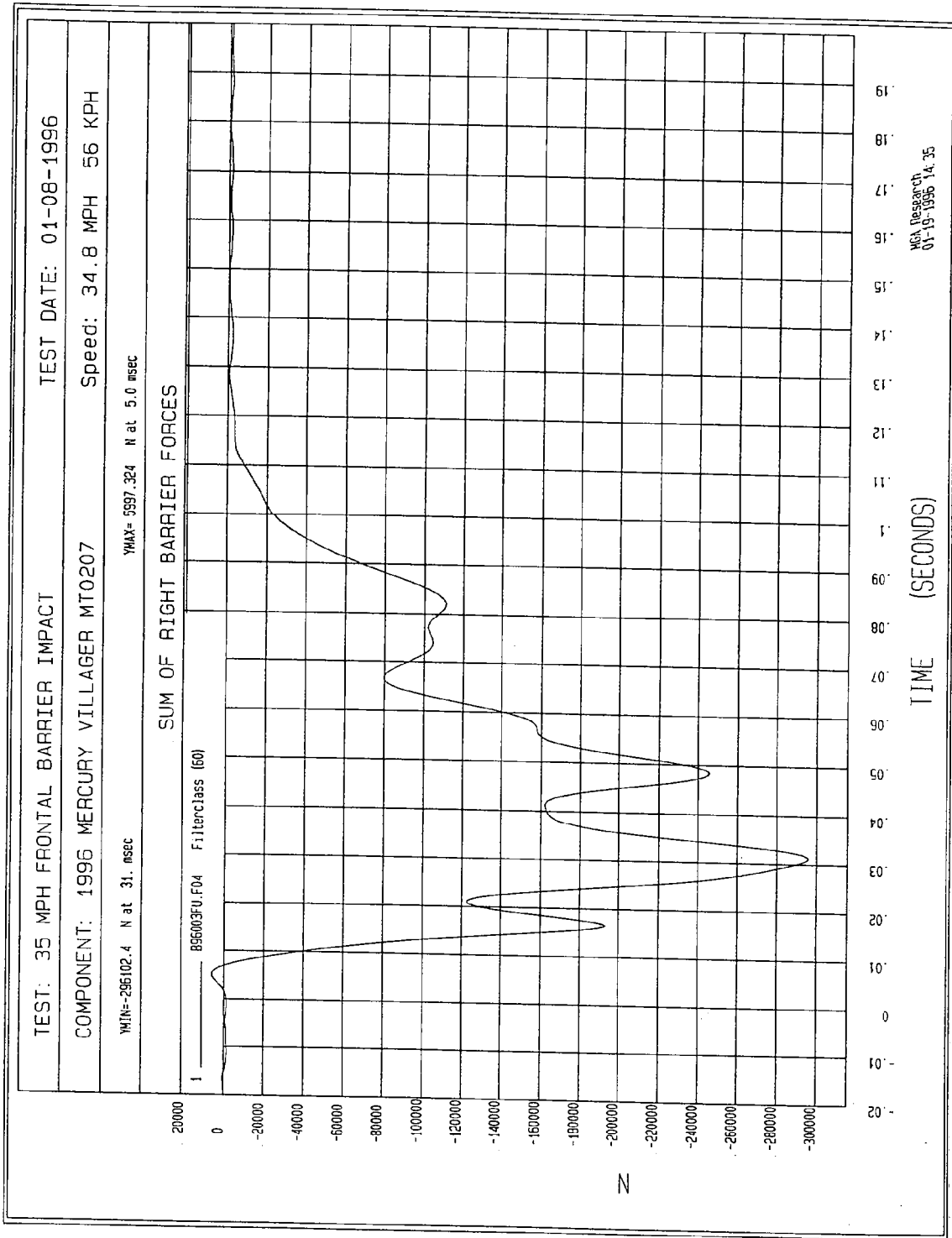


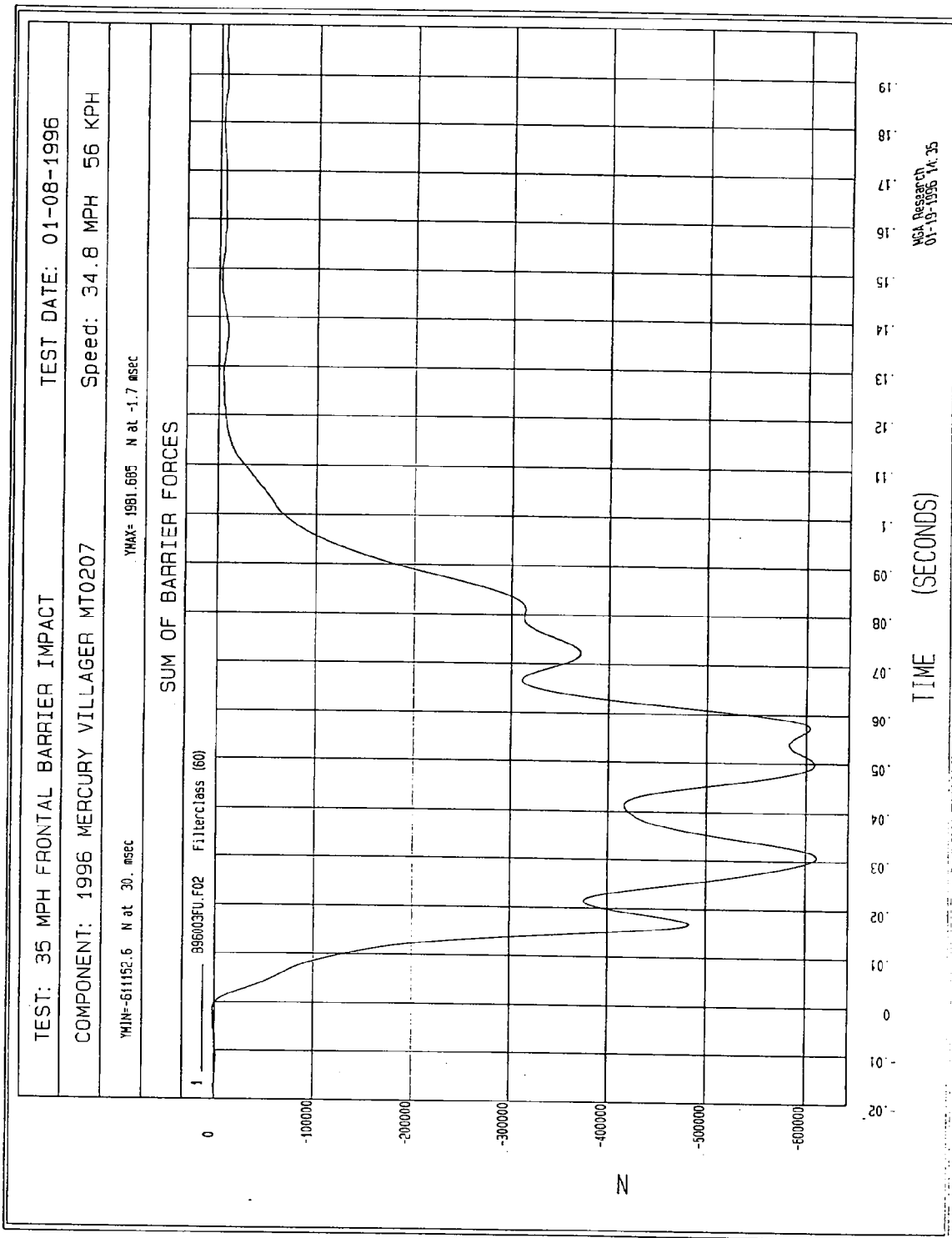




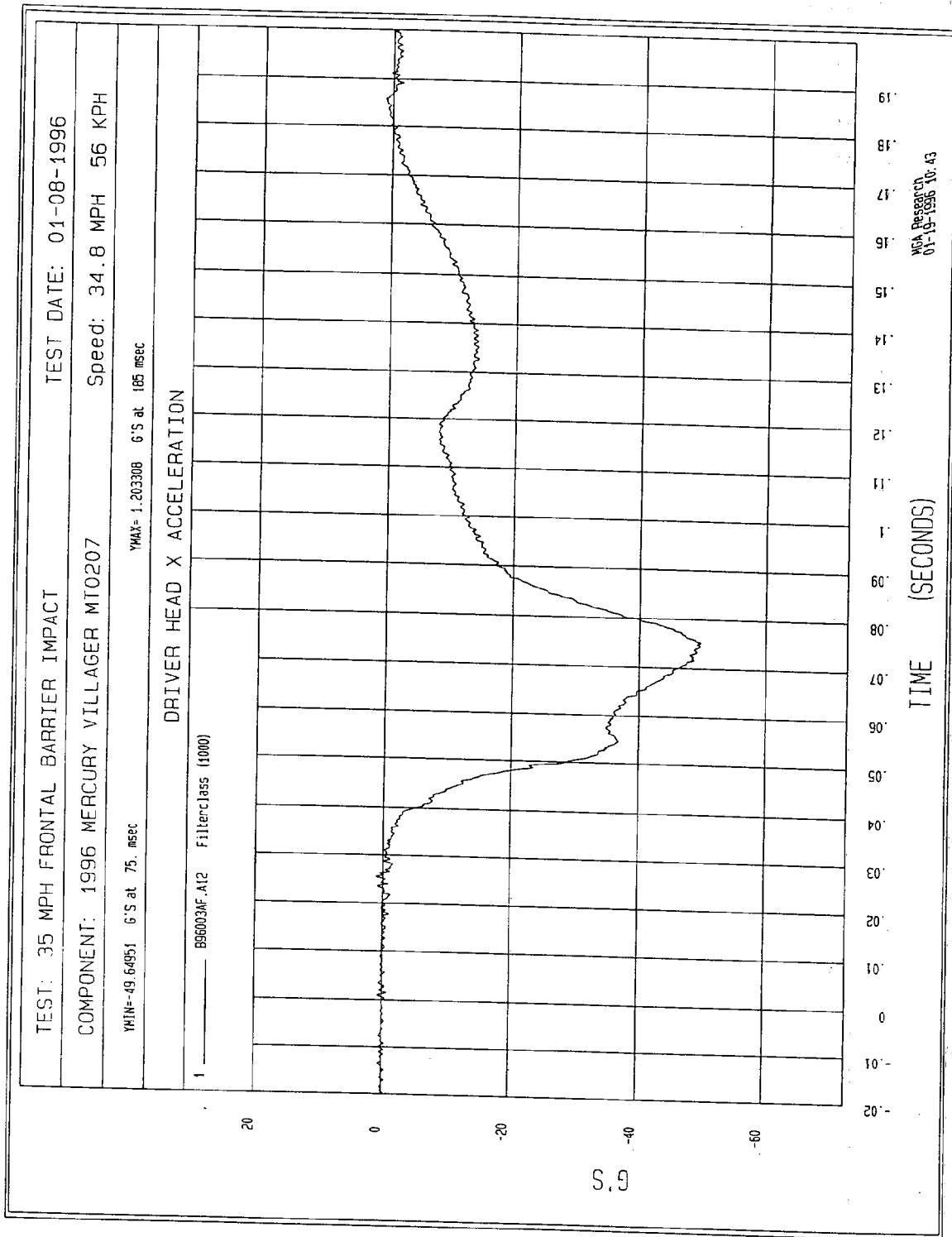


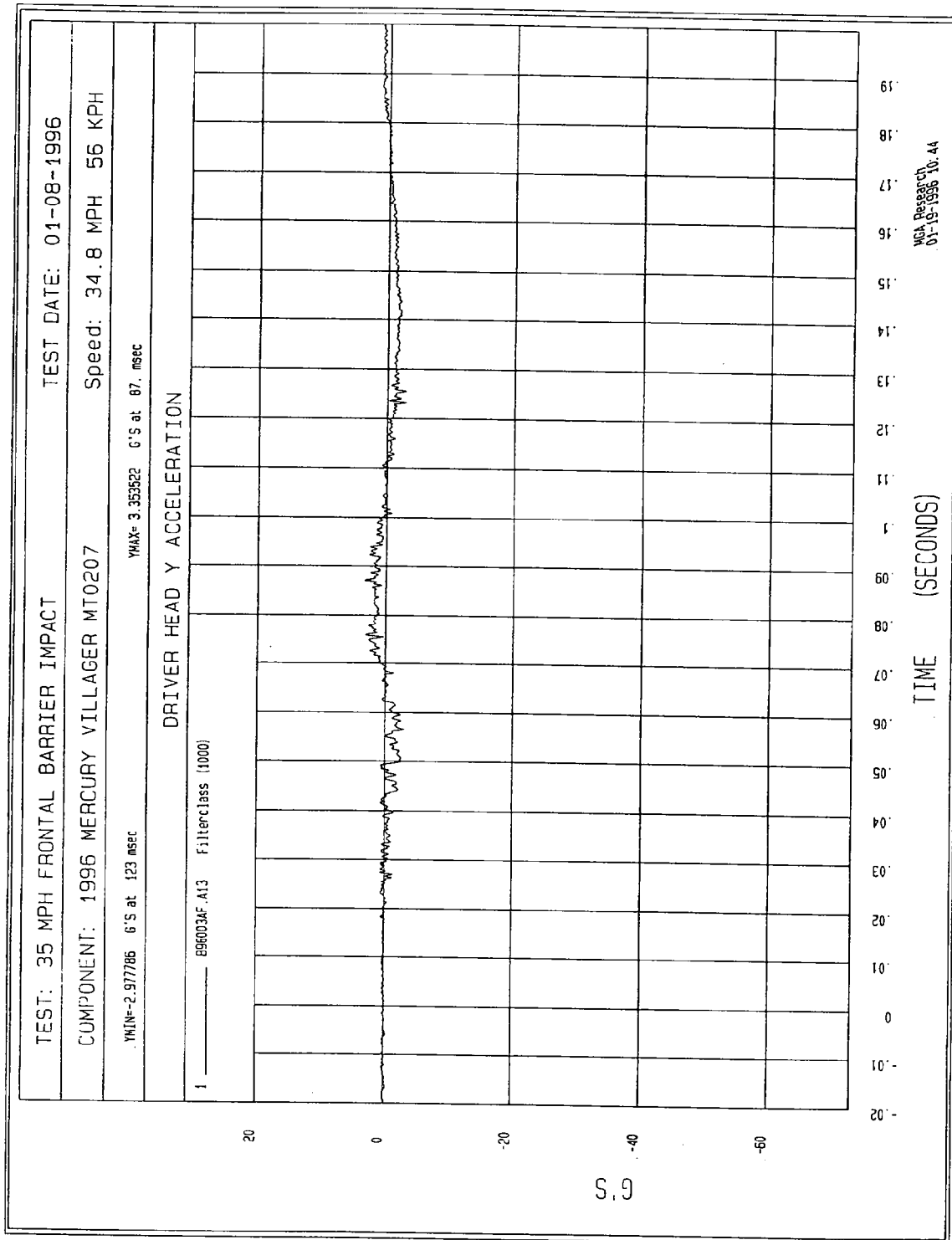


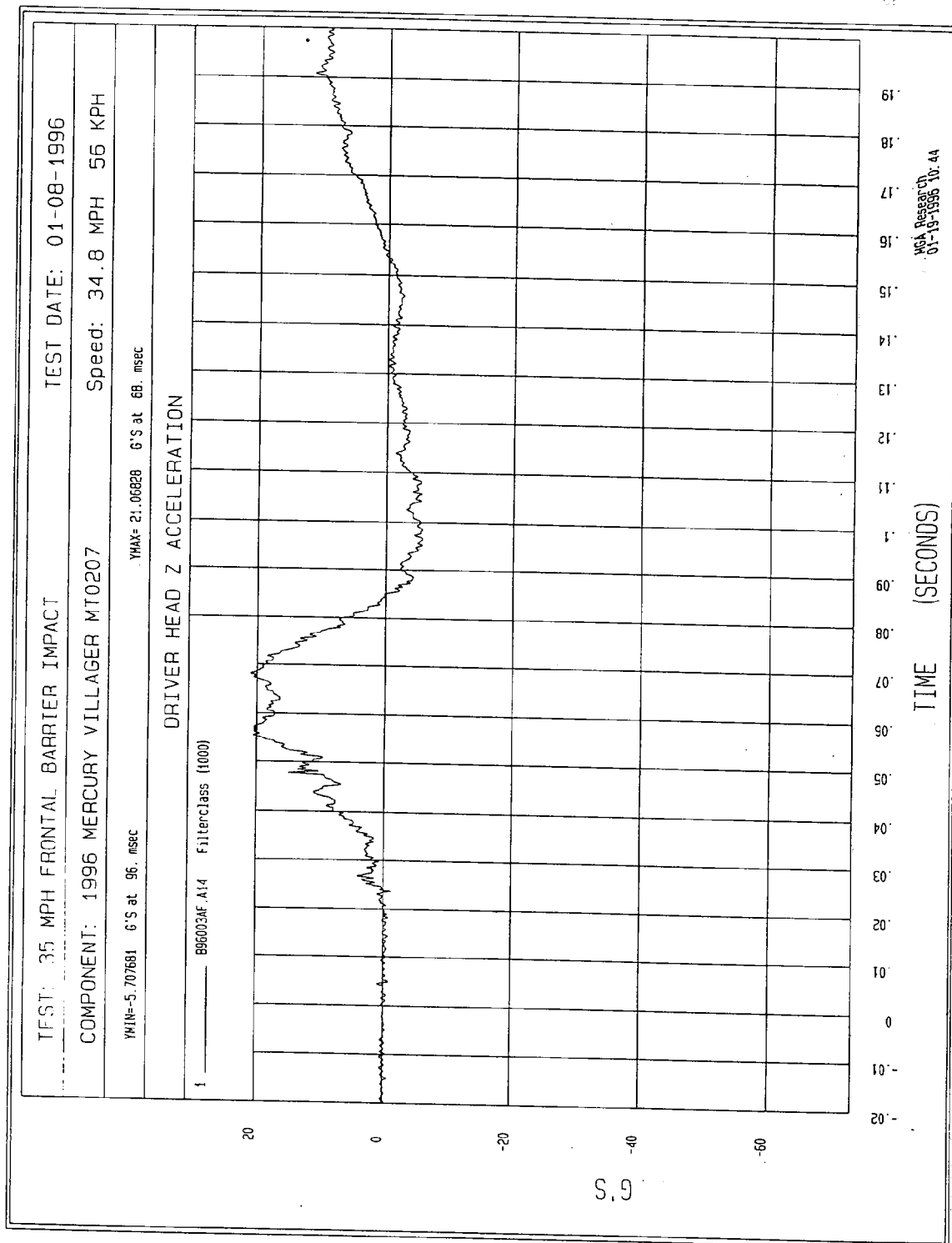


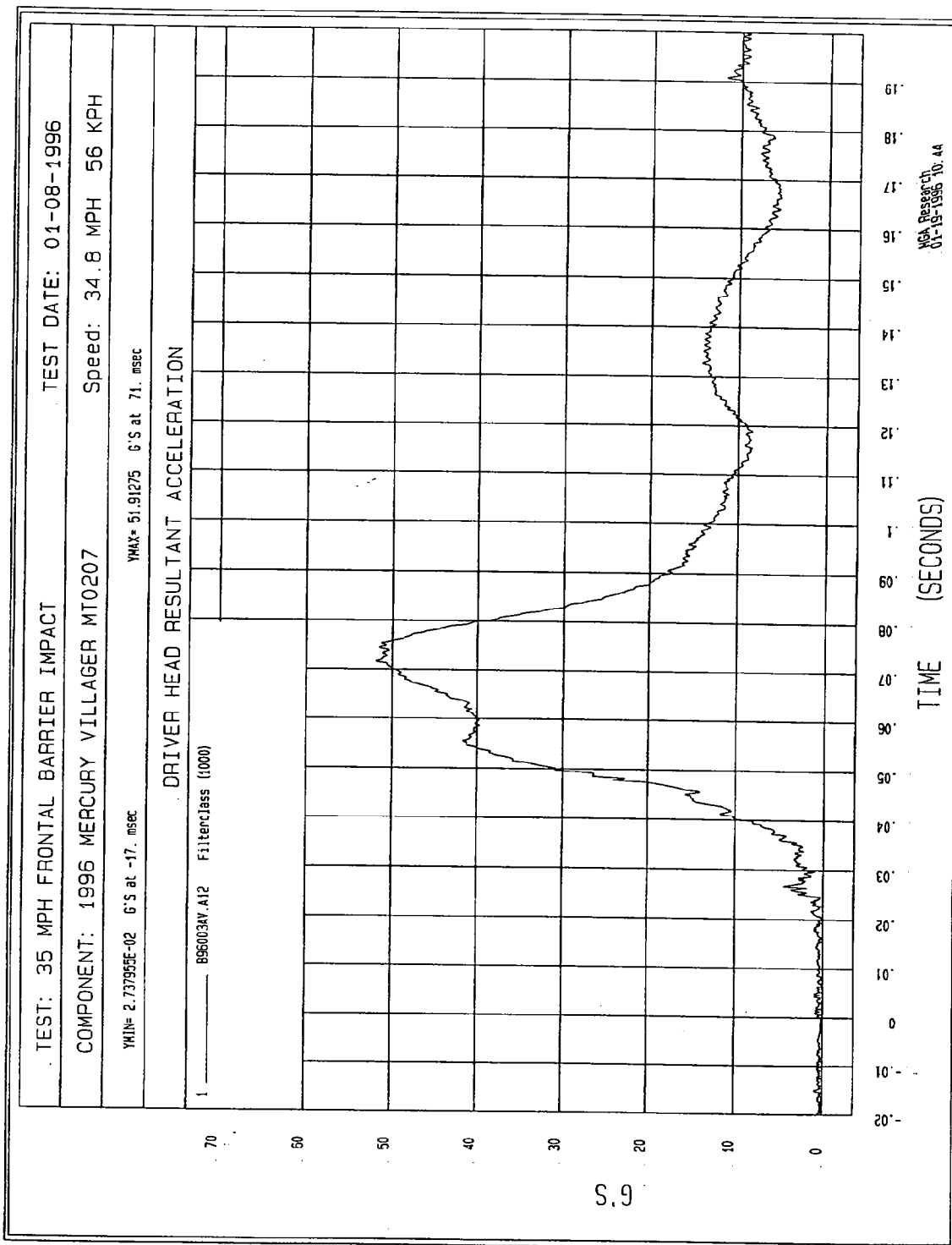


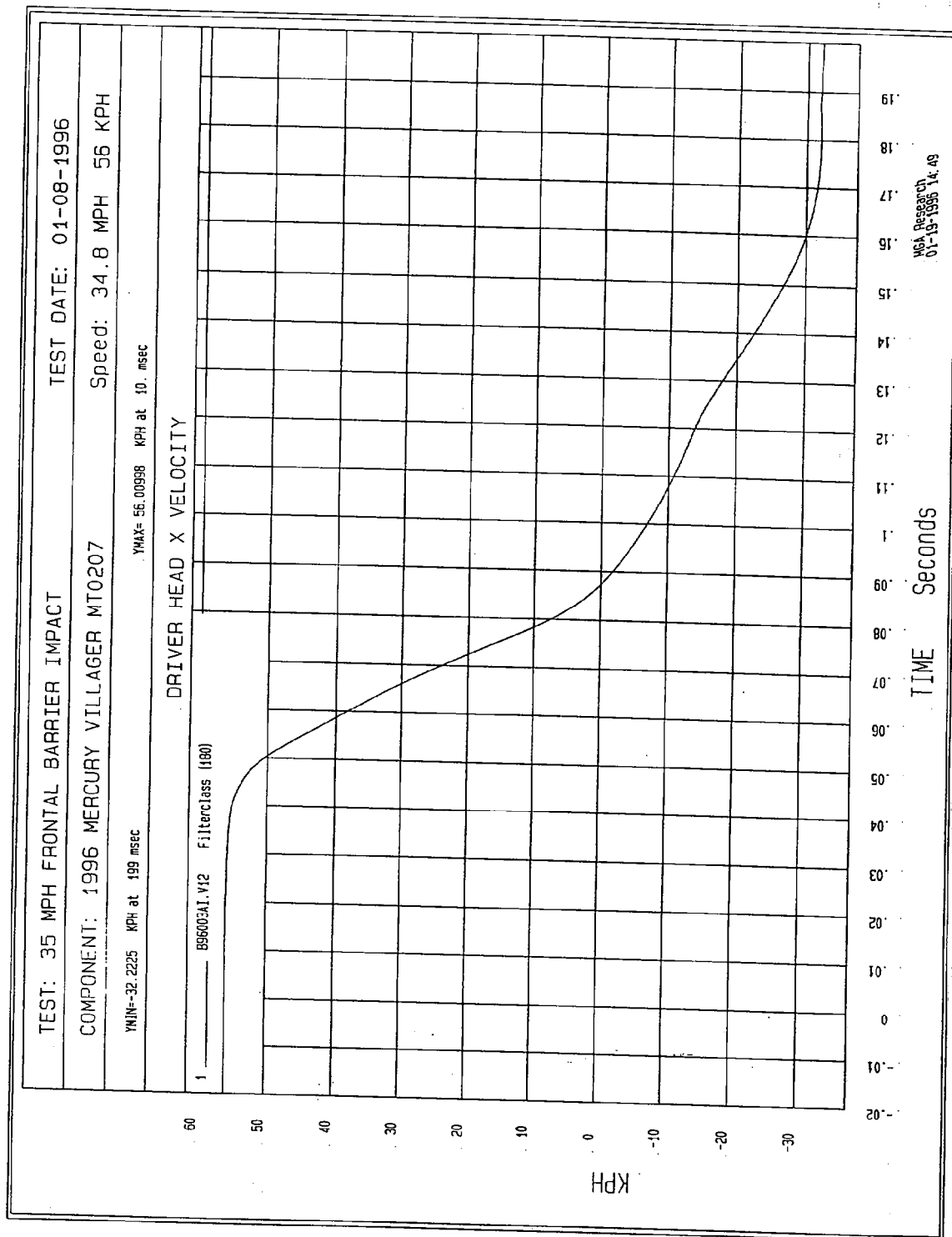
NCA Research
01-19-1996 14:35

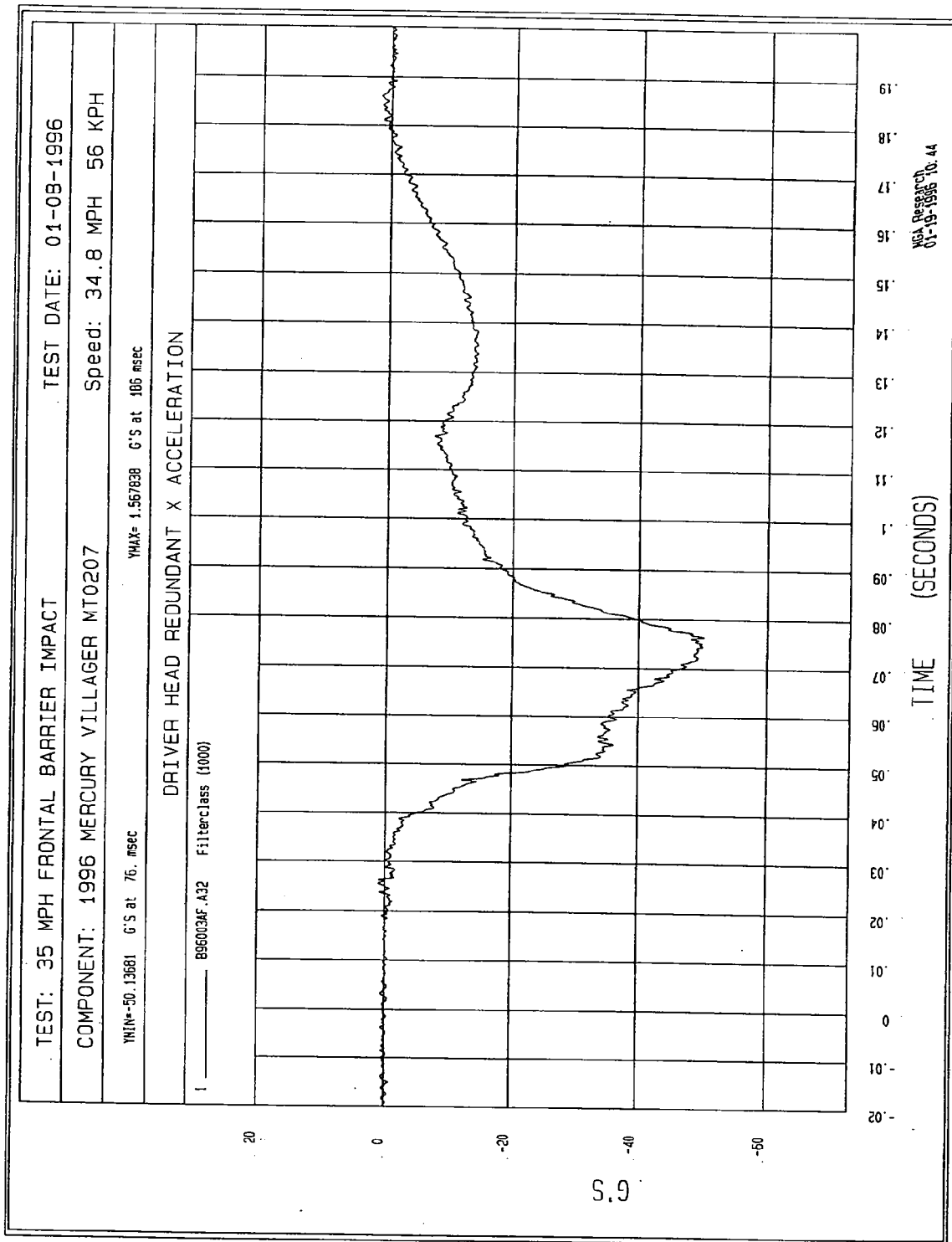




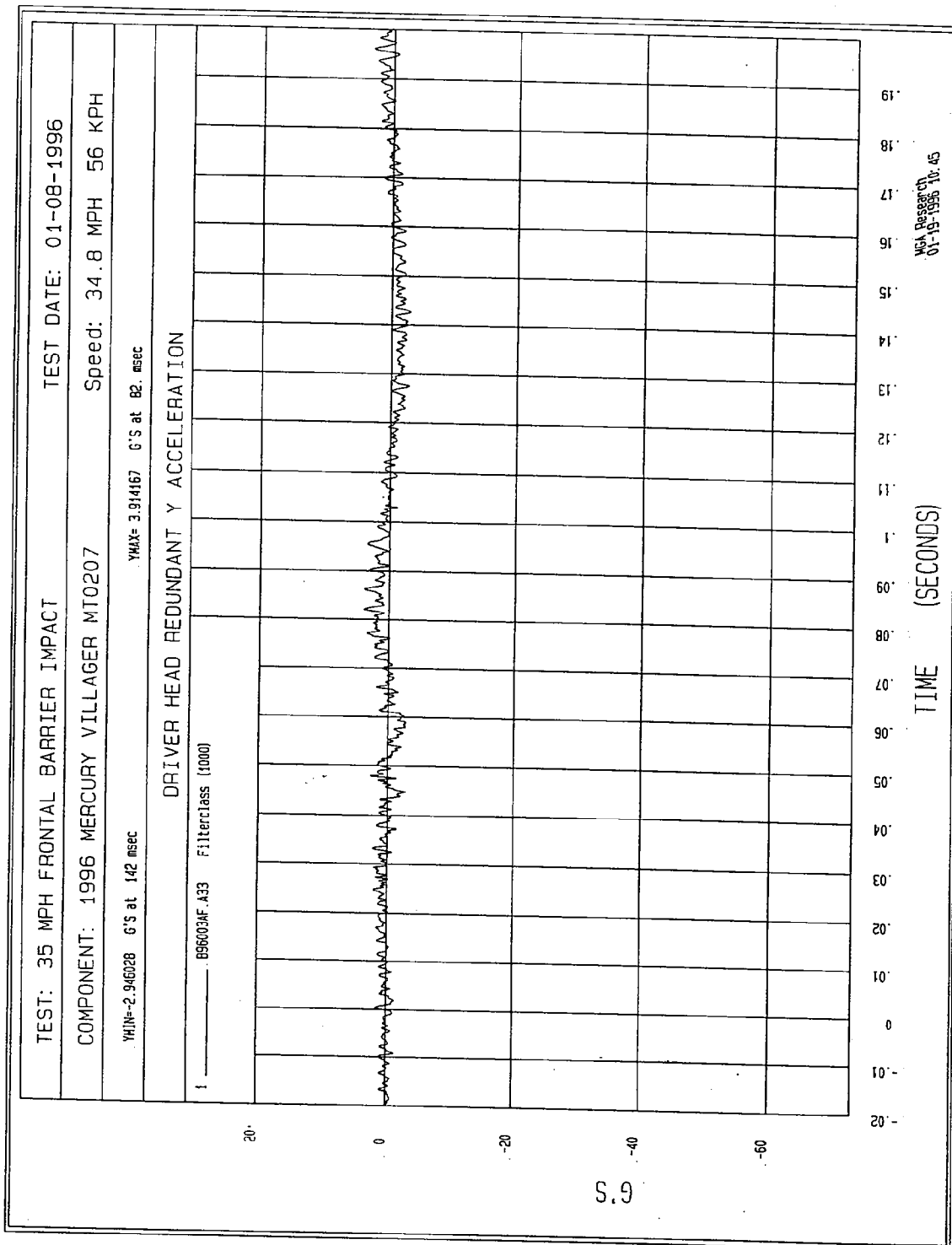


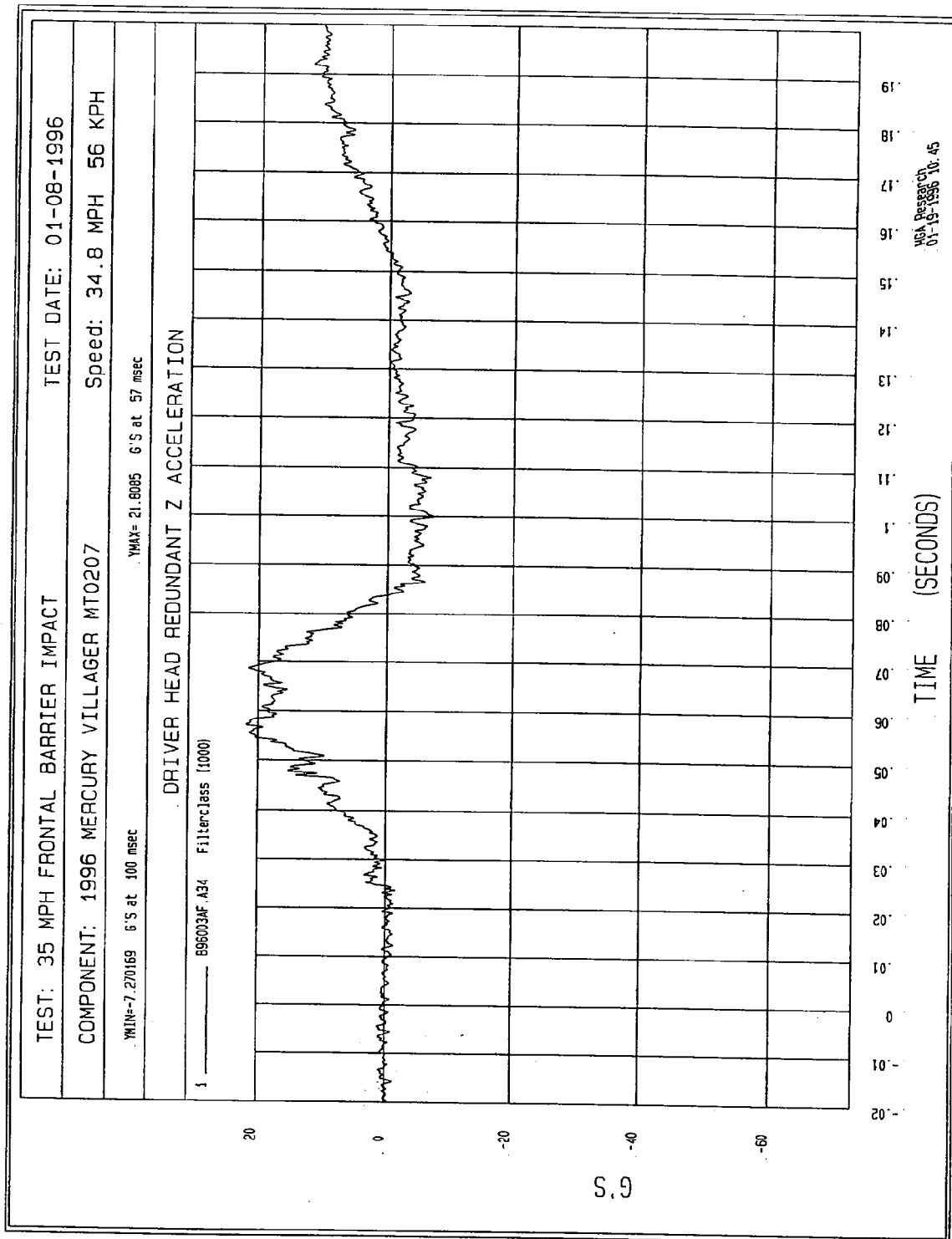


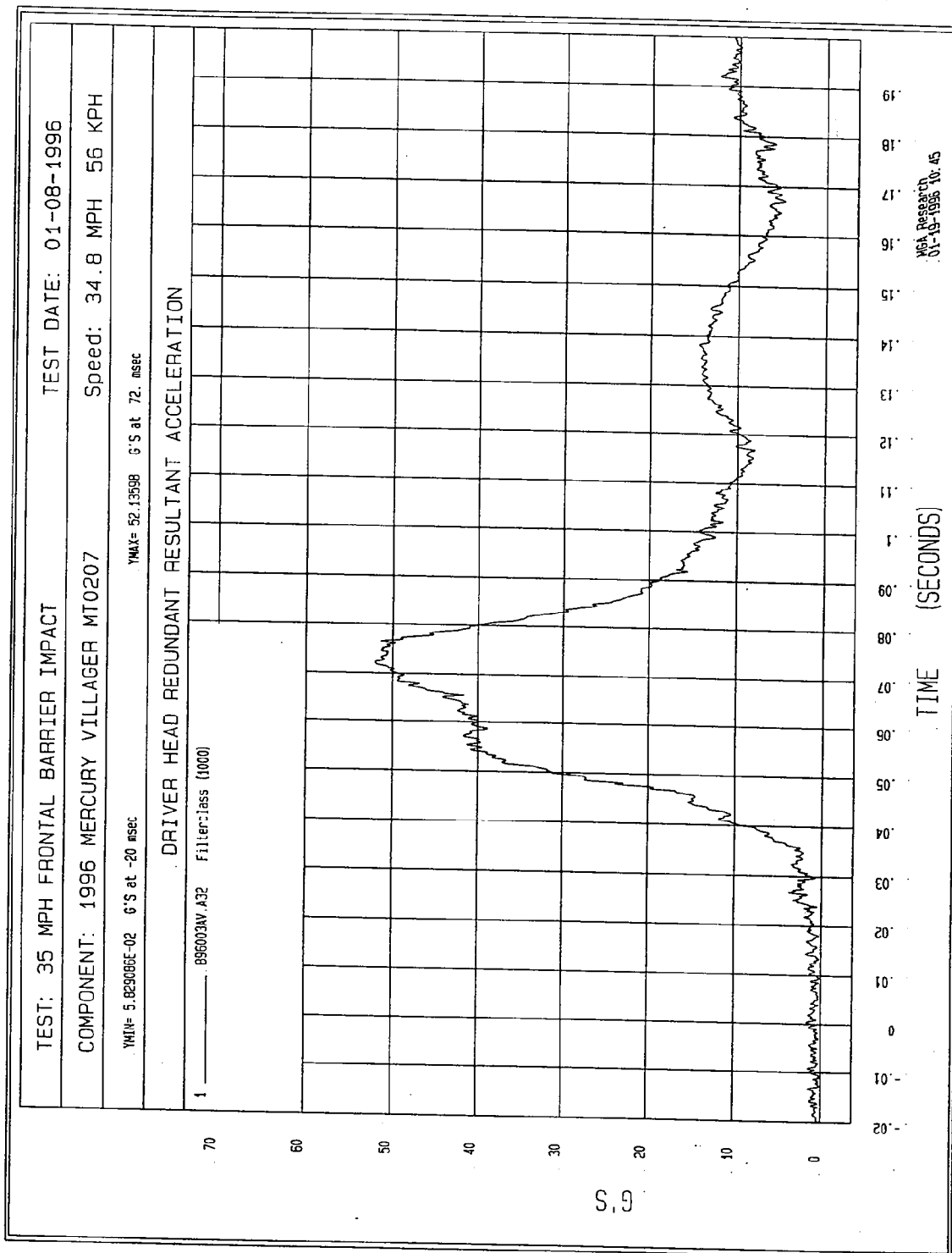


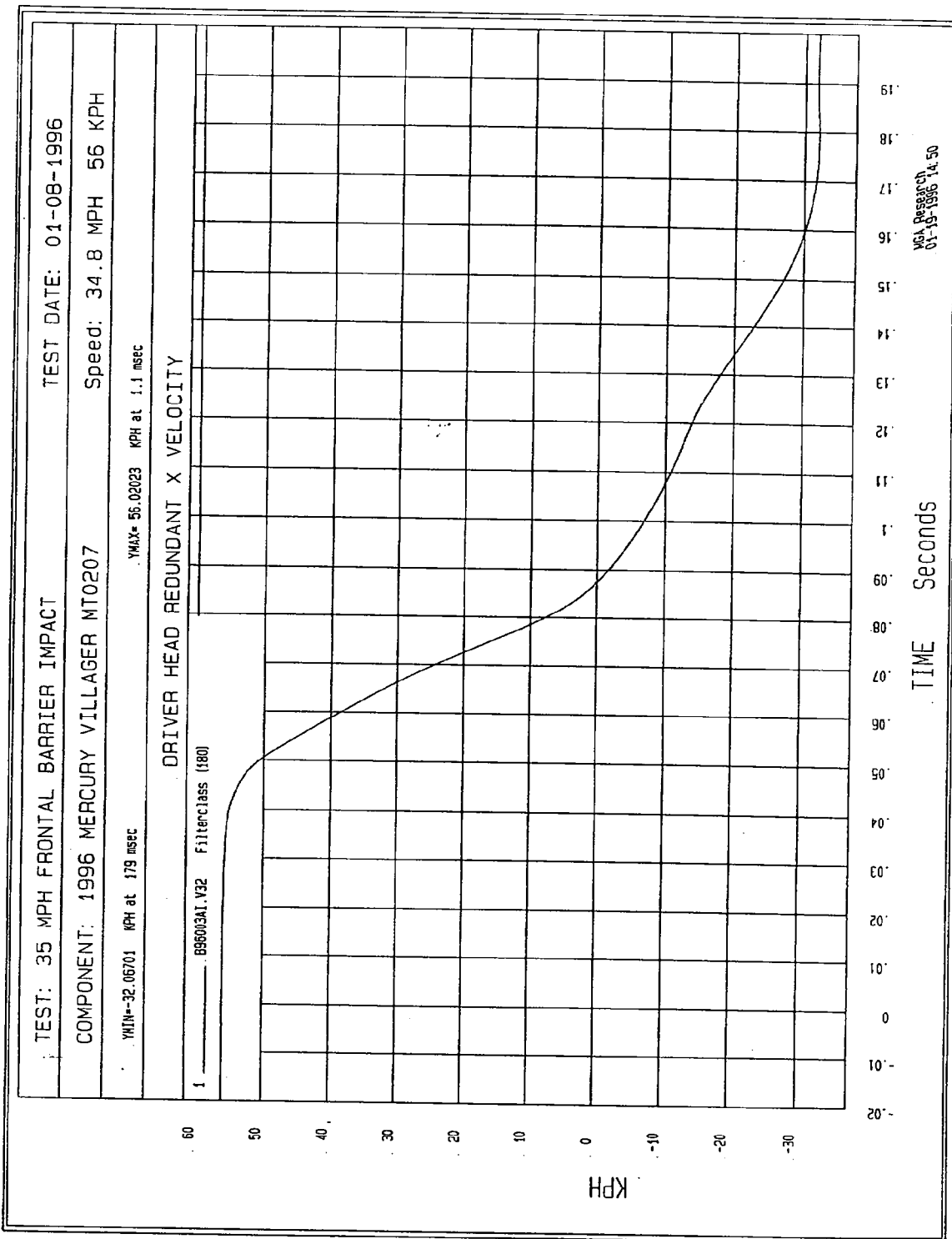


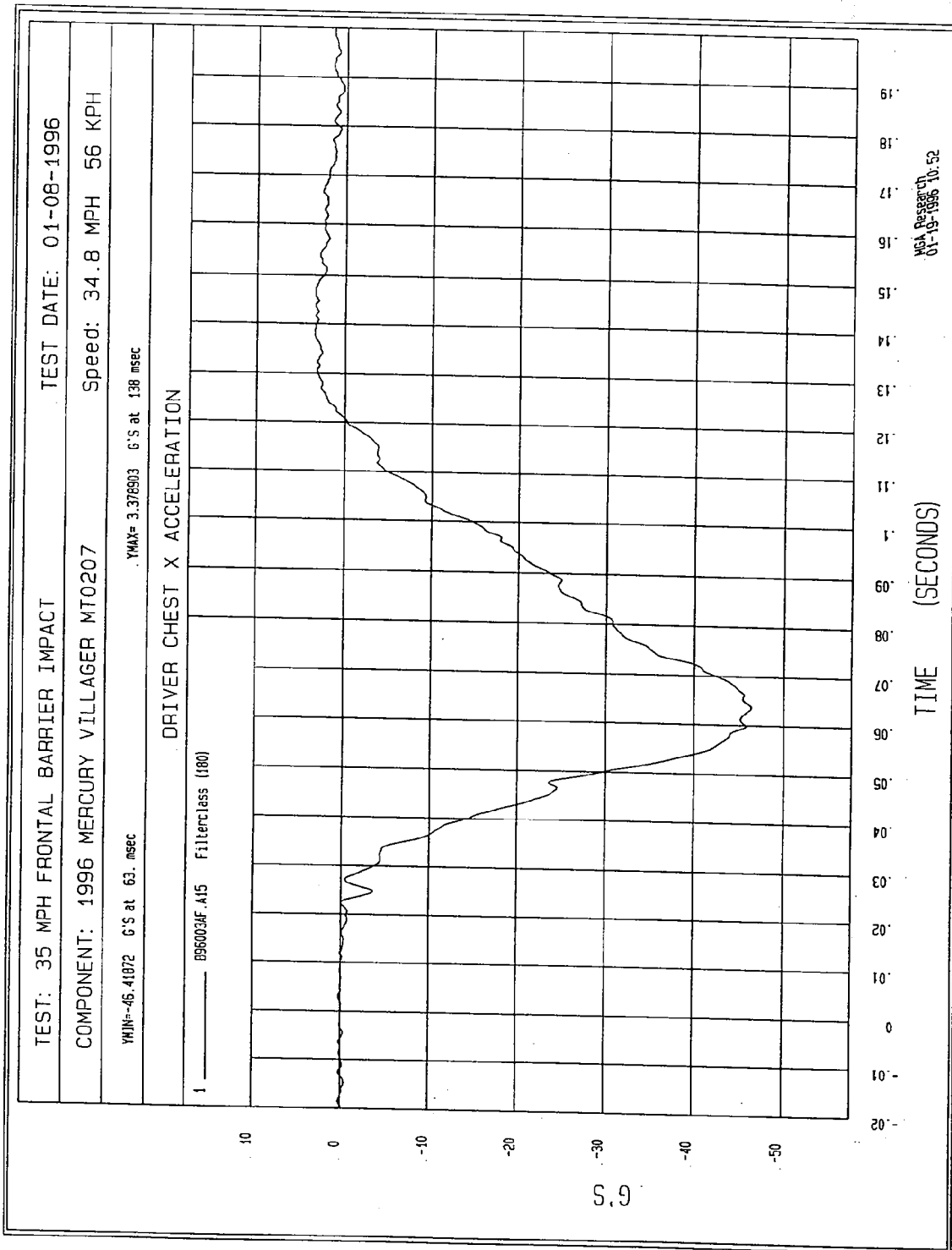
NGA Research
01-19-1996 10.44

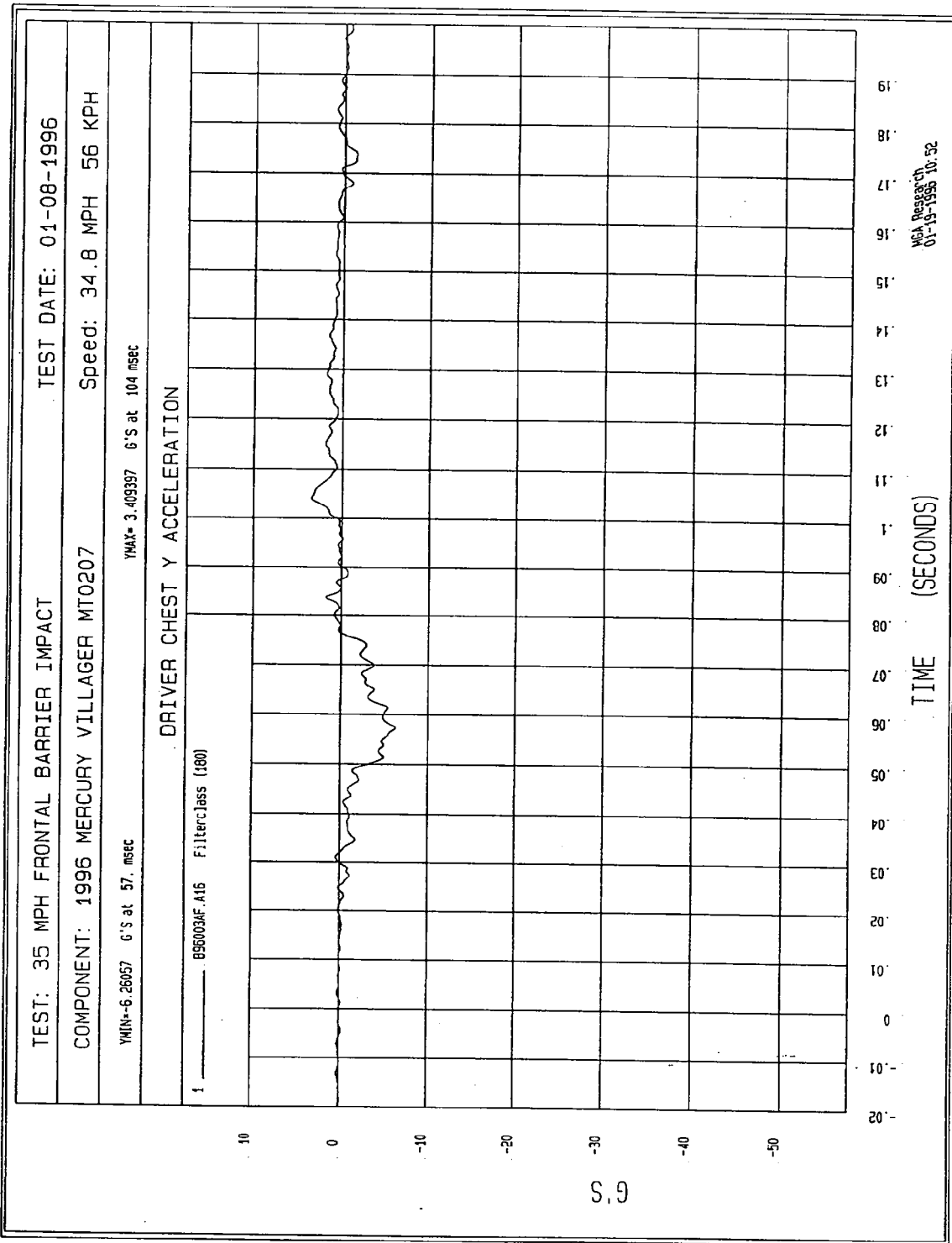


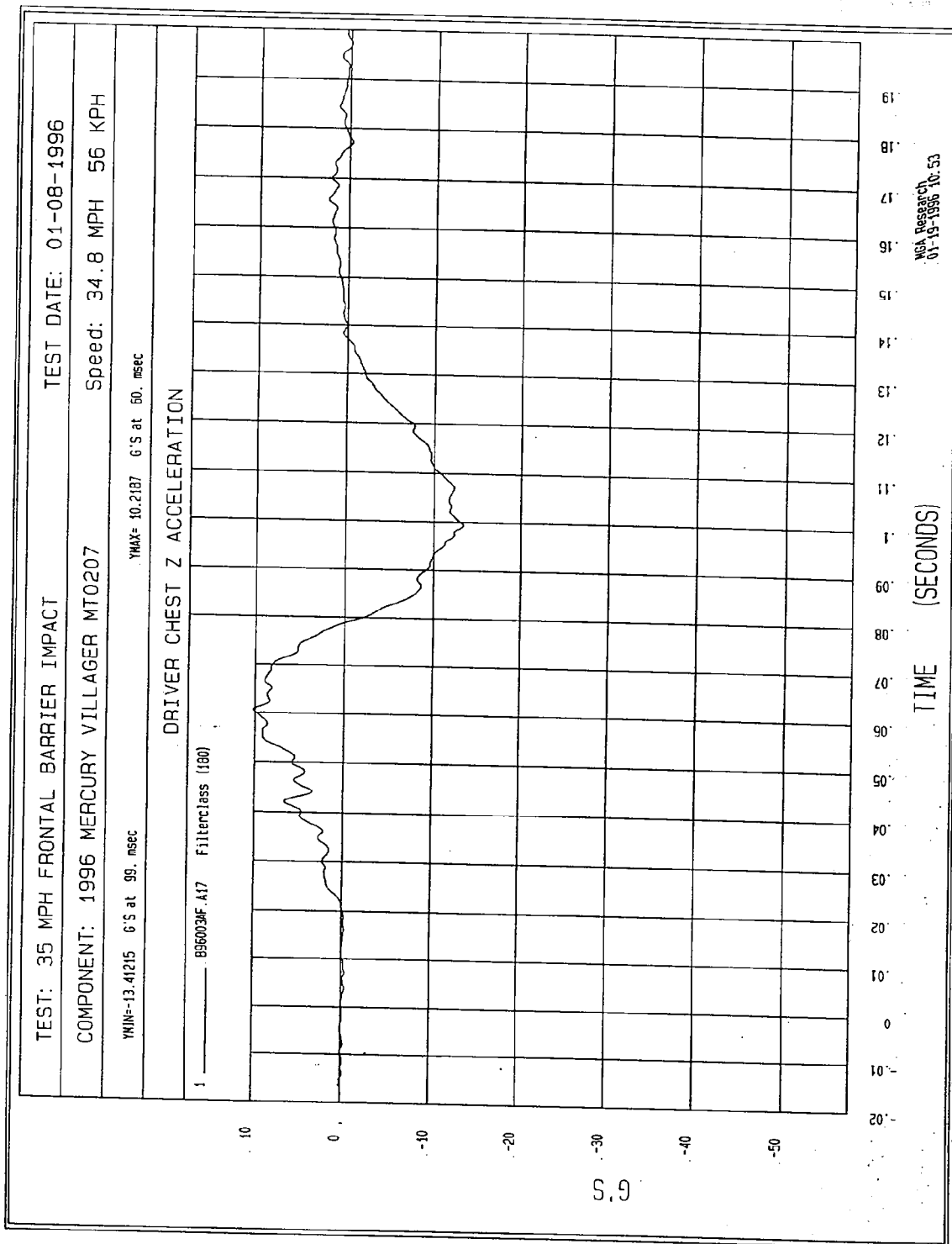












TEST: 35 MPH FRONTAL BARRIER IMPACT

TEST DATE: 01-08-1996

COMPONENT: 1996 MERCURY VILLAGER MT0207

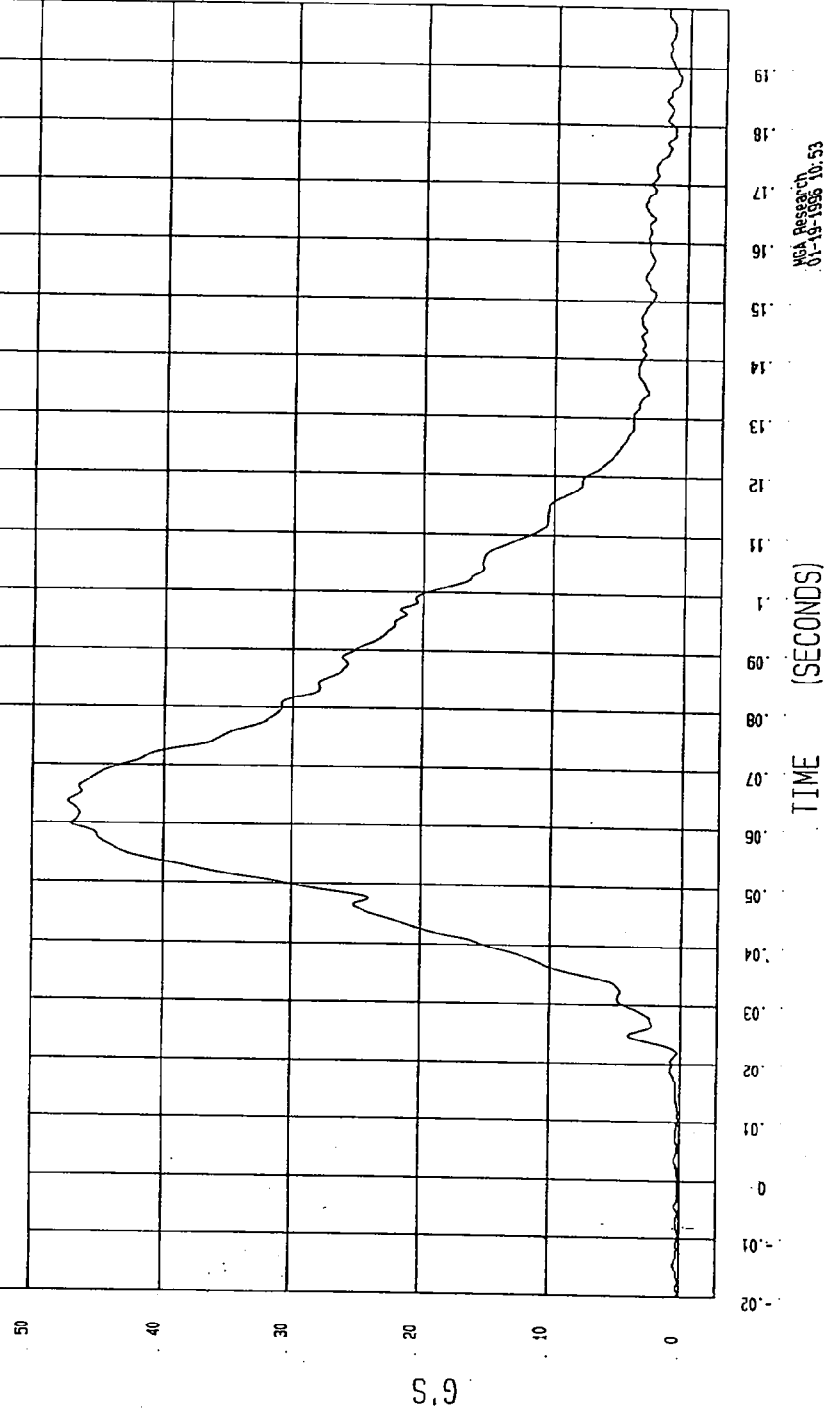
Speed: 34.8 MPH 56 KPH

YMIN= .04125 G'S at -19. msec

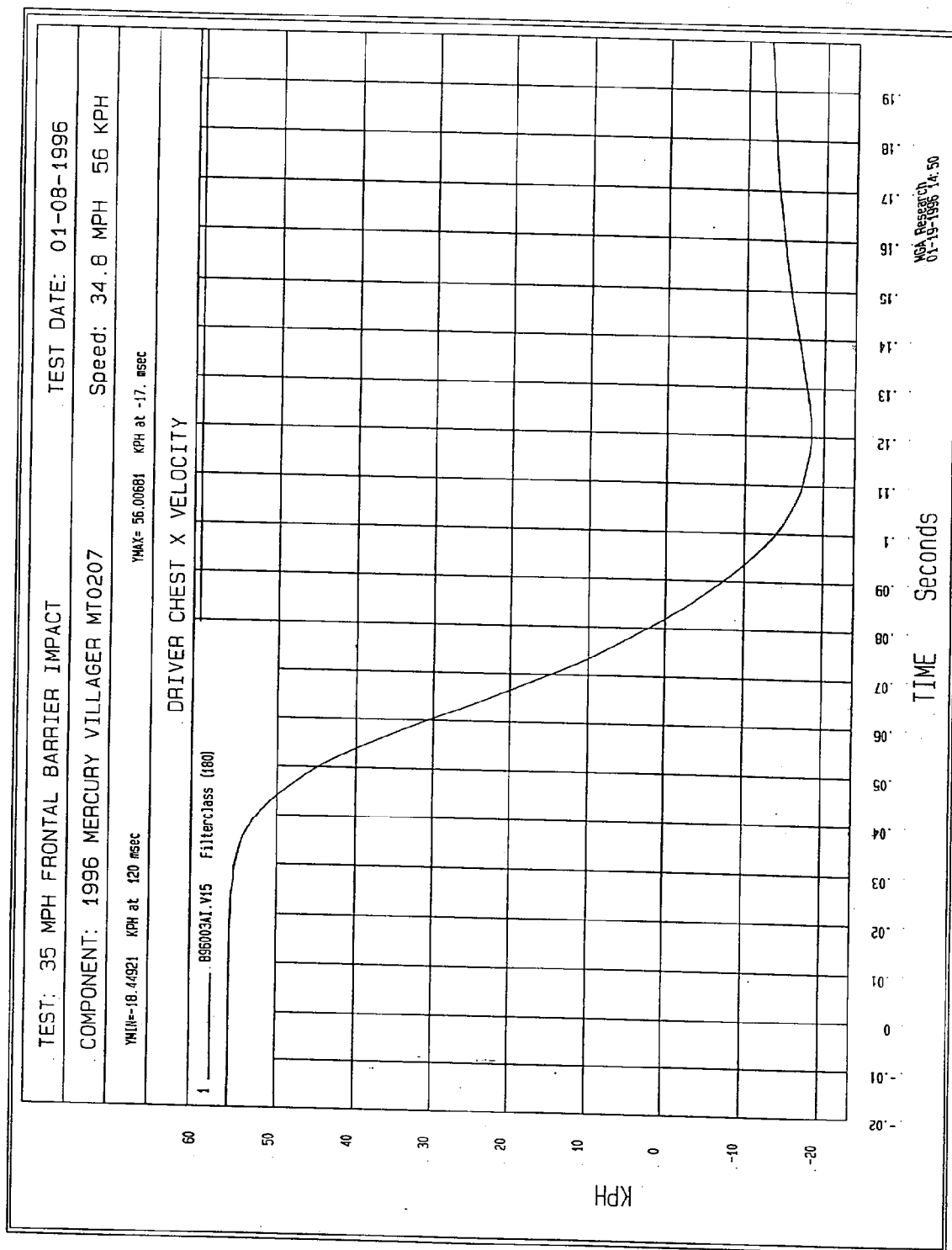
YMAX= 47.31331 G'S at 63. msec

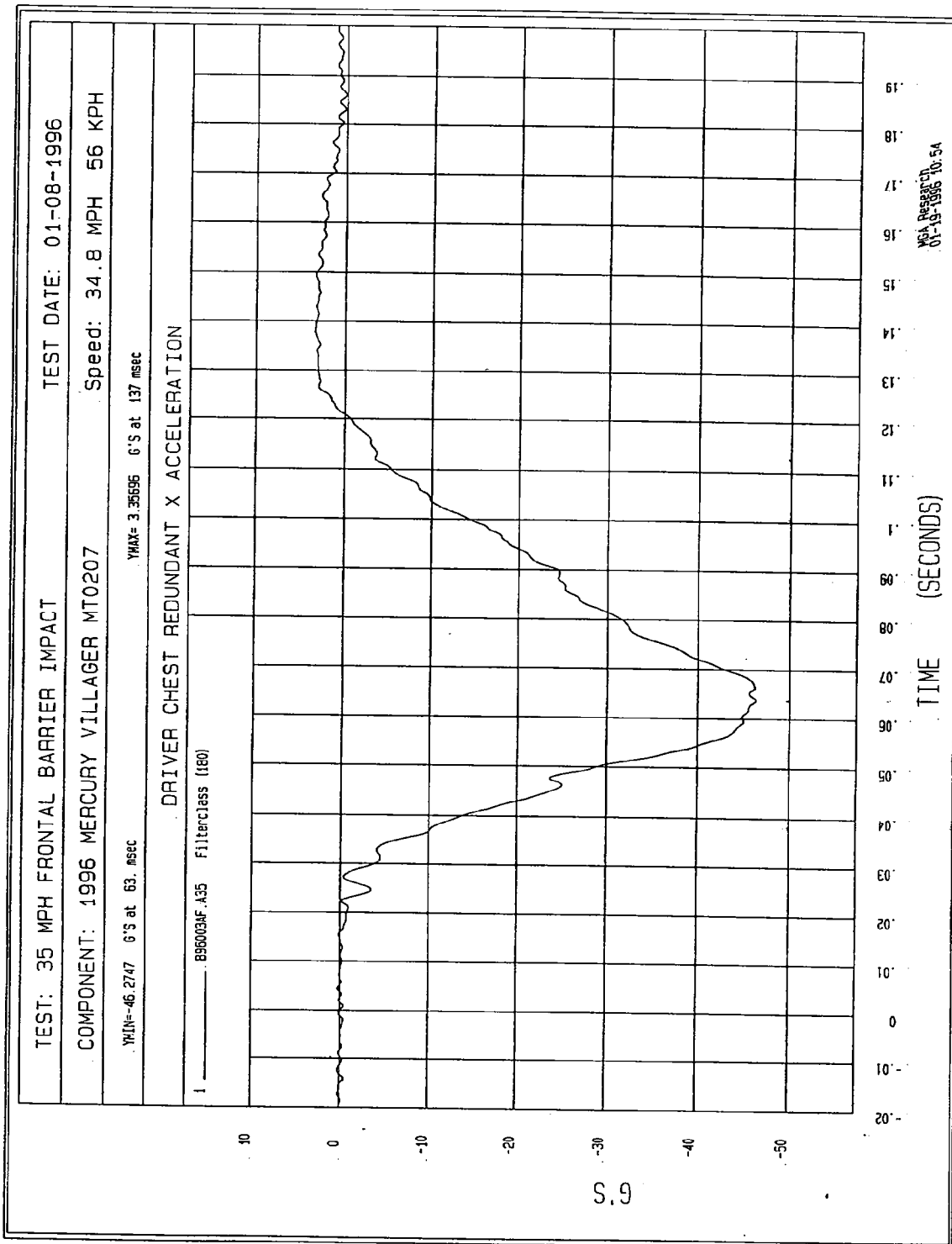
DRIVER CHEST RESULTANT ACCELERATION

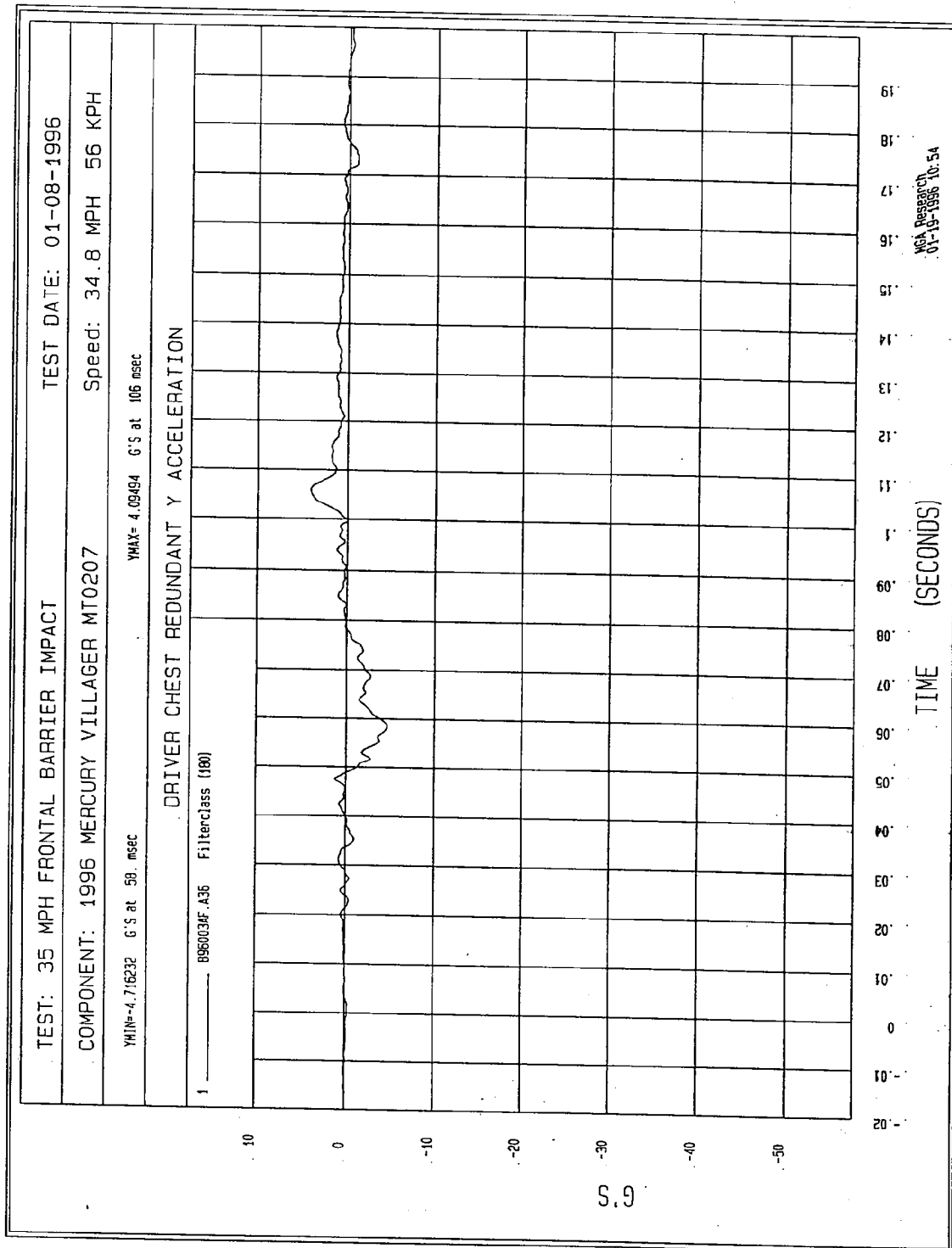
1 — 896003IV.A15 Filterclass (160)

