

REPORT NO. MGA-96-N013

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

MAZDA MOTOR CORPORATION
1996 MAZDA MX-5 *MIATA*
NHTSA NO. MT5401

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: January 24, 1996

Report Date: January 30, 1996

FINAL REPORT

Prepared For:

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF MARKET INCENTIVES
400 SEVENTH STREET, S.W.
Room No. 5313 (NRM-22)
400 Seventh Street, S.W.
Washington, D.C. 20590

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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 Mazda MX-5 2 Door Convertible at the MGA Proving Grounds and Crash Test Center in Burlington, WI. on January 24, 1996. The barrier impact velocity was 56.5 kph (35.08 mph), and the ambient temperature at the time of impact was 21°C. The post-test maximum static crush was 529 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 710 and the 3 msec. Clip (Chest g's) was 54 g's. The left and right femur loads for the driver were 6509 and 4092 Newtons, respectively. The passenger's HIC was 672 and the 3 msec Clip was 58 g's. The left and right femur maximum loads were 6676 and 8067 Newtons respectively.					
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APPROVED BY: David Winkelbauer
David Winkelbauer
MGA Research Corporation

FINAL REPORT ACCEPTED BY:

Manager, New Car Assess. Program (NCAP)

Date of Report Acceptance

H. S. Chan
Contracting Officer's Tech. Rep. (COTR)

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 Mazda MX-5 at a velocity of 56.5 kph (35.08 mph). The test was performed at the MGA Proving Grounds and Crash Test Center on January 24, 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. 066), and the right front passenger (Serial No. 065), were used for this test. Certification details, along with instrumentation calibration data, are found in Appendix C and D.

The 109 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 and visor. The driver HIC was 710 and the maximum chest (CLIP) deceleration over 3 milliseconds was 54 g's. The maximum chest displacement was 31 mm. The left and right femur loads were 6509 and 4092 Newtons respectively.

The right front passenger's head struck the inflated airbag. The passenger HIC was 672 and maximum chest (CLIP) deceleration over 3 milliseconds was 58 g's. The maximum chest displacement was 29 mm. The left and right femur loads were 6676 and 8067 Newtons respectively.

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1996/Mazda/MX-5/2 Door Convertible

NHTSA No.: MT5401 VIN.: JM1NA3537T0700772

Body color: Red Date of Manufacture: 7/95

Engine: 4 Cylinders; C.I.D.; 1.8 Liters;

 X Gas; Diesel; Turbocharged

 Longitudinal; X Transverse

Transmission: 5 Speed; X Manual; Automatic; Overdrive

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

Odometer Reading: 87 miles

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

 P/seats; Tilt Wheel; 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 179 kPa (26 Psi) Rear 179 kPa (26 Psi)

Recommended Tire Size: P185/60R14

Recommended Cold Tire Pressure: Front 179 kPa (26 Psi) Rear 179 kPa (26 Psi)

Tires on Vehicle: P185/60R14; Manufacturer: Bridgestone

Number of Occupants: 2 Front; Rear; 3rd Seat; 2 TOTAL

Type of Front Seats: X Bucket; Bench; Split Bench

Type of Front Seat Back: Fixed; X Adj. With; Power; Lever

Vehicle Capacity Weight (VCW) = 154 kg. (A)

No. of Occupants x 68.0 kg. = 136 kg. (B)

Rated Cargo Weight (RCW) A-B = 18 kg.

GVWR 1286 kg. GAWR: Front 660 kg.; Rear 644 kg.

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

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

Right Front = 275.8 kg Right Rear = 251.7 kg

Left Front = 278.5 kg Left Rear = 242.7 kg

TOTAL FRONT WEIGHT = 554.3 kg (52.9% of Total Vehicle Weight)

TOTAL REAR WEIGHT = 494.4 kg (47.1% of Total Vehicle Weight)

TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 1048.7 kg

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight 1048.7 kg

VCW = Vehicle Capacity Weight 154.0 kg

DSC = Designated Seating Capacity 5 RCW = VCW - 68 (DSC) = 18 kg

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

Target Test Weight = 1218.3 kg

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:

Right Front = 309.4 kg Right Rear = 307.5 kg

Left Front = 309.4 kg Left Rear = 300.3 kg

TOTAL FRONT WEIGHT = 618.8 kg (50.4% of Total Vehicle Weight)

TOTAL REAR WEIGHT = 607.8 kg (49.6% of Total Vehicle Weight)

TOTAL TEST WEIGHT = 1226.6 kg

Weight of ballast secured in vehicle trunk area = 0 kg

Vehicle components removed to meet target weight: Rear deck lid, taillights, rear bumper, rear bumper cover, muffler, antenna, wheel rings, spare tire, jack, lug wrench, and trunk interior

VEHICLE ATTITUDE (all dimensions in mm):

Delivered Attitude: RF 634 LF 633 RR 649 LR 651

Test Attitude: RF 618 LF 615 RR 607 LR 609

Wheel Base: 2255 mm; C.G. = 1117 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 24, 1996 Time of Test: 3:23 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 = 56.5 kph; secondary = 56.5 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 3599 C_L 3740 L 3612
 Post-test = R 3119 C_L 3211 L 3113
 Crush = R 480 C_L 529 L 499

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

R 436 mm C_L 374 mm L 454 mm

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Airbag, visor</u>	<u>Airbag</u>
Chest	<u>Airbag</u>	<u>Airbag</u>
Abdomen	<u>No contact</u>	<u>No contact</u>
Left Knee	<u>Dashboard, steering column</u>	<u>Glovebox</u>
Right Knee	<u>Dashboard, steering column</u>	<u>Glovebox</u>

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

	<u>Front</u>	
<u>Post-Test Door Opening</u>	<u>Left</u>	<u>Right</u>
(without use of tools)	<u>yes</u>	<u>yes</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/Mazda/MX-5/2 Door Convertible

NHTSA No.: MT5401 VIN.: JM1NA3537T0700772

- A. Number of Vent Holes: Driver 2; Passenger 2
- B. Size of Vent Holes: Driver 32 mm; Passenger 55 mm
- C. Total Vent Area; Driver 32 cm² Passenger 95 cm²
- D. Deflated Airbag Length and Width Dimensions or, if Round, Diameter
Driver; Length __, Width __, Diameter 658 mm
Passenger; Length 624 mm, Width 624, 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.:

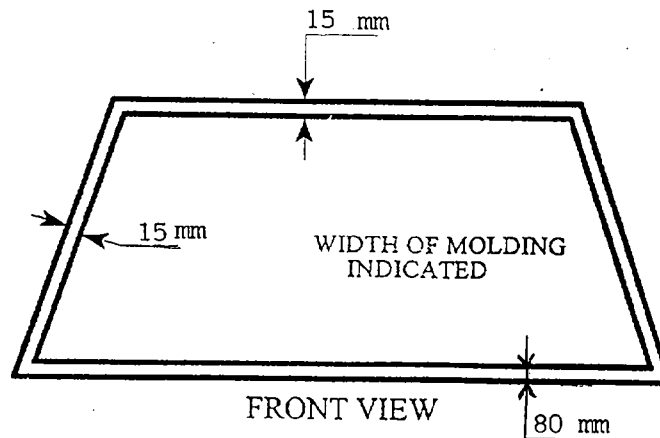
Windshield set in rubber molding with glue

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		PERCENT RETENTION
	PRE-TEST (mm)	POST-TEST (mm)	
RIGHT SIDE	1736	1736	100%
LEFT SIDE	1733	1733	100%
TOTAL	3469	3469	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 $\frac{1}{2}$ " 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= 1055 mm

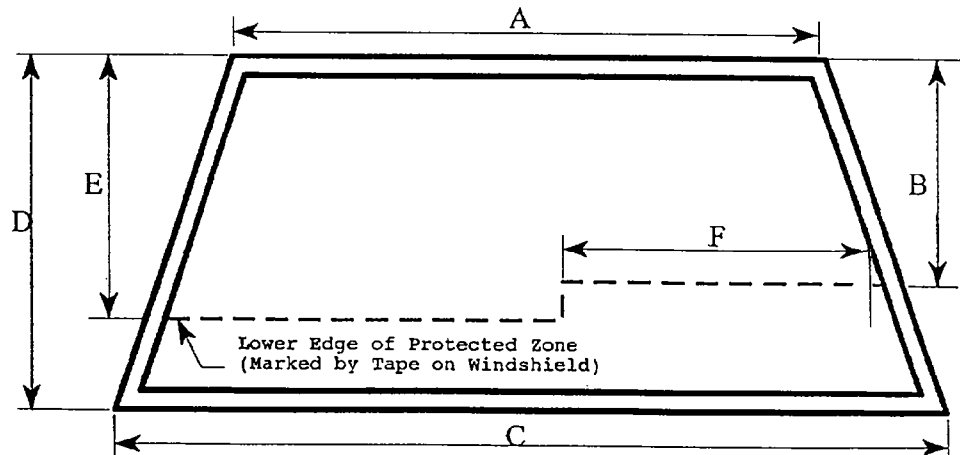
B= 263 mm

C= 1406 mm

D= 509 mm

E= 342 mm

F= 477 mm



FRONT VIEW

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":

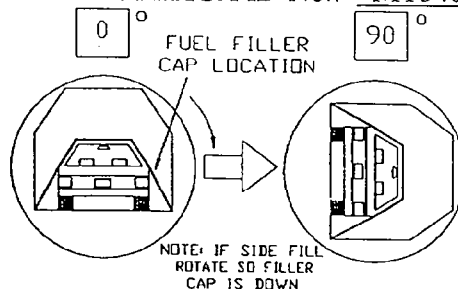
(Show location of penetration)

NONE

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° - 90°

Vehicle NHTSA ID No.: MT5401



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 45 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 45 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
---	---	---	---

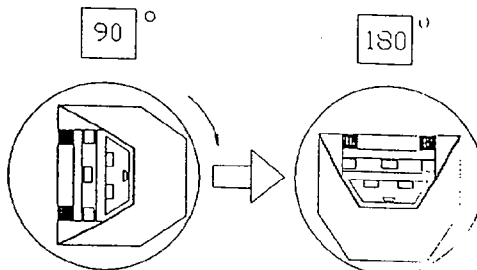
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 90° - 180°

Vehicle NHTSA ID No.: MT5401



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 25 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 25 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
---	---	---	---

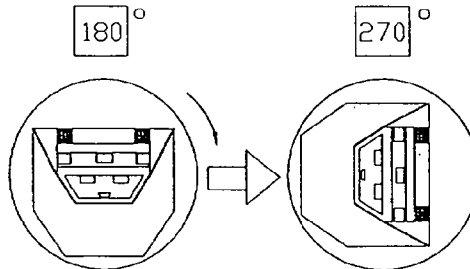
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 180° - 270°

Vehicle NHTSA ID No.: MT5401



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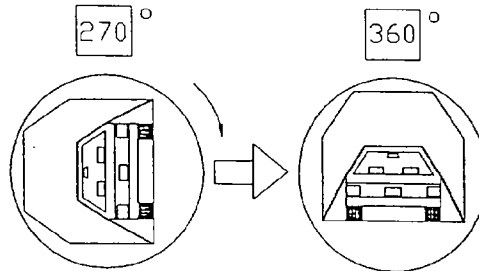
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 270° - 360°

Vehicle NHTSA ID No.: MT5401



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/Mazda/MX-5/2 Door Convertible

VEH. NHTSA NO.: MT5401 TEST DATE: January 24, 1996

MAX. ACCELERATION VALUES: (g's)	DRIVER #066	PASSENGER #065
Head Channel X	-60.2 @ 74 msec.	-60.4 @ 72 msec.
Head Channel Y	-9.3 @ 75 msec.	-21.0 @ 81 msec.
Head Channel Z	34.9 @ 60 msec.	20.7 @ 74 msec.
HEAD RESULTANT	62.7 @ 74 msec.	64.9 @ 72 msec.
Chest Channel X	-55.8 @ 60 msec.	-59.5 @ 77 msec.
Chest Channel Y	-4.3 @ 61 msec.	3.7 @ 68 msec.
Chest Channel Z	-20.3 @ 95 msec.	-19.3 @ 97 msec.
CLIP	54.0	58.1
TIME INTERVAL (msec) [0.003 seconds minimum]	$t_1 = 59.0$ $t_2 = 62.1$	$t_1 = 75.3$ $t_2 = 78.4$

HEAD INJURY CRITERIA (HIC)
VALUES:

HIC	709.5	672.4
$t_1 =$ (msec)	52.7	56.4
$t_2 =$ (msec)	88.7	89.7
Avg. Accel. t_1 to t_2 (g's)	52.2	52.7

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

MAX. COMPRESSIVE FEMUR FORCES:

Left Side (N)	6509	6676
Right Side (N)	4092	8067

MAXIMUM SEAT BELT FORCES:

Lap Belt (N)	5368	2549
Shoulder Belt (N)	5415	6411

HYBRID III NECK, CHEST AND PELVIS DATA SHEET

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1996/Mazda/MX-5/2 Door

VEHICLE NHTSA NO.: MT5401 TEST DATE: January 24, 1996

MAXIMUM VALUES	DRIVER DUMMY #066	PASSENGER DUMMY #065
Neck Load X (N)	364.4 @ 43 msec.	571.1 @ 60 msec.
Neck Load Y (N)	144.8 @ 61 msec.	574.3 @ 72 msec.
Neck Load Z (N)	2685.2 @ 69 msec.	-2024.7 @ 69 msec.
Neck Moment X (NM)	15.0 @ 59 msec.	47.4 @ 70 msec.
Neck Moment Y (NM)	-43.8 @ 78 msec.	38.7 @ 57 msec.
Neck Moment Z (NM)	-17.8 @ 199 msec.	-27.7 @ 83 msec.
Chest Deflection X (mm)	31	29
Time of Max. Occurrence	65 msec.	78 msec.
Pelvis X Acceleration (g's)	-57.9 @ 56 msec.	-61.1 @ 58 msec.
Pelvis Y Acceleration (g's)	-10.7 @ 50 msec.	-9.5 @ 66 msec.
Pelvis Z Acceleration (g's)	-30.5 @ 88 msec.	-28.1 @ 80 msec.
Pelvis Resultant (g's)	61.6 @ 56 msec.	62.1 @ 58 msec.

PART 572 DUMMY IN-VEHICLE POSITION

Vehicle NHTSA No.: MT5401 Vehicle: 1996 Mazda MX-5 2 Door Convertible

SEAT TYPE:

 Bench
 X Bucket
 Split Bench

ADJUSTER TYPE:

Driver: X Manual
 Power

Passenger: X Manual
 Power

BUCKET SEAT BACK TYPE:

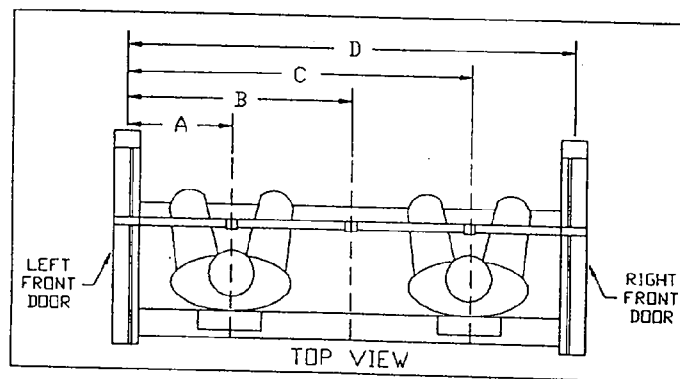
 Fixed
 X Adjustable Reclining

DRIVER SEAT POSITION

10th detent of 19 detents

PASSENGER SEAT POSITION

7th detent of 13 detents



066 DUMMY ID 065

A = Left Door to Driver Centerline	<u>335</u> mm
B = Left Door to Center Passenger Centerline	<u>688</u> mm
C = Left Door to Right Passenger Centerline	<u>1033</u> mm
D = Left Door to Right Door	<u>1376</u> mm

FRONT SEAT MEASUREMENT TABLE

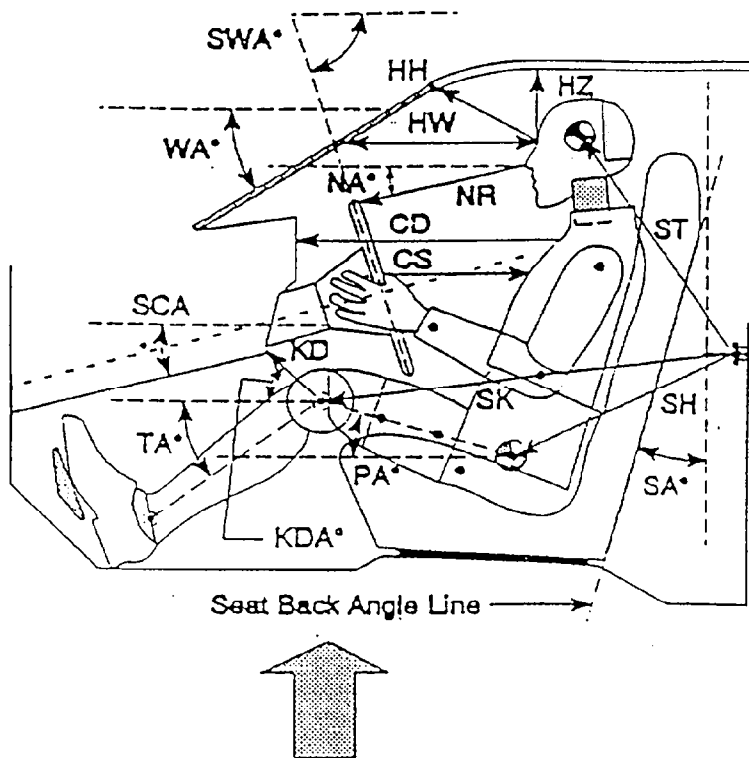
Units (mm)

	DRIVER (Serial #066)	PASSENGER (Serial #065)
WA°	31.0°	
SWA°	18.9°	N/A
SCA°	19.2°	N/A
SA°	8th notch rearward (1st is zero)	8th notch rearward (1st is zero)
HZ	151	143
HH	382	358
HW	487	467
HR	228	233
NR	387 Angle (NA) 10.1°	N/A
CD	510	481
CS	326	N/A
RA	212	N/A
KDL	186 Angle (KDA) 11.6°	162
KDR	186	169 Angle 34.0°
PA°	23.6°	22.2°
TA°	33.3°	27.9°
KK	274	258
ST*	508 Angle 9.3°	510 Angle 18.7°
SK*	637 Angle 91.0°	672 Angle 94.5°
SH*	300 Angle 120.1°	314 Angle 121.2°
SHY	210	204
HS	242	247
HD	123	113
AD	66	68

N/A = Not Applicable

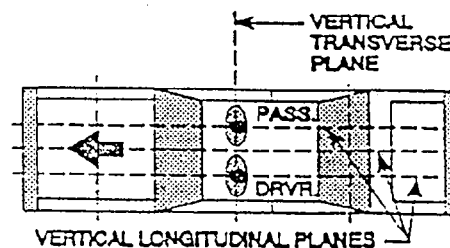
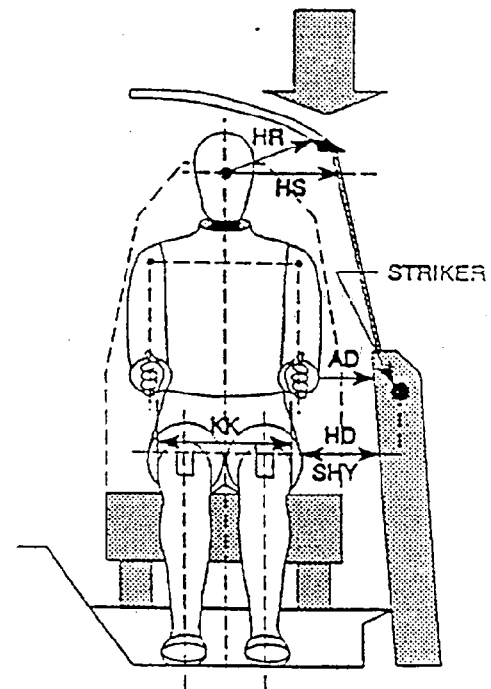
* Angles measured from vertical

FRONT SEAT MEASUREMENTS

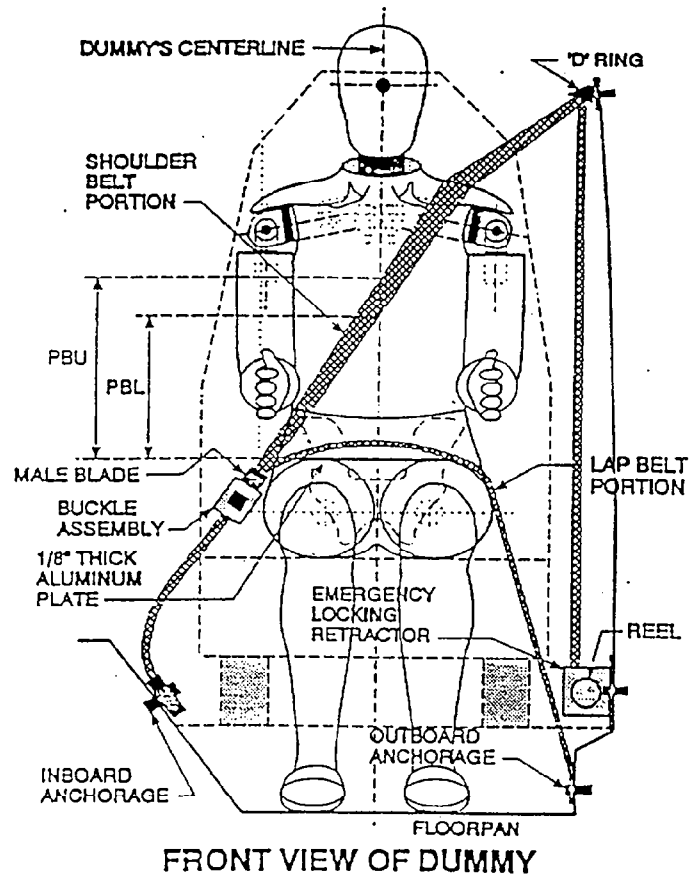


- AD - Arm to Door
- HD - H-Point to Door
- HR - Head to Side Header
- HS - Head to Side Window
- KK - Knee to Knee
- SHY - Striker to H-Point (Y-Direction)

- 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
<u>PBU</u> --	Top surface of alum. plate to upper edge	345	304
<u>PBL</u> --	Top surface of alum. plate to belt lower edge	265	215

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>36 mm</u>	<u>36 mm</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>890 mm</u>	<u>948 mm</u>
Lap belt length as measured on Part 572 Dummy.	<u>720 mm</u>	<u>764 mm</u>

SHOULDER BELT SPOOL-OFF DATA:

As determined by film analysis	<u>NR</u>	<u>NR</u>
As determined mechanically	<u>N/A</u>	<u>N/A</u> at retractor
	<u>NR</u>	<u>NR</u> at D-ring
As determined electronically	<u>NR</u>	<u>NR</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>NR</u>	<u>NR</u>
---	-----------	-----------

NR Not Recorded

CAMERA LOCATIONS

VEH. NHTSA NO.: MT5401; TEST DATE: January 24, 1996; TIME: 3:23 p.m.

VEH. YEAR/MAKE/MODEL/BODY STYLE: 1996/Mazda/MX-5/2 Door

CAMERA POSITION NO.	VIEW	CAMERA POSITIONS (mm.)*			ANGLE (deg)	FILM PLANE TO HEAD TARGET (mm)	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Left Side View	-	-	-	-	-		
2	Left Front View	860	7980	1290	90°	7590	25	980
3	Steering Column Top	1390	7280	1560	90°	6890	25	881
4	Steering Column Bottom	1360	7250	1025	90°	6860	25	656
5	Left Driver Close-up	1200	6800	1305	90°	6410	50	1015
6	Left Angle	4920	5630	2050			50	1031
7	Driver Onboard							
8	Passenger Onboard							
9	Right Overall	1880	-6470	1300	90°	-6860	13	917
10	Right Front	1890	-7960	1330	90°	-8350	25	976
11	Right Passenger Close-up	1520	-7030	1245	90°	-7420	50	1031
12	Right Angle	5170	-5640	2040			50	837
13	Top View Wide	1825	0	5200			8	1026
14	Top Driver	-380	370	2600			13	957
15	Top Passenger	-380	-340	2600			13	1026
16	Pit Engine	1140	0	-3150			13	855
17	Fuel Tank	2835	0	-3150			13	1026

* COORDINATES:

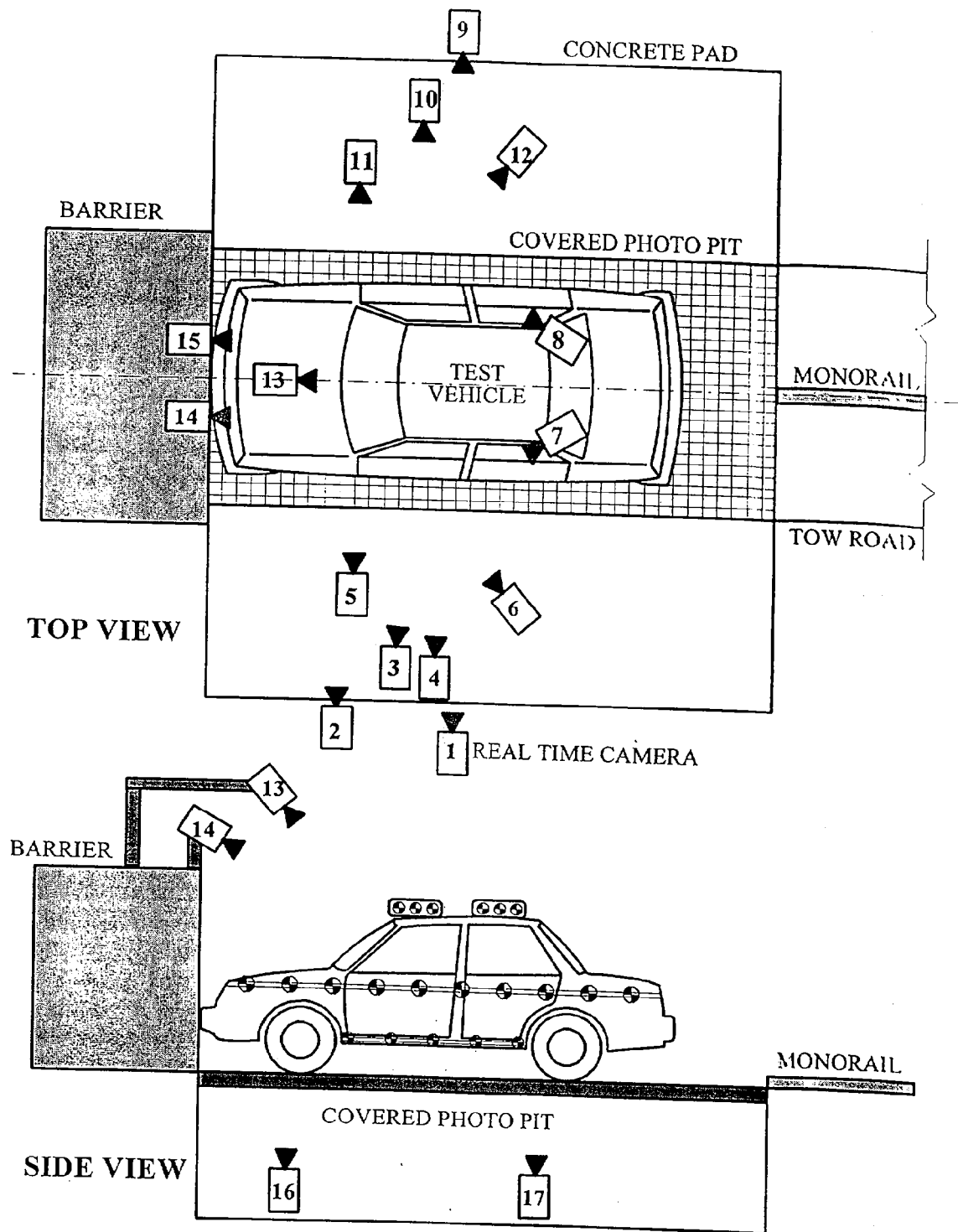
+X = film plane rearward of barrier

+Y = film plane to left of monorail centerline

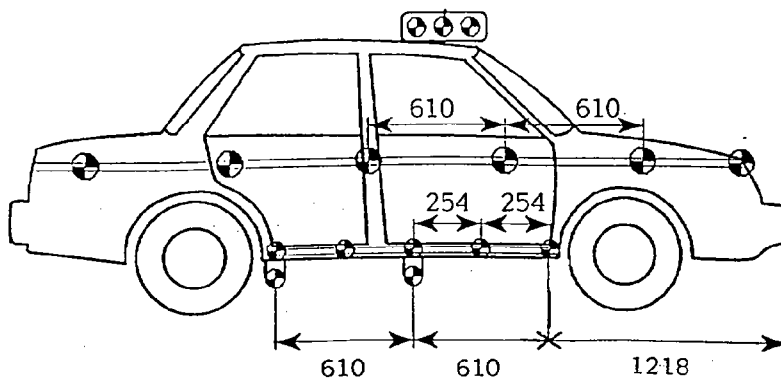
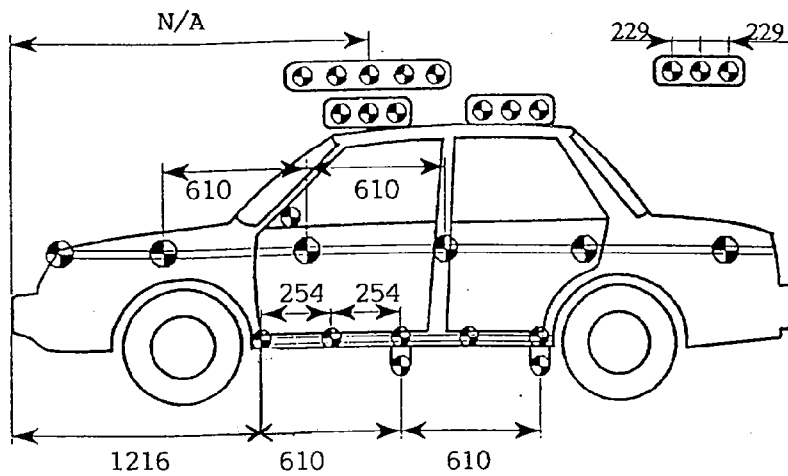
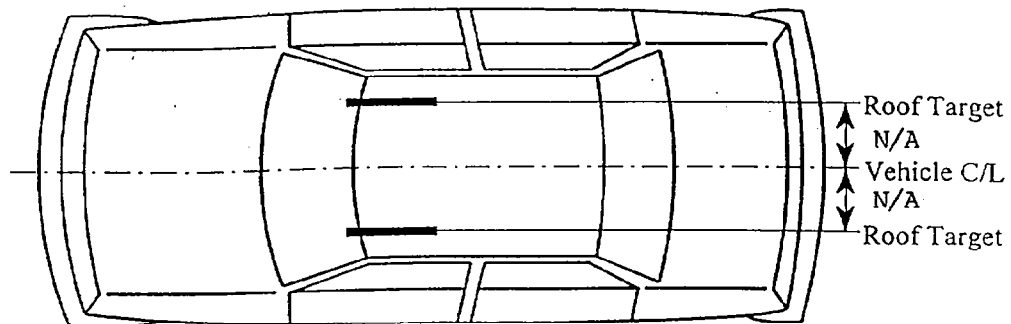
+Z = film plane to above ground level

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)

N/A = Soft top vehicle no roof targets were used

LOAD CELL LOCATIONS ON FIXED BARRIER

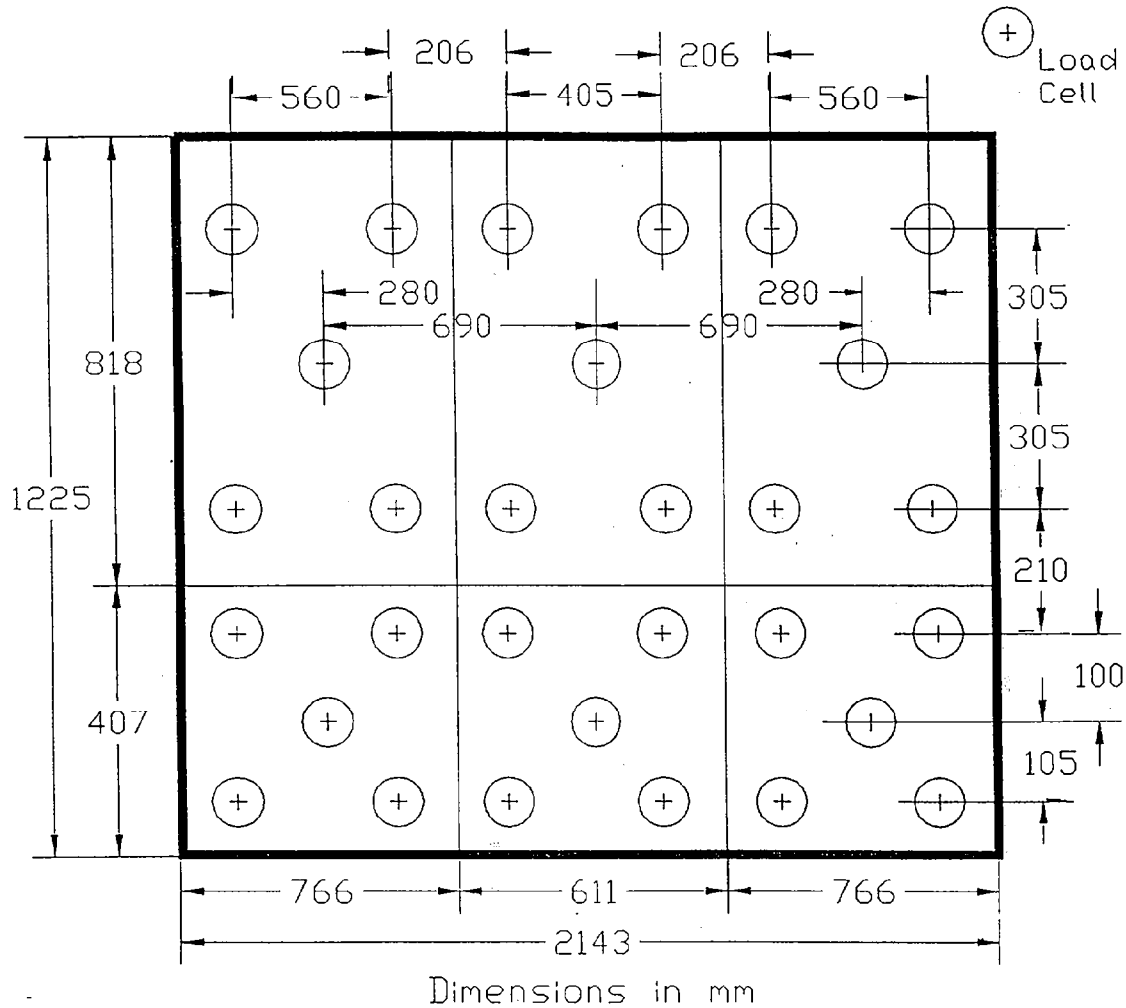
30 Load Cells

6 Rows

9 Columns

6 Groupings (5 cells/group)

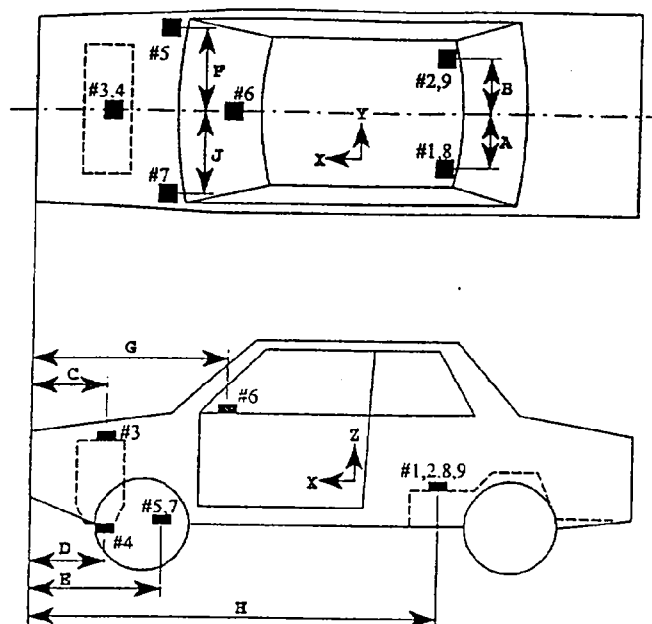
FRONTAL BARRIER FACE



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)

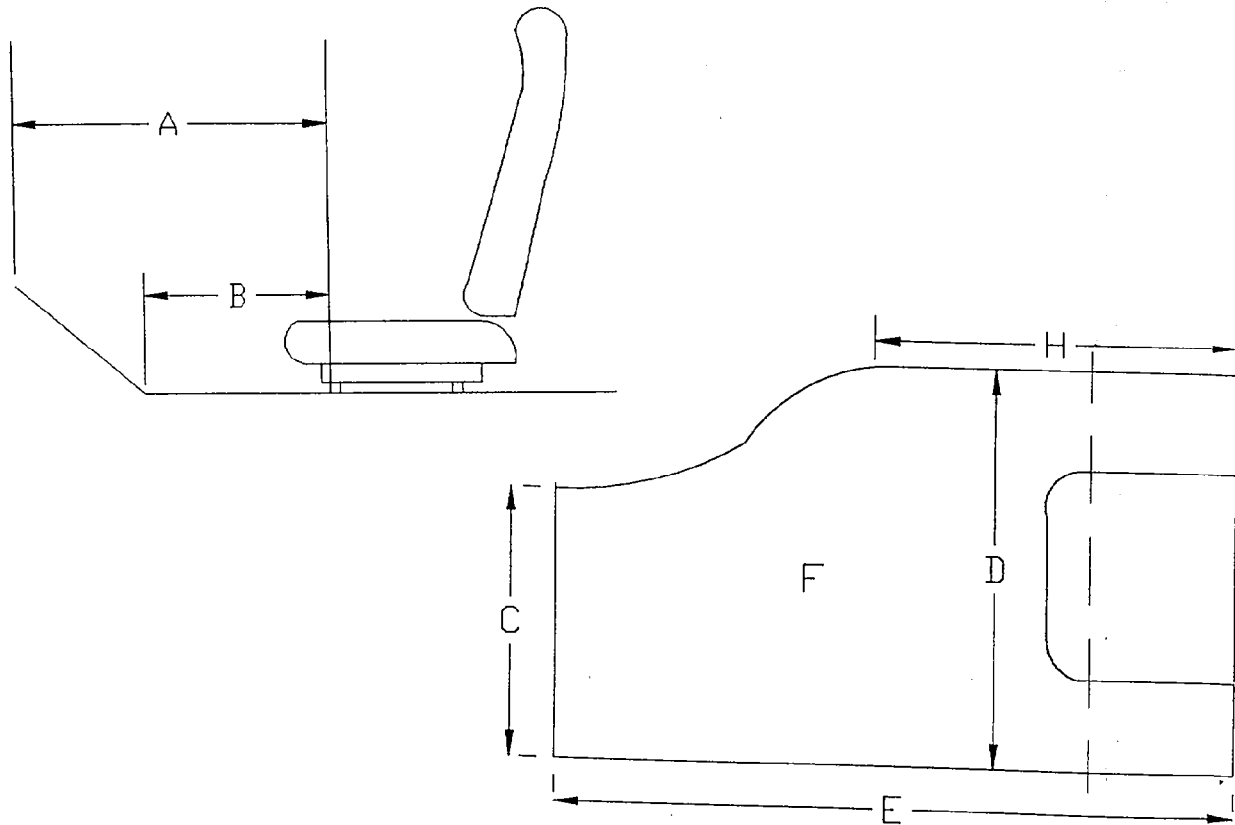
Dimension	Length
A	470
B	472
C	704
D	1068
E	914
F	635
G	1488
H	2555
J	635

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



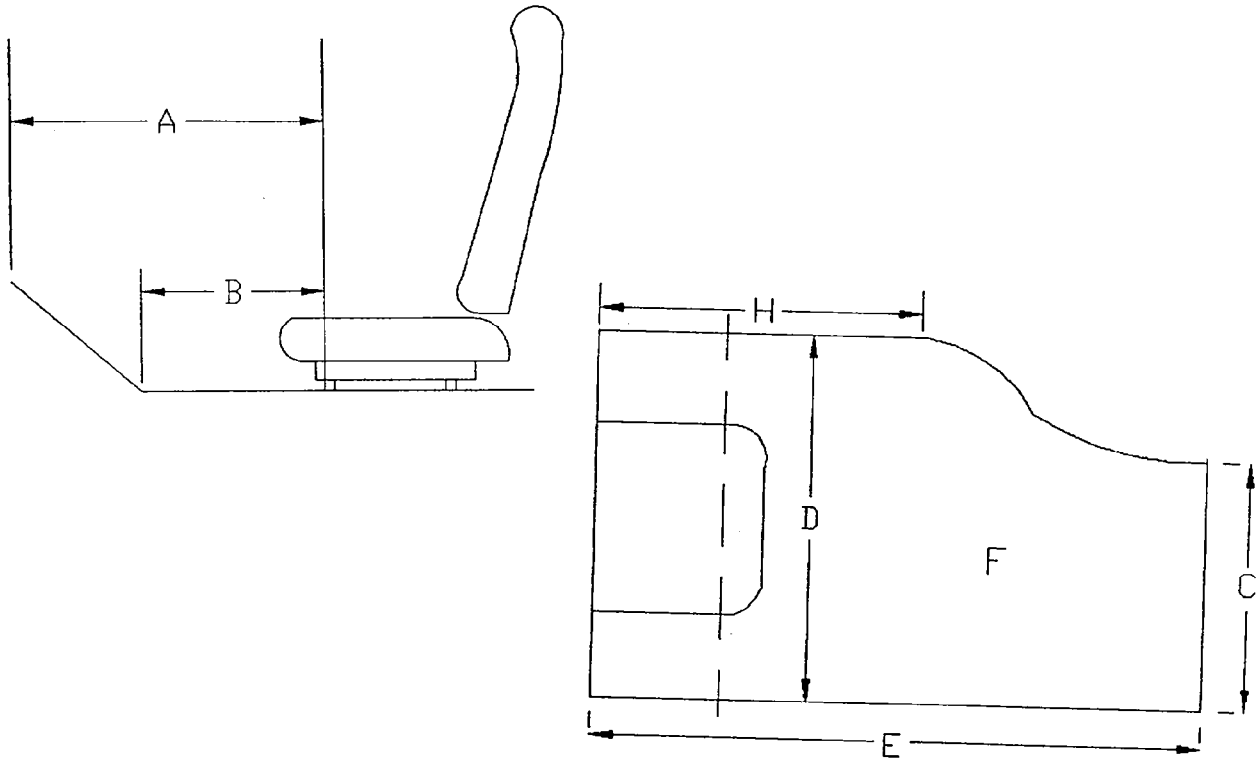
Units = mm

MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	685	652	33
B	476	476	0
C	385	394	9
D	405	404	1
E	1395	1394	1
H	1188	1162	26
F (cm ²)	5608	5725	117

TEST VEHICLE MEASUREMENTS (Cont'd)

STATIC FOOTWELL DEFORMATION

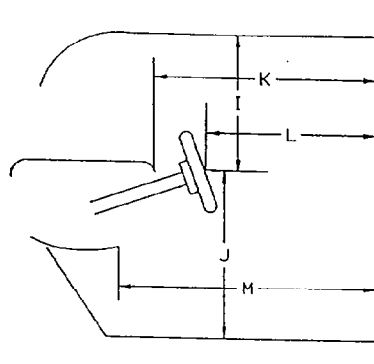
Passenger's Side



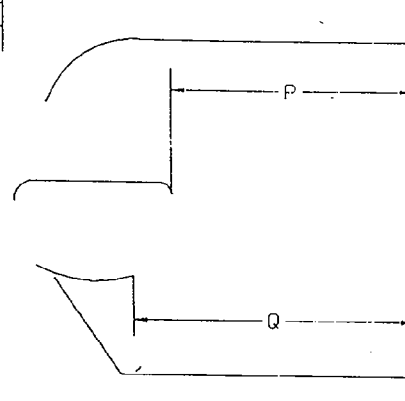
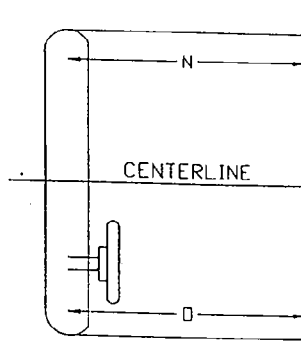
Units = mm

MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	728	675	53
B	604	597	7
C	400	398	2
D	434	443	9
E	1336	1328	8
H	1280	1214	66
F (cm ²)	5779	5832	53

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



MEASUREMENTS
FROM C-PILLAR
BELT ANCHORAGE



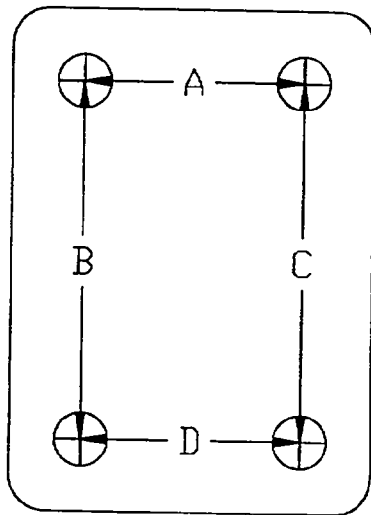
Units = mm

MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
I	390	408	18
J	545	589	44
K	1020	986	34
L	835	833	2
M	1261	1176	85
N	1146	1139	7
O	1150	1135	15
P	1052	1032	20
Q	1174	1159	15

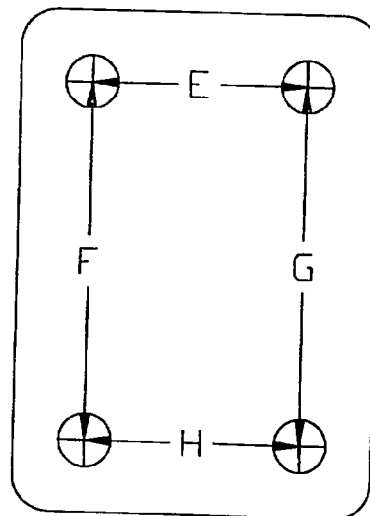
TEST VEHICLE MEASUREMENTS (Cont'd)

UNDERBODY FLOORBOARD DEFORMATION

DRIVER'S SIDE



PASSENGER'S SIDE

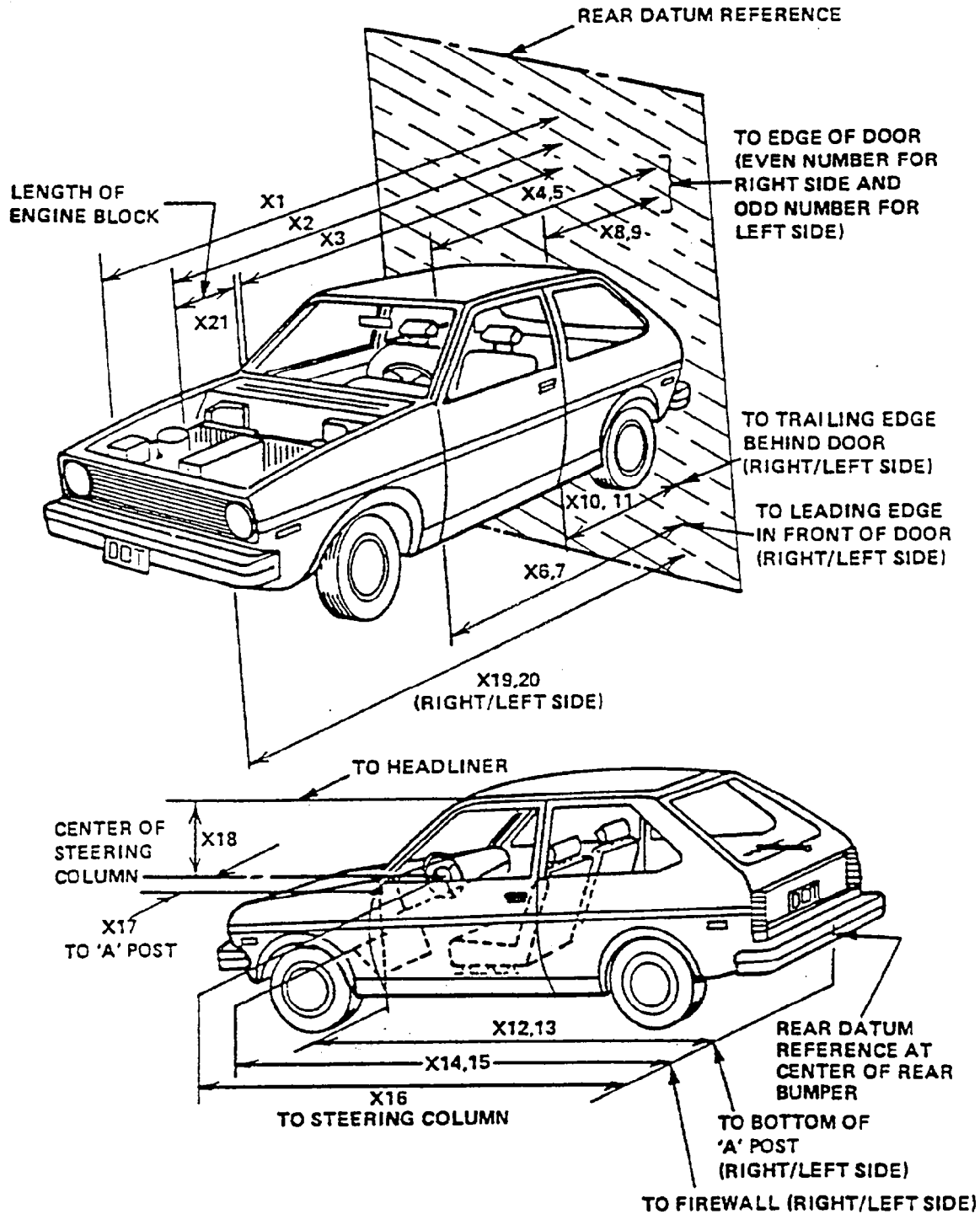


MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	317	317	0
B	367	366	1
C	316	275	41
D	316	320	4
E	280	273	7
F	367	354	13
G	367	368	1
H	353	354	1

TEST VEHICLE MEASUREMENTS (Cont'd)

No.	MEASUREMENT DESCRIPTION:	Pre-Test (mm)	Post-Test (mm)	Diff. (mm)
X1	Total Length of Test Vehicle at Centerline	3740	3211	529
X2	Rear Surface of Vehicle to Front of Engine	3120	2913	207
X3	Rear Surface of Vehicle to Firewall	2580	2483	97
X4	Rear Surface to Upr. Leading Edge of Rt. Door	2199	2212	-13
X5	Rear Surface to Upr. Leading Edge of Left Door	2194	2208	-14
X6	Rear Surface to Lwr. Leading Edge of Rt. Door	2300	2286	14
X7	Rear Surface to Lwr. Leading Edge of Left Door	2289	2287	2
X8	Rear Surface to Upr. Trailing Edge of Rt. Door	1210	1229	-19
X9	Rear Surface to Upr. Trailing Edge of Left Door	1211	1226	-15
X10	Rear Surface to Lwr. Trailing Edge of Rt. Door	1301	1297	4
X11	Rear Surface to Lwr. Trailing Edge of Left Door	1295	1292	3
X12	Rear Surface to Bottom of A-Post on Rt. Side	2298	2292	6
X13	Rear Surface to Bottom of A-Post on Left Side	2297	2290	7
X14	Rear Surface to Firewall on Right Side	2588	2525	63
X15	Rear Surface to Firewall on Left Side	2582	2548	34
X16	Rear Surface to Steering Column	1804	1865	-61
X17	Center of Steering Column to A-Post	368	344	24
X18	Center of Steering Column to Headlining	410	419	-9
X19	Rear Surface to Right Side of Front Bumper	3599	3119	480
X20	Rear Surface to Left Side of Front Bumper	3612	3113	499
X21	Length of Engine Block	480	480	0

TEST VEHICLE MEASUREMENTS (Cont'd)



ACCIDENT INVESTIGATION DIVISION DATA

FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: 1996/Mazda/MX-5/2 Door Convertible

VEH. NHTSA NO.: MT5401; VIN: JM1NA3537T0700772

MODEL YEAR: 1996; BUILD DATE: 7/95; TEST DATE: January 24, 1996

VEH. SIZE CATEGORY: _____; TEST WEIGHT: 1226.6 kg

VEH. WHEELBASE: 2255 mm; FRONT OVERHANG: 744 mm; OVERALL WIDTH: 1658 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: 56.5 kph; TIME OF SEPARATION: 107 msec

VELOCITY CHANGE: 62.0 kph

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

CRUSH DEPTH C1 = 499 mm

DIMENSIONS: C2 = 506 mm

C3 = 526 mm

C4 = 527 mm

C5 = 539 mm

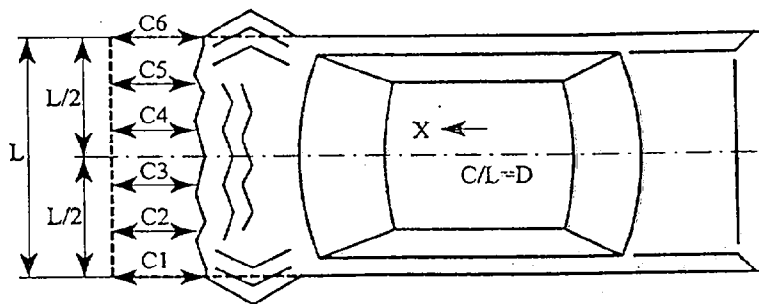
C6 = 480 mm

MIDPOINT OF D = Vehicle Centerline

DAMAGE: (Longitude)

LENGTH OF L = 1132 mm

DAMAGED REGION:



APPENDIX A
PHOTOGRAPHS

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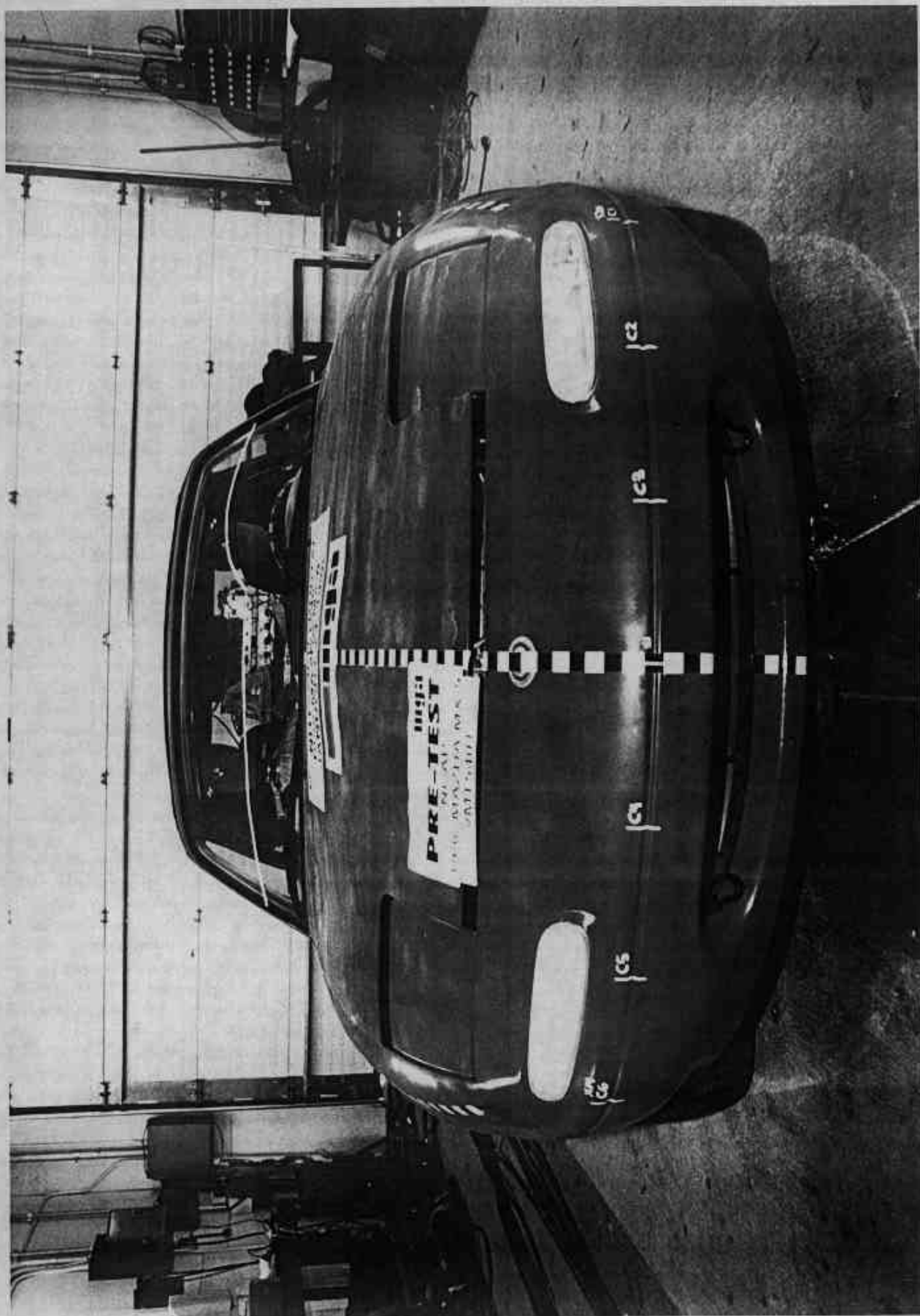


Photo No. A-1 - Pre-Test Front View of Test Vehicle

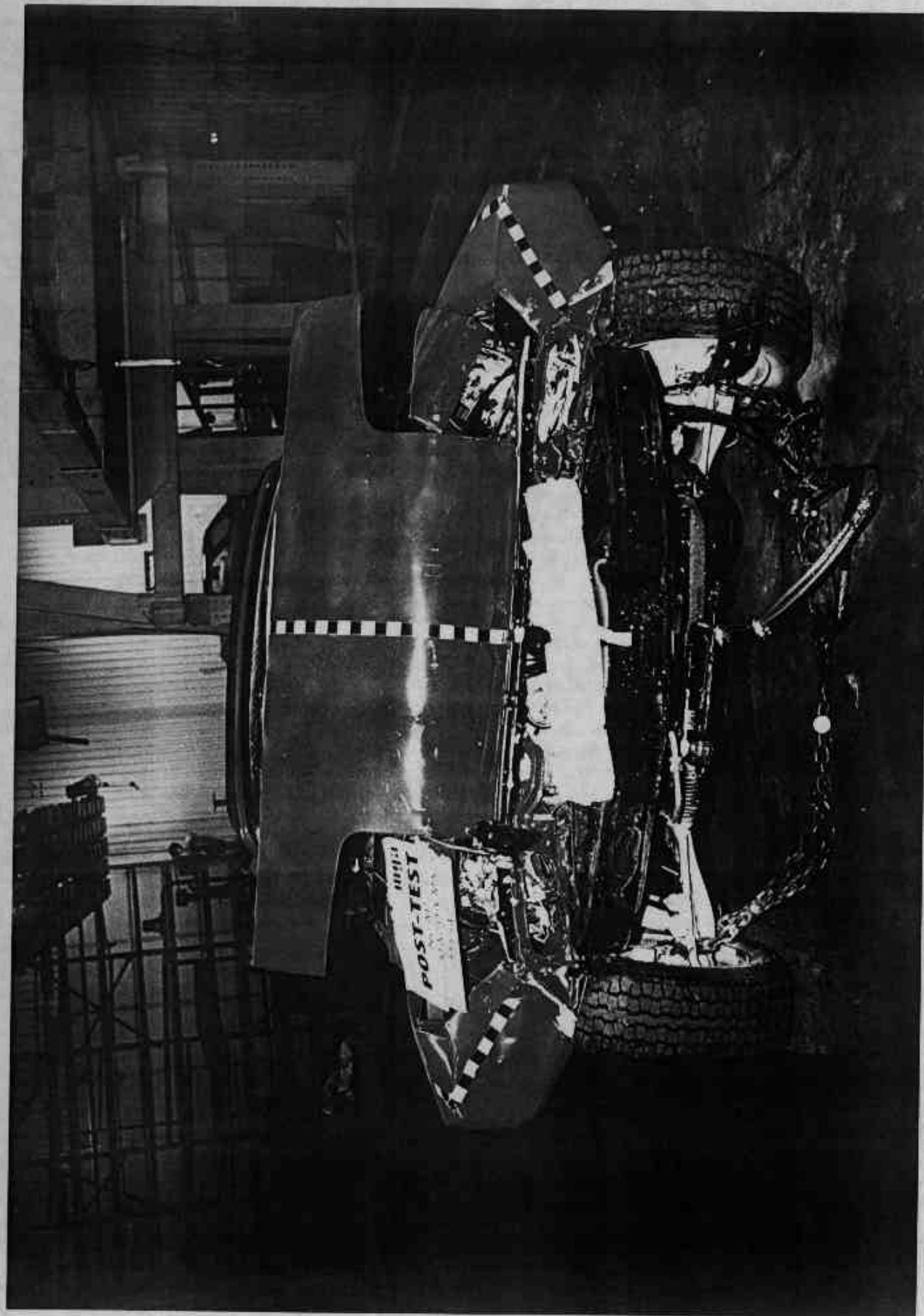


Photo No. A-2 - Post-Test Front View of Test Vehicle

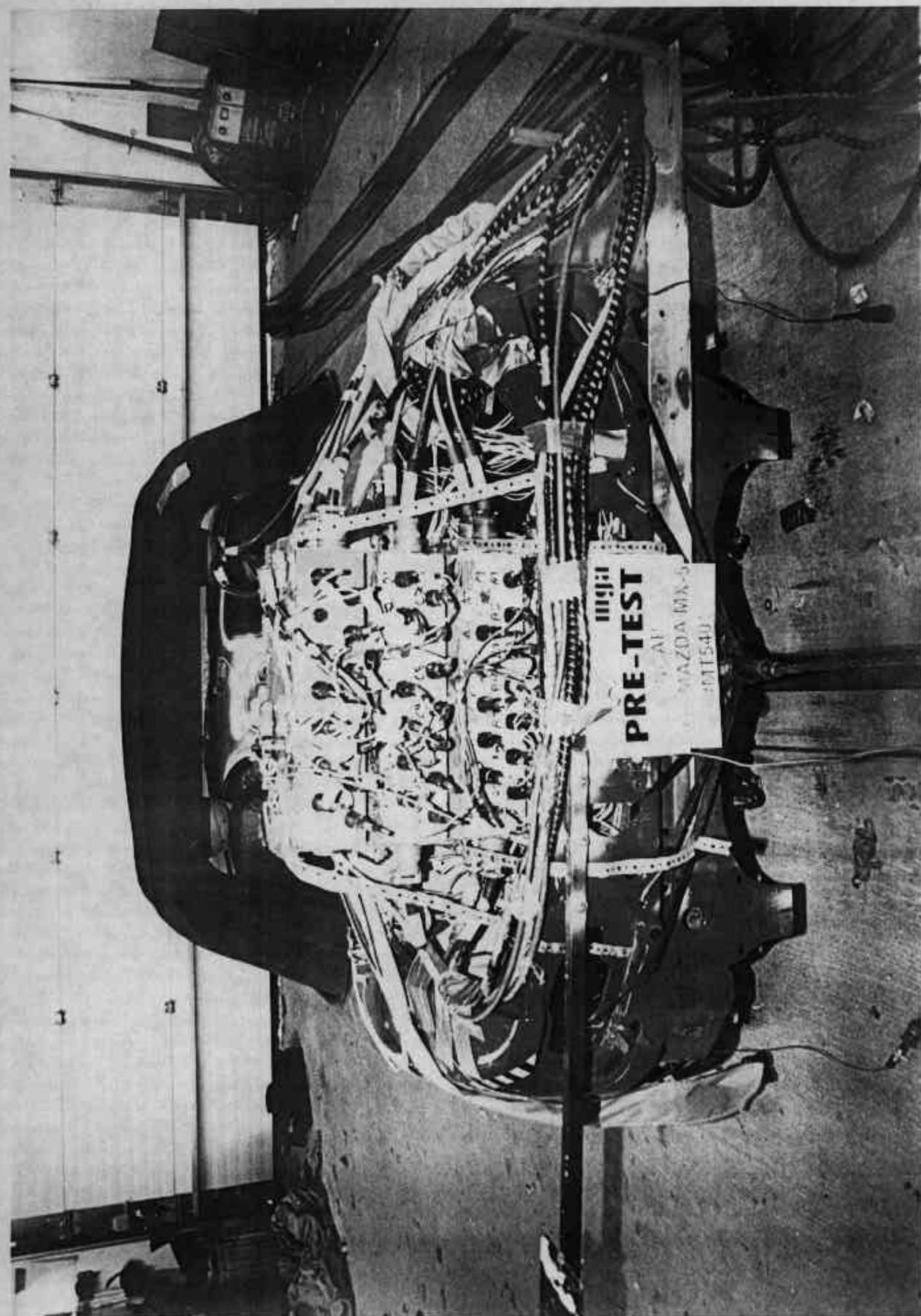


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

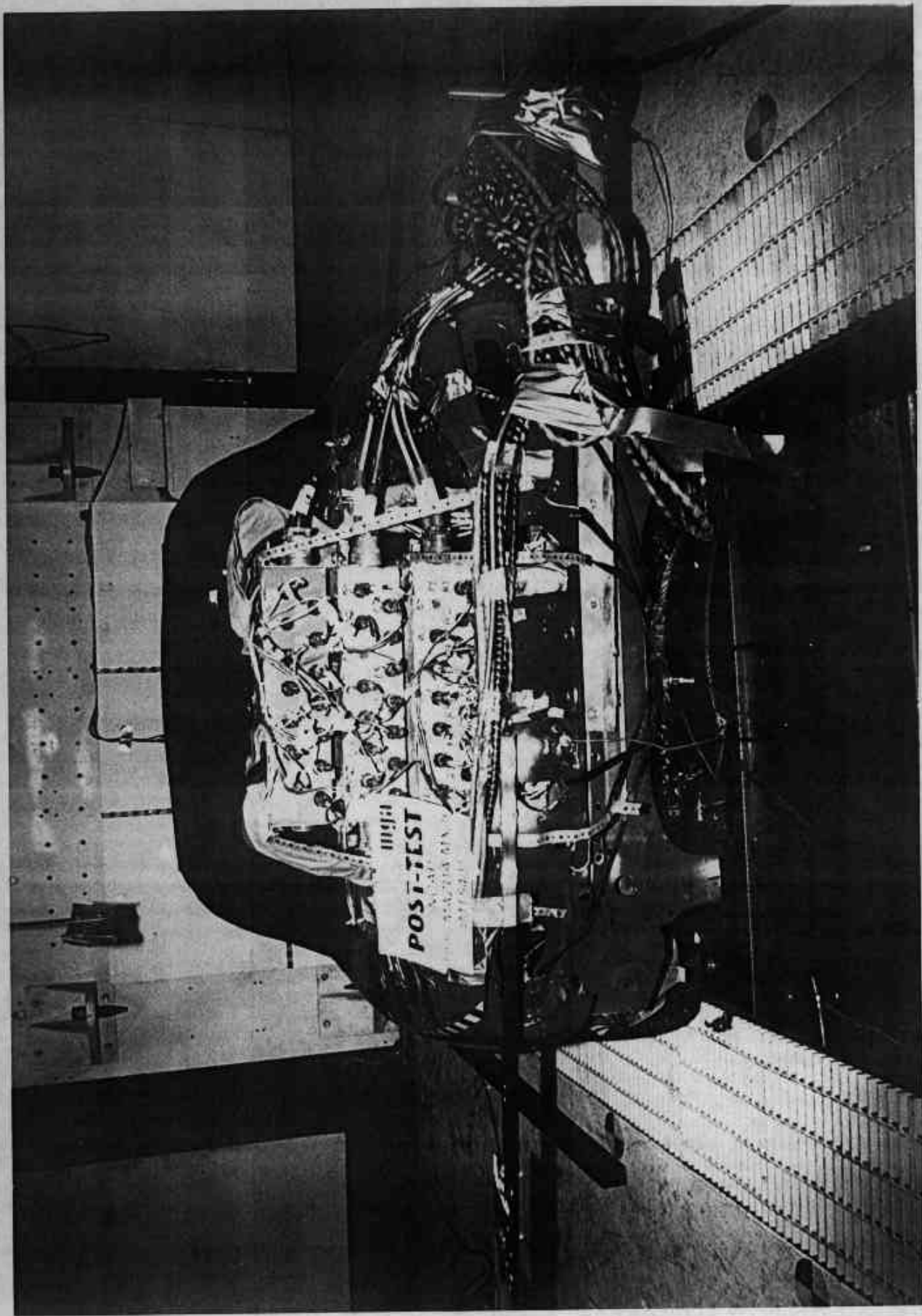


Photo No. A-4 - Post-Test Rear View of Test Vehicle

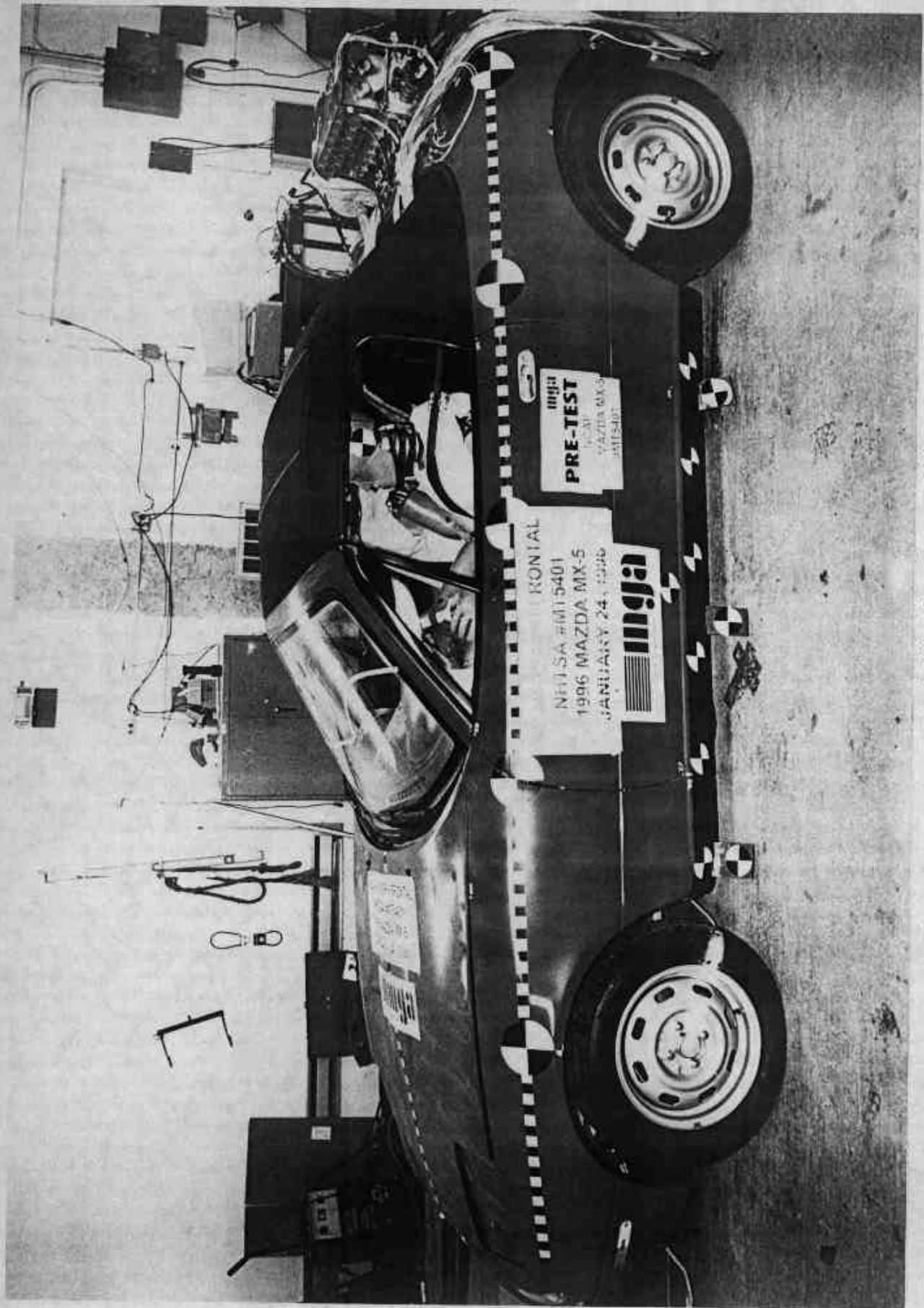


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

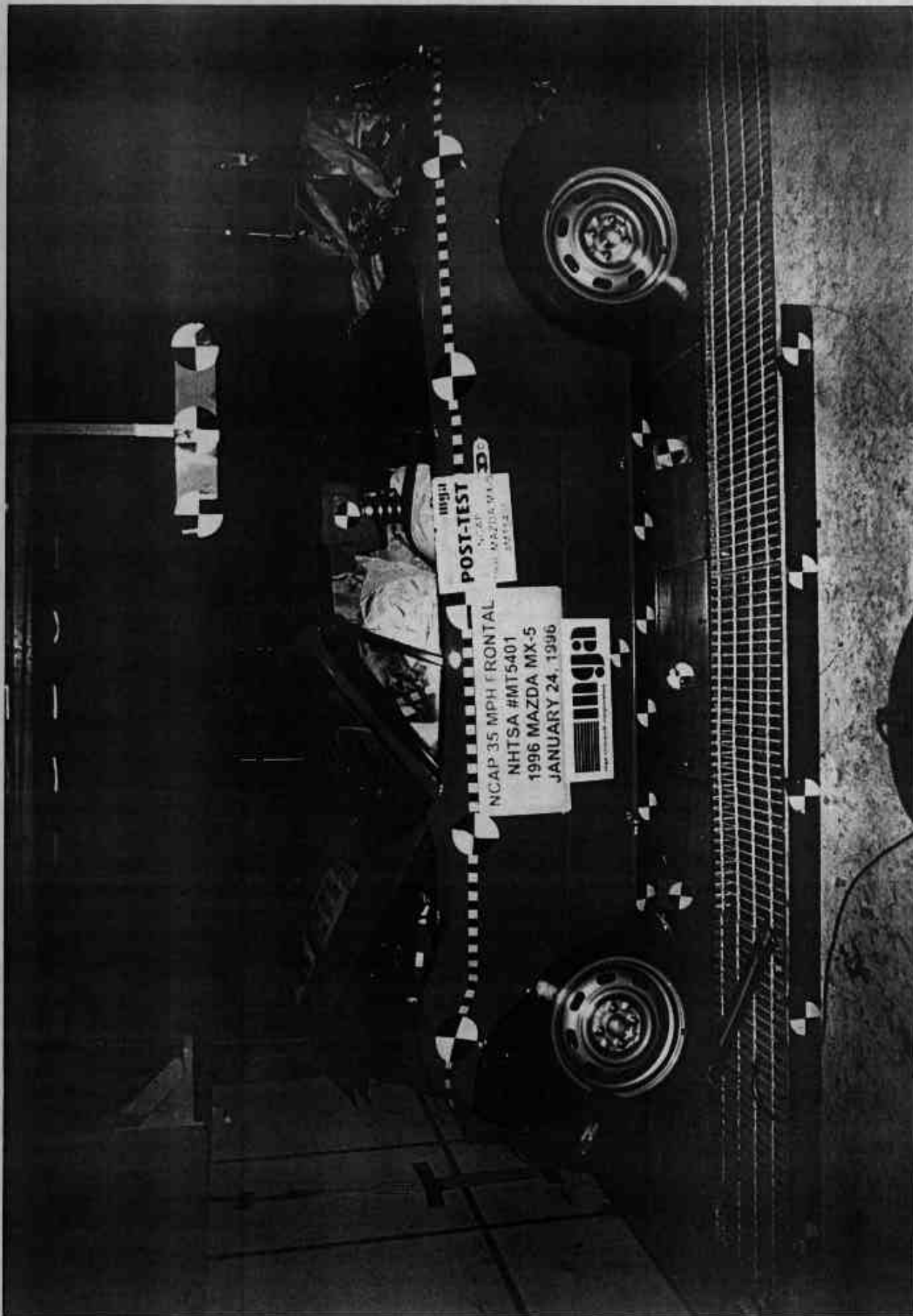


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

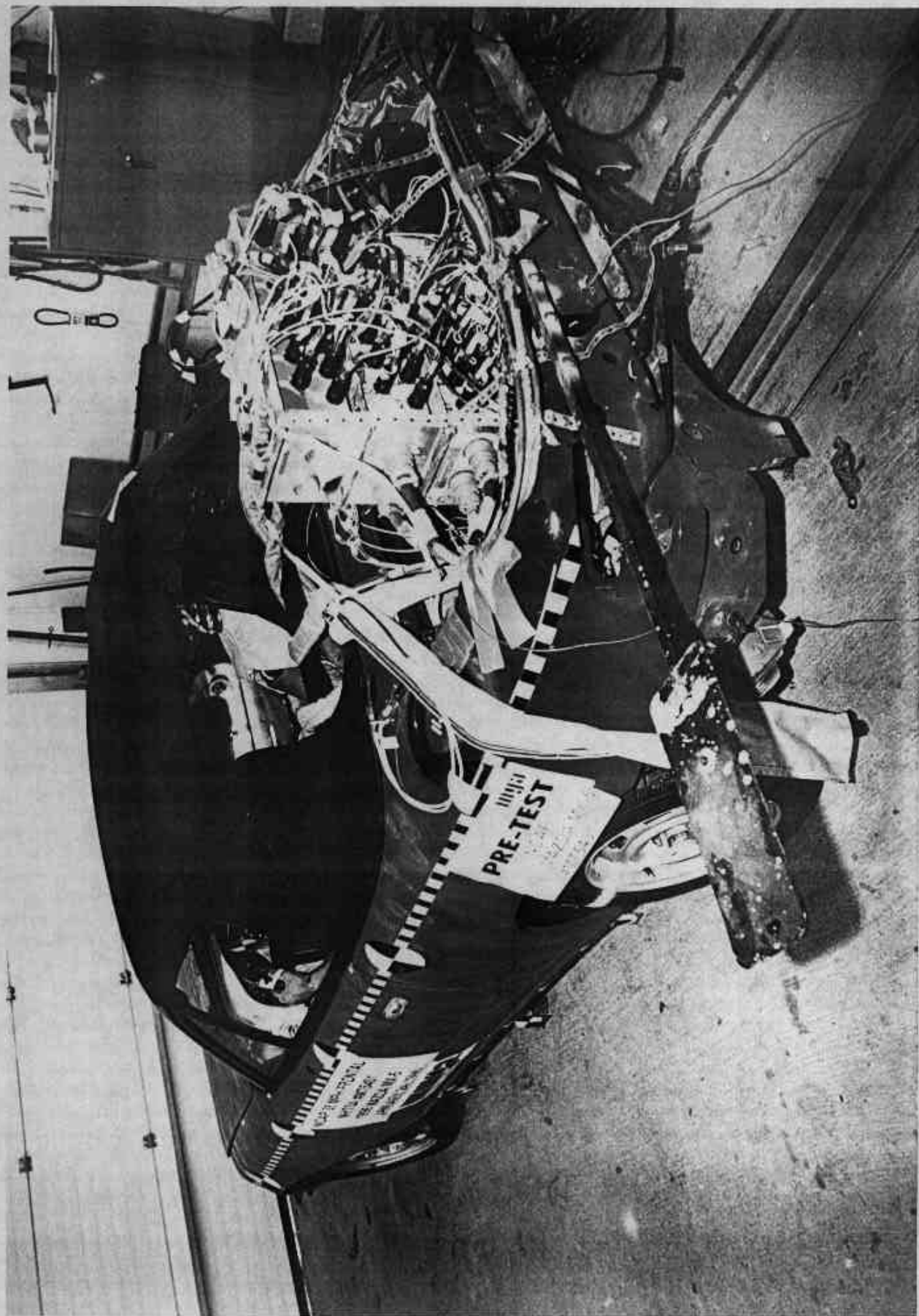


Photo No. A-7 - Pre-Test Left Rear Three-Quarter View of Test Vehicle

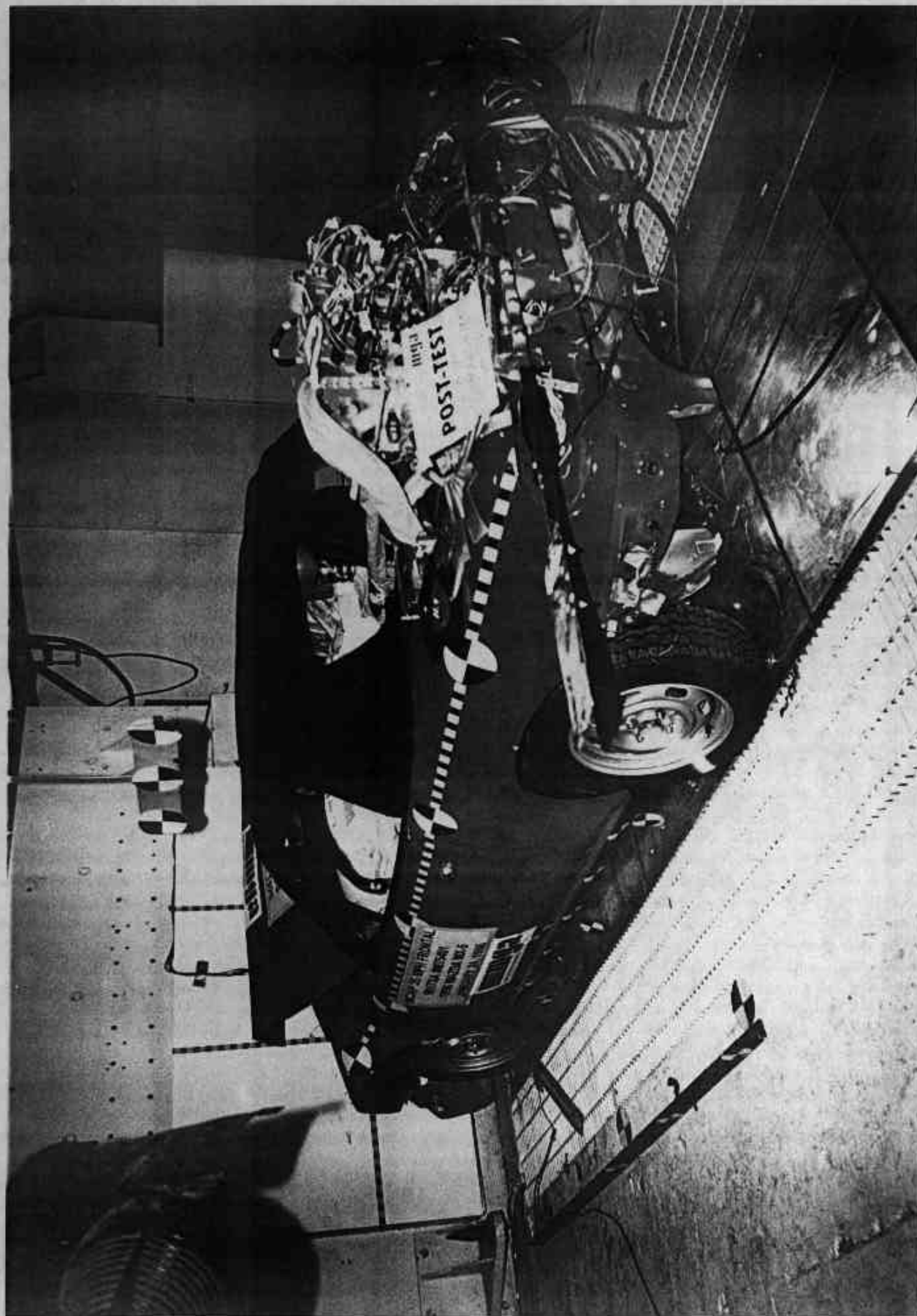


Photo No. A-8 - Post-Test Left Rear Three-Quarter View of Test Vehicle

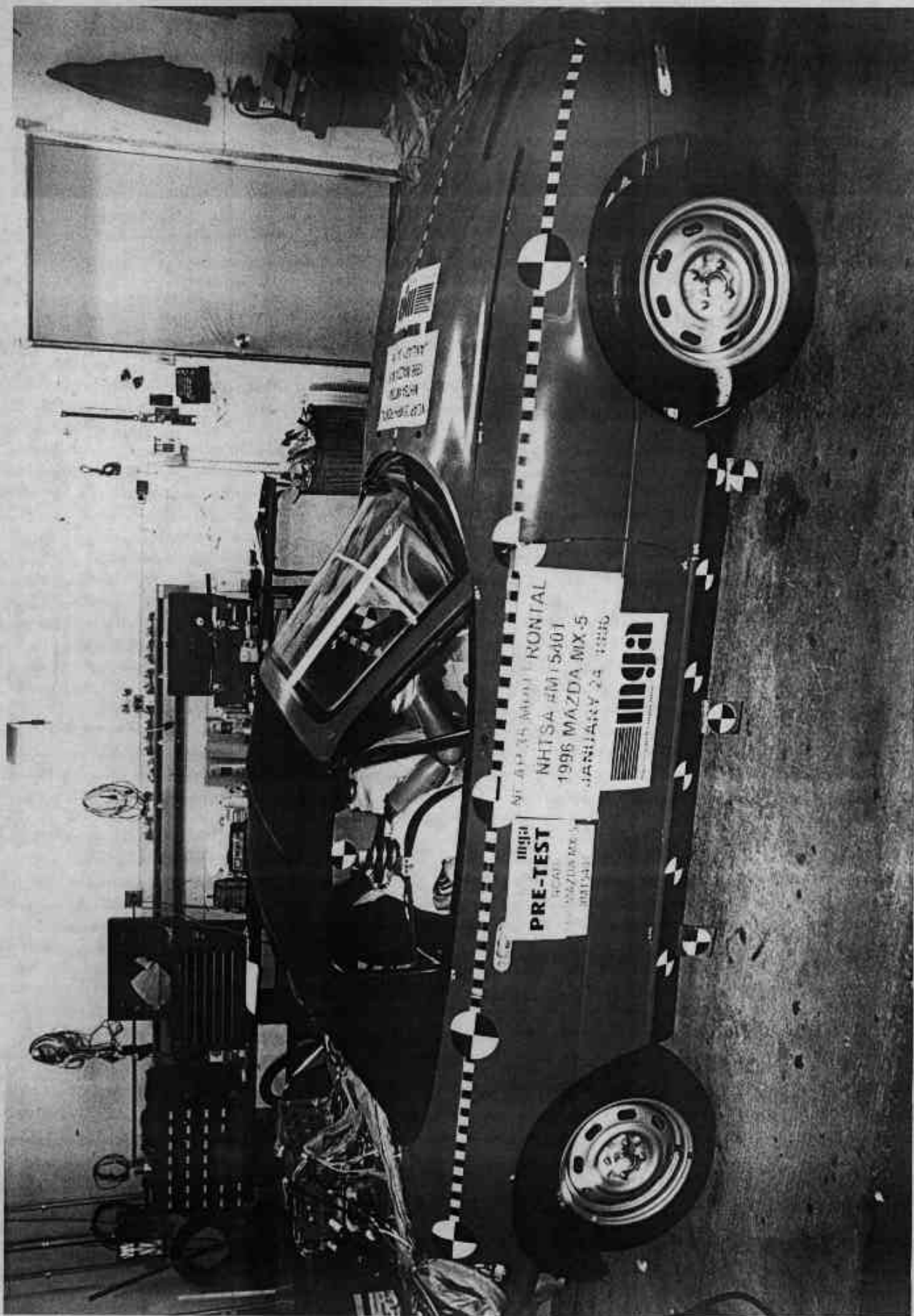


Photo No. A-9 - Pre-Test Right Side View of Test Vehicle

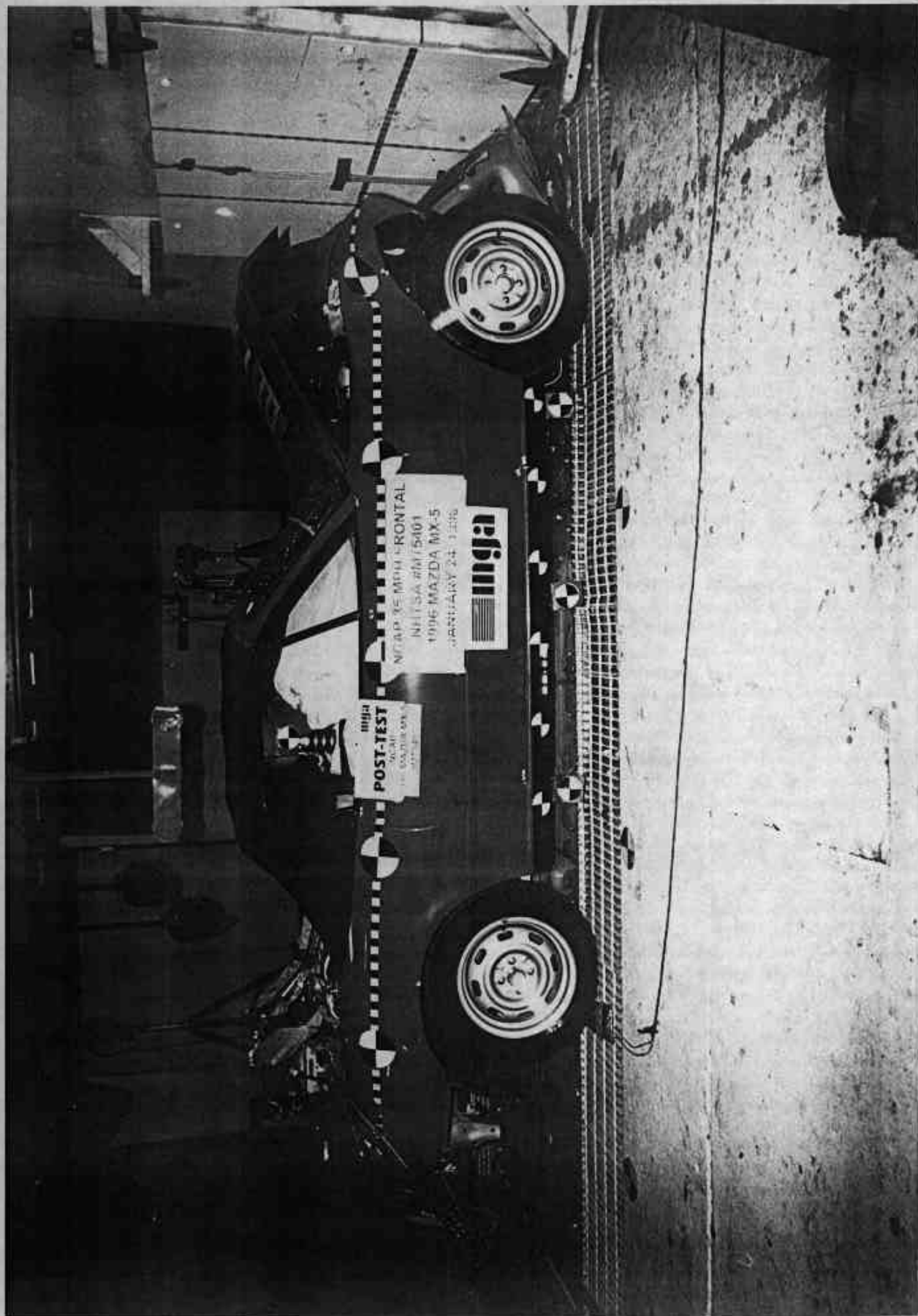


Photo No. A-10 - Post-Test Right Side View of Test Vehicle



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

A-11



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



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

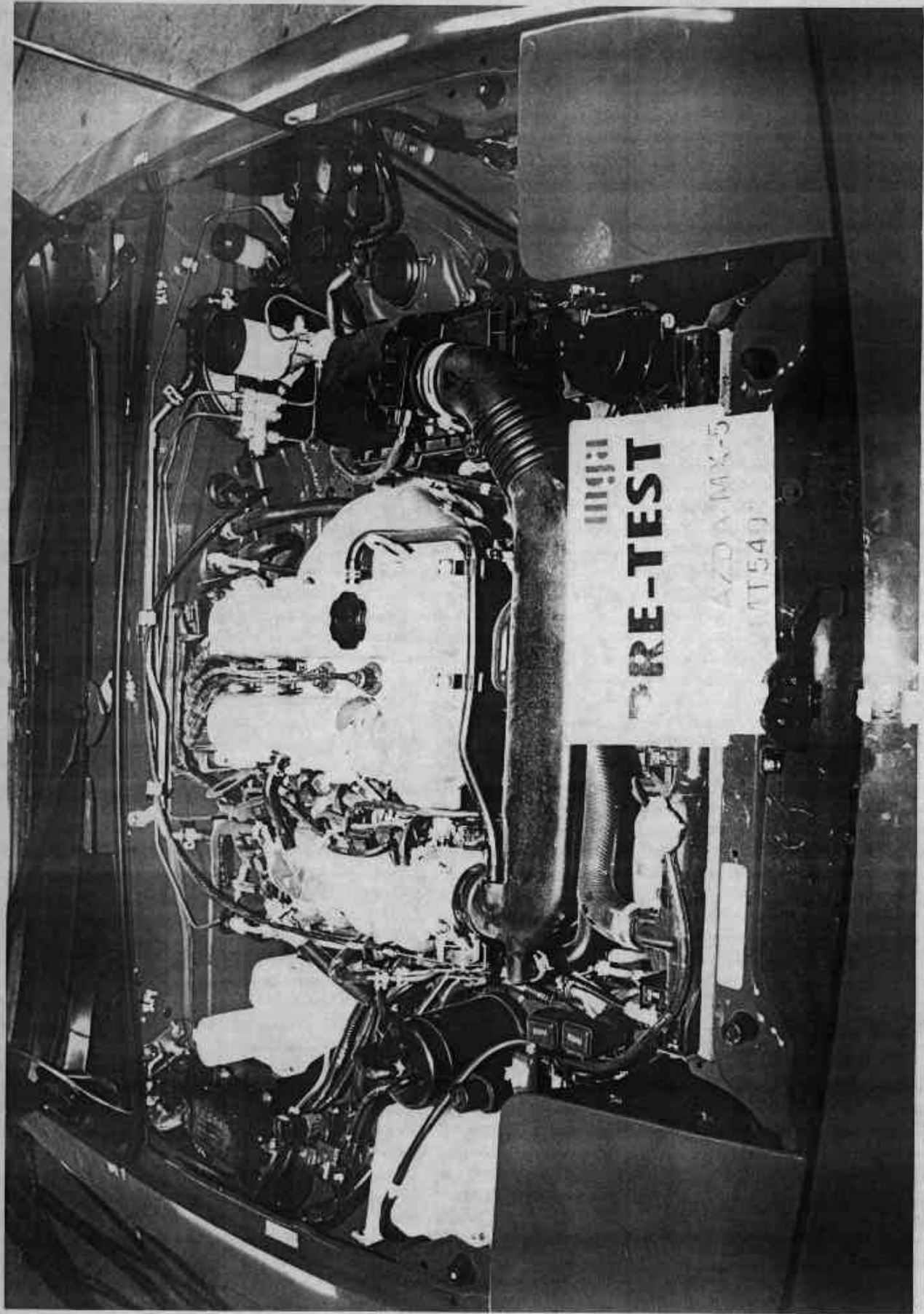
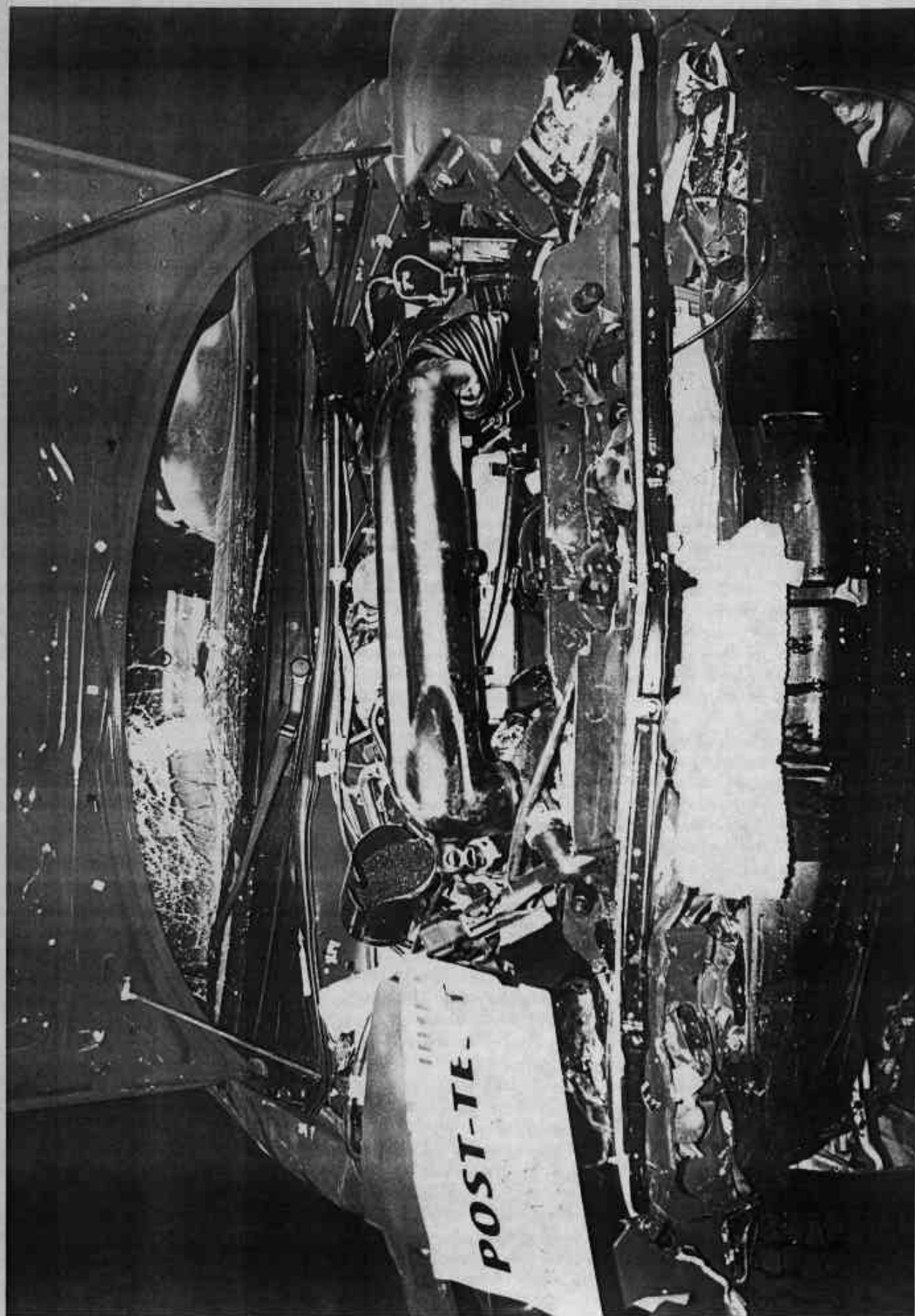


