VC4444

REPORT NUMBER: 208-CAL-96-05
212-CAL-96-05
301-CAL-96-05

VEHICLE SAFETY COMPLIANCE TESTING FOR OCCUPANT CRASH PROTECTION WINDSHIELD MOUNTING, WINDSHIELD ZONE INTRUSION (PARTIAL) AND FUEL SYSTEM INTEGRITY

ISUZU MOTORS LTD., JAPAN
1996 ISUZU TROOPER
4-DOOR MPV

NHTSA NUMBER: CT5700

CALSPAN TEST NUMBER: 8353-3

April 23, 1996

CALSPAN SRL CORPORATION
P.O. BOX 400
BUFFALO, NEW YORK 14225

FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
ENFORCEMENT
Office of Vehicle Safety Compliance
400 Seventh Street, S. W.
Room No. 6115 (NEF-30)
Washington, DC 20590

Rec'd
6/12/96

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared By: Vincent Paolini, Project Engineer

Approved By: David J. Travale, Program Manager
Transportation Sciences Center

Approval Date: Jun 4, 1996

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By:

Acceptance Date: 11/26/96

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
208-CAL-96-05 212-CAL-96-05 301-CAL-96-05		

4. Title and Subtitle	5. Report Date
Final Report of FMVSS 208, 212, 219 (Partial), and 301 Compliance Testing of a 1996 Isuzu Trooper 4-Door MPV NHTSA No. CT5700	April 23, 1996
	6. Performing Organization Code CAL

7. Author(s)	8. Performing Organization Report No.
Vincent Paolini, Project Engineer David J. Travale, Program Manager Report prepared by: Cathryn A. Harrower	8353-3

9. Performing Organization Name and Address	10. Work Unit No.
Calspan SRL Corporation P.O. Box 400 Buffalo, New York 14225	A041-3-1610
	11. Contract or Grant No. DTNH22-93-D-11089

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance (NEF-30) 400 Seventh St , S.W., Rm. 6115, Washington, D.C. 20590	Final - April 1996 - May 1996
	14. Sponsoring Agency Code NEF-30

15. Supplementary Notes

16. Abstract

A 30 mph vehicle safety compliance test was conducted on a 1996 Isuzu Trooper 4-Door MPV.

This test was performed at the Calspan SRL Corporation in Buffalo, New York on April 23, 1996.

The purpose of this test was to determine compliance with the performance requirements of the following Federal Motor Vehicle Safety Standards:

1. FMVSS No. 208, "Occupant Crash Protection"
2. FMVSS No. 212, "Windshield Mounting"
3. FMVSS No. 219 (partial), "Windshield Zone Intrusion"
4. FMVSS No. 301, "Fuel System Integrity"

The test mode was perpendicular (0°) and the impact velocity was 29.4 mph. The ambient temperature at the impact face was 70 °F.

The subject test vehicle appears to comply with the requirements of FMVSS Nos. 208, 212, 219 (partial) and 301.

Type of Restraint System: The test vehicle was equipped with a driver Airbag and a passenger Airbag restraint system. The manual seat belts were not used for this test.

17. Key Words	18. Distribution Statement
Compliance Testing Safety Engineering FMVSS 208	Copies of this report are available from: NHTSA Technical Reference Division ; Mail Code: NAD-52 400 Seventh , S.W., Room 5108, Washington, D.C. 20590 Telephone No. (202) 366-4946 Attn: Robert Hornickle

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	153 pages	

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Section 1

PURPOSE AND TEST PROCEDURE

This 30 mph frontal barrier impact test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 208, 212, 219 (partial) and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by Calspan SRL Corporation under Contract No. DTNH22-93-D-11089. The purpose of this test was to determine if the subject vehicle, a 1996 Isuzu Trooper 4-Door MPV, meets the performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS No. 212, "Windshield Mounting"; FMVSS No. 219 (partial), "Windshield Zone Intrusion"; and FMVSS No. 301, "Fuel System Integrity". This compliance test was conducted using the requirements found in the OVSC Laboratory Test Procedure No. TP-208-09, dated March 15, 1993.

Section 2

SUMMARY OF TEST NUMBER CT5700

A frontal barrier was impacted by a 1996 Isuzu Trooper 4-Door MPV at a velocity of 29.4 mph. The test was performed at the Calspan SRL Corporation on April 23, 1996. Pre- and Post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 14 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 OVSC Laboratory Test Procedure.

Both ATDs were fully instrumented with head and chest three axis (x, y, and z) accelerometers, chest displacement potentiometers and left/right femur load cells. These ATDs had been certified prior to the test.

The 46 channels of data were recorded on a P.C. based data acquisition system. Appendix B contains the vehicle and dummy response data traces. The Engine Bottom (x) accelerometer experienced a pre-zero acceleration spike. It appeared that this acceleration spike was due to a contact with the vehicle tow release system. After the pre-zero acceleration spike the data did level off to zero Gs prior to impact. The position 1 Left lower Tibia Force (x) transducer did not record propely during test.

The driver's HIC was 149. The maximum chest deceleration over 3 milliseconds was 45.4 g's with -2.3 inches of deflection. The maximum force on the driver's left femur was -1970.3 pounds and -1603.9 pounds on the right femur.

The right front passenger's HIC was 116. The maximum chest deceleration over 3 milliseconds was 48.0 g's with -0.9 inches of deflection. Loads of -1643.2 and -2019.4 pounds were recorded on the left and right femurs respectively.

Table 1

CRASH TEST SUMMARY

Vehicle NHTSA No. :	CT5700	Test Mode :	30 mph Frontal Barrier		
Test Date :	April 23, 1996	Time:	13:09	Temperature :	70 °F
Vehicle Make/Model/Body Style :	1996 Isuzu Trooper 4-Door MPV				
Vehicle Test Weight :	5022 lbs				
Vehicle/Barrier Impact Angle :	0 °				
Impact Velocity :	29.4 mph				
Maximum Static Crush :	16.7 inches				
Vehicle Rebound :	7.6 inches				

DUMMIES:	DRIVER	PASSENGER
Type :	Part 572E	Part 572E
Restraint System :	Airbag	Airbag

Number of Data Channels : 46

Number of Cameras : 1 Real Time

14 High Speed

DOOR OPENING DATA : Closed/Operable (no tools required) - Left Front

Closed/Operable (no tools required) - Right Front

Front Seat(s) Data :	DRIVER	PASSENGER
Seat Track Failure :	0.0	0.0
	Inches of shift	
Seat Back Failure :	None	None

VISIBLE DUMMY CONTACT POINTS :	DRIVER	PASSENGER
Head :	Face - airbag Rear of head - headrest	Top of head - sunvisor Face - airbag Rear of head - headrest
Abdomen :	Airbag	Airbag
Chest	Airbag	Airbag
Knees	Knee Bolster	Glove box door

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION :

Year/Make/Model/Body Style : 1996 Isuzu Trooper 4-Door MPV

NHTSA No. : CT5700 ; VIN: JACDJ58V8T7901171 ; Color : Green

Engine Data: V6 cylinders; - CID; 3.2 Liters; - cc

Placement : X Longitudinal or In-Line; - Transverse of Lateral

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

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

Major Options : X A/C; X Pwr.Strg.; X Pwr. Brakes

X Pwr. Windows; X Pwr. Door Locks; X Tilt Wheel

Date Received : 3/20/96 ; Odometer Reading 00228 miles

Selling Dealer : Steve Acuto Isuzu

& Address: Madison & East Water Sts., Elmira, N.Y. 14901

DATA FROM TIRE VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by : Isuzu Motors LTD., Japan

Date of Manufacture Oct. 95

GVWR : 5510 lbs.; GAWR: 2755 lbs. FRONT; 3085 lbs. REAR

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load : 30 psi FRONT

35 psi REAR

Recommended Tire Size : P245/70R16

* Recommended Cold Tire Pressure : 30 psi FRONT; 35 psi REAR

Size of Tires on Test Vehicle: P245/70R16 ; Manufacturer: Goodyear

Vehicle Capacity Data :

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

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

No. of Occupants x 150 lbs. = 750 lbs.

Rated Cargo/Luggage Weight (RCLW) = 300 lbs.

*Tire pressure used for test

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)

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

Right Front	= 1130	lbs.	Right Rear	= 1050	lbs.
Left Front	= 1120	lbs.	Left Rear	= 1105	lbs.
TOTAL FRONT	= 2,250	lbs.	TOTAL REAR	= 2,155	lbs.

TOTAL DELIVERED WEIGHT = 4,405 lbs.

% of Total Front of Vehicle Weight = 51.1 % of Total Rear Weight = 48.9 %

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT :

Total Delivered Weight	= 4,405	lbs.
Rated Cargo/Luggage Weight (RCLW)	= 300	lbs.
Weight of 2 p.572 Dummies @ 167 each	= 334	lbs.
TARGET TEST WEIGHT	= 5,039	lbs.

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 283 POUNDS OF CARGO WEIGHT:

Right Front	= 1137	lbs.	Right Rear	= 1286	lbs.
Left Front	= 1203	lbs.	Left Rear	= 1396	lbs.
TOTAL FRONT	= 2,340	lbs.	TOTAL REAR	= 2,682	lbs.

TOTAL TEST WEIGHT = 5,022 lbs.

% of Total Front Weight = 46.6 % % of Total Rear Weight = 53.4 %

Weight of Ballast Secured in Vehicle Trunk Area = 300 lbs.

Vehicle Components Removed for Weight Reduction: -

VEHICLE ATTITUDE (all dimension in inches) :

AS DELIVERED :	RF	37.9	LF 37.8	RR	38.8	LR	38.9
FULLY LOADED :	RF	37.6	LF 37.5	RR	37.3	LR	37.2
AS TESTED :	RF	37.7	LF 37.5	RR	37.3	LR	37.3

Vehicle's Wheel Base : 108.7 in.

Location of Vehicle's C.G. : 58.1 inches rearward of front wheel center.

FUEL SYSTEM DATA :

Fuel System Capacity From Owner's Manual = 22.5 gallons

Usable Capacity Figure Furnished by COTR = 22.2 gallons

Test Volume Range (92 to 94% of Usable Capacity) = 20.4 to 20.9 gallons

ACTUAL TEST VOLUME= 20.9 gallons (with entire fuel system filled)

Table 3

POST IMPACT DATA

TYPE OF TEST:

Type of Test : Frontal Barrier Impact Angle : 0°

Test Date : April 23, 1996 Time: 13:09 Temperature: 70 °F

Vehicle NHTSA No. : CT5700

Required Impact Velocity Range : 28.9 to 29.9 mph

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

Trap No. 1 = 29.4 mph; Trap No. 2 = 29.4 mph

Distance from vehicle to barrier :(1) entering trap = 52 inches

(2) exiting trap = 12 inches

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

Vehicle Length:

Pre-Test	Right =	176.7	; C/L =	178.9	; Left =	176.7
Post-Test	Right =	161.6	; C/L =	162.2	; Left =	161.4
Crush	Right =	15.1	; C/L =	16.7	; Left =	15.3
AVERAGE	=	15.7	inches			

VEHICLE REBOUND: (From rigid barrier only.)

Distance from front of test vehicle to impact point :

	Right =	7.6	; C/L =	7.6	; Left =	7.7
AVERAGE	=	7.6	inches			

DOOR OPENING :	Left	Right
Front	Closed/Operable (no tools required)	Closed/Operable (no tools required)
Rear	Closed/Operable (no tools required)	Closed/Operable (no tools required)
SEAT MOVEMENT :	Seat Back Failure	Seat Shift
Front	None	0.0"
Rear	-	-

Table 3

POST IMPACT (cont.)

GLAZING DAMAGE :

None

OTHER NOTABLE IMPACT FEATURES :

Windshield sustained stress fractures but remained intact.

Section 3

OCCUPANT AND VEHICLE DATA

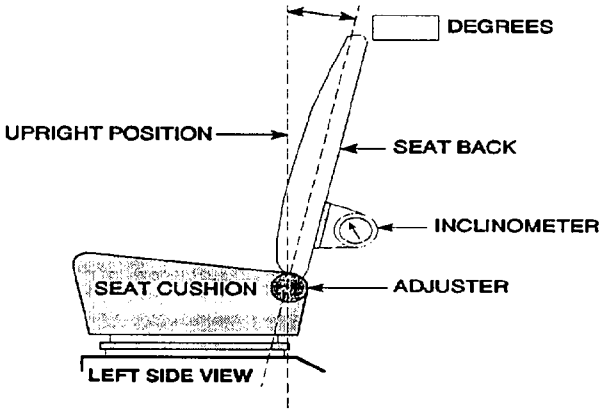
Figure 1

TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year : 1996 Vehicle Model: Isuzu Trooper Body Style : 4-Door MPV

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 : 22°

Measurement instructions : Adjust seat back to 3rd detent rearward from first detent (first detent = 1)

Seat back angle for passenger's seat : 22°

Measurement instructions : Same as driver

2. Seat Fore and Aft Positioning

Positioning of the driver's seat : Seat placed in 9th detent rearward of 1st detent (closest notch rearward of mid-travel) from a total of 16 detents

Positioning of the passenger's seat (if applicable) : Same as driver

3. Fuel Tank Capacity Data

A. "Usable Capacity" of the standard equipment fuel tank is 22.2 gallons

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

4. Steering Column Position :

Place steering column in the 3rd position upward from the lowest position.

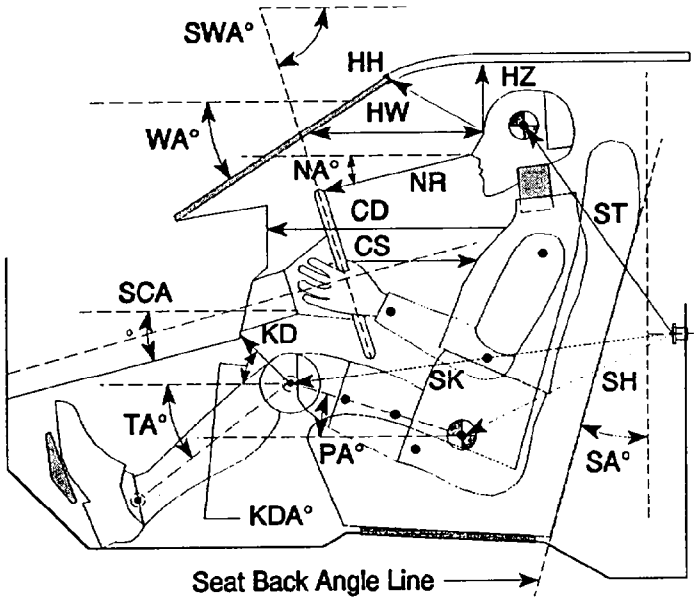
5. Other:

None

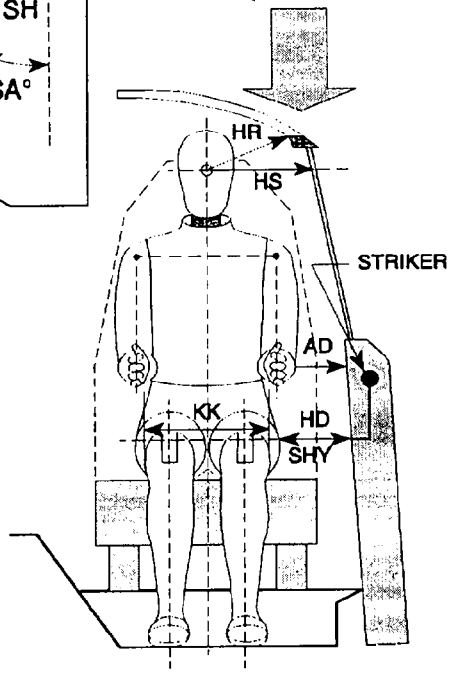
Figure 2

PART 572 DUMMY IN-VEHICLE POSITION

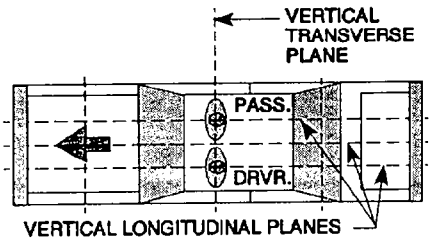
DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



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



8353-3

Table 4

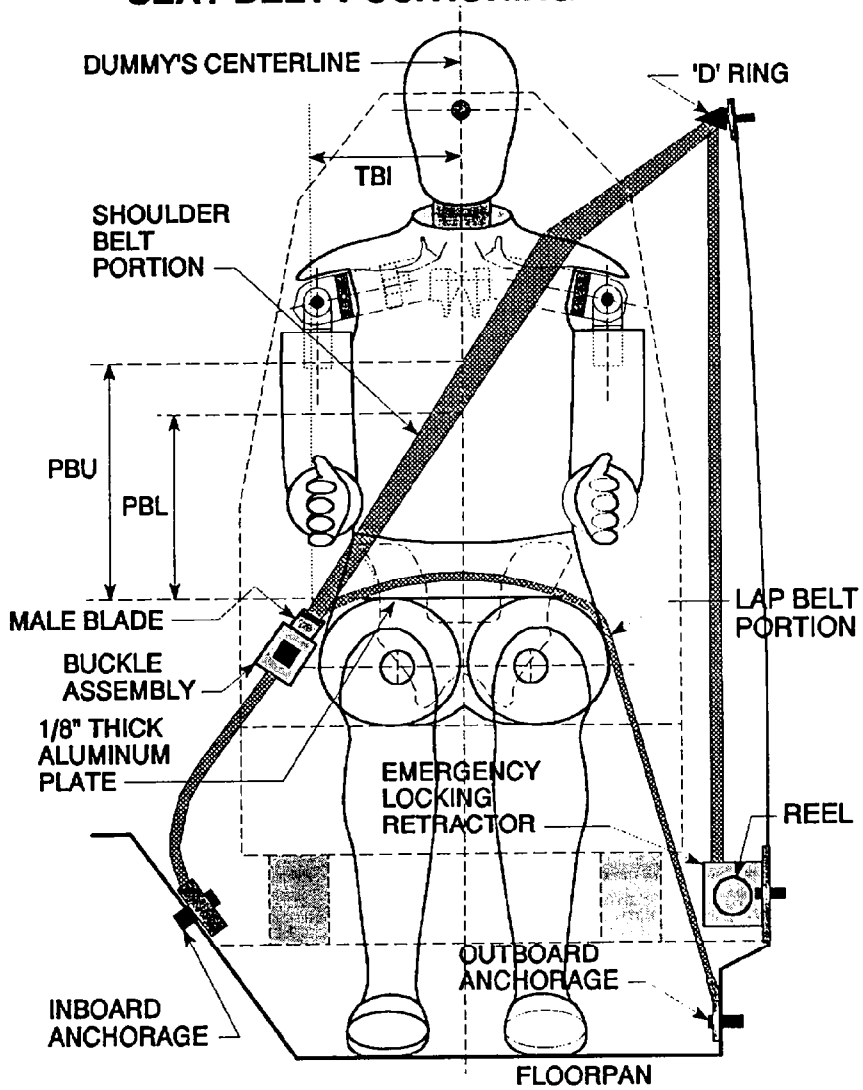
FRONT SEAT OCCUPANT MEASUREMENTS

(All dimensions excluding angles are in inches).

	DRIVER (Serial #313)			PASSENGER (Serial #290)		
WA°	39 deg.			-		
SWA°	28 deg.			-		
SCA°	62 deg.			-		
SA°	22 deg.			22 deg.		
HZ	8.1			8.0		
HH	14.6			14.8		
HW	20.3			20.7		
HR	10.3			9.8		
NR	14.2	Angle	17 deg.	-		
CD	19.5			21.0		
CS	9.6			-		
RA	5.3			-		
KDL/KDA	6.0	Angle	25 deg.	6.7		
KDR/KDA	5.0			6.3	Angle	28 deg.
PA°	20.5 deg.			21 deg.		
TA°	45 deg.			48 deg.		
KK	11.6			10.6		
ST	25.4	Angle	77 deg.	25.7	Angle	80 deg.
SK	24.8	Angle	-1 deg.	24.5	Angle	1 deg.
SH	9.2	Angle	-10 deg.	9.5	Angle	-6 deg.
SHY	9.2			8.8		
HS	12.8			12.8		
HD	6.8			6.4		
AD	3.8			3.8		

Figure 3

SEAT BELT POSITIONING DATA



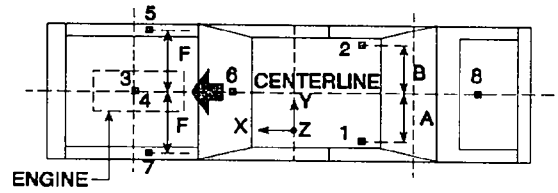
FRONT VIEW OF DUMMY

	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
PBU -- Top surface of alum. plate to upper edge	*	*
PBL -- Top surface of alum. plate to belt lower edge	*	*
TBI -- Distance from torso centerline to buckle	*	*

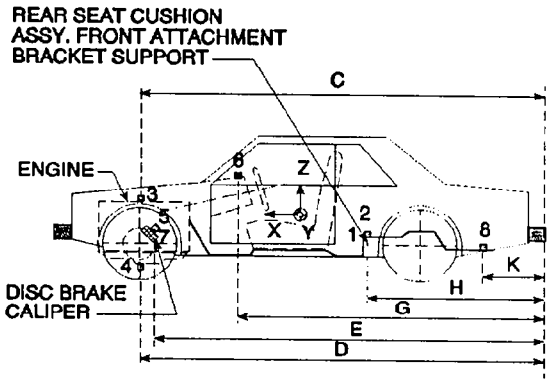
* Vehicle equipped with air bag, manual seat belt not used for this position.

Figure 4

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



TOP VIEW



LEFT SIDE VIEW

ACCELEROMETER NUMBER*	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Left Rear Seat Crossmember	X		
2	Right Rear Seat Crossmember	X		
3	Top of Engine	X		
4	Bottom of Engine	X		
5	Right Disc Brake Caliper	X		
6	Instrument Panel	X		
7	Left Disc Brake Caliper	X		
8	Trunk Z			X

*The accelerometer pack number can be correlated with the vehicle response data traces found in Appendix B.

Table 5

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

DIMENSION	LENGTH (Inches)	
	PRE-TEST VALUES	POST-TEST VALUES
A Left Rear Seat Crossmember Y	19.8	19.7
B Right Rear Seat Crossmember Y	19.5	19.6
C Top of Engine X	144.8	142.2
D Bottom of Engine X	142.0	140.7
E Disc Brake Calipers X	150.6	Right = 149.3 Left = 150.5
F Disc Brake Calipers Y	15.8	15.5
G Instrument Panel X	114.1	114.3
H Rear Seat Crossmembers X	64.9	Right = 64.6 Left = 64.4
K Trunk X	22.8	22.7

LOCATION NUMBER	DESCRIPTION	MAXIMUM VALUE			
		Pos.	msec.	Neg.	msec.
1	Rear Seat X-Member @ Left Side	2.2	125.0	-43.1	27.0
2	Rear Seat X-Member @ Right Side	4.3	127.7	-45.5	27.0
3	Top of Engine Block	63.0	51.5	-180.9	42.2
4	Bottom of Engine	24.9	50.0	-67.6	32.8
5	Disc Brake Caliper @ Right Side	36.1	25.9	-106.4	16.7
6	Instrument Panel	12.8	48.6	-44.8	36.4
7	Disc Brake Caliper @ Left Side	34.6	28.6	-110.8	18.0
8	Trunk	51.4	24.4	-14.5	37.4

Figure 5

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information shown on Table 6.

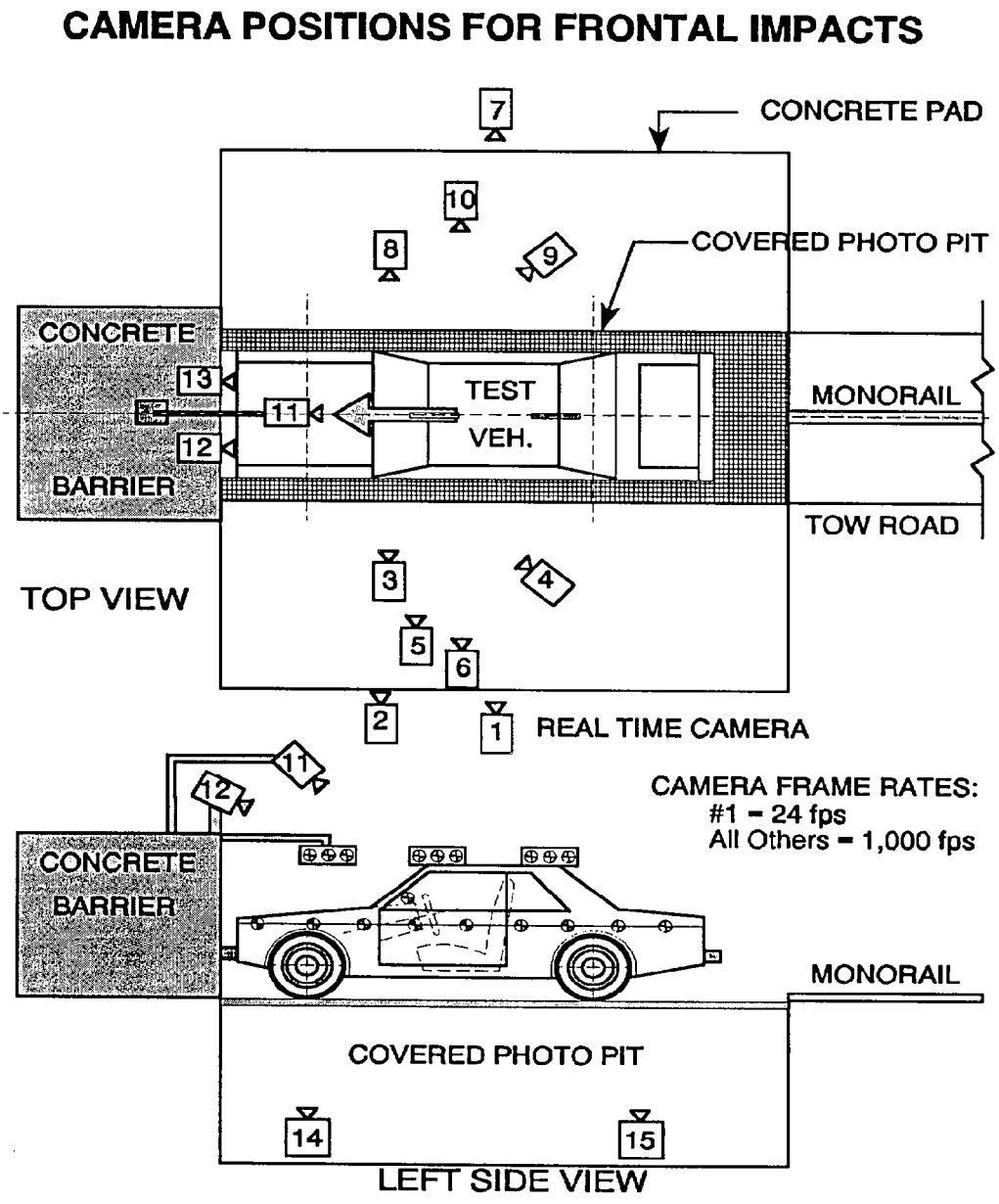


Table 6

HIGH-SPEED CAMERA LOCATIONS

Test No. CT5700 Vehicle: 1996 Isuzu Trooper 4-Door MPV

Camera No.	VIEW	CAMERA POSITIONS (In.)* X	Y	Z	ANGLE** (deg)	FILM PLANE TO HEAD TARGET (In.)	LENS (mm)	SPEED (fps)
1	Real-Time Camera	-	-	-	-	-	-	24
2	Overall Left Side	413	63	48	-7	395	25	1010
3	Left Side View	324	36	49	-3	306	25	990
4	Driver and Interior View	218	117	79	-9	-	25	990
5	Steering Column (Bottom)	376	77	46	-1	358	35	900
6	Steering Column (Top)	376	77	71	-6	358	35	990
7	Overall Right Side	388	82	52	-3	370	25	1020
8	Right Side View	388	62	54	-3	370	35	940
9	Passenger and Interior View	204	124	81	-9	-	25	1060
10	Right Passenger View	389	92	62	-1	-	25	1090
11	Windshield View	0	-3	132	-58	-	13	1060
12	Driver Front View	21	76	75	-42	-	8	1010
13	Passenger Front View	21	76	75	-43	-	8	1000
14	Pit View of Engine	0	30	-86	90	-	13	1010
15	Pit View of Fuel Tank	0	141	-86	90	-	13	870

*X = film plane to monorail centerline
Y = film plane to impact location
Z = film plane to ground
** = referenced to horizontal plane

Figure 6

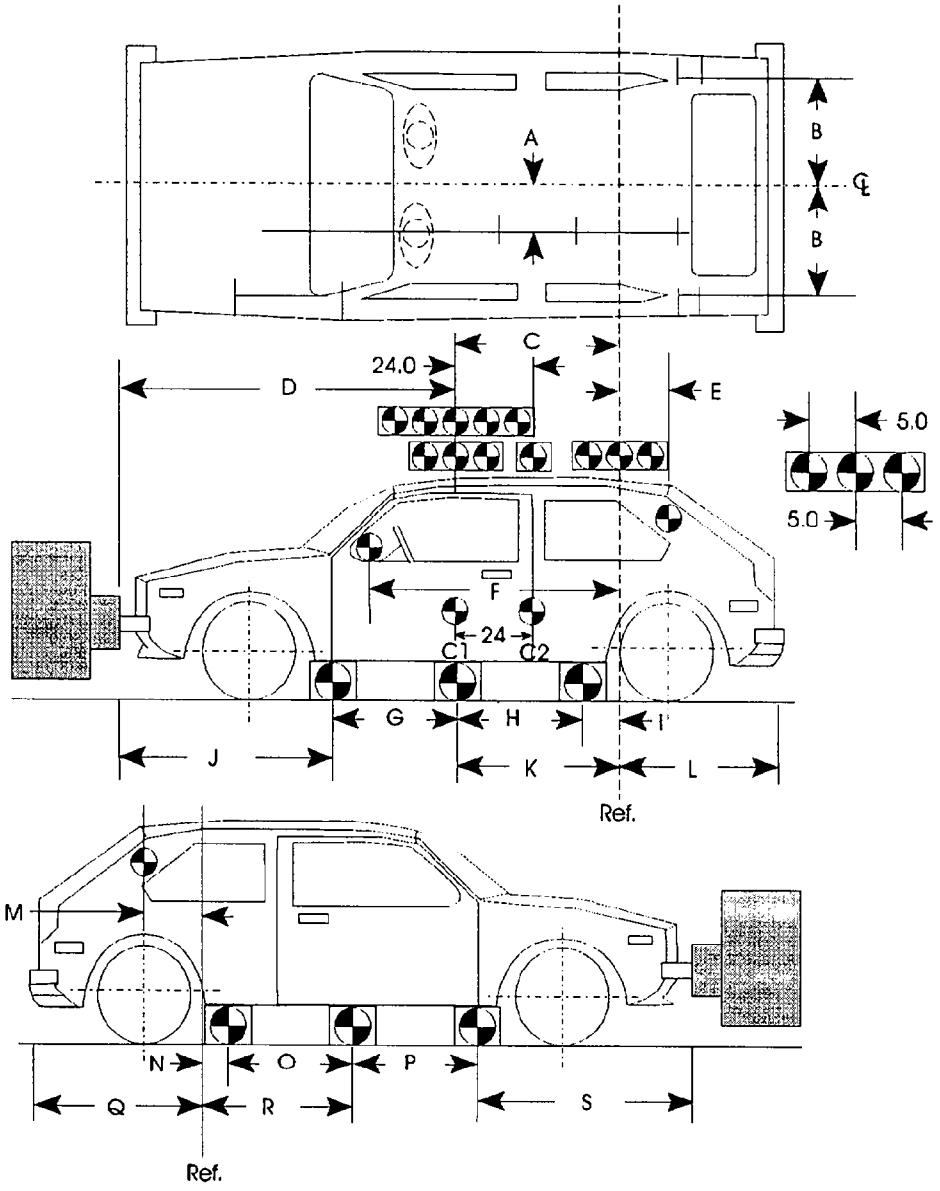
VEHICLE TARGET LOCATIONS
(All dimensions in inches)

Key (Inches)

A =	15.1
B =	23.4

C =	48.0
D =	76.2
E =	8.5
F =	60.8
G =	29.2
H =	29.1
I =	10.8
J =	55.1
K =	39.9
L =	54.7

M =	8.5
N =	10.1
O =	28.8
P =	29.5
Q =	55.1
R =	38.9
S =	55.4



Note: Targets on front fender are 12.0 inches apart. Targets rearward of front fender are 24.0 inches apart.

Figure 7

TEST VEHICLE MEASUREMENTS

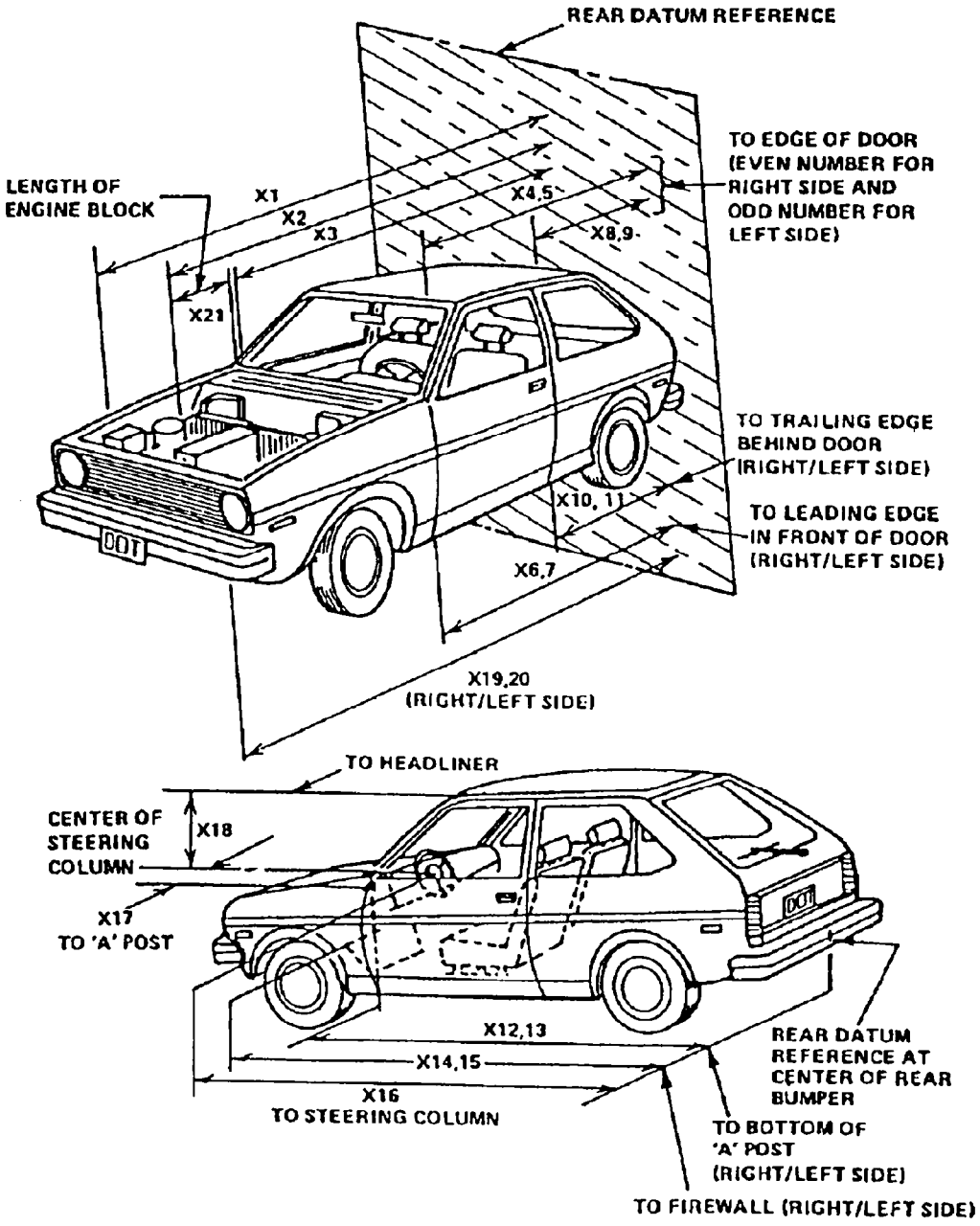


Table 7

VEHICLE MEASUREMENTS

		All Dimensions in inches		
No.		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	178.9	162.2	16.7
X2	Rear Surface of Vehicle to Front of Engine	151.2	146.5	4.7
X3	Rear Surface of Vehicle to Firewall	136.2	135.5	0.7
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	125.6	126.0	-0.4
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	125.5	125.5	0.0
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	124.4	123.4	1.0
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	124.6	123.0	1.6
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	85.3	85.4	-0.1
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	85.2	84.6	0.6
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	85.3	84.2	1.1
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	85.3	83.9	1.4
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	123.9	122.6	1.3
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	124.0	122.3	1.7
X14	Rear Surface of Vehicle to Firewall, Right Side	136.4	136.0	0.4
X15	Rear Surface of Vehicle to Firewall, Left Side	136.6	136.0	0.6
X16	Rear Surface of Vehicle to Steering Column	108.0	110.5	-2.5
X17	Center of Steering Column to "A" Post	17.0	17.0	0.0
X18	Center of Steering Column to Headliner	18.5	16.8	1.7
X19	Rear Surface of Vehicle to Right Side of Front Bumper	176.7	161.6	15.1
X20	Rear Surface of Vehicle to Left Side of Front Bumper	176.7	161.4	15.3
X21	Length of Engine Block	16.0	16.0	0.0

Section 4

SUMMARY OF RESULTS OF FMVSS NOS. 208, 212, 219 AND 301

- "Occupant Crash Protection," FMVSS No. 208 Data
- "Windshield Mounting," FMVSS No. 212 Data
- "Windshield Zone Intrusion," FMVSS No. 219 (Partial) Data
- "Fuel System Integrity," FMVSS No. 301

Table 8

DUMMY INJURY CRITERIA VALUES

NHTSA No. : CT5700 Vehicle : 1996 Isuzu Trooper 4-Door MPV

	MAXIMUM ACCELERATION (g's)								
	HEAD				CHEST				
	X	Y	Z	R	X	Y	Z	R*	Displacement
Dummy (1)	-33.4	-9.3	23.1	35.9	-48.3	6.5	-7.4	45.4	-2.3
Dummy (2)	-28.2	-9.7	29.6	39.9	-48.6	4.0	16.6	48.0	-0.9

	MAXIMUM FORCE - FEMUR LOAD (lbs.)	
	LEFT FEMUR	RIGHT FEMUR
Dummy (1)	-1970.3	-1603.9
Dummy (2)	-1643.2	-2019.4

	HEAD INJURY CRITERIA**			
		36 millisecond Maximum		Avg. Acc (g)
	HIC	t_1 (msec)	t_2 (msec)	t_1 TO t_2
Dummy (1)	149	60.00	96.00	27.94
Dummy (2)	116	57.00	93.00	25.29

* Defined as exceeding 0.003 sec. duration
**As defined in FMVSS No. 208

Table 9

FMVSS NO. 208 - SEAT BELT WARNING SYSTEM CHECK

With occupant in driver's position, the lap belt in stowed position, and ignition switch placed in "Start/On" position:

Log time duration of audible warning signal = 6.0 sec.

Log time duration of reminder light operation = * sec.

With occupant in driver's position, lap belt in use, and the ignition switch placed in "Start/On" position :

Log time duration of audible warning signal = 0.0 sec.
(audible warning should not operate)

Log time duration of reminder light operation = 0.0 sec.

Note wording of visual warning :

Fasten Seat Belt	-
Fasten Belt	-
Symbol 101	X

* Will remain lit until seat belt is attached.

Table 10

FMVSS NO. 208 - LABELING AND DRIVER'S MANUAL INFORMATION

Locate label which describes manufacturers maintenance or replacement schedule for crash-deployed occupant protection system.

Describe location :

Label located on driver and RFP sunvisors

The label does not state information regarding maintenance or a replacement schedule. The owner's manual states no regular maintenance of the SRS system is required.

Were appropriate instructions concerning maintenance and/or replacement of this system provided ?

YES X NO -

Was a description of the functional operation of the system provided ?

YES X NO -

Is there a reference to the instructions and description of the system on the label ?

YES X NO -

Was an owner's manual provided ? YES X NO -

Did the owner's manual contain appropriate information concerning maintenance and/or replacement and a description of the functional operation of the system ?

YES X NO -

Table 11

FMVSS NO. 208 - READINESS INDICATOR

An occupant restraint system that deploys in the event of a crash shall have a monitoring system with a readiness indicator. A totally mechanical system is exempt from this requirement.

Is the system totally mechanical ? YES - NO X

Describe the location of the readiness indicator :

Readiness indicator located lower center of instrument cluster.

Is the readiness indicator clearly visible to the driver ? YES X NO -

Is a list of the elements in the occupant restraint system, being monitored by the readiness indicator, provided ?

YES X NO -

Table 12

FMVSS NO. 208 - COMFORT AND CONVENIENCE TEST SUMMARY

Test Vehicle NHTSA No. :	CT5700
Make/Model :	1996 Isuzu Trooper 4-Door MPV
Date of Comfort/Convenience Check :	4/22/96
Technician Performing Check :	VMP
GVWR :	5510 lbs.

Seat belt comfort and convenience requirements cover vehicles manufactured on or after September 1, 1986, which have a gross vehicle weight rating of 10,000 pounds or less. Exemptions to this rule are belts installed in a walk-in, van-type vehicle and manual Type 2 belt systems installed in the front outboard seating positions of passenger automobiles. On or after September 1, 1989, the exemption of the type 2 manual seat belts installed in the front outboard seating positions of passenger automobiles will change depending on the states' enactment of mandatory usage laws.

Was vehicle built after or on September 1, 1986, and is it equipped with :

1. Automatic seat belts — YES - NO X

If yes, go to requirements D1, D2, and D3

2. Manual seat belts* — YES X NO -

a. The seat belts, other than Type 2 lap/shoulder belts, are located in the front outboard seating positions of a passenger automobile.

YES - NO X

(Go to requirements D3, D4, D5, and D6)

b. The seat belt system is Type 2 lap/shoulder belt in the front outboard seating positions or the seat belts are located in a walk-in van.

STOP

* If the seat belts are voluntarily installed by the manufacturer they do not have to comply.

Table 12 (cont.)

D1
CONVENIENCE HOOKS

A convenience hook or other device is provided to stow seat belt webbing to facilitate entering or exiting the vehicle.

YES - NO X

Check the option which applies to this test vehicle:

1. A convenience hook or other device automatically releases the webbing when the automatic belt system is operational and remains in the released mode as long as the vehicle's ignition switch is moved to the "on" or "start" position and the vehicle's drivetrain is engaged.

YES N/A NO N/A

2. A convenience hook or other device automatically releases the webbing when the automatic belt system is operational and remains in the released mode as long as the vehicle's ignition switch is moved to the "on" or "start" position and the vehicle's parking brake is in the released mode (non-engaged)

YES N/A NO N/A

D2
WEBBING TENSION - RELIEVING DEVICE

The seat belt assembly installed in the outboard designated seating position has either manual or automatic tension relieving devices permitting the introduction of slack in the webbing of the shoulder belt ("comfort clips" or "window shade" devices).

YES - NO X

Check the owner's manual and determine the maximum amount of slack recommended by the manufacturer in inches. The recommended slack is inches. Introduce this slack into the shoulder belt before testing the vehicle to comply with the requirements of FMVSS 208 S5.1. A warning is included in the owner's manual that introducing slack beyond the amount specified can significantly reduce the effectiveness of the shoulder belt.

YES N/A NO N/A

(If NO, provide explanation.)

Check the option which applies to this test vehicle:

1. This vehicle is equipped with automatic seat belts and the tension relieving device is cancelled each time the adjacent door is opened.

YES N/A NO N/A

(If NO, provide explanation.)

Table 12 (cont.)

2. This vehicle is equipped with manual belts, required to meet FMVSS 208 S4.6, and the tension relieving device is cancelled each time one of the following options occurs:

a. The adjacent door is opened. YES N/A NO N/A

b. The latch plate is released from the buckle. YES N/A NO N/A

3. This is an open-body vehicle, without doors. Does the manual mean to cancel any shoulder belt slack introduced by a tension relieving device to operate properly ?

YES N/A NO N/A

(If NO, provide explanation.)

D3
BELT CONTACT FORCE

1. Do not measure the belt contact force if the manual or automatic seat belt assemblies in this vehicle incorporate a webbing tension relieving device. Does the vehicle incorporate a tension relieving device?

YES - NO X

2. Seat are adjusted according to instructions in Appendix B.

YES X NO -

3. The test dummies are positioned according to dummy position placement instructions in Appendix B and Appendix C.

YES X NO -

4. Close the vehicle's adjacent door, pull either 12 inches of belt webbing or the maximum available amount of belt webbing, whichever is less, from the retractor and then release it, allowing the belt webbing to return to the dummy's chest, then fasten the latch. Locate the point where the centerline of the upper torso belt webbing crosses the midsagittal line on the dummy's chest. At that point, pull the belt webbing out 3 inches from the dummy's chest and release until it is within one inch from the dummy's chest. Measure the contact force exerted by the belt webbing on the dummy's chest. The contact force is 0.3 pounds. Contact the COTR if the contact force exceeds 0.7 pounds.

Table 12 (cont.)

