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REPORT NUMBER: 214-CAL-98-05

SAFETY COMPLIANCE TESTING FOR FMVSS 214 SIDE IMPACT PROTECTION - PASSENGER CARS

FUJI HEAVY INDUSTRIES LTD.
1998 SUBARU IMPREZA OUTBACK SPORT
4-DOOR WAGON

NHTSA NUMBER: CW5501

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

October 28, 1997

FINAL REPORT

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Compliance
400 Seventh Street, SW
Room 6115 (NSA-30)
Washington, DC 20590

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-97-C-01033. 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 manufactures' 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.

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16. Abstract

A 48/24 kph 90° Impact (Moving Deformable Barrier) Compliance Test was conducted on the subject 1998 Subaru Impreza Outback Sport 4-Door Wagon in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-214D-04 to determine FMVSS 214 Side Impact Protection compliance. This test was conducted at the Calspan SRL Corporation Crash Test Facility in Buffalo, New York, on October 28, 1997.

The impact velocity of the Moving Deformable Barrier (MDB) was 52.9 kph, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 20.6°C. The target vehicle post-test maximum crush was 315 mm at level 2.

The test or target vehicle's performance is given below:

	Front SID		Rear SID	
Left Upper Rib Acceleration:	65	g's	44	g's
Left Lower Rib Acceleration:	54	g's*	60	g's
Lower Spine Acceleration:	76	g's	57	g's
Thoracic Trauma Index (TTI):	70	g's	59	g's
Pelvis Acceleration (PEV):	71	g's	71	g's

The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.

* Primary accelerometer wire was cut at approximately 30 msec, redundant accelerometer value is shown.

17. Key Words	18. Distribution Statement
Compliance Testing Side Impact Protection FMVSS 214 Side Impact Dummy (SID)	Copies of this report are available from: National Highway Traffic Safety Administration Technical Reference Division Room 5108 (NAD-52) 400 Seventh st., S.W. Washington, D.C. 20590 Telephone No. (202) 366-4946 ATTN: Robert Hornicle

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SECTION 1

PURPOSE AND TEST PROCEDURE

This side impact test is part of the FMVSS 214 Side Impact Protection Compliance Test Program sponsored by the National Highway Safety Administration (NHTSA) under Contract No. DTNH22-97-C-01033. The purpose of this test was to evaluate side impact protection in a 1998 Subaru Impreza Outback Sport 4-Door Wagon. The test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-214D-04, dated September 1, 1995).

SECTION 2

SUMMARY OF SIDE IMPACT TEST

A 1998 Subaru Impreza Outback Sport 4-Door Wagon was impacted on the left or driver's side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the monorail at a velocity of 52.9 kph (32.9 mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by the Calspan SRL Corporation Transportation Sciences Center in Buffalo, New York on October 28, 1997. Pre- and post-test photographs of the test vehicle, the moving deformable barrier (MDB), and the side impact dummies (SIDs) are included in appendix A.

Two restrained Side Impact Dummies (SIDs) were placed in the driver (Pos. #1) and left rear (Pos. #4) designated seating positions according to the instructions specified in the OVSC Side Impact Laboratory Test Procedure (TP-214D-04, dated September 1, 1995). Both SIDs were certified prior to this test. The side impact test was documented by one real-time camera and 9 high-speed cameras. Camera locations and other pertinent camera information are included in this report.

The SIDs were instrumented with the following accelerometers:

1. Left Upper Rib (LUR) uniaxial and redundant accelerometer (Y-direction)
2. Left Lower Rib (LLR) uniaxial and redundant accelerometer (Y-direction)
3. Lower Thoracic Spine (T_{12}) uniaxial and redundant accelerometer (Y-direction)
4. Pelvic (PEV) section uniaxial and redundant accelerometer (Y-direction)

A summary of the side impact dummy (SID) configuration and verification test data can be found in Appendix C. A total of 41 channels of data were recorded. Appendix B contains the vehicle, MDB and dummy response data traces. The front SID Left Lower Rib primary and the Left Lower B-Pillar accelerometer wires were cut approximately 30 msec into the impact.

The following table summarizes the results of the test.

Injury Criteria	Front SID	Rear SID
TTI (g)	70	59
PEV (g)	71	71

FMVSS 214D requires that the TTI not exceed 85 for 4 door vehicles and not exceed 90 for 2-door vehicles. Peak lateral pelvis acceleration shall not exceed 130 g's.

SECTION 3

SUMMARY OF TEST RESULTS

DATA SHEET 1

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1998 Subaru Impreza Outback Sport 4-Door Wagon

Vehicle Body Color: Green VIN: JF1GF485XWG800752

Vehicle NHTSA No.: CW5501 Month & Year of Manufacture: 06/97

Engine Data: 4 Cylinders; - CID; 2.2 Liters; - cc

Engine Placement: X Longitudinal; or - Lateral

Transmission: 5 Speed; X Manual; - Automatic; - Overdrive

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

Odometer Reading 85 km

Options: X A/C; X Power Steering; X Pwr.Brakes; X Pwr. Windows

DATA FROM TIRE PLACARD

Tire Pressure* (at capacity); 221 kPa FRONT

200 kPa REAR

Recommended Tire Size: P205/60R15

Tires on Test Vehicle: P205/60R15 ; Manufacturer: BF Goodrich

Vehicle Capacity Data:

Number of Occupants: 2 Front; 3 Rear; - 3rd Seat; 5 Total

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

Type of Front Seat Back: - Fixed; X Adjustable with X Lever or - Knob

Vehicle Max Capacity Loading = 410.0 kg (A)

No. of Occupants x 68.04 kg. = 340.2 kg (B)

Vehicle Cargo Capacity = 69.8 kg (A-B)

TEST VEHICLE DELIVERED WEIGHT WITH MAXIMUM FLUIDS:

Left Front	=	368.0 kg	Left Rear	=	286.0 kg
Right Front	=	352.0 kg	Right Rear	=	285.0 kg
TOTAL FRONT	=	720.0 kg	TOTAL REAR	=	571.0 kg
% of Total Weight	=	55.8 %	% of Total Weight	=	44.2 %

TOTAL WEIGHT = 1,291.0 kg

* Tire pressure used in test.

DATA SHEET 1 (continued)

GENERAL TEST VEHICLE PARAMETER DATA

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Max. Fluids	=	1291.0	kg (A)
Maximum Cargo Carrying Capacity of Test Vehicle	=	69.8	kg (B)
Weight of instrumented Side Impact Dummies (1 or 2 X 81.2 kg)	=	162.4	kg (C)
TEST VEHICLE TARGET WEIGHT:	=	1,523.2	kg (A+B+C)

FULLY LOADED TEST VEHICLE (UDVW + 1 or 2 SID(s) + CARGO):

Left Front	=	415.0	kg	Left Rear	=	401.0	kg
Right Front	=	351.0	kg	Right Rear	=	356.0	kg
TOTAL FRONT	=	766.0	kg	TOTAL REAR	=	757.0	kg
% of Total Weight	=	50.3	%	% of Total Weight	=	49.7	%

TOTAL TEST WEIGHT = 1,523.0 kg

AS TESTED WEIGHT OF TEST VEHICLE (1 OR 2 SID(s) + CARGO + EQUIPMENT & INSTRUMENTATION):

Left Front	=	411.0	kg	Left Rear	=	386.0	kg
Right Front	=	363.0	kg	Right Rear	=	356.0	kg
TOTAL FRONT	=	774.0	kg	TOTAL REAR	=	742.0	kg
% of Total Weight	=	51.1	%	% of Total Weight	=	48.9	%

TOTAL TEST WEIGHT = 1,516.0 kg

TEST VEHICLE ATTITUDE (all dimensions in millimeters):

AS DELIVERED:

Left Front 688 Right Front 691 Left Rear 682 Right Rear 685

FULLY LOADED:

Left Front 674 Right Front 687 Left Rear 641 Right Rear 661

READY FOR TEST:

Left Front 679 Right Front 691 Left Rear 645 Right Rear 663

Test Vehicle Wheelbase: 2532 millimeters

C.G. = 1,239 millimeters rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 4315 millimeters

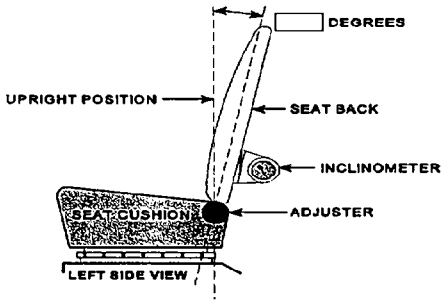
Left Side = 4315 millimeters

Centerline = 4382 millimeters

GENERAL TEST VEHICLE PARAMETER DATA

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501

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

FRONT SEAT CUSHION PLACEMENT: Position in detent #9, where the forward most position is detent #1

Total Length of Adjustment Travel: 215 millimeters

Total Number of Adjustment Positions or Detents: 17

FRONT SEAT BACK ADJUSTMENT POSITION: Detent #5, where the most upright position is detent #1

Seat Back Torso Angle: 10 degrees (as measured at the headrest post)

SECOND POSITION SEAT:

Total Length of Fore/Aft Adjustment Travel: N/A millimeters

Seat Back Adjustment Position: N/A

ADJUSTABLE STEERING COLUMN POSITION: Mid-position

WINDOW POSITIONS: Left Front: Closed Left Rear: Closed

Right Front: Open Right Rear: Open

Note: Windows will be in closed position on struck side of test vehicle and in open position on opposite side.

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

60.0 liters (Fuel Tank Usable Capacity)

55.4 liters used in test (92%-94% of Fuel Tank Usable Capacity)

LOCATION OF IMPACT POINT ON TEST VEHICLE SIDE TO BE IMPACTED:

Wheelbase = 2532 millimeters

Impact Point is 326 millimeters rearward of front axle centerline

(which is 940 millimeters forward of the wheelbase midpoint)

Actual Impact Point is 329 millimeters rearward of front axle centerline

DATA SHEET 2

TEST VEHICLE SUMMARY OF RESULTS

VEHICLE IDENTIFICATION:

Vehicle Year/Make/Model: 1998 Subaru Impreza Outback Sport

Body Style: 4-Door Wagon VIN: JF1GF485XWG800752

NHTSA No.: CW5501 Test Date: October 28, 1997

Overall Length = 4382 millimeters; Overall Width = 1690 millimeters

VEHICLE TEST WEIGHT (Pre-Test):

Left Front	=	411.0 kg	Left Rear	=	386.0 kg
Right Front	=	363.0 kg	Right Rear	=	356.0 kg
TOTAL FRONT	=	774.0 kg	TOTAL REAR	=	742.0 kg

TOTAL VEHICLE WEIGHT 1,516.0 kg

Wheelbase = 2532 millimeters

Longitudinal C.G. from Center of Front Axle = 1,239 millimeters

Impact Angle with Respect to Impactor = 90 degrees

ACTUAL IMPACT POINT

Actual Impact Point is 3 mm rearward of nominal impact ref. line (Lateral)

Actual Impact Point is 2 mm above nominal impact point (Vertical)

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (	242 mm above ground)	=	160 millimeters
2. LEVEL 2 (	477 mm above ground)	=	315 millimeters
3. LEVEL 3 (	589 mm above ground)	=	284 millimeters
4. LEVEL 4 (	852 mm above ground)	=	235 millimeters
5. LEVEL 5 (	1334 mm above ground)	=	42 millimeters

Maximum Post-Test Intrusion = 315 millimeters

OCCUPANTS:	Front Passenger:	Rear Passenger:
Dummy Identification	268	027
Restraints Used	3-point active seat belt	3-point active seat belt

INSTRUMENTATION:

Number of Vehicle Data Channels:		=	20
Number of Cameras:	Onboard	=	3
	Offboard	=	6
	TOTAL	=	9

DATA SHEET 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501

MDB FACE MANUFACTURER AND SERIAL NUMBER:

Plascore, Inc.: 025B0797-3, 064A0697, 6566-02

POSITION OF IMPACT (MDB) ON MONORAIL:

Crabbed 27° to left

MDB DETAILS:

Overall Width of Framework Carriage	=	1250	millimeters
Overall Length of MDB (incl. honeycomb impact face)	=	4120	millimeters
Wheelbase of Framework Carriage	=	2590	millimeters
Tread of Framework Carriage (Front & Rear)	=	1875	millimeters
C.G. Location Rearward of Front Axle	=	1104	millimeters

MDB WEIGHT:

Left Front	=	409.5	kg	Left Rear	=	281.5	kg
Right Front	=	372.5	kg	Right Rear	=	299.0	kg
TOTAL FRONT	=	782.0	kg	TOTAL REAR	=	580.5	kg
TOTAL MDB WEIGHT	=	1,362.5	kg				

Impact Angle (MDB C/L to Target Vehicle C/L) = 90 degrees

Impact Speed = 52.9 kph

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1. Row A at Center of Bumper Level	=	83	millimeters
2. Row B at Top of Bumper Level	=	40	millimeters
3. Row C at Mid Level	=	82	millimeters
4. Row D at Top of Stack Level	=	121	millimeters

INSTRUMENTATION:

Number of MDB Data Channels = 5

DATA SHEET 4

POST-TEST OBSERVATIONS

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501

VISIBLE DUMMY CONTACT POINTS:

	LEFT FRONT SID	LEFT REAR SID
Head:	Back of head to D-ring adjuster	Top/side of head to upper C-pillar trim
Upper Torso:	Upper shoulder form to door trim below window	Upper shoulder form to door trim below window
Lower Torso:	Lower shoulder form to door trim above armrest, pelvis to rear lower door trim	Lower shoulder form to door trim above armrest, pelvis to rear lower door trim
Left Knee:	Left knee to door trim above speaker	Left knee to door trim
Right Knee:	Right knee to left knee	Right knee to left knee

DOOR OPENING:

	LEFT DOOR	RIGHT DOOR
Front:	Closed / Inoperable	Closed / Operable
Rear:	Closed / Inoperable	Closed / Operable

MDB DISTANCE FROM TARGET IMPACT POINT: Vertical: 2 mm above target

Horizontal: 3 mm rearward of target

ARM REST LOCATIONS:

Front: 225 millimeters below the bottom of the window

Rear: 240 millimeters below the bottom of the window

SEAT MOVEMENT:

Front: Driver seat was slightly rotated and pushed against the center console

Rear: None

GLAZING DAMAGE:

Windshield: Fracture originating from the upper driver side

Window: Front and rear left side windows shattered at impact

PILLAR PERFORMANCE:

No visible tears or separation

SILL SEPARATION:

None

OTHER NOTABLE IMPACT EFFECTS:

Vehicle frontal airbags did not deploy during the impact

SECTION 4

OCCUPANT AND VEHICLE INFORMATION

DATA SHEET 5

SID INSTRUMENTATION DATA

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501

	Front Dummy ID# 268				Rear Dummy ID# 027			
	Pos. Direction		Neg. Direction		Pos. Direction		Neg. Direction	
	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
RIB ACCELERATIONS:								
Upper Rib Lateral . Y	65.1	25.0	-30.4	72.5	44.3	38.7	-12.5	73.7
Upper Rib Lateral . Y(R)	59.7	25.0	-21.4	72.5	45.3	38.7	-11.2	73.7
Lower Rib Lateral . Y *	-	-	-	-	59.9	36.9	-23.7	73.7
Lower Rib Lateral . Y(R)	54.0	35.6	-18.9	74.4	64.3	36.9	-24.2	73.7
SPINE ACCELERATIONS:								
Lower Lateral . . . . Y	75.7	30.0	-25.3	66.9	57.3	49.4	-36.2	68.7
Lower Lateral . . . . Y(R)	76.0	30.0	-27.2	66.9	56.3	49.4	-36.3	68.7
PELVIC ACCELERATIONS:								
Lateral . . . . . Y	70.5	28.1	-18.7	83.7	71.0	40.0	-12.4	76.2
Lateral . . . . . Y(R)	70.7	28.1	-19.0	82.5	68.8	39.4	-12.2	75.0

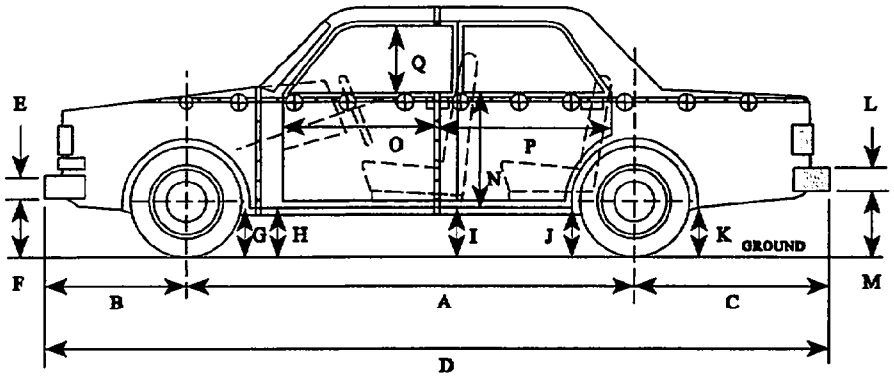
REFERENCE: Positive Direction - Longitudinal (X) = forward
Lateral (Y) = to right
Vertical (Z) = up
Negative Direction - Longitudinal (X) = rearward
Lateral (Y) = to left
Vertical (Z) = down

Note: Above data has been FIR filtered, Y(R) denotes redundant Y direction accelerometer.
* Accelerometer wire was cut approximately 30 msec into the impact.

DATA SHEET 6

VEHICLE SIDE MEASUREMENTS

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501



LEFT SIDE VIEW

NOTE: all dimensions are in millimeters with tolerance of ±3 mm

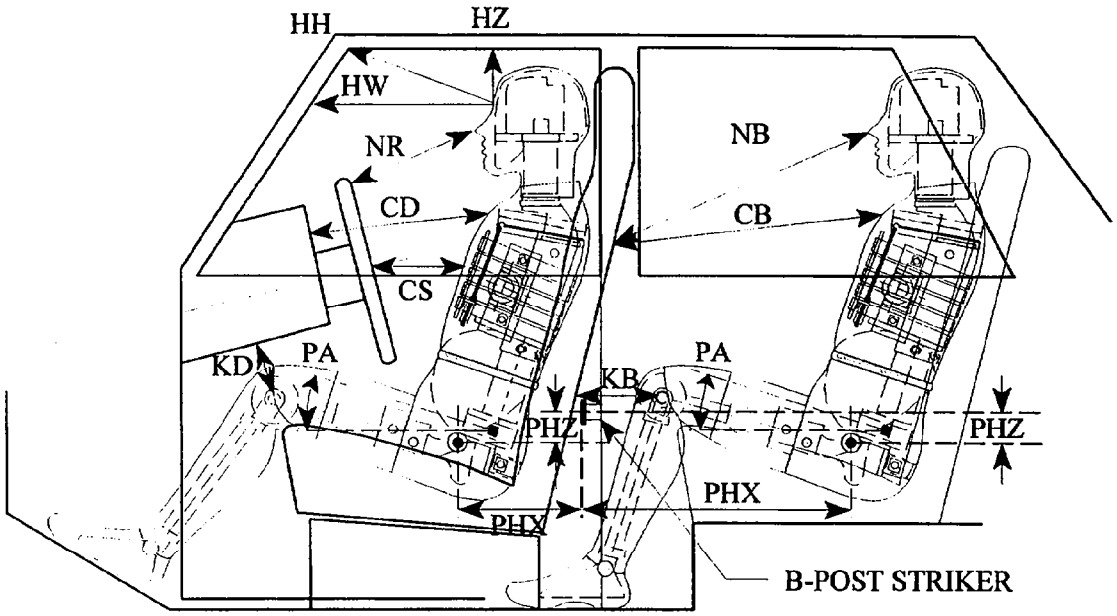
	PRE-TEST (as delivered)	PRE-TEST (as tested)	POST-TEST (as tested)	Δ CHANGE
A	2532	-	2480	-52
B	885	-	875	-10
C	965	-	950	-15
D	4382	-	4350	-32
E	575	-	590	15
F	255	250	280	30
G	190	175	230	55
H	195	175	230	55
I	195	155	200	45
J1	200	160	190	30
J2	295	255	340	85
K	295	255	285	30
L	600	-	590	-10
M	330	300	310	10
N	625	-	546	-79
O	668	-	652	-16
P	1368	-	1294	-74
Q	481	-	479	-2
R	4315	-	4320	5
S	4315	-	4270	-45
T	1690	-	1535	-155

D = Length at Centerline
T = Width at B-Pillar
E&L = Bumper Thickness
J1 = To Pinch Weld
R = Right Side Length
J2 = To Sill
S = Left Side Length

DATA SHEET 7

SID LONGITUDINAL CLEARANCE DIMENSIONS

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501



NOTE: 2-DOOR VEHICLE SHOWN. REAR DUMMY PHX & PHZ MEASUREMENTS FOR A 4-DOOR VEHICLE WOULD USE THE C-POST STRIKER AS A REFERENCE POINT

LEFT SIDE VIEW

NOTE: All dimensions are in millimeters with tolerance of ±3 mm

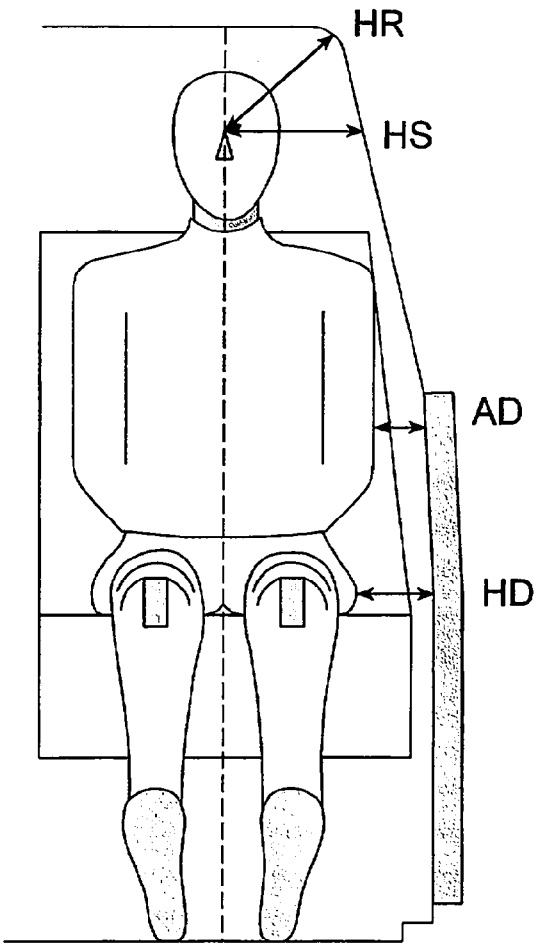
	DRIVER ID# 268	LEFT REAR PASS. ID# 027
HH	403	N/A
HW	590	N/A
HZ	186	145
NR/NB	492	586
CD/CB	543	480
CS	312	N/A
KDL(KDA°)/KBL(KDA°)	177 / (32°)	132 / (32°)
KDR(KBA°)/KBR(KBA°)	175 / (26°)	134 / (32°)
PA°	25°	25°
PHX	143	673
PHZ	116	267

Note: 2-door vehicle shown. Rear dummy PHX & PHZ measurements for 4-door vehicle would use the C-post striker as a reference point.

DATA SHEET 8

SID LATERAL CLEARANCE DIMENSIONS

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501



NOTE: All dimensions are in millimeters with tolerance of ±3 mm

	DRIVER ID # 268	LEFT REAR PASS. ID # 027
HR	210	182
HS	330	207
AD*	LOWER: 91 UPPER: 84	LOWER: 103 UPPER: 98
HD	126	190

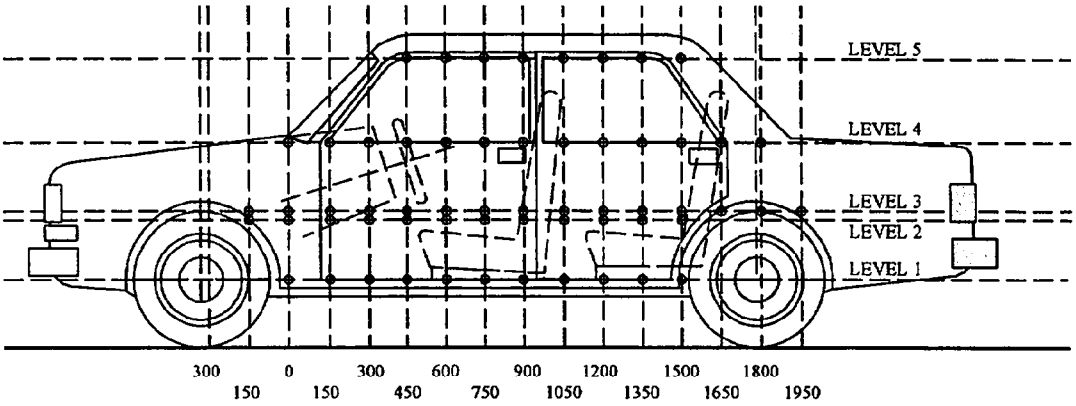
* Lower measurement is taken laterally at center of the lower rib accelerometer height from the SID arm segment to the closest part of the vehicle side.

Upper measurement is taken laterally at center of the upper rib accelerometer height from the SID arm segment to the closest part of the vehicle side.

DATA SHEET 9

VEHICLE SIDE MEASUREMENTS

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501



LEFT SIDE VIEW

NOTE: All measurements are in millimeters (mm)

LEVEL 5 - WINDOW TOP
LEVEL 4 - WINDOW SILL
LEVEL 3 - MID-DOOR
LEVEL 2 - OCCUPANT H-POINT
LEVEL 1 - AXLE CENTERLINE HEIGHT OR SILL TOP HEIGHT

MEASUREMENTS ARE TAKEN WHEN THE VEHICLE IS IN THE "AS TESTED" CONFIGURATION.
Measurements Along the Vertical 750 mm Line Shown Above:

Level 5 @ Window Top	=	1334	millimeters
Level 4 @ Window Sill	=	852	millimeters
Level 3 @ Mid Door	=	589	millimeters
Level 2 @ Occupant H-Point	=	477	millimeters
Level 1 @ Axle Centerline Height (or Sill Top Height)	=	242	millimeters

DATA SHEET 10

VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS

Vehicle: 1998 Subaru Impreza Outback Sport

NHTSA No. CW5501

NOTE: All dimensions are in millimeters with a tolerance of ±3 mm

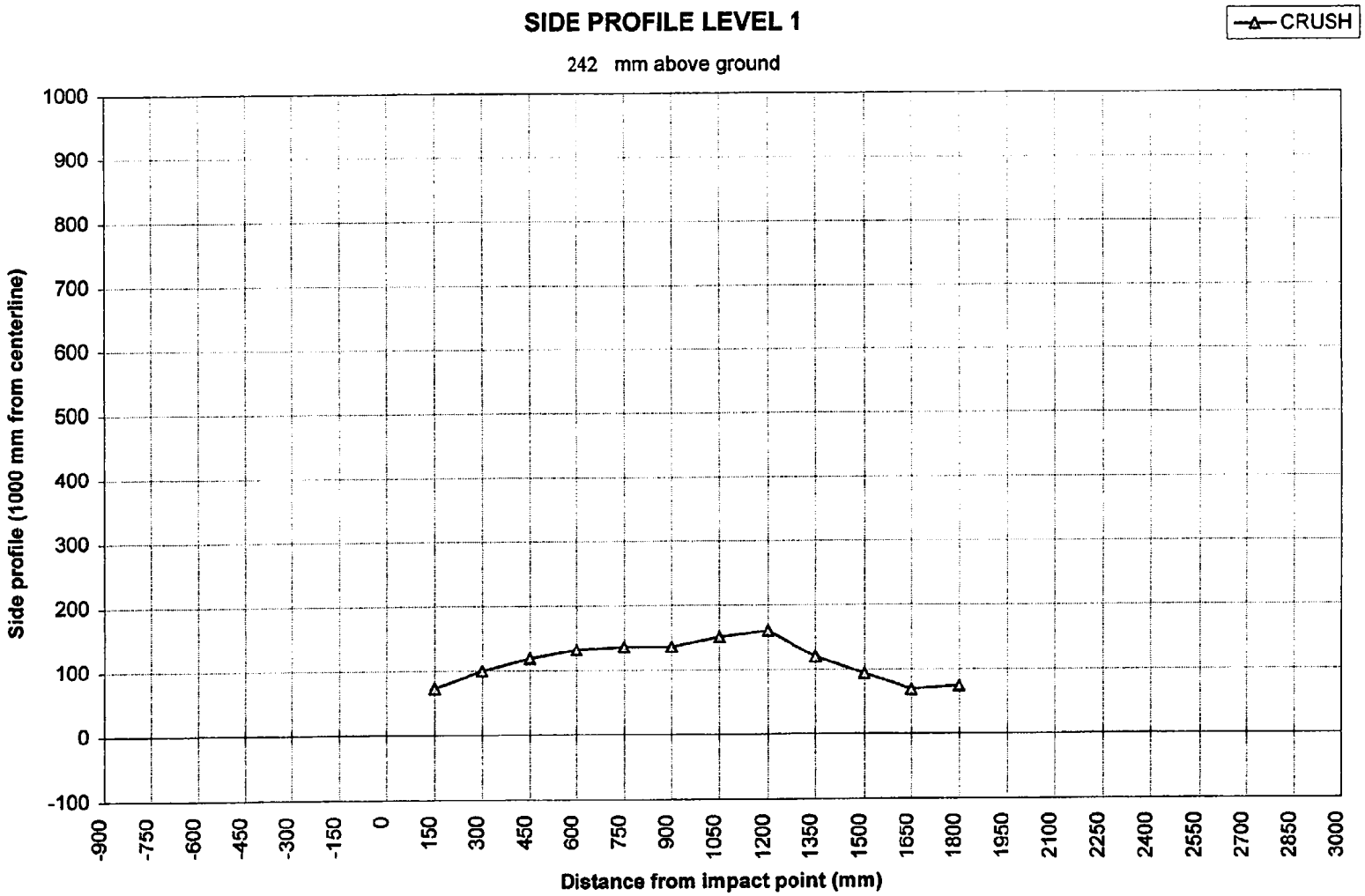
			DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT																											
LEVEL	HEIGHT (mm)		-900	-750	-600	-450	-300	-150	0	150	300	450	600	750	900	1050	1200	1350	1500	1650	1800	1950	2100	2250	2400	2550	2700	2850	3000
LEVEL 1		PRE	--	--	--	--	--	--	--	245	244	244	240	239	238	235	238	236	237	239	233	--	--	--	--	--	--	--	--	--
SIDE	242	POST	--	--	--	--	--	--	--	317	344	362	372	376	374	386	399	355	331	308	307	--	--	--	--	--	--	--	--	--
SILL		CRUSH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	72	100	119	132	136	136	151	160	119	94	68	74	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LEVEL 2		PRE	232	204	--	--	--	--	--	186	186	185	187	184	184	184	183	183	183	183	185	--	--	--	--	198	221	--	--	--
H	477	POST	209	186	--	--	--	--	--	422	456	478	489	495	495	489	491	498	484	470	388	--	--	--	--	218	234	--	--	--
POINT		CRUSH	-23	-18	N/A	N/A	N/A	N/A	N/A	236	270	293	303	310	311	305	307	315	301	287	202	N/A	N/A	N/A	N/A	20	14	N/A	N/A	N/A
LEVEL 3		PRE	--	214	180	--	--	--	--	175	176	177	176	177	177	176	175	175	174	176	177	175	--	--	180	201	232	--	--	--
MID	589	POST	--	190	165	--	--	--	285	363	395	409	423	425	427	431	459	450	438	427	415	288	--	--	205	221	243	--	--	--
DOOR		CRUSH	N/A	-25	-15	N/A	N/A	N/A	N/A	188	218	233	246	248	249	255	284	275	264	251	238	113	N/A	N/A	25	19	11	N/A	N/A	N/A
LEVEL 4		PRE	--	--	--	--	277	263	25	242	239	239	236	235	232	230	221	230	230	230	232	233	240	241	244	255	280	--	--	--
WINDOW	852	POST	--	--	--	--	268	257	245	277	326	374	388	395	412	421	452	465	460	438	398	300	236	268	266	276	293	--	--	--
SILL		CRUSH	N/A	N/A	N/A	N/A	-9	-6	0	35	87	135	152	161	180	191	231	235	231	209	167	67	-4	27	22	21	13	N/A	N/A	N/A
LEVEL 5		PRE	--	--	--	--	--	--	--	--	--	--	--	--	481	470	472	471	474	482	490	504	516	--	--	--	--	--	--	--
WINDOW	1334	POST	--	--	--	--	--	--	--	--	--	--	--	--	489	487	506	513	504	503	502	511	522	--	--	--	--	--	--	--
TOP		CRUSH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	17	34	42	30	20	12	7	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A

DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

Vehicle: 1998 Subaru Impreza Outback Sport

NHTSA No. CW5501

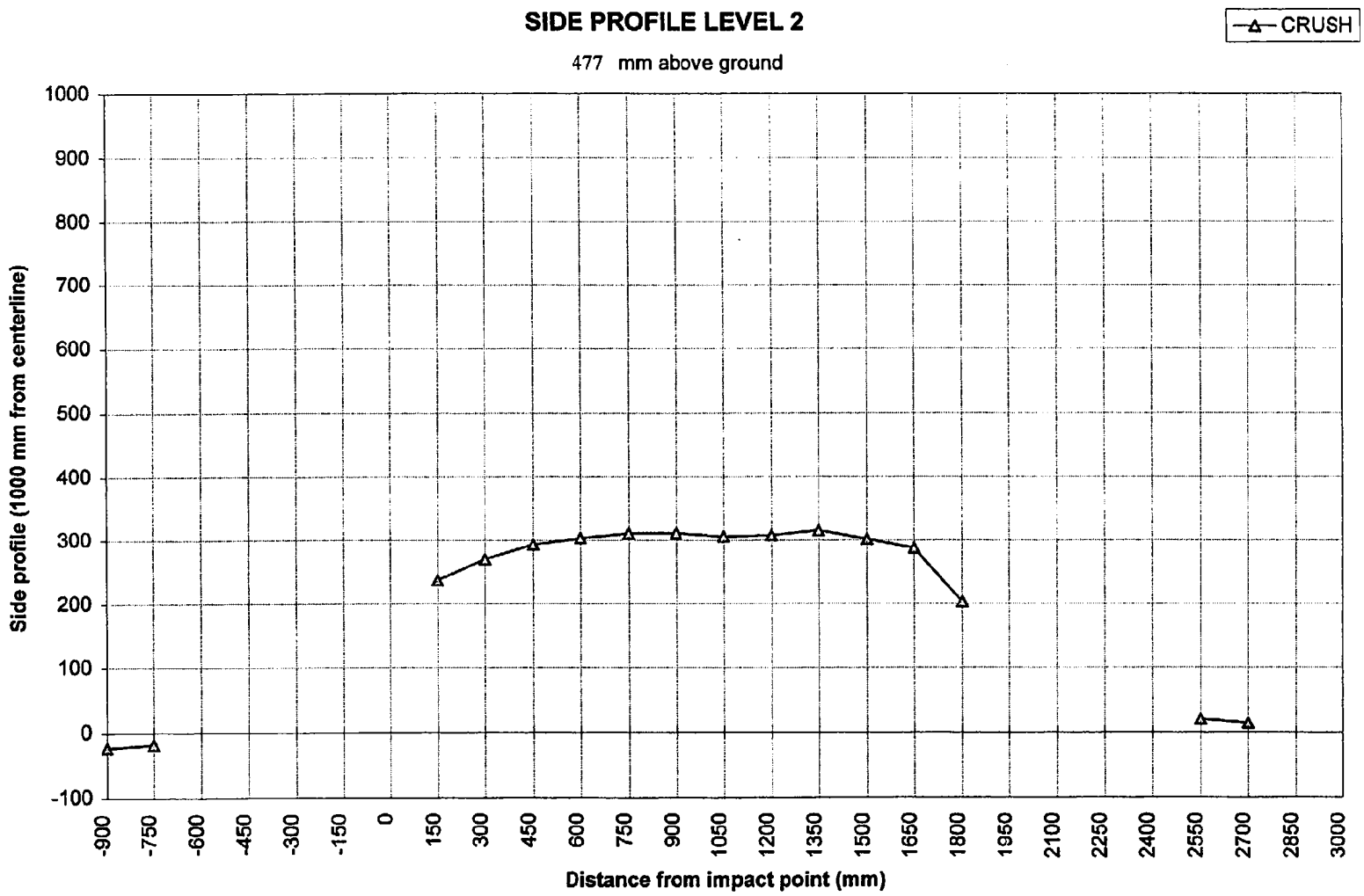


DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

Vehicle: 1998 Subaru Impreza Outback Sport

NHTSA No. CW5501

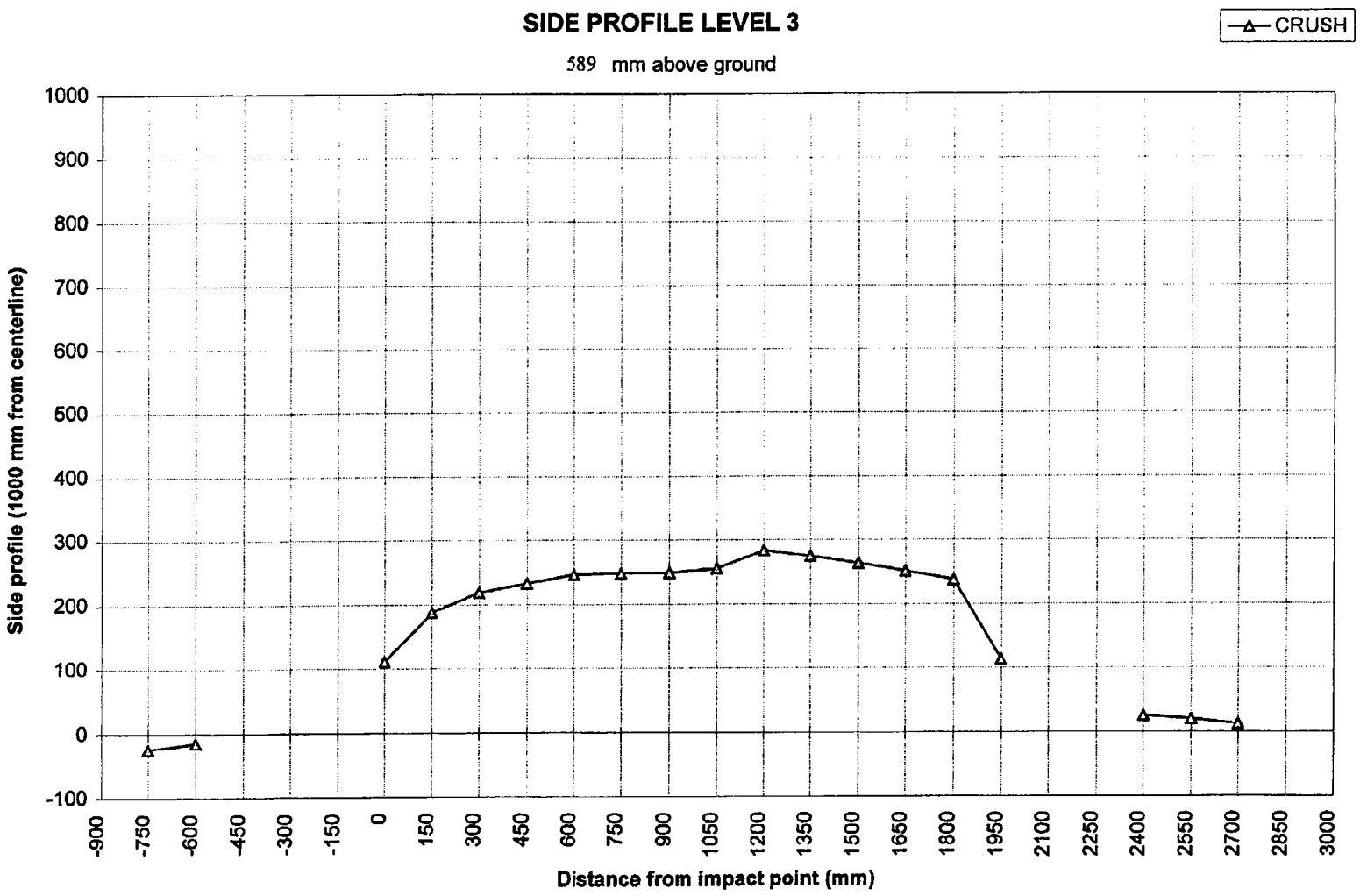


DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

Vehicle: 1998 Subaru Impreza Outback Sport

NHTSA No. CW5501

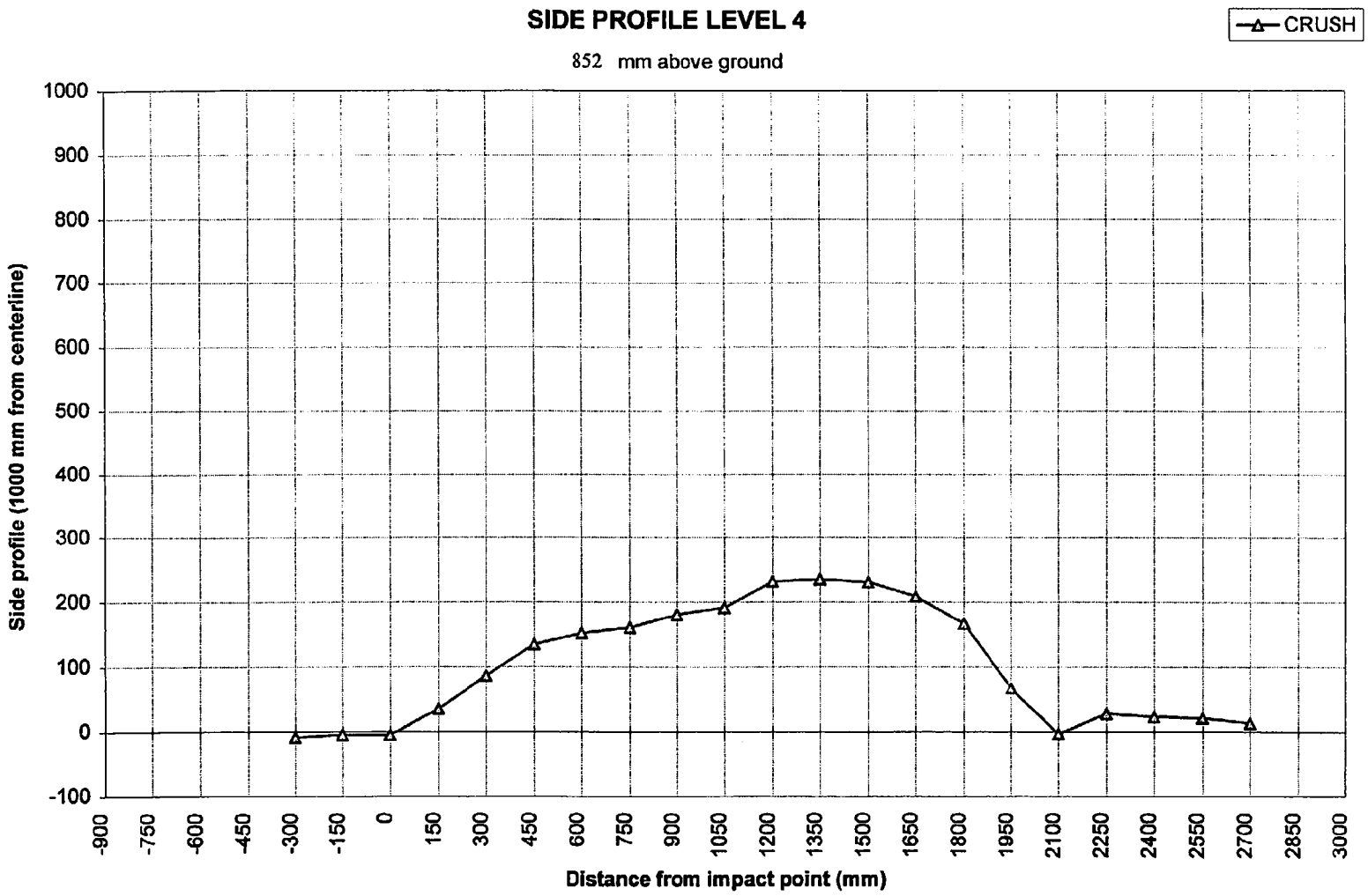


[redacted]

DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501

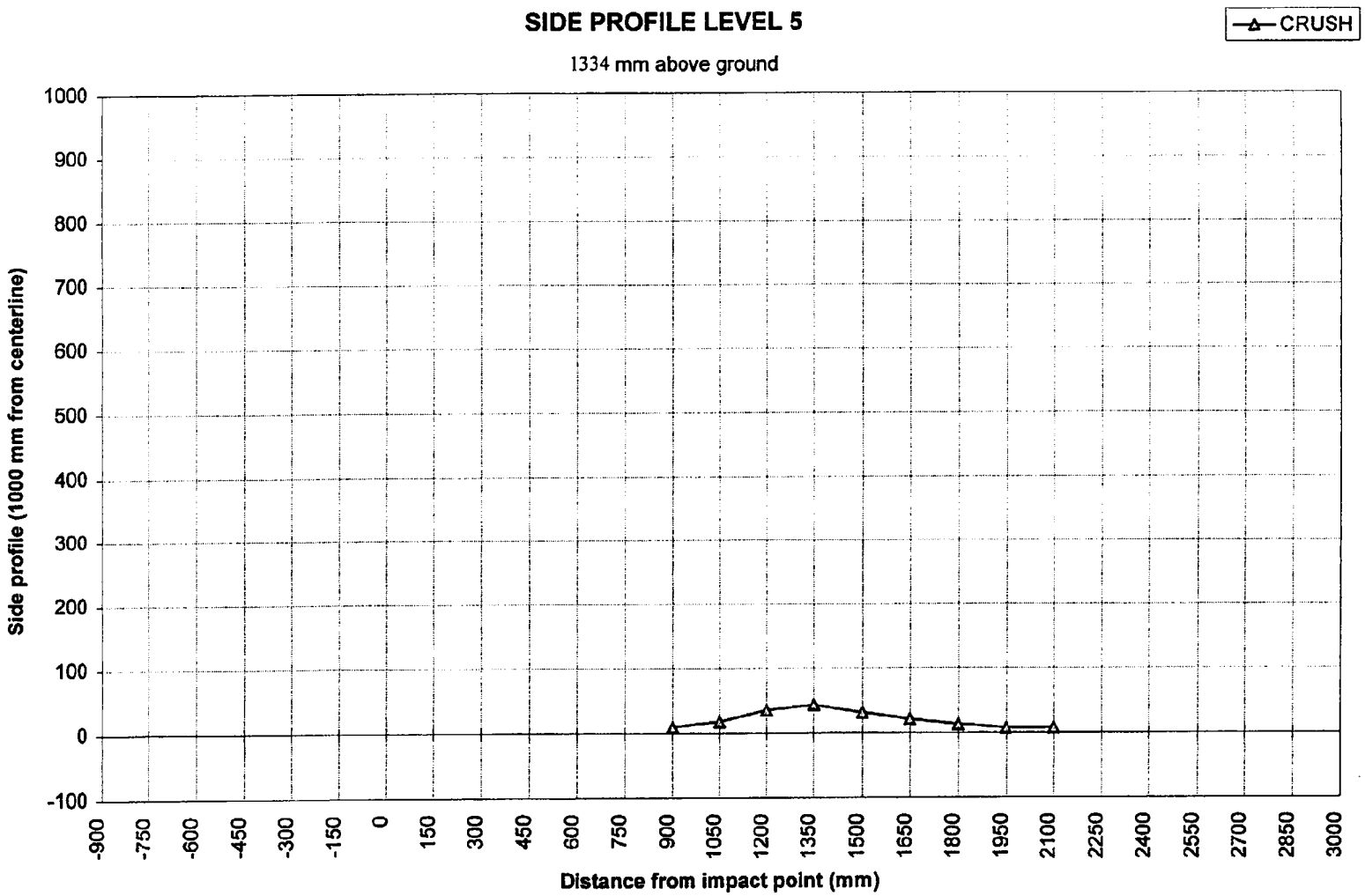


DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

Vehicle: 1998 Subaru Impreza Outback Sport

NHTSA No. CW5501

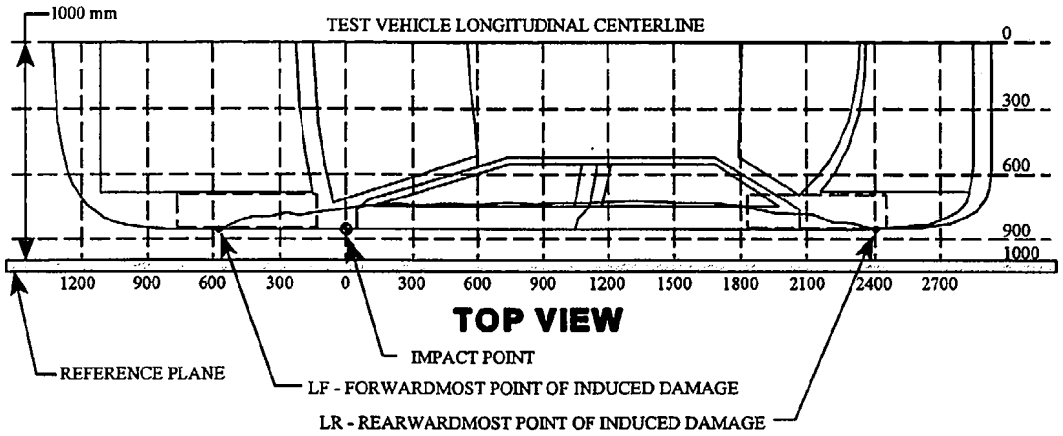


DATA SHEET 11

VEHICLE DAMAGE PROFILE DISTANCES

Vehicle: 1998 Subaru Impreza Outback Sport

NHTSA No. CW5501



MEASUREMENT CONVENTIONS:
Forward of the impact point (towards front of vehicle) is considered negative (—).
Rearward of the impact point (toward rearend of vehicle) is considered positive (+).

NOTE: All dimensions are in millimeters with tolerance of ±3 mm.

DPD MEASUREMENTS		POST TEST (mm)	PRETEST (mm)	STATIC CRUSH (mm)
1	(LF = 40 mm)	304	173	131
2	572	487	186	301
3	1104	490	184	306
4	1636	472	183	289
5	2168	251	241	10
6	(LR = 2700 mm)	234	221	13

DATA SHEET 12

EXTERIOR STATIC CRUSH FOR IMPACTOR FACE
(Grid as looking at MDB from front)

Vehicle: 1998 Subaru Impreza Outback Sport

NHTSA No. CW5501

NOTE: All dimensions are in millimeters with a tolerance of ±3 mm

			DISTANCE RIGHT OF CENTER (mm)									DISTANCE LEFT OF CENTER (mm)							
LEVEL	HEIGHT AT CL (mm)*		800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
LEVEL 4		PRE	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619
TOP	831	POST	661	624	611	609	609	612	613	615	616	618	622	624	625	630	665	707	740
STACK		CRUSH	42	5	-8	-9	-9	-7	-6	-4	-3	-1	3	5	6	12	46	88	121
LEVEL 3		PRE	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619
MID	684	POST	636	620	607	611	610	612	618	614	613	613	615	616	618	619	628	667	701
LEVEL		CRUSH	18	1	-11	-7	-8	-7	-1	-4	-6	-6	-4	-3	-1	1	10	48	82
LEVEL 2		PRE	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619
TOP	535	POST	654	642	627	618	622	621	615	610	607	616	616	619	618	624	624	639	659
BUMPER		CRUSH	36	24	9	0	3	3	-4	-9	-12	-2	-3	0	0	5	5	20	40
LEVEL 1		PRE	535	519	518	518	518	518	518	518	518	518	518	518	518	518	518	519	535
MID	433	POST	618	599	584	565	559	568	555	541	533	527	523	521	525	525	531	561	584
BUMPER		CRUSH	83	80	66	47	41	50	37	23	15	8	5	3	7	7	13	41	49

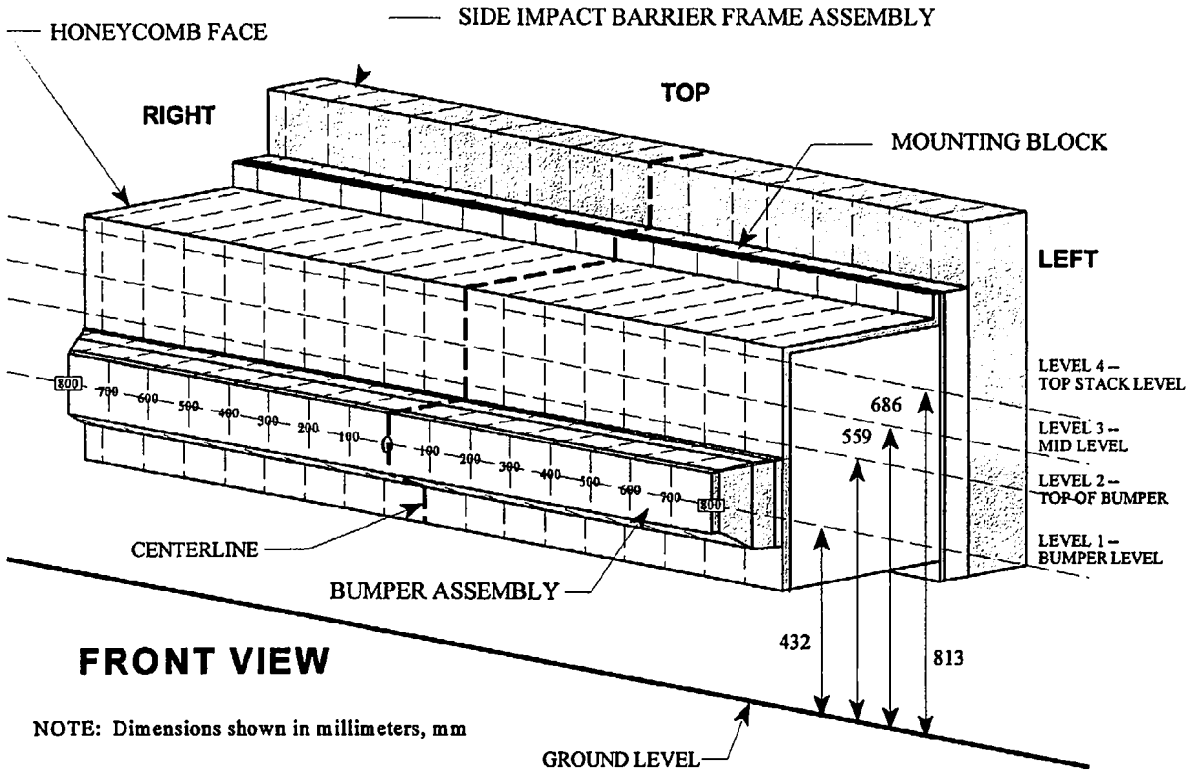
*Heights measured above ground level.

DATA SHEET 12 (continued)

EXTERIOR STATIC CRUSH FOR IMPACTOR FACE

Vehicle: 1998 Subaru Impreza Outback Sport

NHTSA No. CW5501



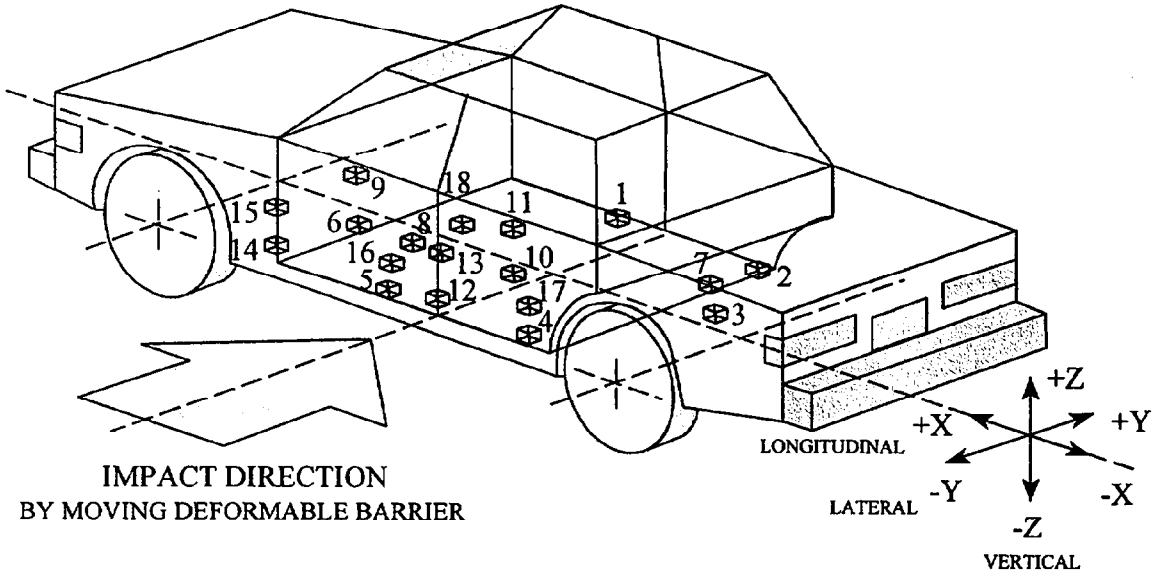
NOTE: Dimensions shown in millimeters, mm

DATA SHEET 13

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Vehicle: 1998 Subaru Impreza Outback Sport

NHTSA No. CW5501



1-Right Side Sill @ Front Seat
2-Right Side Sill @ Rear Seat
3-Rear Floorpan Above Axle
4-Left Side Sill @ Rear Seat
5-Left Side Sill @ Front Seat
6-Left Front Door on Centerline
7-Right Rear Occupant Compartment
8-Midrear of Left Front Door
9-Left Front Door Upper Centerline
10-Midrear of Left Rear Door
11-Left Rear Door Upper Centerline
12-Left Lower B-Pillar
13-Left Middle B-Pillar
14-Left Lower A-Pillar
15-Left Middle A-Pillar
16-Front Seat Track
17-Rear Seat Track
18-Vehicle CG

DATA SHEET 13 (continued)

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501

Accel. No.	Location	Coordinates (mm)±3 mm				Long. (x)		Lat. (y)		Vert. (z)		Resultant	
		X*	Y*	Z*		Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
1	Right Side Sill at Front Seat	2593	768	444	pos. neg.	4.7 -11.3	55.1 15.6	25.7 -1.9	5.4 195.2	4.9 -6.1	21.2 9.0	26.3	5.5
2	Right Side Sill at Rear Seat	1873	789	446	pos. neg.	5.4 -8.0	55.2 16.0	21.9 -2.1	8.7 195.5	4.0 -5.6	91.0 10.1	23.0	8.6
3	Rear Floorpan Above Axle	945	0	603	pos. neg.	3.4 -8.4	4.4 8.7	17.6 -3.0	33.2 145.4	9.4 -15.0	20.5 25.4	22.9	25.5
4	Left Side Sill at Rear Seat	1821	-626	486	pos. neg.	-	-	43.3 -15.5	2.8 41.8	-	-	-	-
5	Left Side Sill at Front Seat	2575	-611	439	pos. neg.	-	-	24.1 -11.0	2.8 7.1	-	-	-	-
6**	Left Front Door on Centerline	-	-	-	pos. neg.	-	-	-	-	-	-	-	-
7	Right Rear Occupant Compartment	1914	307	379	pos. neg.	-	-	27.5 -2.1	5.5 157.7	-	-	-	-
8**	Midrear of Left Front Door	-	-	-	pos. neg.	-	-	-	-	-	-	-	-
9**	Left Front Door Upper Centerline	-	-	-	pos. neg.	-	-	-	-	-	-	-	-
10**	Midrear of Left Rear Door	-	-	-	pos. neg.	-	-	-	-	-	-	-	-
11**	Left Rear Door Upper Centerline	-	-	-	pos. neg.	-	-	-	-	-	-	-	-

*Reference: X - Rear Bumper (+ Forward) Y - Vehicle Centerline (+ To Right) Z - Ground Level (+ Up)

**Accelerometer was not requested by COTR.

DATA SHEET 13 (continued)

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501

Accel. No.	Location	Coordinates (mm) ±3 mm				Long. (x)		Lat. (y)		Vert. (z)		Resultant	
		X*	Y*	Z*		Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
12†	Left Lower B-Pillar	1978	-714	704	pos. neg.	-	-	†	†	-	-	-	-
13	Left Middle B-Pillar	1978	-714	929	pos. neg.	-	-	123.7 -55.4	2.4 19.4	-	-	-	-
14	Left Lower A-Pillar	3014	-673	499	pos. neg.	-	-	89.3 -19.2	2.8 25.6	-	-	-	-
15	Left Middle A-Pillar	3237	-686	948	pos. neg.	-	-	15.0 -2.3	28.9 268.7	-	-	-	-
16	Front Seat Track	2058	-579	480	pos. neg.	-	-	45.6 -8.0	15.1 43.5	-	-	-	-
17**	Rear Seat Track	-	-	-	pos. neg.	-	-	-	-	-	-	-	-
18	Vehicle CG	2381	0	570	pos. neg.	5.7 -11.1	46.1 8.8	20.5 -2.2	4.9 260.6	8.3 -5.7	28.0 17.1	23.5	28.1

* Reference: X - Rear Bumper (+ Forward) Y - Vehicle Centerline (+ To Right) Z - Ground Level (+ Up)

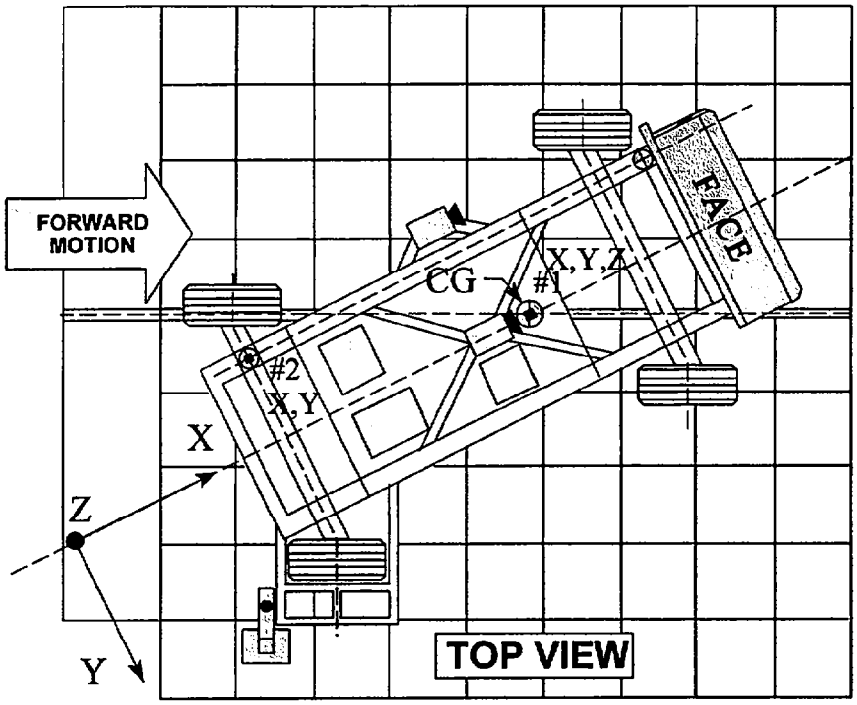
** No accessible mounting location.

† Accelerometer wire was cut approximately 30 msec into the impact.

DATA SHEET 14

MDB ACCELEROMETER LOCATIONS AND DATA SUMMARY

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501



Accel. No.	Location	Coordinates (millimeters)			Pos. Direct.		Neg. Direct.	
		X*	Y*	Z*	Max (g)	Time (msec)	Max (g)	Time (msec)
1	MDB Center of Gravity							
	Longitudinal... X	1859	0	330	1.2	124.4	-17.1	32.4
	Lateral..... Y				1.5	49.6	-6.6	21.8
	Vertical..... Z				8.1	30.7	-6.5	101.5
	Resultant..... R				18.6	31.3	-	-
2	Rear Frame Member							
	Longitudinal... X	386	-660	660	1.7	130.1	-21.2	33.4
	Lateral..... Y				3.8	24.0	-2.2	65.5

*Reference: X = Rear Bumper (+ Forward)

Y = Vehicle Centerline (+ To Right)

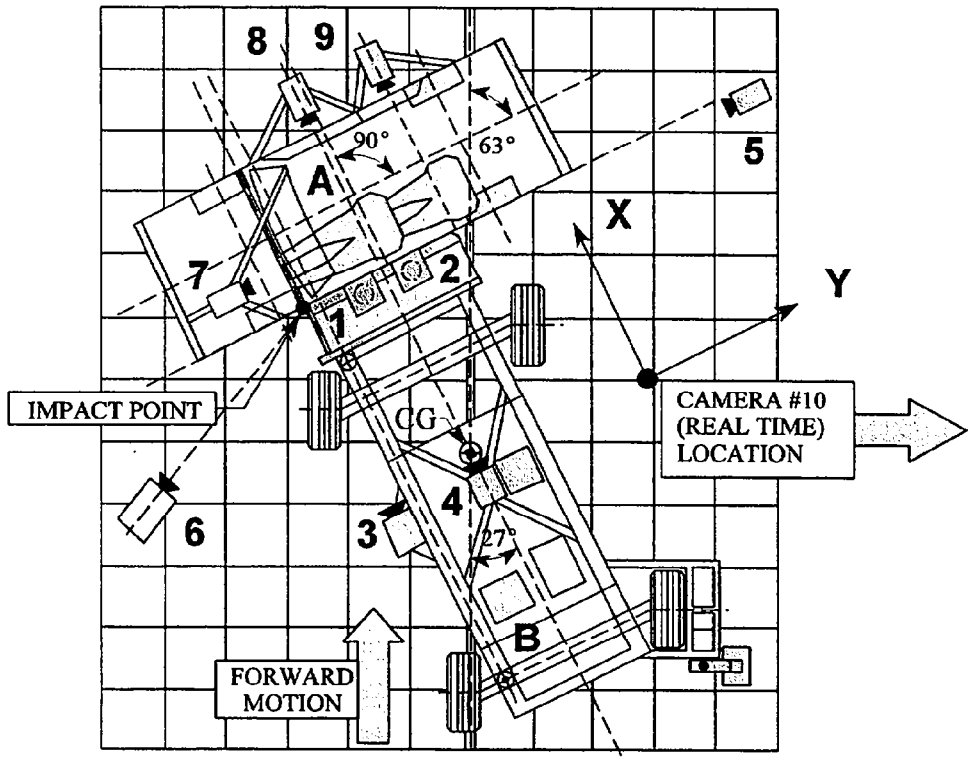
Z = Ground Level (+ Up)

All measurements accurate to within ±3 mm.