Photo No. A-14 - Pre-Test Engine Compartment View



A-15

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

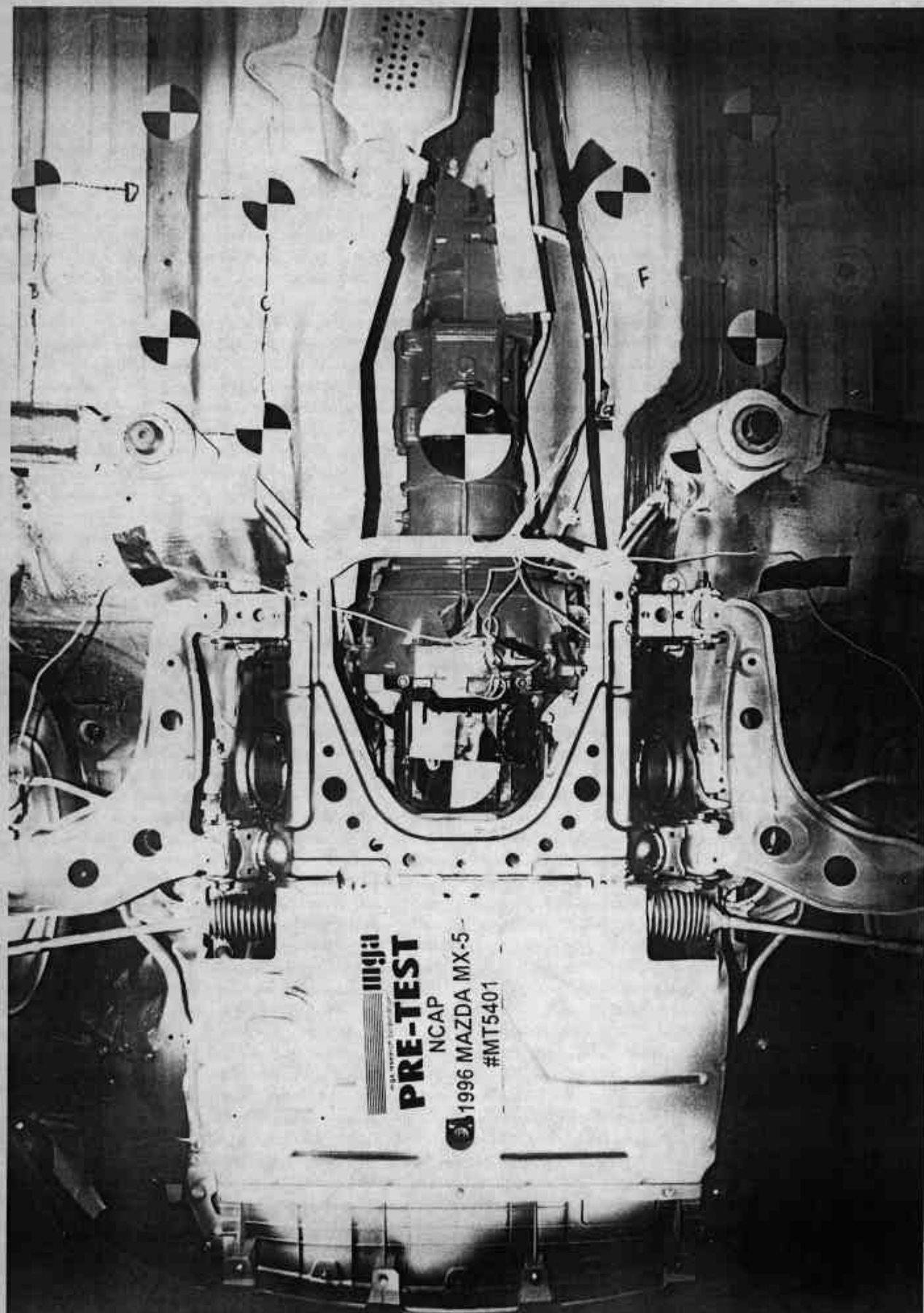


Photo No. A-16 - Pre-Test Front Underbody View

A-16

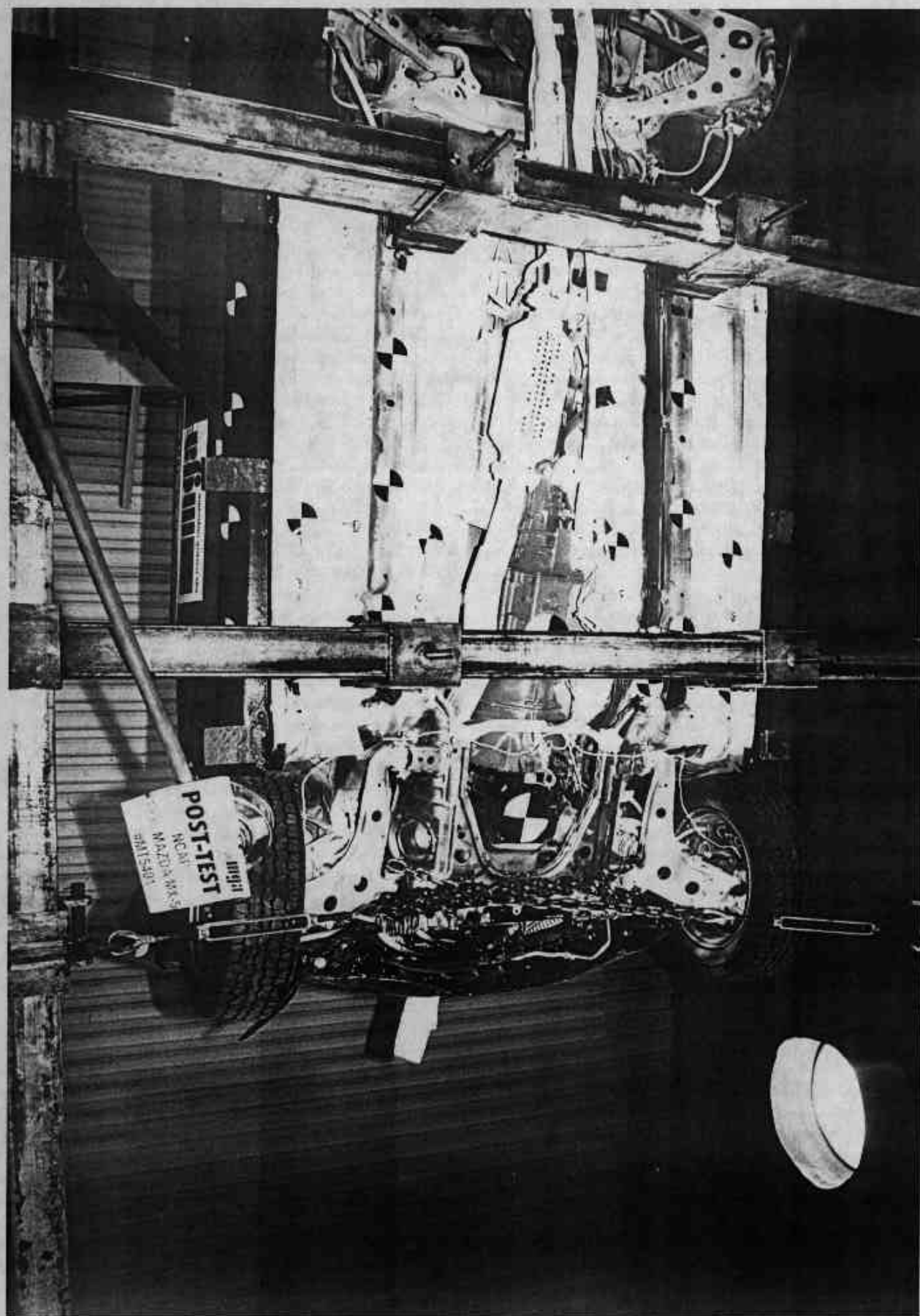


Photo No. A-17 - Post-Test Front Underbody View

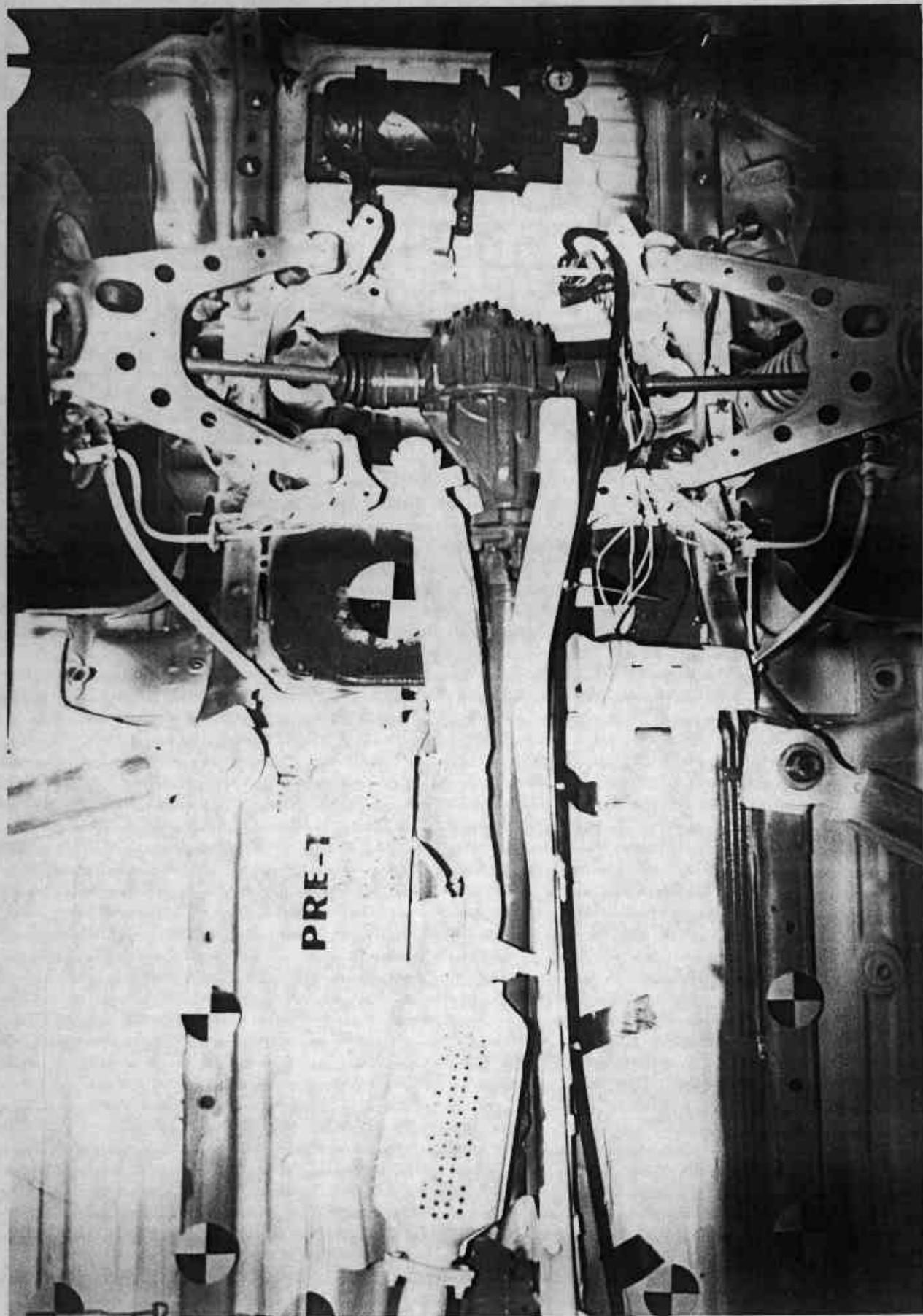


Photo No. A-18 - Pre-Test Rear Underbody View

A-18

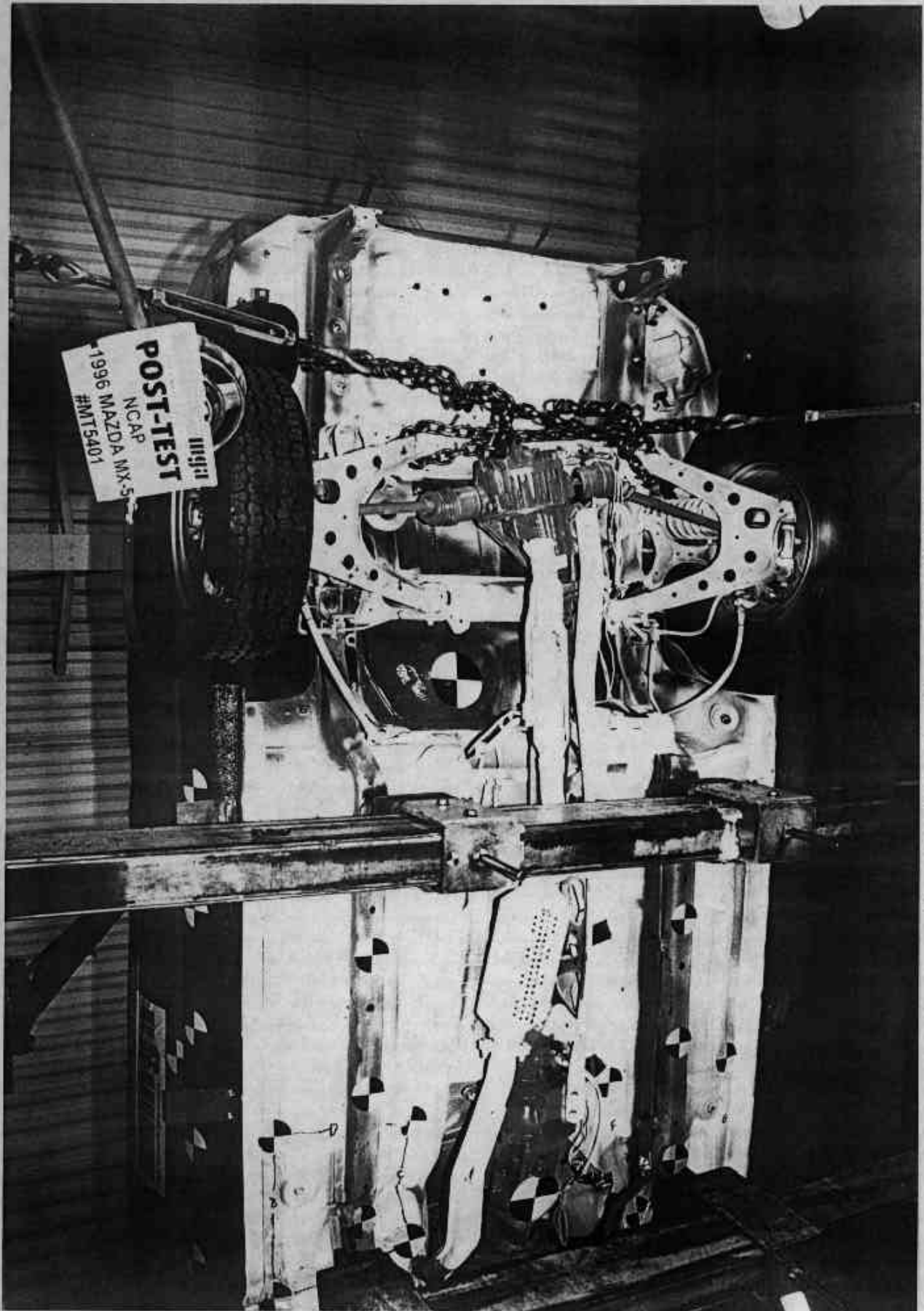
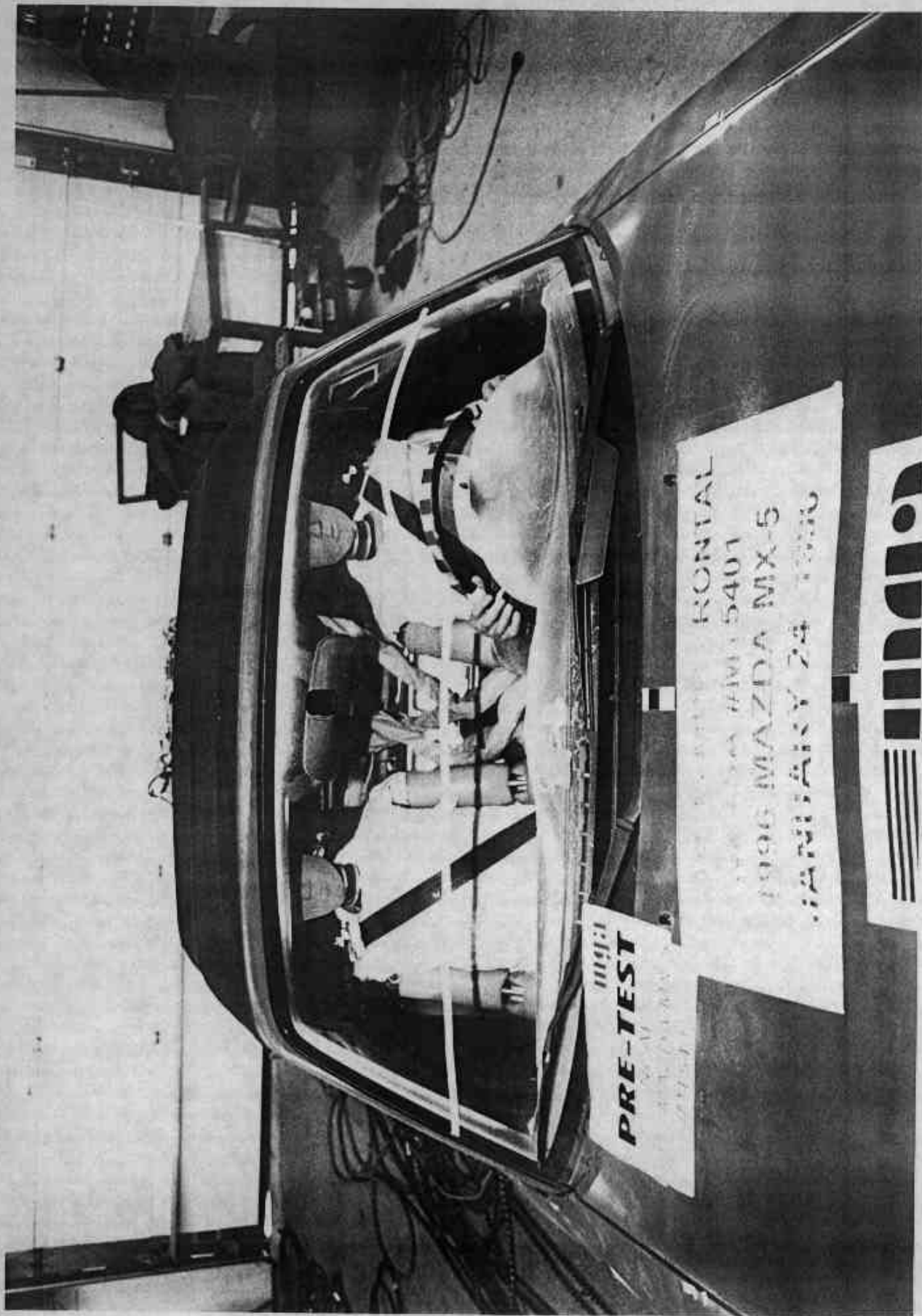


Photo No. A-19 - Post-Test Rear Underbody View



RONTAL
#101 5401
1990 MAZDA MX-5
JANUARY 24 1990

PRE-TEST



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

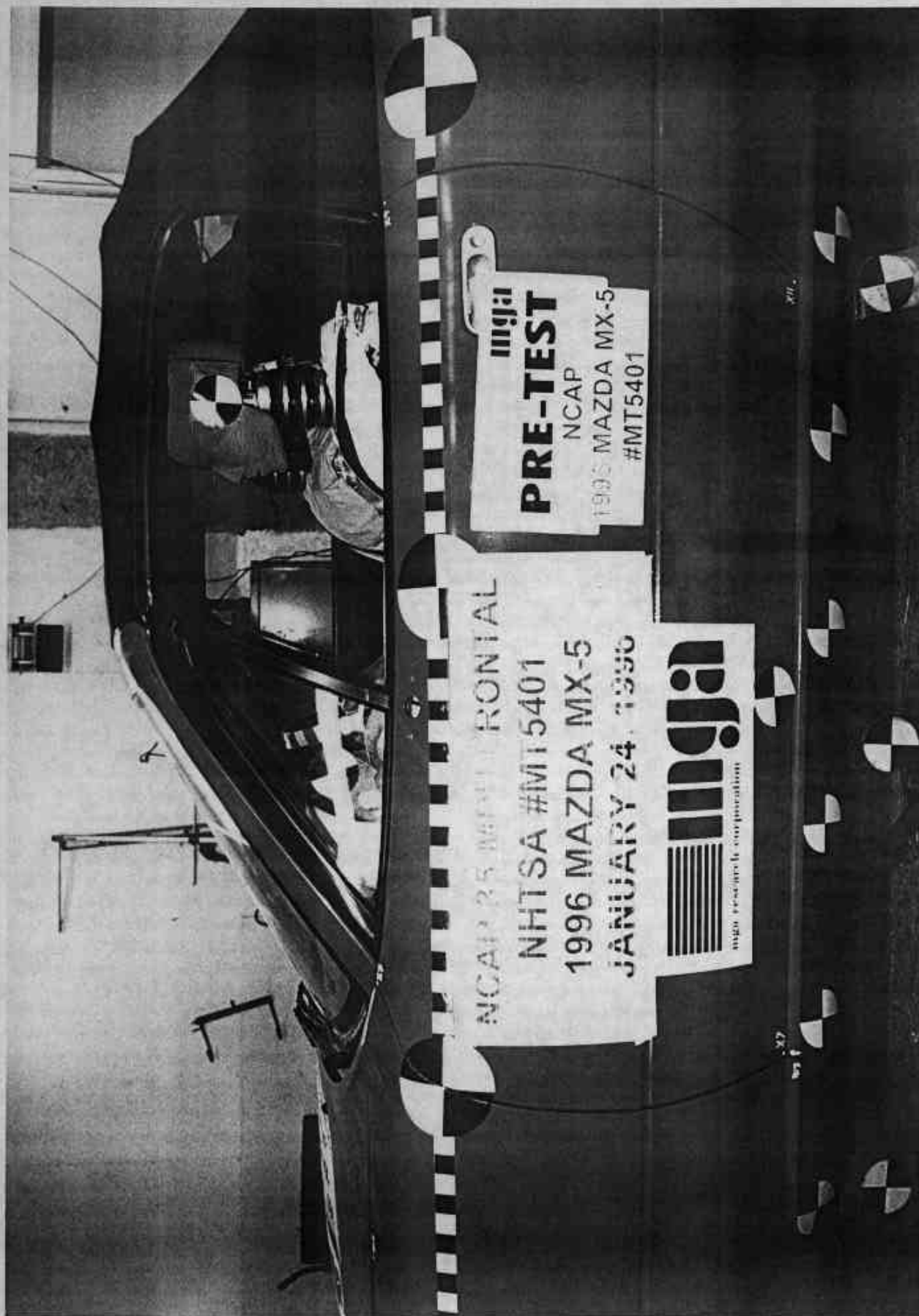


Photo No. A-22 - Pre-Test Driver Dummy Position Left Side View



A-23

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

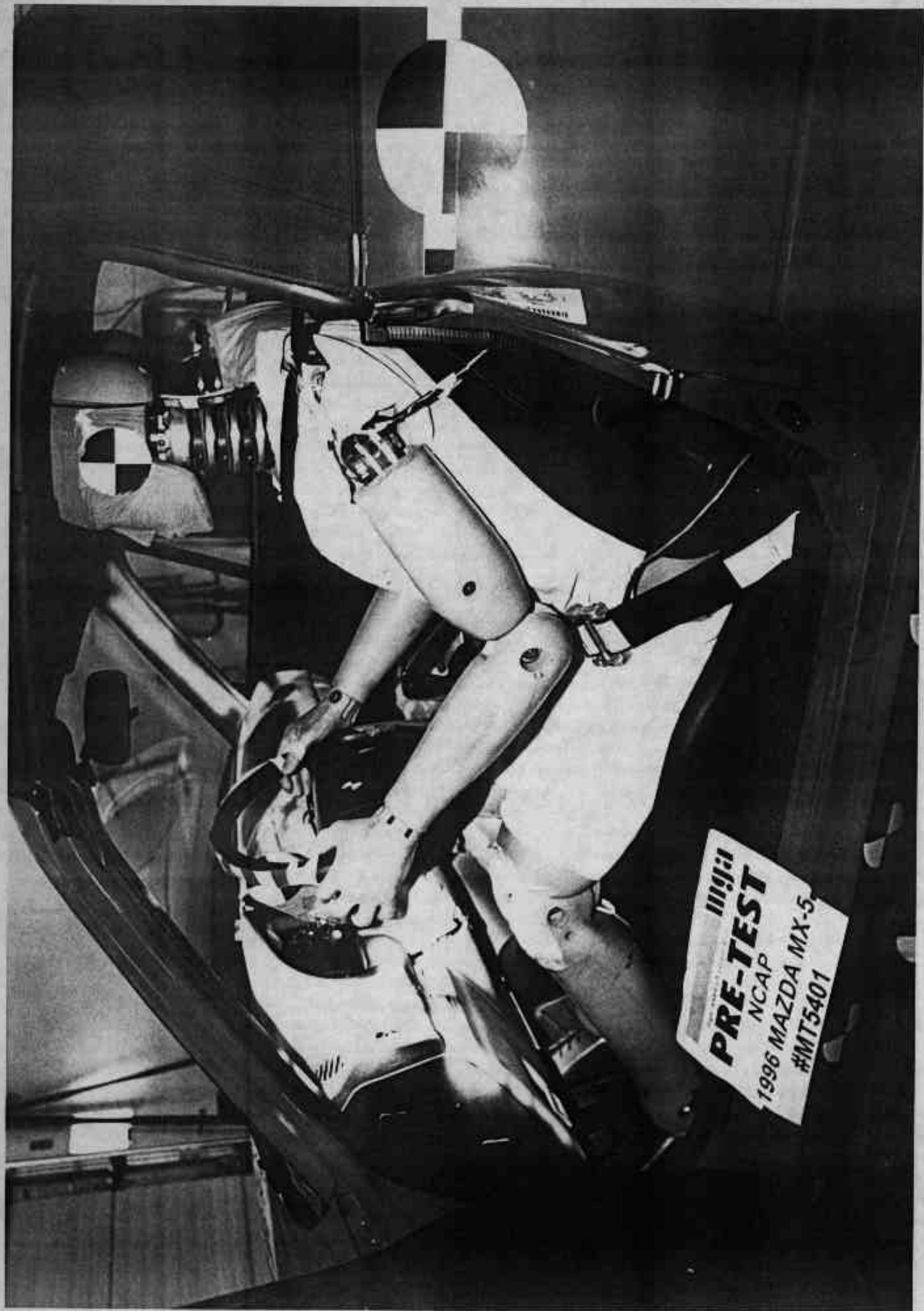


Photo No. A-24 - Pre-Test Driver Dummy Position Left Side View (Door Open)



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



A-26

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



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



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

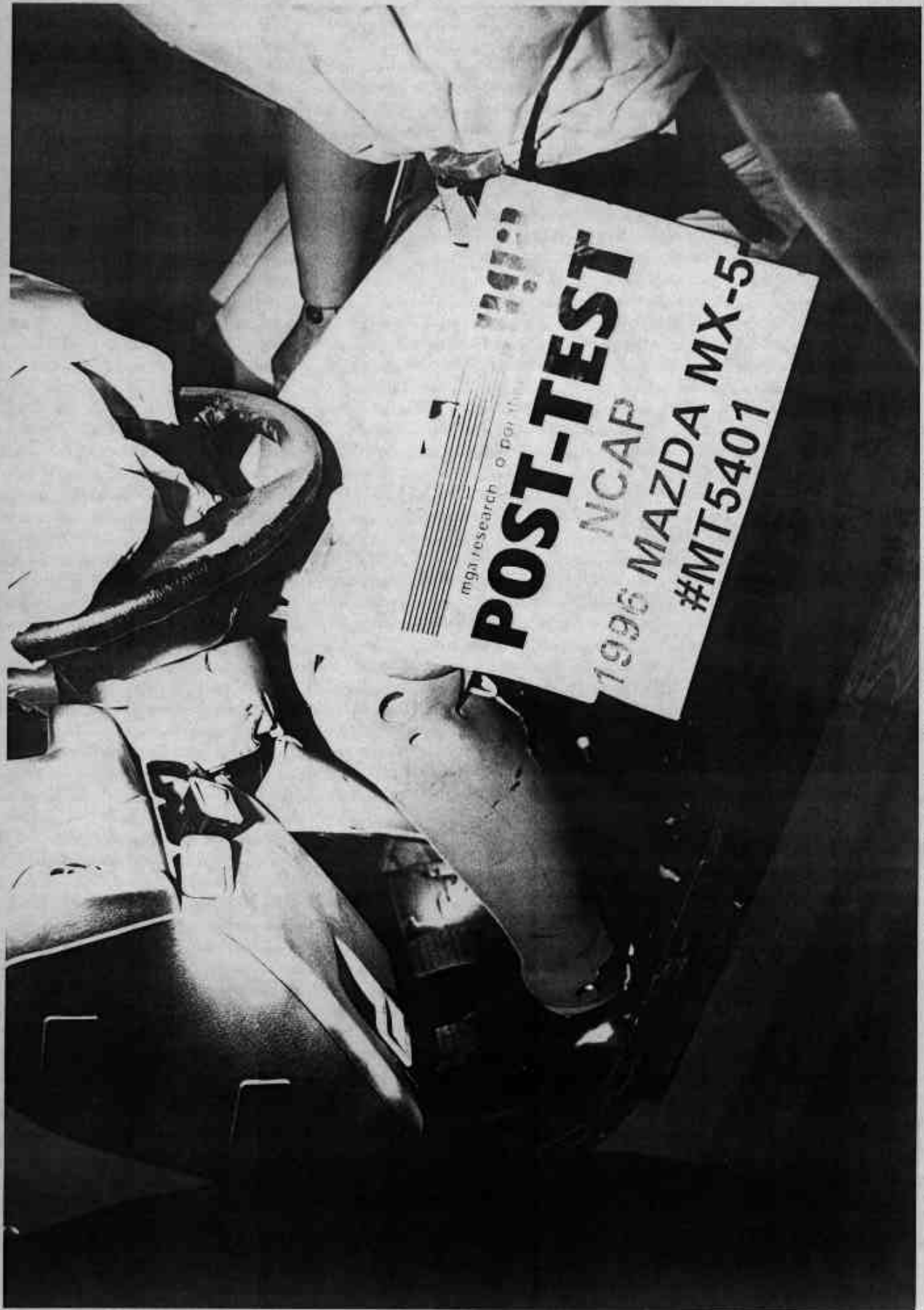


Photo No. A-29 - Post-Test Driver Dummy Knee Position



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



Photo No. A-31 - Post-Test Driver Knee Contact View



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



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

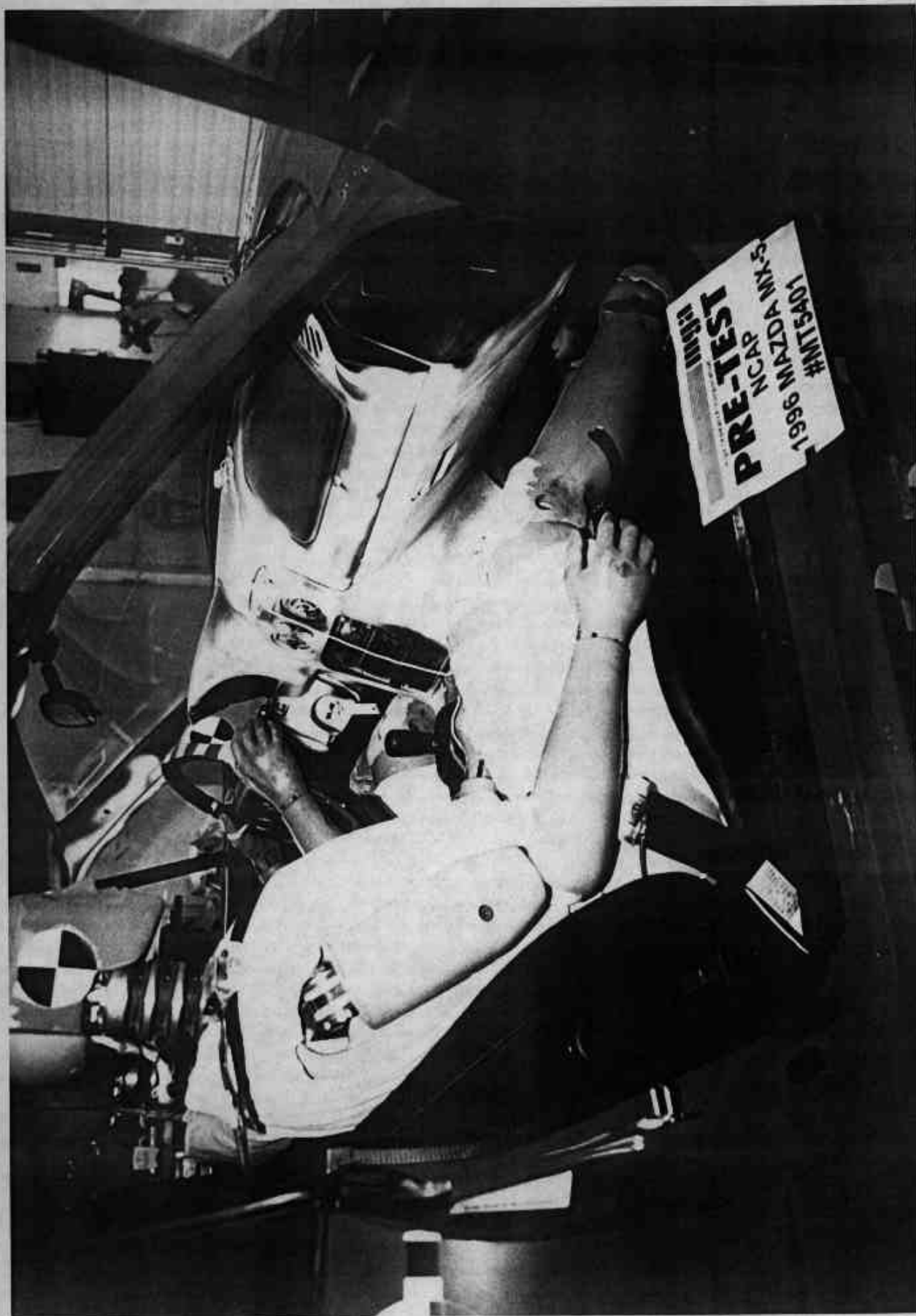


Photo No. A-34 - Pre-Test Passenger Dummy Position Right Side View (Door Open)



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



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



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



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



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



Photo No. A-40 - Post-Test Passenger Knee Contact View

MFD. BY MAZDA MOTOR CORPORATION

DATE	07/95	GVWR	2835	LB	1455	LB	1420	LB
			1286	KG	660	KG	644	KG

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY
BUMPER, AND THEFT PREVENTION
STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

JM1NA3537T0700772 PASSENGER



BODY COLOR CODE: SU

MADE IN JAPAN



Photo No. A-41 - Vehicle Certification

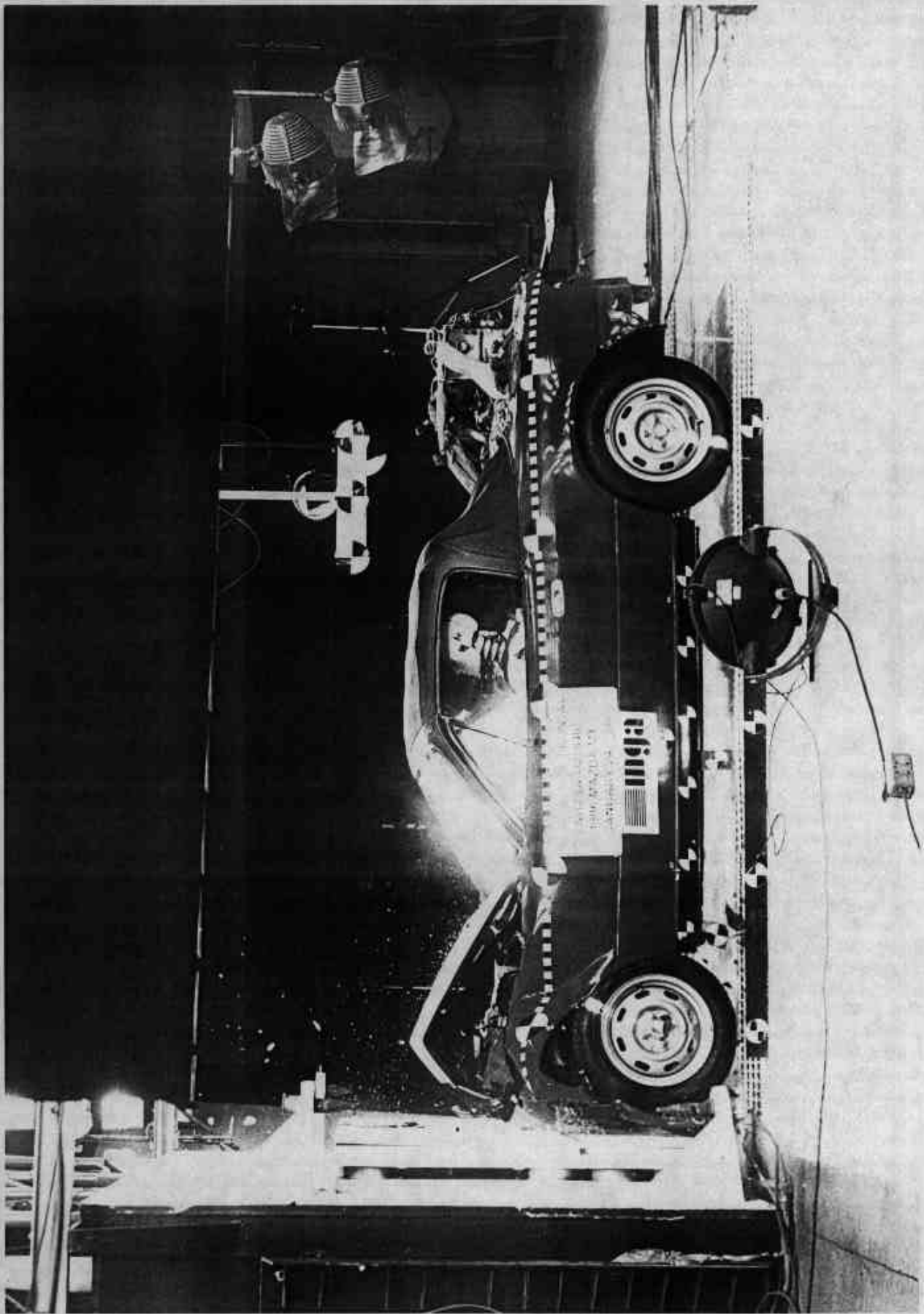
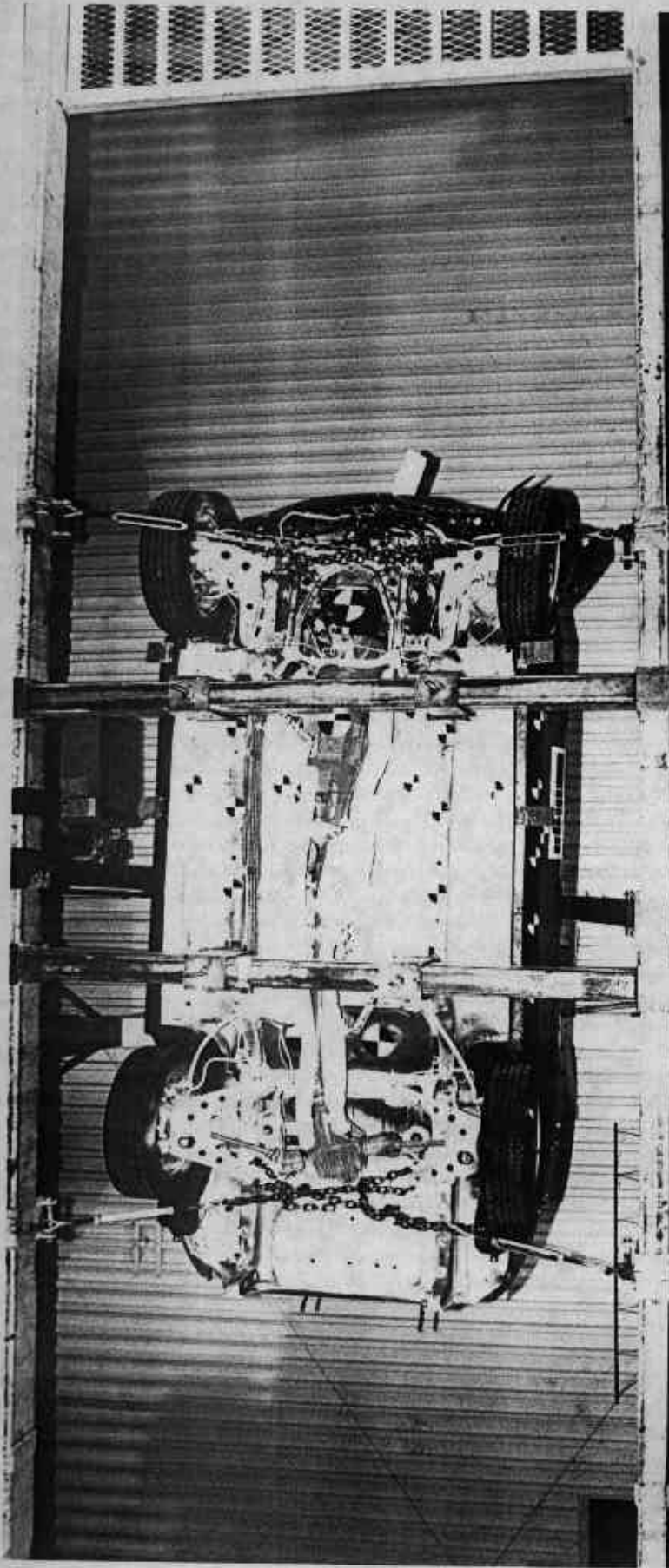


Photo No. A-43 - Vehicle Impact



A-44

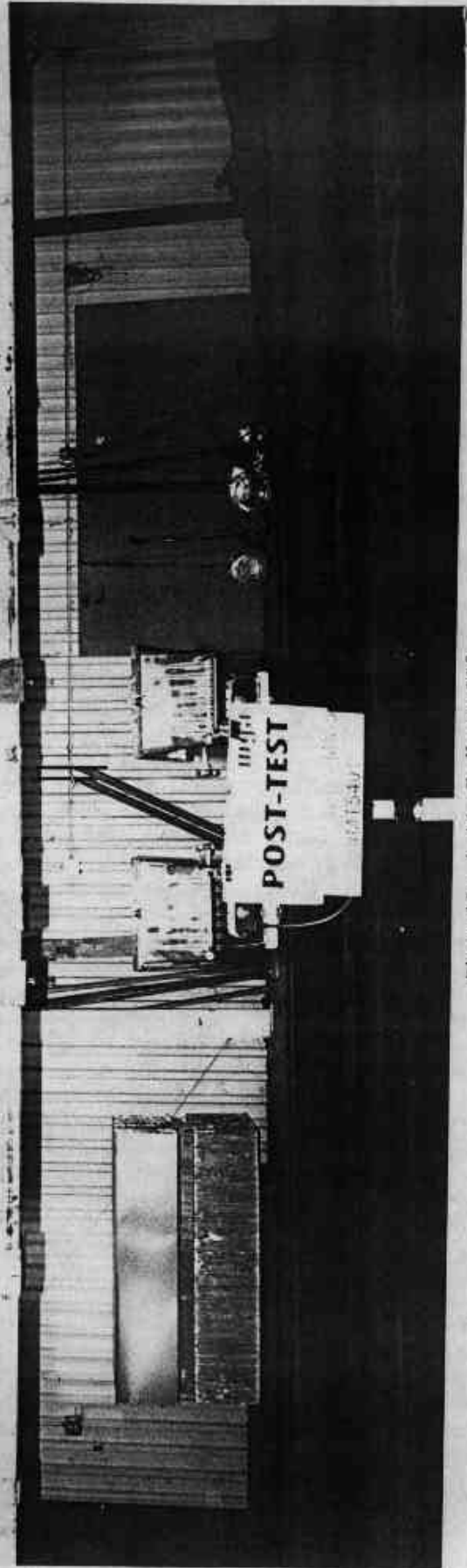


Photo No. A-44 - Rollover 90°

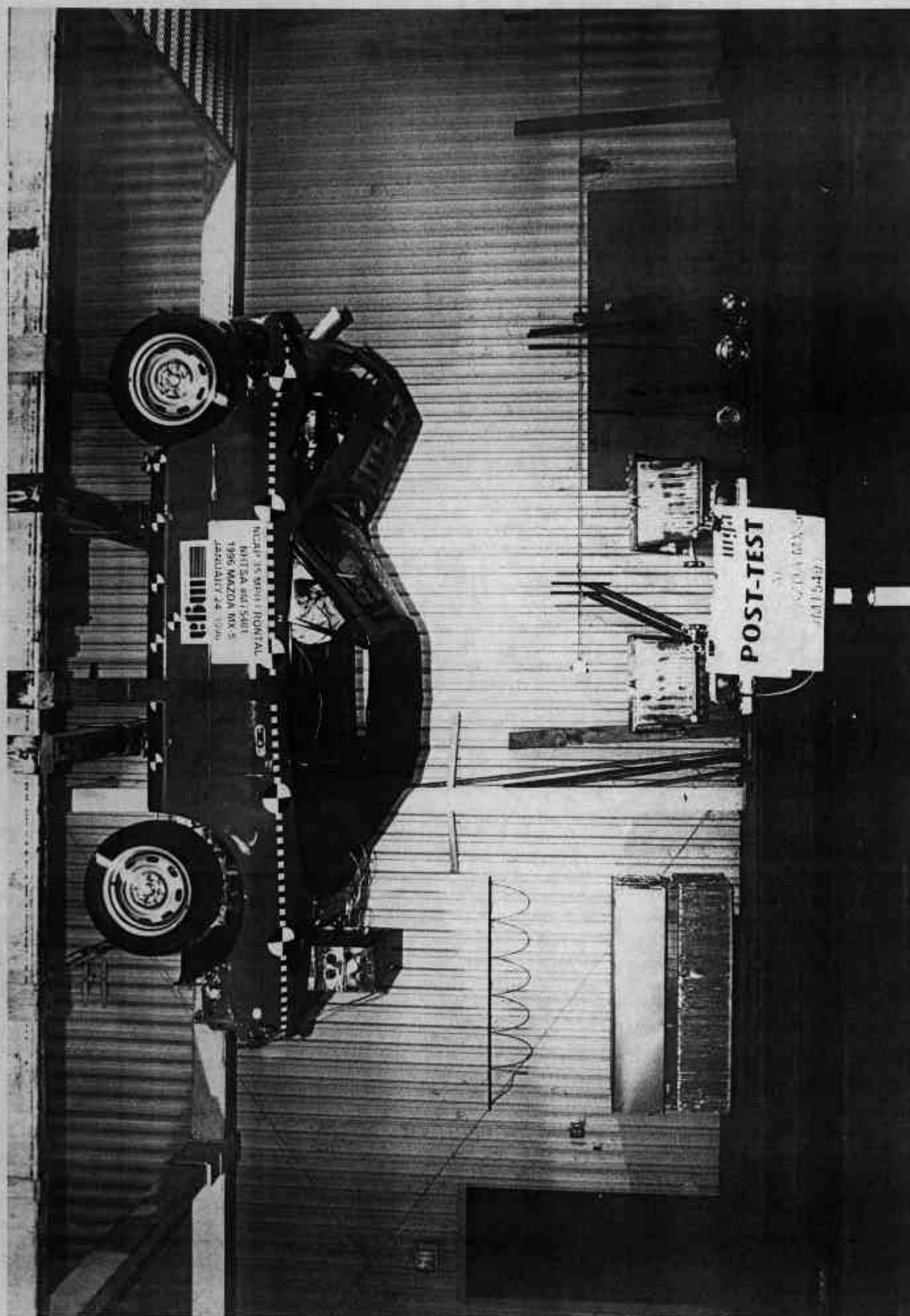


Photo No. A-45 - Rollover 180°

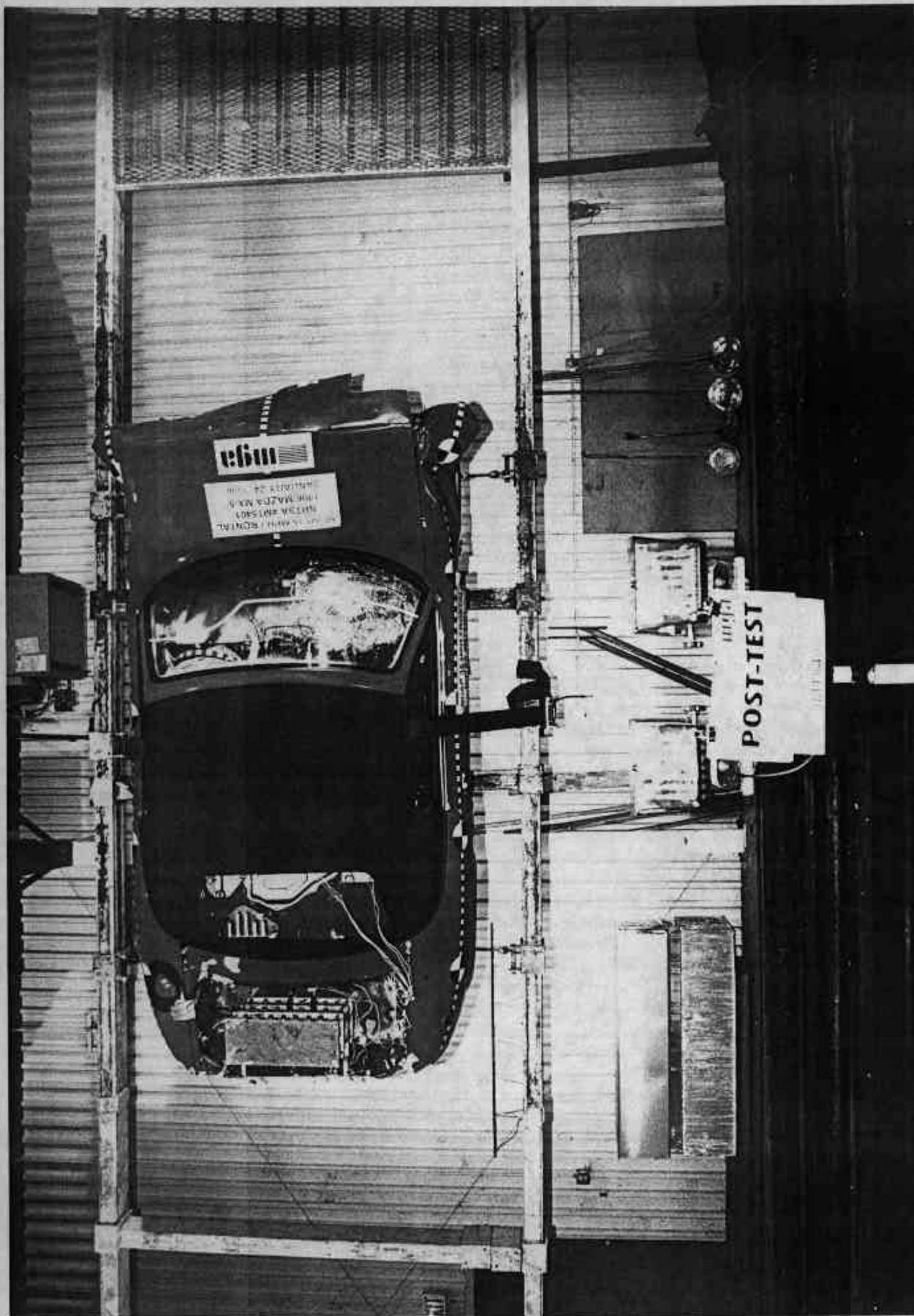
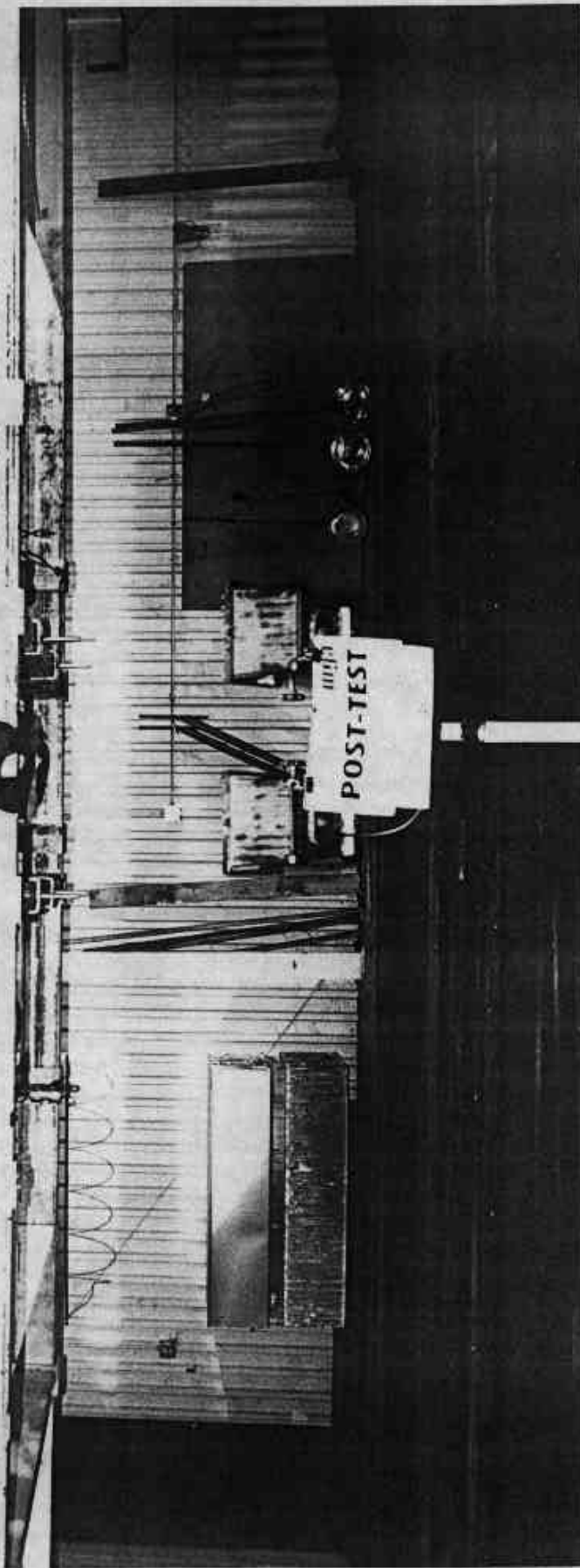
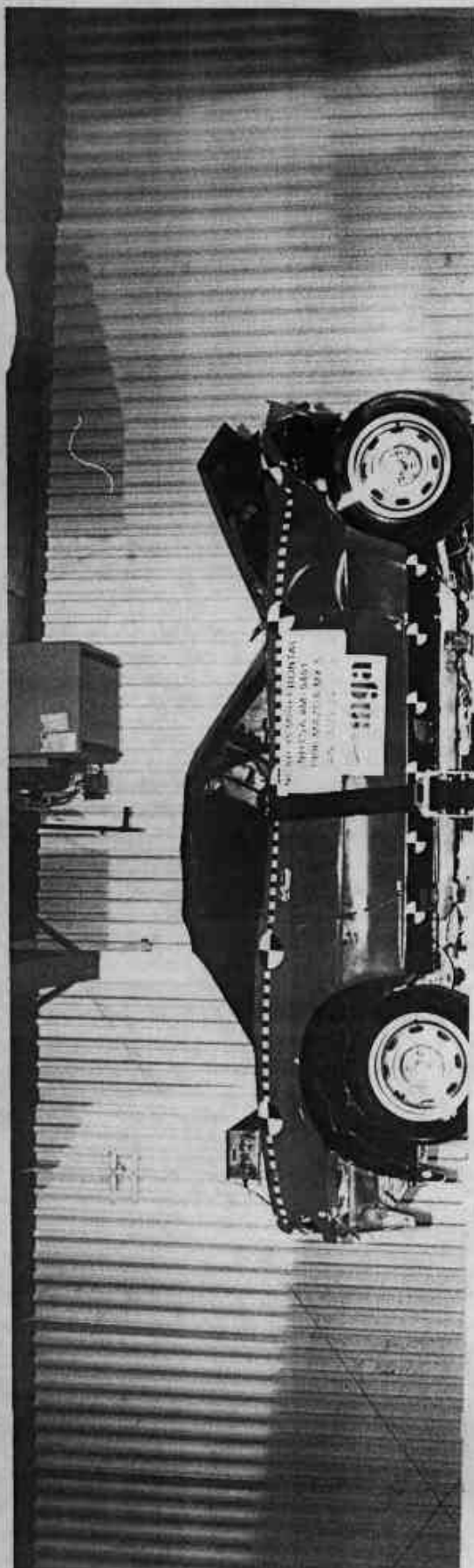


Photo No. A-46 - Rollover 270°

A-46



A-47

Photo No. A-47 - Rollover 360°

APPENDIX B
Vehicle, Load Cell Barrier and Dummy Response Data

1996 Mazda MX-5
NHTSA NO.: MT5401

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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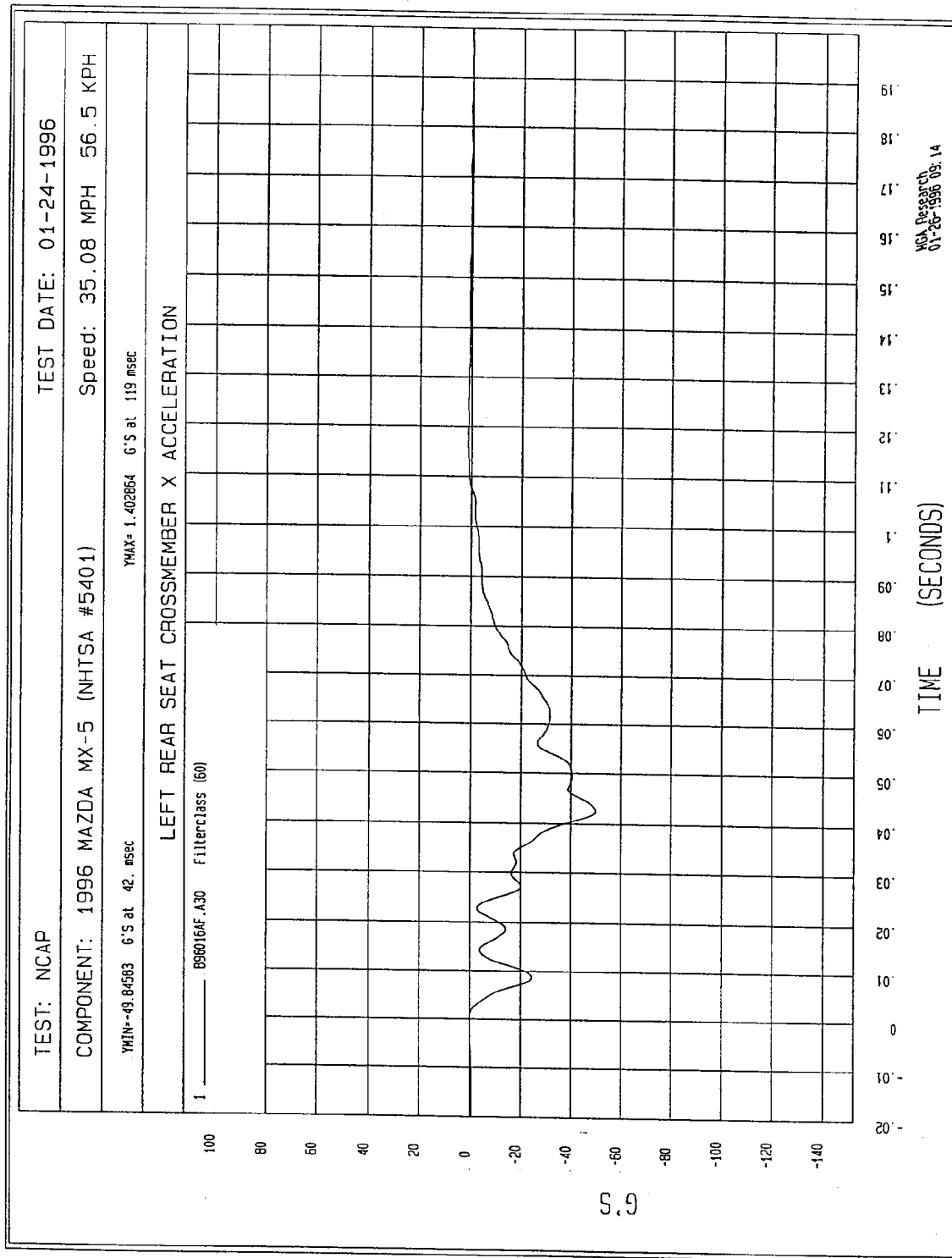
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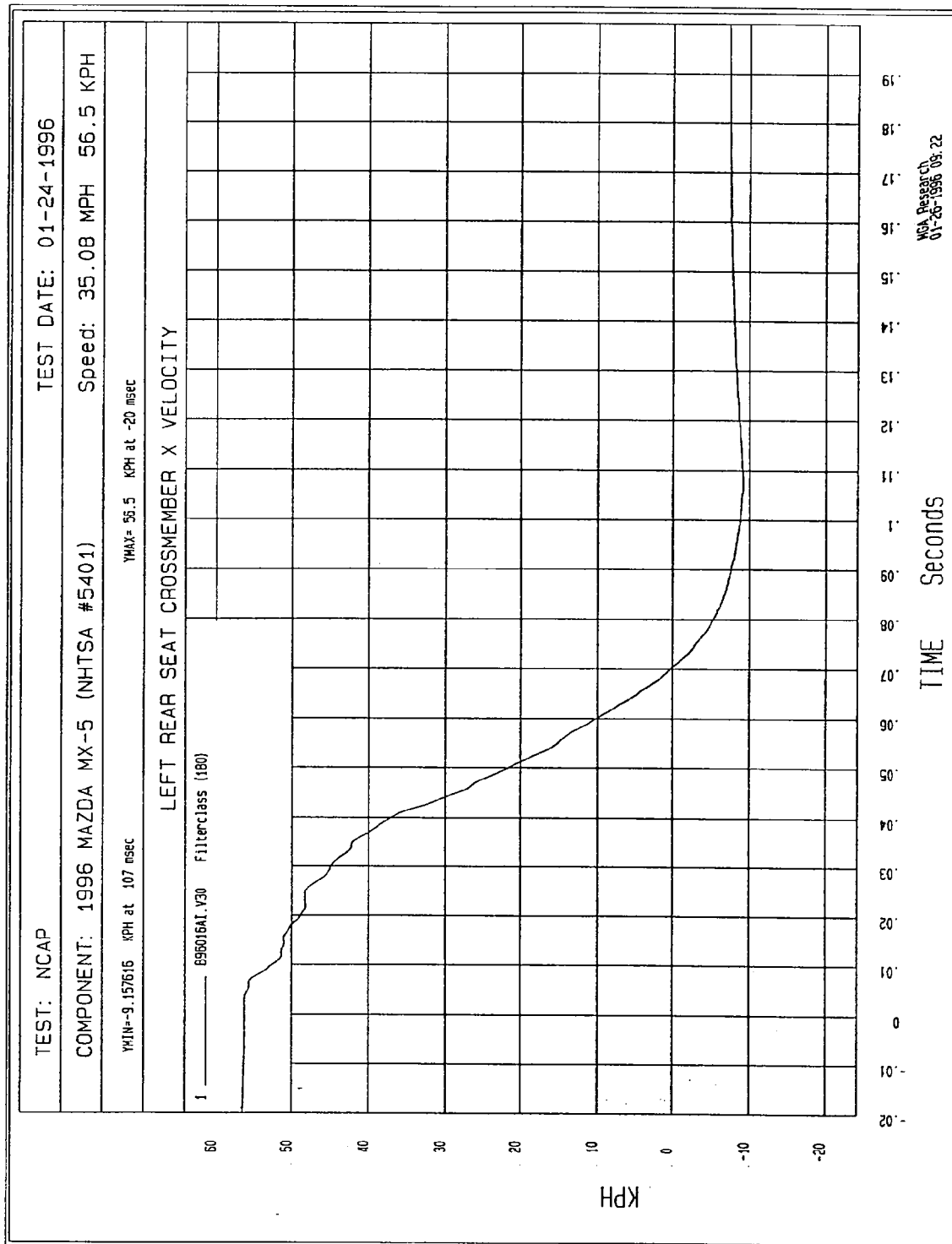
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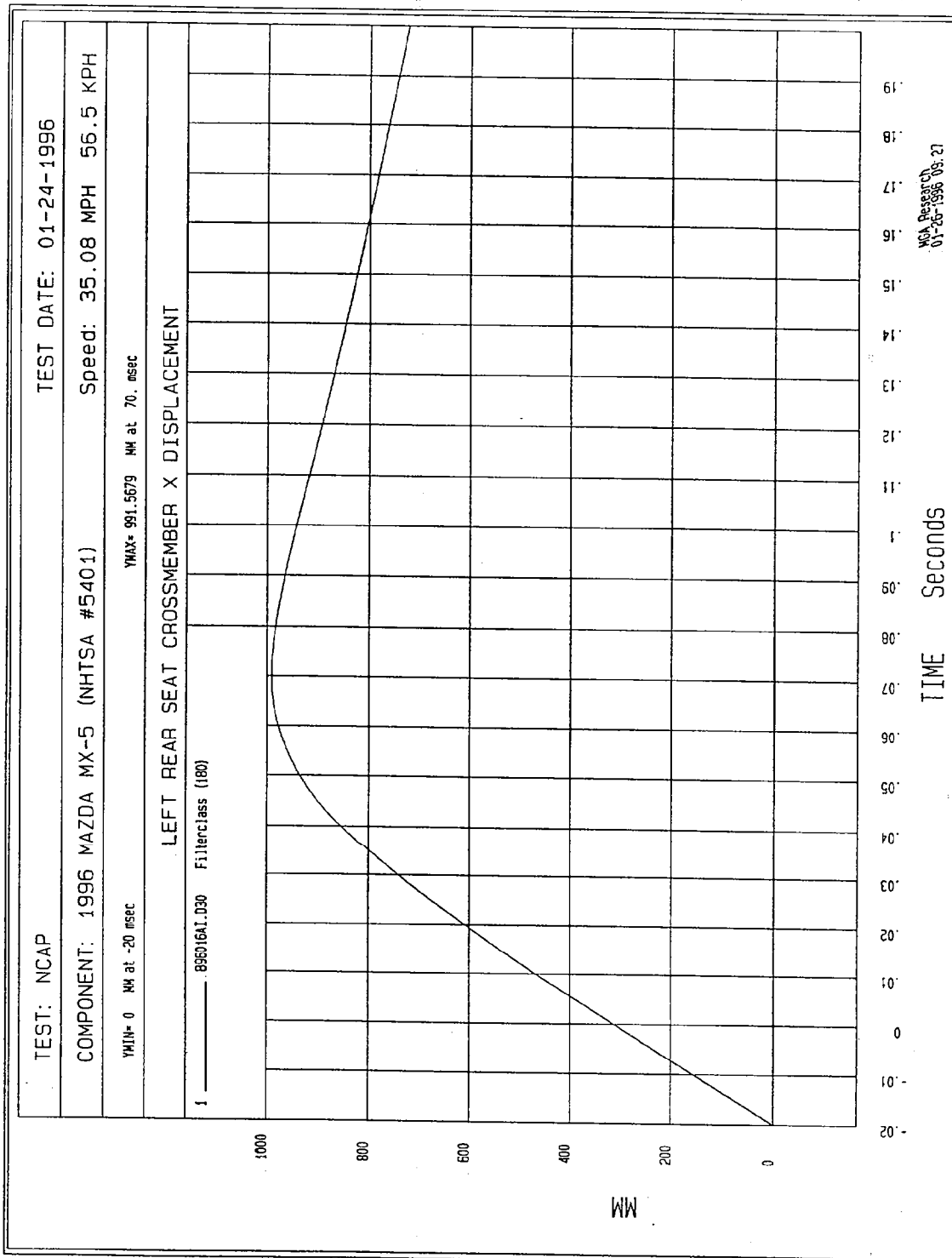
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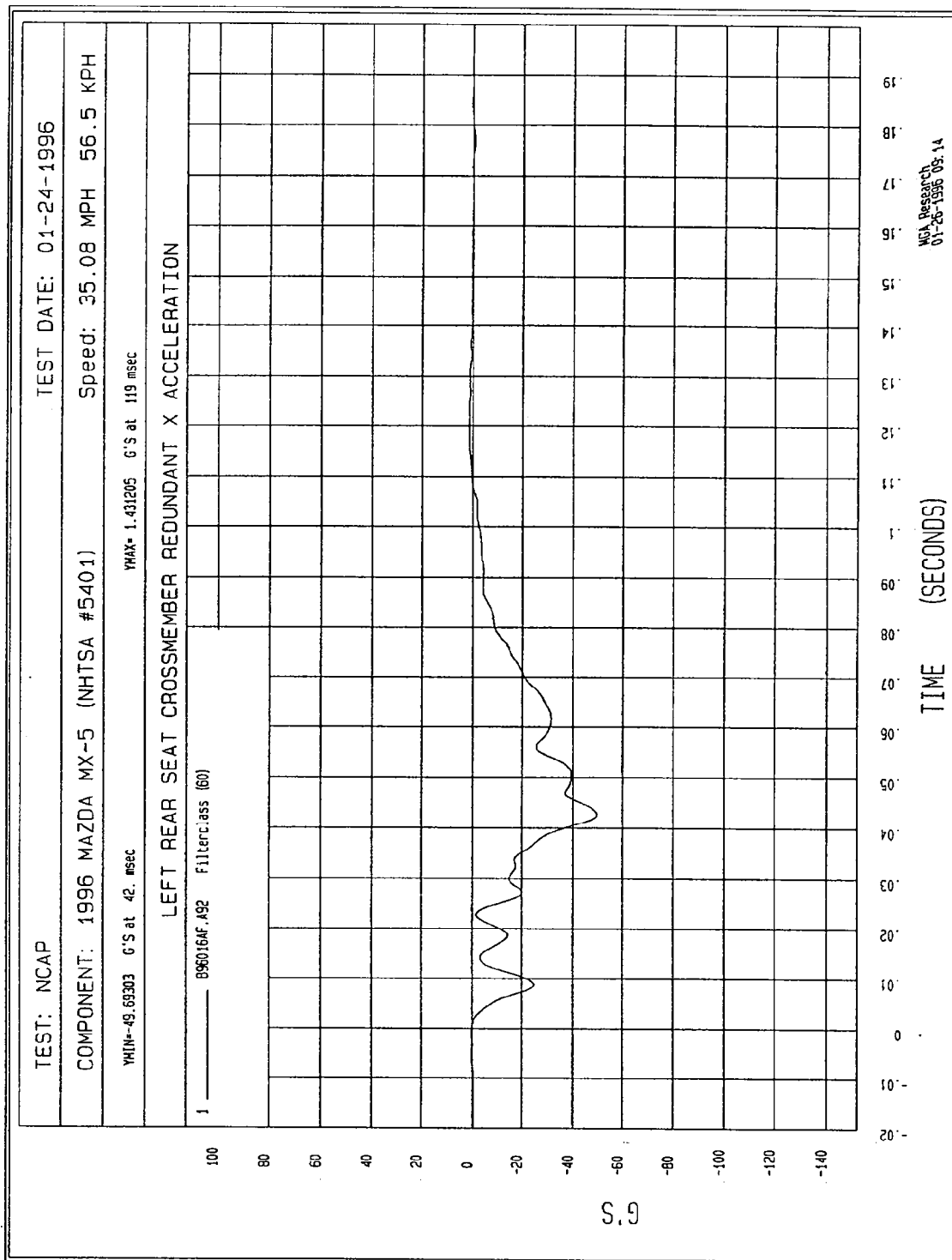
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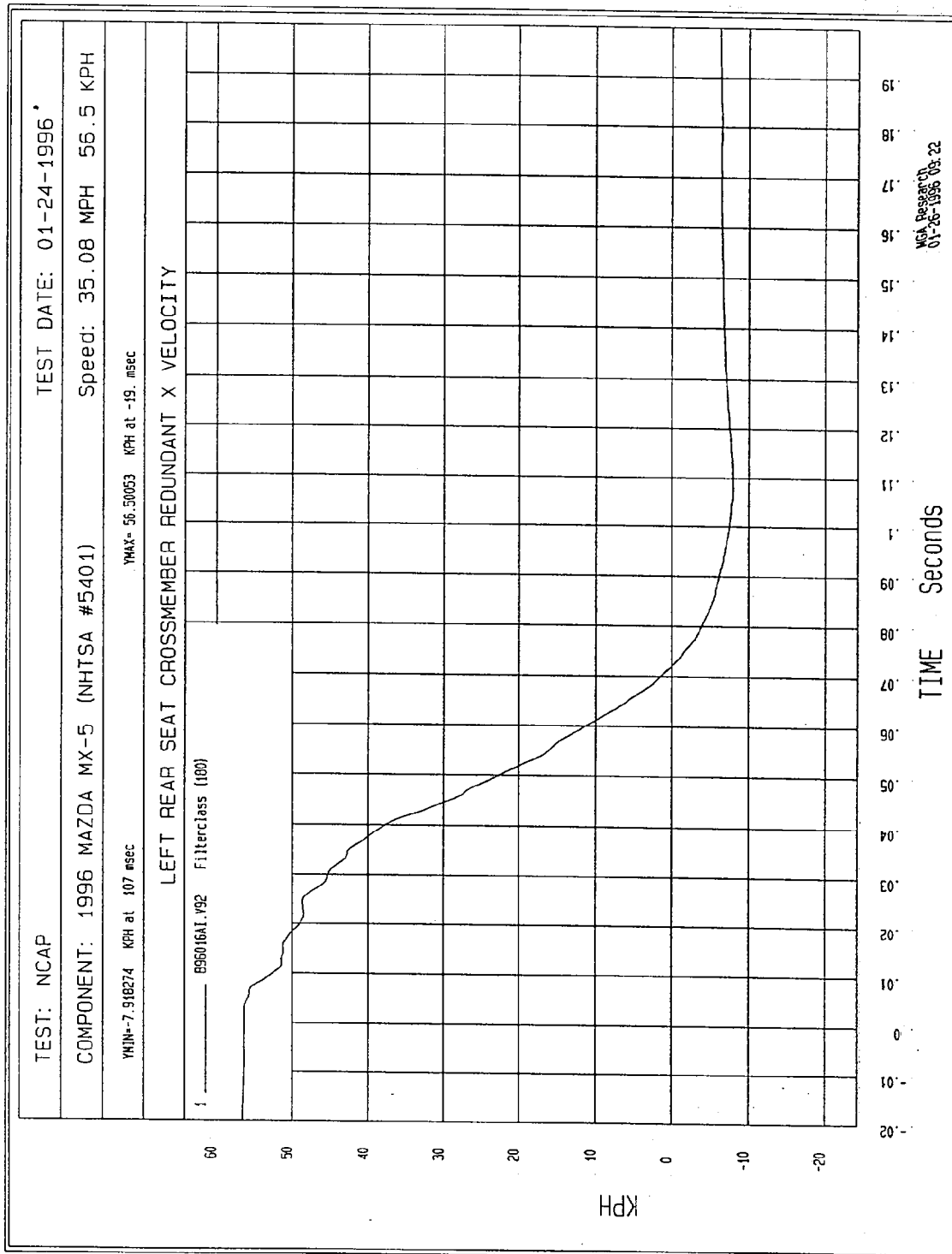
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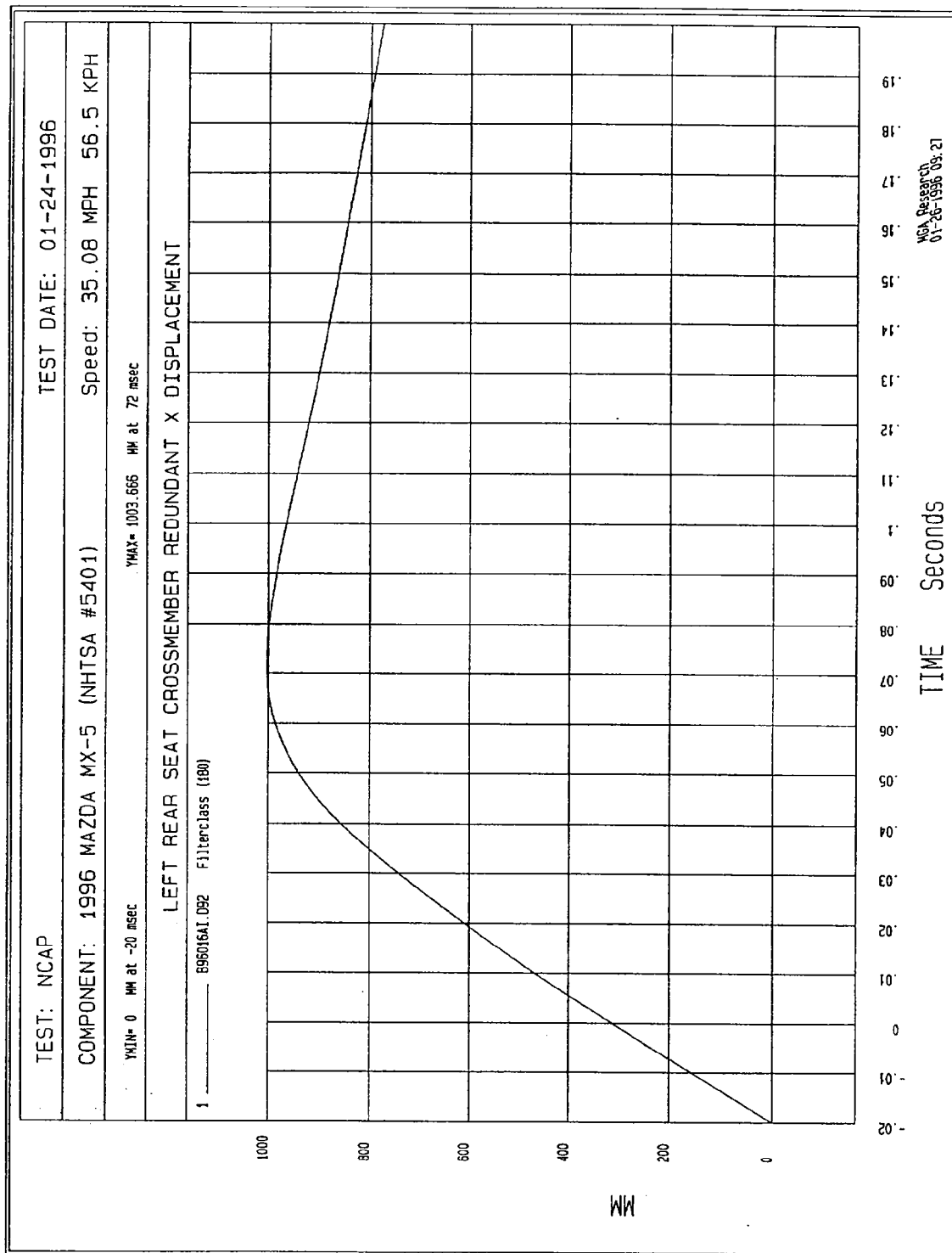


