V2765

REPORT NUMBER: CAL-98-18

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

Saturn Corporation
1998 Saturn SL
4-Door Sedan

NHTSA NUMBER: MW0111

CALSPAN TEST NUMBER: 8413-17

CALSPAN CORPORATION
TRANSPORTATION SCIENCE CENTER
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BUFFALO, NEW YORK 14225

January 22, 1998

FINAL REPORT

PREPARED FOR:

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Safety Performance Standards
Office of Crashworthiness Standards
Mail Code: NPS-10
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FINAL REPORT ACCEPTANCE BY OCS:

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Manager, New Car Assessment Program (NCAP)
NHTSA, Office of Crashworthiness Standards

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Date of Report Acceptance

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15. *Supplementary Notes*		

16. *Abstract*

A frontal barrier test of a 1998 Saturn SL 4-Door Sedan was performed at Calspan Corporation crash test facility in Buffalo, New York, on January 22, 1998.

The impact velocity was 56.6 kph and the temperature at the barrier face was 20.6°C. The maximum post-test vehicle crush was 595 mm. The test vehicle was equipped with a 3-point belt system and supplemental second generation airbags at both front outboard seating positions.

With respect to FMVSS 208 "Occupant Crash Protection - Injury Criteria" both the driver and passenger appear to comply with the head, chest and femur requirements.

17. *Key Words* 56 kph Frontal Barrier Impact test New Car Assessment Program (NCAP)	18. *Distribution Statement* Copies of this report are available from: NHTSA Technical Reference Division National Highway Traffic Safety Admin. 400 Seventh St., SW, Room 5108 Washington, DC 20590

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Section 1

PURPOSE AND SUMMARY OF TEST MW0111

PURPOSE

This 56.6 kph frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-96-D-02010. 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 48.3 kph requirements.

The 56.6 kph frontal barrier impact test was conducted in accordance with the Office of Market Incentives (OMI) Laboratory Indicant Test procedure.

SUMMARY

A barrier was impacted by a 1998 Saturn SL 4-Door Sedan at a velocity of 56.6 kph. The test was performed at the Calspan Corporation on January 22, 1998. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by 1 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, chest, and pelvis triaxial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 061) was calibrated previous to this test and the right-front passenger (position 2) ATD (Serial No. 150) was used for one previous test. Injury criteria for ATD Serial No. 150 was not exceeded in the previous test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 95 channels of data were recorded on a P.C. based data acquisition system. Appendix B contains the vehicle and dummy response data traces. Position 1 Left Femur transducer sustained a cut wire approximately 30 msec after T-zero. Position 2 Belt Elongation transducer sustained a cut wire approximately 60 msec after T-zero. Accelerometer 3 Engine Top X and 5 Right Caliper X sustained a cut wires approximately 25 msec after T-zero. Accelerometer 4 Engine Bottom X sustained a damaged data cable after 20 msec. Position 1 Left Ankle X data noisy after 70 msec. Position 2 Right Lower Tibia FZ transducer sustained a cut wire approximately 80 msec after T-zero. Load Cell Barrier data channels not requested for this test.

The driver's HIC was 435.1. The maximum chest deceleration over 3 milliseconds was 40.2 g's and maximum chest deflection was 40.8 mm. Femur load was -2046.8 Newtons on the right.

The right front passenger's HIC was 584.7. Maximum chest deceleration over 3 milliseconds was 43.5 g's and maximum chest deflection was 35.0 mm. Femur loads were -4907.7 Newtons on the left and -4038.0 Newtons on the right.

SECTION 2

GENERAL TEST AND VEHICLE PARAMETER DATA

DATA SHEET NO. 1 CRASH TEST SUMMARY

Vehicle NHTSA No. : MW0111 Test Mode : 56 kph Frontal Barrier

Test Date : January 22, 1998 Time: 14:30 Temperature : 20.6 °C

Vehicle Make/Model/Body Style : 1998 Saturn SL 4-Door Sedan

Vehicle Test Weight : 1226 kg

Vehicle/Barrier Impact Angle : 0 °

Impact Velocity : 56.6 kph

Maximum Static Crush : 595 mm

Vehicle Rebound : 361.7 mm

DUMMIES:	DRIVER	PASSENGER
Type :	572E	572E
Restraint System :	Airbag with 3-point belt system	Airbag with 3-point belt system

Number of Data Channels : 95

Number of Cameras : 1 Real Time

16 High Speed

DOOR OPENING DATA : Closed /Operable - Left Front

Closed/Operable - Right Front

Front Seat(s) Data :	DRIVER	PASSENGER
Seat Track Failure :(mm of shift)	10 mm	10 mm
Seat Back Failure :	NONE	NONE

VISIBLE DUMMY CONTACT POINTS :	DRIVER	PASSENGER
Head :	Face into Airbag	Face into Airbag / Back of Head to Headrest
Abdomen :	-	-
Chest	Airbag	Airbag
Knees	Knee Bolster	Knee Bolster

DATA SHEET NO. 2 GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION :

Year/Make/Model/Body Style : 1998 Saturn SL 4-Door Sedan

NHTSA No. : MW0111 ; VIN: 1G8ZF5289WZ153108 ; Color : White

Engine Data: 4 cylinders; x CID; 1.8 Liters; x cc

Placement : x Longitudinal or In-Line; - Transverse or Lateral

Transmission Data : 5 speeds; x Manual; - Automatic; - Overdrive

Final Drive : - Rear Wheel Drive; x Front Wheel Drive; - Four Wheel Drive

Major Options : - A/C; - Pwr.Strg.; x Pwr. Brakes

- Pwr. Windows; - Pwr. Door Locks; x Tilt Wheel

Date Received : 1/8/98 ; Odometer Reading 16 km

Selling Dealer : Saturn of Clarence

& Address: 5535 Transit Rd. Williamsville, N.Y. 14221

DATA FROM TIRE VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by : Saturn Corporation

Date of Manufacture 9/97

GVWR : 1446 kg; GAWR: 722 kg FRONT; 724 kg REAR

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load : 210 kpa FRONT

180 kpa REAR

Recommended Tire Size : P175/70R14

* Recommended Cold Tire Pressure : 210 kpa FRONT; 180 kpa REAR

Size of Tires on Test Vehicle: P175/70R14 ; Manufacturer: Firestone

Vehicle Capacity Data :

Type of Front Seats: - Bench; x Bucket; - Split Bench

Number of Occupants: 2 Front; 3 Rear; 5 Total

Vehicle Capacity Weight (VCW) = 392 kg

No. of Occupants x 68 kg = 340 kg

Rated Cargo/Luggage Weight (RCLW) = 52 kg

*Tire pressure used for test

DATA SHEET NO. 2 GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids)= UDW:

Right Front =	302.5	kg	Right Rear =	212	kg
Left Front =	310.5	kg	Left Rear =	204	kg
TOTAL FRONT =	613.0	kg	TOTAL REAR =	416.0	kg

TOTAL DELIVERED WEIGHT = 1,029.0 kg

% of Total Front of Vehicle Weight = 59.6 % of Total Rear Weight = 40.4 %

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW) =	1,029.0	kg
Rated Cargo/Luggage Weight (RCLW) =	52.0	kg
Weight of 2 p.572 Dummies @ 76 each =	152	kg
TARGET TEST WEIGHT =	1,233.0	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 45 KG OF CARGO WEIGHT:

Right Front =	332	kg	Right Rear =	283	kg
Left Front =	332	kg	Left Rear =	279	kg
TOTAL FRONT =	664.0	kg	TOTAL REAR =	562.0	kg

TOTAL TEST WEIGHT = 1,226.0 kg

% of Total Front Weight = 54.2 % % of Total Rear Weight = 45.8 %

Weight of Ballast Secured in Vehicle Trunk Area = 0 kg

Vehicle Components Removed for Weight Reduction: Trunk Lid, Mirrors and Muffler

VEHICLE ATTITUDE (all dimension in millimeters):

AS DELIVERED :	RF	672	LF	675	RR	675	LR	670
FULLY LOADED :	RF	656	LF	660	RR	646	LR	647
AS TESTED :	RF	662	LF	660	RR	647	LR	648

Vehicle's Wheel Base : 2595 mm

Location of Vehicle's C.G. : 1,189.6 mm rearward of front wheel center.

FUEL SYSTEM DATA :

Fuel System Capacity From Owner's Manual = 47.2 liters

Usable Capacity Figure Furnished by COTR = 47.2 liters

Test Volume Range (92 to 94% of Usable Capacity) = 43.4 to 44.3 liters

ACTUAL TEST VOLUME= 43.5 liters (with entire fuel system filled)

Test Fluid Type: Stoddard Solution ; Spec. Grav. = 0.764

Kinematic Viscosity = 0.96 centistokes; Color = Orange

Type of Fuel Pump: Electric- x ; Mechanical- -

Does Electric Pump operate with ignition switch "ON" & engine "OFF" Yes- x No- -

Details of Fuel System Fuel filler is aft of rear axle on left side, fuel tank is centered over axle and fuel lines run along left frame rail.

DATA SHEET NO. 3 POST IMPACT DATA

TYPE OF TEST:

Type of Test : Frontal Barrier Impact Angle : 0°

Test Date : January 22, 1998 Time: 14:30 Temperature: 20.6 °C

Vehicle NHTSA No. : MW0111

Required Impact Velocity Range : 55.7 to 57.1 kph

BARRIER IMPACT VELOCITY : (Speed traps within 5 feet of impact plane.)

Trap No. 1 = 56.6 kph; Trap No. 2 = 56.6 kph

Distance from vehicle to barrier : (1) entering trap = 813 mm

(2) exiting trap = 305 mm

VEHICLE STATIC CRUSH: (mm) (For frontal and rear impacts only.)

Vehicle Length:

Pre-Test	Right =	4440	; C/L =	4485	; Left =	4440
Post-Test	Right =	3860	; C/L =	3890	; Left =	3875
Crush	Right =	580.0	; C/L =	595.0	; Left =	565.0
AVERAGE	=	580.0	mm			

VEHICLE REBOUND: (From rigid barrier only.)

Distance from front of test vehicle to impact point :

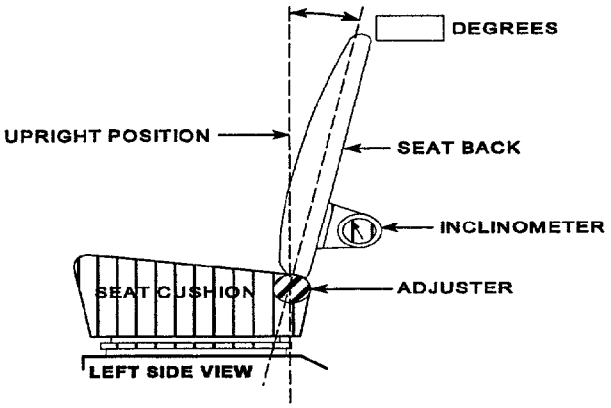
	Right =	359	; C/L =	362	; Left =	364
AVERAGE	=	361.7	mm			

DATA SHEET NO. 4 TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year : 1998 Vehicle Model: Saturn SL Body Style : 4-Door Sedan

1. Nominal Design Riding Position for adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.



FRONT SEAT ASSEMBLY

Seat back angle for driver's seat : *

Measurement instructions : * Seat back was placed in 2nd notch from full up position at Saturn representative's request

Seat back angle for passenger's seat : *

Measurement instructions : * Seat back was placed in 2nd notch from full up position at Saturn representative's request

2. Seat Fore and Aft Positioning

Positioning of the driver's seat : Mechanical midpoint - 19 detents were located and was placed in 10th.

Positioning of the passenger's seat (if applicable) : Mechanical midpoint - 19 detents were located and was placed in 10th.

3. Fuel Tank Capacity Data

3.1

A. "Usable Capacity" of the standard equipment fuel tank is 47.2 liters

B. "Usable Capacity" of the optional equipment fuel tank is - liters

C. "Usable Capacity" of the vehicle(s) used for certification testing to requirements of FMVSS 301 = 47.2 liters

3.2 Amount of Stoddard solvent added to vehicle(s) used for certification test(s) = 42.5 liters

3.3 Is vehicle equipped with electric fuel pump? Yes- x ; No- -

If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.

With ignition turned on.

4. STEERING COLUMN ADJUSTMENTS :

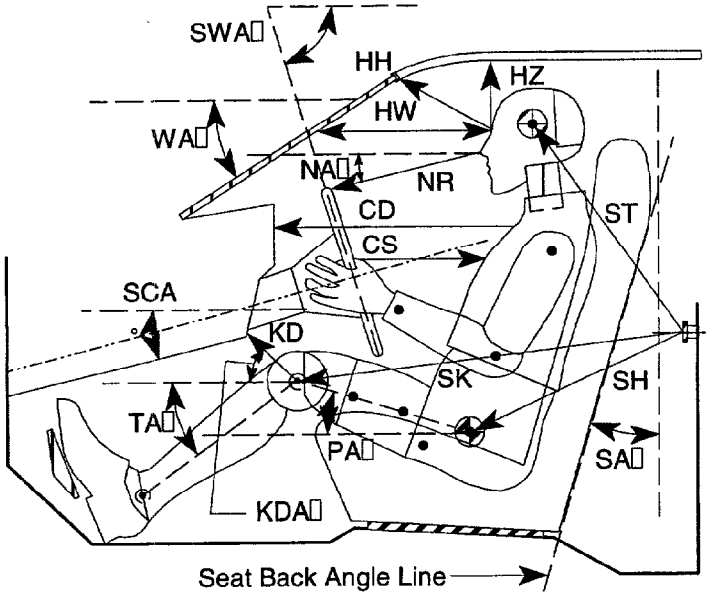
Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

Operational Instructions: Mechanical midpoint - found lower and upper ranges of column and bisected distance.

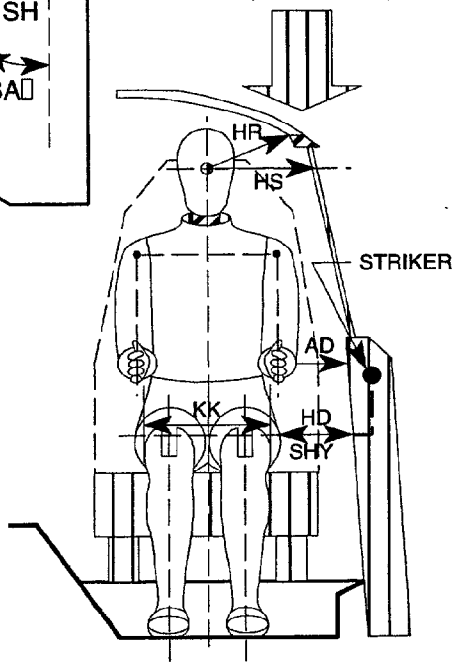
5. SEAT BELT UPPER ANCHORAGE

Nominal design riding position: Mechanical midpoint - located 5 notches and placed in 3rd.

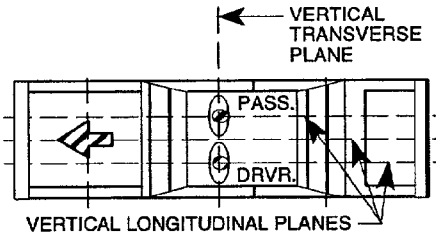
DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



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



DATA SHEET NO. 5 FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE

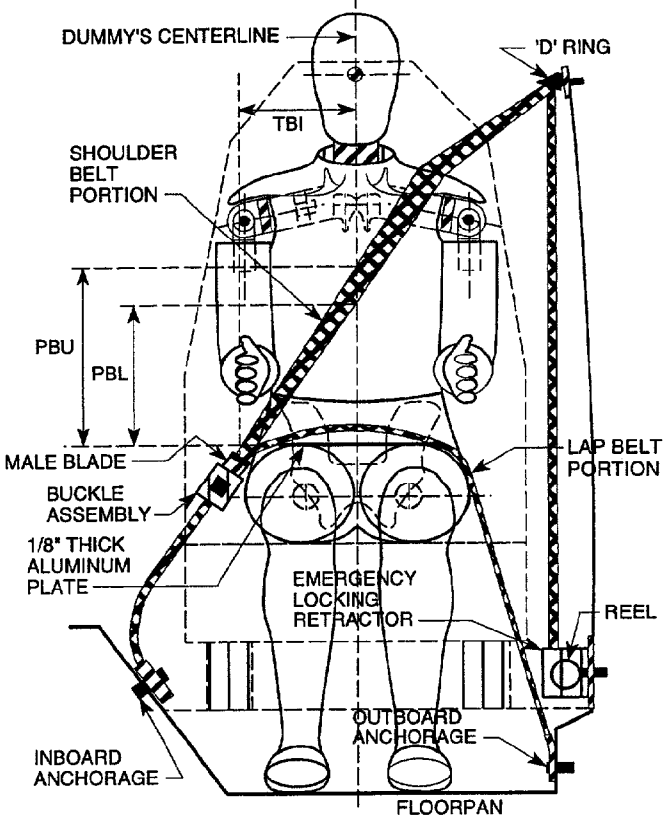
	DRIVER (Serial #061)			PASS. (Serial # 150)		
WA°	24 deg.			N/A		
SWA°	71 deg.			N/A		
SCA°	29 deg.			N/A		
SA°	* deg.			* deg.		
HZ	181			177		
HH	335			314		
HW	552			529		
HR	234			225		
NR	380	Angle	11 deg.	N/A		
CD	514			459		
CS	314			N/A		
RA	206			N/A		
KDL	177	Angle (KDA)	31 deg.	181		
KDR	191			163	Angle (KDA)	42 deg.
PA°	23 deg.			24 deg.		
TA°	42 deg.			35 deg.		
KK	288			278		
ST	474	Angle	8 deg.	508	Angle	9 deg.
SK	570	Angle	92 deg.	568	Angle	96 deg.
SH	242	Angle	139 deg.	231	Angle	136 deg.
SHY	176			180		
HS	319			298		
HD	124			119		
AD	109			91		

* Seatback was placed in 2nd notch position at Saturn representative's request.

Dimensions in millimeters

DATA SHEET NO. 6 SEAT BELT POSITIONING DATA

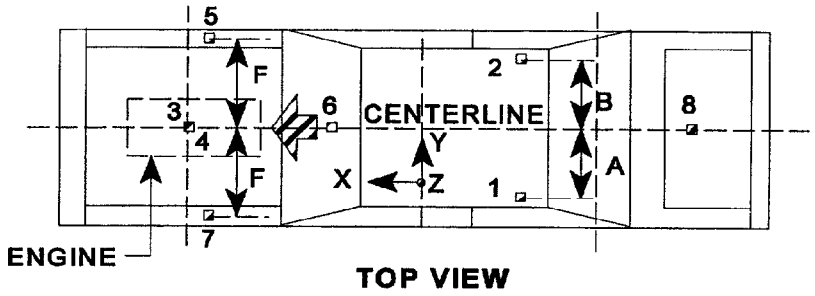
SEAT BELT POSITIONING DATA



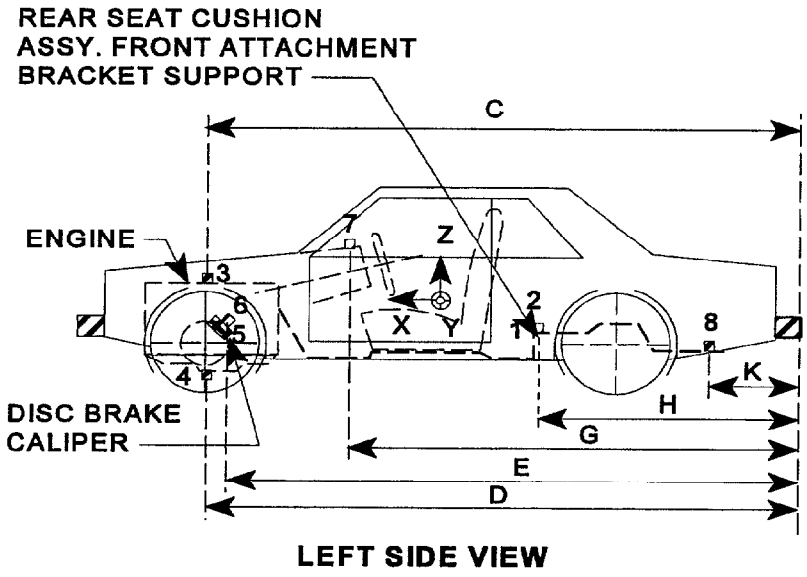
FRONT VIEW OF DUMMY

	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	329	324
PBL-- Top surface of alum. plate to belt lower edge	236	231
LAP BELT TENSION	Retractor	Retractor
SHOULDER BELT TENSION	Retractor	Retractor

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



TOP VIEW



LEFT SIDE VIEW

Note: Vehicle accelerometer location and data summary shown in DATA SHEET NO. 7

DATA SHEET NO. 7 VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

DIMENSION	LENGTH (mm)	
	PRE-TEST VALUES	
A Left Rear Seat Crossmember Y	503	536 redundant
B Right Rear Seat Crossmember Y	529	565 redundant
C Top of Engine X	3633	
D Bottom of Engine X	3594	
E Disc Brake Calipers X	3502	
F Disc Brake Calipers Y	596	
G Instrument Panel X	2726	
H Rear Seat Crossmembers X	1559	

LOCATION NUMBER	DESCRIPTION	MAXIMUM VALUE (g's)			
		Pos.	msec.	Neg.	msec.
1	Rear Seat X-Member @ Left Side	2.0	159.9	-37.6	74.5
2	Rear Seat X-Member @ Right Side	1.2	146.2	-34.3	68.3
3	Top of Engine Block	*	*	*	*
4	Bottom of Engine	**	**	**	**
5	Disc Brake Caliper @ Left Side	*	*	*	*
6	Disc Brake Caliper @ Right Side	13.4	53.9	-58.1	63.3
7	Instrument Panel	7.6	66.6	-112.6	45.3
8	Rear Seat X-Member @ Left-Redundant	2.1	149.7	-36.5	74.4
9	Rear Seat X-Member @ Right-Redundant	2.1	140.9	-35.0	69.0

*Transducer sustained a cut wire approximately 25 msec after T-zero.
**Data cable damaged after 20 msec.

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES

NHTSA Test No.: MW0111 Vehicle: 1998 Saturn SL 4-Door Sedan

DESCRIPTION	UNIT	MAXIMUM VALUE			
		Pos.	msec.	Neg.	msec.
Pos. 1 Head X	**g's**	8.0	245.3	-50.4	80.8
Pos. 1 Head Y	**g's**	3.9	64.2	-5.0	86.2
Pos. 1 Head Z	**g's**	24.6	75.6	-1.6	24.4
Pos. 1 Head Resultant	**g's**	53.9	78.6	0.1	-26.6
Pos. 2 Head X	**g's**	45.2	213.5	-52.8	87.2
Pos. 2 Head Y	**g's**	7.1	227.2	-16.3	208.3
Pos. 2 Head Z	**g's**	28.1	69.2	-1.9	129.6
Pos. 2 Head Resultant	**g's**	58.5	87.4	0.0	-24.0
Pos. 1 Chest X	**g's**	2.6	282.7	-42.5	75.1
Pos. 1 Chest Y	**g's**	2.4	64.9	-5.1	71.8
Pos. 1 Chest Z	**g's**	2.9	40.0	-8.9	90.8
Pos. 1 Chest Resultant	**g's**	42.8	75.1	0.0	-32.0
Pos. 1 Chest Displacement	**mm**	0.1	6.4	-40.8	92.5
Pos. 2 Chest X	**g's**	4.1	228.1	-44.6	91.4
Pos. 2 Chest Y	**g's**	8.6	65.4	-8.6	100.4
Pos. 2 Chest Z	**g's**	9.3	70.8	-6.3	123.6
Pos. 2 Chest Resultant	**g's**	45.1	91.4	0.0	-30.6
Pos. 2 Chest Displacement	**mm**	0.0	6.1	-35.0	90.6
Pos. 1 Left Femur	**N**	*	*	*	*
Pos. 1 Right Femur	**N**	538.5	38.4	-2046.8	74.8
Pos. 2 Left Femur	**N**	233. 5	126.2	-4907.7	52.8
Pos. 2 Right Femur	**N**	236. 5	47.9	-4038.0	58.9
Pos. 1 Left Belt Load	**N**	2933.9	75.6	-19.3	16.2
Pos. 1 Torso Belt Load	**N**	5352.4	88.8	-24.2	16.3
Pos. 2 Right Belt Load	**N**	1757.4	65.1	-27.4	16.5
Pos. 2 Torso Belt Load	**N**	7475.7	84.6	-3.8	-40.0

*Transducer sustained a cut wire approximately 30 msec after T-zero.

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)

NHTSA Test No.: MW0111 Vehicle: 1998 Saturn SL 4-Door Sedan

	HEAD INJURY CRITERIA (HIC)			
	HIC**	t_1 (msec)	t_2 (msec)	Average Acceleration t_1 to t_2
Position #1 - Driver	435.1	64.4	100.4	42.9
Position #2 - Passenger	584.7	67.6	103.6	48.3

** HIC is as defined in FMVSS 208. The maximum time interval from t_1 to t_2 is 36 milliseconds.

	CLIP SUMMARY*			
	CLIP (g's)	t_1 (msec)	t_2 (msec)	CSI
Position #1 - Driver	40.2	73.7	76.7	383.9
Position #2 - Passenger	43.5	89.4	92.4	433.7

* The maximum chest resultant acceleration is defined as the maximum acceleration which exceeds 0.003 seconds in duration.

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)
HYBRID III NECK AND PELVIC DATA SHEET

Vehicle Year/Make/Model/Body Style: 1998 Saturn SL 4-Door Sedan

NHTSA Test No.: MW0111 Test Date: January 22, 1998

DESCRIPTION	UNIT	MAXIMUM VALUE			
		Pos.	msec	Neg.	msec
Pos. 1 Upper Neck Fx	**N**	721.2	82.0	-510.9	115.9
Pos. 1 Upper Neck Fy	**N**	450.1	74.1	-234.1	115.7
Pos. 1 Upper Neck Fz	**N**	1662.1	74.3	-261.9	359.9
Pos. 1 Neck Force Result	**N**	1714.1	74.3	5.2	-23.8
Pos. 1 Upper Neck Mx	**N-m**	5.5	67.2	-17.0	74.1
Pos. 1 Upper Neck My	**N-m**	87.8	69.3	-15.1	51.4
Pos. 1 Upper Neck Mz	**N-m**	17.6	98.7	-5.1	50.0
Pos. 1 Neck Moment Result	**N-m**	89.1	69.3	0.1	-39.3
Pos. 2 Upper Neck Fx	**N**	260.3	302.3	-860.0	69.3
Pos. 2 Upper Neck Fy	**N**	620.3	74.8	-530.4	102.7
Pos. 2 Upper Neck Fz	**N**	2643.4	74.8	-396.7	16.2
Pos. 2 Neck Force Result	**N**	2839.5	74.8	3.5	-23.9
Pos. 2 Upper Neck Mx	**N-m**	6.3	236.6	-27.0	224.3
Pos. 2 Upper Neck My	**N-m**	41.3	115.5	-34.8	227.9
Pos. 2 Upper Neck Mz	**N-m**	26.1	236	-6.4	16.2
Pos. 2 Neck Moment Result	**N-m**	47.5	111.2	0.1	-31.5
Pos. 1 Pelvic (X)	**g's**	3.7	275.1	-37.8	62.5
Pos. 1 Pelvic (Y)	**g's**	5.3	76.0	-8.8	59.6
Pos. 1 Pelvic (Z)	**g's**	4.3	243.9	-21.1	84.6
Pos. 1 Pelvic (R)	**g's**	41.2	79.0	0.0	6.4
Pos. 2 Pelvic (X)	**g's**	3.6	186.2	-47.2	54.5
Pos. 2 Pelvic (Y)	**g's**	9.6	66.4	-7.7	106.4
Pos. 2 Pelvic (Z)	**g's**	5.8	215.5	-13.4	68.7
Pos. 2 Pelvic (R)	**g's**	47.8	54.5	0.0	-26.3

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)
HYBRID III LOWER LEG DATA SHEET

Vehicle Year/Make/Model/Body Style: 1998 Saturn SL 4-Door Sedan

NHTSA Test No.: MW0111 Test Date: January 22, 1998

DESCRIPTION	UNIT	MAXIMUM VALUE			
		Pos.	msec	Neg.	msec
P1 Lt Upper Tibia Mx	**N-m**	15.4	29.4	-43.6	38.5
P1 Lt Upper Tibia My	**N-m**	5.8	52.6	-97.7	35.9
P1 Lt Lower Tibia Fx	**N**	188.7	212.4	-599.5	35.9
P1 Lt Lower Tibia Fz	**N**	346.0	240.6	-3642.3	35.4
P1 Lt Lower Tibia My	**N-m**	59.7	32.9	-33.8	28.6
P1 Rt Upper Tibia Mx	**N-m**	42.6	74.1	-38.8	50.5
P1 Rt Upper Tibia My	**N-m**	150.0	72.7	-7.6	236.6
P1 Rt Lower Tibia Fx	**N**	206.5	235.8	-1689.4	72.1
P1 Rt Lower Tibia Fz	**N**	179.0	176.5	-1894.5	71.3
P1 Rt Lower Tibia My	**N-m**	198.2	68.7	-13.9	51.8
Pos. 2 Lt Upper Tibia Mx	**N-m**	40.9	70.2	-40.7	75.3
Pos. 2 Lt Upper Tibia My	**N-m**	11.0	233.3	-136.5	65.8
Pos. 2 Lt Lower Tibia Fx	**N**	214.7	211.3	-789.8	70.3
Pos. 2 Lt Lower Tibia Fz	**N**	495	173.9	-2759.1	67.1
Pos. 2 Lt Lower Tibia My	**N-m**	21.0	41.0	-32.3	52.1
Pos. 2 Rt Upper Tibia Mx	**N-m**	18.6	26.2	-19.2	98.3
Pos. 2 Rt Upper Tibia My	**N-m**	9.5	156.3	-68.0	69.1
Pos. 2 Rt Lower Tibia Fx	**N**	290.4	156.9	-573.0	71.8
Pos. 2 Rt Lower Tibia Fz	**N**	*	*	*	*
Pos. 2 Rt Lower Tibia My	**N-m**	24.8	59.0	-39.7	69.5

*Transducer sustained a cut wire approximately 80 msec after T-zero.

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)
HYBRID III ANKLE DATA SHEET

Vehicle Year/Make/Model/Body Style: 1998 Saturn SL 4-Door Sedan

NHTSA Test No.: MW0111 Test Date: January 22, 1998

DESCRIPTION	UNIT	MAXIMUM VALUE			
		Pos.	msec	Neg.	msec
Pos. 1 Left Ankle X	**g's**	*	*	*	*
Pos. 1 Left Ankle Z	**g's**	32.8	44.0	-71.8	35.6
Pos. 1 Left Toe Z	**g's**	68.9	33.0	-133.2	27.1
Pos. 1 Right Ankle X	**g's**	24.5	72.8	-65.6	50.9
Pos. 1 Right Ankle Z	**g's**	12.8	88.4	-97.5	57.3
Pos. 1 Right Toe Z	**g's**	41.2	62.6	-144.7	55.0
Pos. 2 Left Ankle X	**g's**	45.2	58.2	-57.8	67.5
Pos. 2 Left Ankle Z	**g's**	76.0	157.0	-60.8	99.0
Pos. 2 Left Toe Z	**g's**	163.6	157.5	-87.3	61.2
Pos. 2 Right Ankle X	**g's**	19.4	33.3	-44.1	68.6
Pos. 2 Right Ankle Z	**g's**	4.0	58.8	-58.7	69.6
Pos. 2 Right Toe Z	**g's**	23.4	58.7	-73.6	47.6

* Data is noisy after 70 msec.

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)
REDUNDANT DUMMY DATA

NHTSA Test No.: MW0111 Vehicle: 1998 Saturn SL 4-Door Sedan

DESCRIPTION	UNIT	MAXIMUM VALUE			
		Pos.	msec	Neg.	msec
Pos. 1 Head X(R)	**g's**	8.5	274.6	-53.3	80.6
Pos. 1 Head Y(R)	**g's**	7.7	83.9	-0.7	54.2
Pos. 1 Head Z(R)	**g's**	26.8	274.6	-2.8	359.9
Pos. 1 Head Resultant(RR)	**g's**	55.9	78.3	0.1	-24.8
Pos. 2 Head X(R)	**g's**	41.6	213.4	-55.7	86.3
Pos. 2 Head Y(R)	**g's**	37.5	44.7	-16.4	210.3
Pos. 2 Head Z(R)	**g's**	30.8	210.3	-7.9	16.3
Pos. 2 Head Resultant(RR)	**g's**	61.1	85.9	0.0	-26.9
Pos. 1 Chest X(R)	**g's**	2.6	281.9	-42.9	74.9
Pos. 1 Chest Y(R)	**g's**	2.5	57.5	-6.6	74.5
Pos. 1 Chest Z(R)	**g's**	4.1	235.2	-7.4	90.4
Pos. 1 Chest Resultant(RR)	**g's**	43.4	74.8	0.0	-31.3
Pos. 2 Chest X(R)	**g's**	4.6	229.1	-43.7	91.2
Pos. 2 Chest Y(R)	**g's**	6.1	71.4	-8.1	98.0
Pos. 2 Chest Z(R)	**g's**	12.5	74.9	-4.7	123.0
Pos. 2 Chest Resultant(RR)	**g's**	44.3	91.2	0.0	-33.2

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)
REDUNDANT DUMMY DATA

NHTSA Test No.: MW0111 Vehicle: 1998 Saturn SL 4-Door Sedan

	HEAD INJURY CRITERIA (HIC) **REDUNDANT**			
	HIC**	t_1 (msec)	t_2 (msec)	Average Acceleration t_1 to t_2
Position #1 - Driver	482.2	62.6	98.6	44.8
Position #2 - Passenger	630.7	67.2	103.2	49.8

** HIC is as defined in FMVSS 208. The maximum time interval from t_1 to t_2 is 36 milliseconds.

	CLIP SUMMARY* **REDUNDANT**			
	CLIP (g's)	t_1 (msec)	t_2 (msec)	CSI
Position #1 - Driver	40.9	73.5	76.5	387.5
Position #2 - Passenger	42.8	89.0	92.0	414.1

* The maximum chest resultant acceleration is defined as the maximum acceleration which exceeds 0.003 seconds in duration.

DATA SHEET NO. 9 SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:	Driver	Passenger
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	1810	1818
Shoulder belt length as measured on Part 572 Dummy.	831	839
Lap belt length as measured on Part 572 Dummy.	819	819
SHOULDER BELT SPOOL-OFF DATA:		
As determined by film analysis.	88.9	101.6
As determined mechanically.	87	97
As determined electronically.	n/a	n/a
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	49.6 mm/M	*
Measured mechanically.	1 mm	1 mm

* Transducer sustained a cut wire approximately 60 msec after T-zero.
Dimensions in millimeters

DATA SHEET NO.10 SUMMARY OF FMVSS 212 DATA

FMVSS NO. 212 - "WINDSHIELD MOUNTING" DATA

DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:

Windshield is bonded in place and covered with 20 mm molding.

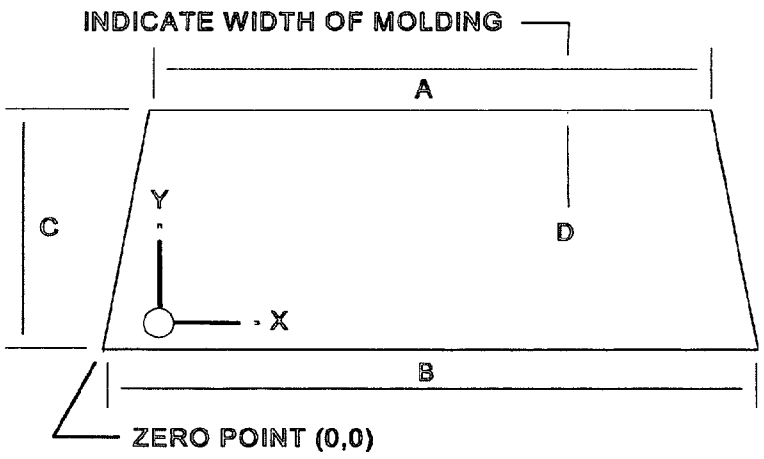
FMVSS 212 REQUIREMENTS:

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 the windshield for vehicles equipped with automatic restraint systems for front occupants,

FMVSS 212 TEST DATA

	WINDSHIELD PERIPHERY		
	PRE-TEST (mm)	POST-TEST(mm)	% OF RETENTION
RIGHT SIDE	2145	2145	100
LEFT SIDE	2145	2145	100
TOTAL	4,290	4,290	100

AREA OF RETENTION FAILURE: None



FRONT VIEW OF WINDSHIELD

DIMENSIONS (mm)	
A	1150
B	1540
C	800
D	20

FAILURE DETAILS: None

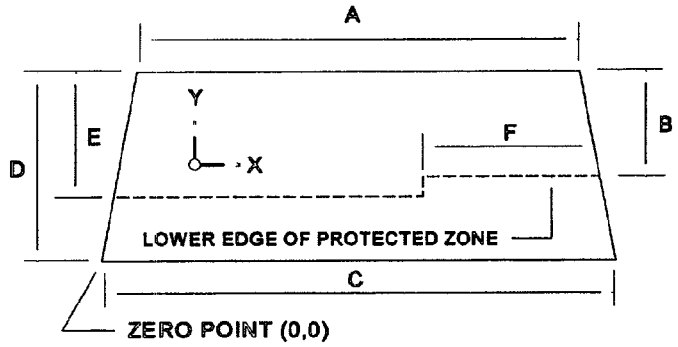
DATA SHEET NO. 11 FMVSS NO. 219 (PARTIAL) - "WINDSHIELD ZONE INTRUSION" DATA

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 165 mm diameter rigid sphere weighing 6.8 kg in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. The locus of points is drawn on the inner surface of the windshield contacted by the sphere across the width of the instrument panel. From the outermost contactable points extend the locus line horizontally to the edges of the windshield, then draw a line on the inner surface of the windshield below and 13 mm distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection of this line onto the outer surface of the windshield.

FMVSS 219 TEST DATA:

(Dimensions in mm)



FRONT VIEW OF WINDSHIELD

DIMENSIONS	
A	1150
B	540
C	1540
D	800
E	540
F	530

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 6 mm: None

(Show location of penetration on the above sketch)

	COORDINATES	
	X	Y
1.		
2.		
3.		
4.		

DATA SHEET NO. 12 FMVSS NO. 301-75 "FUEL SYSTEM INTEGRITY" POST IMPACT TEST DATA

NHTSA TEST No.:	MW0111	TEST DATE:	January 22, 1998
VEHICLE MAKE/MODEL:	1998 Saturn SL		

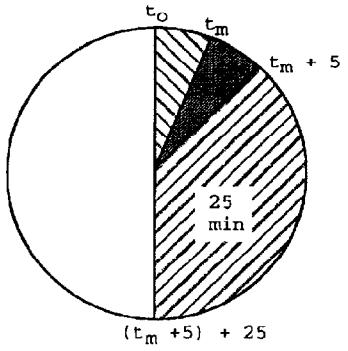
The test vehicle was filled from 92% to 94% of the manufacture's "usable" capacity. The electric fuel pump was operating if it will operate without engine operation. Two Part 572 anthropomorphic test devices were located at each of the front designated seating positions.

==========

TEST VEHICLE IMPACT TYPE:

X	Frontal (56 kph)
	Oblique (48 kph) with _____ deg. barrier face first contacting _____
-	(driver/passenger) side
-	Rear Moving Barrier (48 kph)
-	Lateral Moving Barrier (32 kph)

FUEL SPILLAGE MEASUREMENT:



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

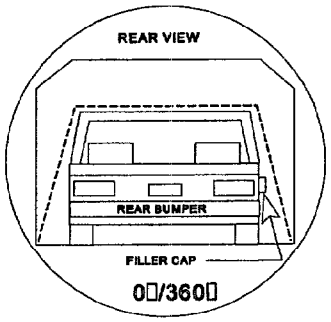
	ACTUAL	MAX ALLOWED
1.	0	28 g
2.	0	141 g
3.	0	28 g/min.

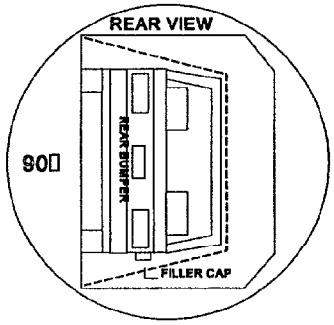
SOLVENT SPILLAGE DETAILS: None

DATA SHEET NO. 13 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:
0-90 deg.

NHTSA Test No.:
MW0111





INDETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	7	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	7	seconds
Next whole minute interval	7	minutes	00	seconds

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

141 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	n/a

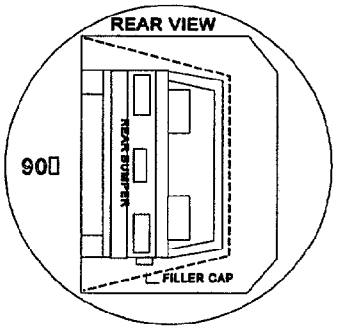
Note: Record spillage for whole minute intervals only as determined above.

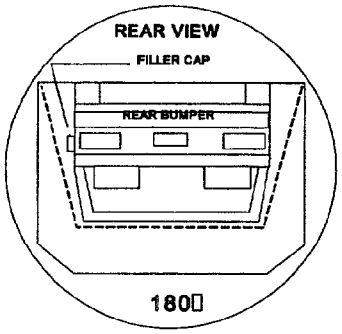
IV. SOLVENT SPILLAGE LOCATION(S): None

TEST SHEET NO. 13 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:
90-180 deg.

NHTSA Test No.:
MW0111





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	3	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	3	seconds
Next whole minute interval	7	minutes	00	seconds

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

141 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	n/a

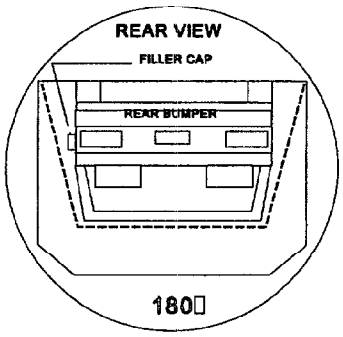
Note: Record spillage for whole minute intervals only as determined above.

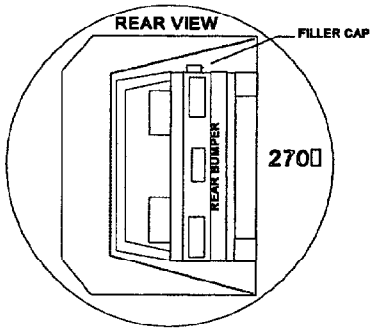
IV. SOLVENT SPILLAGE LOCATION(S): None

TEST SHEET NO. 13 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:
180-270 deg.

NHTSA Test No.:
MW0111





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	6	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	6	seconds
Next whole minute interval	7	minutes	00	seconds

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

141 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	n/a

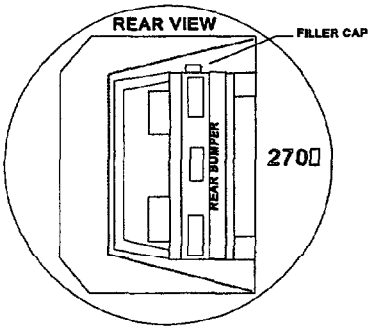
Note: Record spillage for whole minute intervals only as determined above.

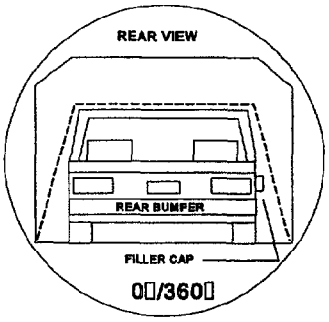
IV. SOLVENT SPILLAGE LOCATION(S): None

TEST SHEET NO. 13 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:
270-360 deg.

NHTSA Test No.:
MW0111





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	1	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	1	seconds
Next whole minute interval	7	minutes	00	seconds

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

141 g	28 g	28 g	28 g

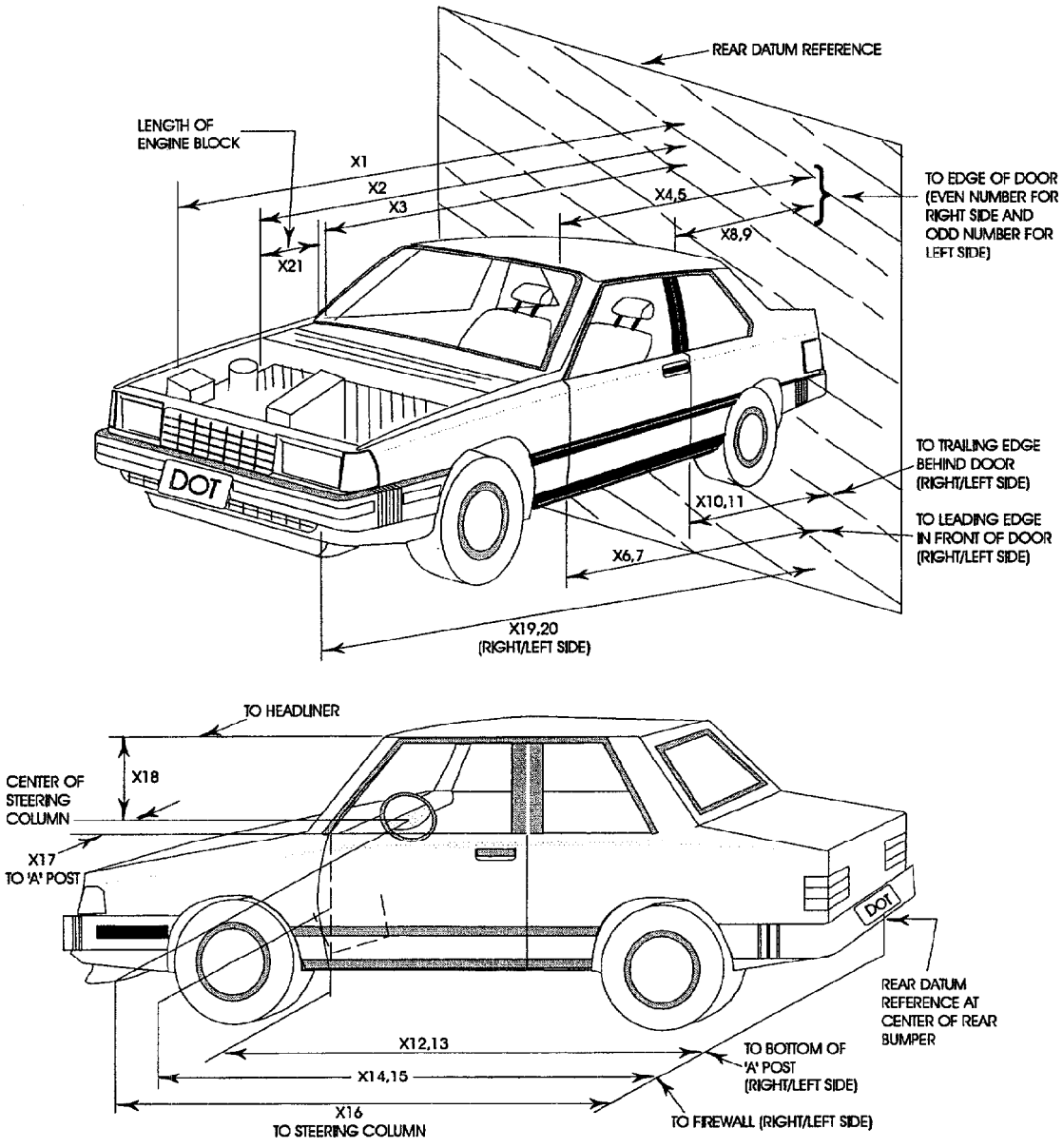
III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	n/a

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

IV. SOLVENT SPILLAGE LOCATION(S): None

TEST VEHICLE MEASUREMENTS



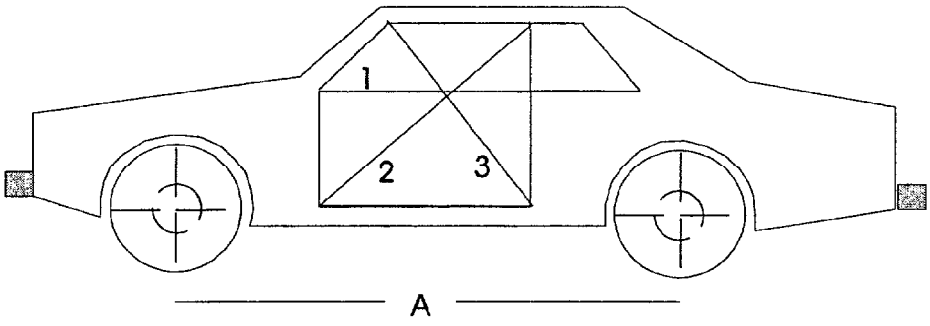
DATA SHEET NO.14 VEHICLE MEASUREMENTS

		All Dimensions in mm		
No.		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	4485	3890	595
X2	Rear Surface of Vehicle to Front of Engine	3760	3505	255
X3	Rear Surface of Vehicle to Firewall	5950	N/A	N/A
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	3012	2988	24
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	3023	3006	17
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	2984	2953	31
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	2989	2967	22
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2005	1992	13
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2010	1995	15
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2012	1986	26
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2015	1996	19
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	3065	3038	27
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	3072	3045	27
X14	Rear Surface of Vehicle to Firewall, Right Side	3370	3239	131
X15	Rear Surface of Vehicle to Firewall, Left Side	3390	3250	140
X16	Rear Surface of Vehicle to Steering Column	2595	2585	10
X17	Center of Steering Column to "A" Post	420	395	25
X18	Center of Steering Column to Headliner	420	390	30
X19	Rear Surface of Vehicle to Right Side of Front Bumper	4440	3860	580
X20	Rear Surface of Vehicle to Left Side of Front Bumper	4440	3875	565
X21	Length of Engine Block	420	420	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	2825	2815	10
CD	Rear Surface of Vehicle to Center of Dash Panel	2795	2785	10
LD	Rear Surface of Vehicle to Left Side of Dash Panel	2820	2820	0

DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)

VEHICLE INTRUSION MEASUREMENTS

DOOR OPENING WIDTH



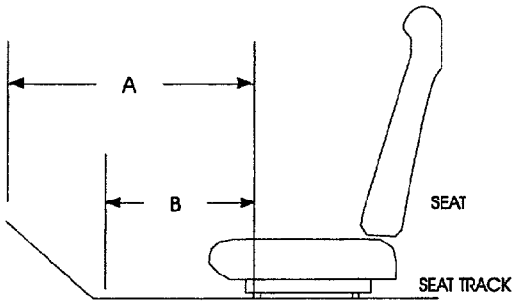
UNITS (mm)	LEFT			RIGHT		
MEASUREMENT	1	2	3	1	2	3
BEFORE TEST	935	1392	940	935	1415	940
AFTER TEST	930	1400	945	920	1410	955
DIFFERENCE	5	-8	-5	15	5	-15

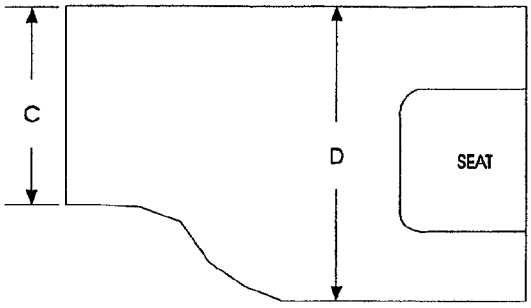
UNITS (mm)	A = WHEELBASE LEFT	A = WHEELBASE RIGHT
BEFORE TEST	2065	2060
AFTER TEST	2475	2475
DIFFERENCE	-410	-415

DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)

VEHICLE INTRUSION MEASUREMENTS

STATIC FOOTWELL DEFORMATION





DRIVER

Measurement	Pre-Test	Post-Test	Difference
A	640	610	30
B	580	575	5
C	435	430	5
D	465	450	15

PASSENGER

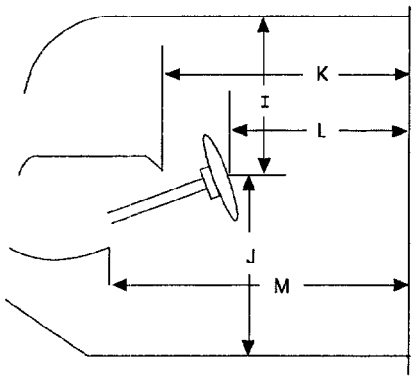
Measurement	Pre-Test	Post-Test	Difference
A	640	600	40
B	575	570	5
C	445	440	5
D	460	425	35

Units = mm

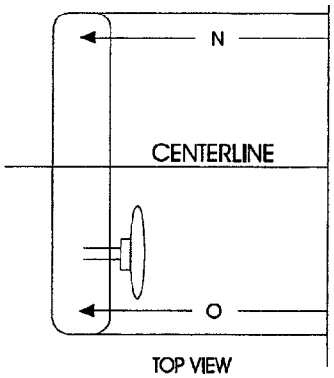
DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)

VEHICLE INTRUSION MEASUREMENTS

STATIC PASSENGER COMPARTMENT INTRUSION

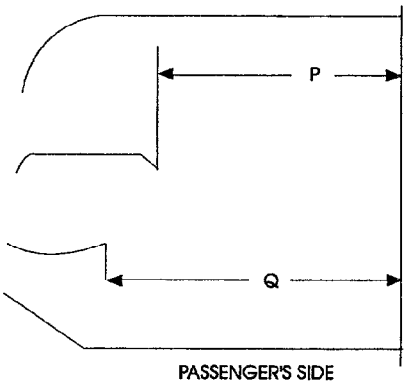


DRIVER'S SIDE



TOP VIEW

MEASUREMENTS
FROM C-PILLAR
BELT ANCHORAGE



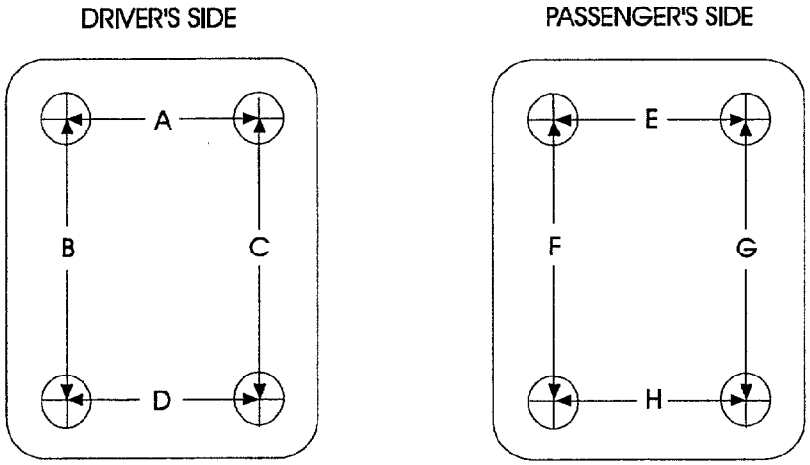
PASSENGER'S SIDE

Measurement	Pre-Test	Post-Test	Difference
I	410	375	35
J	620	655	-35
K	695	690	5
L	540	530	10
M	725	710	15
N	770	760	10
O	765	765	0
P = K (PASS.)	675	670	5
Q = M (PASS.)	720	675	45

Units = mm

DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)

FLOORBOARD DEFORMATION



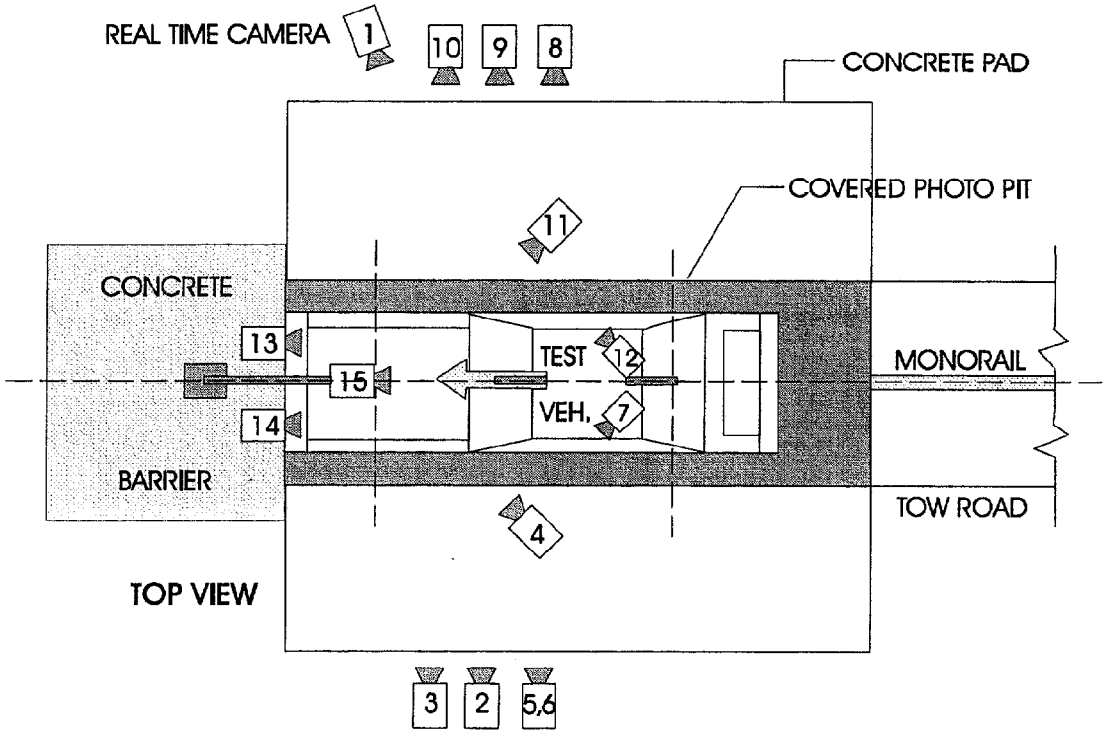
TOP VIEW THROUGH FLOOR PAN

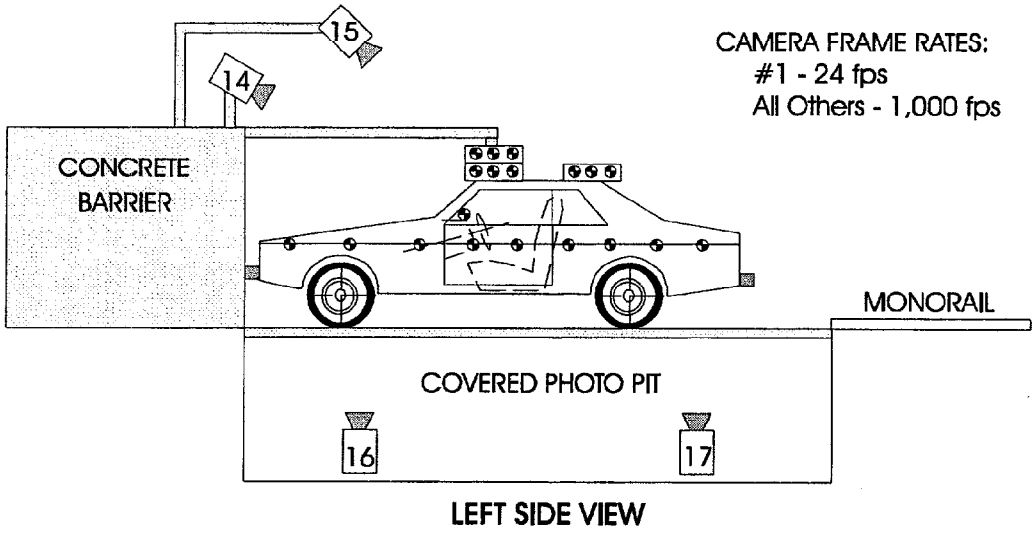
Measurement	Pre-Test	Post-Test	Difference
A	375	370	5
B	420	410	10
C	410	405	5
D	455	455	0
E	375	370	5
F	415	415	0
G	420	405	15
H	465	460	5

Units = mm

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera information shown in DATA SHEET NO. 15.





DATA SHEET NO.15 HIGH-SPEED CAMERA LOCATIONS

NHTSA Test No.: MW0111 Vehicle: 1998 Saturn SL 4-Door Sedan

CAMERA NO.	VIEW	CAMERA POSITIONS (mm)* X	Y	Z	ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
1	Real-Time Camera	-	-	-	-	-	-	24
2	Overall Left Side	6541	1573	1127	-3	6280	12.5	1010
3	Left Side View	7660	945	1141	-4	7399	25	1010
4	Driver and Interior View	4869	2847	1952	-15	-	25	1010
5	Steering Column (Bottom)	7220	1805	1170	-3	6959	25	1025
6	Steering Column (Top)	7220	1805	1776	-8	6959	25	1025
7	Left Belt	-	-	-	-	-	8	875
8	Overall Right Side	6259	2162	1093	-3	5998	13	1025
9	Right Side View	7716	1623	1209	-2	7455	25	n.t.
10	Right Passenger View	7620	1941	1570	-6	7359	35	1000
11	Passenger and Interior View	4732	3015	1961	-14	-	25	1025
12	Right Belt	-	-	-	-	-	8	850
13	Passenger Front View	580	0	2000	-49	-	8	1020
14	Driver Front View	580	0	2000	-51	-	8	1020
15	Windshield View	0	-147	3607	-55	-	13	1000
16	Pit View of Engine	0	835	-3048	90	-	13	950
17	Pit View of Fuel Tank	0	2572	-3048	90	-	13	1010

*X = film plane to monorail centerline

Y = film plane to impact location

Z = film plane to ground

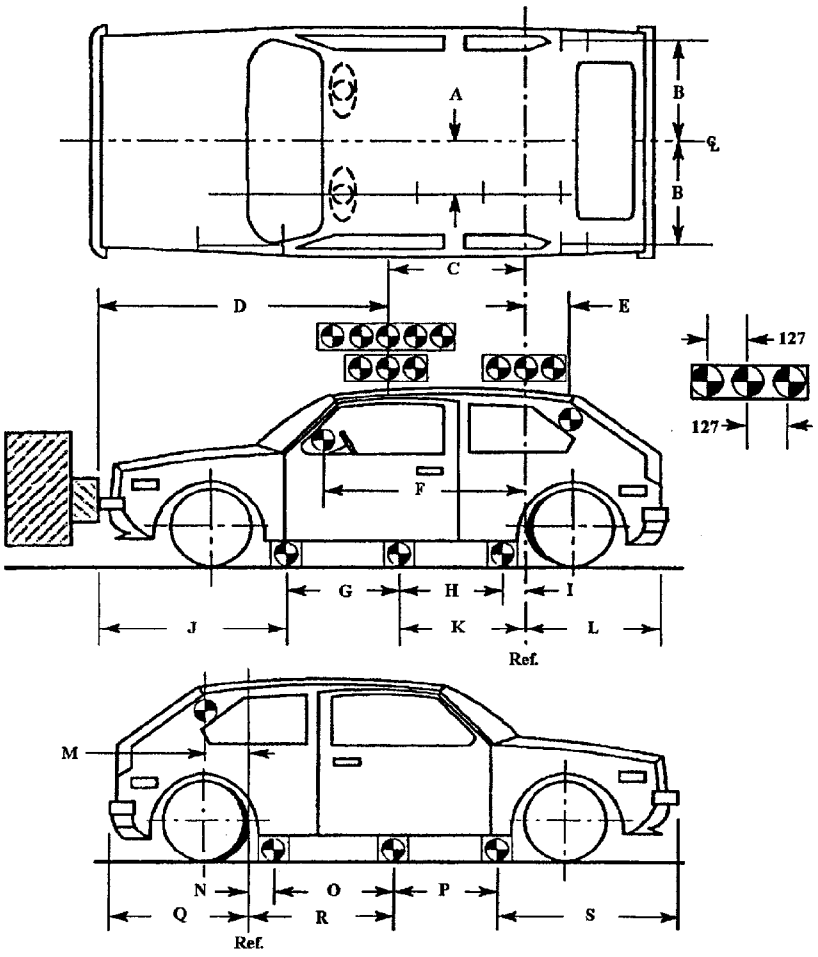
** = referenced to horizontal plane

N.T. indicates No Timing

DATA SHEET NO. 16 VEHICLE REFERENCE PHOTO TARGET LOCATIONS

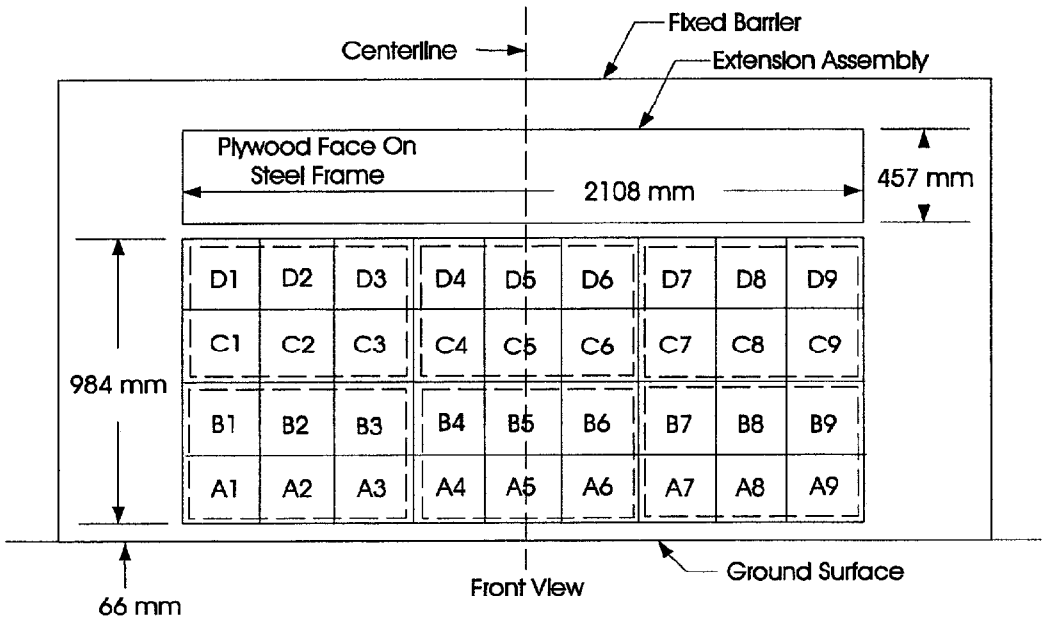
(Dimensions in millimeters)

A	338
B	1184
C	1222
D	2051
E	303
F	1489
G	900
H	900
I	84
J	1363
K	984
L	2138
M	303
N	84
O	900
P	900
Q	2138
R	984
S	1363



DATA SHEET NO. 17 LOAD CELL LOCATIONS ON FIXED BARRIER

LOAD CELL BARRIER NOT REQUESTED FOR THIS TEST
36 Load Cells
4 Rows
9 Columns
6 Groupings (6 cells/group)



6 GROUPS OF 6 LOAD CELLS EACH

Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

The following data is presented in Appendix B:

(1)Data from 36 individual load cells
(2)Total or Sum of 36 individual load cells
(3)Data from 6 Groupings shown above (6 cells/group)

DATA SHEET NO. 18 POST TEST AIR BAG DATA

NHTSA No. : MW0111; Test Date: January 22, 1998; Technician: J. Cz.

Vehicle Model Year/Make/Model: 1998 Saturn SL

A. No. of vent holes: 2 -Driver 0 -Passenger

B. Size of vent holes: (mm^2) 20 -Driver 0 -Passenger

C. Total vent area: (mm^2) 40 -Driver 0 -Passenger

D. Deflated air bag length and width dimensions or, if round, diameter. (mm)

Driver: - -Length; - -Width; 640 -Diameter

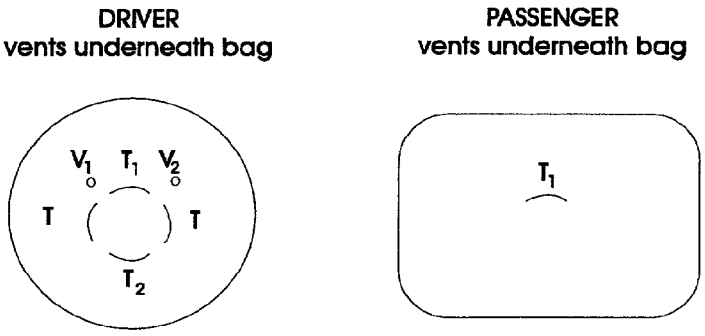
Passenger: 500 -Height; 770 -Width; 360 -Depth

E. Is the air bag tethered?

Driver: x -Yes; - -No; If yes, record length of tether- 240

Passenger: x -Yes; - -No; If yes, record length of tether- 220

Sketch the air bag showing the location of the vent holes, how the bag is tethered, and where the bag is tethered. Also describe how the tethers are attached to the bag and the steering wheel.
(Note: Not to scale; V_n = Vent hole$_n$, T_n = Tether$_n$).



