1492

REPORT NO. MGA-97-N04

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

1997 PONTIAC GRAND AM
NHTSA NO. MV0104

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105

Test Date: January 20, 1997

Report Date: January 27, 1997

FINAL REPORT

Prepared For:

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

16. Abstract

A 56 kph (35 mph) frontal barrier impact using a 30 load cell barrier was conducted on a 1996 Pontiac Grand AM at the MGA Proving Grounds and Crash Test Center in Burlington, WI. on January 20, 1997.

The barrier impact velocity was 56.4 kph (35.0 mph), and the ambient temperature at the time of impact was 21°C. The post-test maximum static crush was 522 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 517 and the 3 msec. Clip (Chest g's) was 41 g's. The left and right femur loads for the driver were 3038 and 4411 Newtons, respectively. The passenger's HIC was 617 and the 3 msec Clip was 45 g's. The left and right femur maximum loads were 4228 and 4204 Newtons respectively.

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

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Manager, New Car Assess. Program (NCAP)

4/1/97

Date of Report Acceptance

_____

Contracting Officer's Tech. Rep. (COTR)

4/1/97

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'97 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 1997 Pontiac Grand AM at a velocity of 56.4 kph (35.0 mph). The test was performed at the MGA Proving Grounds and Crash Test Center on January 20, 1997. 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. 037), and the right front passenger (Serial No. 036), 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. The driver HIC was 517 and the maximum chest (CLIP) deceleration over 3 milliseconds was 41 g's. The maximum chest displacement was 25 mm. The left and right femur loads were 3038 and 4411 Newtons respectively.

The right front passenger's head struck the inflated airbag. The passenger HIC was 617 and maximum chest (CLIP) deceleration over 3 milliseconds was 45 g's. The maximum chest displacement was 32 mm. The left and right femur loads were 4228 and 4204 Newtons respectively.

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1997/Pontiac/Grand/AM

NHTSA No.: MV0104 VIN.: 1G2NE52T3VC735948

Body color: Taupe Date of Manufacture: 9/96

Engine: 4 Cylinders; ___ C.I.D.; 2.4 Liters;

X Gas; ___ Diesel; ___ Turbocharged

___ Longitudinal; X Transverse

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

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

Odometer Reading: 94 miles

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

___P/seats; X Tilt Wheel; ___Cruise Control; ___Abs

Type of Occupant Restraint: Type II belt system with driver and passenger airbags

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 207 kPa (30 Psi) Rear 207 kPa (30 Psi)

Recommended Tire Size: P195/70R14

Recommended Cold Tire Pressure: Front 207 kPa (30 Psi) Rear 207 kPa (30 Psi)

Tires on Vehicle: P195/70R14 Manufacturer: Michelin

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

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

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

Vehicle Capacity Weight (VCW) = 400.0 kg. (A)

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

Rated Cargo Weight (RCW) A-B = 59.8 kg.

GVWR 1761 kg. GAWR: Front 998 kg.; Rear 763 kg.

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

Right Front = 448.6 kg Right Rear = 230.9 kg

Left Front = 446.3 kg Left Rear = 227.3 kg

TOTAL FRONT WEIGHT = 894.9 kg (66 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 458.2 kg (34 % of Total Vehicle Weight)

TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 1353.1 kg

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight 1353.1 kg

VCW = Vehicle Capacity Weight 400.0 kg

DSC = Designated Seating Capacity 5 RCW = VCW - 68 (DSC) = 59.8 kg

Target Test Weight = UDW + RCW + (2 dummies x 167 kg/dummy)

Target Test Weight = 1568.9 kg

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:

Right Front = 493.9 kg Right Rear = 302.6 kg

Left Front = 491.2 kg Left Rear = 280.8 kg

TOTAL FRONT WEIGHT = 985.1 kg (63 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 583.4 kg (37 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 1568.5 kg

Weight of ballast secured in vehicle trunk area = 0 kg

Vehicle components removed to meet target weight: Rear bumper, rear seat, spare tire, muffler, trunk interior

VEHICLE ATTITUDE (all dimensions in mm):

Delivered Attitude:	RF 677	LF 680	RR 718	LR 711
Test Attitude:	RF 662	LF 667	RR 680	LR 679
Post Test	RF 675	LF 628	RR 677	LR 677

Wheel Base: 2625 mm; C.G. = 976 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 20, 1997 Time of Test: 4:05 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 = 56.4 kph; secondary = 56.6 kph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 1203 mm

Exiting Speed Trap: 203 mm

VEHICLE REBOUND AND CRUSH (mm):

Vehicle Length:	Pre-test	= R	4226	C_L	4441	L 4249
	Post-test	= R	3820	C_L	3919	L 3757
	Crush	= R	406	C_L	522	L 492

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

R 565 mm C_L 466 mm L 615 mm

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	to airbag and visor	to airbag and b-post
Chest	to airbag	to airbag and b-post
Abdomen	to airbag	to airbag and b-post
Left Knee	instrument panel	to glovebox
Right Knee	instrument panel and steering column	to glovebox

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

	Front	
Post-Test Door Opening	Left	Right
(without use of tools)	Yes	No

	Front	
Seat Movement	Left	Right
Seat Back Movement	0	0
Seat Shift (mm)	2 mm forward	6 mm forward

Glazing Damage

Backlight/Windshield: Cracked Windshield

Other Notable Impact Effects: Airbags Deployed

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

POST TEST AIRBAG DATA

Vehicle Yr/Make/Model/Body Style: 1997/Pontiac/Grand/AM

NHTSA No.: MV0104 VIN: 1G2NE52T3VC735948

A. Number of Vent Holes: Driver 2; Passenger 0

B. Size of Vent Holes: Driver 30 mm dia;. Passenger N/A

C. Total Vent Area; Driver 14 cm^2 Passenger 0 cm^2

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

Driver; Length ____mm, Width____mm, Diameter 660 mm

Passenger; Length 650 mm, Width 500 mm, 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

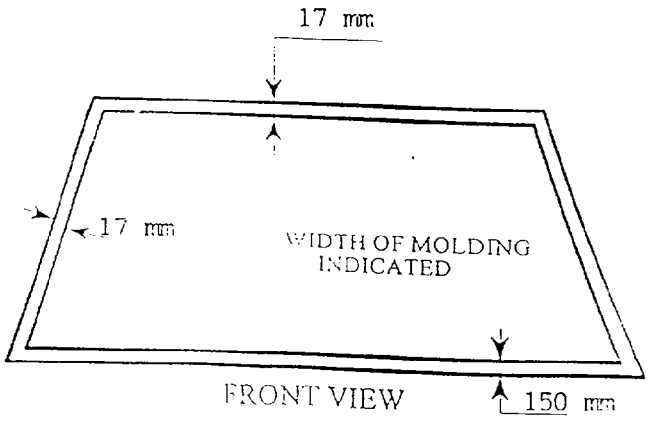
Details of windshield mounting such as retention method, trim type, etc.:
Windshield set in rubber molding with glue and plastic trim

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

FMVSS 212 TEST DATA:

	WINDSHIELD PERIPHERY		
	PRE-TEST (mm)	POST-TEST (mm)	PERCENT RETENTION
RIGHT SIDE	2017	2017	100%
LEFT SIDE	2017	2017	100%
TOTAL	4034	4034	100%

AREA OF RETENTION FAILURE: None



FAILURE DETAILS: None

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

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the surface of the instrument panel, including padding, and drawing the locus of points on the inner surface of the windshield contactable by the sphere across the width of the instrument panel. From the outermost contact points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and ½" distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection onto the outer surface of the windshield of this line.

FMVSS 219 TEST DATA:

A= 1064 mm

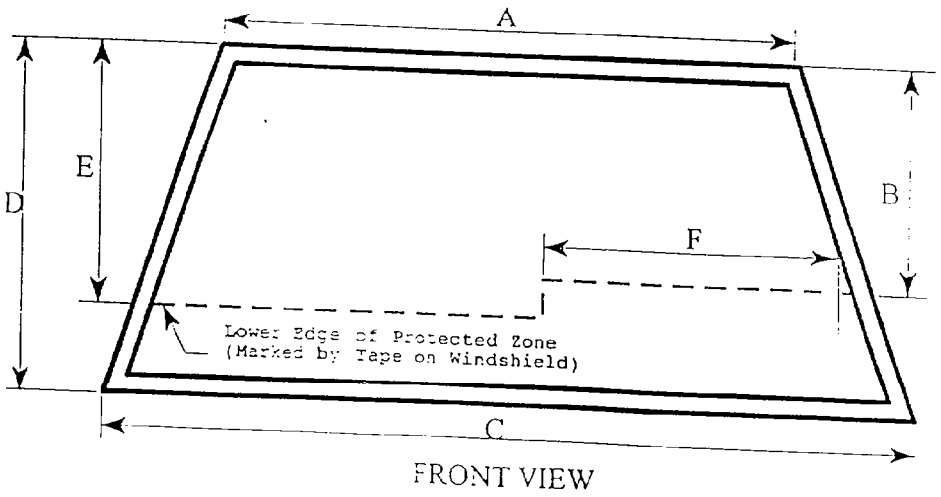
B= 546 mm

C= 1534 mm

D= 718 mm

E= 526 mm

F= 490 mm



FRONT VIEW

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

(Show location of penetration)

NONE

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

FMVSS NO. 301

TEST VEHICLE NHTSA NO.: MV0104 Test Date: January 20, 1997

Vehicle Mfgr./Make/Model: 1997/Pontiac/Grand/AM

Usable Capacity of Vehicle's Fuel Tank: 57.5 Liters
(figure furnished by vehicle manufacturer)

TEST REQUIREMENTS:

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

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

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

TEST VEHICLE IMPACT TYPE: _X_ Frontal (35 mph)

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

___ Rear Moving Barrier (30 mph)

___ Side Impact MDB (33.2 mph)

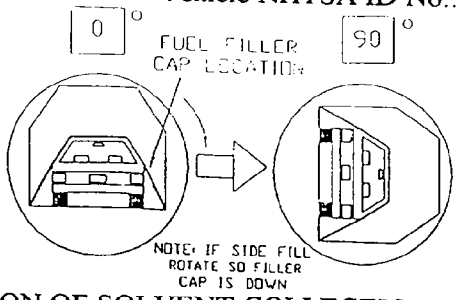
FUEL SPILLAGE MEASUREMENT:

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

SOLVENT SPILLAGE DETAILS: None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° - 90° Vehicle NHTSA ID No.: MV0104



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 52 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 52 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

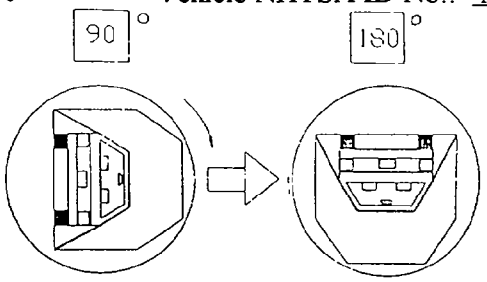
0	0	0	0

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

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 90° - 180° Vehicle NHTSA ID No.: MV0104



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 35 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 35 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:

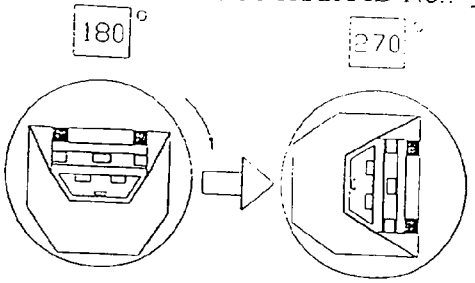
0	0	0	0

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.: MV0104



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 17 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 17 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

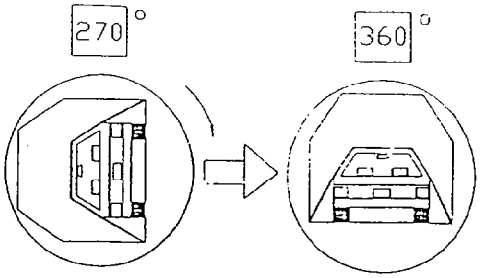
0	0	0	0

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

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 270° - 360° Vehicle NHTSA ID No.: MV0104



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 39 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 39 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0

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

IV. SOLVENT SPILLAGE LOCATIONS(S): None

SECTION 4

OMI FINAL DATA

Occupant and Vehicle Information

I. OMI DATA

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

II. OVR DATA

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

III. AID DATA

1. Accident Investigation Damage Data Summary

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

VEH. YR./MAKE/MODEL/BODY STYLE: 1997/Pontiac/Grand/AM
VEH. NHTSA NO.: MV0104 TEST DATE: January 20. 1997

MAX. ACCELERATION VALUES: (g's)	DRIVER # 037	PASSENGER # 036
Head Channel X	-57.1	-57.6
Head Channel Y	-12.2	23.2
Head Channel Z	17.8	-29.2
HEAD RESULTANT	59.5	64.5
Chest Channel X	-41.4	-45.2
Chest Channel Y	3.9	-6.3
Chest Channel Z	15.1	14.9
CLIP	40.6	45.1
TIME INTERVAL (msec) [3. msec. minimum]	t_1 = 60.9 t_2 = 64.0	t_1 = 67.3 t_2 = 70.4

HEAD INJURY CRITERIA (HIC) VALUES:

HIC	516.5	617.4
t_1 = (msec)	62.4	60.5
t_2 = (msec)	98.4	96.5
Avg. Accel. t_1 to t_2 (g's)	46.0	49.4

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

MAX. COMPRESSIVE FEMUR FORCES:

Left Side (N)	-3038	-4228
Right Side (N)	-4411	-4204

MAXIMUM SEAT BELT FORCES:

Lap Belt (N)	4465	4732
Shoulder Belt (N)	4761	5043

HYBRID III NECK, CHEST AND PELVIS DATA SHEET

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1997/Pontiac/Grand/AM

VEHICLE NHTSA NO.: MV0104 TEST DATE: January 20, 1997

MAXIMUM VALUES	DRIVER DUMMY # 037	PASSENGER DUMMY # 036
Neck Load X (N)	745	525
Neck Load Y (N)	-188	203
Neck Load Z (N)	1559	1645
Neck Moment X (NM)	-14.7	16.8
Neck Moment Y (NM)	29.7	-63.2
Neck Moment Z (NM)	18.2	-28.3
Chest Deflection X (mm)	25	32
Time of Max. Occurrence	86	75
Pelvis X Acceleration (g's)	-47.2	-63.1
Pelvis Y Acceleration (g's)	12.8	51.2 (2)
Pelvis Z Acceleration (g's)	-118.3 (1)	24.2 (3)
Pelvis Resultant (g's)	125.5 (1)	75.8

(1) Data Spike at 53 msec.
(2) Data Spike at 63 msec.
(3) Data Spike at 53 msec.

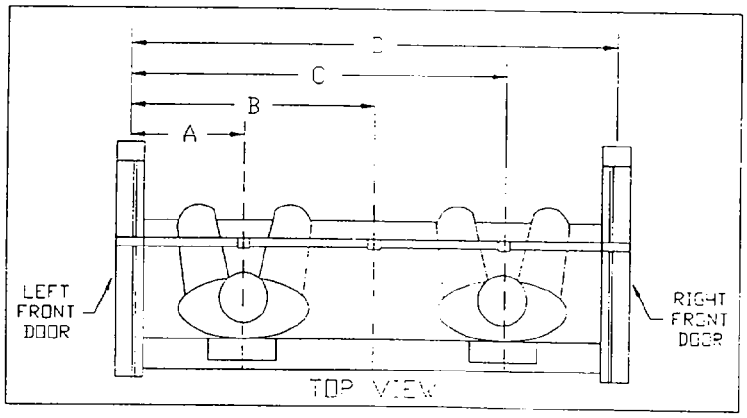
PART 572 DUMMY IN-VEHICLE POSITION

Vehicle NHTSA No.: MV0104 Vehicle: 1997 Pontiac Grand AM

SEAT TYPE:	ADJUSTER TYPE:		BUCKET SEAT BACK TYPE:
_____Bench	Driver:	_X_Manual	_____Fixed
_X_Bucket		____Power	_X_Adjustable Reclining
_____Split Bench			
	Passenger:	_X_Manual	_____ Fixed
		____Power	_____Adjustable reclining

DRIVER SEAT POSITION
12th detent rearward out of 22 detents

PASSENGER SEAT POSITION
6th detent rearward of 10 detents



_37_ DUMMY ID_36_

A = Left Door to Driver Centerline ___412___ mm

B = Left Door to Center Passenger Centerline ___751___ mm

C = Left Door to Right Passenger Centerline ___1096___ mm

D = Left Door to Right Door ___1502___ mm

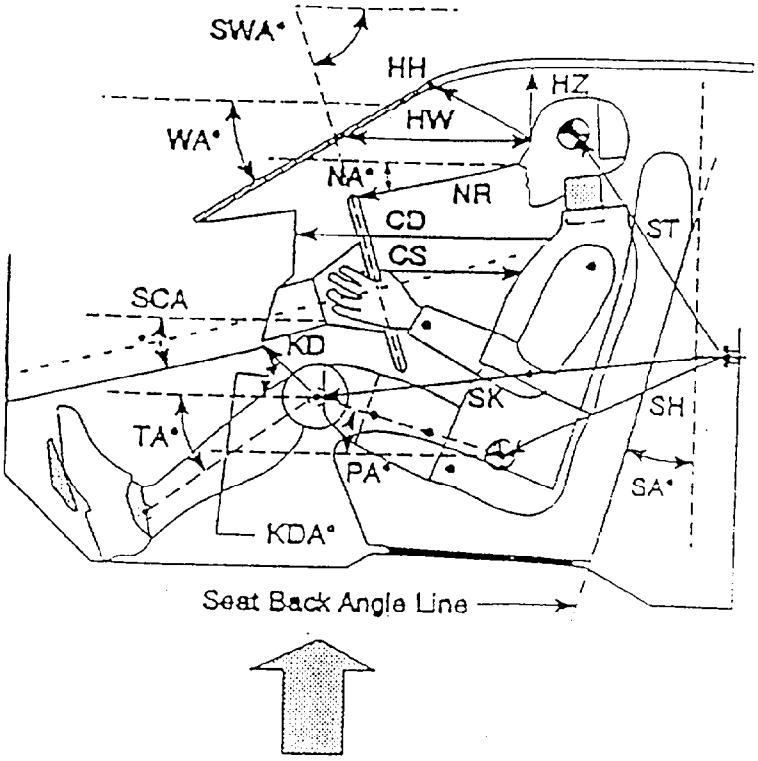
FRONT SEAT MEASUREMENT TABLE

Units (mm)

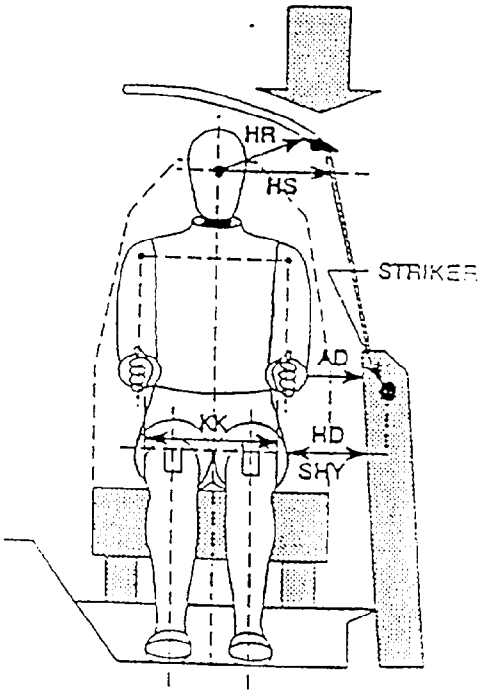
	DRIVER (Serial # 037)	PASSENGER (Serial # 036)
WA°	27.6°	
SWA°	18.7°	N/A
SCA°	26.0°	N/A
SA°	28.0°	27.6°
HZ	141	151
HH	329	313
HW	528	528
HR	172	167
NR	374 Angle 12.5°	N/A
CD	511	508
CS	303	N/A
RA	187	N/A
KDL	142 Angle (KDA) 38.8°	167
KDR	147	154 Angle 36.7°
PA°	23.8°	23.8°
TA°	42.5°	39.3°
KK	302	236
ST	539 Angle 6.4°	552 Angle 7.2°
SK	596 Angle 88°	590 Angle 91.8°
SH	242 Angle 114.5°	232 Angle 126.3°
SHY	220	234
HS	310	306
HD	102	109
AD	75	77

N/A = Not Applicable

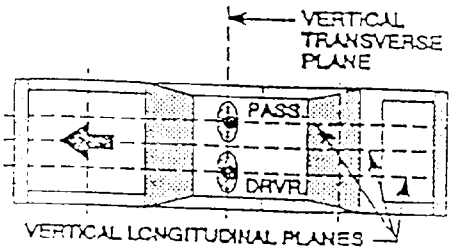
FRONT SEAT MEASUREMENTS



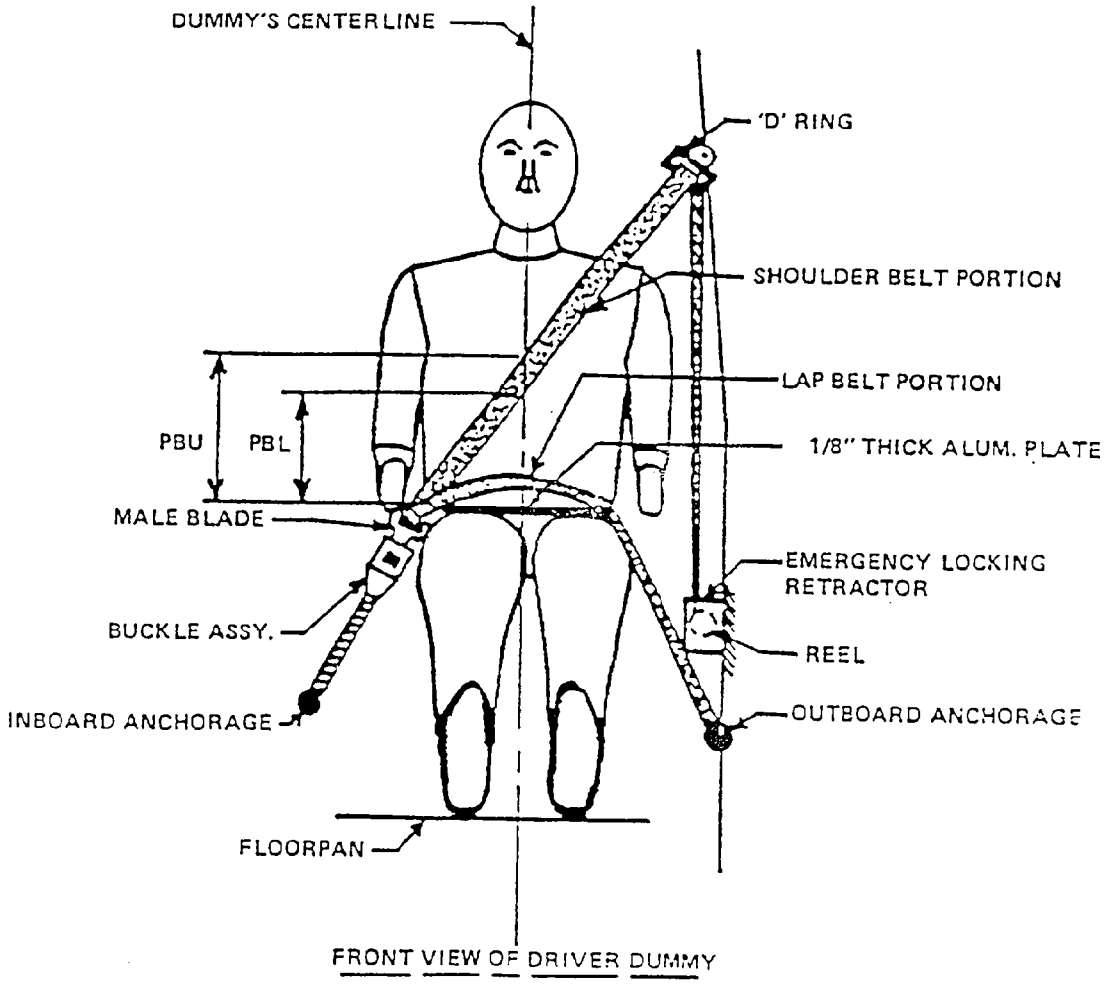
AD	-	Arm to Door
HD	-	H-Point to Door
HR	-	Head to Side Header
HS	-	Head to Side Window
KK	-	Knee to Knee
SHY	-	Striker to H-Point (Y-Direction)



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



SEAT BELT POSITIONING DATA



(illustration)

Dimension = mm

	DRIVER DUMMY	PASSENGER DUMMY
PBU -- Top surface of alum. plate to upper edge	324	341
PBL -- Top surface of alum. plate to belt lower edge	241	259

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:	Driver	Passenger	
Length from trim above retractor reel to "D" ring as measured on dummy.	255 mm	249 mm	
Shoulder belt length as measured on Part 572 Dummy.	755 mm	793 mm	
Lap belt length as measured on Part 572 Dummy.	205 mm	225 mm	
SHOULDER BELT SPOOL-OFF DATA:			
As determined by film analysis	40 mm	51 mm	at retractor
As determined mechanically	56 mm	56 mm	at retractor
As determined electronically	N/R	N/R	
BELT STRETCH DATA:			
Measured electronically between shoulder belt load cell and the "D" ring.	N/R	N/R	
Measured mechanically	N/R	N/R	
RETRACTOR LOCK-UP TIME:			
As determined by shoulder belt spool-off observed in on-board cameras	60 msec.	70 msec.	

N/R Not Recorded

CAMERA LOCATIONS

VEH. NHTSA NO.: MV0104 ; TEST DATE: January 20, 1997

VEH. YEAR/MAKE/MODEL/BODY STYLE: 1997/Pontiac/Grand/AM

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	870	10200	1560	90	9775	25	649
3	Steering Column Top	2120	8090	1530	90	7665	25	1015
4	Steering Column Bottom	2110	8100	1005	90	7675	25	976
5	Driver Close-up	1280	10530	1500	90	10105	75	1093
6	Driver Angle	5040	5590	2090			50	1015
7	Onboard Driver						35	1010
8	Onboard Passenger						35	1010
9	Right Overall	2100	7000	1245	90	6585	13	1005
10	Right Passenger Half	1090	8080	1140	90	7665	25	976
11	Right Close-up	1440	10160	1205	90	9745	75	1053
12	Right Angle	4830	5530	1960			50	1020
13	Top Overall	380	0	2700			13	1042
14	Top Driver	100	-450	1600			13	971
15	Top Passenger	100	470	1610			13	885
16	Pit Front	1180	0	-3155			13	990
17	Pit Rear	2680	0	-3165			13	1005

* COORDINATES:

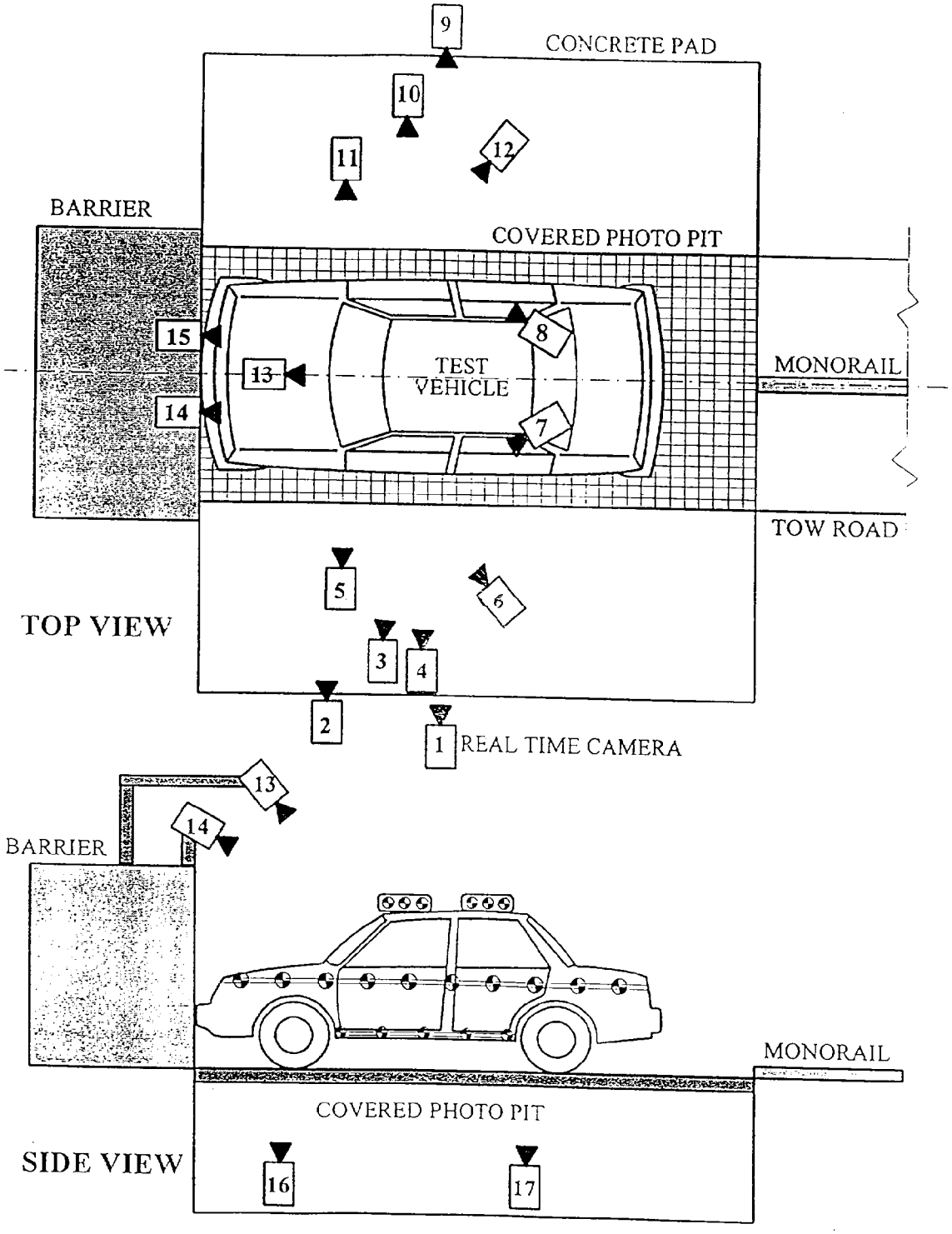
+X = film plane rearward of barrier

+Y = film plane to left of monorail centerline

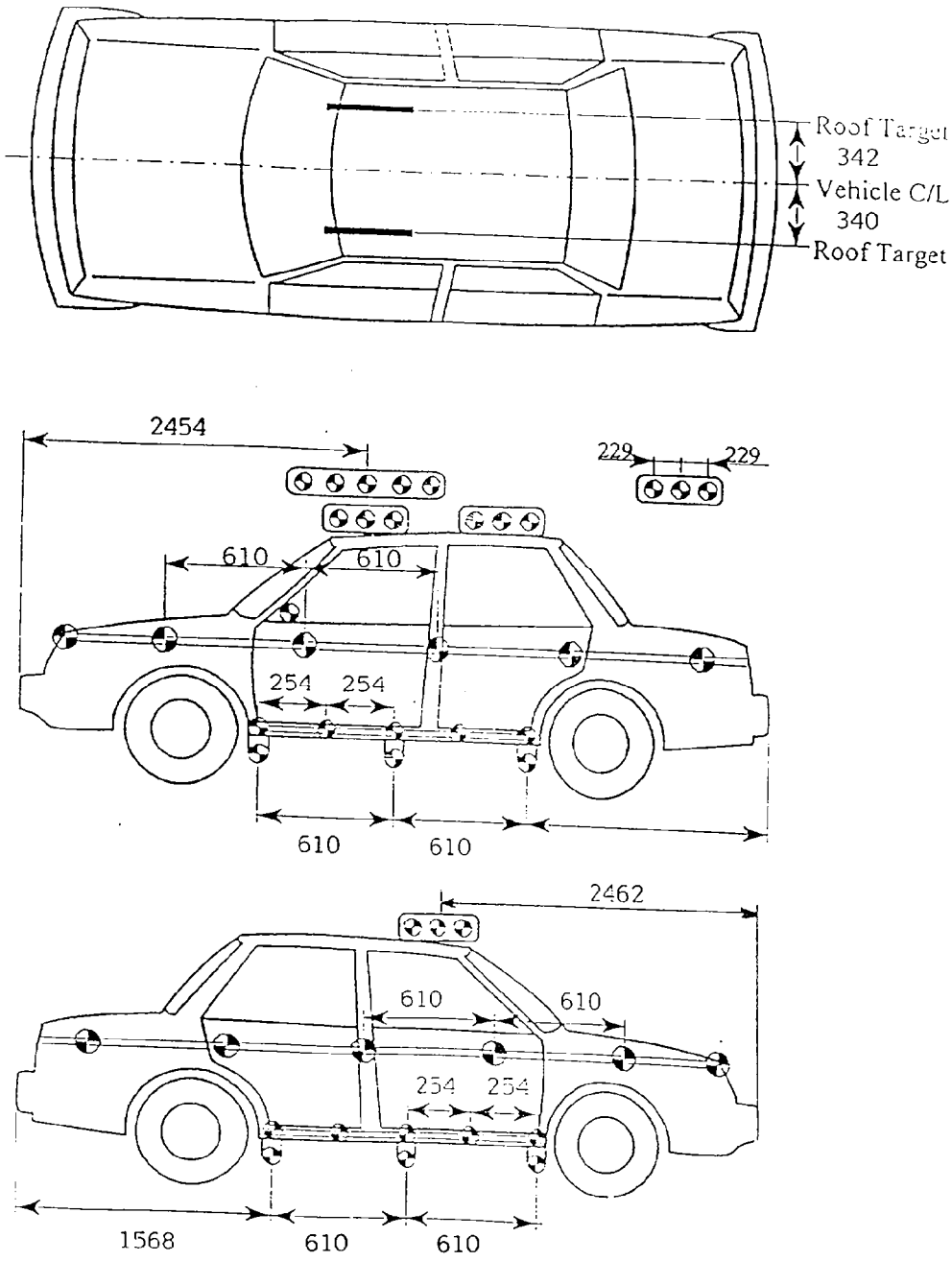
+Z = film plane to above ground level

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

CAMERA LOCATIONS (Cont'd)



VEHICLE TARGET LOCATIONS



(DIMENSIONS IN MM)

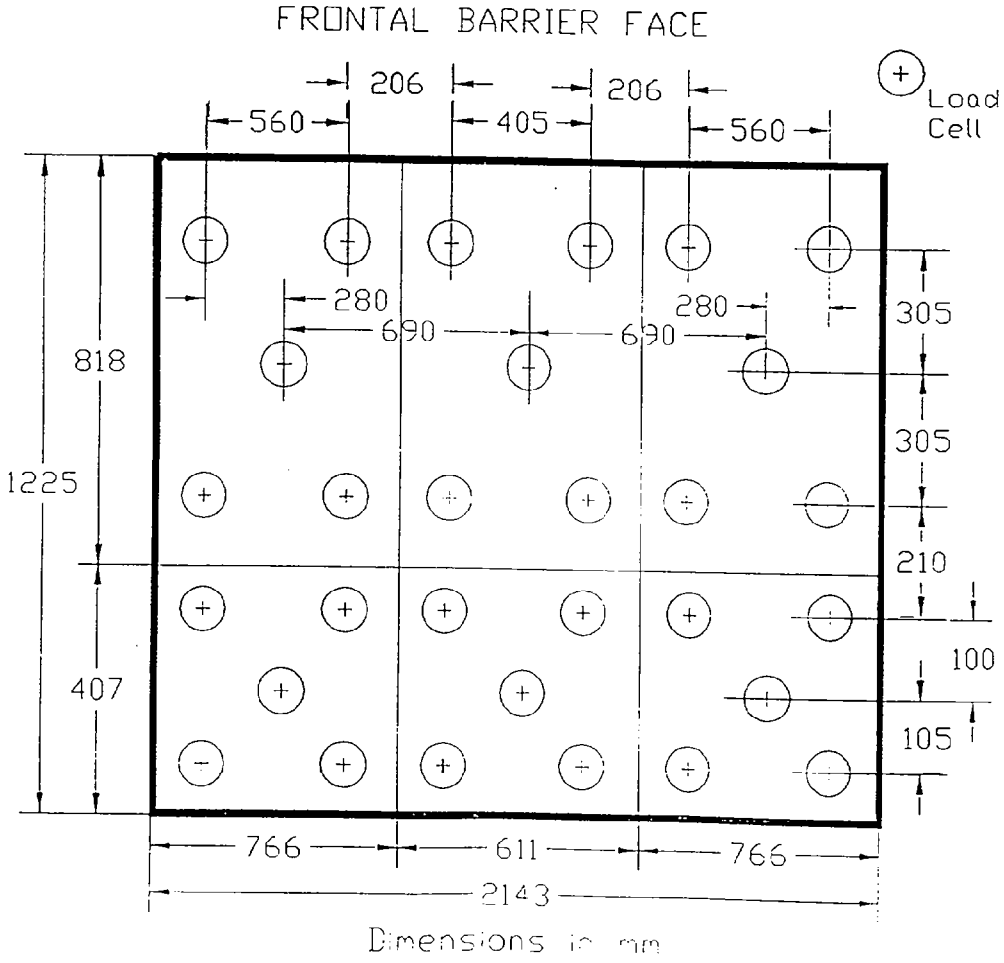
LOAD CELL LOCATIONS ON FIXED BARRIER

30 Load Cells

6 Rows

9 Columns

6 Groupings (5 cells/group)

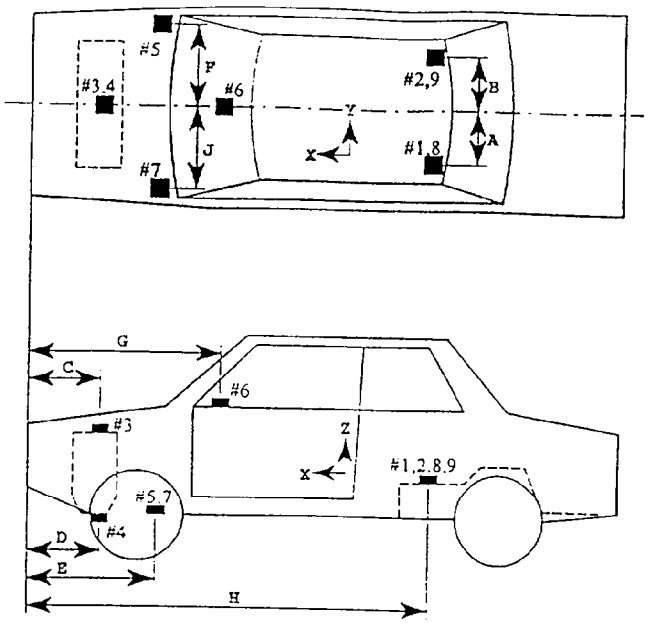


The following data is presented in Appendix B:

(1) Total or Sum of 30 individual load cells

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

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



Units: (mm)

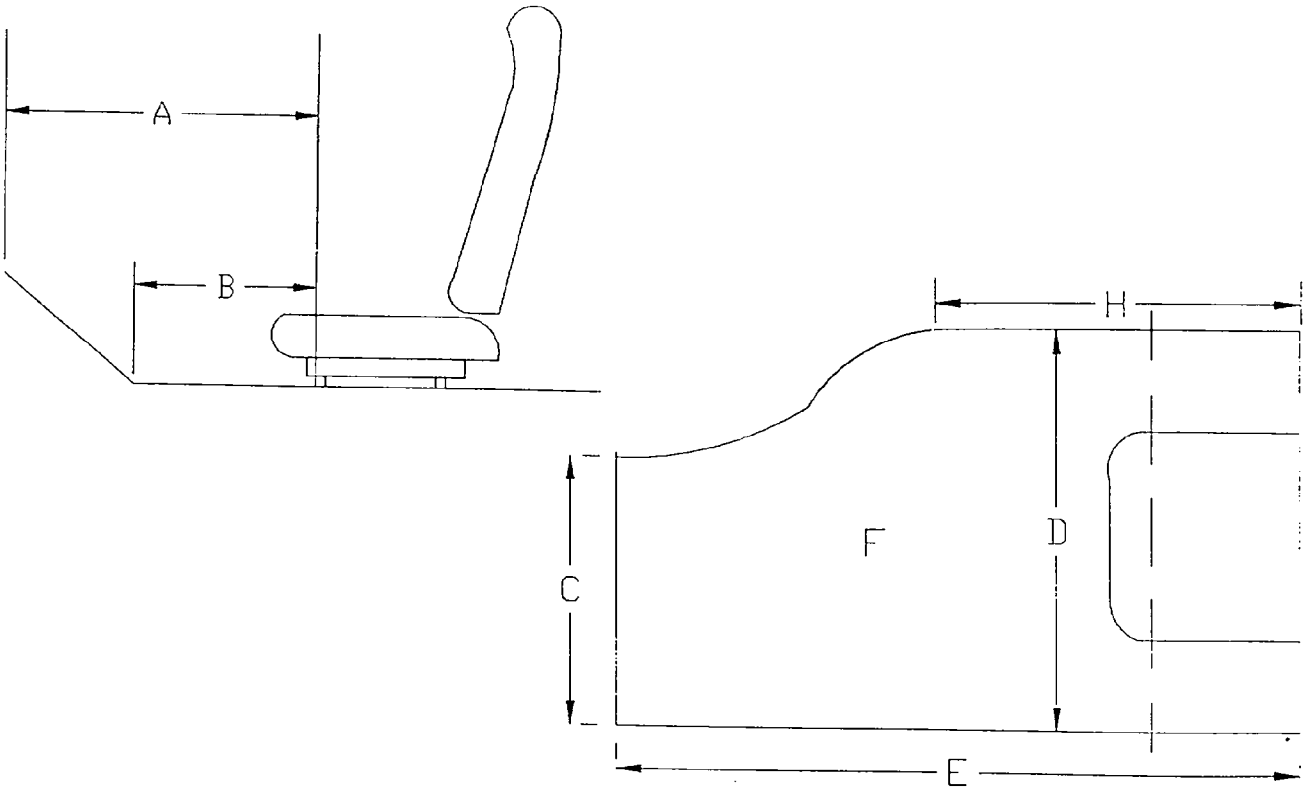
Dimension	Length
A	-388
B	388
C	842
D	873
E	1032
F	605
G	1709
H	2907
J	-605

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



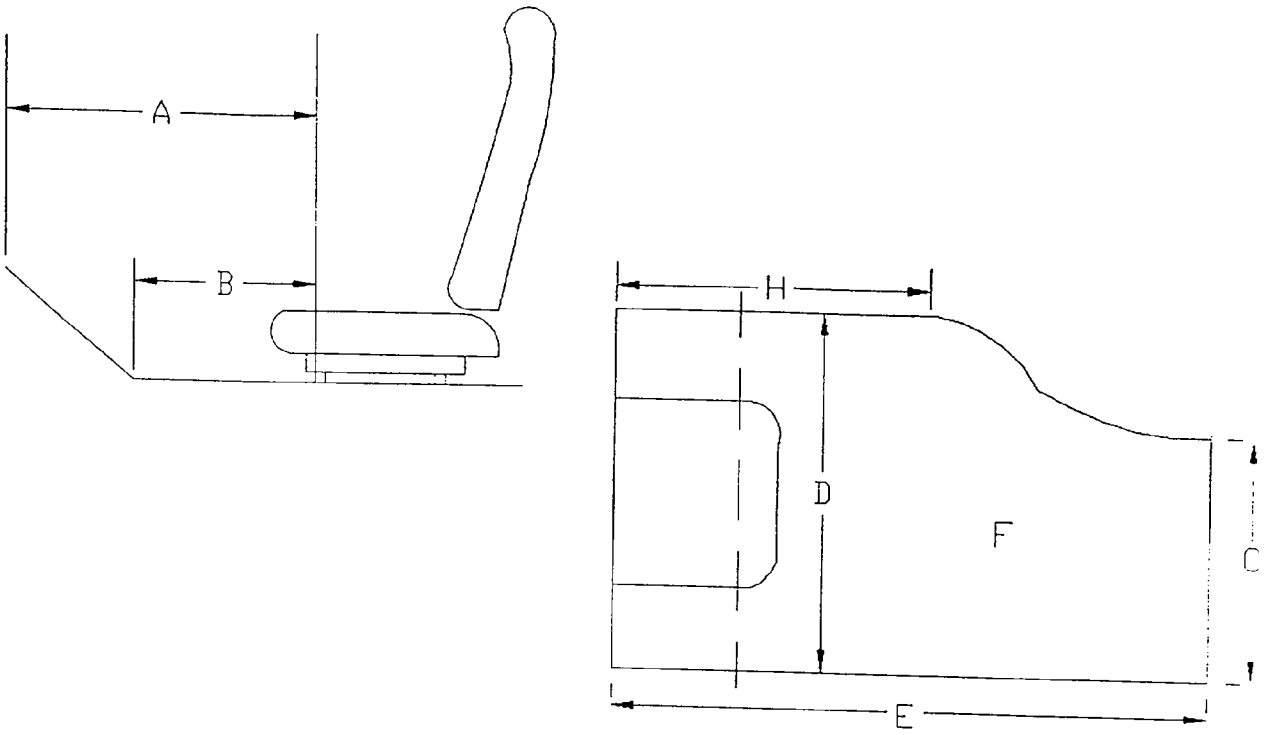
Units = mm

MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	760	612	-148
B	447	356	-91
C	282	304	22
D	309	313	16
E	2173	2024	-149
H	1864	1824	-40

TEST VEHICLE MEASUREMENTS (Cont'd)

STATIC FOOTWELL DEFORMATION

Passenger's Side

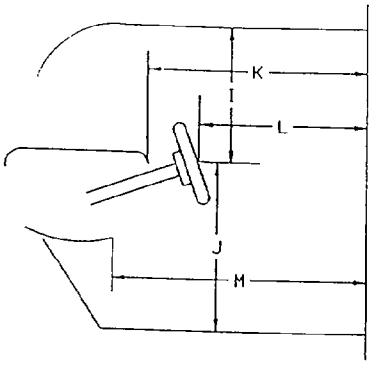


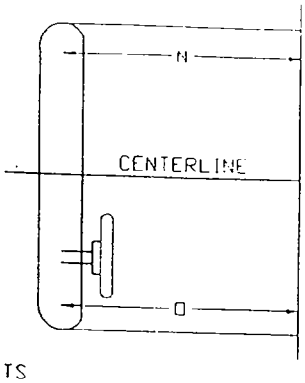
Units = mm

MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	722	526	-196
B	472	332	-140
C	324	288	-36
D	345	339	-6
E	2218	2061	-157
H	1862	1826	-36

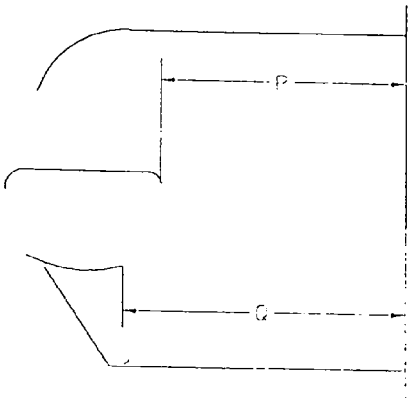
TEST VEHICLE MEASUREMENTS (Cont'd)

STATIC PASSENGER COMPARTMENT INTRUSION





MEASUREMENTS
FROM C-PILLAR
BELT ANCHORAGE



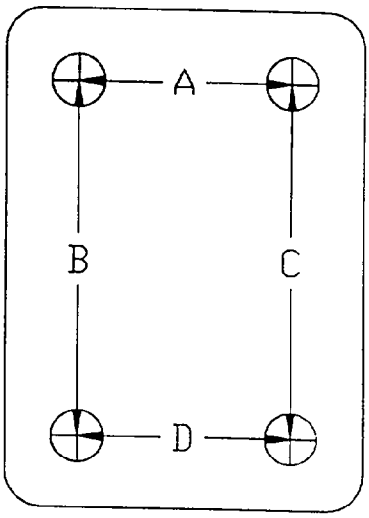
Units = mm

MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
I	434	362	72
J	655	786	-131
K	1764	1761	-3
L	1562	1568	-6
M	1937	1853	-84
N	2059	2006	-53
O	2059	2041	-18
P	1779	1711	-68
Q	1931	1812	-119

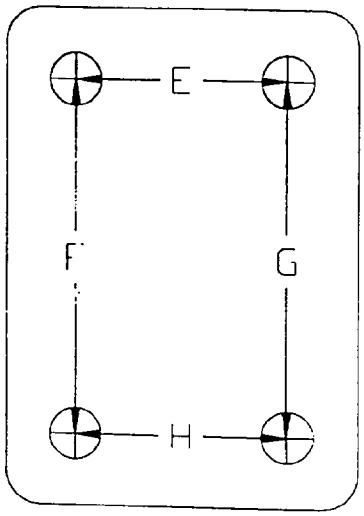
TEST VEHICLE MEASUREMENTS (Cont'd)

UNDERBODY FLOORBOARD DEFORMATION

DRIVER'S SIDE



PASSENGER'S SIDE

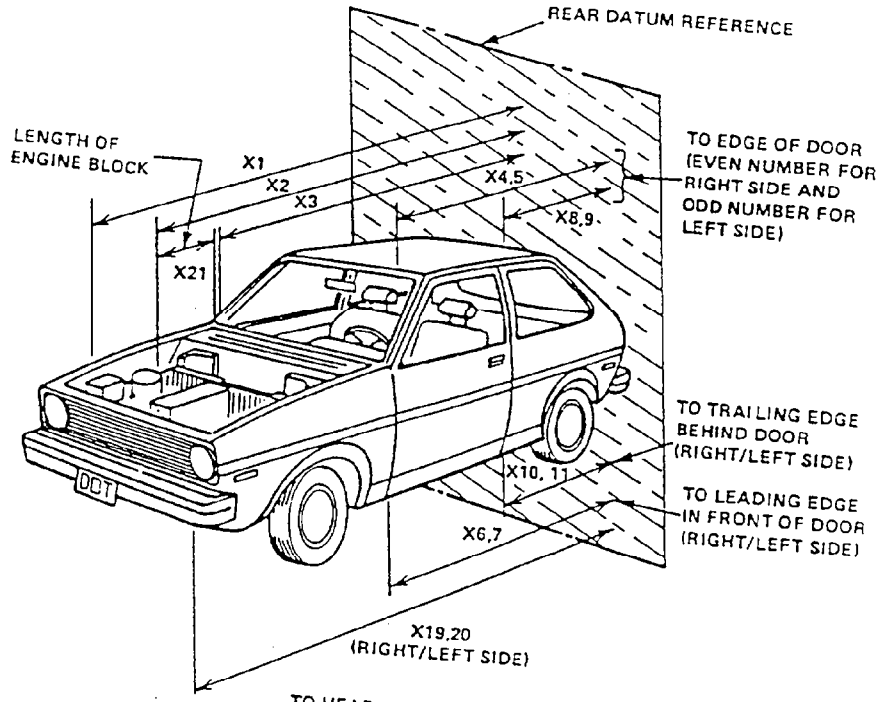


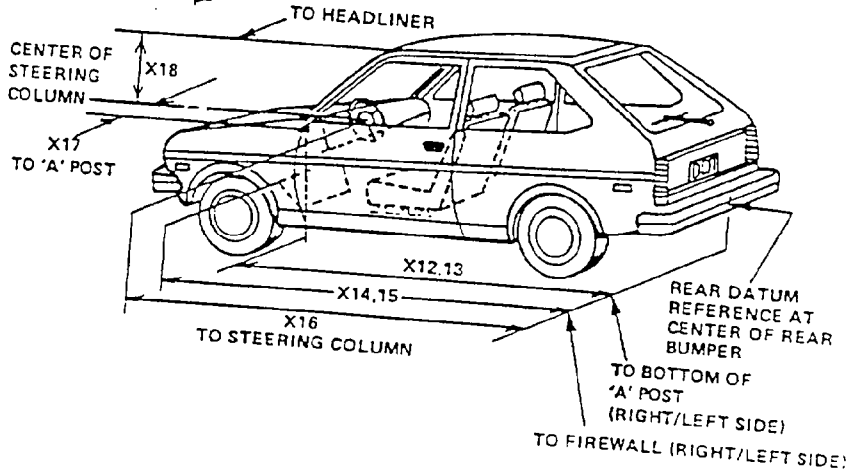
MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	330	293	-37
B	375	335	-40
C	388	260	-128
D	328	324	-4
E	332	300	-32
F	377	310	-67
G	363	308	-55
H	315	312	-3

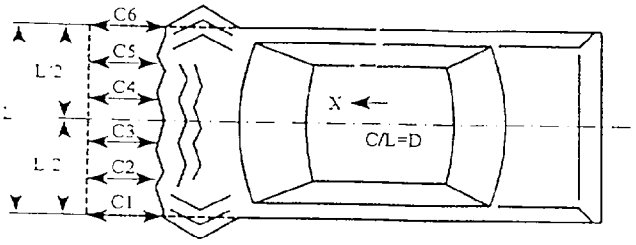
TEST VEHICLE MEASUREMENTS (Cont'd)

No.	MEASUREMENT DESCRIPTION:	Pre-Test (mm)	Post-Test (mm)	Diff. (mm)
X1	Total Length of Test Vehicle at Centerline	4441	3919	522
X2	Rear Surface of Vehicle to Front of Engine	3631	3419	212
X3	Rear Surface of Vehicle to Firewall	3043	3049	6
X4	Rear Surface to Upr. Leading Edge of Rt. Door	2856	2869	13
X5	Rear Surface to Upr. Leading Edge of Left Door	2858	2878.	20
X6	Rear Surface to Lwr. Leading Edge of Rt. Door	2847	2821	26
X7	Rear Surface to Lwr. Leading Edge of Left Door	2847	2819	28
X8	Rear Surface to Upr. Trailing Edge of Rt. Door	1826	1812	14
X9	Rear Surface to Upr. Trailing Edge of Left Door	1824	1842	18
X10	Rear Surface to Lwr. Trailing Edge of Rt. Door	1851	1827	24
X11	Rear Surface to Lwr. Trailing Edge of Left Door	1856	1839	17
X12	Rear Surface to Bottom of A-Post on Rt. Side	2854	2857	3
X13	Rear Surface to Bottom of A-Post on Left Side	2852	2827	25
X14	Rear Surface to Firewall on Right Side	3044	3049	5
X15	Rear Surface to Firewall on Left Side	3136	3089	47
X16	Rear Surface to Steering Column	2406	2350	56
X17	Center of Steering Column to A-Post	395	228	167
X18	Center of Steering Column to Headlining	453	304	149
X19	Rear Surface to Right Side of Front Bumper	4226	3820	406
X20	Rear Surface to Left Side of Front Bumper	4249	3757	492
X21	Length of Engine Block	402	402	0

TEST VEHICLE MEASUREMENTS (Cont'd)







ACCIDENT INVESTIGATION DIVISION DATA

FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: 1997/Pontiac/Grand/AM

VEH. NHTSA NO.: MV0104; VIN: 1G2NE52T3VC735948

MODEL YEAR: 1997 ; BUILD DATE: 9/96 ; TEST DATE: January 20, 1997

VEH. SIZE CATEGORY: Mid ; TEST WEIGHT: 1569 kg

VEH. WHEELBASE: 2625 mm; FRONT OVERHANG: 1092 mm; OVERALL WIDTH: 1532 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: 56.4 kph ; TIME OF SEPARATION: 88 msec

VELOCITY CHANGE: 71.9 kph

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

CRUSH DEPTH DIMENSIONS:

C1 = 492 mm

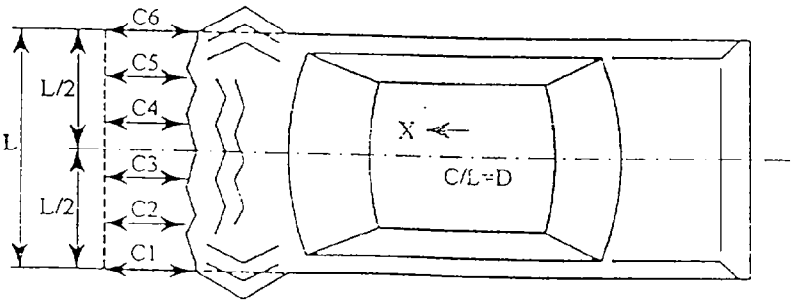
C2 = 477 mm

C3 = 504 mm

C4 = 514 mm

C5 = 620 mm

C6 = 406 mm



MIDPOINT OF DAMAGE: D = Vehicle Centerline (Longitude)

LENGTH OF DAMAGED REGION: L = 1378 mm

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (Cont'd)

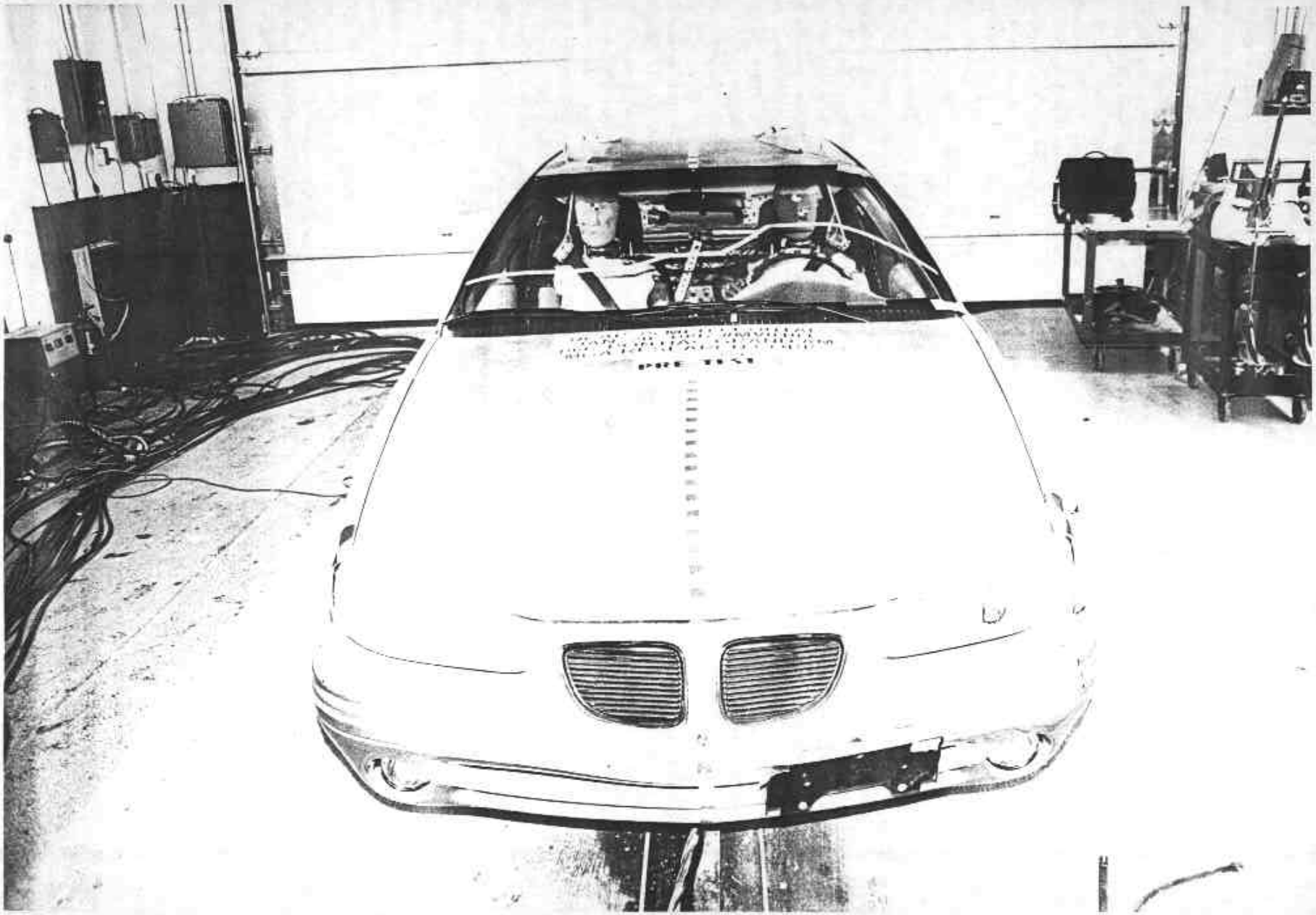


Photo No. A-1 - Pre-Test Front View of Test Vehicle

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

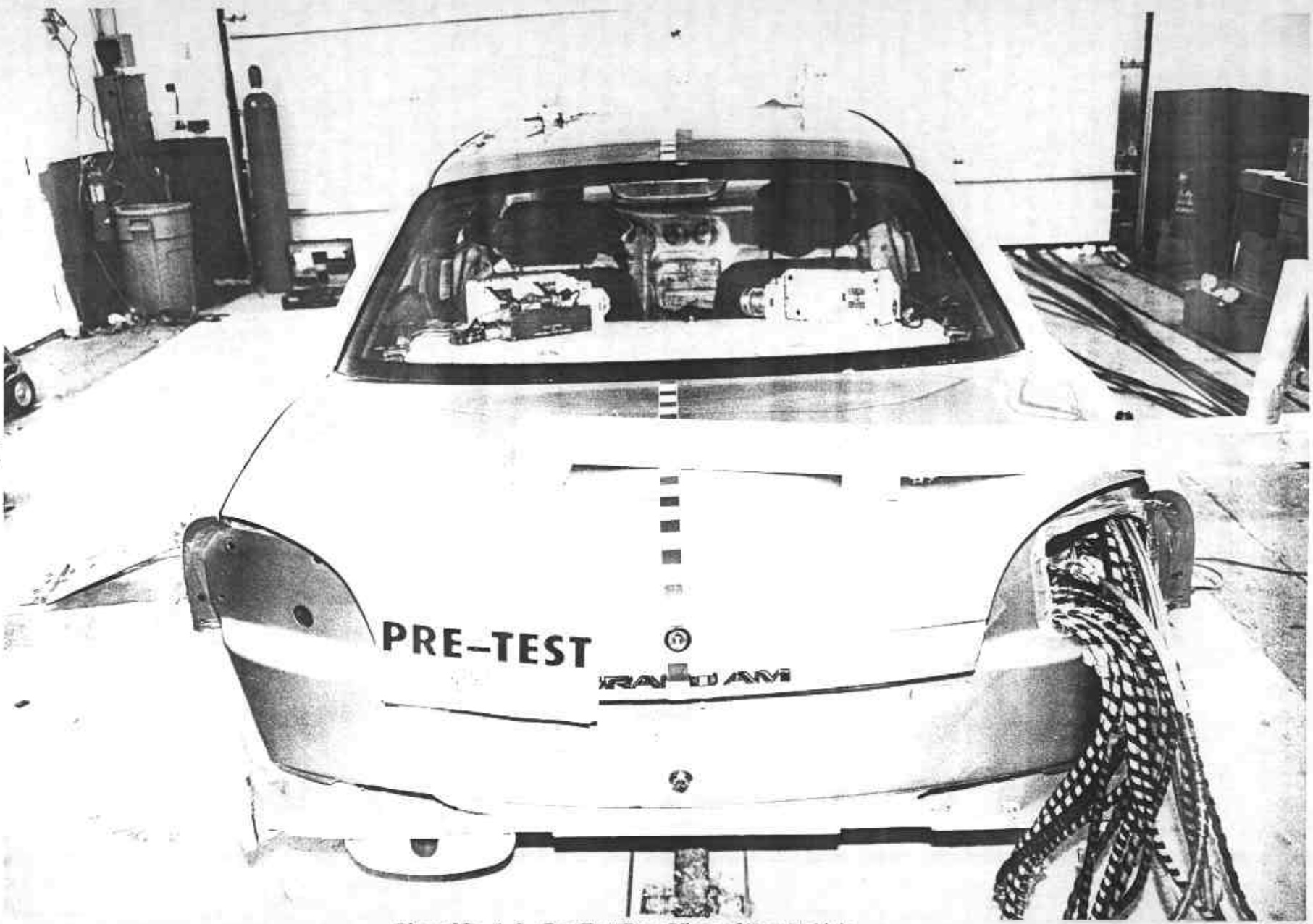
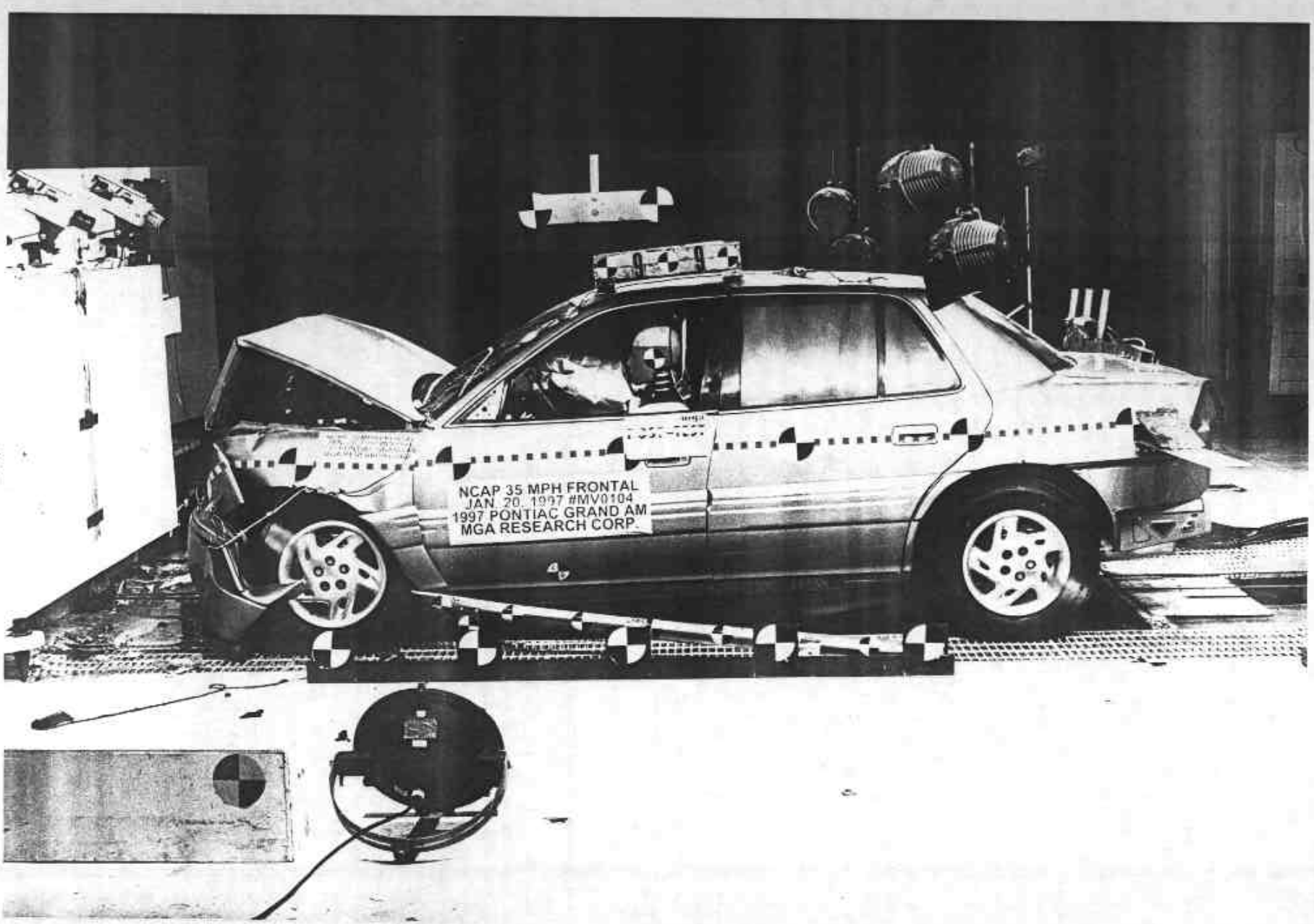


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

A-4

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

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



A-6

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

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

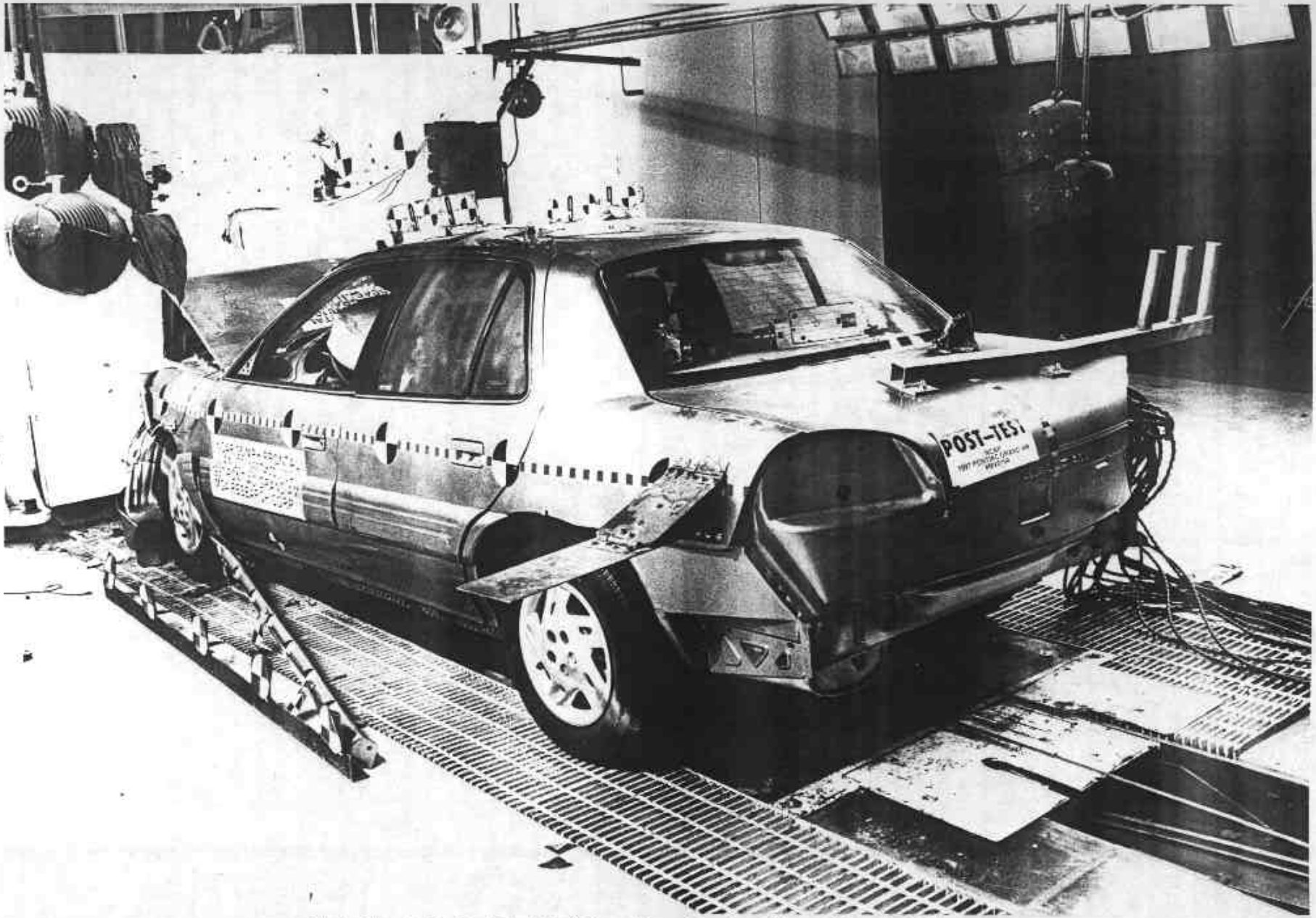


Photo No. A-8 - Post-Test Left Rear Three-Quarter View of Test Vehicle

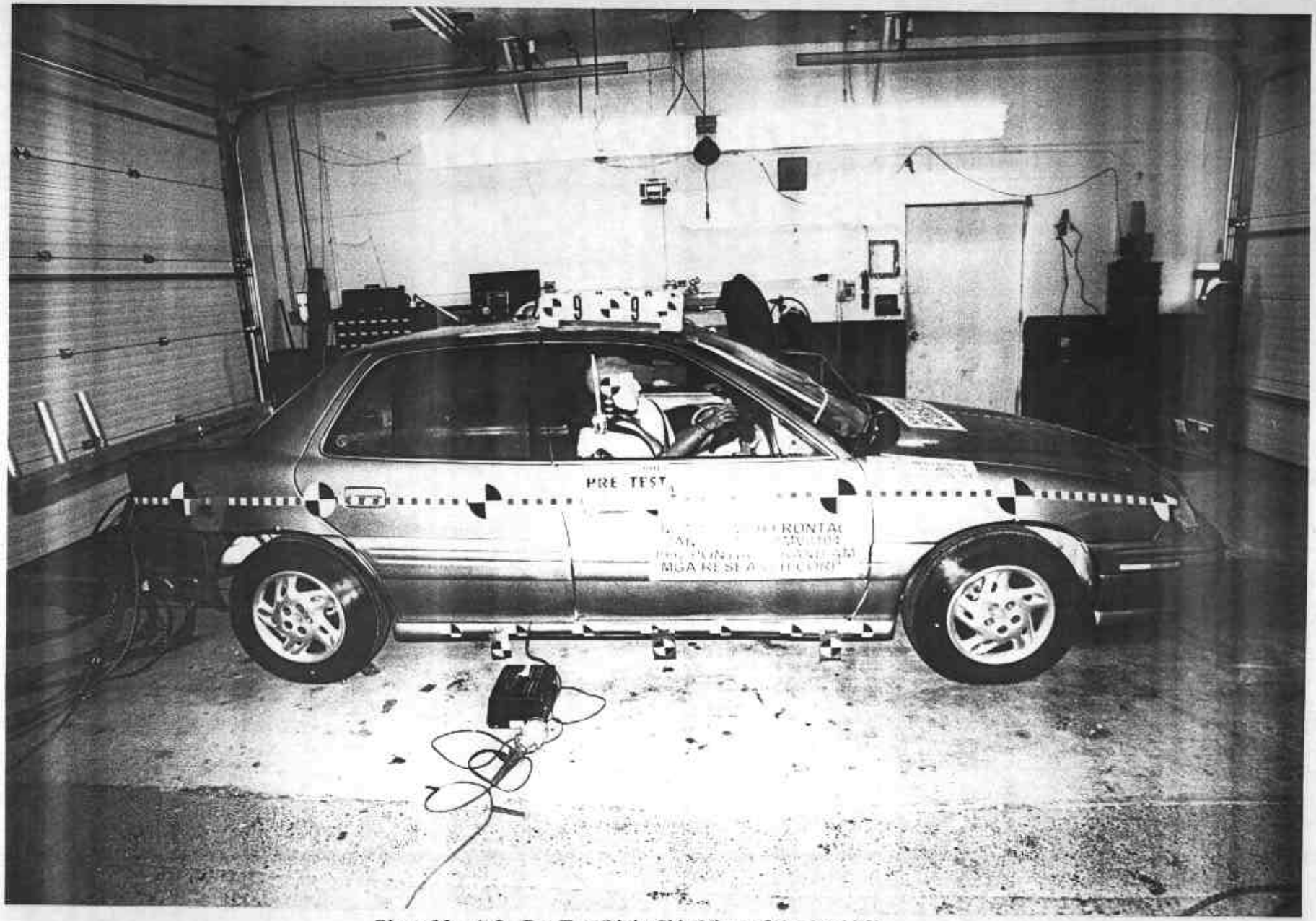


Photo No. A-9 - Pre-Test Right Side View of Test Vehicle

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

A-11

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

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

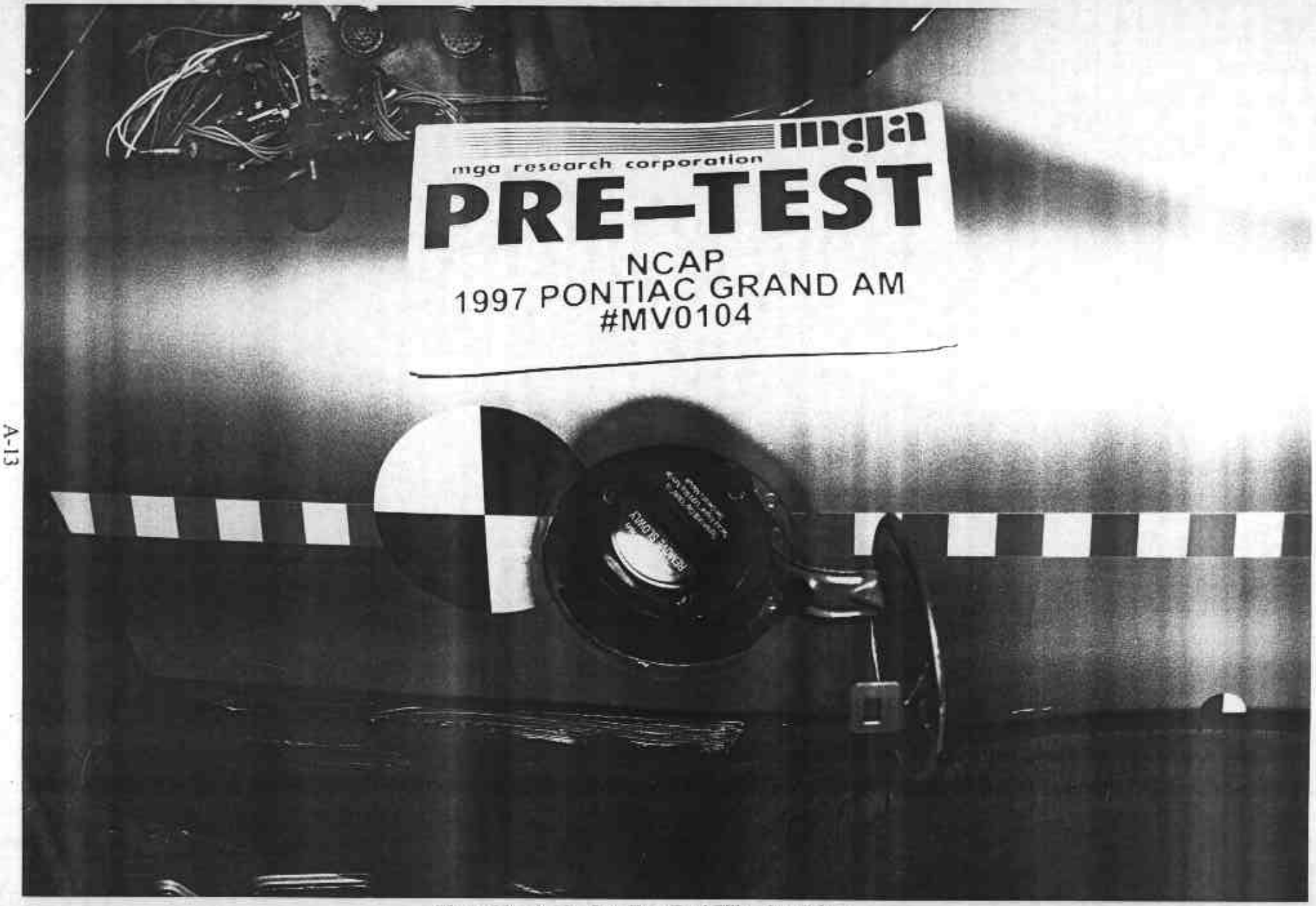


Photo No. A-13 - Pre-Test Fuel Filler Cap View

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

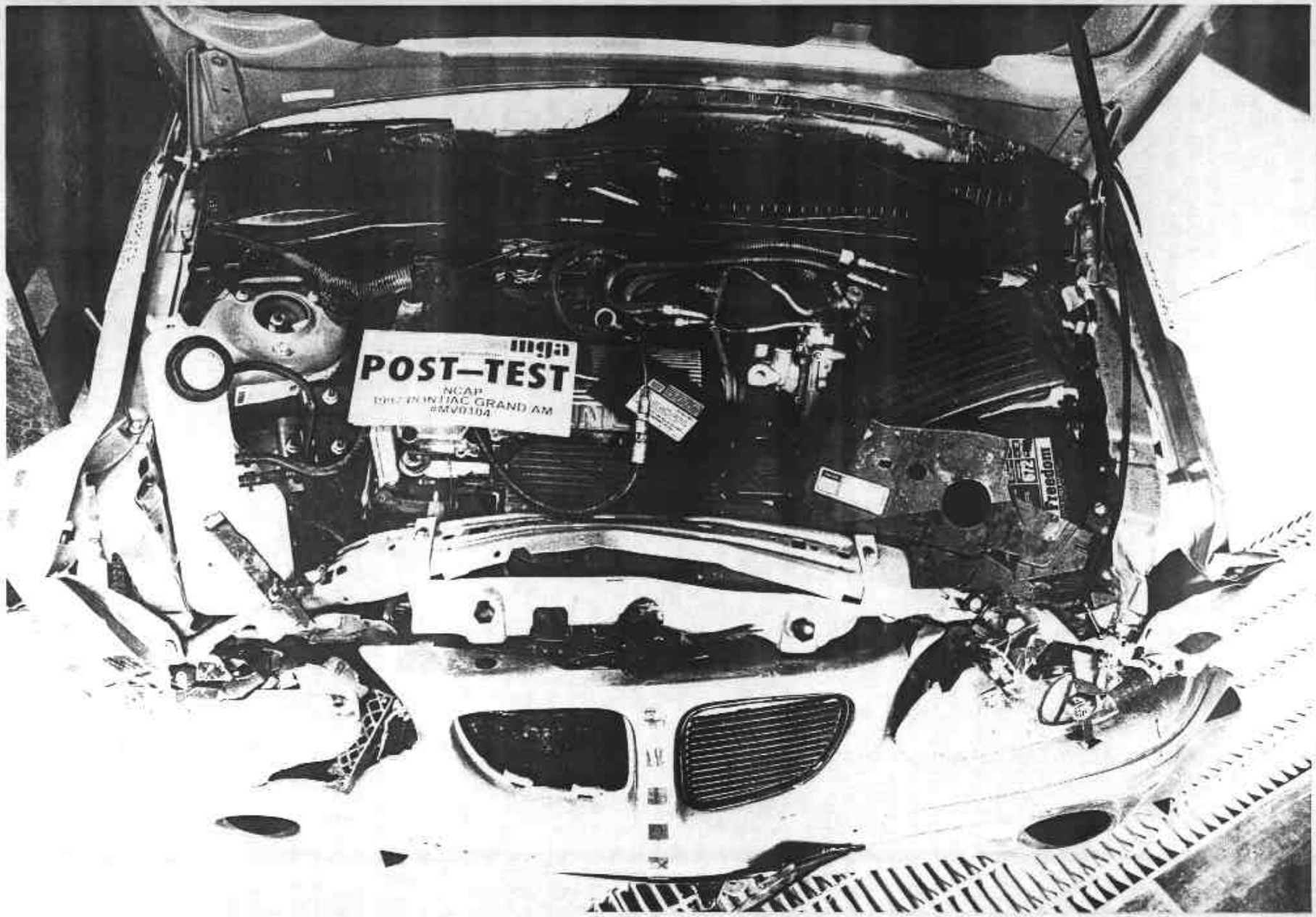
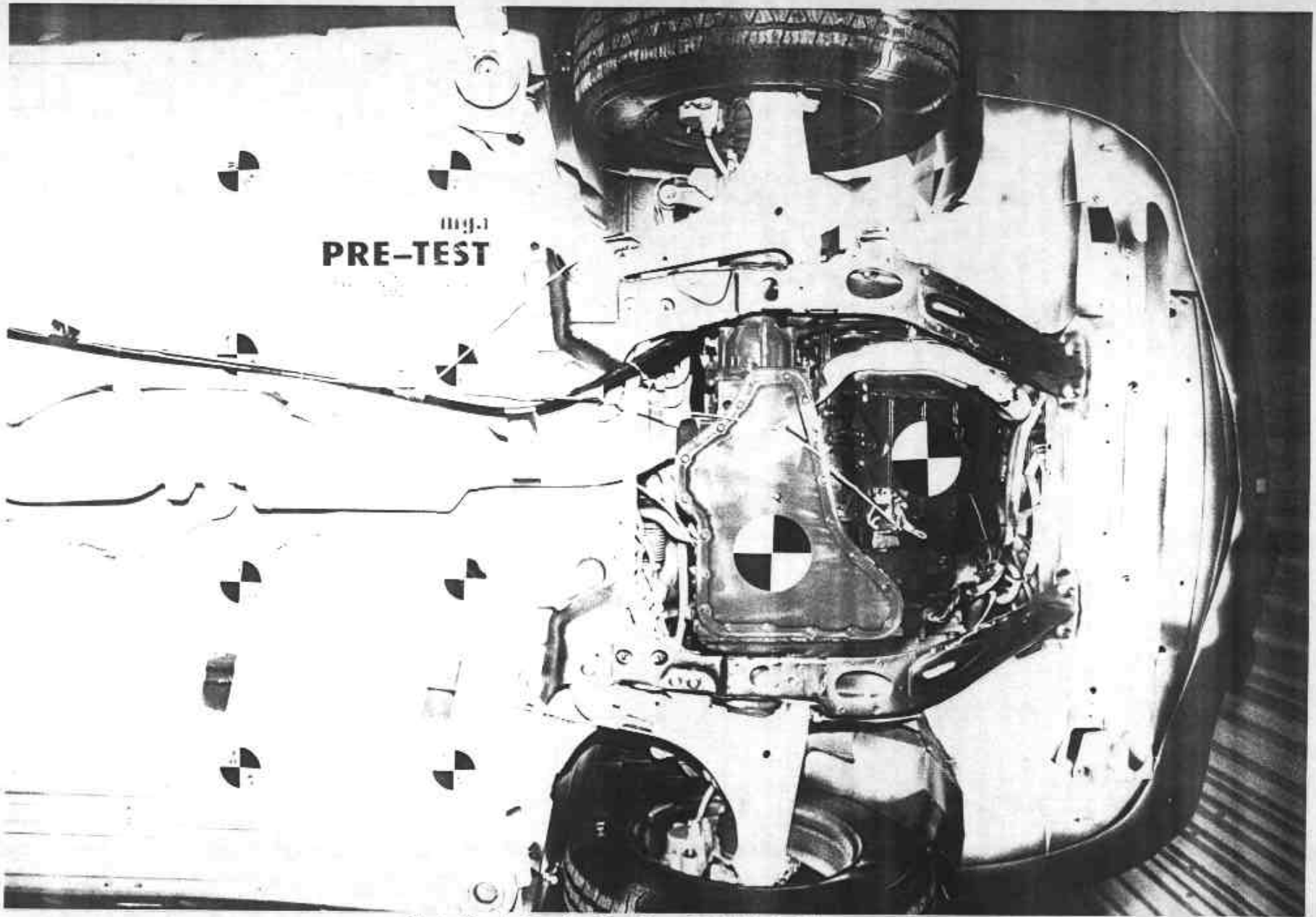