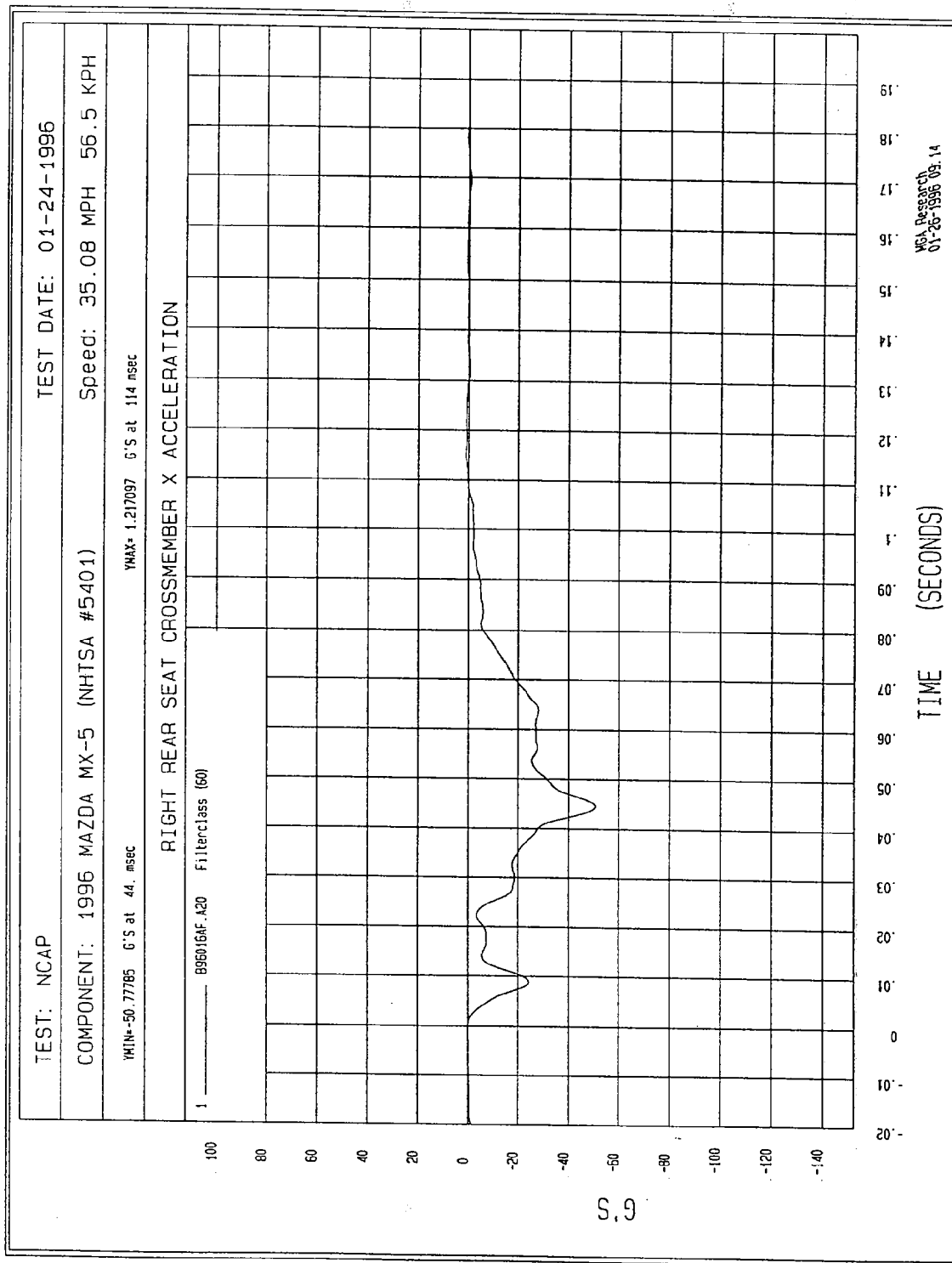


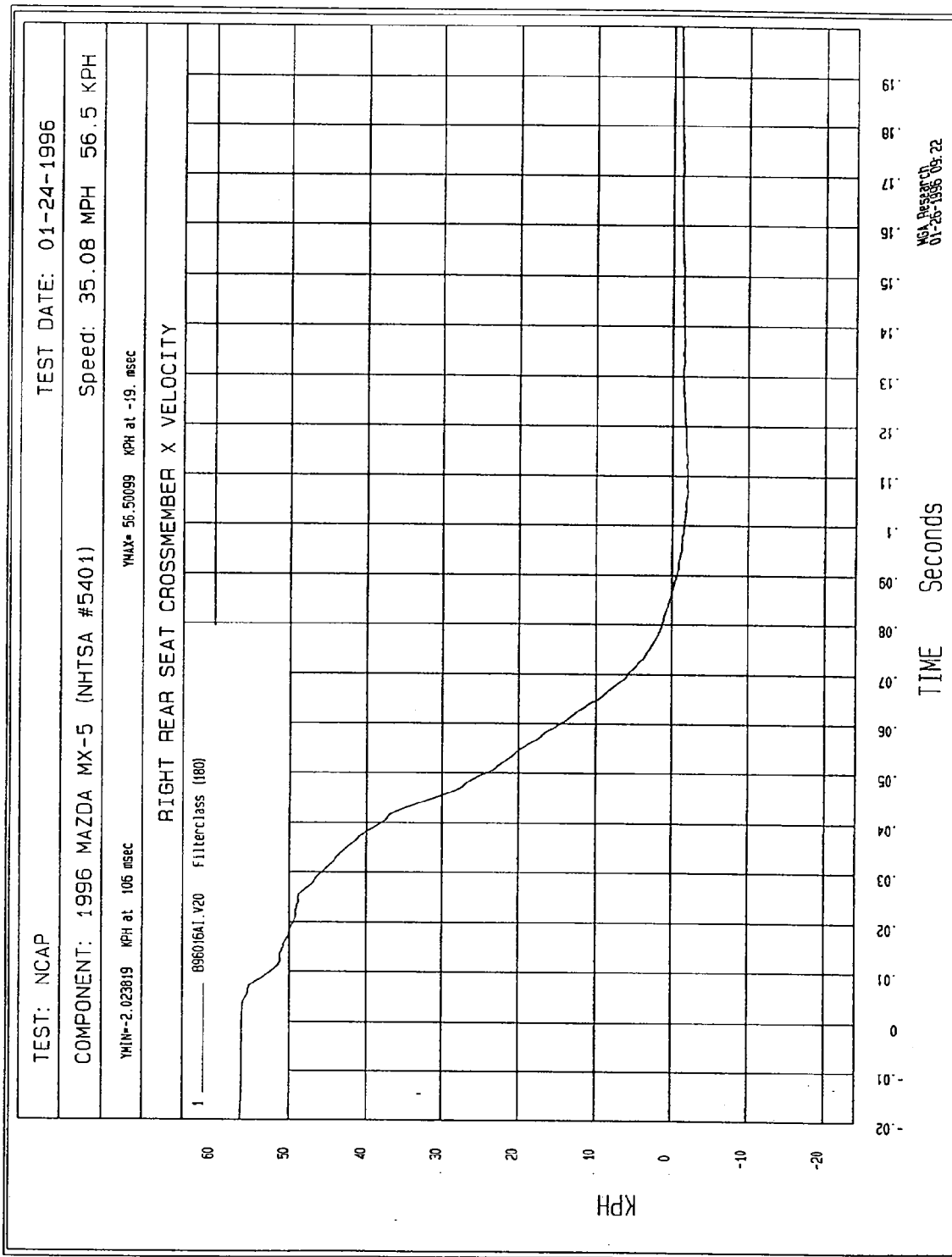


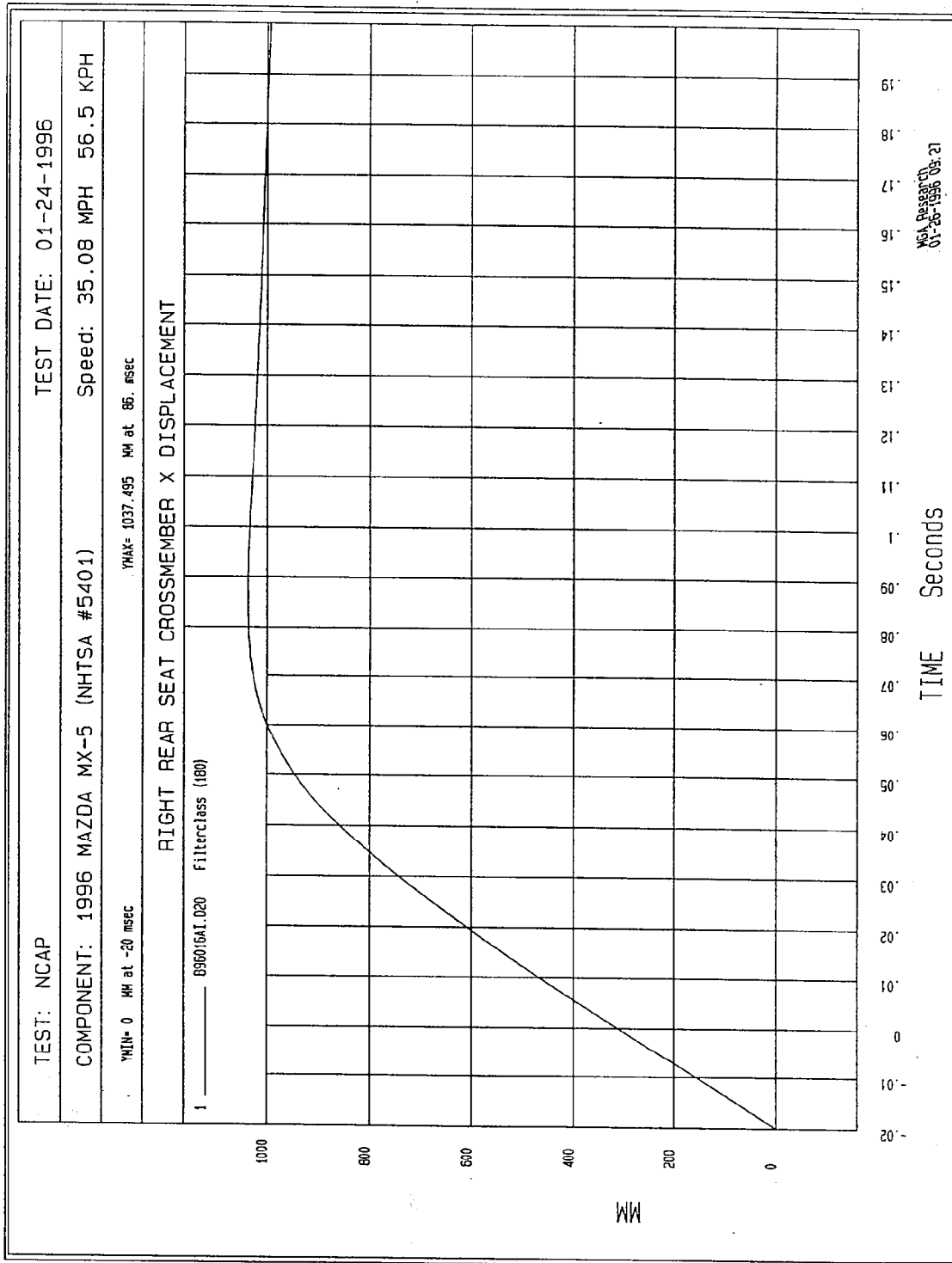


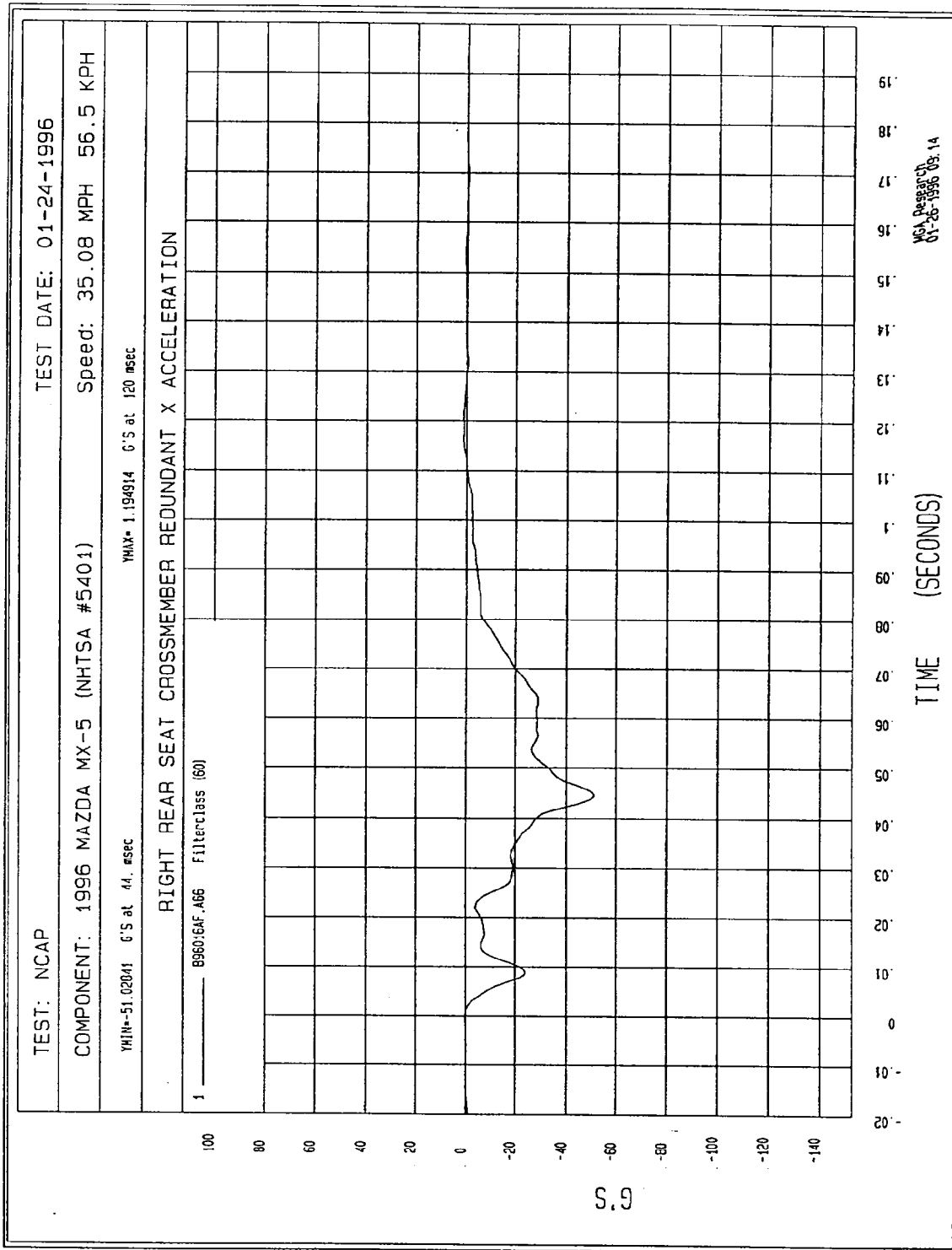


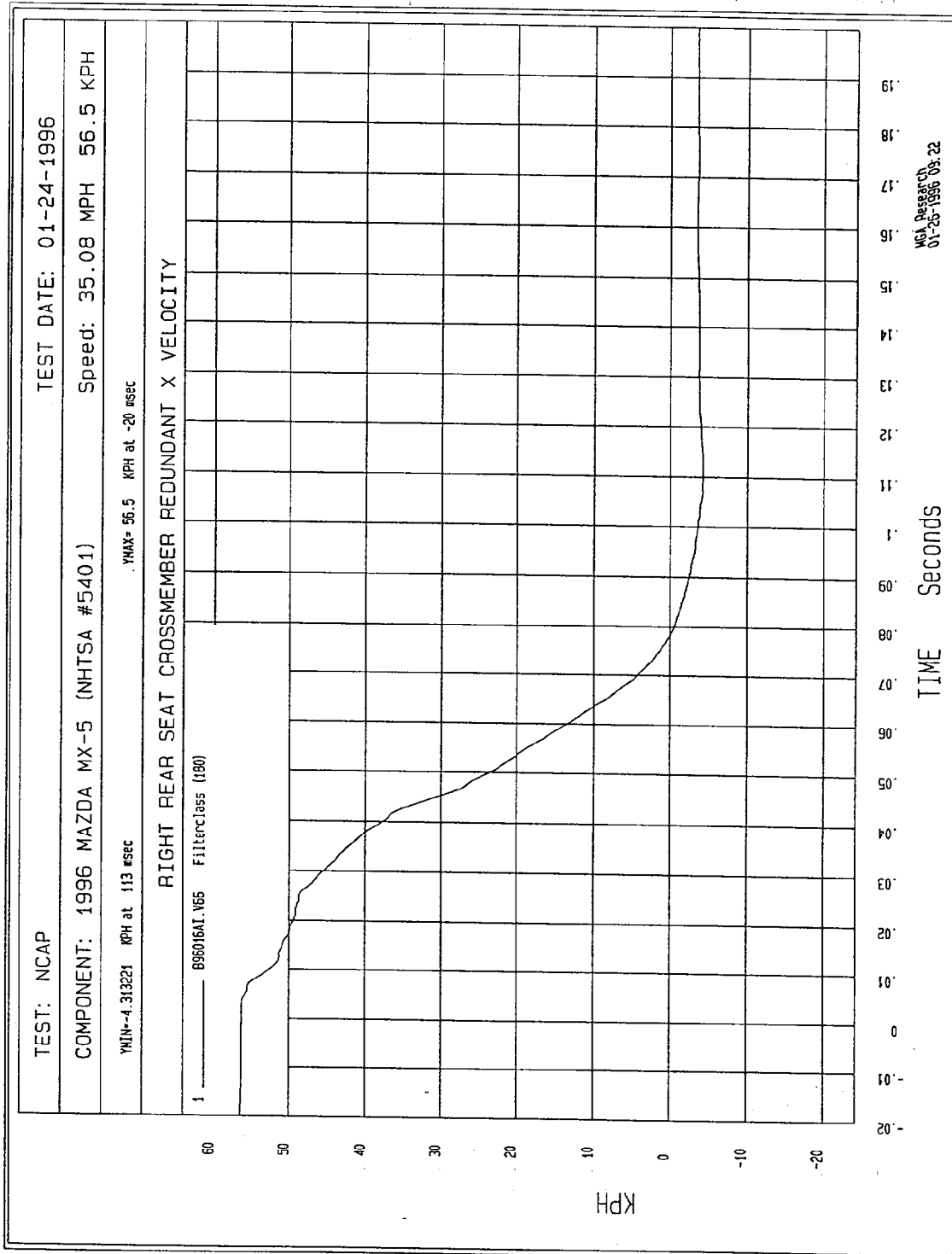


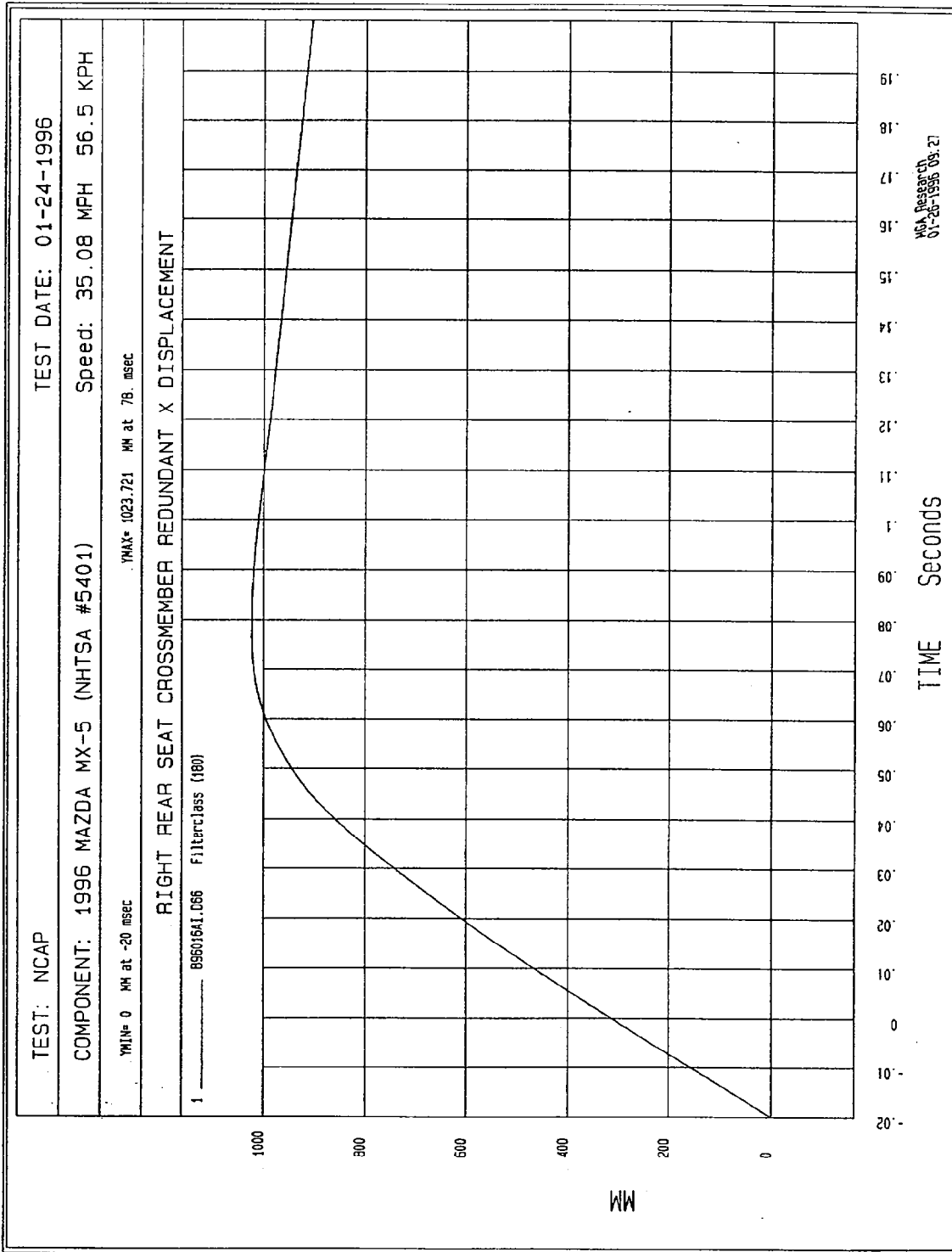


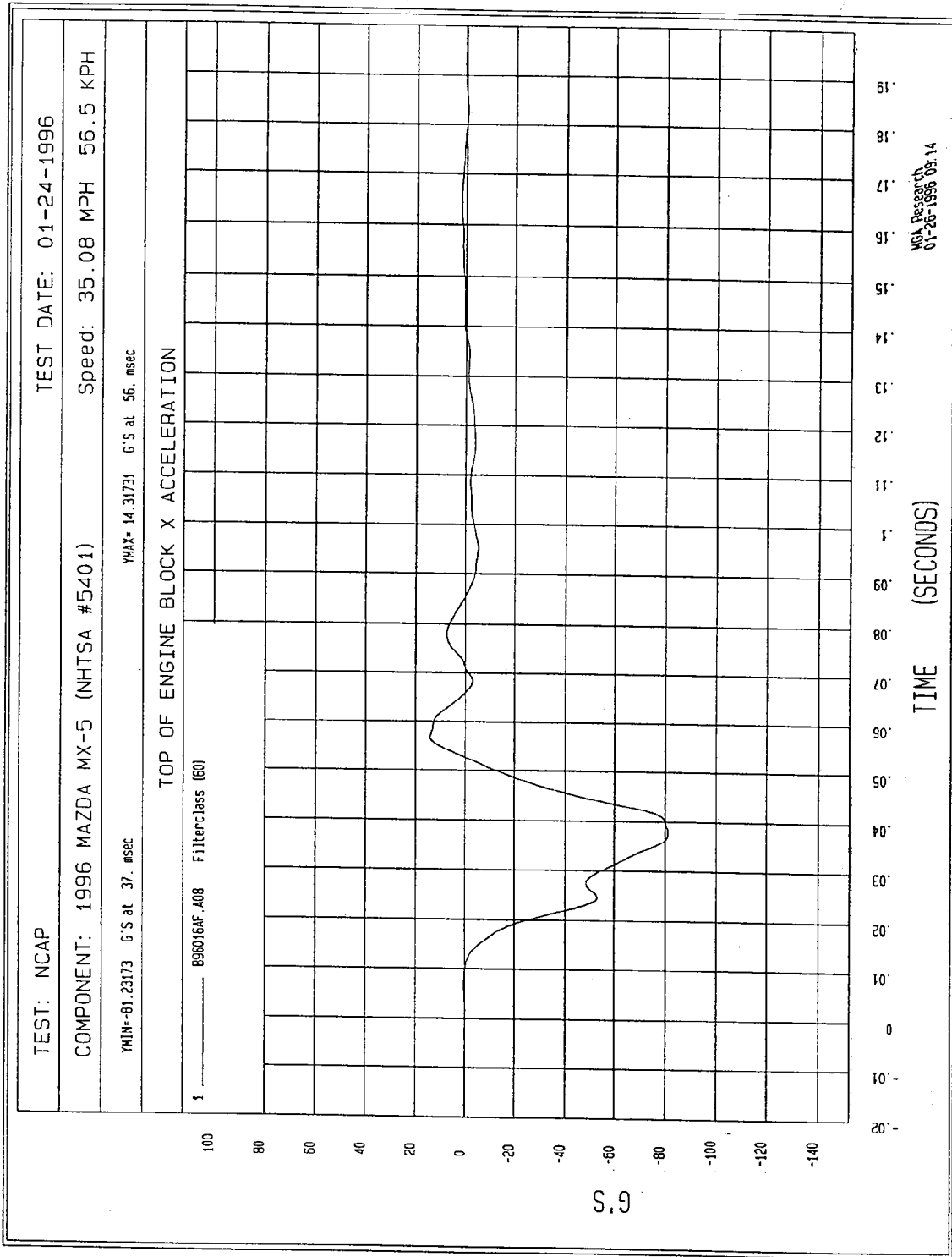


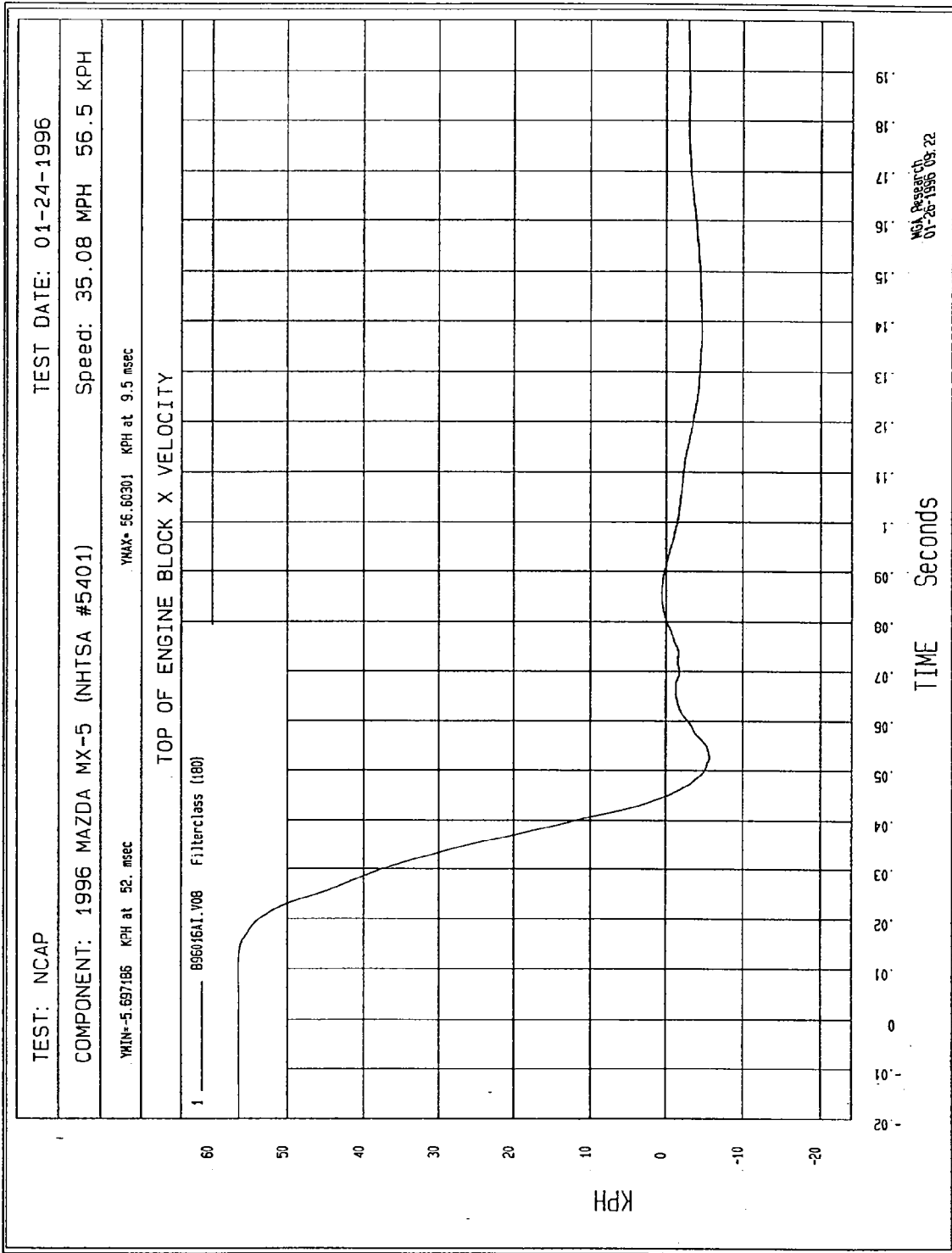


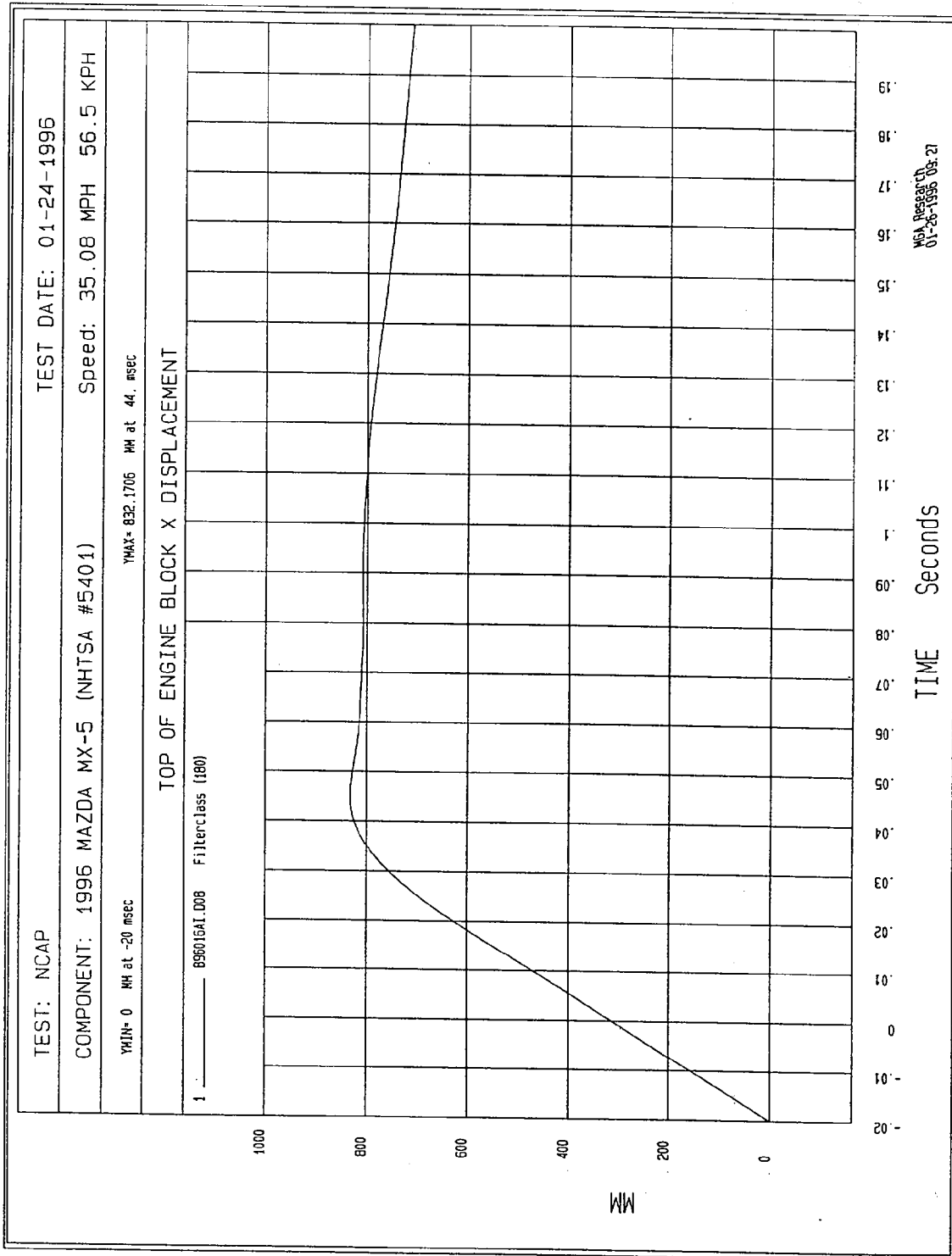


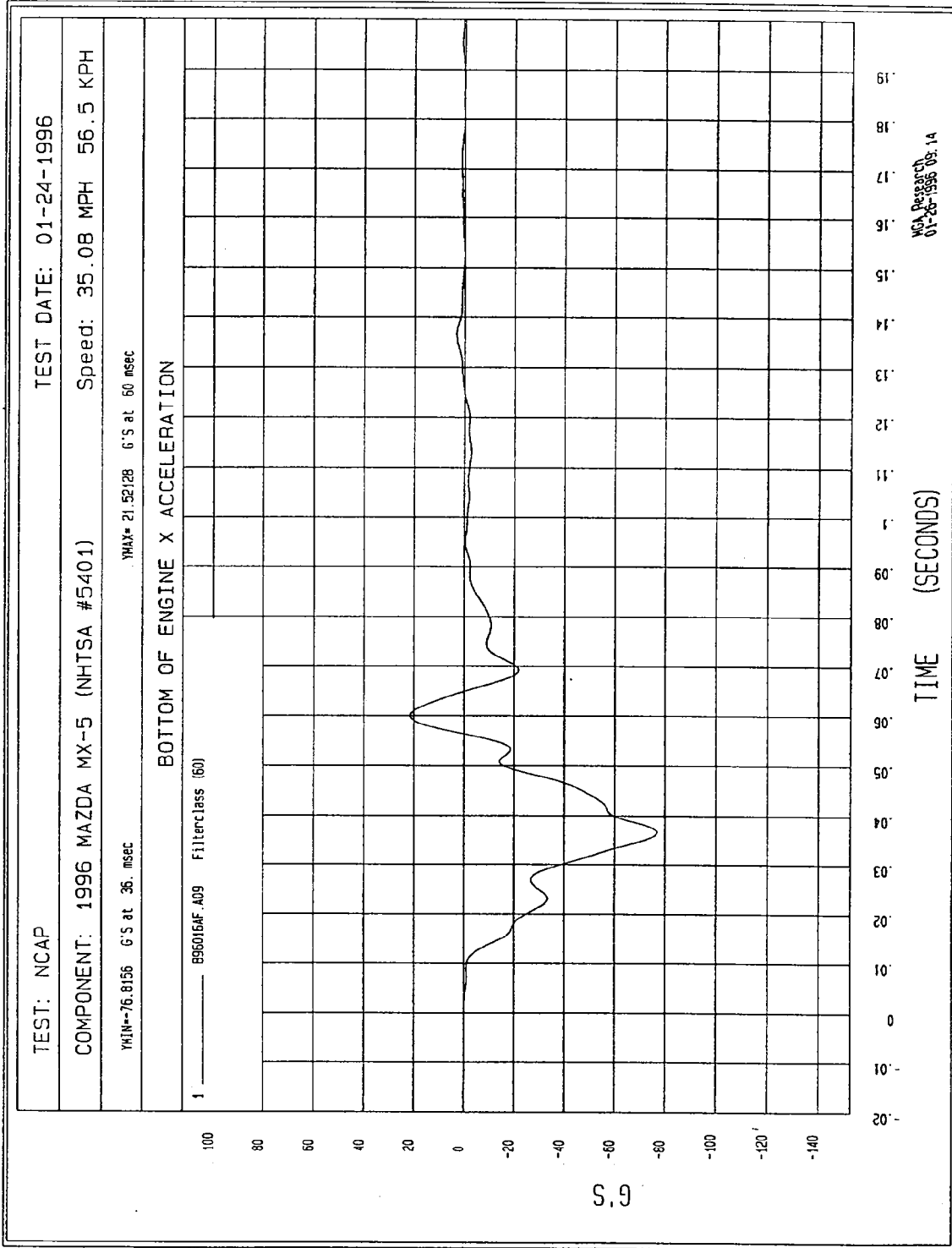


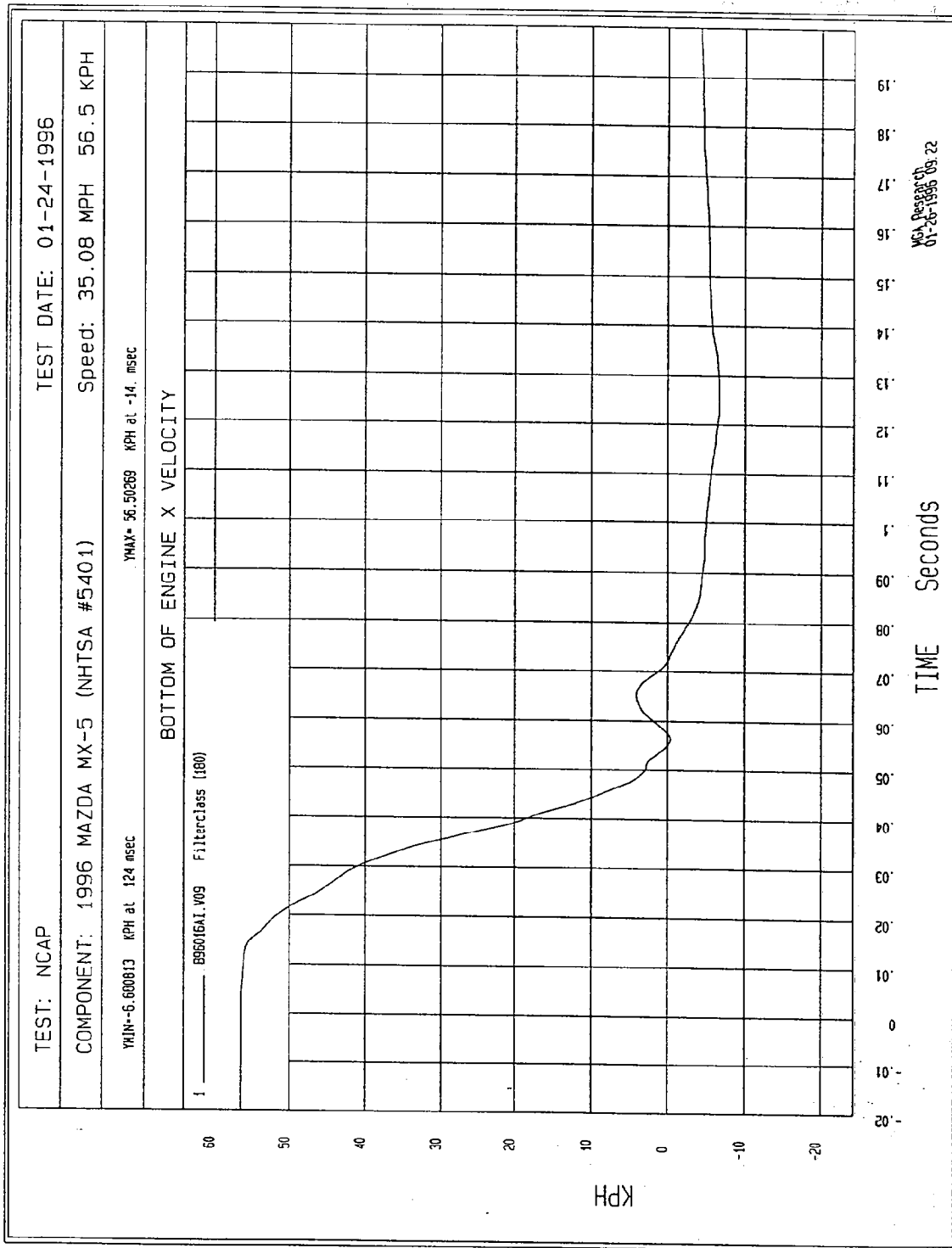


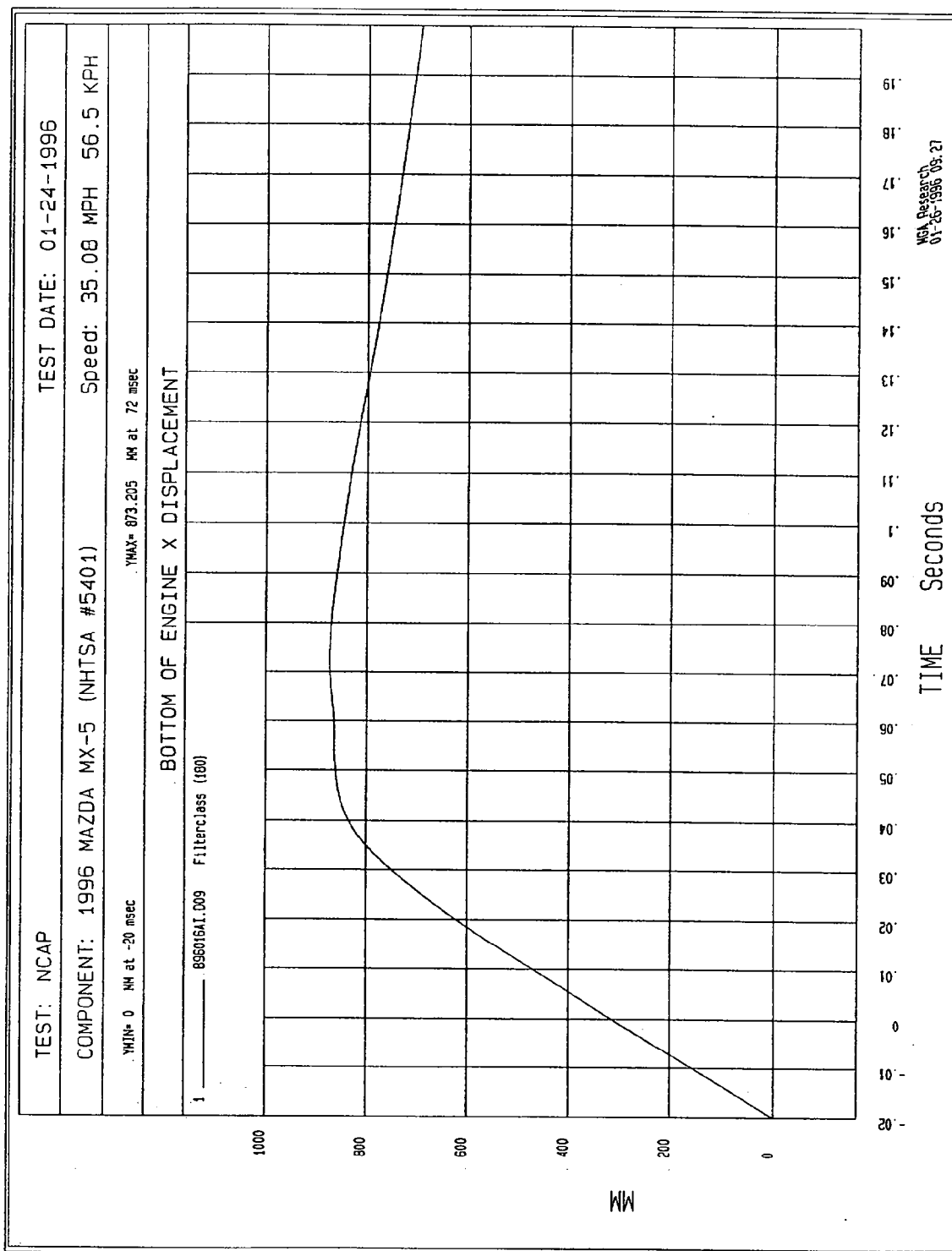


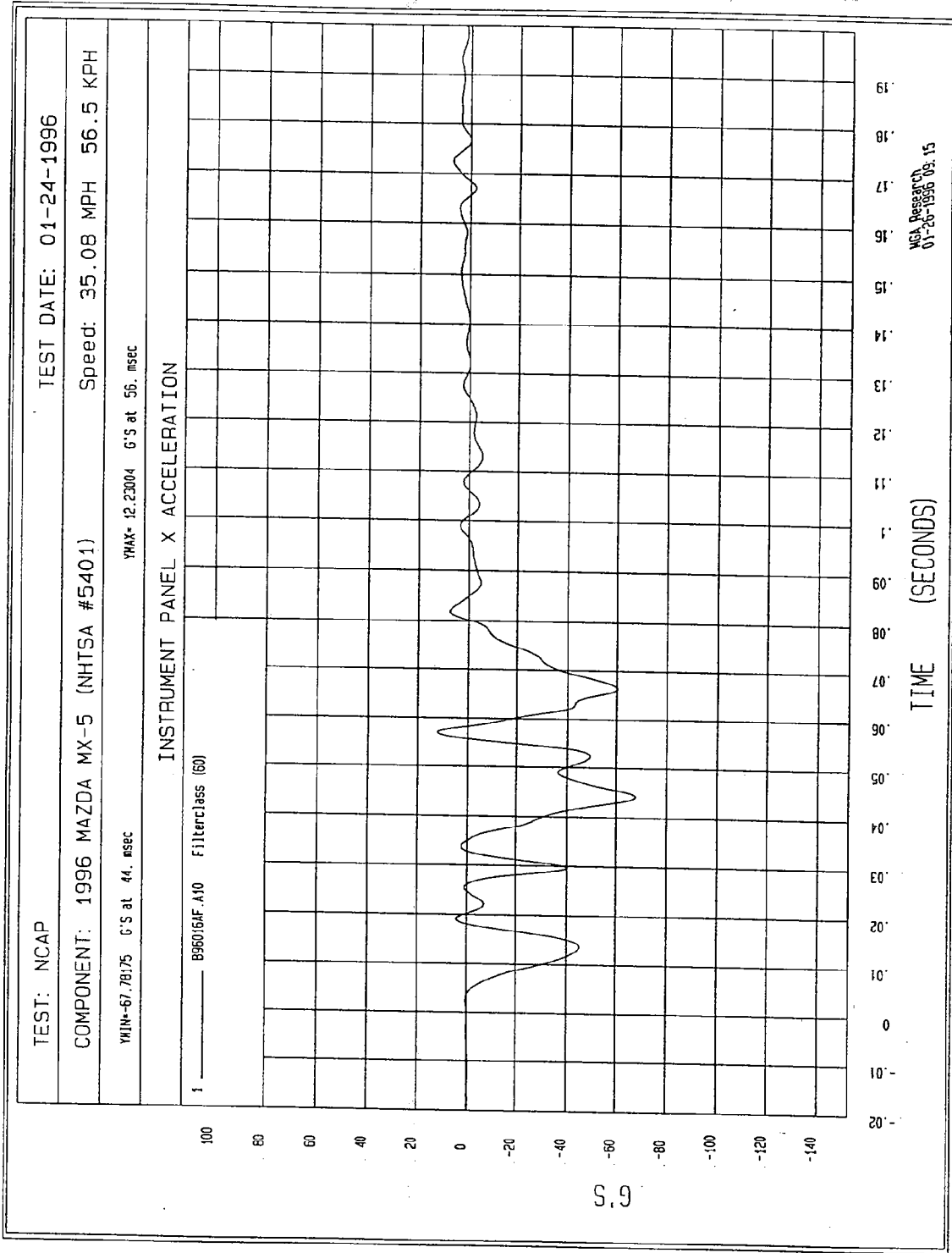


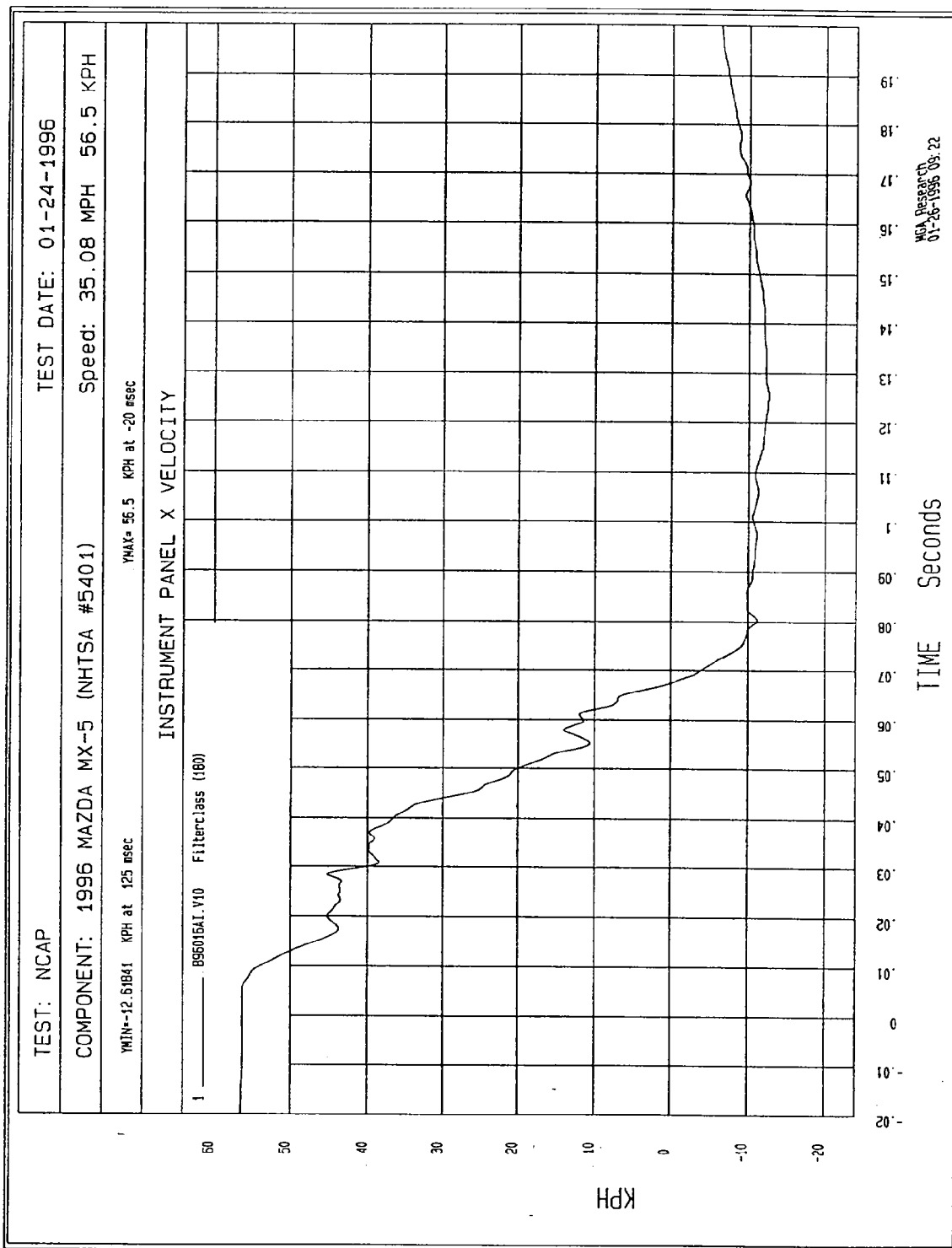


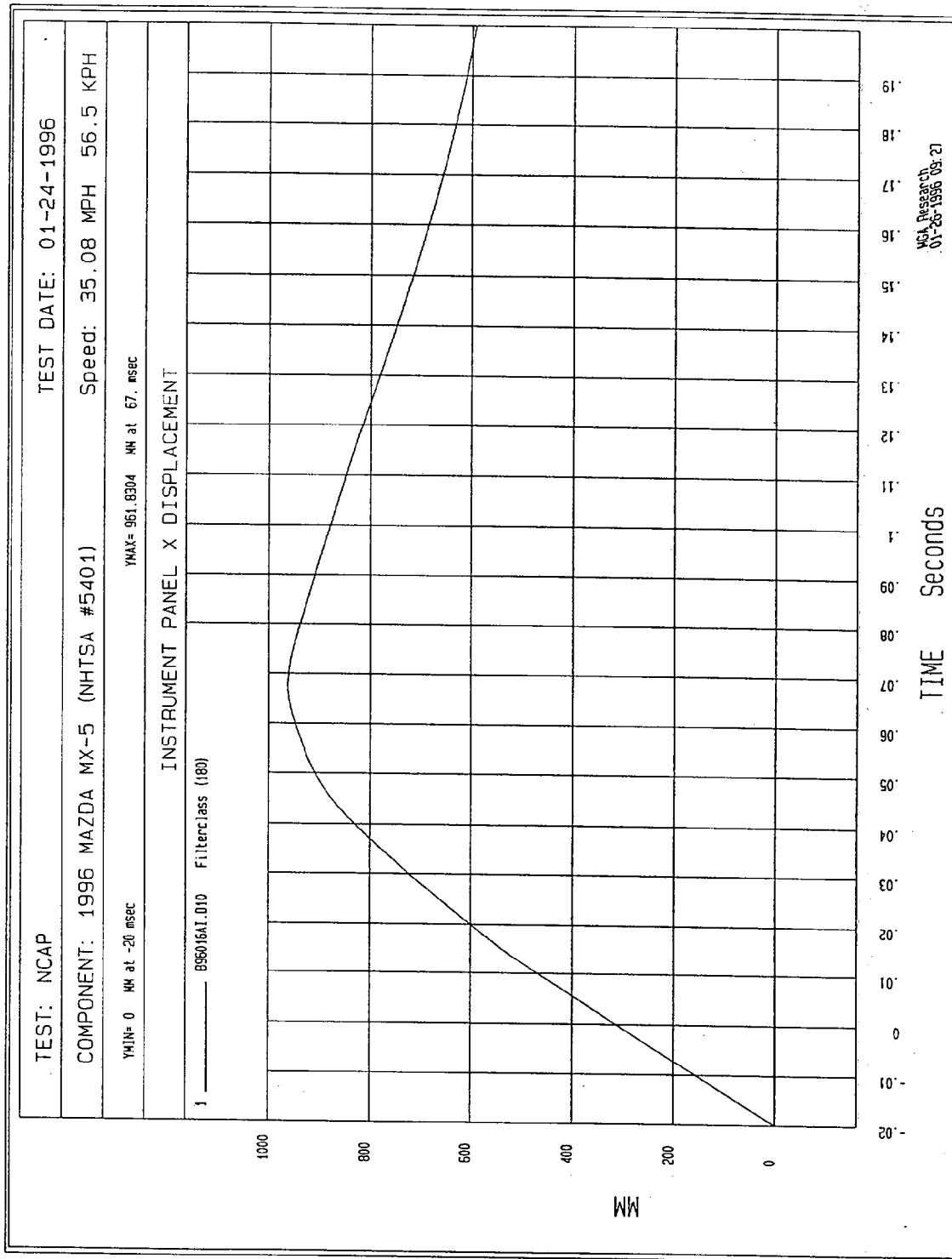


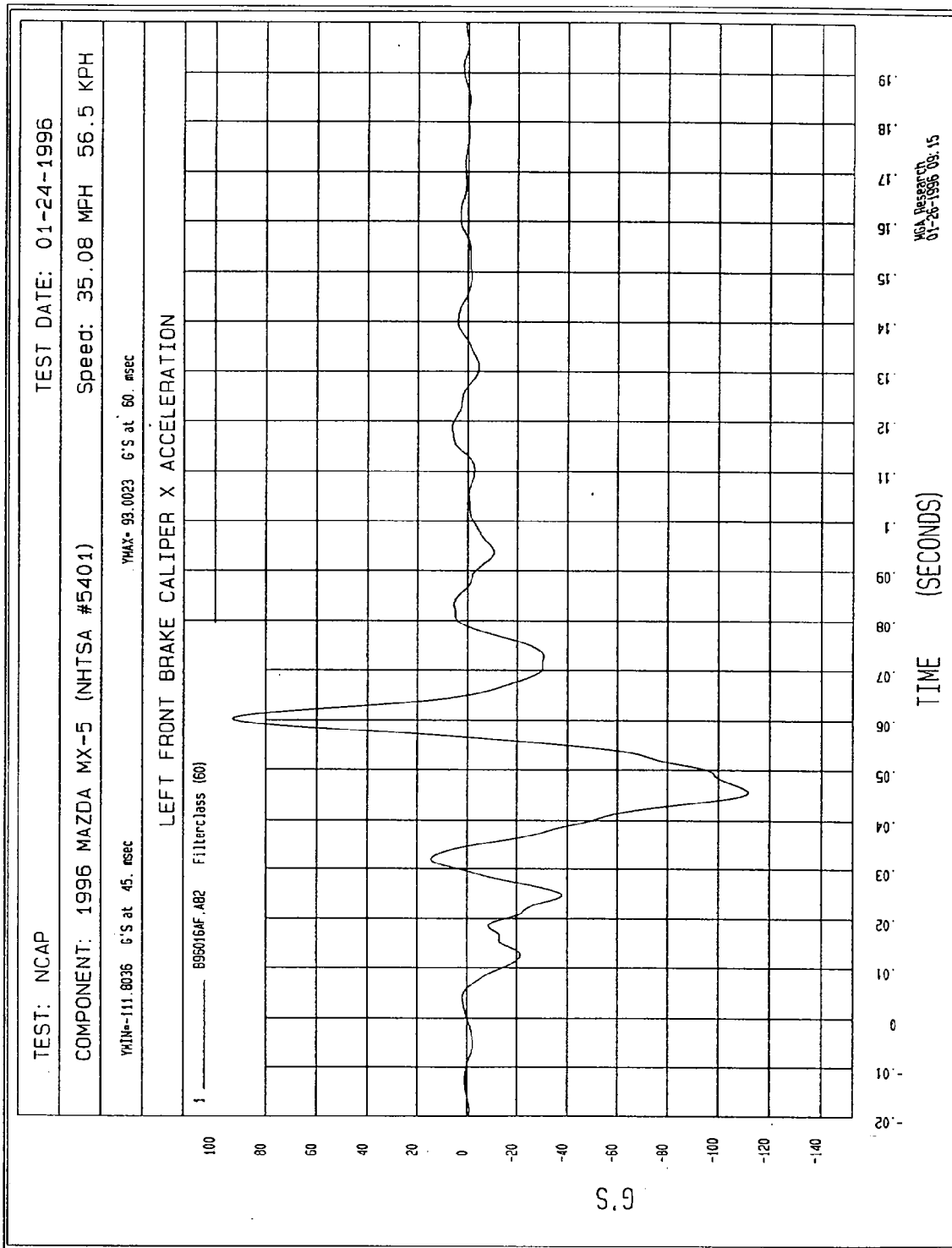


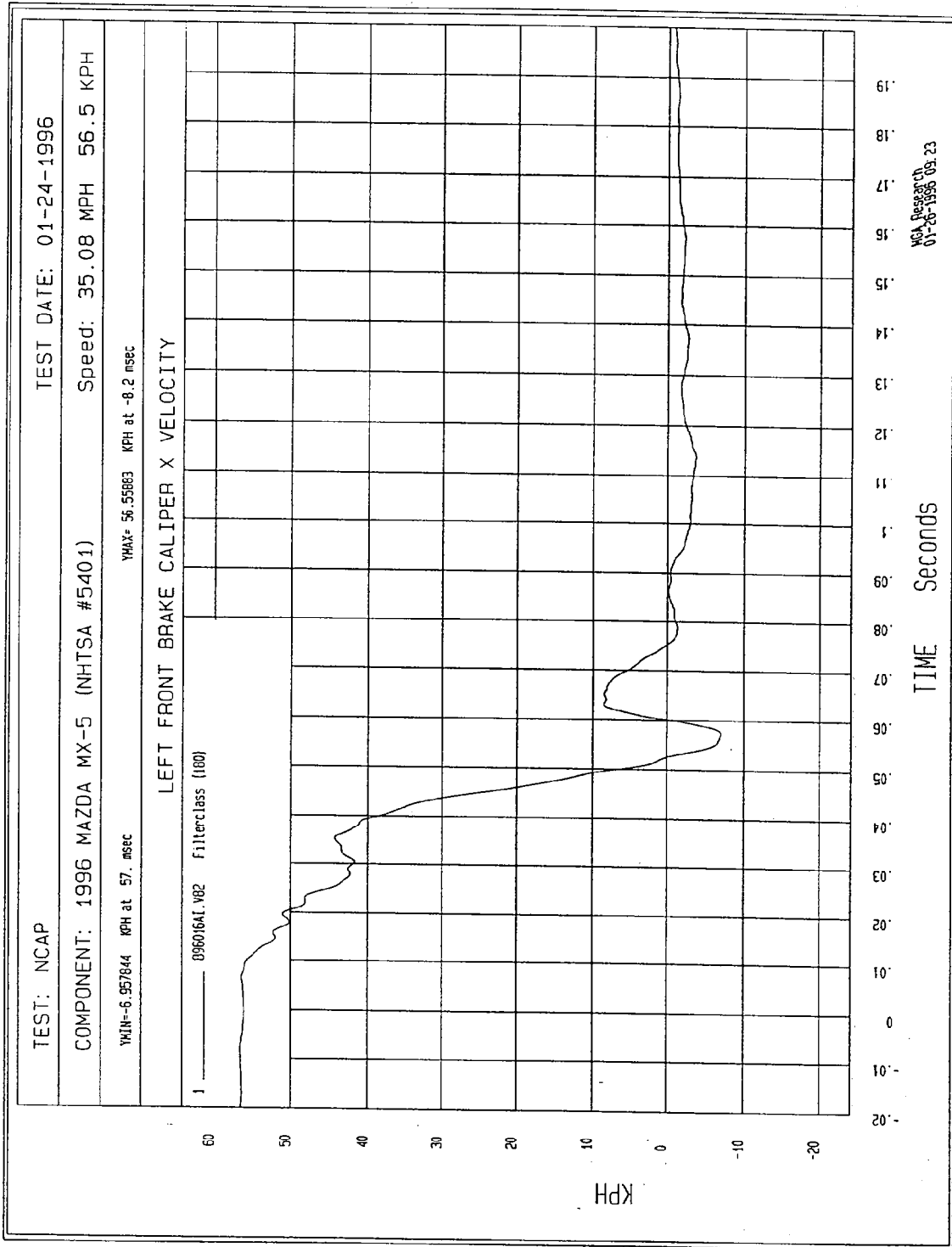


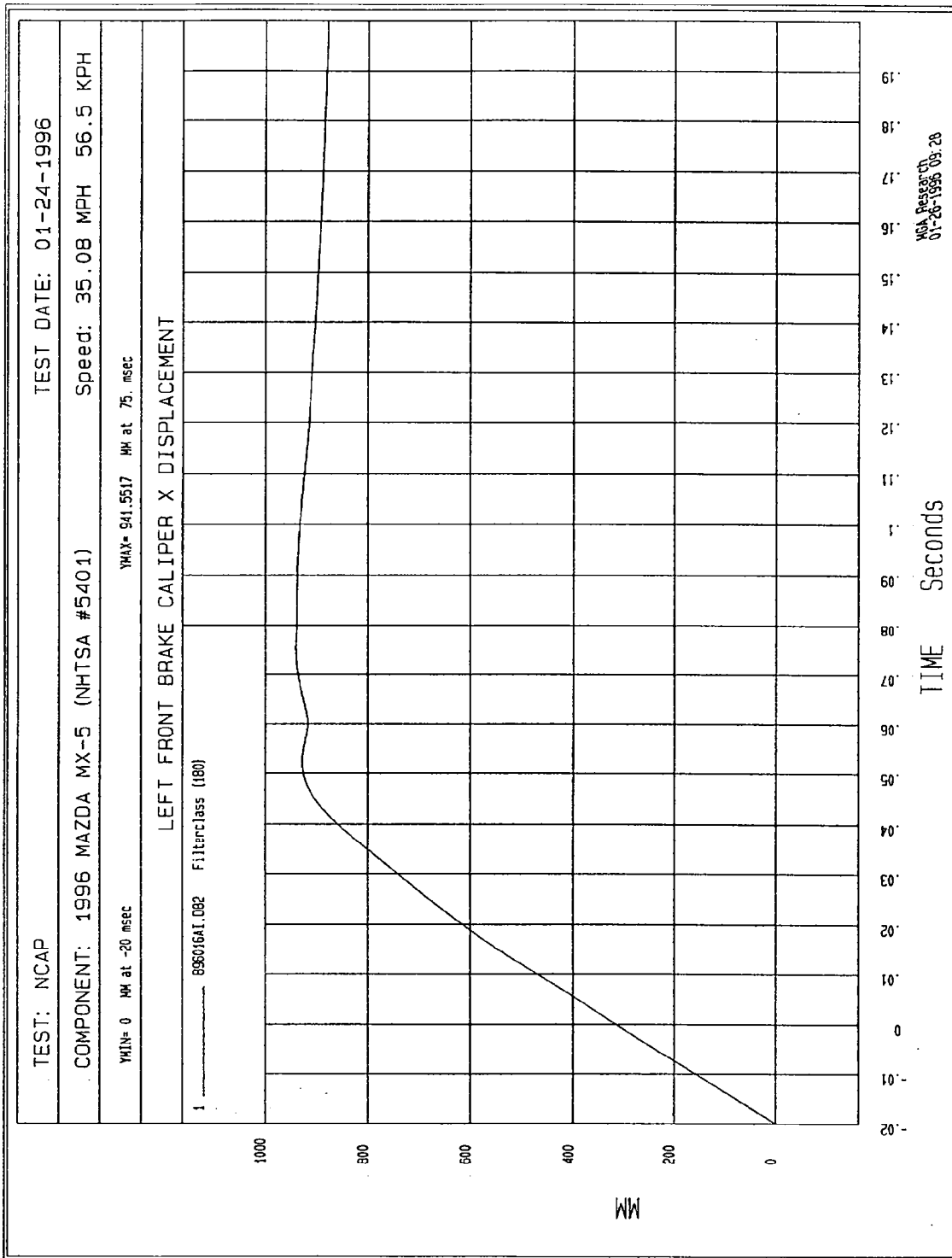


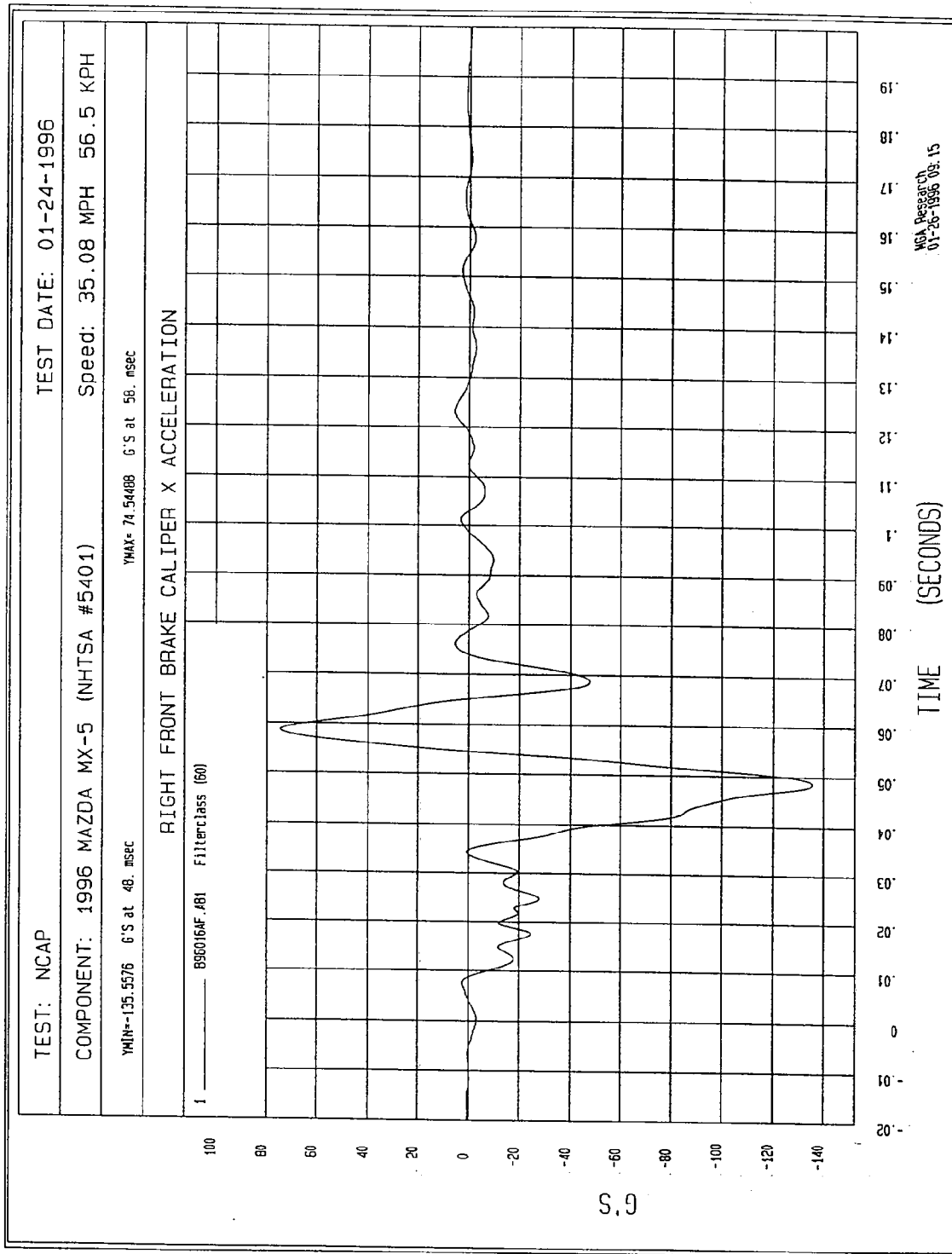


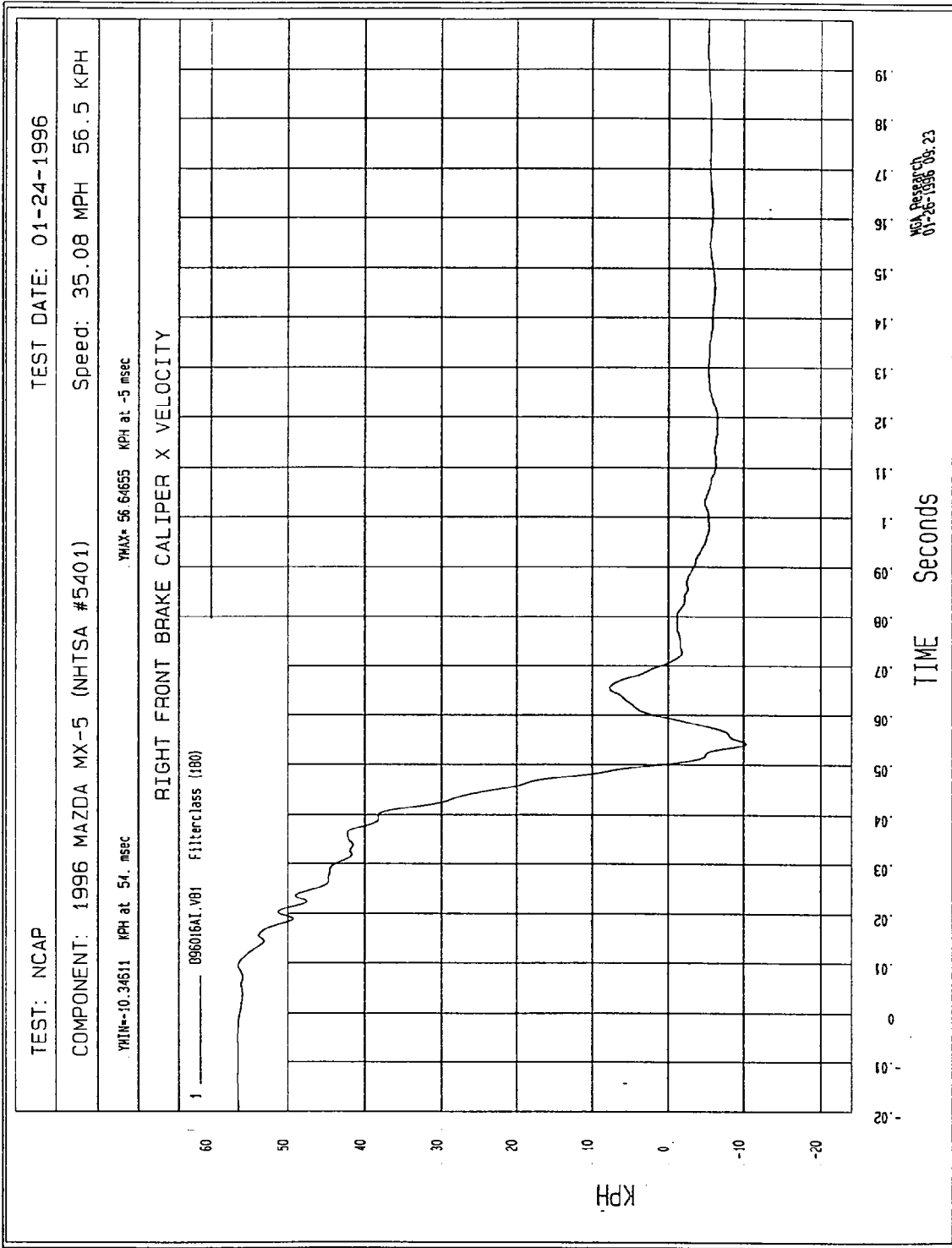


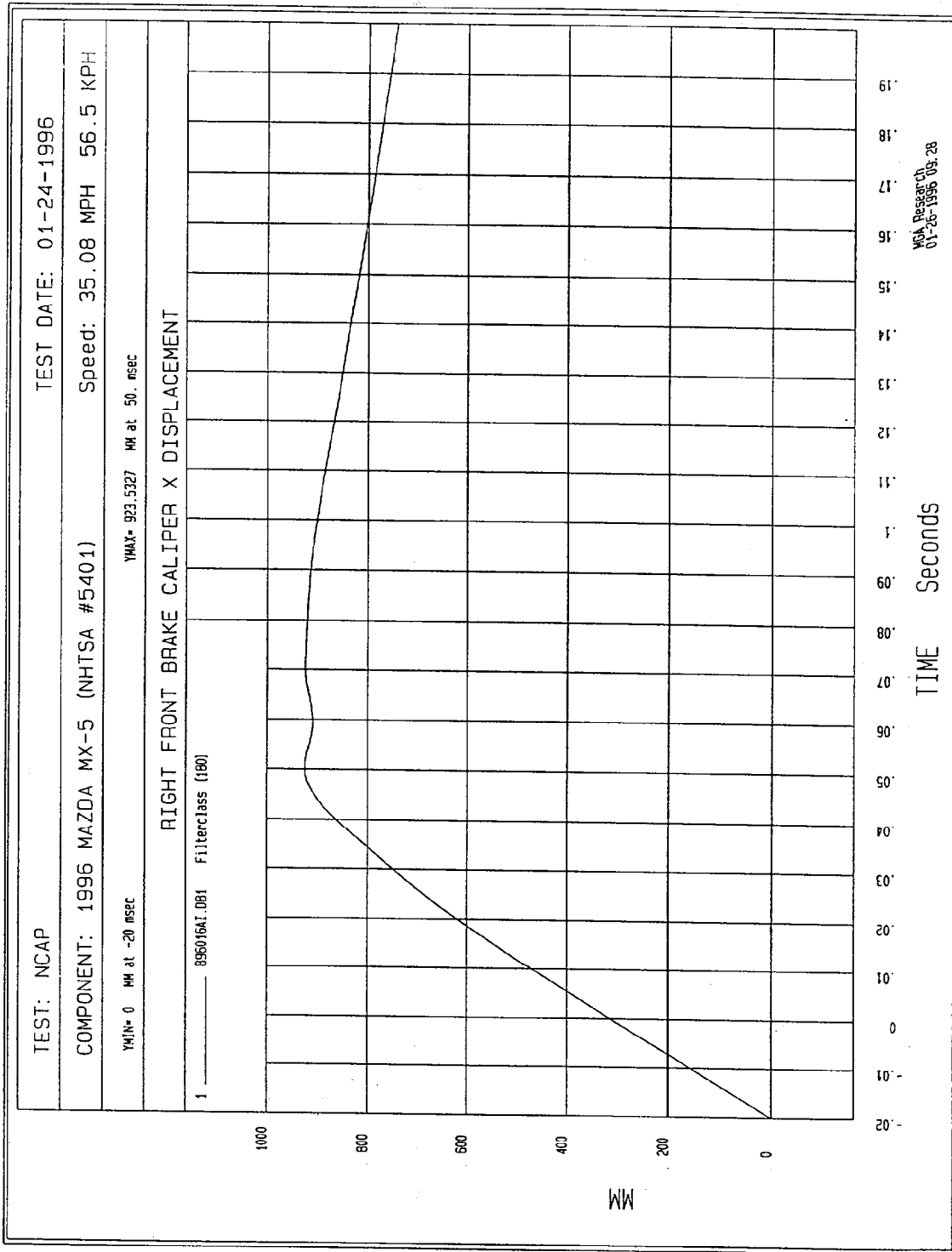












TEST: NCAP

TEST DATE: 01-24-1996

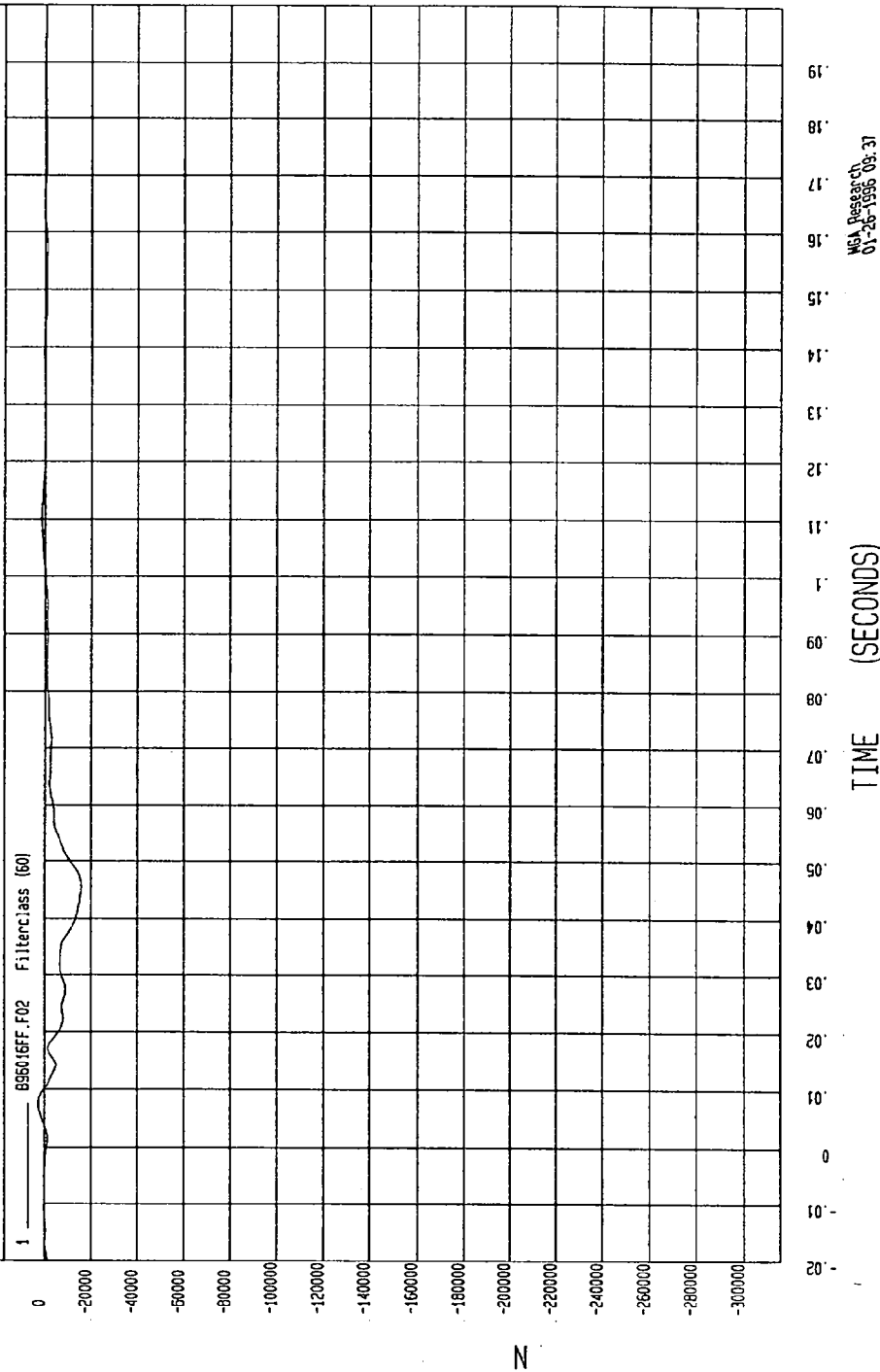
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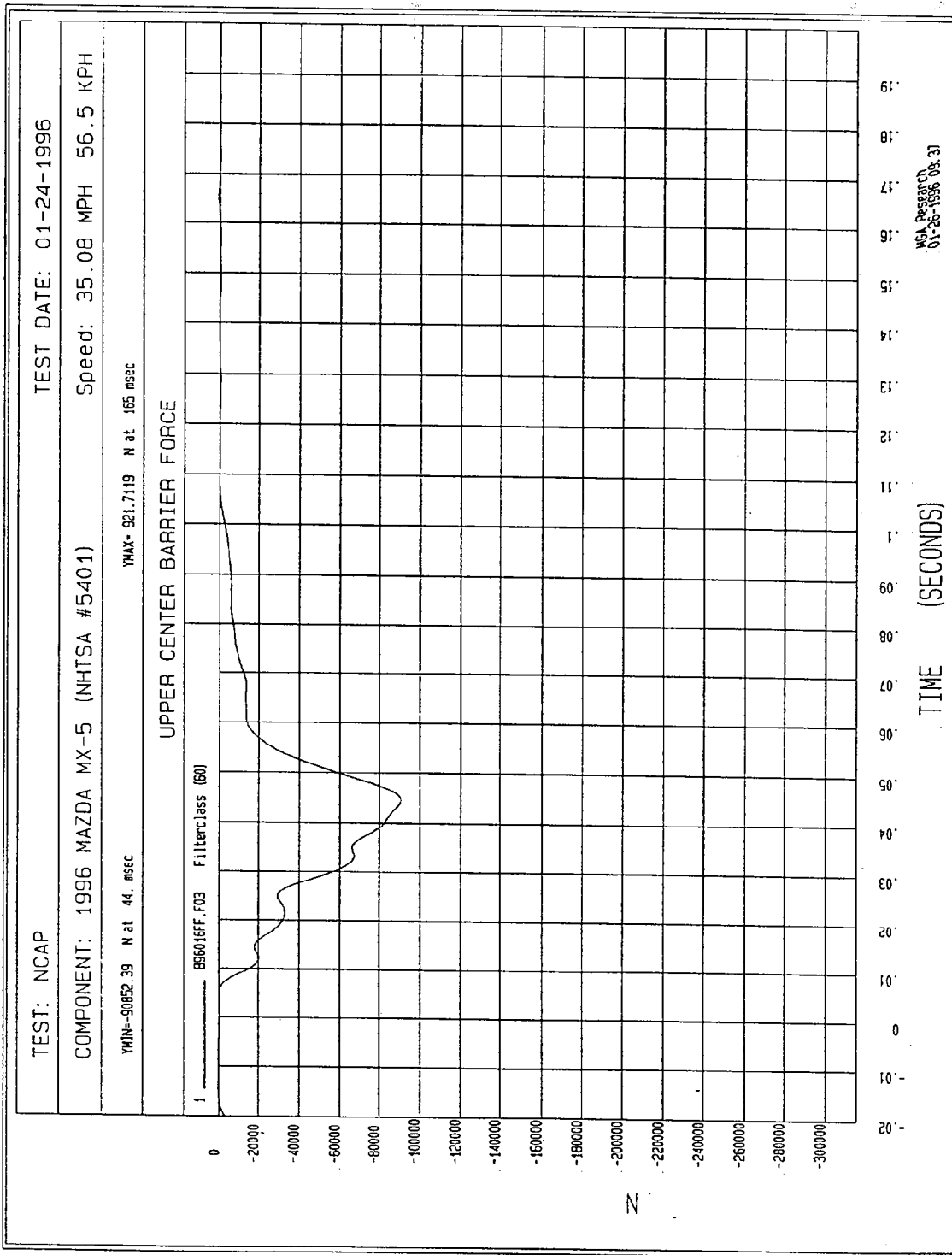
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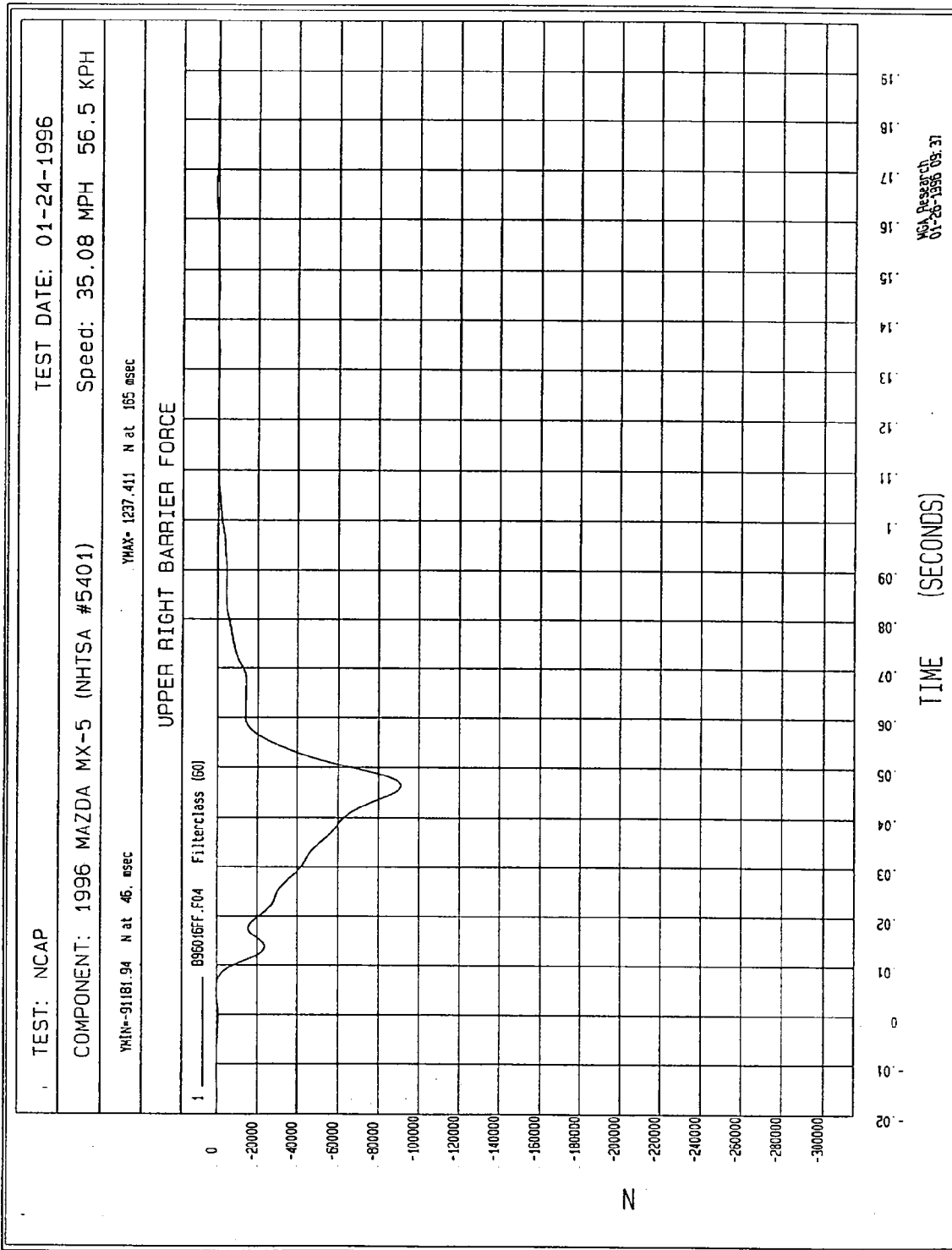
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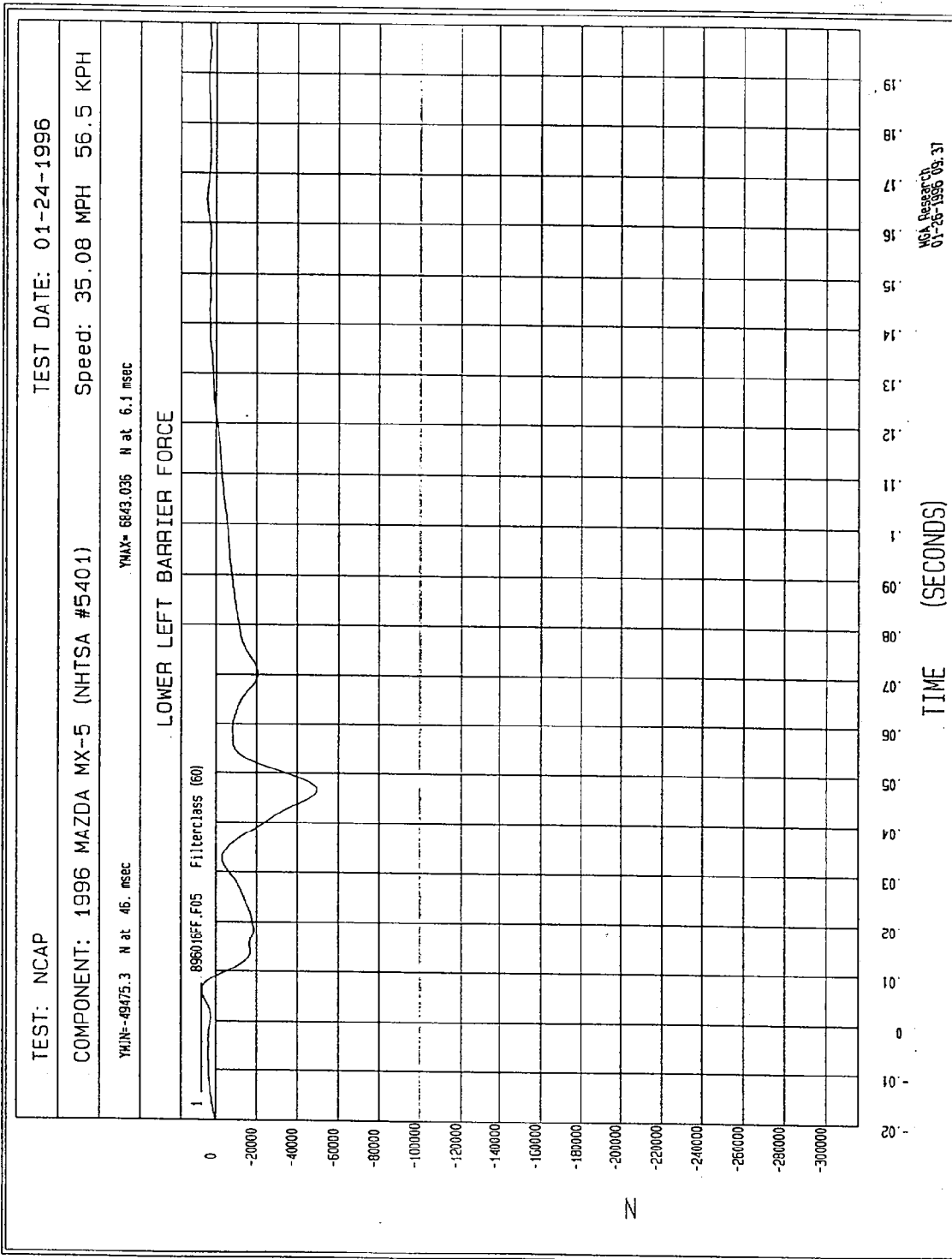
YMAX= 2702.861 N at 7.5 msec