F. Record part numbers and manufacturer name of the air bag and gas generator.

Driver: Air bag: -

Generator: 2106 AB0934IBRAXD74 MY98

Passenger: Air bag: -

Generator: 2106 AL0920ICF1255238 MY98

DATA SHEET NO.19 ACCIDENT INVESTIGATION DIVISION DATA

FOR 56.3 KPH FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: Saturn SL 4-Door Sedan

NHTSA Test No.: MW0111 VIN: IG8ZF5289WZ153108

Model Year: 1998 Build Date: 9/97 Test Date: January 22, 1998

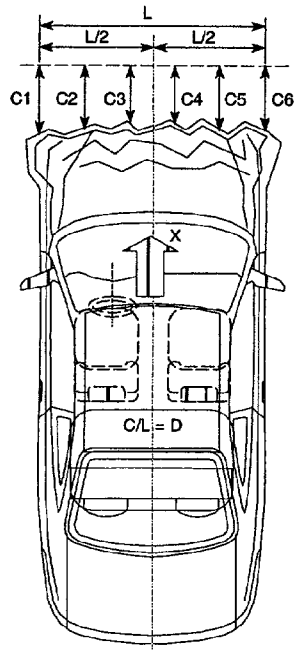
Vehicle Size Category: Sedan Test Weight: 1226 kg

Vehicle Wheelbase: 2595 mm; Front Overhang: 1363 mm; Overall Width: 1694 mm

Collision Deformation Classification (CDC) Code: 12FDEW3

Crush Depth Dimensions;

	PRE	POST	DIFF	
C1 =	4285	3825	-460	mm
C2 =	4445	3885	-560	mm
C3 =	4480	3890	-590	mm
C4 =	4485	3885	-600	mm
C5 =	4440	3865	-575	mm
C6 =	4290	3740	-550	mm



Midpoint of Damage: D = Vehicle Centerline (Longitudinal)

Length of Damaged Region:

L1= 1545 mm

L2= 772.5 mm

L3= 309 mm

Appendix A

PHOTOGRAPHS

PHOTOGRAPHS

PHOTOGRAPHS (continued)

PHOTOGRAPH NOT AVAILABLE

Figure A-1 LOAD CELL LOCATIONS

Figure A-2 PRE-TEST FRONT VIEW

Figure A-3 POST-TEST FRONT VIEW

Figure A-4 PRE-TEST LEFT SIDE VIEW

A-8

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Figure A-5 POST-TEST LEFT SIDE VIEW

Figure A-6 PRE-TEST RIGHT SIDE VIEW

Figure A-7 POST-TEST RIGHT SIDE VIEW

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Figure A-8 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

Figure A-9 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

Figure A-10 PRE-TEST LEFT REAR THREE-QUARTER VIEW

Figure A-11 POST-TEST LEFT REAR THREE-QUARTER VIEW

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Figure A-12 PRE-TEST WINDSHIELD VIEW

Figure A-13 POST-TEST WINDSHIELD VIEW

Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

Figure A-15 FUEL CAP VIEW

Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

Figure A-17 POST-TEST FRONT UNDERBODY VIEW

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Figure A-18 PRE-TEST FRONT SIDE UNDERBODY VIEW

Figure A-19 POST-TEST FRONT SIDE UNDERBODY VIEW

Figure A-20 PRE-TEST REAR UNDERBODY VIEW

Figure A-21 POST-TEST REAR UNDERBODY VIEW

Figure A-22 PRE-TEST DRIVER POSITION VIEW

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Figure A-23 POST-TEST DRIVER POSITION VIEW

Figure A-24 PRE-TEST PASSENGER POSITION VIEW

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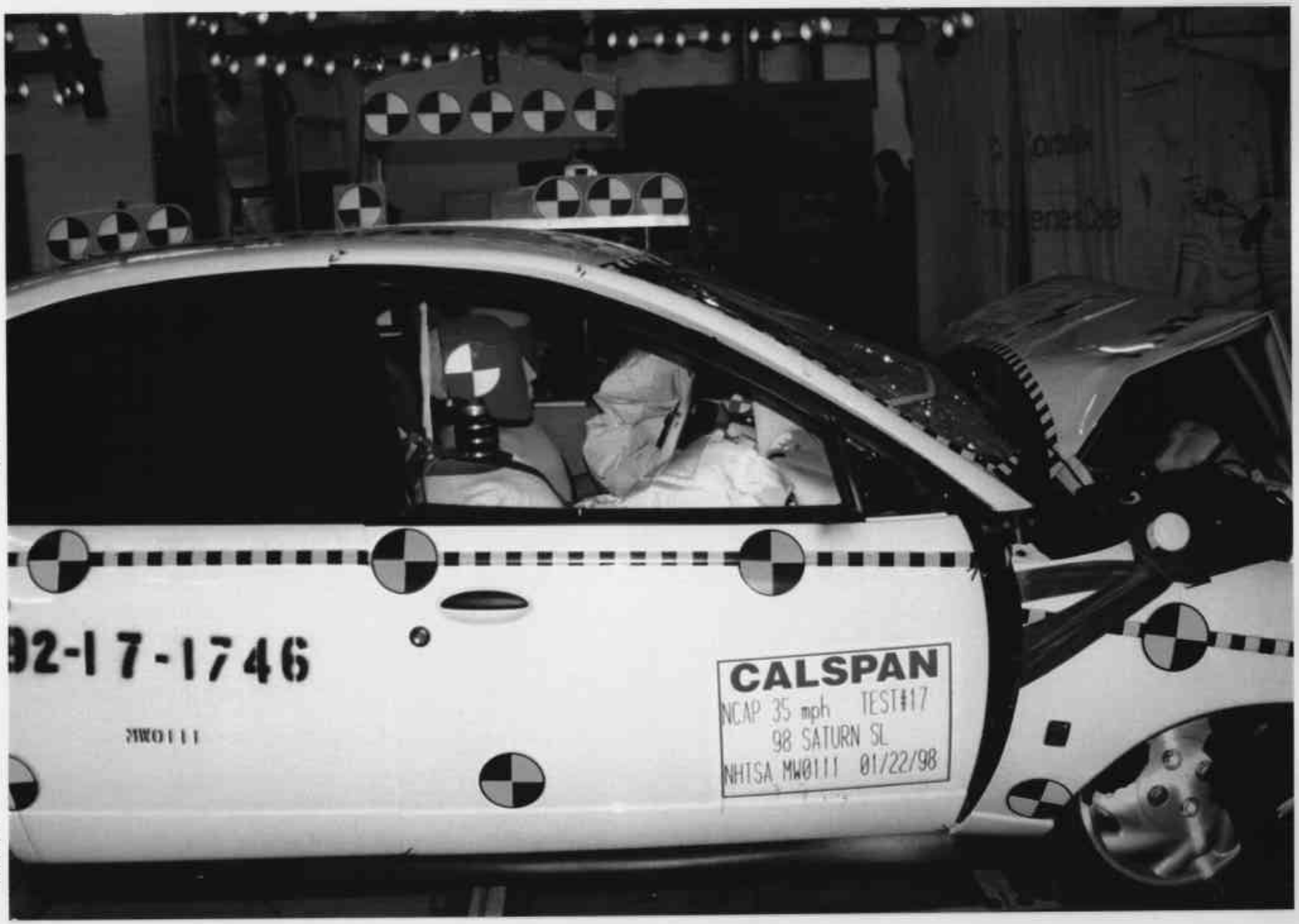

Figure A-25 POST-TEST PASSENGER POSITION VIEW

A-29

8413-17

Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW

A-30

8413-17

Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW

Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW

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Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW

Figure A-30 PRE-TEST DRIVER HEAD LOCATION

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Figure A-31 POST-TEST DRIVER HEAD LOCATION

Figure A-32 PRE-TEST PASSENGER HEAD LOCATION

Figure A-33 POST-TEST PASSENGER HEAD LOCATION

Figure A-34 PRE-TEST DRIVER FLOOR PAN VIEW

Figure A-35 POST-TEST DRIVER FLOOR PAN VIEW

Figure A-36 PRE-TEST PASSENGER FLOOR PAN VIEW

Figure A-37 POST-TEST PASSENGER FLOOR PAN VIEW

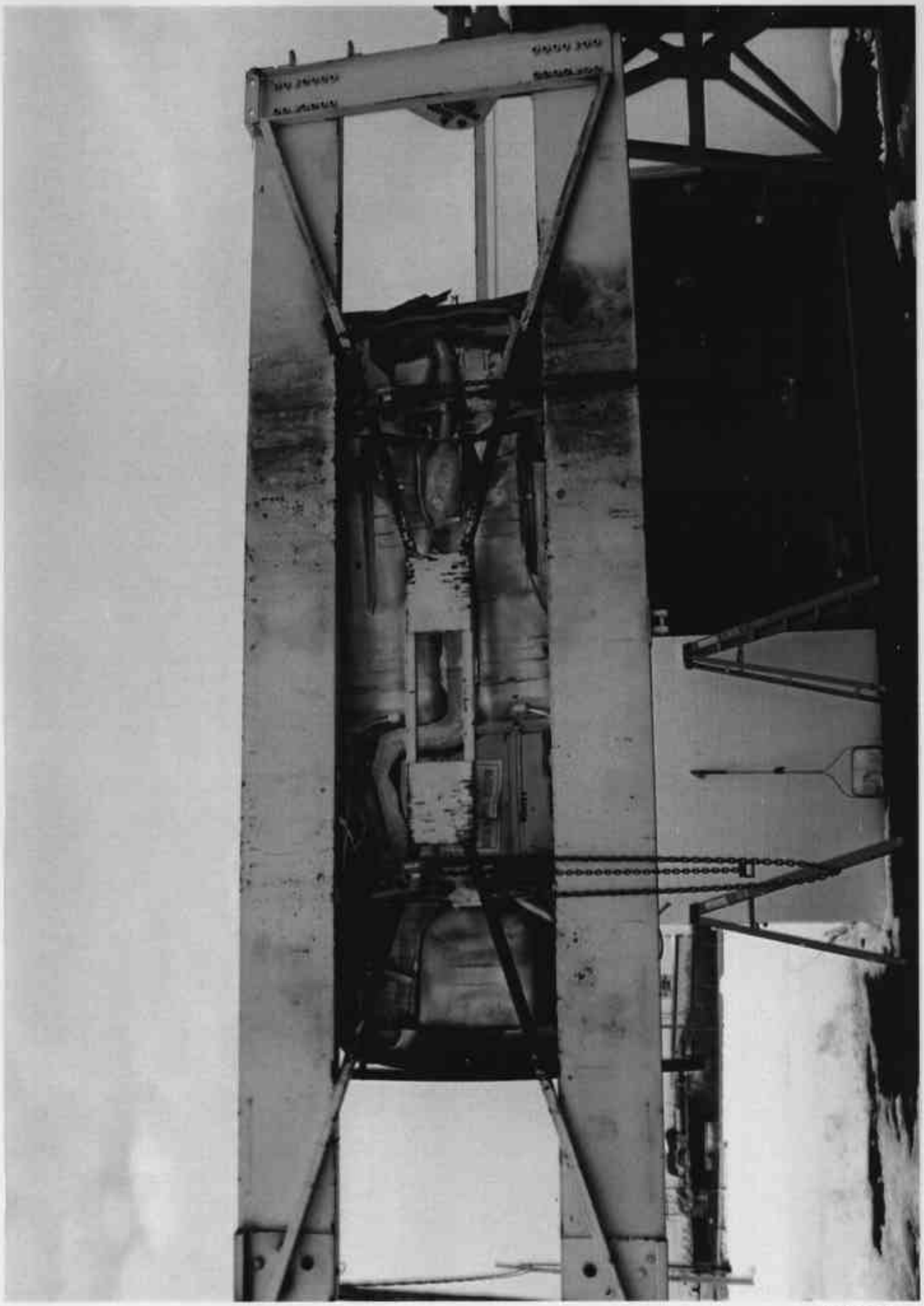


Figure A-38 ROLLOVER VIEW

Figure A-39 IMPACT VIEW

Appendix B

DUMMY, VEHICLE AND LOAD CELL BARRIER RESPONSE DATA

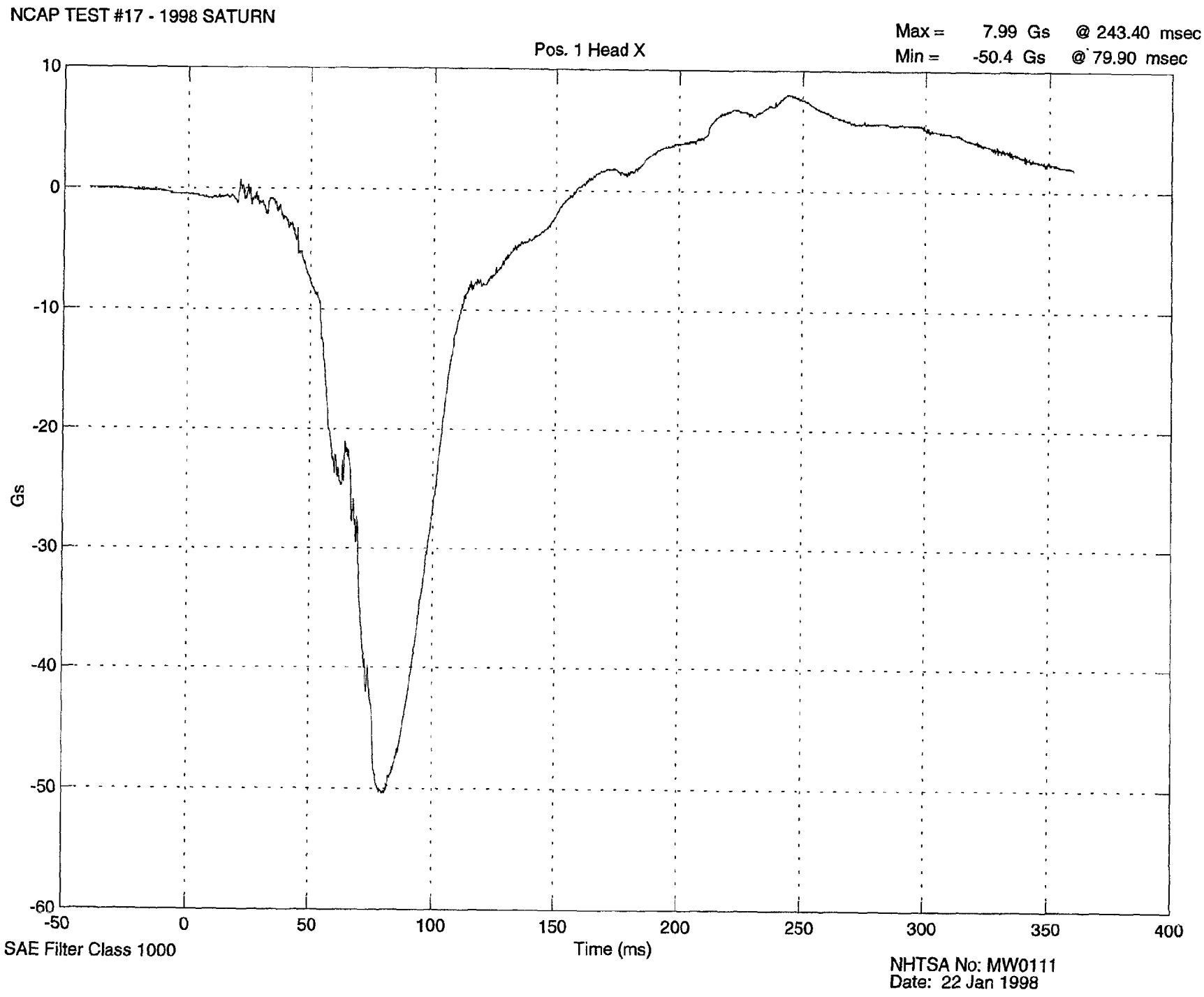
Hybrid III Dummy Sign Conventions
Load Cells and Special Transducers

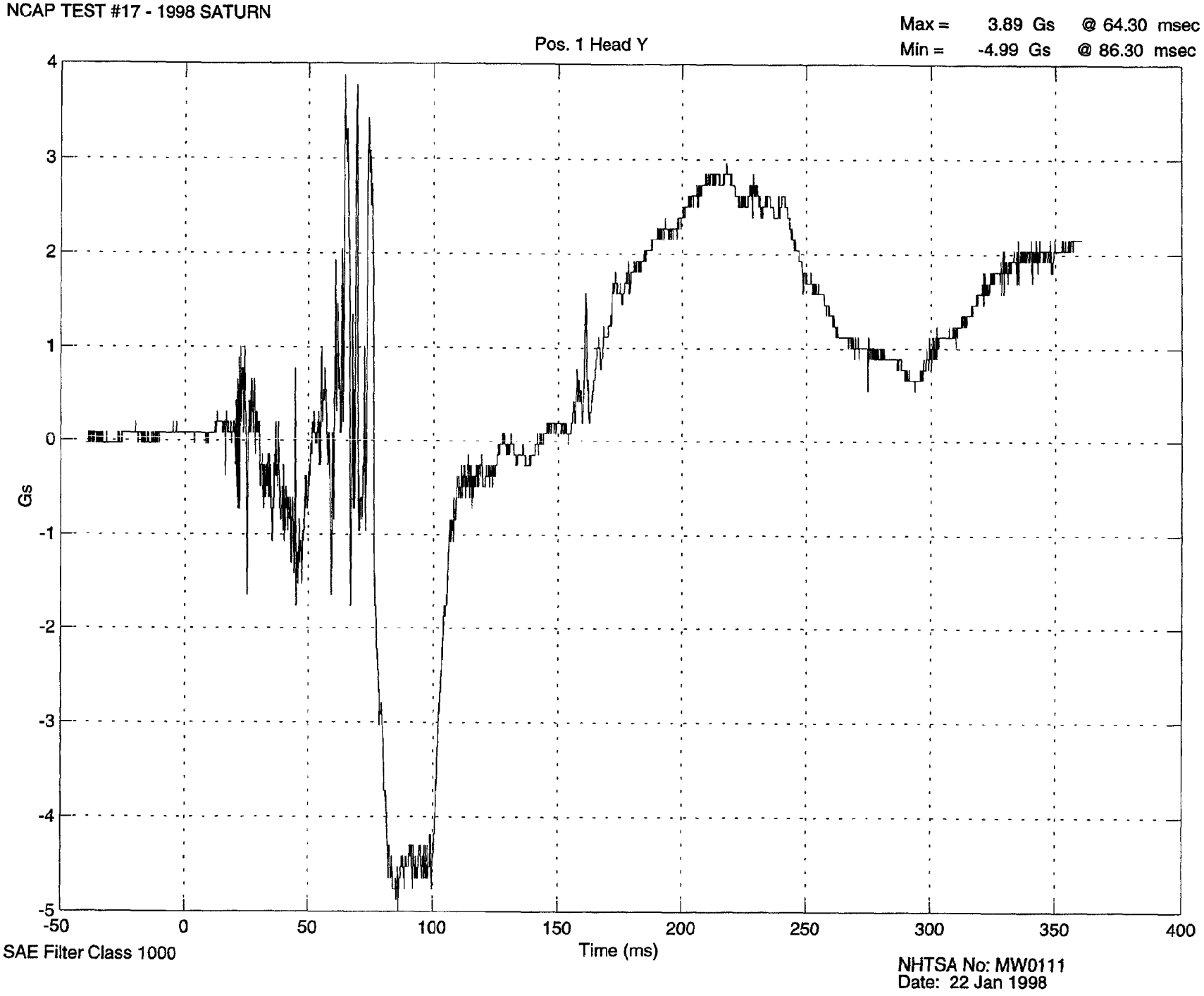
Transducer	DOT/NHTSA Sign Convention (positive unless noted)
Upper Neck Load Cell	Fx Head forward Fy Head left Fz Neck in tension Mx Right ear to right shoulder My Chin to chest (flexion) Mz Chin to left shoulder (look left)
Chest Displacement Potentiometer	Compression is negative
Pelvic Load Cell (Lower Lumbar)	Fx Chest forward Fy Chest left Fz Spine in tension
Femur Load Cell	Compression is negative
Upper Tibia Load Cell (right and left leg)	Mx Support tibia, load right side center My Support tibia, load front (shin) center
Lower Tibia Load Cell (right and left leg)	Fy Foot right w/r to left Fz Tibia in tension Mx Support tibia, press right side center

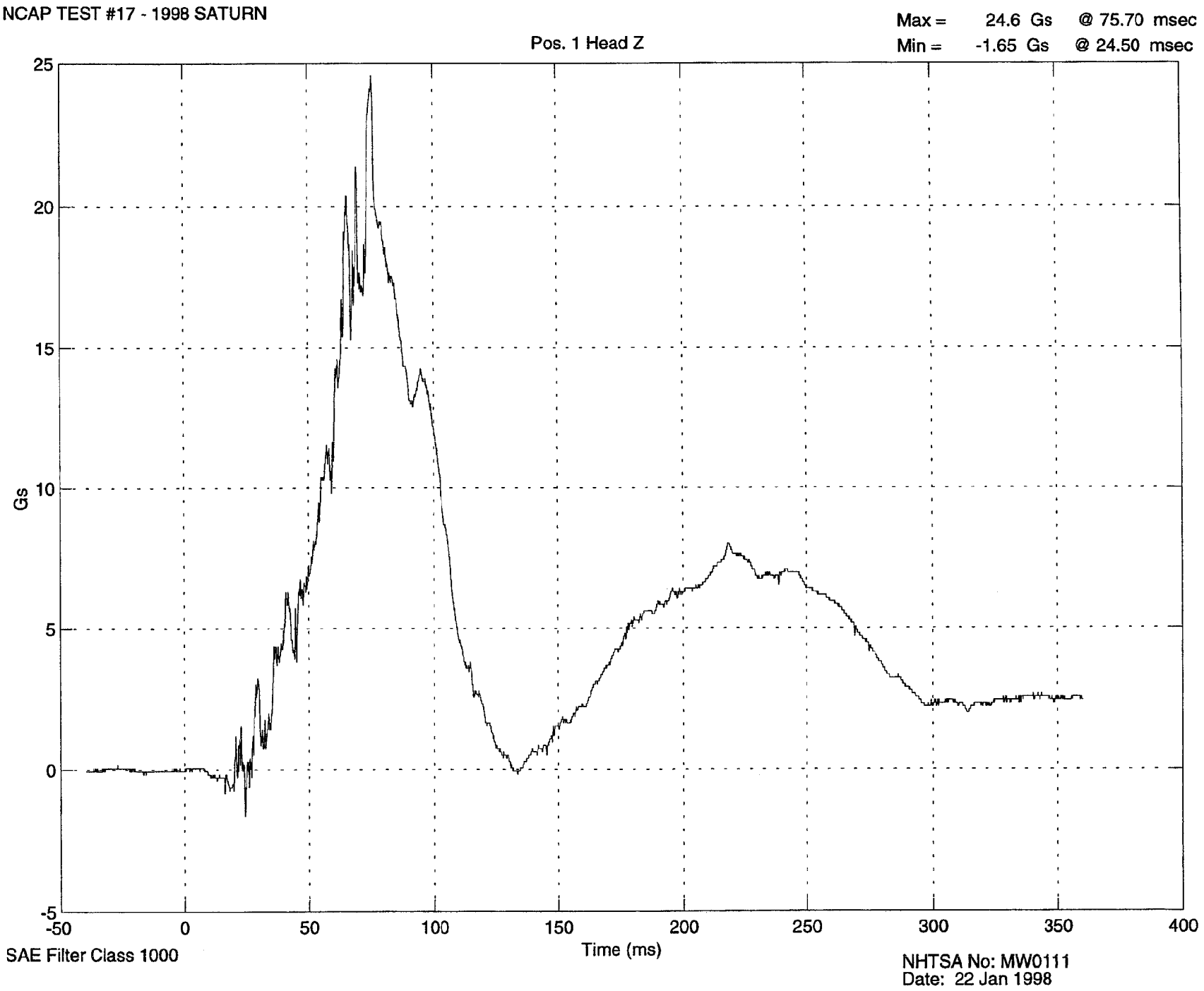
NHTSA TEST NO. MW0111

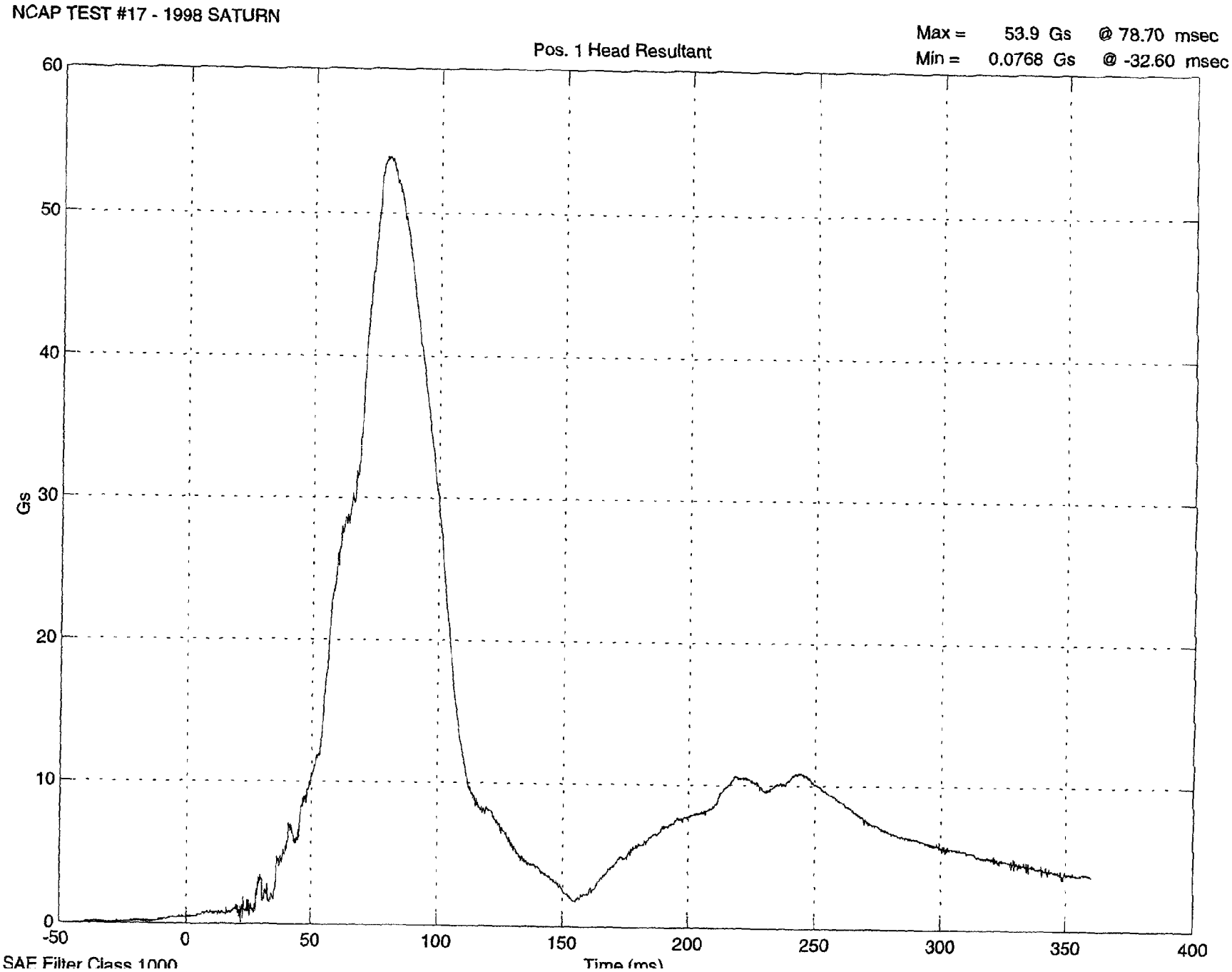
DUMMY DATA

CLASS	FILTER CHANNEL
Head Accelerations	1000
Chest Accelerations	180
Chest Displacements	60
Femur Forces	600
Belt Loads	60
Belt Displacements	180
Neck Forces	1000
Neck Moments	600


NCAP TEST #17 - 1998 SATURN
Pos. 1 Head X
Max = 7.99 Gs @ 243.40 msec
Min = -50.4 Gs @ 79.90 msec
10
0
-10
-20
-30
-40
-50
-60
Gs
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Head Y
Max = 3.89 Gs @ 64.30 msec
Min = -4.99 Gs @ 86.30 msec
Gs
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998

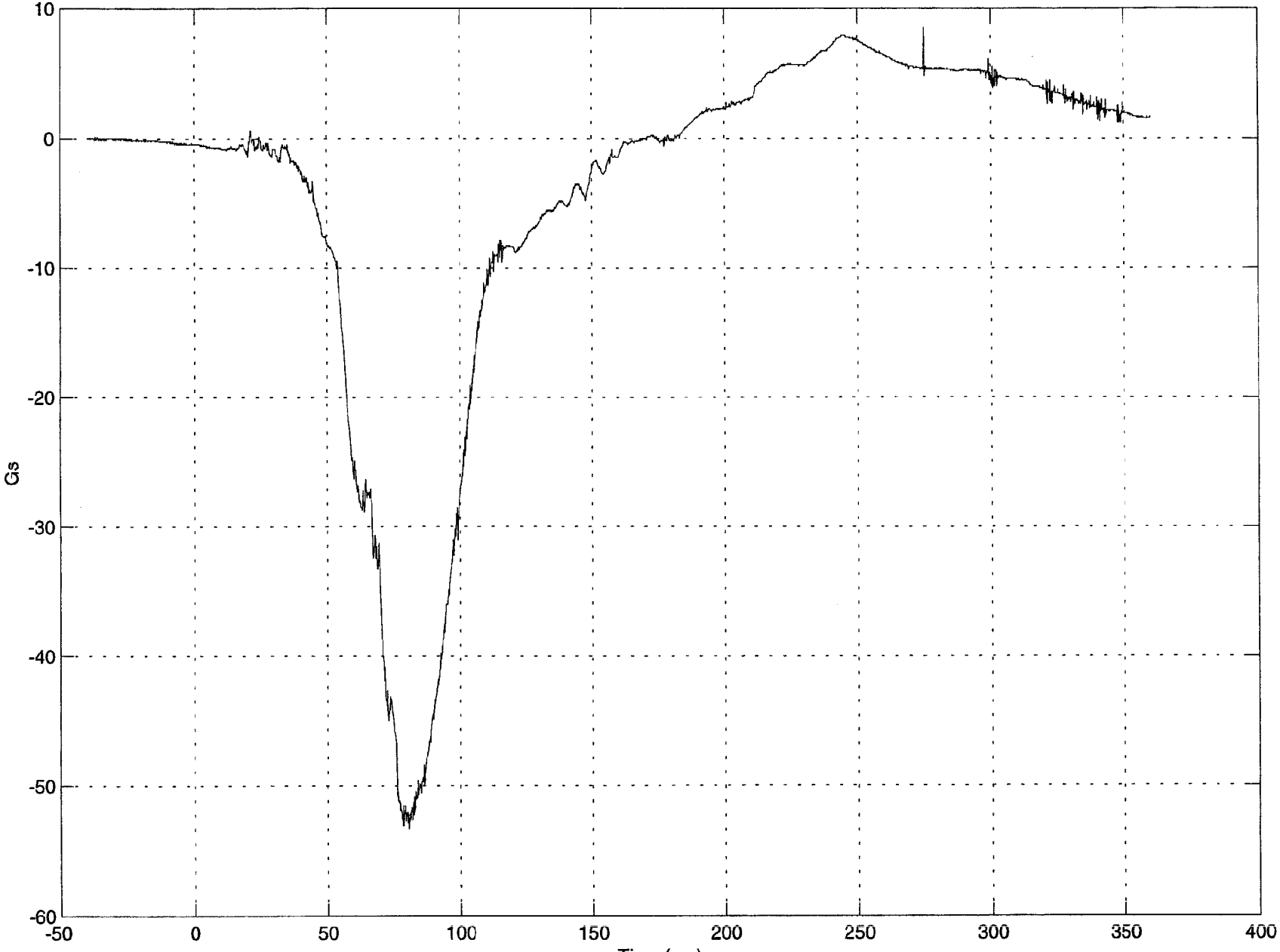

NCAP TEST #17 - 1998 SATURN
Pos. 1 Head Z
Max = 24.6 Gs @ 75.70 msec
Min = -1.65 Gs @ 24.50 msec
Gs
Time (ms)
25
20
15
10
5
0
-5
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Head Resultant
Max = 53.9 Gs @ 78.70 msec
Min = 0.0768 Gs @ -32.60 msec
Gs
Time (ms)
SAE Filter Class 1000
60
50
40
30
20
10
0
-50
0
50
100
150
200
250
300
350
400

NCAP TEST #17 - 1998 SATURN

Pos. 1 Head X(R)

Max = 8.52 Gs @ 274.70 msec
Min = -53.3 Gs @ 80.70 msec



SAE Filter Class 1000

NHTSA No: MW0111
Date: 22 Jan 1998

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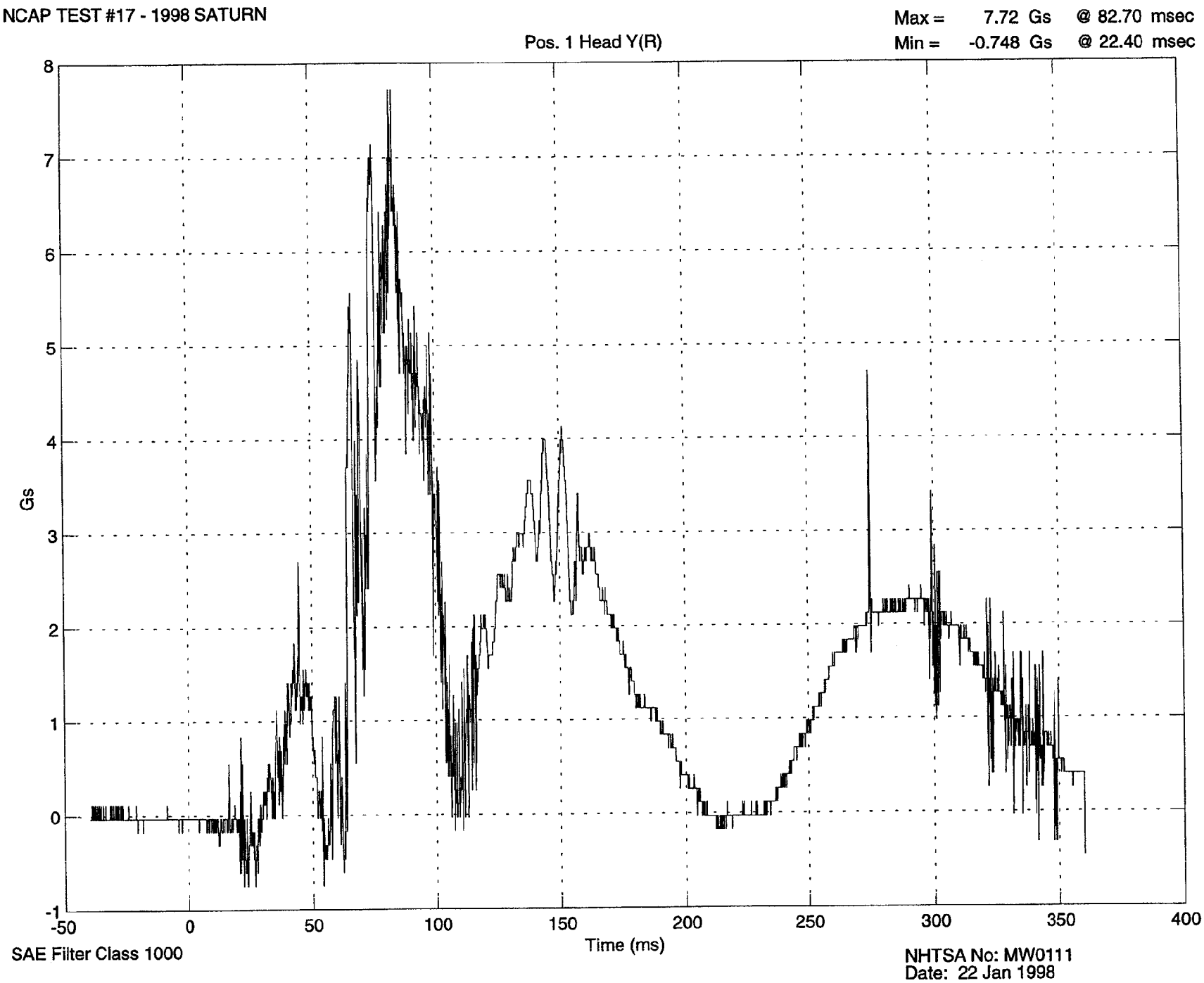
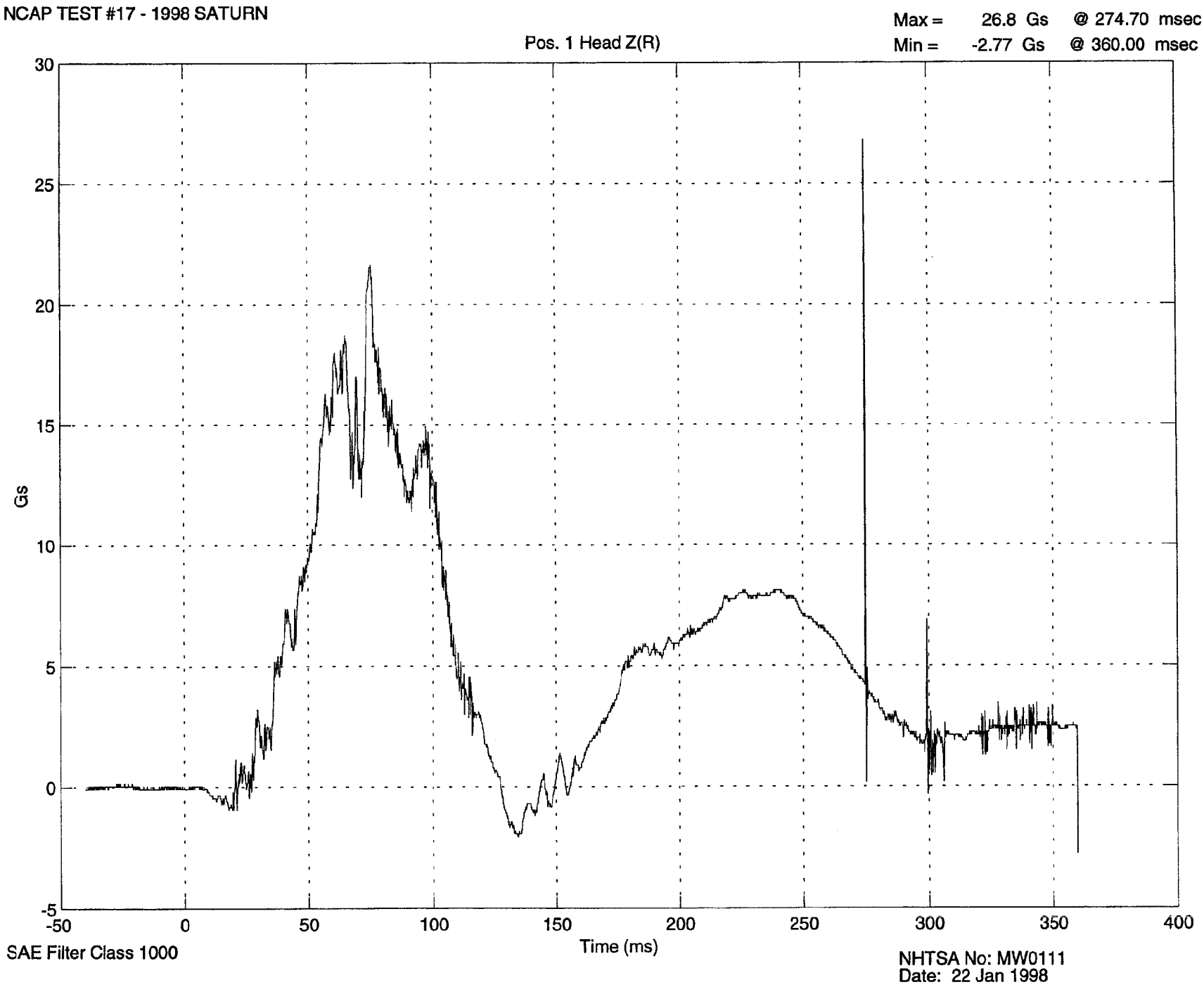
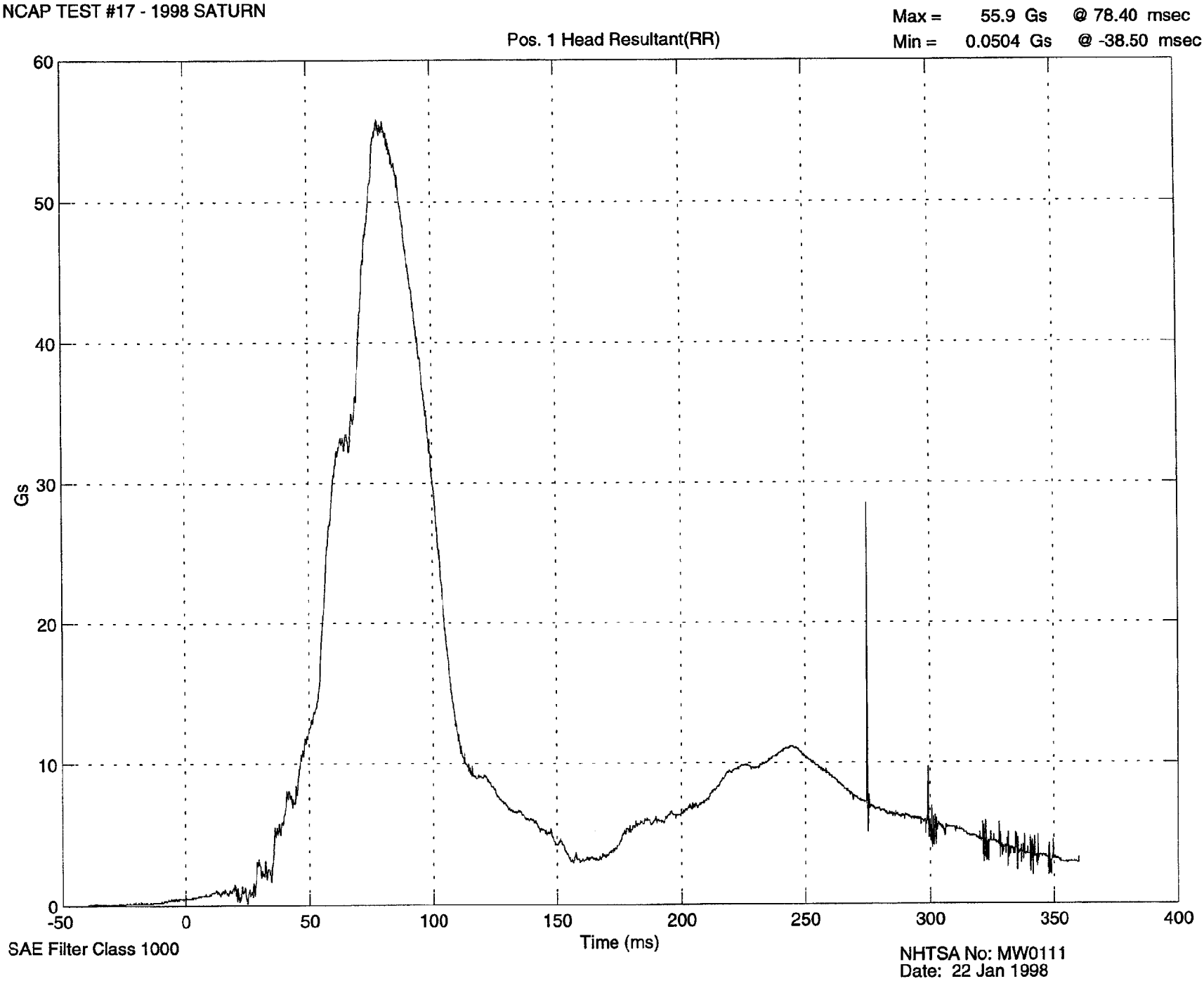
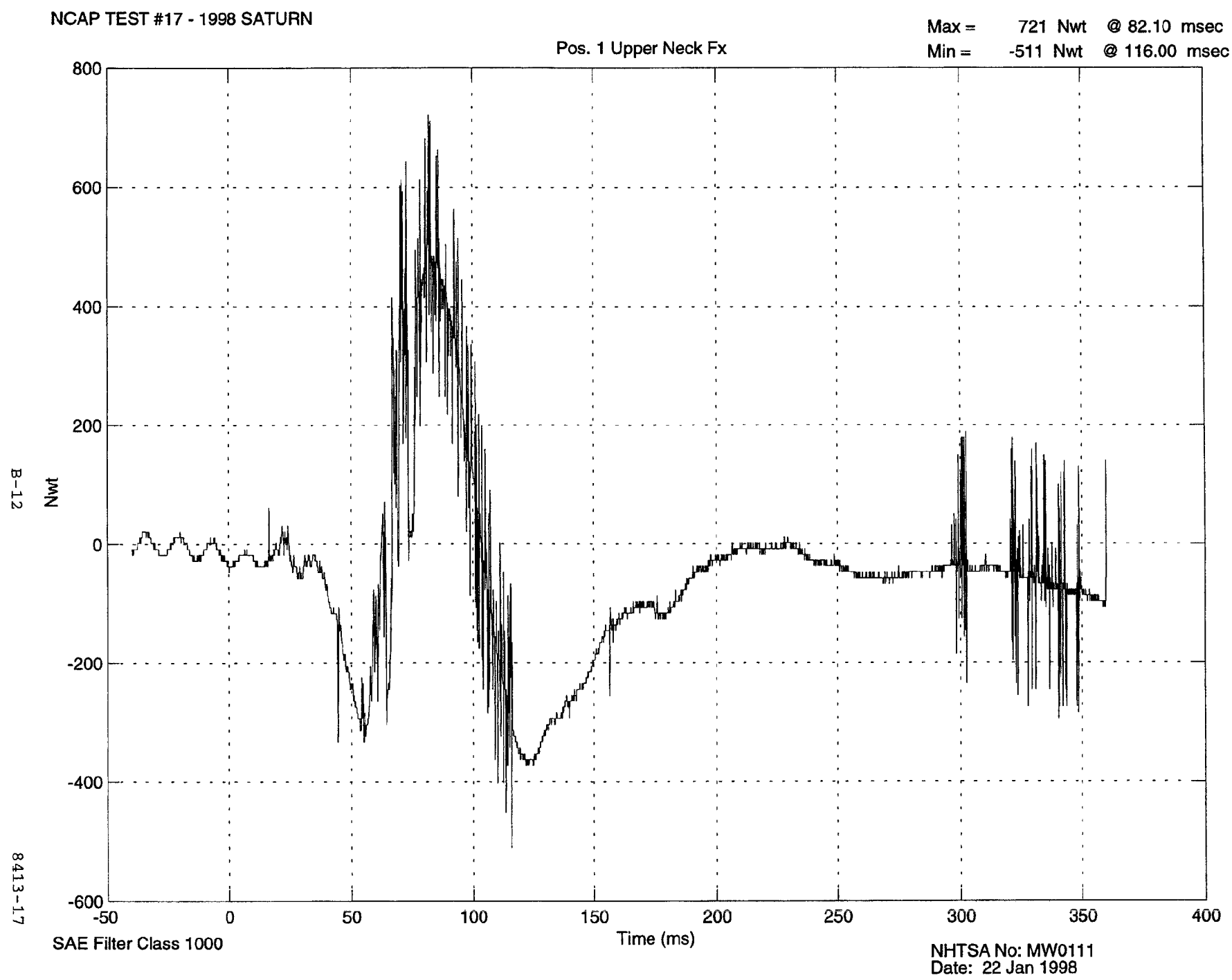
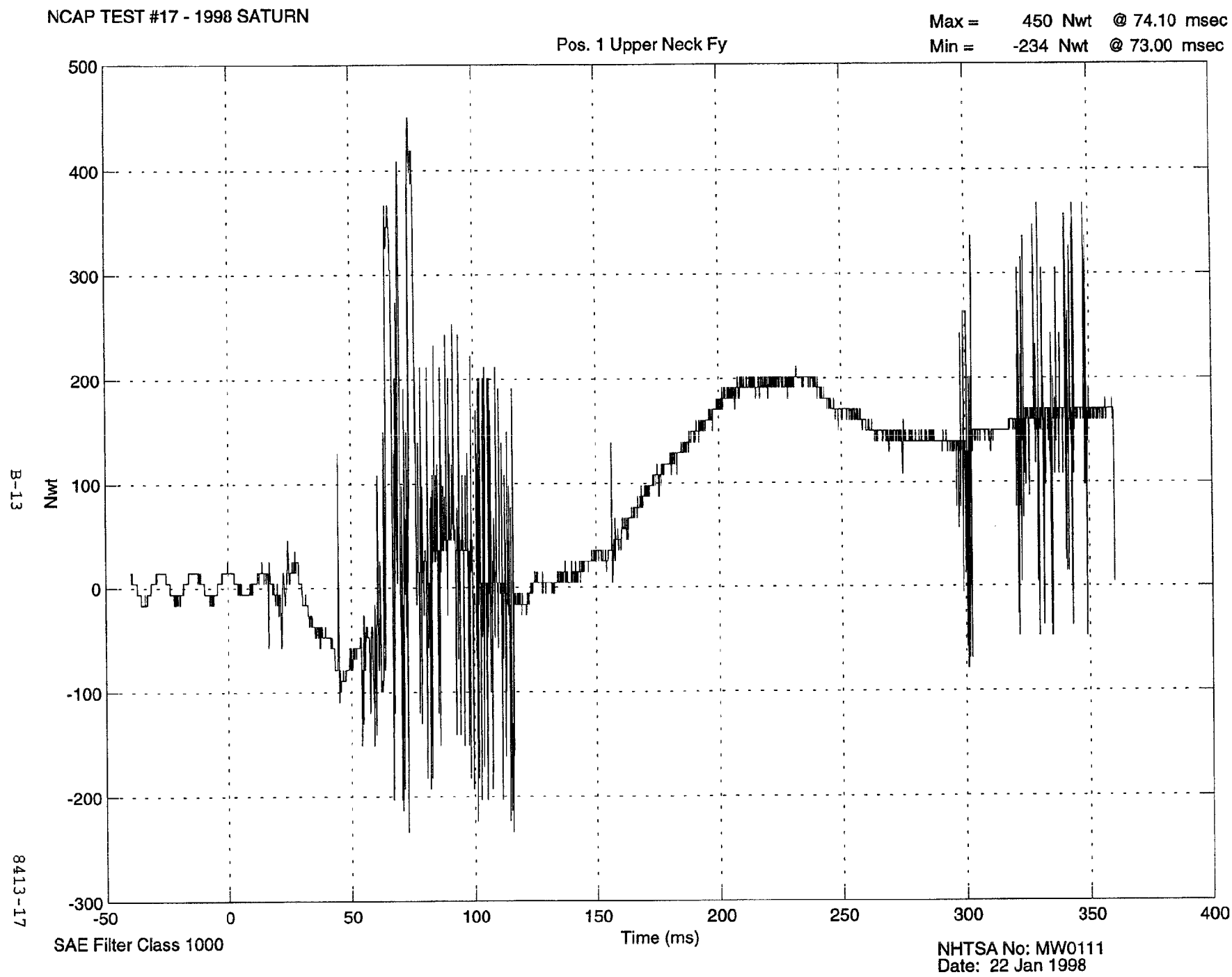
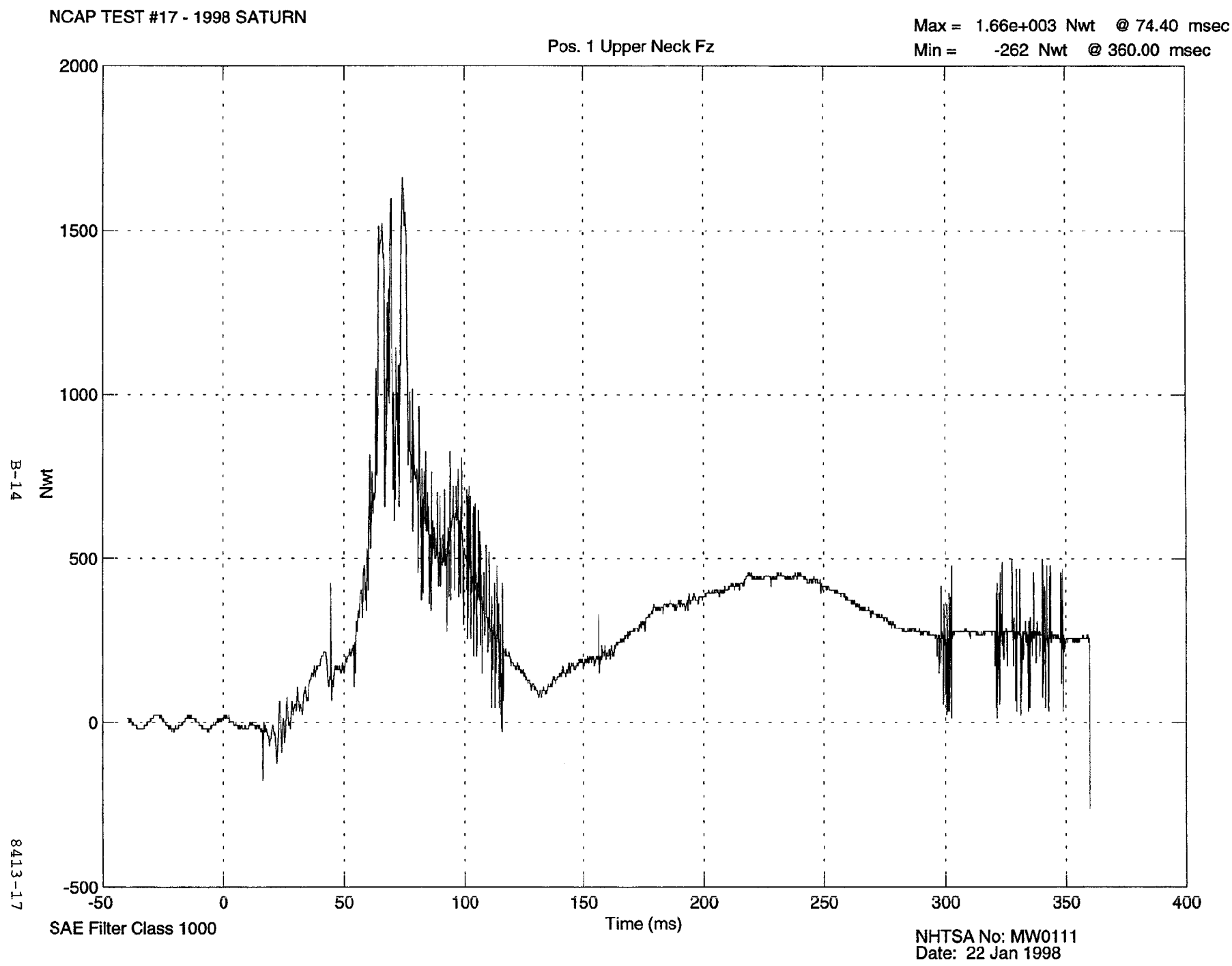

NCAP TEST #17 - 1998 SATURN
Pos. 1 Head Y(R)
Max = 7.72 Gs @ 82.70 msec
Min = -0.748 Gs @ 22.40 msec
Gs
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Head Z(R)
Max = 26.8 Gs @ 274.70 msec
Min = -2.77 Gs @ 360.00 msec
Gs
Time (ms)
30
25
20
15
10
5
0
-5
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Head Resultant(RR)
Max = 55.9 Gs @ 78.40 msec
Min = 0.0504 Gs @ -38.50 msec
Gs
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Upper Neck Fx
Max = 721 Nwt @ 82.10 msec
Min = -511 Nwt @ 116.00 msec
800
600
400
200
0
-200
-400
-600
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Upper Neck Fy
Max = 450 Nwt @ 74.10 msec
Min = -234 Nwt @ 73.00 msec
Nwt
Time (ms)
500
400
300
200
100
0
-100
-200
-300
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Upper Neck Fz
Max = 1.66e+003 Nwt @ 74.40 msec
Min = -262 Nwt @ 360.00 msec
2000
1500
1000
500
0
-500
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998
B-14
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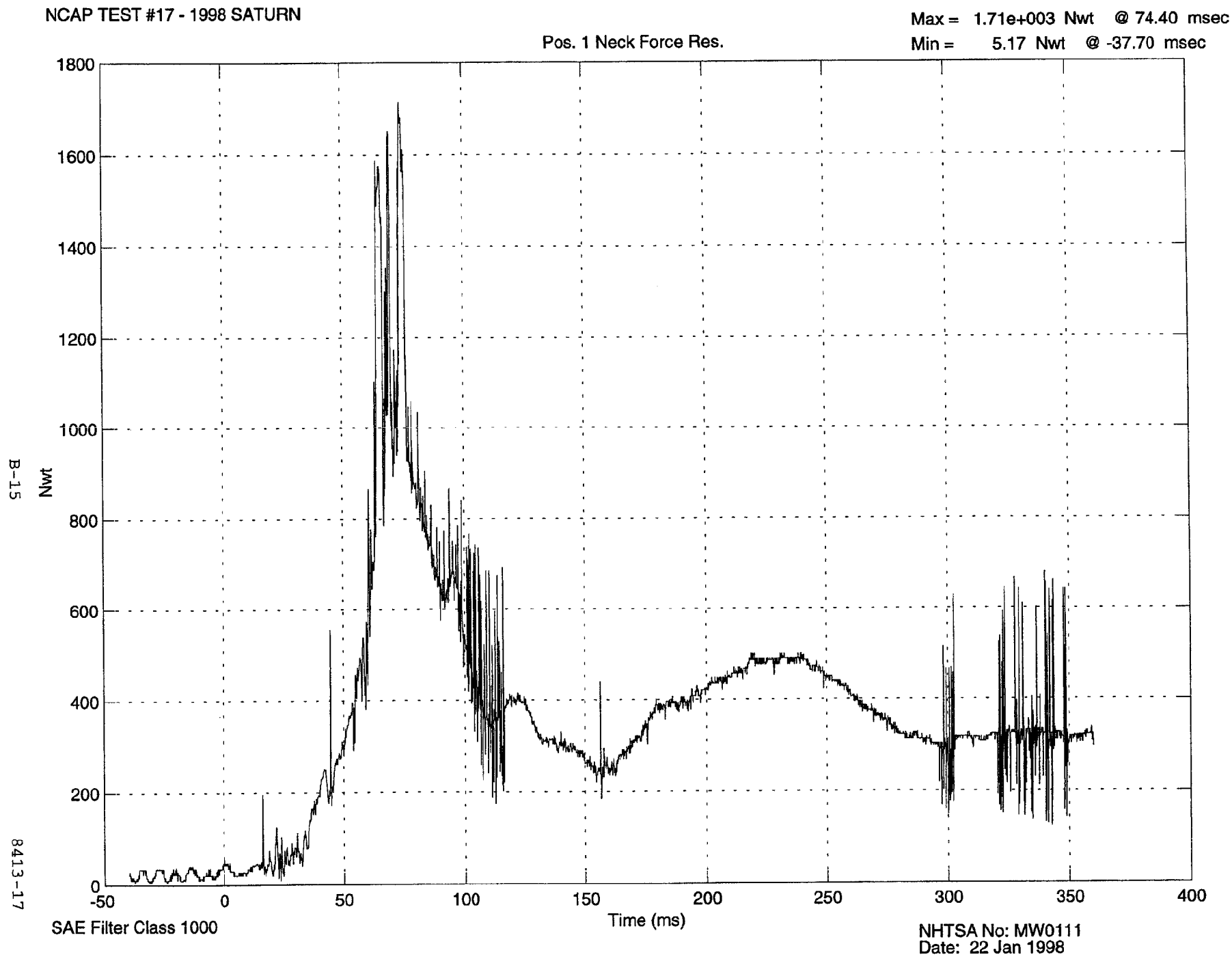
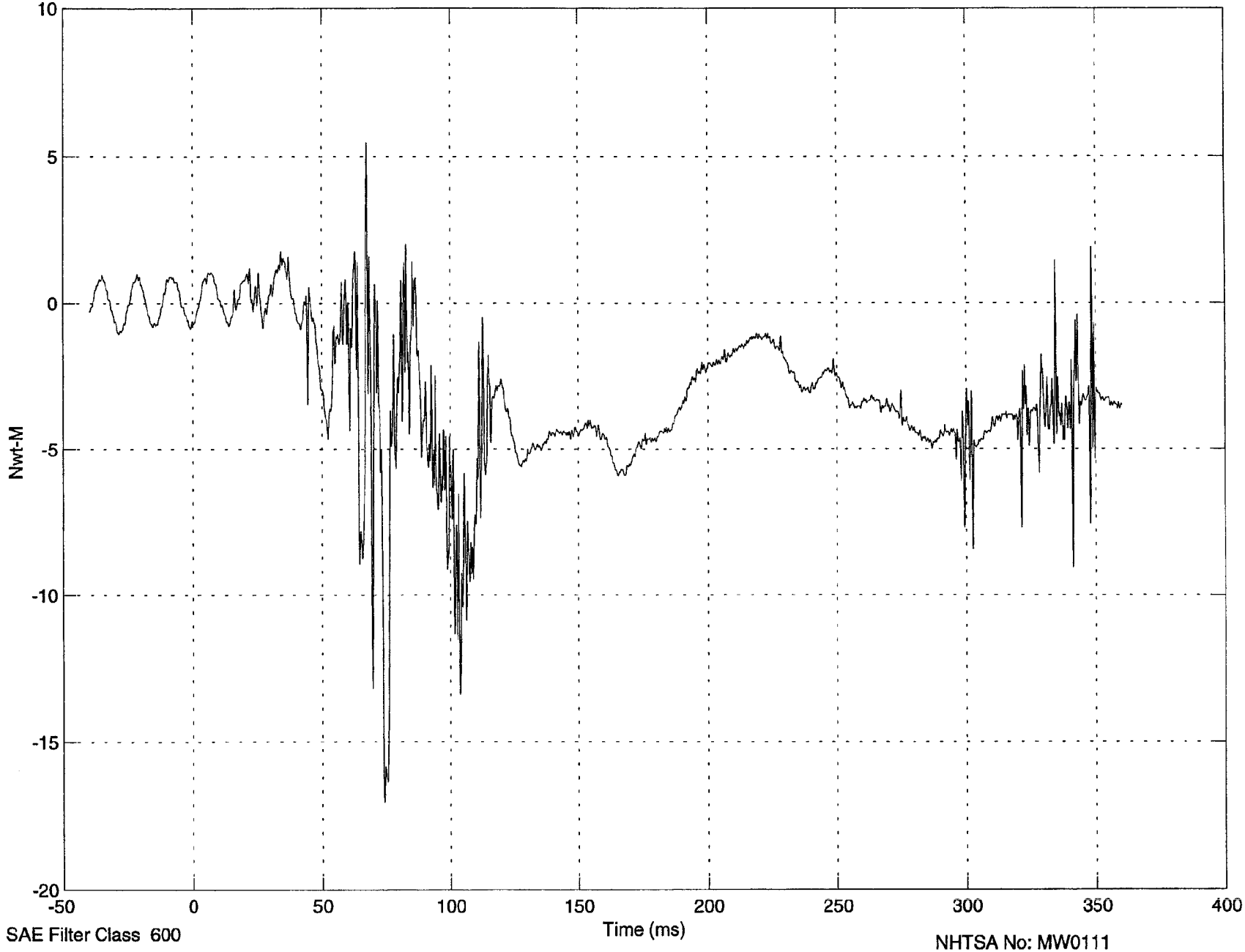

NCAP TEST #17 - 1998 SATURN
Pos. 1 Neck Force Res.
Max = 1.71e+003 Nwt @ 74.40 msec
Min = 5.17 Nwt @ -37.70 msec
Nwt
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998
B-15
8413-17

NCAP TEST #17 - 1998 SATURN

Pos. 1 Upper Neck Mx

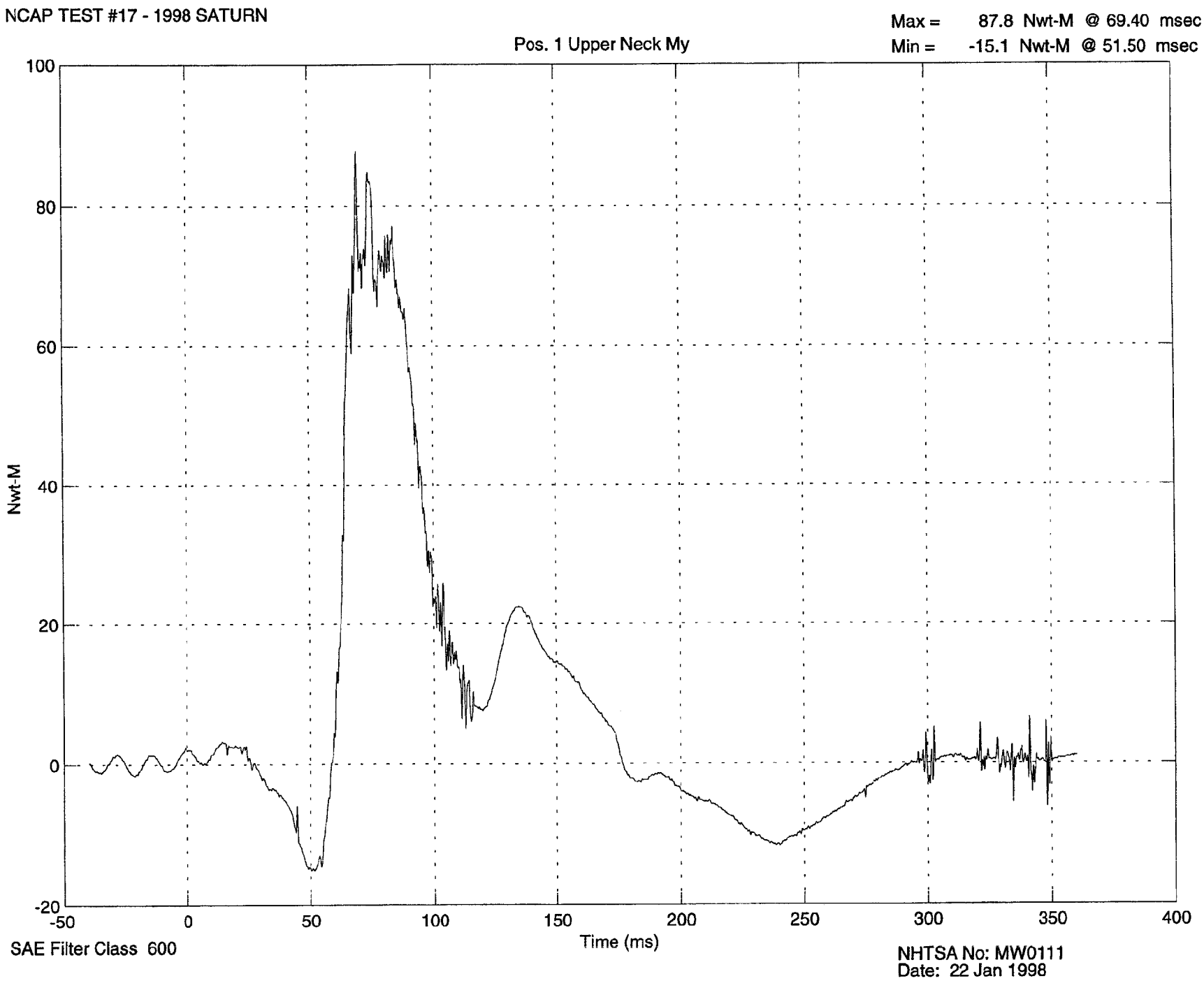
Max = 5.49 Nwt-M @ 67.30 msec
Min = -17 Nwt-M @ 74.20 msec



SAE Filter Class 600

NHTSA No: MW0111
Date: 22 Jan 1998

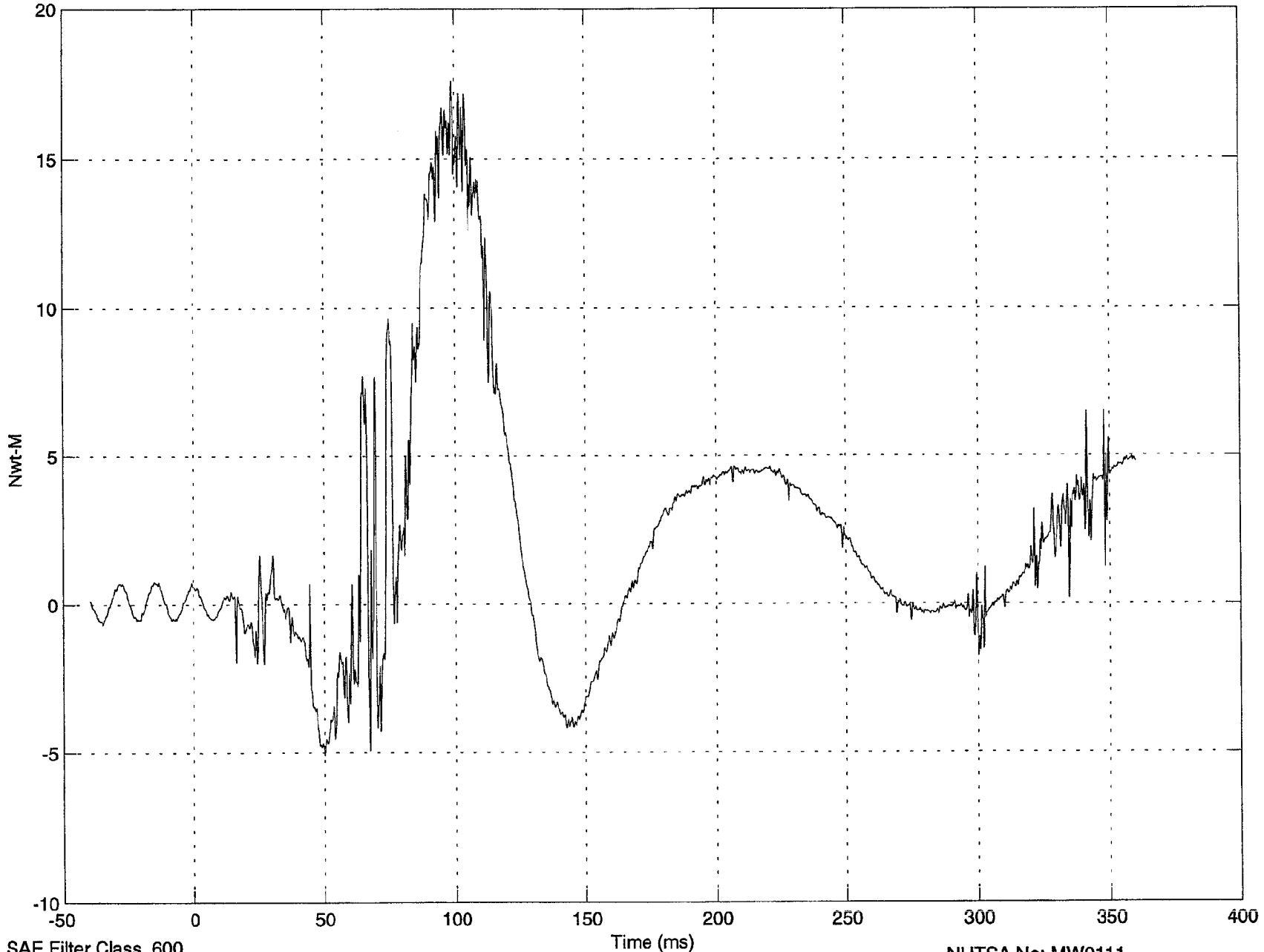
8413-17


NCAP TEST #17 - 1998 SATURN
Pos. 1 Upper Neck My
Max = 87.8 Nwt-M @ 69.40 msec
Min = -15.1 Nwt-M @ 51.50 msec
Nwt-M
100
80
60
40
20
0
-20
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998

NCAP TEST #17 - 1998 SATURN

Pos. 1 Upper Neck Mz

Max = 17.6 Nwt-M @ 98.80 msec
Min = -5.09 Nwt-M @ 50.10 msec



SAE Filter Class 600

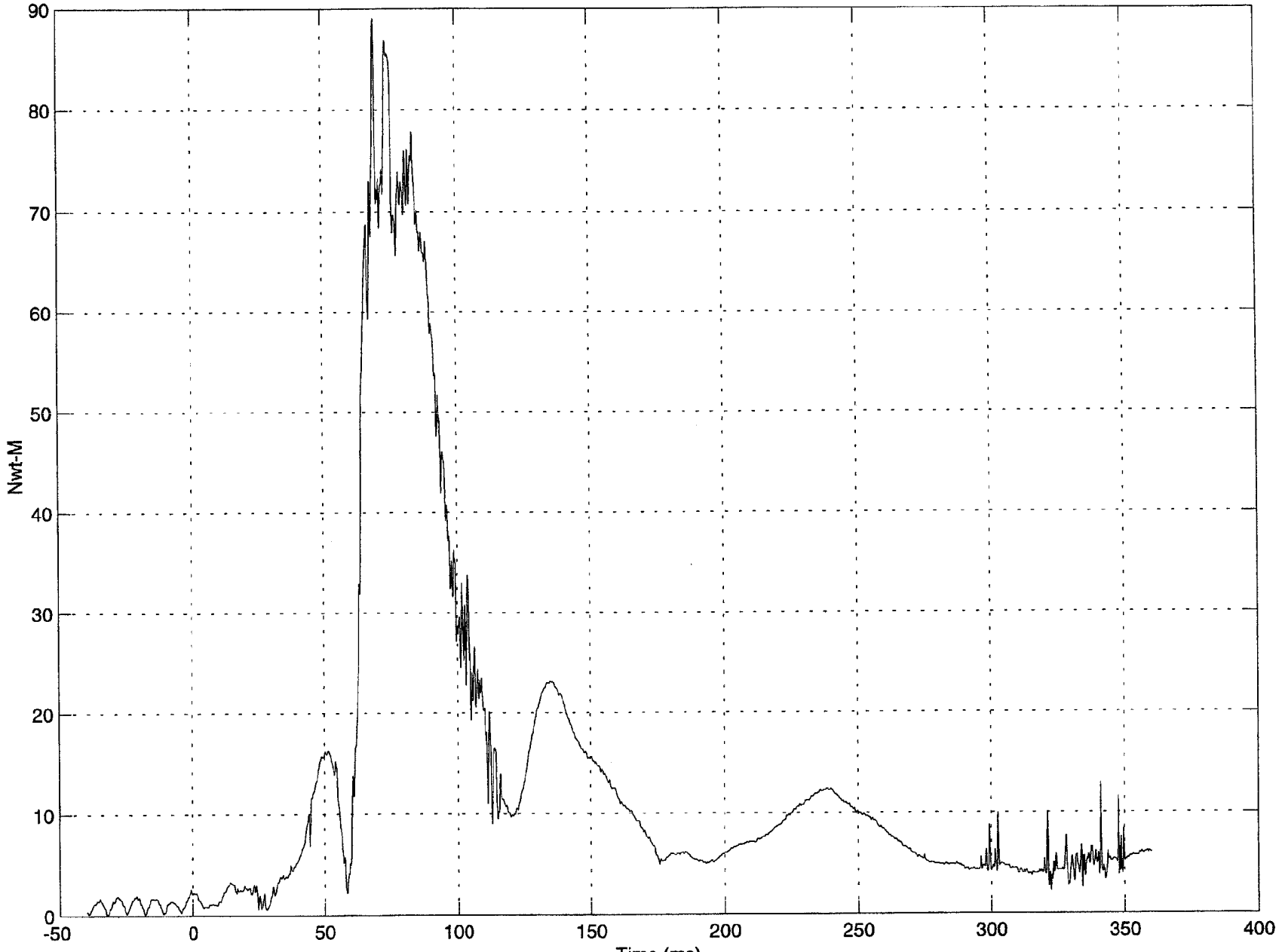
NHTSA No: MW0111
Date: 22 Jan 1998

8413-17

NCAP TEST #17 - 1998 SATURN

Pos. 1 Neck Moment Res.