Photo No. A-15 - Post-Test Engine Compartment View



A-16

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

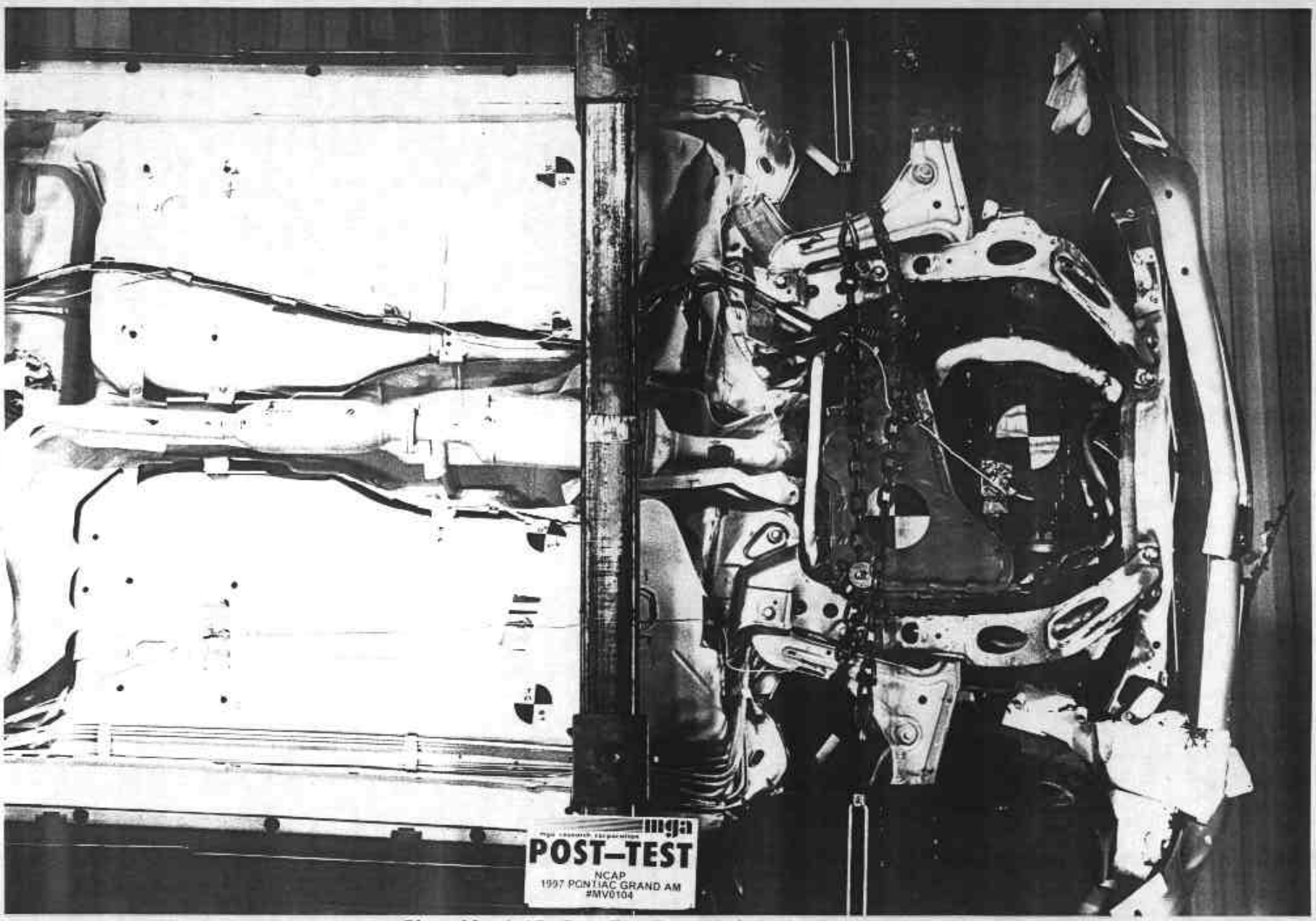


Photo No. A-17 - Post-Test Front Underbody View

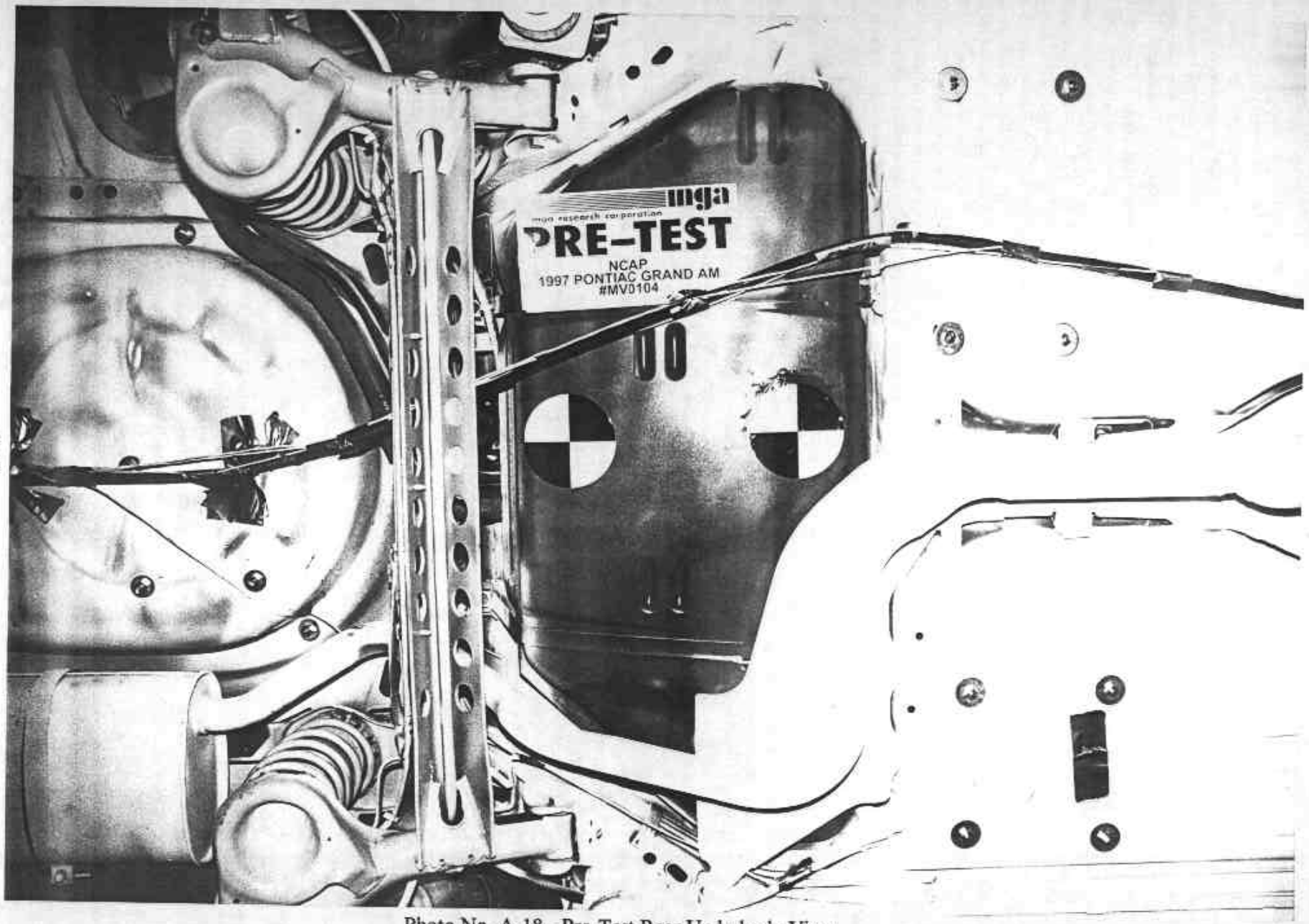


Photo No. A-18 - Pre-Test Rear Underbody View

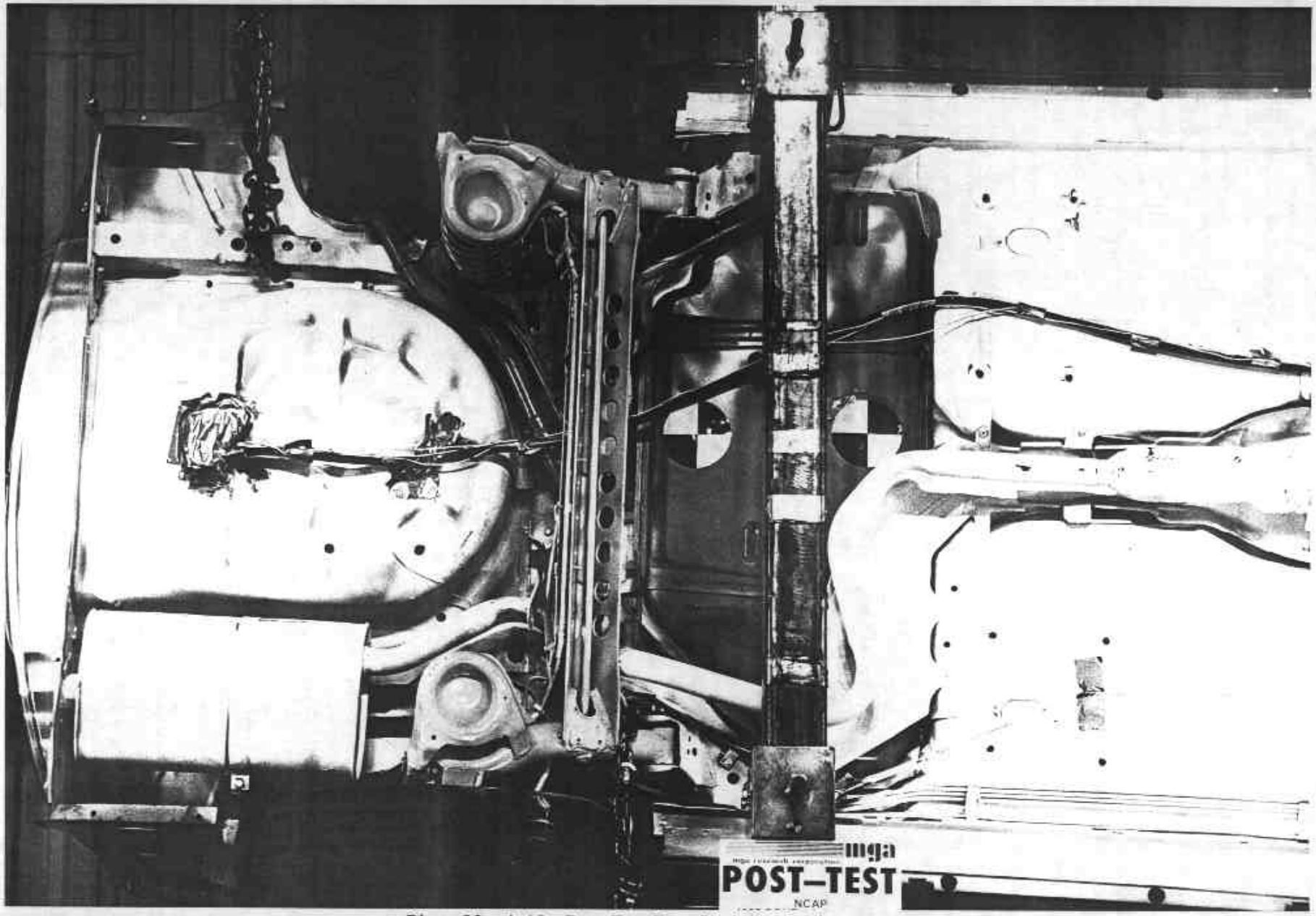


Photo No. A-19 - Post-Test Rear Underbody View

A-20

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

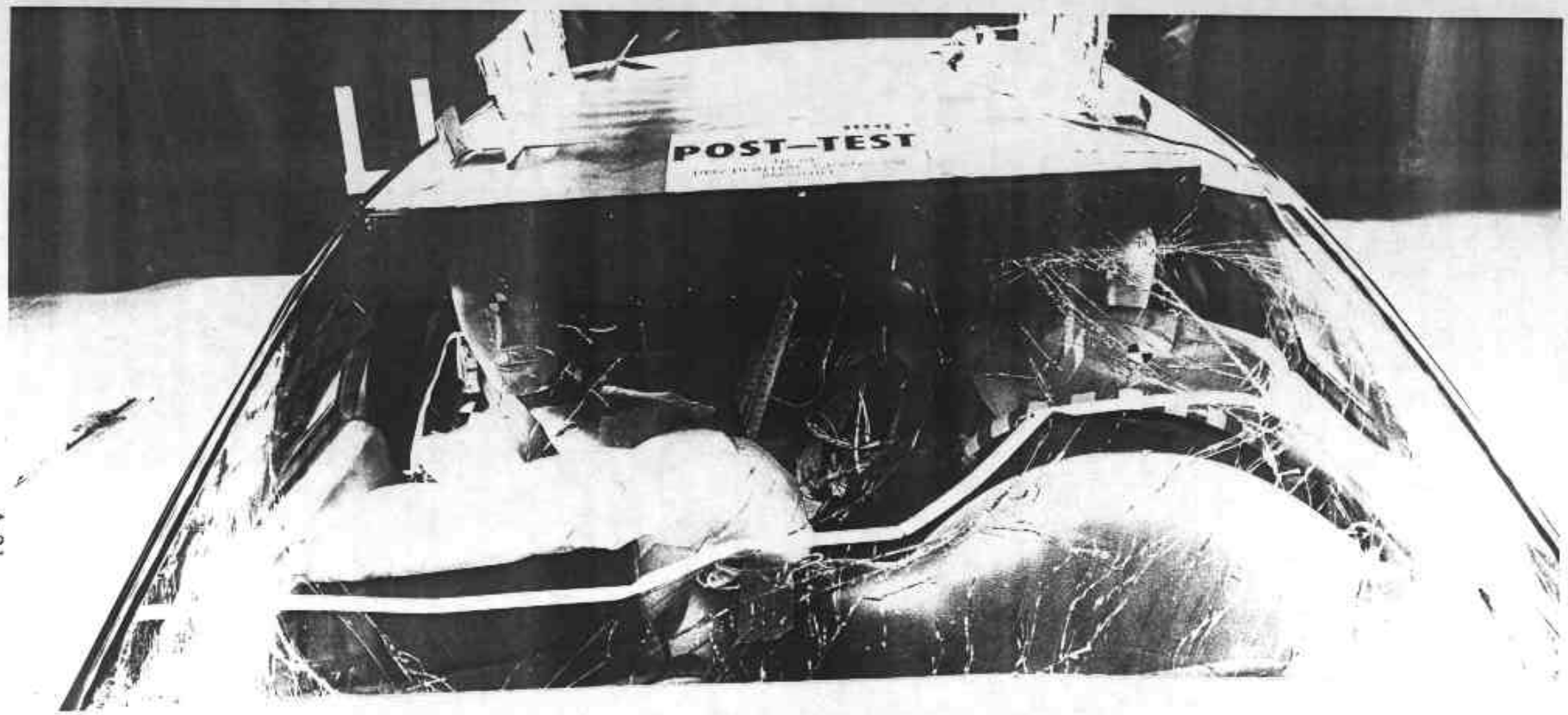


Photo No. A-21 - Post-Test Windshield View

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

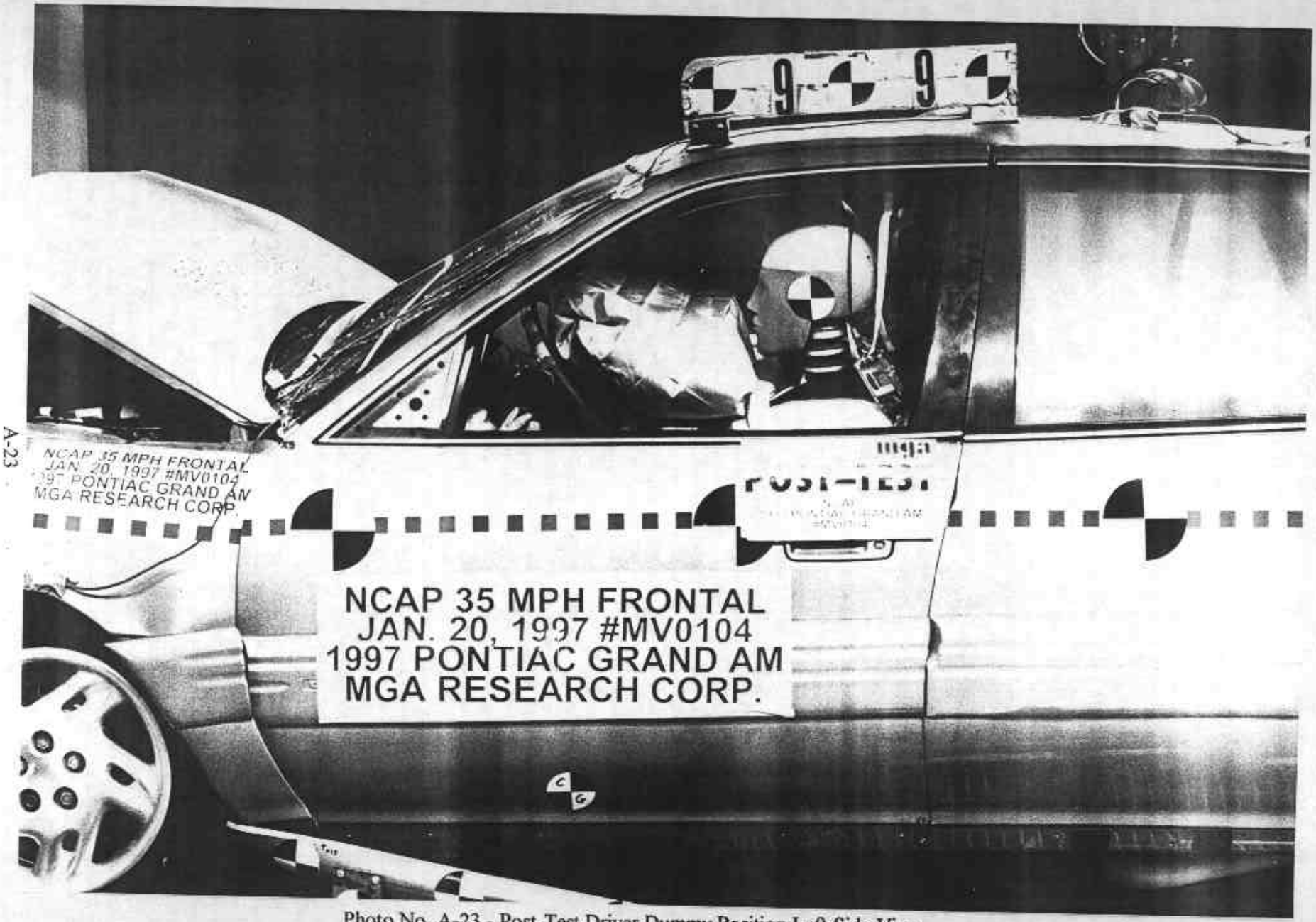


Photo No. A-23 - Post-Test Driver Dummy Position Left Side View

A-24

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

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

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

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

A-28

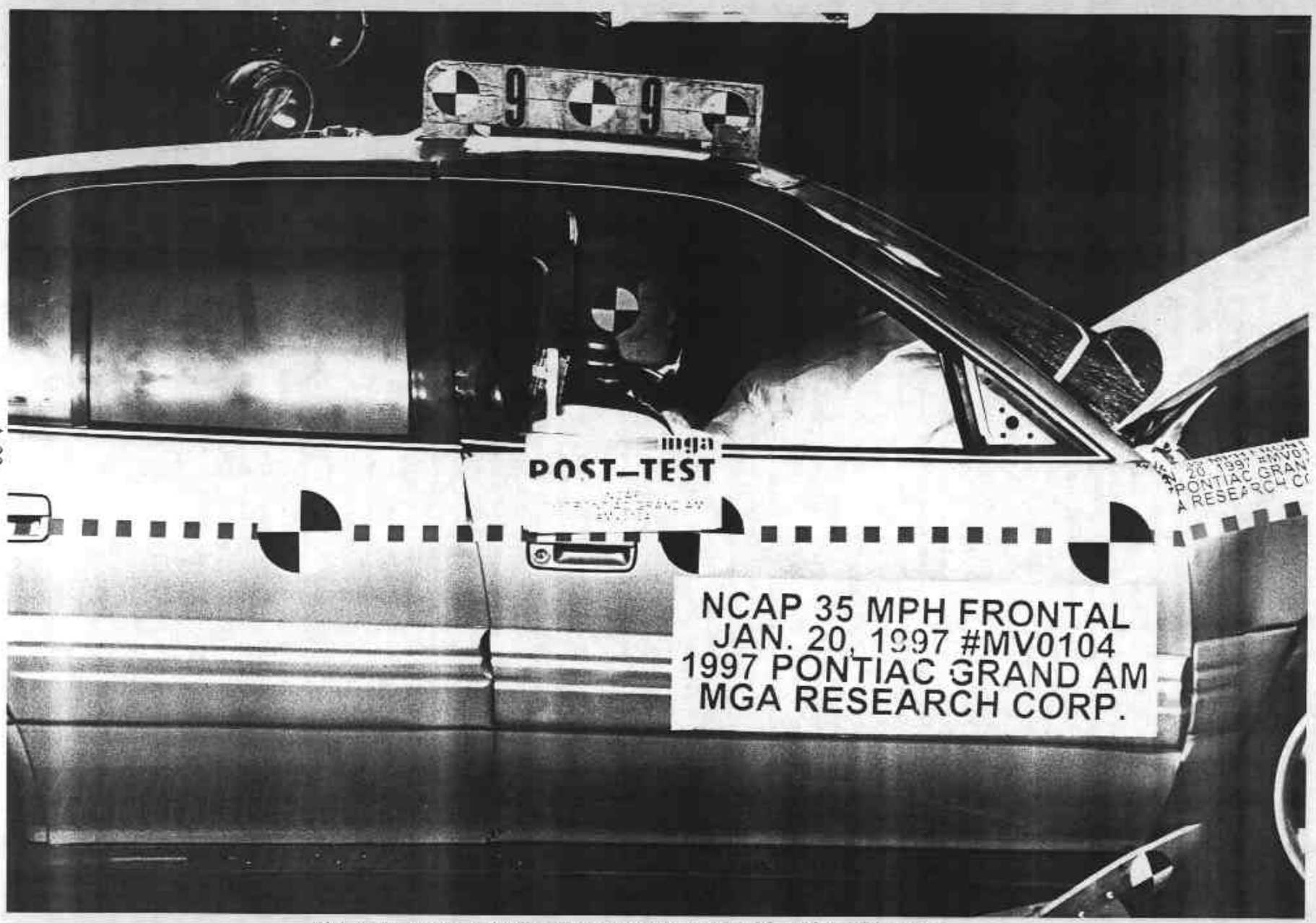
Photo No. A-28 - Pre-Test Driver Dummy Knee Position

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



A-33

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

A-34

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)

A-36

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

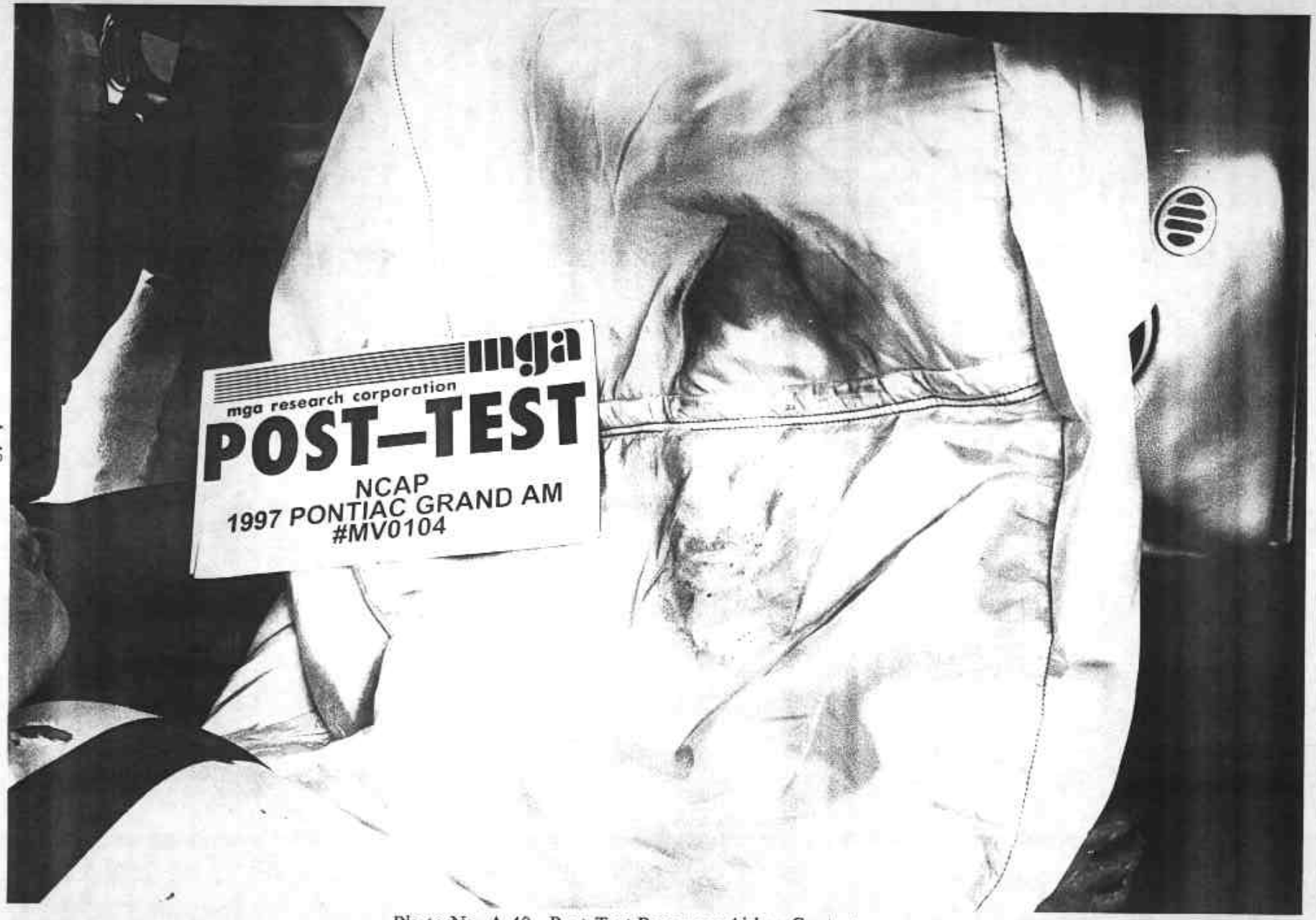


Photo No. A-40 - Post-Test Passenger Airbag Contact

A-41

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

Photo No. A-42 - Vehicle Impact

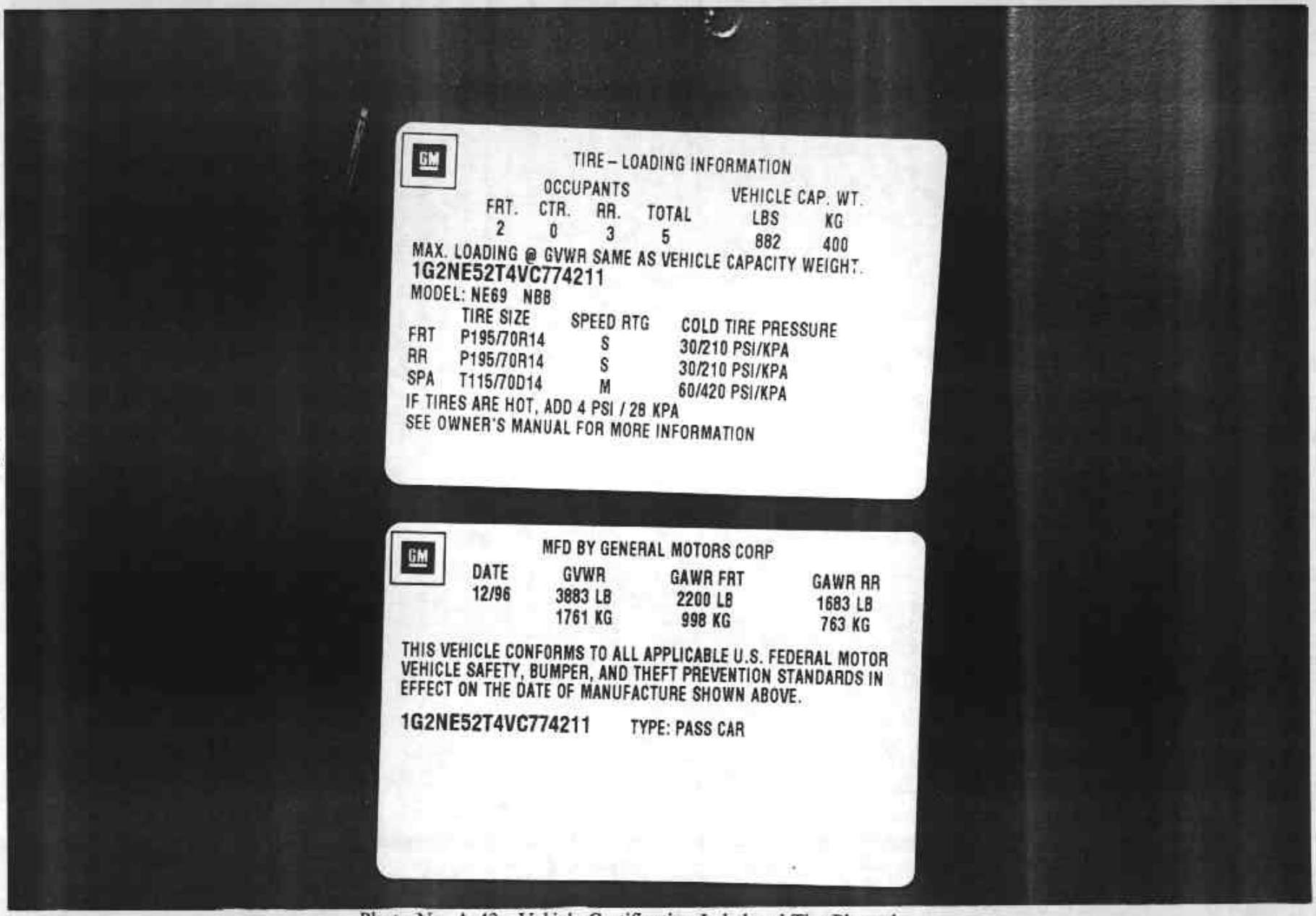


Photo No. A-43 - Vehicle Certification Label and Tire Placard

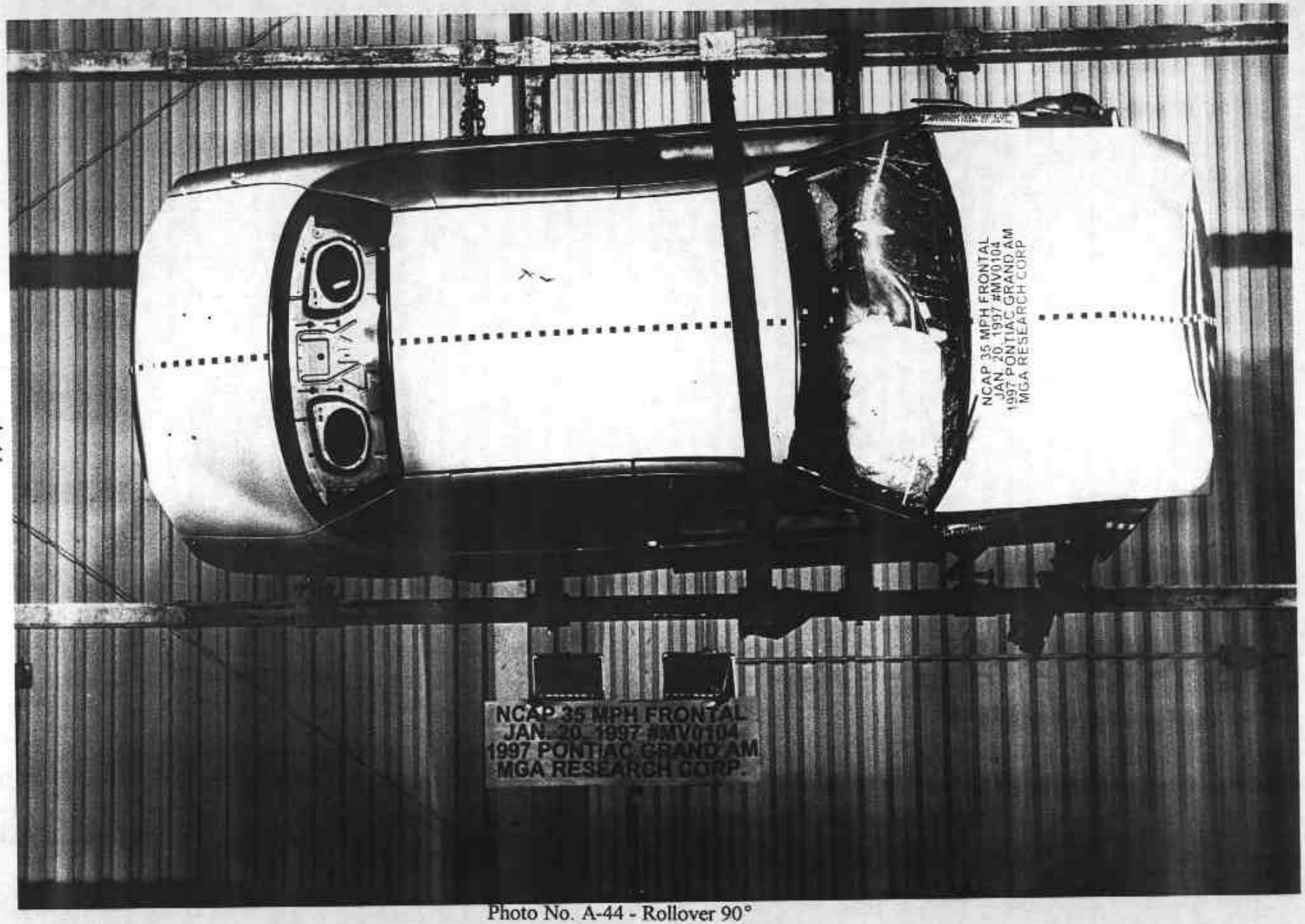


Photo No. A-44 - Rollover 90°

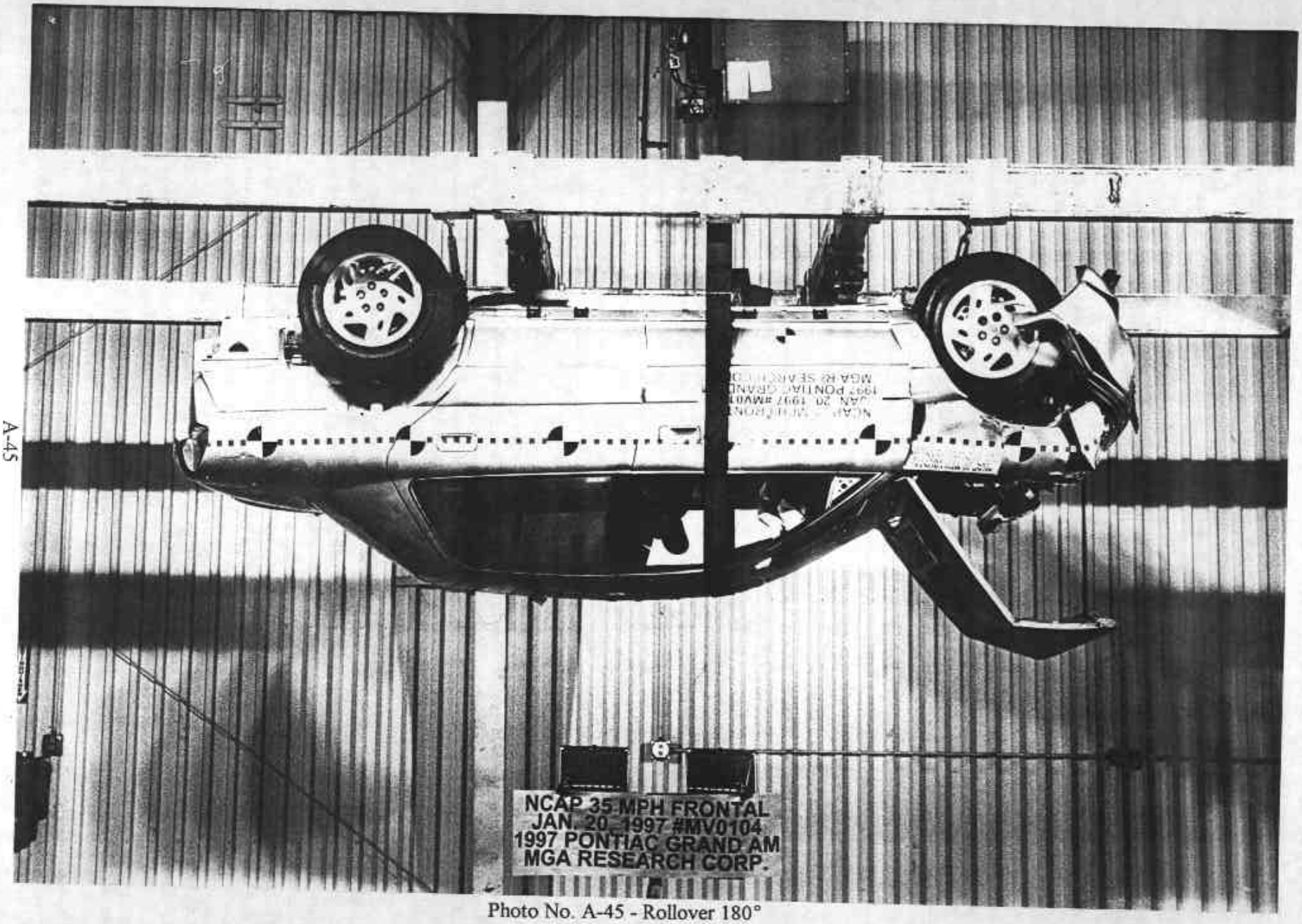


Photo No. A-45 - Rollover 180°

PHOTOGRAPH NOT AVAILABLE

Photo No. A-46 - Rollover 270°

A-47

Photo No. A-47 - Rollover 360°

APPENDIX B

Vehicle, Load Cell Barrier and Dummy Response Data

1997 Pontiac Grand AM

NHTSA NO.: MV0104

VEHICLE DATA FILTER CHANNEL CLASS

Head Accelerations 1000 (1650 Hz)

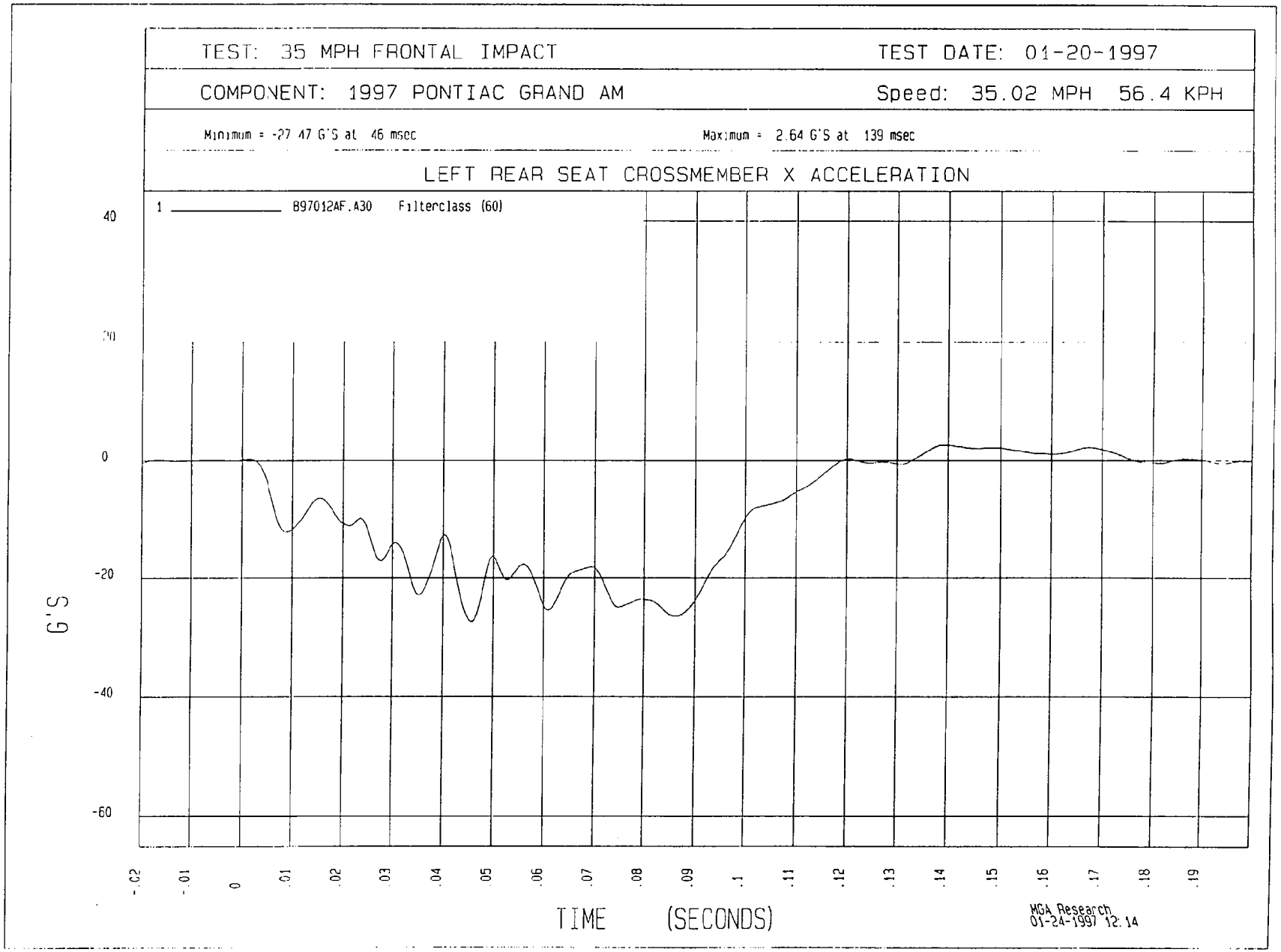
Chest Accelerations 180 (300 Hz)

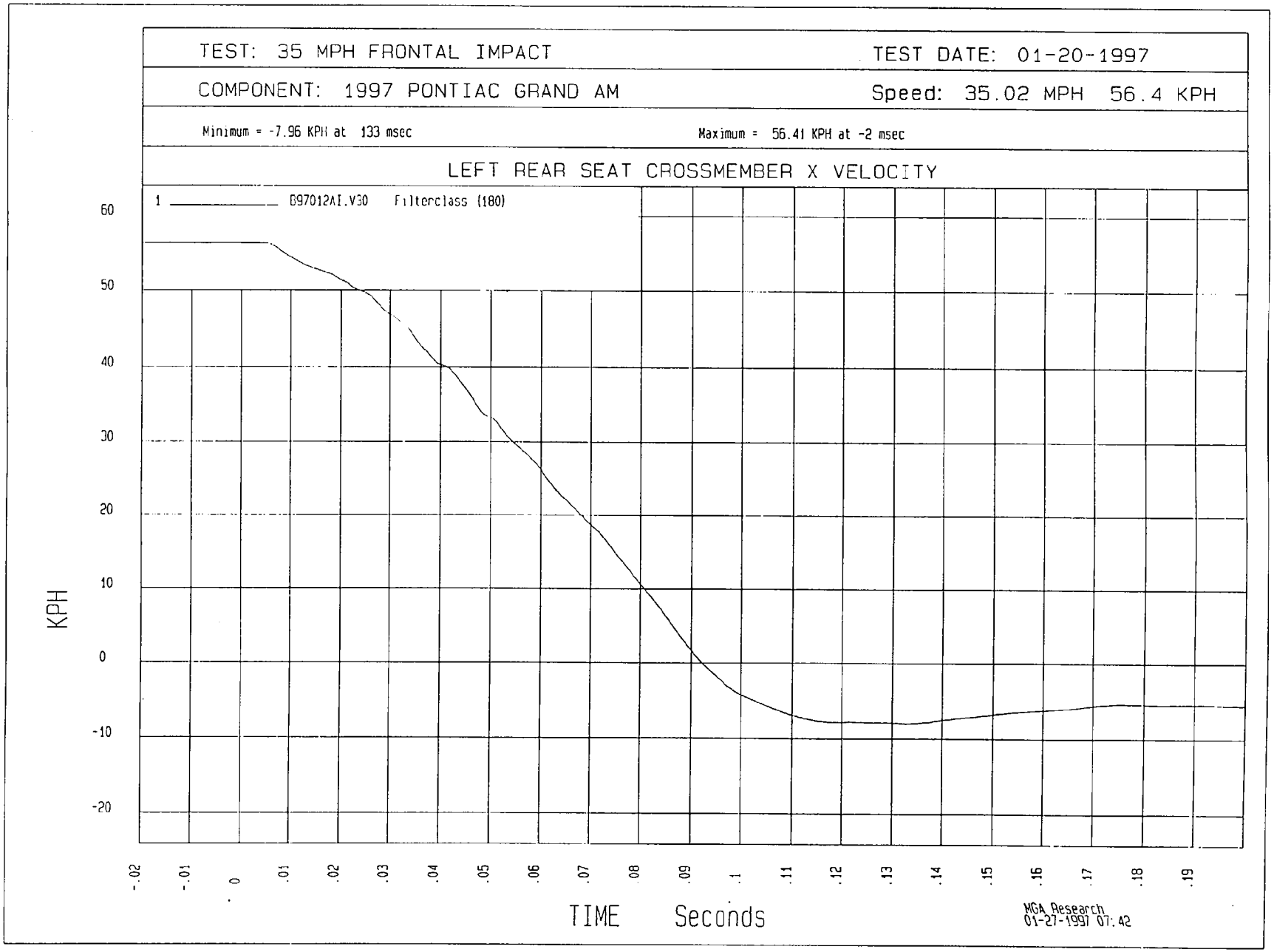
Vehicle Accelerations 60 (100 Hz)

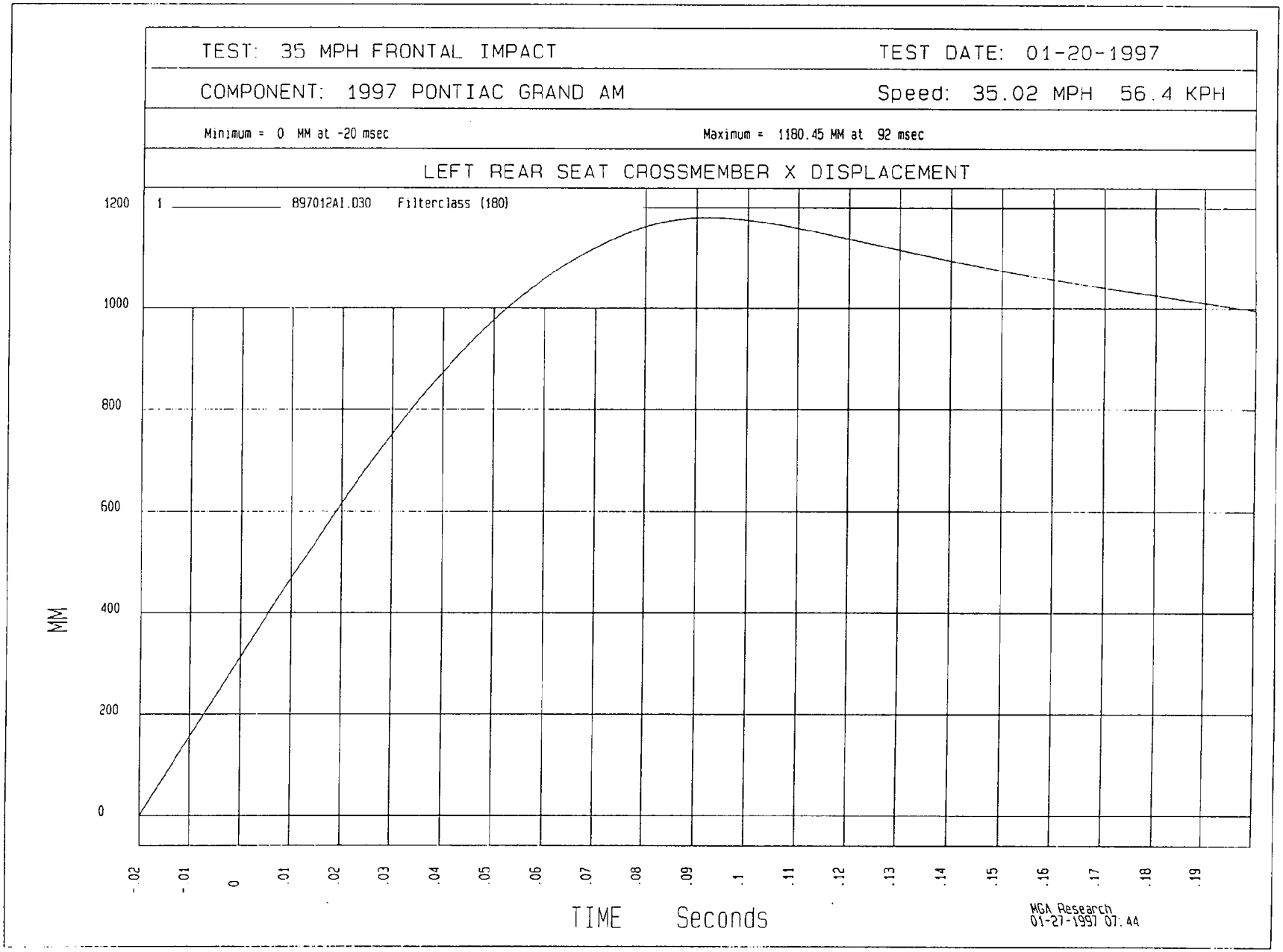
Barrier Load Cells 60 (100 Hz)

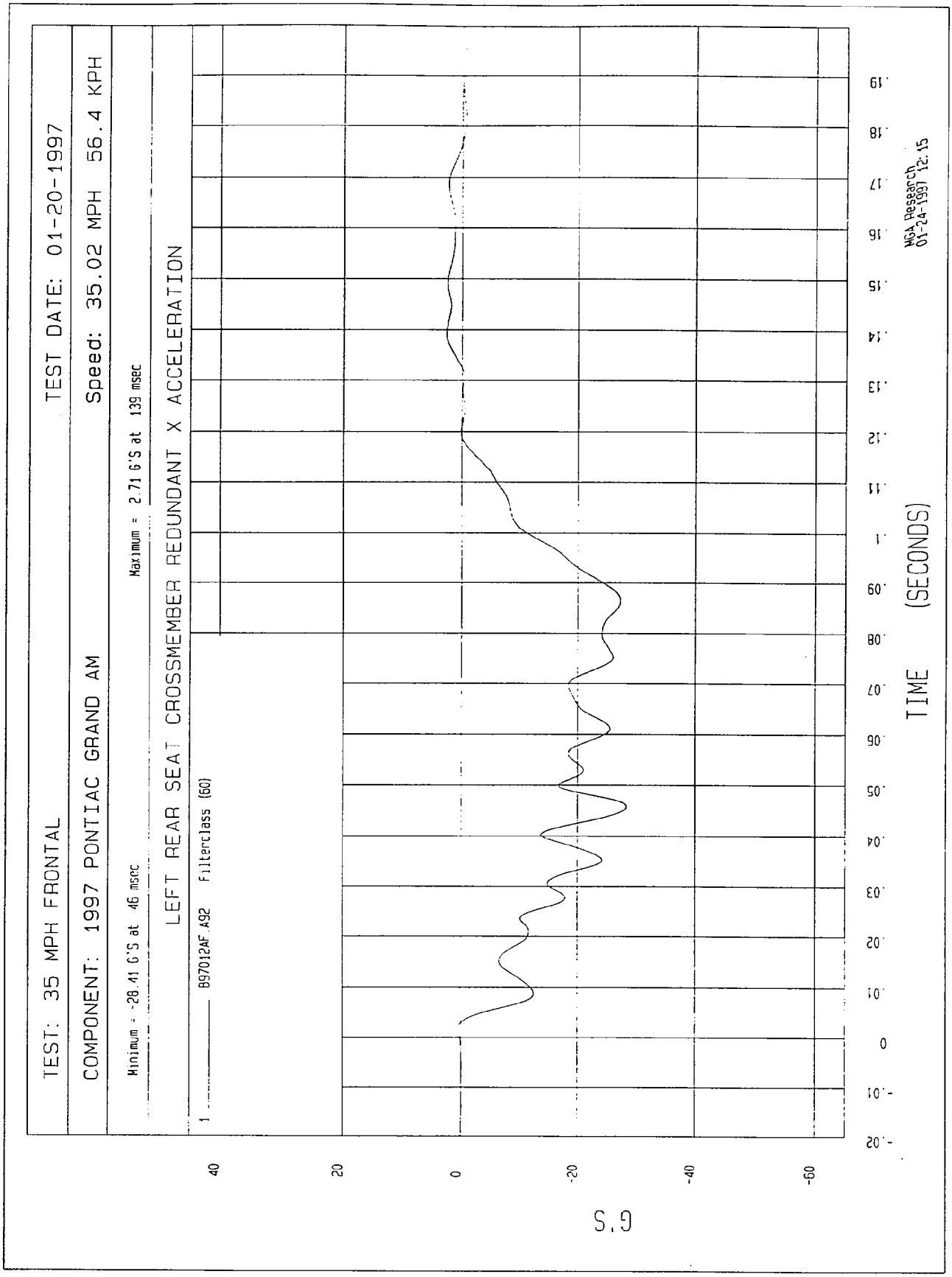
Femur Load Cells 600 (1000 Hz)

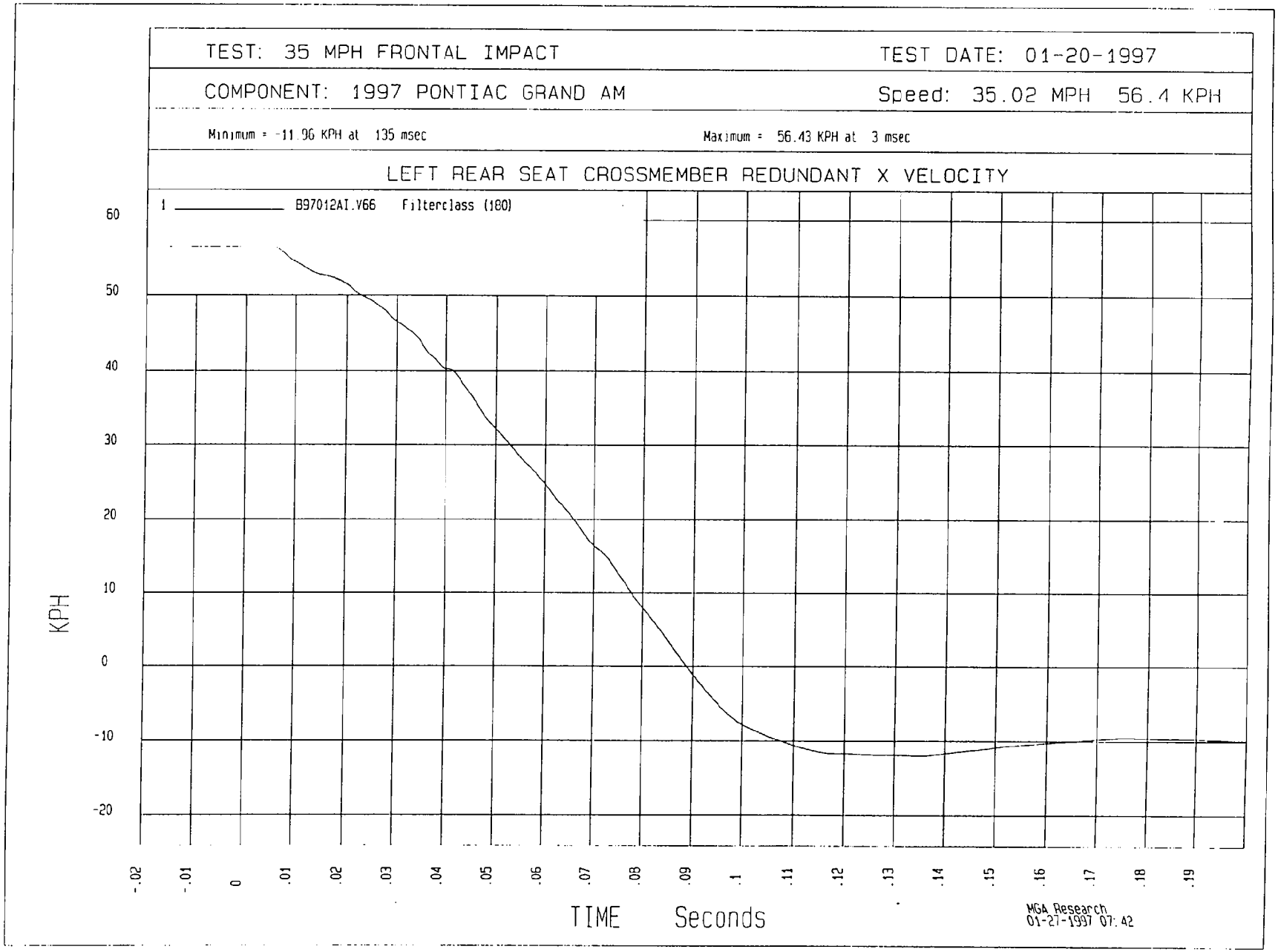
Lap and Torso Belts 60 (100 Hz)

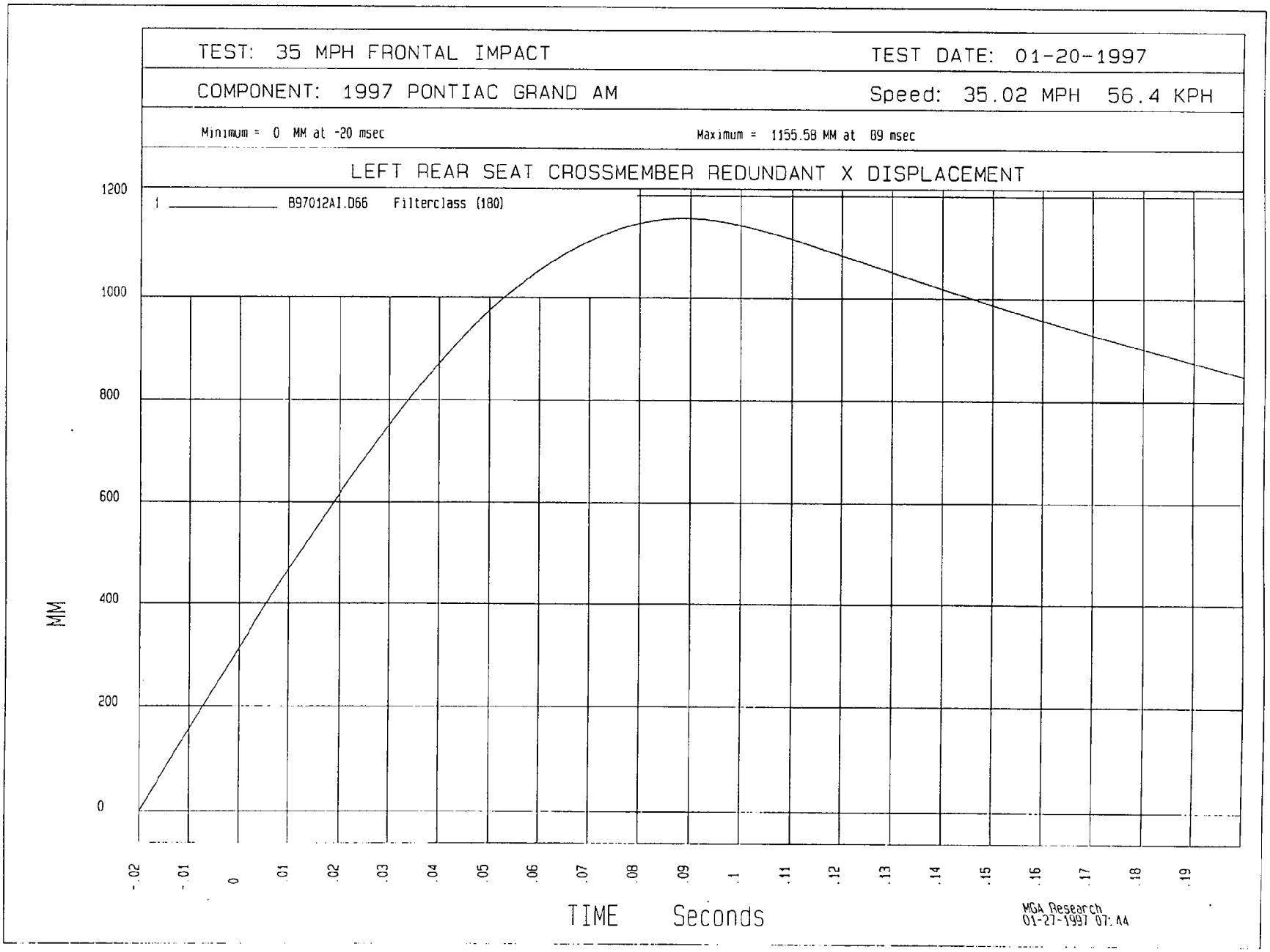

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -27.47 G'S at 46 msec
Maximum = 2.64 G'S at 139 msec
LEFT REAR SEAT CROSSMEMBER X ACCELERATION
1 B97012AF.A30 Filterclass (60)
40
20
0
-20
-40
-60
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 12:14

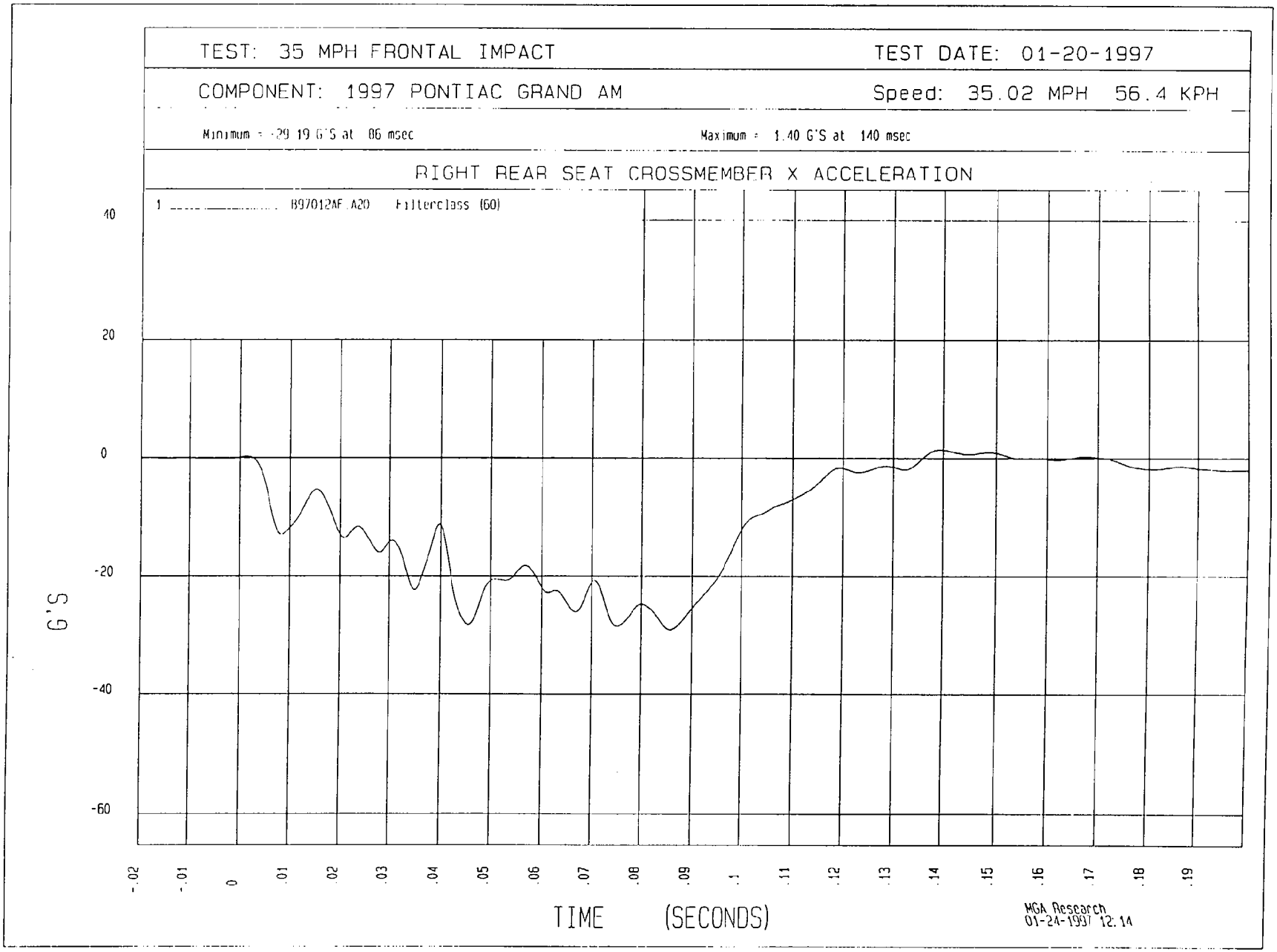

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -7.96 KPH at 133 msec
Maximum = 56.41 KPH at -2 msec
LEFT REAR SEAT CROSSMEMBER X VELOCITY
1 ——— 097012AI.V30 Filterclass (180)
KPH
60
50
40
30
20
10
0
-10
-20
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-27-1997 07:42

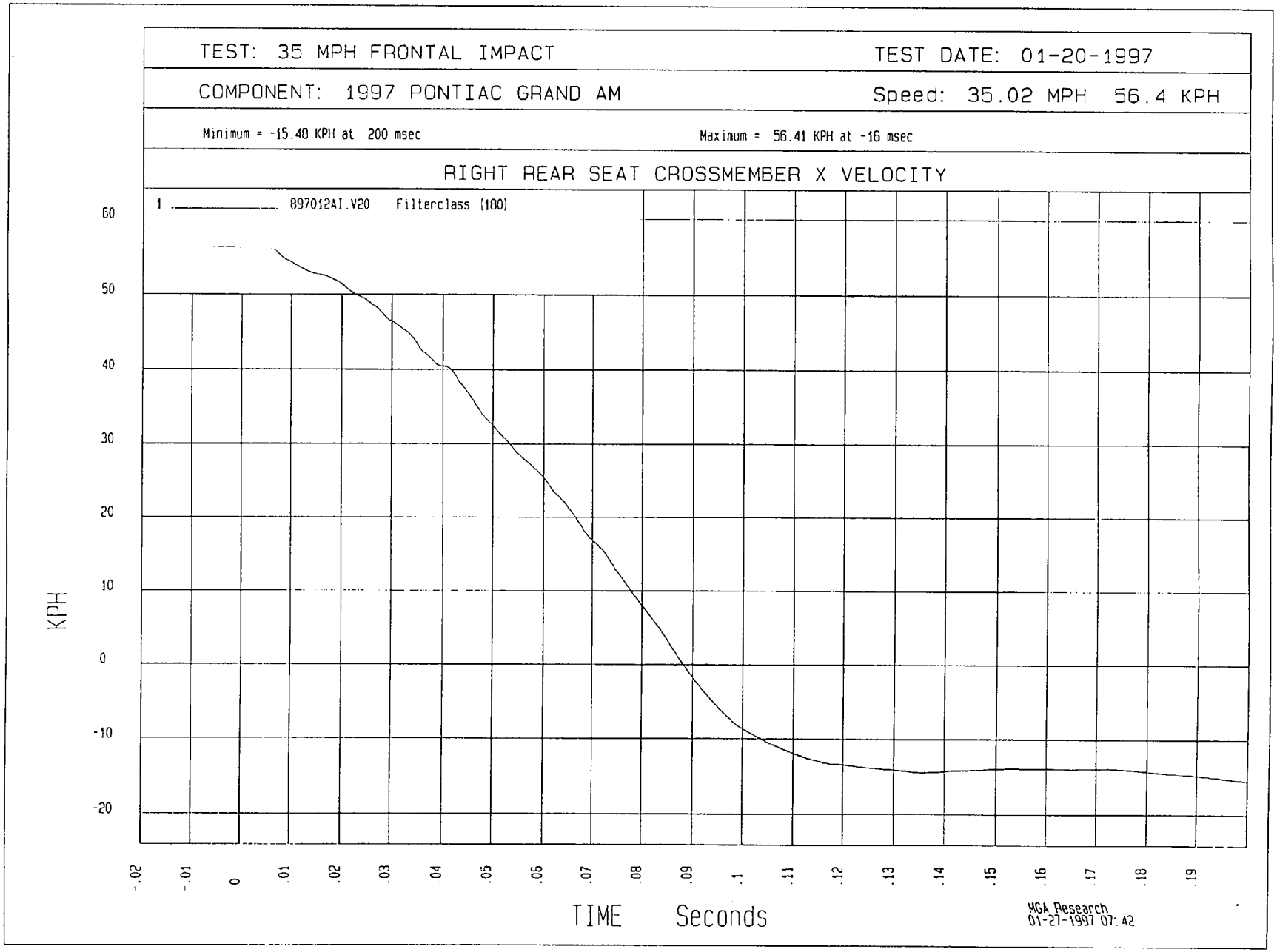

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 0 MM at -20 msec
Maximum = 1180.45 MM at 92 msec
LEFT REAR SEAT CROSSMEMBER X DISPLACEMENT
1 897012AI.030 Filterclass (180)
1200
1000
800
600
400
200
0
MM
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-27-1997 07:44

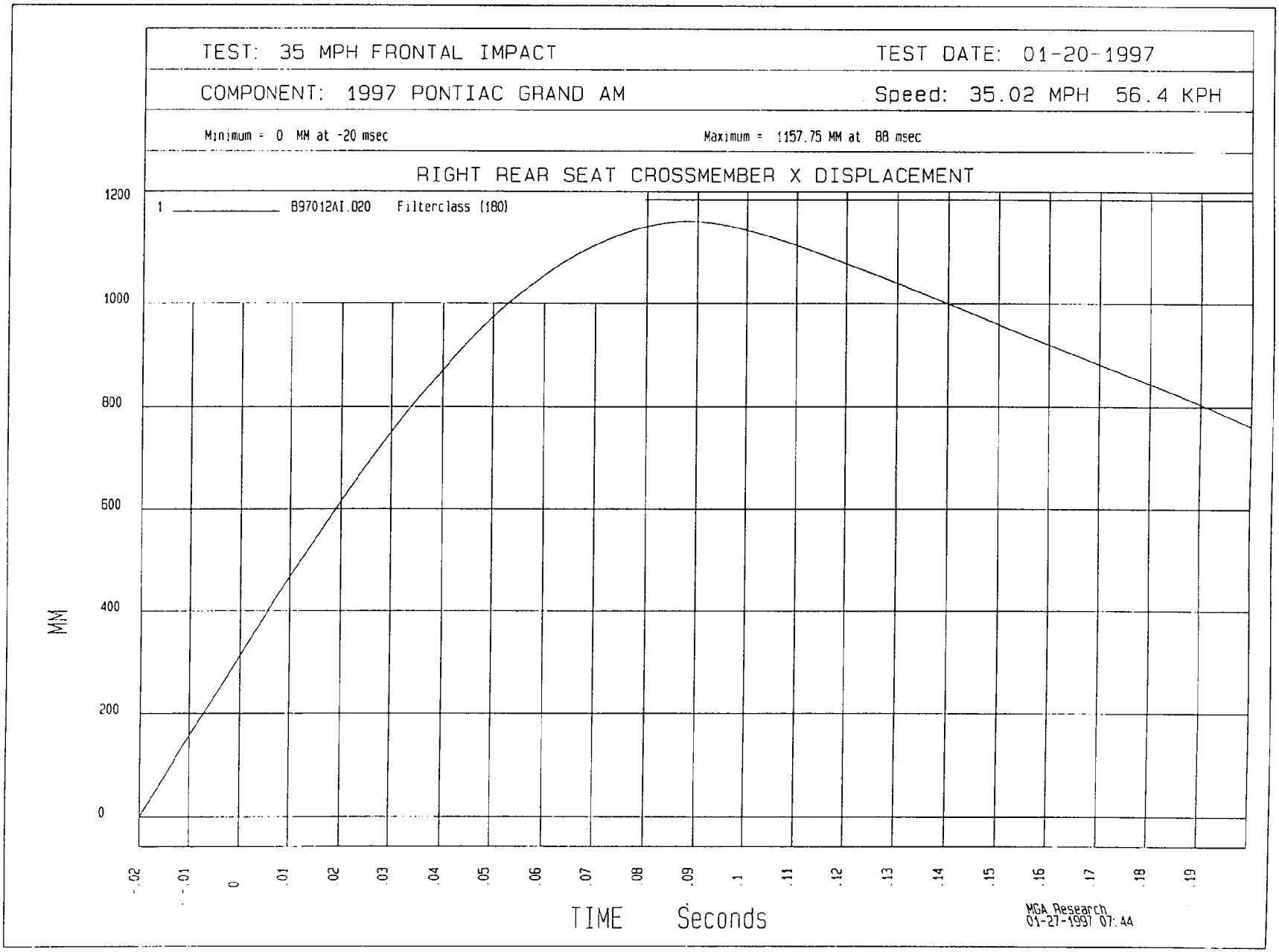

TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -28.41 G'S at 46 msec
Maximum = 2.71 G'S at 139 msec
LEFT REAR SEAT CROSSMEMBER REDUNDANT X ACCELERATION
1 _____ 897012AF A92 Filterclass (60)
40
20
0
-20
-40
-60
G'S
.19
.18
.17
.16
.15
.14
.13
.12
.11
.1
.09
.08
.07
.06
.05
.04
.03
.02
.01
0
-.01
-.02
TIME (SECONDS)
MGA Research
01-24-1997 12:15

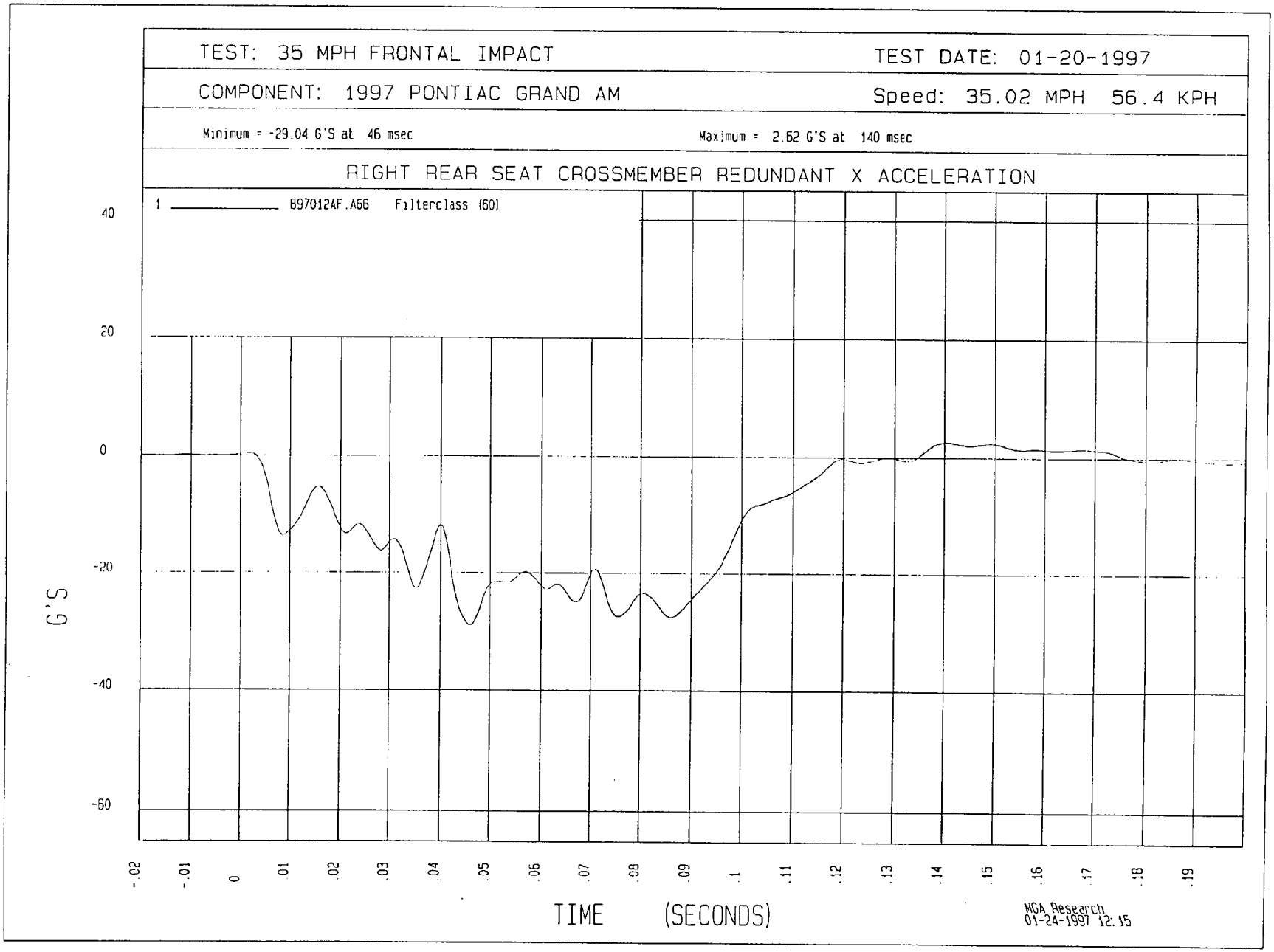

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -11.96 KPH at 135 msec
Maximum = 56.43 KPH at 3 msec
LEFT REAR SEAT CROSSMEMBER REDUNDANT X VELOCITY
1 B97012AI.V66 Filterclass (180)
KPH
60
50
40
30
20
10
0
-10
-20
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-27-1997 07:42

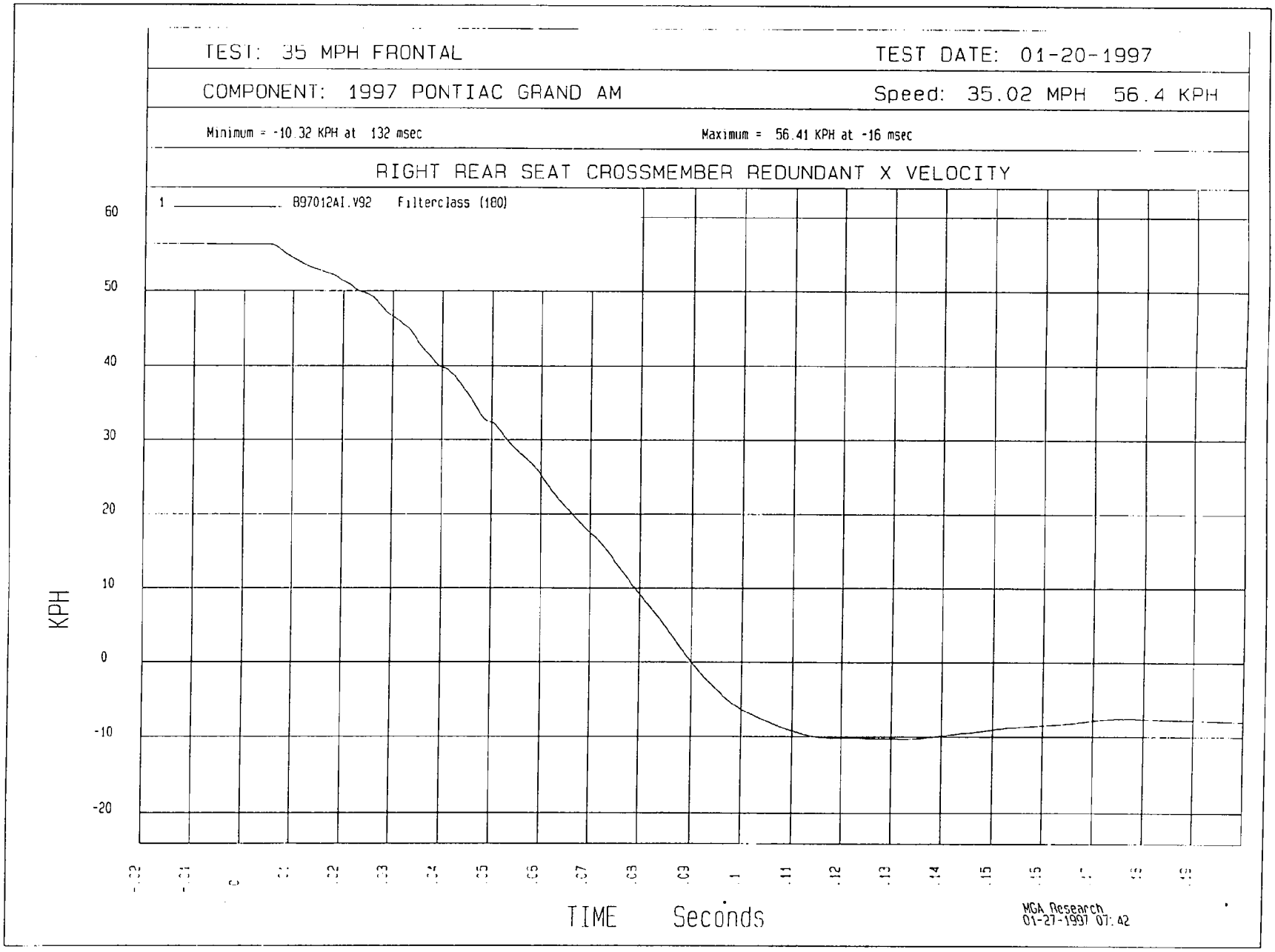

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 0 MM at -20 msec
Maximum = 1155.58 MM at 89 msec
LEFT REAR SEAT CROSSMEMBER REDUNDANT X DISPLACEMENT
1 B97012AI.D66 Filterclass (180)
MM
1200
1000
800
600
400
200
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-27-1997 07:44

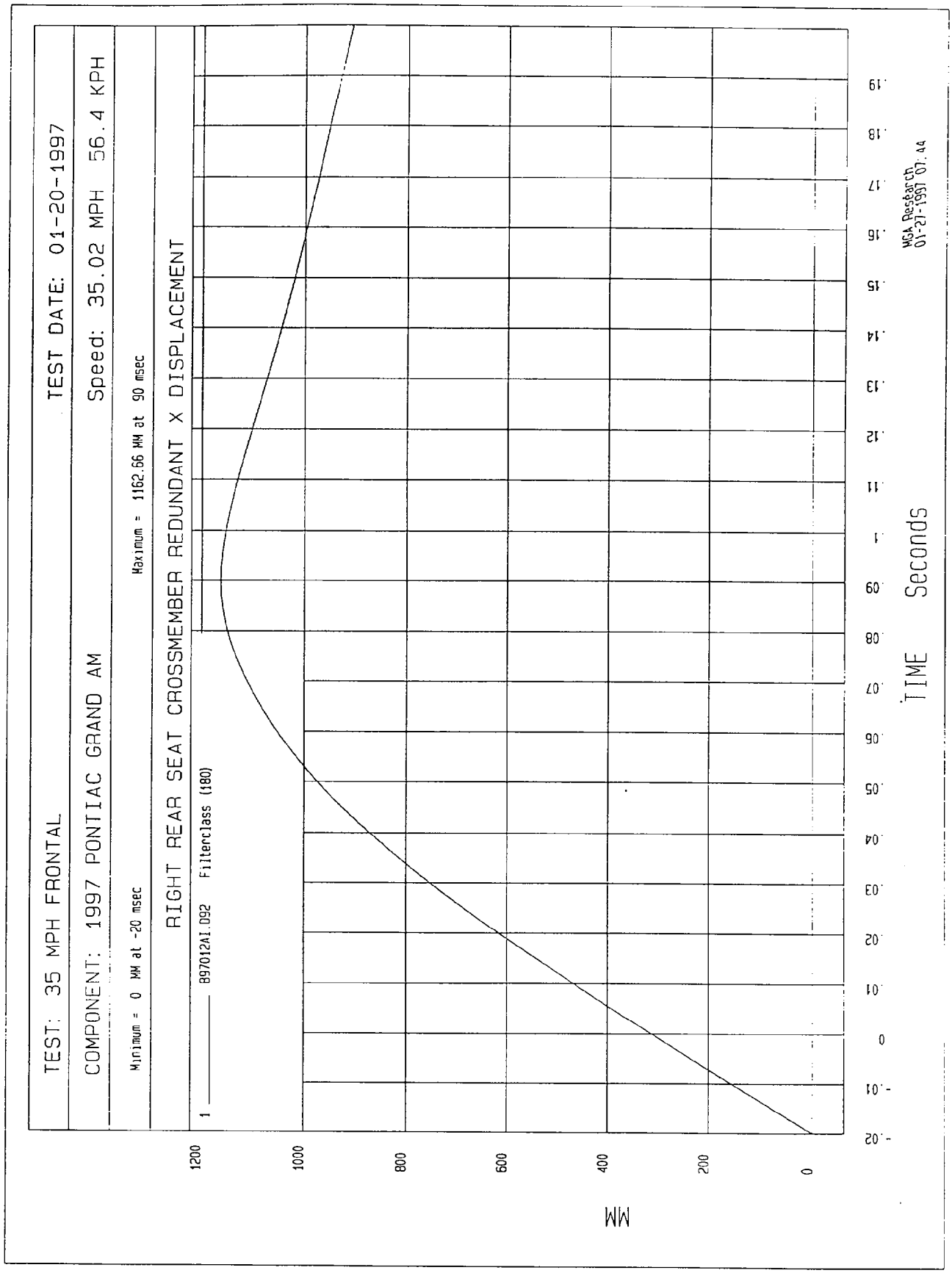

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -29.19 G'S at 86 msec
Maximum = 1.40 G'S at 140 msec
RIGHT REAR SEAT CROSSMEMBER X ACCELERATION
1 B97012AF.A20 Filterclass (60)
40
20
0
-20
-40
-60
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 12:14

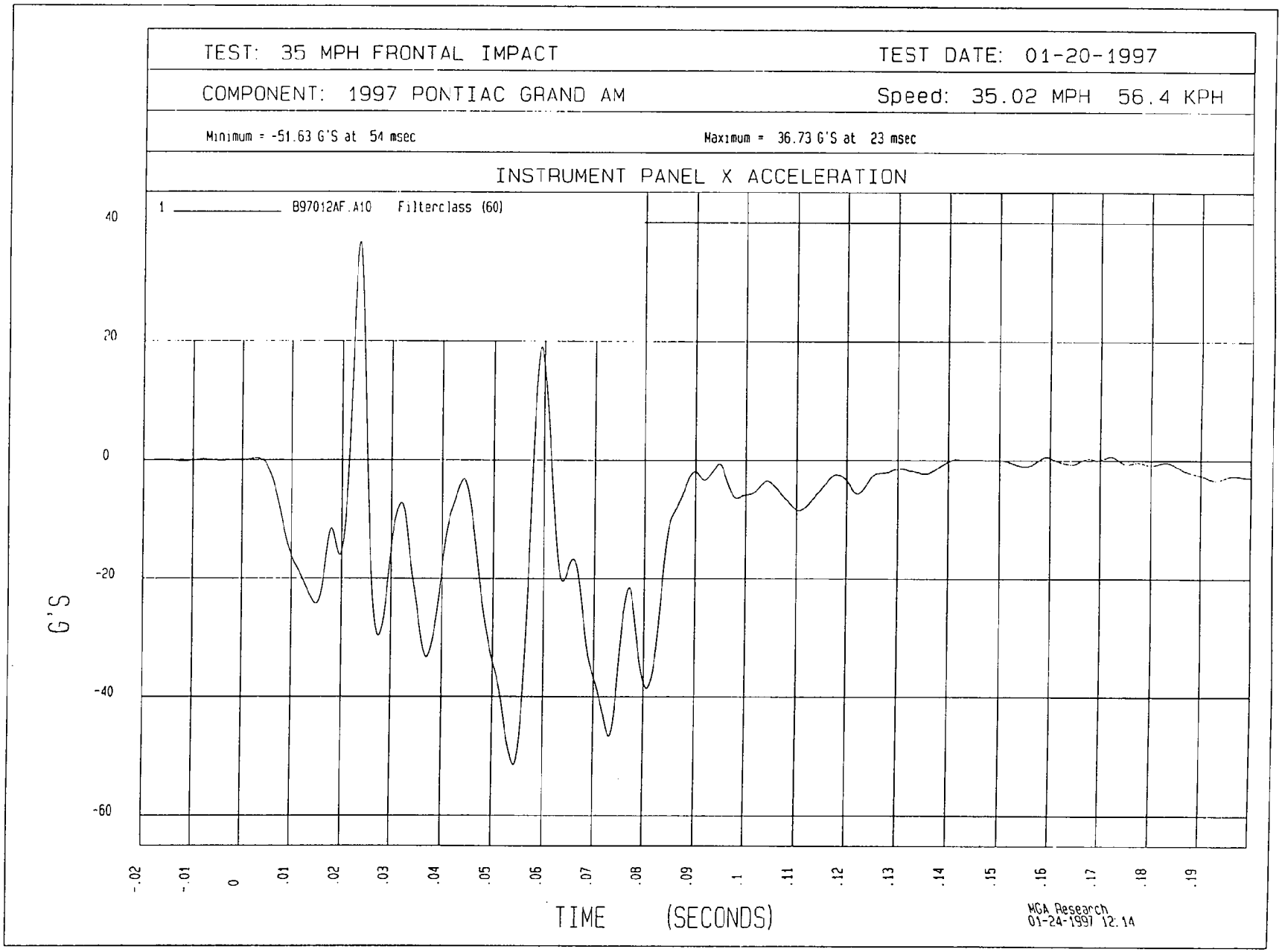

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -15.48 KPH at 200 msec
Maximum = 56.41 KPH at -16 msec
RIGHT REAR SEAT CROSSMEMBER X VELOCITY
1 ——— 897012AI.V20 Filterclass (180)
60
50
40
30
20
10
0
-10
-20
KPH
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-27-1997 07:42

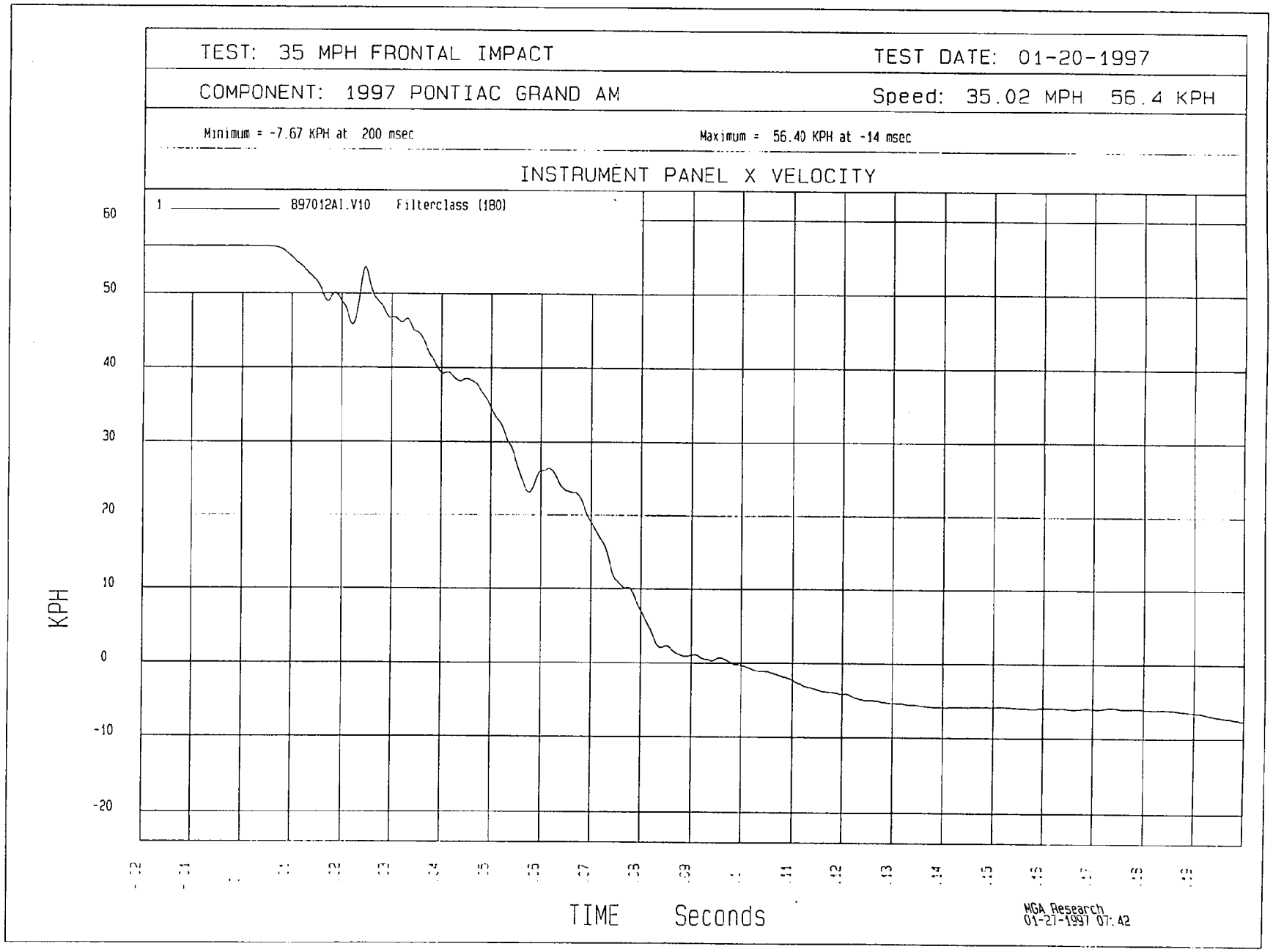

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 0 MM at -20 msec
Maximum = 1157.75 MM at 88 msec
RIGHT REAR SEAT CROSSMEMBER X DISPLACEMENT
1 B97012AI.020 Filterclass (180)
MM
1200
1000
800
600
400
200
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-27-1997 07:44

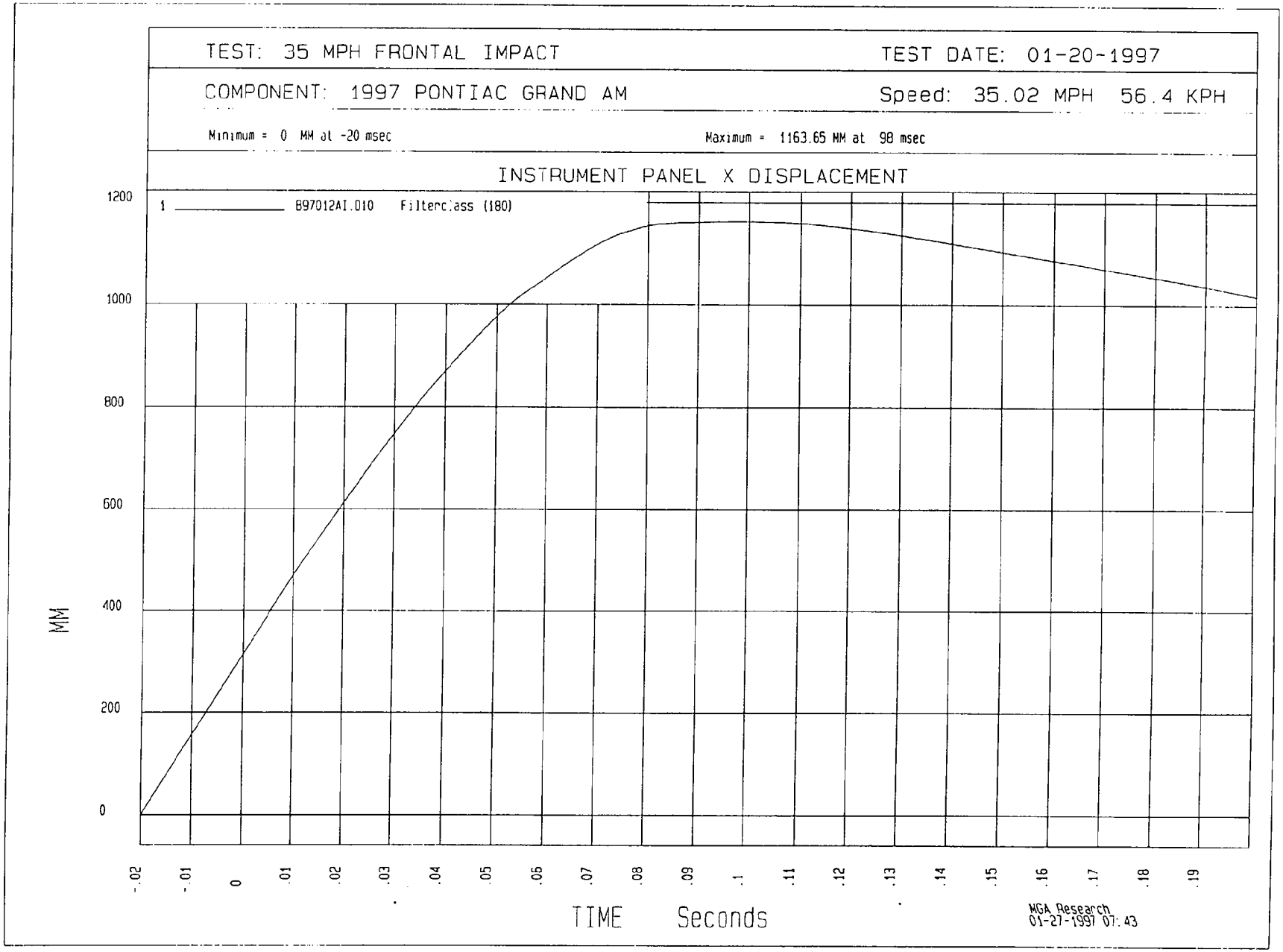

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -29.04 G'S at 46 msec
Maximum = 2.62 G'S at 140 msec
RIGHT REAR SEAT CROSSMEMBER REDUNDANT X ACCELERATION
1 B97012AF.A66 Filterclass (60)
40
20
0
-20
-40
-60
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 12:15

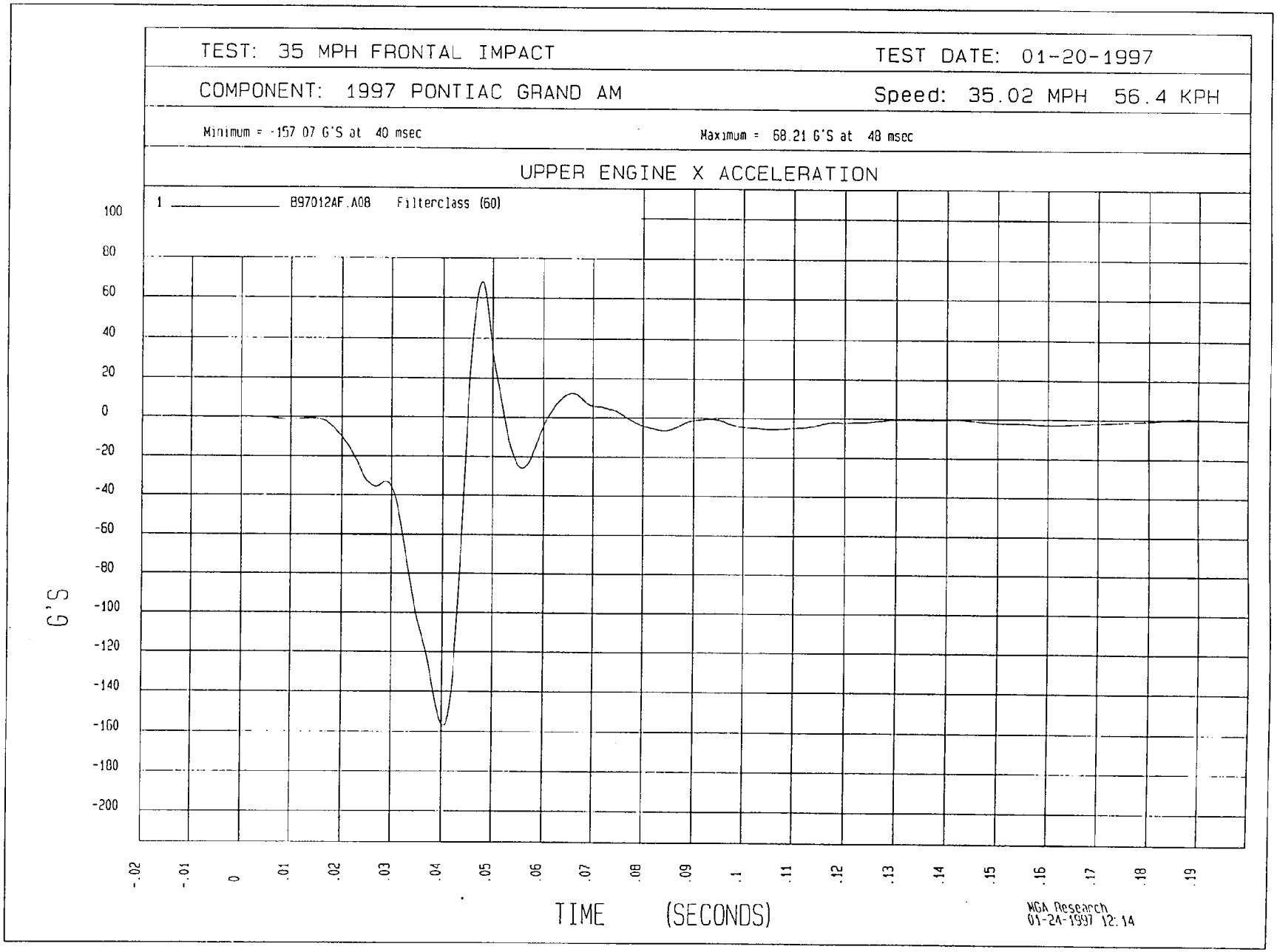

TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -10.32 KPH at 132 msec
Maximum = 56.41 KPH at -16 msec
RIGHT REAR SEAT CROSSMEMBER REDUNDANT X VELOCITY
1 B97012AI.V92 Filterclass (180)
60
50
40
30
20
10
0
-10
-20
KPH
TIME Seconds
MGA Research
01-27-1997 07:42