UPPER LEFT BARRIER FORCE









TEST: NCAP

TEST DATE: 01-24-1996

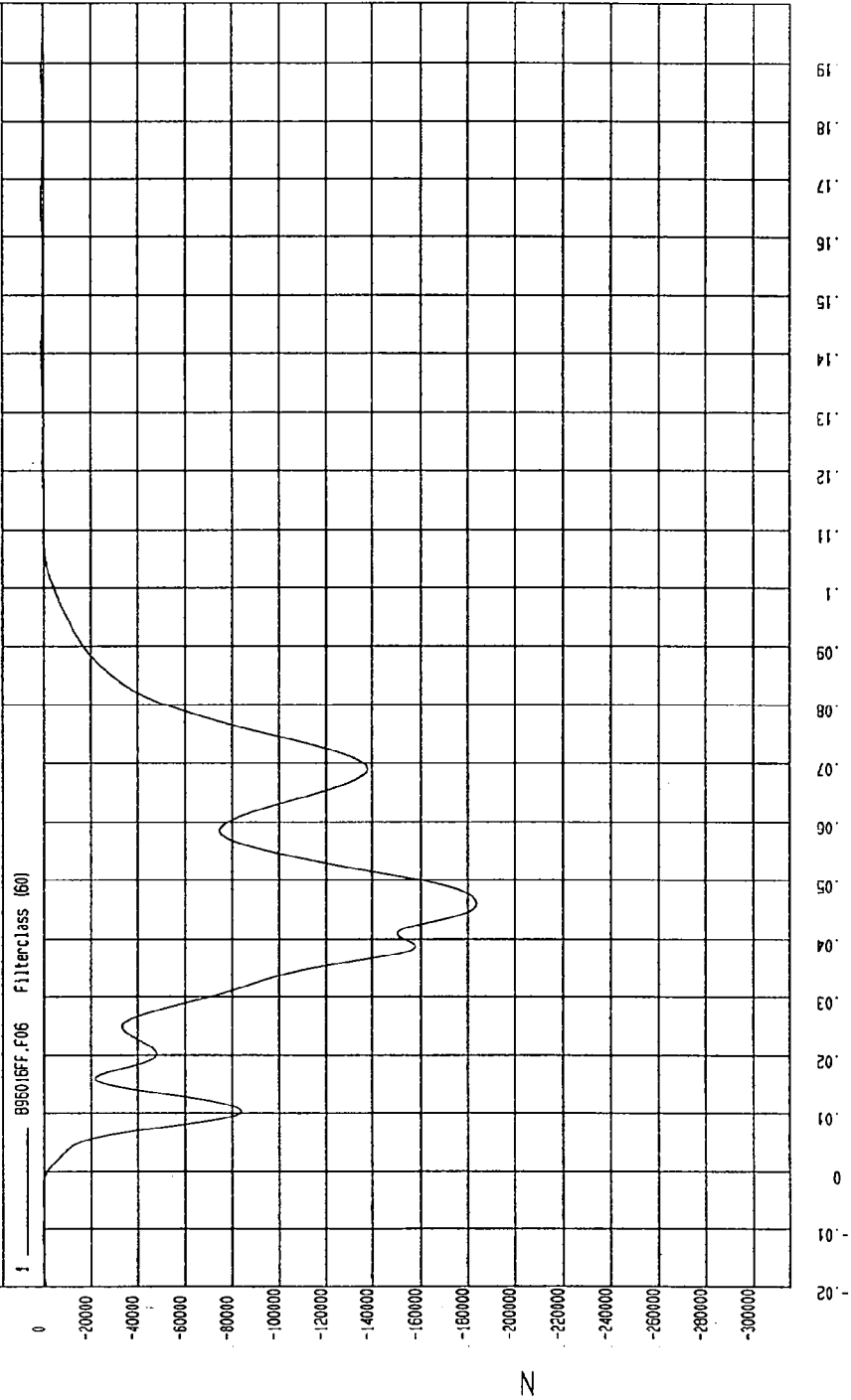
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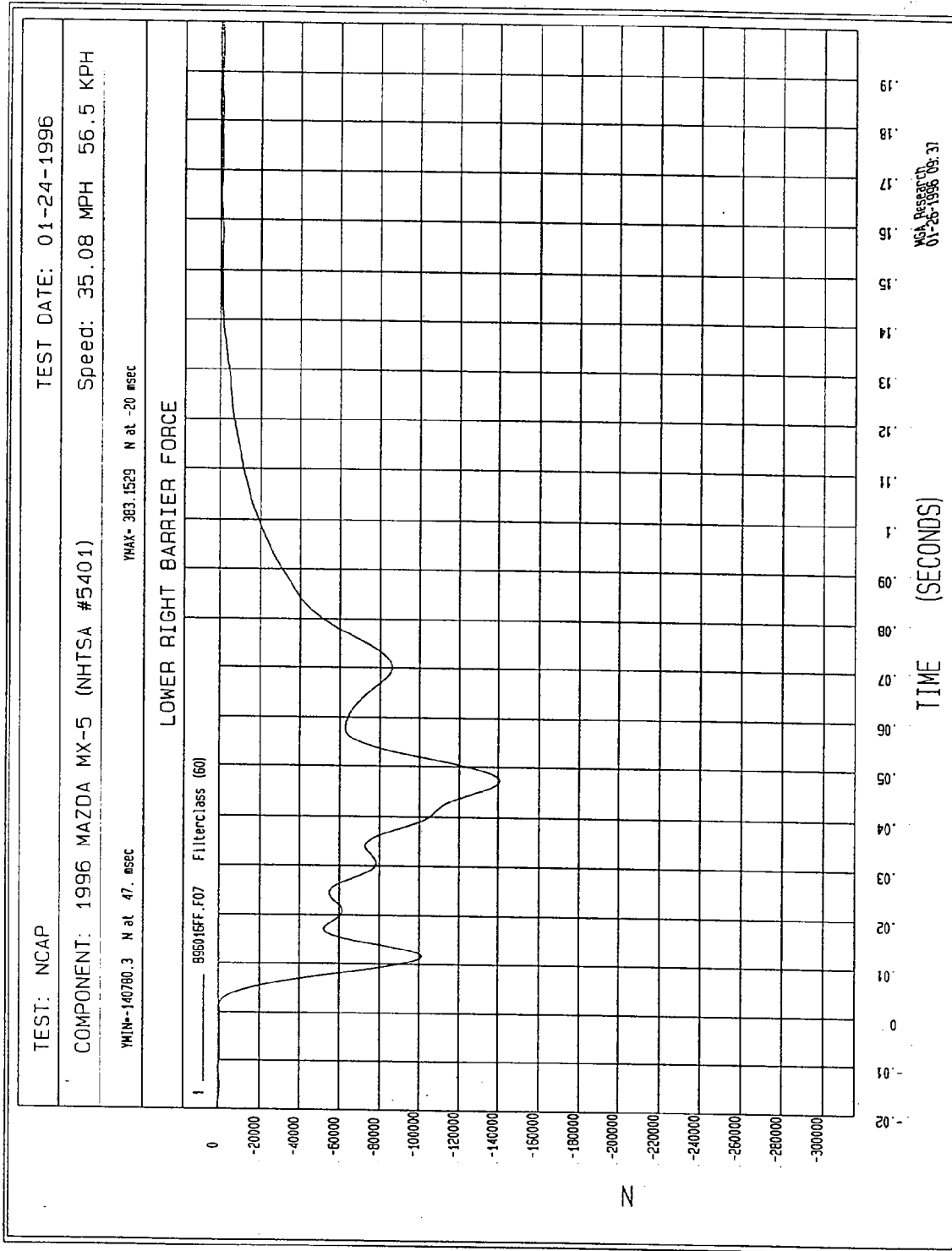
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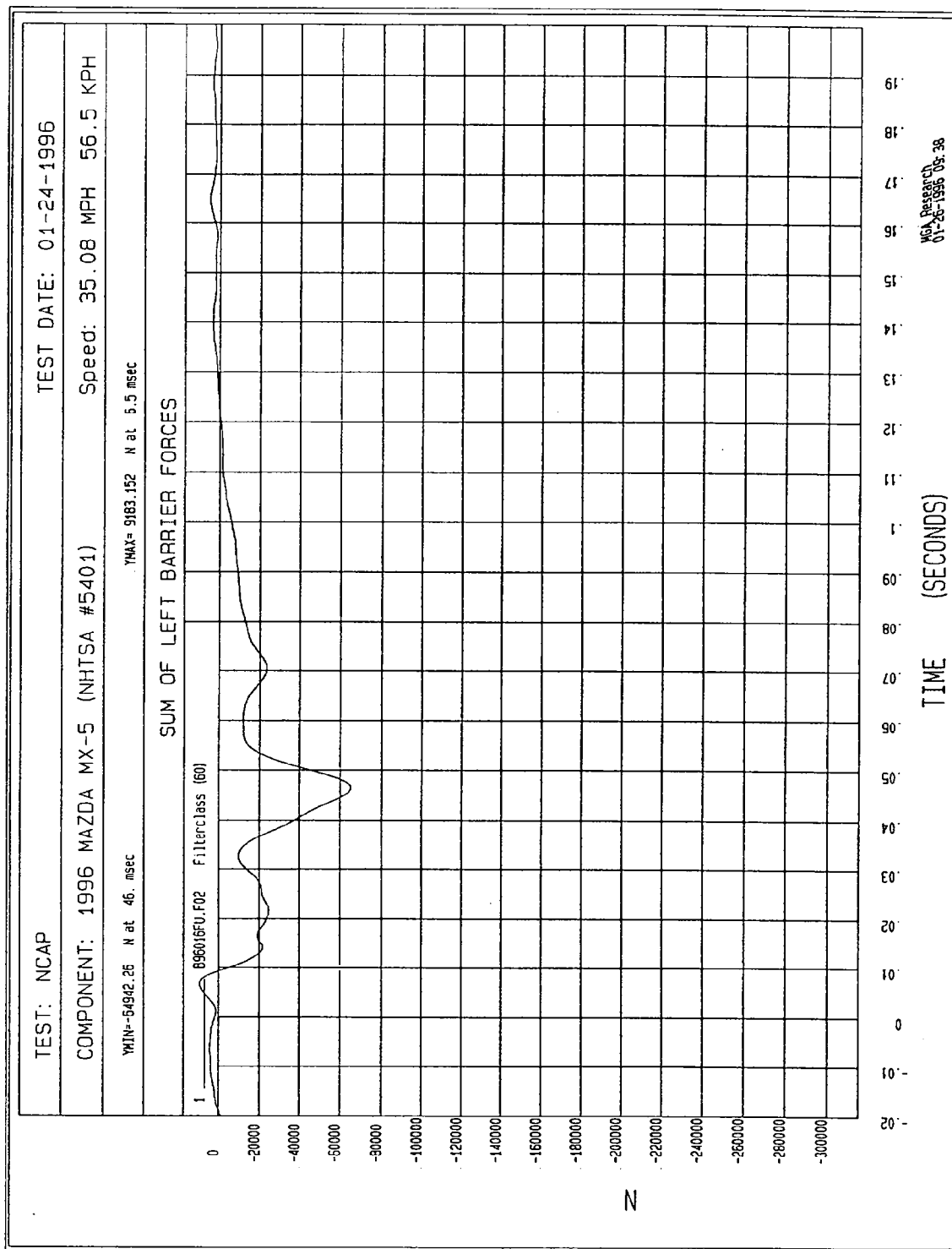
YMAX= 1084.9 N at 165 msec

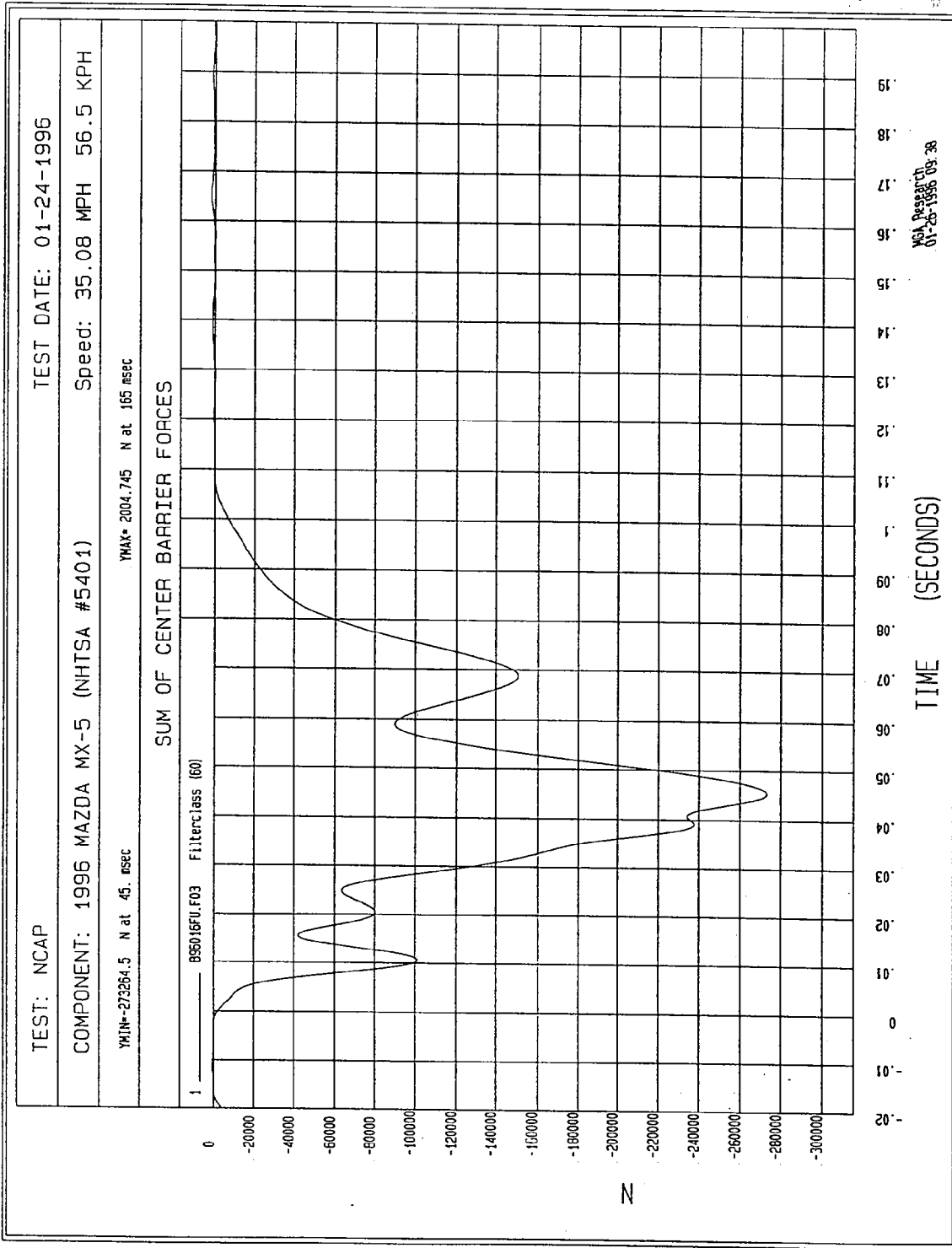
LOWER CENTER BARRIER FORCE



MCA Research
01-25-1996 09:37







TEST: NCAP

TEST DATE: 01-24-1996

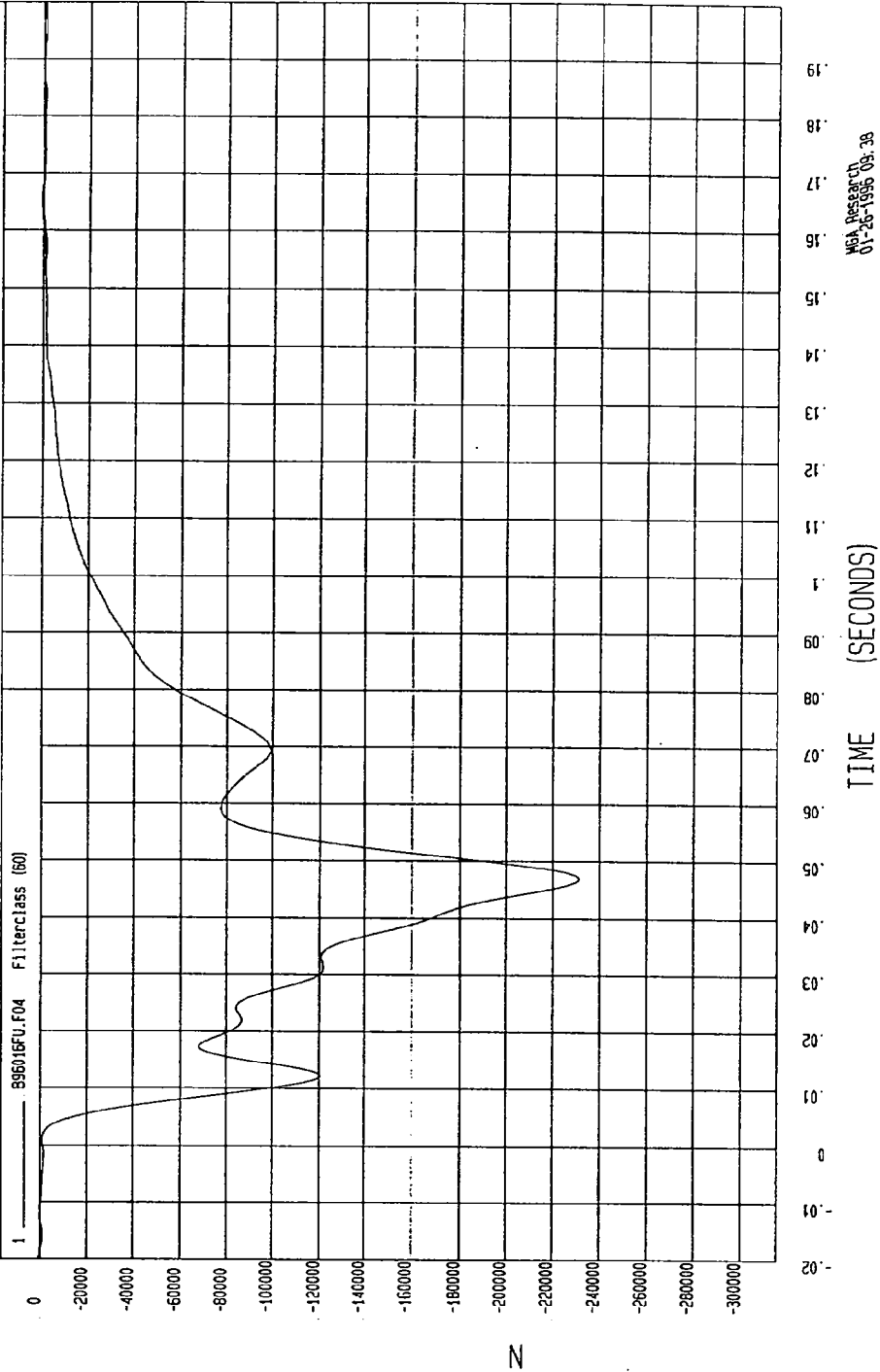
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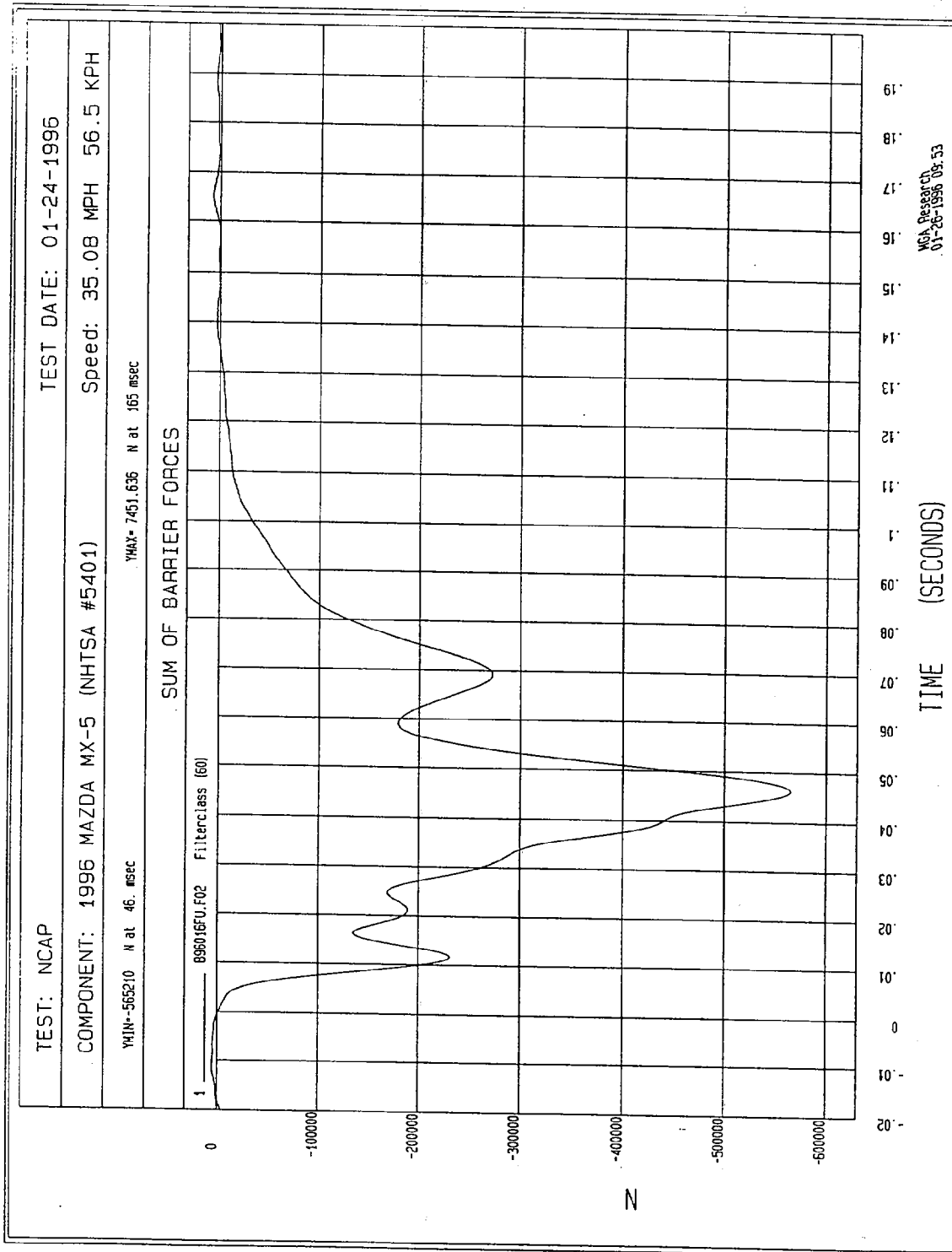
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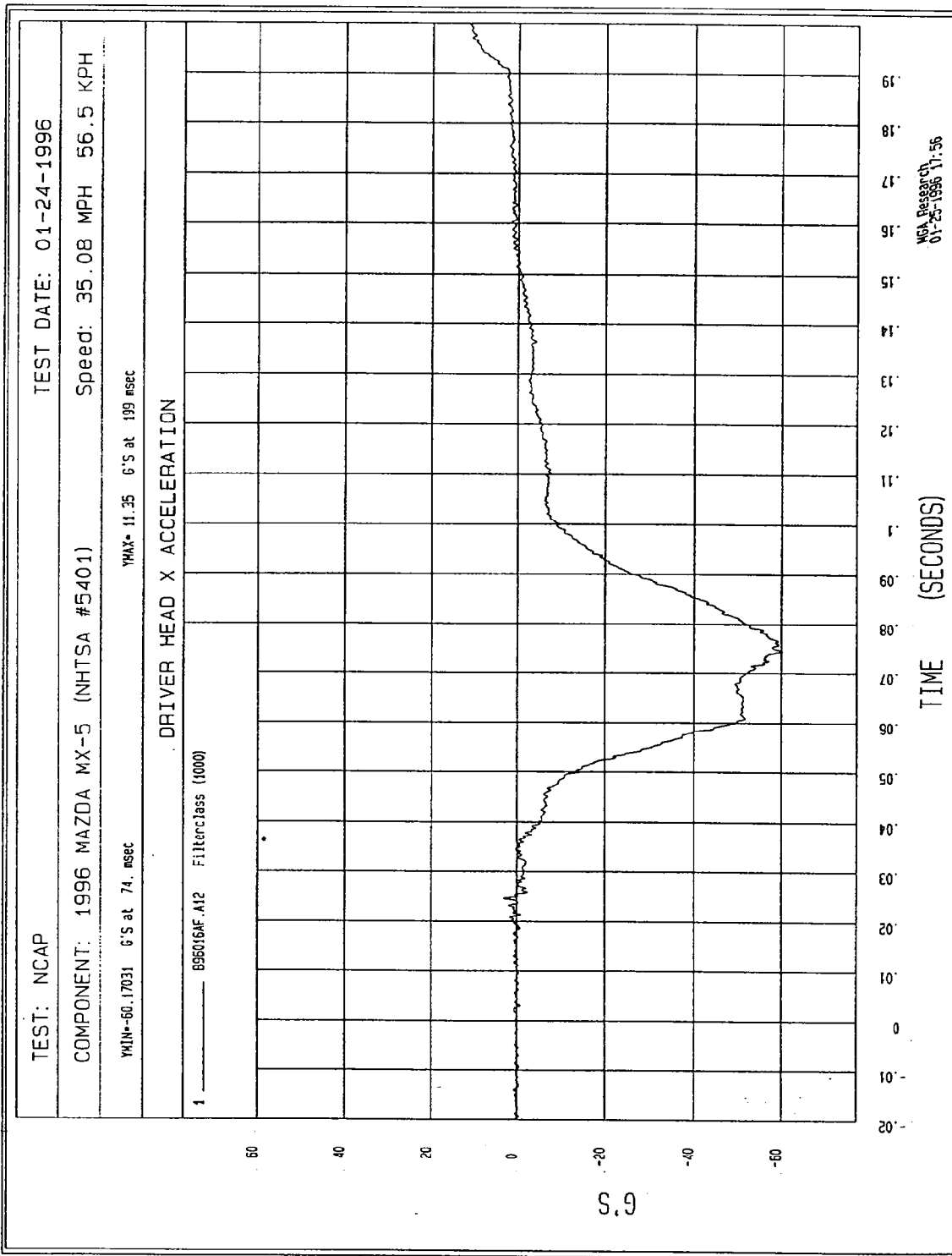
YMIN=-231172 N at 46. msec