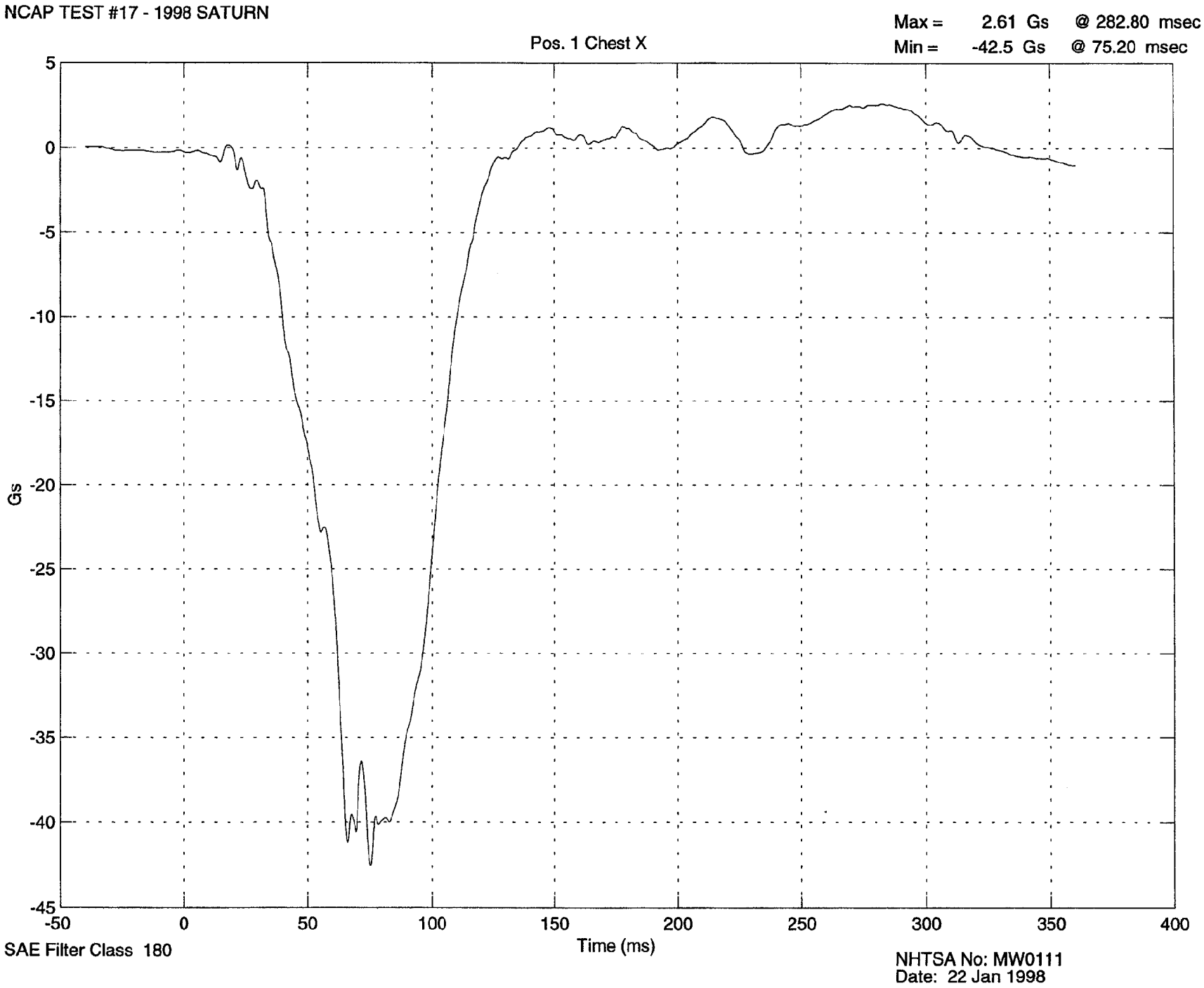
Max = 89.1 Nwt-M @ 69.40 msec
Min = 0.127 Nwt-M @ -39.20 msec

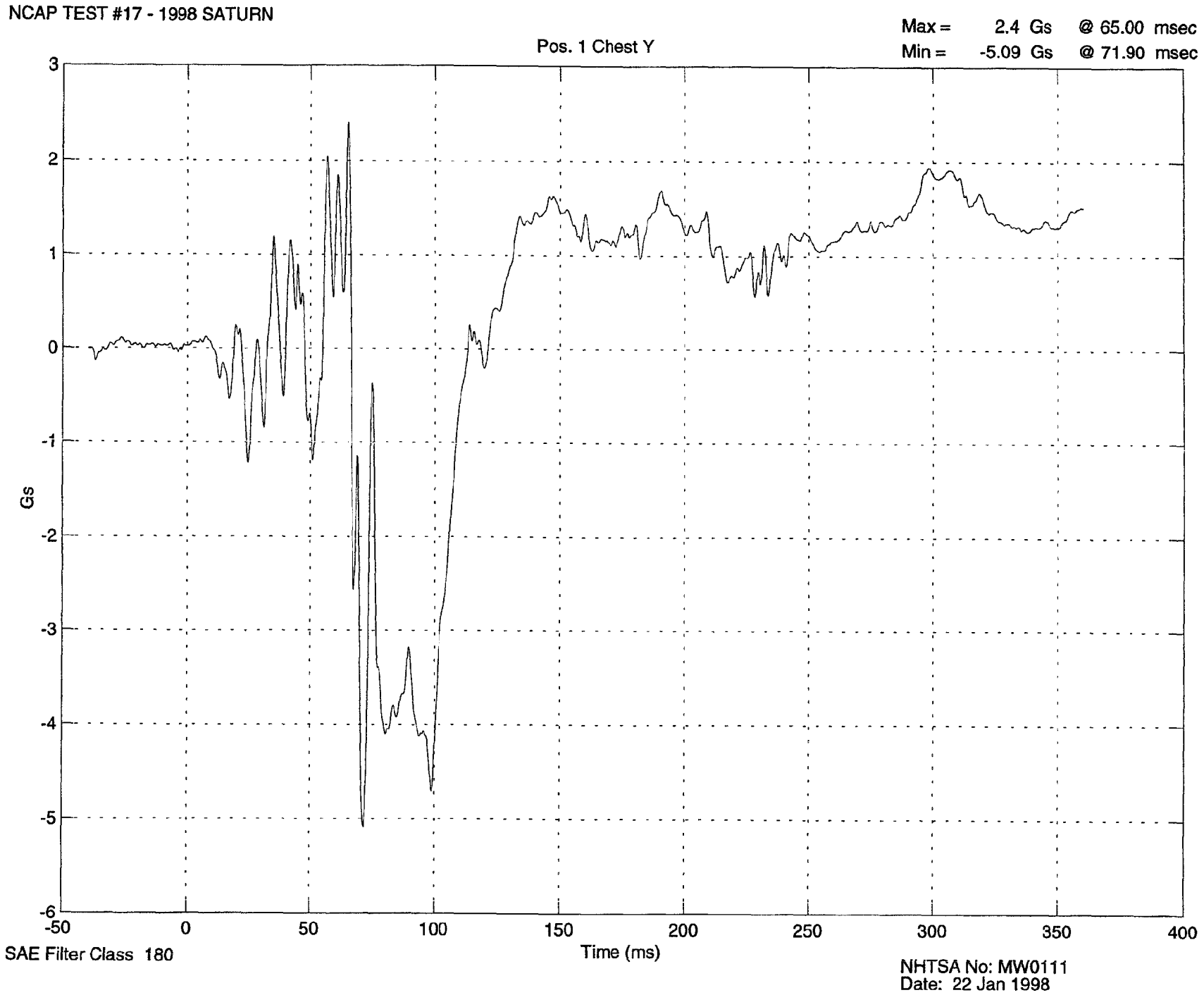


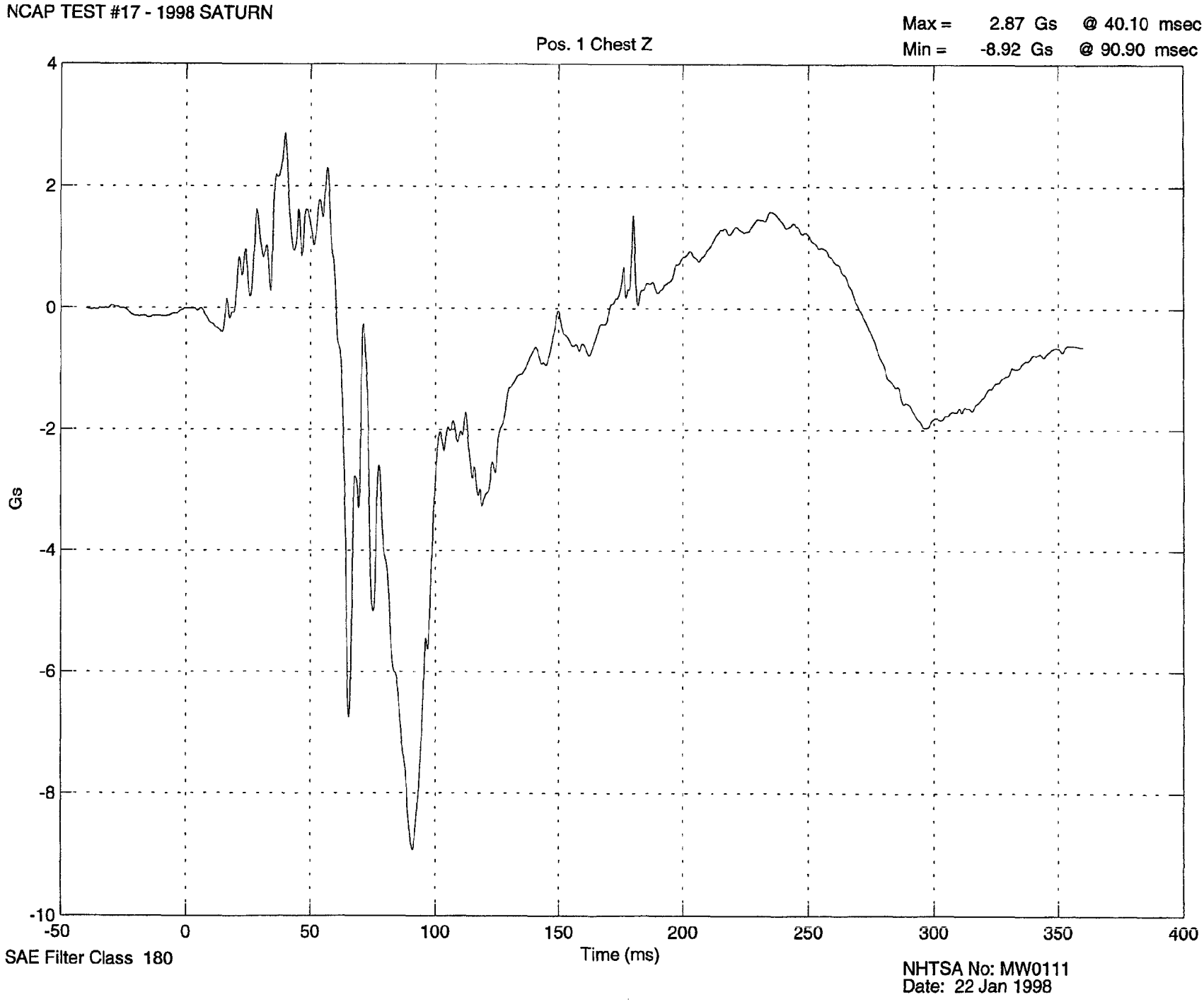
SAE Filter Class 600

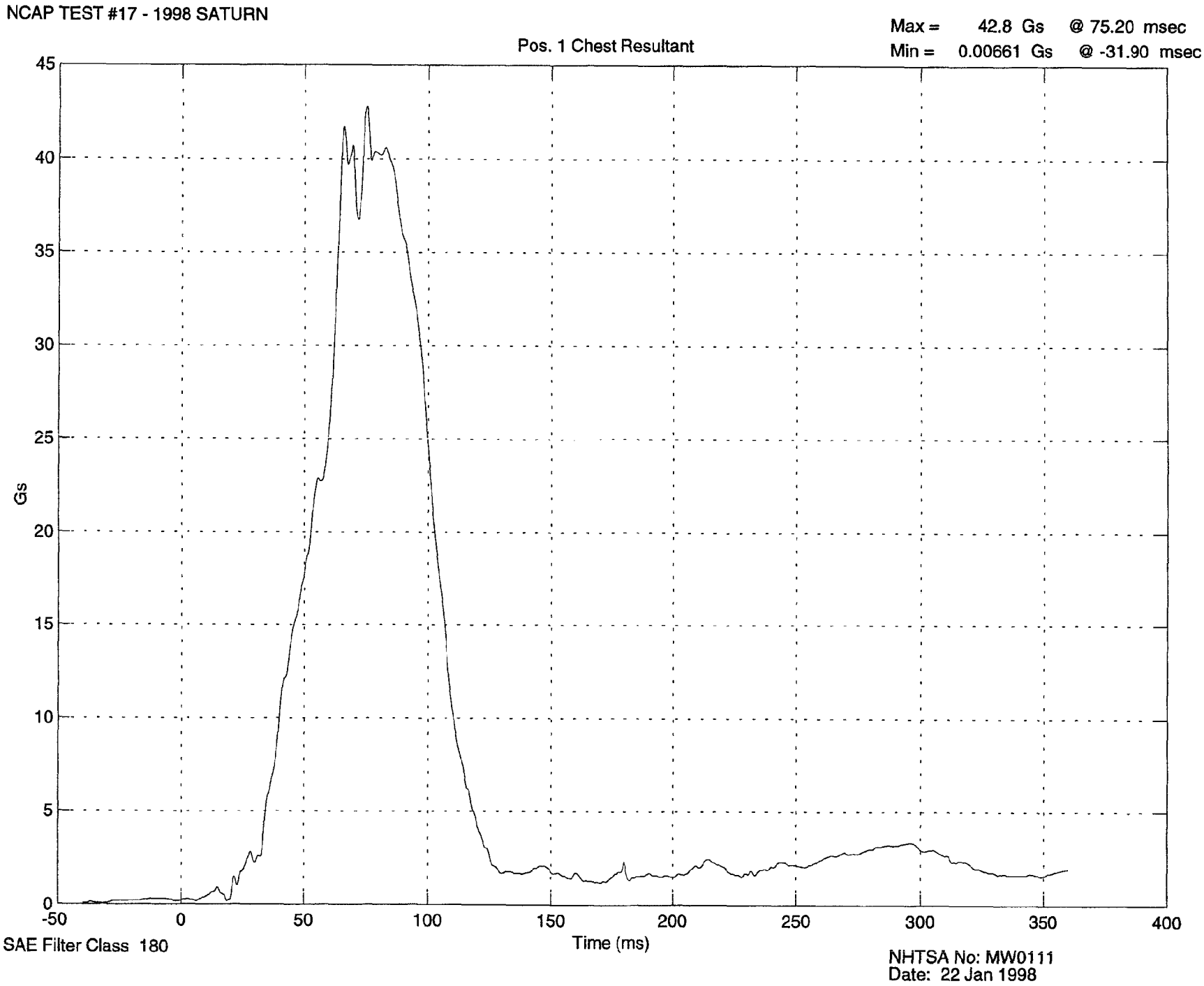
NHTSA No: MW0111
Date: 22 Jan 1998

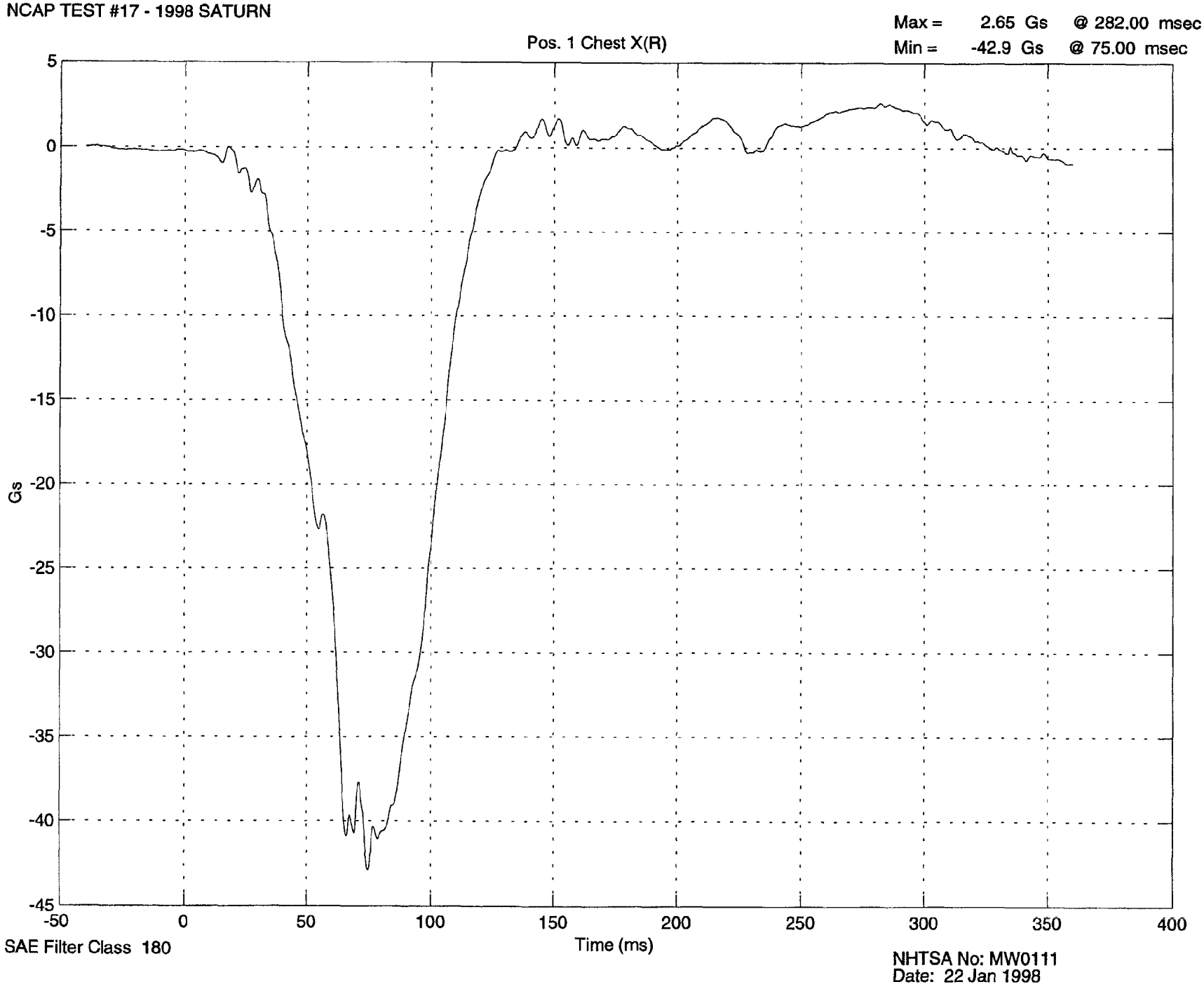
8413-17

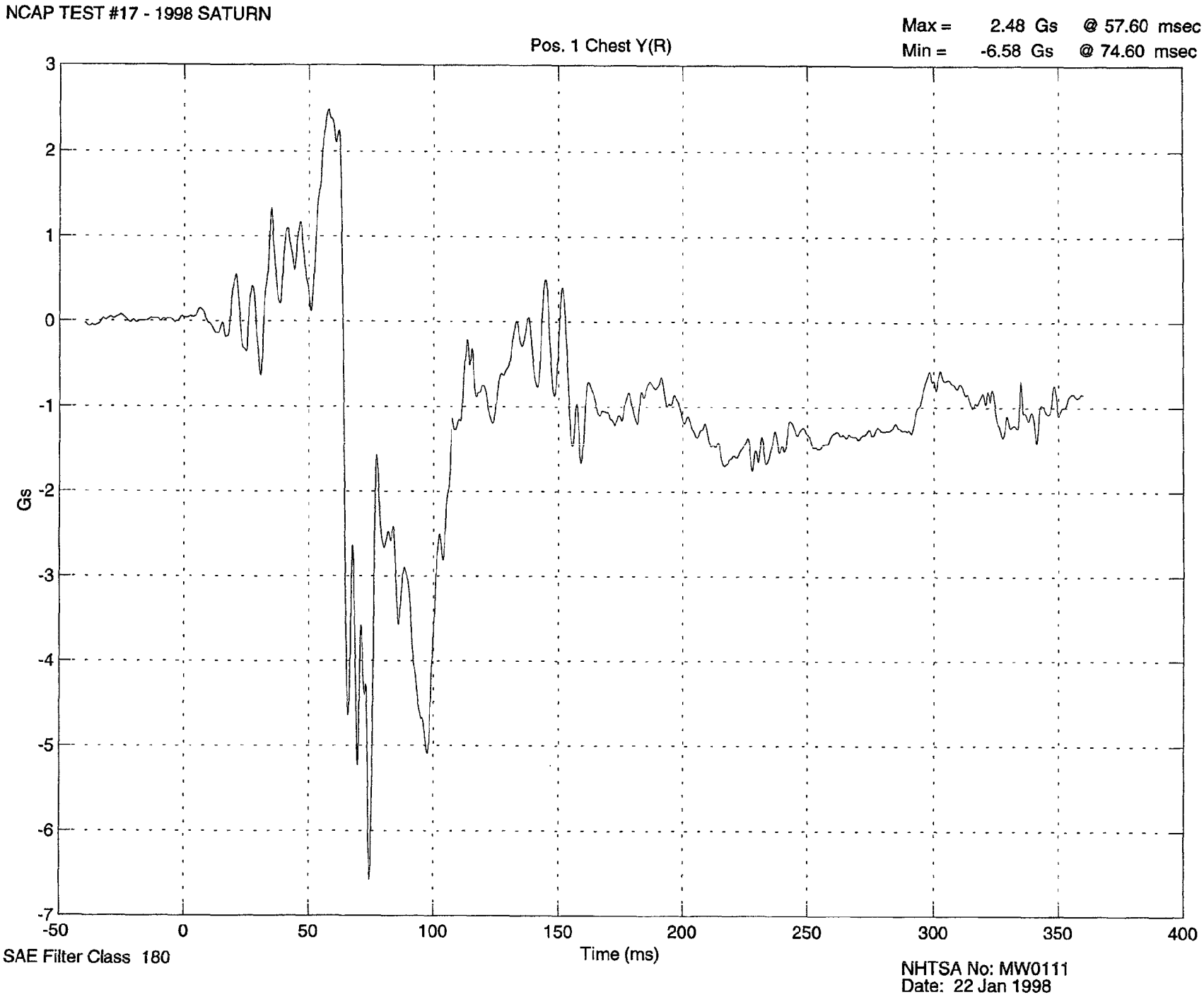

NCAP TEST #17 - 1998 SATURN
Pos. 1 Chest X
Max = 2.61 Gs @ 282.80 msec
Min = -42.5 Gs @ 75.20 msec
Gs
Time (ms)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Chest Y
Max = 2.4 Gs @ 65.00 msec
Min = -5.09 Gs @ 71.90 msec
Gs
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998

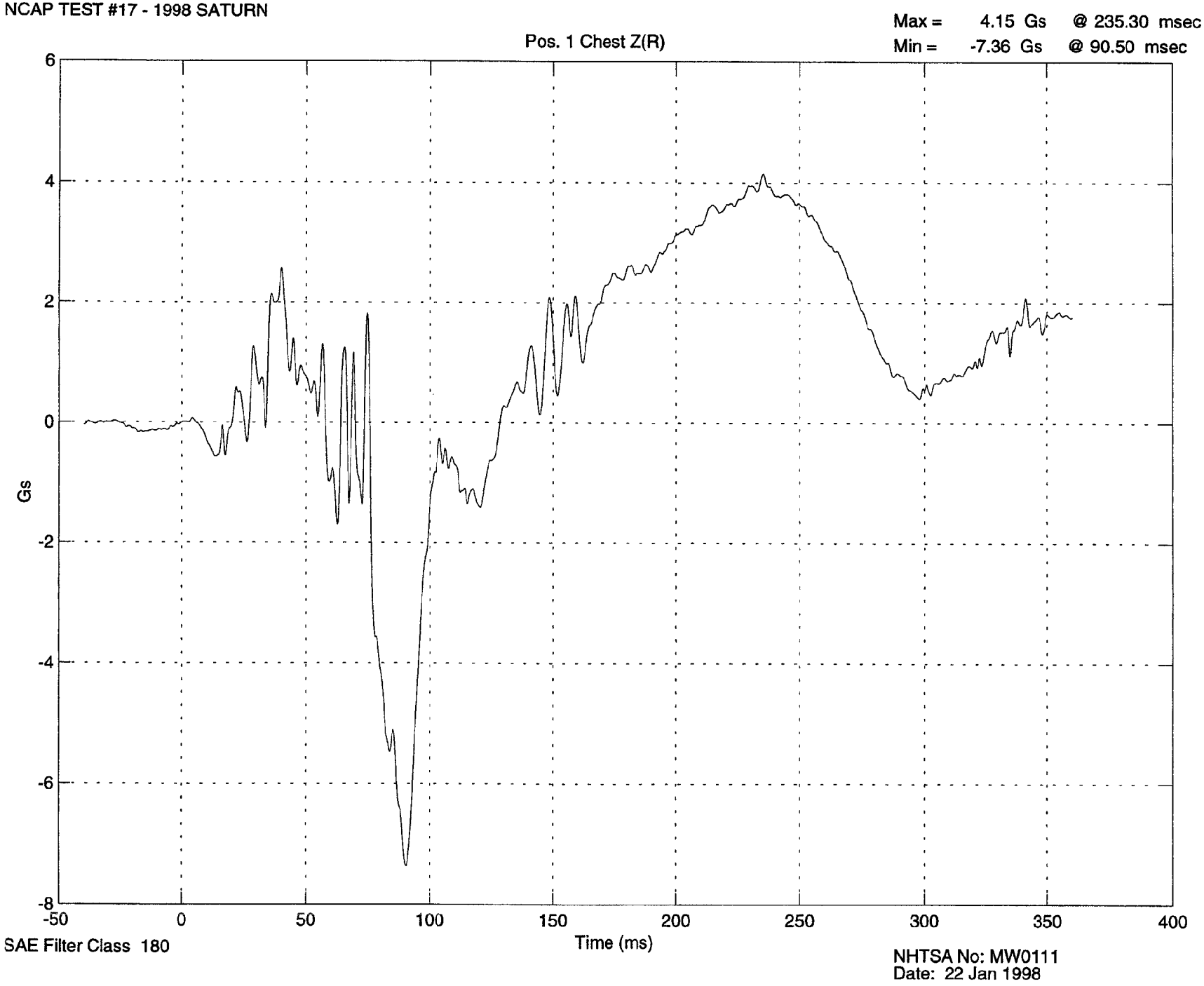

NCAP TEST #17 - 1998 SATURN
Pos. 1 Chest Z
Max = 2.87 Gs @ 40.10 msec
Min = -8.92 Gs @ 90.90 msec
Gs
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Chest Resultant
Max = 42.8 Gs @ 75.20 msec
Min = 0.00661 Gs @ -31.90 msec
Gs
Time (ms)
45
40
35
30
25
20
15
10
5
0
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Chest X(R)
Max = 2.65 Gs @ 282.00 msec
Min = -42.9 Gs @ 75.00 msec
Gs
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Chest Y(R)
Max = 2.48 Gs @ 57.60 msec
Min = -6.58 Gs @ 74.60 msec
Gs
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998

NCAP TEST #17 - 1998 SATURN



SAE Filter Class 180

NHTSA No: MW0111
Date: 22 Jan 1998

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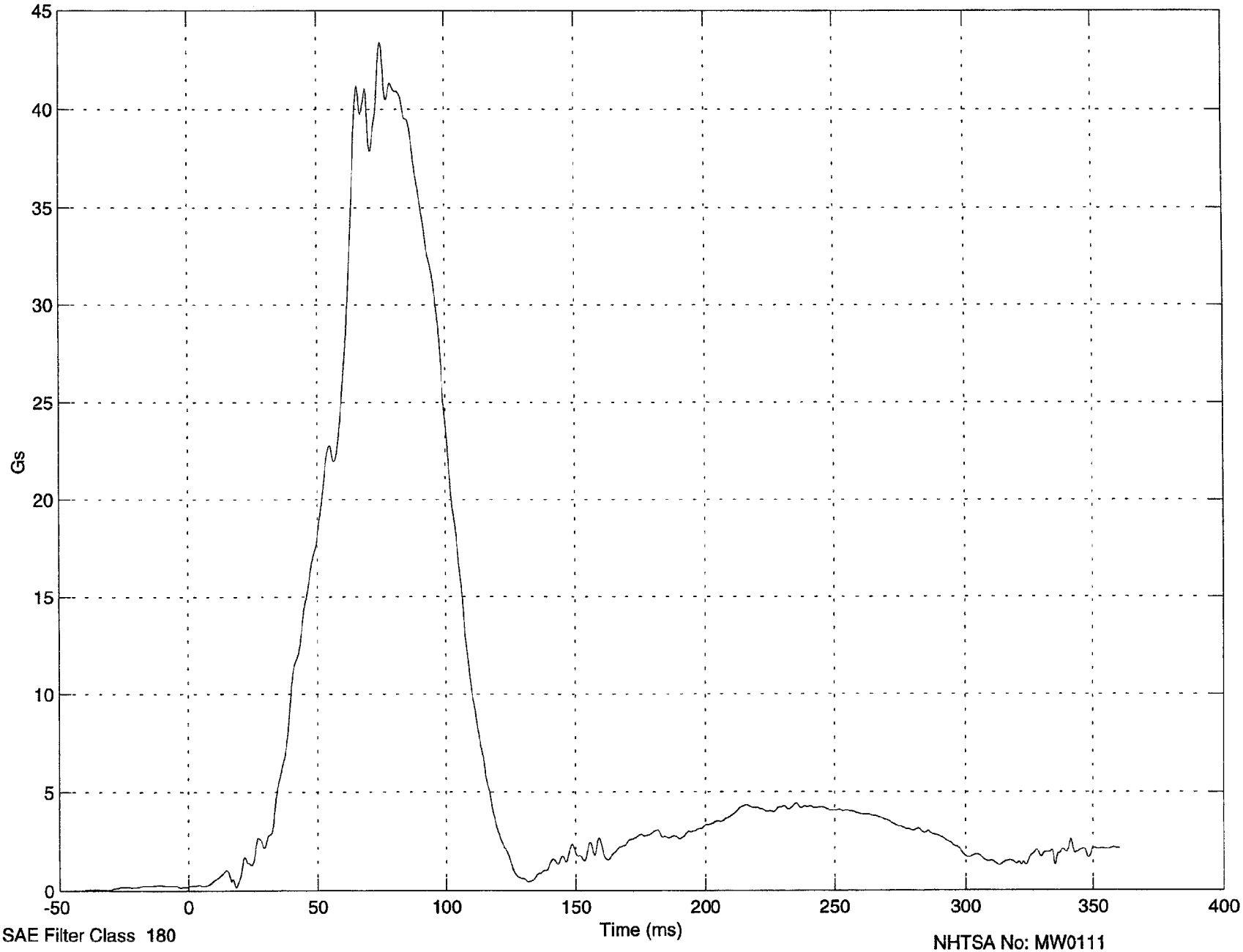
NCAP TEST #17 - 1998 SATURN

Max = 43.4 Gs @ 74.90 msec
Min = 0.0157 Gs @ -31.20 msec



SAE Filter Class 180

NHTSA No: MW0111
Date: 22 Jan 1998

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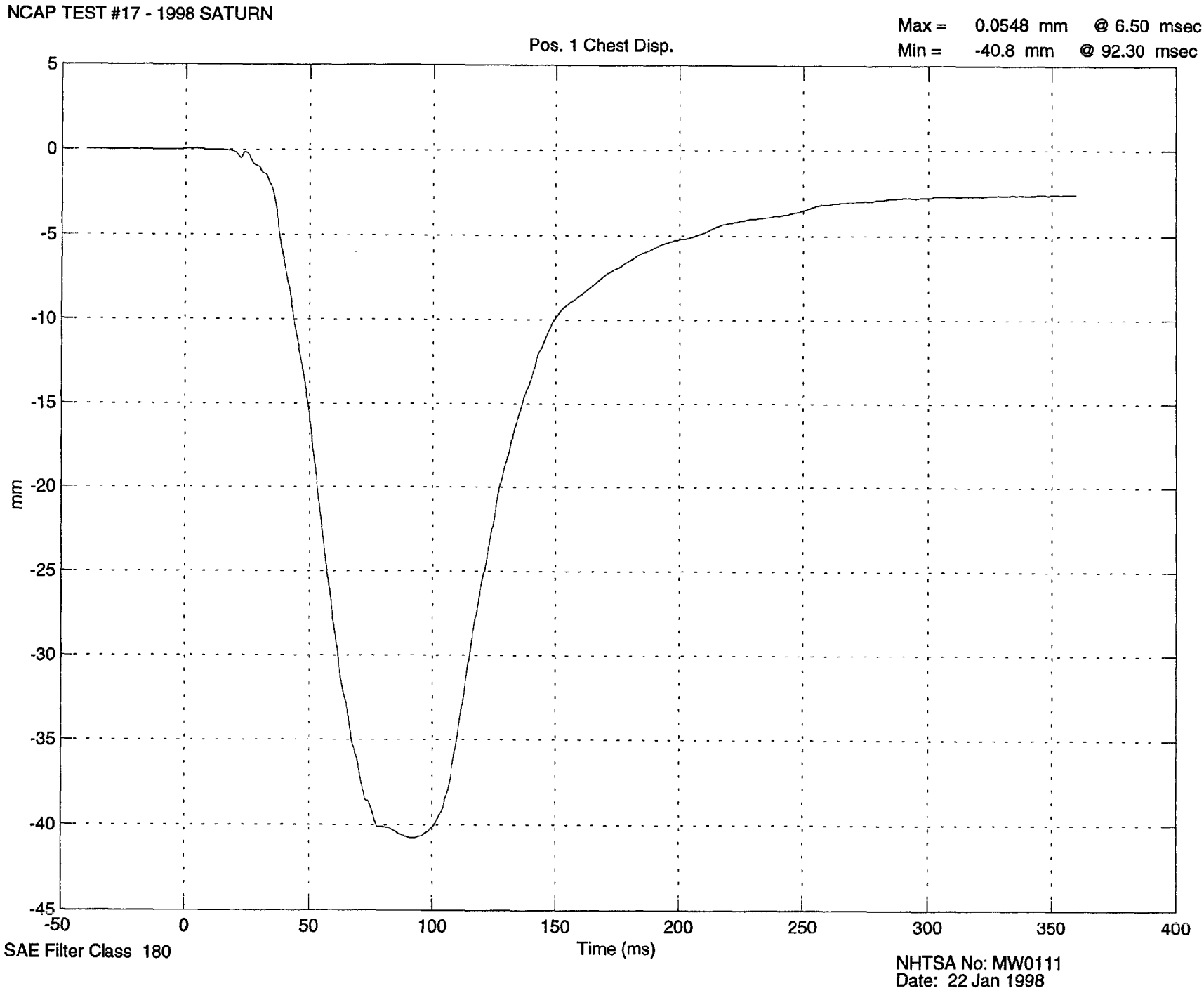
NCAP TEST #17 - 1998 SATURN
Pos. 1 Chest Disp.
Max = 0.0548 mm @ 6.50 msec
Min = -40.8 mm @ 92.30 msec
mm
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998
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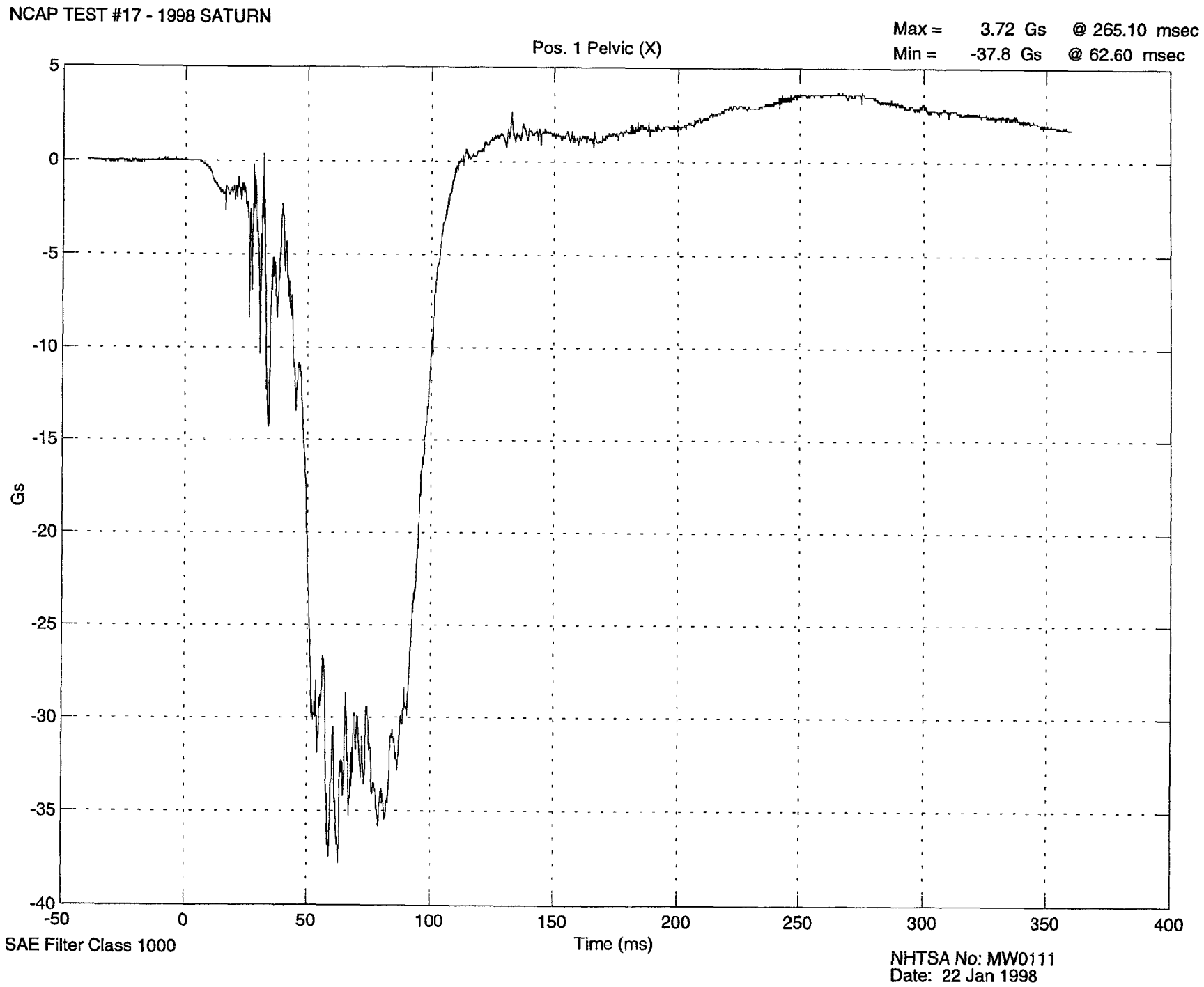
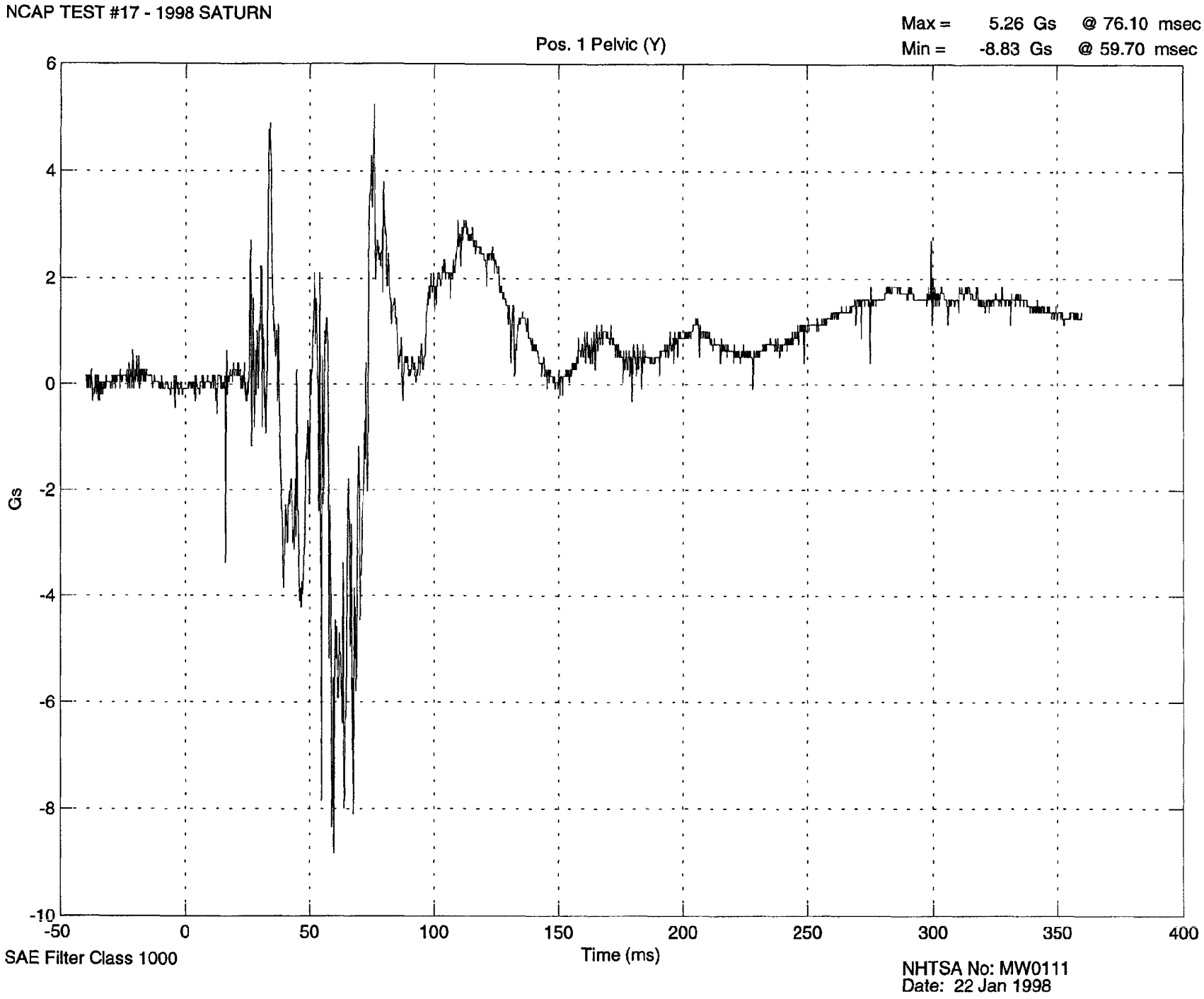
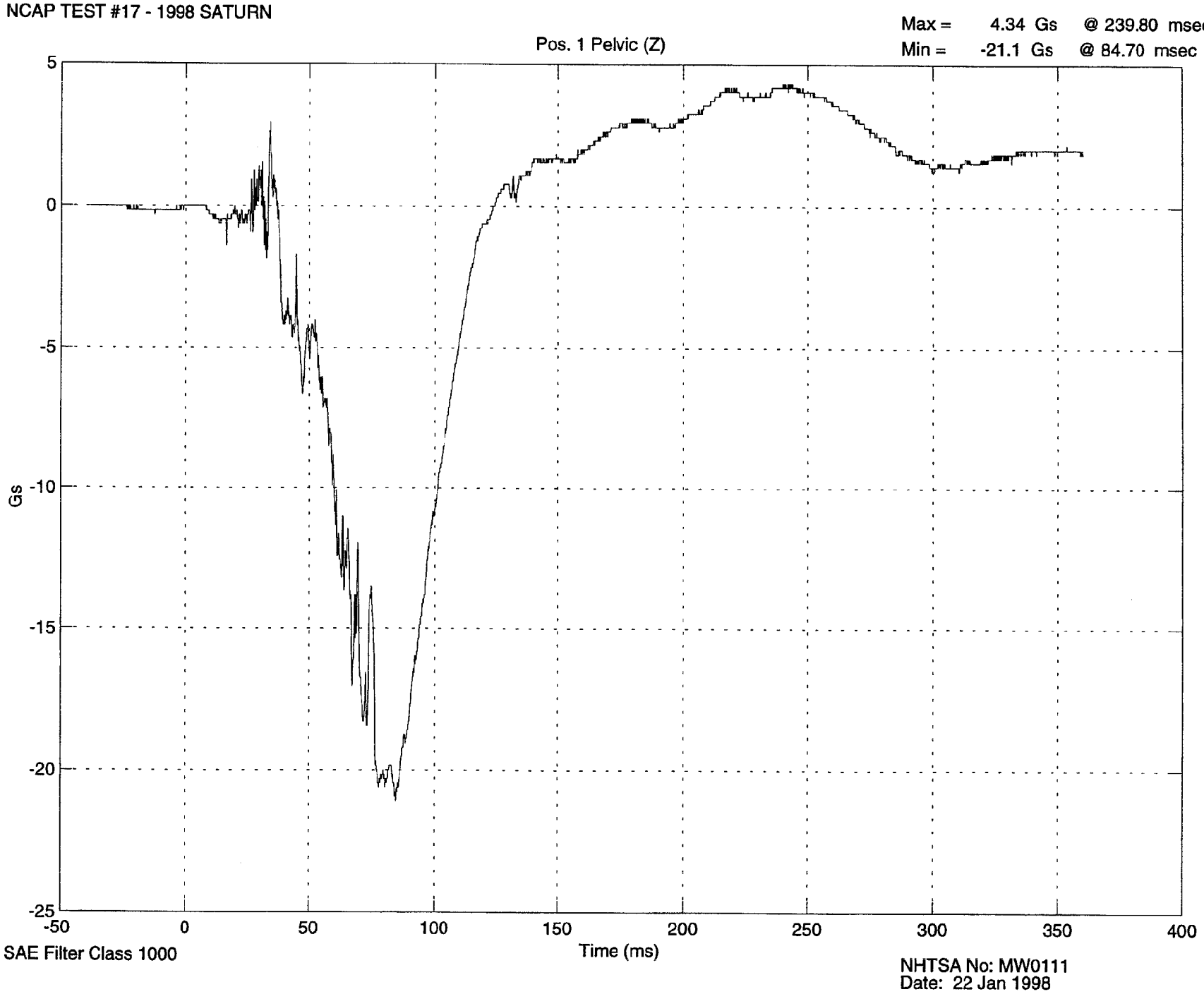
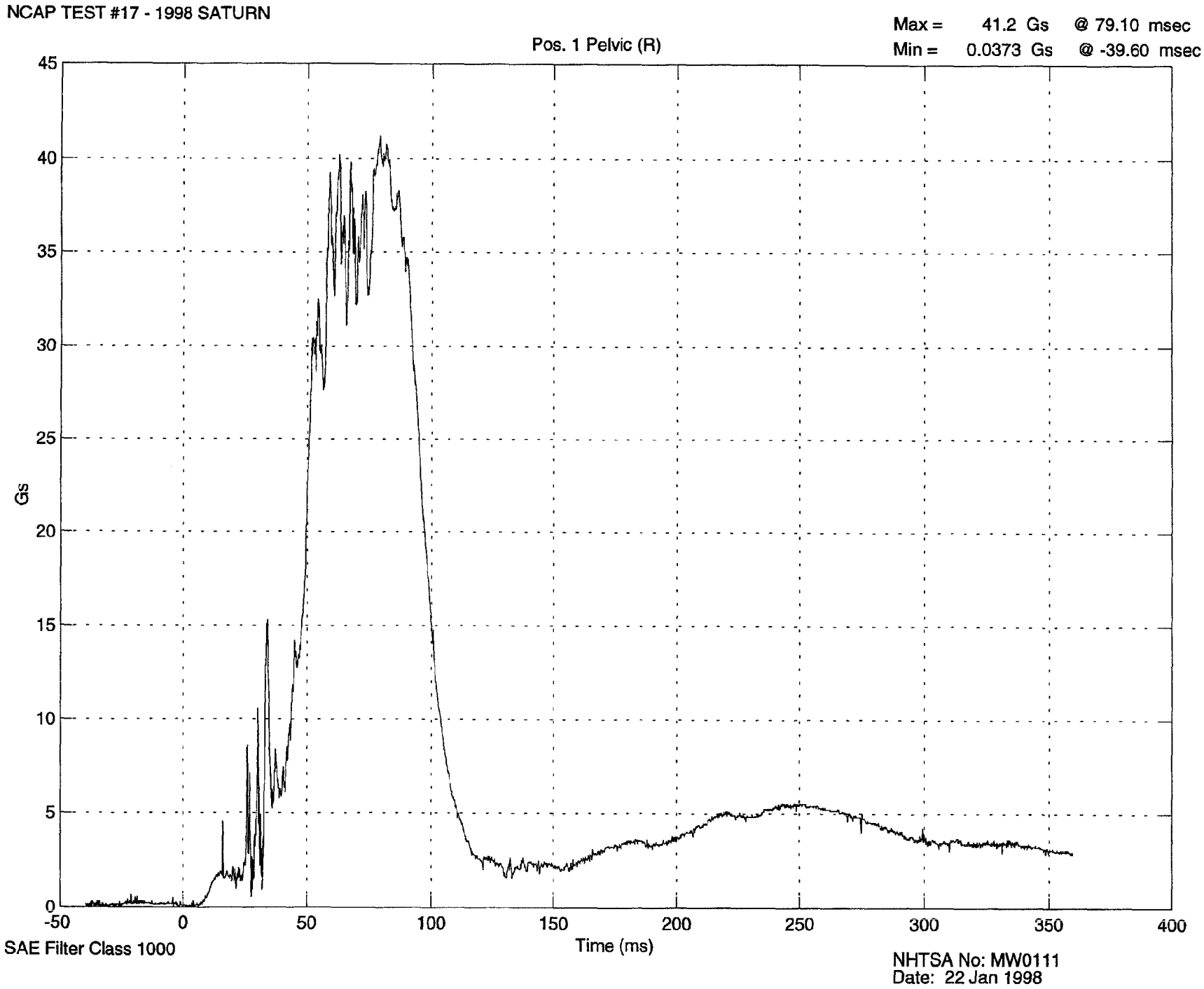
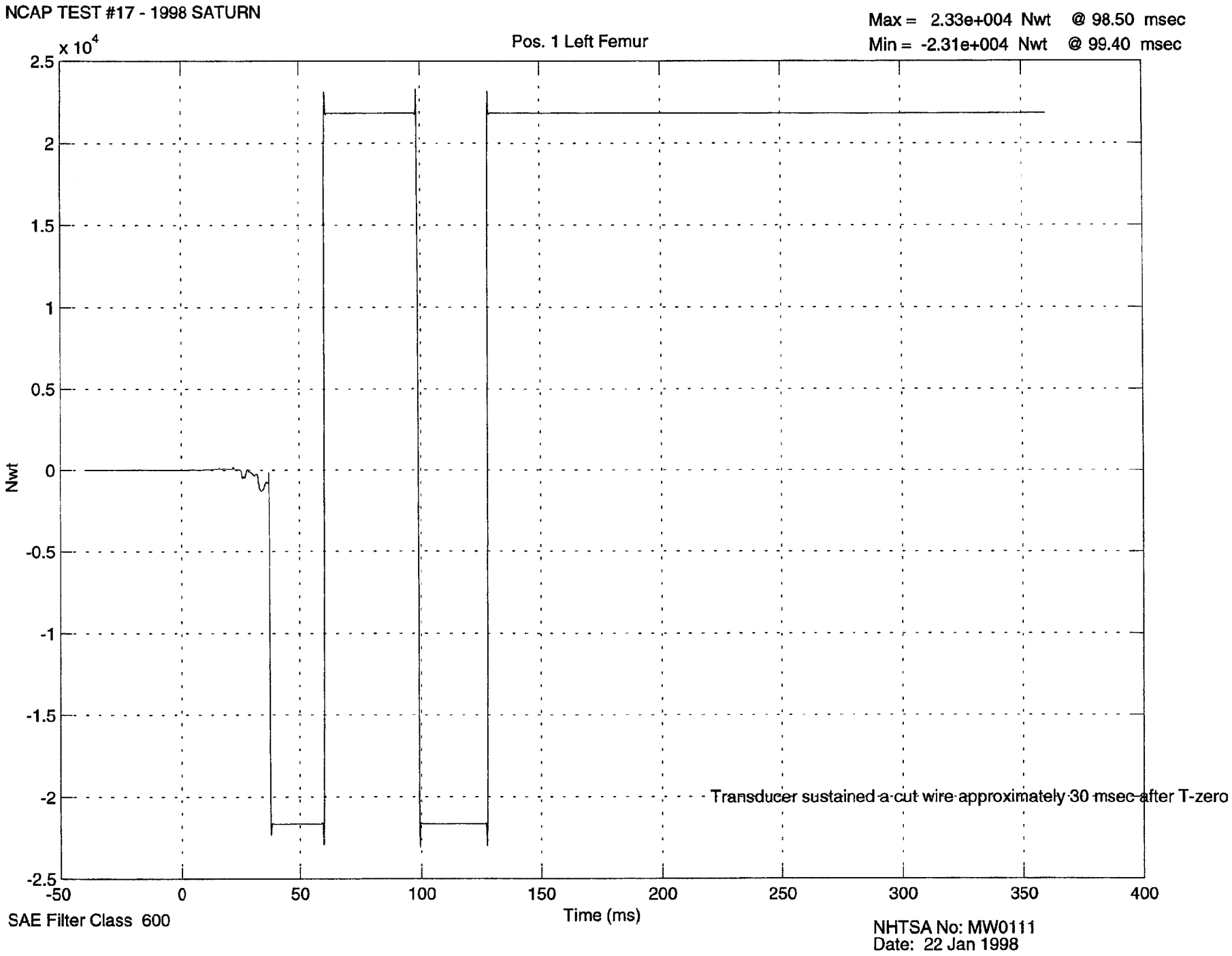

NCAP TEST #17 - 1998 SATURN
Pos. 1 Pelvic (X)
Max = 3.72 Gs @ 265.10 msec
Min = -37.8 Gs @ 62.60 msec
Gs
Time (ms)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Pelvic (Y)
Max = 5.26 Gs @ 76.10 msec
Min = -8.83 Gs @ 59.70 msec
Gs
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Pelvic (Z)
Max = 4.34 Gs @ 239.80 msec
Min = -21.1 Gs @ 84.70 msec
Gs
5
0
-5
-10
-15
-20
-25
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Pelvic (R)
Max = 41.2 Gs @ 79.10 msec
Min = 0.0373 Gs @ -39.60 msec
Gs
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Max = 2.33e+004 Nwt @ 98.50 msec
Min = -2.31e+004 Nwt @ 99.40 msec
Pos. 1 Left Femur
x 10^4
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
Transducer sustained a cut wire approximately 30 msec after T-zero
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998

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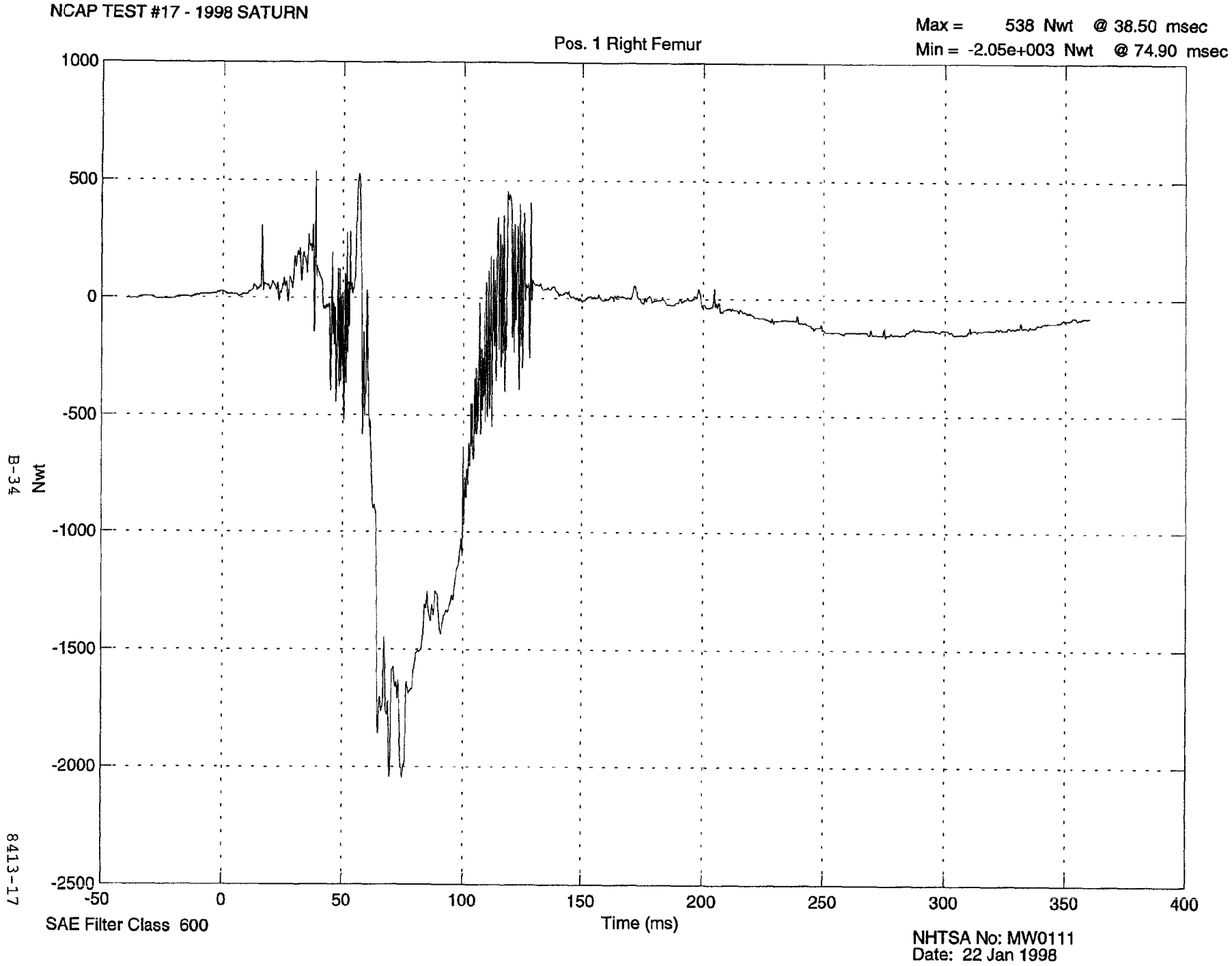
NCAP TEST #17 - 1998 SATURN
Pos. 1 Right Femur
Max = 538 Nwt @ 38.50 msec
Min = -2.05e+003 Nwt @ 74.90 msec
1000
500
0
-500
-1000
-1500
-2000
-2500
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998
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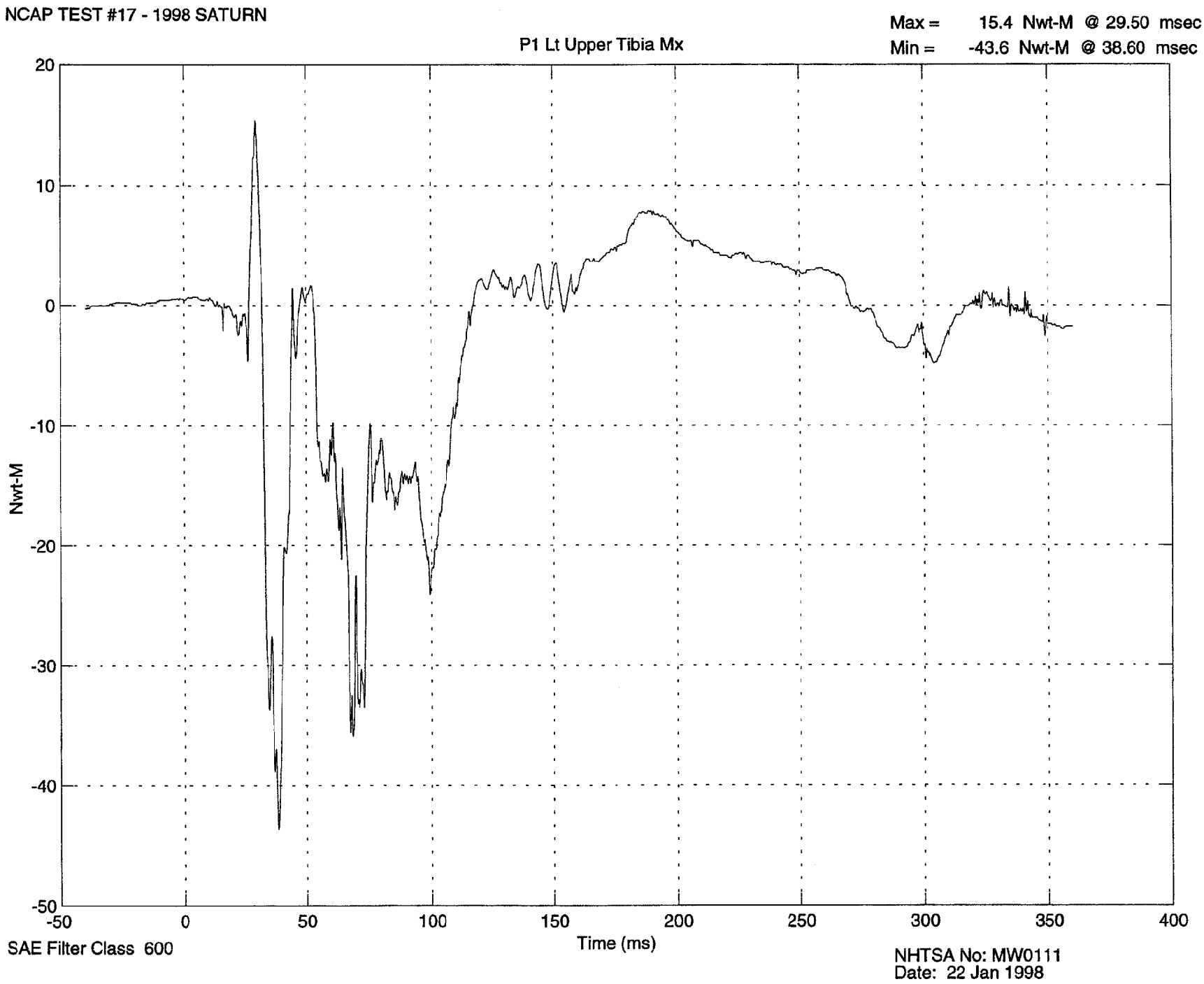
NCAP TEST #17 - 1998 SATURN
P1 Lt Upper Tibia Mx
Max = 15.4 Nwt-M @ 29.50 msec
Min = -43.6 Nwt-M @ 38.60 msec
Nwt-M
Time (ms)
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998

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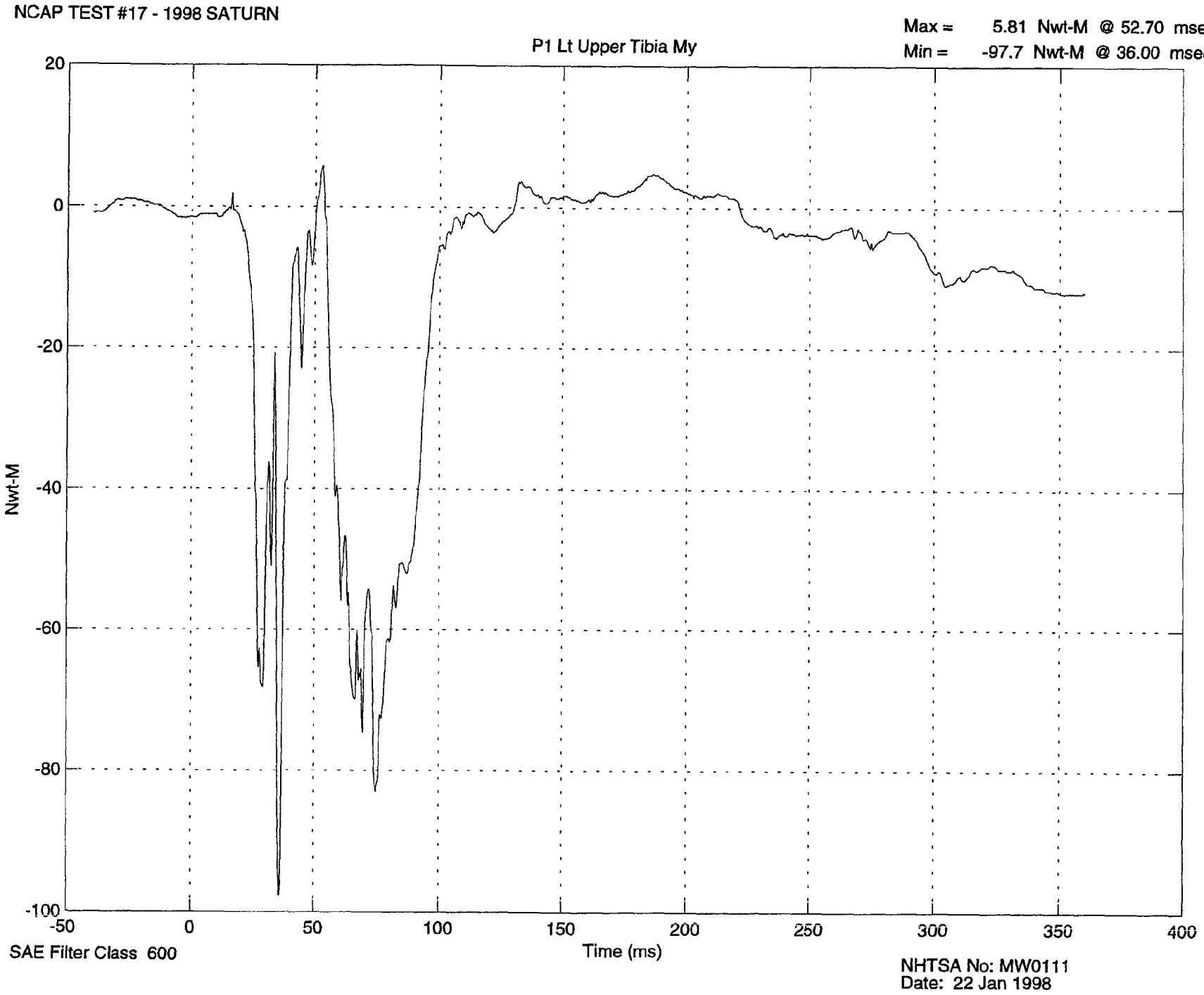
NCAP TEST #17 - 1998 SATURN
P1 Lt Upper Tibia My
Max = 5.81 Nwt-M @ 52.70 msec
Min = -97.7 Nwt-M @ 36.00 msec
20
0
-20
-40
-60
-80
-100
Nwt-M
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998

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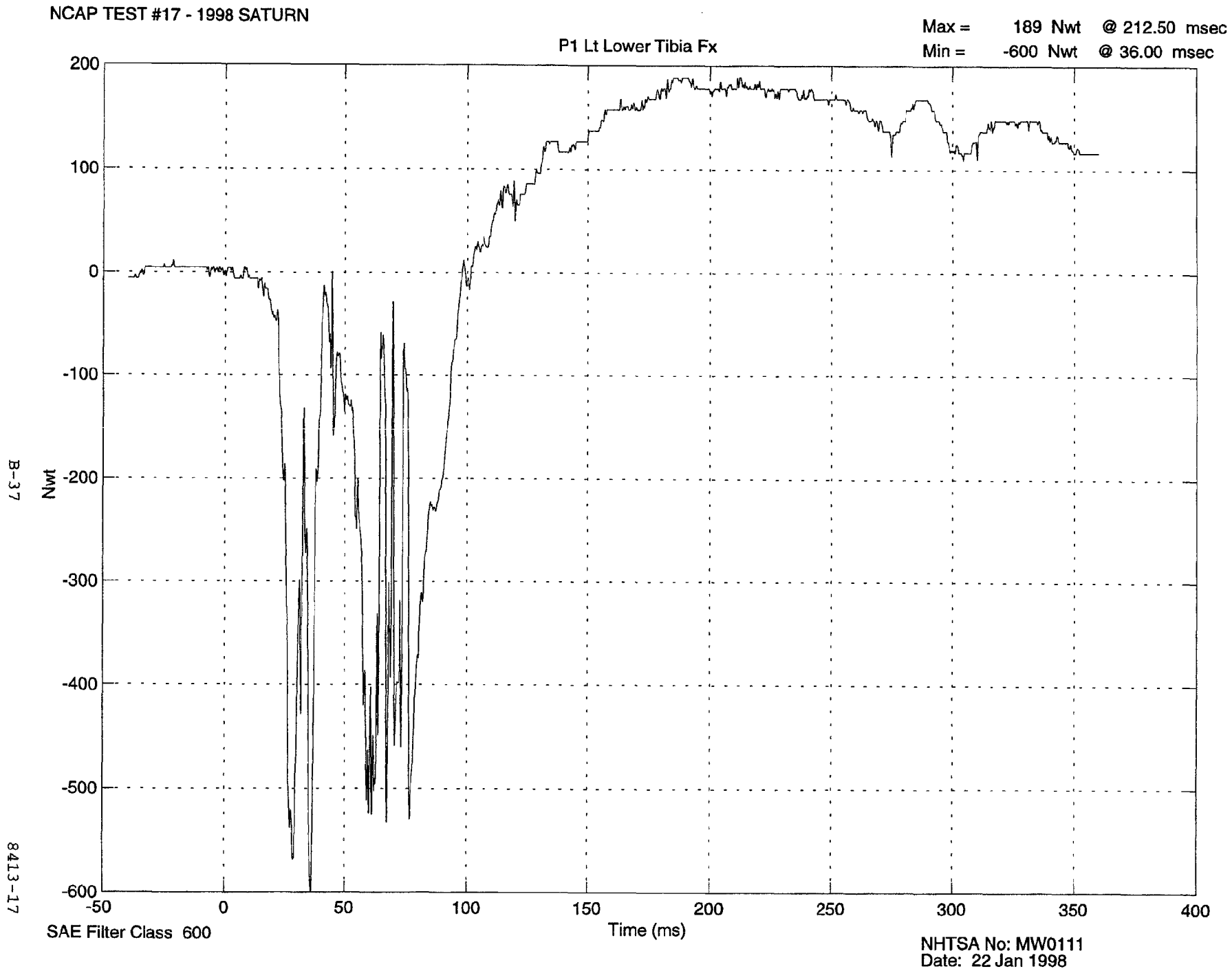
NCAP TEST #17 - 1998 SATURN
P1 Lt Lower Tibia Fx
Max = 189 Nwt @ 212.50 msec
Min = -600 Nwt @ 36.00 msec
Nwt
200
100
0
-100
-200
-300
-400
-500
-600
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998
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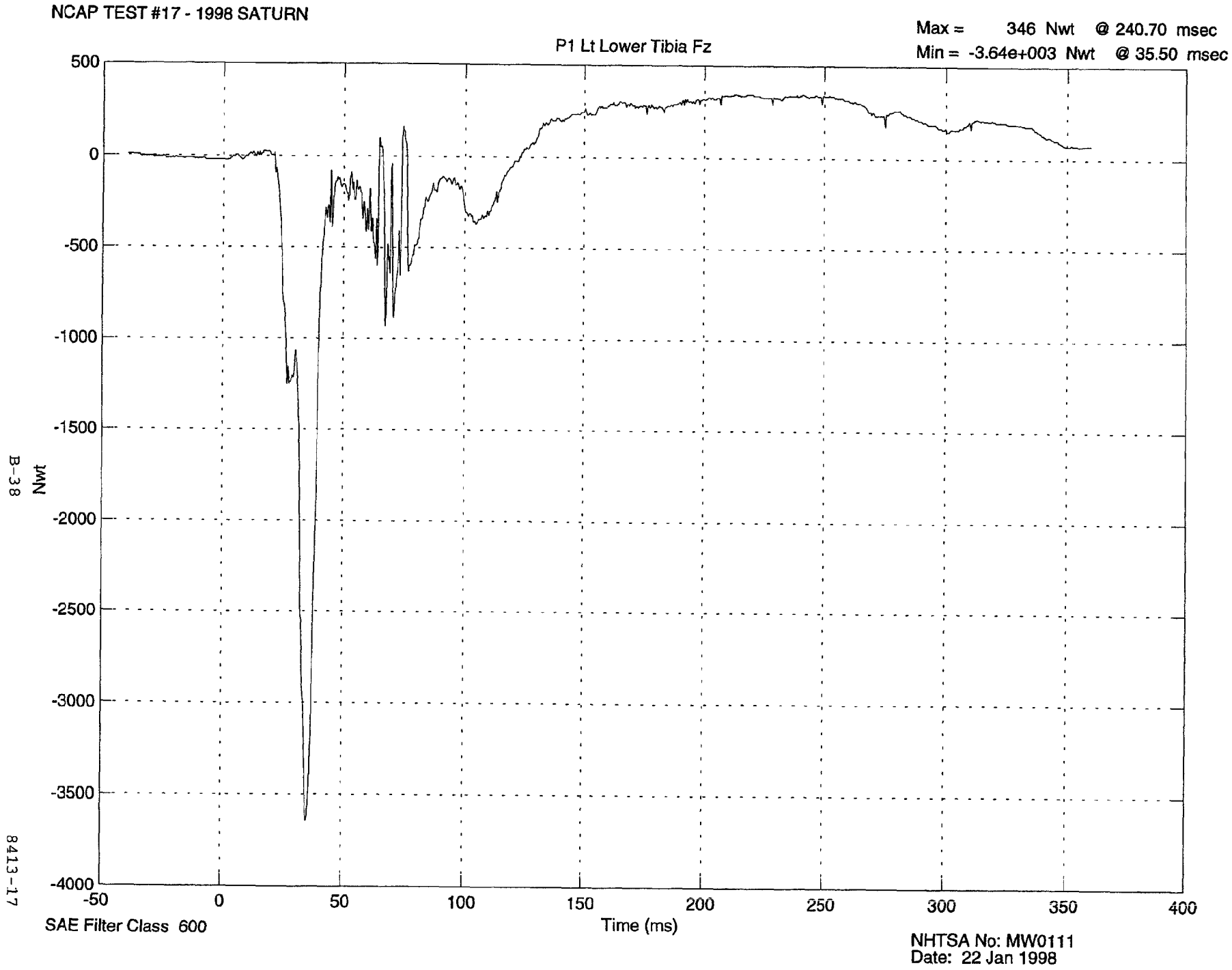
NCAP TEST #17 - 1998 SATURN
P1 Lt Lower Tibia Fz
Max = 346 Nwt @ 240.70 msec
Min = -3.64e+003 Nwt @ 35.50 msec
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
-4000
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998
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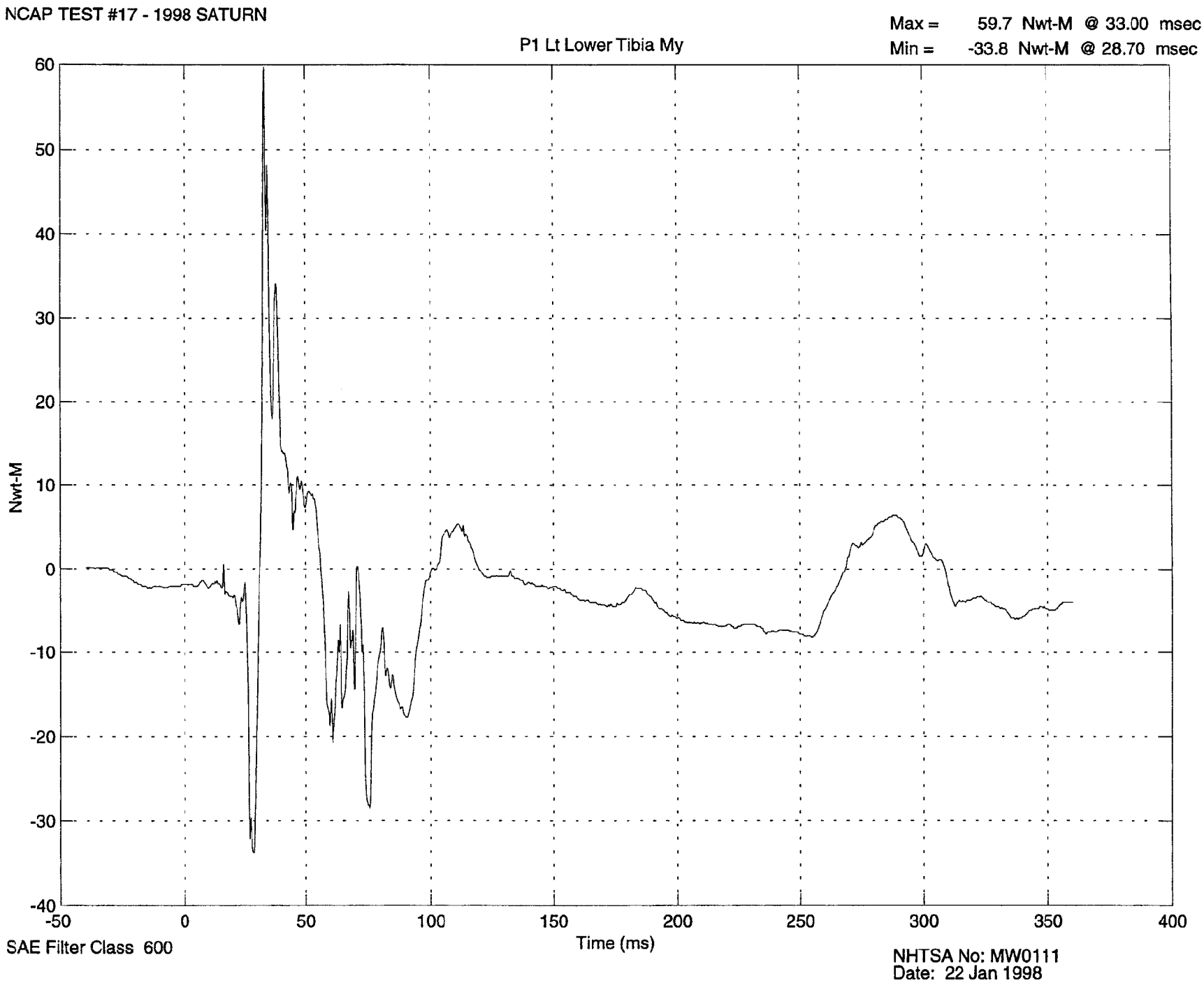
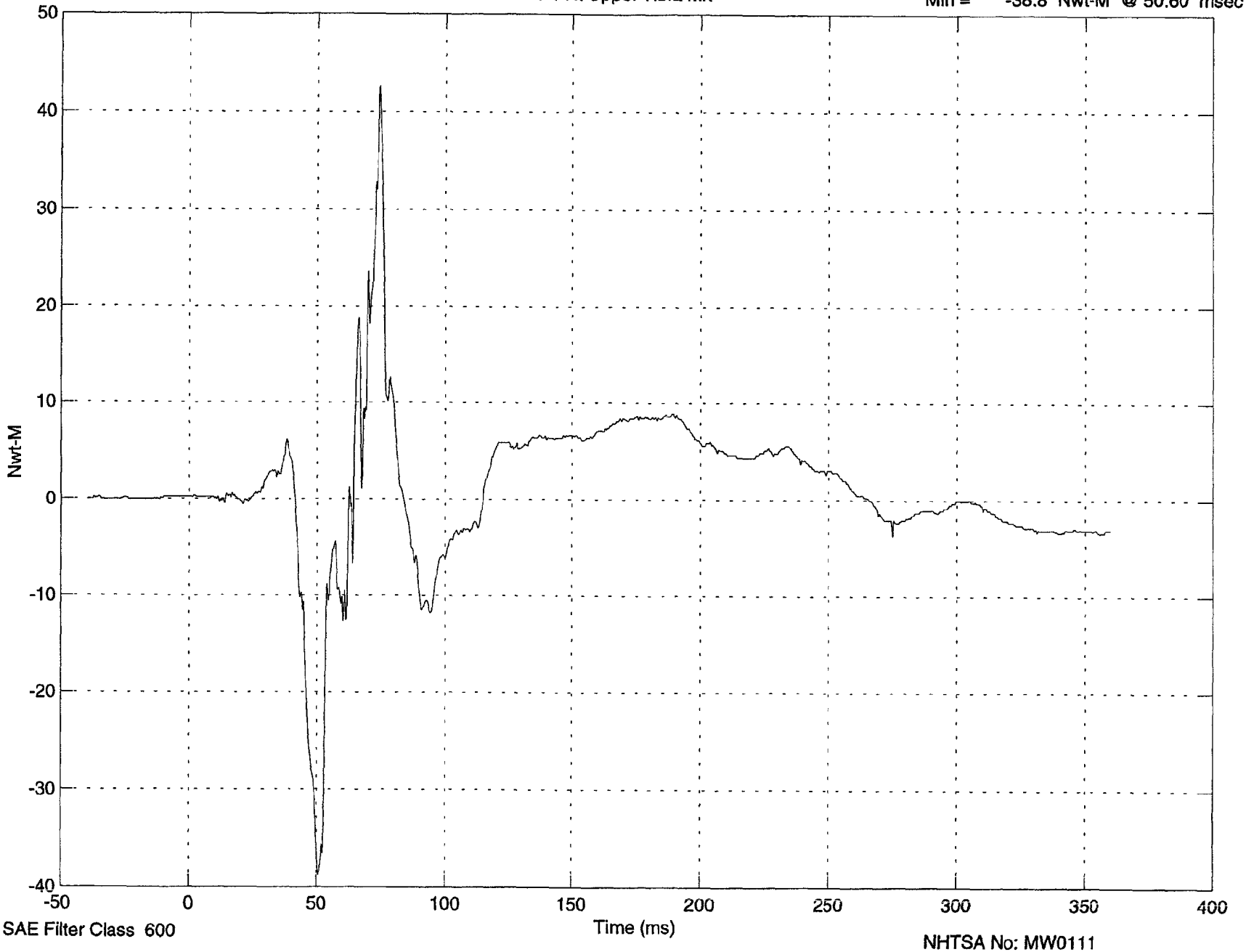

NCAP TEST #17 - 1998 SATURN
P1 Lt Lower Tibia My
Max = 59.7 Nwt-M @ 33.00 msec
Min = -33.8 Nwt-M @ 28.70 msec
Nwt-M
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998

