REPORT NUMBERS: 208-CAL-91-12
212-CAL-91-12
301-CAL-91-12

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

FORD MOTOR COMPANY
1991 FORD FESTIVA L
2-DOOR HATCHBACK

NHTSA NUMBER: CM0205

CALSPAN TEST NUMBER: 7914-2

JUNE 18, 1991

CALSPAN CORPORATION
ADVANCED TECHNOLOGY CENTER
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

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4. Title and Subtitle Final report of FMVSS Nos. 208, 212, 219 (Partial) and 301 Compliance testing of a 1991 Ford Festiva 2-door hatchback		5. Report Date June 18, 1991 6. Performing Organization Code CAL
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9. Performing Organization Name and Address Calspan Advanced Technology Center P.O. Box 400 Buffalo, New York 14225		10. Work Unit No. J70-2-1085 11. Contract or Grant No. DTNH22-90-C-01003
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15. Supplementary Notes		

16. Abstract

A 30 mph vehicle safety compliance test was conducted on a 1991 Ford Festiva L 2-Door Hatchback.

This test was performed at the Calspan Advanced Technology Center in Buffalo, New York on June 18, 1991. 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 29.5 mph. The ambient temperature at the impact face was 77°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 an automatic torso belt at both front outboard seating positions.

17. Key Words 30 mph Vehicle Safety Compliance Testing FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219, "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity" Frontal Impact	18. Distribution Statement Copies of this report are available from: Technical Reference Division National Highway Traffic Safety Admin. Nassif Building, Room 5108 (NAD-52) 400 Seventh St., S.W., Washington, DC 20590

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Section I

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 Advanced Technology Center under Contract No. DTNH22-90-C-01003. The purpose of this test was to determine if the subject vehicle, a 1991 Ford Festiva 2-Door Hatchback, 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-208-08, dated September 8, 1989.

Section 2

SUMMARY OF TEST NUMBER CM0205

A frontal barrier was impacted by a 1991 Ford Festiva 2-Door Hatchback at a velocity of 29.5 mph. The test was performed at the Calspan Corporation Advanced Technology Center on June 18, 1991. 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 572B, 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 triaxial accelerometers and left/right femur load cells. These ATDs had been certified prior to the test.

The 23 channels of data were recorded on two 14-channel FM tape recorders. Appendix B contains the vehicle and dummy response data traces.

Position #1 - Right Femur is noisy and a maximum value for that channel is not available. Accelerometer Pack #6, located on the left front brake caliper, sustained a cut wire approximately 50 milliseconds after impact.

The driver's HIC was 341. The maximum chest deceleration over 3 milliseconds was 41.9 g's. The maximum force on the driver's left femur was 975 pounds.

The right front passenger's HIC was 221. The maximum chest deceleration over 3 milliseconds was 34.2 g's and loads were 1204 and 1028 pounds on the left and right femurs respectively.

Table 1

CRASH TEST SUMMARY

Vehicle NHTSA No.: CM0205 Test Mode: 30 mph Frontal Barrier

Test Date.: June 18, 1991 Time: 11:40 Temperature: 77°F

Vehicle Make/Model/Body Style: 1991 Ford Festiva 2-Door Hatchback

Vehicle Test Weight: 2130 lbs.

Vehicle/Barrier Impact Angle: 0

Impact Velocity: 29.5 mph

Maximum Static Crush: 15.2 inches

Vehicle Rebound: 9.4 inches

DUMMIES:	DRIVER	PASSENGER
Type:	Part 572B	Part 572B
Restraint System:	Automatic Torso Belt	Automatic Torso Belt

Number of Data Channels: 23

Number of Cameras: 1 Real Time

14 High Speed

DOOR OPENING DATA: closed-operable - Left Front

closed-operable - 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:	Top forehead with steering hub	Chin with chest
Abdomen	No contact	No contact
Chest	Brushed steering wheel rim	No contact
Knees	Steering column	Glove box door

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1991 Ford Festiva 2-door Hatchback

NHTSA No. CM0205 ; VIN: KNJPT05H9M6126071 ; Color: Red

Engine Data: 4 cylinders; - CID; 1.3 Liters; - 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

- Power Door Locks

Date Received: 6-10-91 ; Odometer Reading 98 miles

Selling Dealer: Gambino Ford

& Address S. Transit Rd., Lockport, N.Y.

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: KIA Motors Co.

Date of Manufacture: 12/26/90

GVWR: 2645 lbs.; GAWR: 1450 lbs. FRONT; 1200 lbs. REAR

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load: 32 psi FRONT

32 psi REAR

Recommended Tire Size: 145 SR12 Load Range: 780

Recommended Cold Tire Pressure: 32 psi FRONT; 32 psi REAR

Size of Tires on Test Vehicle: 145 SR12 ; Manufacturer: Yokohama

Vehicle Capacity Data:

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

Number of Occupants: 2 Front; 2 Rear; 4 Total

Vehicle Capacity Weight (VCW) = 680 lbs.

No. of Occupants x 150 lbs. = 600 lbs.

Rated Cargo/Luggage Weight (RCLW) = 80 lbs. (Difference)

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

Right Front =	550 lbs.	Right Rear =	310 lbs.
Left Front =	540 lbs.	Left Rear =	340 lbs.
TOTAL FRONT =	1090 lbs.	TOTAL REAR =	650 lbs.
% of Total Vehicle Weight =	62.6	% of Total Weight =	37.4

TOTAL DELIVERED WEIGHT = 1740 lbs.

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight	= 1740	lbs.
Rated Cargo/Luggage Weight (RCLW)	= 80	lbs.
Weight of 2 P.572 Dummies @ 164 ea.	= 328	lbs.
TARGET TEST WEIGHT	= 2148	lbs. (sum)

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 0 POUNDS OF CARGO WEIGHT:

Right Front =	610 lbs.	Right Rear =	410 lbs.
Left Front =	660 lbs.	Left Rear =	450 lbs.
TOTAL FRONT =	1270 lbs.	TOTAL REAR =	860 lbs.
% of Total Weight =	59.6 %	% of Total Weight =	40.4 %

TOTAL TEST WEIGHT = 2130 lbs.

Weight of Ballast Secured in Vehicle Trunk Area = 0 lbs.

Vehicle Components Removed for Weight Reduction *

VEHICLE ATTITUDE (all dimensions in inches):

AS DELIVERED:	RF 24.0"	LF 24.0"	RR 24.3"	LR 24.2"
FULLY LOADED:	RF 22.5"	LF 22.8"	RR 21.3"	LR 21.4"
AS TESTED:	RF 23.1"	LF 23.2"	RR 22.2"	LR 22.5"

Vehicle's Wheel Base: 90.1 in.

Location of Vehicle's C.G.: 36.4 inches rearward of front wheel center

FUEL SYSTEM DATA:

Fuel System Capacity From Owner's Manual = 10 gallons

Usable Capacity Figure Furnished by COTR = 9.86 gallons

Test Volume Range (92 to 94% of Usable Capacity) = 9.1 to 9.3 gallons

ACTUAL TEST VOLUME = 9.2 gallons (with entire fuel system filled)

*Rear bumper, both tail lights, and hatchback window were removed.

Table 3

POST IMPACT DATA

TYPE OF TEST:

Type of Test: Frontal Barrier Impact Angle: 0°

Test Date: June 18, 1991 Time: 11:40 Temperature: 77°F

Vehicle NHTSA No.: CM0205

Required Impact Velocity Range: 28.9 to 29.9 mph

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

Trap No. 1 = 29.5 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	=	139.0	; C/L =	141.0	; Left =	139.1
Post-Test	Right	=	122.7	; C/L =	125.2	; Left =	125.6
Crush	Right	=	16.3	; C/L =	15.8	; Left =	13.5
AVERAGE		=	15.2	inches			

VEHICLE REBOUND: (From rigid barrier only.)

Distance from front of test vehicle to impact point:

	Right	=	8.3	; C/L =	8.7	; Left =	11.3
AVERAGE		=	9.4	inches			

DOOR OPENING:	Left	Right
Front	closed-operable	closed-operable
Rear	N/A	N/A

SEAT MOVEMENT:	Seat Back Failure	Seat Shift
Front	None	None
Rear	N/A	N/A

Table 3

POST IMPACT DATA (cont.)

GLAZING DAMAGE: Windshield sustained stress fractures but remained intact.

OTHER NOTABLE IMPACT FEATURES: The steering column moved upward.

Section 3

OCCUPANT AND VEHICLE DATA

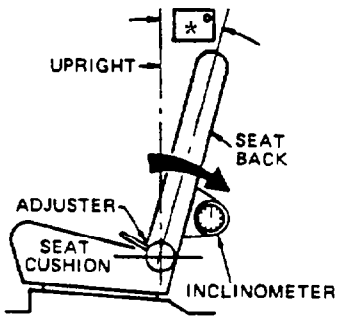
Figure 1

TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year: 1991 Vehicle Model: Ford Festiva Body Style: 2-Door Hatchback

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.



LEFT SIDE VIEW

Seat back angle for driver's seat *

Measurement instructions: Seat back was placed in 5th locking position from first locking position (first locking position = 0 detent).

Seat back angle for passenger's seat: *

Measurement instructions: Same as driver.

2. Seat Fore and Aft Positioning

Provide instructions for positioning the driver and front outboard passenger seat(s) in the center of fore and aft travel. For example, provide information to locate the detent in which the seat track is to be locked.

Positioning of the driver's seat: Seat placed in 13th detent (mid-position) from a total of 25 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 9.86 gallons

B. "Usable Capacity" of the optional equipment fuel tank is N/A gallons

Additional Instructions: None.

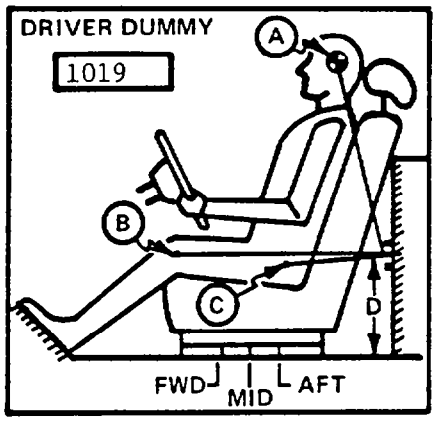
*Seat back was positioned according to manufacturer specifications.

Figure 2

PART 572 DUMMY IN-VEHICLE POSITION

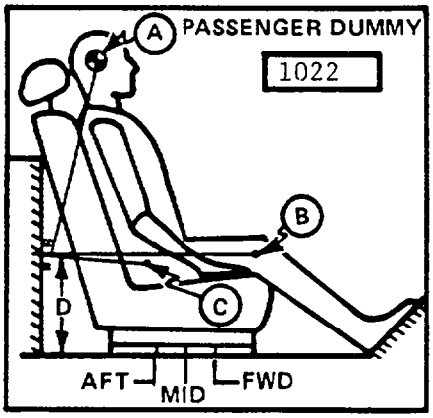
Test No.: CM0205 Vehicle: 1991 Ford Festiva 2-Door Hatchback

SEAT TYPE:	ADJUSTER TYPE:	SEAT BACK TYPE:
- Bench	X Manual	- Fixed
X Bucket	- Power	X Adjustable Reclining
- Split Bench		

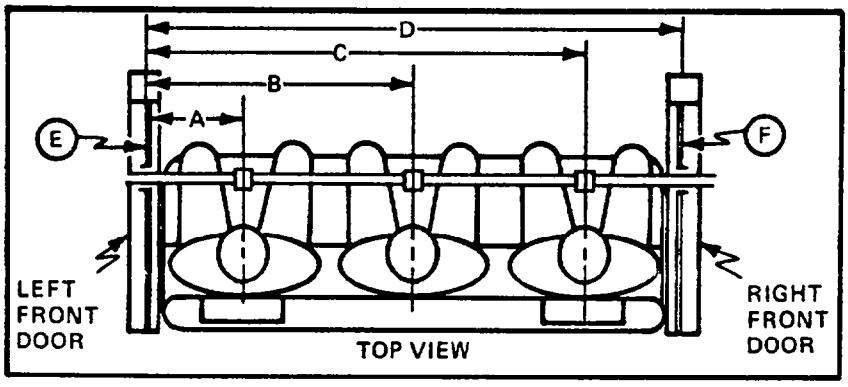


MEASUREMENT LOCATION

A - Head Target
B - Knee Joint
C - Approximate 'H' Point
D - Sill to Reference Point



A =	23.8	in.	23	Degrees	A =	24.3	in.	21	Degrees
B =	32.5	in.	93	Degrees	B =	32.4	in.	95	Degrees
C =	17.8	in.	110	Degrees	C =	17.2	in.	110	Degrees
D =	14.5	in.			D =	14.5	in.		



DUMMY ID

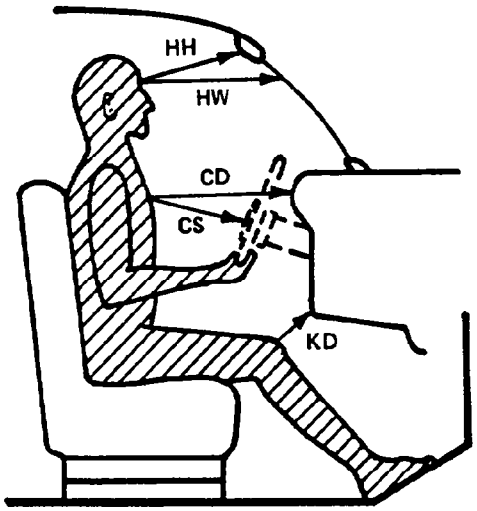
S/N 1019 S/N 1022

A =	Left Door to Driver Centerline	11.2	in.
B =	Left Door to Center Passenger Centerline	-	in.
C =	Left Door to Right Passenger Centerline	35.8	in.
D =	Left Door to Right Door	47.2	in.
E,F =	Window Glass Height (Right and Left Must Be Equal)	12.0	in.

Figure 3

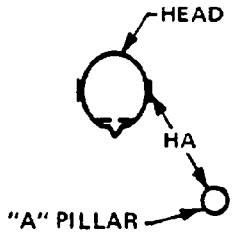
OCCUPANT CLEARANCE DIMENSIONS

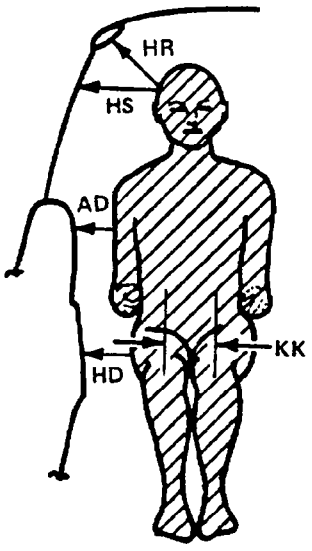
	DRIVER	PASSENGER
HH	16.6	16.3
HW	20.1	19.8
CD	23.0	19.8
CS	15.8	-
KDL	5.3	7.1
KDR	6.0	6.4
SA	See Note	See Note
TA	25°	24°



HH = Head to Windshield Header
HW = Head to Windshield
CD = Chest to Dash
CS = Chest to Steering Wheel
KD(L/R) = Knee to Dash (Left/Right)
SA = Seat Back Angle
TA = Torso Angle

HA = Head Target to "A" Pillar
HR = Head to Side Roof
HS = Head to Side Window
AD = Arm to Door
HD = Hip to Door
KK = Knee to Knee



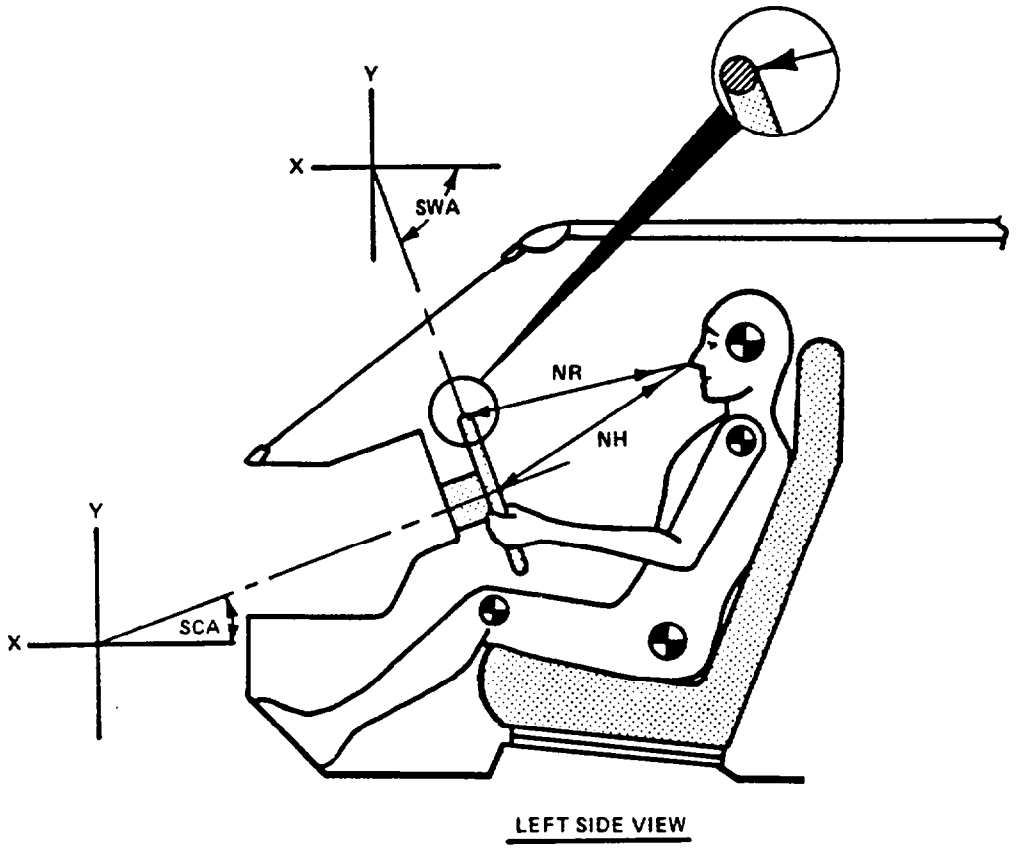


	DRIVER	PASSENGER
HR	5.5	5.3
HS	7.8	8.3
AD	3.5	4.2
HD	6.3	6.2
KK	9.4	7.3
HA	21.5	20.5

Note: Seat back positioned according to manufacturer specifications.

Figure 4

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS

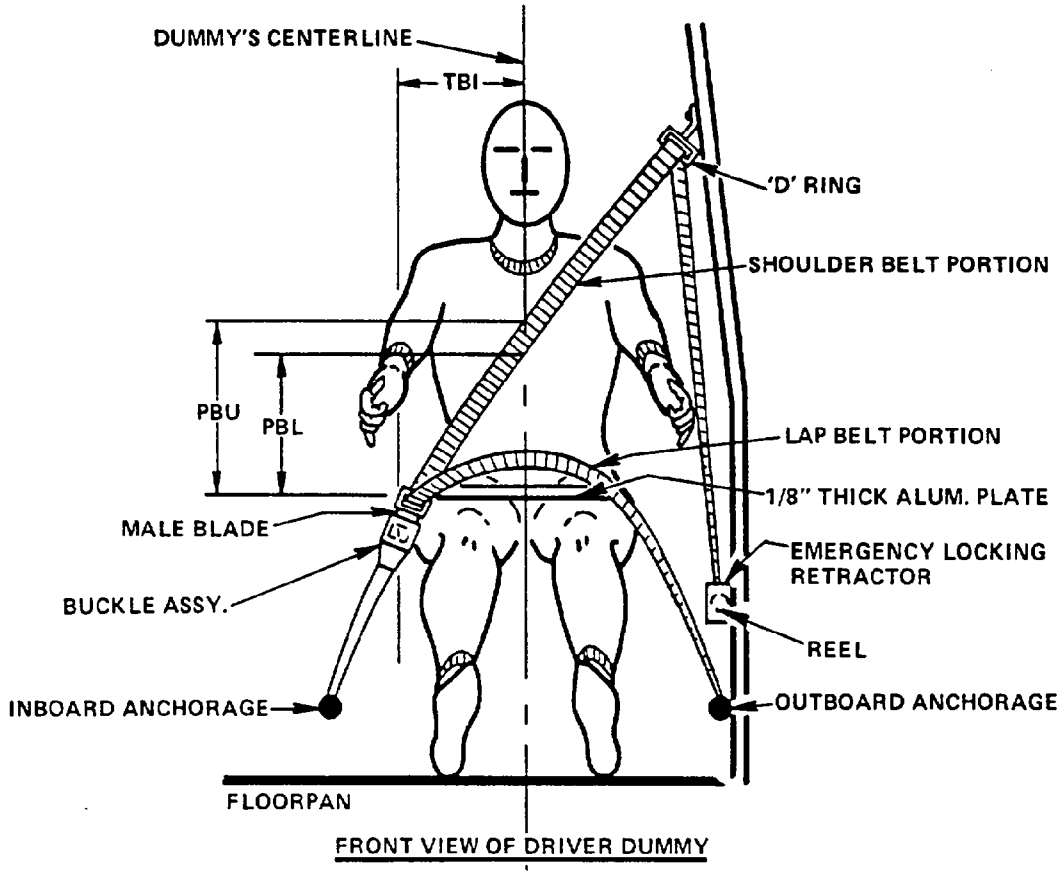


LEFT SIDE VIEW

	MEASUREMENTS	
NR -- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	20.1	Inches
NH -- Distance from tip of dummy's nose to center of steering wheel hub	21.3	Inches
SCA -- Angle of steering column relative to the horizontal X axis	28	Degrees
SWA -- Angle of steering wheel relative to the horizontal X axis	-62	Degrees

Figure 5

SEAT BELT POSITIONING DATA

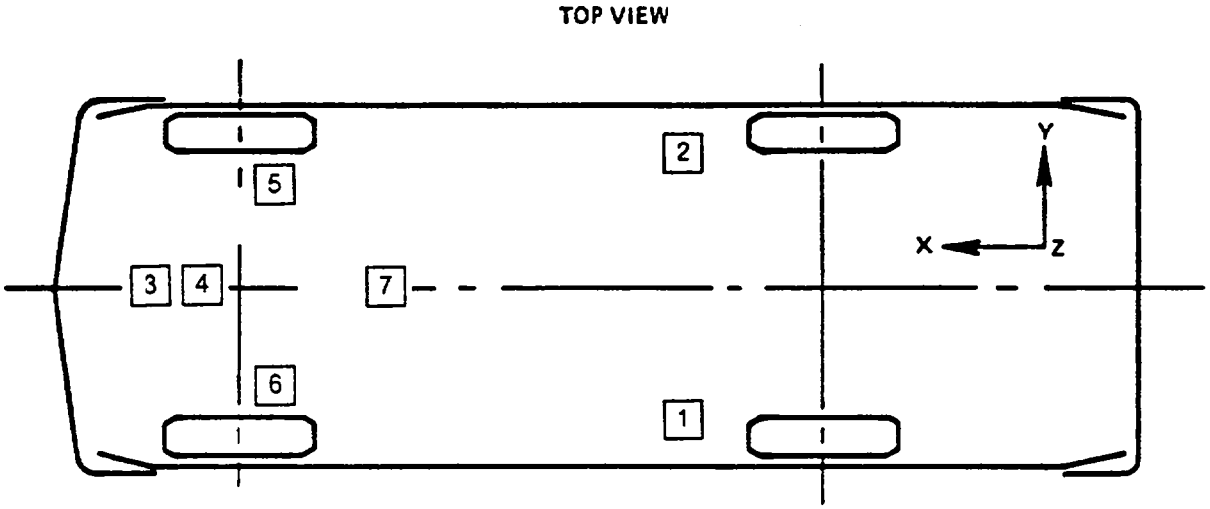


	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
PBU -- Top surface of alum. plate to upper edge	16.9	16.4
PBL -- Top surface of alum. plate to belt lower edge	13.6	13.0
TBI -- Distance from torso centerline to buckle	*	*

*Manual lap belt not used for this test.

Figure 6

VEHICLE ACCELEROMETER LOCATIONS



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	Left Disc Brake Caliper	X		
7	Instrument Panel	X		

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

Table 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

NO.	LOCATION		X*	Y*	Z*	POSITIVE DIRECTION** MAX (g)	POSITIVE DIRECTION** TIME (msec)	NEGATIVE DIRECTION** MAX (g)	NEGATIVE DIRECTION** TIME (msec)
1	REAR SEAT X-MEMBER AT LEFT SIDE	PRE:	45.1	13.8	17.5				
		POST:	45.1	13.8	17.2				
	LONGITUDINAL ACCELERATION					3	120	-38	30
2	REAR SEAT X-MEMBER AT RIGHT SIDE	PRE:	45.1	-13.8	17.5				
		POST:	44.8	-13.8	16.9				
	LONGITUDINAL ACCELERATION					3	130	-38	30
3	TOP OF ENGINE BLOCK	PRE:	117.6	0.5	31.2				
		POST:	111.7	0.5	29.7				
	LONGITUDINAL ACCELERATION					23	37	-189	25
4	BOTTOM OF ENGINE	PRE:	119.2	-1.0	10.6				
		POST:	112.5	-0.9	9.4				
	LONGITUDINAL ACCELERATION					8	34	-94	19
5	BRAKE CALIPER AT RIGHT SIDE	PRE:	110.5	-26.2	17.2				
		POST:	107.5	-26.3	16.8				
	LONGITUDINAL ACCELERATION					10	55	-89	17
6	BRAKE CALIPER AT LEFT SIDE	PRE:	110.9	26.2	17.2				
		POST:	108.2	25.7	16.9				
	LONGITUDINAL ACCELERATION					See Note	See Note	See Note	See Note
7	DASH PANEL	PRE:	88.5	-1.4	29.3				
		POST:	89.3	-1.3	31.2				
	LONGITUDINAL ACCELERATION					63	55	-113	37

*X	+	Forward from rear bumper	**	POSITIVE	NEGATIVE
Y	+	Left from vehicle centerline	LONGITUDINAL:	FORWARD	REARWARD
Z	+	Up from ground	LATERAL:	LEFTWARD	RIGHTWARD
			VERTICAL:	UPWARD	DOWNWARD

DISTANCE MEASUREMENTS IN INCHES

Note: Data is not accurate after 50 mSec.

Figure 7

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 5.

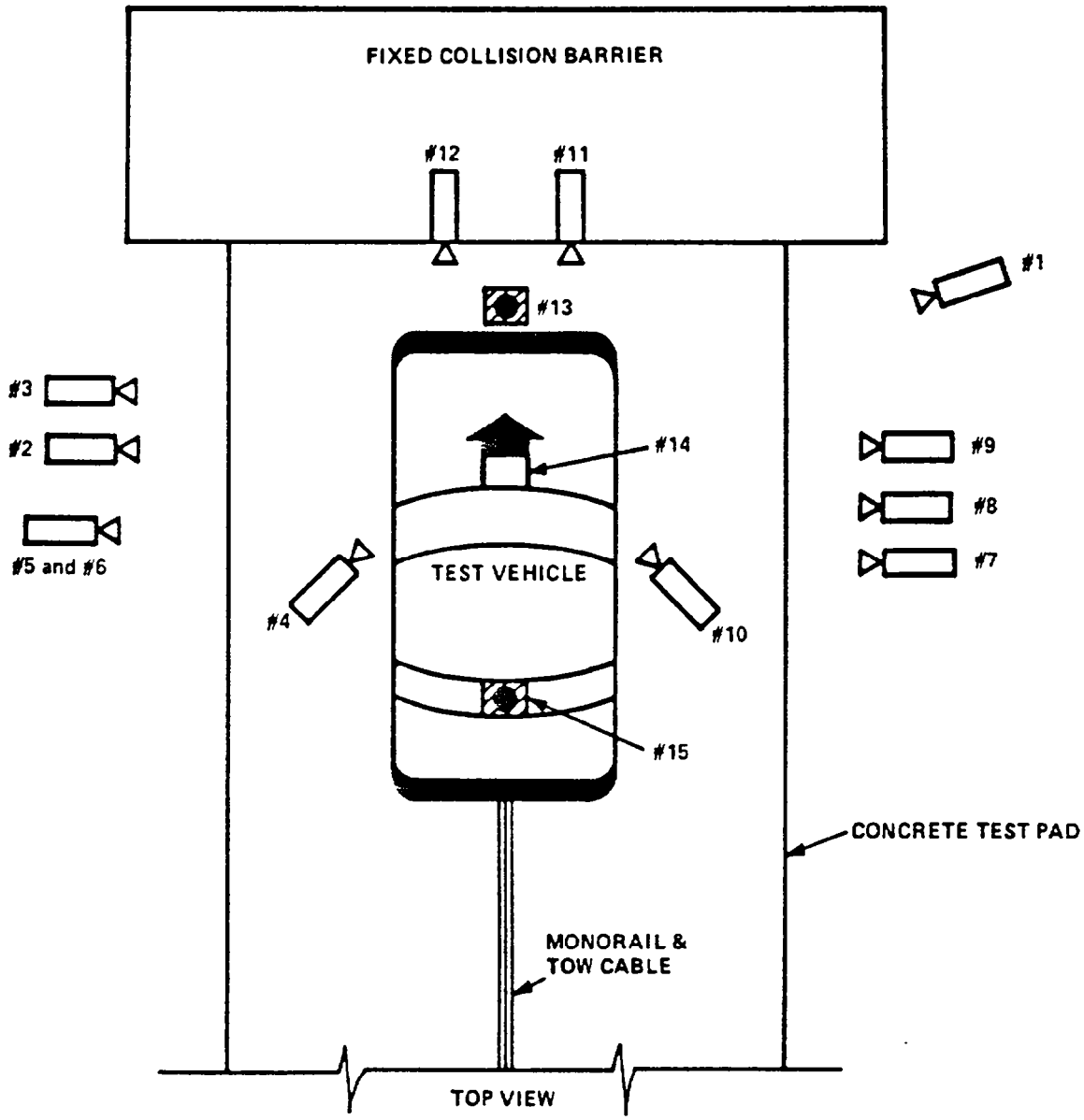


Table 5

HIGH-SPEED CAMERA LOCATIONS

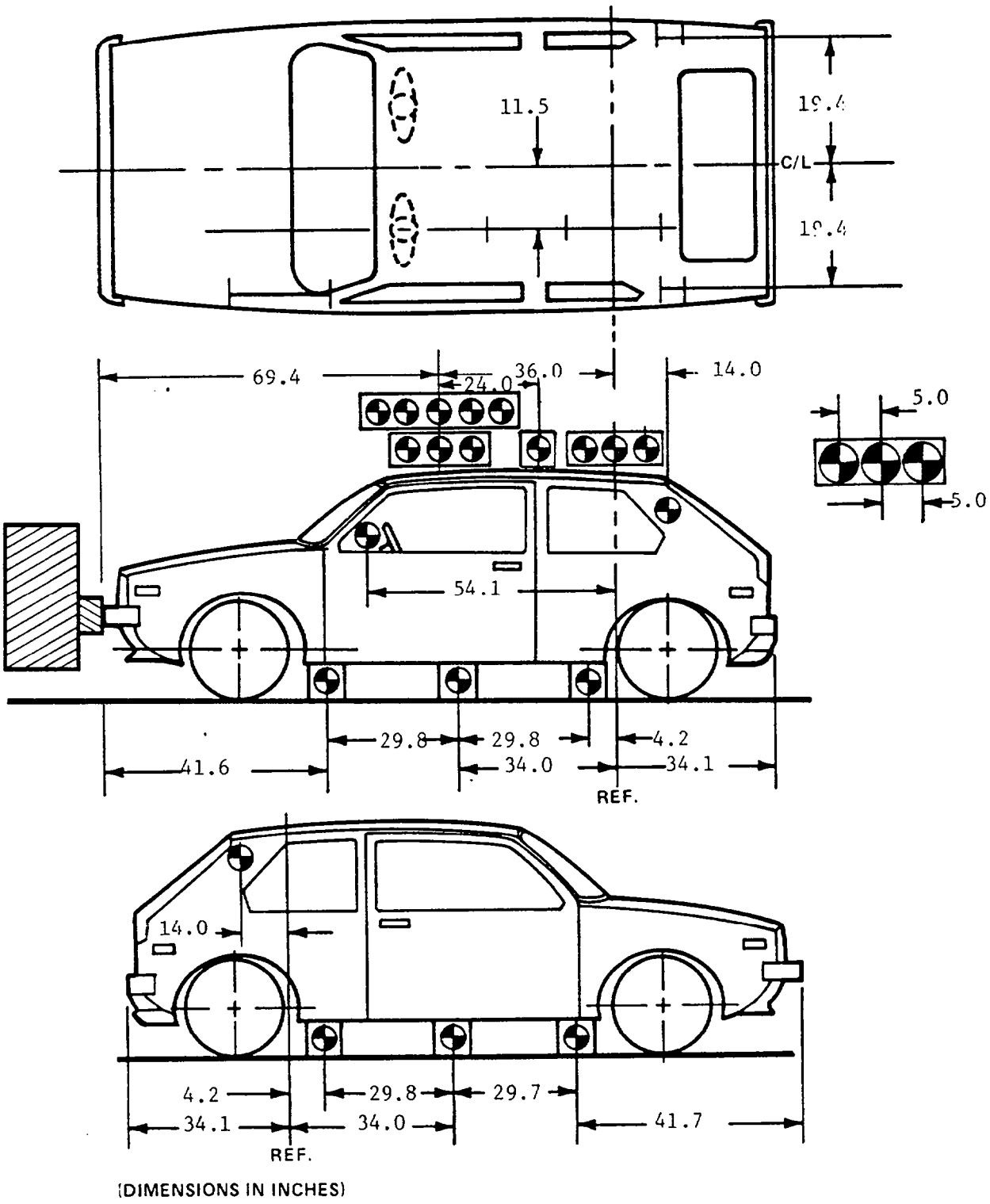
Test No. CM0205 Vehicle: 1991 Ford Festiva L 2-Door Hatchback

CAMERA NO.	VIEW	CAMERA POSITIONS (in)* X	Y	Z	ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
1	Real-Time Camera	-	-	-	-	-	-	24
2	Overall Left Side	196	57	41	-6	180.6	13	540
3	Left Side View	271	30	41	-4	255.6	25	560
4	Driver and Interior View	101	90	72	-19	-	13	660
5	Steering Column (Bottom)	248	72	46	-4	232.6	25	540
6	Steering Column (Top)	248	72	70	-10	232.6	25	520
7	Overall Right Side	201	66	42	-3	185.6	13	630
8	Right Side View	265	44	41	-1	249.6	25	640
9	Right Passenger View	284	52	50	-2	268.6	35	560
10	Passenger and Interior View	99	89	68	-19	-	13	520
11	Passenger Front View	21	19	72	-56	-	13	530
12	Driver Front View	21	19	72	-55	-	13	550
13	Windshield View	0	0	130	-61	-	25	540
14	Pit View of Engine	0	30	-120	90	-	13	700
15	Pit View of Fuel Tank	0	85	-120	90	-	13	720

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

Figure 8

VEHICLE TARGET LOCATIONS



(DIMENSIONS IN INCHES)

Figure 9

TEST VEHICLE MEASUREMENTS

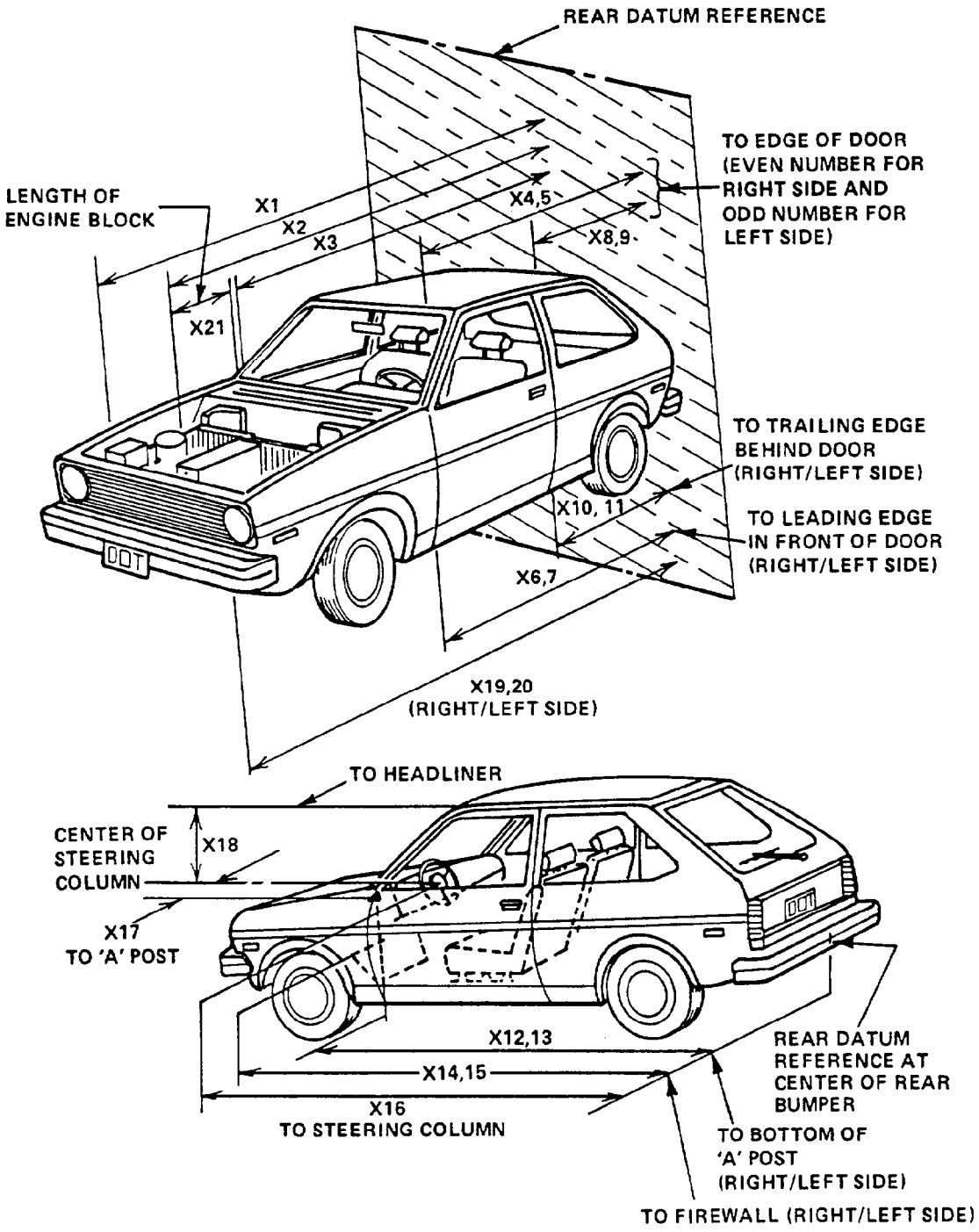


Table 6

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	141.0	125.2	15.8
X2	Rear Surface of Vehicle to Front of Engine	123.0	116.4	6.6
X3	Rear Surface of Vehicle to Firewall	107.5	105.0	2.5
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	96.4	95.4	1.0
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	96.2	96.1	0.1
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	97.2	95.7	1.5
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	97.2	96.5	0.7
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	50.5	49.6	0.9
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	50.5	50.3	0.2
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	51.8	50.3	1.5
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	51.9	50.8	1.1
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	96.3	94.7	1.6
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	96.0	95.3	0.7
X14	Rear Surface of Vehicle to Firewall, Right Side	106.7	104.8	1.9
X15	Rear Surface of Vehicle to Firewall, Left Side	106.6	105.2	1.4
X16	Rear Surface of Vehicle to Steering Column	82.6	81.5	1.1
X17	Center of Steering Column to "A" Post	15.4	14.9	0.5
X18	Center of Steering Column to Headliner	17.9	14.0	3.9
X19	Rear Surface of Vehicle to Right Side of Front Bumper	139.0	122.7	16.3
X20	Rear Surface of Vehicle to Left Side of Front Bumper	139.1	125.6	13.5
X21	Length of Engine Block	7.0	7.0	0.0

Section 4

SUMMARY OF RESULTS OF FMVSS NOS. 208, 212, 219 AND 301-75

- "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. 301-75

Table 7

DUMMY INJURY CRITERIA VALUES

NHTSA No.: CM0205 Vehicle: 1991 Ford Festiva L 2-Door Hatchback

	MAXIMUM ACCELERATION (g's)							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
Dummy (1)	43.8	-20.2	40	56.6	-41.9	-9.5	-19.6	41.9
Dummy (2)	-20.1	17.9	36.7	40.0	-34.5	15	-15.6	34.2

	MAXIMUM FORCE - FEMUR LOAD (lbs.)	
	LEFT FEMUR	RIGHT FEMUR
Dummy (1)	975.3	N/A
Dummy (2)	1204.4	1027.6

	HEAD INJURY CRITERIA**			
	HIC	36 millisecond Maximum		Avg. Acc. (g)
		t_1 msec	t_2 msec	t_1 TO t_2
Dummy (1)	340.8	62.880	98.760	39.0
Dummy (2)	221.4	57.000	92.880	32.8

*Defined as exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

Table 8

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 = 6.0 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 = - sec.
(audible warning should not operate)

Log time duration of reminder light operation = 6.0 sec.