D4
LATCHPLATE ACCESSIBILITY

1. Position the test dummy in the driver's seat or passenger's seat in its forward most adjustment position.

YES X NO -

2. Attach the inboard and outboard reach string. YES X NO -

3. Extend each line backward and outboard to generate arcs of the reach envelope of the test dummy's arms. With the latchplate in the normal stowed position, check to assure that the latchplates are within the reach envelope.

YES X NO -

4. Using the clearance test block, determine if there is sufficient clearance between the vehicle seat and the side of vehicle interior to allow the test block to move unhindered to the latchplate or buckle.

YES X NO -

D5
RETRACTION

1. Seats and seat backs are adjusted according to instructions in Appendix B "General Test Conditions" in TP-208-09, dated March 15, 1993.

YES X NO -

2. Use anthropomorphic test dummies whose arms have been removed and position the dummies in the front outboard designated seating positions according to instructions in Appendix B and restrain the dummies, using the belt systems for the positions being tested.

YES X NO -

3. Outboard armrests which are capable of being stowed on vehicle seats shall be placed in their stowed positions.

YES N/A NO N/A

4. Check the option which applies to this test vehicle:

a. The torso and lap belt webbing of the seat belt system automatically retract to a stowed position when the adjacent vehicle door is in an open position and the seat belt latch plate is released.

YES X NO -

Table 12 (cont.)

b. The torso and lap belt webbing of the seat belt system automatically retract when the seat belt latchplate is released.

YES X NO -

5. With the webbing and hardware in the stowed position, close the door to assure that the webbing and hardware are prevented from being pinched.

YES X NO -

6. If this test vehicle has an open body (without doors) and has a belt system with a tension-relieving device, check to assure that the belt system fully retracts when the tension-relief device is manually deactivated.

YES N/A NO N/A

D6
ACCESSIBILITY

The requirements for accessibility do not apply to:

1. Seats whose seat cushions are removable so that the seat back serves a function other than seating;
2. Seats which are removable;
3. Seats which are movable so that the space formerly occupied by the seat can be used for a secondary function.

If the seats in this vehicle are different than the criteria above, then determine if:

1. Each manual seat belt assembly whose webbing is designed to pass through the seat cushion or between the seat cushion and seat back has one of the following three parts (the seat belt latchplate, the buckle, or the seat belt webbing) on top of or above the seat cushion under normal conditions (i.e., conditions other than when belt hardware is intentionally pushed behind the seat by a vehicle occupant).

YES X NO -

2. The remaining two seat belt parts are accessible under normal conditions.

YES X NO -

Table 12 (cont.)

3. The buckle and latchplate pass through the guides or conduits provided and do not fall behind the seat when the following events occur in order:

   a. The belt is completely retracted or, if the belt is non-retractable, the belt is unattached.

   YES X NO -

   b. The seat is moved to any position to which it is designed to be adjusted.

   YES X NO -

   c. The seat back, if foldable, is folded forward as far as possible and then moved backward into positions.

   YES X NO -

4. Is the inboard receptacle end of the seat belt assembly which is installed in the outboard designated seating position accessible with the center arm rest in any position to which it can be adjusted without moving the armrest?

   YES N/A NO N/A

D7
LATCH MECHANISM

A seat belt assembly installed in a passenger car, except an automatic belt assembly, shall have a latch mechanism:

1. Whose components are accessible to a seated occupant in both the stowed and operational positions.

   YES X NO -

2. That releases both the upper torso restraint and the lap belt simultaneously, if the assembly has a lap belt and an upper torso restraint that require unlatching for release of the occupant.

   YES X NO -

3. That releases at a single point by a push button action.

   YES X NO -

Figure 8

FMVSS NO. 212 - "WINDSHIELD MOUNTING" DATA SHEET

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

The windshield is bonded in place with 1" plastic and rubber trim along sides of windshield and 0.6" plastic trim along top of windshield. A 1.3" plastic and rubber trim covers the bottom of windshield.

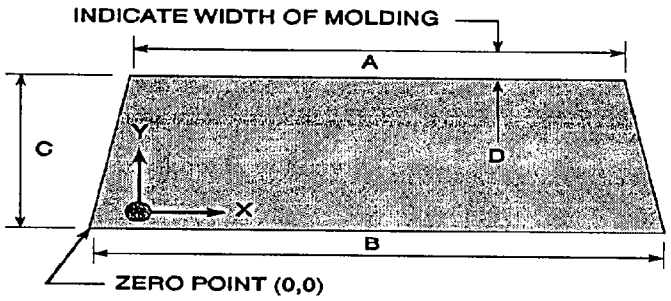
FMVSS 212 REQUIREMENTS :

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

FMVSS 212 TEST DATA :

	WINDSHIELD PERIPHERY		
	PRE - TEST (in.)	POST - TEST (in.)	PERCENT RETENTION
RIGHT SIDE	86.0	86.0	100.0
LEFT SIDE	86.0	86.0	100.0
TOTAL	172.0	172.0	100.0

AREA OF RETENTION FAILURE:



FRONT VIEW OF WINDSHIELD

FAILURE DETAILS : None

Figure 9

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

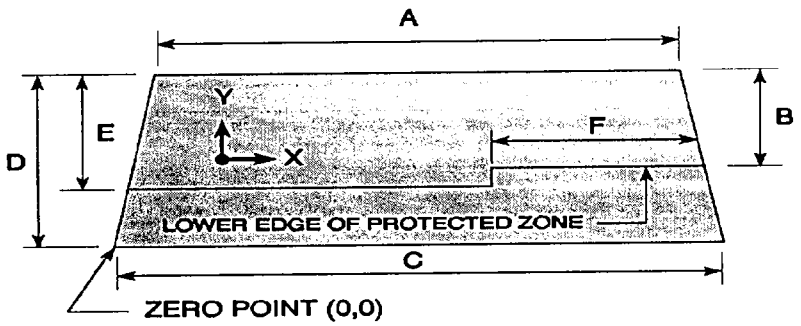
PROTECTED ZONE LOWER EDGE REQUIREMENT :

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the 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, and then draw a line on the inner surface of the windshield below and 1/2" distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection of this line onto the outer surface of the windshield

FMVSS 219 TEST DATA : (Dimensions in inches.)

KEY (Inches):

A =	52.0
B =	15.5
C =	64.0
D =	28.0
E =	20.5
F =	37.3



FRONT VIEW OF WINDSHIELD

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

(Show location of penetration on above sketch)

	COORDINATES	
	X	Y
1		
2		
3		
4		

None

Table 13

FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO. 301

TEST VEHICLE NHTSA NO. : CT5700 TEST DATE : April 23, 1996

Vehicle Mfgr./Make/Model : 1996 Isuzu Trooper 4-Door MPV

Test vehicle fuel tank filled to 92% to 94% of manufacturer's "usable" capacity and with electric fuel pump operating (if it will operate without engine operation). Part 572 test dummies located at each front designated seating position.

****

TEST VEHICLE IMPACT TYPE :

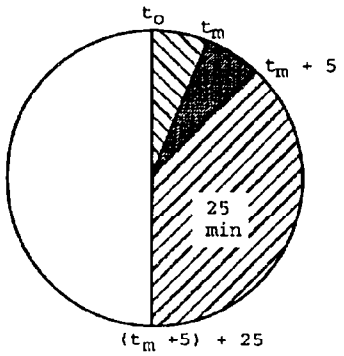
X Frontal (30 mph)

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

\- Rear Moving Barrier (30 mph)

\- Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT:



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

ACTUAL	MAX ALLOWED
0	1 oz.
0	5 oz.
0	1 oz./1 min.

SOLVENT SPILLAGE DETAILS :

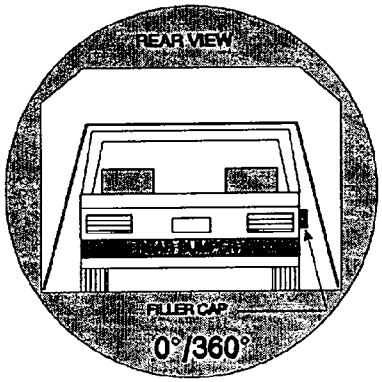
None

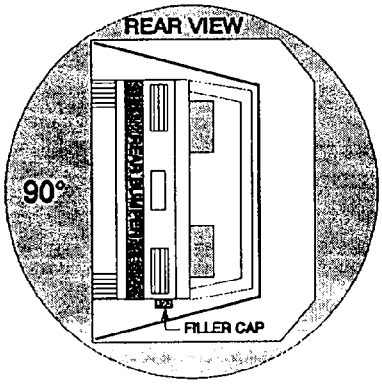
Table 14

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE :
0-90 Deg.

Vehicle NHTSA ID No. :
CT5700





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)		1	minutes	57	seconds
FMVSS 301 Position Hold Time +		5	minutes	00	seconds
	TOTAL	6	minutes	57	seconds
Next whole minute interval		7	minutes		

II. FMVSS 301 REQUIREMENTS :

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE :

0	0	0	N/A

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

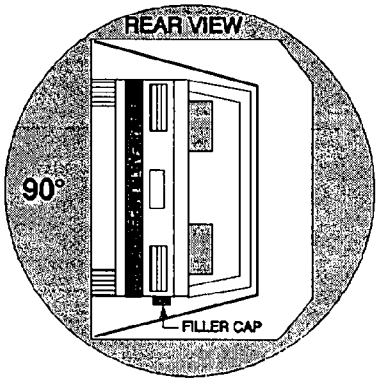
IV. SOLVENT SPILLAGE LOCATION(S) :

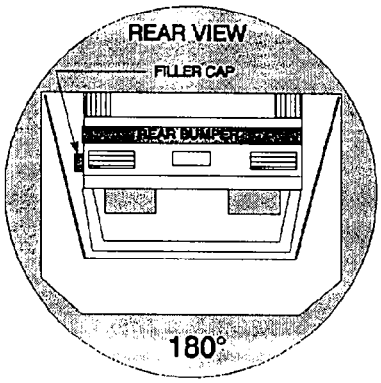
None

Table 14
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE :
90-180 Deg.

Vehicle NHTSA ID No. :
CT5700





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)		2	minutes	20	seconds
FMVSS 301 Position Hold Time +		5	minutes	00	seconds
	TOTAL	7	minutes	20	seconds
Next whole minute interval		8	minutes		

II. FMVSS 301 REQUIREMENTS :

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE :

0	0	0	0

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

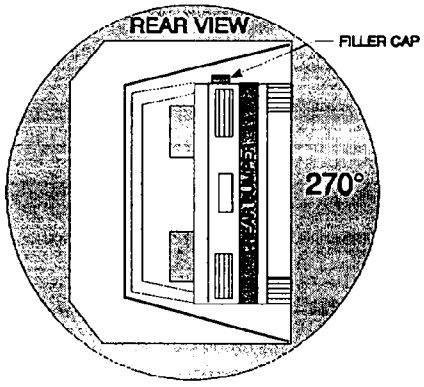
IV. SOLVENT SPILLAGE LOCATION(S) :

None

Table 14
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE :
180-270 Deg.

Vehicle NHTSA ID No. :
CT5700



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)		2	minutes	22	seconds
FMVSS 301 Position Hold Time +		5	minutes	00	seconds
	TOTAL	7	minutes	22	seconds
Next whole minute interval		8	minutes		

II. FMVSS 301 REQUIREMENTS :

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE :

0	0	0	0

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

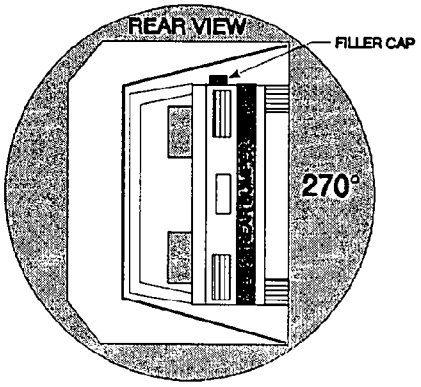
IV. SOLVENT SPILLAGE LOCATION(S) :

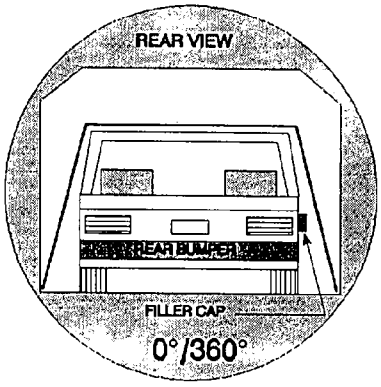
None

Table 14
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE :
270-360 Deg.

Vehicle NHTSA ID No. :
CT5700





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)		1	minutes	55	seconds
FMVSS 301 Position Hold Time +		5	minutes	00	seconds
	TOTAL	6	minutes	55	seconds
Next whole minute interval		7	minutes		

II. FMVSS 301 REQUIREMENTS :

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE :

0	0	0	N/A

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

IV. SOLVENT SPILLAGE LOCATION(S) :

None

Table 15

POST TEST AIR BAG DATA

NHTSA No. : CT5700; Test Date: April 23, 1996; Technician: VMP

Vehicle Model Year/Make/Model: 1996 Isuzu Trooper 4-Door MPV

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

B. Size of vent holes: (In.^{2}) 1.77 -Driver _____ -Passenger

C. Total vent area: (In.^{2}) 3.54 -Driver _____ -Passenger

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

Driver: - -Length; - -Width; 25 -Diameter

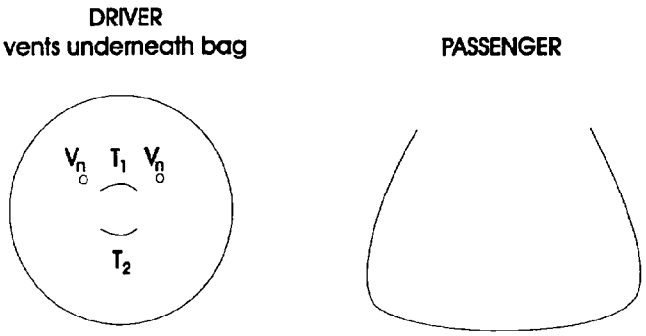
Passenger: 24 -Height; 18 -Width; 18 -Depth

E. Is the air bag tethered?

Driver: X -Yes; _____ -No; If yes, record length of tether- 9.7 in.

Passenger: _____ -Yes; X -No; If yes, record length of tether- _____

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: PE5271400-03, TB85172B0942

Generator: AB2595ZB526045

Passenger: Air bag: IZHF2342454

Generator: T26IS243536227 (Do not use in model year 1995)

G. Cut out a 6 inch by 6 inch swatch of the bag material and at least one tether from each bag, mark the vehicle's NHTSA number on the swatch, and send these parts to the COTR with the test report.

Table 16

ACCIDENT INVESTIGATION DIVISION DATA

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1996 Isuzu Trooper 4-Door MPV

VEHICLE NHTSA NO. : CT5700 VIN NO. : JACDJ58V8T7901171

WHEELBASE: 108.7 in. BUILD DATE: Oct. 95 TEST DATE: April 23, 1996

VEH SIZE CATEGORY: MPV TEST WEIGHT: 5022 lbs.

FRONT OVERHANG: 32.3 in. OVERALL WIDTH: 72.2 in.

COLLISION DEFORMATION (CDC) CODE: 12FDEW2

IMPACT MODE: 30 mph zero degree frontal barrier.

CRUSH DEPTH DIMENSIONS: (Inches)

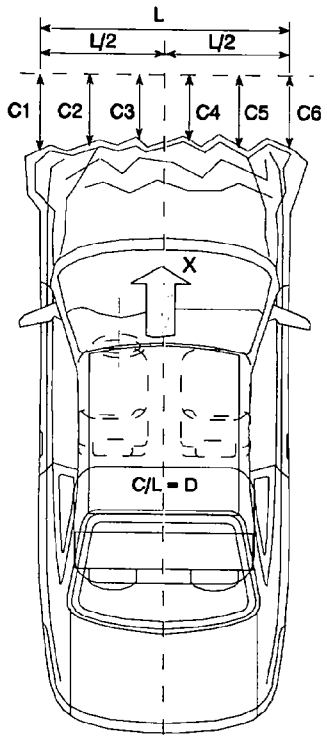
C1 = 14.2 C4 = 16.7

C2 = 15.0 C5 = 16.0

C3 = 16.3 C6 = 15.0

MIDPOINT OF DAMAGE: D=
(Vehicle Longitudinal Centerline) 32.3

LENGTH OF DAMAGE
REGION: L= 64.5



Remarks: None

Table 17
TEST VEHICLE NONCOMPLIANCE NOTICE

NHTSA Contract Lab : Calspan SRL Corporation

Lab Project Manager & Telephone No. : David J. Travale (716) 632 - 7500

Date of Test : April 23, 1996 Vehicle NHTSA No. : CT5700

Vehicle Manufacturer : Isuzu Motors LTD., Japan

Model Year : 1996 VIN : JACDJ58V8T7901171

Model : Trooper Body Style: 4-Door MPV Build Date : Oct. 95

Dummy Stabilized Temperature at Time of Test : 70 °F (Spec. = 69 - 72 °F)

Impact Velocity : 29.4 mph; Time of Test : 13:09

Type of Automatic Restraint System :

Driver : Airbag

Passenger : Airbag

Failure Details :

The vehicle as tested, appears to comply with the requirements of FMVSS Nos. 208, 212, 219(partial), and 301.

Appendix A

PHOTOGRAPHS

LIST OF PHOTOGRAPHS

Figure A-1 PRE-TEST FRONT VIEW

8353-3

Figure A-2 POST-TEST FRONT VIEW

Figure A-3 PRE-TEST LEFT SIDE VIEW

8353-3

Figure A-4 POST-TEST LEFT SIDE VIEW

Figure A-5 PRE-TEST RIGHT SIDE VIEW

Figure A-6 POST-TEST RIGHT SIDE VIEW

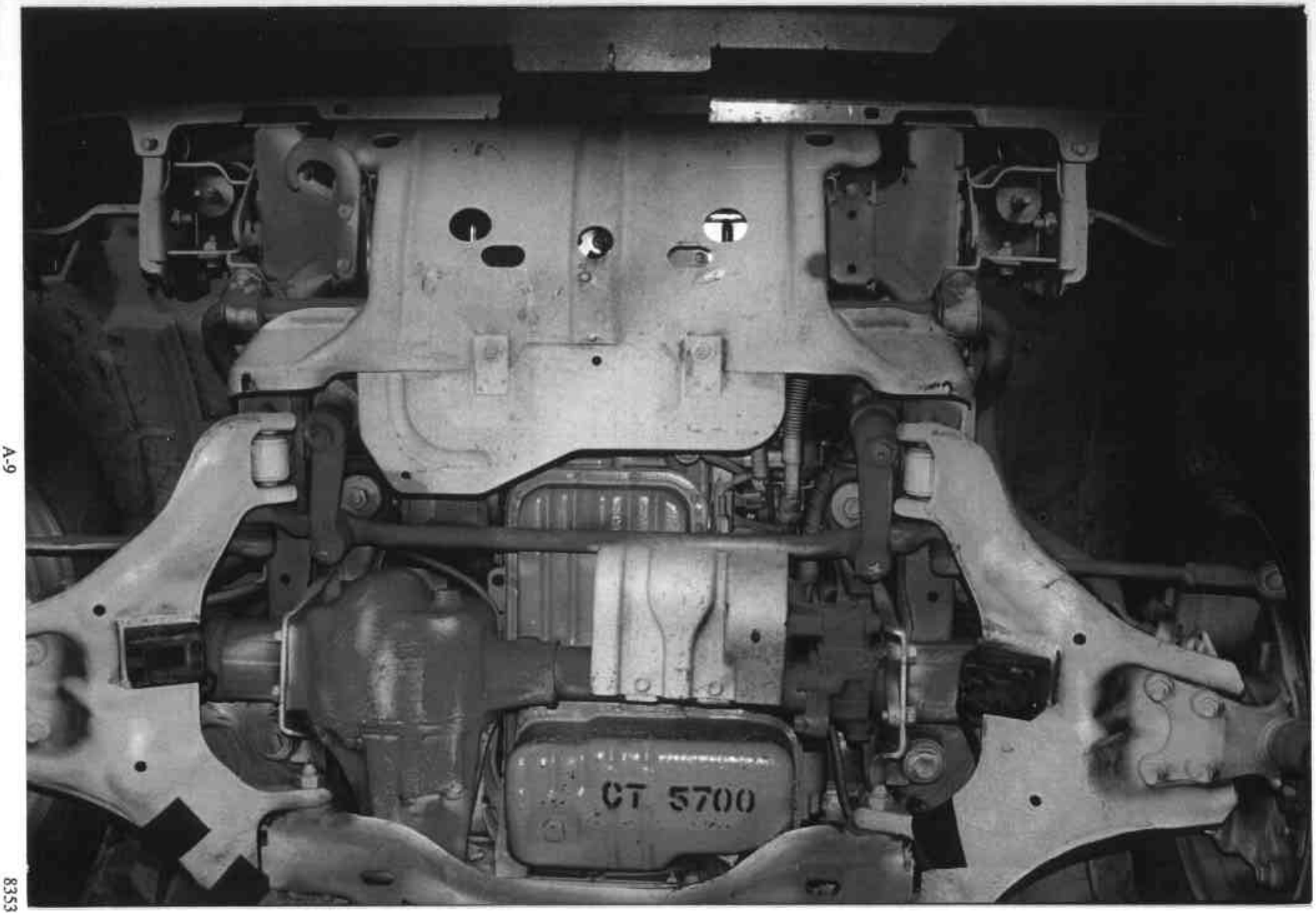


Figure A-7 PRE-TEST FRONT UNDERBODY VIEW

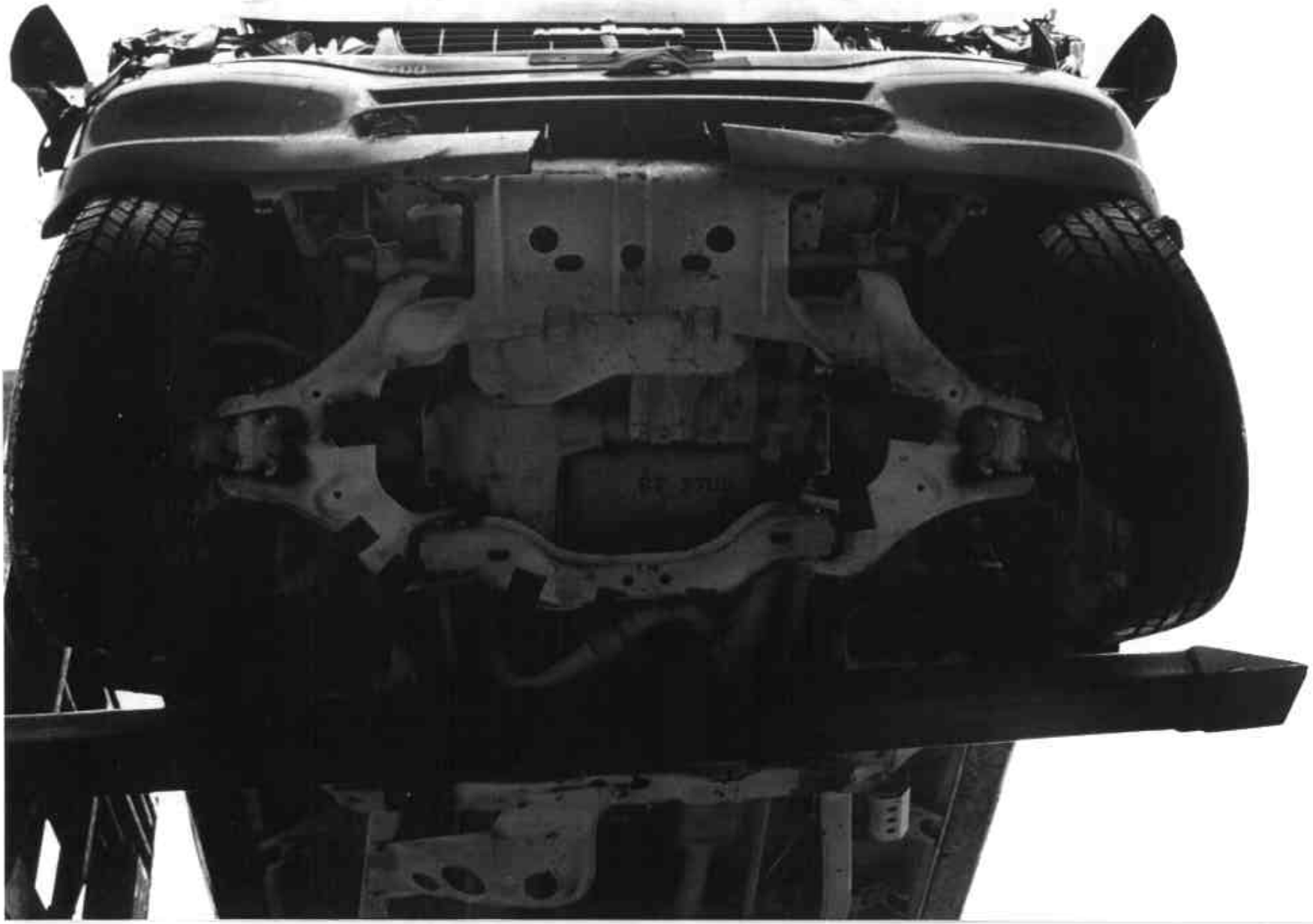


Figure A-8 POST-TEST FRONT UNDERBODY VIEW

Figure A-9 PRE-TEST DRIVER SIDE VIEW

Figure A-10 POST-TEST DRIVER SIDE VIEW

8353-3

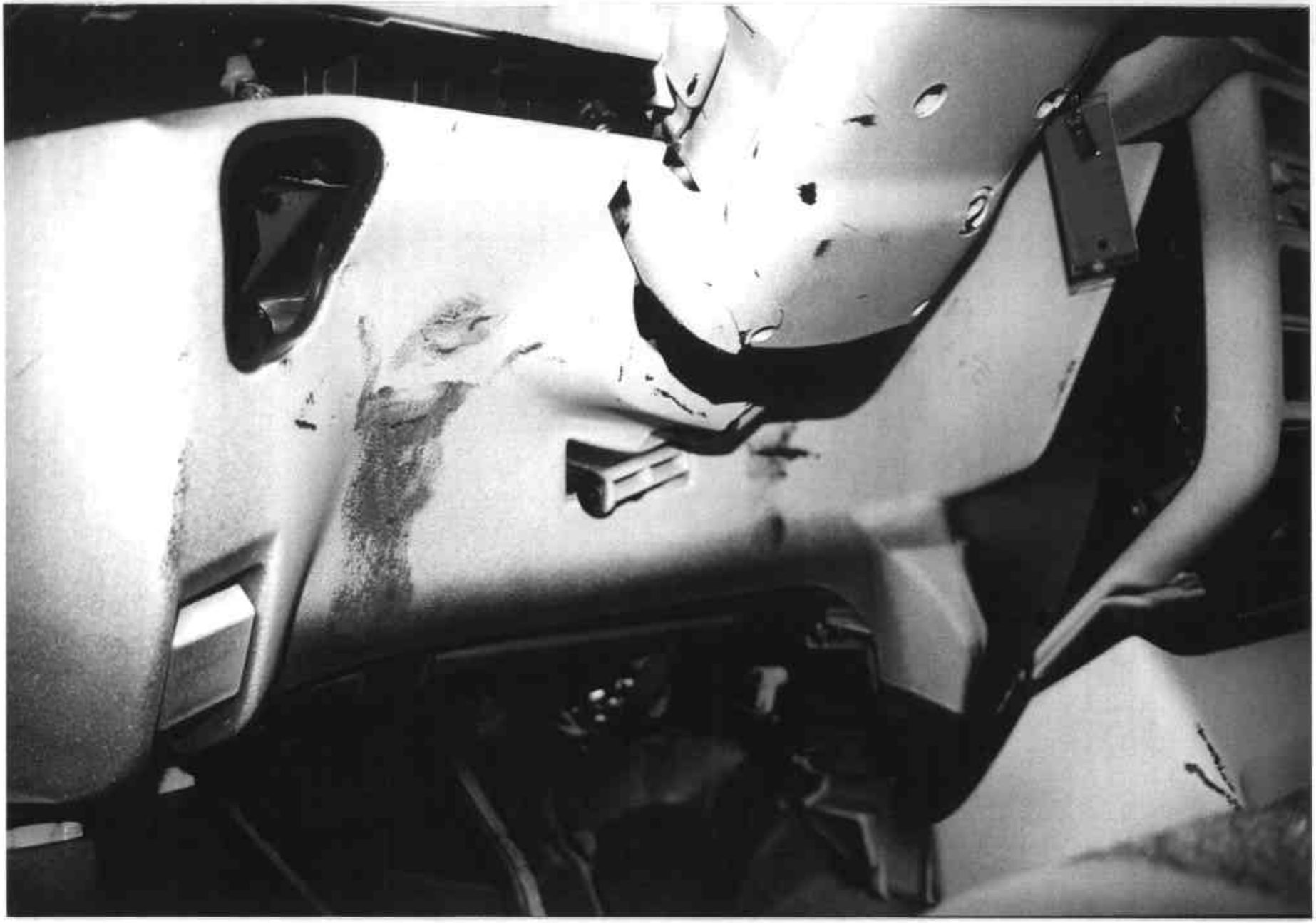
Figure A-11 PRE-TEST PASSENGER SIDE VIEW

8353-3

Figure A-12 POST-TEST PASSENGER SIDE VIEW

8353-3

Figure A-13 PRE-TEST DRIVER KNEE BOLSTER



A-16

8353-3

Figure A-14 POST-TEST DRIVER KNEE BOLSTER

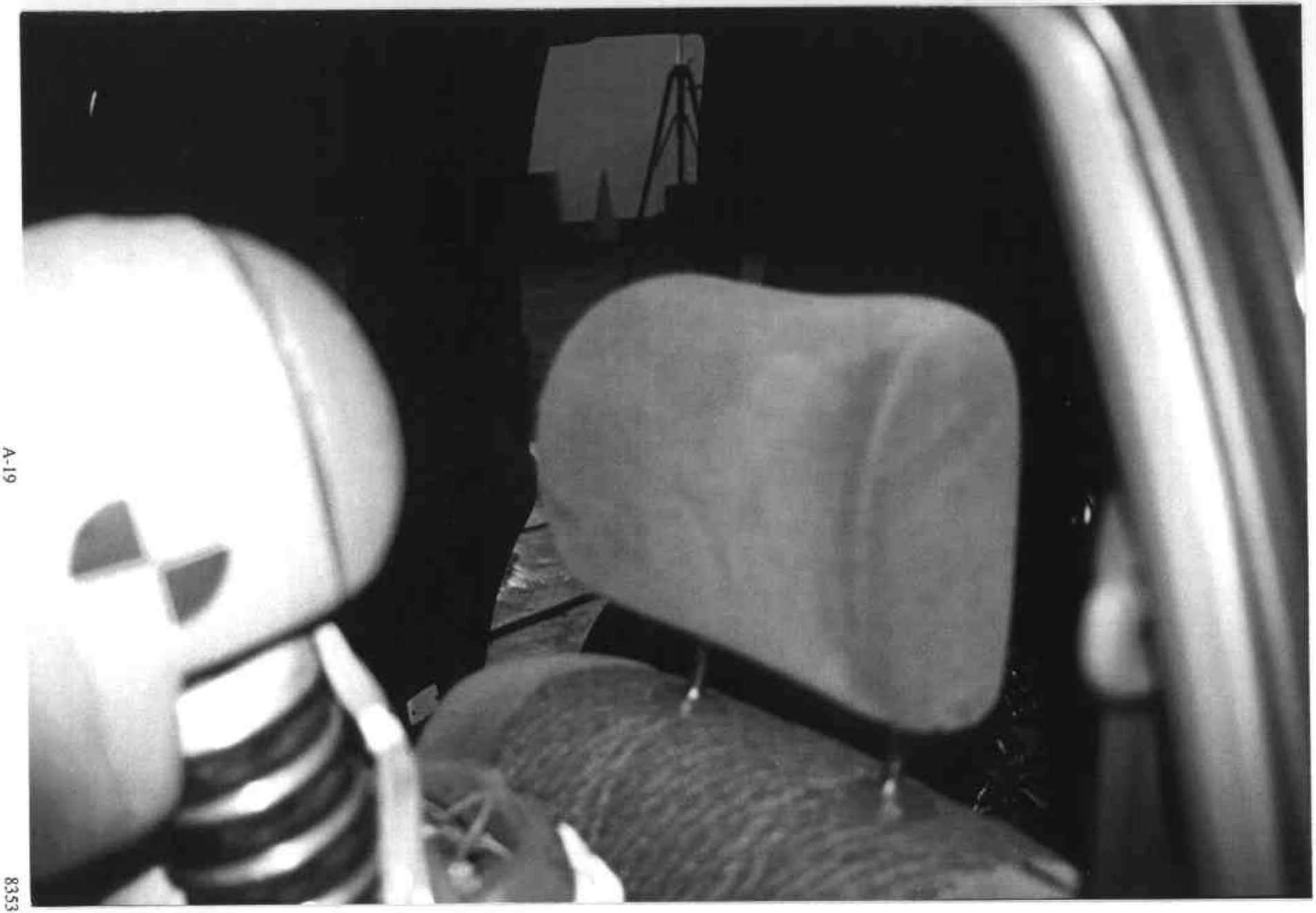
A-17

8353-3

Figure A-15 PRE-TEST PASSENGER KNEE BOLSTER

8353-3

Figure A-16 POST-TEST PASSENGER KNEE BOLSTER

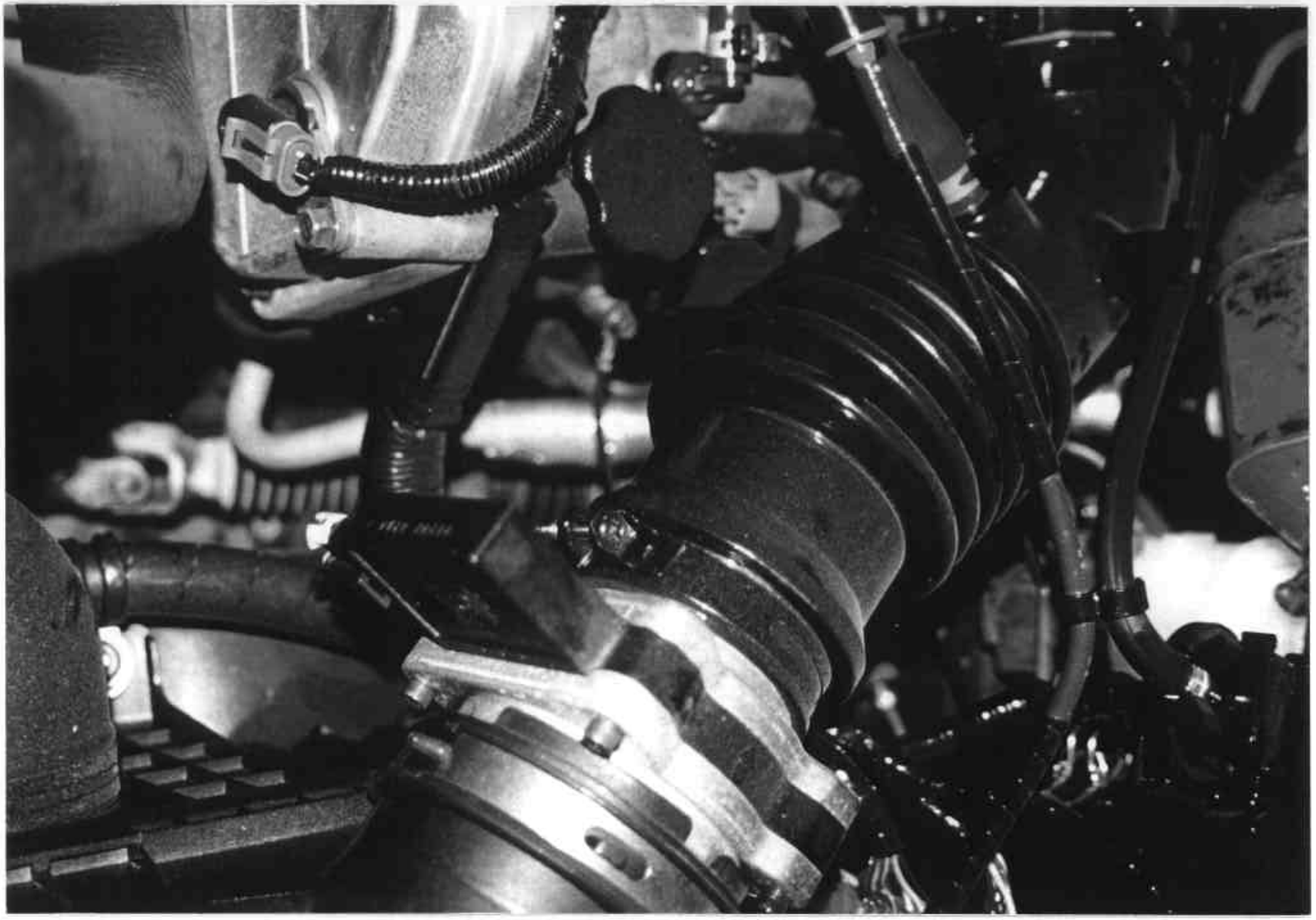


8353-3

Figure A-17 POST-TEST DRIVER HEADREST VIEW

Figure A-18 POST-TEST PASSENGER HEADREST VIEW

Figure A-19 POST-TEST PASSENGER SUNVISOR VIEW



8353-3

Figure A-20 PRE-TEST UNDERBODY STEERING SHAFT

8353-3

Figure A-21 POST-TEST UNDERBODY STEERING SHAFT

Figure A-22 PRE-TEST STEERING COLUMN/FIREWALL INSIDE VIEW

PHOTOGRAPH NOT AVAILABLE

Figure A-23 POST-TEST STEERING COLUMN/FIREWALL INSIDE VIEW

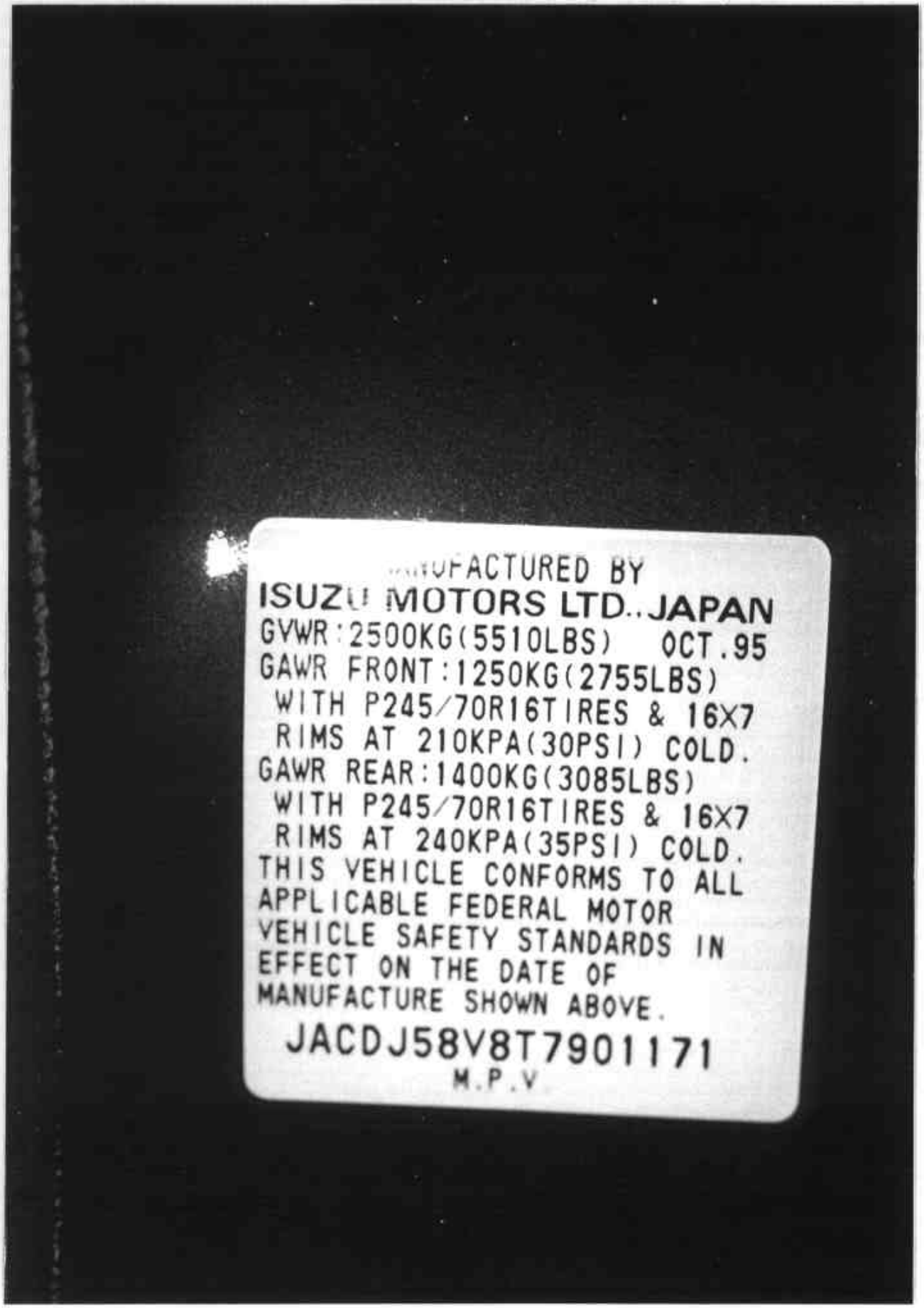


Figure A-24 CERTIFICATION/TIRE PLACARD

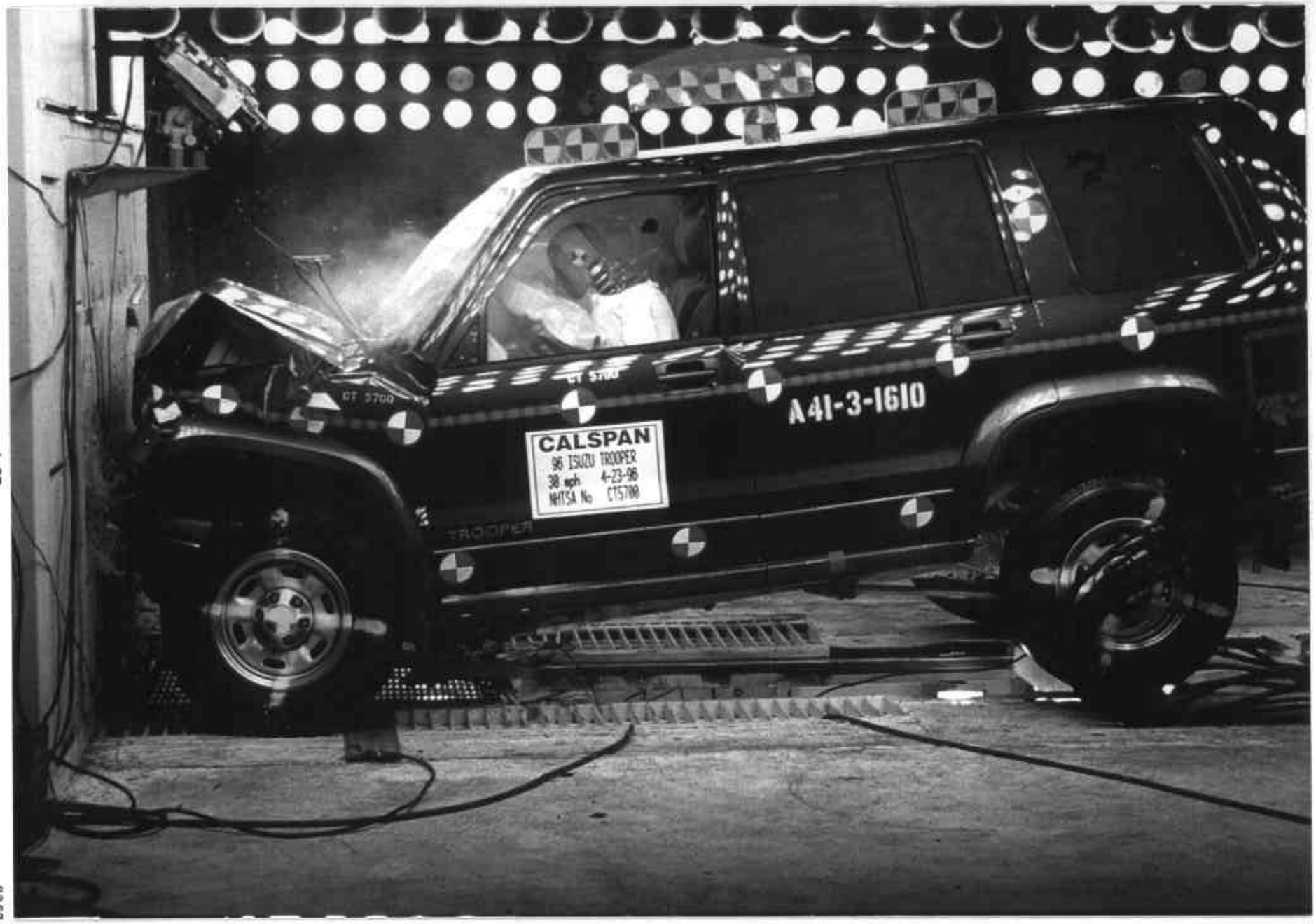


Figure A-25 VEHICLE IMPACT

8353-3

Figure A-26 POST-TEST DRIVER AIRBAG VIEW

8353-3

8353-3

Figure A-27 POST-TEST PASSENGER AIRBAG VIEW

Appendix B

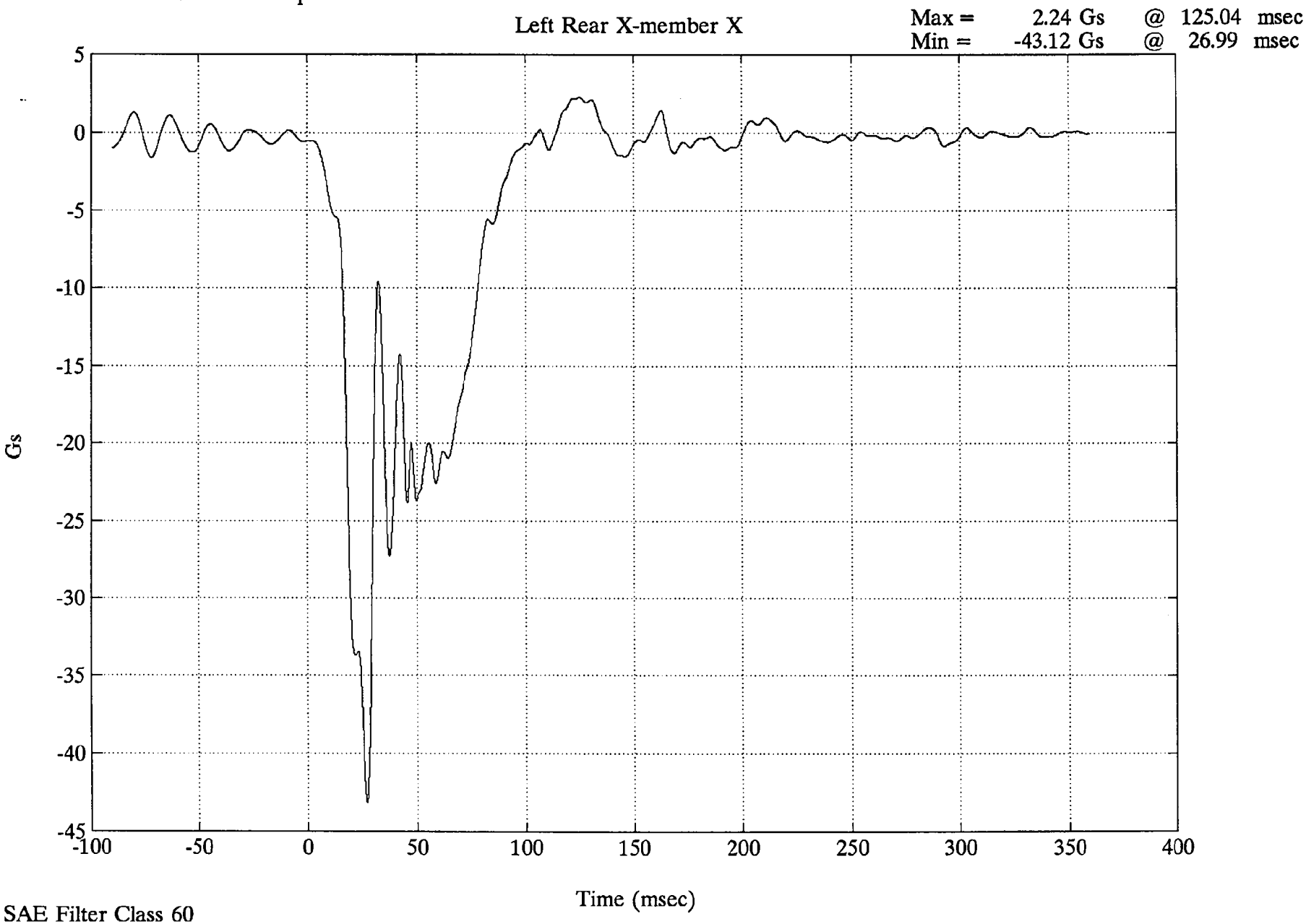
VEHICLE AND DUMMY RESPONSE DATA

NOTE : Data trace scales are automatically scaled at the request of the COTR. Use caution when reviewing data.