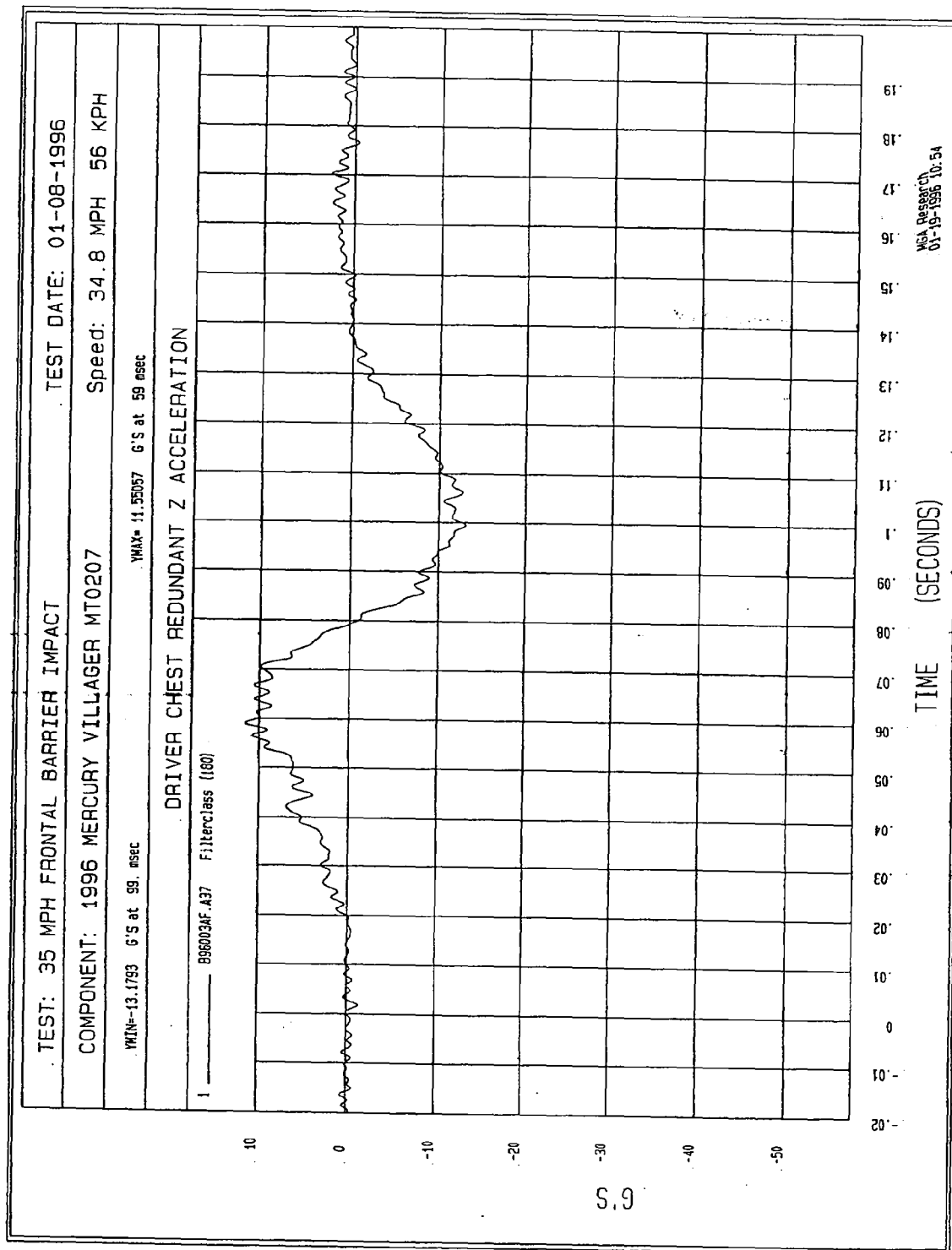


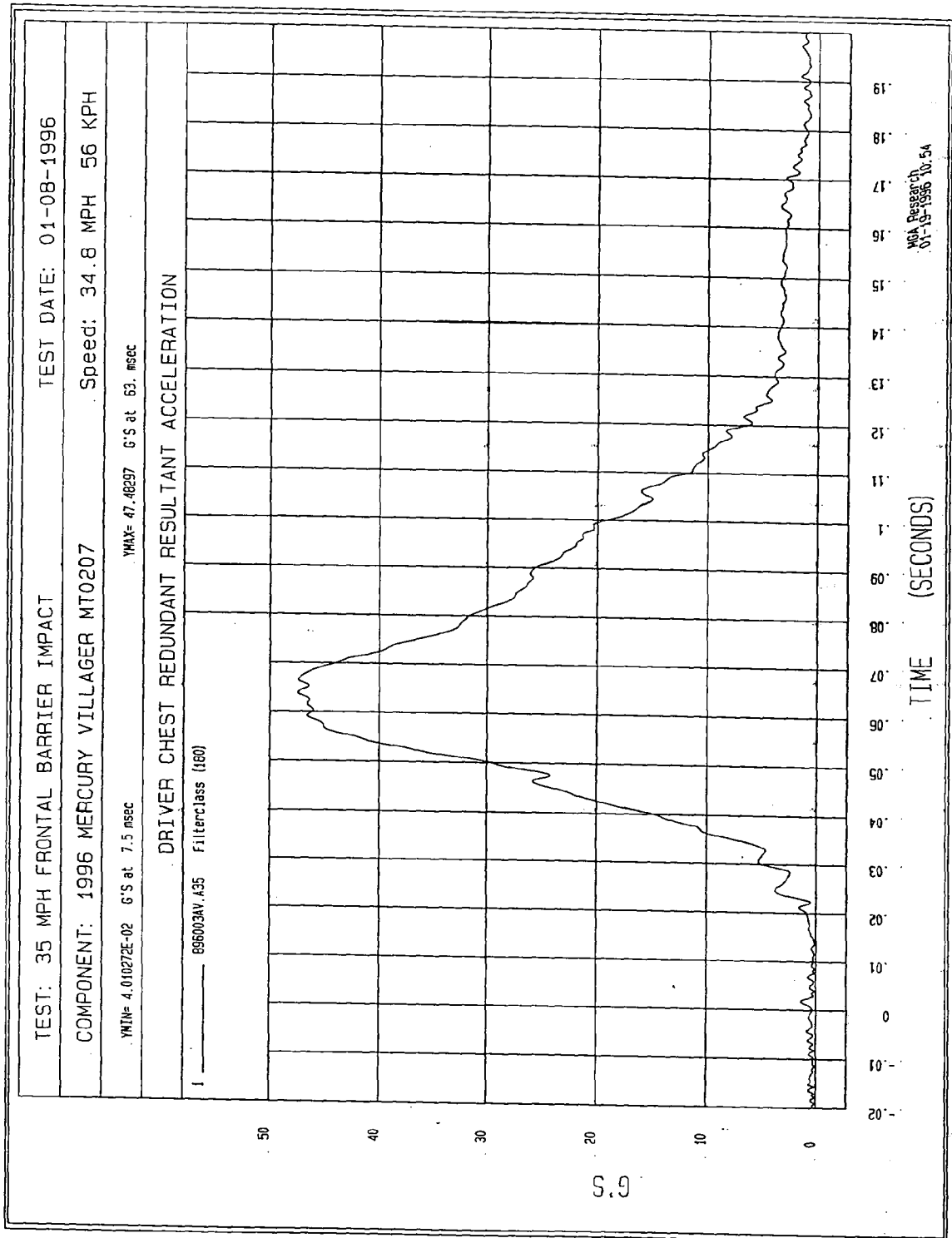
NCA Research
01-19-1996 10:53

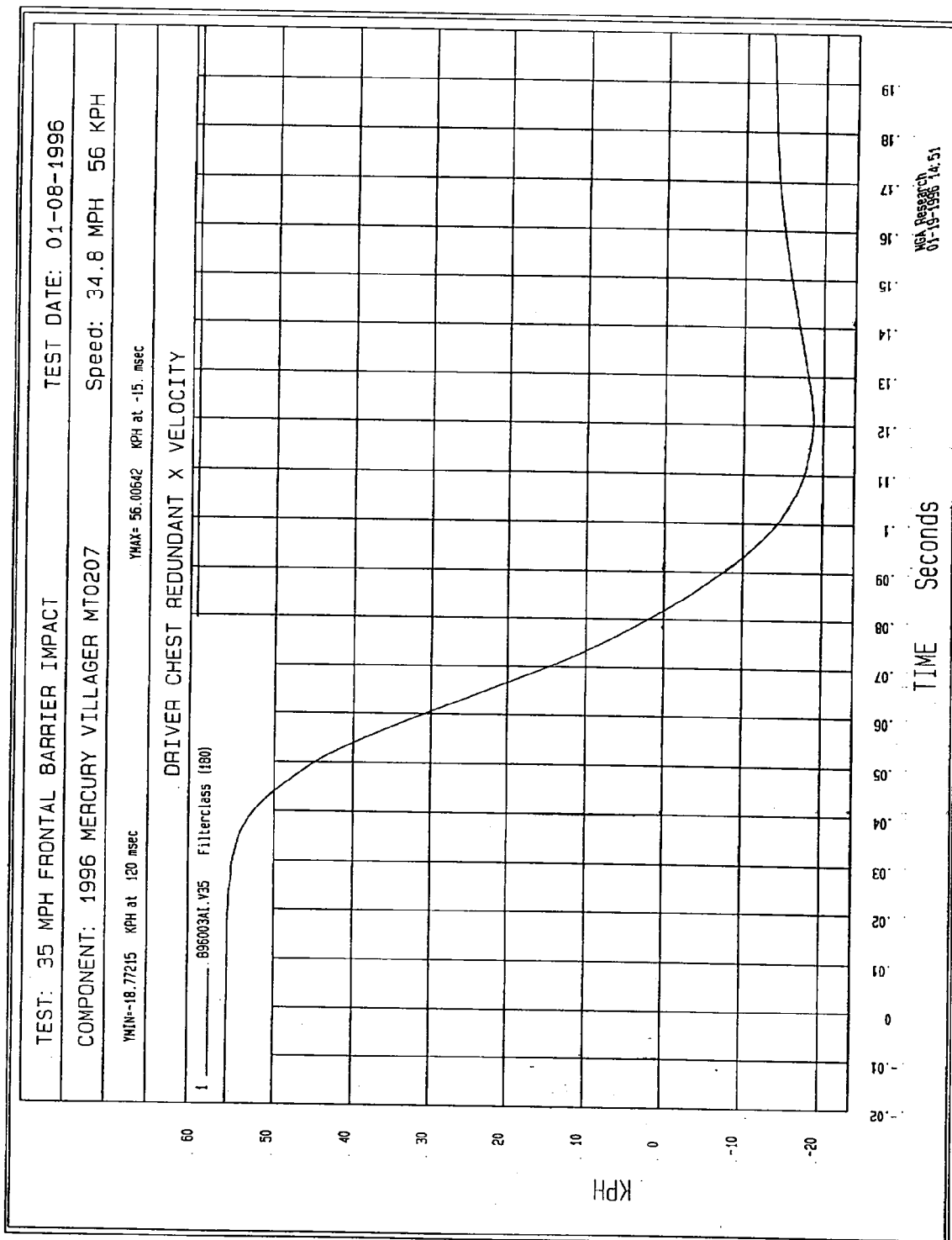


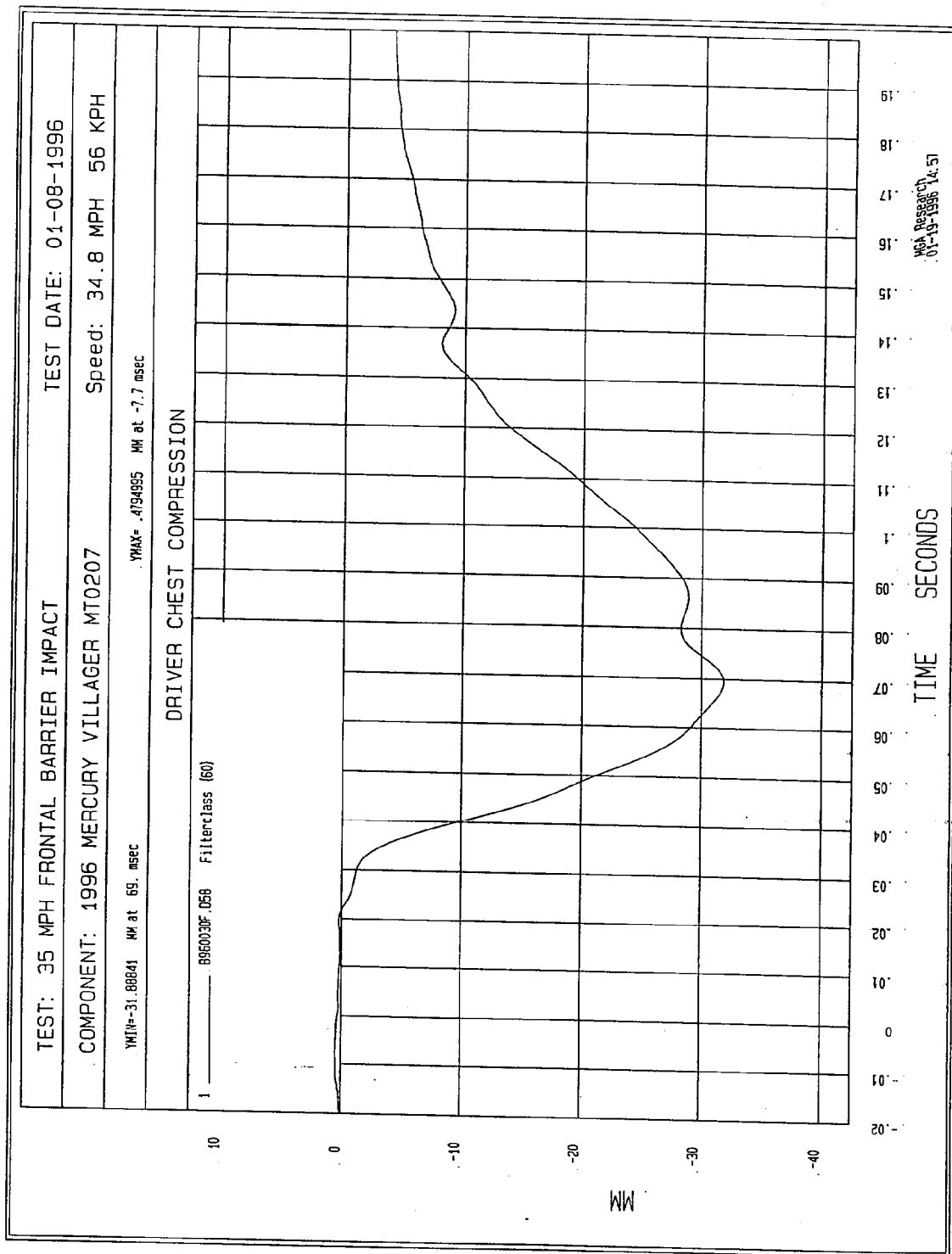


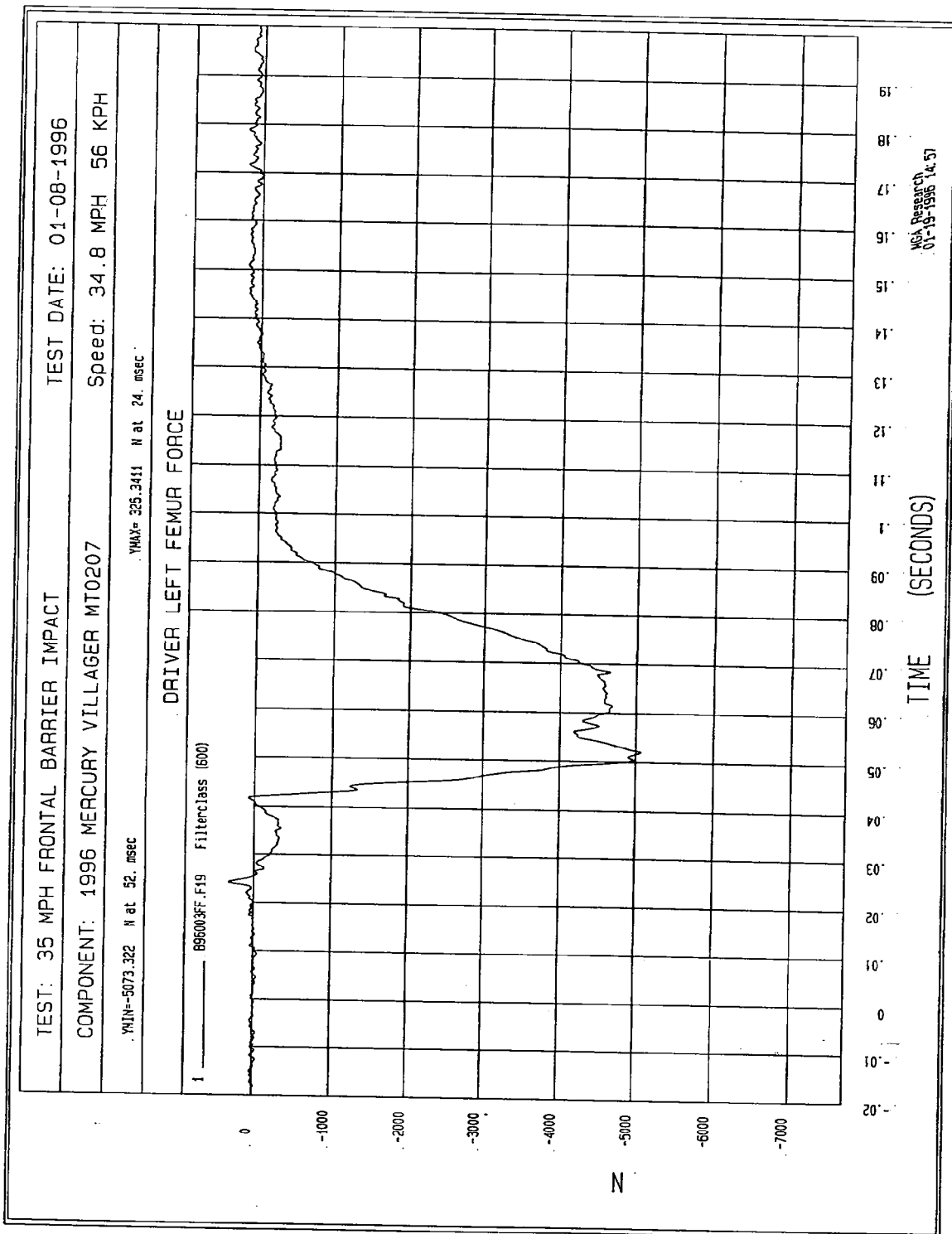


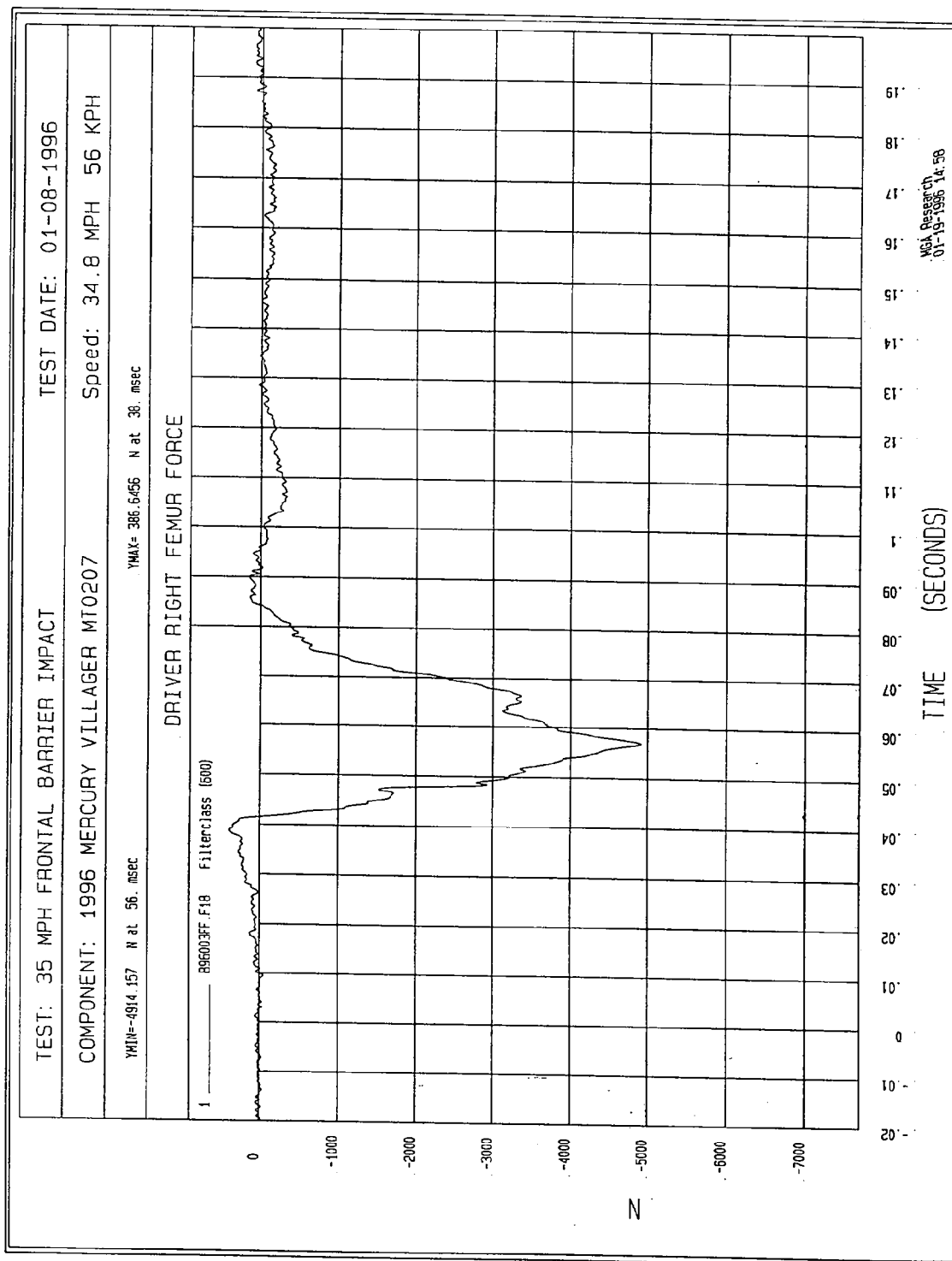


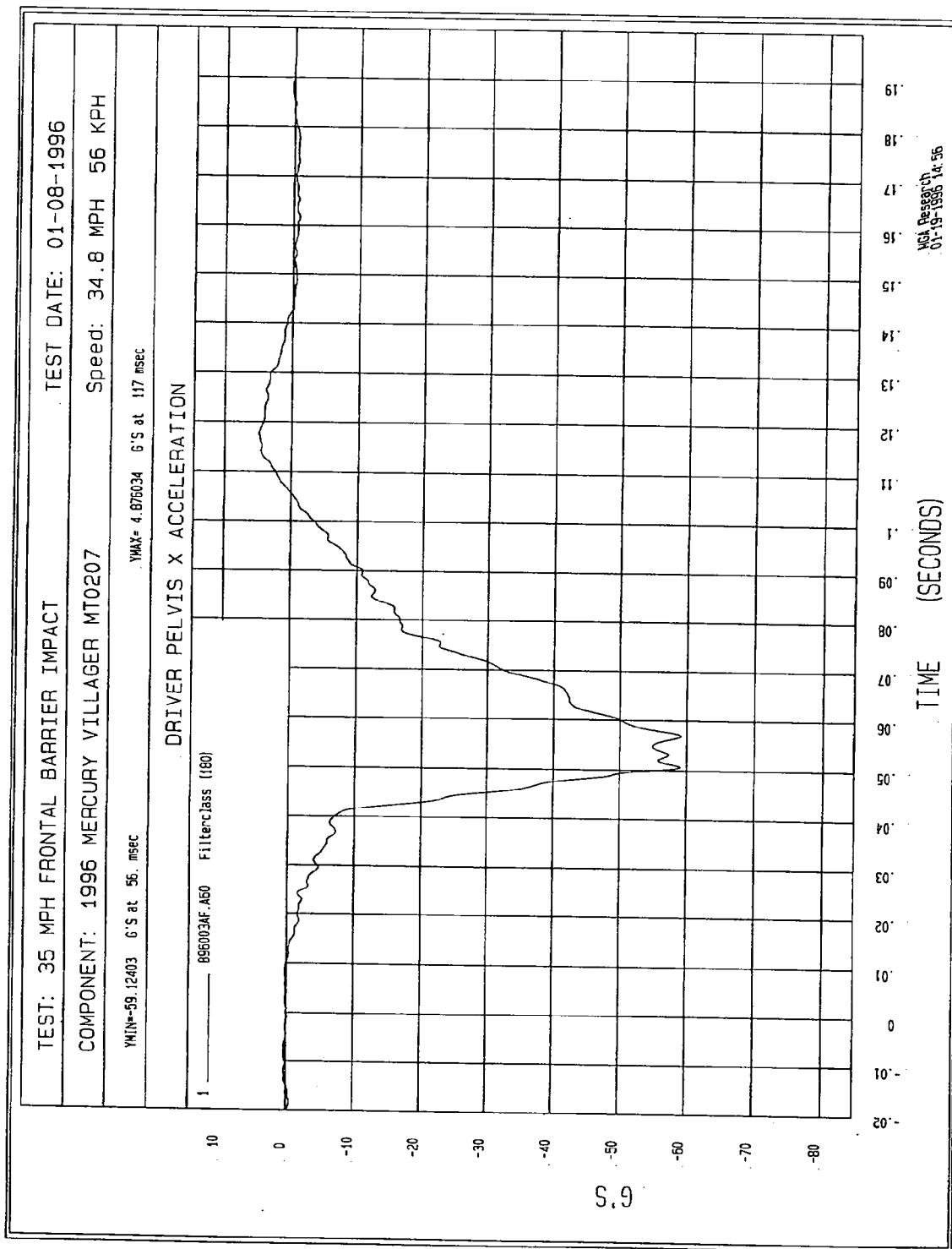


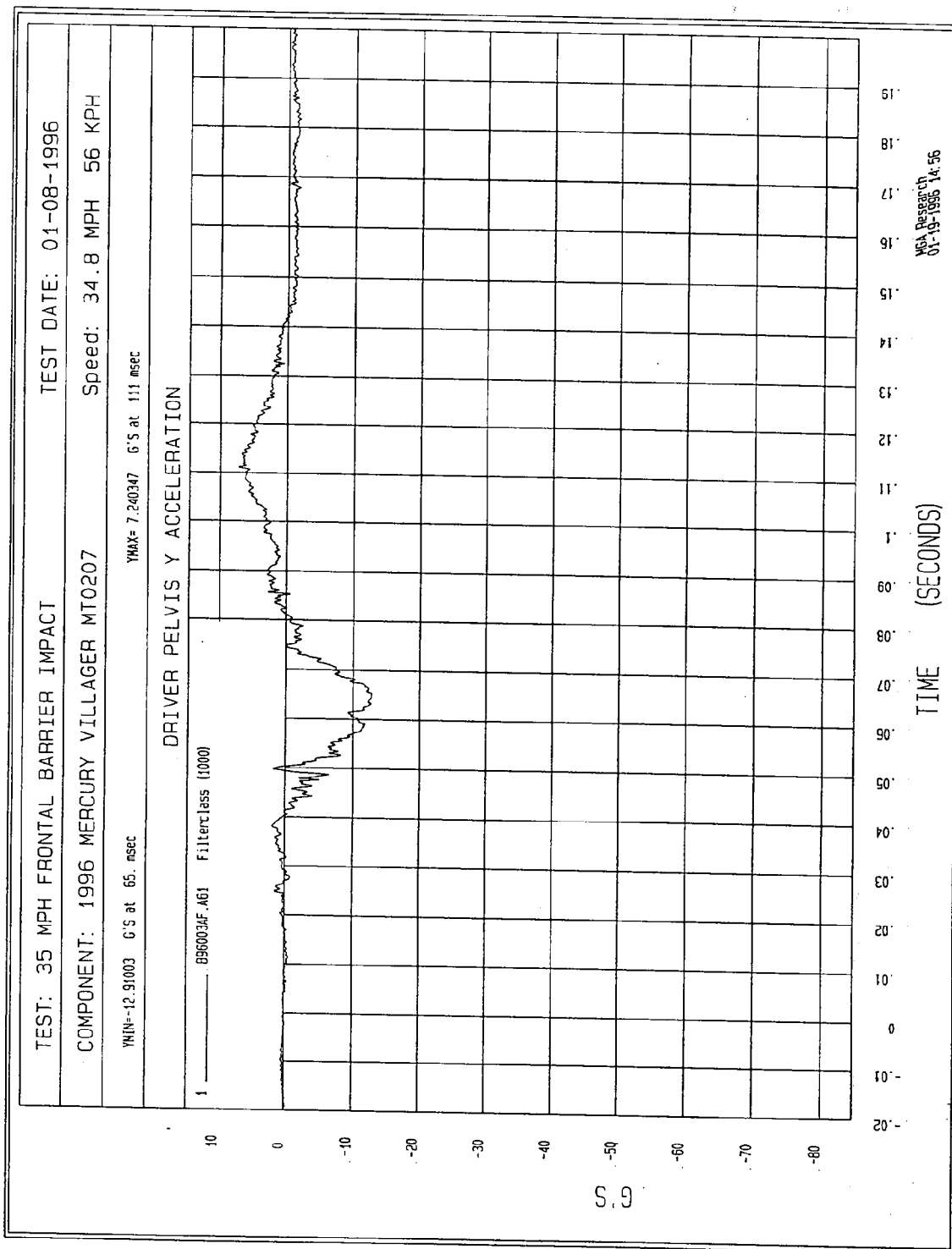


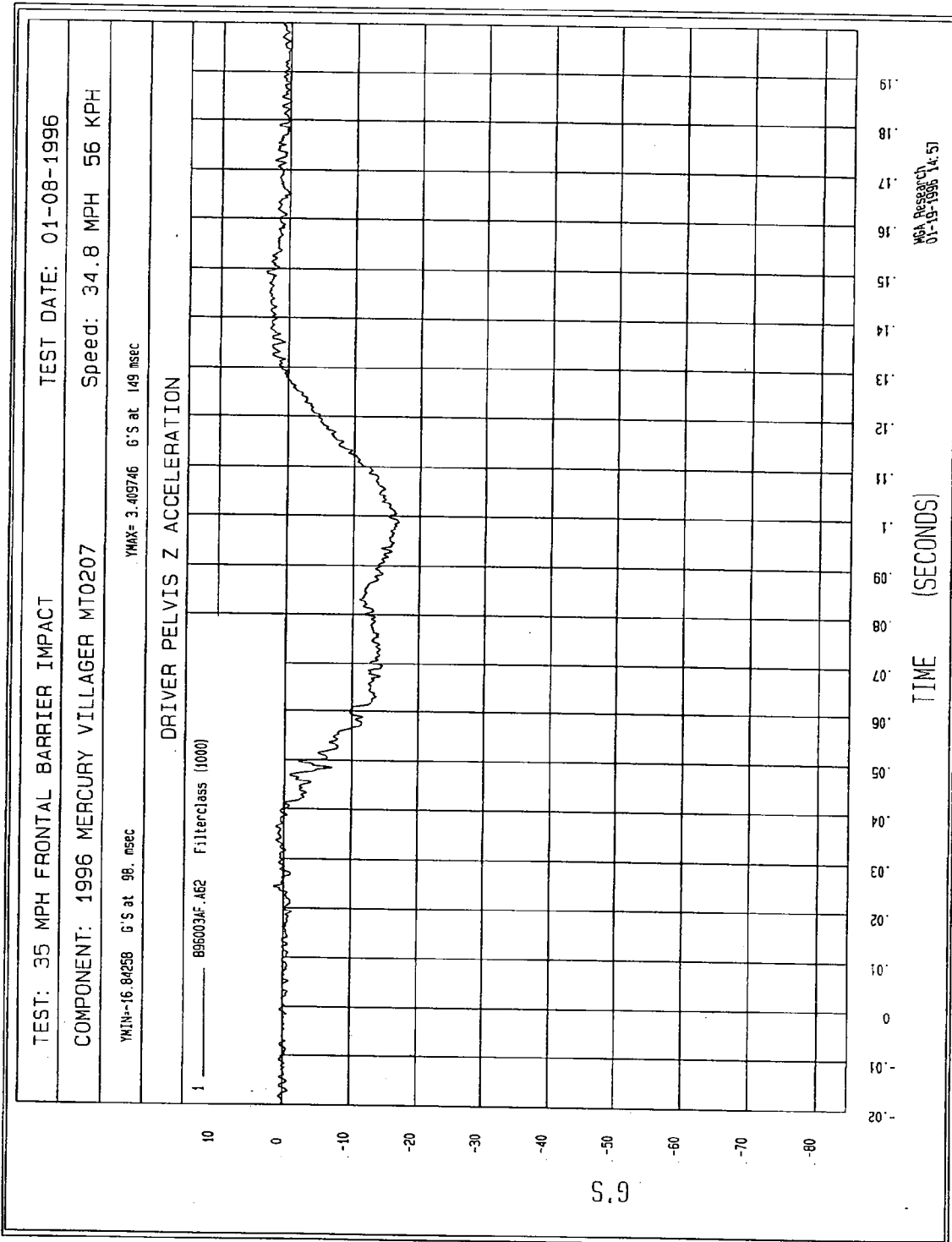


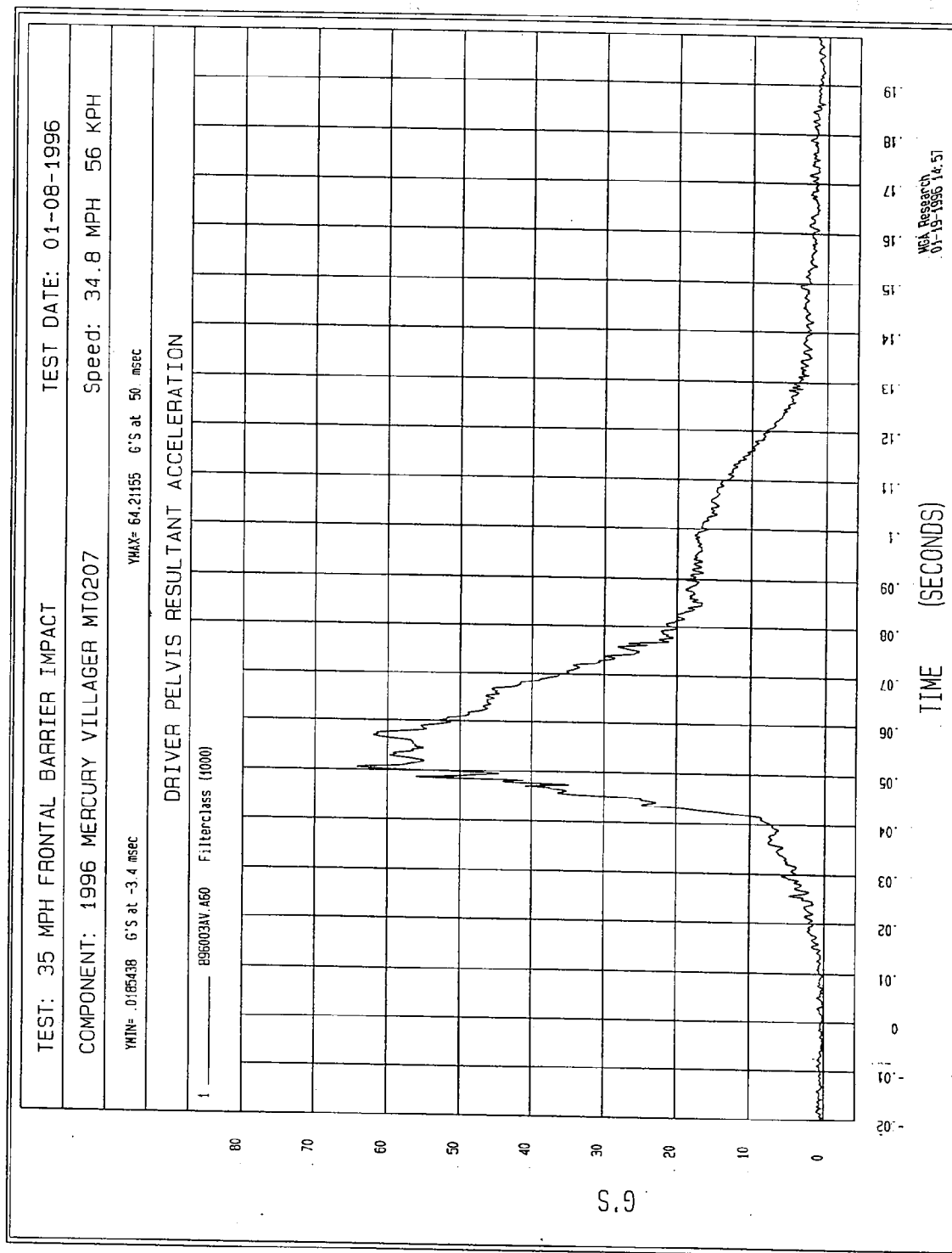


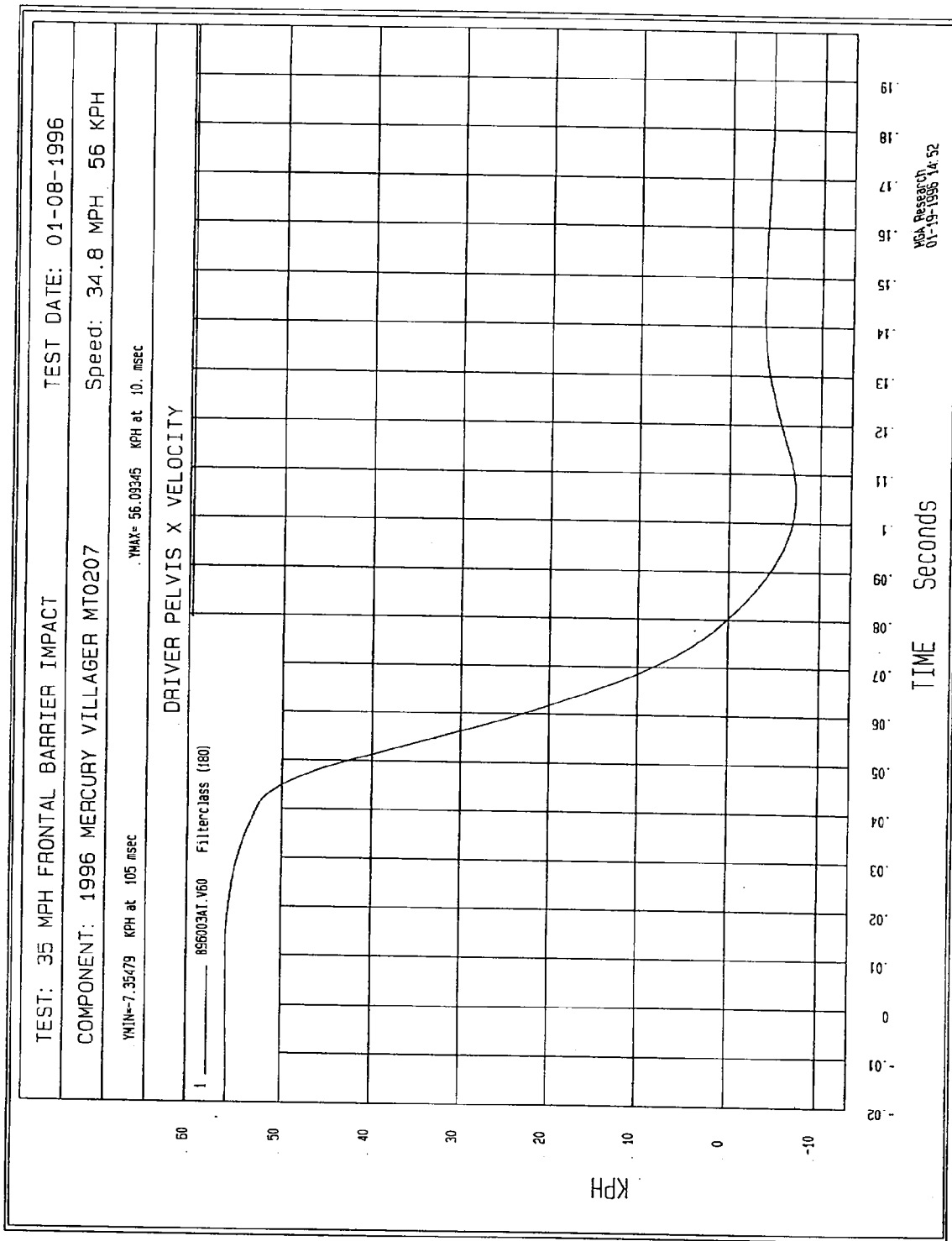


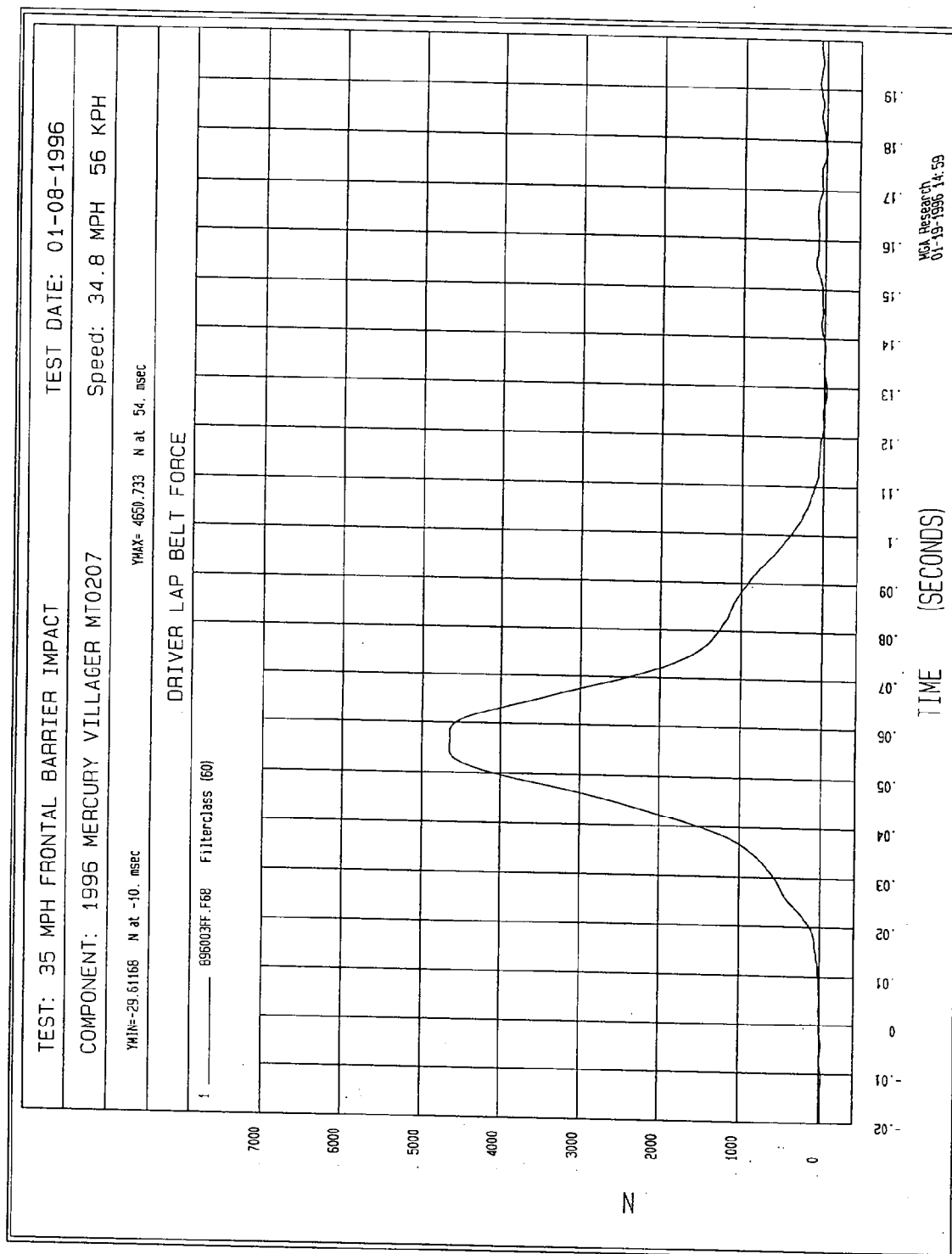


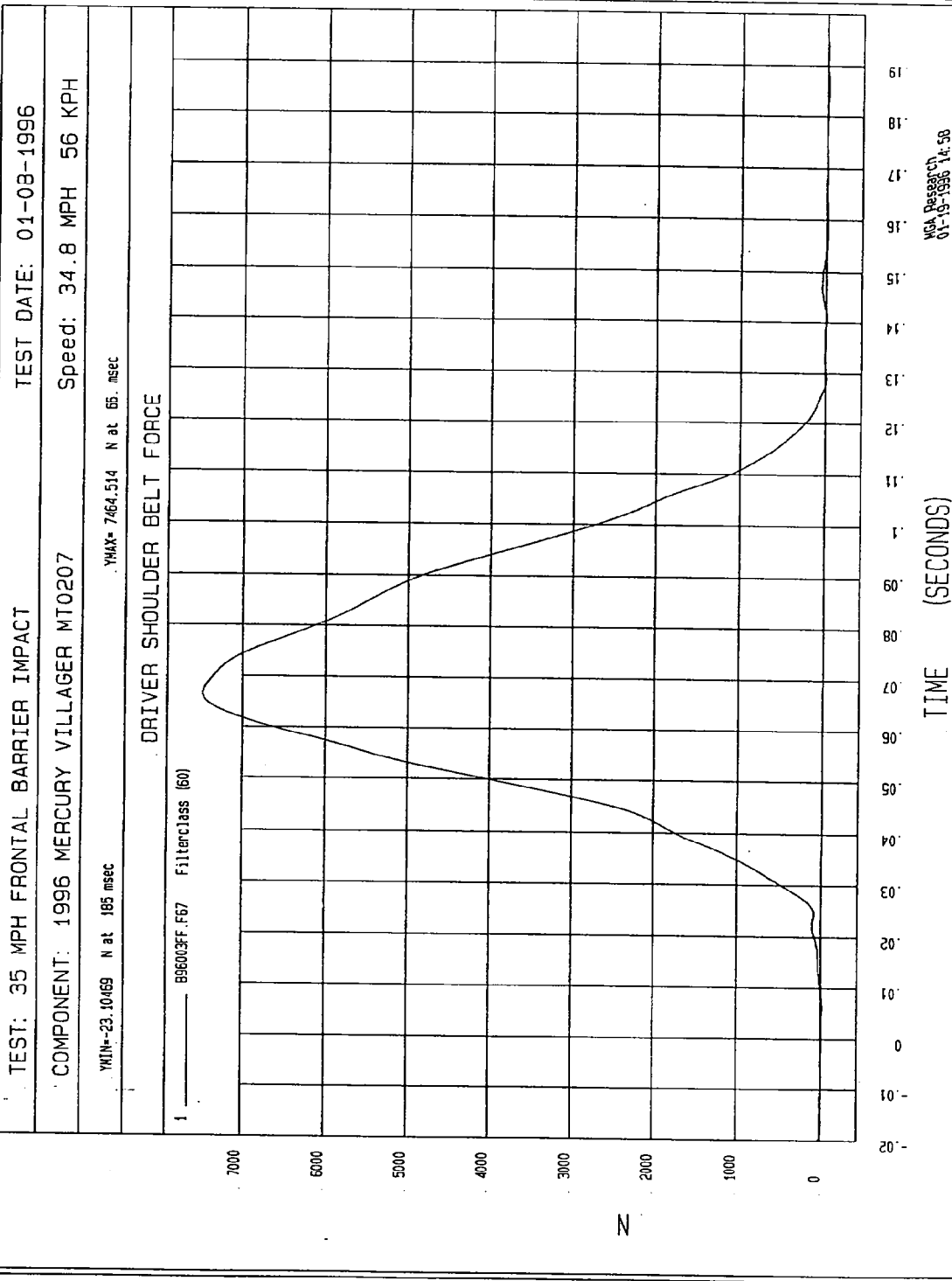


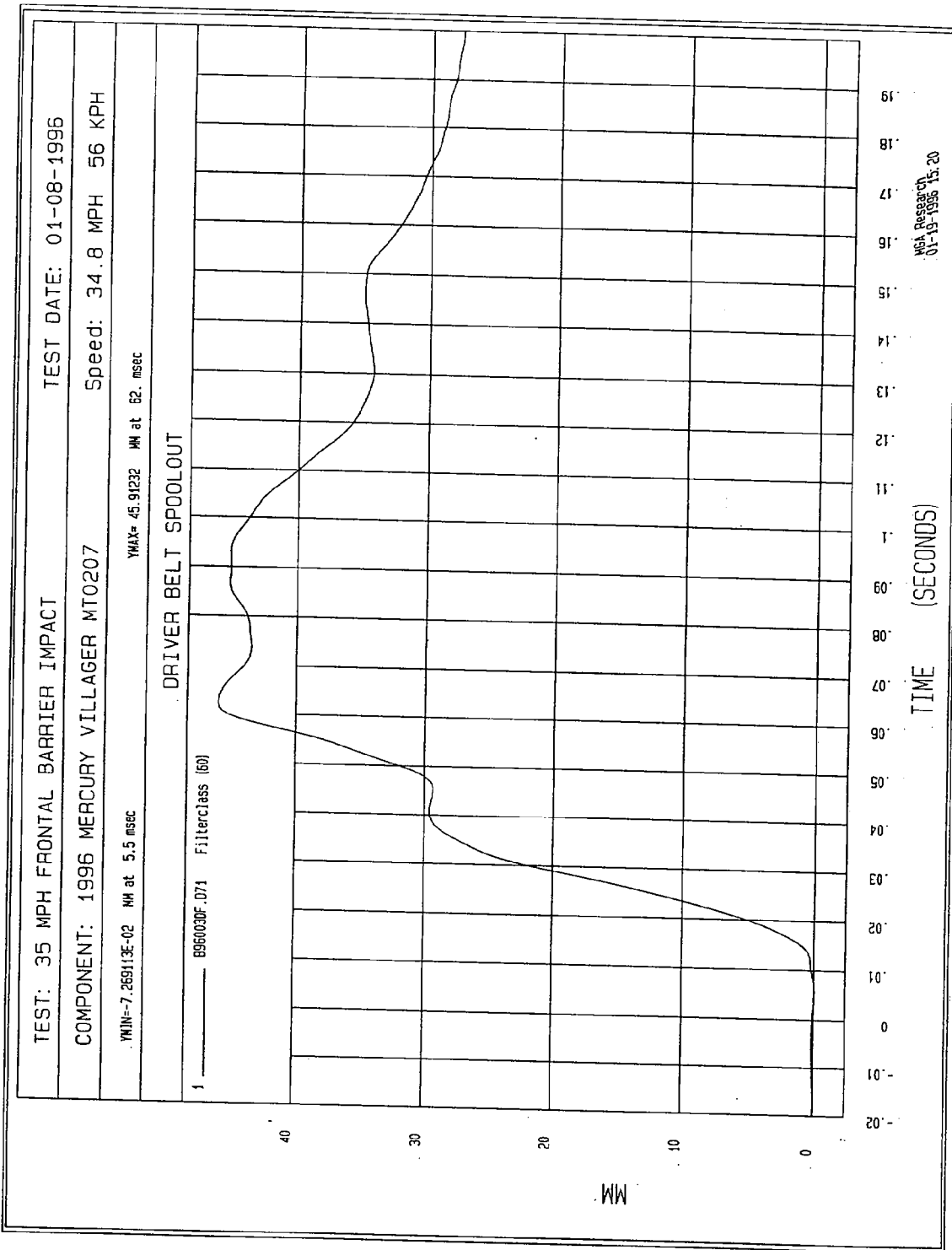


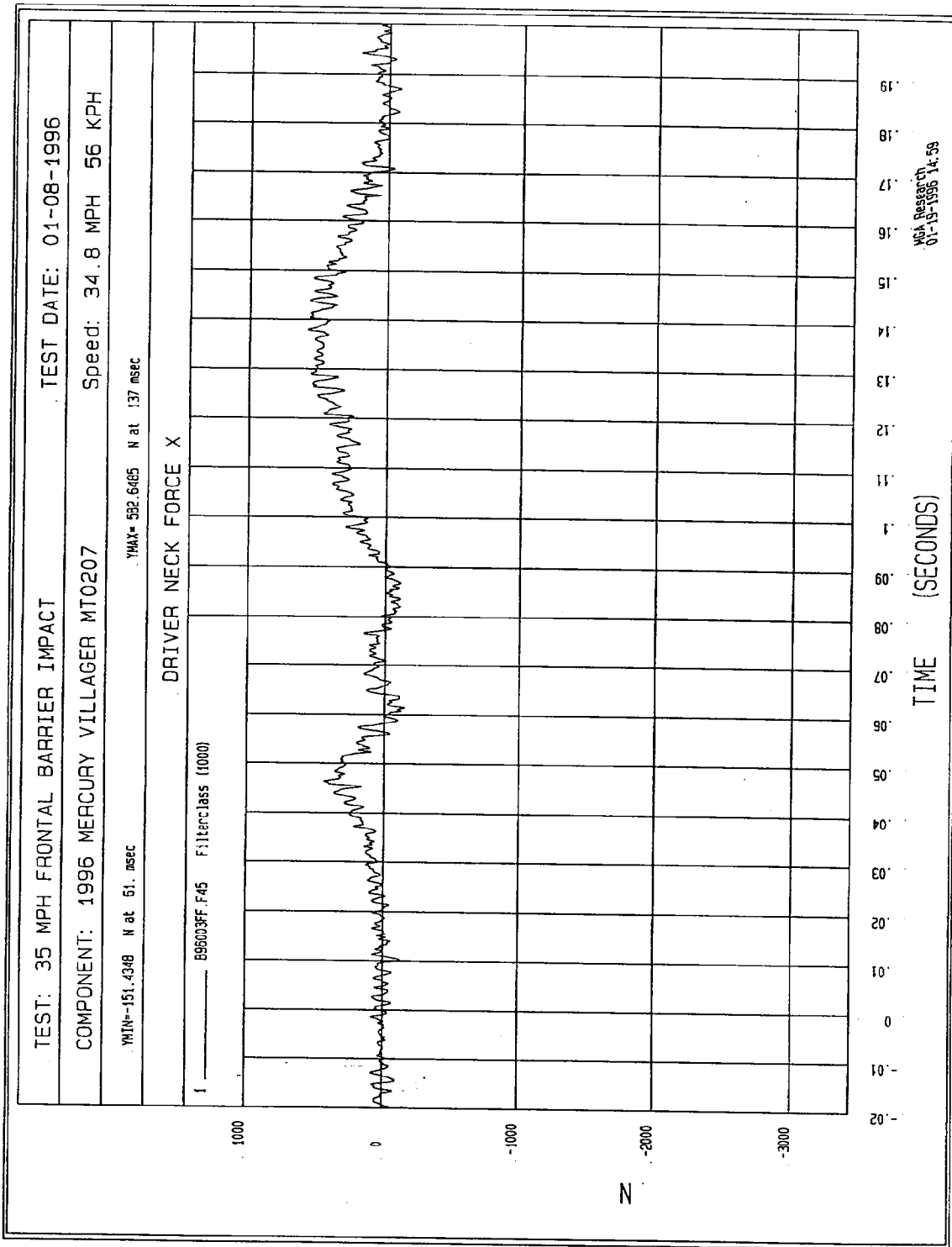


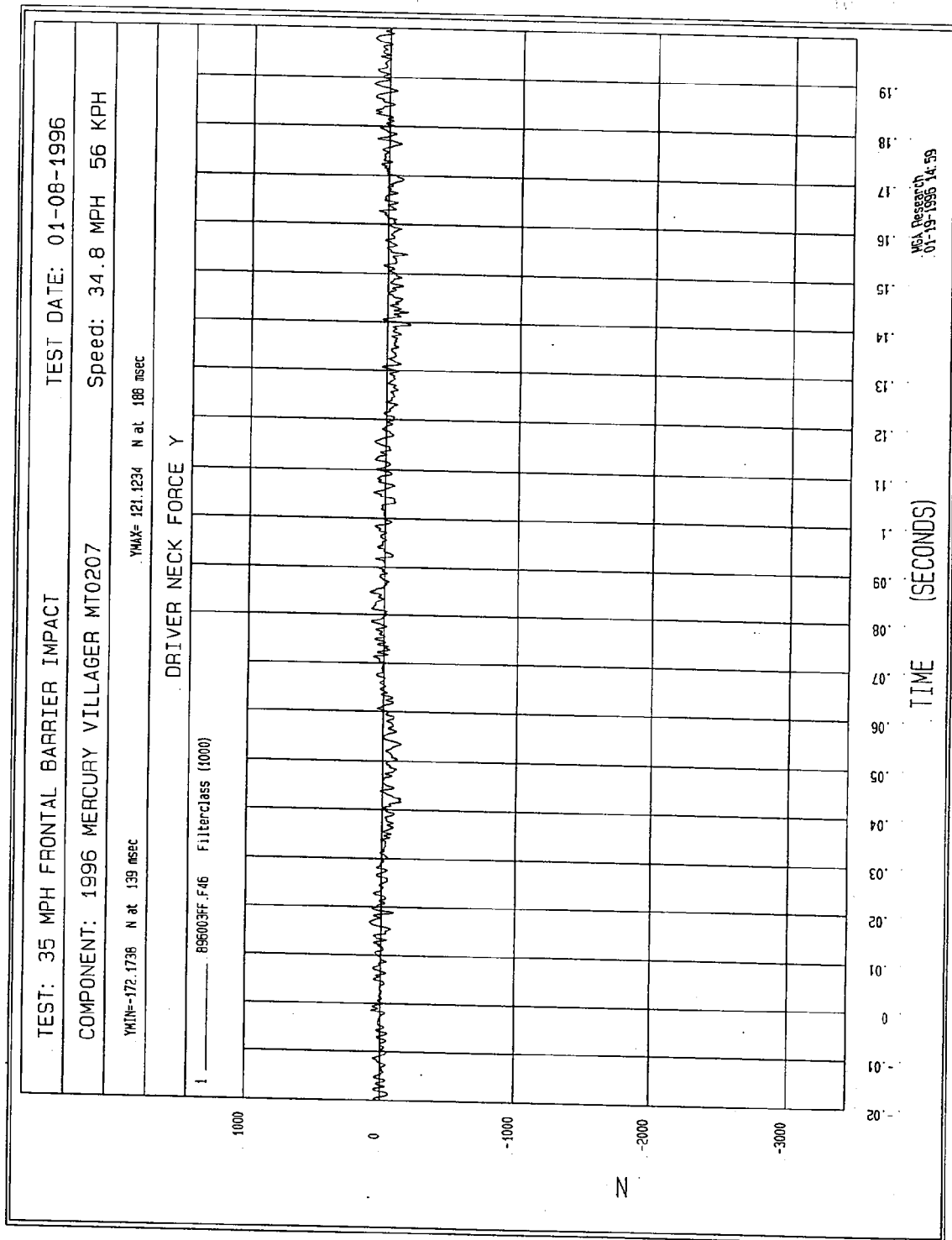


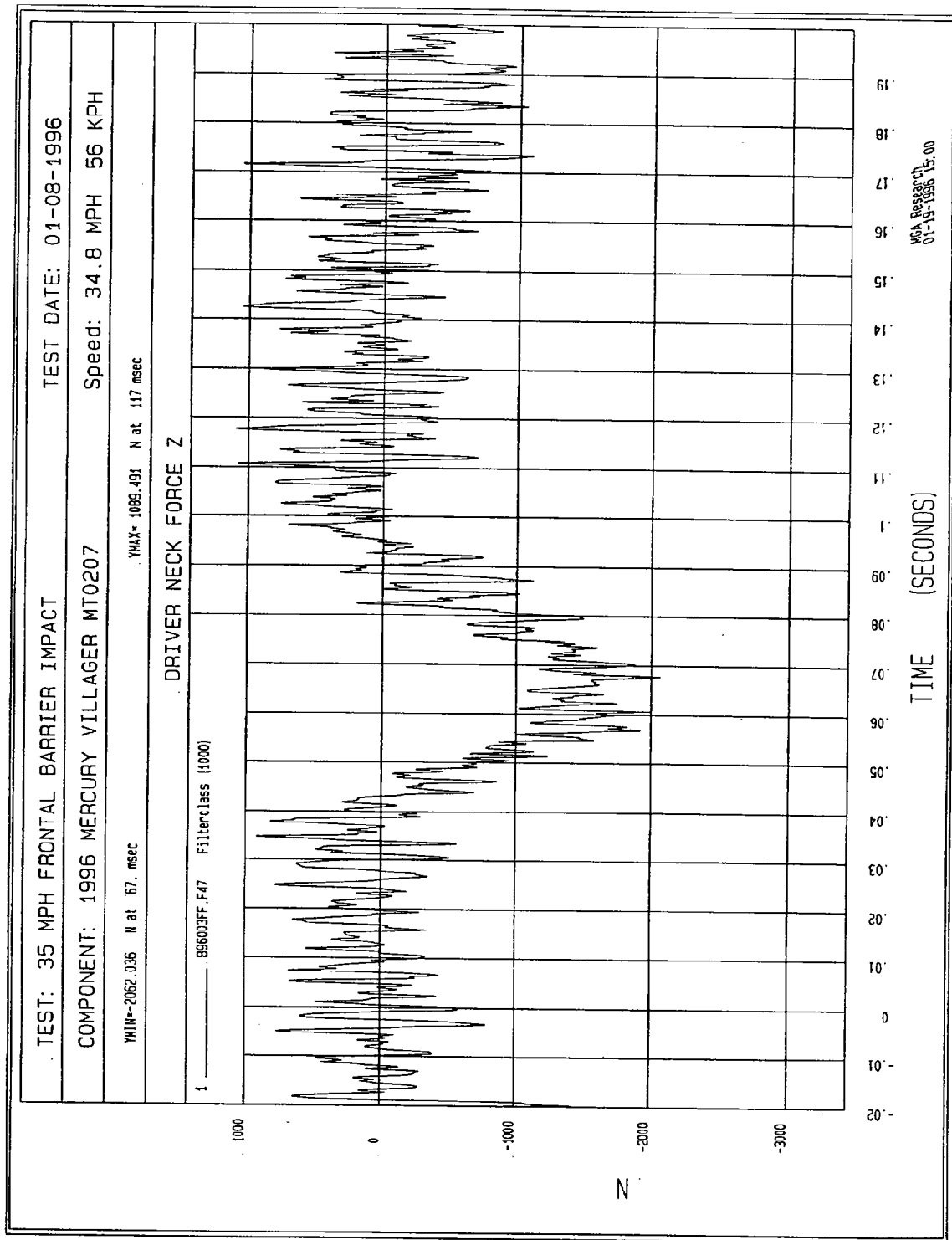


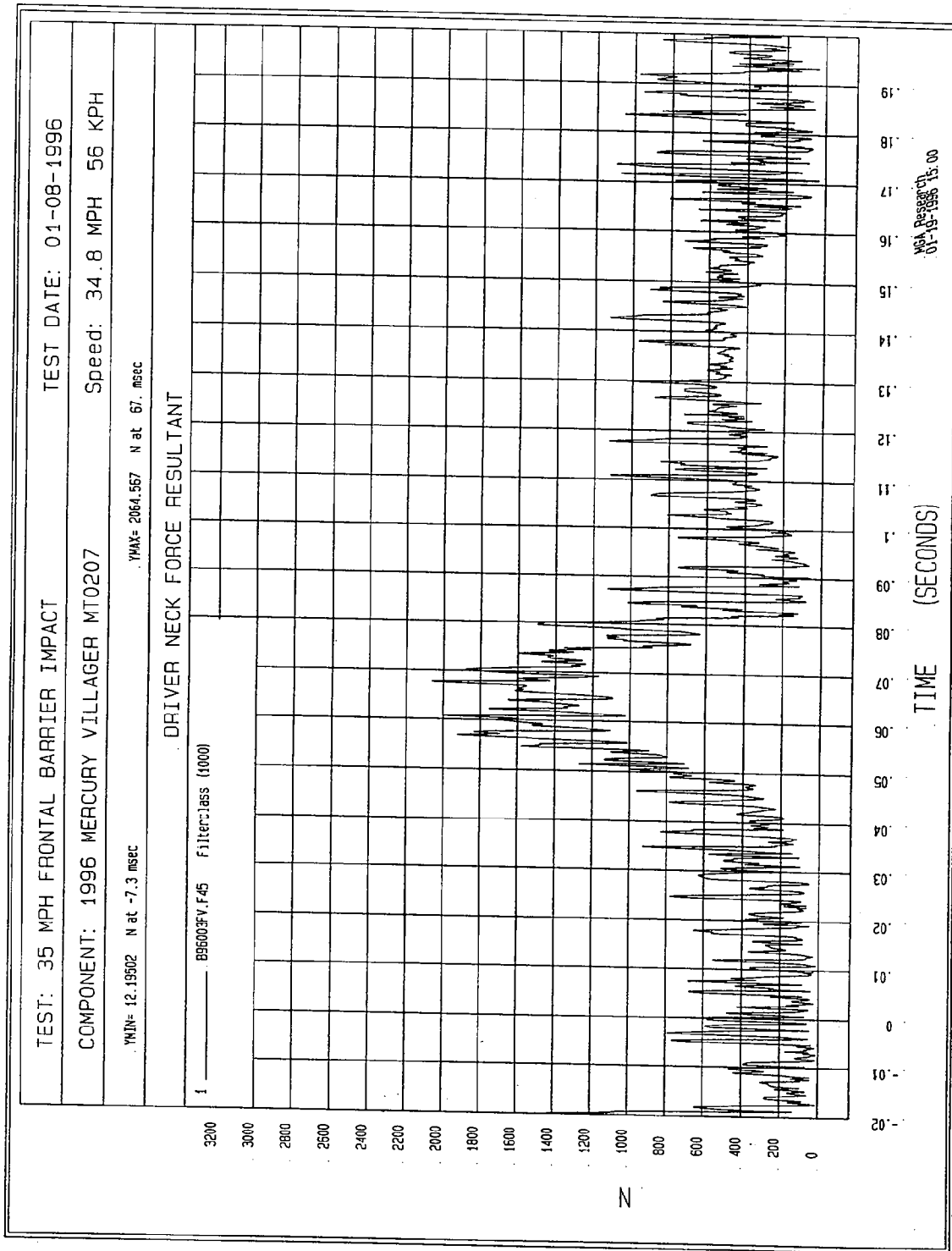


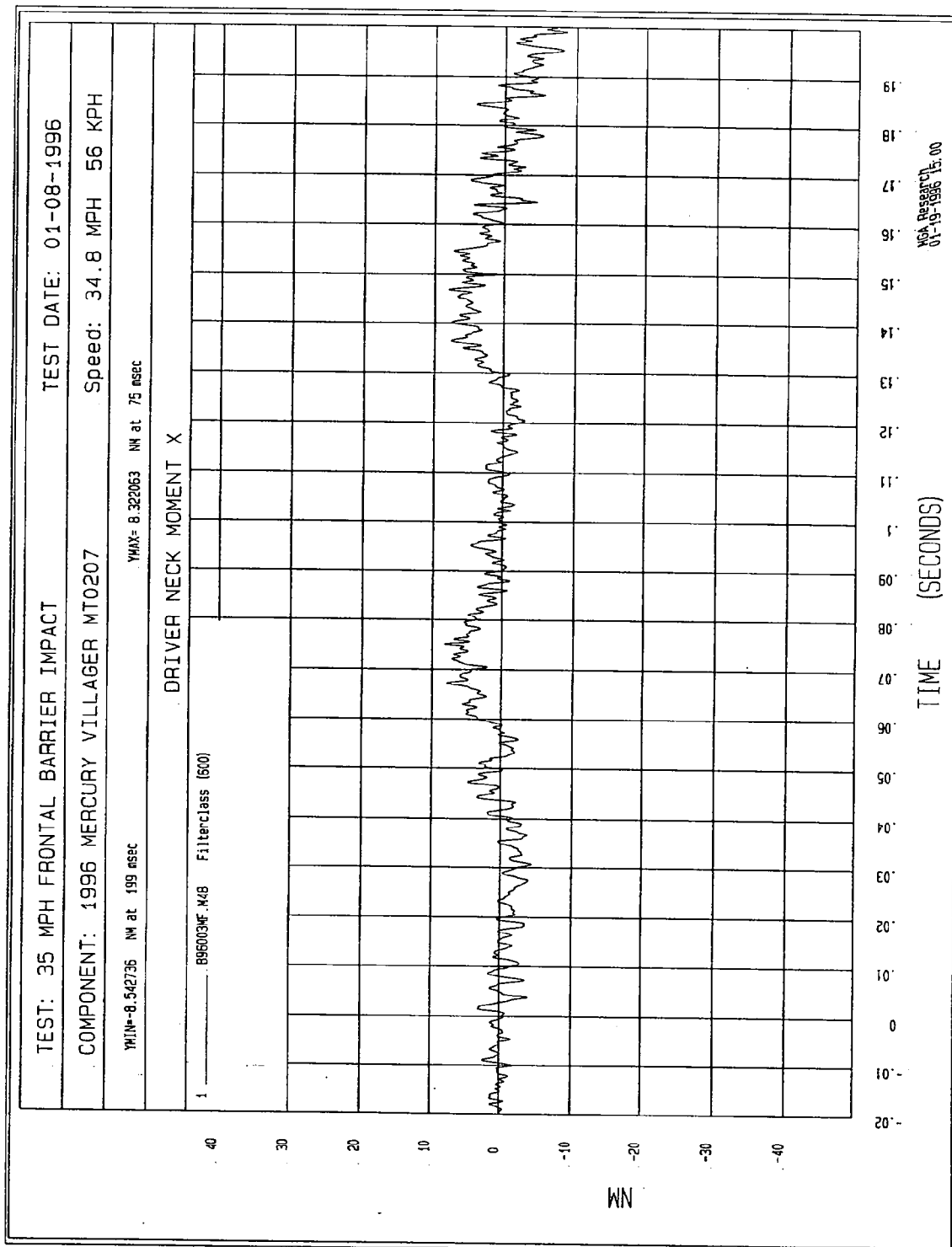


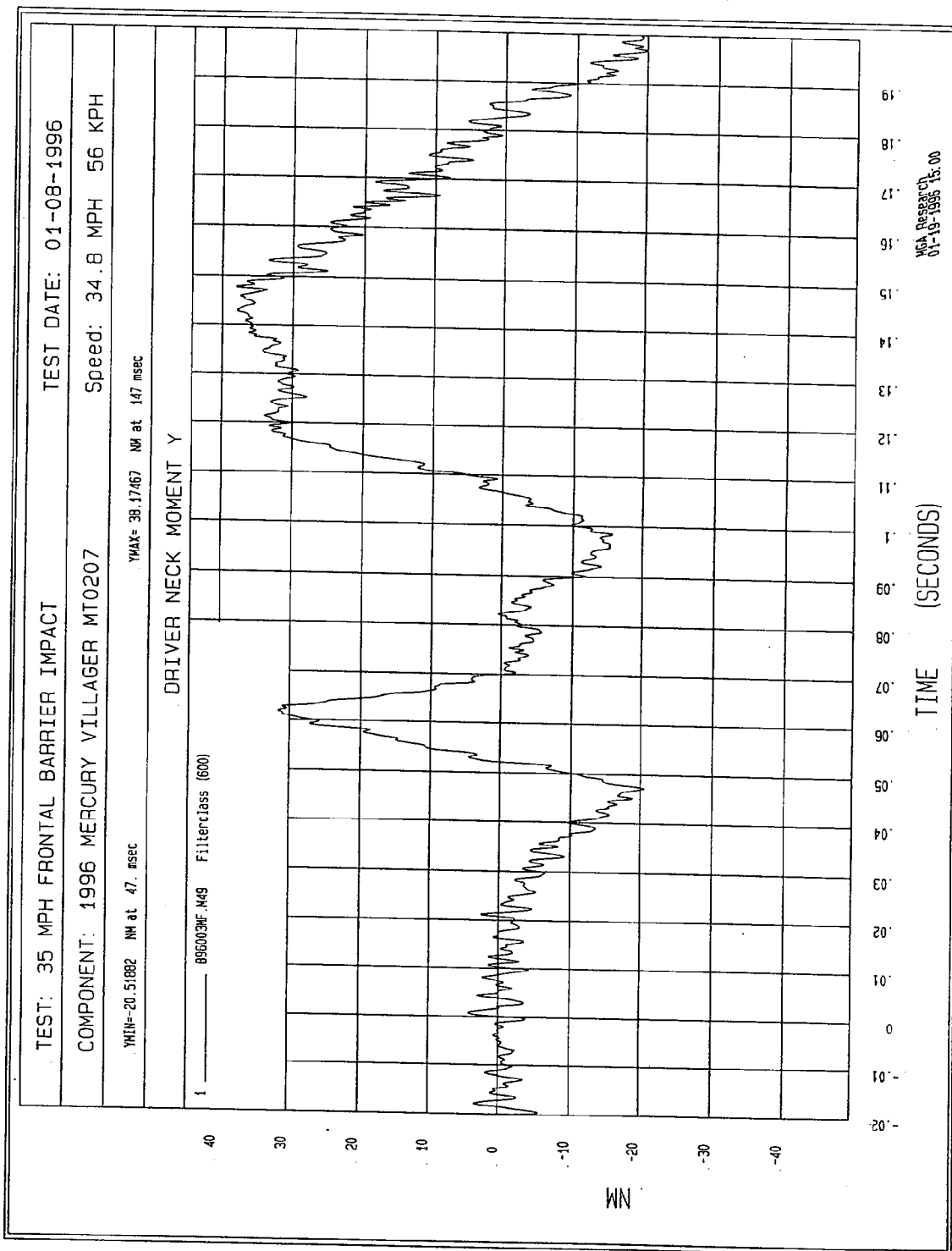










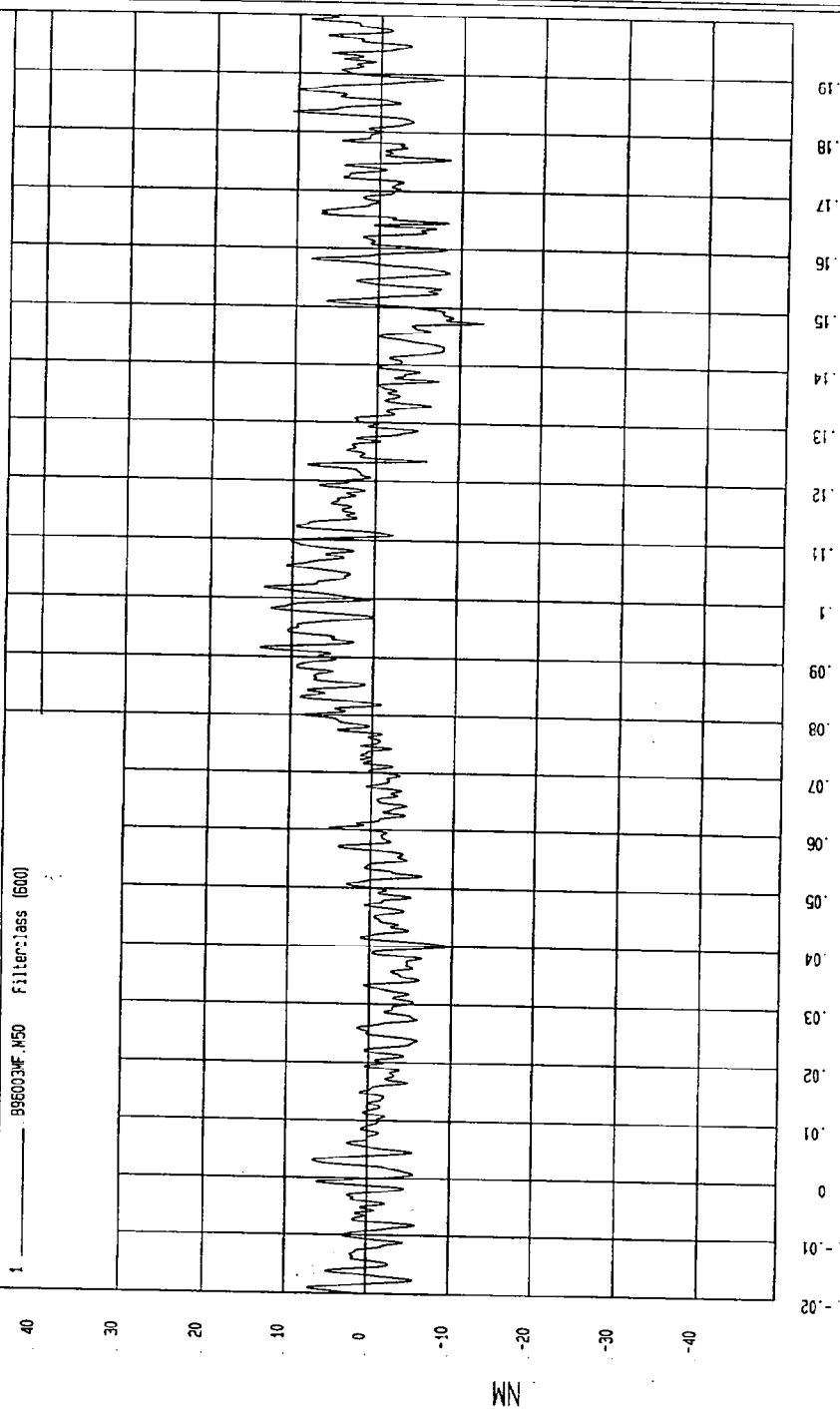


TEST: 35 MPH FRONTAL BARRIER IMPACT TEST DATE: 01-08-1996

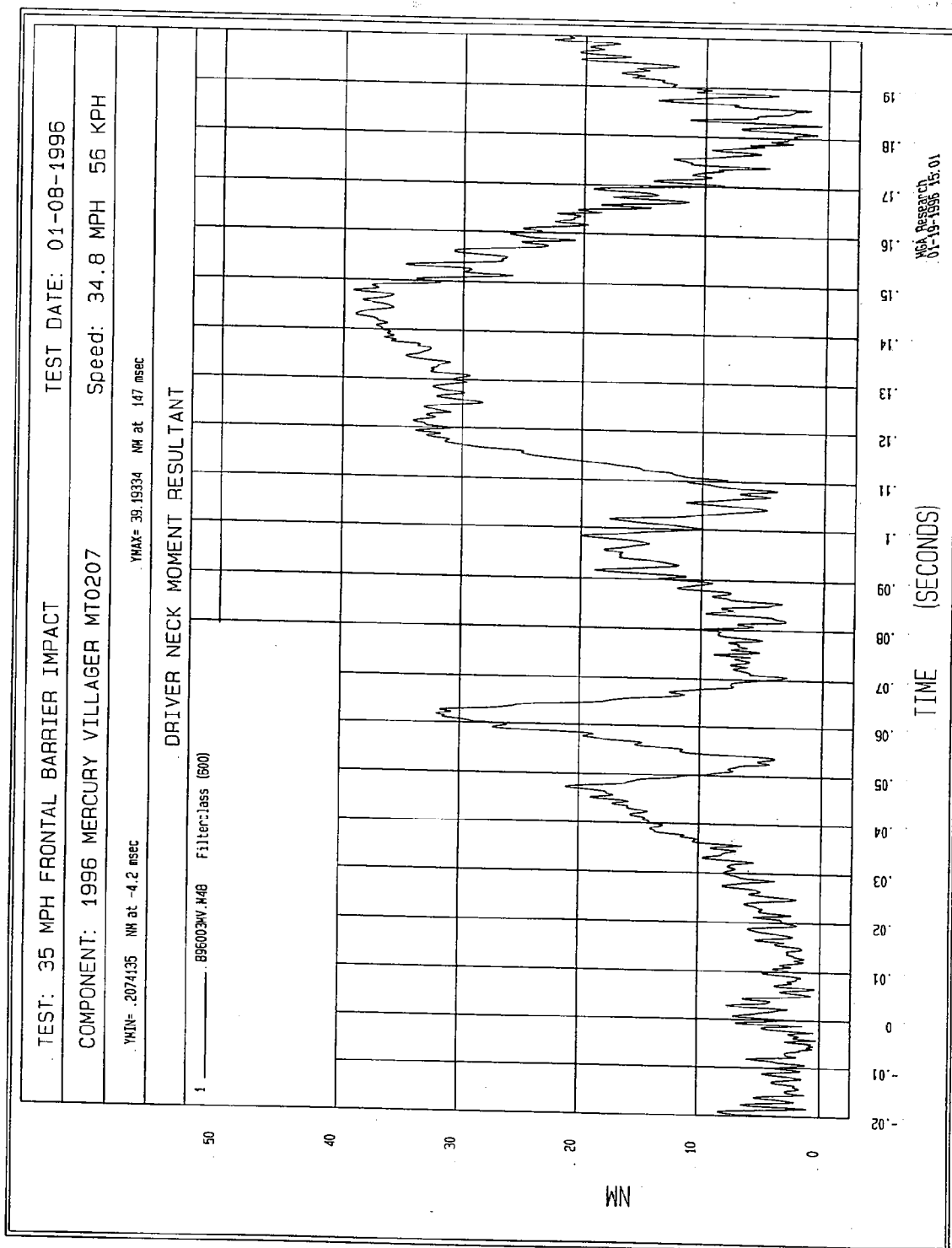
COMPONENT: 1996 MERCURY VILLAGER MT0207 Speed: 34.8 MPH 56 KPH

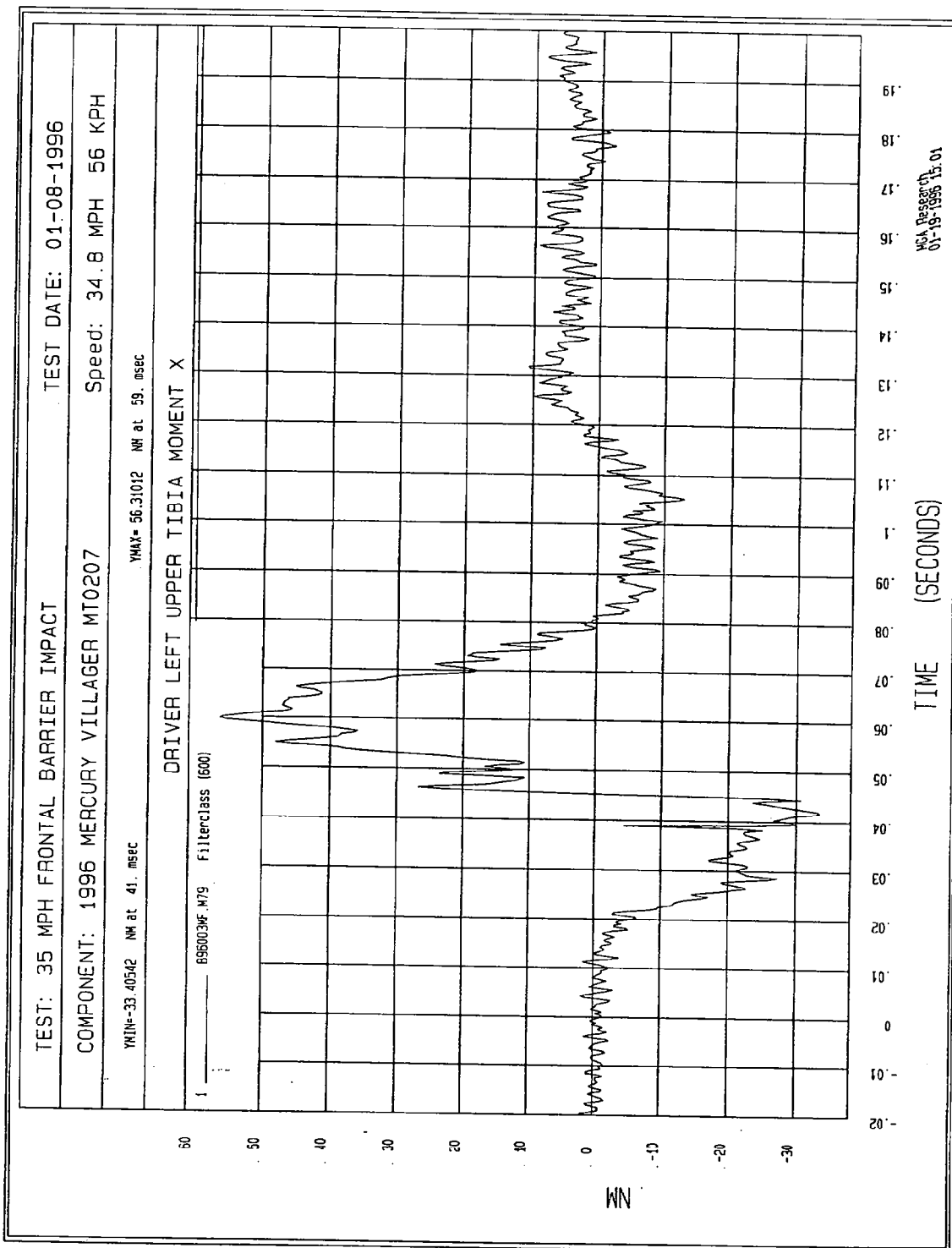
YMIN=-12.82665 NM at 147 msec YMAX= 13.82984 NM at 91 msec