Note wording of visual warning:

Fasten Seat Belt -

Fasten Belt -

Symbol 101-80 X

Table 9

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: Vehicle does not incorporate a crash deployed occupant protection system.

The manufacturers recommended schedule is to replace ____-____ or repair ____-____ this system:

a. by ____-____ month, ____-____ year

b. by ____-____ miles

c. or after a time interval of ____-____ months or ____-____ years.

Were appropriate instructions concerning maintenance and/or replacement of this system provided? YES ____-____ NO ____-____

Was a description of the functional operation of the system provided? YES ____-____ NO ____-____

Is there a reference to the instructions and description of the system on the label? YES ____-____ NO ____-____

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

Did the owner's manual contain appropriate information concerning maintenance and/or replacement and a description of the functional operation of the systems? YES ____-____ NO ____-____

Table 10

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___X___ NO_____-___

Describe the location of the readiness indicator:

Not Applicable

Is the readiness indicator clearly visible to the driver?

YES_____-___ NO_____-___

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

YES_____-___ NO_____-___

Table 11

FMVSS NO. 208 – COMFORT AND CONVENIENCE TEST SUMMARY

Test Vehicle NHTSA No.:	CM0205
Make/Model:	1991 Ford Festiva
Date of Comfort/Convenience Check:	June 14, 1991
Technician Performing Check:	VMP
GVWR:	2645 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 X NO –

If yes, go to requirements D1, D2 and D3

2. Manual seat belts* YES _____ NO X**

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

YES X NO –

(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.

**Manual lap belt was not used in this test.

Table 11 (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 X NO -

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 X NO -

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 (nonengaged).

   YES X NO -

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 11 (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 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. Seats 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 for is ___0.4___ pounds. Contact the COTR if the contact force exceeds 0.7 pounds.

Table 11 (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-208-8.

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 ___-___

b. The torso and lap belt webbing of the seat belt system automatically retract when the seat belt latch plate 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 ___-___

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

   a. The belt is completely retracted or, if the belt is nonretractable, the belt is unattached.

   YES __-__ NO __X__

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

   YES __-__ NO __X__

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

   YES __-__ NO __X__

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: Automatic torso belt was used in this test.

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

   YES __N/A__ NO __N/A__

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 __N/A__ NO __N/A__

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

   YES __N/A__ NO __N/A__

Figure 10

FMVSS NO. 212 – "WINDSHIELD MOUNTING" DATA SHEET

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

Windshield is bonded in place with a 1.0" rubber covering metal trim along the entire windshield perimeter.

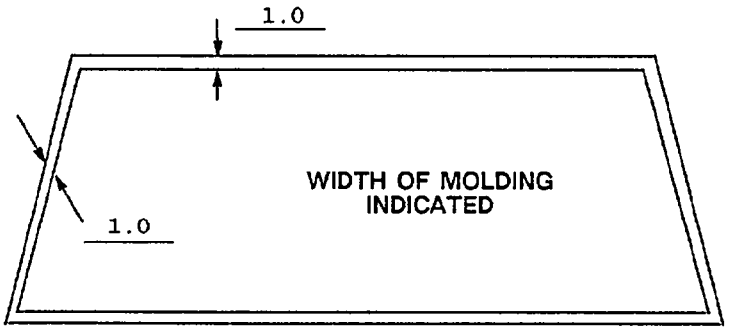
FMVSS 212 REQUIREMENTS:

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

FMVSS 212 TEST DATA:

	WINDSHIELD PERIPHERY		
	PRE-TEST (in.)	POST-TEST (in.)	PERCENT RETENTION
RIGHT SIDE	74.6	74.6	100%
LEFT SIDE	75.6	74.6	100%
TOTAL	149.2	149.2	100%

AREA OF RETENTION FAILURE:



FRONT VIEW

FAILURE DETAILS:

None.

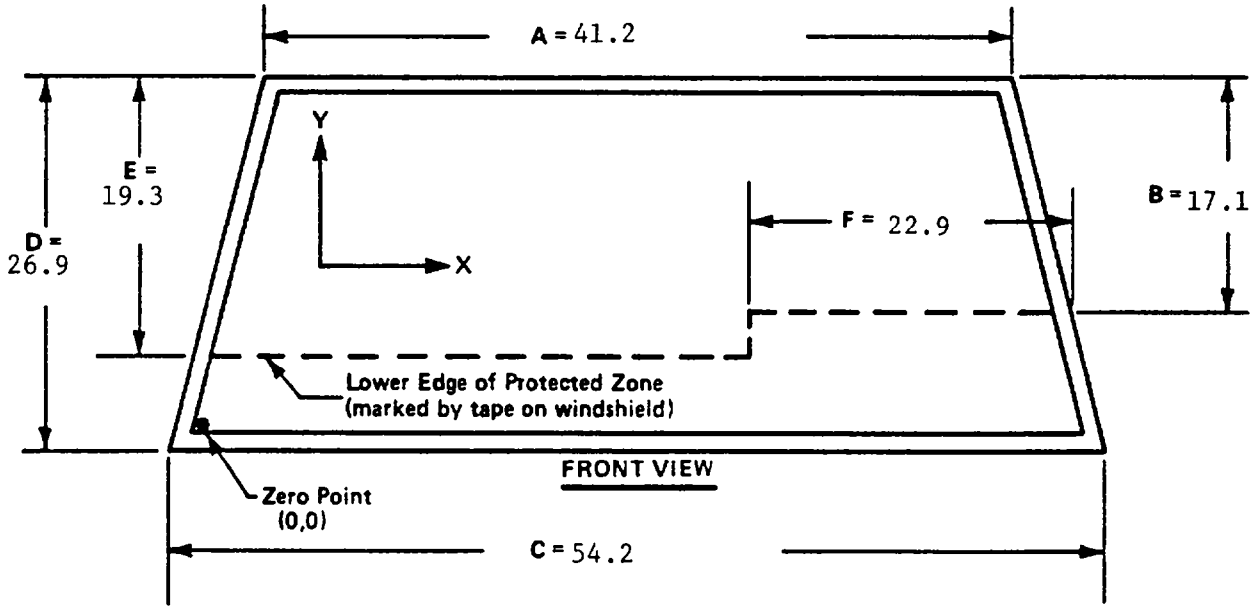
Figure 11

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.)



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

(Show location of penetration on above sketch)

None.

	COORDINATES	
	X	Y
1.		
2.		
3.		
4.		

Table 12

FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO. 301

TEST VEHICLE NHTSA NO.: | C | M | 0 | 2 | 0 | 5 | TEST DATE: June 18, 1991

Vehicle Mfgr./Make/Model: 1991 Ford Festiva L 2-Door Hatchback

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:

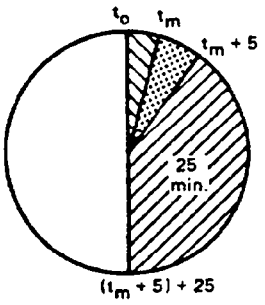
__X__ Frontal (30 mph)

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

__-__ Rear Moving Barrier (30 mph)

__-__ Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT:



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

SOLVENT SPILLAGE DETAILS:

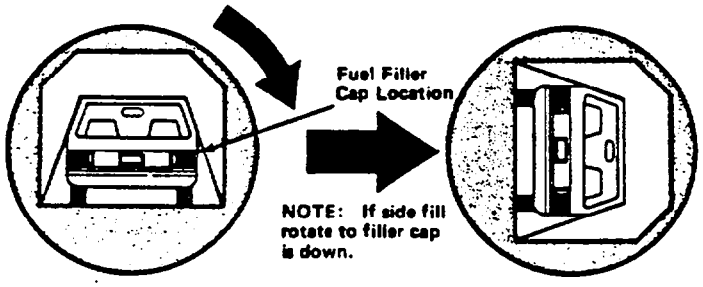
None.

Table 13

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° 90°

Vehicle NHTSA ID No.: CM0205



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	2 minutes 49 seconds
FMVSS 301 Position Hold Time +	5 minutes 00 seconds
TOTAL	
	7 minutes 49 seconds
Next whole minute interval	8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0

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

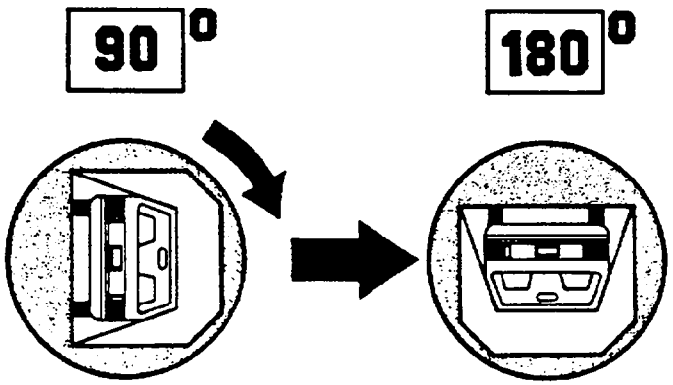
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 13

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

TEST PHASE



Vehicle NHTSA ID No.: CM0205

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	2 minutes 21 seconds
FMVSS 301 Position Hold Time +	5 minutes 00 seconds
TOTAL	
	7 minutes 21 seconds
Next whole minute interval	8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0

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

IV. SOLVENT SPILLAGE LOCATION(S):

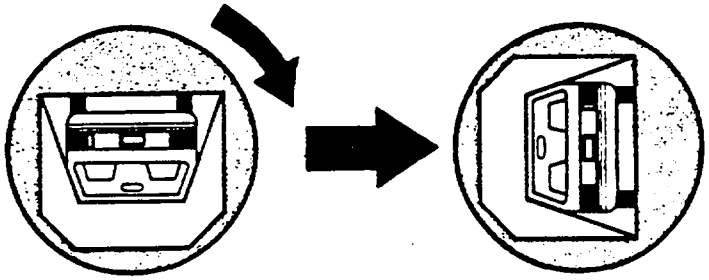
None.

Table 13

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

TEST PHASE: 180° 270°

Vehicle NHTSA ID No.: CM0205



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	2 minutes 44 seconds
FMVSS 301 Position Hold Time +	5 minutes 00 seconds
TOTAL	7 minutes 44 seconds
Next whole minute interval	8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0

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

IV. SOLVENT SPILLAGE LOCATION(S):

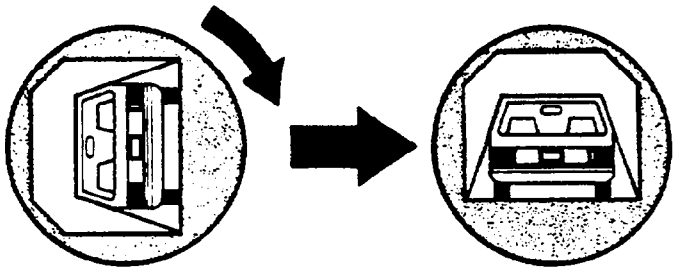
None.

Table 13

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

TEST PHASE: 270° 360°

Vehicle NHTSA ID No.: CM0205



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	2 minutes 30 seconds
FMVSS 301 Position Hold Time +	5 minutes 00 seconds
TOTAL	
	7 minutes 30 seconds
Next whole minute interval	8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

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

TEST VEHICLE NONCOMPLIANCE NOTICE

NHTSA Contract Lab: Calspan Advanced Technology Center

Lab Project Manager & Telephone No.: Walter E. Levan (716) 632-7500

Date of Test: June 18, 1991 Vehicle NHTSA No.: CM0205

Vehicle Manufacturer: KIA Motors Company

Model Year: 1991 VIN: KNJPT05H9M6126071

Body Style: 2-Door Hatchback Build Date: 12-26-90

Dummy Stabilized Temperature at Time of Test: 72°F (Spec. = 66-78°F)

Impact Velocity: 29.5 mph Time of Test: 11:40

Type of Automatic Restraint System: Automatic Torso Belt

Failure Details:

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

Appendix A

PHOTOGRAPHS

LIST OF PHOTOGRAPHS

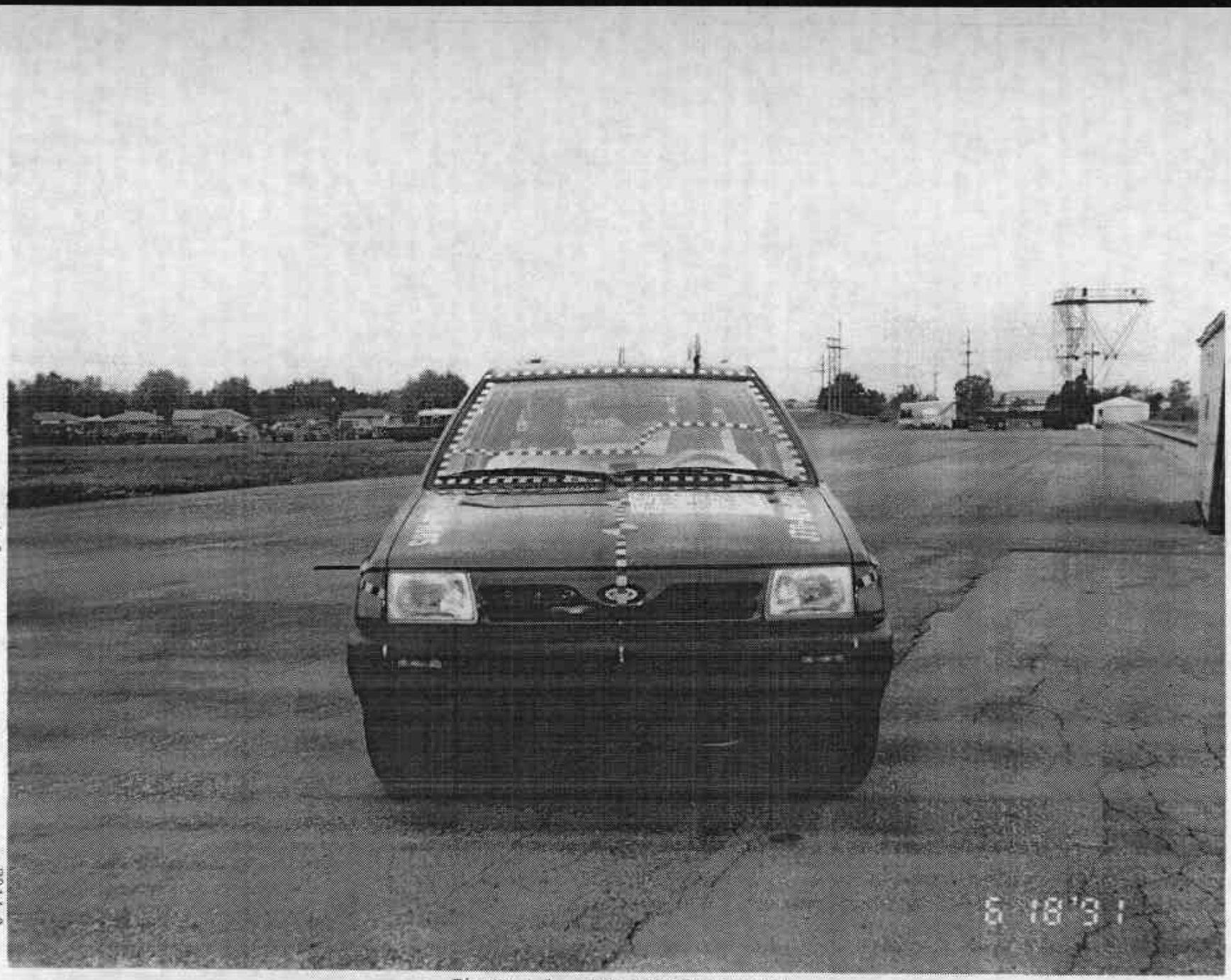


Figure A-1 PRE-TEST FRONT VIEW

Figure A-2 POST-TEST FRONT VIEW

Figure A-3 PRE-TEST LEFT SIDE VIEW

Figure A-4 POST-TEST LEFT SIDE VIEW

Figure A-5 PRE-TEST RIGHT SIDE VIEW

Figure A-8 POST-TEST RIGHT SIDE VIEW

Figure A-7 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

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

Figure A-9 PRE-TEST LEFT REAR THREE-QUARTER VIEW

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

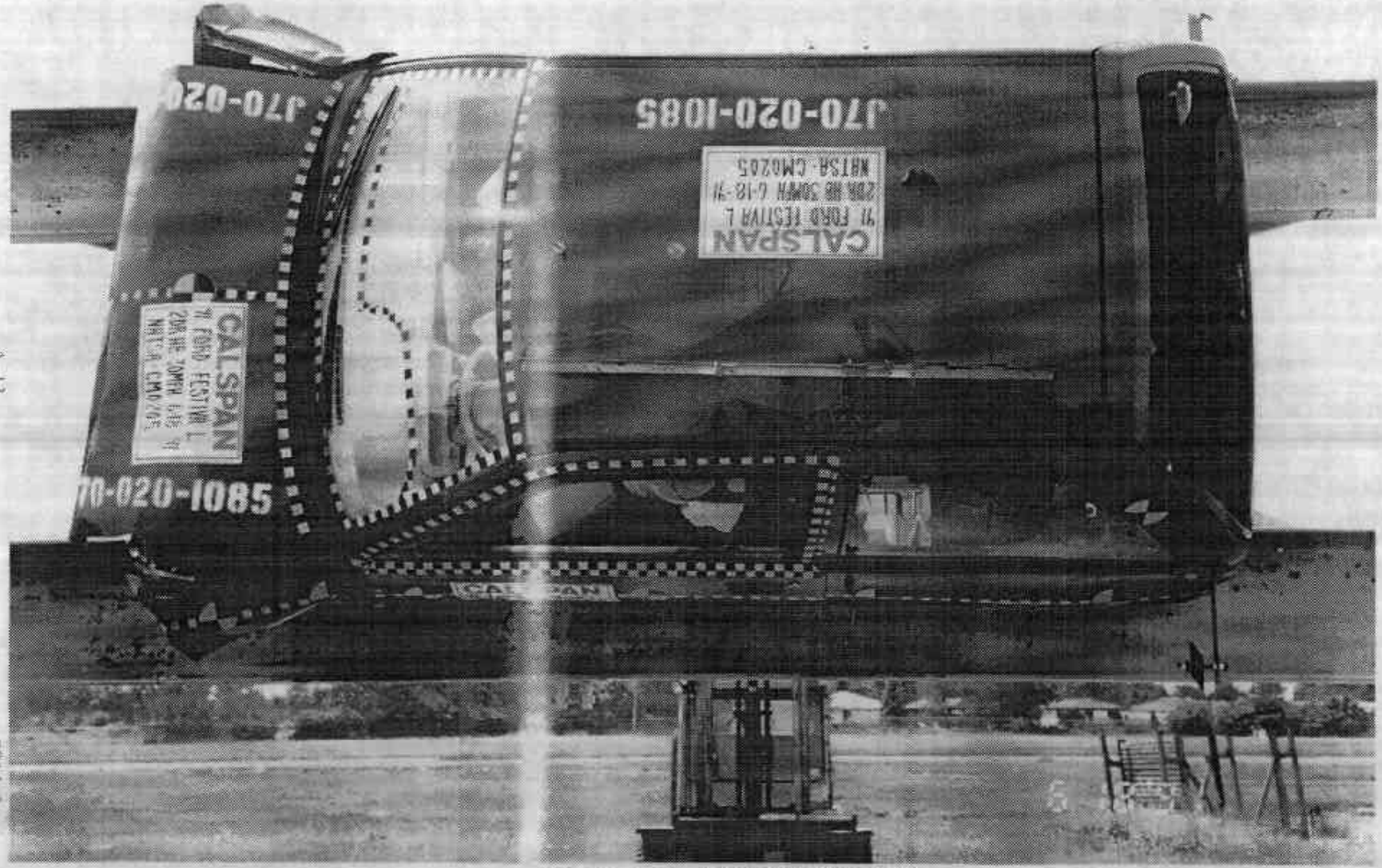

Figure A-11 POST-TEST TOP VIEW

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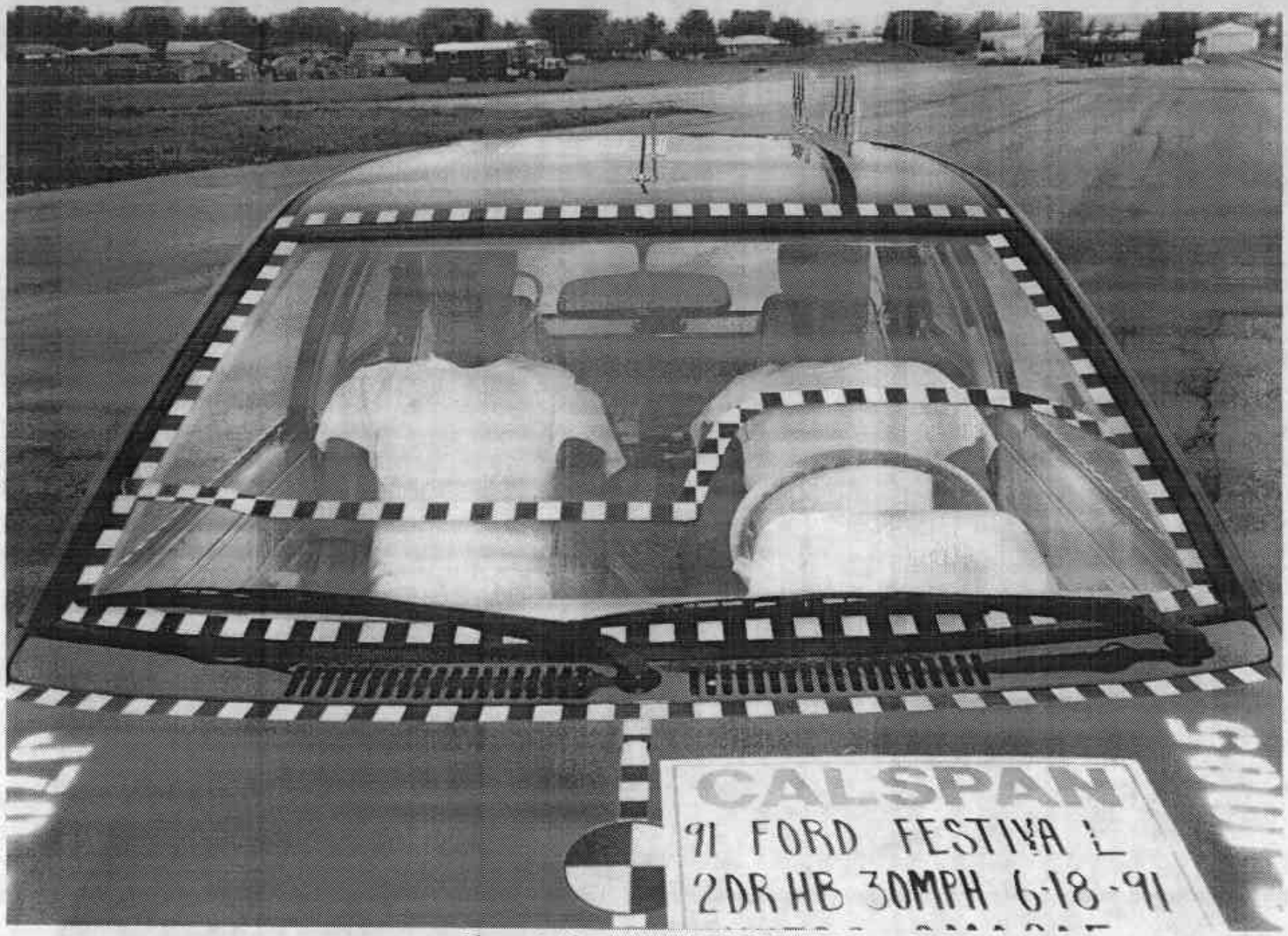


Figure A-12 PRE-TEST WINDSHIELD VIEW

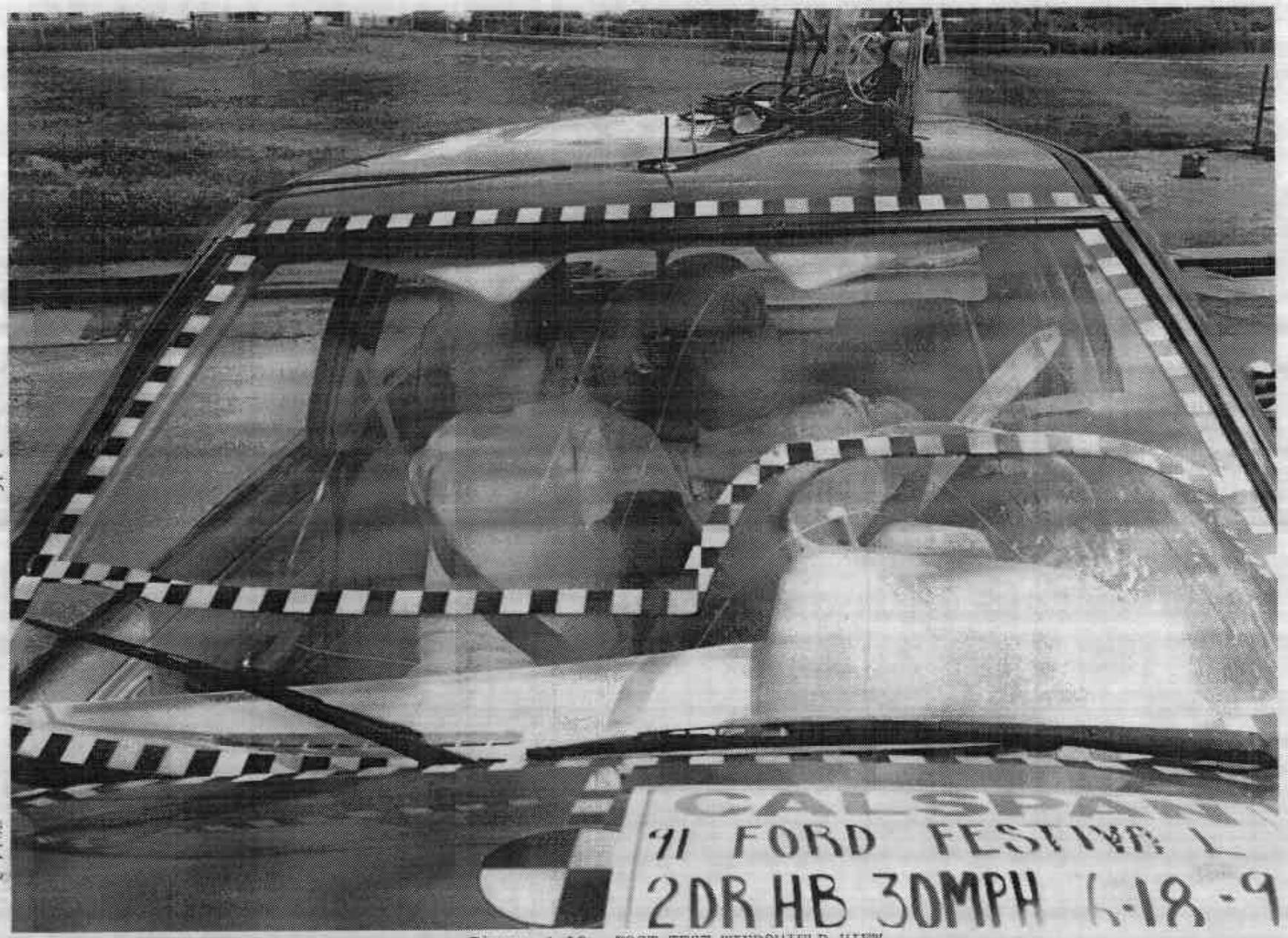


Figure A-13 POST-TEST WINDSHIELD VIEW

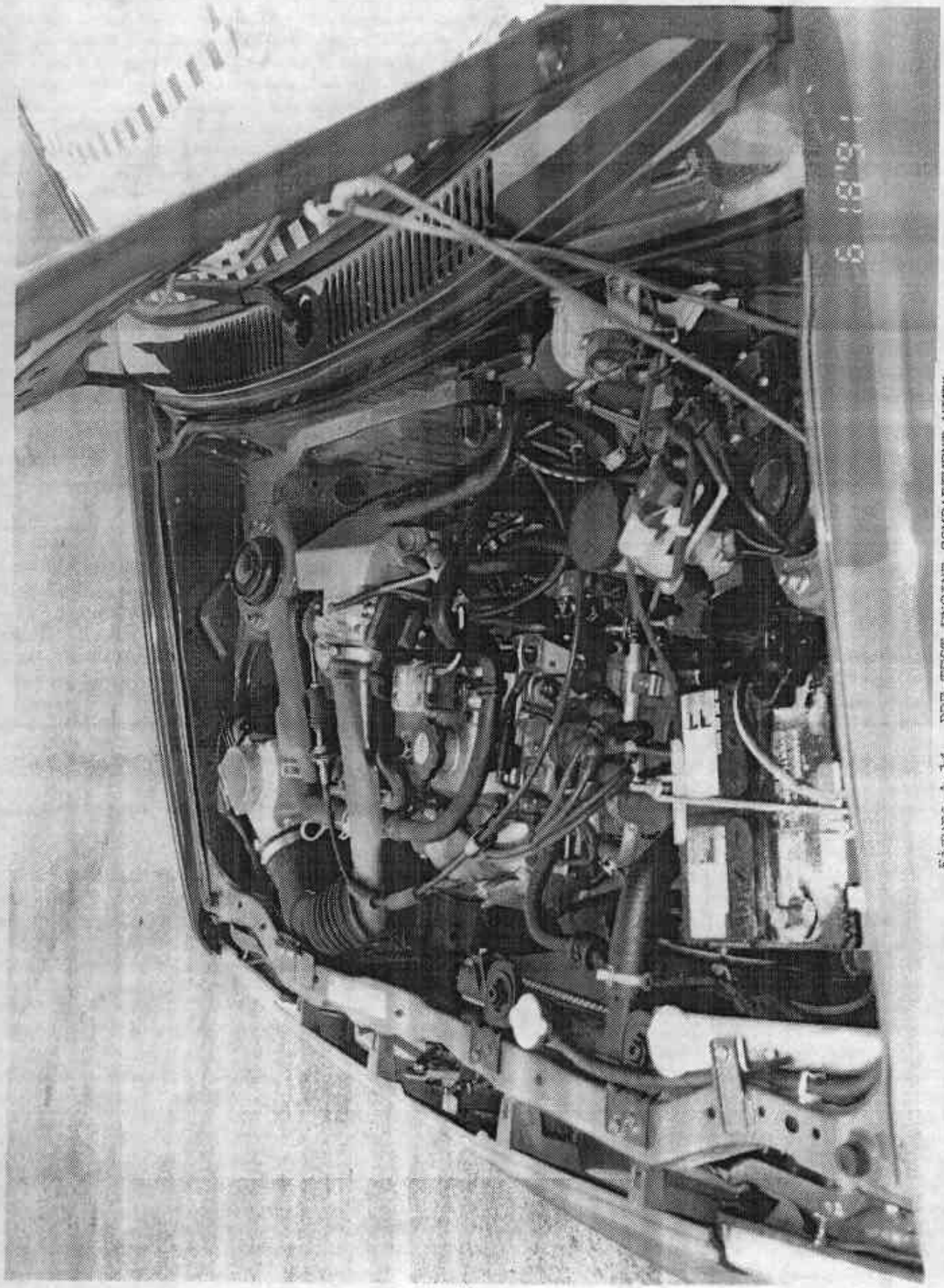
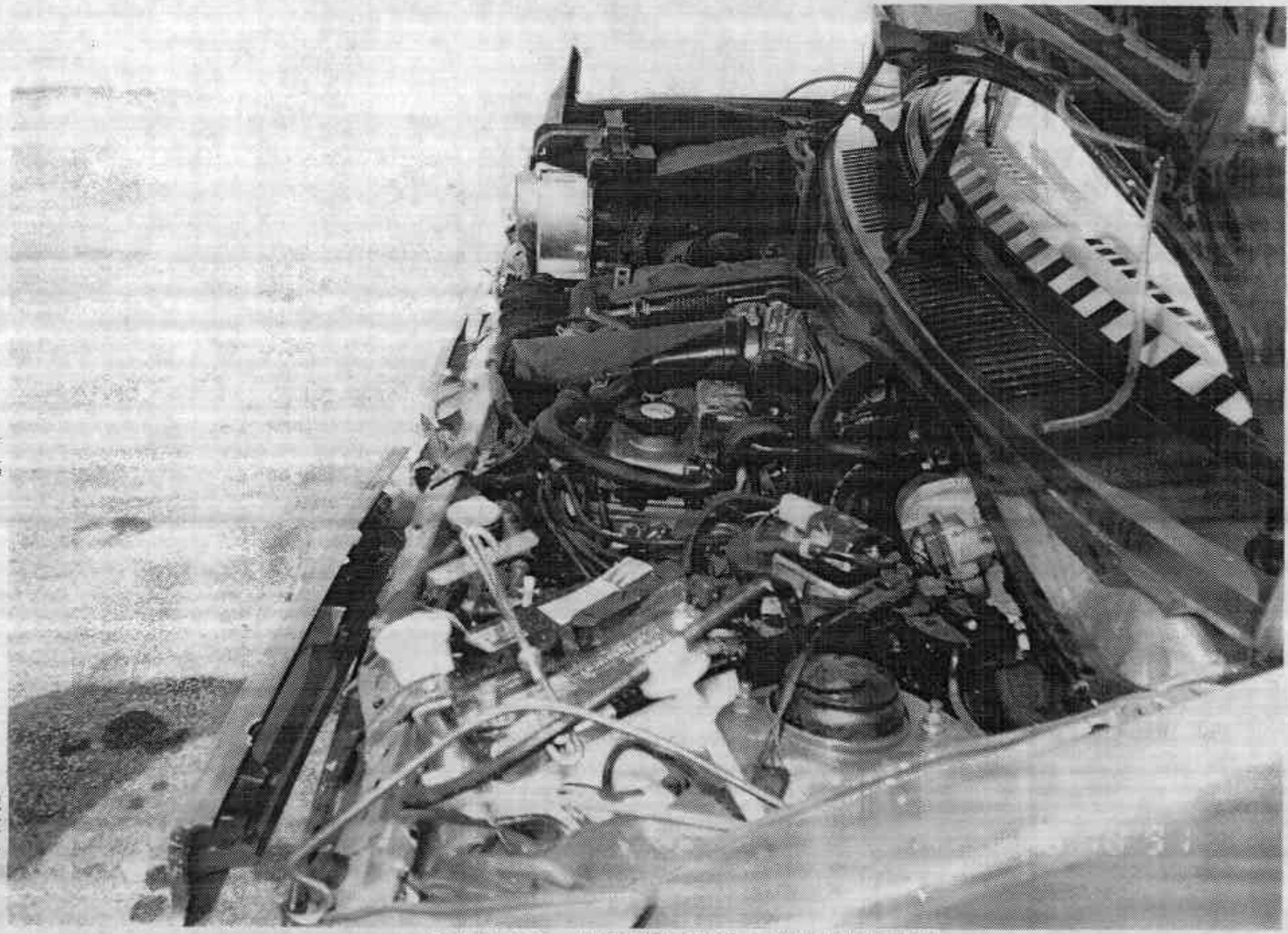


Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW



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7914-2

Figure A-15 POST-TEST ENGINE COMPARTMENT VIEW

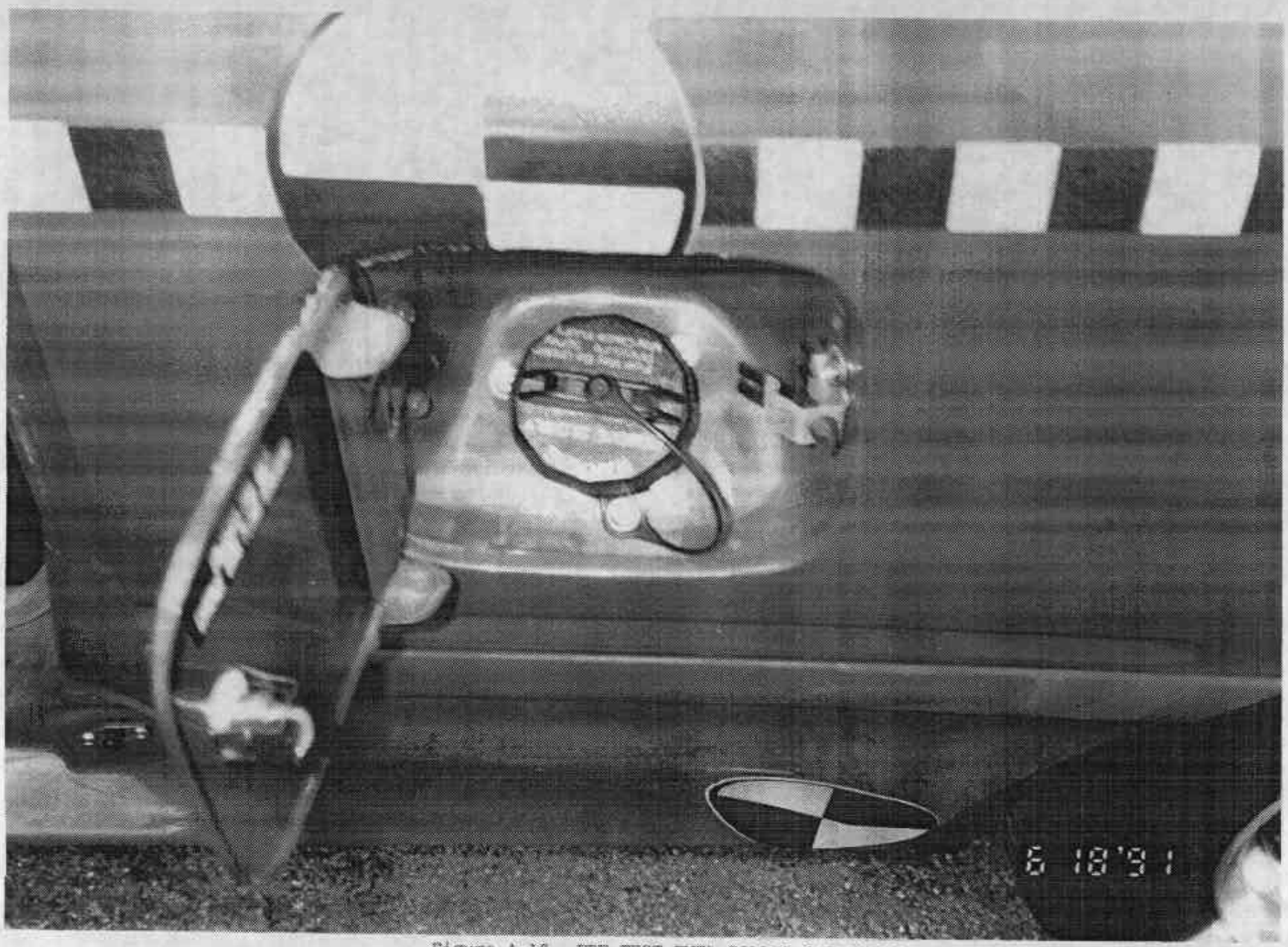

Figure A-16 PRE-TEST FUEL FILLER CAP PHOTO

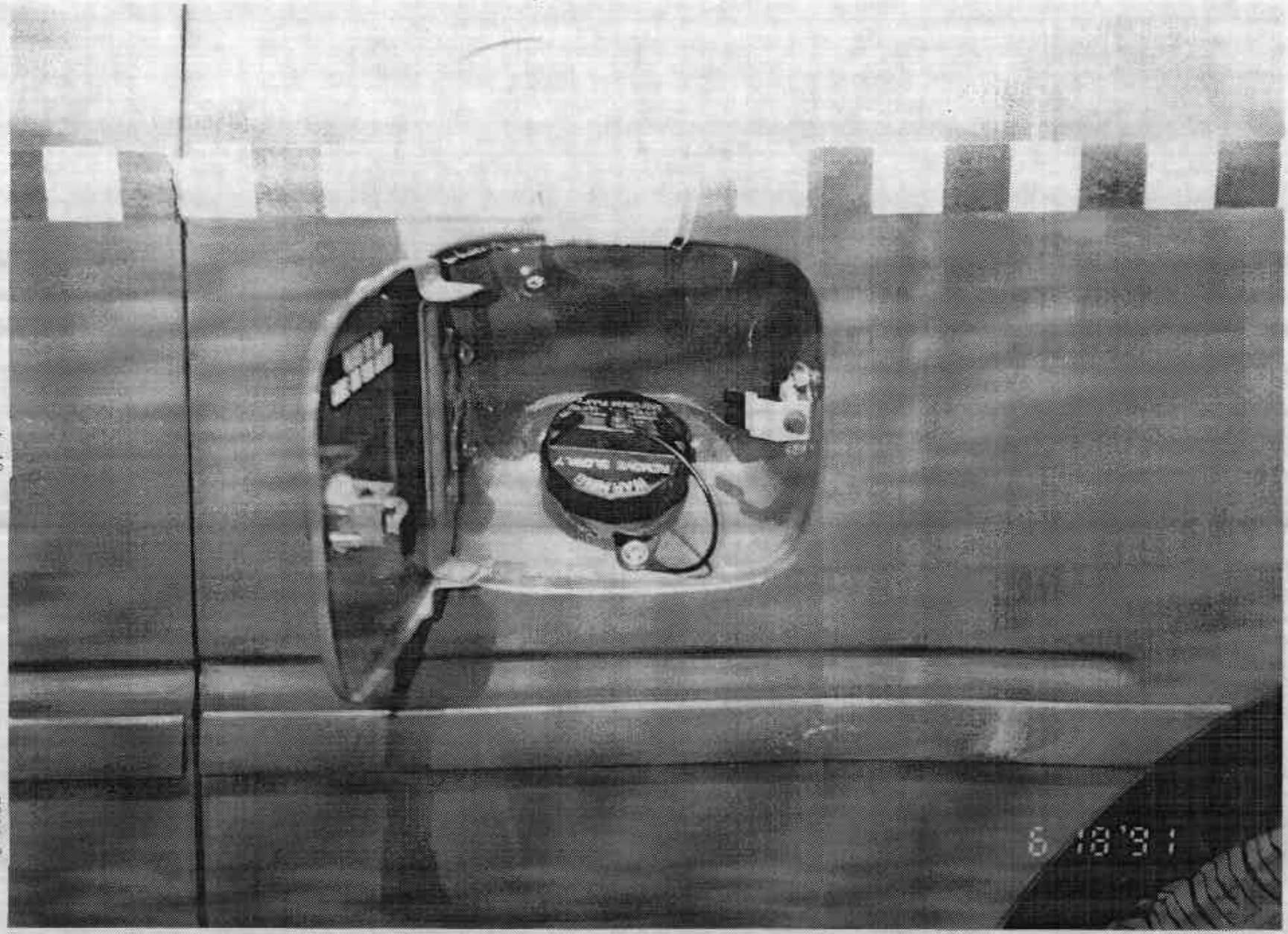

Figure A-17 POST-TEST FUEL FILLER CAP PHOTO

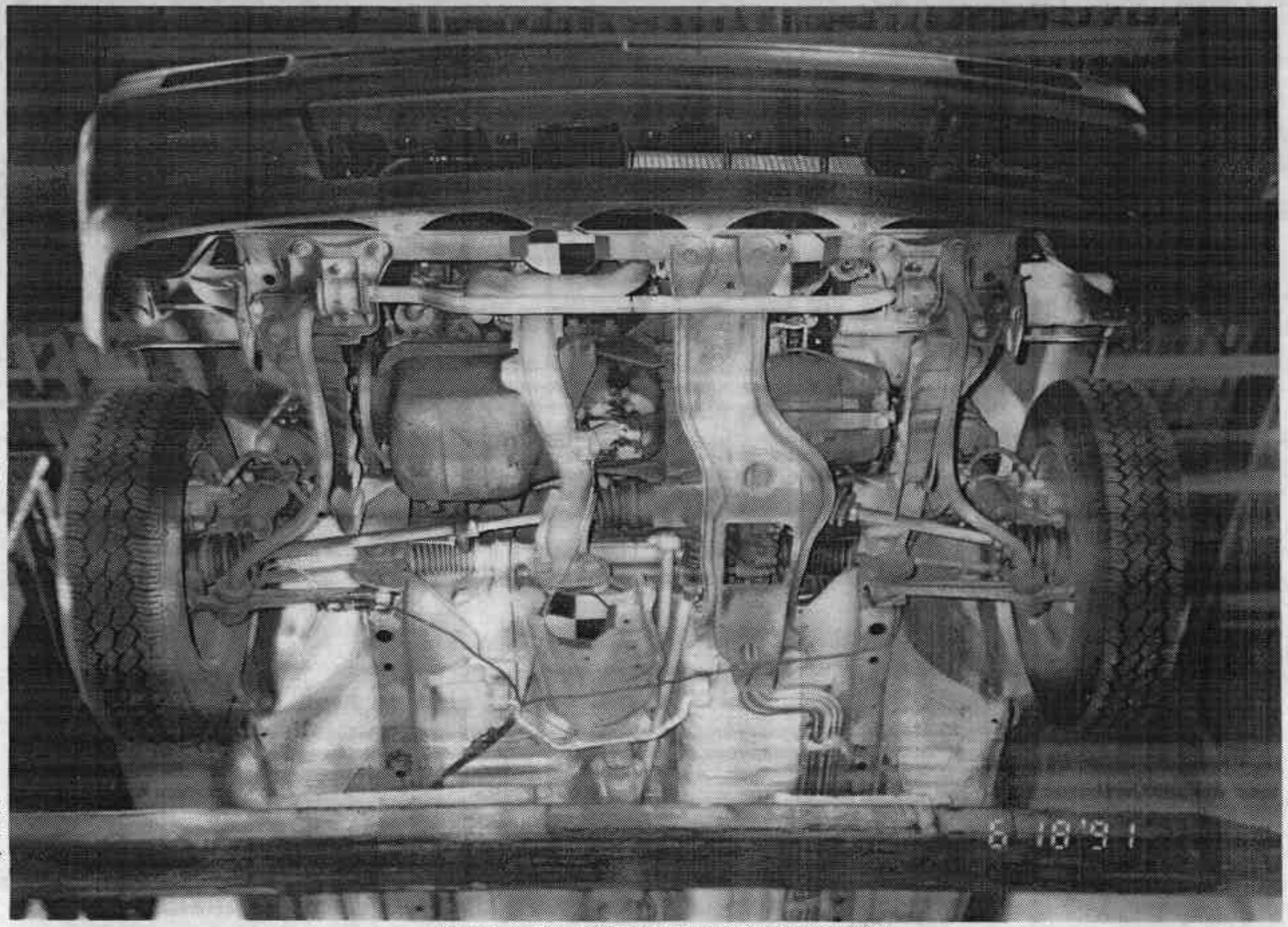

Figure A-18 PRE-TEST FRONT UNDERBODY VIEW

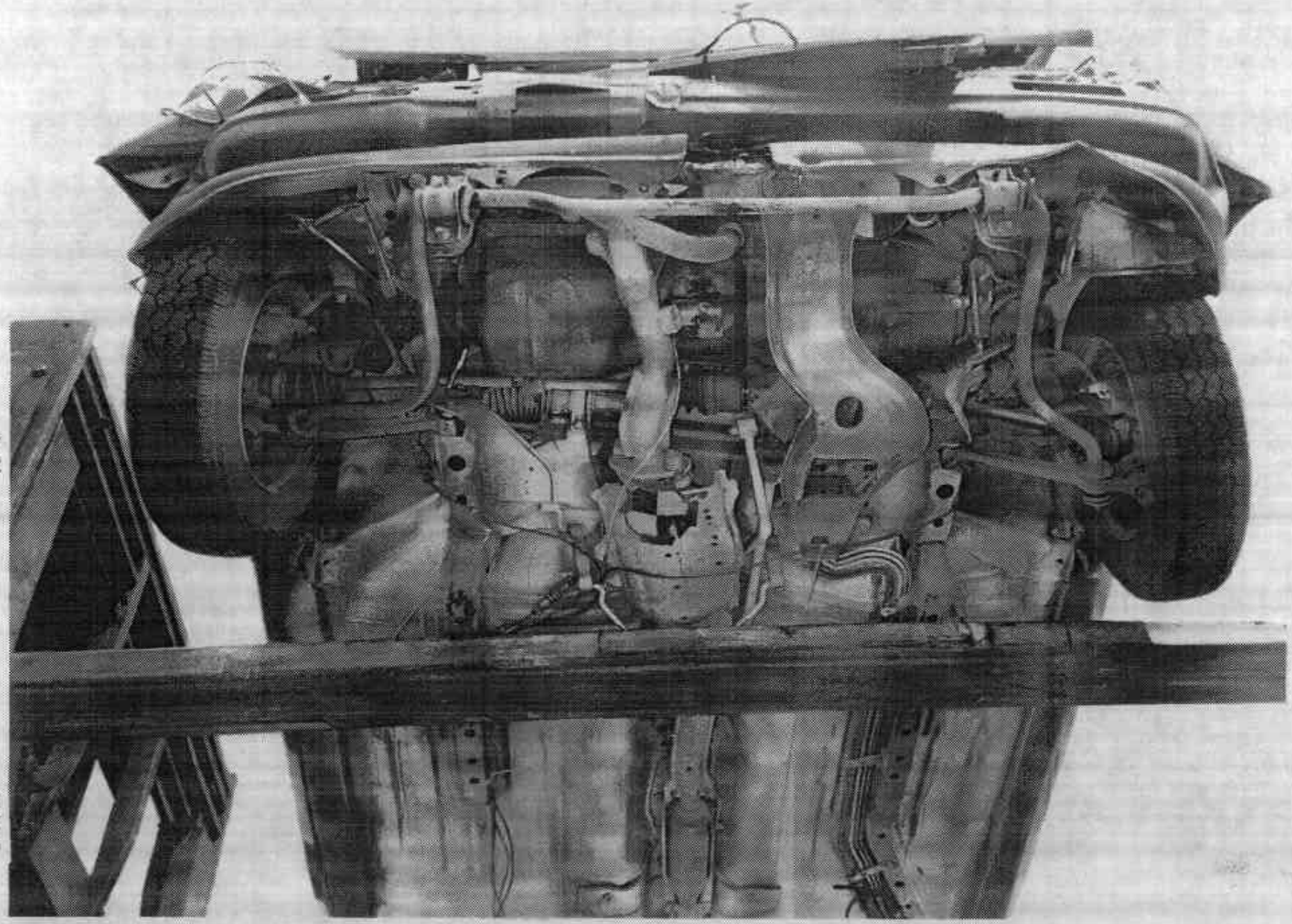

Figure A-19 POST-TEST FRONT UNDERBODY VIEW

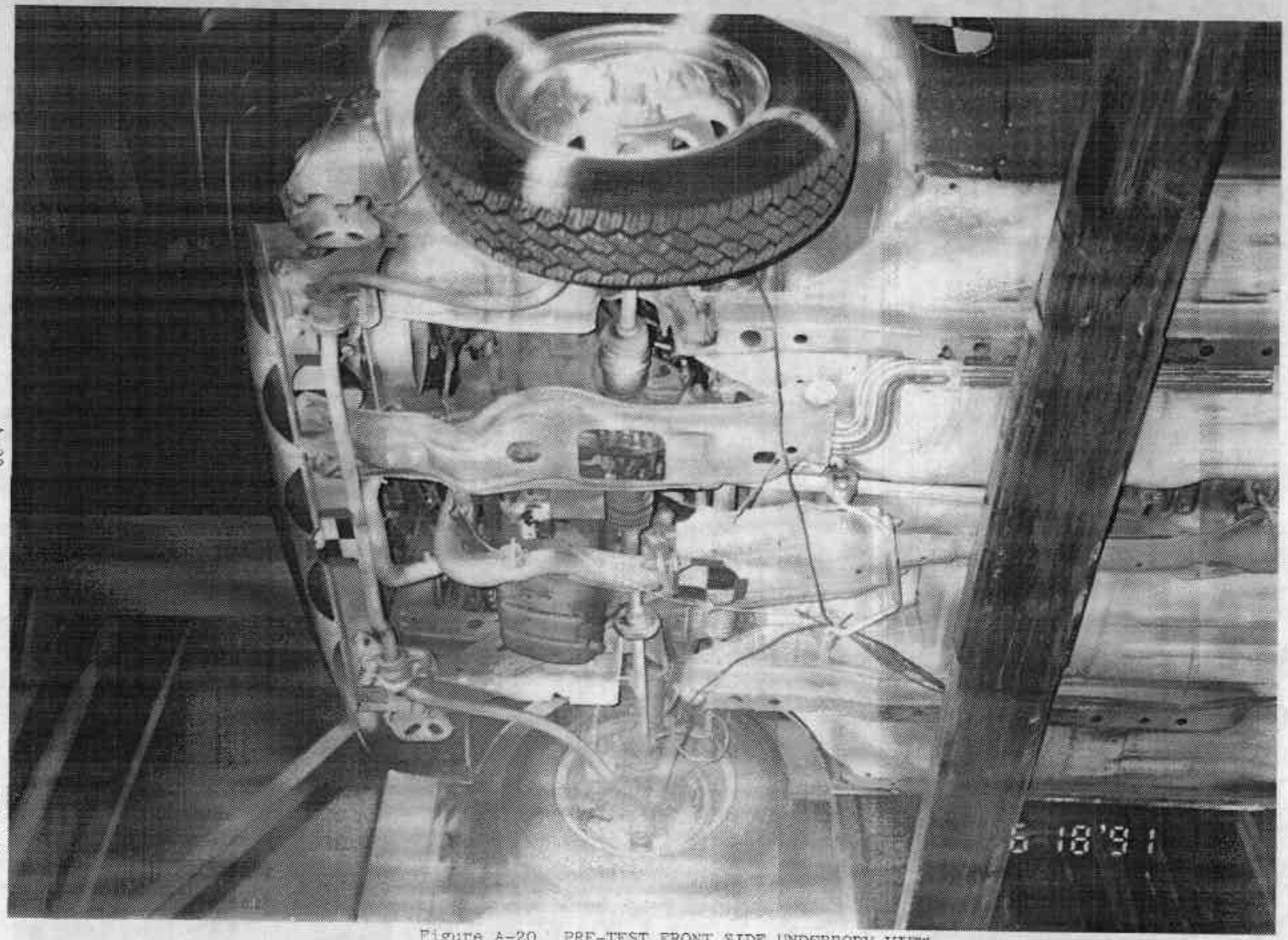

Figure A-20 PRE-TEST FRONT SIDE UNDERBODY VIEW

Figure A-21 POST-TEST FRONT SIDE UNDERBODY VIEW

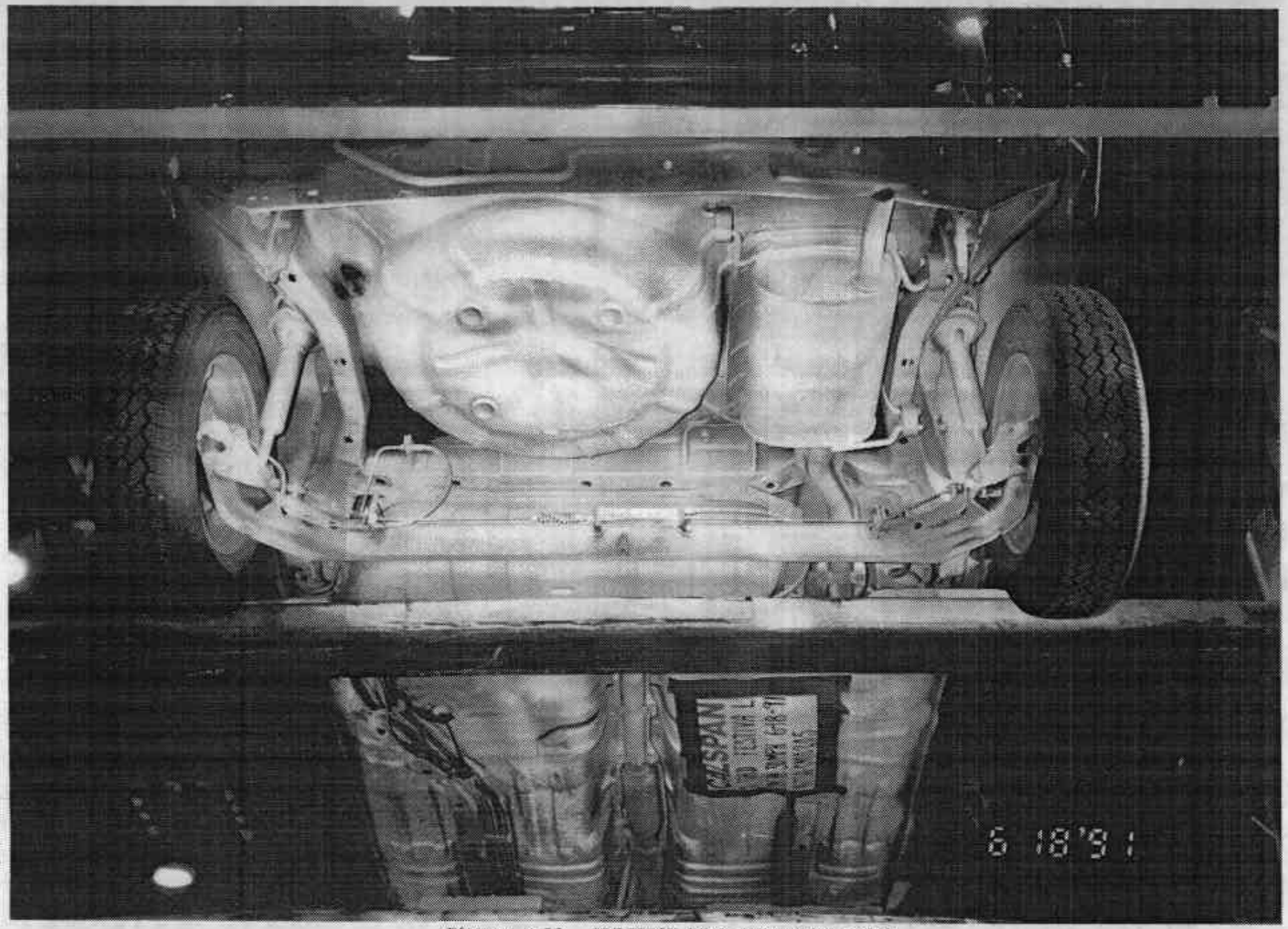

Figure A-22 PRE-TEST REAR UNDERBODY VIEW

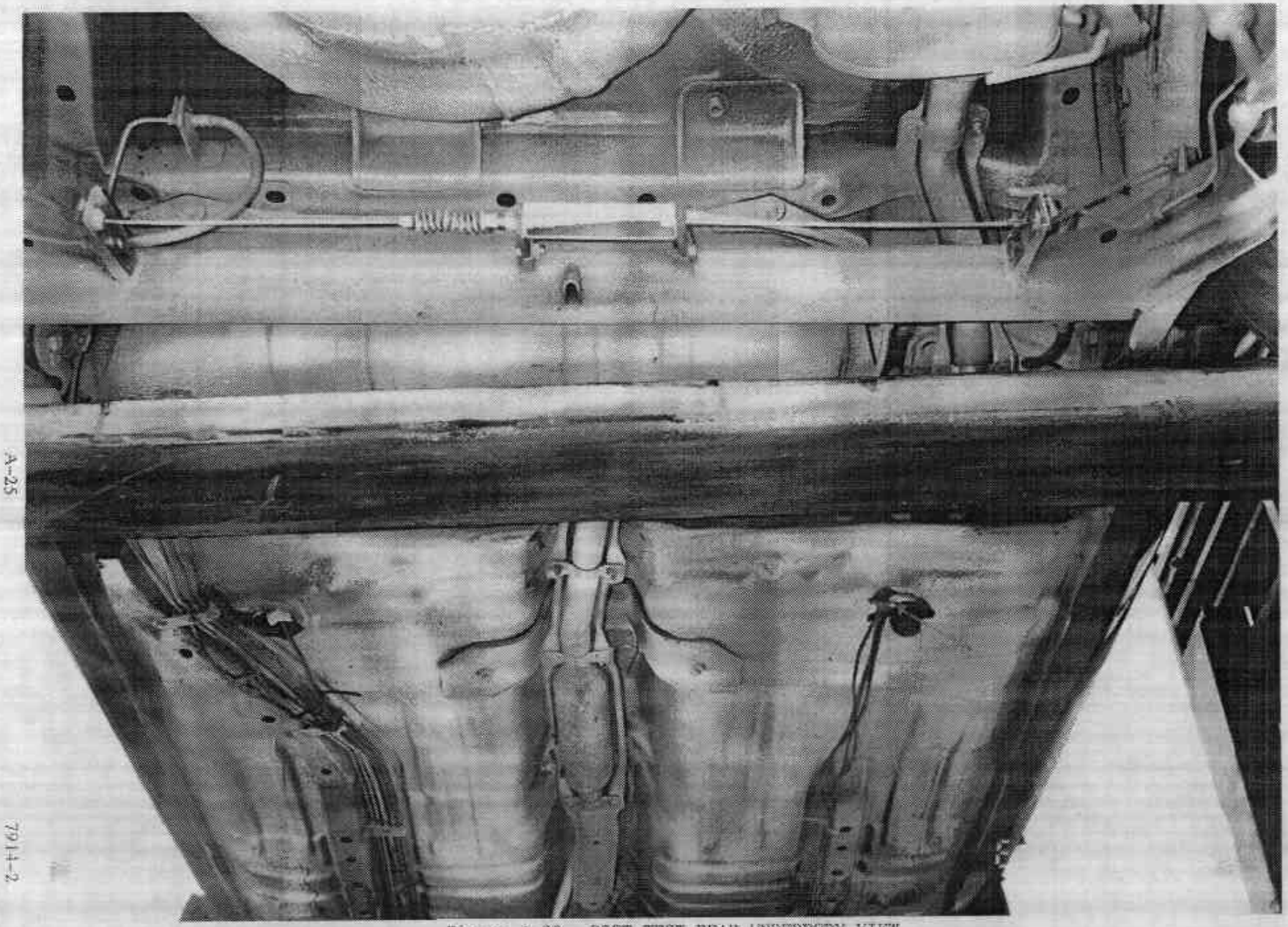

Figure A-23 POST-TEST REAR UNDERBODY VIEW

Figure A-24 CERTIFICATION LABEL

Figure A-25 TIRE PLACARD

Figure A-26 PRE-TEST DRIVER DUMMY POSITION

Figure A-27 POST-TEST DRIVER DUMMY POSITION

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Figure A-28 PRE-TEST PASSENGER DUMMY POSITION