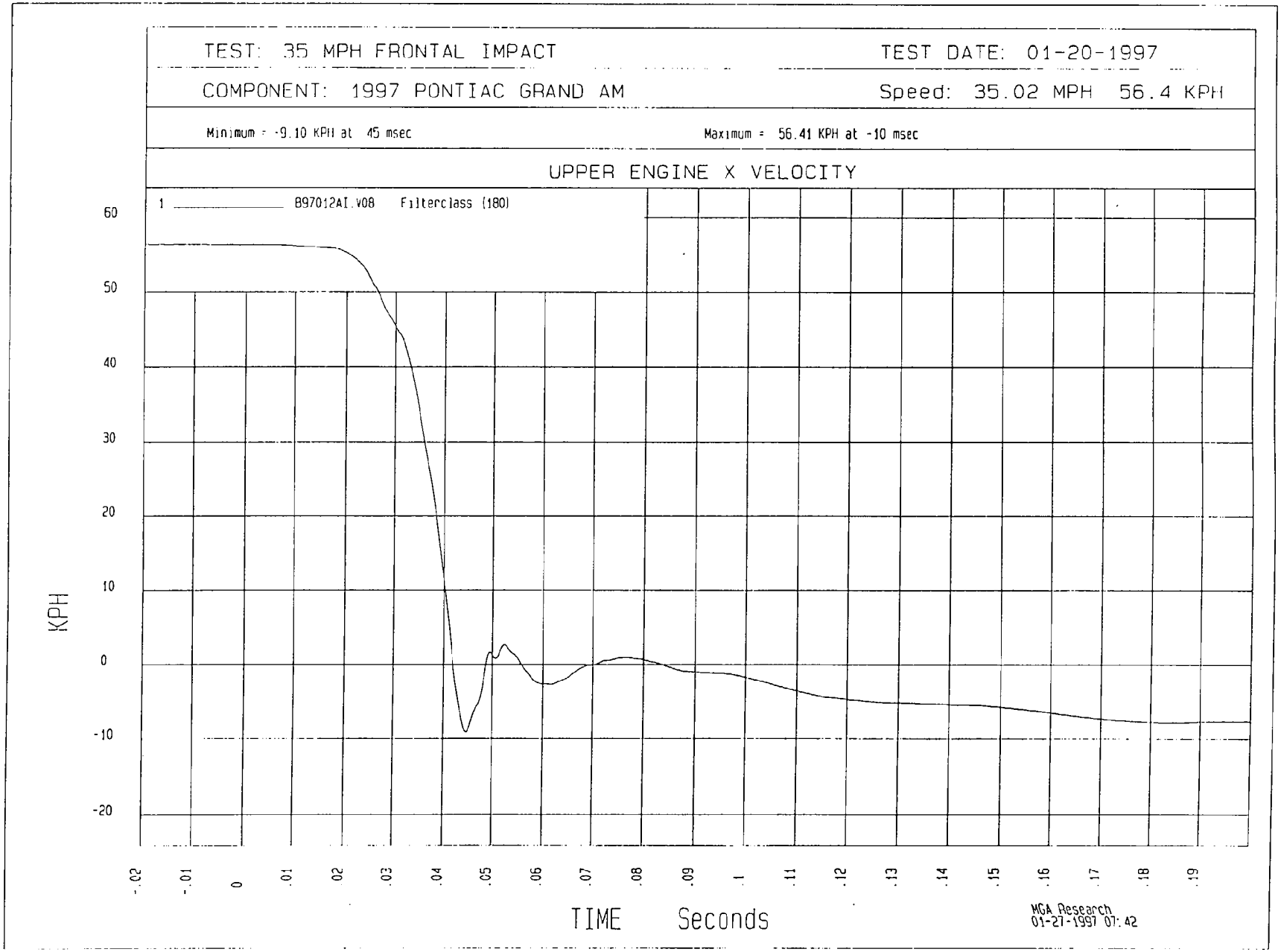

TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 0 MM at -20 msec
Maximum = 1162.66 MM at 90 msec
RIGHT REAR SEAT CROSSMEMBER REDUNDANT X DISPLACEMENT
1 ——— 897012AI.092 Filterclass (180)
MM
TIME Seconds
MGA Research
01-27-1997 07:44

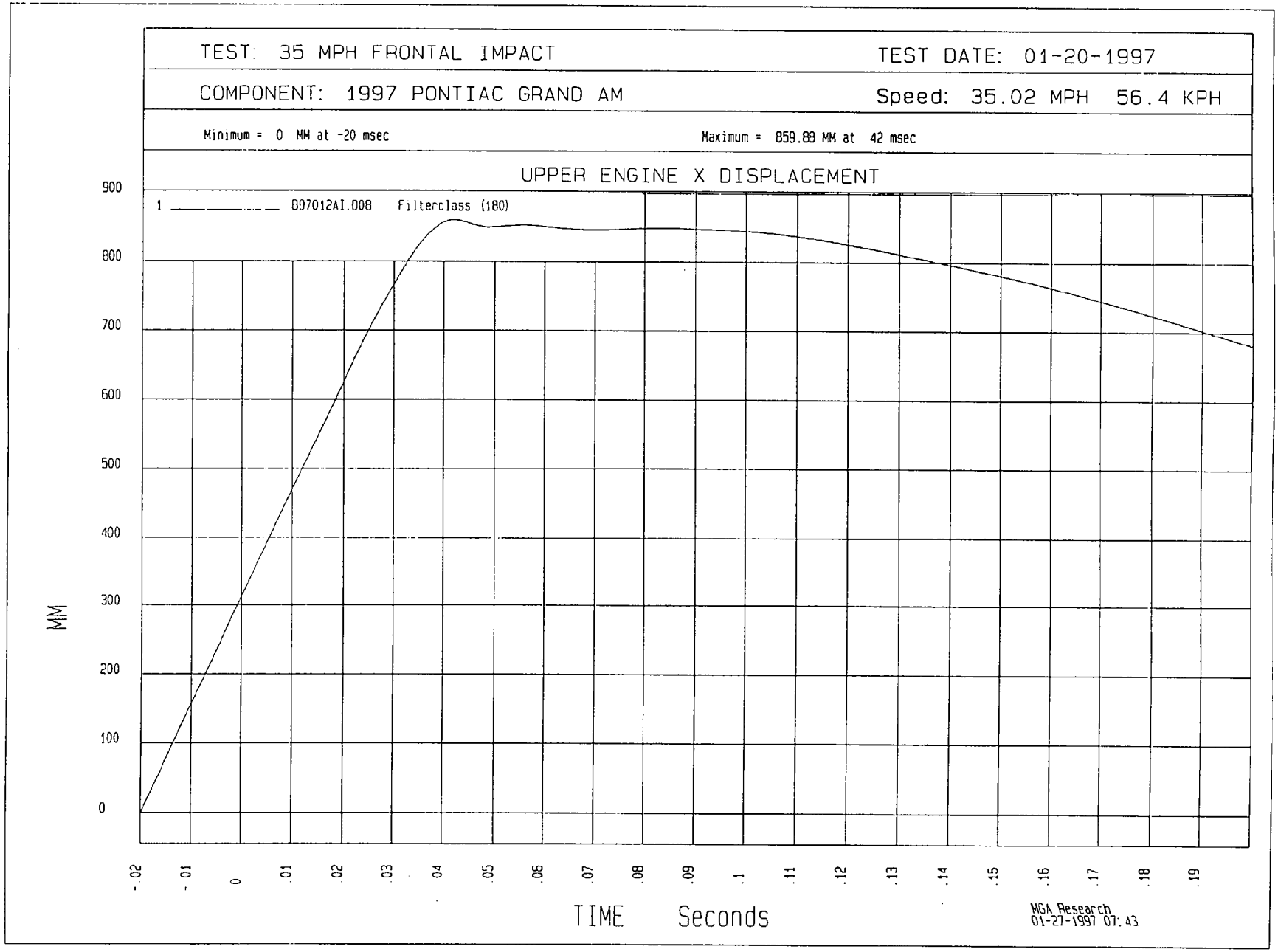

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -51.63 G'S at 54 msec
Maximum = 36.73 G'S at 23 msec
INSTRUMENT PANEL X ACCELERATION
1 B97012AF.A10 Filterclass (60)
40
20
0
-20
-40
-60
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 12:14

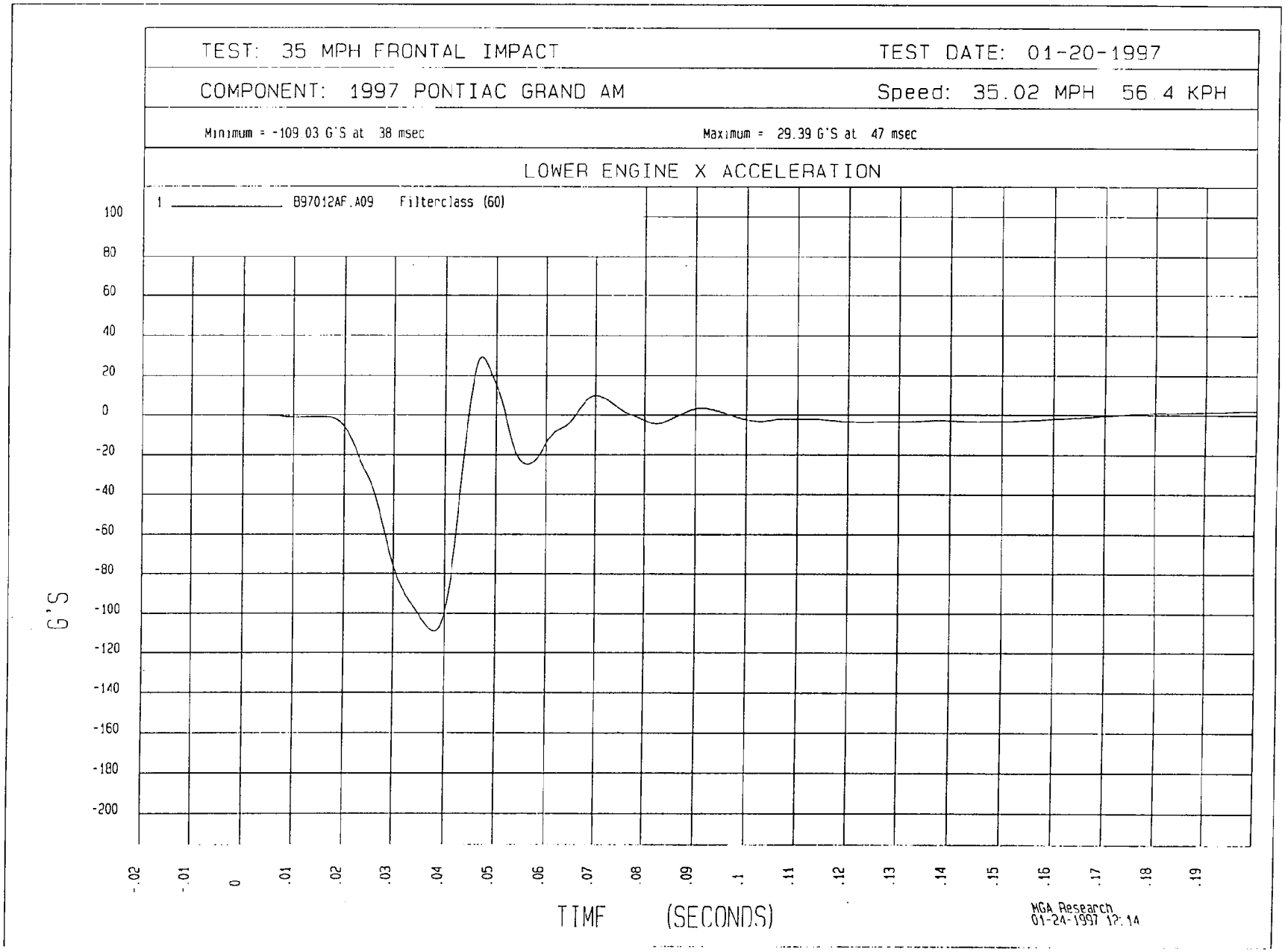

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -7.67 KPH at 200 msec
Maximum = 56.40 KPH at -14 msec
INSTRUMENT PANEL X VELOCITY
1 897012AI.V10 Filterclass (180)
60
50
40
30
20
10
0
-10
-20
KPH
TIME Seconds
MGA Research
01-27-1997 07:42

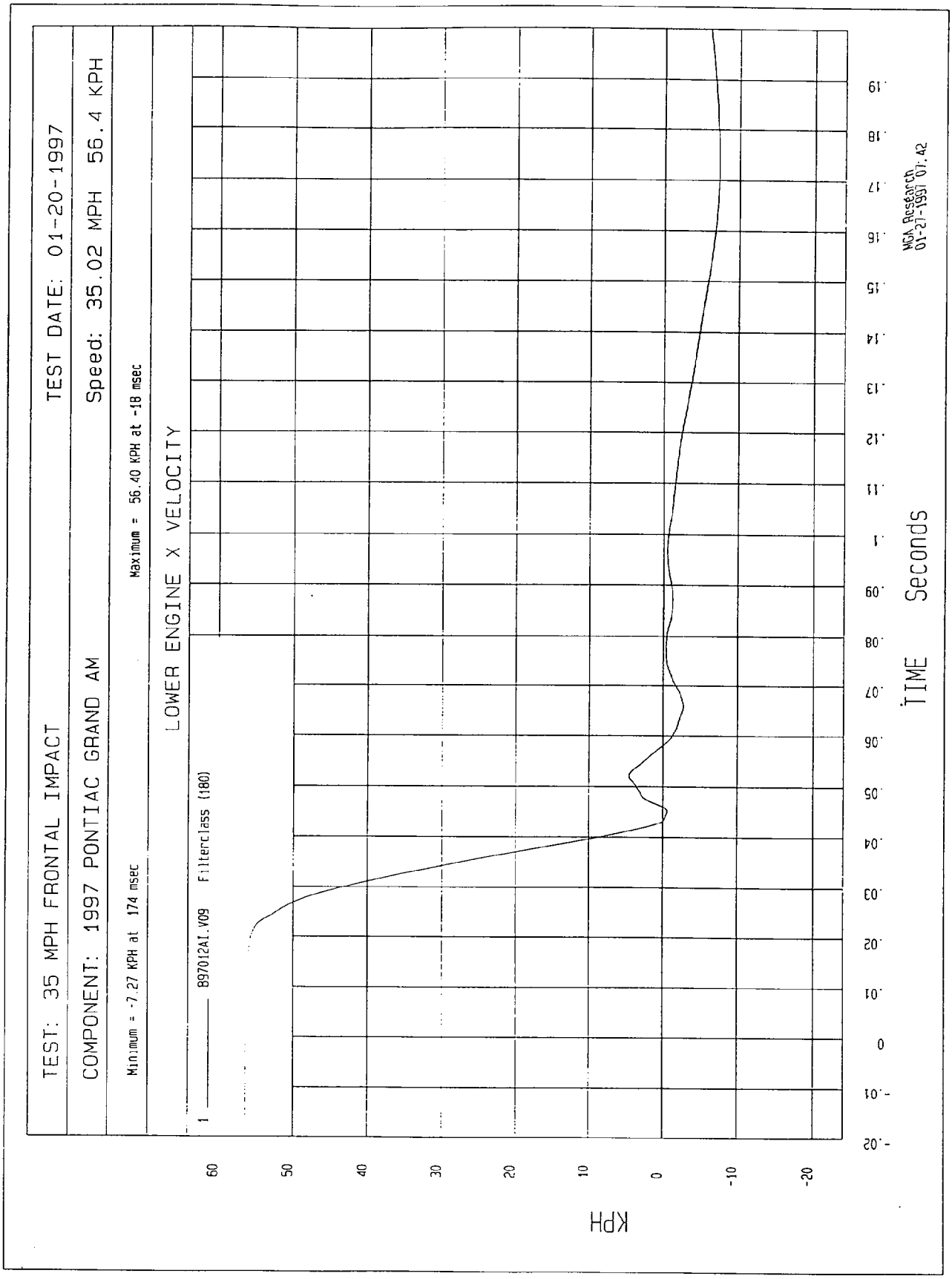

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 0 MM at -20 msec
Maximum = 1163.65 MM at 98 msec
INSTRUMENT PANEL X DISPLACEMENT
1 B97012AI.010 FilterClass (180)
MM
1200
1000
800
600
400
200
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-27-1997 07:43

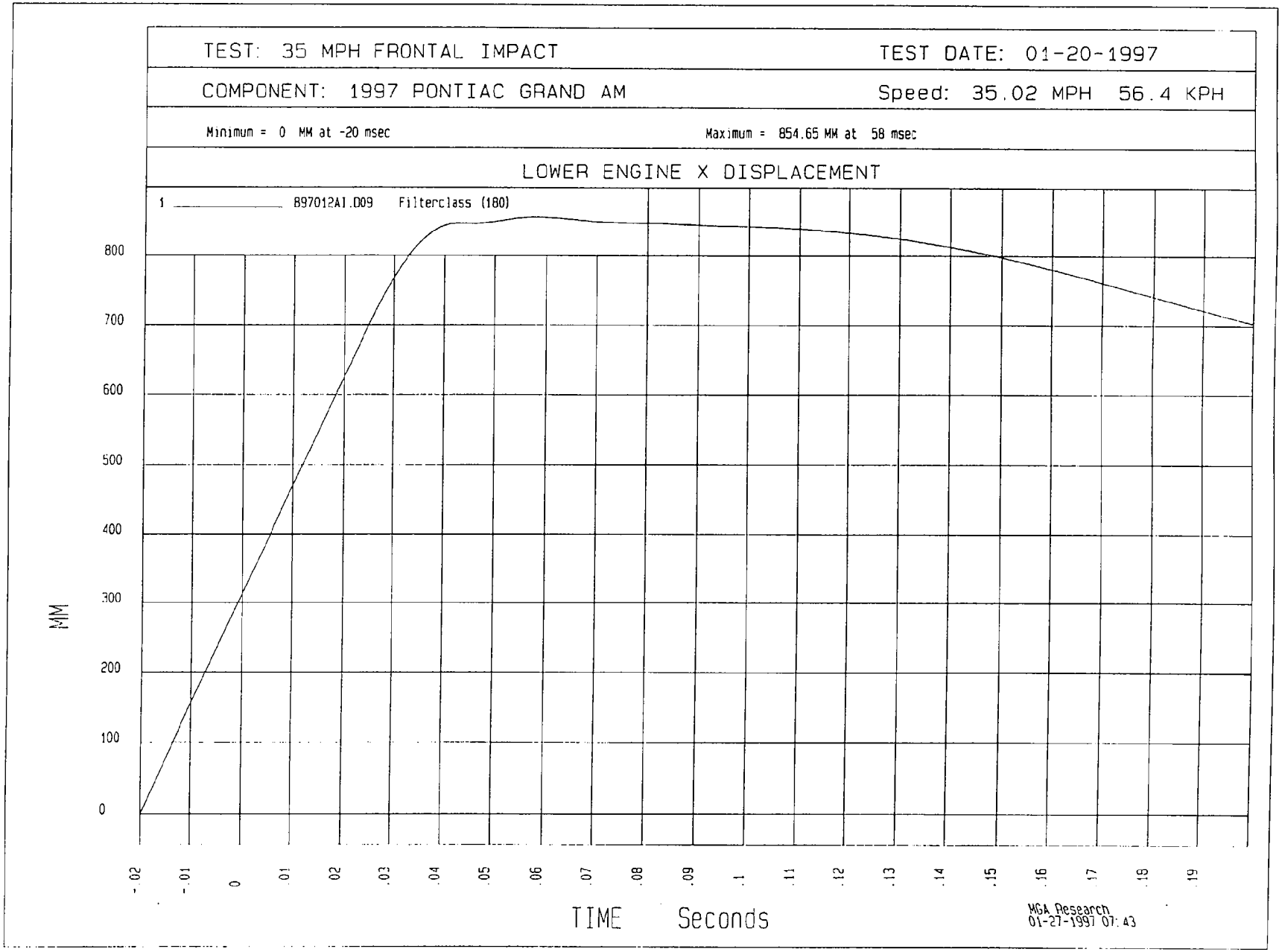

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -157 07 G'S at 40 msec
Maximum = 68.21 G'S at 48 msec
UPPER ENGINE X ACCELERATION
1 B97012AF.A08 Filterclass (60)
100
80
60
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 12:14


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -9.10 KPH at 45 msec
Maximum = 56.41 KPH at -10 msec
UPPER ENGINE X VELOCITY
1 897012AI.V08 Filterclass (180)
60
50
40
30
20
10
0
-10
-20
KPH
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-27-1997 07:42


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 0 MM at -20 msec
Maximum = 859.89 MM at 42 msec
UPPER ENGINE X DISPLACEMENT
1 D97012AI.008 Filterclass (180)
MM
900
800
700
600
500
400
300
200
100
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-27-1997 07:43


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -109.03 G'S at 38 msec
Maximum = 29.39 G'S at 47 msec
LOWER ENGINE X ACCELERATION
1 B97012AF.A09 Filterclass (60)
100
80
60
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 12:14


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -7.27 KPH at 174 msec
Maximum = 56.40 KPH at -18 msec
LOWER ENGINE X VELOCITY
1 B97012AI.V09 Filterclass (180)
KPH
60
50
40
30
20
10
0
-10
-20
TIME Seconds
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
1
11
12
13
14
15
16
17
18
19
NGA Research
01-27-1997 07:42


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 0 MM at -20 msec
Maximum = 854.65 MM at 58 msec
LOWER ENGINE X DISPLACEMENT
1 B97012A1.D09 Filterclass (180)
MM
800
700
600
500
400
300
200
100
0
-.02
-.01
0
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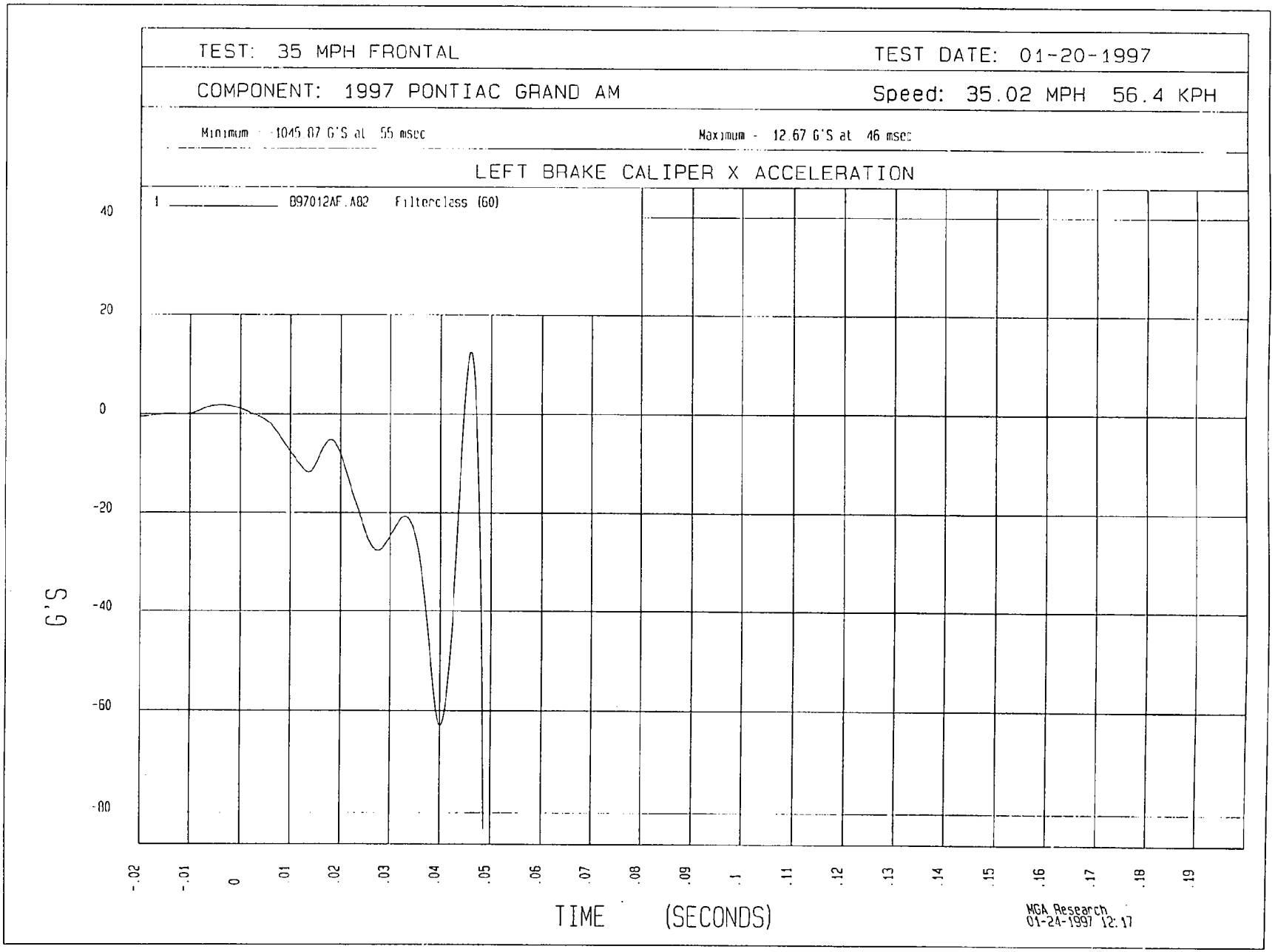
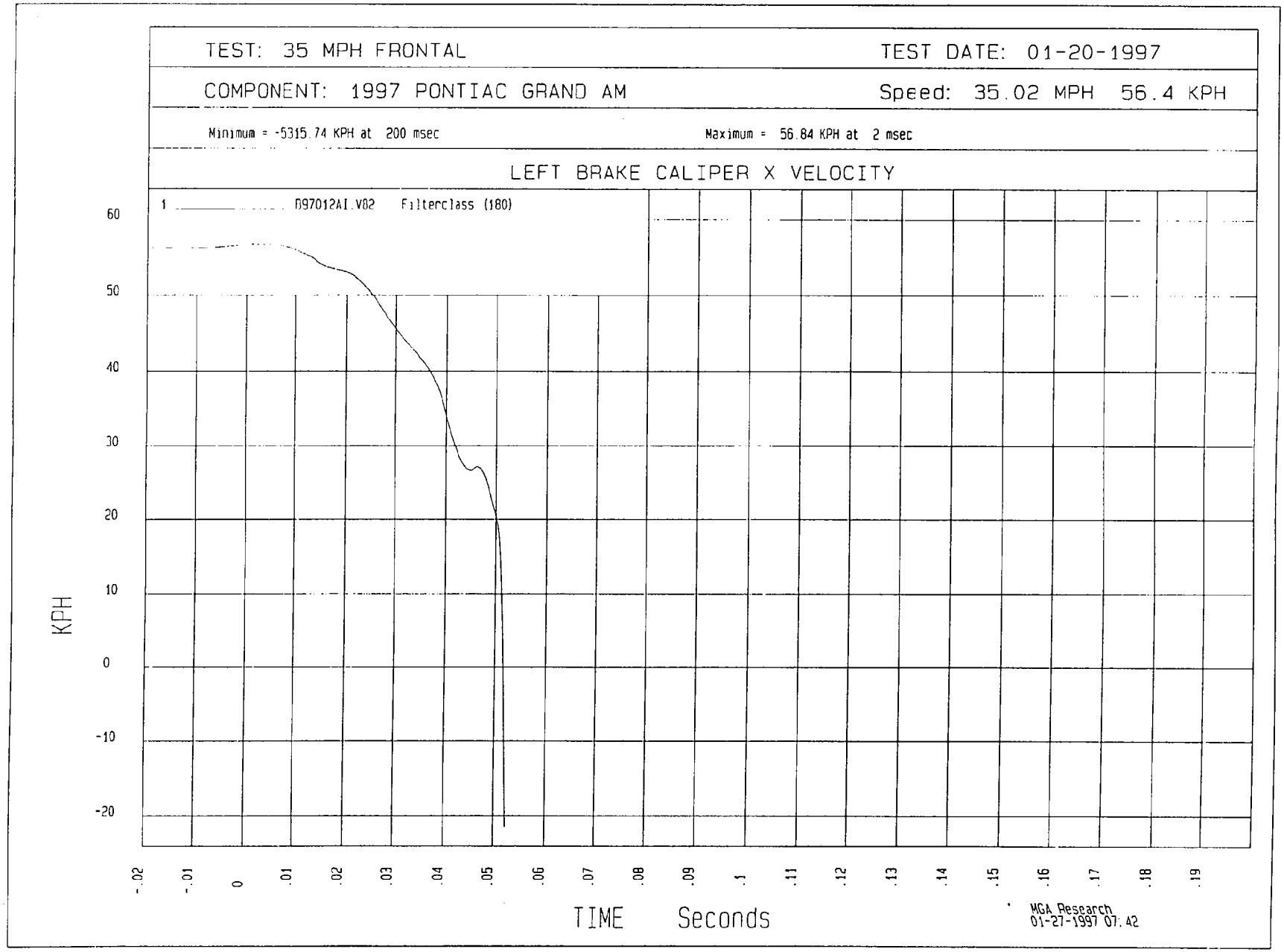
TIME Seconds
MGA Research
01-27-1997 07:43


TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum - 1045.07 G'S at 55 msec
Maximum - 12.67 G'S at 46 msec
LEFT BRAKE CALIPER X ACCELERATION
1 B97012AF.A82 Filterclass (60)
40
20
0
-20
-40
-60
-80
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 12:17


TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -5315.74 KPH at 200 msec
Maximum = 56.84 KPH at 2 msec
LEFT BRAKE CALIPER X VELOCITY
1 D97012AI.V02 Filterclass (180)
KPH
60
50
40
30
20
10
0
-10
-20
-.02
-.01
0
.01
.02
.03
.04
.05
.06
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.12
.13
.14
.15
.16
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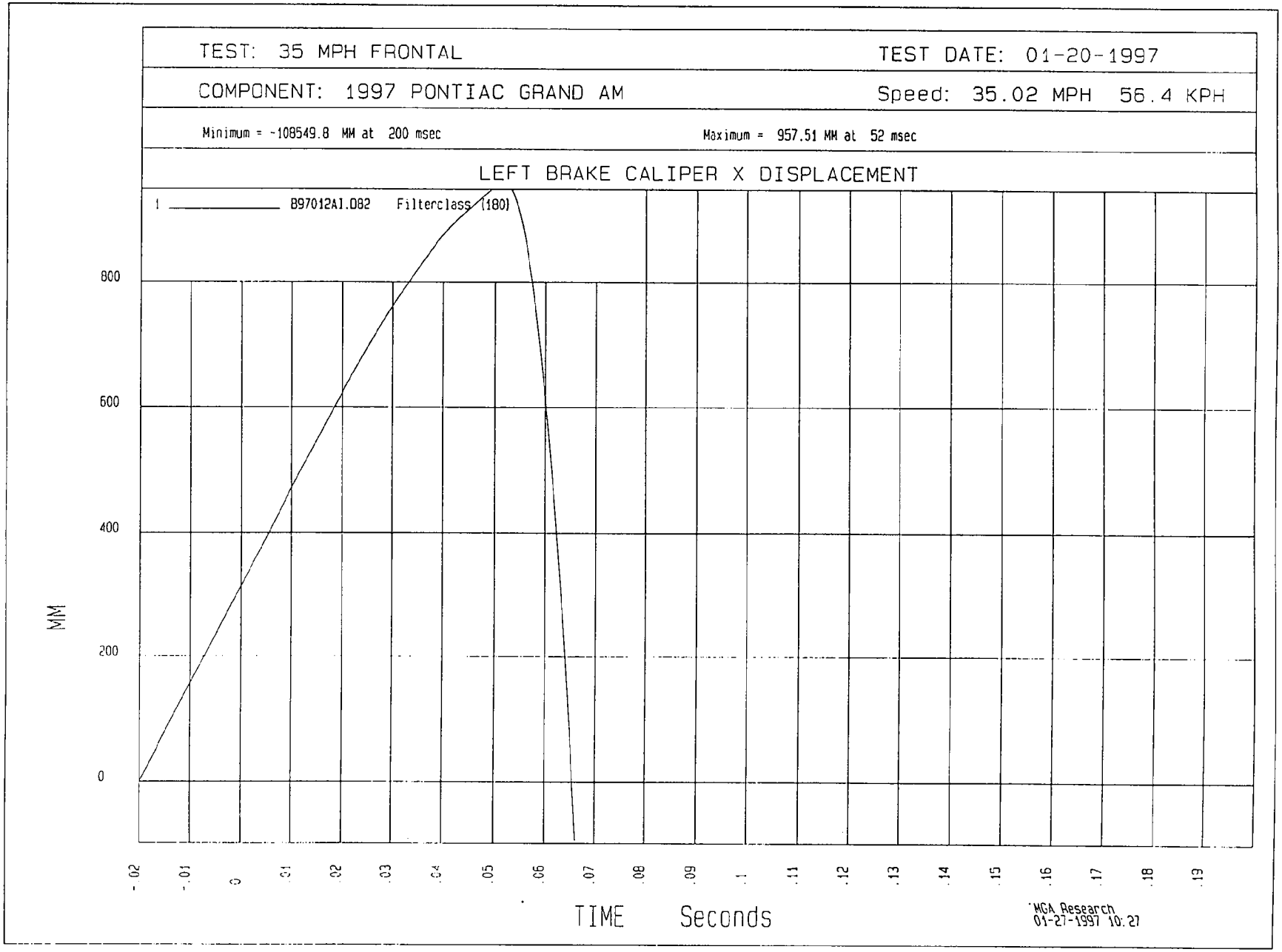
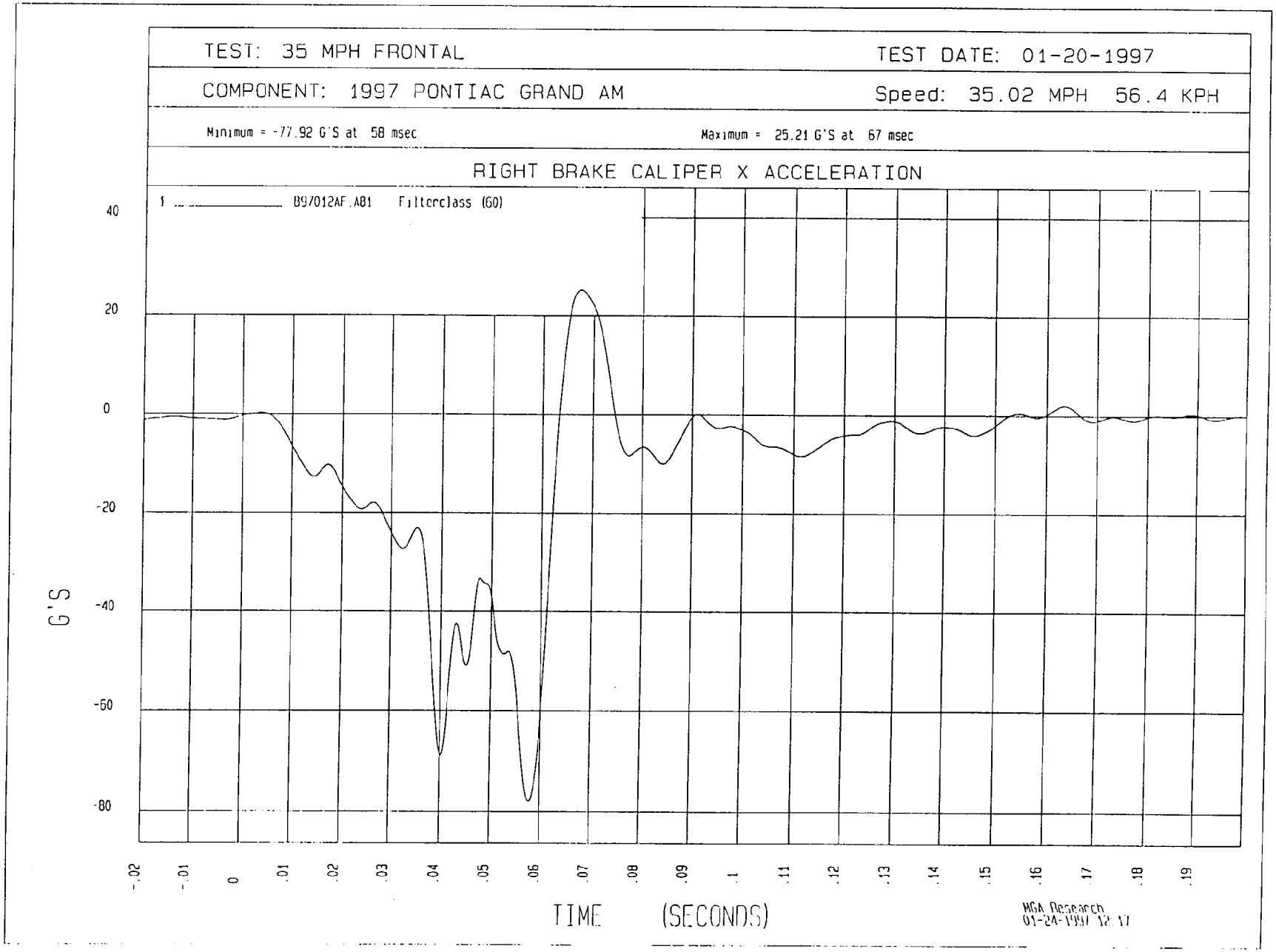
TIME Seconds
MGA Research
01-27-1997 07:42


TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -108549.8 MM at 200 msec
Maximum = 957.51 MM at 52 msec
LEFT BRAKE CALIPER X DISPLACEMENT
1 B97012A1.D82 Filterclass (180)
800
600
400
200
0
MM
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-27-1997 10:27


TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -77.92 G'S at 58 msec
Maximum = 25.21 G'S at 67 msec
RIGHT BRAKE CALIPER X ACCELERATION
1 B97012AF.A81 Filterclass (60)
40
20
0
-20
-40
-60
-80
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
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.16
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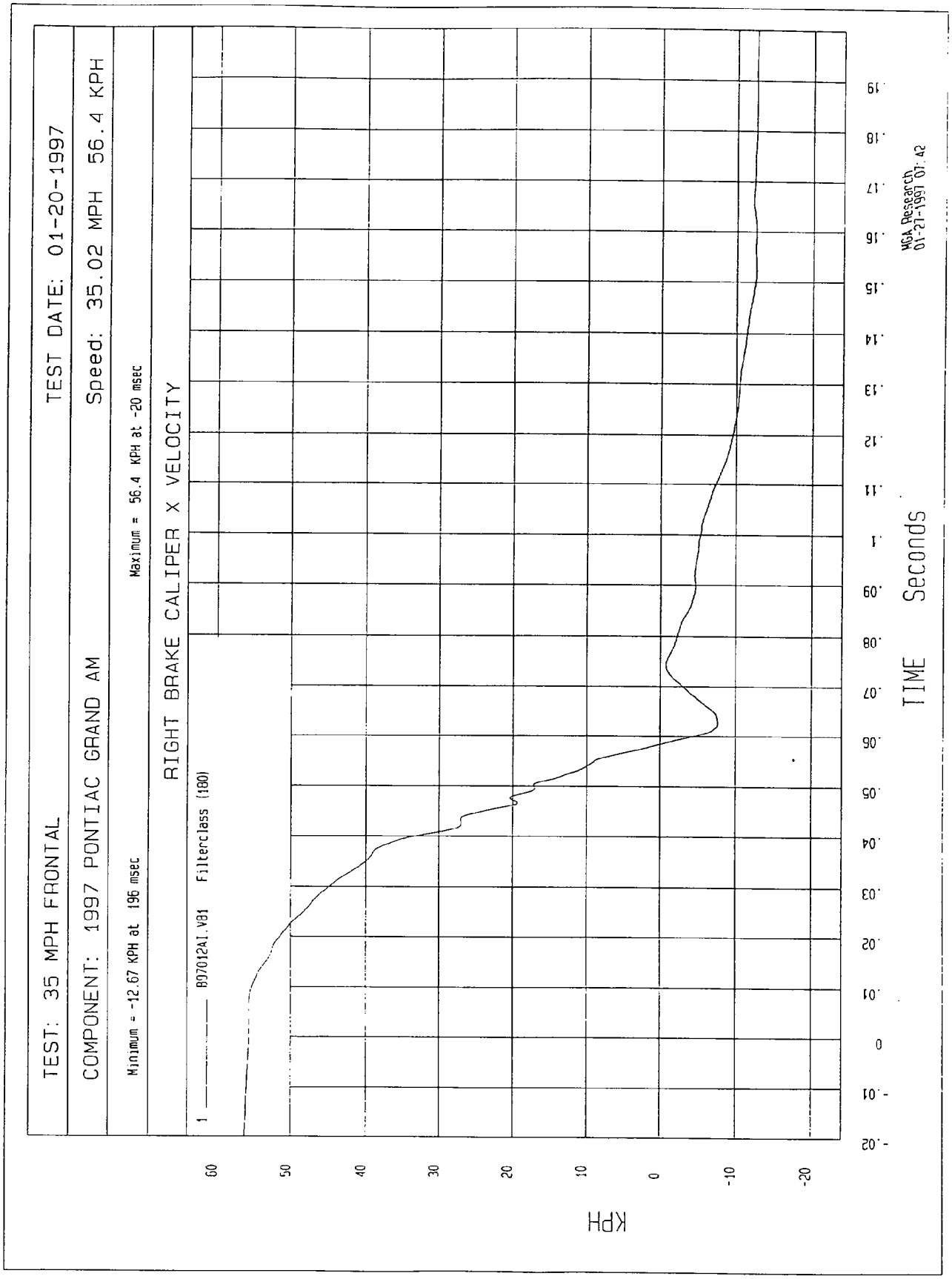
TIME (SECONDS)
MGA Research


TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -12.67 KPH at 196 msec
Maximum = 56.4 KPH at -20 msec
RIGHT BRAKE CALIPER X VELOCITY
1 B07012A1.V81 Filterclass (180)
KPH
60
50
40
30
20
10
0
-10
-20
TIME Seconds
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
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.11
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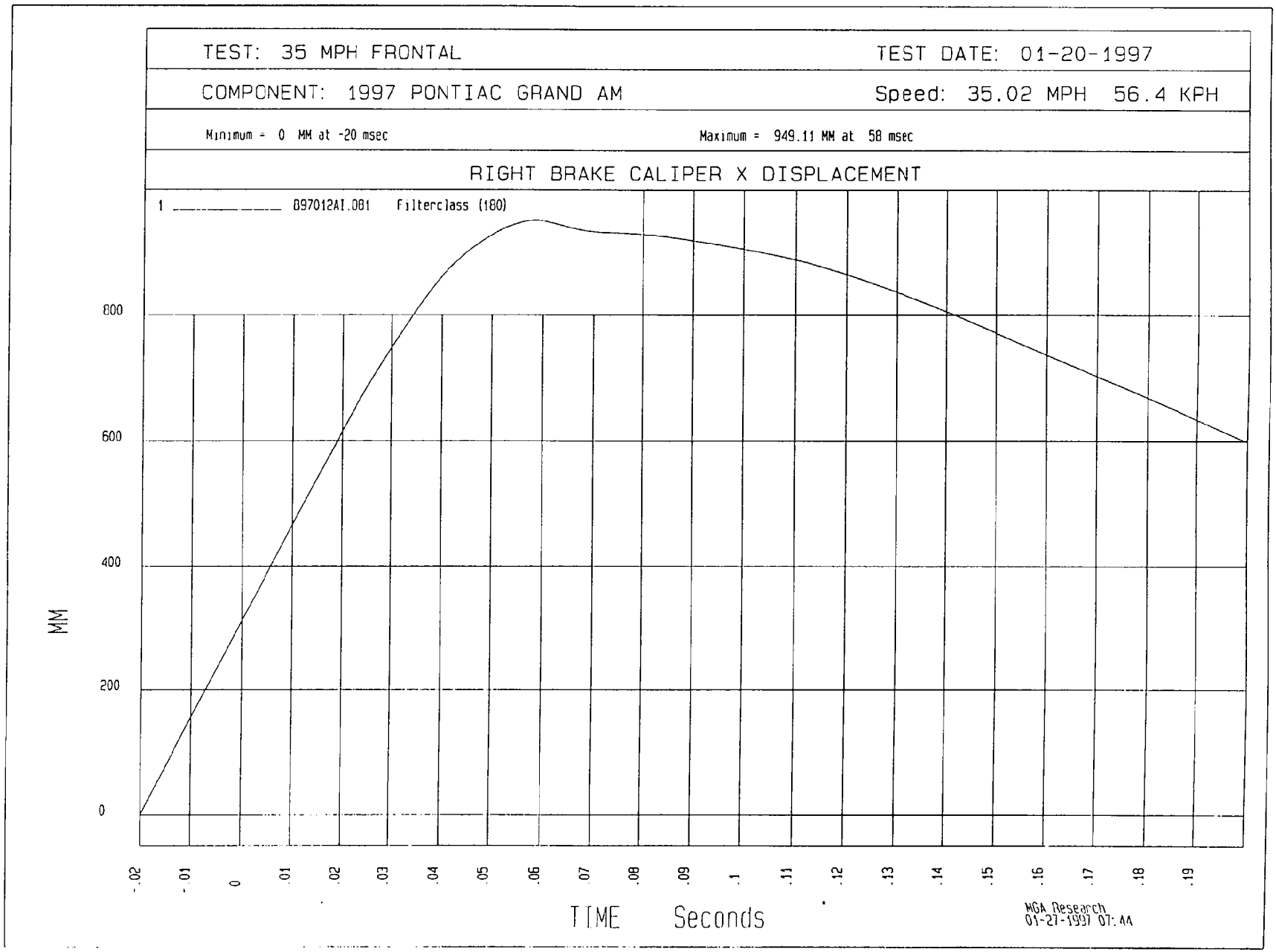
MGA Research
01-27-1997 07:42


TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 0 MM at -20 msec
Maximum = 949.11 MM at 58 msec
RIGHT BRAKE CALIPER X DISPLACEMENT
1 B97012AI.081 Filterclass (180)
MM
800
600
400
200
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
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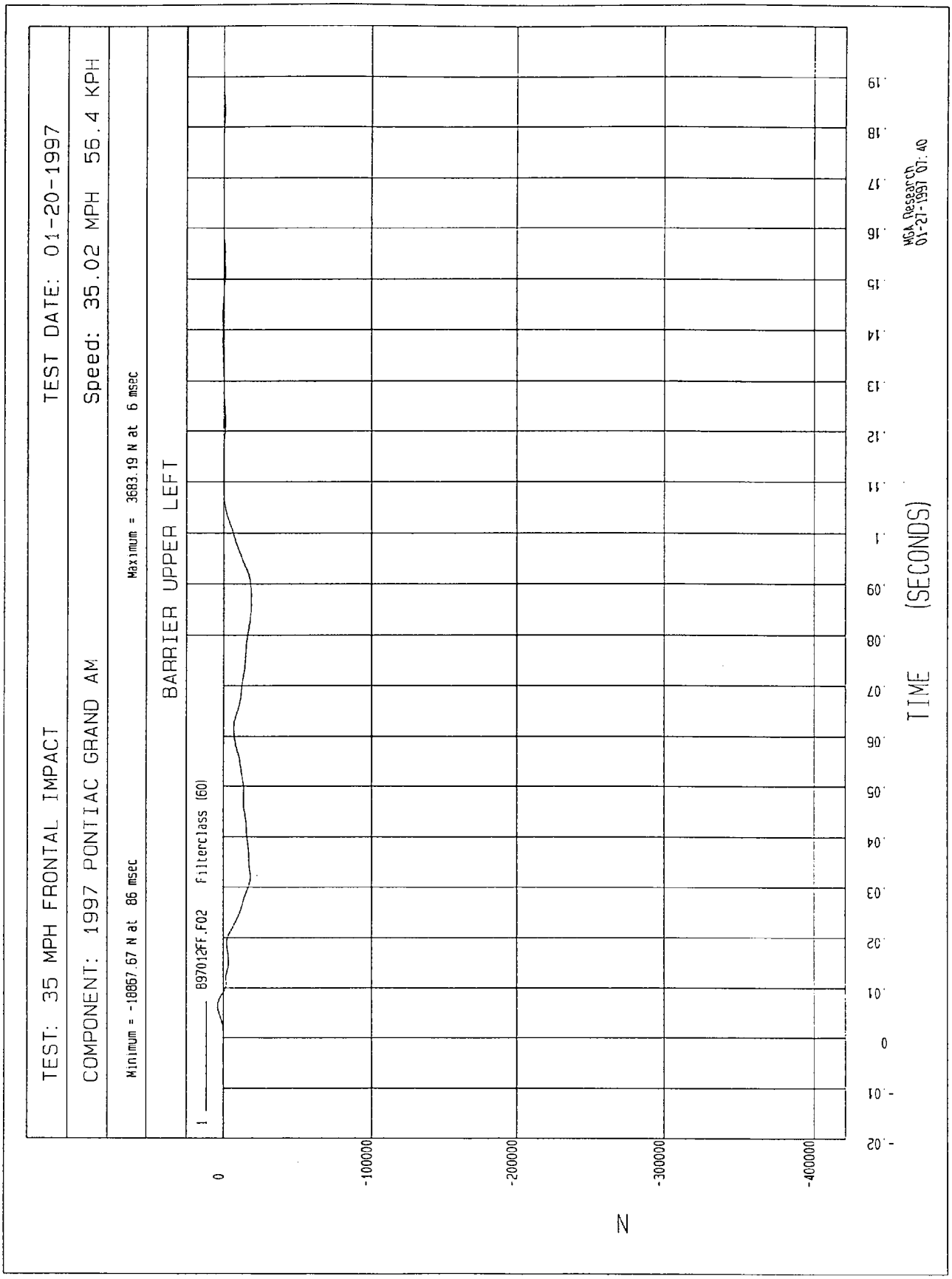
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-27-1997 07:44


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -18867.67 N at 86 msec
Maximum = 3683.19 N at 6 msec
BARRIER UPPER LEFT
1 ——— 897012ff.F02 Filterclass (60)
0
-100000
-200000
-300000
-400000
N
TIME (SECONDS)
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
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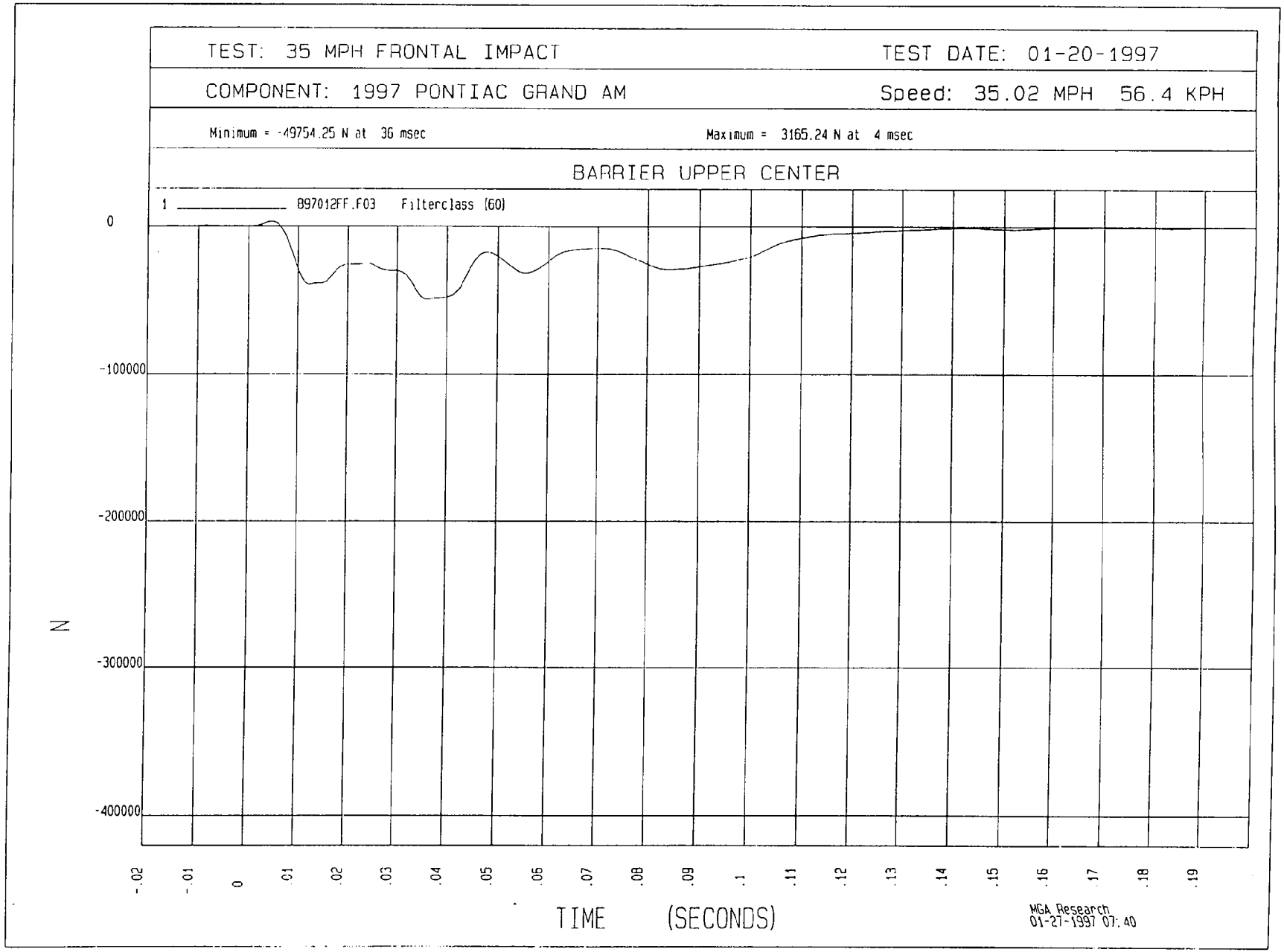
MGA Research
01-27-1997 07:40


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -49754.25 N at 36 msec
Maximum = 3165.24 N at 4 msec
BARRIER UPPER CENTER
1 B97012FF.F03 Filterclass (60)
0
-100000
-200000
-300000
-400000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
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.14
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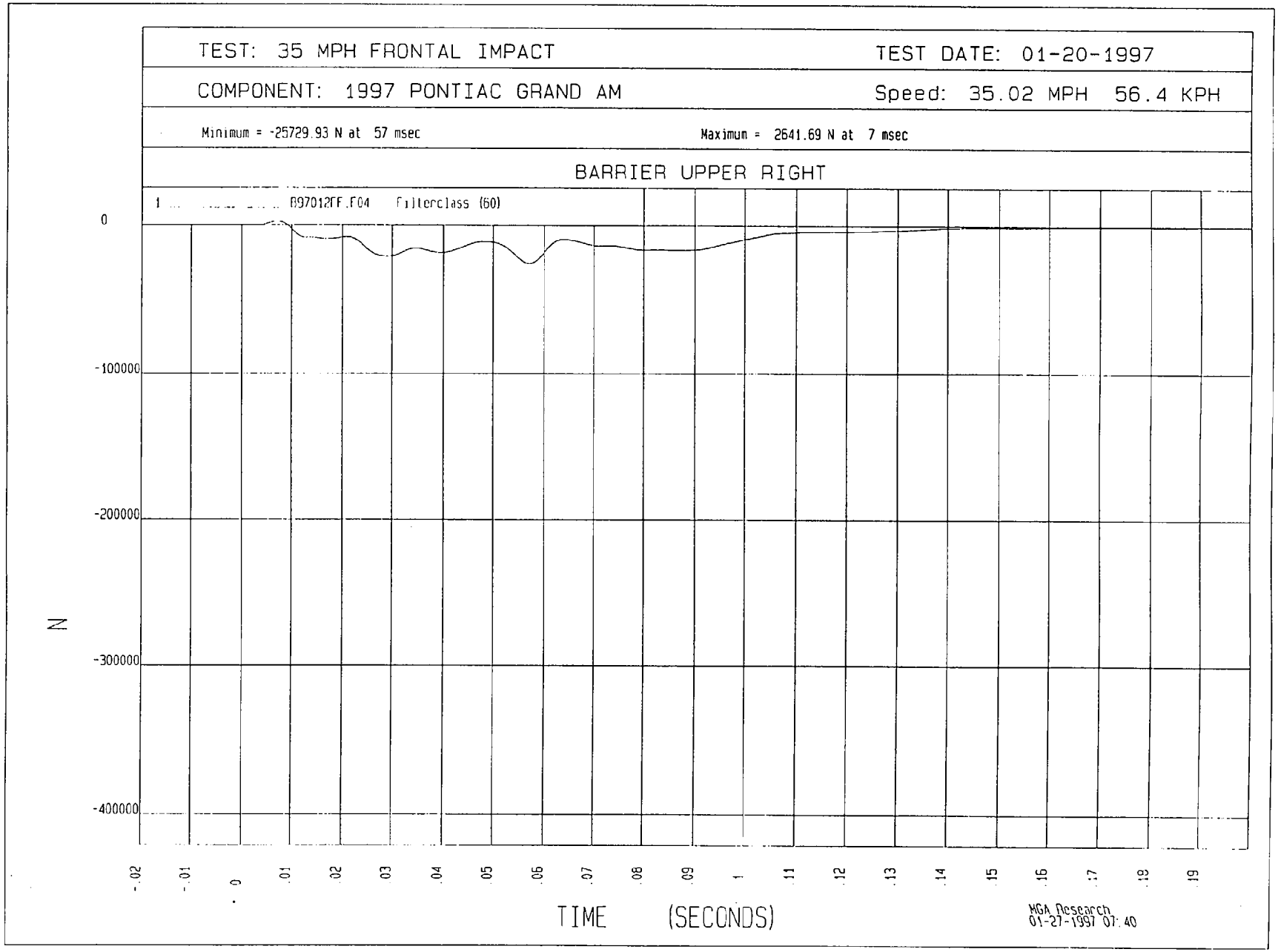
TIME (SECONDS)
MGA Research
01-27-1997 07:40


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -25729.93 N at 57 msec
Maximum = 2641.69 N at 7 msec
BARRIER UPPER RIGHT
1 ... B97012FF.F04 Filterclass (60)
0
-100000
-200000
-300000
-400000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
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.09
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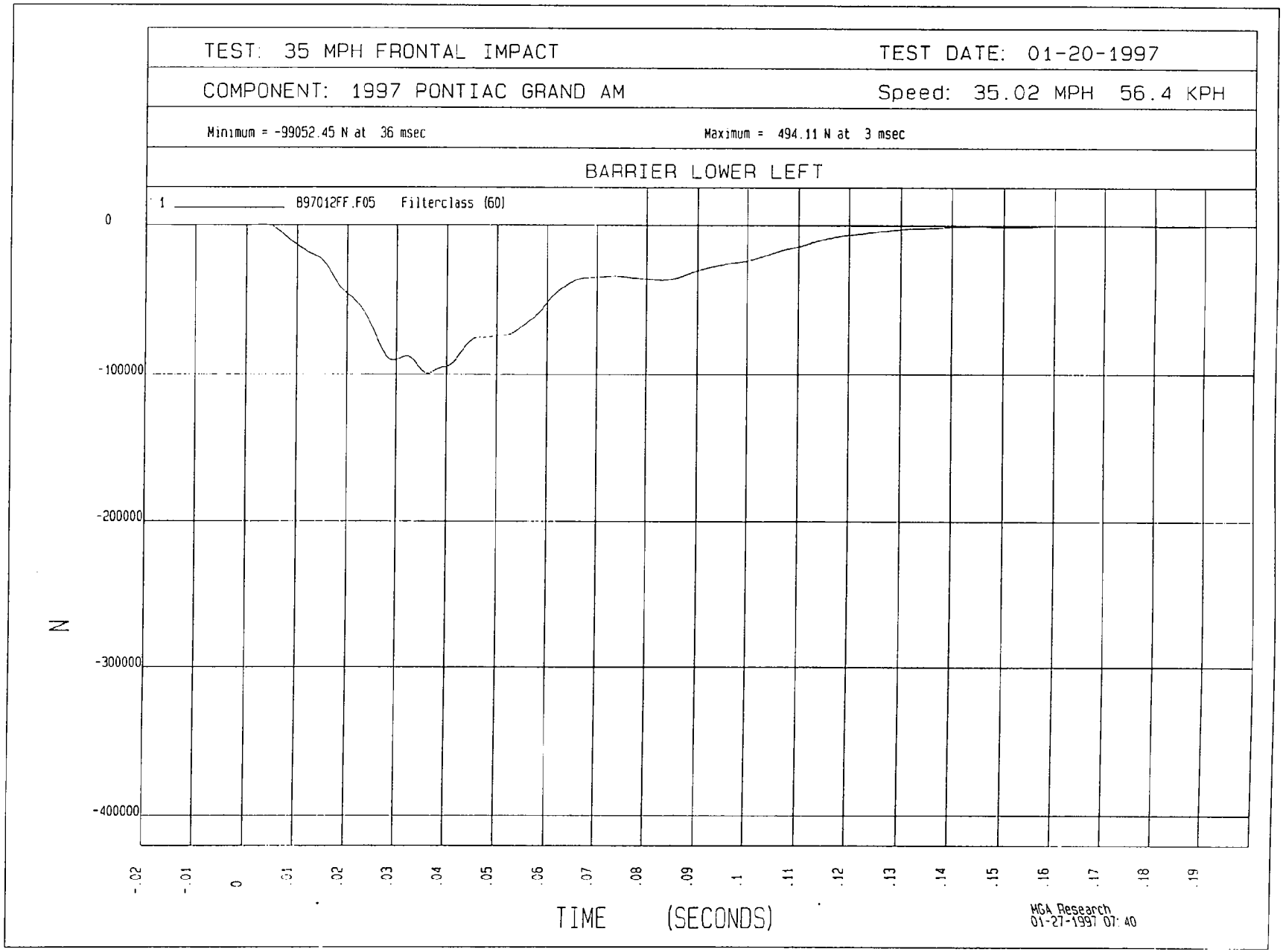
TIME (SECONDS)
MGA Research
01-27-1997 07:40


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -99052.45 N at 36 msec
Maximum = 494.11 N at 3 msec
BARRIER LOWER LEFT
1 B97012FF.F05 Filterclass (60)
0
-100000
-200000
-300000
-400000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
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.14
.15
.16
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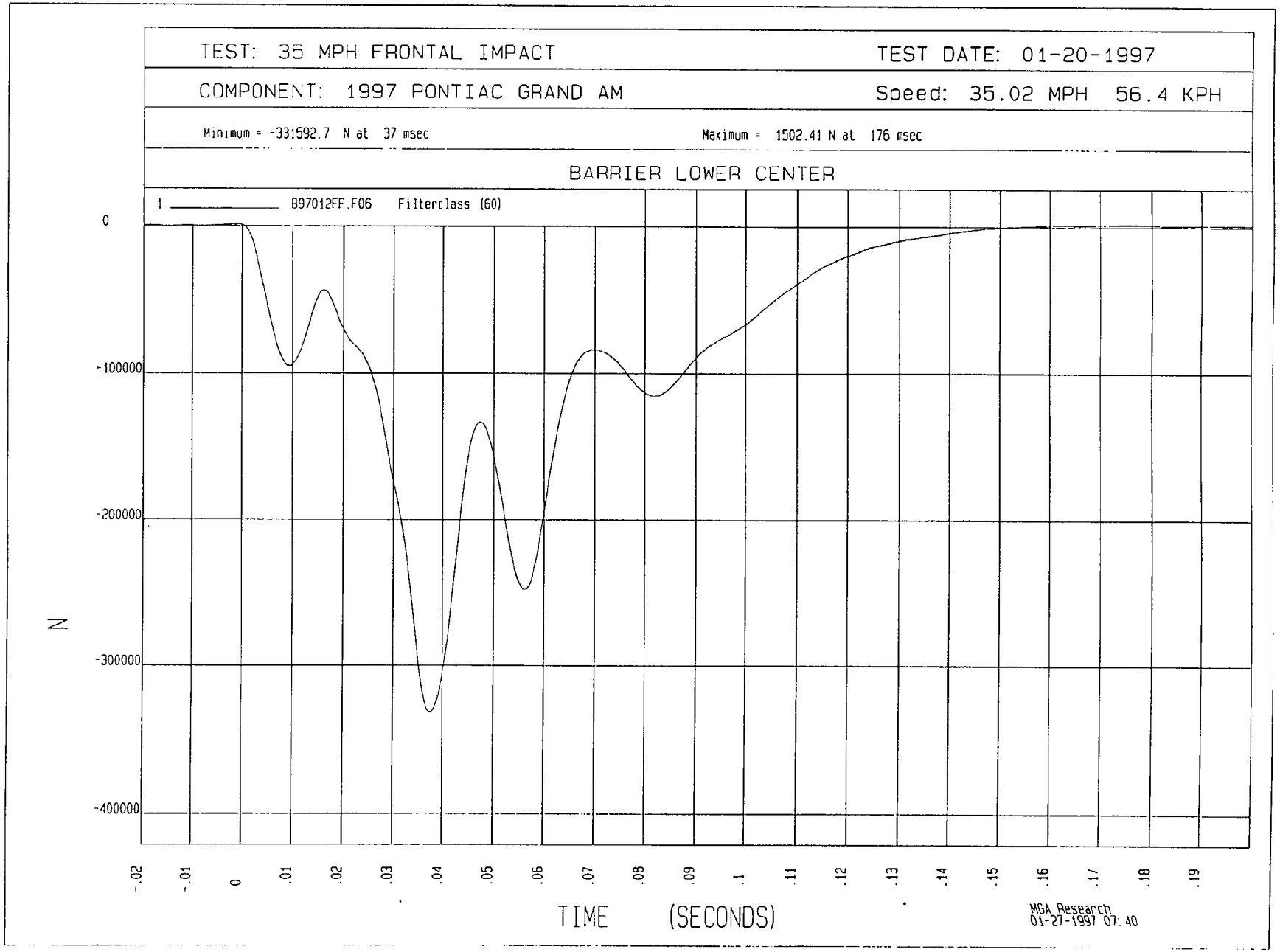
TIME (SECONDS)
MGA Research
01-27-1997 07:40


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -331592.7 N at 37 msec
Maximum = 1502.41 N at 176 msec
BARRIER LOWER CENTER
1 B97012FF.F06 Filterclass (60)
0
-100000
-200000
-300000
-400000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
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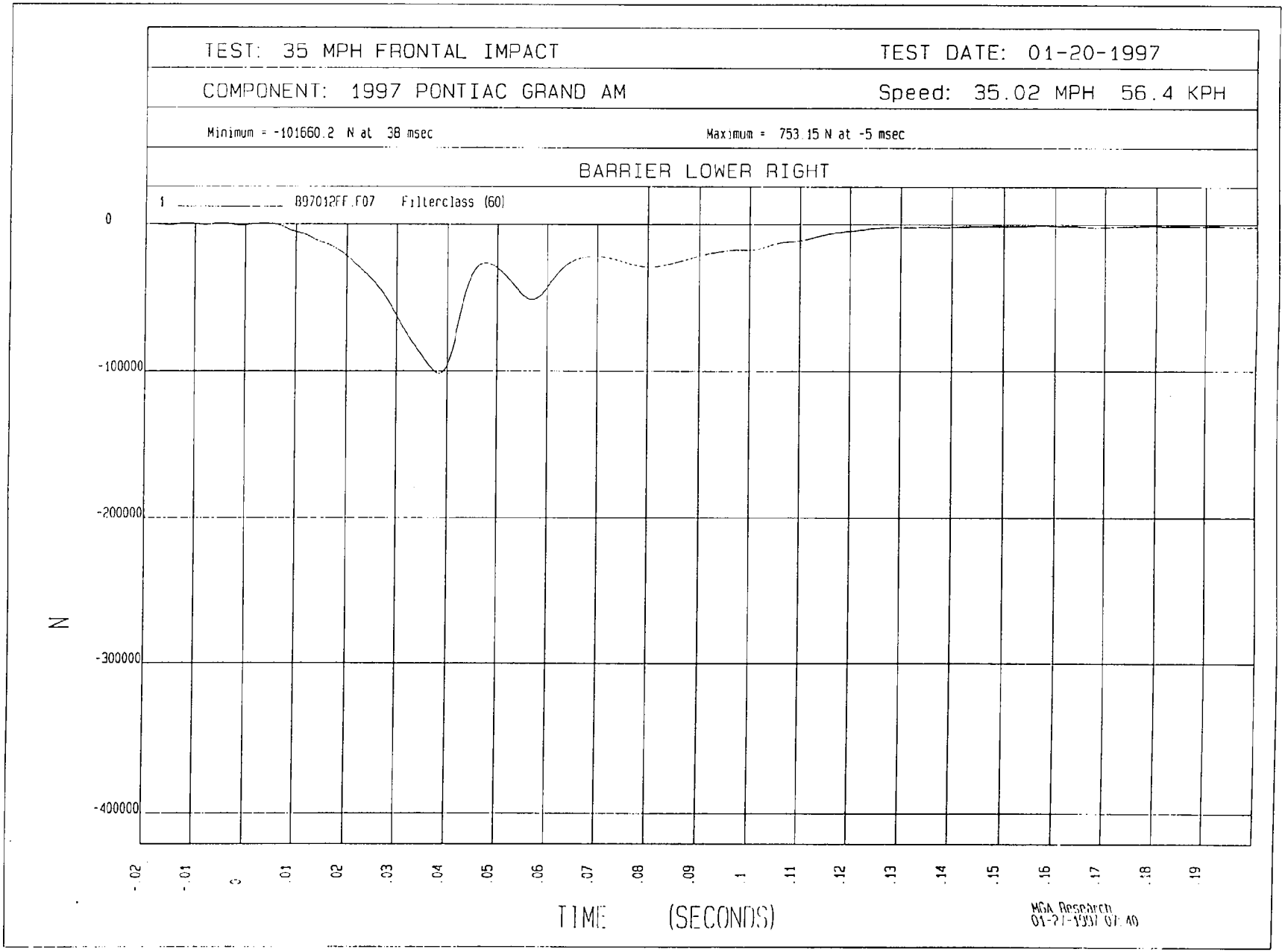
TIME (SECONDS)
MGA Research
01-27-1997 07:40


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -101660.2 N at 38 msec
Maximum = 753.15 N at -5 msec
BARRIER LOWER RIGHT
1 B97012FF.F07 Filterclass (60)
0
-100000
-200000
-300000
-400000
N
-.02
-.01
0
.01
.02
.03
.04
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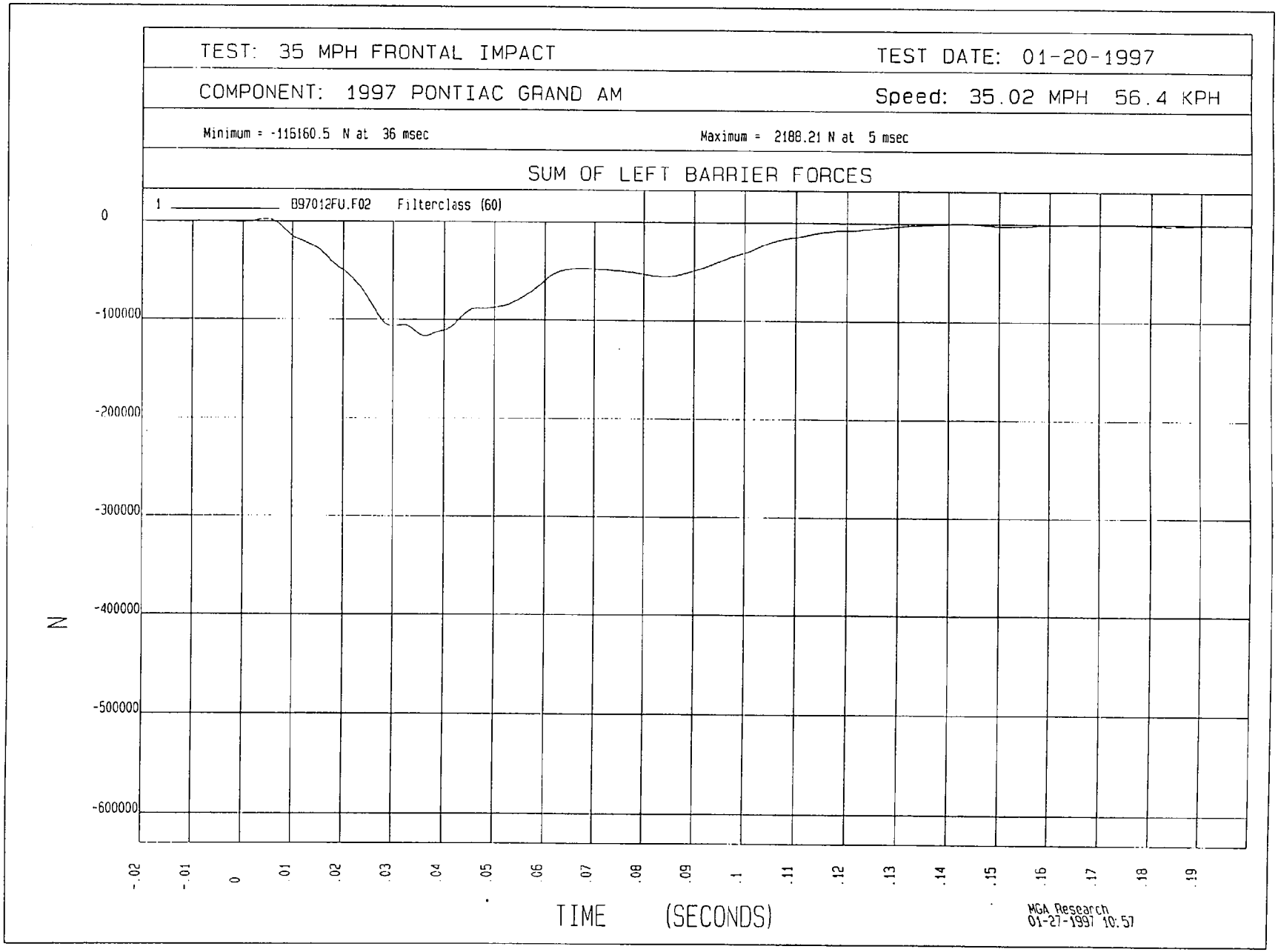
TIME (SECONDS)
MGA Research
01-27-1997 07:40


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -115160.5 N at 36 msec
Maximum = 2188.21 N at 5 msec
SUM OF LEFT BARRIER FORCES
1 B97012FU.F02 Filterclass (60)
0
-100000
-200000
-300000
-400000
-500000
-600000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
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.1
.11
.12
.13
.14
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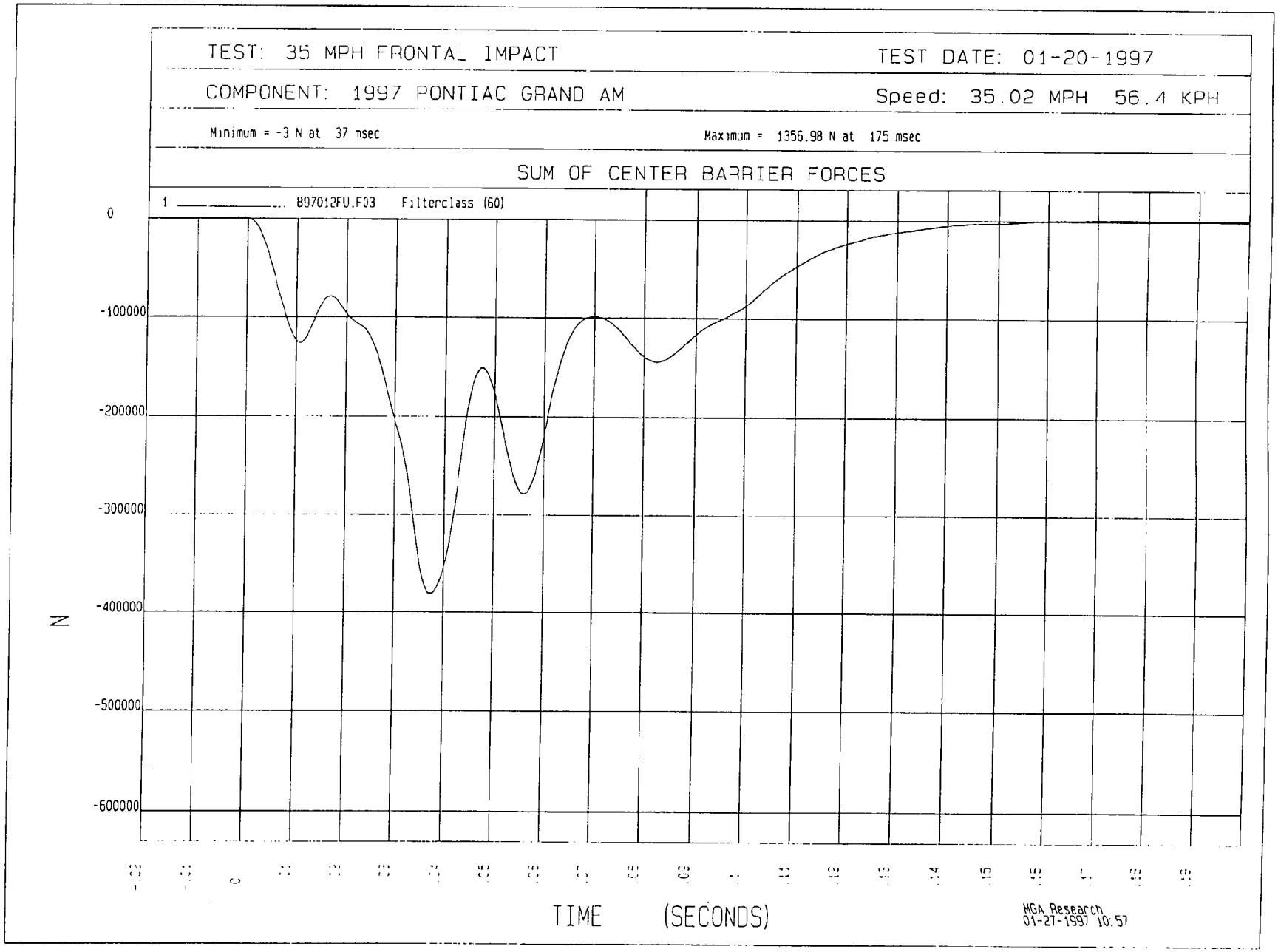
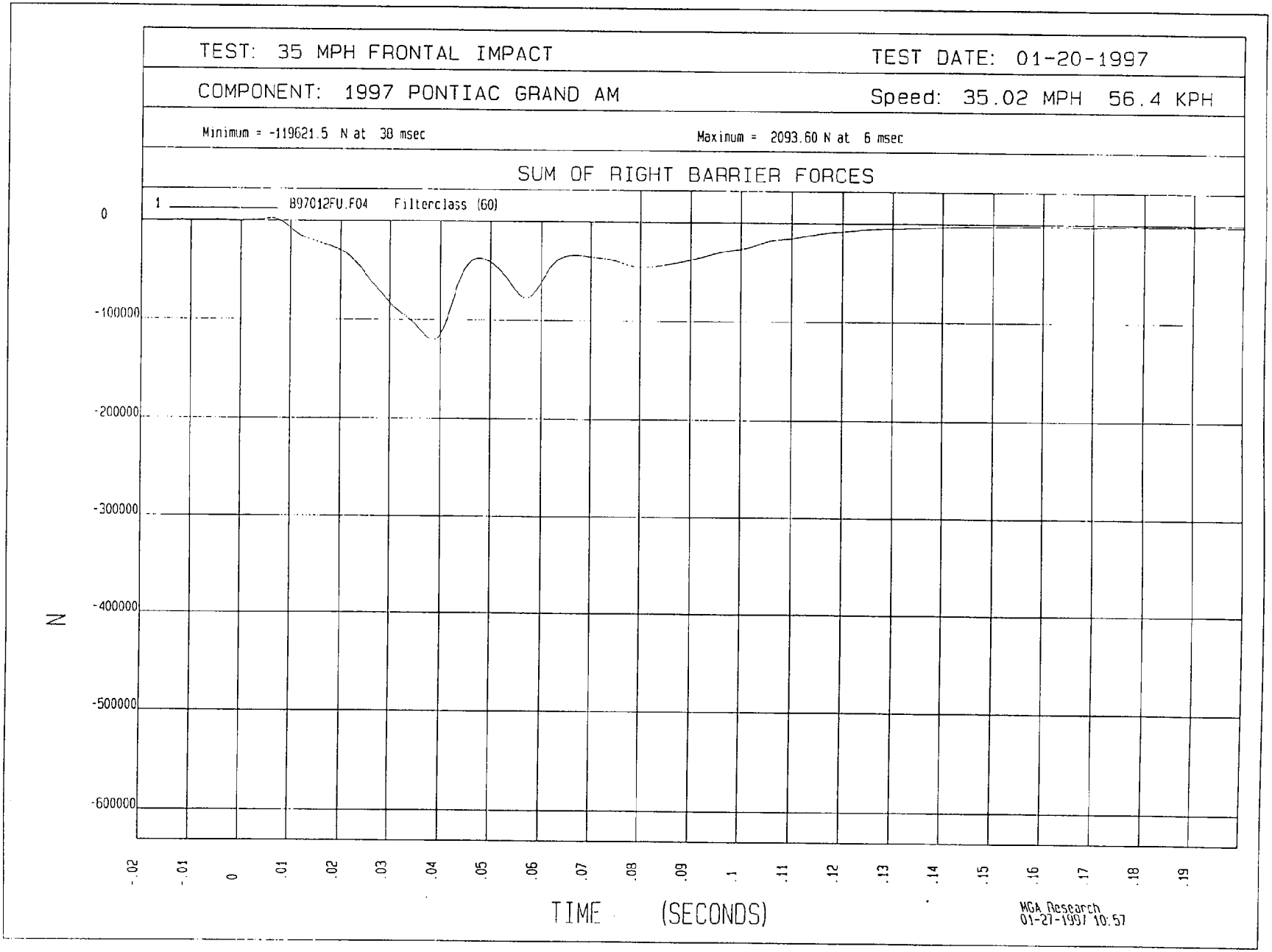
TIME (SECONDS)
MGA Research
01-27-1997 10:57


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -3 N at 37 msec
Maximum = 1356.98 N at 175 msec
SUM OF CENTER BARRIER FORCES
1 B97012FU.F03 Filterclass (60)
0
-100000
-200000
-300000
-400000
-500000
-600000
N
TIME (SECONDS)
MGA Research
01-27-1997 10:57


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -119621.5 N at 38 msec
Maximum = 2093.60 N at 6 msec
SUM OF RIGHT BARRIER FORCES
1 B97012FU.F04 Filterclass (60)
0
-100000
-200000
-300000
-400000
-500000
-600000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
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.11
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.13
.14
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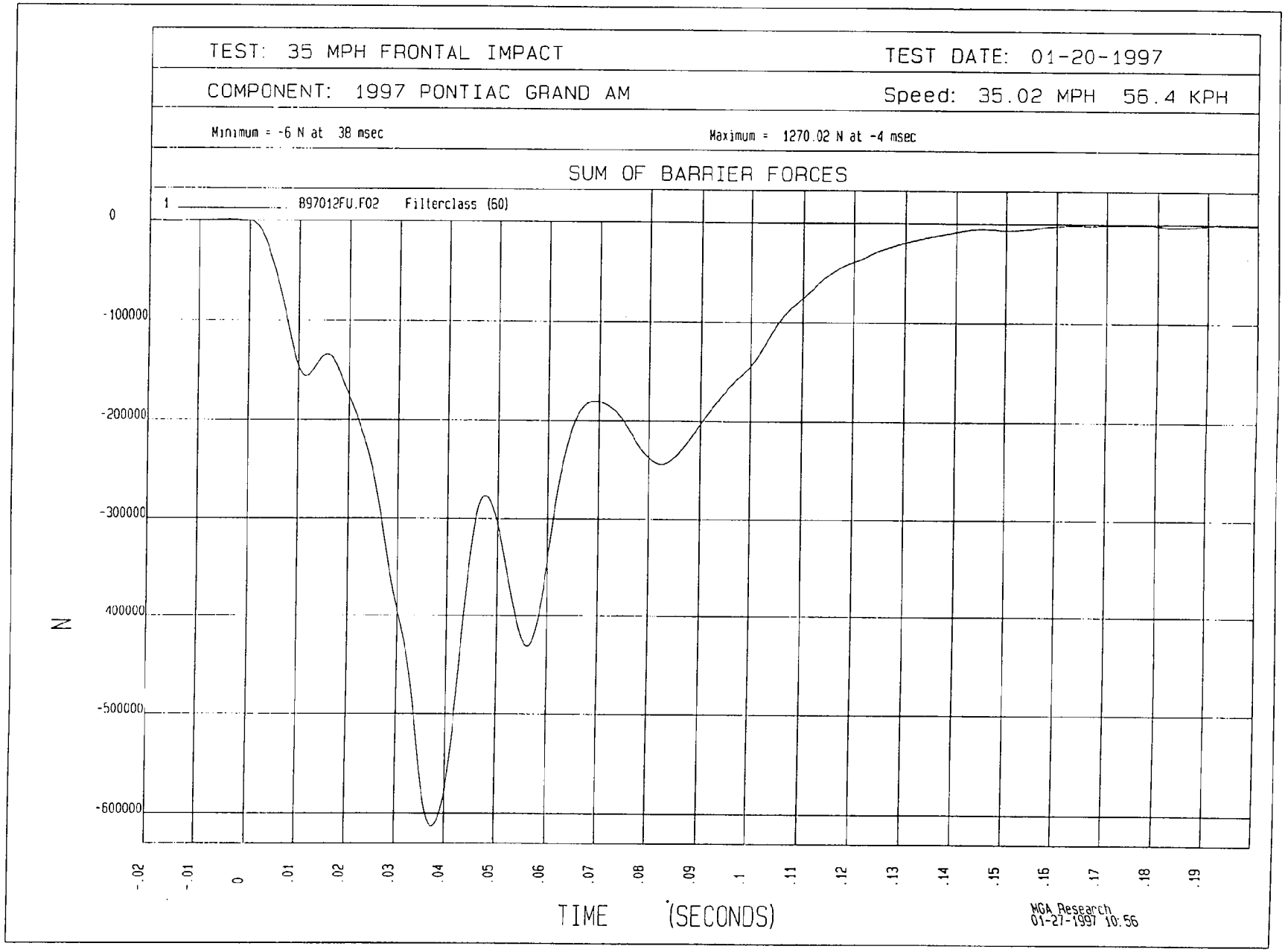
TIME (SECONDS)
MGA Research
01-27-1997 10:57


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -6 N at 38 msec
Maximum = 1270.02 N at -4 msec
SUM OF BARRIER FORCES
1 B97012FU.F02 Filterclass (60)
0
-100000
-200000
-300000
-400000
-500000
-600000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
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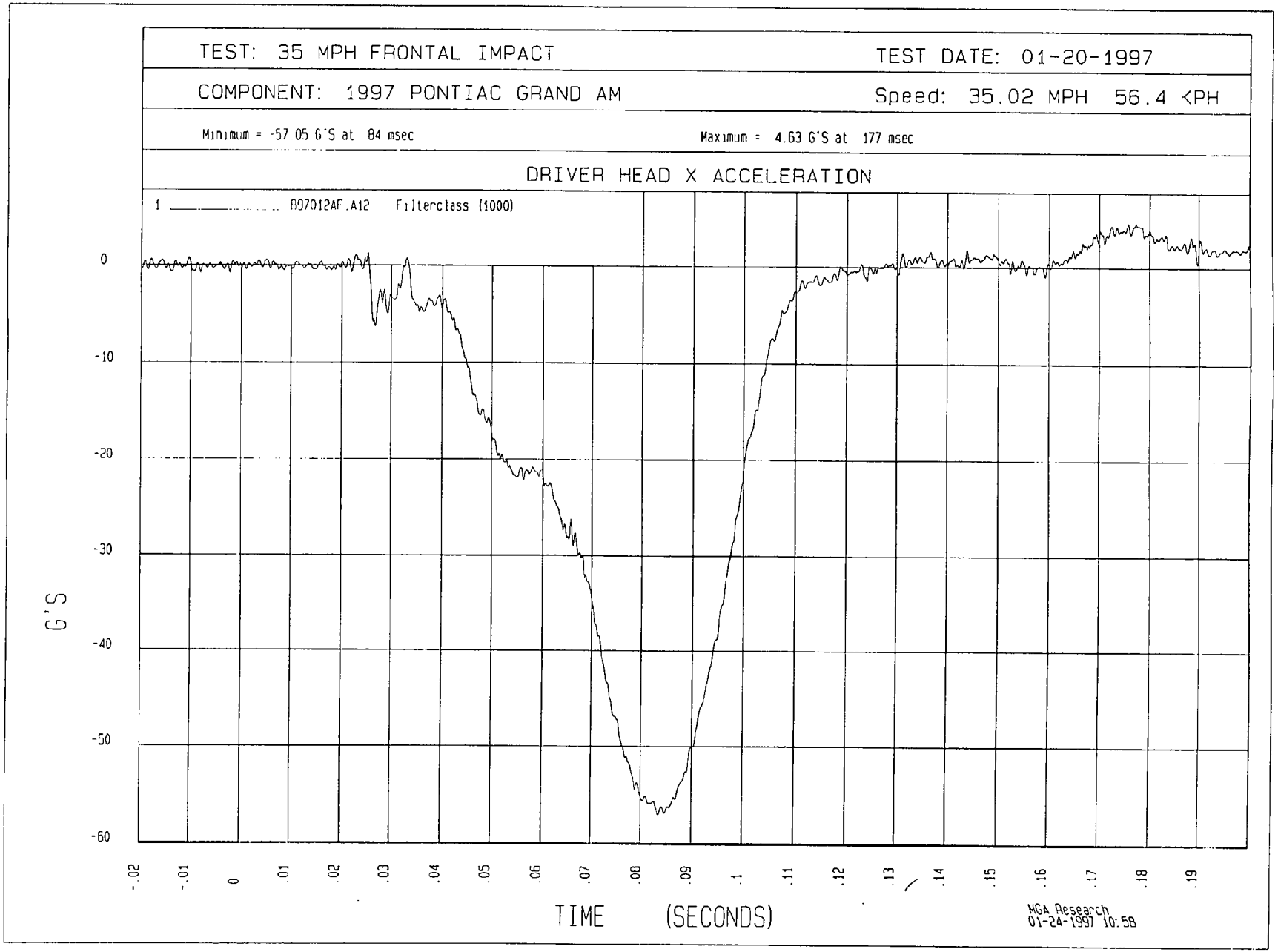
TIME (SECONDS)
MGA Research
01-27-1997 10:56


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -57.05 G'S at 84 msec
Maximum = 4.63 G'S at 177 msec
DRIVER HEAD X ACCELERATION
1 097012AF.A12 Filterclass (1000)
0
-10
-20
-30
-40
-50
-60
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
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.15
.16
.17
.18
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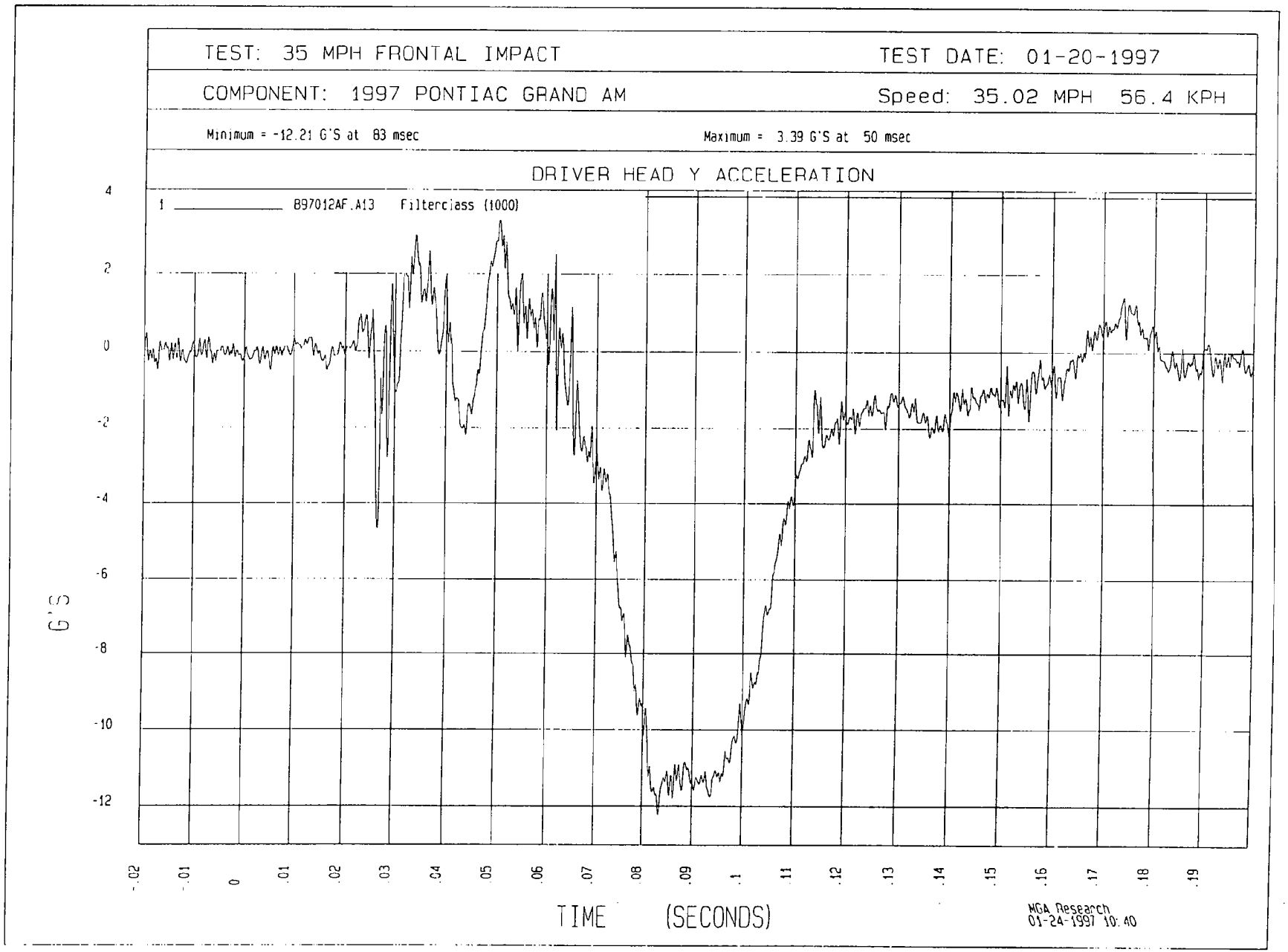
TIME (SECONDS)
MGA Research
01-24-1997 10:58