TEST NO. CT5700

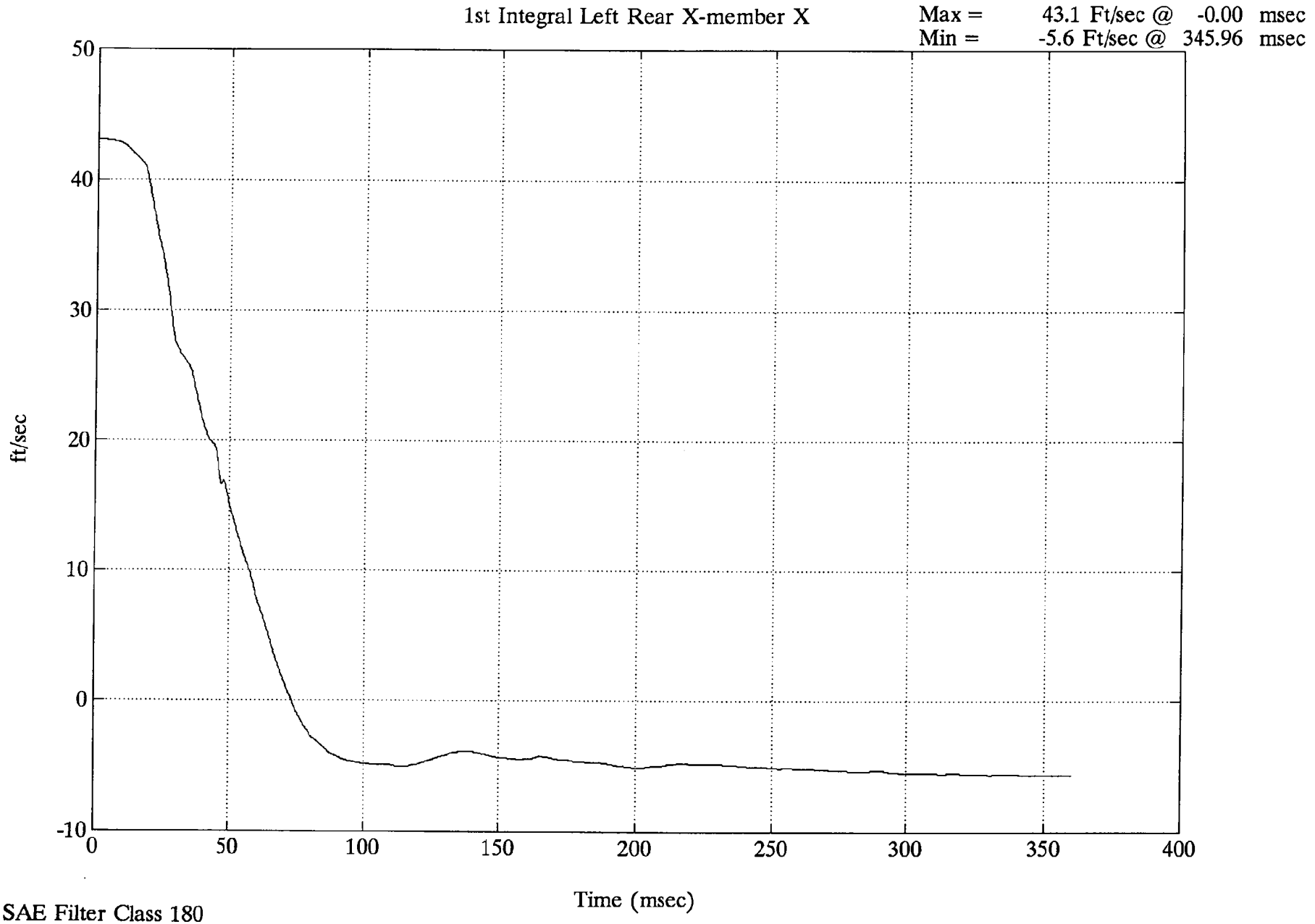
VEHICLE	SAE FILTER CHANNEL CLASS
Acceleration	60
Velocity	180
Displacement	180

208 Test #5 - 1996 Isuzu Trooper



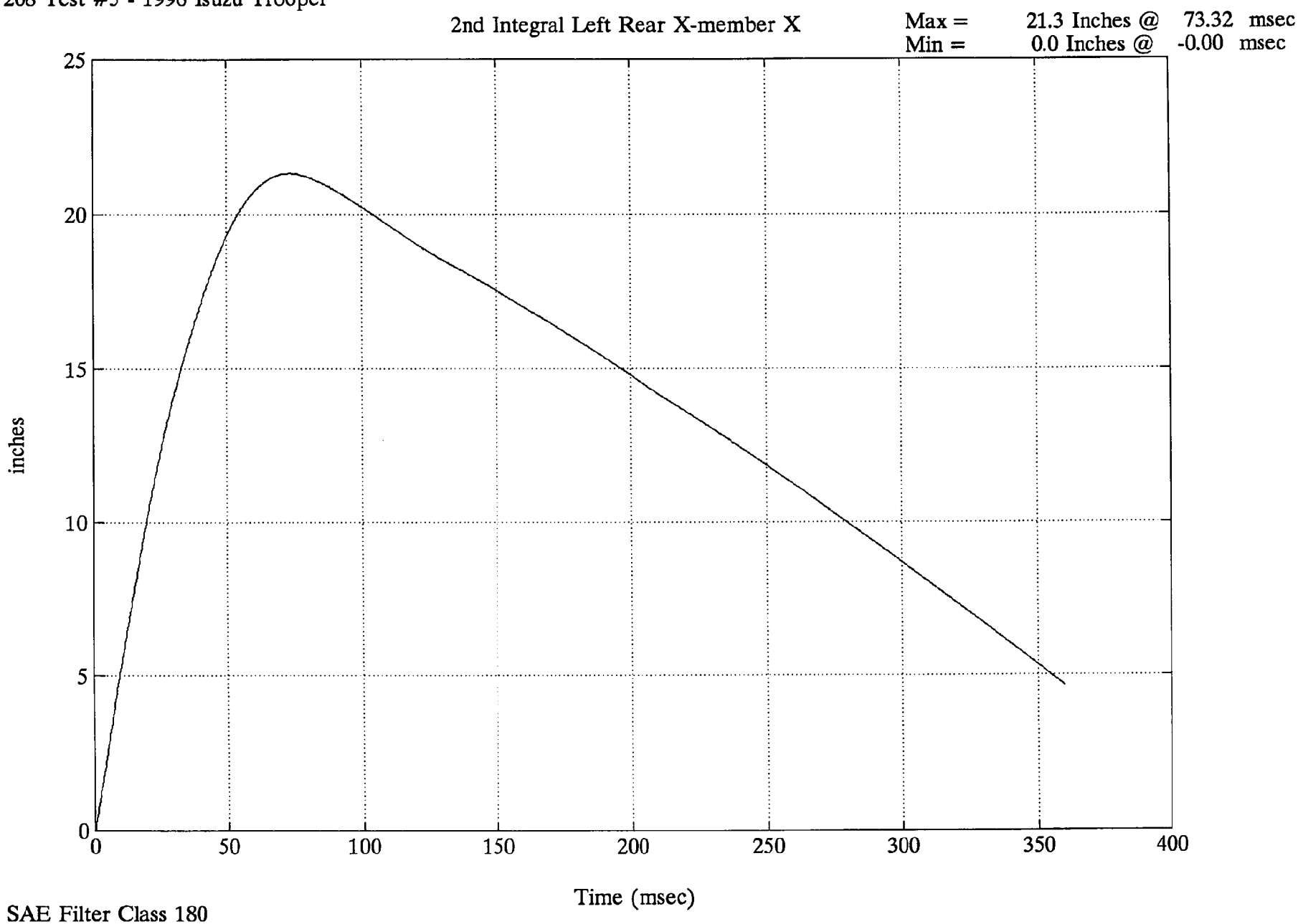
SAE Filter Class 60

208 Test #5 - 1996 Isuzu Trooper



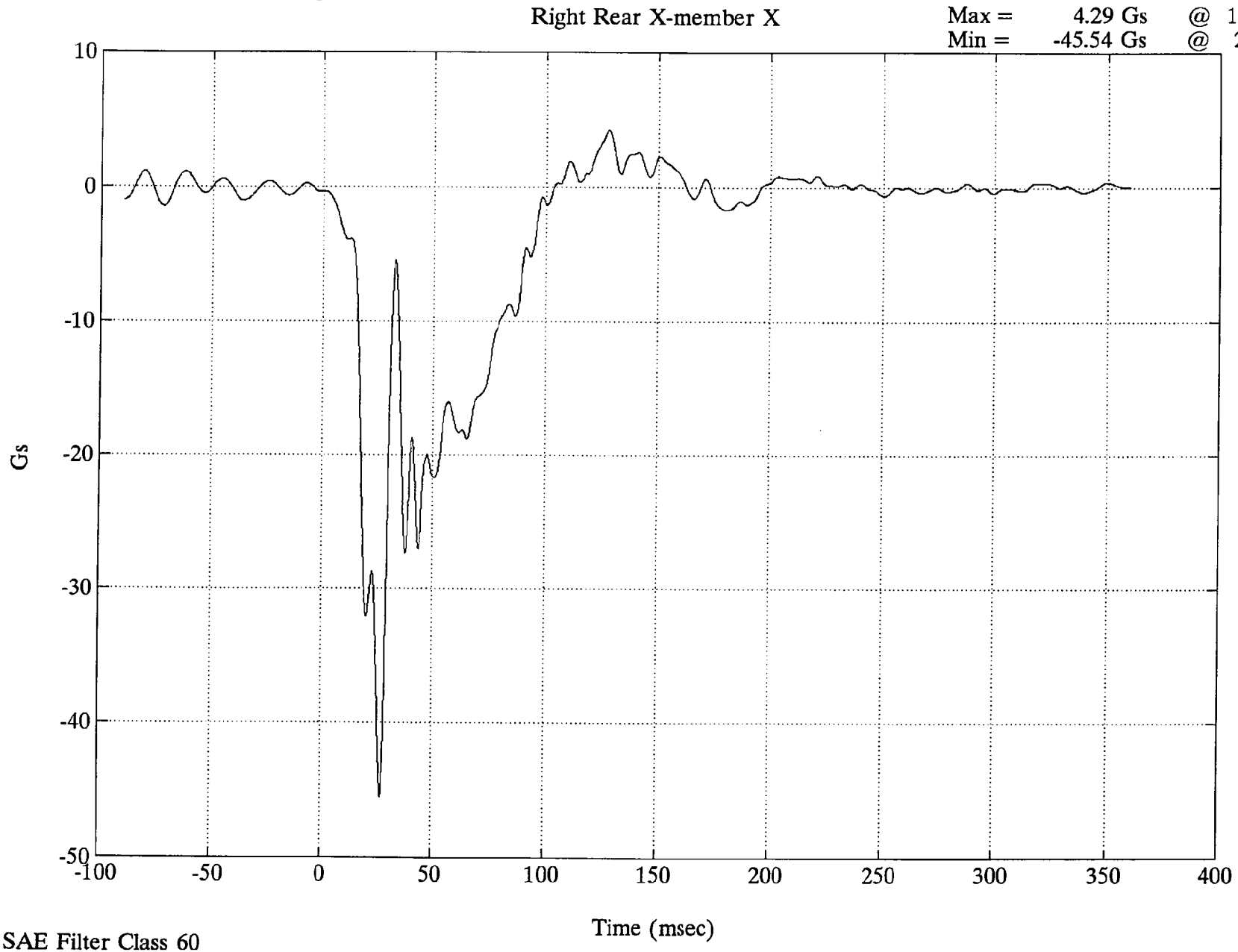
SAE Filter Class 180

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 180

208 Test #5 - 1996 Isuzu Trooper

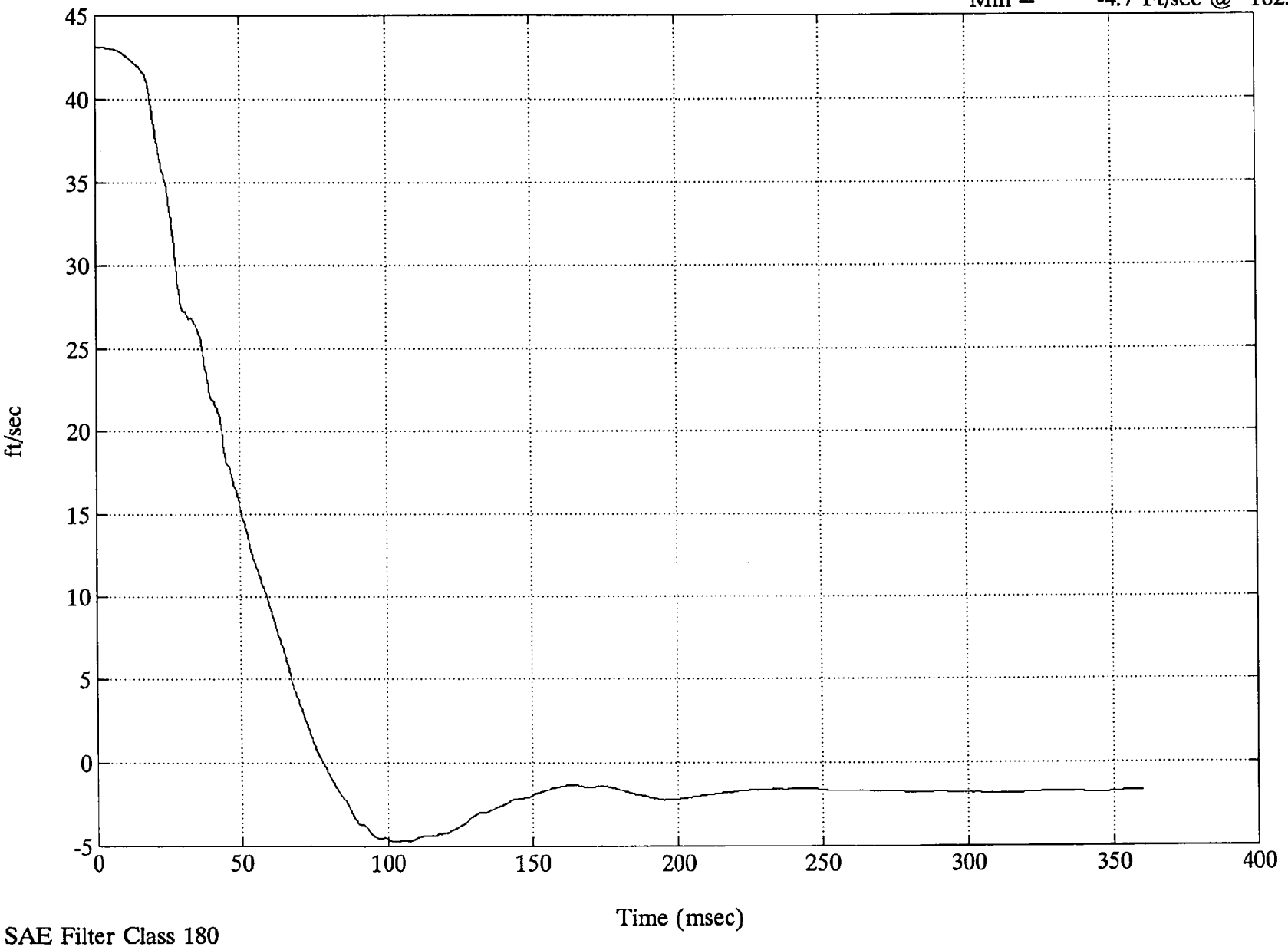


SAE Filter Class 60

208 Test #5 - 1996 Isuzu Trooper

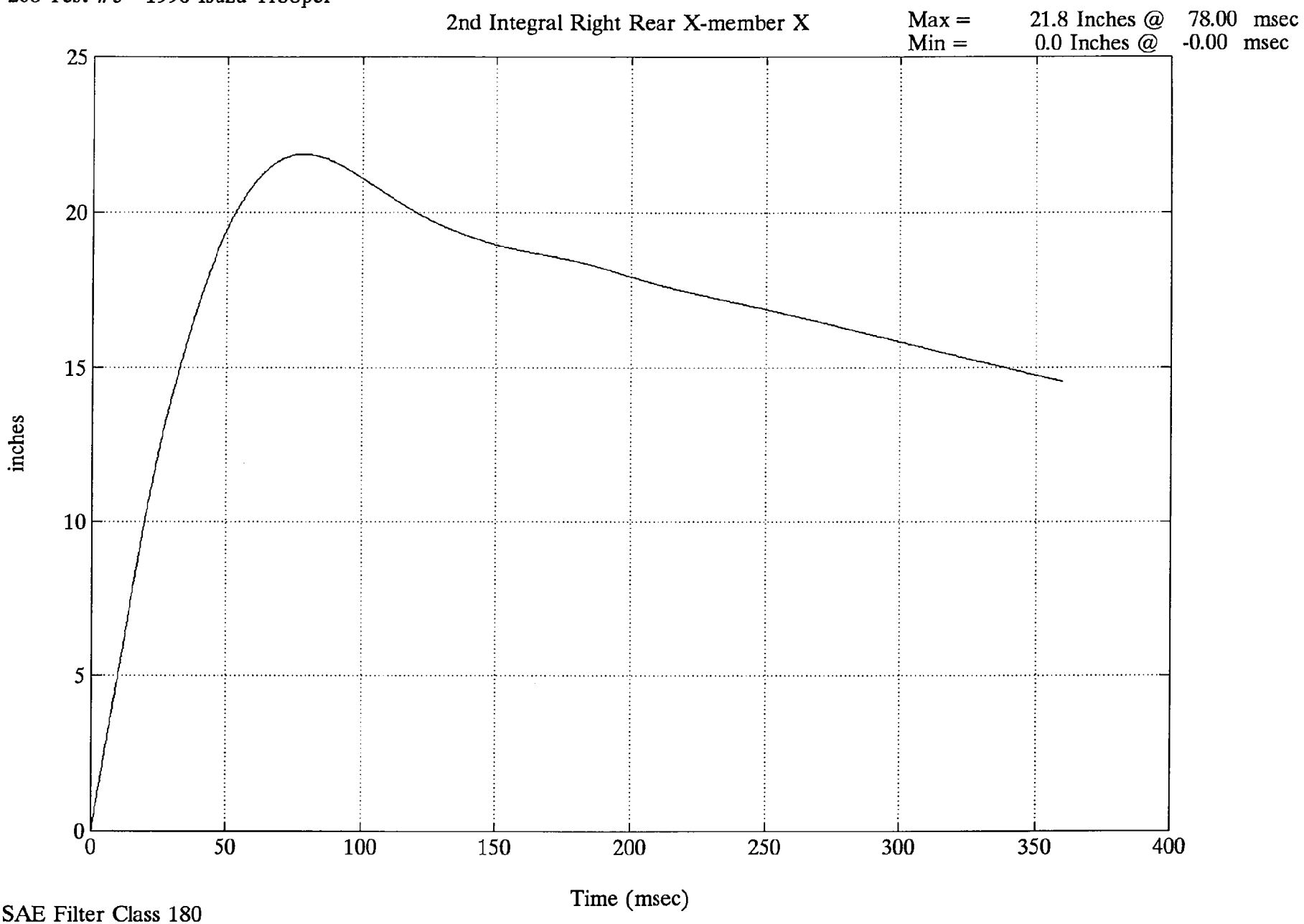
1st Integral Right Rear X-member X

Max = 43.1 Ft/sec @ -0.00 msec
Min = -4.7 Ft/sec @ 102.60 msec



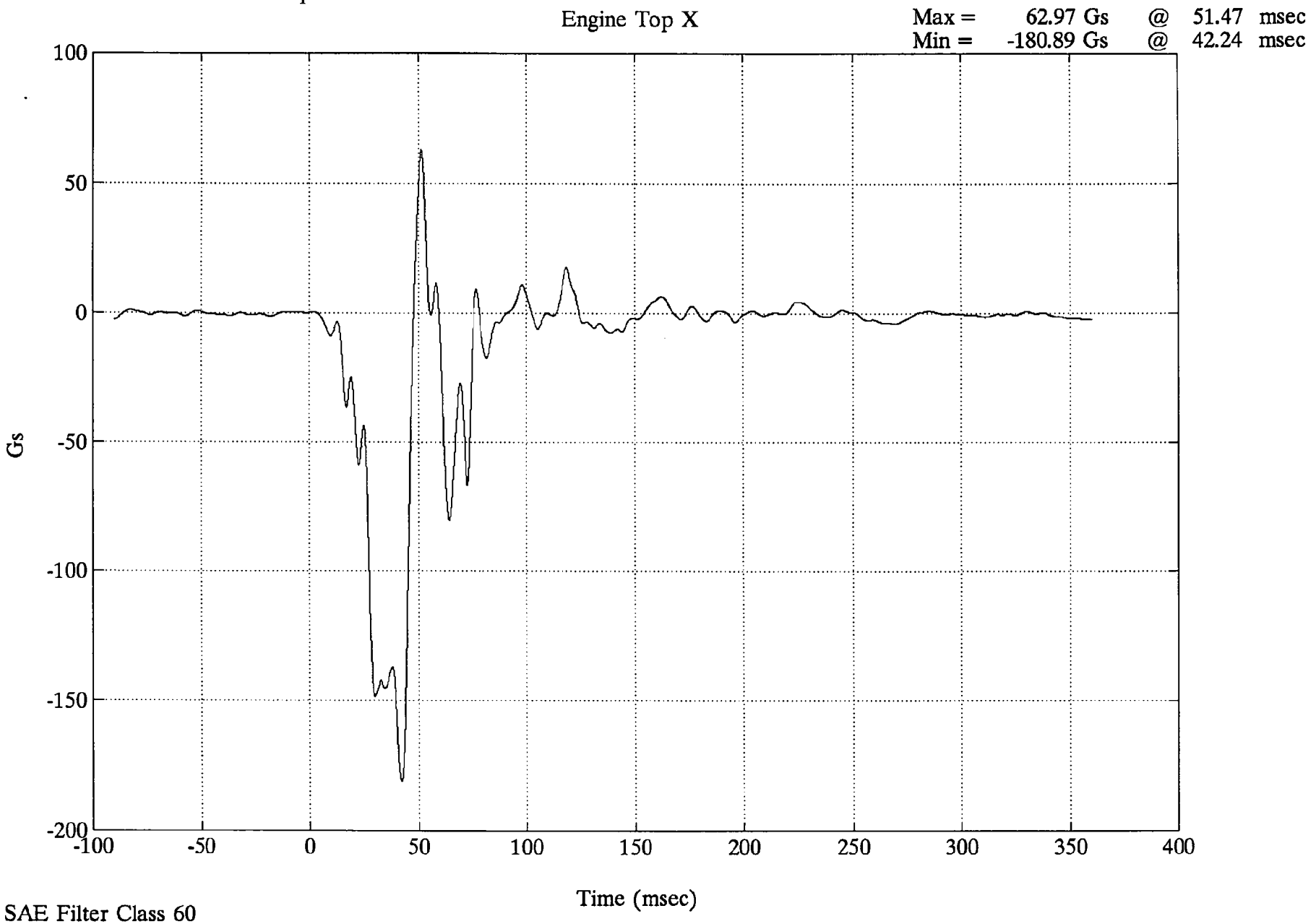
SAE Filter Class 180

208 Test #5 - 1996 Isuzu Trooper



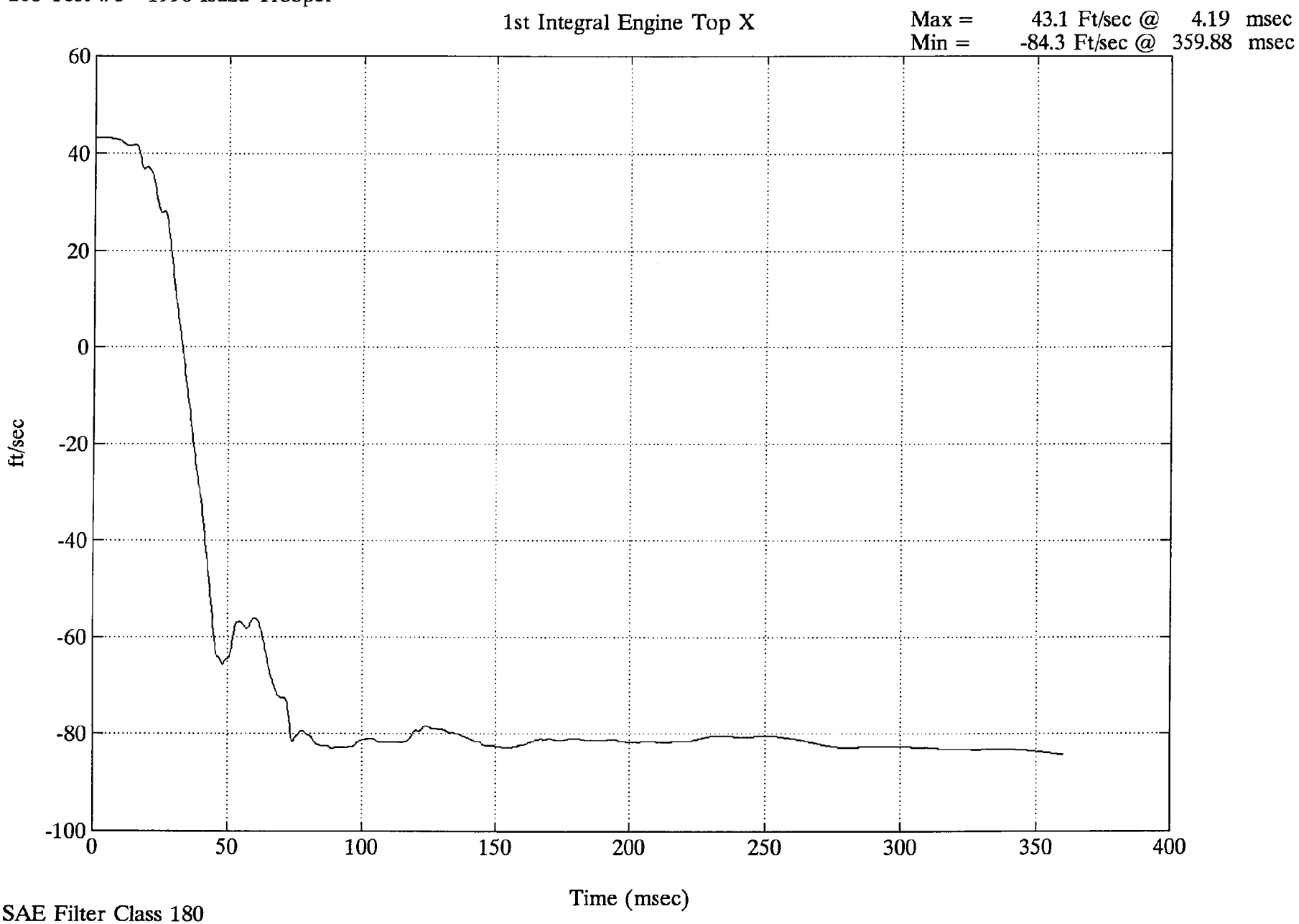
SAE Filter Class 180

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 60

208 Test #5 - 1996 Isuzu Trooper



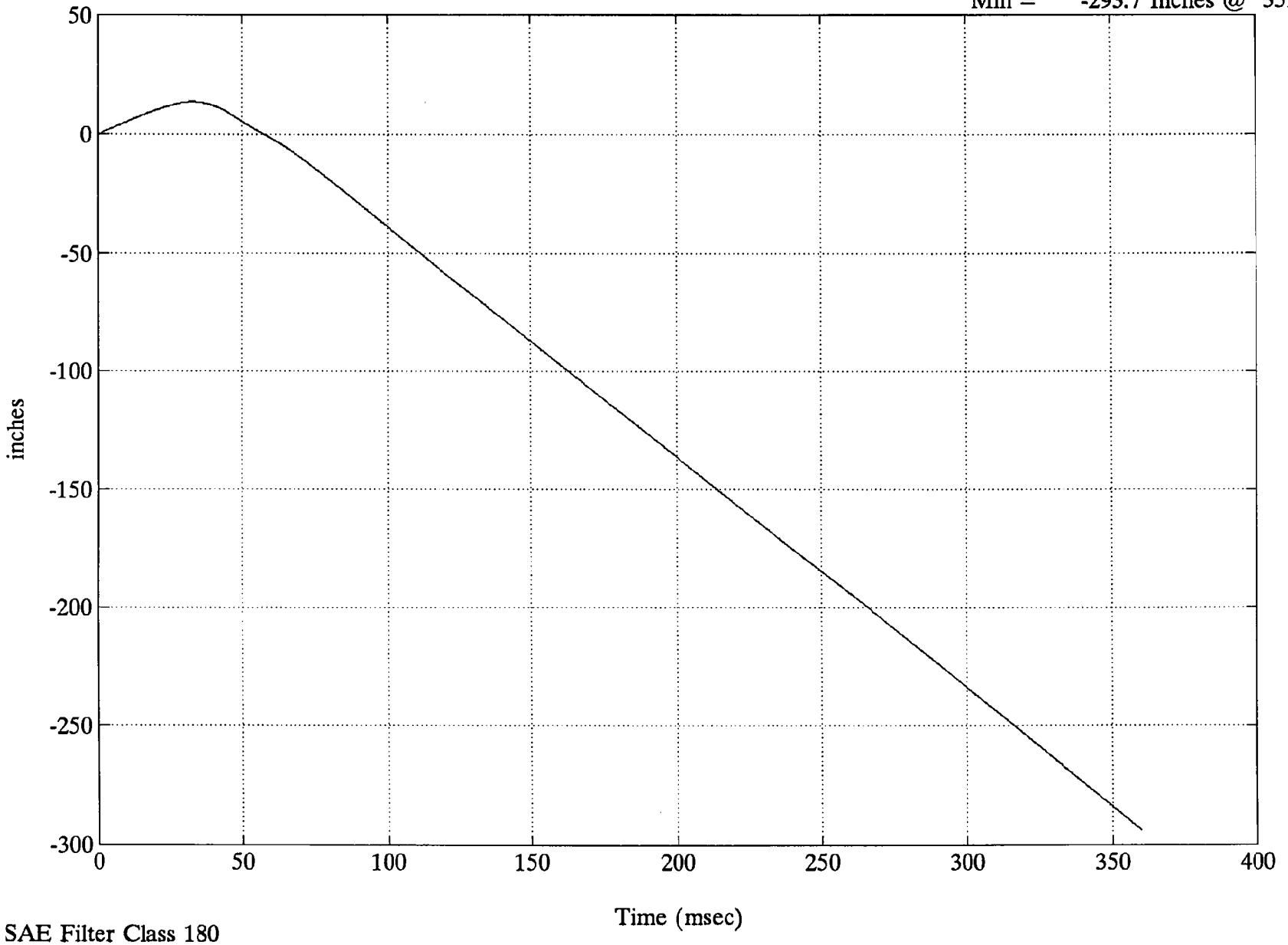
SAE Filter Class 180

8353-3

208 Test #5 - 1996 Isuzu Trooper

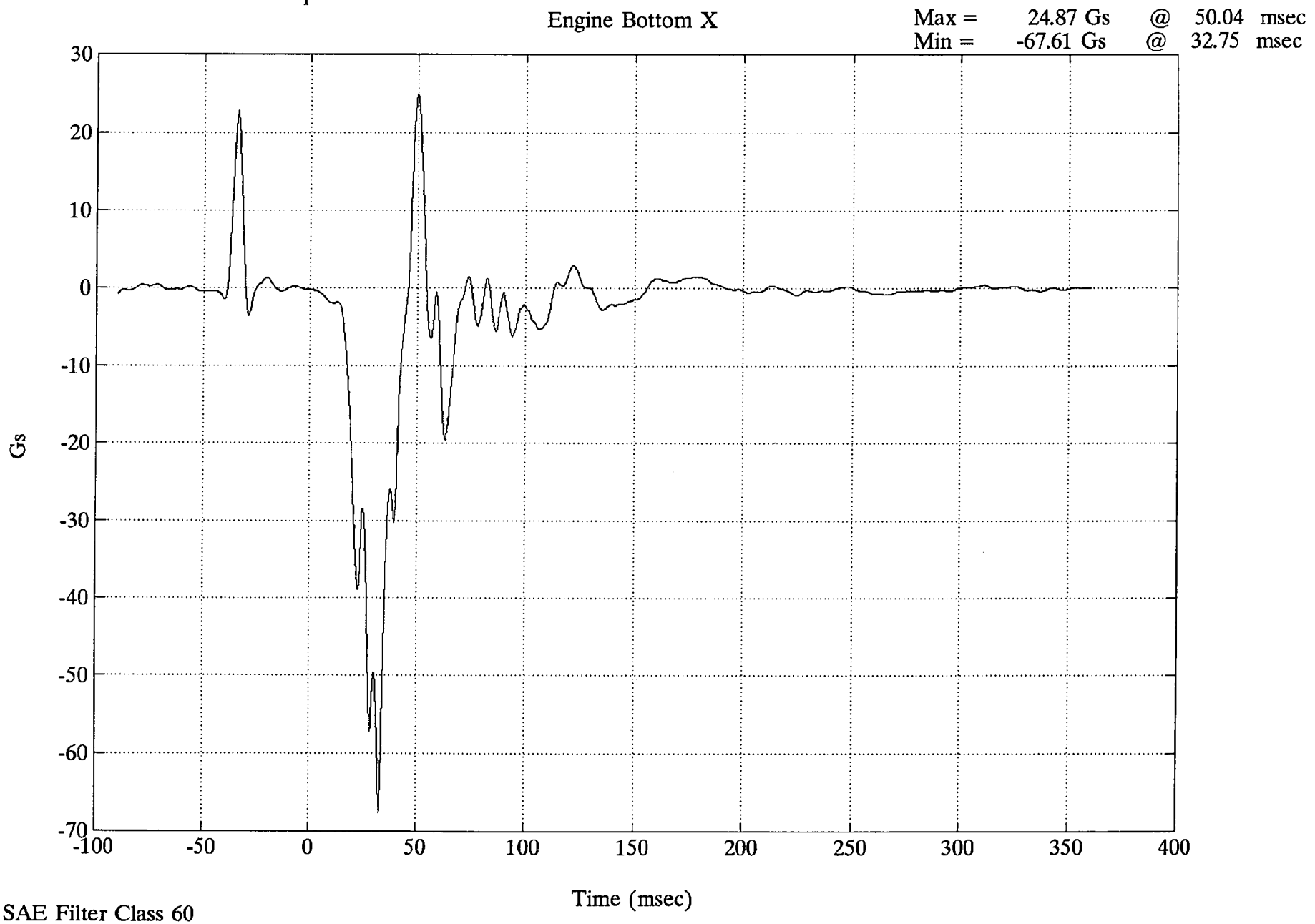
2nd Integral Engine Top X

Max = 13.4 Inches @ 32.63 msec
Min = -293.7 Inches @ 359.88 msec



SAE Filter Class 180

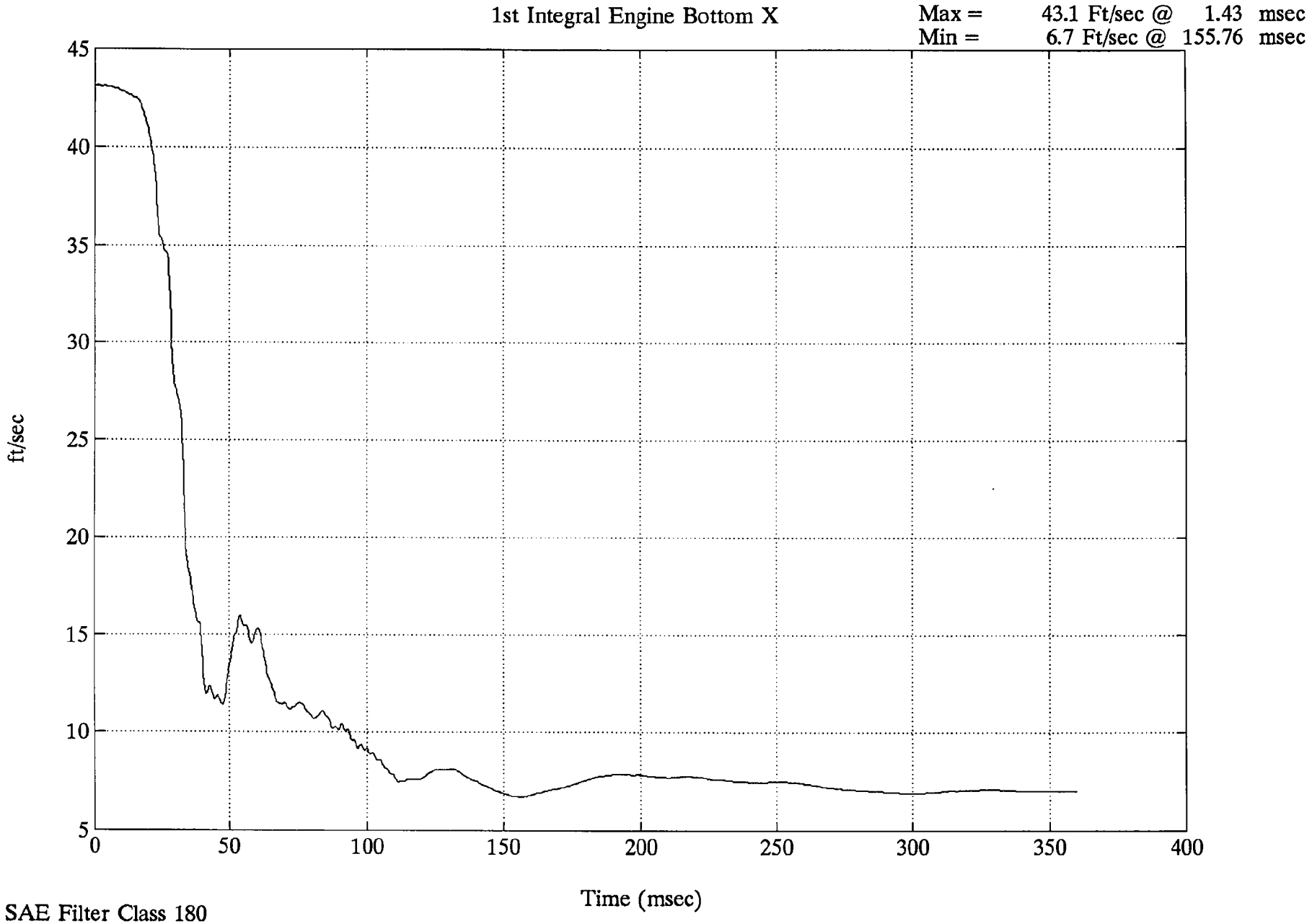
208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 60