Figure A-29 POST-TEST PASSENGER DUMMY POSITION

Figure A-30 PRE-TEST DRIVER DUMMY AND INTERIOR VIEW

7914-2

Figure A-31 POST-TEST DRIVER DUMMY AND INTERIOR VIEW

7914-2

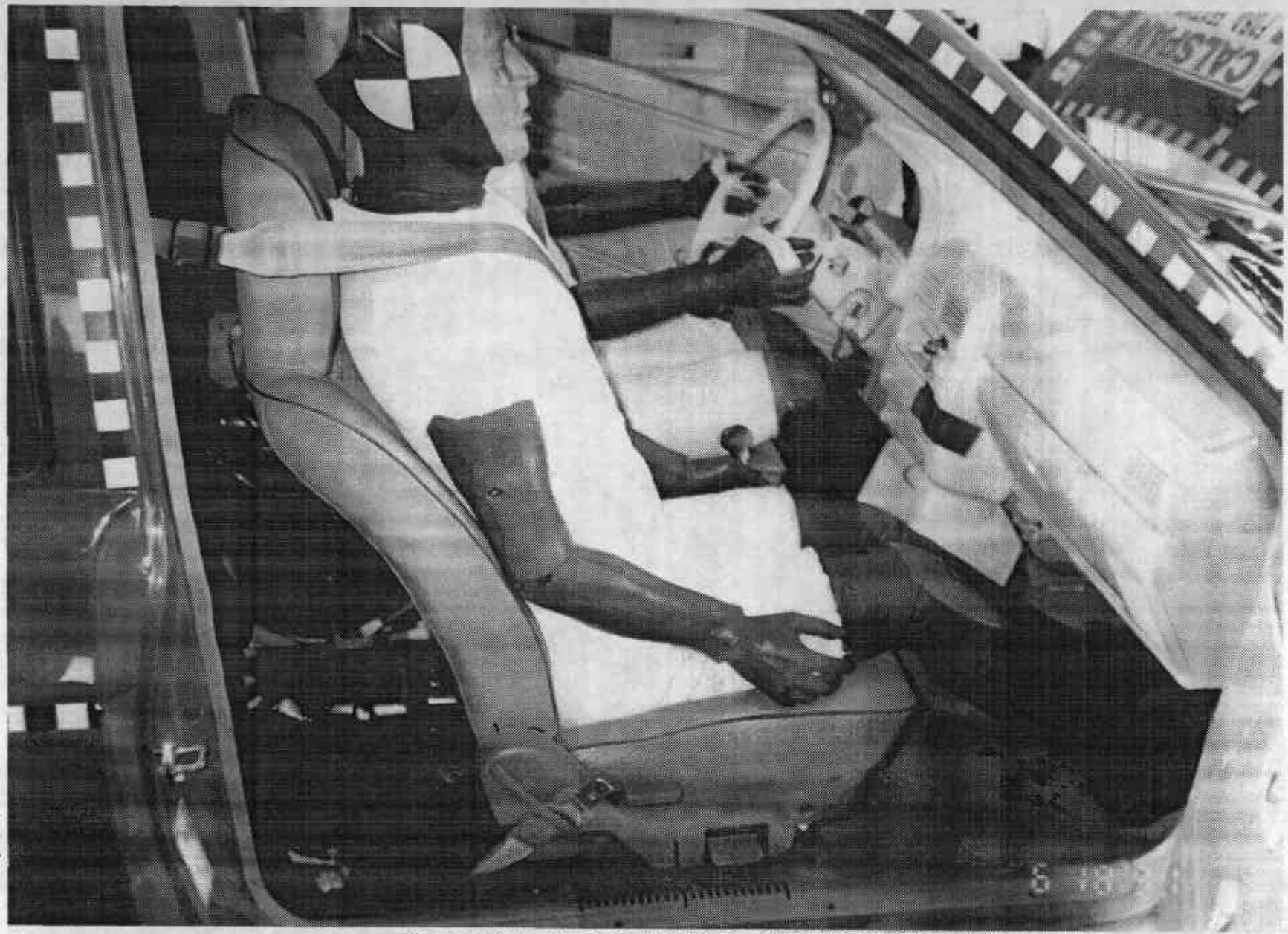


Figure A-32 PRE-TEST PASSENGER DUMMY AND INTERIOR VIEW

7914-2

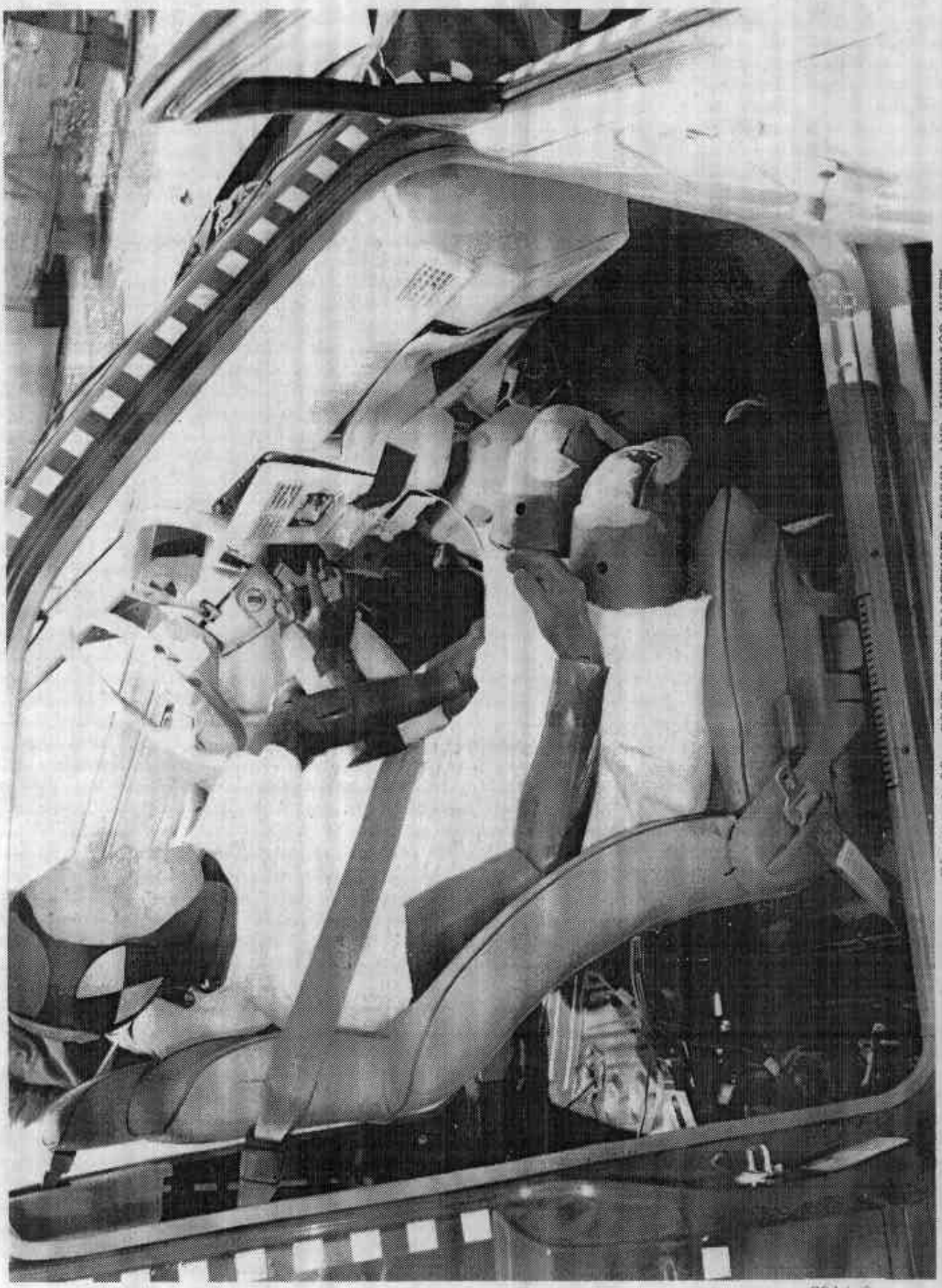


Figure A-33 POST-TEST PASSENGER DUMMY AND INTERIOR VIEW

Figure A-34 VEHICLE IMPACT

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

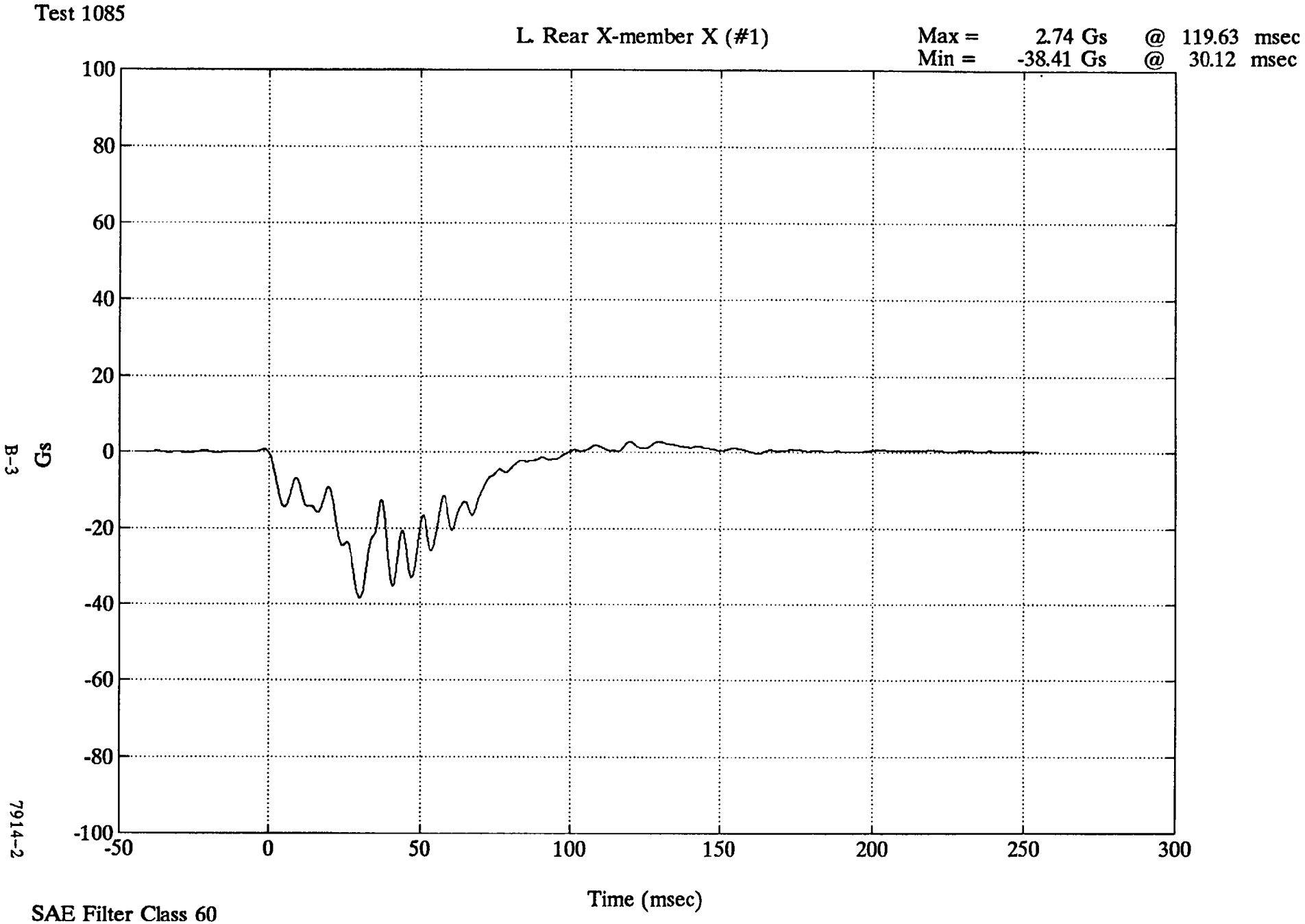
TEST NO. CM0205

VEHICLE DATA

FILTER CHANNEL CLASS

60

Test 1085

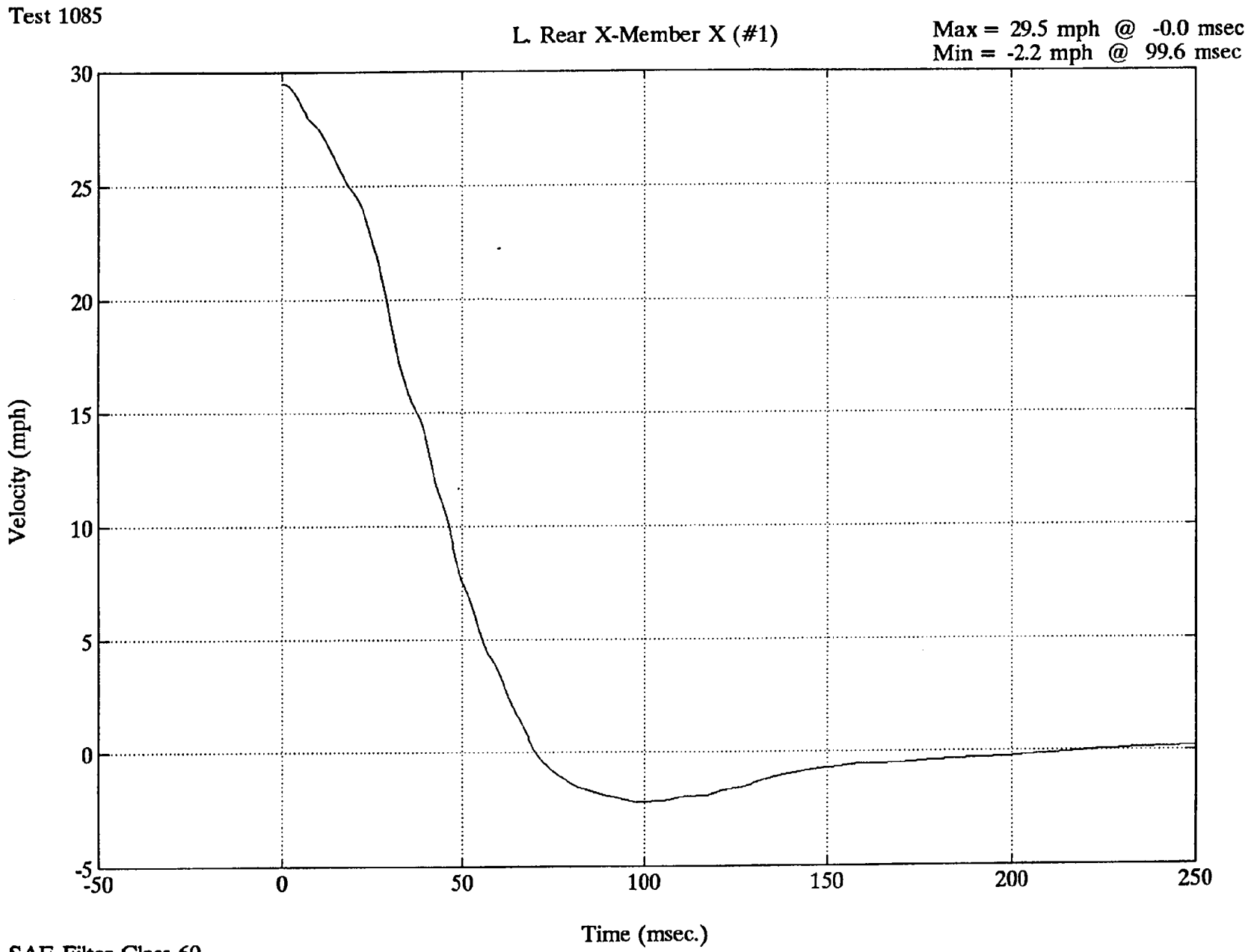


B-3

7914-2

SAE Filter Class 60

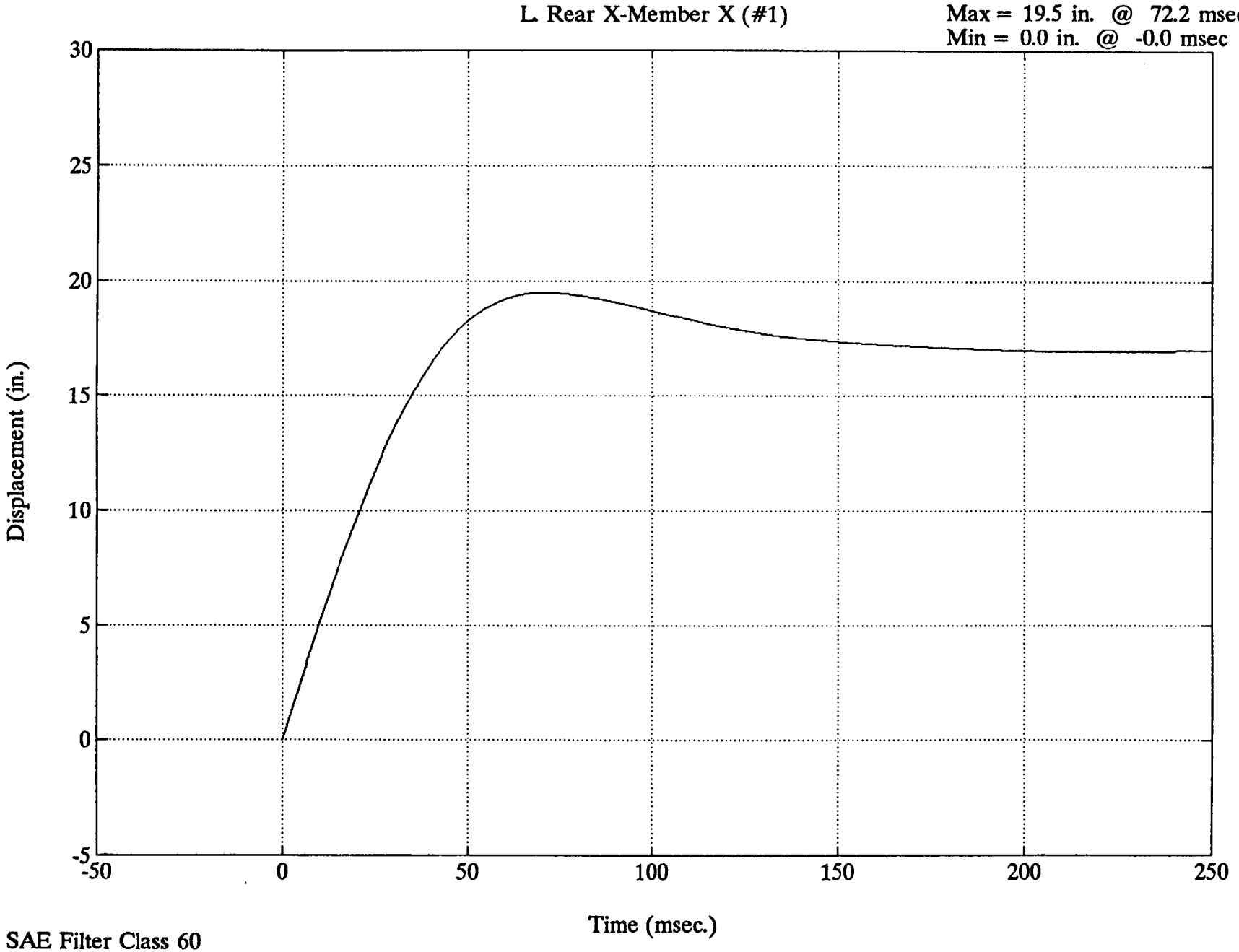
Test 1085



SAE Filter Class 60

7914-2

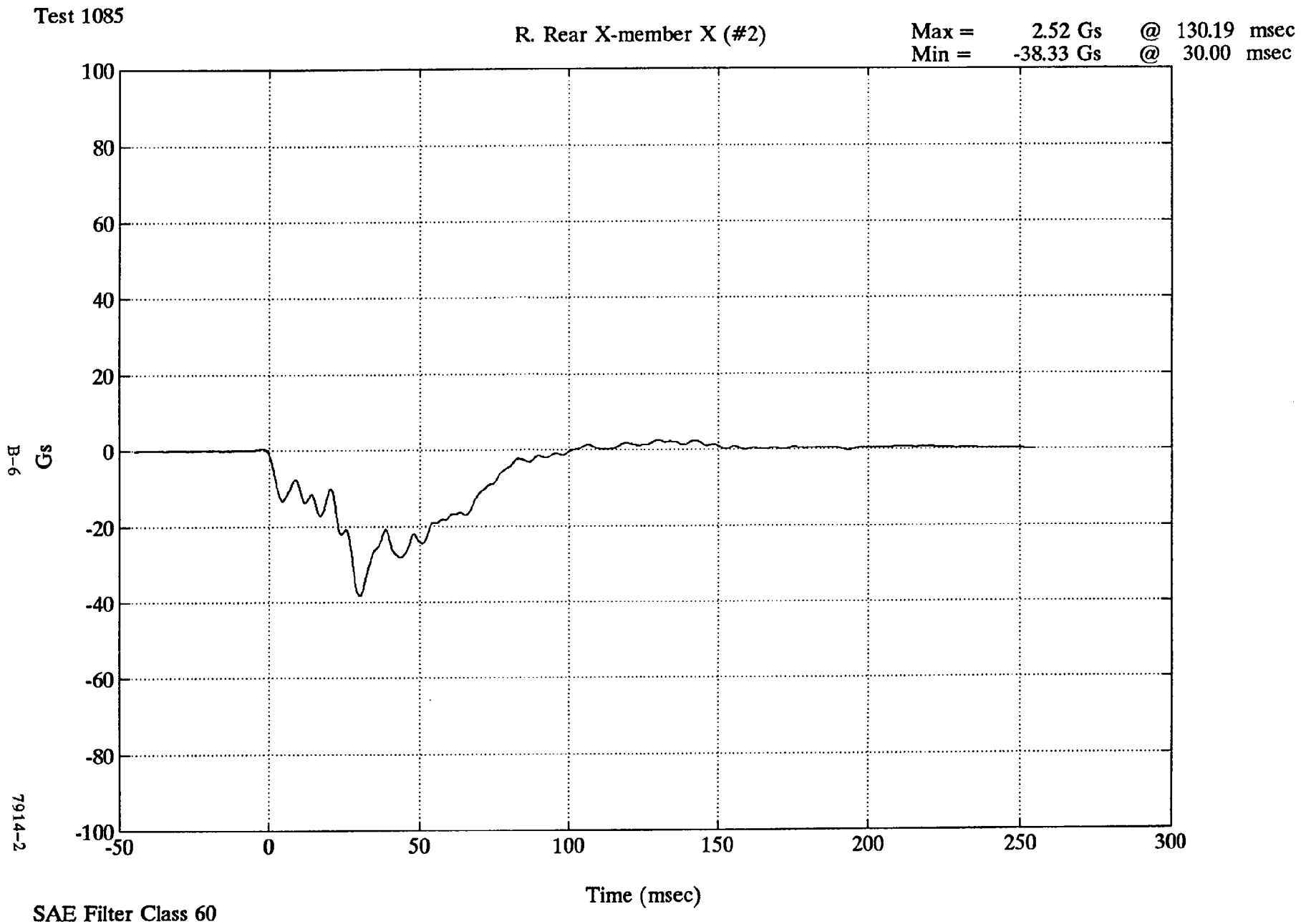
Test 1085



SAE Filter Class 60

7914-2

Test 1085



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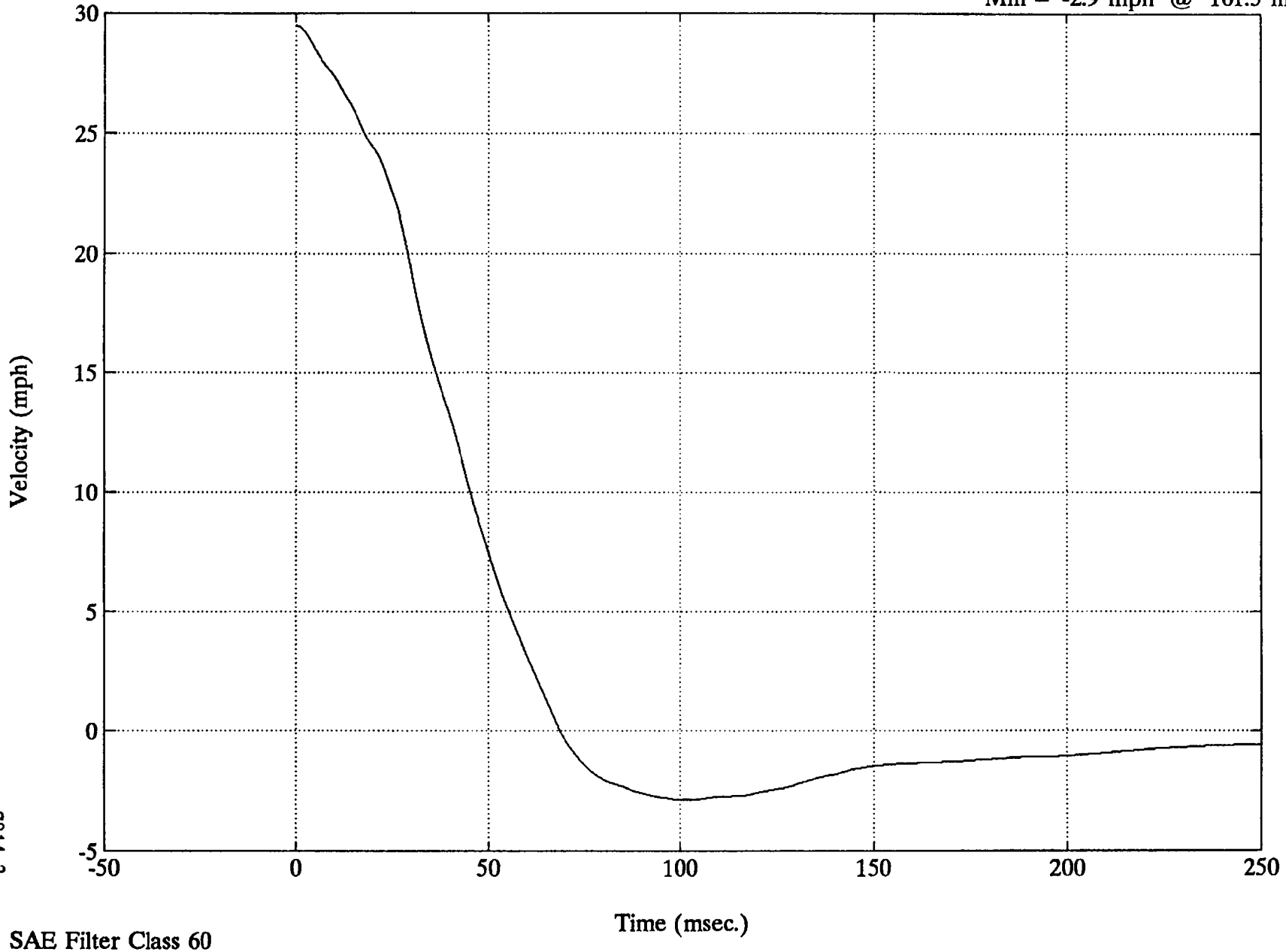
7914-2

SAE Filter Class 60

Test 1085

R. Rear X-Member X (#2)

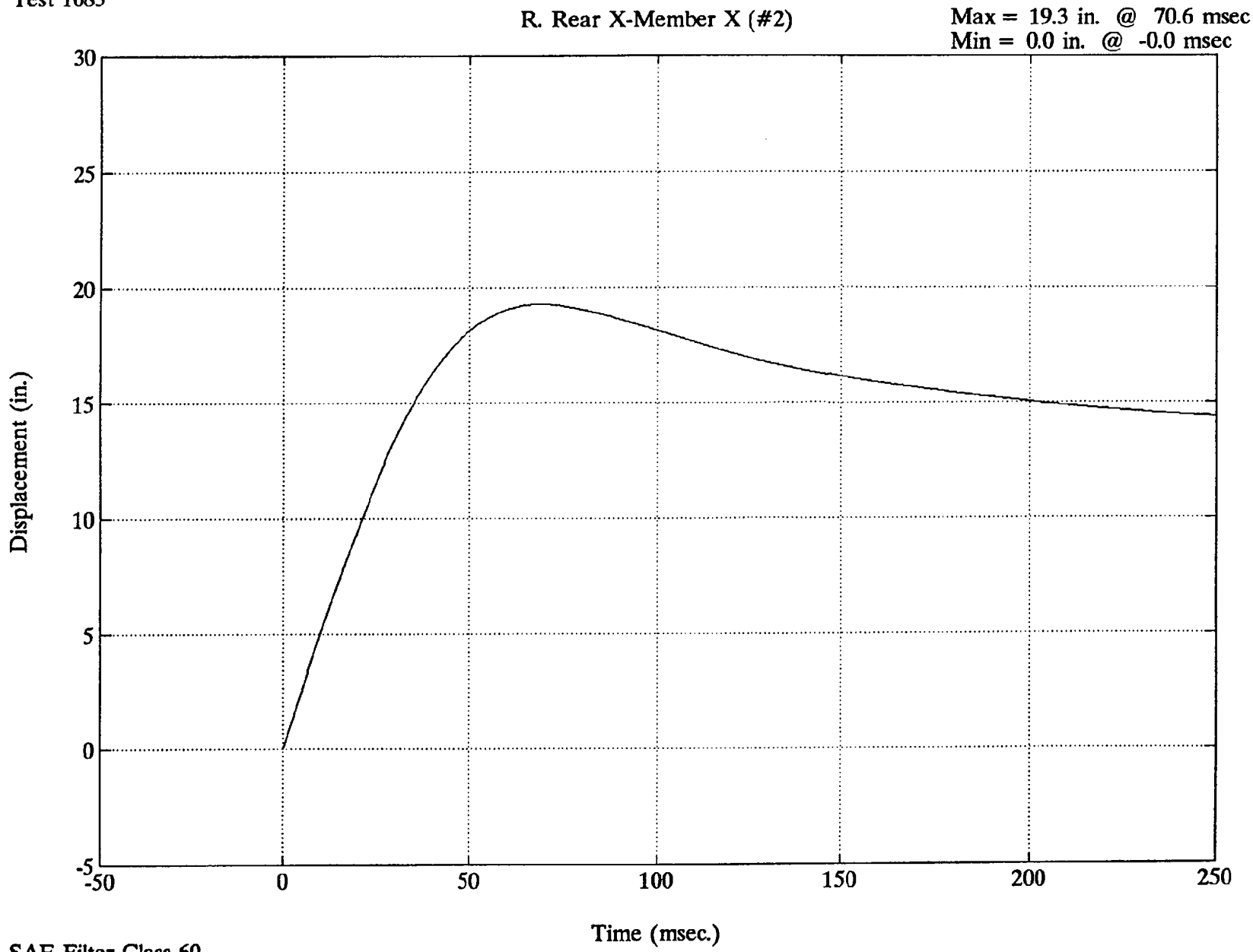
Max = 29.5 mph @ -0.0 msec
Min = -2.9 mph @ 101.5 msec



SAE Filter Class 60

7914-2

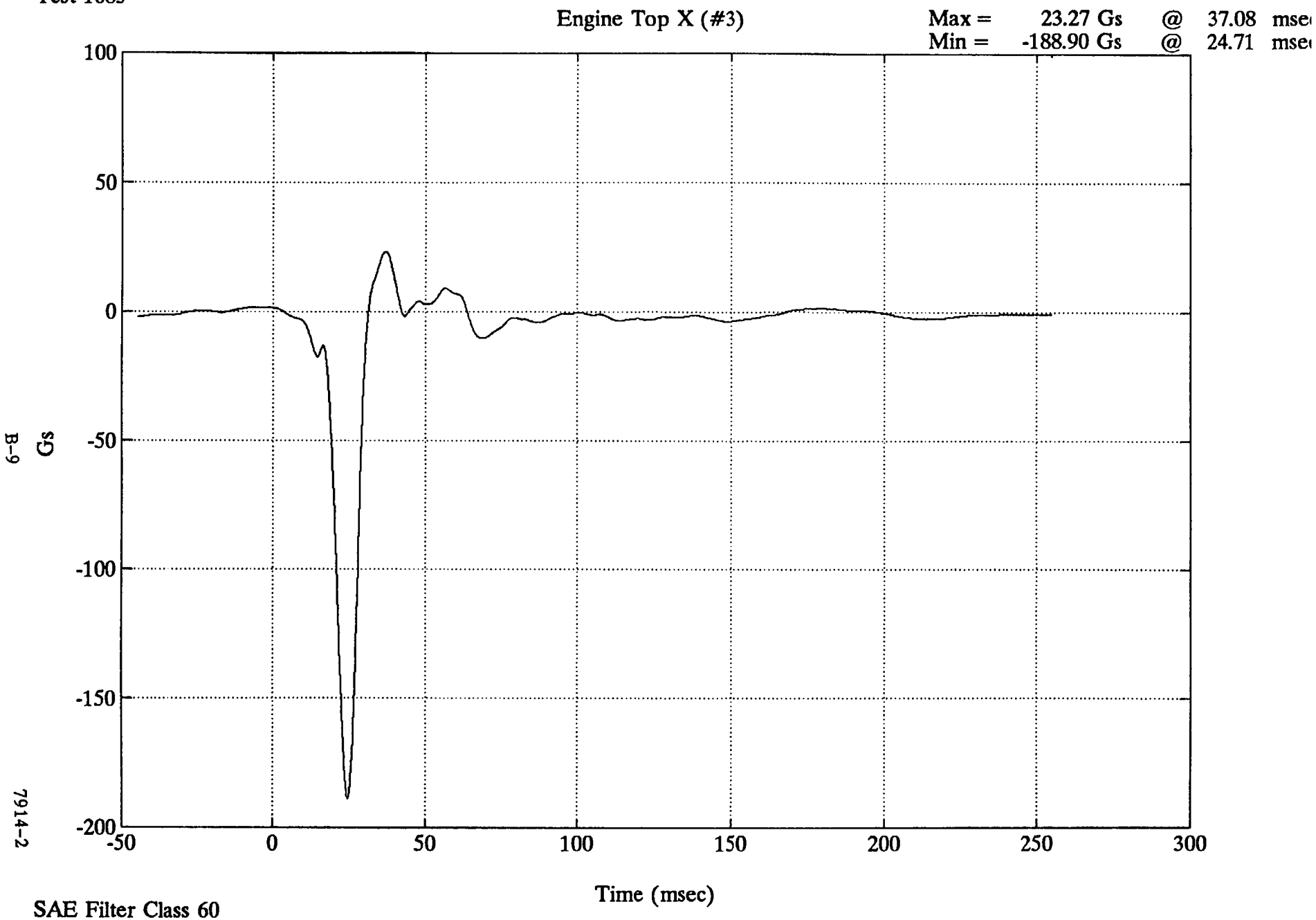
Test 1085



SAE Filter Class 60

7914-2

Test 1085



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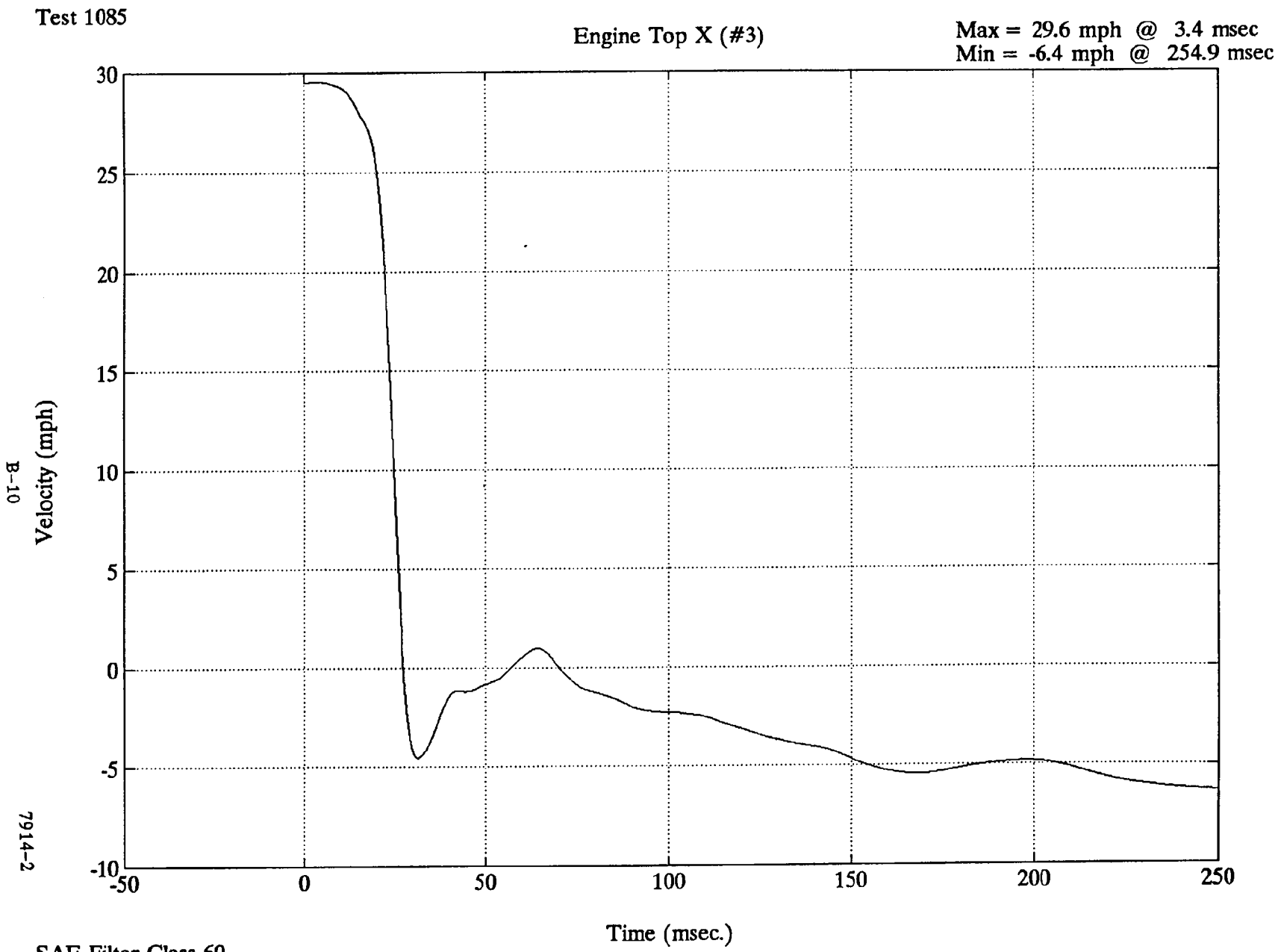
7914-2