NCAP TEST #17 - 1998 SATURN

P1 Rt Upper Tibia Mx

Max = 42.6 Nwt-M @ 74.20 msec
Min = -38.8 Nwt-M @ 50.60 msec



SAE Filter Class 600

NHTSA No: MW0111
Date: 22 Jan 1998

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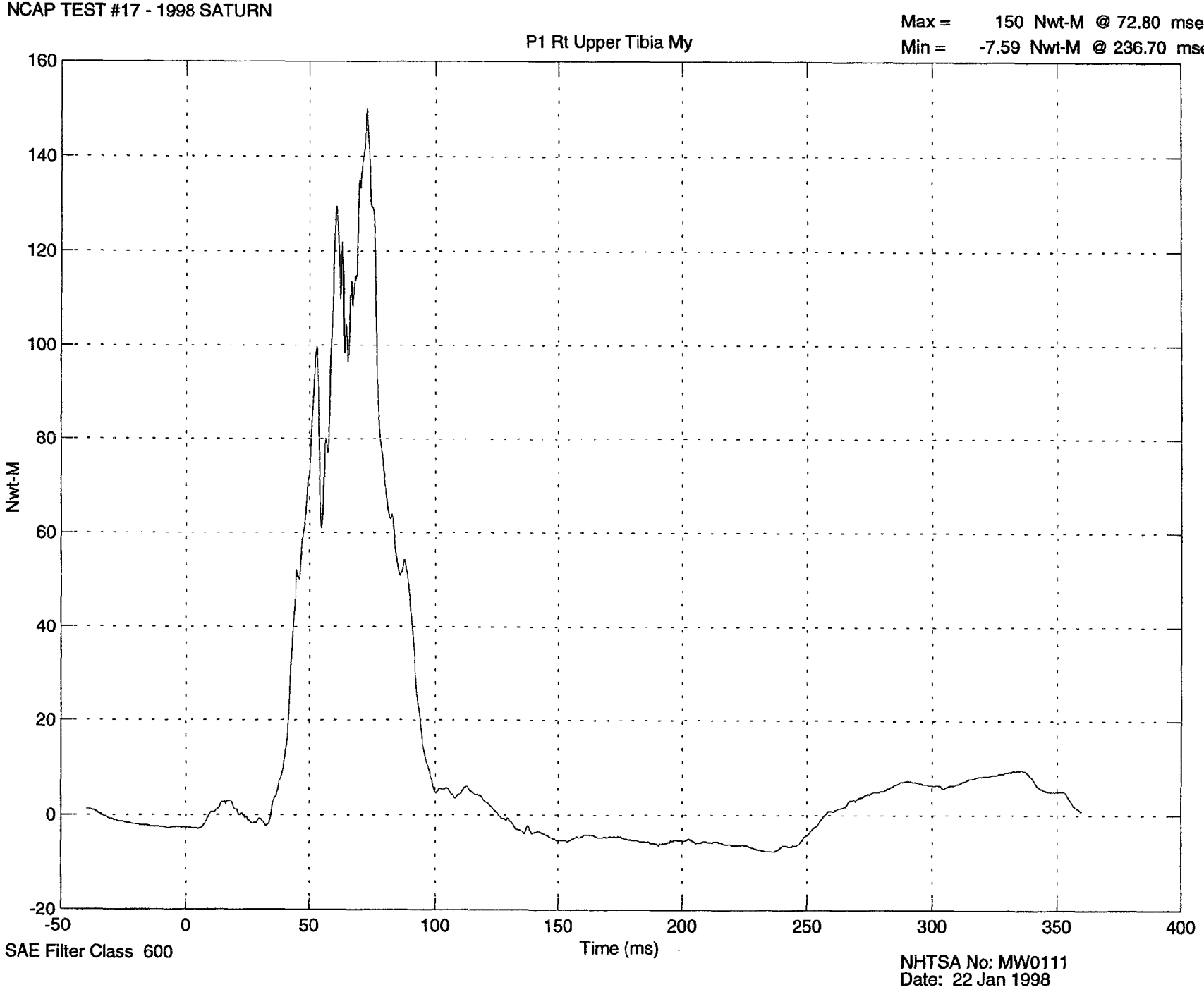
NCAP TEST #17 - 1998 SATURN



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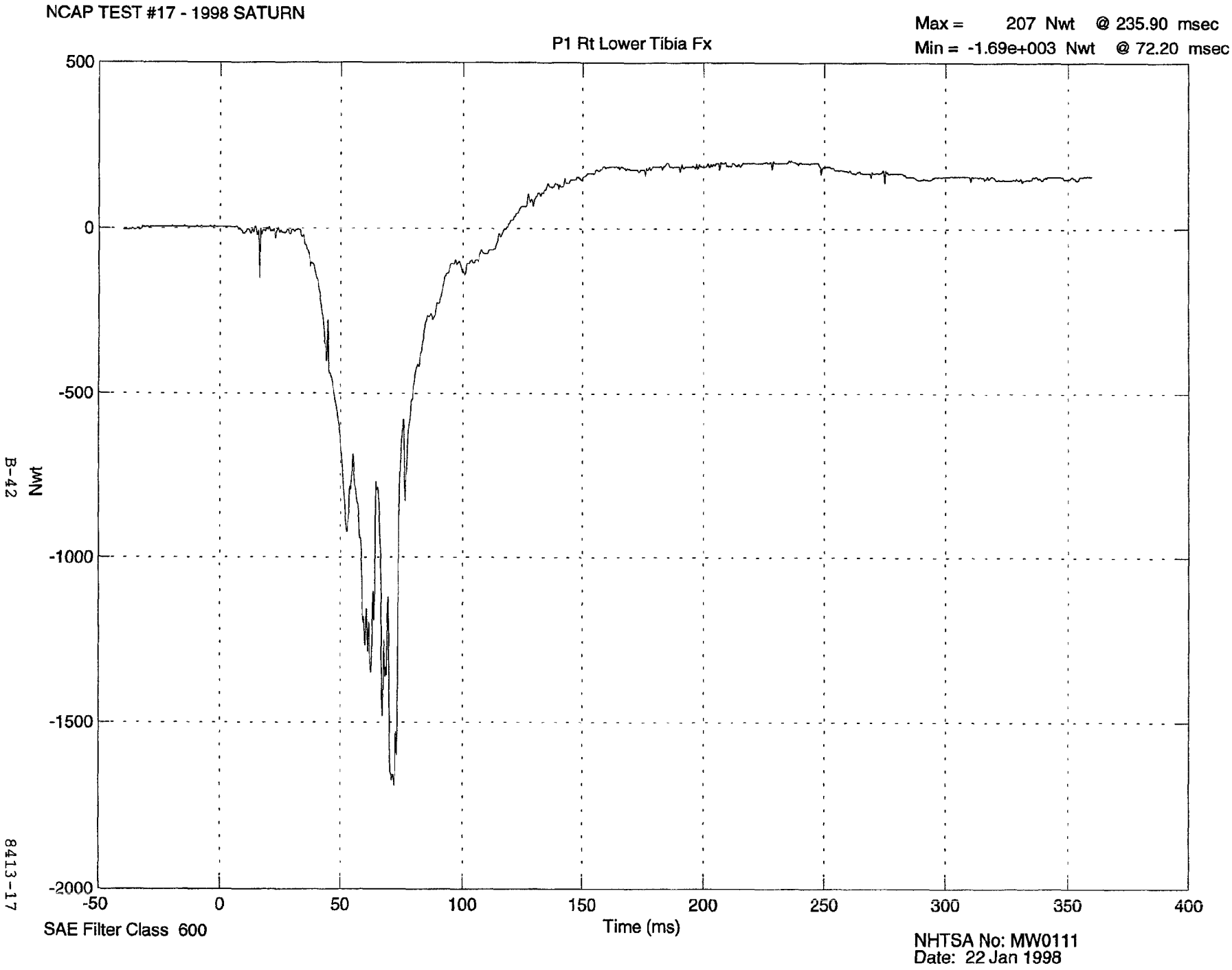
NCAP TEST #17 - 1998 SATURN
P1 Rt Lower Tibia Fx
Max = 207 Nwt @ 235.90 msec
Min = -1.69e+003 Nwt @ 72.20 msec
500
0
-500
-1000
-1500
-2000
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998
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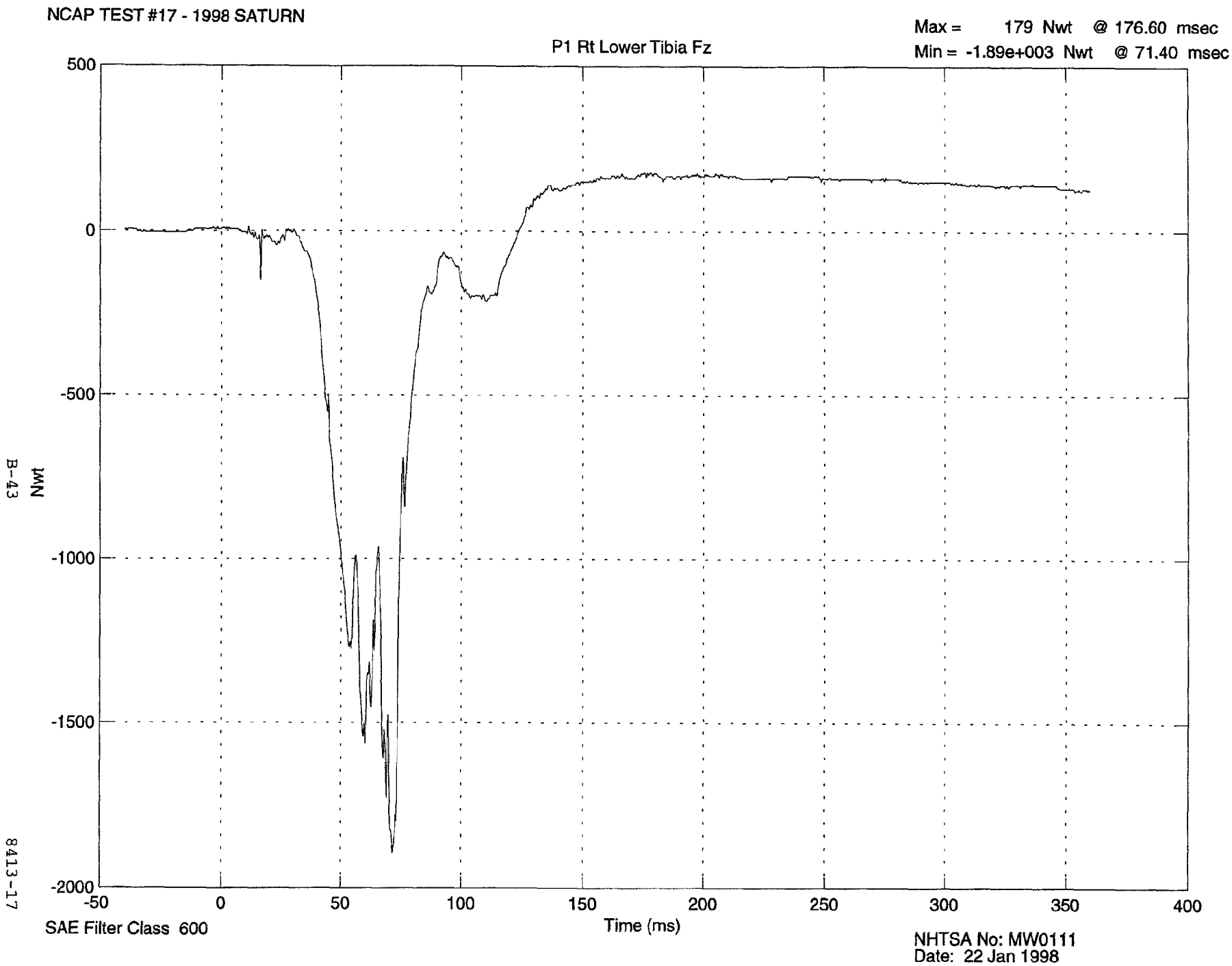
NCAP TEST #17 - 1998 SATURN
P1 Rt Lower Tibia Fz
Max = 179 Nwt @ 176.60 msec
Min = -1.89e+003 Nwt @ 71.40 msec
500
0
-500
-1000
-1500
-2000
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998
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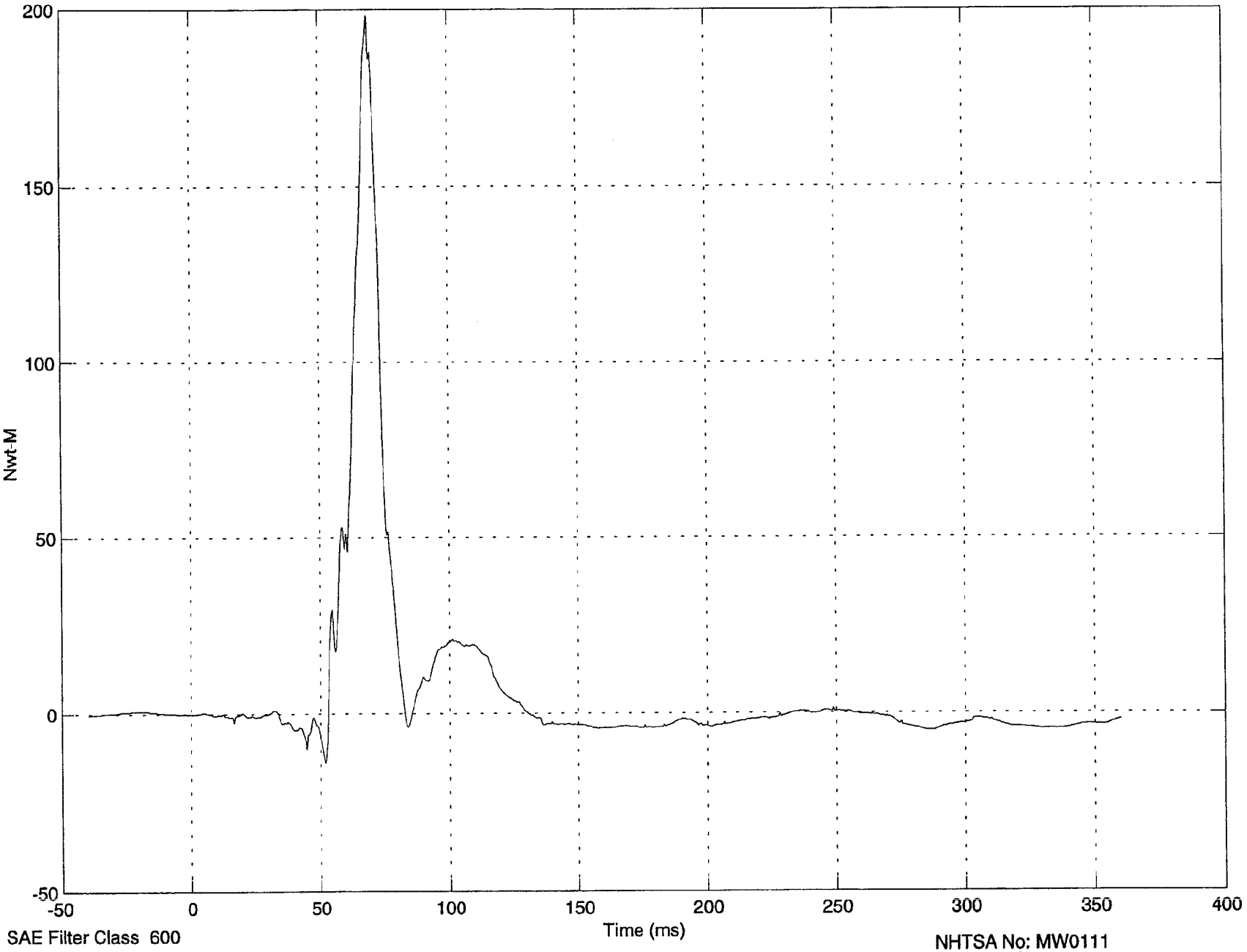
NCAP TEST #17 - 1998 SATURN

P1 Rt Lower Tibia My

Max = 198 Nwt-M @ 68.80 msec
Min = -13.9 Nwt-M @ 51.90 msec



SAE Filter Class 600

NHTSA No: MW0111
Date: 22 Jan 1998

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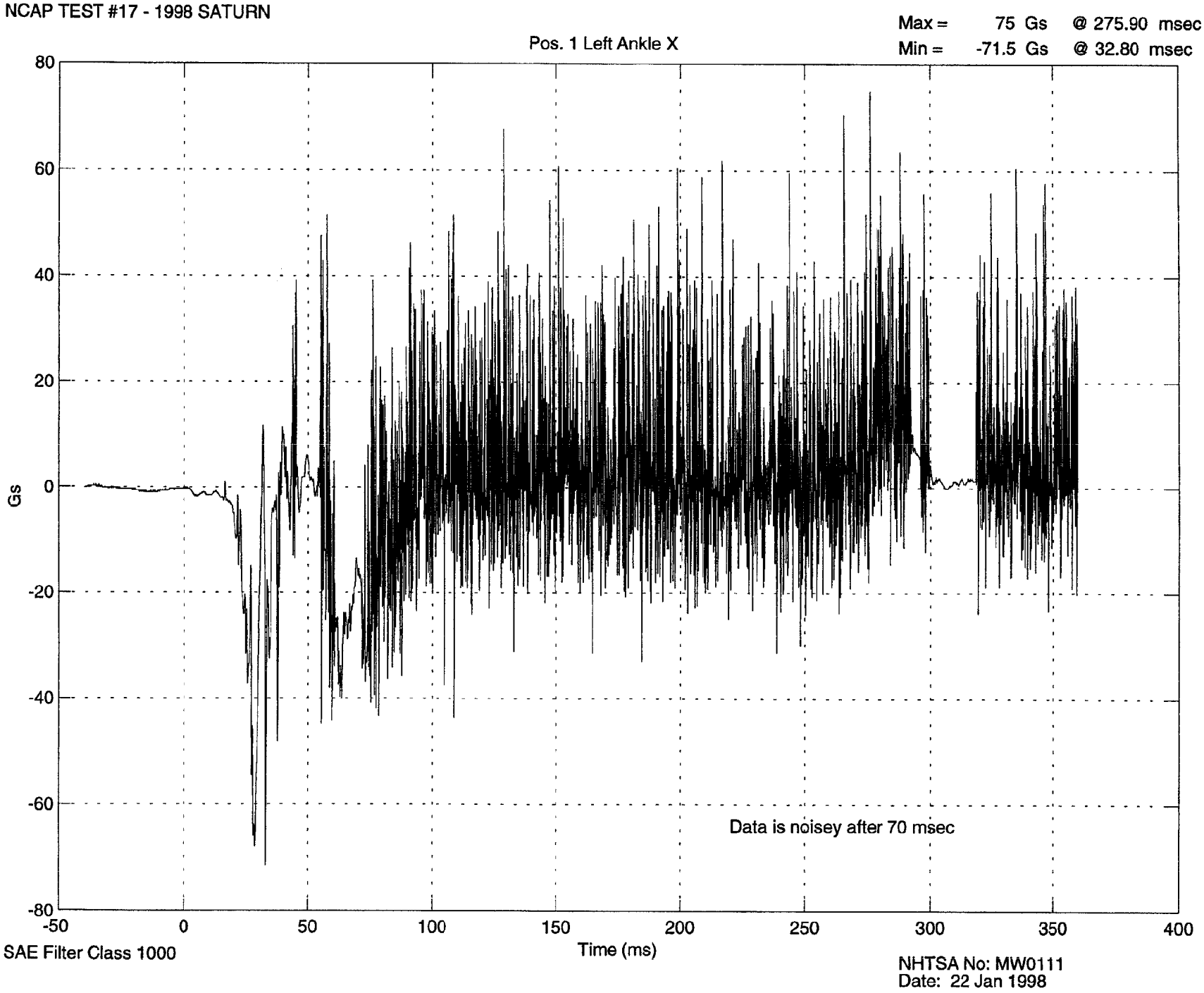
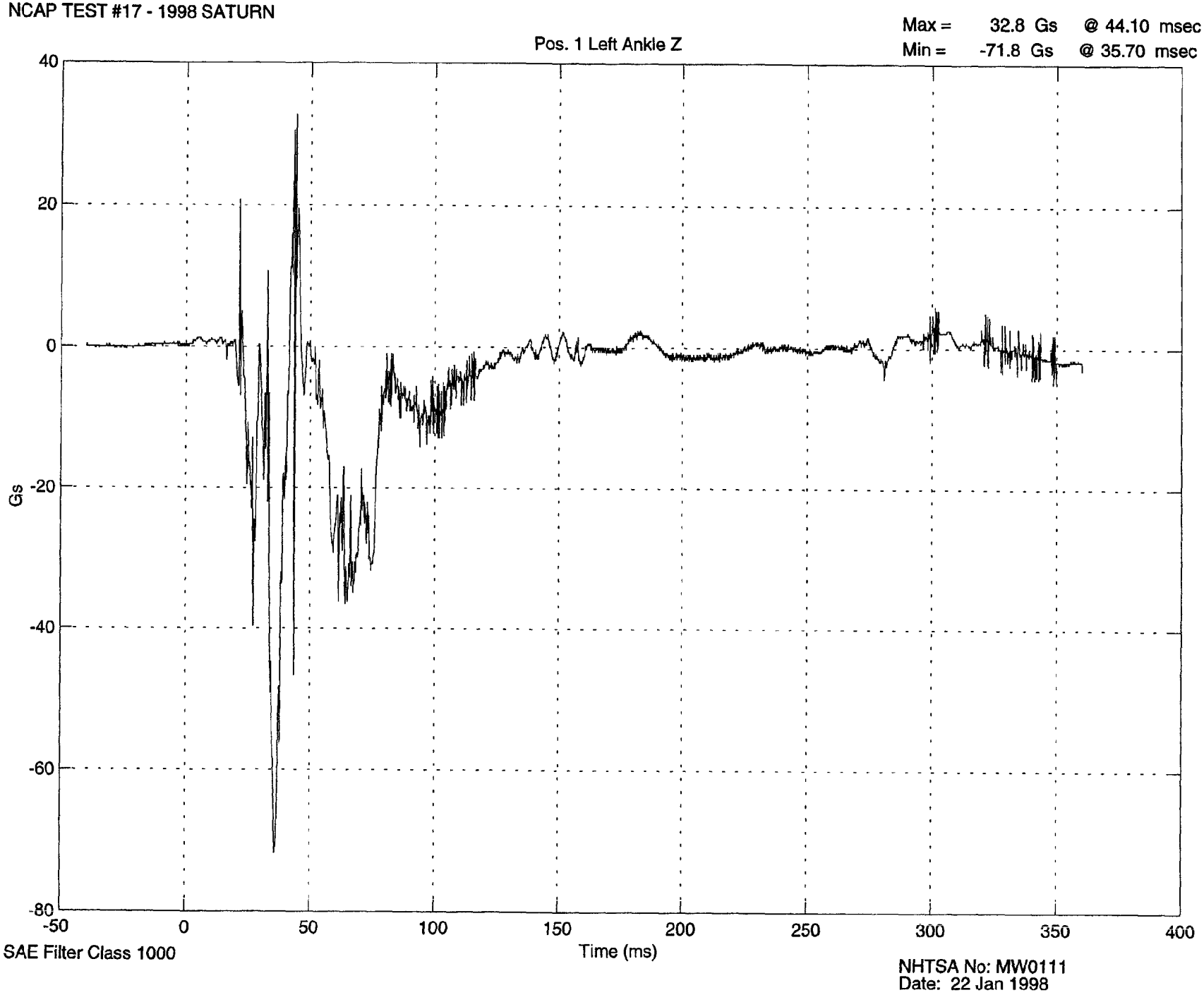
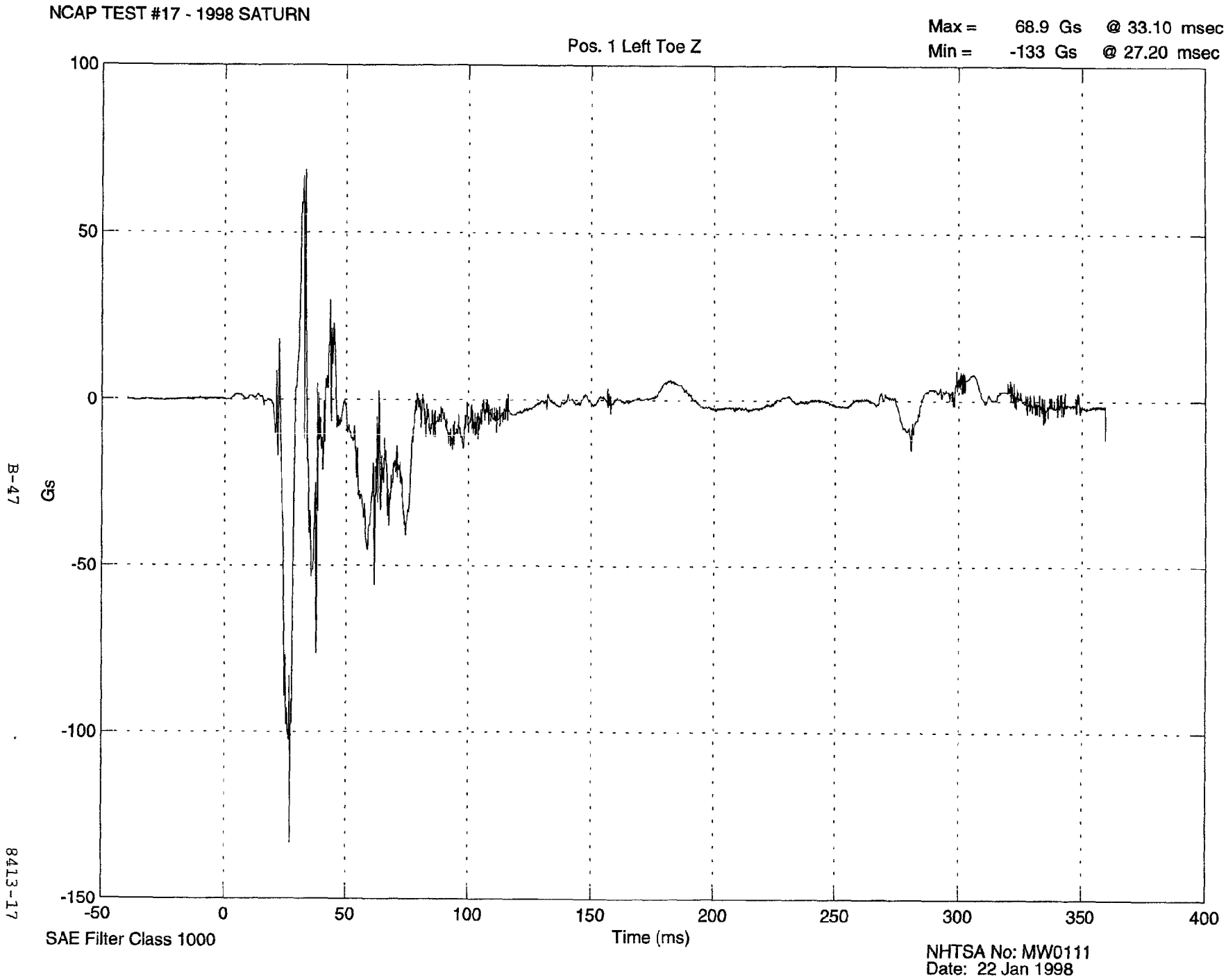
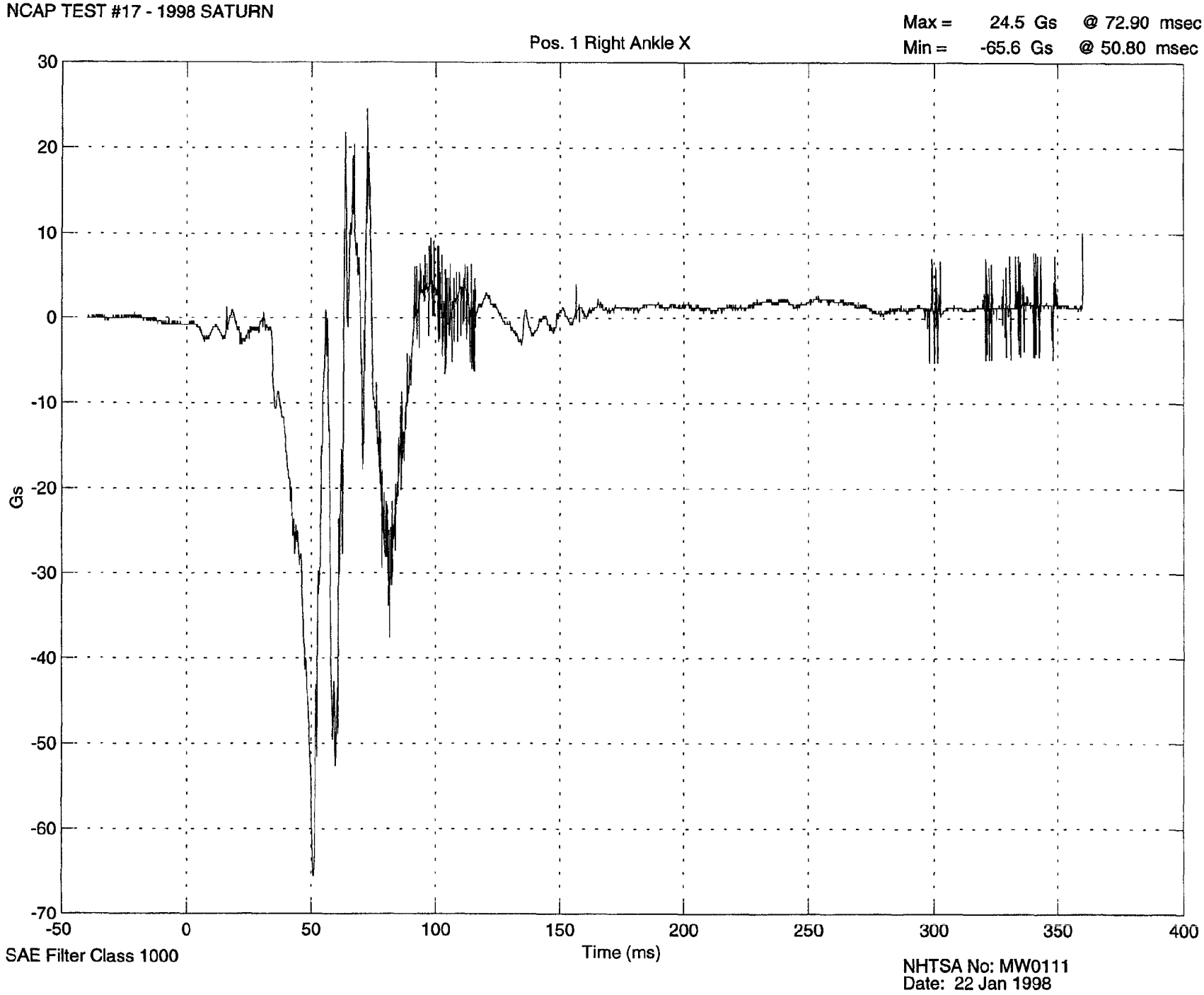
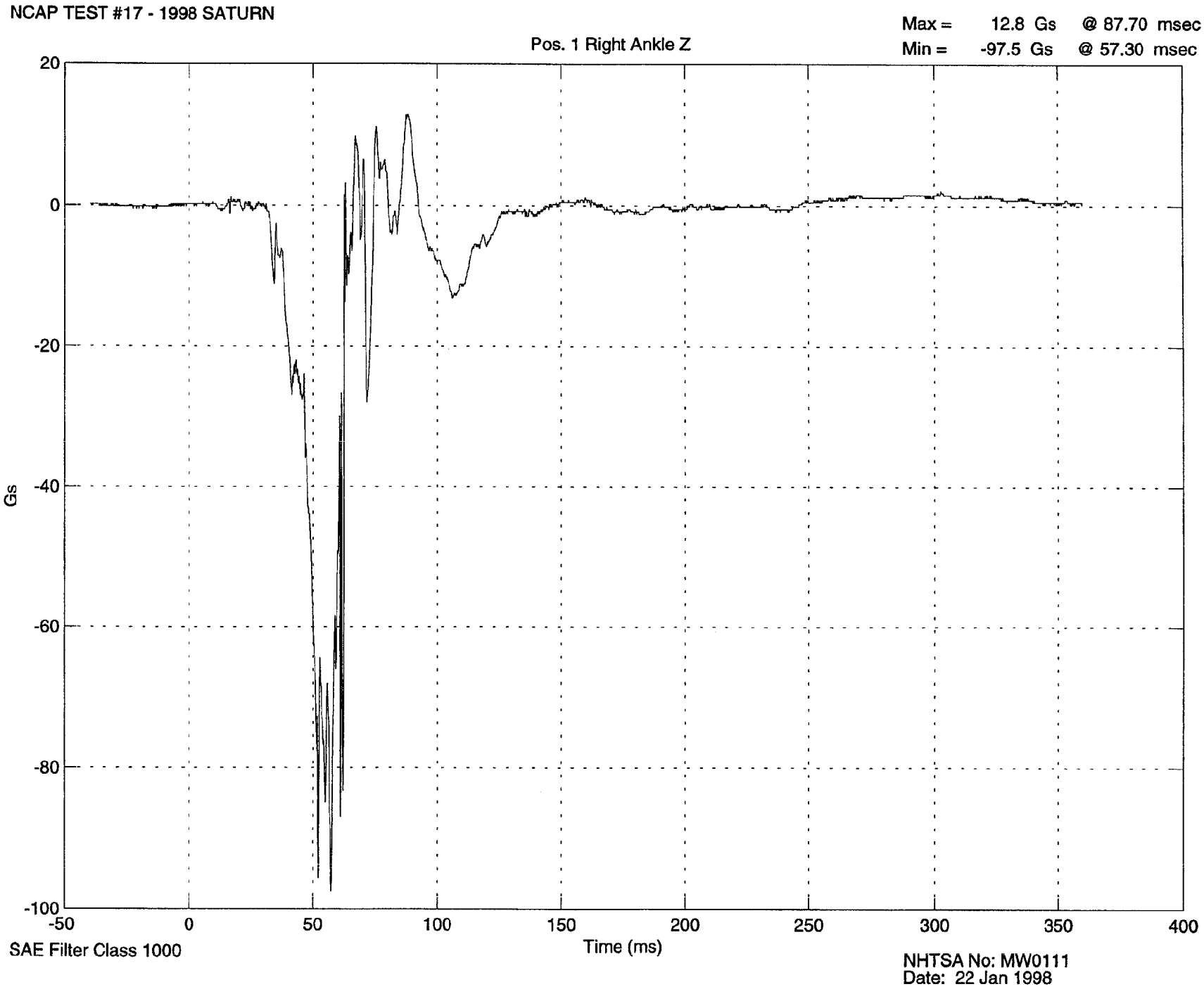
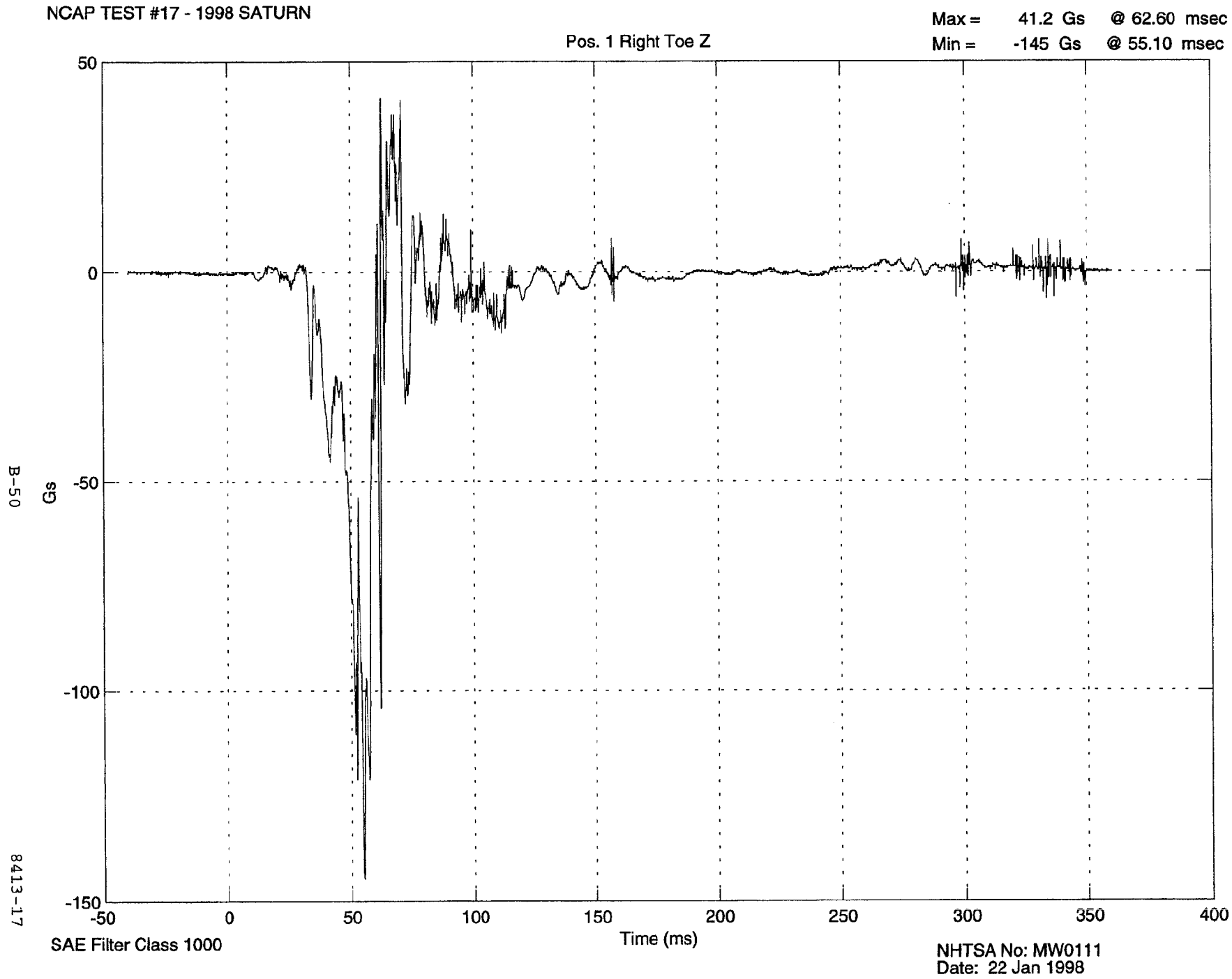

NCAP TEST #17 - 1998 SATURN
Pos. 1 Left Ankle X
Max = 75 Gs @ 275.90 msec
Min = -71.5 Gs @ 32.80 msec
Gs
Time (ms)
Data is noisey after 70 msec
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Left Ankle Z
Max = 32.8 Gs @ 44.10 msec
Min = -71.8 Gs @ 35.70 msec
Gs
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Left Toe Z
Max = 68.9 Gs @ 33.10 msec
Min = -133 Gs @ 27.20 msec
100
50
0
-50
-100
-150
Gs
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Right Ankle X
Max = 24.5 Gs @ 72.90 msec
Min = -65.6 Gs @ 50.80 msec
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
Gs
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Right Ankle Z
Max = 12.8 Gs @ 87.70 msec
Min = -97.5 Gs @ 57.30 msec
Gs
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 1 Right Toe Z
Max = 41.2 Gs @ 62.60 msec
Min = -145 Gs @ 55.10 msec
50
0
-50
-100
-150
Gs
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998

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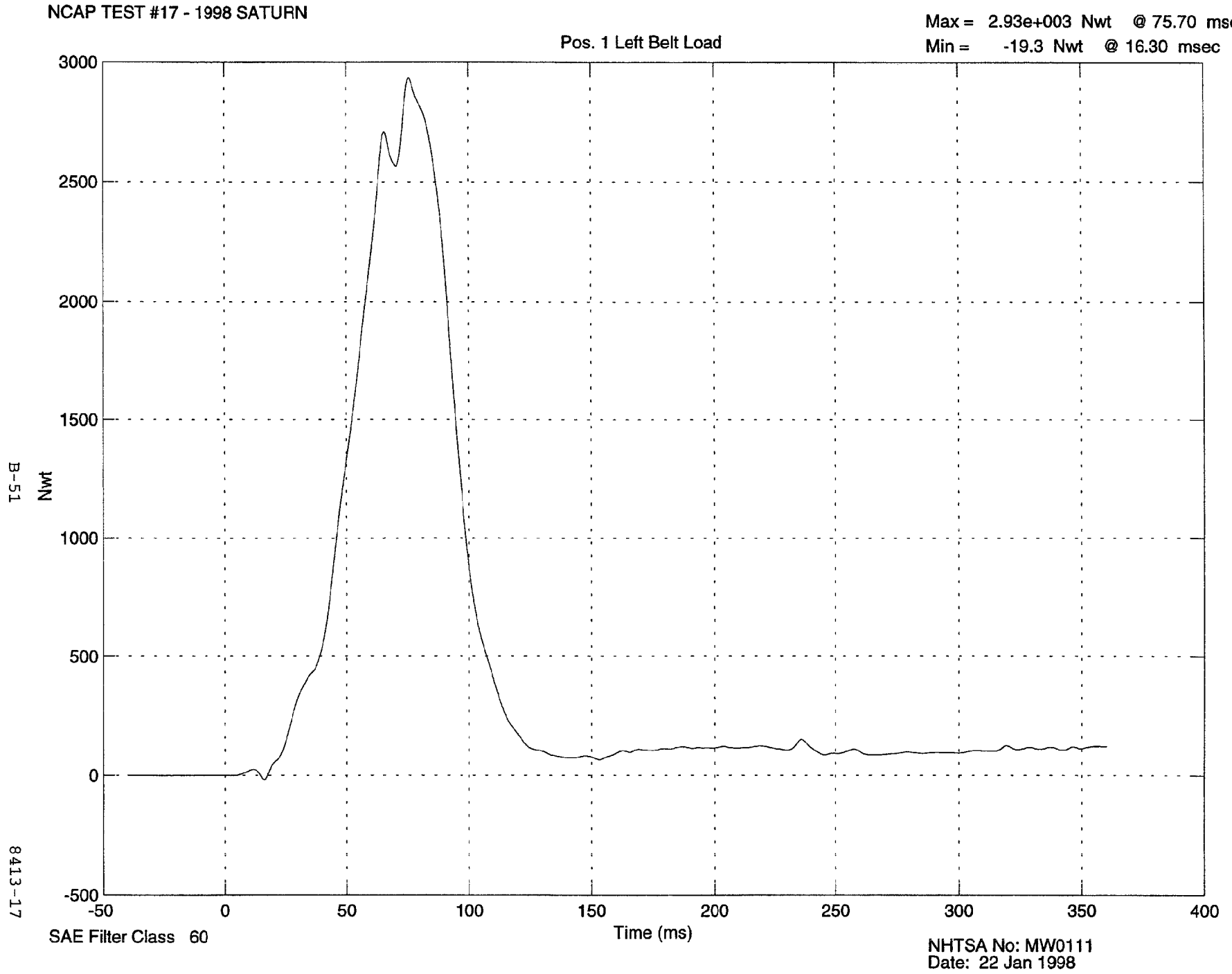
NCAP TEST #17 - 1998 SATURN
Pos. 1 Left Belt Load
Max = 2.93e+003 Nwt @ 75.70 msec
Min = -19.3 Nwt @ 16.30 msec
3000
2500
2000
1500
1000
500
0
-500
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 60
NHTSA No: MW0111
Date: 22 Jan 1998
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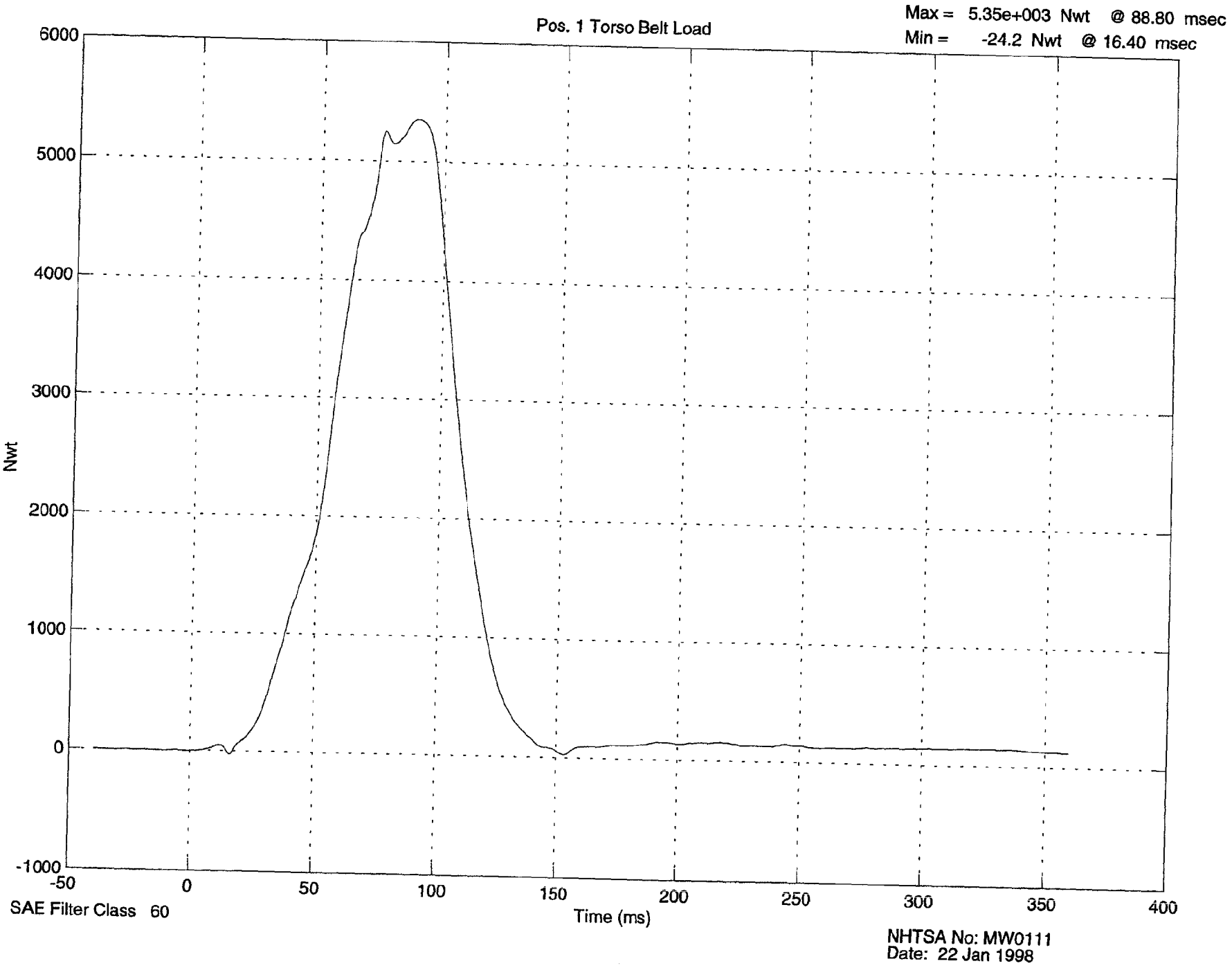
NCAP TEST #17 - 1998 SATURN



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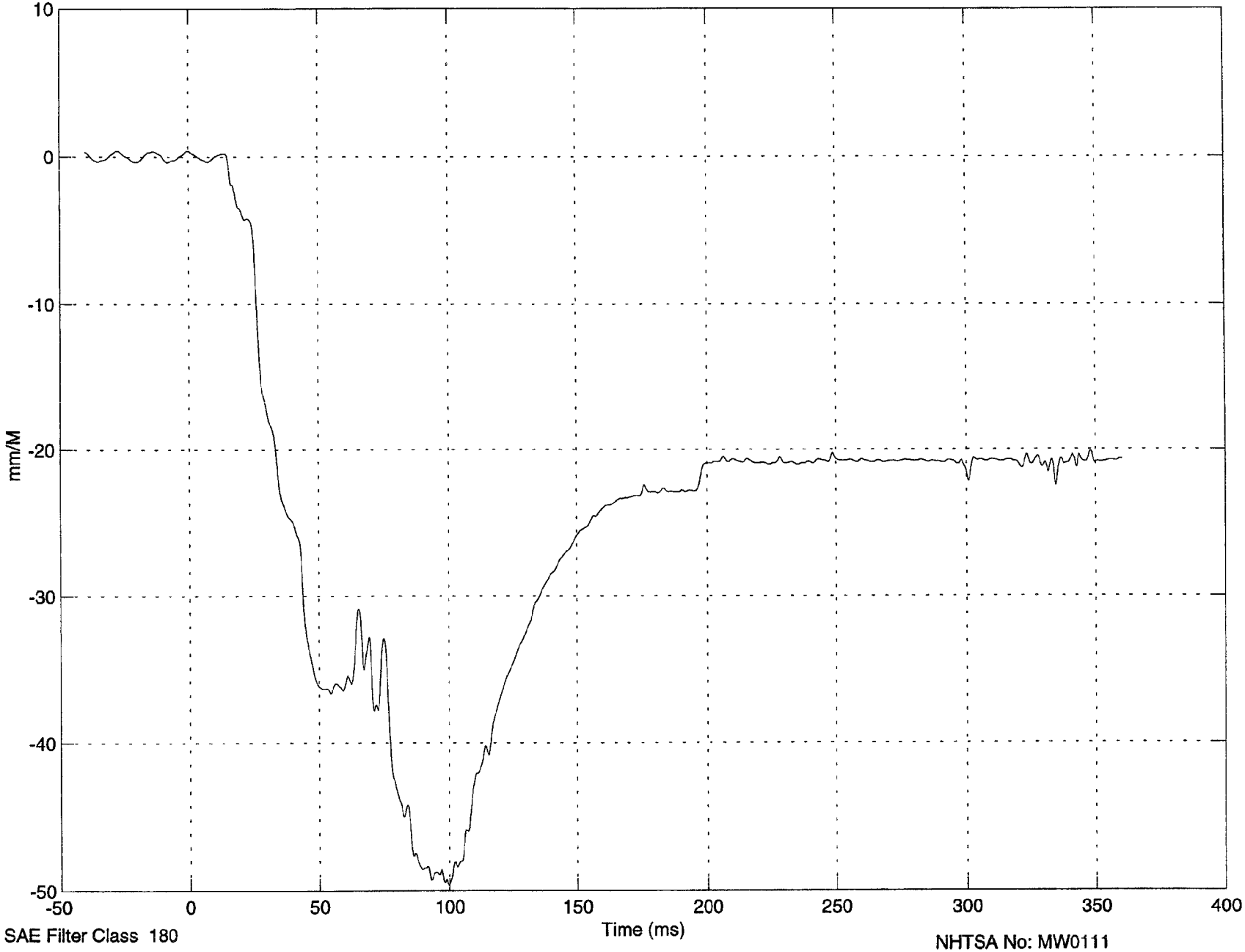
NCAP TEST #17 - 1998 SATURN

Pos. 1 Belt Elongation

Max = 0.391 mm/M @ -0.10 msec
Min = -49.6 mm/M @ 99.70 msec



SAE Filter Class 180

NHTSA No: MW0111
Date: 22 Jan 1998

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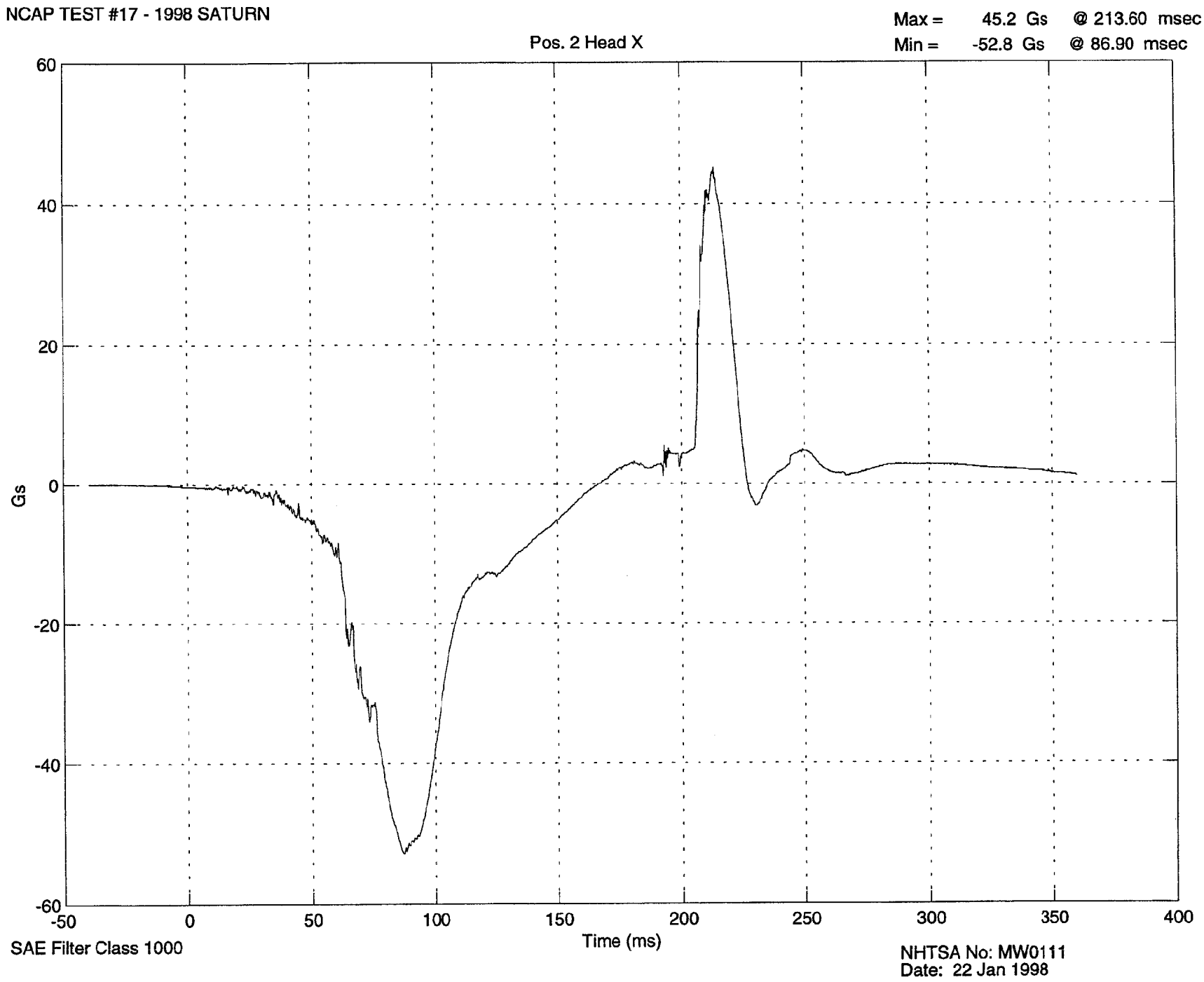
NCAP TEST #17 - 1998 SATURN
Pos. 2 Head X
Max = 45.2 Gs @ 213.60 msec
Min = -52.8 Gs @ 86.90 msec
60
40
20
0
-20
-40
-60
Gs
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
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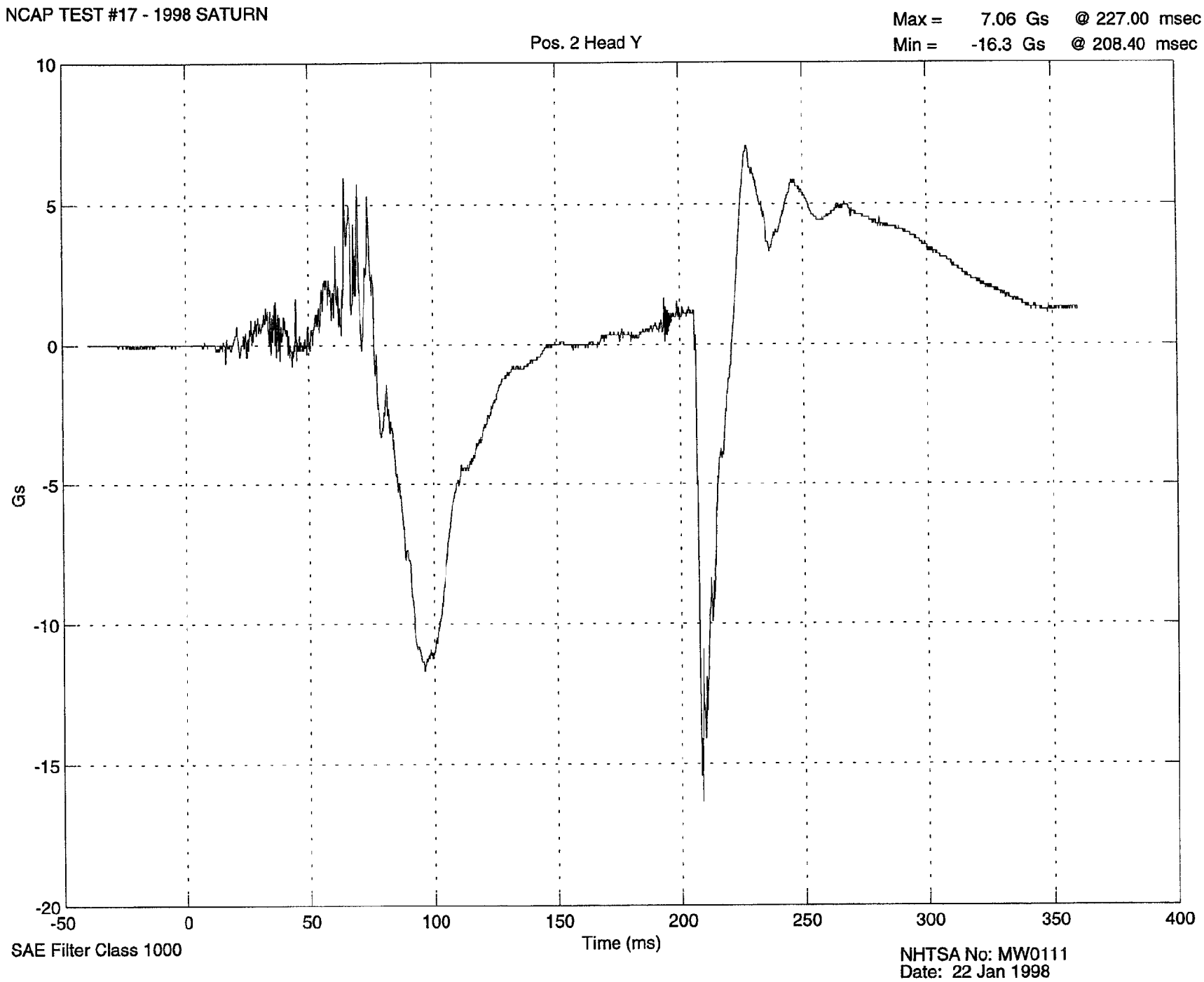
NCAP TEST #17 - 1998 SATURN
Pos. 2 Head Y
Max = 7.06 Gs @ 227.00 msec
Min = -16.3 Gs @ 208.40 msec
10
5
0
-5
-10
-15
-20
Gs
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998

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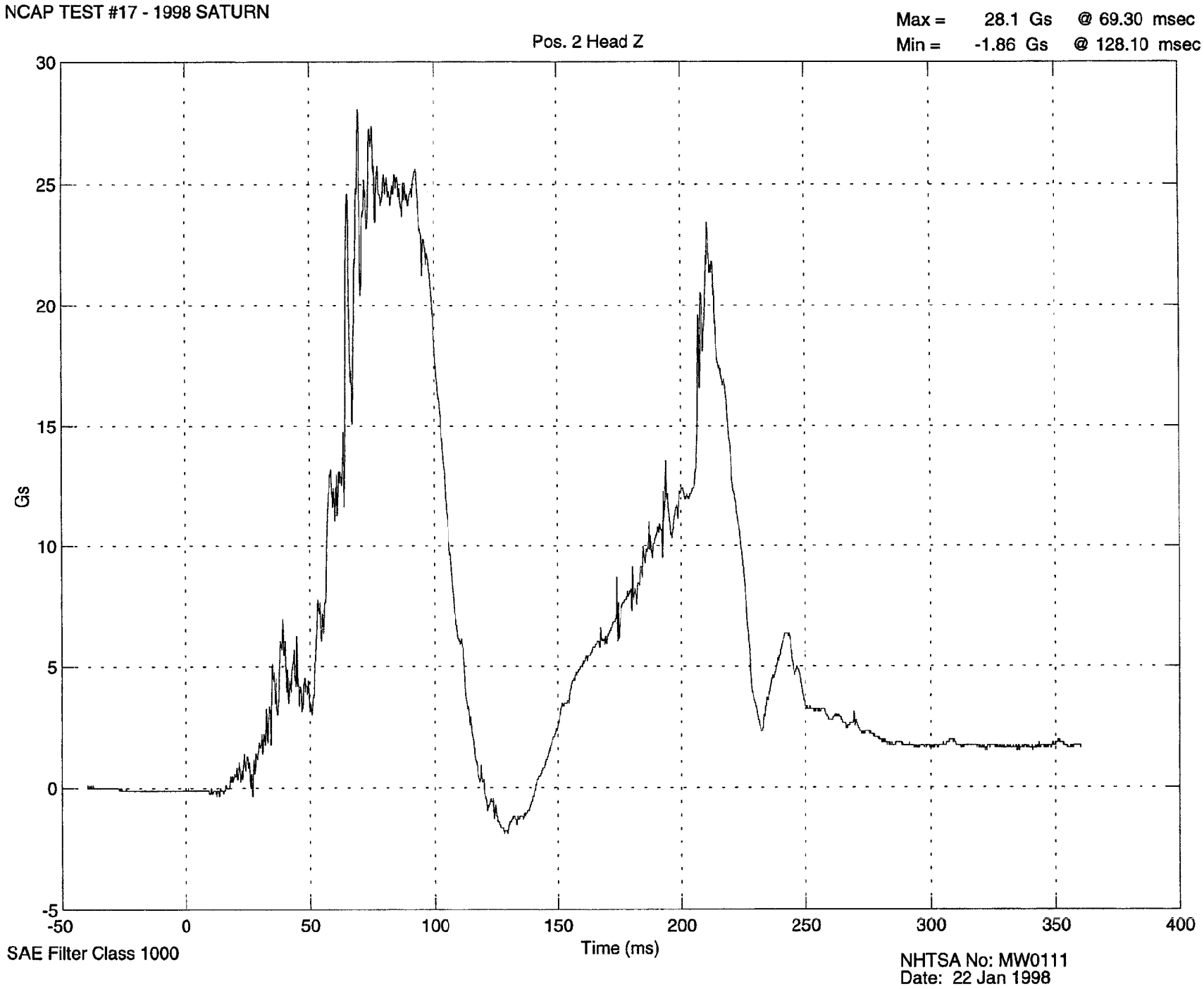
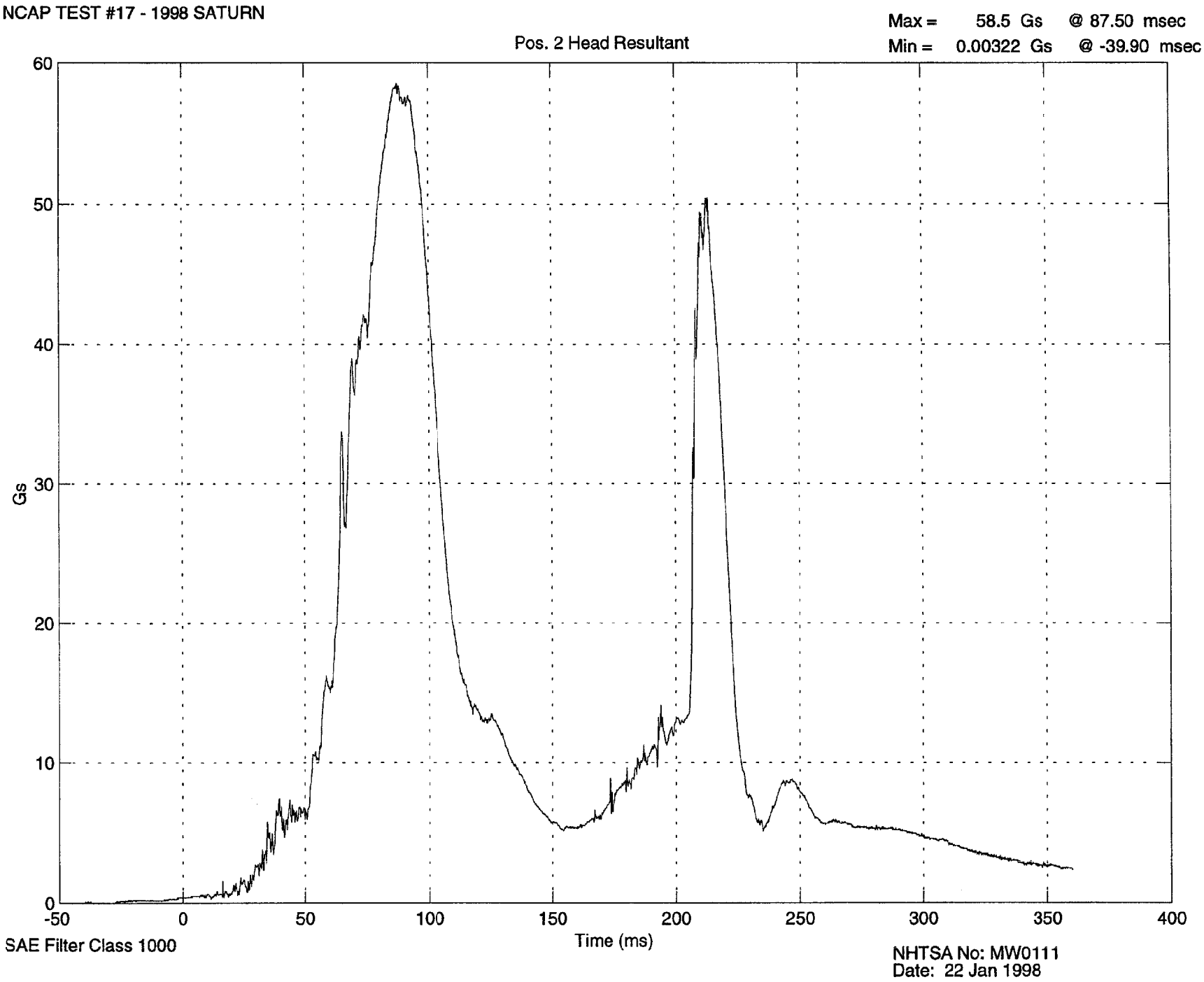

NCAP TEST #17 - 1998 SATURN
Pos. 2 Head Z
Max = 28.1 Gs @ 69.30 msec
Min = -1.86 Gs @ 128.10 msec
Gs
Time (ms)
30
25
20
15
10
5
0
-5
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Head Resultant
Max = 58.5 Gs @ 87.50 msec
Min = 0.00322 Gs @ -39.90 msec
Gs
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
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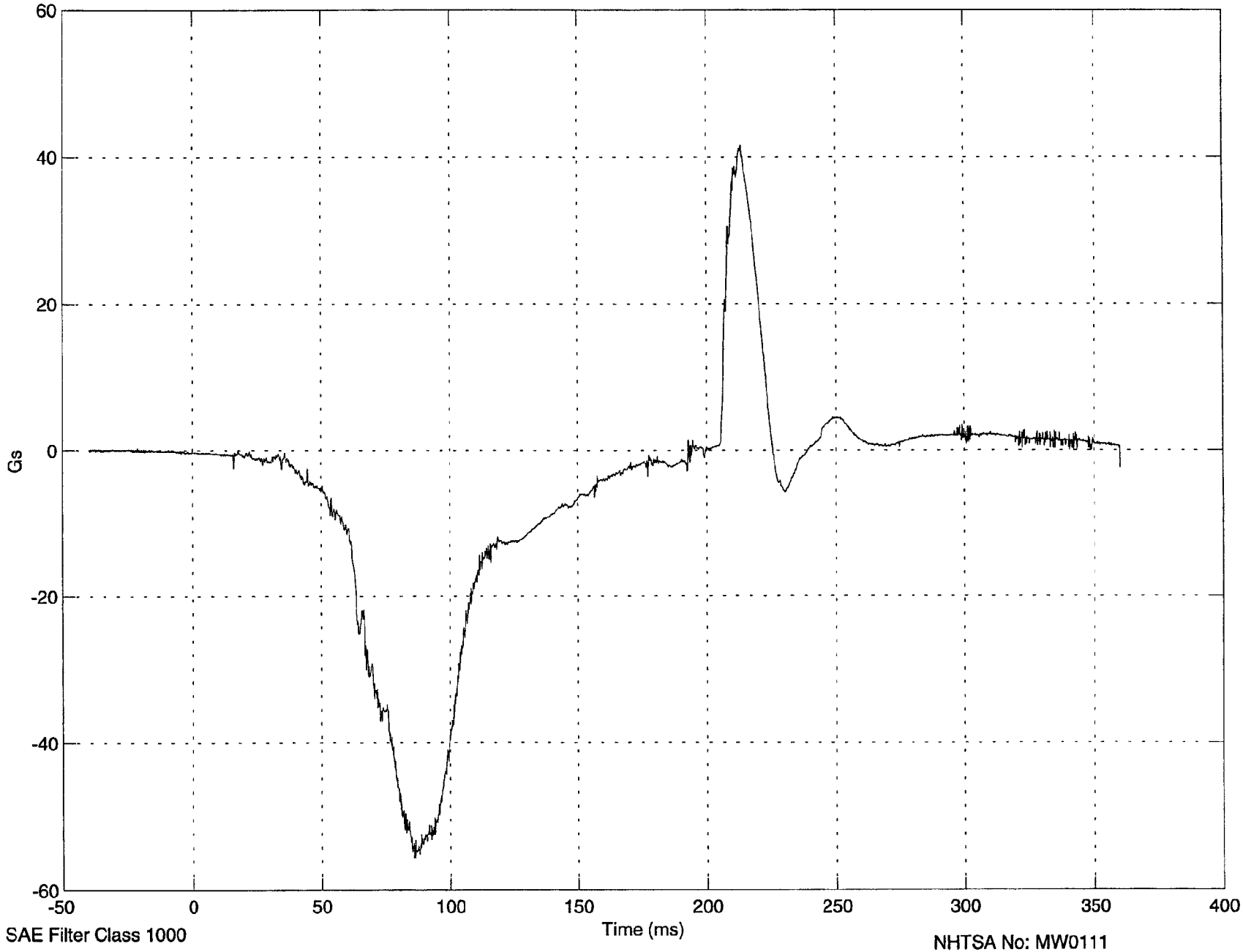
NCAP TEST #17 - 1998 SATURN

Pos. 2 Head X(R)