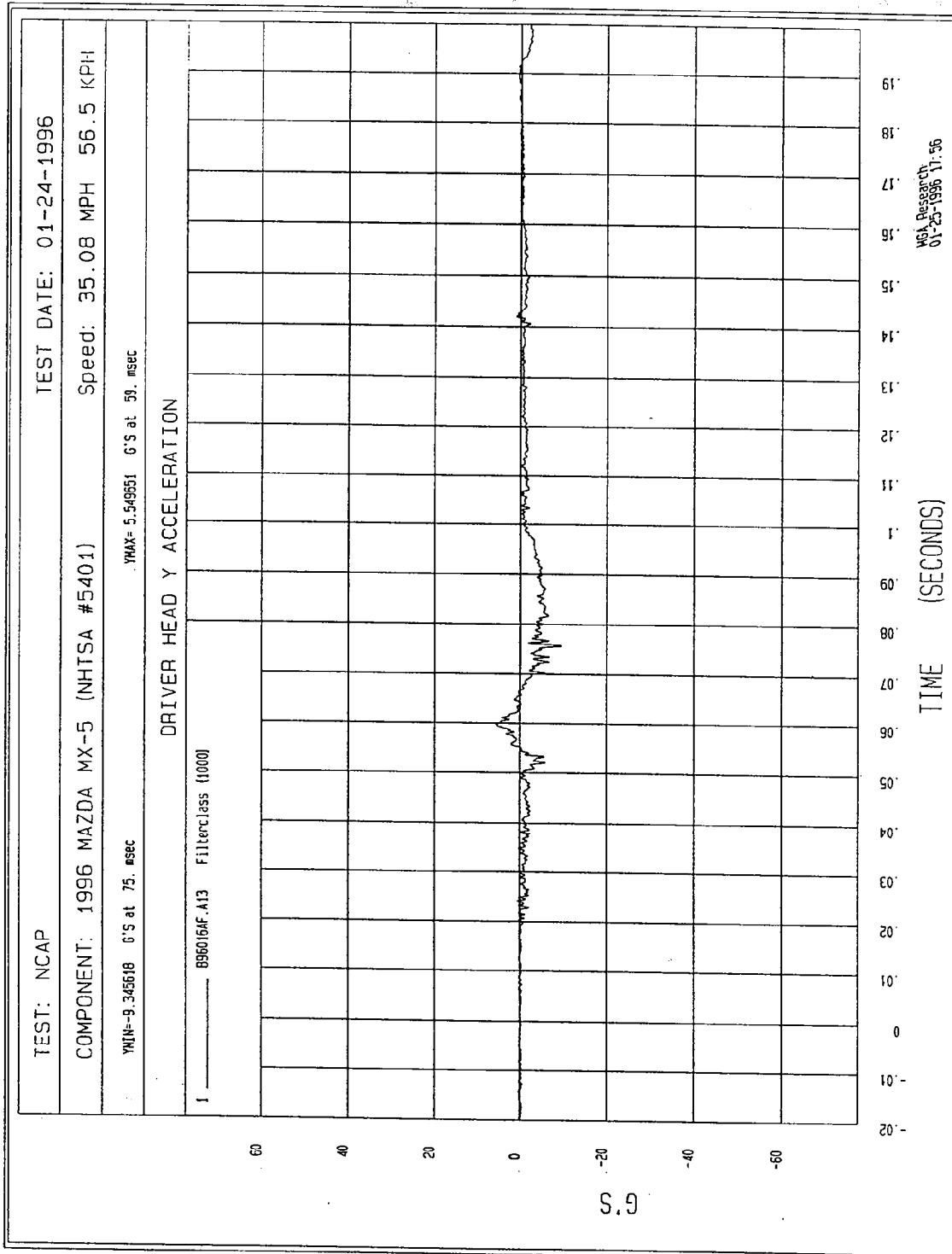
YMAX= 970.9412 N at -20 msec

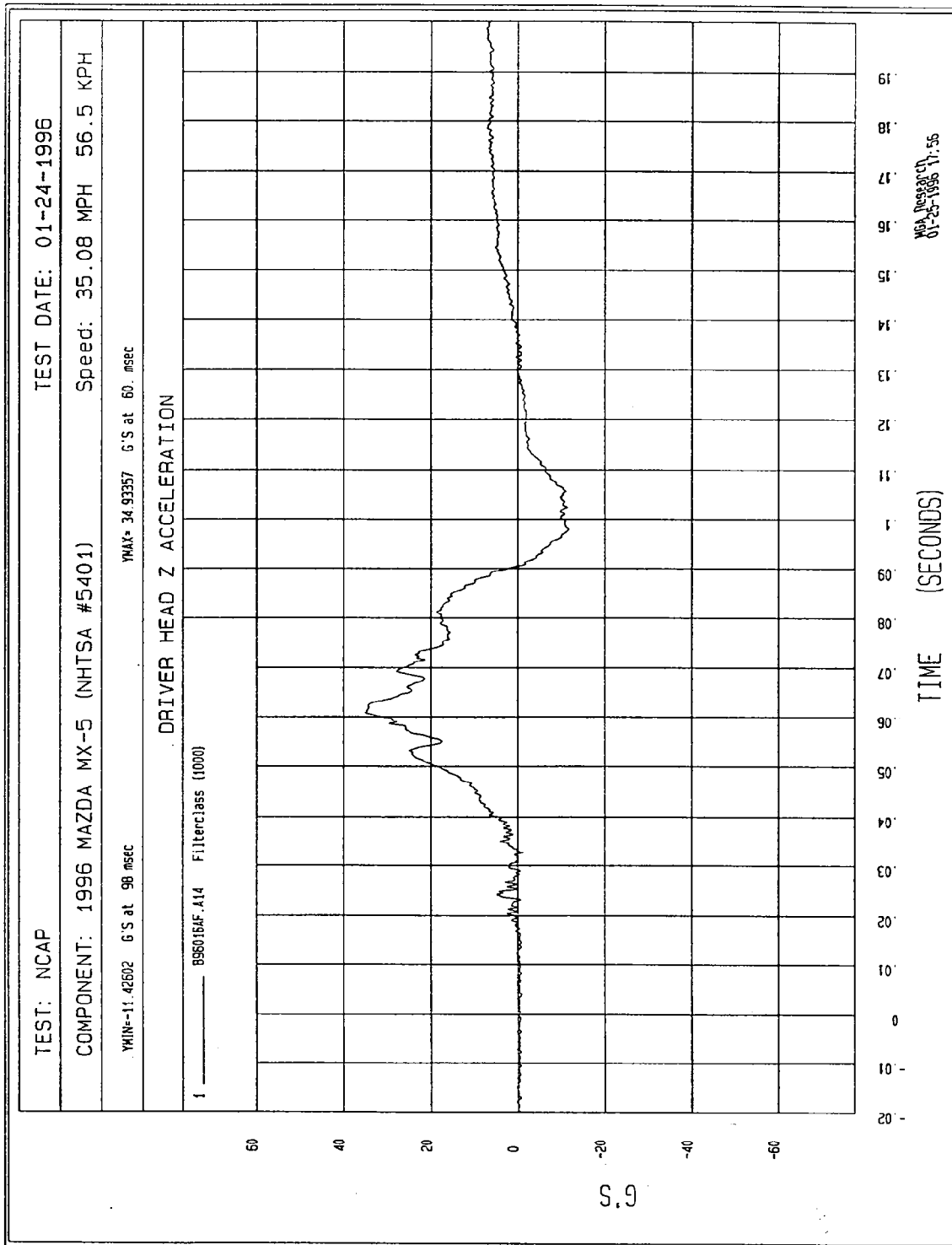
SUM OF RIGHT BARRIER FORCES

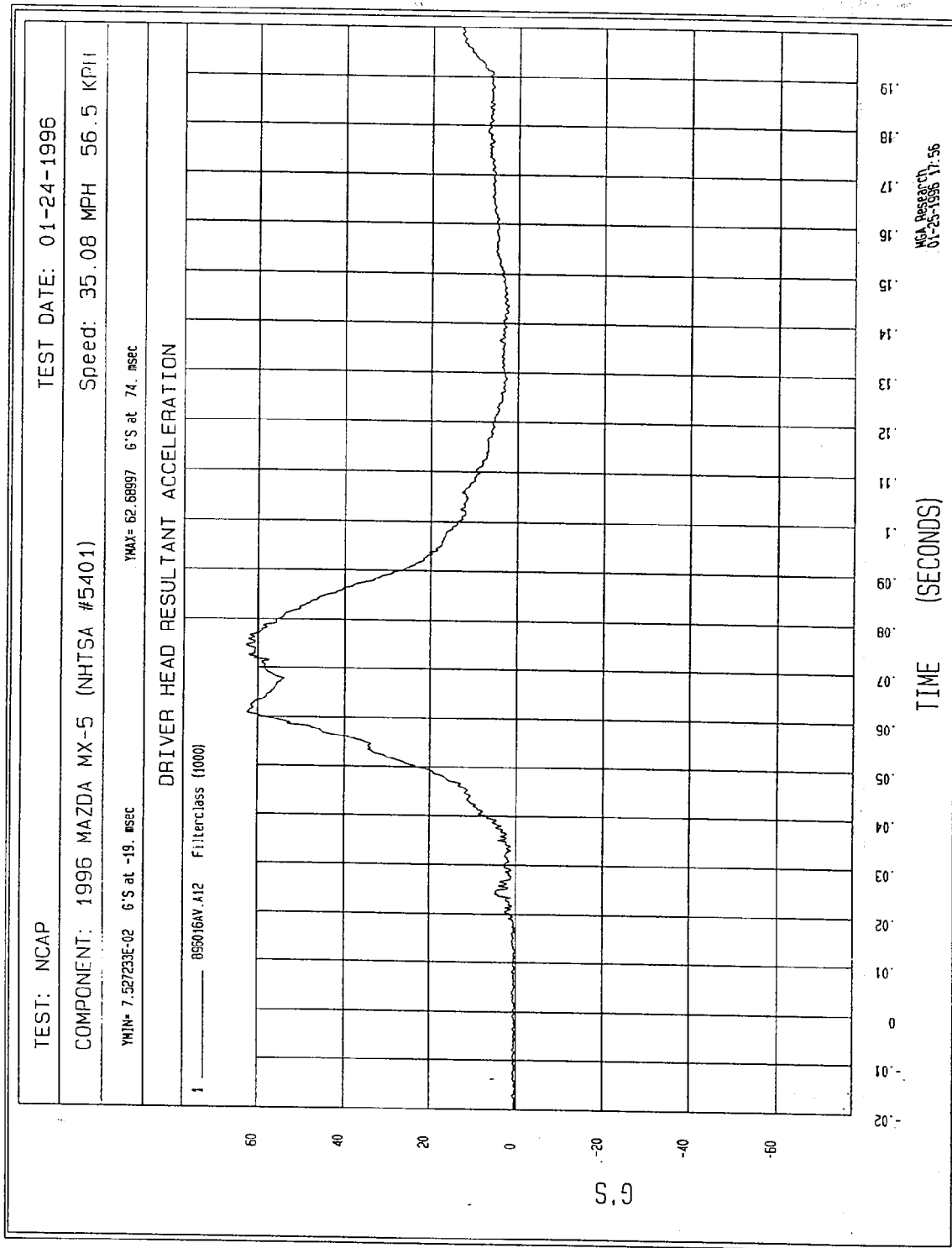


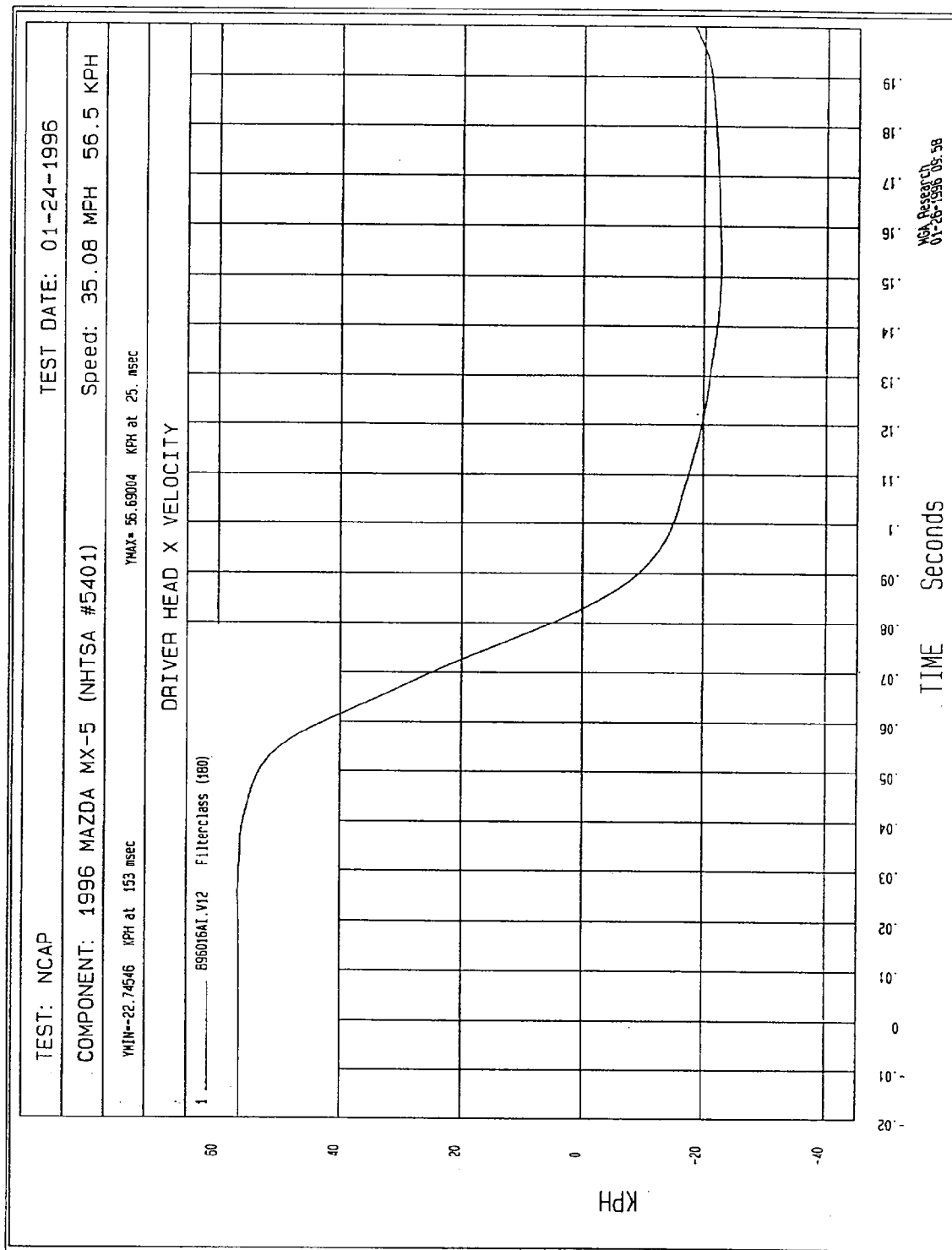


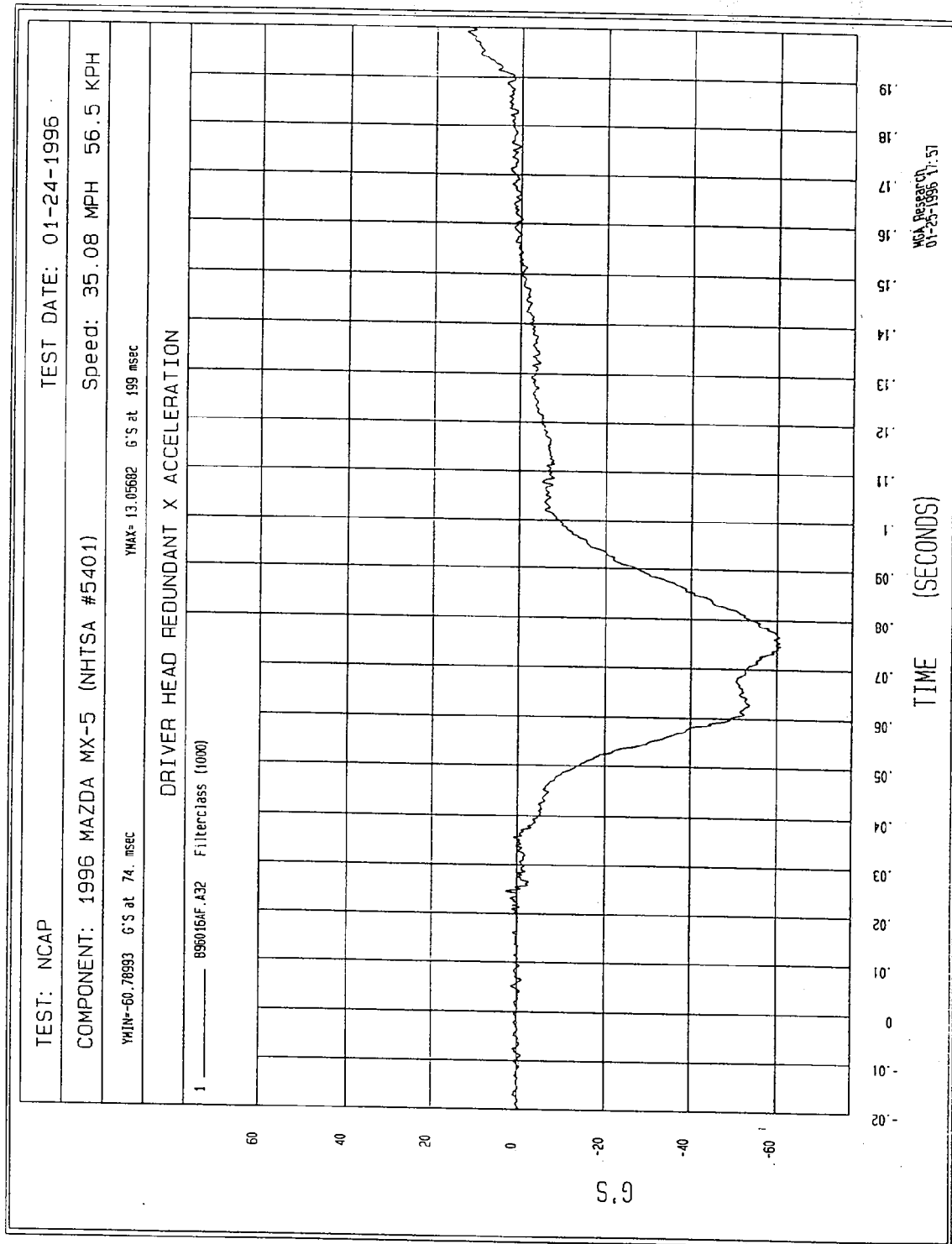


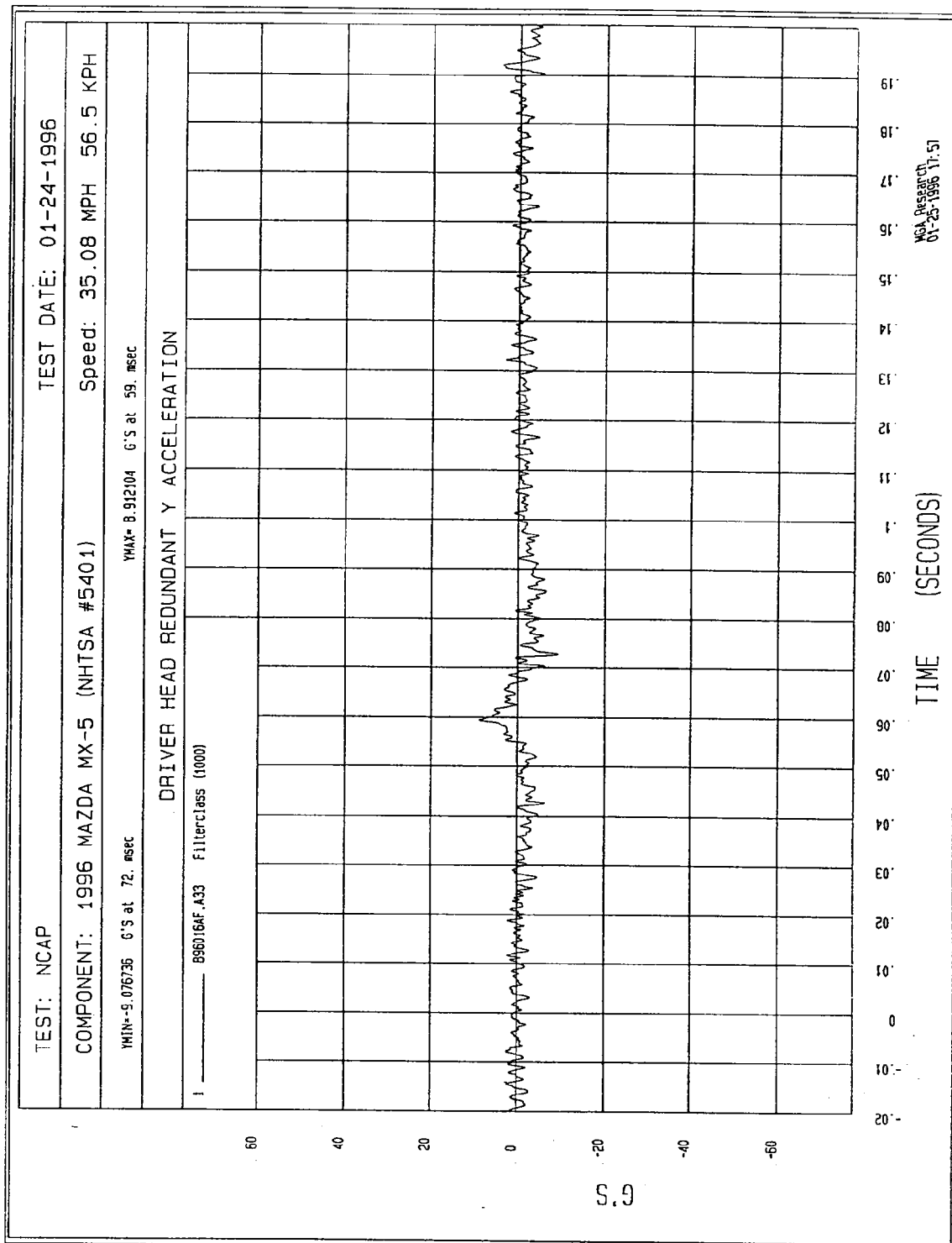


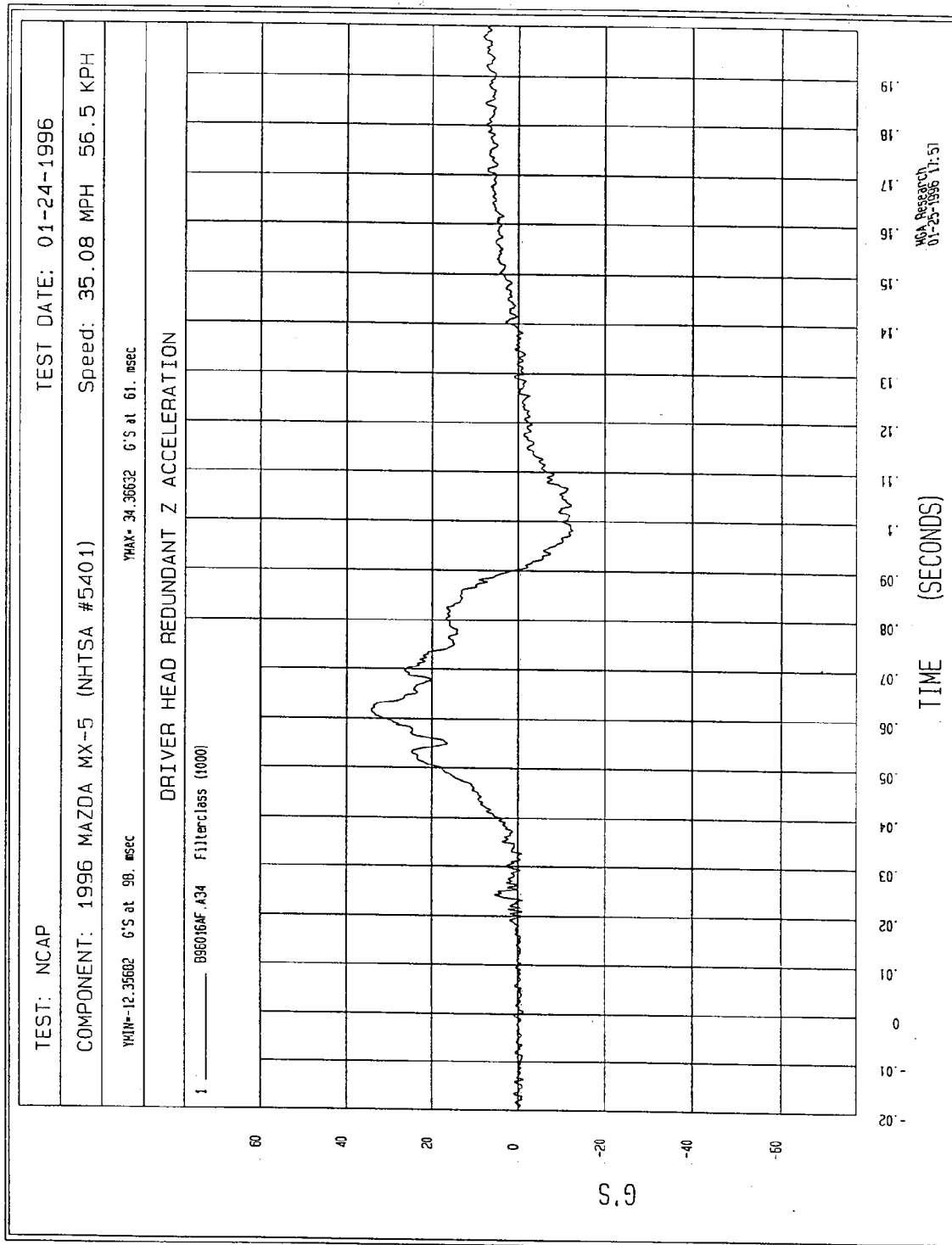


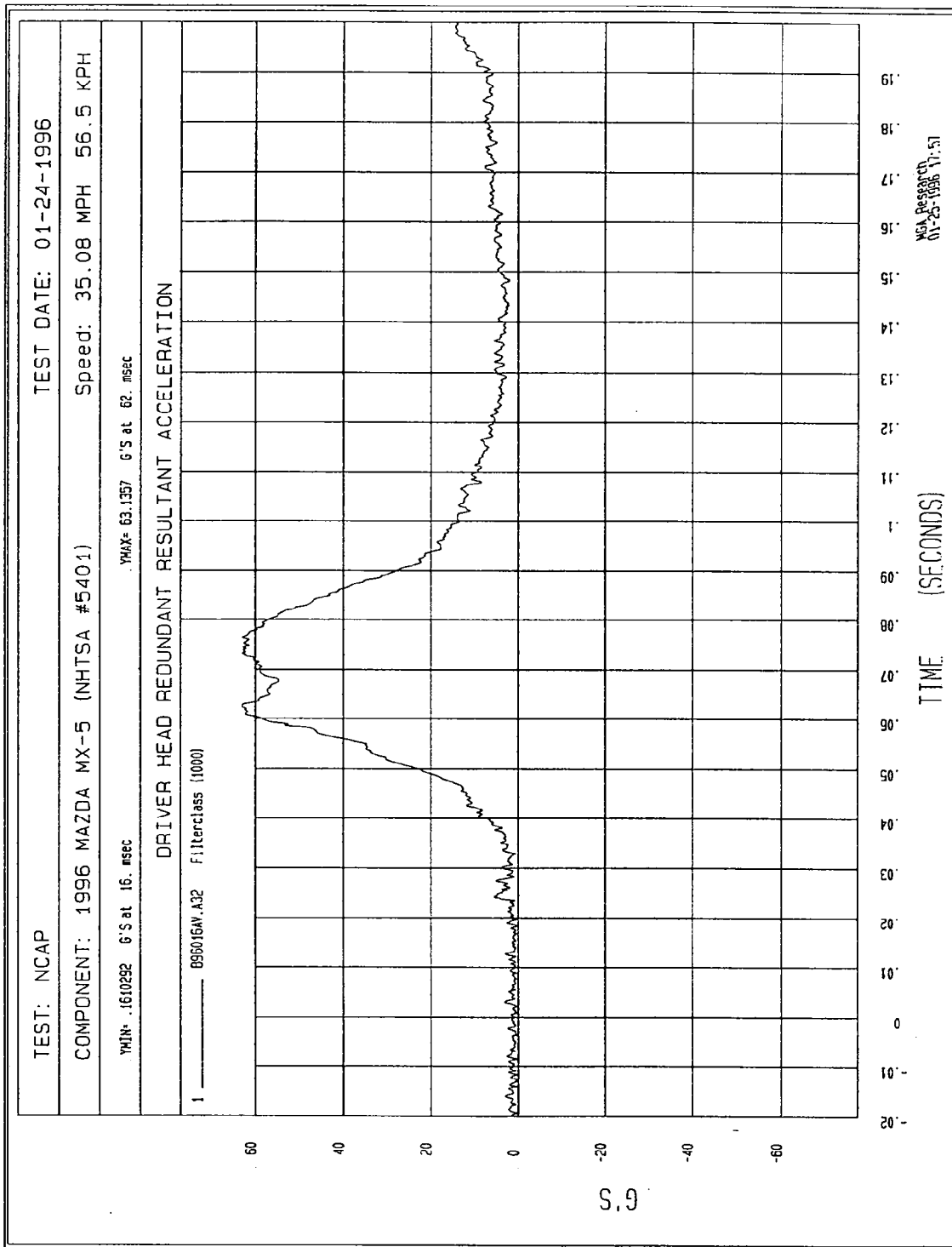


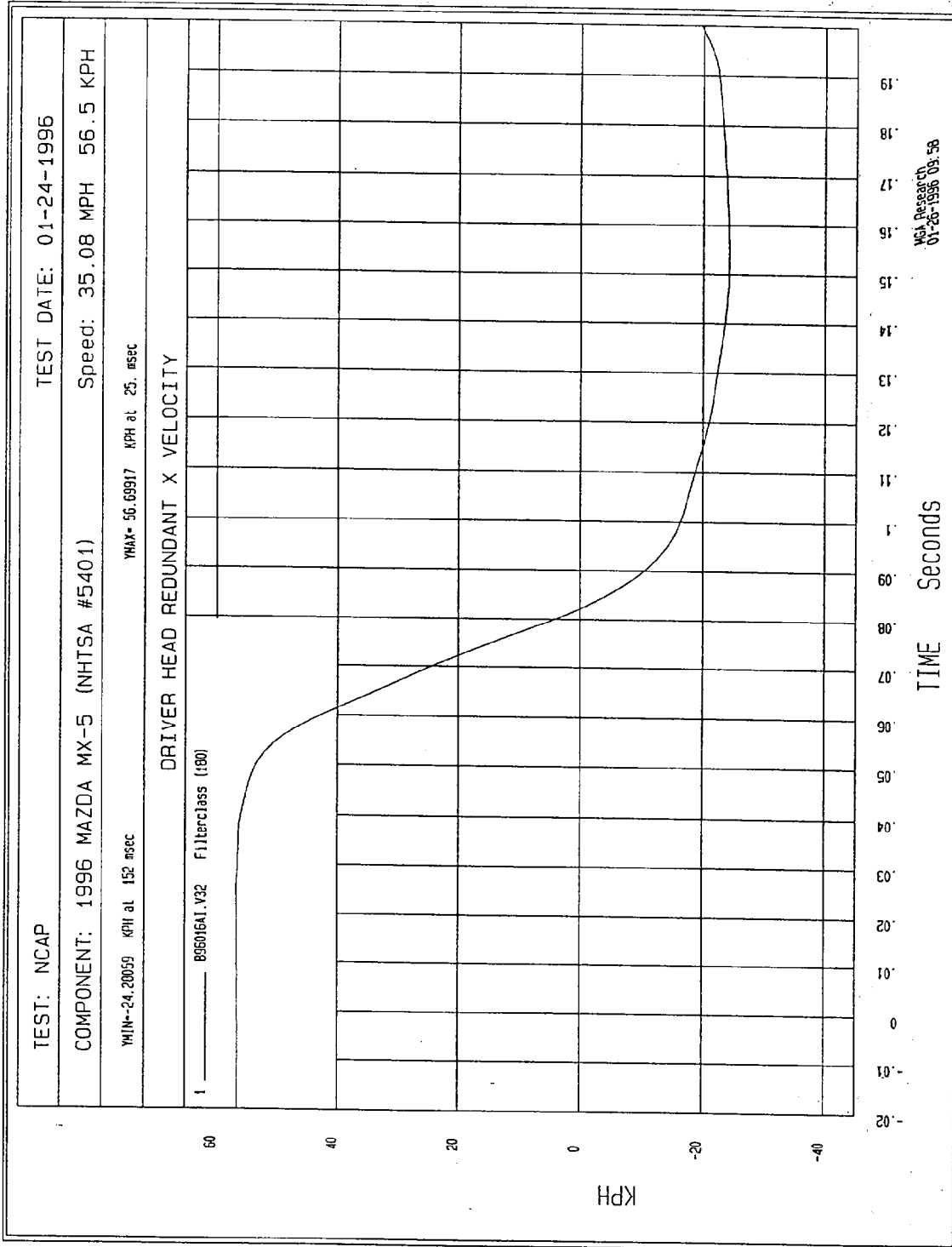


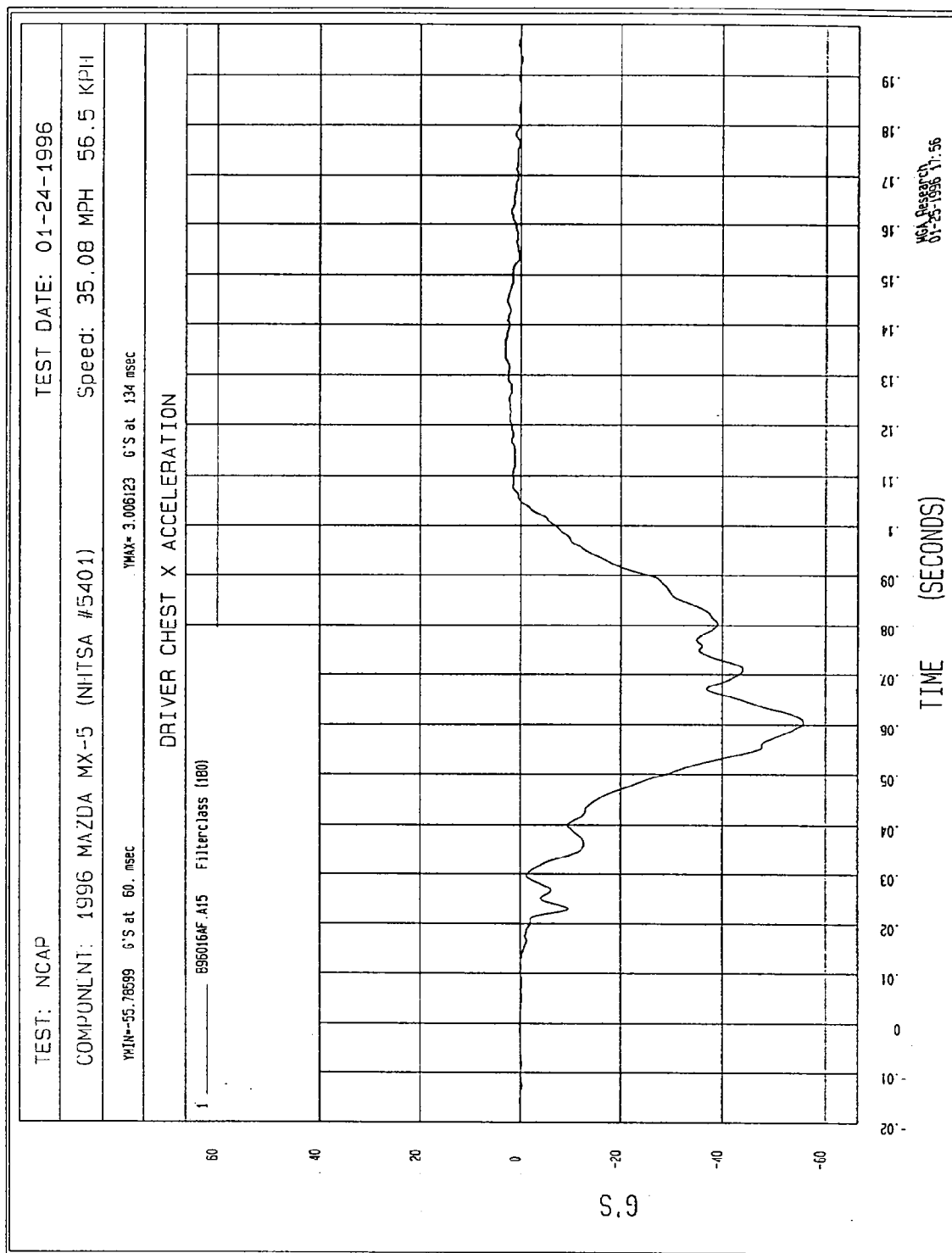


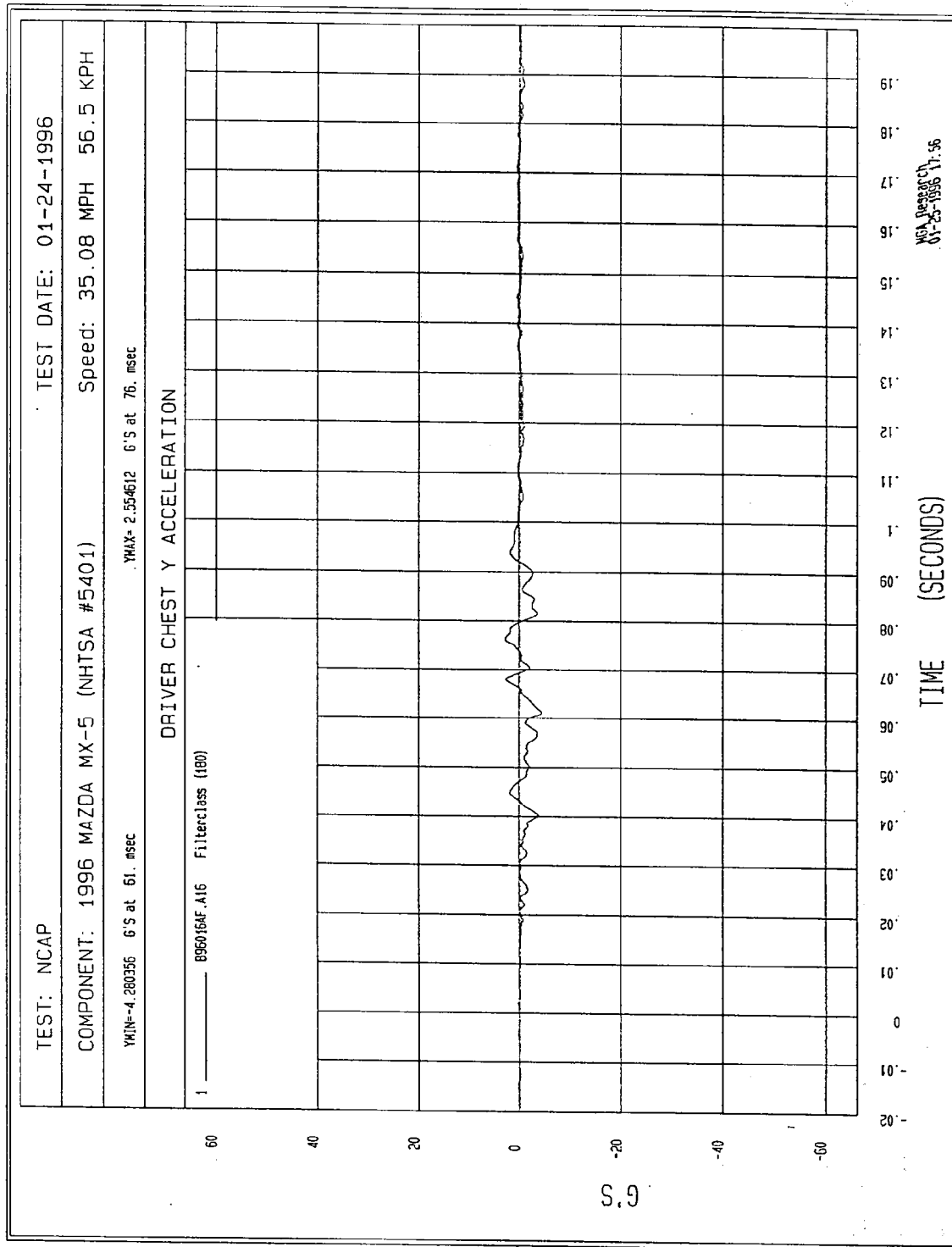


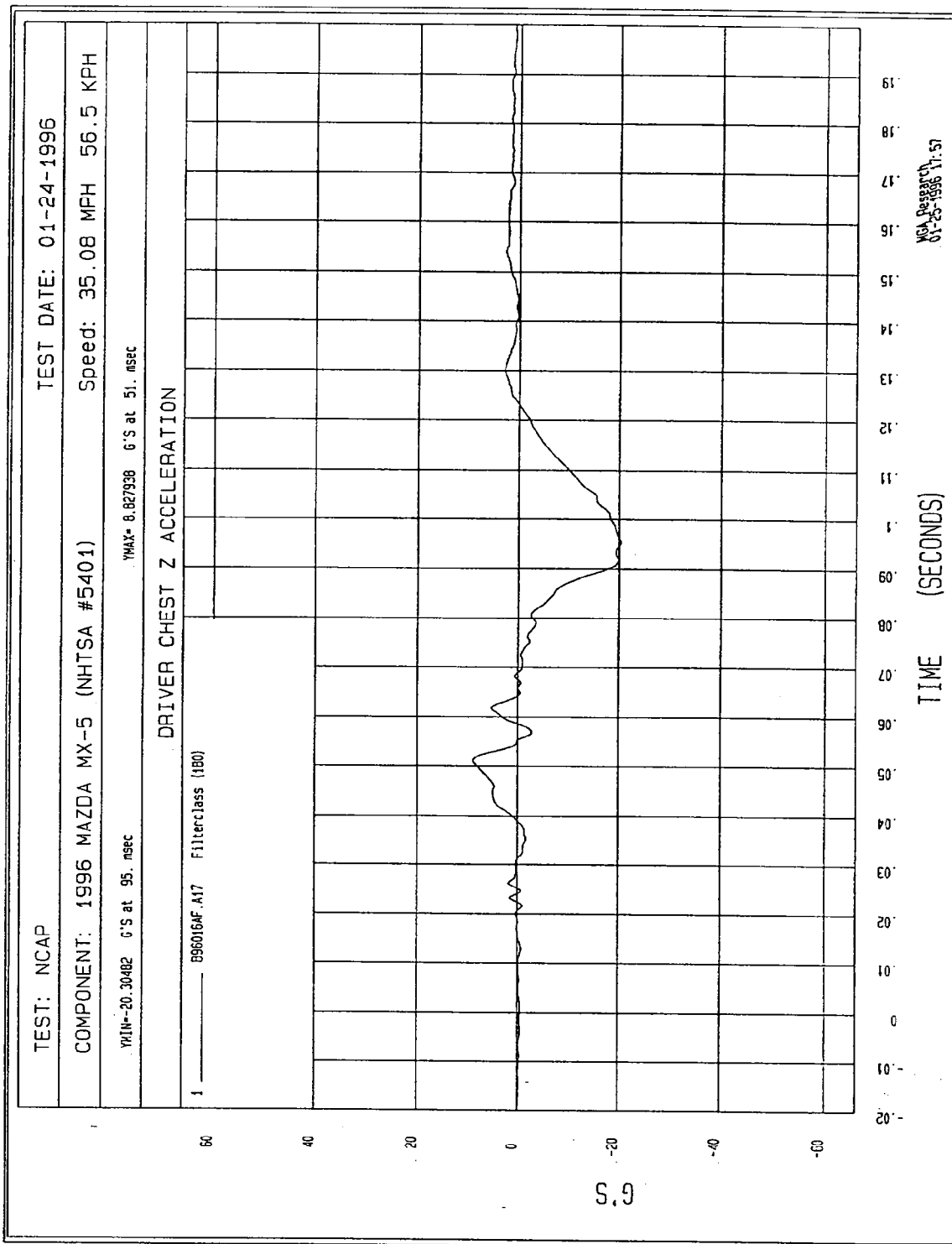


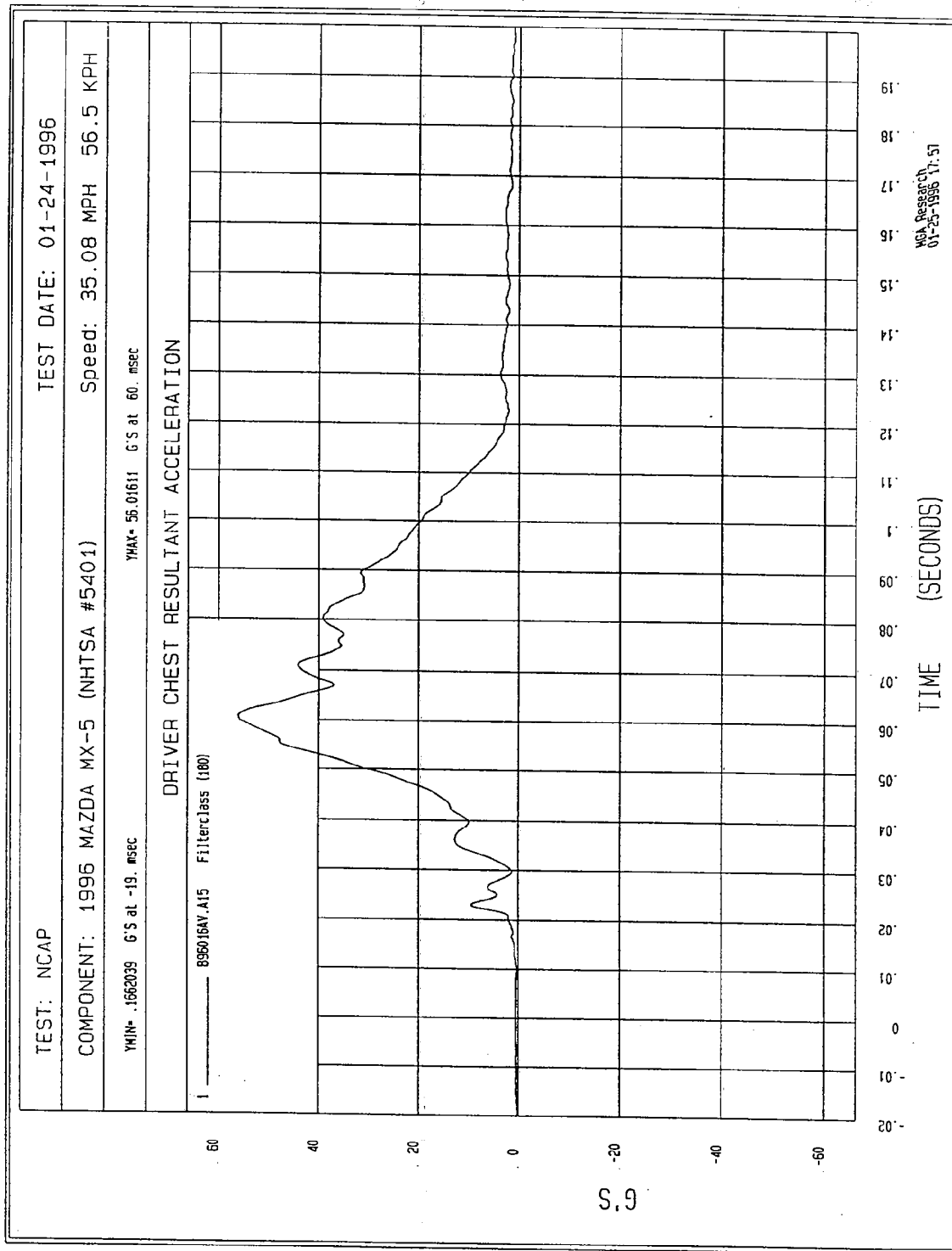


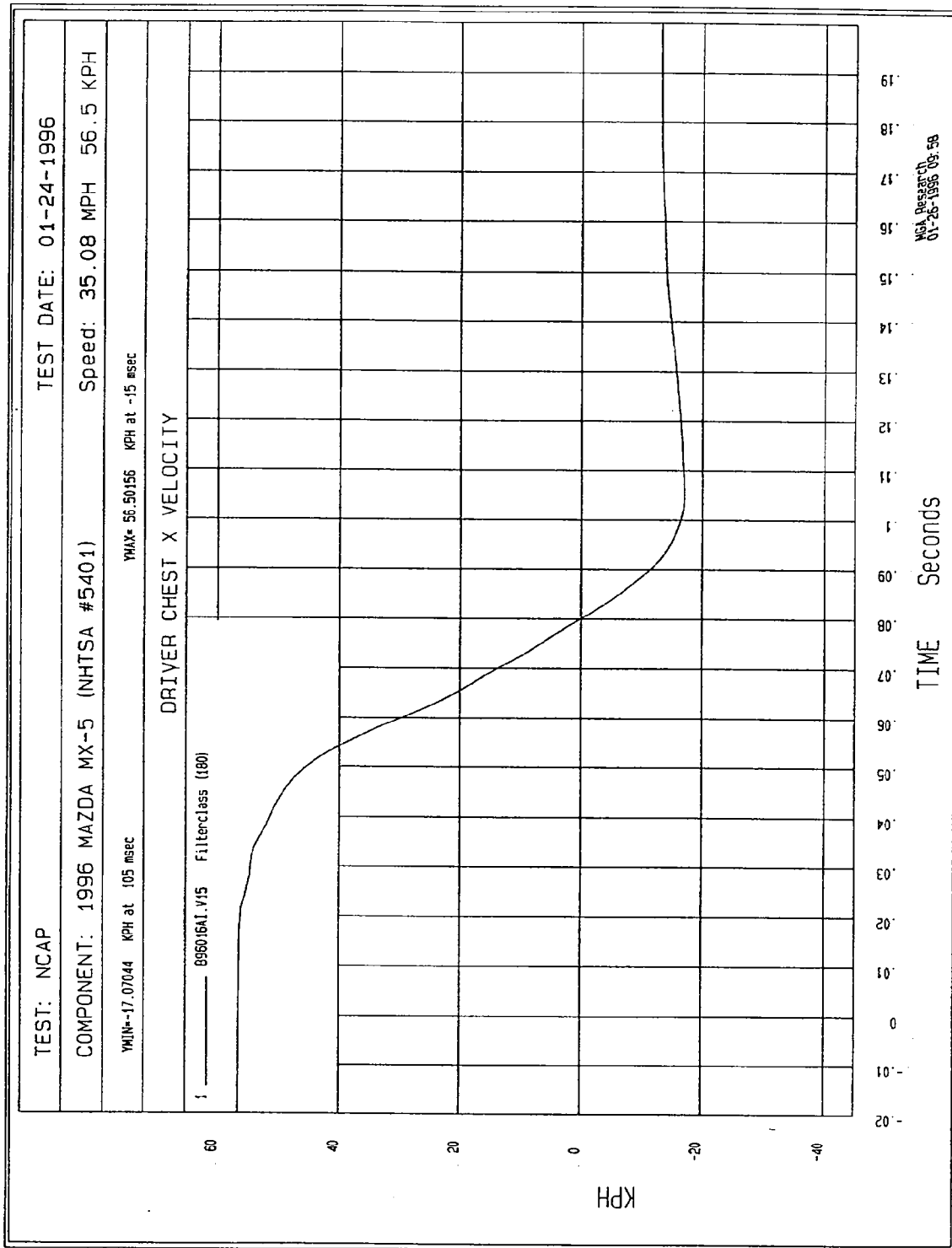


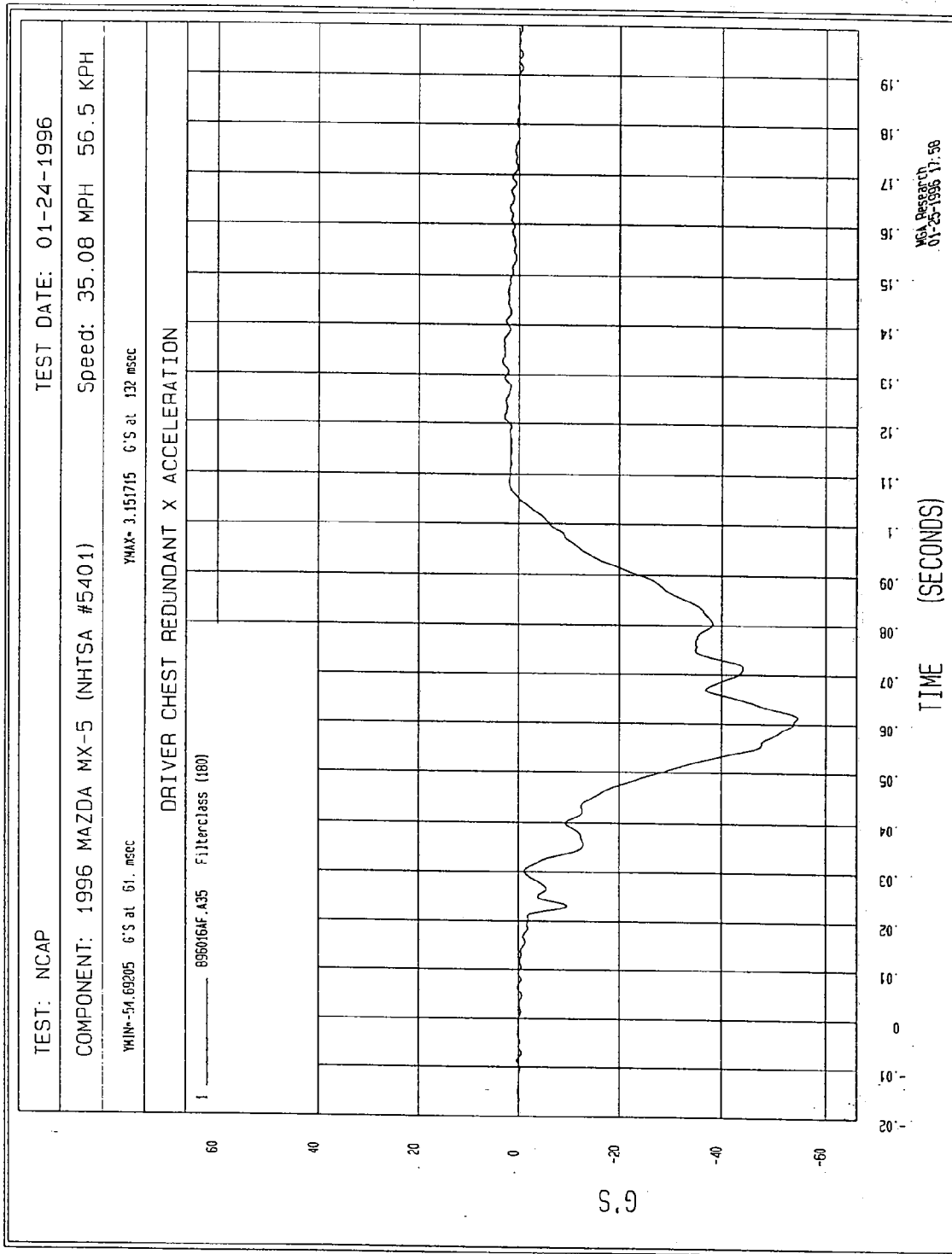


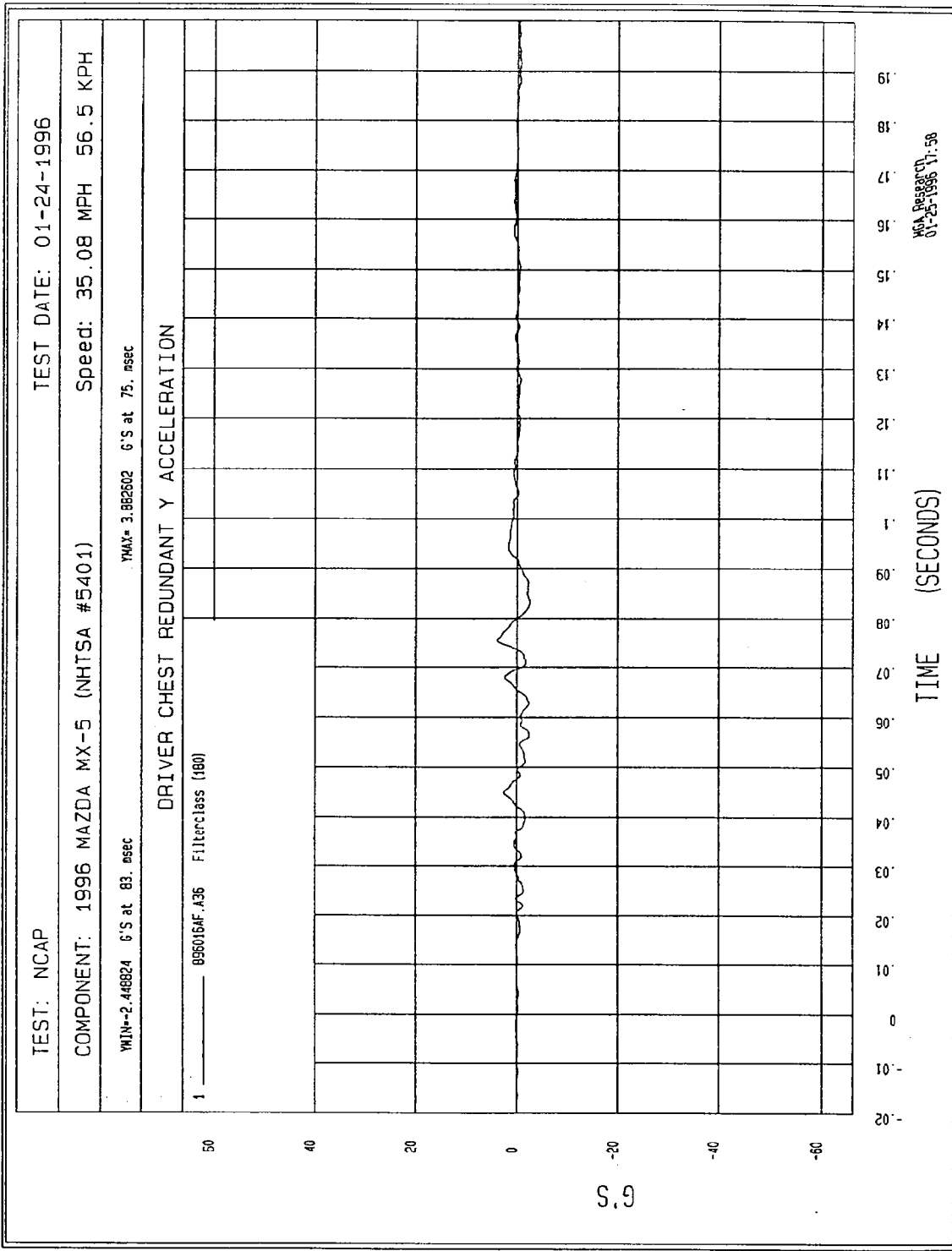


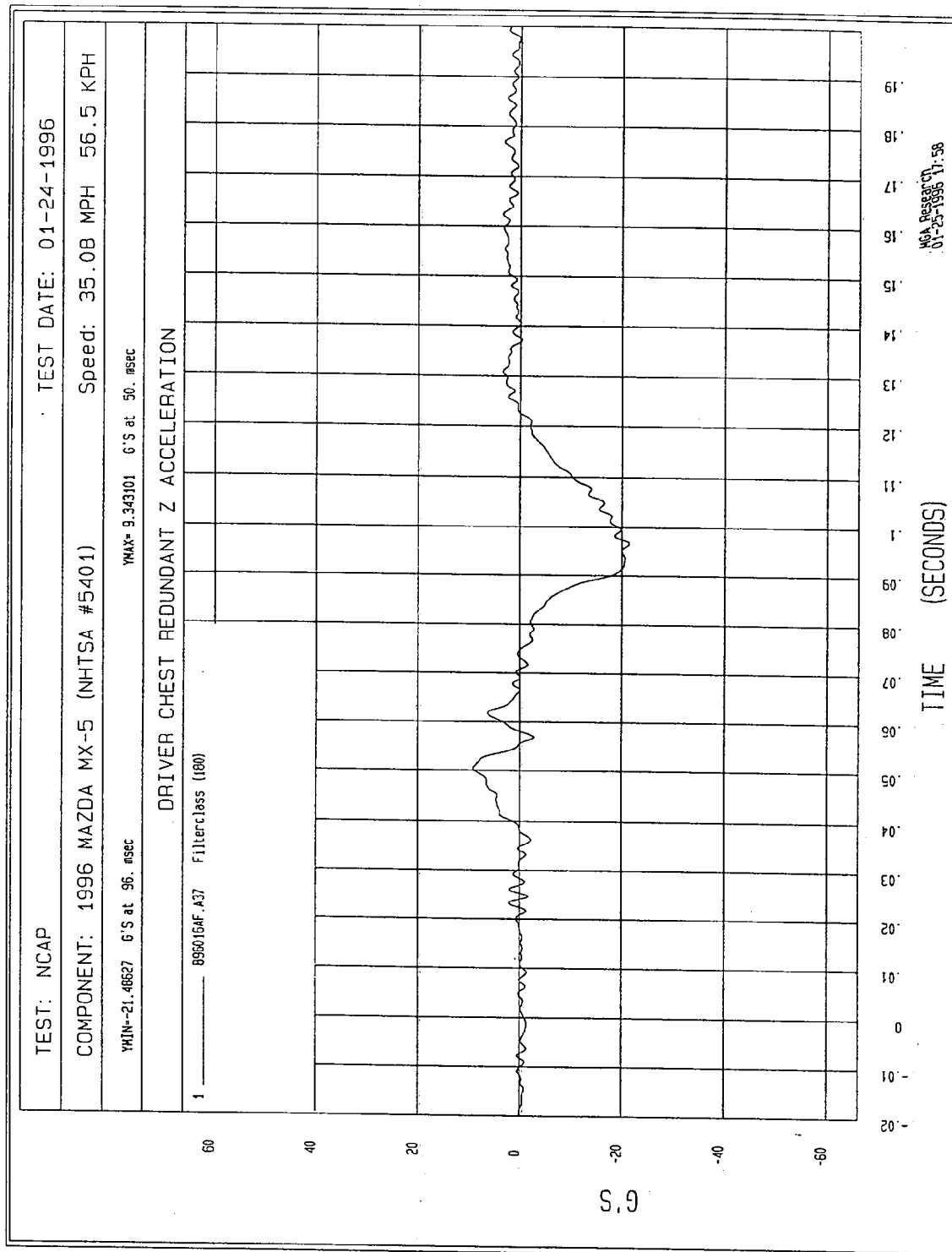


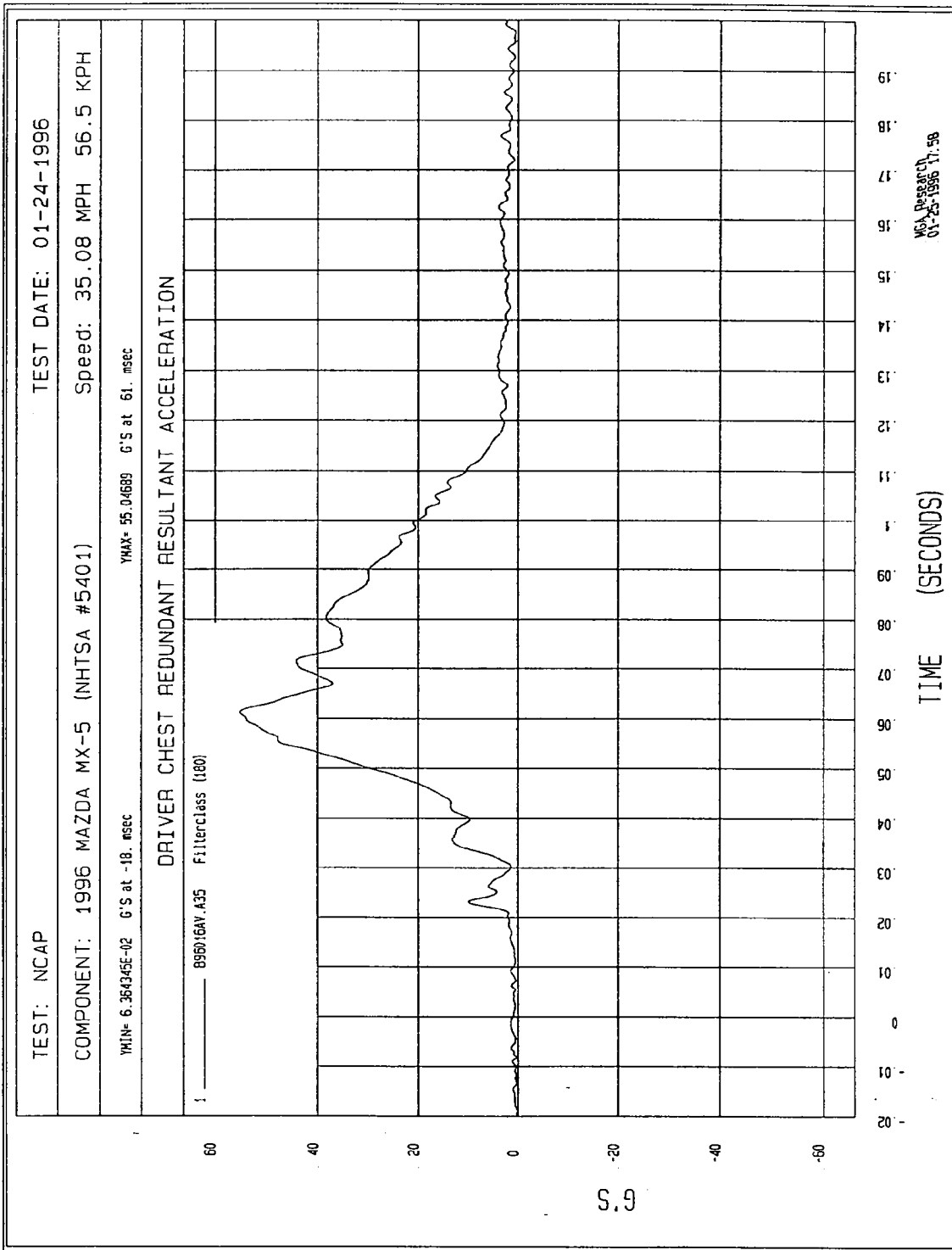


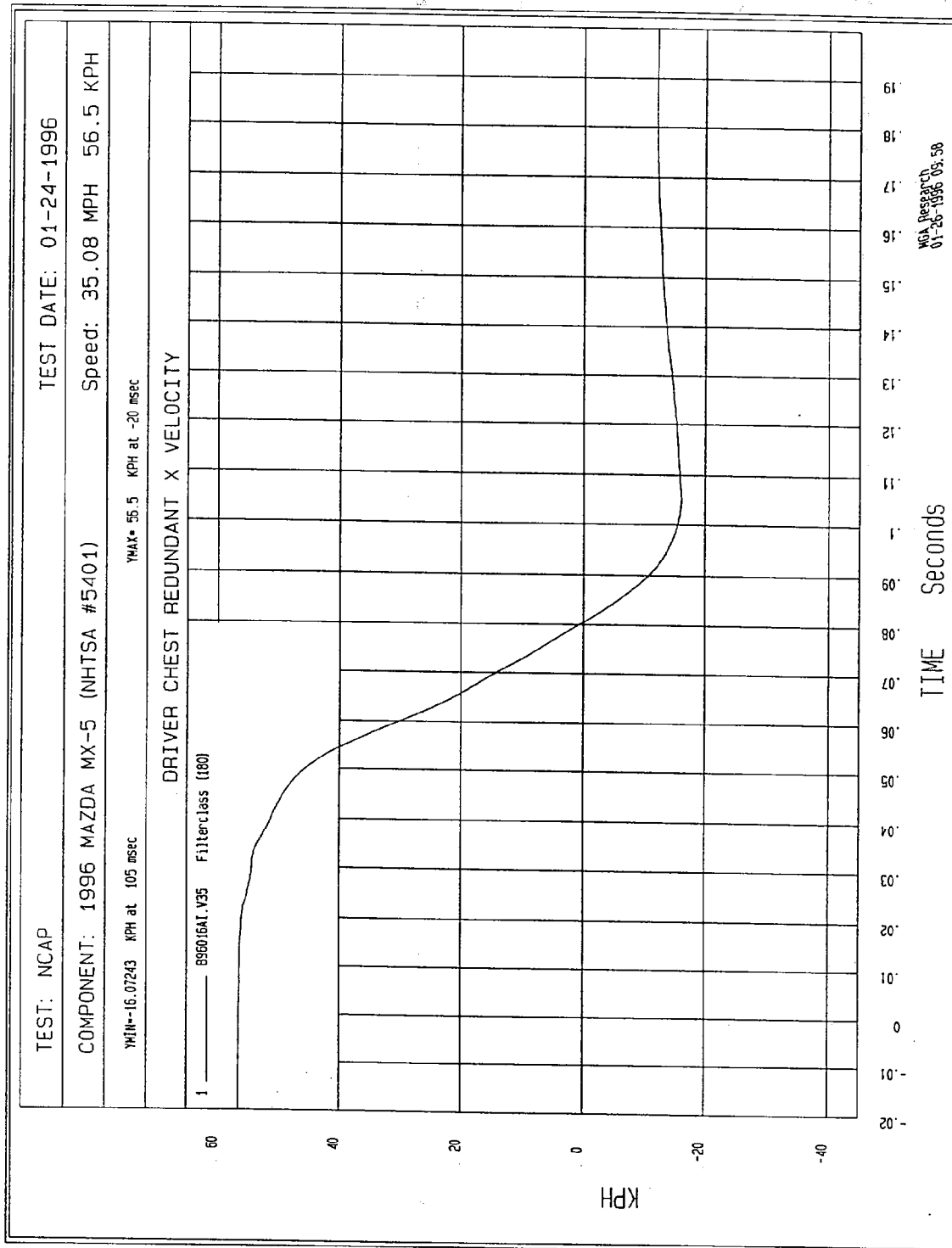


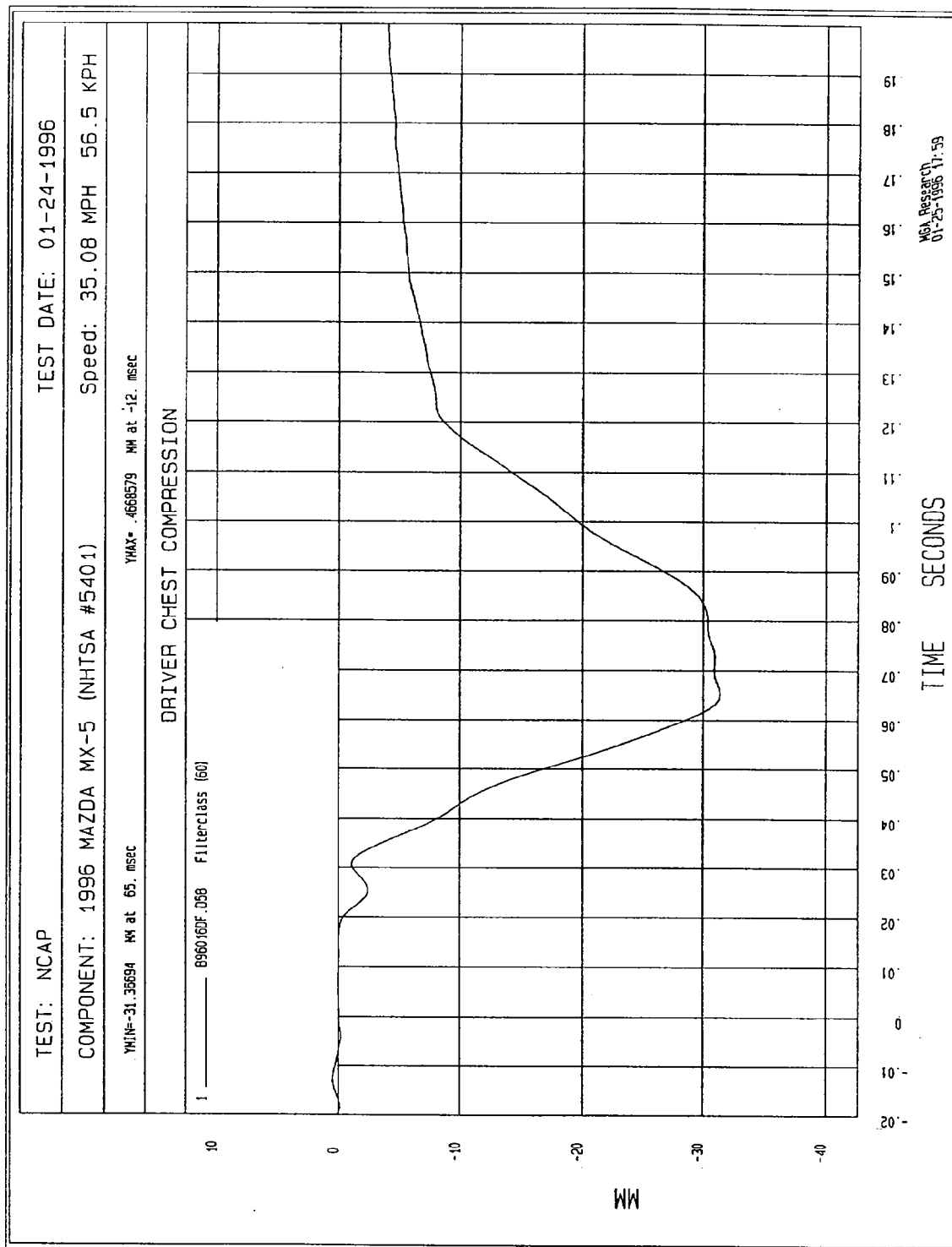












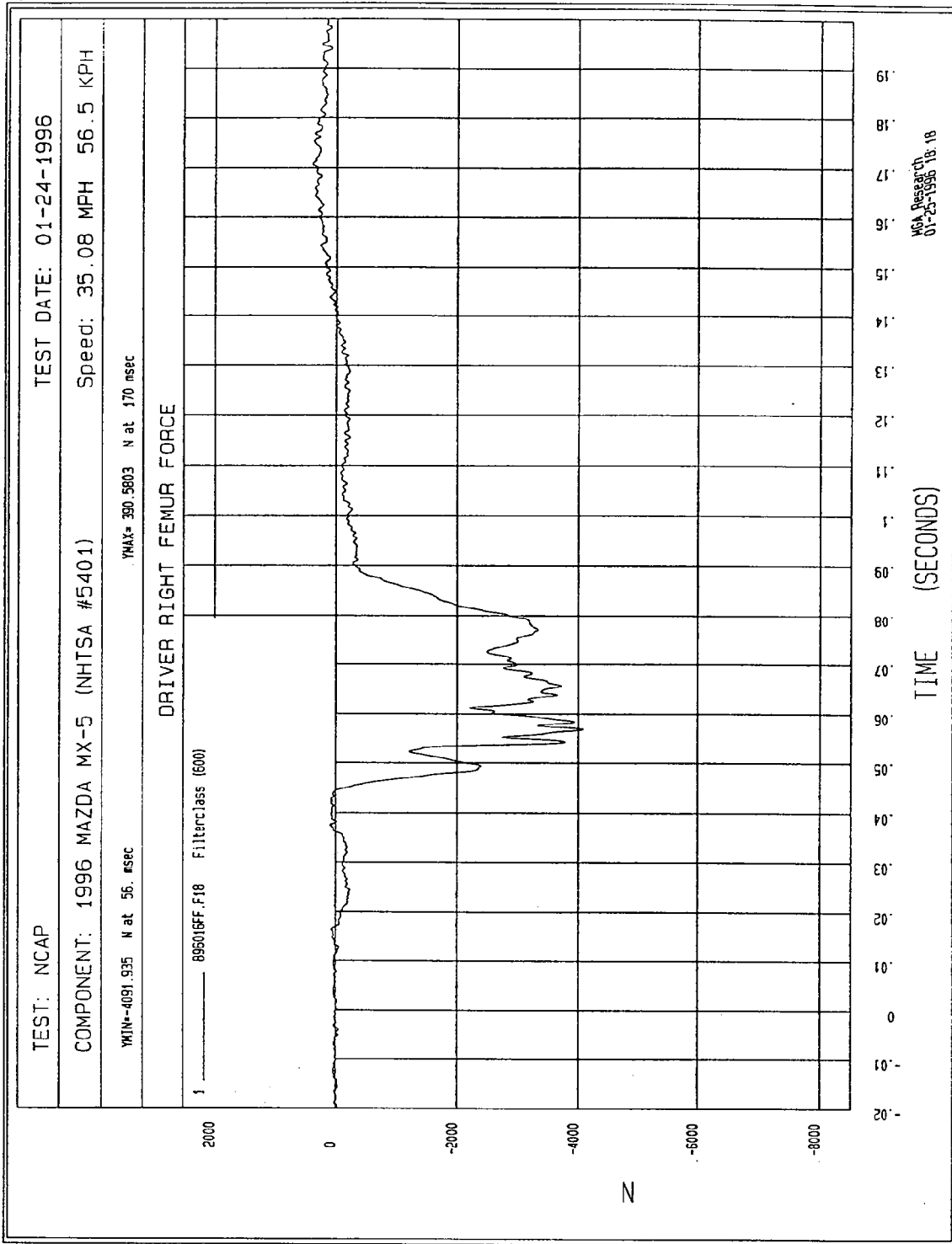
TEST DATE: 01-24-1996

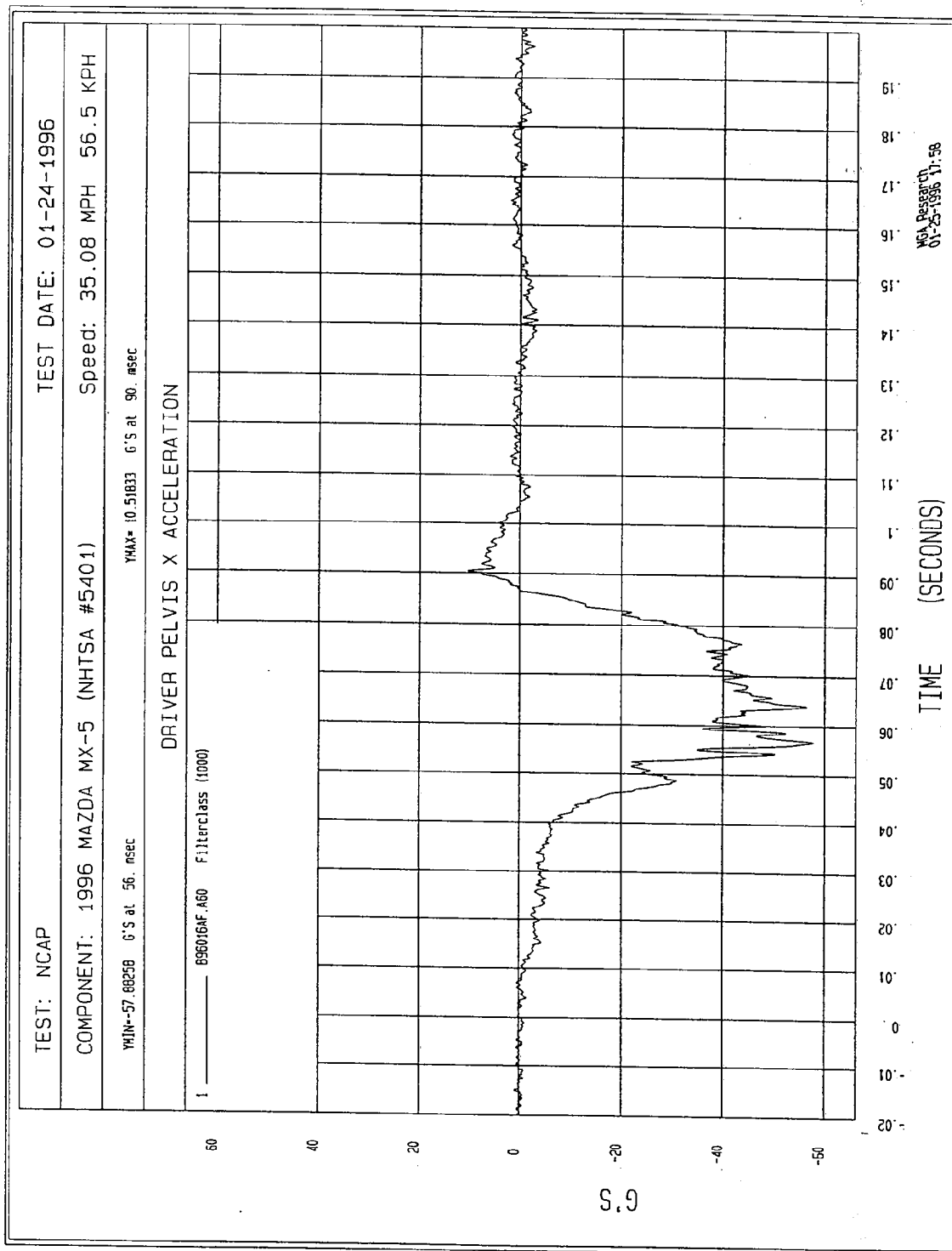
Speed: 35.08 MPH 56.5 KPH

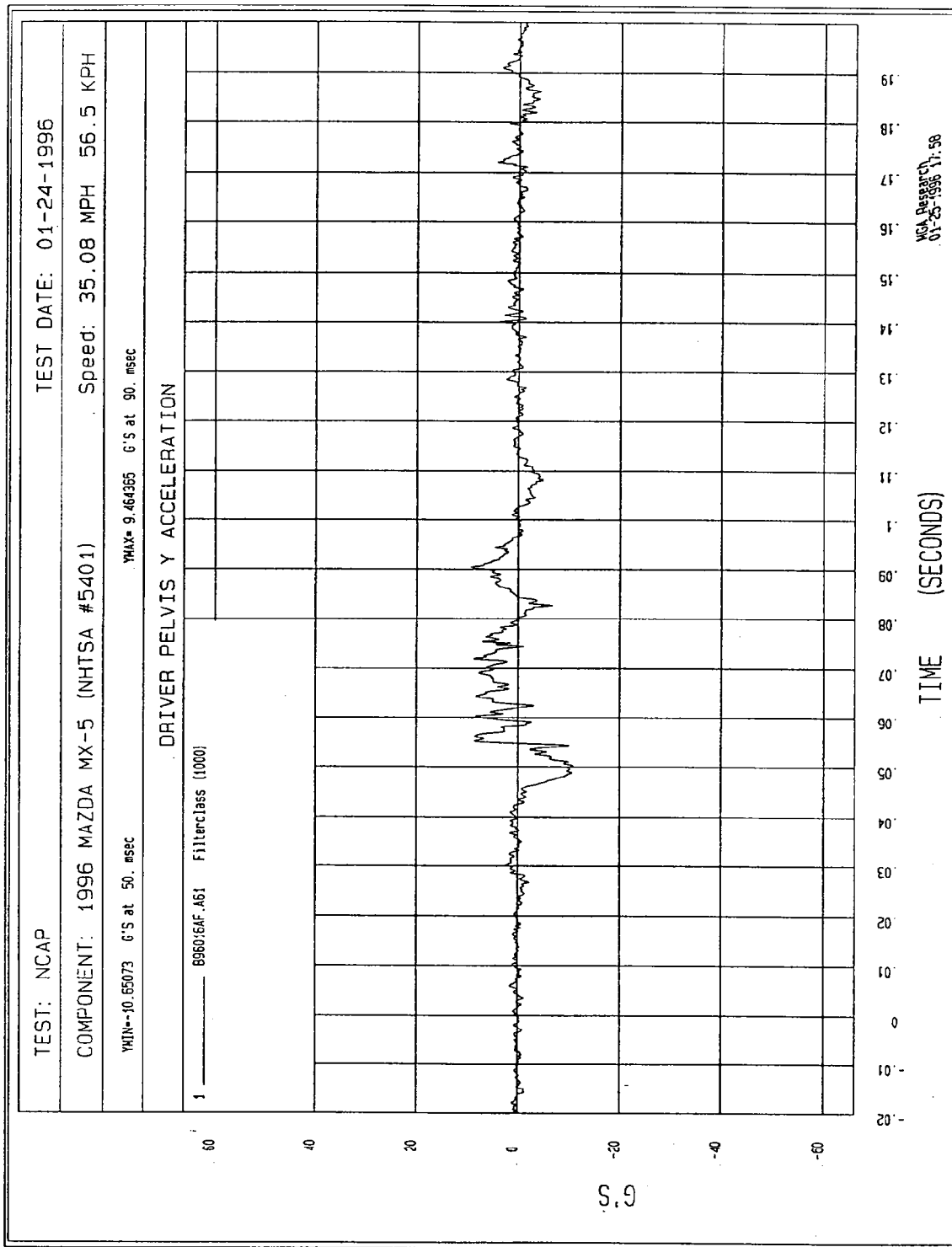
YMAX= 239.4728 N at 158 msec

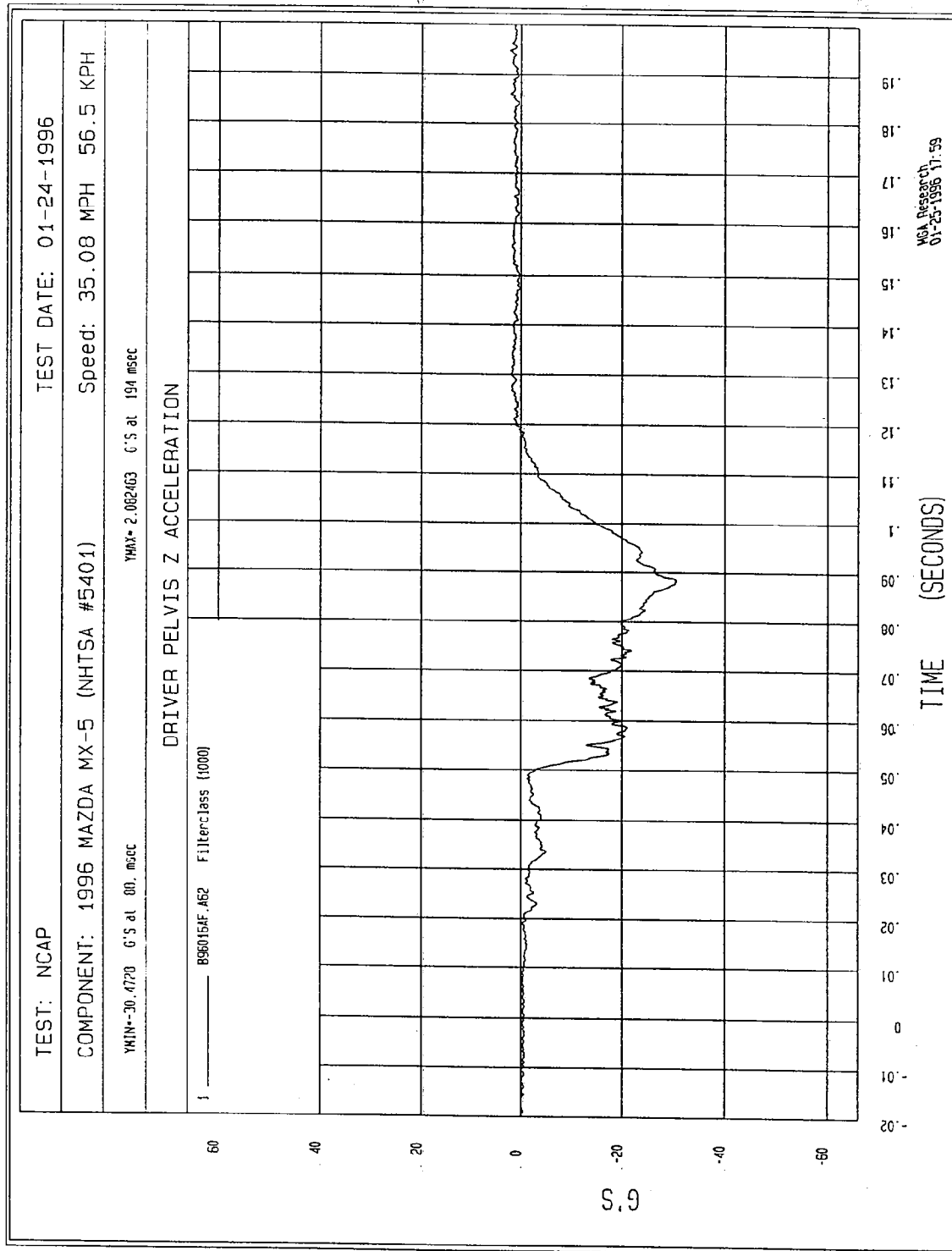
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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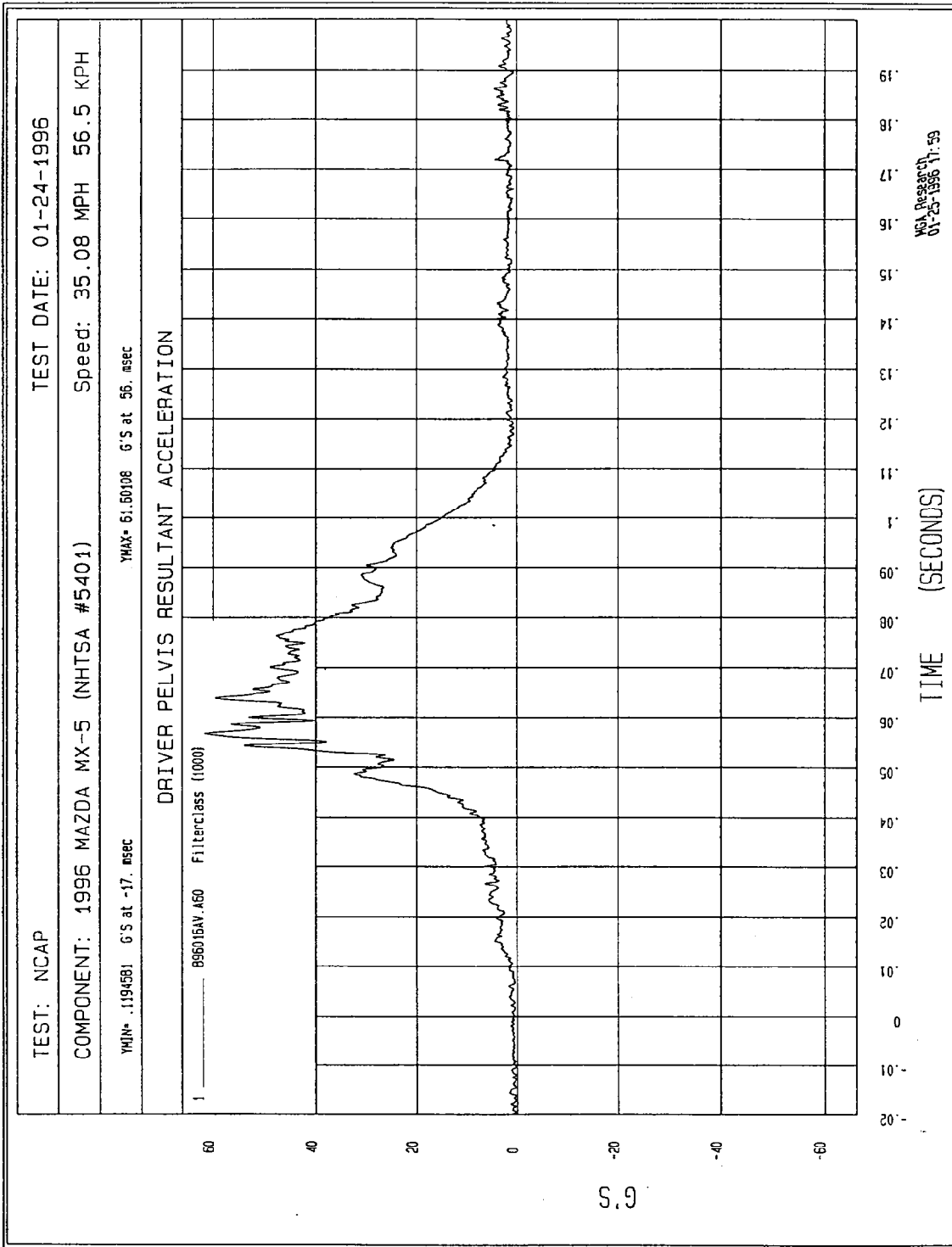


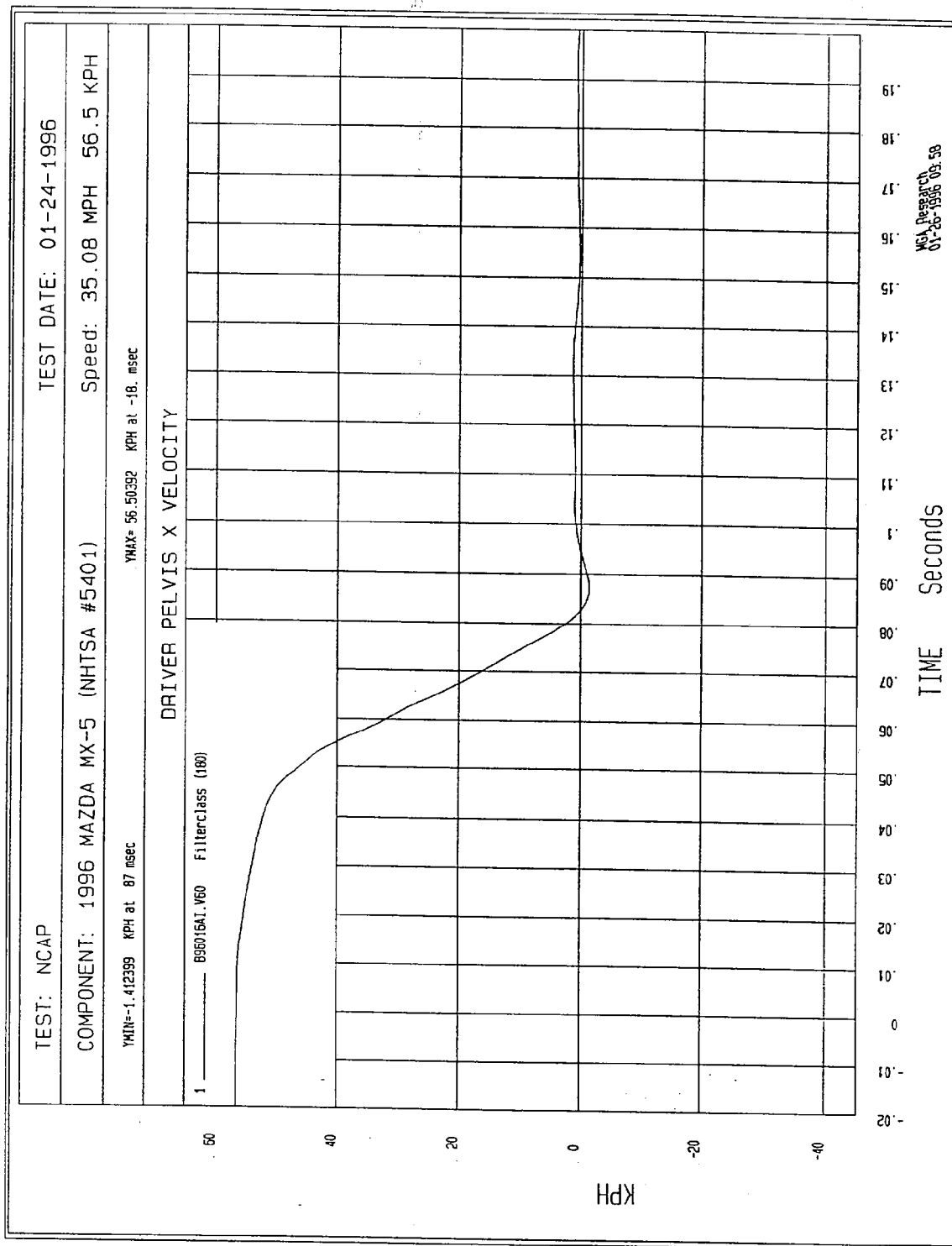


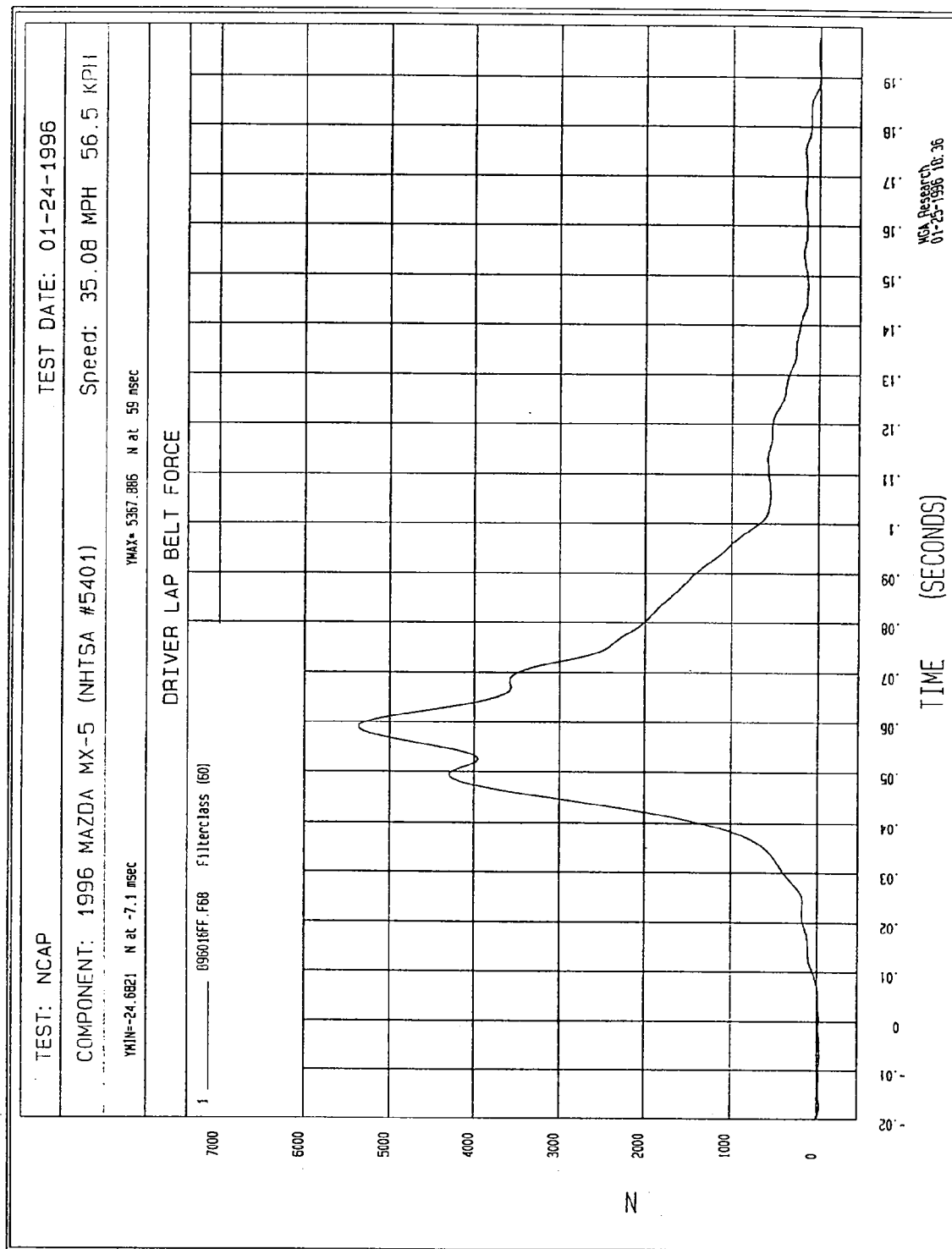


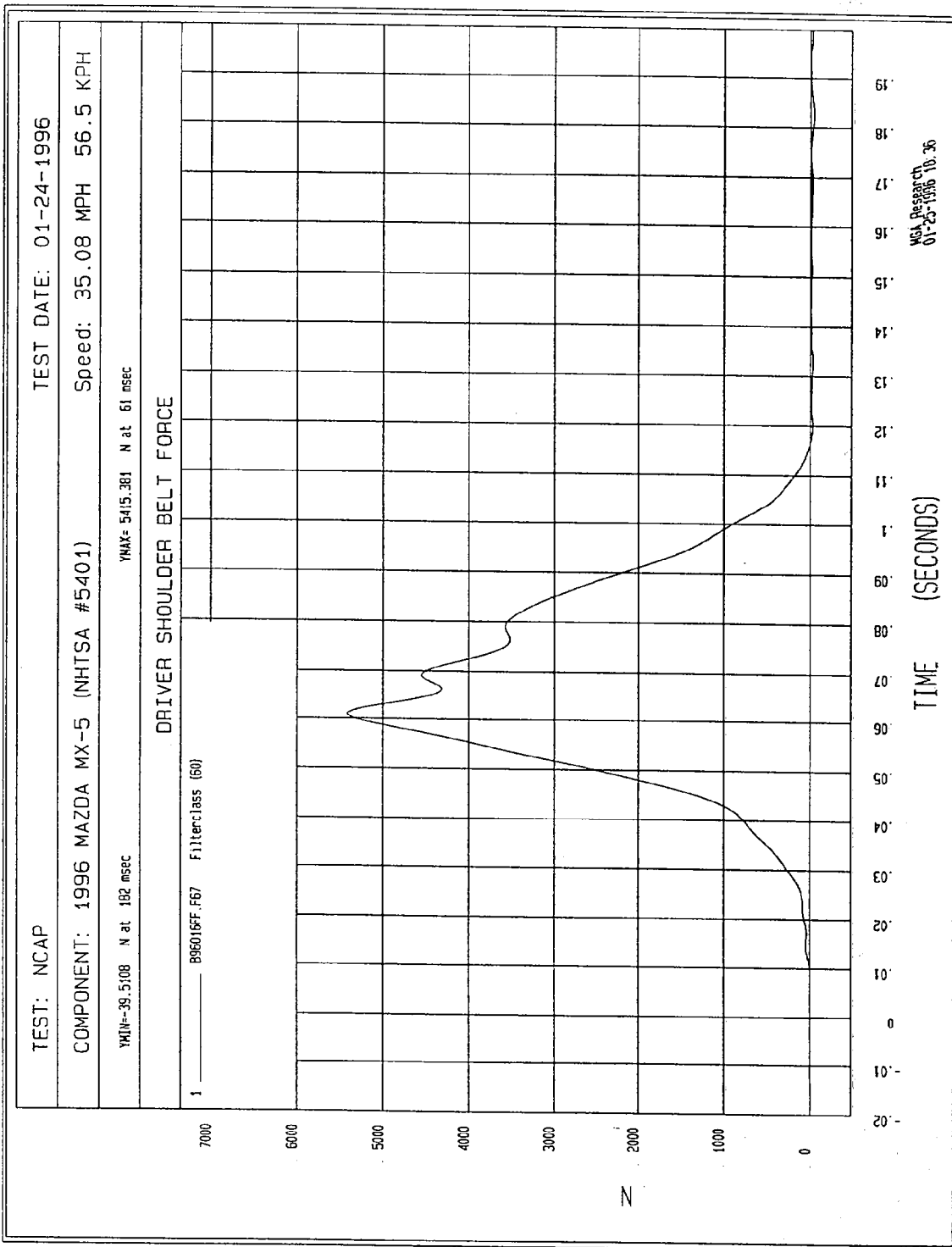


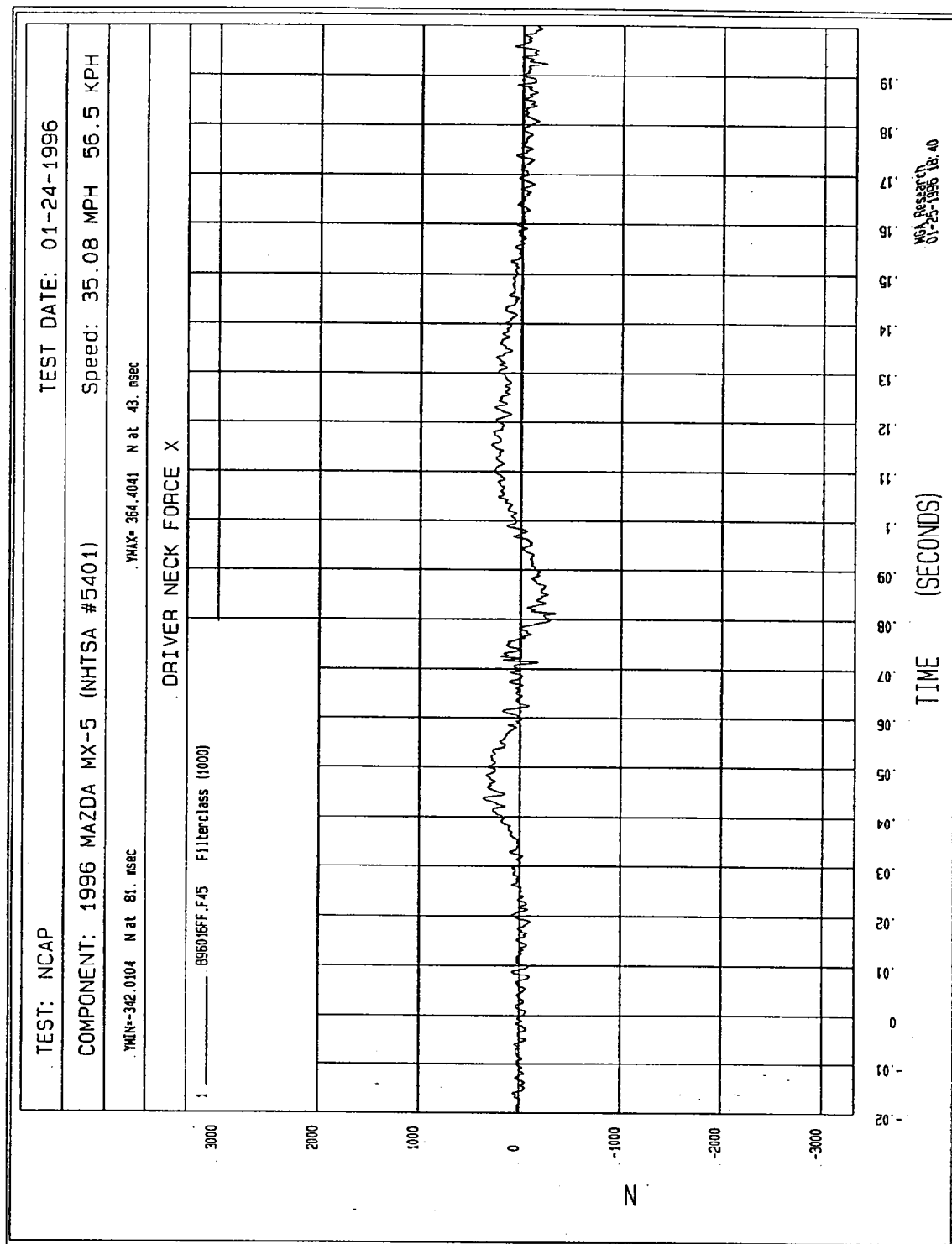


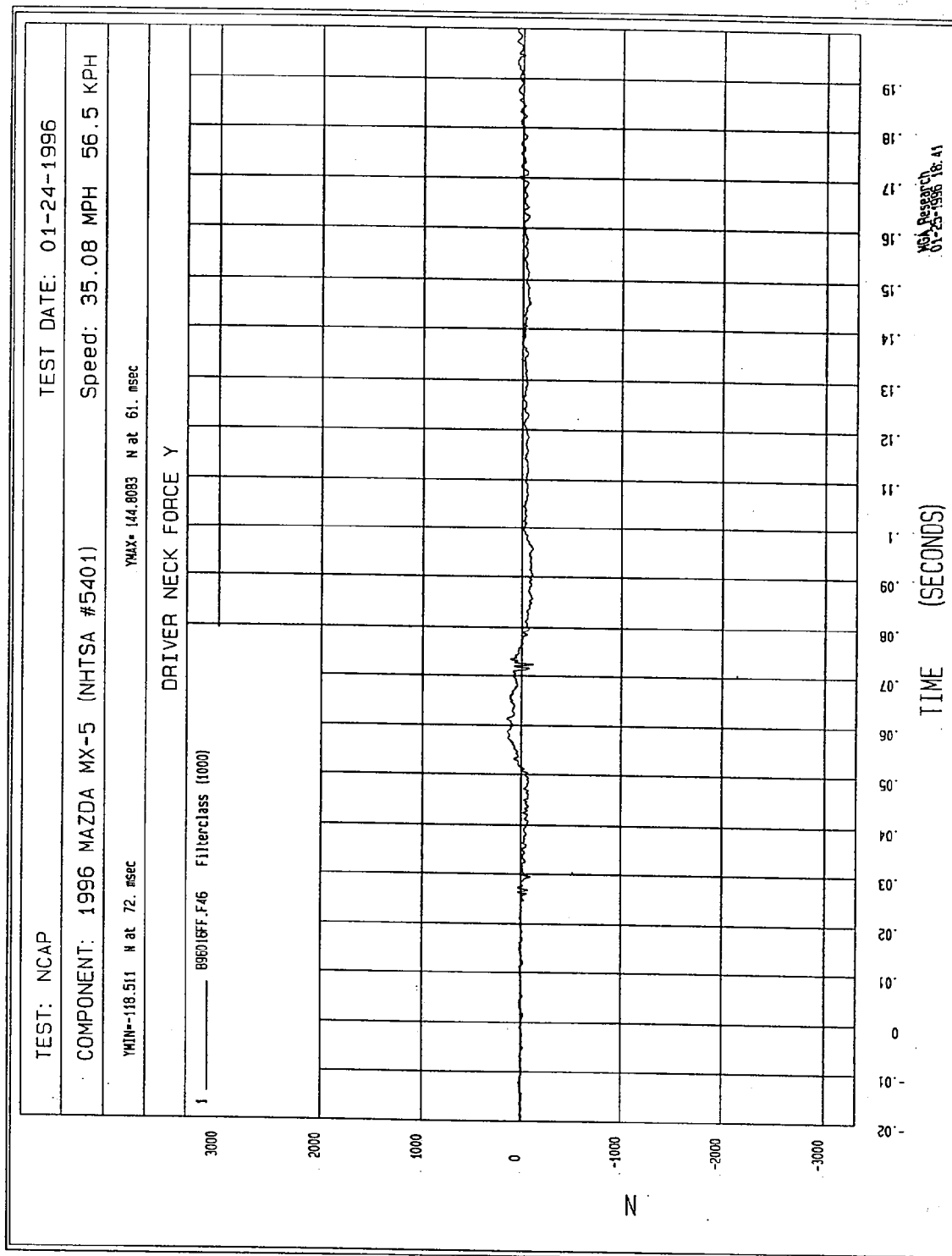


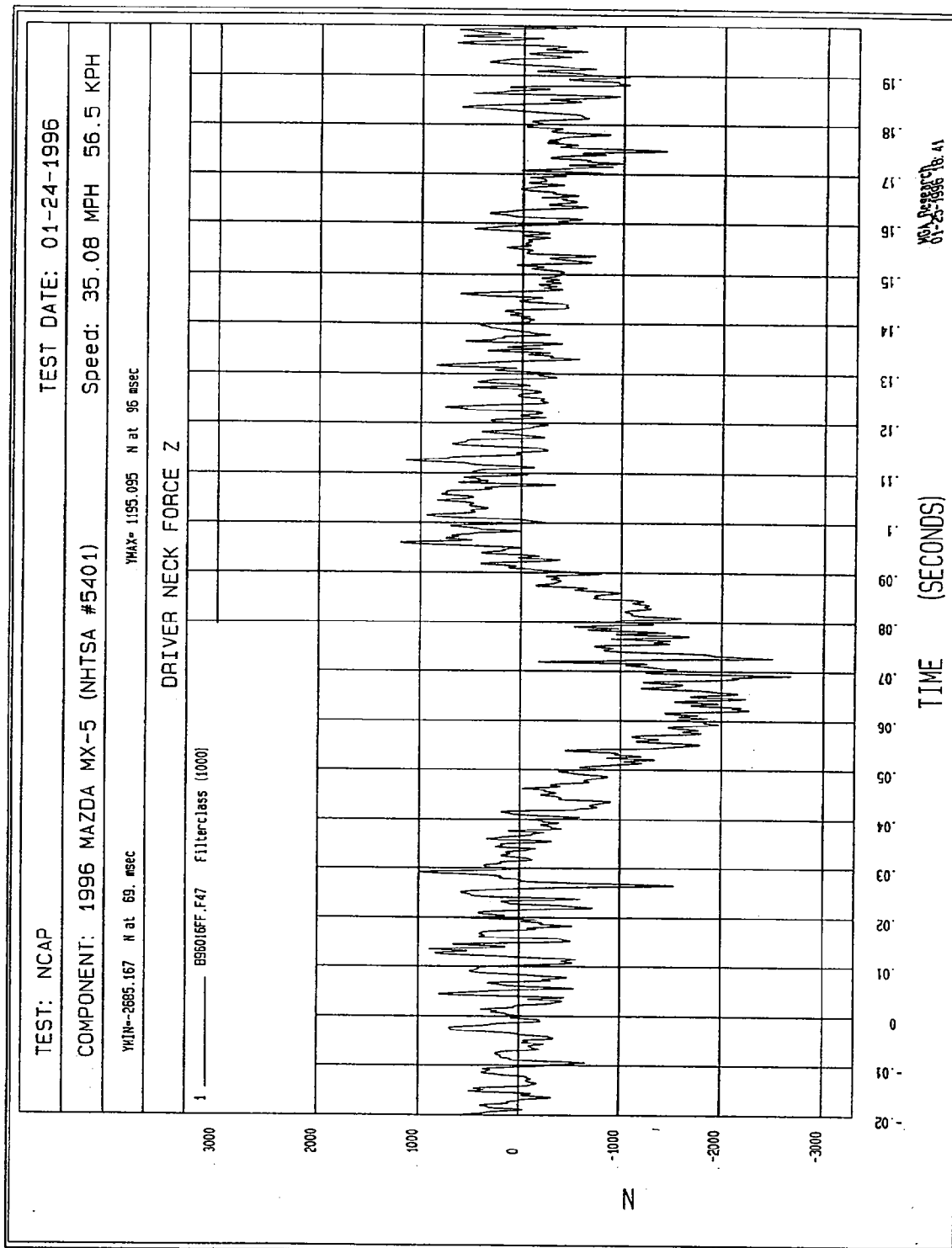


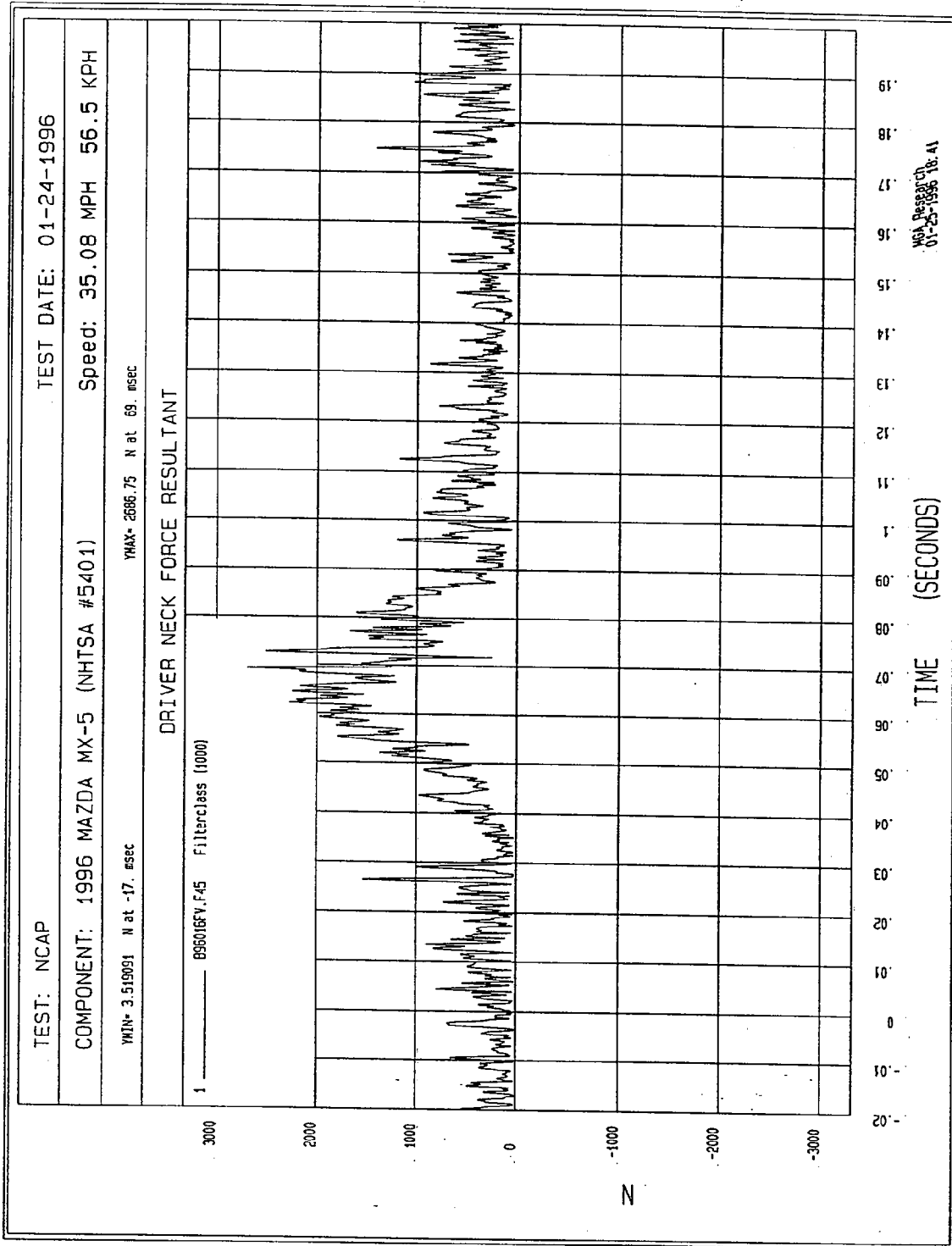












TEST: NCAP

TEST DATE: 01-24-1996

COMPONENT: 1996 MAZDA MX-5 (NHTSA #5401)

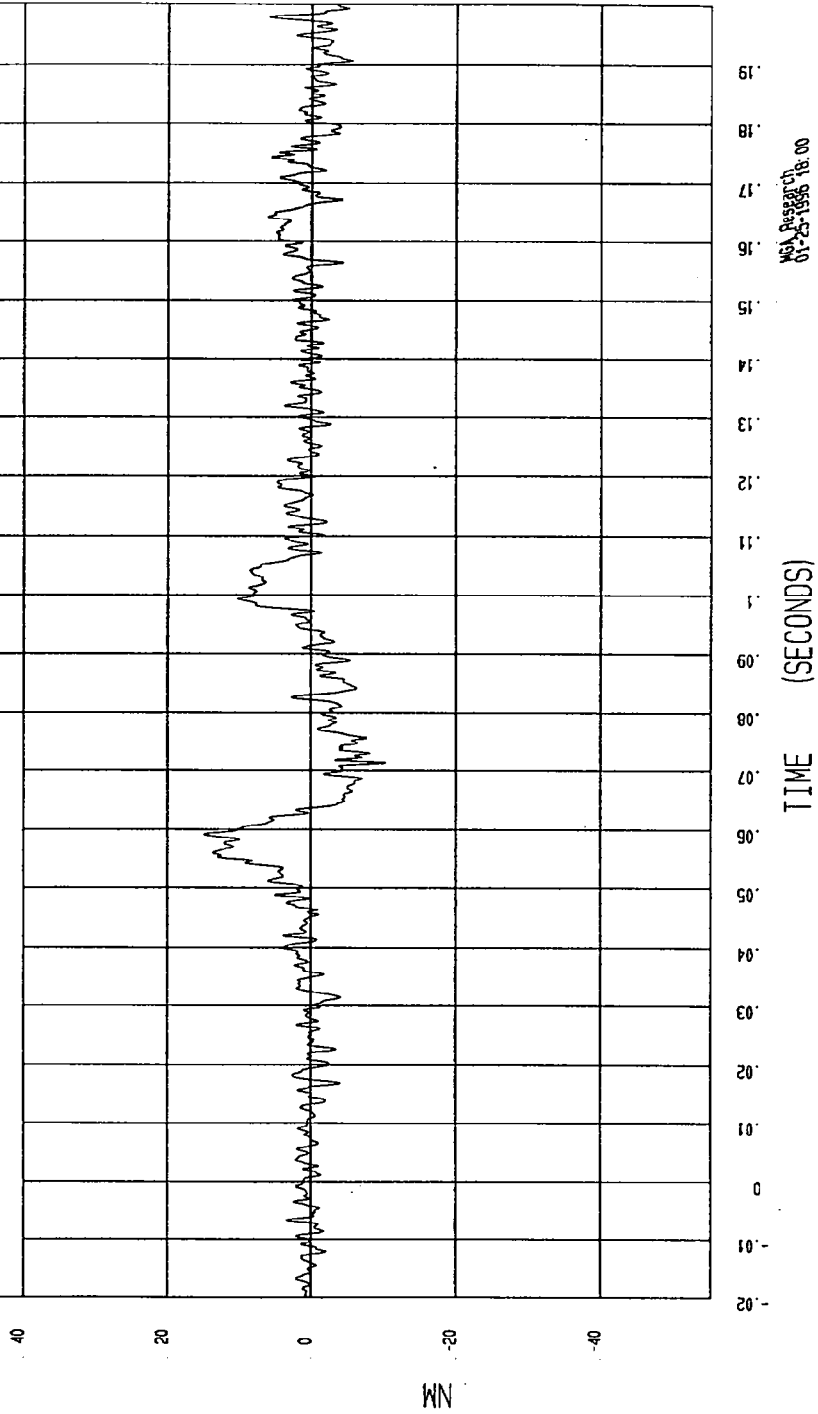
Speed: 35.08 MPH 56.5 KPH

YMIN=-10.18051 NM at 71. msec

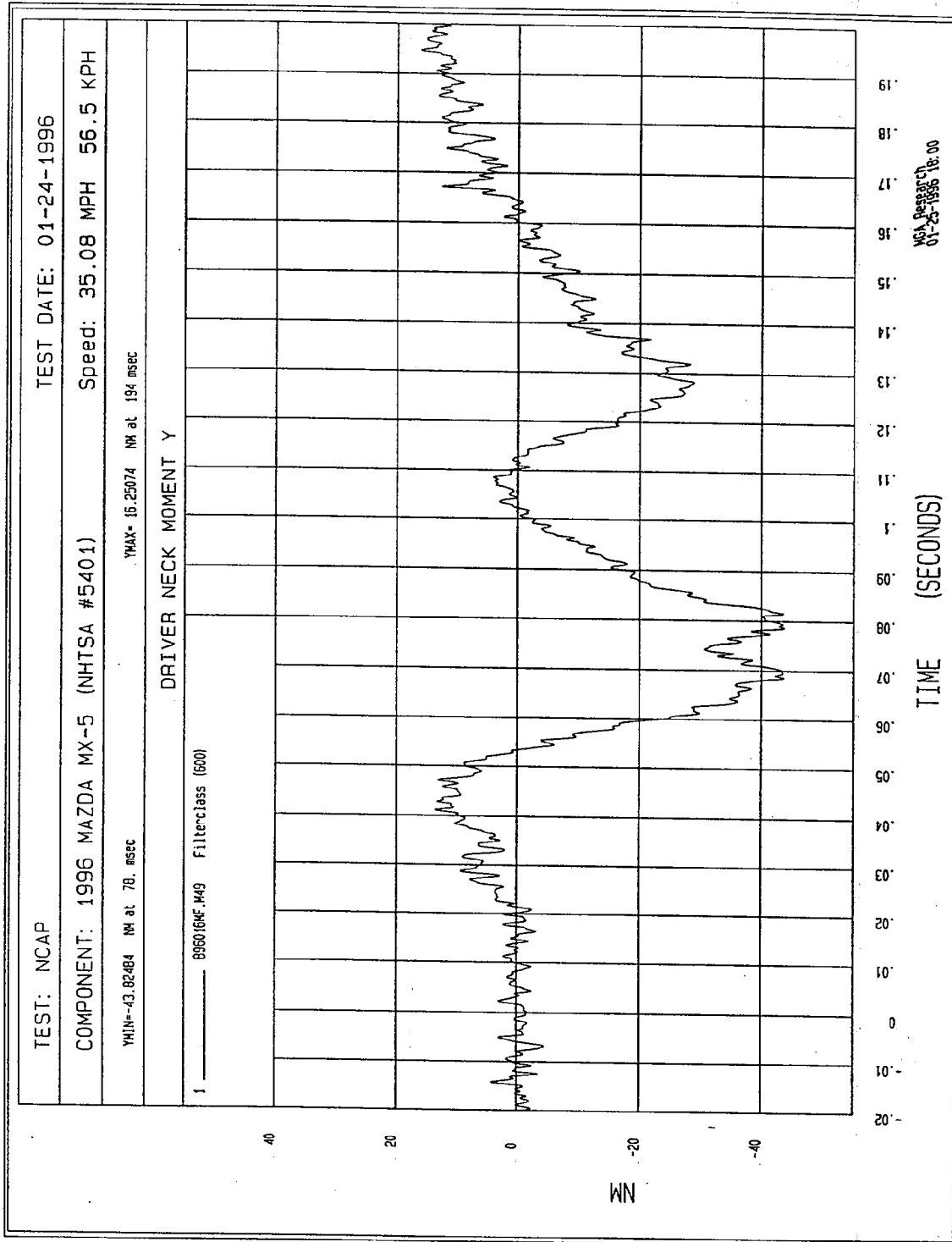
YMAX= 15.03128 NM at 59. msec

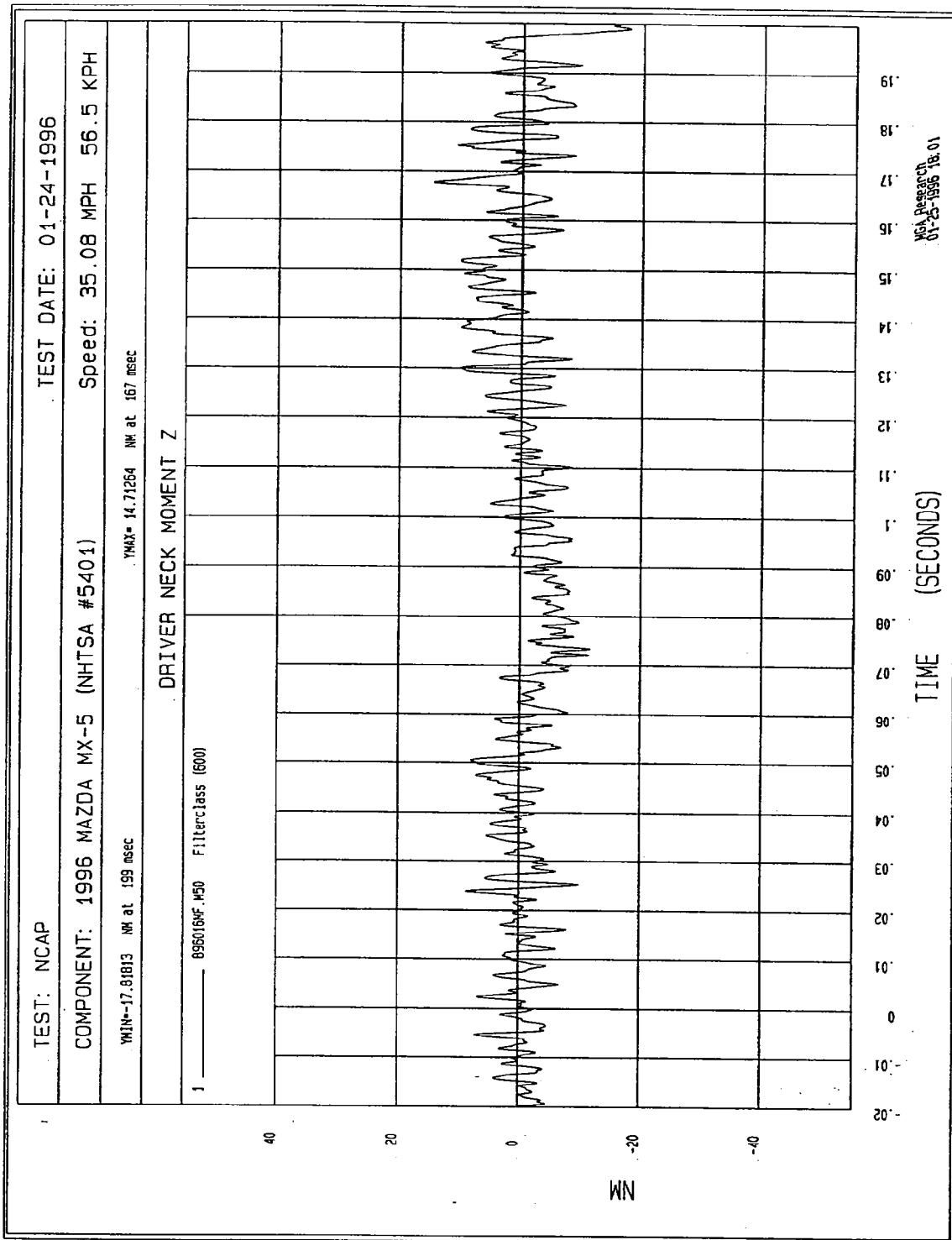
DRIVER NECK MOMENT X

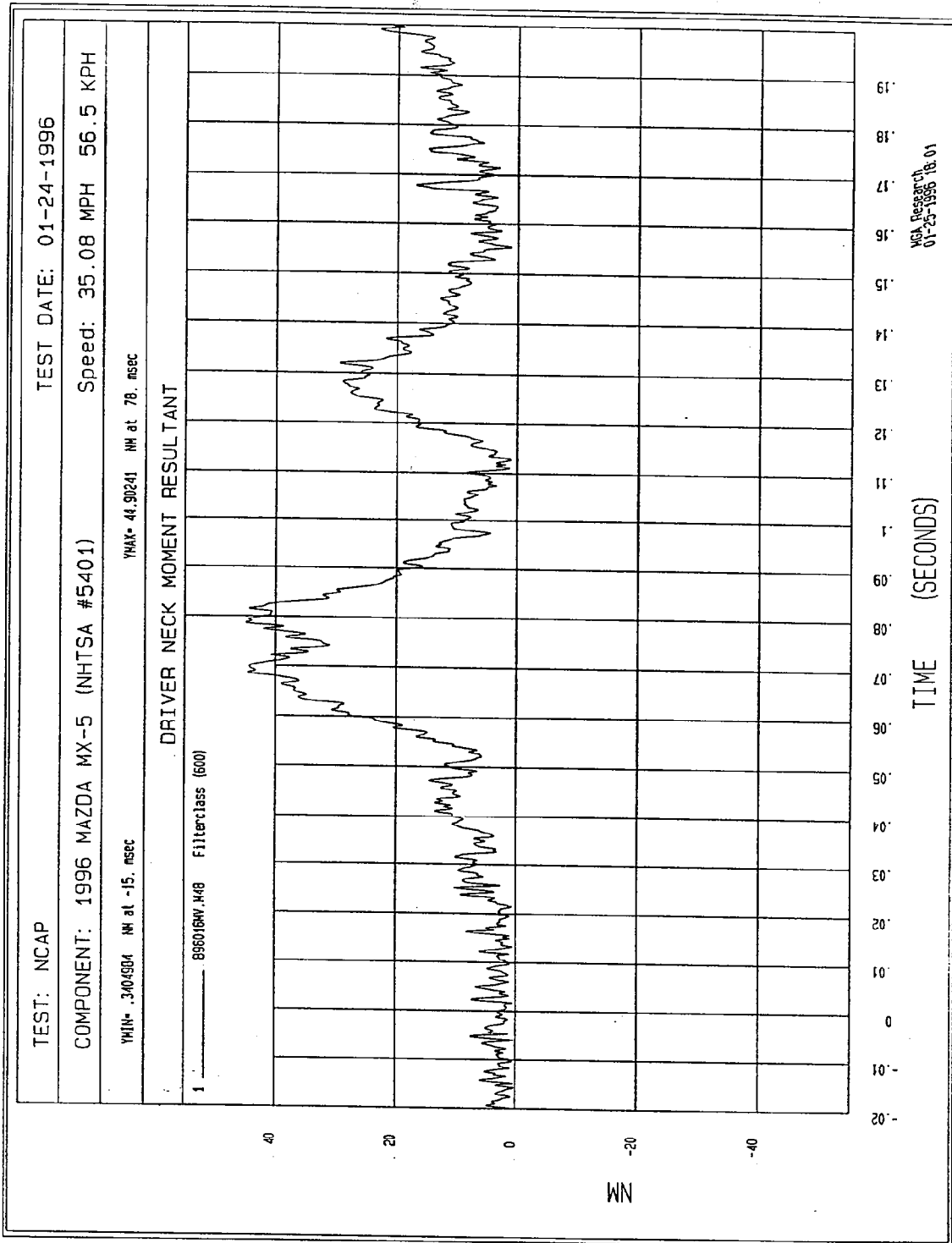
1 896016MF.M48 Filterclass (600)