SAE Filter Class 60

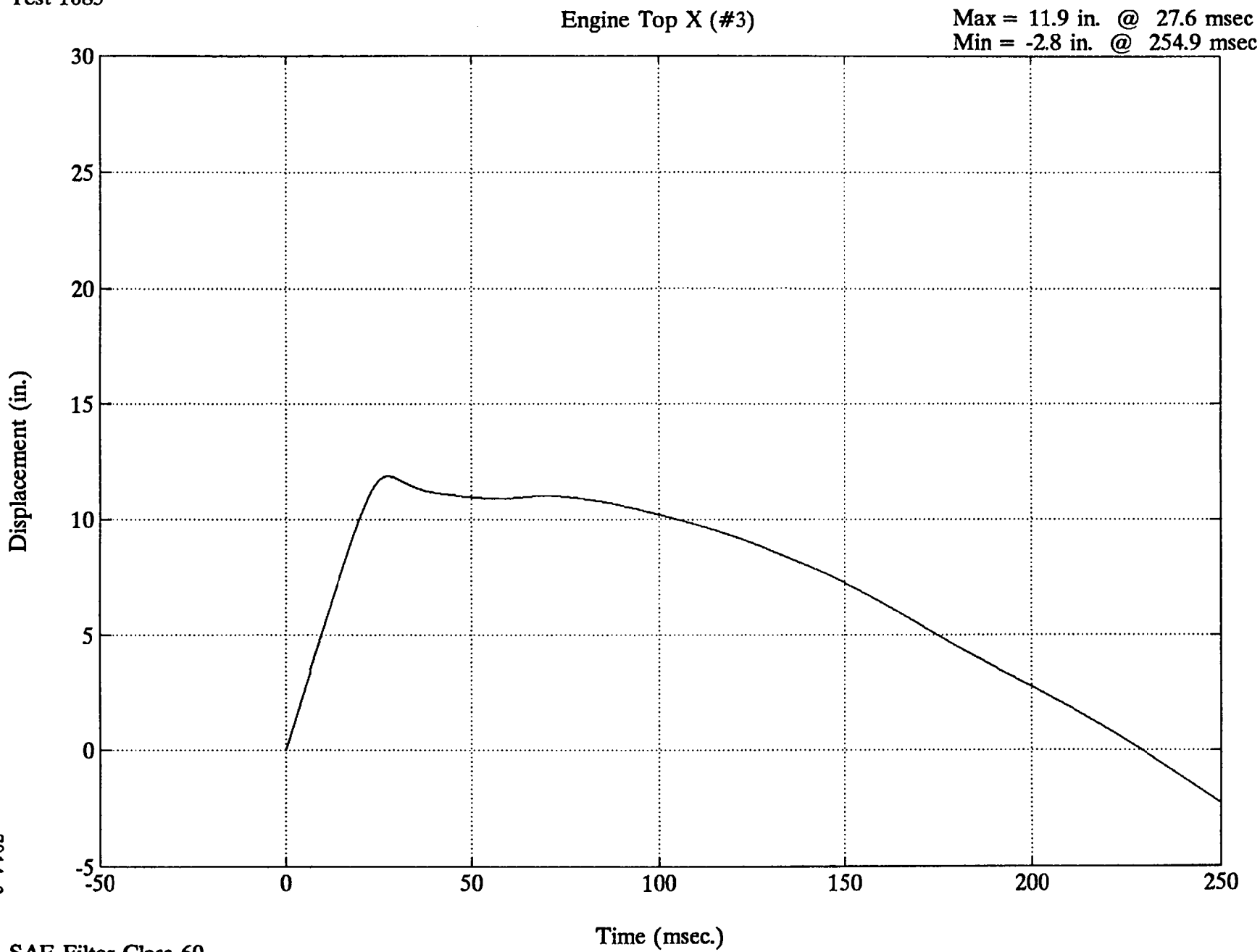
Test 1085



SAE Filter Class 60

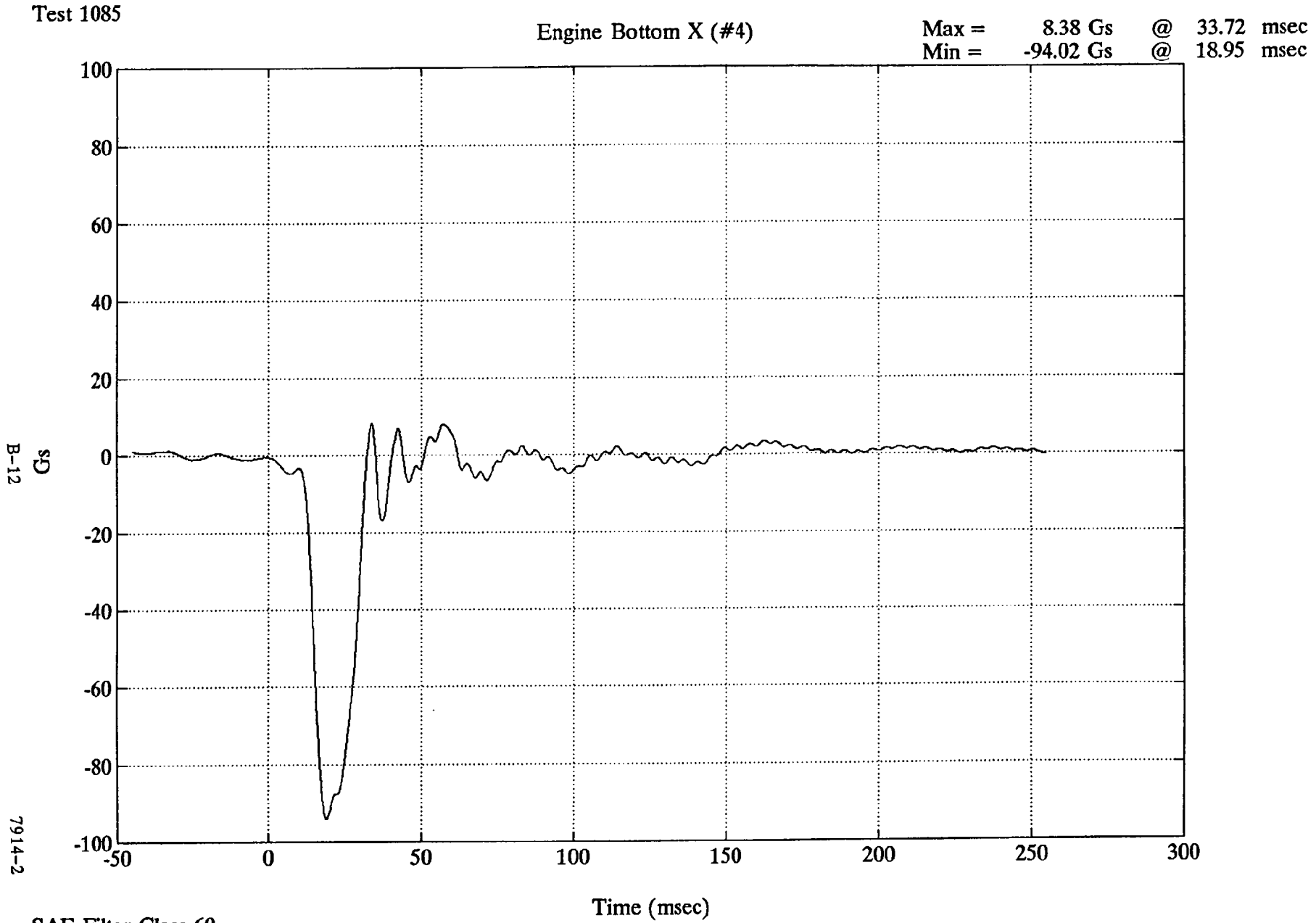
7914-2

Test 1085

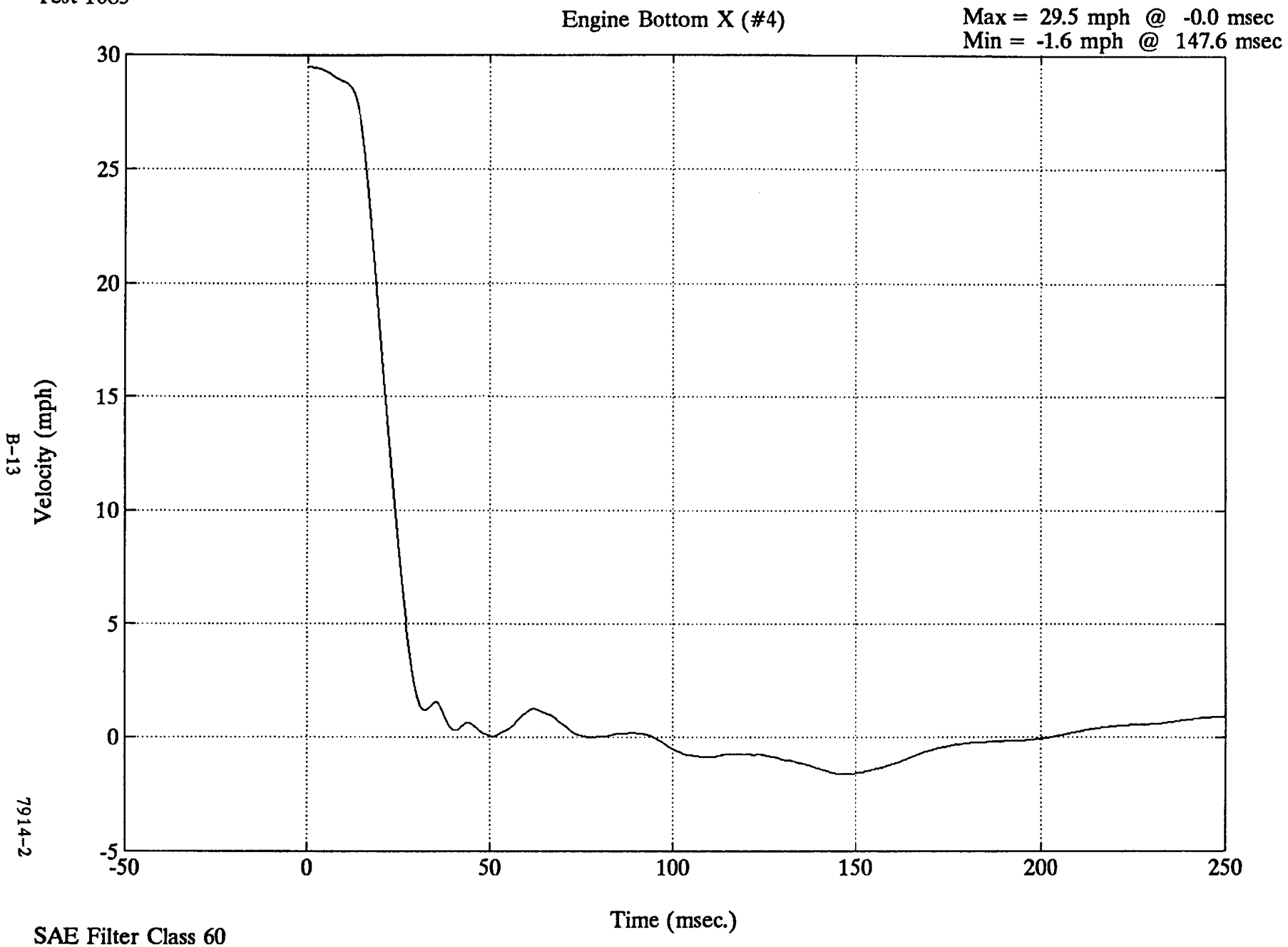


SAE Filter Class 60

7914-2


Test 1085
Engine Bottom X (#4)
Max = 8.38 Gs @ 33.72 msec
Min = -94.02 Gs @ 18.95 msec
100
80
60
40
20
0
-20
-40
-60
-80
-100
-50
0
50
100
150
200
250
300
Gs
Time (msec)
B-12
7914-2
SAE Filter Class 60

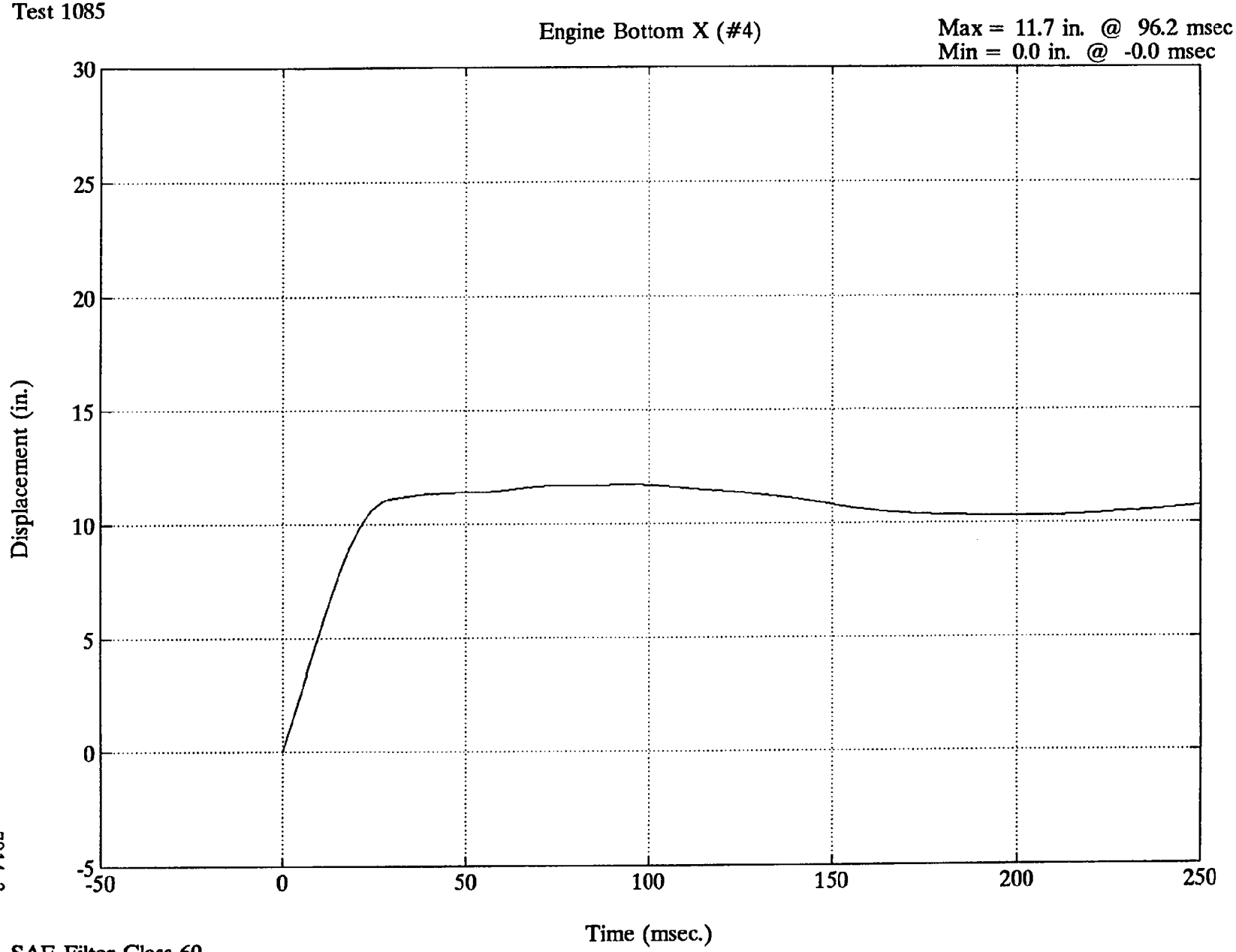
Test 1085



SAE Filter Class 60

7914-2

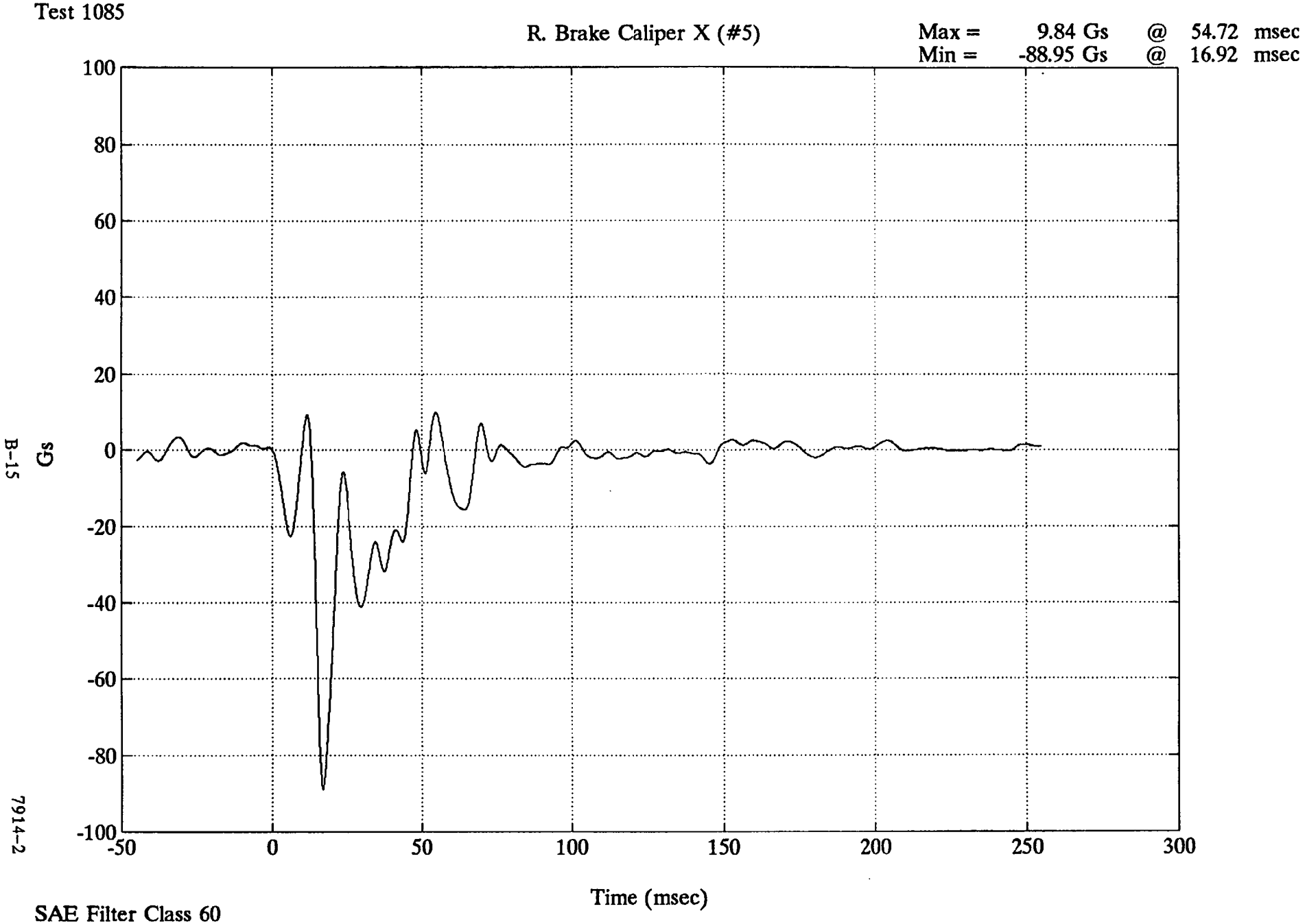
Test 1085



SAE Filter Class 60

7914-2

Test 1085



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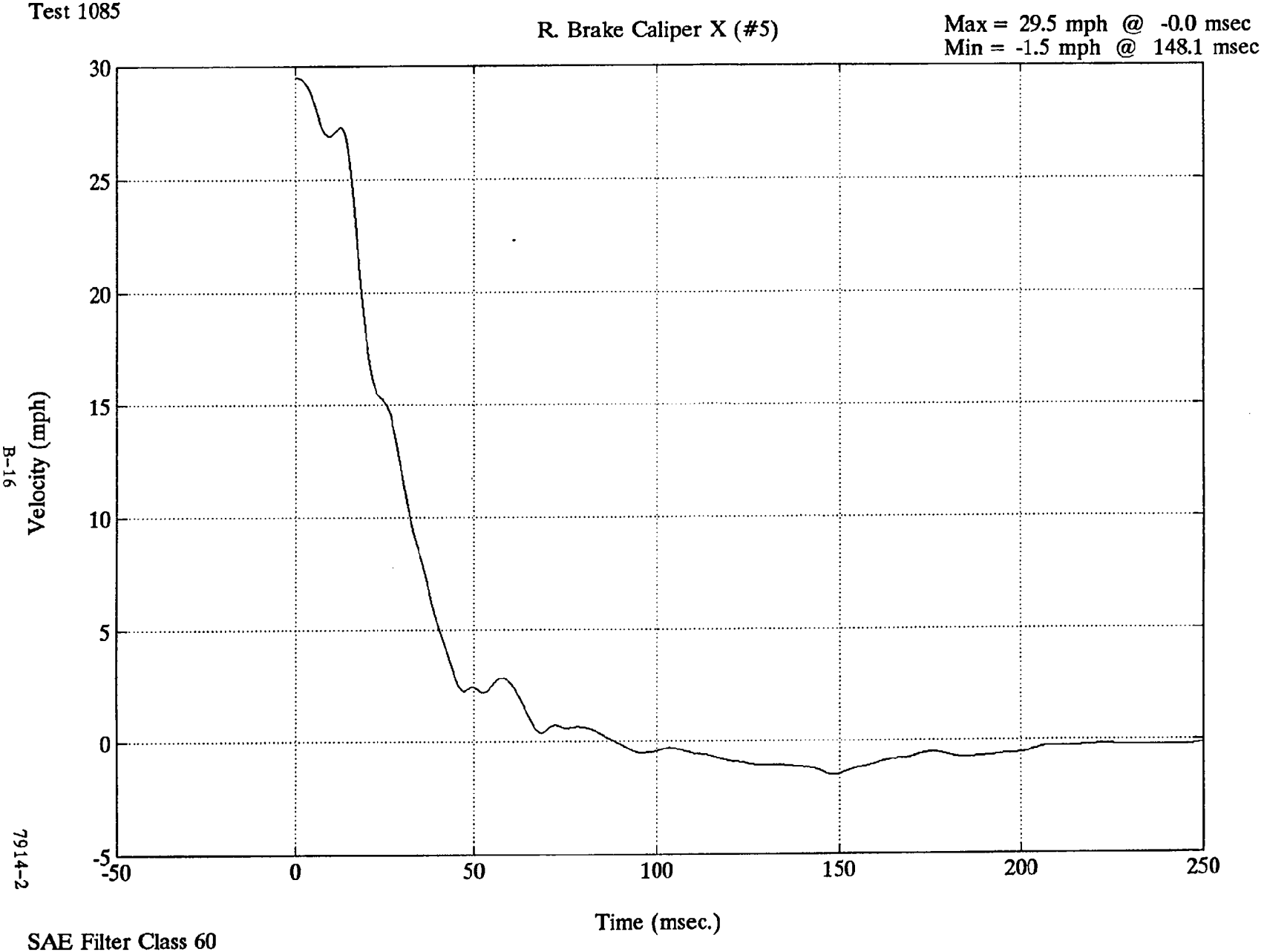
SAE Filter Class 60