Max = 41.6 Gs @ 213.50 msec
Min = -55.7 Gs @ 86.00 msec



SAE Filter Class 1000

NHTSA No: MW0111
Date: 22 Jan 1998

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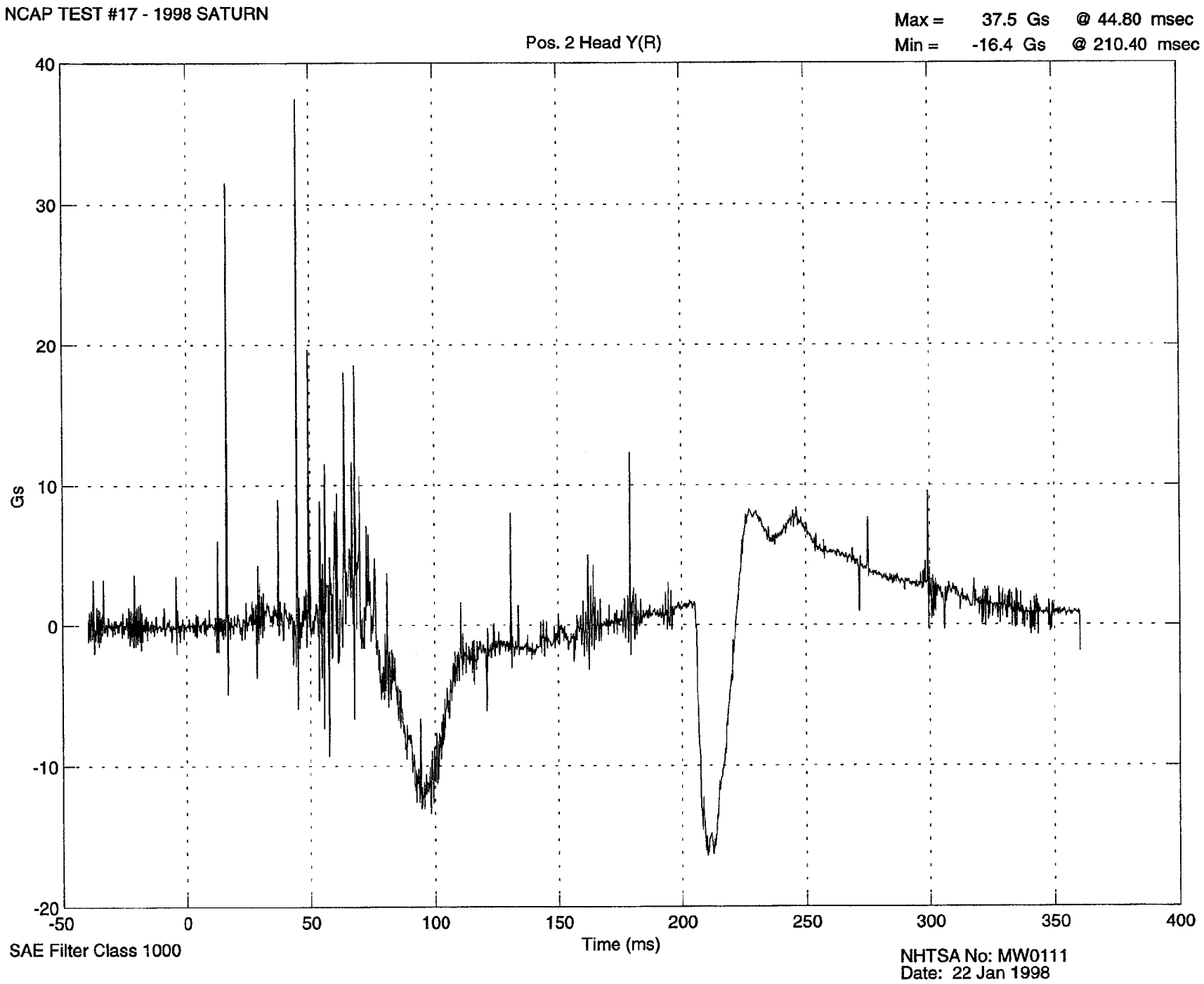
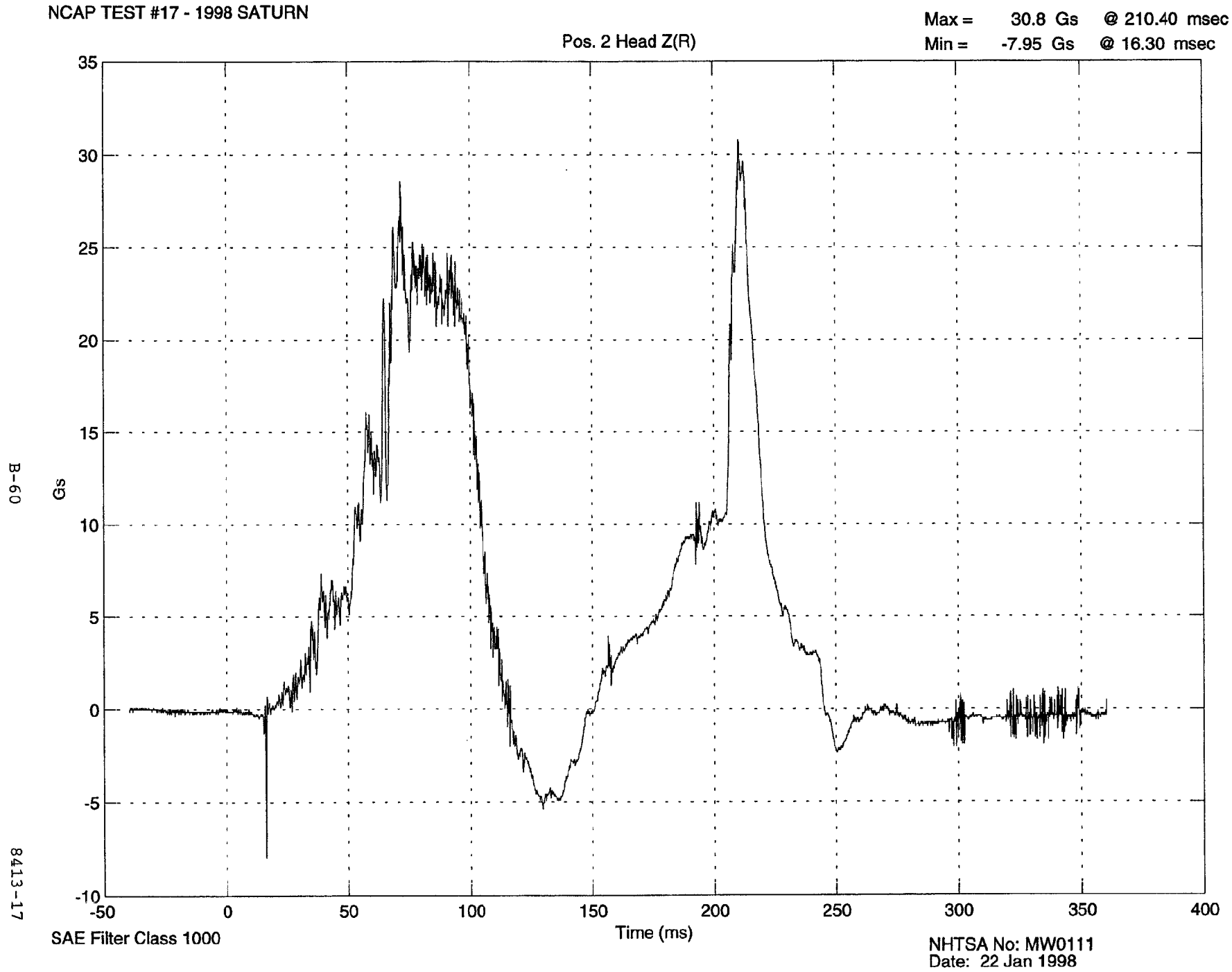
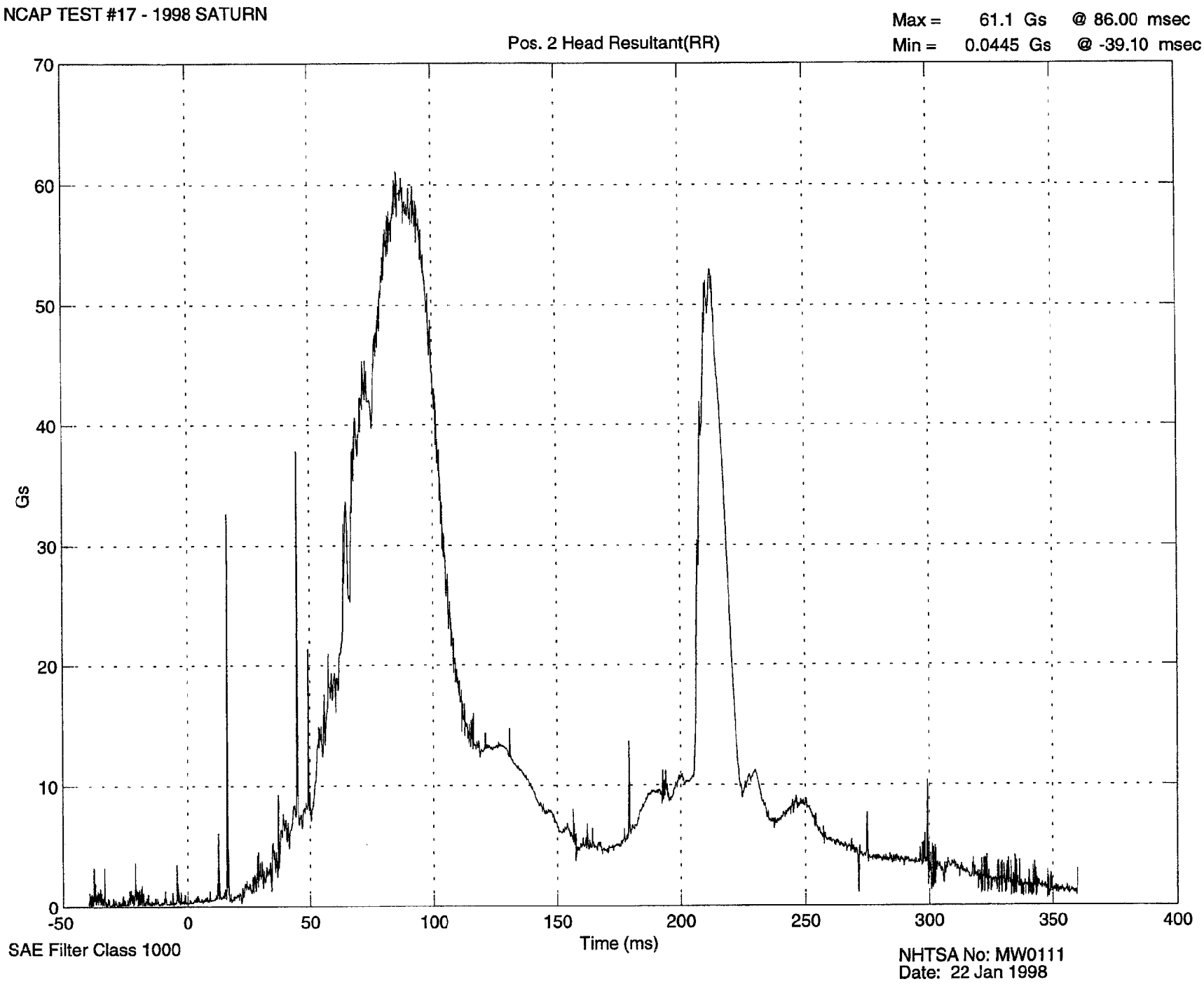
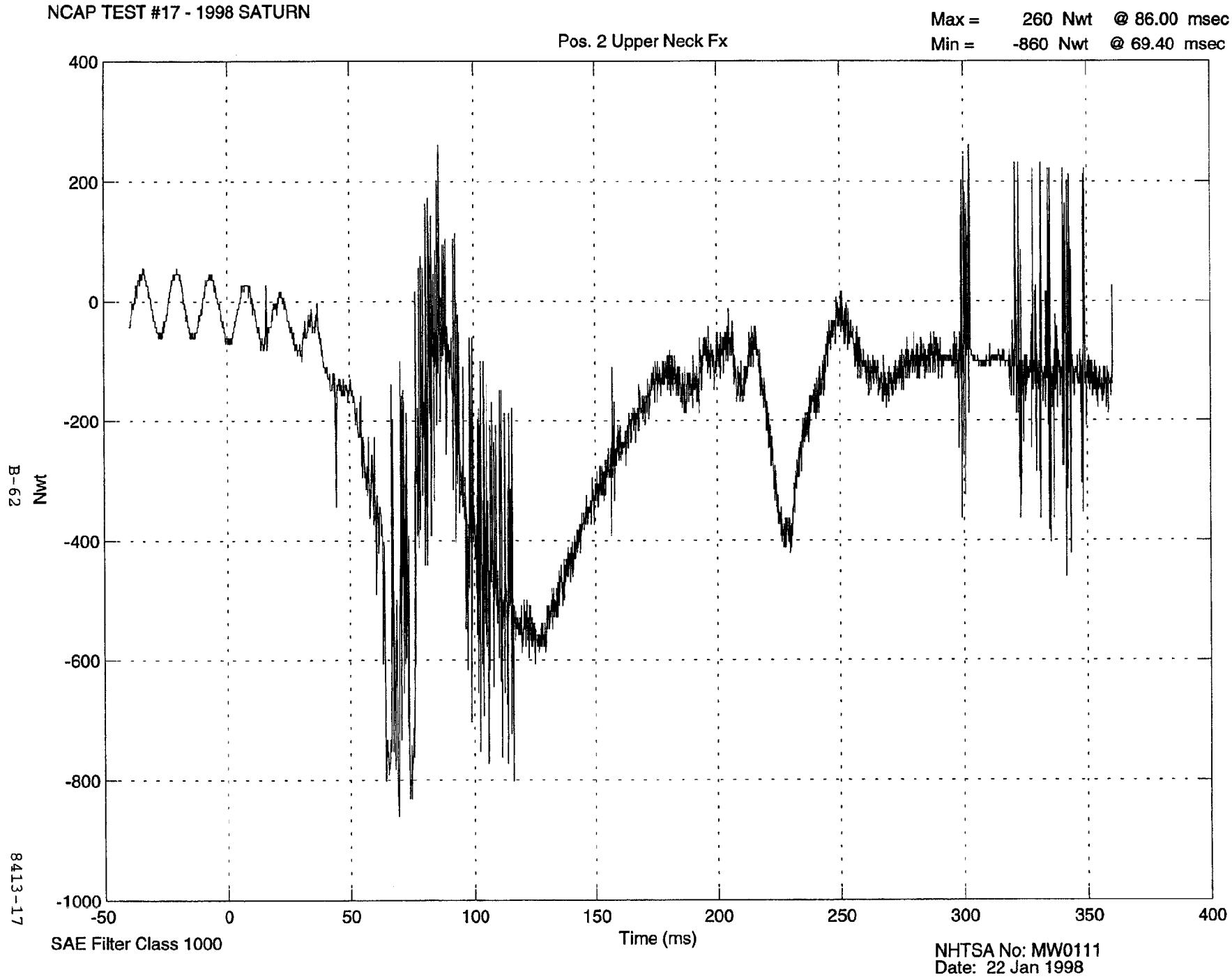

NCAP TEST #17 - 1998 SATURN
Pos. 2 Head Y(R)
Max = 37.5 Gs @ 44.80 msec
Min = -16.4 Gs @ 210.40 msec
Gs
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Head Z(R)
Max = 30.8 Gs @ 210.40 msec
Min = -7.95 Gs @ 16.30 msec
Gs
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Head Resultant(RR)
Max = 61.1 Gs @ 86.00 msec
Min = 0.0445 Gs @ -39.10 msec
Gs
Time (ms)
70
60
50
40
30
20
10
0
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Upper Neck Fx
Max = 260 Nwt @ 86.00 msec
Min = -860 Nwt @ 69.40 msec
400
200
0
-200
-400
-600
-800
-1000
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998
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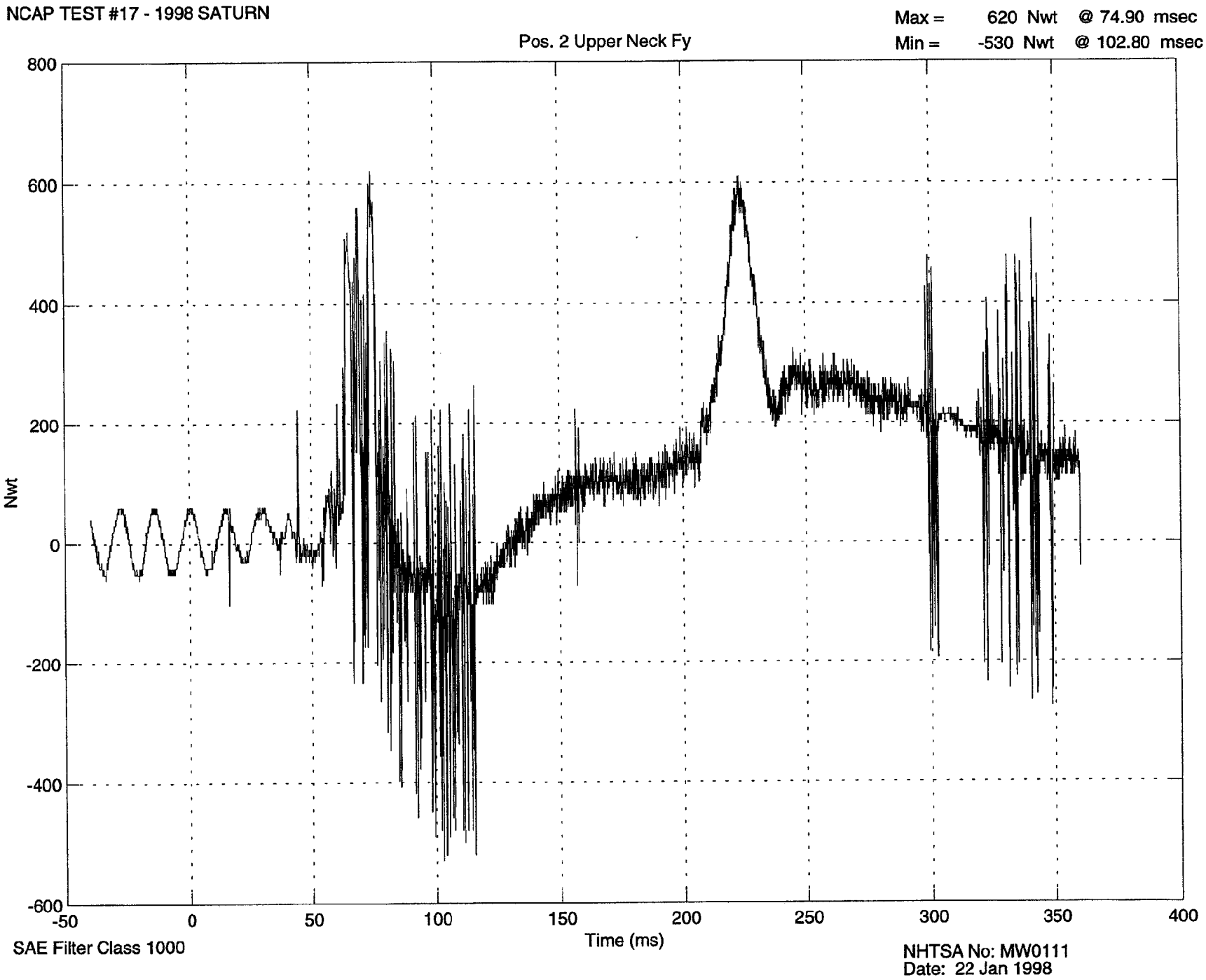
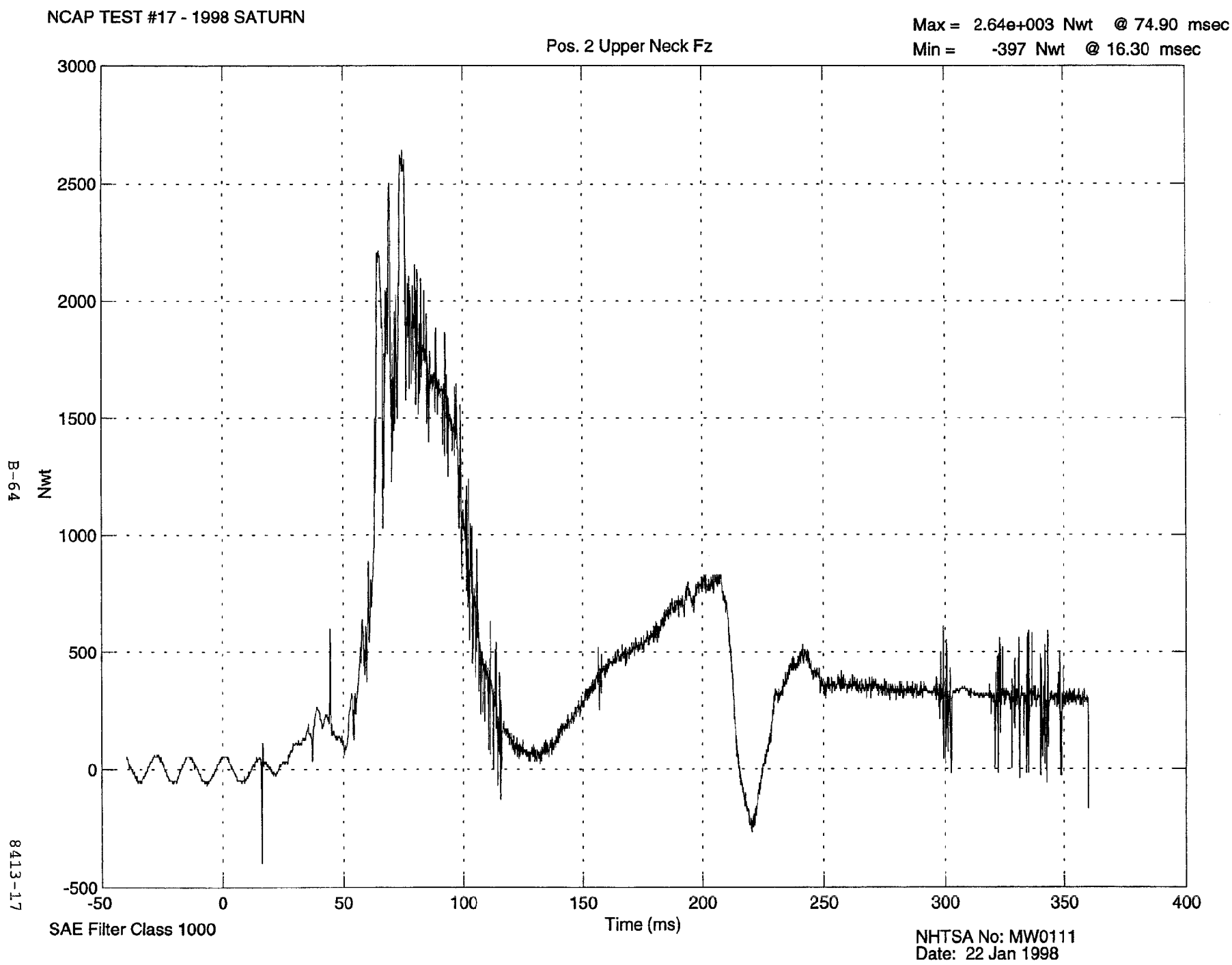

NCAP TEST #17 - 1998 SATURN
Pos. 2 Upper Neck Fy
Max = 620 Nwt @ 74.90 msec
Min = -530 Nwt @ 102.80 msec
800
600
400
200
0
-200
-400
-600
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Upper Neck Fz
Max = 2.64e+003 Nwt @ 74.90 msec
Min = -397 Nwt @ 16.30 msec
Nwt
Time (ms)
3000
2500
2000
1500
1000
500
0
-500
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998

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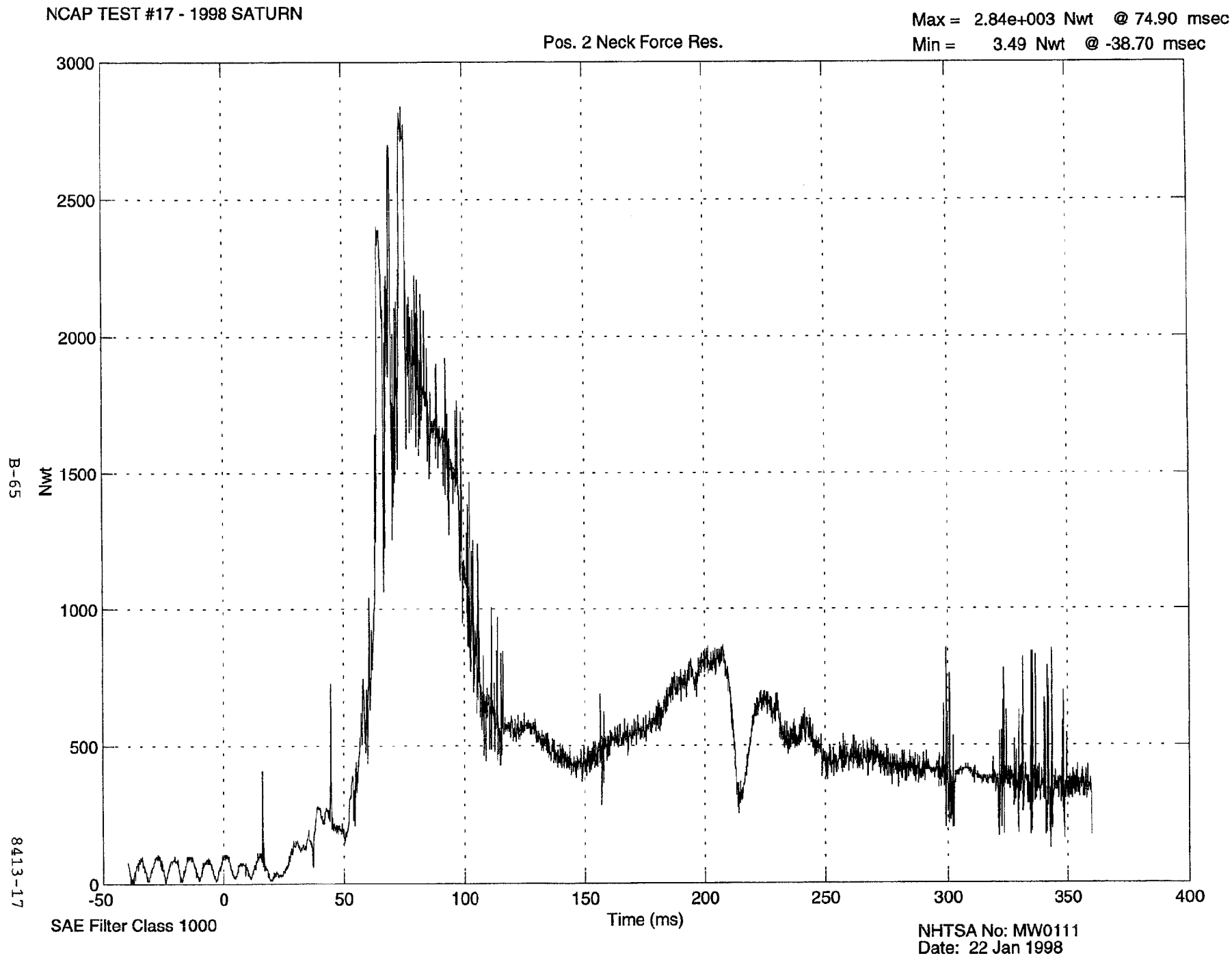
NCAP TEST #17 - 1998 SATURN
Pos. 2 Neck Force Res.
Max = 2.84e+003 Nwt @ 74.90 msec
Min = 3.49 Nwt @ -38.70 msec
Nwt
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998
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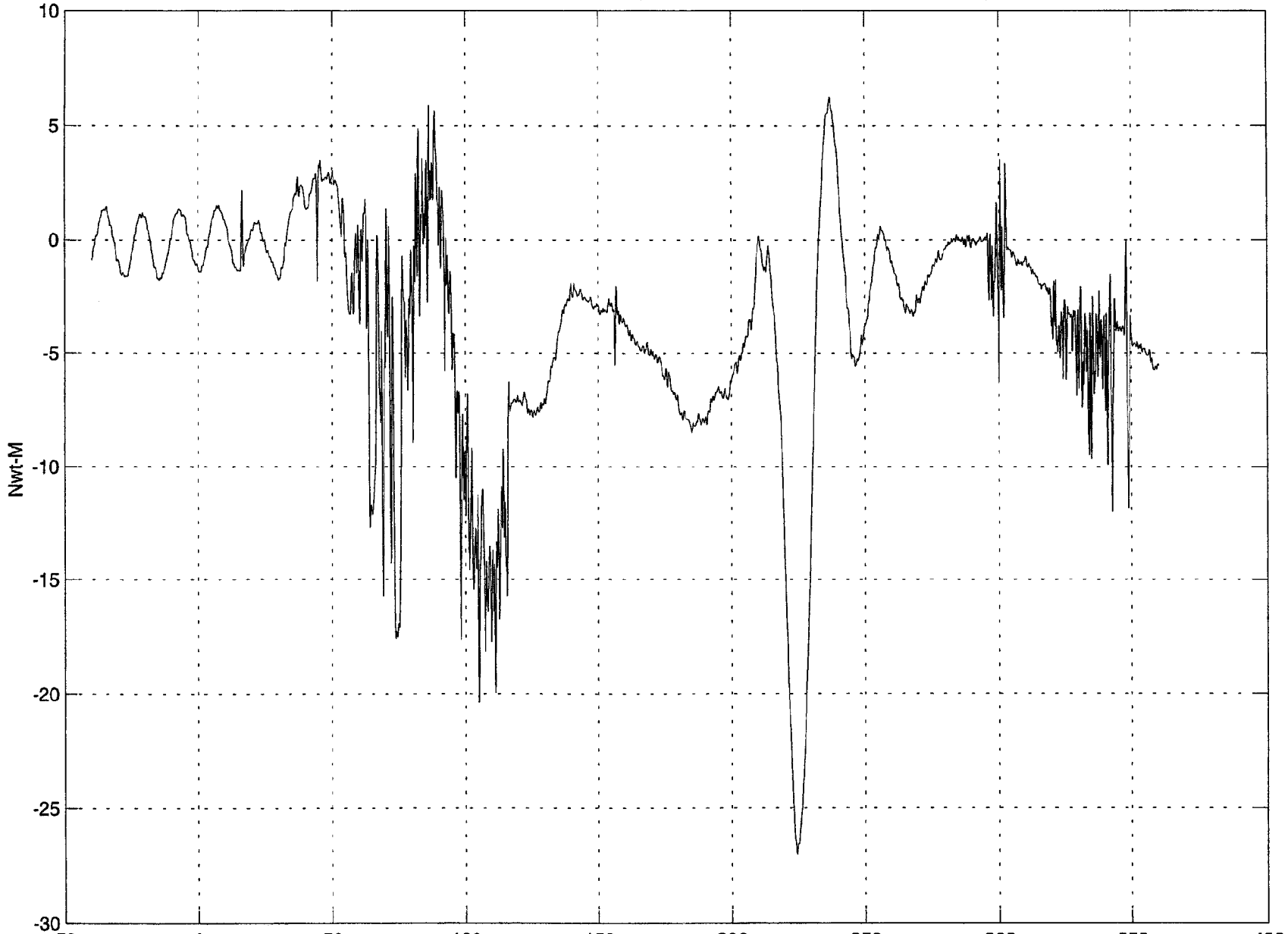
NCAP TEST #17 - 1998 SATURN

Pos. 2 Upper Neck Mx

Max = 6.26 Nwt-M @ 236.70 msec
Min = -27 Nwt-M @ 224.40 msec



SAE Filter Class 600

NHTSA No: MW0111
Date: 22 Jan 1998

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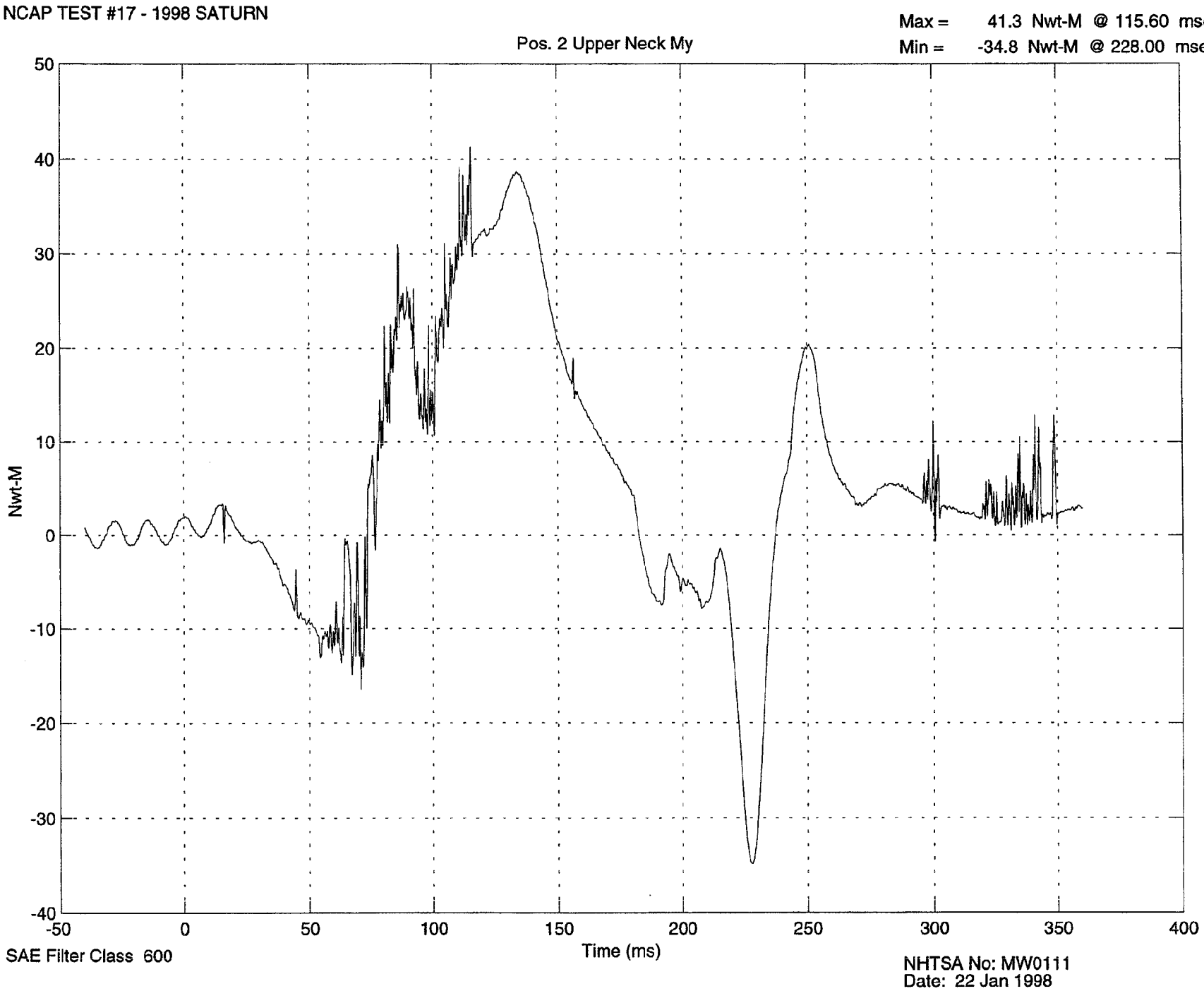
NCAP TEST #17 - 1998 SATURN
Pos. 2 Upper Neck My
Max = 41.3 Nwt-M @ 115.60 msec
Min = -34.8 Nwt-M @ 228.00 msec
Nwt-M
Time (ms)
SAE Filter Class 600
NHTSA No: MW0111
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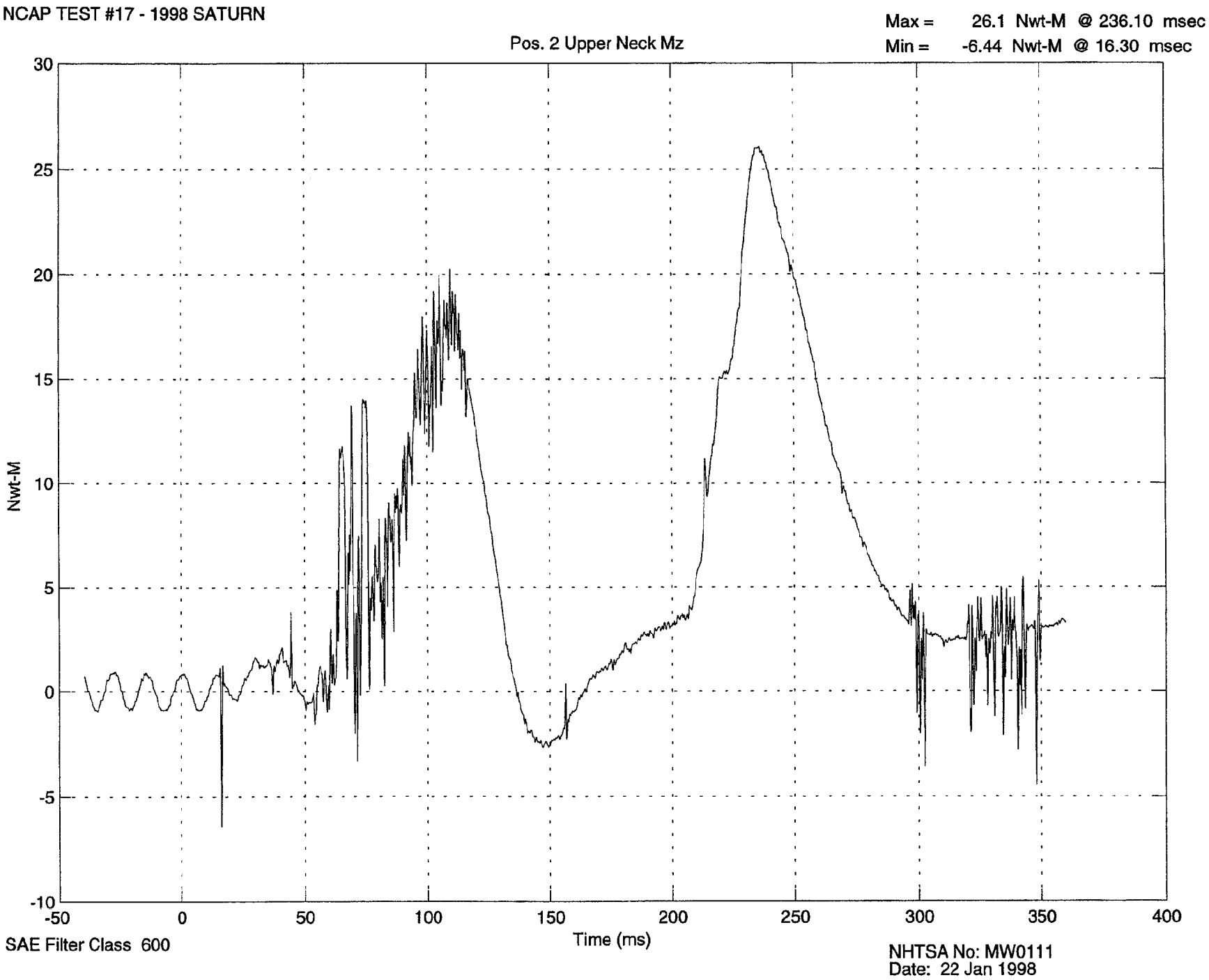
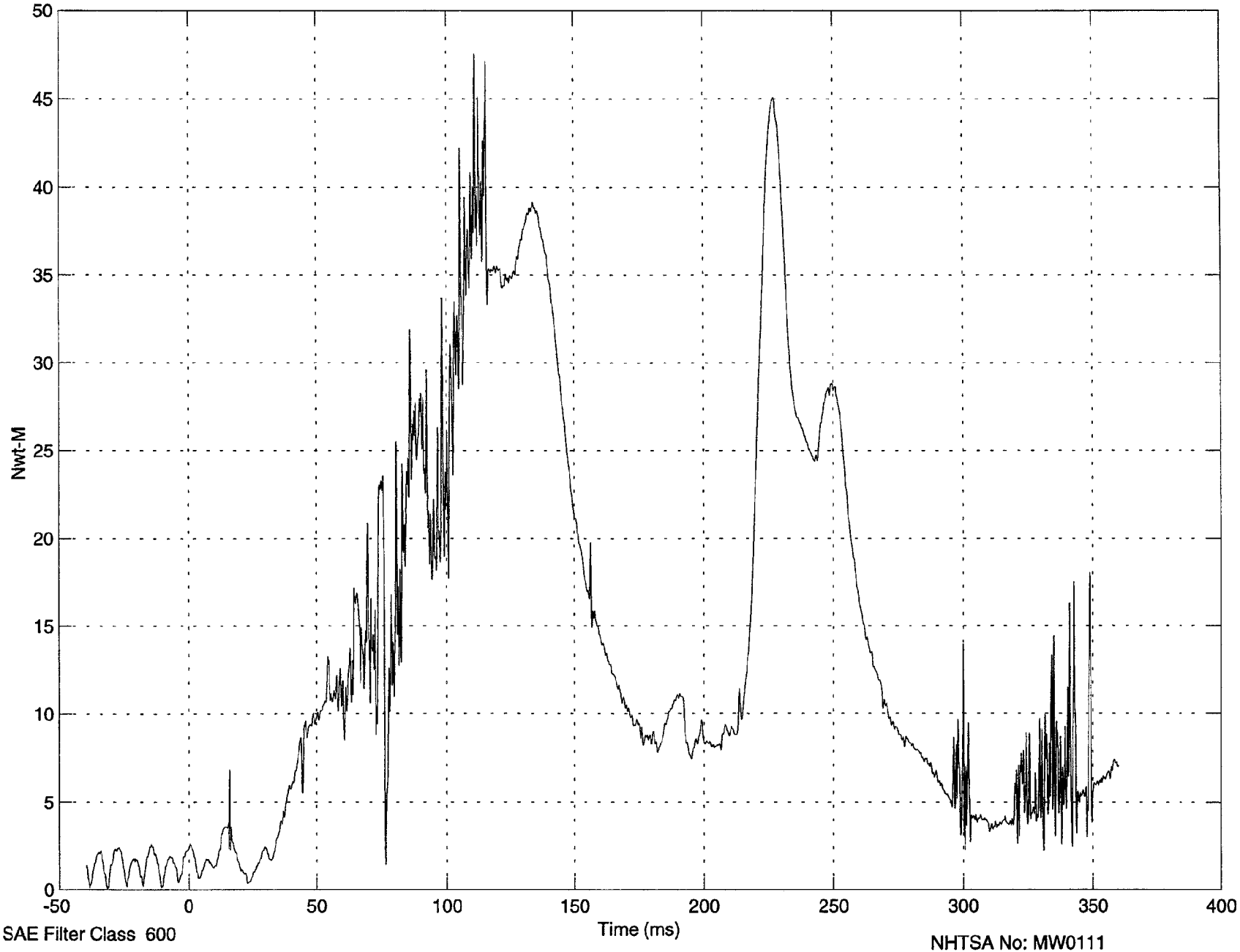

NCAP TEST #17 - 1998 SATURN
Pos. 2 Upper Neck Mz
Max = 26.1 Nwt-M @ 236.10 msec
Min = -6.44 Nwt-M @ 16.30 msec
Nwt-M
Time (ms)
30
25
20
15
10
5
0
-5
-10
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998

NCAP TEST #17 - 1998 SATURN

Pos. 2 Neck Moment Res.

Max = 47.5 Nwt-M @ 111.30 msec
Min = 0.0593 Nwt-M @ -31.40 msec



SAE Filter Class 600

NHTSA No: MW0111
Date: 22 Jan 1998

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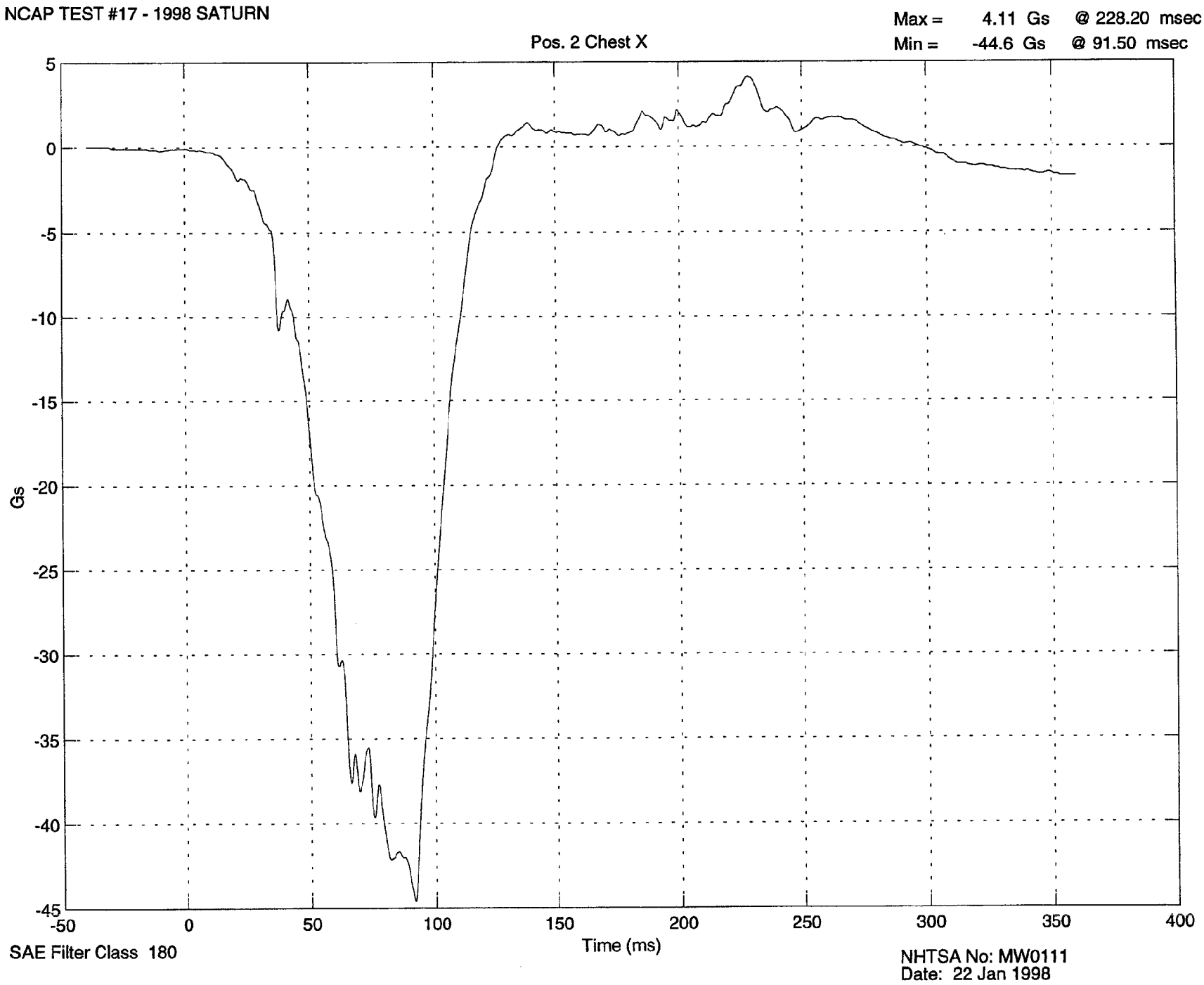
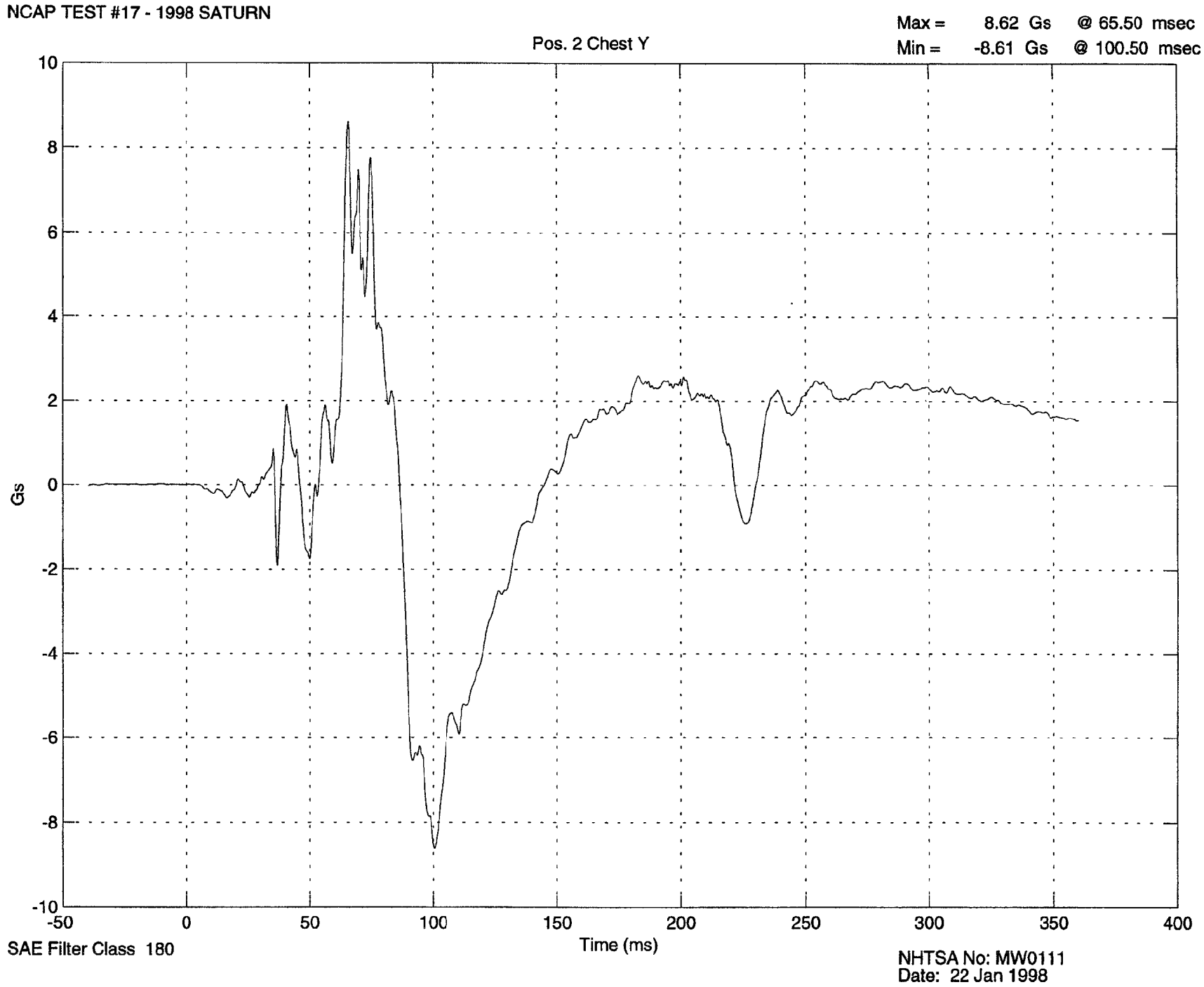
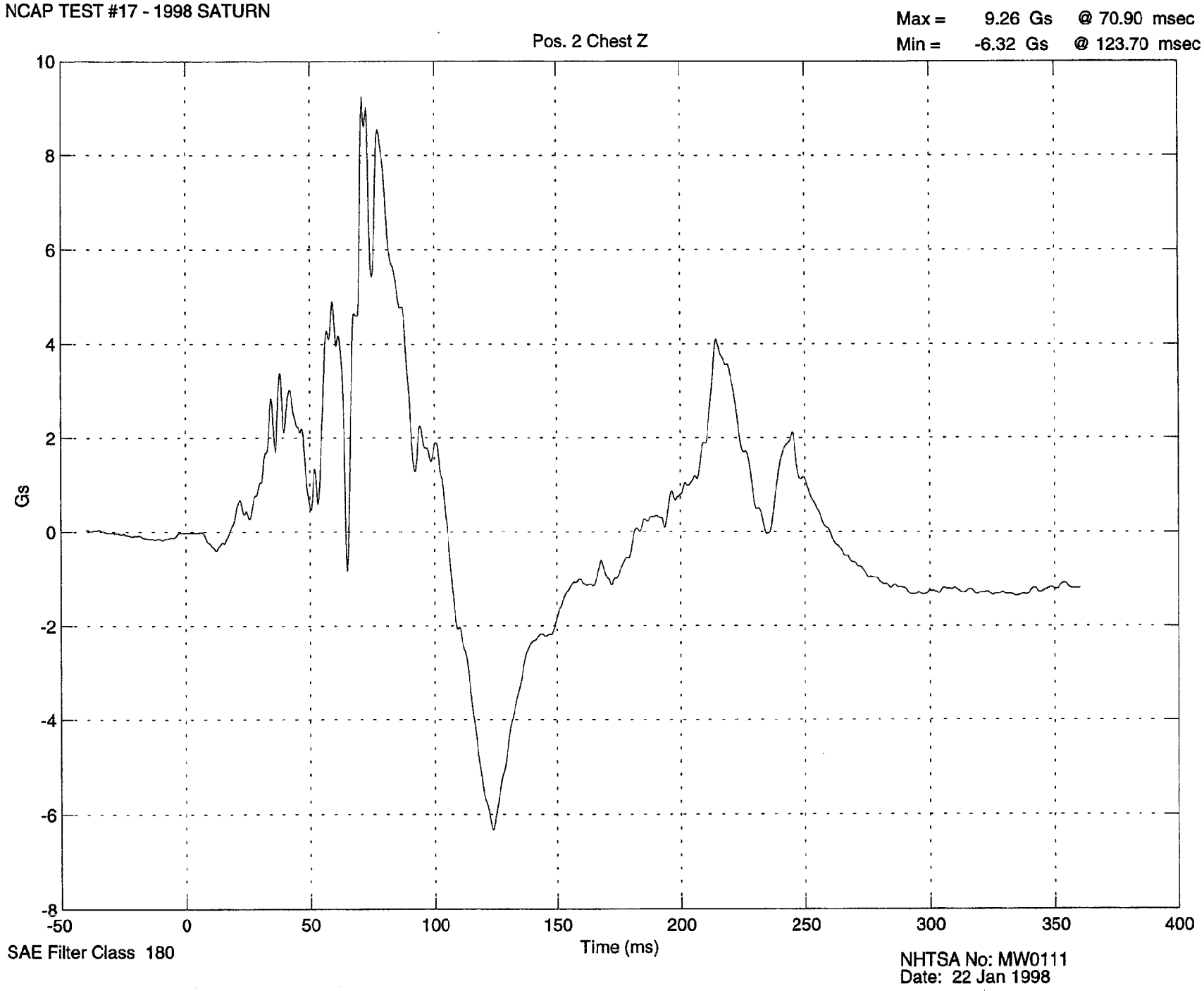
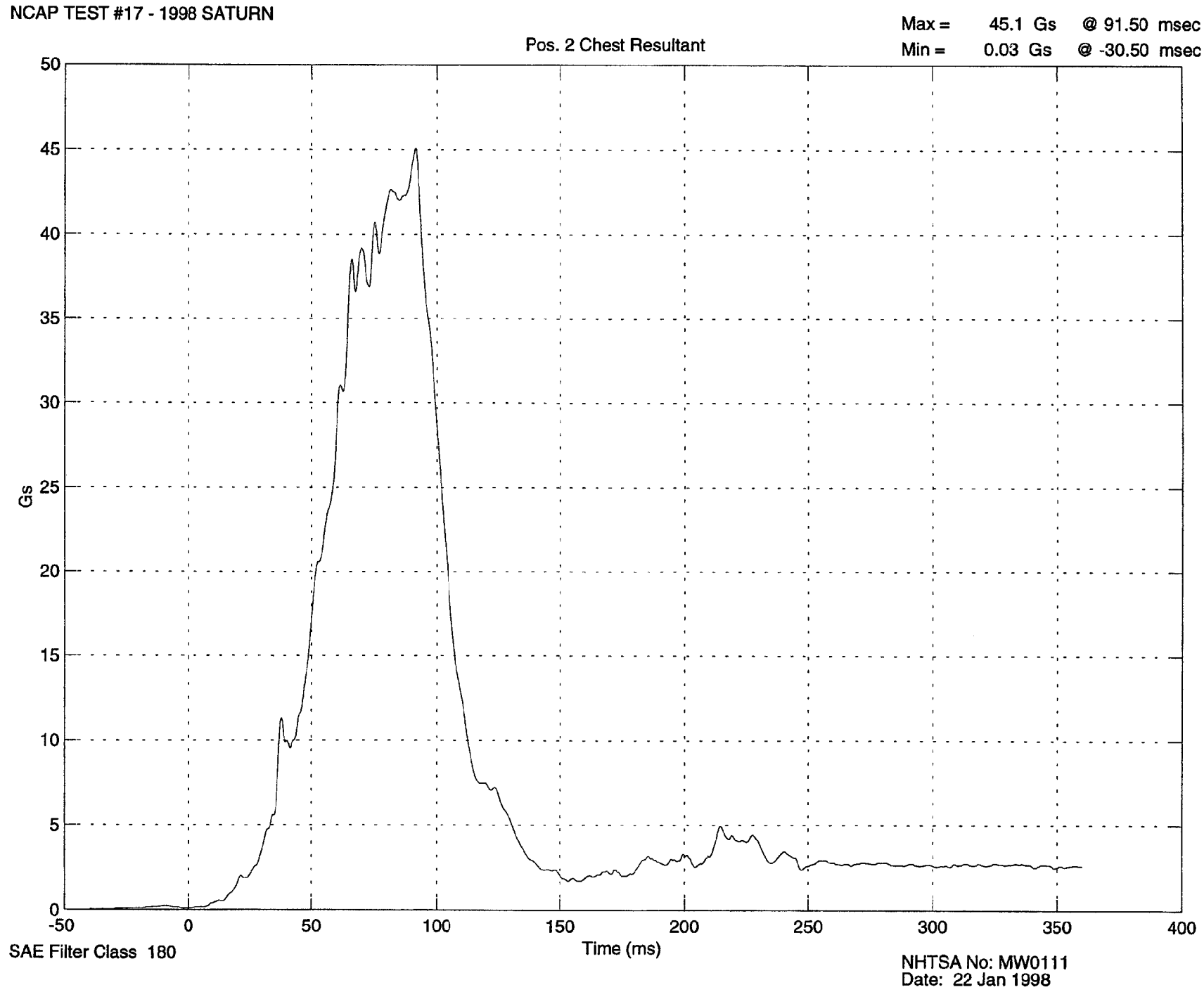

NCAP TEST #17 - 1998 SATURN
Pos. 2 Chest X
Max = 4.11 Gs @ 228.20 msec
Min = -44.6 Gs @ 91.50 msec
Gs
Time (ms)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Chest Y
Max = 8.62 Gs @ 65.50 msec
Min = -8.61 Gs @ 100.50 msec
Gs
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Chest Z
Max = 9.26 Gs @ 70.90 msec
Min = -6.32 Gs @ 123.70 msec
Gs
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Chest Resultant
Max = 45.1 Gs @ 91.50 msec
Min = 0.03 Gs @ -30.50 msec
Gs
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998

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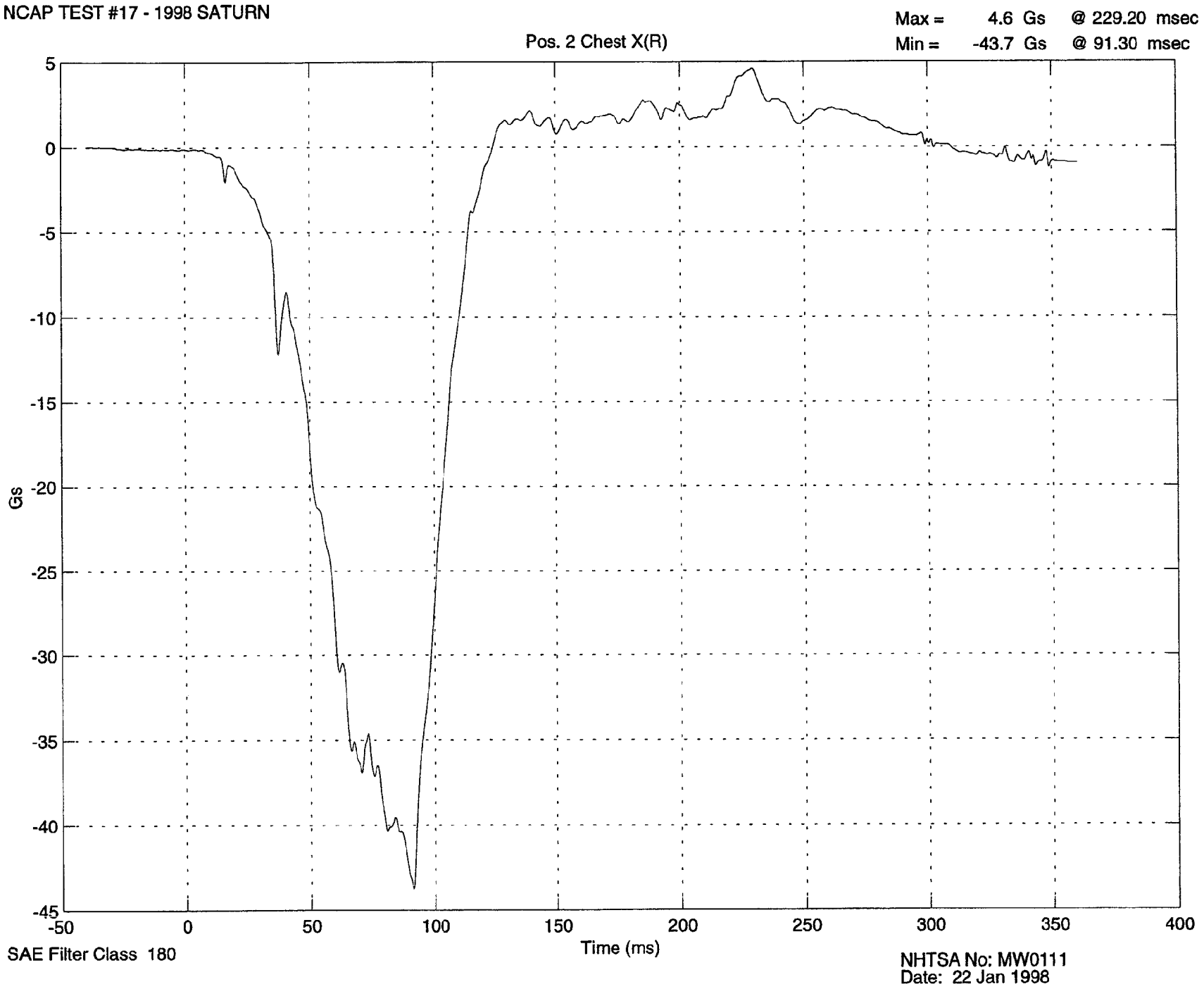
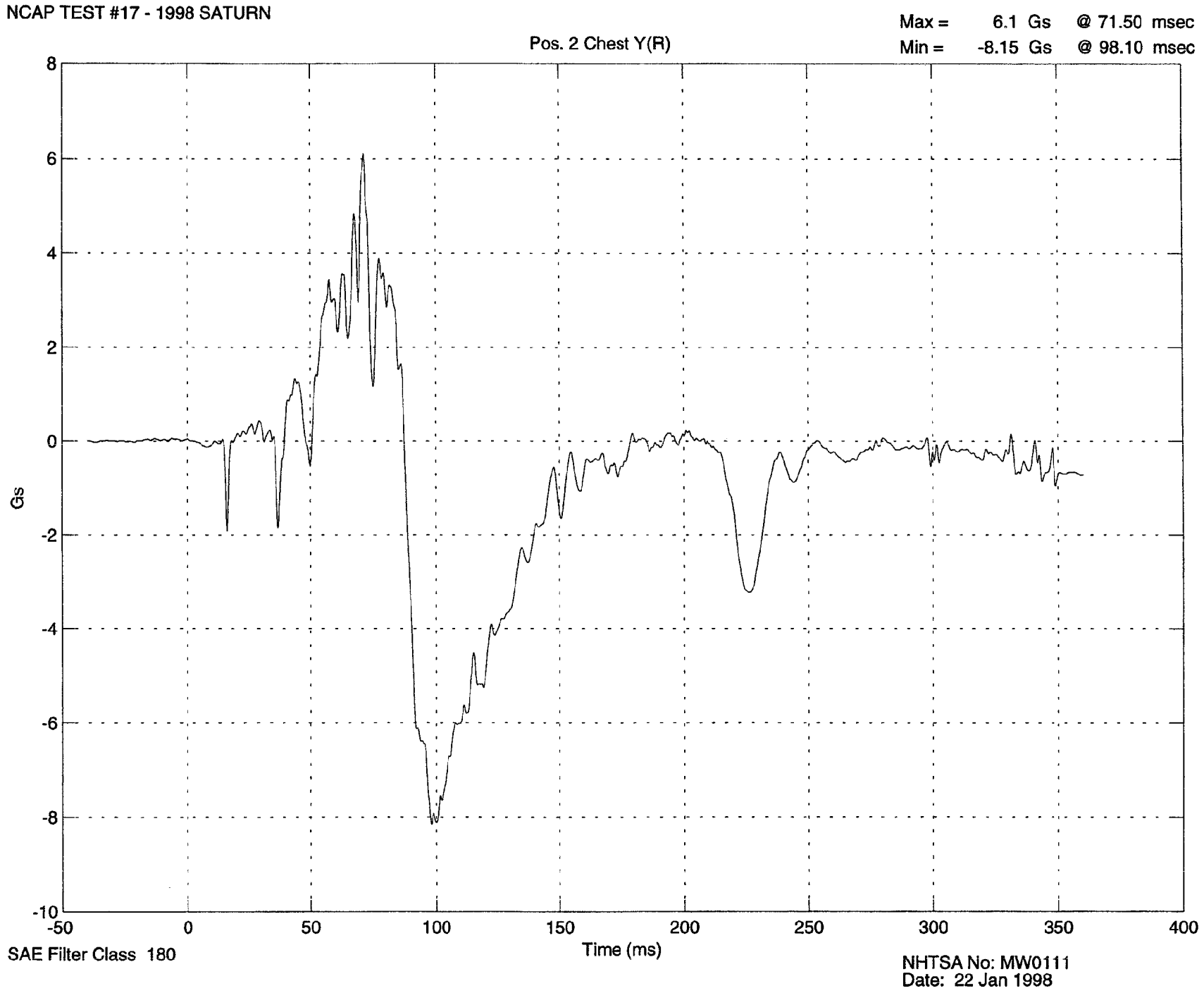
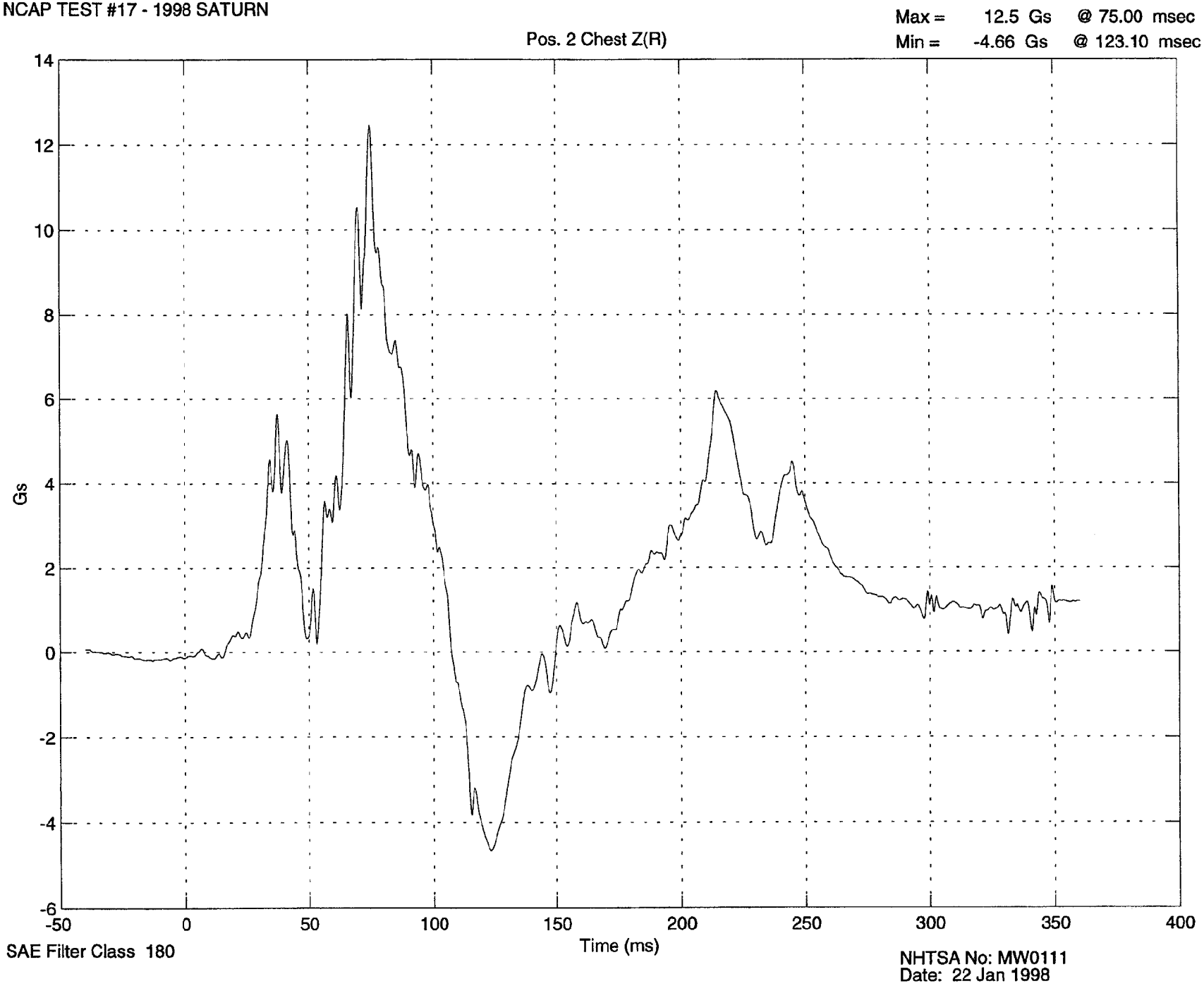

NCAP TEST #17 - 1998 SATURN
Pos. 2 Chest X(R)
Max = 4.6 Gs @ 229.20 msec
Min = -43.7 Gs @ 91.30 msec
Gs
Time (ms)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998

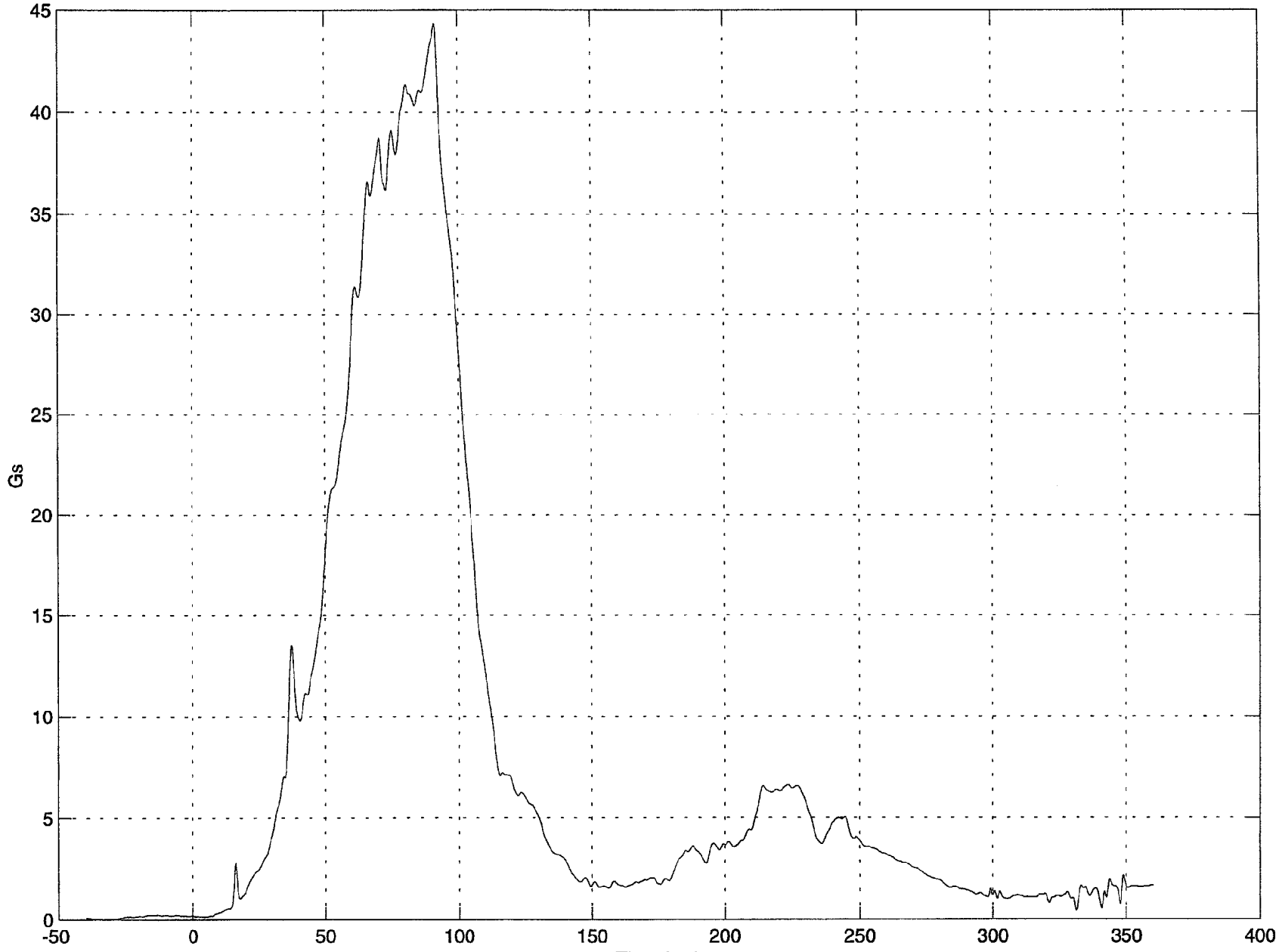

NCAP TEST #17 - 1998 SATURN
Pos. 2 Chest Y(R)
Max = 6.1 Gs @ 71.50 msec
Min = -8.15 Gs @ 98.10 msec
Gs
Time (ms)
8
6
4
2
0
-2
-4
-6
-8
-10
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Chest Z(R)
Max = 12.5 Gs @ 75.00 msec
Min = -4.66 Gs @ 123.10 msec
Gs
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998

NCAP TEST #17 - 1998 SATURN

Pos. 2 Chest Res(RR)

Max = 44.3 Gs @ 91.30 msec
Min = 0.00722 Gs @ -33.10 msec



SAE Filter Class 180

NHTSA No: MW0111
Date: 22 Jan 1998

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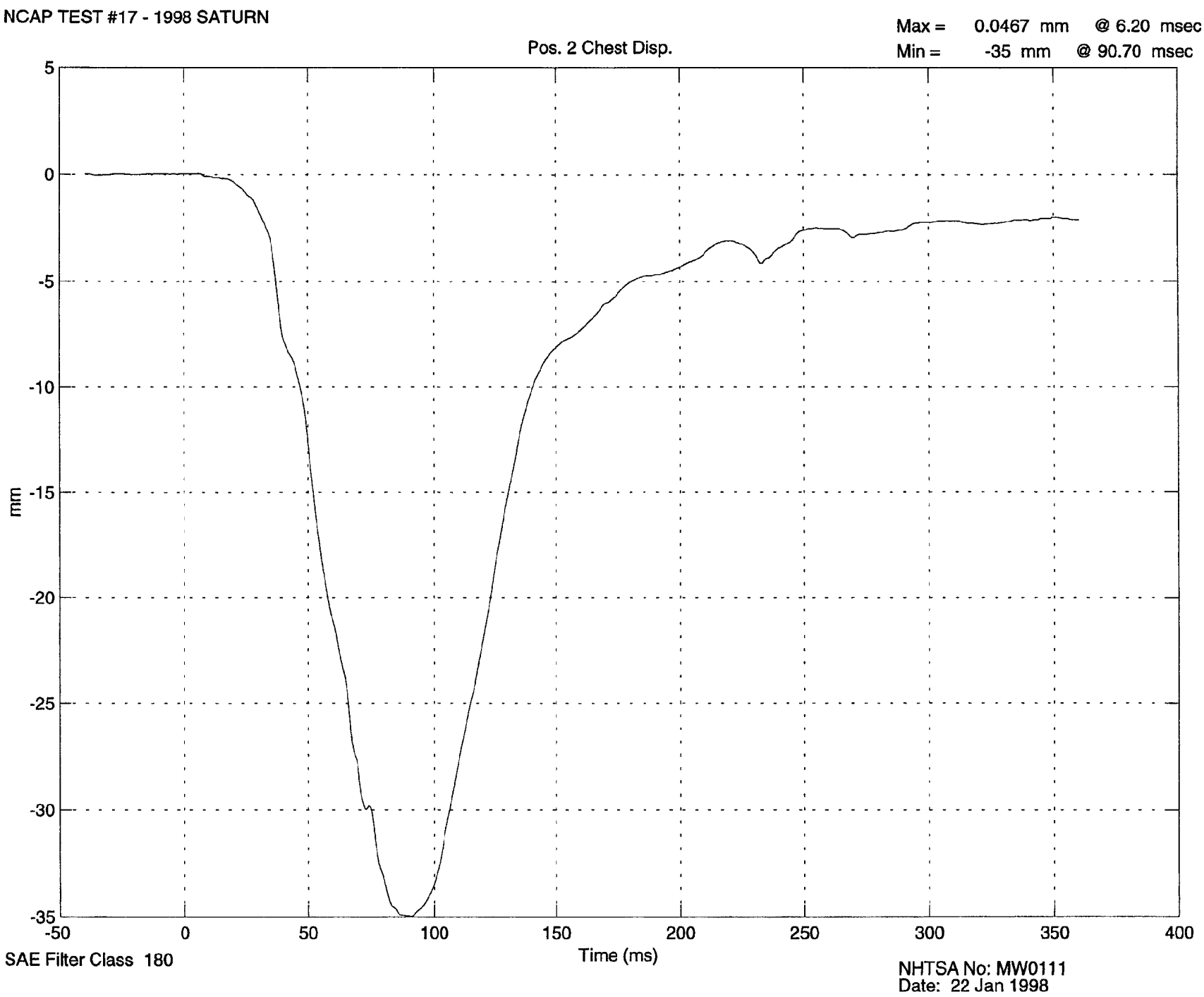
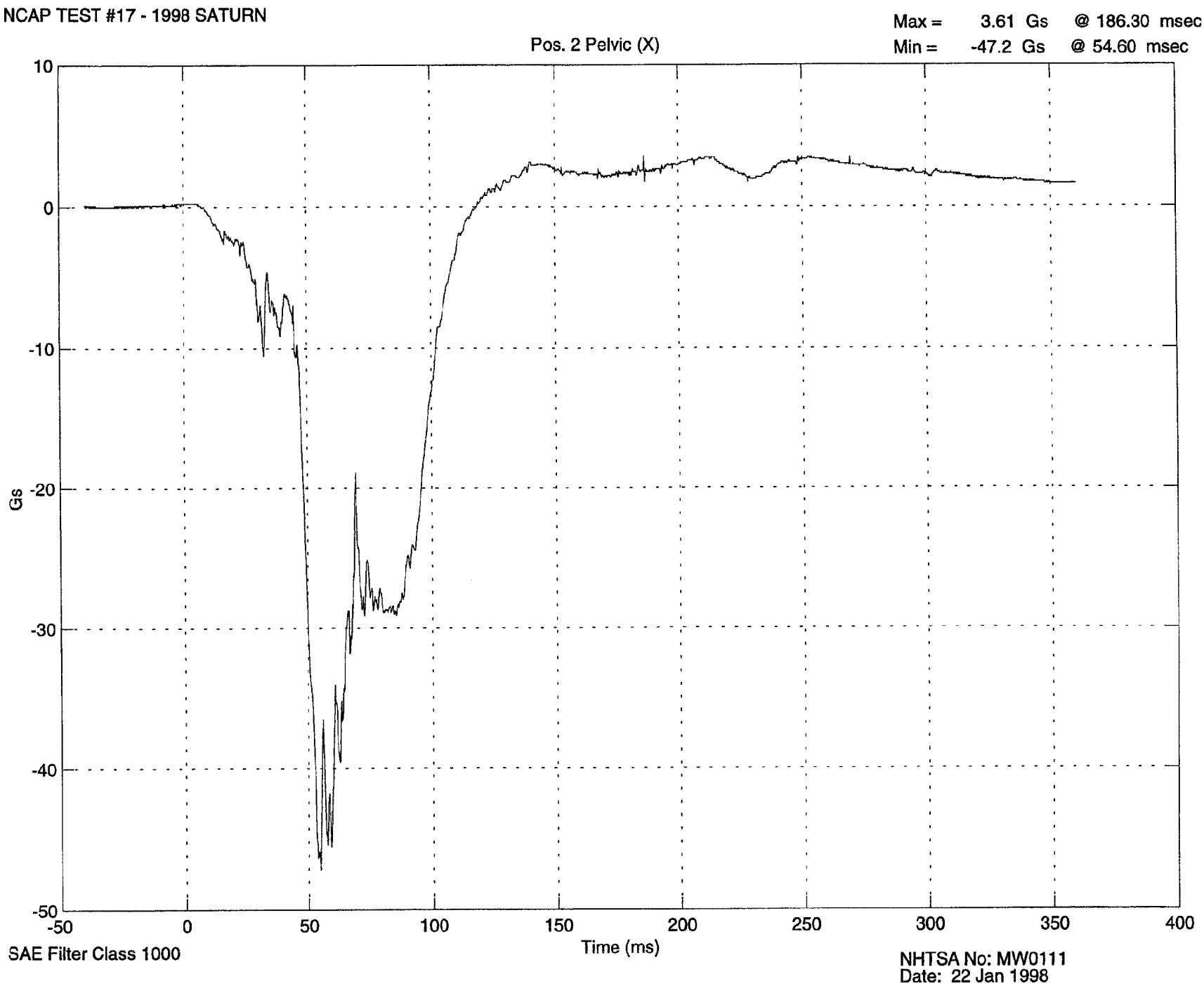