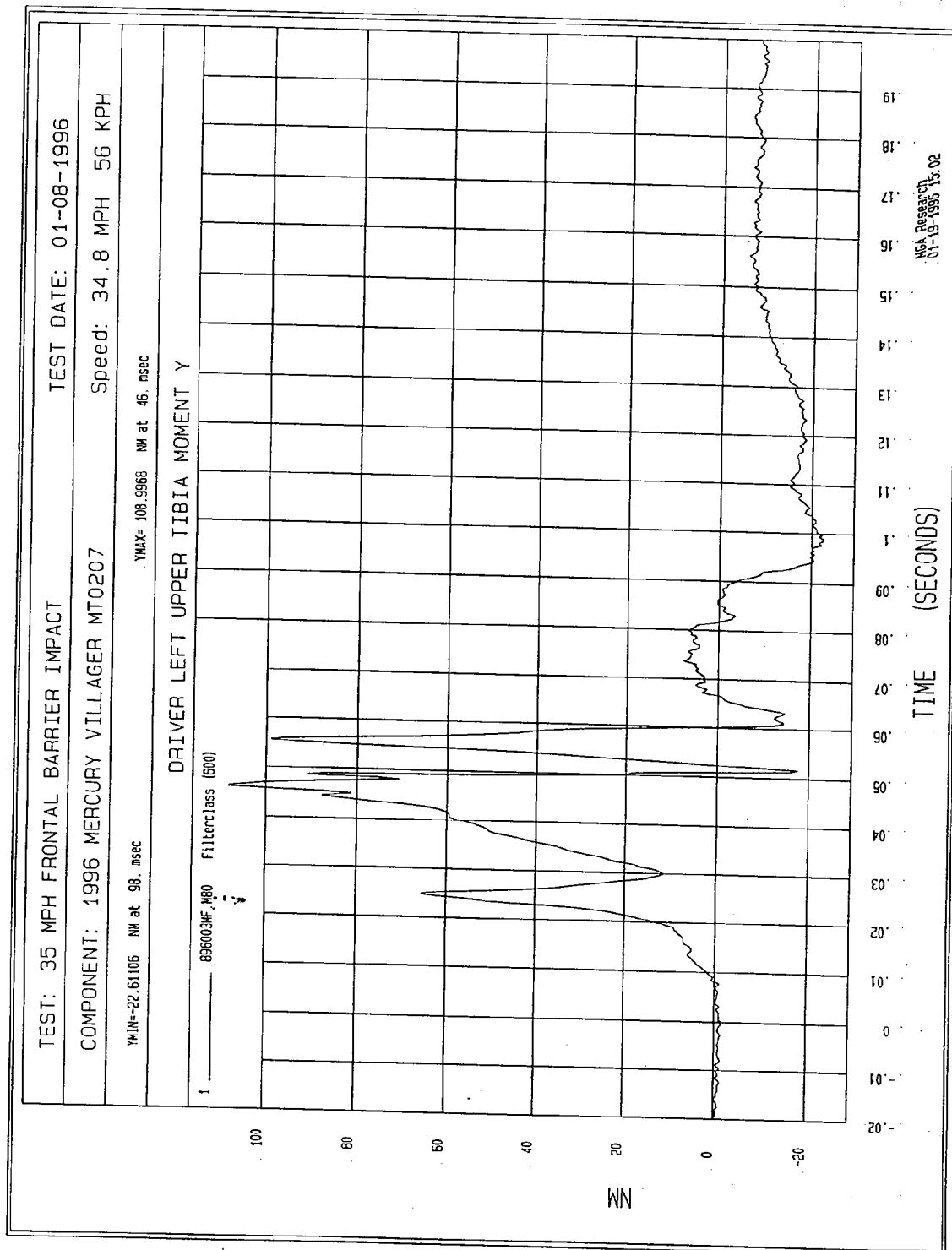
DRIVER NECK MOMENT Z

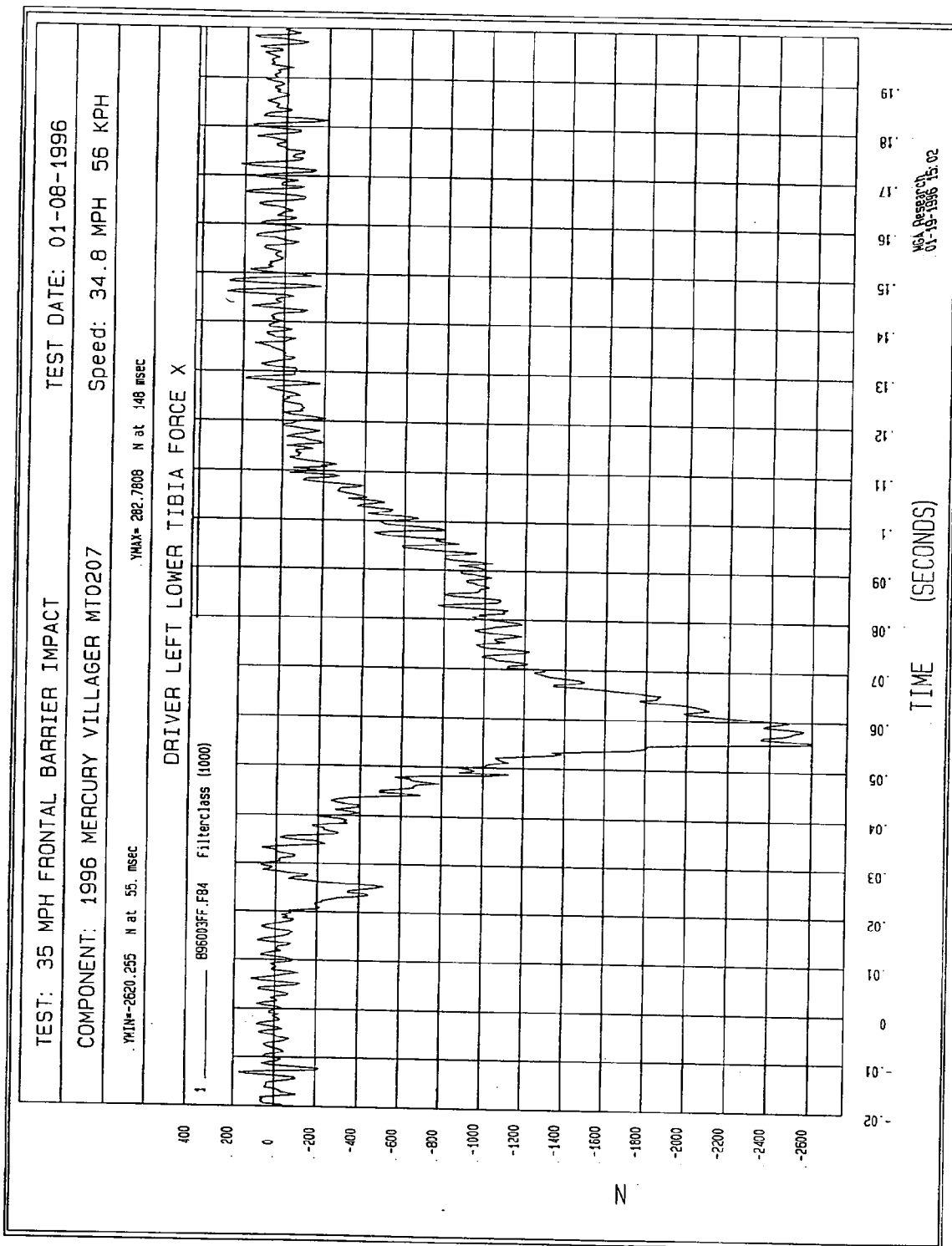


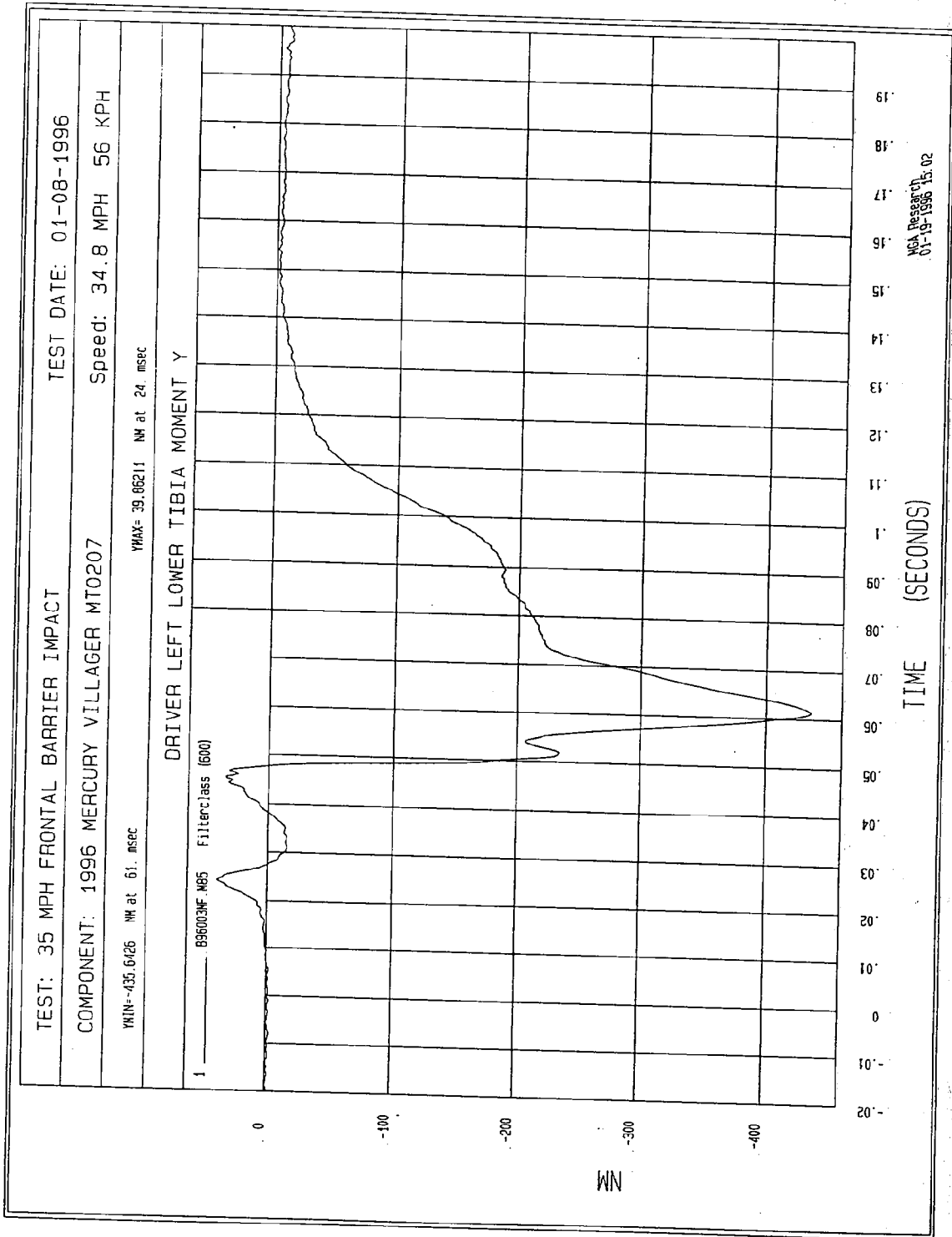
MSA Research
01-19-1996 15:01

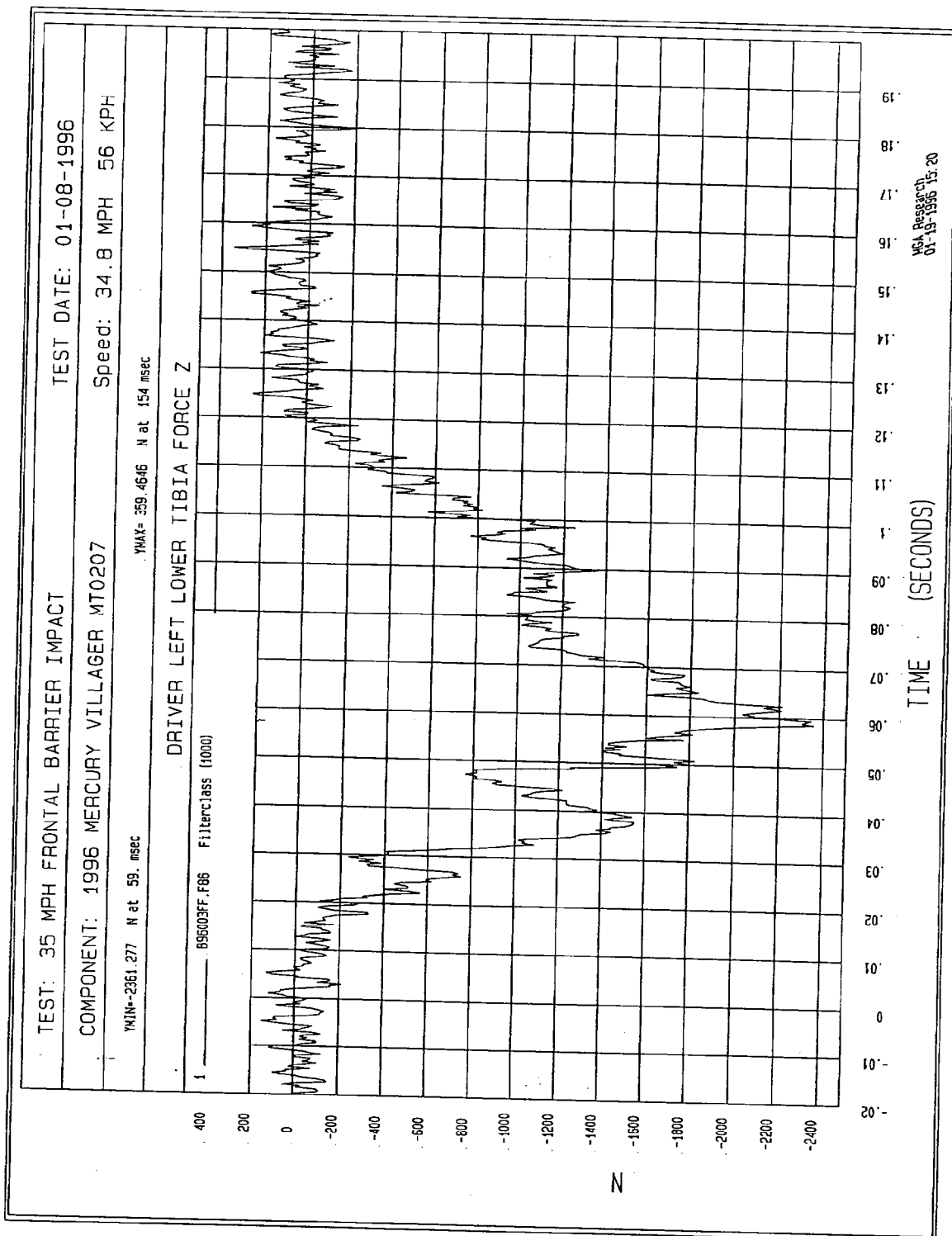


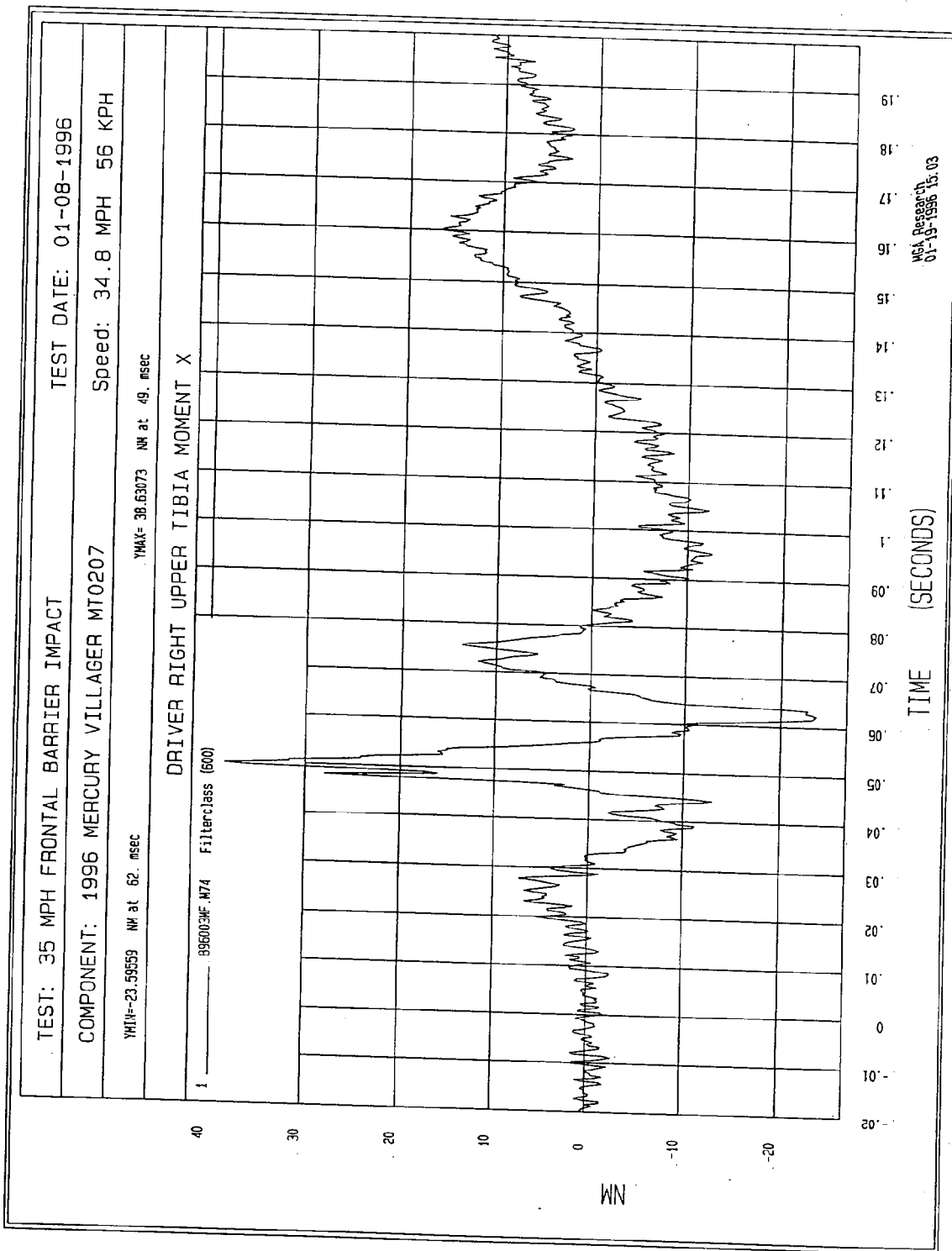


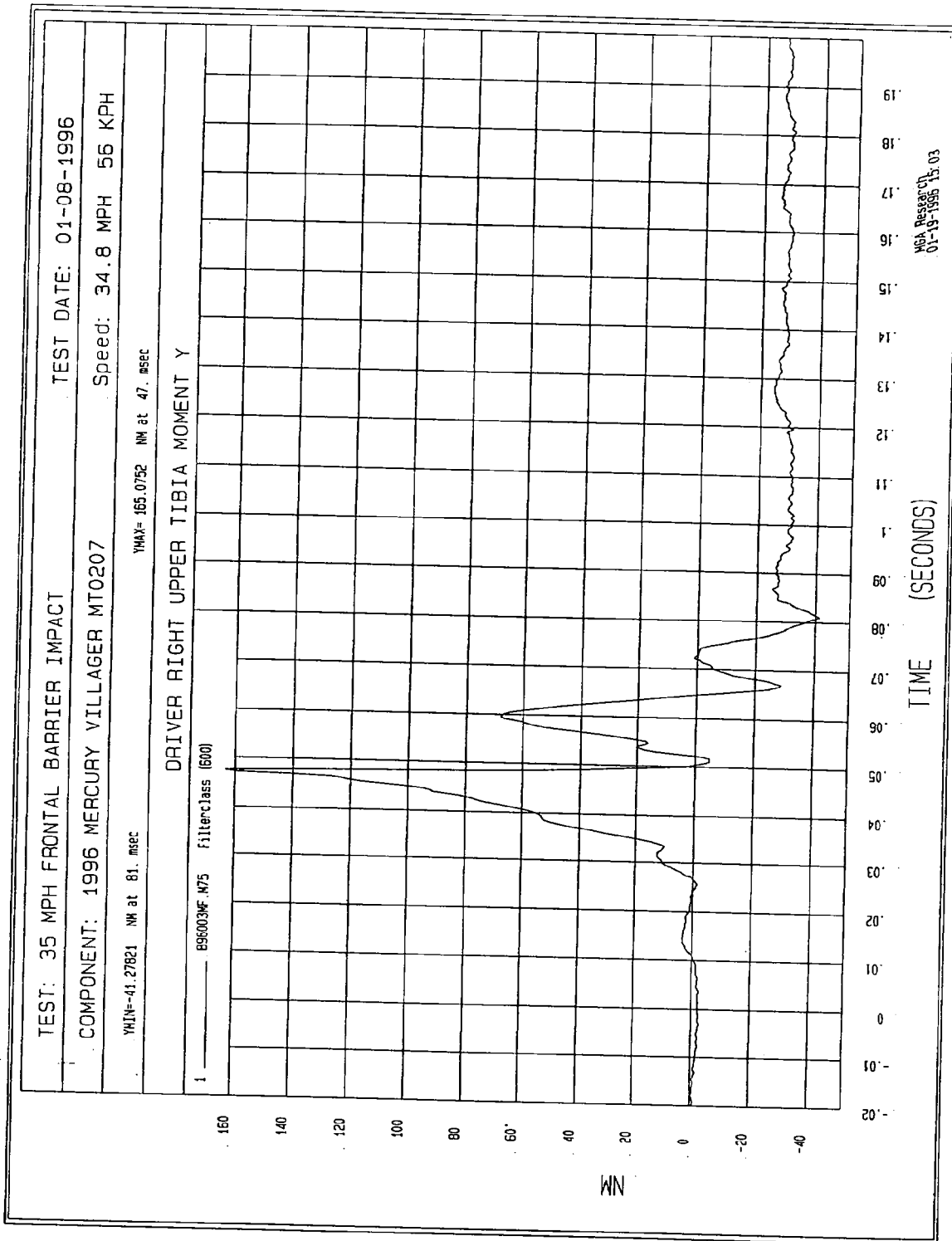


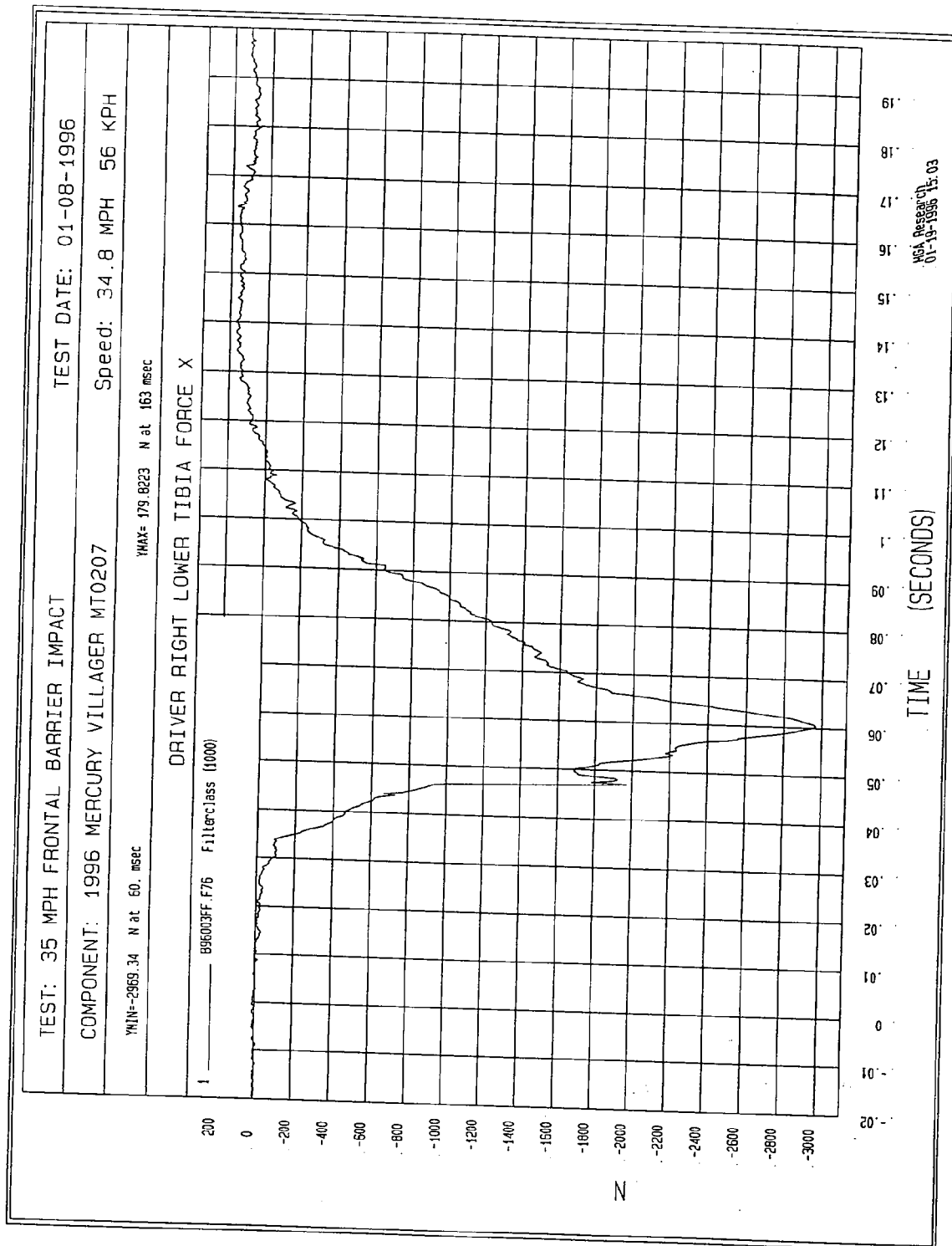


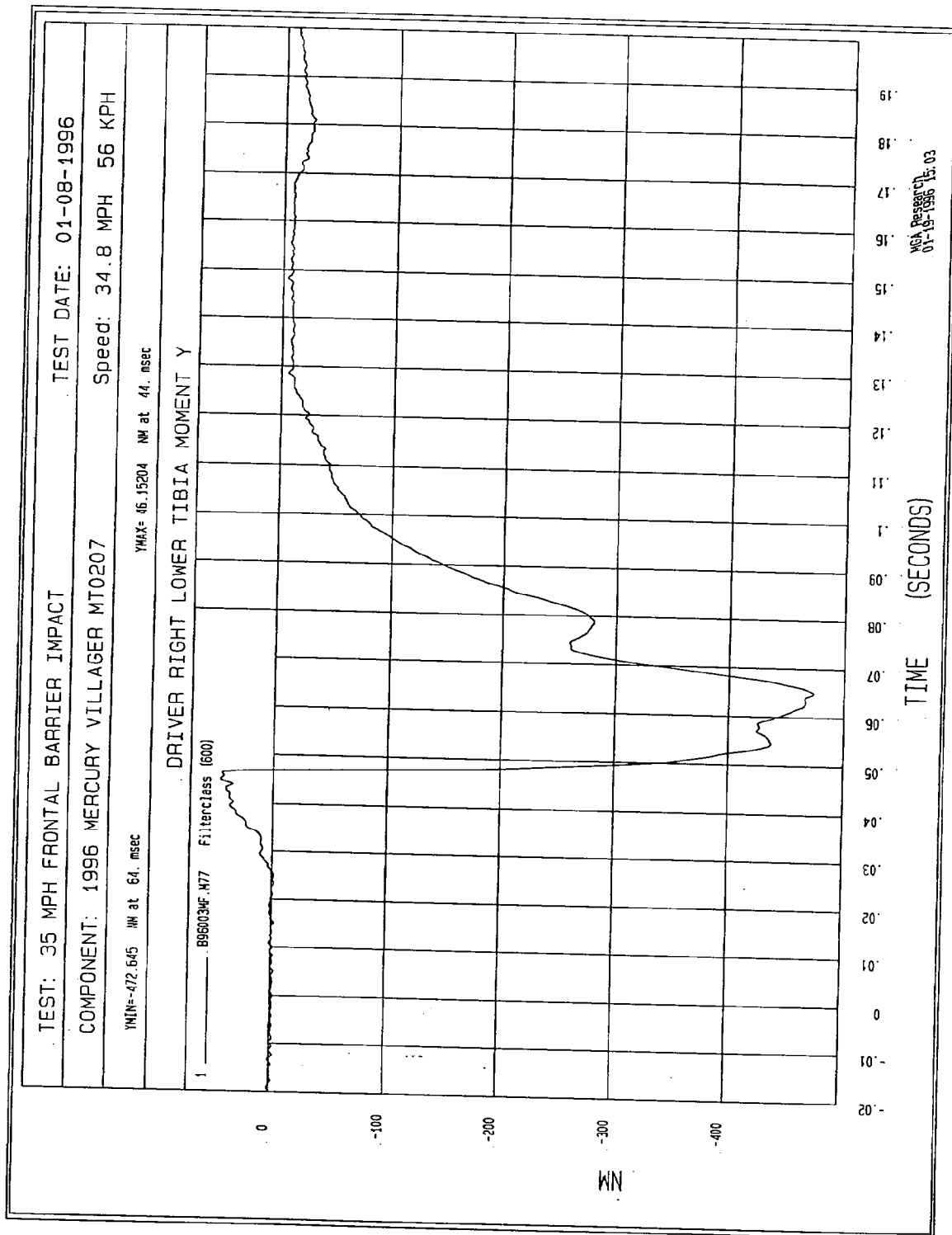


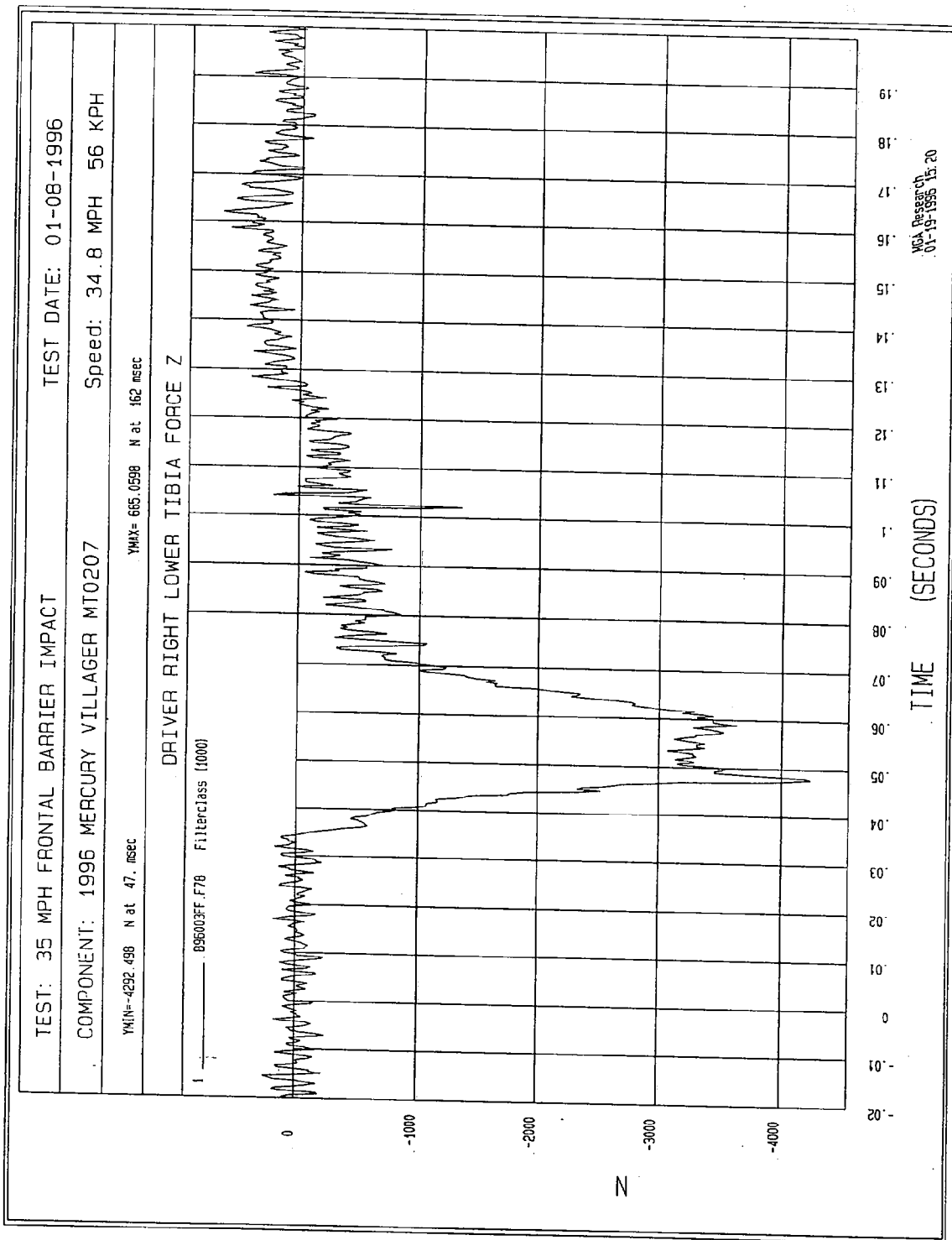


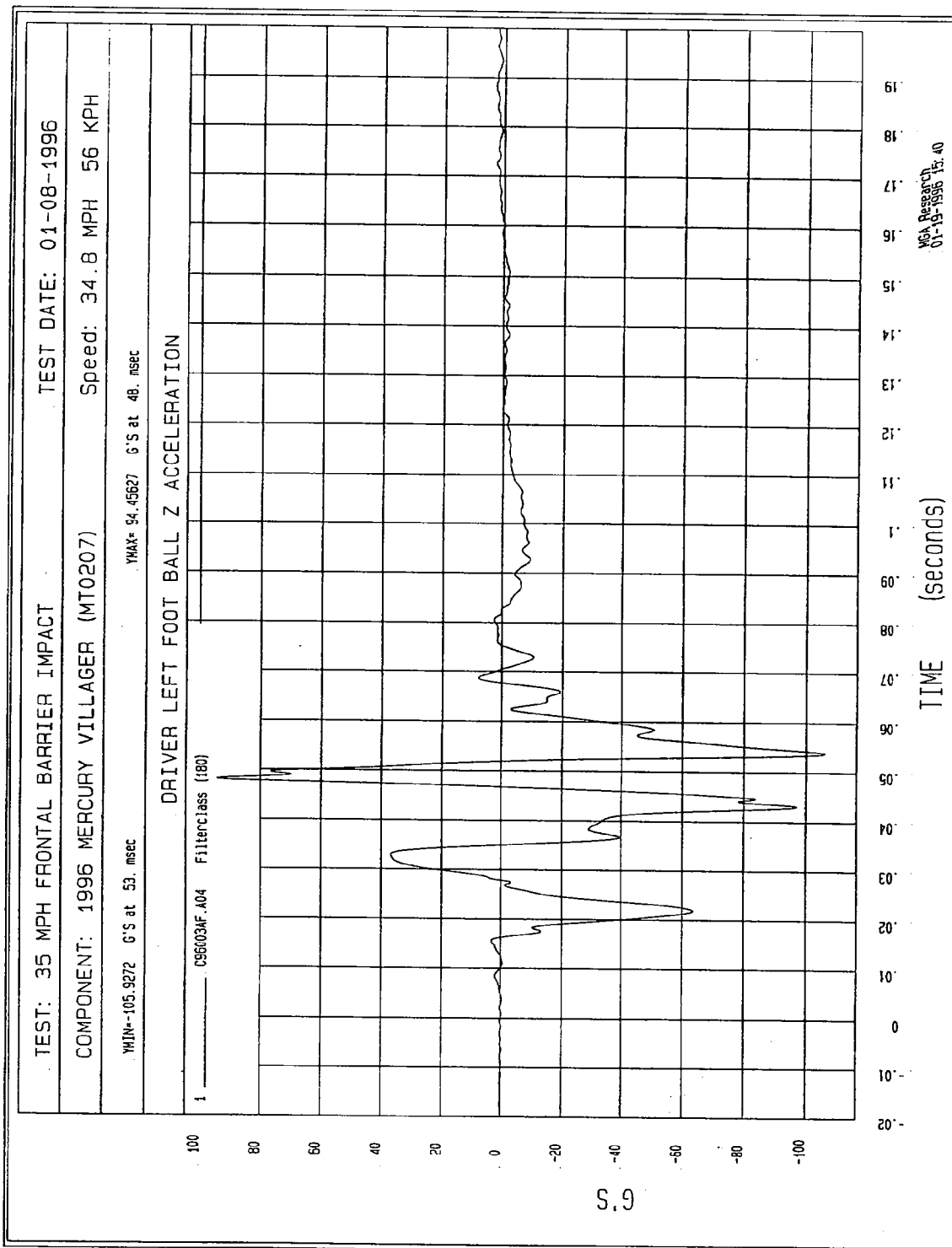


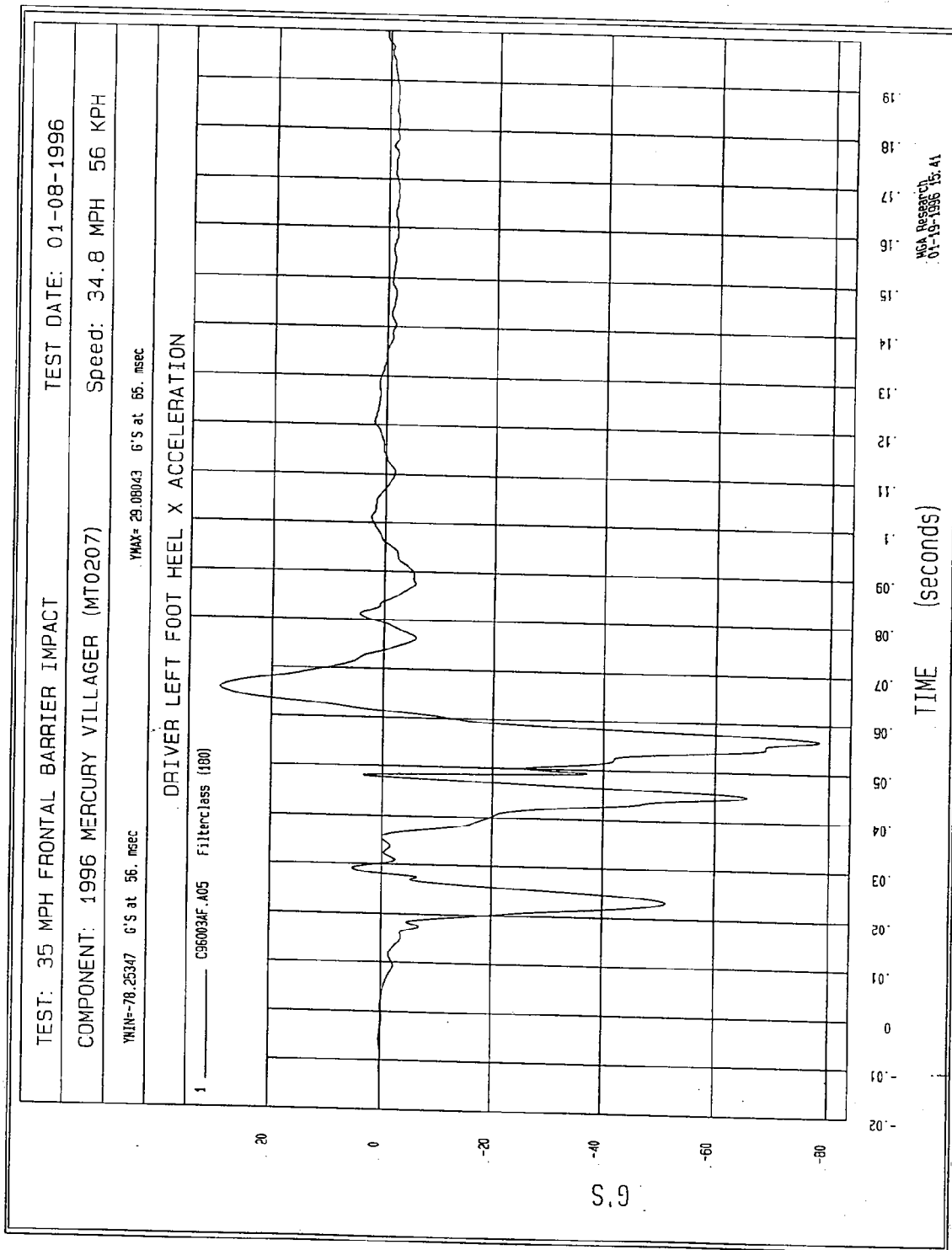


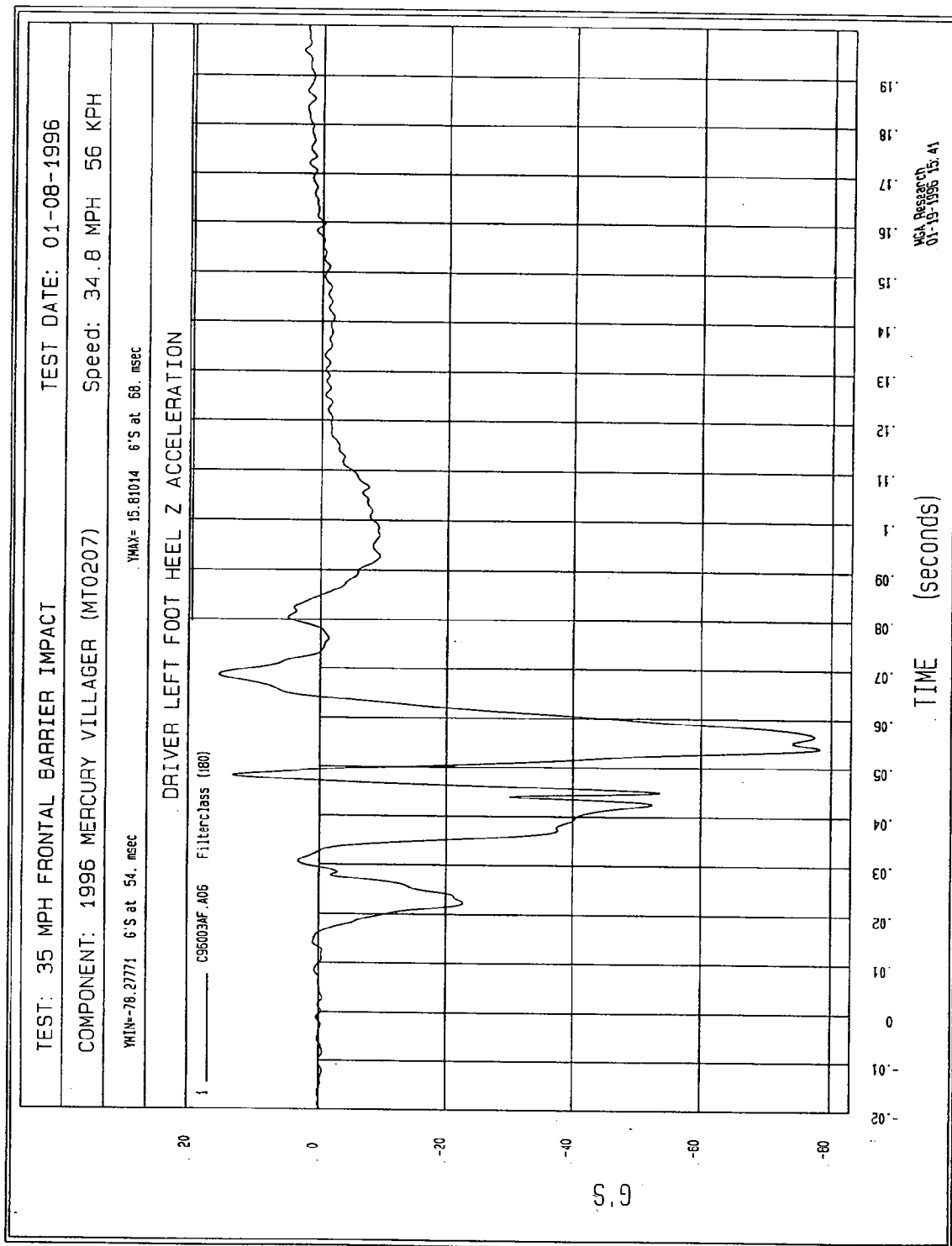


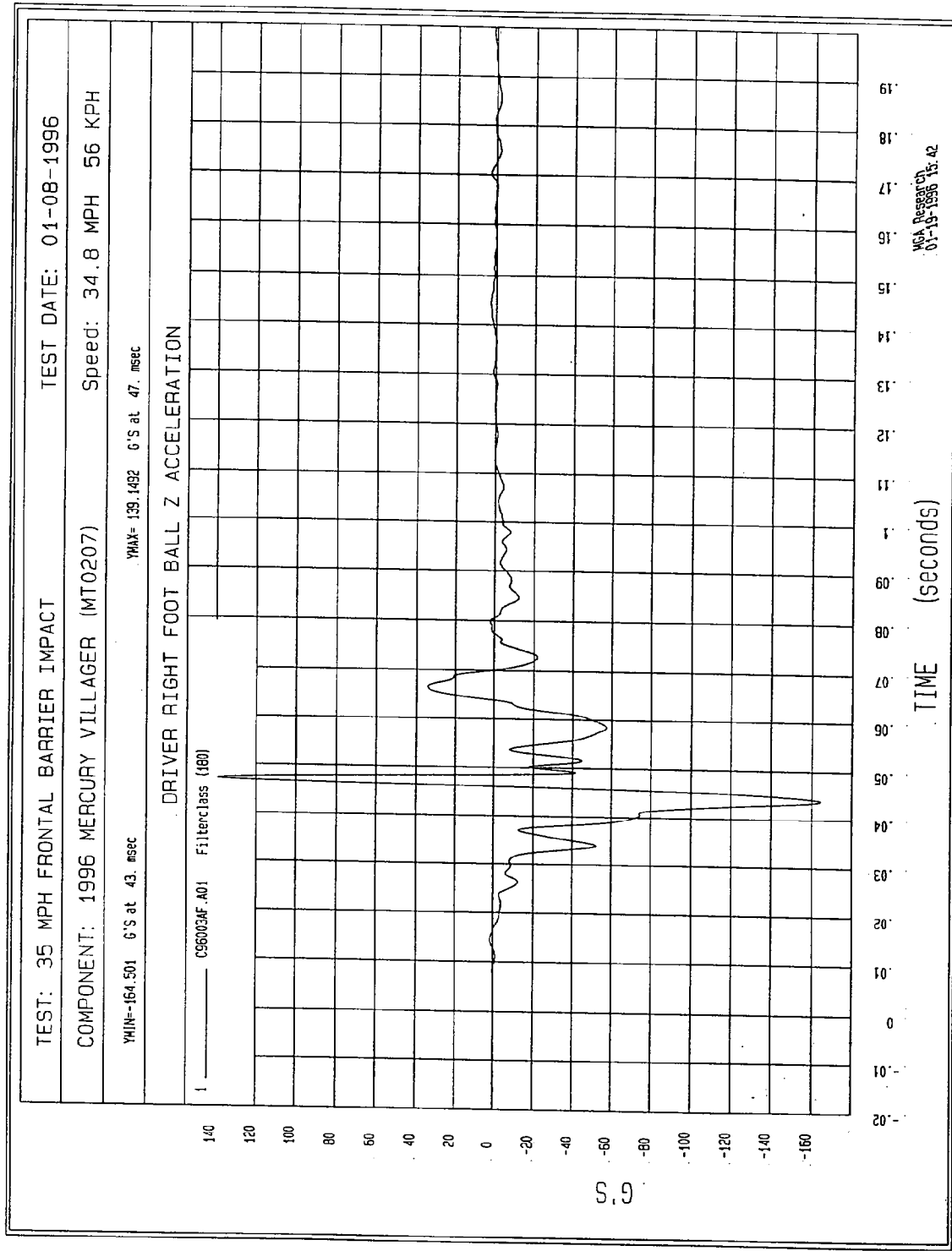


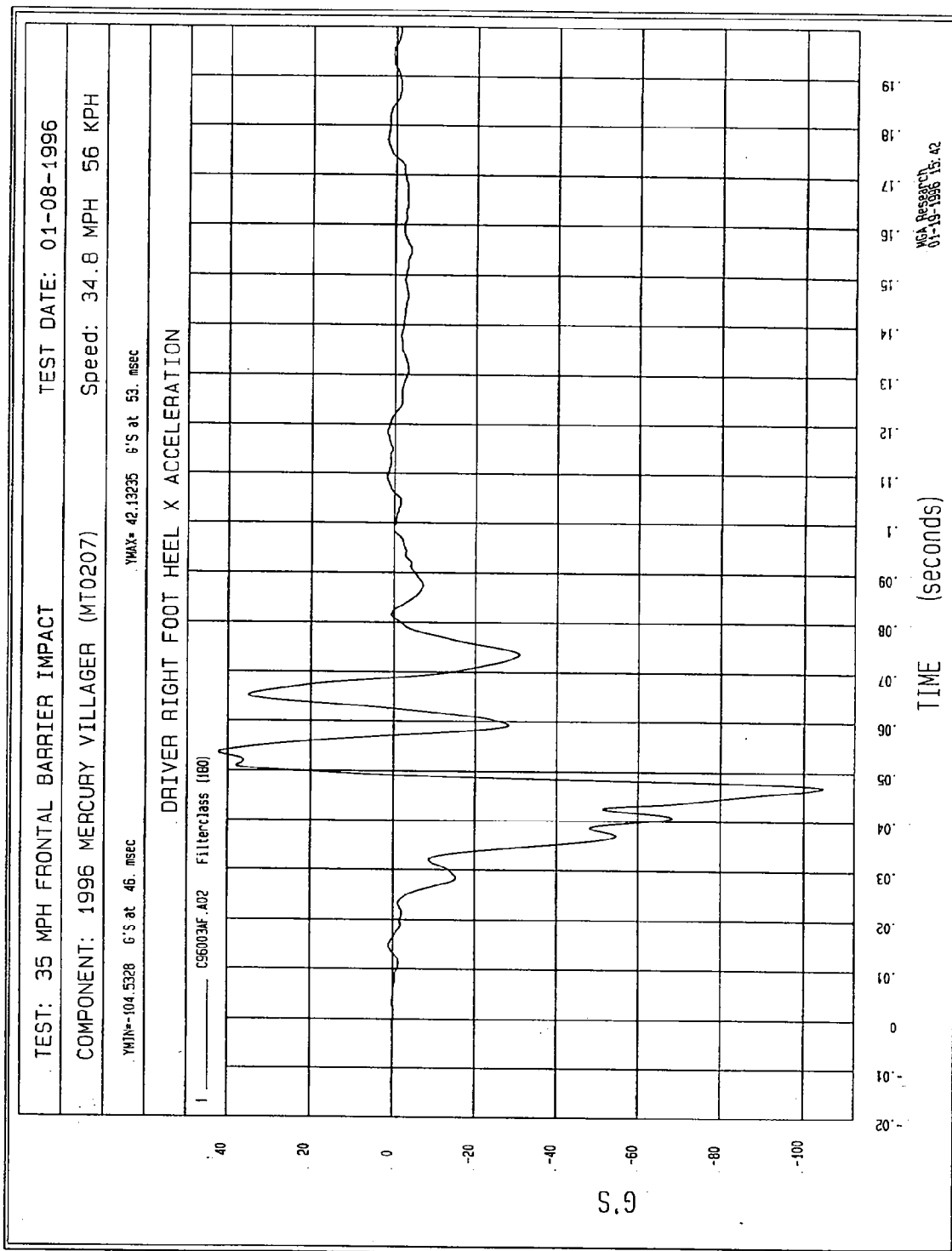


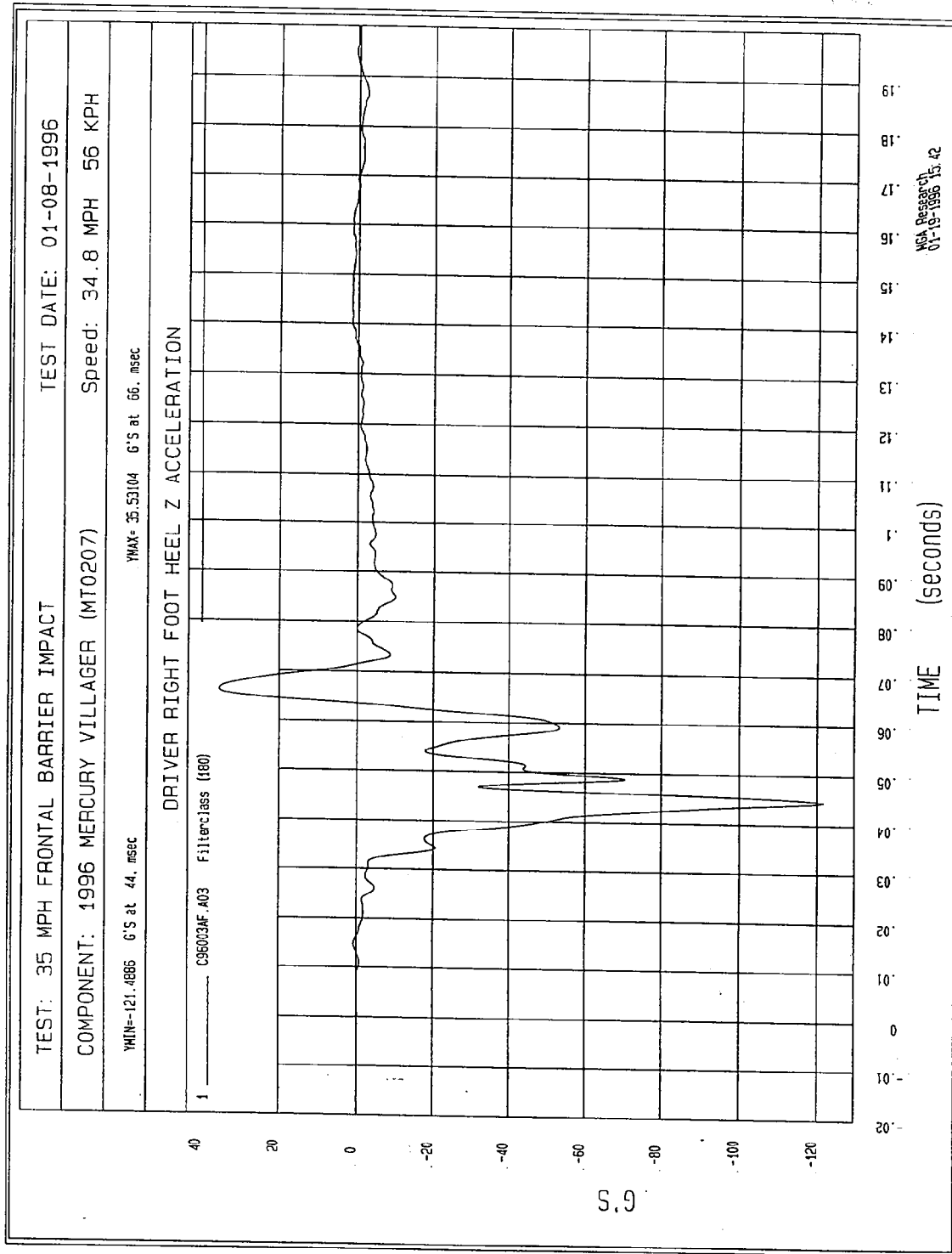












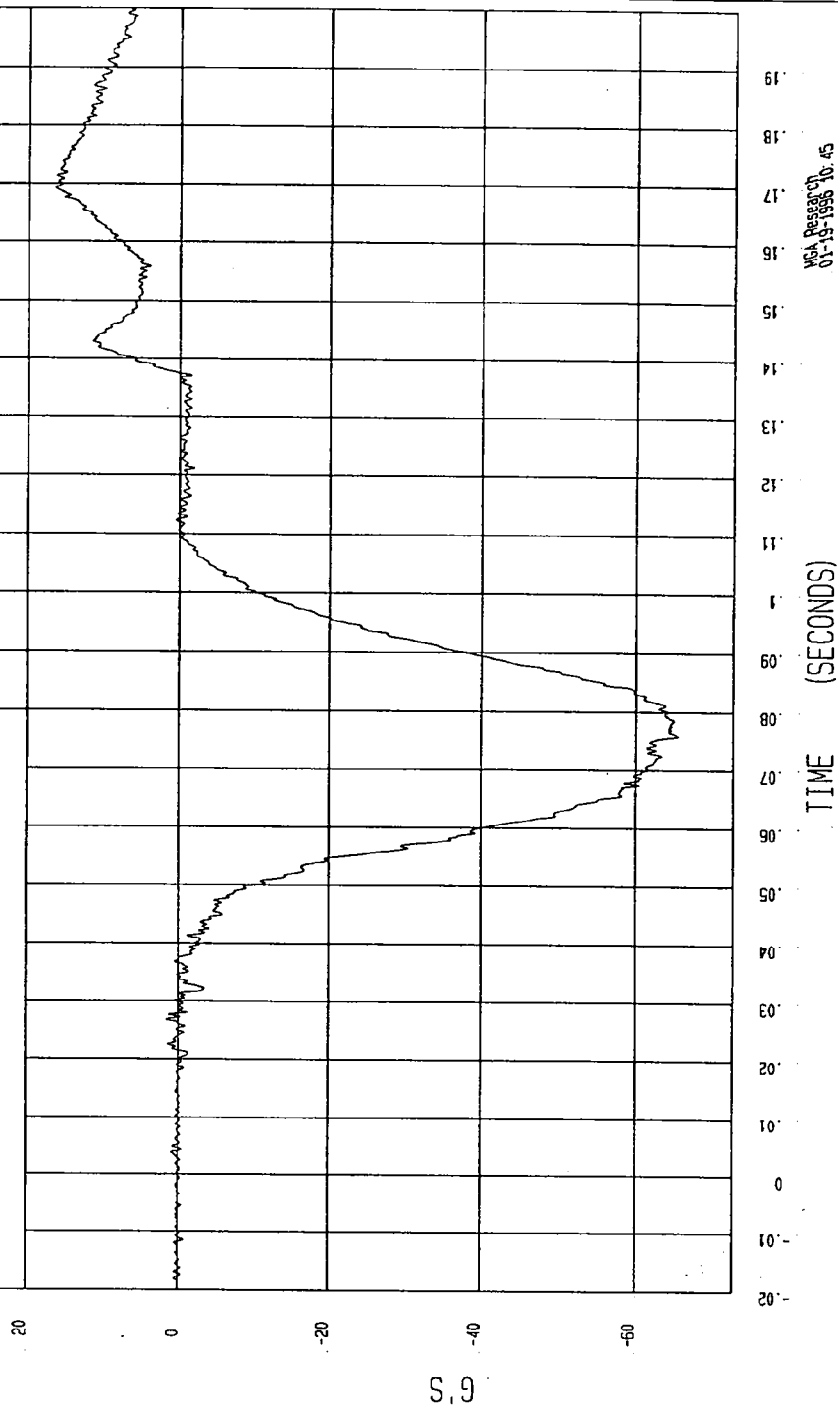
TEST: 35 MPH FRONTAL BARRIER IMPACT TEST DATE: 01-08-1996

COMPONENT: 1996 MERCURY VILLAGER MT0207 Speed: 34.8 MPH 56 KPH

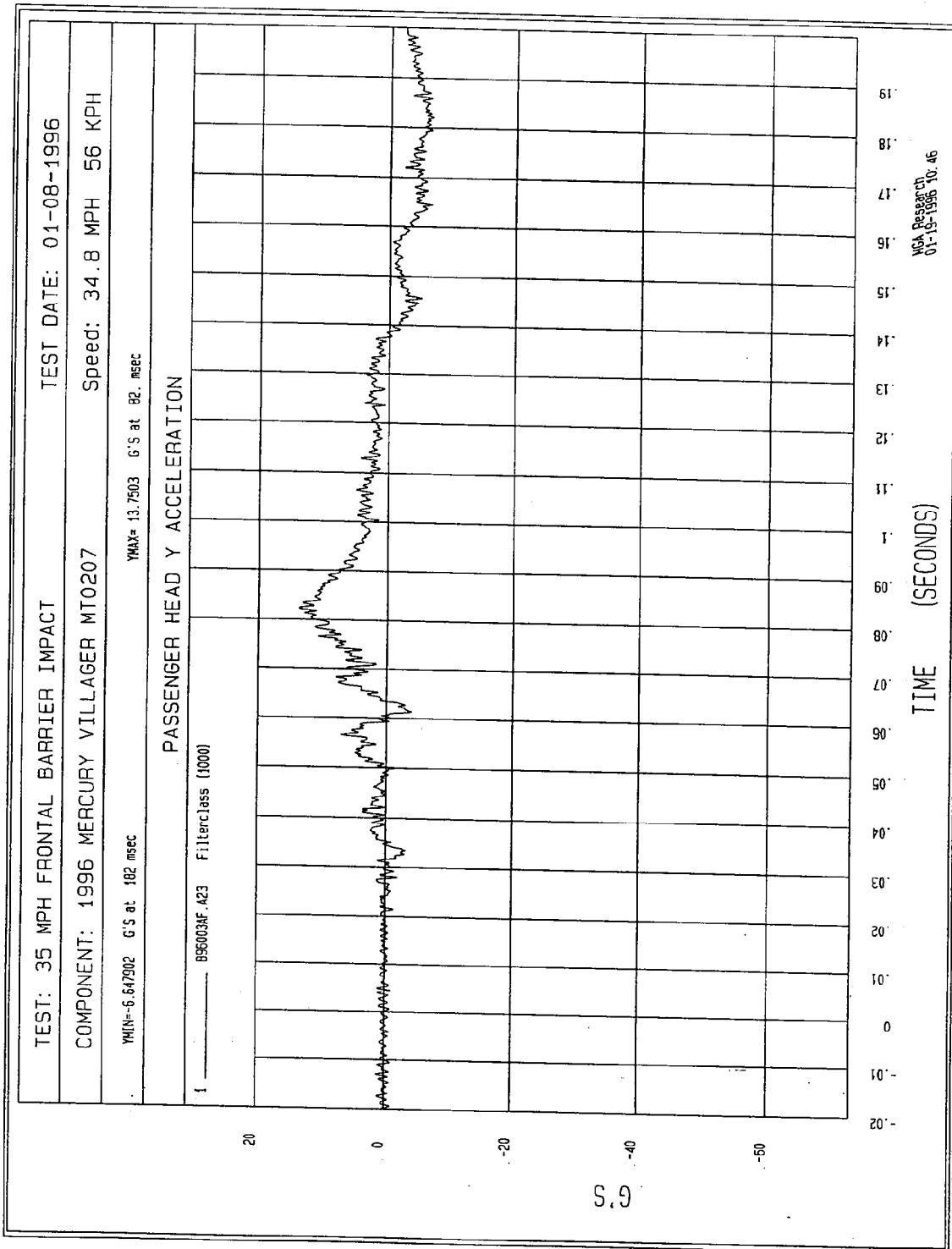
YMIN=-65.63677 G'S at 75. msec YMAX= 16.44173 G'S at 169 msec