DATA SHEET 15

HIGH SPEED CAMERA LOCATIONS AND DATA SUMMARY

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501



Camera No.	View	Coordinates (millimeters)			Angle (deg.)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Overhead view of test vehicle	55	795	4880	-90	8	1000
2	Overhead closeup view of impact plane	395	990	4880	-90	12.5	1000
3	MDB onboard closeup view of impact point	1470	0	847	0	13	985
4	MDB onboard view of driver dummy	1140	838	1586	-17	7.5	910
5	Right side ground level overall view	444	9108	1050	-4	25	1000
6	Left side ground level overall view	-2183	-2956	1085	-5	13	1000
7	Test vehicle onboard driver front view	571	-560	1205	-8	13	1000
8	Test vehicle onboard driver side view	1612	800	978	-8	8	1000
9	Test vehicle onboard passenger side view	1608	1620	975	-13	8	1000
10	Real time film coverage of test	-	-	-	-	-	24

* Reference (from point of impact); all measurements accurate to within ±6 mm.

+X = Forward

+Y = To Right

+Z = Upward

SECTION 5

FUEL SYSTEM INTEGRITY

DATA SHEET 16

FMVSS 301 FUEL SYSTEM INTEGRITY DATA

NHTSA No.: CW5501 TEST DATE: October 28, 1997

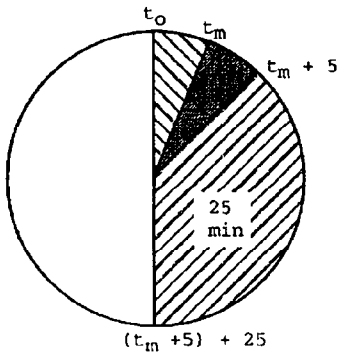
Vehicle Mfgr./Make/Model : 1998 Subaru Impreza Outback Sport 4-Door Wagon

****

TEST VEHICLE IMPACT TYPE :

- \- Frontal (48.28 kph)
- \- Oblique (48.28 kph) with - ° barrier face first contacting the - side (driver/passenger)
- \- Rear Moving Barrier (48.28 kph)
- \- Lateral Moving Barrier (32.19 kph)
- X Side Impact Moving Deformable Barrier (53.91 kph) contacting the driver side side (driver/passenger)

FUEL SPILLAGE MEASUREMENT:



	ACTUAL	MAX ALLOWED
1. From impact until vehicle motion ceases	0 g	28 g
2. For five minute period after vehicle motion ceases	0 g	142 g
3. For next 25 minutes	0 g	28 g/1 min.

SOLVENT SPILLAGE DETAILS :

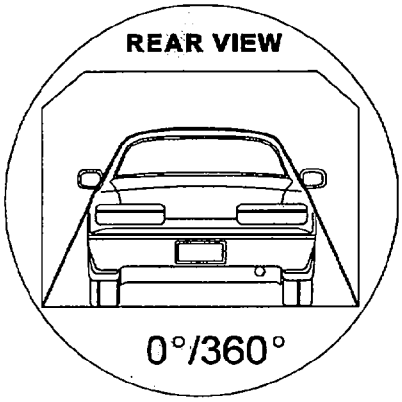
None

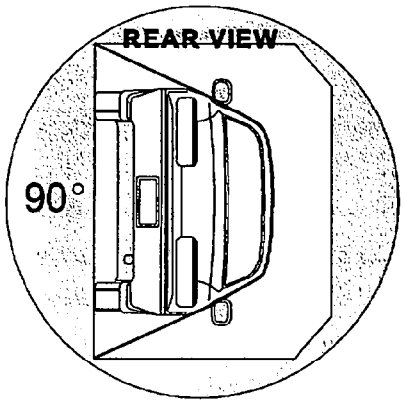
DATA SHEET 17

ROLLOVER DATA

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501

0 - 90 Degrees





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	6	seconds
FMVSS 301 Position Hold Time +	5	minutes	0	seconds
TOTAL	6	minutes	6	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 required)

(2) Maximum Allowable Solvent Spillage

142 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0 g	0 g	0 g	N/A

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

IV. SOLVENT SPILLAGE LOCATION(S) :

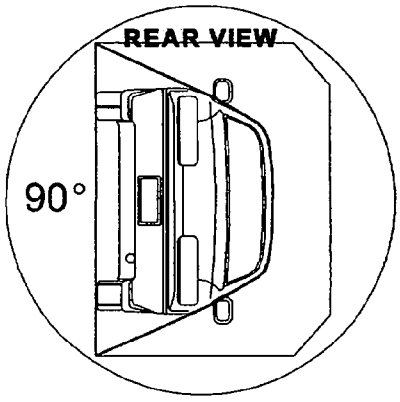
None

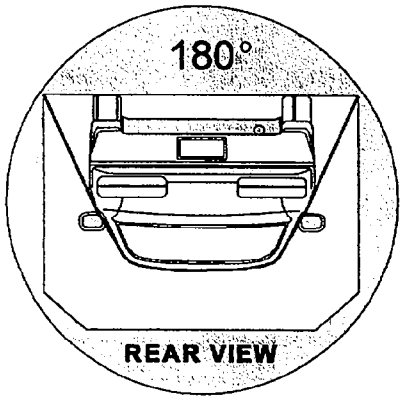
DATA SHEET 17 (continued)

ROLLOVER DATA

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501

90 - 180 Degrees





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time	1	minutes	5	seconds
(Spec. Range = 1 to 3 minutes)				
FMVSS 301 Position Hold Time +	5	minutes	0	seconds
TOTAL	6	minutes	5	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 required)

(2) Maximum Allowable Solvent Spillage

142 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0 g	0 g	0 g	N/A

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

IV. SOLVENT SPILLAGE LOCATION(S) :

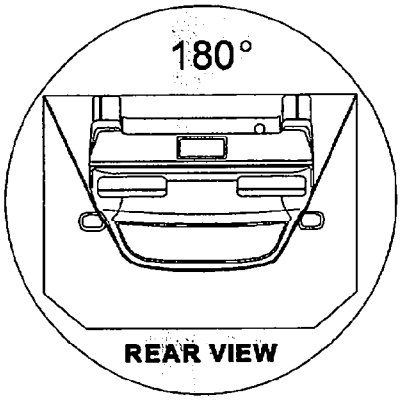
None

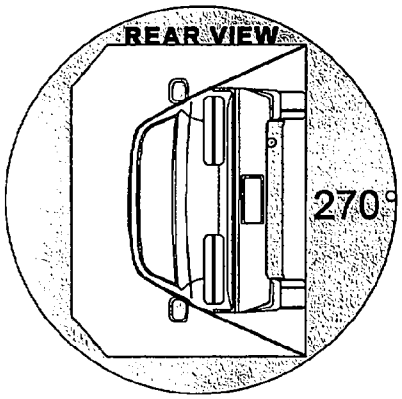
DATA SHEET 17 (continued)

ROLLOVER DATA

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501

180 - 270 Degrees





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	10	seconds
FMVSS 301 Position Hold Time +	5	minutes	0	seconds
TOTAL	6	minutes	10	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 required)

(2) Maximum Allowable Solvent Spillage

142 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0 g	0 g	0 g	N/A

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

IV. SOLVENT SPILLAGE LOCATION(S) :

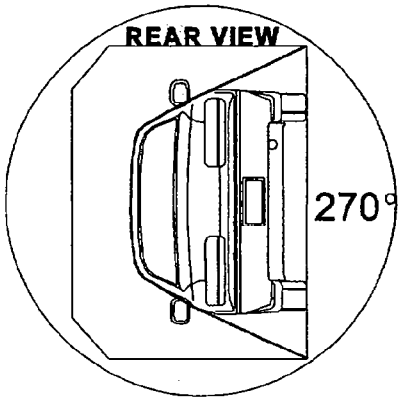
None

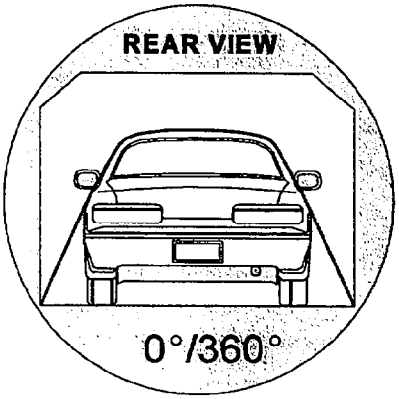
DATA SHEET 17 (continued)

ROLLOVER DATA

Vehicle: 1998 Subaru Impreza Outback Sport NHTSA No. CW5501

270 - 360 Degrees





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	6	seconds
FMVSS 301 Position Hold Time +	5	minutes	0	seconds
TOTAL	6	minutes	6	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 required)

(2) Maximum Allowable Solvent Spillage

142 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0 g	0 g	0 g	N/A

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

IV. SOLVENT SPILLAGE LOCATION(S) :

None

APPENDIX A

PHOTOGRAPHS

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Figure A- 3	PRE-TEST REAR VIEW OF TEST VEHICLE	A- 5
Figure A- 4	POST-TEST REAR VIEW OF TEST VEHICLE	A- 6
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Figure A- 7	PRE-TEST FRONTAL VIEW OF IMPACTOR FACE	A- 9
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Figure A- 18	POST-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF FRONT SID	A- 20
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Figure A- 21	PRE-TEST LEFT OCCUPANT COMPARTMENT VIEW OF FRONT SID	A- 23
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Figure A- 25	PRE-TEST INTERIOR OF FRONT DOOR	A- 27
Figure A- 26	POST-TEST INTERIOR OF FRONT DOOR SHOWING SID IMPACT LOCATIONS	A- 28
Figure A- 27	PRE-TEST INTERIOR OF REAR DOOR	A- 29
Figure A- 28	POST-TEST INTERIOR OF REAR DOOR SHOWING SID IMPACT LOCATIONS	A- 30
Figure A- 29	PRE-TEST LEFT SIDE VIEW OF MDB WITH IMPACTOR FACE IN POSITION	A- 31
Figure A- 30	PRE-TEST RIGHT SIDE VIEW OF MDB WITH IMPACTOR FACE IN POSITION	A- 32
Figure A- 31	POST-TEST CLOSE-UP VIEW OF IMPACT POINT TARGET	A- 33
Figure A- 32	CLOSE-UP VIEW OF VEHICLE'S CERTIFICATION LABEL	A- 34
Figure A- 33	CLOSE-UP VIEW OF VEHICLE'S TIRE PLACARD LABEL	A- 35
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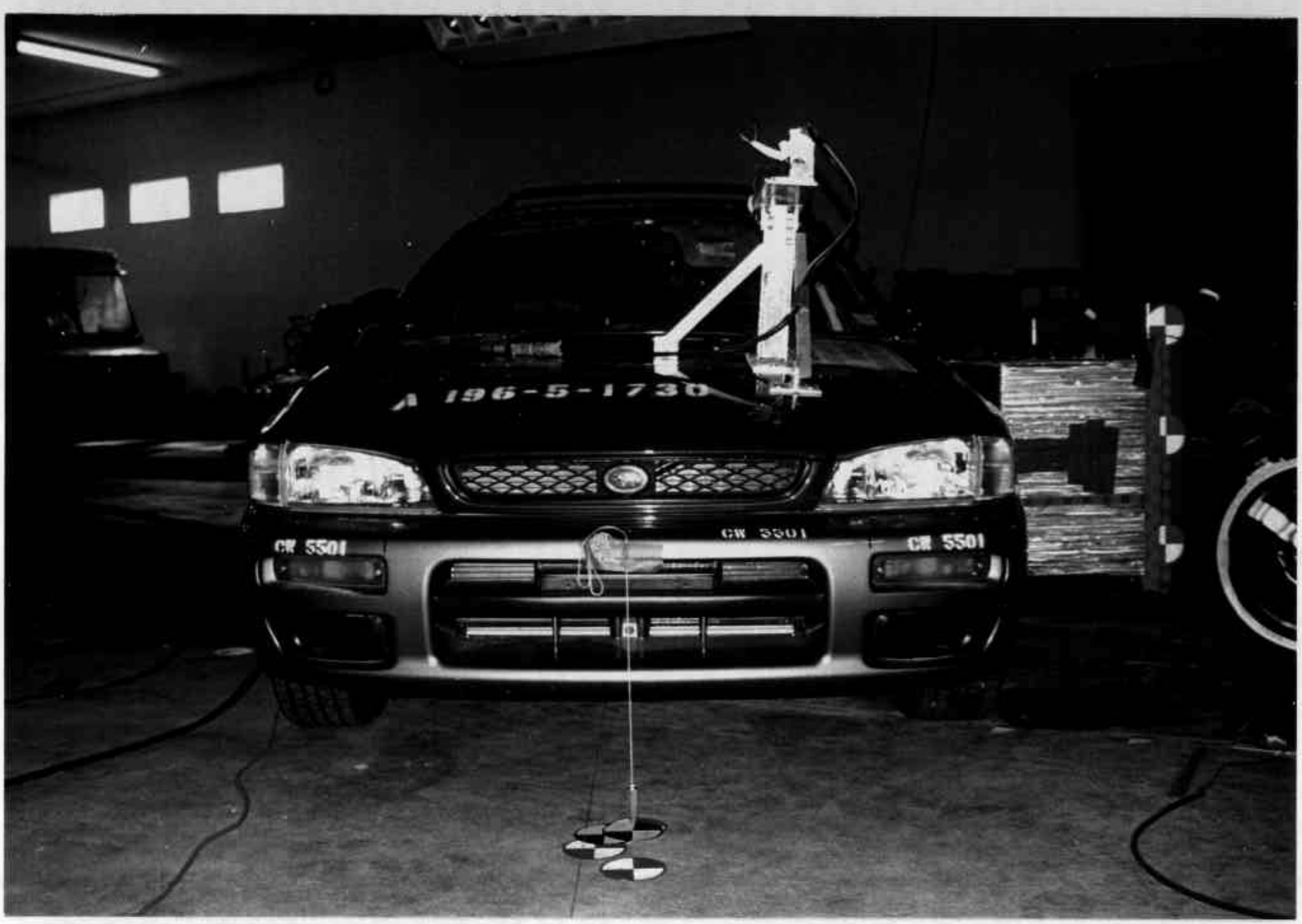


Figure A-1 PRE-TEST FRONTAL VIEW OF TEST VEHICLE

Figure A-2 POST-TEST FRONTAL VIEW OF TEST VEHICLE

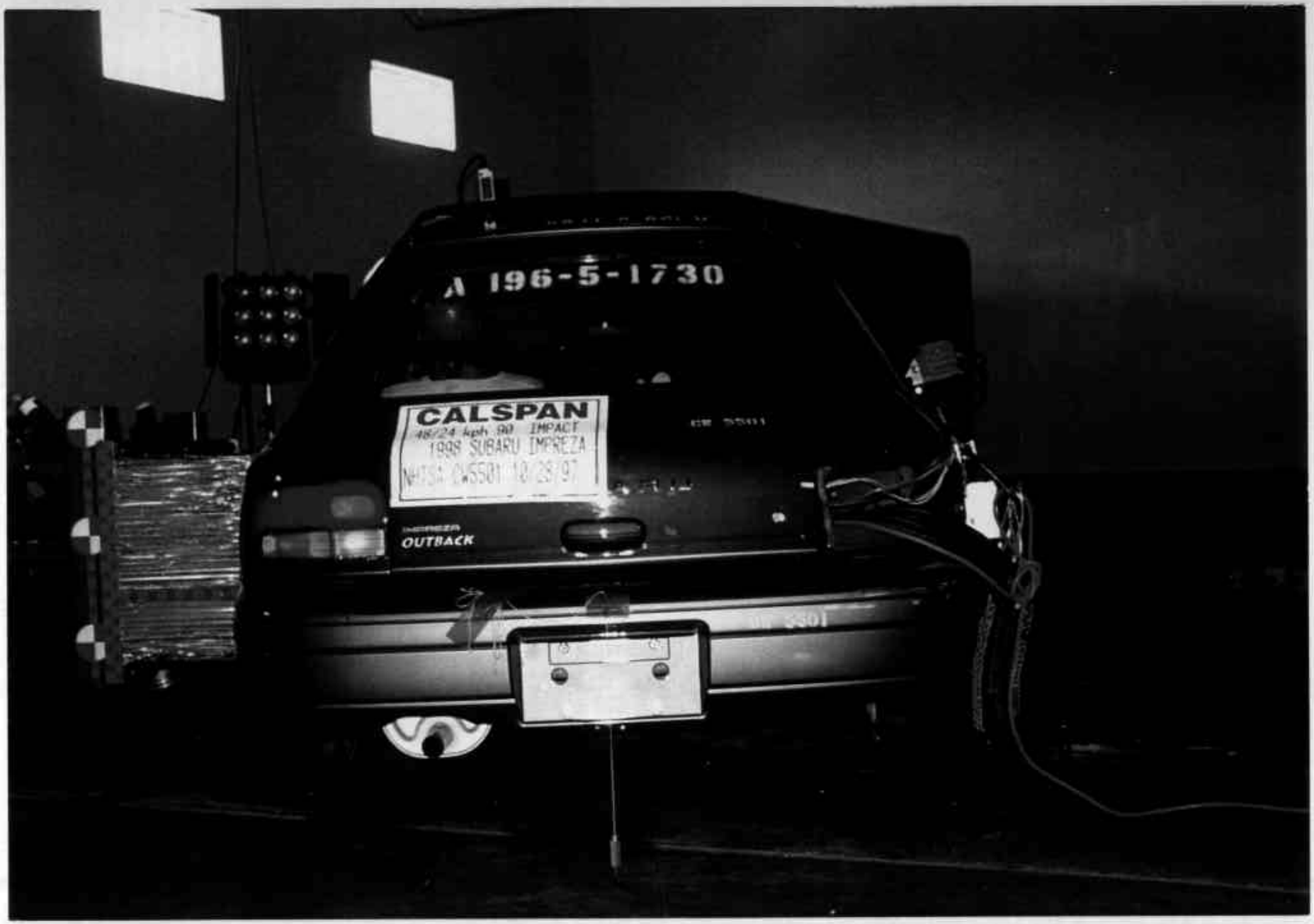


Figure A-3 PRE-TEST REAR VIEW OF TEST VEHICLE

Figure A-4 POST-TEST REAR VIEW OF TEST VEHICLE

Figure A-5 PRE-TEST IMPACTED SIDE VIEW OF TEST VEHICLE

Figure A-6 POST-TEST IMPACTED SIDE VIEW OF TEST VEHICLE

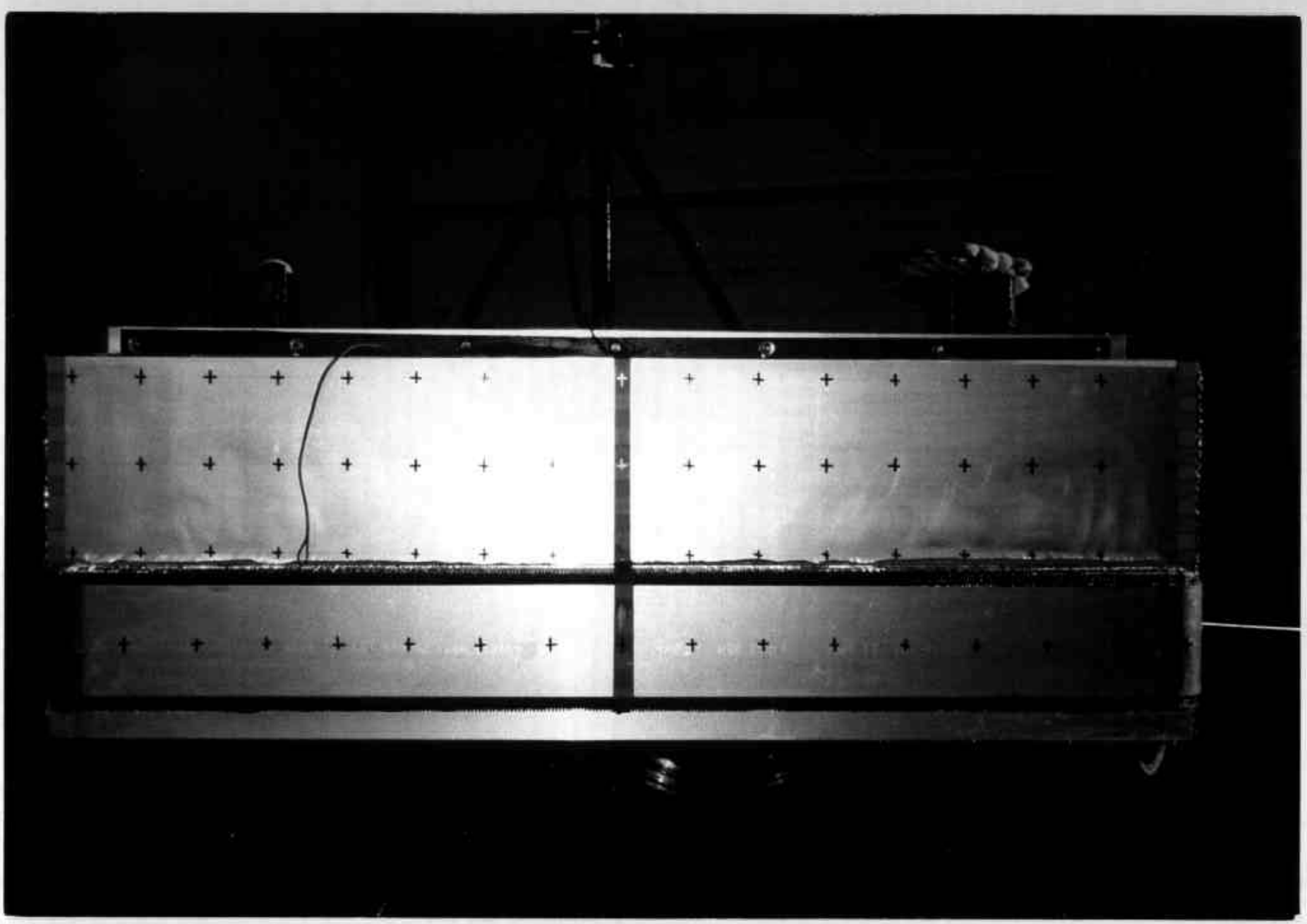


Figure A-7 PRE-TEST FRONTAL VIEW OF IMPACTOR FACE

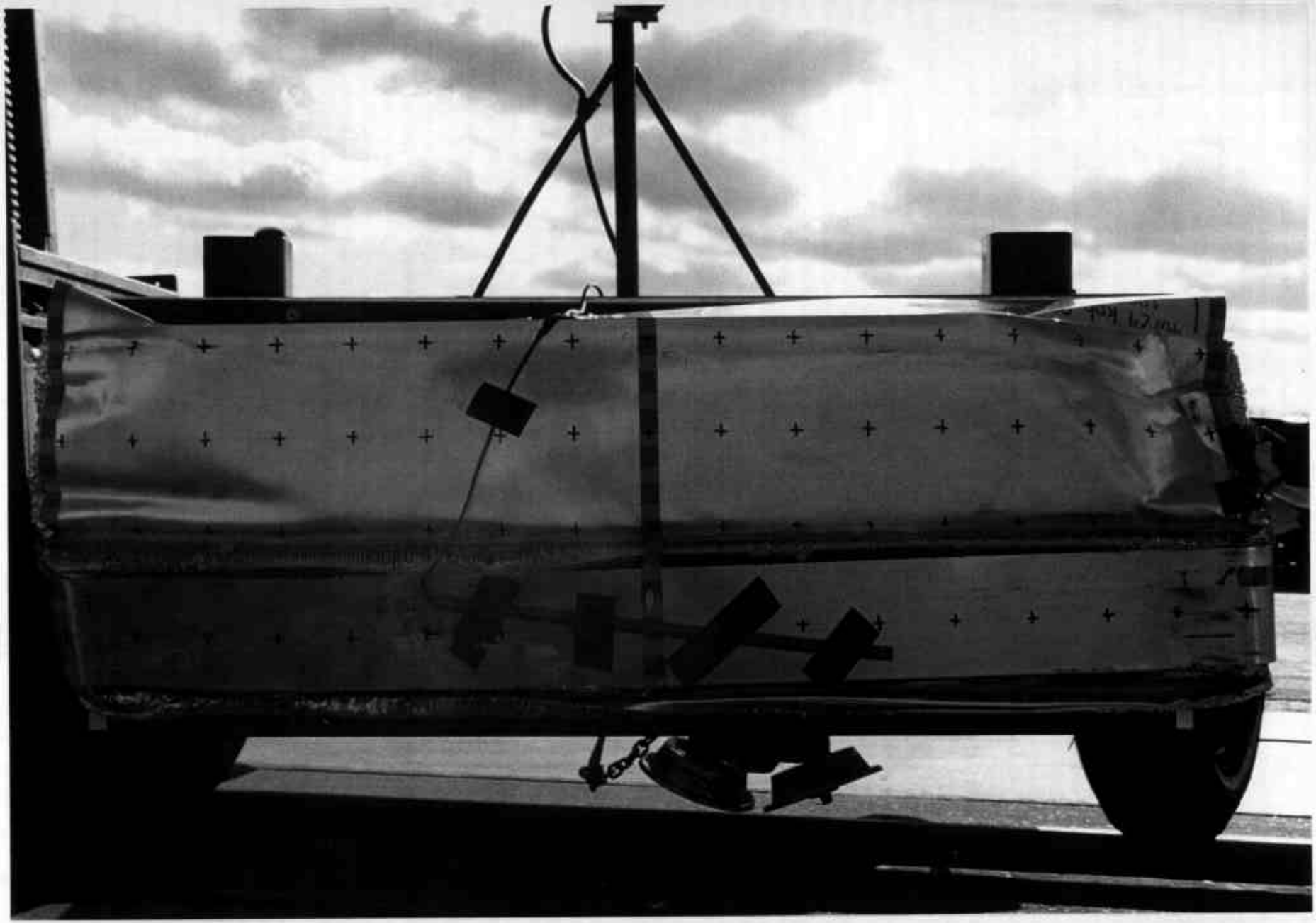


Figure A-8 POST-TEST FRONTAL VIEW OF IMPACTOR FACE

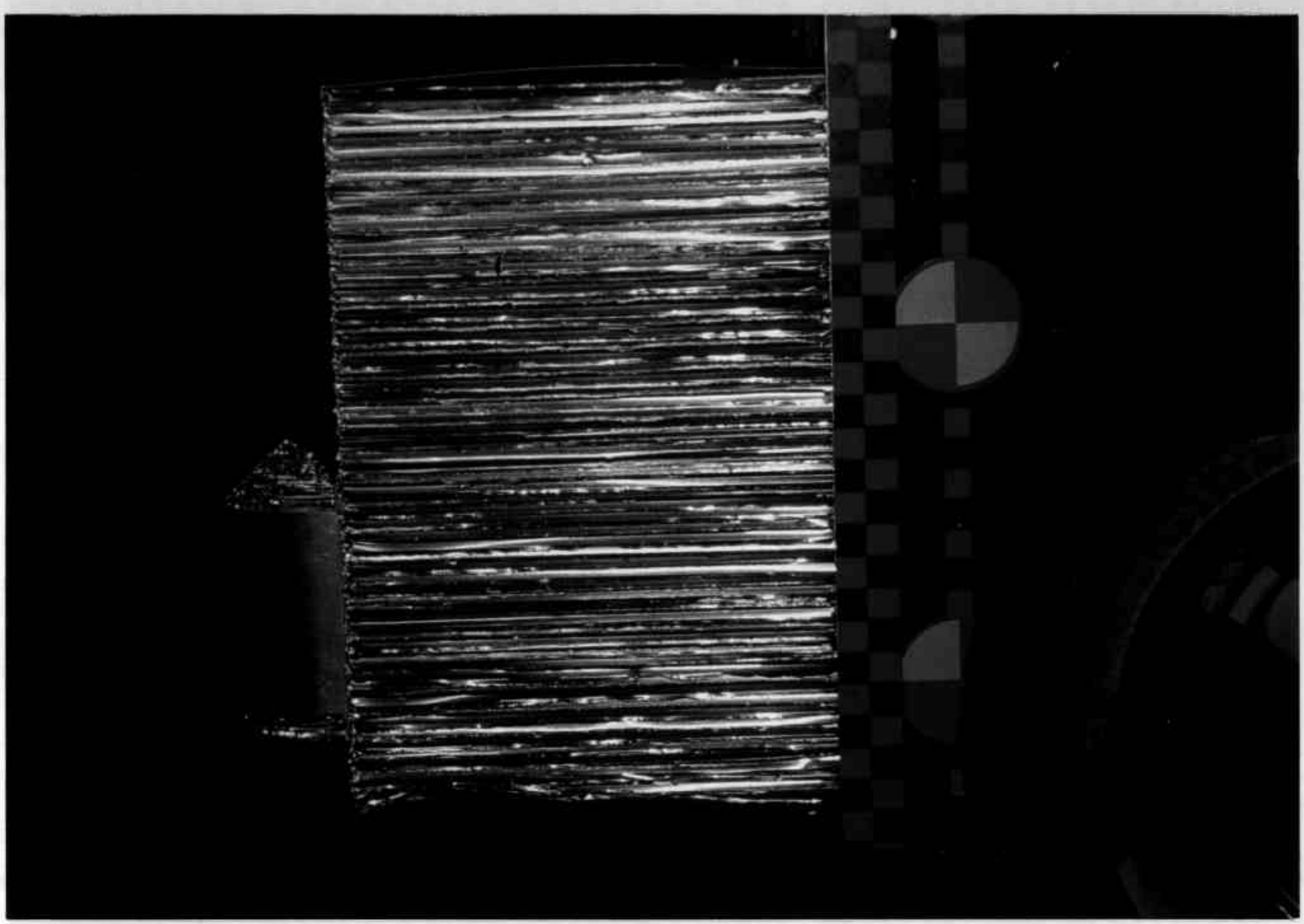
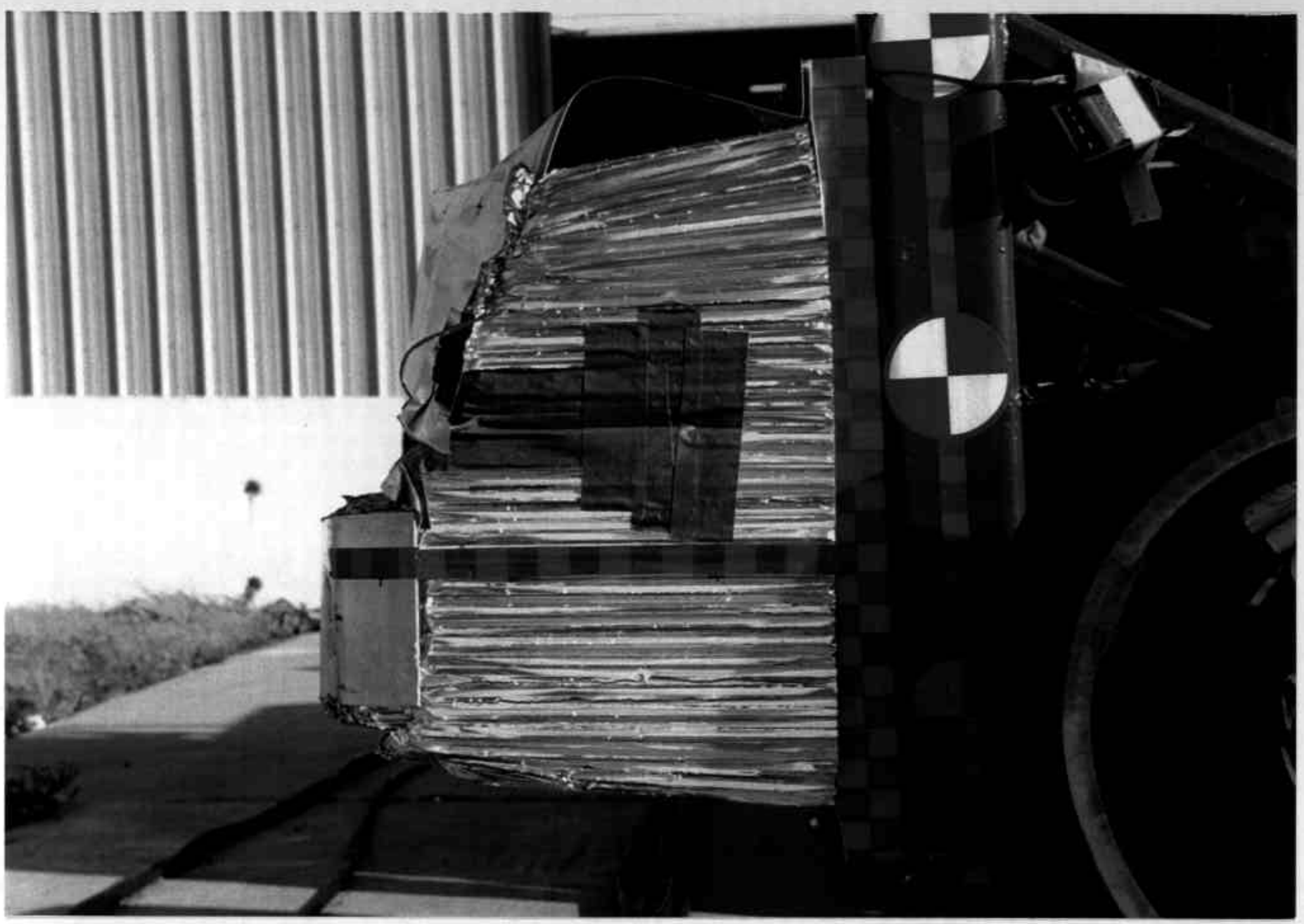