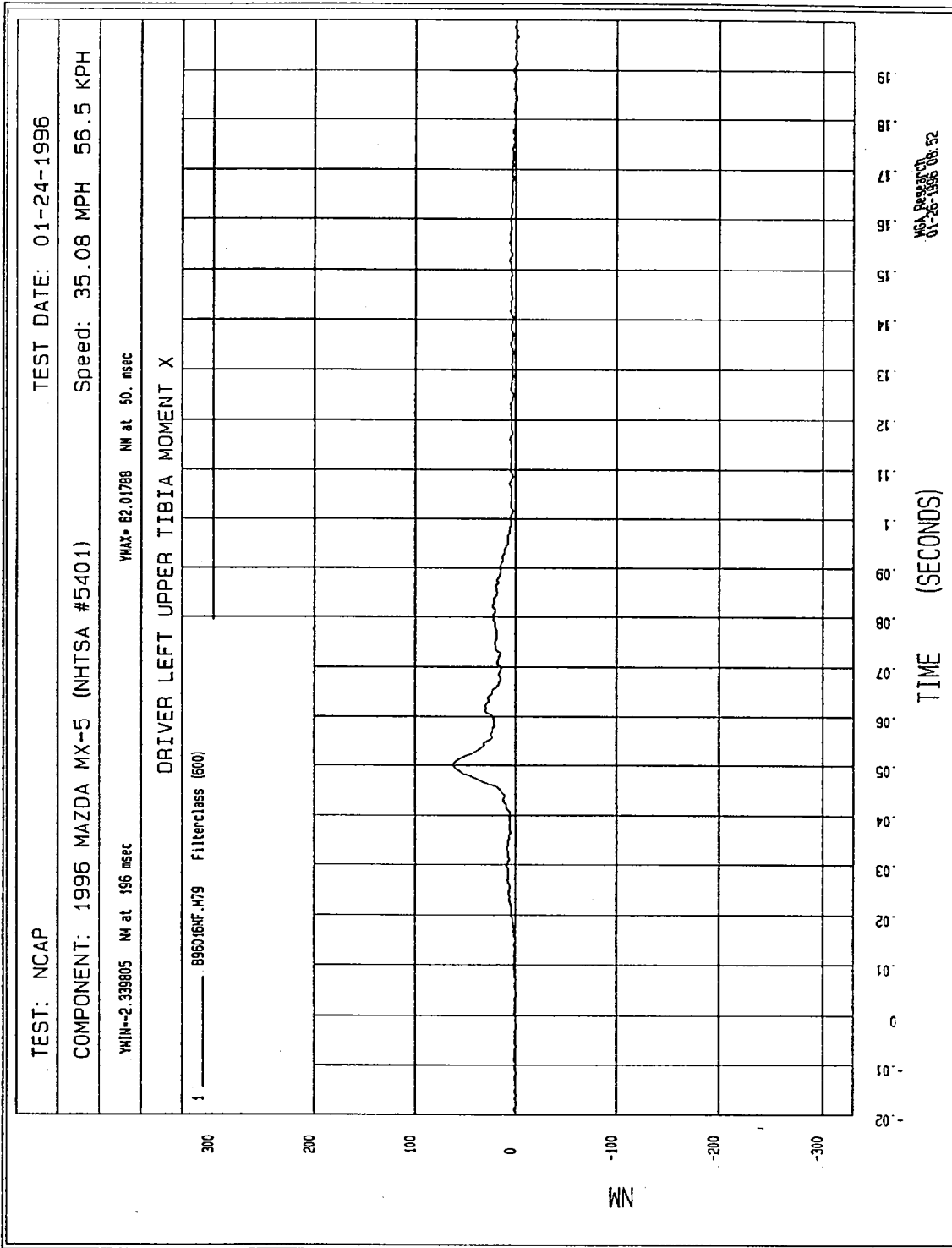


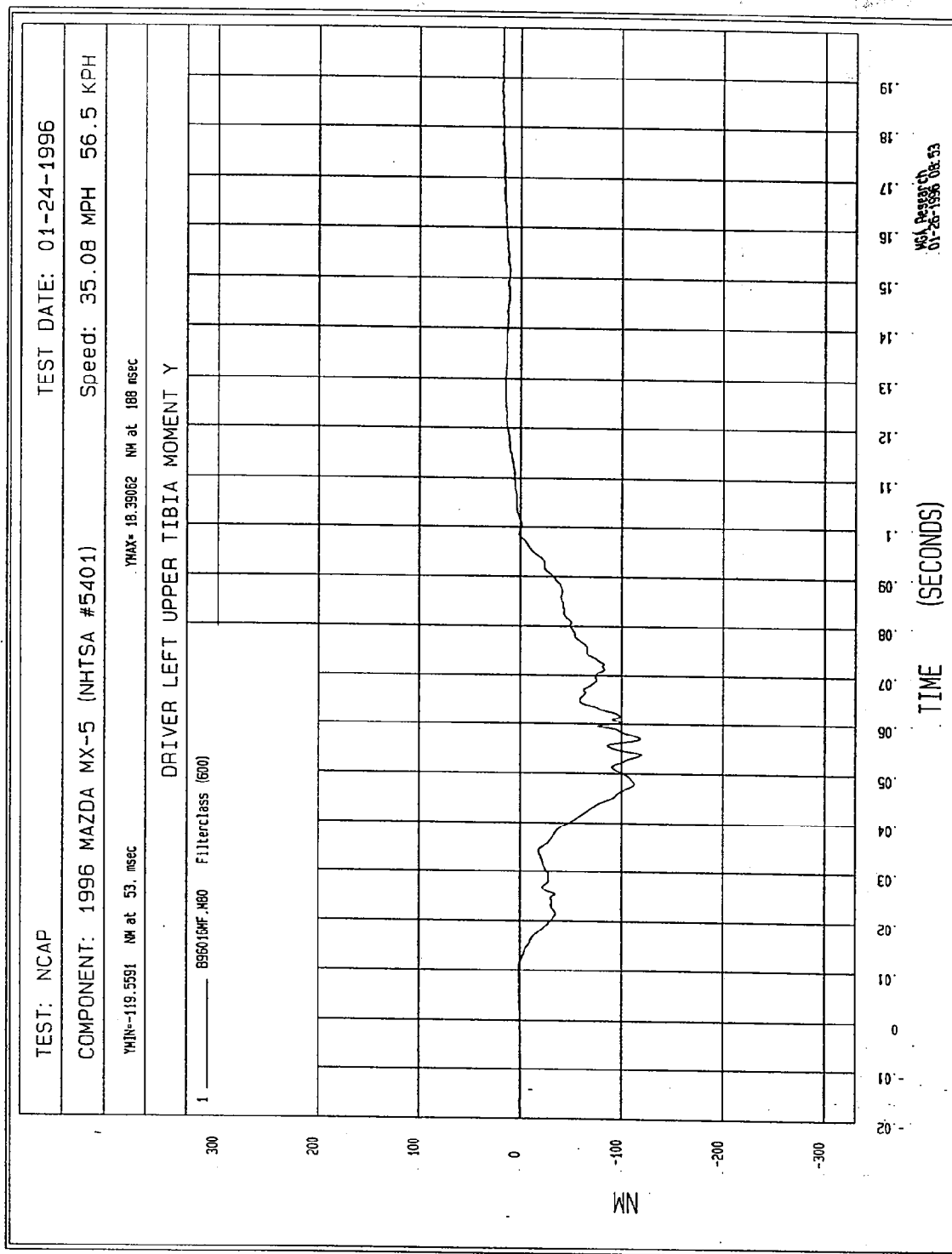
NCAP Research
01-25-1996 16:00

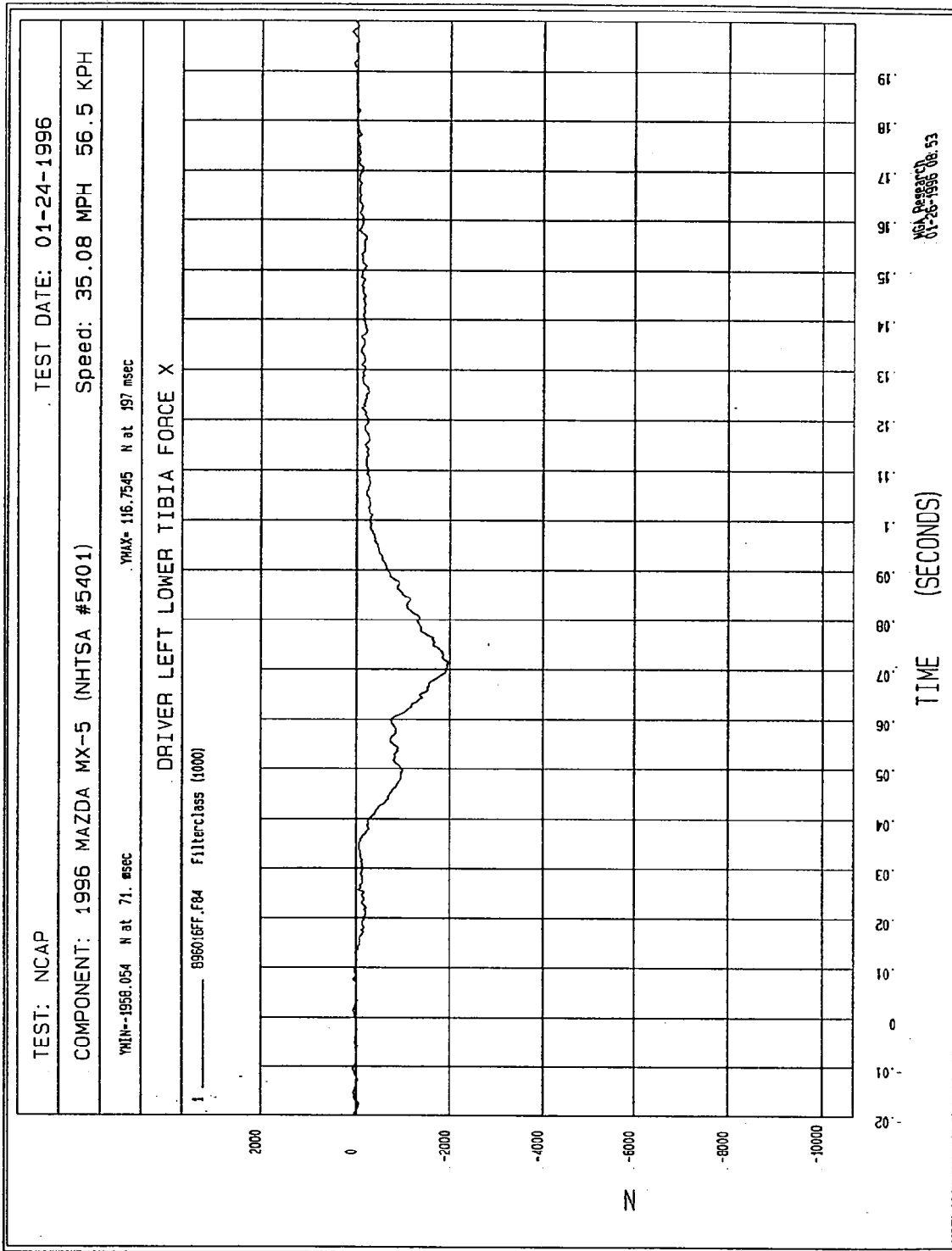


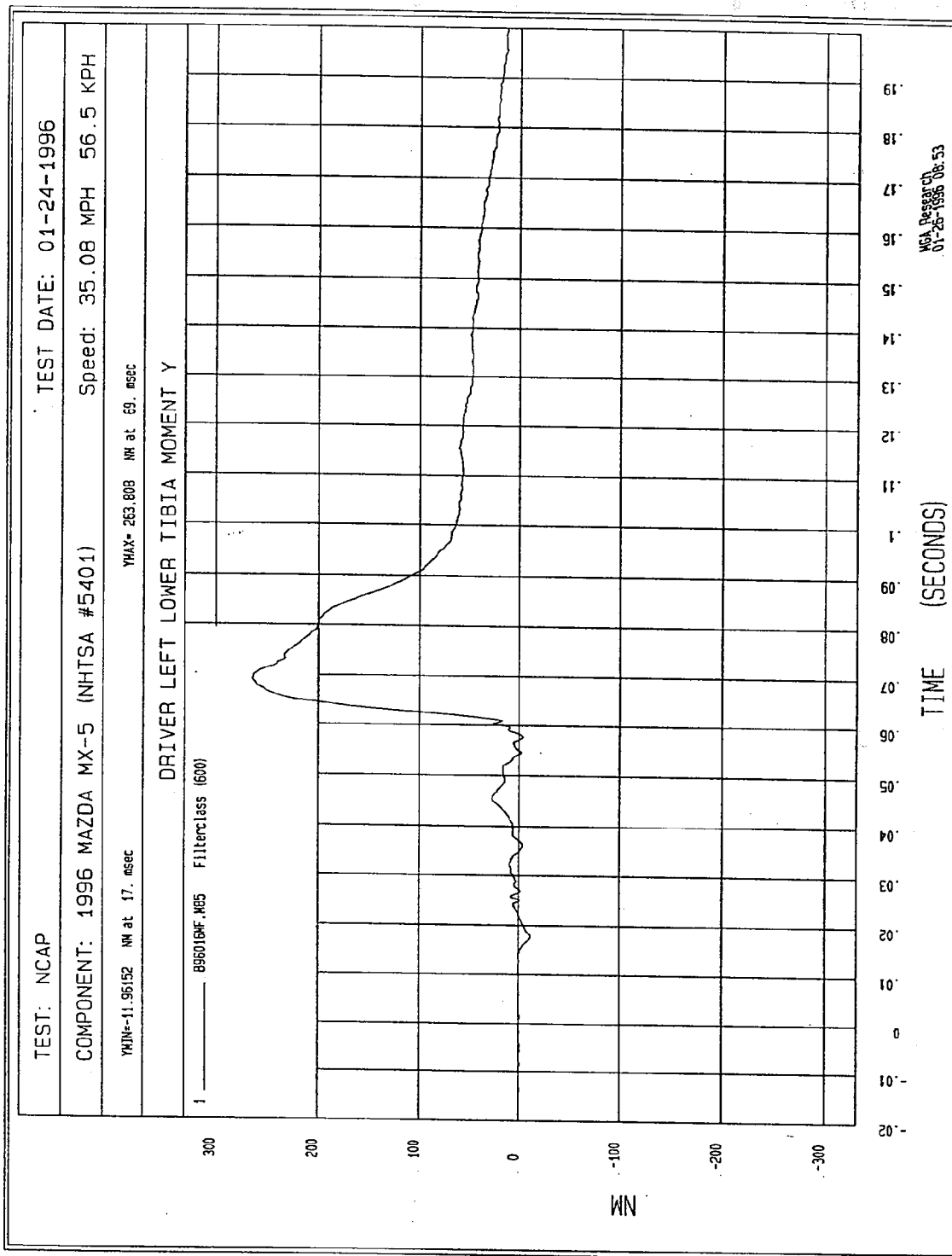


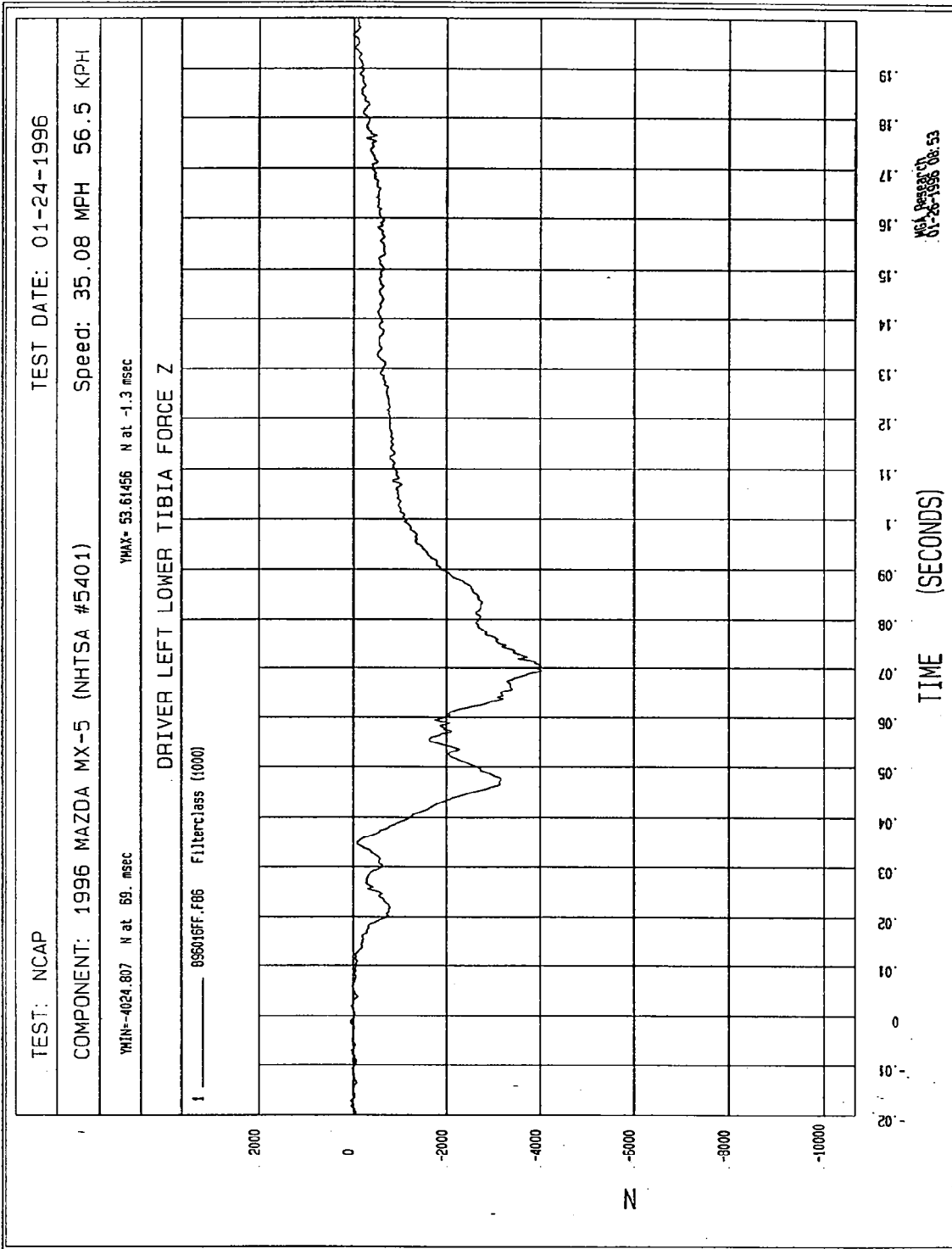


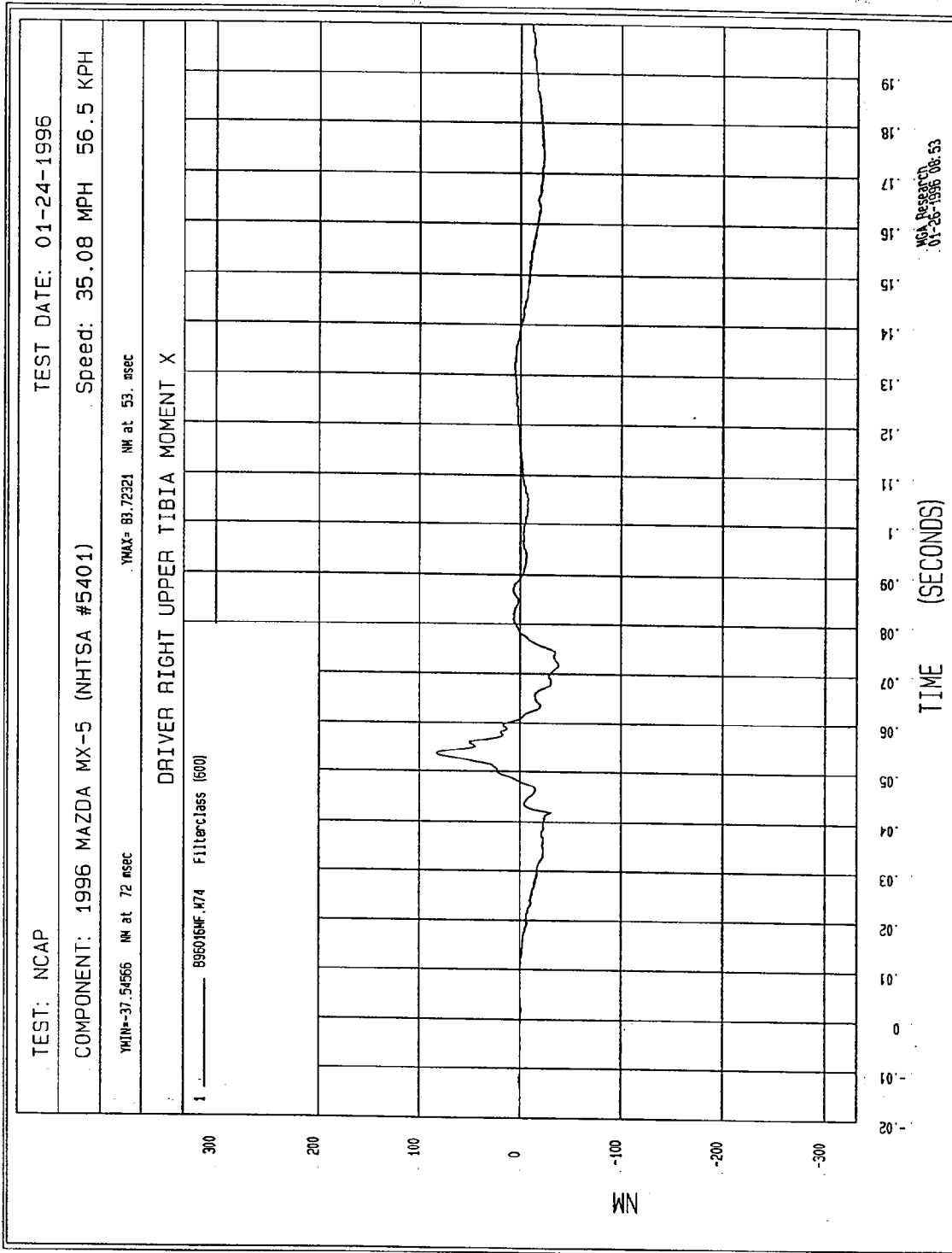


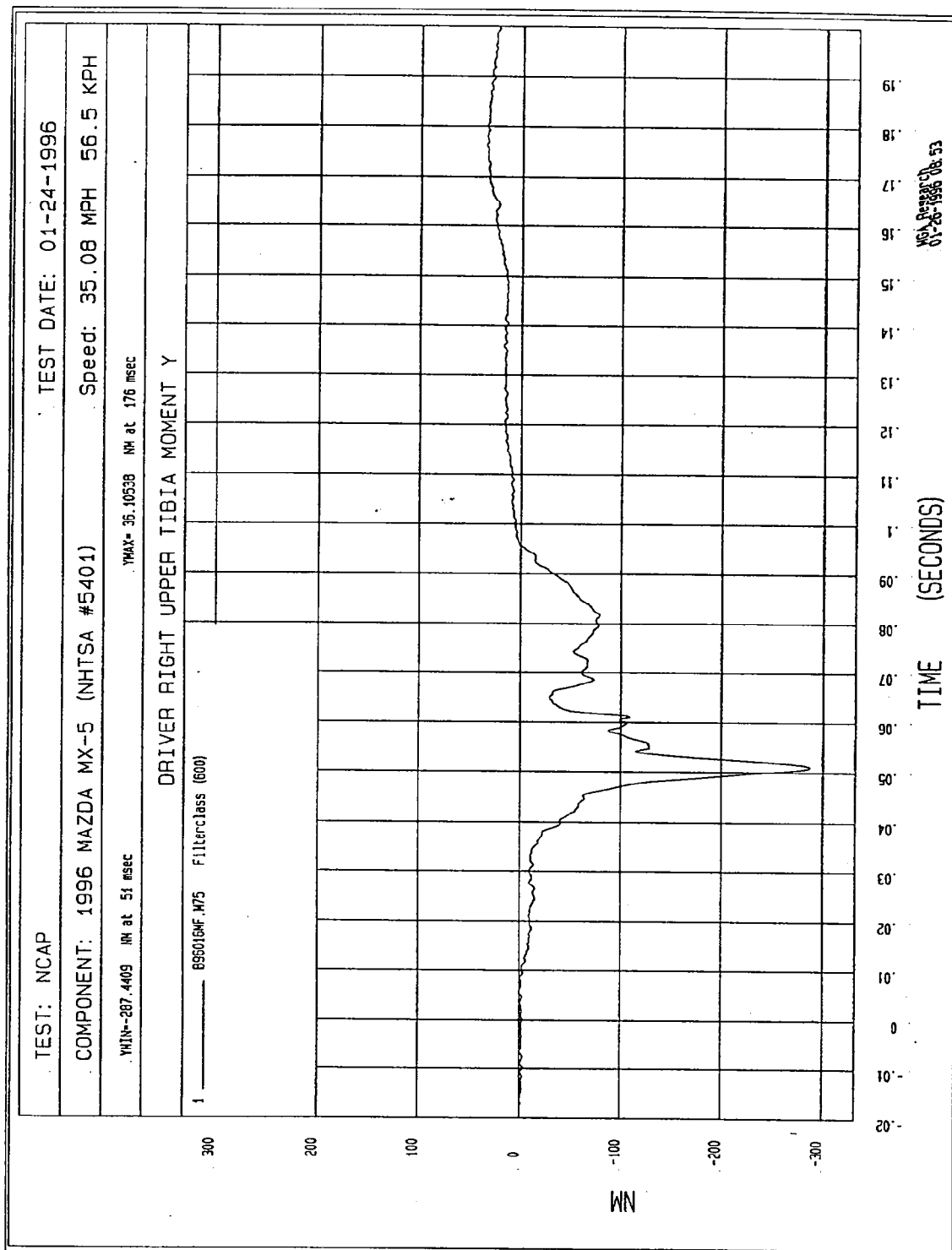


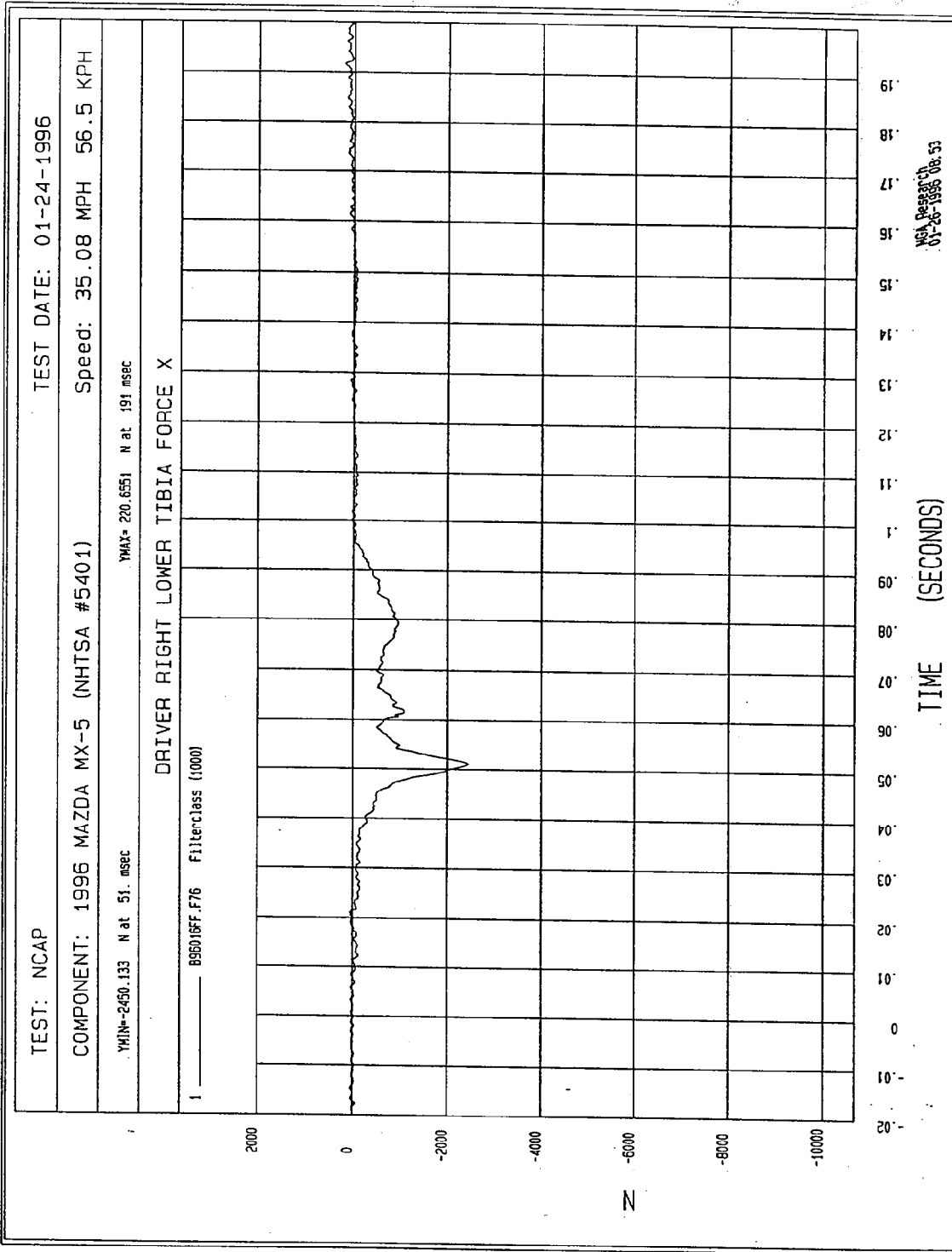


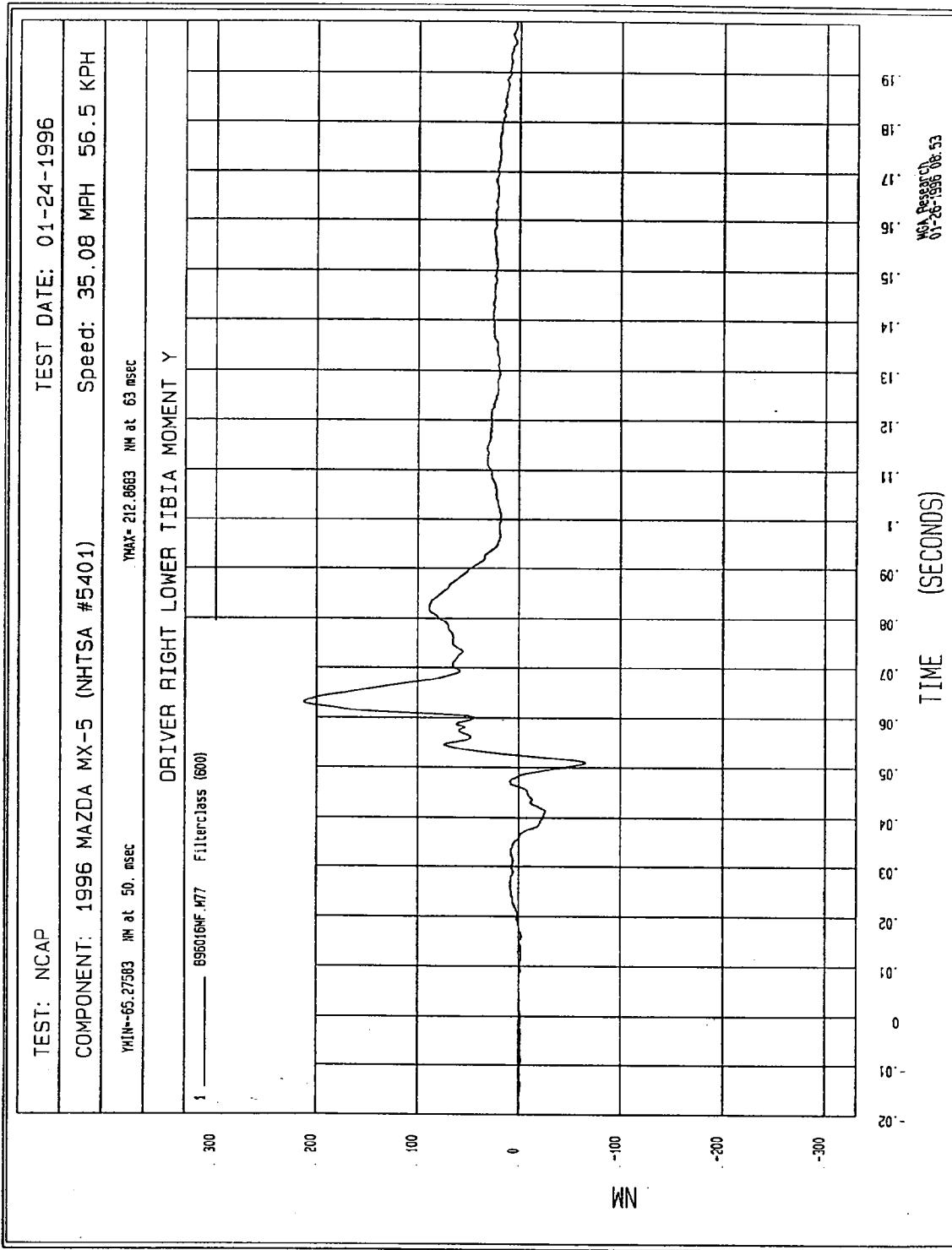


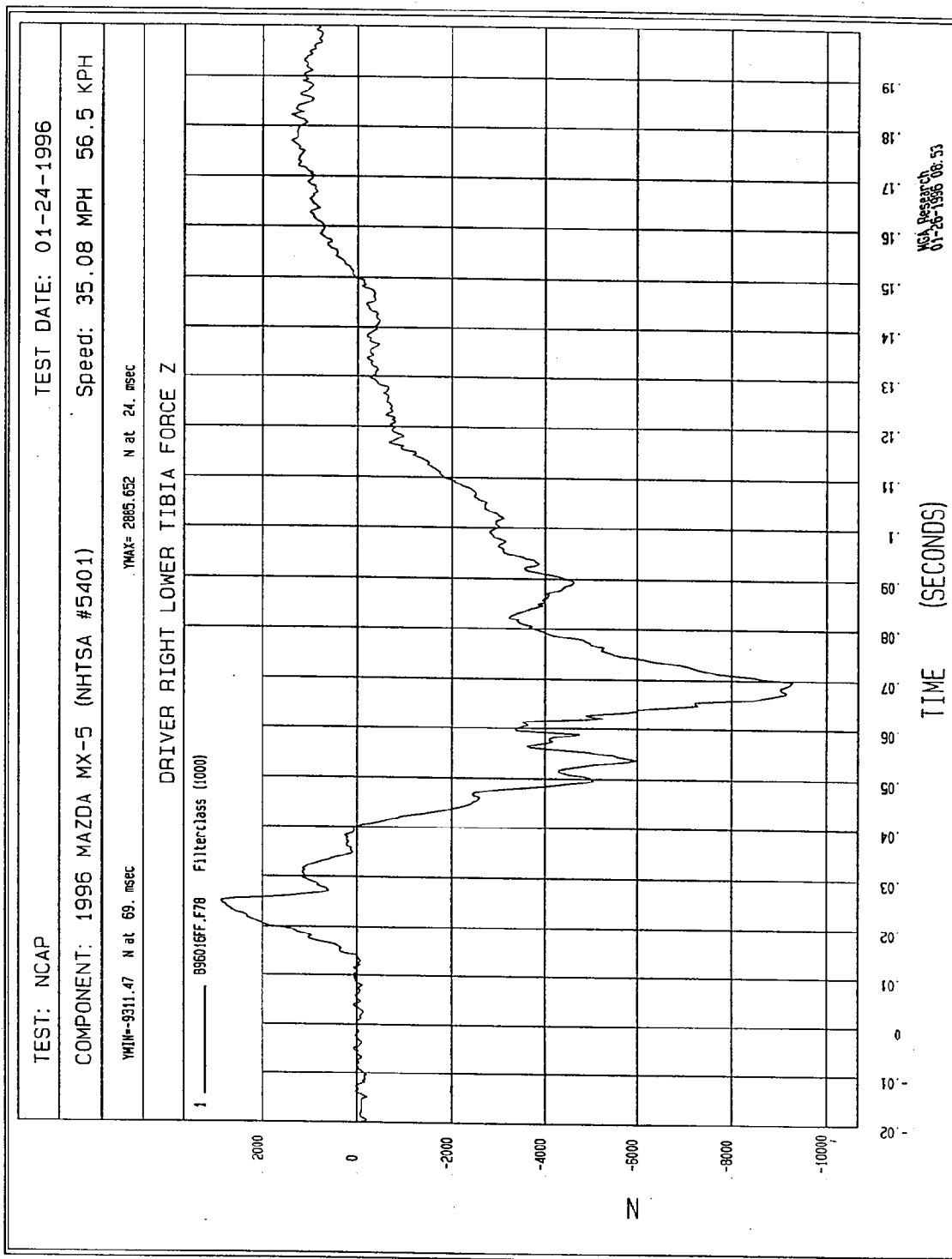


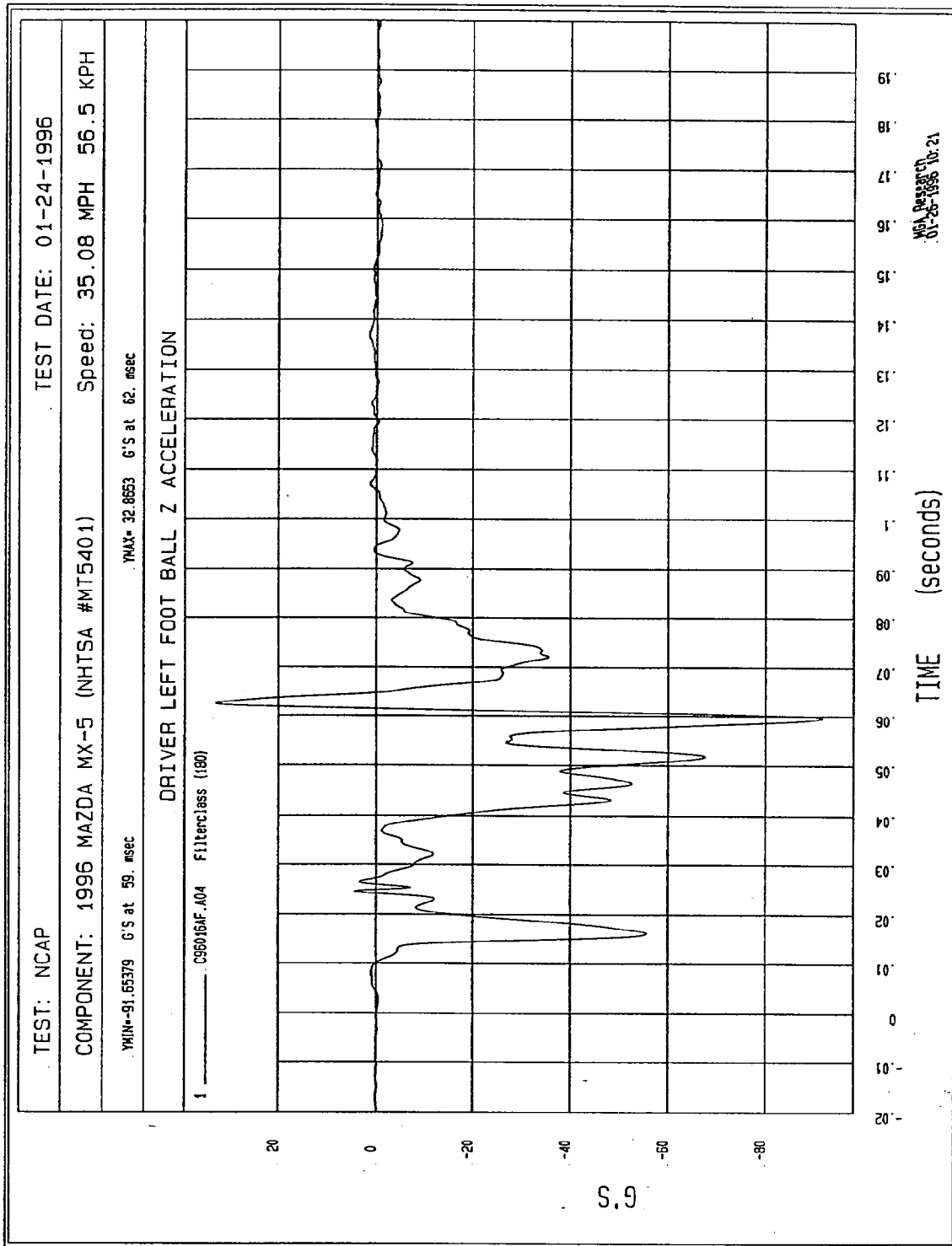


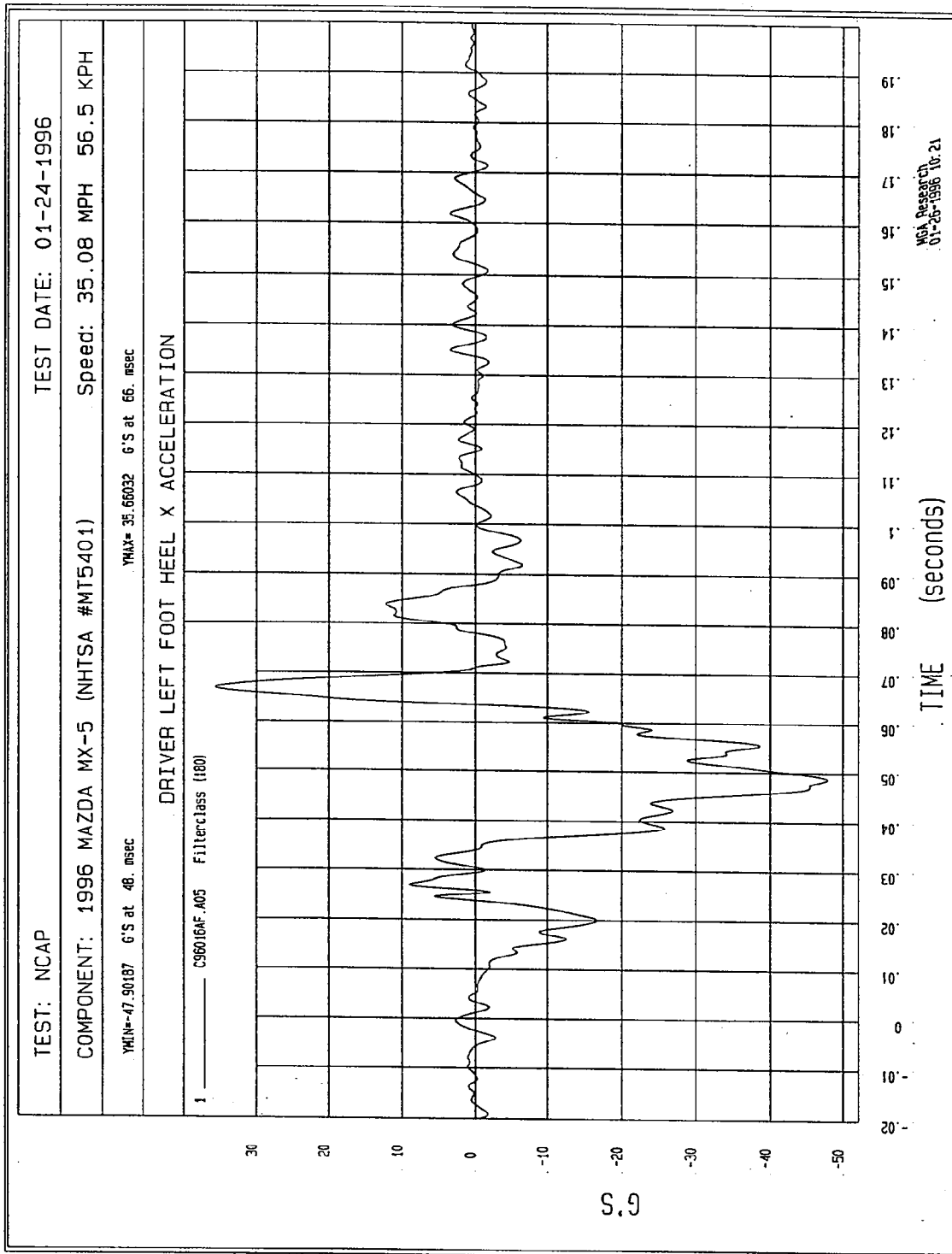


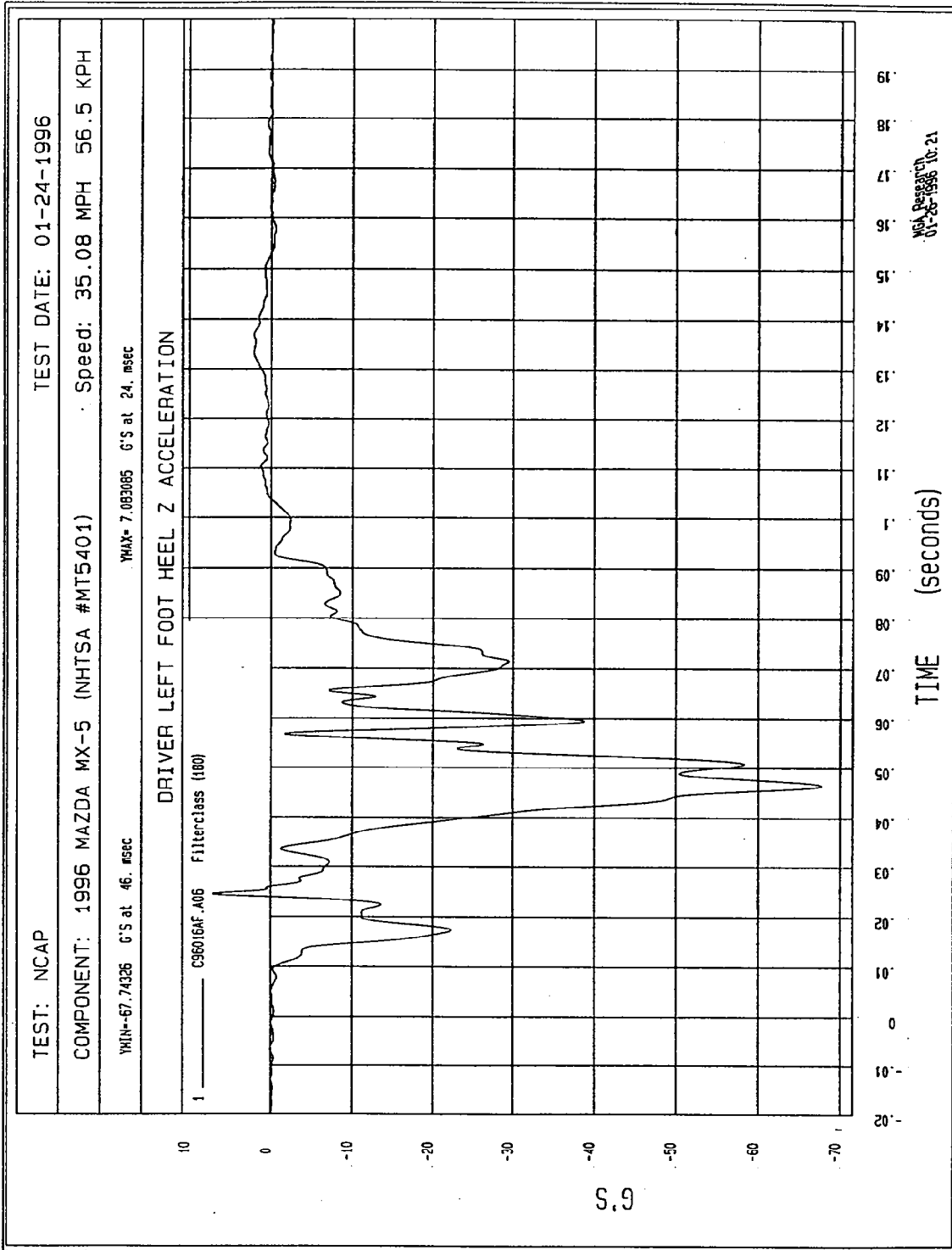


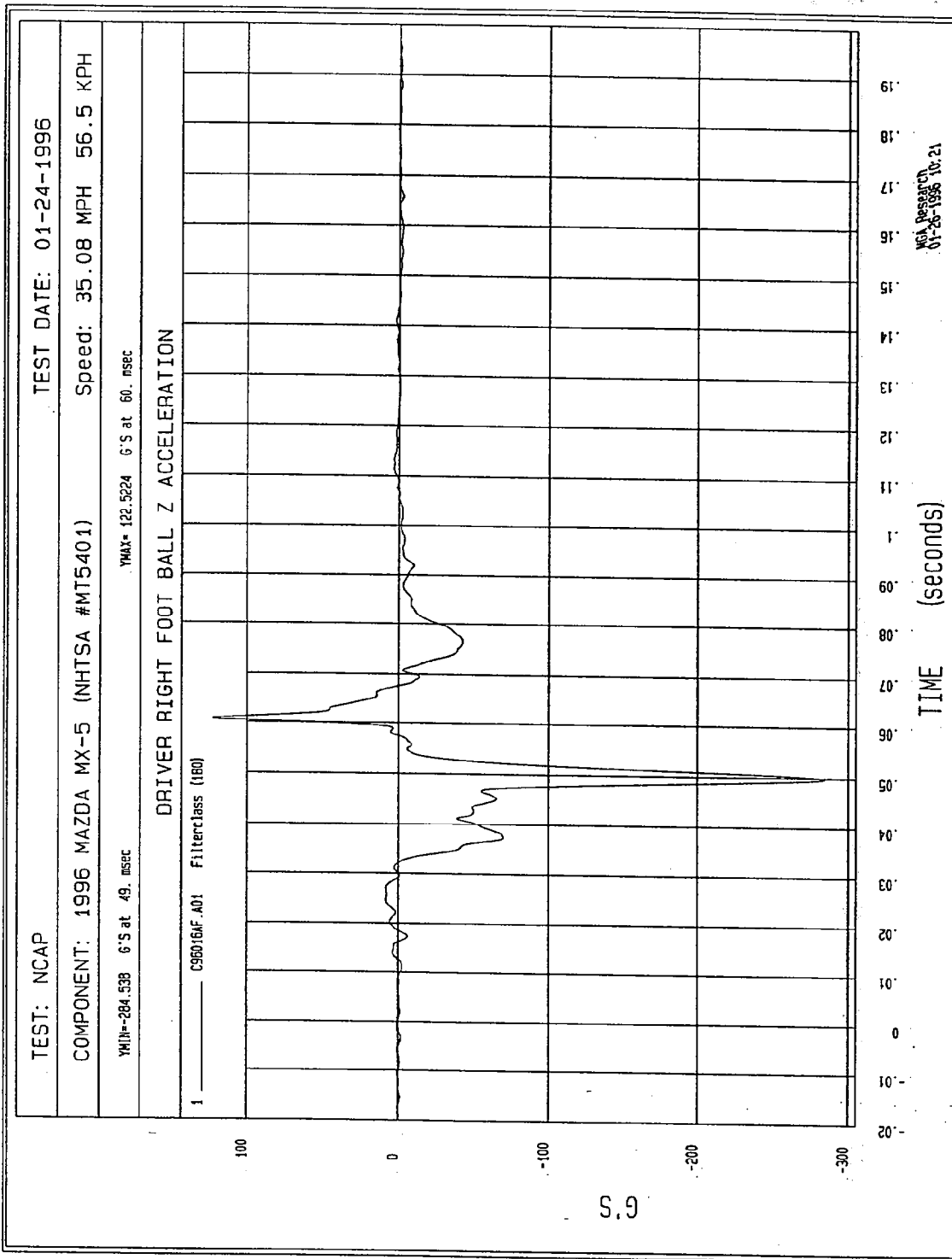












TEST: NCAP

TEST DATE: 01-24-1996

COMPONENT: 1996 MAZDA MX-5 (NHTSA #MT5401)

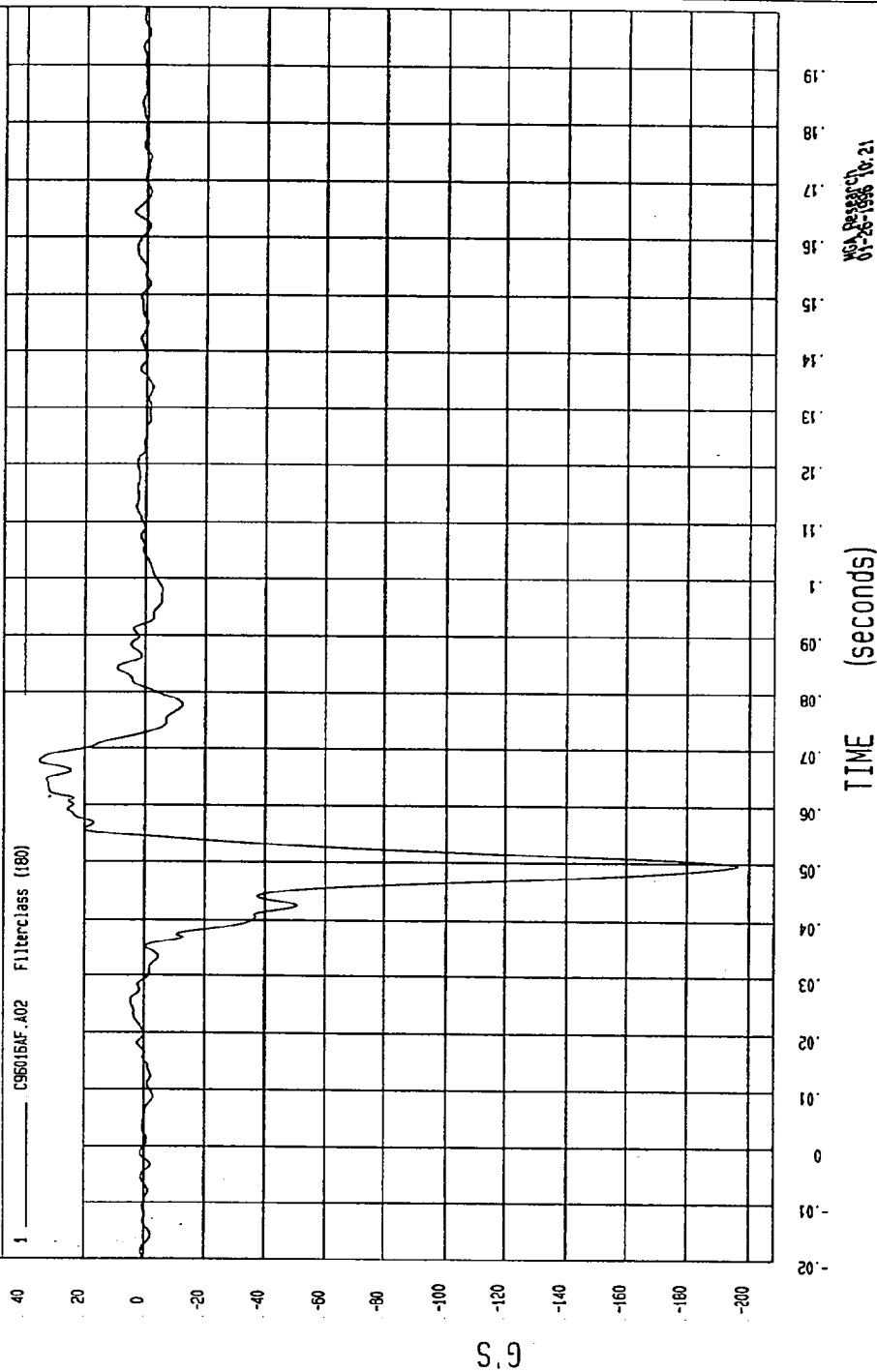
Speed: 35.08 MPH 56.5 KPH

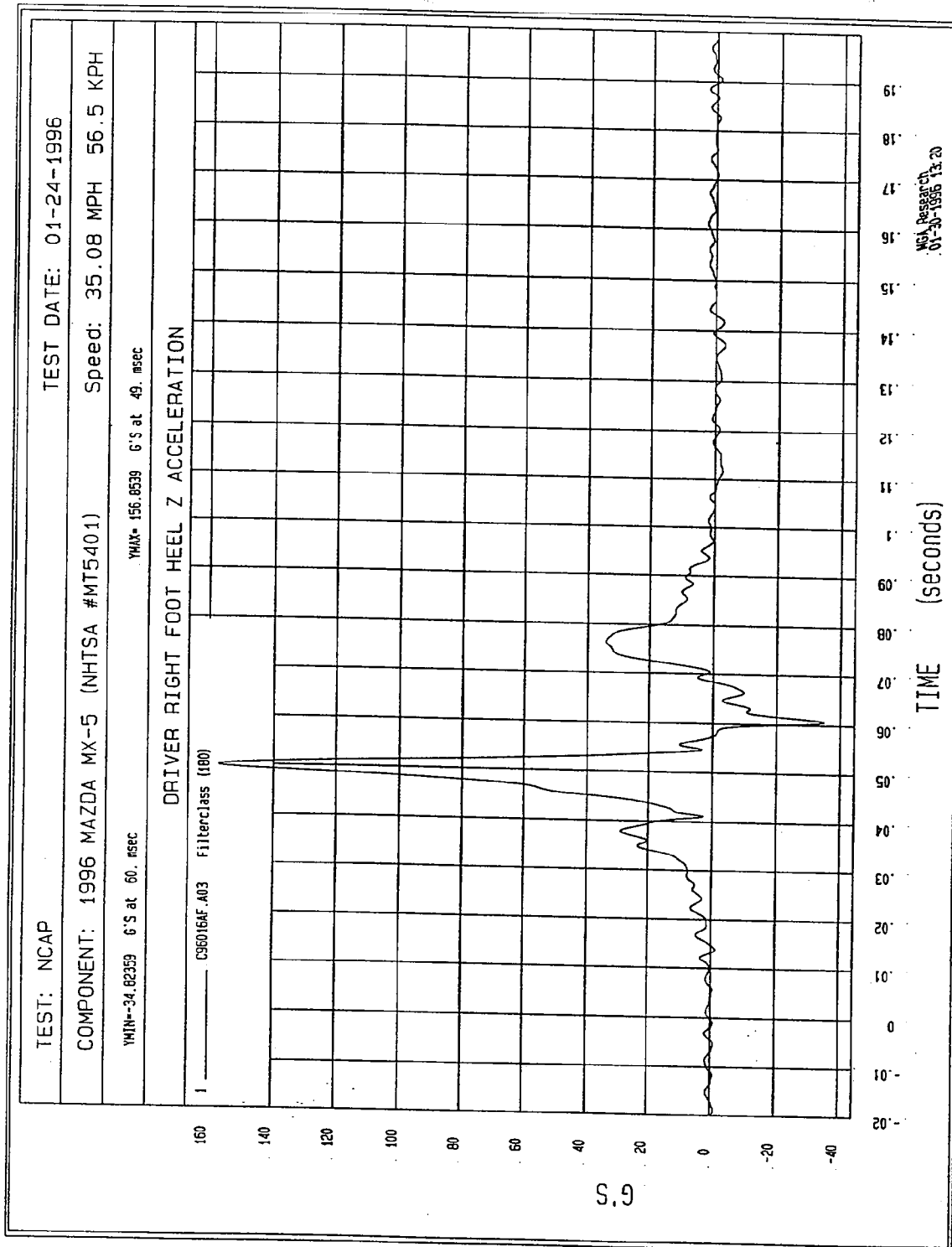
YMIN=-195.4079 G'S at 49. msec

YMAX= 35.24348 G'S at 67. msec

DRIVER RIGHT FOOT HEEL X ACCELERATION

1 C95015AF.A02 Filterclass (180)





TEST: NCAP

TEST DATE: 01-24-1996

COMPONENT: 1996 MAZDA MX-5 (NHTSA #5401)

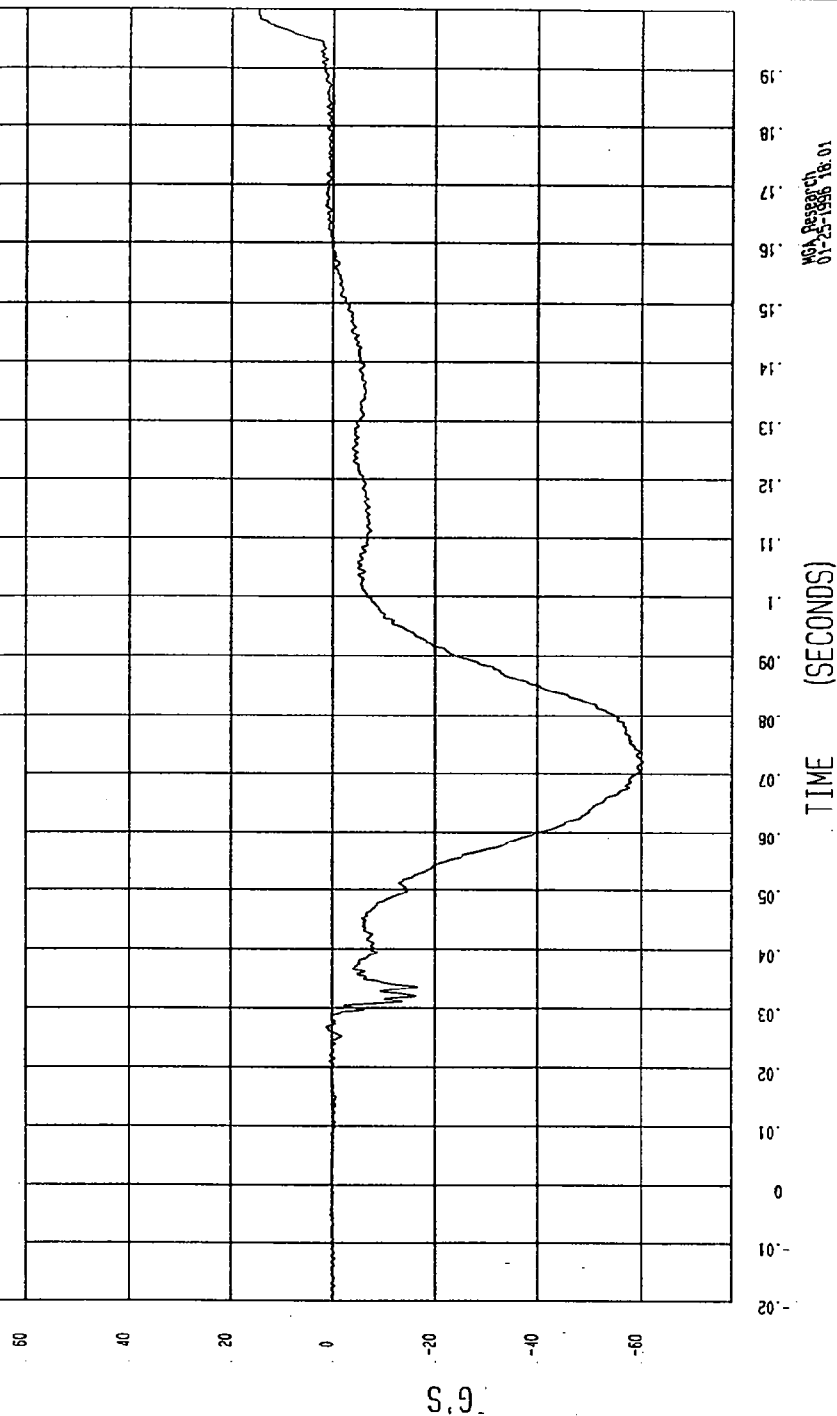
Speed: 35.08 MPH 56.5 KPH

YMIN=-60.35633 G'S at 72 msec

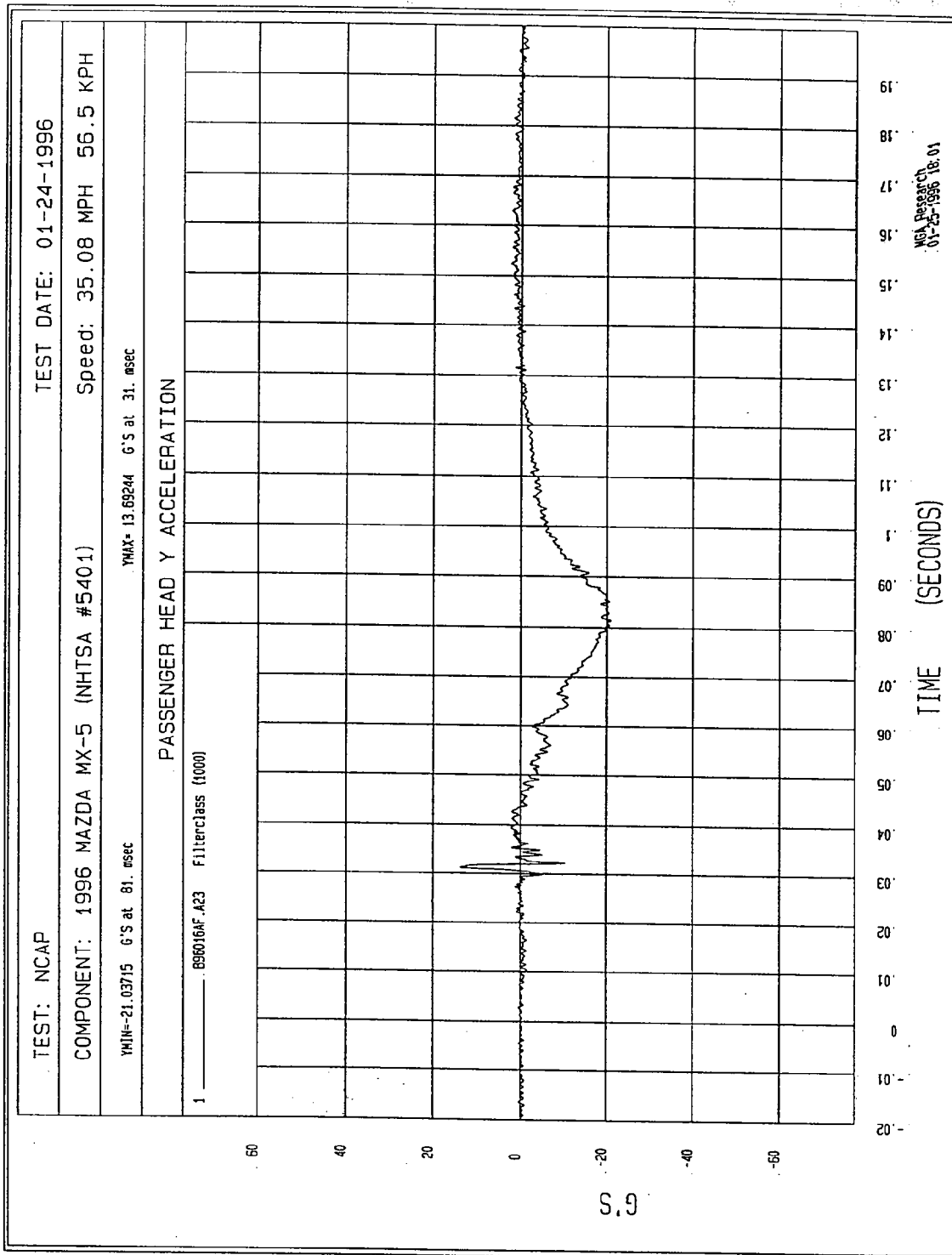
YMAX= 14.74879 G'S at 199 msec

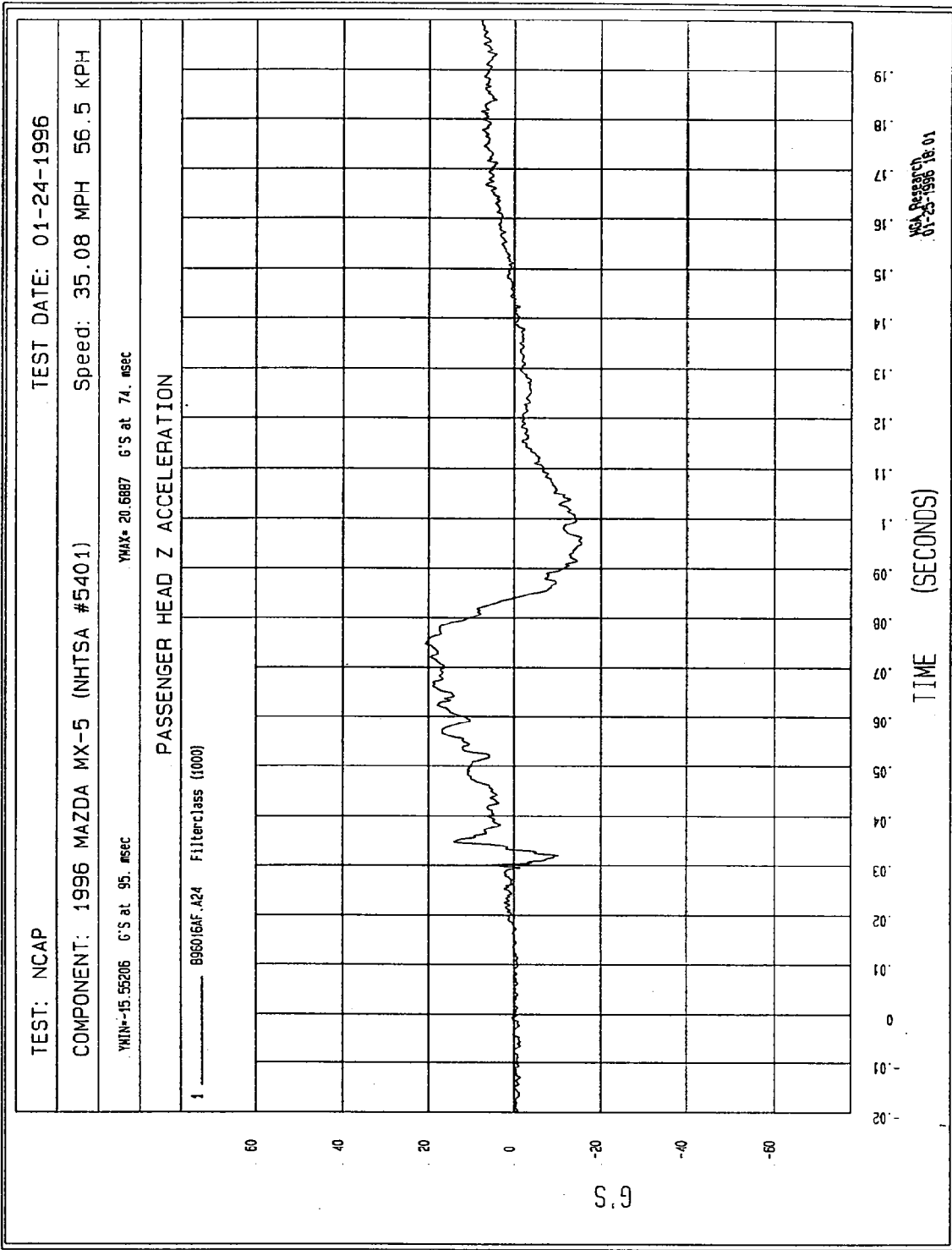
PASSENGER HEAD X ACCELERATION

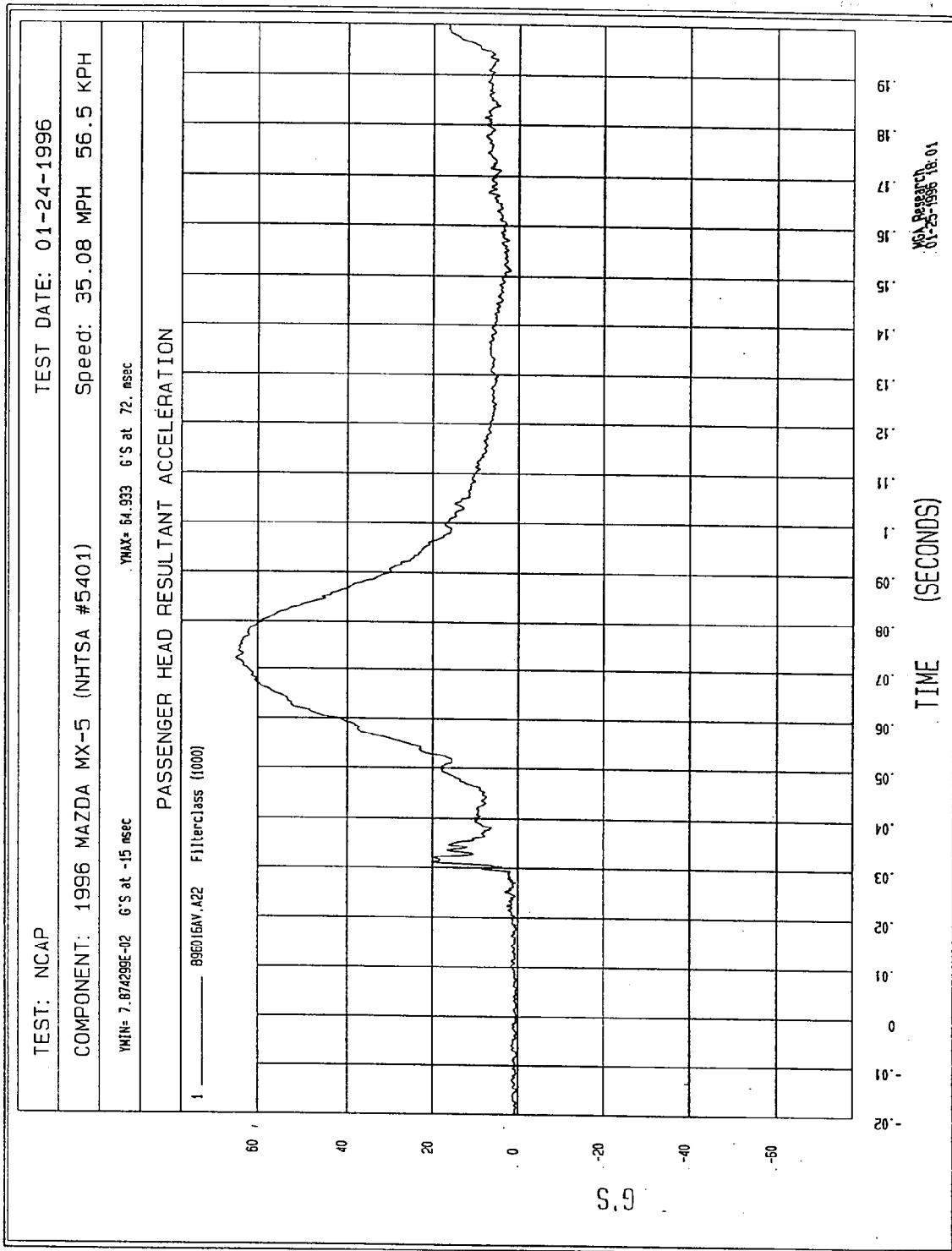
1 _____ 895016AF.A22 Filterclass (1000)