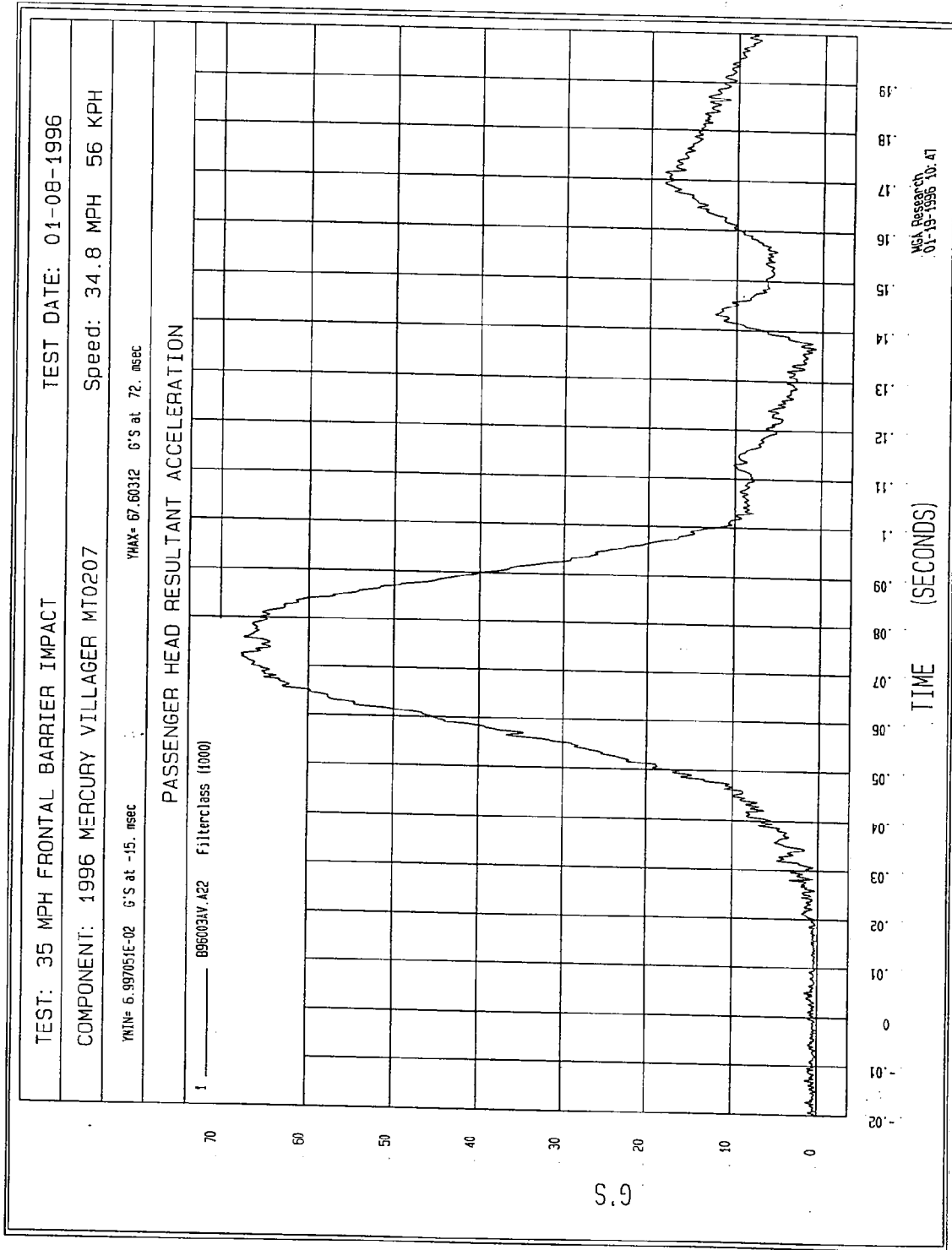
PASSENGER HEAD X ACCELERATION

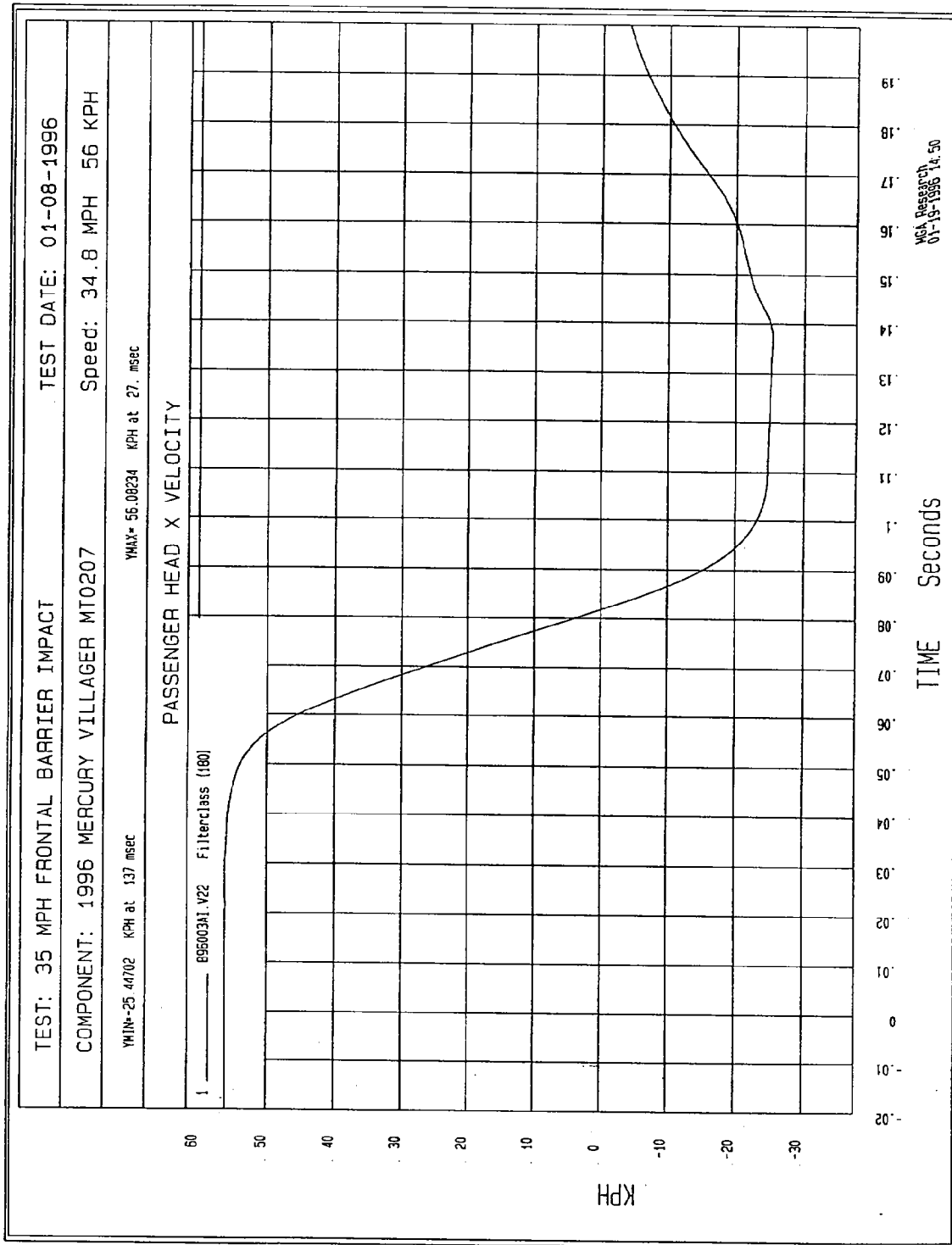
1 B96003MF.422 Filter:Class (1000)