Figure A-9 PRE-TEST LEFT SIDE VIEW OF IMPACTOR FACE



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8455-5

Figure A-10 POST-TEST LEFT SIDE VIEW OF IMPACTOR FACE

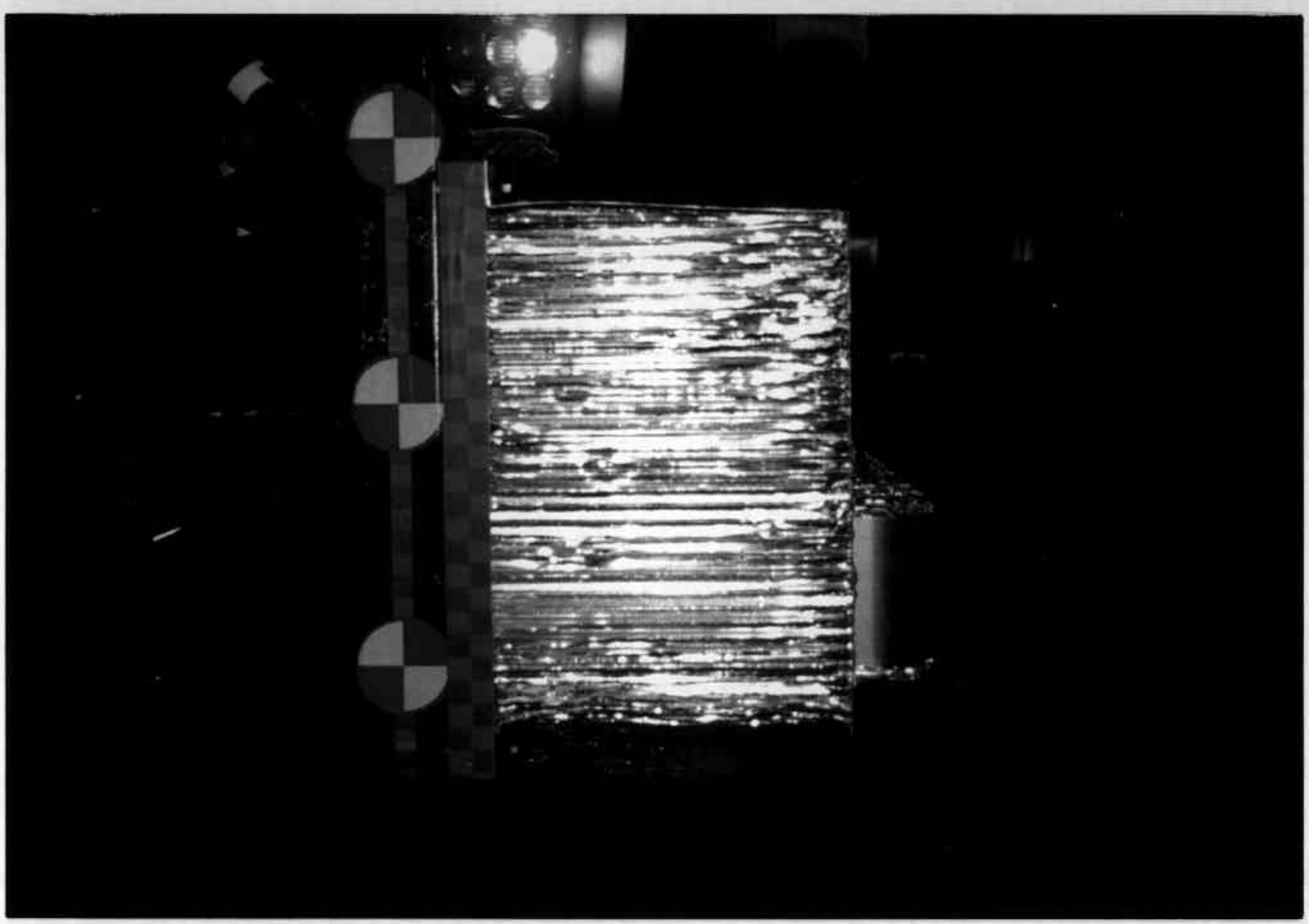
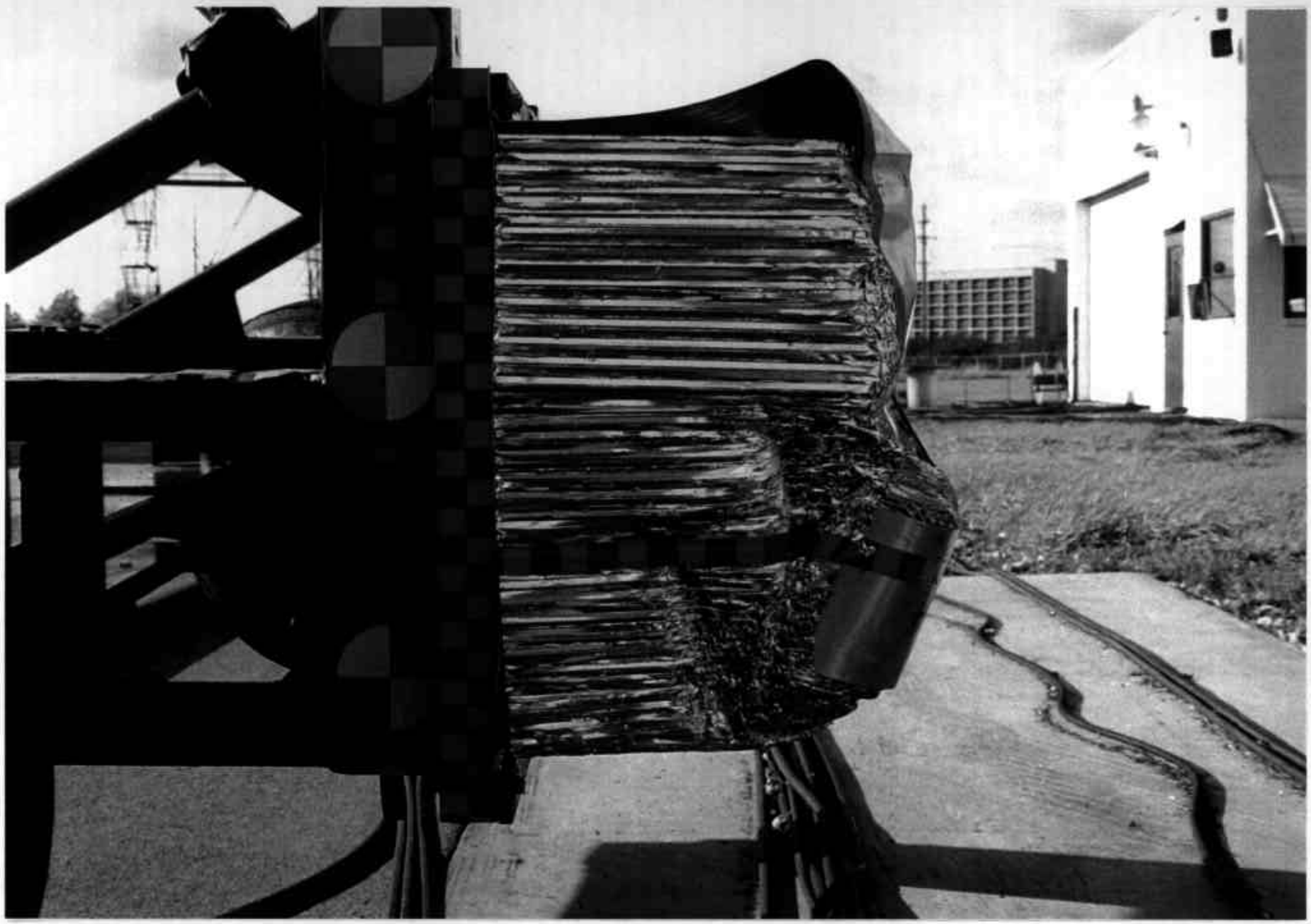


Figure A-11 PRE-TEST RIGHT SIDE VIEW OF IMPACTOR FACE



A-14

8455-5

Figure A-12 POST-TEST RIGHT SIDE VIEW OF IMPACTOR FACE

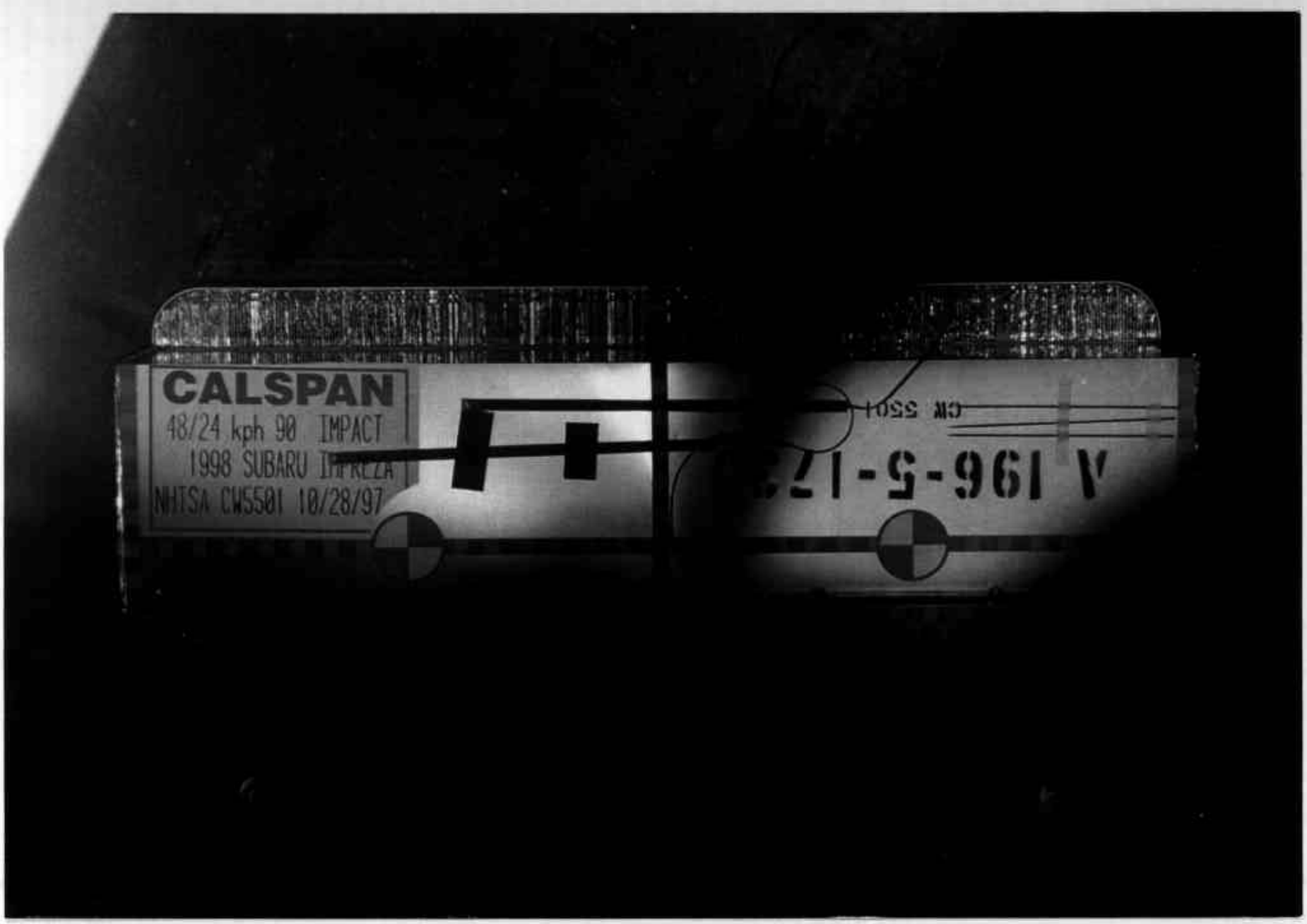


Figure A-13 PRE-TEST TOP VIEW OF IMPACTOR FACE

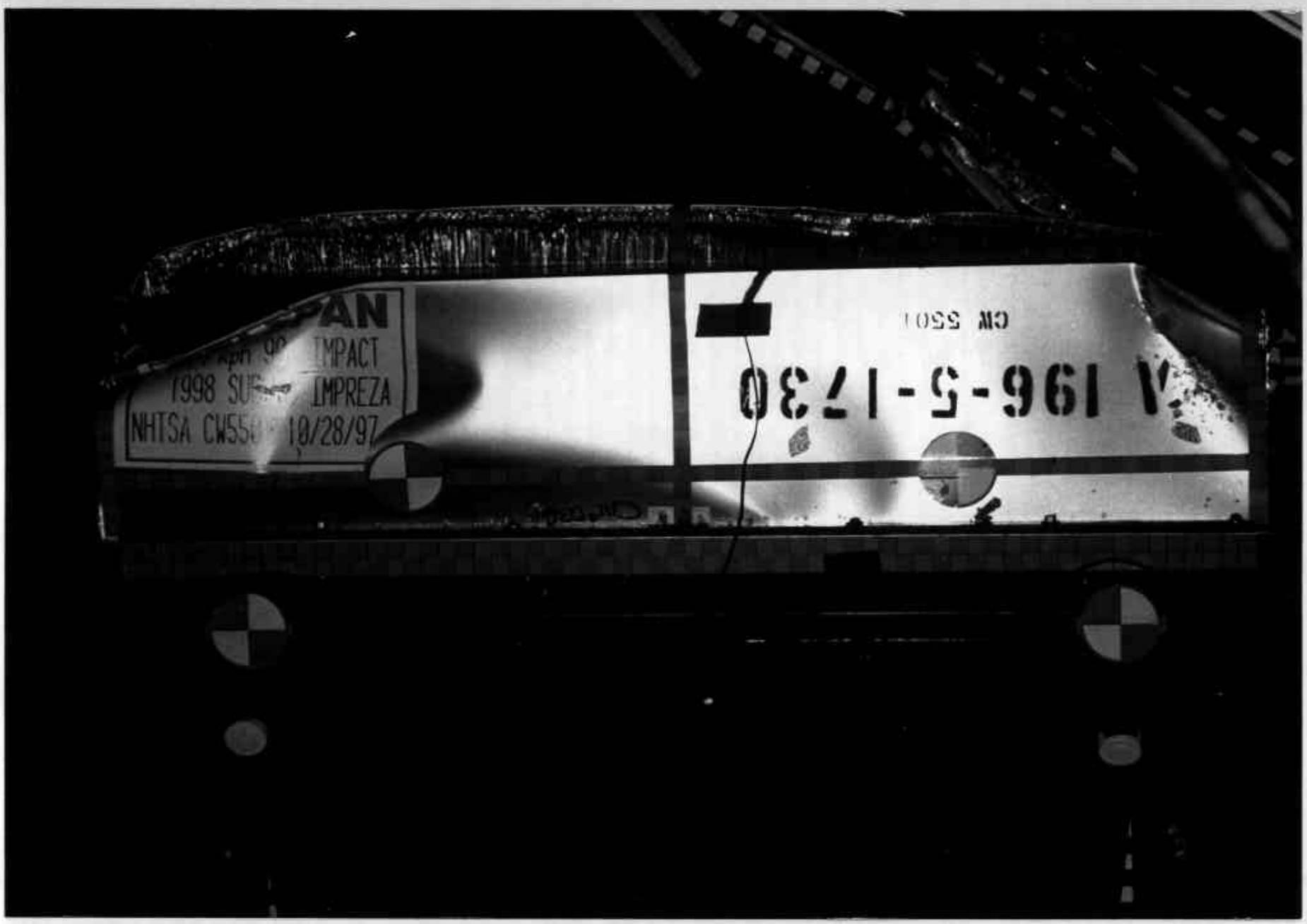


Figure A-14 POST-TEST TOP VIEW OF IMPACTOR FACE

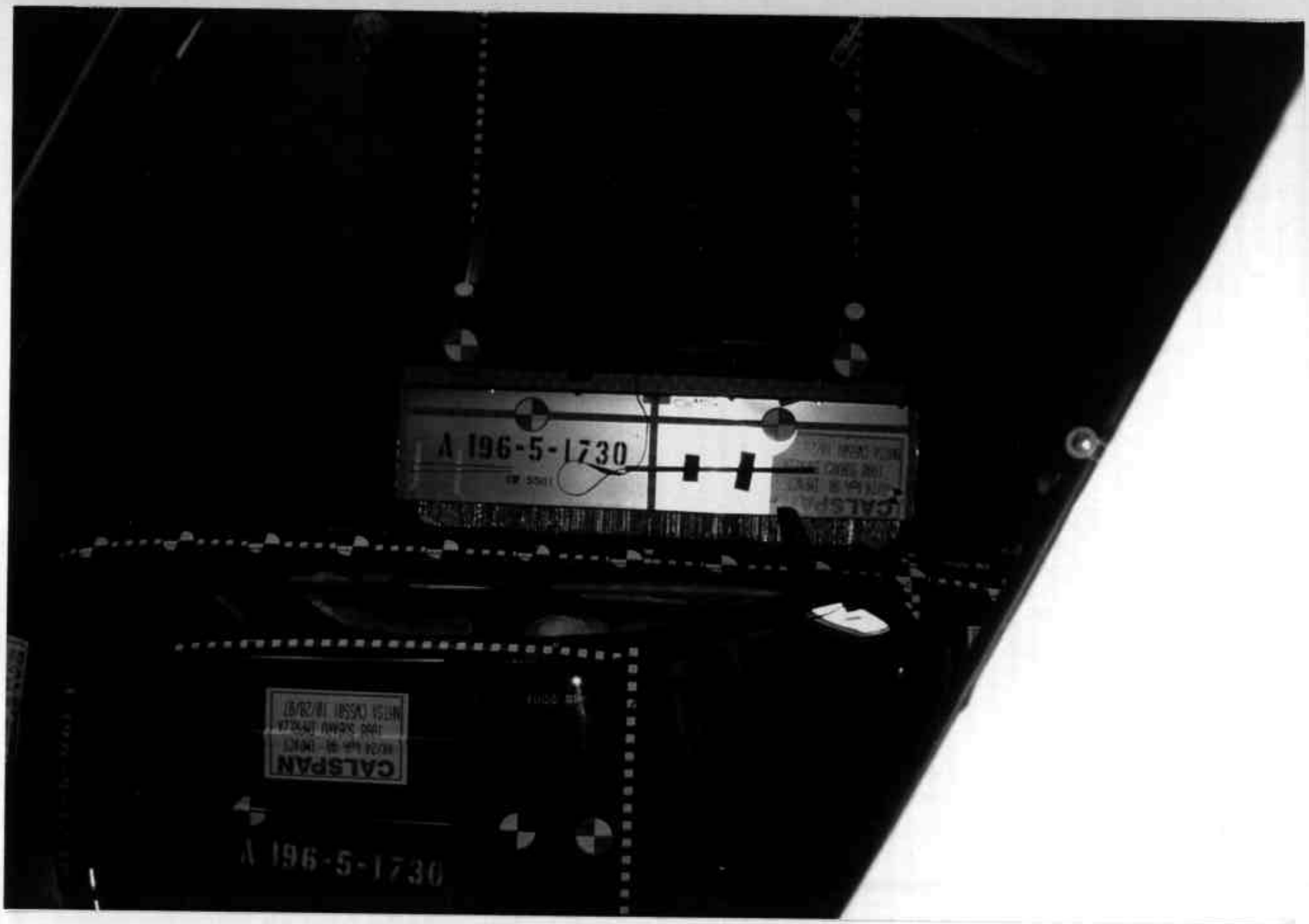


Figure A-15 PRE-TEST OVERHEAD VIEW OF ALIGNED MDB AND VEHICLE

8455-5

Figure A-16 POST-TEST OVERHEAD VIEW OF MDB AND VEHICLE

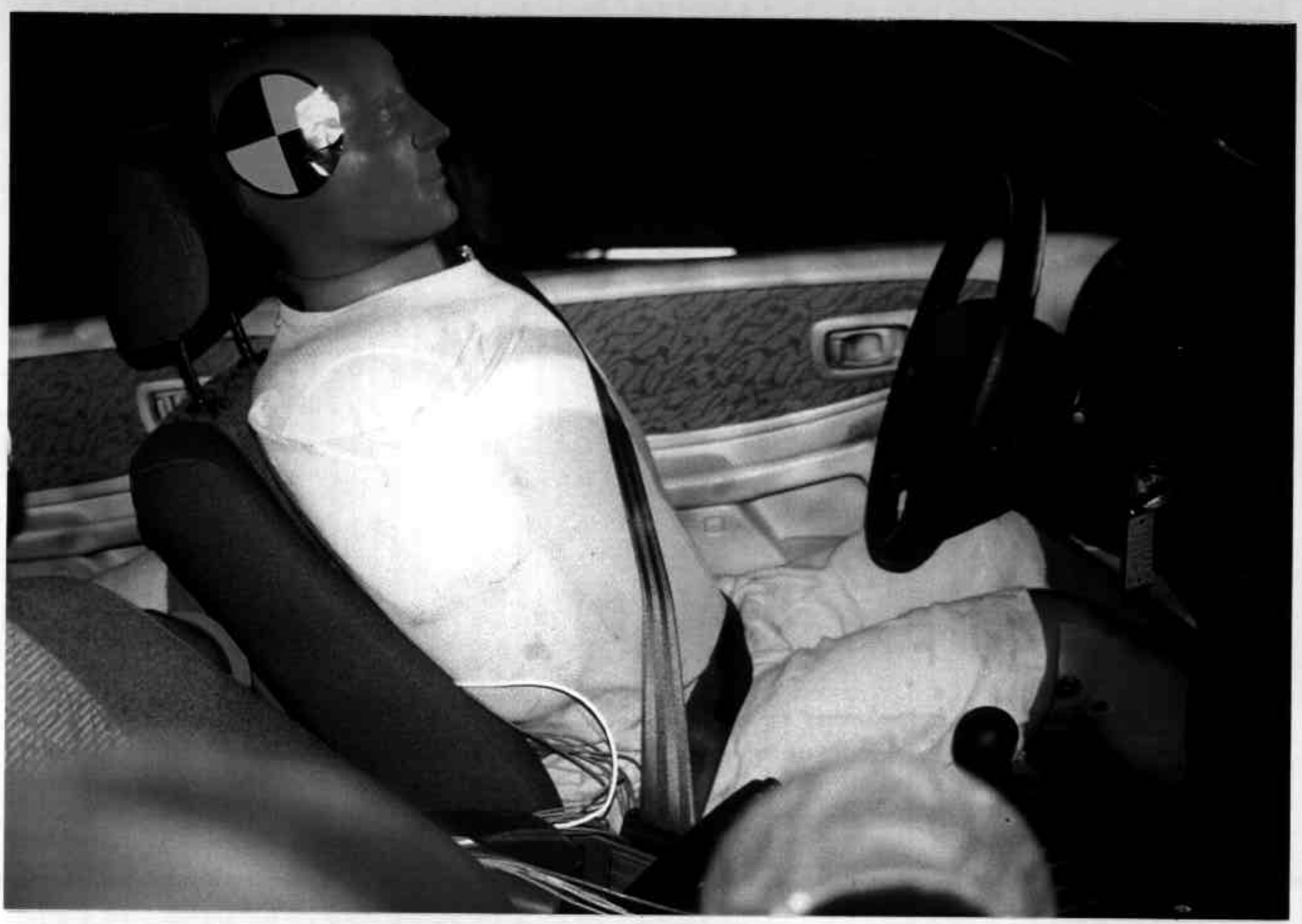


Figure A-17 PRE-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF FRONT SID

Figure A-18 POST-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF FRONT SID

Figure A-19 PRE-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF REAR SID

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Figure A-20 POST-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF REAR SID

Figure A-21 PRE-TEST LEFT OCCUPANT COMPARTMENT VIEW OF FRONT SID

Figure A-22 POST-TEST LEFT OCCUPANT COMPARTMENT VIEW OF FRONT SID

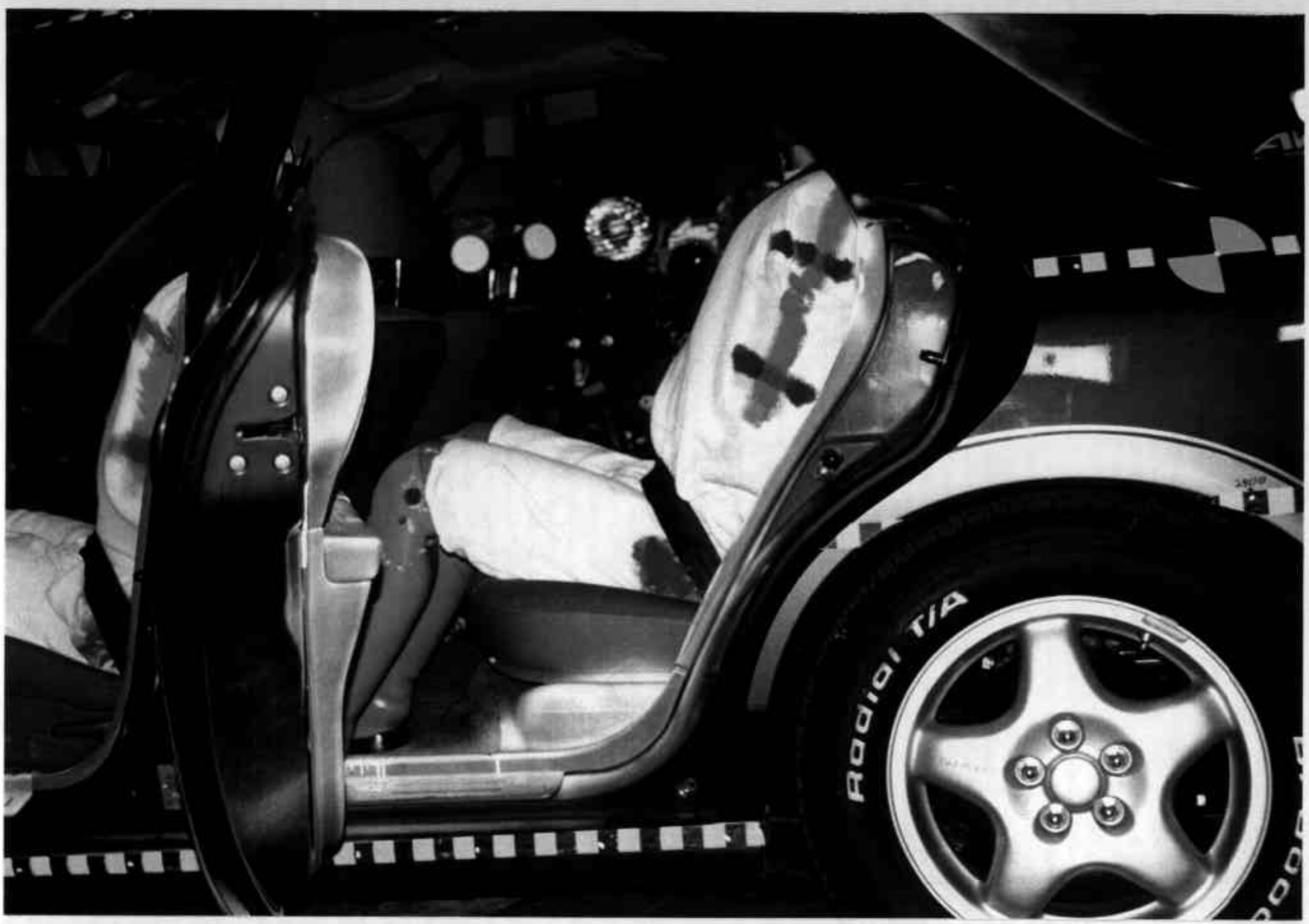

Figure A-23 PRE-TEST LEFT OCCUPANT COMPARTMENT VIEW OF REAR SID

Figure A-24 POST-TEST LEFT OCCUPANT COMPARTMENT VIEW OF REAR SID

Figure A-25 PRE-TEST INTERIOR OF FRONT DOOR

A-28

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Figure A-26 POST-TEST INTERIOR OF FRONT DOOR SHOWING SID IMPACT LOCATIONS

Figure A-27 PRE-TEST INTERIOR OF REAR DOOR

Figure A-28 POST-TEST INTERIOR OF REAR DOOR SHOWING SID IMPACT LOCATIONS

Figure A-29 PRE-TEST LEFT SIDE VIEW OF MDB WITH IMPACTOR FACE IN POSITION

Figure A-30 PRE-TEST RIGHT SIDE VIEW OF MDB WITH IMPACTOR FACE IN POSITION

Figure A-31 POST-TEST CLOSE-UP VIEW OF IMPACT POINT TARGET

Figure A-32 CLOSE-UP VIEW OF VEHICLE'S CERTIFICATION LABEL

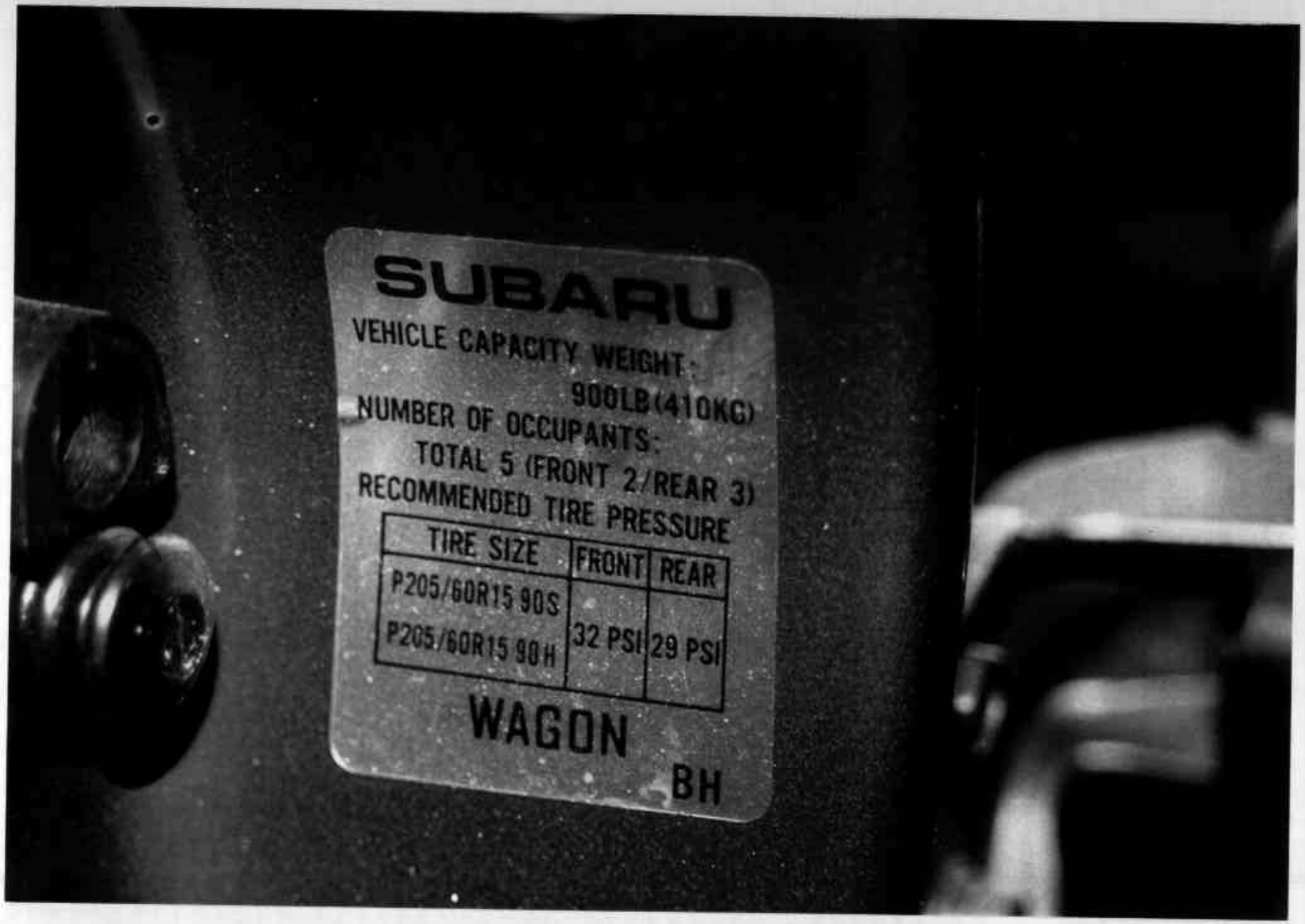


Figure A-33 CLOSE-UP VIEW OF VEHICLE'S TIRE PLACARD LABEL

8455-5

Figure A-34 IMPACT PHOTO

APPENDIX B

VEHICLE, MDB AND SID RESPONSE DATA

TABLE OF DATA PLOTS

DRIVER AND PASSENGER DUMMY INSTRUMENTATION PLOTS
ACCELERATION DATA - FILTER CLASS 180
INTEGRATION DATA - FILTER CLASS 180