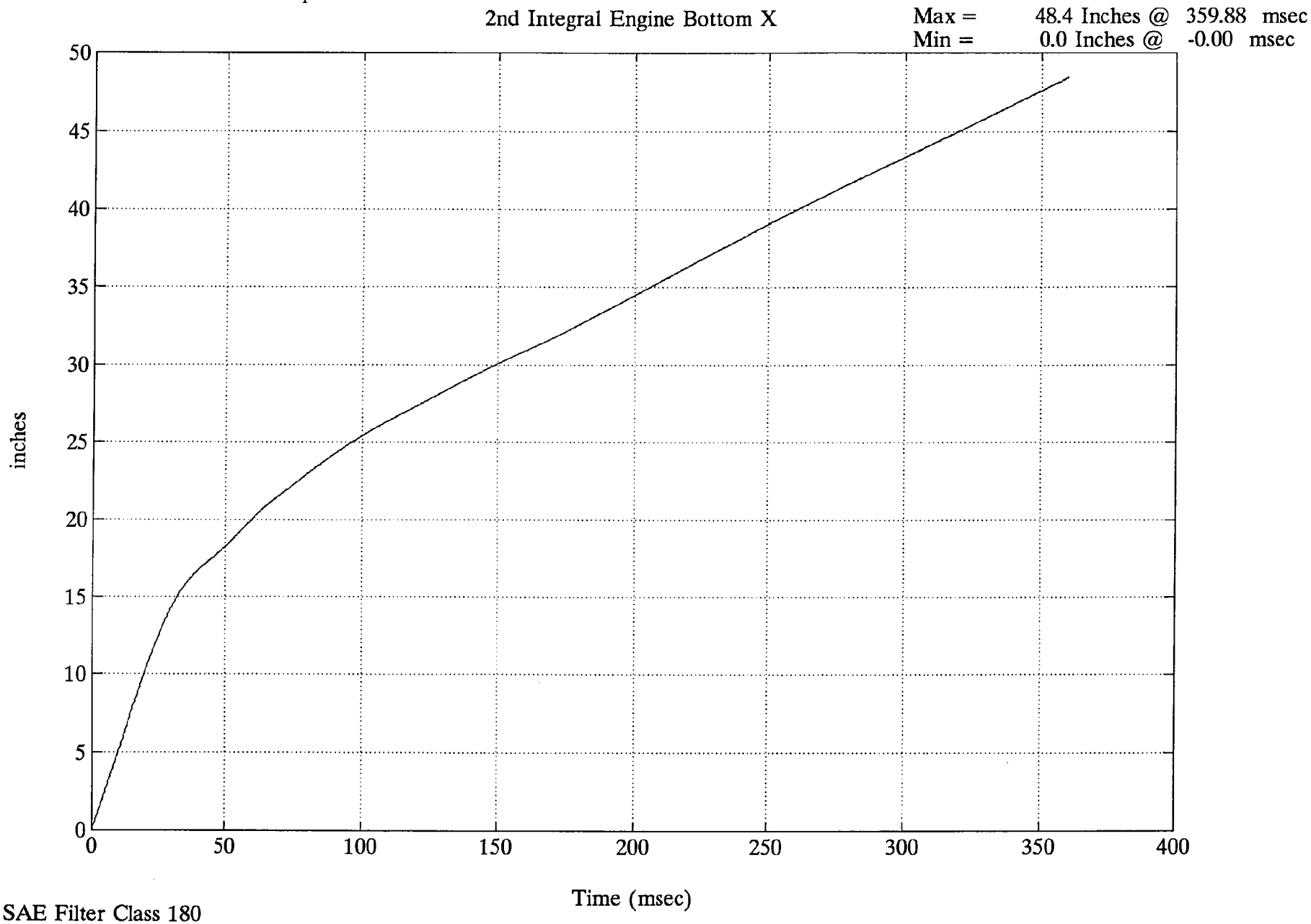
8353-3

208 Test #5 - 1996 Isuzu Trooper



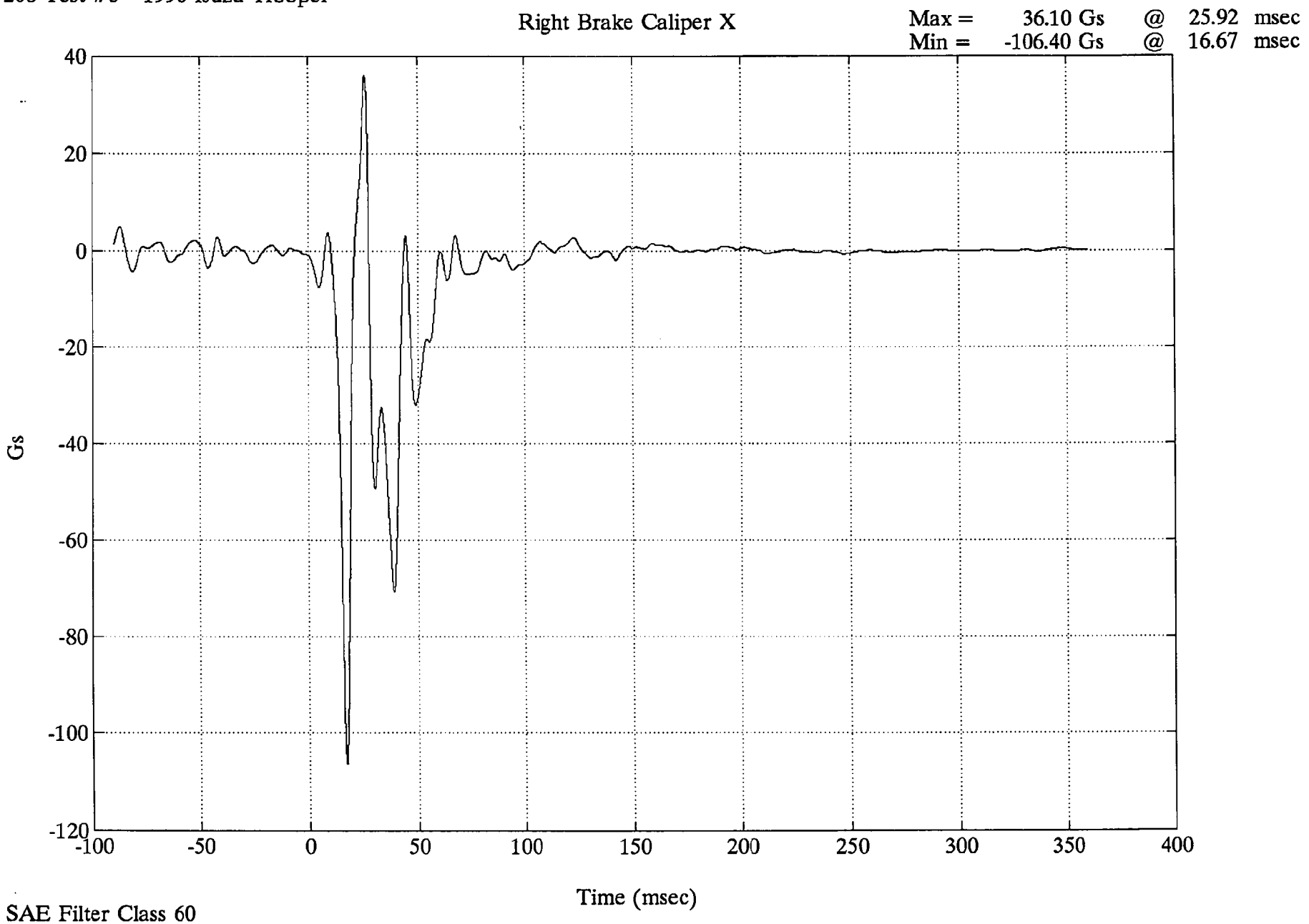
SAE Filter Class 180

208 Test #5 - 1996 Isuzu Trooper



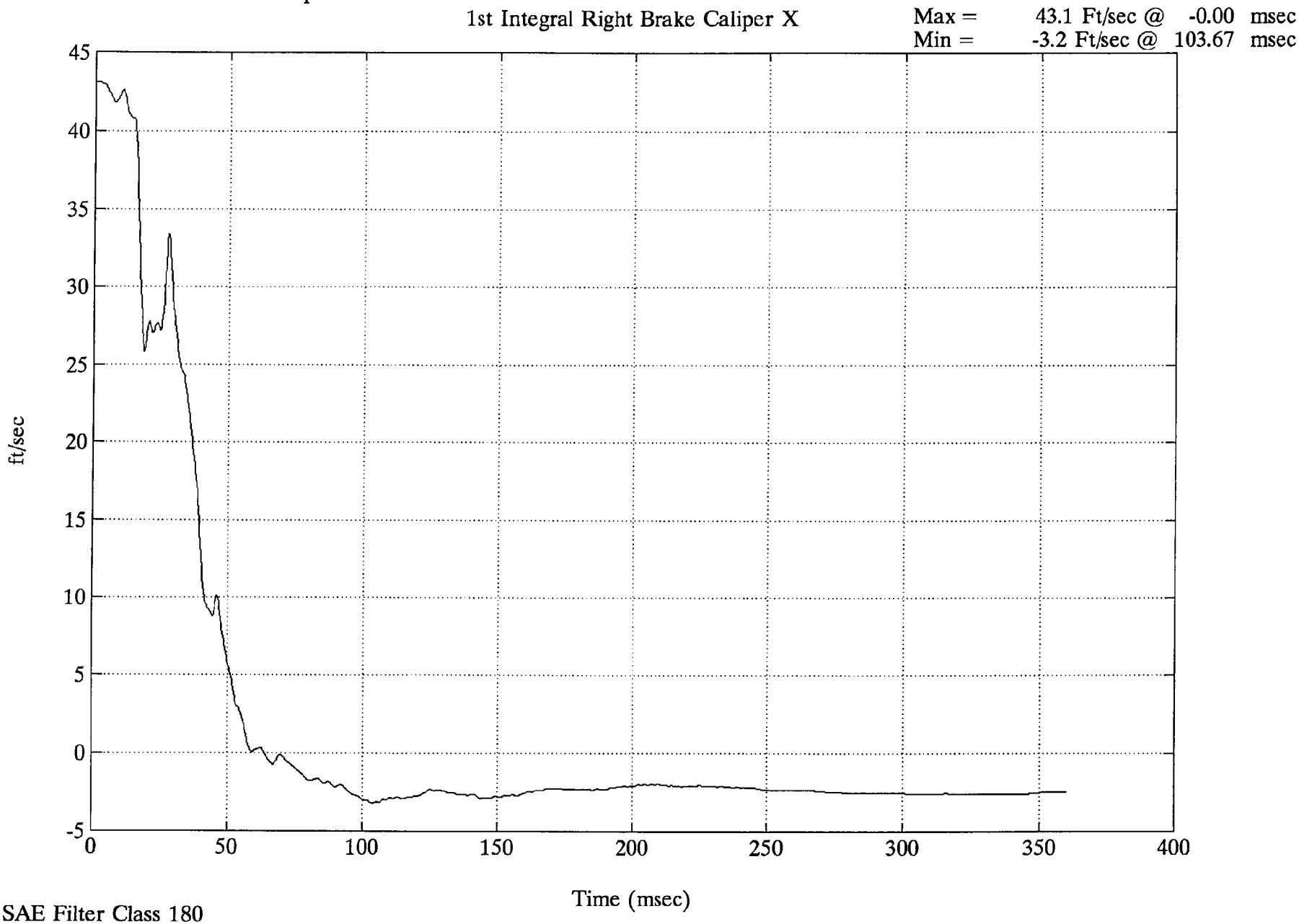
SAE Filter Class 180

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 60

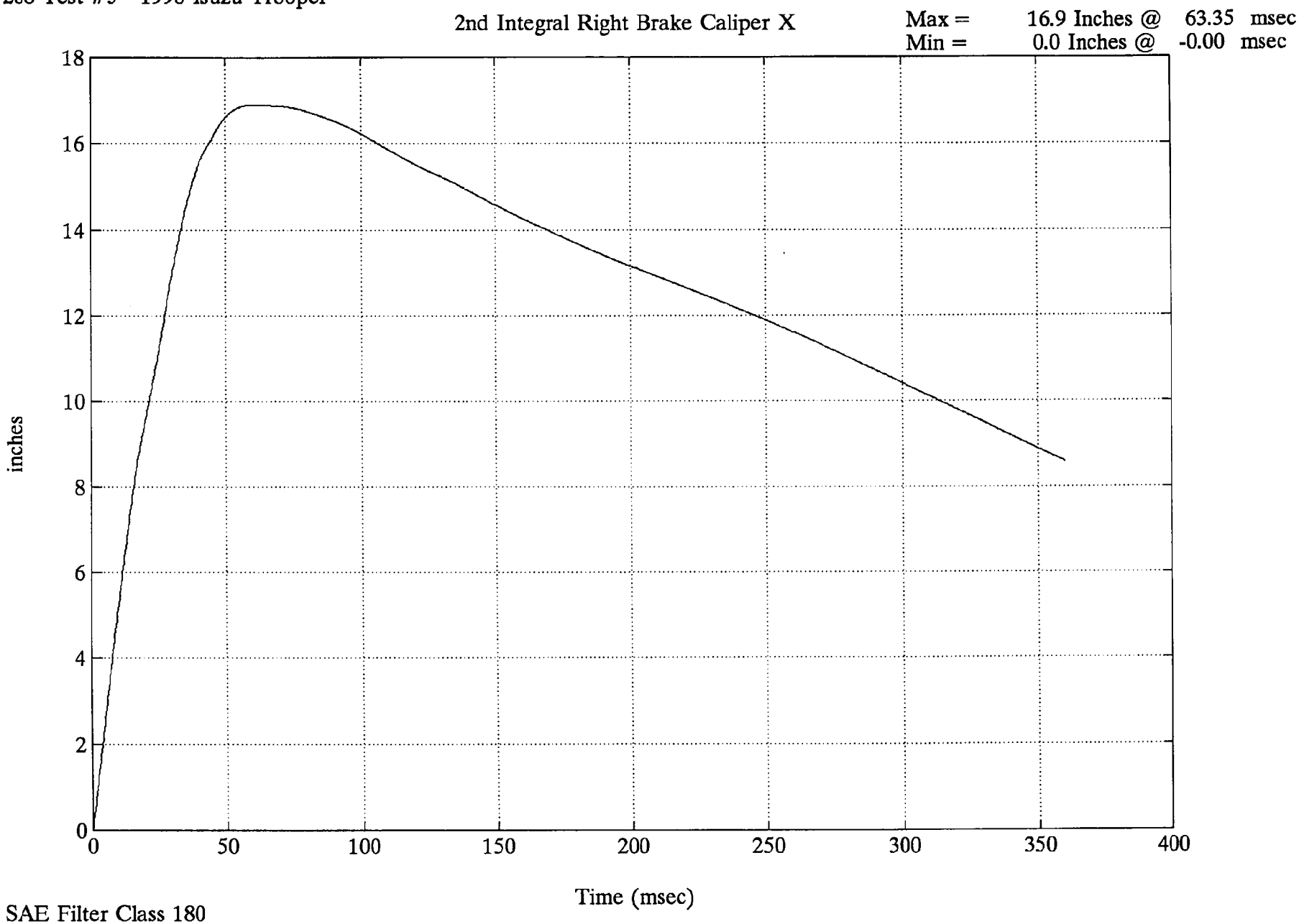
208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 180

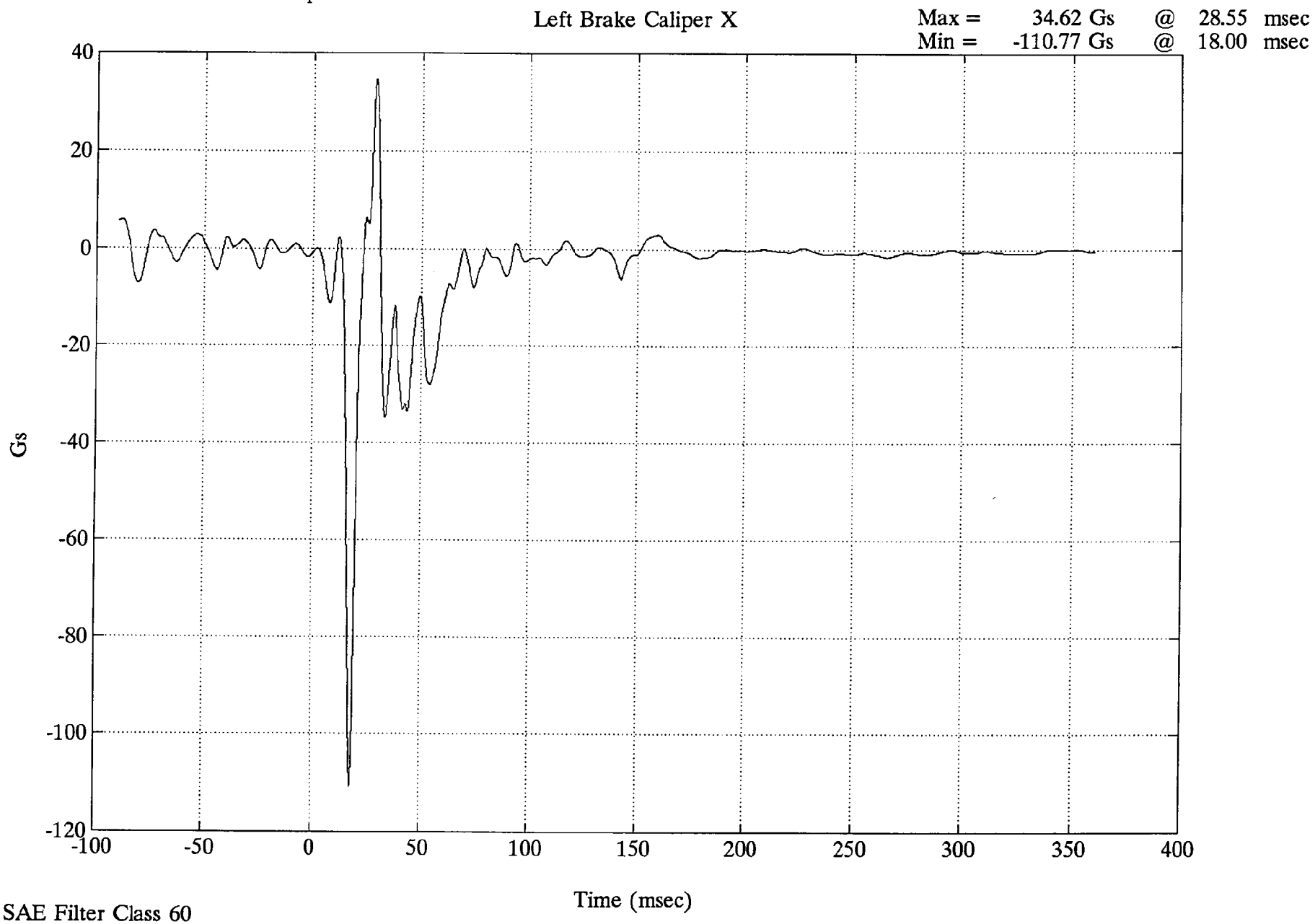
8353-3

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 180

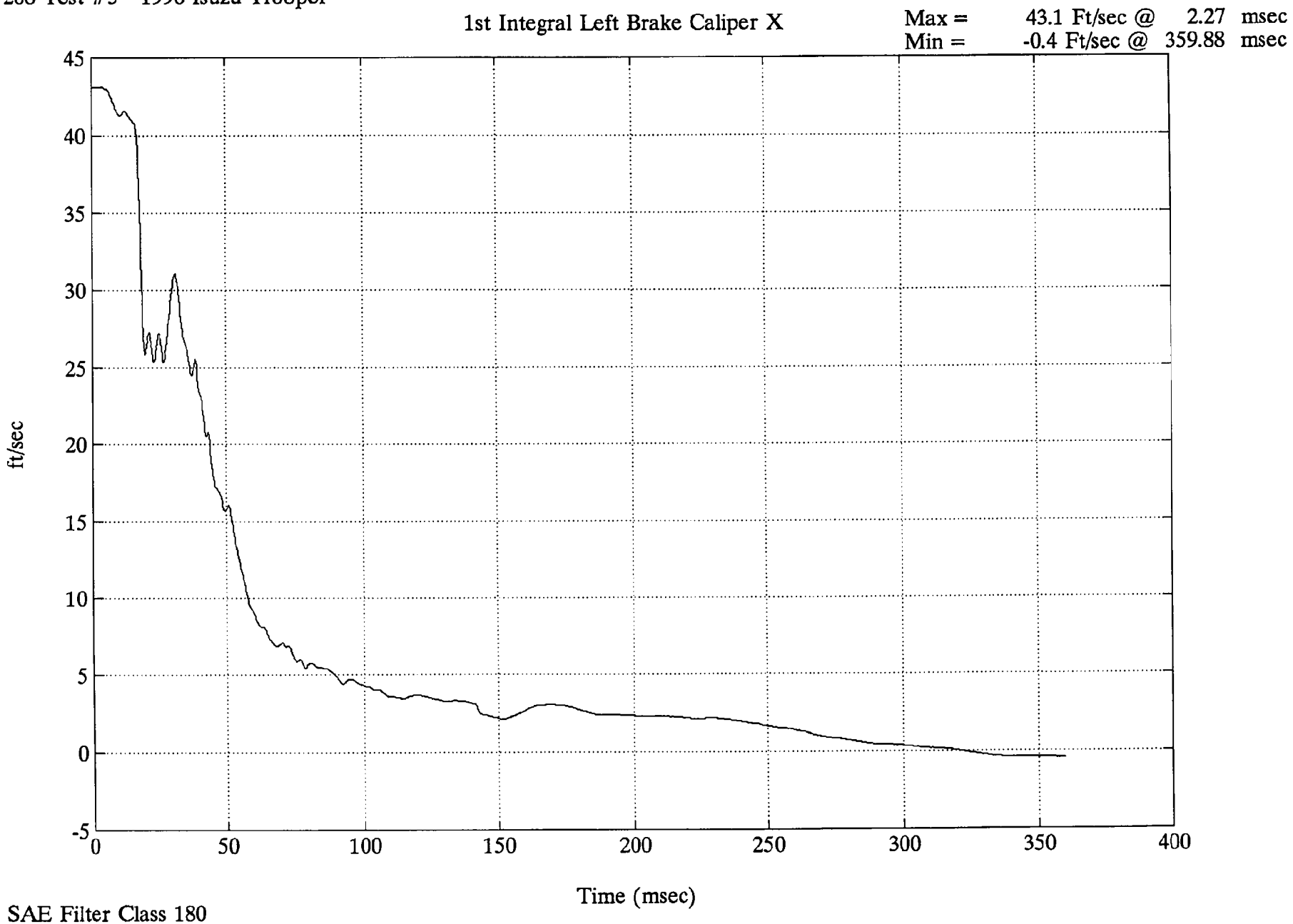
208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 60

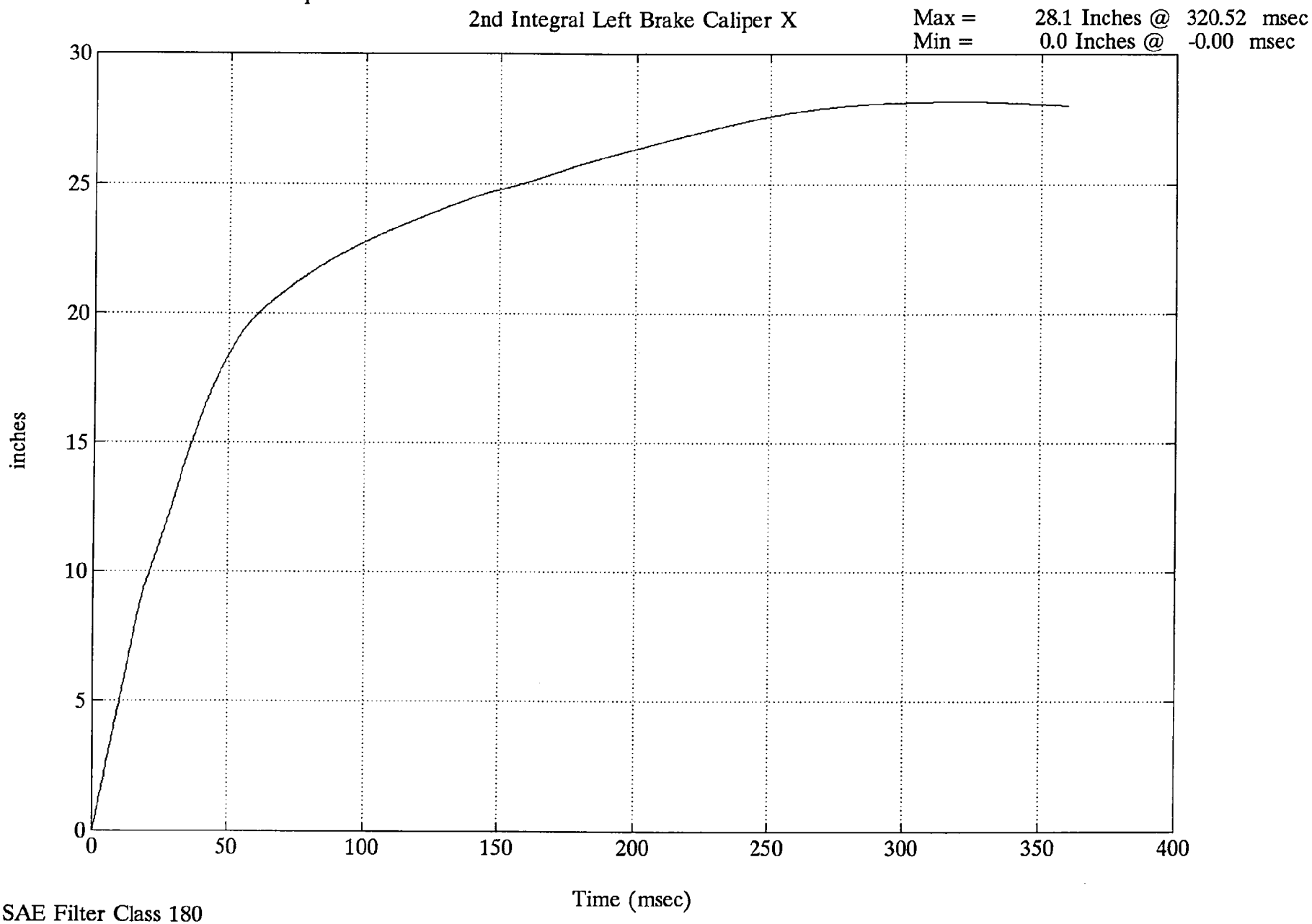
8353-3

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 180

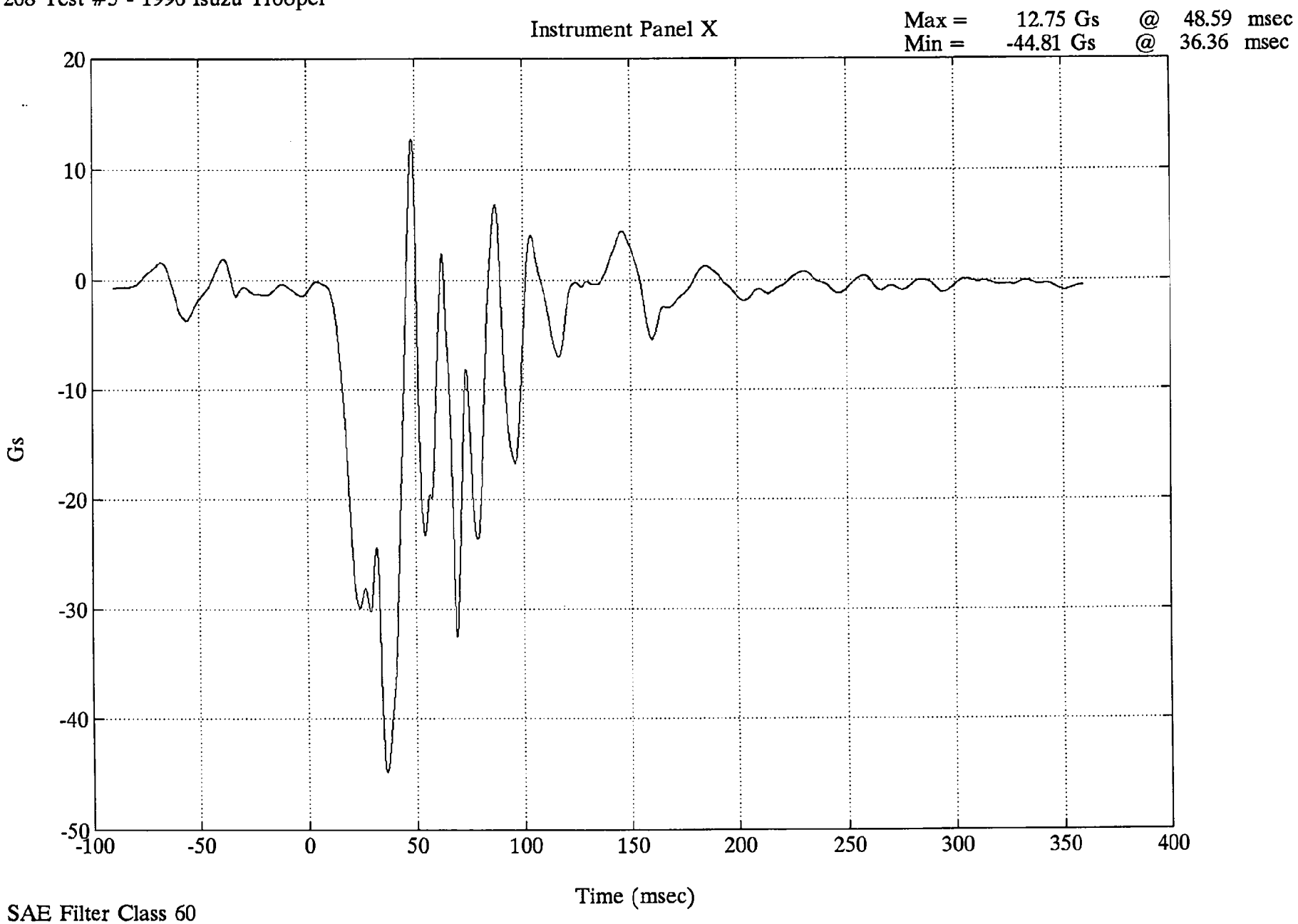
208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 180

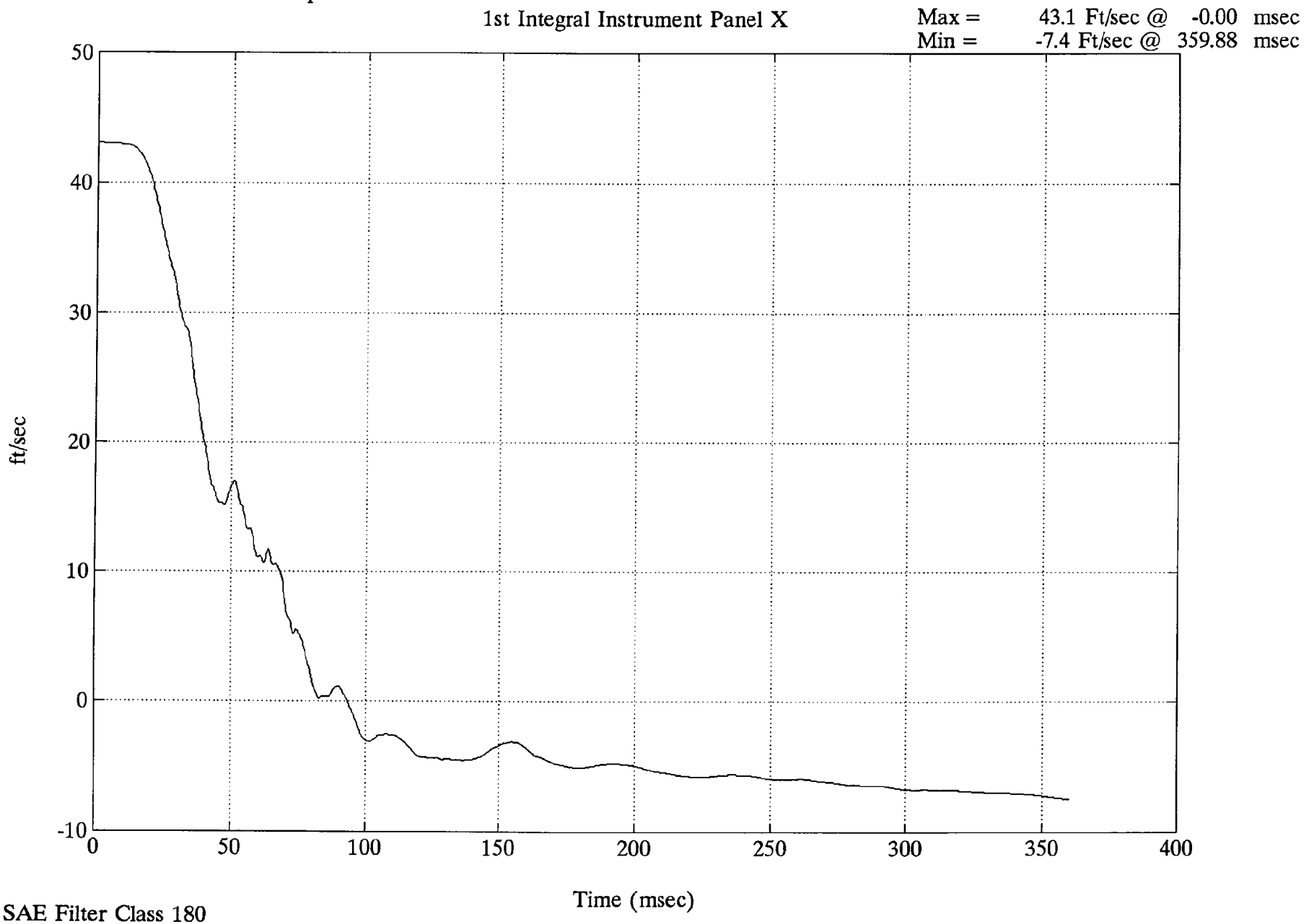
8353-3

208 Test #5 - 1996 Isuzu Trooper



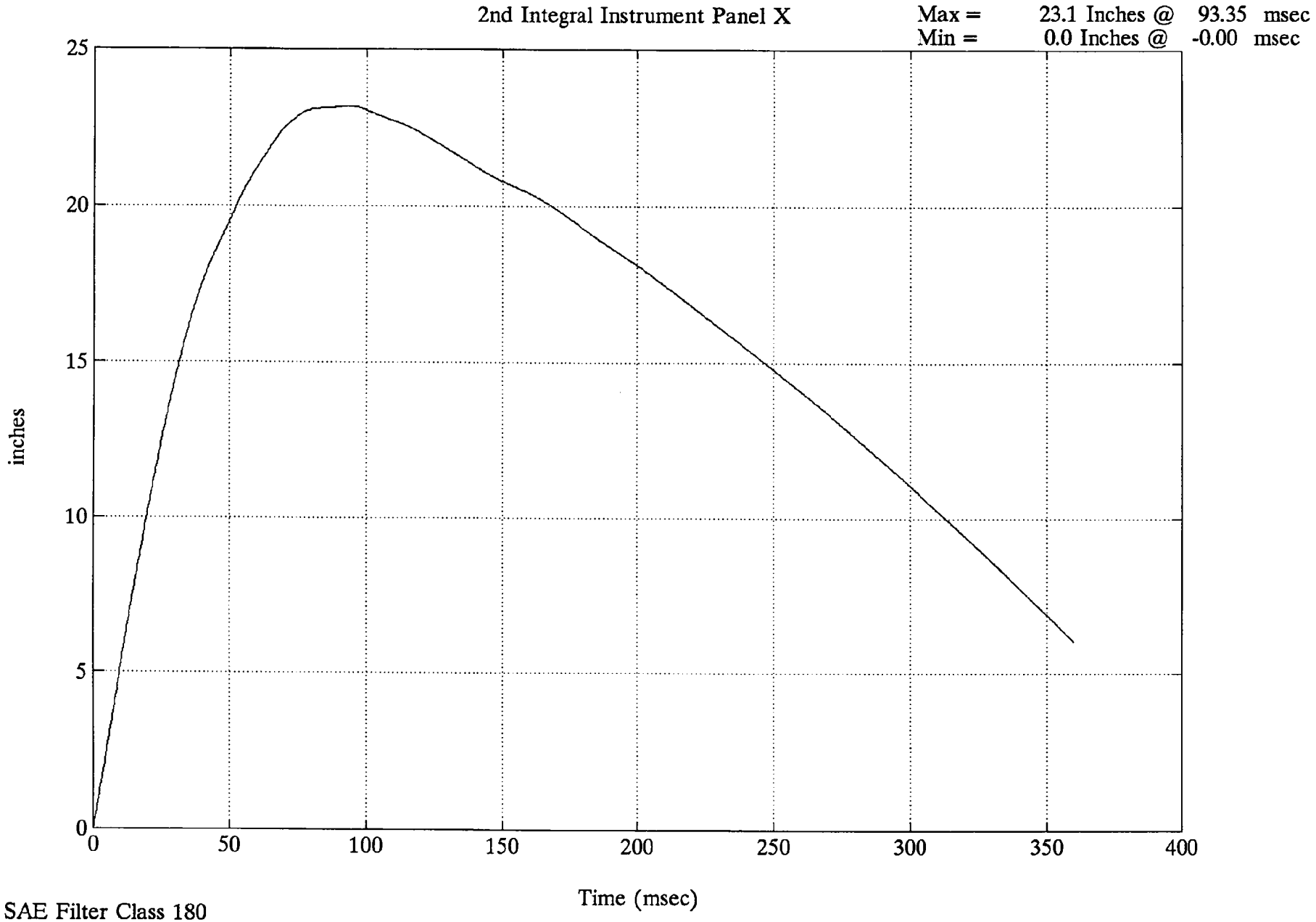
SAE Filter Class 60

208 Test #5 - 1996 Isuzu Trooper



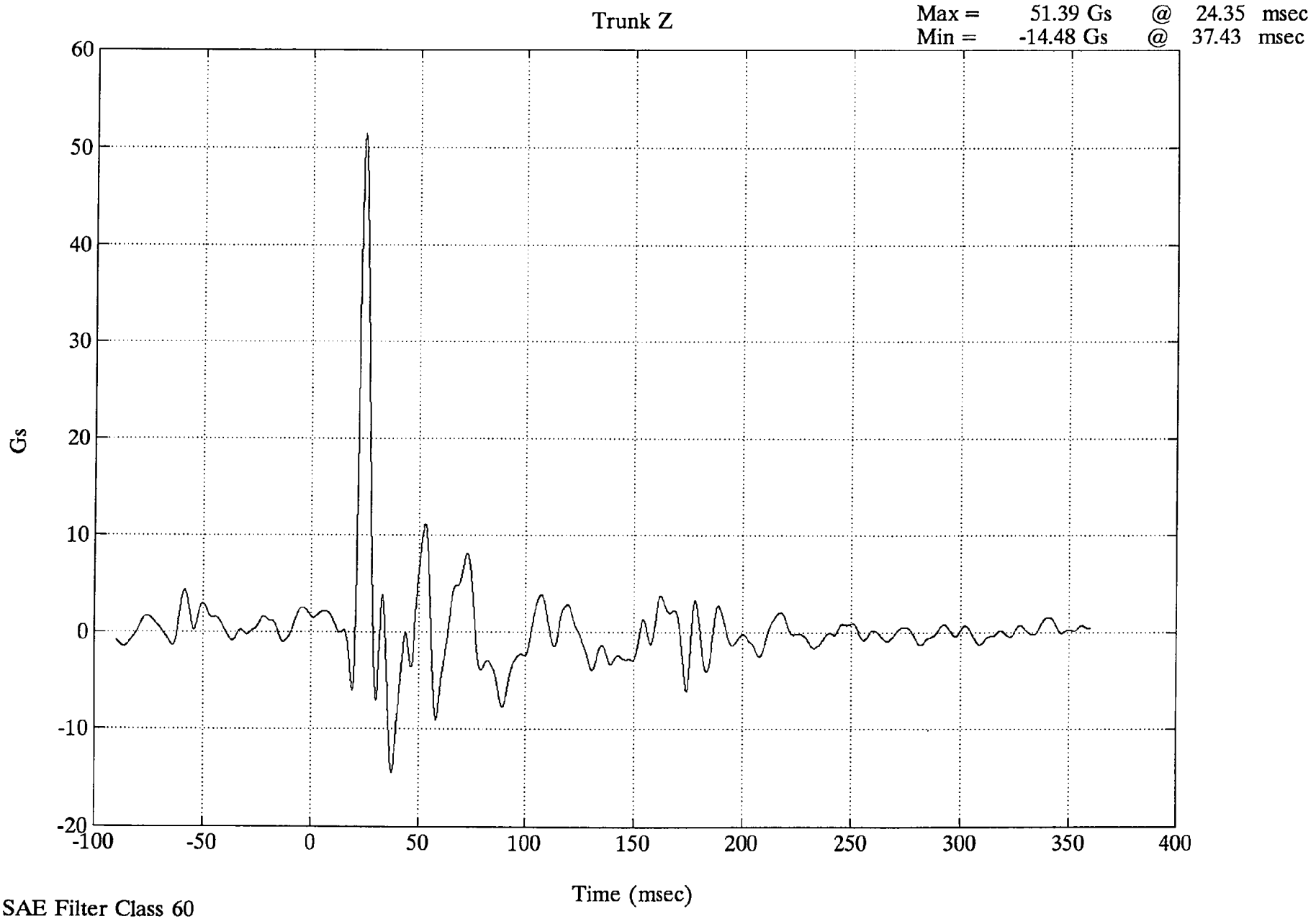
SAE Filter Class 180

208 Test #5 - 1996 Isuzu Trooper



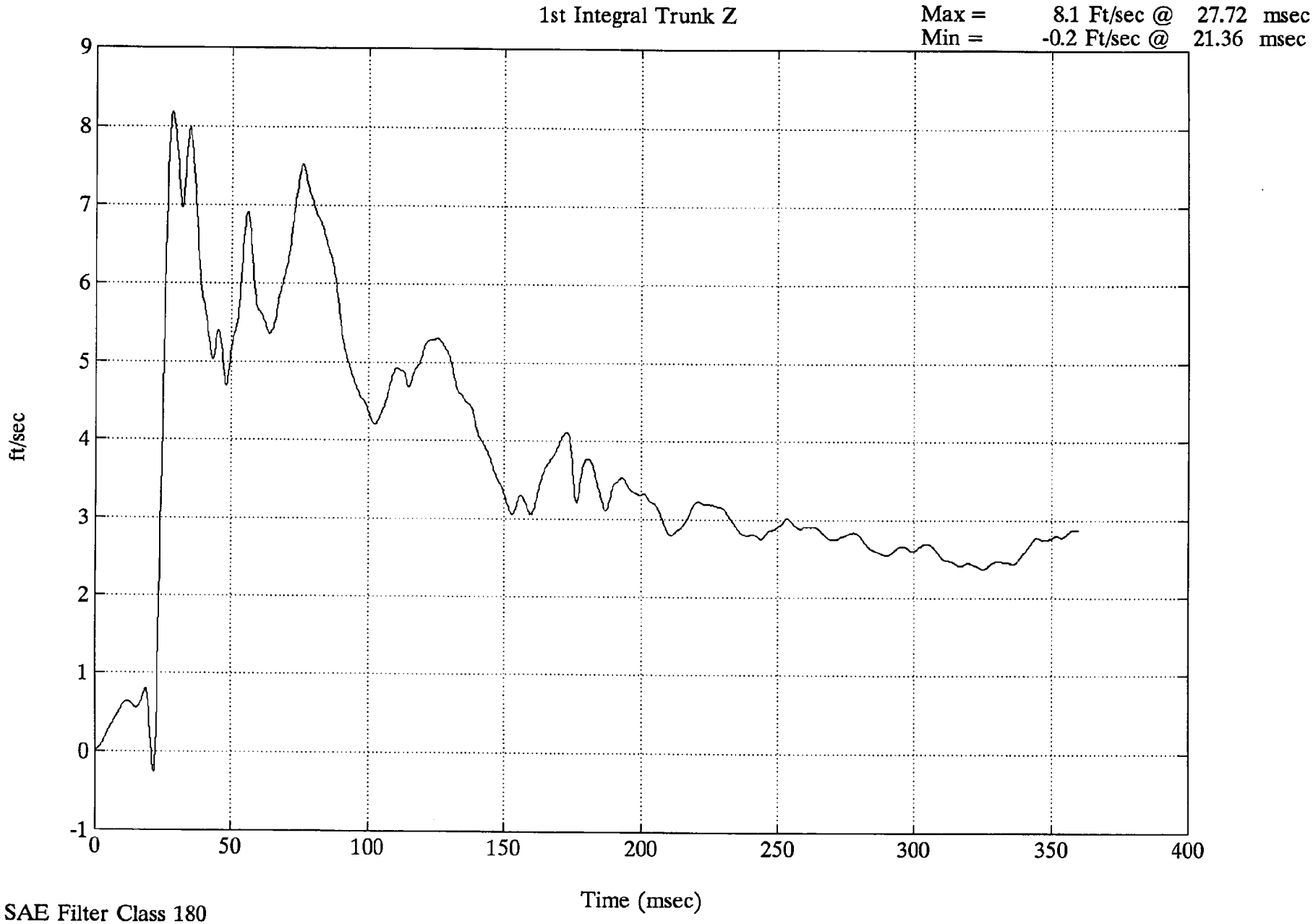
SAE Filter Class 180

208 Test #5 - 1996 Isuzu Trooper



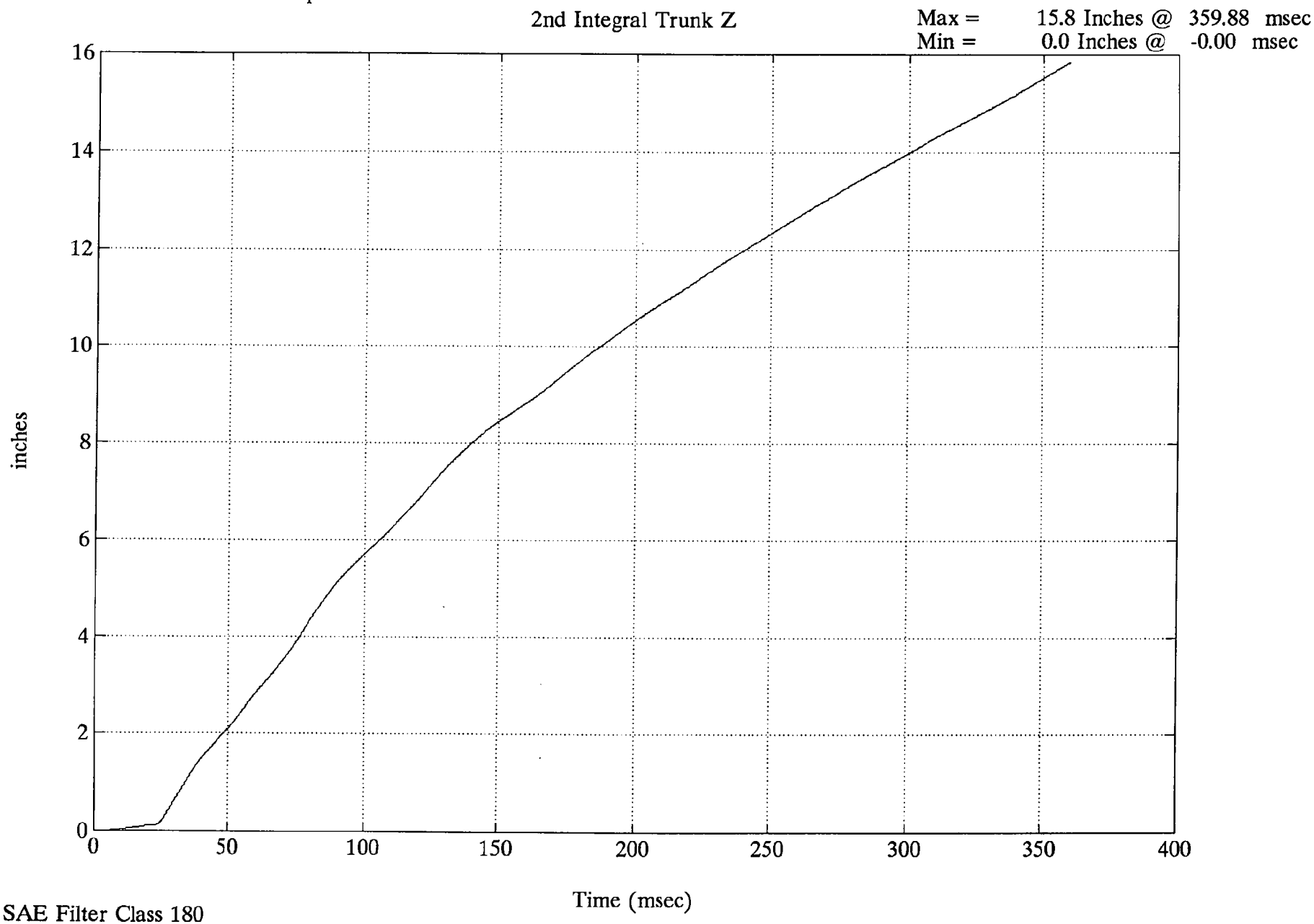
SAE Filter Class 60

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 180

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 180

TEST NO. CT5700

DUMMY	SAE FILTER CHANNEL CLASS
Head Accelerations	1000
Chest Accelerations	180
Chest Displacements	180
Femur Forces	600
Tibia Forces, Moments	600