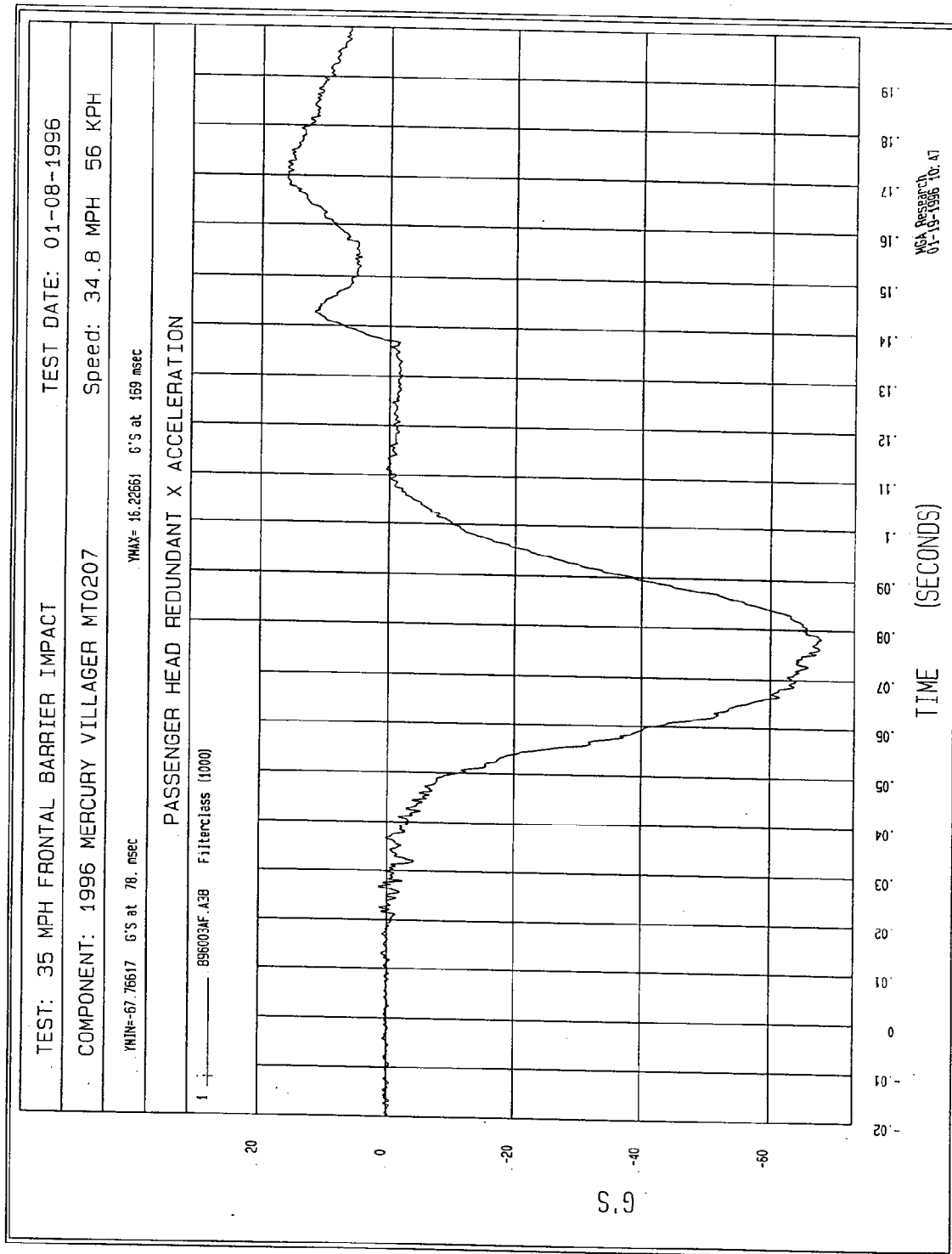


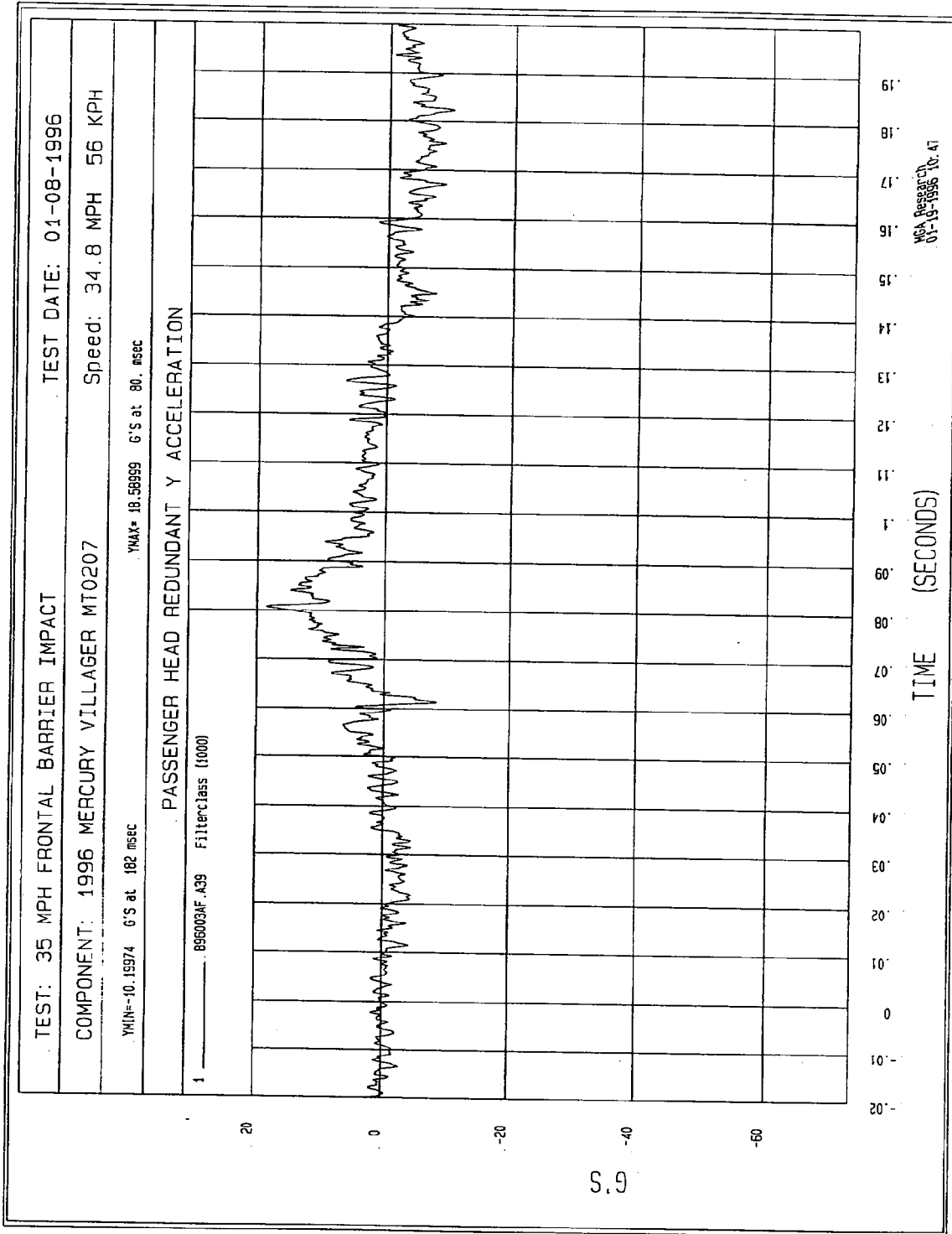
VEL Research
01-19-1996 10:45

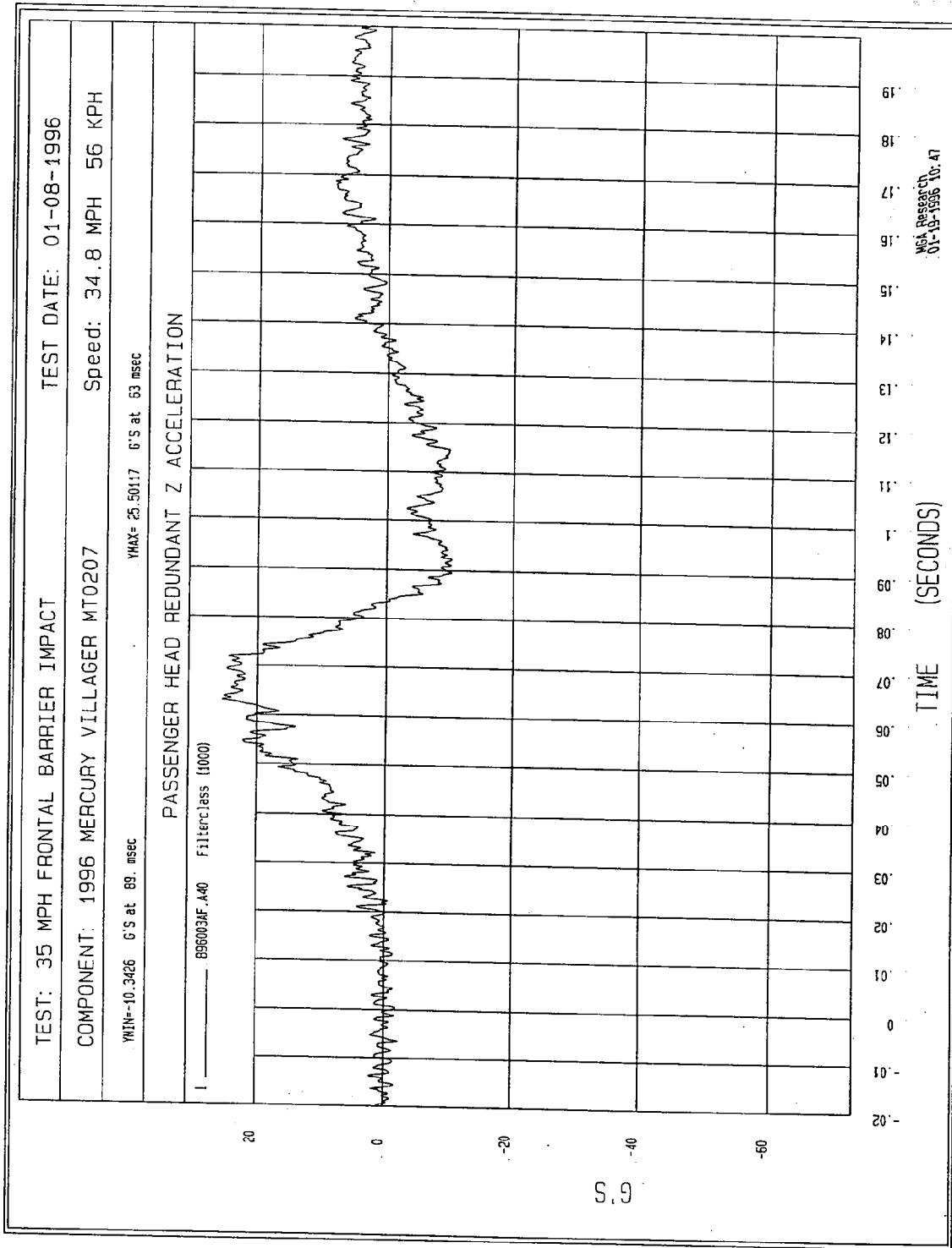


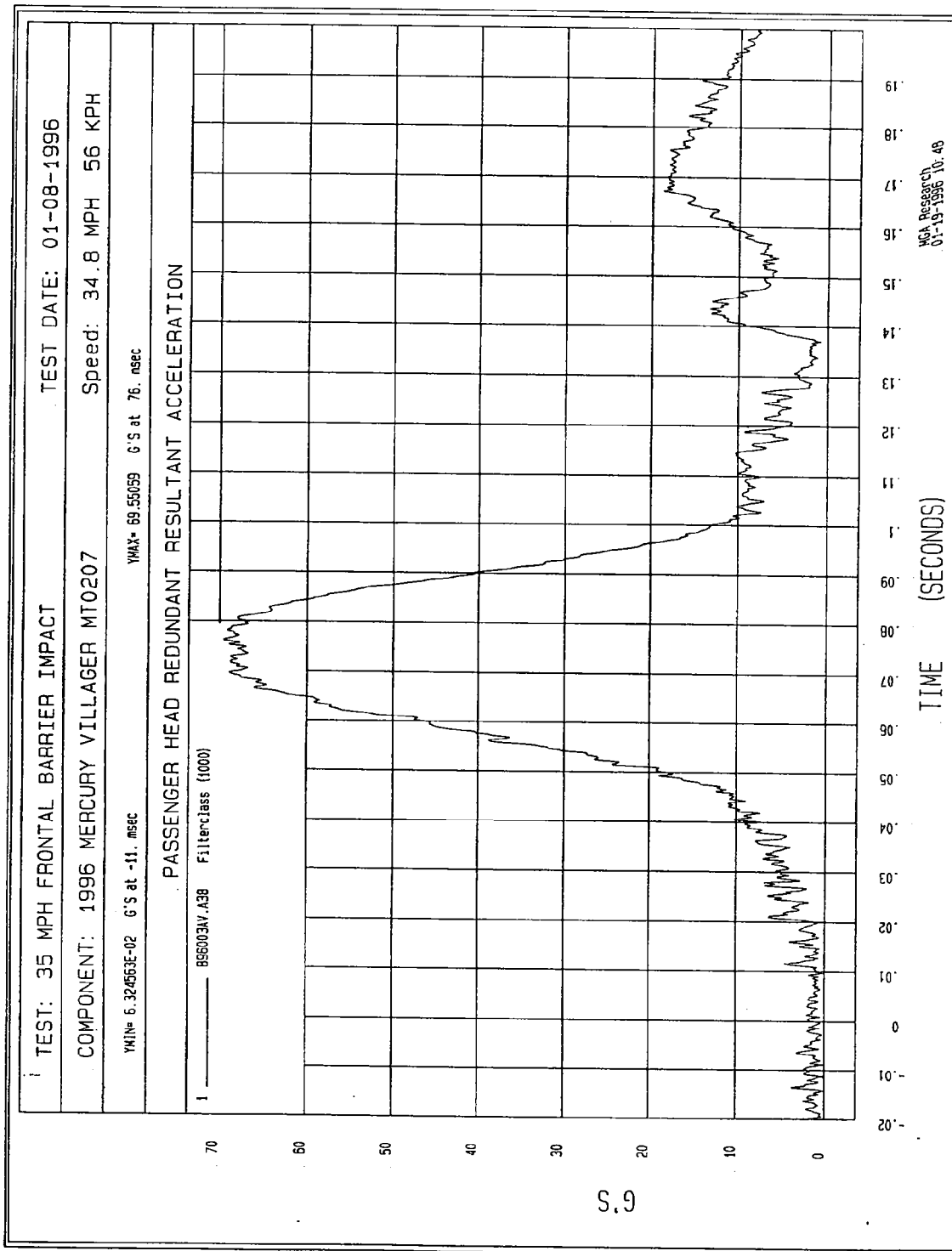


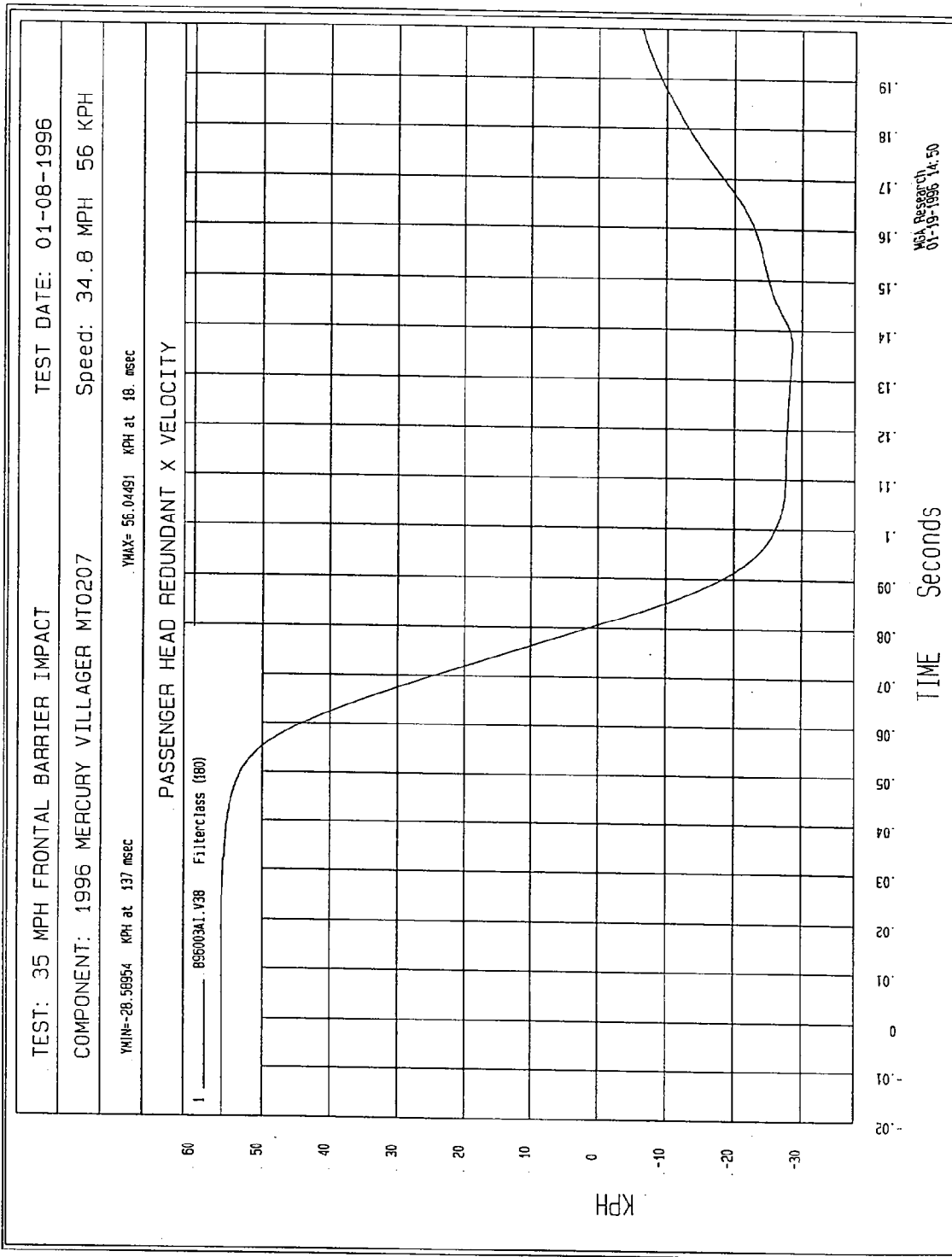


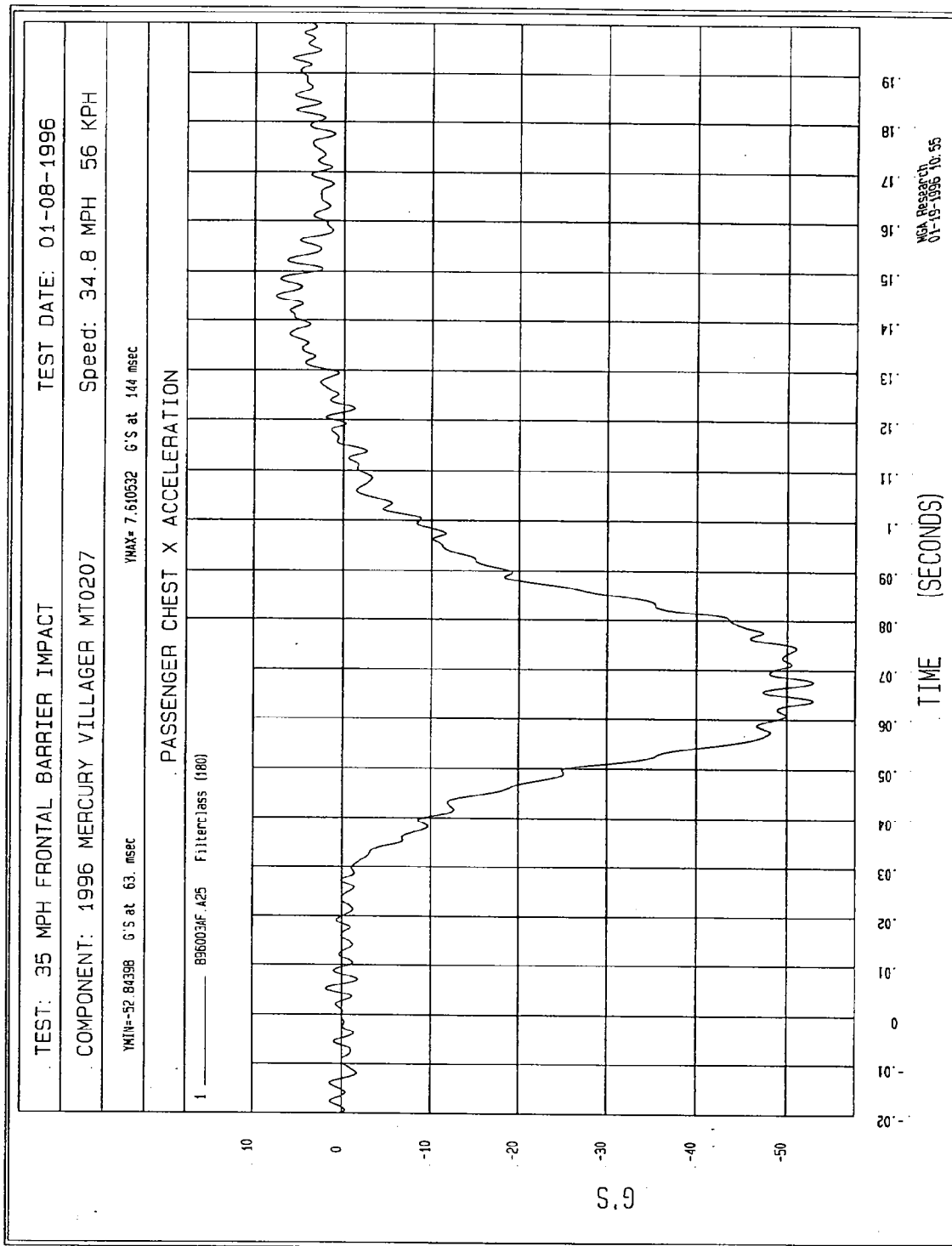


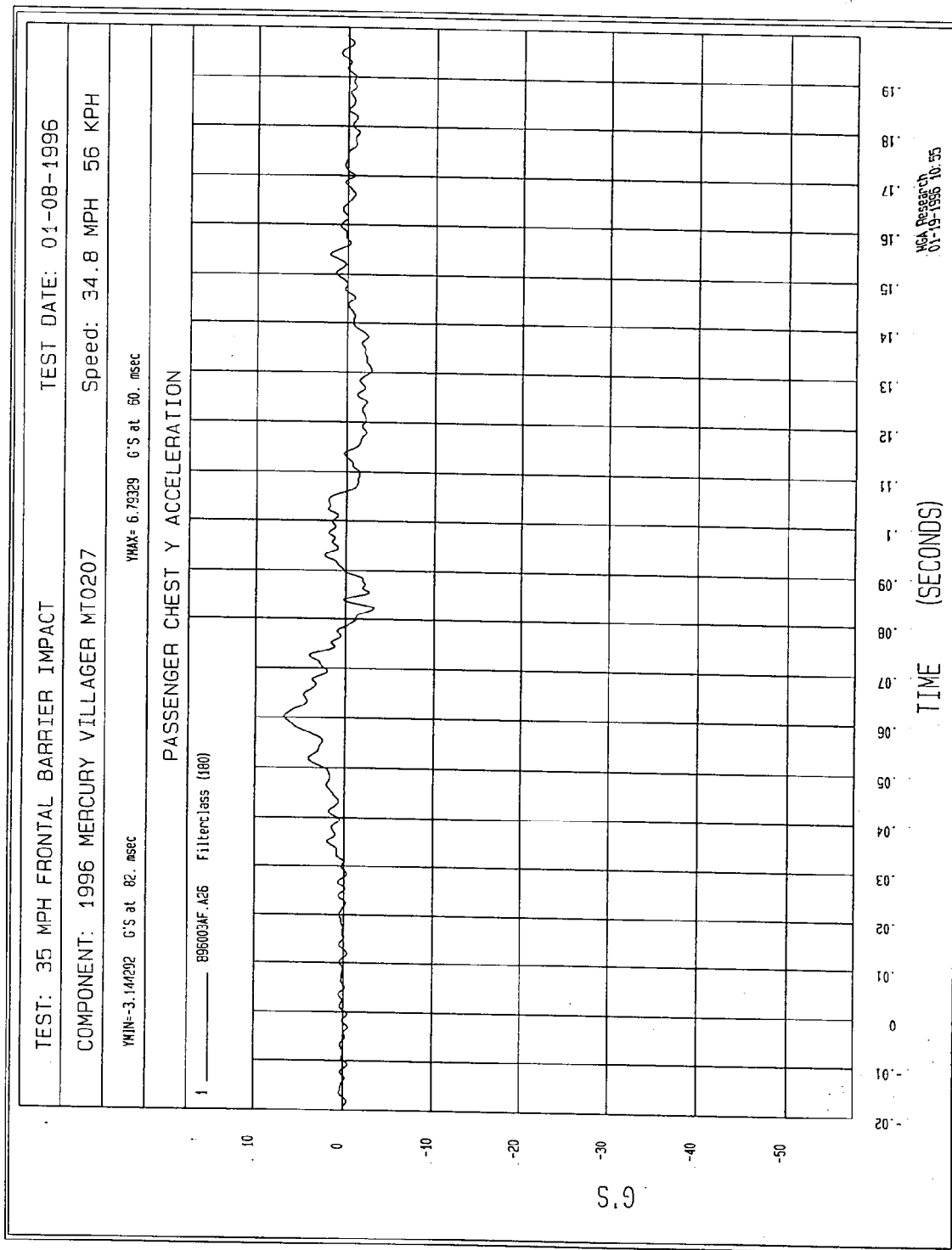


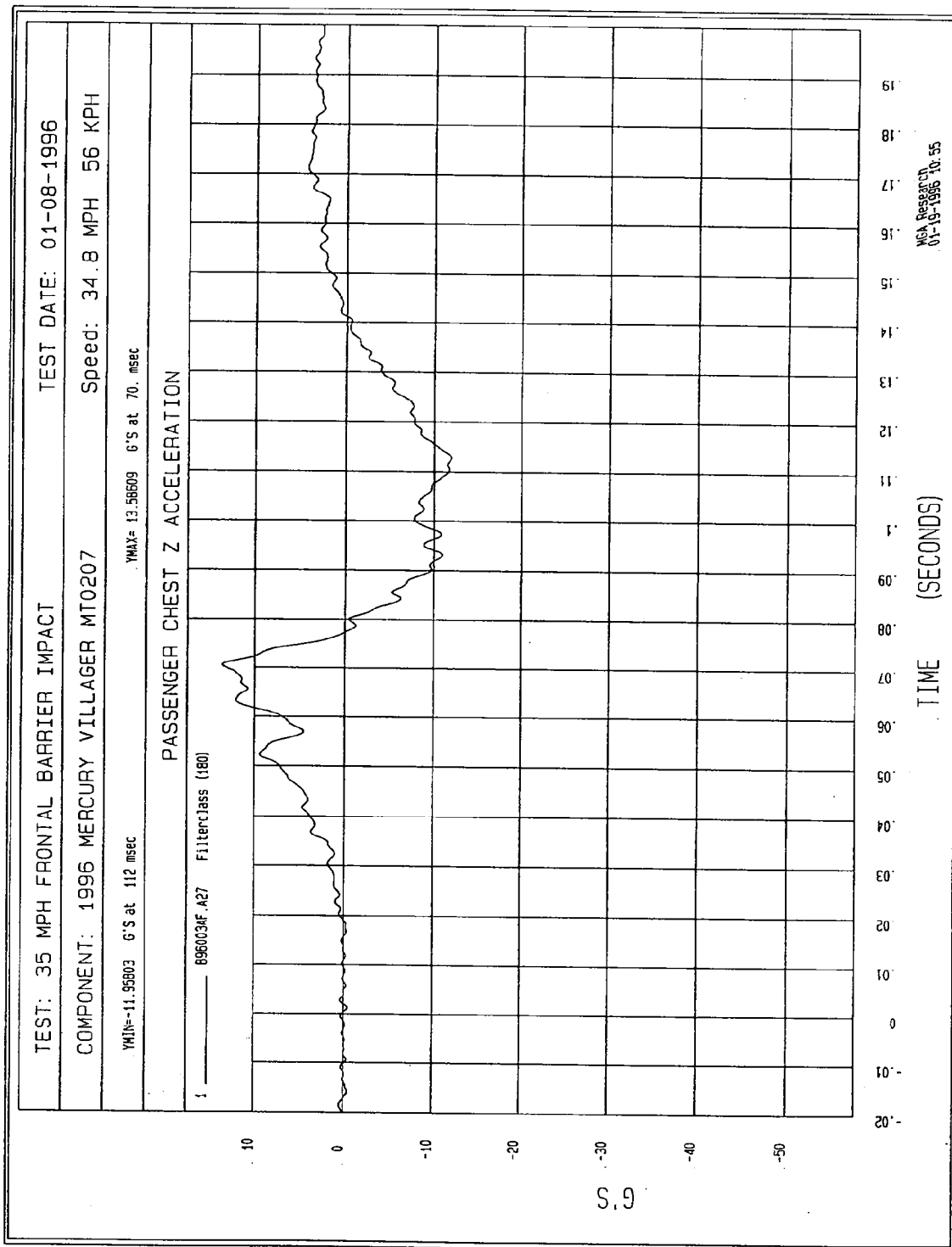


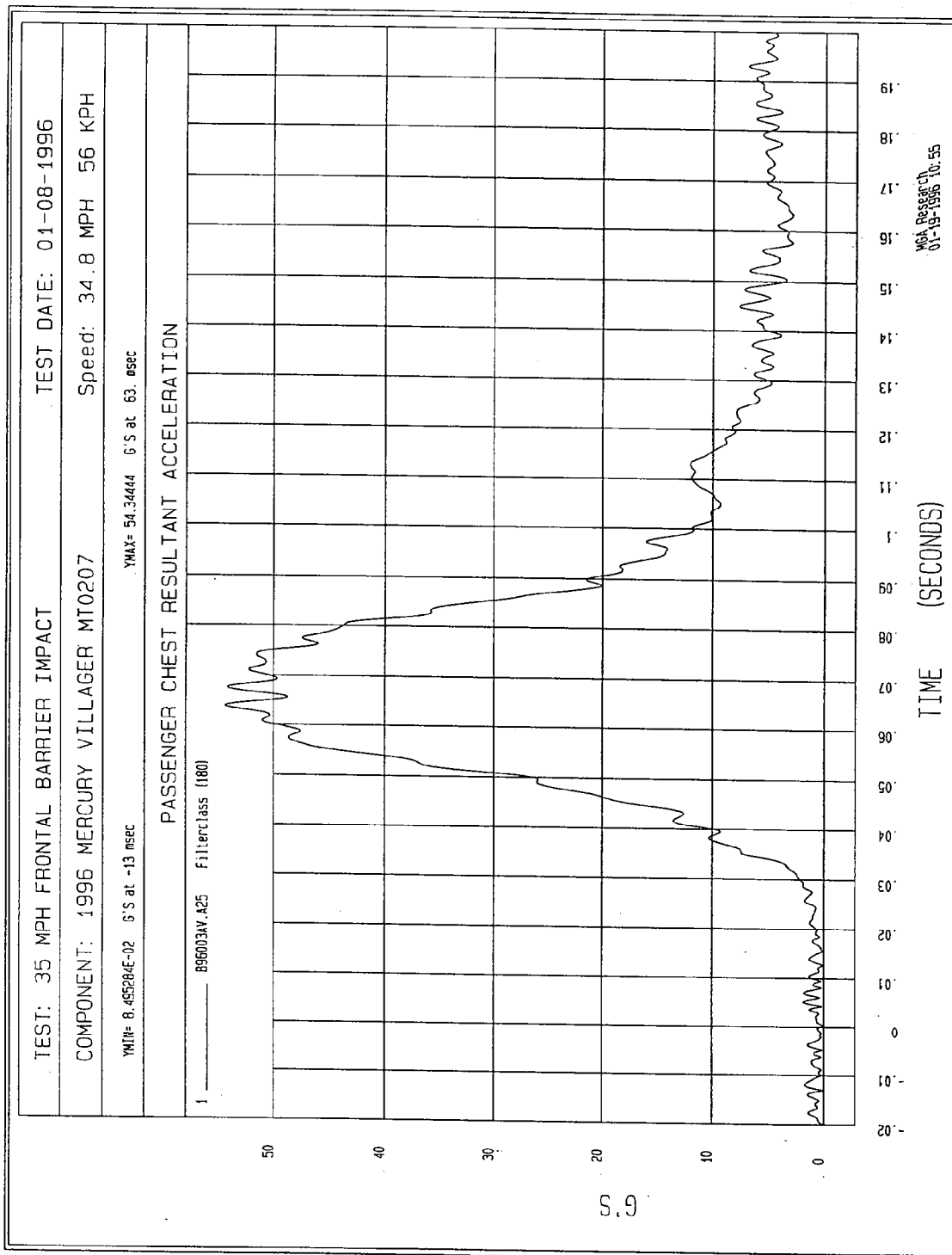


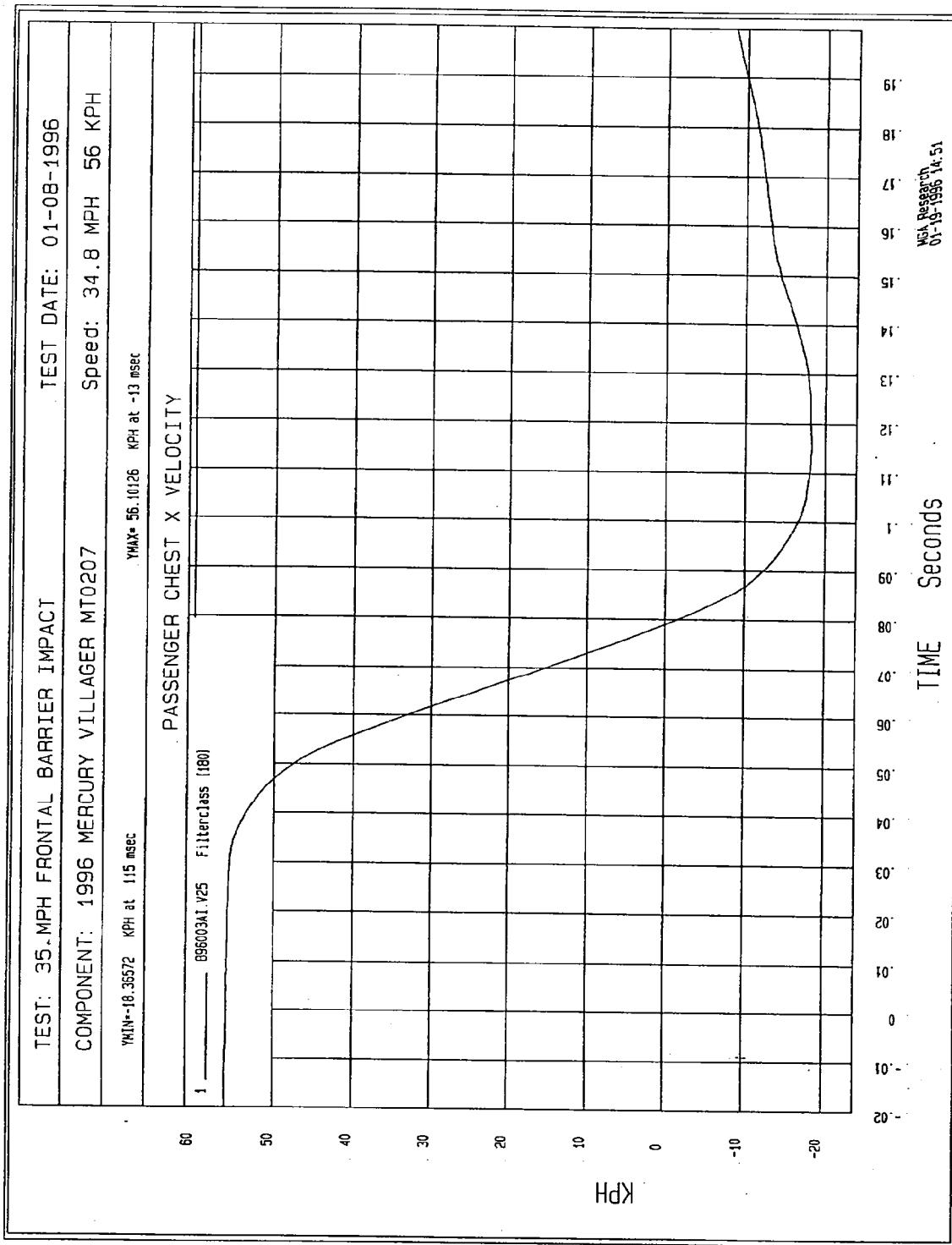


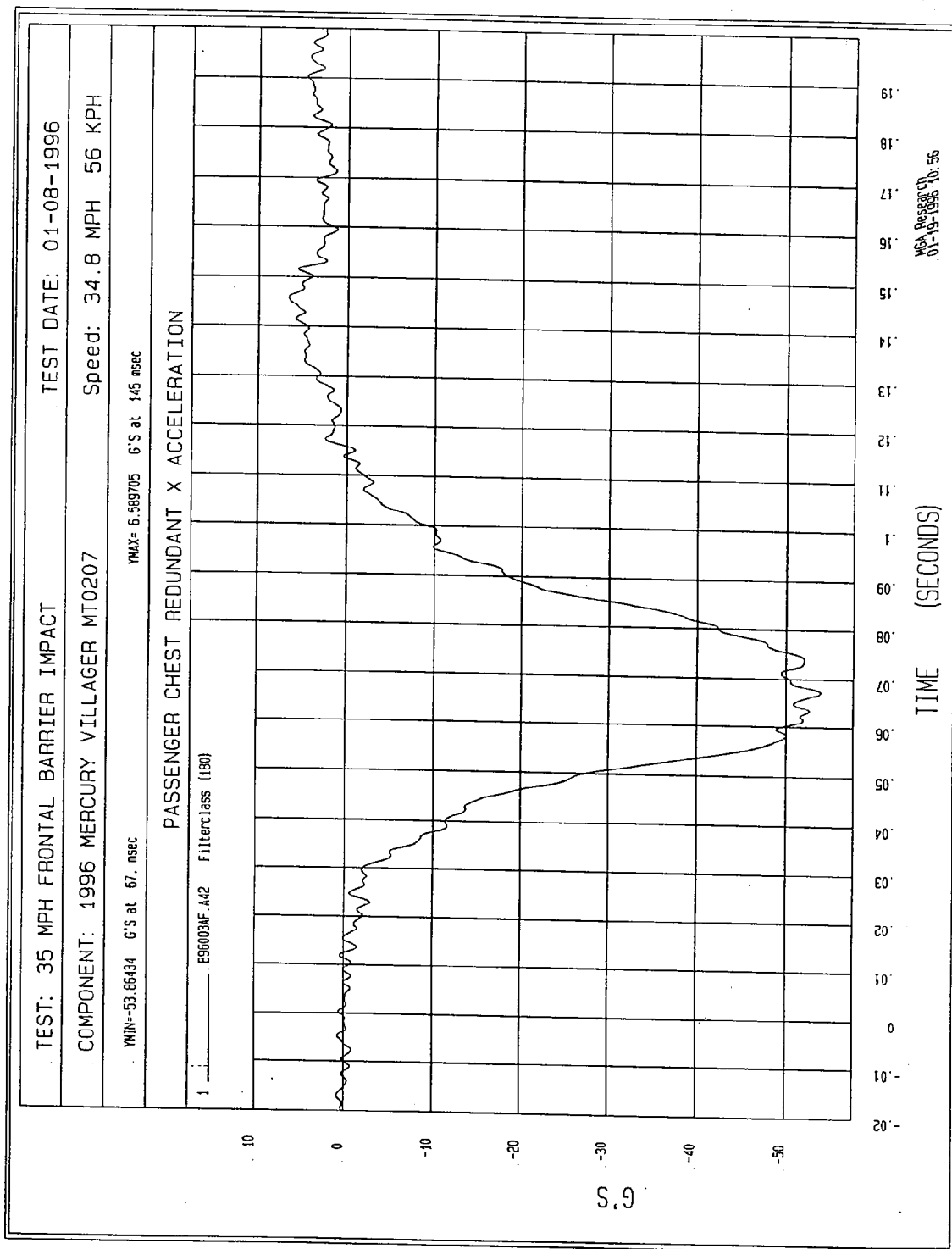


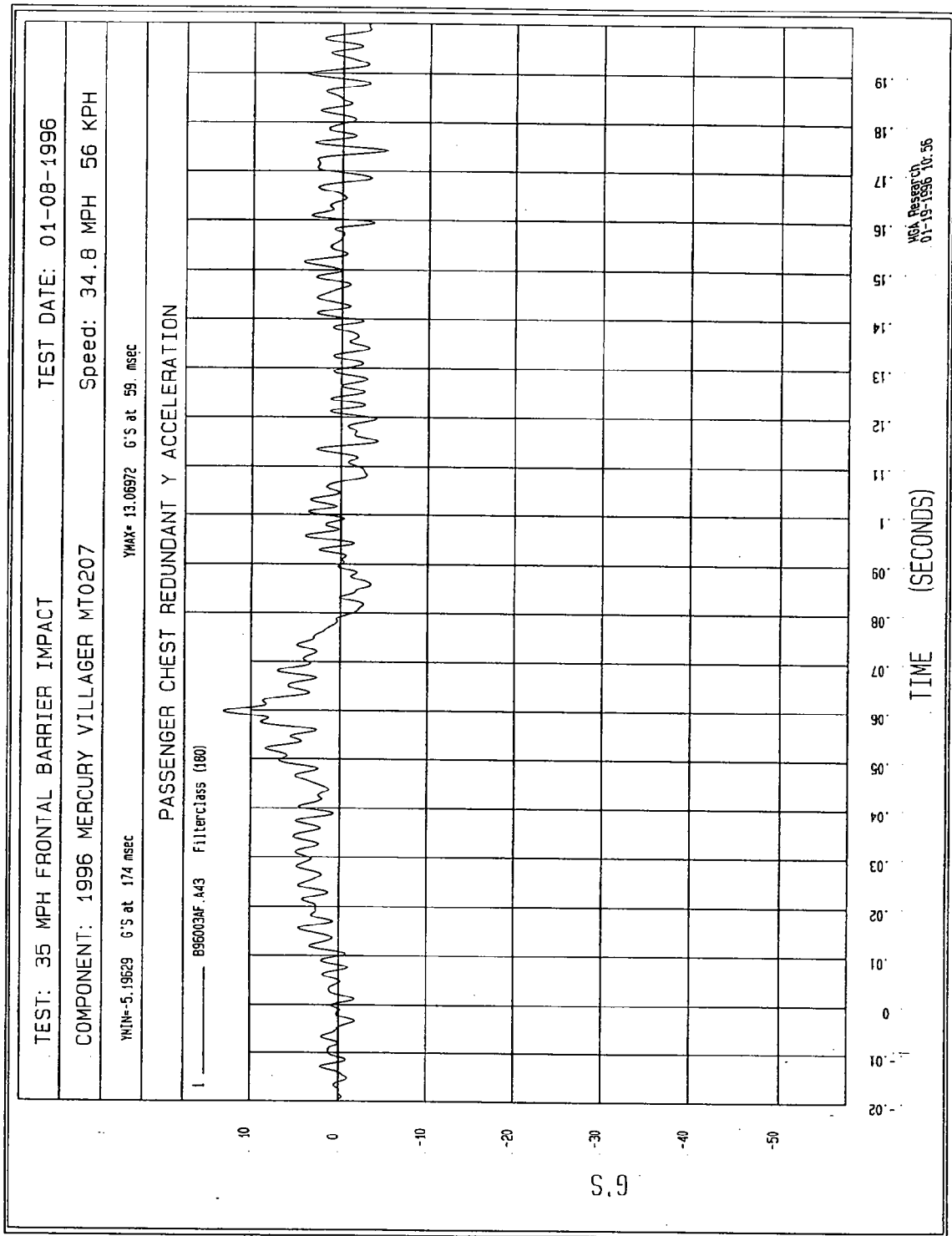


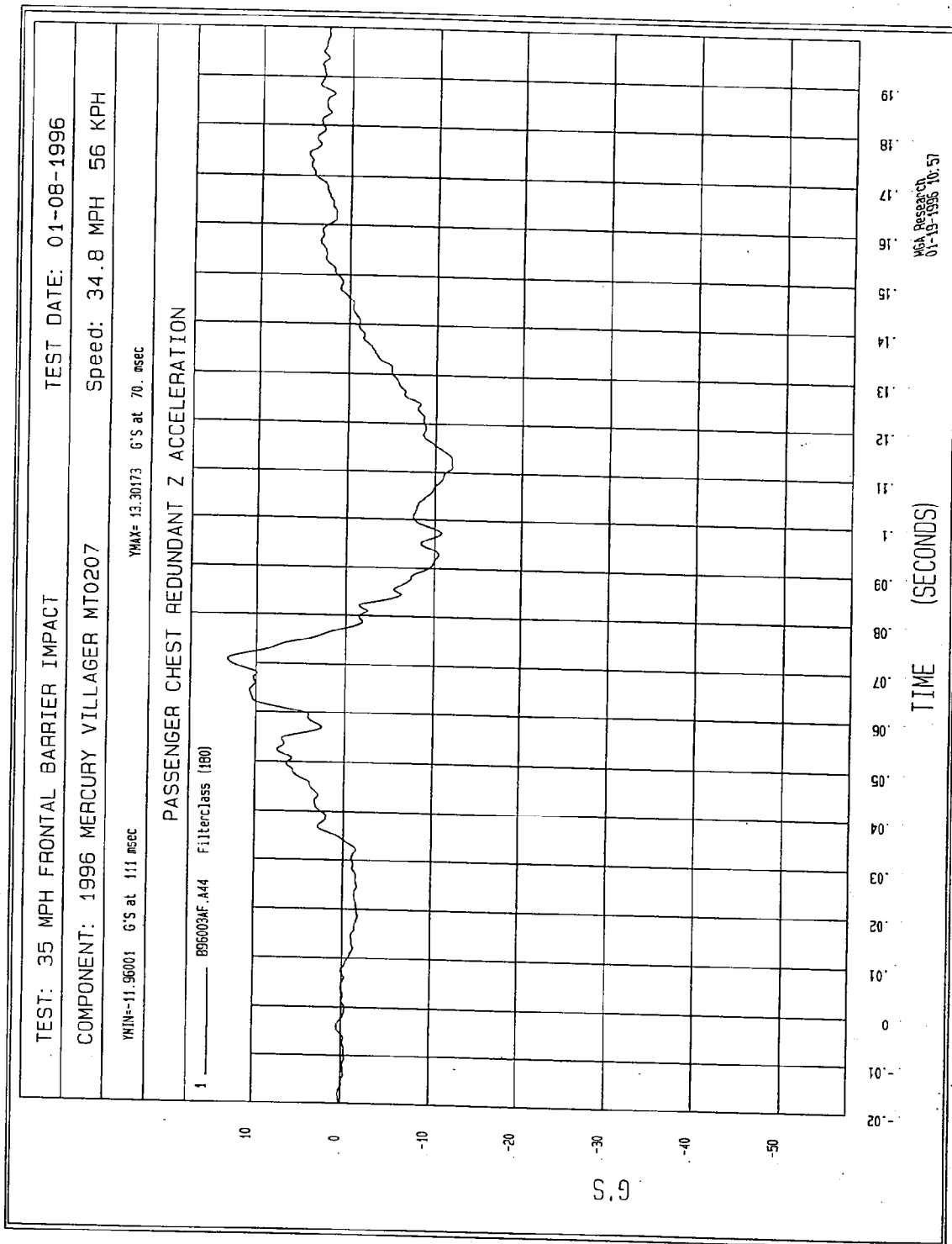


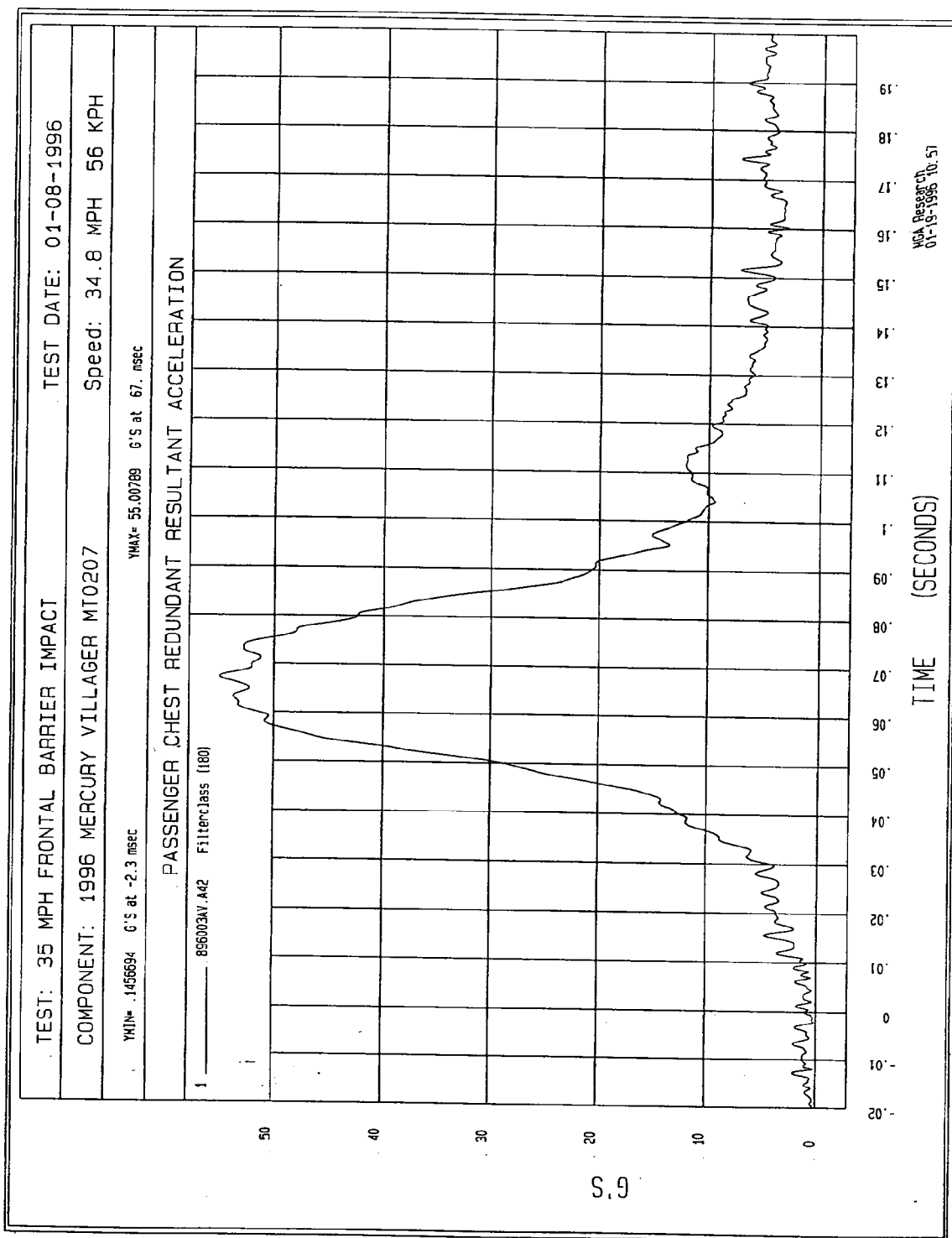


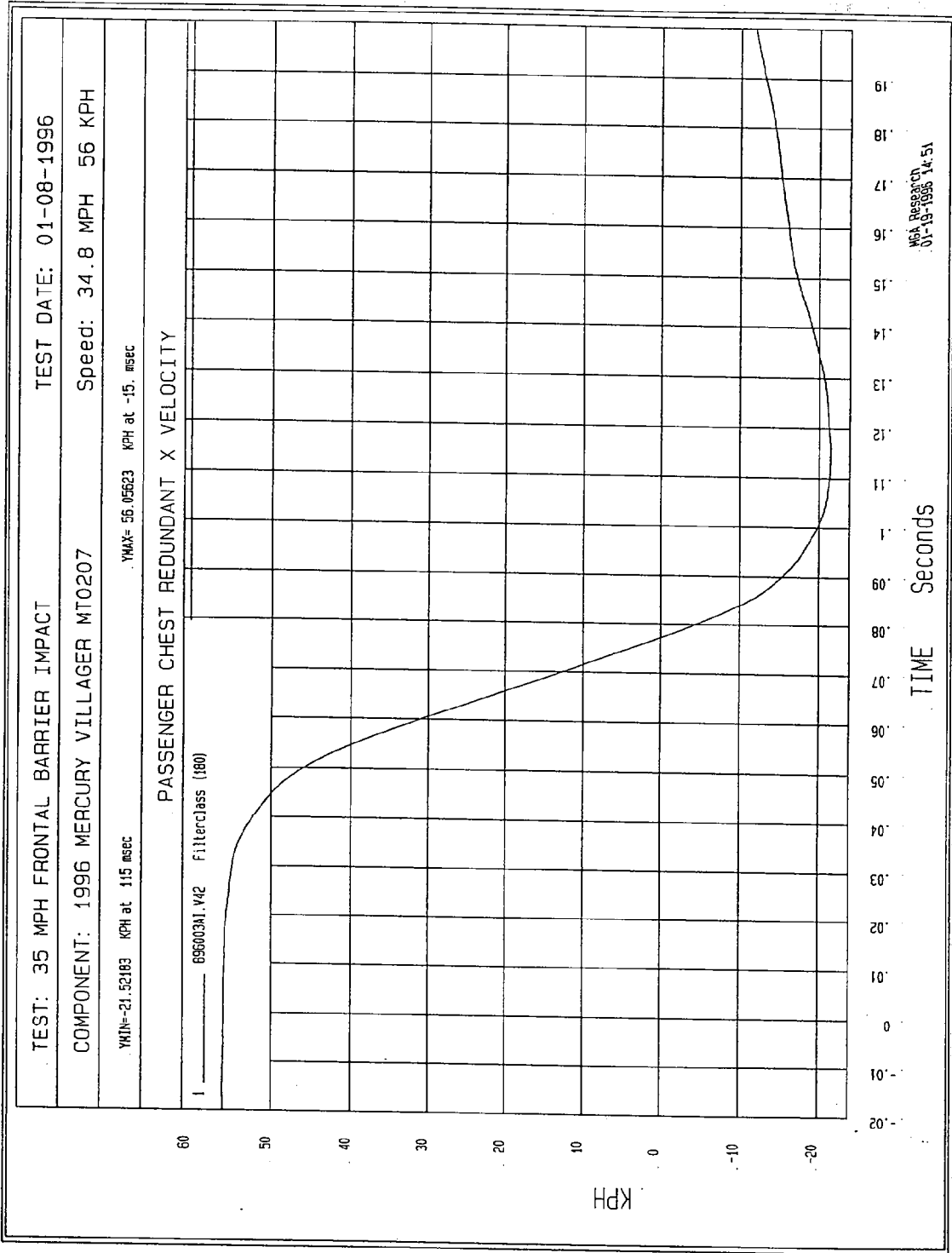


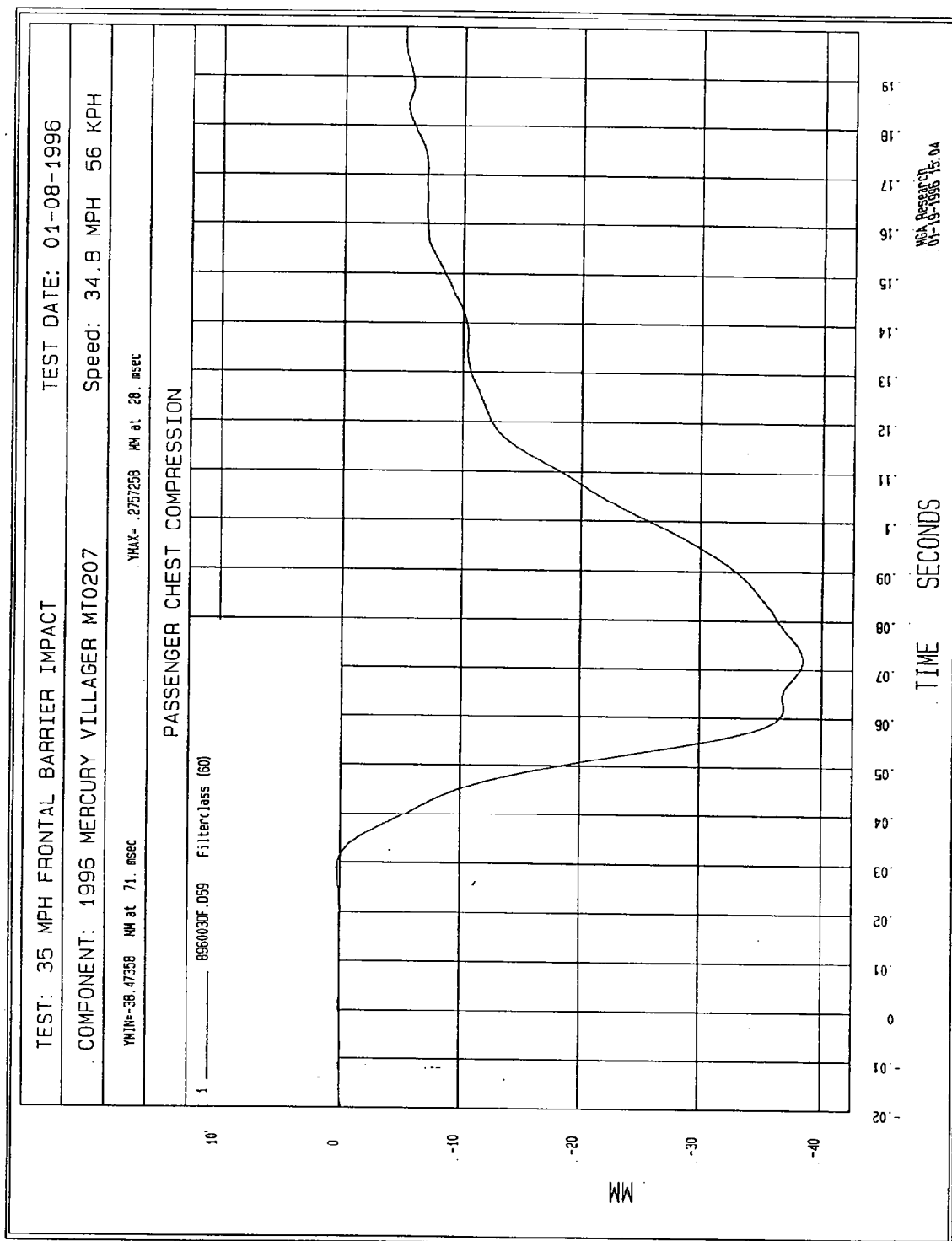


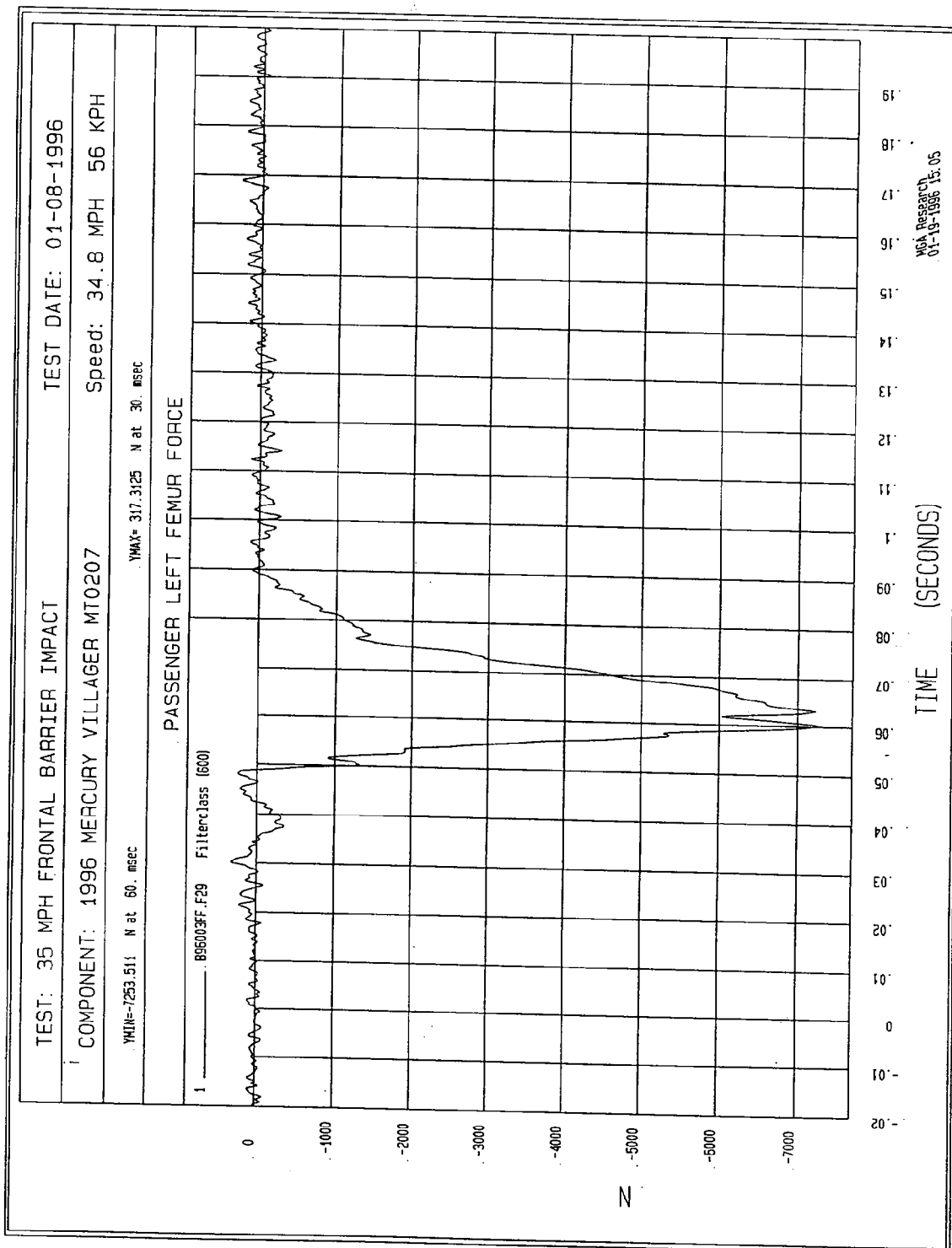


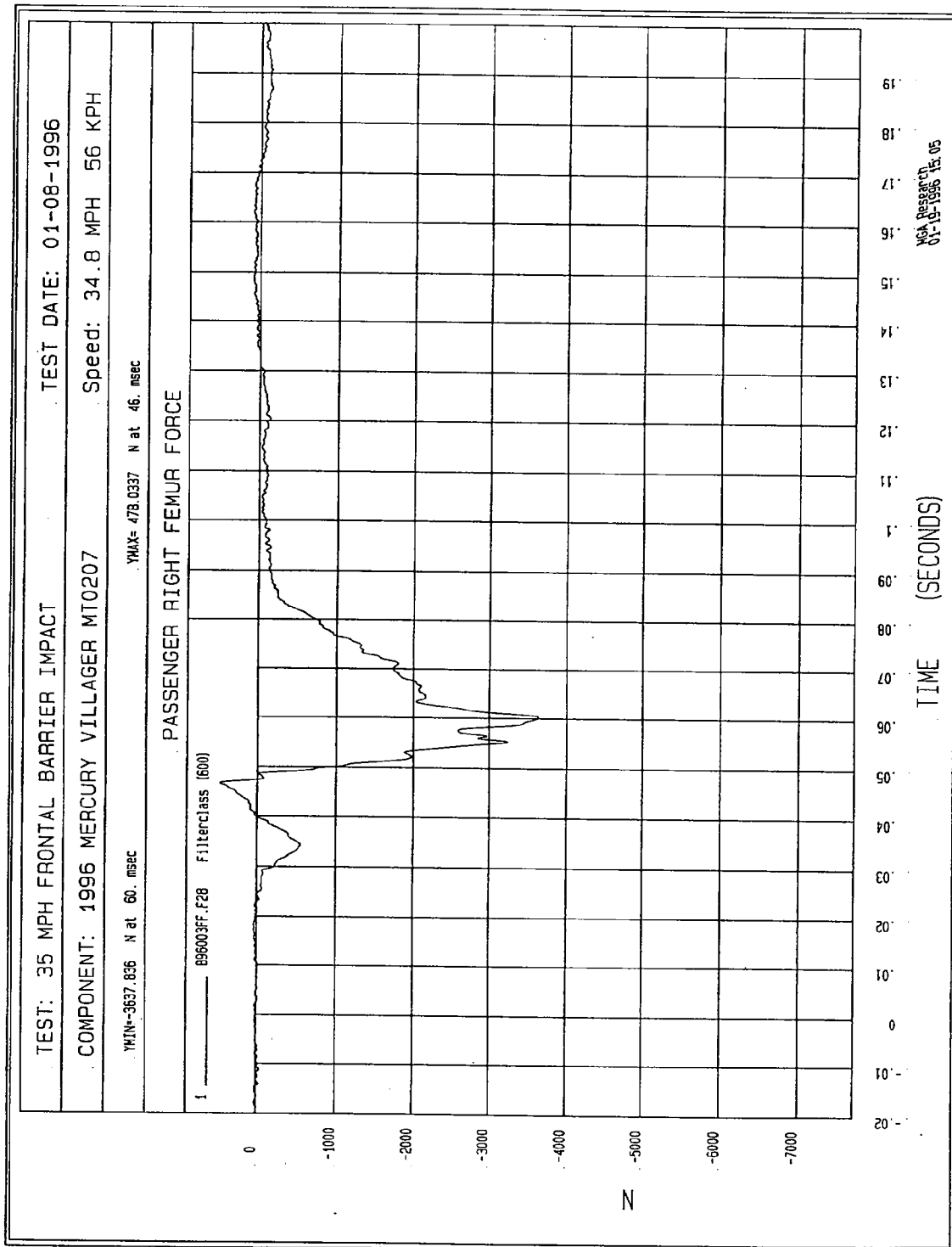


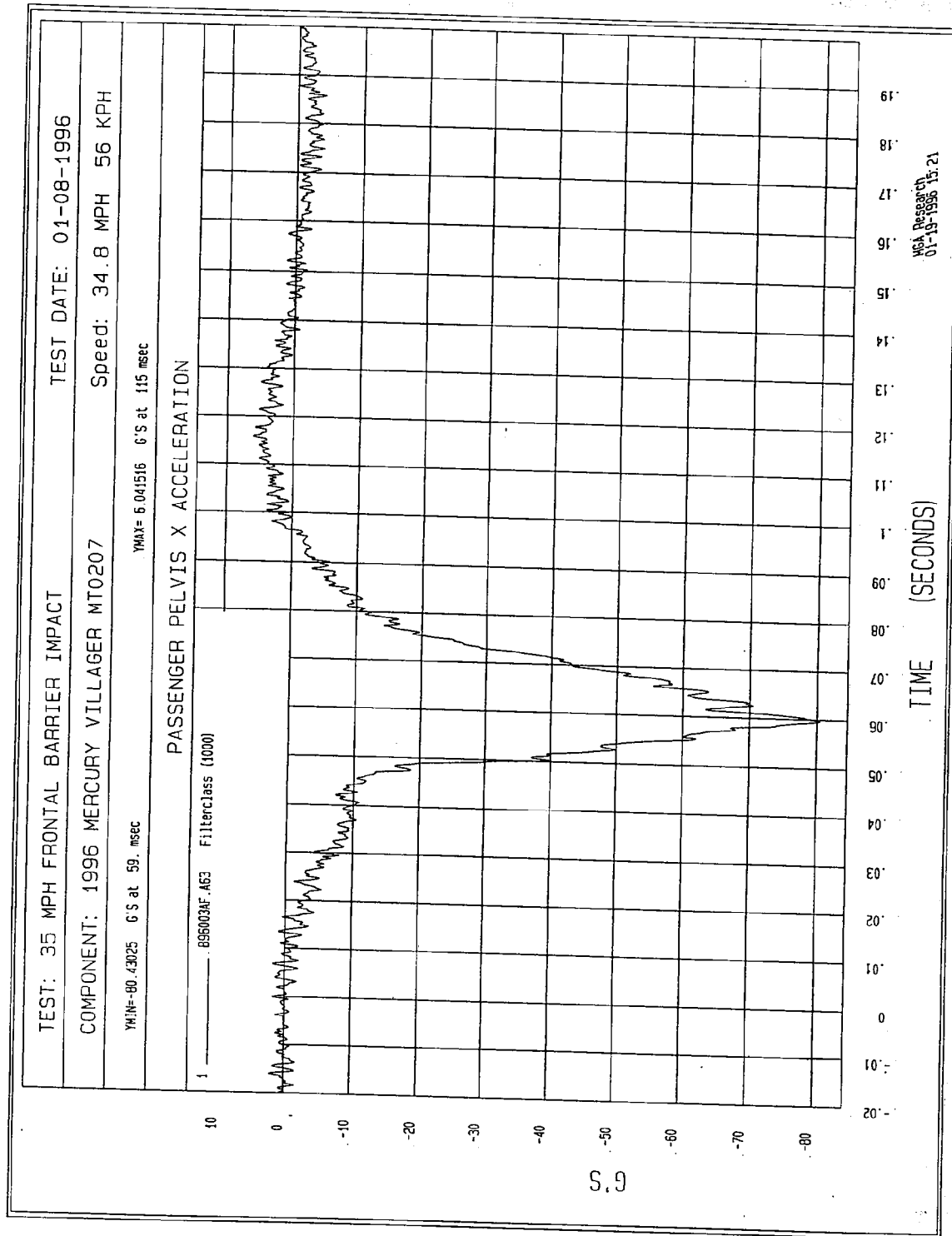


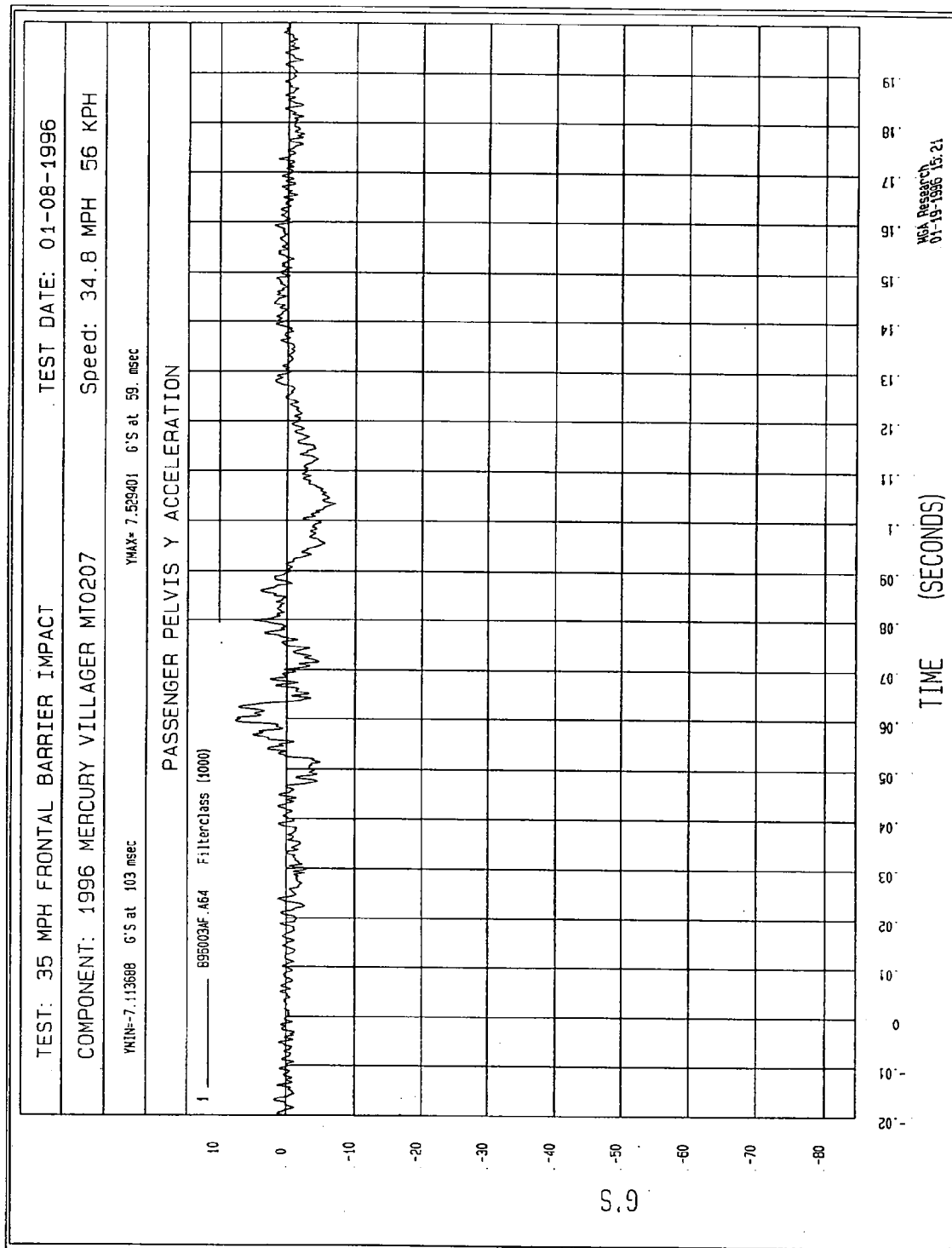


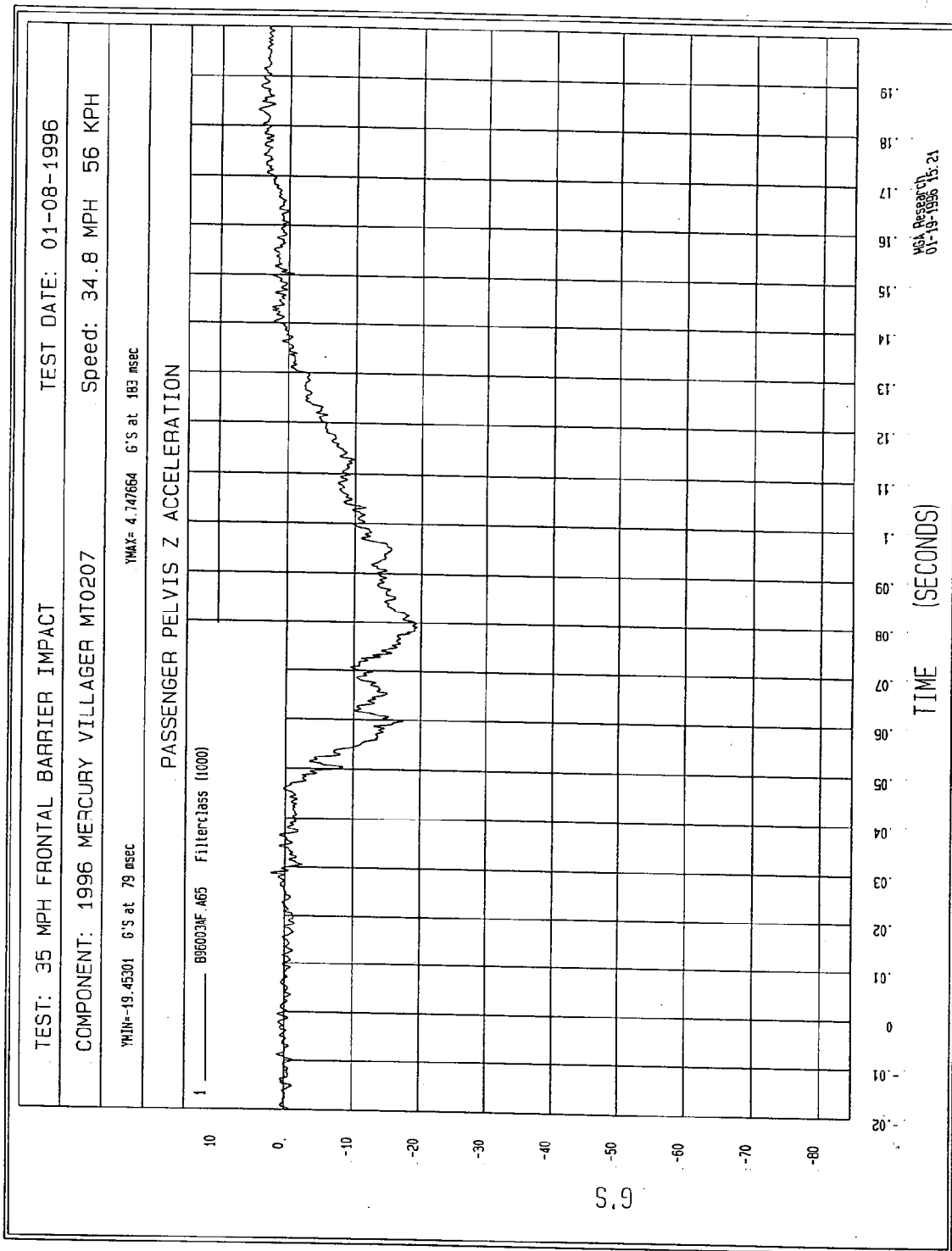


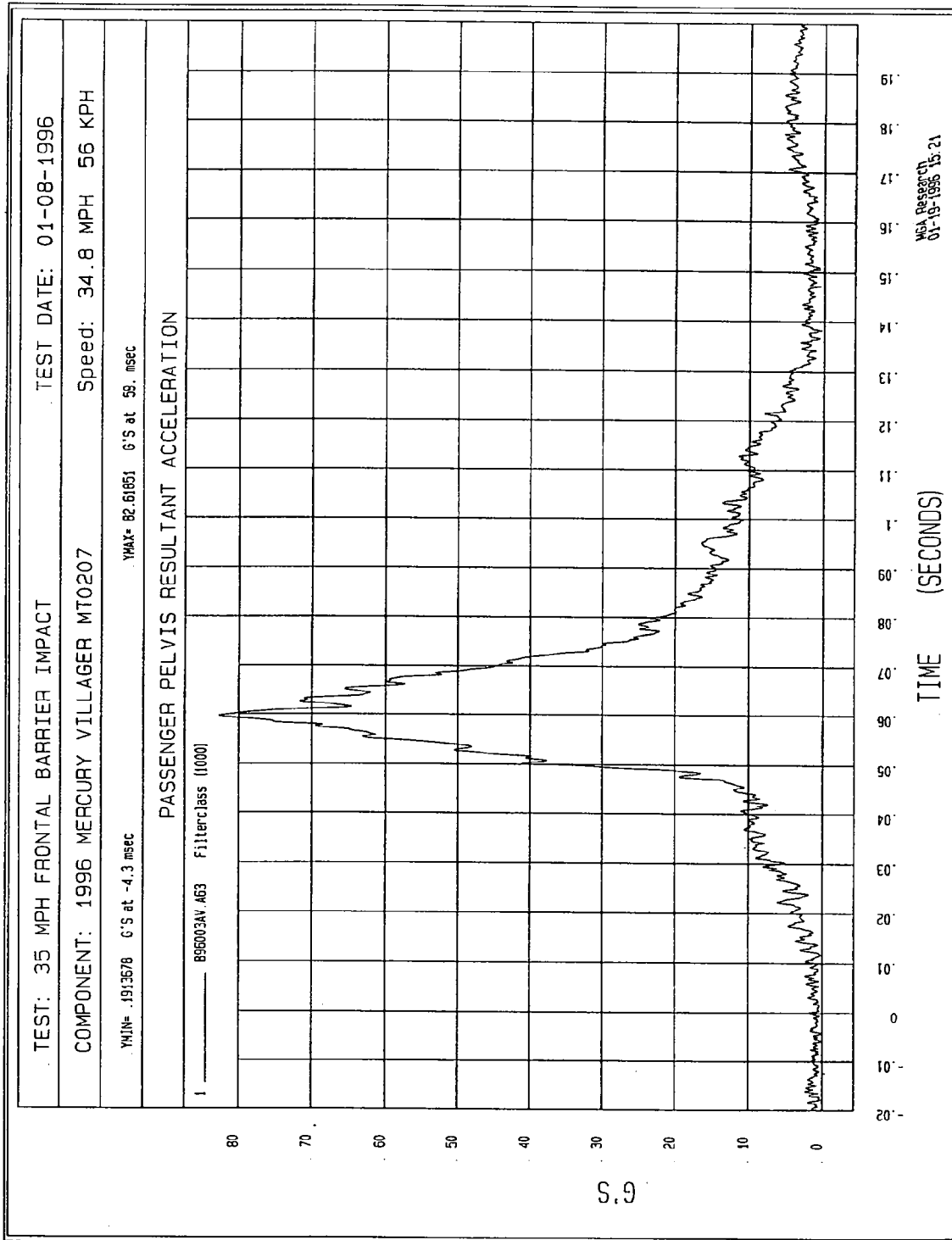


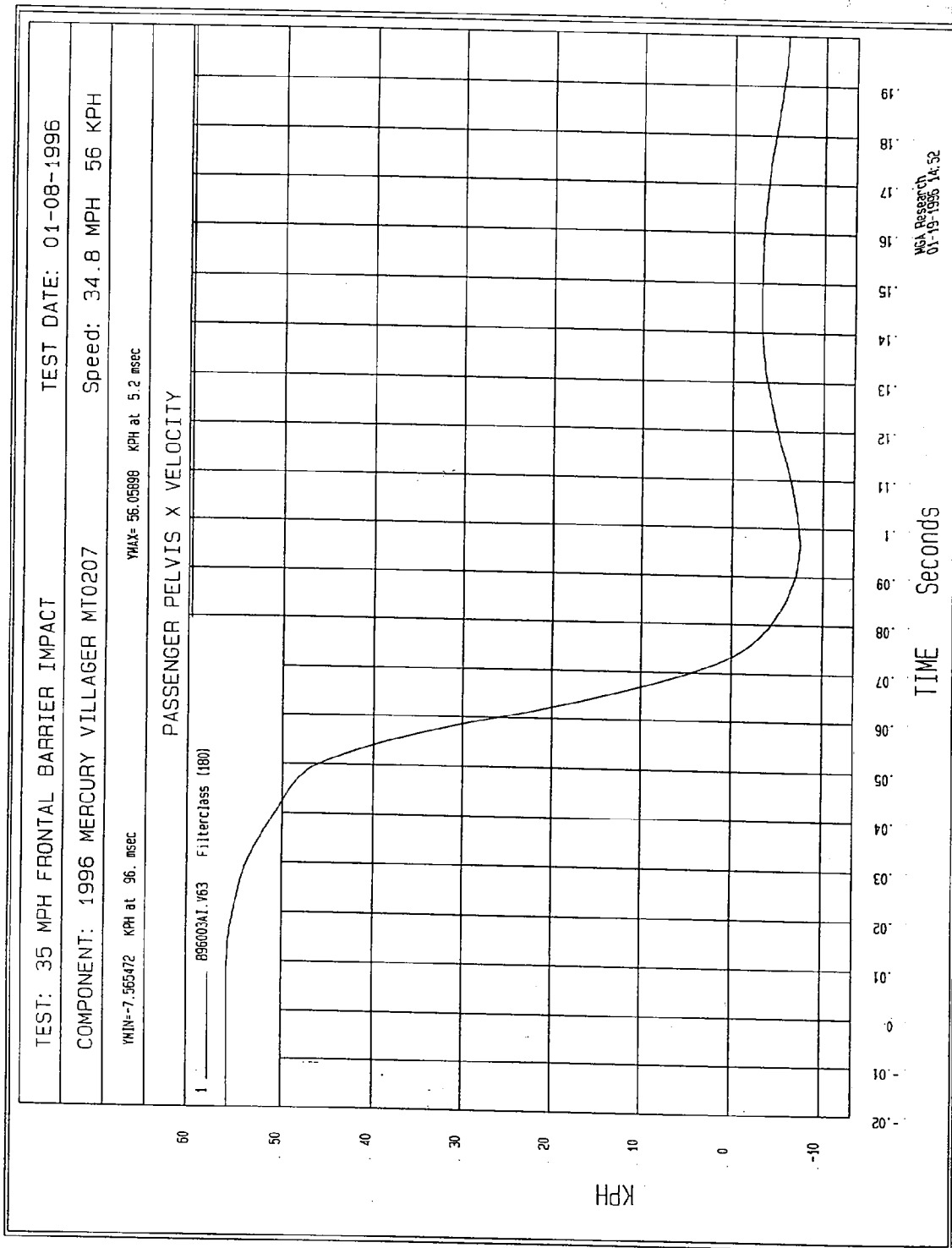


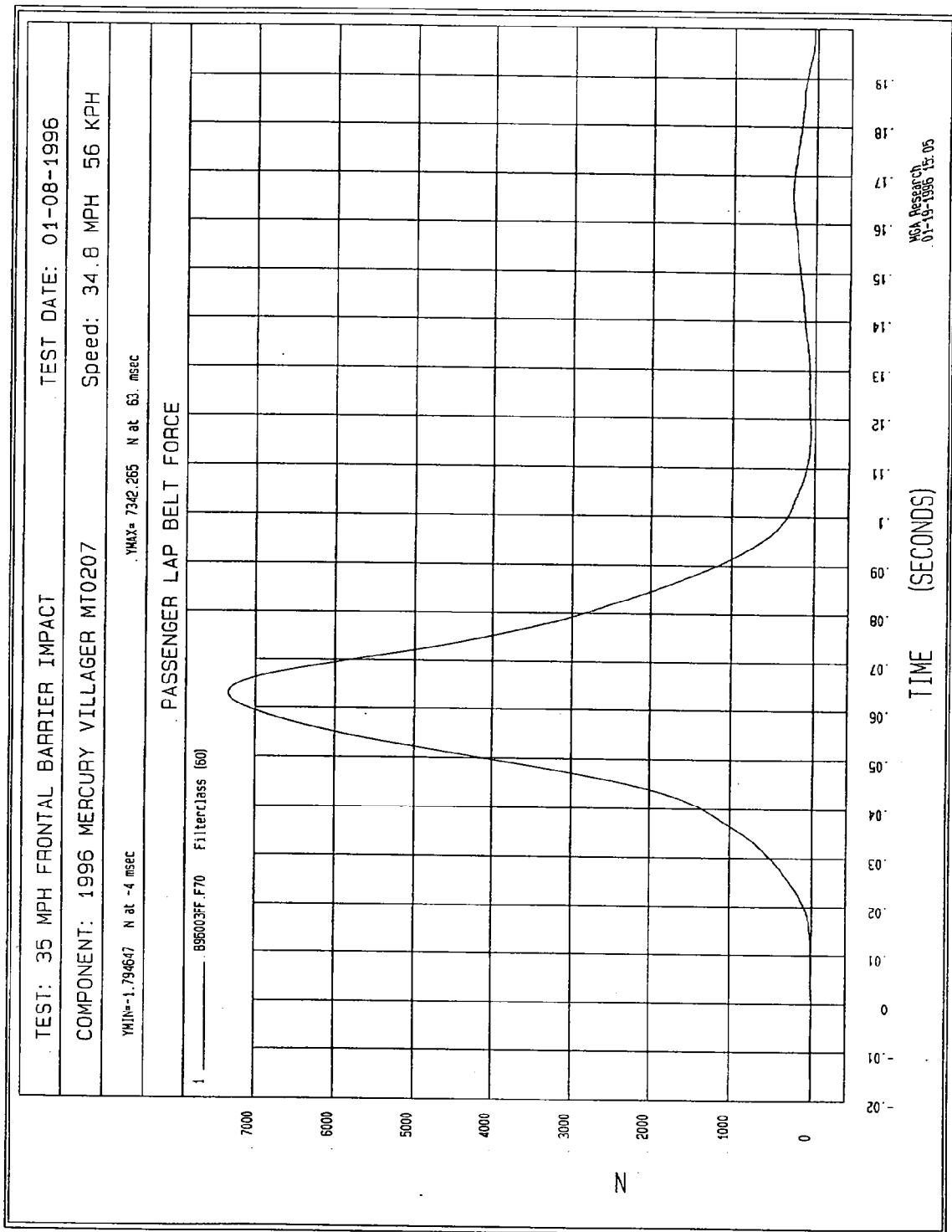


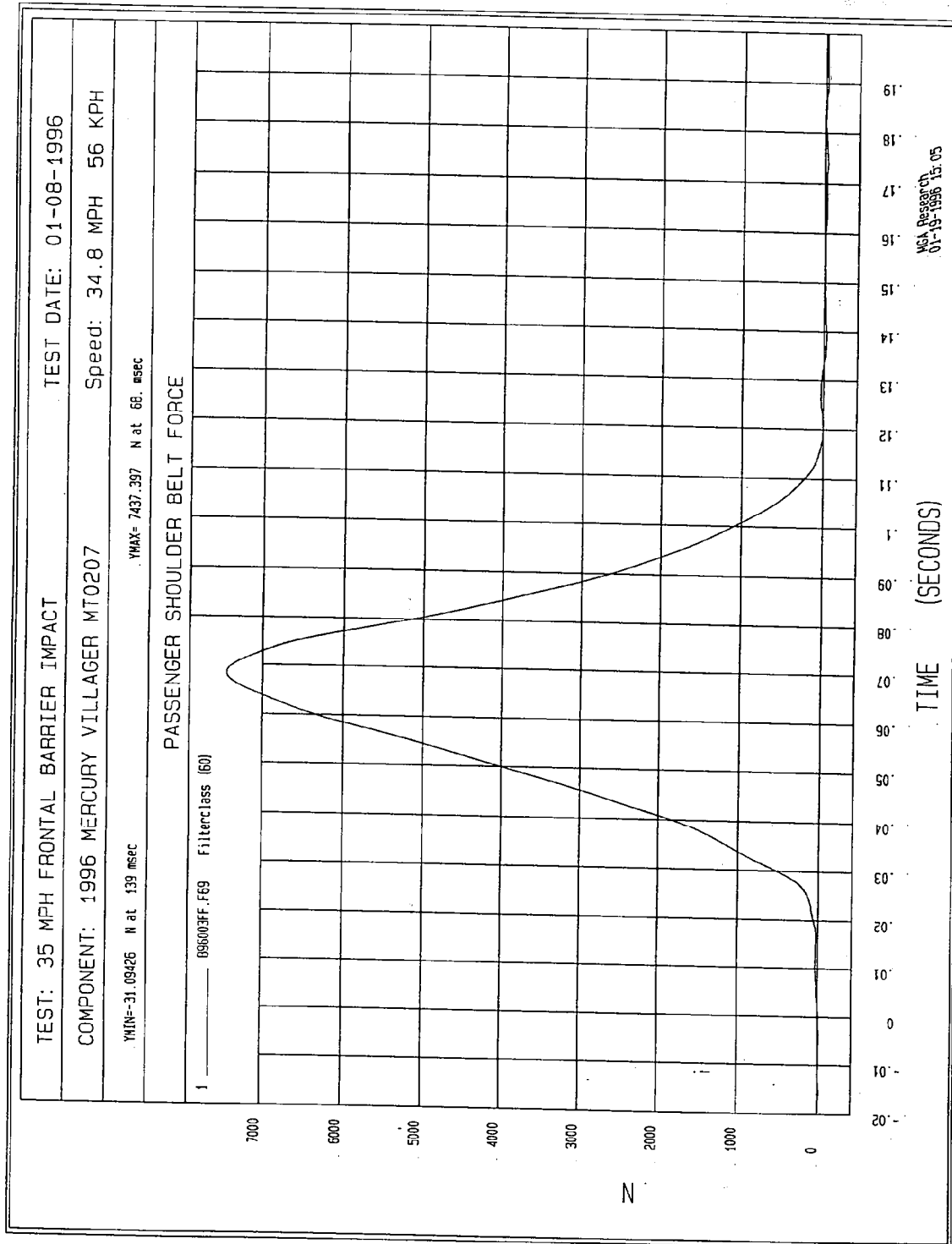


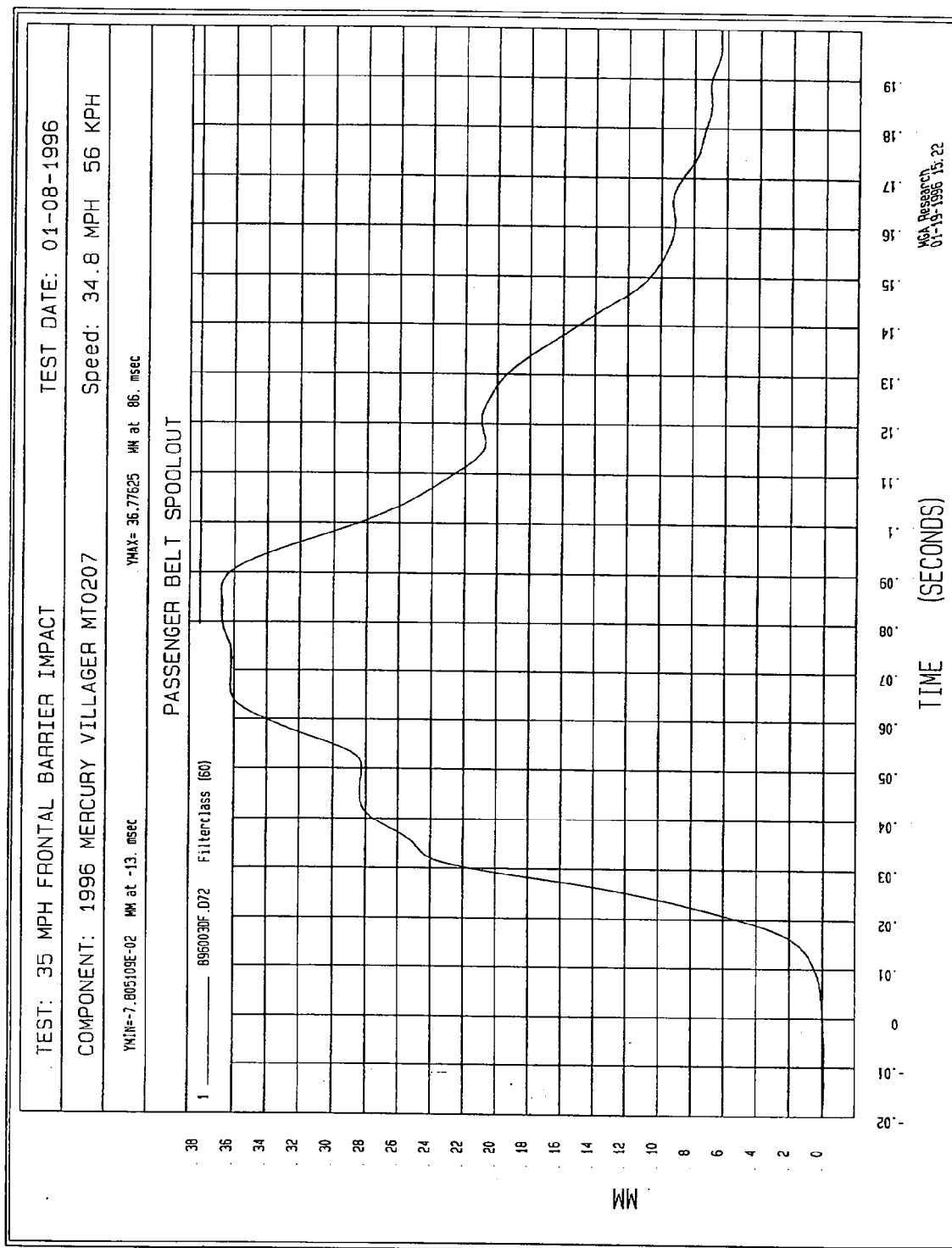


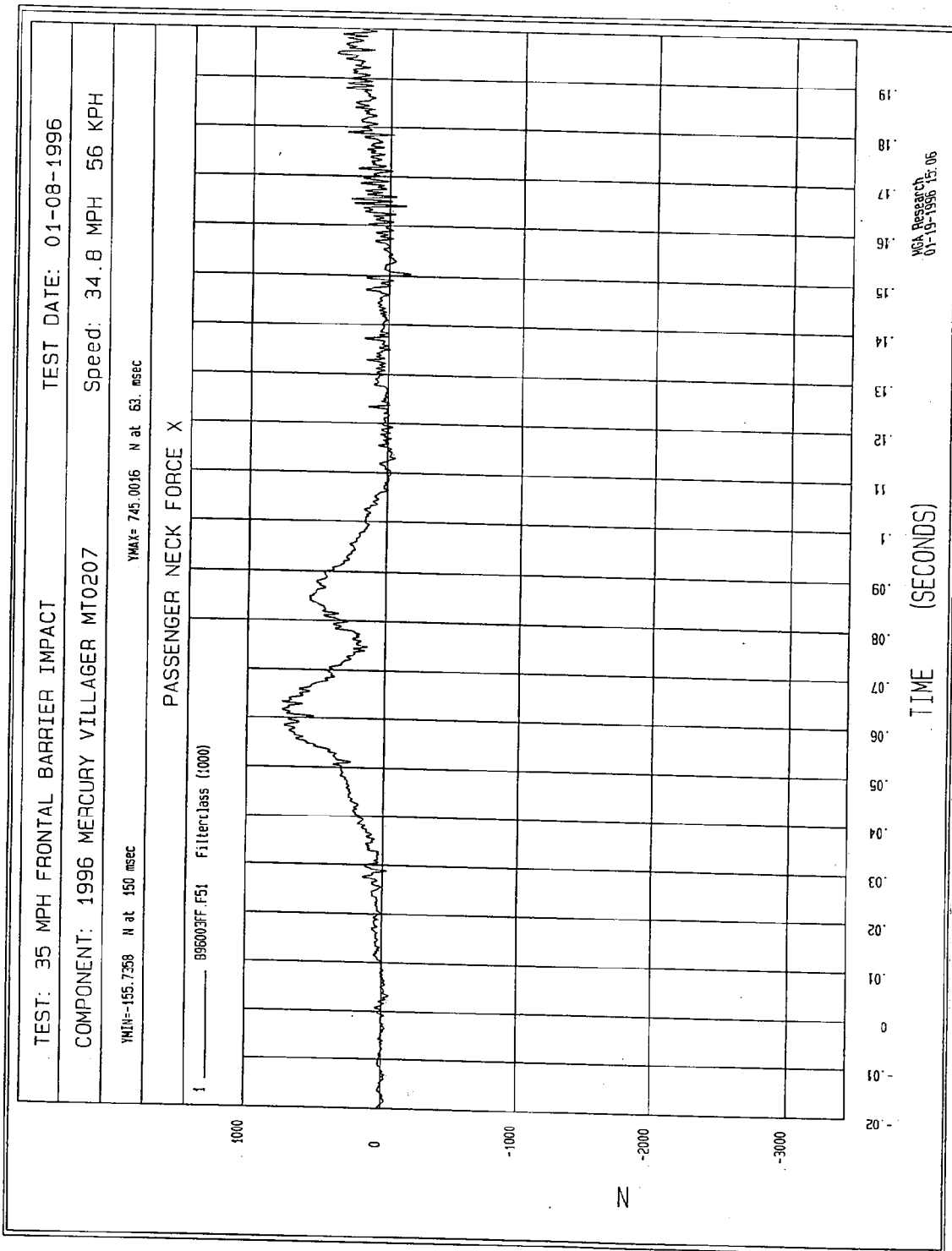


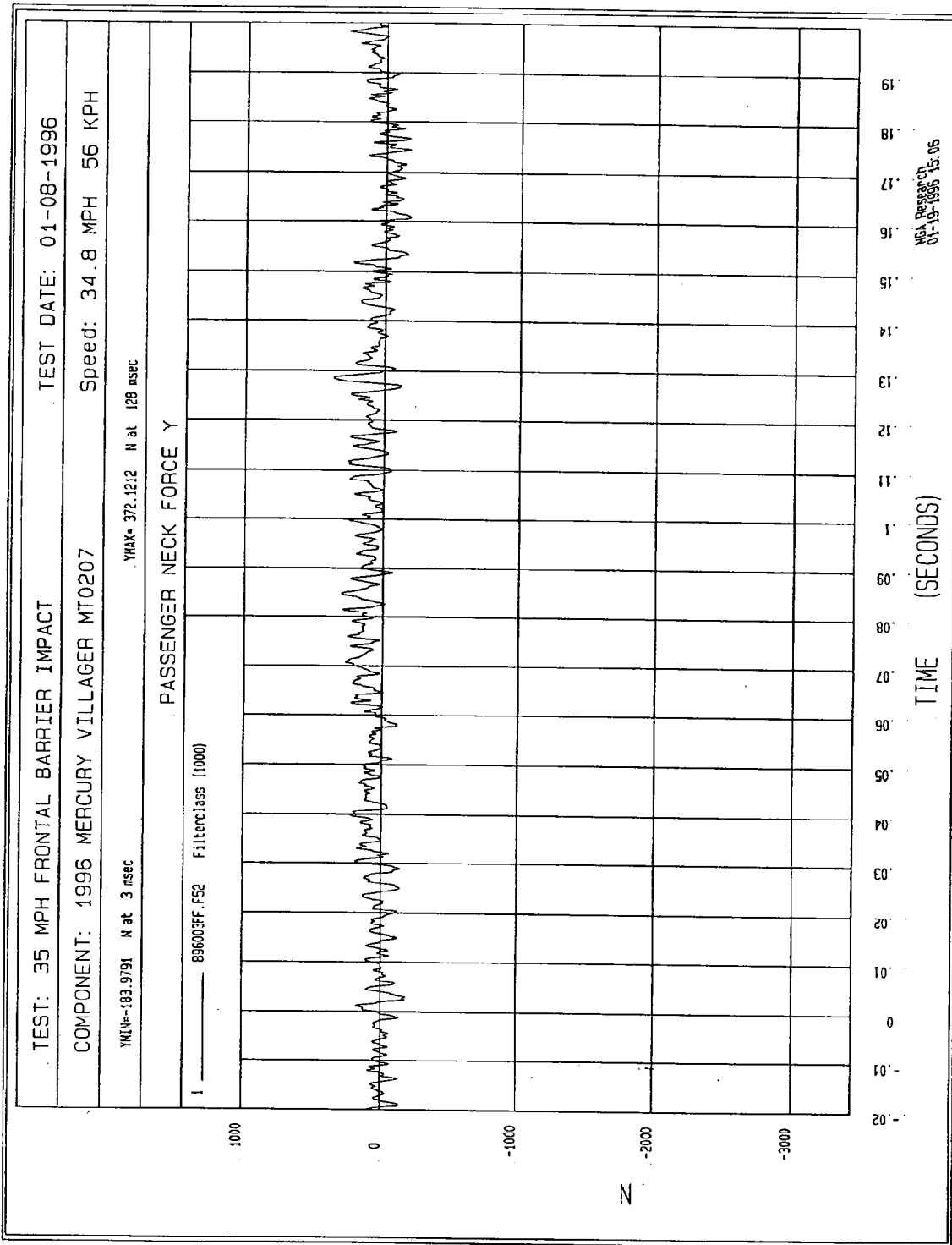


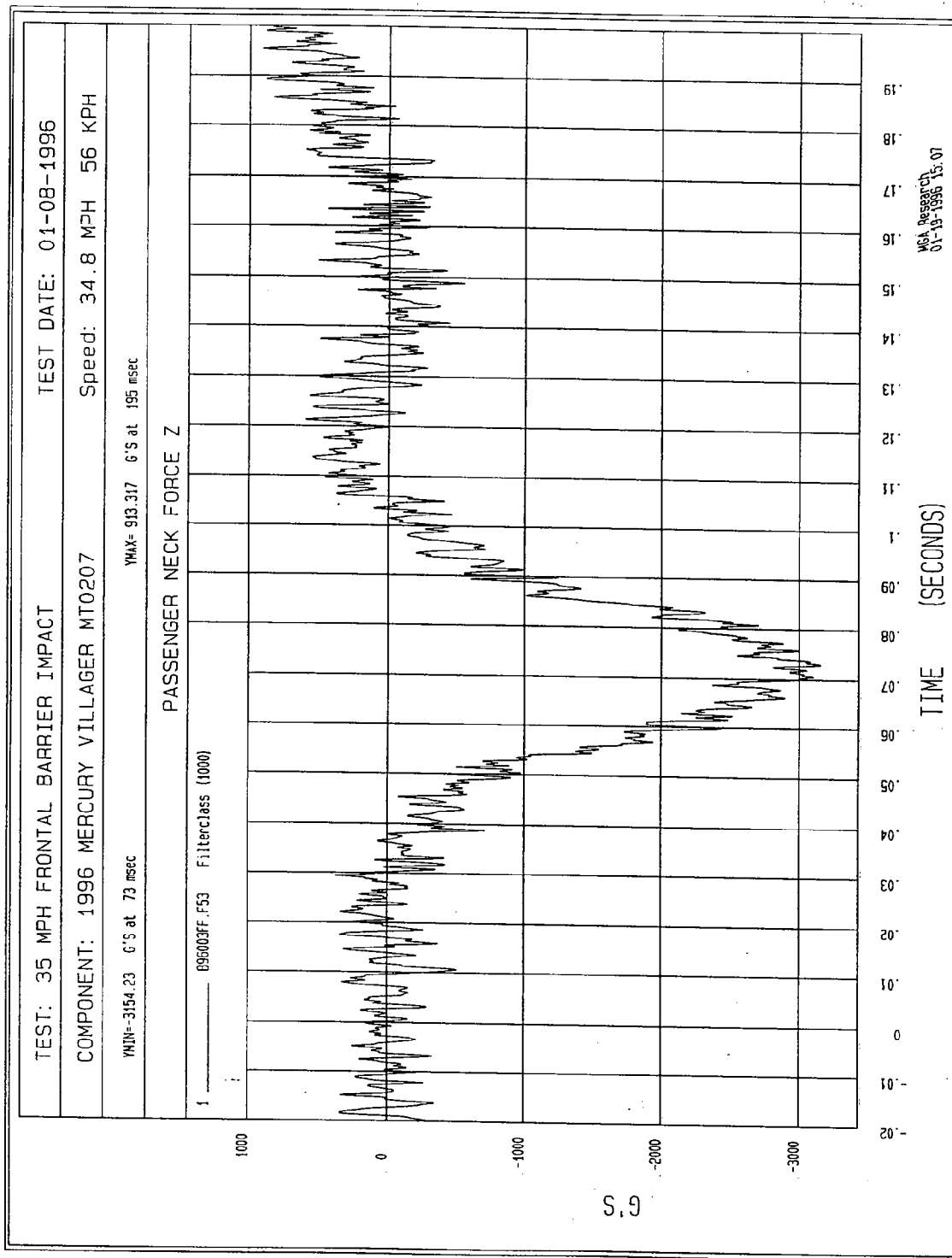


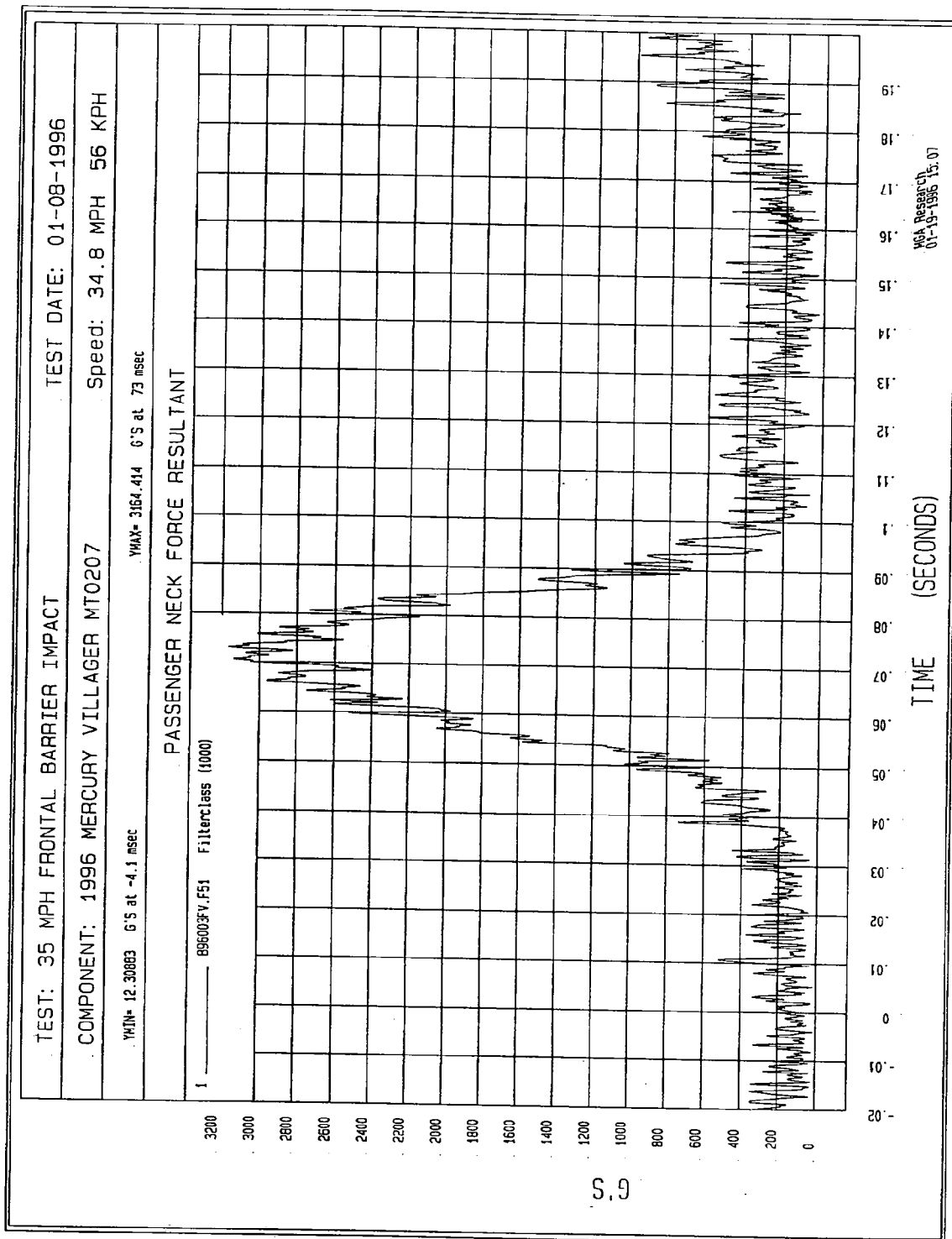


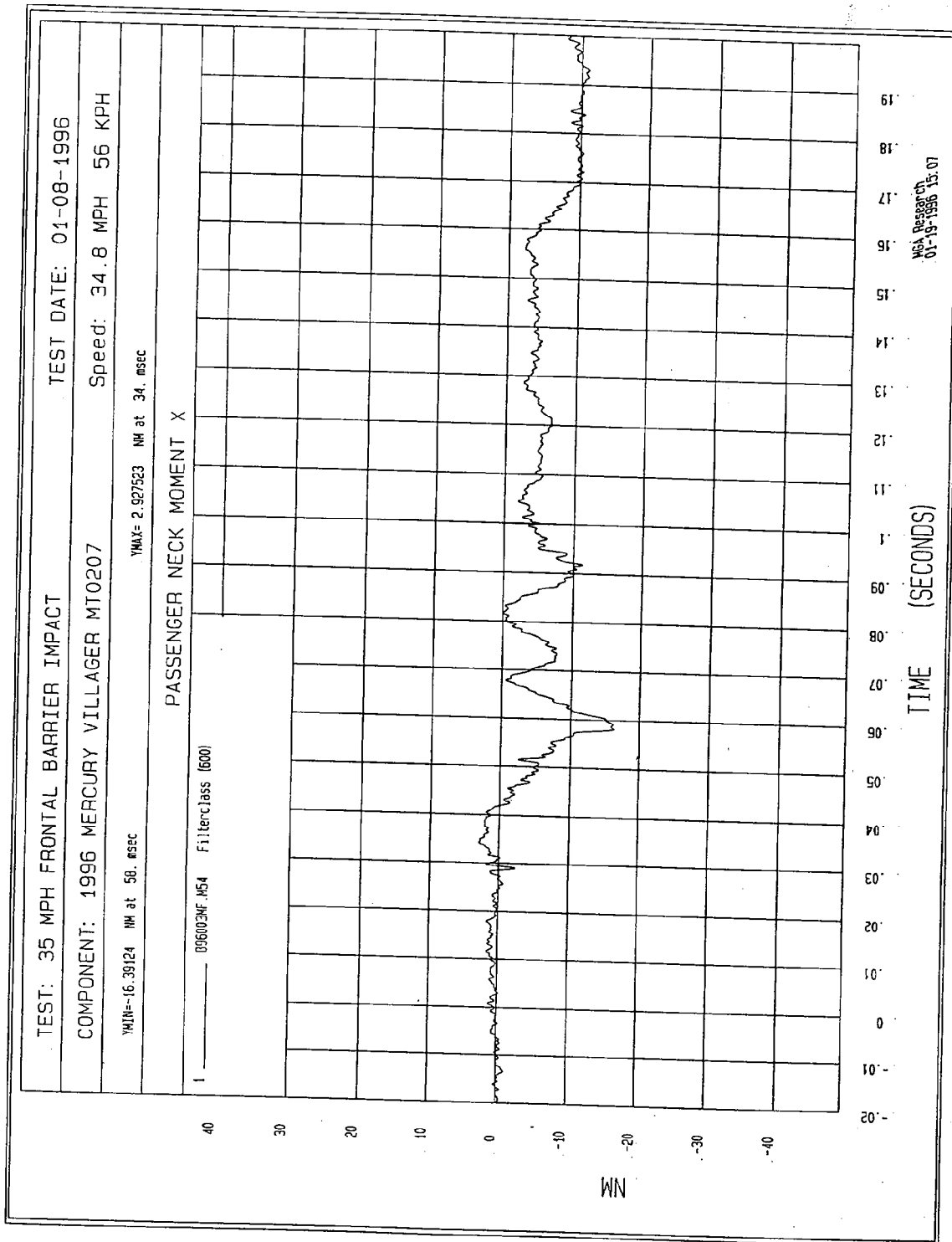


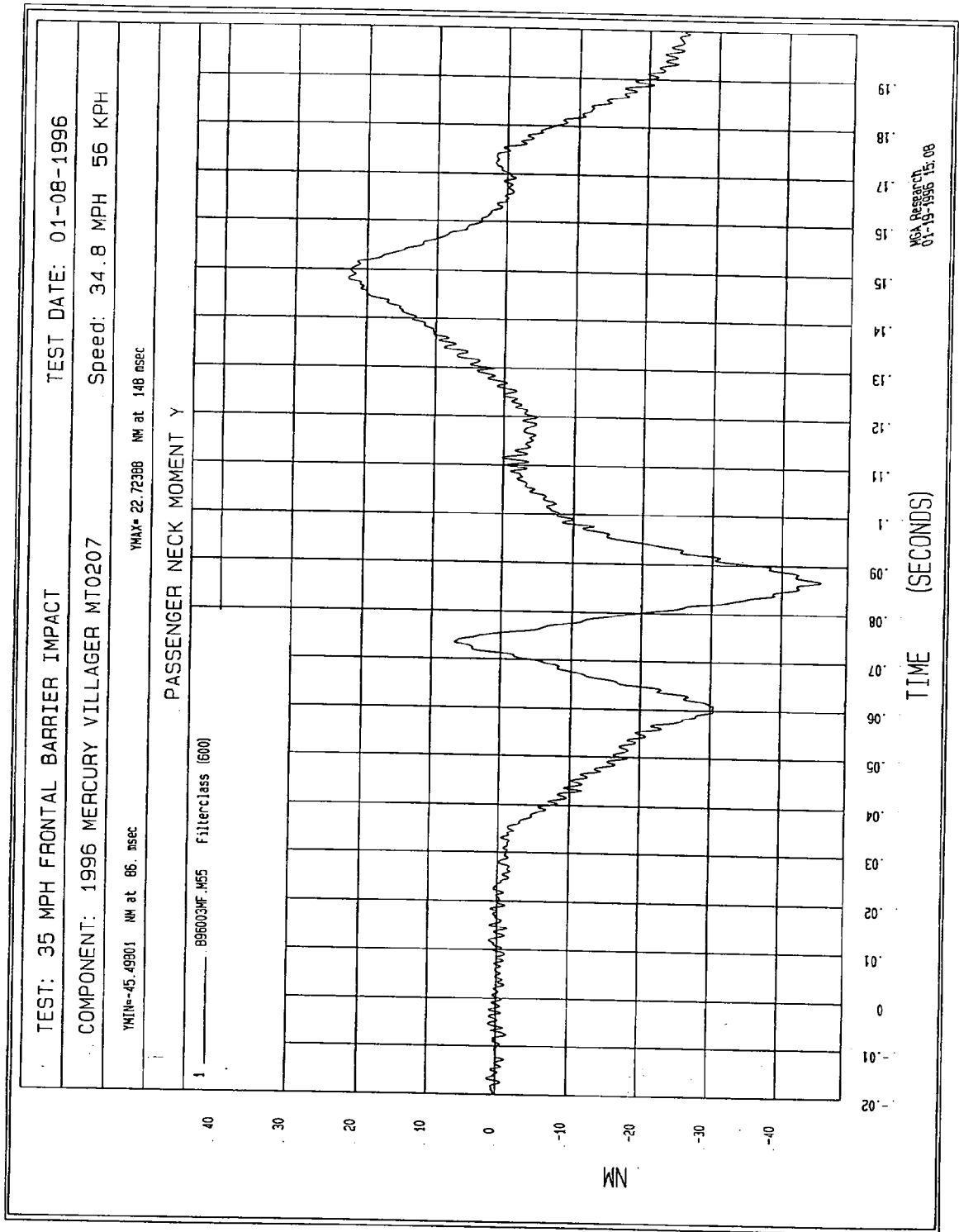


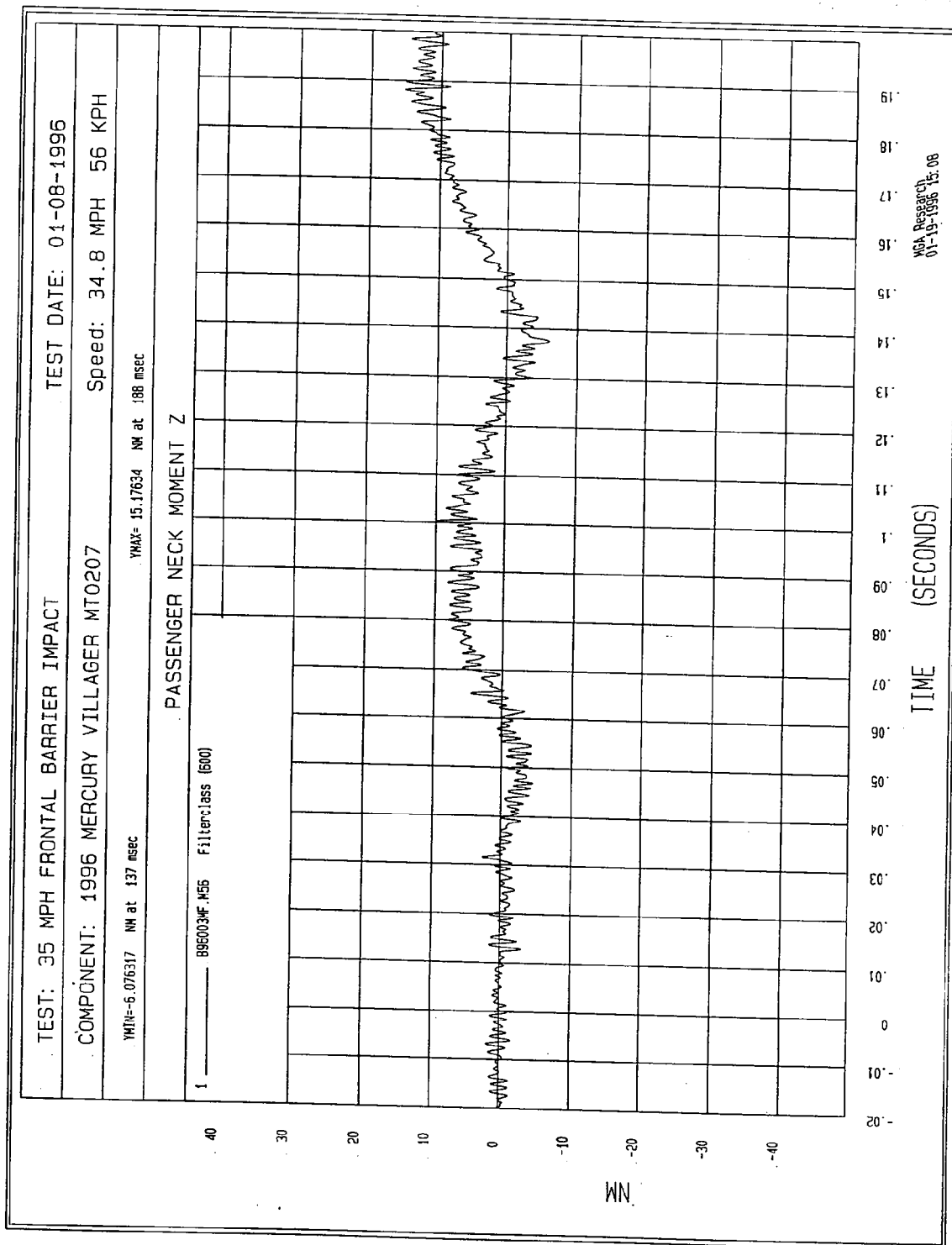


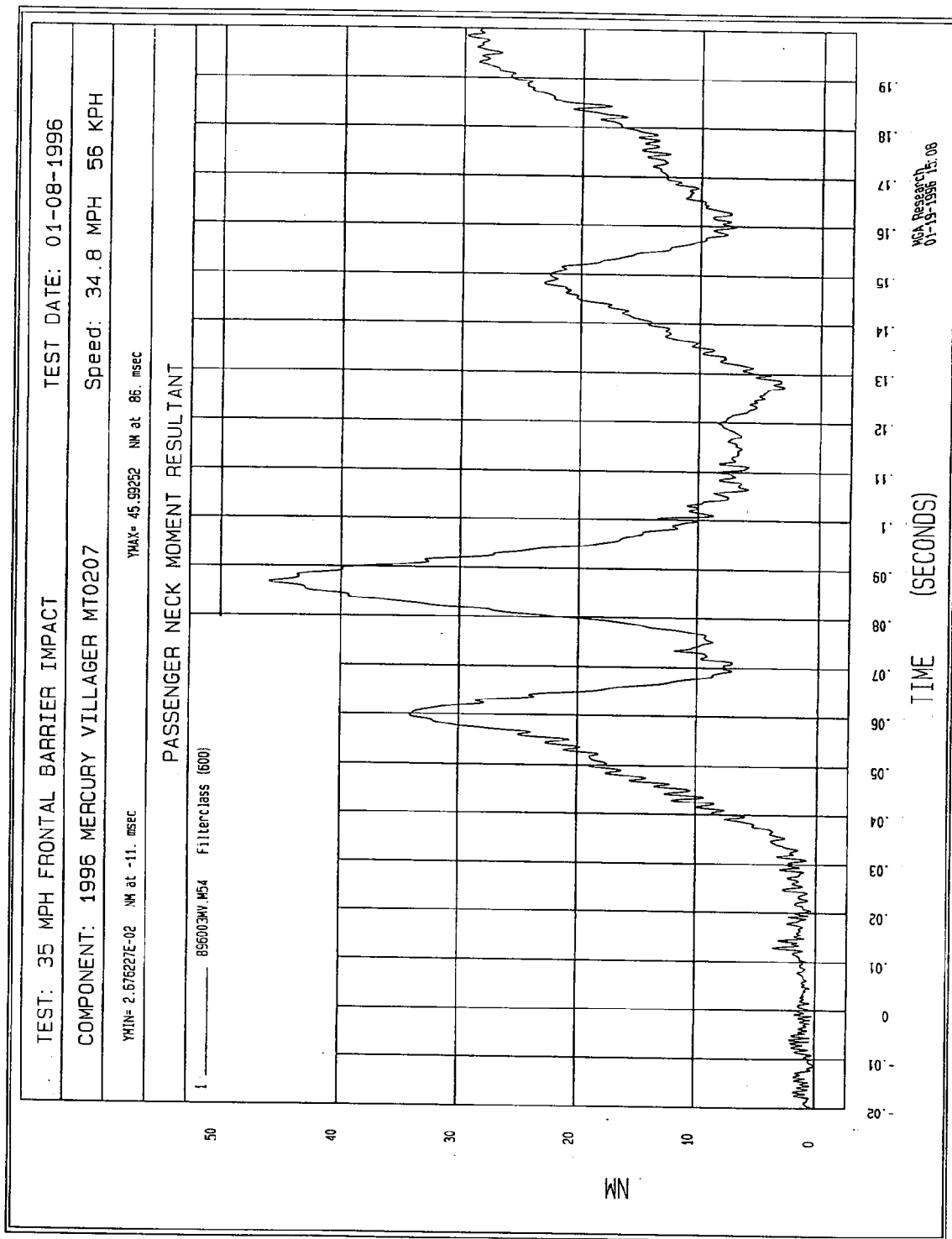


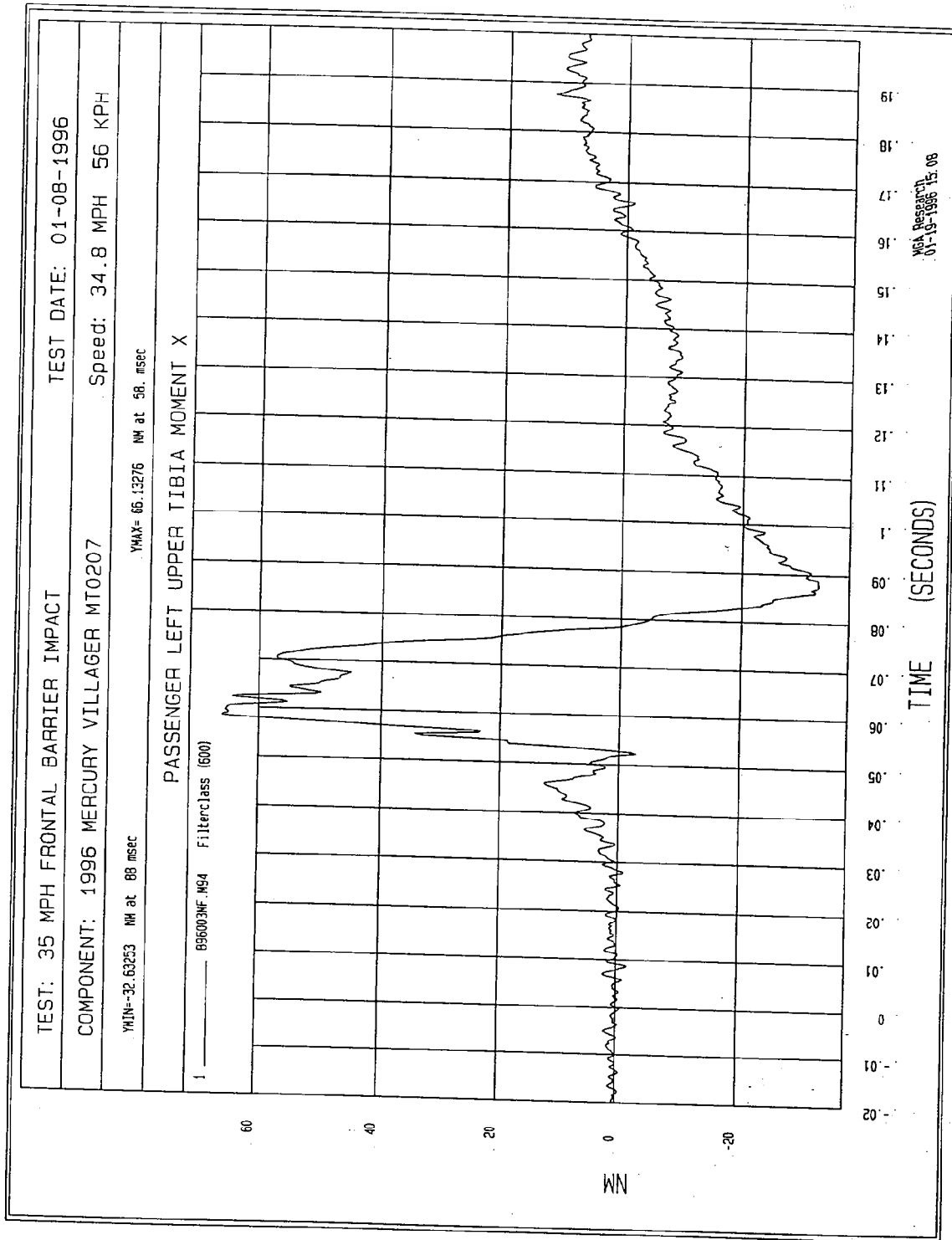


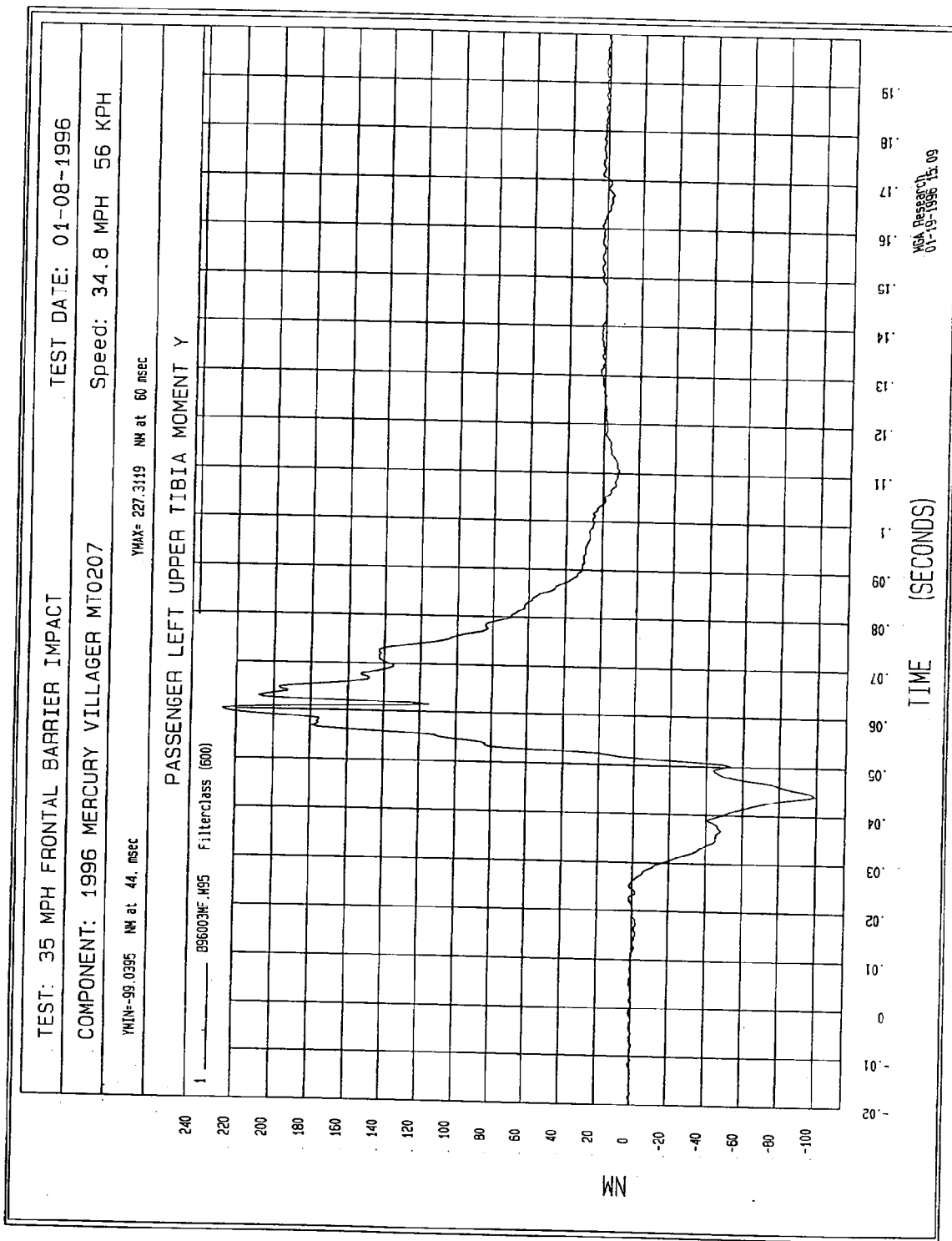


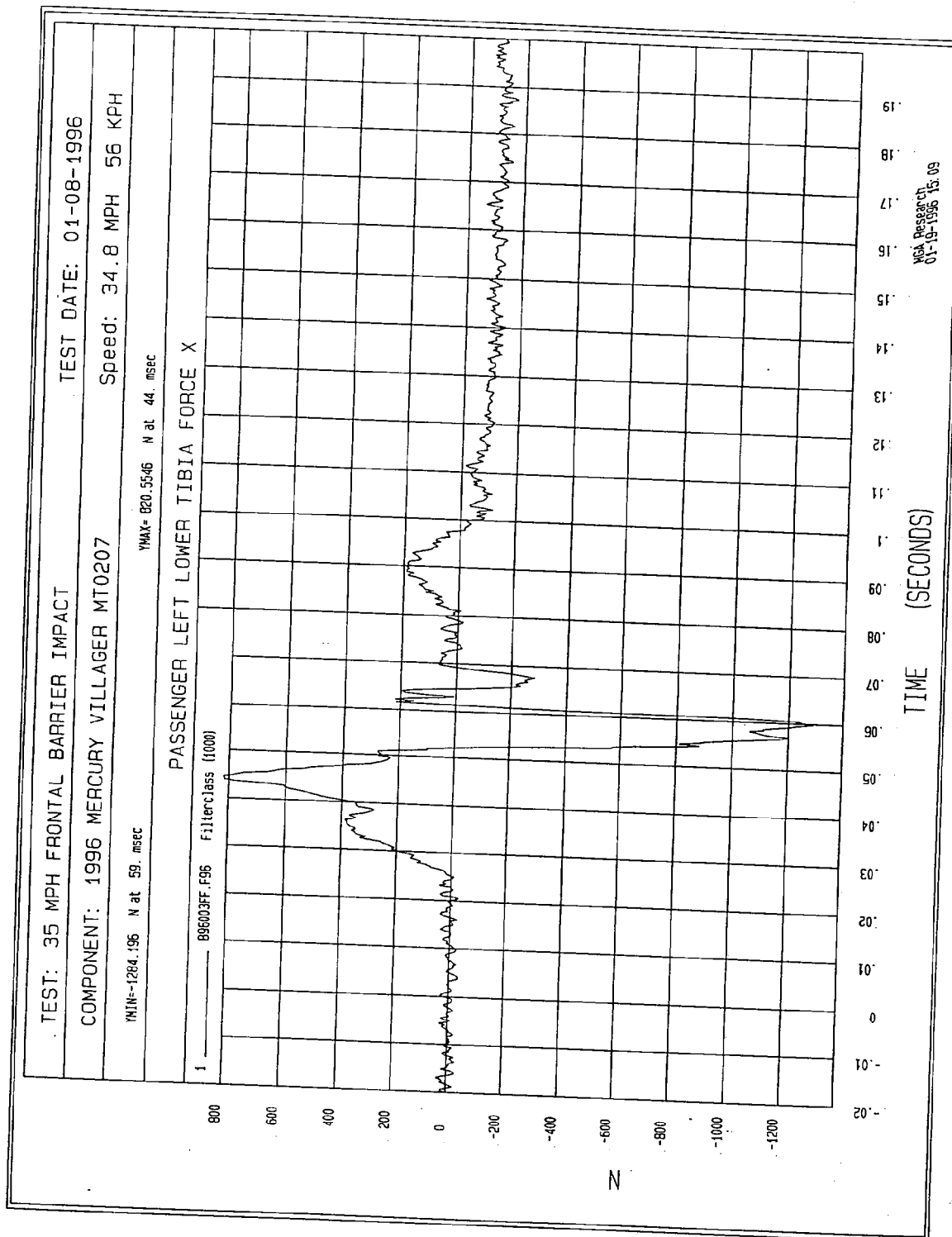


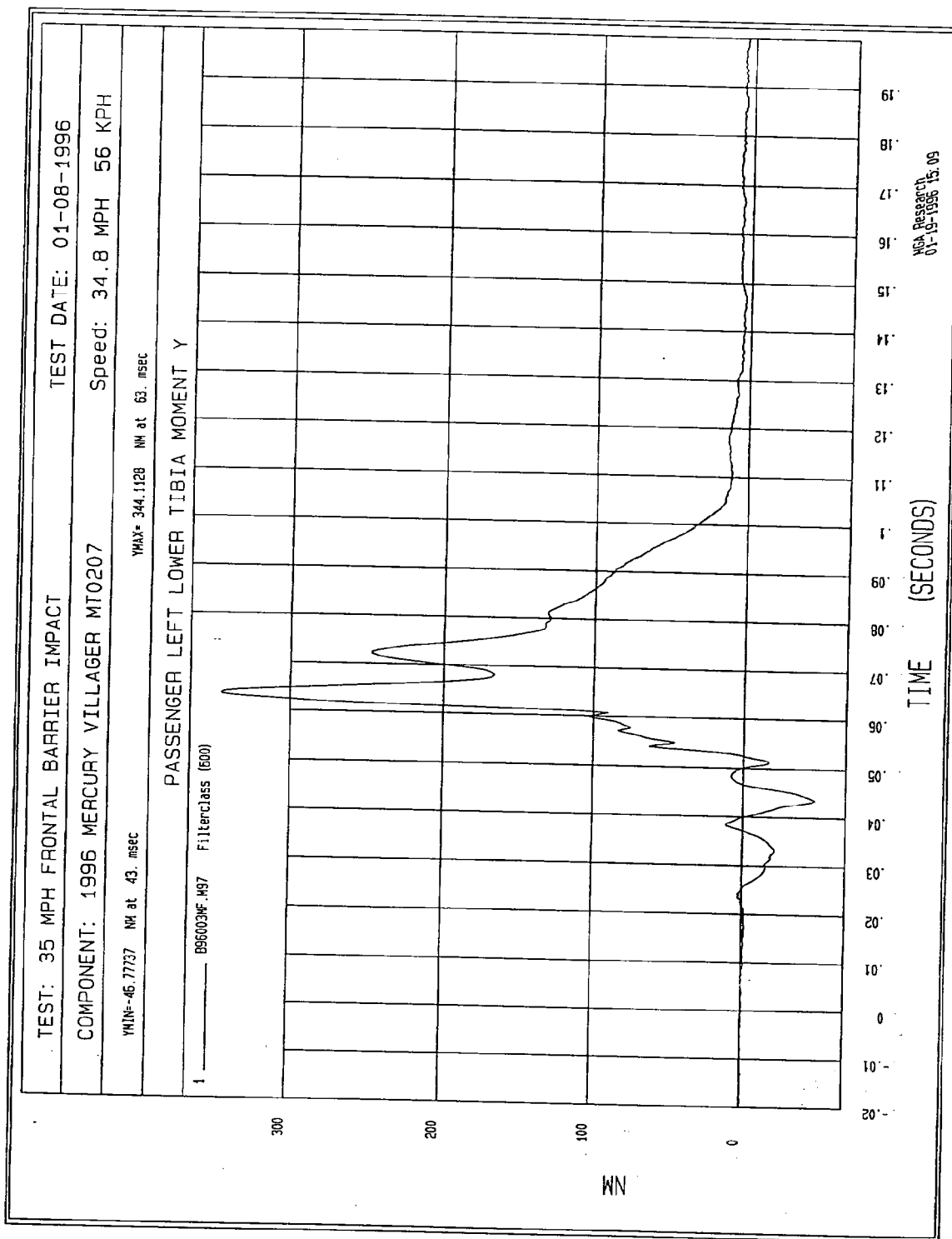


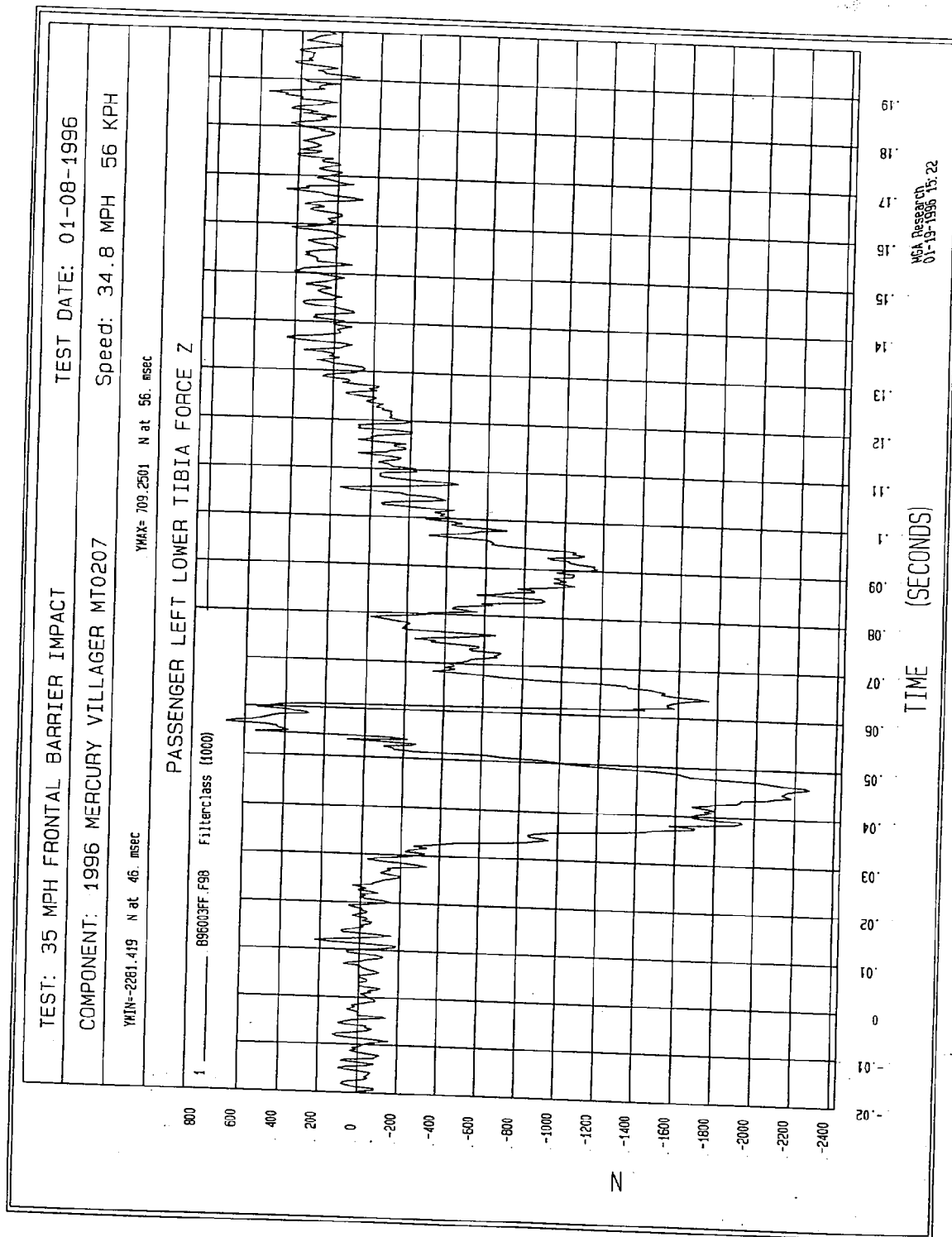


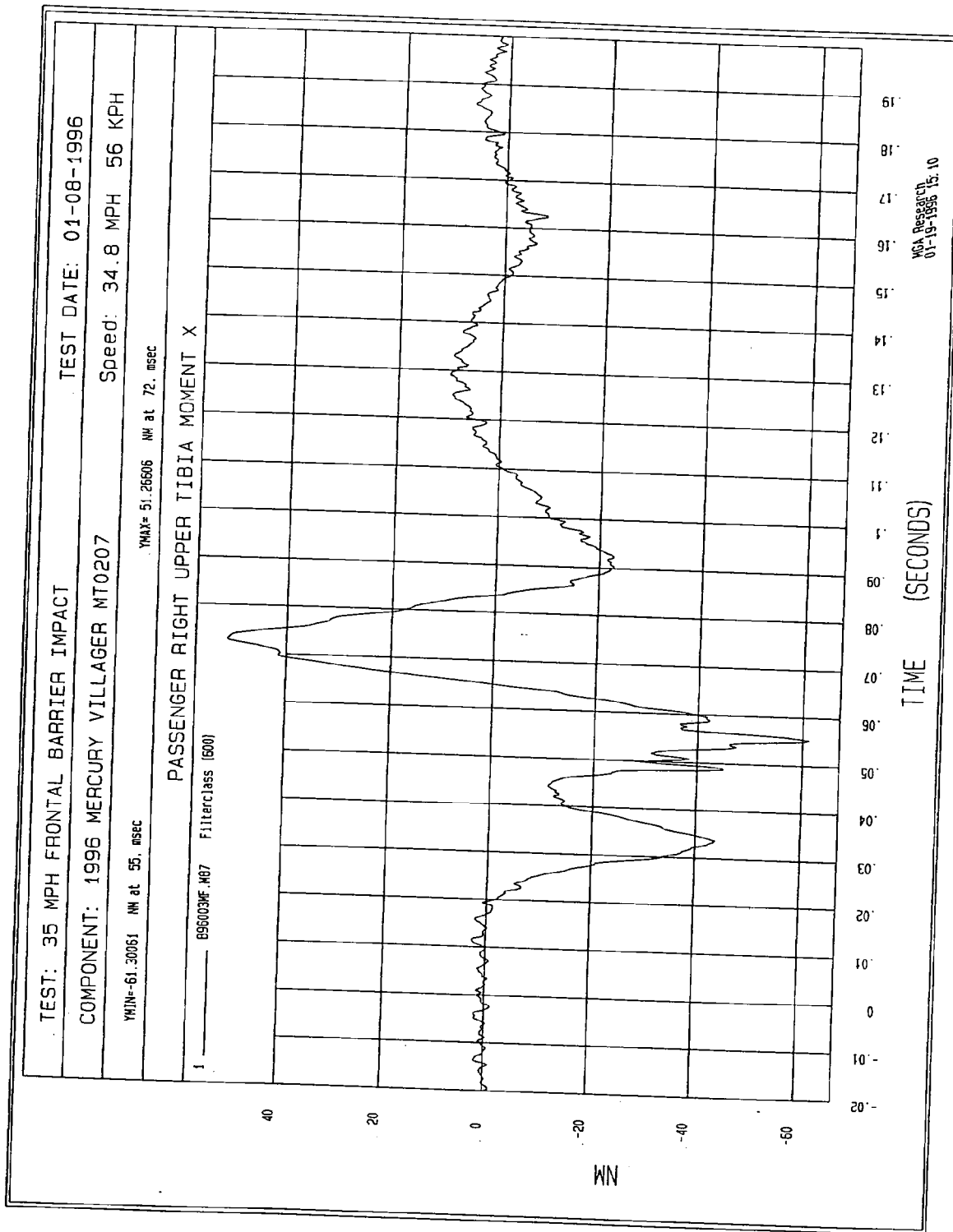


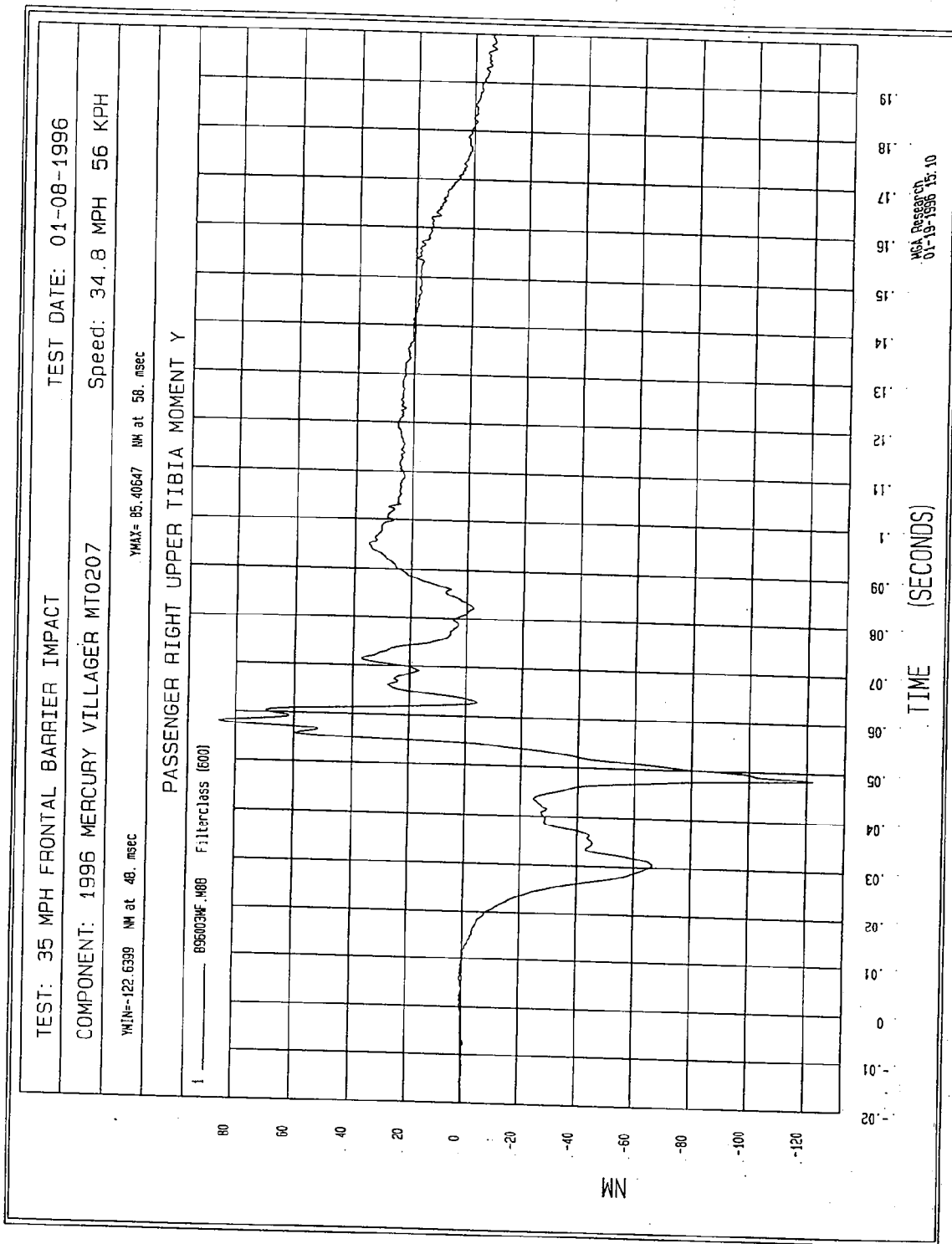


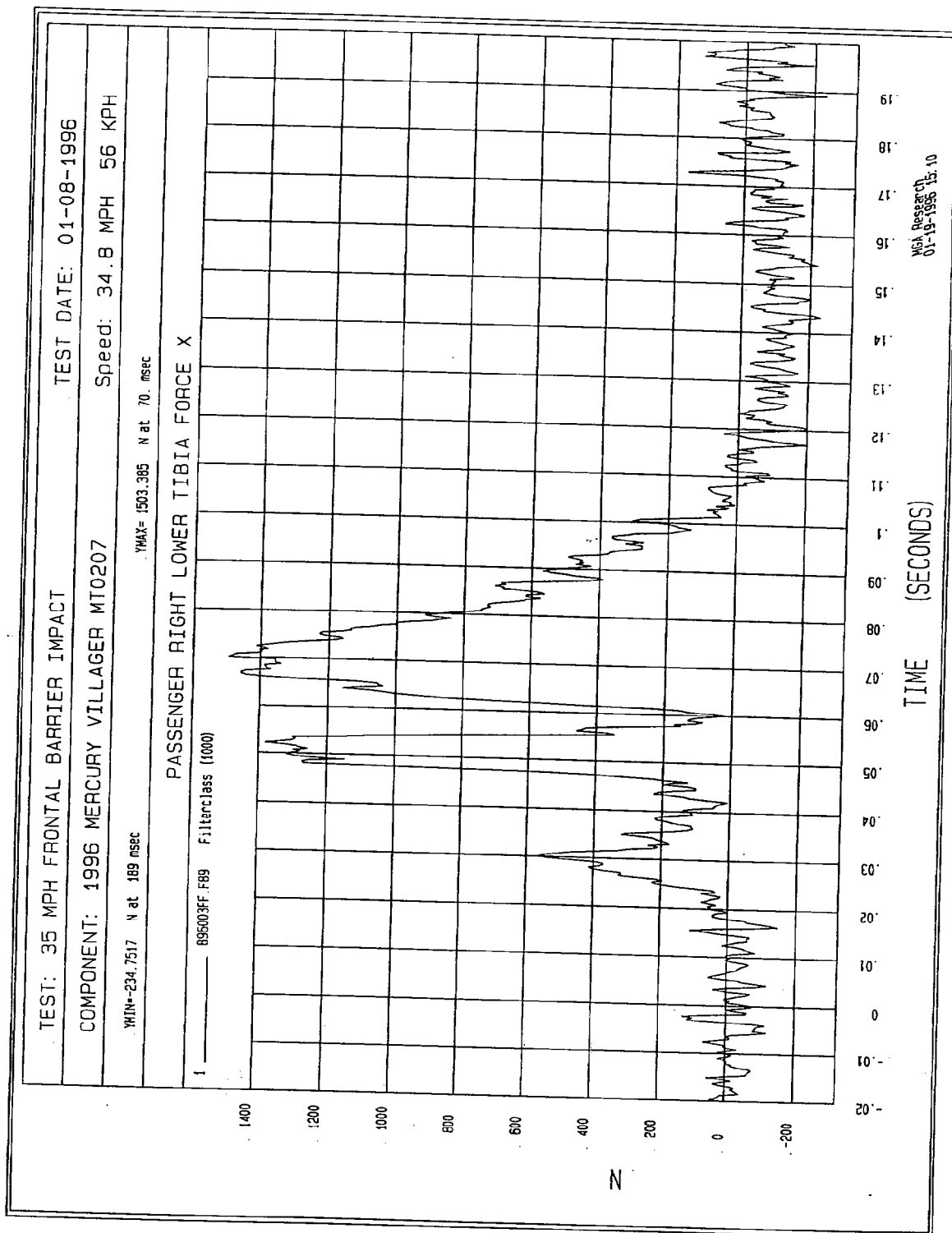


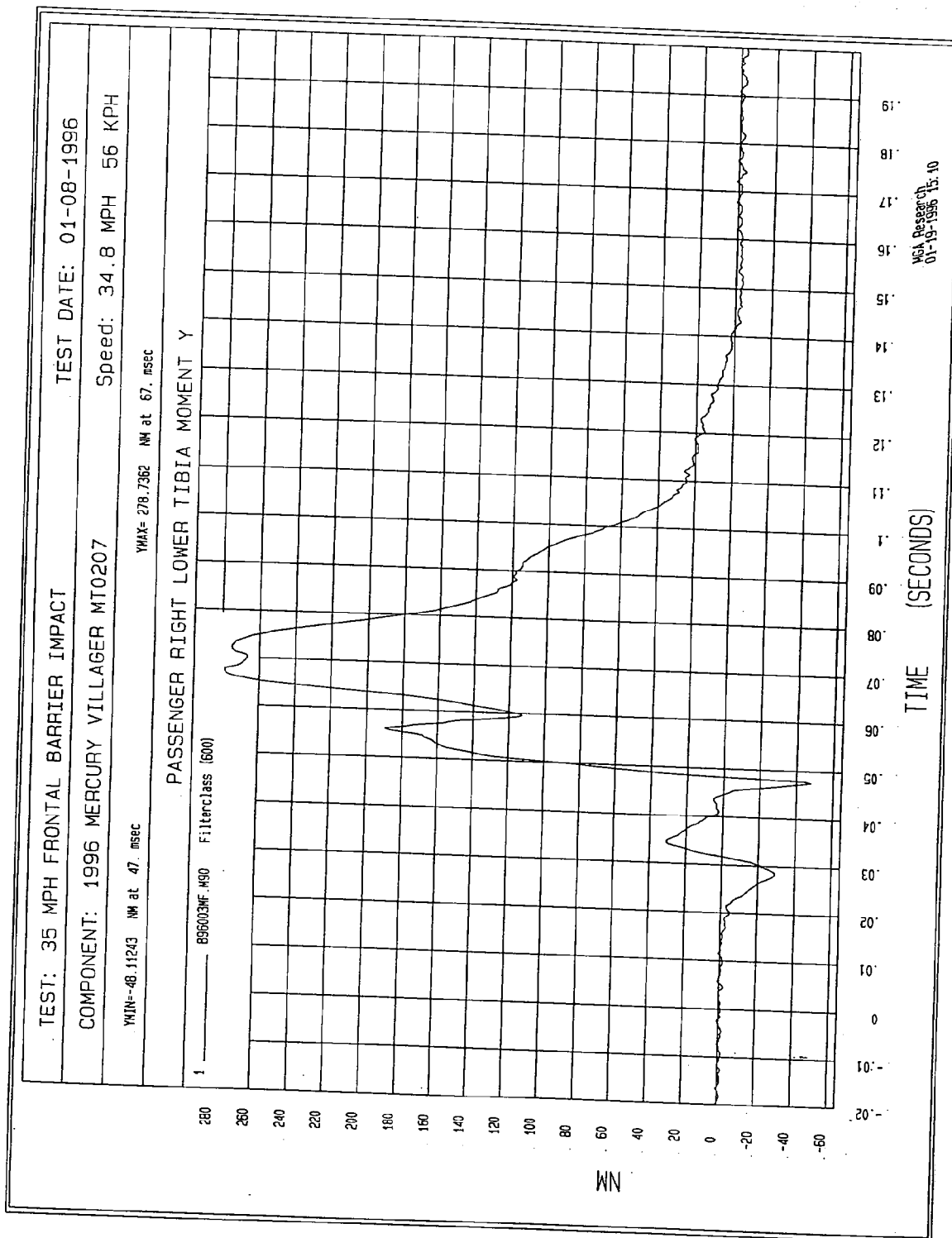


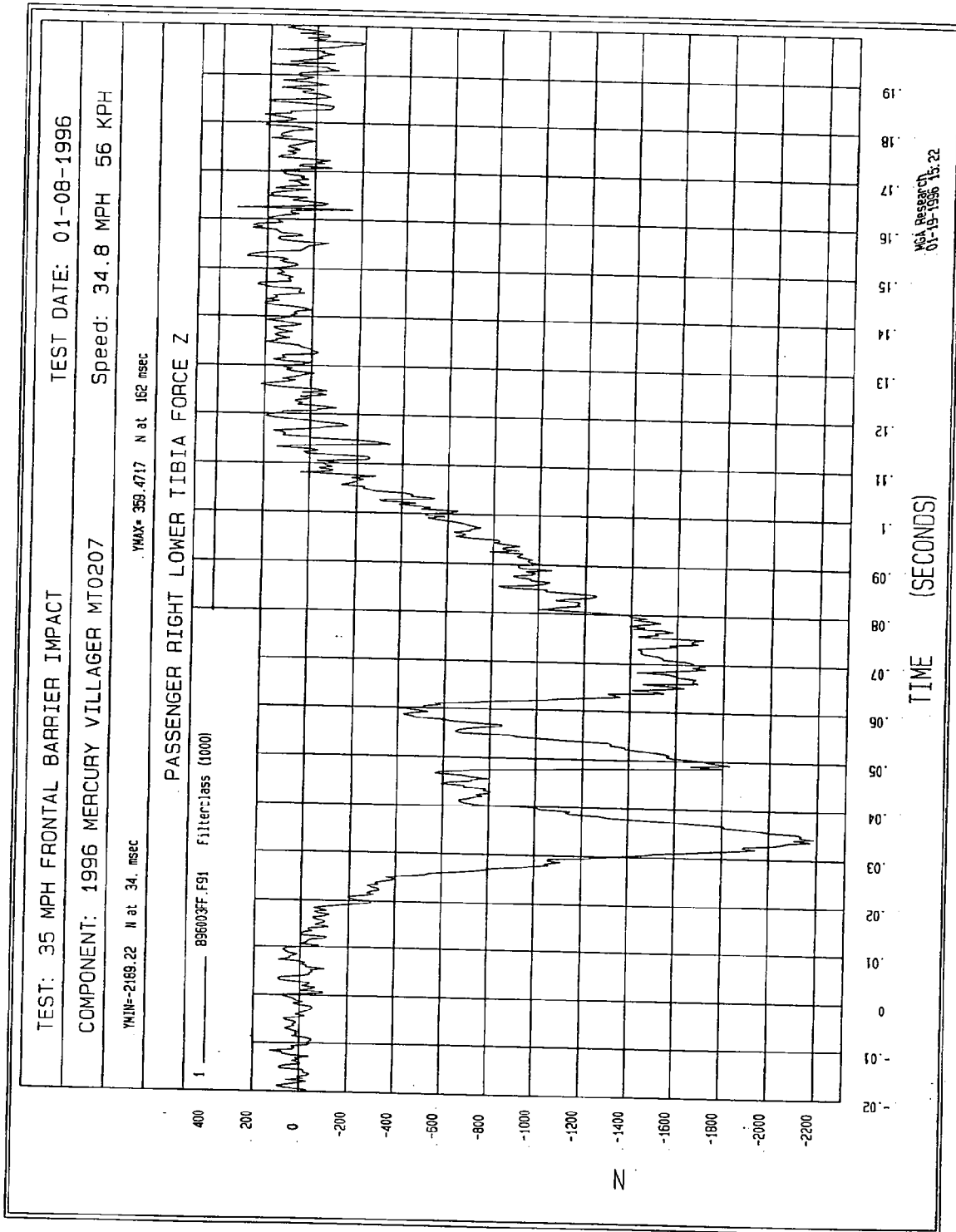




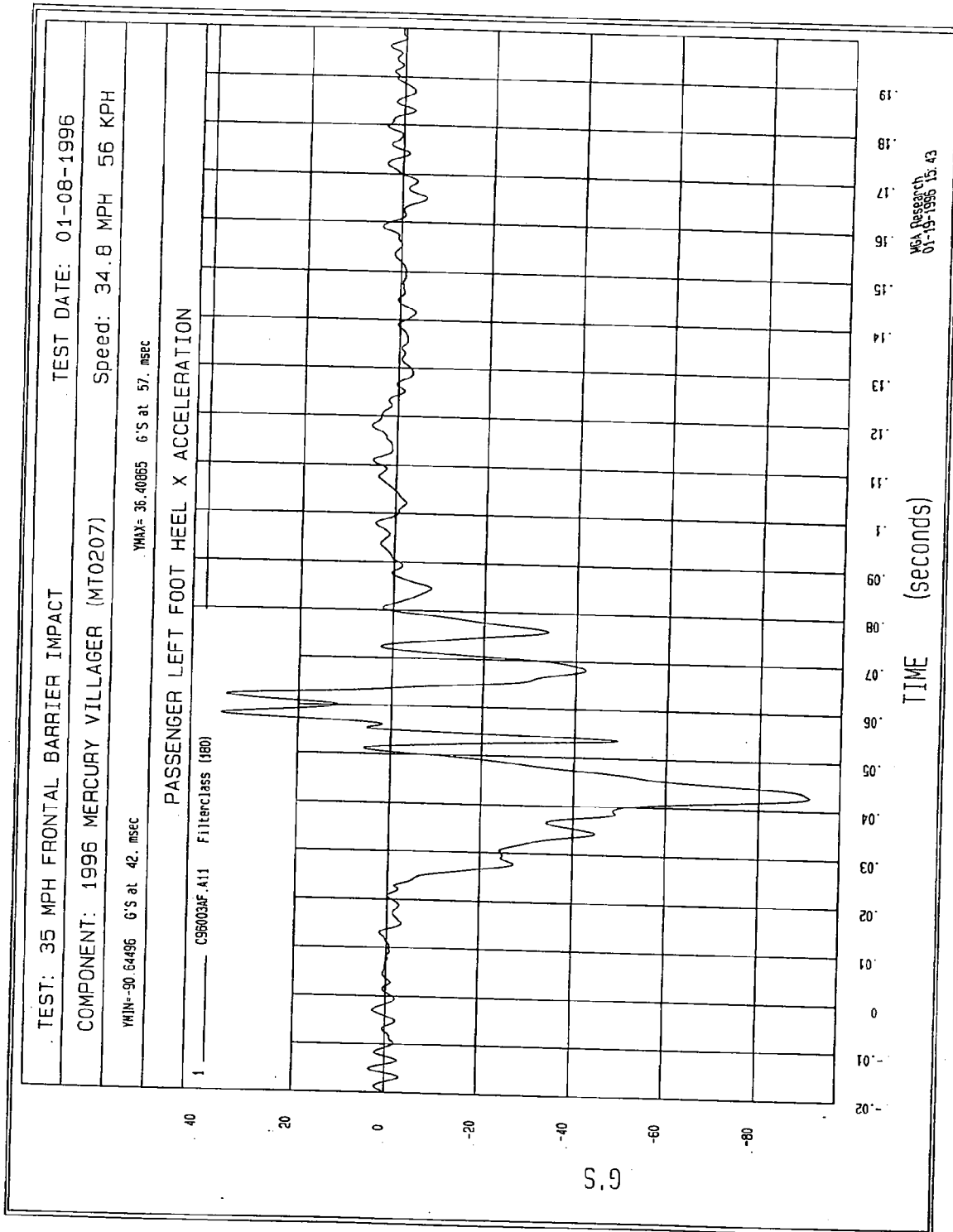


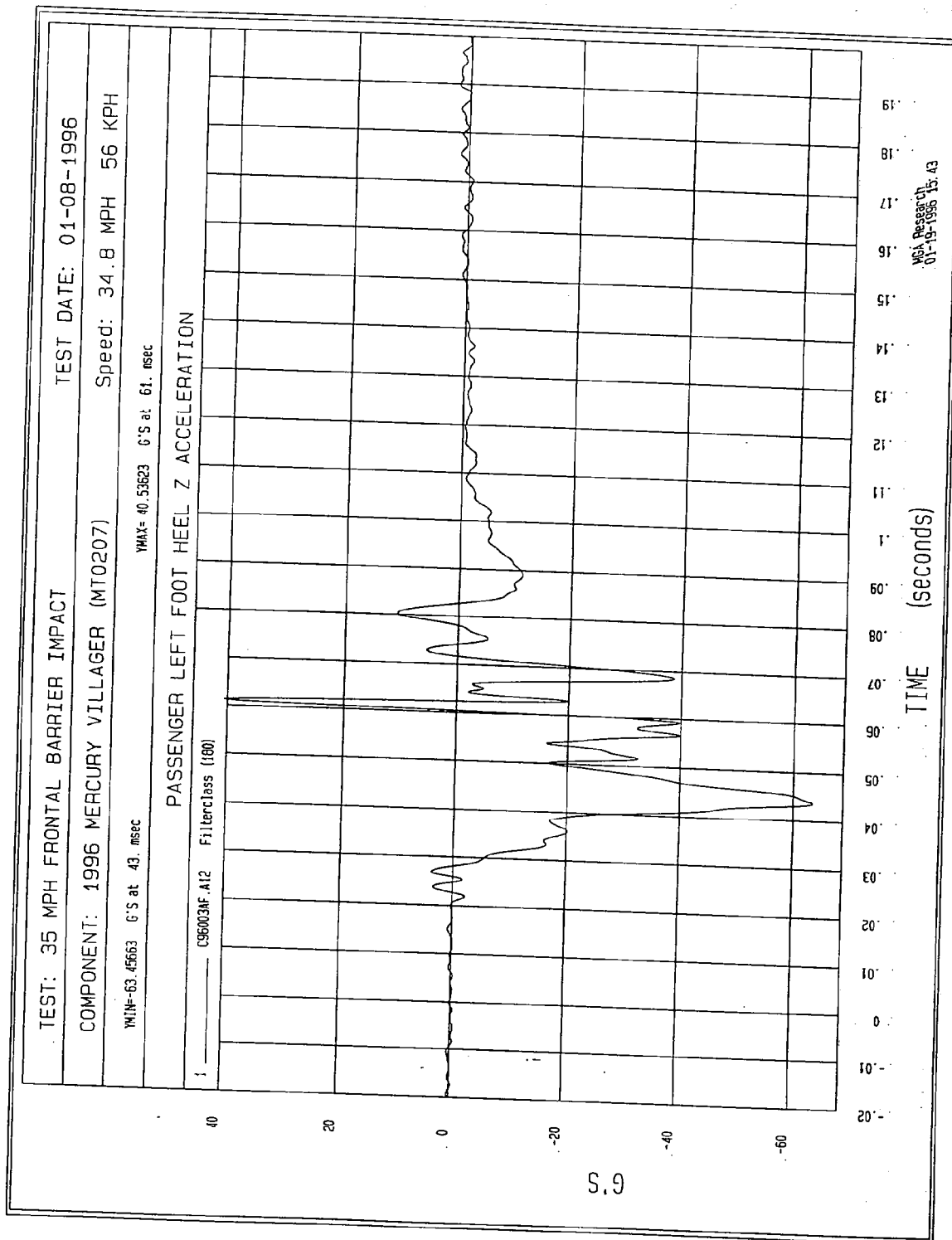


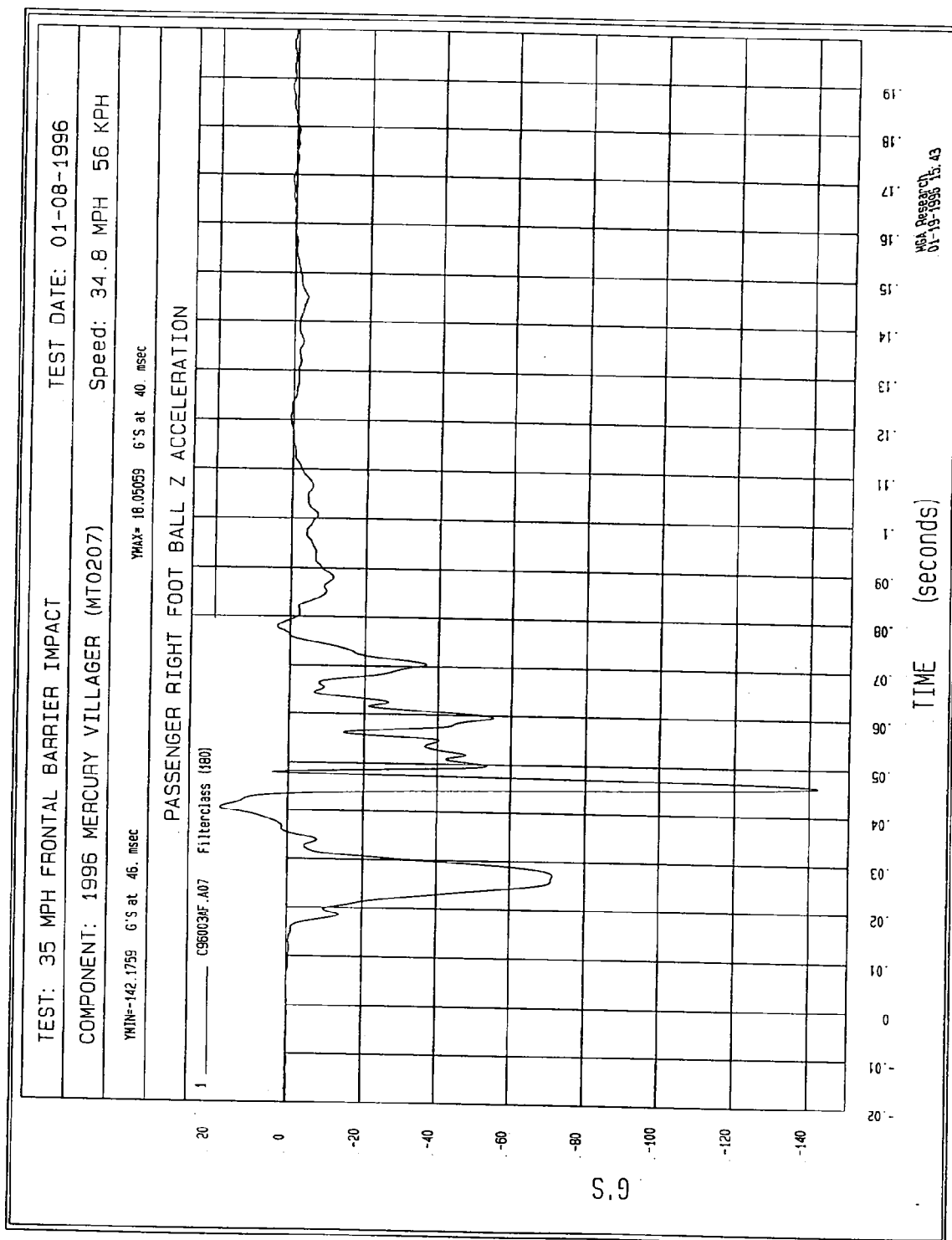


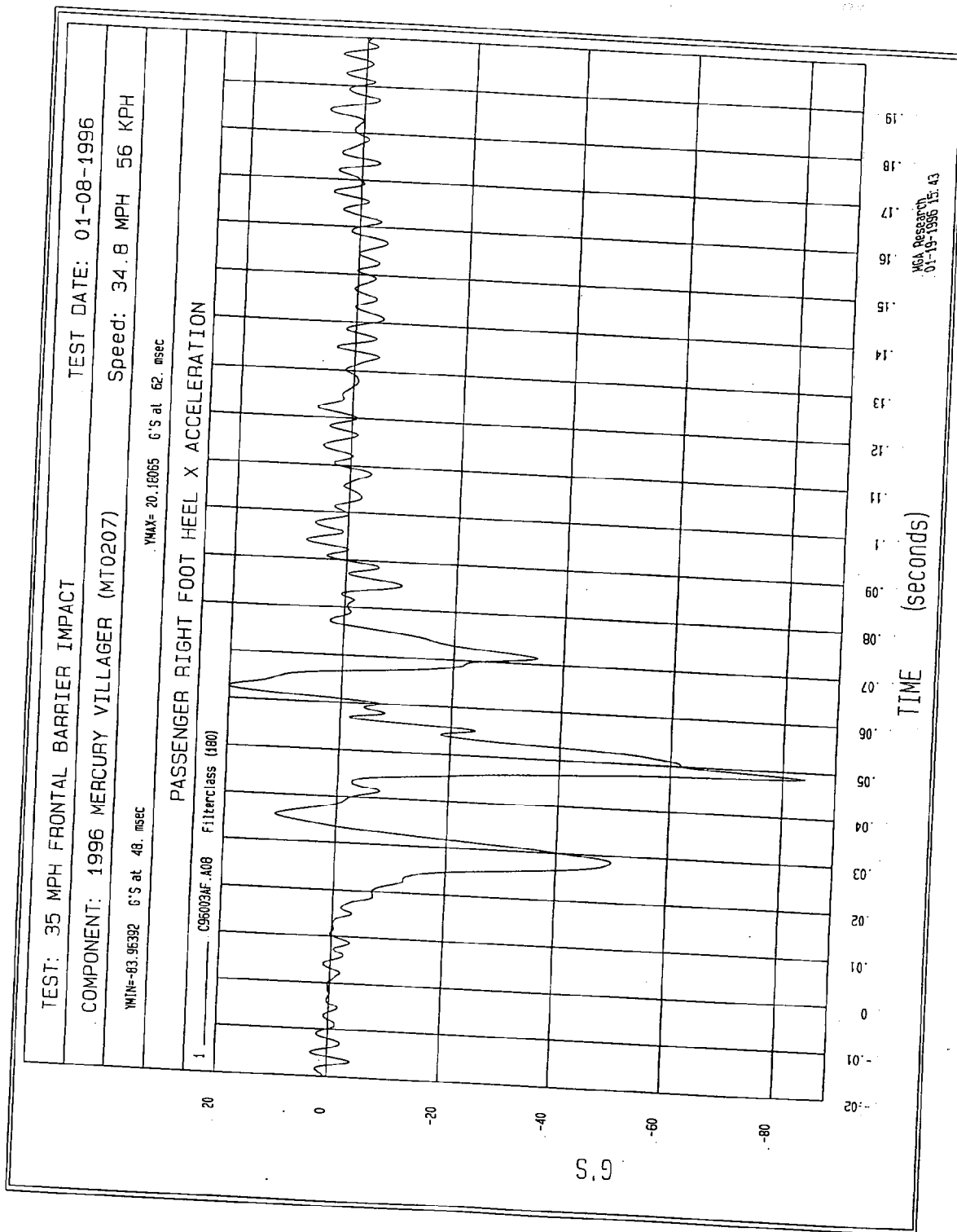


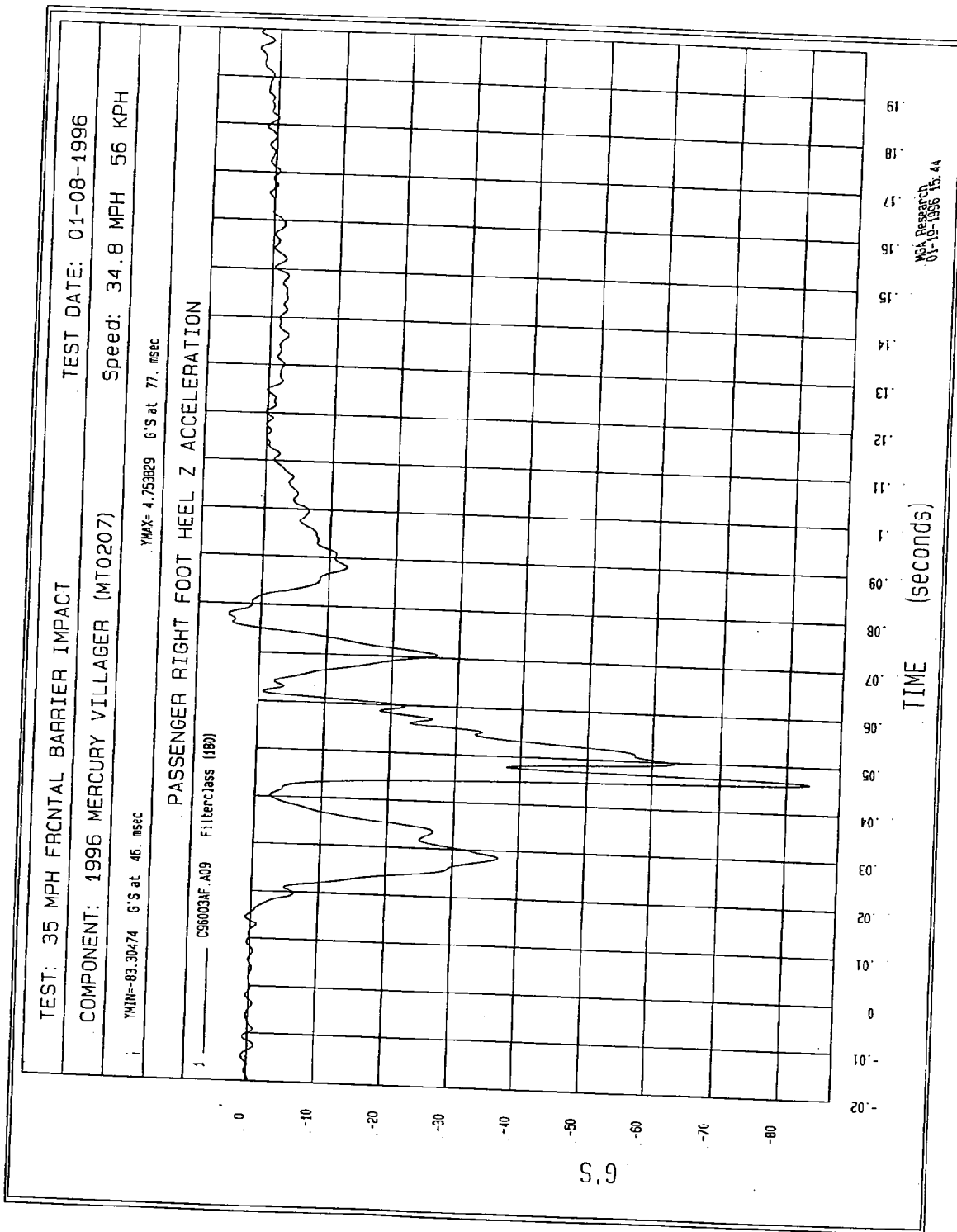
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APPENDIX E

Vehicle Owner's Occupant Restraint System Instructions

Safety Restraints

Important Safety Belt Information

The use of safety belts helps to restrain you and your passengers in case of a collision. In most states and in Canada the law requires their use.

Safety belts provide best restraint when:

- the seatback is upright
- the occupant is sitting upright (not slouched)
- the lap belt is snug and low on the hips
- the shoulder belt is snug against the chest
- the knees are straight forward

To help you remember to fasten your safety belt, a warning light may come on and a chime may sound. See *Safety Belt Warning Light and Chime* in the *Warning Lights and Gauges* chapter.

See the following sections in this chapter for directions on how to properly use these safety belts. Also see *Safety Restraints for Children* in this chapter for special instructions about using safety belts for children.

WARNING

Make sure that you and your passengers wear safety belts. Always drive and ride with your seatback upright and the lap belt snug and low across the hips.

⚠ WARNING

Never wear the shoulder belt under the arm. Never swing it around the neck over the inside shoulder. Never use a single belt for more than one person or across more than one seating position. Each seating position in your vehicle has a specific safety belt assembly which is made up of one buckle and one tongue that are designed to be used as a pair. Failure to follow these precautions could increase the risk and/or severity of injury in a collision.

⚠ WARNING

Never drive or ride with a twisted or jammed safety belt. If you cannot untwist or unjam the safety belt, see the nearest qualified technician immediately.

⚠ WARNING

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

⚠ WARNING

Never let a passenger hold a child on his or her lap while the vehicle is moving. The passenger cannot protect the child from injury in a collision.

Lock the doors of your vehicle before driving to lessen the risk of the door coming open in a collision.

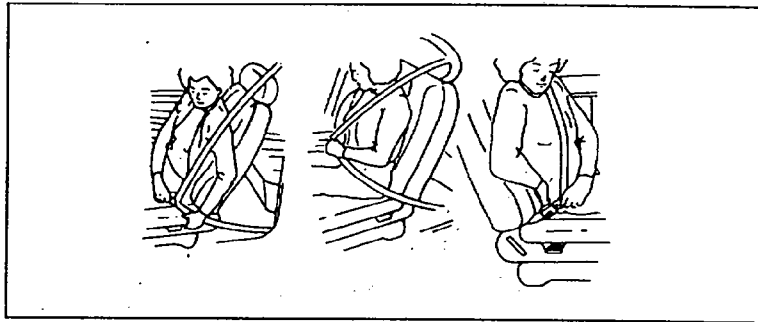
Safety Restraints

Combination Lap and Shoulder Belts

While your vehicle is in motion, the combination lap and shoulder belt adjusts to your movement. However, if you brake hard, turn hard, or if your vehicle receives an impact of 5 mph (8 km/h) or more, the lap and shoulder belt locks and helps to reduce your forward movement.

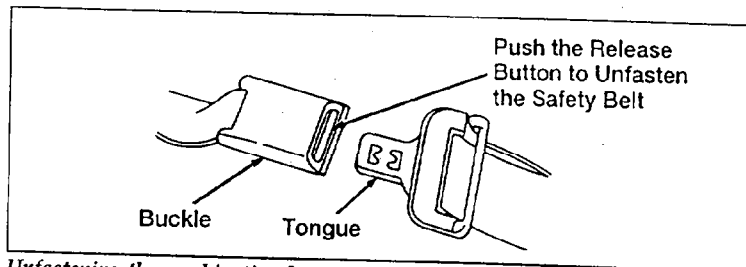
After you get into your vehicle, close the door and lock it. Then adjust the seat to the position that suits you best.

To fasten the belt, pull the combination lap and shoulder belt from the retractor so that the shoulder portion of the belt crosses your shoulder and chest. Be sure the belt is not twisted. If it is, remove the twist. Insert the belt tongue into the proper buckle until you hear a snap and feel it latch. Make sure the tongue is securely fastened to the buckle by pulling on tongue.



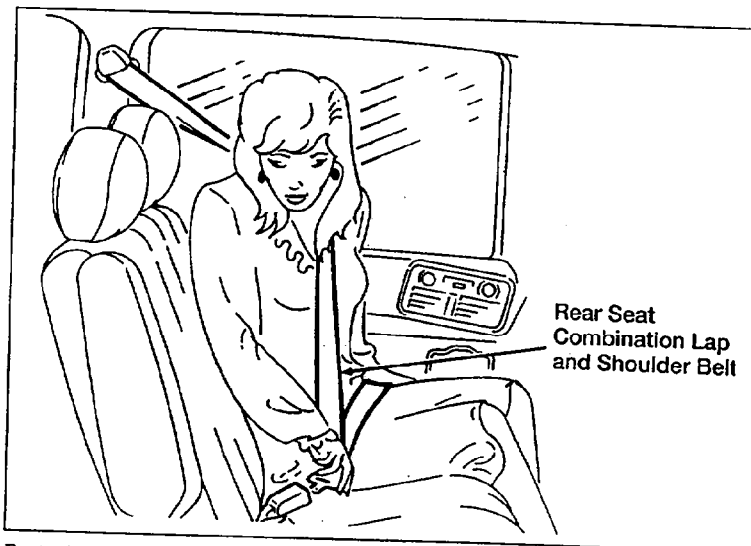
Fastening the front seat combination lap and shoulder belt