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -12.21 G'S at 83 msec
Maximum = 3.39 G'S at 50 msec
DRIVER HEAD Y ACCELERATION
1 B97012AF.A13 Filterclass (1000)
4
2
0
-2
-4
-6
-8
-10
-12
G's
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
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.16
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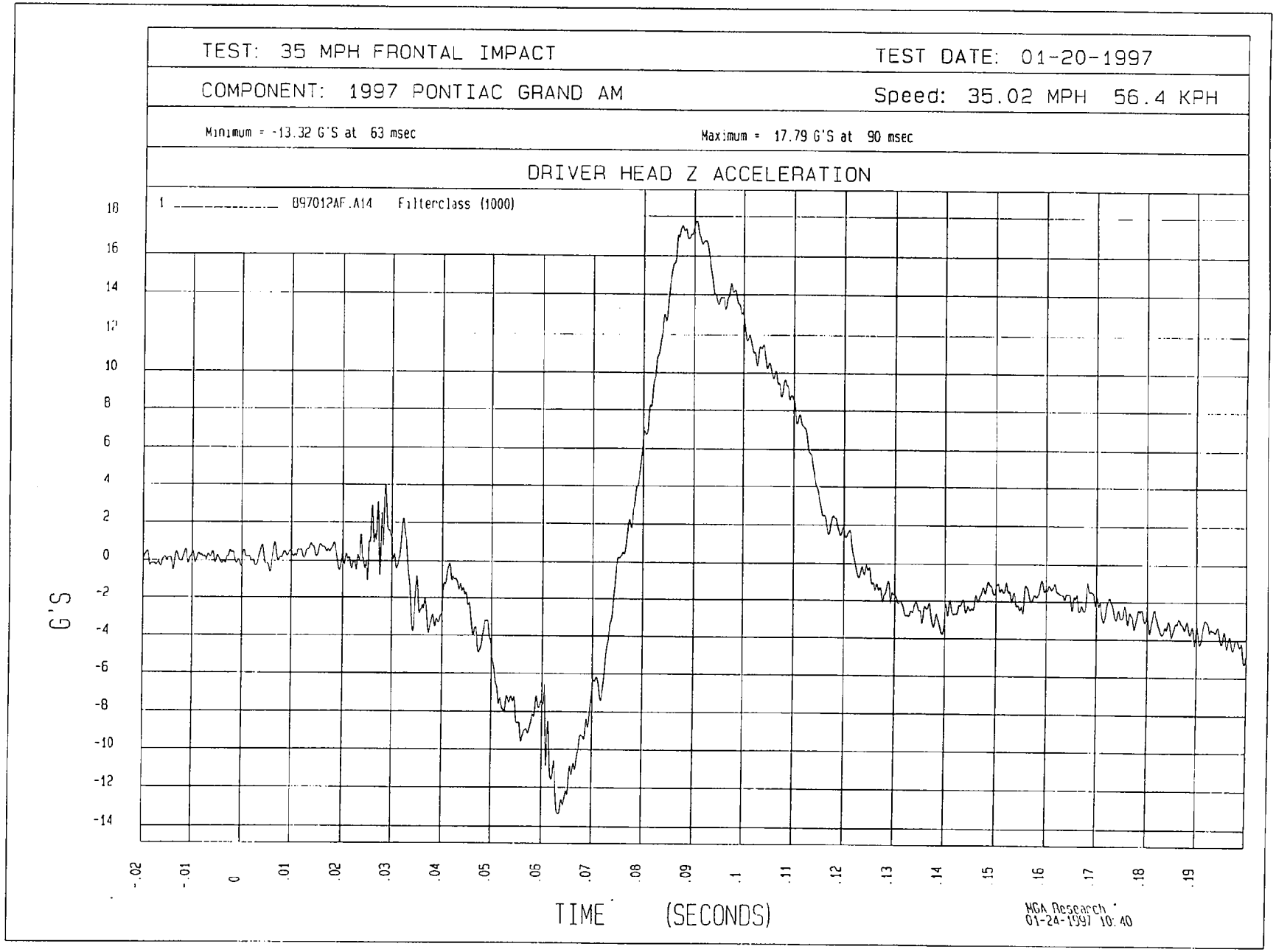
TIME (SECONDS)
MGA Research
01-24-1997 10:40


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -13.32 G'S at 63 msec
Maximum = 17.79 G'S at 90 msec
DRIVER HEAD Z ACCELERATION
1 B97012AF.A14 Filterclass (1000)
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
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.08
.09
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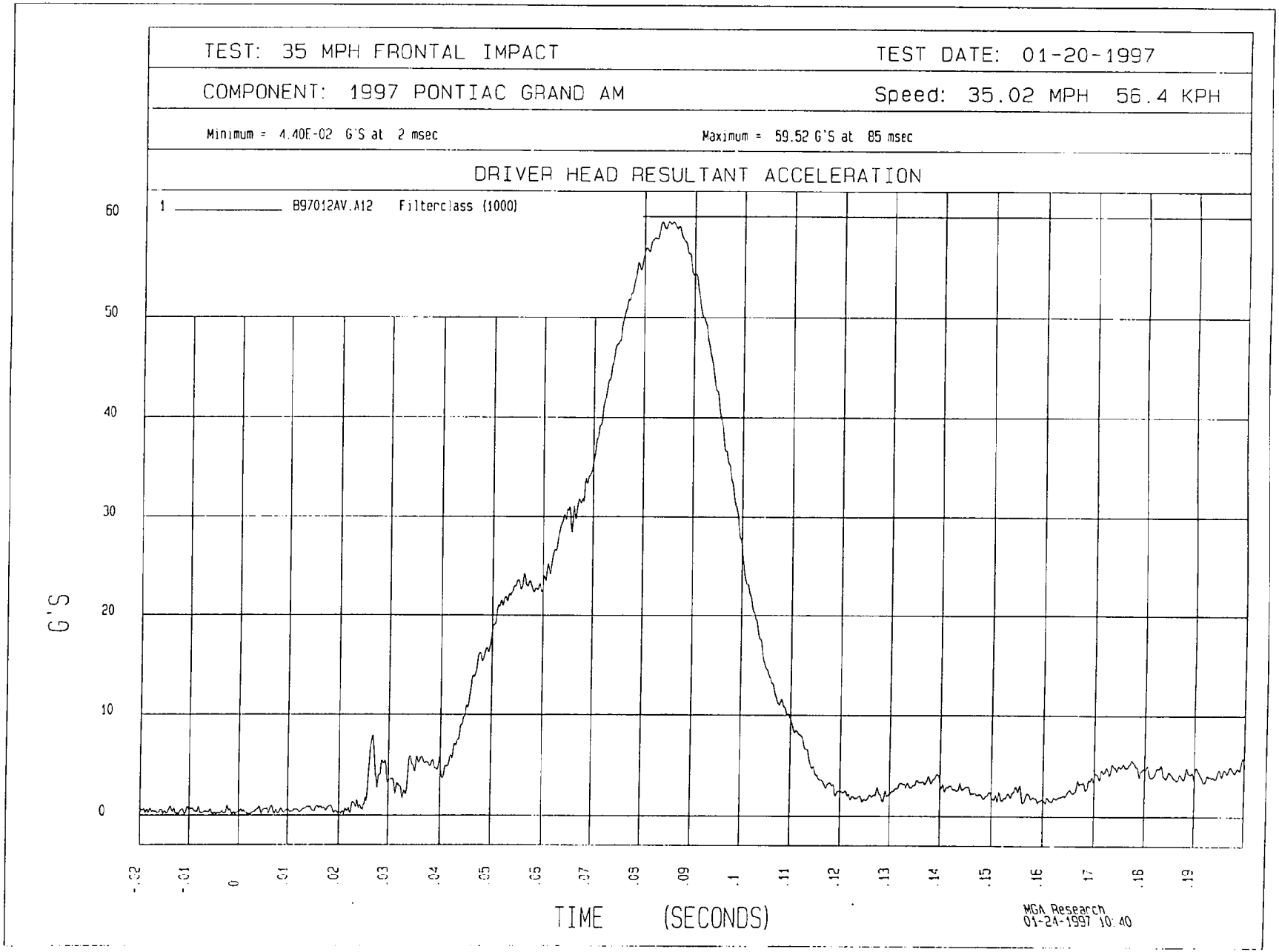
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:40


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 4.40E-02 G'S at 2 msec
Maximum = 59.52 G'S at 85 msec
DRIVER HEAD RESULTANT ACCELERATION
1 B97012AV.A12 Filterclass (1000)
G'S
60
50
40
30
20
10
0
-.02
-.01
0
.01
.02
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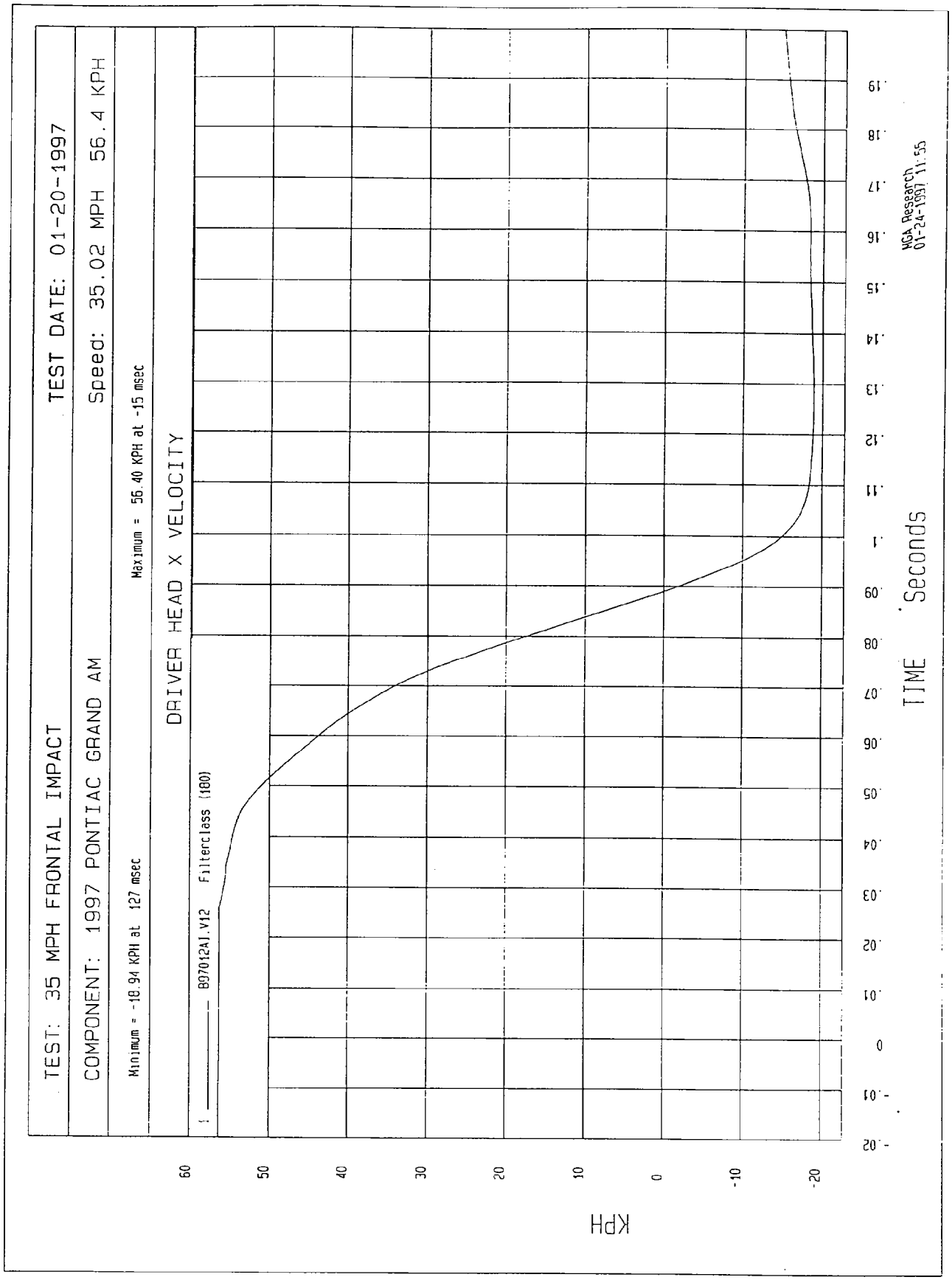
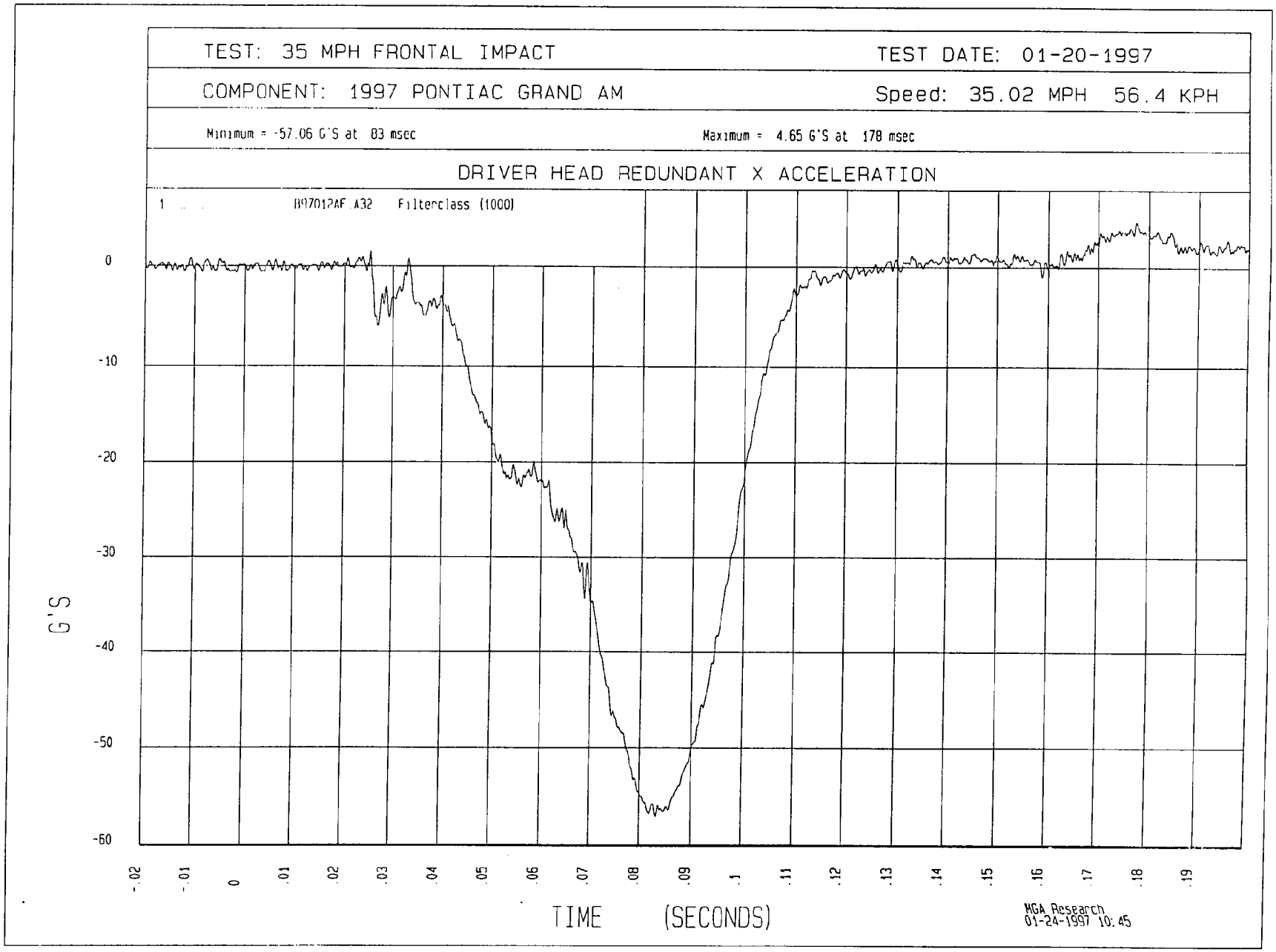
TIME (SECONDS)
MGA Research
01-24-1997 10:40


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -18.94 KPH at 127 msec
Maximum = 56.40 KPH at -15 msec
DRIVER HEAD X VELOCITY
B97012A1.V12 Filterclass (180)
KPH
TIME Seconds
MGA Research
01-24-1997 11:55


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -57.06 G'S at 83 msec
Maximum = 4.65 G'S at 178 msec
DRIVER HEAD REDUNDANT X ACCELERATION
1 B97012AF.A32 Filterclass (1000)
0
-10
-20
-30
-40
-50
-60
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
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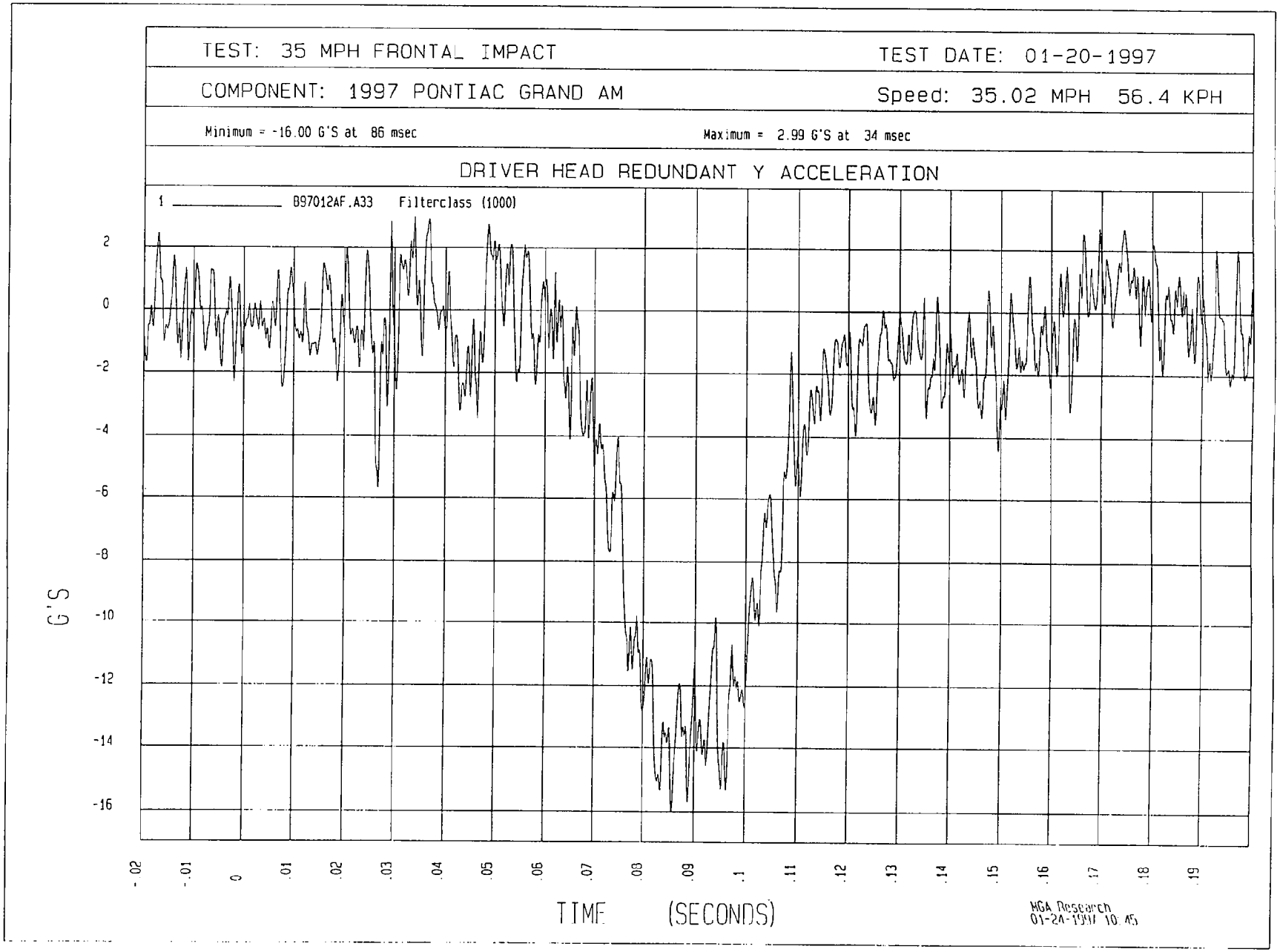
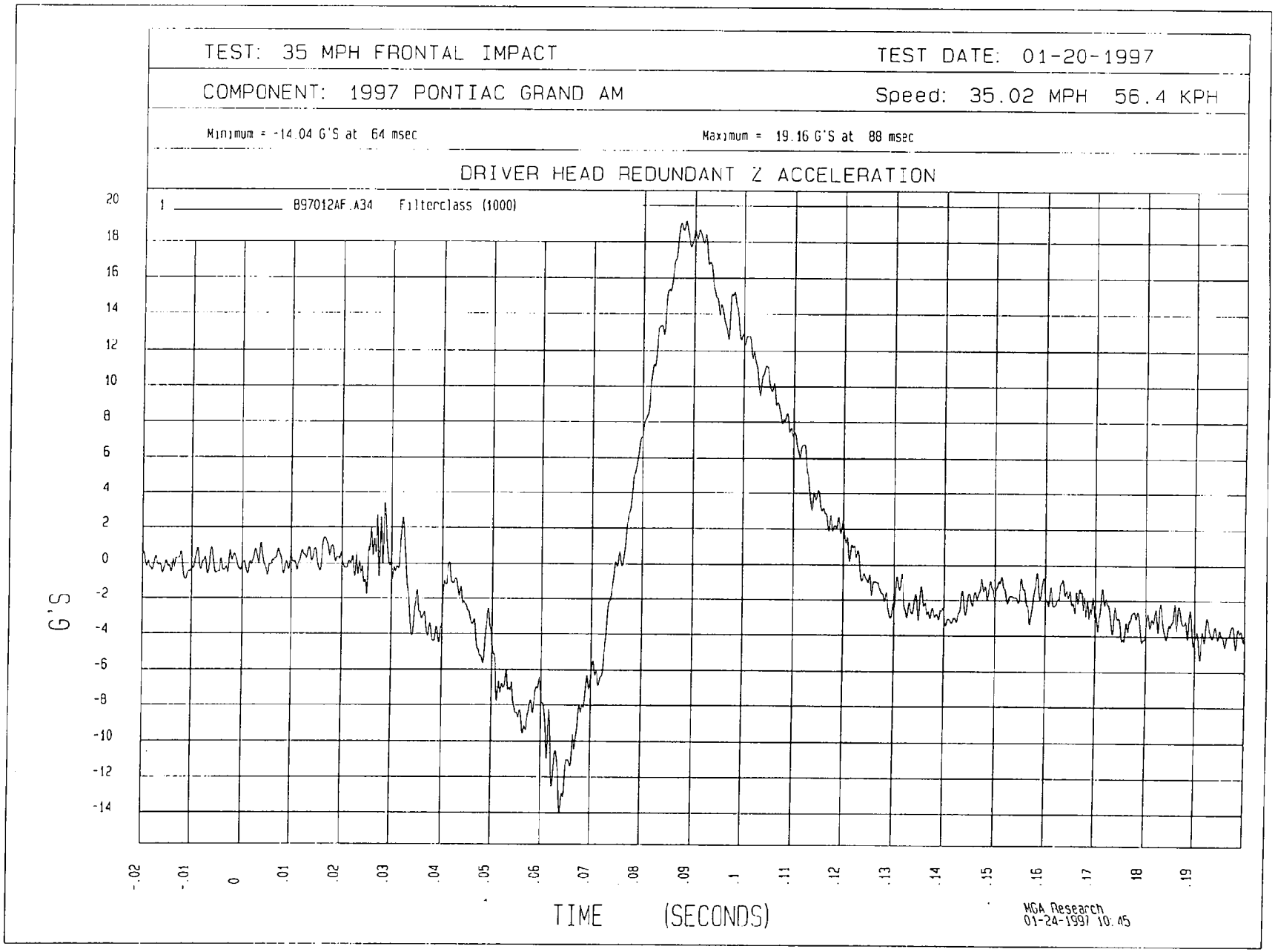
TIME (SECONDS)
MGA Research
01-24-1997 10:45


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -16.00 G'S at 86 msec
Maximum = 2.99 G'S at 34 msec
DRIVER HEAD REDUNDANT Y ACCELERATION
1 B97012AF.A33 Filterclass (1000)
2
0
-2
-4
-6
-8
-10
-12
-14
-16
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:45


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -14.04 G'S at 64 msec
Maximum = 19.16 G'S at 88 msec
DRIVER HEAD REDUNDANT Z ACCELERATION
1 B97012AF.A34 Filterclass (1000)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
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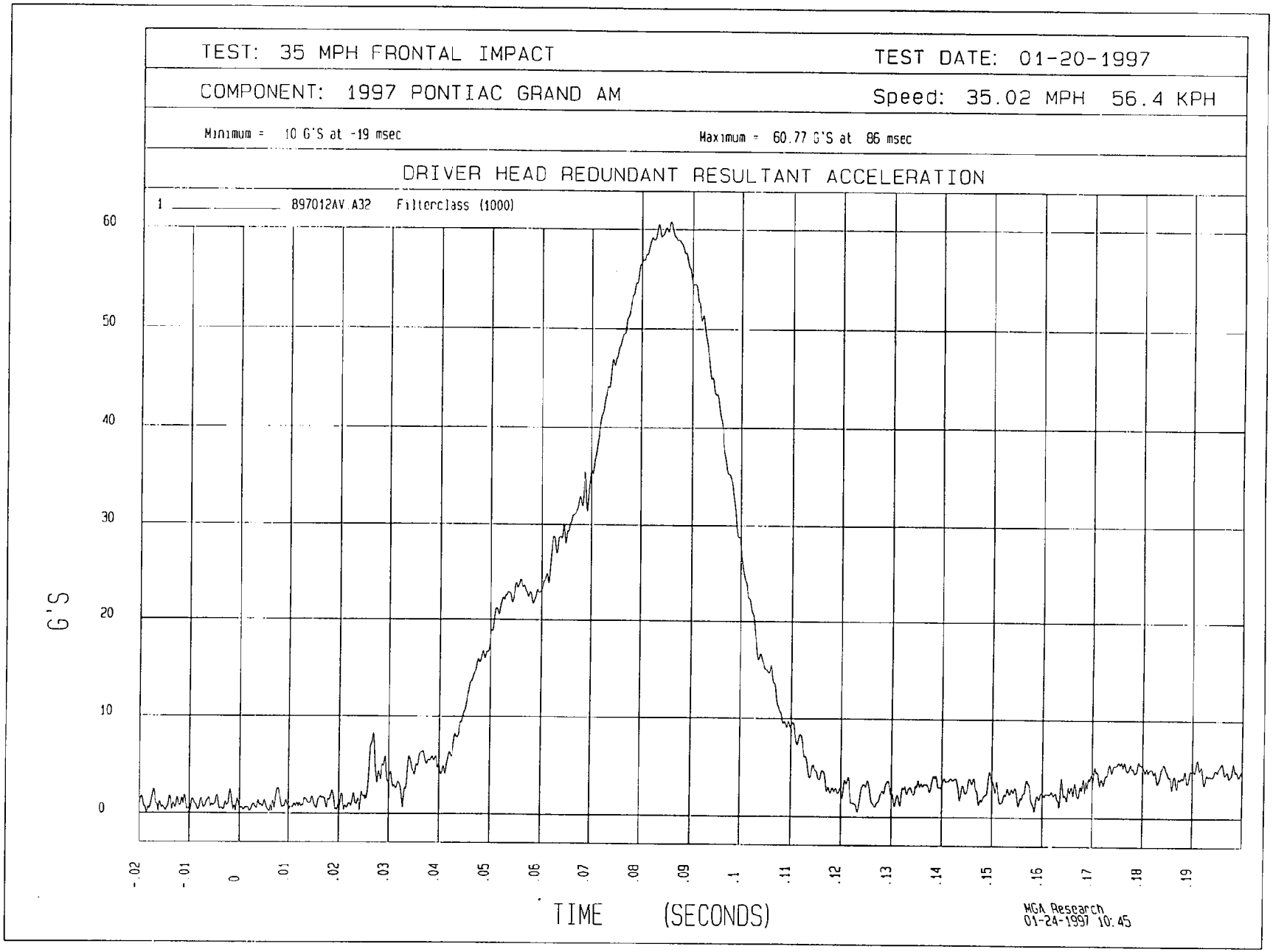
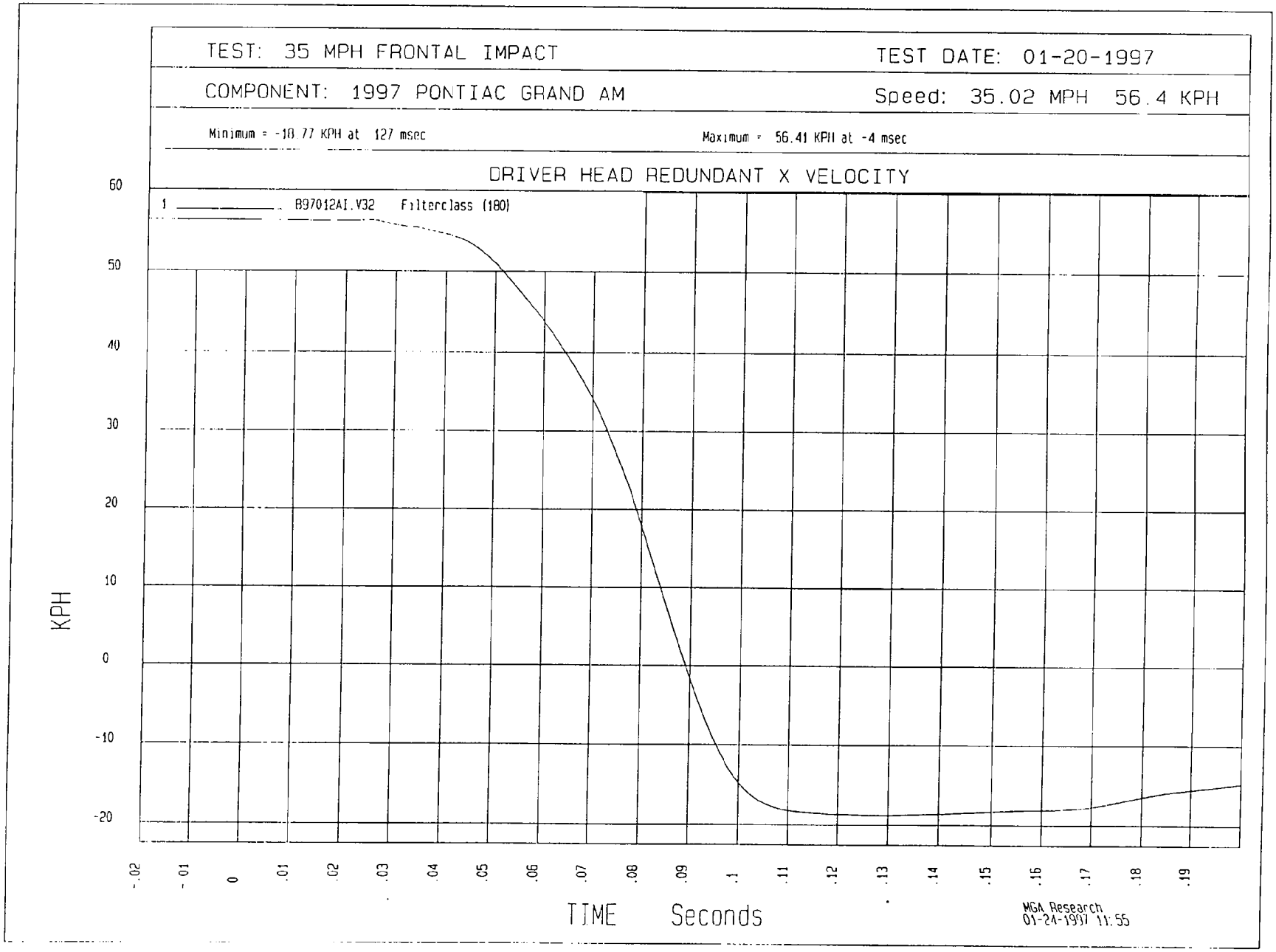
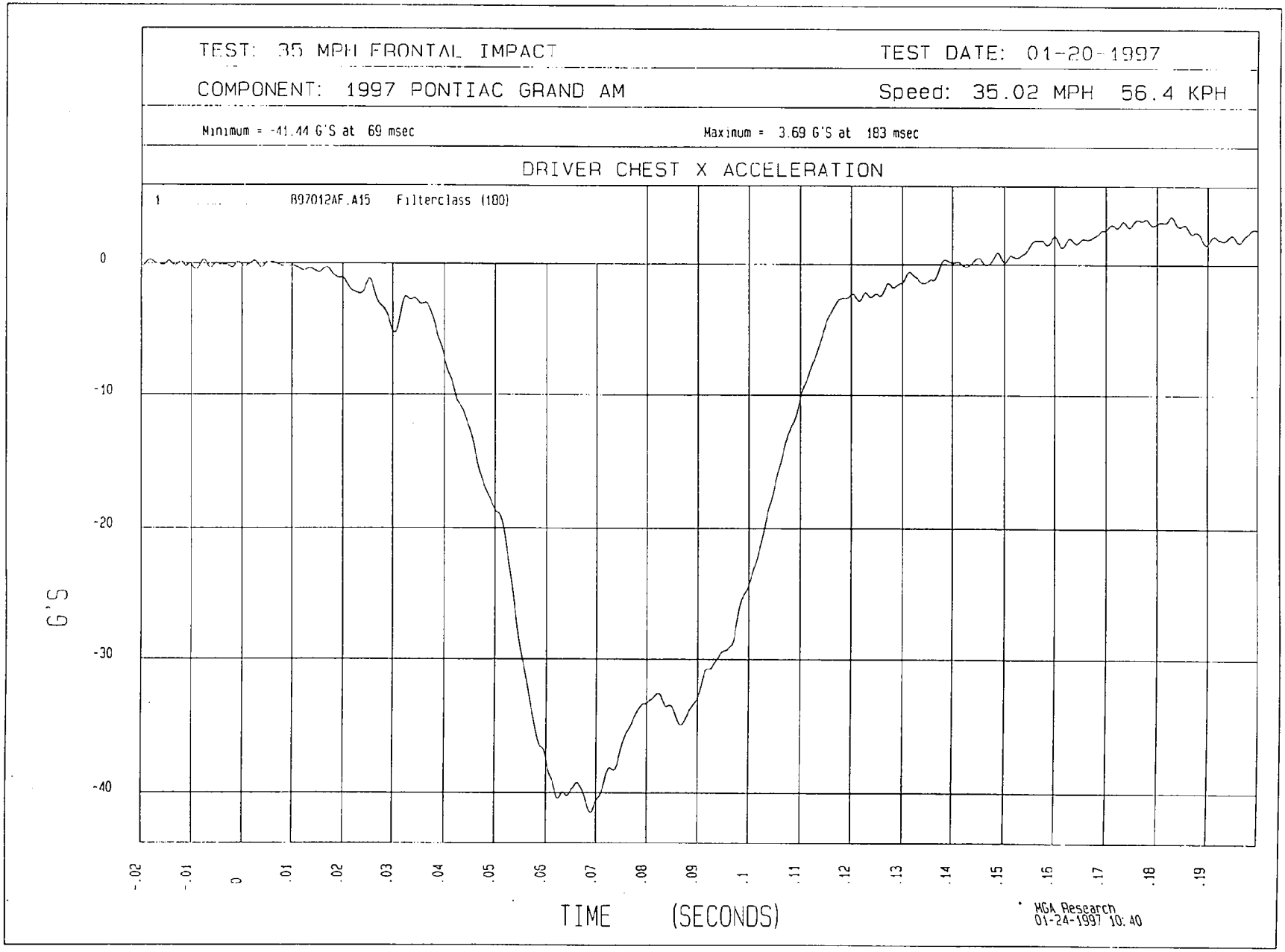
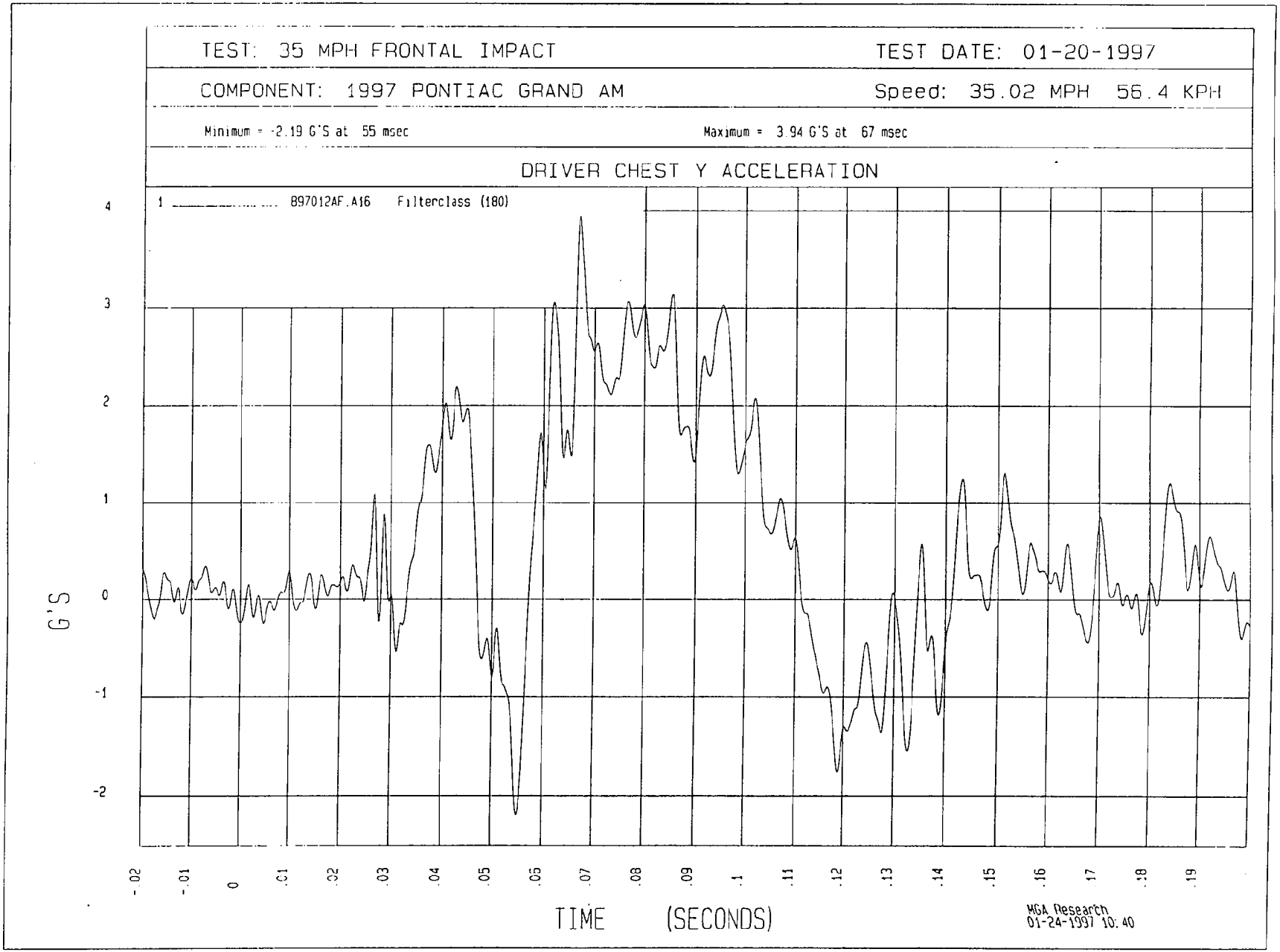
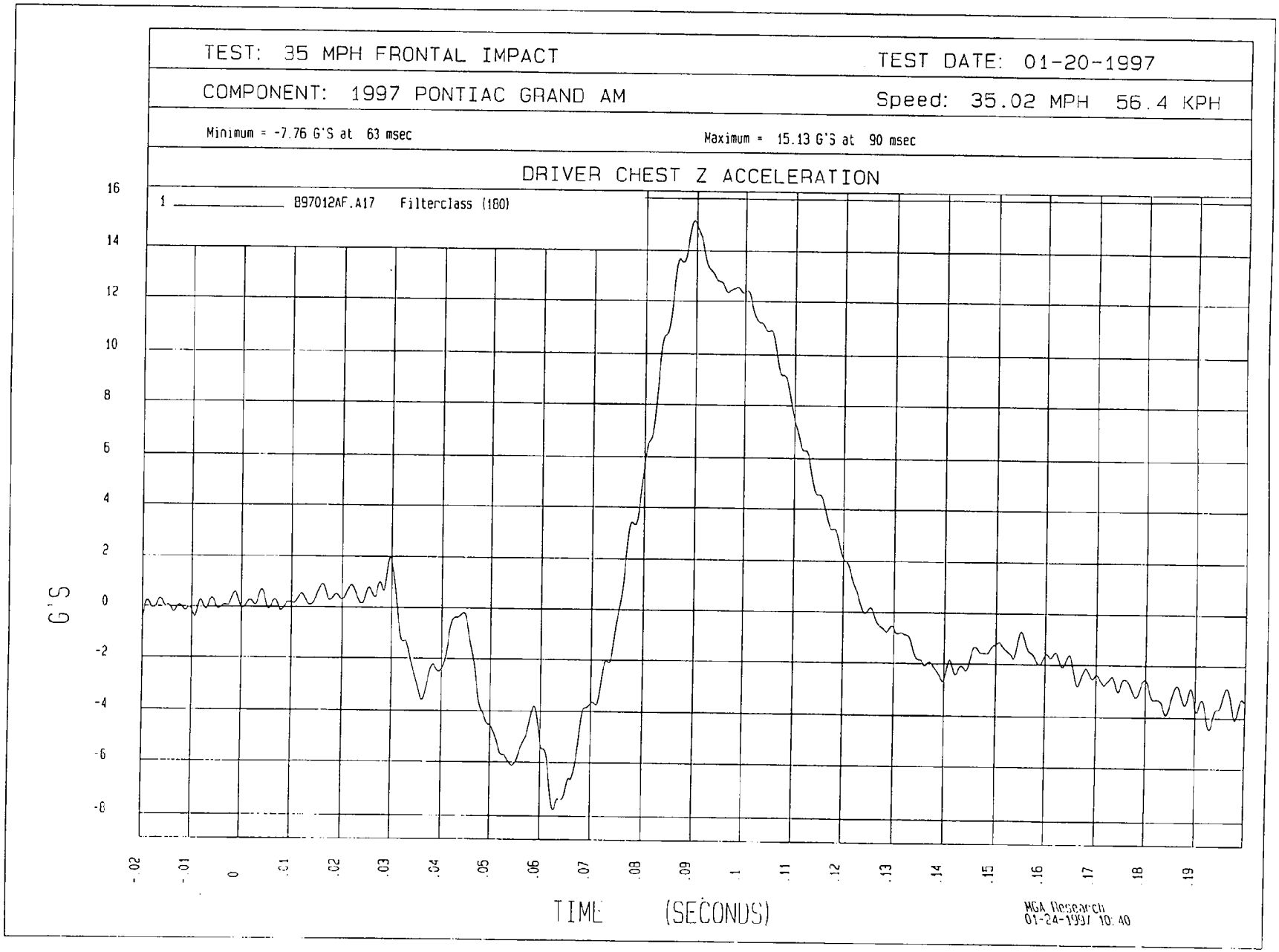
.19
TIME (SECONDS)
NGA Research
01-24-1997 10:45

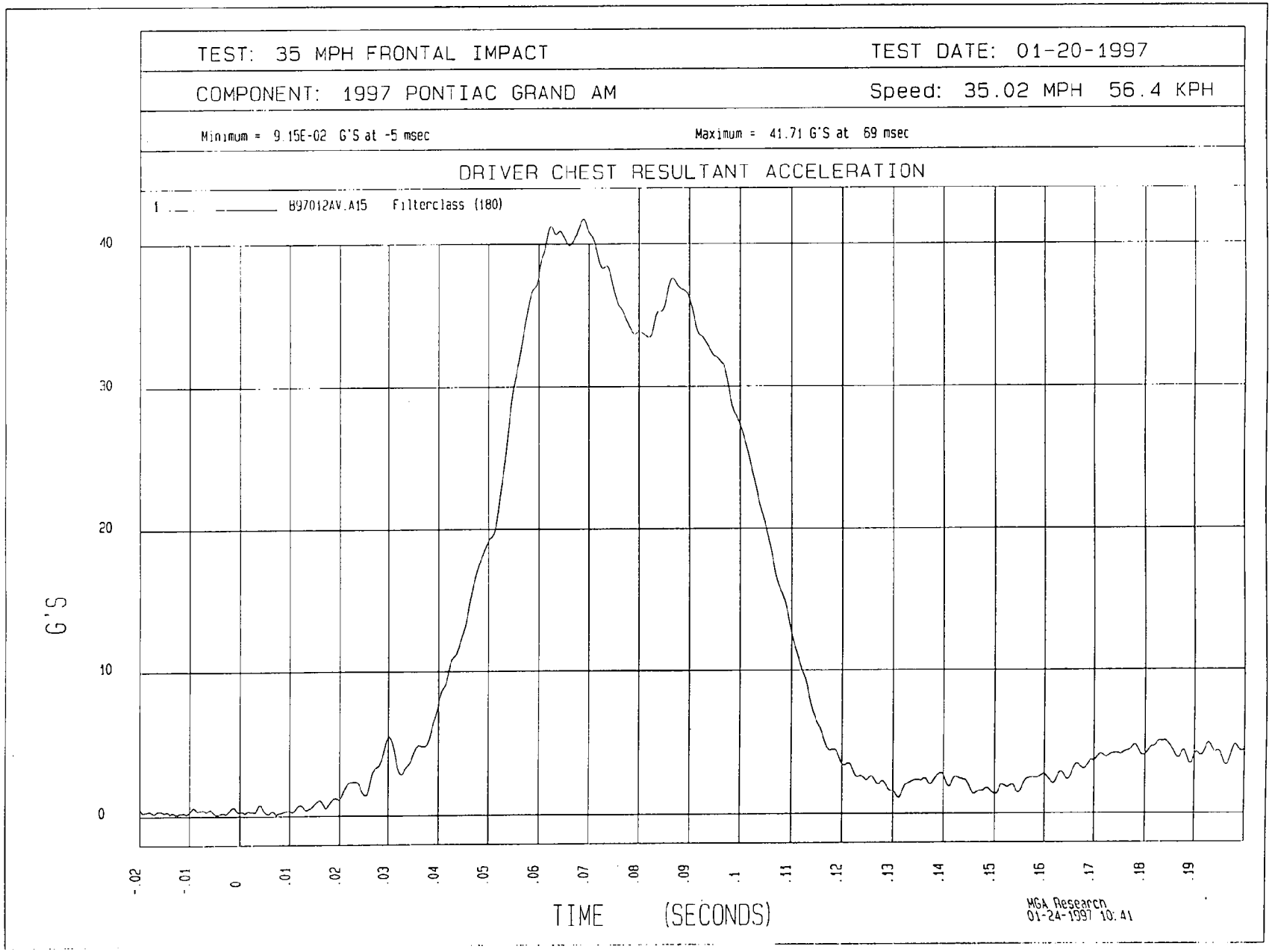

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 10 G'S at -19 msec
Maximum = 60.77 G'S at 86 msec
DRIVER HEAD REDUNDANT RESULTANT ACCELERATION
1 B97012AV.A32 Filterclass (1000)
G'S
60
50
40
30
20
10
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:45

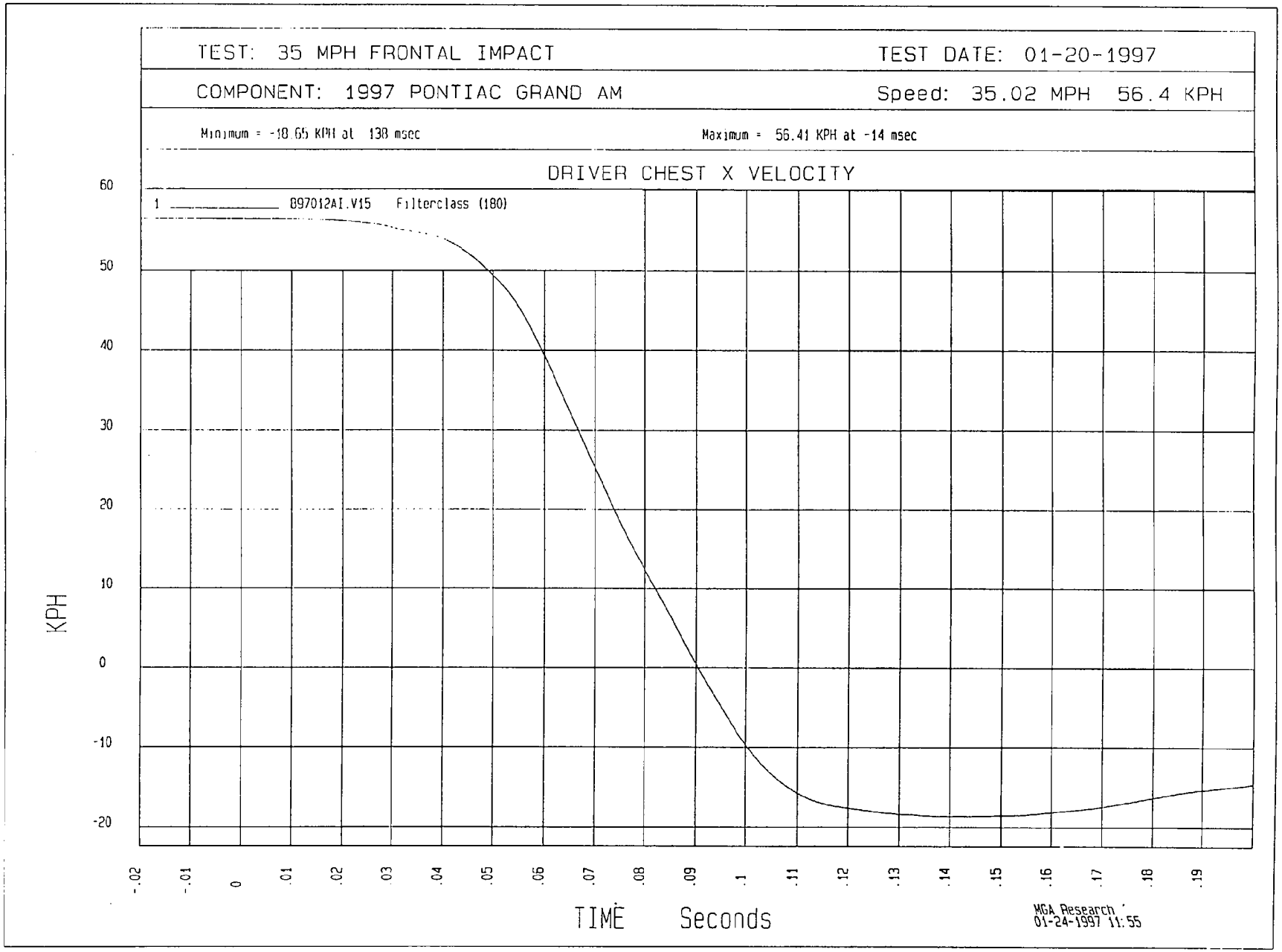

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -18.77 KPH at 127 msec
Maximum = 56.41 KPH at -4 msec
DRIVER HEAD REDUNDANT X VELOCITY
1 B97012AI.V32 Filterclass (180)
KPH
60
50
40
30
20
10
0
-10
-20
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-24-1997 11:55

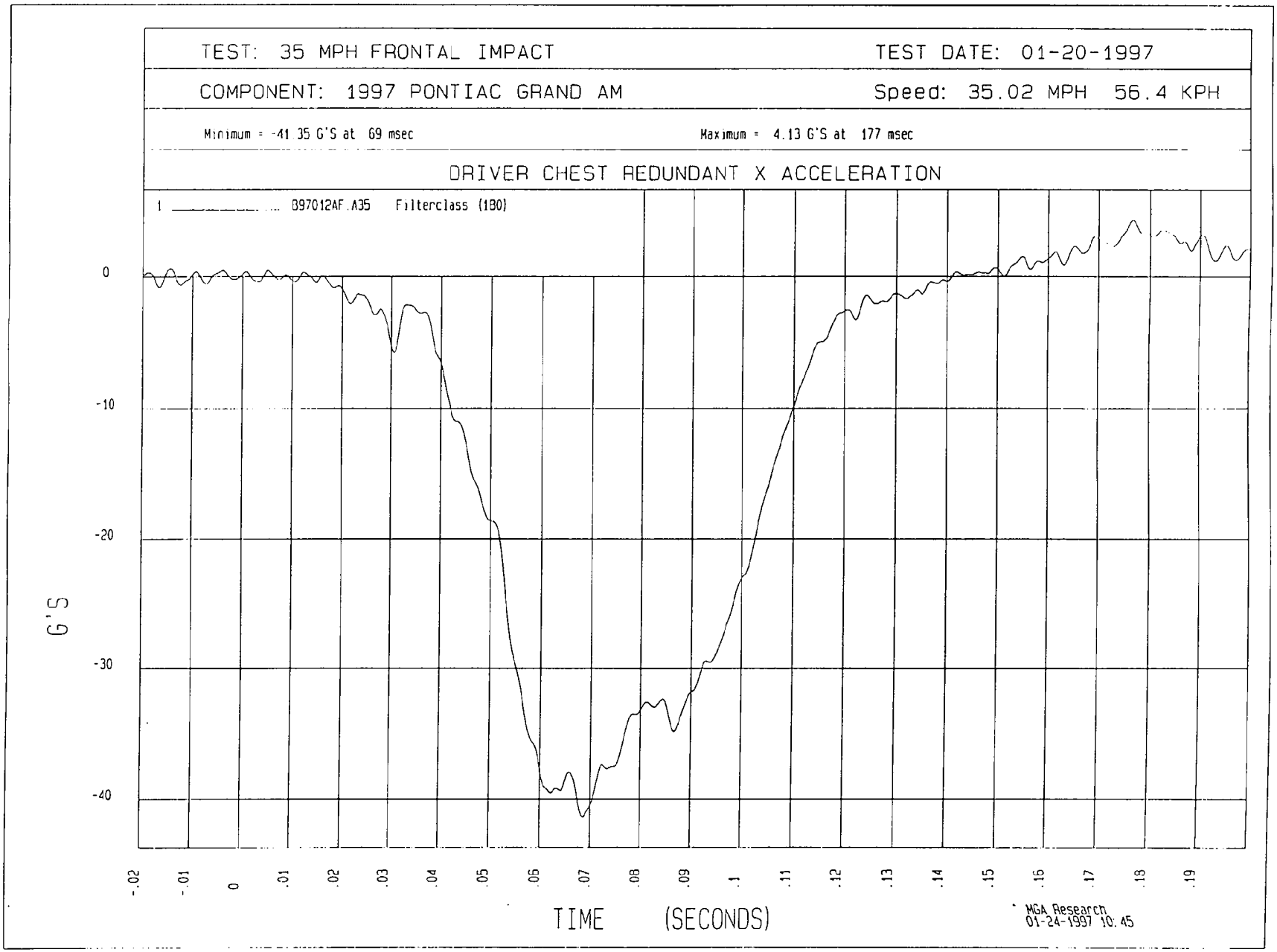

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -41.44 G'S at 69 msec
Maximum = 3.69 G'S at 183 msec
DRIVER CHEST X ACCELERATION
1 B97012AF.A15 Filterclass (180)
0
-10
-20
-30
-40
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:40

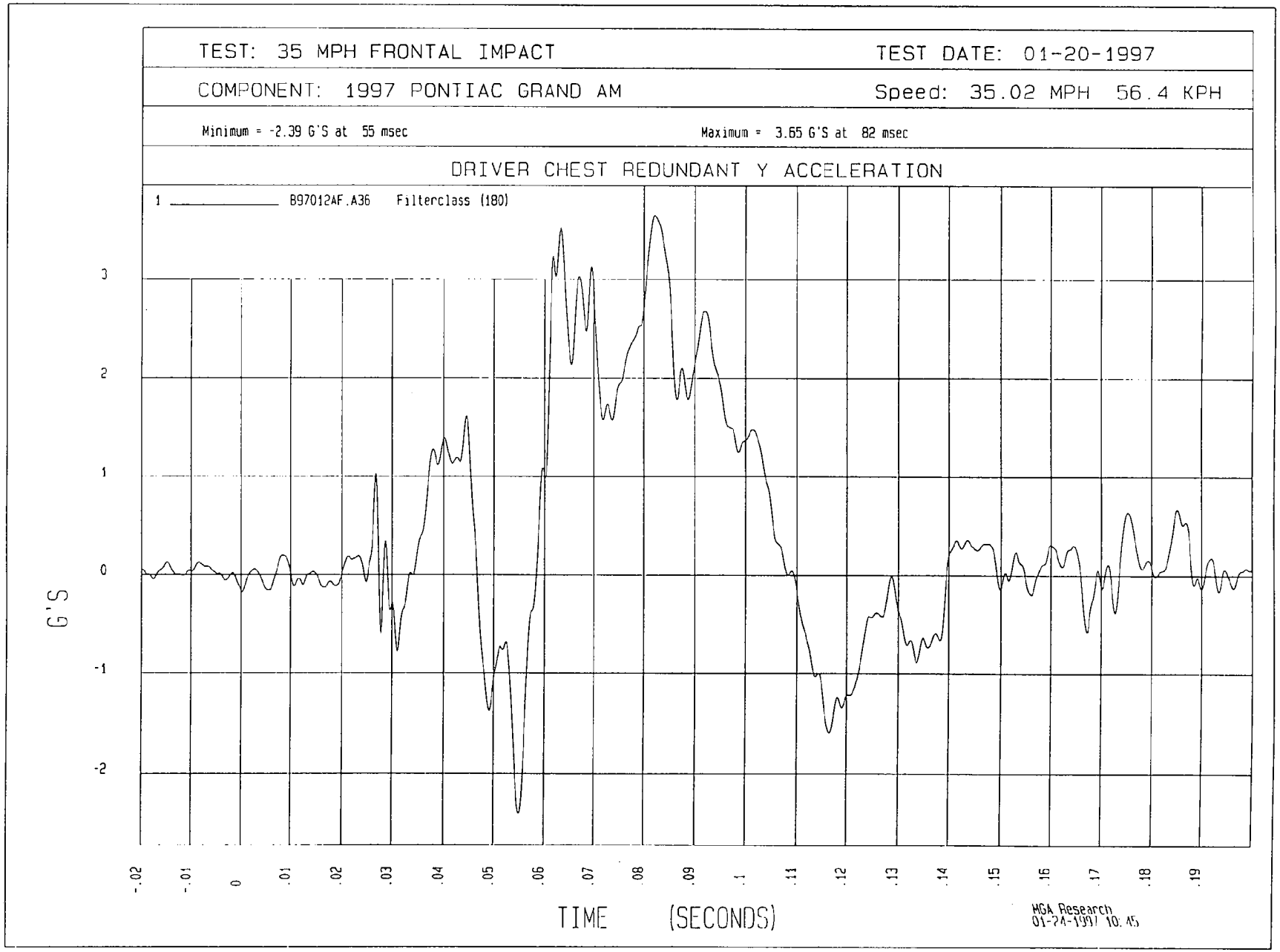

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -2.19 G'S at 55 msec
Maximum = 3.94 G'S at 67 msec
DRIVER CHEST Y ACCELERATION
1 897012AF.A16 Filterclass (180)
G'S
4
3
2
1
0
-1
-2
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:40

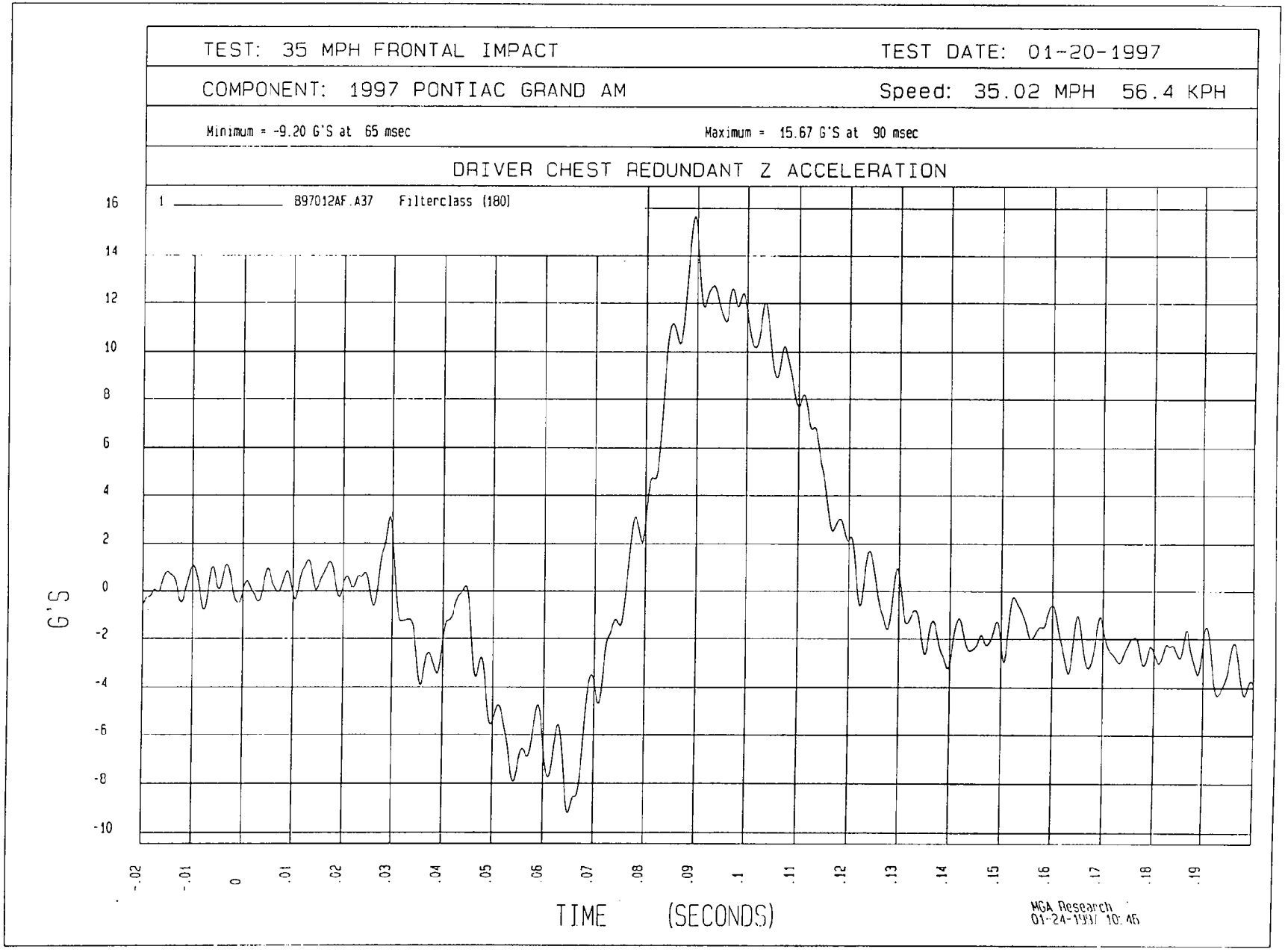

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -7.76 G'S at 63 msec
Maximum = 15.13 G'S at 90 msec
DRIVER CHEST Z ACCELERATION
1 B97012AF.A17 Filterclass (180)
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:40

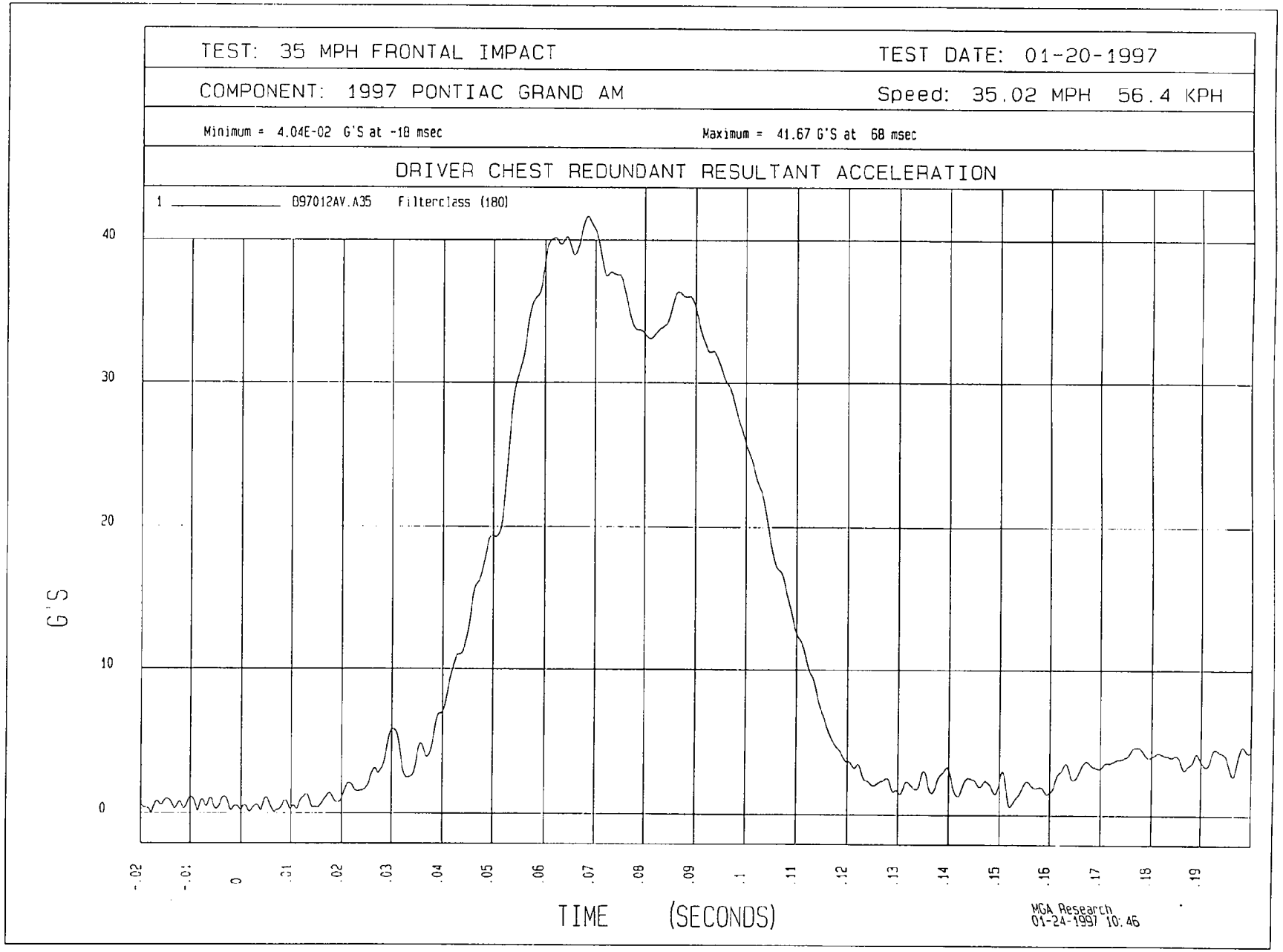

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 9.15E-02 G'S at -5 msec
Maximum = 41.71 G'S at 69 msec
DRIVER CHEST RESULTANT ACCELERATION
1 B97012AV.A15 Filterclass (180)
G'S
40
30
20
10
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:41

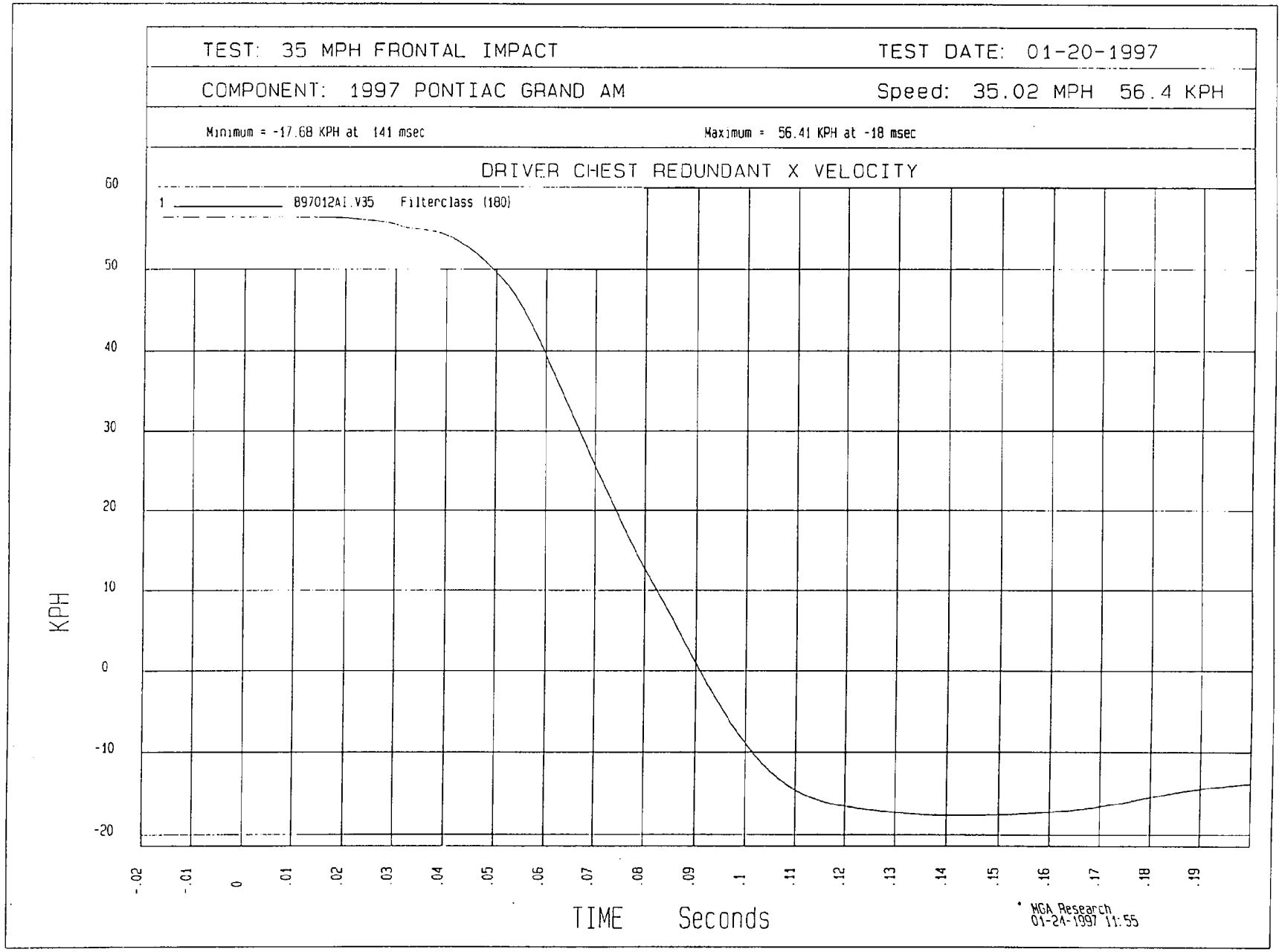

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -18.65 KPH at 138 msec
Maximum = 56.41 KPH at -14 msec
DRIVER CHEST X VELOCITY
1 897012AI.V15 Filterclass (180)
60
50
40
30
20
10
0
-10
-20
KPH
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-24-1997 11:55

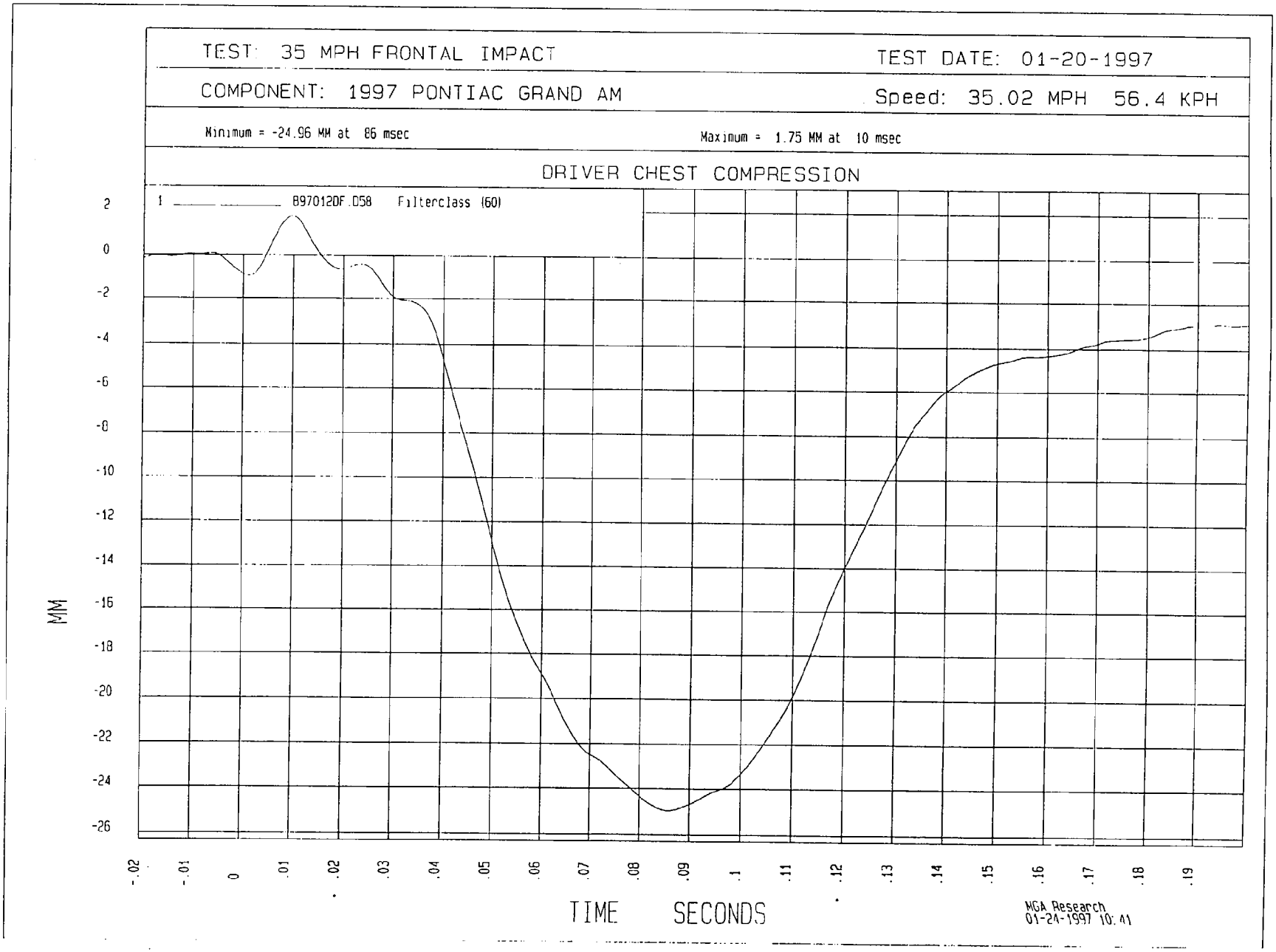

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -41.35 G'S at 69 msec
Maximum = 4.13 G'S at 177 msec
DRIVER CHEST REDUNDANT X ACCELERATION
1 B97012AF.A35 Filterclass (180)
0
-10
-20
-30
-40
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:45


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -2.39 G'S at 55 msec
Maximum = 3.65 G'S at 82 msec
DRIVER CHEST REDUNDANT Y ACCELERATION
1 B97012AF.A36 Filterclass (180)
G'S
3
2
1
0
-1
-2
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:45


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -9.20 G'S at 65 msec
Maximum = 15.67 G'S at 90 msec
DRIVER CHEST REDUNDANT Z ACCELERATION
1 B97012AF.A37 Filterclass (180)
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:46


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 4.04E-02 G'S at -18 msec
Maximum = 41.67 G'S at 68 msec
DRIVER CHEST REDUNDANT RESULTANT ACCELERATION
1 097012AV.A35 Filterclass (180)
G'S
40
30
20
10
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:46


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -17.68 KPH at 141 msec
Maximum = 56.41 KPH at -18 msec
DRIVER CHEST REDUNDANT X VELOCITY
1 B97012A1.V35 Filterclass (180)
KPH
60
50
40
30
20
10
0
-10
-20
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-24-1997 11:55


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -24.96 MM at 86 msec
Maximum = 1.75 MM at 10 msec
DRIVER CHEST COMPRESSION
1 B97012DF.D58 Filterclass (60)
MM
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
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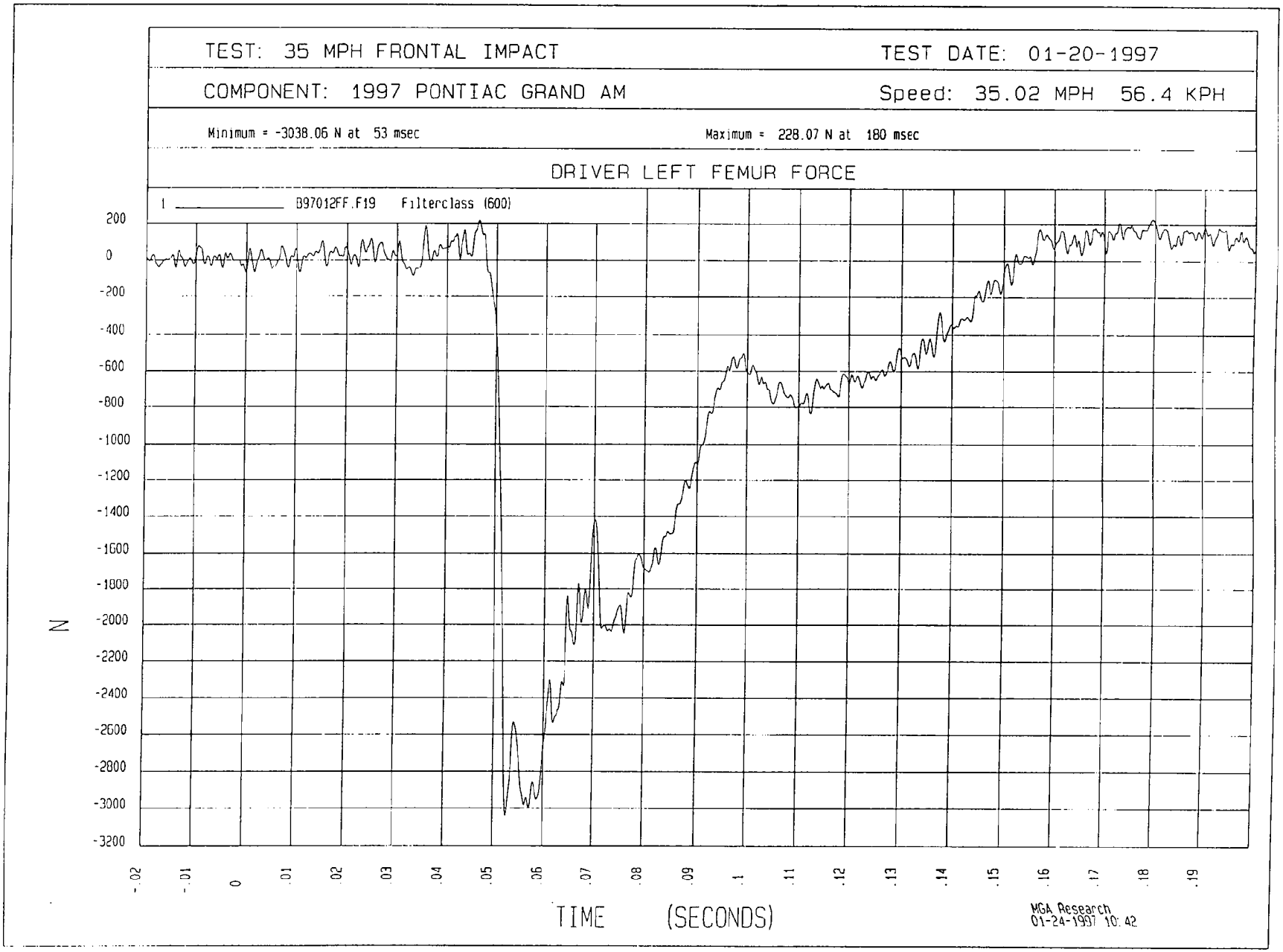
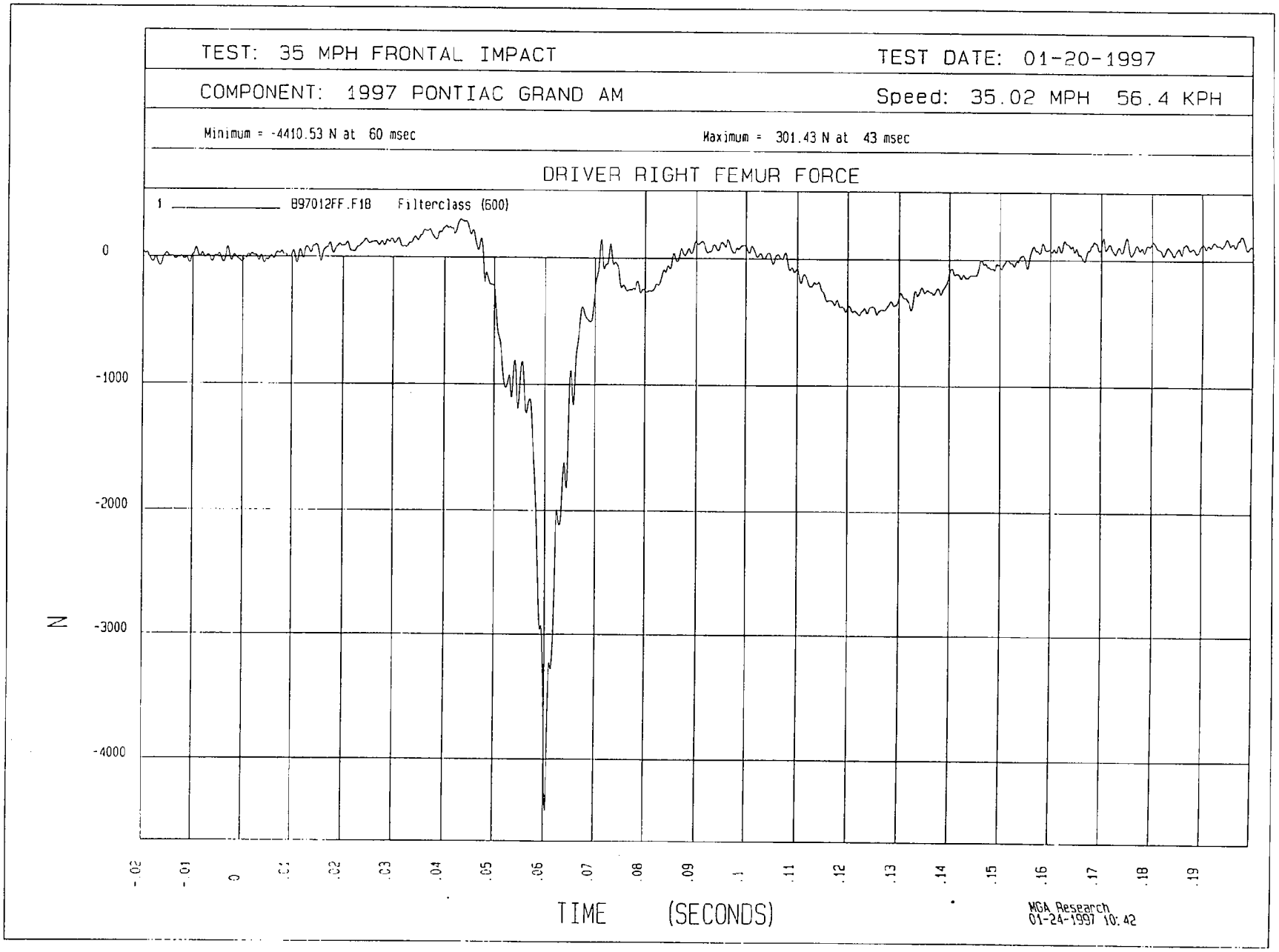
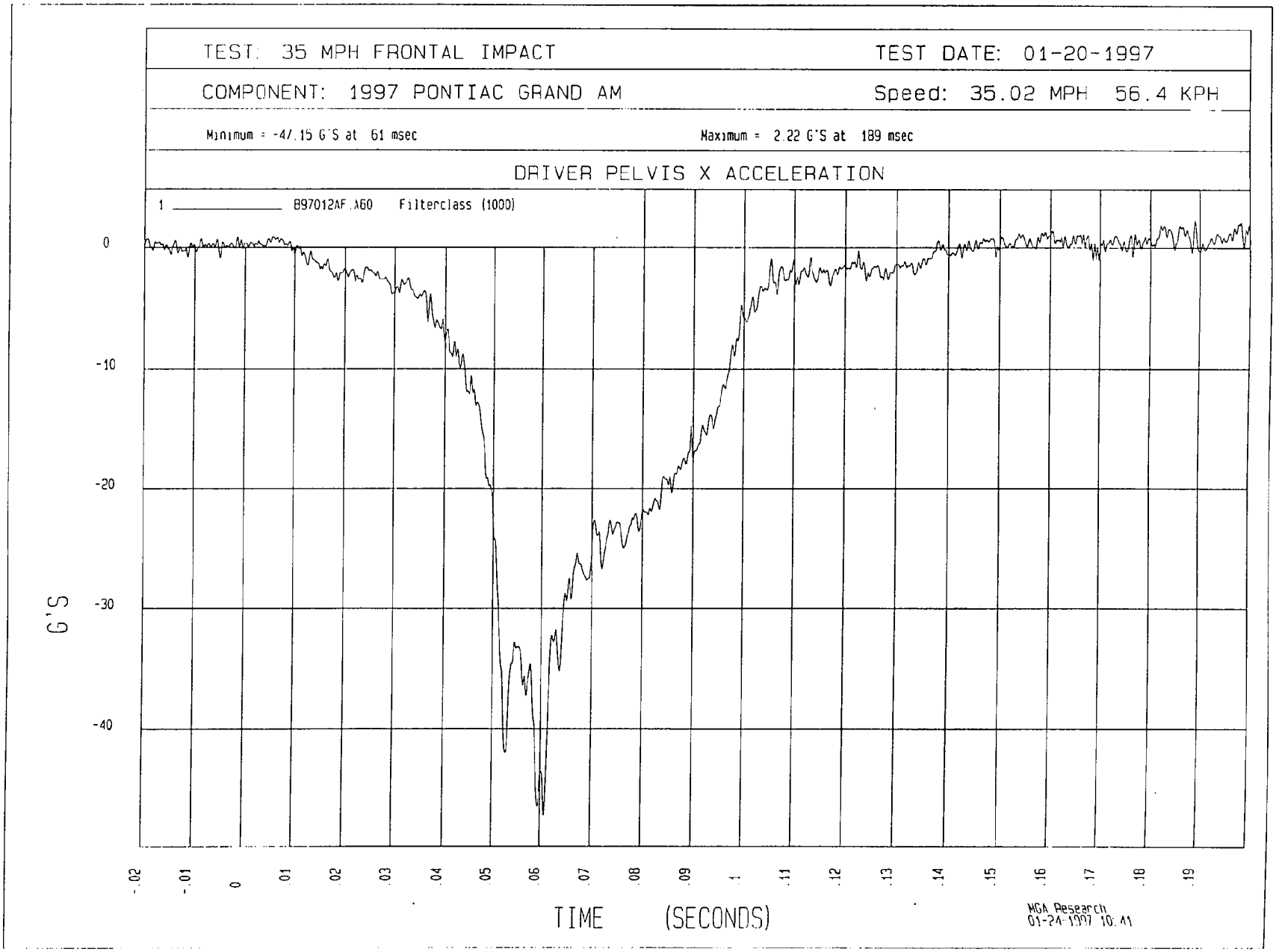
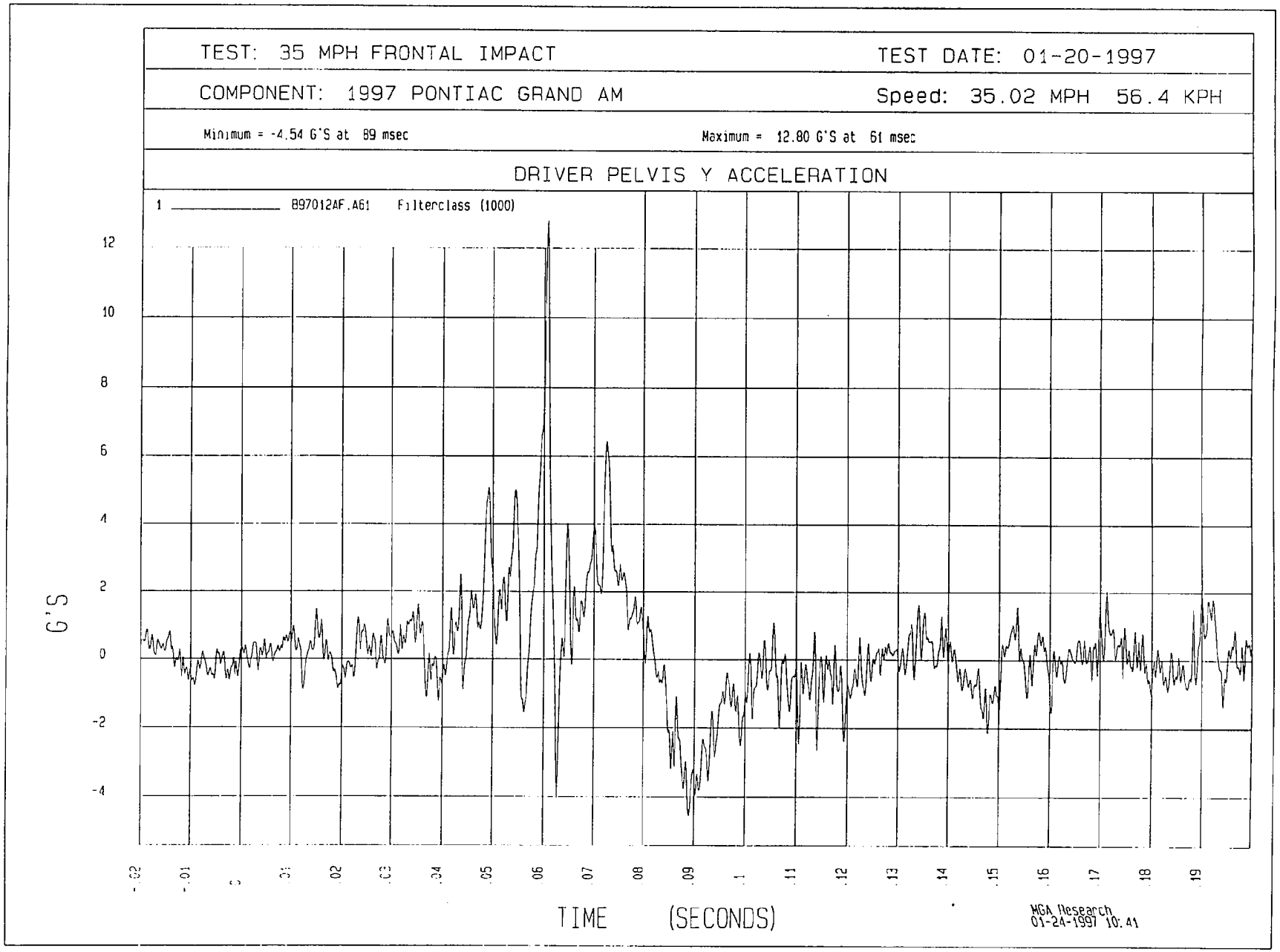
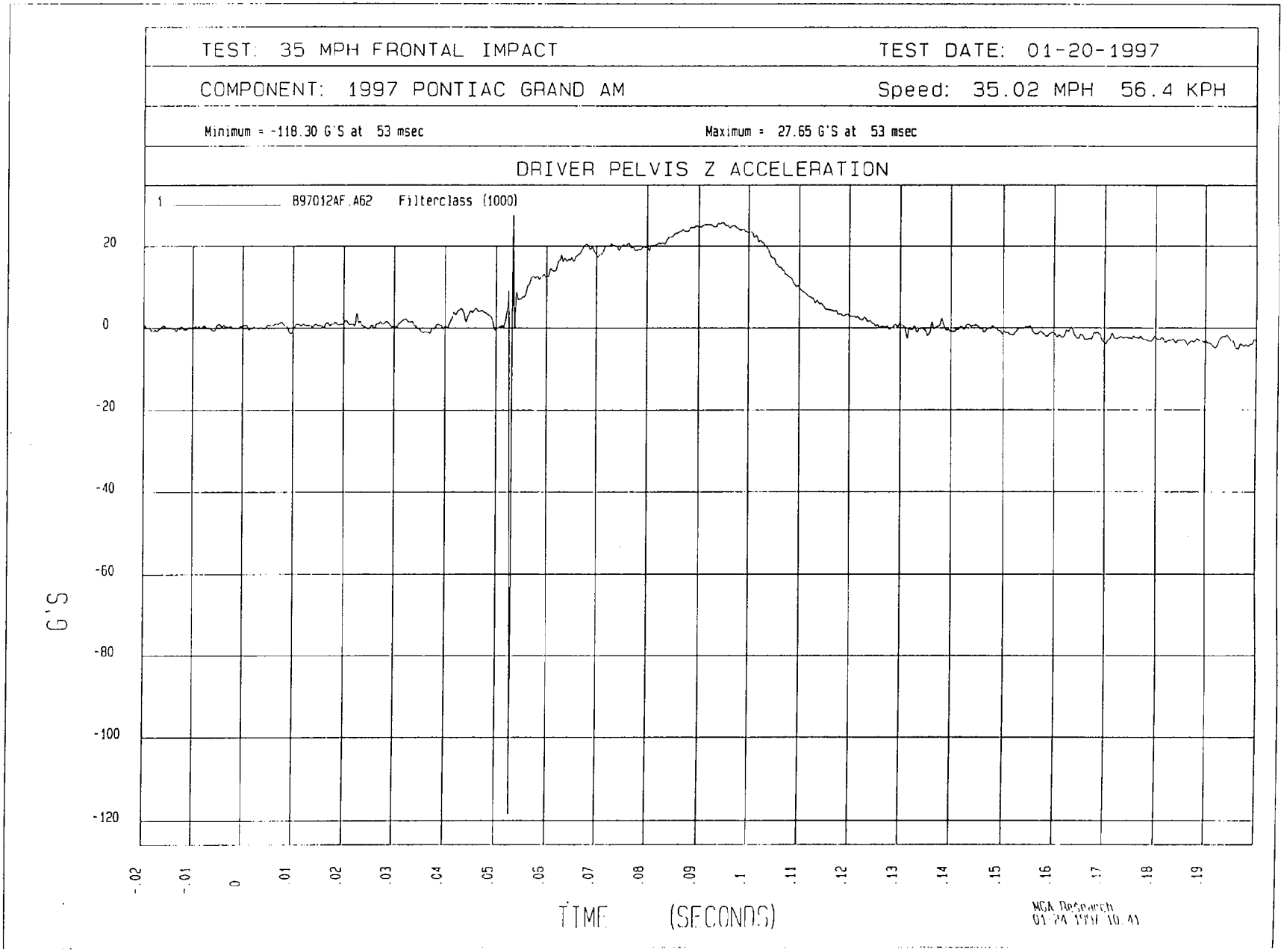
.13
.14
.15
.16
.17
.18
.19
TIME SECONDS
MGA Research
01-24-1997 10:41


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -3038.06 N at 53 msec
Maximum = 228.07 N at 180 msec
DRIVER LEFT FEMUR FORCE
1 B97012FF.F19 Filterclass (600)
200
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
-1800
-2000
-2200
-2400
-2600
-2800
-3000
-3200
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:42


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -4410.53 N at 60 msec
Maximum = 301.43 N at 43 msec
DRIVER RIGHT FEMUR FORCE
1 B97012FF.F18 Filterclass (600)
0
-1000
-2000
-3000
-4000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:42


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -47.15 G'S at 61 msec
Maximum = 2.22 G'S at 189 msec
DRIVER PELVIS X ACCELERATION
1 B97012AF.A60 Filterclass (1000)
0
-10
-20
-30
-40
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:41


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -4.54 G'S at 89 msec
Maximum = 12.80 G'S at 61 msec
DRIVER PELVIS Y ACCELERATION
1 B97012AF.A61 Filterclass (1000)
12
10
8
6
4
2
0
-2
-4
G'S
TIME (SECONDS)
MGA Research
01-24-1997 10:41