FACILITY: track TEST DATE: 23 Apr 1996
RUN #: 1610 TEST TIME: 13:09:16
SERIES #: 1 BOARD: A

TITLE: 208 Test #5 - 1996 Isuzu Trooper

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM AMP	MAXIMUM msec	MINIMUM AMP	MINIMUM msec	FILTER CLASS
1	Pos. 1 Head X	Gs	4.1	28.9	-33.4	76.3	1000.0
2	Pos. 1 Head Y	Gs	4.8	142.4	-9.3	55.6	1000.0
3	Pos. 1 Head Z	Gs	23.1	142.4	-8.1	29.0	1000.0
4	Pos. 1 Left Femur	lbs	1181.5	142.4	-1970.3	45.4	600.0
5	Pos. 1 Chest X	Gs	2.7	124.0	-48.3	77.6	180.0
6	Pos. 1 Chest Y	Gs	6.5	142.3	-3.7	45.4	180.0
7	Pos. 1 Chest Z	Gs	6.8	142.3	-7.4	46.4	180.0
8	Pos. 1 Right Femur	lbs	982.4	142.4	-1603.9	58.4	600.0
9	Pos. 2 Head X	Gs	10.1	302.2	-28.2	82.2	1000.0
10	Pos. 2 Head Y	Gs	4.7	40.4	-9.7	111.5	1000.0
11	Pos. 2 Head Z	Gs	29.6	78.0	-16.9	50.0	1000.0
12	Pos. 2 Left Femur	lbs	105.7	115.1	-1643.2	70.2	600.0
13	Pos. 2 Chest X	Gs	1.9	351.1	-48.6	80.2	180.0
14	Pos. 2 Chest Y	Gs	4.0	51.7	-3.7	63.2	180.0
15	Pos. 2 Chest Z	Gs	16.6	76.8	-13.2	48.8	180.0
16	Pos. 2 Right Femur	lbs	805.3	142.4	-2019.4	63.7	600.0
17	Pos. 1 Head Resultant	Gs	35.9	76.4	.1	-76.6	1000.0
18	Pos. 1 Chest Resultant	Gs	48.5	77.8	.0	-54.4	180.0
19	Pos. 2 Head Resultant	Gs	39.9	78.0	.0	-77.0	1000.0
20	Pos. 2 Chest Resultant	Gs	49.9	80.2	.1	-77.0	180.0

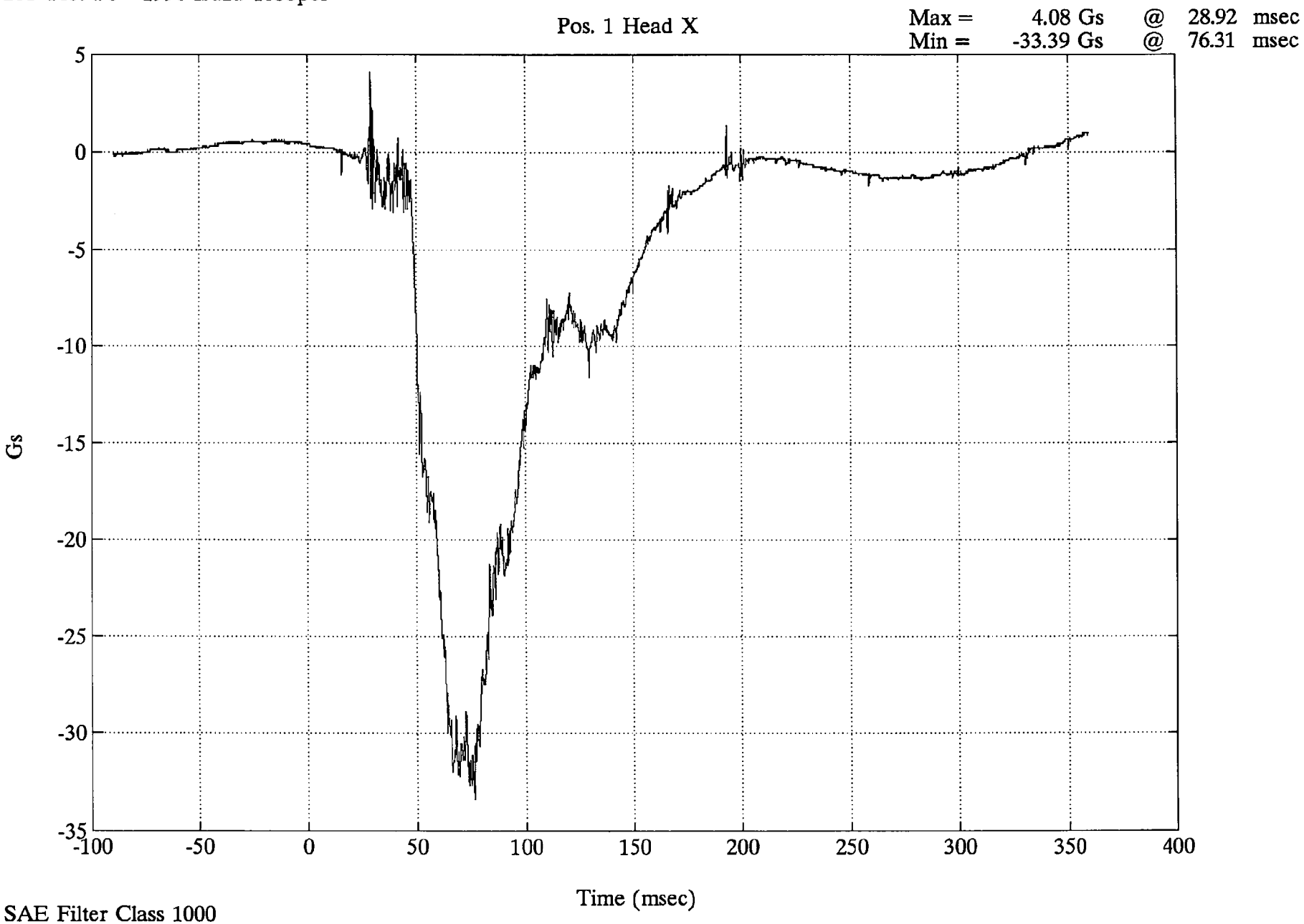
V2 36 ms Fixed Duration HIC SUMMARY: Pos. 1 Head Resultant
hic: 148.56
t1 = 60.000 msec
t2 = 96.000 msec
Average G's Over Hic Duration = 27.94

V2 36 ms Fixed Duration HIC SUMMARY: Pos. 2 Head Resultant
hic: 115.83
t1 = 57.000 msec
t2 = 93.000 msec
Average G's Over Hic Duration = 25.29

CLIP V2.1 SUMMARY: Pos. 1 Chest Resultant
Peak Resultant (3 ms CLIPPED DURATION) = 45.375 G's
Tstart = 76.1031 ms
Tend = 79.1031 ms
CSI = 295.803

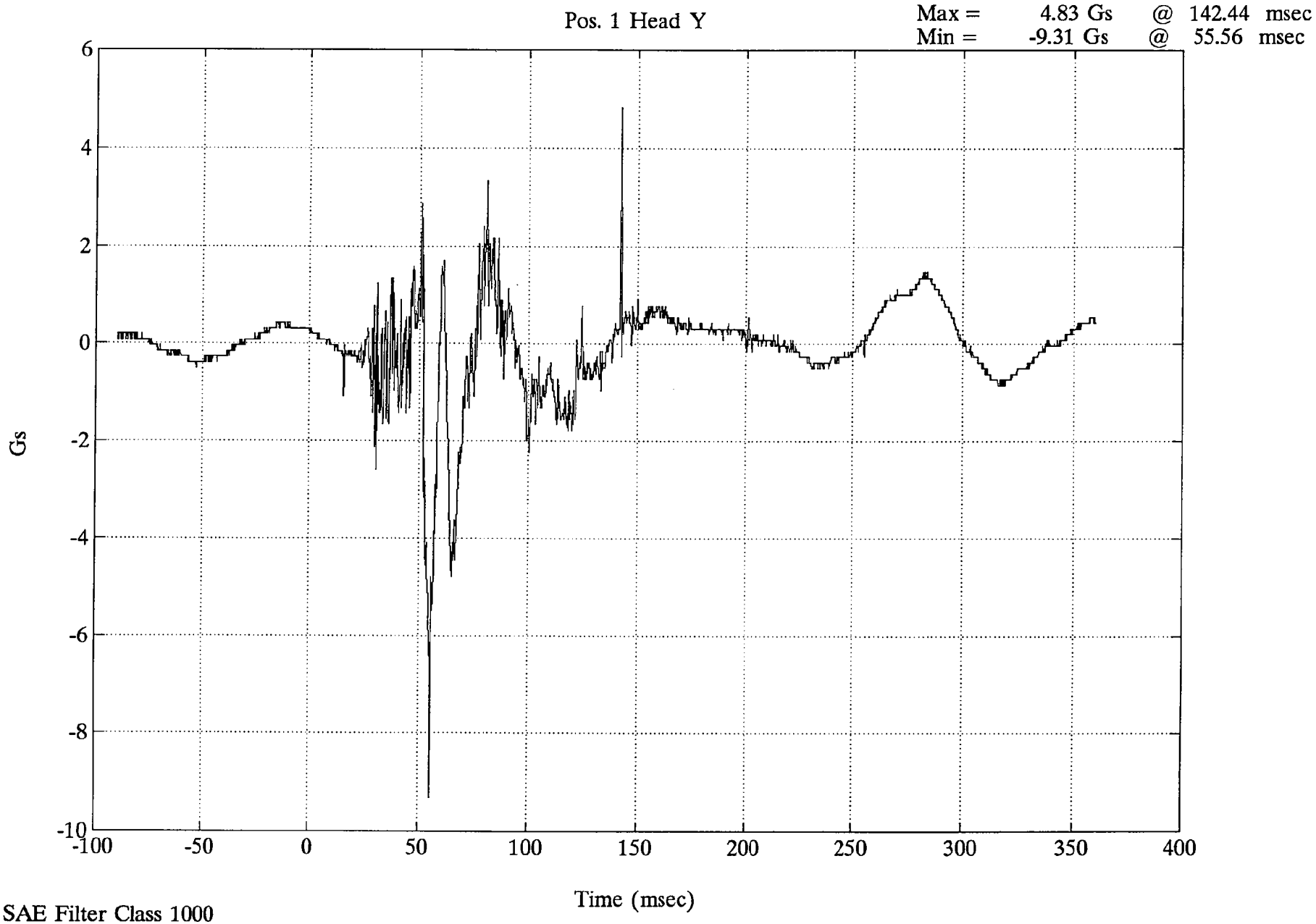
CLIP V2.1 SUMMARY: Pos. 2 Chest Resultant
Peak Resultant (3 ms CLIPPED DURATION) = 48.012 G's
Tstart = 78.3975 ms
Tend = 81.3975 ms
CSI = 323.649

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 1000

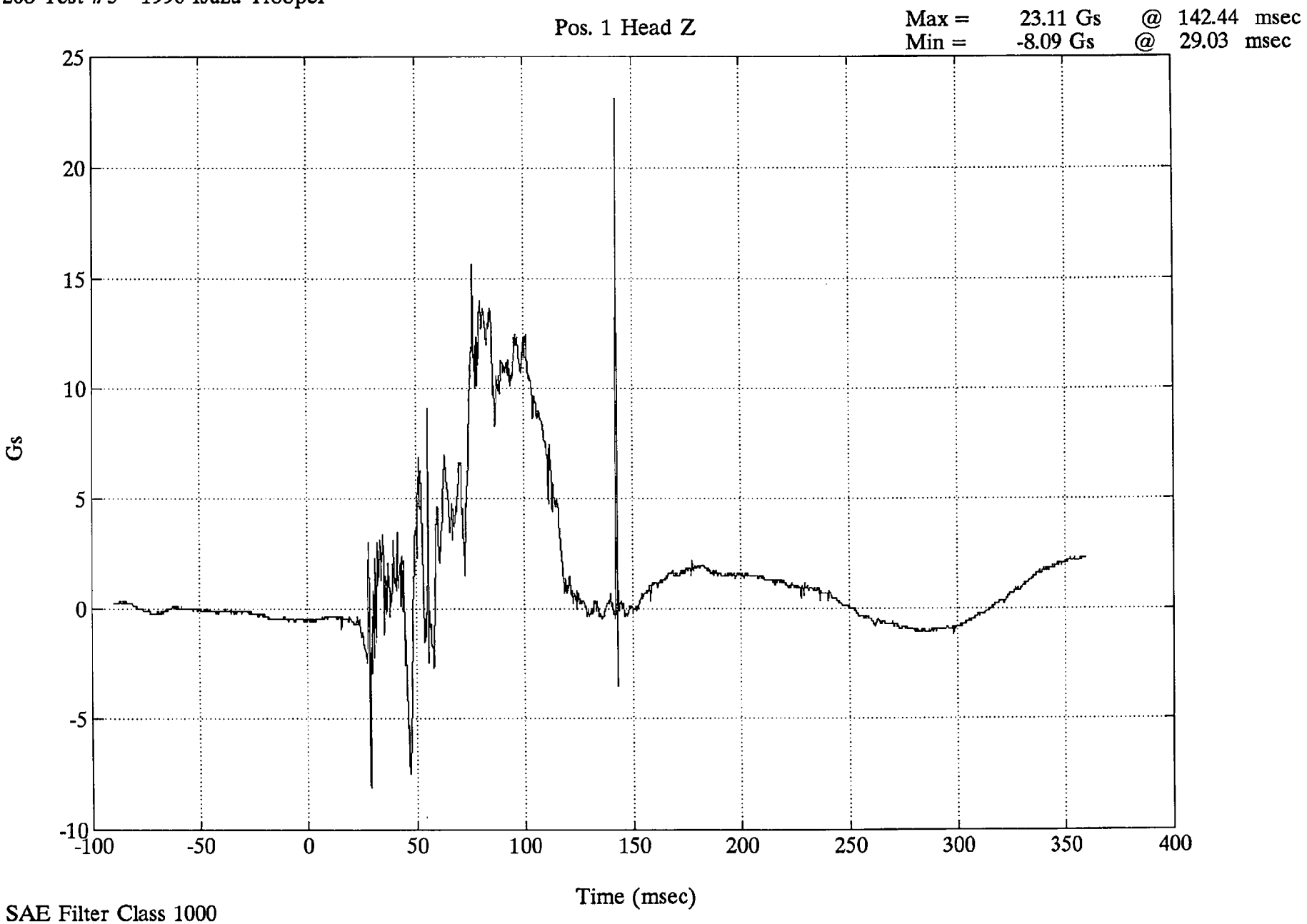
208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 1000

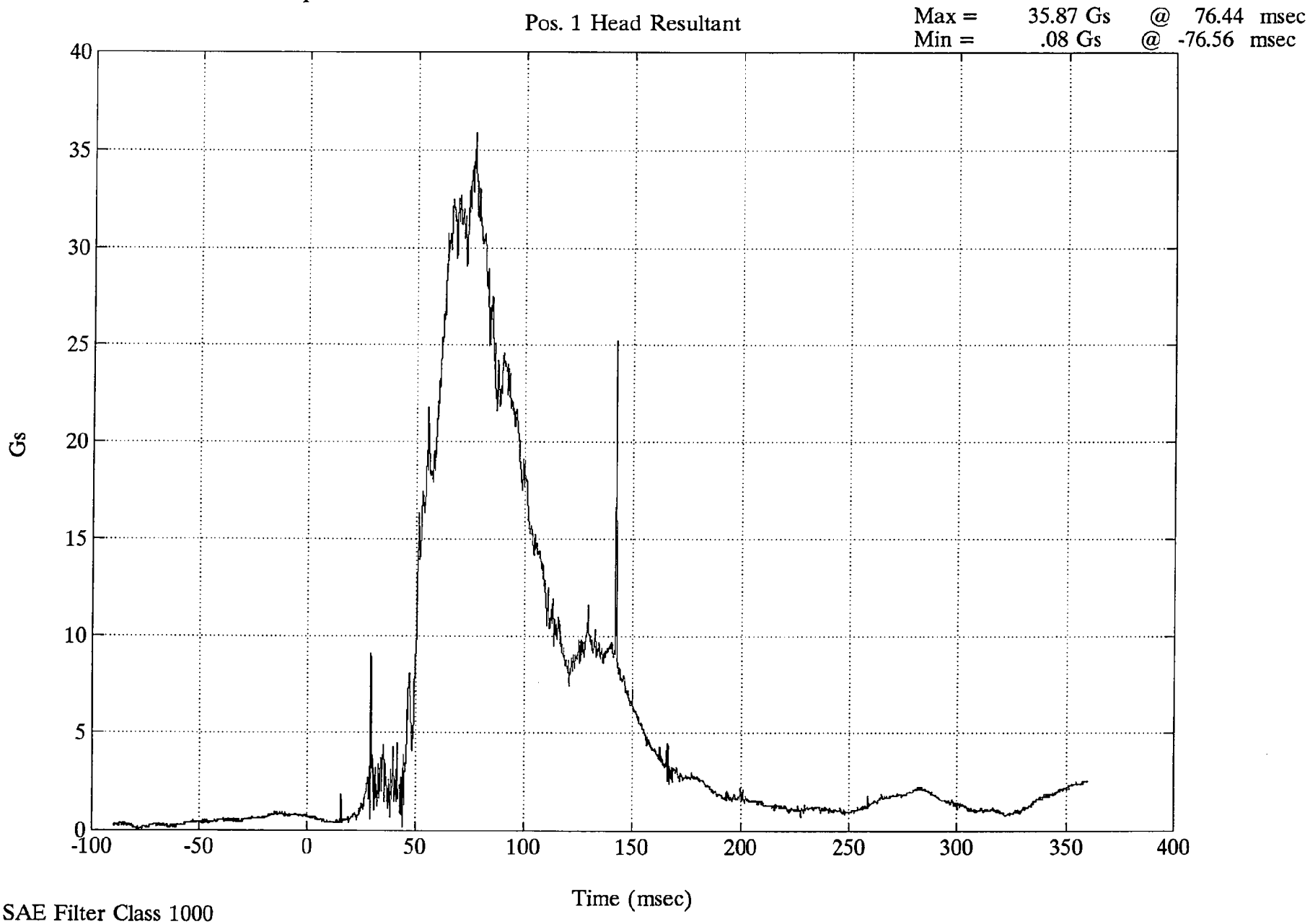
8353-3

208 Test #5 - 1996 Isuzu Trooper



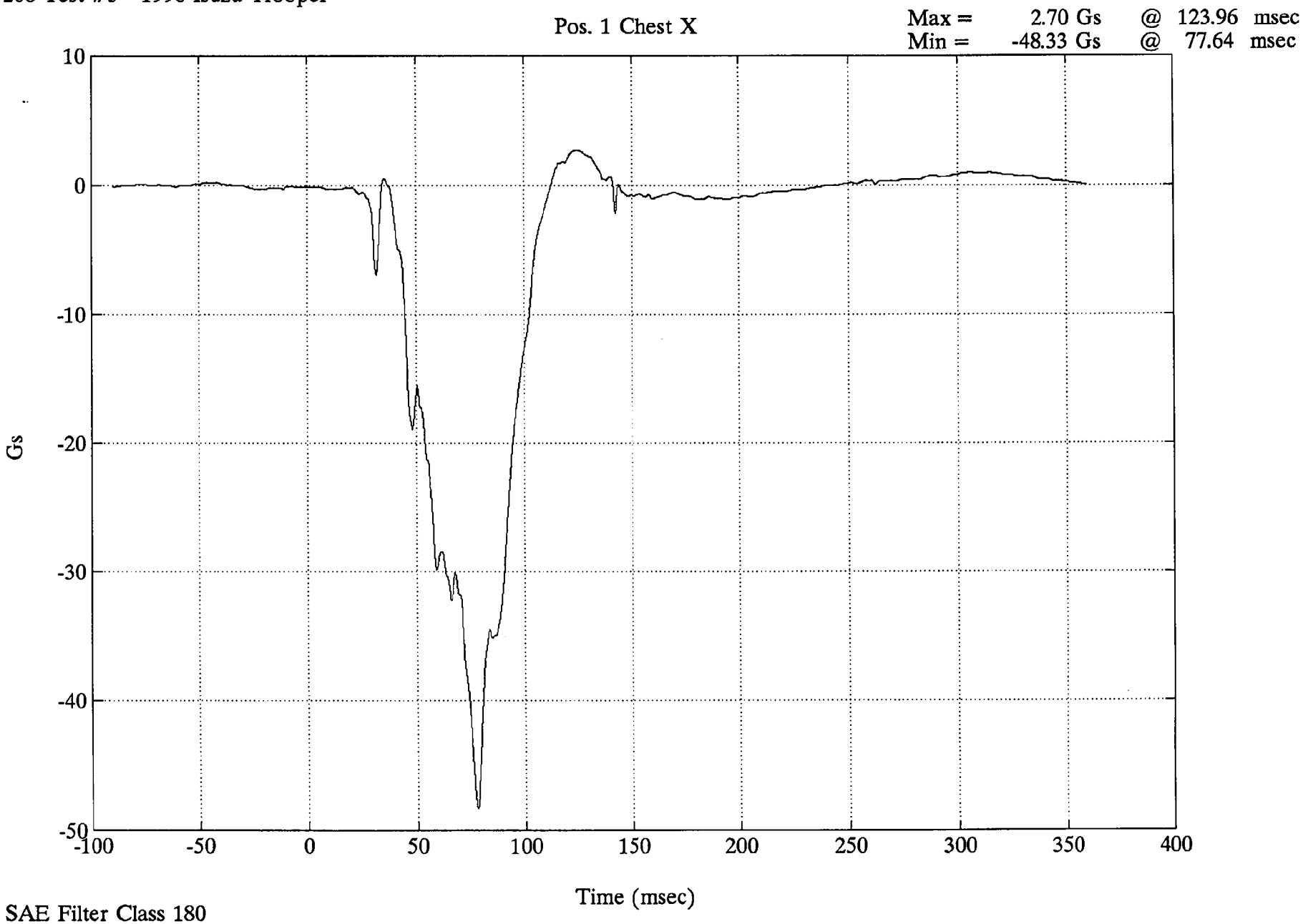
SAE Filter Class 1000

208 Test #5 - 1996 Isuzu Trooper



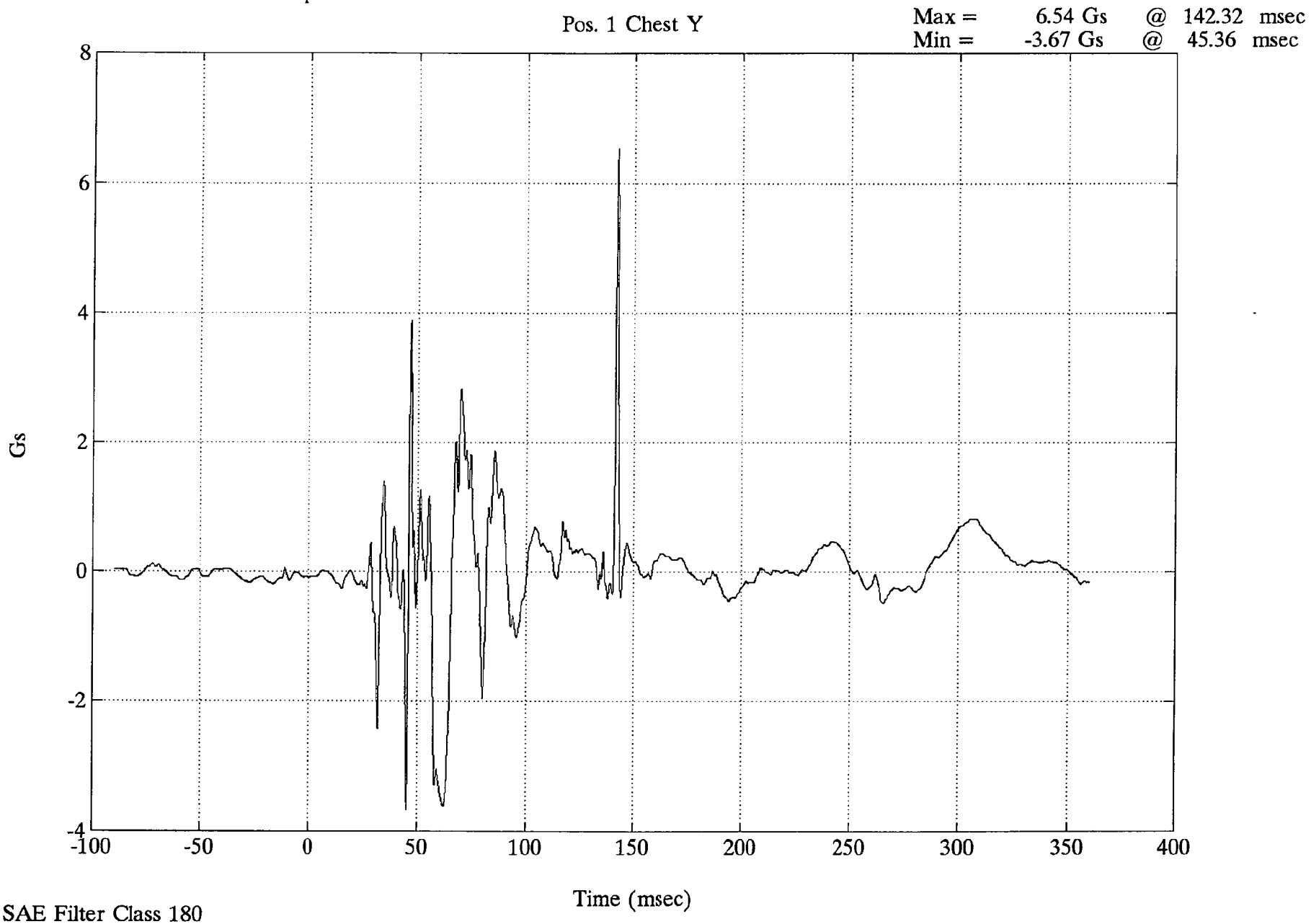
SAE Filter Class 1000

208 Test #5 - 1996 Isuzu Trooper



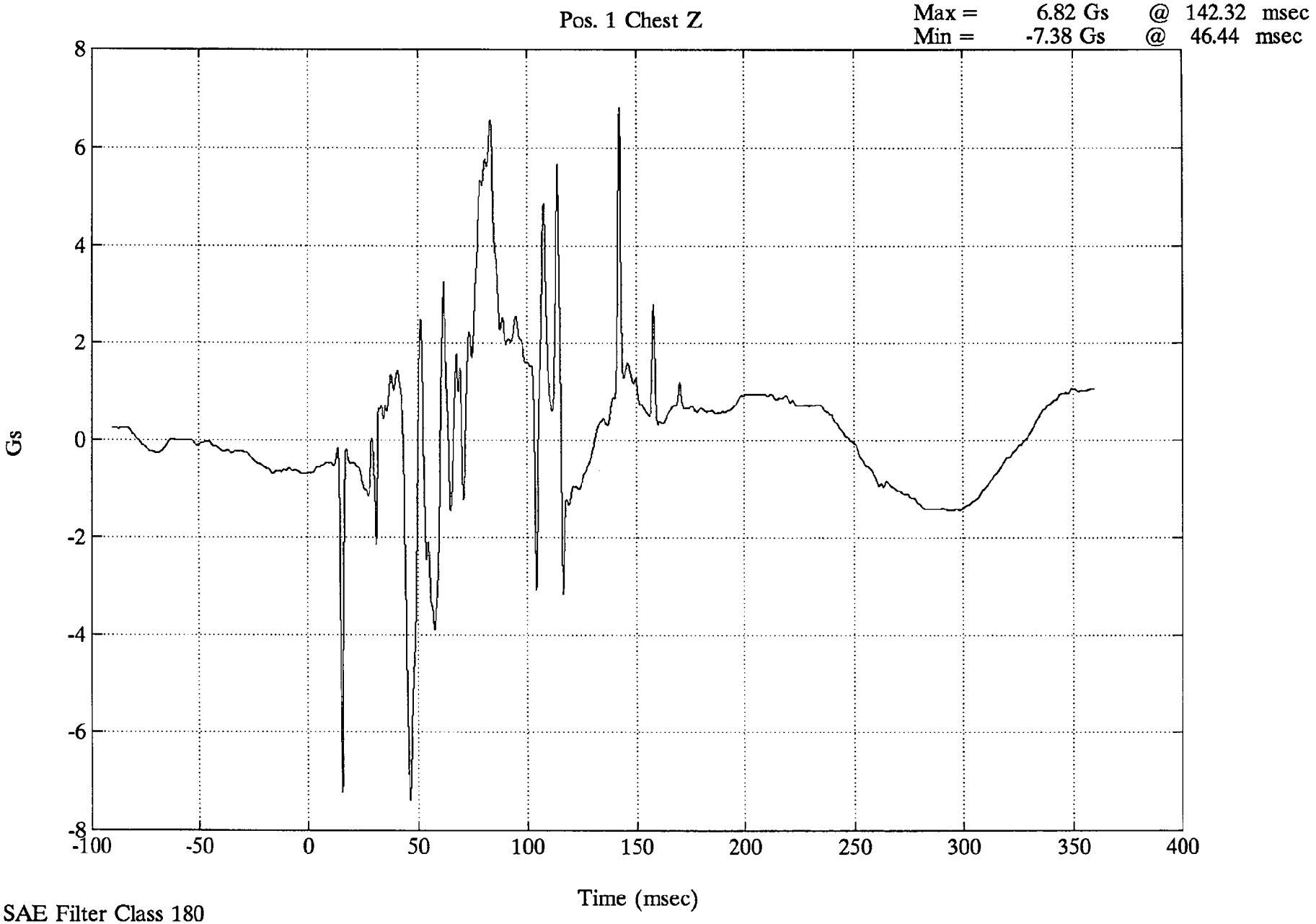
SAE Filter Class 180

208 Test #5 - 1996 Isuzu Trooper



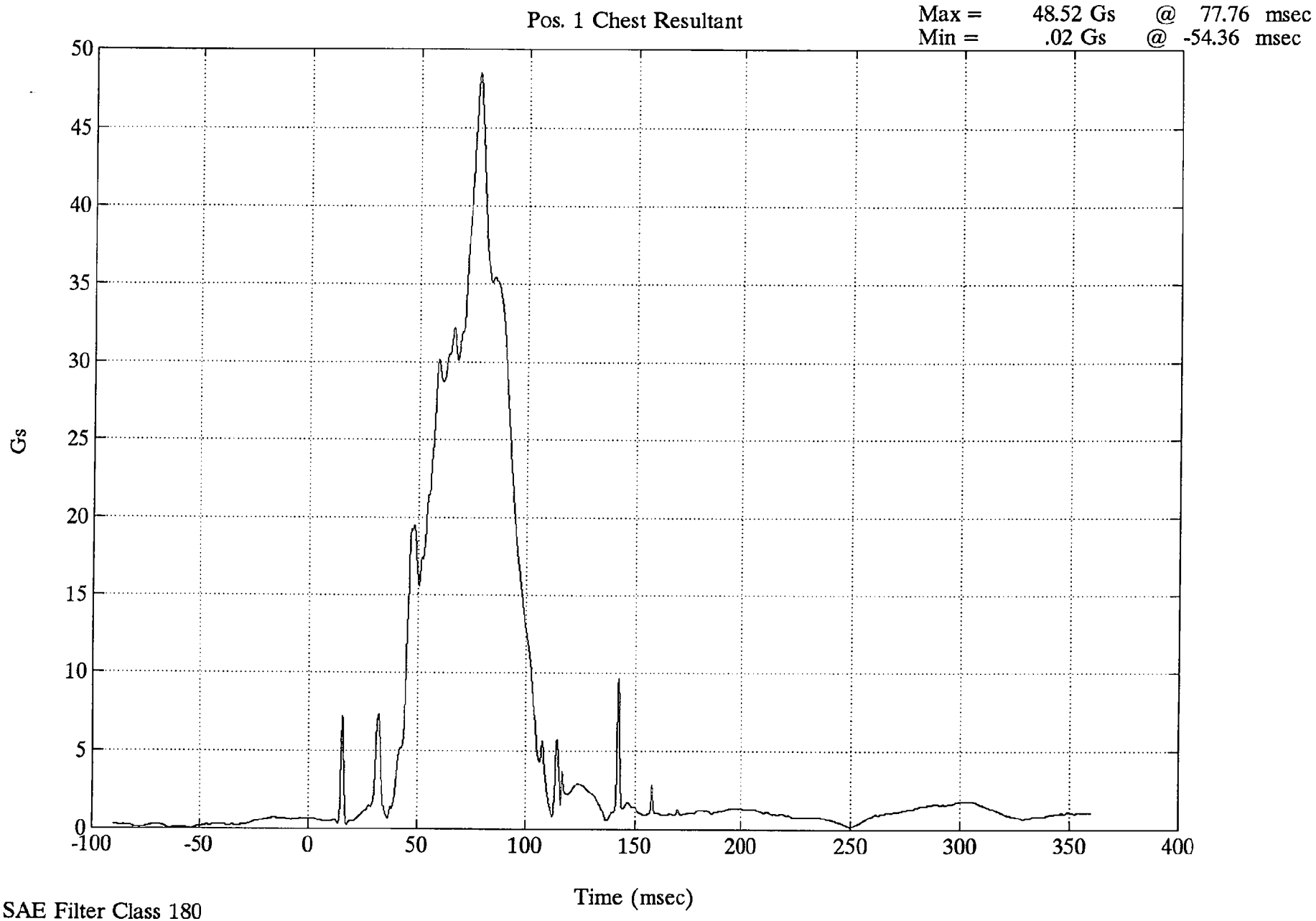
SAE Filter Class 180

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 180

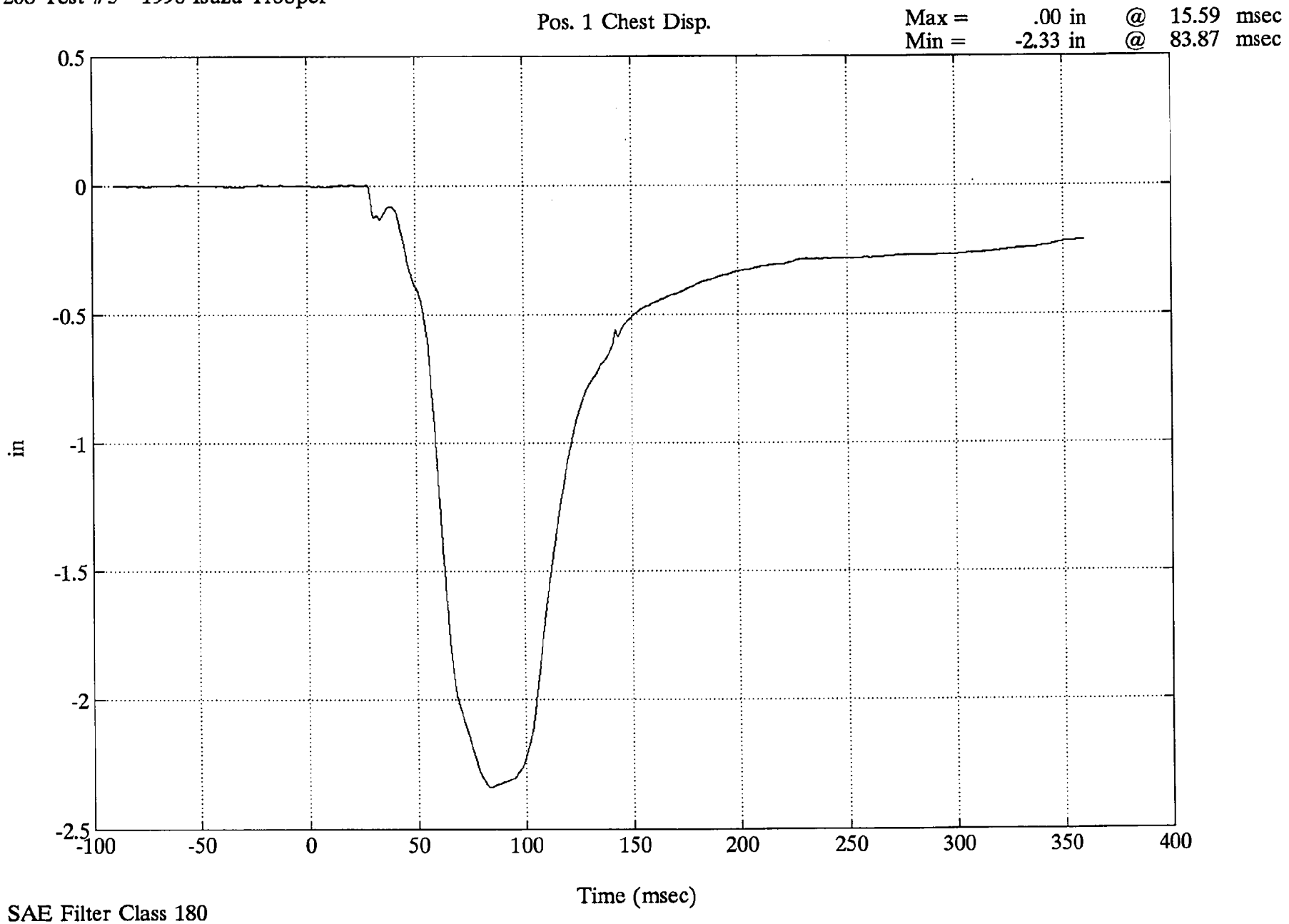
208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 180

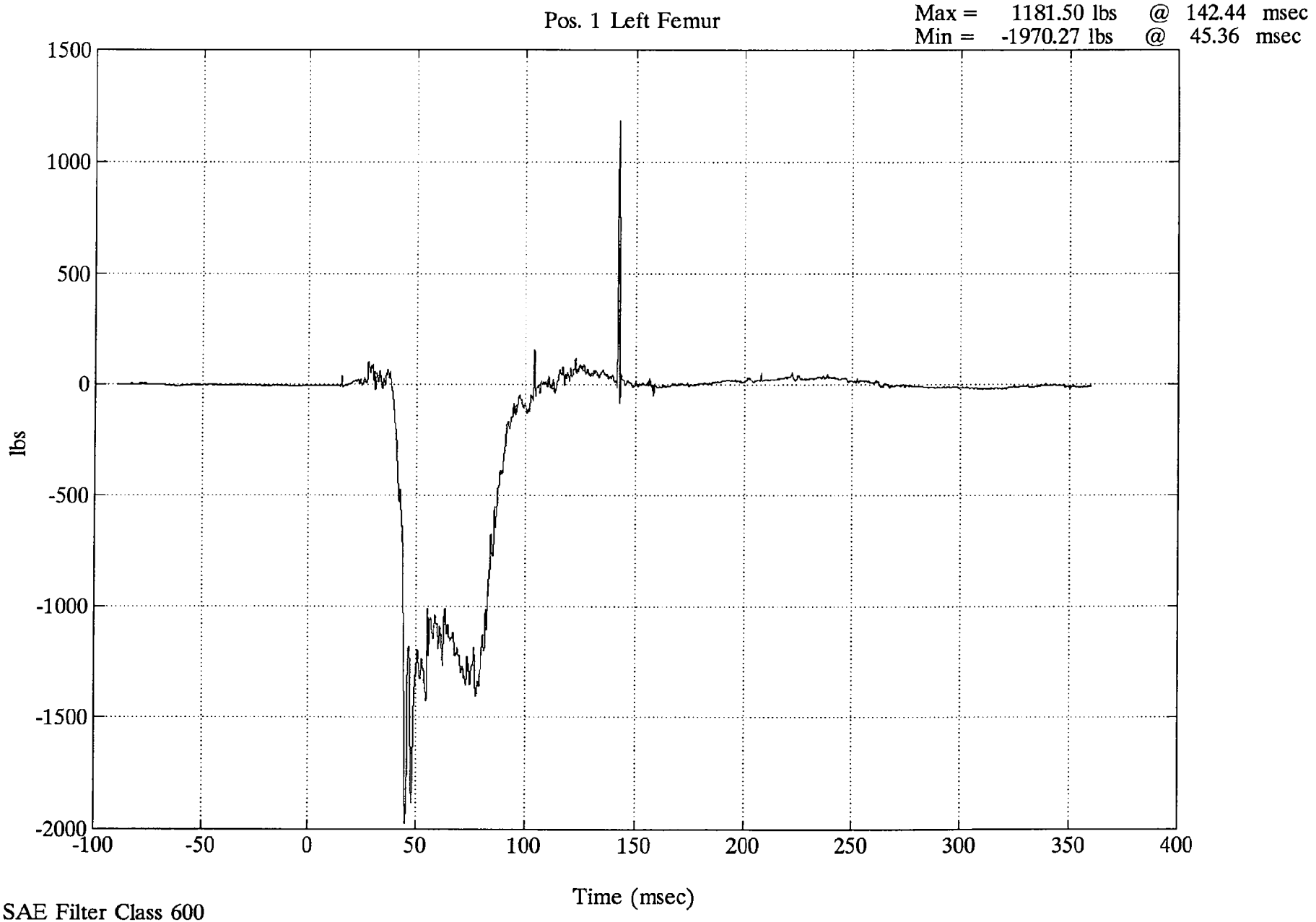
8353-3

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 180

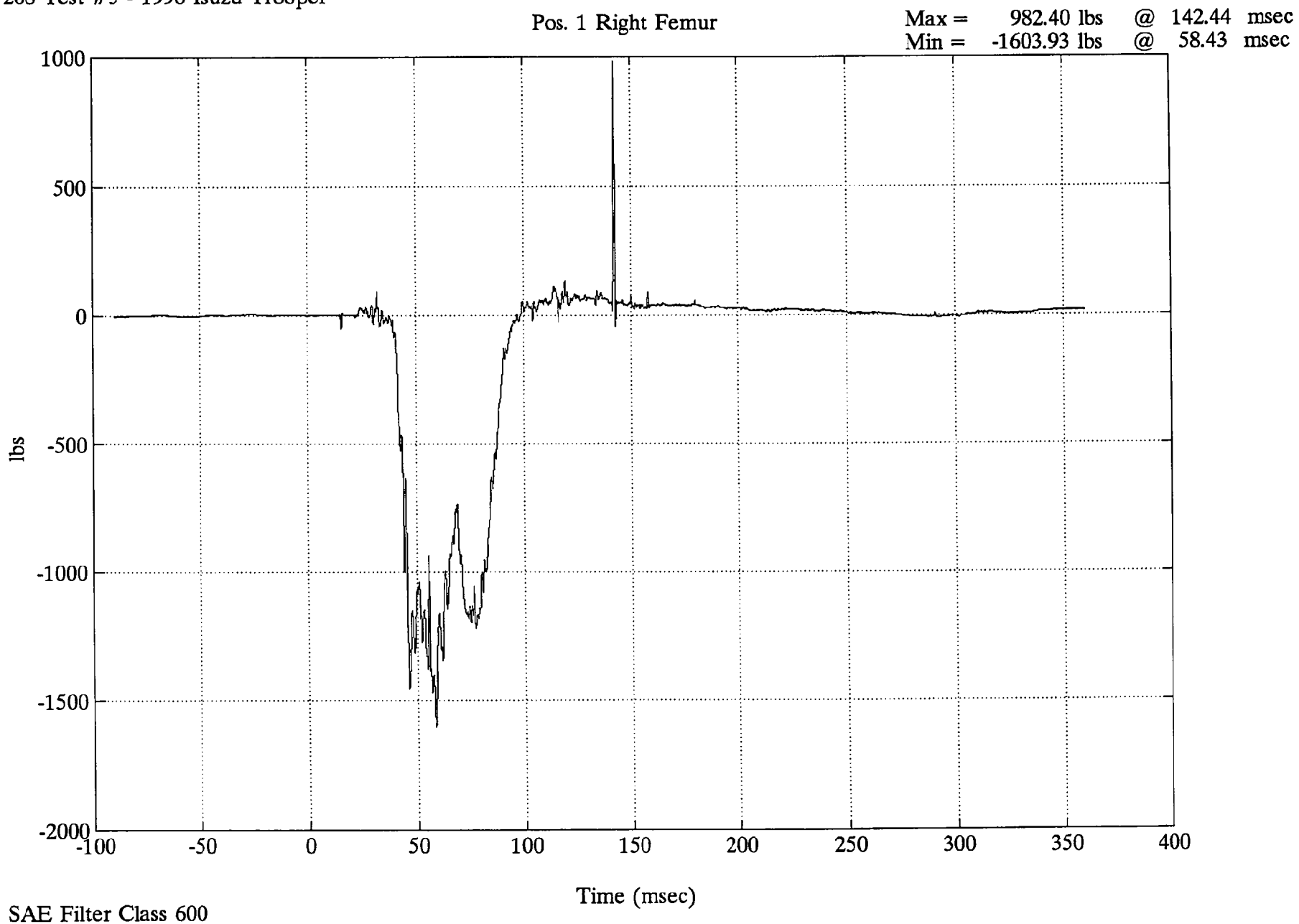
208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 600