NOTE: Be sure to read and understand *Important Safety Belt Information* at the beginning of this chapter.



Unfastening the combination lap and shoulder belts — front and rear outboard seating positions

Third-row passengers should be aware that the proper safety belt for their seating position is slightly behind their seat. They should not use the second-row safety belts which are in front of the third seat.



Fastening the rear seat combination lap and shoulder belt

Safety Restraints

WARNING

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

To tighten the lap portion of the belt, pull up on the shoulder belt until it fits you snugly. The belt should rest as low on your hips as possible.

The passenger seated near the sliding door in the three-passenger bench seat can route the safety belt webbing under the guide located on the head restraint. This safety belt guide is designed to help keep the safety belt webbing properly positioned across the passenger's chest for maximum comfort. This guide is only needed when the two-passenger second row bench seat is removed and the three-passenger bench seat is moved up to the second-row position.

WARNING

Rear-facing infant seats should never be placed in the front seats.

This mode **must be used** when installing a child safety seat on the front passenger seat and rear outboard seats where dual locking retractors are provided.

To switch the retractor from the emergency locking mode to the automatic locking mode, perform the following steps:

1. Buckle the lap/shoulder combination belt.
2. Grasp the shoulder portion of the belt and pull downward until all of the belt is extracted and, when allowed to retract, a clicking sound is heard. At this time, the belt retractor is in the automatic locking mode (child restraint mode).
3. A clicking sound will continue to be heard as the belt is allowed to retract. This indicates that the retractor is in the automatic locking mode.

NOTE: When the combination lap/shoulder belt is unbuckled and allowed to retract completely, the retractor will switch to the vehicle sensitive (emergency) locking mode. See the detailed instructions under *Safety Seats for Children* in this chapter.

Safety Restraints

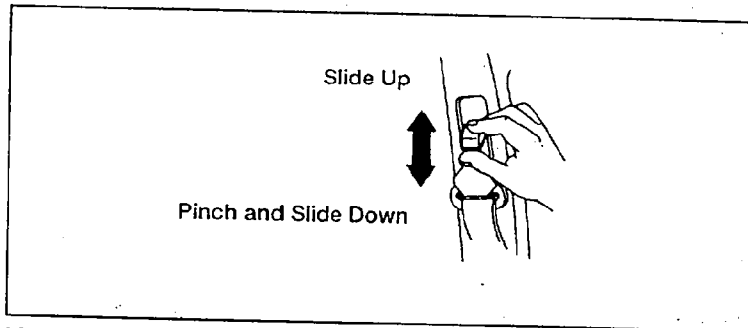
Shoulder Belt Height Adjustment

Driver and right front passenger

You can adjust the shoulder belt height to one of five (5) positions.

To adjust the belt down, pinch the release button. To adjust the belt up, pinch the release button and slide the adjuster up.

Make sure the adjuster is firmly in one of the five positions. The belt should be adjusted up or down until the belt rests on your shoulder near your neck.



The shoulder belt height adjuster

⚠ WARNING

Position the shoulder belt height adjuster so that the belt rests across the middle of your shoulder. Be sure the shoulder belt is properly positioned on your shoulder each time you use the belt. If the shoulder belt is off your shoulder, on your upper arm or neck, there is a greater risk of severe injury in a collision.

Lap Belt Without a Retractor (for the three-passenger bench seat)

The center seat of the three-passenger bench seat has a lap belt without a retractor. To make the belt longer, tip the tongue at a right angle to the belt and pull the belt over your lap until the tongue reaches the buckle.

To fasten the belt, pull the belt across your hips and insert the tongue into the correct buckle on your seat until you hear a snap and feel it lock. Make sure the buckle is securely fastened.

Adjust the belt so that it fits snugly and as low as possible around the hips:

- If you need to lengthen the belt, unfasten it and repeat the procedure above.
- If you need to shorten the belt, pull on the loose end of the webbing.

To store the belt:

Fasten the center tongue and buckle when not in use. This will prevent the belt from falling between the seat and the seatback.

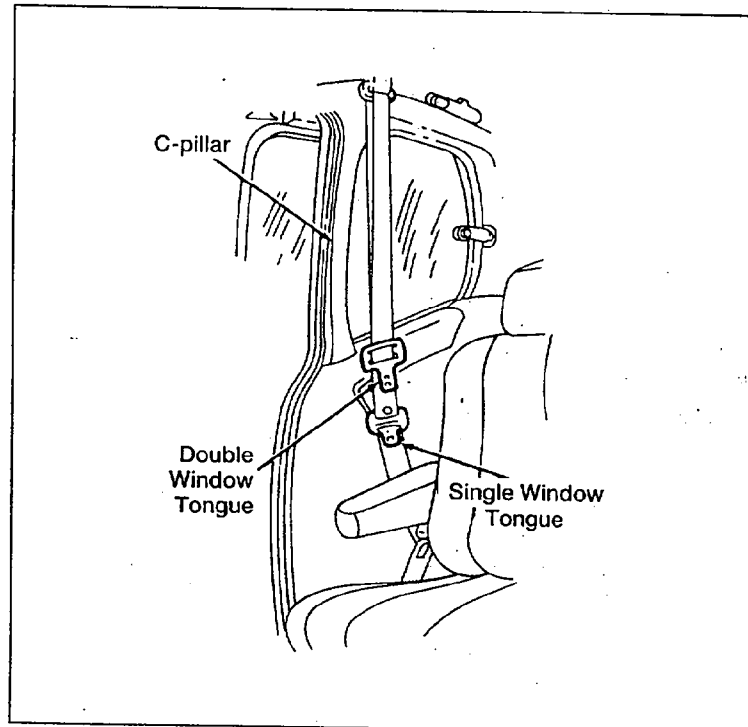
Auxiliary Safety Restraint System for the Second Row Bench Seat (7 passenger vehicle)

There is a unique safety restraint system for the outside seating position of the second row bench seat. It is very important that you read and understand this section before anyone rides in the outside seating position (near the sliding door) of the two-passenger bench seat.

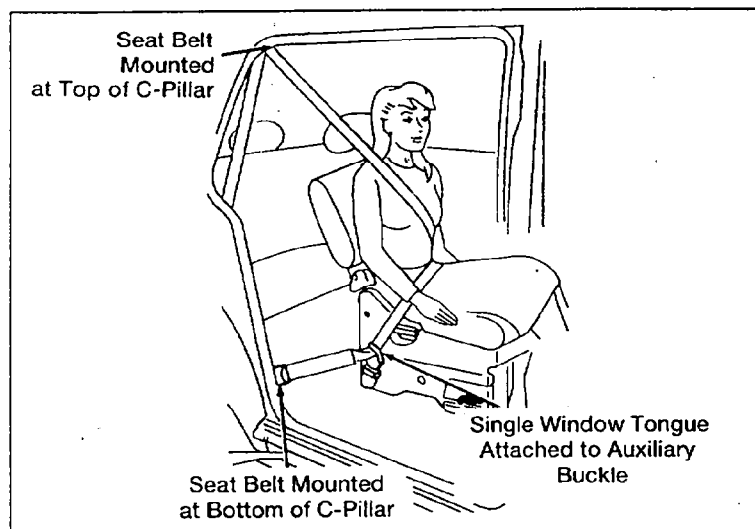
The two-passenger bench seat in the second row has a safety restraint system made up of two buckles and two tongues. There is an anchor location at the bottom of the C-pillar and another anchor location at the top of the C-pillar that attach each end of the seat belt webbing to the bodyside.

Safety Restraints

One of the seat belt tongues has two "windows" (or holes) and the other has only one "window." The seat belt tongue with one window attaches to the buckle mounted to the side of the seat. The seat belt tongue with two windows should be pulled across the passenger's chest and fastened to the buckle mounted in the standard location in the middle of the seat.



The auxiliary safety restraint system for the second row bench seat

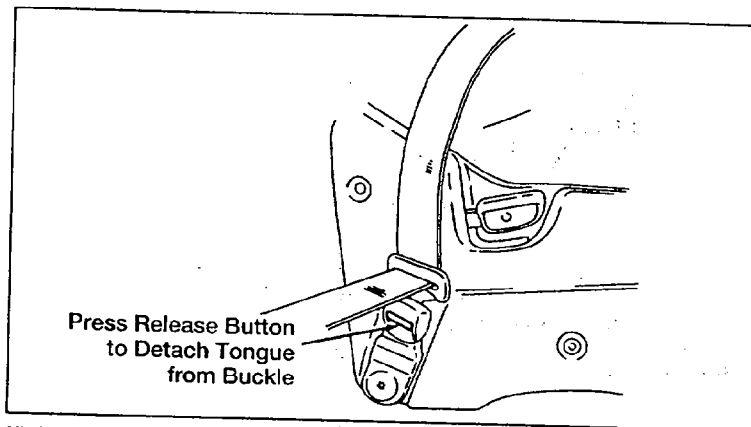


The auxiliary safety restraint system fastened