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -118.30 G'S at 53 msec
Maximum = 27.65 G'S at 53 msec
DRIVER PELVIS Z ACCELERATION
1 B97012AF.A62 Filterclass (1000)
20
0
-20
-40
-60
-80
-100
-120
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
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.14
.15
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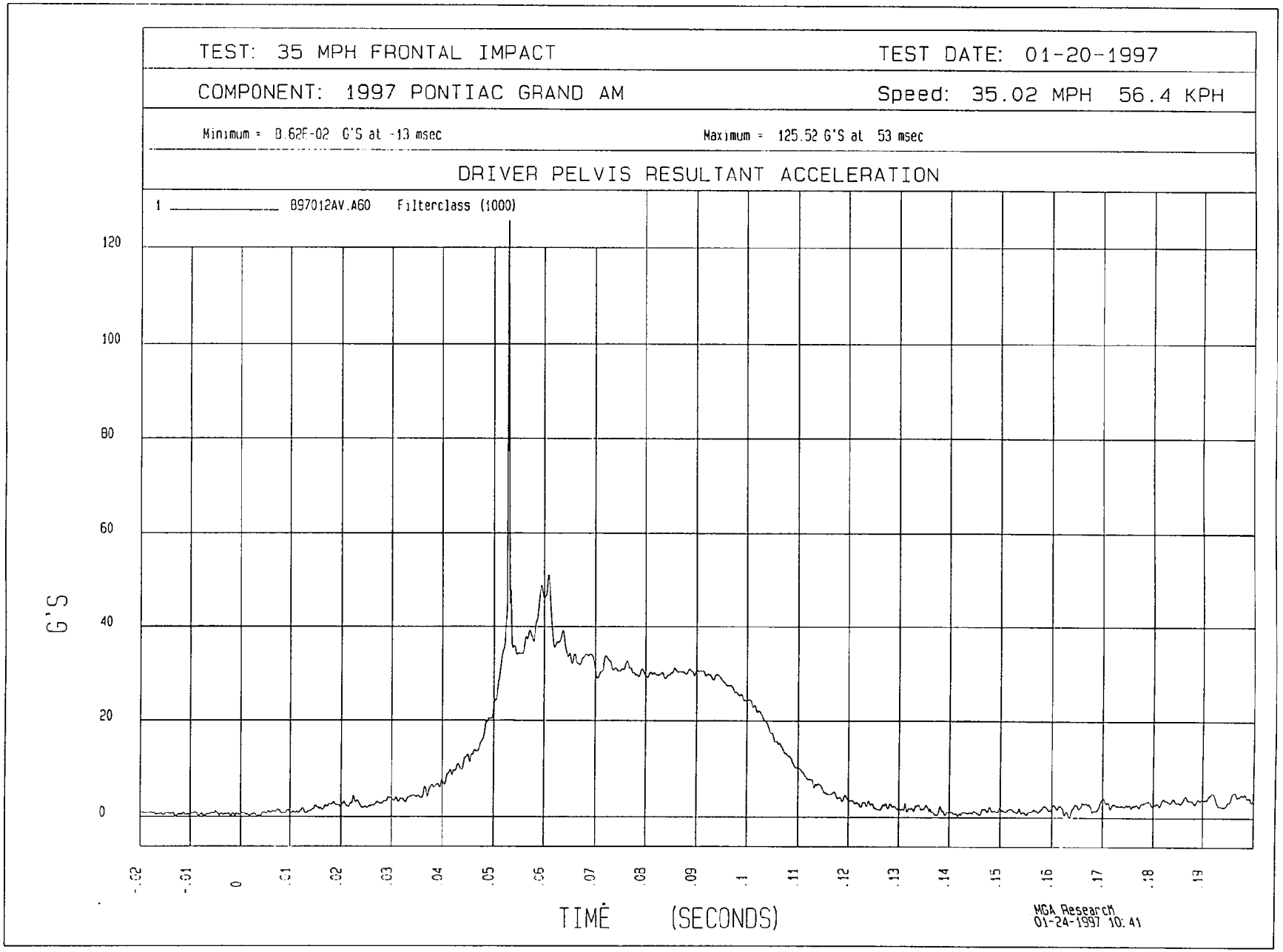
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24 11:47 10.41


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 8.62E-02 G'S at -13 msec
Maximum = 125.52 G'S at 53 msec
DRIVER PELVIS RESULTANT ACCELERATION
1 B97012AV.A60 Filterclass (1000)
120
100
80
60
40
20
0
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
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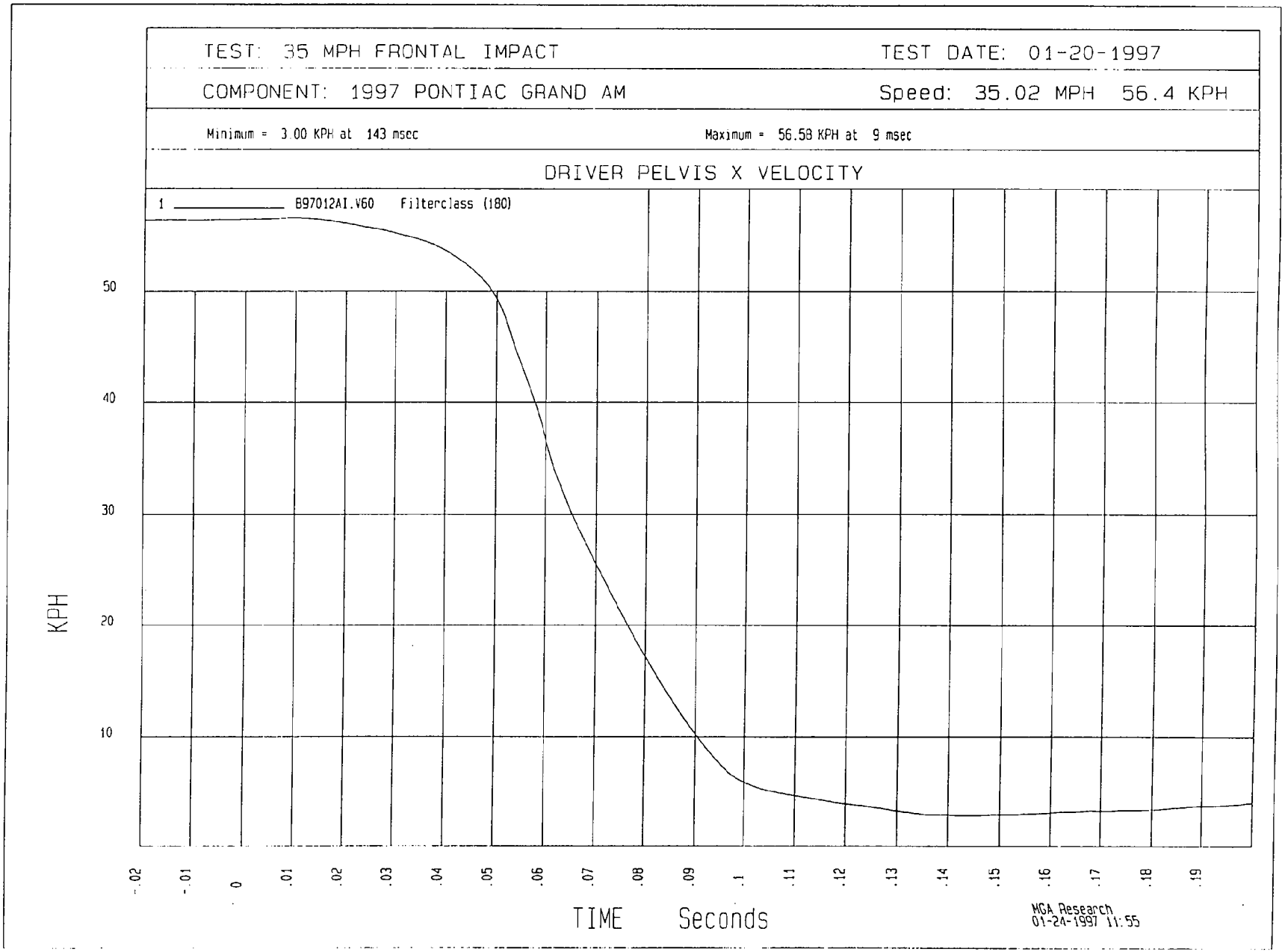
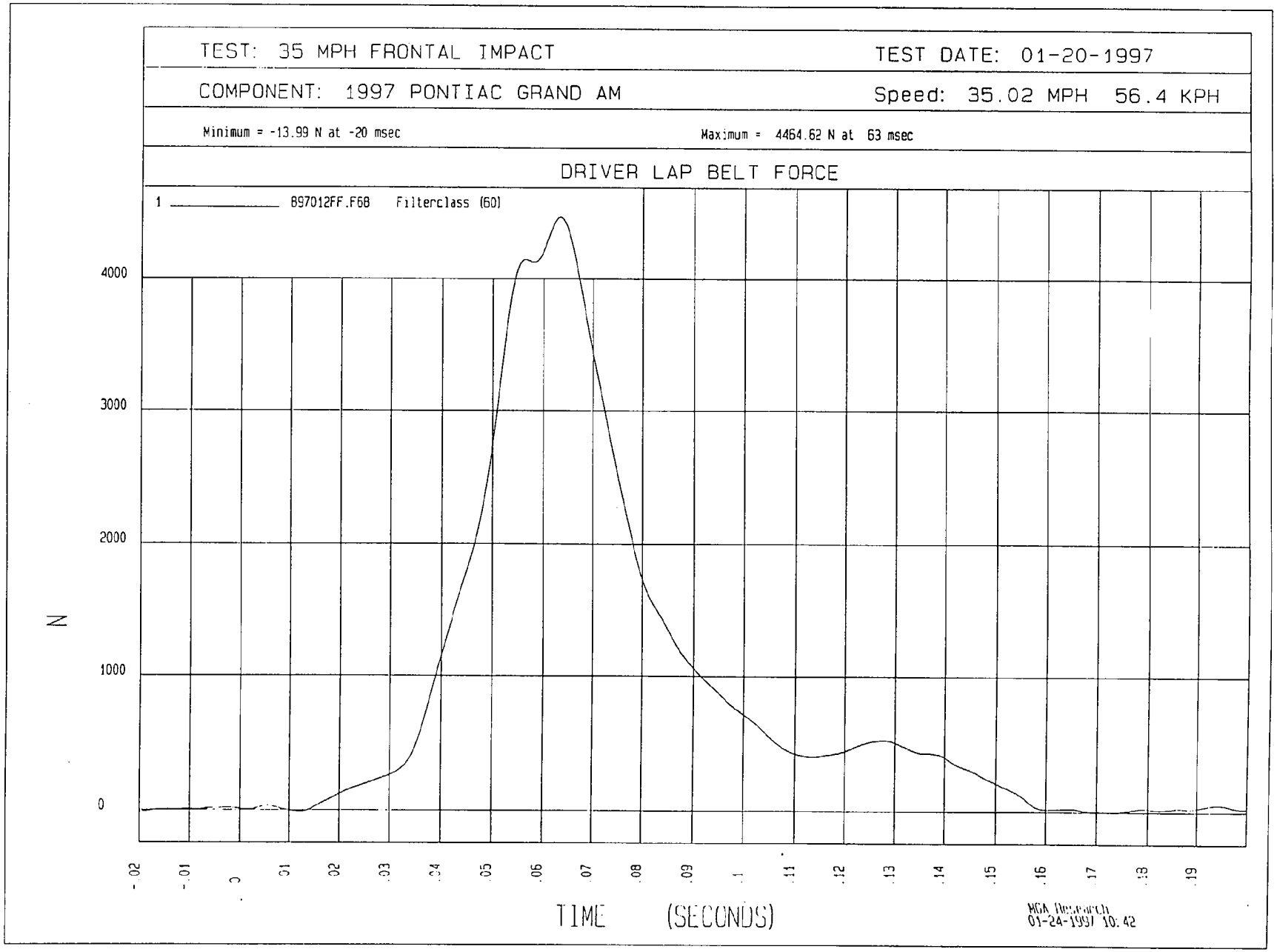
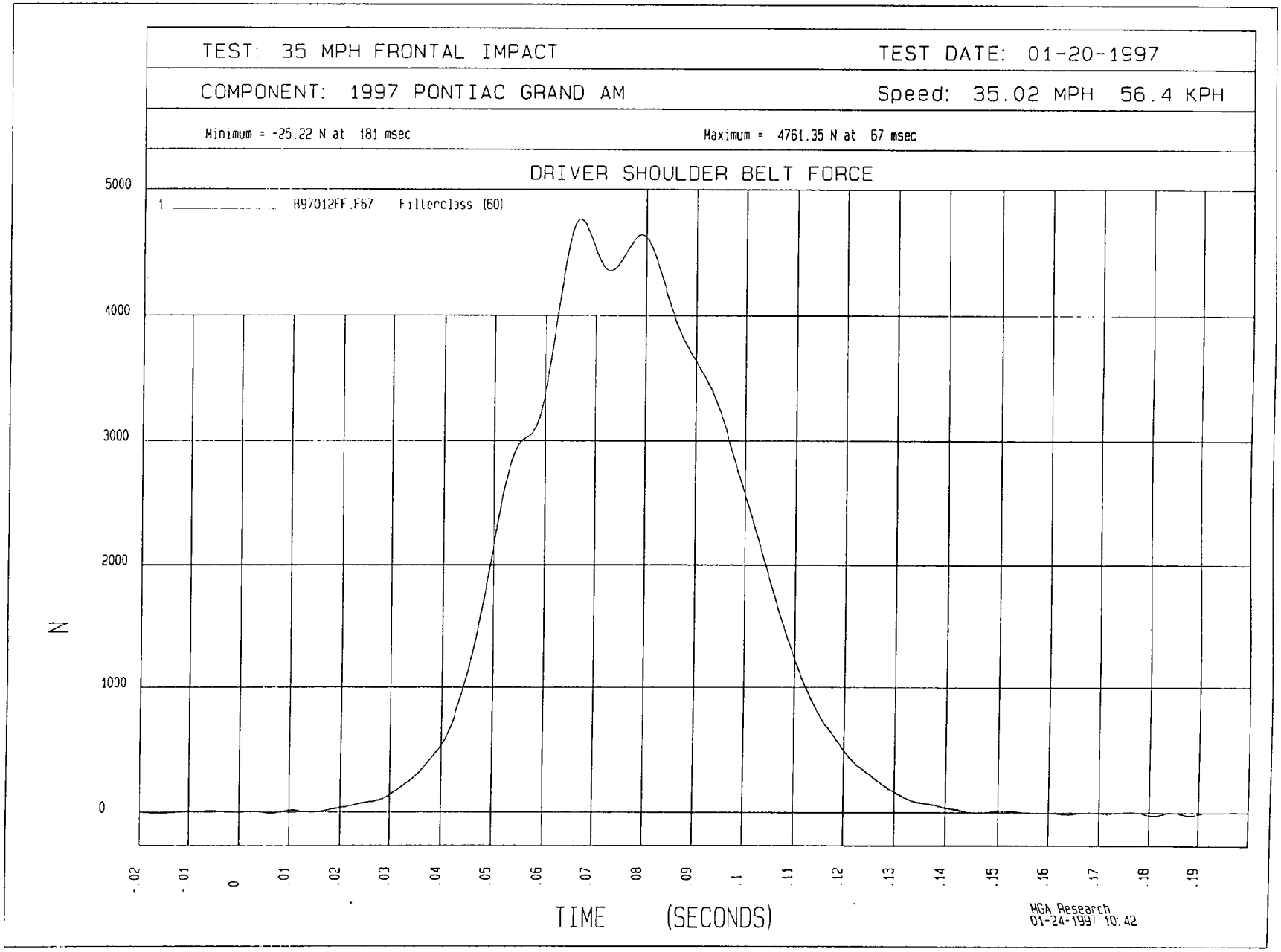
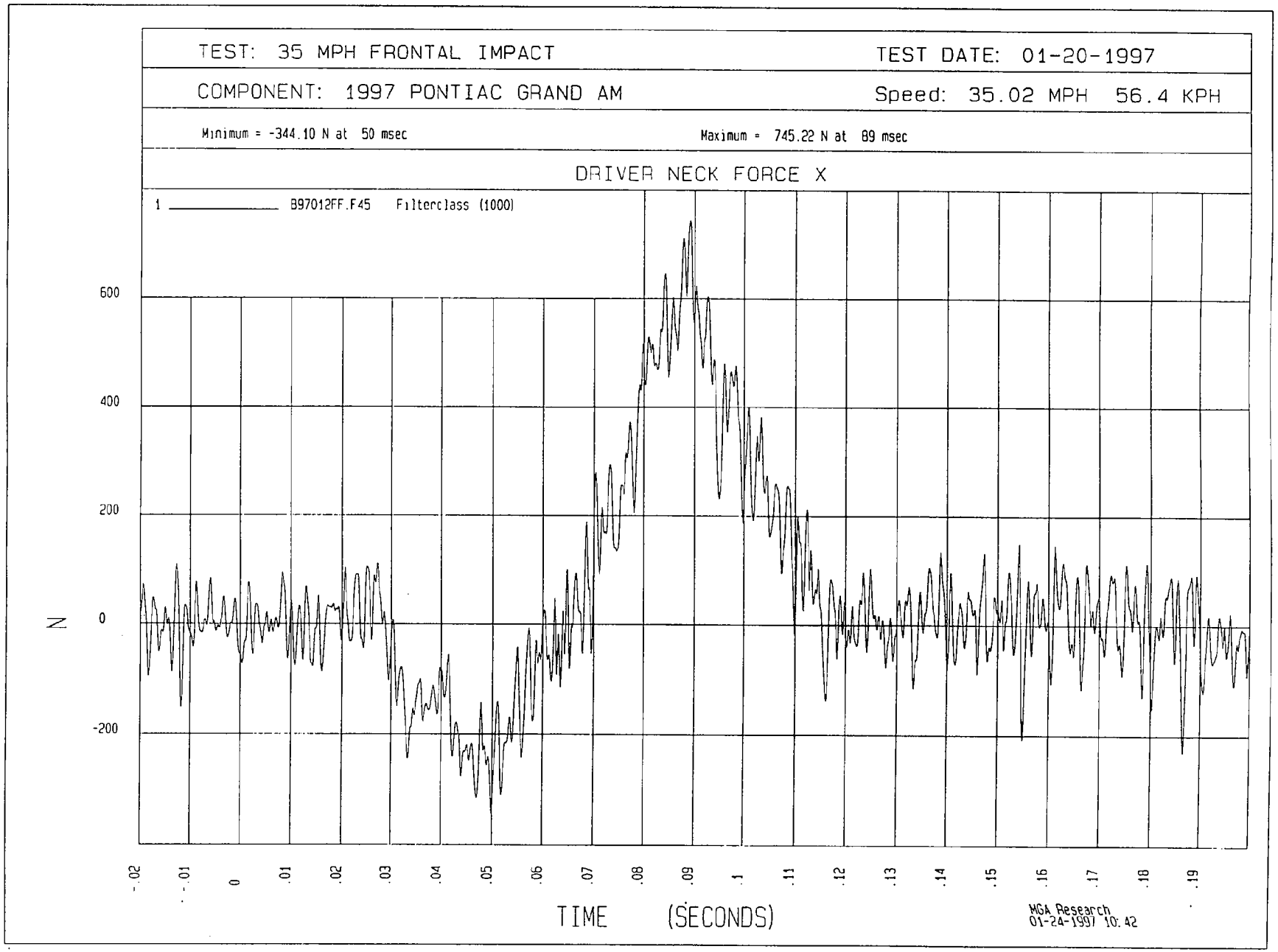
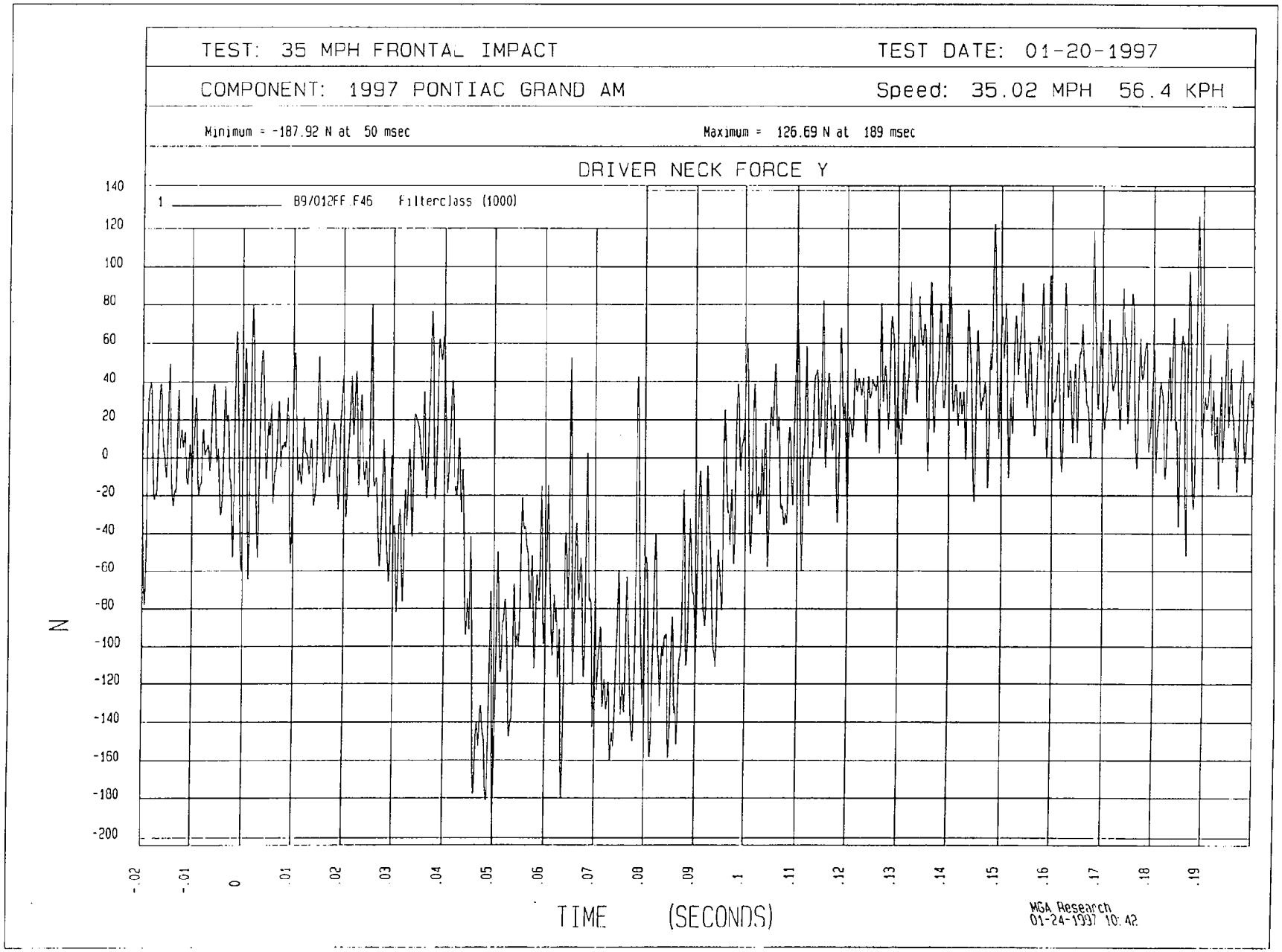
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:41

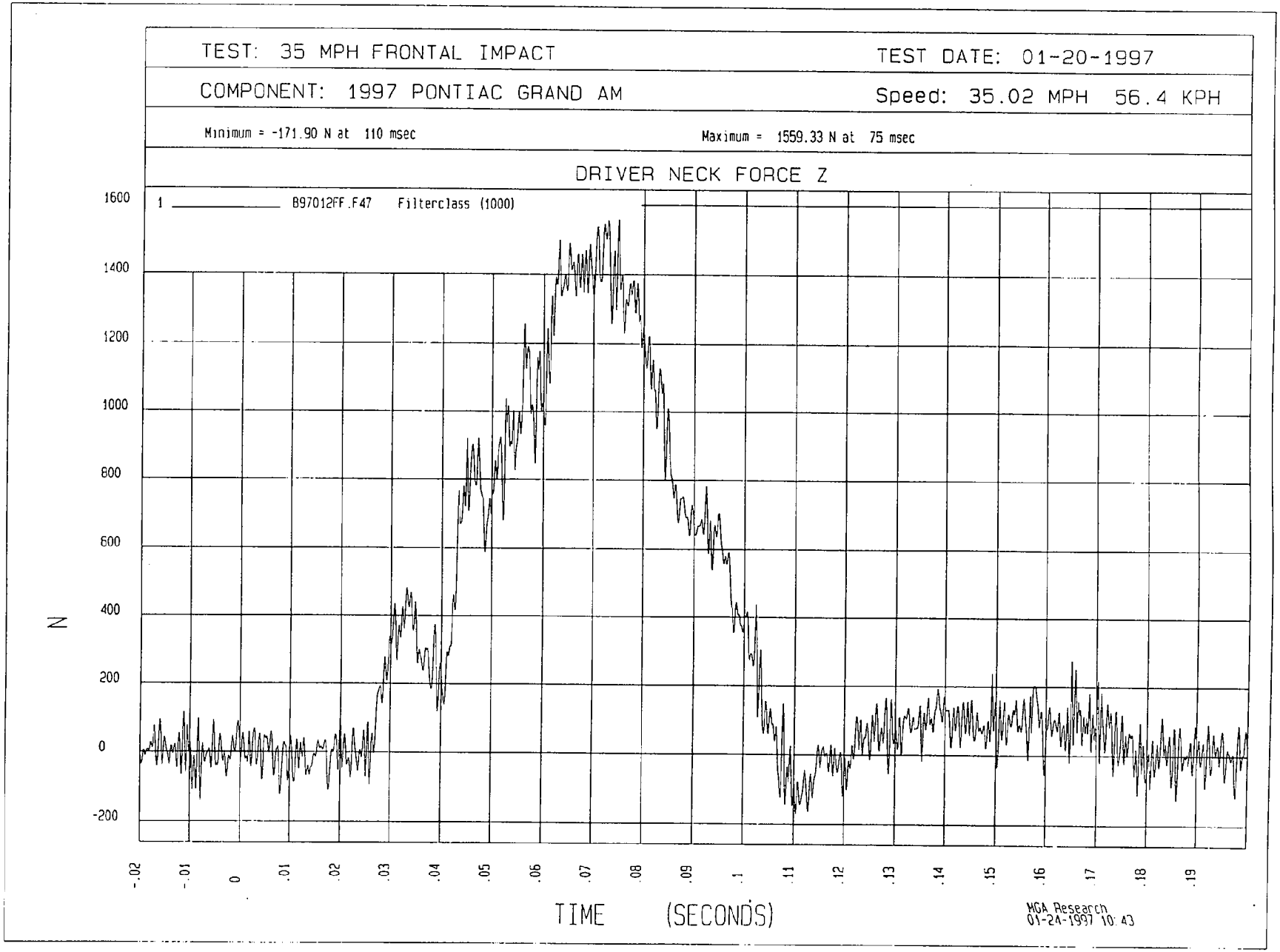

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 3.00 KPH at 143 msec
Maximum = 56.58 KPH at 9 msec
DRIVER PELVIS X VELOCITY
1 B97012AI.V60 Filterclass (180)
KPH
50
40
30
20
10
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-24-1997 11:55


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -13.99 N at -20 msec
Maximum = 4464.62 N at 63 msec
DRIVER LAP BELT FORCE
1 897012FF.F68 Filterclass (60)
4000
3000
2000
1000
0
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:42


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -25.22 N at 181 msec
Maximum = 4761.35 N at 67 msec
DRIVER SHOULDER BELT FORCE
1 B97012FF.F67 Filterclass (60)
5000
4000
3000
2000
1000
0
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:42


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -344.10 N at 50 msec
Maximum = 745.22 N at 89 msec
DRIVER NECK FORCE X
1 B97012FF.F45 Filterclass (1000)
600
400
200
0
-200
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:42


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -187.92 N at 50 msec
Maximum = 126.69 N at 189 msec
DRIVER NECK FORCE Y
1 B9/012FF.F46 Filterclass (1000)
N
140
120
100
80
60
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:42


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -171.90 N at 110 msec
Maximum = 1559.33 N at 75 msec
DRIVER NECK FORCE Z
1 B97012FF.F47 Filterclass (1000)
1600
1400
1200
1000
800
600
400
200
0
-200
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
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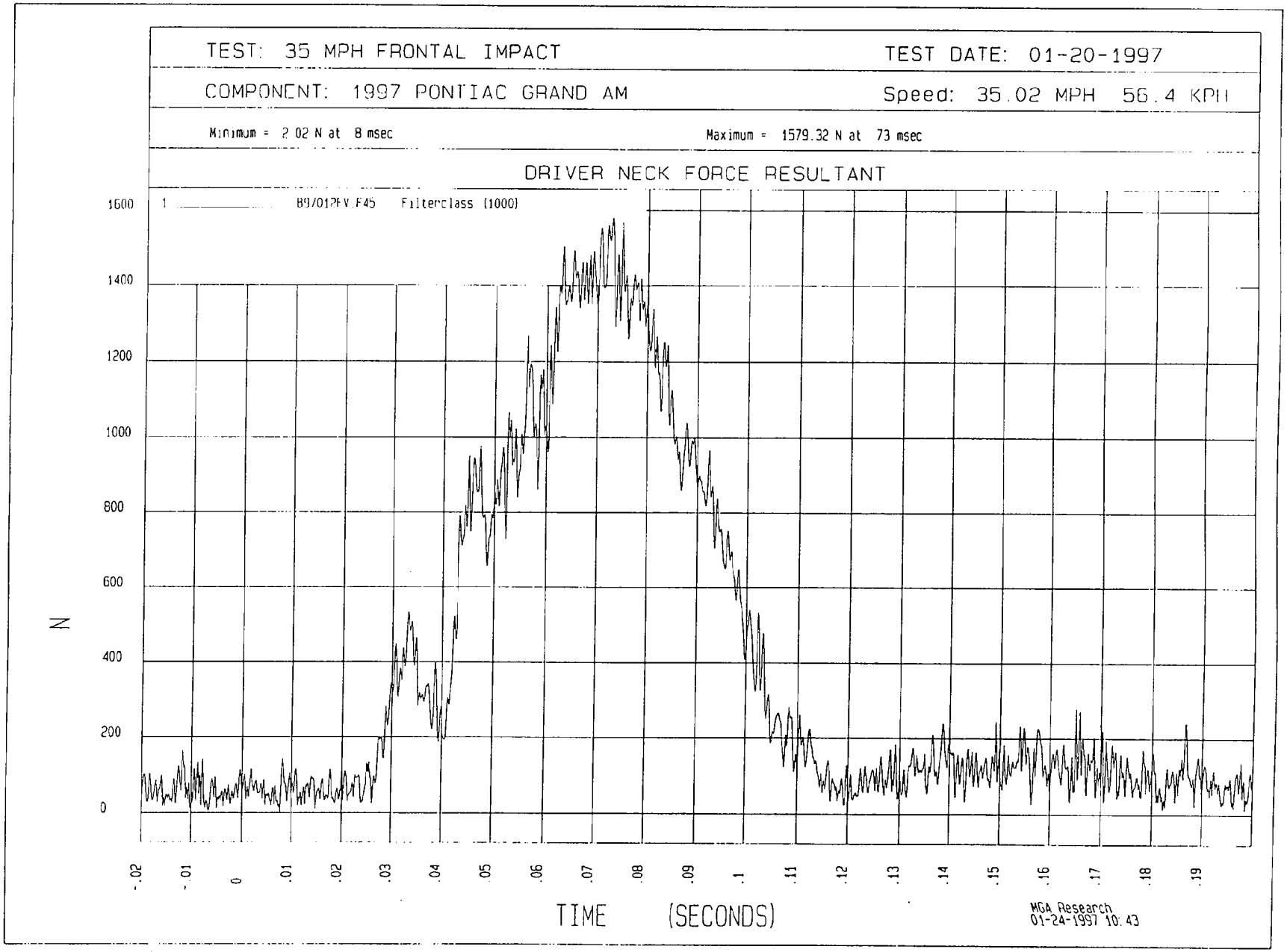
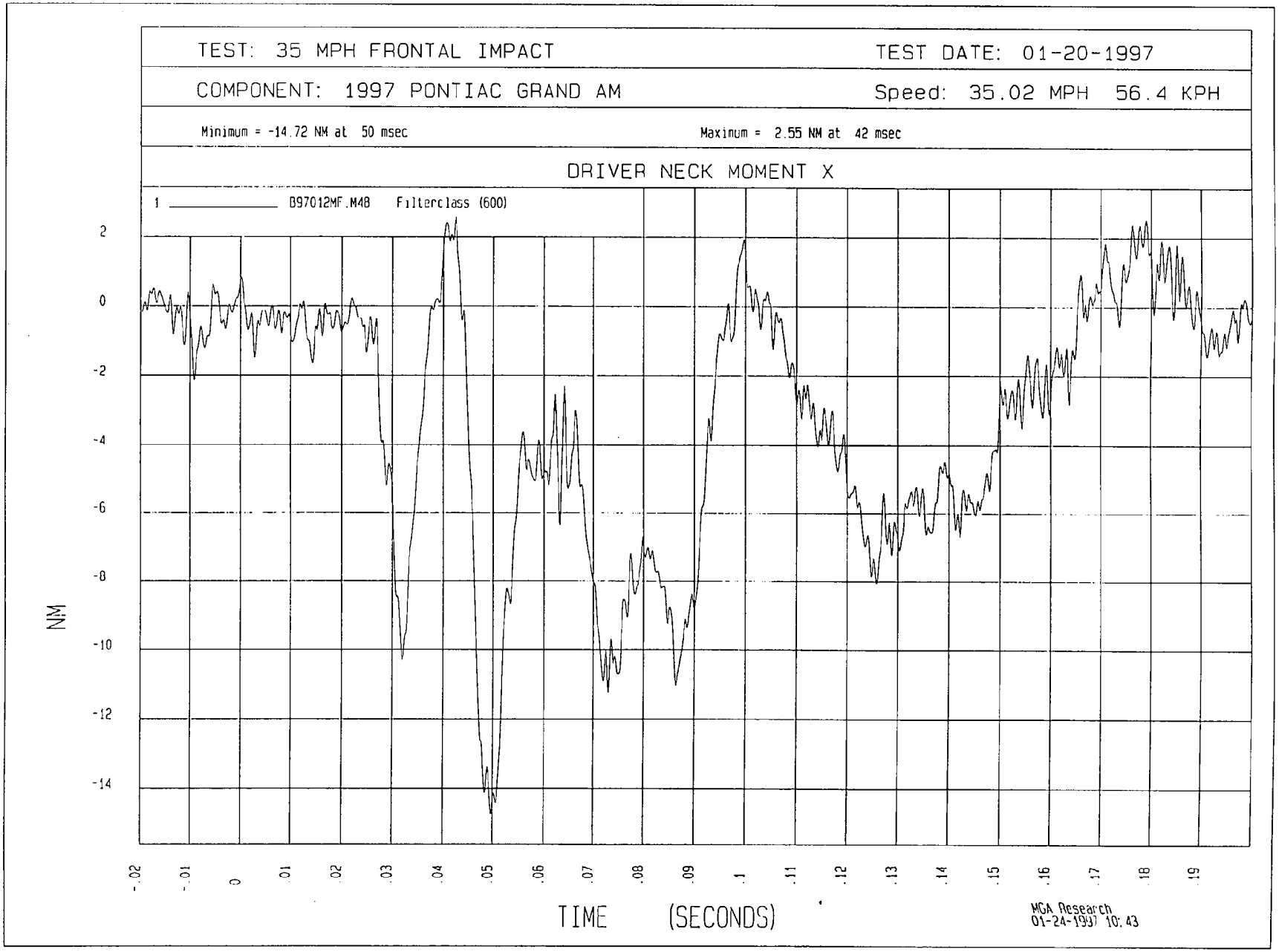
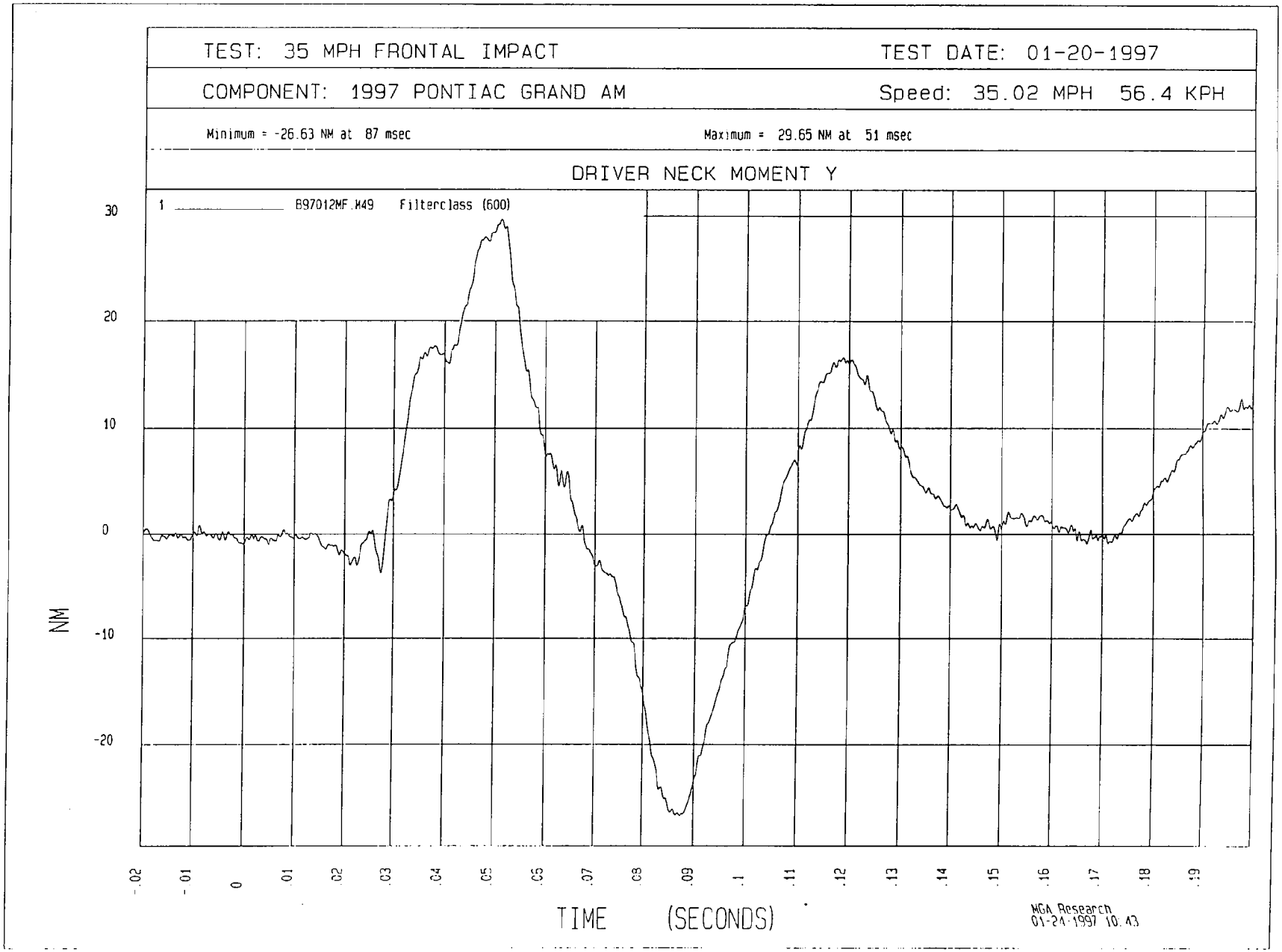
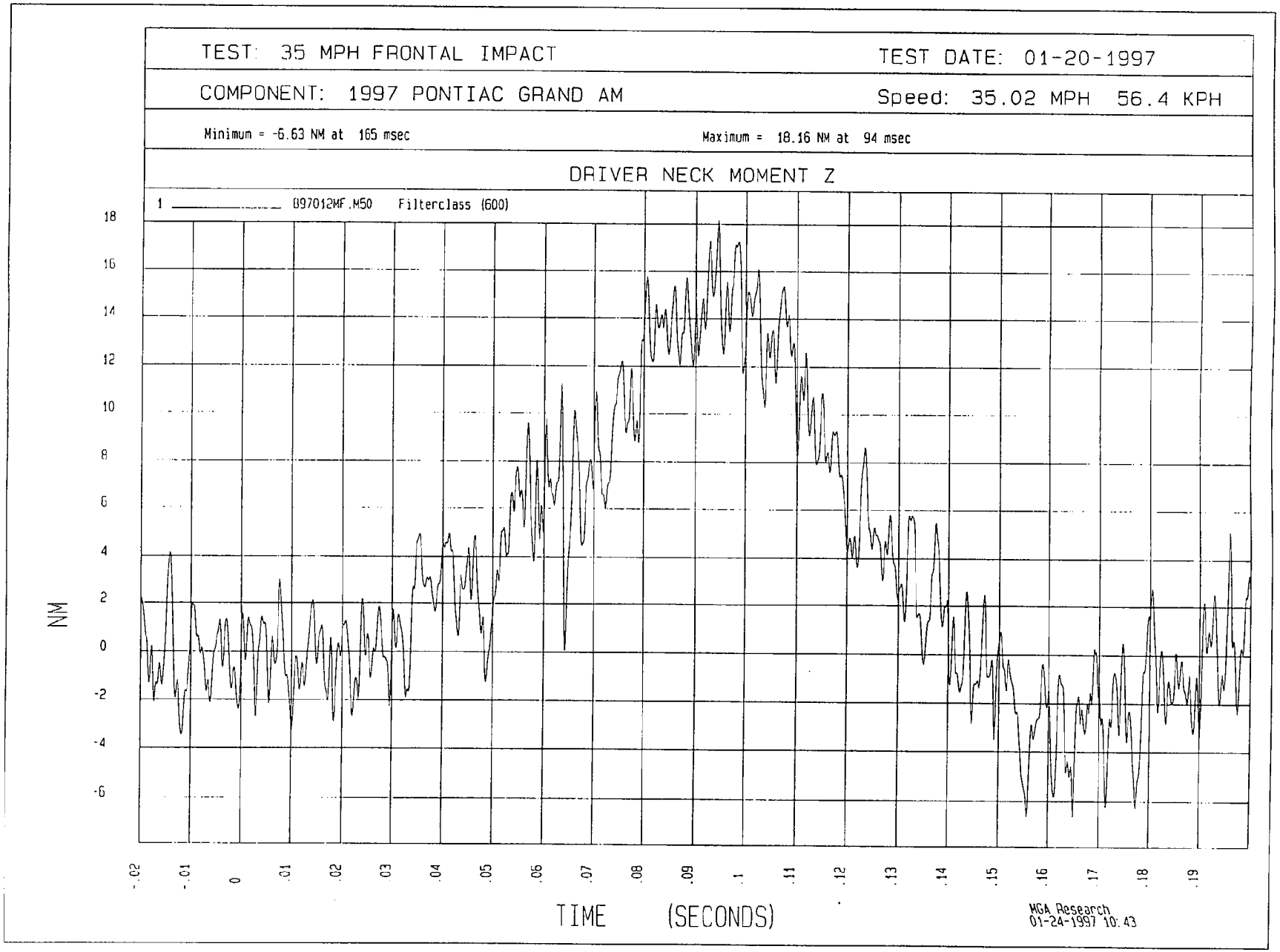
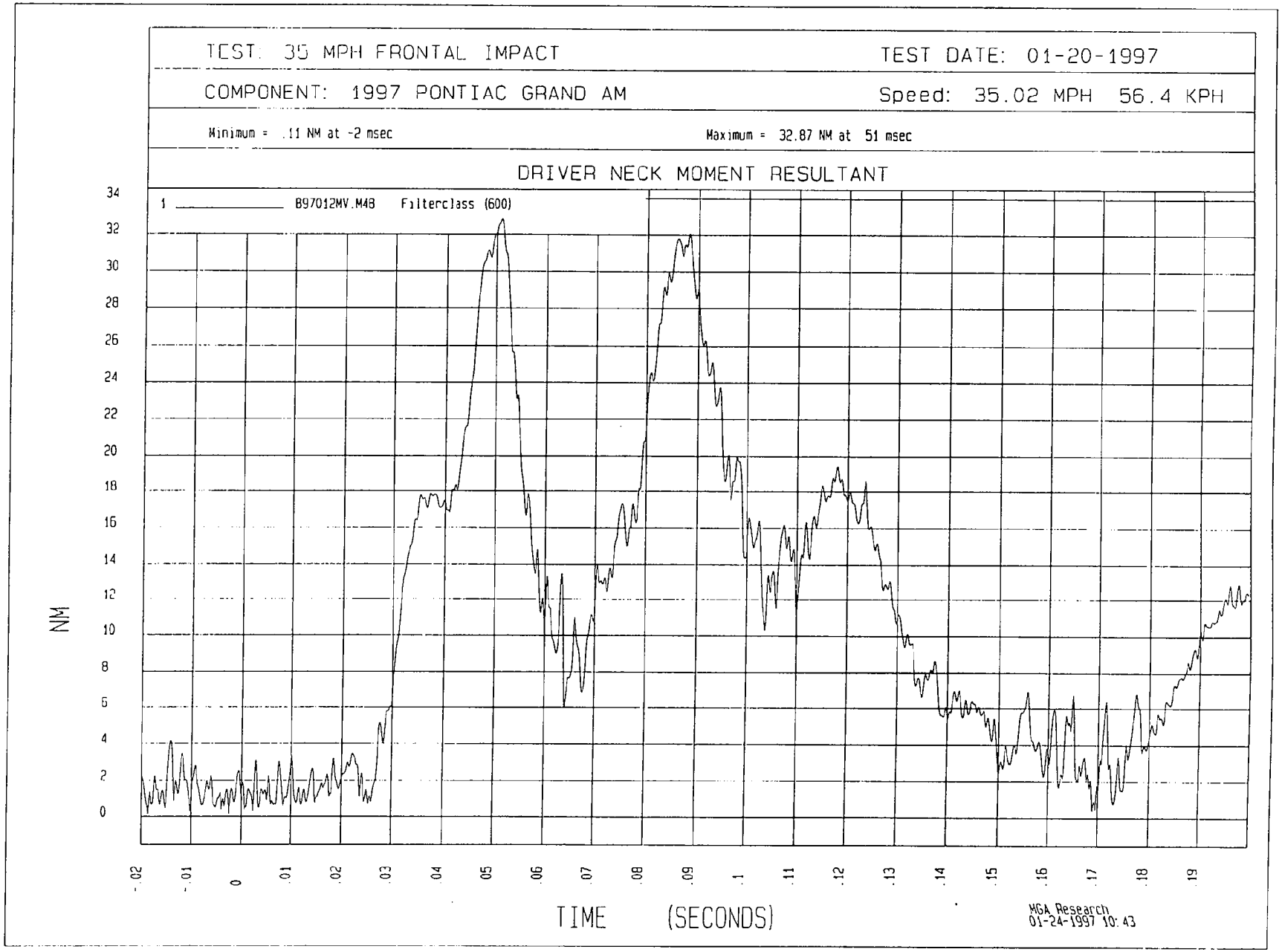
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:43

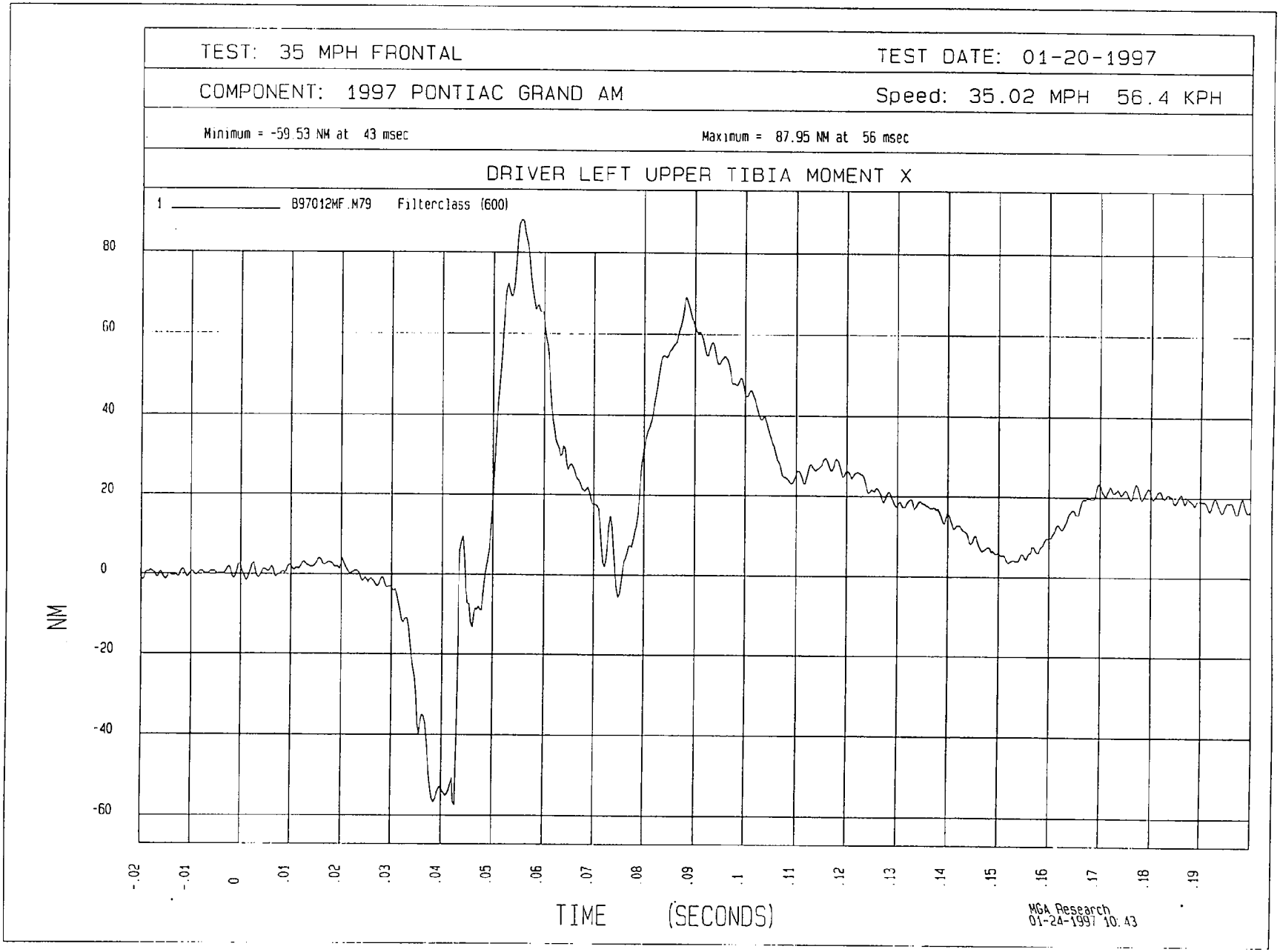

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 2.02 N at 8 msec
Maximum = 1579.32 N at 73 msec
DRIVER NECK FORCE RESULTANT
1 B9/012FEV.F45 Filterclass (1000)
1600
1400
1200
1000
800
600
400
200
0
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:43

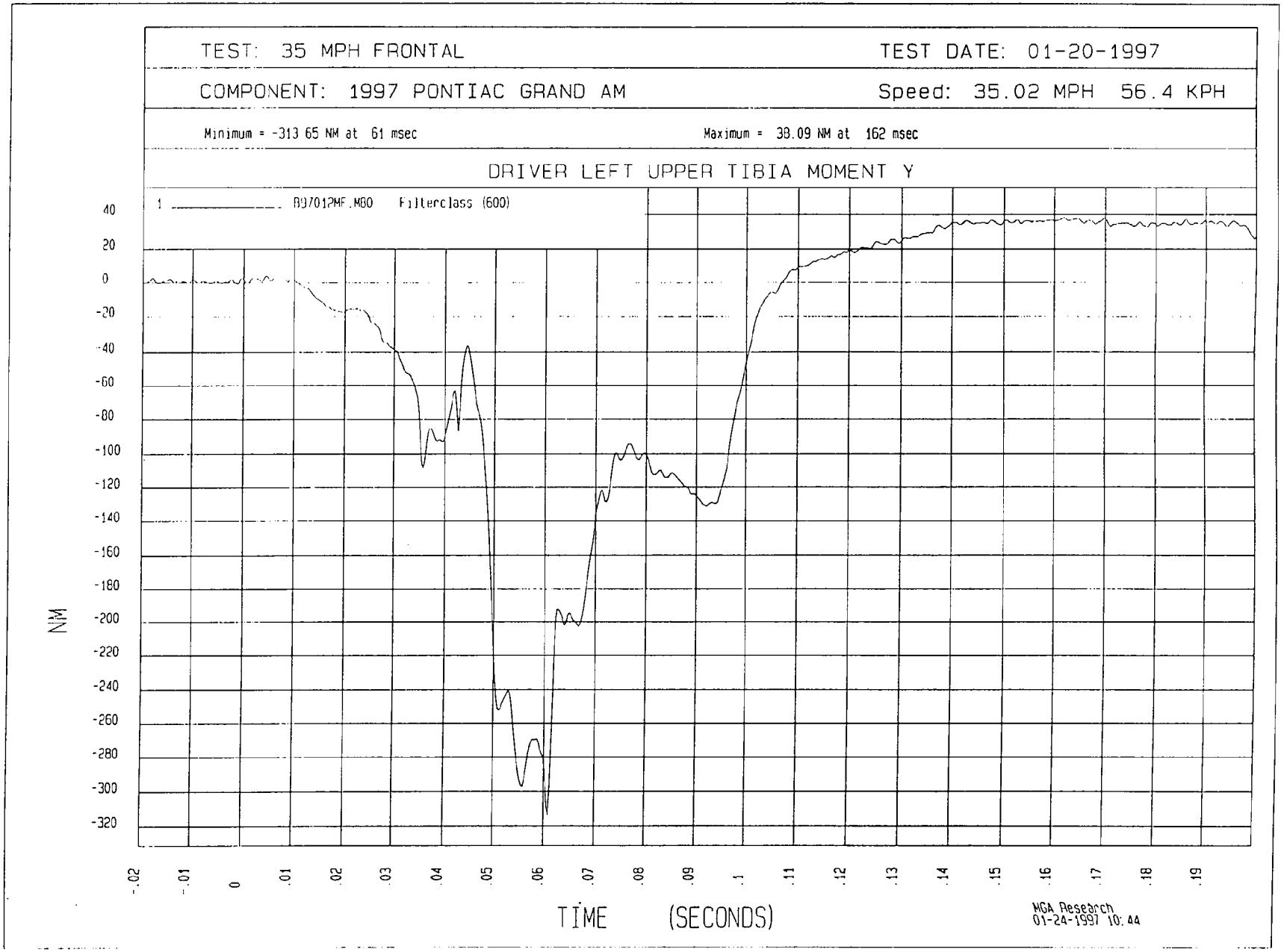

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -14.72 NM at 50 msec
Maximum = 2.55 NM at 42 msec
DRIVER NECK MOMENT X
1 B97012MF.M4B Filterclass (600)
NM
2
0
-2
-4
-6
-8
-10
-12
-14
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:43

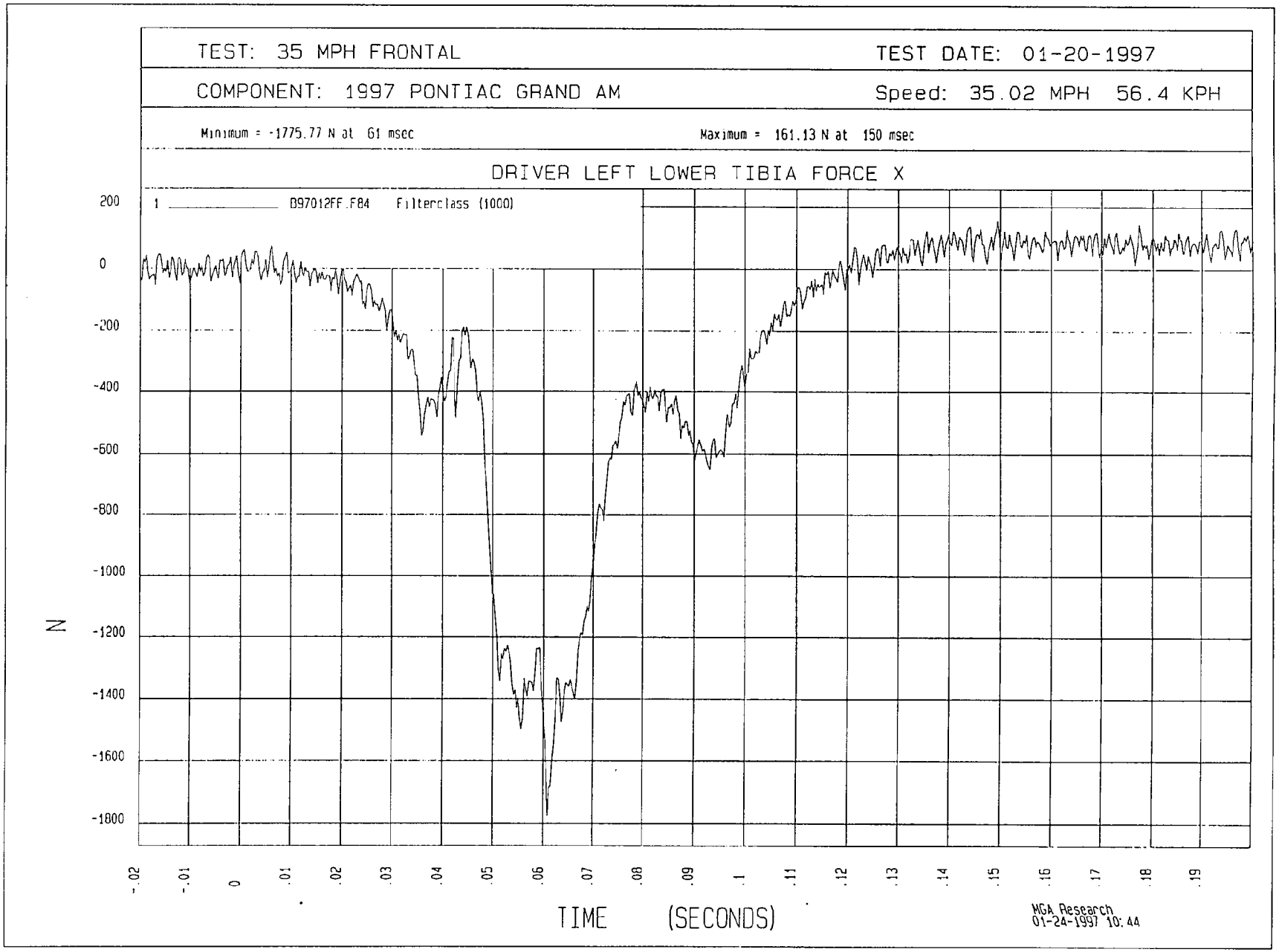

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -26.63 NM at 87 msec
Maximum = 29.65 NM at 51 msec
DRIVER NECK MOMENT Y
1 B97012MF.M49 Filterclass (600)
30
20
10
0
-10
-20
NM
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-21-1997 10:43

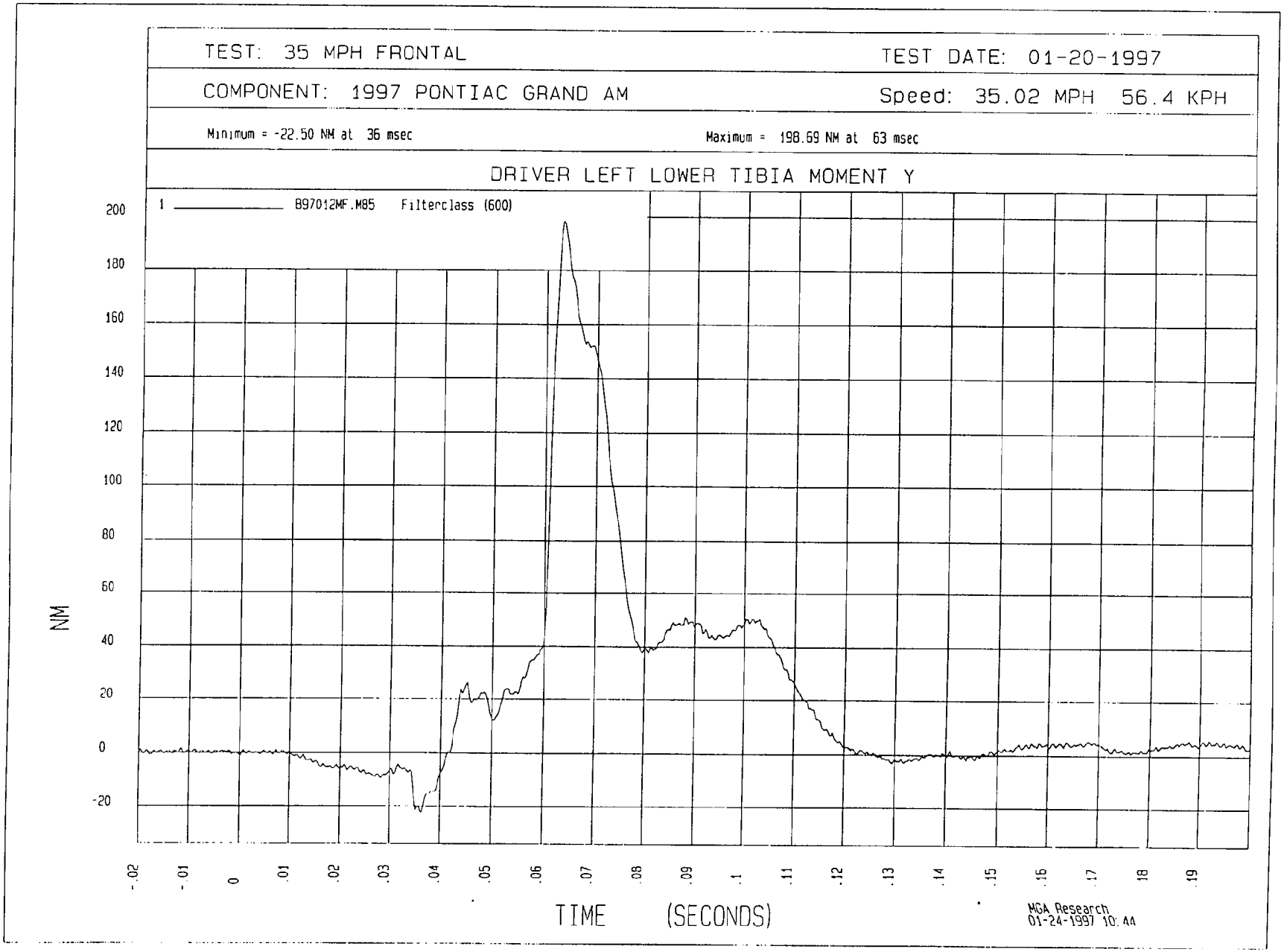

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -6.63 NM at 165 msec
Maximum = 18.16 NM at 94 msec
DRIVER NECK MOMENT Z
1 097012MF.M50 Filterclass (600)
NM
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:43

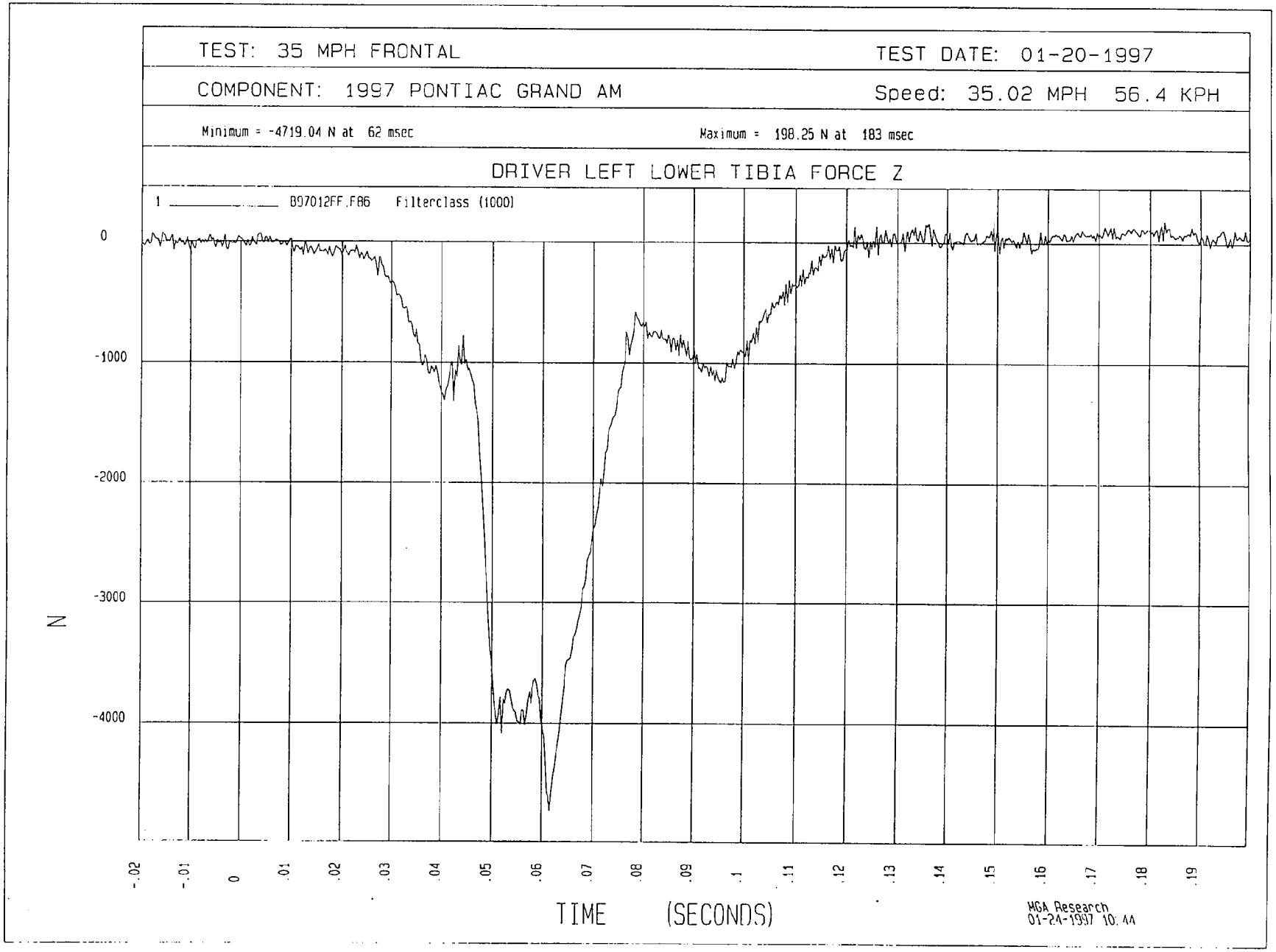

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = .11 NM at -2 msec
Maximum = 32.87 NM at 51 msec
DRIVER NECK MOMENT RESULTANT
1 B97012MV.M48 Filterclass (600)
NM
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:43

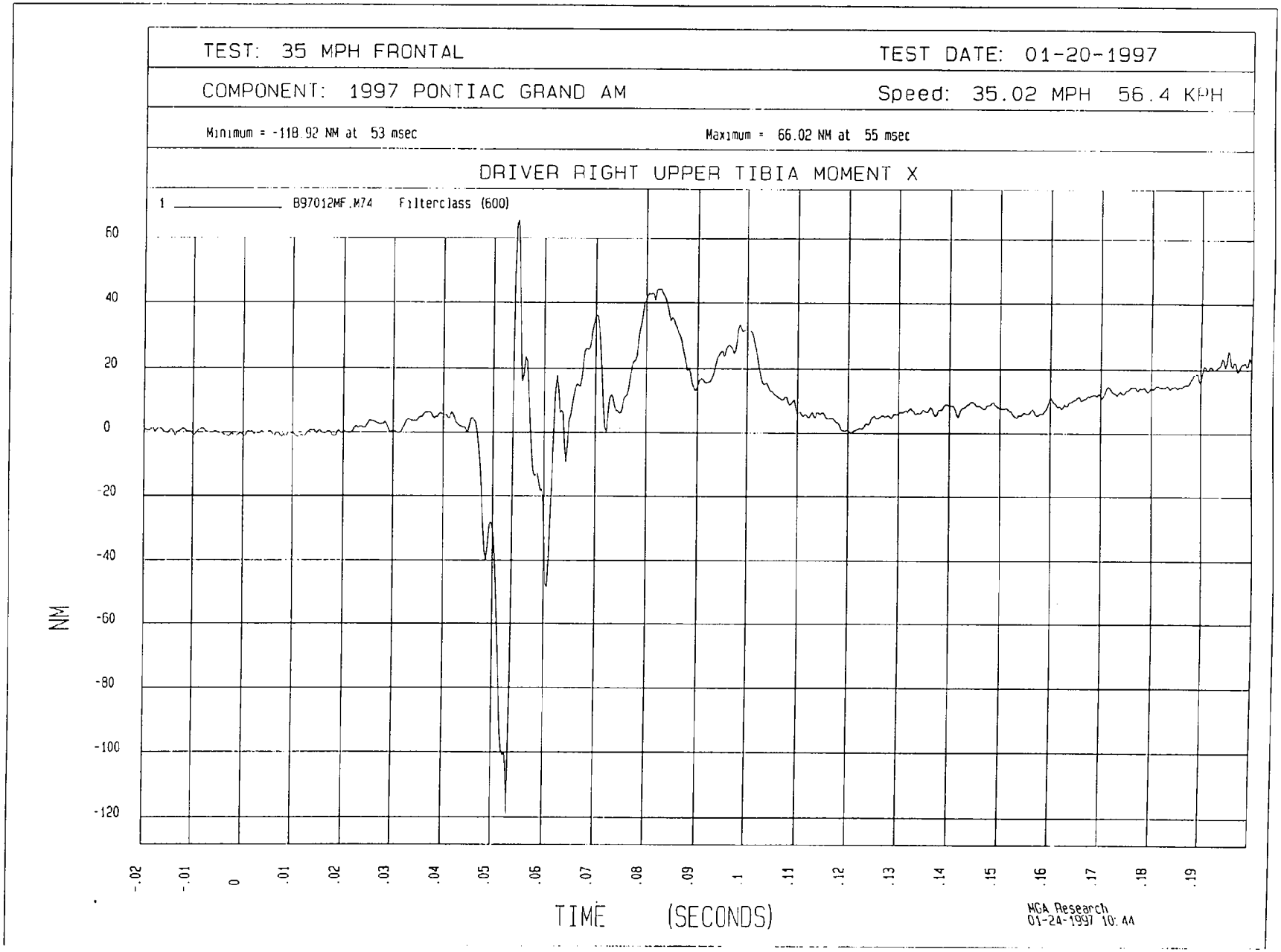

TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -59.53 NM at 43 msec
Maximum = 87.95 NM at 56 msec
DRIVER LEFT UPPER TIBIA MOMENT X
1 B97012MF.M79 Filterclass (600)
NM
80
60
40
20
0
-20
-40
-60
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:43

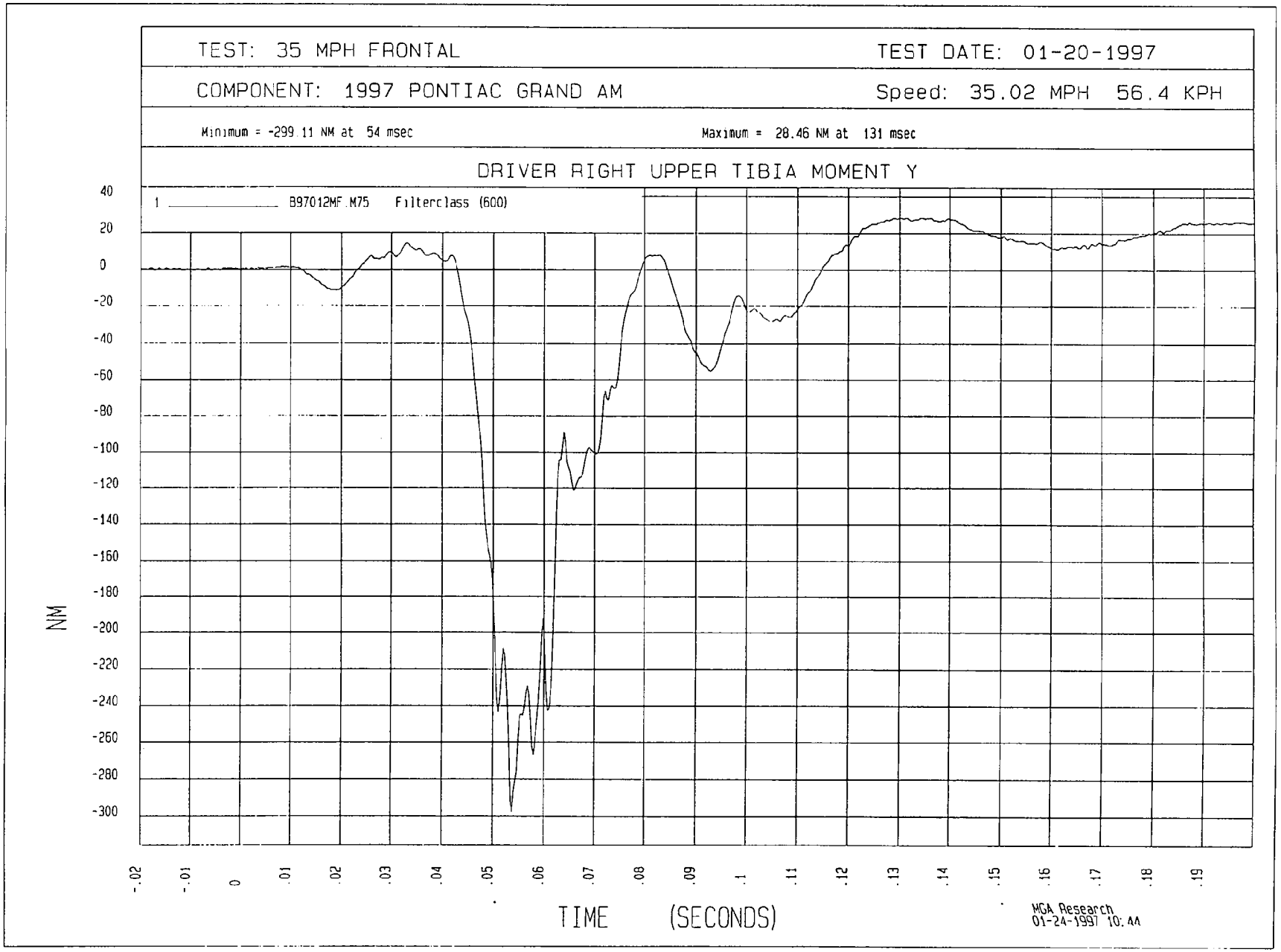

TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -313.65 NM at 61 msec
Maximum = 38.09 NM at 162 msec
DRIVER LEFT UPPER TIBIA MOMENT Y
1 B97012MF.M80 Filterclass (600)
NM
TIME (SECONDS)
MGA Research
01-24-1997 10:44

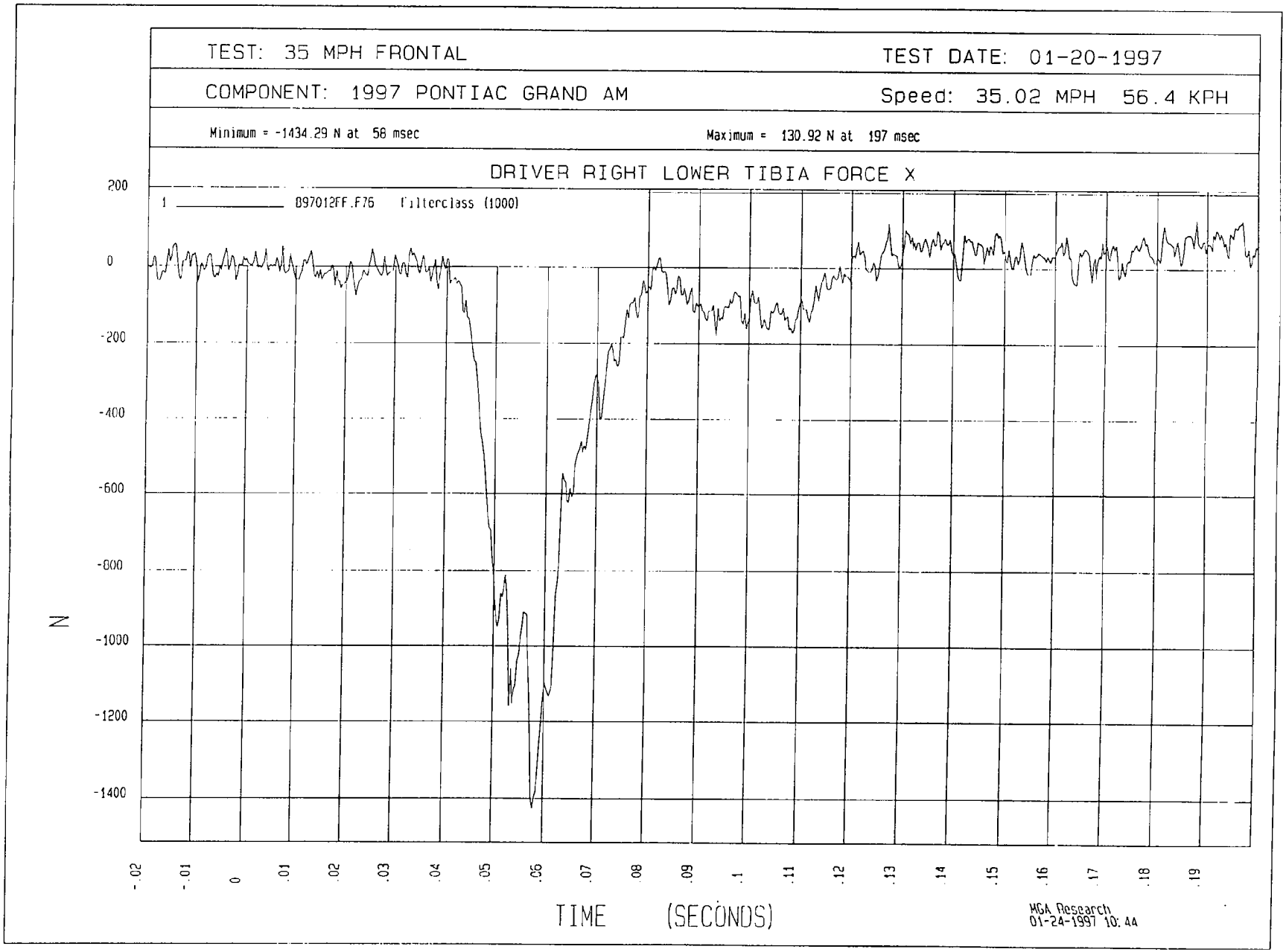

TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -1775.77 N at 61 msec
Maximum = 161.13 N at 150 msec
DRIVER LEFT LOWER TIBIA FORCE X
1 D97012FF.F84 Filterclass (1000)
200
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
-1800
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:44

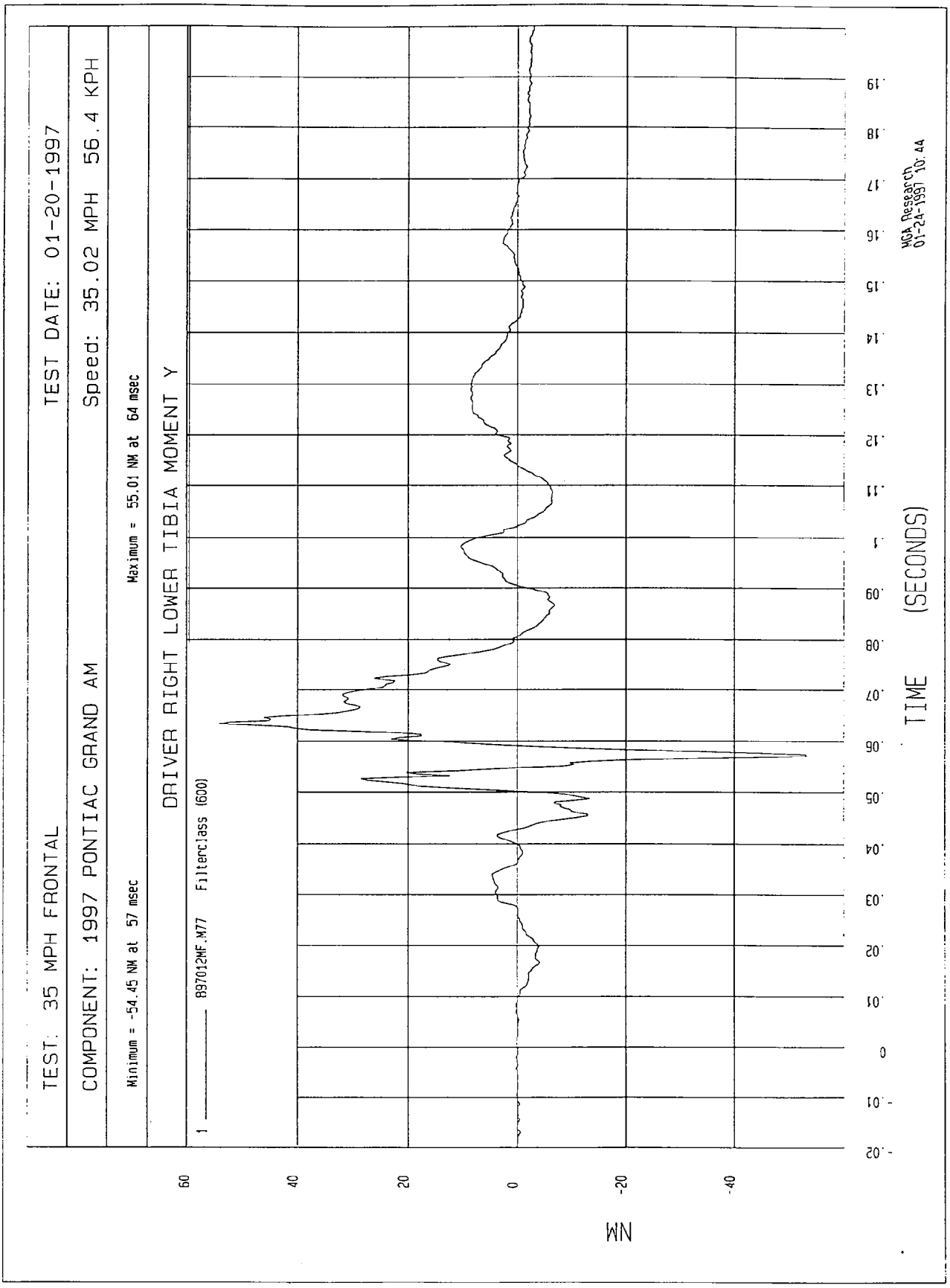

TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -22.50 NM at 36 msec
Maximum = 198.69 NM at 63 msec
DRIVER LEFT LOWER TIBIA MOMENT Y
1 B97012MF.M85 Filterclass (600)
NM
200
180
160
140
120
100
80
60
40
20
0
-20
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:44

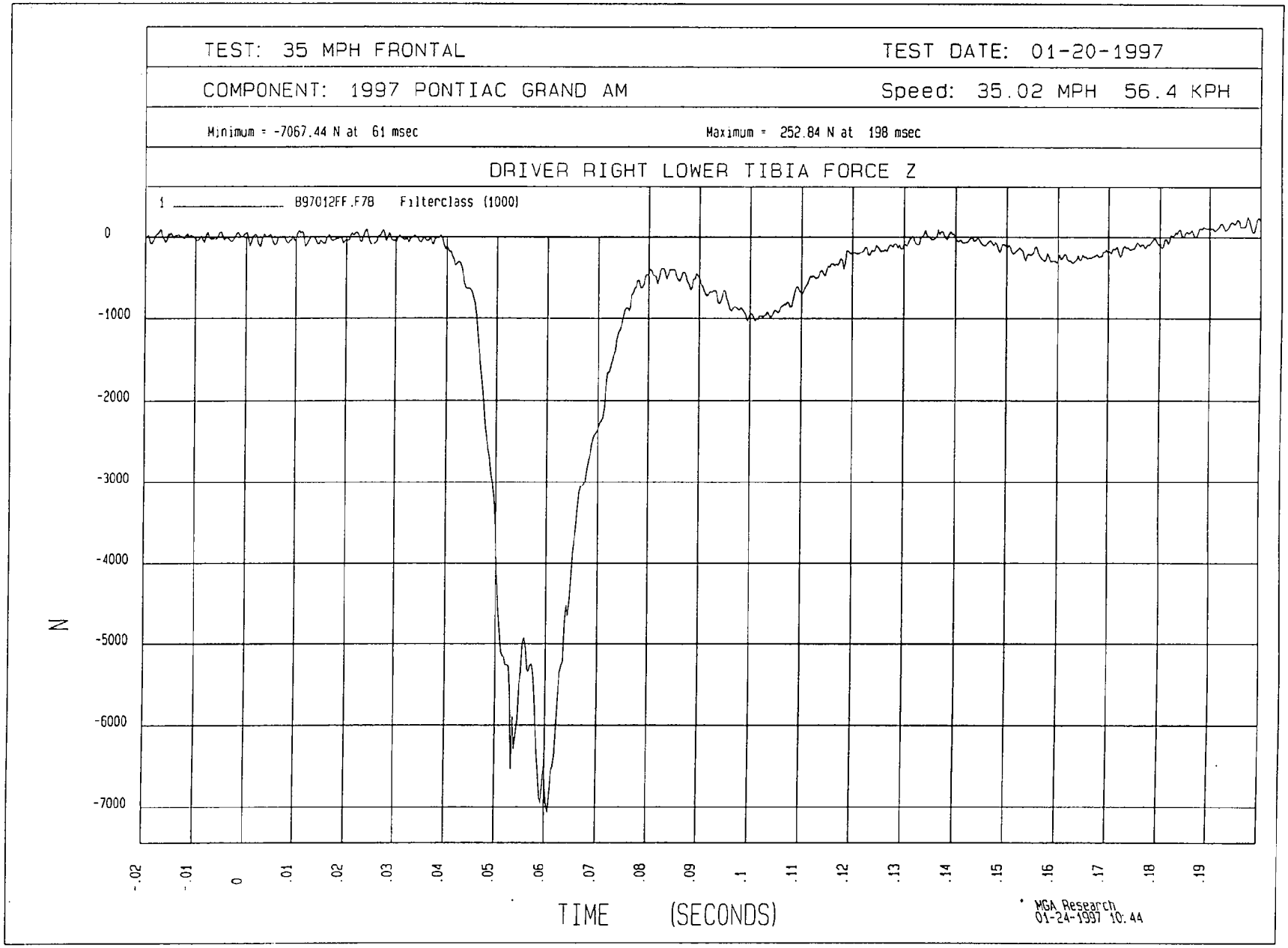

TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -4719.04 N at 62 msec
Maximum = 198.25 N at 183 msec
DRIVER LEFT LOWER TIBIA FORCE Z
1 B97012FF.F86 Filterclass (1000)
0
-1000
-2000
-3000
-4000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:44


TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -118.92 NM at 53 msec
Maximum = 66.02 NM at 55 msec
DRIVER RIGHT UPPER TIBIA MOMENT X
1 B97012MF.M74 Filterclass (600)
60
40
20
0
-20
-40
-60
-80
-100
-120
NM
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:44


TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -299.11 NM at 54 msec
Maximum = 28.46 NM at 131 msec
DRIVER RIGHT UPPER TIBIA MOMENT Y
1 B97012MF.M75 Filterclass (600)
NM
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
-220
-240
-260
-280
-300
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:44


TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -1434.29 N at 58 msec
Maximum = 130.92 N at 197 msec
DRIVER RIGHT LOWER TIBIA FORCE X
1 B97012FF.F76 Filterclass (1000)
200
0
-200
-400
-600
-800
-1000
-1200
-1400
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:44


TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -54.45 NM at 57 msec
Maximum = 55.01 NM at 64 msec
DRIVER RIGHT LOWER TIBIA MOMENT Y
1 _____ 897012MF.M77 Filterclass (600)
NM
TIME (SECONDS)
NCA Research
01-24-1997 10:44


TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -7067.44 N at 61 msec
Maximum = 252.84 N at 198 msec
DRIVER RIGHT LOWER TIBIA FORCE Z
1 B97012FF.F78 Filterclass (1000)
0
-1000
-2000
-3000
-4000
-5000
-6000
-7000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
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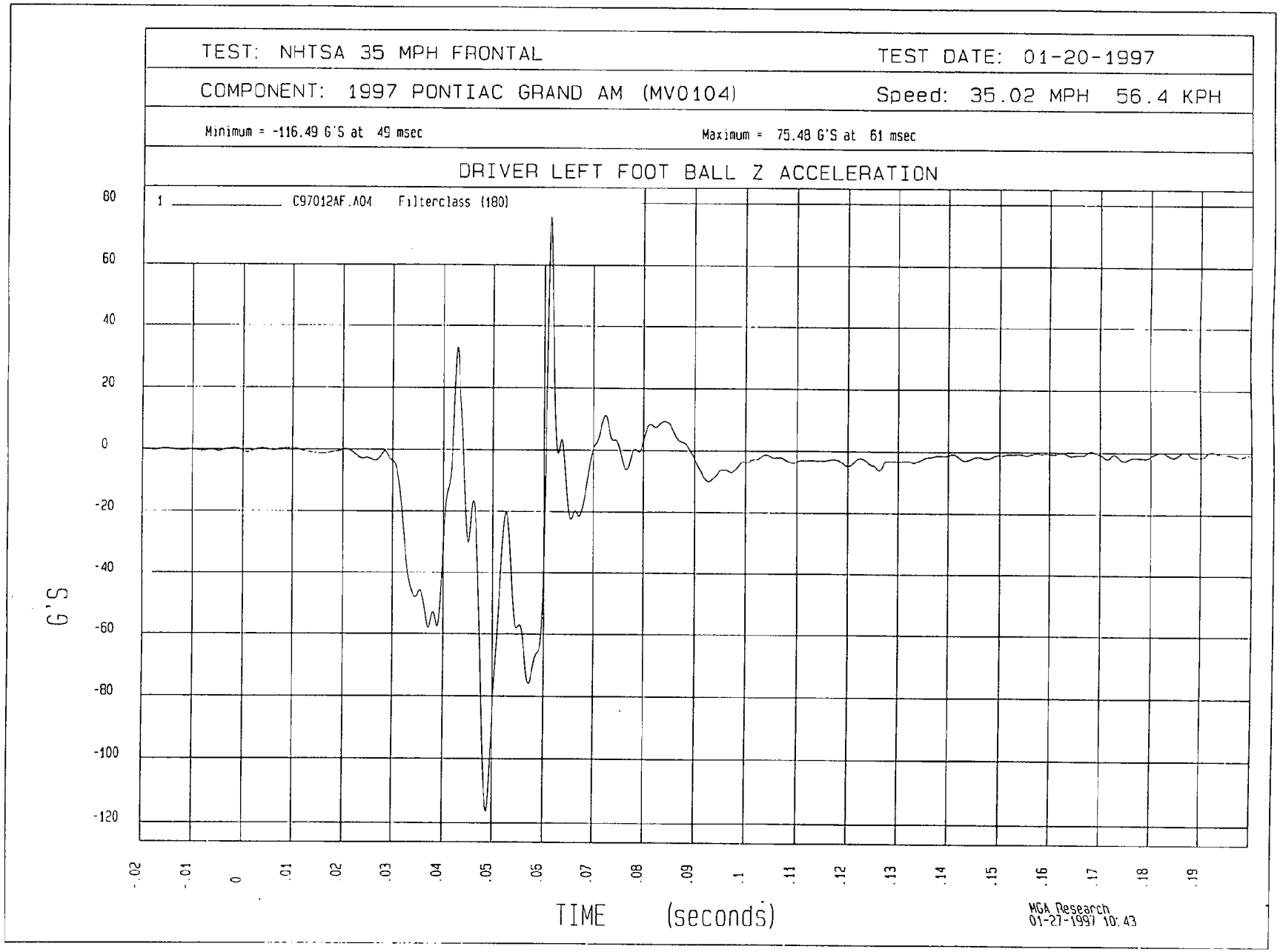
TIME (SECONDS)
MGA Research
01-24-1997 10:44