8353-3

208 Test #5 - 1996 Isuzu Trooper

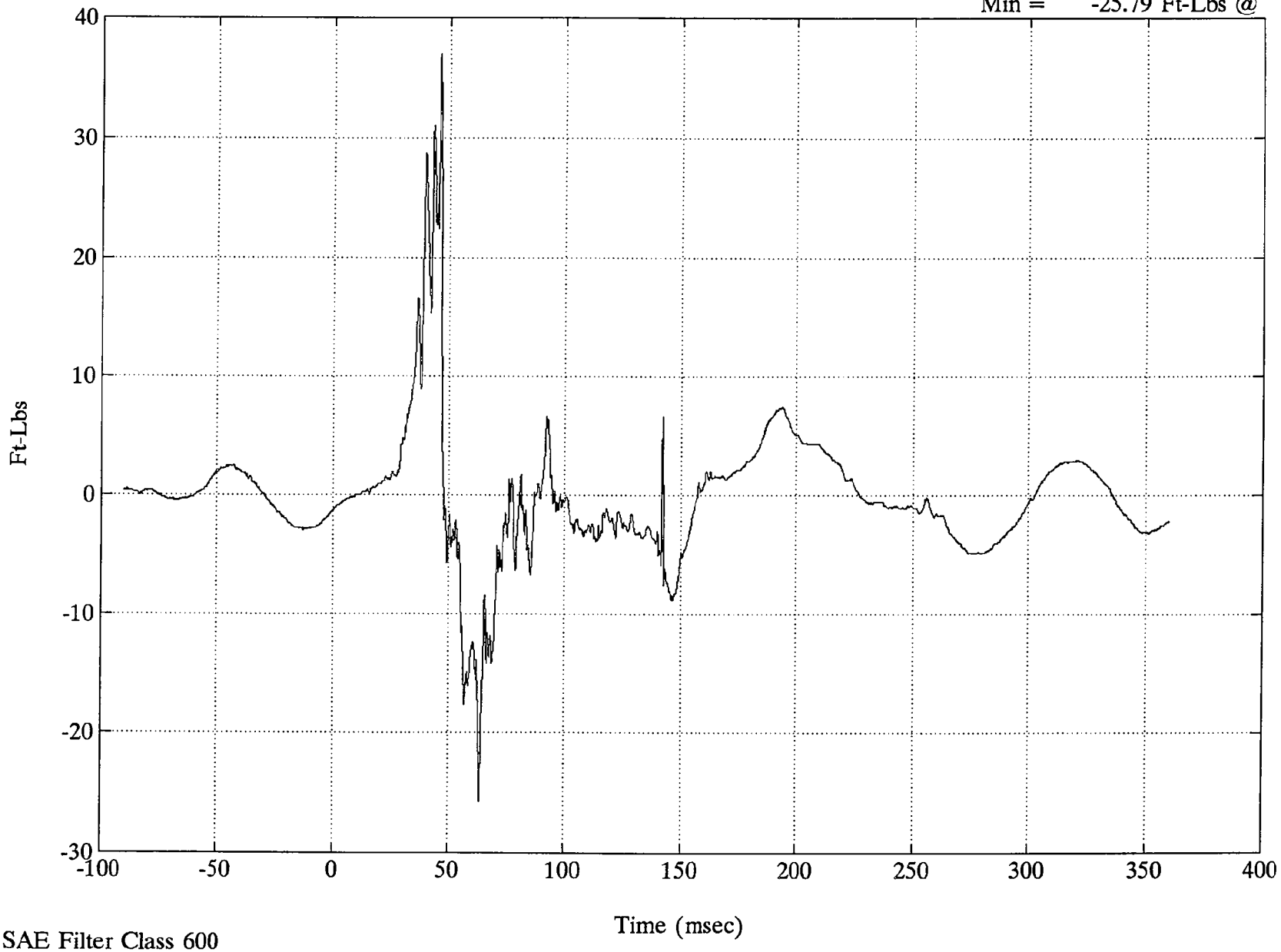


SAE Filter Class 600

208 Test #5 - 1996 Isuzu Trooper

P1 Lt Upper Tibia Mx

Max = 36.96 Ft-Lbs @ 45.96 msec
Min = -25.79 Ft-Lbs @ 63.72 msec



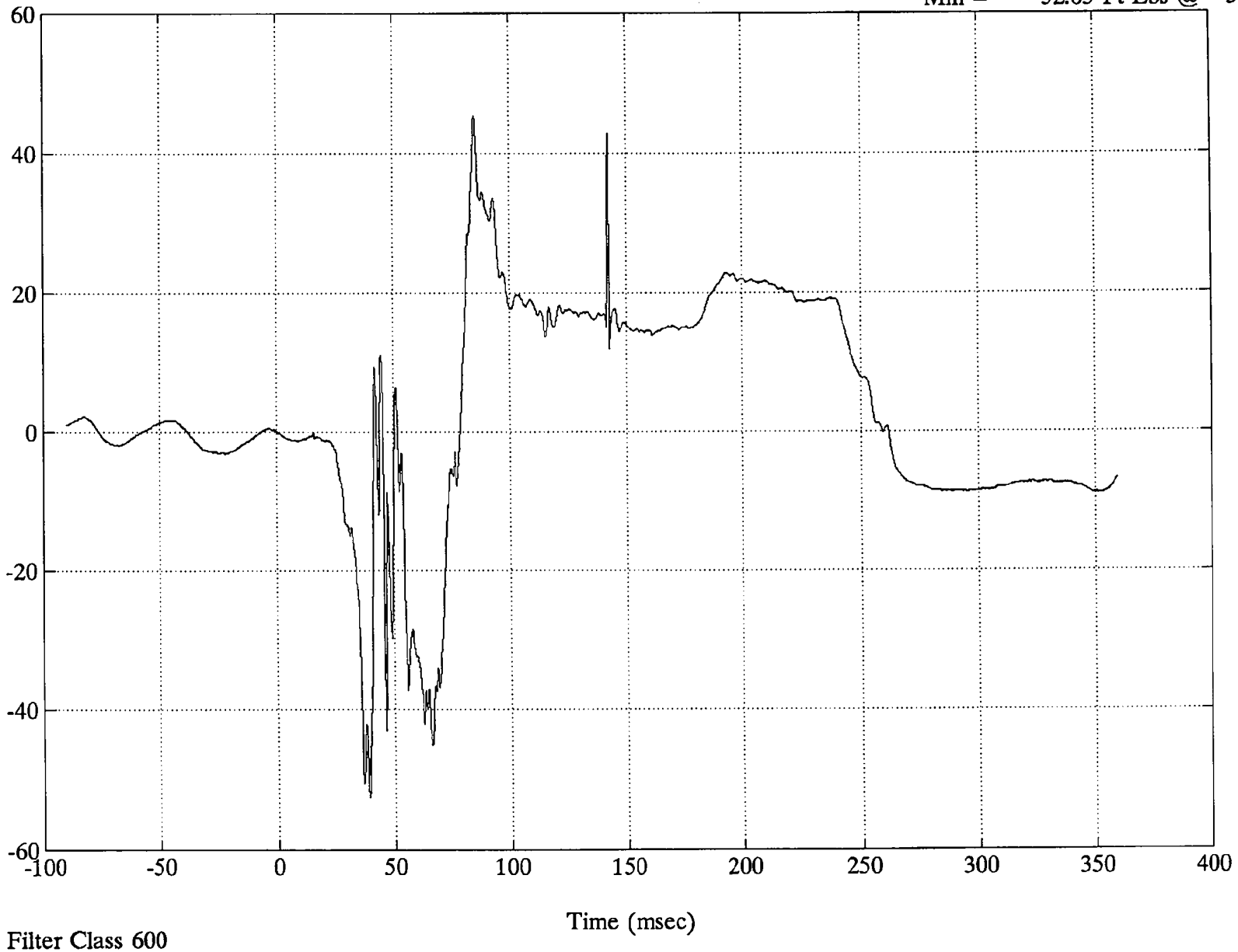
SAE Filter Class 600

8353-3

208 Test #5 - 1996 Isuzu Trooper

P1 Lt Upper Tibia My

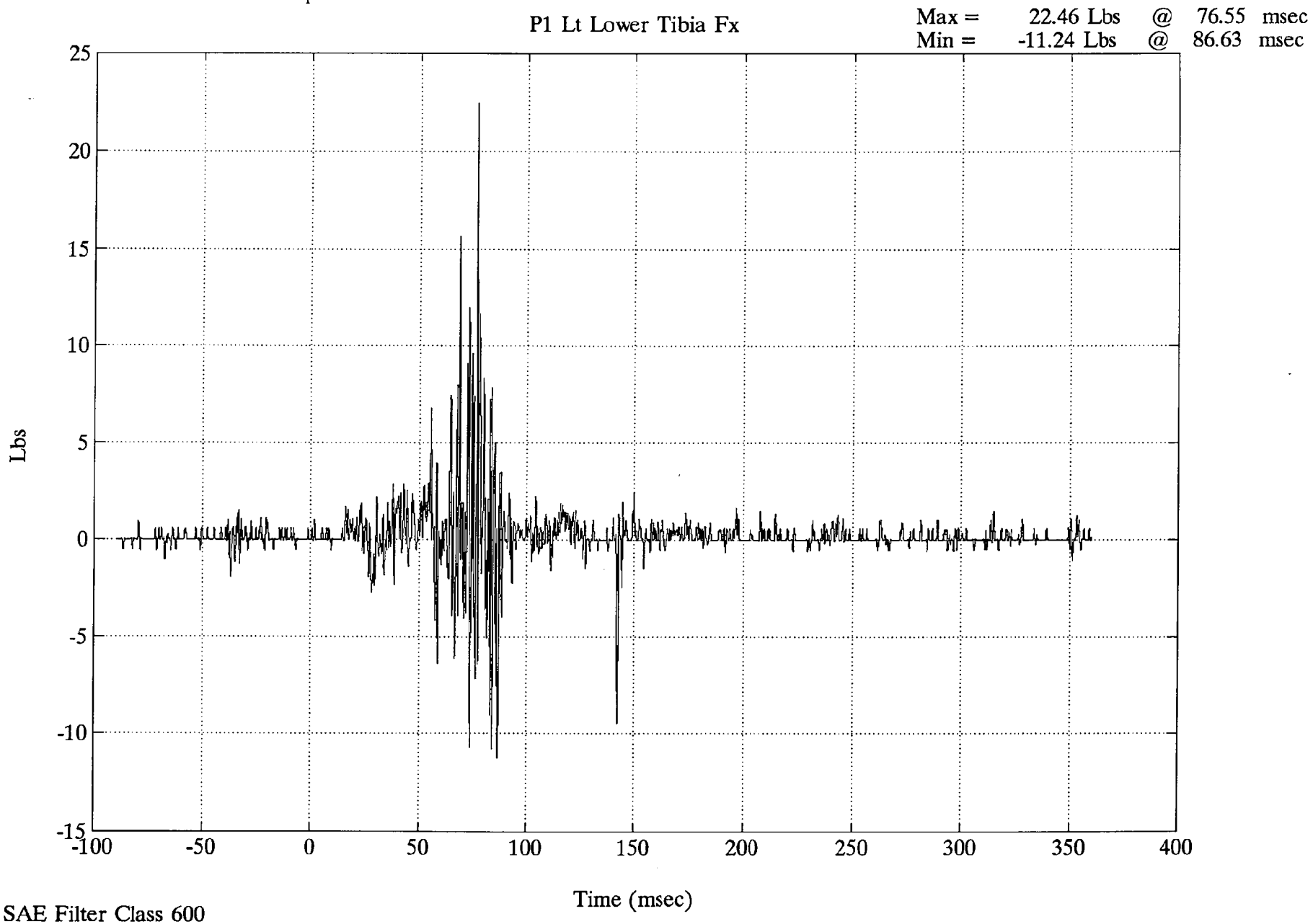
Max = 45.35 Ft-Lbs @ 84.95 msec
Min = -52.63 Ft-Lbs @ 39.23 msec



SAE Filter Class 600

8353-3

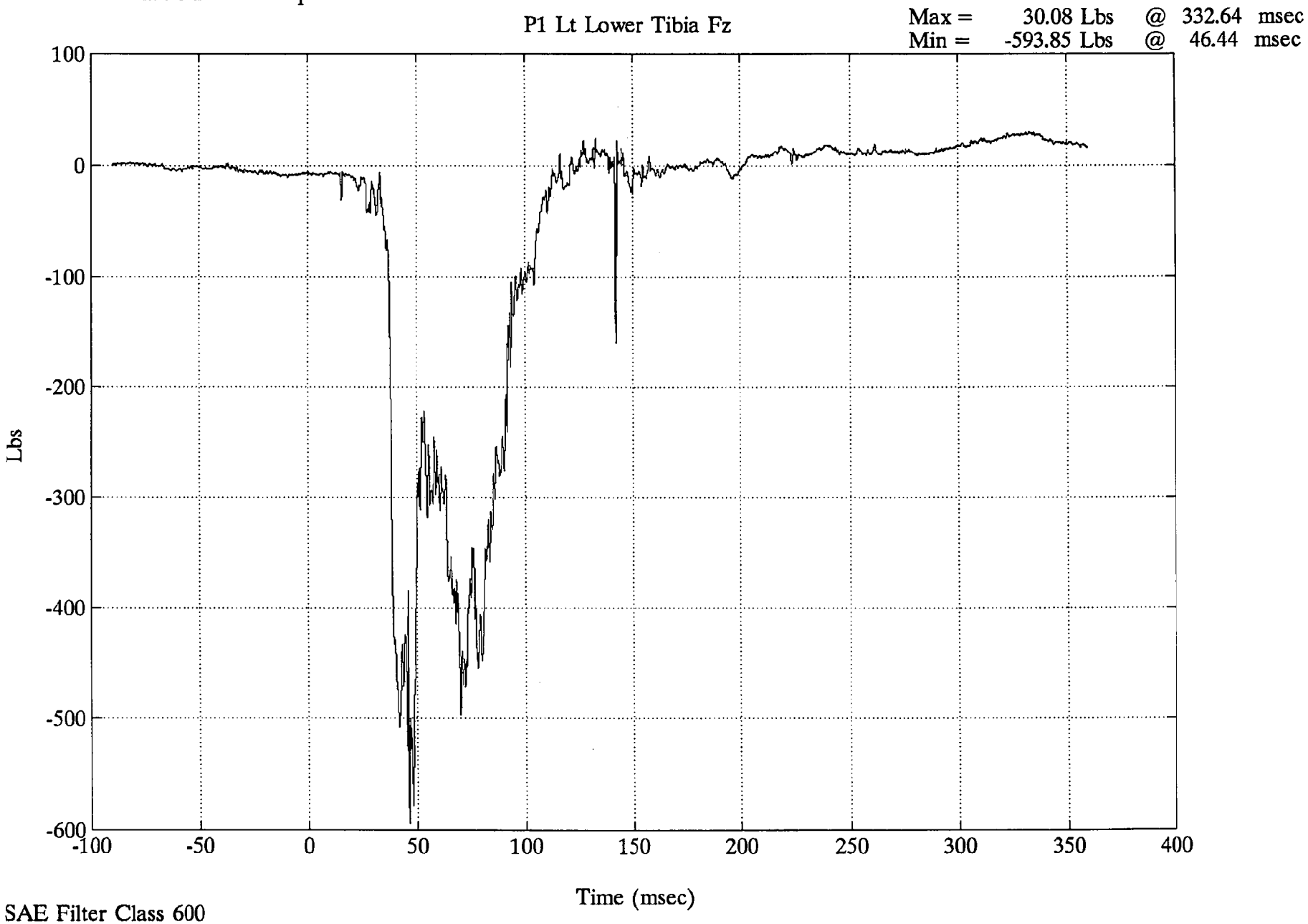
208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 600

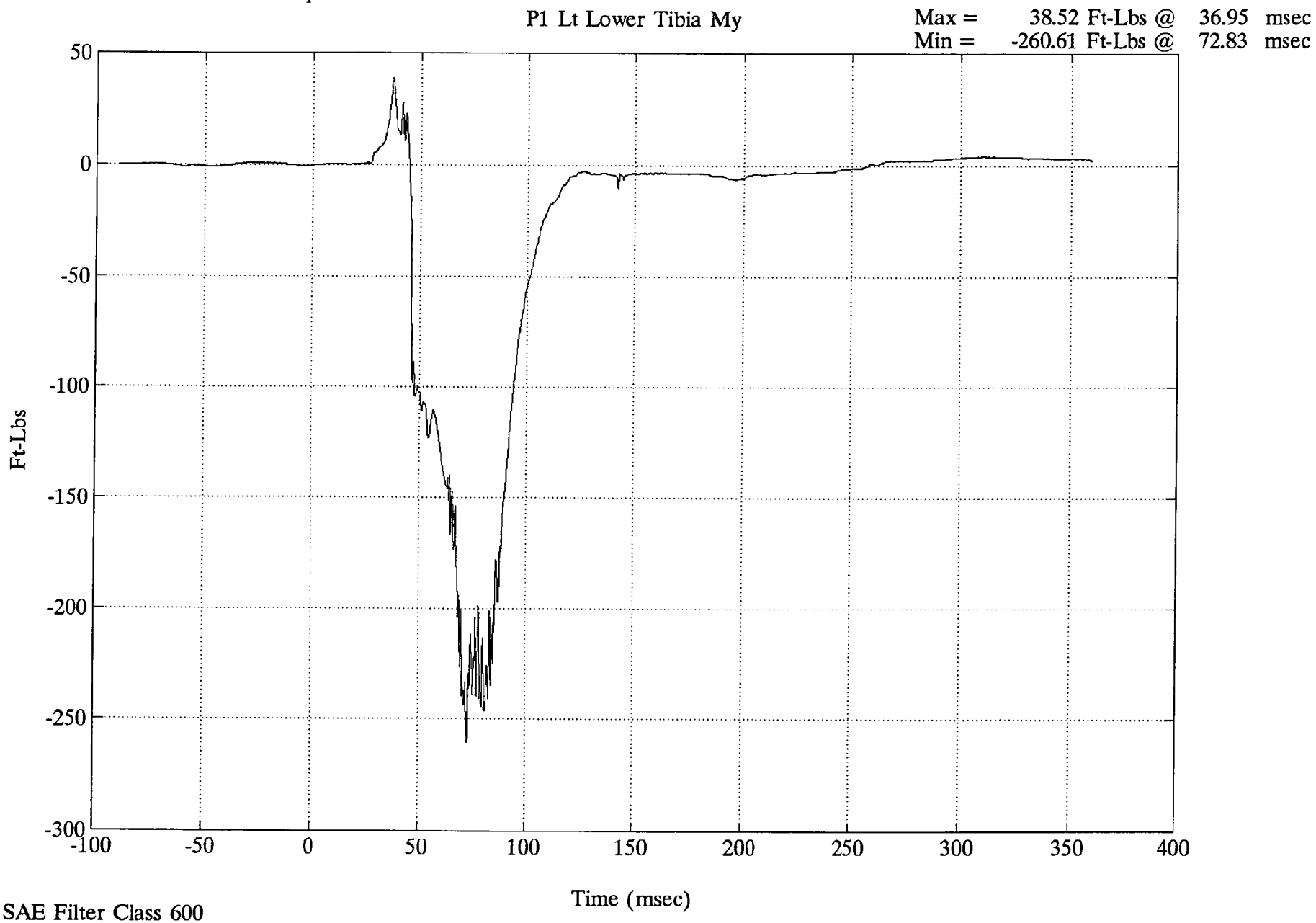
8353-3

208 Test #5 - 1996 Isuzu Trooper



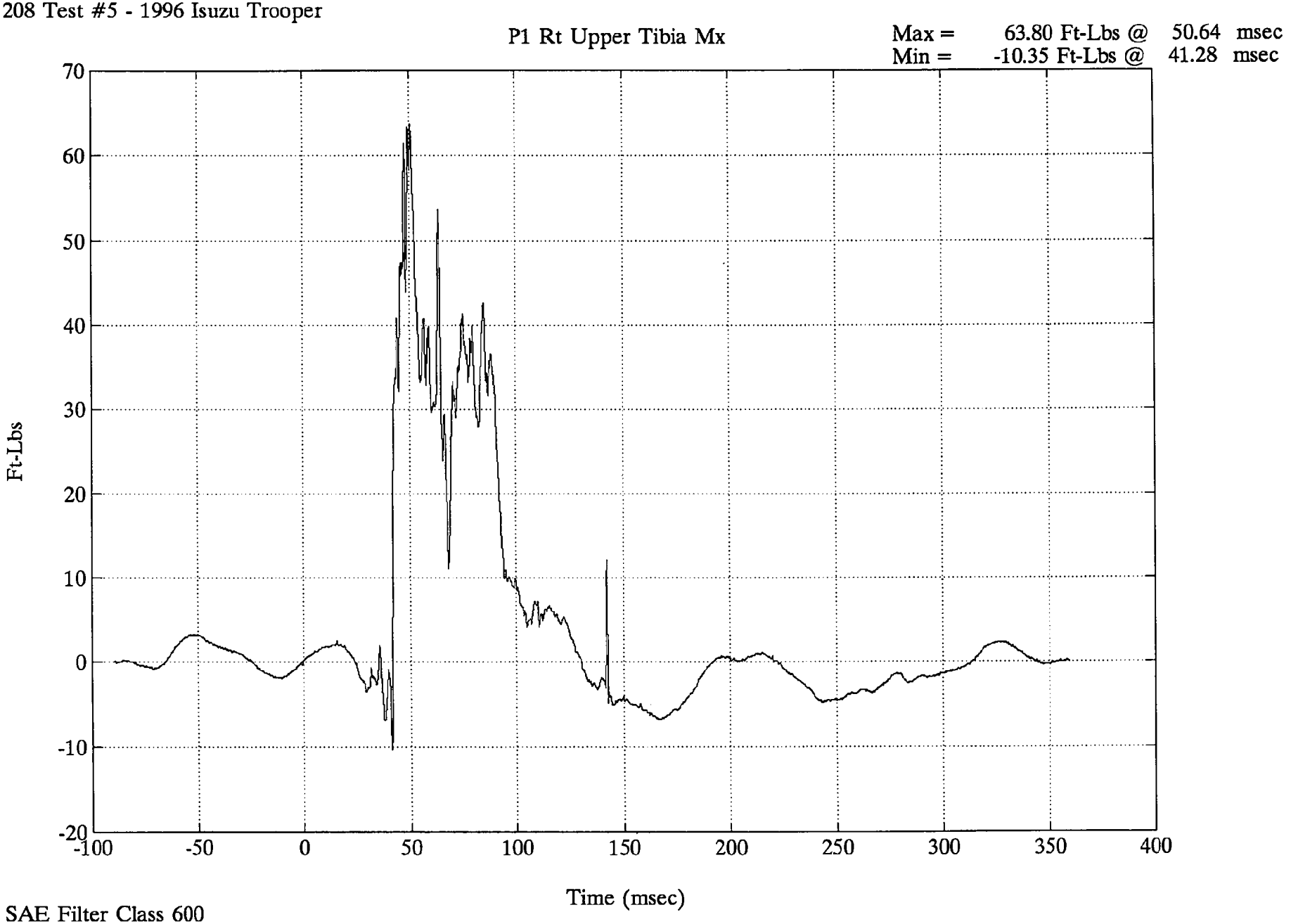
SAE Filter Class 600

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 600

208 Test #5 - 1996 Isuzu Trooper

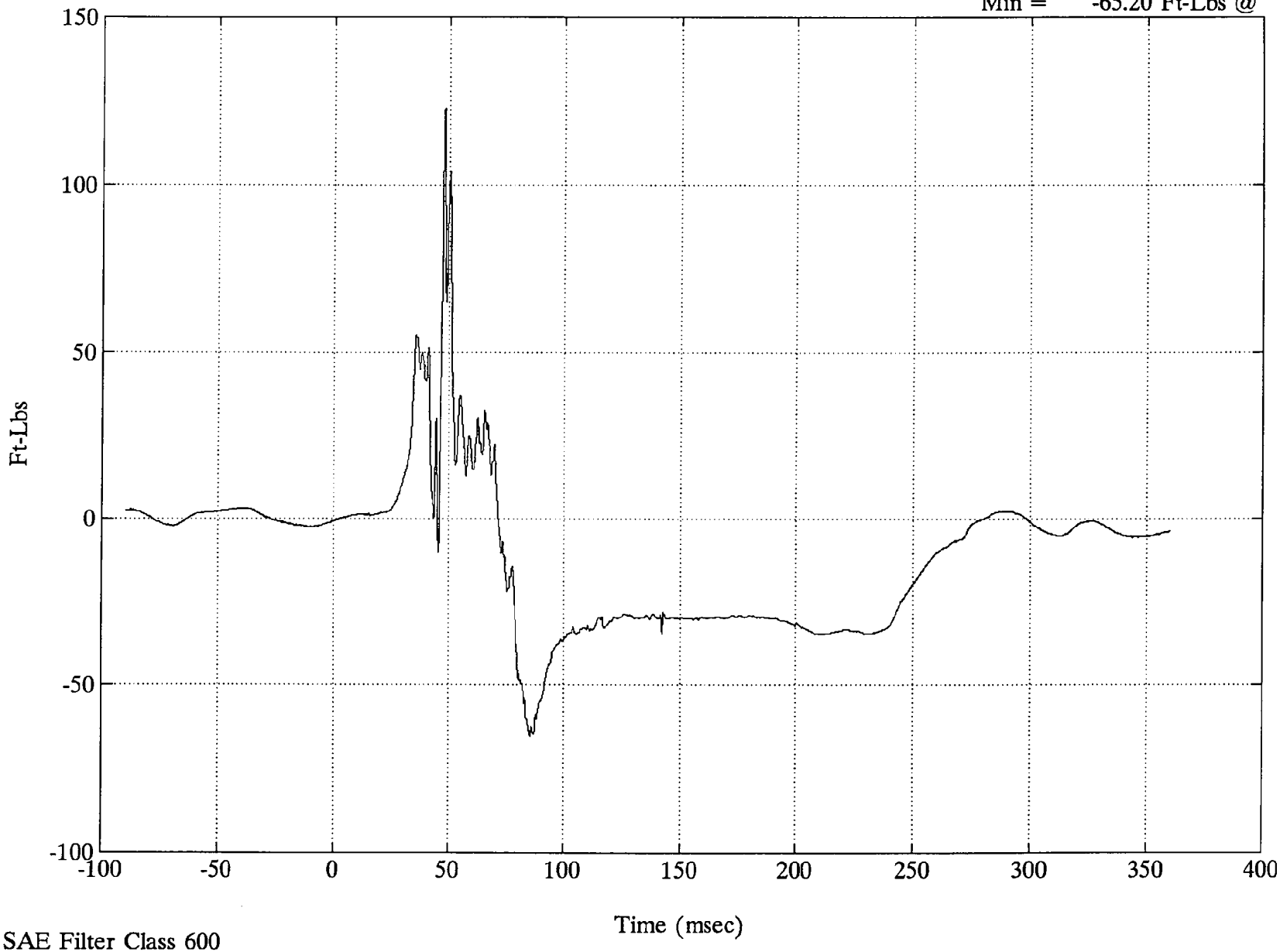


SAE Filter Class 600

208 Test #5 - 1996 Isuzu Trooper

P1 Rt Upper Tibia My

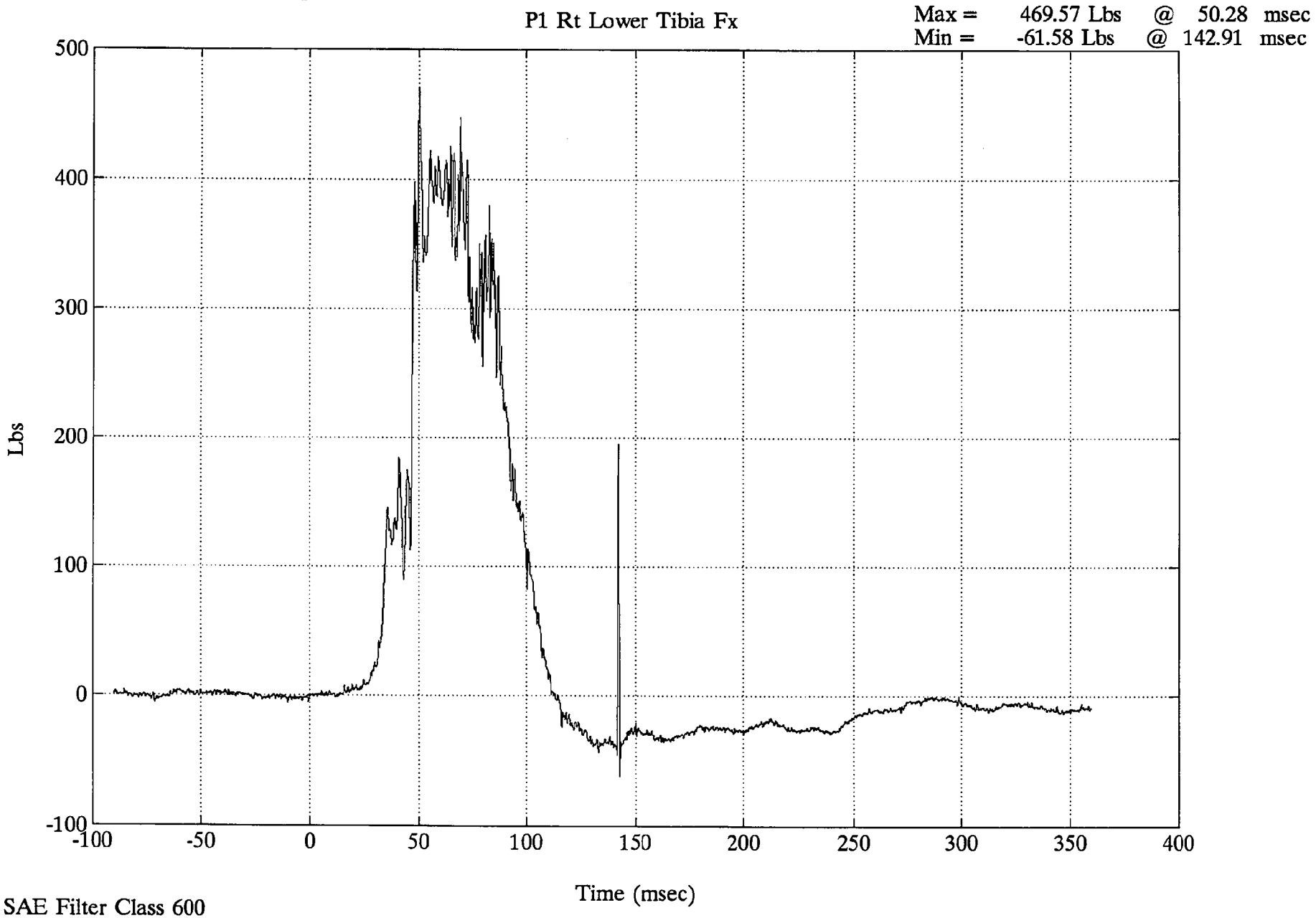
Max = 122.98 Ft-Lbs @ 48.00 msec
Min = -65.20 Ft-Lbs @ 85.68 msec