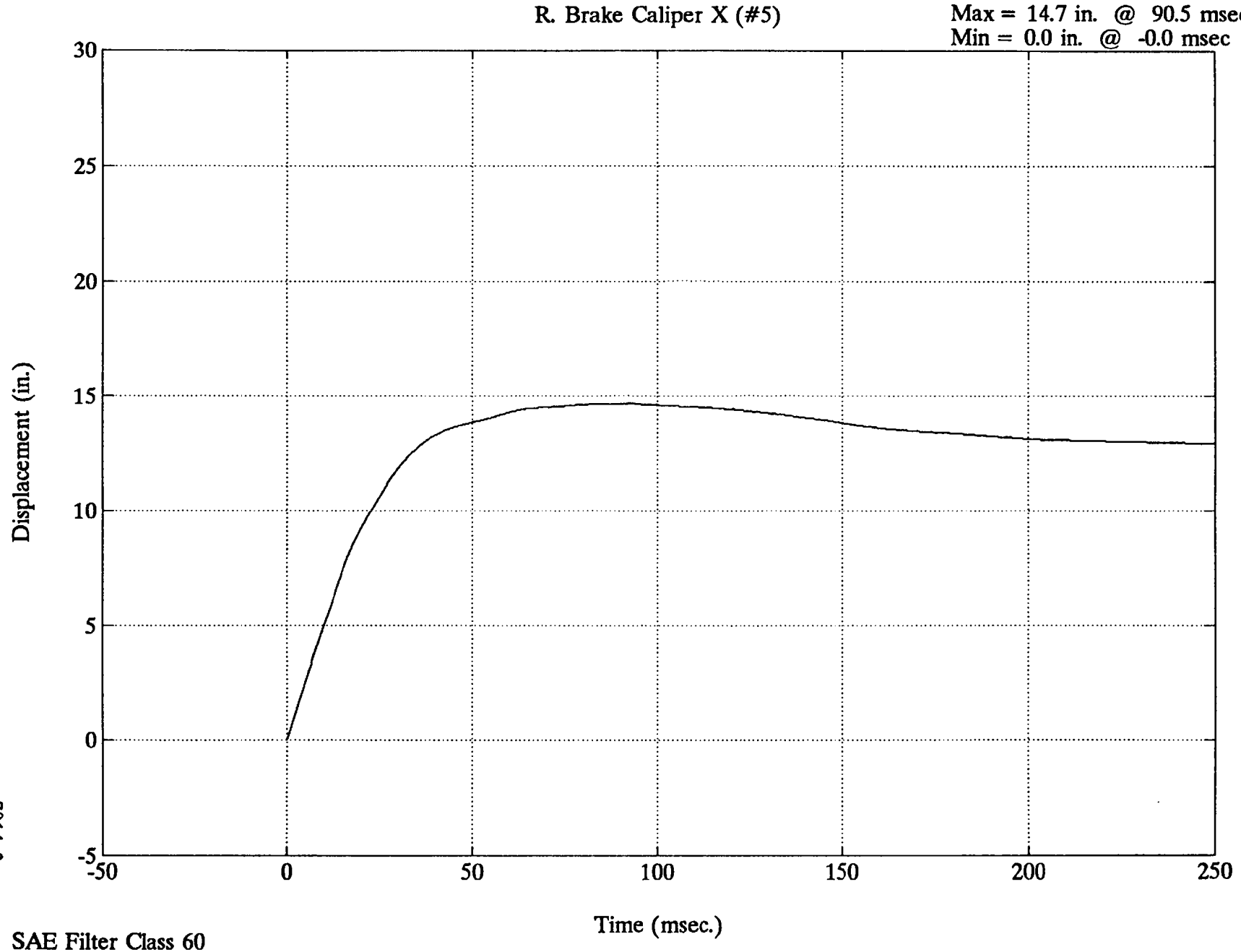
Test 1085



SAE Filter Class 60

7914-2

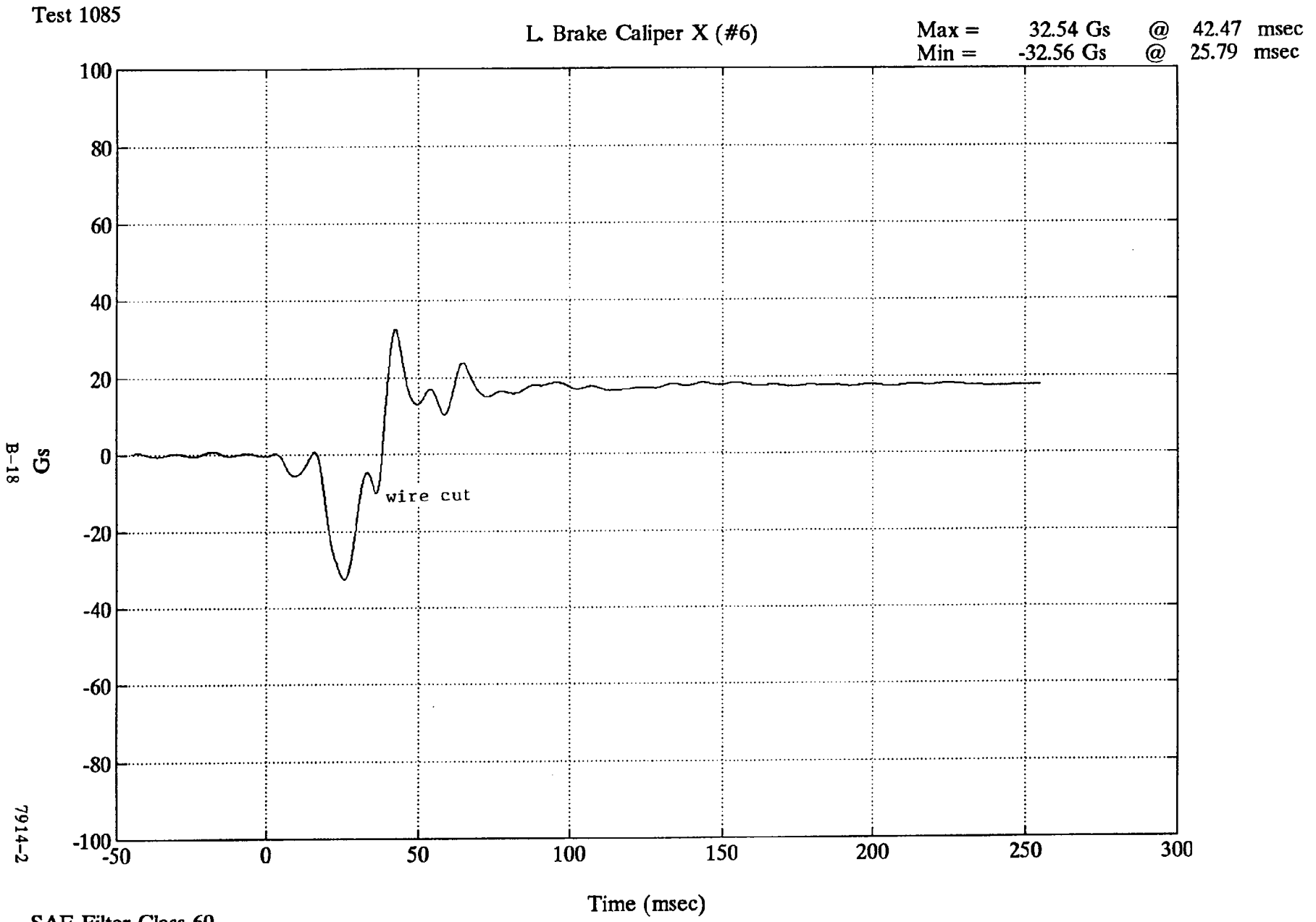
Test 1085



SAE Filter Class 60

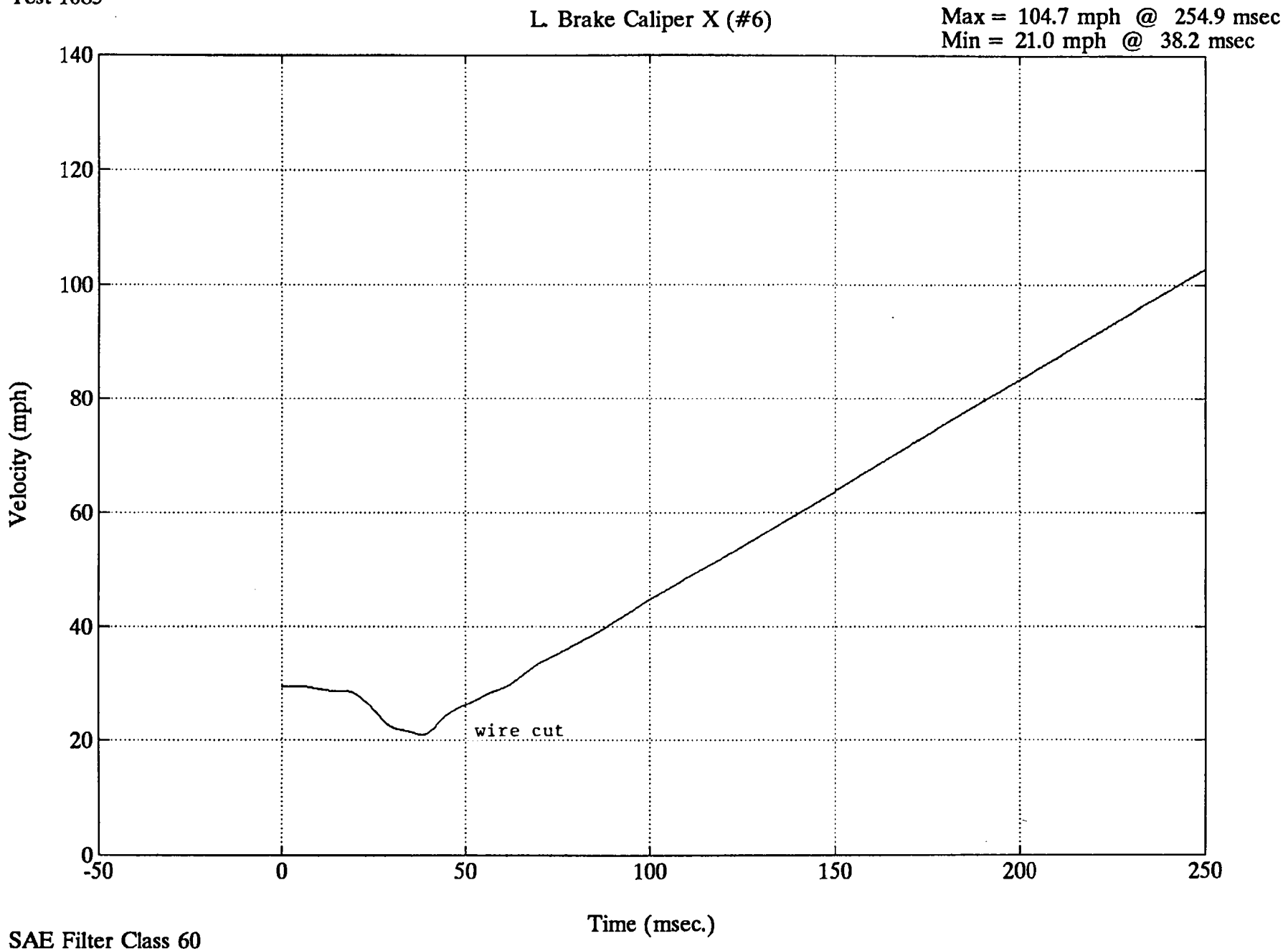
7914-2

Test 1085



SAE Filter Class 60

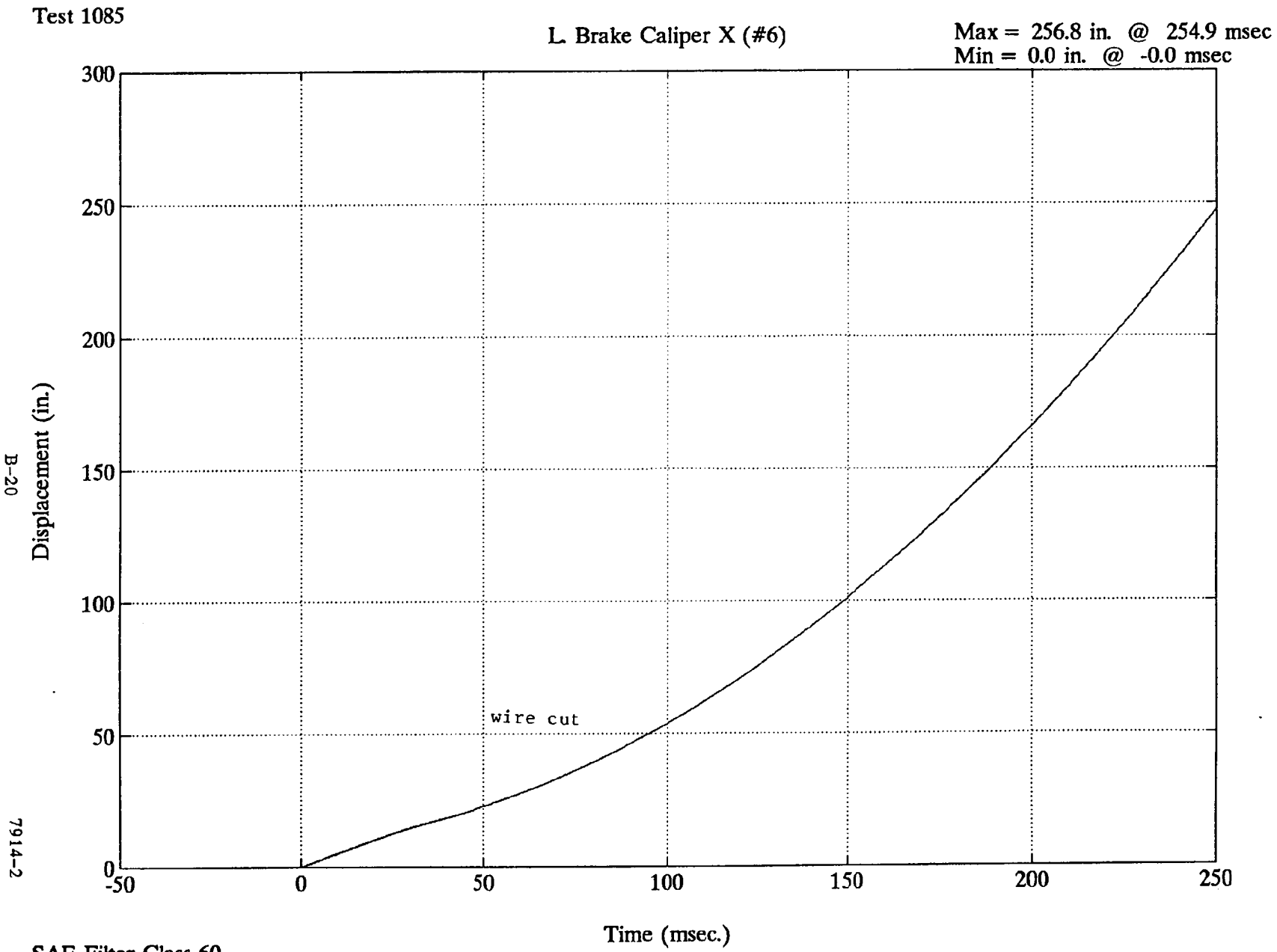
Test 1085



SAE Filter Class 60

7914-2

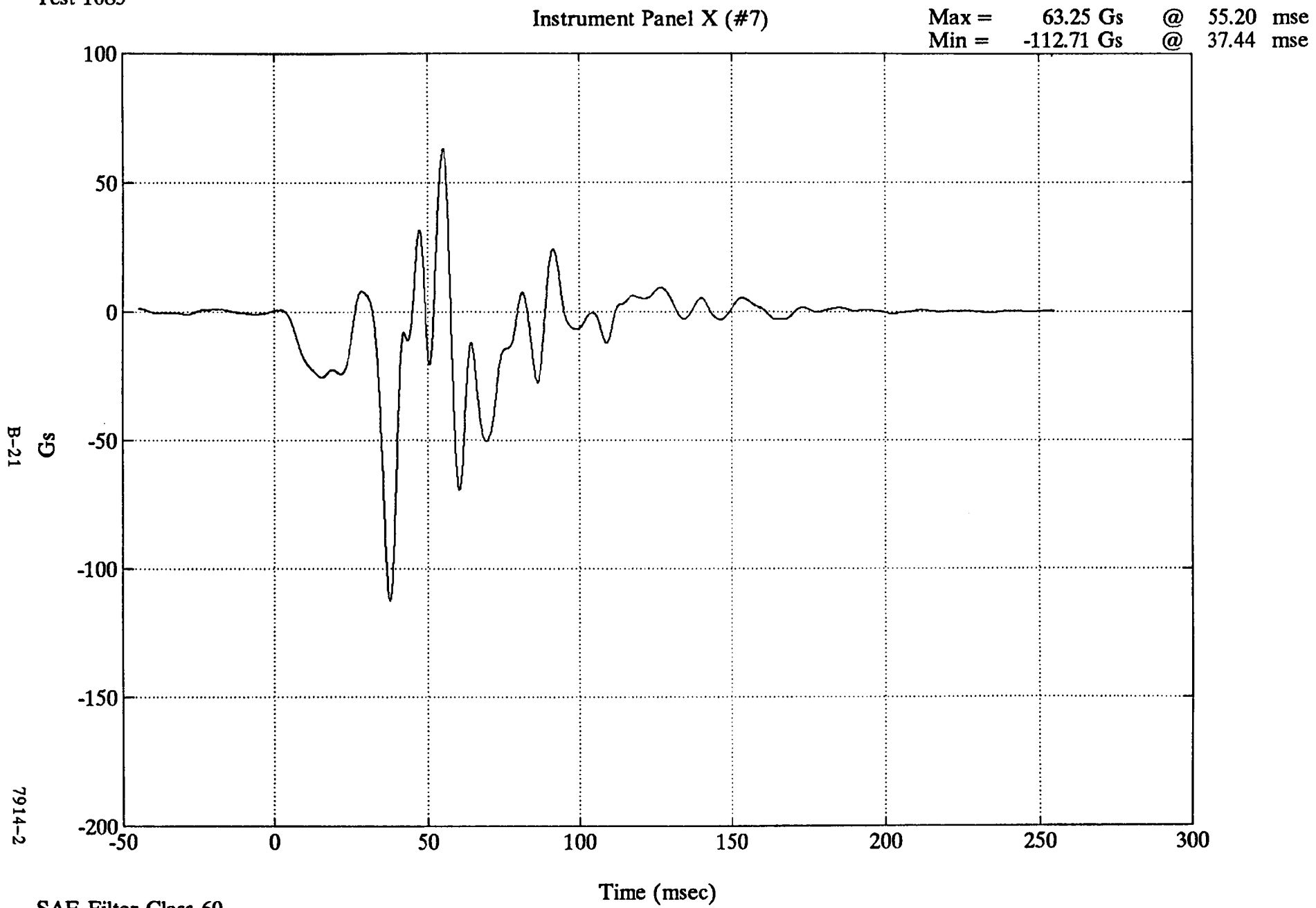
Test 1085



SAE Filter Class 60

7914-2

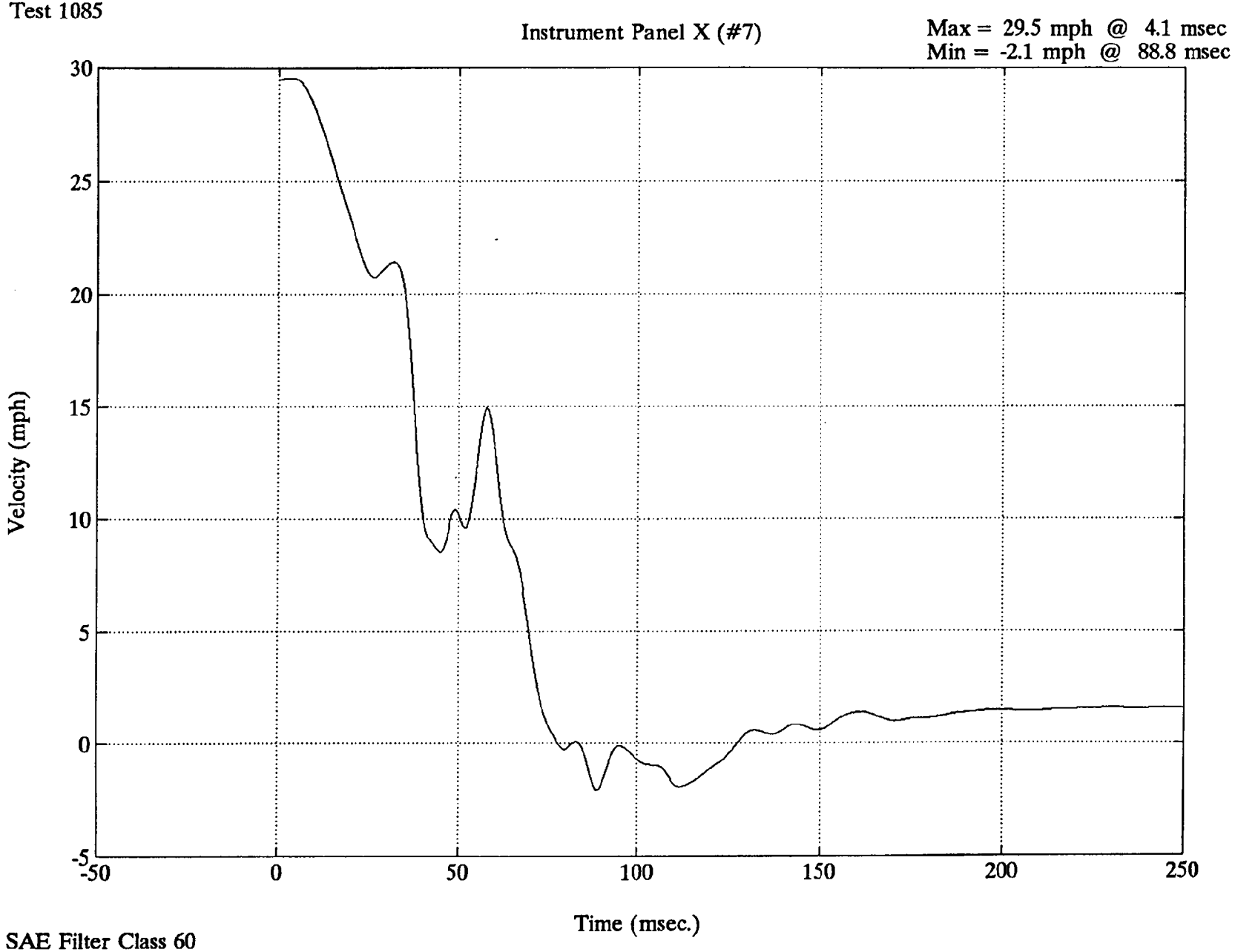
Test 1085



SAE Filter Class 60

7914-2

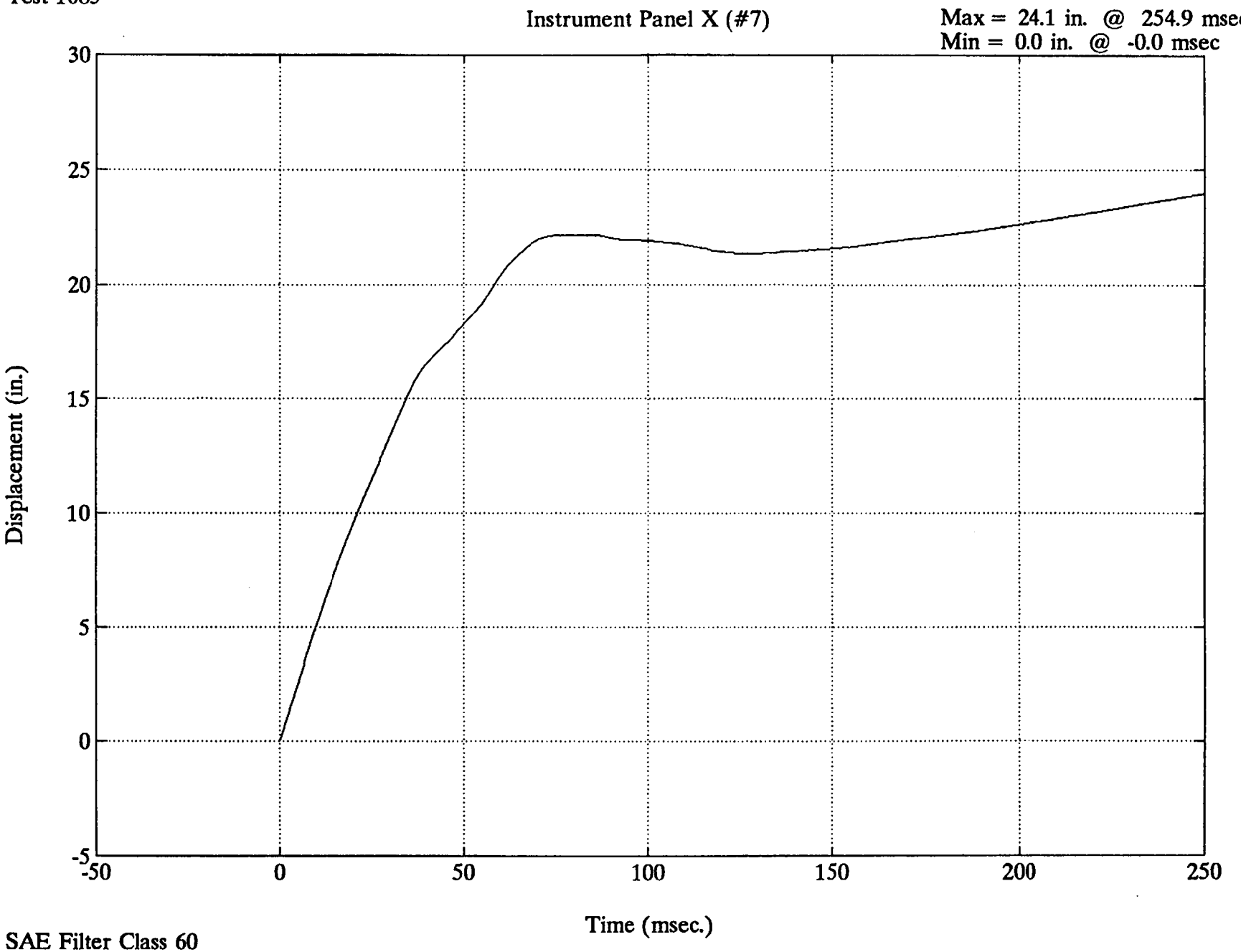
Test 1085



SAE Filter Class 60

7914-2

Test 1085



SAE Filter Class 60

7914-2

TEST NO. CM0205

DUMMY DATA	FILTER CHANNEL CLASS
Head Accelerations	1000
Chest Accelerations	180
Femur Forces	600

FACILITY: TRACK

RUN #: 1085 TEST TIME: 10:40:03
SERIES #: 12 BOARD: A

TITLE: NHTSA "208" TEST 12

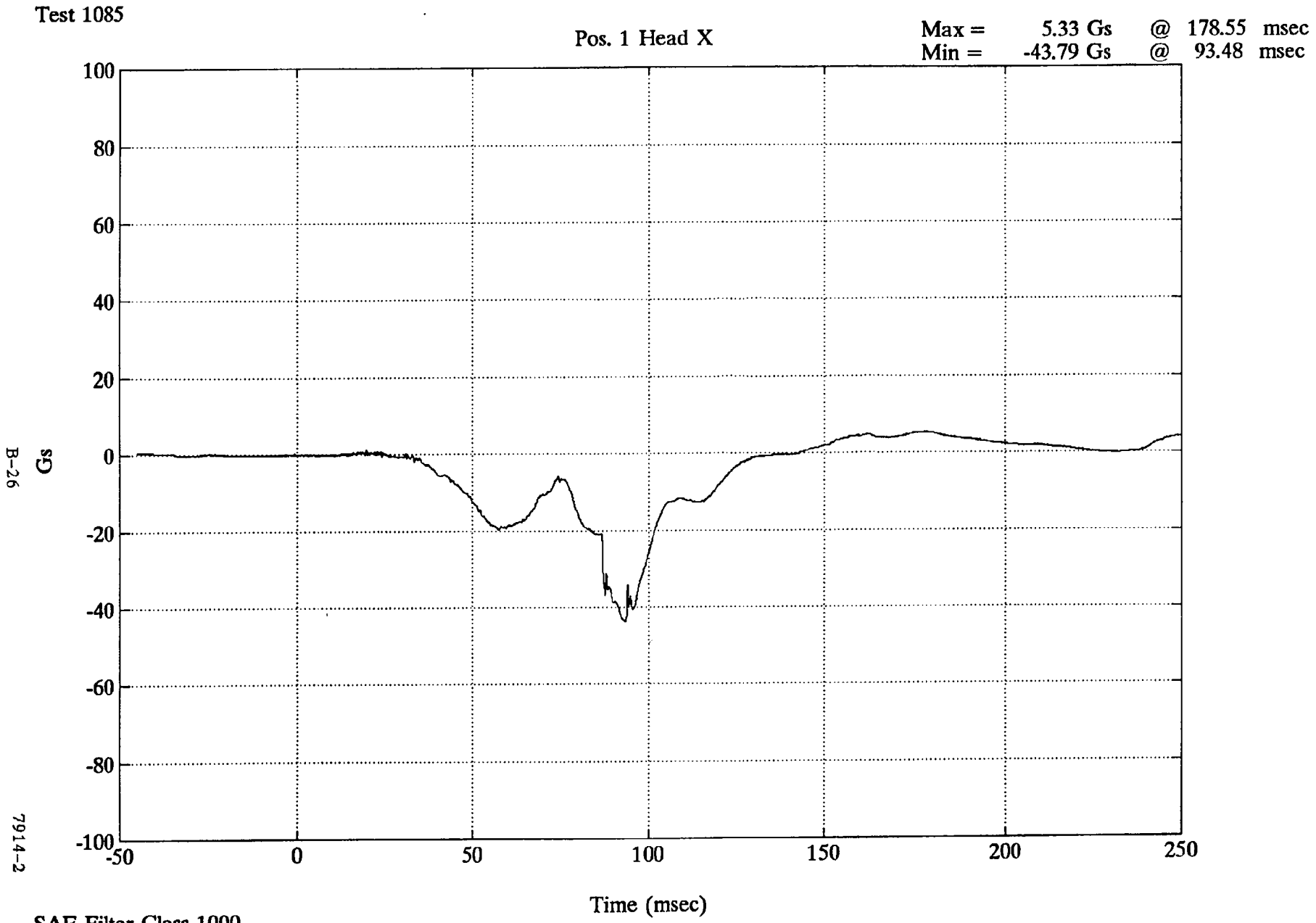
HIC SUMMARY: Pos. 1 Head Resultant

hic: 340.85
t1 = 62.880 msec
t2 = 98.760 msec
Average G's Over Hic Duration = 39.00

HIC SUMMARY: Pos. 2 Head Resultant

hic: 221.44
t1 = 57.000 msec
t2 = 92.880 msec
Average G's Over Hic Duration = 32.82

Test 1085



SAE Filter Class 1000

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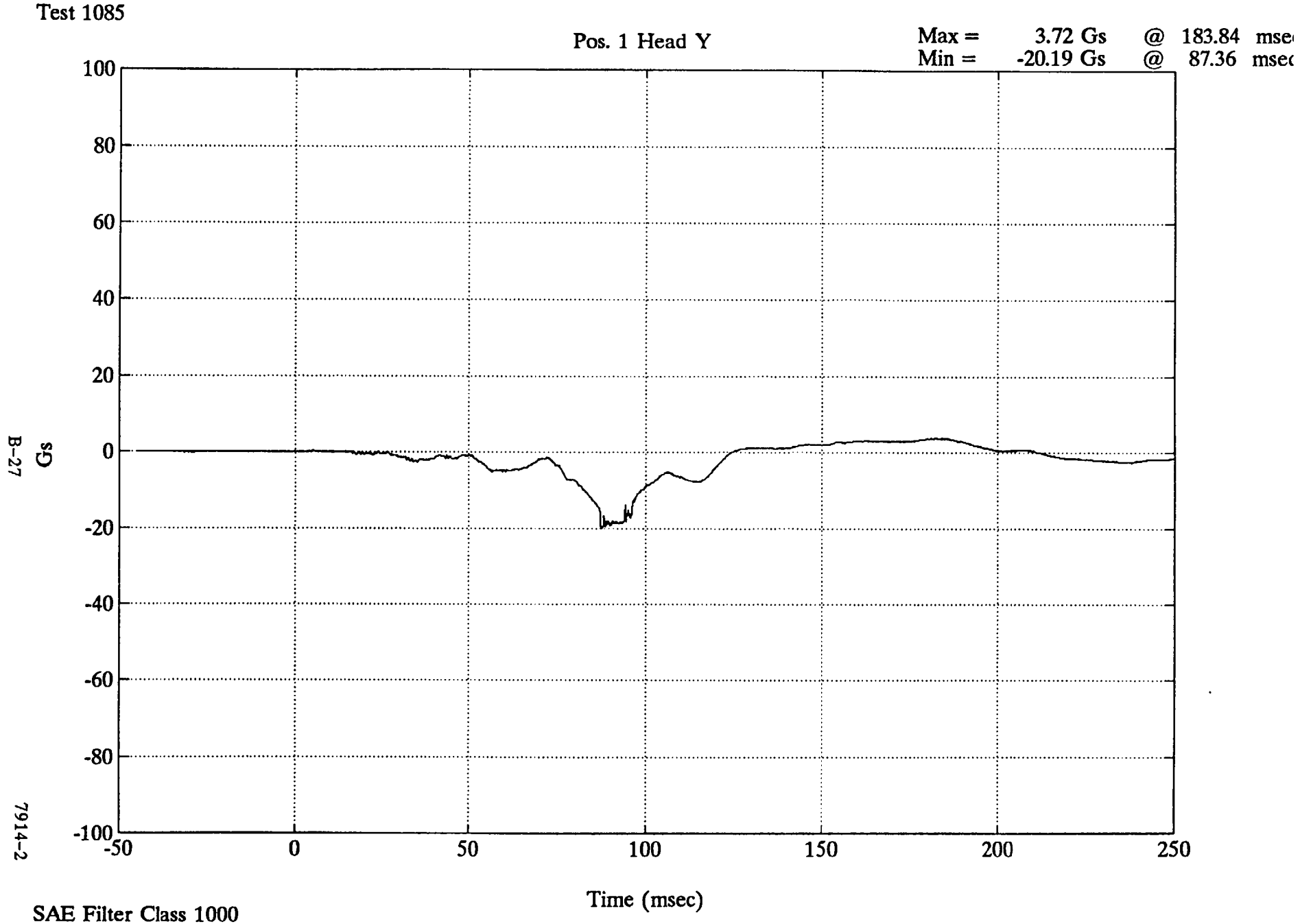
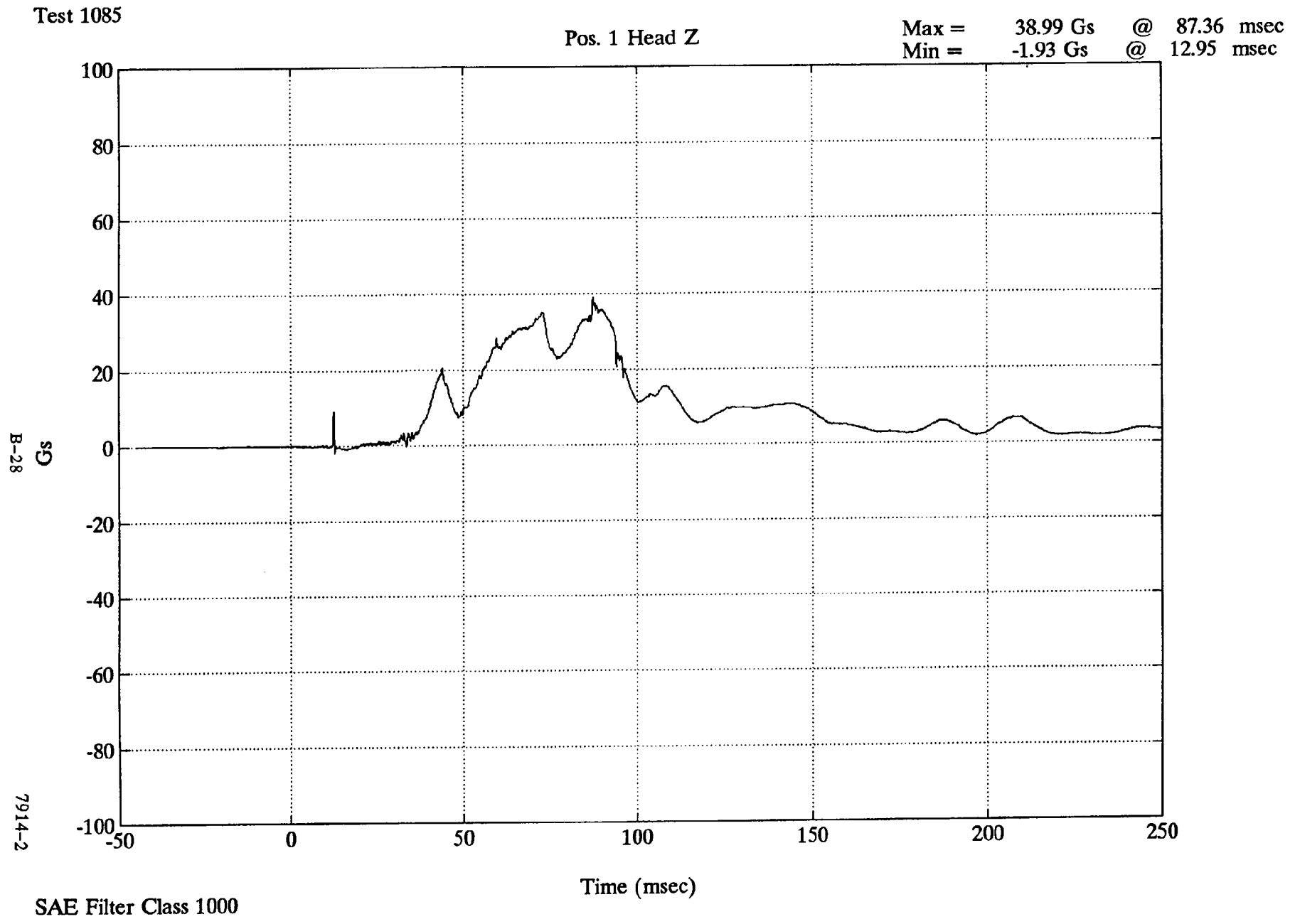
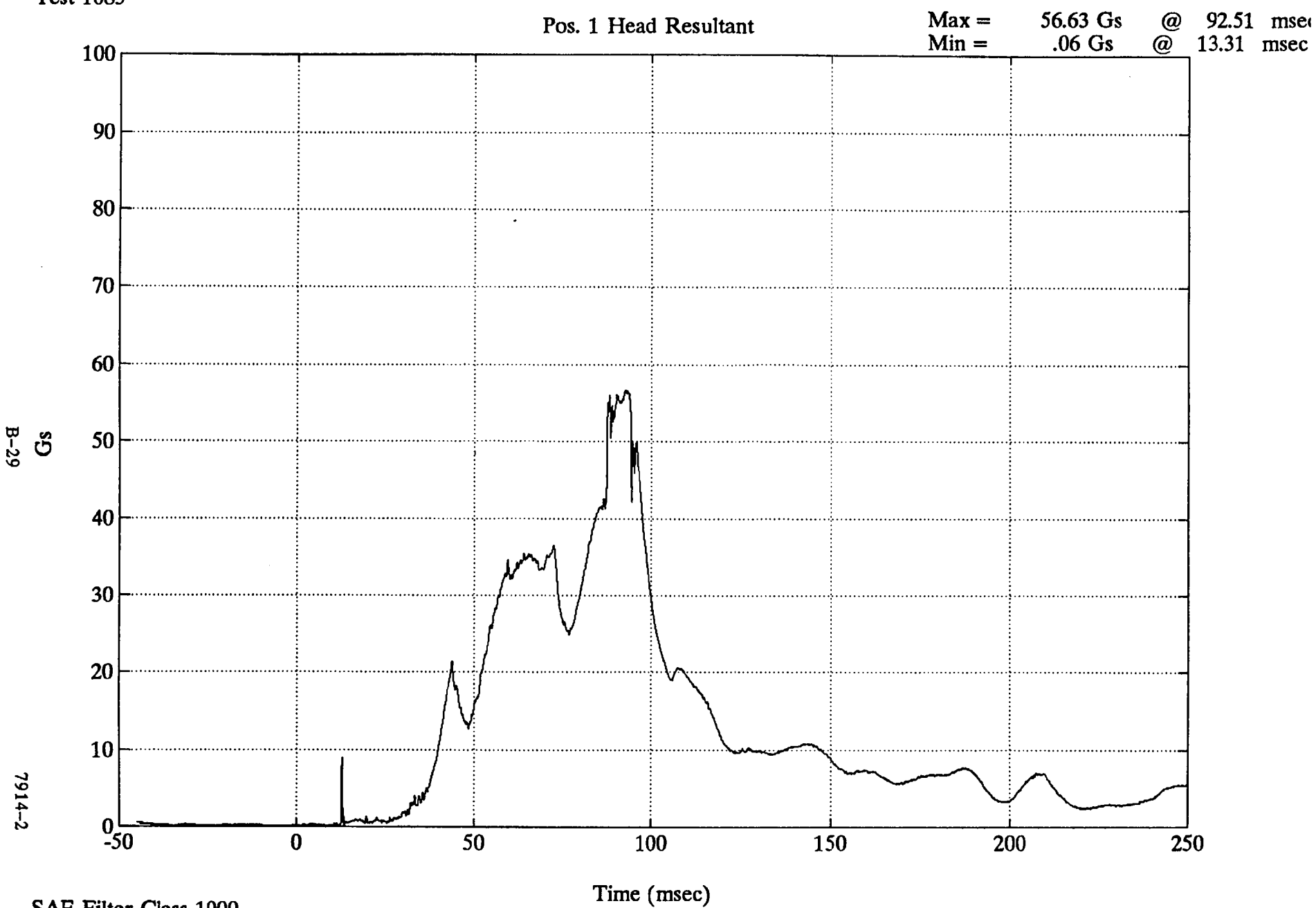
7914-2


Test 1085
Pos. 1 Head Y
Max = 3.72 Gs @ 183.84 msec
Min = -20.19 Gs @ 87.36 msec
100
80
60
40
20
0
-20
-40
-60
-80
-100
Gs
-50
0
50
100
150
200
250
Time (msec)
B-27
7914-2
SAE Filter Class 1000


Test 1085
Pos. 1 Head Z
Max = 38.99 Gs @ 87.36 msec
Min = -1.93 Gs @ 12.95 msec
100
80
60
40
20
0
-20
-40
-60
-80
-100
Gs
-50
0
50
100
150
200
250
Time (msec)
B-28
7914-2
SAE Filter Class 1000

Test 1085



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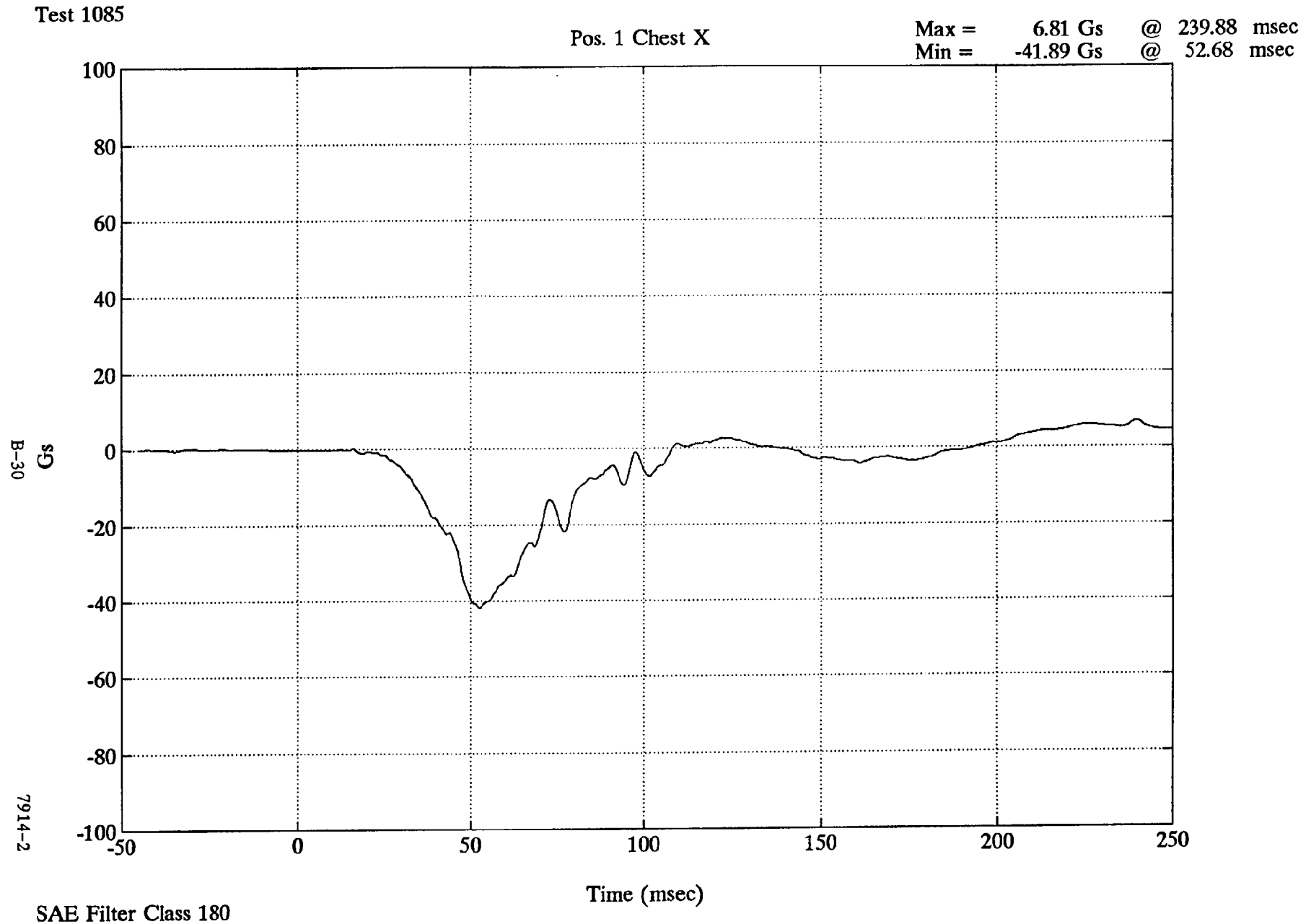
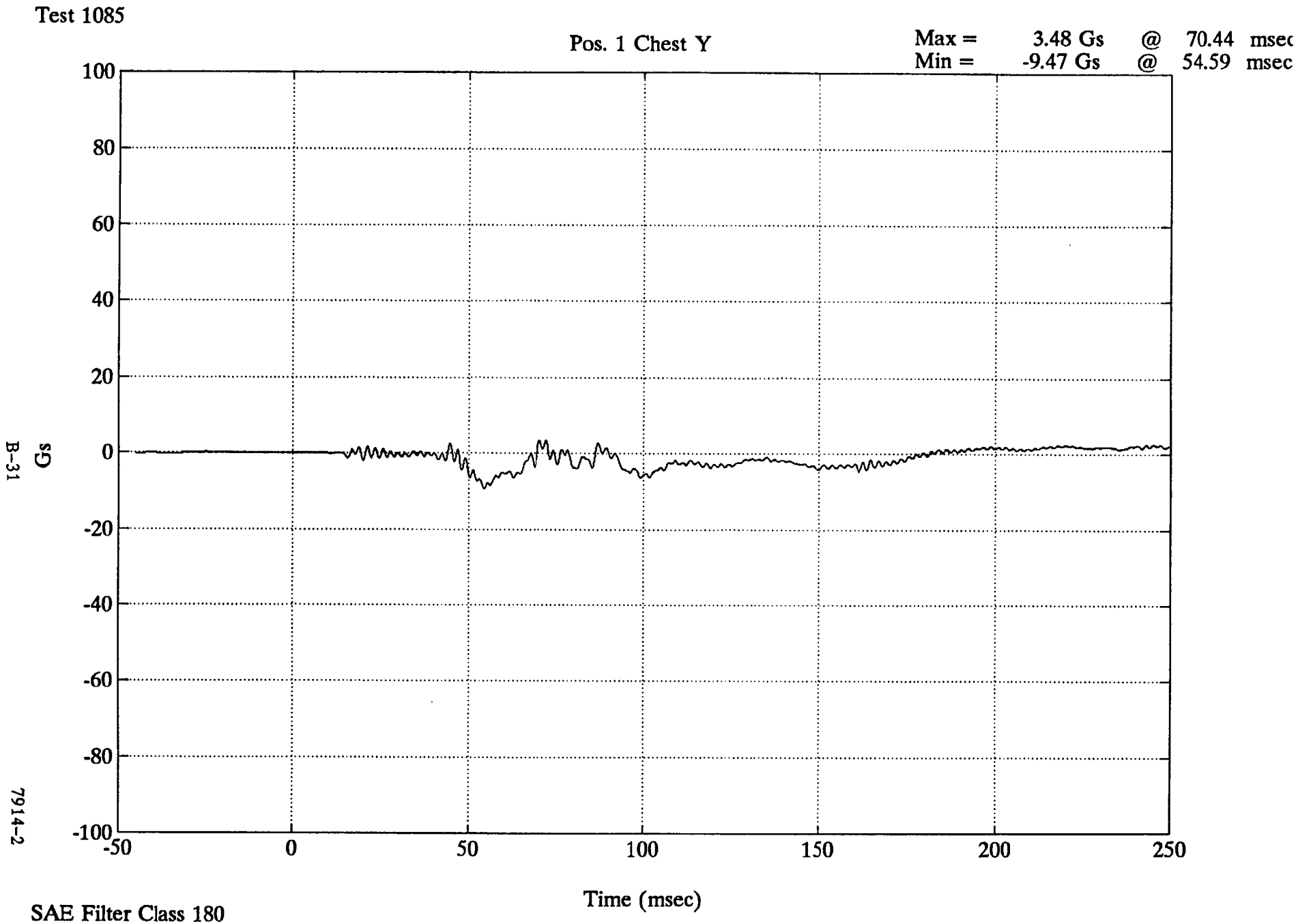
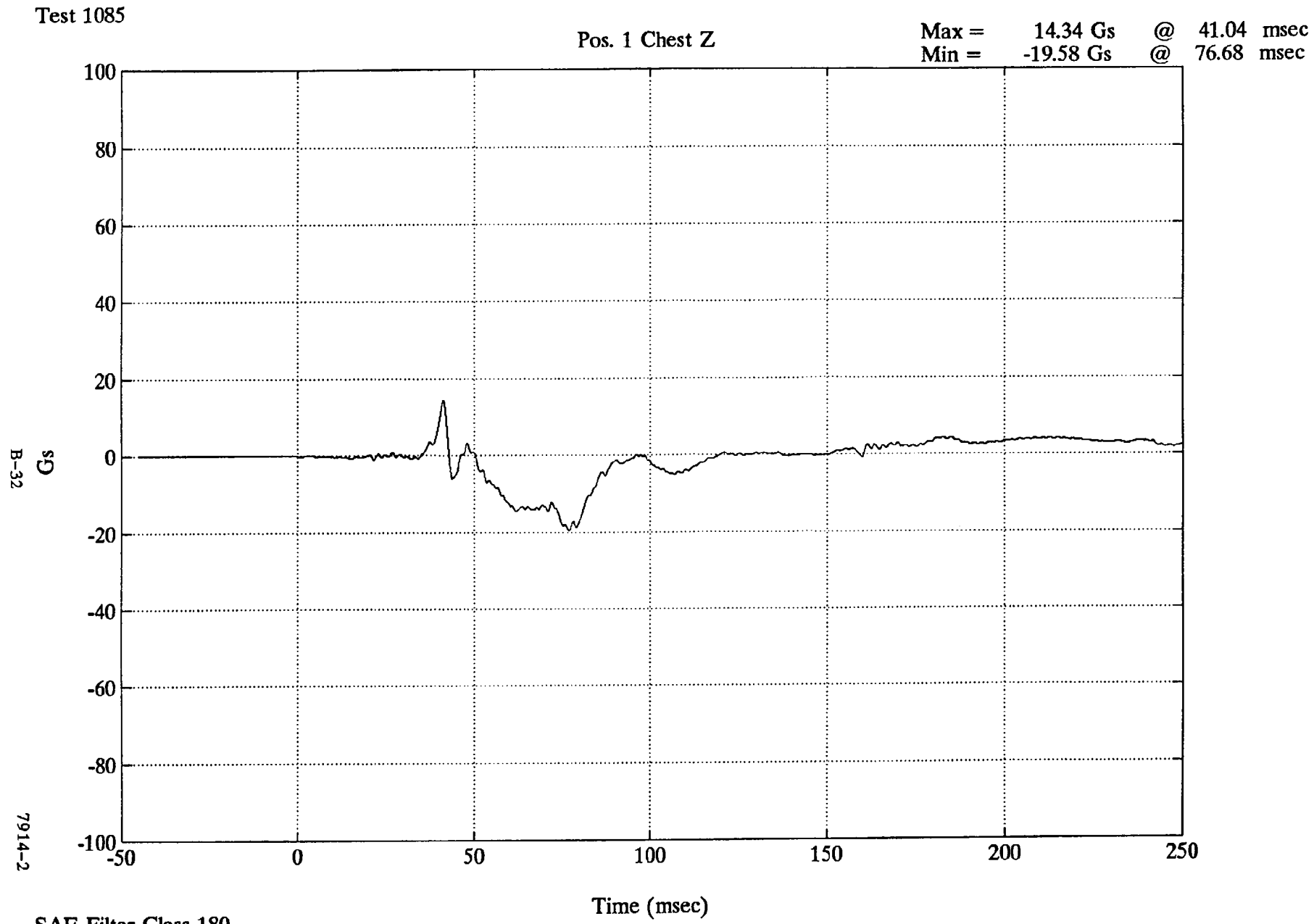
7914-2