NCAP TEST #17 - 1998 SATURN
Pos. 2 Chest Disp.
Max = 0.0467 mm @ 6.20 msec
Min = -35 mm @ 90.70 msec
mm
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Pelvic (X)
Max = 3.61 Gs @ 186.30 msec
Min = -47.2 Gs @ 54.60 msec
10
0
-10
-20
-30
-40
-50
Gs
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998

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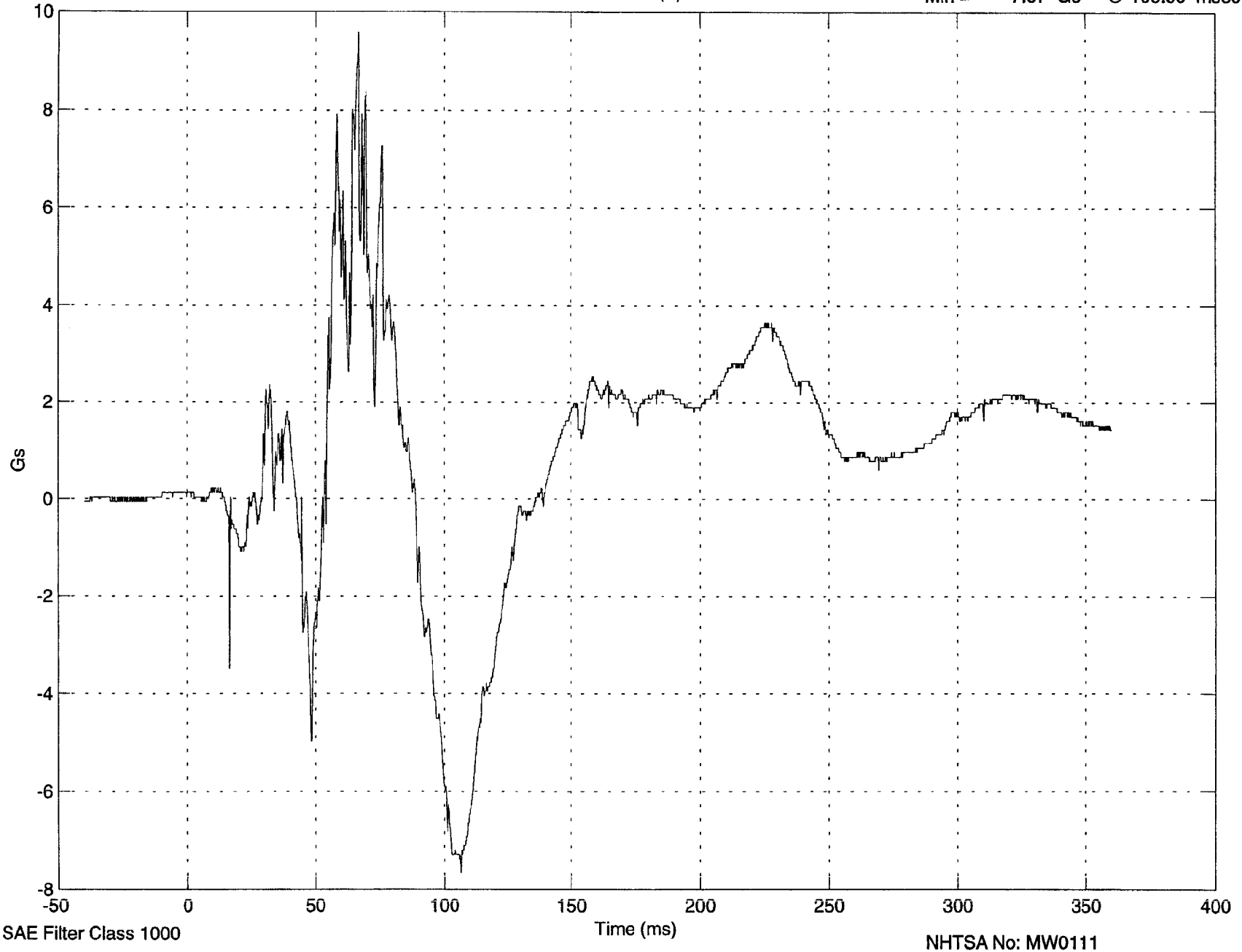
NCAP TEST #17 - 1998 SATURN

Pos. 2 Pelvic (Y)

Max = 9.59 Gs @ 66.50 msec
Min = -7.67 Gs @ 106.50 msec



SAE Filter Class 1000

NHTSA No: MW0111
Date: 22 Jan 1998

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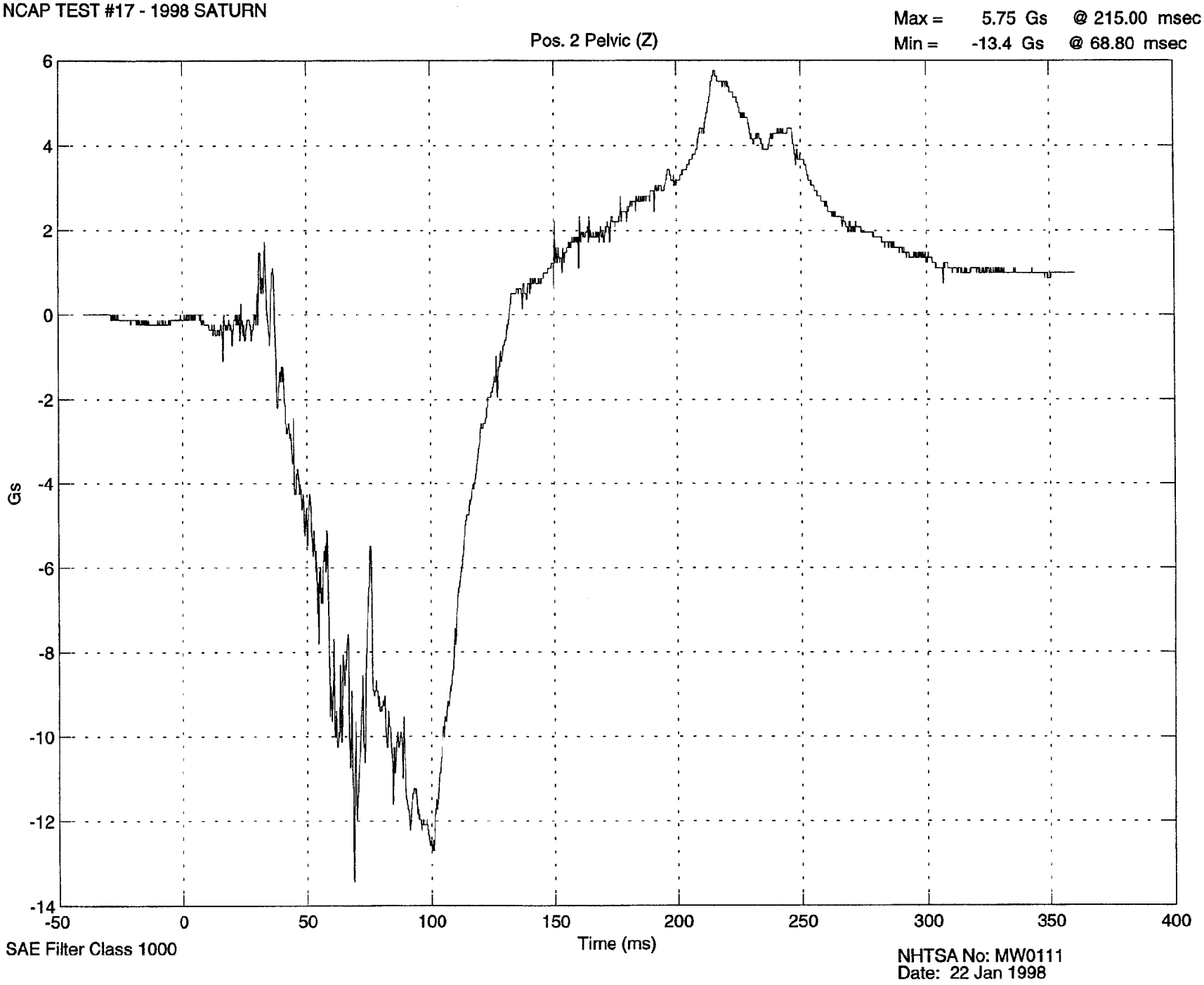
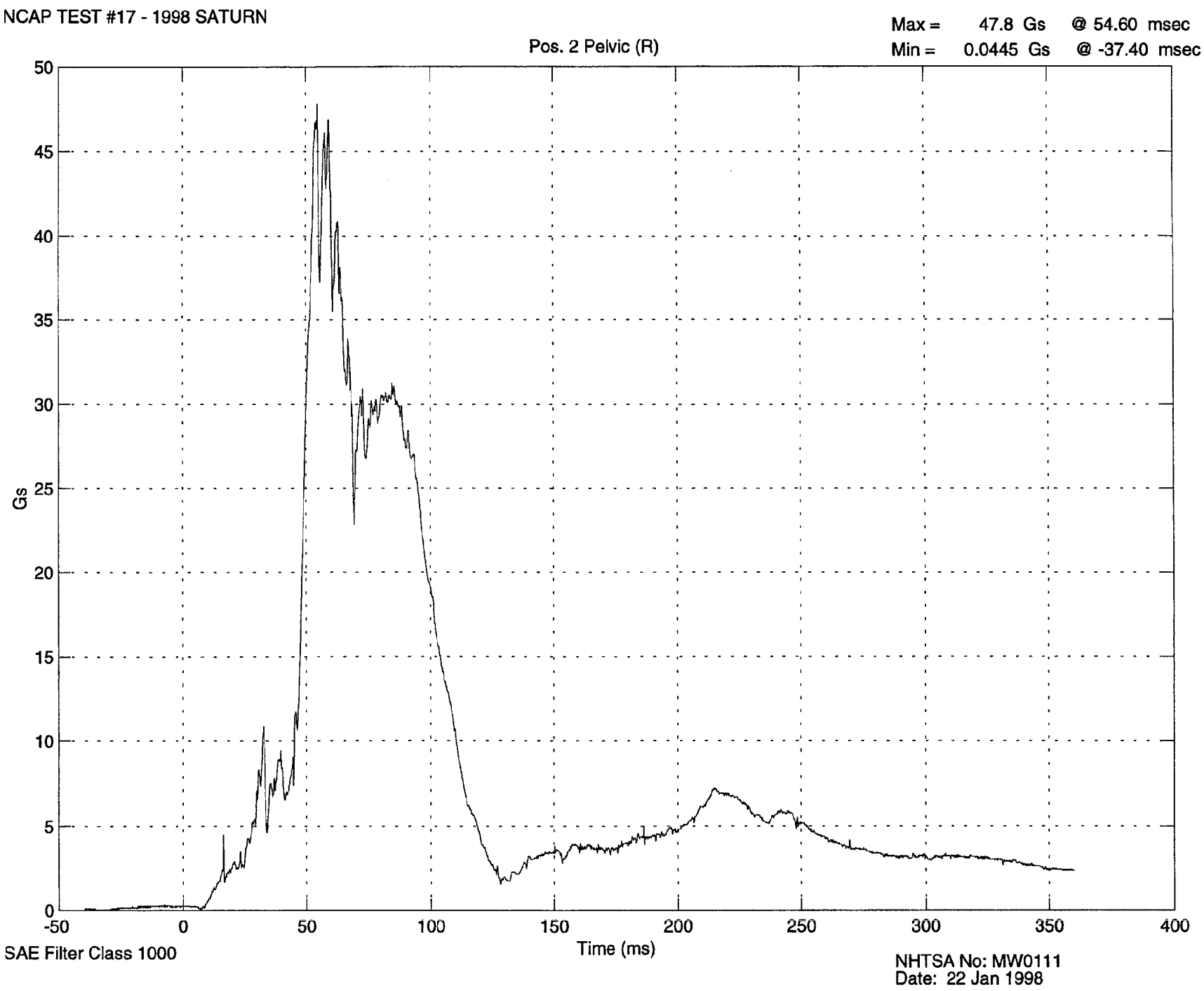
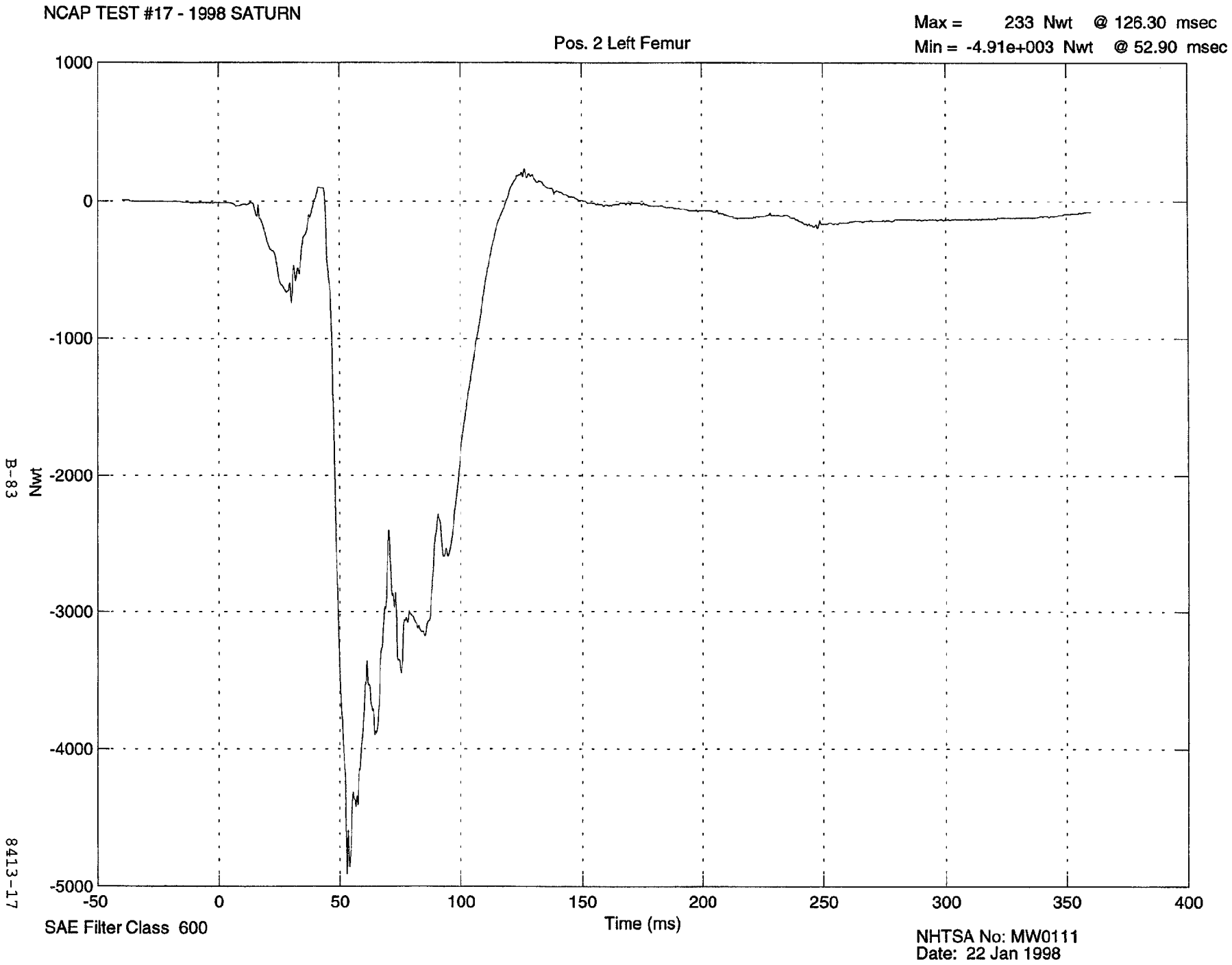

NCAP TEST #17 - 1998 SATURN
Pos. 2 Pelvic (Z)
Max = 5.75 Gs @ 215.00 msec
Min = -13.4 Gs @ 68.80 msec
Gs
Time (ms)
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Pelvic (R)
Max = 47.8 Gs @ 54.60 msec
Min = 0.0445 Gs @ -37.40 msec
Gs
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Max = 233 Nwt @ 126.30 msec
Min = -4.91e+003 Nwt @ 52.90 msec
Pos. 2 Left Femur
1000
0
-1000
-2000
-3000
-4000
-5000
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
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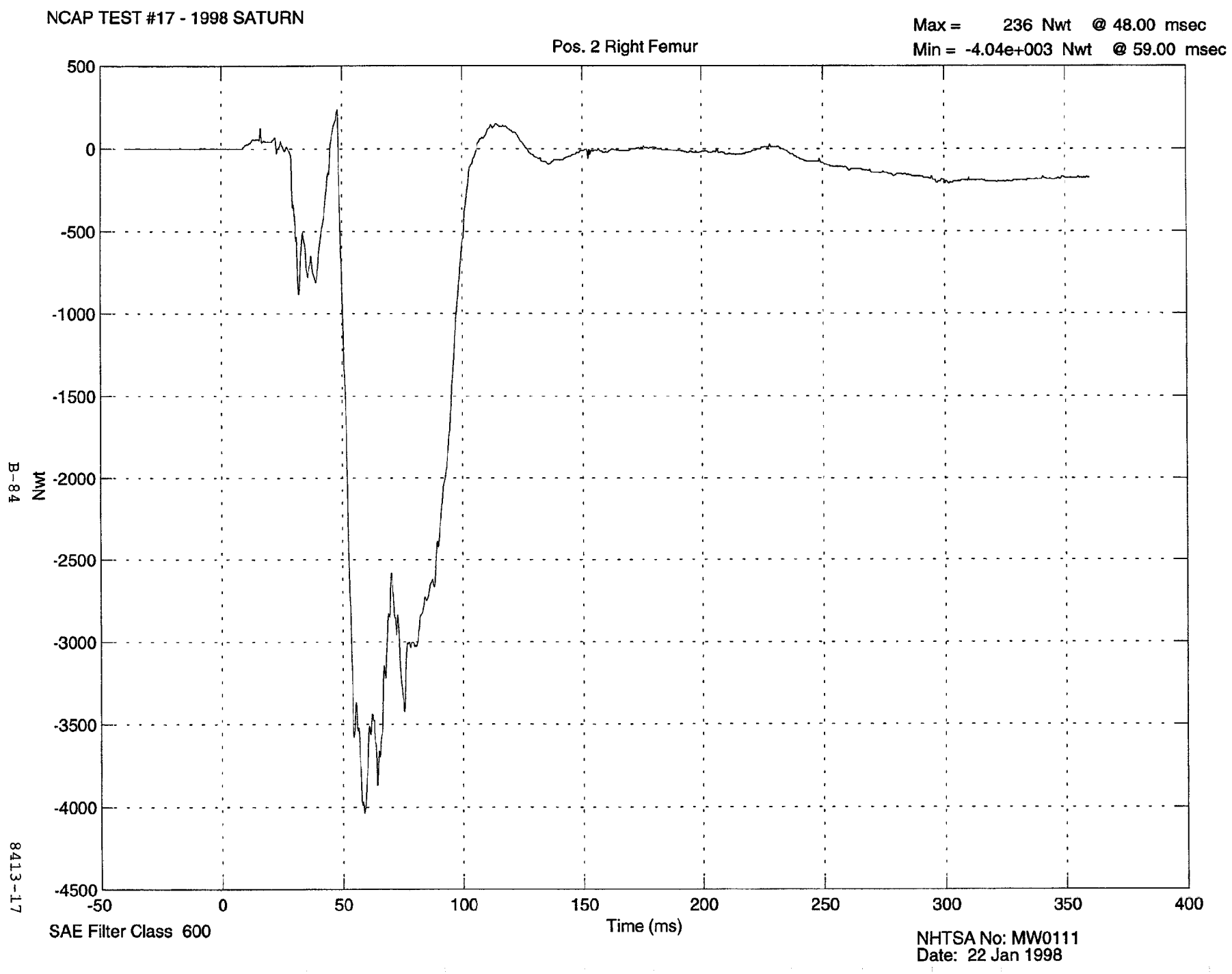
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Right Femur
Max = 236 Nwt @ 48.00 msec
Min = -4.04e+003 Nwt @ 59.00 msec
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
-4000
-4500
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998
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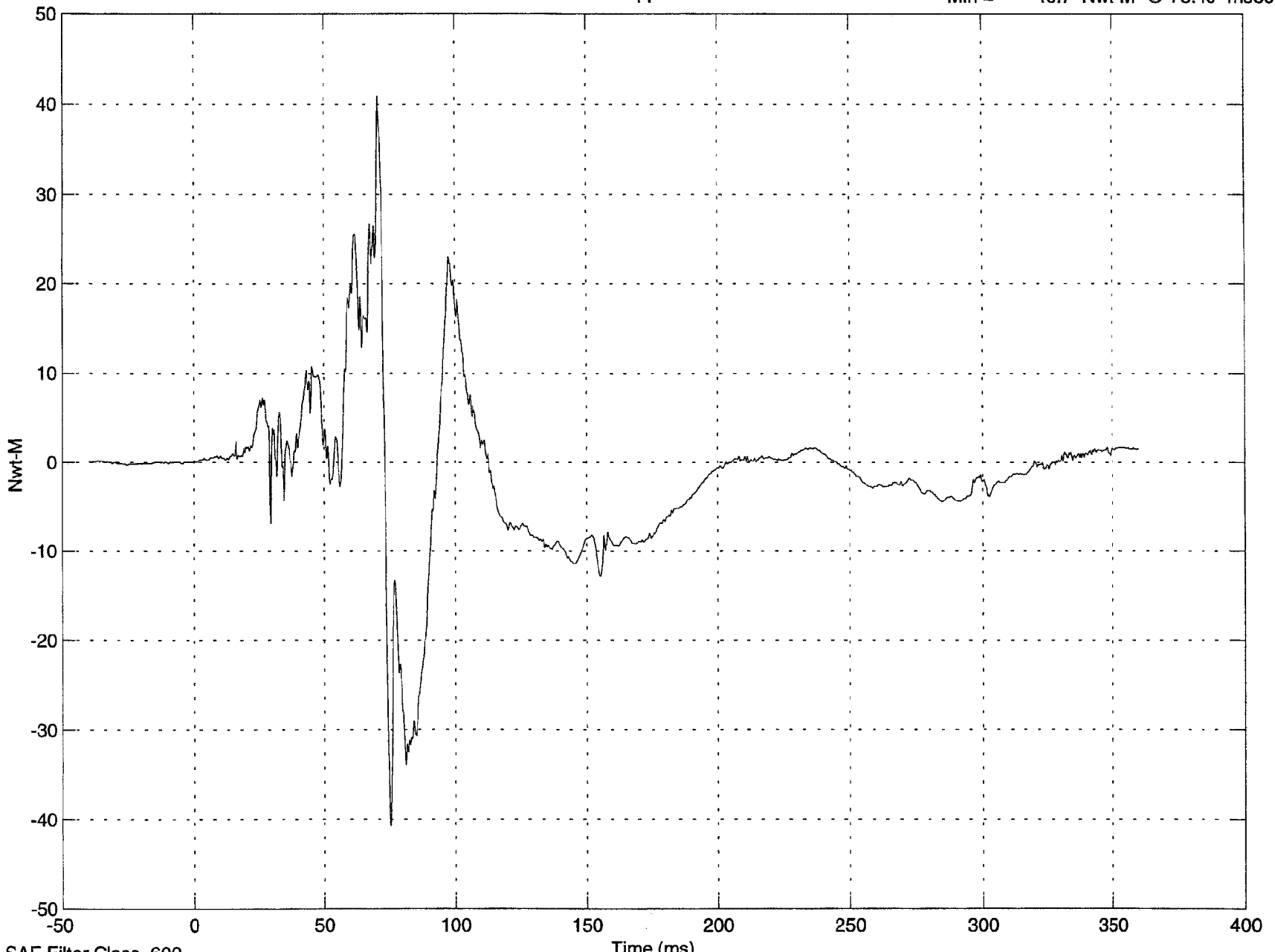
NCAP TEST #17 - 1998 SATURN

Pos. 2 Lt Upper Tibia Mx

Max = 40.9 Nwt-M @ 70.30 msec
Min = -40.7 Nwt-M @ 75.40 msec



SAE Filter Class 600

NHTSA No: MW0111
Date: 22 Jan 1998

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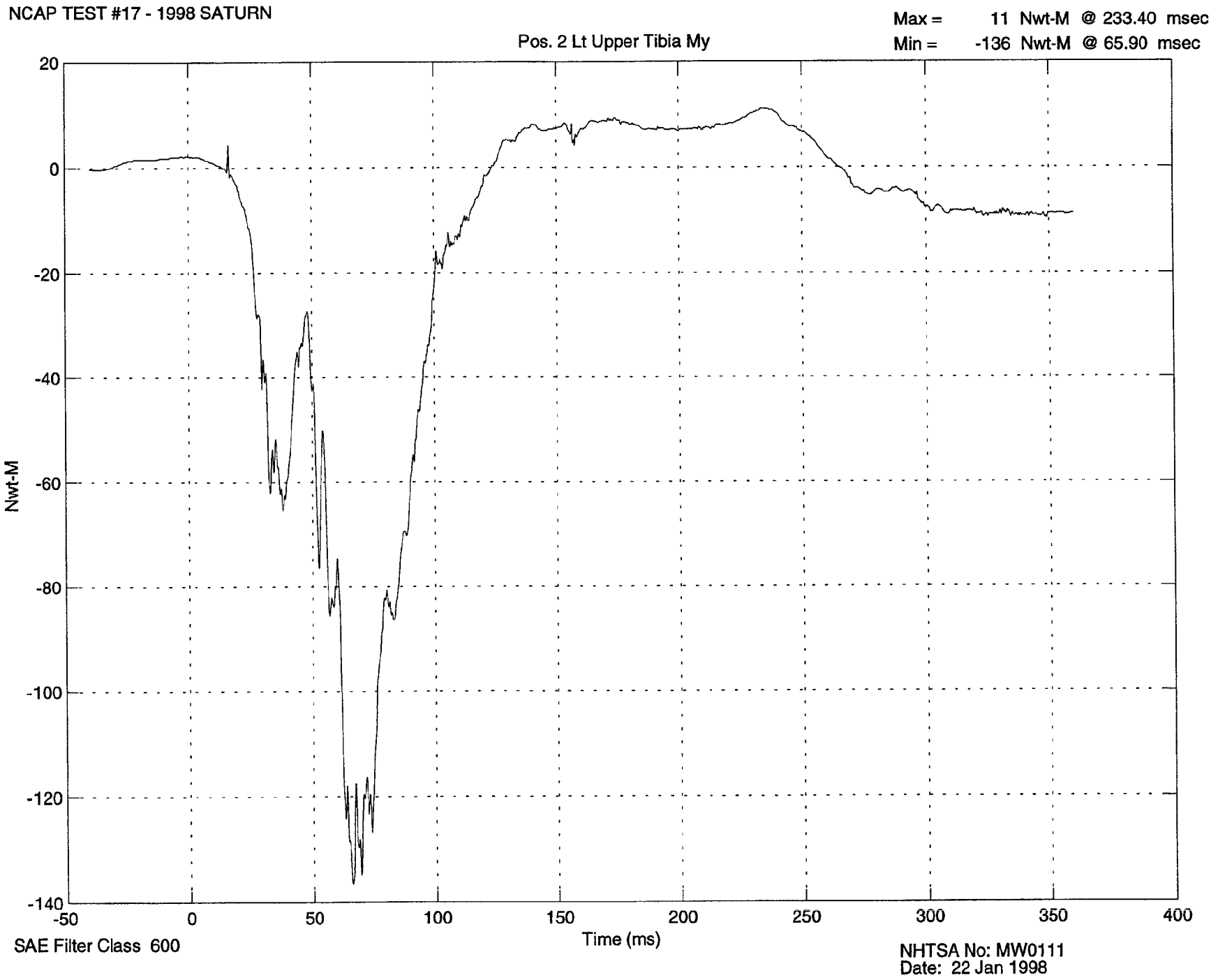
NCAP TEST #17 - 1998 SATURN
Pos. 2 Lt Upper Tibia My
Max = 11 Nwt-M @ 233.40 msec
Min = -136 Nwt-M @ 65.90 msec
Nwt-M
Time (ms)
20
0
-20
-40
-60
-80
-100
-120
-140
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998
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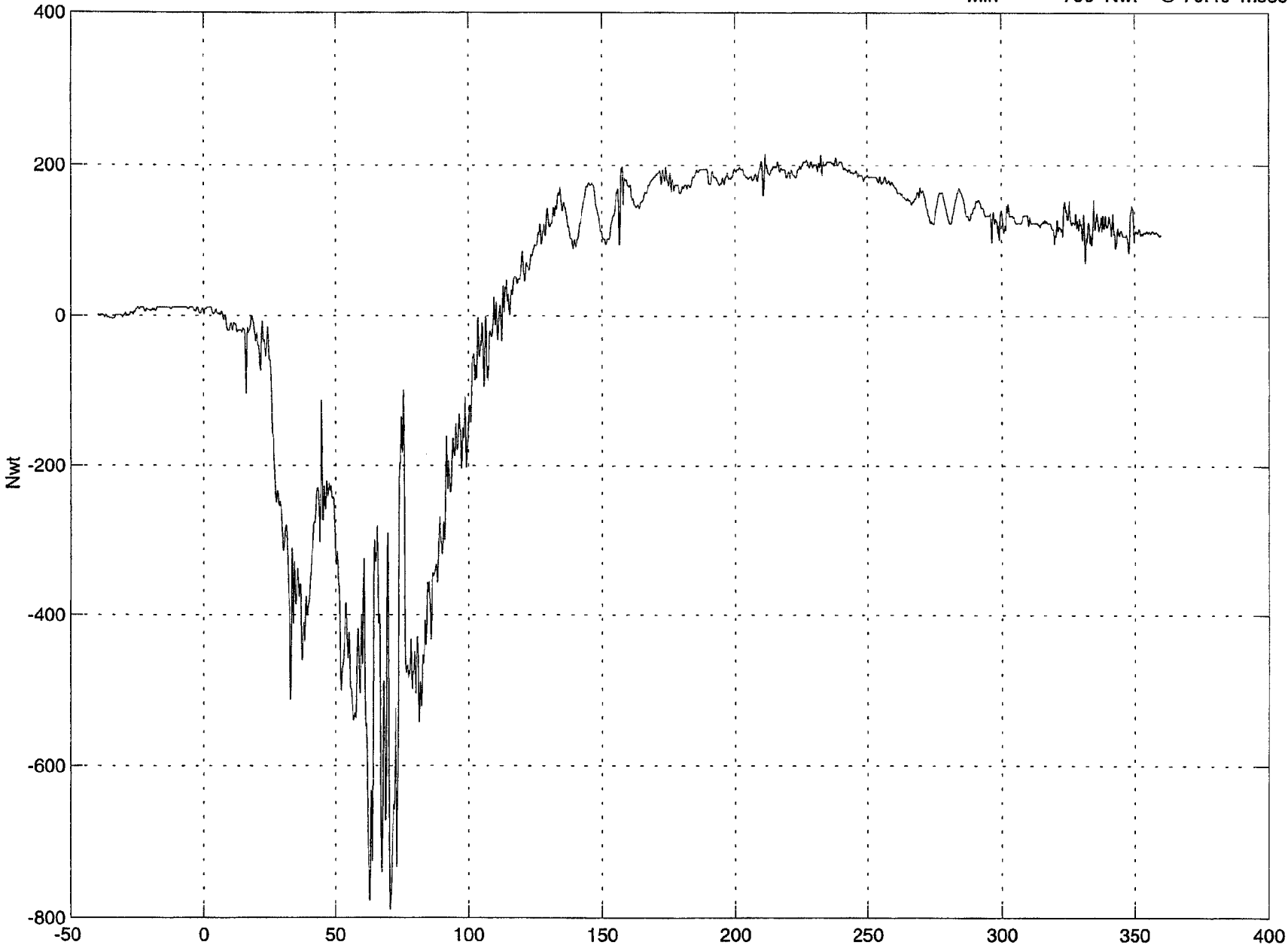
NCAP TEST #17 - 1998 SATURN

Pos. 2 Lt Lower Tibia Fx

Max = 215 Nwt @ 211.40 msec
Min = -790 Nwt @ 70.40 msec



SAE Filter Class 600

NHTSA No: MW0111
Date: 22 Jan 1998

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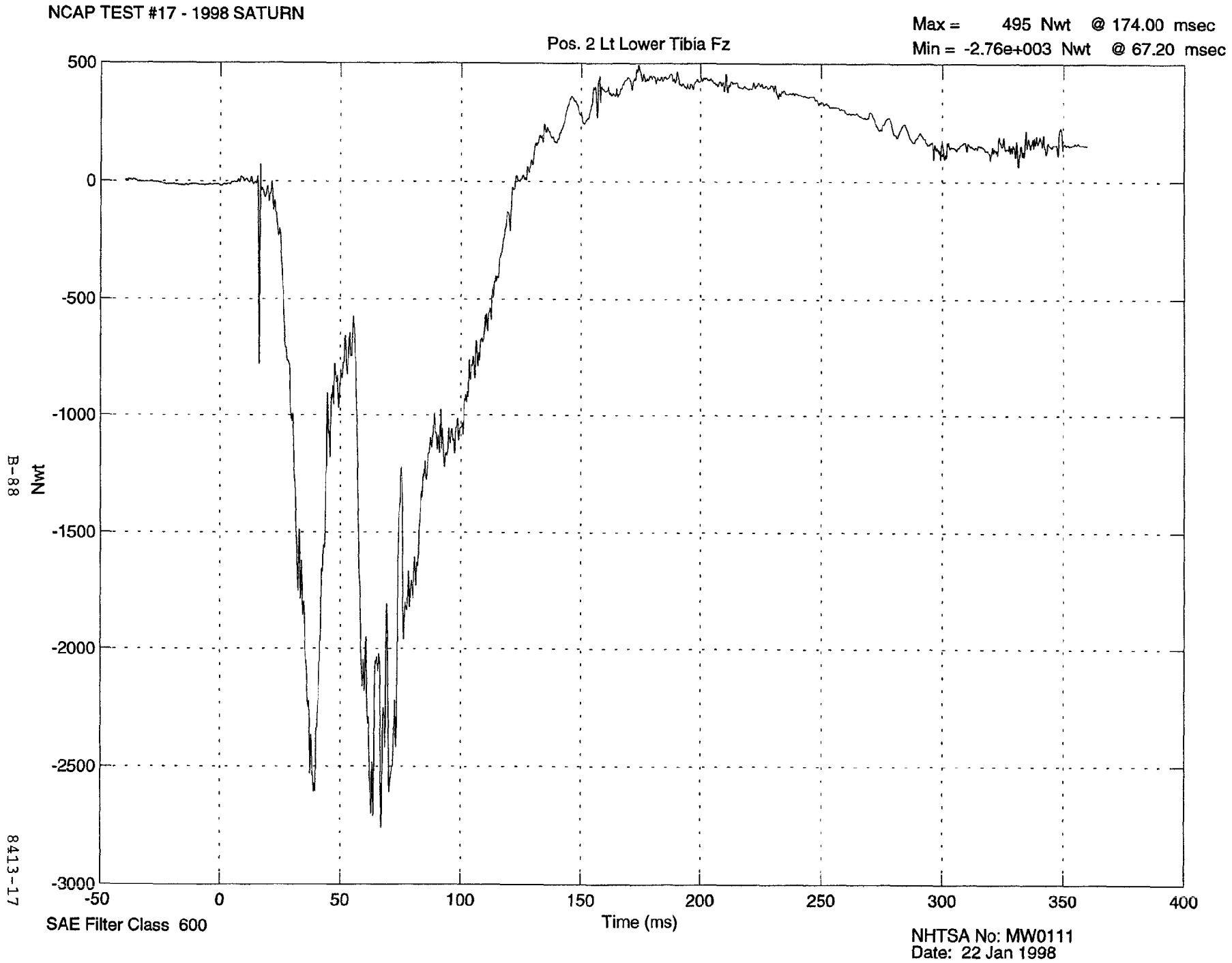
NCAP TEST #17 - 1998 SATURN
Pos. 2 Lt Lower Tibia Fz
Max = 495 Nwt @ 174.00 msec
Min = -2.76e+003 Nwt @ 67.20 msec
500
0
-500
-1000
-1500
-2000
-2500
-3000
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
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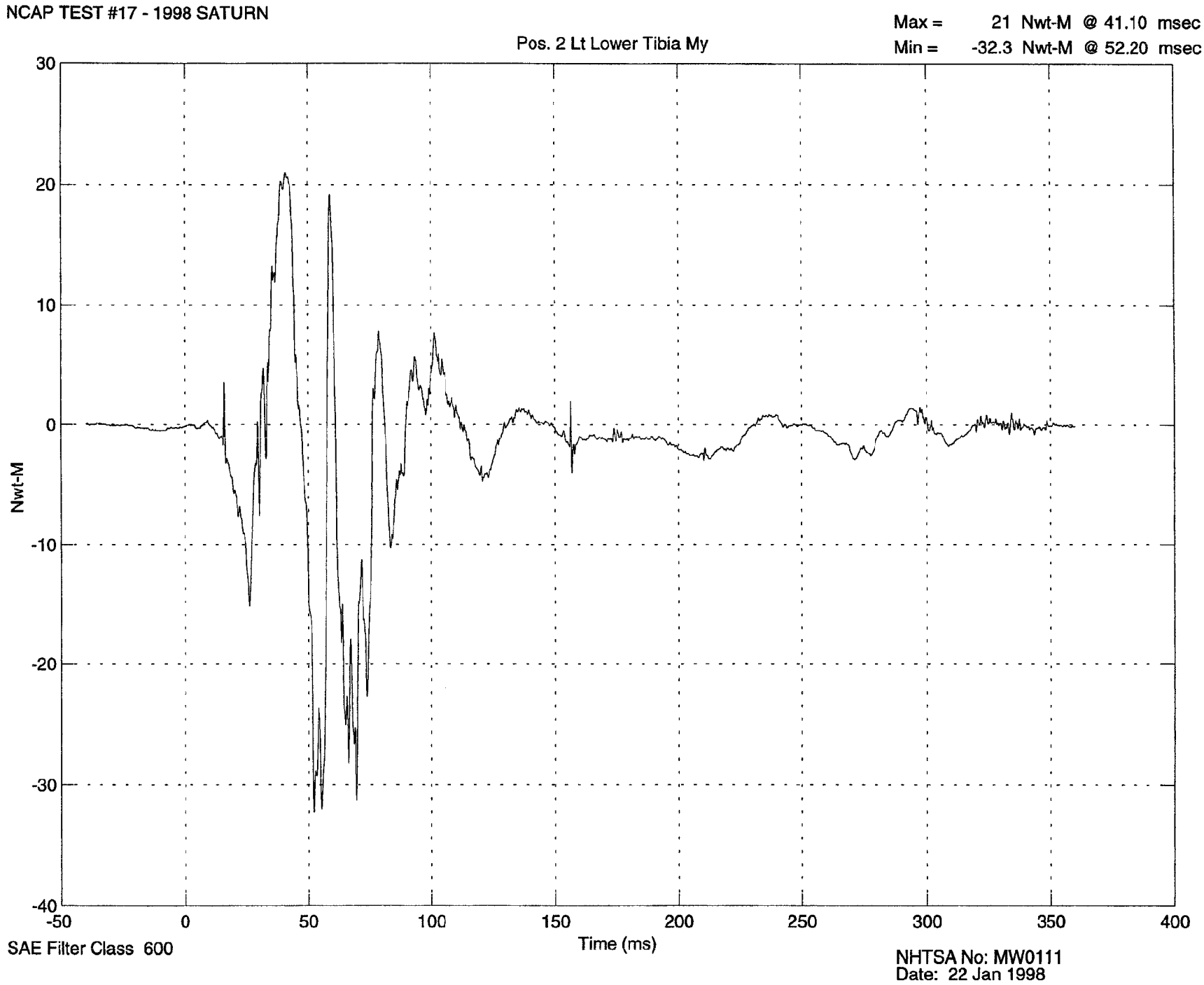
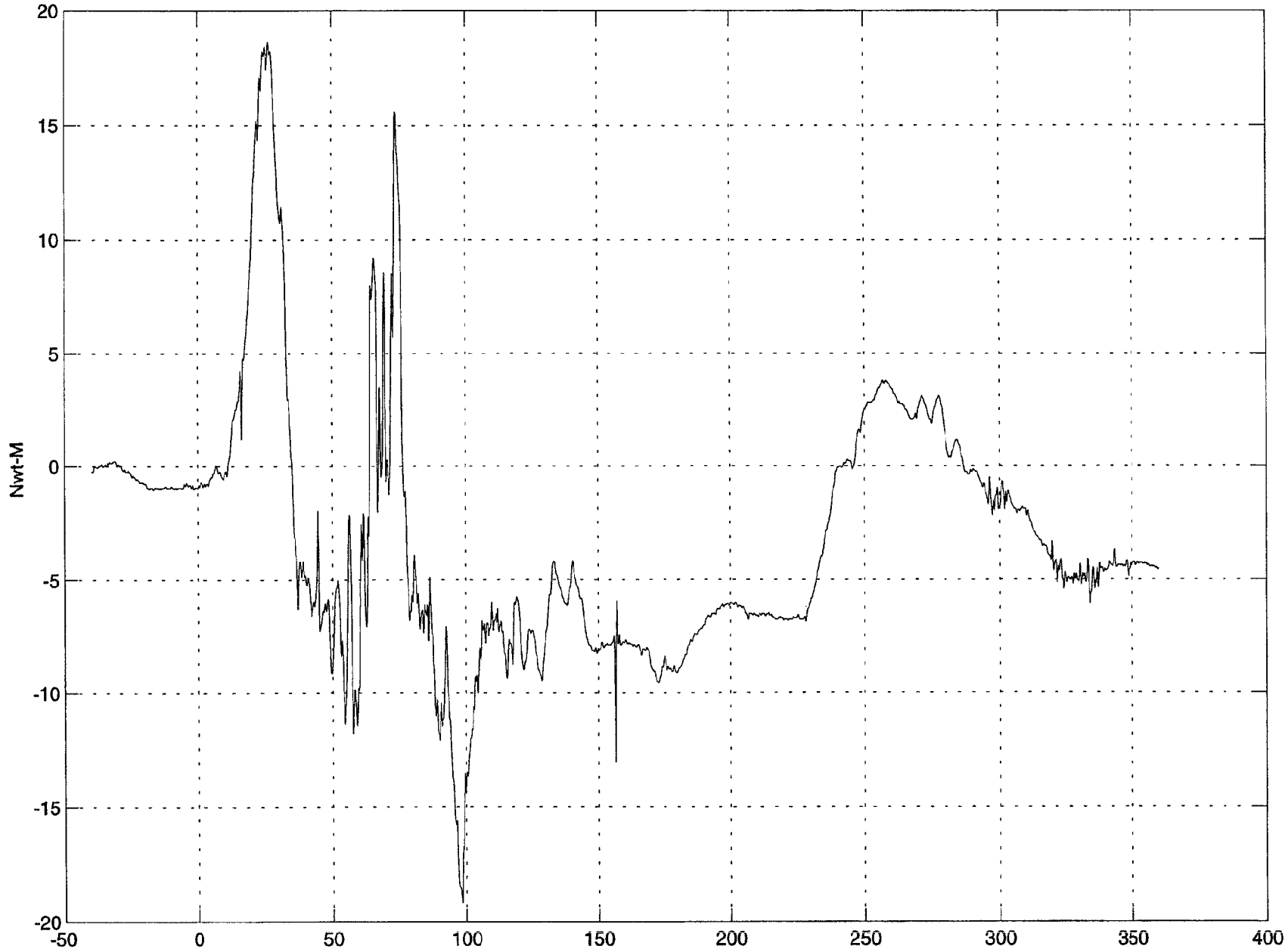
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Lt Lower Tibia My
Max = 21 Nwt-M @ 41.10 msec
Min = -32.3 Nwt-M @ 52.20 msec
Nwt-M
Time (ms)
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998

NCAP TEST #17 - 1998 SATURN

Pos. 2 Rt Upper Tibia Mx

Max = 18.6 Nwt-M @ 26.30 msec
Min = -19.2 Nwt-M @ 98.40 msec



SAE Filter Class 600

NHTSA No: MW0111
Date: 22 Jan 1998

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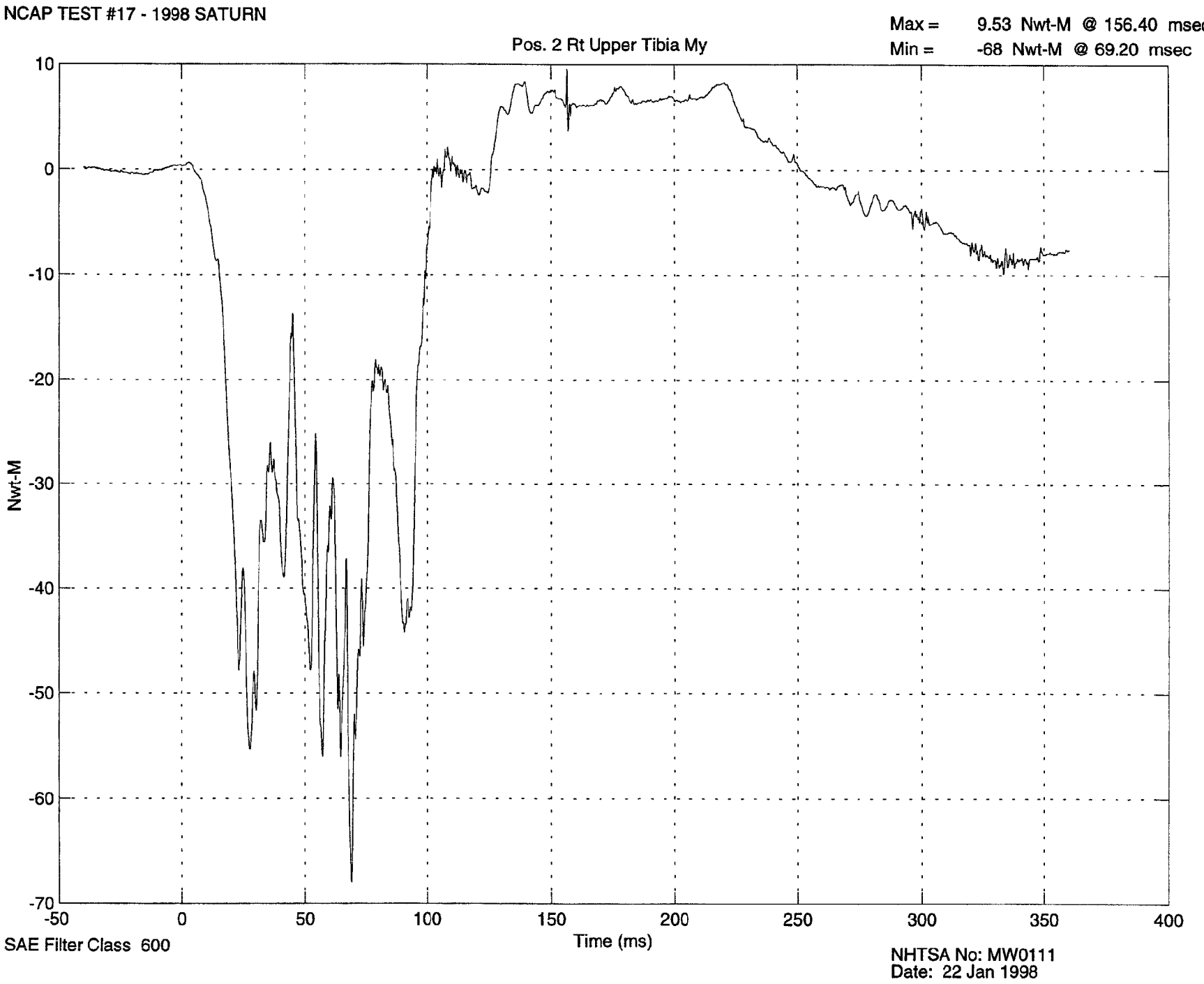
NCAP TEST #17 - 1998 SATURN
Pos. 2 Rt Upper Tibia My
Max = 9.53 Nwt-M @ 156.40 msec
Min = -68 Nwt-M @ 69.20 msec
Nwt-M
10
0
-10
-20
-30
-40
-50
-60
-70
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998

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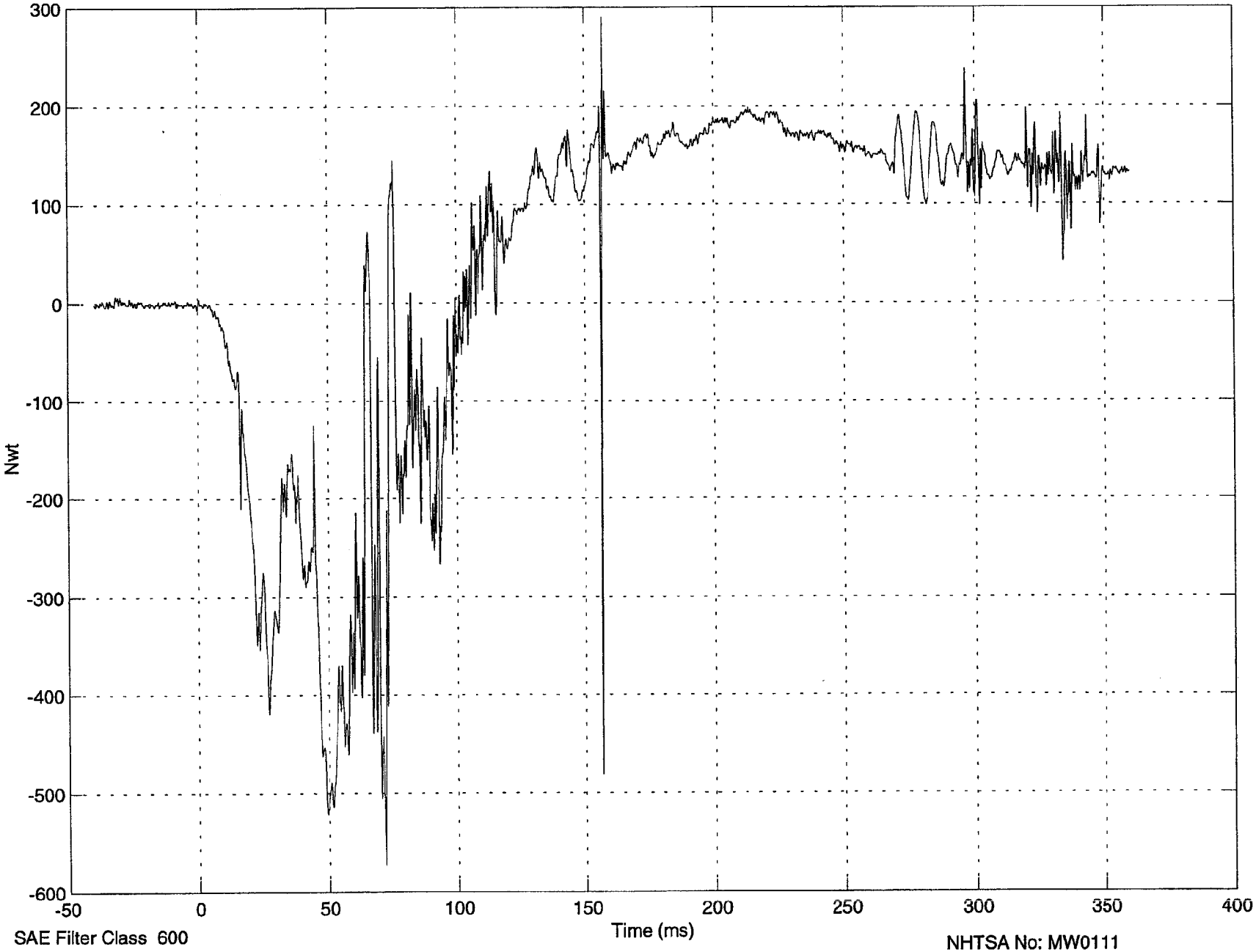
NCAP TEST #17 - 1998 SATURN

Pos. 2 Rt Lower Tibia Fx

Max = 290 Nwt @ 157.00 msec
Min = -573 Nwt @ 71.90 msec



SAE Filter Class 600

NHTSA No: MW0111
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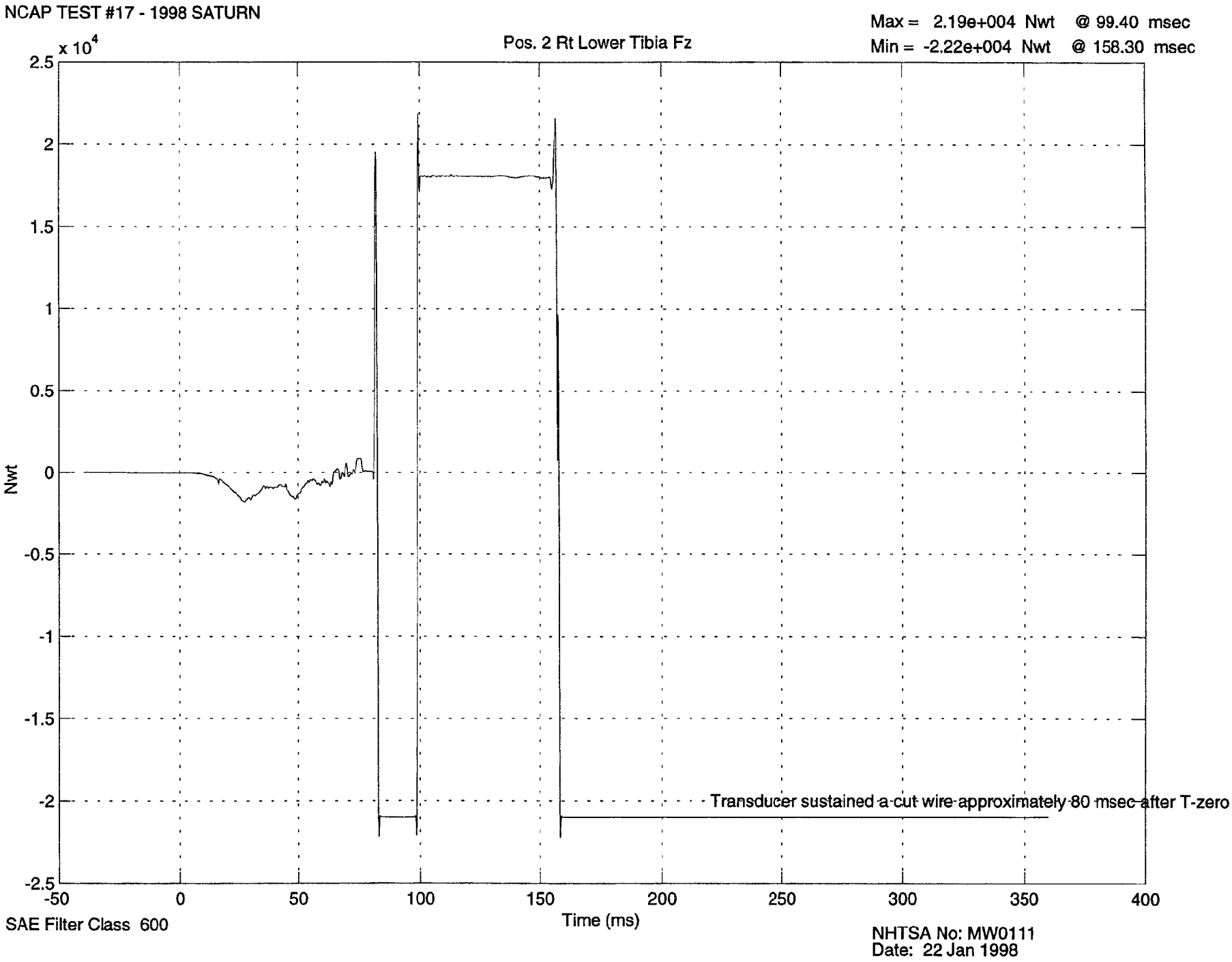
NCAP TEST #17 - 1998 SATURN
Max = 2.19e+004 Nwt @ 99.40 msec
Min = -2.22e+004 Nwt @ 158.30 msec
Pos. 2 Rt Lower Tibia Fz
x 10^4
Nwt
Time (ms)
Transducer sustained a cut wire approximately 80 msec after T-zero
SAE Filter Class 600
NHTSA No: MW0111
Date: 22 Jan 1998
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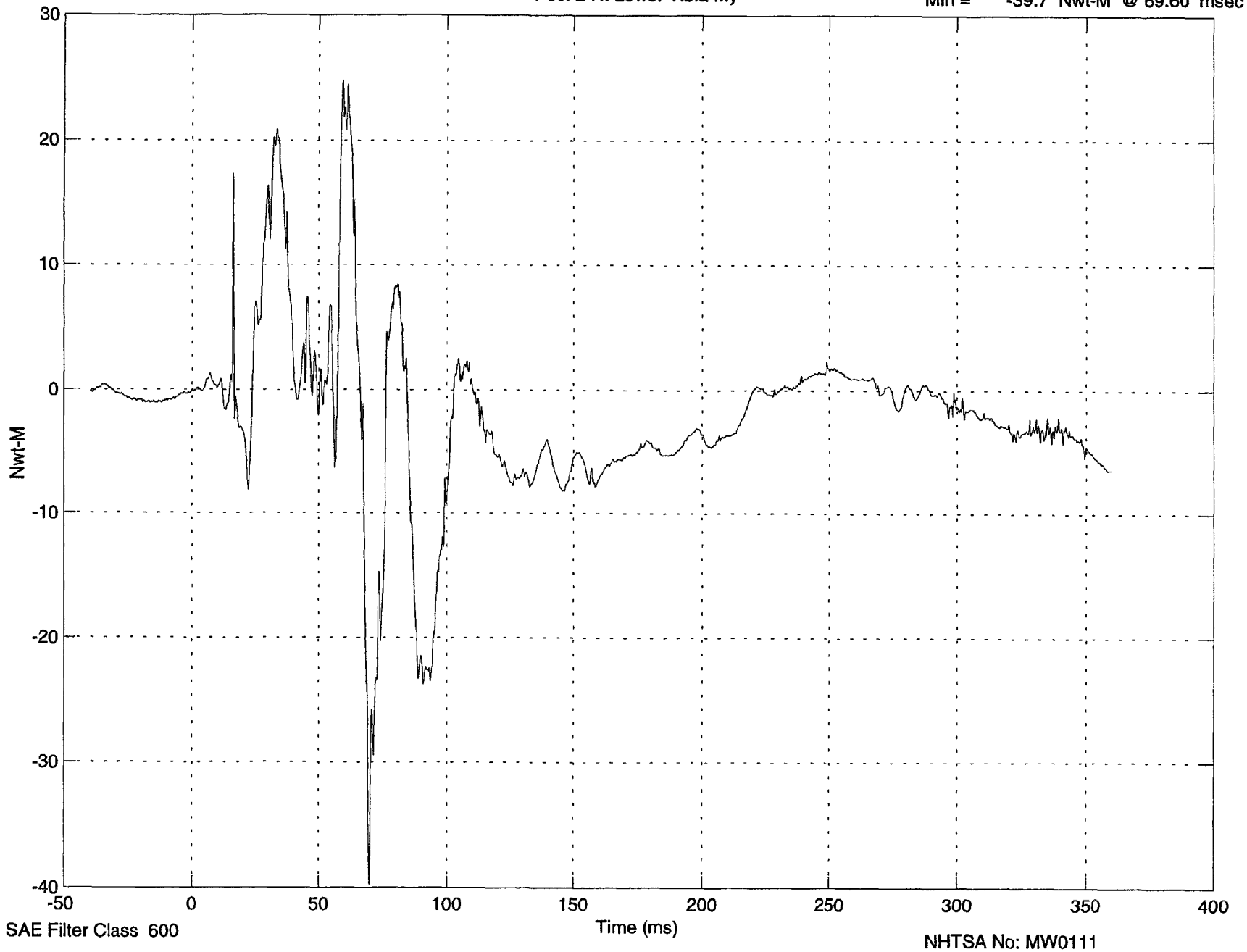
NCAP TEST #17 - 1998 SATURN

Pos. 2 Rt Lower Tibia My

Max = 24.8 Nwt-M @ 59.10 msec
Min = -39.7 Nwt-M @ 69.60 msec



SAE Filter Class 600

NHTSA No: MW0111
Date: 22 Jan 1998

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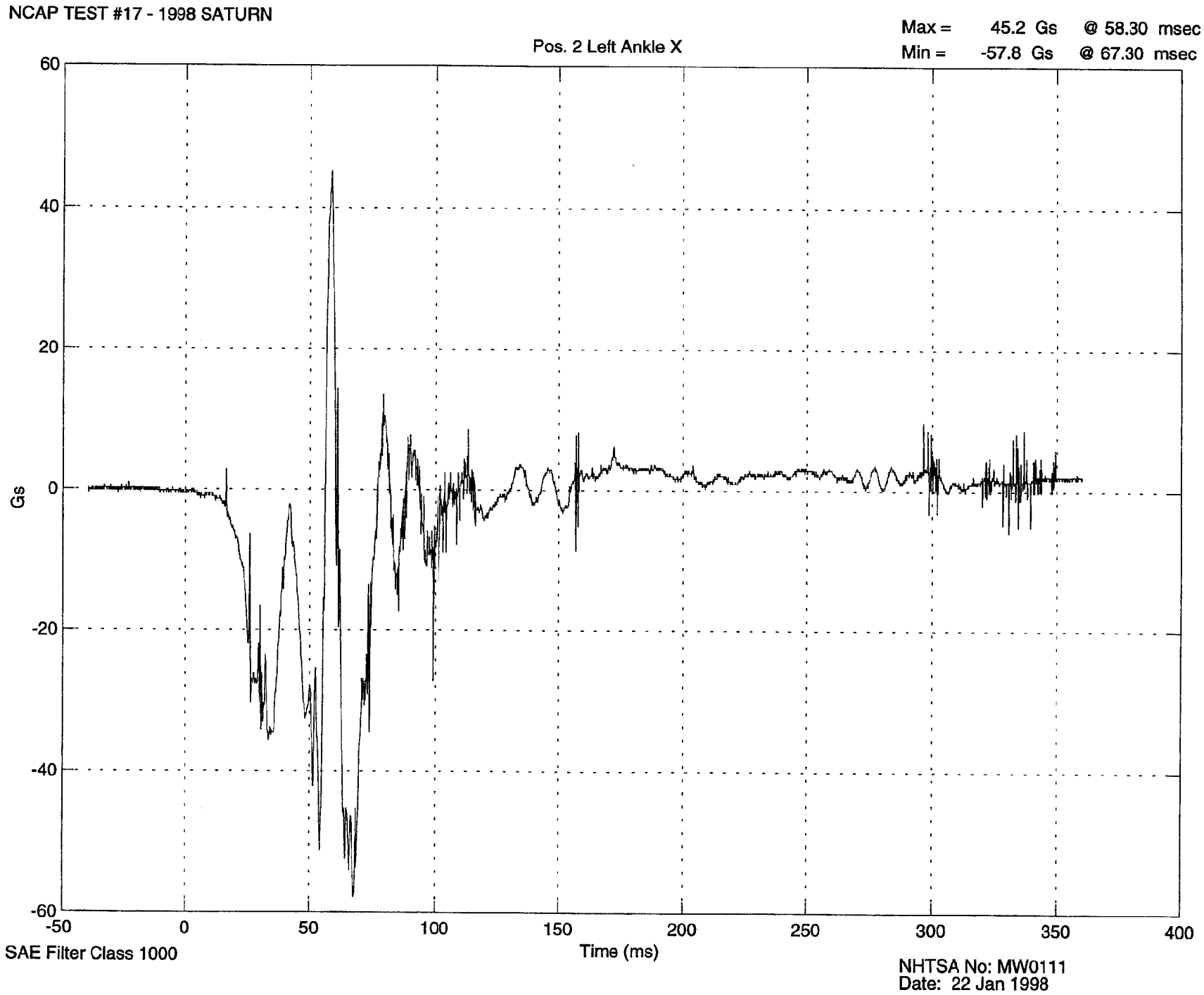
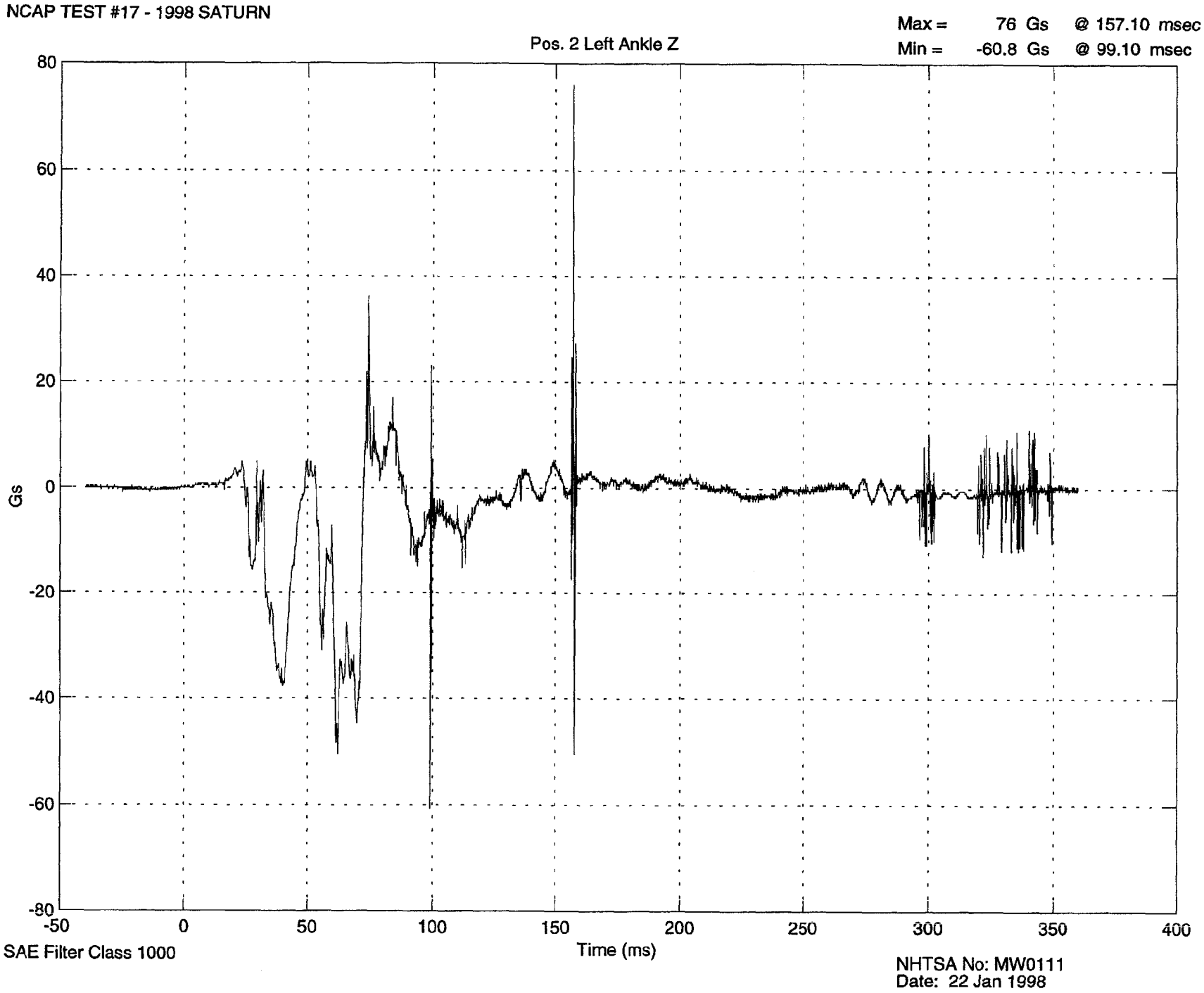

NCAP TEST #17 - 1998 SATURN
Pos. 2 Left Ankle X
Max = 45.2 Gs @ 58.30 msec
Min = -57.8 Gs @ 67.30 msec
60
40
20
0
-20
-40
-60
Gs
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Left Ankle Z
Max = 76 Gs @ 157.10 msec
Min = -60.8 Gs @ 99.10 msec
Gs
Time (ms)
80
60
40
20
0
-20
-40
-60
-80
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998

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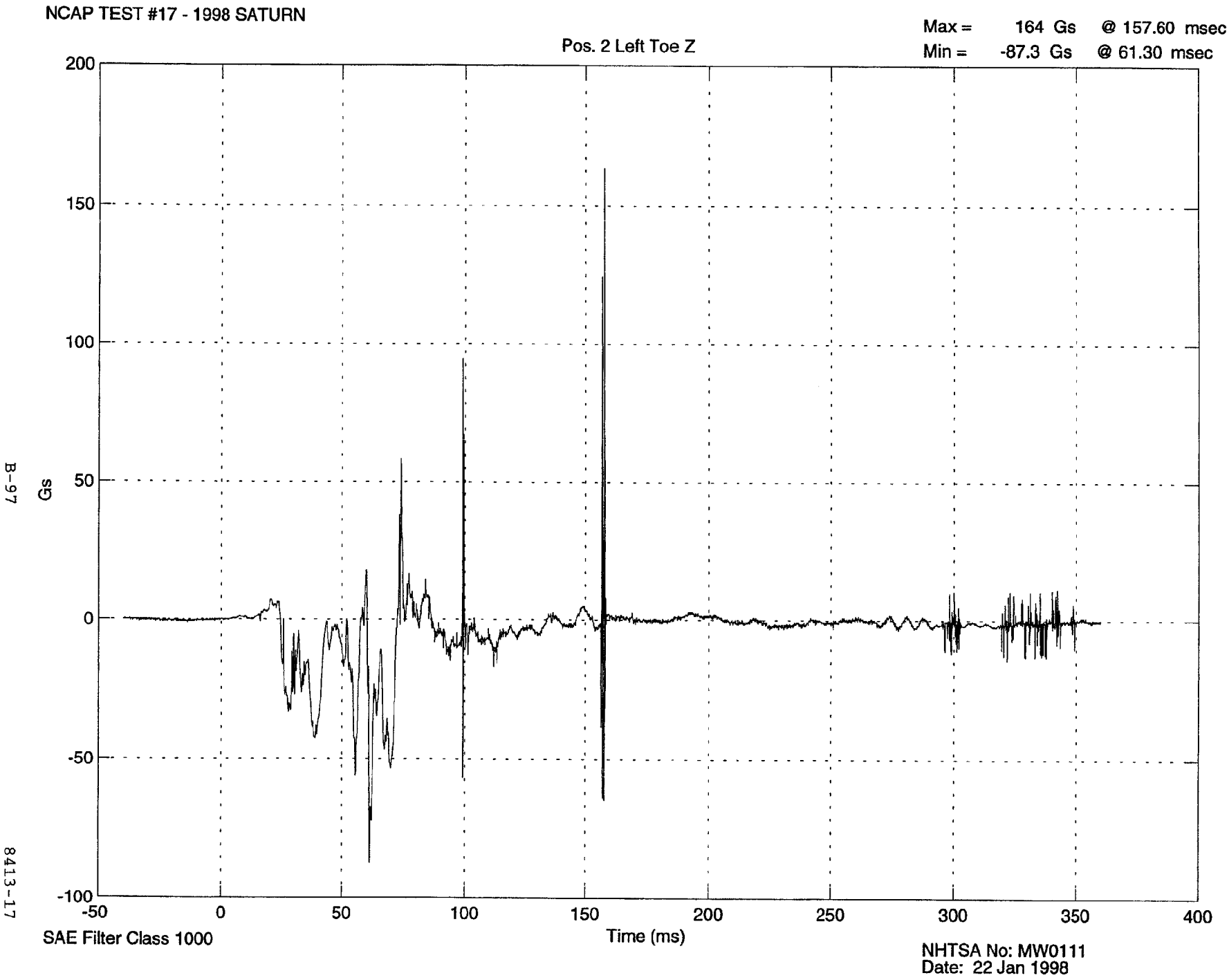
NCAP TEST #17 - 1998 SATURN
Pos. 2 Left Toe Z
Max = 164 Gs @ 157.60 msec
Min = -87.3 Gs @ 61.30 msec
Gs
200
150
100
50
0
-50
-100
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 22 Jan 1998
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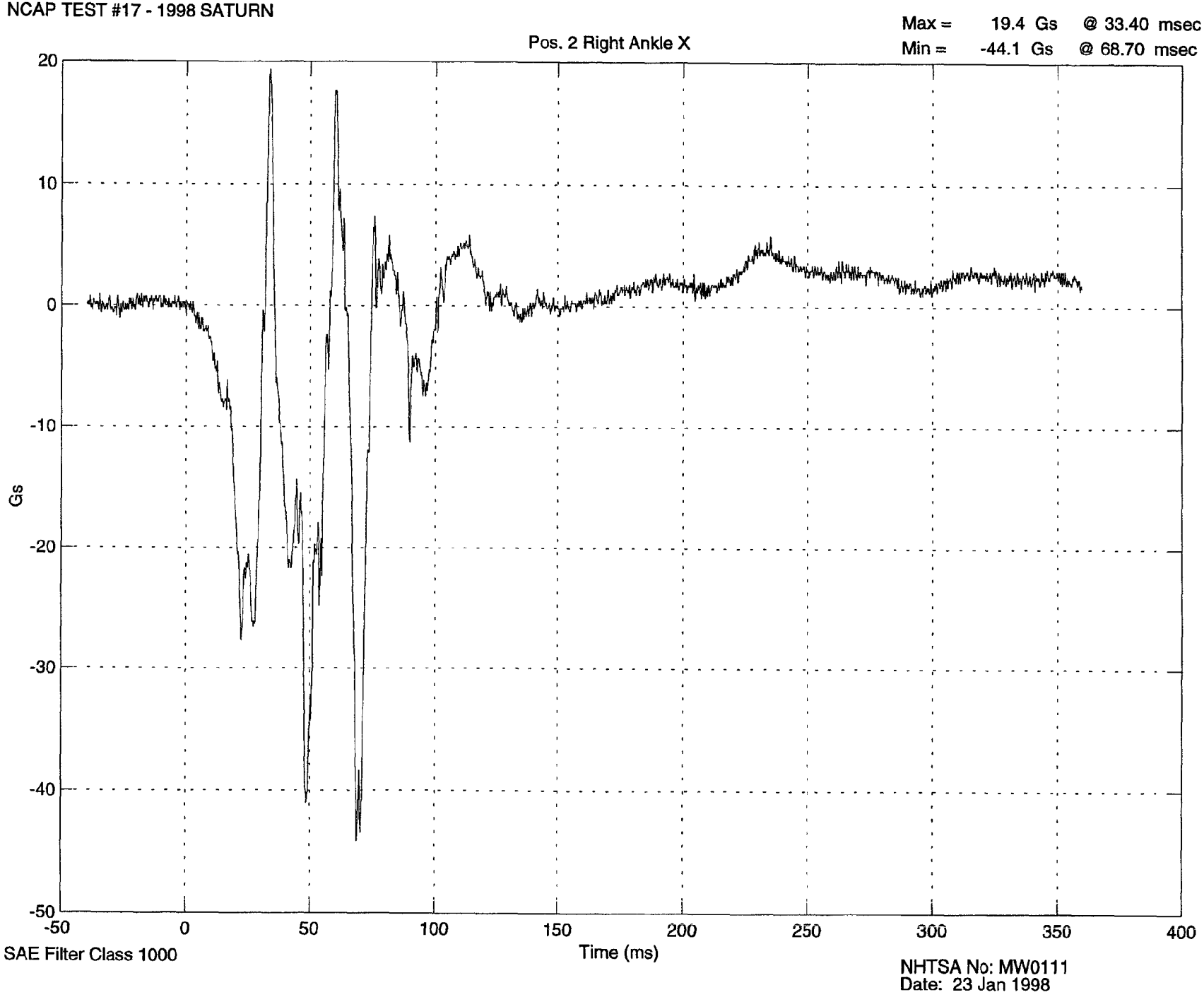
NCAP TEST #17 - 1998 SATURN