SAE Filter Class 600

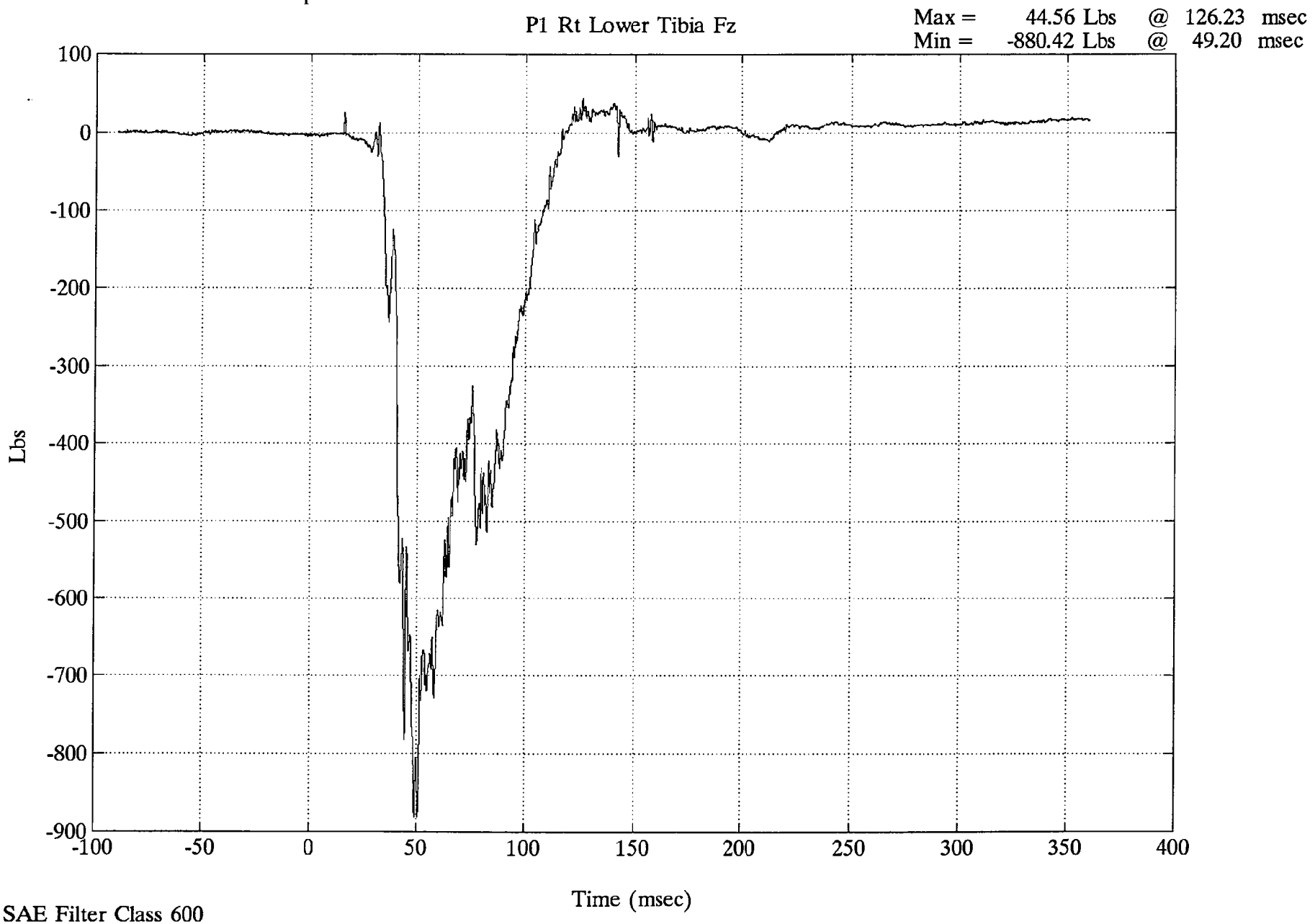
8353-3

208 Test #5 - 1996 Isuzu Trooper



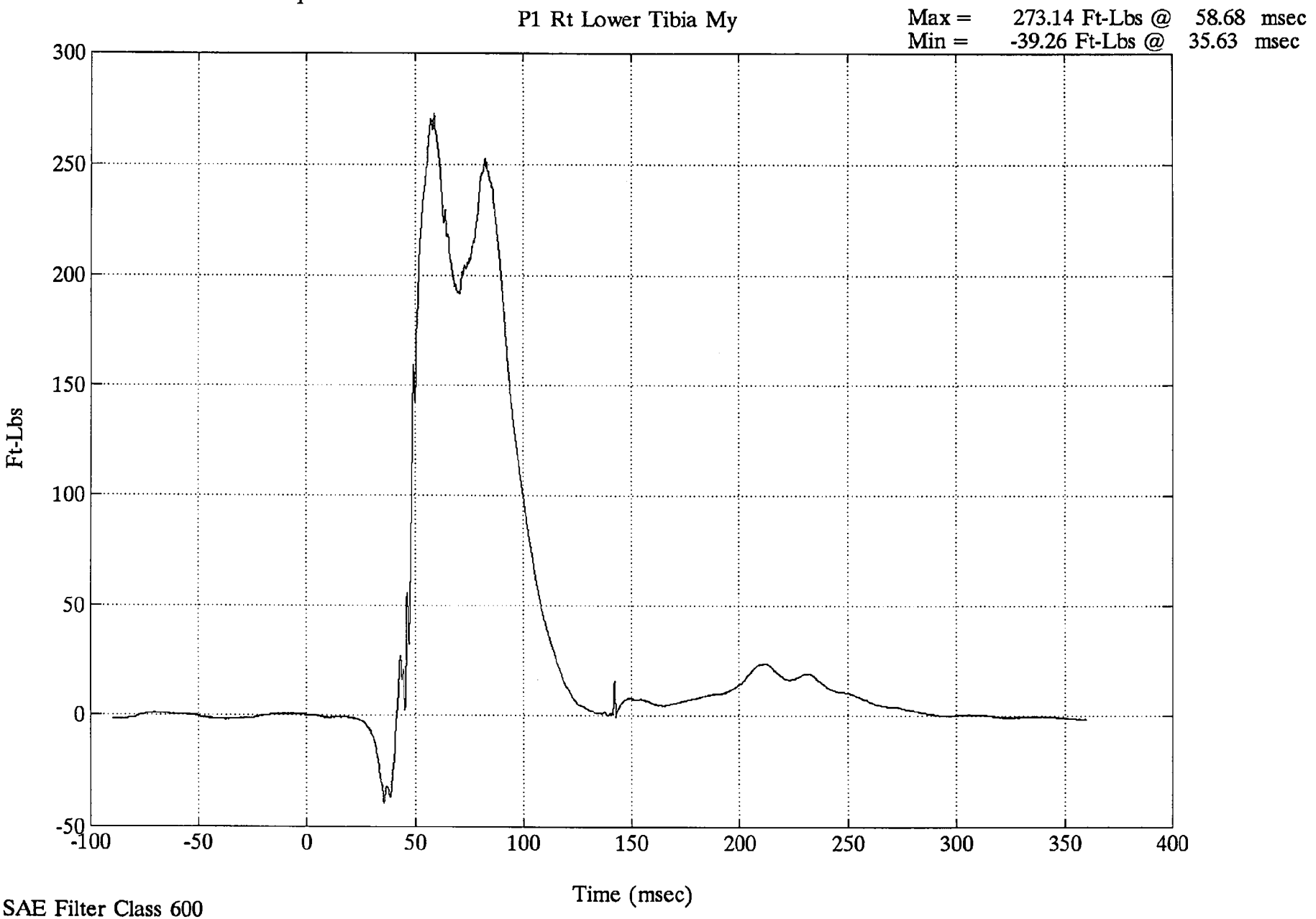
SAE Filter Class 600

208 Test #5 - 1996 Isuzu Trooper



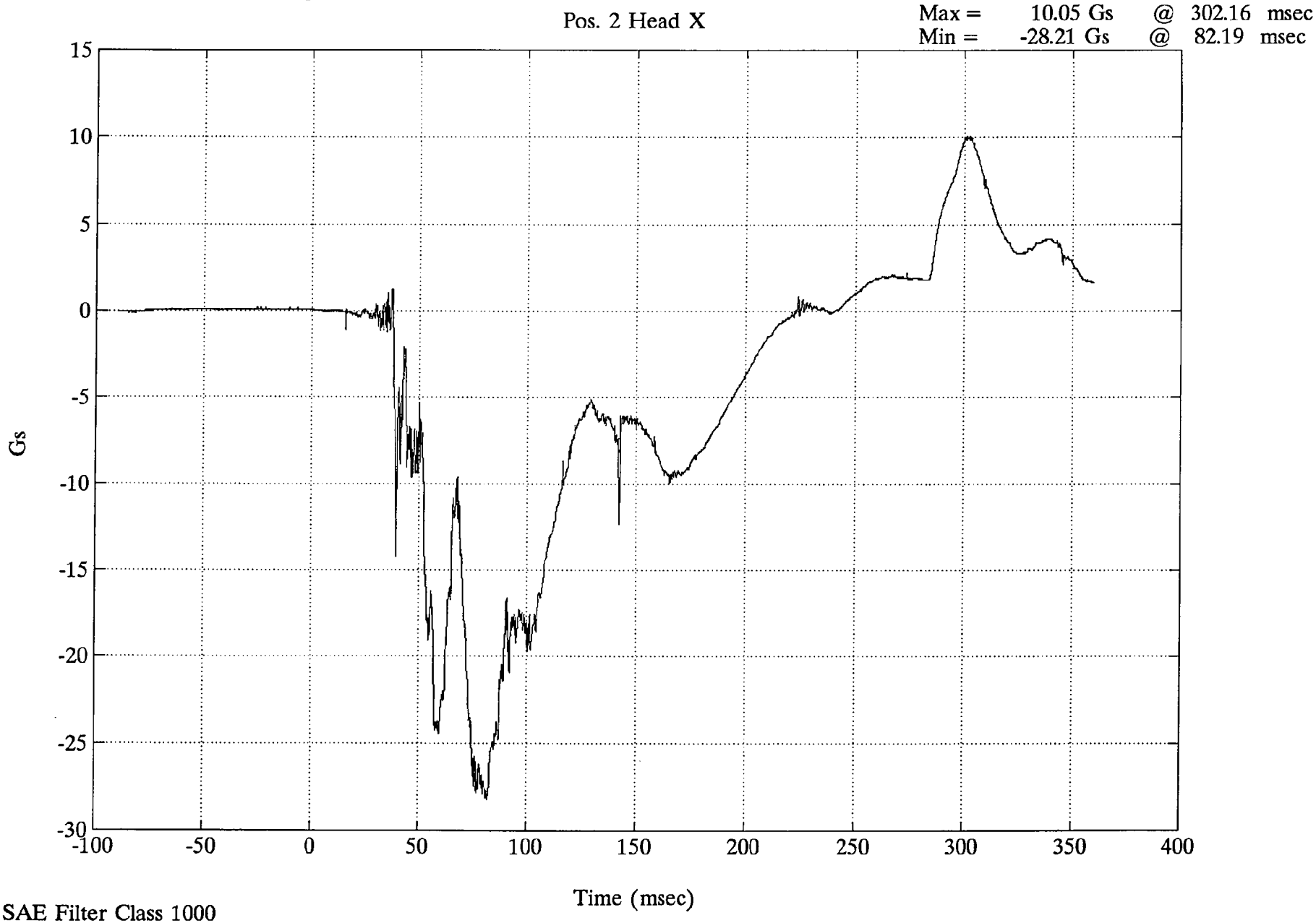
SAE Filter Class 600

208 Test #5 - 1996 Isuzu Trooper



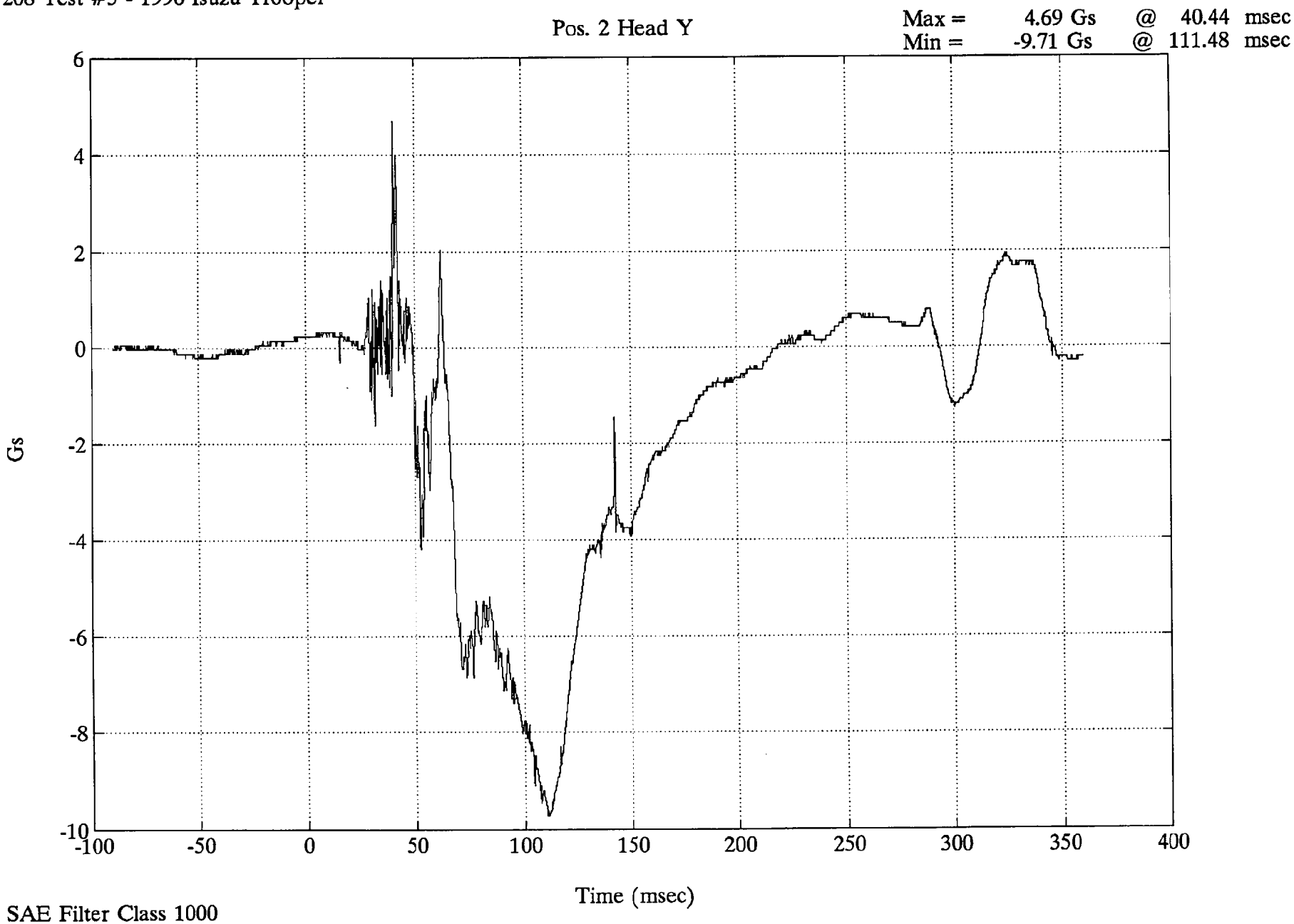
SAE Filter Class 600

208 Test #5 - 1996 Isuzu Trooper



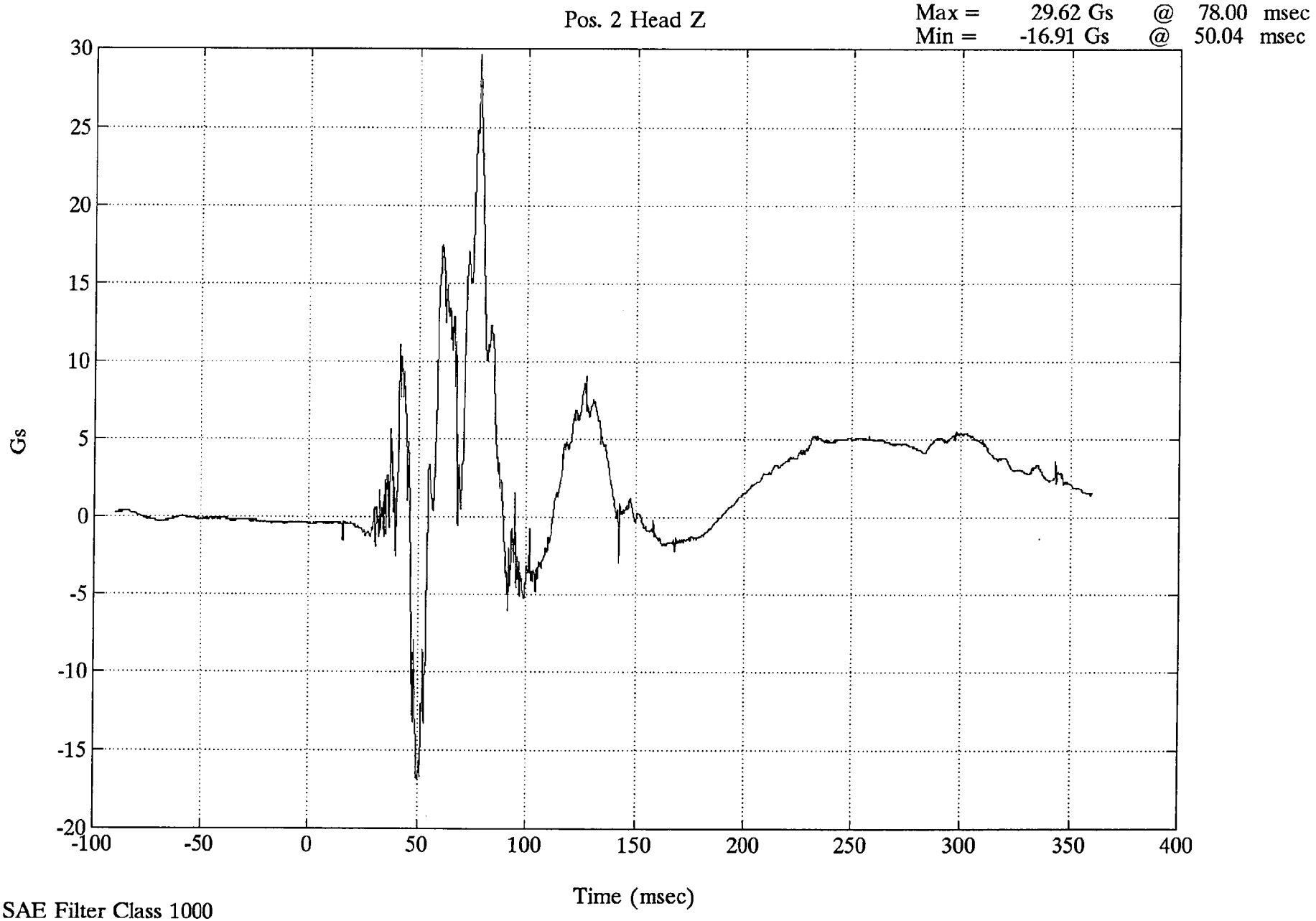
SAE Filter Class 1000

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 1000

208 Test #5 - 1996 Isuzu Trooper

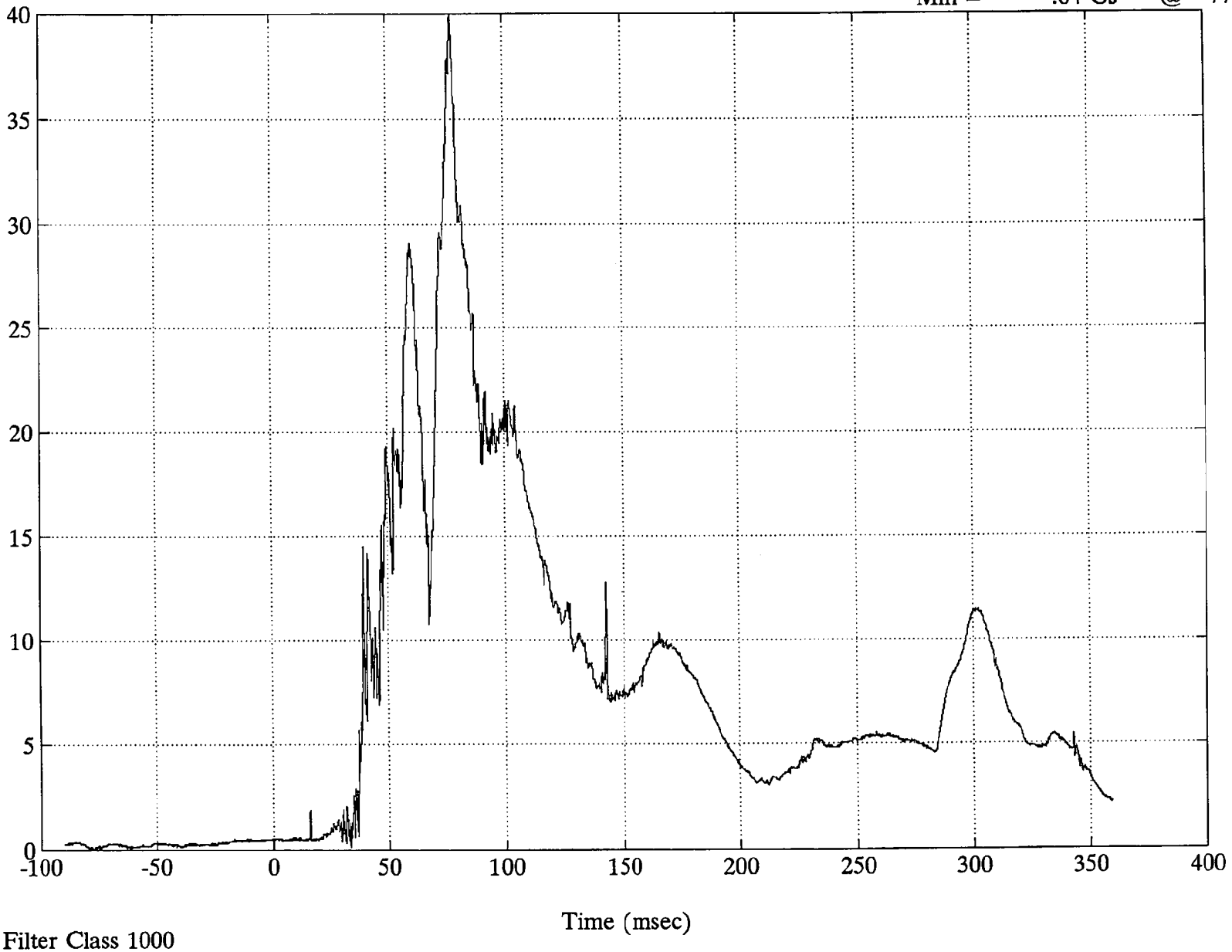


SAE Filter Class 1000

208 Test #5 - 1996 Isuzu Trooper

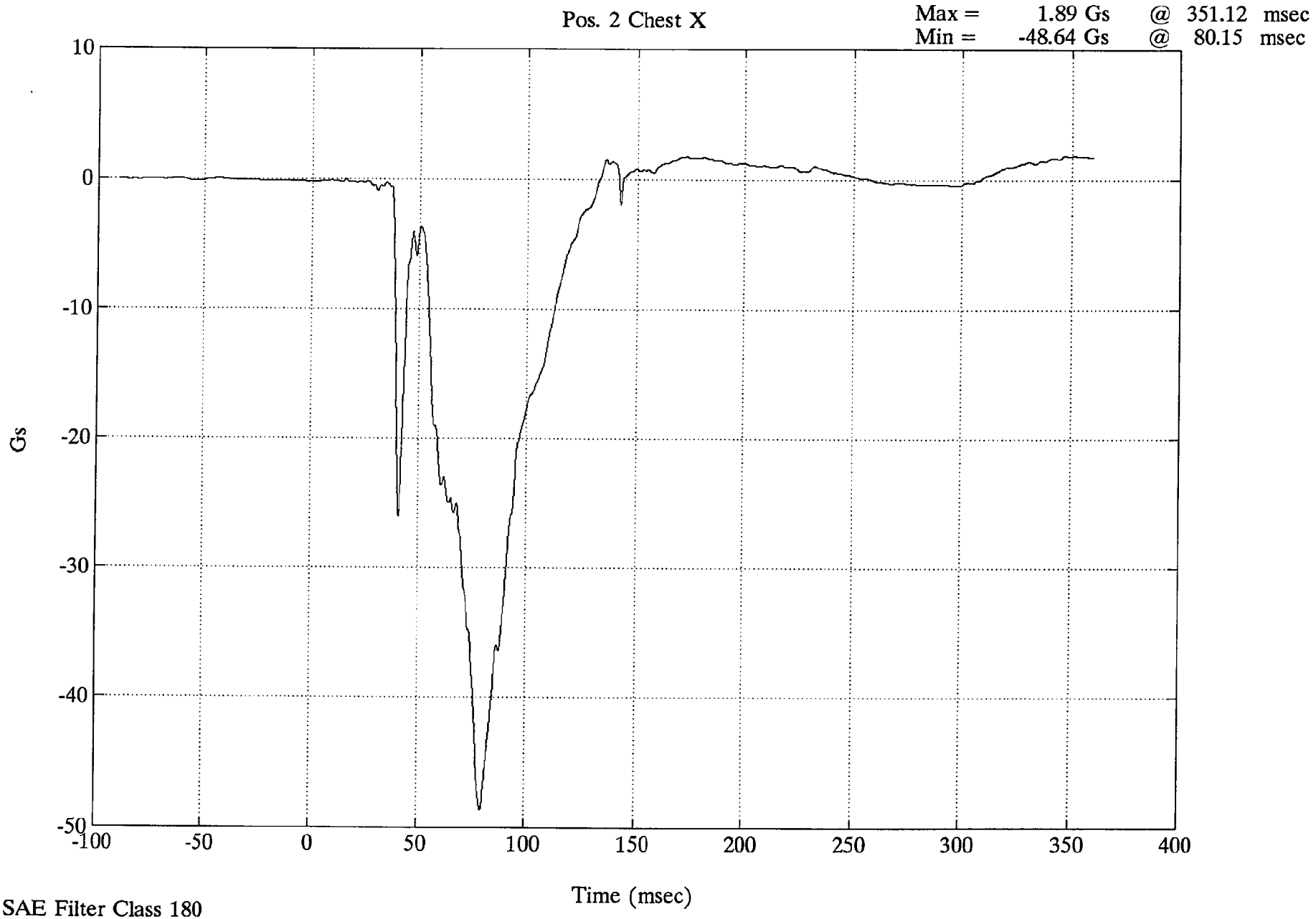
Pos. 2 Head Resultant

Max = 39.94 Gs @ 78.00 msec
Min = .04 Gs @ -77.04 msec



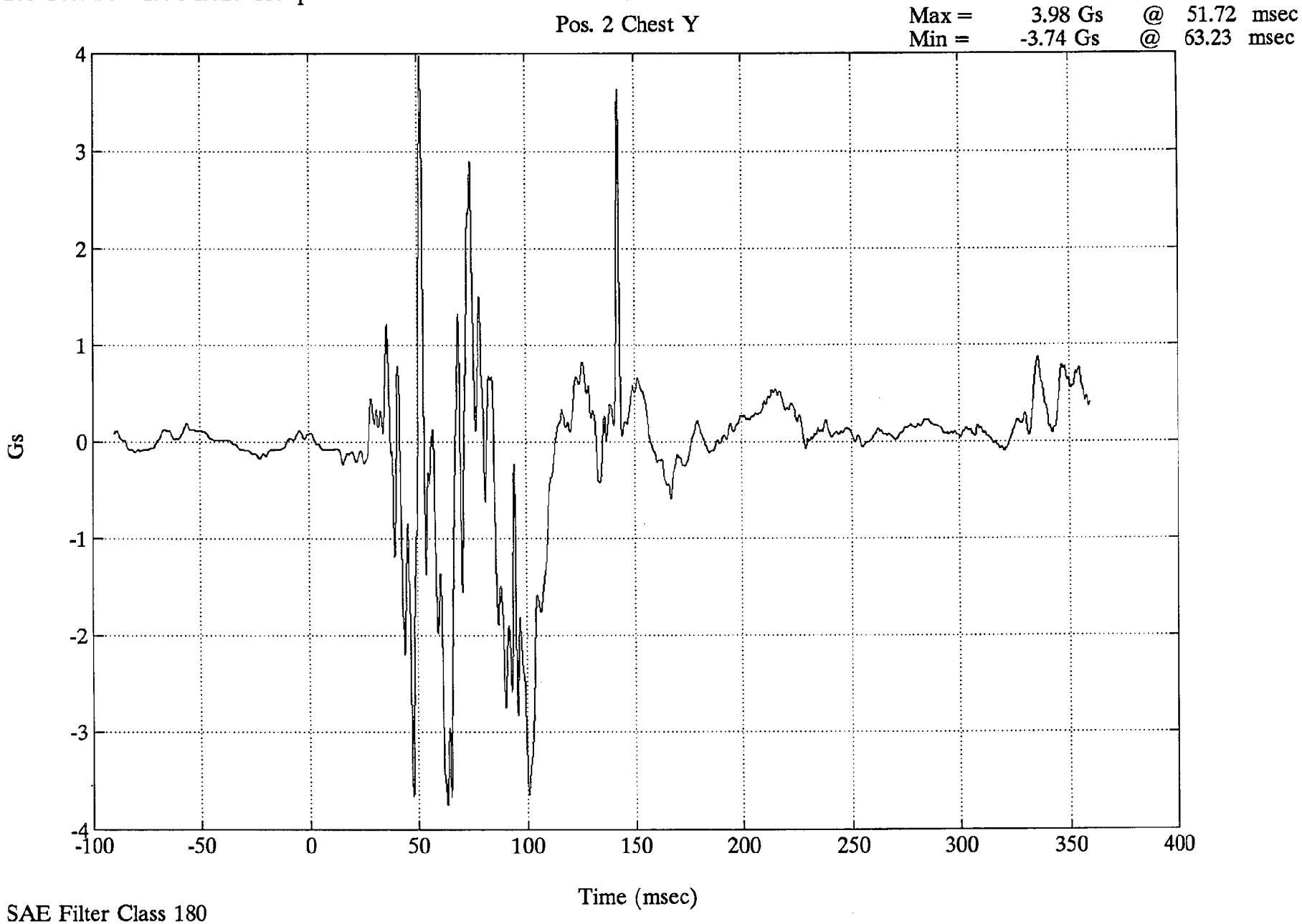
SAE Filter Class 1000

208 Test #5 - 1996 Isuzu Trooper



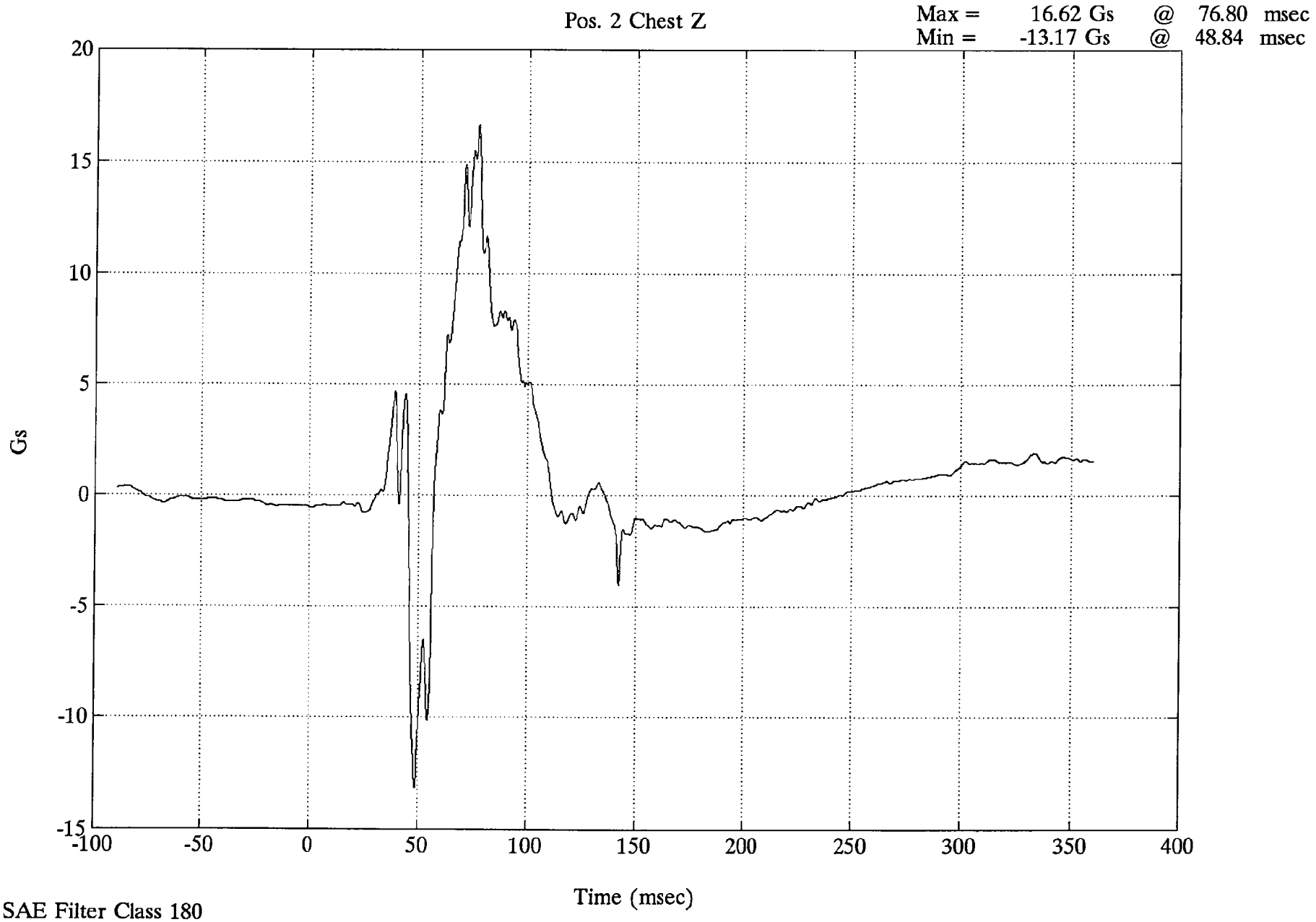
SAE Filter Class 180

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 180

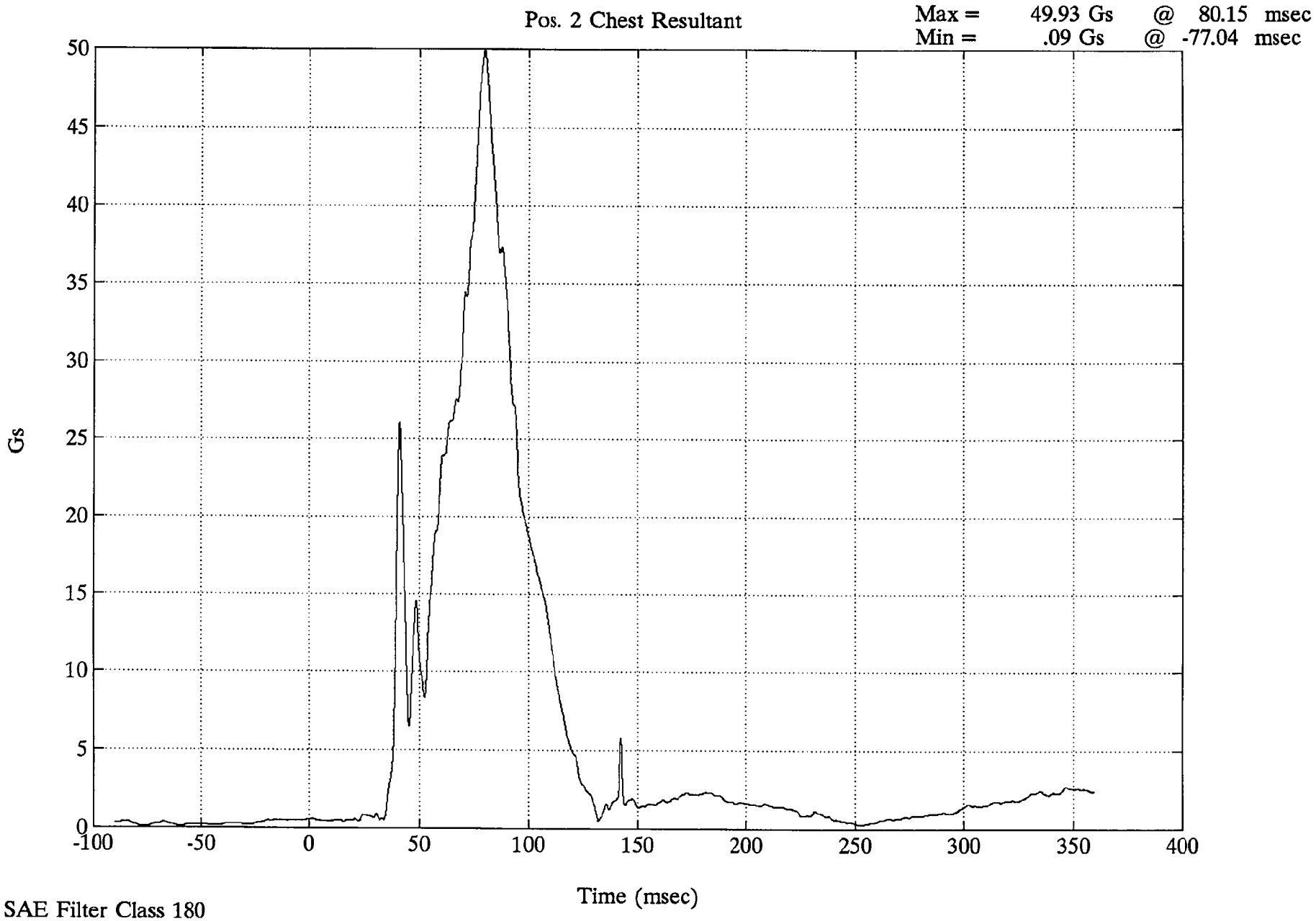
208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 180

8353-3

208 Test #5 - 1996 Isuzu Trooper

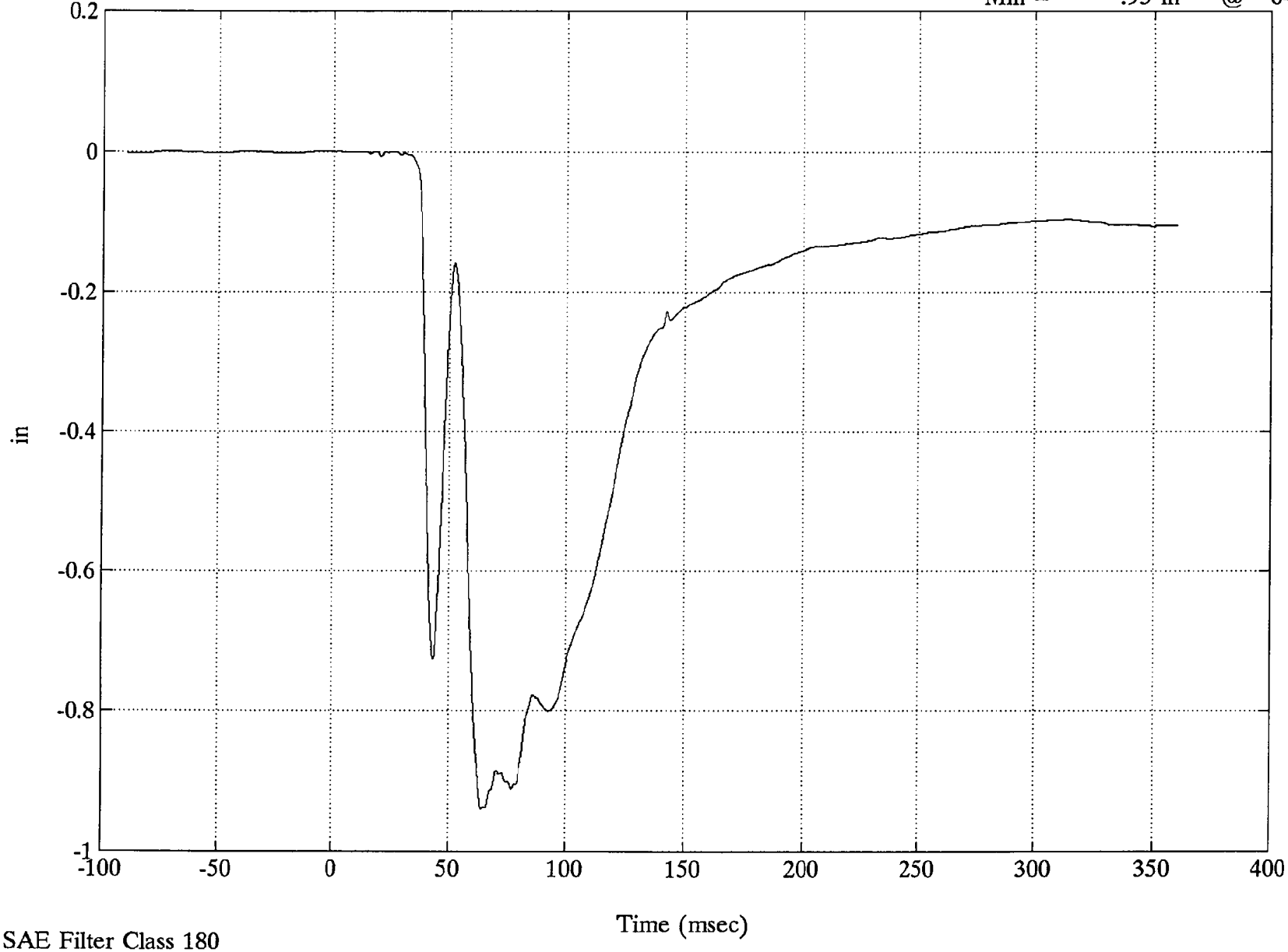


SAE Filter Class 180

208 Test #5 - 1996 Isuzu Trooper

Pos. 2 Chest Disp.

Max = .00 in @ -73.08 msec
Min = -.93 in @ 64.19 msec

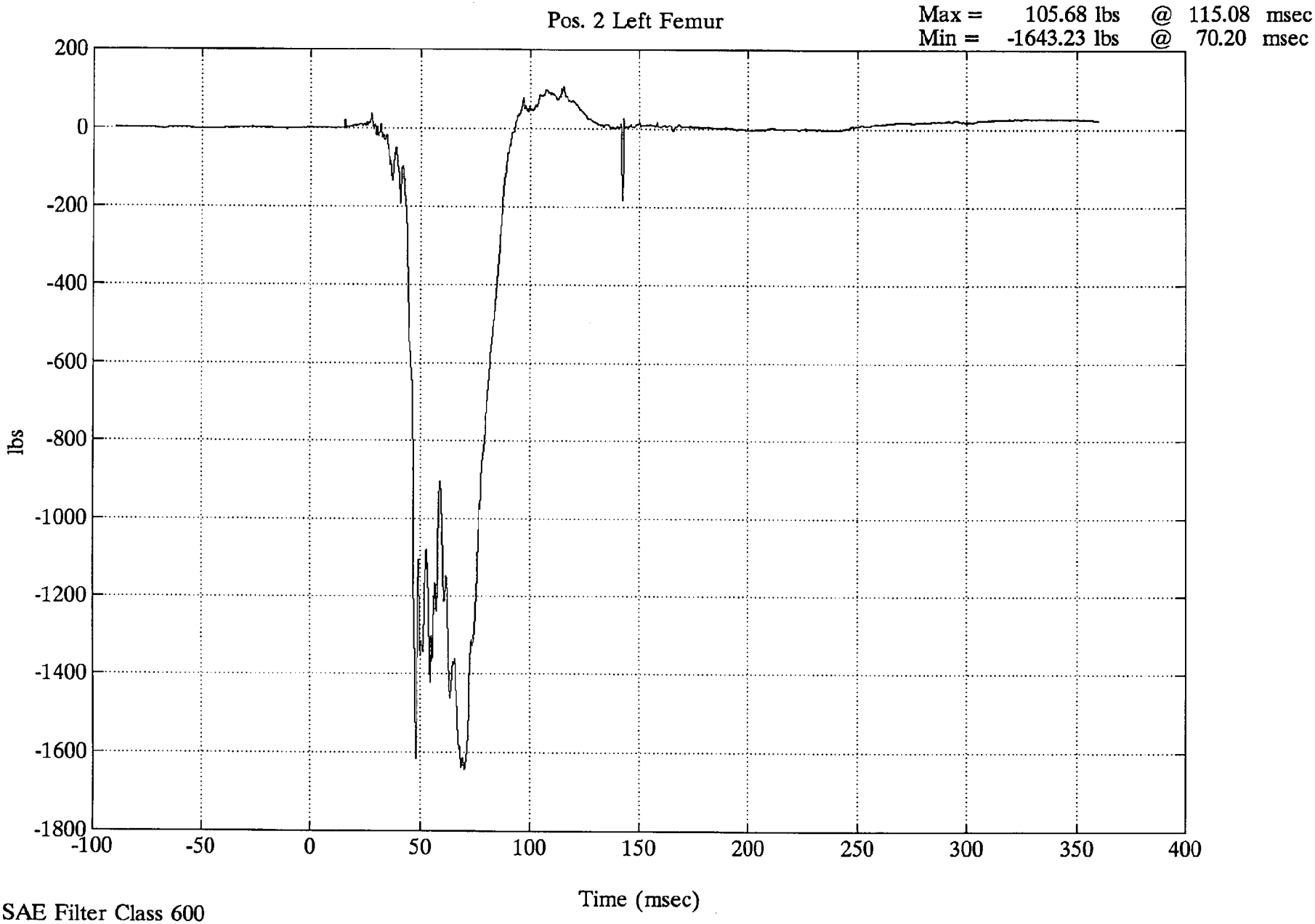


SAE Filter Class 180

B-58

8353-3

208 Test #5 - 1996 Isuzu Trooper

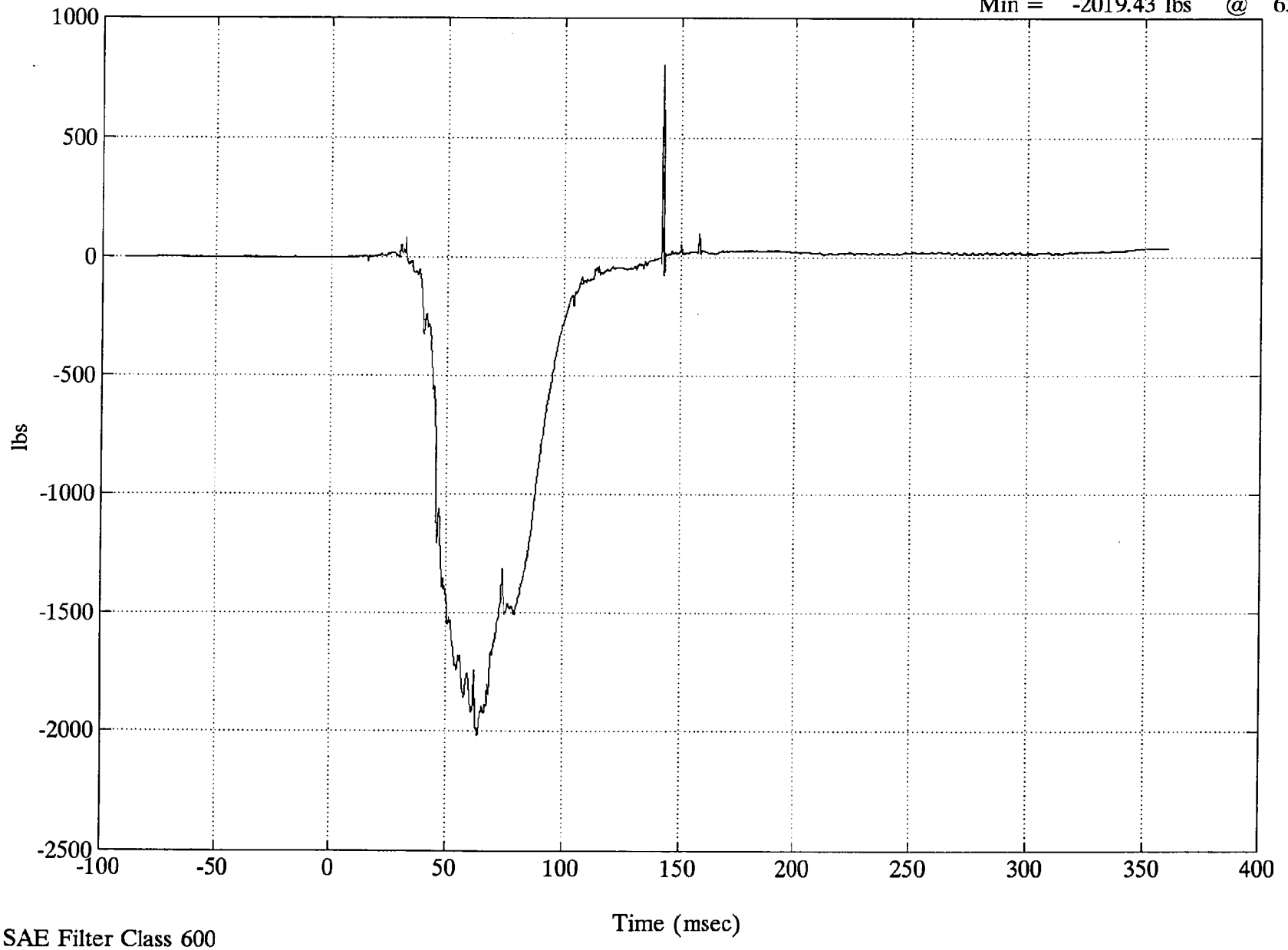


SAE Filter Class 600

208 Test #5 - 1996 Isuzu Trooper

Pos. 2 Right Femur

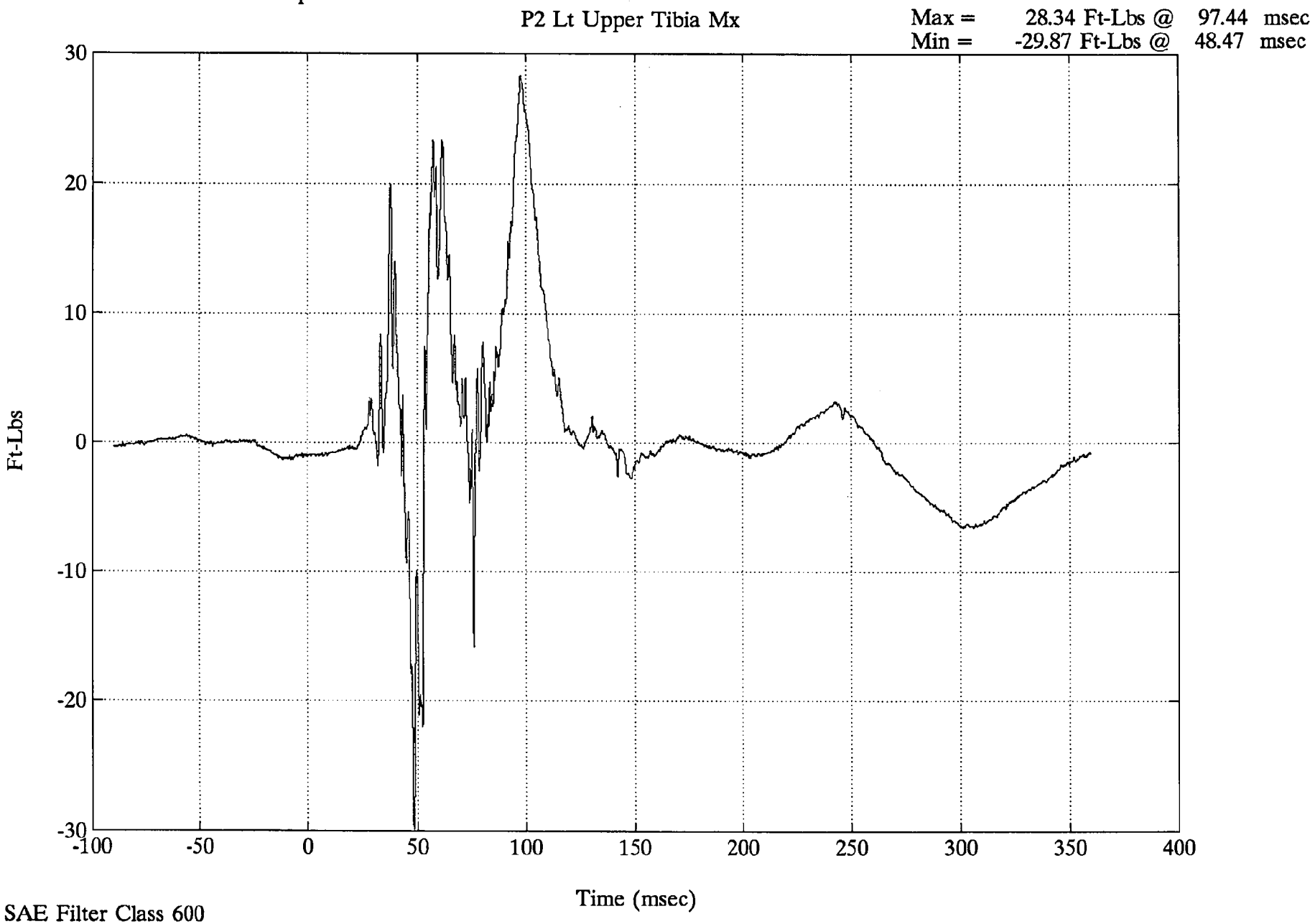
Max = 805.32 lbs @ 142.44 msec
Min = -2019.43 lbs @ 63.72 msec



SAE Filter Class 600

8353-3

208 Test #5 - 1996 Isuzu Trooper

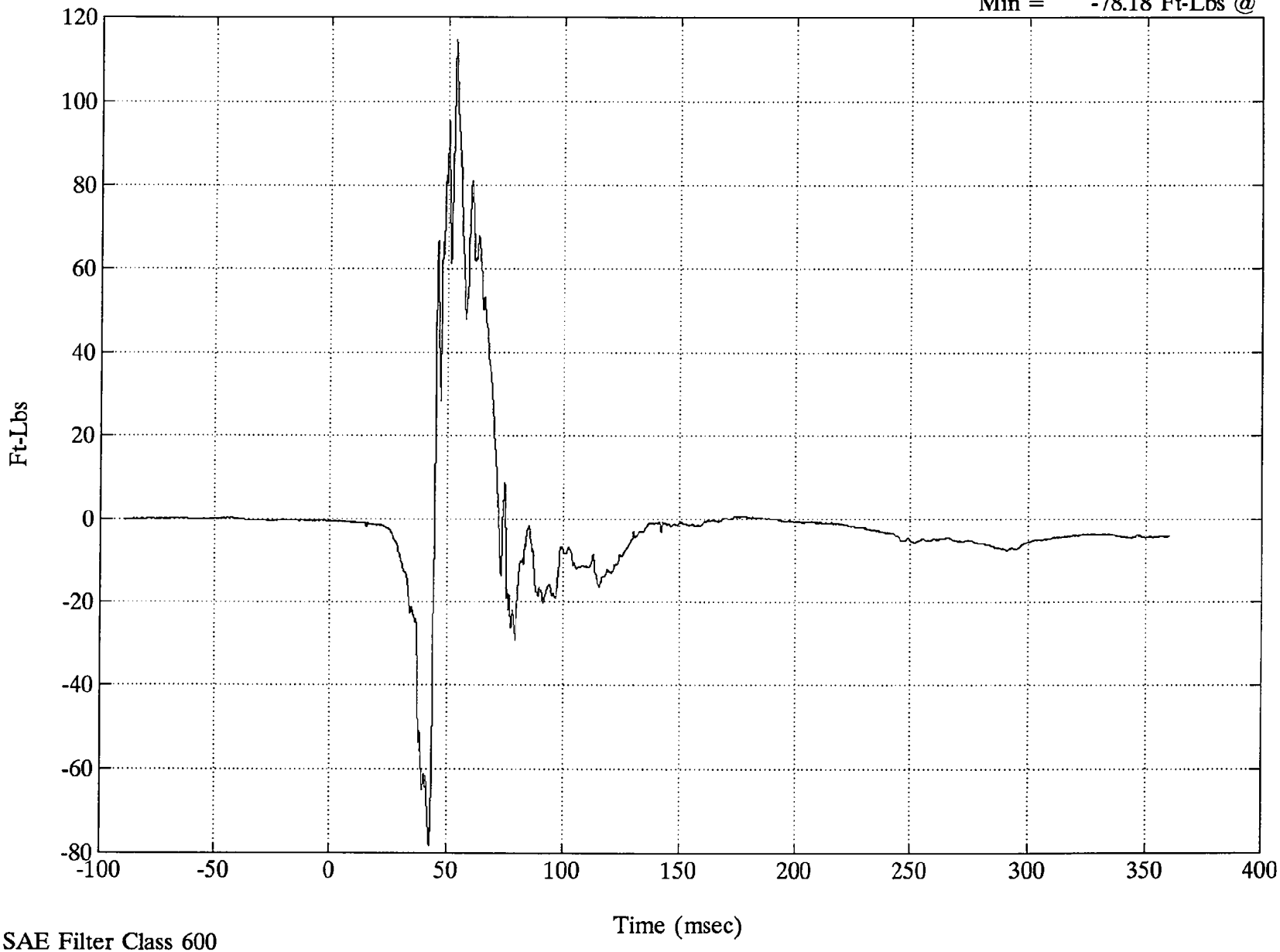


SAE Filter Class 600

208 Test #5 - 1996 Isuzu Trooper

P2 Lt Upper Tibia My

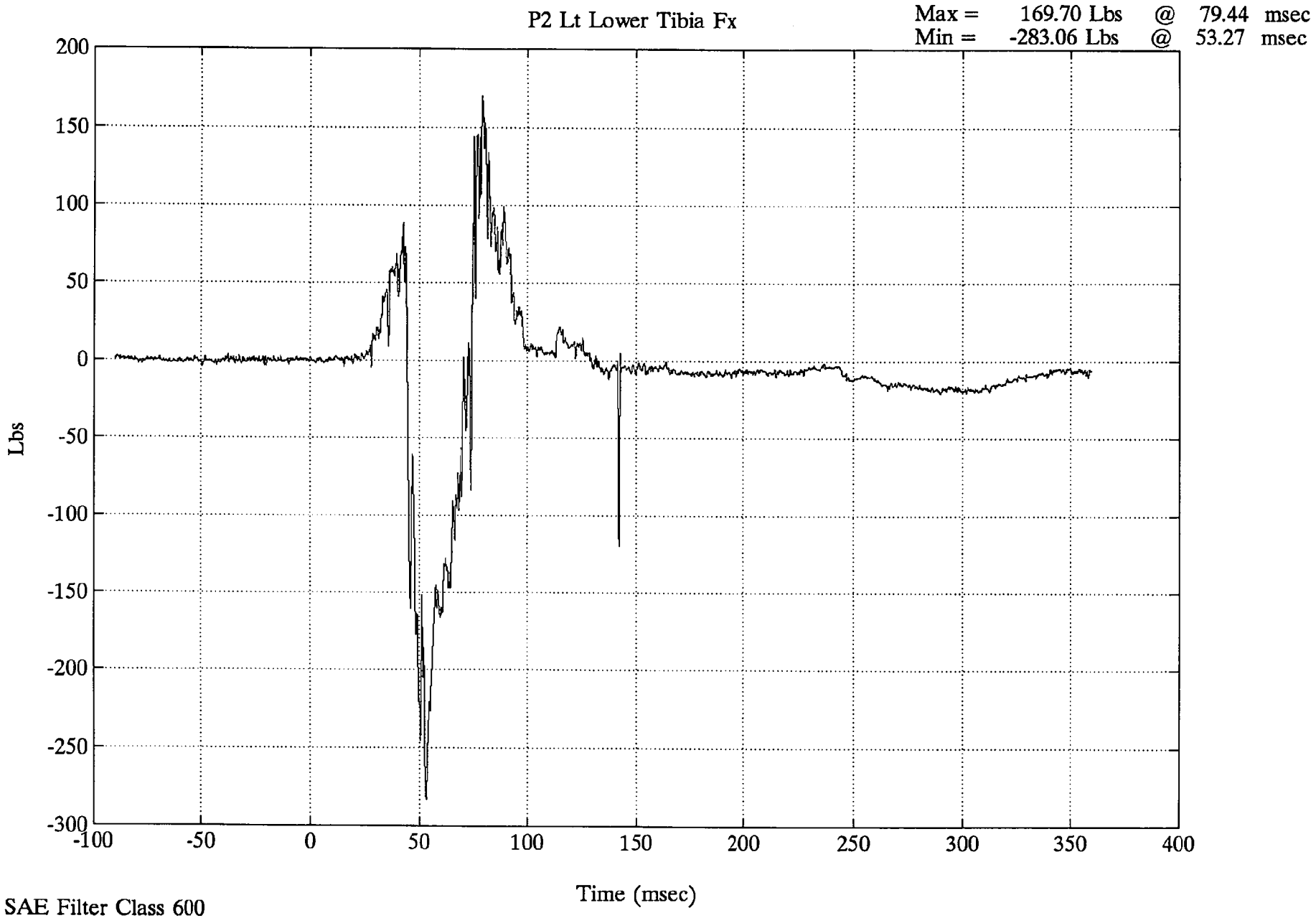
Max = 114.59 Ft-Lbs @ 53.52 msec
Min = -78.18 Ft-Lbs @ 42.72 msec