SAE Filter Class 1000


Test 1085
Pos. 1 Chest X
Max = 6.81 Gs @ 239.88 msec
Min = -41.89 Gs @ 52.68 msec
100
80
60
40
20
0
-20
-40
-60
-80
-100
Gs
B-30
7914-2
-50
0
50
100
150
200
250
Time (msec)
SAE Filter Class 180

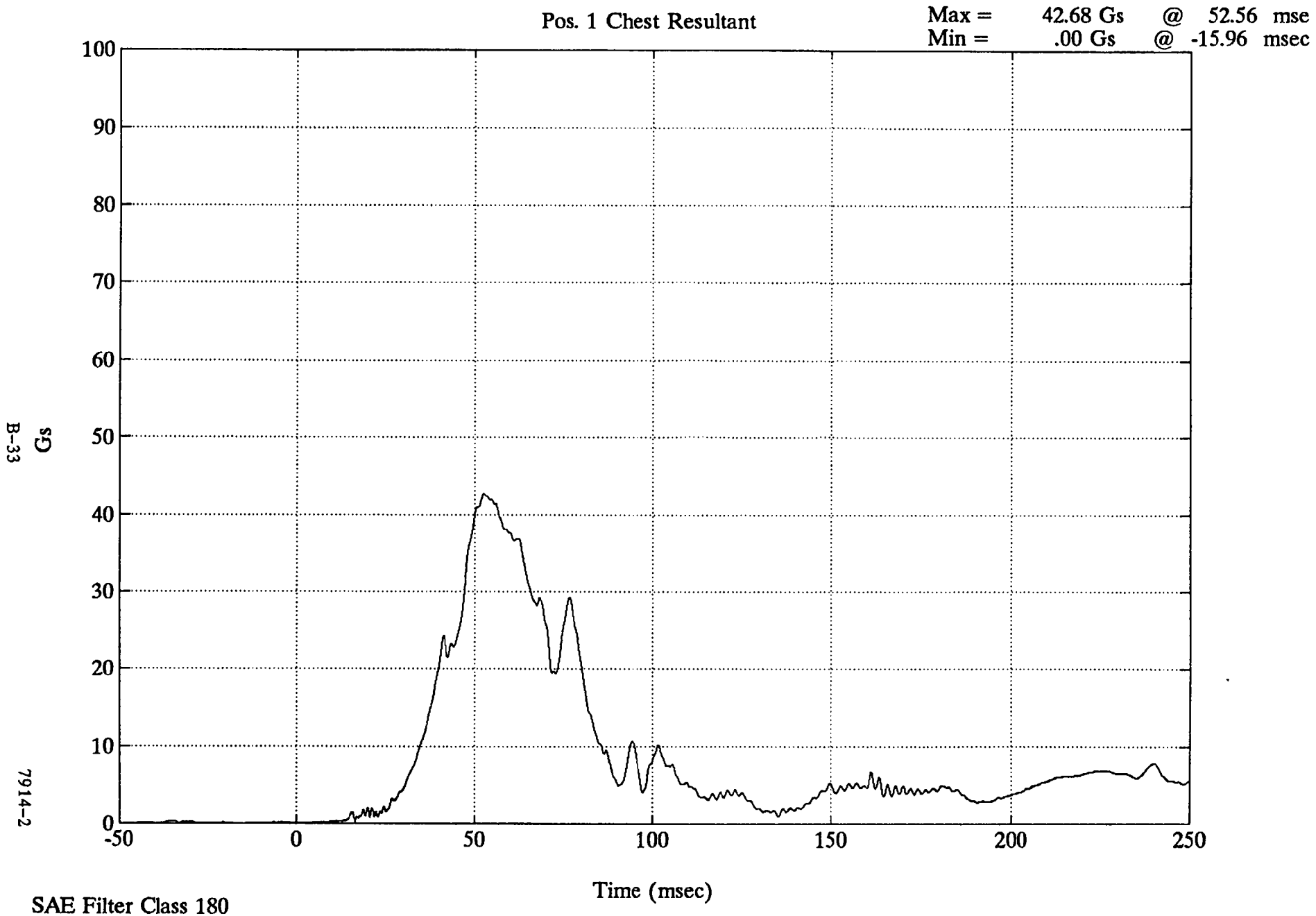

Test 1085
Pos. 1 Chest Y
Max = 3.48 Gs @ 70.44 msec
Min = -9.47 Gs @ 54.59 msec
100
80
60
40
20
0
-20
-40
-60
-80
-100
Gs
-50
0
50
100
150
200
250
Time (msec)
B-31
7914-2
SAE Filter Class 180

Test 1085

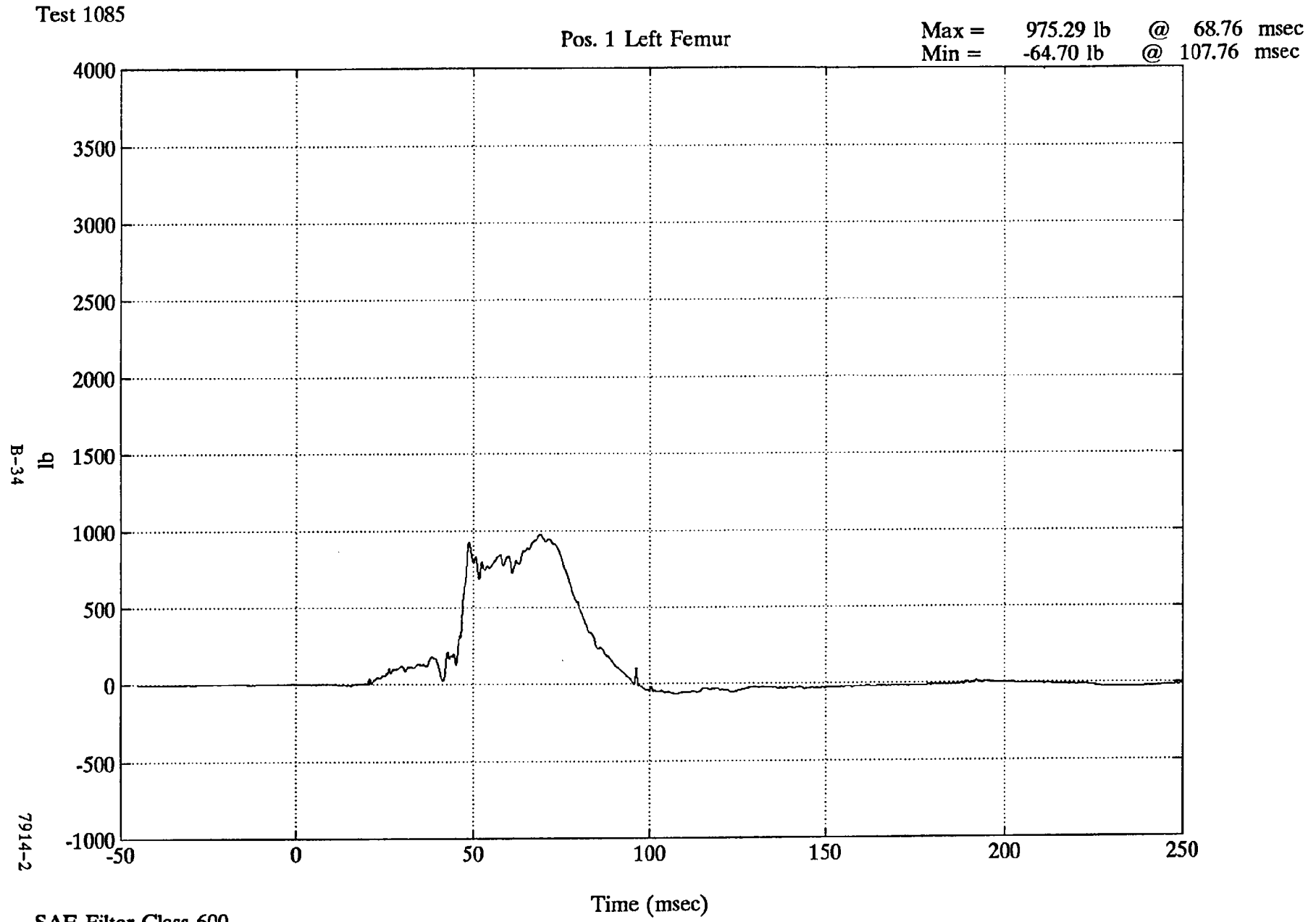


SAE Filter Class 180

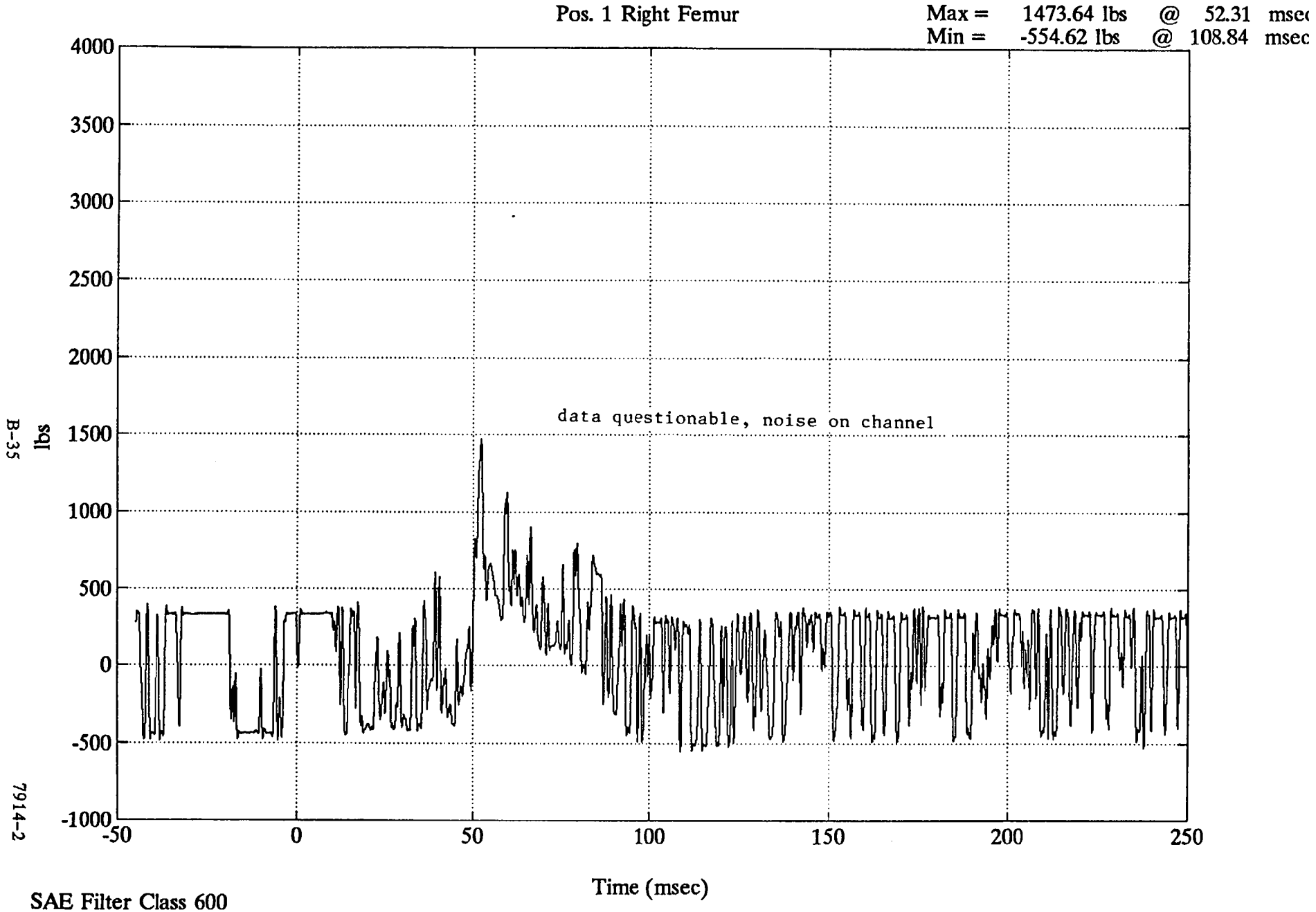
Test 1085



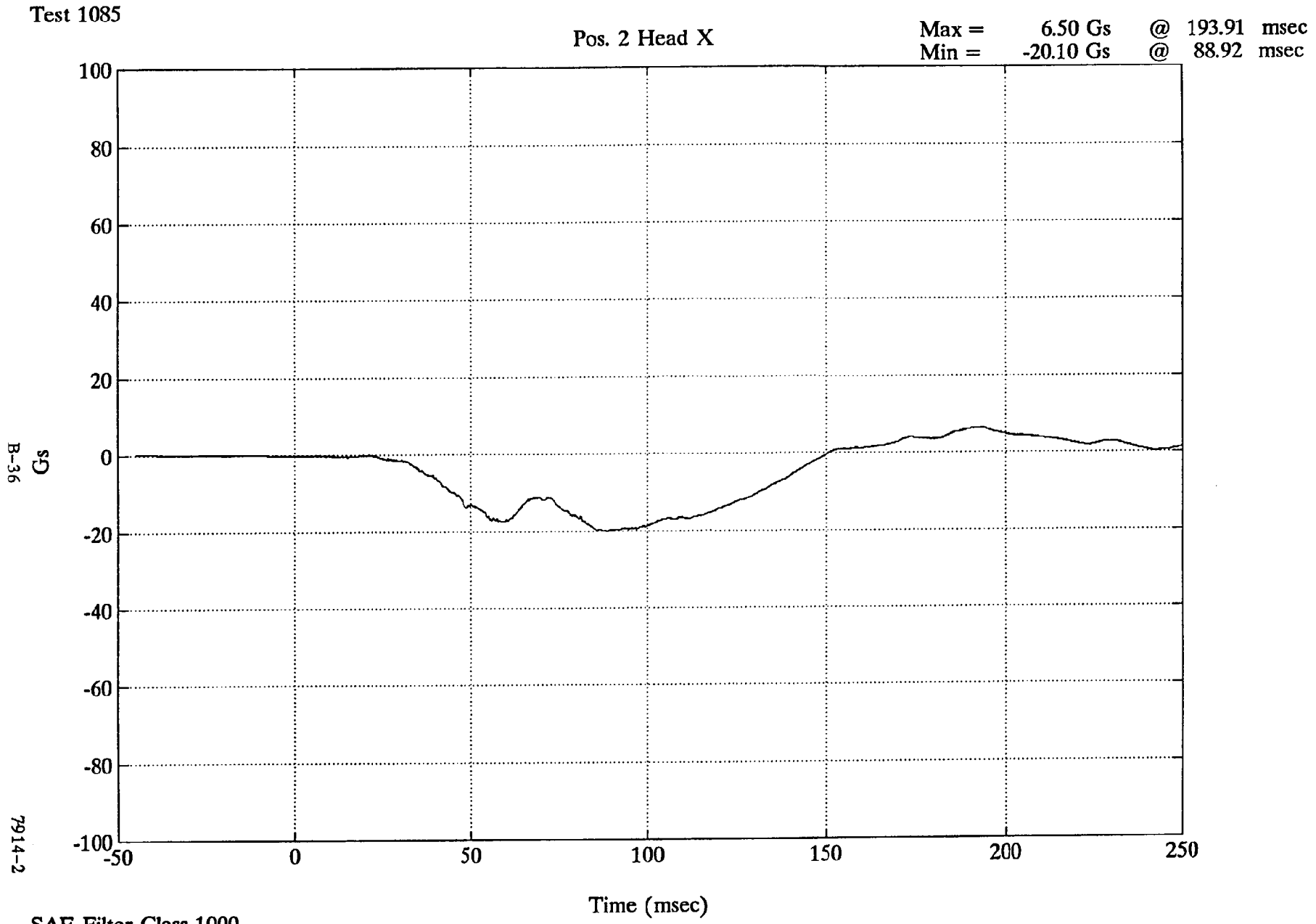
SAE Filter Class 180


Test 1085
Pos. 1 Left Femur
Max = 975.29 lb @ 68.76 msec
Min = -64.70 lb @ 107.76 msec
4000
3500
3000
2500
2000
1500
1000
500
0
-500
-1000
lb
-50
0
50
100
150
200
250
Time (msec)
SAE Filter Class 600
B-34
7914-2

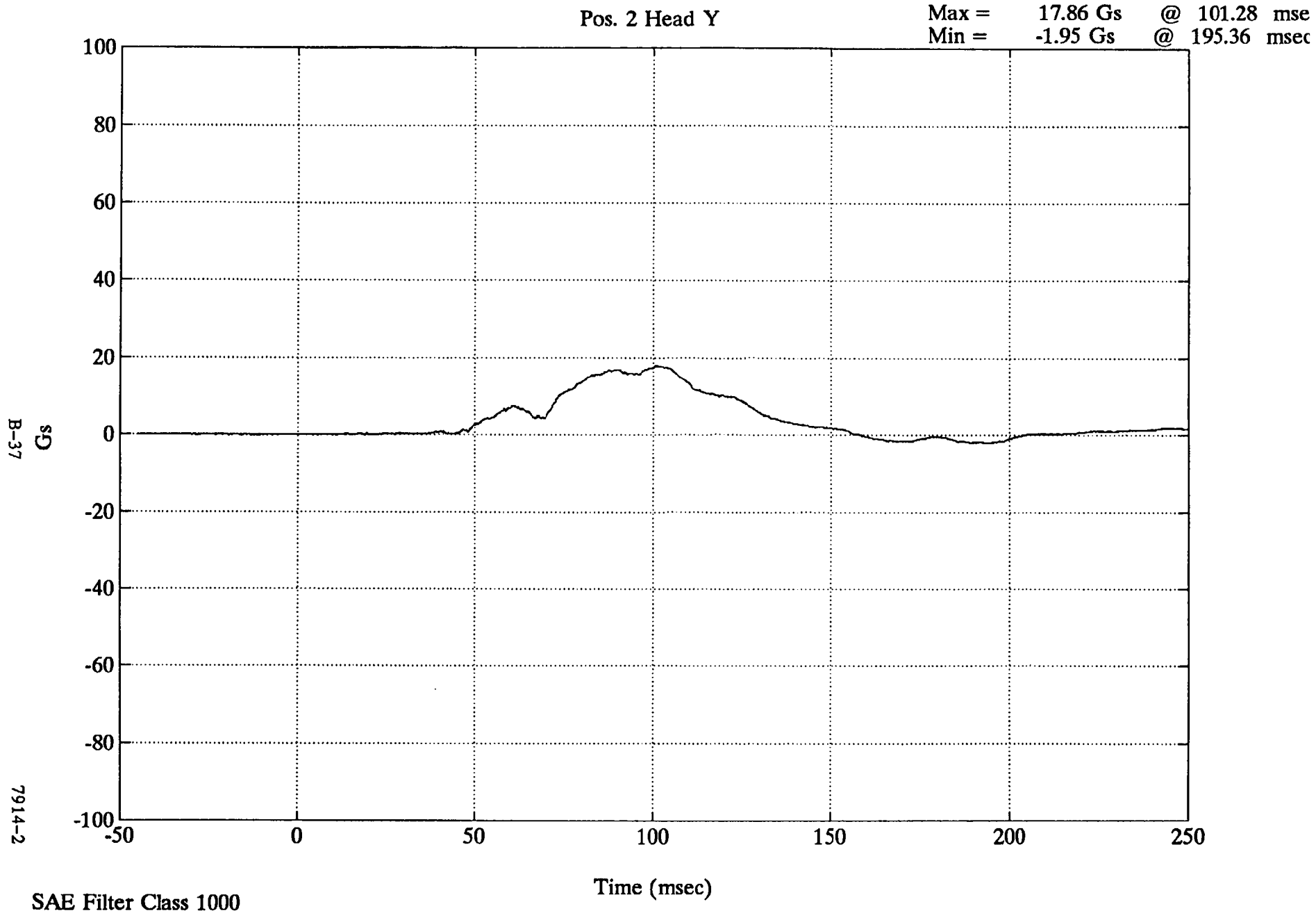
Test 1085



SAE Filter Class 600

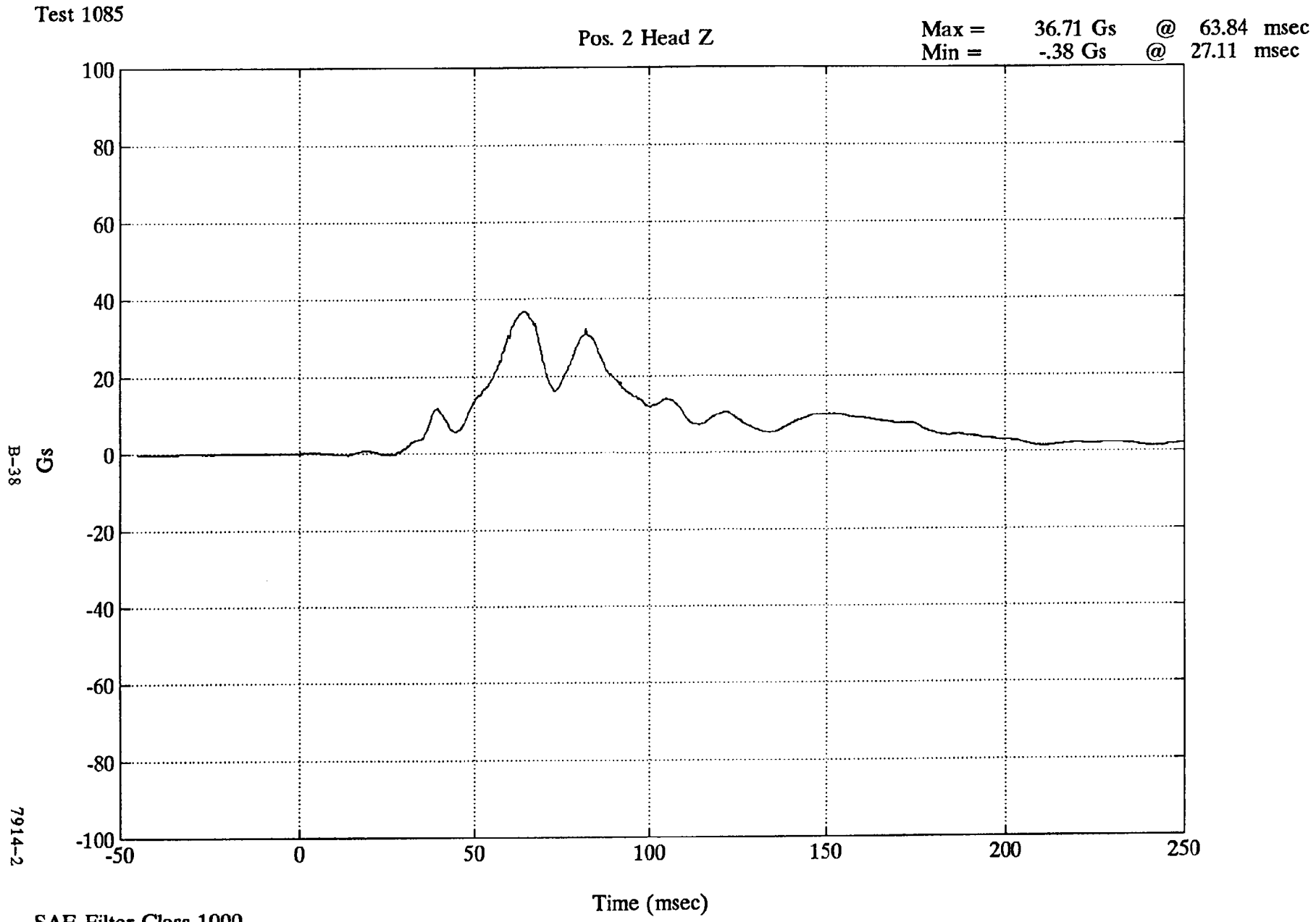

Test 1085
Pos. 2 Head X
Max = 6.50 Gs @ 193.91 msec
Min = -20.10 Gs @ 88.92 msec
100
80
60
40
20
0
-20
-40
-60
-80
-100
Gs
-50
0
50
100
150
200
250
Time (msec)
SAE Filter Class 1000
B-36
7914-2

Test 1085



SAE Filter Class 1000

Test 1085



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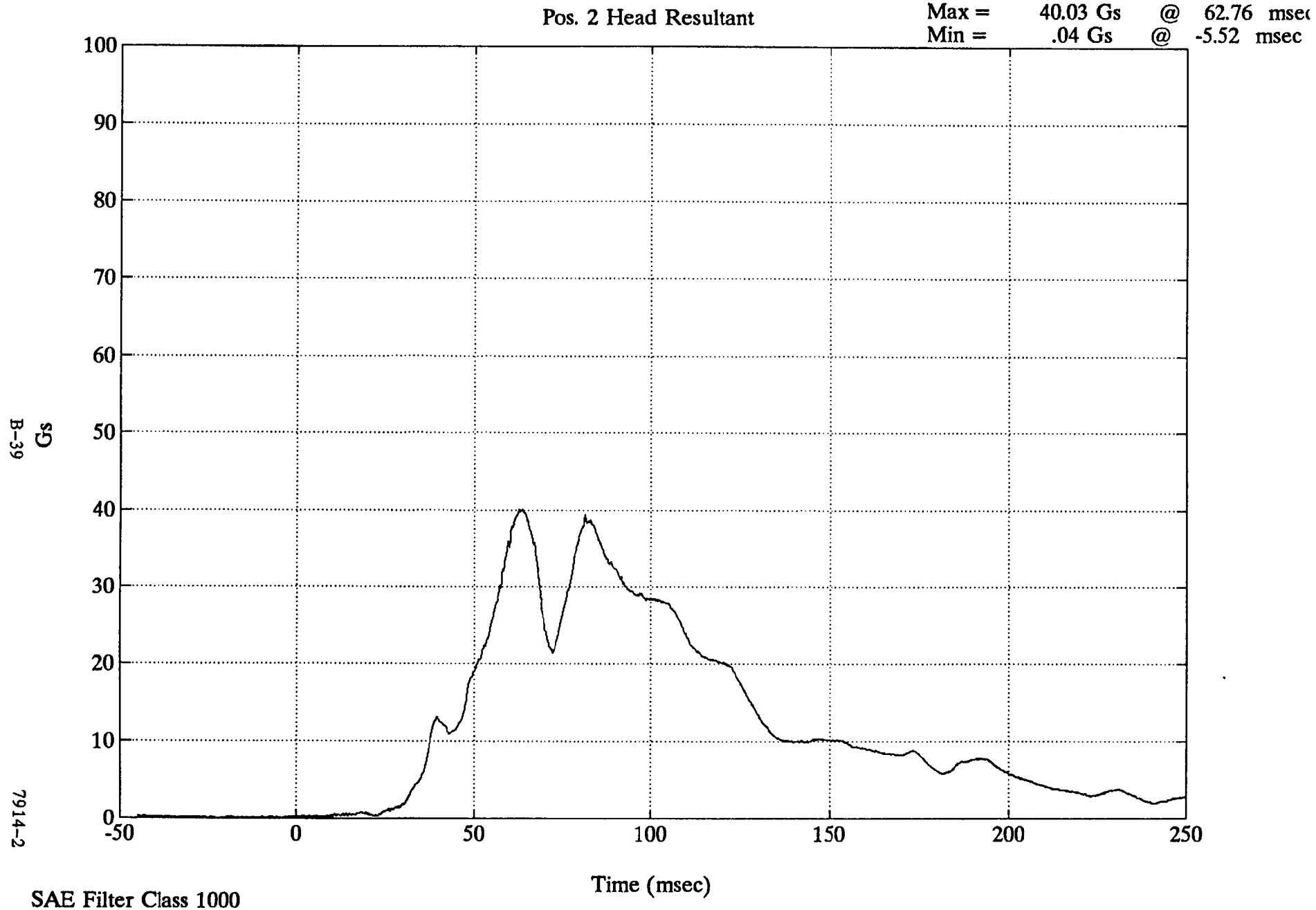
7914-2

SAE Filter Class 1000

Test 1085



SAE Filter Class 1000

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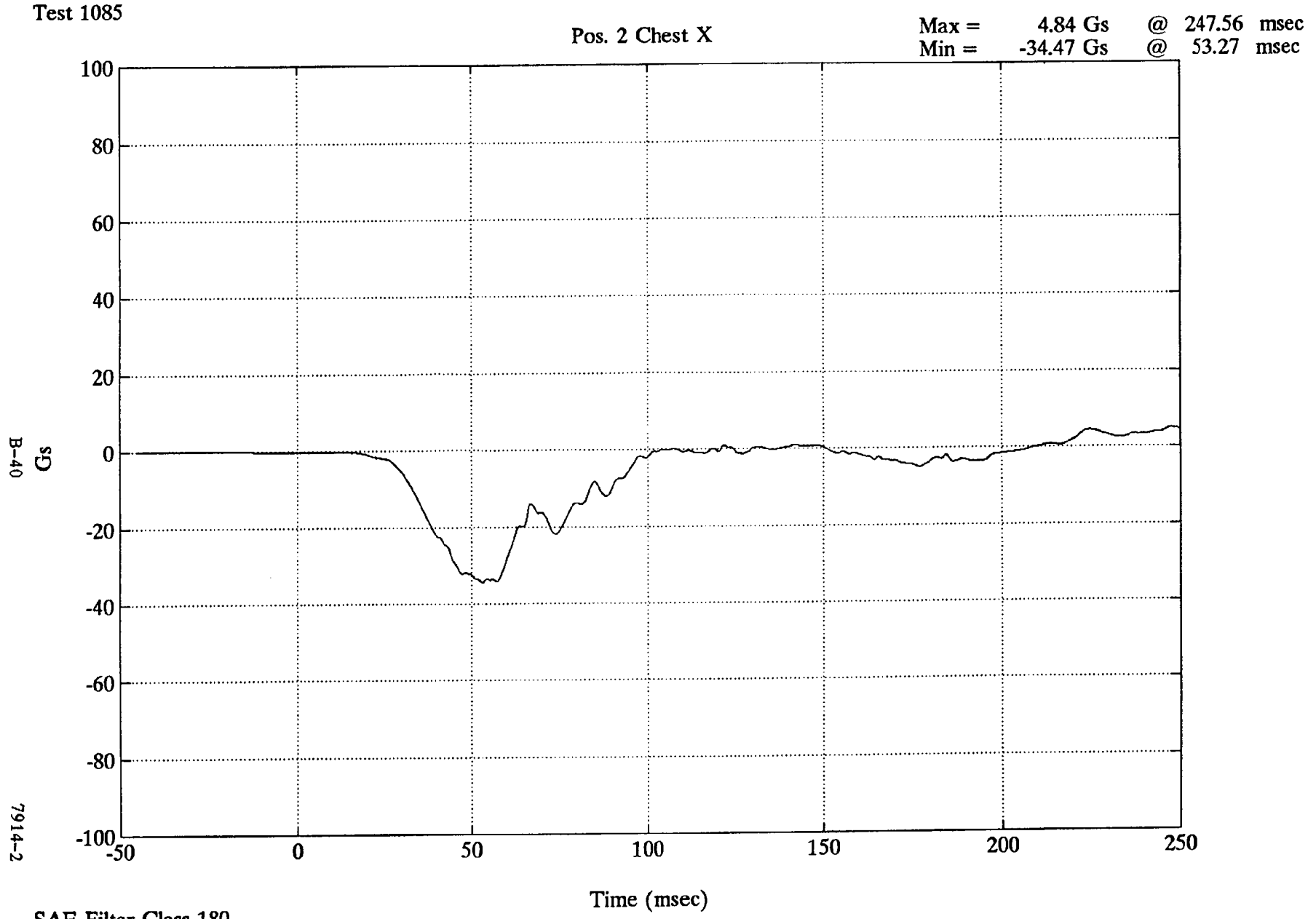
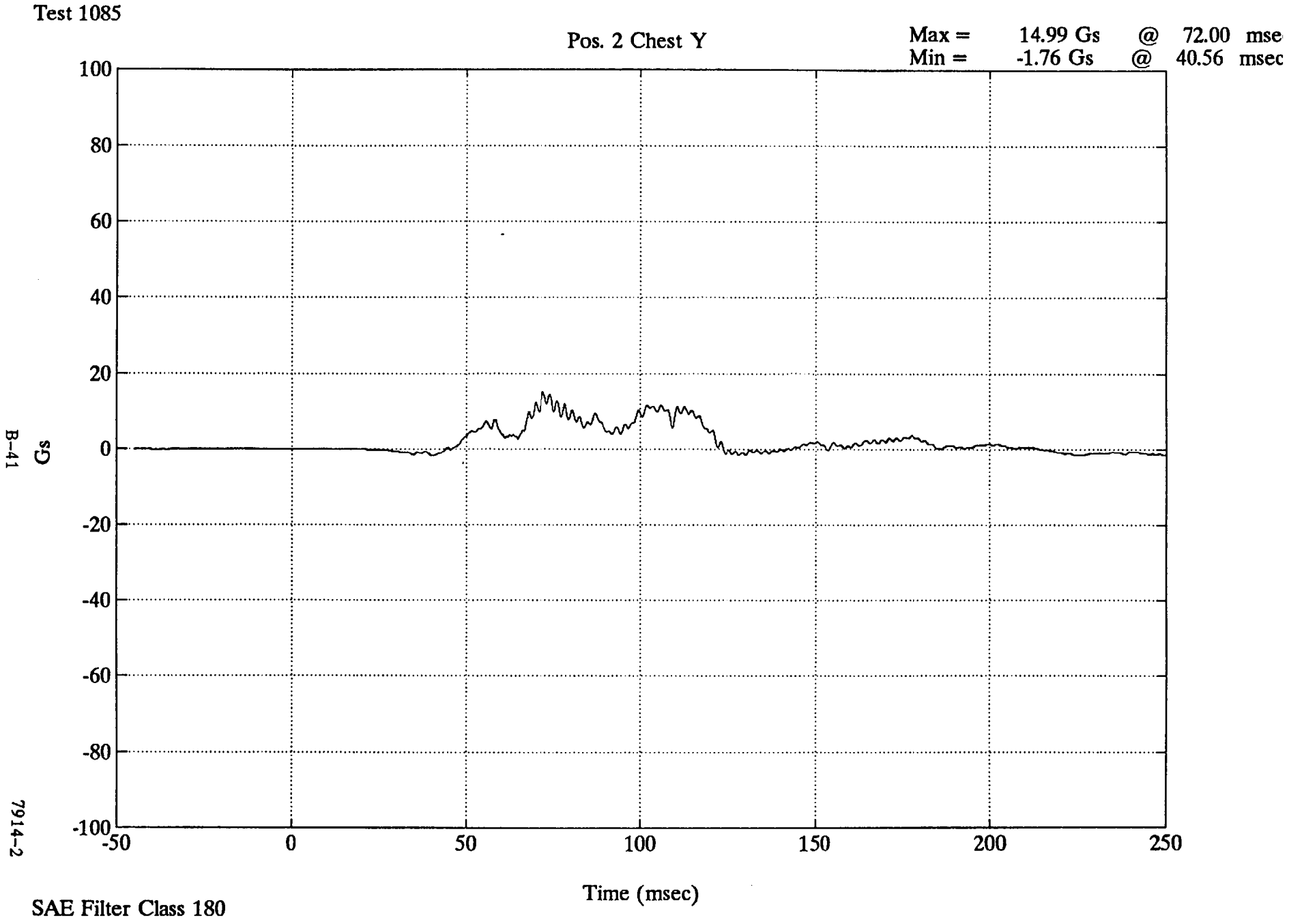
7914-2