SAE Filter Class 1000

NHTSA No: MW0111
Date: 23 Jan 1998

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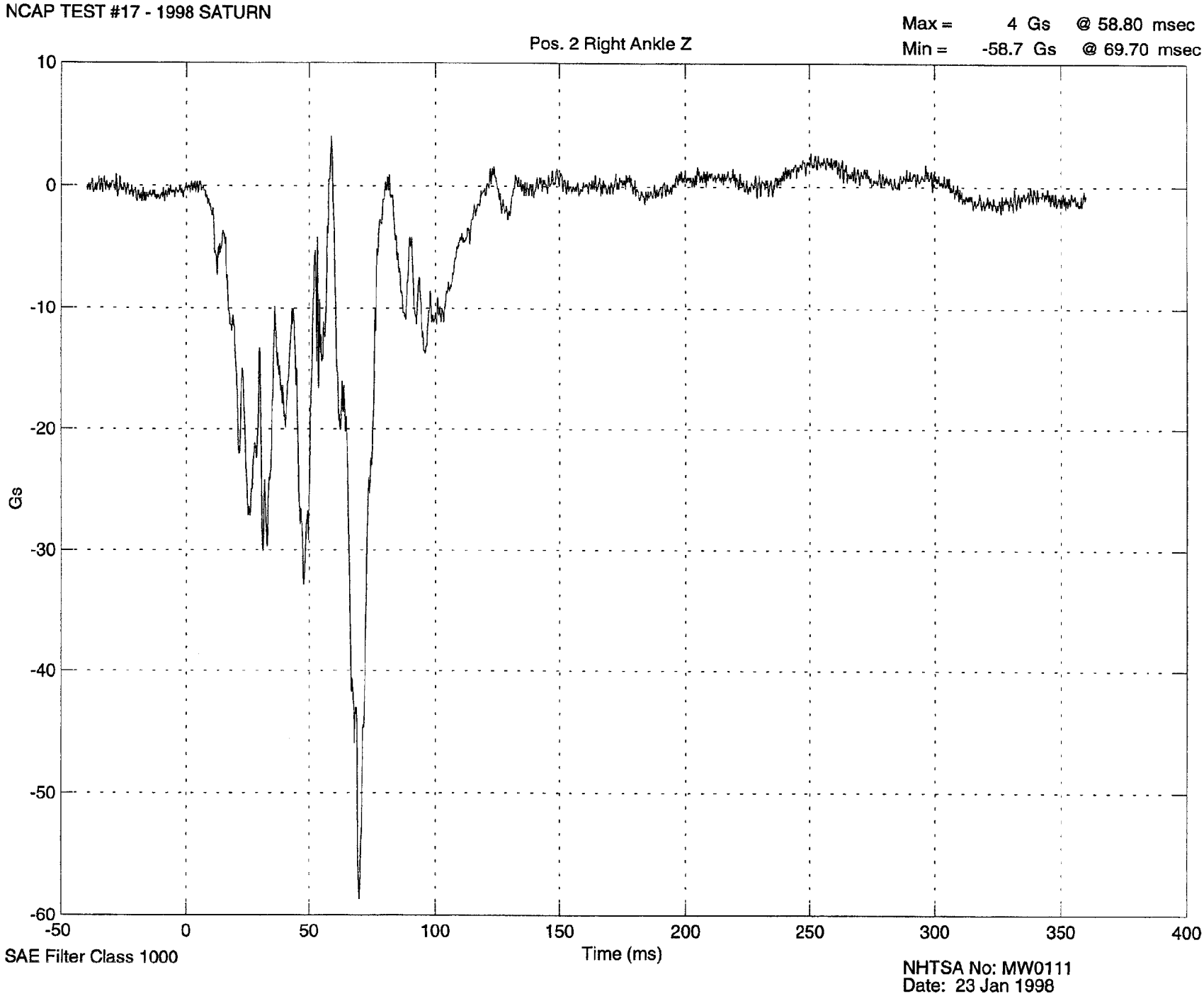
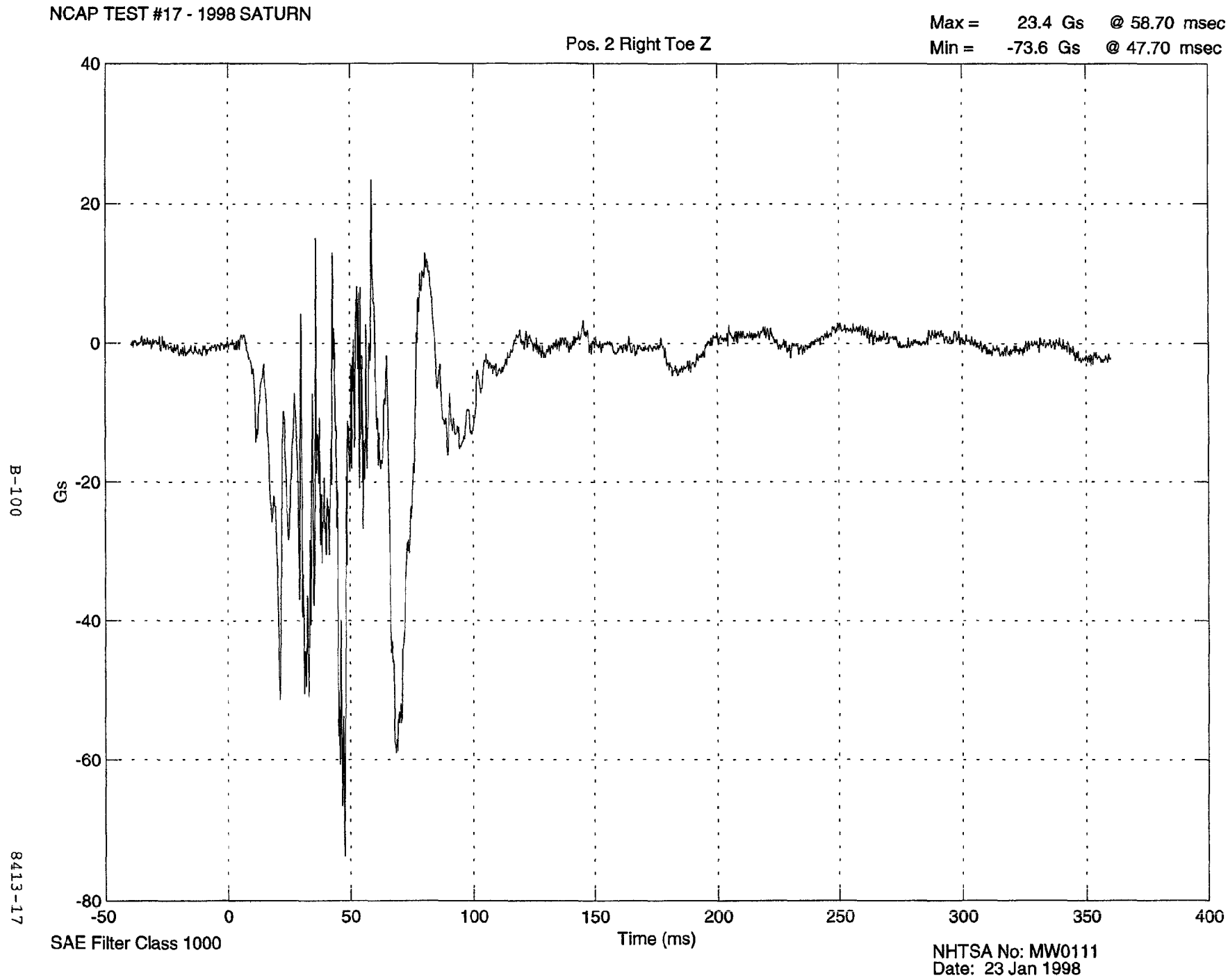

NCAP TEST #17 - 1998 SATURN
Pos. 2 Right Ankle Z
Max = 4 Gs @ 58.80 msec
Min = -58.7 Gs @ 69.70 msec
10
0
-10
-20
-30
-40
-50
-60
Gs
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 23 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Right Toe Z
Max = 23.4 Gs @ 58.70 msec
Min = -73.6 Gs @ 47.70 msec
40
20
0
-20
-40
-60
-80
Gs
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 23 Jan 1998
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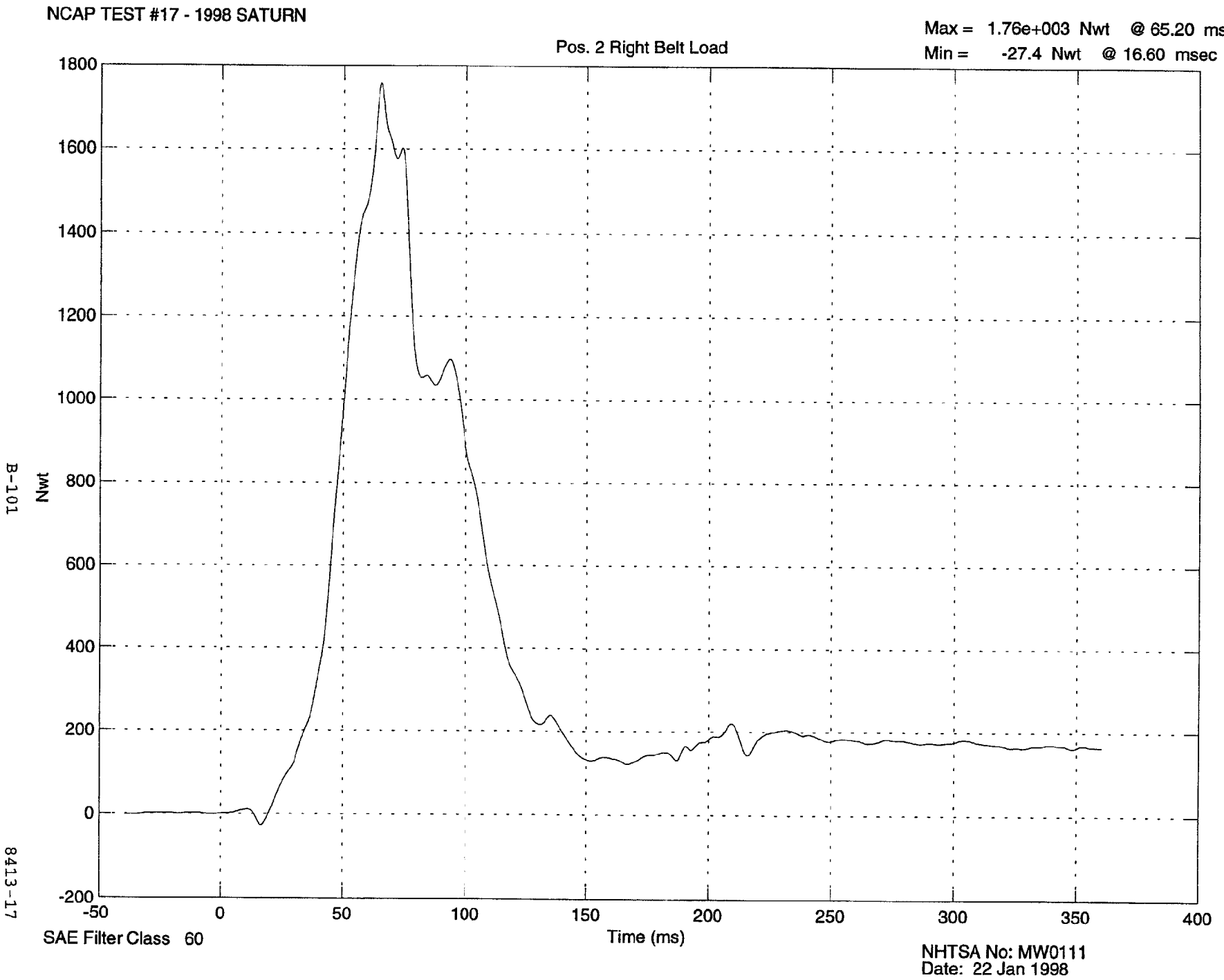
NCAP TEST #17 - 1998 SATURN
Pos. 2 Right Belt Load
Max = 1.76e+003 Nwt @ 65.20 msec
Min = -27.4 Nwt @ 16.60 msec
1800
1600
1400
1200
1000
800
600
400
200
0
-200
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
B-101
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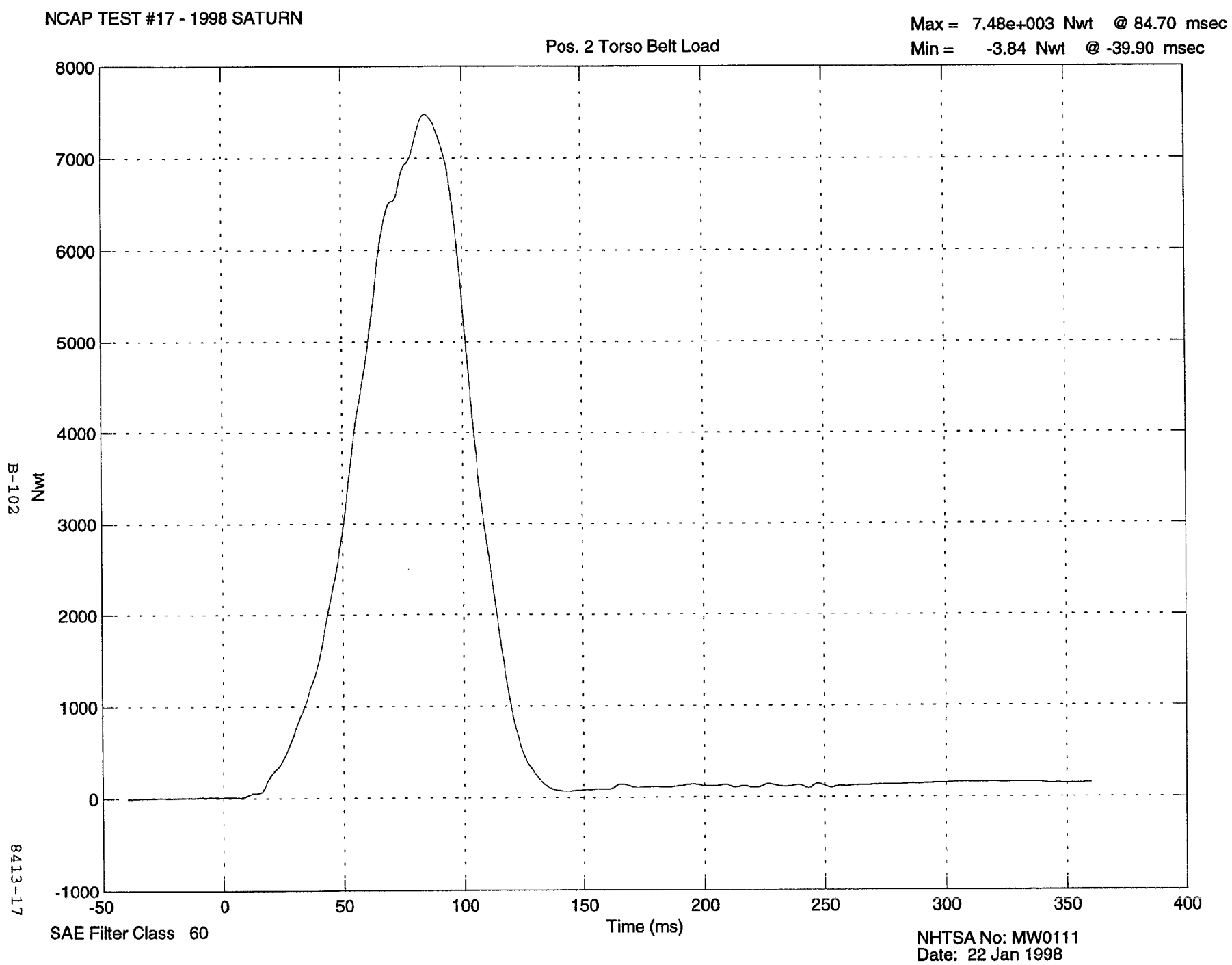
SAE Filter Class 60
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Pos. 2 Torso Belt Load
Max = 7.48e+003 Nwt @ 84.70 msec
Min = -3.84 Nwt @ -39.90 msec
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
Nwt
-50
0
50
100
150
200
250
300
350
400
Time (ms)
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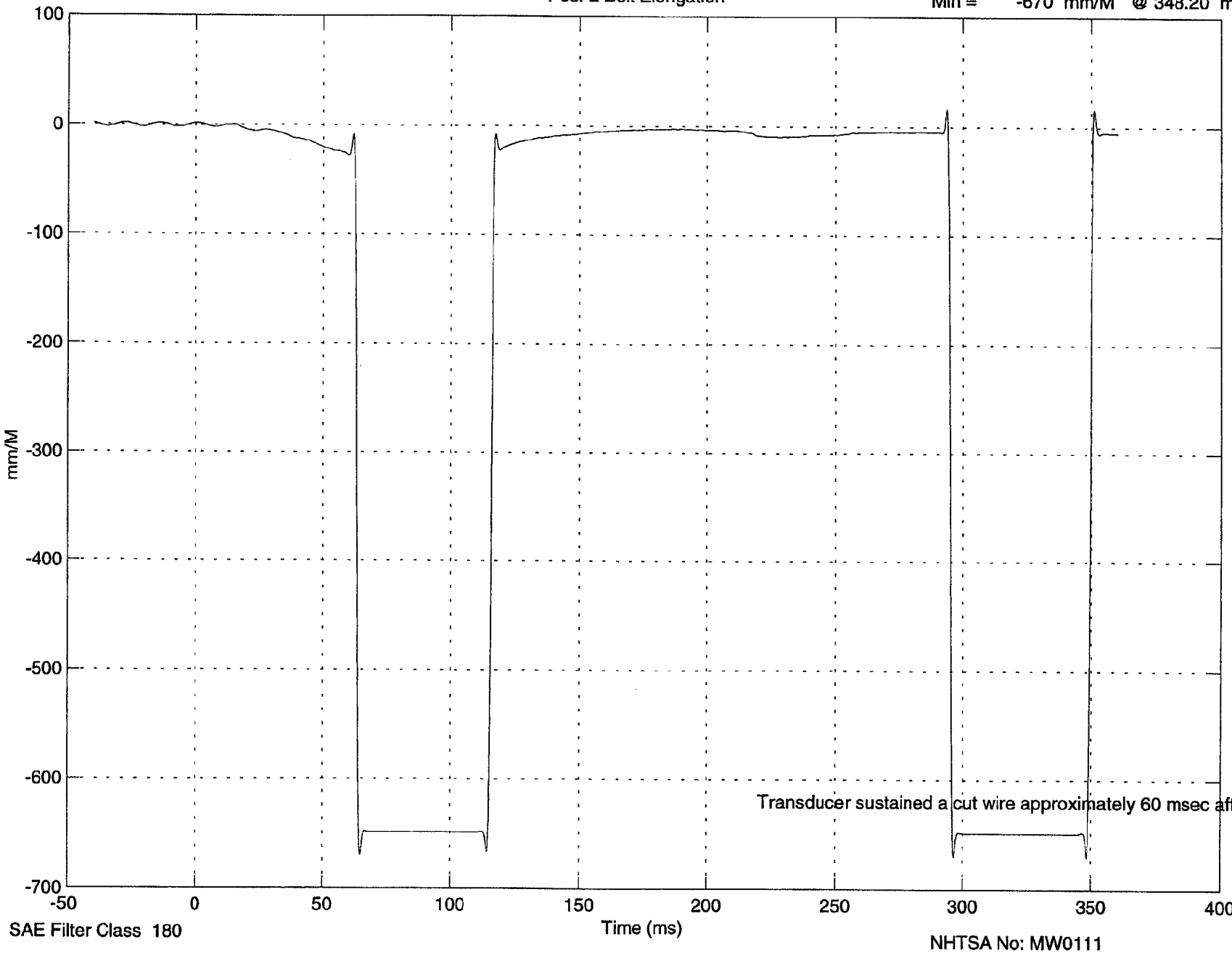
SAE Filter Class 60
NHTSA No: MW0111
Date: 22 Jan 1998

NCAP TEST #17 - 1998 SATURN

Pos. 2 Belt Elongation

Max = 16.6 mm/M @ 293.60 msec
Min = -670 mm/M @ 348.20 msec



Transducer sustained a cut wire approximately 60 msec after T-zero

SAE Filter Class 180

NHTSA No: MW0111
Date: 22 Jan 1998

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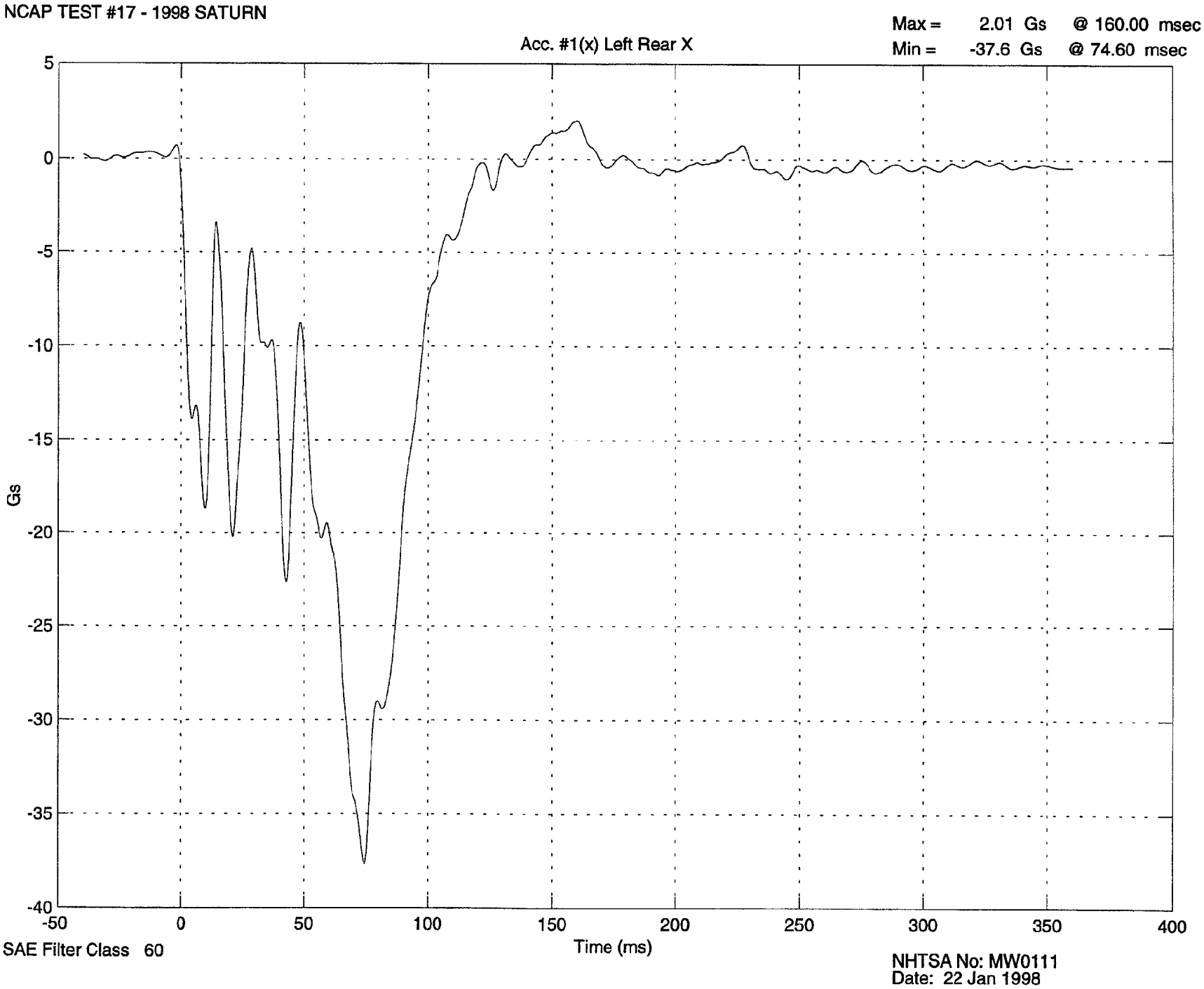
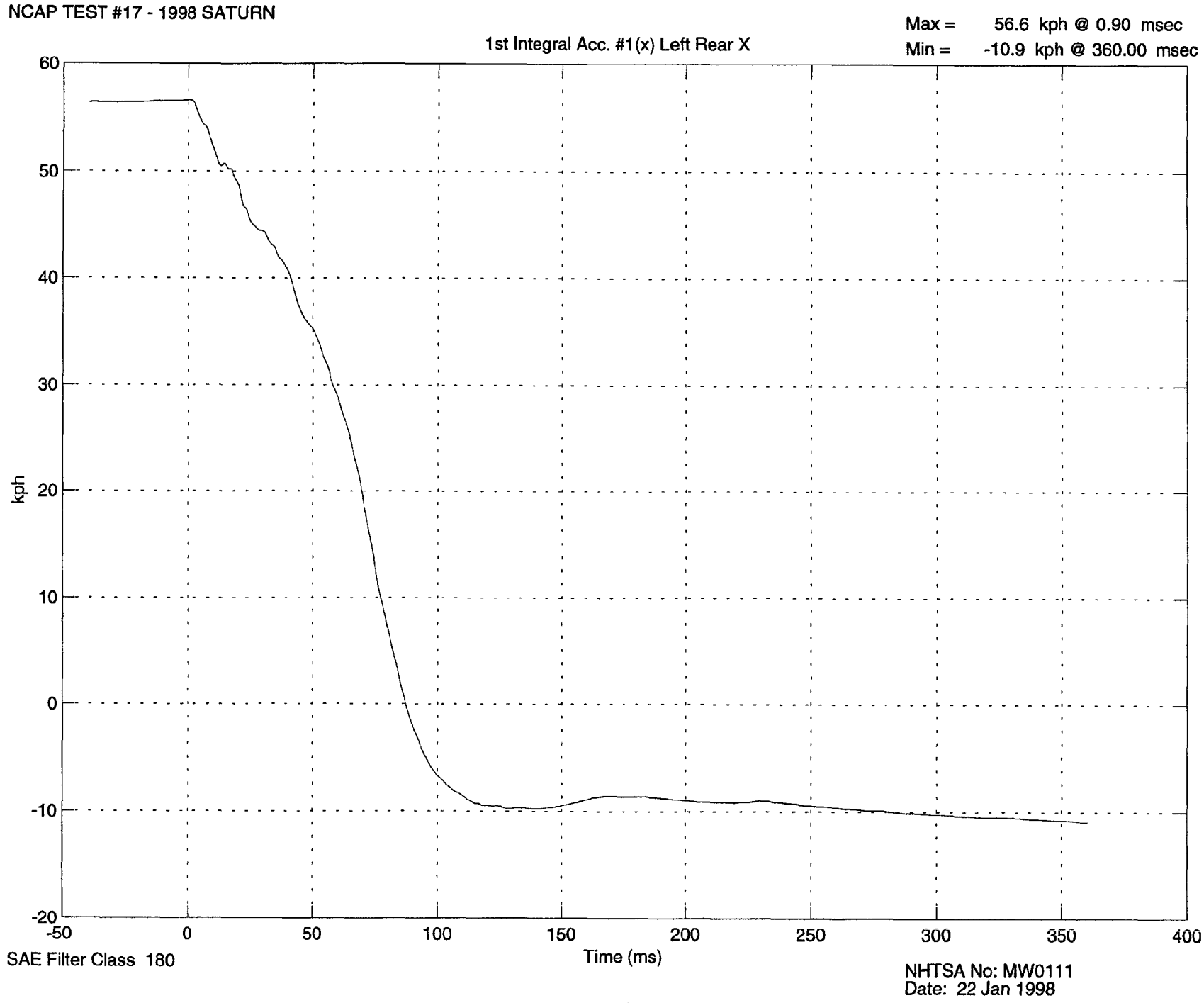
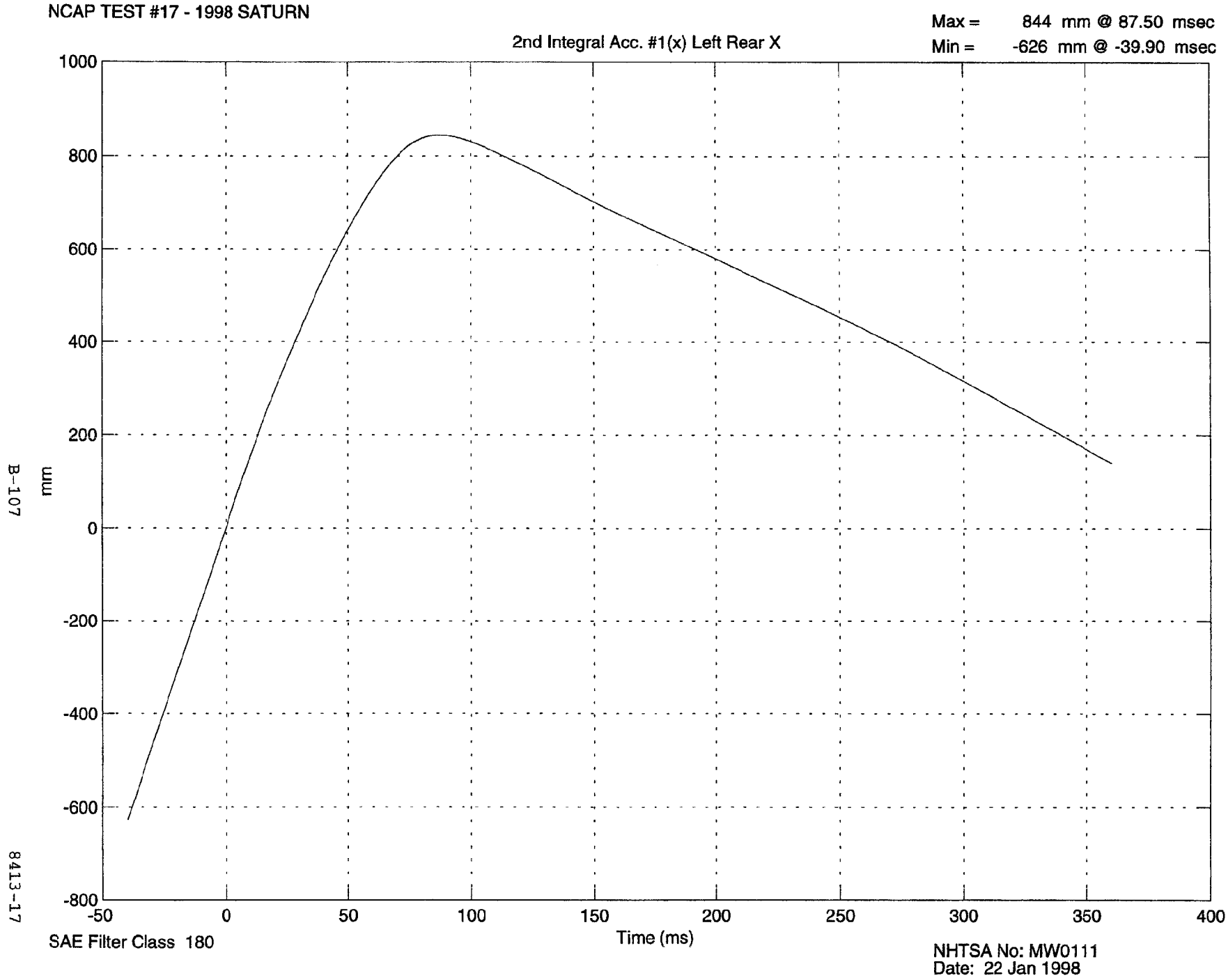
NHTSA TEST NO. MW0111

VEHICLE DATA	FILTER CHANNEL CLASS
Acceleration	60
Velocity	180
Displacement	180


NCAP TEST #17 - 1998 SATURN
Acc. #1(x) Left Rear X
Max = 2.01 Gs @ 160.00 msec
Min = -37.6 Gs @ 74.60 msec
Gs
Time (ms)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 60
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
1st Integral Acc. #1(x) Left Rear X
Max = 56.6 kph @ 0.90 msec
Min = -10.9 kph @ 360.00 msec
kph
60
50
40
30
20
10
0
-10
-20
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
2nd Integral Acc. #1(x) Left Rear X
Max = 844 mm @ 87.50 msec
Min = -626 mm @ -39.90 msec
1000
800
600
400
200
0
-200
-400
-600
-800
mm
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998
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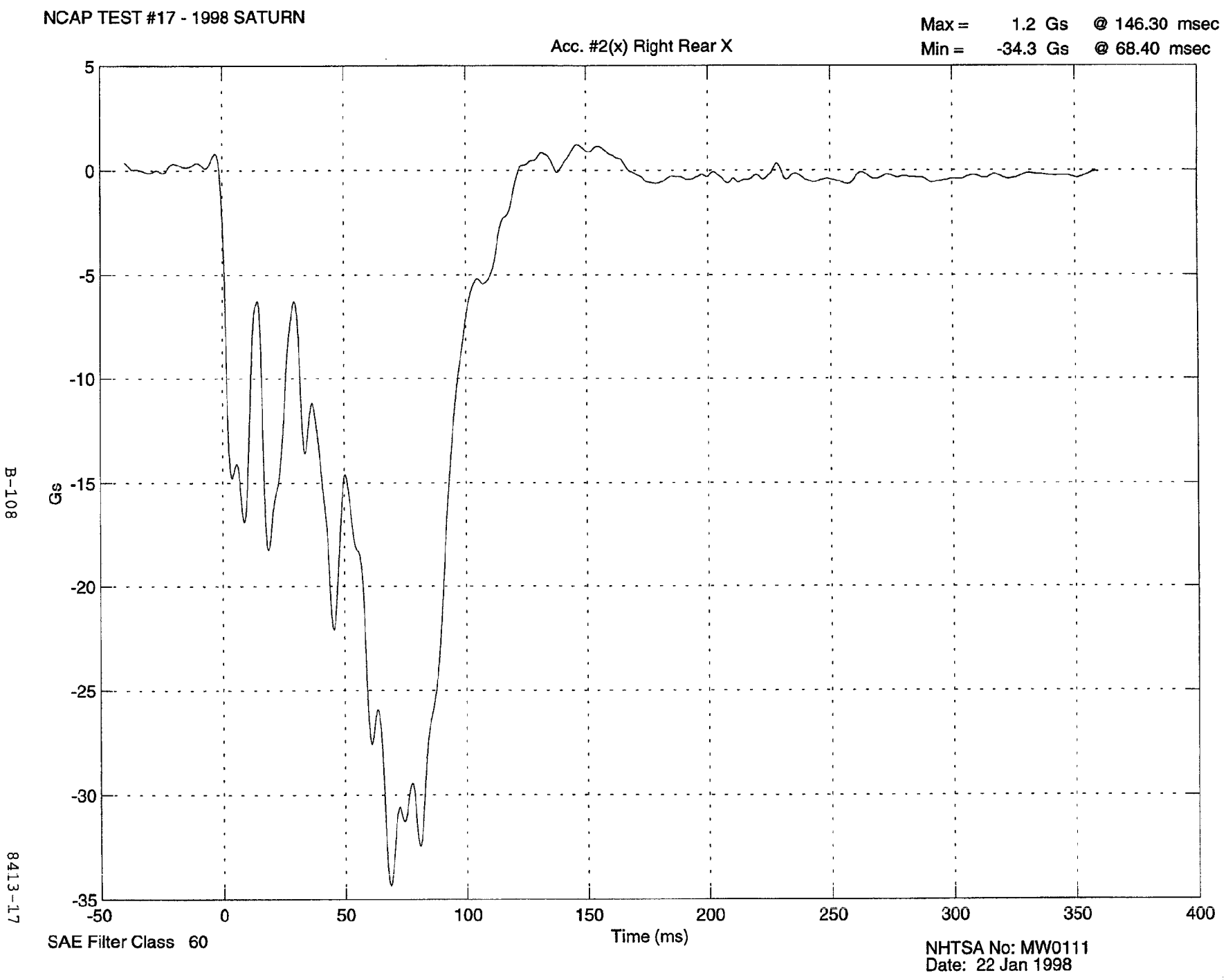
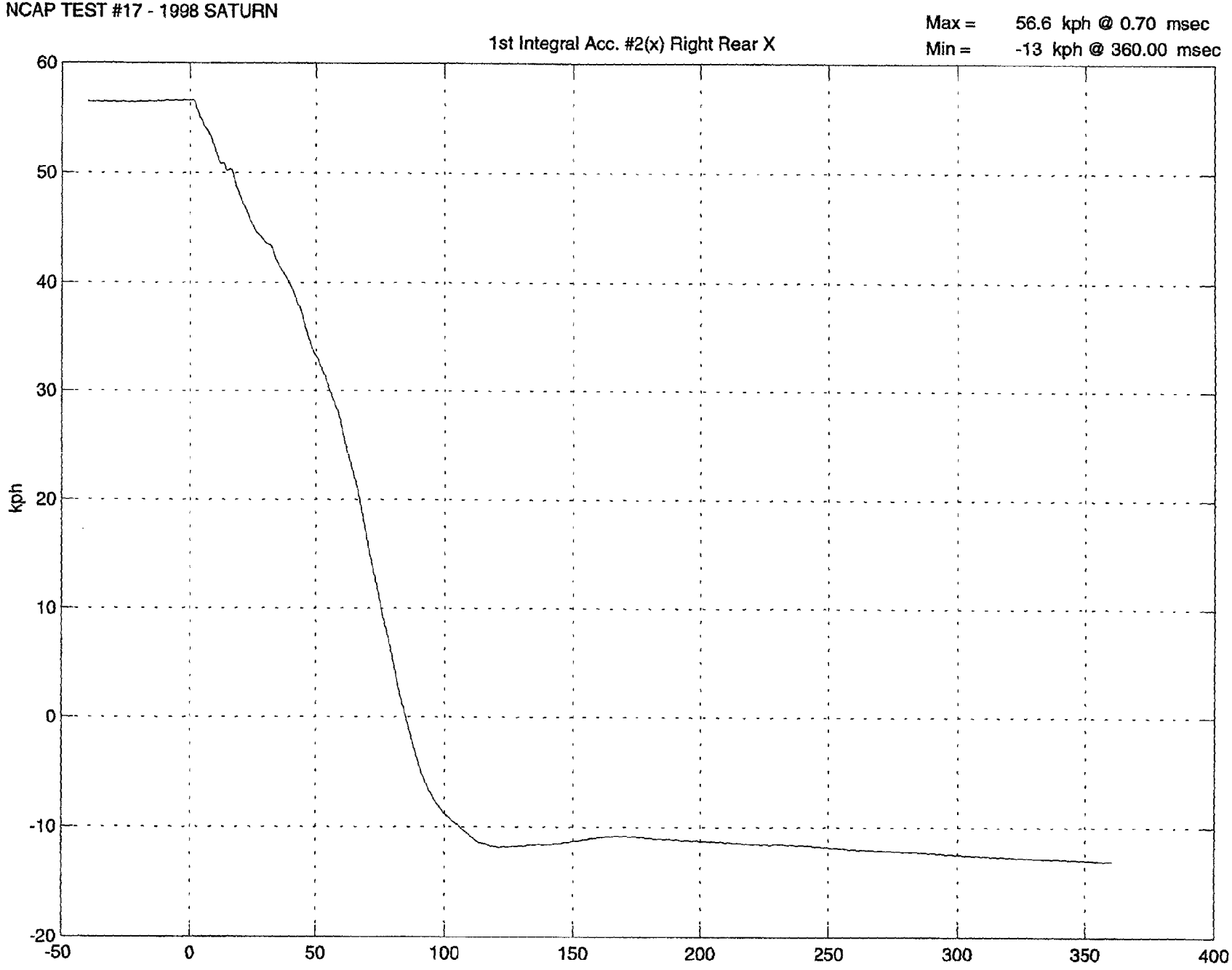

NCAP TEST #17 - 1998 SATURN
Acc. #2(x) Right Rear X
Max = 1.2 Gs @ 146.30 msec
Min = -34.3 Gs @ 68.40 msec
Gs
Time (ms)
5
0
-5
-10
-15
-20
-25
-30
-35
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 60
NHTSA No: MW0111
Date: 22 Jan 1998

NCAP TEST #17 - 1998 SATURN



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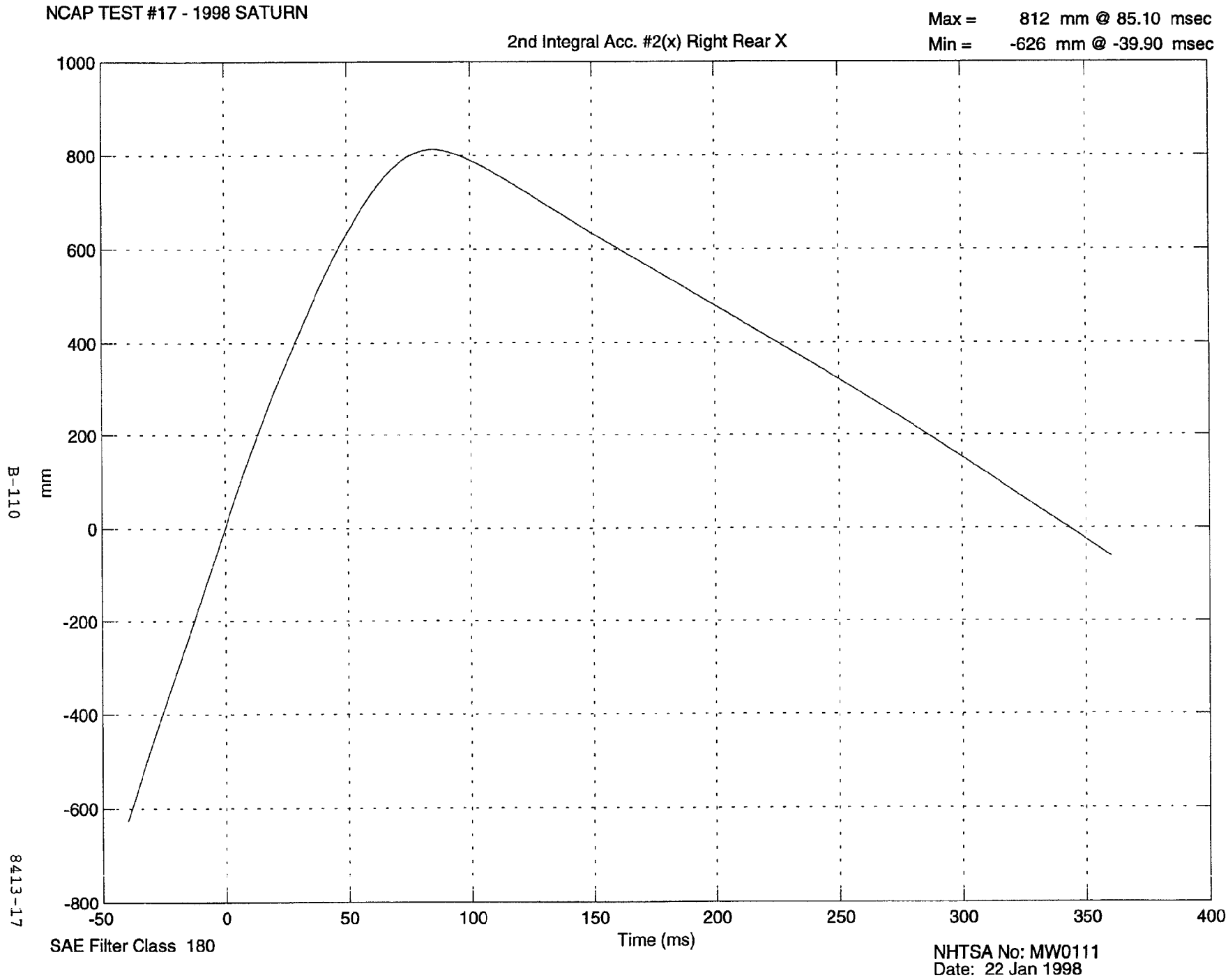
NCAP TEST #17 - 1998 SATURN
2nd Integral Acc. #2(x) Right Rear X
Max = 812 mm @ 85.10 msec
Min = -626 mm @ -39.90 msec
1000
800
600
400
200
0
-200
-400
-600
-800
mm
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998
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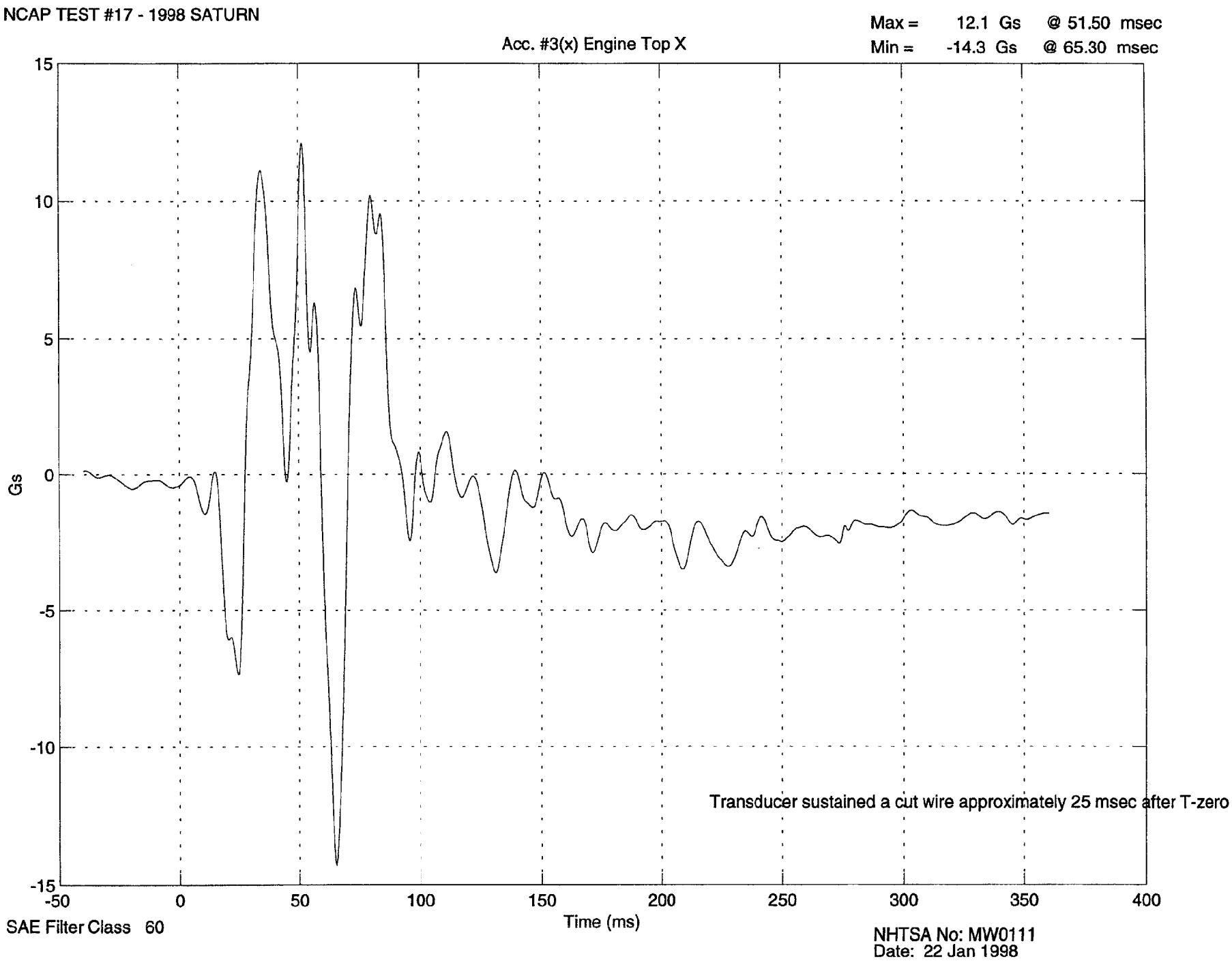
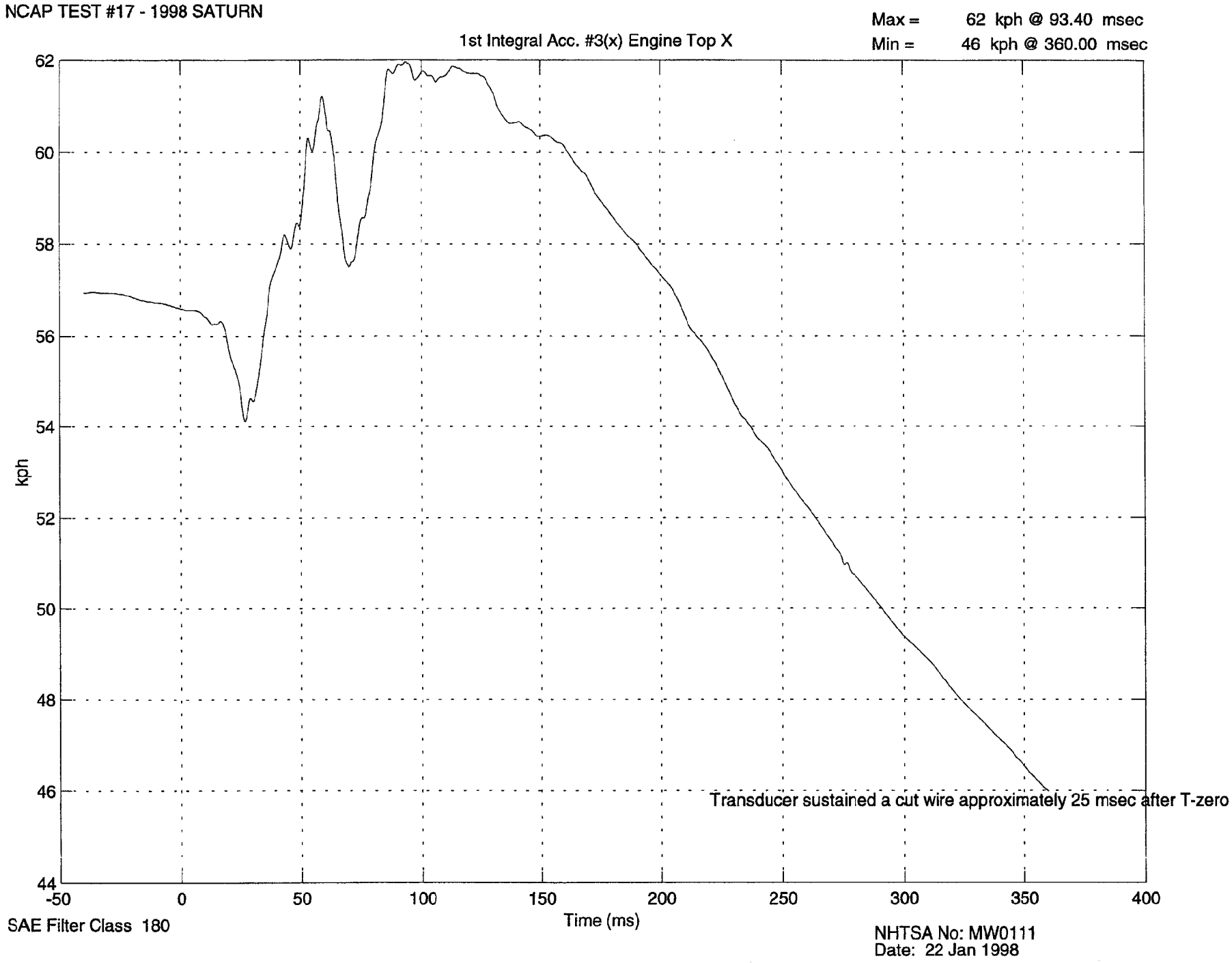
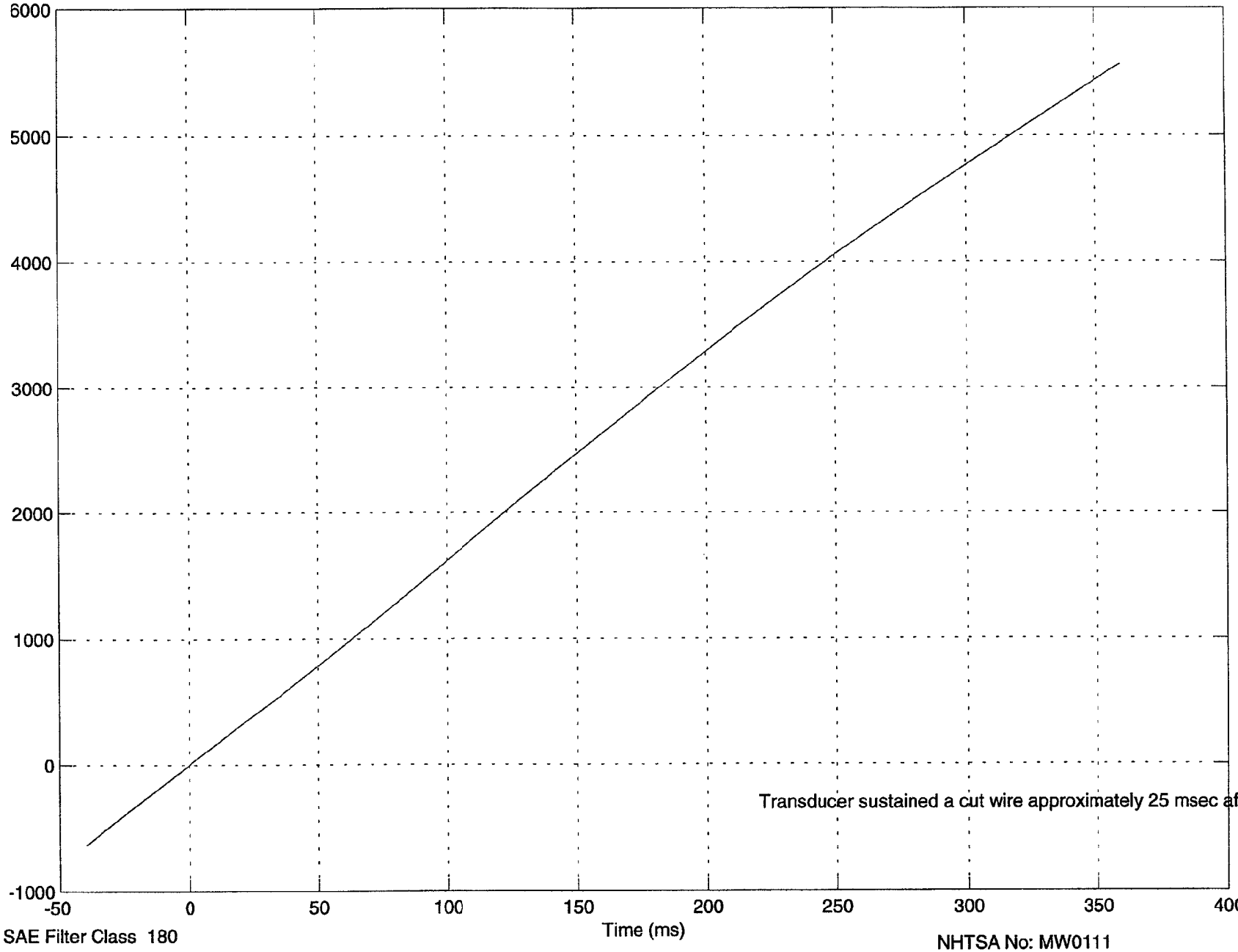

NCAP TEST #17 - 1998 SATURN
Acc. #3(x) Engine Top X
Max = 12.1 Gs @ 51.50 msec
Min = -14.3 Gs @ 65.30 msec
Gs
15
10
5
0
-5
-10
-15
-50
0
50
100
150
200
250
300
350
400
Time (ms)
Transducer sustained a cut wire approximately 25 msec after T-zero
SAE Filter Class 60
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
1st Integral Acc. #3(x) Engine Top X
Max = 62 kph @ 93.40 msec
Min = 46 kph @ 360.00 msec
62
60
58
56
54
52
50
48
46
44
kph
-50
0
50
100
150
200
250
300
350
400
Time (ms)
Transducer sustained a cut wire approximately 25 msec after T-zero
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998

NCAP TEST #17 - 1998 SATURN

Max = 5.56e+003 mm @ 360.00 msec
Min = -630 mm @ -39.90 msec



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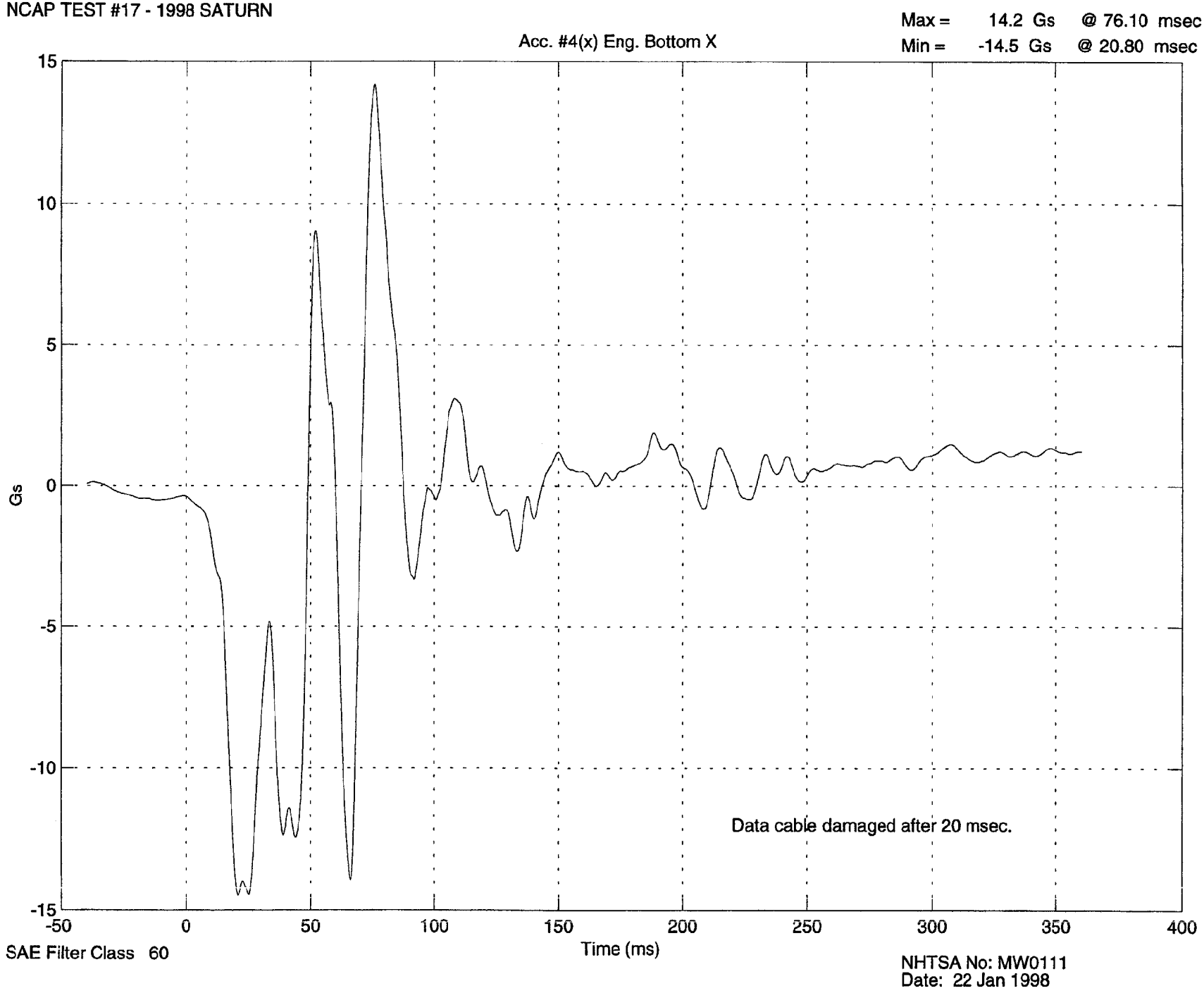
SAE Filter Class 180

NHTSA No: MW0111
Date: 22 Jan 1998

NCAP TEST #17 - 1998 SATURN



SAE Filter Class 60

NHTSA No: MW0111
Date: 22 Jan 1998

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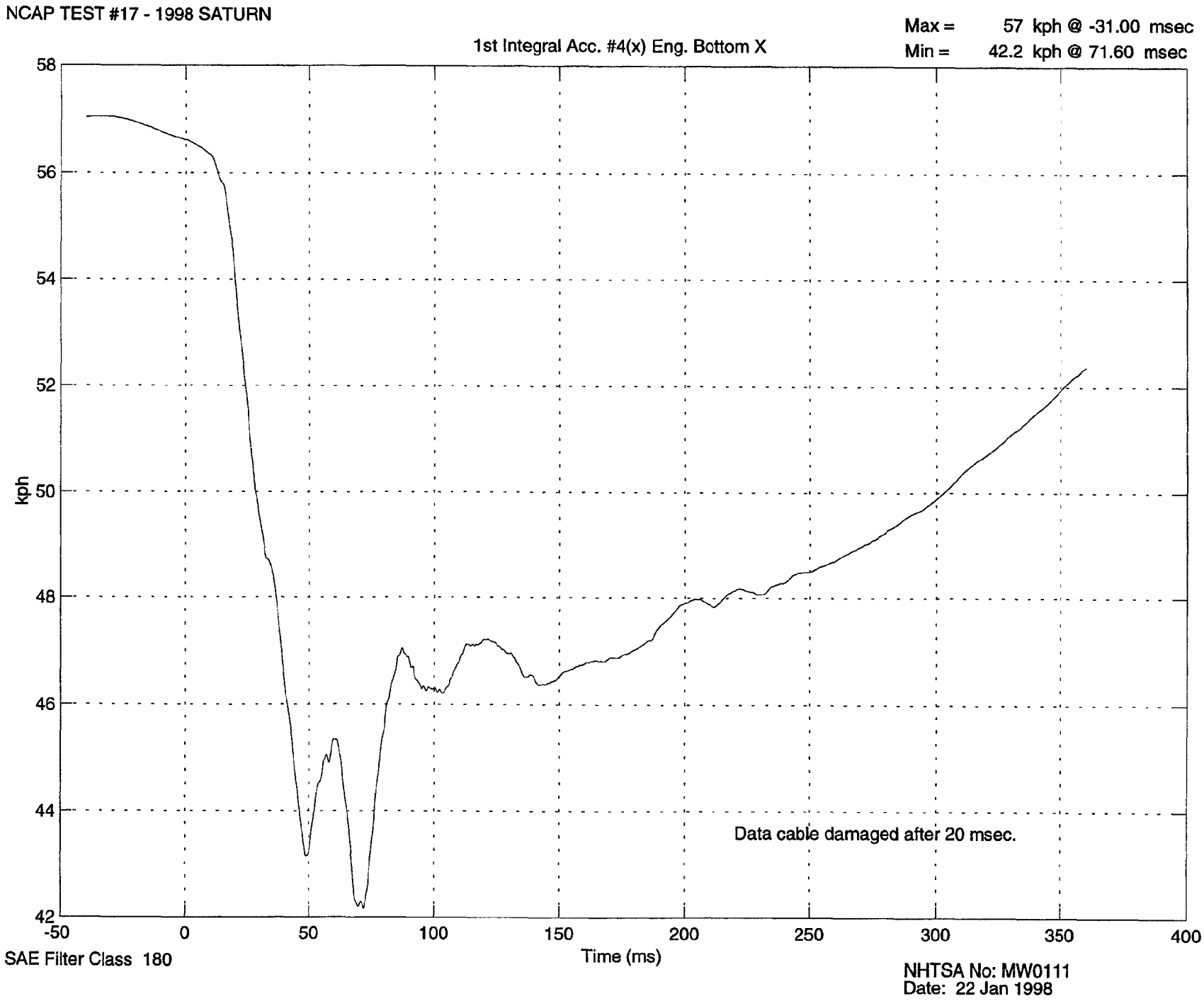
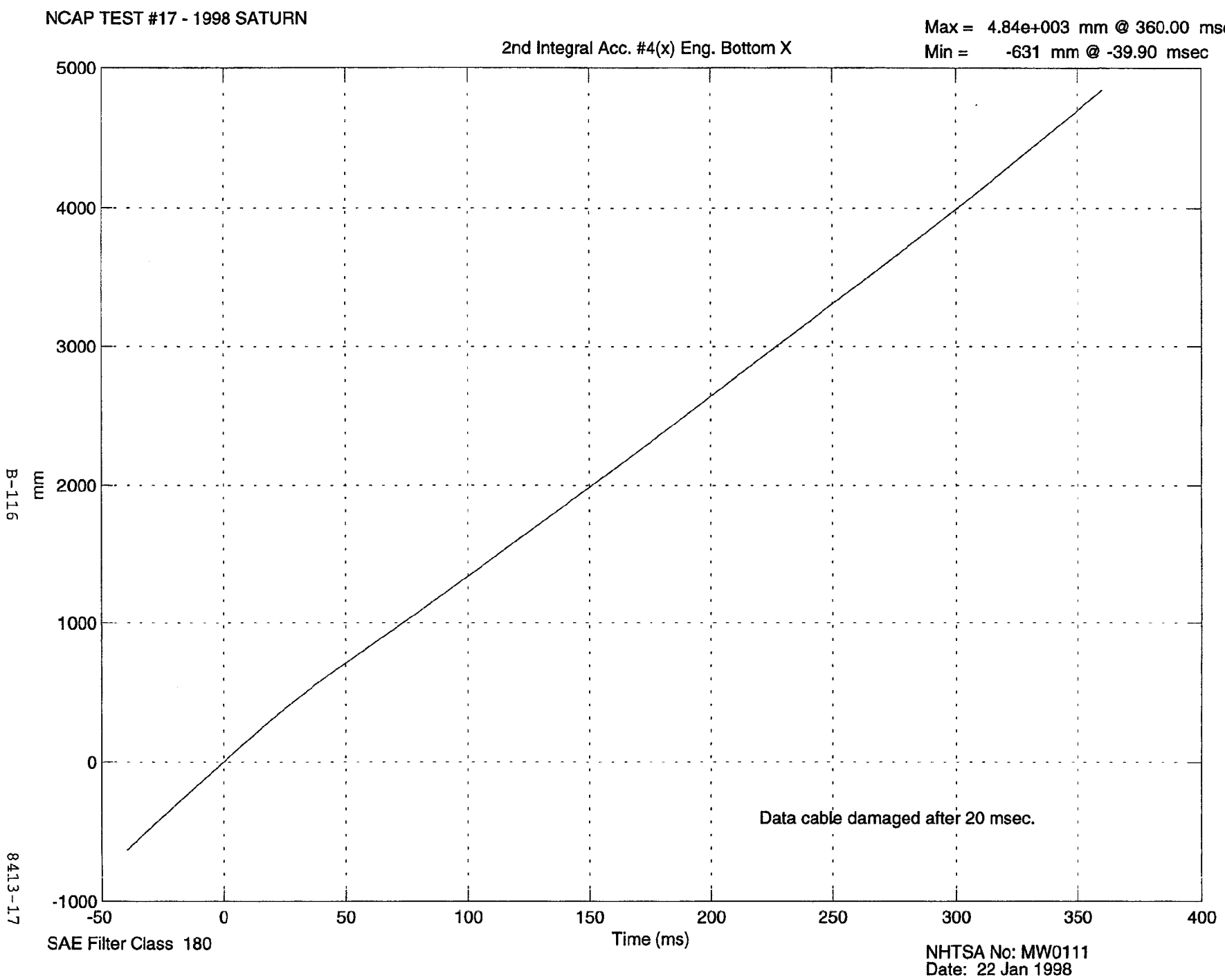

NCAP TEST #17 - 1998 SATURN
1st Integral Acc. #4(x) Eng. Bottom X
Max = 57 kph @ -31.00 msec
Min = 42.2 kph @ 71.60 msec
kph
Time (ms)
Data cable damaged after 20 msec.
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998

NCAP TEST #17 - 1998 SATURN



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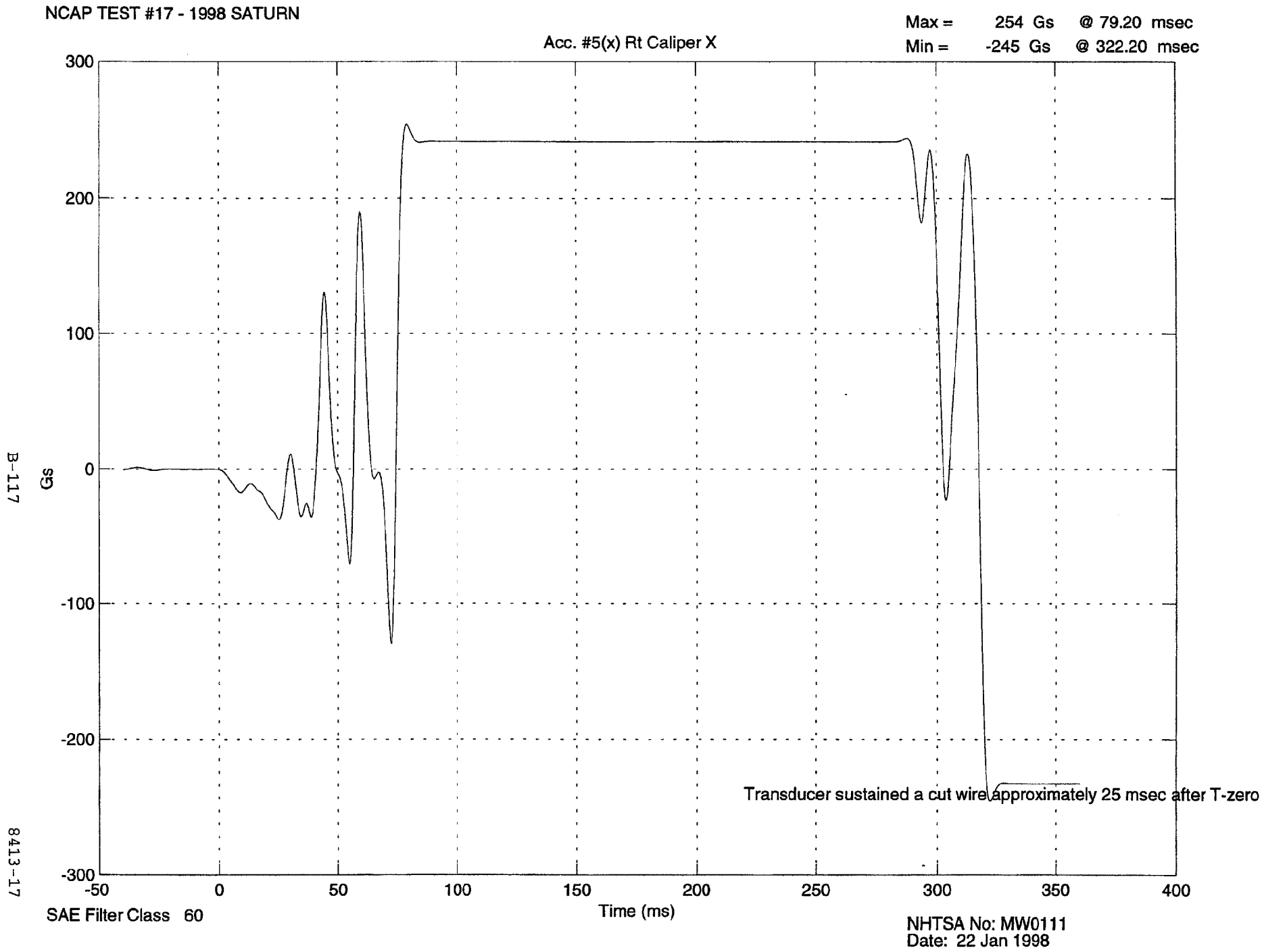
NCAP TEST #17 - 1998 SATURN
Acc. #5(x) Rt Caliper X
Max = 254 Gs @ 79.20 msec
Min = -245 Gs @ 322.20 msec
300
200
100
0
-100
-200
-300
Gs
-50
0
50
100
150
200
250
300
350
400
Time (ms)
Transducer sustained a cut wire approximately 25 msec after T-zero
SAE Filter Class 60
NHTSA No: MW0111
Date: 22 Jan 1998
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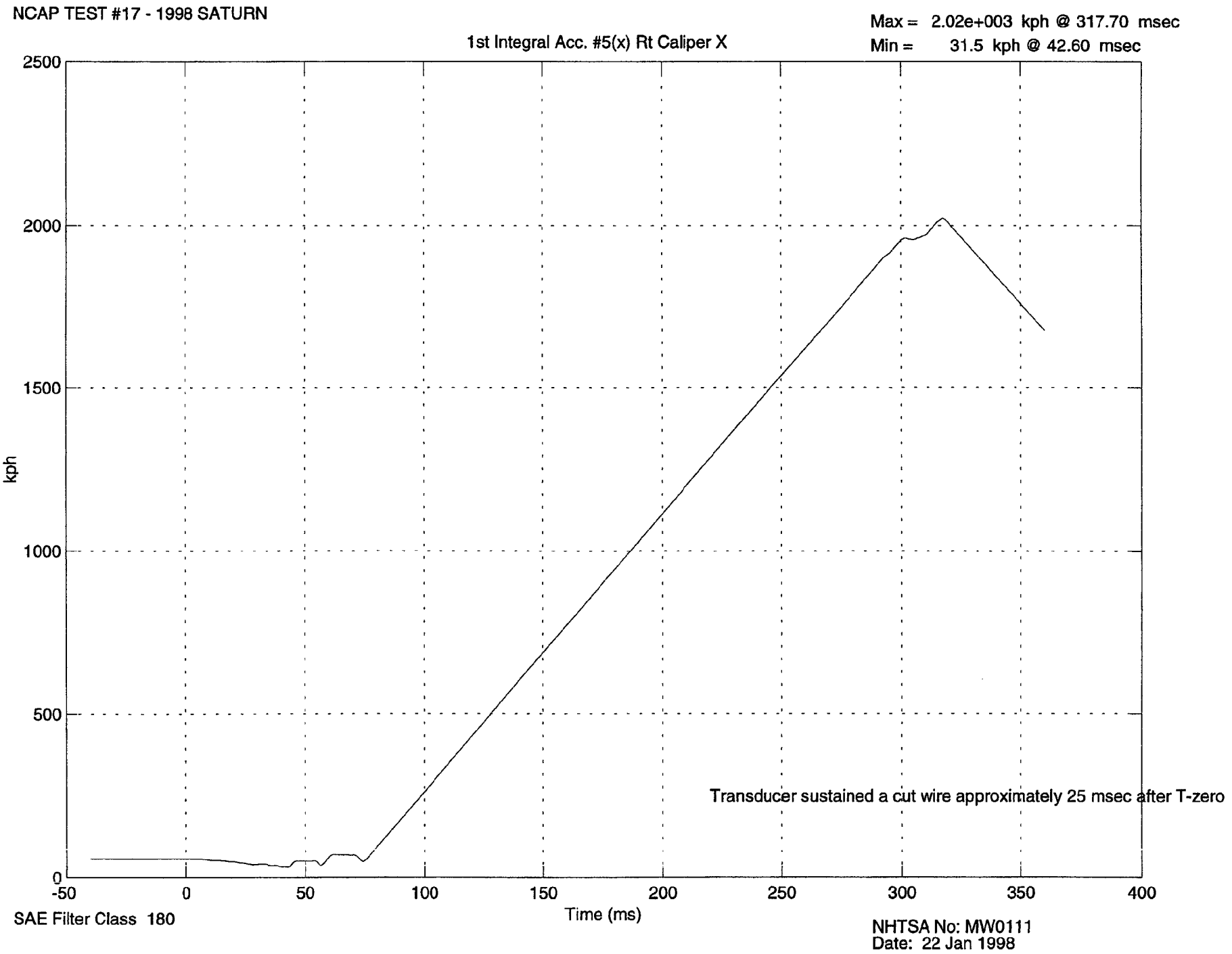
NCAP TEST #17 - 1998 SATURN
1st Integral Acc. #5(x) Rt Caliper X
Max = 2.02e+003 kph @ 317.70 msec
Min = 31.5 kph @ 42.60 msec
2500
2000
1500
1000
500
0
kph
-50
0
50
100
150
200
250
300
350
400
Time (ms)
Transducer sustained a cut wire approximately 25 msec after T-zero
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998
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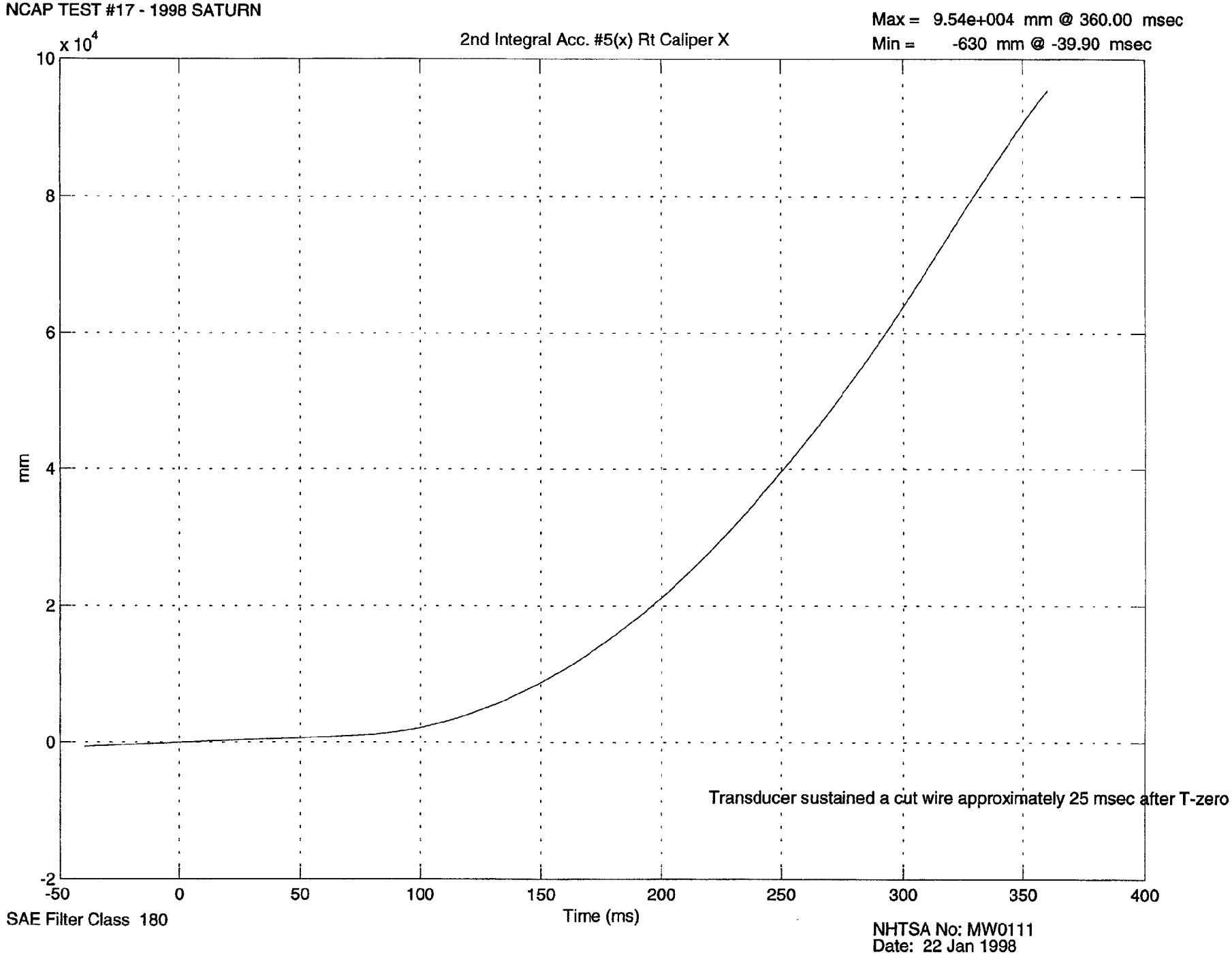
NCAP TEST #17 - 1998 SATURN