TEST: NHTSA 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM (MV0104)
Speed: 35.02 MPH 56.4 KPH
Minimum = -116.49 G'S at 49 msec
Maximum = 75.48 G'S at 61 msec
DRIVER LEFT FOOT BALL Z ACCELERATION
1 C97012AF.A04 Filterclass (180)
80
60
40
20
0
-20
-40
-60
-80
-100
-120
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
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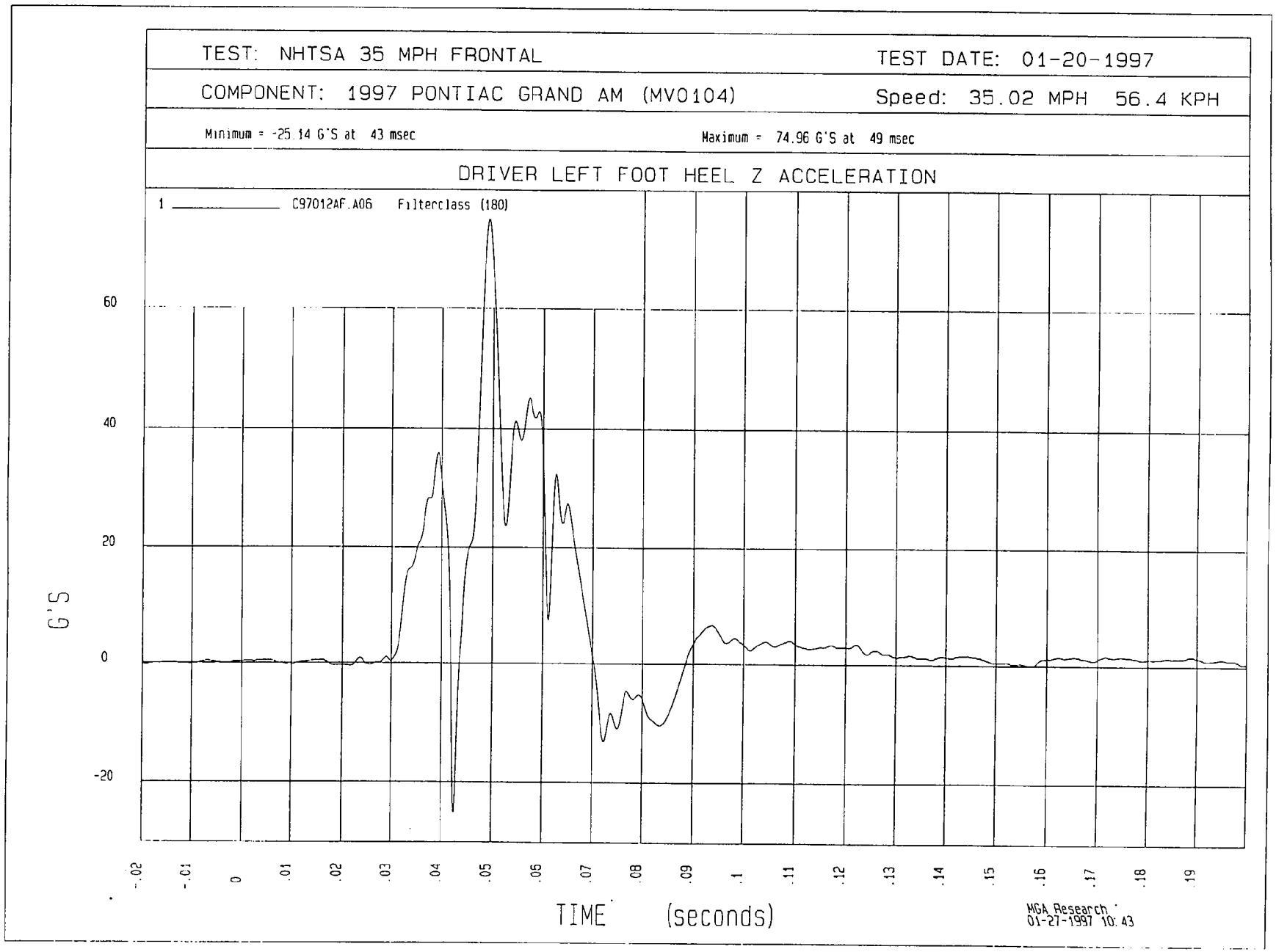
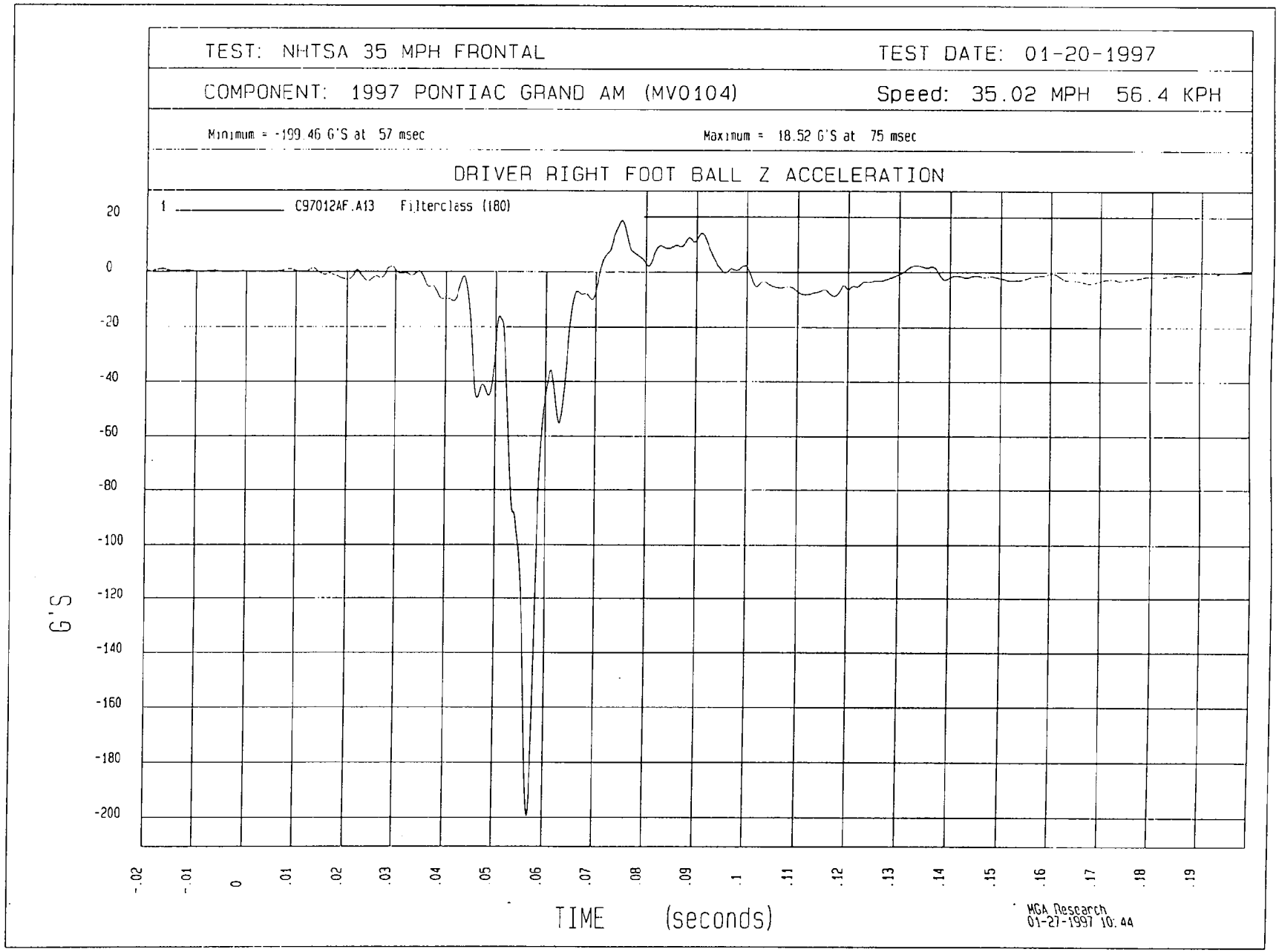
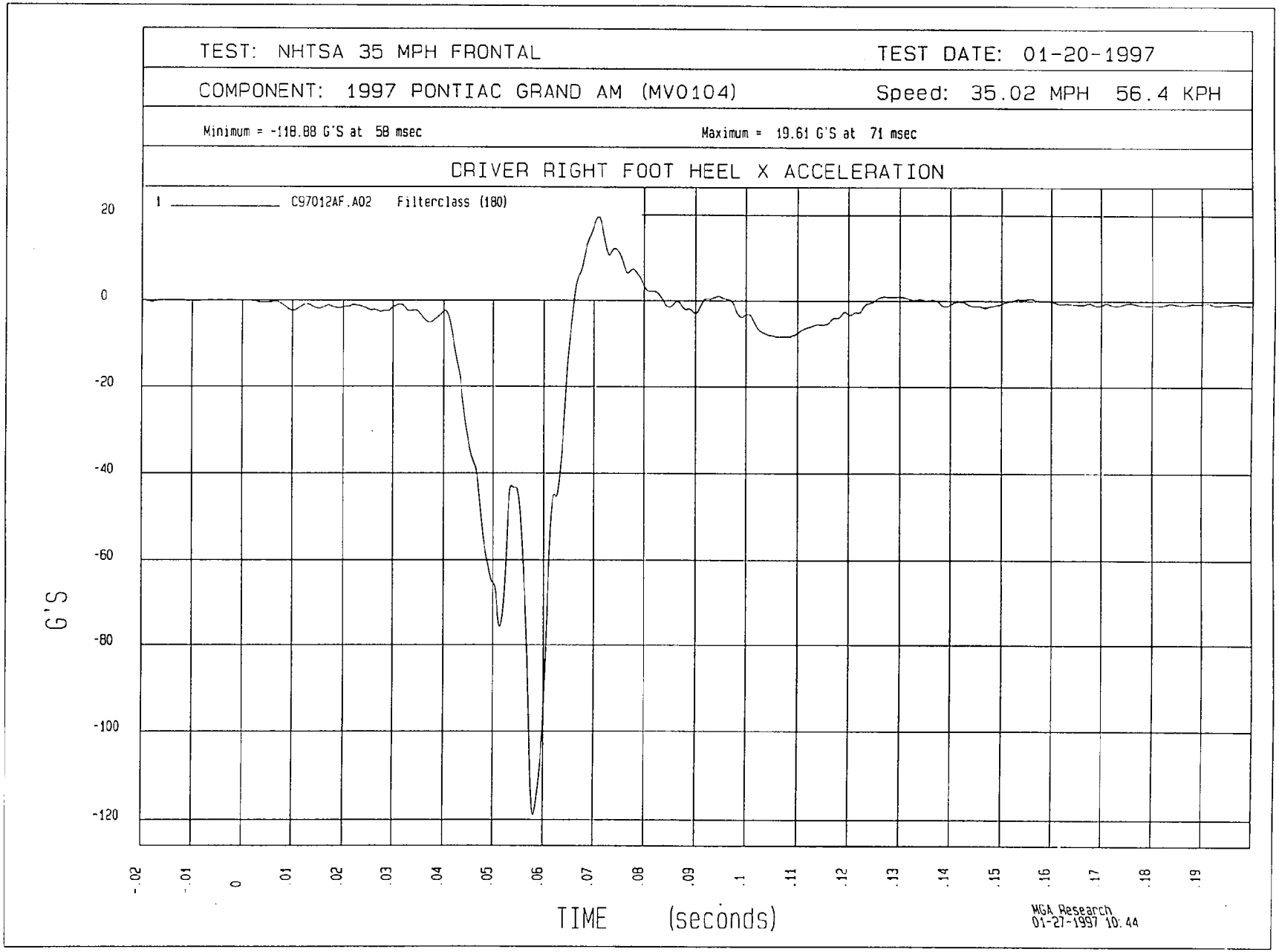
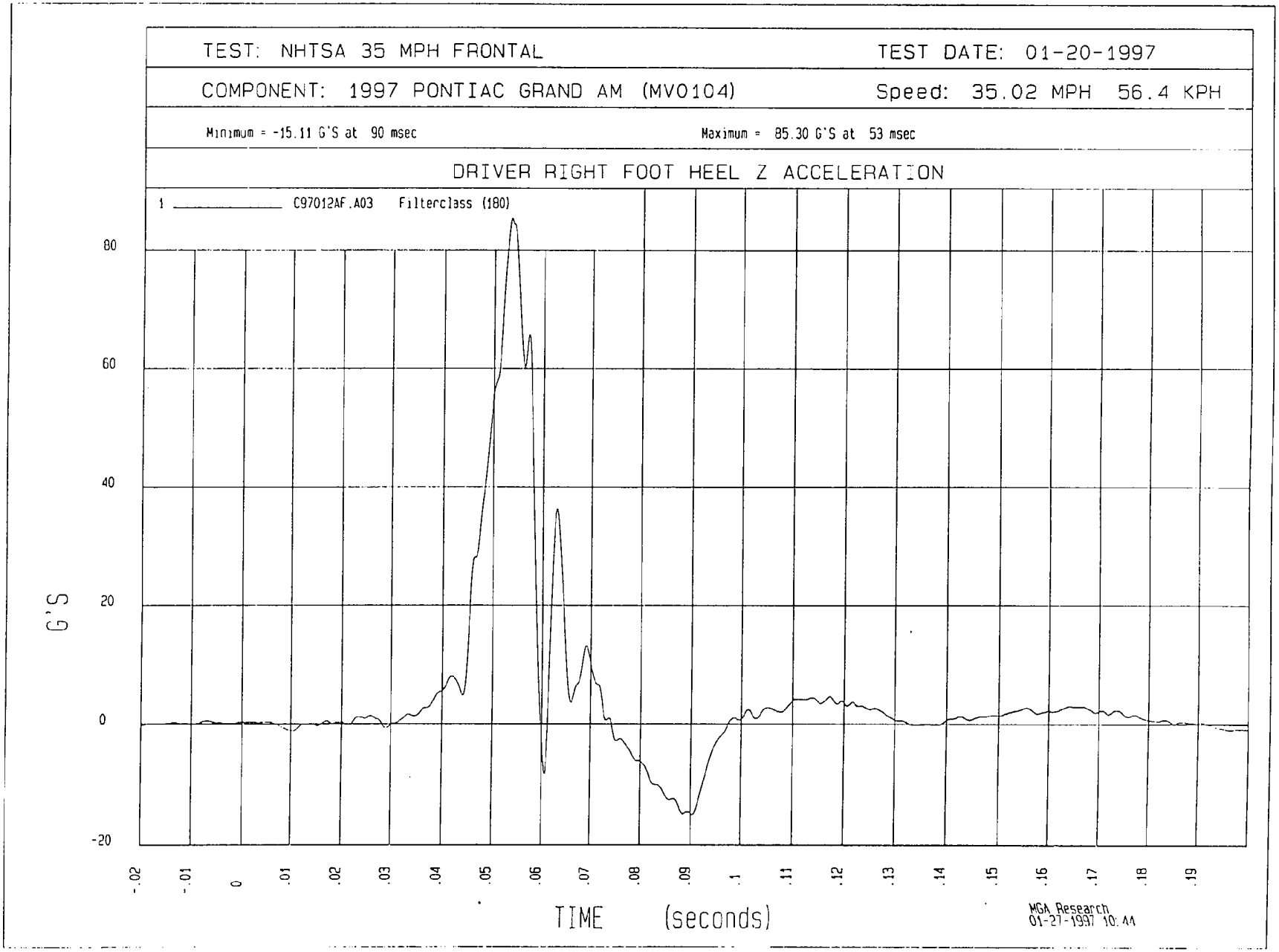
.19
TIME (seconds)
MGA Research
01-27-1997 10:43

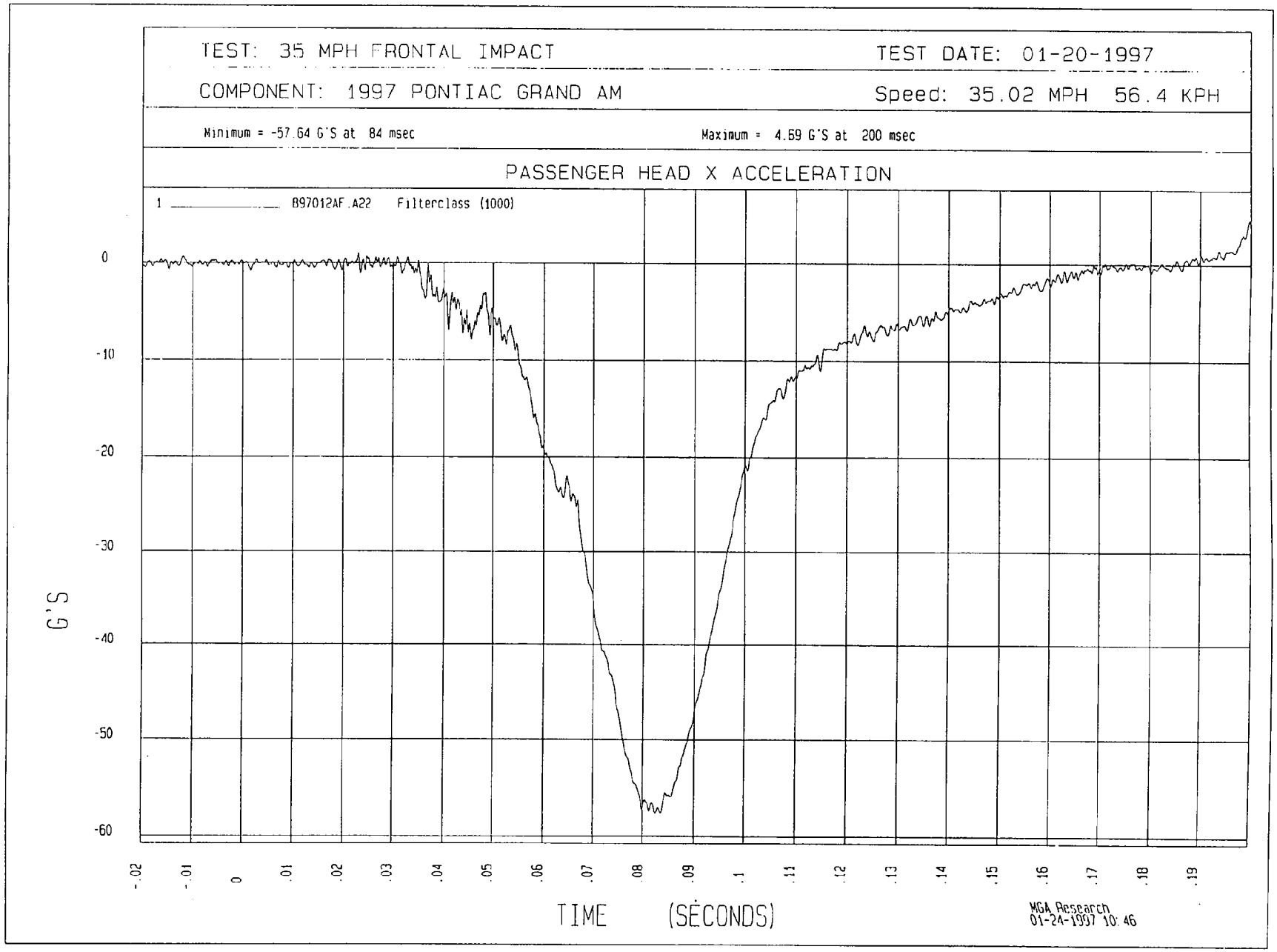

TEST: NHTSA 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM (MV0104)
Speed: 35.02 MPH 56.4 KPH
Minimum = -77.68 G'S at 50 msec
Maximum = 11.19 G'S at 73 msec
DRIVER LEFT FOOT HEEL X ACCELERATION
1 C97012AF.A05 Filterclass (180)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (seconds)
MGA Research
01-27-1997 10:43

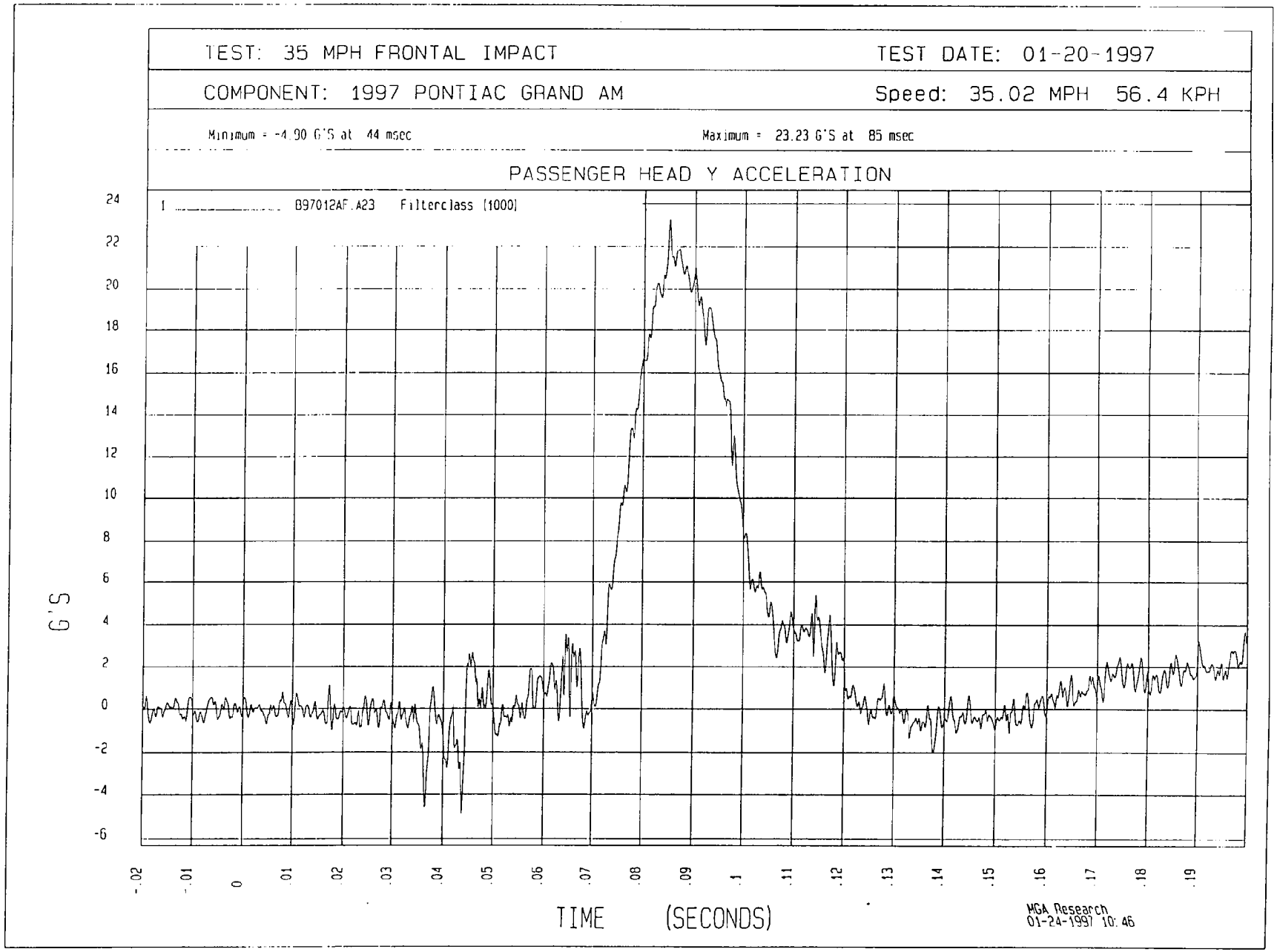

TEST: NHTSA 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM (MV0104)
Speed: 35.02 MPH 56.4 KPH
Minimum = -25.14 G'S at 43 msec
Maximum = 74.96 G'S at 49 msec
DRIVER LEFT FOOT HEEL Z ACCELERATION
1 C97012AF.A06 Filterclass (180)
60
40
20
0
-20
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (seconds)
MGA Research
01-27-1997 10:43

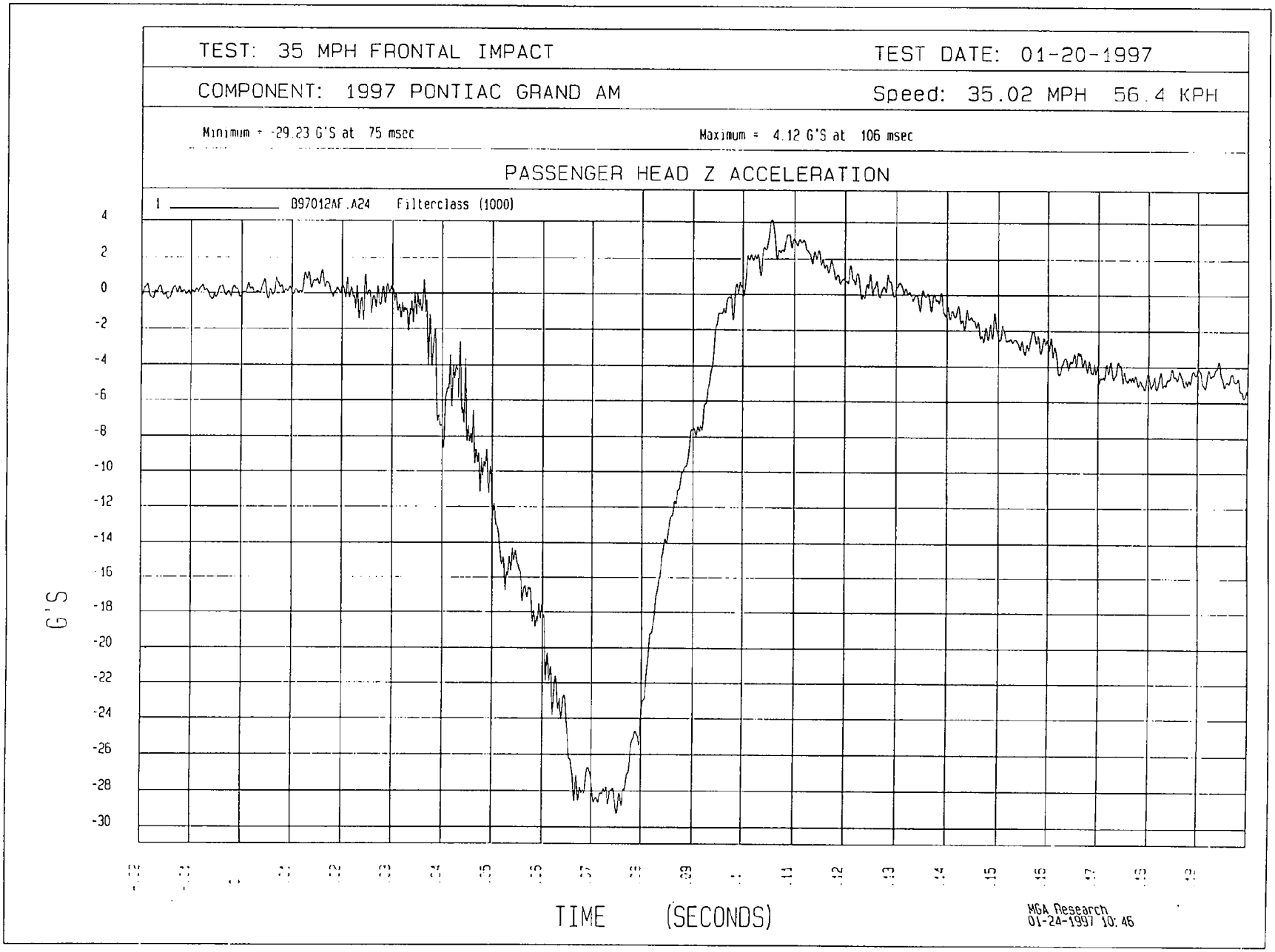

TEST: NHTSA 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM (MV0104)
Speed: 35.02 MPH 56.4 KPH
Minimum = -199.46 G'S at 57 msec
Maximum = 18.52 G'S at 75 msec
DRIVER RIGHT FOOT BALL Z ACCELERATION
1 C97012AF.A13 Filterclass (180)
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (seconds)
MGA Research
01-27-1997 10:44

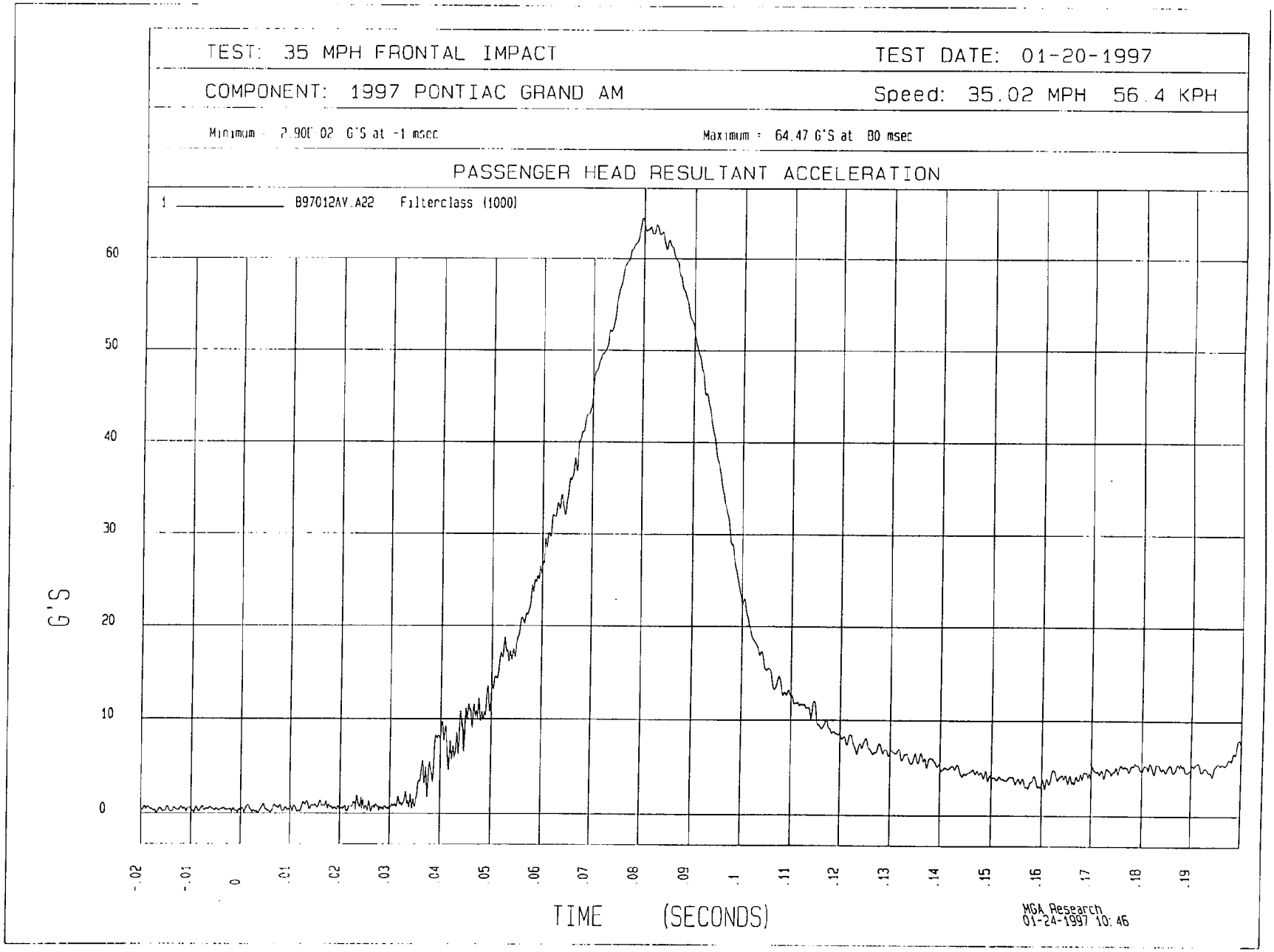

TEST: NHTSA 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM (MV0104)
Speed: 35.02 MPH 56.4 KPH
Minimum = -118.88 G'S at 58 msec
Maximum = 19.61 G'S at 71 msec
DRIVER RIGHT FOOT HEEL X ACCELERATION
1 C97012AF.A02 Filterclass (180)
20
0
-20
-40
-60
-80
-100
-120
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (seconds)
MGA Research
01-27-1997 10:44

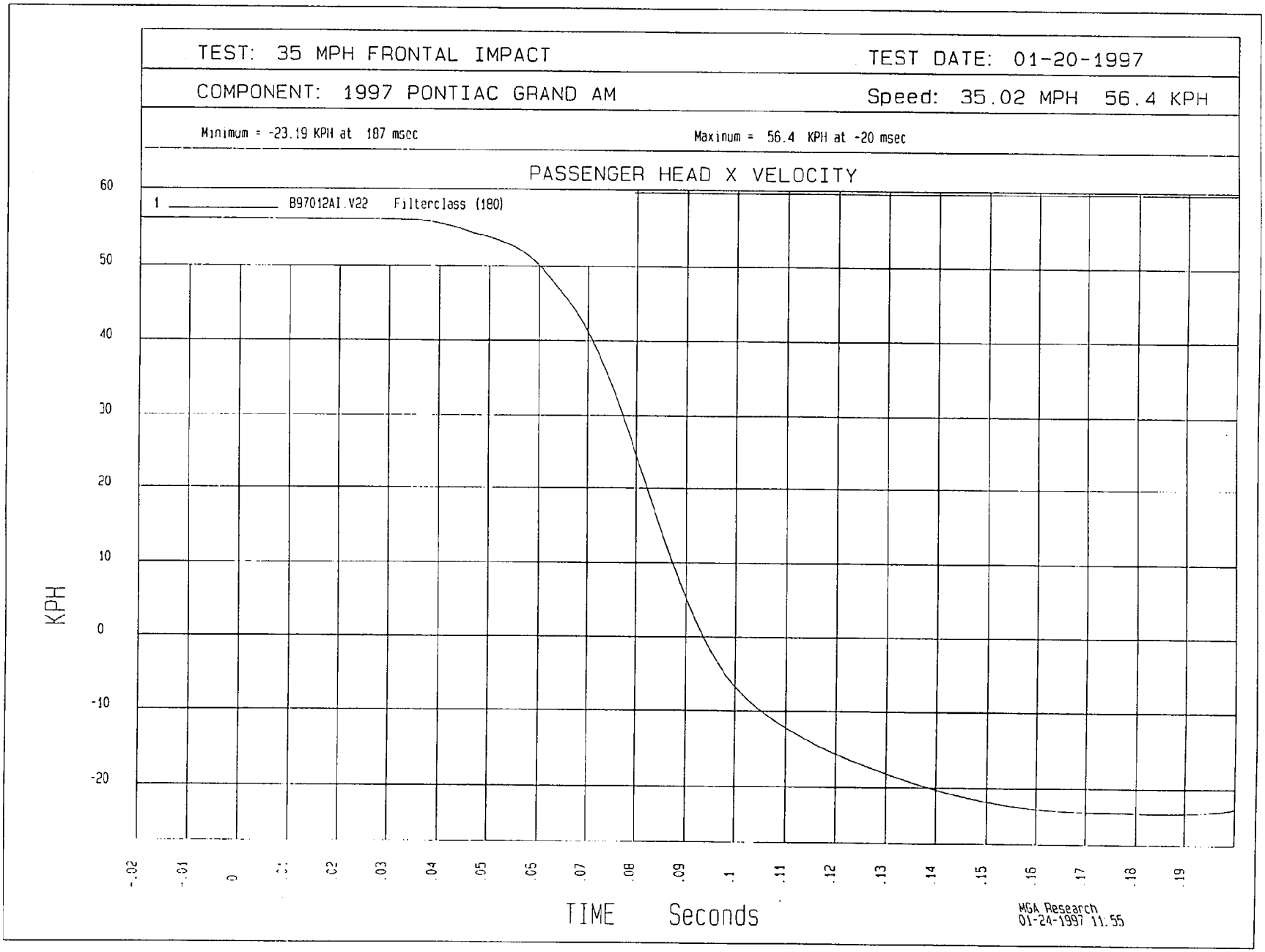

TEST: NHTSA 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM (MV0104)
Speed: 35.02 MPH 56.4 KPH
Minimum = -15.11 G'S at 90 msec
Maximum = 85.30 G'S at 53 msec
DRIVER RIGHT FOOT HEEL Z ACCELERATION
1 C97012AF.A03 Filterclass (180)
80
60
40
20
0
-20
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (seconds)
MGA Research
01-27-1997 10:44

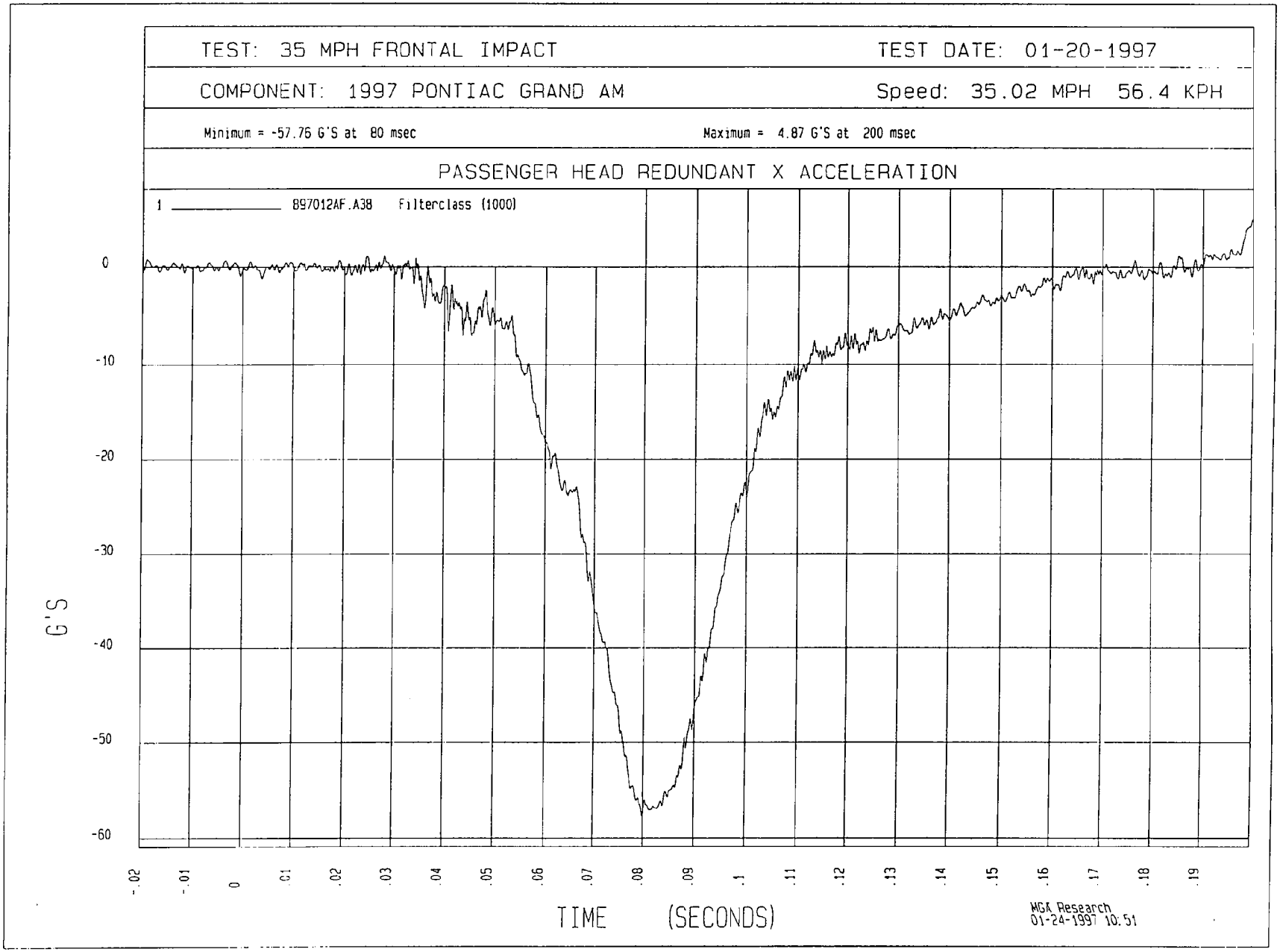

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -57.64 G'S at 84 msec
Maximum = 4.69 G'S at 200 msec
PASSENGER HEAD X ACCELERATION
1 B97012AF.A22 Filterclass (1000)
0
-10
-20
-30
-40
-50
-60
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:46

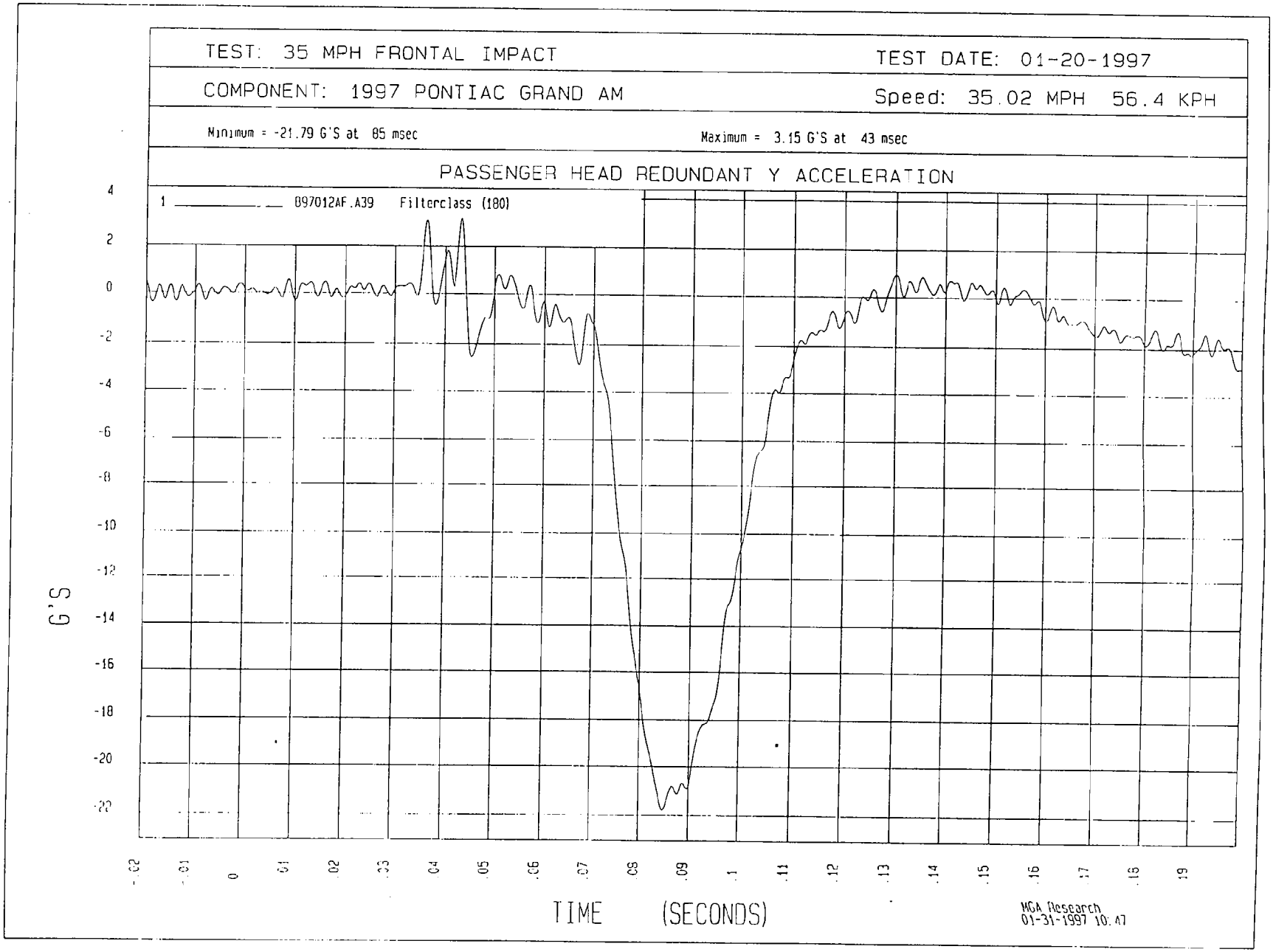

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -4.90 G'S at 44 msec
Maximum = 23.23 G'S at 85 msec
PASSENGER HEAD Y ACCELERATION
1 B97012AF.A23 Filterclass (1000)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:46

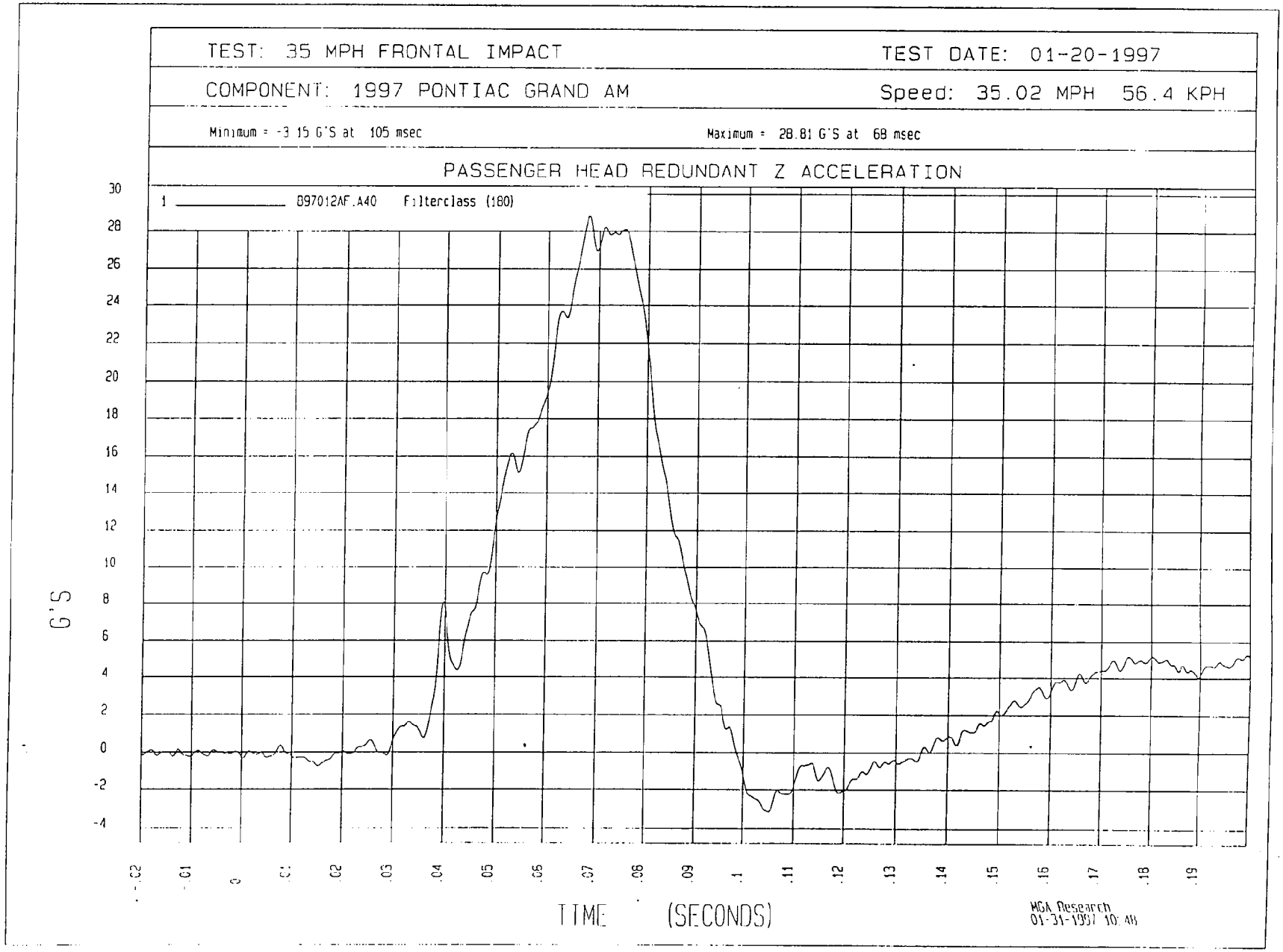

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -29.23 G'S at 75 msec
Maximum = 4.12 G'S at 106 msec
PASSENGER HEAD Z ACCELERATION
1 B97012AF.A24 Filterclass (1000)
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
G'S
TIME (SECONDS)
MGA Research
01-24-1997 10:46

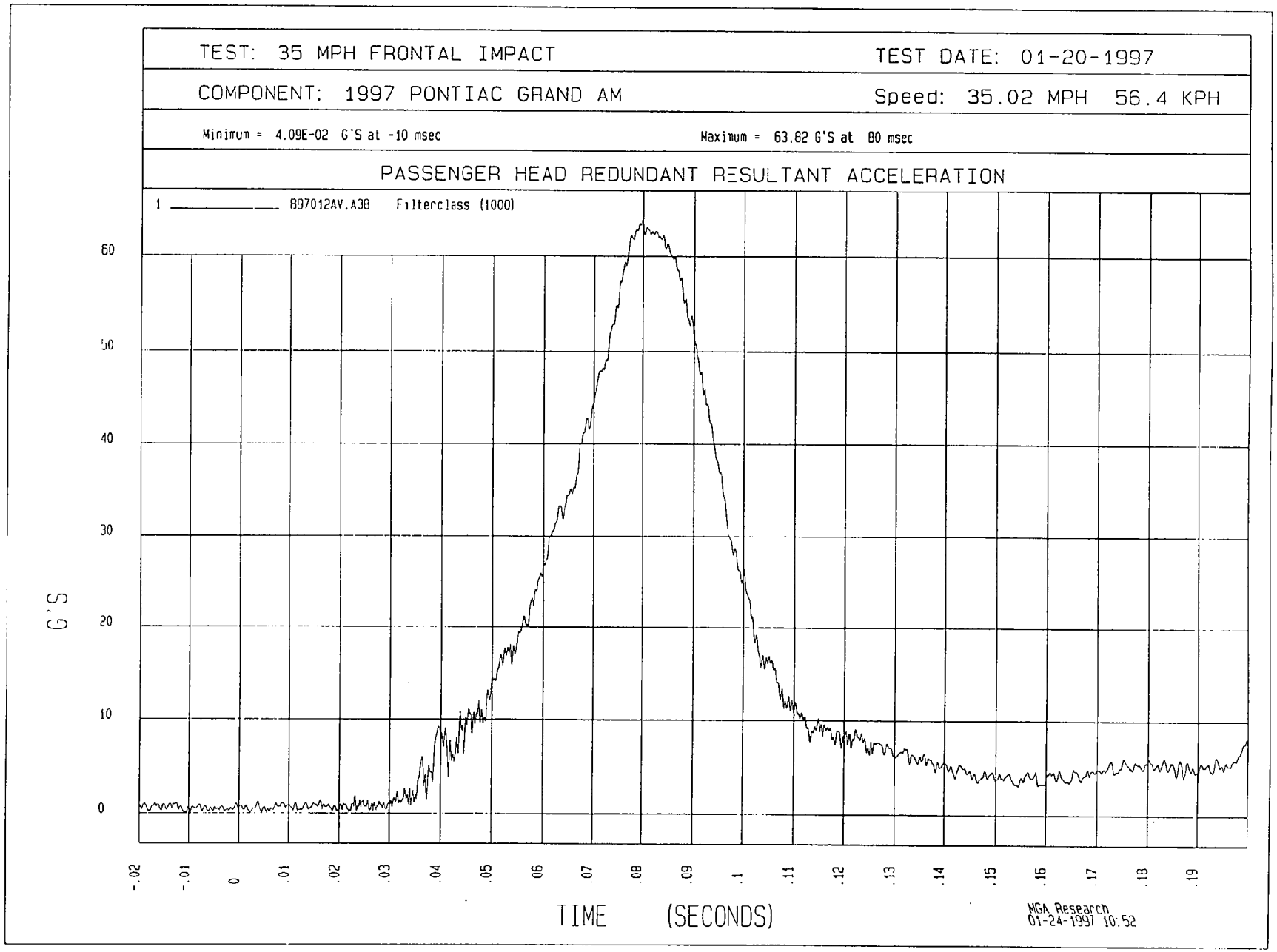

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 2.90E-02 G'S at -1 msec
Maximum = 64.47 G'S at 80 msec
PASSENGER HEAD RESULTANT ACCELERATION
1 B97012AV.A22 Filterclass (1000)
G'S
60
50
40
30
20
10
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:46

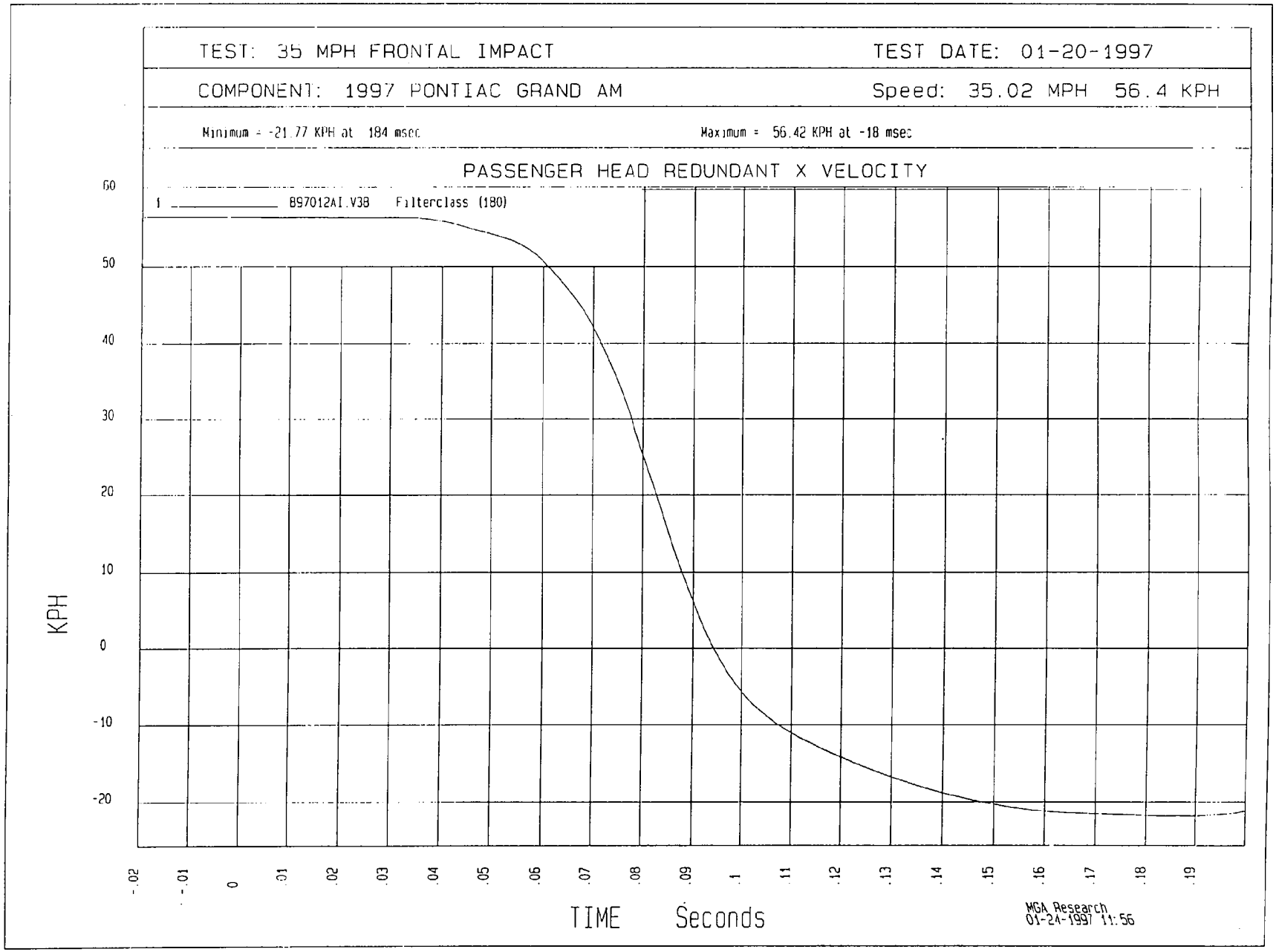

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -23.19 KPH at 187 msec
Maximum = 56.4 KPH at -20 msec
PASSENGER HEAD X VELOCITY
1 B97012AI.V22 Filterclass (180)
KPH
60
50
40
30
20
10
0
-10
-20
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-24-1997 11:55

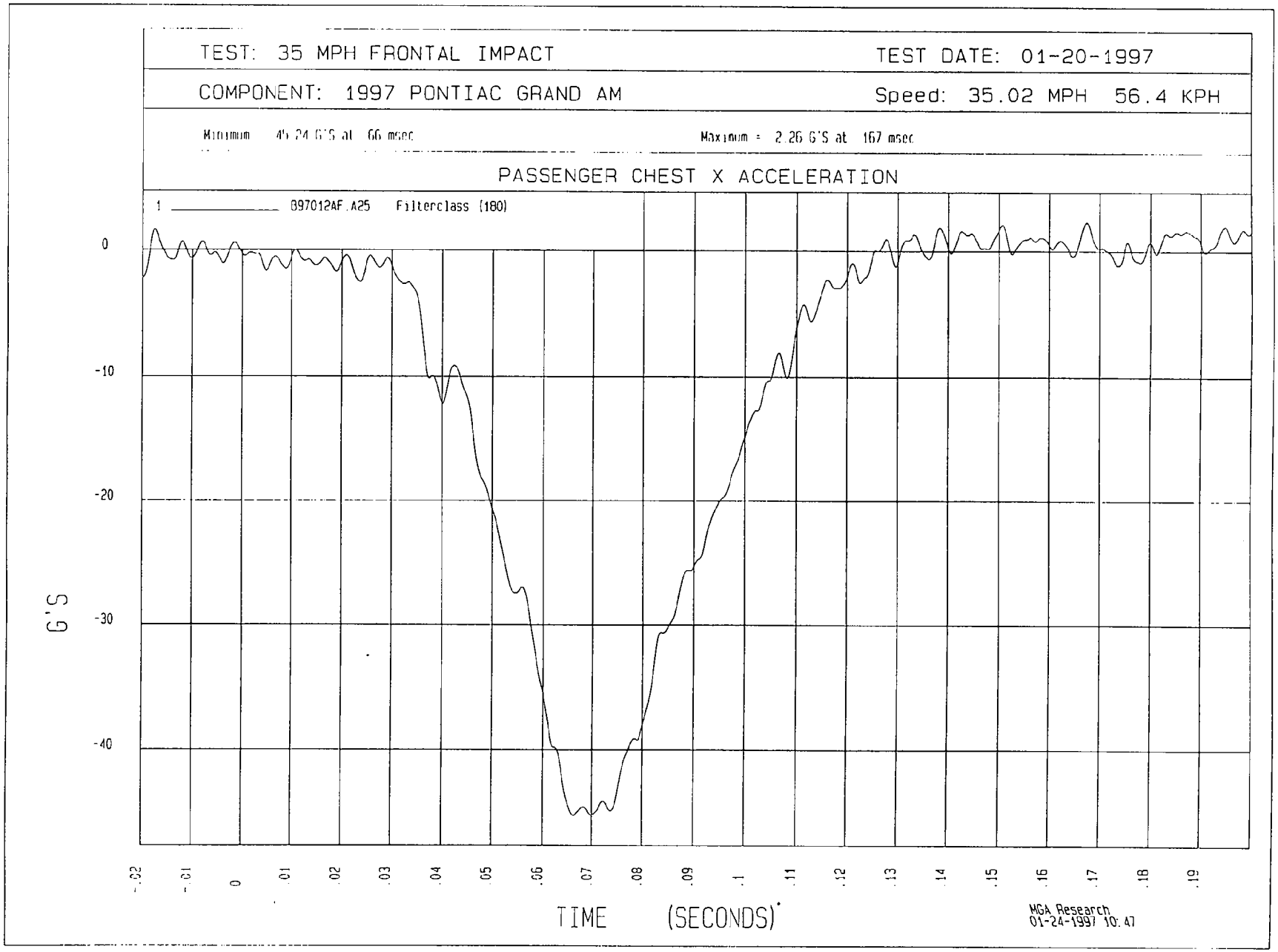

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -57.76 G'S at 80 msec
Maximum = 4.87 G'S at 200 msec
PASSENGER HEAD REDUNDANT X ACCELERATION
1 897012AF.A38 Filterclass (1000)
0
-10
-20
-30
-40
-50
-60
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:51

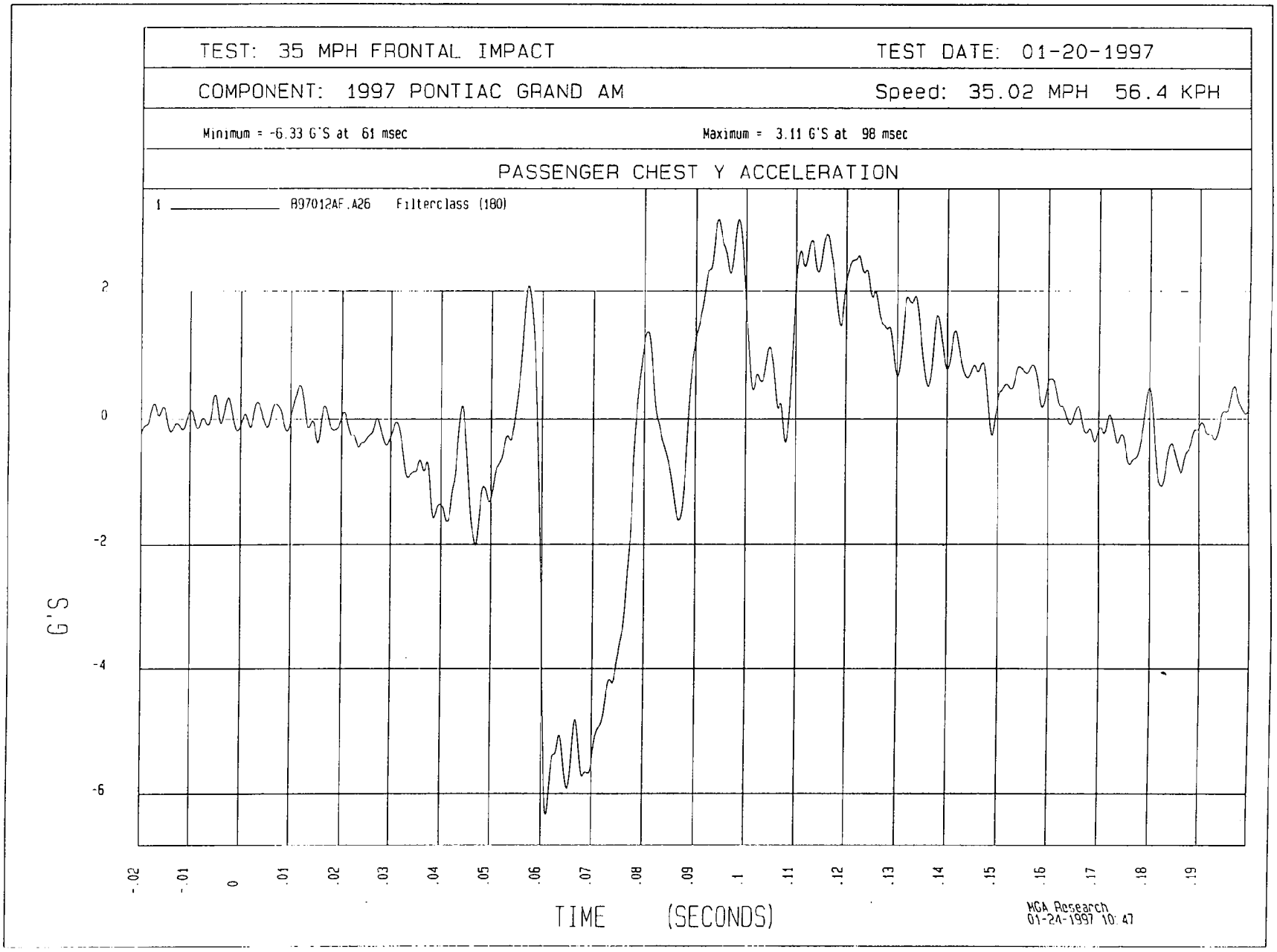

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -21.79 G'S at 85 msec
Maximum = 3.15 G'S at 43 msec
PASSENGER HEAD REDUNDANT Y ACCELERATION
1 097012AF.A39 Filterclass (180)
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-31-1997 10:47

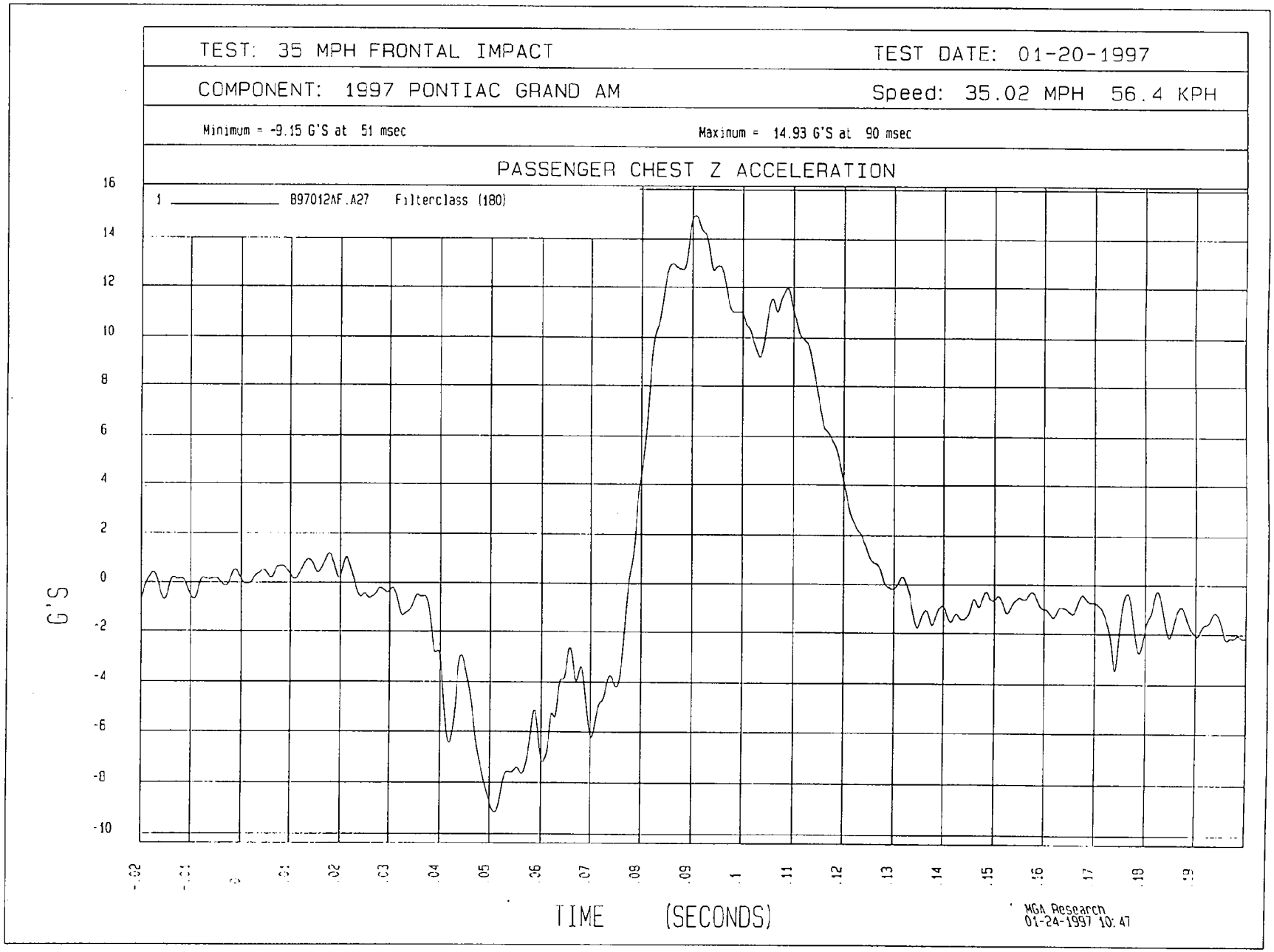

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -3.15 G'S at 105 msec
Maximum = 28.81 G'S at 68 msec
PASSENGER HEAD REDUNDANT Z ACCELERATION
1 B97012AF.A40 Filterclass (180)
G'S
TIME (SECONDS)
MGA Research
01-31-1997 10:4M

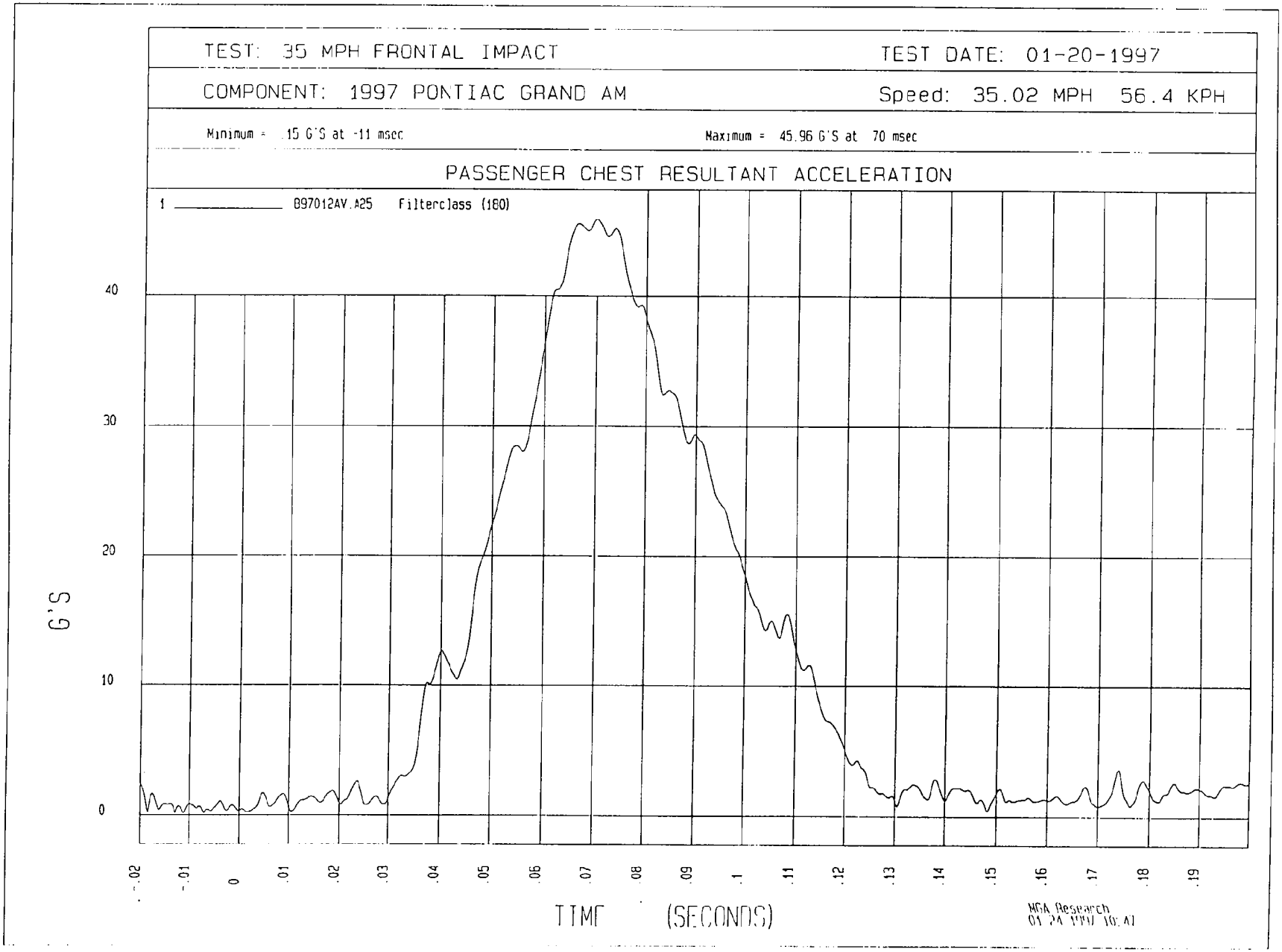

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 4.09E-02 G'S at -10 msec
Maximum = 63.82 G'S at 80 msec
PASSENGER HEAD REDUNDANT RESULTANT ACCELERATION
1 B97012AV.A38 Filterclass (1000)
G'S
60
50
40
30
20
10
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:52

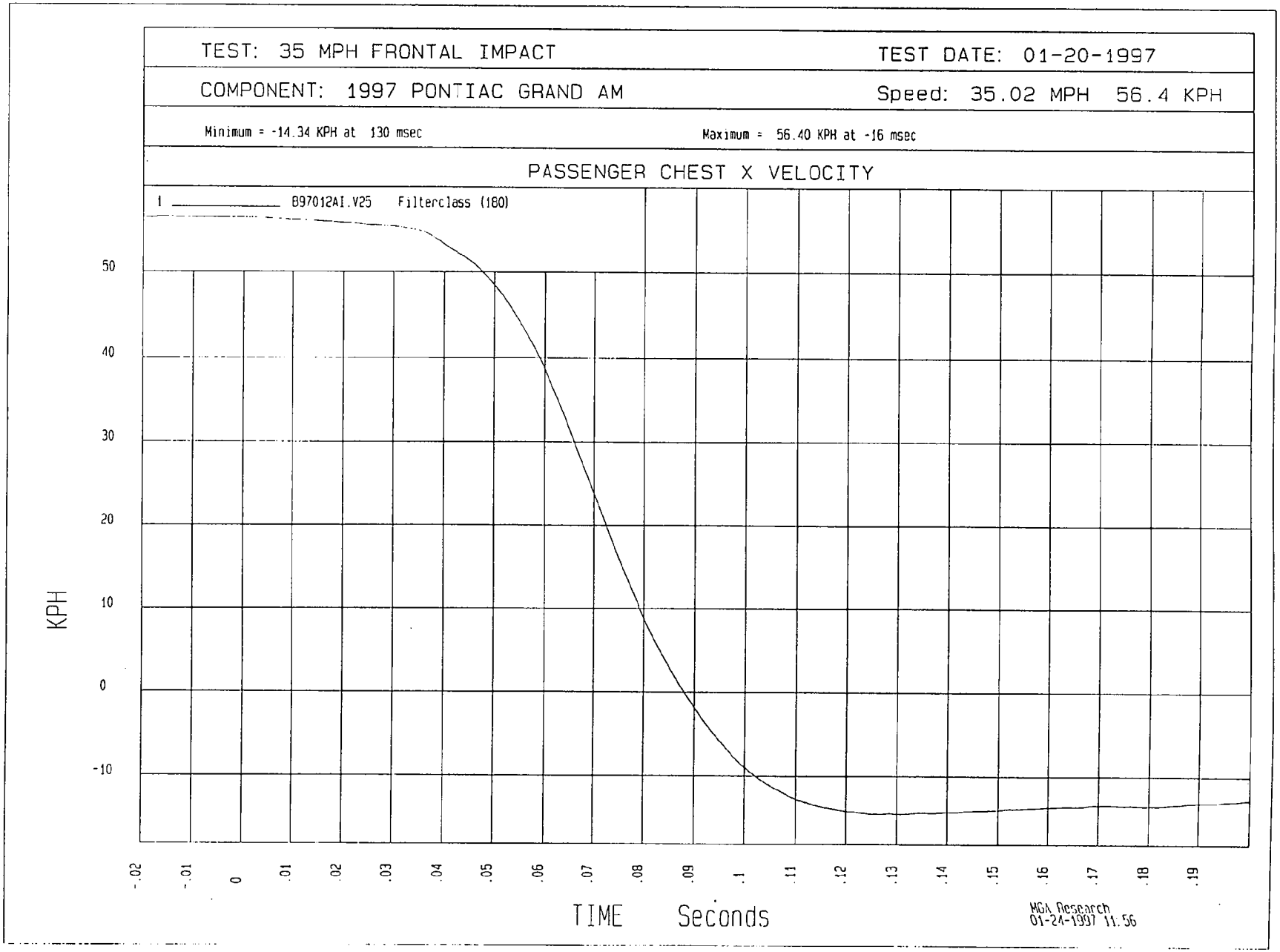

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -21.77 KPH at 184 msec
Maximum = 56.42 KPH at -18 msec
PASSENGER HEAD REDUNDANT X VELOCITY
1 B97012AI.V38 Filterclass (180)
KPH
60
50
40
30
20
10
0
-10
-20
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-24-1997 11:56

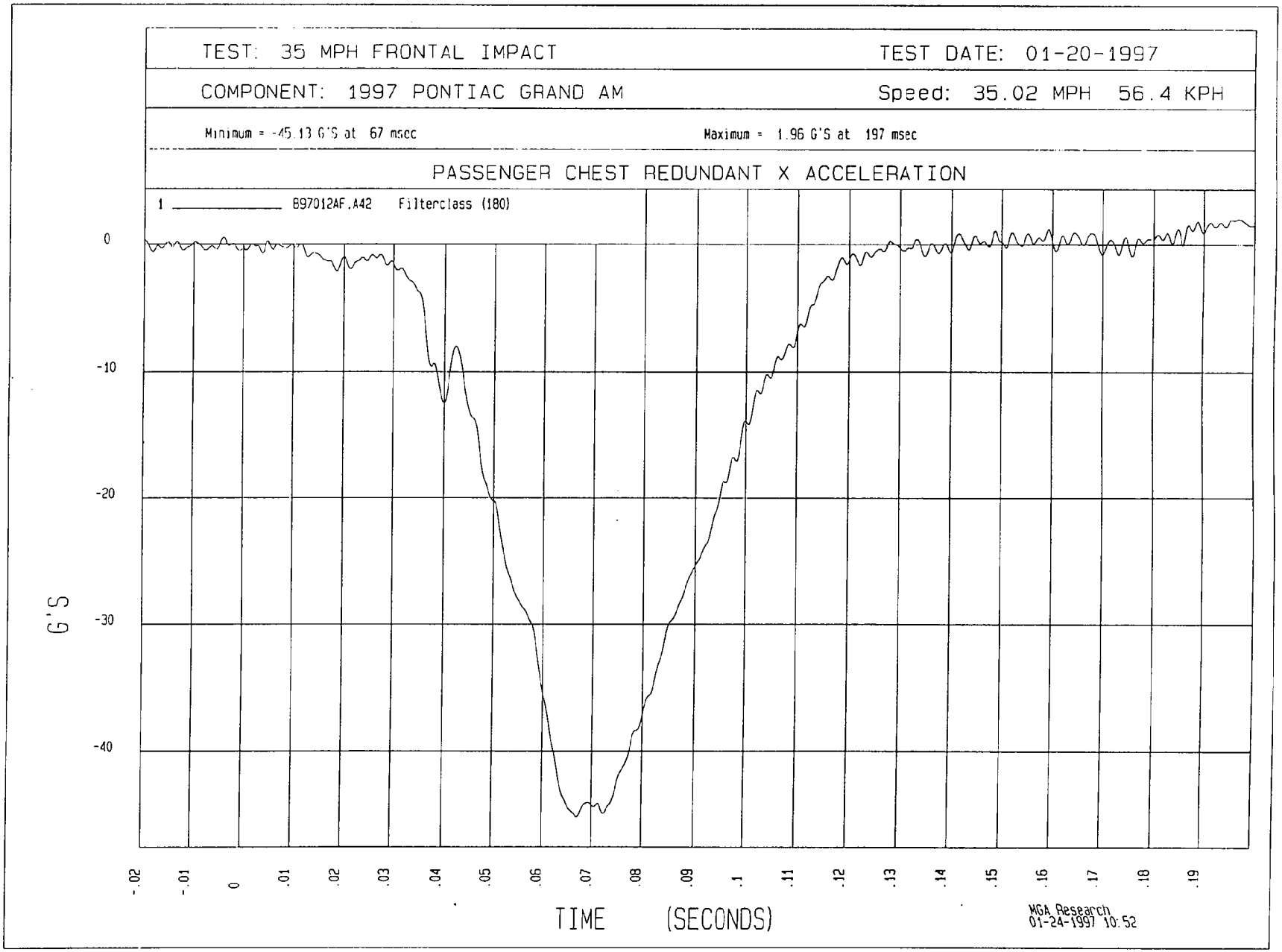

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 45.24 G'S at 66 msec
Maximum = 2.26 G'S at 167 msec
PASSENGER CHEST X ACCELERATION
1 B97012AF.A25 Filterclass (180)
0
-10
-20
-30
-40
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:47

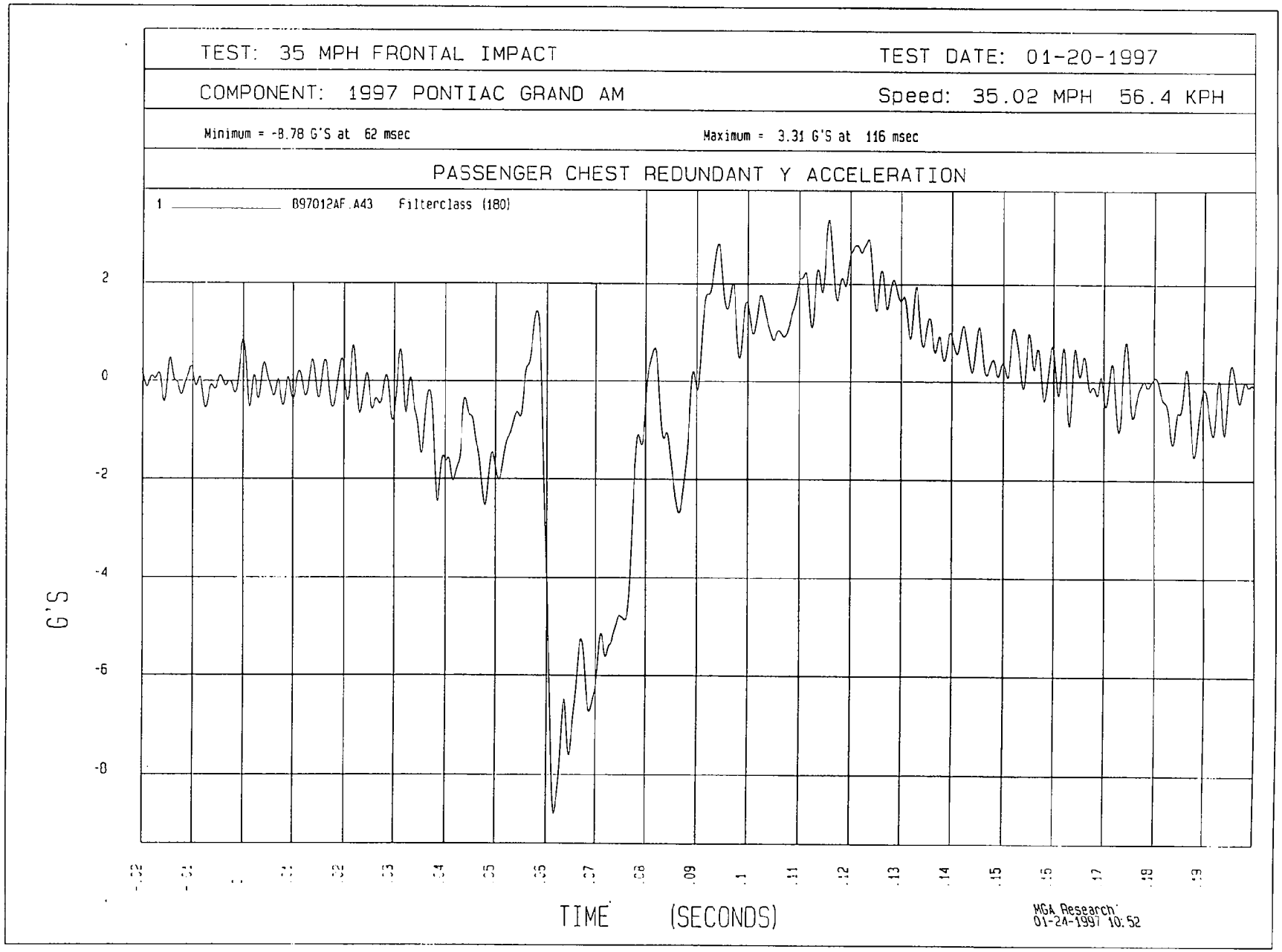

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -6.33 G'S at 61 msec
Maximum = 3.11 G'S at 98 msec
PASSENGER CHEST Y ACCELERATION
1 B97012AF.A26 Filterclass (180)
2
0
-2
-4
-6
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:47

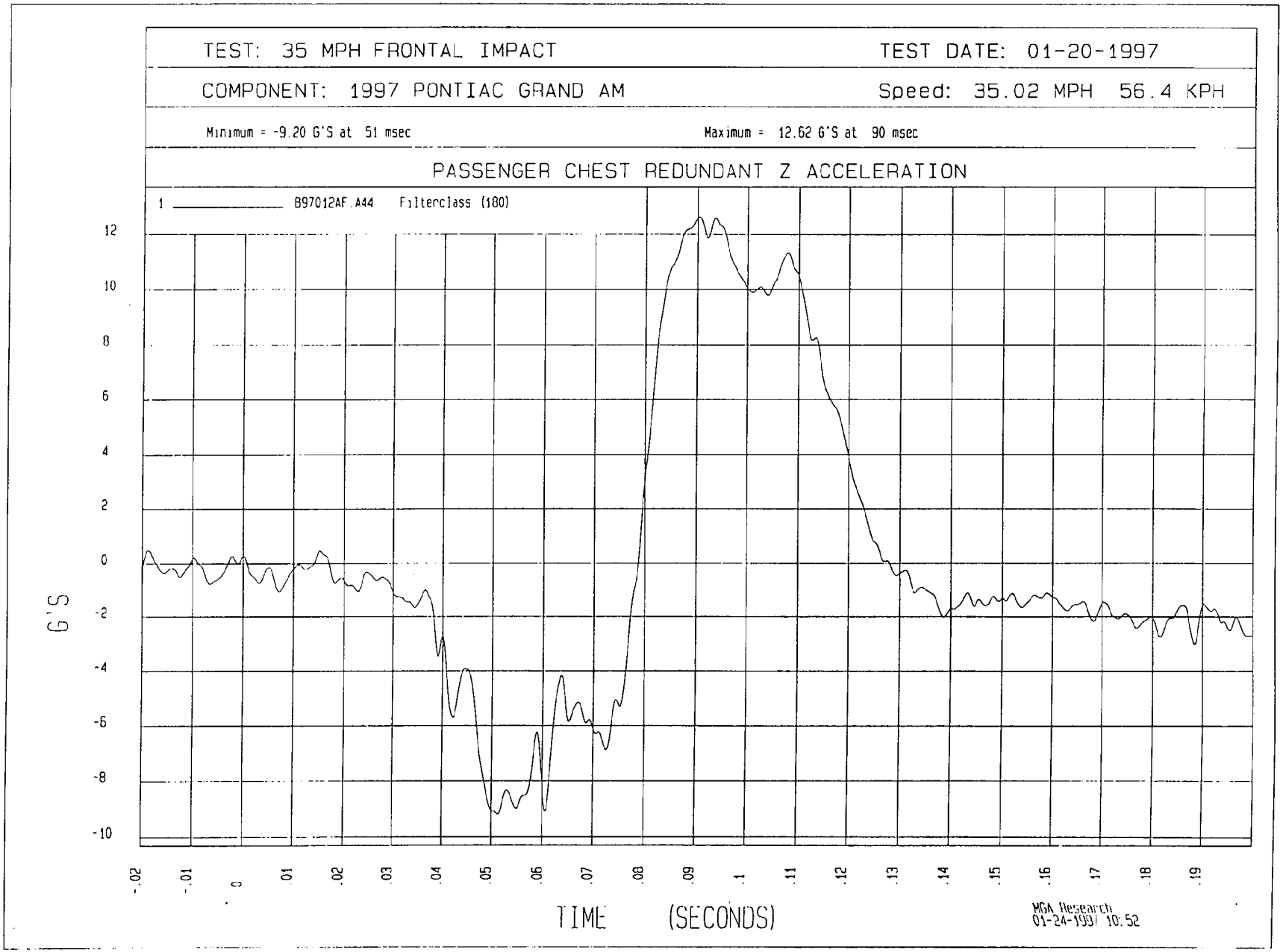

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -9.15 G'S at 51 msec
Maximum = 14.93 G'S at 90 msec
PASSENGER CHEST Z ACCELERATION
1 B97012AF.A27 Filterclass (180)
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
G'S
TIME (SECONDS)
MGA Research
01-24-1997 10:47

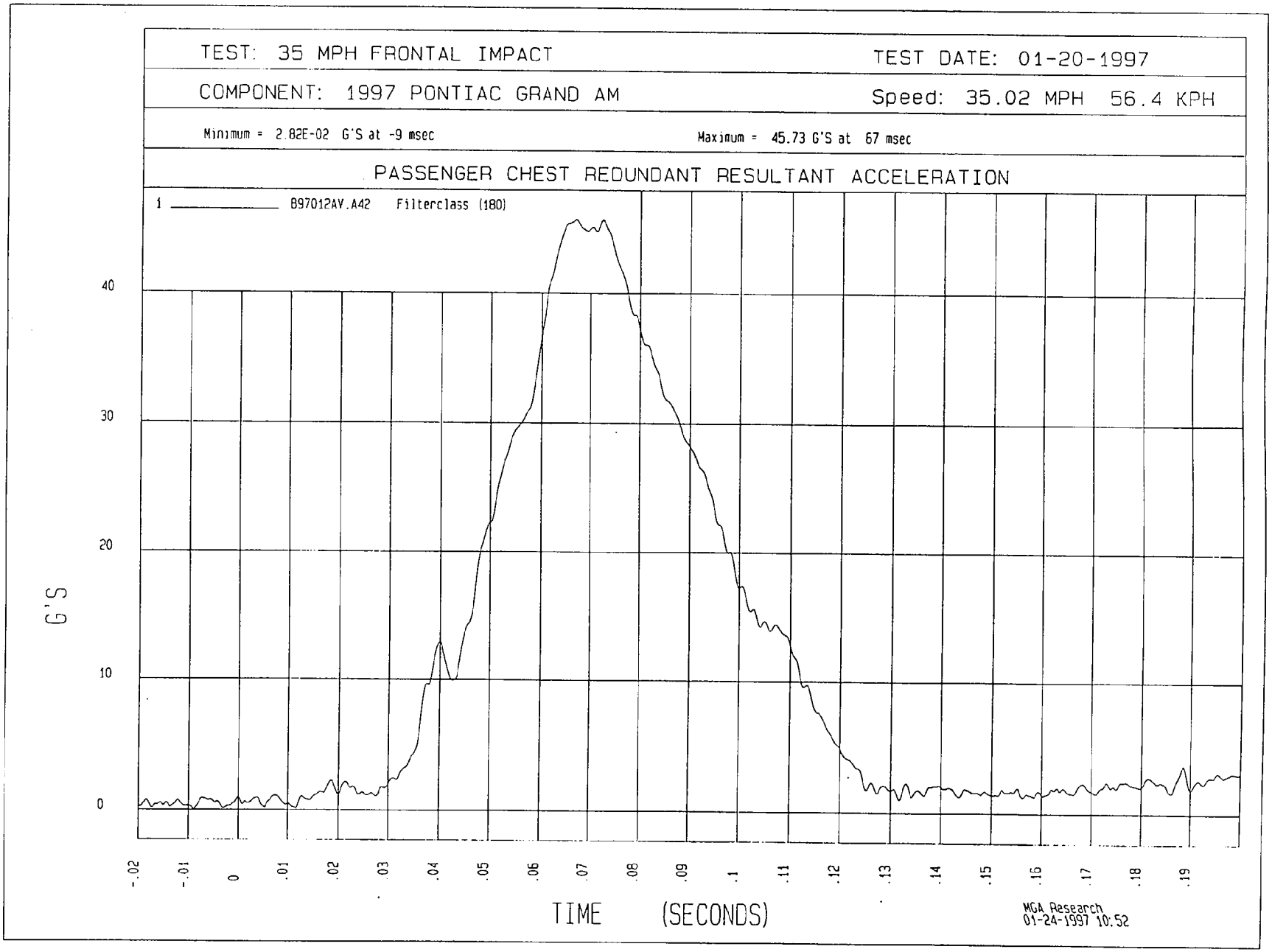

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = .15 G'S at -11 msec
Maximum = 45.96 G'S at 70 msec
PASSENGER CHEST RESULTANT ACCELERATION
1 B97012AV.A25 Filterclass (180)
G'S
40
30
20
10
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research

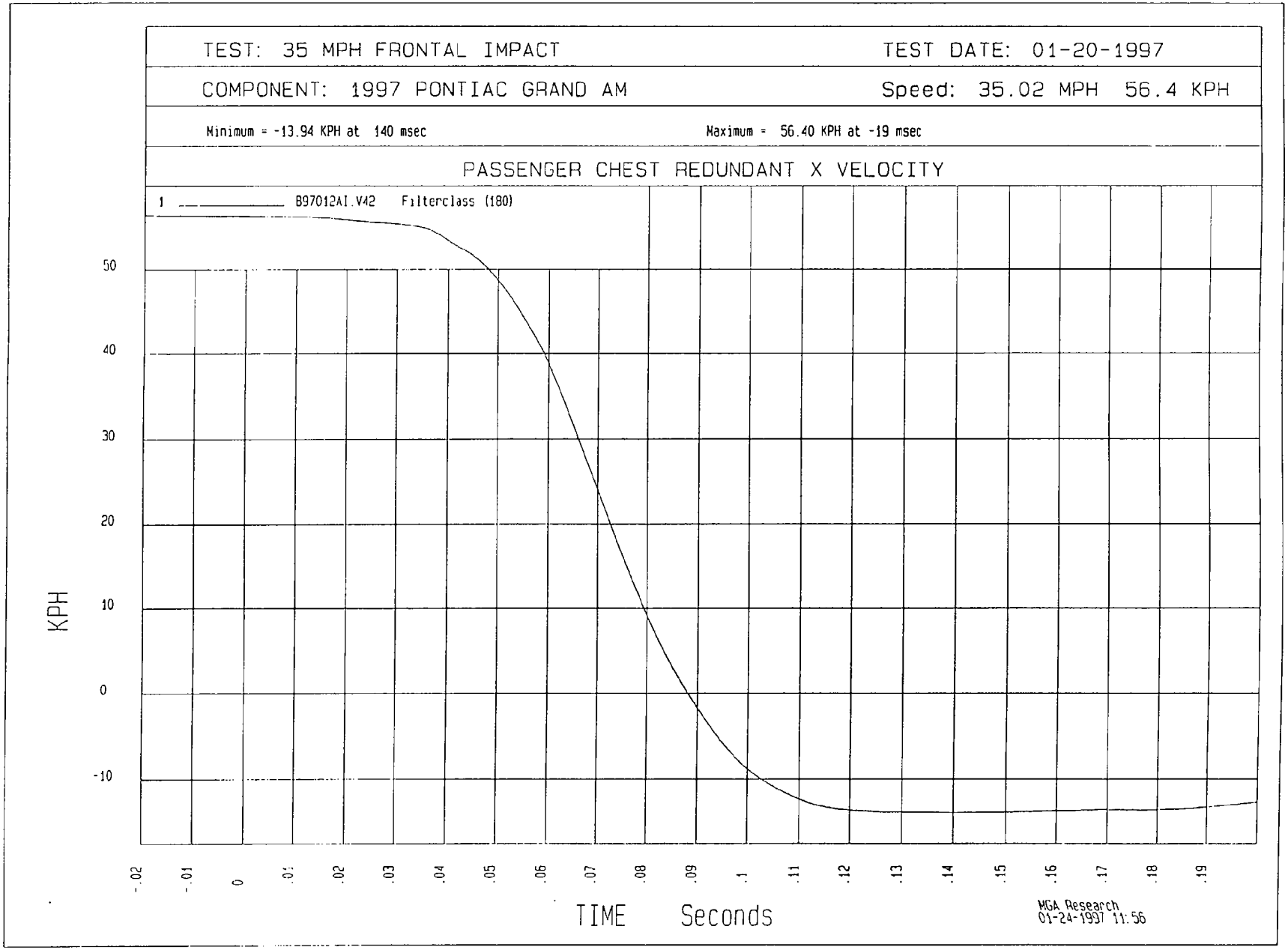

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -14.34 KPH at 130 msec
Maximum = 56.40 KPH at -16 msec
PASSENGER CHEST X VELOCITY
1 B97012AI.V25 Filterclass (180)
KPH
50
40
30
20
10
0
-10
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-24-1997 11:56


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -45.13 G'S at 67 msec
Maximum = 1.96 G'S at 197 msec
PASSENGER CHEST REDUNDANT X ACCELERATION
1 B97012AF.A42 Filterclass (180)
0
-10
-20
-30
-40
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:52


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -8.78 G'S at 62 msec
Maximum = 3.31 G'S at 116 msec
PASSENGER CHEST REDUNDANT Y ACCELERATION
1 B97012AF.A43 Filterclass (180)
2
0
-2
-4
-6
-8
G'S
TIME (SECONDS)
MGA Research
01-24-1997 10:52


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -9.20 G'S at 51 msec
Maximum = 12.62 G'S at 90 msec
PASSENGER CHEST REDUNDANT Z ACCELERATION
1 B97012AF.A44 Filterclass (180)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:52


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 2.82E-02 G'S at -9 msec
Maximum = 45.73 G'S at 67 msec
PASSENGER CHEST REDUNDANT RESULTANT ACCELERATION
1 B97012AV.A42 Filterclass (180)
G'S
40
30
20
10
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:52