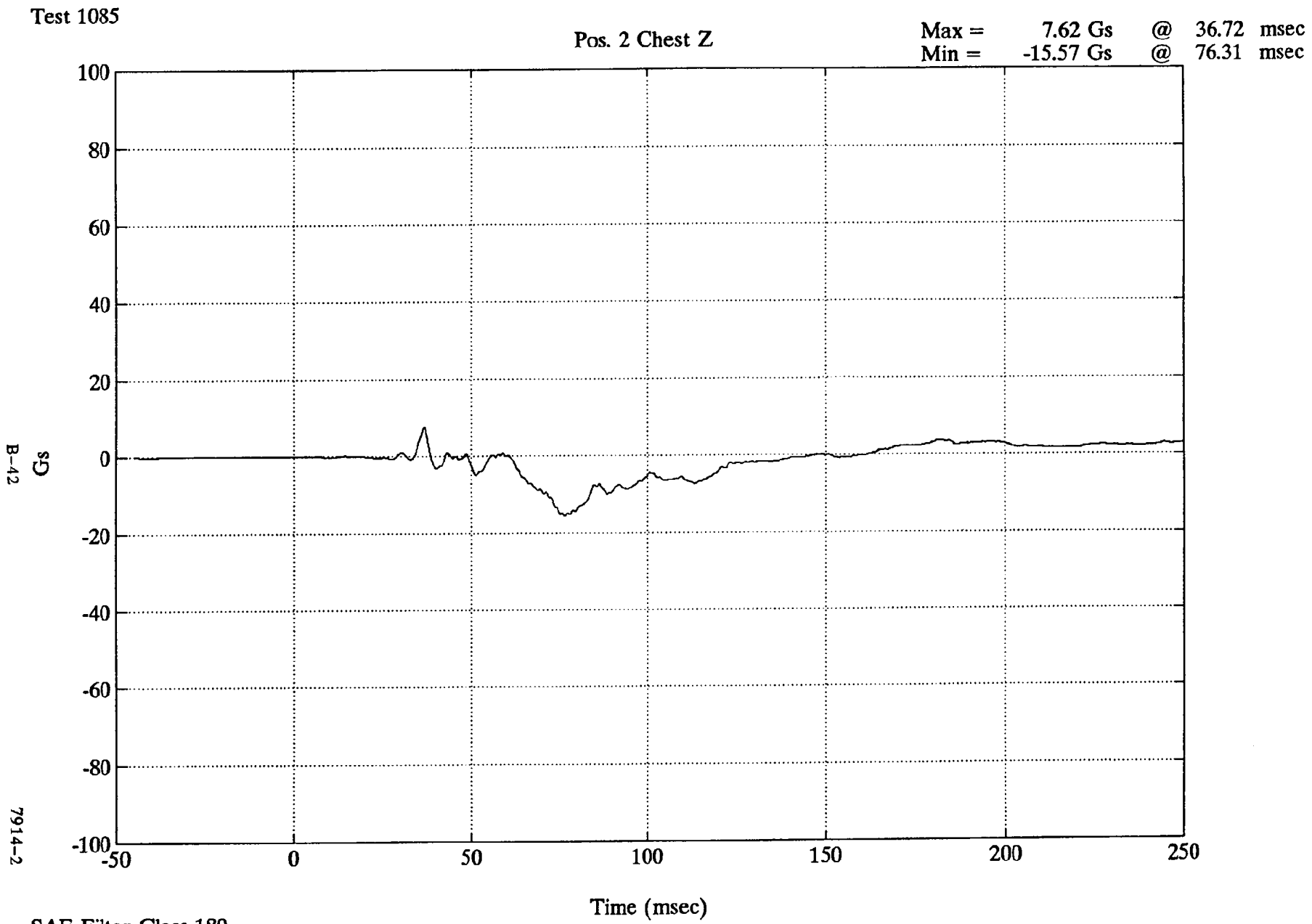
Test 1085



SAE Filter Class 180


Test 1085
Pos. 2 Chest Y
Max = 14.99 Gs @ 72.00 mse
Min = -1.76 Gs @ 40.56 msec
100
80
60
40
20
0
-20
-40
-60
-80
-100
Gs
-50
0
50
100
150
200
250
Time (msec)
B-41
7914-2
SAE Filter Class 180

Test 1085



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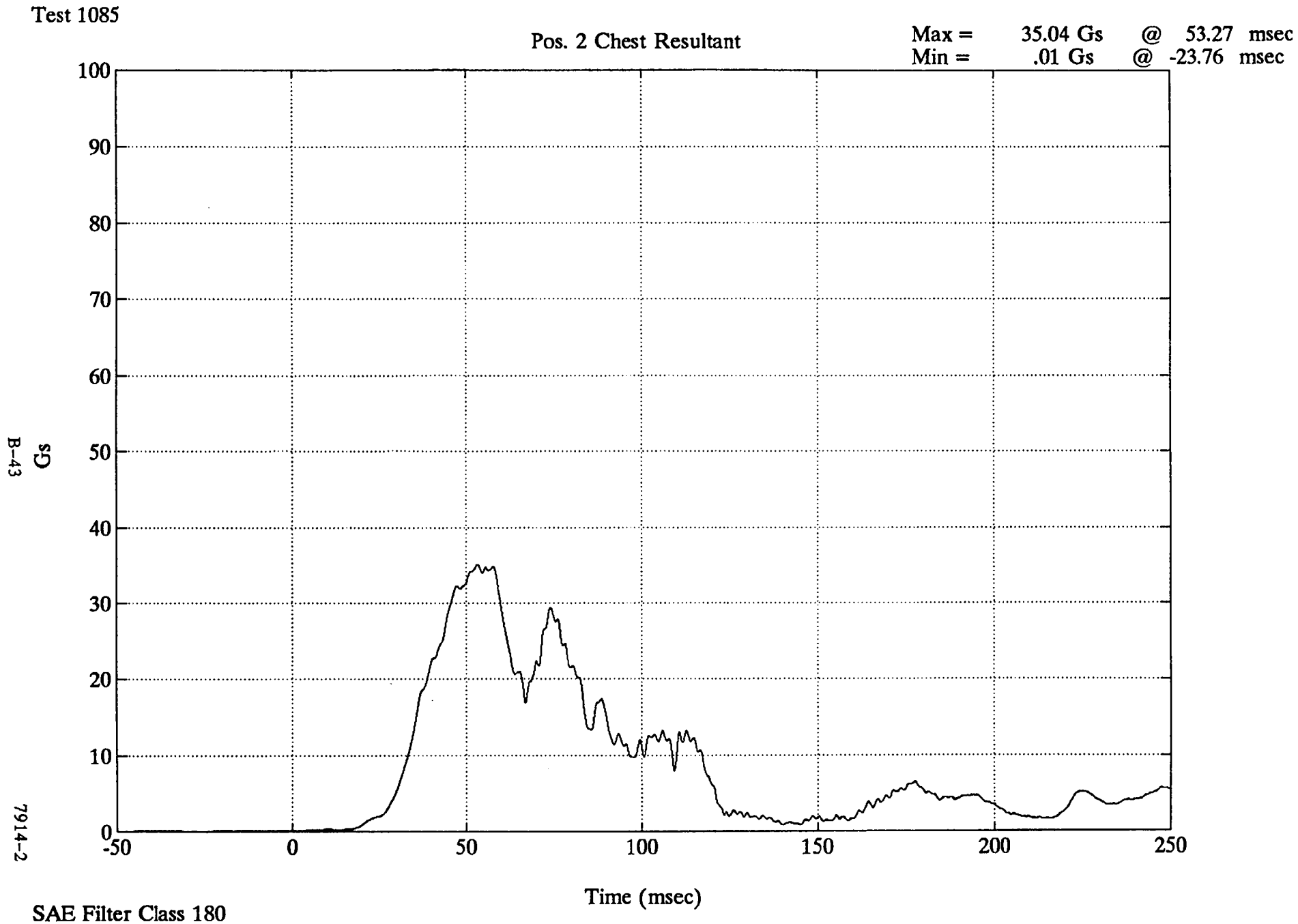

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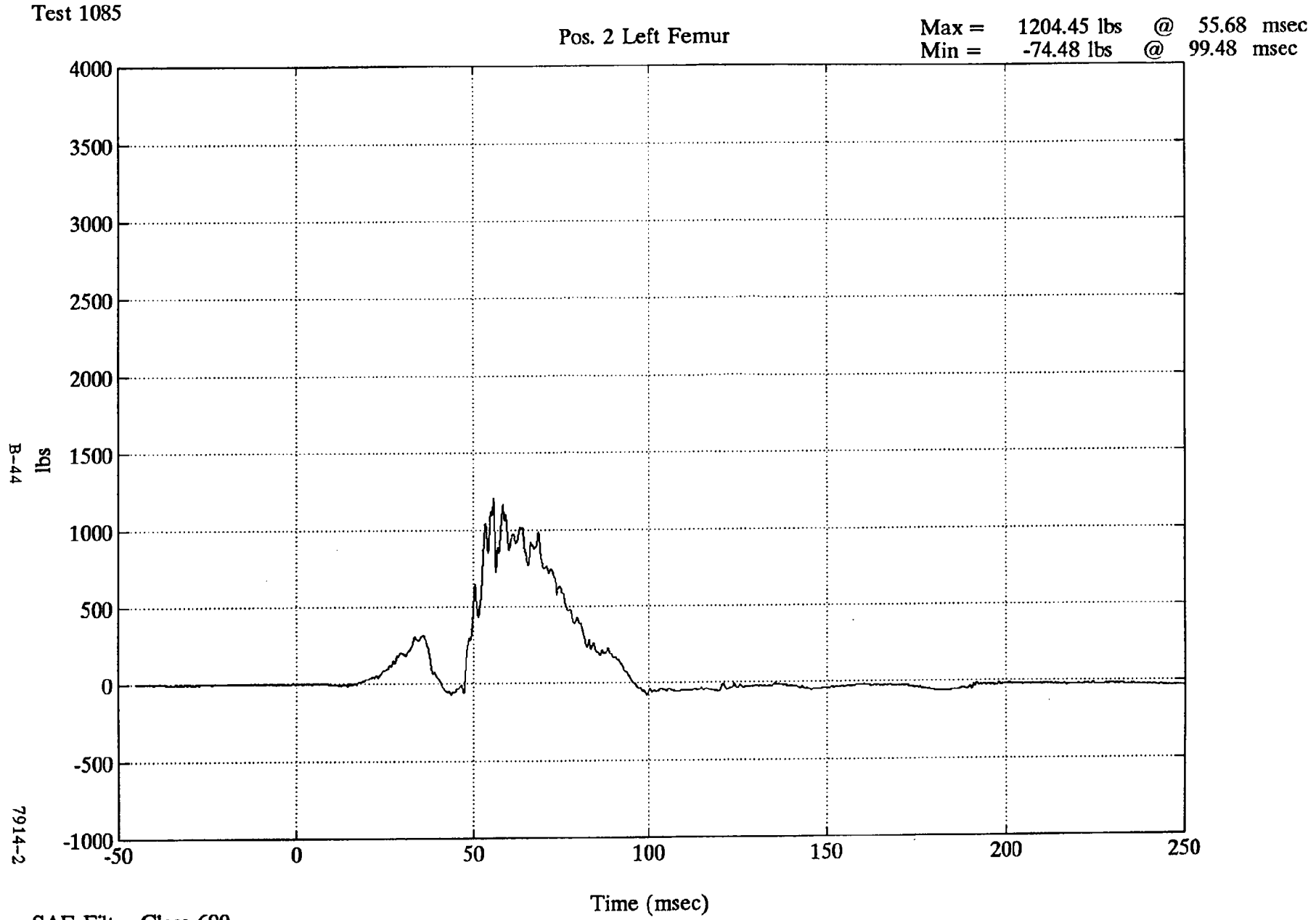

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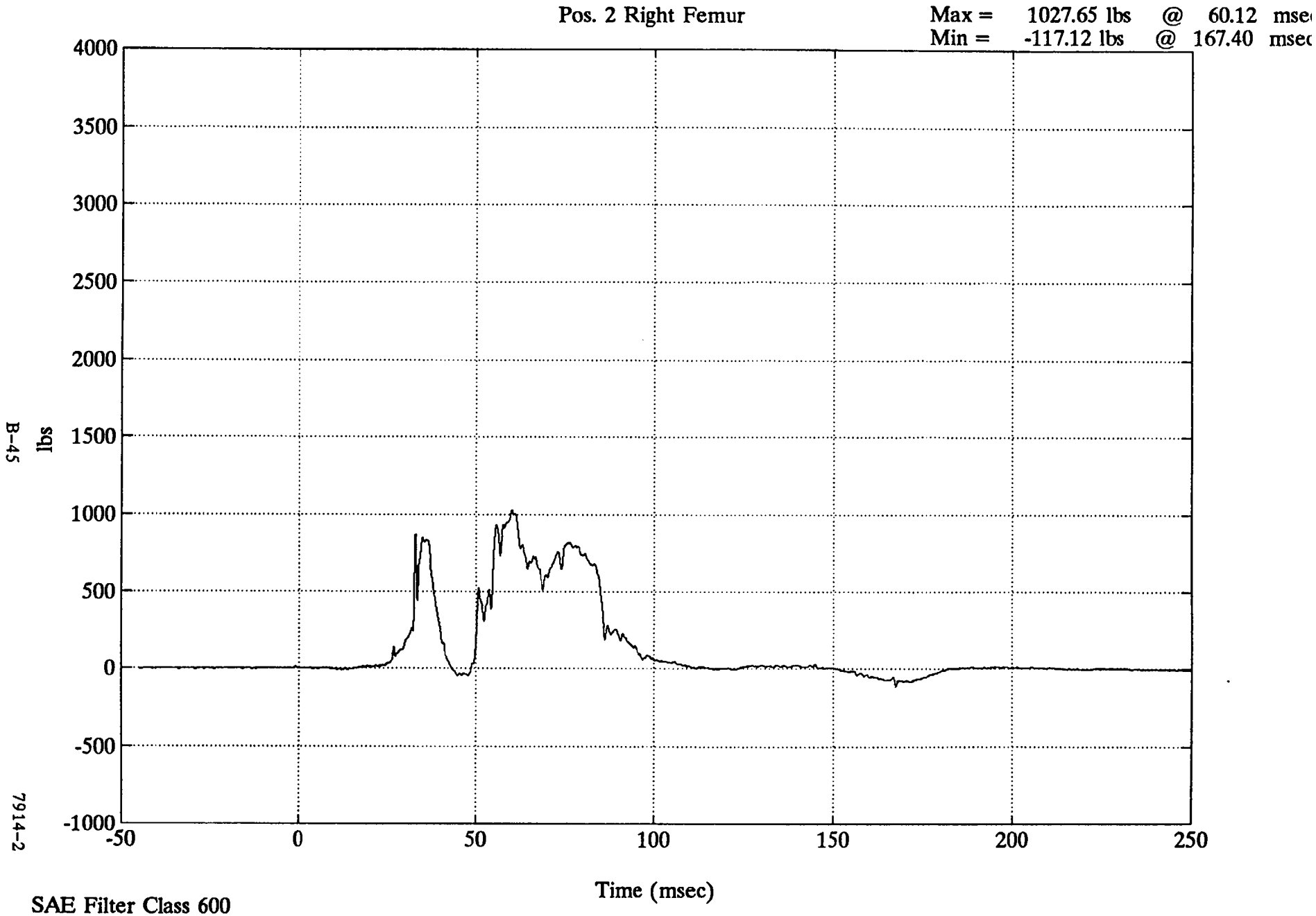

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Appendix C

VEHICLE OWNERS MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

Using Safety Restraints Properly

Safety Belts

The use of safety belts helps to protect you and your passengers in case of a collision. In most states, the law requires their use. We strongly recommend that you use them every time you travel in your vehicle.

Safety belts provide best restraint when:

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

For your safety, your vehicle has:

- ❑ LAP AND SHOULDER BELTS – for all occupants.

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

Warning: Make sure that you and your passengers, including pregnant women, wear safety belts. Be sure that lap belts fit snugly and as low as possible around the hips. If safety belts are not used properly, the risk of you or your passengers being injured in a collision greatly increases.

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

Do not allow any people to ride in the cargo area of your vehicle. People who are not riding in seats with their safety belts fastened are much more likely to be injured in a collision.

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

Never use a single belt for more than one person or across seating positions. This greatly increases the risk that one or both of the people will be injured in a collision. Each seating position in your vehicle has a specific safety belt assembly which is made up of one buckle and one tongue. Each assembly is designed to be used as a pair.

Warning: Be sure to lock all doors before you drive away. This will lessen your risk of your being thrown from the vehicle in a collision.

Warning: Always drive and ride with your seat back upright and the lap belt snug across the hips to reduce the risk of serious injury to the abdomen or neck that could be caused by sliding under the safety belts in a collision.

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

Safety Belt Maintenance

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

Warning: All safety belt assemblies including retractors and attaching hardware should be inspected after any collision. Ford recommends that all safety belt assemblies used during a collision be replaced unless the collision was minor and a qualified technician finds that the belts do not show damage and continue to operate properly. Safety belt assemblies not in use during a collision should also be inspected and replaced if either damage or improper operation is noted.

Front and Rear Seat Combination Lap and Shoulder Belts

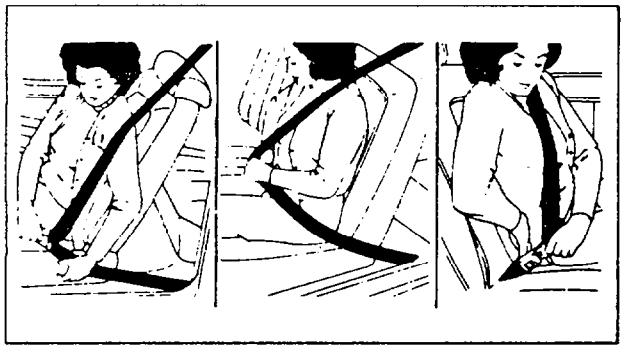
Front and rear seats on Canadian vehicles

Rear seats on U.S. and Canadian vehicles

While you drive, the combination lap and shoulder belt adjusts to your movement. However, if you brake hard or if your car receives an impact of 5 mph (8 km/h) or more, the lap and shoulder belt locks.

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

To fasten the belt, find the long strap of the belt near the edge of the seat back, pull it across your shoulder and chest, and insert the tongue into the nearest buckle on your seat until you hear a snap and feel it lock. Be sure to use the correct buckle and check to make sure the buckle is securely fastened.



Fastening the Lap and Shoulder Belt

Warning: Front and rear seat occupants (including pregnant women) should wear both lap and shoulder belts, for optimum protection in an accident.

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

Adjust the lap part of the belt by pulling up on the shoulder belt until the lap belt fits snugly and as low as possible around your hips.

Motorized Passive Shoulder Belt Restraint System (Front Seat)

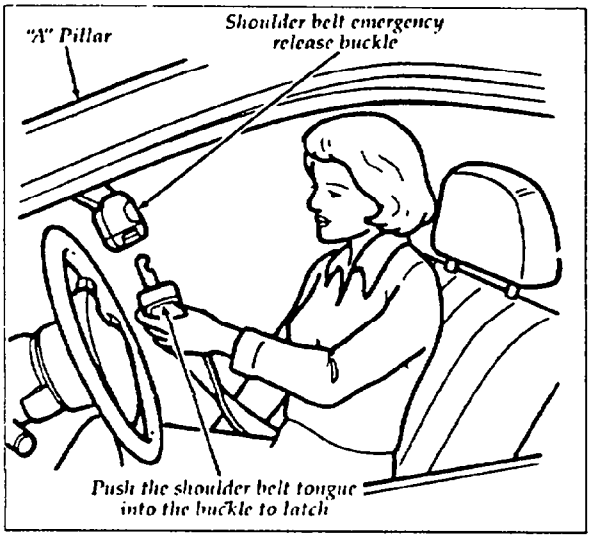
(U.S. Vehicles Only)

The passive shoulder belt restraint system operates electrically. The automatic shoulder belt, the manual lap belt, and knee bolsters, provide restraint for the front seat occupants.

Warning: The lap safety belt is to be manually buckled by the driver/passenger and should always be worn with the shoulder belt. Be sure the lap belt is on your hips as low as possible.

After entering the vehicle and closing the door, check to ensure the shoulder belt is latched to the emergency release buckle. The shoulder belt should remain latched to the release buckle at all times except for emergency situations.

If the shoulder belt is unlatched, refer to the following instructions:

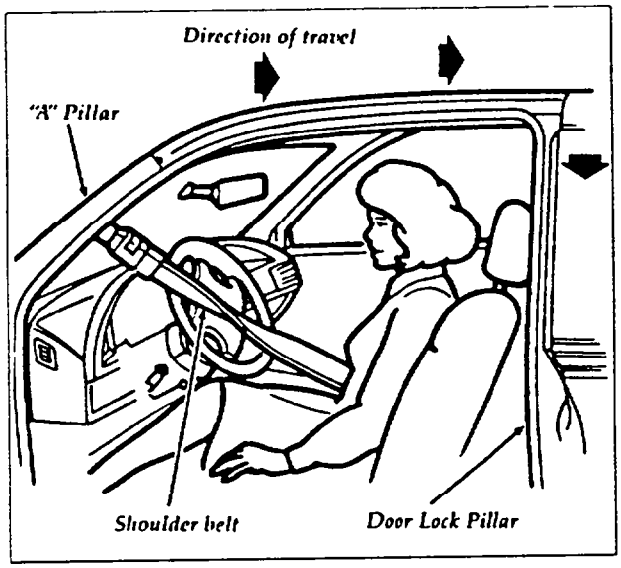


Fastening the shoulder belt to the emergency release buckle

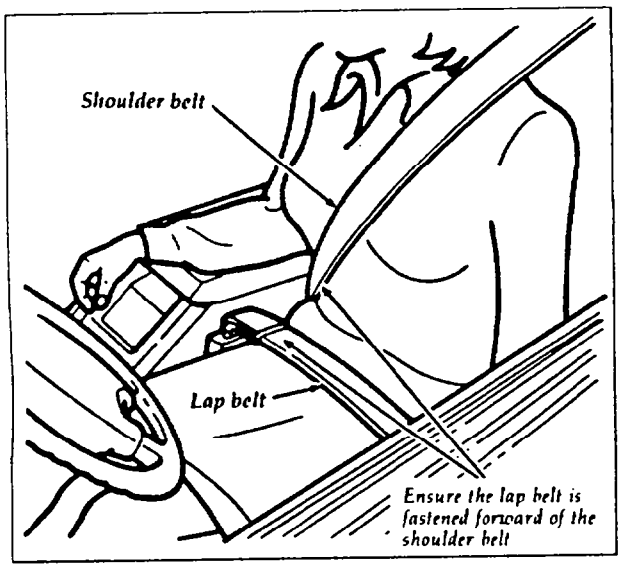
To latch the shoulder belt to the emergency release buckle at the "A" pillar, pull the shoulder belt from the retractor between the seat and console, and buckle it to the emergency release buckle.

NOTE: The buckle fits only one way, be sure to position it properly.

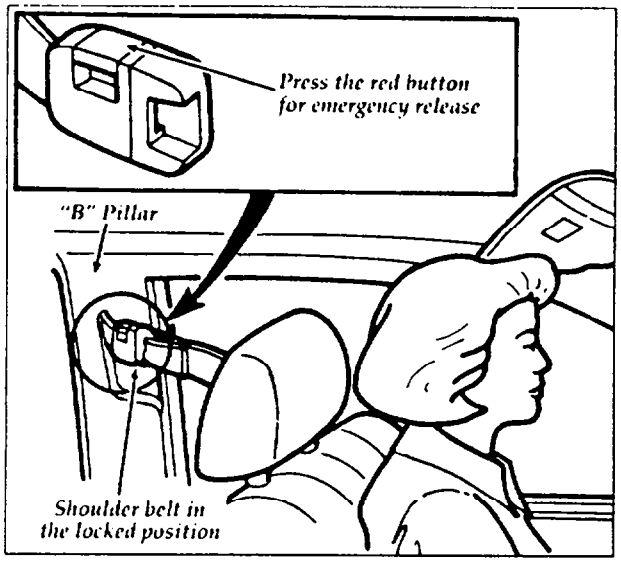
Close your door. Insert the ignition key and turn it to the ON position. A motor will slide the shoulder belt along its track starting at the front "A" pillar and moving rearward to its locked position on the "B" pillar.



Shoulder belt movement



Shoulder belt in locked position



Shoulder belt in locked position

If either driver or passenger shoulder belt or driver's lap belt is not buckled, when the ignition switch is turned to the ON position, the reminder buzzer will sound for 4 to 8 seconds, and the warning lamp will illuminate until both shoulder belts are buckled.

When the ignition switch is in the ON position and the shoulder belt is moving, the warning lamp will illuminate. When the shoulder belt comes to rest (in the rear position), the warning lamp will go out.

The shoulder belt will automatically adjust itself to allow for comfortable wear and freedom of movement by the occupant. It will lock tight only on extremely hard braking, or hard cornering or impacts of approximately 5 mph (8 km/h) or more.

Warning: Use the shoulder belt on the outside shoulder only. Never wear the shoulder belt under the arm. Never swing it around the neck over the inside shoulder. Never use a single belt for more than one person. Failure to follow these precautions could increase the chance and/or severity of injury in an accident. When the ignition is in any position and the door is opened, the shoulder belt will move forward to the "A" pillar. This will allow ample room for exit from the vehicle by the driver or passenger. DO NOT use the belt as an assist handle when entering or exiting the vehicle. The door should not be opened while the vehicle is in motion.

To reduce the risk of sliding under the lap belt during a collision, always drive and ride with seat backs in the upright position. If the lap belt slips above the hip-bone during a collision and applies force directly to the soft areas of the abdomen; it will increase the risk of serious injury. The seat backs and the belts provide best restraint when the seat is upright, the occupant is sitting upright in the seat (not slouching), the lap belt is snug and low on the hips, the shoulder belt is snug against the chest and the knees are straight forward.

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

Be sure to keep the sun visors away from the side windows when the shoulder belts move along their tracks, to prevent possible damage to the sun visors or shoulder belt system.

Important For Your Safety

Before driving the vehicle, read the label on the back of the sun visor.

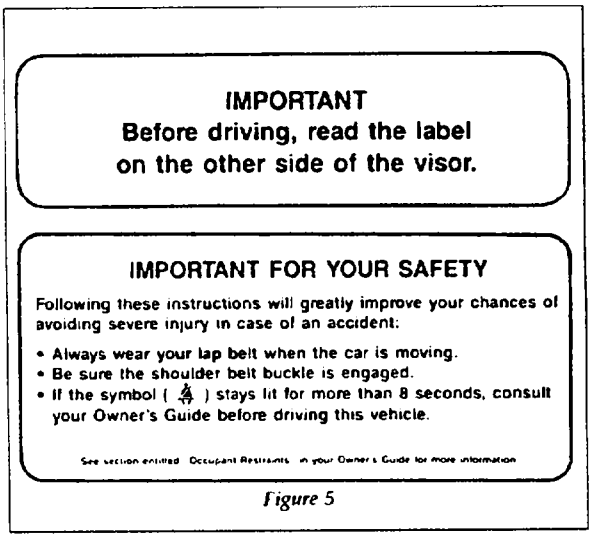


Figure 5

Labels located on the driver's sun visor

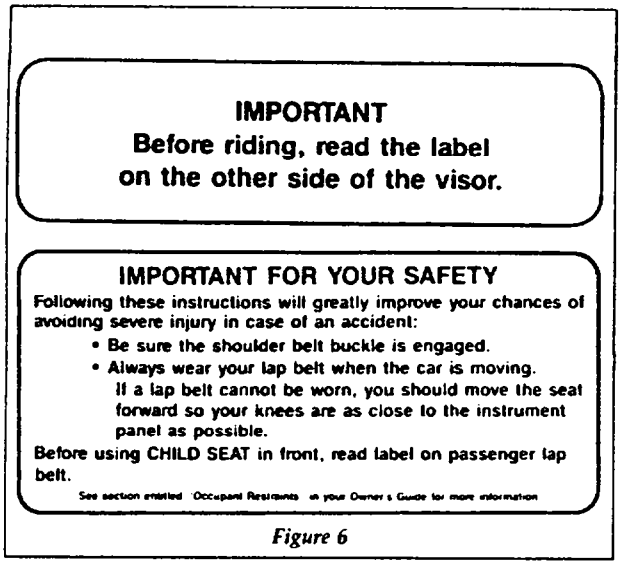
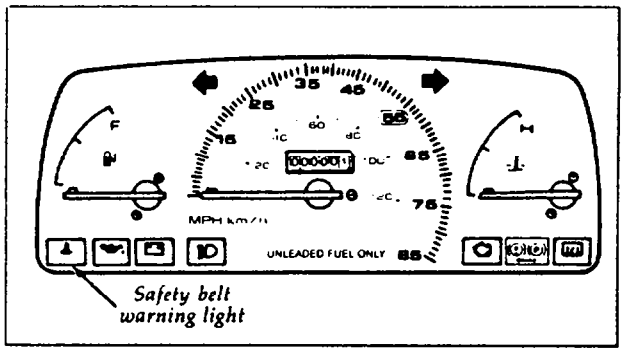


Figure 6

Labels located on the passenger's sun visor



Indicator light locations

Warning: The vehicle should not be driven unless the doors are fully closed and the shoulder belts are in the locked position on the "B" pillar.

In the event of an accident, the shoulder belt retractor is designed to lock in order to protect the occupants and may remain locked after the accident. If this occurs, unbuckle the shoulder belt at the "B" pillar by pressing the RED emergency release button on the buckle for the occupant to exit the vehicle.

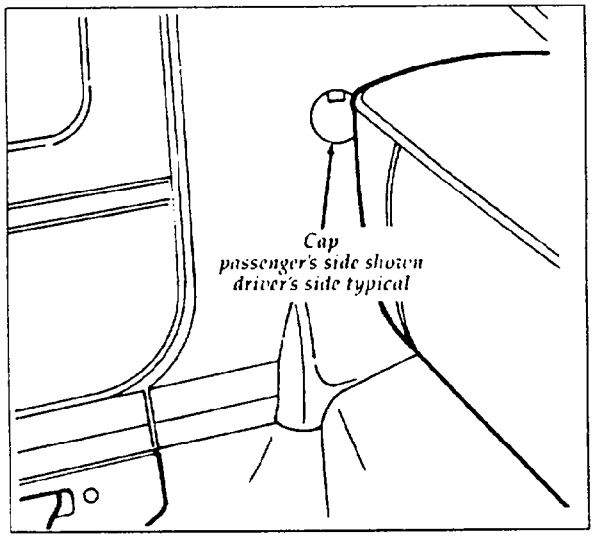
After an accident, refer to seat belt maintenance in this section.

Manual Override System — Important For Your Safety

If the shoulder belt does not move rearward, or stops before reaching the "B" pillar position, perform the following steps before driving the vehicle:

1. Turn the ignition key to the OFF position.
2. Open and close door(s). Make sure all doors are fully closed.

3. If the shoulder belt will not move forward to the "A" pillar position, press the RED emergency release button on the buckle to exit the vehicle. Then check to see if the automatic fuel pump shutoff switch has been tripped. Refer to *Fuel Pump Shut-Off Switch* in the Index.
4. Turn the ignition key to the ON position.
5. If the belt still does not move to the "B" pillar, turn the ignition key to the OFF position. Unbuckle the shoulder belt by pressing the red emergency release button on the buckle.
6. Using a screwdriver, remove cap located in the rear trim panel.



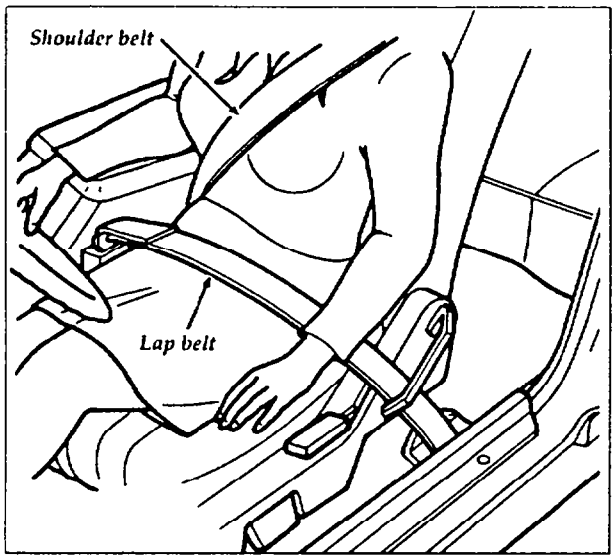
7. Pull the electrical wiring harness out through the hole in the trim, and disconnect the connector. Fold rear seat back down and fold rear seat forward.
8. Fit the emergency handle located in the glove compartment into the internal hex-nut.
9. Turn the emergency handle to move the buckle rearward (for the left side turn clockwise; for the right side, turn counterclockwise). Move the buckle rearward, to its locked position in the "B" pillar until an audible click is heard.
10. After sitting on the front seat, insert the tongue of the shoulder belt into the buckle until an audible click is heard.

NOTE: The fuel pump shutoff switch shuts off power to the fuel pump and the passive restraint system.

Warning: If the fuel pump shut-off switch is not the cause for the shoulder belt not moving, have the system serviced by a qualified technician as soon as possible.

Manual Front Lap Belts

After the shoulder belt has moved rearward, pull the lap belt out of the retractor with a steady motion. Route the lap belt forward of the shoulder belt. Insert the tongue into the buckle until you hear a snap and feel the latch engage. Ensure the lap belt is not trapped under the shoulder belt.



The lap belt and shoulder belt engaged

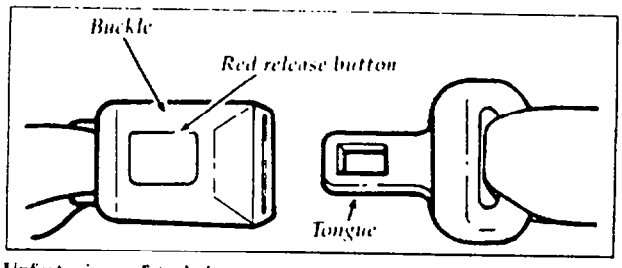
As a reminder to the driver to fasten the lap belt, the warning lamp will illuminate for about four to eight seconds each time the ignition switch is turned to the ON position.

If the driver's lap belt is not connected, the warning buzzer will sound for four (4) to eight (8) seconds, when the ignition is turned to the ON position.

Warning: Be sure the lap belt is fitted snugly and as low as possible around the hips, not around the waist. Failure to do so may increase the chance of injury in the event of a collision.

To unfasten the belt:

1. Push the red release button on end of the buckle. This allows the tongue to unlatch from the buckle.



Unfastening safety belts

2. While the belt retracts, guide the tongue to its original position. If you do not guide the tongue, it may strike you or part of the vehicle.

To Untwist or Unjam a Safety Belt:

If you should jam the lap belt retractor by allowing the belt to retract when it is twisted, you can free the webbing with this procedure:

1. Work the belt slowly out of its retractor as far as it will go and untwist the belt or remove the object that is jamming the belt. Let the belt retract.
2. Then, pull the belt out and let it retract several times to make sure that the belt works properly.

Safety Restraints for Children

In most states, you are required by law to use safety restraints for children. If small children ride in your vehicle – this generally includes children who are four years old or younger and who weigh 40 pounds (18 kg) or less – you must put them in safety seats that are made specially for children. Safety belts alone do not provide maximum protection for these children. Check your local and state laws for specific requirements.

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

Make sure children sit where they can be properly restrained. If they are not restrained, their chance of being injured in a collision greatly increases.

Warning: Never let children ride in the cargo area of your vehicle. Make sure that they sit where they can be properly restrained. If they are not restrained their risk of being injured in a collision greatly increases.

When possible, put children in the rear seat of your vehicle. Accident statistics suggest that children are safer when properly restrained in the rear seating positions than in the front seating positions.

Warning: When using any infant or child restraint system, it is important that you follow the instructions and warnings provided by the manufacturer concerning its installation and use. Failure to follow each of the restraint manufacturer's instructions could increase the risk or severity of an injury in the event of a collision or sudden stop.

Safety belts and seats can become hot in a vehicle that has been closed up in sunny weather; they could burn a small child. Check seat covers and buckles before you place a child anywhere near them.

Warning: Never leave a child unattended in your vehicle. Always remove the key from the ignition and take it with you.

Safety Belts for Children

Children who are too large for child safety seats should always wear safety belts. (See instructions with your child seat, or contact its manufacturer, to determine maximum size of child.)

Warning: If safety belts are not properly worn and adjusted as described below, the risk of serious injury to the child in a collision will be much greater.

If the shoulder belt portion of one of the lap and shoulder belts can be positioned so that it does not cross or rest in front of the child's face or neck, the child should wear the lap and shoulder belt. Moving the child closer to the center of the vehicle may help provide a good shoulder belt fit.

Lap belts and the lap belt portion of lap and shoulder belts should always be worn snugly and below the hips, touching the child's thighs.

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