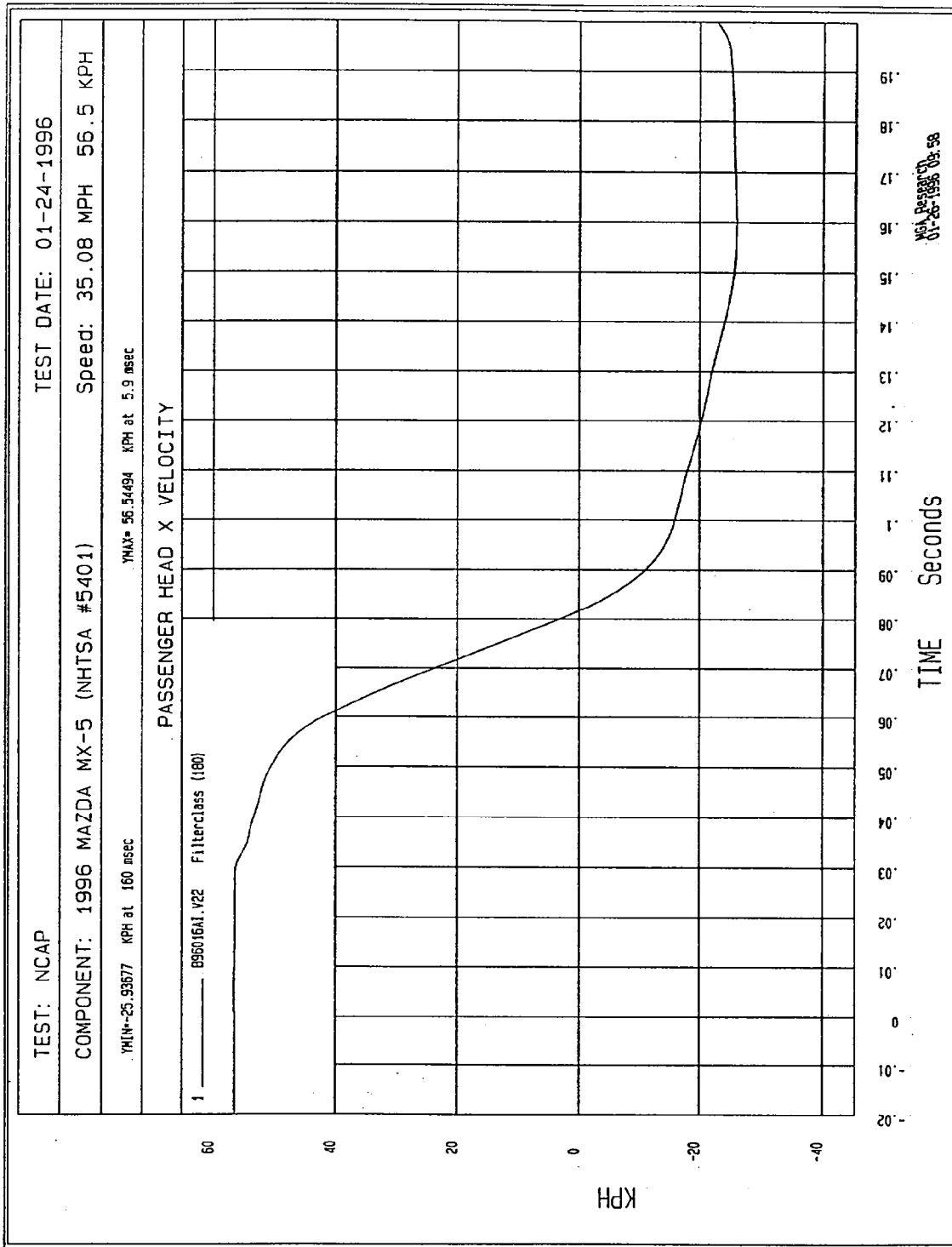


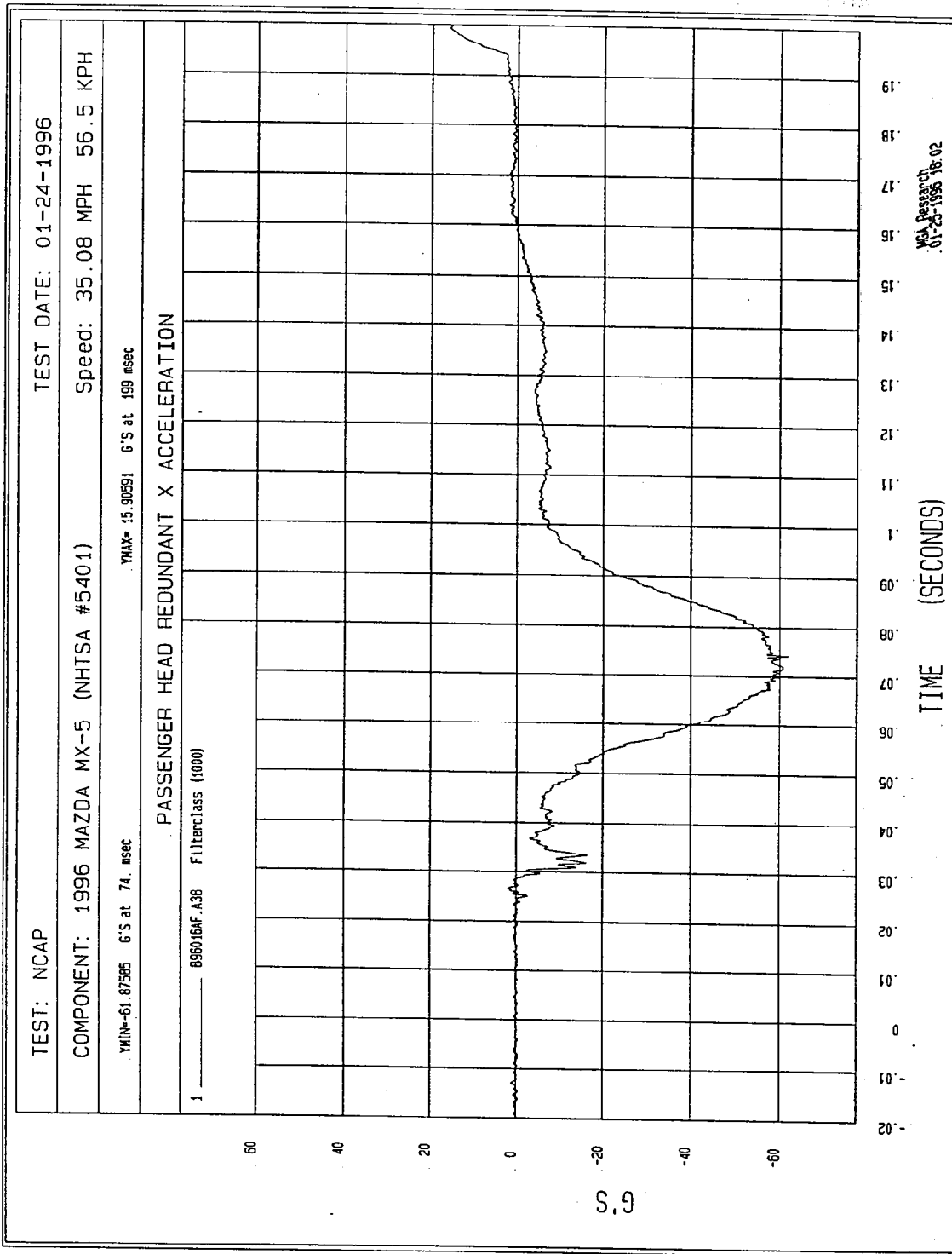
WCA Research
01-25-1996 16.01

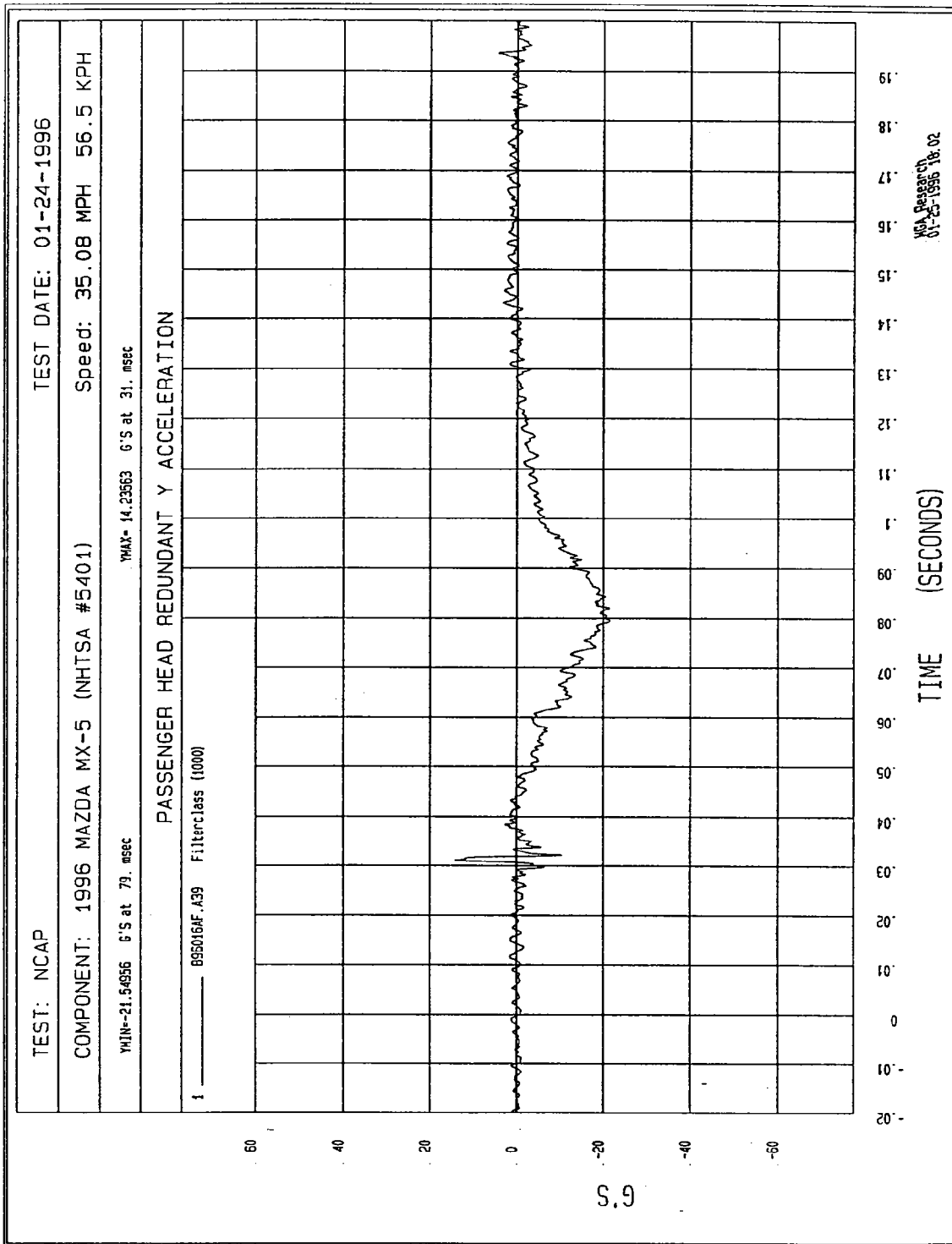


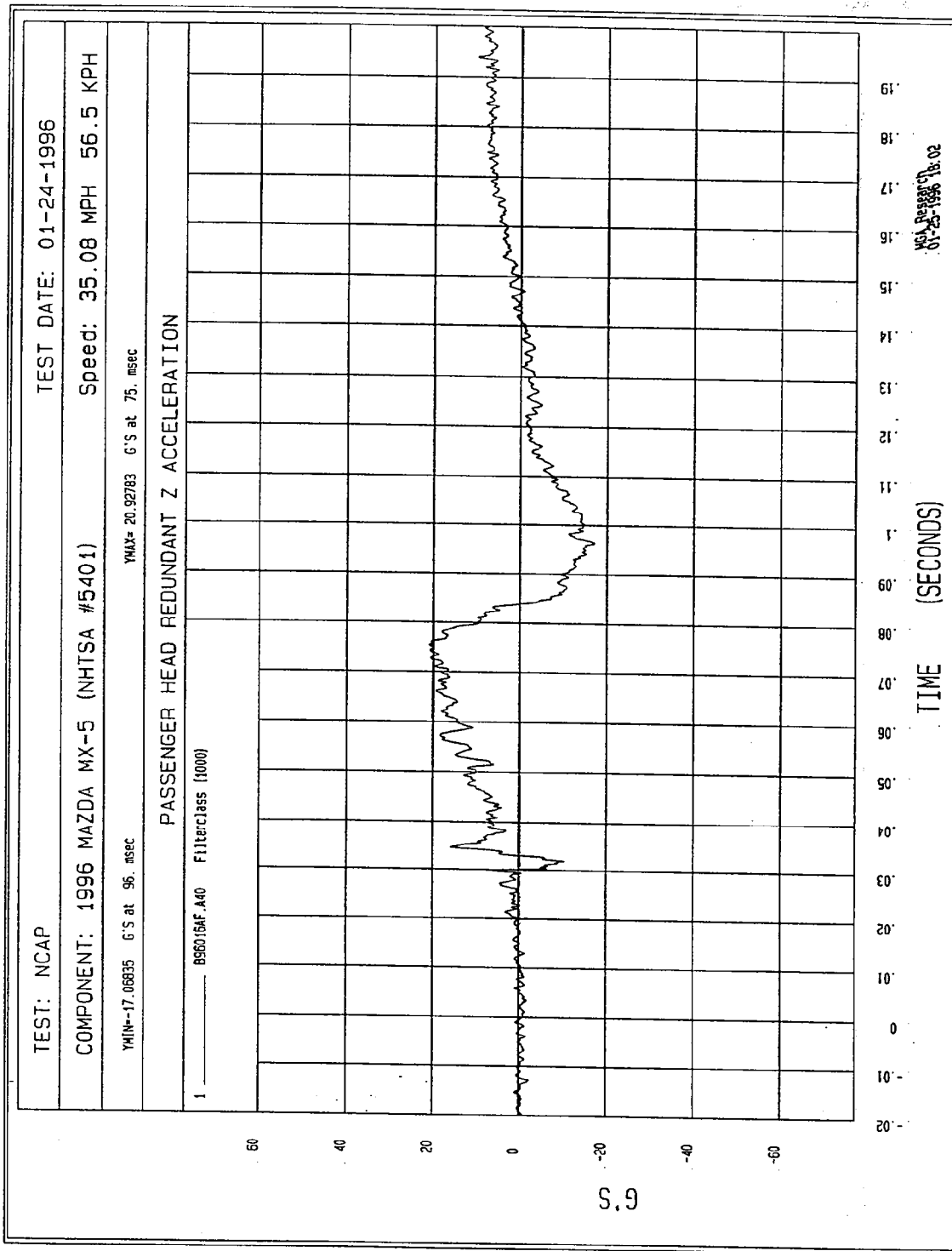


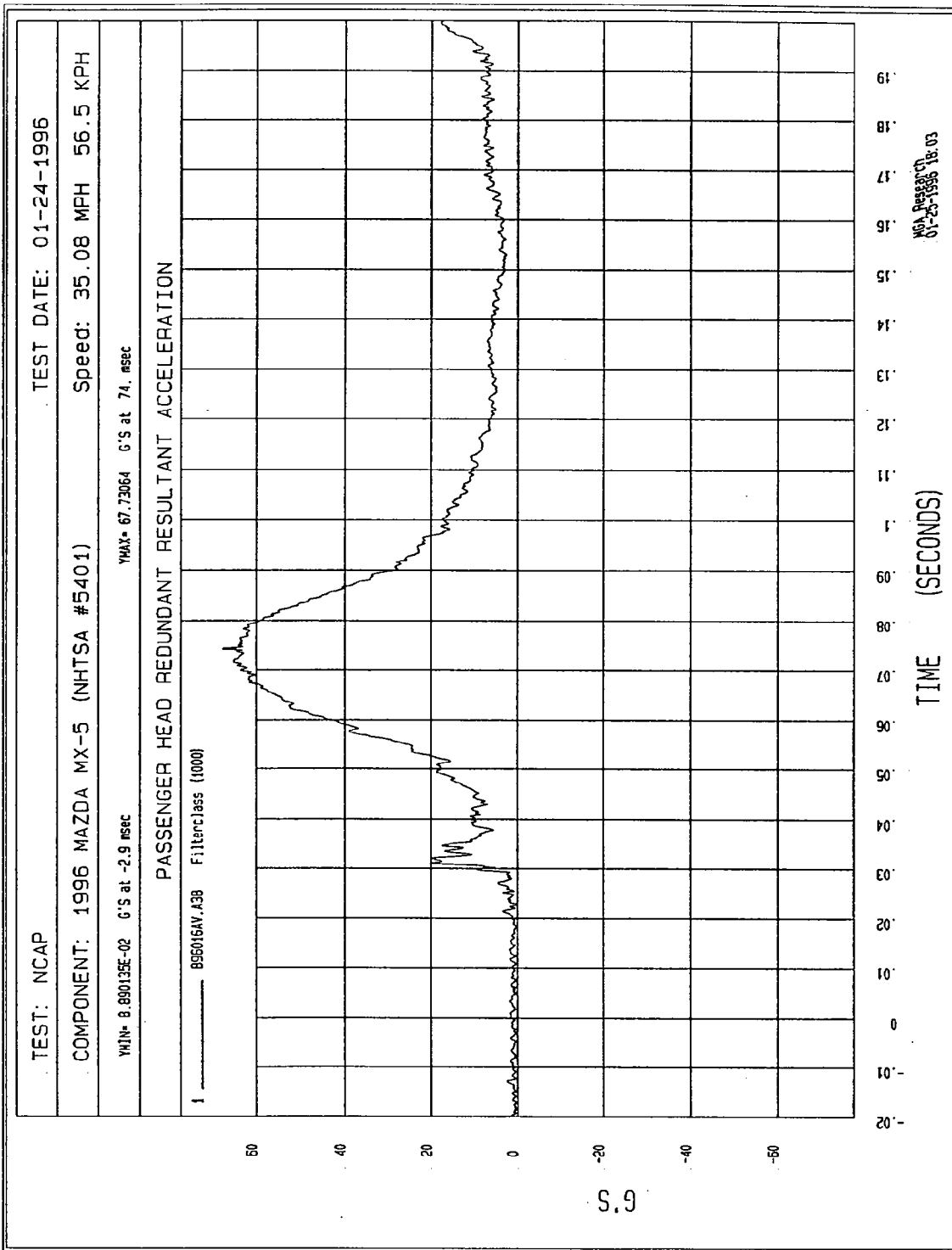


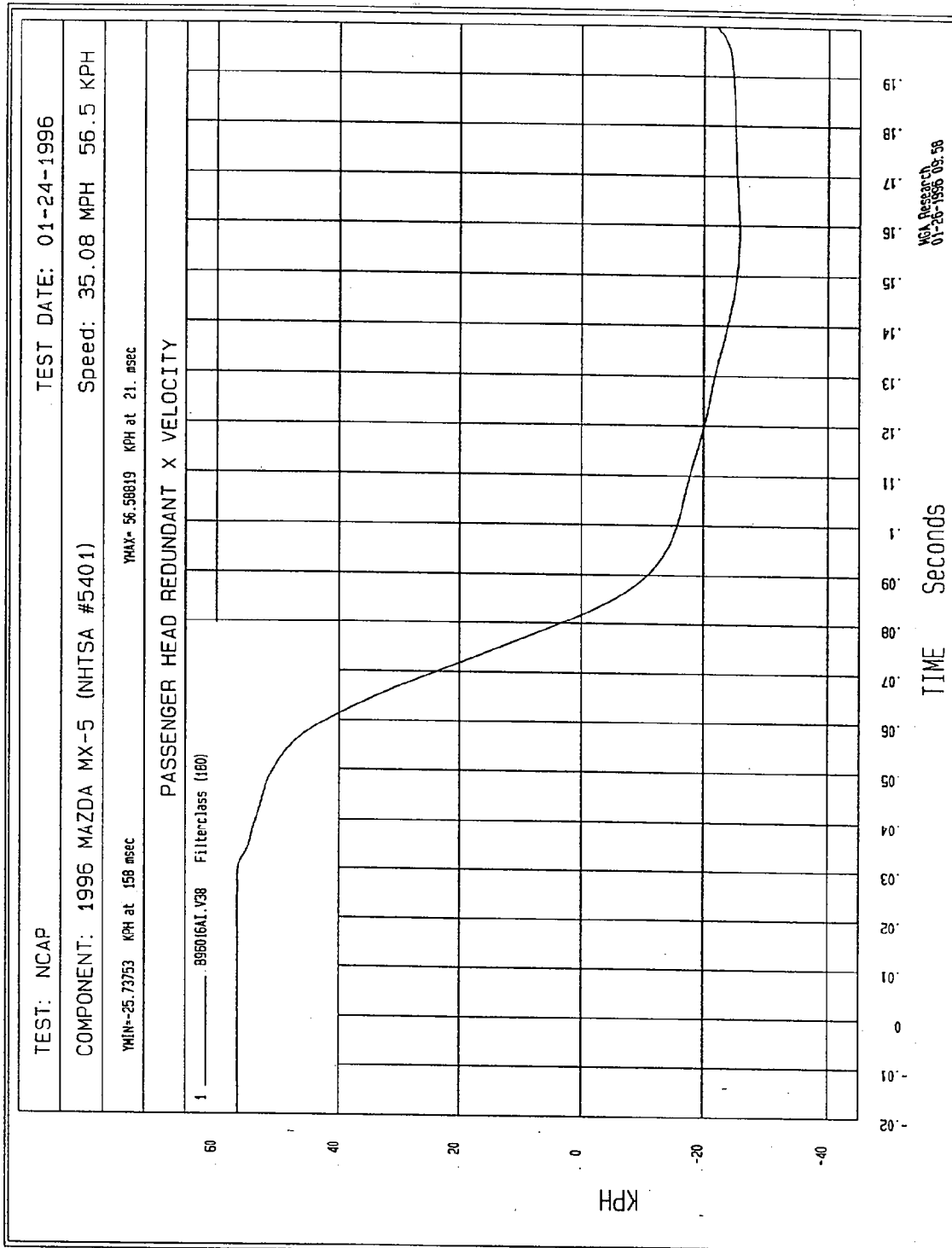


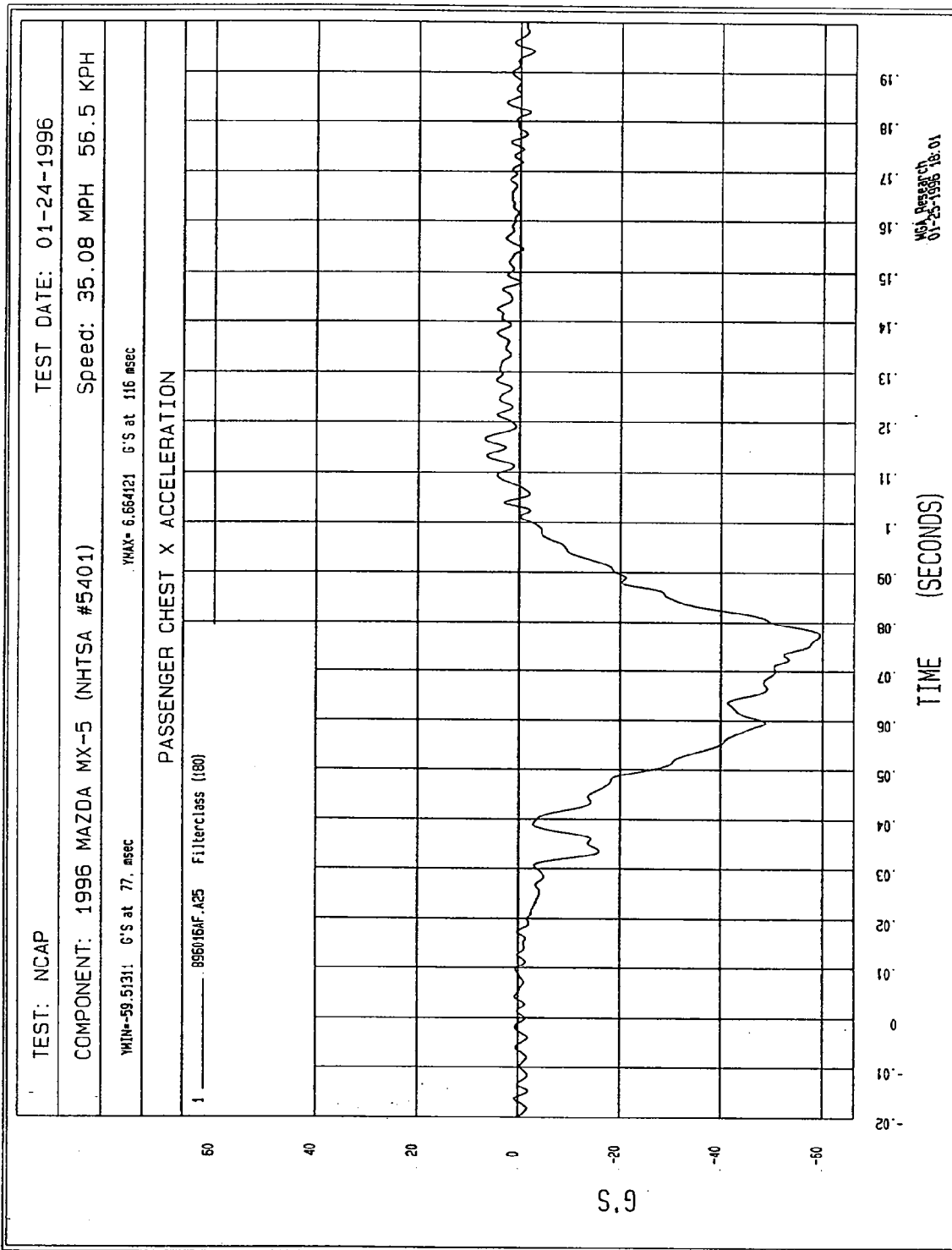


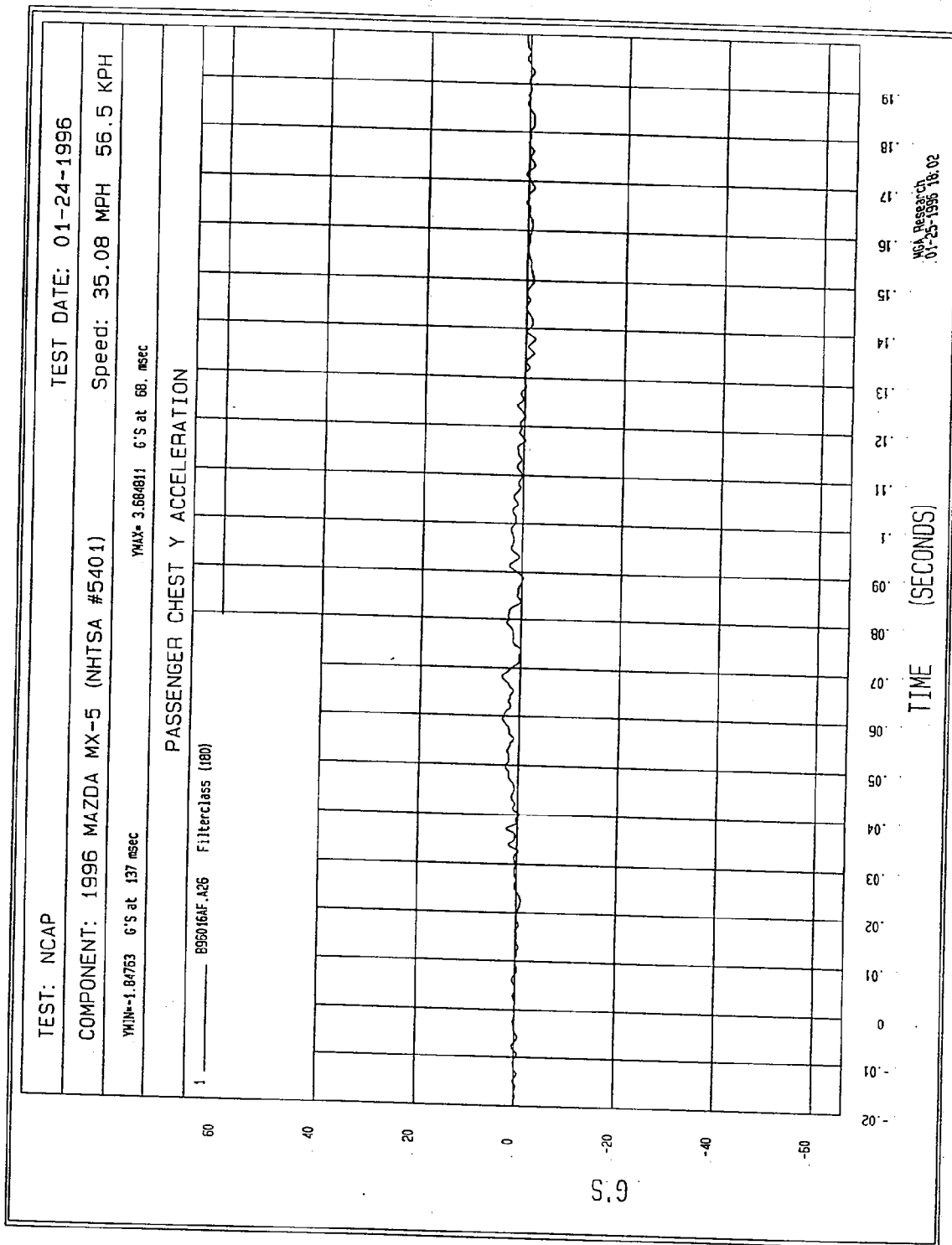


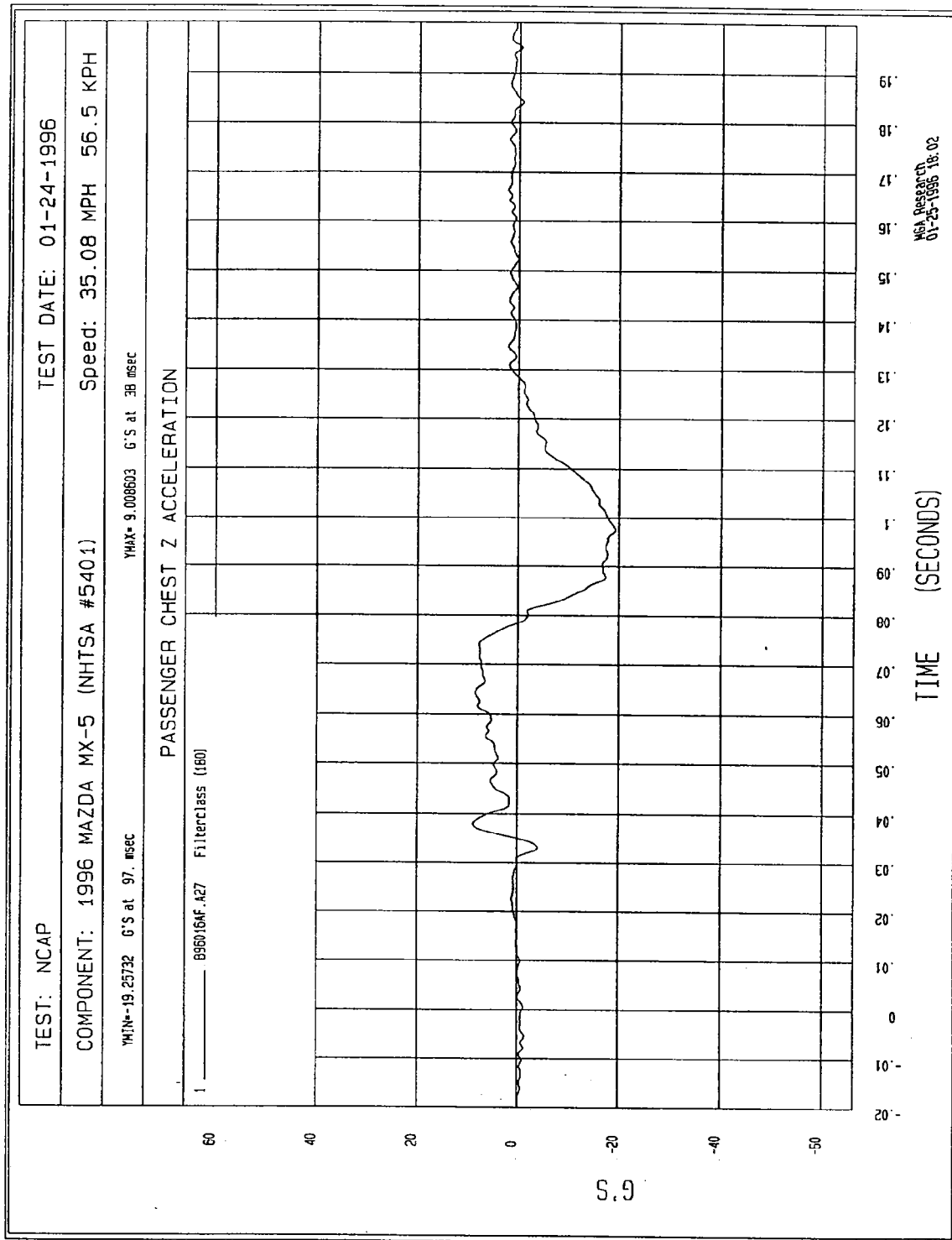


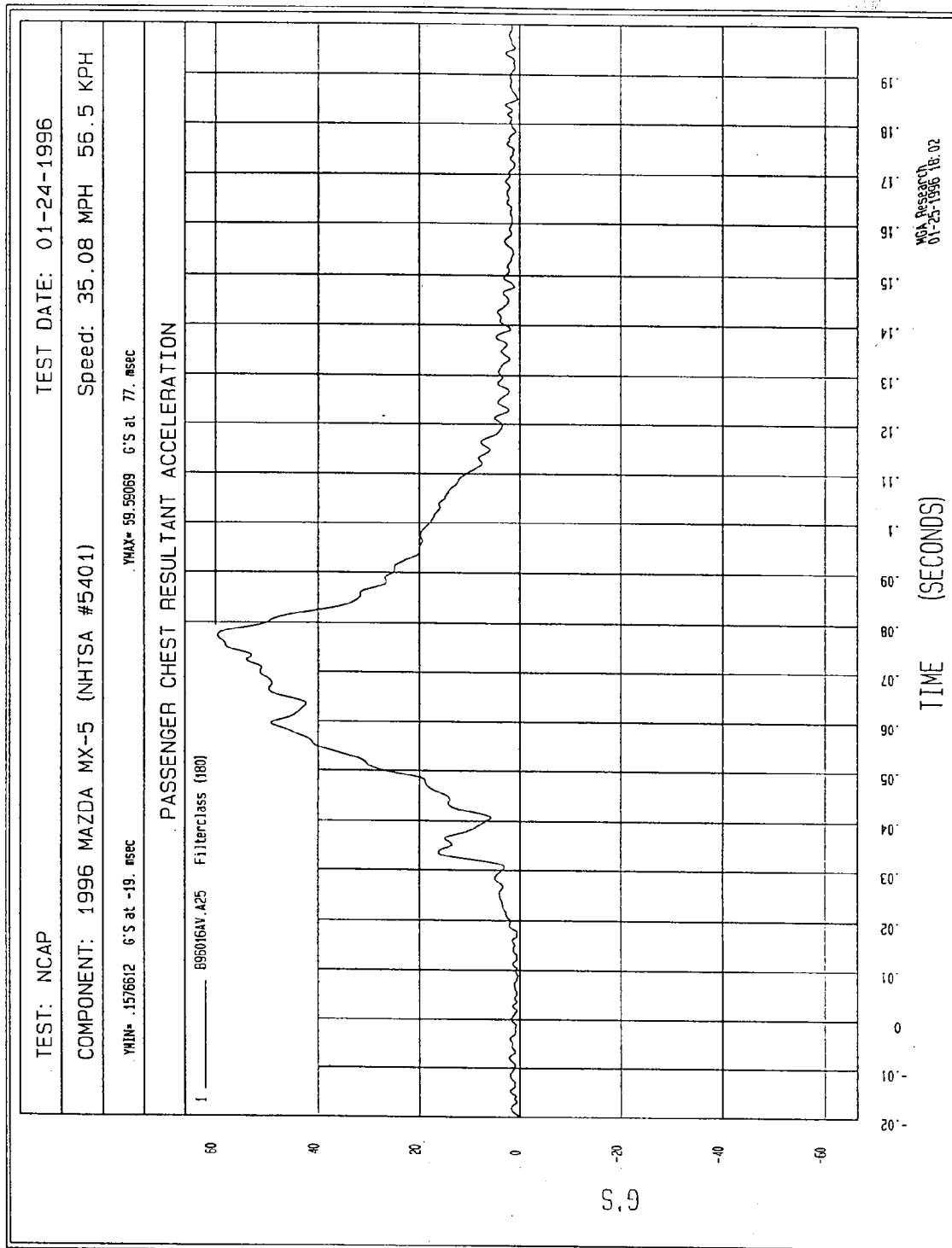


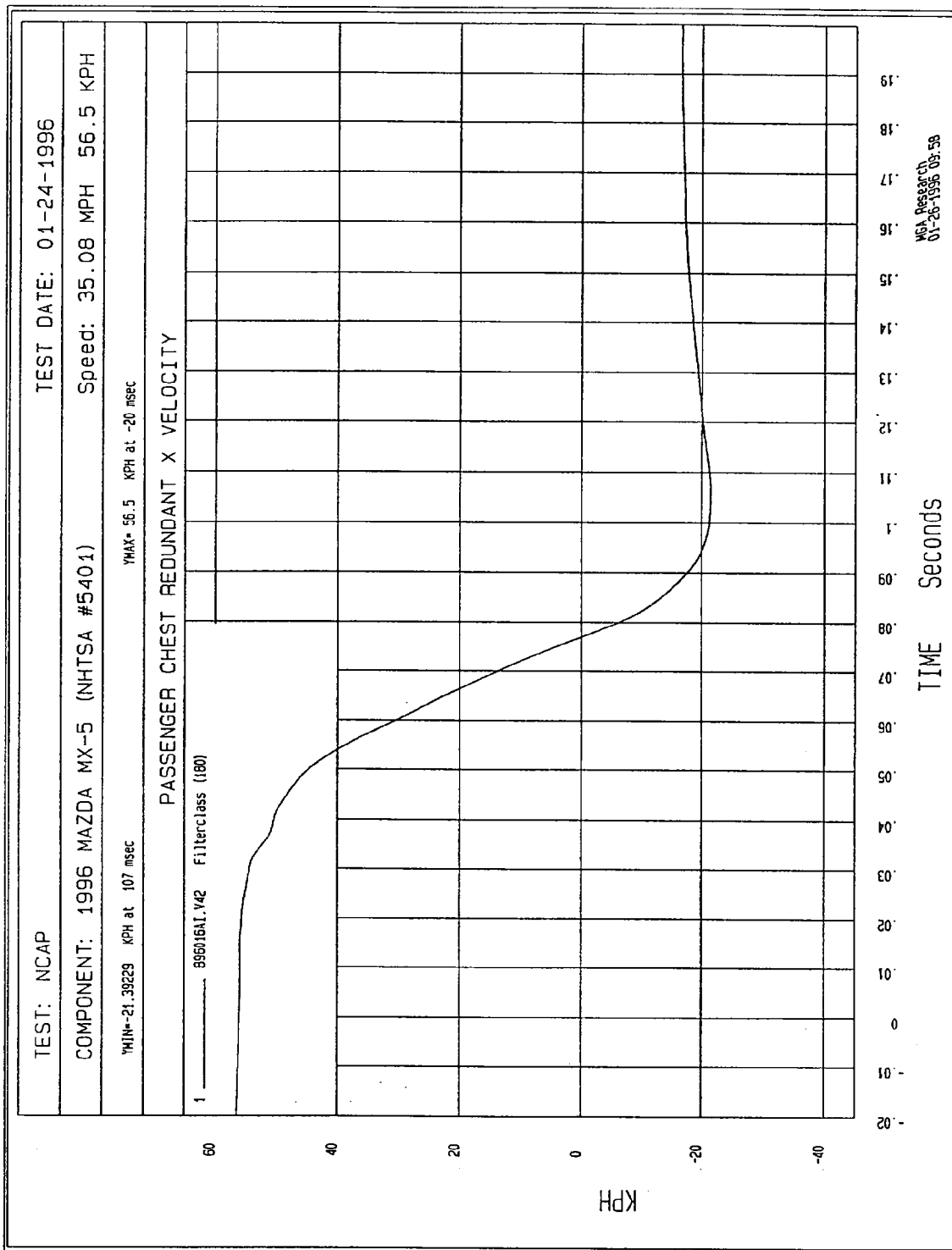


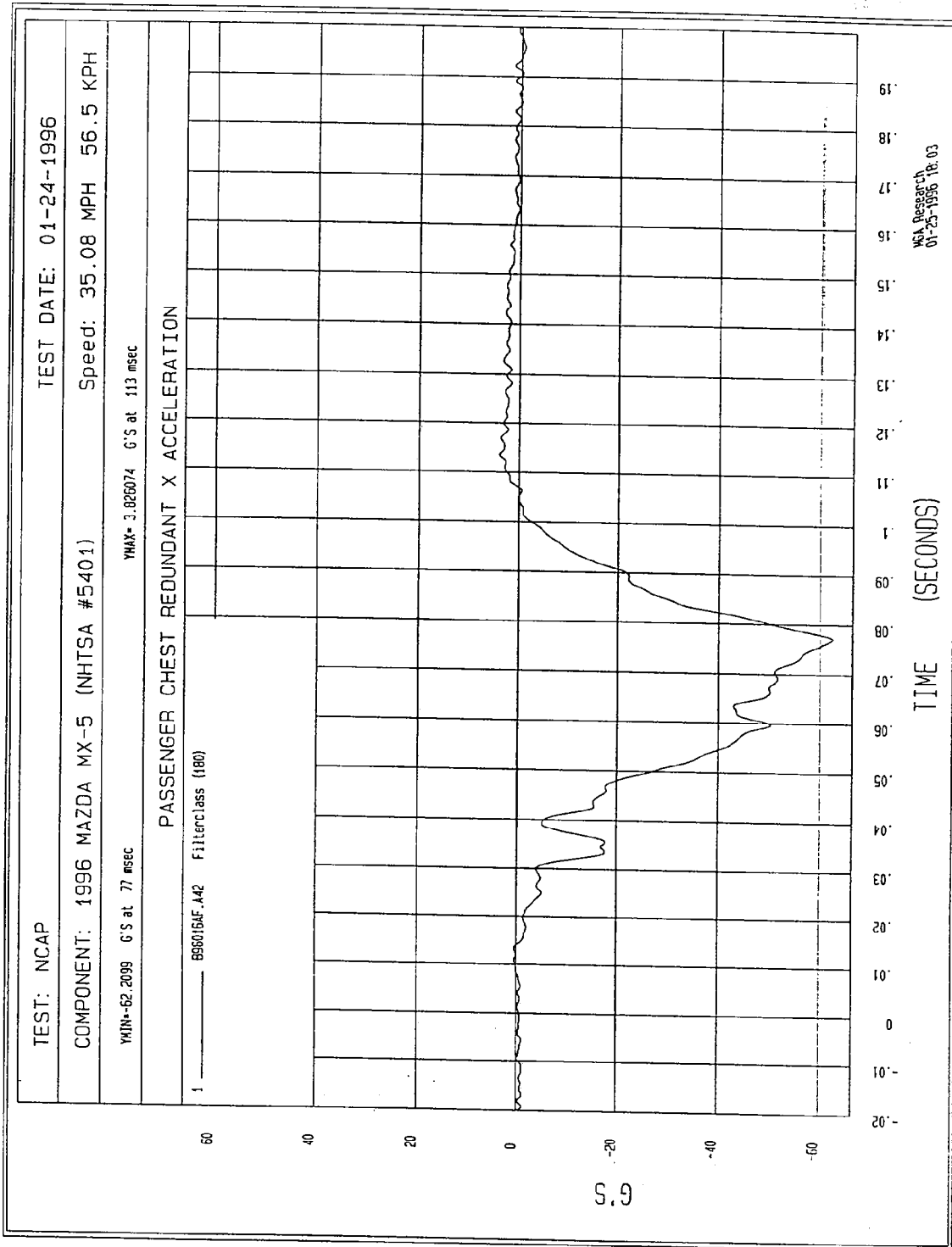


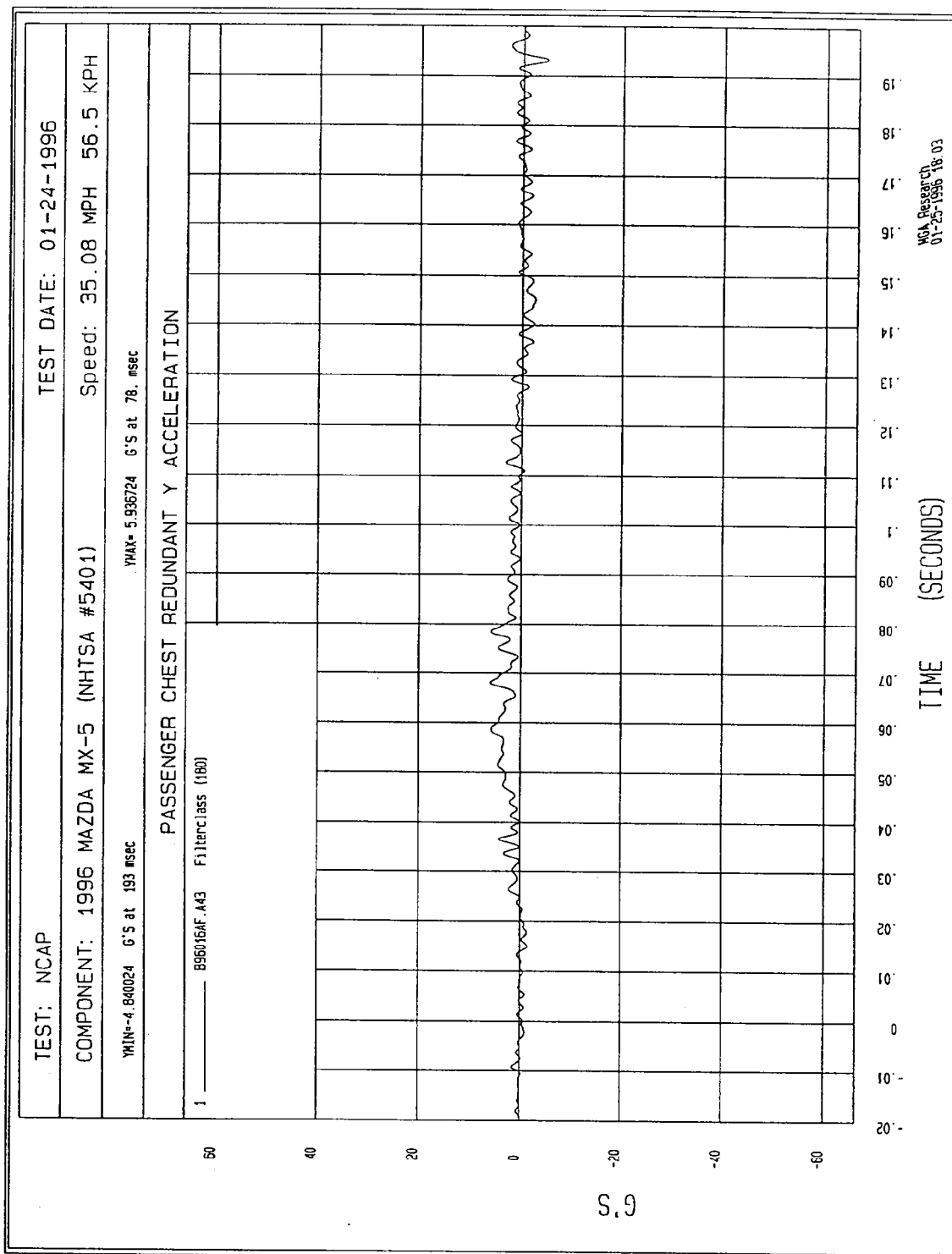


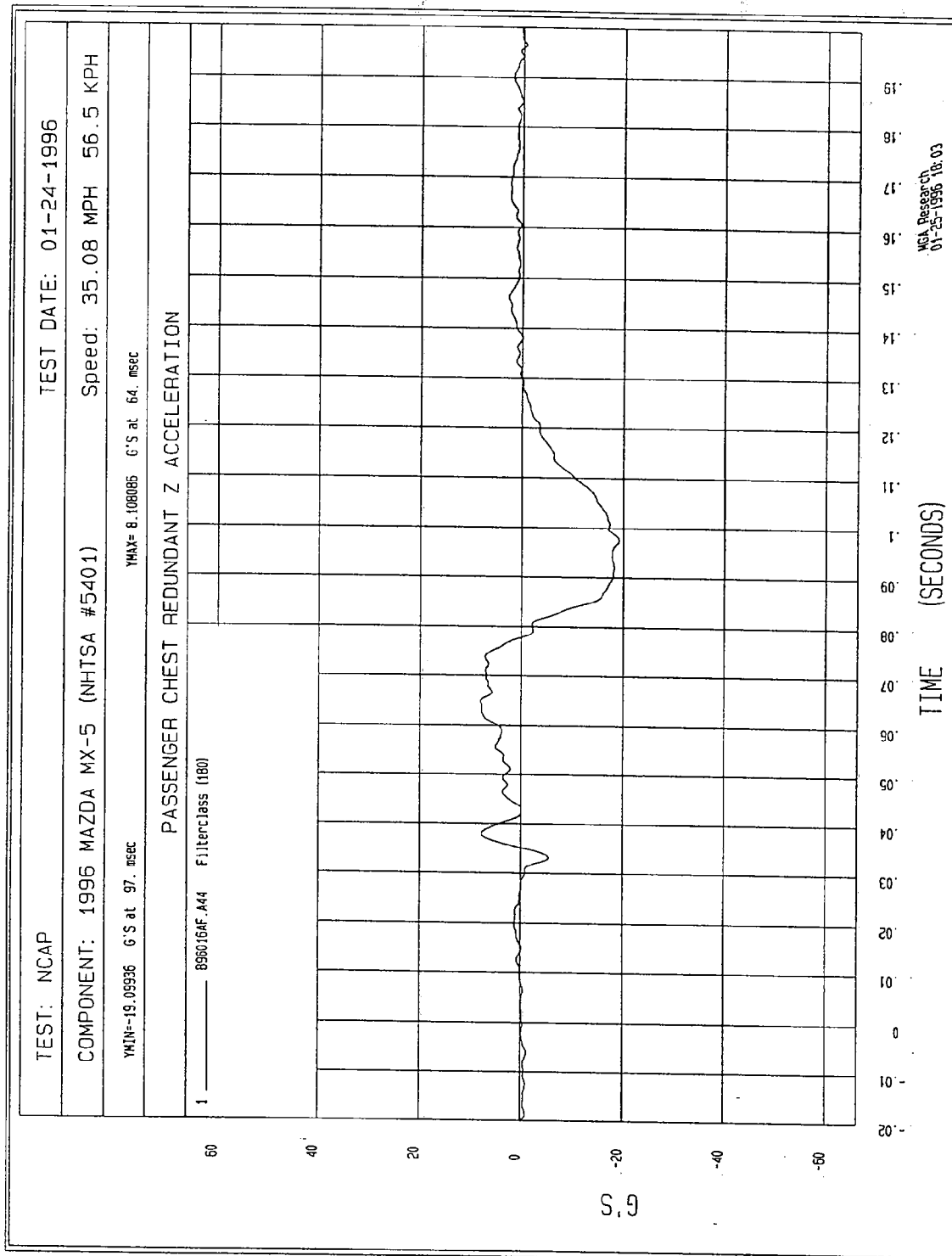


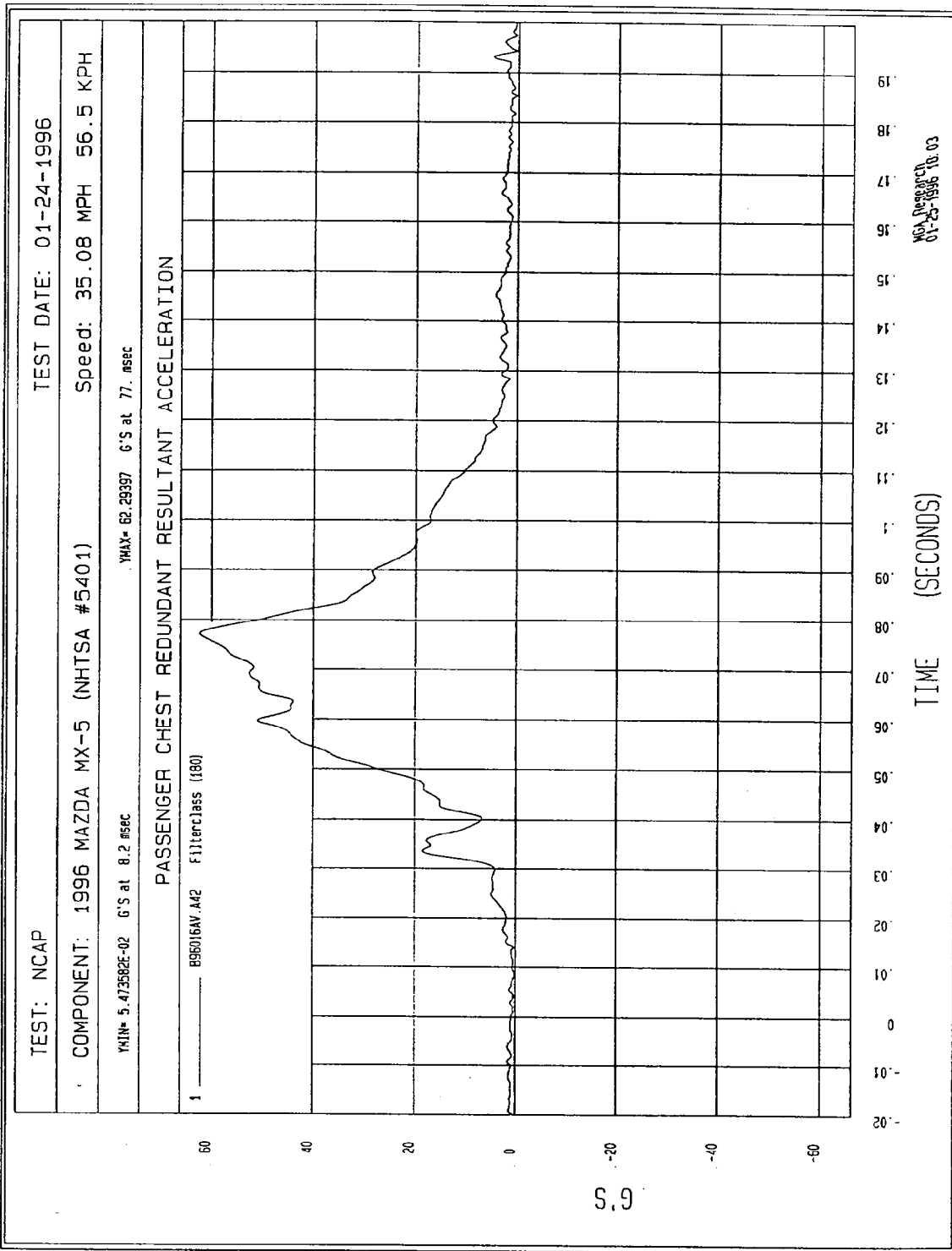


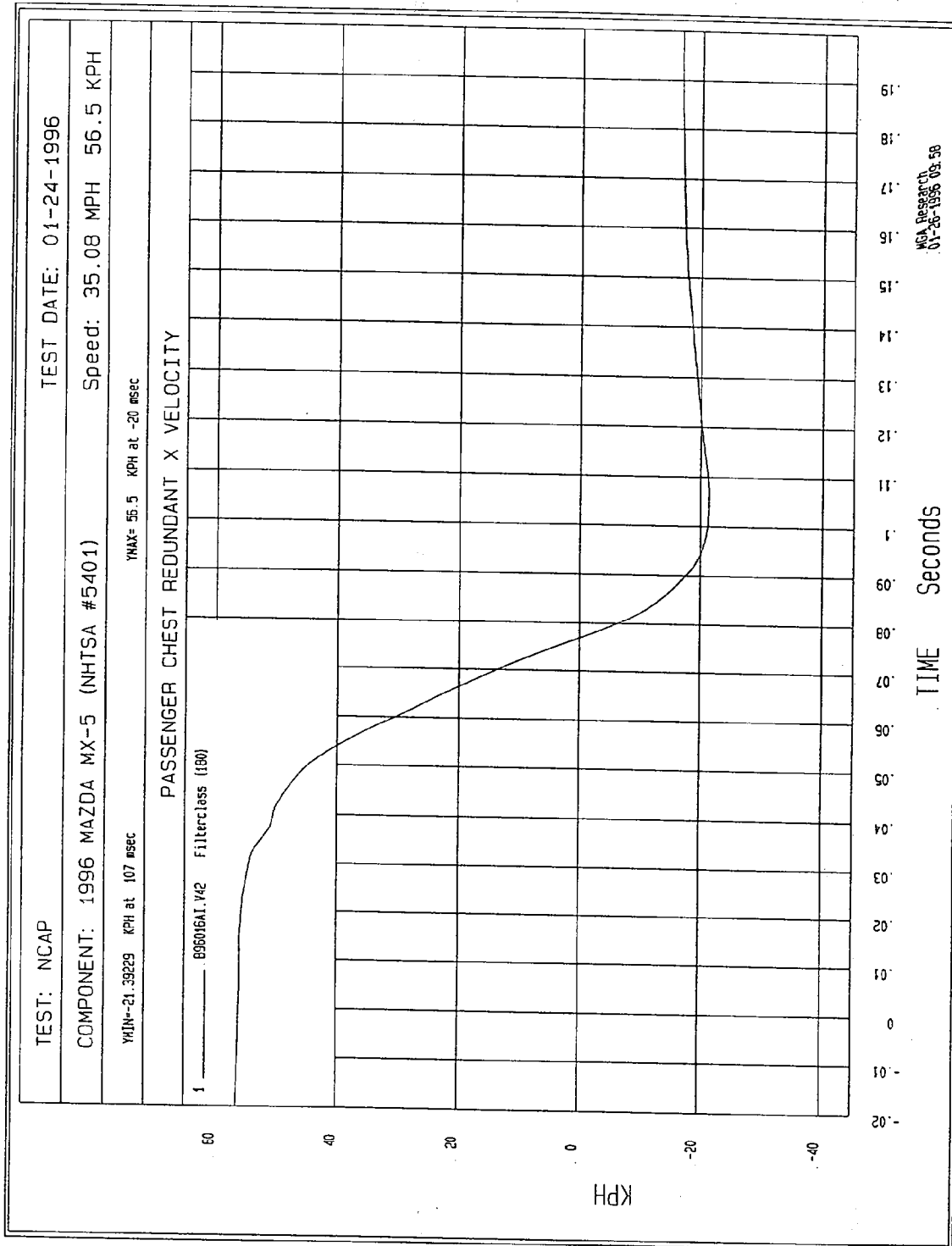


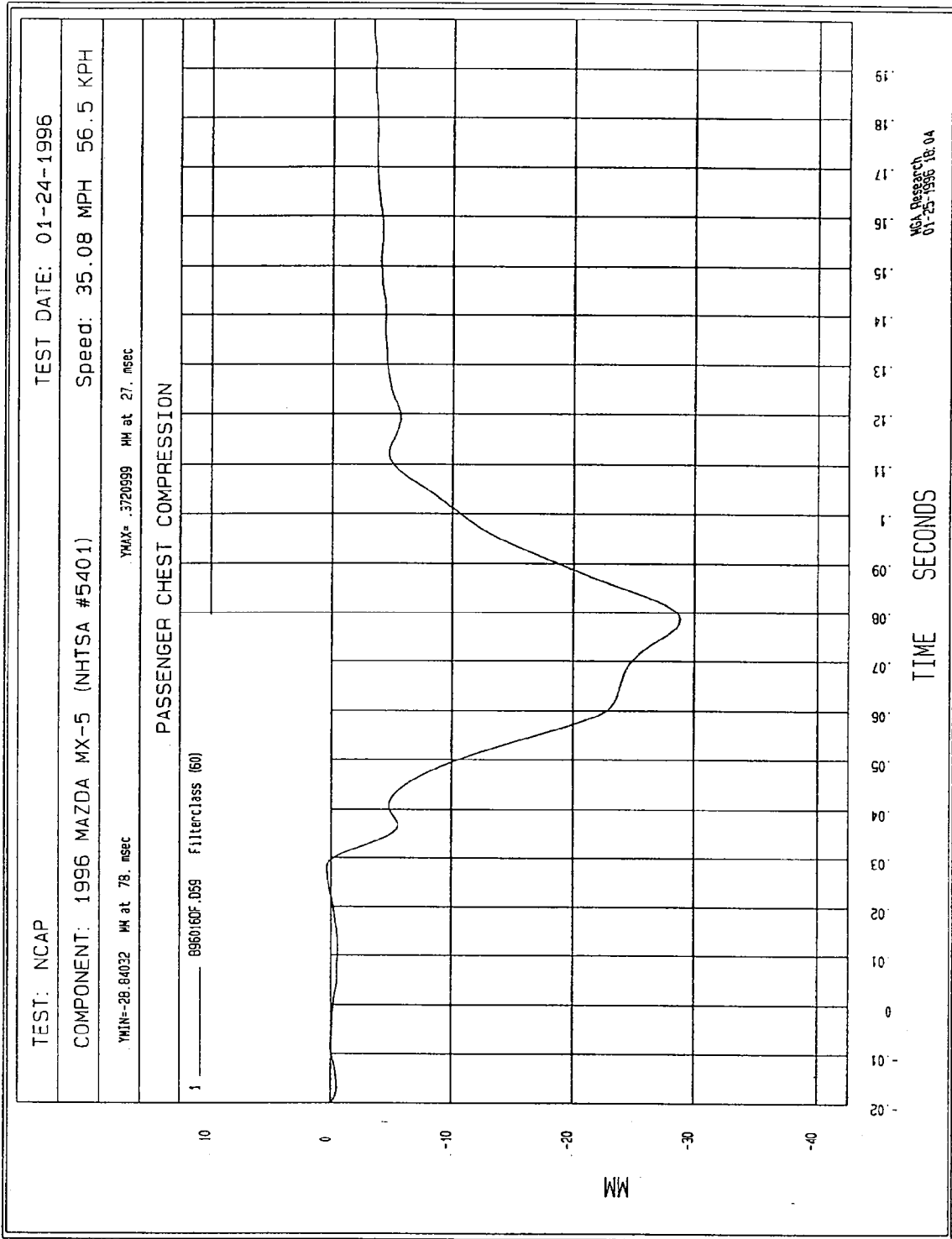


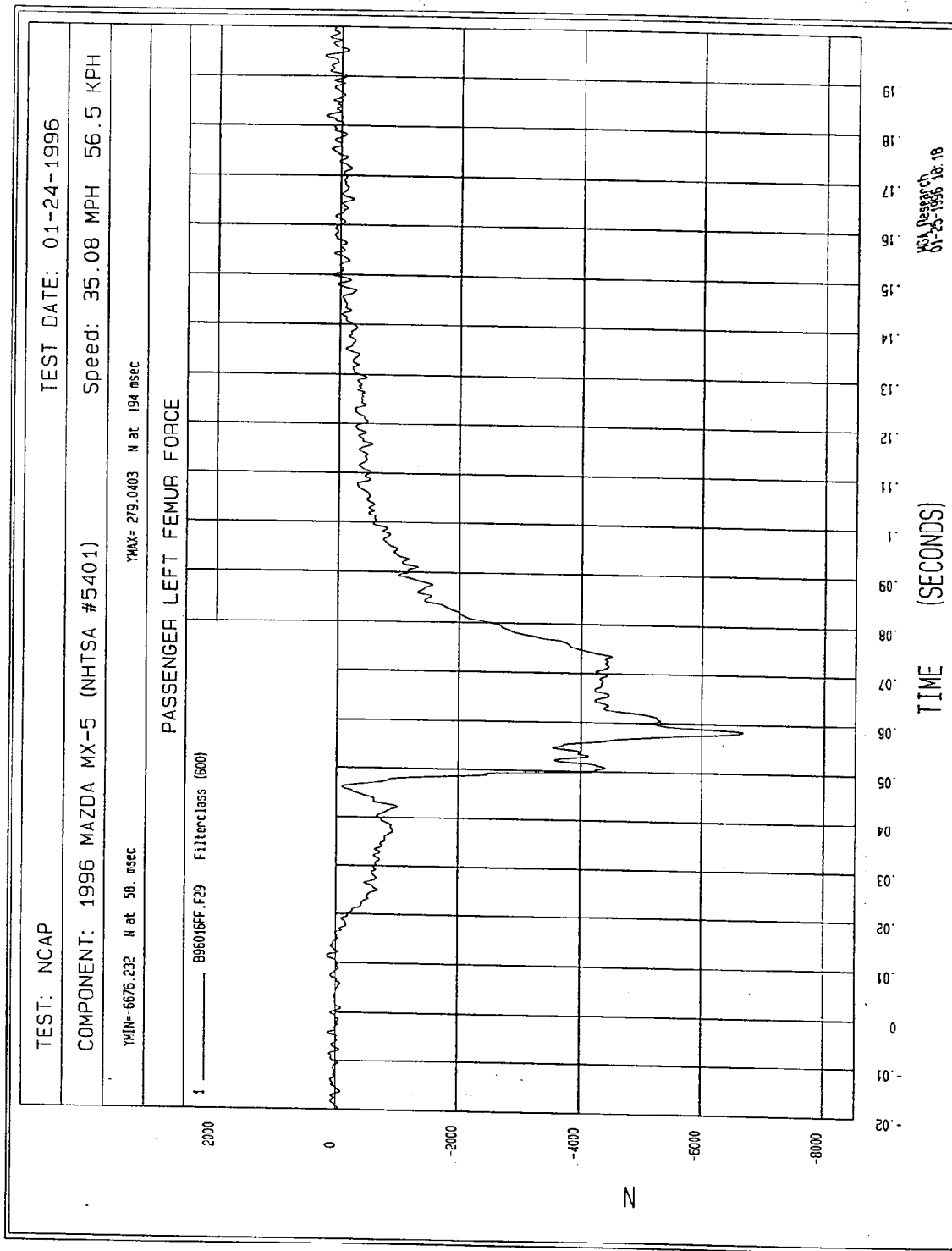


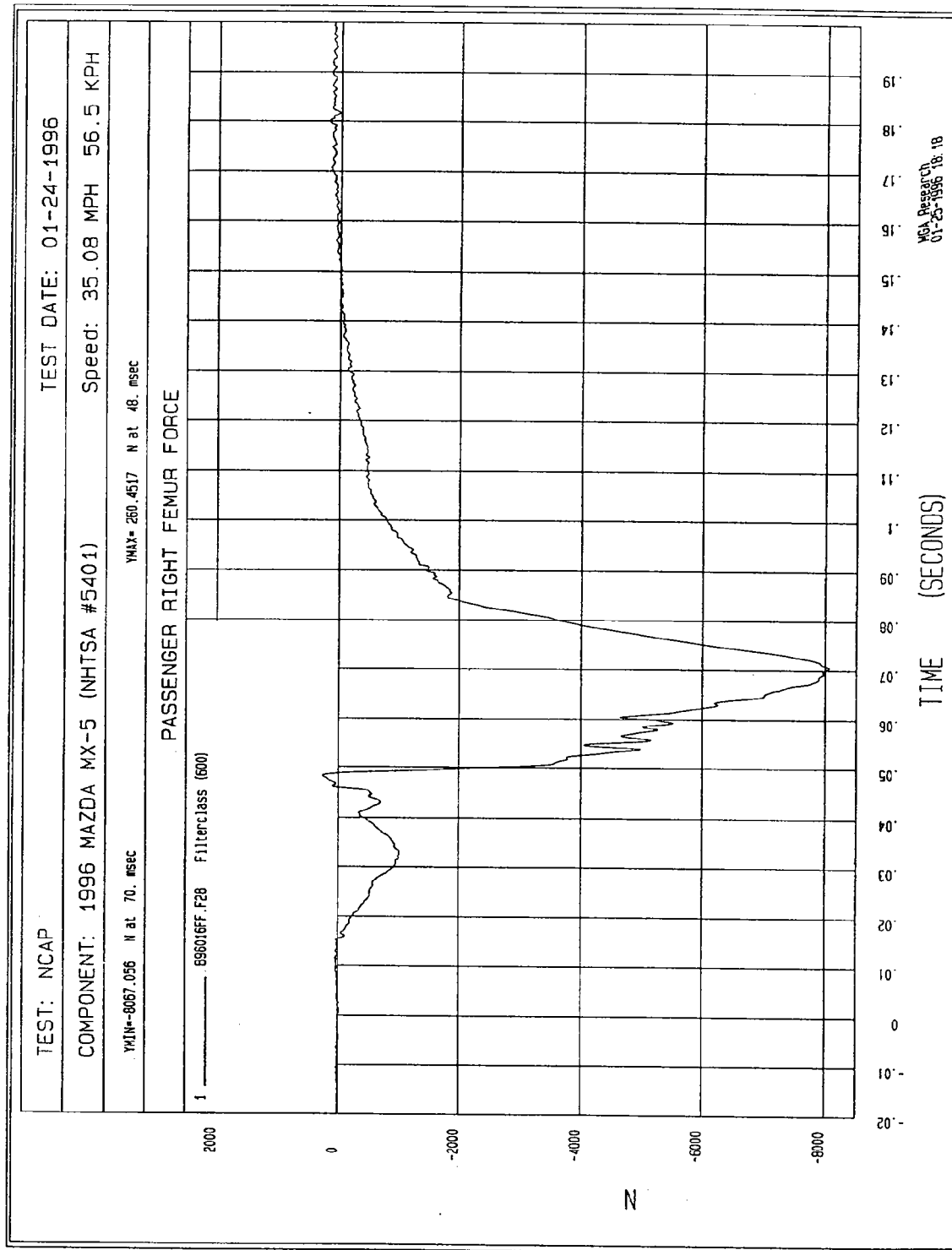


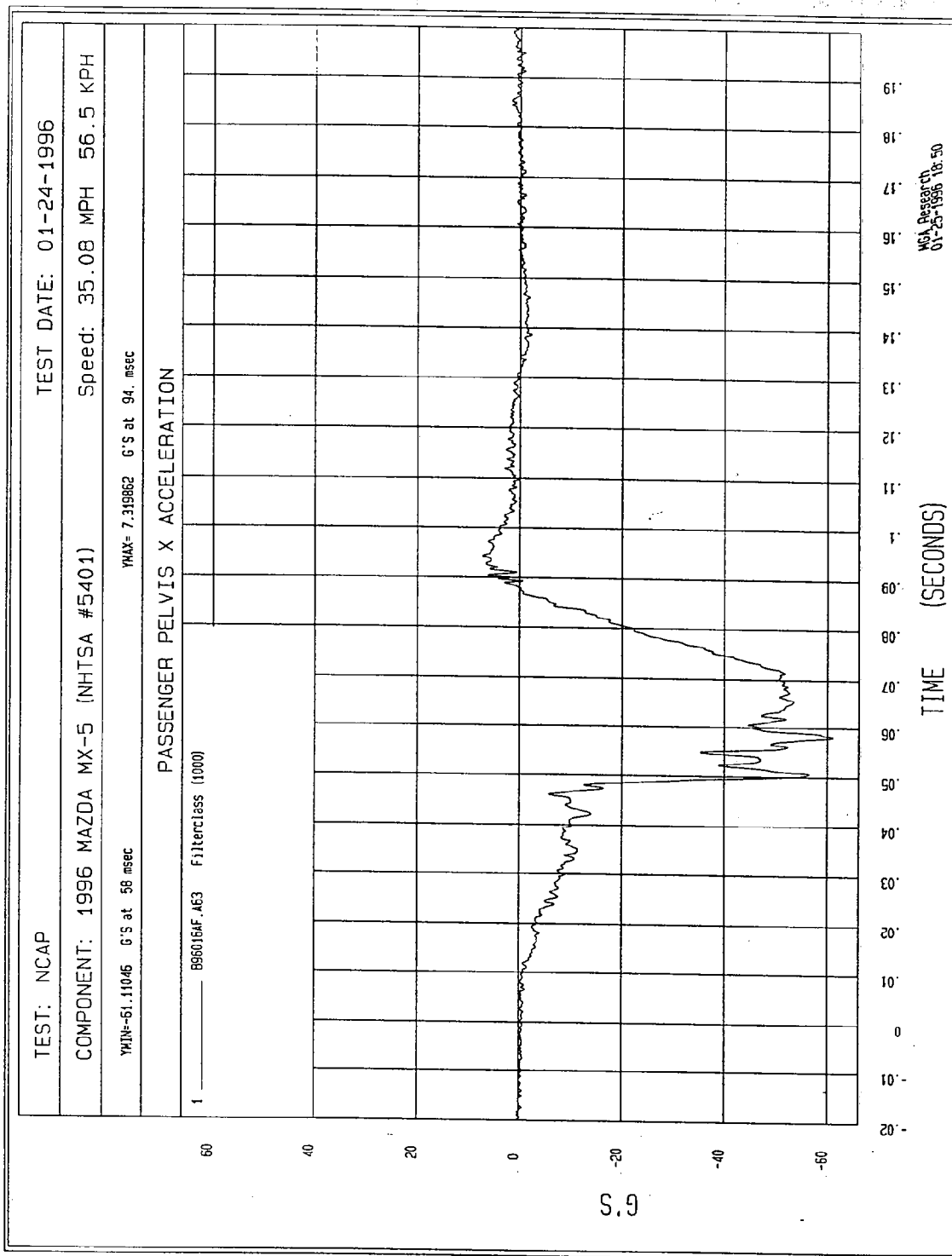


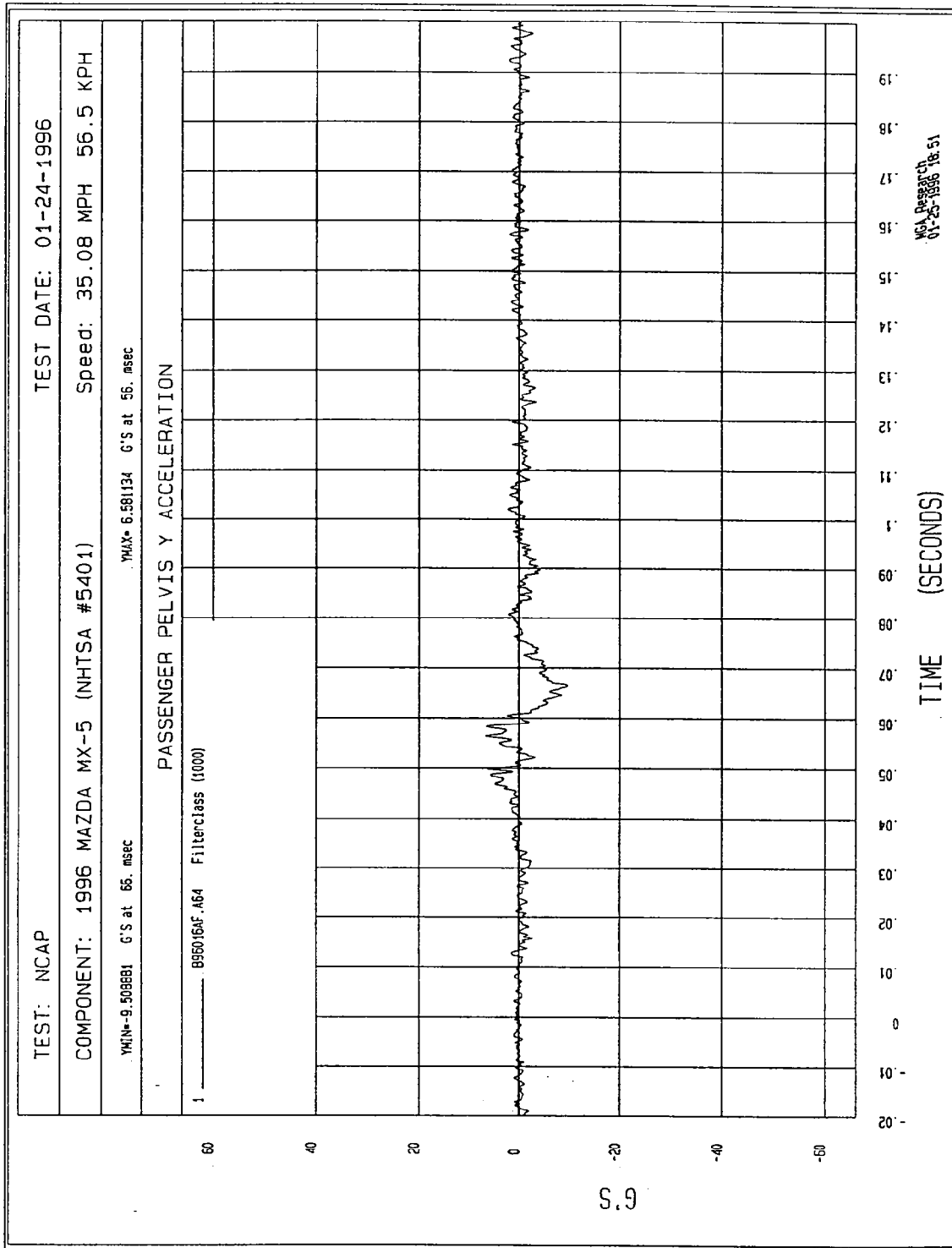


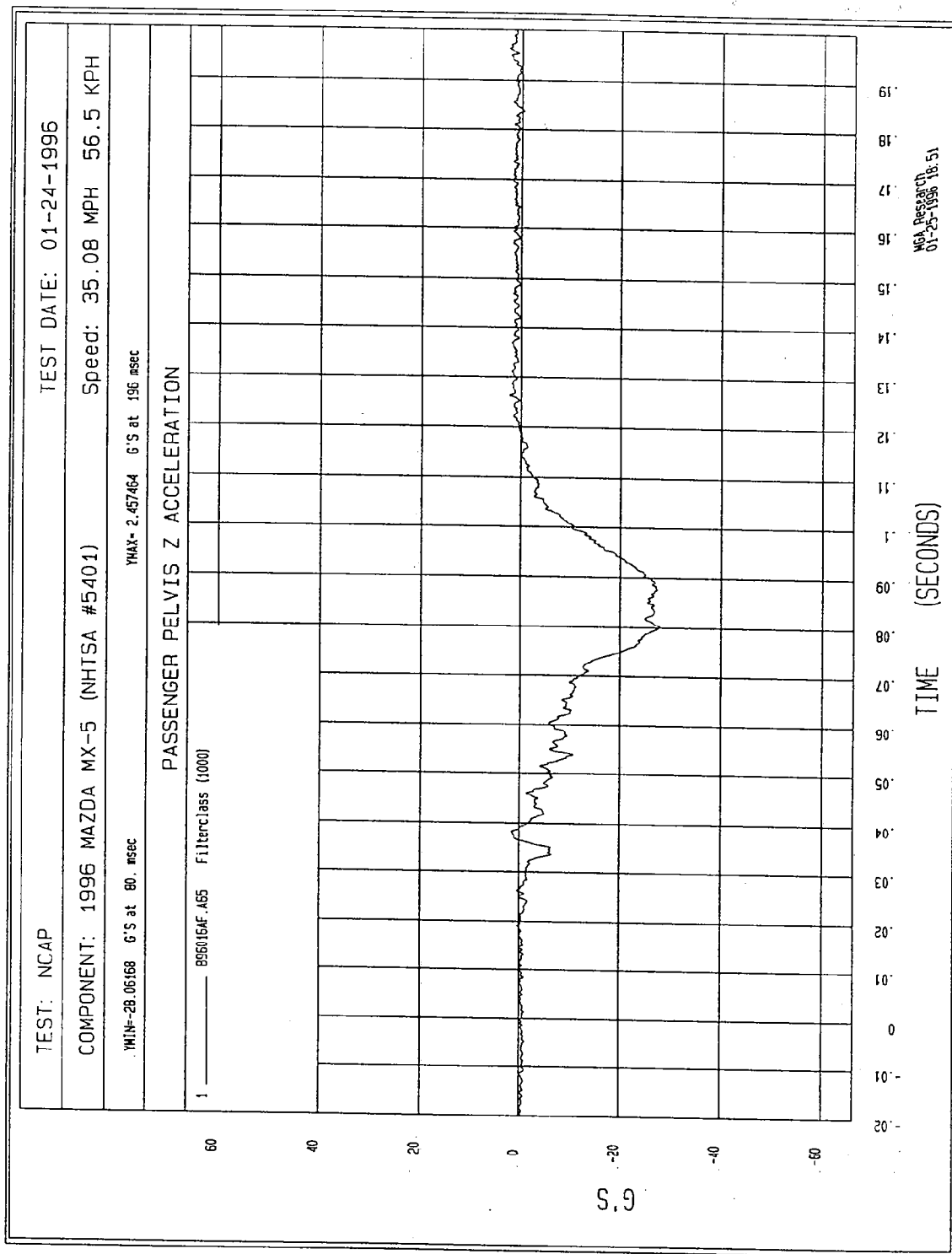


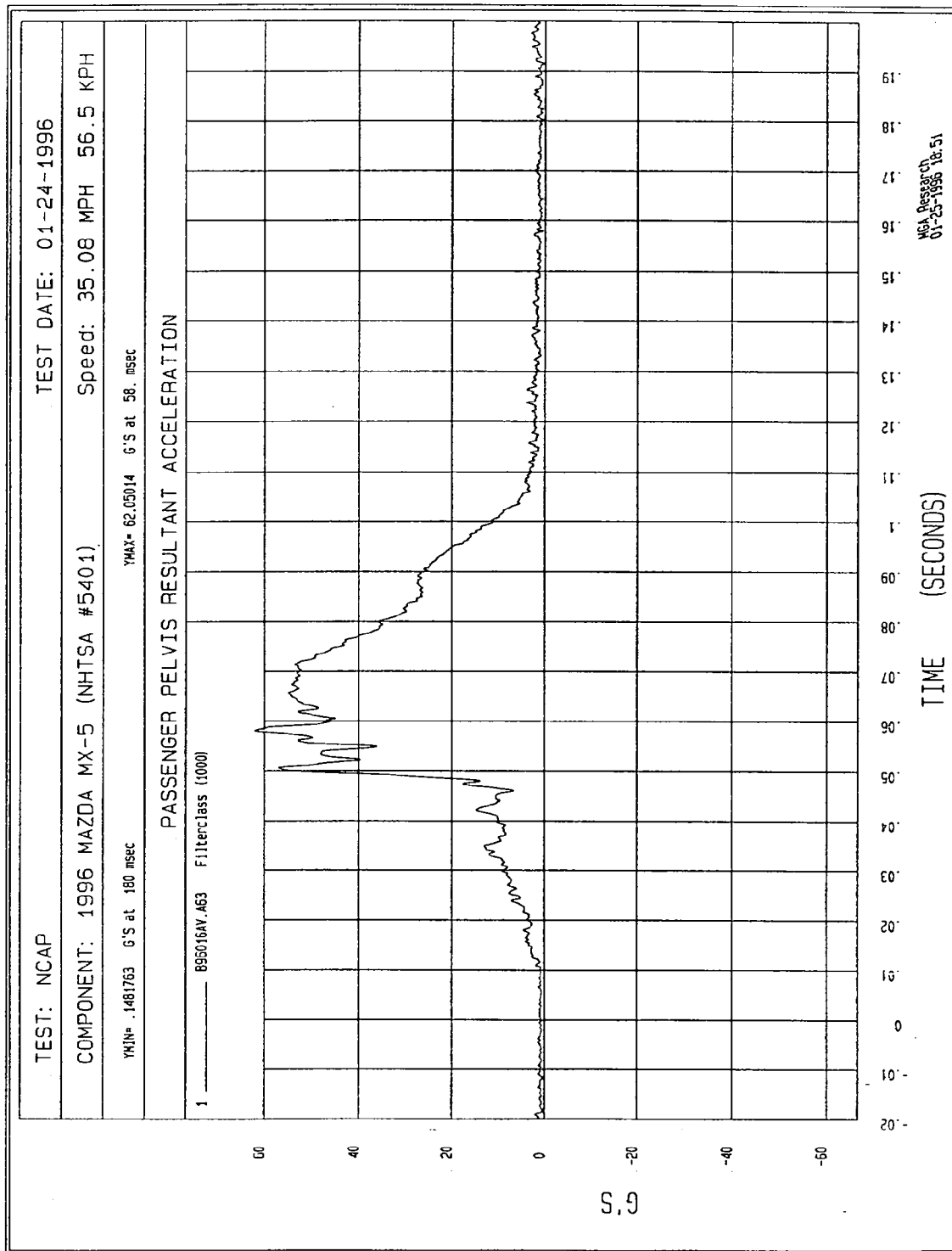


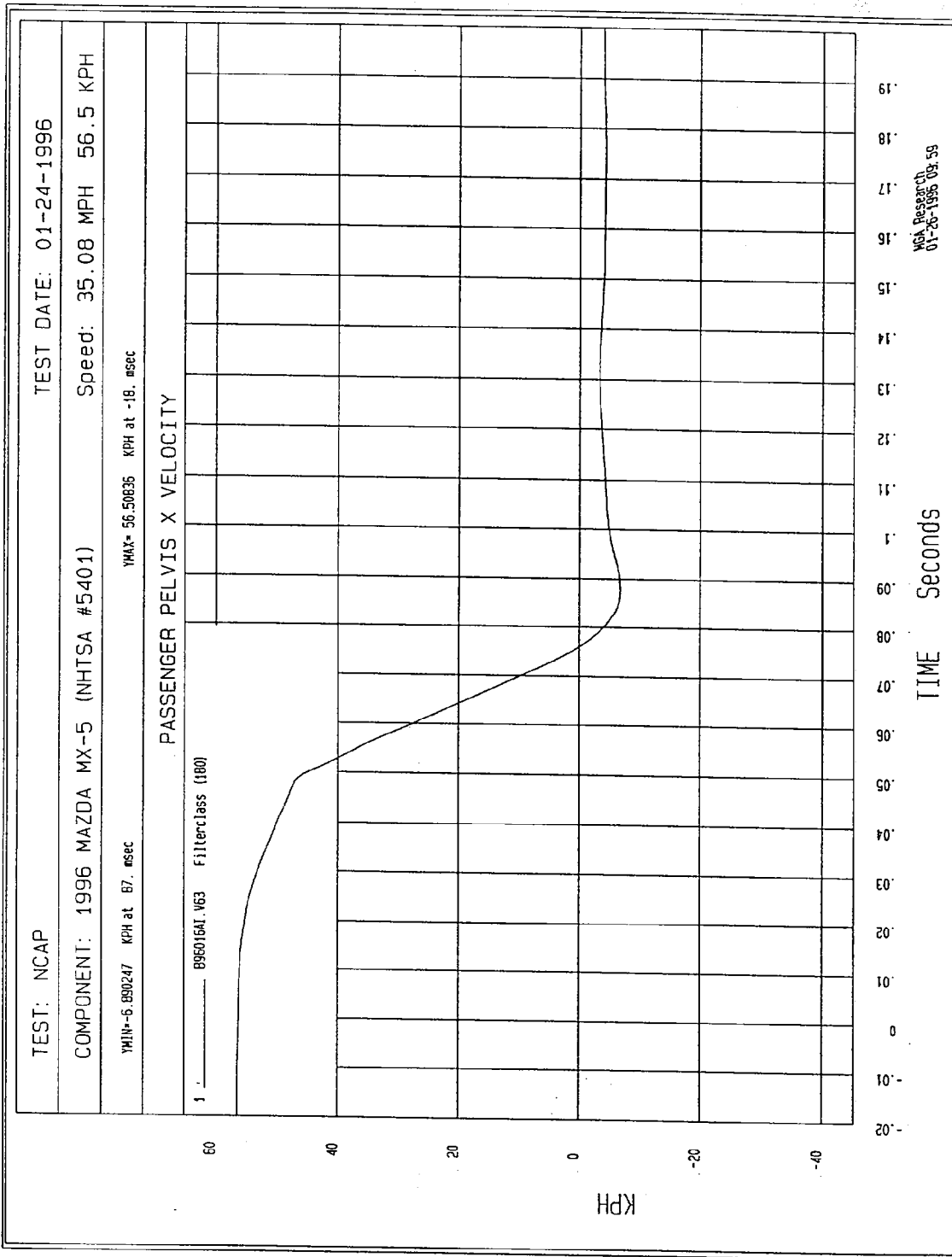


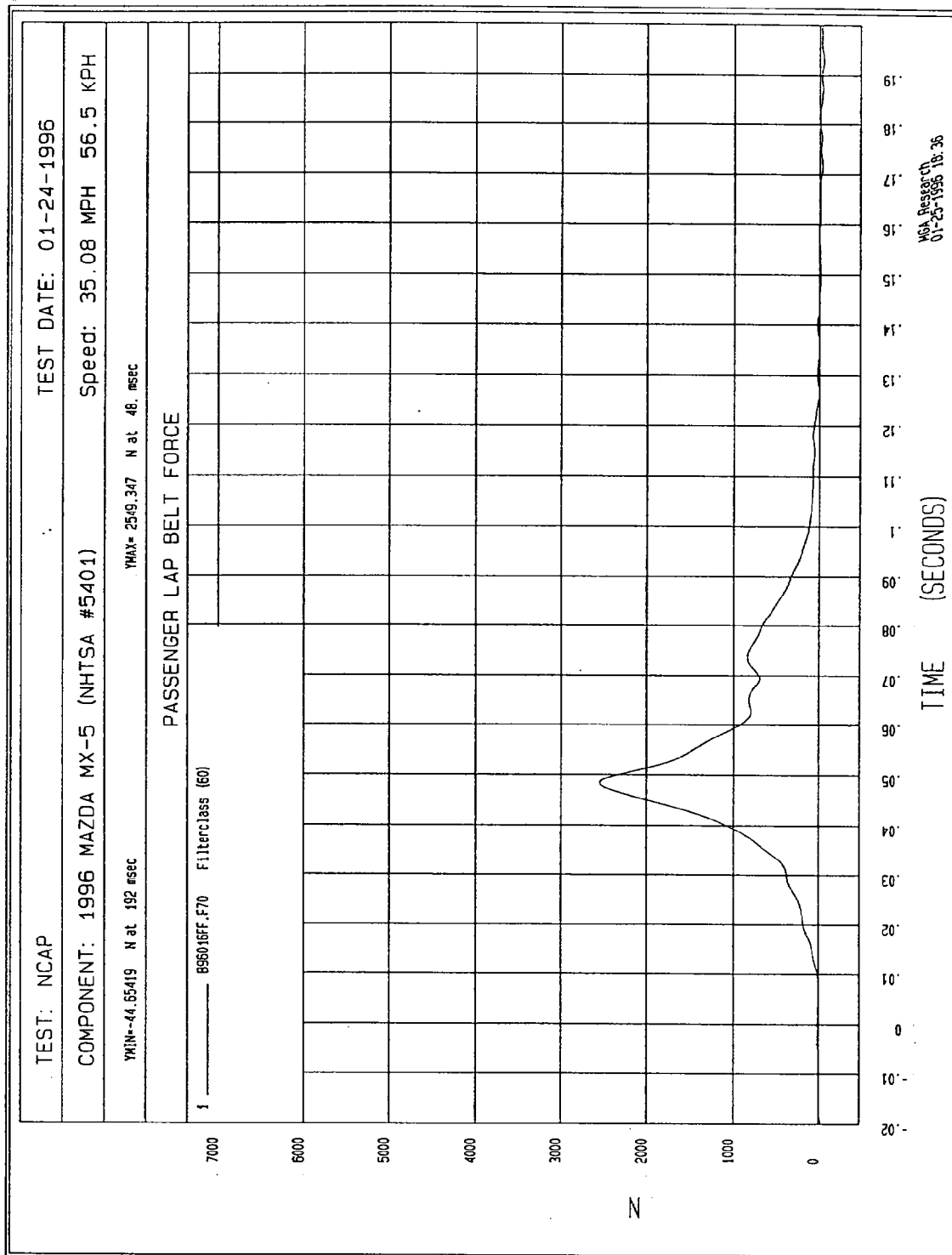


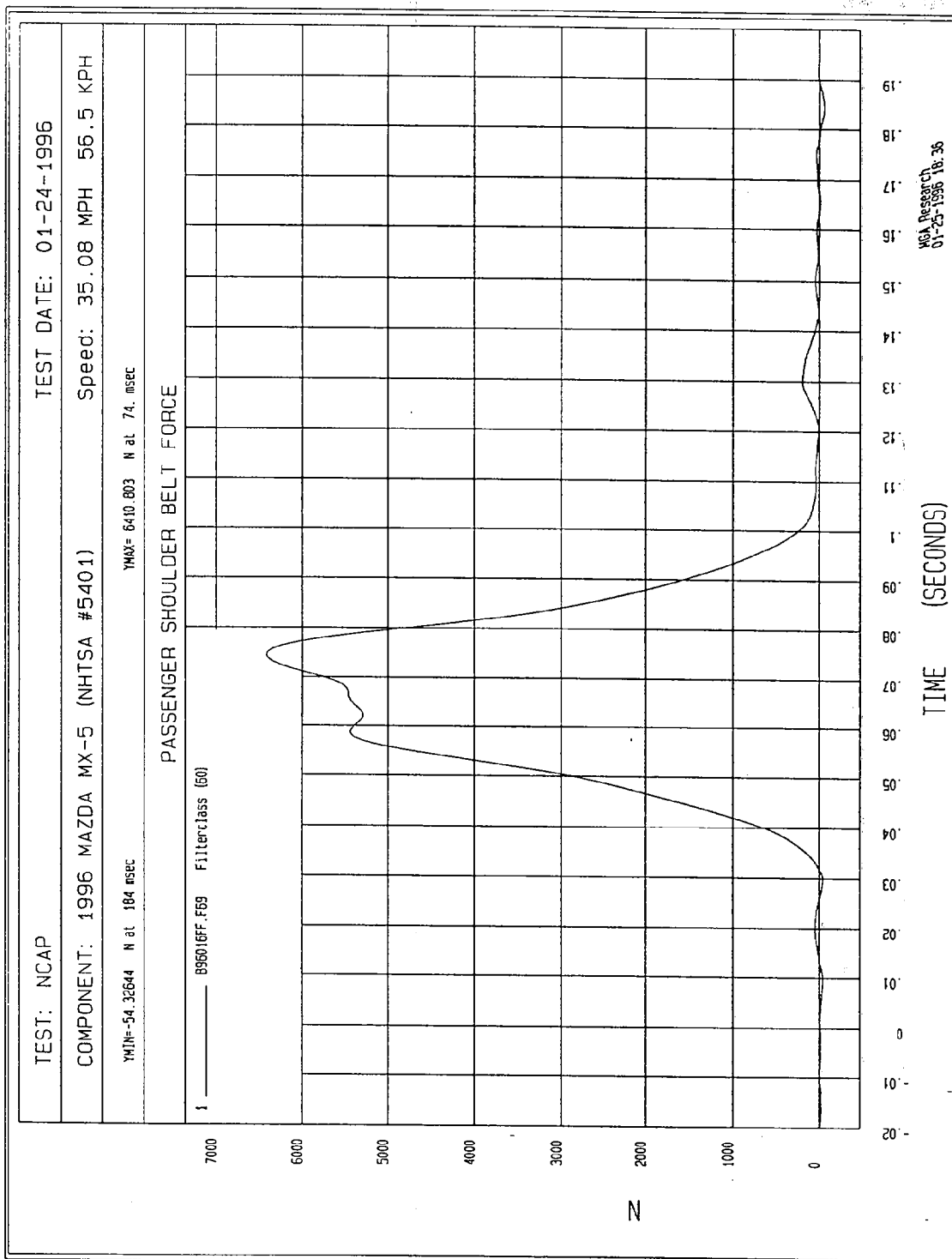


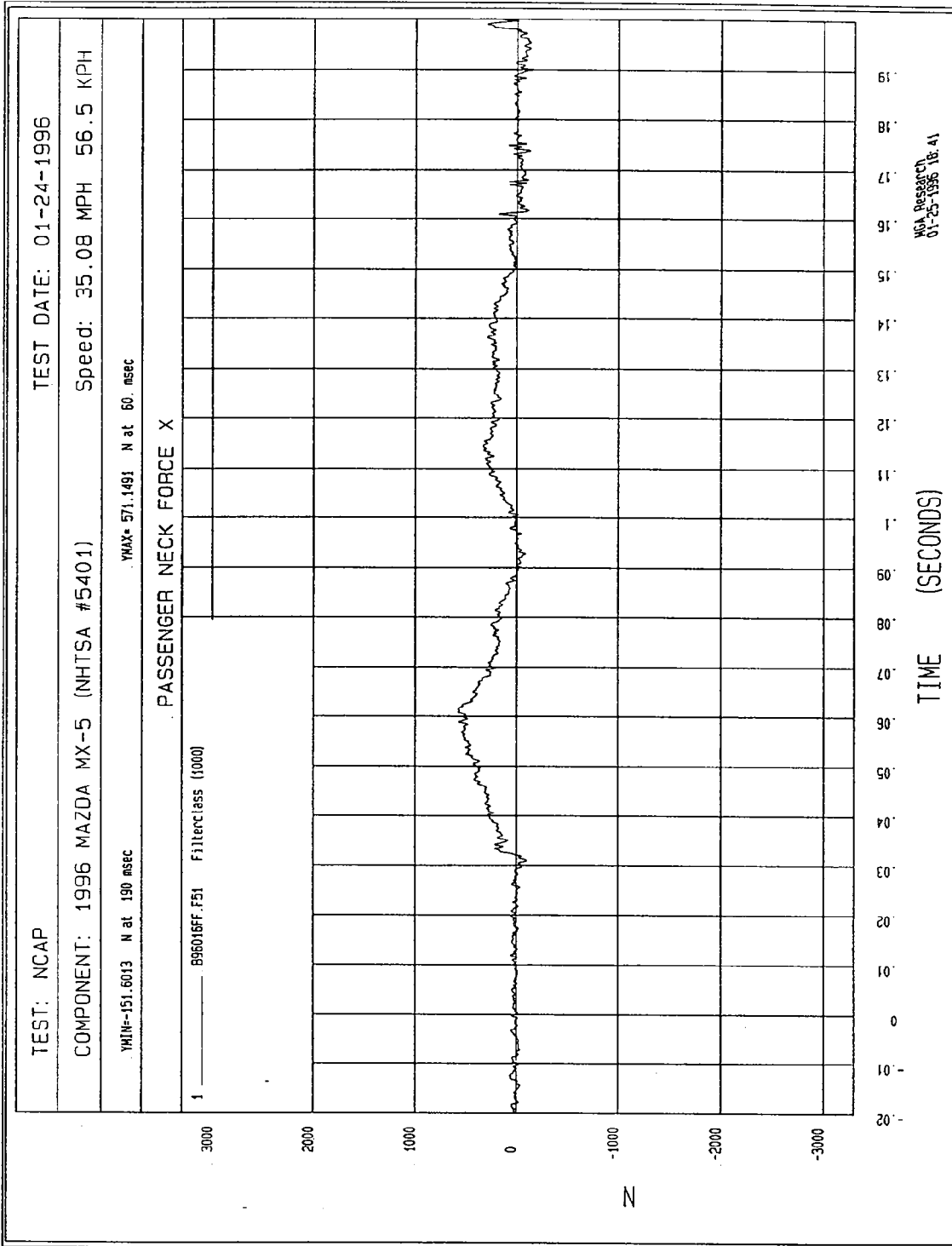


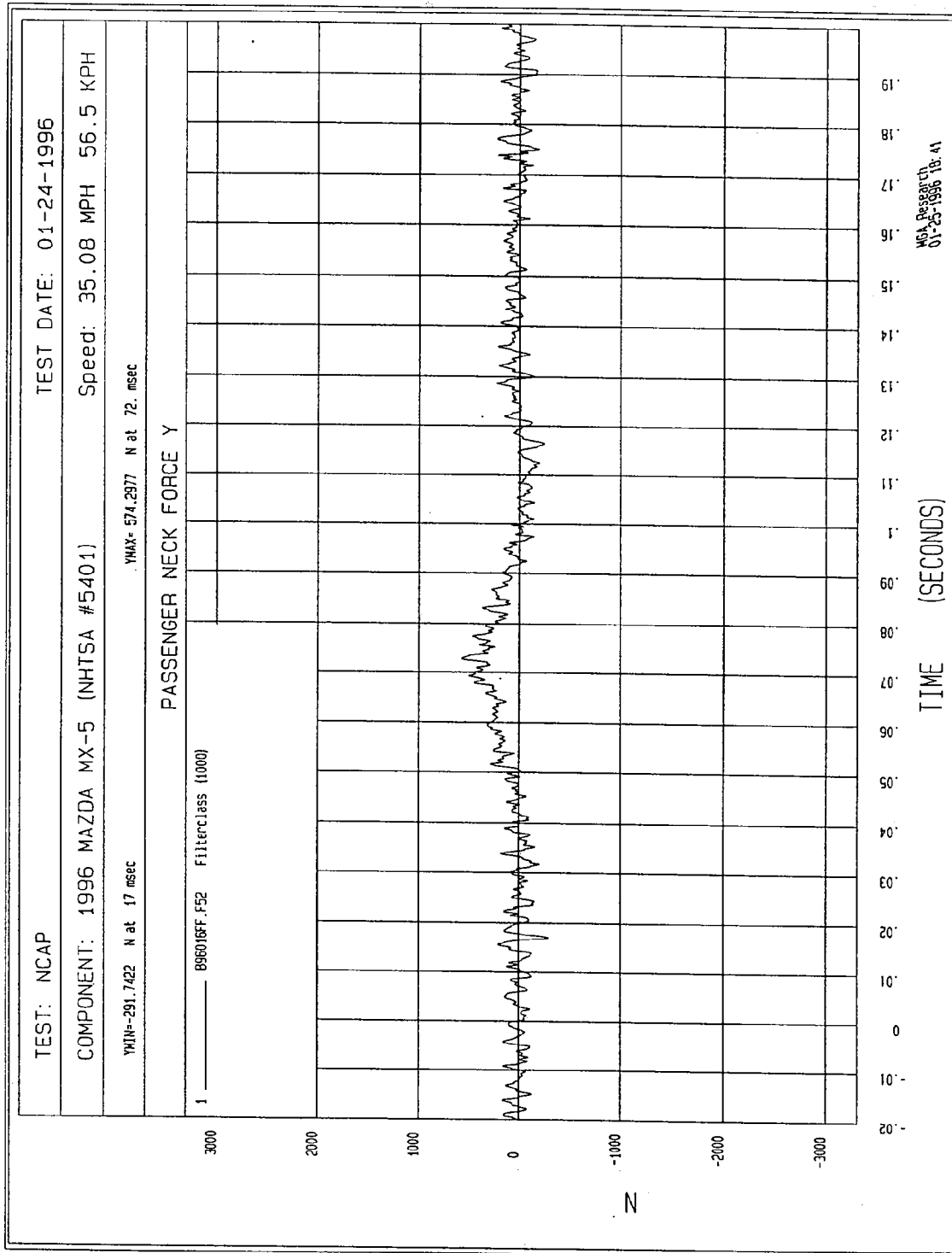


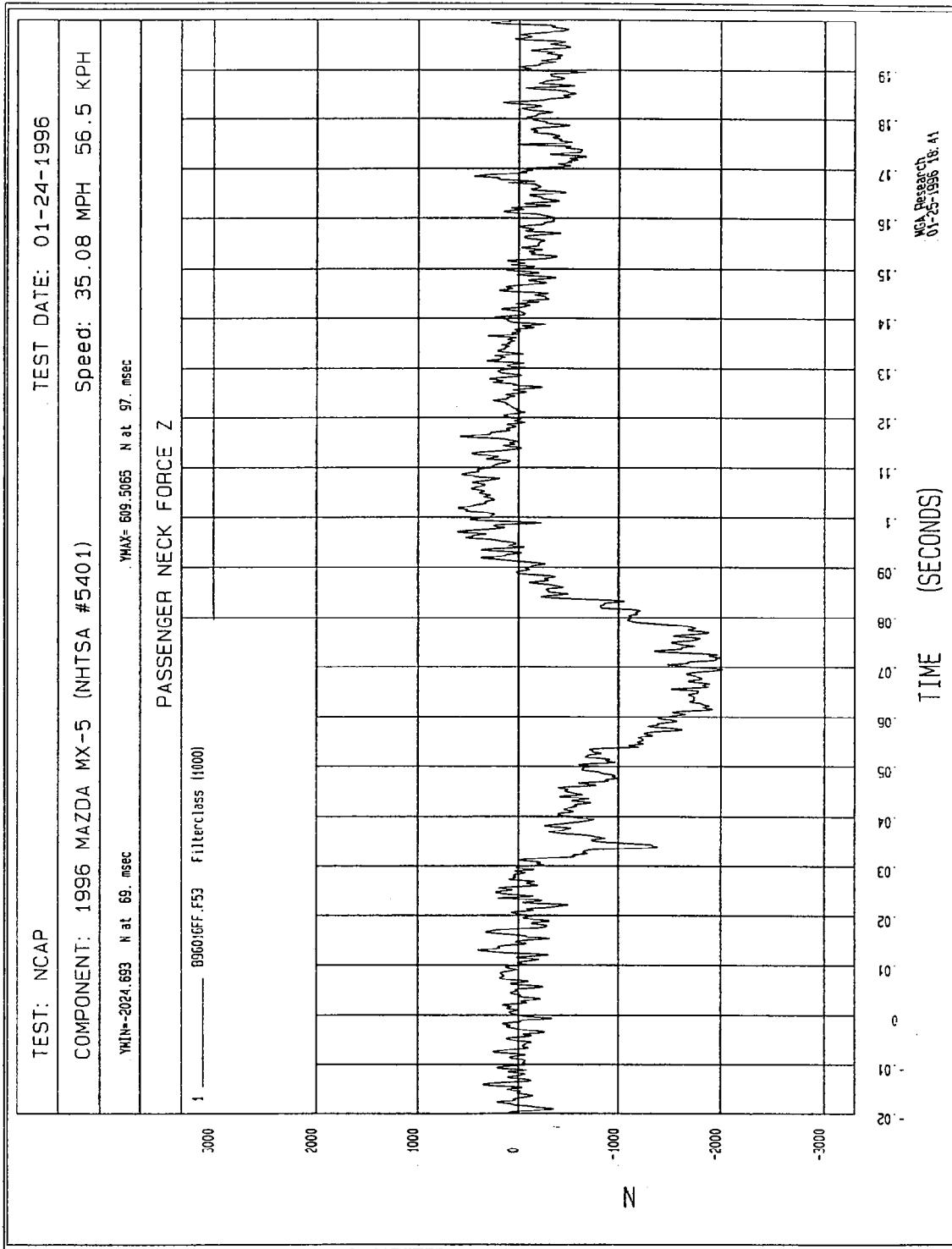


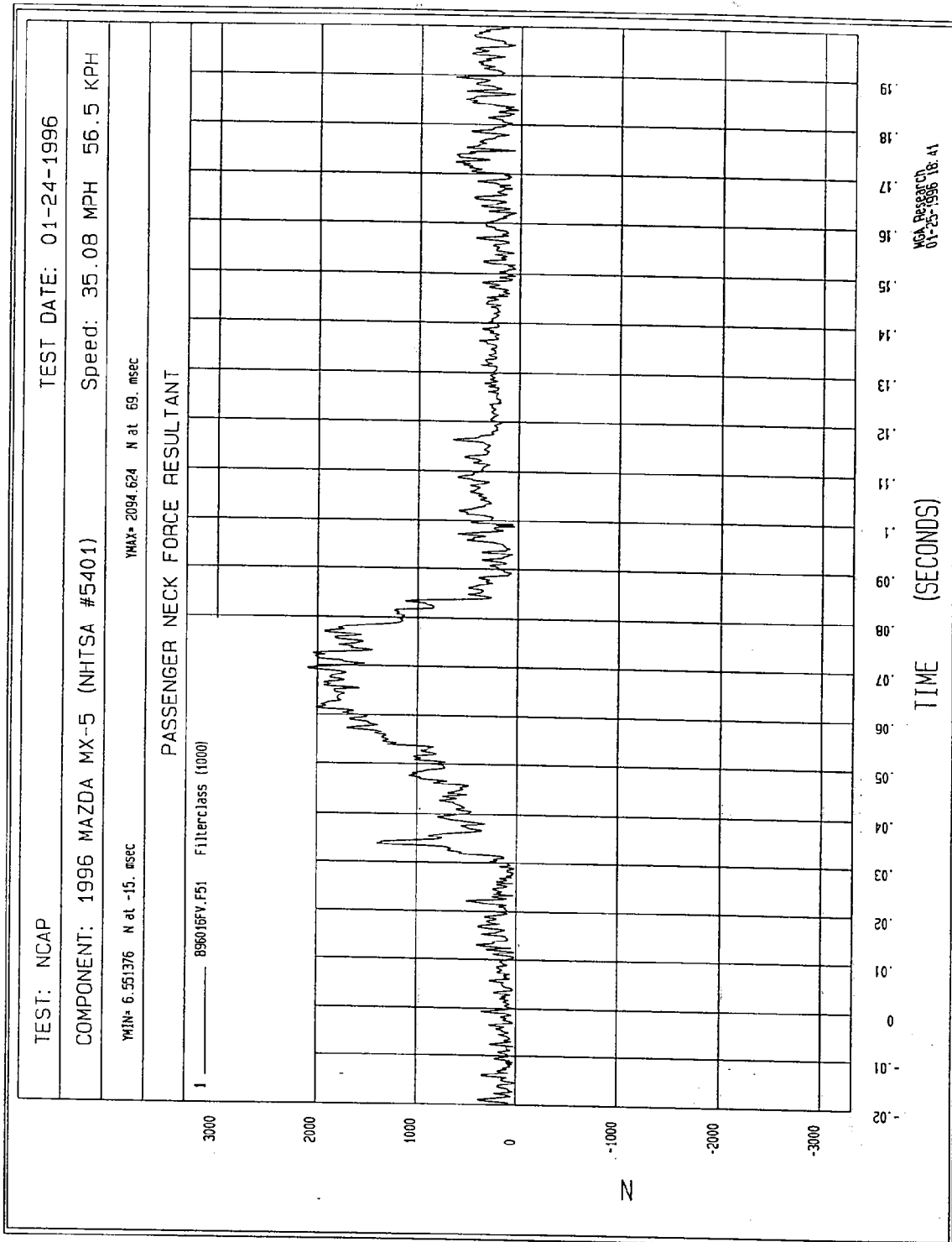


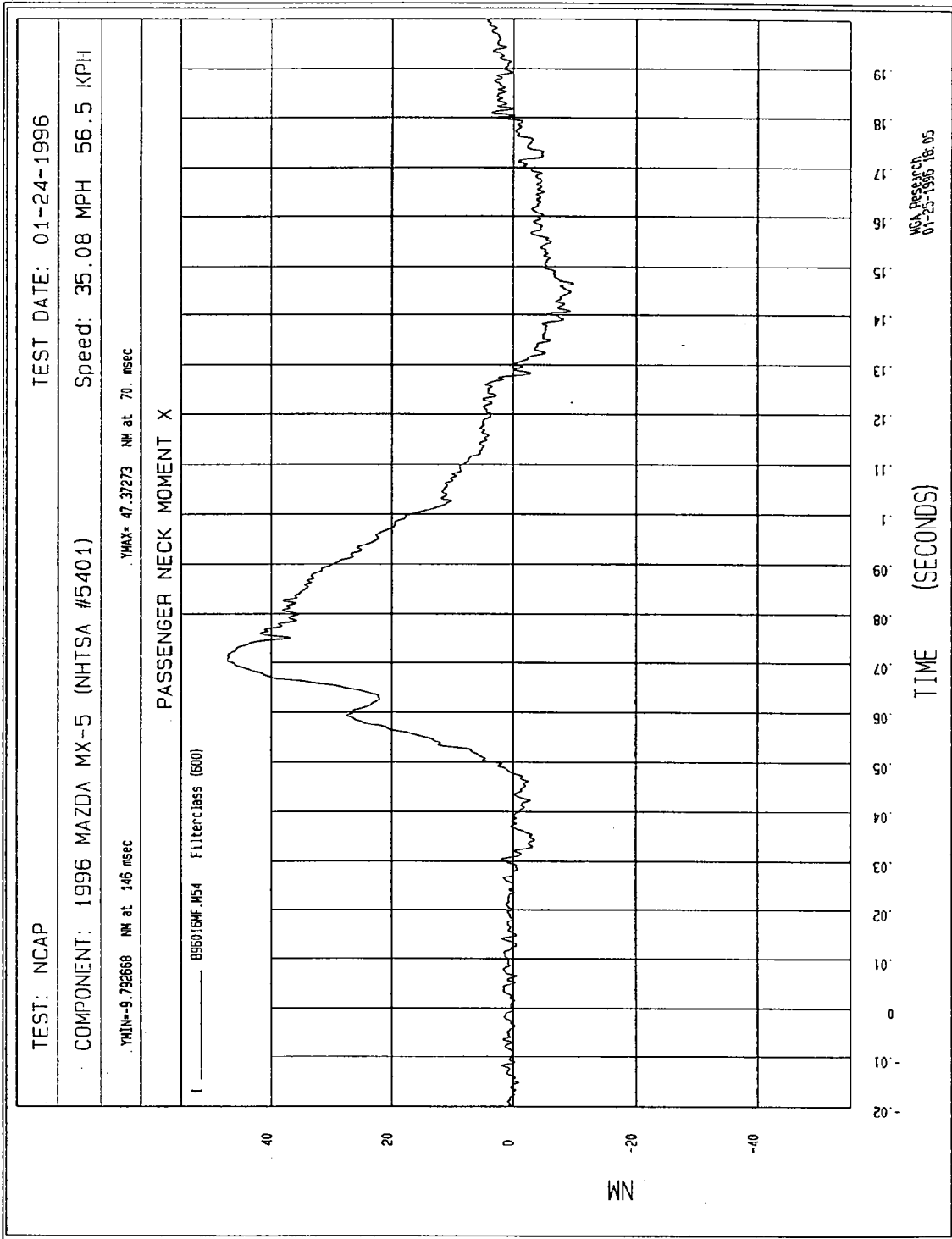


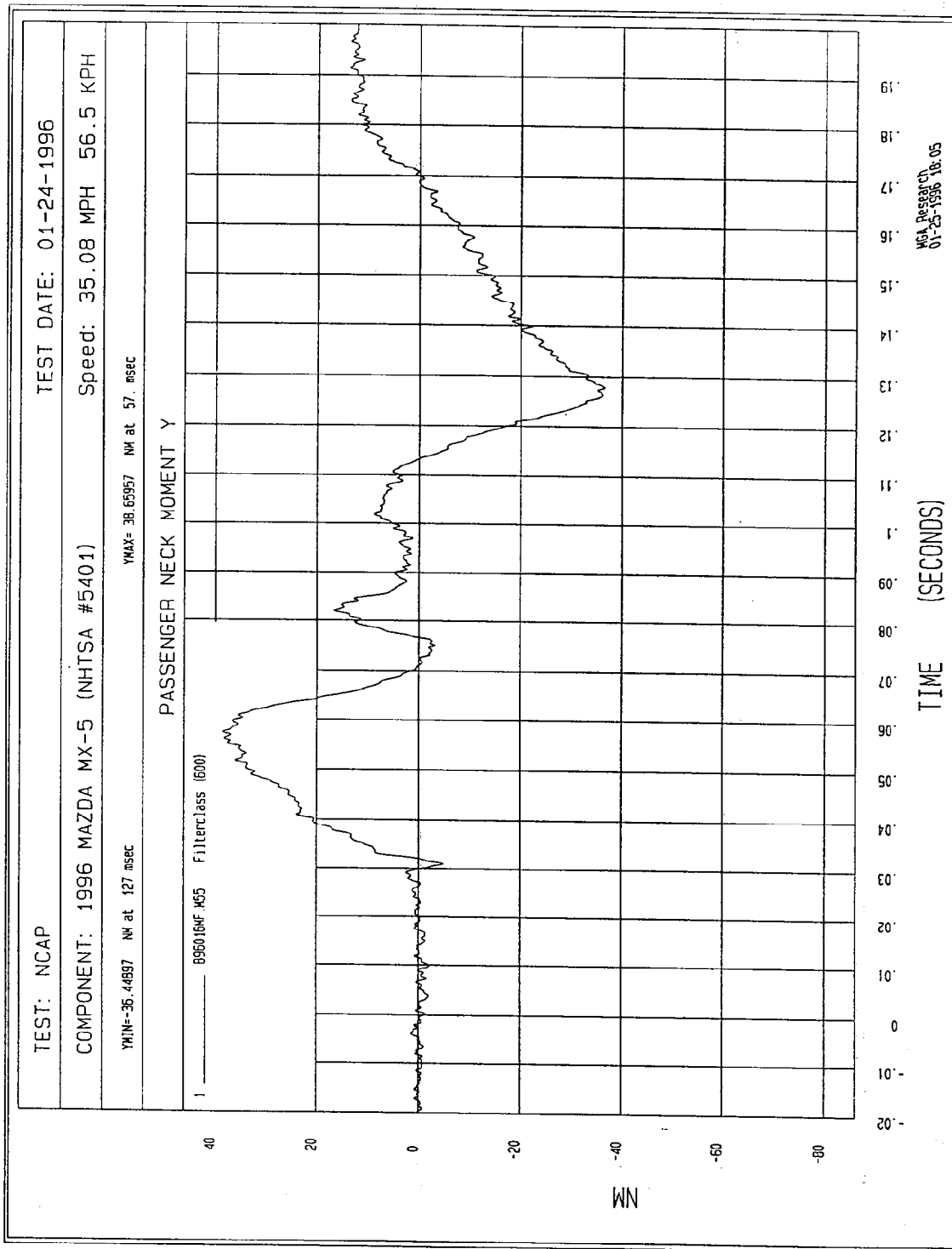


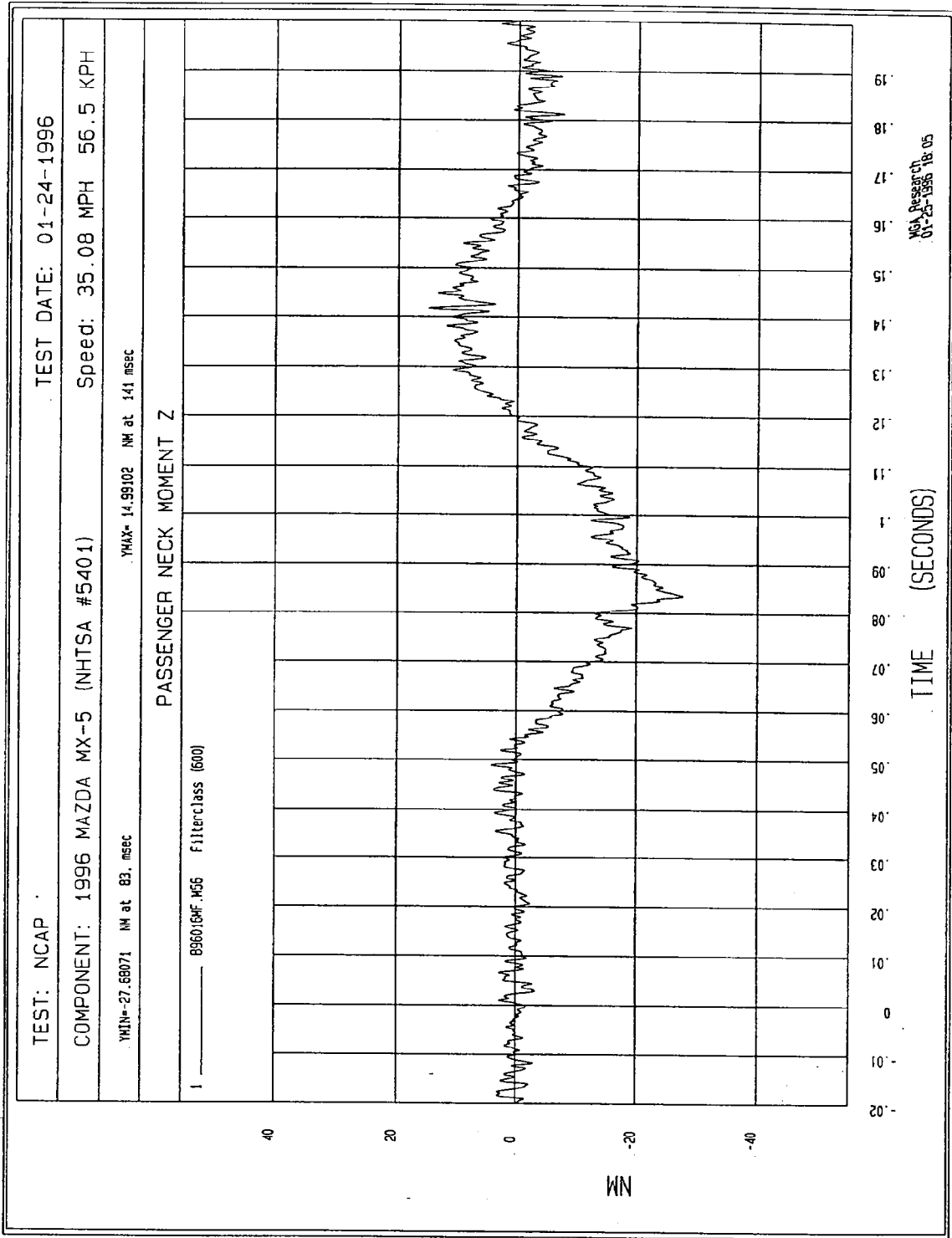


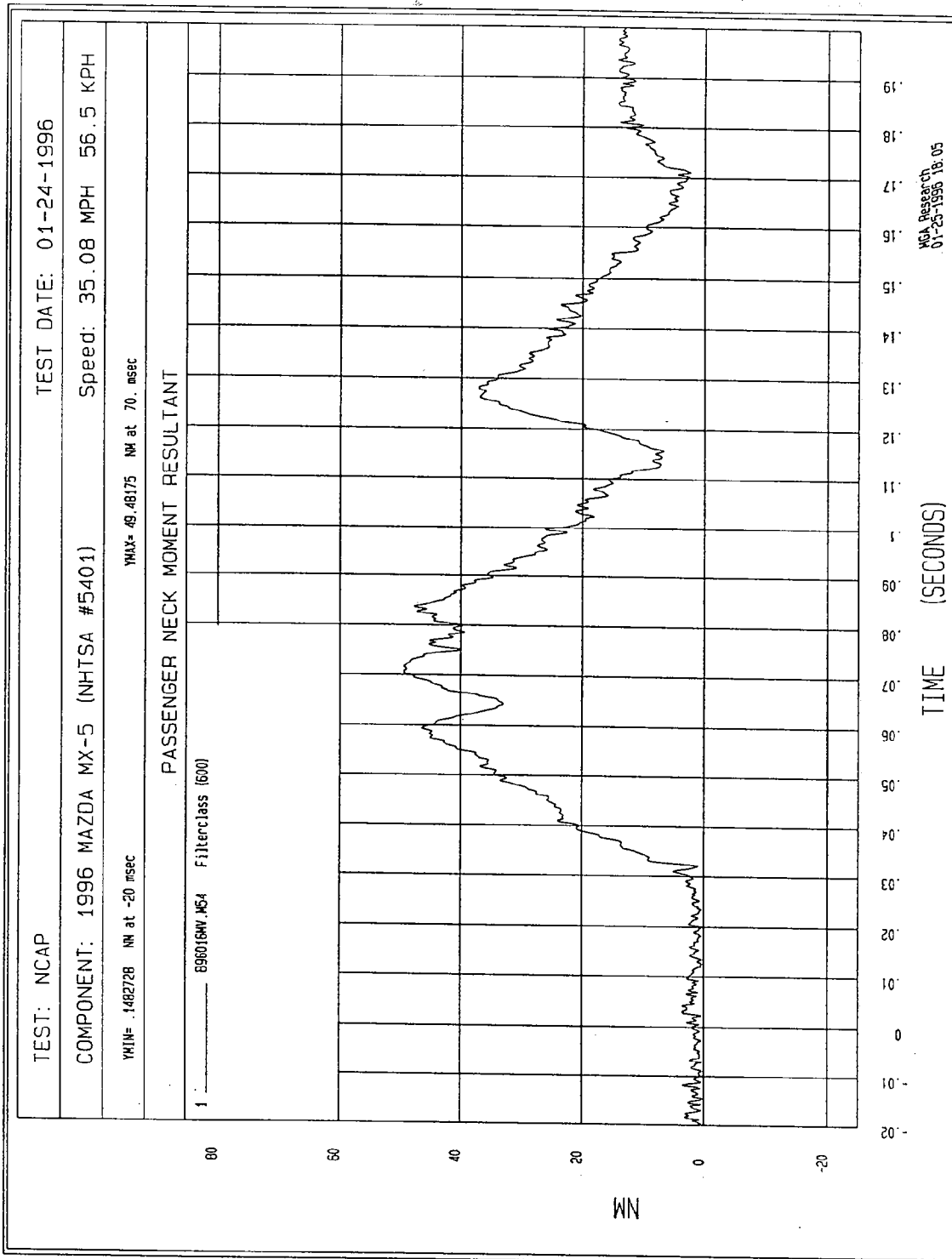


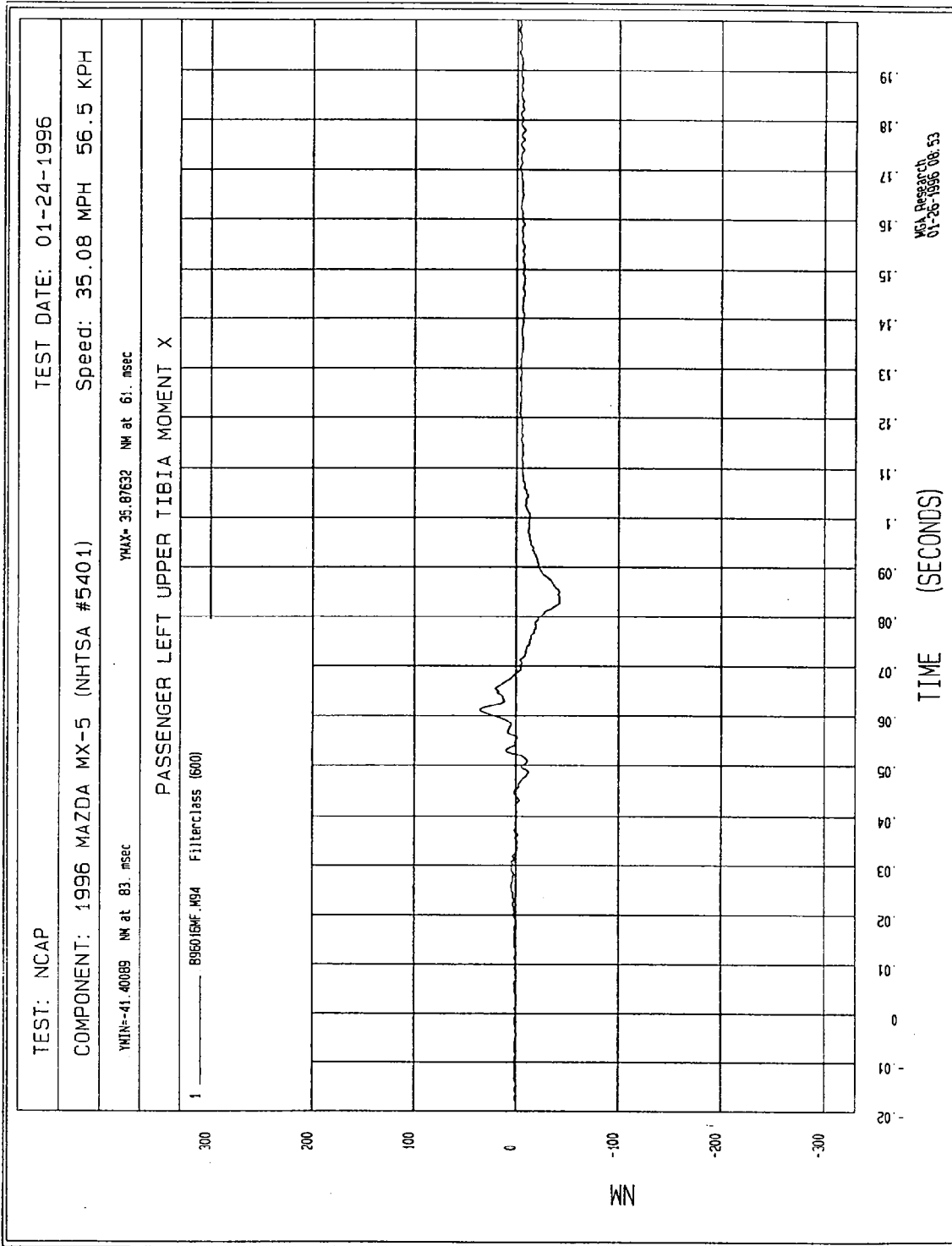


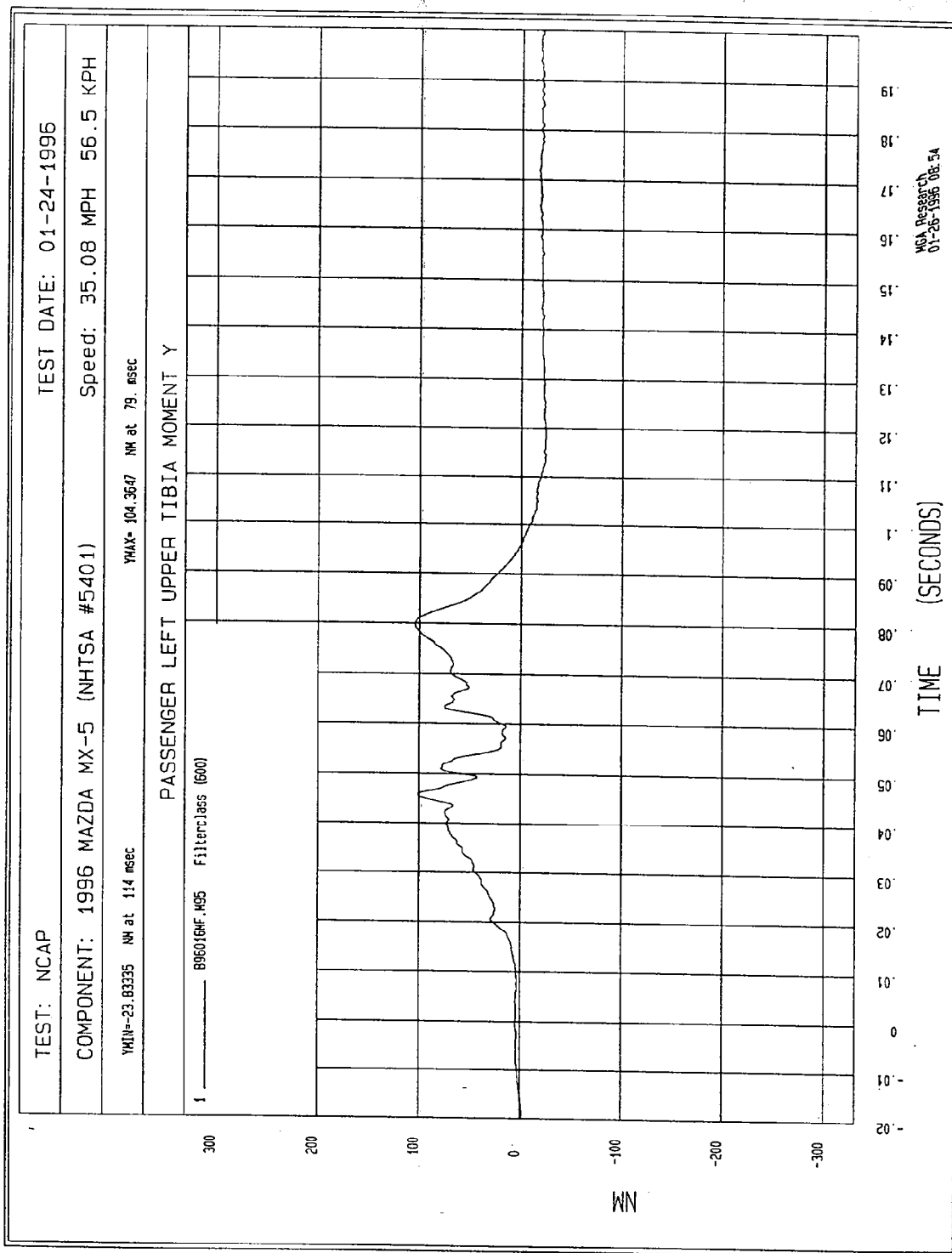


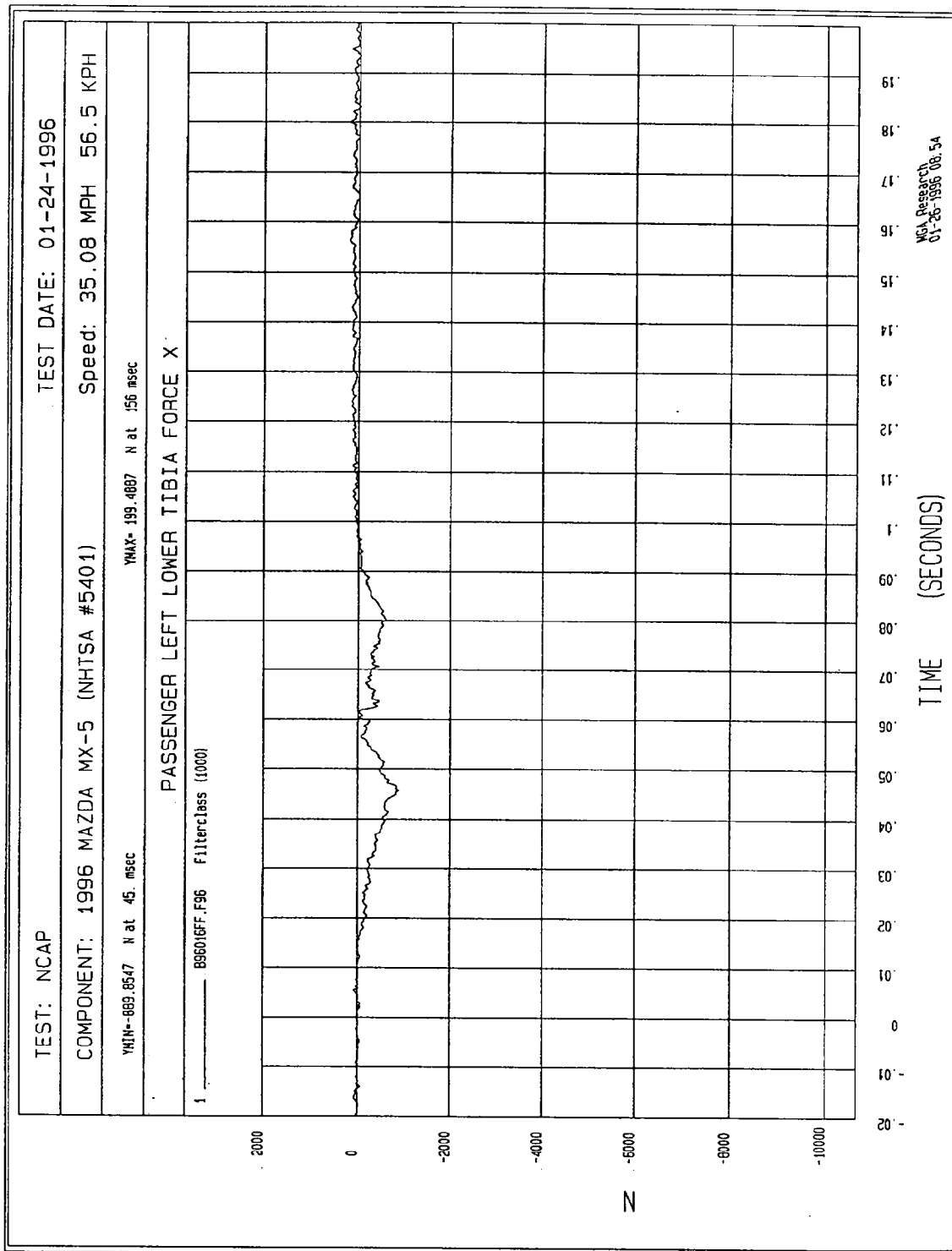


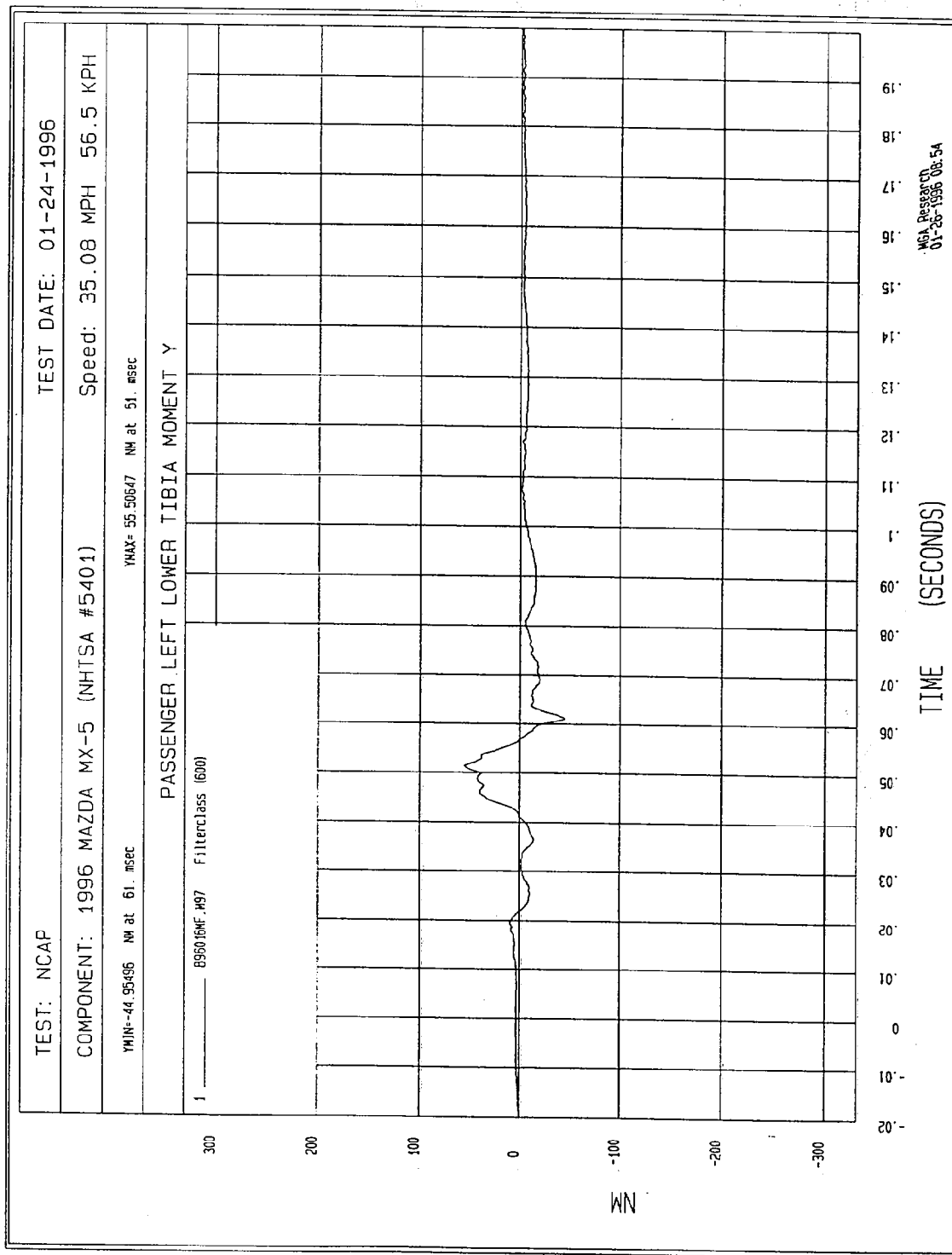


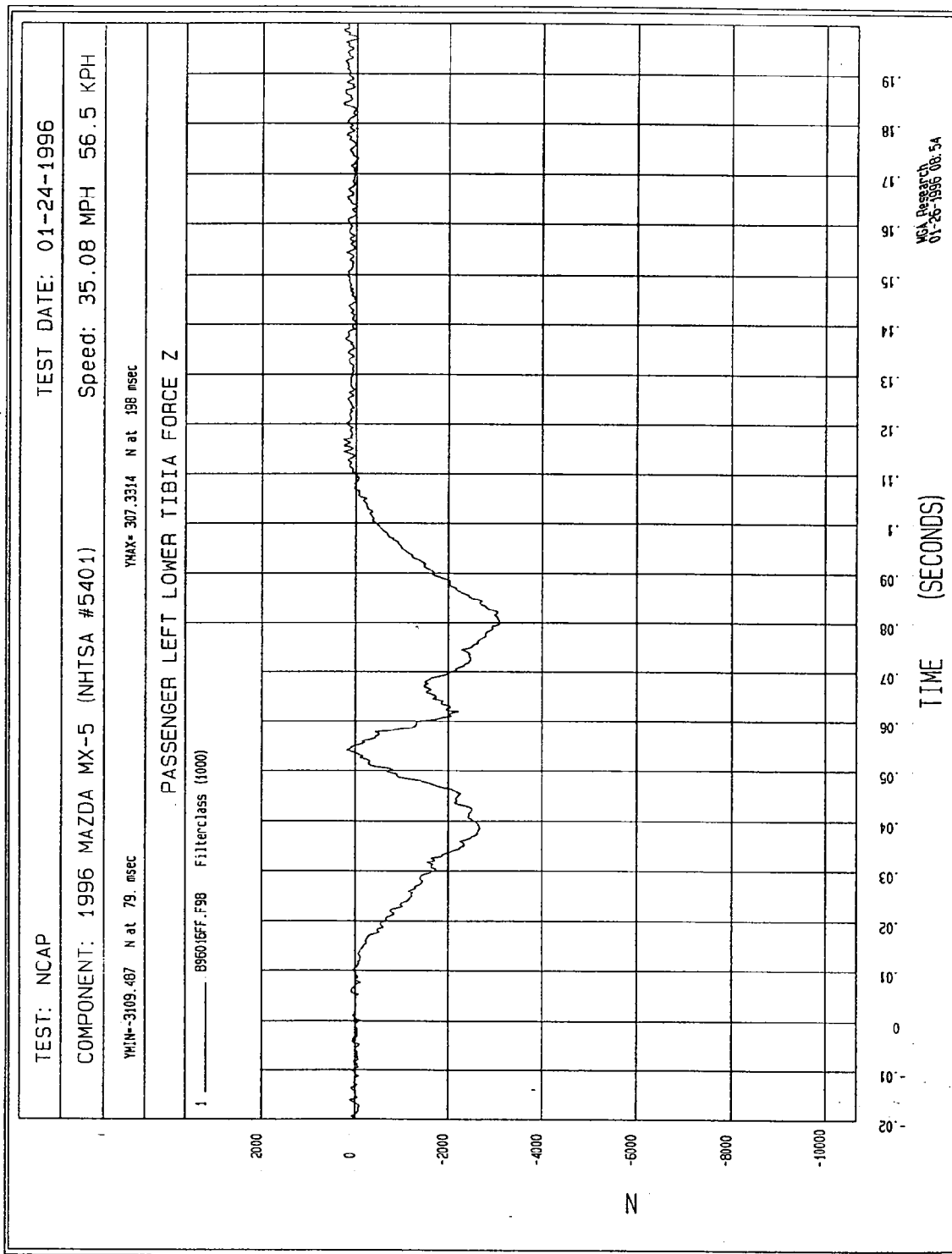


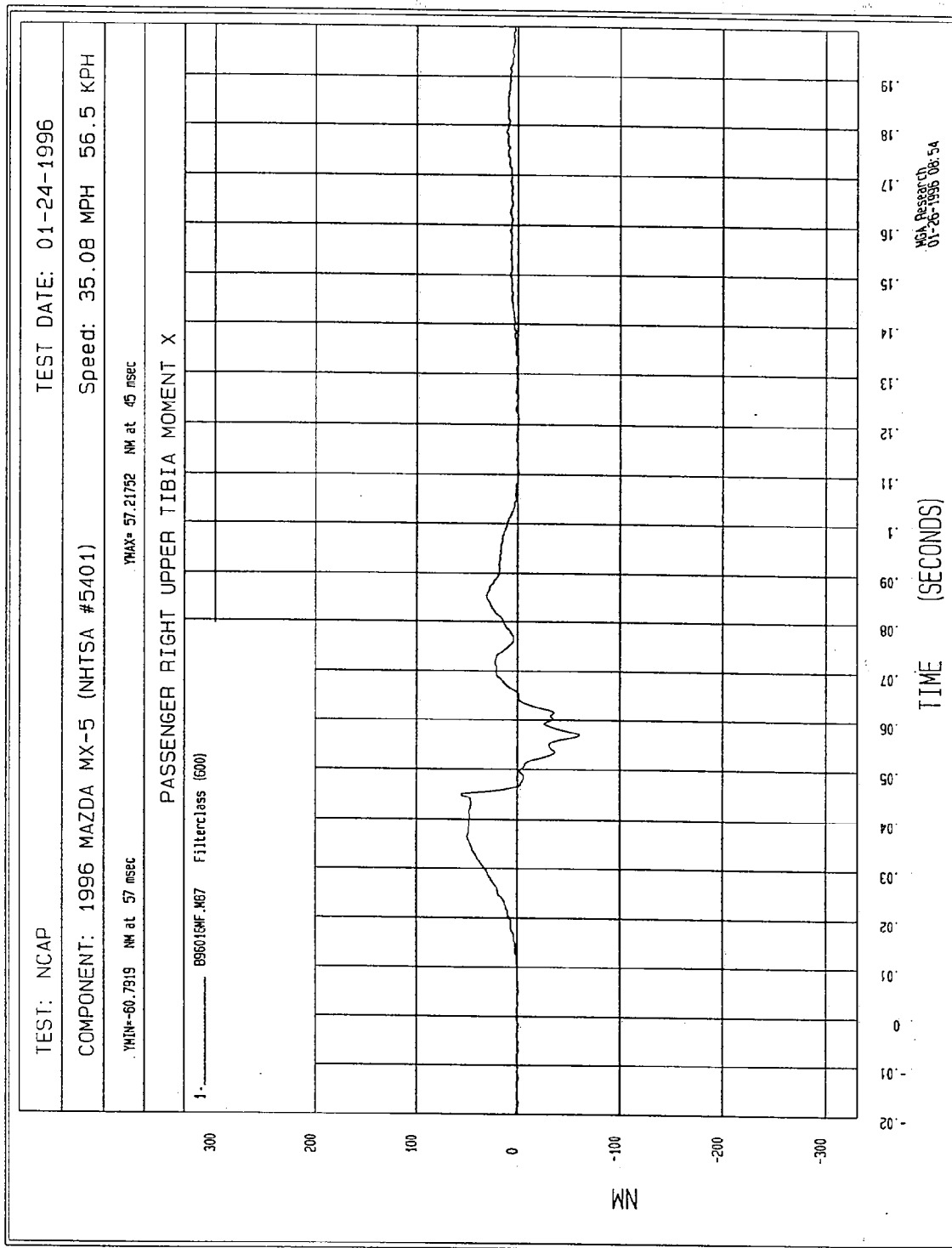


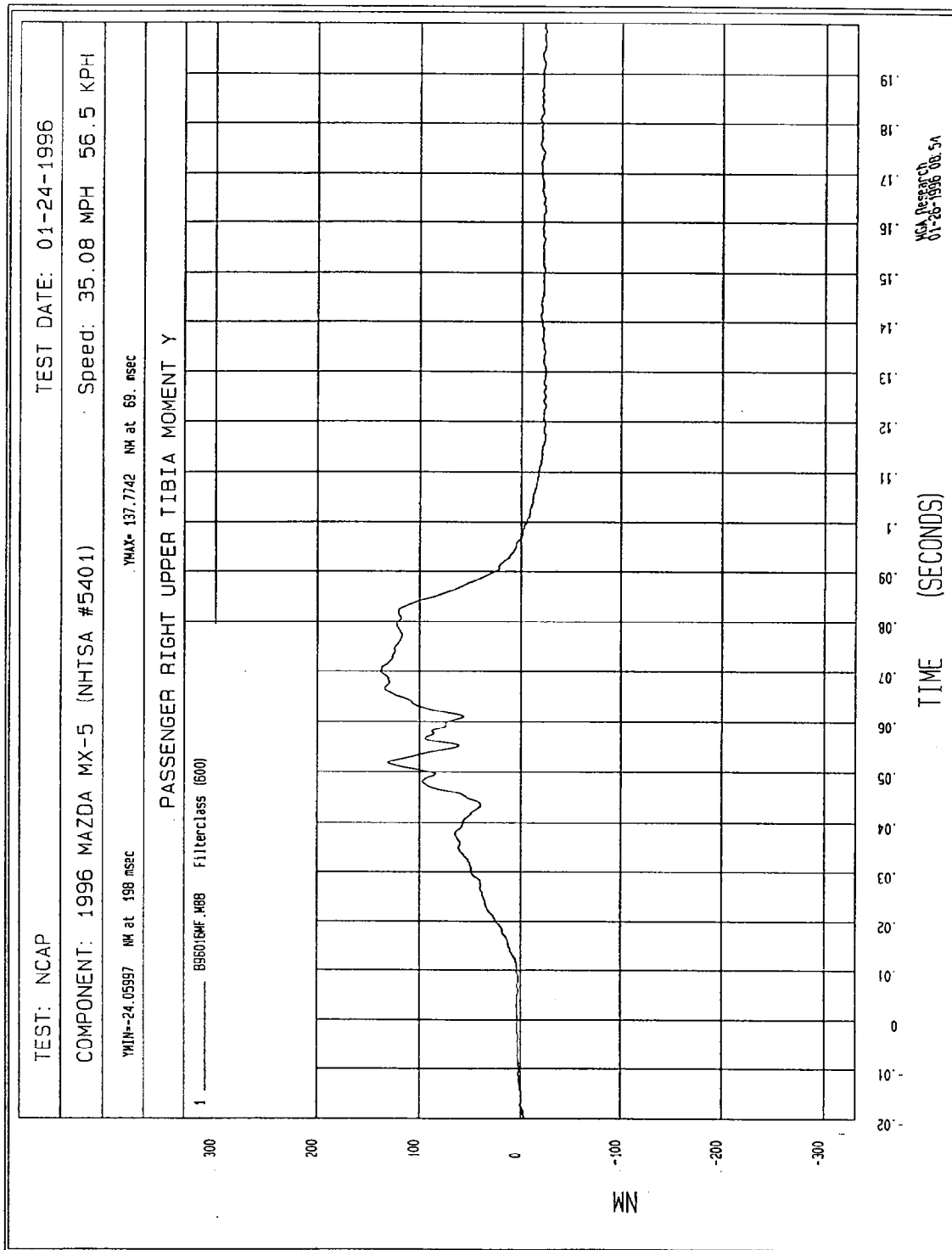










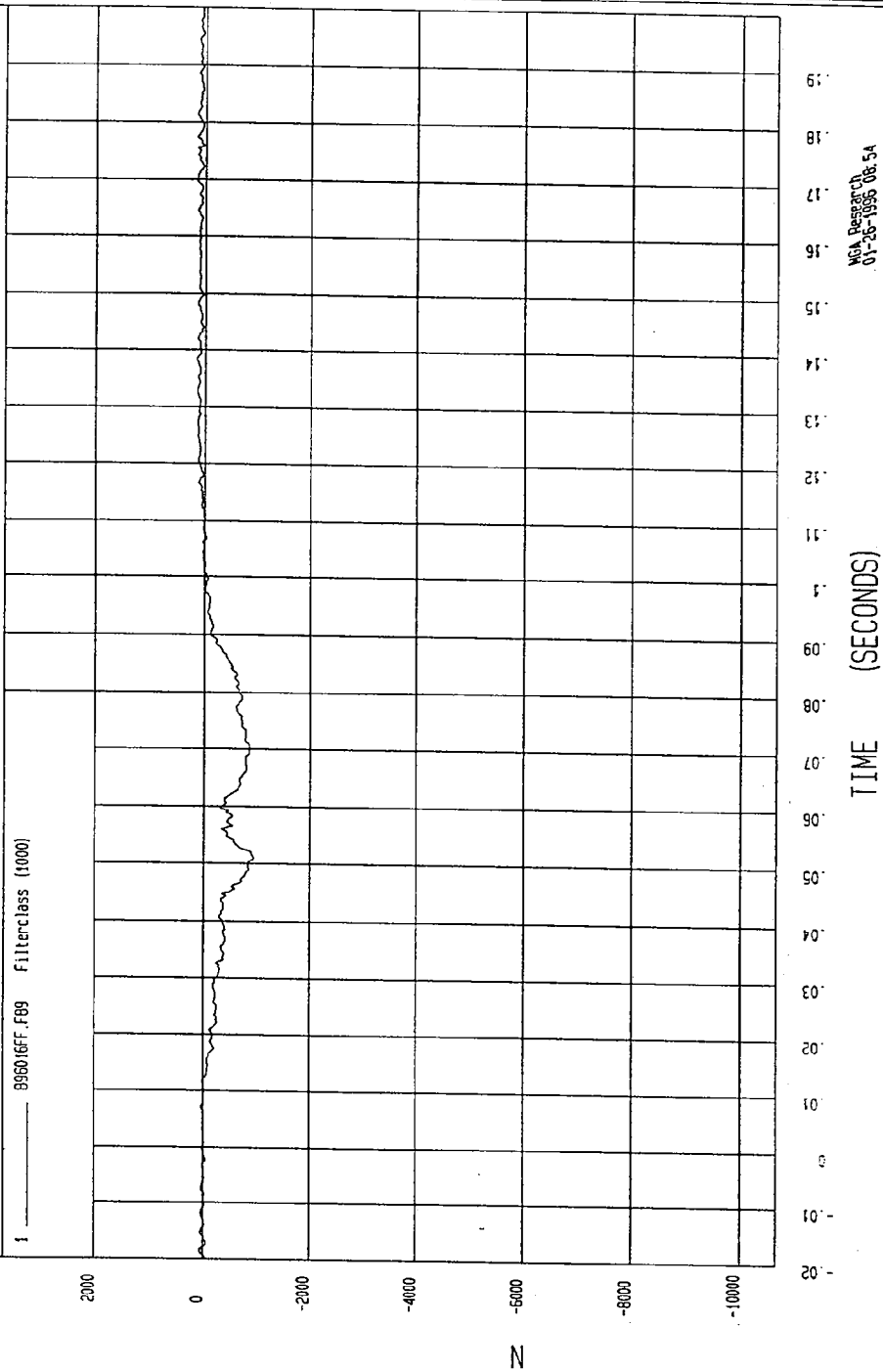


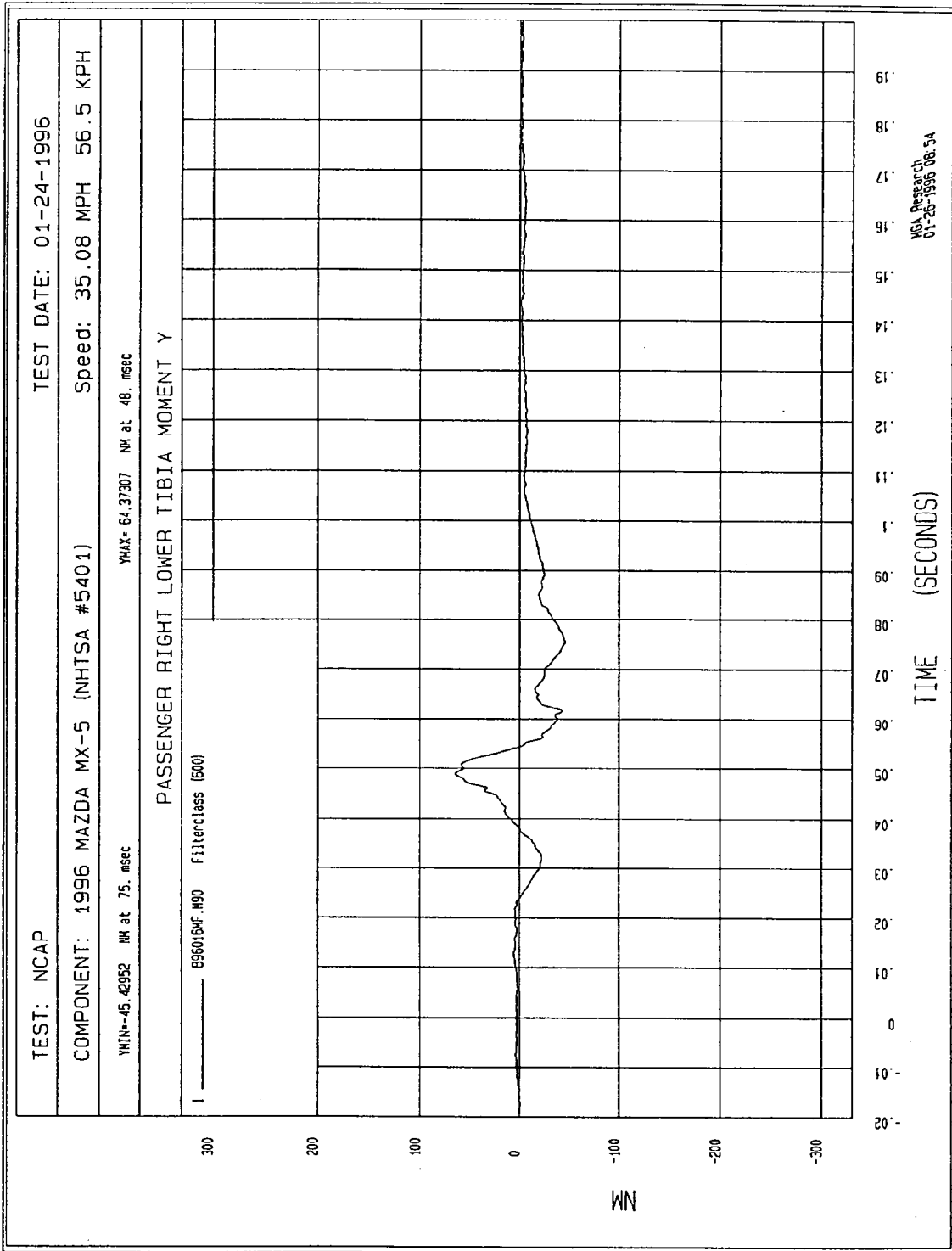
TEST DATE: 01-24-1996

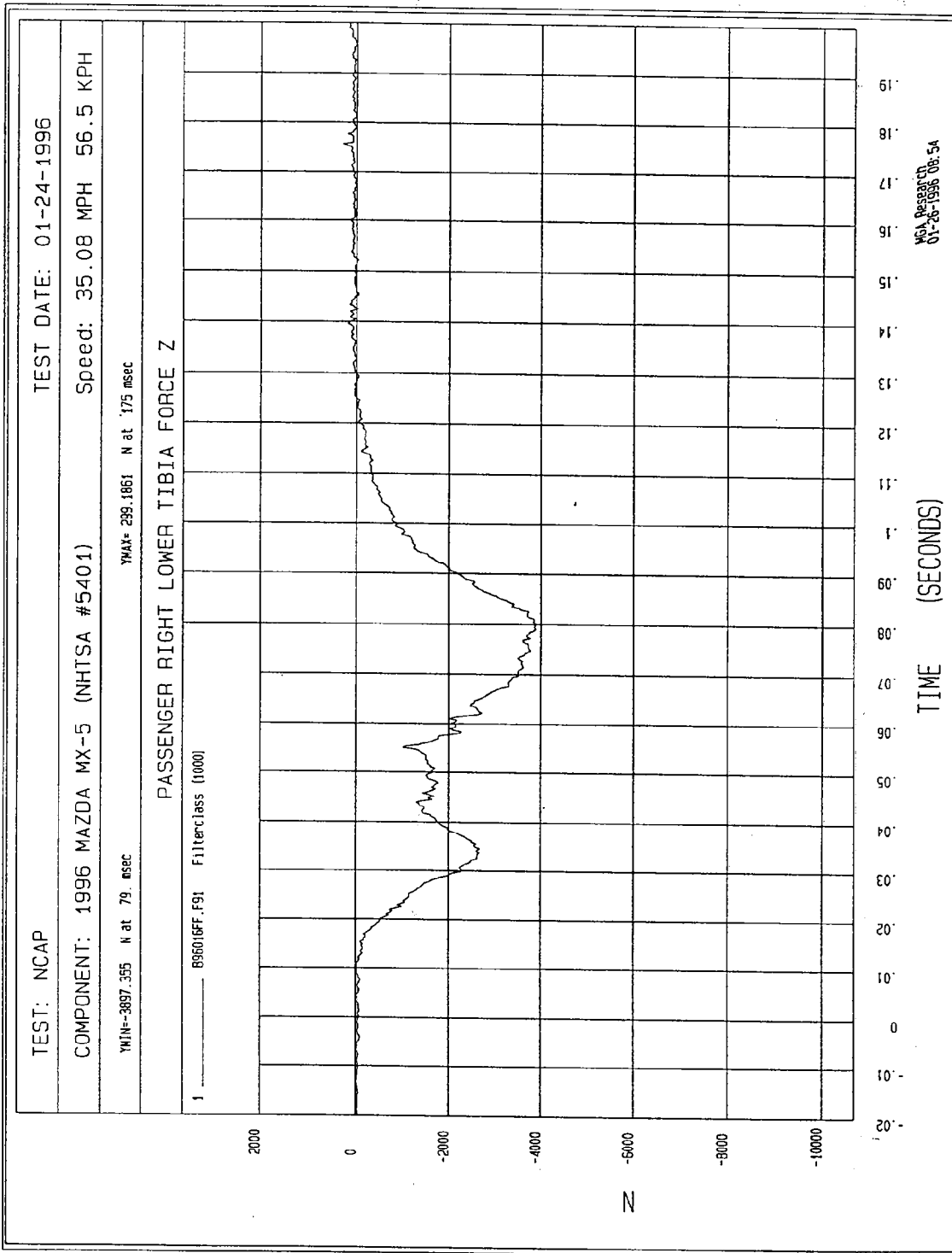
Speed: 35.08 MPH 56.5 KPH

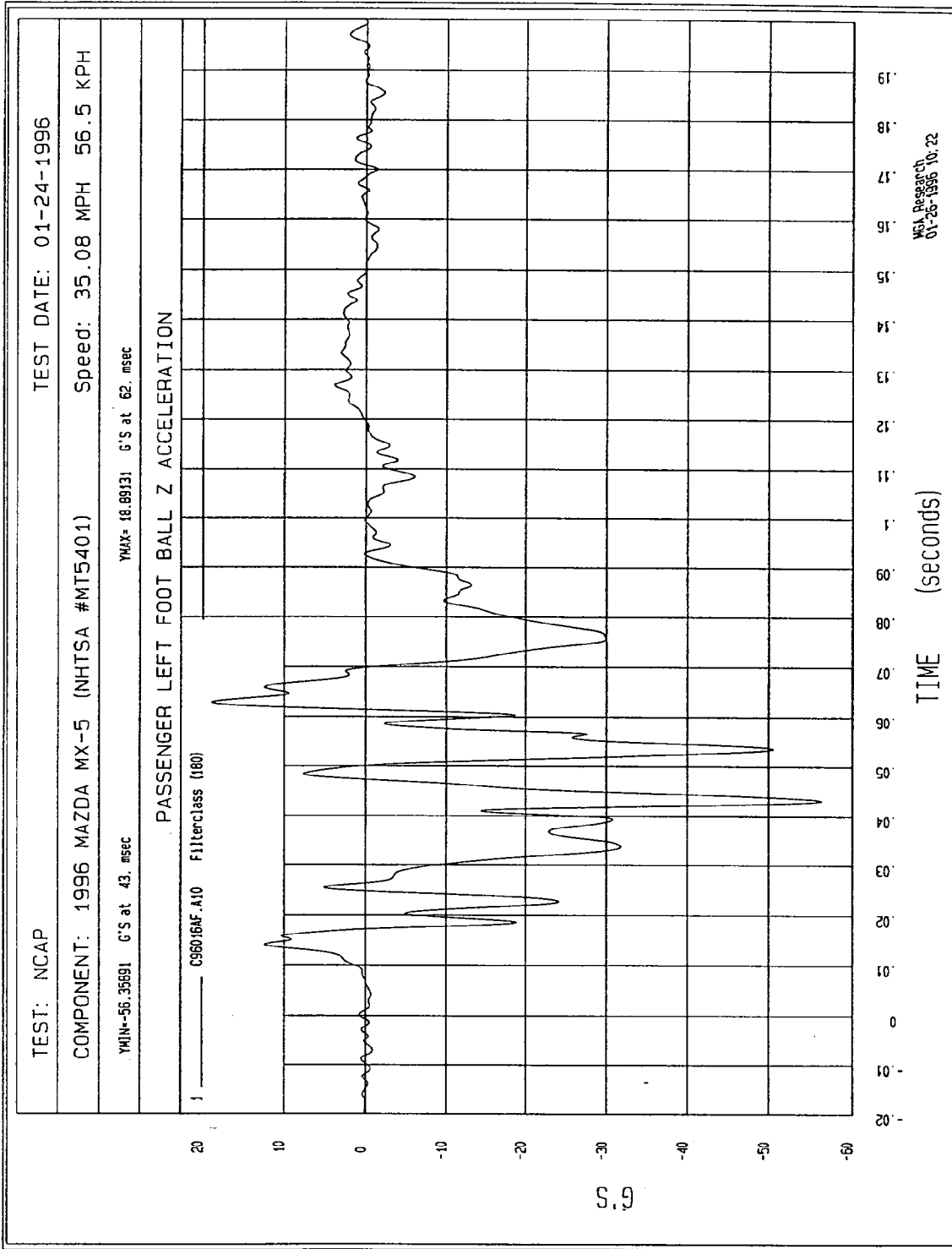
YMAX= 163.7568 N at 177 msec

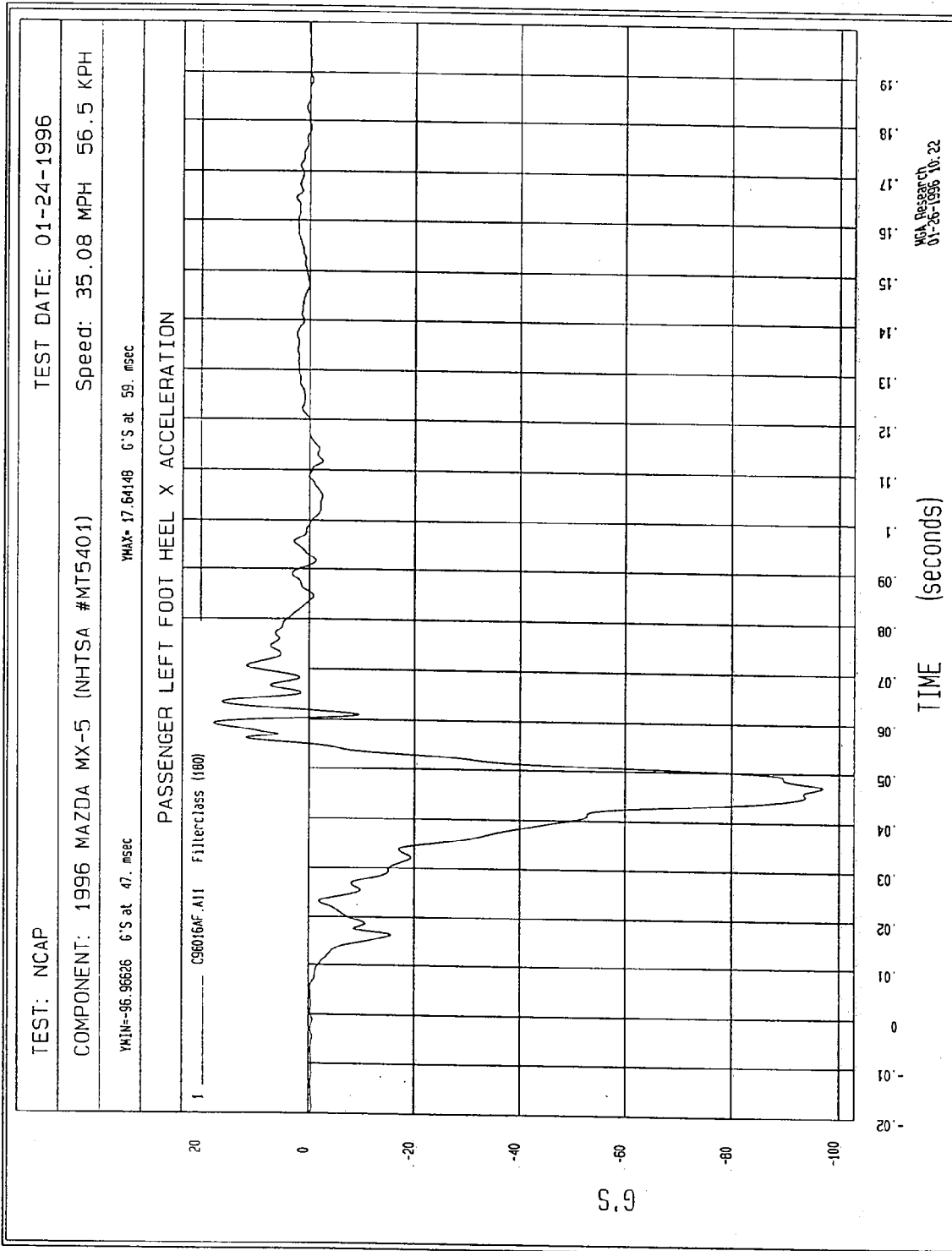
PASSENGER RIGHT LOWER TIBIA FORCE X

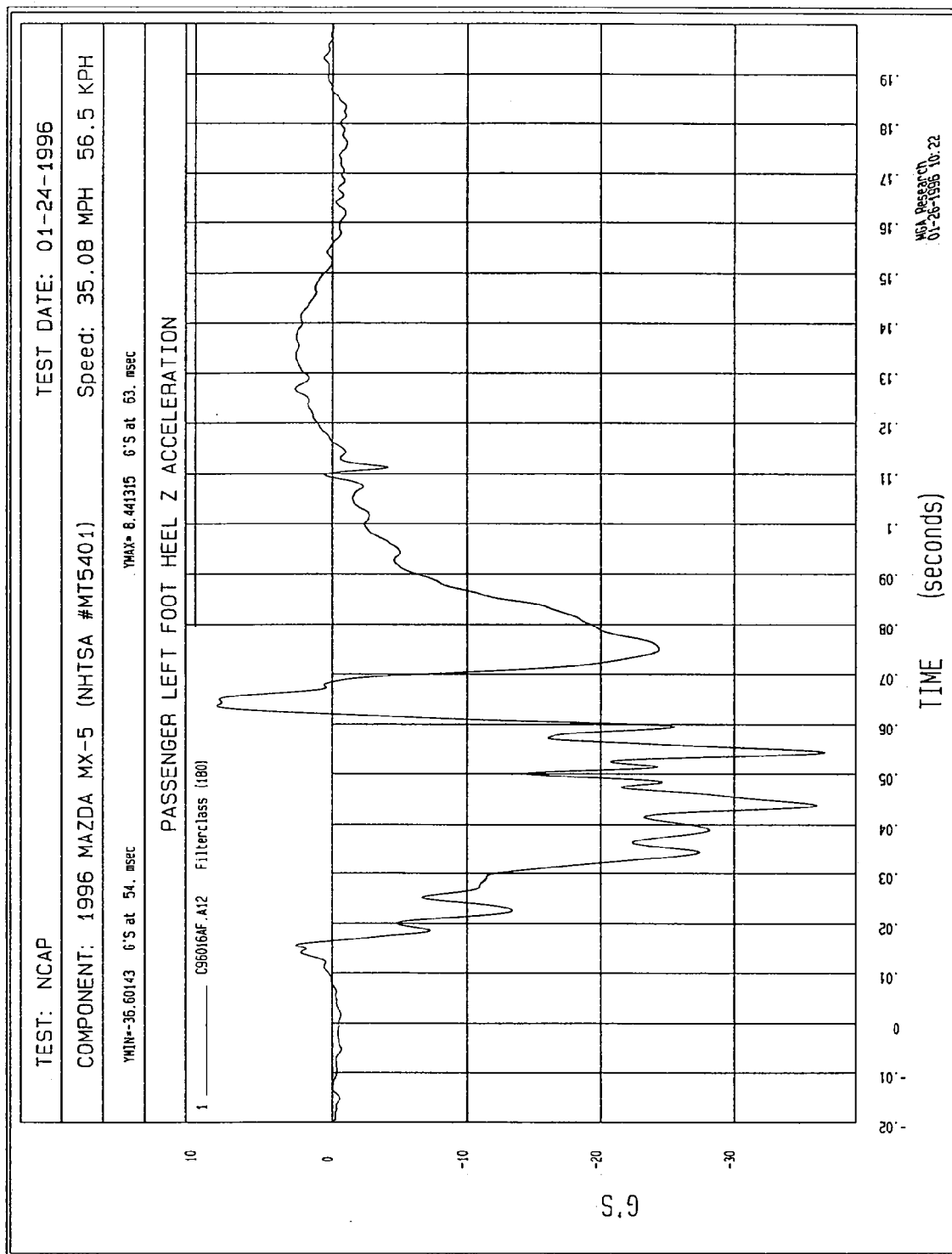


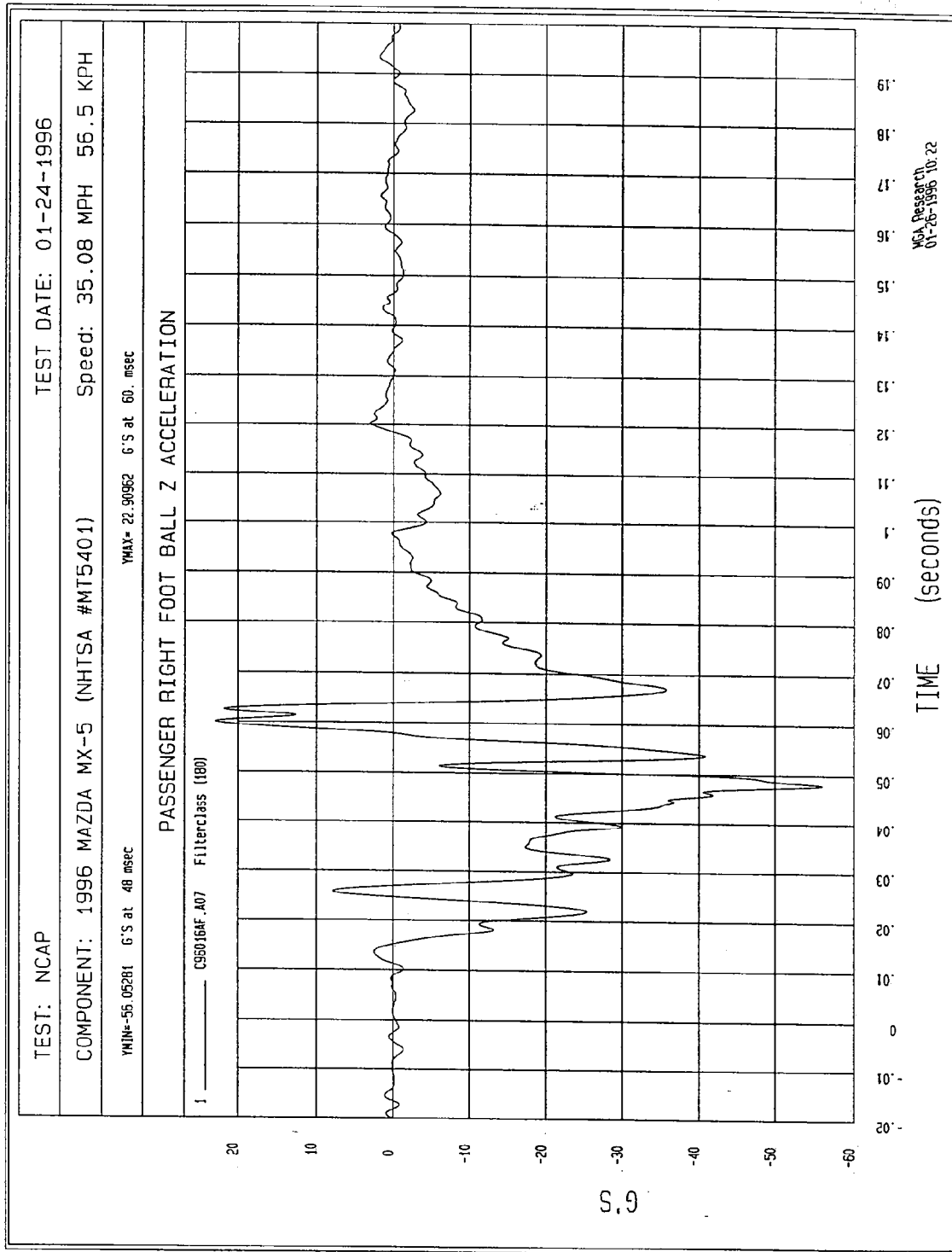


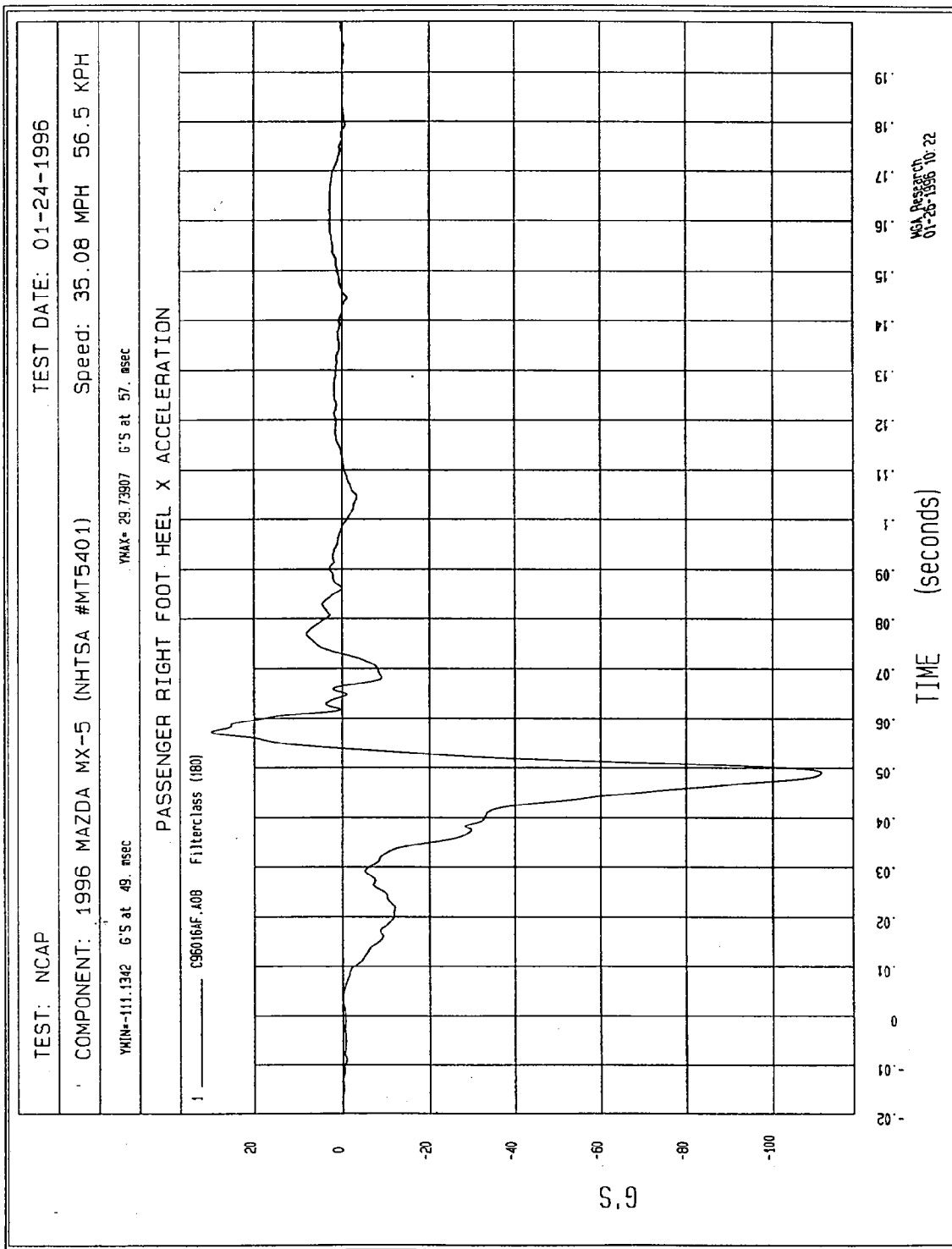


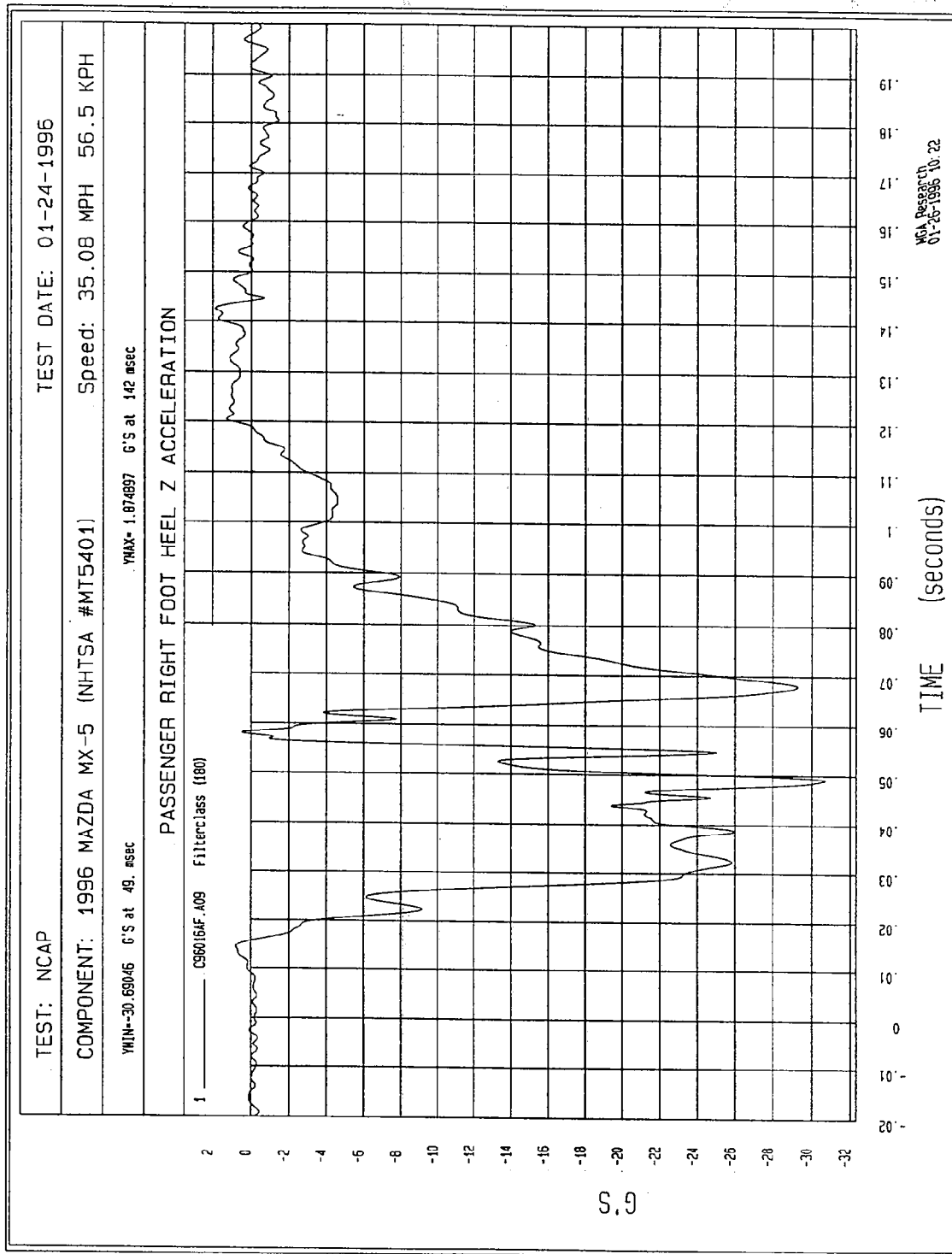












APPENDIX C

Dummy Configuration & Performance Verification Data

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 066 DUMMY CALIBRATION BY: Al Chalmers

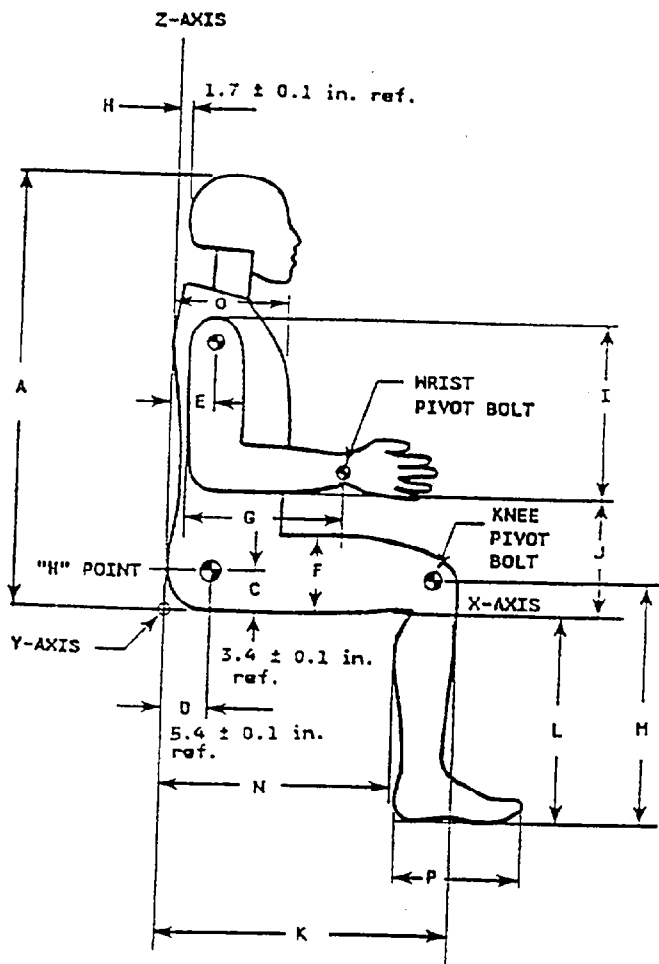
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 1-16-96

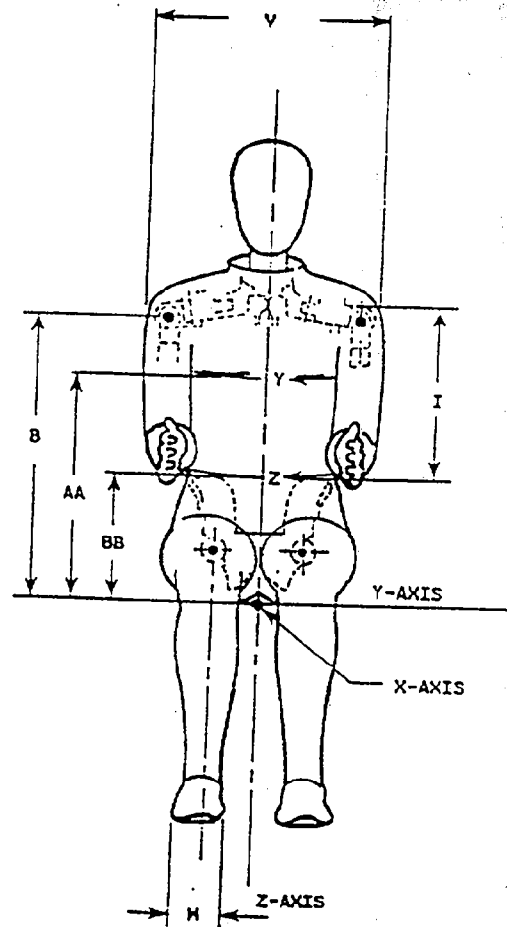
DESCRIPTION	SPECIFICATION (inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.9
B - Shoulder Pivot Height	19.9 - 20.5	20.5
C - "H" Point Height	3.3 - 3.5	3.5
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1	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.: 066 DUMMY CALIBRATION BY: Al Chalmers

VERIFICATION DATE: 1-16-96

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

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	259
Peak Lateral Acceleration	15 G. MAX	3
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	23.66
	20 MS	17.60 - 22.60 G	20.90
	30 MS	12.50 - 18.50 G	14.88
Max. Pendulum G Above 30 MS		29.0 G MAX	14.8
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	41
D Plane Rotation	MAX	64 - 78 DEG.	68
	TIME	57 - 64 MS	59
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	114
Moment About Occipital Condyle	MIN.	65 - 80 FT.LBS	70
	TIME	47 - 58 MS	53
Positive Moment - Time Curve Decay Time to Zero		97 - 107 MS	104

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	20.06
Pendulum Deceleration	10 MS	17.20 - 21.20 G	18.83
	20 MS	14.00 - 19.00 G	16.70
	30 MS	11.00 - 16.00 G	12.58
Max. Pendulum G Above 30 MS		22 G Max	13
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	45
D Plane Rotation	MAX	81 - 106 DEG.	98
	TIME	72 - 82 MS	78
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	156
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-44.6
	TIME	65 - 79 MS	70
Positive Moment - Time Curve Decay Time to Zero		120 - 148 MS	141

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.	2.59
Peak Resistive Force	1160 to 1325 LBS.	1310
Internal Hysteresis	69 to 85%	70

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

5.0 KNEE IMPACT TESTS

LEFT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	6.9
Maximum Force	1060 - 1300 LBS.	1145

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	6.9
Maximum Force	1060 - 1300 LBS.	1186

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 065 DUMMY CALIBRATION BY: Al Chalmers

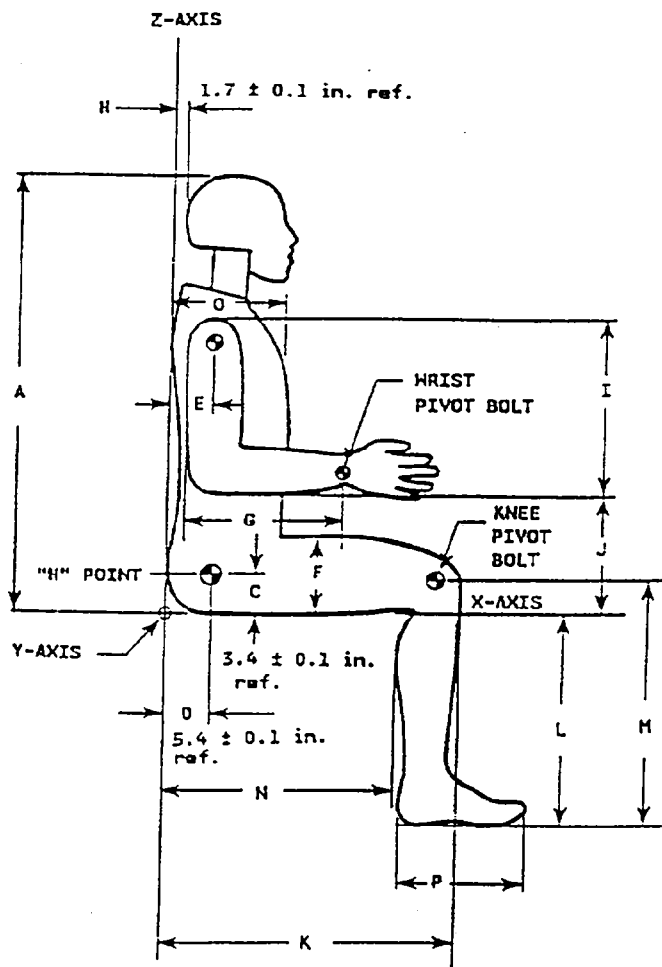
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 1-16-96

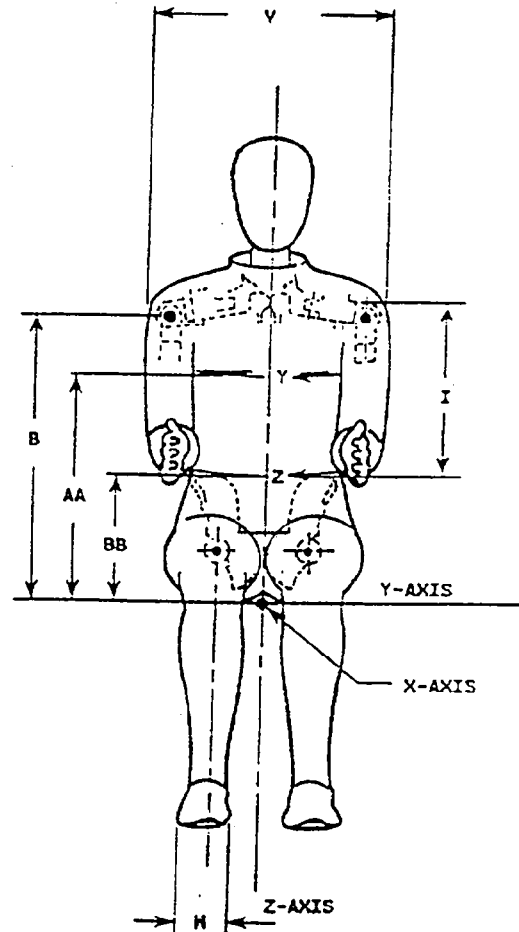
DESCRIPTION	SPECIFICATION (Inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.8
B - Shoulder Pivot Height	19.9 - 20.5	20.5
C - "H" Point Height	3.3 - 3.5	3.5
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1	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.: 065 DUMMY CALIBRATION BY: Al Chalmers

VERIFICATION DATE: 1-16-96

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

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	228
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	23.1
Pendulum Deceleration	10 MS	22.50 - 27.50 G	23.78
	20 MS	17.60 - 22.60 G	21.10
	30 MS	12.50 - 18.50 G	16.01
Max. Pendulum G Above 30 MS		29.0 G MAX	15.9
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	40
D Plane Rotation	MAX	64 - 78 DEG.	69
	TIME	57 - 64 MS	63
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	114
Moment About Occipital Condyle	MIN.	65 - 80 FT.LBS	69
	TIME	47 - 58 MS	53
Positive Moment - Time Curve Decay Time to Zero		97 - 107 MS	105

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	20.00
Pendulum Deceleration	10 MS	17.20 - 21.20 G	19.22
	20 MS	14.00 - 19.00 G	15.76
	30 MS	11.00 - 16.00 G	12.70
Max. Pendulum G Above 30 MS		22 G Max	13
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	45
D Plane Rotation	MAX	81 - 106 DEG.	99
	TIME	72 - 82 MS	78
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	156
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-47.0
	TIME	65 - 79 MS	72
Positive Moment - Time Curve Decay Time to Zero		120 - 148 MS	144

4.0 CHEST IMPACT TESTS

	SPECIFICATION	MEASUREMENT
Probe Speed	21.6 to 22.4 F/S	21.94
Peak Deflection	2.50 to 2.86 IN.	2.51
Peak Resistive Force	1160 to 1325 LBS.	1324
Internal Hysteresis	69 to 85%	71

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

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.	1122

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	7.0
Maximum Force	1060 - 1300 LBS.	1148

APPENDIX D

Dummy, Vehicle and Laboratory Calibration Data

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 066

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ACCY6	Endevco	12/22/95
Head Y	ACCH1	Endevco	12/22/95
Head Z	AAMW5	Endevco	12/22/95
Head X Redundant	AJ9D2	Endevco	12/22/95
Head Y Redundant	AHIE2	Endevco	12/22/95
Head Z Redundant	AJ7K3	Endevco	12/22/95
Chest X	ACCY1	Endevco	12/21/95
Chest Y	ACCC8	Endevco	12/21/95
Chest Z	ACC77	Endevco	12/21/95
Chest X Redundant	AJ9D4	Endevco	12/21/95
Chest Y Redundant	AJ9F3	Endevco	12/21/95
Chest Z Redundant	AJ9D9	Endevco	12/21/95
Right Femur Load Cell	261	Denton	1/03/96
Left Femur Load Cell	262	Denton	1/03/96
Pelvis X	ALDY8	Endevco	12/21/95
Pelvis Y	ALEK9	Endevco	12/21/95
Pelvis Z	ALE80	Endevco	12/21/95

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 066

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Load Cell X	443	Denton	12/18/95
Neck Load Cell Y	443	Denton	12/18/95
Neck Load Cell Z	443	Denton	12/18/95
Neck Moment X	443	Denton	12/18/95
Neck Moment Y	443	Denton	12/18/95
Neck Moment Z	443	Denton	12/18/95
Chest Deflection Gauge	066	Servo	1/04/96
Lap Belt Load Cell	657	Lebow	10/17/95
Torso Belt Load Cell	624	Lebow	10/17/95

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 066

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Right Tibia Moment X	036	Denton	12/20/95
Upper Right Tibia Moment Y	036	Denton	12/20/95
Lower Right Tibia Moment Y	040	Denton	12/22/95
Lower Right Tibia Force X	040	Denton	12/22/95
Lower Right Tibia Force Z	040	Denton	12/22/95
Upper Left Tibia Moment X	039	Denton	12/20/95
Upper Left Tibia Moment Y	039	Denton	12/20/95
Lower Left Tibia Moment Y	033	Denton	12/22/95
Lower Left Tibia Force X	033	Denton	12/22/95
Lower Left Tibia Force Z	033	Denton	12/22/95
Right Foot Ball Z	AP120	Endevco	12/14/95
Right Foot Heel X	AP2C4	Endevco	12/14/95
Right Foot Heel Z	AP042	Endevco	12/14/95
Left Foot Ball Z	AN8M6	Endevco	12/14/95
Left Foot Heel X	AHY99	Endevco	12/14/95
Left Foot Heel Z	AP0E1	Endevco	12/14/95

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 065

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	AAMN8	Endevco	1/03/96
Head Y	ACC61	Endevco	1/03/96
Head Z	ACCW9	Endevco	1/03/96
Head X Redundant	AJ621	Endevco	1/03/96
Head Y Redundant	AJ619	Endevco	1/03/96
Head Z Redundant	AHY54	Endevco	1/03/96
Chest X	ACC78	Endevco	12/21/95
Chest Y	ACCE6	Endevco	12/21/95
Chest Z	ACCY3	Endevco	12/21/95
Chest X Redundant	AJ9J7	Endevco	12/21/95
Chest Y Redundant	AJ7A2	Endevco	12/21/95
Chest Z Redundant	AJ819	Endevco	12/21/95
Right Femur Load Cell	259	Denton	1/03/96
Left Femur Load Cell	260	Denton	1/03/96
Pelvis X	ALB87	Endevco	12/21/95
Pelvis Y	AGNB3	Endevco	12/21/95
Pelvis Z	AJ834	Endevco	12/21/95

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 065

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Load Cell X	442	Denton	12/18/95
Neck Load Cell Y	442	Denton	12/18/95
Neck Load Cell Z	442	Denton	12/18/95
Neck Moment X	442	Denton	12/18/95
Neck Moment Y	442	Denton	12/18/95
Neck Moment Z	442	Denton	12/18/95
Chest Deflection Gauge	065	Servo	1/04/96
Lap Belt Load Cell	212	Lebow	10/17/95
Torso Belt Load Cell	661	Lebow	10/17/95

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 065

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Right Tibia Moment X	040	Denton	9/26/95
Upper Right Tibia Moment Y	040	Denton	9/26/95
Lower Right Tibia Moment Y	034	Denton	9/26/95
Lower Right Tibia Force X	034	Denton	9/26/95
Lower Right Tibia Force Z	034	Denton	9/26/95
Upper Left Tibia Moment X	023	Denton	9/26/95
Upper Left Tibia Moment Y	023	Denton	9/26/95
Lower Left Tibia Moment Y	023	Denton	9/26/95
Lower Left Tibia Force X	023	Denton	9/26/95
Lower Left Tibia Force Z	023	Denton	9/26/95
Right Foot Ball Z	AP0P6	Endevco	12/21/95
Right Foot Heel X	AP0T3	Endevco	12/21/95
Right Foot Heel Z	AP122	Endevco	12/21/95
Left Foot Ball Z	ACC81	Endevco	12/21/95
Left Foot Heel X	APIY1	Endevco	12/21/95
Left Foot Heel Z	AMTB8	Endevco	12/21/95

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

VEHICLE ACCELEROMETERS			
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	E13-D01	Entran	9/28/95
Right Rear Seat Crossmember X	L18-G02	Entran	10/24/95
Top of Engine Block X	F07-A19	Entran	9/29/95