A twisted belt may prevent the retractor from working properly. If the unique safety belt system is twisted, disengage the single window tongue from the buckle on the side of the seat, remove the twist and re-install the tongue into the buckle until you hear a snap and feel the latch engage.

NOTE: If the three-passenger bench seat is moved up to the second-row position, the outside passenger (near the sliding door) only needs to use the double window tongue and the standard buckle. Because the third-row seat is wider and is closer to the sliding door, the single window tongue and the auxiliary buckle are not necessary.

Safety Restraints

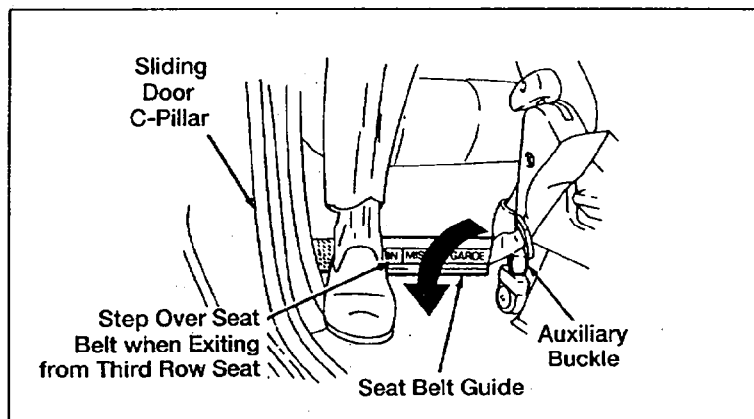


Unfastening the auxiliary safety restraint system

Both tongues must be attached to their appropriate buckles whenever someone is riding in that seating position.

When the two-passenger bench seat is removed from the vehicle, you must detach the single window tongue from the auxiliary buckle.

Third-row passengers must be very careful when exiting if the auxiliary restraint system is being used by a second-row passenger. It is important to step over the seat belt guide and belt webbing to avoid tripping.



Exiting a vehicle with the auxiliary safety restraint system

Labels are provided on the back of the second-row bench seat to remind passengers to use care when exiting.

Safety Belt Extension Assembly

A safety belt may be too short even when it is fully extended. You can add about eight inches (20 cm) to the belt length with a safety belt extension assembly. Safety belt extensions are available at no cost (part number 611C22) from your dealer.

⚠ WARNING

Failure to follow these instructions will affect the performance of the safety belts and increase the risk of personal injury.

Safety Restraints

Safety Belt Maintenance

Check the safety belt systems periodically to make sure that they work properly and are not damaged.

All safety belt assemblies, including retractors, buckles, front seat belt buckle support assemblies (slide bar) (if so equipped), child safety seat tether bracket assemblies (if so equipped), and attaching hardware, should be inspected after any collision. Ford recommends that all safety belt assemblies used in vehicles involved in a collision be replaced. However, if the collision was minor and a qualified technician finds that the belts do not show damage and continue to operate properly, they do not need to be replaced. Safety belt assemblies not in use during a collision should also be inspected and replaced if either damage or improper operation is noted.

Cleaning the Safety Belts

Clean the safety belts with any mild soap solution that is recommended for cleaning upholstery or carpets. Do not bleach or dye the belt because this may weaken it.

Air Bag Supplemental Restraint System (SRS)

The driver and right front passenger air bags are Supplemental Restraint Systems (SRS), provided at these seating positions in addition to the lap/shoulder belt, and are designed to supplement the protection provided to properly belted occupants in moderate to severe frontal collisions. The supplemental air bag system does not provide restraint to the lower body.

The Importance of Wearing Safety Belts

WARNING

Safety belts must be worn by all vehicle occupants to be properly restrained and help reduce the risk of injury in a collision.

WARNING

All occupants of the vehicle, including the driver, should always wear their safety belts, even when an air bag Supplemental Restraint System is provided.

There are four very important reasons to use safety belts even with a supplemental air bag system. Use your safety belts to:

- help keep you in the proper position when the supplemental air bag inflates
- reduce the risk of harm in rollover, side or rear impact accidents. The air bag supplemental restraint system is not designed to inflate in such situations
- reduce the risk of harm in frontal collisions that are not severe enough to activate the supplemental air bag
- reduce the risk of being thrown from your vehicle

Safety Restraints

The Importance of Being Properly Seated

In a collision, the air bag must inflate extremely fast to help provide additional protection for you. In order to do this, the air bag must inflate with considerable force. If you are not seated in a normal riding position with your back against the seatback, the air bag may not protect you properly and could possibly hurt you as it inflates.

WARNING

If a passenger is not properly seated and restrained, an inflating air bag could cause serious injury.

WARNING

Rear-facing infant seats should never be placed in the front seat.

In rear-facing infant seats, the infant's head is closer to the air bag. The force of the rapidly inflating air bag could push the top of the rear-facing seat against the vehicle seatback or center armrests (if so equipped), or center console (if so equipped). REAR-FACING INFANT CARRIERS MUST ALWAYS BE SECURED IN THE REAR SEAT, and other child safety seats and infant seats should be secured in the rear seat whenever possible.