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -13.94 KPH at 140 msec
Maximum = 56.40 KPH at -19 msec
PASSENGER CHEST REDUNDANT X VELOCITY
1 B97012A1.V42 Filterclass (180)
KPH
50
40
30
20
10
0
-10
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
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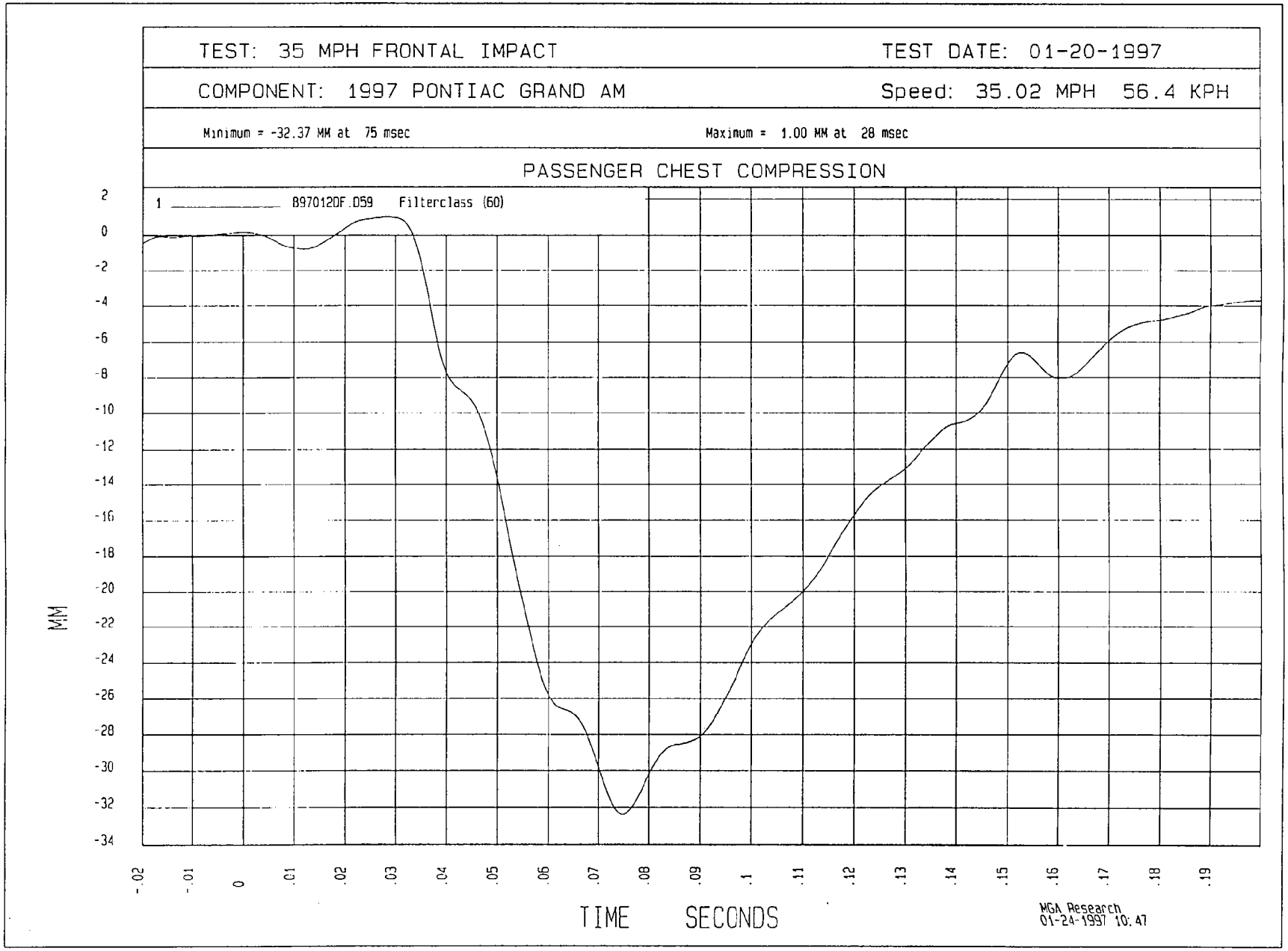
.17
.18
.19
TIME Seconds
MGA Research
01-24-1997 11:56


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -32.37 MM at 75 msec
Maximum = 1.00 MM at 28 msec
PASSENGER CHEST COMPRESSION
1 B970120F.059 Filterclass (60)
MM
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-.02
-.01
0
.01
.02
.03
.04
.05
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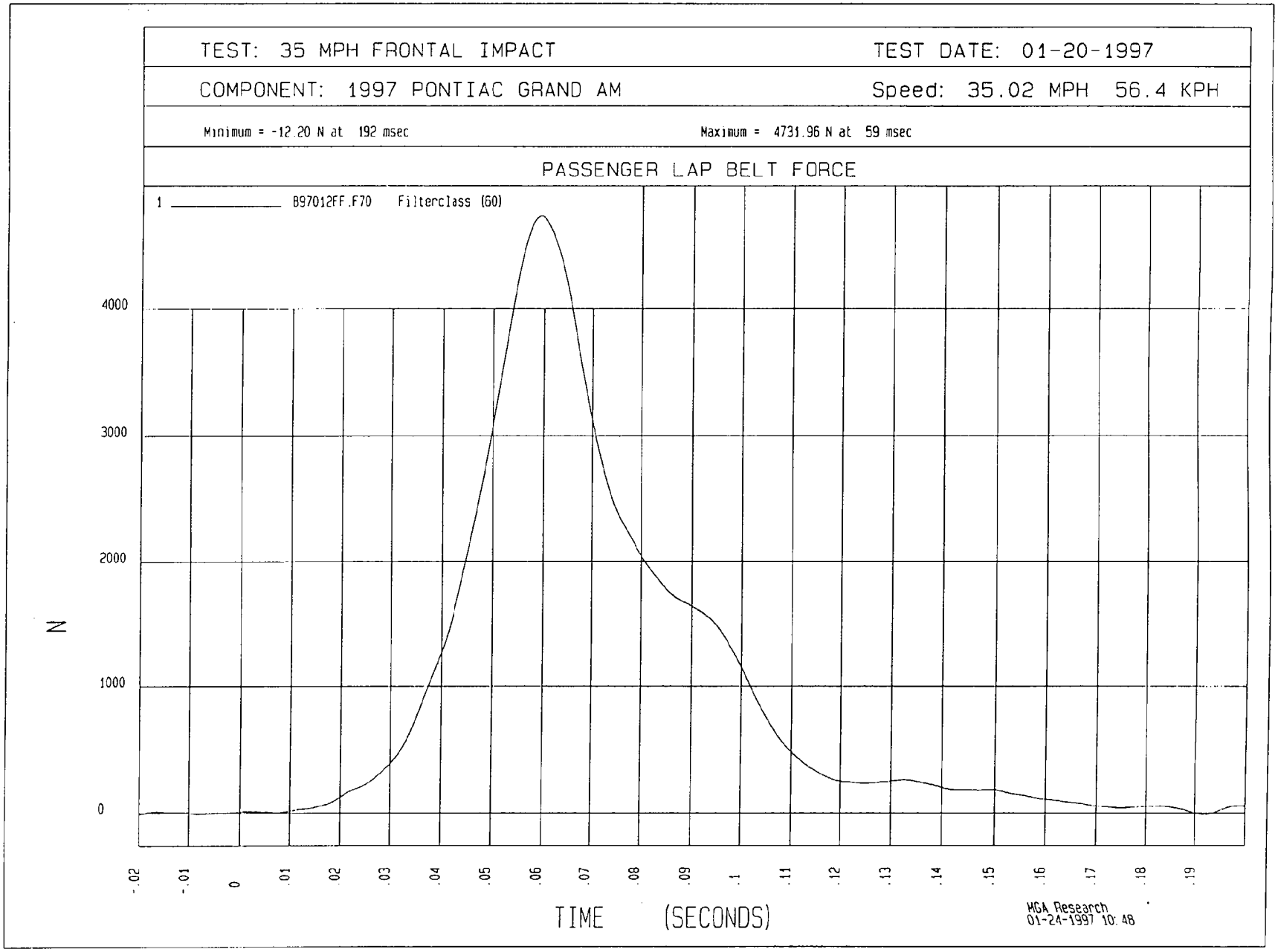
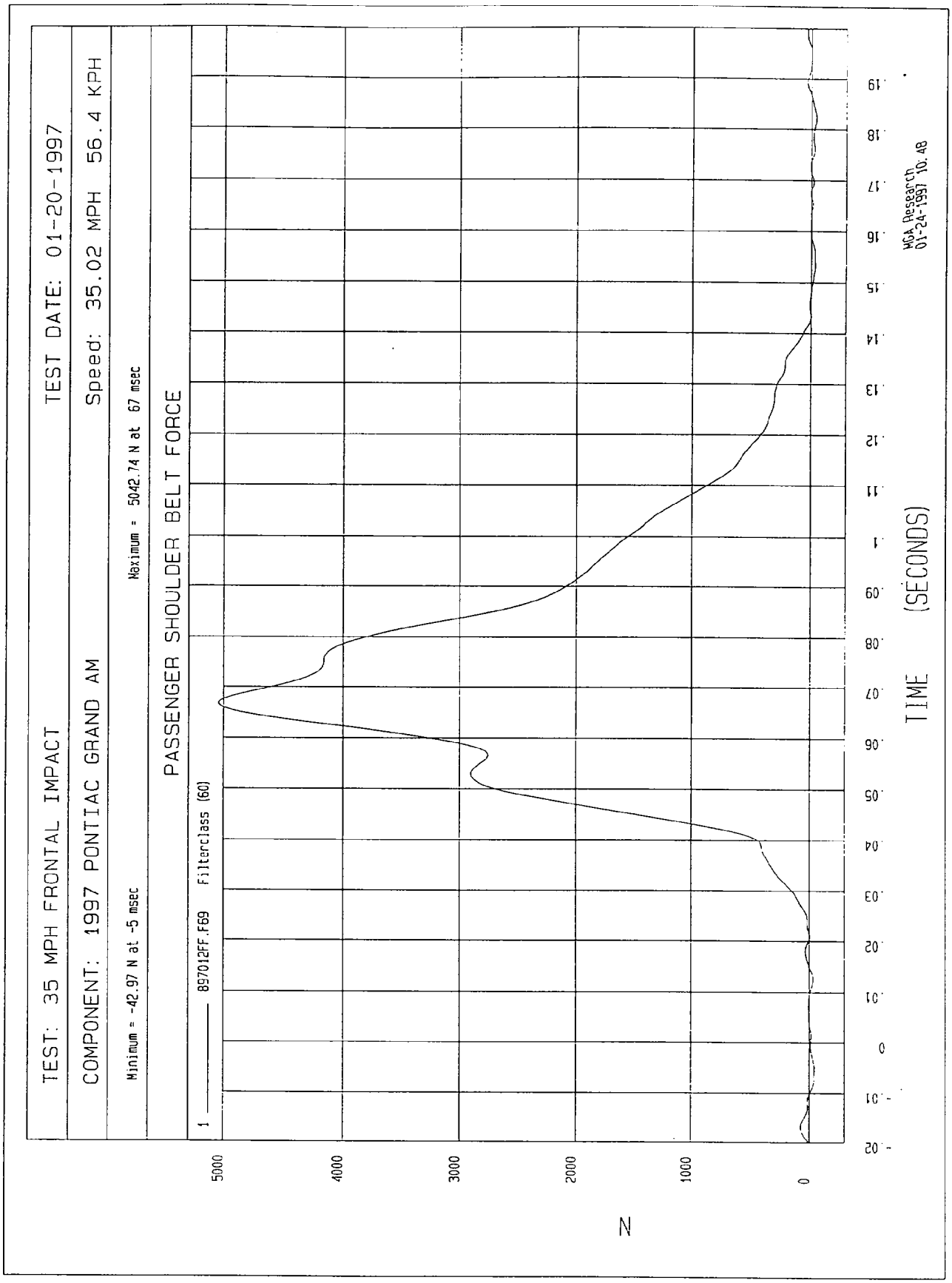
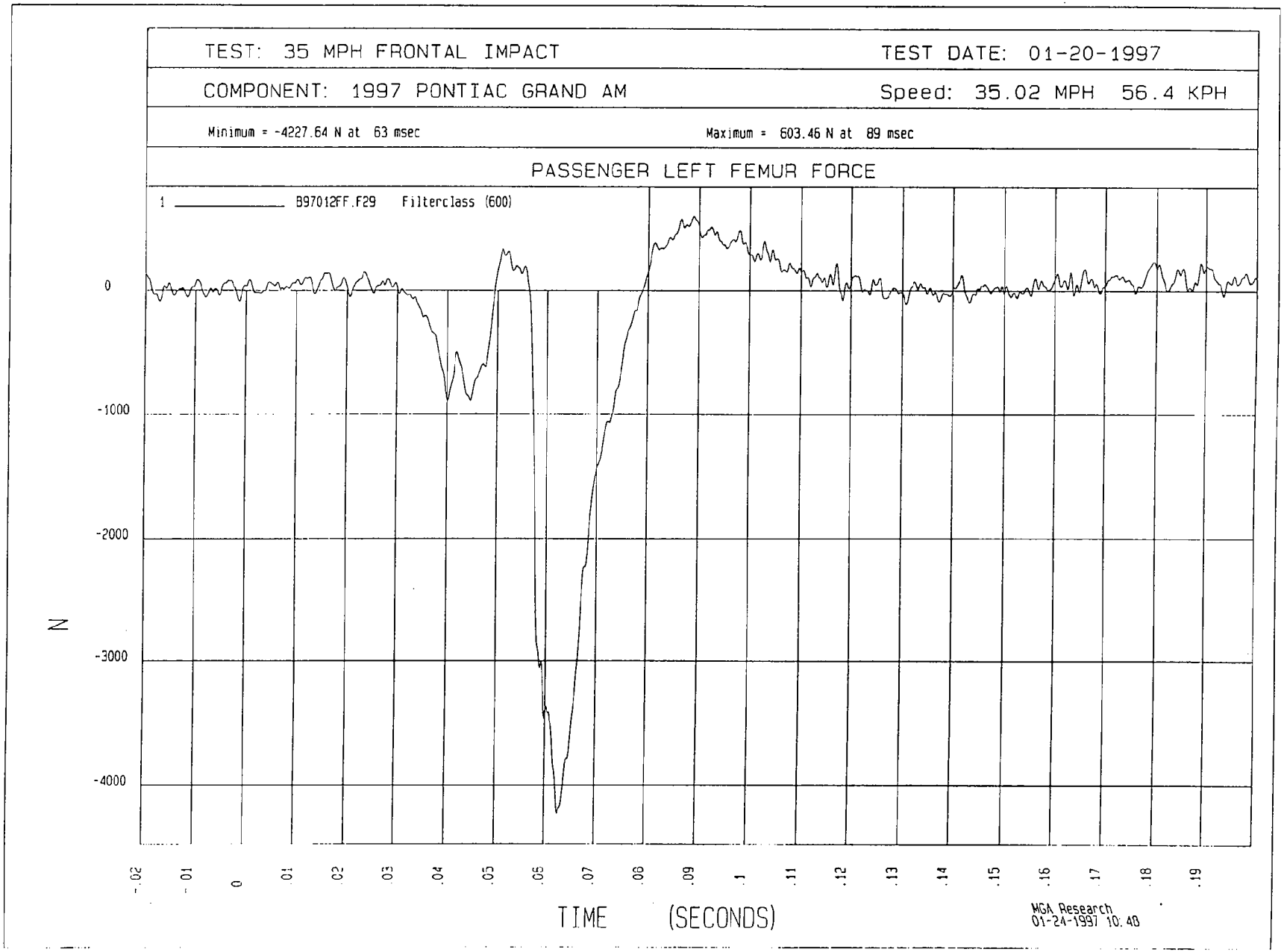
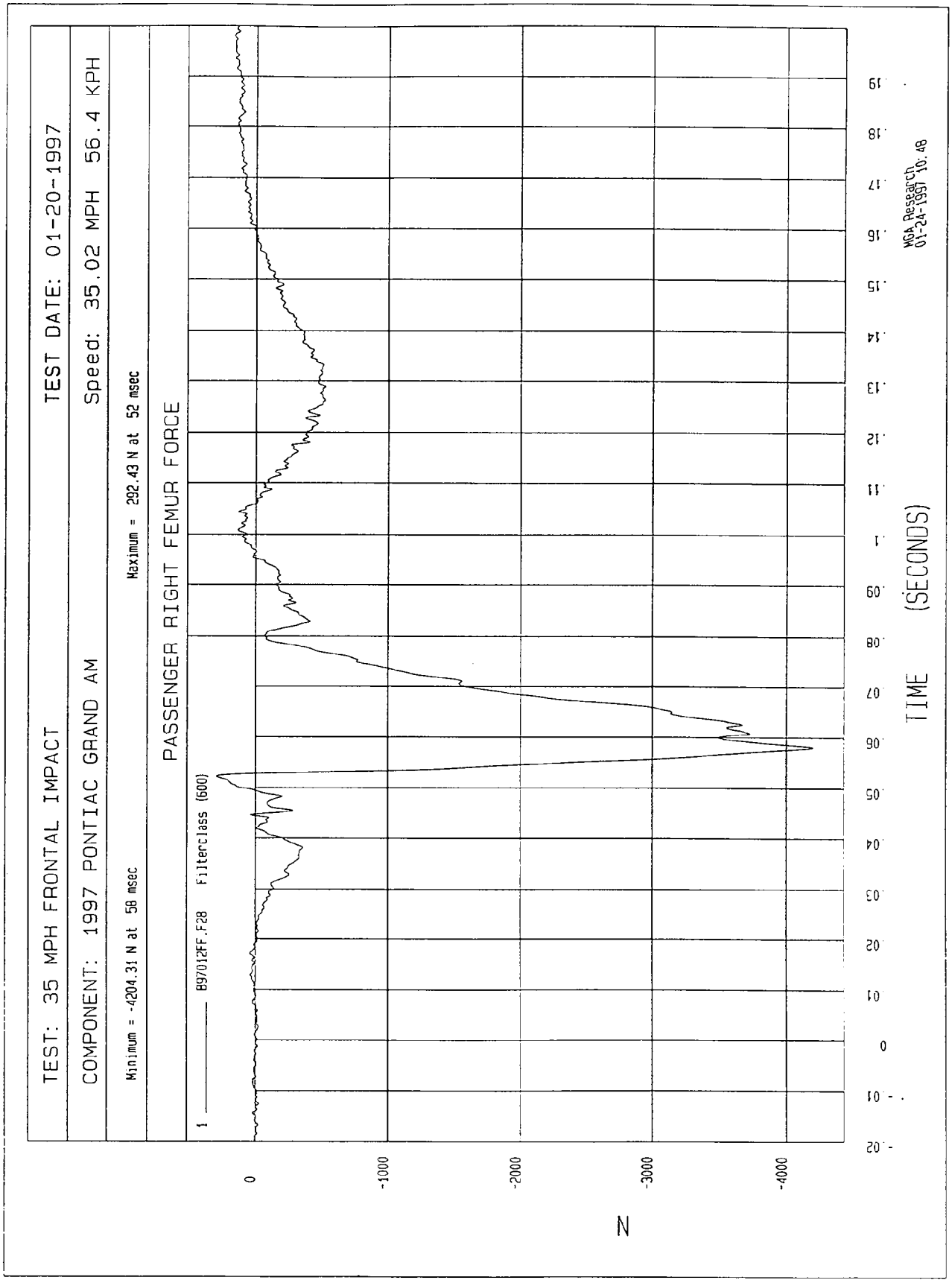
TIME SECONDS
MGA Research
01-24-1997 10:47


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -12.20 N at 192 msec
Maximum = 4731.96 N at 59 msec
PASSENGER LAP BELT FORCE
1 B97012FF.F70 Filterclass (60)
4000
3000
2000
1000
0
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:48


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -42.97 N at -5 msec
Maximum = 5042.74 N at 67 msec
PASSENGER SHOULDER BELT FORCE
1 897012FF.F69 Filterclass (60)
5000
4000
3000
2000
1000
0
N
TIME (SECONDS)
MGA Research
01-24-1997 10:48


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -4227.64 N at 63 msec
Maximum = 603.46 N at 89 msec
PASSENGER LEFT FEMUR FORCE
1 B97012FF.F29 Filterclass (600)
0
-1000
-2000
-3000
-4000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:40


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -4204.31 N at 58 msec
Maximum = 292.43 N at 52 msec
PASSENGER RIGHT FEMUR FORCE
1 ——— 897012FF.F28 Filterclass (600)
0
-1000
-2000
-3000
-4000
N
TIME (SECONDS)
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
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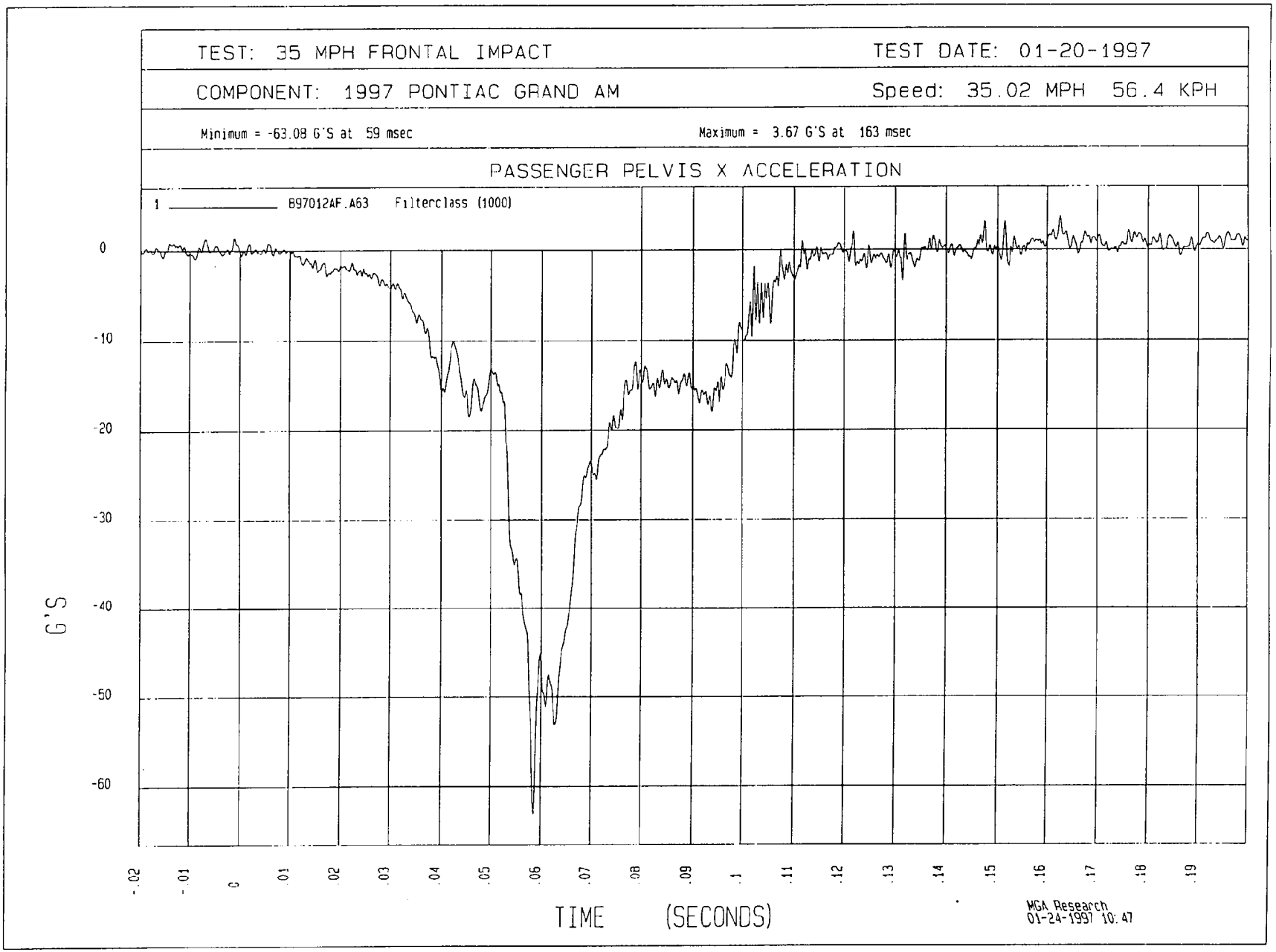
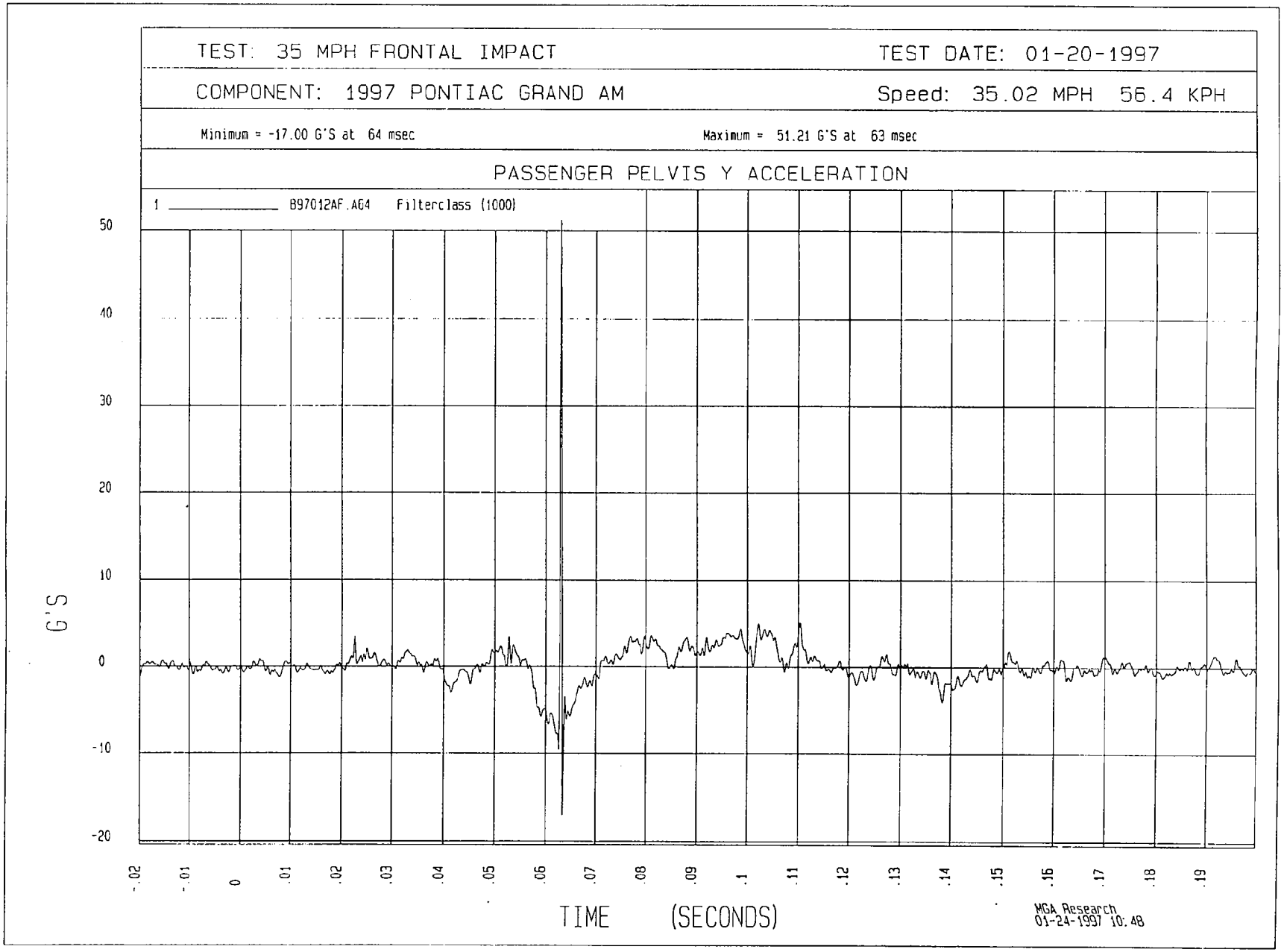
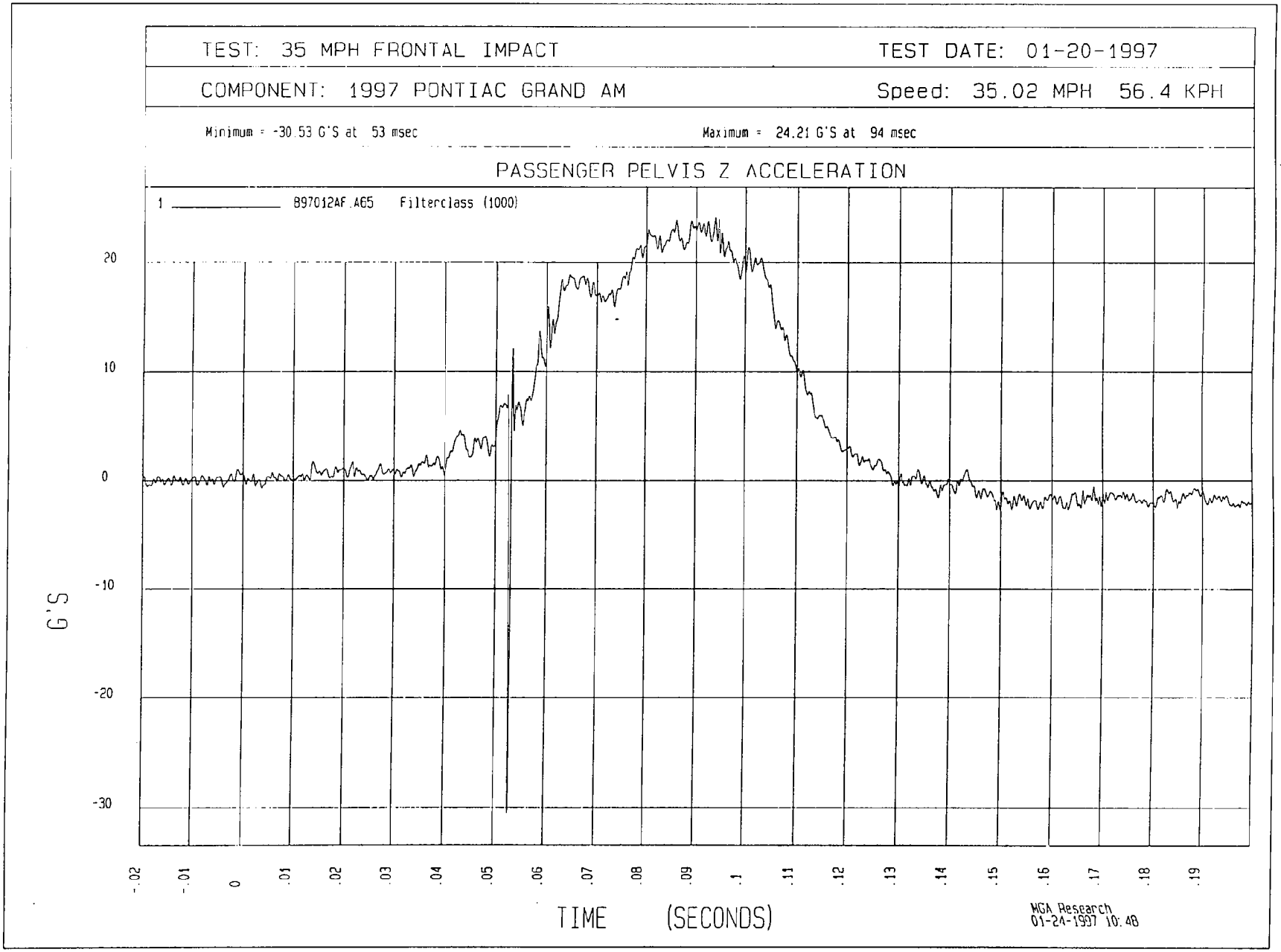
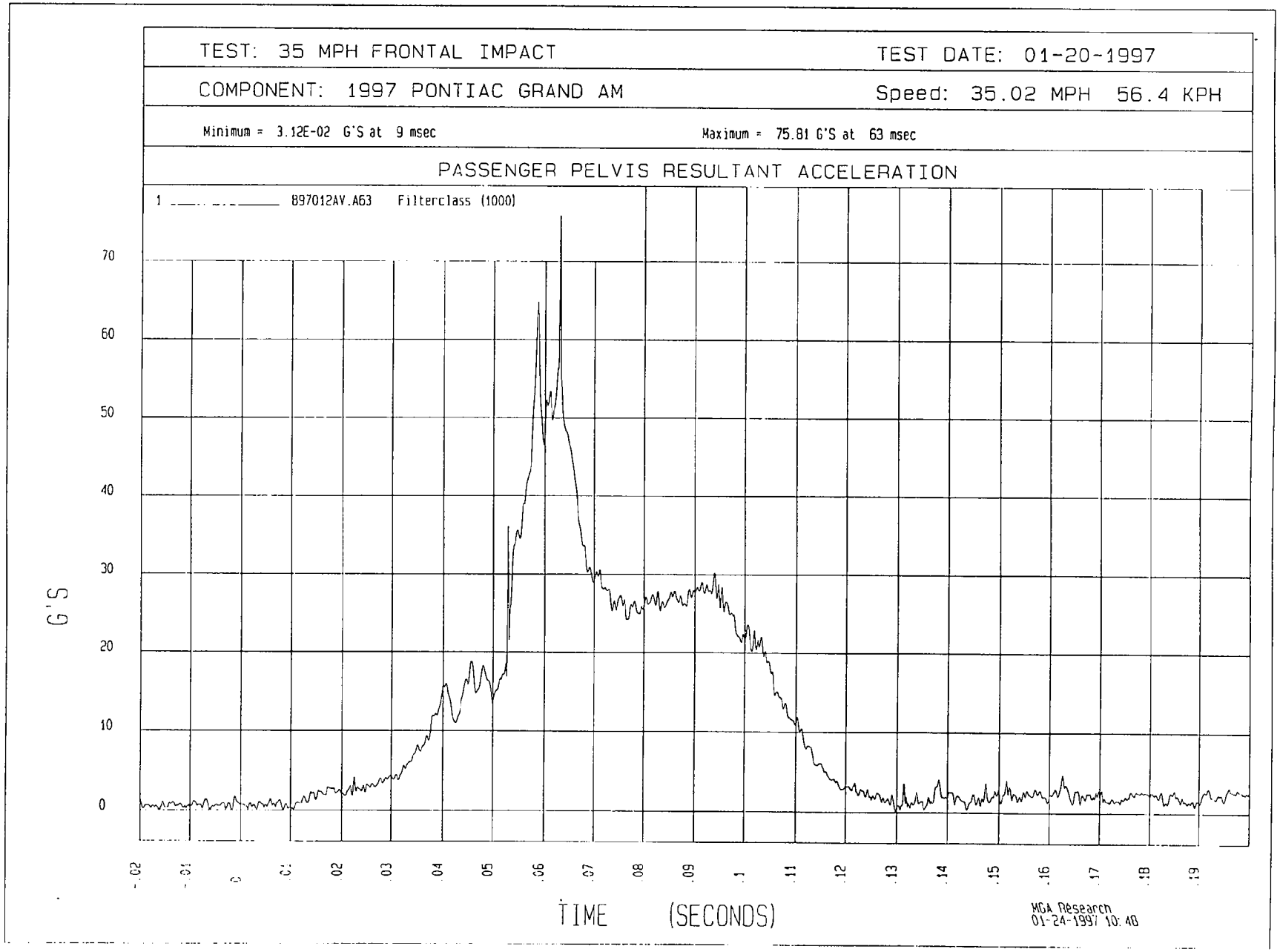
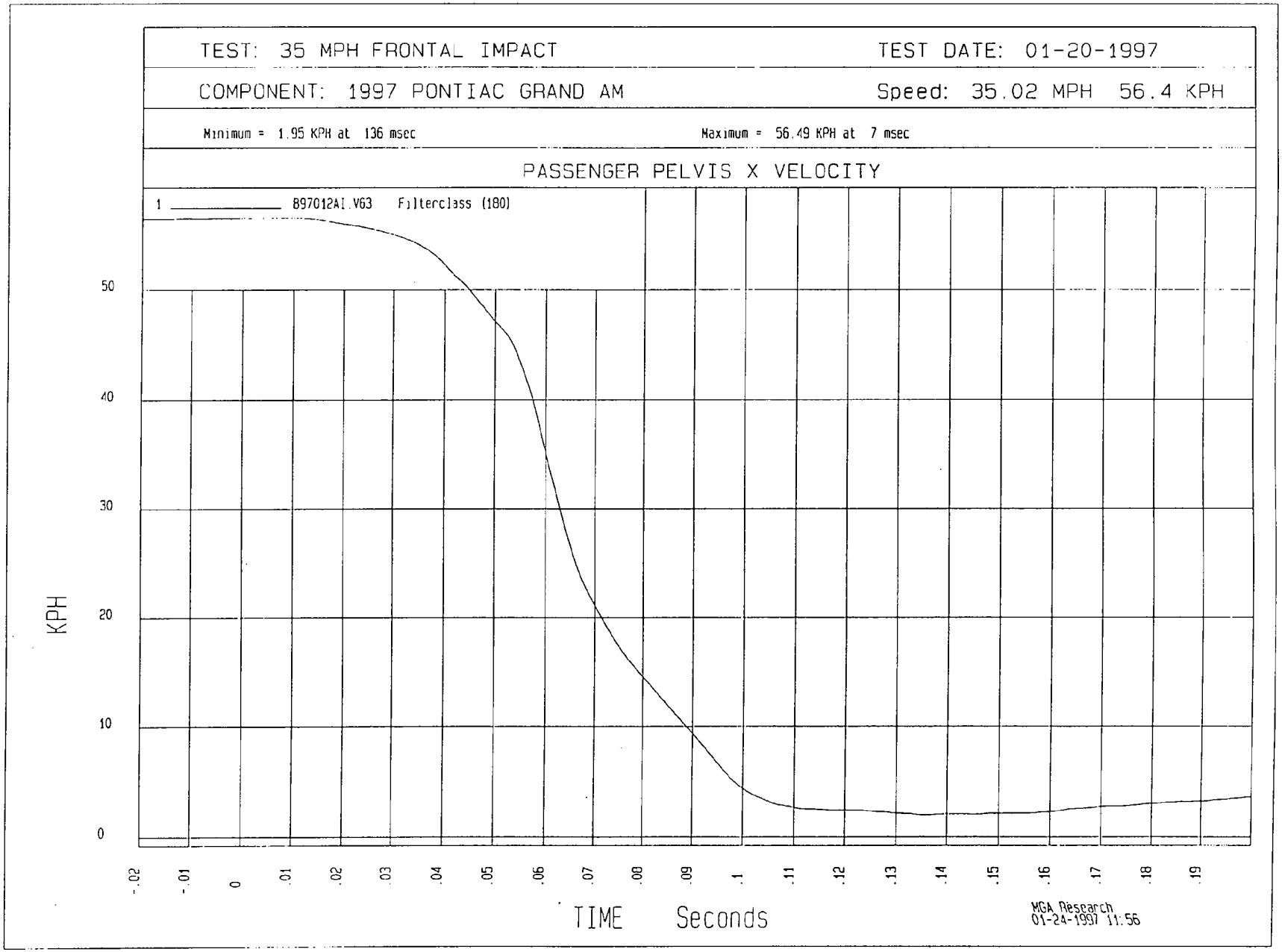
MGA Research
01-24-1997 10:48

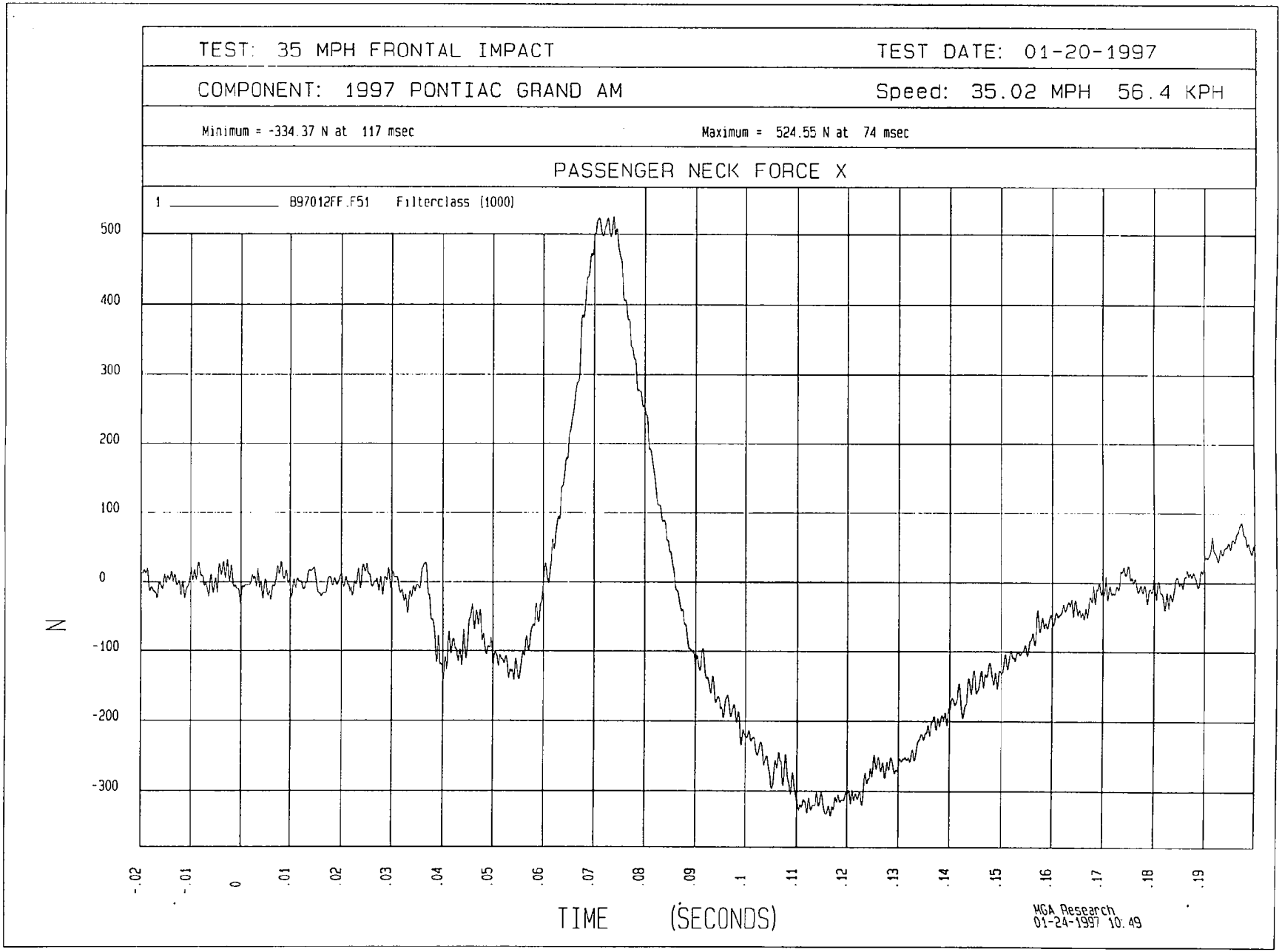

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -63.08 G'S at 59 msec
Maximum = 3.67 G'S at 163 msec
PASSENGER PELVIS X ACCELERATION
1 B97012AF.A63 Filterclass (1000)
0
-10
-20
-30
-40
-50
-60
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:47

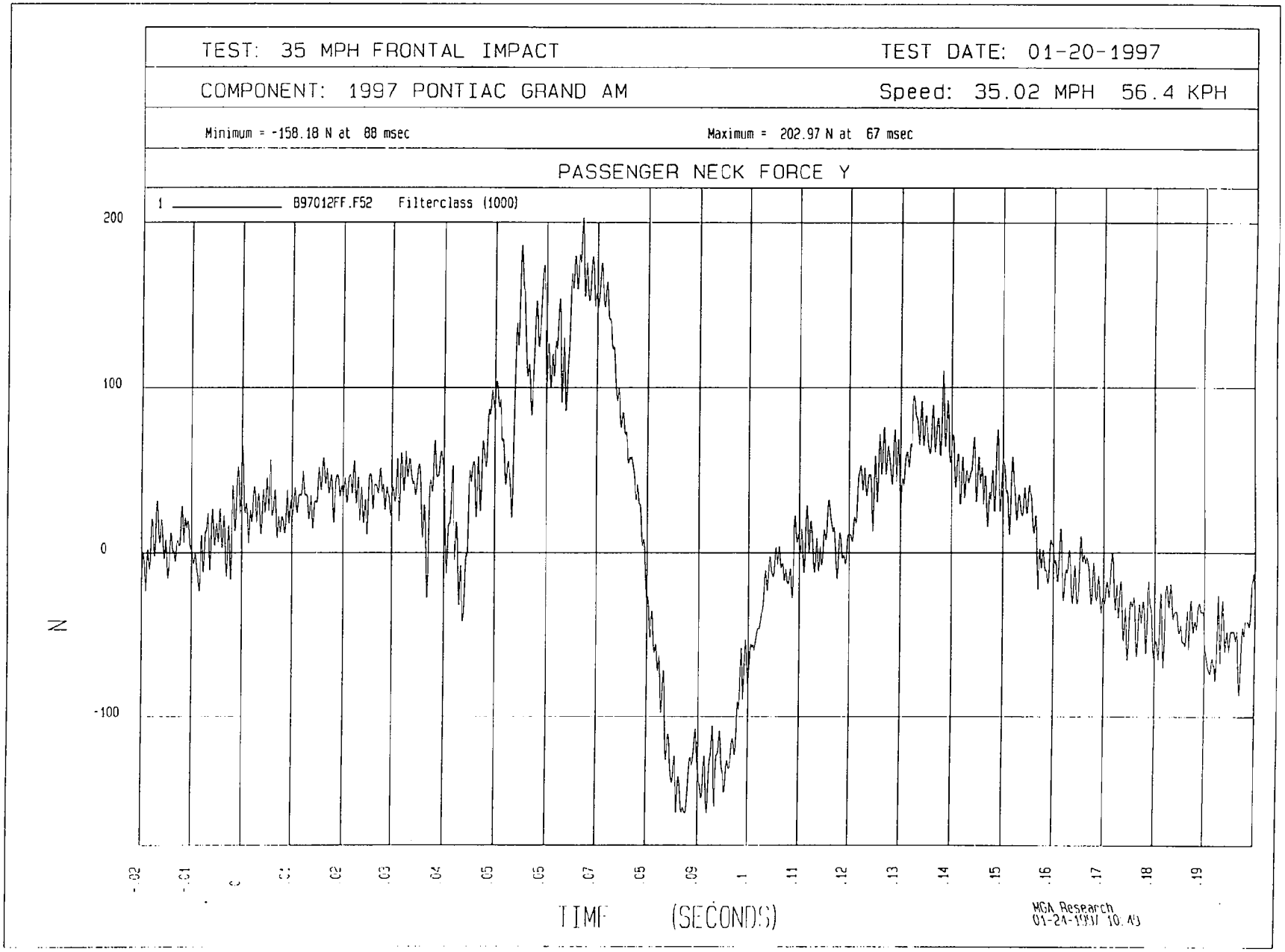

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -17.00 G'S at 64 msec
Maximum = 51.21 G'S at 63 msec
PASSENGER PELVIS Y ACCELERATION
1 B97012AF.AG4 Filterclass (1000)
50
40
30
20
10
0
-10
-20
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:48

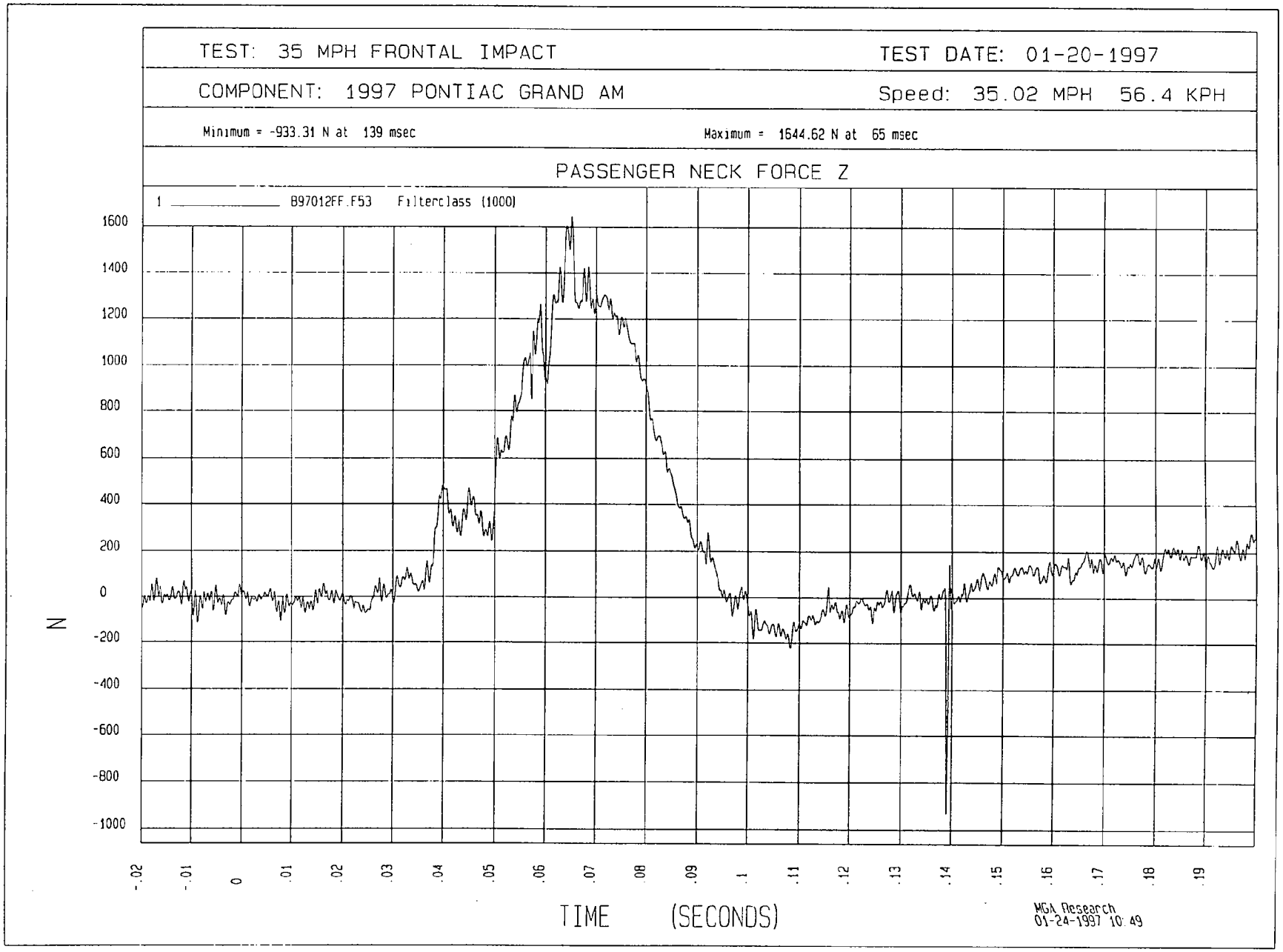

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -30.53 G'S at 53 msec
Maximum = 24.21 G'S at 94 msec
PASSENGER PELVIS Z ACCELERATION
1 897012AF.A65 Filterclass (1000)
20
10
0
-10
-20
-30
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:48

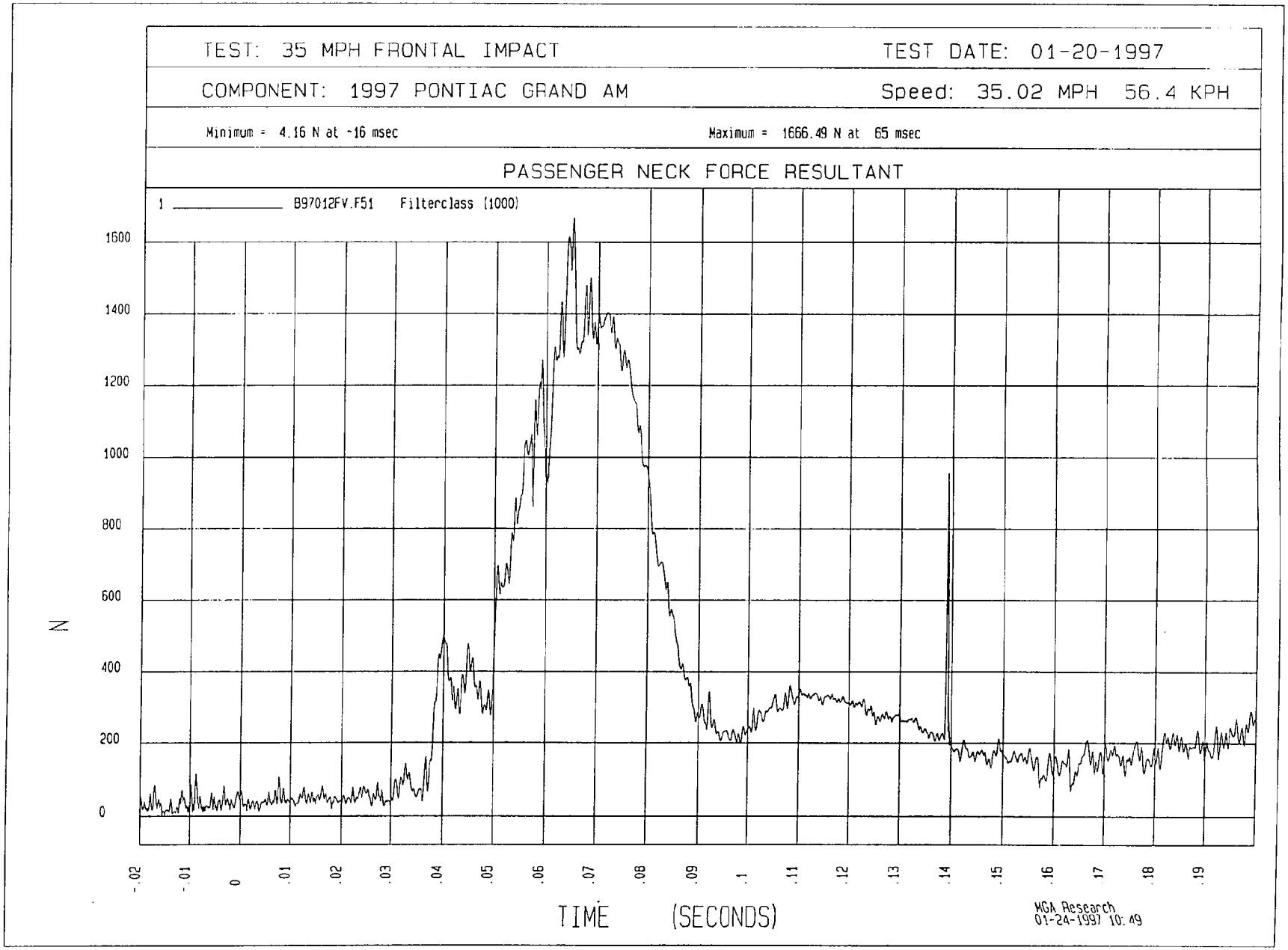

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 3.12E-02 G'S at 9 msec
Maximum = 75.81 G'S at 63 msec
PASSENGER PELVIS RESULTANT ACCELERATION
1 897012AV.A63 Filterclass (1000)
G'S
70
60
50
40
30
20
10
0
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:40

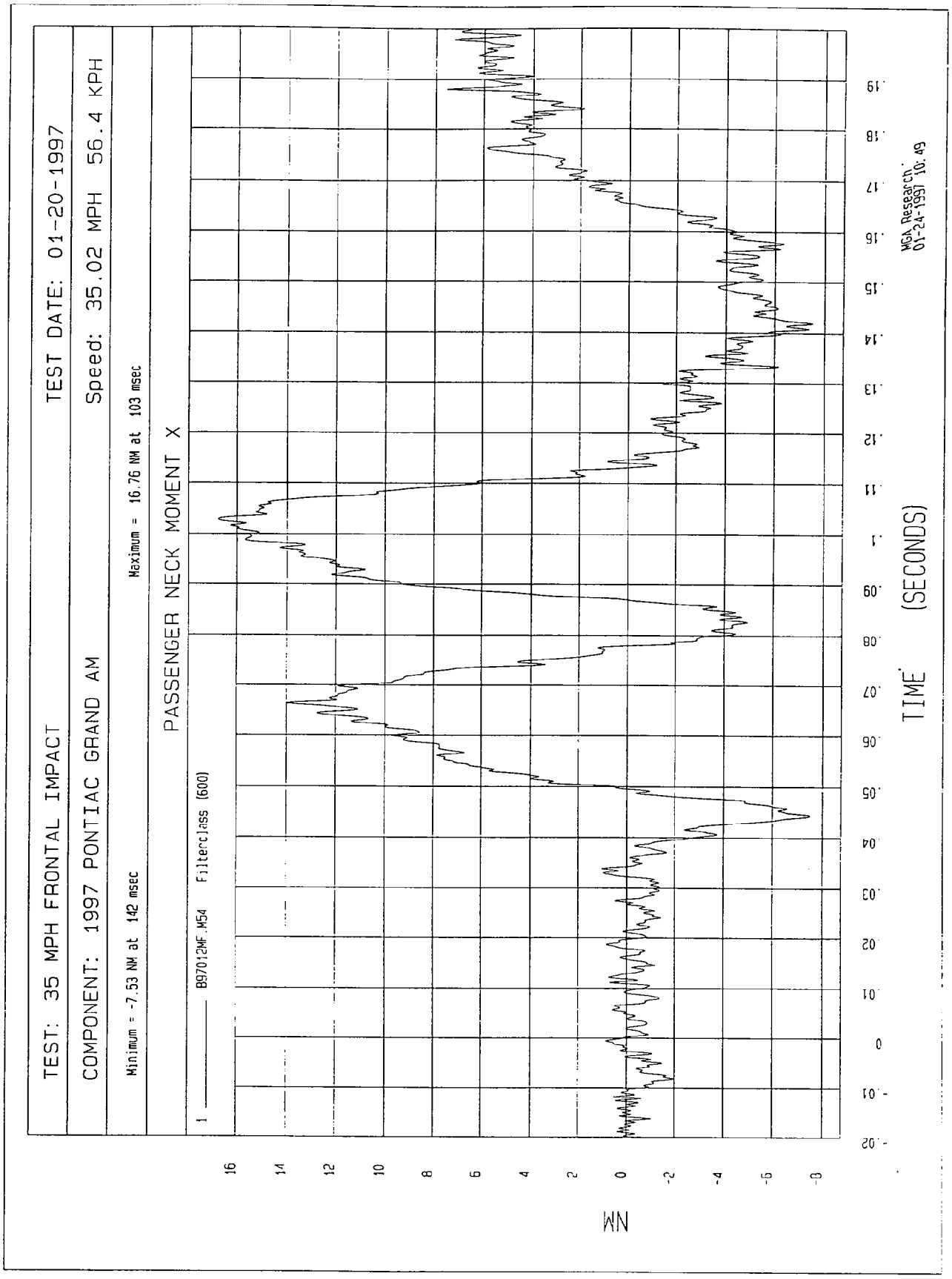

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 1.95 KPH at 136 msec
Maximum = 56.49 KPH at 7 msec
PASSENGER PELVIS X VELOCITY
1 _____ 897012AI.V63 Filterclass (180)
KPH
50
40
30
20
10
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME Seconds
MGA Research
01-24-1997 11:56

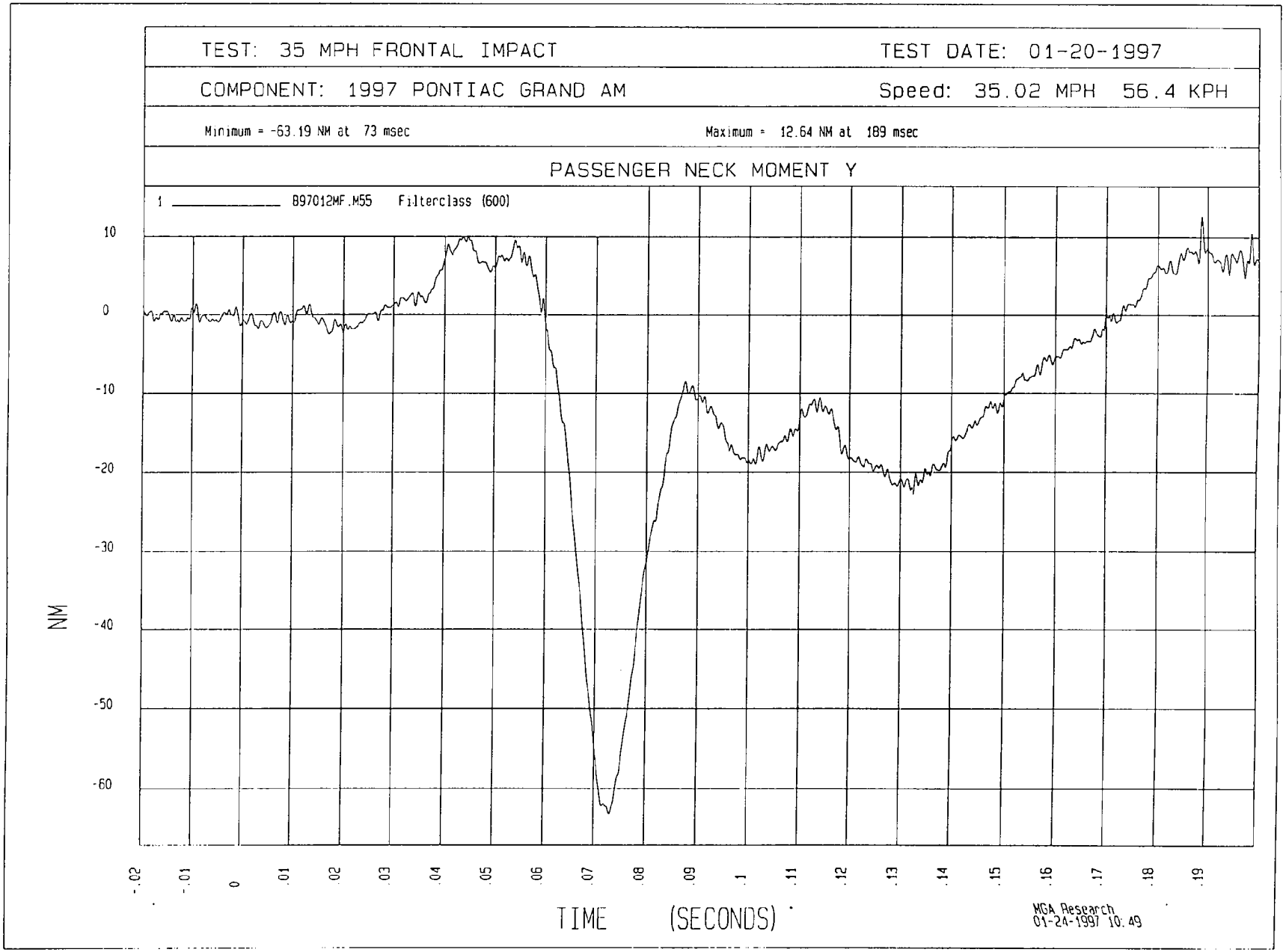

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -334.37 N at 117 msec
Maximum = 524.55 N at 74 msec
PASSENGER NECK FORCE X
1 B97012FF.F51 Filterclass (1000)
500
400
300
200
100
0
-100
-200
-300
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:49

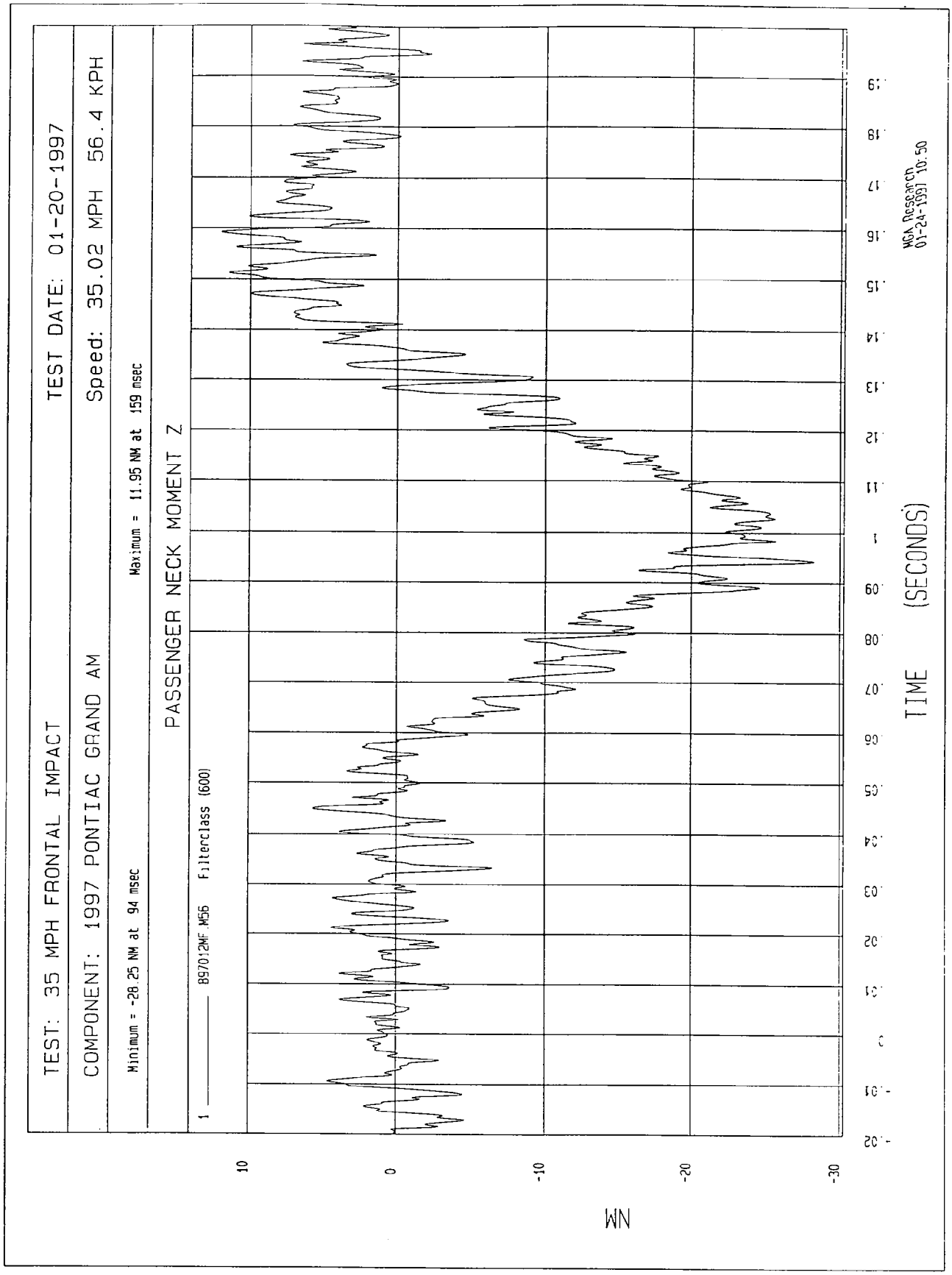

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -158.18 N at 88 msec
Maximum = 202.97 N at 67 msec
PASSENGER NECK FORCE Y
1 B97012FF.F52 Filterclass (1000)
200
100
0
-100
N
TIME (SECONDS)
MGA Research
01-22-1997 10:43


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -933.31 N at 139 msec
Maximum = 1644.62 N at 65 msec
PASSENGER NECK FORCE Z
1 B97012FF.F53 Filterclass (1000)
1600
1400
1200
1000
800
600
400
200
0
-200
-400
-600
-800
-1000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:49


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = 4.16 N at -16 msec
Maximum = 1666.49 N at 65 msec
PASSENGER NECK FORCE RESULTANT
1 B97012FV.F51 Filterclass (1000)
1600
1400
1200
1000
800
600
400
200
0
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:49


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -7.53 NM at 142 msec
Maximum = 16.76 NM at 103 msec
PASSENGER NECK MOMENT X
1 B97012MF.M54 Filterclass (600)
NM
TIME (SECONDS)
MGA Research
01-24-1997 10:49


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -63.19 NM at 73 msec
Maximum = 12.64 NM at 189 msec
PASSENGER NECK MOMENT Y
1 B97012MF.M55 Filterclass (600)
10
0
-10
-20
-30
-40
-50
-60
NM
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:49


TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -28.25 NM at 94 msec
Maximum = 11.95 NM at 159 msec
PASSENGER NECK MOMENT Z
1 B97012MF.M66 Filterclass (600)
NM
10
0
-10
-20
-30
TIME (SECONDS)
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
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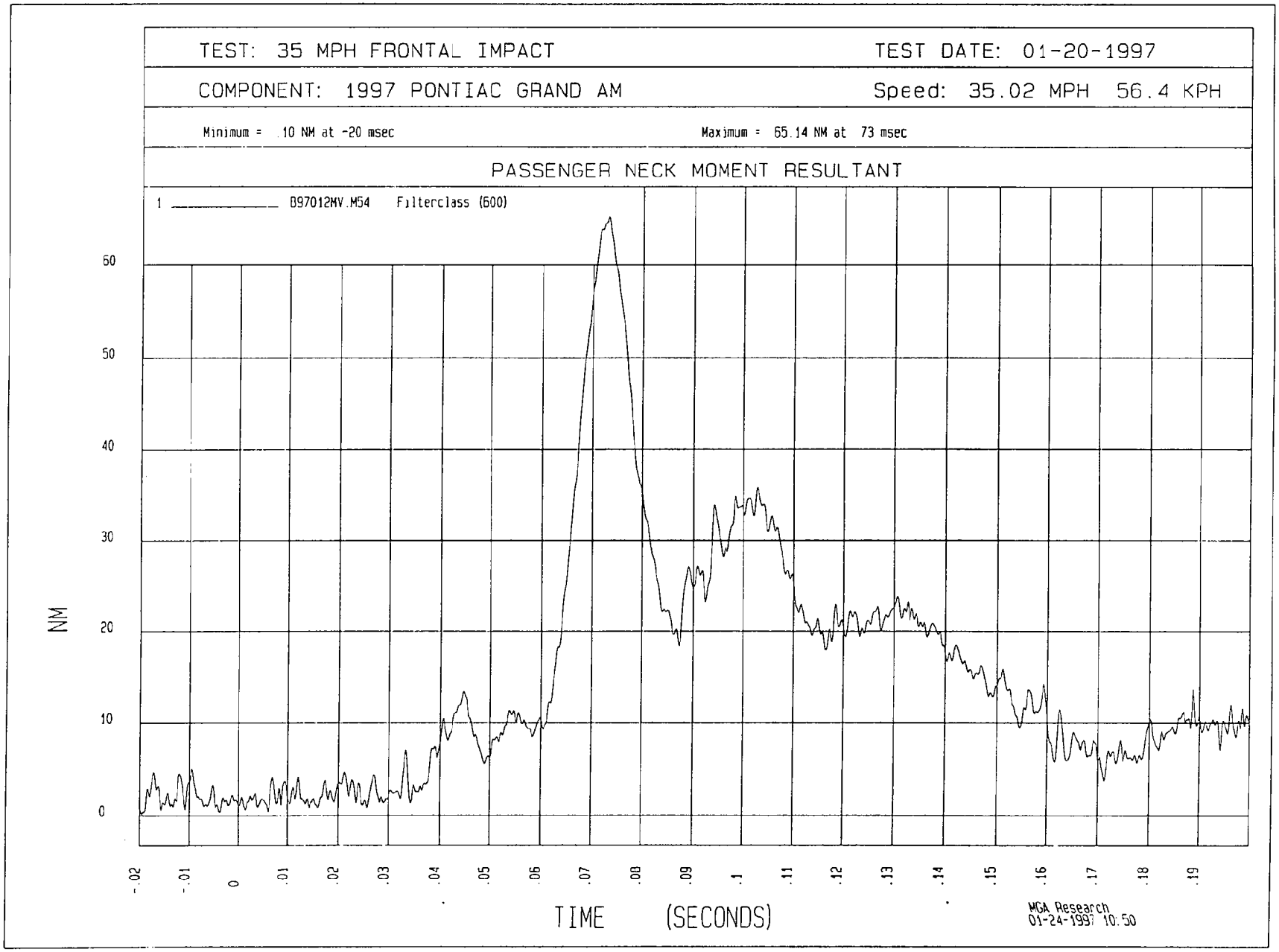
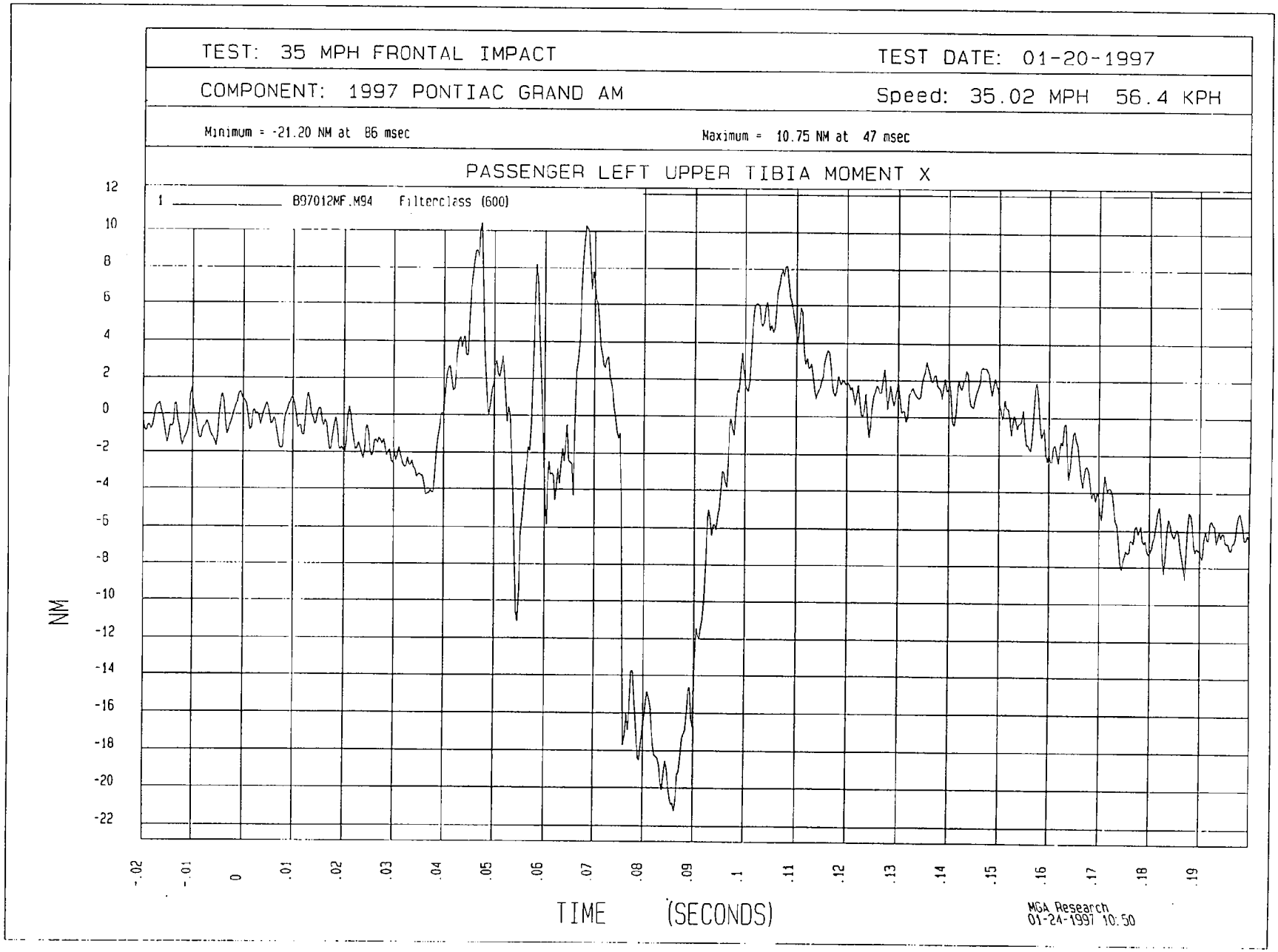
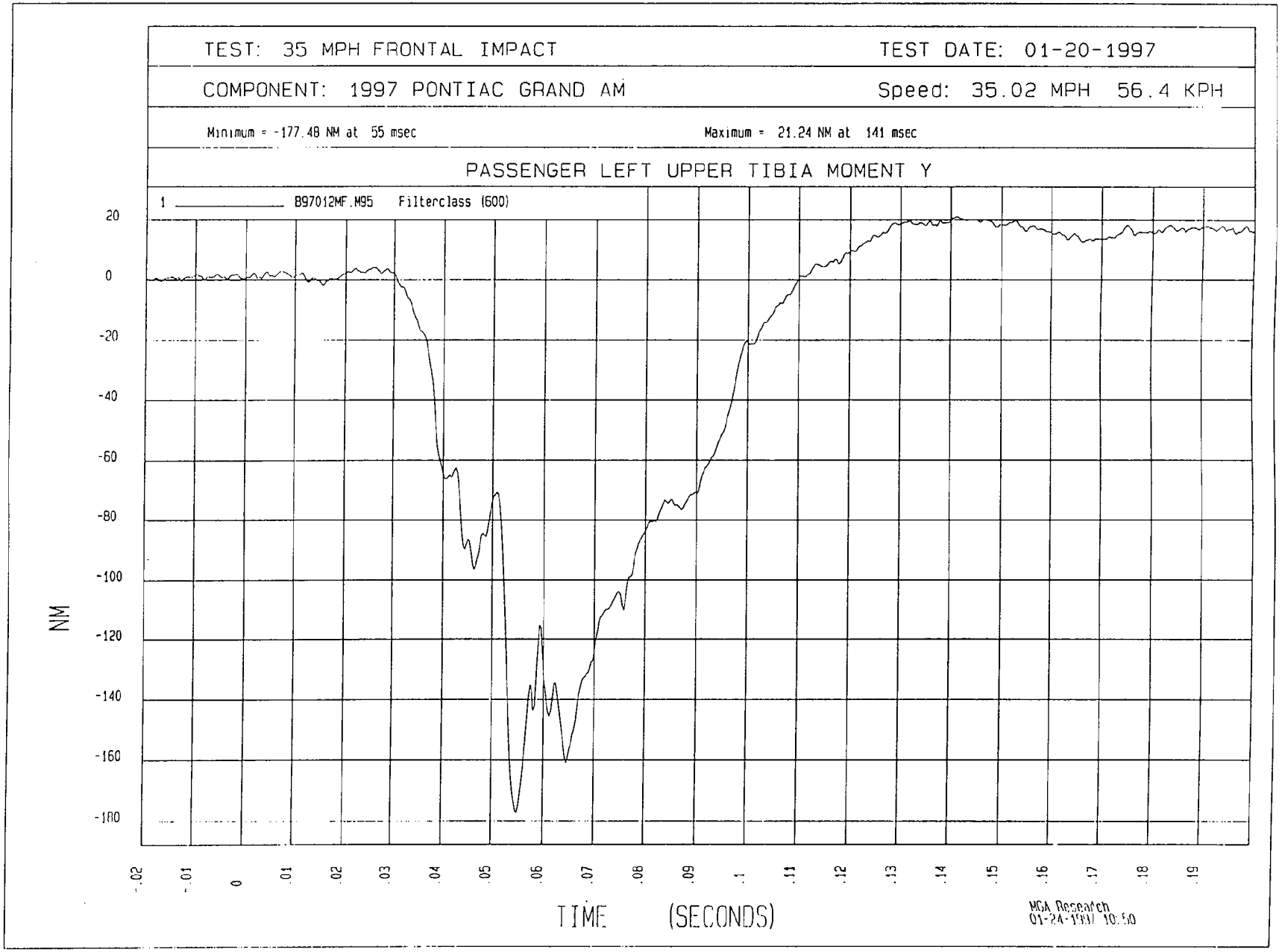
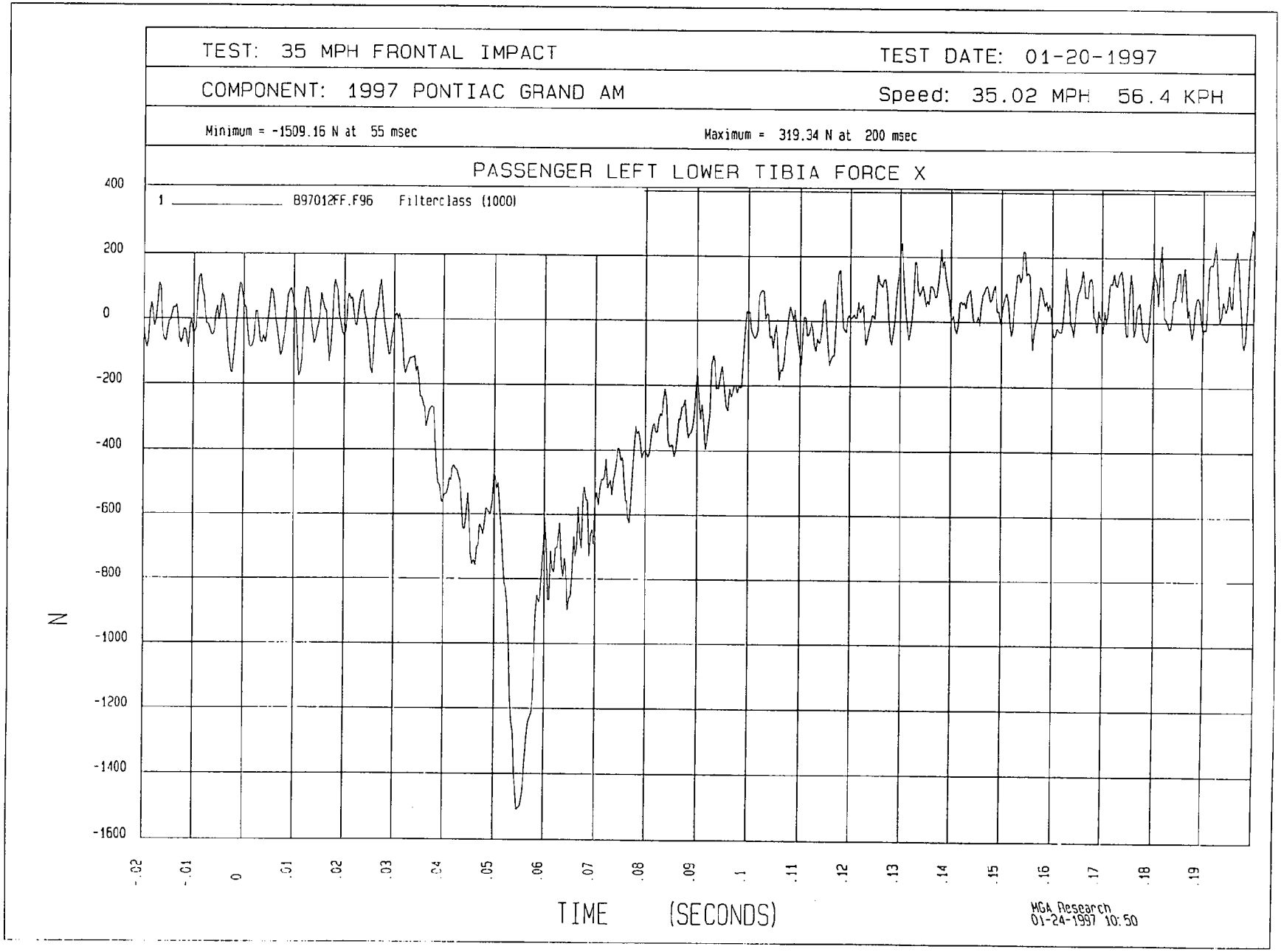
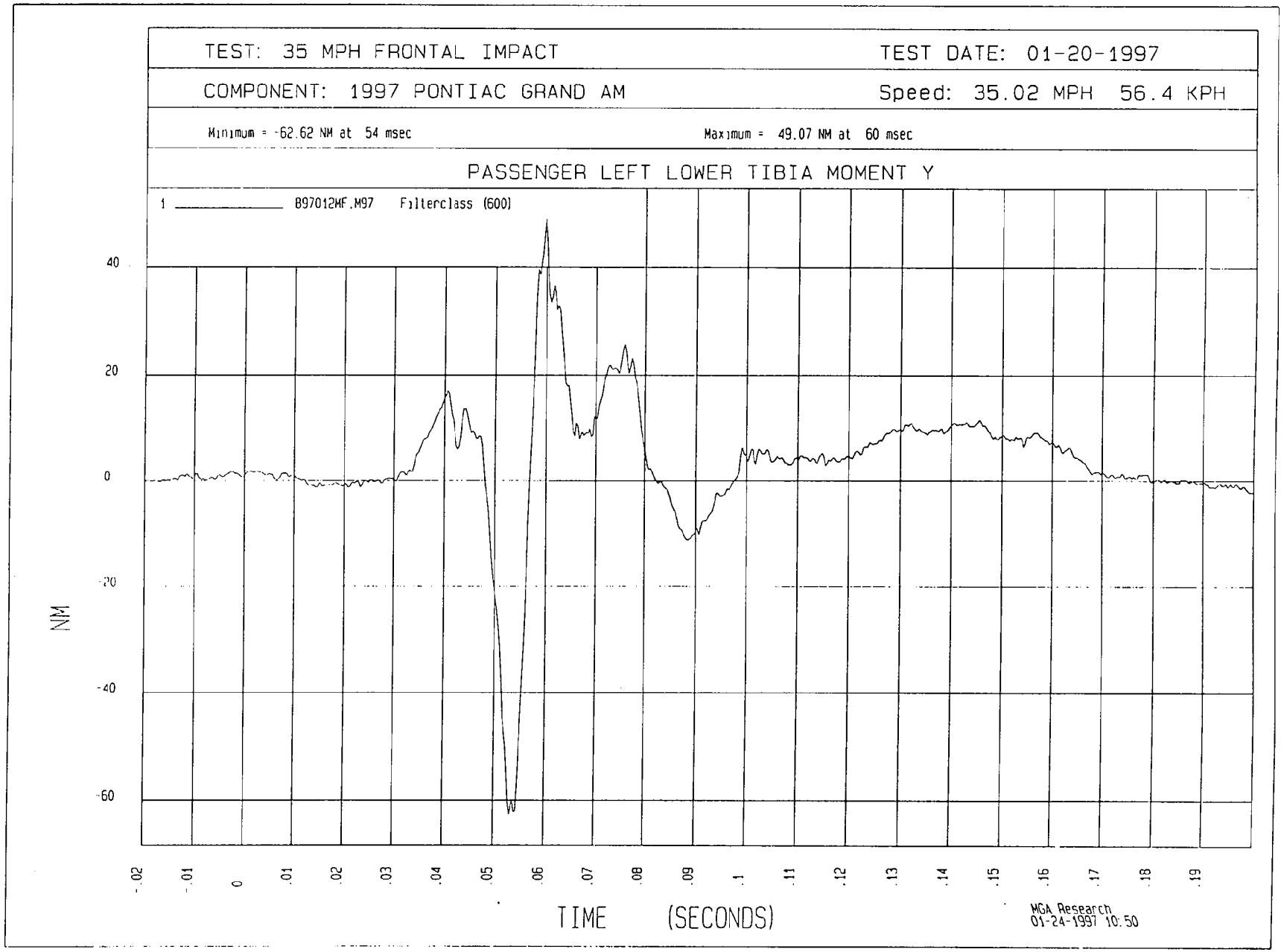
MGA Research
01-24-1997 10:50

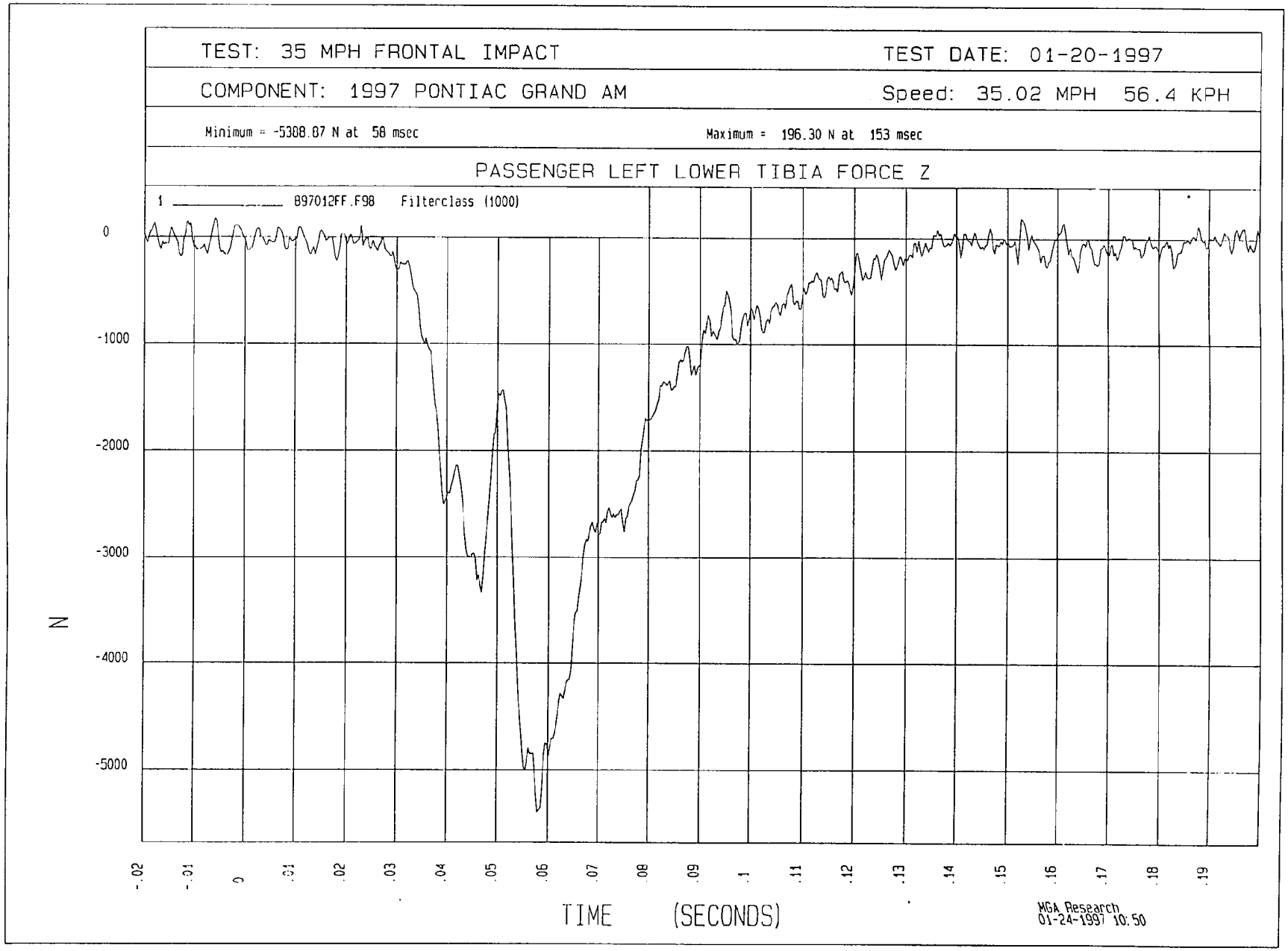

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = .10 NM at -20 msec
Maximum = 65.14 NM at 73 msec
PASSENGER NECK MOMENT RESULTANT
1 _____ B97012MV.M54 Filterclass (600)
NM
60
50
40
30
20
10
0
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:50

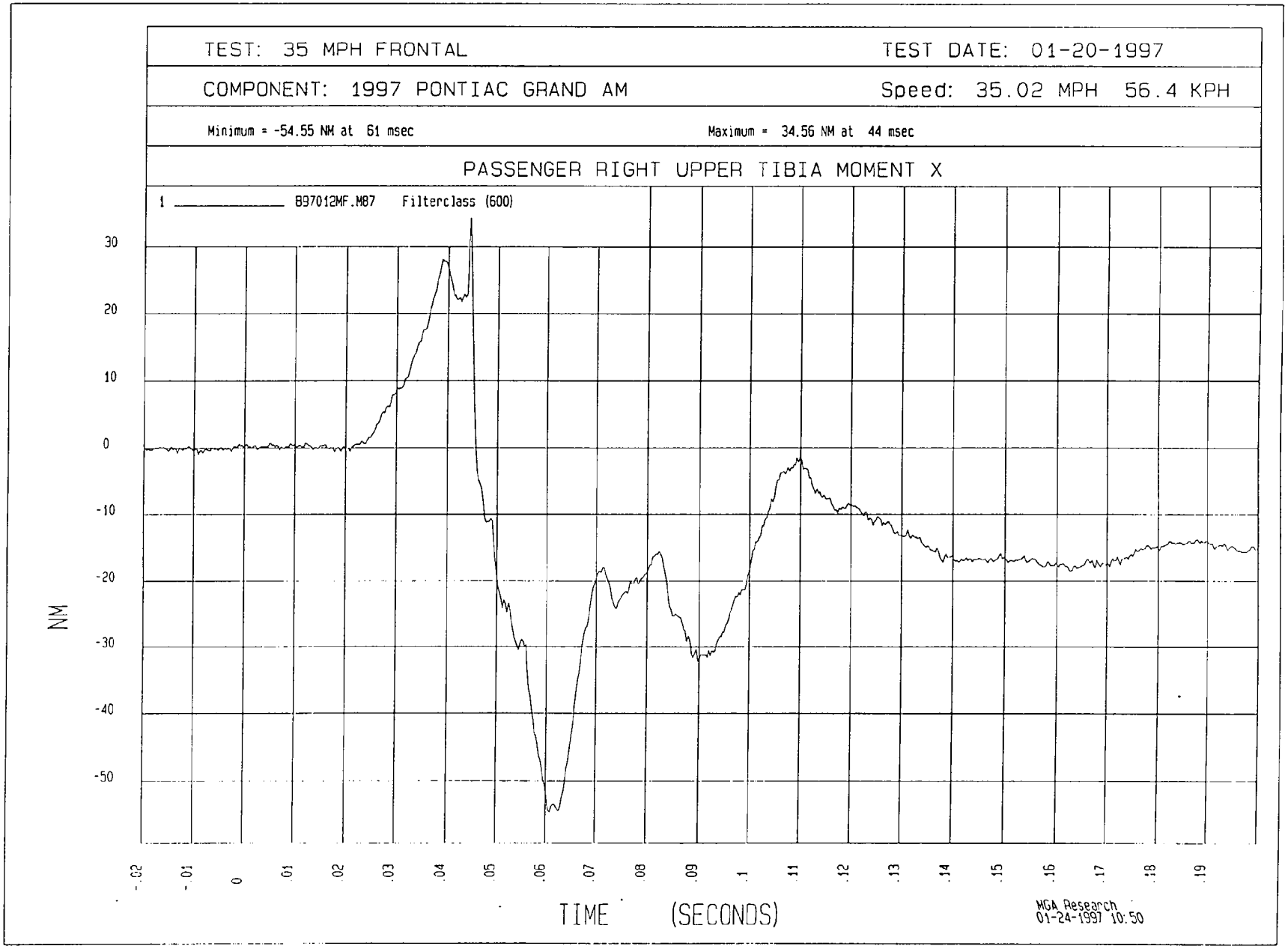

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -21.20 NM at 86 msec
Maximum = 10.75 NM at 47 msec
PASSENGER LEFT UPPER TIBIA MOMENT X
1 B97012MF.M94 Filterclass (600)
NM
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:50