SAE Filter Class 180

NHTSA No: MW0111
Date: 22 Jan 1998

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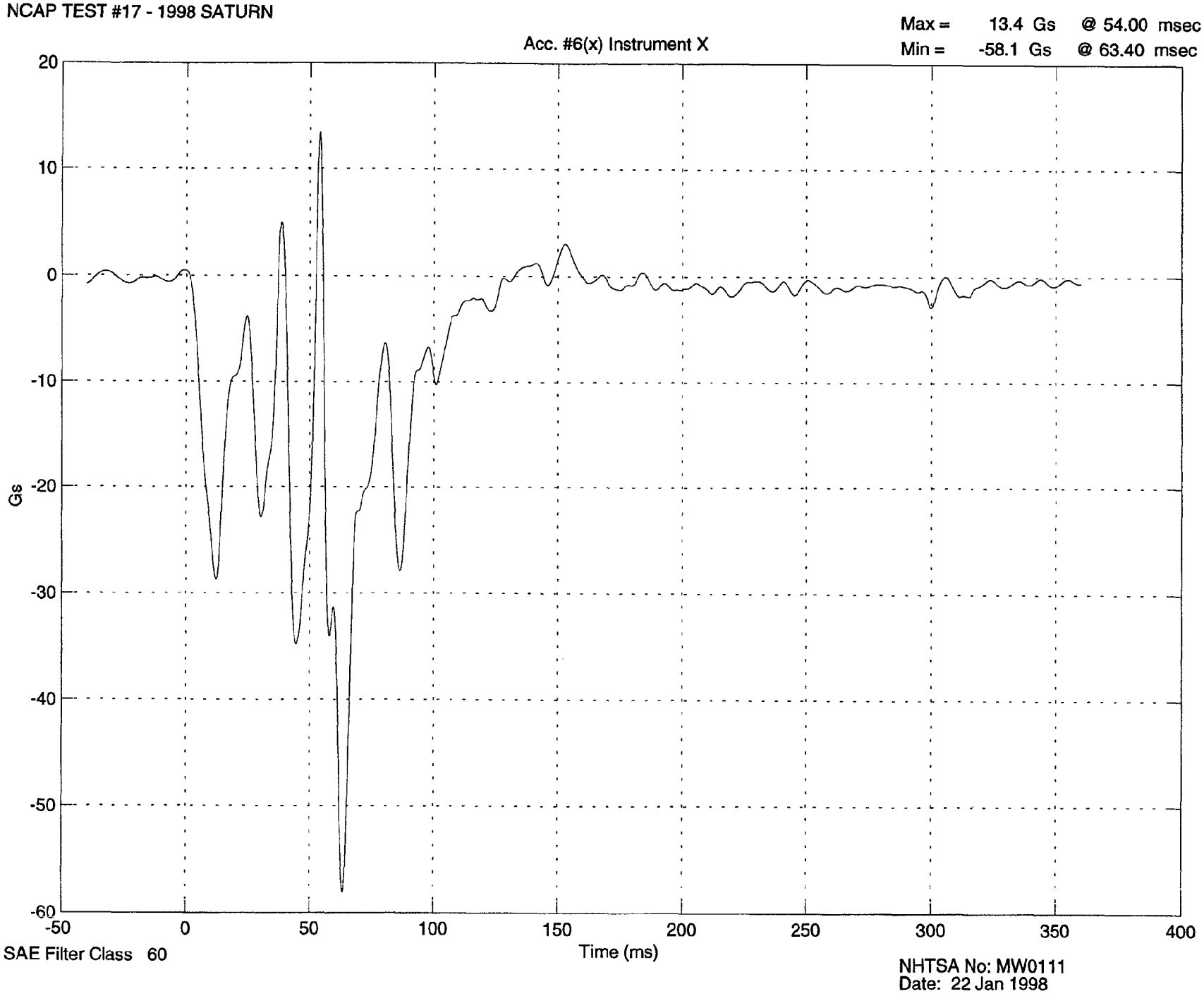
NCAP TEST #17 - 1998 SATURN
Acc. #6(x) Instrument X
Max = 13.4 Gs @ 54.00 msec
Min = -58.1 Gs @ 63.40 msec
Gs
Time (ms)
SAE Filter Class 60
NHTSA No: MW0111
Date: 22 Jan 1998
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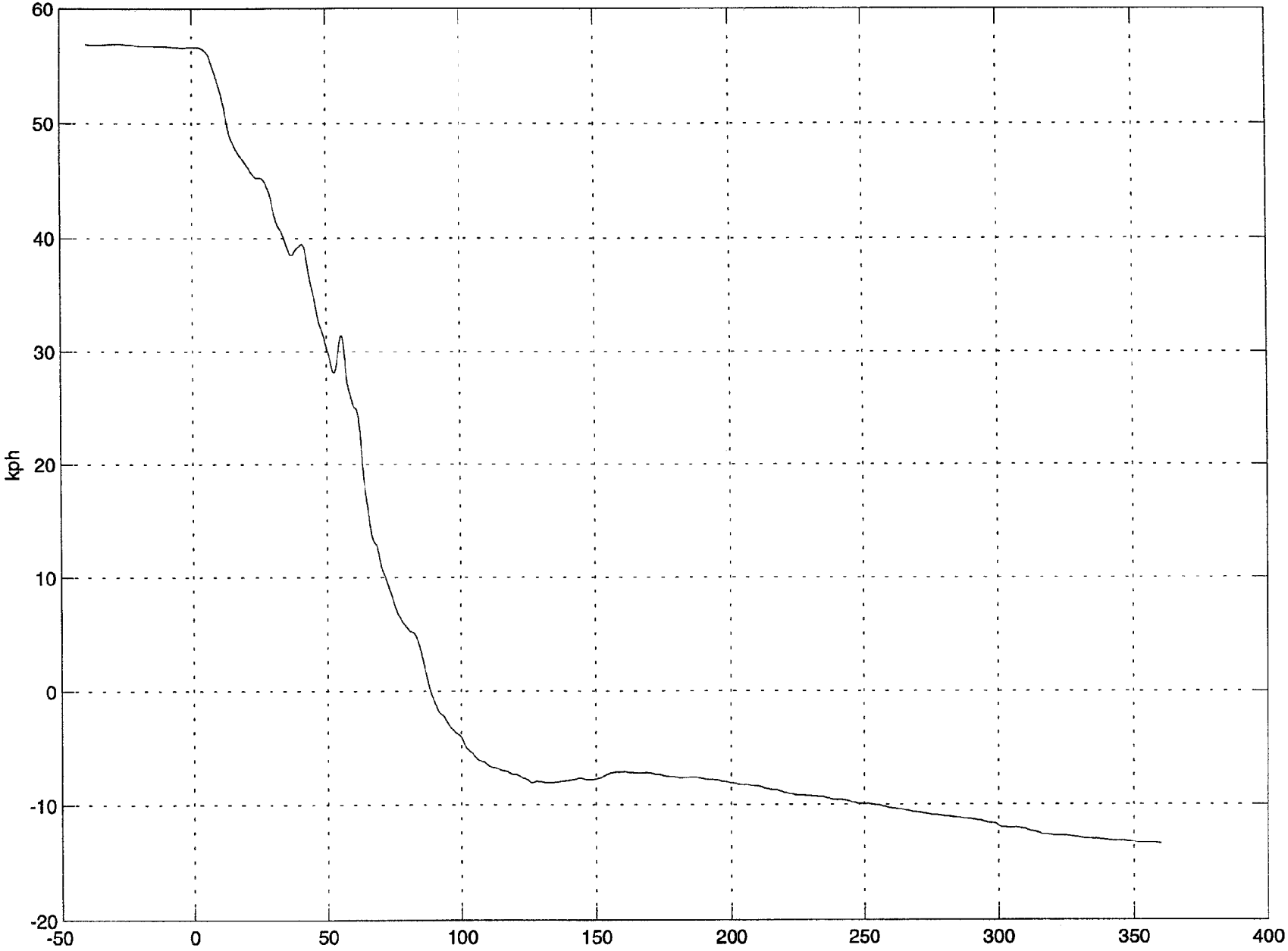
NCAP TEST #17 - 1998 SATURN

1st Integral Acc. #6(x) Instrument X

Max = 56.9 kph @ -28.40 msec
Min = -13.4 kph @ 360.00 msec



SAE Filter Class 180

NHTSA No: MW0111
Date: 22 Jan 1998

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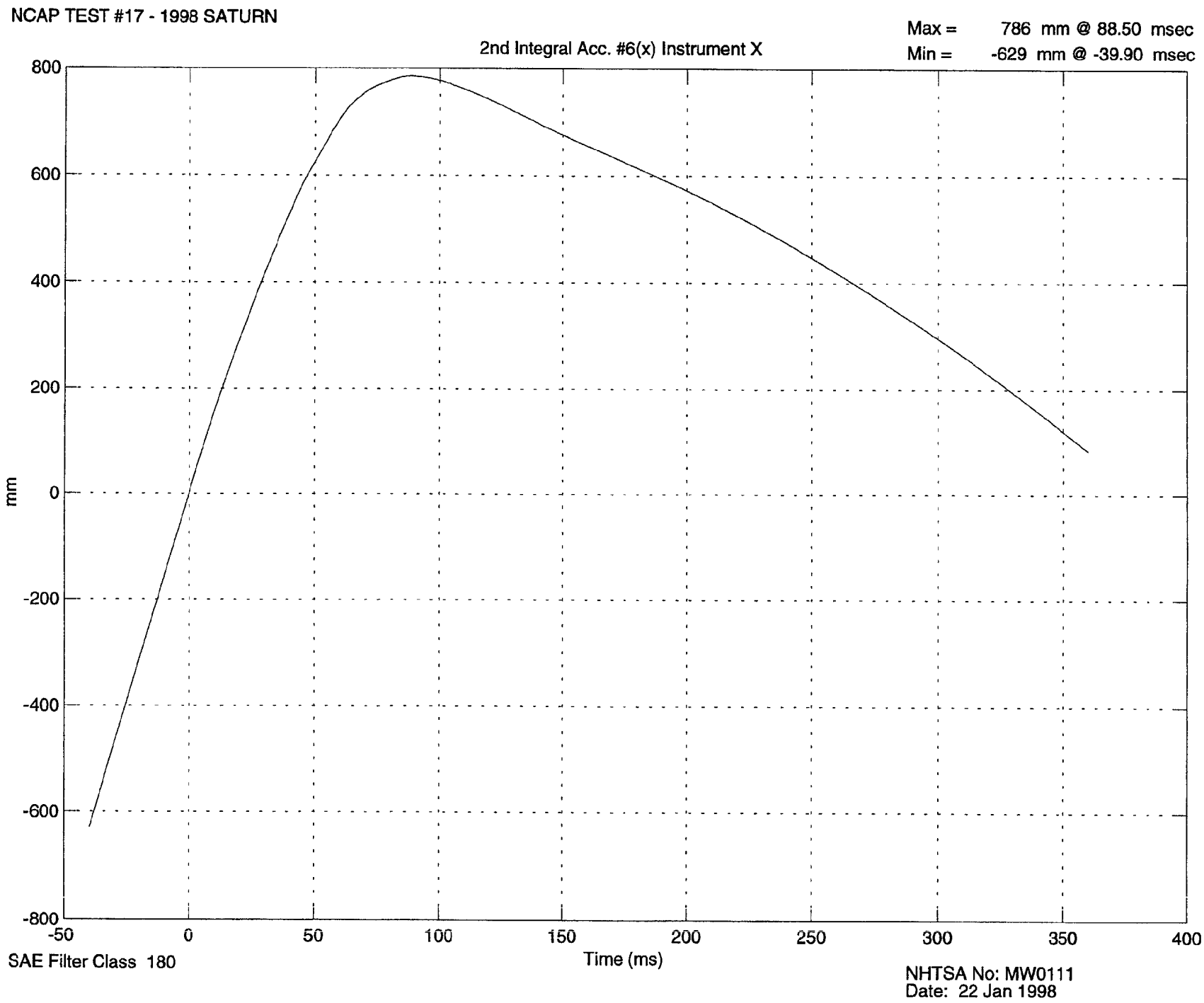
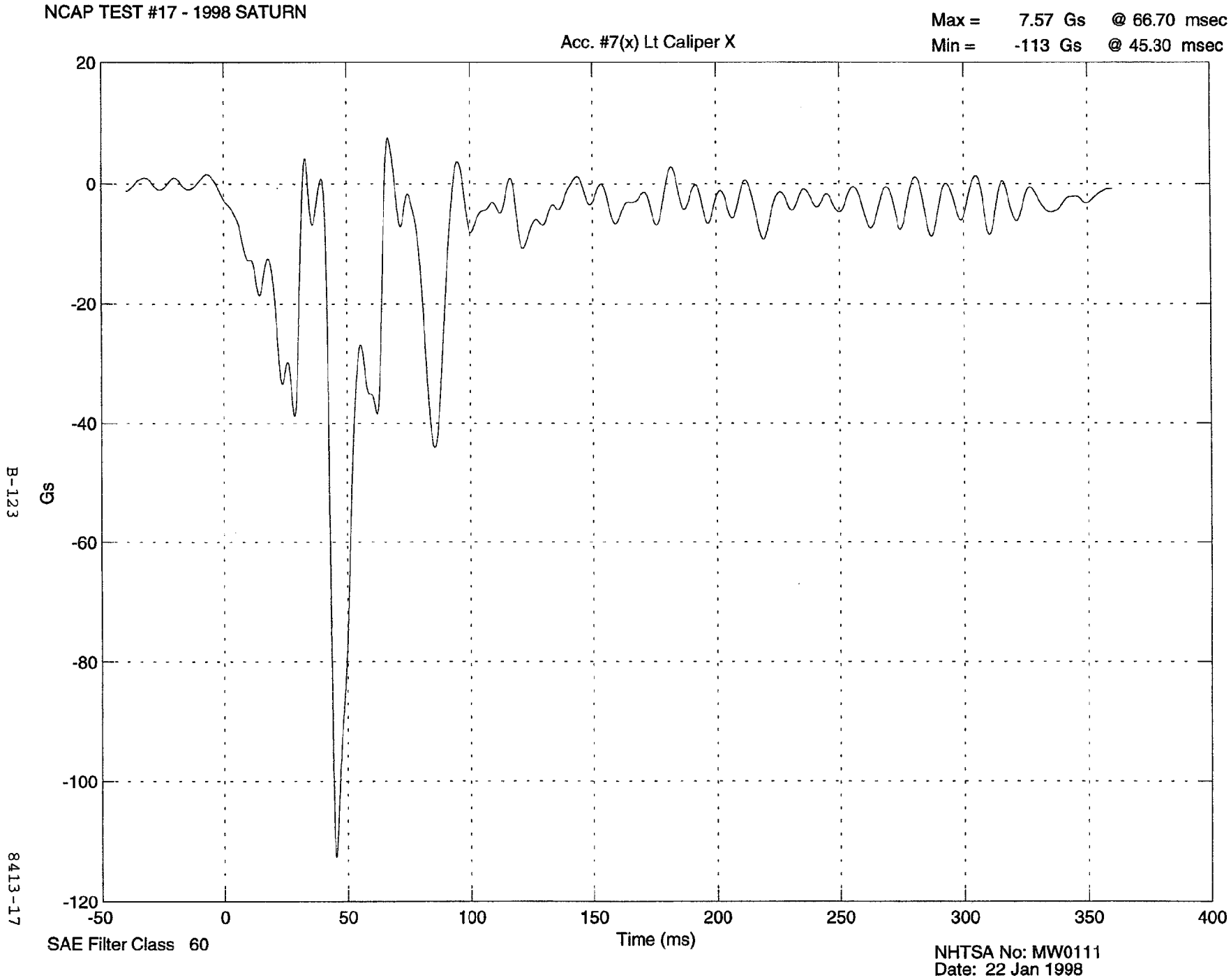
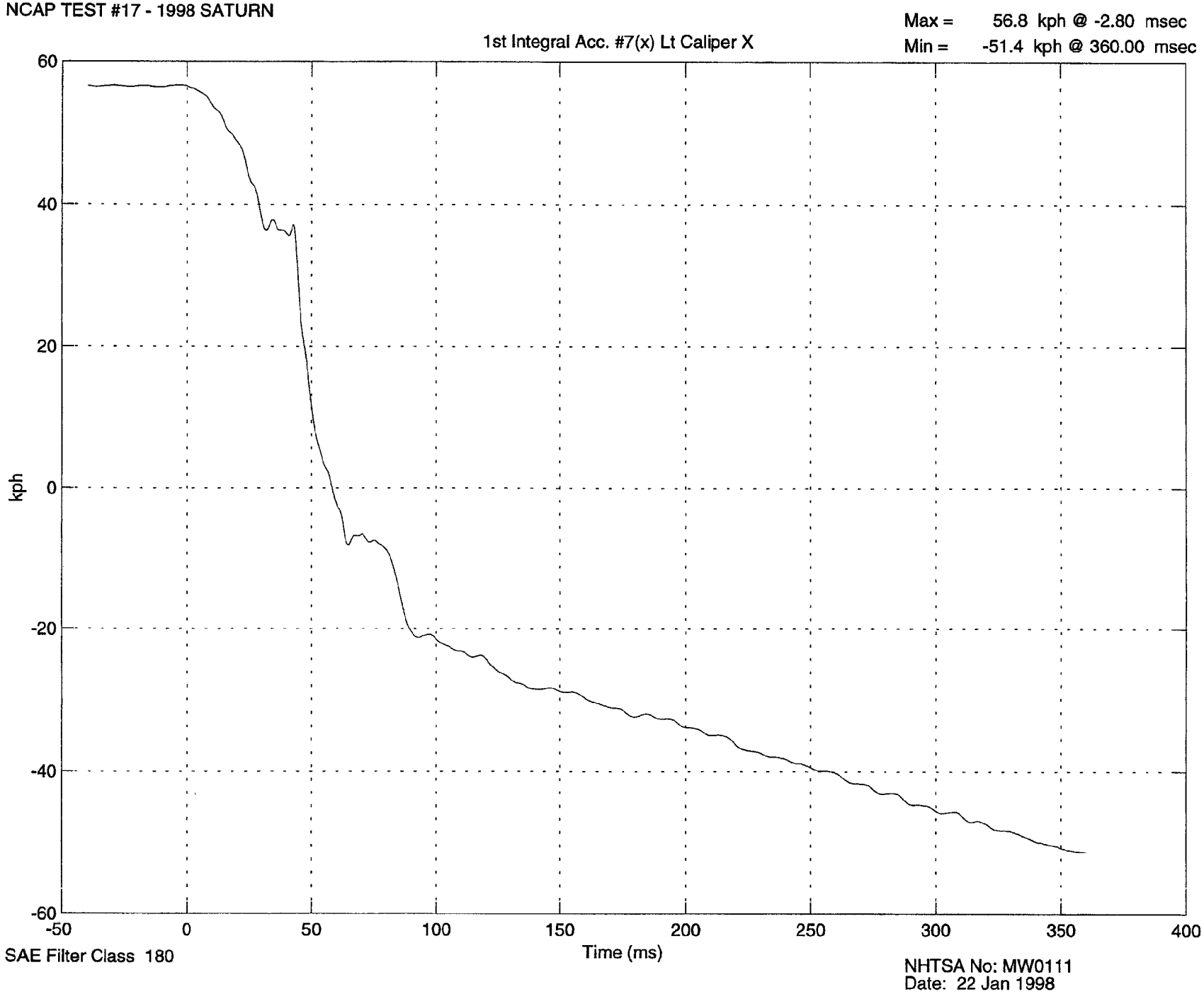
8413-17


NCAP TEST #17 - 1998 SATURN
2nd Integral Acc. #6(x) Instrument X
Max = 786 mm @ 88.50 msec
Min = -629 mm @ -39.90 msec
800
600
400
200
0
-200
-400
-600
-800
mm
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Acc. #7(x) Lt Caliper X
Max = 7.57 Gs @ 66.70 msec
Min = -113 Gs @ 45.30 msec
20
0
-20
-40
-60
-80
-100
-120
Gs
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 60
NHTSA No: MW0111
Date: 22 Jan 1998
B-123
8413-17

NCAP TEST #17 - 1998 SATURN



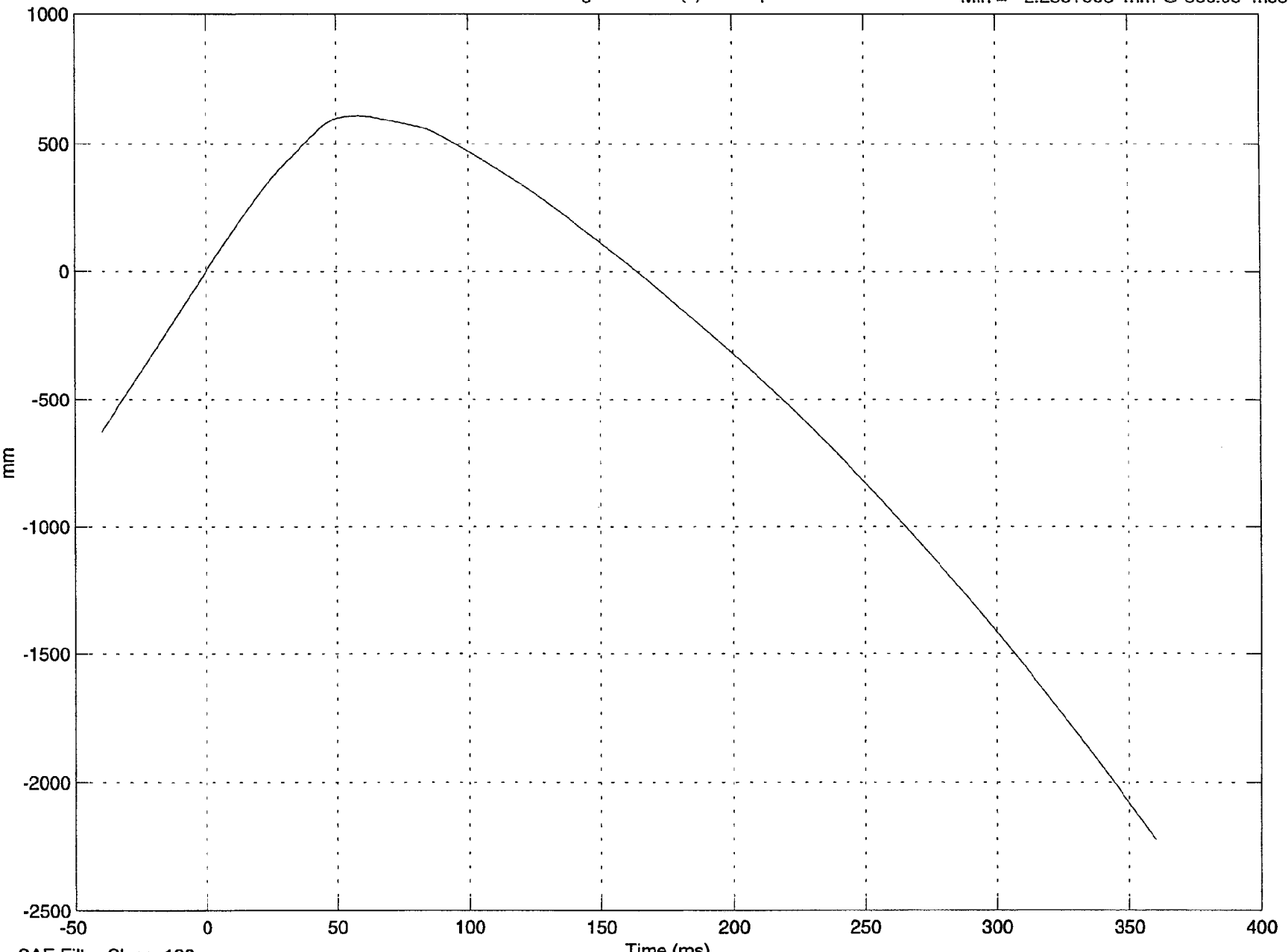
SAE Filter Class 180

NHTSA No: MW0111
Date: 22 Jan 1998

NCAP TEST #17 - 1998 SATURN

2nd Integral Acc. #7(x) Lt Caliper X

Max = 609 mm @ 58.20 msec
Min = -2.23e+003 mm @ 360.00 msec



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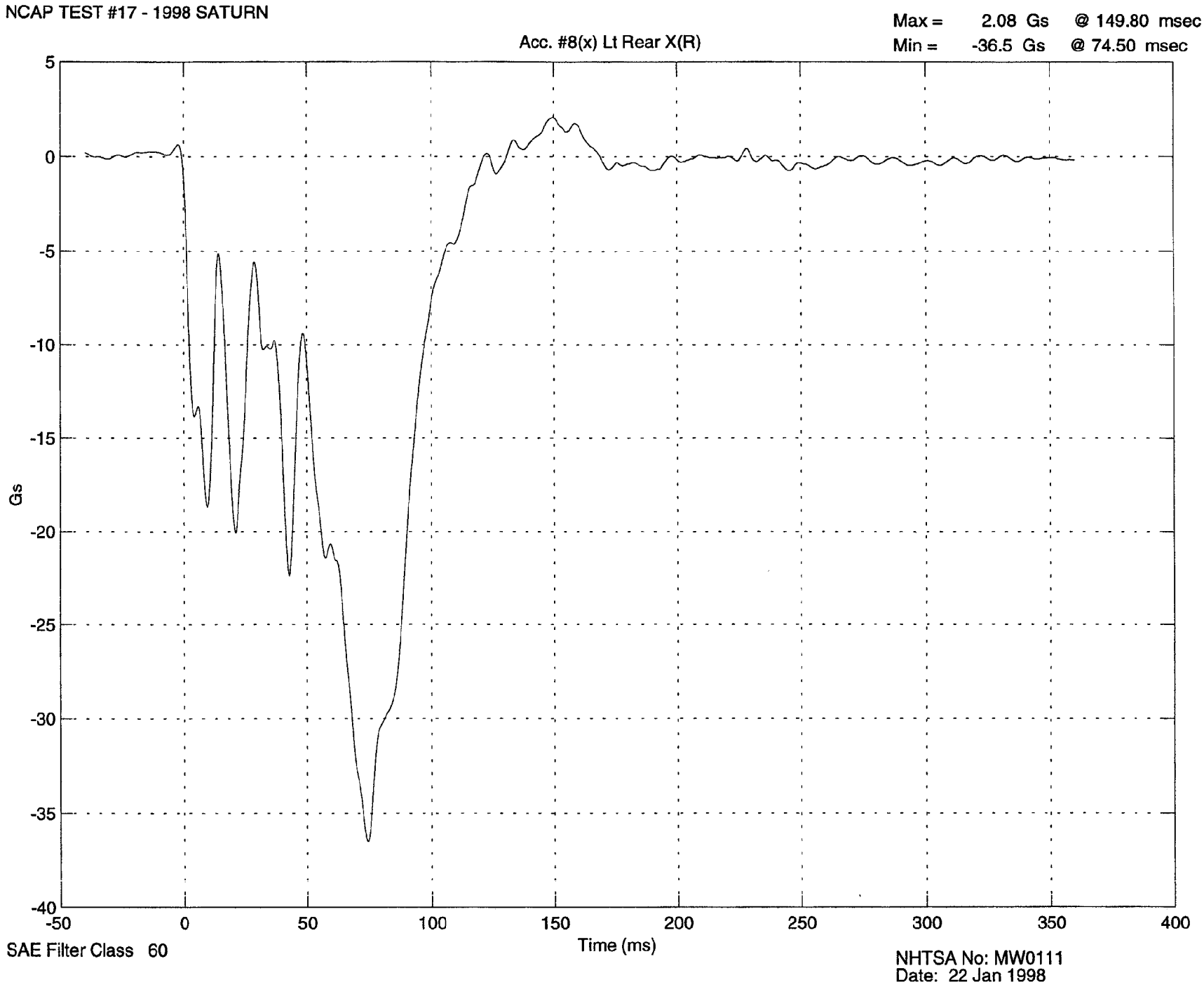
SAE Filter Class 180

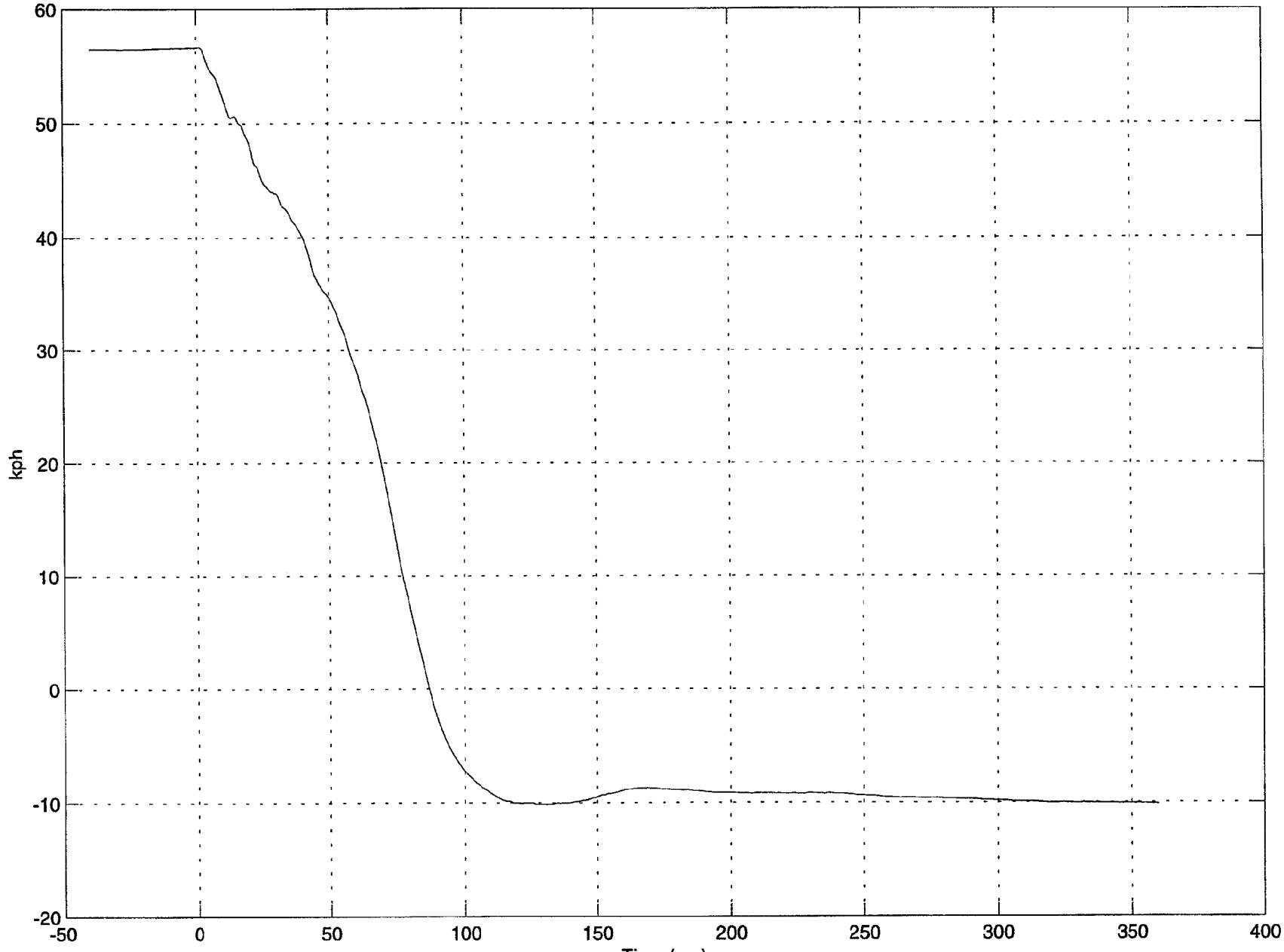
NHTSA No: MW0111
Date: 22 Jan 1998


NCAP TEST #17 - 1998 SATURN
Acc. #8(x) Lt Rear X(R)
Max = 2.08 Gs @ 149.80 msec
Min = -36.5 Gs @ 74.50 msec
5
0
-5
-10
-15
-20
-25
-30
-35
-40
Gs
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 60
NHTSA No: MW0111
Date: 22 Jan 1998

NCAP TEST #17 - 1998 SATURN

1st Integral Acc. #8(x) Lt Rear X(R)

Max = 56.6 kph @ 1.00 msec
Min = -10.2 kph @ 131.30 msec



SAE Filter Class 180

NHTSA No: MW0111
Date: 22 Jan 1998

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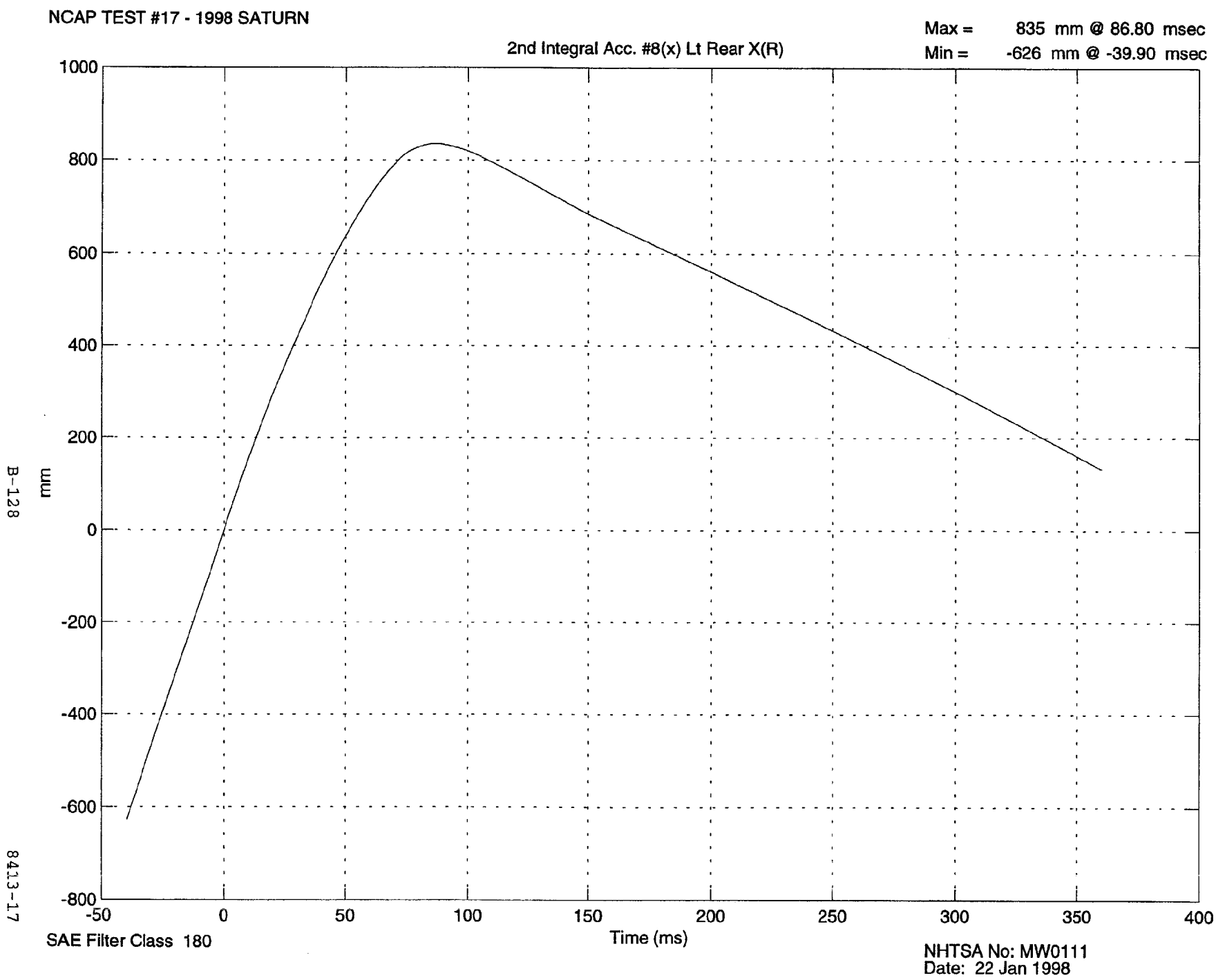
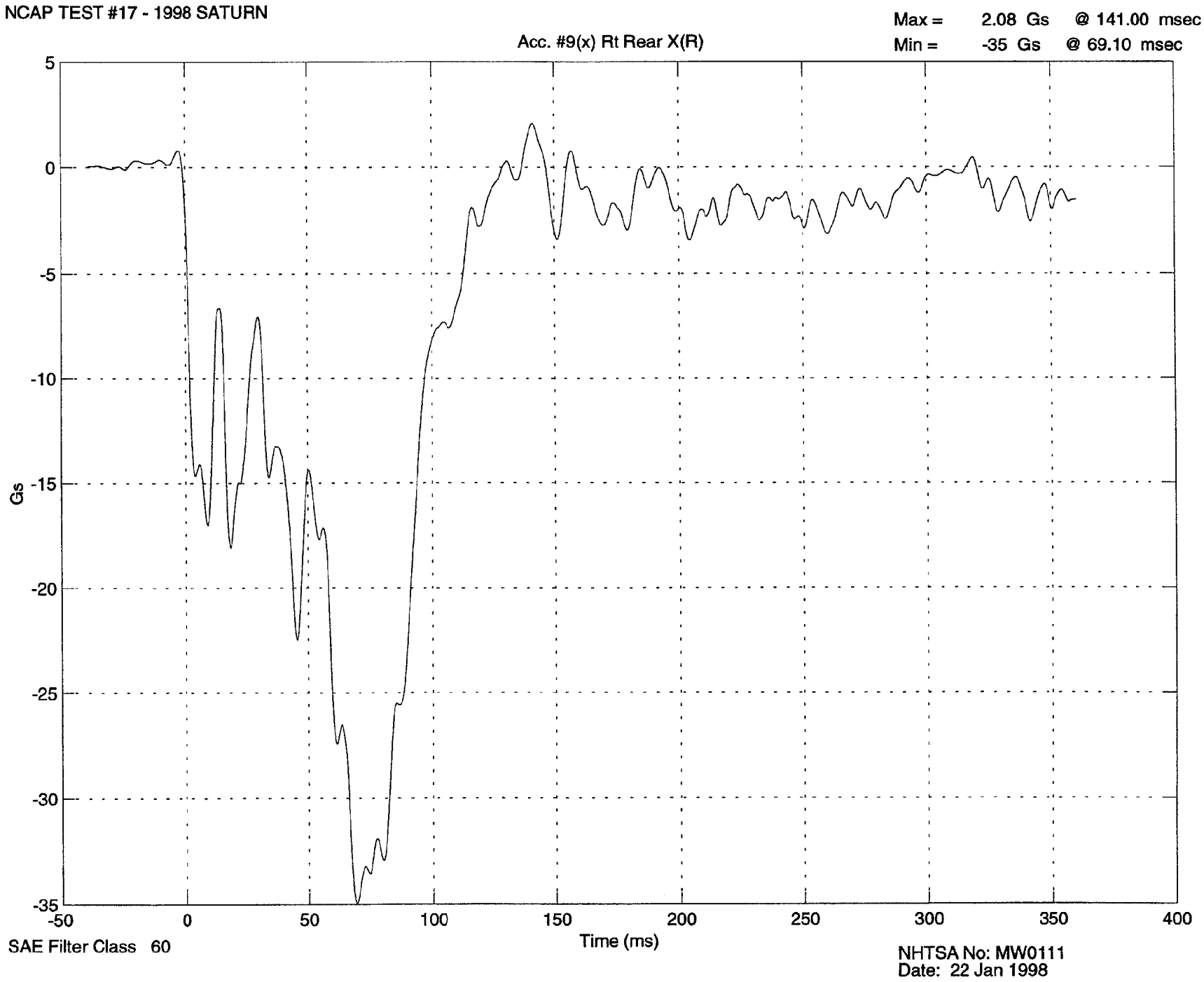

NCAP TEST #17 - 1998 SATURN
2nd Integral Acc. #8(x) Lt Rear X(R)
Max = 835 mm @ 86.80 msec
Min = -626 mm @ -39.90 msec
1000
800
600
400
200
0
-200
-400
-600
-800
mm
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 180
NHTSA No: MW0111
Date: 22 Jan 1998
B-128
8413-17

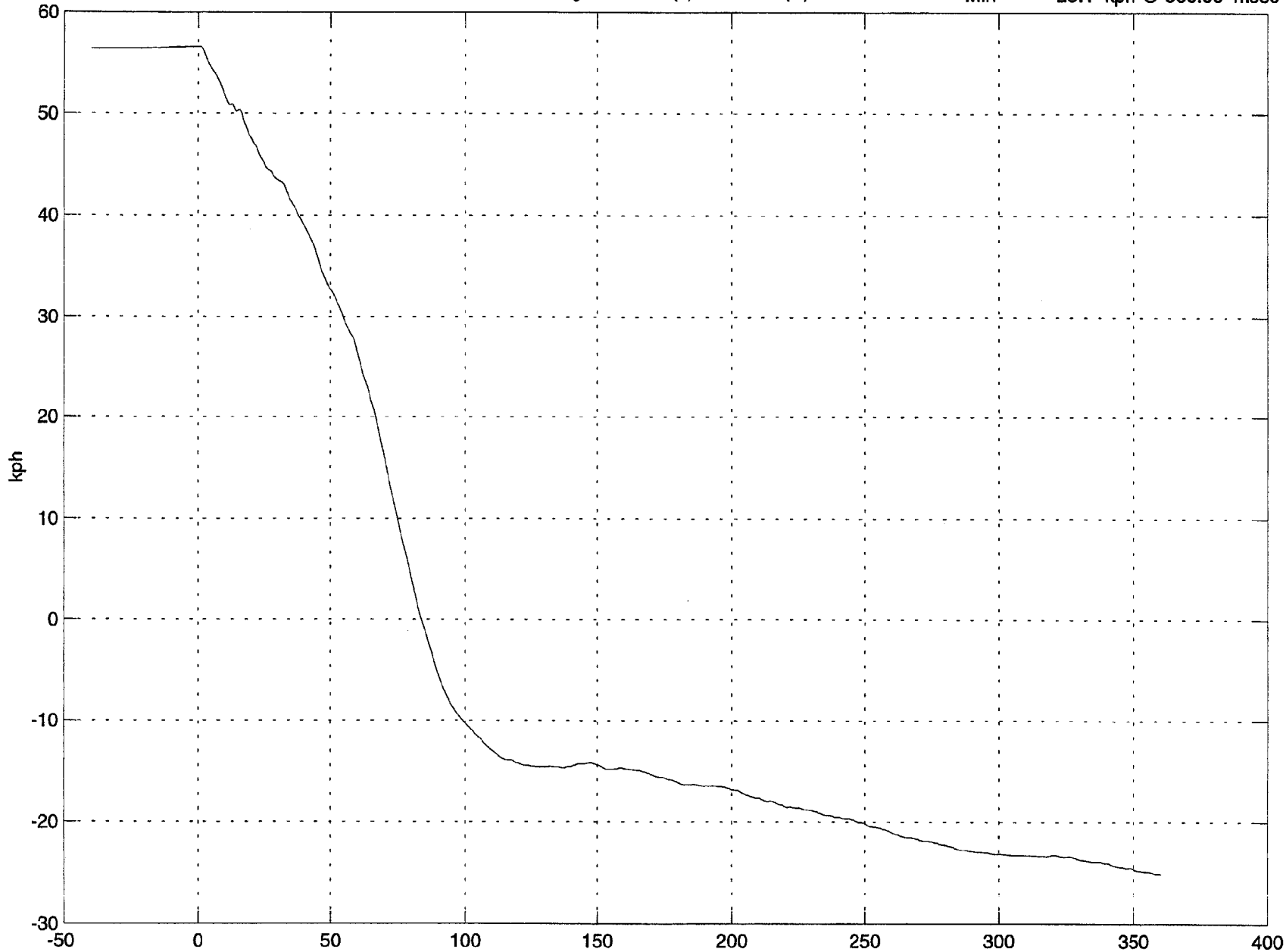

NCAP TEST #17 - 1998 SATURN
Acc. #9(x) Rt Rear X(R)
Max = 2.08 Gs @ 141.00 msec
Min = -35 Gs @ 69.10 msec
Gs
Time (ms)
SAE Filter Class 60
NHTSA No: MW0111
Date: 22 Jan 1998

8413-17

NCAP TEST #17 - 1998 SATURN

1st Integral Acc. #9(x) Rt Rear X(R)

Max = 56.6 kph @ 0.70 msec
Min = -25.1 kph @ 360.00 msec



SAE Filter Class 180

NHTSA No: MW0111
Date: 22 Jan 1998

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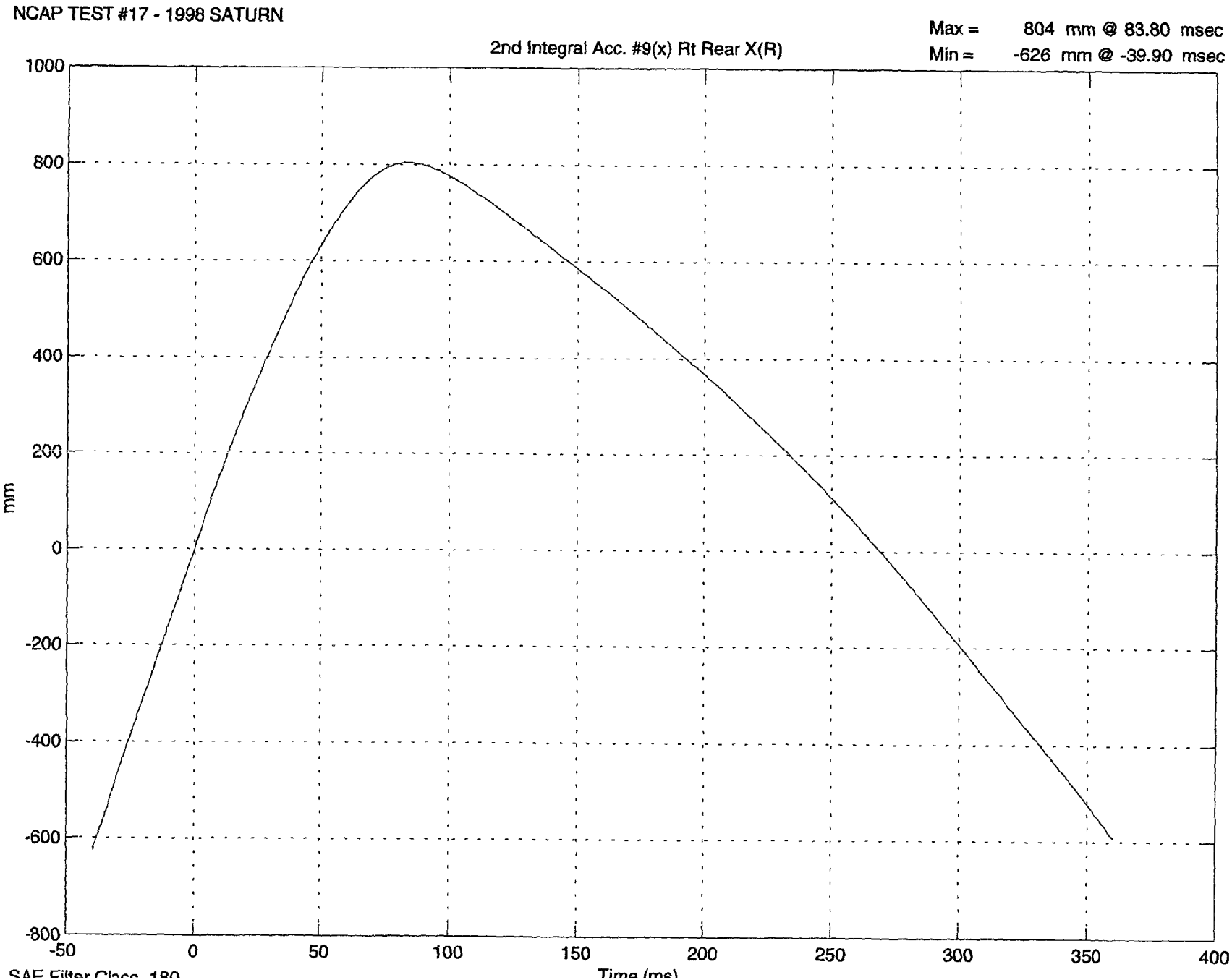
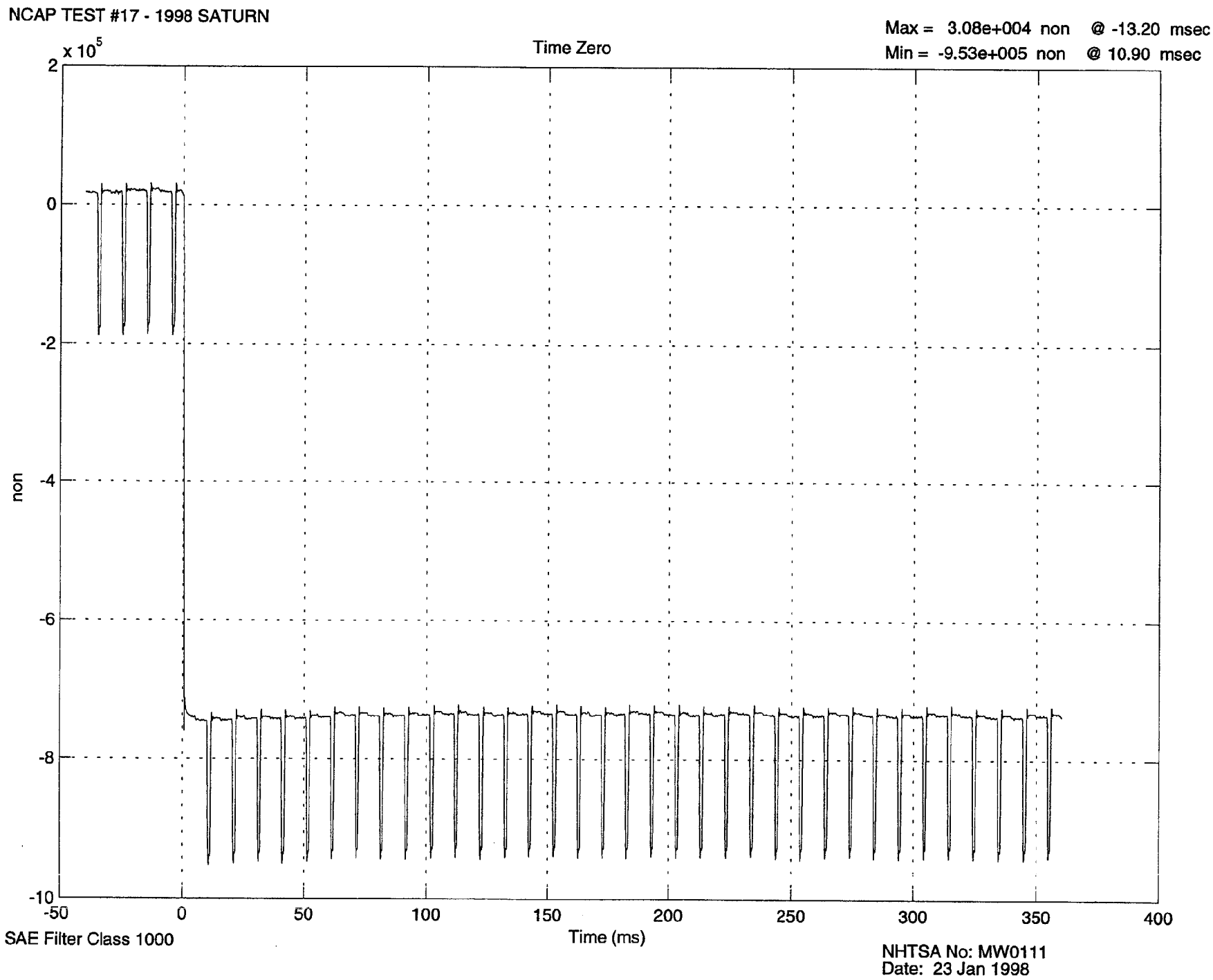
8413-17


NCAP TEST #17 - 1998 SATURN
2nd Integral Acc. #9(x) Rt Rear X(R)
Max = 804 mm @ 83.80 msec
Min = -626 mm @ -39.90 msec
mm
Time (ms)
1000
800
600
400
200
0
-200
-400
-600
-800
-50
0
50
100
150
200
250
300
350
400

8413-17


NCAP TEST #17 - 1998 SATURN
Max = 3.08e+004 non @ -13.20 msec
Min = -9.53e+005 non @ 10.90 msec
Time Zero
x 10^5
2
0
-2
-4
-6
-8
-10
non
-50
0
50
100
150
200
250
300
350
400
Time (ms)
SAE Filter Class 1000
NHTSA No: MW0111
Date: 23 Jan 1998

Appendix C

PART 572B/E DUMMY CONFIGURATION

AND PERFORMANCE VERIFICATION DATA SHEETS

Appendix C contains the results from certification tests performed on the 50th percentile male anthropomorphic test devices utilized for this crash test. The results indicate that the dummies meet all of the performance requirements of the six standard tests as specified in 49 CFR Part 572, Federal Register, Volume 42, No. 25, dated February 7, 1977.

The tests were conducted at the Dummy Certification Test Facility of Calspan SRL Corporation. A summary of the test results, and Part 572 specifications are included in this Appendix.

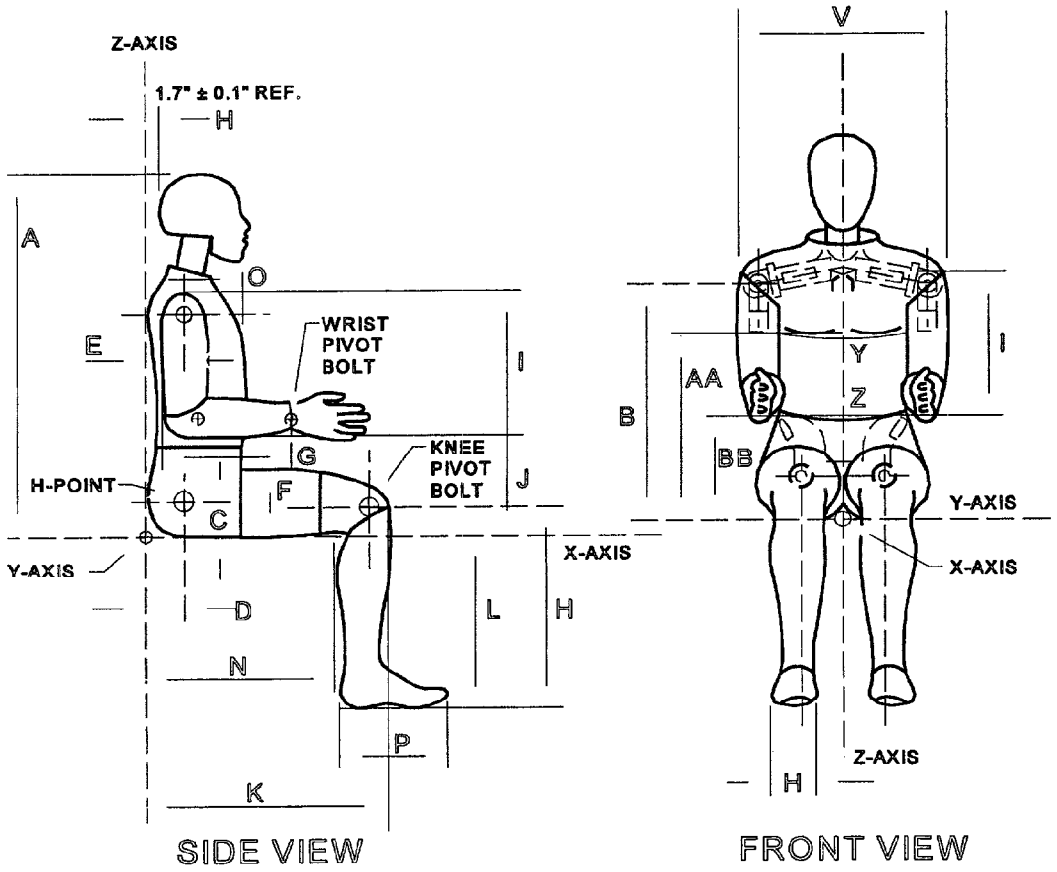
Dummy serial numbers and certification dates are:

Position No./Location	Serial No.	Completion Date
#1/Driver	061	1/19/98
#2/Right Front Passenger	150	12/1/97

Electronic Test Equipment

The complement of signal conditioning, recording and display equipment, in conjunction with dummy certification testing, can be found in New Car Assessment and Standards Indicant Testing Final Report No. 6525-V-1.

EXTERNAL DIMENSIONS SPECIFICATIONS



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. (REF: S572.31(A)(6))

PART 572E
HEAD DROP TEST

Dummy Serial Number	061
Calspan Sequential Test Number	1
Date	01/16/98
Workfile	061198.hdp

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	66-78 Deg F	70
Relative Humidity	10% - 70%	34
Peak Resultant Acceleration	225-275 G's	259.7
Peak Lateral Acceleration	15 G's Max	11.4
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
NECK FLEXION TEST

Dummy Serial Number	061
Calspan Sequential Test Number	1
Date	01/19/98
Workfile	061198.nfl

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70
Relative Humidity		10% - 70%	40
Impact Velocity		22.60 - 23.40 Ft/s	23.00
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	23.40
	20 ms	17.60 - 22.60 G's	19.94
	30 ms	12.50 - 18.50 G's	16.46
Max Pendulum G's Above 30 ms		29 G's Max	16.46
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	42.00
D Plane Rotation	Max	64 - 78 Deg	66.51
	Time	57 - 64 ms	57.75
Moment About Occipital Condyle	Max	65 - 80 Ft-Lbs	65.10
	Time	47 - 58 ms	54.13
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	119.25
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	98.63

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	061
Calspan Sequential Test Number	1
Date	01/19/98
Workfile	061198.nex

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70
Relative Humidity		10% - 70%	40
Impact Velocity		19.50 - 20.30 Ft/s	19.90
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	17.51
	20 ms	14.00 - 19.00 G's	16.23
	30 ms	11.00 - 16.00 G's	14.02
Max Pendulum G's Above 30 ms		22 G's Max	14.02
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	45.38
D Plane Rotation	Max	81 - 106 Deg	88.93
	Time	72 - 82 ms	78.00
Moment About Occipital Condyle	Max	-59.0 - -39.0 Ft-Lbs	-40.58
	Time	65 - 79 ms	71.88
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	159.38
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	137.88

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number	061
Calspan Sequential Test Number	1
Date	01/19/98
Workfile	061198.th3

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	69-72 Deg F	70
Relative Humidity	10% - 70%	40
Pendulum Velocity	21.6 - 22.4 Ft/s	21.61
Maximum Deflection	2.50 - 2.86 in	2.50
Maximum Resistive Force	1160 - 1325 Lbs	1309.04
Internal Hysteresis	69 - 85 %	71.8

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number	061
Calspan Sequential Test Number	1
Date	01/21/98
Workfile	061198

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	66 - 78 Deg F	70
Relative Humidity	10% - 70%	40
Probe Velocity	6.8 - 7.0 Ft/s	6.90
Peak Knee Impact Force	1060 - 1300 Lbs	1286.0
RIGHT KNEE		
Temperature	66 - 78 Deg F	70
Relative Humidity	10% - 70%	40
Probe Velocity	6.8 - 7.0 Ft/s	6.91
Peak Knee Impact Force	1060 - 1300 Lbs	1140.0

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 061
Calspan Sequential Test Number 1
Date 01-19-98

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			70
Relative Humidity			40
Location for Chest Circumference	AA	16.9 -17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	39.4
Waist Circumference	Z	32.9 - 34.1 in	33.5
Chest Depth	O	8.4 - 9.0 in	8.5
H-Point Height	C	3.3 - 3.5 in	3.4
H-Point from Backline	D	5.3 - 5.5 in	5.4
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Total Sitting Height	A	34.6 - 35.0 in	34.6
Thigh Clearance	F	5.5 - 6.1 in	6.1
Buttock Knee Length	K	22.8 - 23.8 in	23.2
Buttock Popliteal Length	N	17.8 - 18.8 in	18.3
Popliteal Height	L	16.9 - 17.9 in	17.7
Knee Pivot Height	M	19.1 - 19.7 in	19.4
Foot Length	P	9.9 - 10.5 in	10.1
Foot Breadth	W	3.6 - 4.2 in	3.8
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.5
Shoulder Breadth	V	16.6 - 17.2 in	16.8
Shoulder Pivot Height	B	19.9 - 20.5 in	20.1
Elbow Rest Height	J	7.5 - 8.3 in	7.7
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.4
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.6

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
HEAD DROP TEST

Dummy Serial Number	150
Calspan Sequential Test Number	7
Date	11/25/97
Workfile	150797.hdp

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	66-78 Deg F	70
Relative Humidity	10% - 70%	50
Peak Resultant Acceleration	225-275 G's	225.4
Peak Lateral Acceleration	15 G's Max	3.1
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
NECK FLEXION TEST

Dummy Serial Number	150
Calspan Sequential Test Number	7
Date	11/26/97
Workfile	150797.nfl

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70
Relative Humidity		10% - 70%	50
Impact Velocity		22.60 - 23.40 Ft/s	22.68
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	23.52
	20 ms	17.60 - 22.60 G's	19.52
	30 ms	12.50 - 18.50 G's	16.29
Max Pendulum G's Above 30 ms		29 G's Max	16.29
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	40.13
D Plane Rotation	Max	64 - 78 Deg	68.63
	Time	57 - 64 ms	59.75
Moment About Occipital Condyle	Max	65 - 80 Ft-Lbs	72.99
	Time	47 - 58 ms	53.50
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	118.38
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	103.38

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	150
Calspan Sequential Test Number	7
Date	11/26/97
Workfile	150797.nex

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70
Relative Humidity		10% - 70%	50
Impact Velocity		19.50 - 20.30 Ft/s	19.61
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	18.57
	20 ms	14.00 - 19.00 G's	16.77
	30 ms	11.00 - 16.00 G's	13.44
Max Pendulum G's Above 30 ms		22 G's Max	13.44
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	44.00
D Plane Rotation	Max	81 - 106 Deg	90.90
	Time	72 - 82 ms	74.38
Moment About Occipital Condyle	Max	-59.0 - -39.0 Ft-Lbs	-50.73
	Time	65 - 79 ms	68.88
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	152.00
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	138.00

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number	150
Calspan Sequential Test Number	7
Date	12/01/97
Workfile	150797.th3

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	69-72 Deg F	70
Relative Humidity	10% - 70%	50
Pendulum Velocity	21.6 - 22.4 Ft/s	21.70
Maximum Deflection	2.50 - 2.86 in	2.74
Maximum Resistive Force	1160 - 1325 Lbs	1304.14
Internal Hysteresis	69 - 85 %	73.24

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number	150
Calspan Sequential Test Number	7
Date	11/24/97
Workfile	150797

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	66 - 78 Deg F	70
Relative Humidity	10% - 70%	50
Probe Velocity	6.8 - 7.0 Ft/s	6.90
Peak Knee Impact Force	1060 - 1300 Lbs	1289.0
RIGHT KNEE		
Temperature	66 - 78 Deg F	70
Relative Humidity	10% - 70%	50
Probe Velocity	6.8 - 7.0 Ft/s	6.90
Peak Knee Impact Force	1060 - 1300 Lbs	1241.0

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 150
Calspan Sequential Test Number 7
Date 12/01/97

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			70
Relative Humidity			50
Location for Chest Circumference	AA	16.9 -17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	39.2
Waist Circumference	Z	32.9 - 34.1 in	34.0
Chest Depth	O	8.4 - 9.0 in	8.4
H-Point Height	C	3.3 - 3.5 in	3.4
H-Point from Backline	D	5.3 - 5.5 in	5.4
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Total Sitting Height	A	34.6 - 35.0 in	34.8
Thigh Clearance	F	5.5 - 6.1 in	5.7
Buttock Knee Length	K	22.8 - 23.8 in	23.4
Buttock Popliteal Length	N	17.8 - 18.8 in	18.4
Popliteal Height	L	16.9 - 17.9 in	17.5
Knee Pivot Height	M	19.1 - 19.7 in	19.4
Foot Length	P	9.9 - 10.5 in	10.2
Foot Breadth	W	3.6 - 4.2 in	3.8
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.6
Shoulder Breadth	V	16.6 - 17.2 in	16.9
Shoulder Pivot Height	B	19.9 - 20.5 in	20.2
Elbow Rest Height	J	7.5 - 8.3 in	8.1
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.2
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.5

Remarks:

Laboratory Technician: B. Swiecicki

Appendix D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY

(6 Month Calibration Minimum)

DRIVER DUMMY (S/N 061)		Serial #	Manufacturer	Calibration	
				Last	Next
Head	X	C14883	ENDEVCO	8/97	2/98
	Y	C14972	ENDEVCO	8/97	2/98
	Z	C15018	ENDEVCO	8/97	2/98
Chest	X	AL6C4	ENDEVCO	8/97	2/98
	Y	AE8W7	ENDEVCO	8/97	2/98
	Z	A57G	ENDEVCO	8/97	2/98
Right Femur Load Cell		951	GSE	1/98	7/98
Left Femur Load Cell		952	GSE	1/98	7/98
Neck Load Cell	X	269	DENTON	10/97	4/98
	Y	269	DENTON	10/97	4/98
	Z	269	DENTON	10/97	4/98
Neck Moment	X	269	DENTON	10/97	4/98
	Y	269	DENTON	10/97	4/98
	Z	269	DENTON	10/97	4/98
Chest Deflection Gauge		061	HUMANOID	11/97	5/98
Hybrid III Use Only					
Lap Belt Load Cells		706	LEBOW	1/98	7/98
Shoulder Belt Load Cells		707	LEBOW	1/98	7/98
Spool-Out Potentiometer		N/A	MAGNETEK	N/A	N/A
Belt Stretch Transducer		E1	CALSPAN	9/97	3/98

INSTRUMENT CALIBRATION FOR DRIVER DUMMY

(6 Month Calibration Minimum)

DRIVER DUMMY		Serial #	Manufacturer	Calibration	
				Last	Next
Head	X (R)	A13937	ENDEVCO	10/97	4/98
	Y (R)	A13517	ENDEVCO	10/97	4/98
	Z (R)	A13941	ENDEVCO	10/97	4/98
Chest	X (R)	A1381	ENDEVCO	10/97	4/98
	Y (R)	A13828	ENDEVCO	10/97	4/98
	Z (R)	A13883	ENDEVCO	10/97	4/98
Pelvic	X	AC2P5	ENDEVCO	8/97	2/98
	Y	ADL50	ENDEVCO	8/97	2/98
	Z	A59J	ENDEVCO	8/97	2/98
Left Upper Tibia	Mx	038	DENTON	10/97	4/98
Left Upper Tibia	My	038	DENTON	10/97	4/98
Left Lower Tibia	Fy	032	DENTON	10/97	4/98
Left Lower Tibia	Fz	032	DENTON	10/97	4/98
Left Lower Tibia	Mx	032	DENTON	10/97	4/98
Right Upper Tibia	Mx	045	DENTON	10/97	4/98
Right Upper Tibia	My	045	DENTON	10/97	4/98
Right Lower Tibia	Fy	041	DENTON	10/97	4/98
Right Lower Tibia	Fz	041	DENTON	10/97	4/98
Right Lower Tibia	Mx	041	DENTON	10/97	4/98

INSTRUMENT CALIBRATION FOR DRIVER DUMMY

(6 Month Calibration Minimum)

DRIVER DUMMY		Serial #	Manufacture	Calibration	
				Last	Next
Left Foot Front	Z	A14058	ENDEVCO	9/97	3/98
Left Foot Rear	X	A13929	ENDEVCO	9/97	3/98
Left Foot Rear	Z	A14150	ENDEVCO	9/97	3/98
Right Foot Front	Z	A14124	ENDEVCO	9/97	3/98
Right Foot Rear	X	A14181	ENDEVCO	9/97	3/98
Right Foot Rear	Z	A14126	ENDEVCO	9/97	3/98

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY (S/N 150)		Serial #	Manufacturer	Calibration	
				Last	Next
Head	X	AH5MP	ENDEVCO	1/98	7/98
	Y	AGHF5	ENDEVCO	1/98	7/98
	Z	AL6K2	ENDEVCO	1/98	7/98
Chest	X	A33A	ENDEVCO	1/98	7/98
	Y	FB32L	ENDEVCO	1/98	7/98
	Z	AD395	ENDEVCO	1/98	7/98
Right Femur Load Cell		231	GSE	1/98	7/98
Left Femur Load Cell		232	GSE	1/98	7/98
Neck Load Cell	X	205	DENTON	1/98	7/98
	Y	205	DENTON	1/98	7/98
	Z	205	DENTON	1/98	7/98
Neck Moment	X	205	DENTON	1/98	7/98
	Y	205	DENTON	1/98	7/98
	Z	205	DENTON	1/98	7/98
Chest Deflection Gauge		150	HUMANOID	10/97	4/98
Hybrid III Use Only					
Lap Belt Load Cells		635	LEBOW	1/98	7/98
Shoulder Belt Load Cells		711	LEBOW	1/98	7/98
Spool-Out Potentiometer		N/A	MAGNETEK	N/A	N/A
Belt Stretch Transducer		E3	CALSPAN	9/97	3/98

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY		Serial #	Manufacturer	Calibration	
				Last	Next
Head	X (R)	APBF4	ENDEVCO	1/98	7/98
	Y (R)	APBD7	ENDEVCO	1/98	7/98
	Z (R)	AN967	ENDEVCO	1/98	7/98
Chest	X (R)	J18406	ENDEVCO	1/98	7/98
	Y (R)	AP1B5	ENDEVCO	1/98	7/98
	Z (R)	AY60	ENDEVCO	1/98	7/98
Pelvic	X	AF480	ENDEVCO	1/98	7/98
	Y	AC2M6	ENDEVCO	1/98	7/98
	Z	AF5C1	ENDEVCO	1/98	7/98
Left Upper Tibia	Mx	015	DENTON	10/97	4/98
Left Upper Tibia	My	015	DENTON	10/97	4/98
Left Lower Tibia	Fy	011	DENTON	10/97	4/98
Left Lower Tibia	Fz	011	DENTON	10/97	4/98
Left Lower Tibia	Mx	011	DENTON	10/97	4/98
Right Upper Tibia	Mx	016	DENTON	10/97	4/98
Right Upper Tibia	My	016	DENTON	10/97	4/98
Right Lower Tibia	Fy	012	DENTON	10/97	4/98
Right Lower Tibia	Fz	012	DENTON	10/97	4/98
Right Lower Tibia	Mx	012	DENTON	10/97	4/98

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY		Serial #	Manufacture	Calibration	
				Last	Next
Left Foot Front	Z	A13011	ENDEVCO	9/97	3/98
Left Foot Rear	X	A13506	ENDEVCO	9/97	3/98
Left Foot Rear	Z	A12268	ENDEVCO	9/97	3/98
Right Foot Front	Z	J18418	ENDEVCO	8/97	2/98
Right Foot Rear	X	AEWK1	ENDEVCO	8/97	2/98
Right Foot Rear	Z	ADK92	ENDEVCO	8/97	2/98

INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS

(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration	
			Last	Next
Left Seat Rear Crossmember	D72	ICS	10/97	4/98
Right Rear Seat Crossmember	D79	ICS	9/97	3/98
Top of Engine	Y18	ICS	10/97	4/98
Bottom of Engine	D78	ICS	10/97	4/98
Left Disc Brake Caliper	A44	CEC	10/97	4/98
Right Disc Brake Caliper	E02	CEC	1/98	7/98
Instrument Panel	A189	CEC	8/97	2/98
Left Seat Rear Crossmember (R)	D32	ICS	9/97	3/98
Right Seat Rear Crossmember (R)	D75	ICS	10/97	4/98