Your vehicle is equipped with a right front passenger air bag. Air bags deploy with great force, faster than the blink of an eye. Front passengers, especially children and small adults, must never sit on the front edge of the seat, stand near the glove compartment of the instrument panel, or lean over near the air bag cover when the vehicle is moving. All occupants should sit with their backs against the seatback, move the seat to the most rearward position if possible and use the safety belts. Children weighing less than 40 lbs. (18 kg) always should use child or infant seats.

⚠ WARNING

When using forward-facing child seats move the passenger seat as far back from the instrument panel as possible. **NEVER SECURE REAR-FACING INFANT SEATS IN THE FRONT SEAT.**

THE FORCE OF THE RAPIDLY INFLATING PASSENGER AIR BAG COULD PUSH THE TOP OF THE REAR-FACING SEAT AGAINST THE VEHICLE SEATBACK, ARMRESTS OR CONSOLE. REAR-FACING INFANT SEATS MUST ALWAYS BE SECURED IN THE REAR SEAT.

⚠ WARNING

Do not place objects or mount equipment on or near the air bag cover on the steering wheel or in front seat areas that may come in contact with a deploying air bag. Failure to follow this instruction may increase the risk of personal injury in the event of a collision.

For further information about the proper mounting of equipment in the front seat of this vehicle, please refer to Ford's brochure entitled *Some Important Information About Air Bag Supplemental Restraint System* which can be obtained by calling Helm Inc. at 1-800-782-4356. Ask for brochure FPS-8602.

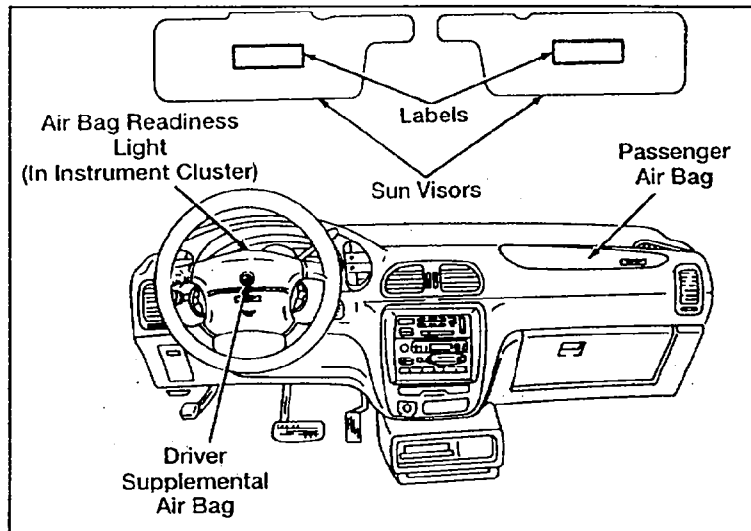
For additional important safety information on the proper use of seat belts, child seats, and infant seats, please read the other sections of this part of the Owner Guide, especially sections entitled *Safety Belts for Children* and *Safety Seats for Children*.

Safety Restraints

How the Air Bag Supplemental Restraint System Operates

The Air Bag Supplemental Restraint System consists of the driver and passenger air bags, impact sensors, a system diagnostic module, a readiness light and tone, and the electrical wiring which connects the components.

The driver air bag is in the center of the steering wheel. The front passenger seat air bag is located in the center of the instrument panel ledge above the glove compartment. Both air bags are designed to stay out of sight until they are activated.



The location of air bags and warning labels

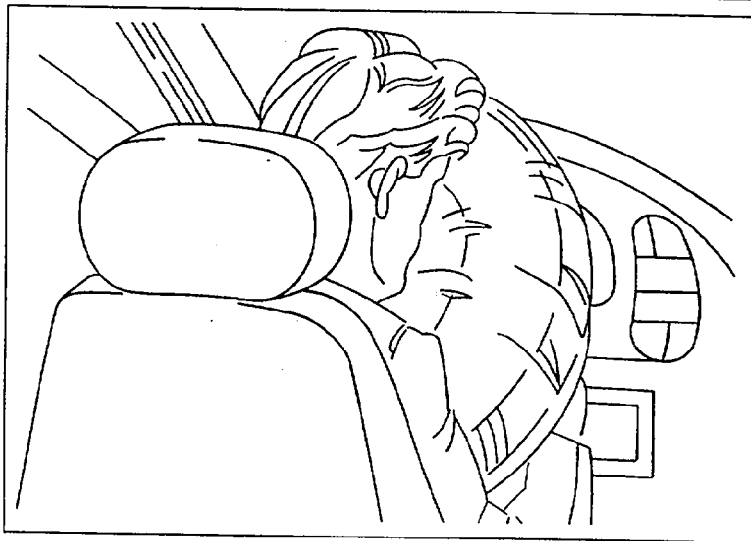
If a collision occurs, the sensors sense the severity of the impact and activate the air bags if necessary. The air bag system is designed to deploy in frontal and front-angled collisions more severe than hitting a parked vehicle (of similar size and weight)

head-on at about 28 mph (45 km/h). Because the system senses the crash severity rather than vehicle speed, some frontal collisions at speeds above 28 mph (45 km/h) will not inflate the air bag.

When the sensors activate the system, the air bags inflate rapidly, filling with non-toxic nitrogen gas in a fraction of a second. Immediately after inflation, the air bags deflate by releasing the nitrogen gas through vent holes. The whole process takes place in a matter of seconds.

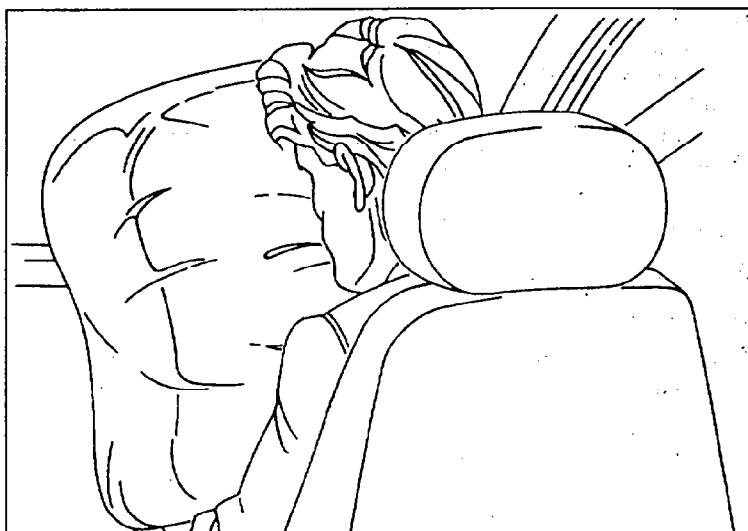
⚠ WARNING

Air bag system components get hot after inflation. Do not touch them after inflation.



Inflated driver-side supplemental air bag

Safety Restraints



Inflated passenger-side supplemental air bag

⚠ WARNING

If the air bag is inflated, THE AIR BAG WILL NOT FUNCTION AGAIN AND MUST BE REPLACED IMMEDIATELY. If the air bag is not replaced, the unrepaired area will increase the risk of injury in a collision.

To ensure that the air bag system will operate as intended in a crash, the system is equipped with a diagnostic module, which controls a readiness lamp and a warning tone. The diagnostic module monitors its own circuits, the air bag electrical system, the air bag readiness light, the air bag power, and the air bag inflators.

The air bag system uses a readiness light on the instrument cluster and a tone to indicate the condition of the system. When you turn the ignition key to the ON position, this light will illuminate for approximately six (6) seconds and then turn off. This indicates that the system is operating normally. NOTE: Maintenance of the air bag system is not required.

A problem with the system is indicated by one or more of the following:

- the readiness light will either flash or stay lit,
- or it will not light immediately after ignition is turned on,
- or a group of five beeps will be heard. The tone pattern will repeat periodically until the problem and light are repaired.

If any of these things happen, have the air bag system serviced at your Ford or Lincoln-Mercury dealer immediately. Unless serviced, the air bag supplemental restraint system may not function properly in the event of a collision.

⚠ WARNING

Do not attempt to service, repair, or modify the Air Bag Supplemental Restraint System or its fuses. See your Ford or Lincoln-Mercury dealer.

Disposal of supplemental air bags or supplemental air bag equipped vehicles

For disposal of air bags or air bag equipped vehicles, see your local Ford or Lincoln-Mercury dealer. Air bags **MUST** be disposed of by qualified personnel.