Bottom of Engine X	L14-D19	Entran	10/24/95
Left Brake Caliper X	L18-E14	Entran	10/23/95
Right Brake Caliper X	C18-G12	Entran	9/29/95
Instrument Panel X	L18-E07	Entran	10/23/95
Redundant Left Rear Seat Crossmember X	C27-B02	Entran	9/28/95
Redundant Right Rear Seat Crossmember X	L15-G20	Entran	9/29/95

LABORATORY INSTRUMENTS		
	SERIAL NO.	CALIBRATION DATE
Neck Bending Pendulum Accelerometer	AH5N9	Endevco
Neck Bending Head Rotary Potentiometer	018	Spectrol
Neck Bending Pendulum Rotary Potentiometer	019	Spectrol
Chest Probe Accelerometer	AN8A4	Endevco
Knee Impact Accelerometer	MGA001	Entran

APPENDIX E

Vehicle Owner's Occupant Restraint System Instructions

Seat Belt System

Seat belts help to decrease the possibility of severe injury during accidents and sudden stops. Mazda recommends that the driver and passengers always wear seat belts.

The passenger's seat belt retractor is designed to keep the lap/shoulder belt out of the way when not in use.

The driver's seat belt has no provisions for child-restraint systems and has only an emergency locking mode. The driver may wear it comfortably, and it will lock during a collision.

However, the passenger's seat lap/shoulder belt retractor operates in two modes, emergency locking mode and for child-restraint systems, automatic locking mode.

Emergency locking mode

If the belt has fully retracted, it will always be in the emergency locking mode until you move it into automatic mode by pulling the belt all the way out to its full length. In the emergency locking mode, the belt remains comfortable on the occupant and the retractor will lock in position during a collision.

If the belt feels tight and hinders comfortable movement while the vehicle is stopped or in motion, you may be in the automatic retractor mode because you have pulled the belt too far out and set it up for a child seat. To return to the more comfortable emergency locking mode, wait until you can stop the vehicle in a safe area, retract the belt fully and then again extend it around you.

Automatic locking mode

Always use the automatic locking mode to keep the child-restraint system from shifting to an unsafe position in the event of an accident. To get the seat belt into the automatic locking mode, pull it all the way out and connect it as instructed on the child-restraint system. It will retract down to the child restraint and stay locked on it. See the section on child-restraint systems for more information.

WARNING

Seat Belts:

Passengers not wearing seat belts during a collision can be injured much worse than those wearing seat belts. They can hit things inside the vehicle or even be thrown from it. They can be seriously injured or killed. In the same collision, passengers wearing seat belts might be much safer.

WARNING

Twisted Seat Belts:

Twisted seat belts can cause injury. In a collision, the full width of the belt isn't available to absorb the impact. This puts more force on the bones beneath the belt, which could break them or cause other serious injury. Don't wear twisted seat belts.

WARNING

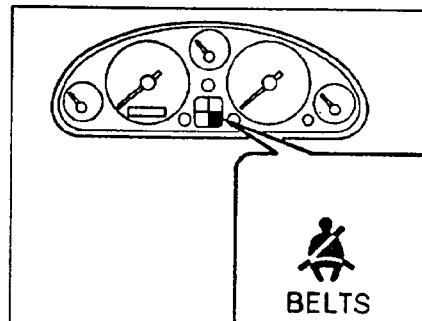
Damaged Seat Belts:

An accident can damage a seat belt in use. The belt webbing can be weakened and retractors and anchors can be bent or broken. Therefore a damaged seat belt may not provide adequate protection in a collision. Have a professional inspect all seat belt systems in use during an accident before they are used again.

WARNING

One Belt, One Passenger:

Using one seat belt for more than one person at a time is dangerous. A seat belt used in this way can't spread the impact forces properly and the two passengers could be crushed together and seriously injured. Never use one belt for more than one person at a time.

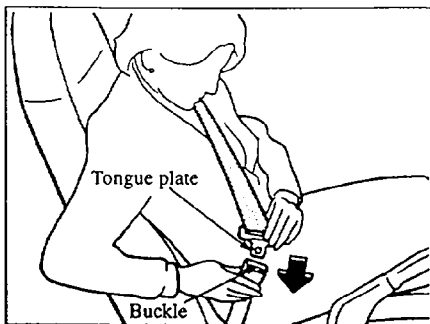


■ Seat Belt Warning Light/Beep

When the ignition is turned to ON (II), this light will stay on for about 6 seconds.

If the driver's seat belt is not buckled when the ignition is at ON (II), a beep will sound for about 6 seconds.

If the system does not operate correctly, consult an Authorized Mazda Dealer.



■ Seat Belts

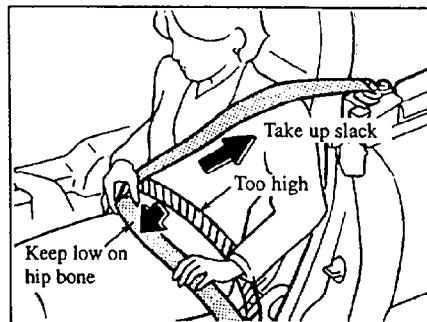
To fasten:

1. Grasp the buckle and tongue plate.
2. Slowly pull out the lap/shoulder belt.
3. Insert the plate into the buckle until you hear a click.

⚠ WARNING

Positioning the Shoulder Portion of the Seat Belt:

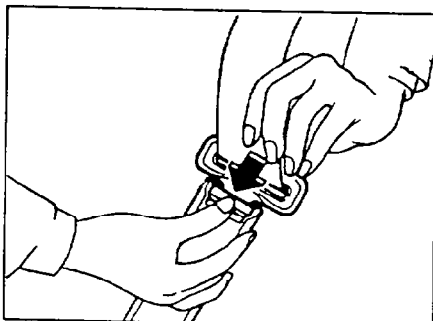
Failure to position the shoulder portion of the seat belt properly reduces the amount of protection in an accident and increases the chance of injury. Make sure the shoulder portion of the seat belt is positioned across your shoulder near your neck, not on your neck or upper arm.



⚠ WARNING

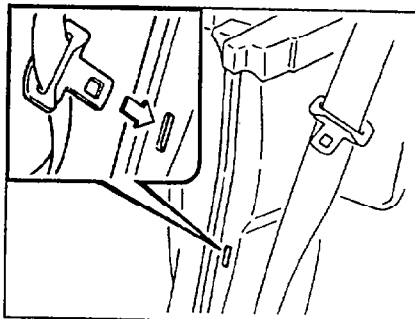
Positioning the Lap Portion of the Seat Belt:

The lap portion of the seat belt worn too high can be dangerous. In a collision, this would concentrate the impact force directly on the abdominal area, causing serious injury. Wear the lap portion of the belt snugly and as low as possible.

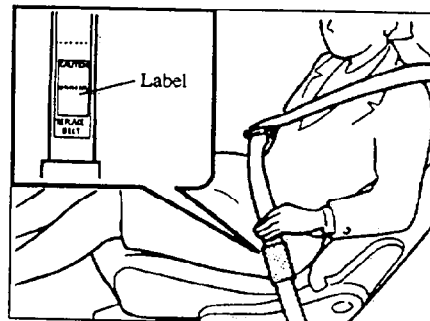


To unfasten:

Depress the buckle release.



To prevent the passenger's seat belt from rattling when it isn't in use, insert the seat belt tongue into the slot.



■ Seat Belt Caution Label

A caution label is inside the sleeve of each lap belt. If a belt is used in an accident, the stress will cause this label to be pulled from the sleeve.

This indicates that the seat belt must be replaced.

Also, if the seat belt undergoes excessive stress at any time, the belt's webbing, metal fittings, and anchor bolt may be damaged. The damage may not be apparent, so the seat belt should be replaced after this kind of stress, even if the label is not exposed.

Supplemental Restraint System

In a front-end accident, the supplemental restraint system with air bags is designed to provide protection **in addition to** the three-point seat belt system.

WARNING

The Importance of Seat Belts:

The air bags must have assistance from the seat belt system to provide its best protection. Alone, an air bag may not prevent severe injury in an accident. Vehicle occupants should always wear seat belts.

WARNING

Air Bag Activation:

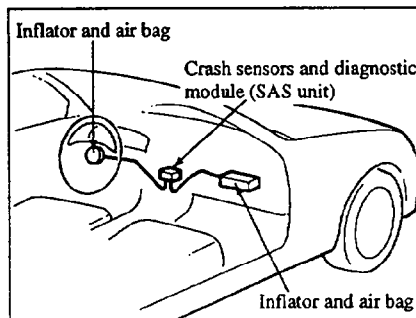
The air bags will inflate only during a frontal or near-frontal collision that is at least moderate in force. In other kinds of accidents, such as side impact, rear impact or roll over, only seat belts can protect occupants because the air bags will not activate. Vehicle occupants should always wear seat belts to help reduce the possibility of injury during a sudden stop or an accident.

Small children, those under 40 lbs. (18 kg), should be protected by a child restraint system.

WARNING

Child Restraint Positioning:

Child restraints which face the rear are unsafe in your vehicle. The restraint can be hit by a deploying air bag, moved out of position, and result in your child being seriously injured. Don't use child restraints which face the rear.

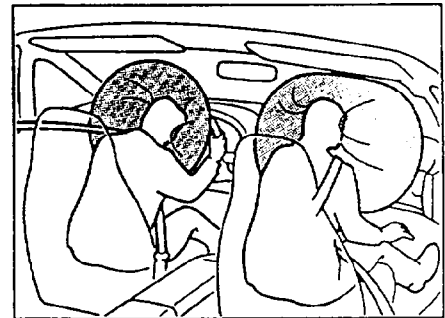


■ **System Description**

The supplemental restraint system has two basic subsystems:

- 1) The air bag system with inflator and air bags
- 2) The electric system with crash sensors and diagnostic module

The air bags are mounted in the center of the steering wheel and passenger side of the dashboard, but they are out of sight until activated.



■ **How Air Bags Work**

When air bag crash sensors detect a greater than moderate frontal impact, an electrical current is sent to the inflators. Nitrogen gas is produced to inflate both bags. After the inflation, they quickly deflate.

WARNING

Seating Position:

Sitting too close to an air-bag storage compartment or placing hands on it increases the risk of injury if the air bags inflate. The driver should hold onto only the steering wheel rim. Front seat occupants should adjust their seats as far back as possible and always sit upright against the seat backs.

NOTE

- During a severe front end impact, you will hear a loud inflation noise and some smoke will be released.

Neither will cause injury, and the smoke doesn't indicate a fire.

- The air bags will function only once. After that, the air bags will not work again and must be replaced.

Only an Authorized Mazda Dealer can replace the system.

WARNING

Hot Air Bag Inflators:

Immediately after inflation of the bags, the inflators in the steering wheel and in the dashboard are very hot. To protect yourself from burns, don't touch the internal components of the air bag storage areas after the bags have inflated.

WARNING

Modification of the Supplemental Restraint System:

Modifying the components or wiring of the supplemental restraint system is dangerous. You could accidentally activate it or make it inoperable. Don't make any modifications to the supplemental restraint system. This includes installing trim, badges, or anything else over the air bag storage areas. It also includes installing extra electric equipment on or near system components or wiring.

WARNING

Air Bag Storage Area:

Attaching an object to an air bag storage area or placing one in front of it is dangerous. In an accident, the object could interfere with air bag inflation or injure the occupants. Always keep the air bag storage areas free of objects.

WARNING

Air Bag Inspection after a Collision:

If your Mazda was in a collision not strong enough to inflate the air bags, parts on which the sensors are mounted may be distorted, and without repairs the system may not operate when necessary.

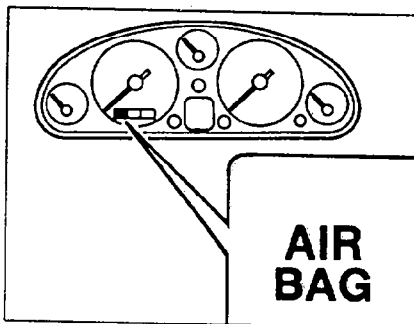
Have an Authorized Mazda Dealer make a very careful inspection of the system.

■ Constant Monitoring

These components are monitored by the supplemental restraint system warning light:

- SAS unit
- Air bag modules
- Related wiring

A diagnostic module continuously monitors the system's readiness. This begins when the ignition is turned on and continues while the vehicle is being driven.



If the supplemental restraint system is OK, the warning light comes on when the ignition is turned on or after the engine is cranked. After about 6 seconds it goes out.

A system malfunction is indicated when this light constantly flashes or stays on or if it doesn't come on at all. If one of these happens, consult an Authorized Mazda Dealer as soon as possible. The system may not work in an accident.

WARNING

Supplemental Restraint System Service:

Don't try to self-service the system. Tampering with it could cause it to activate, and this could result in injury. For servicing and repairs, have an Authorized Mazda Dealer do the work.

WARNING

Air Bag Disposal:

Disposing of an air bag can be dangerous. Unless all safety procedures are followed, injury can result. Ask an Authorized Mazda Dealer how to safely dispose of an air bag or how to scrap an air bag equipped vehicle.