SAE Filter Class 600

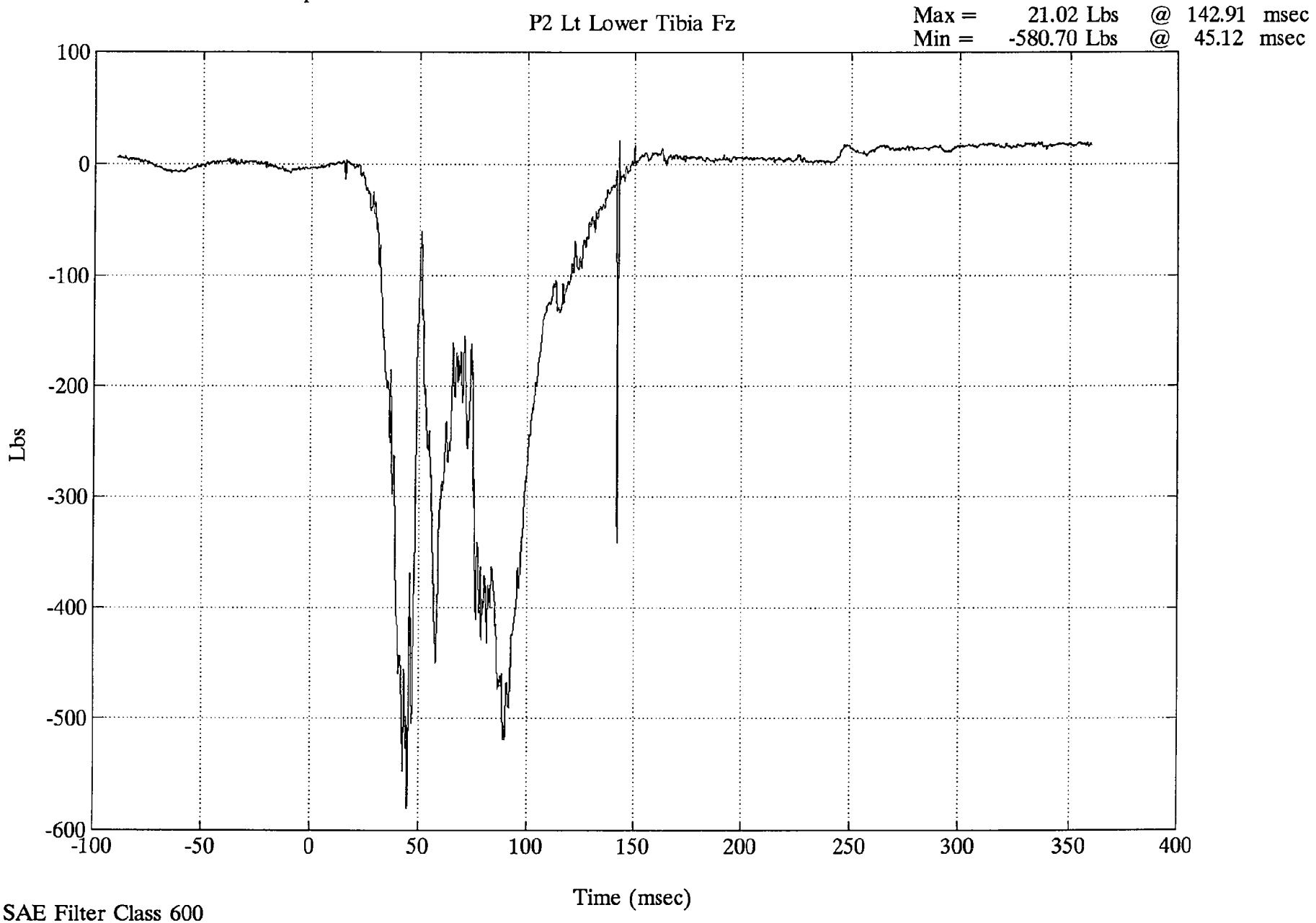
8353-3

208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 600

208 Test #5 - 1996 Isuzu Trooper



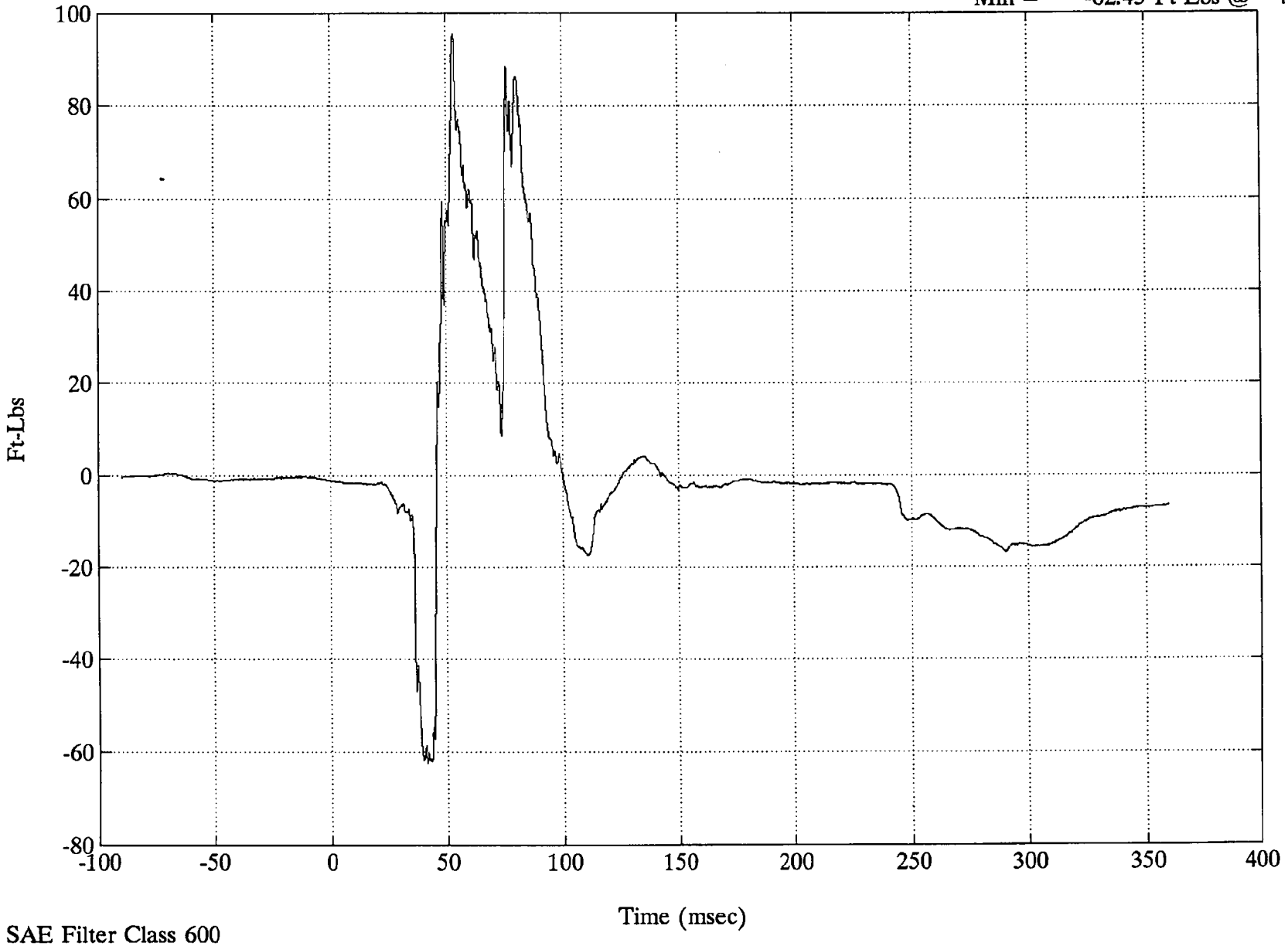
SAE Filter Class 600

8353-3

208 Test #5 - 1996 Isuzu Trooper

P2 Lt Lower Tibia My

Max = 95.69 Ft-Lbs @ 53.39 msec
Min = -62.43 Ft-Lbs @ 41.28 msec

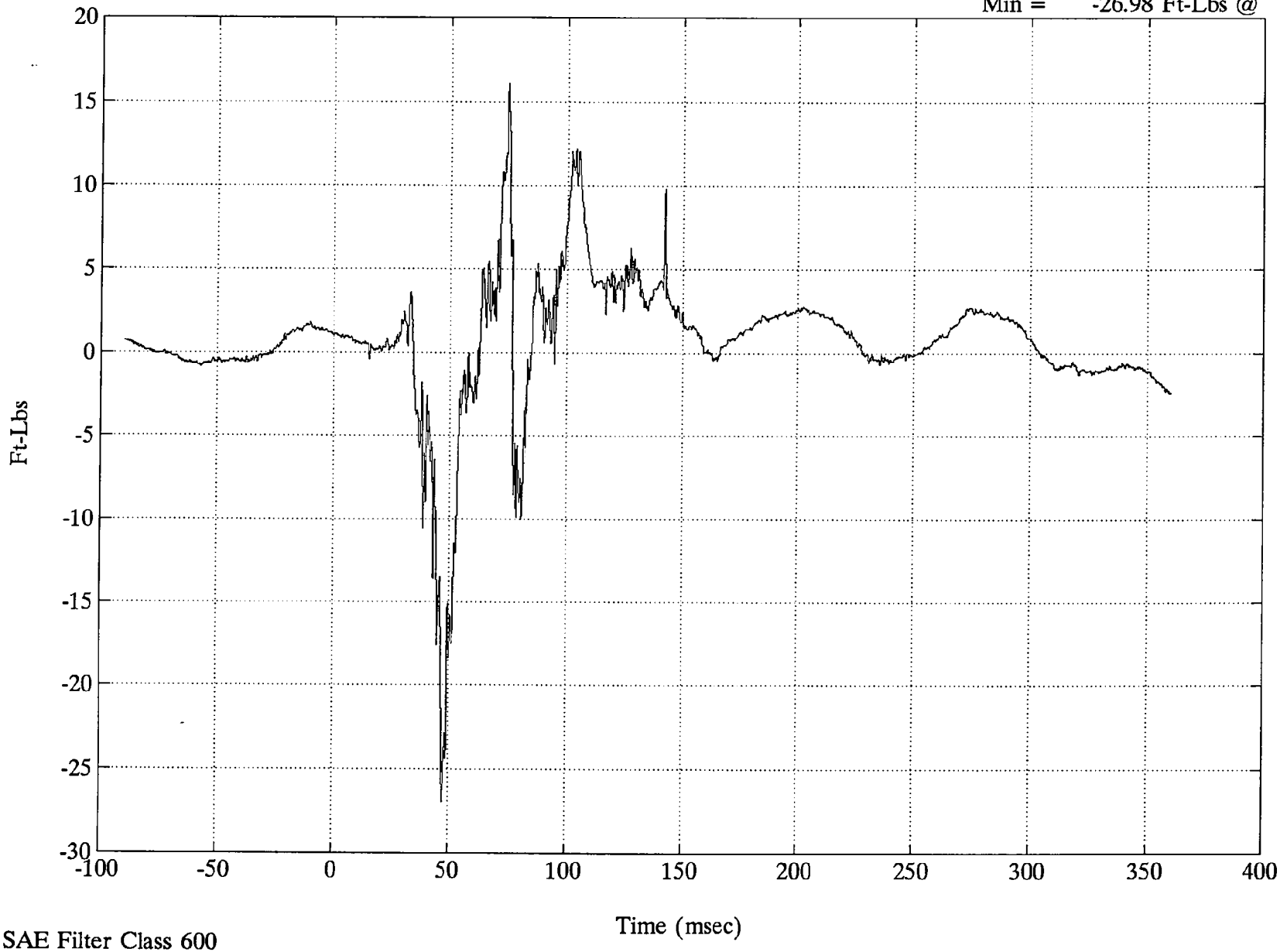


SAE Filter Class 600

208 Test #5 - 1996 Isuzu Trooper

P2 Rt Upper Tibia Mx

Max = 16.09 Ft-Lbs @ 74.27 msec
Min = -26.98 Ft-Lbs @ 47.40 msec



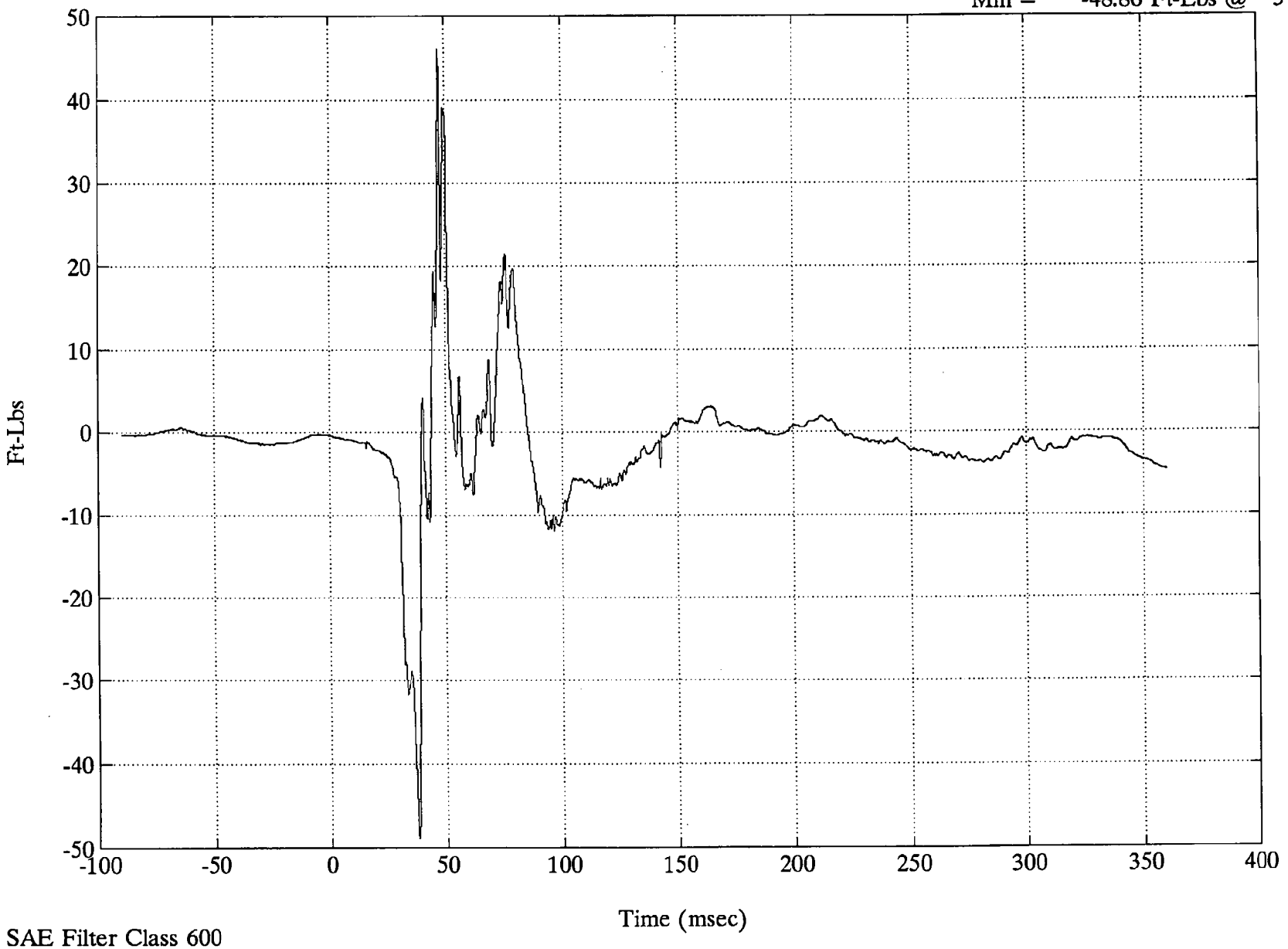
SAE Filter Class 600

8353-3

208 Test #5 - 1996 Isuzu Trooper

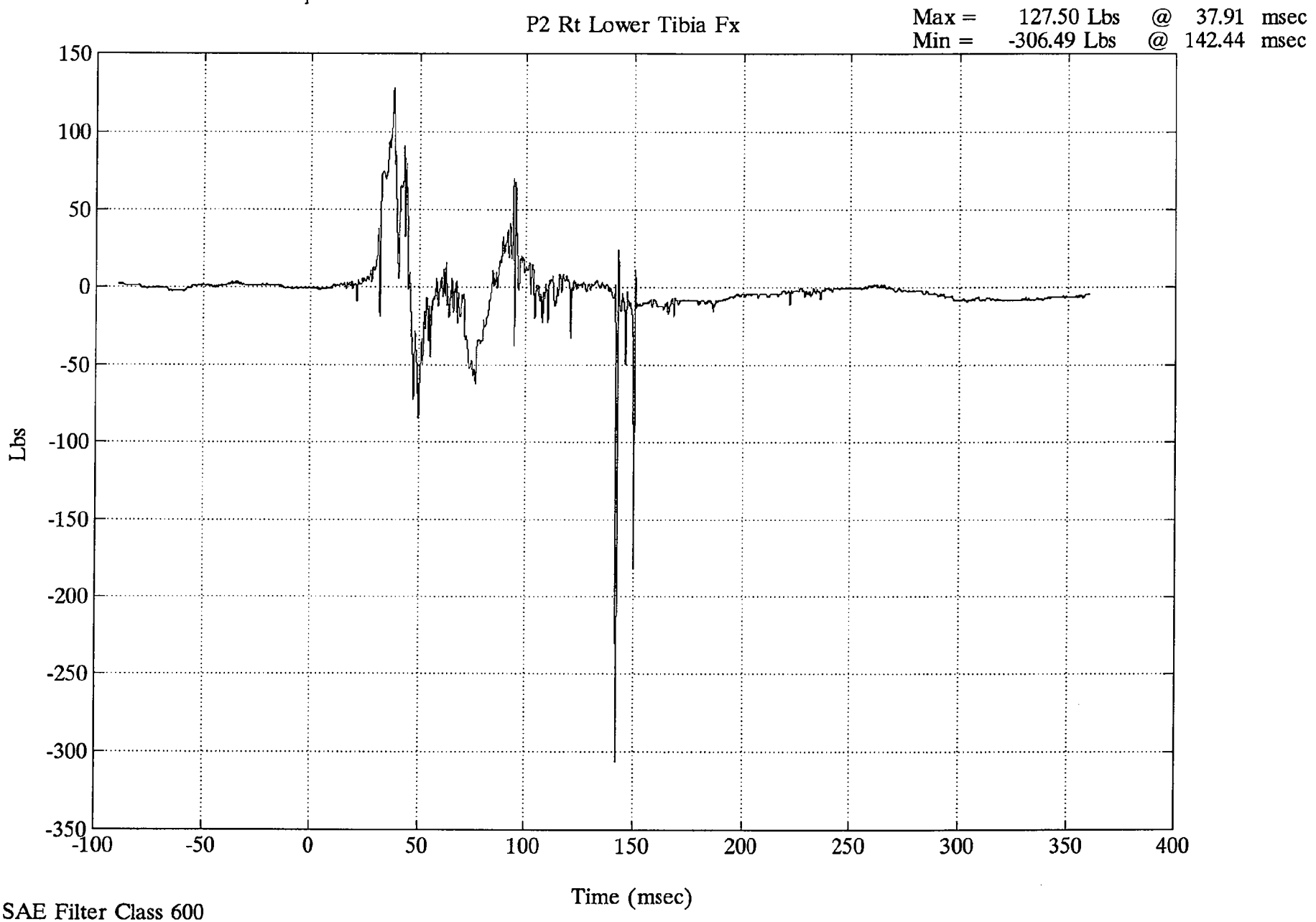
P2 Rt Upper Tibia My

Max = 46.06 Ft-Lbs @ 47.40 msec
Min = -48.86 Ft-Lbs @ 37.91 msec



SAE Filter Class 600

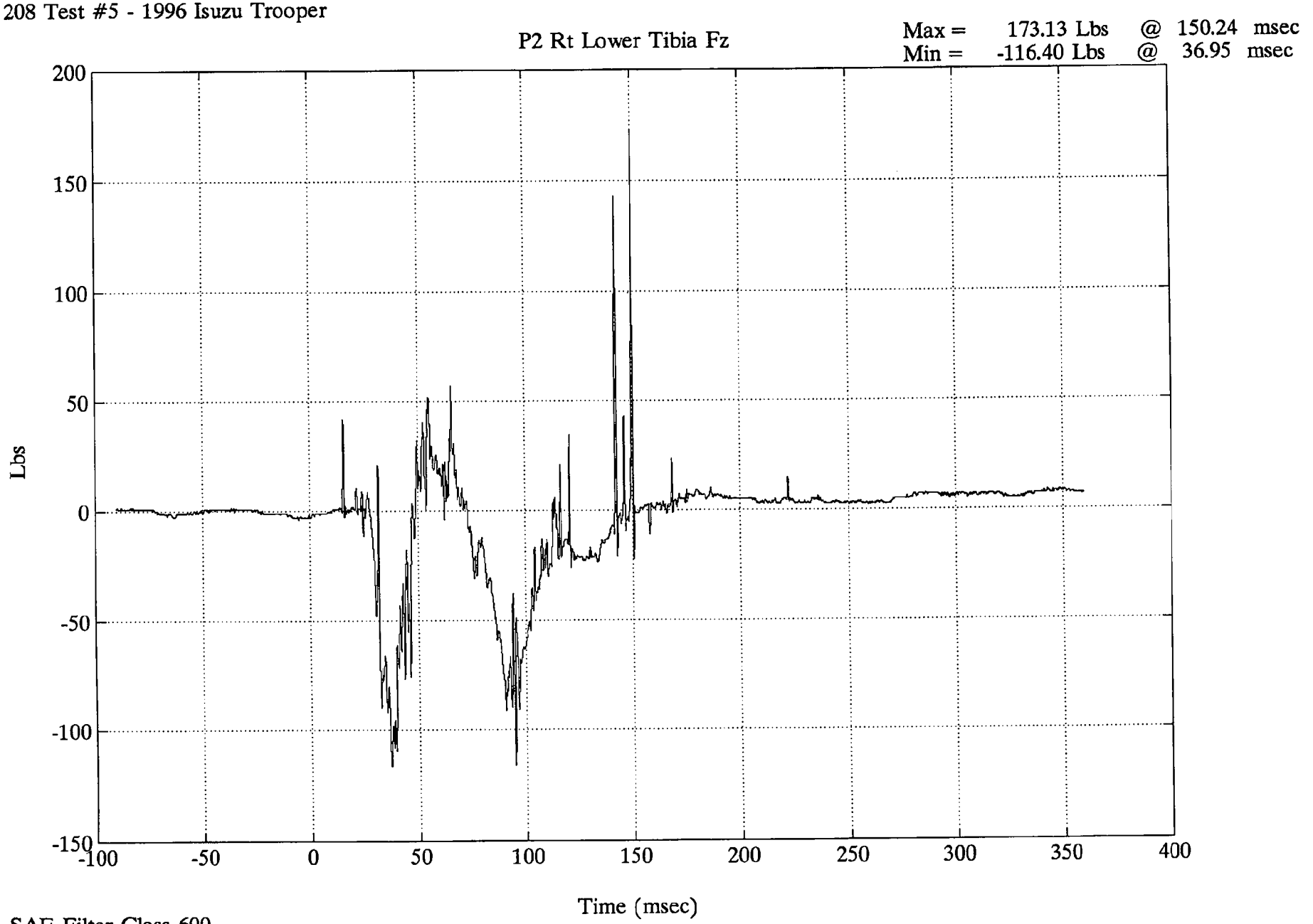
208 Test #5 - 1996 Isuzu Trooper



SAE Filter Class 600

8353-3

208 Test #5 - 1996 Isuzu Trooper

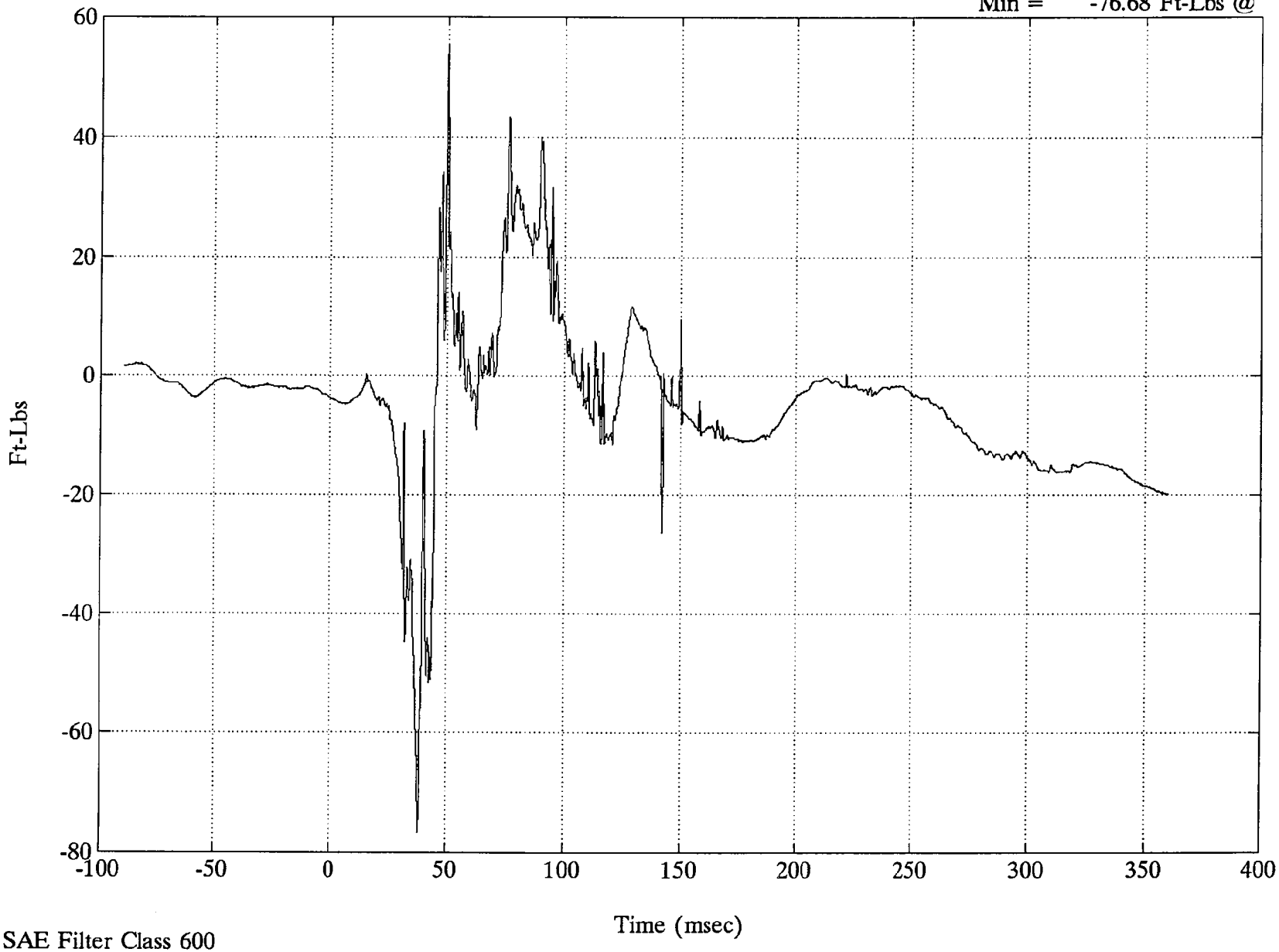


SAE Filter Class 600

208 Test #5 - 1996 Isuzu Trooper

P2 Rt Lower Tibia My

Max = 55.30 Ft-Lbs @ 50.04 msec
Min = -76.68 Ft-Lbs @ 38.04 msec



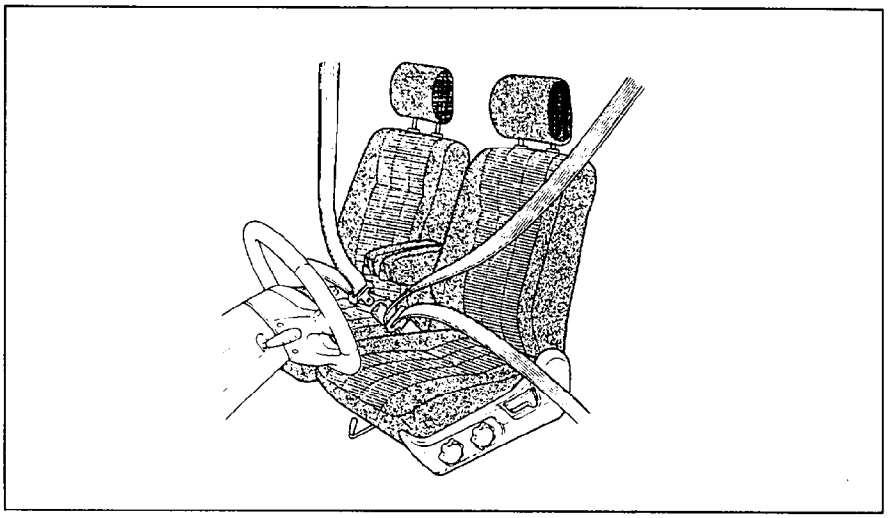
SAE Filter Class 600

8353-3

Appendix C

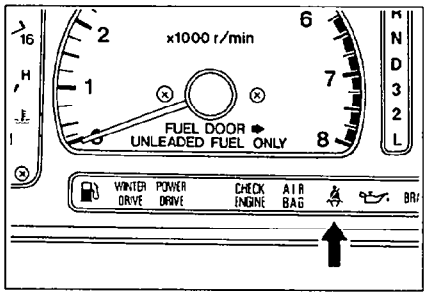
VEHICLE OWNERS MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

3. *Seats, Seat belts and Air Bags* / D SEAT BELTS



❶ SEAT BELT REMINDER

When the key is turned to the "ON" position, a light will be illuminated until the driver's seat belt is buckled. Unless the driver's seat belt is buckled, a buzzer will sound for four to eight seconds.



❷ FRONT AND REAR SEAT LAP/ SHOULDER BELTS

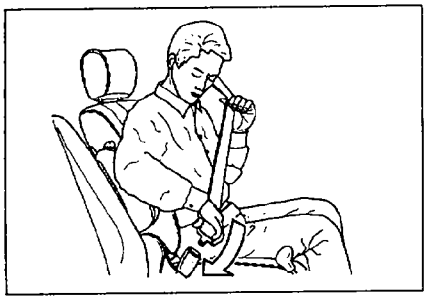
Safety Belt/Air Bag Relationship
The Air Bag is formally called a Supplemental Restraint System (SRS). Both the driver and the right front passenger must always use the seat belts even though the vehicle is equipped with front seat air bags. That's true not only in frontal collisions, but especially in side and other collisions.

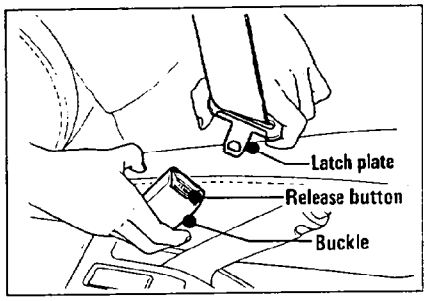
WARNING

To help lessen the chance of injury in accidents or sudden stops, we urge that people riding in the vehicle must be properly restrained at all times, using the seat belts provided. This includes children and pregnant women. See the following pages for use of restraints by children and pregnant women.

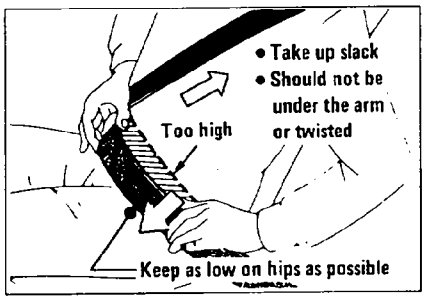
To Fasten the Seat Lap/Shoulder Belt

1. Adjust the front seat as needed. Sit up straight and well back in the seat.
2. Grasp the latch plate and:
- Pull the lap-shoulder belt webbing across the body.
- At the same time, slide the latch along the belt until it reaches the buckle.
- Push the latch plate into the buckle until it clicks.
- Pull the shoulder belt webbing to confirm that the latch plate latchs to the buckle completely.

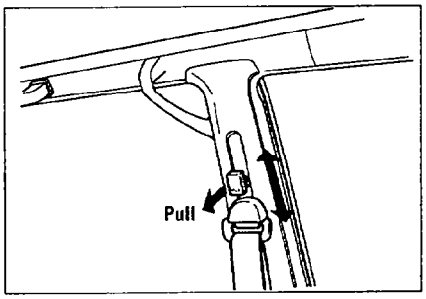


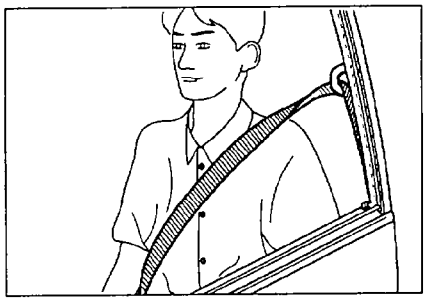


3. Position the "lap" portion of the belt across the lap as LOW ON THE HIPS as possible.



4. With the shoulder anchor pulled, move it up and down to adjust the position of the shoulder belt so that it comes right onto the shoulder. The adjustment position is available in 5 steps.





Then, adjust to a SNUG FIT by holding the "shoulder" portion of the front seat belt and pulling it UPWARD through the latch plate until the lap portion is snug across the lap. This reduces the risk of sliding under the belt during an accident.

5. To unfasten the belt, push in the button on the buckle. The belt should retract when the buckle is unlatched but hold the latch plate as it does so, to keep it from hitting people or nearby objects. To help prevent damage to the safety belt and interior trim, before closing the door be sure the belt is fully retracted and the latch plate is out of the way.

WARNING

⚠ **•A snug fit with the lap belt positioned low on the hips is necessary to lessen the chance of injury and/or the degree of injury in an accident. This spreads the force of the lap belt over the hip bone instead of across the abdomen.**
•Never use the same seat belt for more than one person at a time. A seat belt worn by more than one person will not provide adequate protection in the event of a collision.
•Never wear twisted seat belts.
•Be very careful not to damage seat belts or seat belt buckles by pinching them in the seat or the door.
•Too much slack could increase the amount of injury because the belt would not be able to properly restrain you in an accident. DO NOT wear the shoulder belt under the arm or out of position. Such use could increase the chance of injury and/or the degree of injury in an accident.
•According to Federal accident statistics, children are safer when properly restrained in rear seating positions than in the front seating positions. It is advisable to have children seated in the rear center seat and restrained with the vehicle's safety belt. Children who have outgrown child restraint systems should use the vehicle's safety belts and sit in the rear seat. If the child's seating position has a shoulder belt which is on or very close to the face or neck, position the child so that the belt is properly positioned.

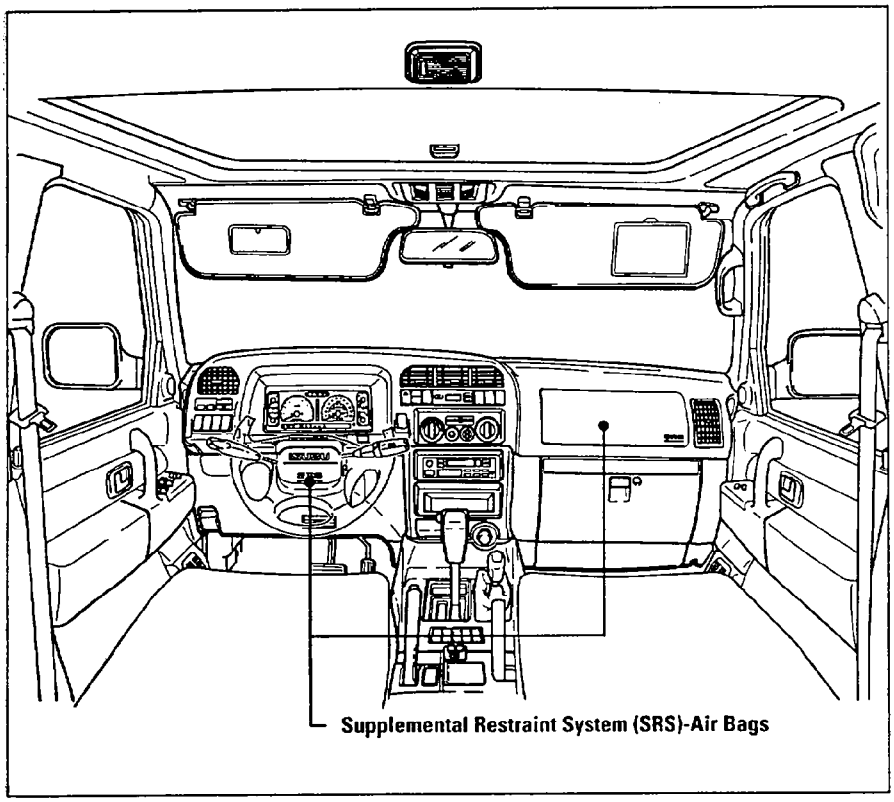
NOTE

- *The retractor will lock the belt only during a sudden stop or on impact.*
- *At other times you can move around freely.*
- *The seat belts for the outside passenger seats have an additional locking mechanism designed for securing child restraint seats. When the belt is pulled all the way out, the locking mechanism will only permit the belt to retract. Do not pull the belt all the way out except when using it to secure a child restraint seat. If the belt is inadvertently pulled all the way out, let the belt fully retract before using it for an adult passenger.*

❸ REAR CENTER SEAT LAP BELTS (Non-retractor type)

1. Sit up straight and well back in the seat.
2. Take hold of the latch plate at an angle to the webbing and slide it toward the front of vehicle. Then pull it slowly across your lap and

3. *Seats, Seat belts and Air Bags* / ESUPPLEMENTAL RESTRAINT SYSTEM (SRS)-AIR BAGS



3-23

Supplemental Restraint System (SRS)-Air Bags

This section explains the Supplemental Restraint System (SRS) - Air Bags. Your Trooper has air bags for both the driver and the right-front passenger.

Here's the most important thing to know:

WARNING

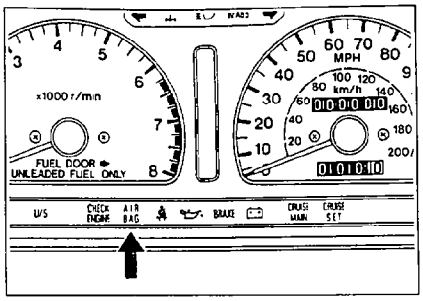
•To get full advantage of this system, the driver and right-front passenger must always use the seat belt. Air bags are not designed to inflate in rollovers or in rear, side or low-speed frontal crashes. You must wear your seat belt to reduce the chance of hitting things inside the vehicle or being ejected from it. Always wear your seat belt, even though your vehicle is equipped with air bags. Also refer to the supplement "Supplemental Restraint System (AIR BAG)".

WARNING

⚠ •If you're too close to an inflating air bag, it could seriously injure you, since it inflates with great force, faster than the blink of an eye. Seat belts help keep you in position for an air bag inflation in a crash. Always wear your seat belt even though your vehicle is equipped with air bags. The driver should sit as far as back possible while still maintaining control of the vehicle and the right passenger occupant should also sit as backwards as possible.
Do not sit or lean unnecessarily close to the air bag.

- An inflating air bag can seriously injure small children. Always secure children properly in your vehicle. Do not install rearward-facing child seats in front passenger seat position.
A child who is too small for safety belts should be properly secured in a child restraint. However, a child is safer when properly restrained in the rear seat, rather than the front seat. Do not put a rear-facing child restraint in the front passenger seat. The child could be seriously injured if the air bag deploys. If it is absolutely necessary to put a child in a front facing child restraint in the front passenger seat, the passenger seat should be moved as far back as possible.

AIR BAG READINESS INDICATOR LIGHT



There is an air bag readiness indicator light on the instrument panel, which has "AIR BAG" on it. The system checks itself and the light tells you if there is a problem. You will see this light blink 7 times when you turn your ignition to ON or START. Then the light should go out which means the system is ready.
If the air bag readiness indicator light illuminates at any other time, or the indicator fails to perform properly when you turn your ignition to ON or START the Air Bag System needs repair. Until it is serviced, the system may not inflate in the event of the type of collision that would normally activate.

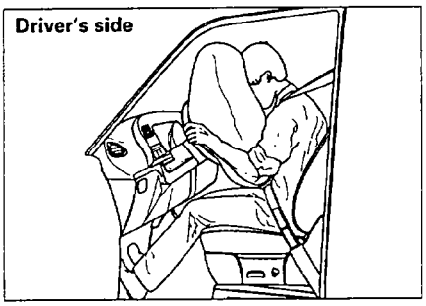
The air bag readiness indicator light monitors itself and the electrical system that connects the air bags and various electronic components and power sources. Your Isuzu Dealer is best qualified to check and repair the system if needed.

WARNING

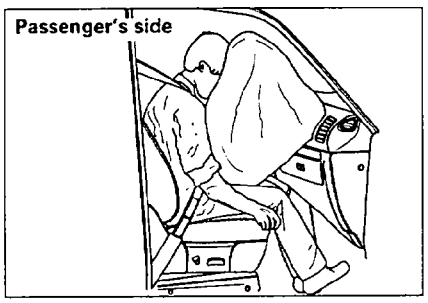
⚠ If the air bag readiness indicator light doesn't come on and blink 7 times when you turn your ignition to ON or START, your air bag system may not work properly. Have your vehicle serviced right away at your nearest Isuzu Dealer.

HOW THE AIR BAG SYSTEM WORKS

Where are the air bags?
The driver's air bag is in the middle of the steering wheel.



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



3-25

What will you see after an air bag inflation?

After the air bag has inflated, it will then quickly deflate. This occurs so quickly that some people may not even realize that the air bag inflated. The air bag will not impede the driver's vision or ability to steer the vehicle, nor will it hinder the occupants from exiting the vehicle. There will be small amounts of smoke coming from vents in the deflated air bags. Some components of the air bag module in the steering wheel hub for the driver's air bag or the instrument panel for the passenger's bag may be hot for a short time.
The nitrogen gas in driver side and argon gas in right-front passenger side used to inflate the air bag will have vented into the passenger compartment and the bag will be deflated within seconds after the collision.
As the nitrogen and argon vent from the bag, small particles are also vented into the passenger compartment.
In many crashes severe enough to inflate an air bag, windshields are broken by vehicle deformation. Additional windshield breakage may occur in vehicles with passenger air bags because the windshield acts as a reaction surface for the inflating air bag.

WARNING

•Don't put anything on, or attach anything to, the steering wheel pad or the instrument panel. Also, don't put anything (such as objects or pets) between any occupant and the steering wheel pad or instrument panel. If anything is between the occupant and the air bag, it could affect the performance of the air bag, or, worse, it could cause injuries to the occupants.

•The air bags are designed to inflate only once. After they inflate, you'll need some new parts for your air bag system. If you don't get them, the air bag system won't be there to help protect you in another crash. A new system will include air bag modules, control unit and possibly other parts.

•Let only qualified technicians work on your air bag system. Improper service can mean that your air bag system won't work properly. See your Isuzu dealer for service.

SERVICING YOUR ISUZU WITH THE AIR BAG SYSTEM

Please tell or remind anyone who works on your Isuzu that it has air bag system. There are parts of the air bag system in several places around your vehicle. You don't want the system to inflate while someone is working on your vehicle. The air bag system does not need regular maintenance. Scrapping a damaged vehicle that has an undeployed air bag(s) can be dangerous. Ask your authorized Isuzu dealer for assistance if your involvement in the disposal or the repair of the vehicle is required.

WARNING

Do not attempt to repair or service the air bag system by your self. Tampering with it could cause it to activate, and this could result in serious injuries. For service and repairs, have an authorized Isuzu dealer do the work.

NOTE

If you damage the door for the right-front passenger's air bag, it may not work properly. You may have to replace the air bag. Don't open or break the air bag door.

WARNING

For up to 15 seconds after the ignition key is turned off and the battery disconnected, an air bag can still inflate during improper service. You can be injured if you are close to an air bag when it inflates. Be sure to follow proper service procedures, and make sure the person performing the work for you is qualified to do so.