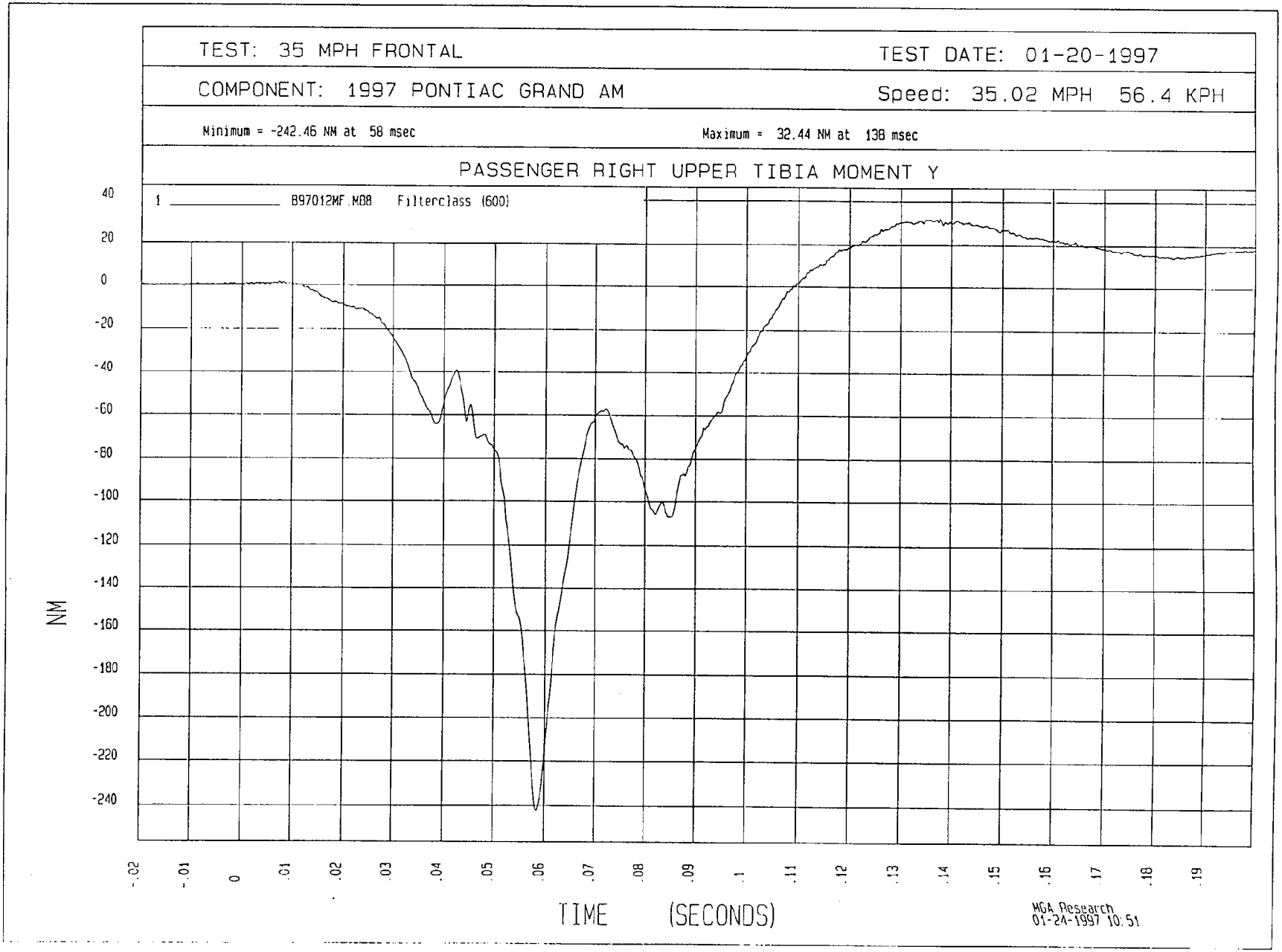

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -177.48 NM at 55 msec
Maximum = 21.24 NM at 141 msec
PASSENGER LEFT UPPER TIBIA MOMENT Y
1 B97012MF.M95 Filterclass (600)
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
NM
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:50

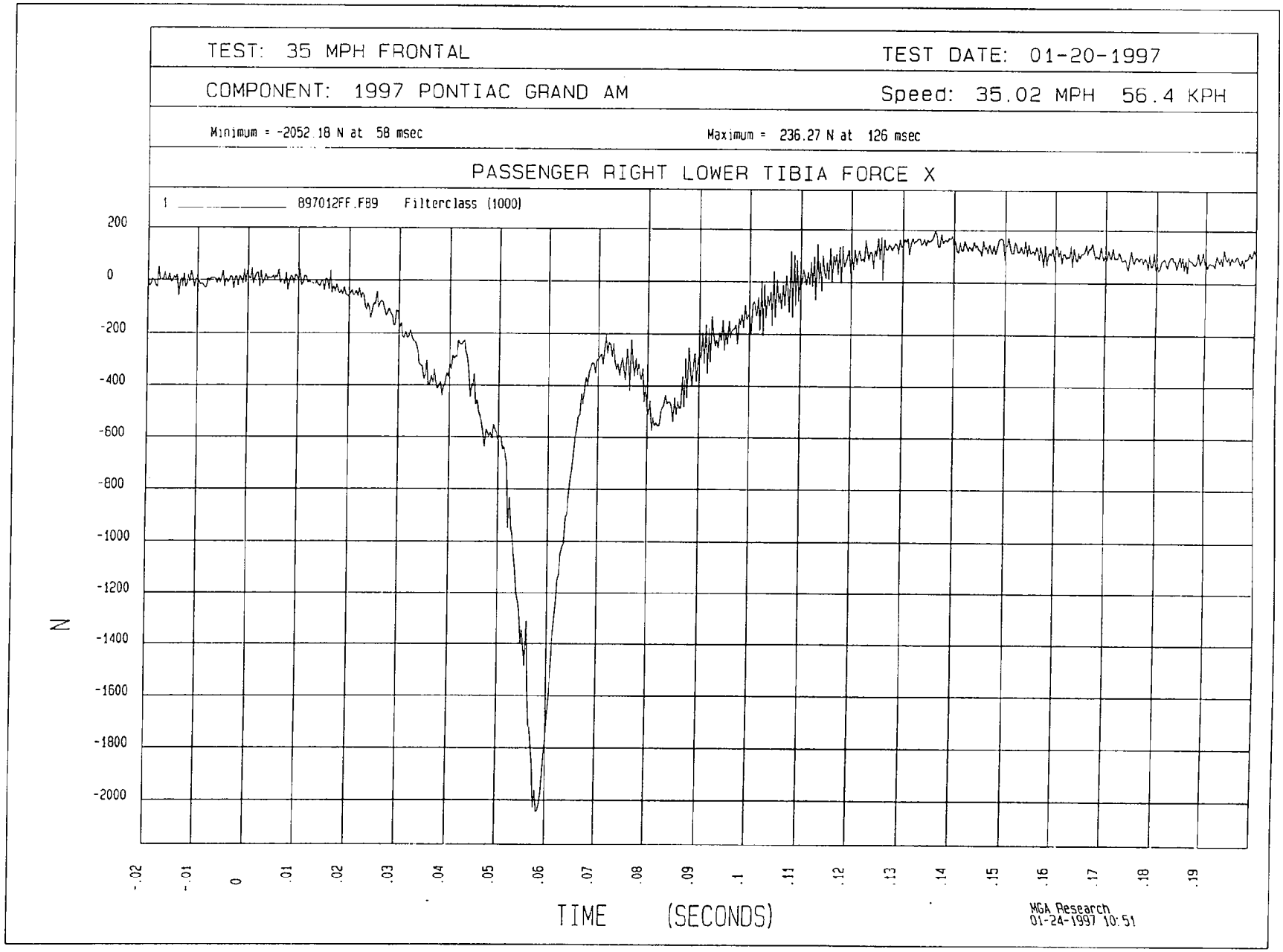

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -1509.16 N at 55 msec
Maximum = 319.34 N at 200 msec
PASSENGER LEFT LOWER TIBIA FORCE X
1 B97012FF.F96 Filterclass (1000)
400
200
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:50

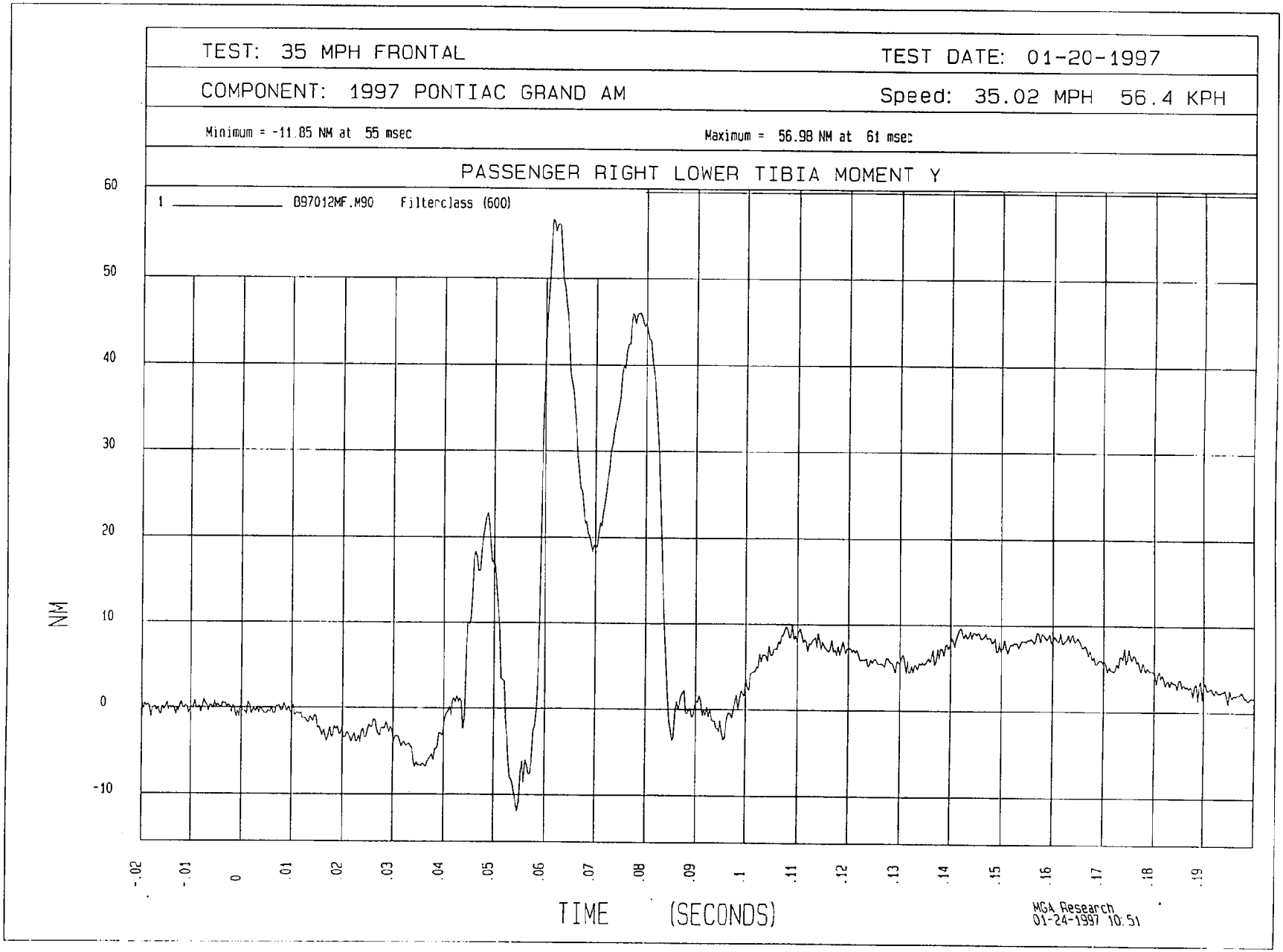

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -62.62 NM at 54 msec
Maximum = 49.07 NM at 60 msec
PASSENGER LEFT LOWER TIBIA MOMENT Y
1 B97012MF.M97 Filterclass (600)
40
20
0
-20
-40
-60
NM
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:50

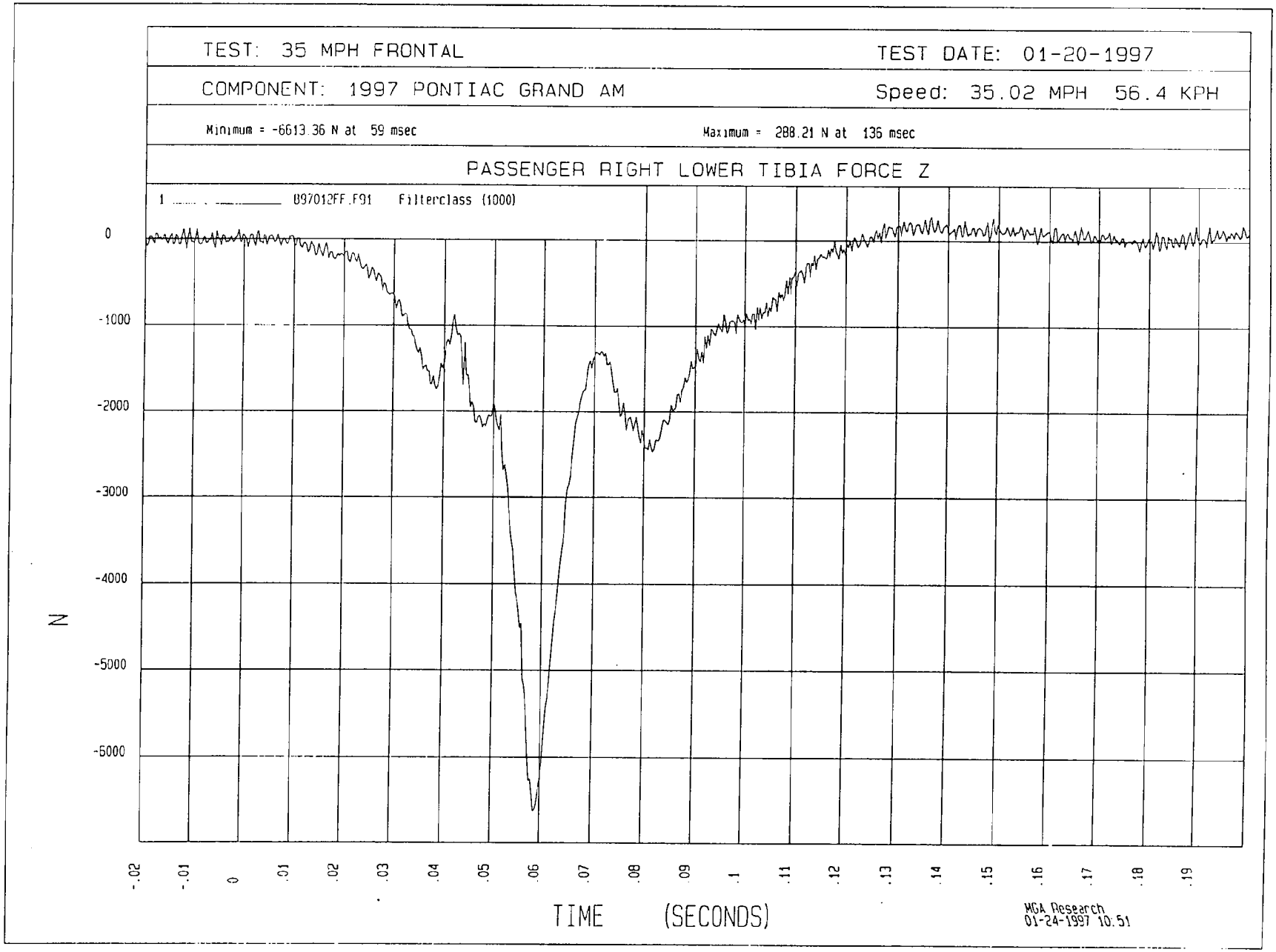

TEST: 35 MPH FRONTAL IMPACT
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -5308.87 N at 58 msec
Maximum = 196.30 N at 153 msec
PASSENGER LEFT LOWER TIBIA FORCE Z
1 897012FF.F98 Filterclass (1000)
0
-1000
-2000
-3000
-4000
-5000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:50

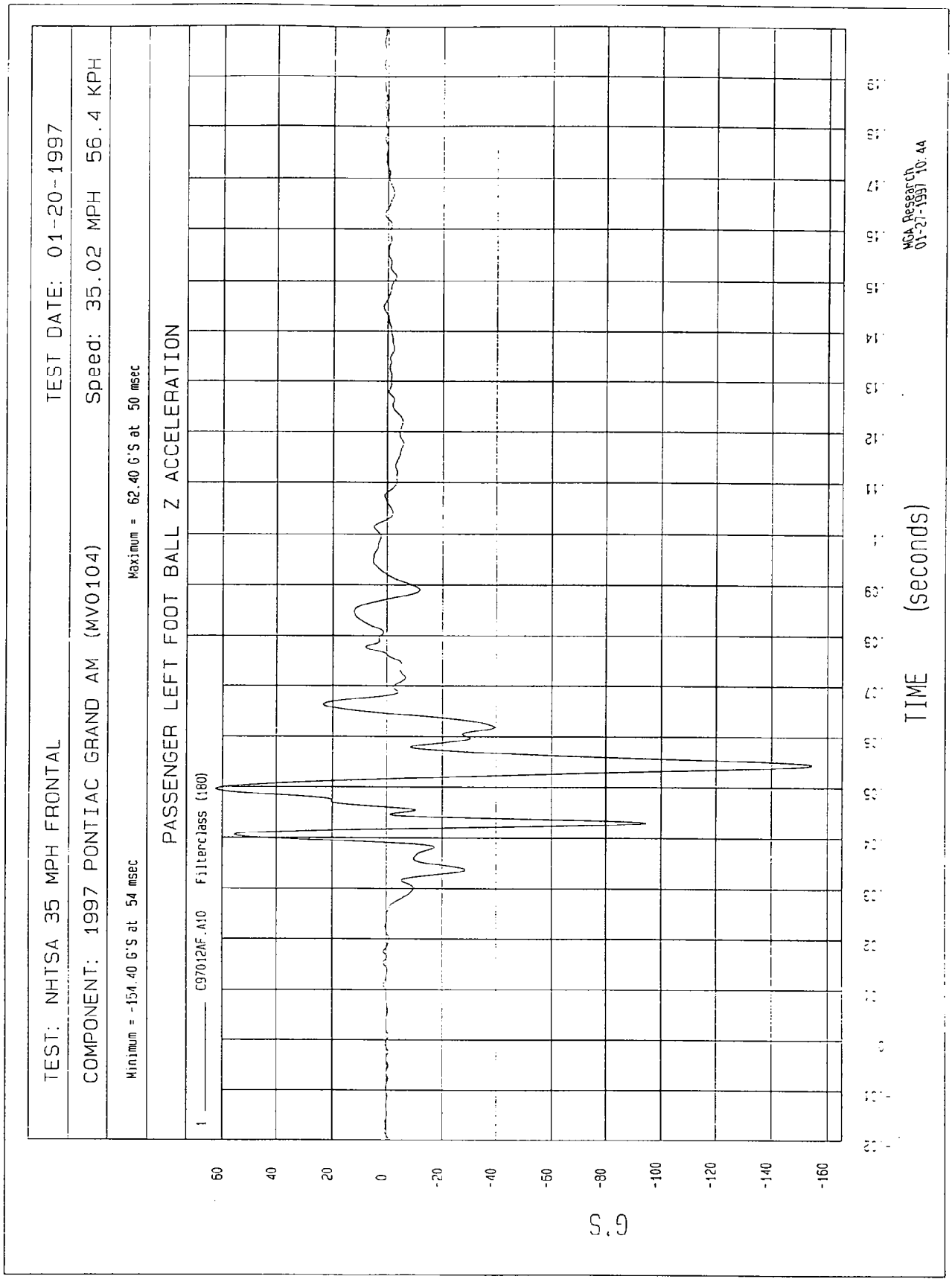

TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -54.55 NM at 61 msec
Maximum = 34.56 NM at 44 msec
PASSENGER RIGHT UPPER TIBIA MOMENT X
1 B97012MF.M87 Filterclass (600)
NM
30
20
10
0
-10
-20
-30
-40
-50
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:50

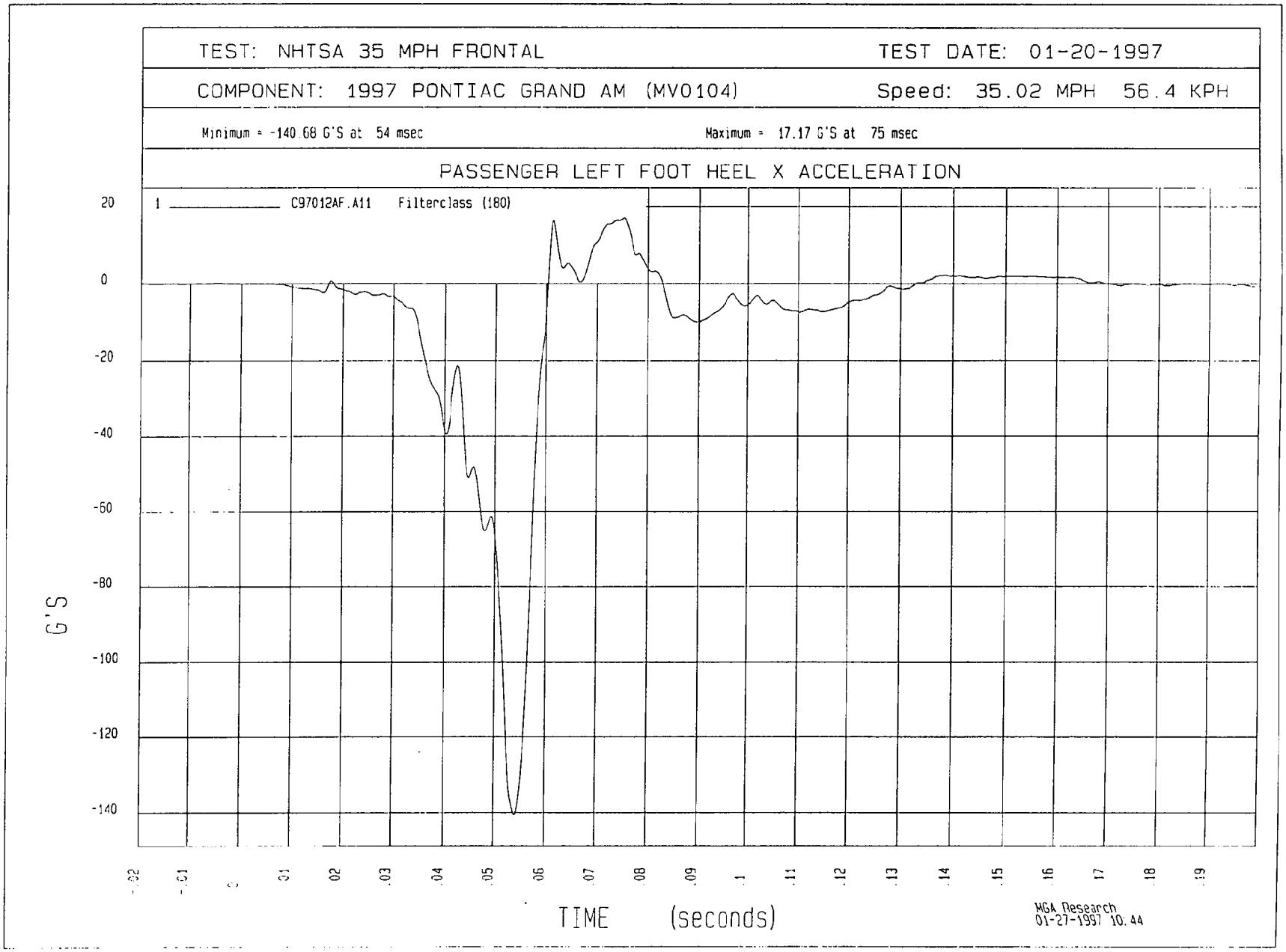

TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -242.46 NM at 58 msec
Maximum = 32.44 NM at 138 msec
PASSENGER RIGHT UPPER TIBIA MOMENT Y
1 B97012MF.M88 Filterclass (600)
NM
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
-220
-240
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:51

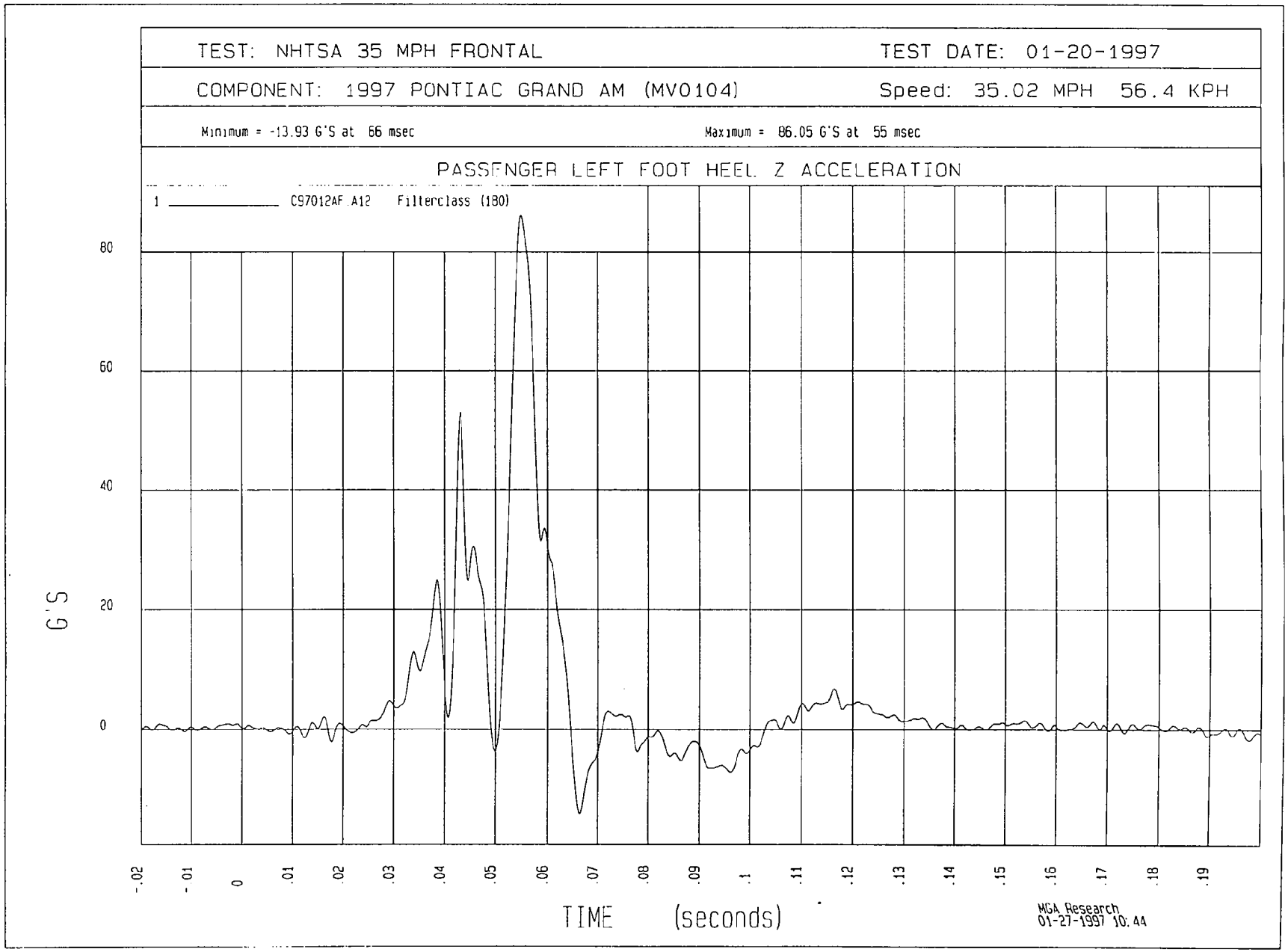

TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -2052.18 N at 58 msec
Maximum = 236.27 N at 126 msec
PASSENGER RIGHT LOWER TIBIA FORCE X
1 897012FF.F89 Filterclass (1000)
200
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
-1800
-2000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:51

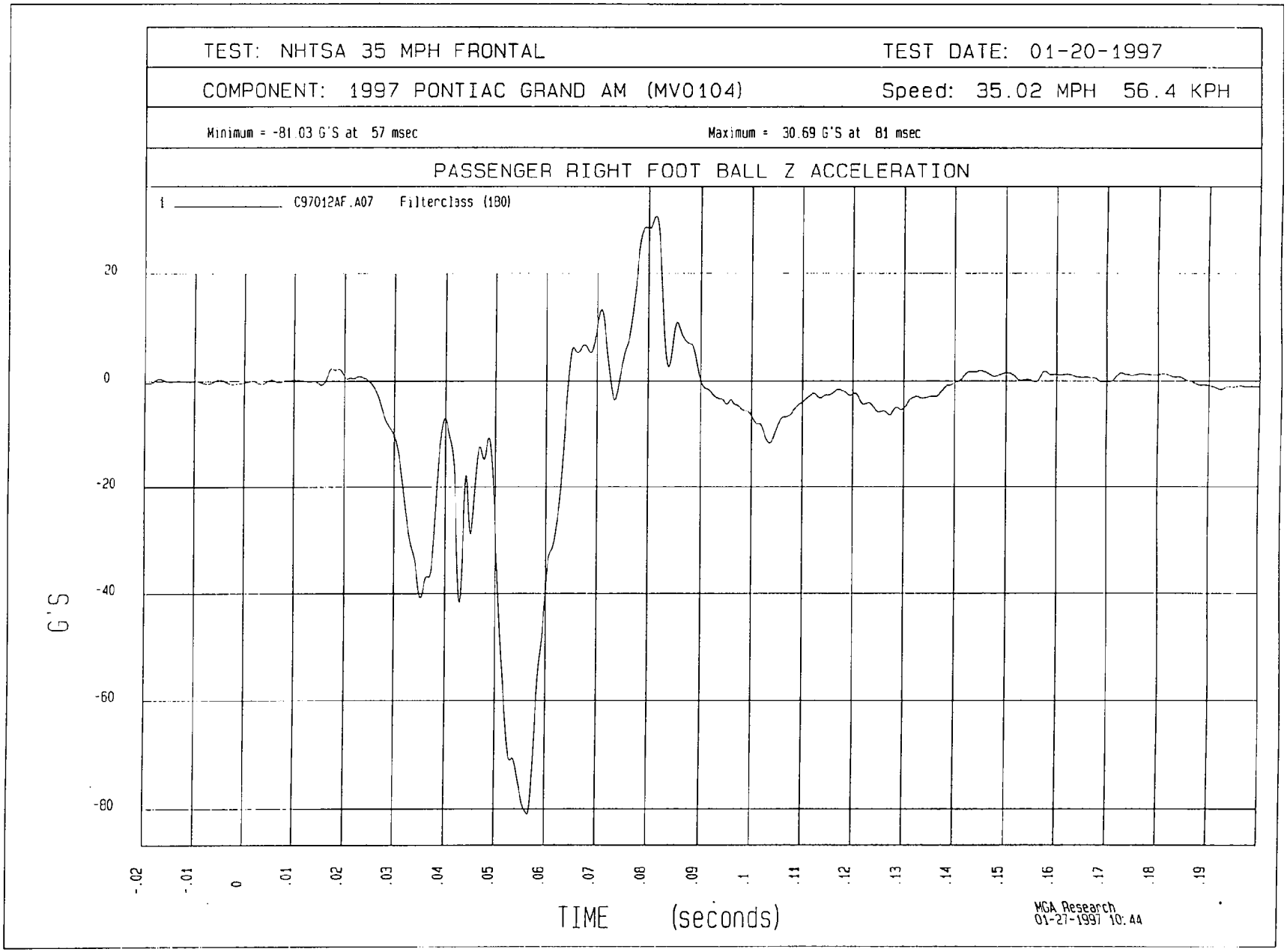

TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -11.85 NM at 55 msec
Maximum = 56.98 NM at 61 msec
PASSENGER RIGHT LOWER TIBIA MOMENT Y
1 B97012MF.M90 Filterclass (600)
NM
60
50
40
30
20
10
0
-10
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:51

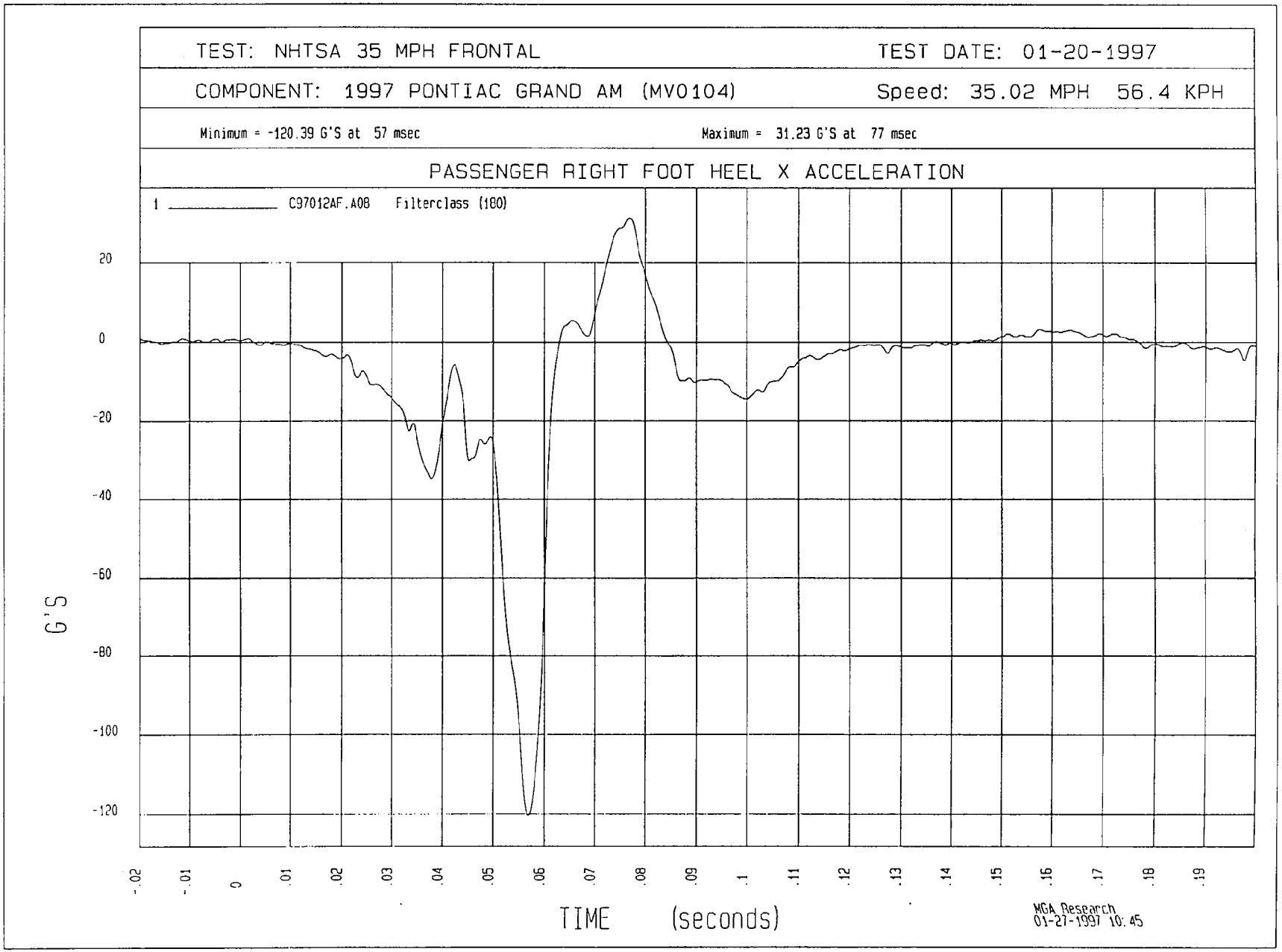

TEST: 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM
Speed: 35.02 MPH 56.4 KPH
Minimum = -6613.36 N at 59 msec
Maximum = 288.21 N at 136 msec
PASSENGER RIGHT LOWER TIBIA FORCE Z
1 097012FF.F91 Filterclass (1000)
0
-1000
-2000
-3000
-4000
-5000
-6000
N
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (SECONDS)
MGA Research
01-24-1997 10:51

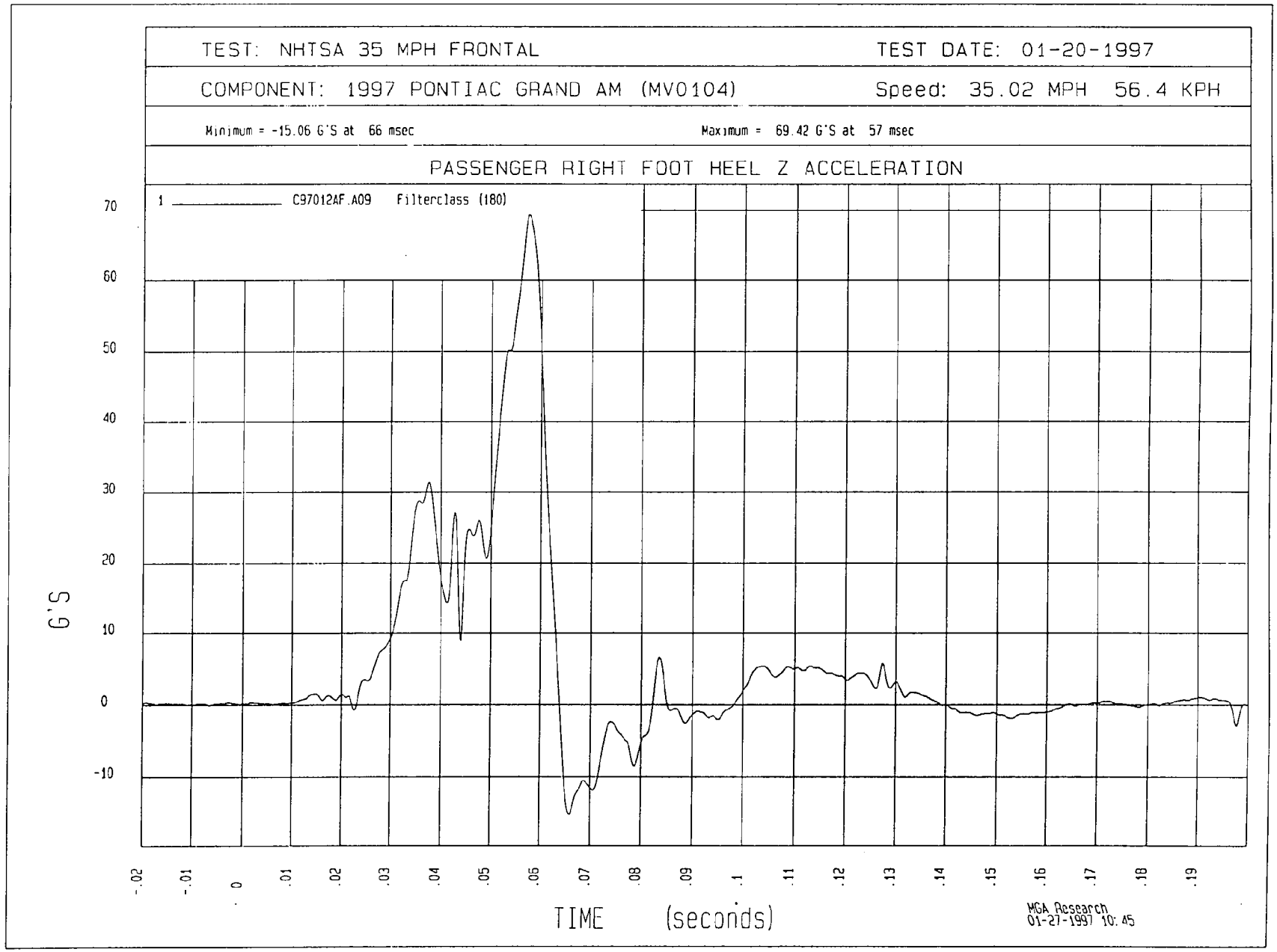

TEST: NHTSA 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM (MV0104)
Speed: 35.02 MPH 56.4 KPH
Minimum = -154.40 G'S at 54 msec
Maximum = 62.40 G'S at 50 msec
PASSENGER LEFT FOOT BALL Z ACCELERATION
1 C97012AF.A10 Filterclass (180)
60
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
G'S
TIME (seconds)
MGA Research
01-21-1997 10:44


TEST: NHTSA 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM (MV0104)
Speed: 35.02 MPH 56.4 KPH
Minimum = -140.68 G'S at 54 msec
Maximum = 17.17 G'S at 75 msec
PASSENGER LEFT FOOT HEEL X ACCELERATION
1 C97012AF.A11 Filterclass (180)
20
0
-20
-40
-60
-80
-100
-120
-140
G'S
.02
.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (seconds)
MGA Research
01-27-1997 10:44


TEST: NHTSA 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM (MV0104)
Speed: 35.02 MPH 56.4 KPH
Minimum = -13.93 G'S at 66 msec
Maximum = 86.05 G'S at 55 msec
PASSENGER LEFT FOOT HEEL Z ACCELERATION
1 C97012AF.A12 Filterclass (180)
80
60
40
20
0
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (seconds)
MGA Research
01-27-1997 10:44


TEST: NHTSA 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM (MV0104)
Speed: 35.02 MPH 56.4 KPH
Minimum = -81.03 G'S at 57 msec
Maximum = 30.69 G'S at 81 msec
PASSENGER RIGHT FOOT BALL Z ACCELERATION
1 C97012AF.A07 Filterclass (180)
20
0
-20
-40
-60
-80
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (seconds)
MGA Research
01-27-1997 10:44


TEST: NHTSA 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM (MV0104)
Speed: 35.02 MPH 56.4 KPH
Minimum = -120.39 G'S at 57 msec
Maximum = 31.23 G'S at 77 msec
PASSENGER RIGHT FOOT HEEL X ACCELERATION
1 C97012AF.A08 Filterclass (180)
20
0
-20
-40
-60
-80
-100
-120
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (seconds)
MGA Research
01-27-1997 10:45


TEST: NHTSA 35 MPH FRONTAL
TEST DATE: 01-20-1997
COMPONENT: 1997 PONTIAC GRAND AM (MV0104)
Speed: 35.02 MPH 56.4 KPH
Minimum = -15.06 G'S at 66 msec
Maximum = 69.42 G'S at 57 msec
PASSENGER RIGHT FOOT HEEL Z ACCELERATION
1 C97012AF.A09 Filterclass (180)
70
60
50
40
30
20
10
0
-10
G'S
-.02
-.01
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19
TIME (seconds)
MGA Research
01-27-1997 10:45

APPENDIX C

Dummy Configuration & Performance Verification Data

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 037 DUMMY CALIBRATION BY: Al Chalmers

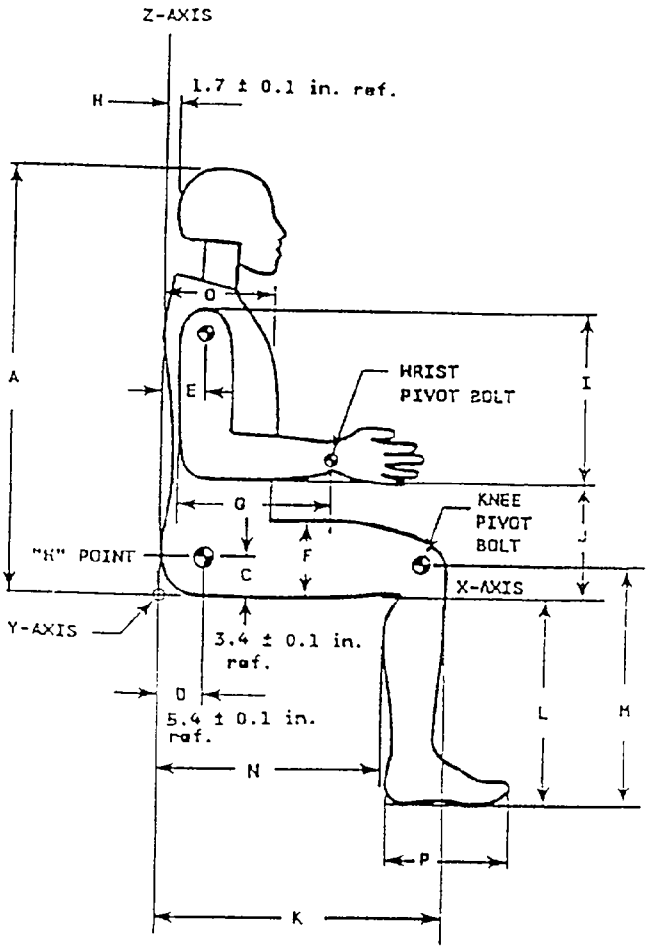
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 5-30-96

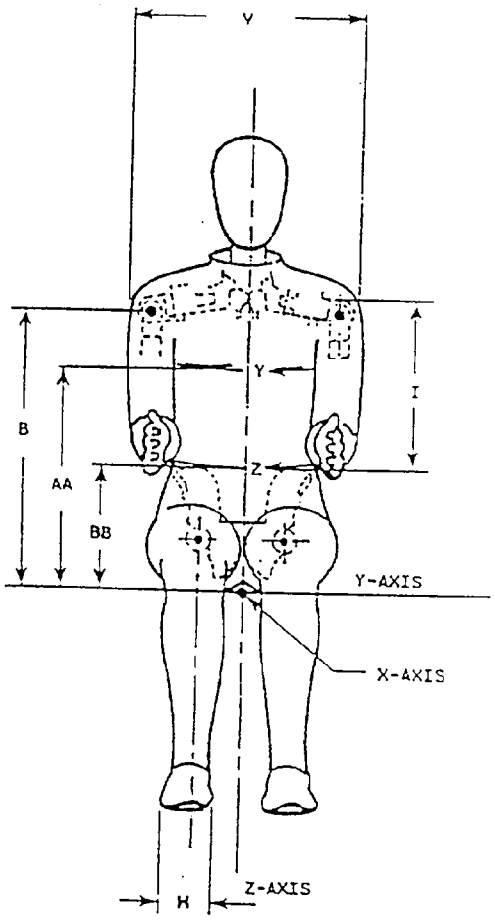
DESCRIPTION	SPECIFICATION (Inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.8
B - Shoulder Pivot Height	19.9 - 20.5	20.5
C - "H" Point Height	3.3 - 3.5	3.5
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1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

DUMMY NO.: 037 DUMMY CALIBRATION BY: Tim Michnay

VERIFICATION DATE: January 9, 1997

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

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	263
Peak Lateral Acceleration	15 G. MAX	7
Is Acceleration Curve Unimodel	within 10% of peak	Yes

2.0 NECK FLEXION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		22.6 - 23.4 FT/SEC	23.0
Pendulum Deceleration	10 MS	22.50 - 27.50 G	22.67
	20 MS	17.60 - 22.60 G	20.91
	30 MS	12.50 - 18.50 G	16.45
Max. Pendulum G Above 30 MS		29.0 G MAX	16.40
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	37
D Plane Rotation	MAX	64 - 78 DEG.	76
	TIME	57 - 64 MS	60
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	118
Moment About Occipital Condyle	MIN.	65 - 80 FT.LBS	70
	TIME	47 - 58 MS	49
Positive Moment - Time Curve Decay Time to Zero		97 - 107 MS	102

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	20.02
Pendulum Deceleration	10 MS	17.20 - 21.20 G	17.86
	20 MS	14.00 - 19.00 G	17.00
	30 MS	11.00 - 16.00 G	13.86
Max. Pendulum G Above 30 MS		22 G Max	14.39
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	38
D Plane Rotation	MAX	81 - 106 DEG.	91
	TIME	72 - 82 MS	74
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	151
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-50
	TIME	65 - 79 MS	69
Positive Moment - Time Curve Decay Time to Zero		120 - 148 MS	136

4.0 CHEST IMPACT TESTS

	SPECIFICATION	MEASUREMENT
Probe Speed	21.6 to 22.4 F/S	21.97
Peak Deflection	2.50 to 2.86 IN.	2.53
Peak Resistive Force	1160 to 1325 LBS.	1300
Internal Hysteresis	69 to 85%	72%

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.	1295

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	6.9
Maximum Force	1060 - 1300 LBS.	1095

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 036 DUMMY CALIBRATION BY: Al Chalmers

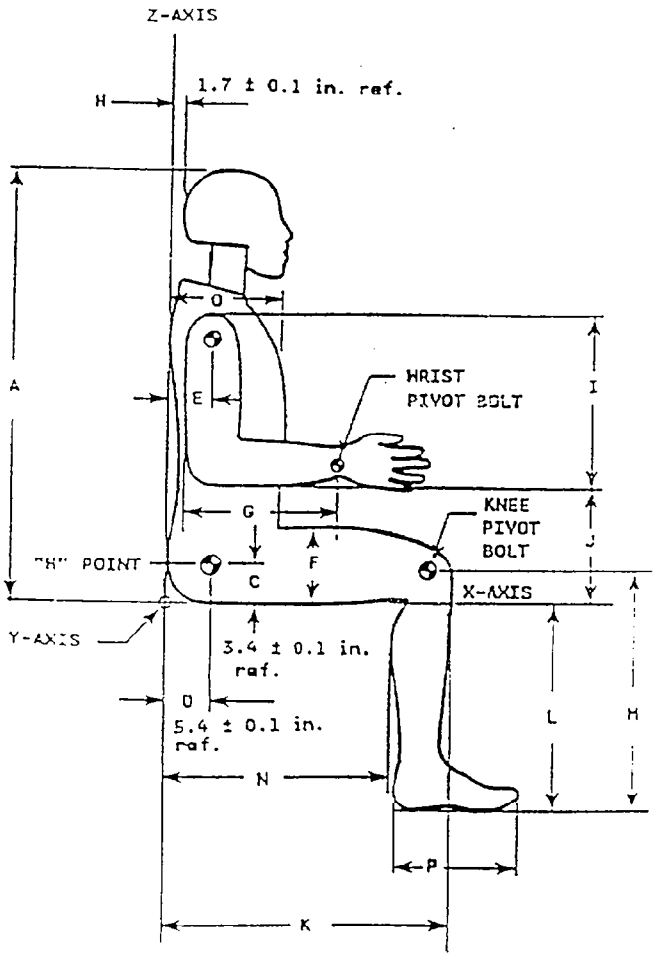
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 5-8-96

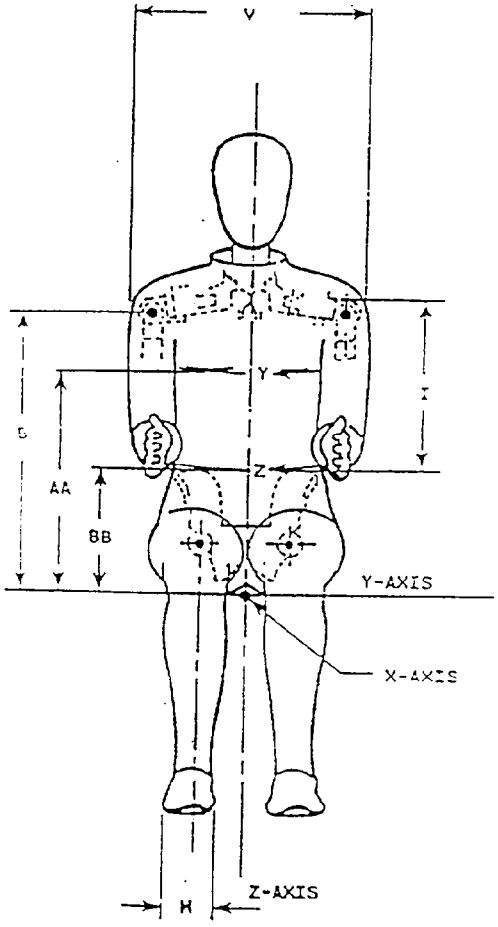
DESCRIPTION	SPECIFICATION (inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.9
B - Shoulder Pivot Height	19.9 - 20.5	20.5
C - "H" Point Height	3.3 - 3.5	3.5
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1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

DUMMY NO.: 036 DUMMY CALIBRATION BY: Tim Michnay

VERIFICATION DATE: January 16, 1997

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

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	234
Peak Lateral Acceleration	15 G. MAX	9
Is Acceleration Curve Unimodal	within 10% of peak	Yes

2.0 NECK FLEXION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		22.6 - 23.4 FT/SEC	22.9
Pendulum Deceleration	10 MS	22.50 - 27.50 G	23.29
	20 MS	17.60 - 22.60 G	20.56
	30 MS	12.50 - 18.50 G	15.81
Max. Pendulum G Above 30 MS		29.0 G MAX	15.77
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	36
D Plane Rotation	MAX	64 - 78 DEG.	74
	TIME	57 - 64 MS	59
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	116
Moment About Occipital Condyle	MIN.	65 - 80 FT.LBS	74
	TIME	47 - 58 MS	47
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	17.95
	20 MS	14.00 - 19.00 G	16.67
	30 MS	11.00 - 16.00 G	13.57
Max. Pendulum G Above 30 MS		22 G Max	13.74
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	40
D Plane Rotation	MAX	81 - 106 DEG.	97
	TIME	72 - 82 MS	76
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	159
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-54.0
	TIME	65 - 79 MS	71
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	21.7
Peak Deflection	2.50 to 2.86 IN.	2.63
Peak Resistive Force	1160 to 1325 LBS.	1266
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	6.9
Maximum Force	1060 - 1300 LBS.	1067

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	7.0
Maximum Force	1060 - 1300 LBS.	1256

APPENDIX D

Dummy, Vehicle and Laboratory Calibration Data

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 037

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ACCY6	Endevco	12/04/96
Head Y	ACCH1	Endevco	12/04/96
Head Z	AAMW5	Endevco	12/04/96
Head X Redundant	AJ9D2	Endevco	12/04/96
Head Y Redundant	AA1E2	Endevco	12/04/96
Head Z Redundant	AJ7K3	Endevco	12/04/96
Chest X	ACCY1	Endevco	12/03/96
Chest Y	ACCC8	Endevco	12/03/96
Chest Z	ACCT7	Endevco	12/03/96
Chest X Redundant	AJ9D4	Endevco	12/03/96
Chest Y Redundant	AJ9F3	Endevco	12/03/96
Chest Z Redundant	AJ9D9	Endevco	12/03/96
Right Femur Load Cell	261	Denton	8/28/96
Left Femur Load Cell	262	Denton	8/28/96
Pelvis X	ALD48	Endevco	12/03/96
Pelvis Y	ALEK9	Endevco	12/03/96
Pelvis Z	ALE80	Endevco	12/03/96

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 037

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Load Cell X	443	Denton	1/10/97
Neck Load Cell Y	443	Denton	1/10/97
Neck Load Cell Z	443	Denton	1/10/97
Neck Moment X	443	Denton	1/10/97
Neck Moment Y	443	Denton	1/10/97
Neck Moment Z	443	Denton	1/10/97
Chest Deflection Gauge	037	Servo	7/10/96
Lap Belt Load Cell	657	Lebow	11/15/96
Torso Belt Load Cell	624	Lebow	11/06/96

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 037

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Right Tibia Moment X	036	Denton	10/01/96
Upper Right Tibia Moment Y	036	Denton	10/01/96
Lower Right Tibia Moment Y	040	Denton	9/24/96
Lower Right Tibia Force X	040	Denton	9/24/96
Lower Right Tibia Force Z	040	Denton	9/24/96
Upper Left Tibia Moment X	039	Denton	10/01/96
Upper Left Tibia Moment Y	039	Denton	10/01/96
Lower Left Tibia Moment Y	033	Denton	9/24/96
Lower Left Tibia Force X	033	Denton	9/24/96
Lower Left Tibia Force Z	033	Denton	9/24/96
Right Foot Ball Z	J13652	Endevco	1/13/97
Right Foot Heel X	J13628	Endevco	12/05/96
Right Foot Heel Z	J14006	Endevco	12/05/96
Left Foot Ball Z	J13650	Endevco	12/05/96
Left Foot Heel X	J13424	Endevco	12/05/96
Left Foot Heel Z	J14006	Endevco	12/05/96

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 036

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	AAMN8	Endevco	12/04/96
Head Y	ACC61	Endevco	12/04/96
Head Z	ACCW9	Endevco	12/04/96
Head X Redundant	AJ621	Endevco	12/04/96
Head Y Redundant	AJ619	Endevco	12/04/96
Head Z Redundant	AHY54	Endevco	12/04/96
Chest X	ACC78	Endevco	12/04/96
Chest Y	ACCE6	Endevco	12/04/96
Chest Z	ACCY3	Endevco	12/04/96
Chest X Redundant	AJ9J7	Endevco	12/04/96
Chest Y Redundant	AJ782	Endevco	12/04/96
Chest Z Redundant	AJ819	Endevco	12/04/96
Right Femur Load Cell	259	Denton	8/28/96
Left Femur Load Cell	260	Denton	8/28/96
Pelvis X	ALB87	Endevco	12/04/96
Pelvis Y	AHRP5	Endevco	12/04/96
Pelvis Z	AJ9T6	Endevco	12/04/96

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 036

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Load Cell X	442	Denton	1/10/97
Neck Load Cell Y	442	Denton	1/10/97
Neck Load Cell Z	442	Denton	1/10/97
Neck Moment X	442	Denton	1/10/97
Neck Moment Y	442	Denton	1/10/97
Neck Moment Z	442	Denton	1/10/97
Chest Deflection Gauge	036	Servo	12/05/96
Lap Belt Load Cell	625	GSE	11/06/96
Torso Belt Load Cell	312	Lebow	11/04/96

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 036

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Right Tibia Moment X	040	Denton	11/05/96
Upper Right Tibia Moment Y	040	Denton	11/05/96
Lower Right Tibia Moment Y	034	Denton	11/05/96
Lower Right Tibia Force X	034	Denton	11/05/96
Lower Right Tibia Force Z	034	Denton	11/05/96
Upper Left Tibia Moment X	023	Denton	11/05/96
Upper Left Tibia Moment Y	023	Denton	11/05/96
Lower Left Tibia Moment Y	019	Denton	11/05/96
Lower Left Tibia Force X	019	Denton	11/05/96
Lower Left Tibia Force Z	019	Denton	11/05/96
Right Foot Ball Z	J11046	Endevco	12/02/96
Right Foot Heel X	J11784	Endevco	12/02/96
Right Foot Heel Z	J11047	Endevco	12/02/96
Left Foot Ball Z	J11014	Endevco	12/02/96
Left Foot Heel X	J10730	Endevco	12/02/96
Left Foot Heel Z	J11625	Endevco	12/02/96

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	L22-G05	Entran	1/02/97
Right Rear Seat Crossmember X	J06-D23	Entran	1/02/97
Top of Engine Block X	L14-D10	Entran	1/07/97
Bottom of Engine X	B02-G09	Entran	12/03/96
Left Brake Caliper X	C25-A11	Entran	12/03/96
Right Brake Caliper X	A10-G04	Entran	1/02/97
Instrument Panel X	C05-Z13	Entran	12/04/96
Redundant Left Rear Seat Crossmember X	B23-B03	Entran	1/02/97
Redundant Right Rear Seat Crossmember X	E13-D03	Entran	1/02/97

	LABORATORY INSTRUMENTS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Bending Pendulum Accelerometer	AH5N9	Endevco	5/08/95
Neck Bending Head Rotary Potentiometer	018	Spectrol	3/13/95
Neck Bending Pendulum Rotary Potentiometer	019	Spectrol	3/13/95
Chest Probe Accelerometer	AN8A4	Endevco	6/12/95
Knee Impact Accelerometer	MGA001	Entran	4/21/95

APPENDIX E

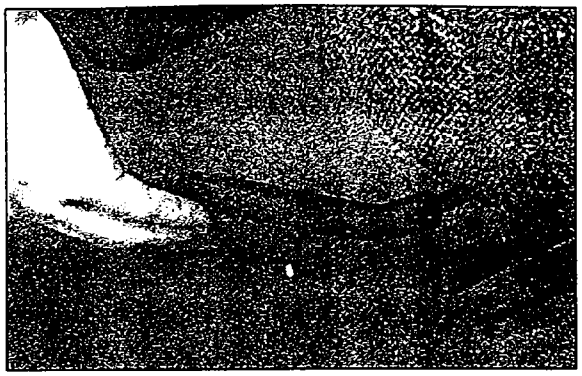
Vehicle Owner's Occupant Restraint System Instructions

Seats and Seat Controls

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

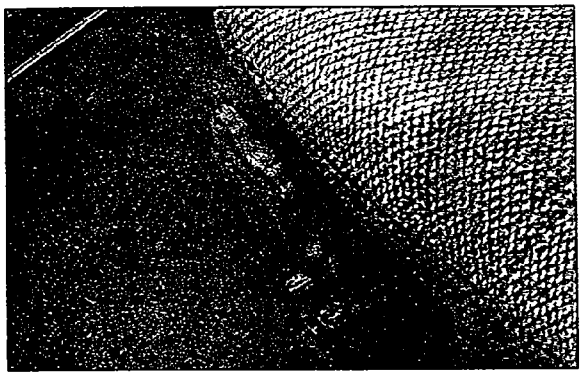
Manual Seats

> **⚠ CAUTION:**
>
> **You can lose control of the vehicle if you try to adjust a manual driver's seat while the vehicle is moving. The sudden movement could startle and confuse you, or make you push a pedal when you don't want to. Adjust the driver's seat only when the vehicle is not moving.**



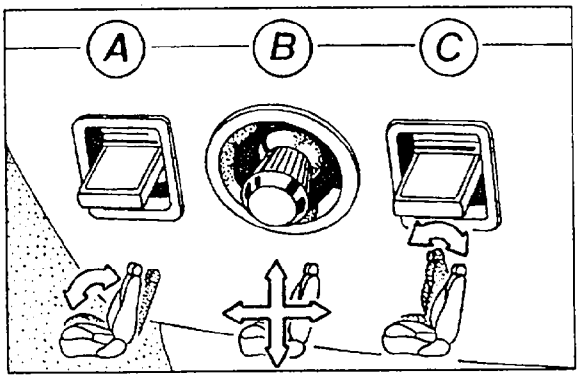
Move the control lever under the front of the seat to unlock it. Slide the seat to where you want it. Then release the lever and try to move the seat with your body, to make sure the seat is locked into place.

Manual Lumbar Support (If Equipped)



Turn the knob on the right front of the driver's seat cushion clockwise or counterclockwise to adjust support for the lower back.

Power Seat Controls (If Equipped)



To adjust the power seat on some models:

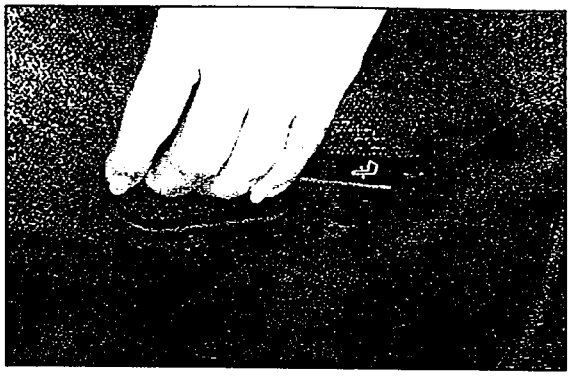
FRONT CONTROL (A): Raise the front of the seat by holding the switch up. Lower the front of the seat by holding the switch down.

CENTER CONTROL (B): Move the seat forward or back by holding the control to the front or back.

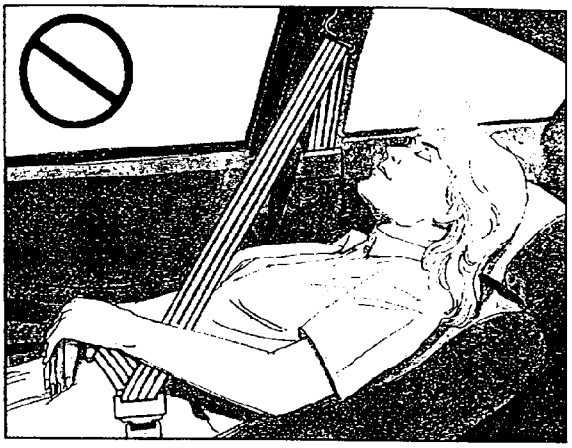
Move the seat higher by holding the control up. Lower the seat by holding the control down.

REAR CONTROL (C): Raise the rear of the seat by holding the switch up. Lower the rear of the seat by holding the switch down.

Reclining Front Seatbacks



To adjust the seatback, lift the lever on the outer side of the seat and move the seatback to where you want it. Release the lever to lock the seatback. Pull up on the lever and the seat will go to an upright position.



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

⚠ CAUTION:

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

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

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

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

Head Restraints

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

Seatback Latches (2-Door Models)

The front seatback folds forward to let people get into the back seat.

To fold a front seatback forward, lift the seatback latch.

When you return the seatback to its original position, the seatback will lock.

> **⚠ CAUTION:**
>
> **If the seatback isn't locked, it could move forward in a sudden stop or crash. That could cause injury to the person sitting there. Always press rearward on the seatback to be sure it is locked.**

Easy Entry Seat (2-Door Models)

The right front seat of your vehicle makes it easy to get in and out of the rear seat.

- Tilt the right front seatback completely forward and the whole seat will slide forward.
- Move the right front seatback to its original position after someone gets into the rear seat area. Then move the seat rearward until it locks.
- Tilt the seatback completely forward again to get out.

> **⚠ CAUTION:**
>
> **If an easy entry right front seat isn't locked, it can move. In a sudden stop or crash, the person sitting there could be injured. After you've used it, be sure to push rearward on an easy entry seat to be sure it is locked.**

Rear Seats

Folding the Rear Seat (If Equipped)

To open, pull forward on the seat tab.

To close, push the seatback up to its original position.

Push the seatback completely up against the back plate to ensure that the latch will hook.

Safety Belts: They're for Everyone

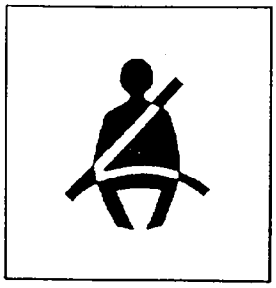
This part of the manual tells you how to use safety belts properly. It also tells you some things you should not do with safety belts.

And it explains the Supplemental Restraint System (SRS), or air bag system.

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

⚠ CAUTION:

It is extremely dangerous to ride in a cargo area, inside or outside of a vehicle. In a collision, people riding in these areas are more likely to be seriously injured or killed. Do not allow people to ride in any area of your vehicle that is not equipped with seats and safety belts. Be sure everyone in your vehicle is in a seat and using a safety belt properly.



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

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

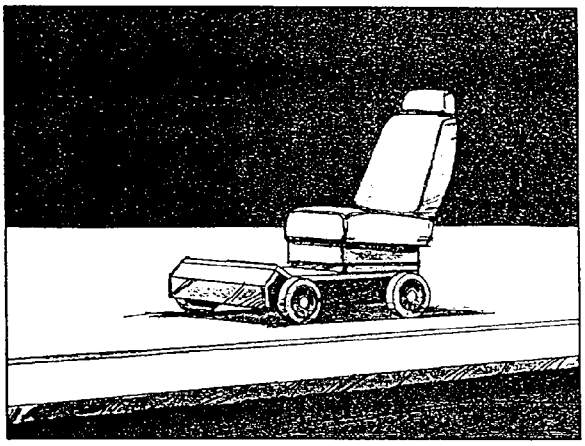
You never know if you'll be in a crash. If you do have a crash, you don't know if it will be a bad one.

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

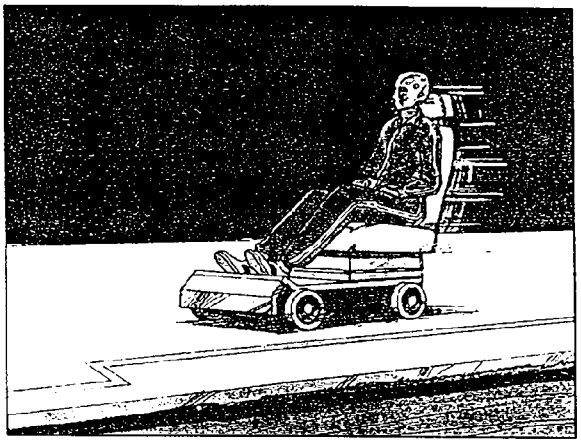
After more than 25 years of safety belts in vehicles, the facts are clear. In most crashes buckling up does matter ... a lot!

Why Safety Belts Work

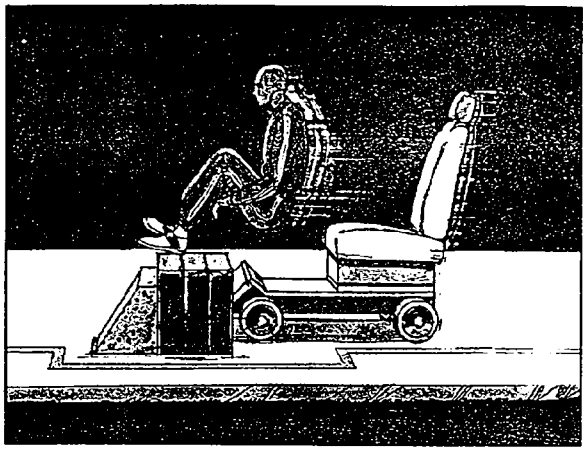
When you ride in or on anything, you go as fast as it goes.



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



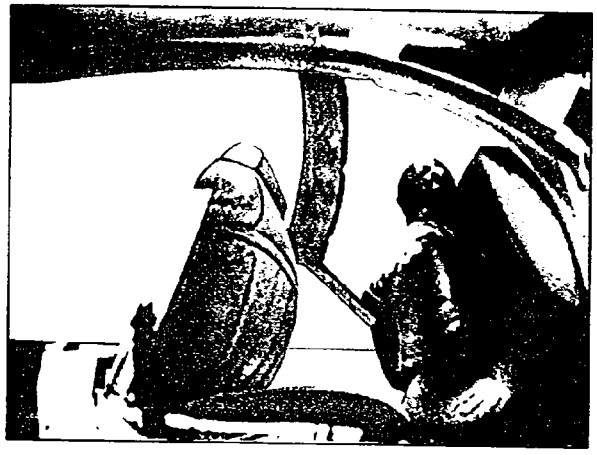
Put someone on it.



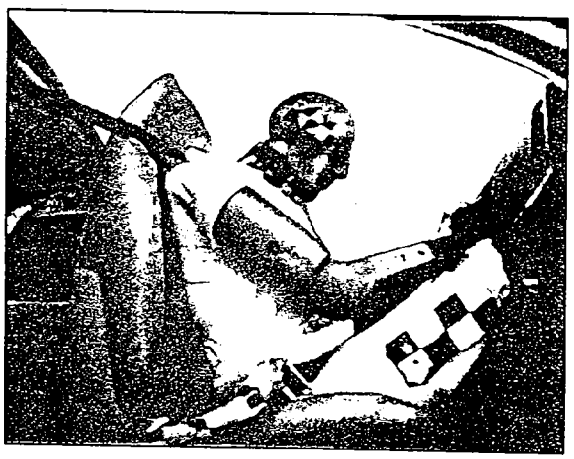
Get it up to speed. Then stop the vehicle. The rider doesn't stop.

The person keeps going until stopped by something.

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



or the instrument panel ...



or the safety belts!

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

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

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

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

Q: **If my vehicle has air bags, why should I have to wear safety belts?**

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

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

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

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

Safety belts are for everyone.

How to Wear Safety Belts Properly

Adults

This part is only for people of adult size.

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

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

We'll start with the driver position.

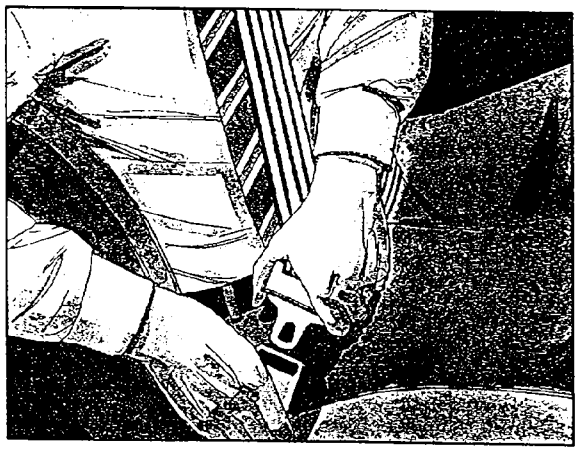
Driver Position

This part describes the driver's restraint system.

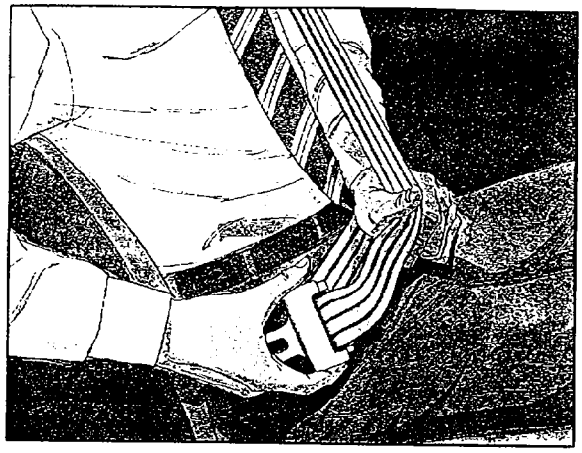
Lap-Shoulder Belt

The driver has a lap-shoulder belt. Here's how to wear it properly.

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



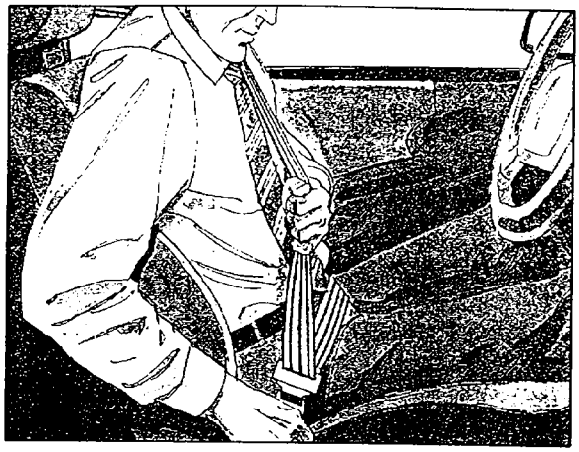
3. Pick up the latch plate and pull the belt across you. Don't let it get twisted.
4. Push the latch plate into the buckle until it clicks.



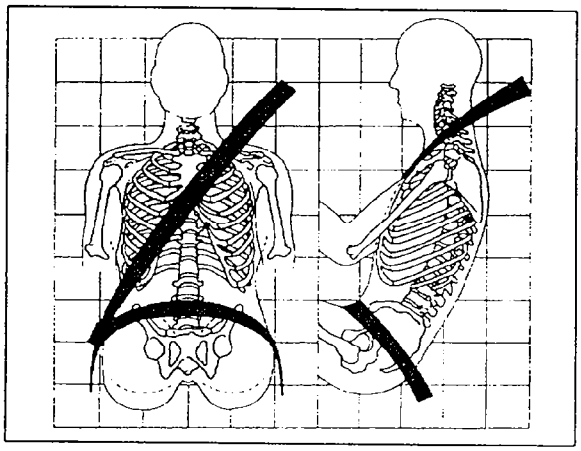
If the belt stops before it reaches the buckle, tilt the latch plate and keep pulling until you can buckle the belt.

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

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



5. To make the lap part tight, pull down on the buckle end of the belt as you pull up on the shoulder belt.

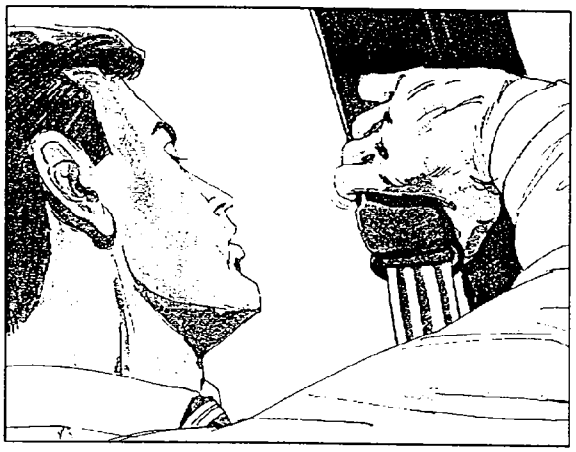


The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even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

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

Shoulder Belt Height Adjuster (4-Door Models)

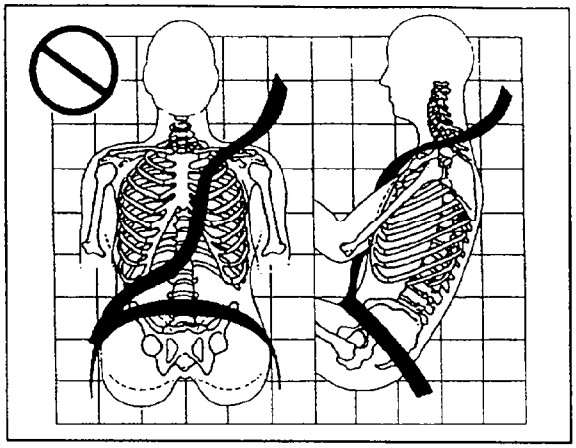
Before you begin to drive, move the shoulder belt adjuster to the height that is right for you.



To move it down, squeeze the release button and move the adjuster to the desired position. You can move the adjuster up just by pushing up on the shoulder belt guide. After you move the adjuster to where you want it, try to move it down without squeezing the release button to make sure it has locked into position.

Adjust the height so that the shoulder portion of the belt is centered on your shoulder. The belt should be away from your face and neck, but not falling off your shoulder.

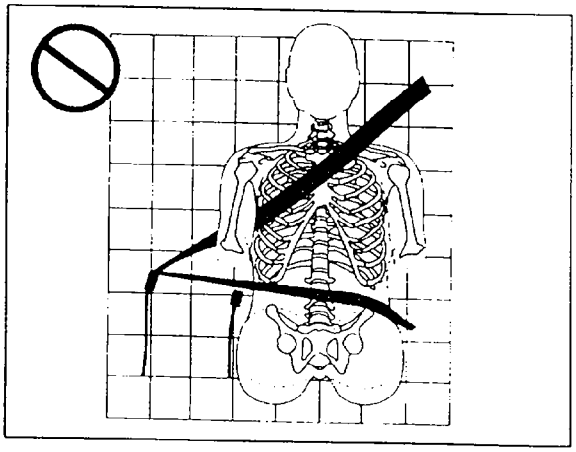
Q: **What's wrong with this?**



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

> **⚠ CAUTION:**
>
> **You can be seriously hurt if your shoulder belt is too loose. In a crash, you would move forward too much, which could increase injury. The shoulder belt should fit against your body.**

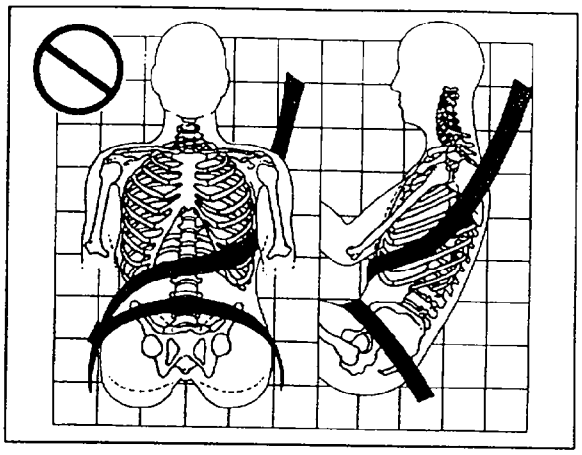
Q: **What's wrong with this?**



A: The belt is buckled in the wrong place.

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

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

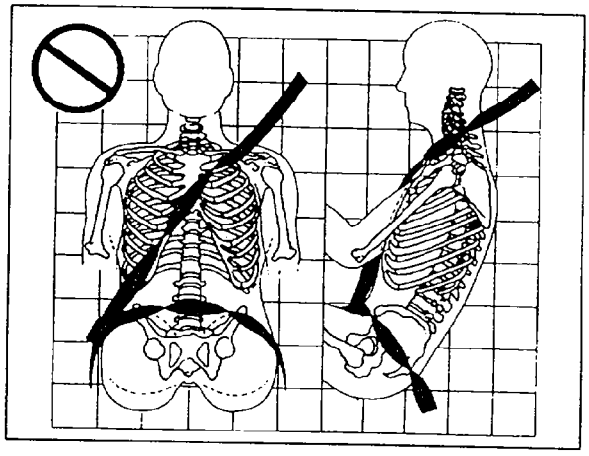


A: The shoulder belt is worn under the arm. It should be worn over the shoulder at all times.

⚠ CAUTION:

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

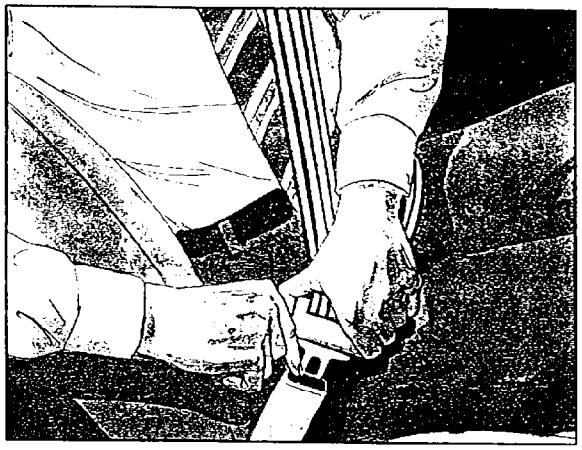
Q: **What's wrong with this?**



A: The belt is twisted across the body.

⚠ CAUTION:

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

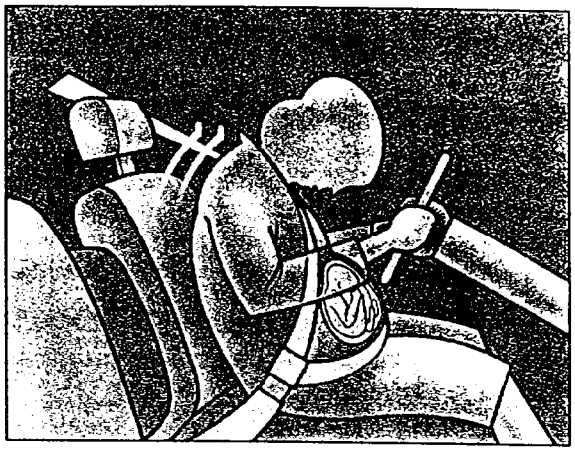


To unlatch the belt, just push the button on the buckle. The belt should go back out of the way.

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

Safety Belt Use During Pregnancy

Safety belts work for everyone, including pregnant women. Like all occupants, they are more likely to be seriously injured if they don't wear safety belts.



A pregnant woman should wear a lap-shoulder belt, and the lap portion should be worn as low as possible, below the rounding, throughout the pregnancy.

The best way to protect the fetus is to protect the mother. When a safety belt is worn properly, it's more likely that the fetus won't be hurt in a crash. For pregnant women, as for anyone, the key to making safety belts effective is wearing them properly.

Right Front Passenger Position

The right front passenger's safety belt works the same way as the driver's safety belt. See "Driver Position," earlier in this section.

Supplemental Restraint System (SRS)

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

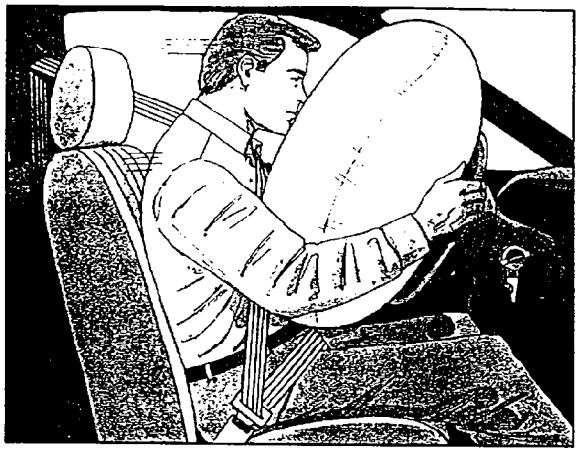
Your Pontiac has two air bags -- one air bag for the driver and another air bag for the right front passenger.

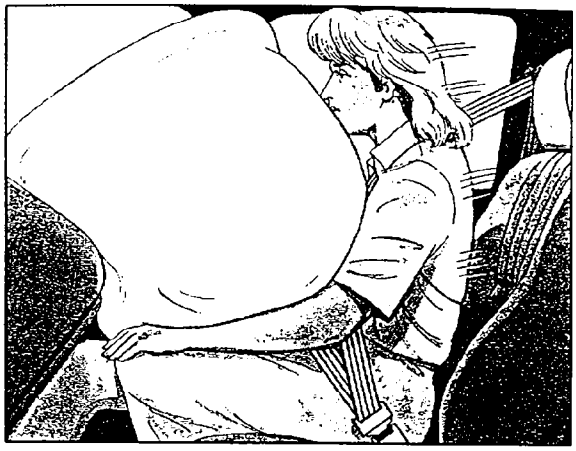
Here are the most important things to know about the air bag system:

⚠ CAUTION:

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

How the Air Bag System Works





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

Where are the air bags?

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

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

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

AIR
BAG

There is an air bag readiness light on the instrument panel, which shows AIR BAG.

The system checks the air bag electrical system for malfunctions. The light tells you if there is an electrical problem. See "Air Bag Readiness Light" in the Index for more information.

> **⚠ CAUTION:**
>
> **Don't attach anything to, or put anything between, an occupant and an air bag. If something is between an occupant and an air bag, the bag might not inflate properly or it might force the object into you and cause injury. The path of an inflating air bag must be kept clear, so don't attach or put anything on the steering wheel hub or on or near any air bag covering.**

When should an air bag inflate?

An air bag is designed to inflate in a moderate to severe frontal or near-frontal crash. The air bag will inflate only if the impact speed is above the system's designed "threshold level." If your vehicle goes straight into a wall that doesn't move or deform, the threshold level is about 9 to 16 mph (14 to 26 km/h). The threshold level can vary, however, with specific vehicle design, so that it can be somewhat above or below this range. If your vehicle strikes something that will move or deform, such as a parked car, the threshold level will be higher. The air bag is not designed to inflate in rollovers, side impacts or rear impacts, because inflation would not help the occupant.

In any particular crash, no one can say whether an air bag should have inflated simply because of the damage to a vehicle or because of what the repair costs were. Inflation is determined by the angle of the impact and how quickly the vehicle slows down in frontal or near-frontal impacts.

What makes an air bag inflate?

In an impact of sufficient severity, the air bag sensing system detects that the vehicle is in a crash. The sensing system triggers a release of gas from the inflator, which inflates the air bag. The inflator, air bag and related hardware are all part of the air bag modules inside the steering wheel and in the instrument panel in front of the right front passenger.

How does an air bag restrain?

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

What will you see after an air bag inflates?

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

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

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

- Air bags are designed to inflate only once. After they inflate, you'll need some new parts for your air bag system. If you don't get them, the air bag system won't be there to help protect you in another crash. A new system will include air bag modules and possibly other parts. The service manual for your vehicle covers the need to replace other parts.
- Your vehicle is equipped with a crash sensing and diagnostic module, which records information about the air bag system. The module records information about the readiness of the system, when the sensors are activated and driver's safety belt usage at deployment.
- Let only qualified technicians work on your air bag system. Improper service can mean that your air bag system won't work properly. See your dealer for service.

NOTICE:

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

Servicing Your Air Bag-Equipped Pontiac

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

⚠ CAUTION:

For up to 10 minutes after the ignition key is turned off and the battery is disconnected, an air bag can still inflate during improper service. You can be injured if you are close to an air bag when it inflates. Avoid wires wrapped with yellow tape or yellow connectors. They are probably part of the air bag system. Be sure to follow proper service procedures, and make sure the person performing work for you is qualified to do so.

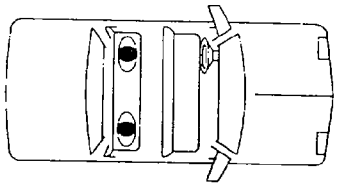
The air bag system does not need regular maintenance.

Rear Seat Passengers

It's very important for rear seat passengers to buckle up! Accident statistics show that unbelted people in the rear seat are hurt more often in crashes than those who are wearing safety belts.

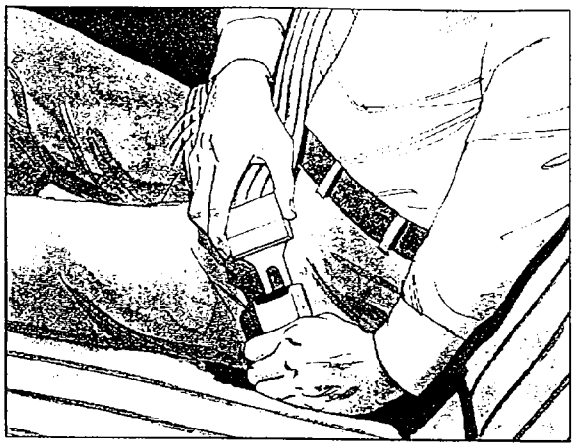
Rear passengers who aren't safety belted can be thrown out of the vehicle in a crash. And they can strike others in the vehicle who are wearing safety belts.

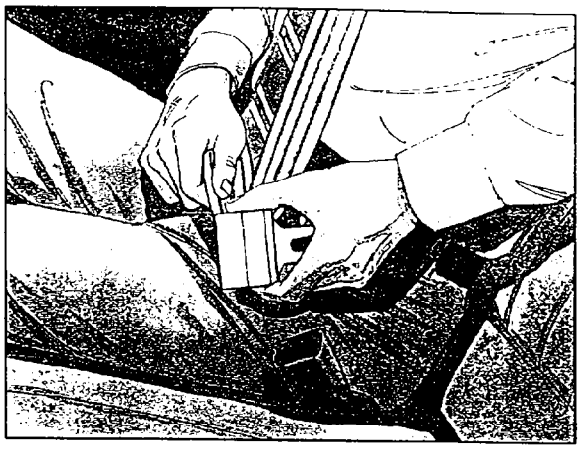
Rear Seat Outside Passenger Positions



Lap-Shoulder Belt

The positions next to the windows have lap-shoulder belts. Here's how to wear one properly.



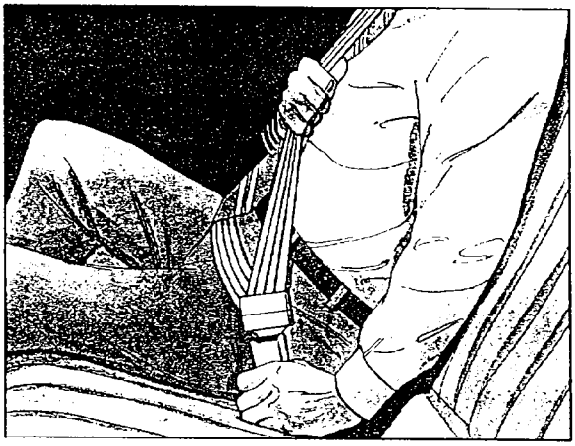


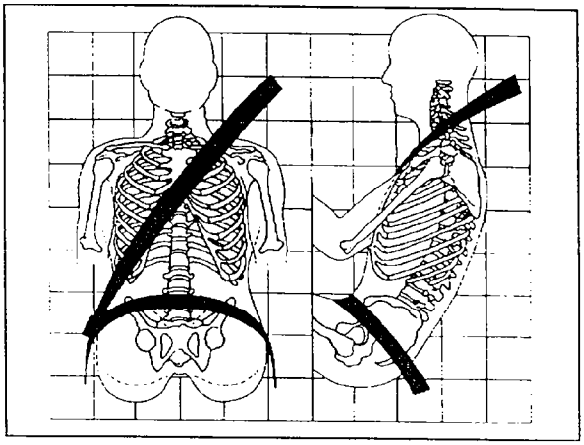
1. Pick up the latch plate and pull the belt across you. Don't let it get twisted.
2. Push the latch plate into the buckle until it clicks.

If the belt stops before it reaches the buckle, tilt the latch plate and keep pulling until you can buckle it.

Pull up on the latch plate to make sure it is secure.

If the belt is not long enough, see "Safety Belt Extender" at the end of this section. Make sure the release button on the buckle is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.



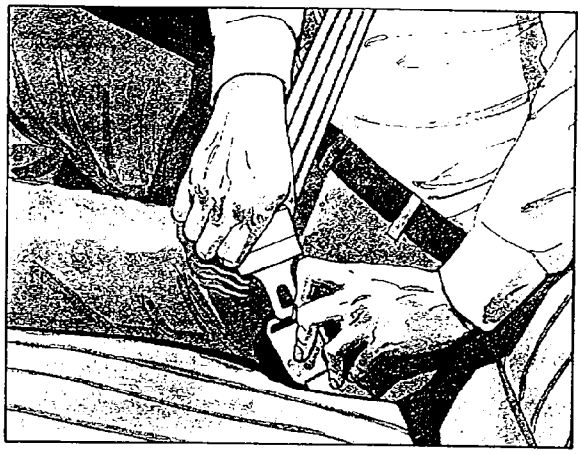


3. To make the lap part tight, pull down on the buckle end of the belt as you pull up on the shoulder part.

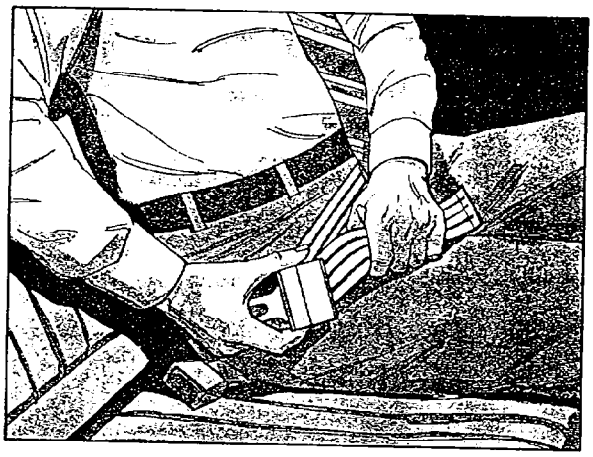
The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even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

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

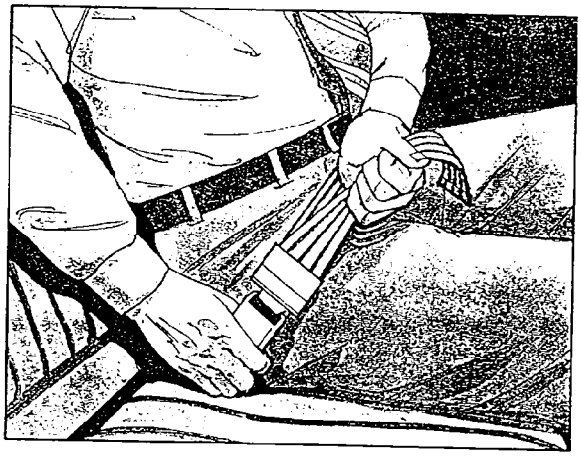
> **⚠ CAUTION:**
>
> **You can be seriously hurt if your shoulder belt is too loose. In a crash, you would move forward too much, which could increase injury. The shoulder belt should fit against your body.**



To unlatch the belt, just push the button on the buckle.



When you sit in the center seating position, you have a lap safety belt, which has no retractor. To make the belt longer, tilt the latch plate and pull it along the belt.



To make the belt shorter, pull its free end as shown until the belt is snug.

Buckle, position and release it the same way as the lap part of a lap-shoulder belt. If the belt isn't long enough, see "Safety Belt Extender" at the end of this section.

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