Plot No.	Data Plot Title	Page
1	DRIVER UPPER RIB (Y) ACCELERATION VS TIME	B- 6
2	DRIVER UPPER RIB (Y) VELOCITY VS TIME	B- 7
3	DRIVER LOWER RIB (Y) ACCELERATION VS TIME	B- 8
4	DRIVER LOWER RIB (Y) VELOCITY VS TIME	B- 9
5	DRIVER LOWER SPINE (Y) ACCELERATION VS TIME	B- 10
6	DRIVER LOWER SPINE (Y) VELOCITY VS TIME	B- 11
7	DRIVER PELVIC (Y) ACCELERATION VS TIME	B- 12
8	DRIVER PELVIC (Y) VELOCITY VS TIME	B- 13
9	PASSENGER UPPER RIB (Y) ACCELERATION VS TIME	B- 14
10	PASSENGER UPPER RIB (Y) VELOCITY VS TIME	B- 15
11	PASSENGER LOWER RIB (Y) ACCELERATION VS TIME	B- 16
12	PASSENGER LOWER RIB (Y) VELOCITY VS TIME	B- 17
13	PASSENGER LOWER SPINE (Y) ACCELERATION VS TIME	B- 18
14	PASSENGER LOWER SPINE (Y) VELOCITY VS TIME	B- 19
15	PASSENGER PELVIC (Y) ACCELERATION VS TIME	B- 20
16	PASSENGER PELVIC (Y) VELOCITY VS TIME	B- 21

TEST VEHICLE INSTRUMENTATION PLOTS
ACCELERATION DATA - FILTER CLASS 60
INTEGRATION DATA - FILTER CLASS 180

Plot No.	Data Plot Title	Page
17	RIGHT SIDE SILL AT FRONT SEAT (X) ACCELERATION VS TIME	B- 23
18	RIGHT SIDE SILL AT FRONT SEAT (X) VELOCITY VS TIME	B- 24
19	RIGHT SIDE SILL AT FRONT SEAT (Y) ACCELERATION VS TIME	B- 25
20	RIGHT SIDE SILL AT FRONT SEAT (Y) VELOCITY VS TIME	B- 26
21	RIGHT SIDE SILL AT FRONT SEAT (Z) ACCELERATION VS TIME	B- 27
22	RIGHT SIDE SILL AT FRONT SEAT (Z) VELOCITY VS TIME	B- 28
23	RIGHT SIDE SILL AT FRONT SEAT RESULTANT ACCELERATION VS TIME	B- 29
24	RIGHT SIDE SILL AT REAR SEAT (X) ACCELERATION VS TIME	B- 30
25	RIGHT SIDE SILL AT REAR SEAT (X) VELOCITY VS TIME	B- 31
26	RIGHT SIDE SILL AT REAR SEAT (Y) ACCELERATION VS TIME	B- 32
27	RIGHT SIDE SILL AT REAR SEAT (Y) VELOCITY VS TIME	B- 33
28	RIGHT SIDE SILL AT REAR SEAT (Z) ACCELERATION VS TIME	B- 34
29	RIGHT SIDE SILL AT REAR SEAT (Z) VELOCITY VS TIME	B- 35
30	RIGHT SIDE SILL AT REAR SEAT RESULTANT ACCELERATION VS TIME	B- 36
31	REAR FLOORPAN ABOVE AXLE (X) ACCELERATION VS TIME	B- 37
32	REAR FLOORPAN ABOVE AXLE (X) VELOCITY VS TIME	B- 38
33	REAR FLOORPAN ABOVE AXLE (Y) ACCELERATION VS TIME	B- 39
34	REAR FLOORPAN ABOVE AXLE (Y) VELOCITY VS TIME	B- 40
35	REAR FLOORPAN ABOVE AXLE (Z) ACCELERATION VS TIME	B- 41

36	REAR FLOORPAN ABOVE AXLE (Z) VELOCITY VS TIME	B- 42
37	REAR FLOORPAN ABOVE AXLE RESULTANT ACCELERATION VS TIME	B- 43
38	LEFT SIDE SILL AT REAR SEAT (Y) ACCELERATION VS TIME	B- 44
39	LEFT SIDE SILL AT REAR SEAT (Y) VELOCITY VS TIME	B- 45
40	LEFT SIDE SILL AT FRONT SEAT (Y) ACCELERATION VS TIME	B- 46
41	LEFT SIDE SILL AT FRONT SEAT (Y) VELOCITY VS TIME	B- 47
42	RIGHT REAR OCCUPANT COMPARTMENT (Y) ACCELERATION VS TIME	B- 48
43	RIGHT REAR OCCUPANT COMPARTMENT (Y) VELOCITY VS TIME	B- 49
44	LOWER B-POST (Y) ACCELERATION VS TIME	B- 50
45	LOWER B-POST (Y) VELOCITY VS TIME	B- 51
46	UPPER B-POST (Y) ACCELERATION VS TIME	B- 52
47	UPPER B-POST (Y) VELOCITY VS TIME	B- 53
48	LOWER A-POST (Y) ACCELERATION VS TIME	B- 54
49	LOWER A-POST (Y) VELOCITY VS TIME	B- 55
50	UPPER A-POST (Y) ACCELERATION VS TIME	B- 56
51	UPPER A-POST (Y) VELOCITY VS TIME	B- 57
52	FRONT SEAT TRACK (Y) ACCELERATION VS TIME	B- 58
53	FRONT SEAT TRACK (Y) VELOCITY VS TIME	B- 59
54	REAR SEAT TRACK (Y) ACCELERATION VS TIME	B- 60
55	REAR SEAT TRACK (Y) VELOCITY VS TIME	B- 61
56	VEHICLE CENTER OF GRAVITY (X) ACCELERATION VS TIME	B- 62
57	VEHICLE CENTER OF GRAVITY (X) VELOCITY VS TIME	B- 63
58	VEHICLE CENTER OF GRAVITY (Y) ACCELERATION VS TIME	B- 64
59	VEHICLE CENTER OF GRAVITY (Y) VELOCITY ACCELERATION VS TIME	B- 65
60	VEHICLE CENTER OF GRAVITY (Z) ACCELERATION VS TIME	B- 66
61	VEHICLE CENTER OF GRAVITY (Z) VELOCITY VS TIME	B- 67
62	VEHICLE CENTER OF GRAVITY RESULTANT ACCELERATION VS TIME	B- 68

MDB INSTRUMENTATION PLOTS
ACCELERATION DATA - FILTER CLASS 60
INTEGRATION DATA - FILTER CLASS 180

Plot No.	Data Plot Title	Page
63	MDB CENTER OF GRAVITY (X) ACCELERATION VS TIME	B- 70
64	MDB CENTER OF GRAVITY (X) VELOCITY VS TIME	B- 71
65	MDB CENTER OF GRAVITY (Y) ACCELERATION VS TIME	B- 72
66	MDB CENTER OF GRAVITY (Y) VELOCITY VS TIME	B- 73
67	MDB CENTER OF GRAVITY (Z) ACCELERATION VS TIME	B- 74
68	MDB CENTER OF GRAVITY (Z) VELOCITY VS TIME	B- 75
69	MDB CENTER OF GRAVITY RESULTANT ACCELERATION VS TIME	B- 76
70	MDB REAR (X) ACCELERATION VS TIME	B- 77
71	MDB REAR (X) VELOCITY VS TIME	B- 78
72	MDB REAR (Y) ACCELERATION VS TIME	B- 79
73	MDB REAR (Y) VELOCITY VS TIME	B- 80

DRIVER & PASSENGER DUMMY INSTRUMENTATION PLOTS (Redundant)
ACCELERATION DATA - FILTER CLASS 180
INTEGRATION DATA - FILTER CLASS 180

Plot No.	Data Plot Title	Page
74	DRIVER UPPER RIB (Y) ACCELERATION VS TIME	B- 82
75	DRIVER UPPER RIB (Y) VELOCITY VS TIME	B- 83
76	DRIVER LOWER RIB (Y) ACCELERATION VS TIME	B- 84
77	DRIVER LOWER RIB (Y) VELOCITY VS TIME	B- 85
78	DRIVER LOWER SPINE (Y) ACCELERATION VS TIME	B- 86
79	DRIVER LOWER SPINE (Y) VELOCITY VS TIME	B- 87
80	DRIVER PELVIC (Y) ACCELERATION VS TIME	B- 88
81	DRIVER PELVIC (Y) VELOCITY VS TIME	B- 89
82	PASSENGER UPPER RIB (Y) ACCELERATION VS TIME	B- 90
83	PASSENGER UPPER RIB (Y) VELOCITY VS TIME	B- 91
84	PASSENGER LOWER RIB (Y) ACCELERATION VS TIME	B- 92
85	PASSENGER LOWER RIB (Y) VELOCITY VS TIME	B- 93
86	PASSENGER LOWER SPINE (Y) ACCELERATION VS TIME	B- 94
87	PASSENGER LOWER SPINE (Y) VELOCITY VS TIME	B- 95
88	PASSENGER PELVIC (Y) ACCELERATION VS TIME	B- 96
89	PASSENGER PELVIC (Y) VELOCITY VS TIME	B- 97

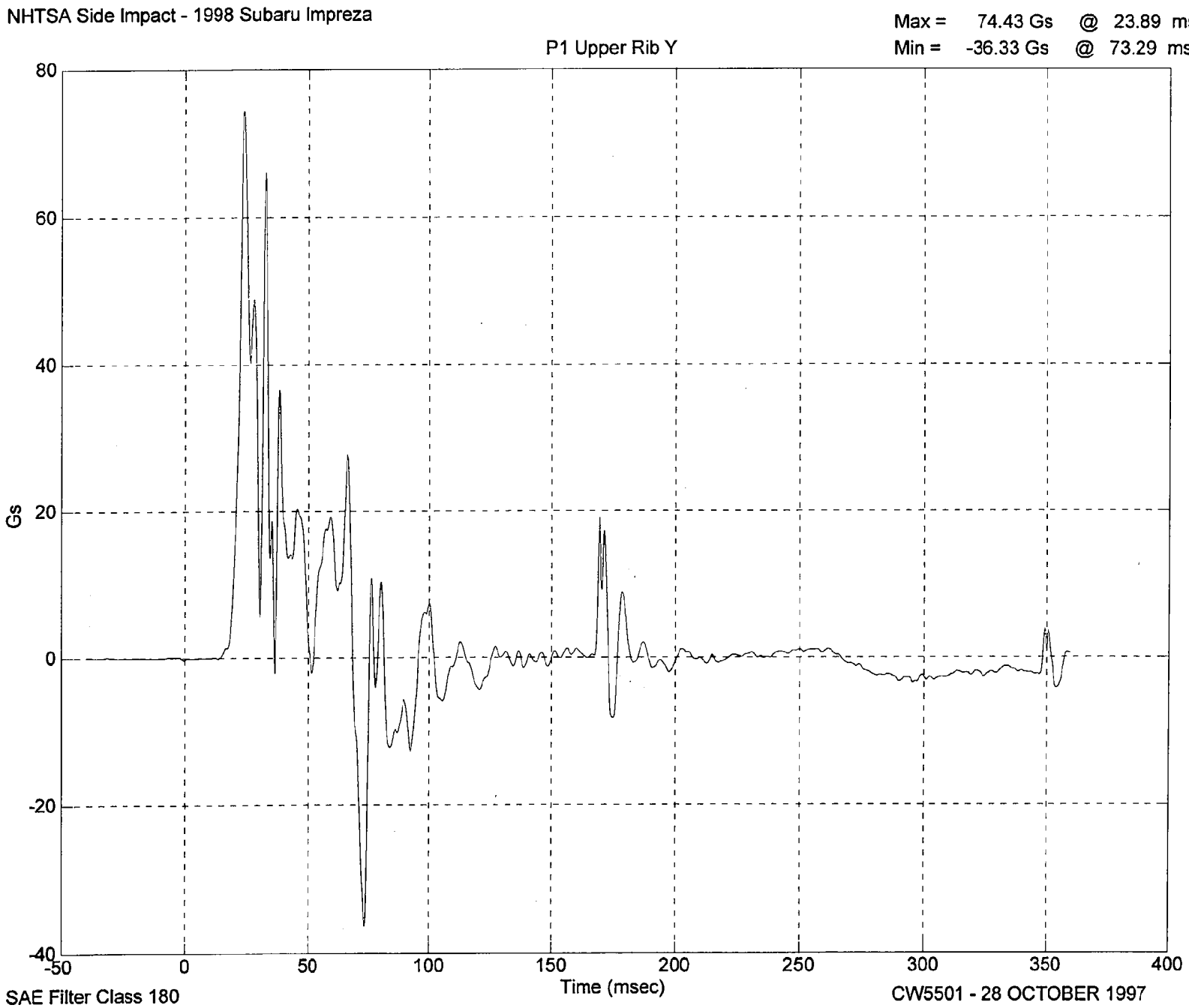
DRIVER & PASSENGER DUMMY INSTRUMENTATION PLOTS
ACCELERATION DATA - FIR FILTERED

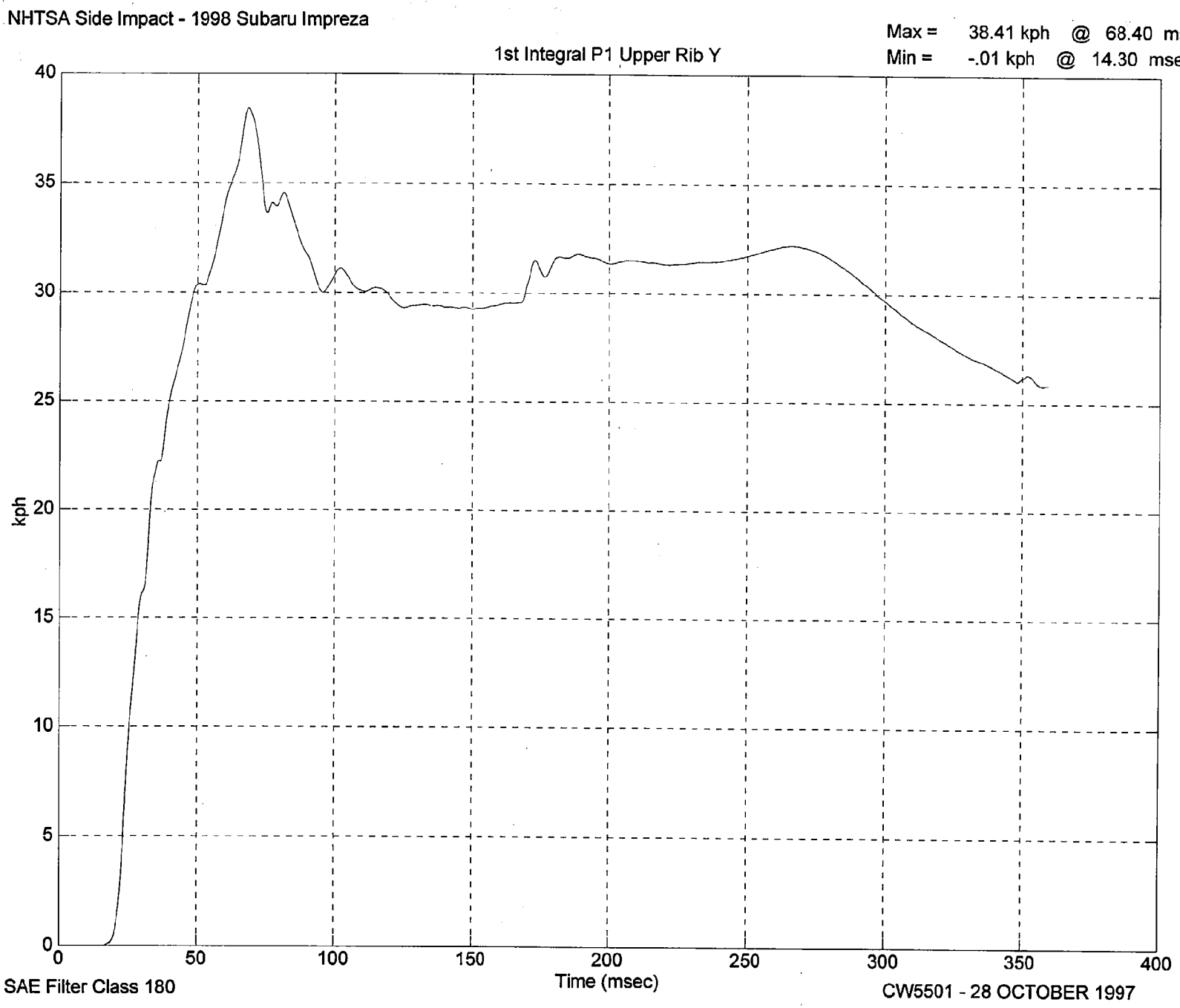
Plot No.	Data Plot Title	Page
90	DRIVER UPPER RIB (Y) ACCELERATION VS TIME	B- 99
91	DRIVER LOWER RIB (Y) ACCELERATION VS TIME	B- 100
92	DRIVER LOWER SPINE (Y) ACCELERATION VS TIME	B- 101
93	DRIVER PELVIC (Y) ACCELERATION VS TIME	B- 102
94	PASSENGER UPPER RIB (Y) ACCELERATION VS TIME	B- 103
95	PASSENGER LOWER RIB (Y) ACCELERATION VS TIME	B- 104
96	PASSENGER LOWER SPINE (Y) ACCELERATION VS TIME	B- 105
97	PASSENGER PELVIC (Y) ACCELERATION VS TIME	B- 106

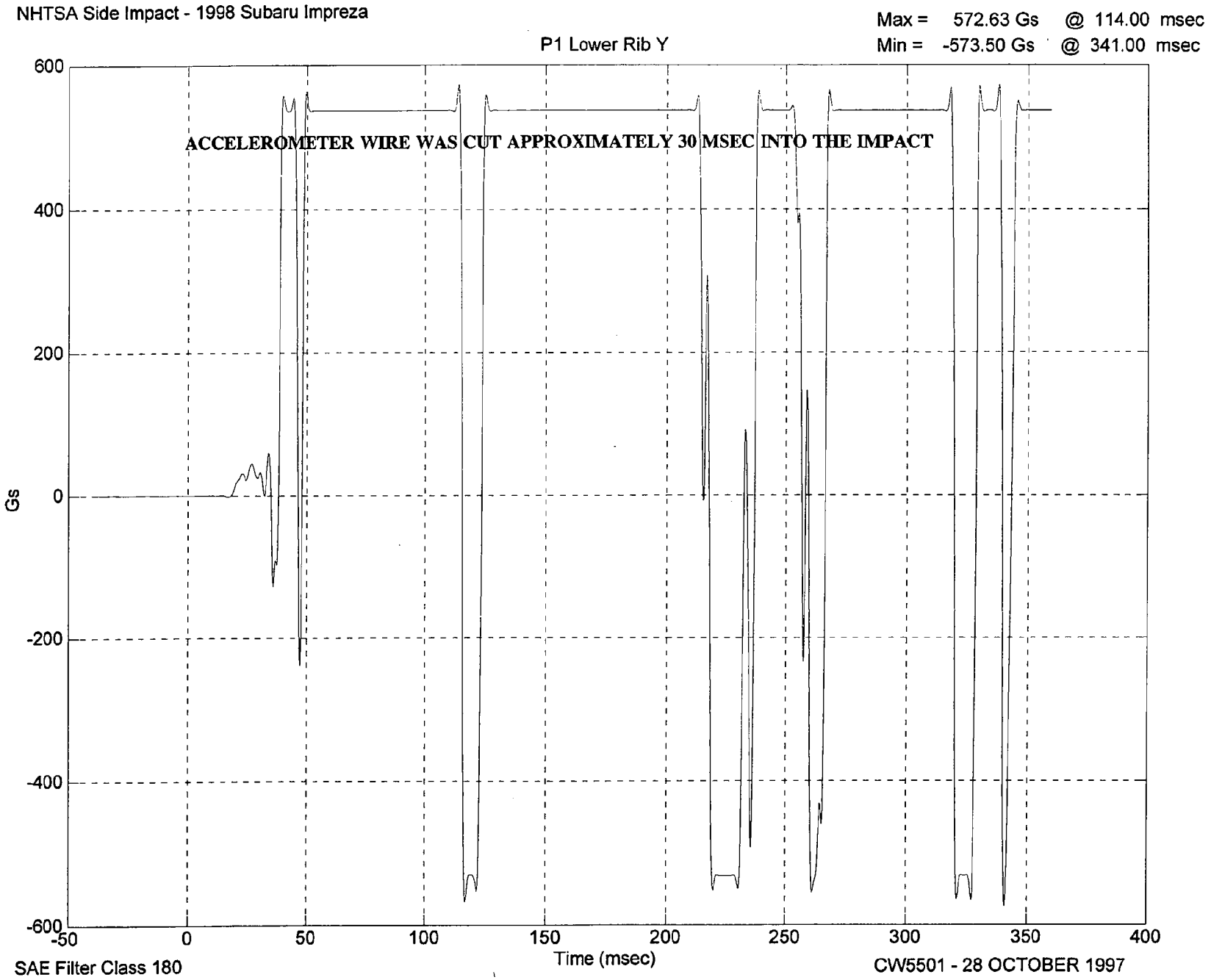
DRIVER & PASSENGER DUMMY INSTRUMENTATION PLOTS (redundant)
ACCELERATION DATA - FIR FILTERED

Plot No.	Data Plot Title	Page
98	DRIVER UPPER RIB (Y) ACCELERATION VS TIME	B- 108
99	DRIVER LOWER RIB (Y) ACCELERATION VS TIME	B- 109
100	DRIVER LOWER SPINE (Y) ACCELERATION VS TIME	B- 110
101	DRIVER PELVIC (Y) ACCELERATION VS TIME	B- 111
102	PASSENGER UPPER RIB (Y) ACCELERATION VS TIME	B- 112
103	PASSENGER LOWER RIB (Y) ACCELERATION VS TIME	B- 113
104	PASSENGER LOWER SPINE (Y) ACCELERATION VS TIME	B- 114
105	PASSENGER PELVIC (Y) ACCELERATION VS TIME	B- 115

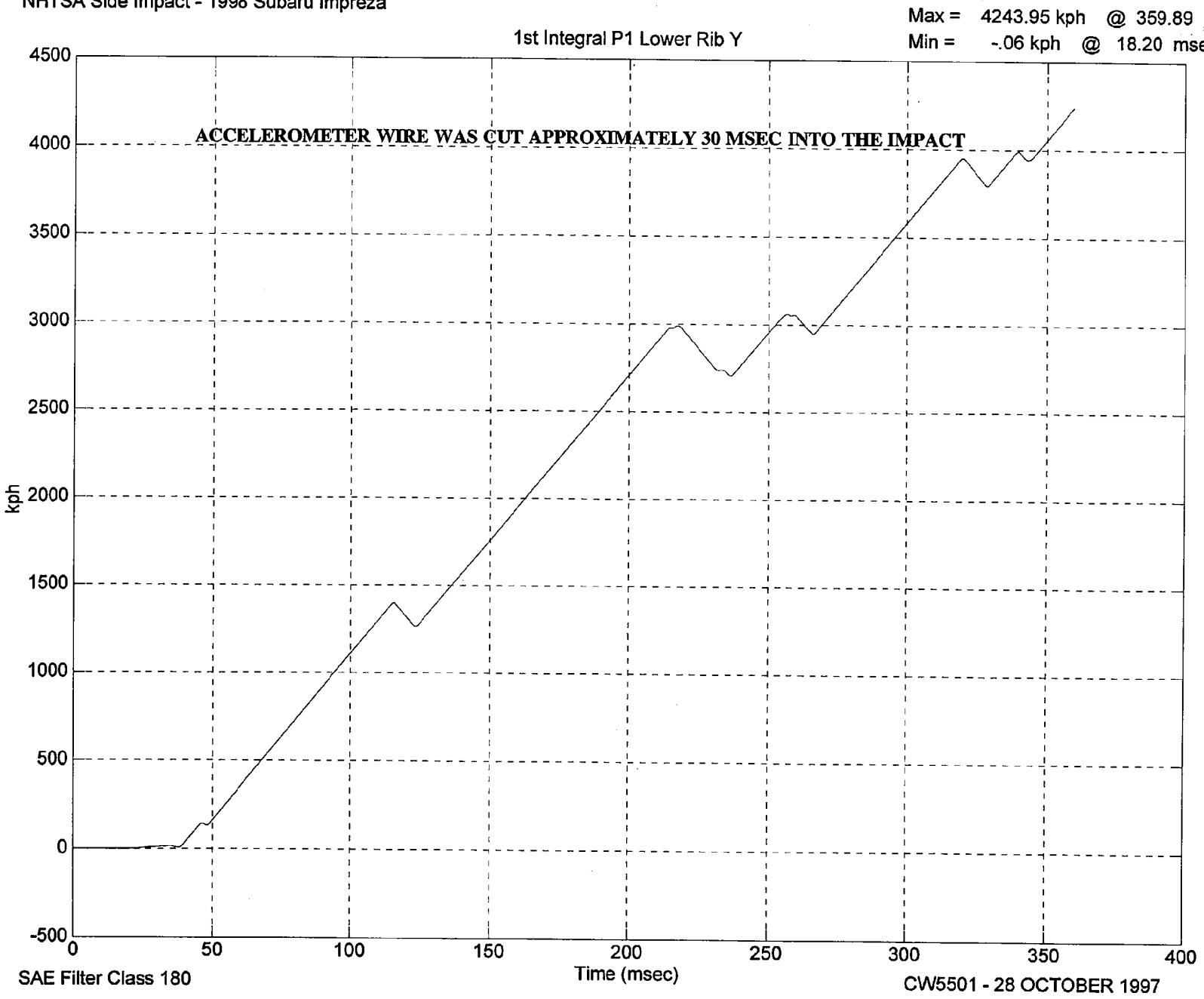
DRIVER AND PASSENGER DUMMY INSTRUMENTATION PLOTS
ACCELERATION DATA - FILTER CLASS 180
INTEGRATION DATA - FILTER CLASS 180

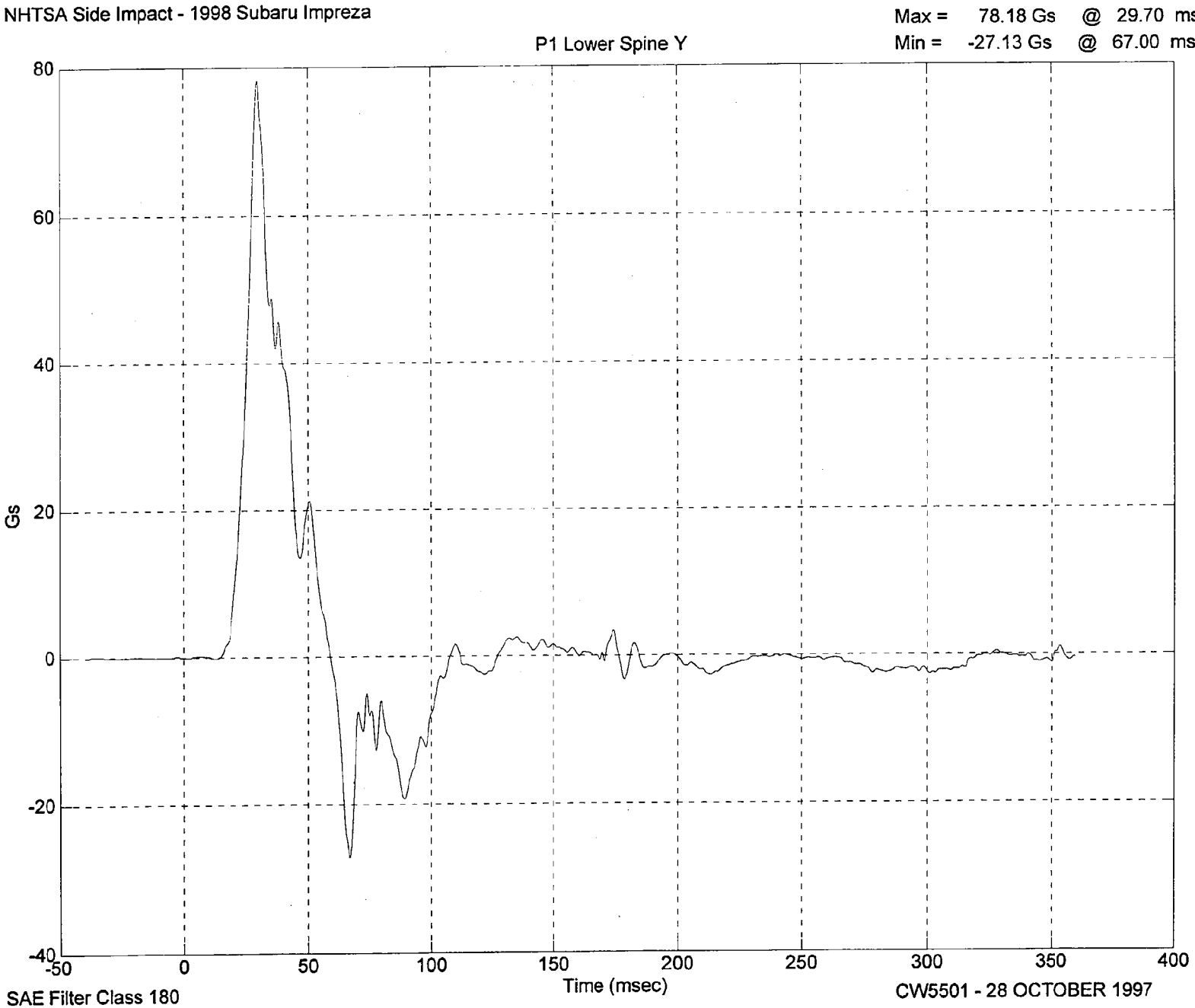

NHTSA Side Impact - 1998 Subaru Impreza
P1 Upper Rib Y
Max = 74.43 Gs @ 23.89 msec
Min = -36.33 Gs @ 73.29 msec
Gs
80
60
40
20
0
-20
-40
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

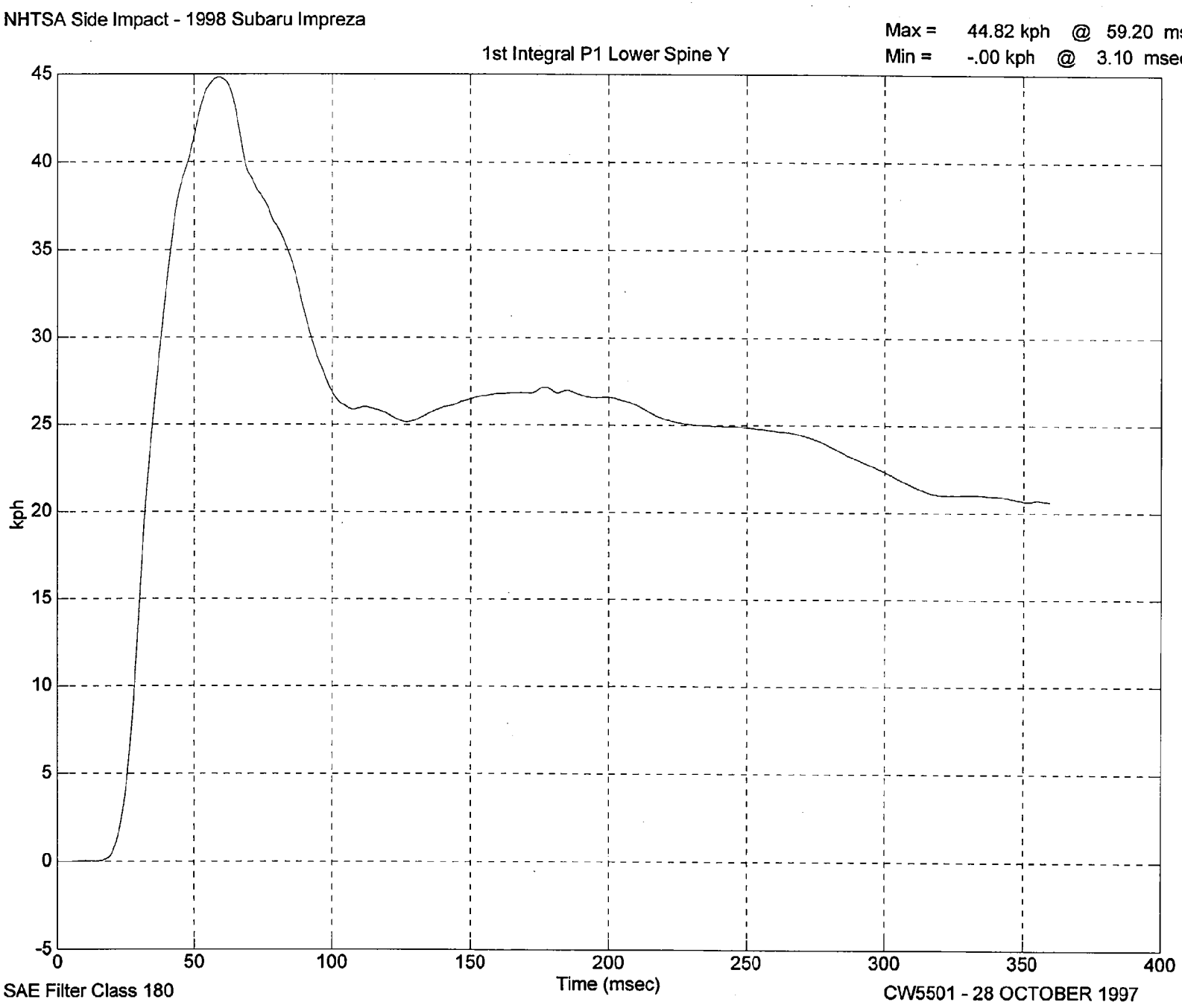

NHTSA Side Impact - 1998 Subaru Impreza
1st Integral P1 Upper Rib Y
Max = 38.41 kph @ 68.40 msec
Min = -.01 kph @ 14.30 msec
kph
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
P1 Lower Rib Y
Max = 572.63 Gs @ 114.00 msec
Min = -573.50 Gs @ 341.00 msec
ACCELEROMETER WIRE WAS CUT APPROXIMATELY 30 MSEC INTO THE IMPACT
600
400
200
0
-200
-400
-600
Gs
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza




NHTSA Side Impact - 1998 Subaru Impreza
P1 Lower Spine Y
Max = 78.18 Gs @ 29.70 msec
Min = -27.13 Gs @ 67.00 msec
80
60
40
20
0
-20
-40
Gs
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
1st Integral P1 Lower Spine Y
Max = 44.82 kph @ 59.20 msec
Min = -.00 kph @ 3.10 msec
kph
45
40
35
30
25
20
15
10
5
0
-5
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
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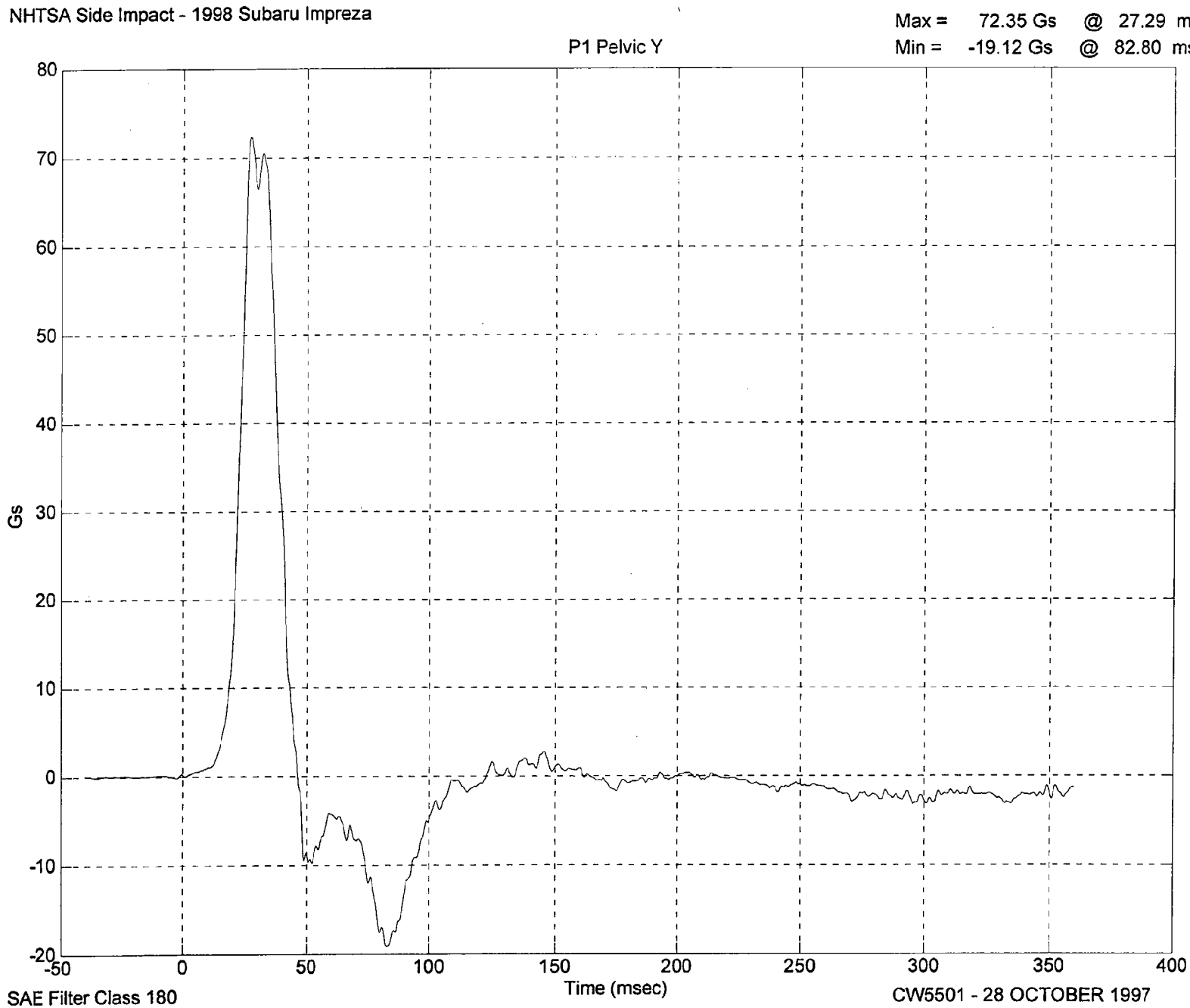
NHTSA Side Impact - 1998 Subaru Impreza
P1 Pelvic Y
Max = 72.35 Gs @ 27.29 msec
Min = -19.12 Gs @ 82.80 msec
Gs
Time (msec)
SAE Filter Class 180
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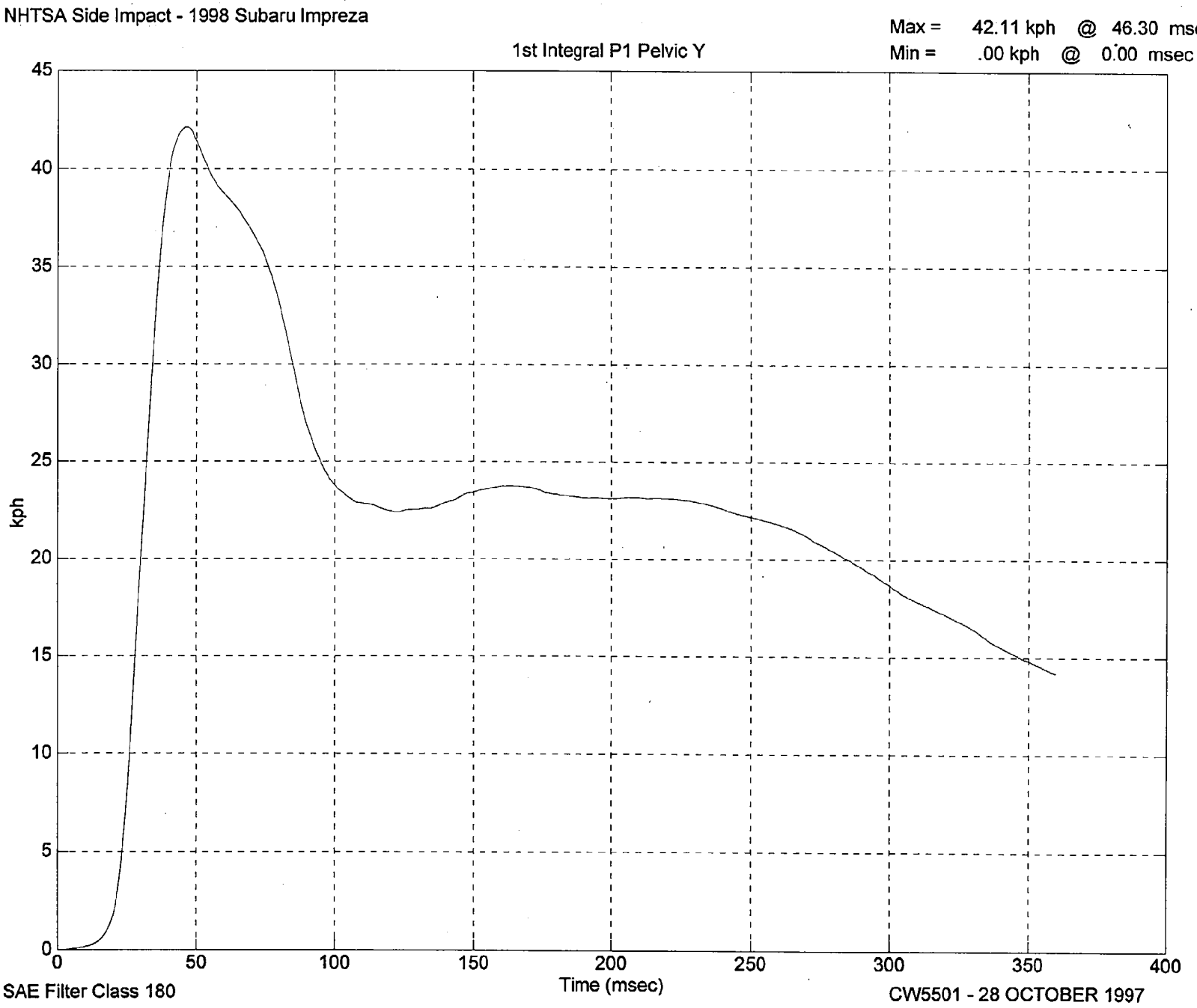
NHTSA Side Impact - 1998 Subaru Impreza
1st Integral P1 Pelvic Y
Max = 42.11 kph @ 46.30 msec
Min = .00 kph @ 0.00 msec
kph
Time (msec)
SAE Filter Class 180
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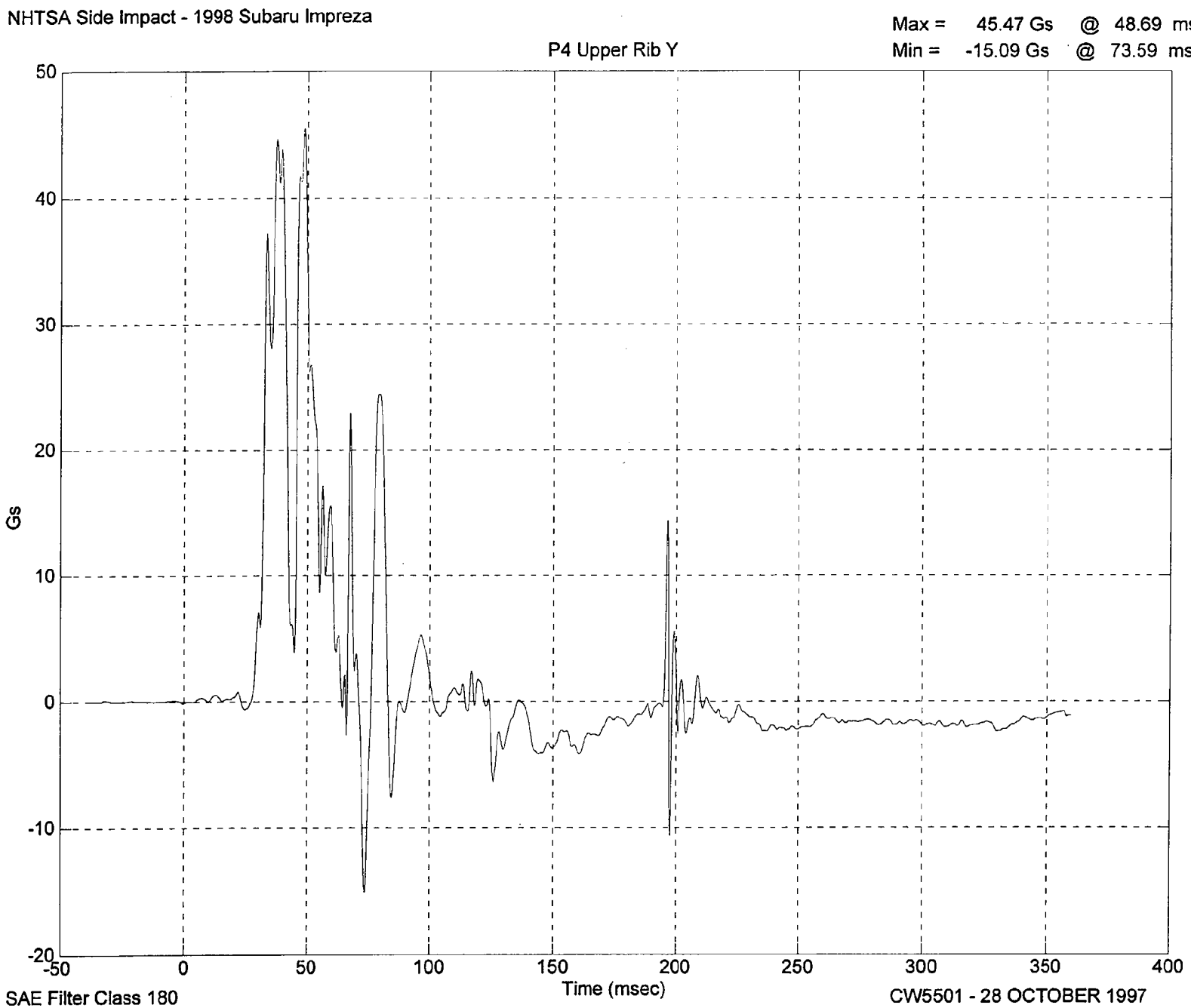
NHTSA Side Impact - 1998 Subaru Impreza
P4 Upper Rib Y
Max = 45.47 Gs @ 48.69 msec
Min = -15.09 Gs @ 73.59 msec
Gs
Time (msec)
SAE Filter Class 180
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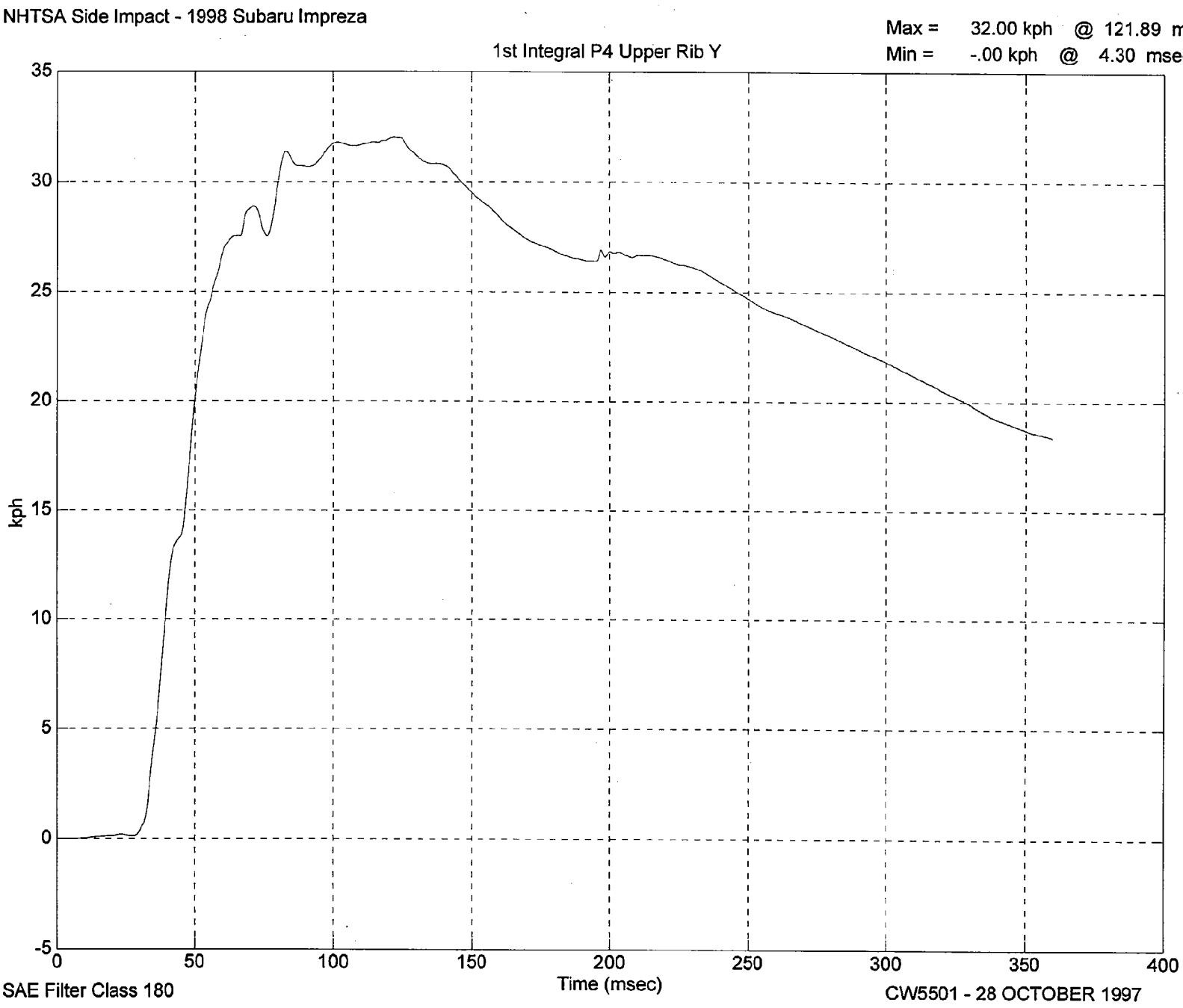
NHTSA Side Impact - 1998 Subaru Impreza
1st Integral P4 Upper Rib Y
Max = 32.00 kph @ 121.89 msec
Min = -.00 kph @ 4.30 msec
kph
35
30
25
20
15
10
5
0
-5
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
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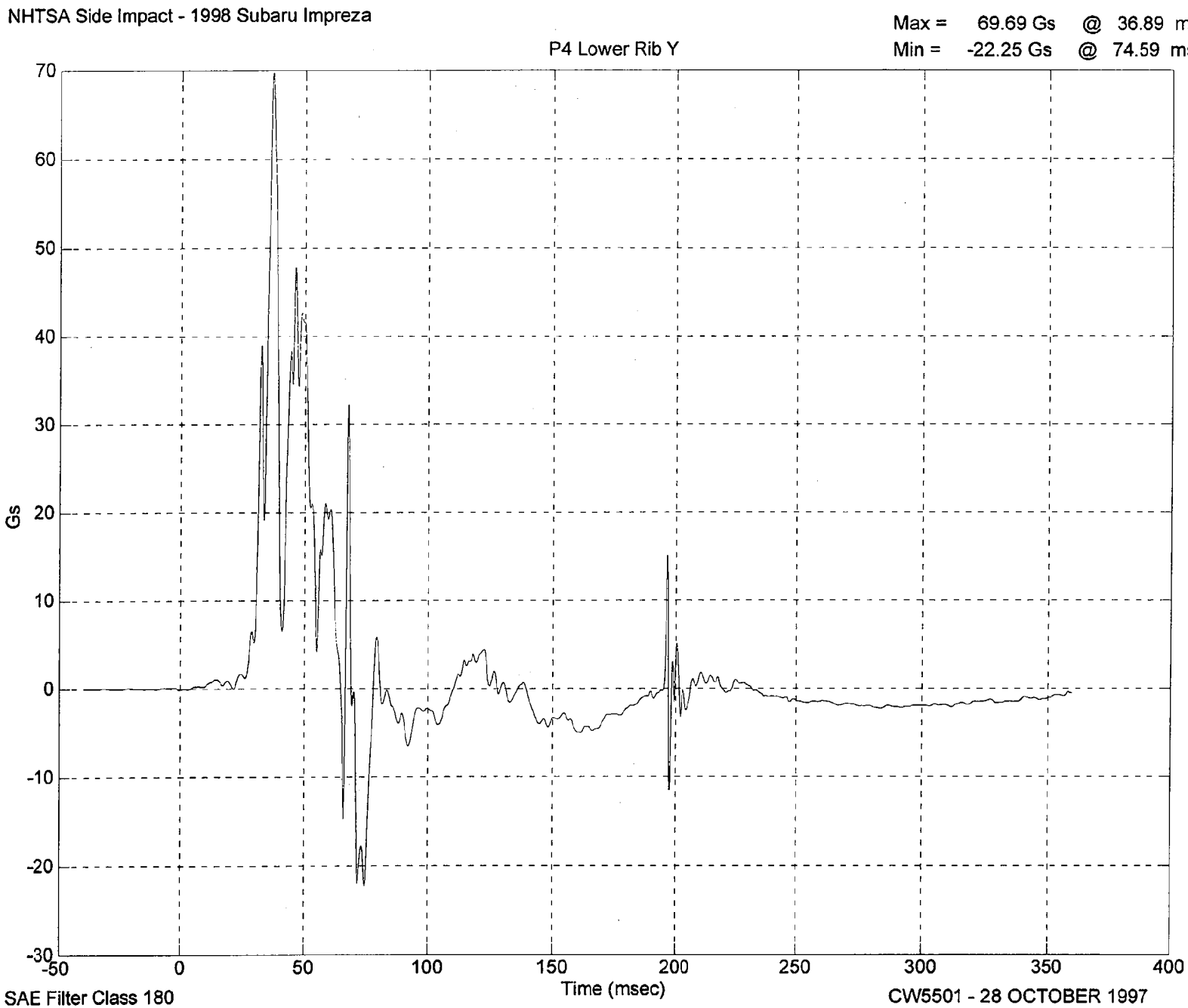
NHTSA Side Impact - 1998 Subaru Impreza
P4 Lower Rib Y
Max = 69.69 Gs @ 36.89 msec
Min = -22.25 Gs @ 74.59 msec
Gs
70
60
50
40
30
20
10
0
-10
-20
-30
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
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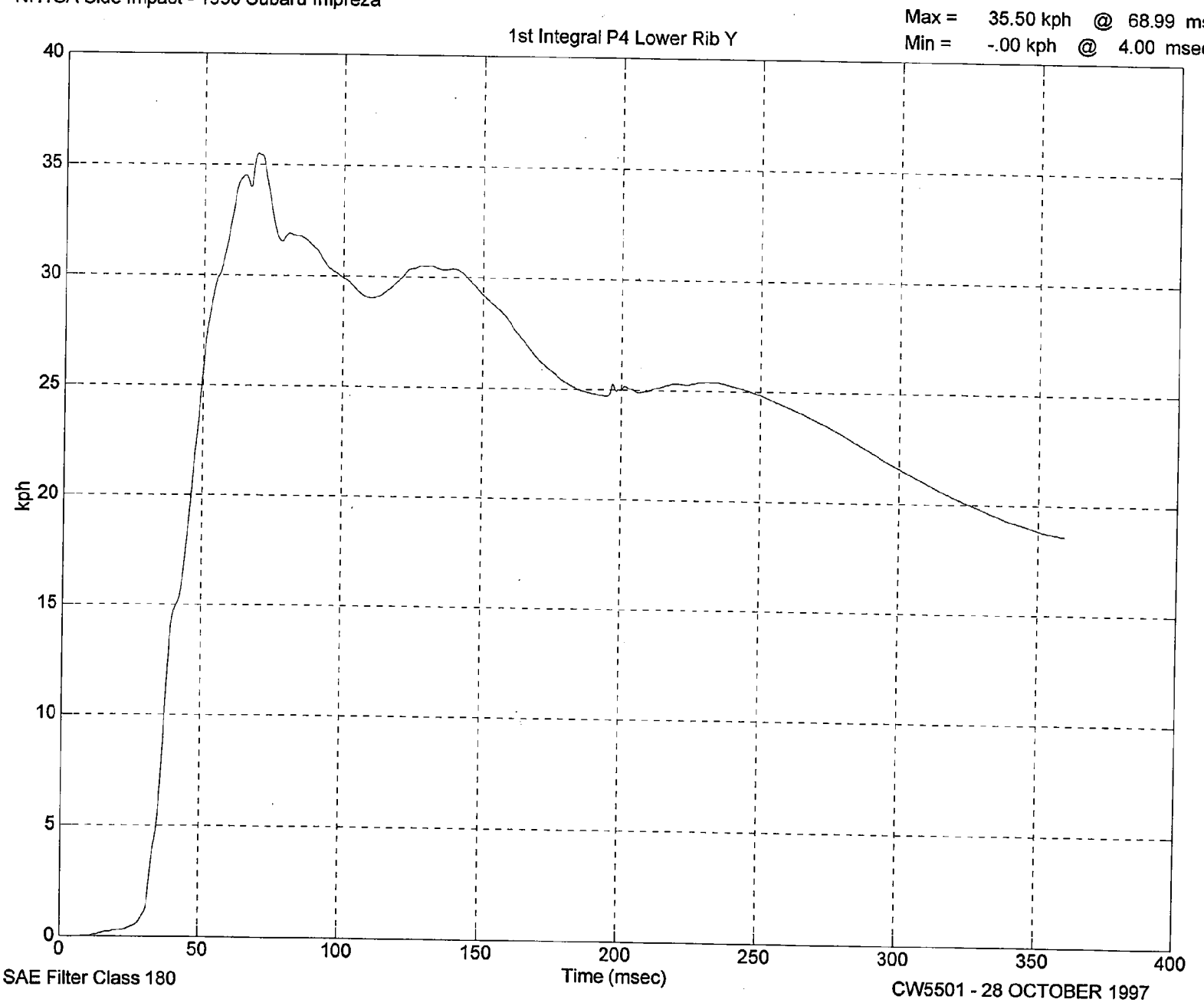
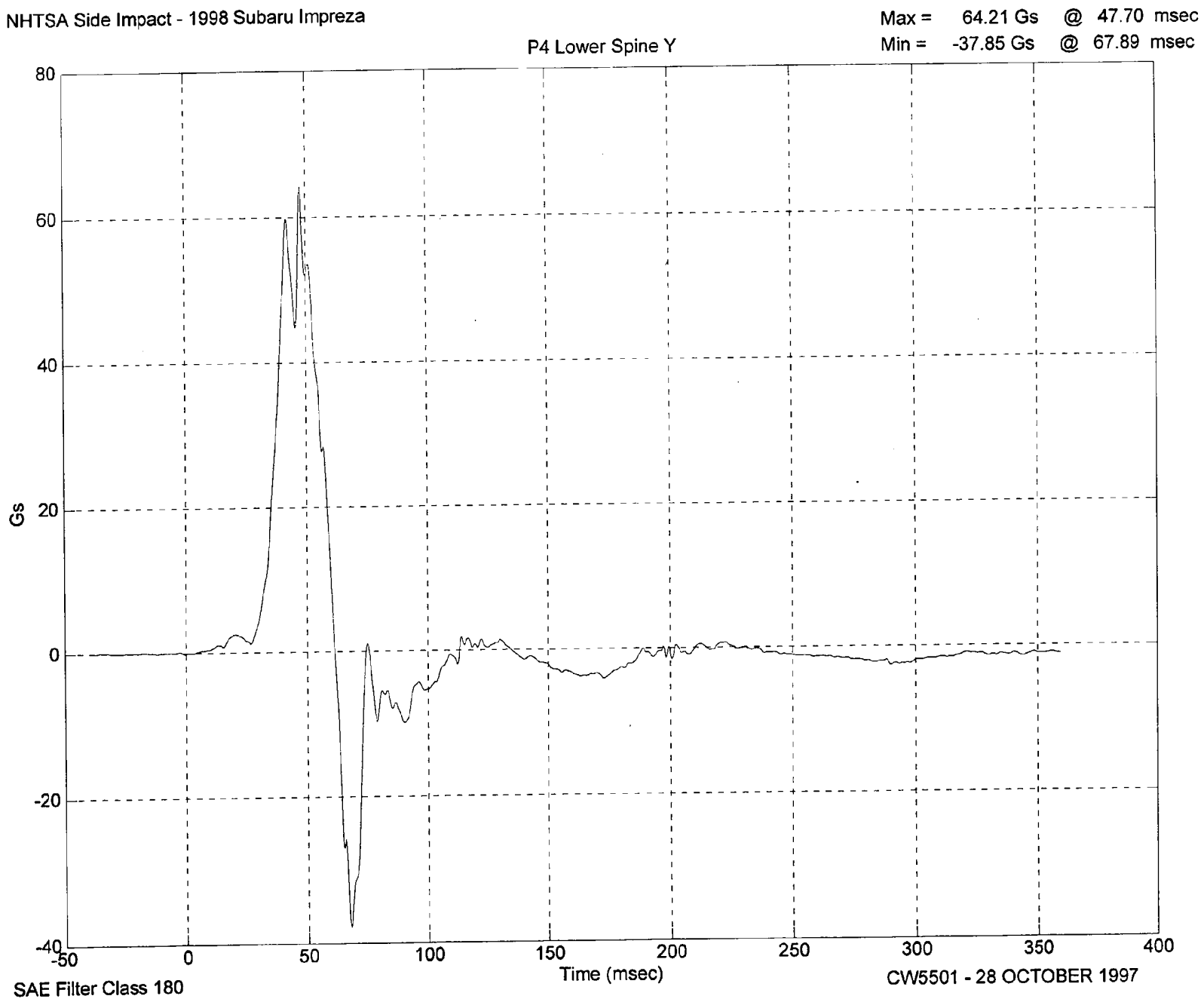
NHTSA Side Impact - 1998 Subaru Impreza

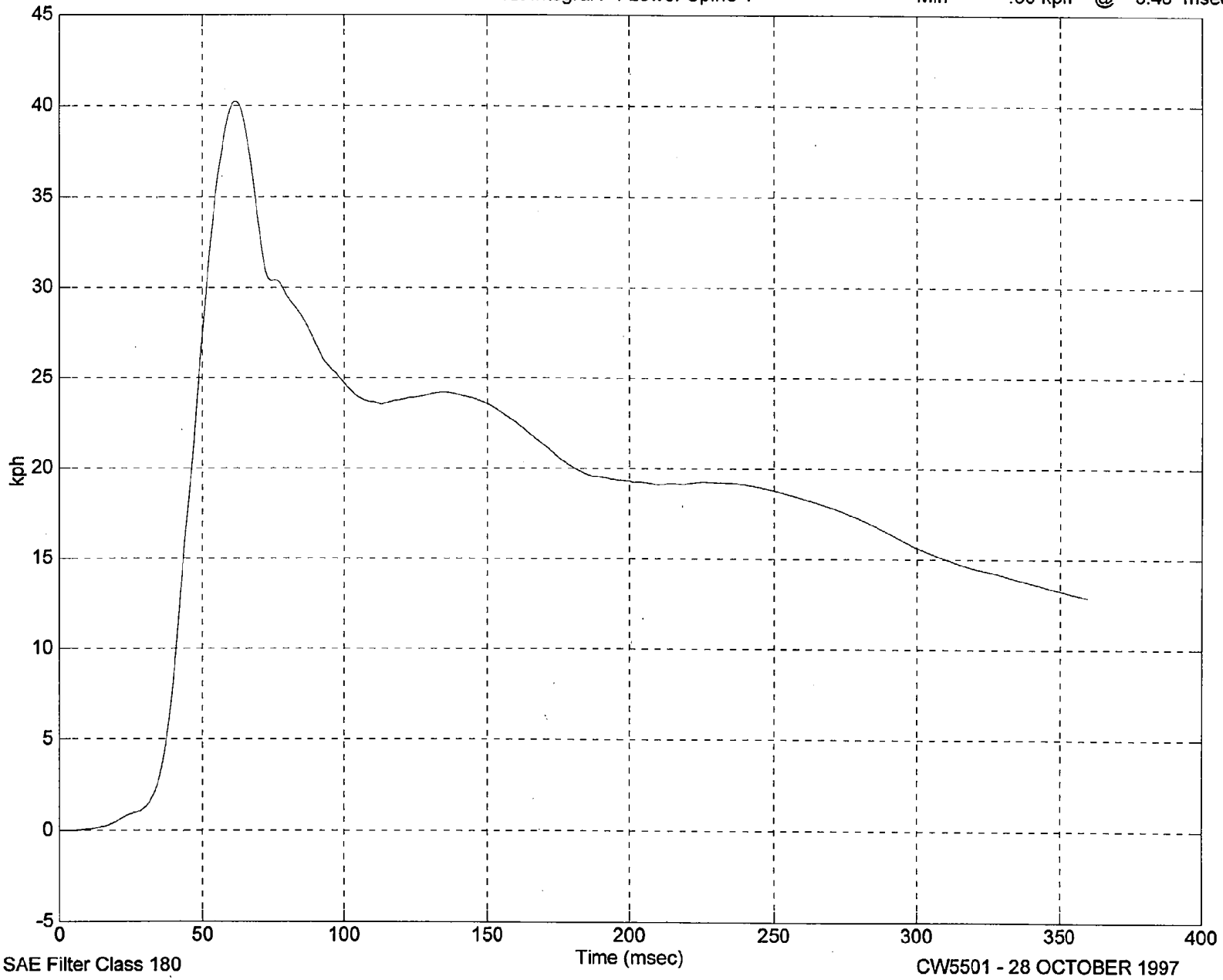



NHTSA Side Impact - 1998 Subaru Impreza
P4 Lower Spine Y
Max = 64.21 Gs @ 47.70 msec
Min = -37.85 Gs @ 67.89 msec
80
60
40
20
0
-20
-40
Gs
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza

1st Integral P4 Lower Spine Y

Max = 40.22 kph @ 61.59 msec
Min = -.00 kph @ 3.40 msec



SAE Filter Class 180

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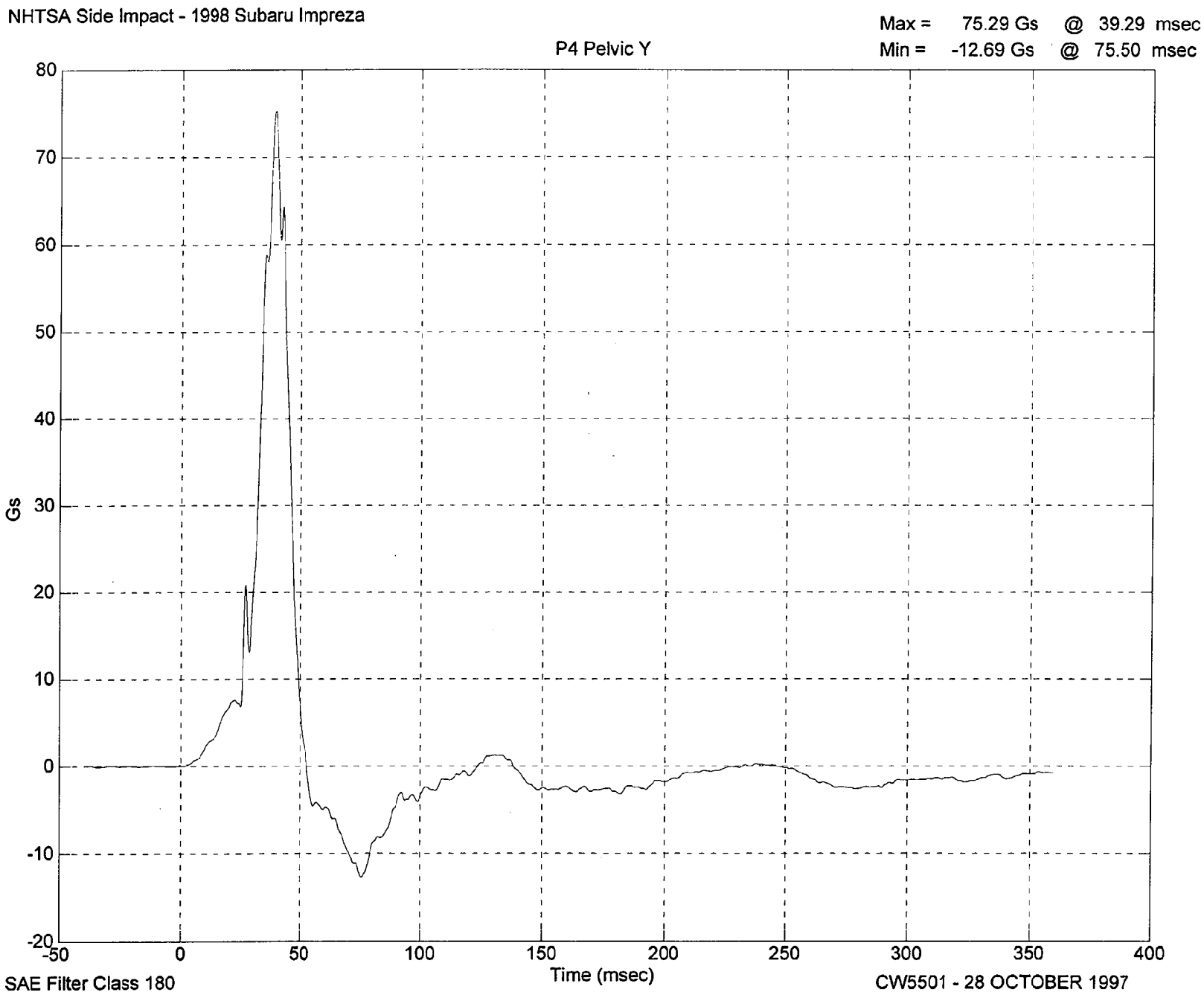
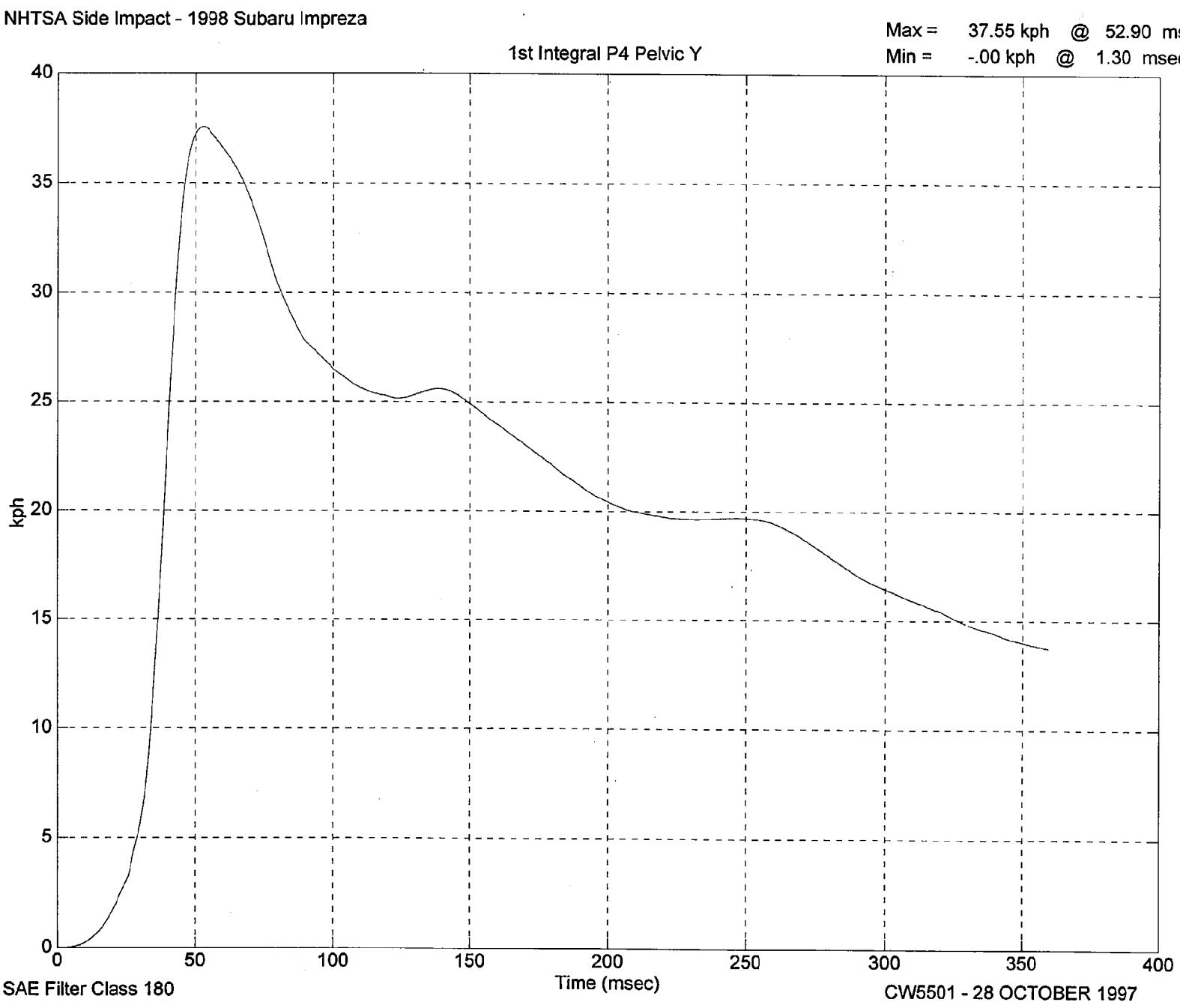

NHTSA Side Impact - 1998 Subaru Impreza
P4 Pelvic Y
Max = 75.29 Gs @ 39.29 msec
Min = -12.69 Gs @ 75.50 msec
Gs
80
70
60
50
40
30
20
10
0
-10
-20
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
1st Integral P4 Pelvic Y
Max = 37.55 kph @ 52.90 msec
Min = -.00 kph @ 1.30 msec
kph
Time (msec)
SAE Filter Class 180
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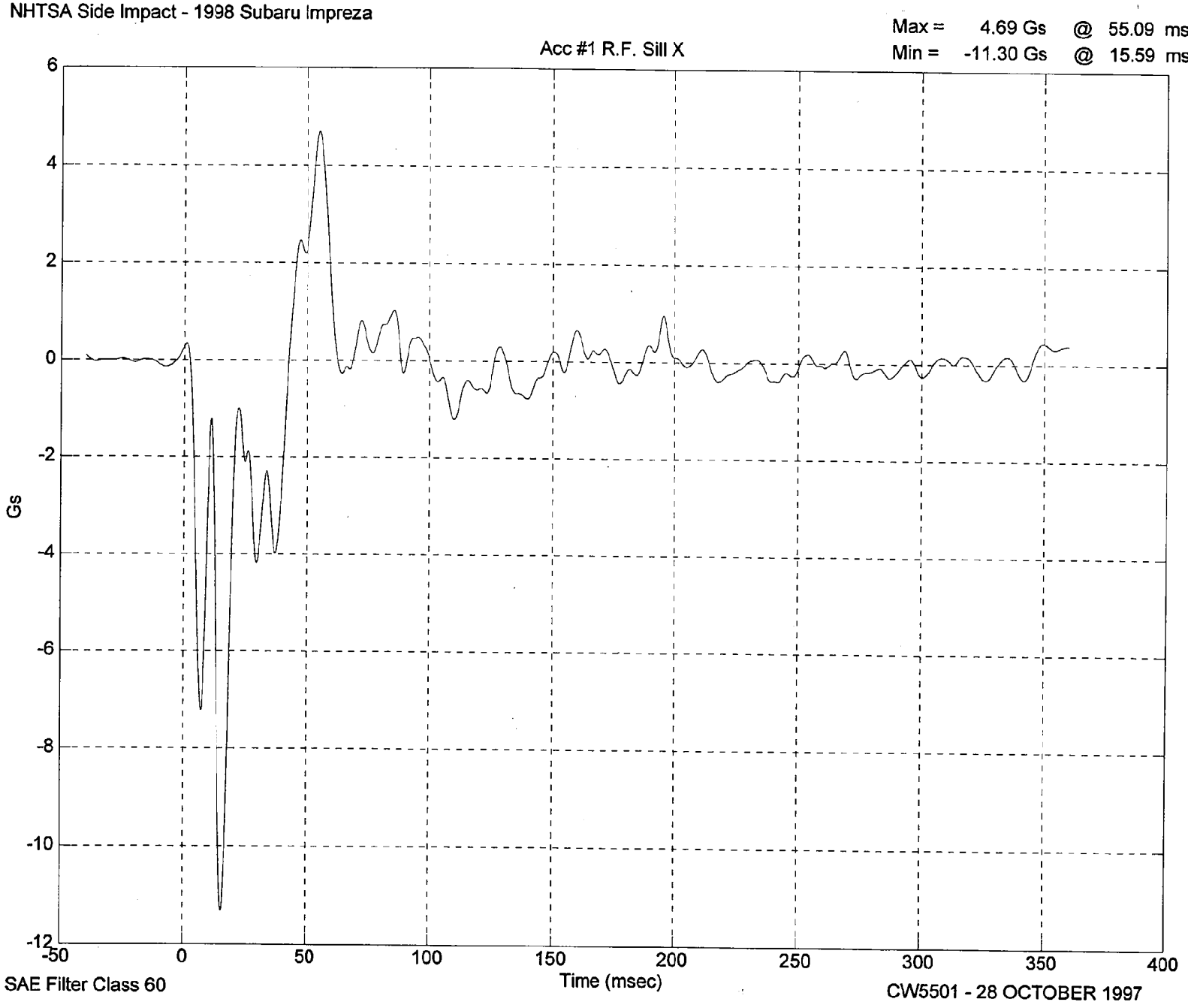
TEST VEHICLE INSTRUMENTATION PLOTS
ACCELERATION DATA - FILTER CLASS 60
INTEGRATION DATA - FILTER CLASS 180

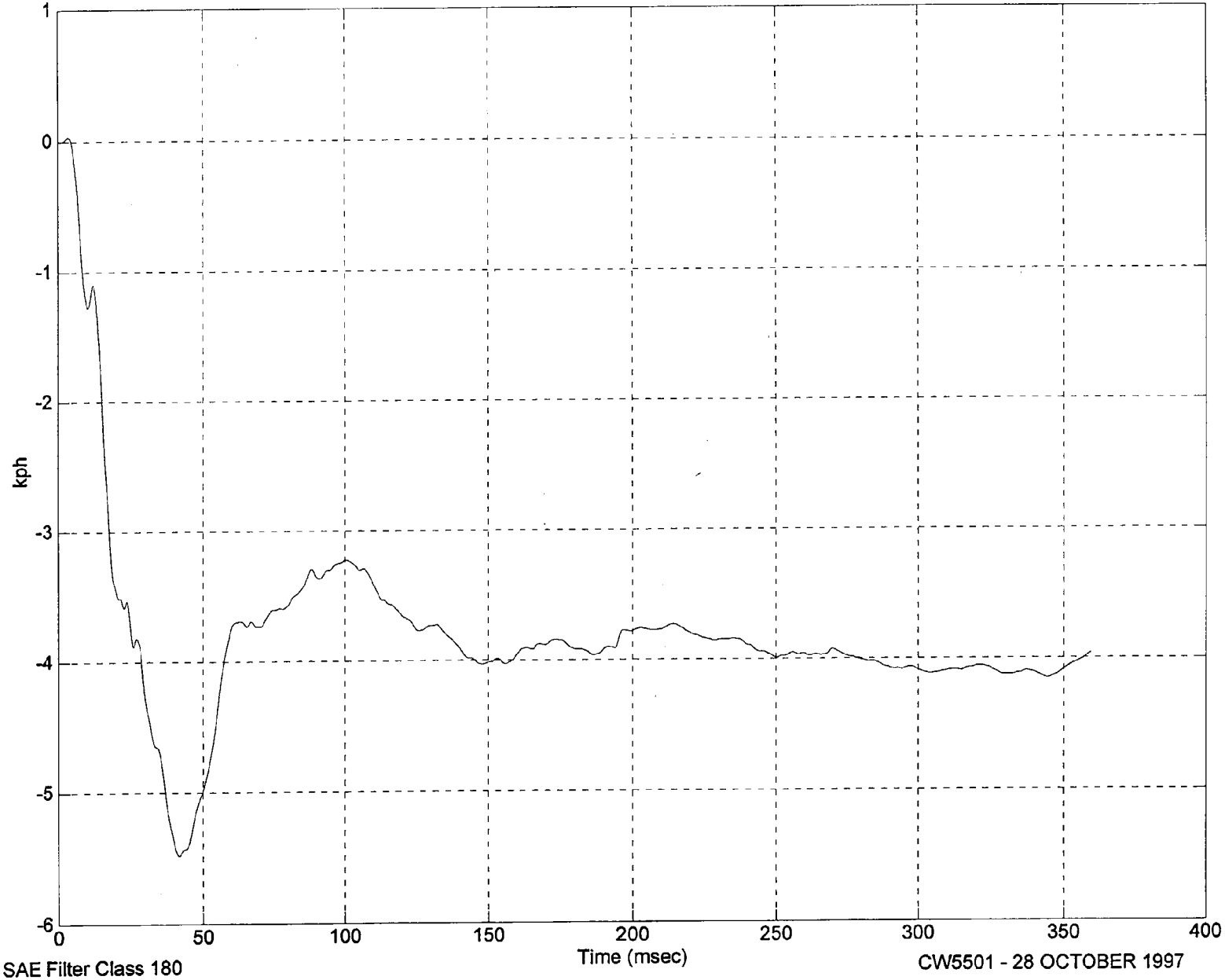
NHTSA Side Impact - 1998 Subaru Impreza



NHTSA Side Impact - 1998 Subaru Impreza

1st Integral Acc #1 R.F. Sill X

Max = .03 kph @ 3.50 msec
Min = -5.48 kph @ 41.70 msec



SAE Filter Class 180

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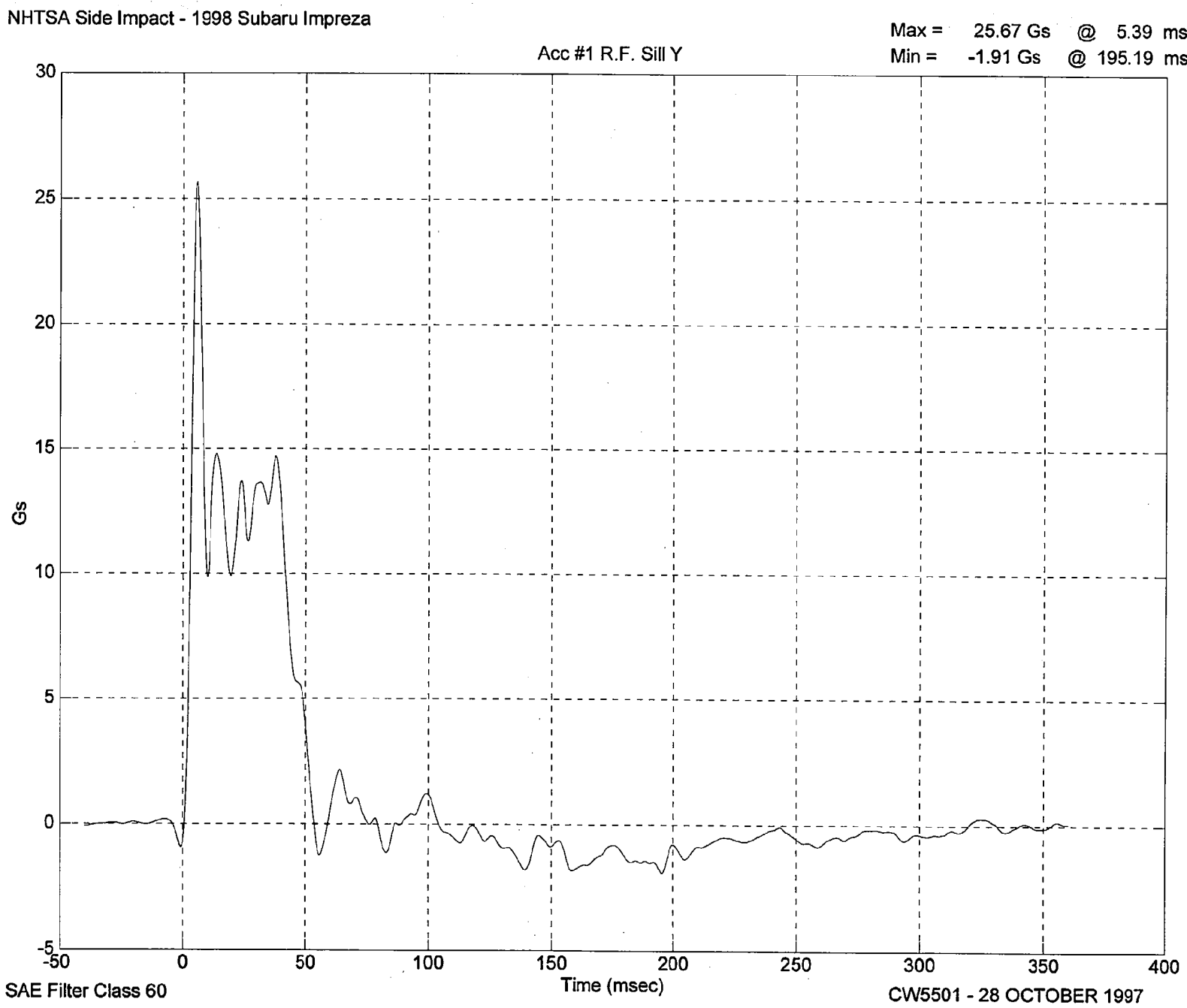
NHTSA Side Impact - 1998 Subaru Impreza
Acc #1 R.F. Sill Y
Max = 25.67 Gs @ 5.39 msec
Min = -1.91 Gs @ 195.19 msec
Gs
Time (msec)
SAE Filter Class 60
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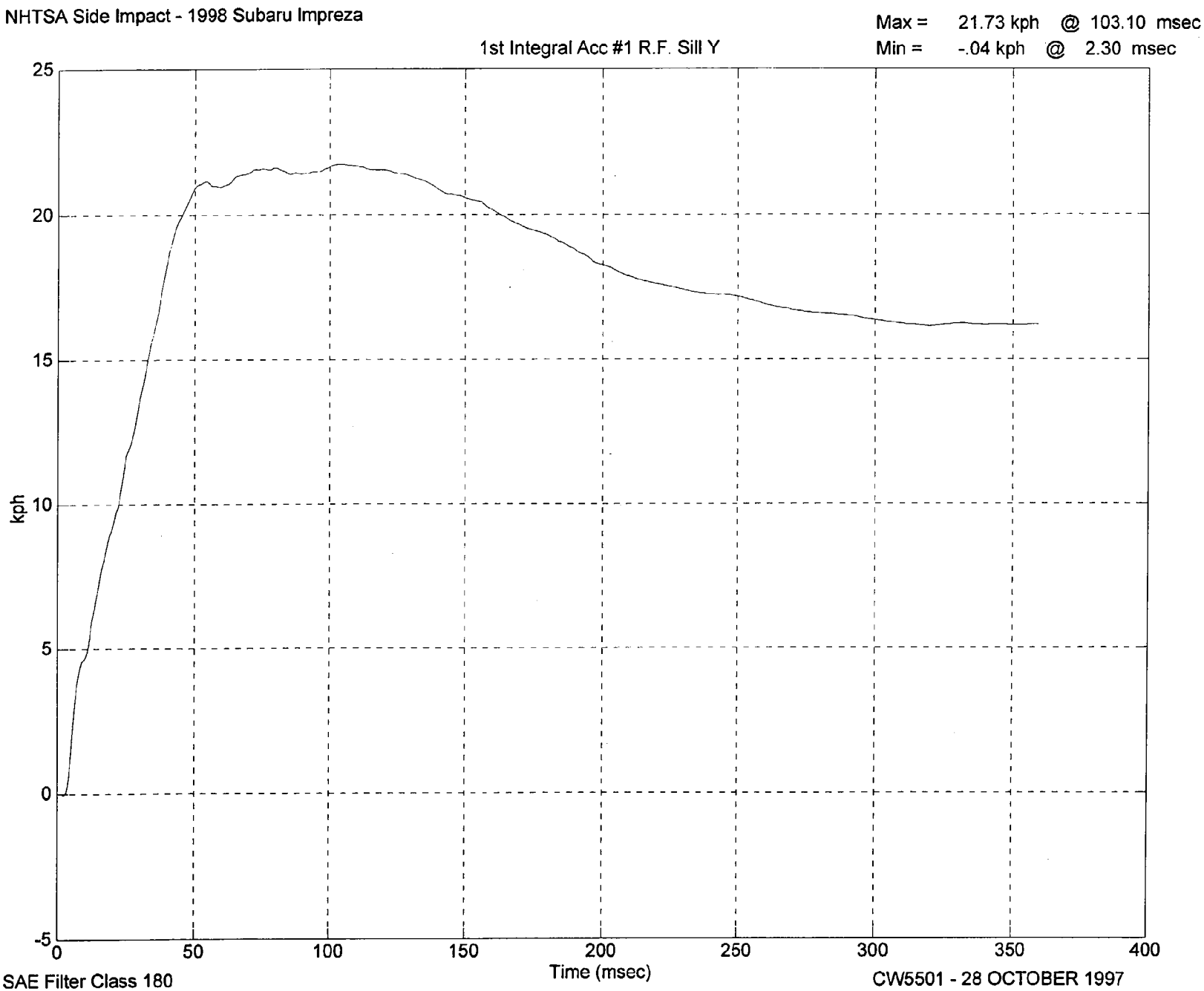
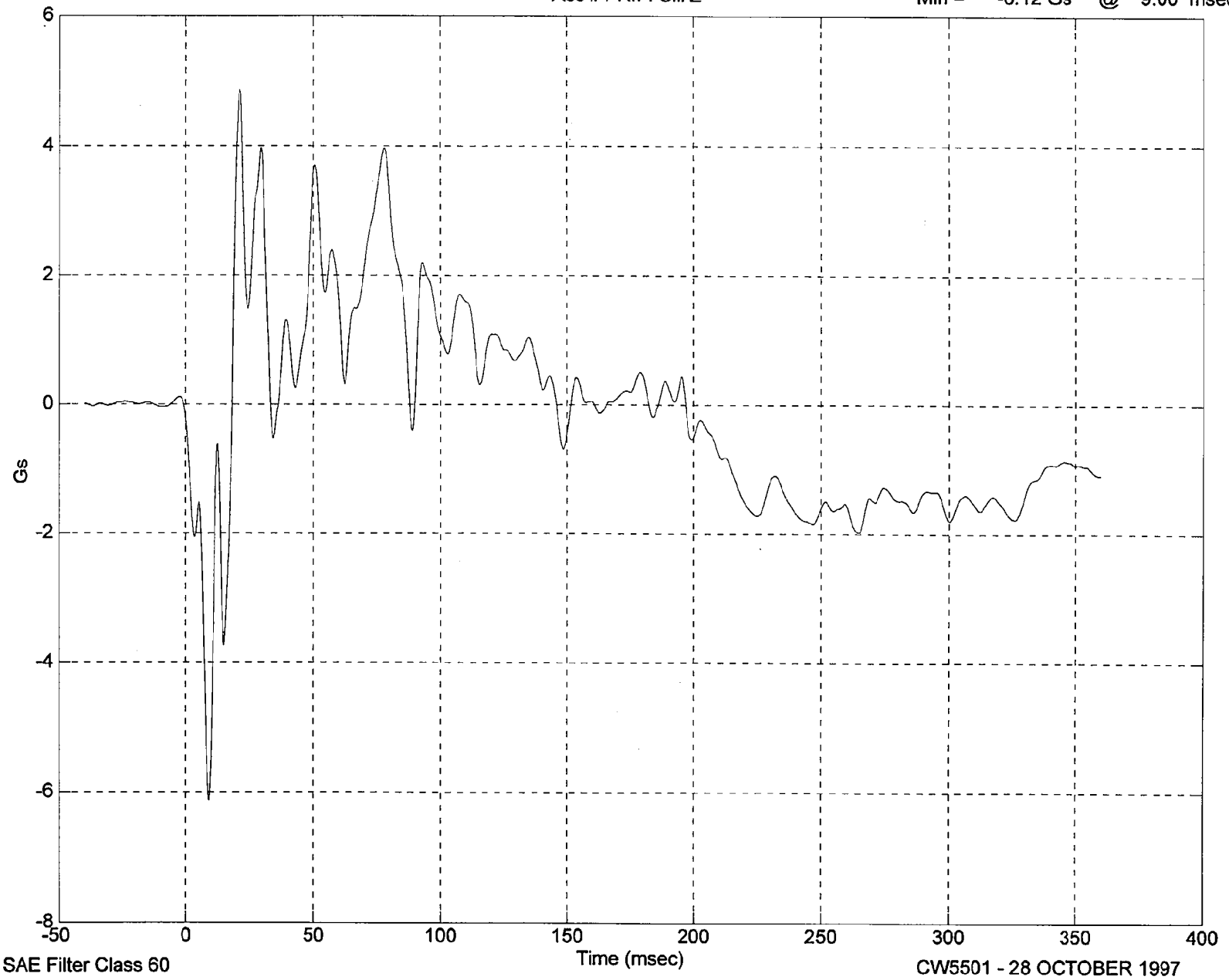

NHTSA Side Impact - 1998 Subaru Impreza
1st Integral Acc #1 R.F. Sill Y
Max = 21.73 kph @ 103.10 msec
Min = -.04 kph @ 2.30 msec
25
20
15
10
5
0
-5
kph
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza

Max = 4.86 Gs @ 21.19 msec
Min = -6.12 Gs @ 9.00 msec



SAE Filter Class 60

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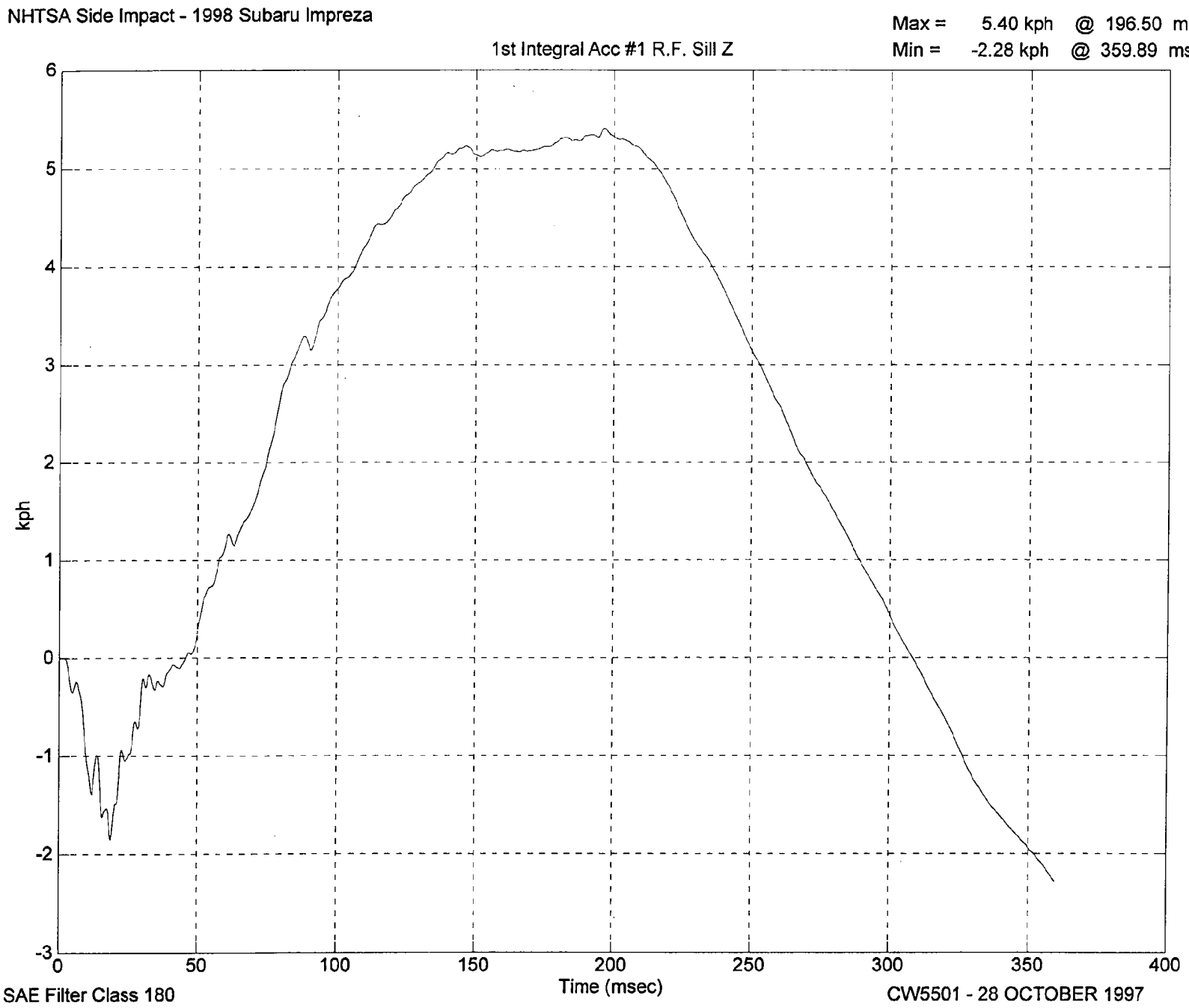
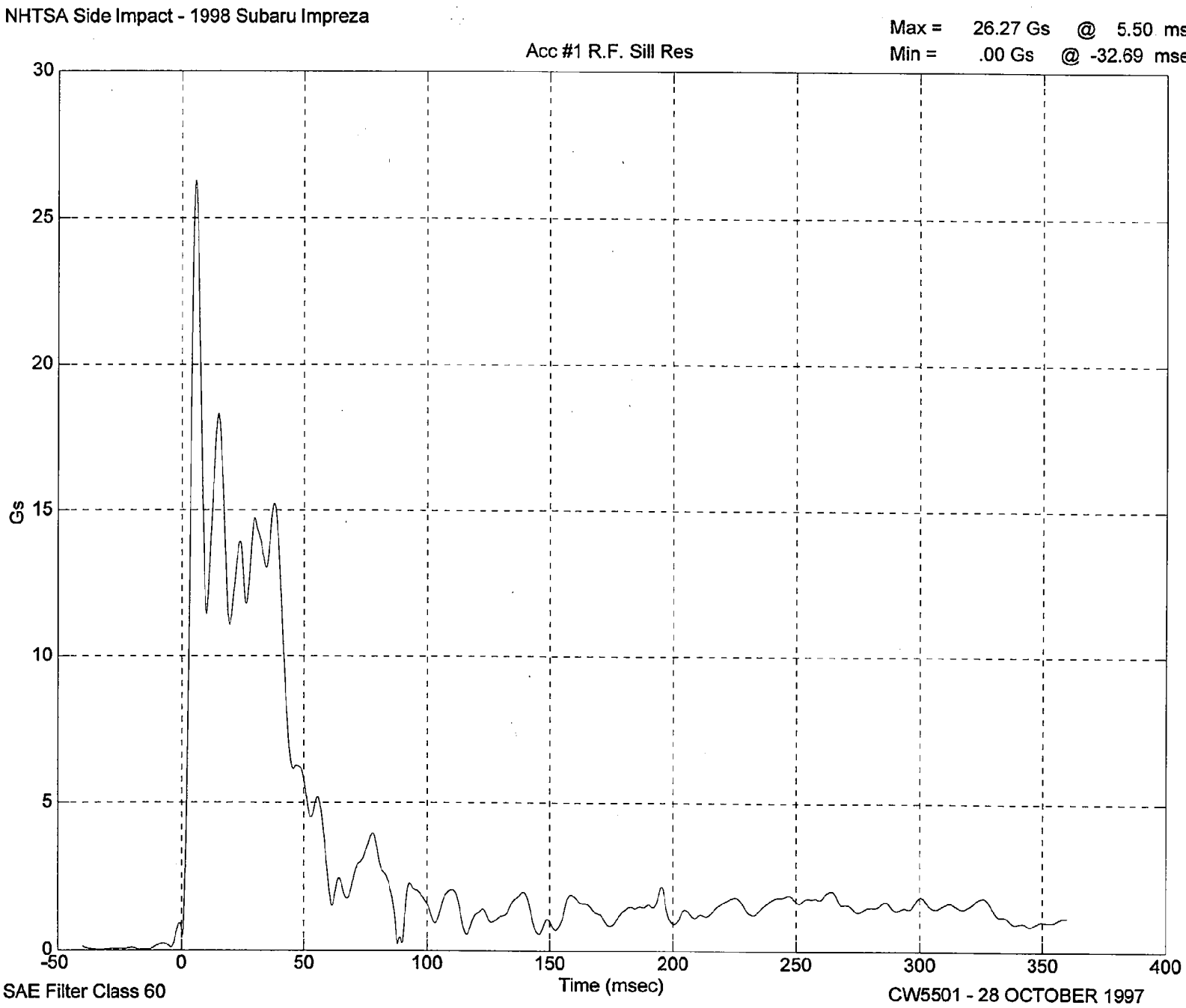
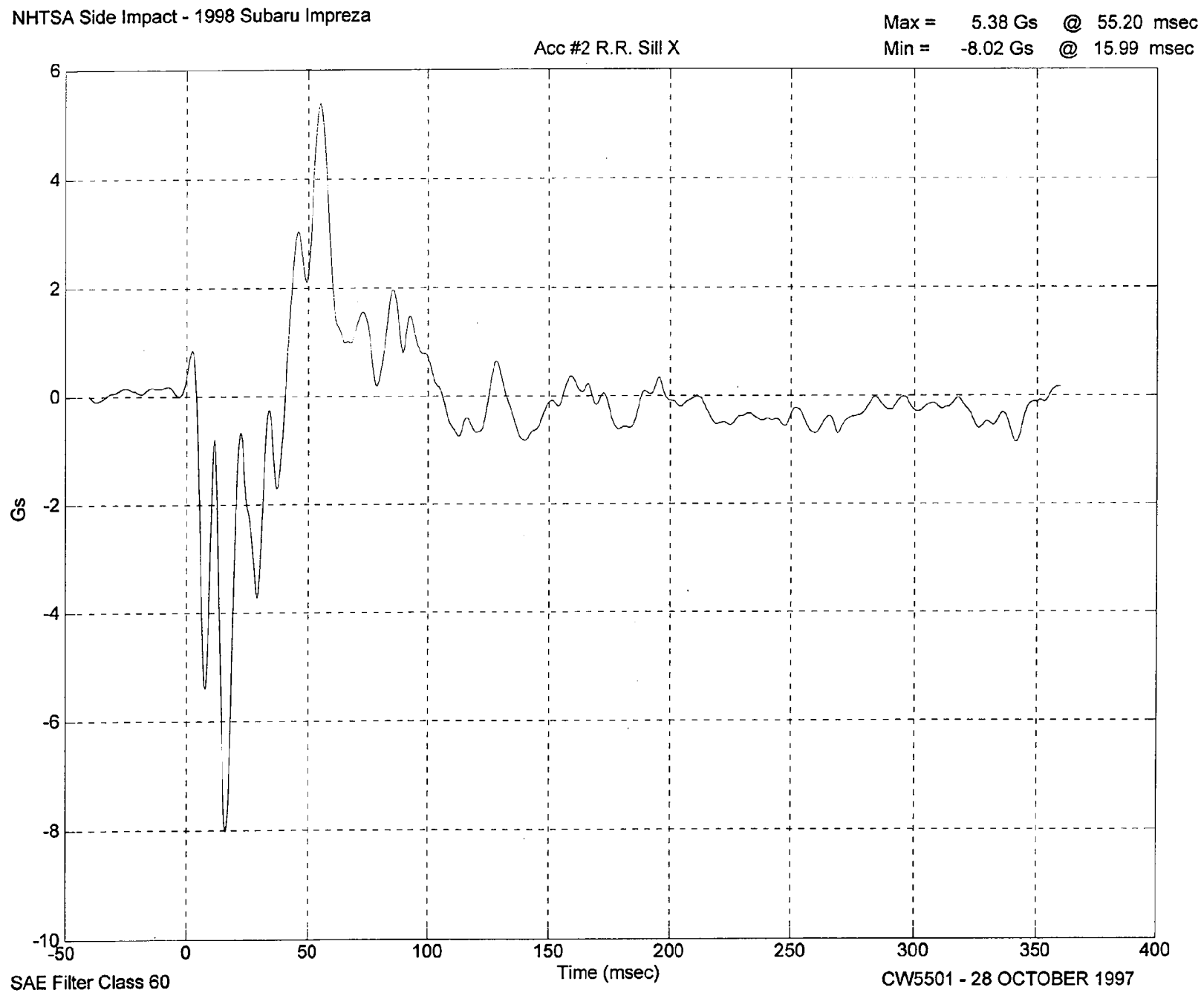
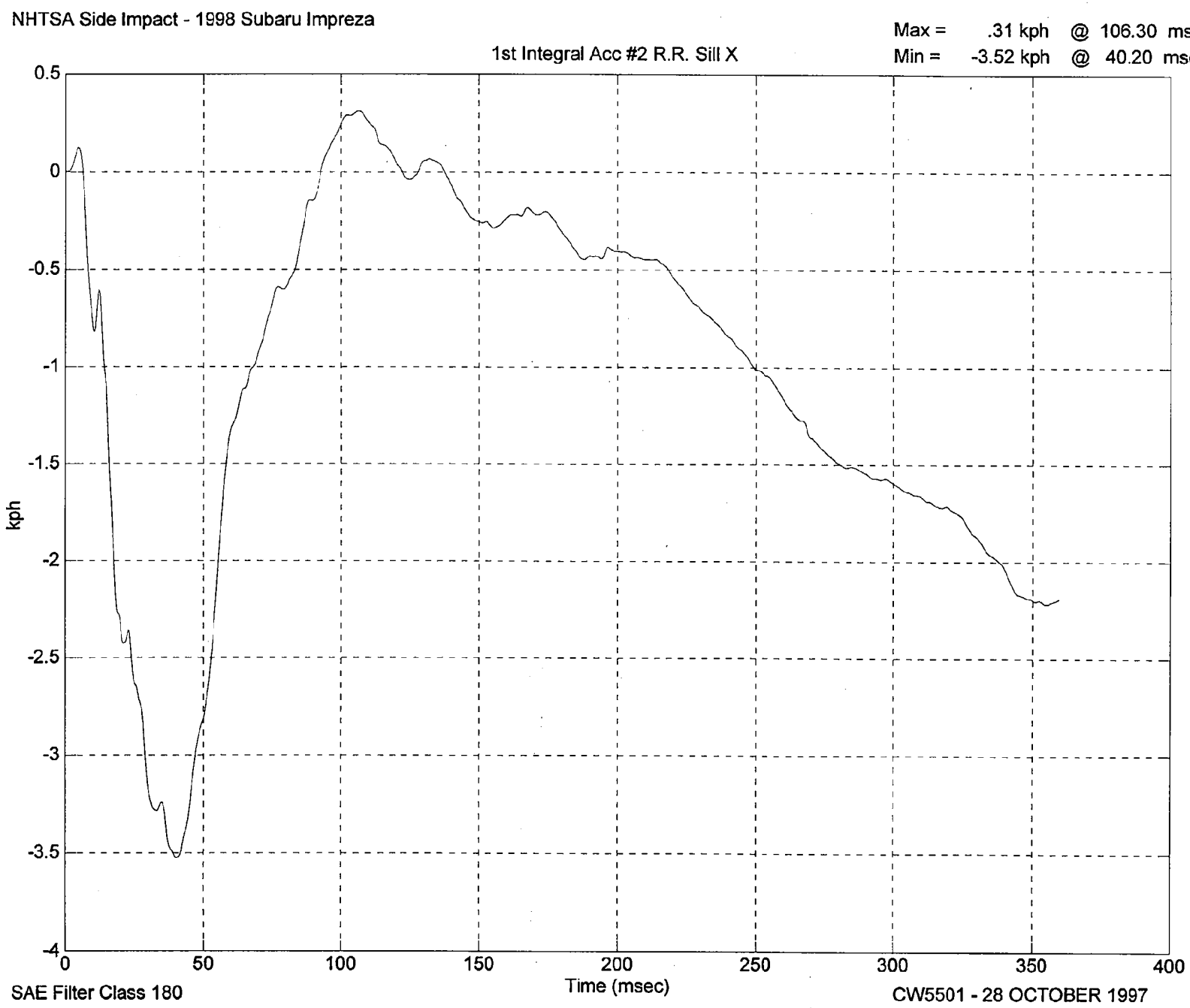
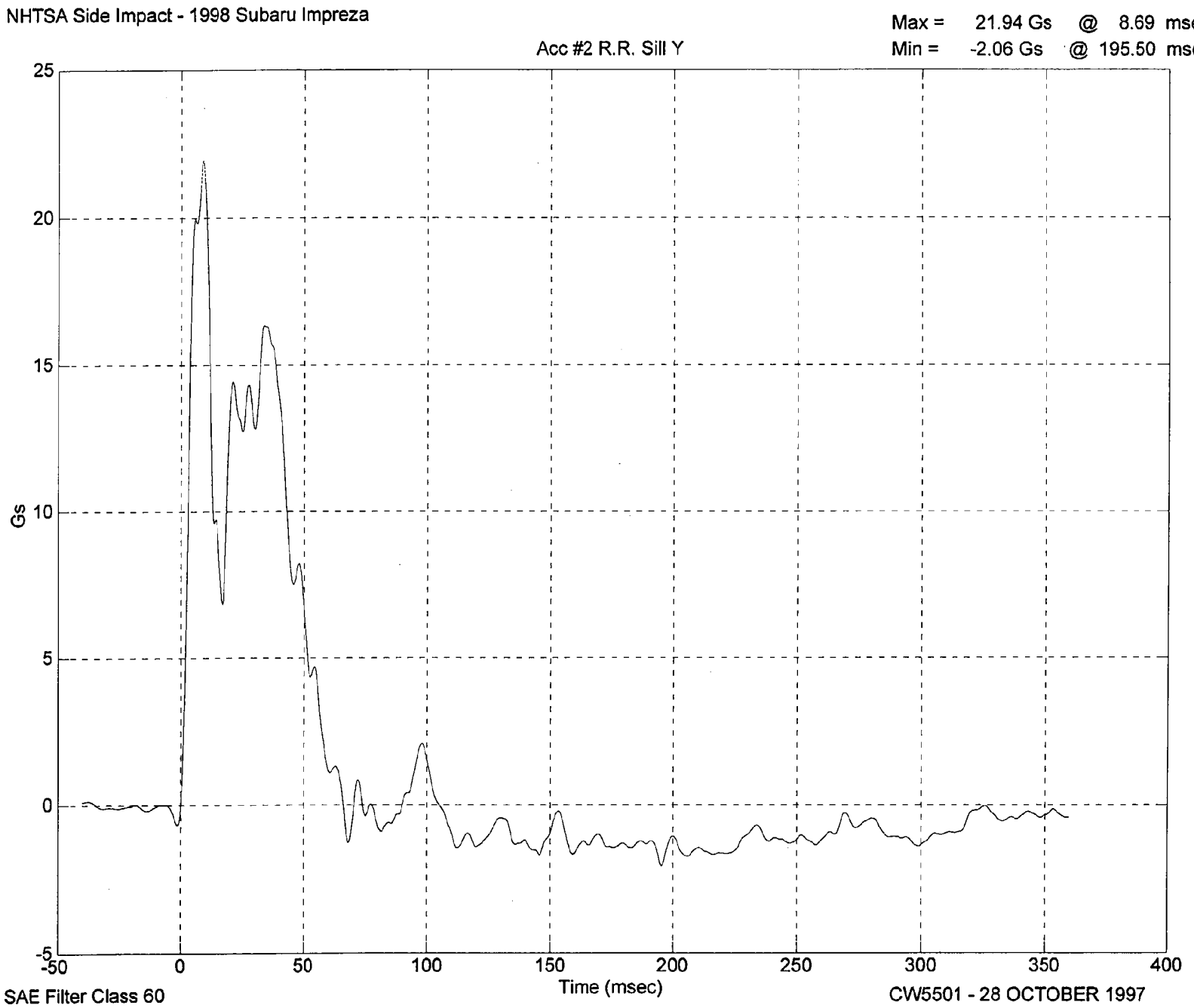
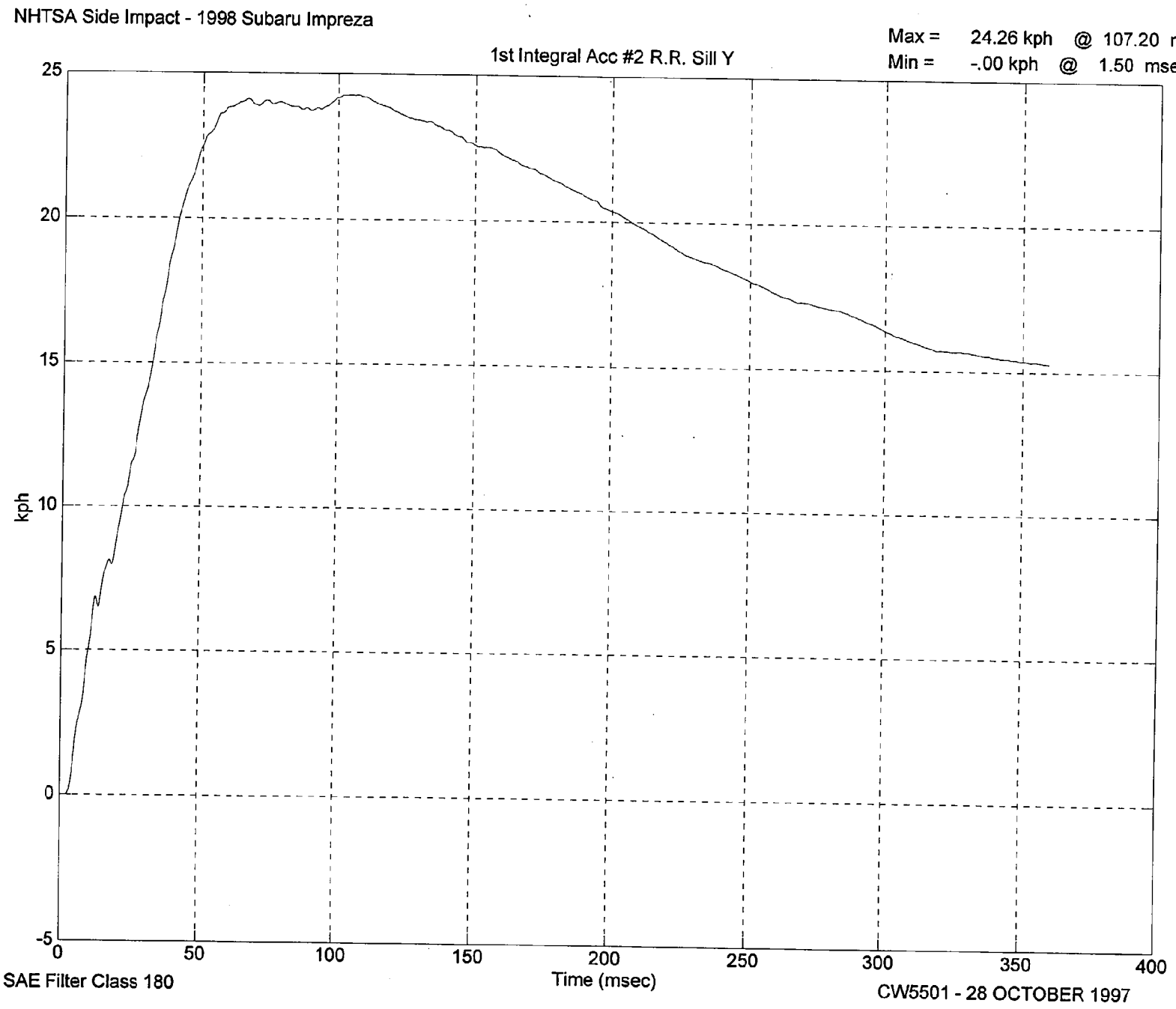

NHTSA Side Impact - 1998 Subaru Impreza
1st Integral Acc #1 R.F. Sill Z
Max = 5.40 kph @ 196.50 msec
Min = -2.28 kph @ 359.89 msec
kph
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

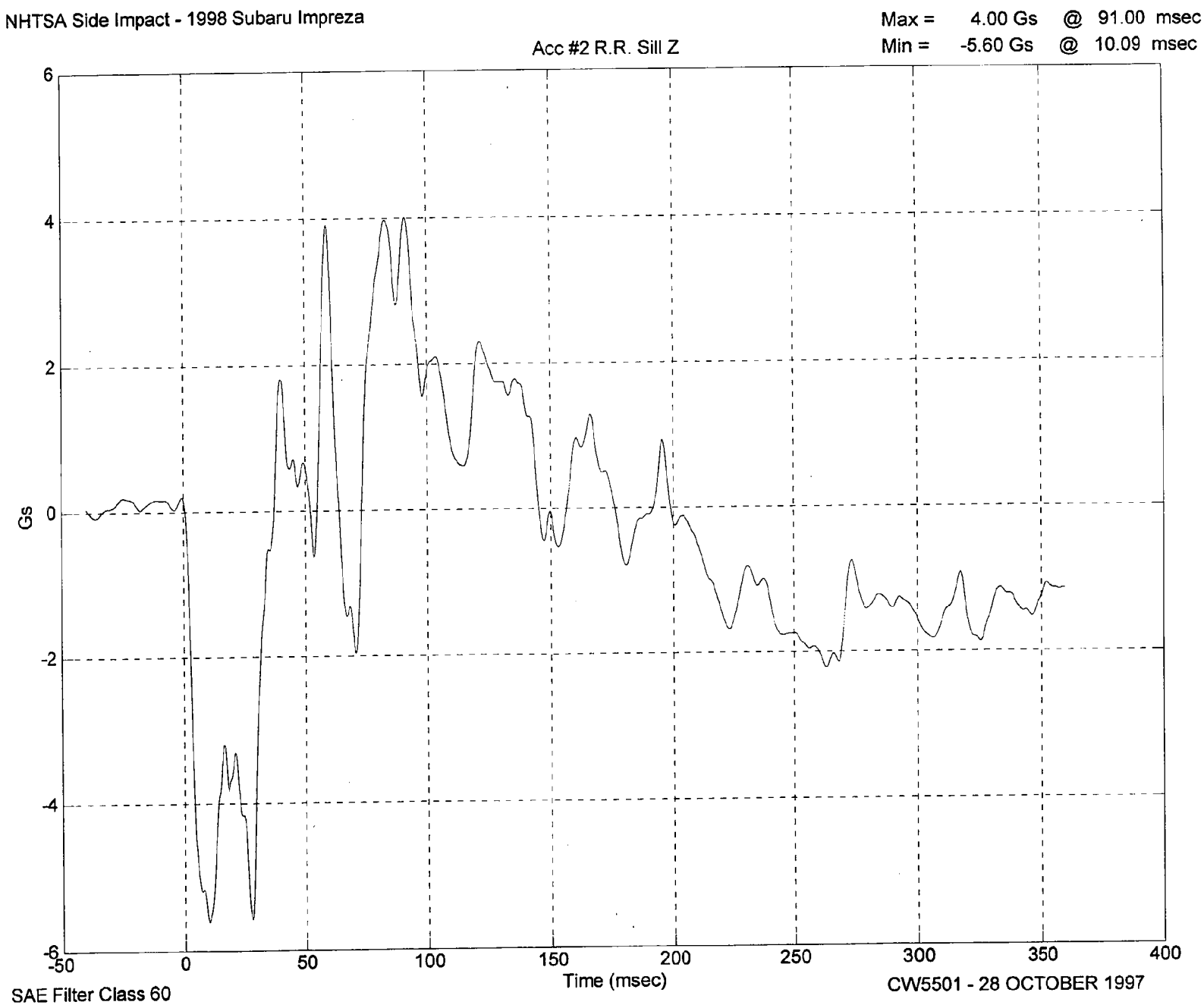

NHTSA Side Impact - 1998 Subaru Impreza
Acc #1 R.F. Sill Res
Max = 26.27 Gs @ 5.50 msec
Min = .00 Gs @ -32.69 msec
Gs
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
Acc #2 R.R. Sill X
Max = 5.38 Gs @ 55.20 msec
Min = -8.02 Gs @ 15.99 msec
Gs
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
1st Integral Acc #2 R.R. Sill X
Max = .31 kph @ 106.30 msec
Min = -3.52 kph @ 40.20 msec
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
kph
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
Max = 21.94 Gs @ 8.69 msec
Acc #2 R.R. Sill Y
Min = -2.06 Gs @ 195.50 msec
25
20
15
10
5
0
-5
Gs
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

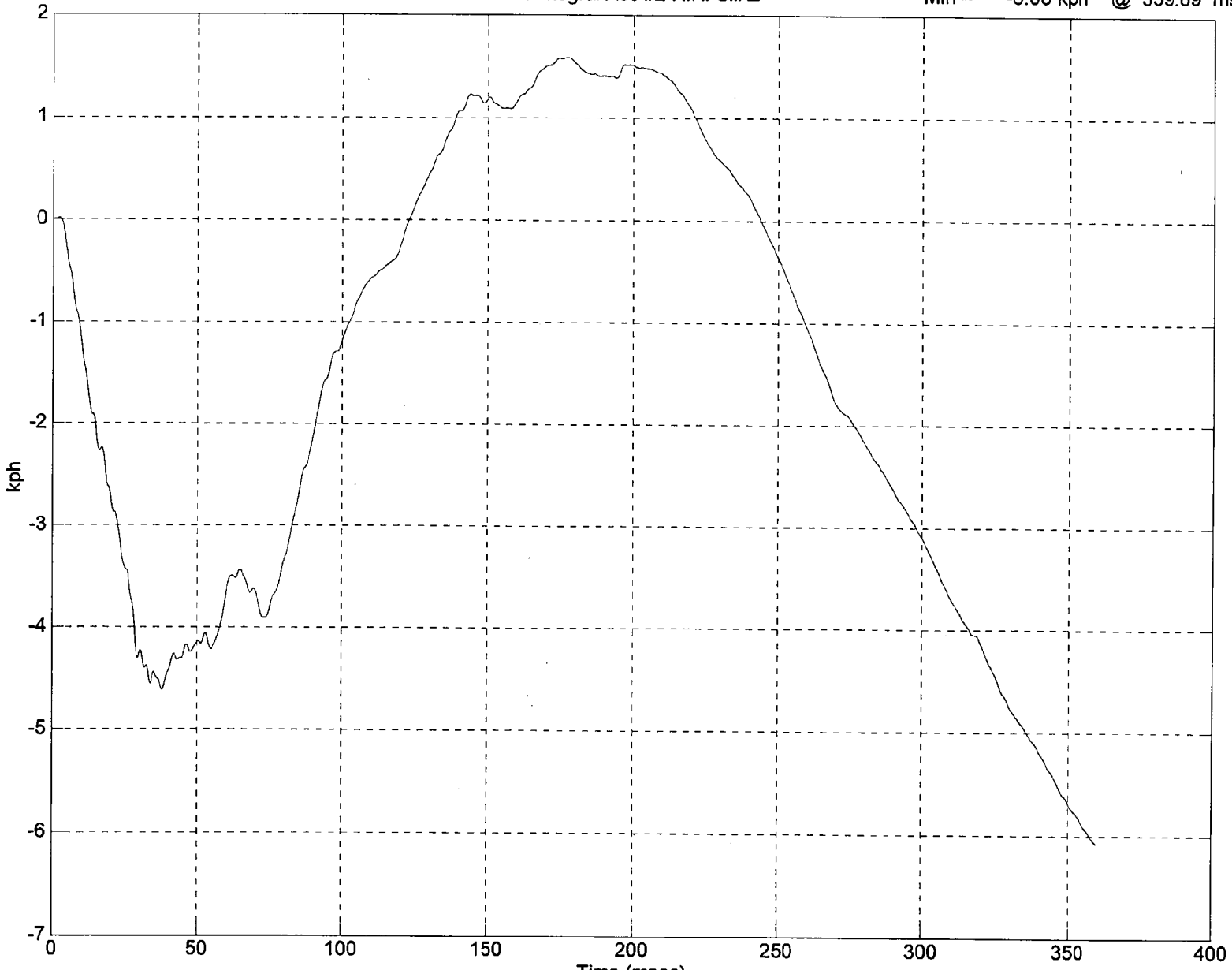

NHTSA Side Impact - 1998 Subaru Impreza
1st Integral Acc #2 R.R. Sill Y
Max = 24.26 kph @ 107.20 msec
Min = -.00 kph @ 1.50 msec
25
20
15
10
5
0
-5
kph
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
Acc #2 R.R. Sill Z
Max = 4.00 Gs @ 91.00 msec
Min = -5.60 Gs @ 10.09 msec
Gs
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza

1st Integral Acc #2 R.R. Sill Z

Max = 1.58 kph @ 177.20 msec
Min = -6.08 kph @ 359.89 msec



SAE Filter Class 180

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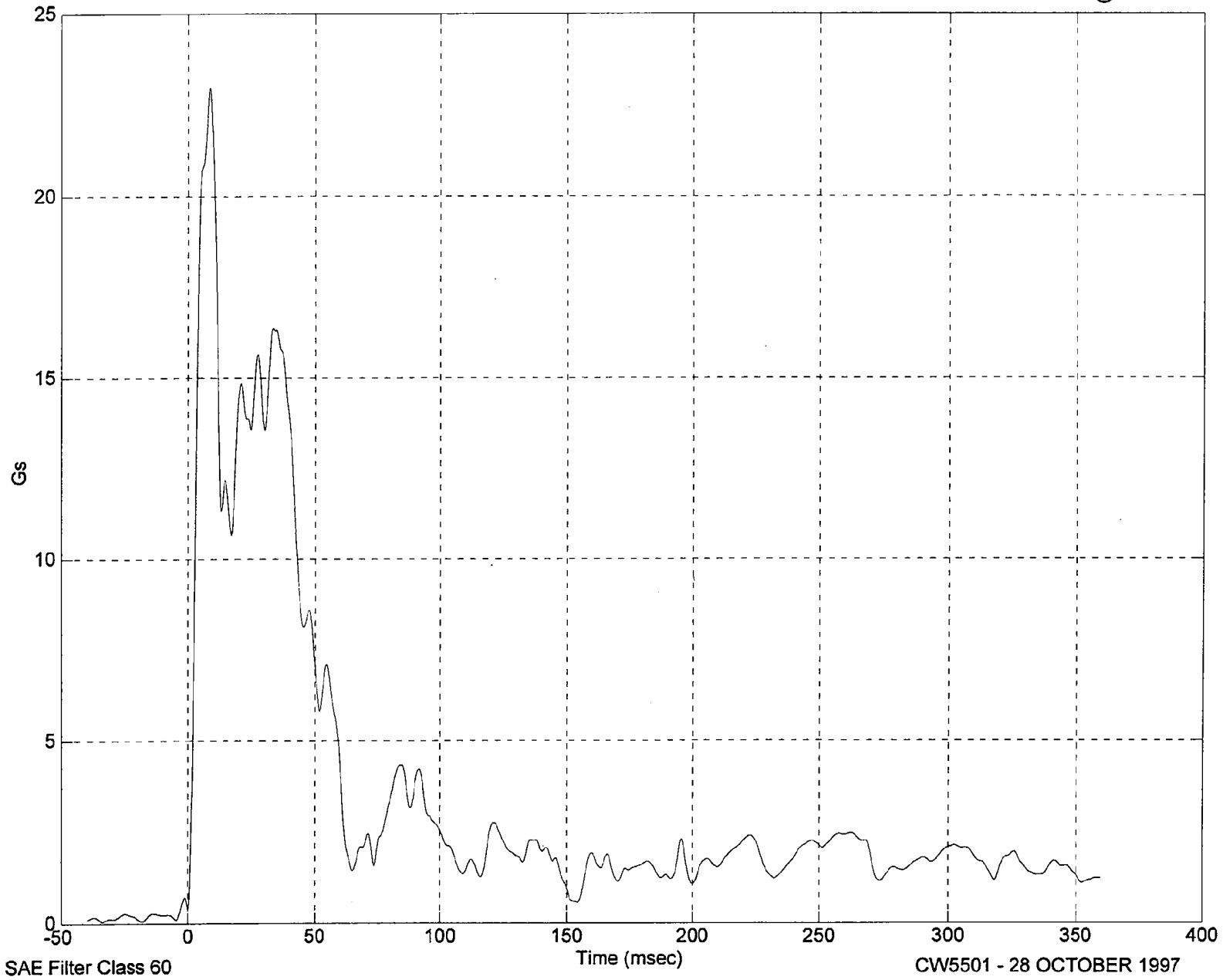
NHTSA Side Impact - 1998 Subaru Impreza

Max = 22.98 Gs @ 8.59 msec
Min = .04 Gs @ -34.00 msec



SAE Filter Class 60

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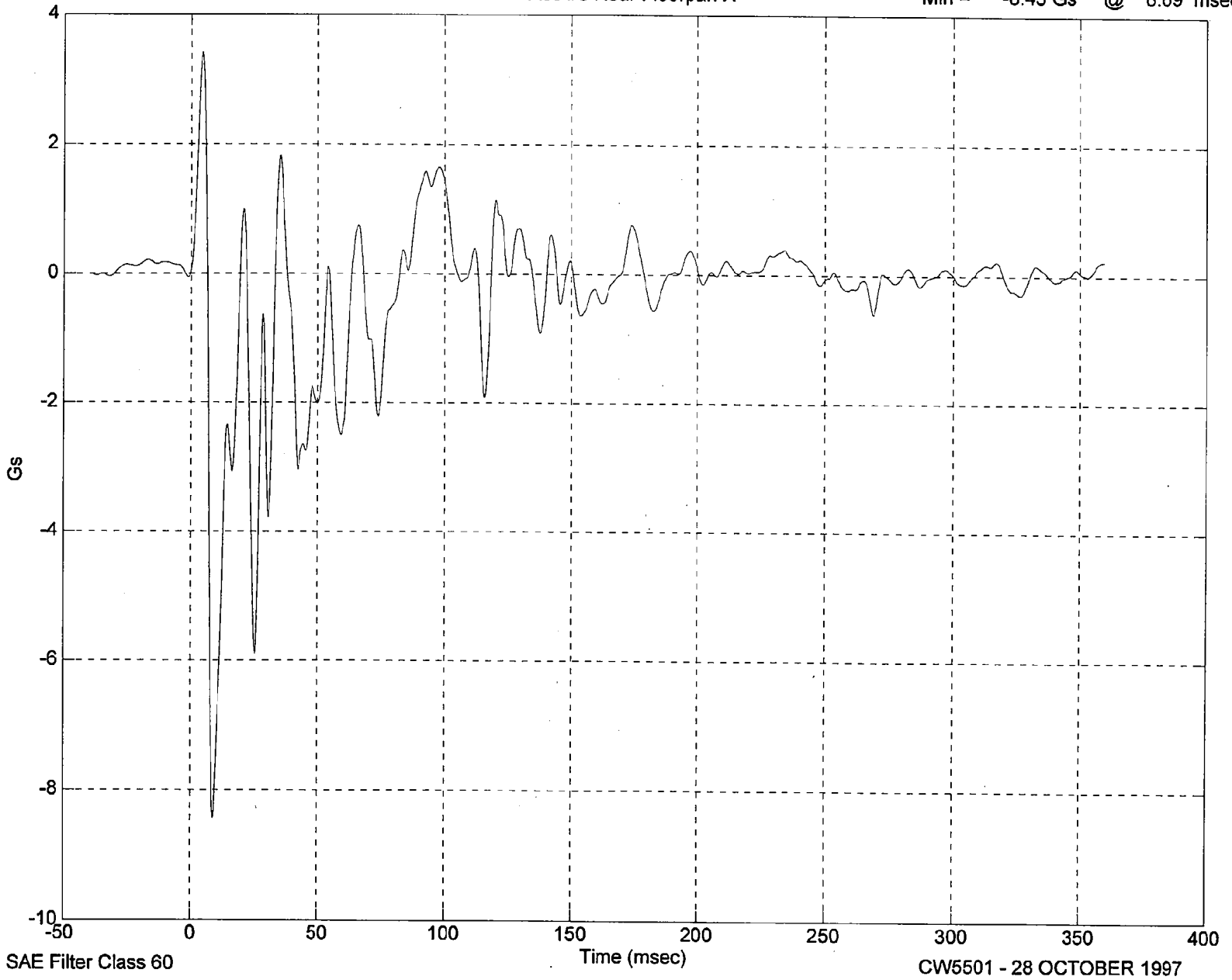
NHTSA Side Impact - 1998 Subaru Impreza

Acc #3 Rear Floorpan X

Max = 3.41 Gs @ 4.40 msec
Min = -8.43 Gs @ 8.69 msec



SAE Filter Class 60

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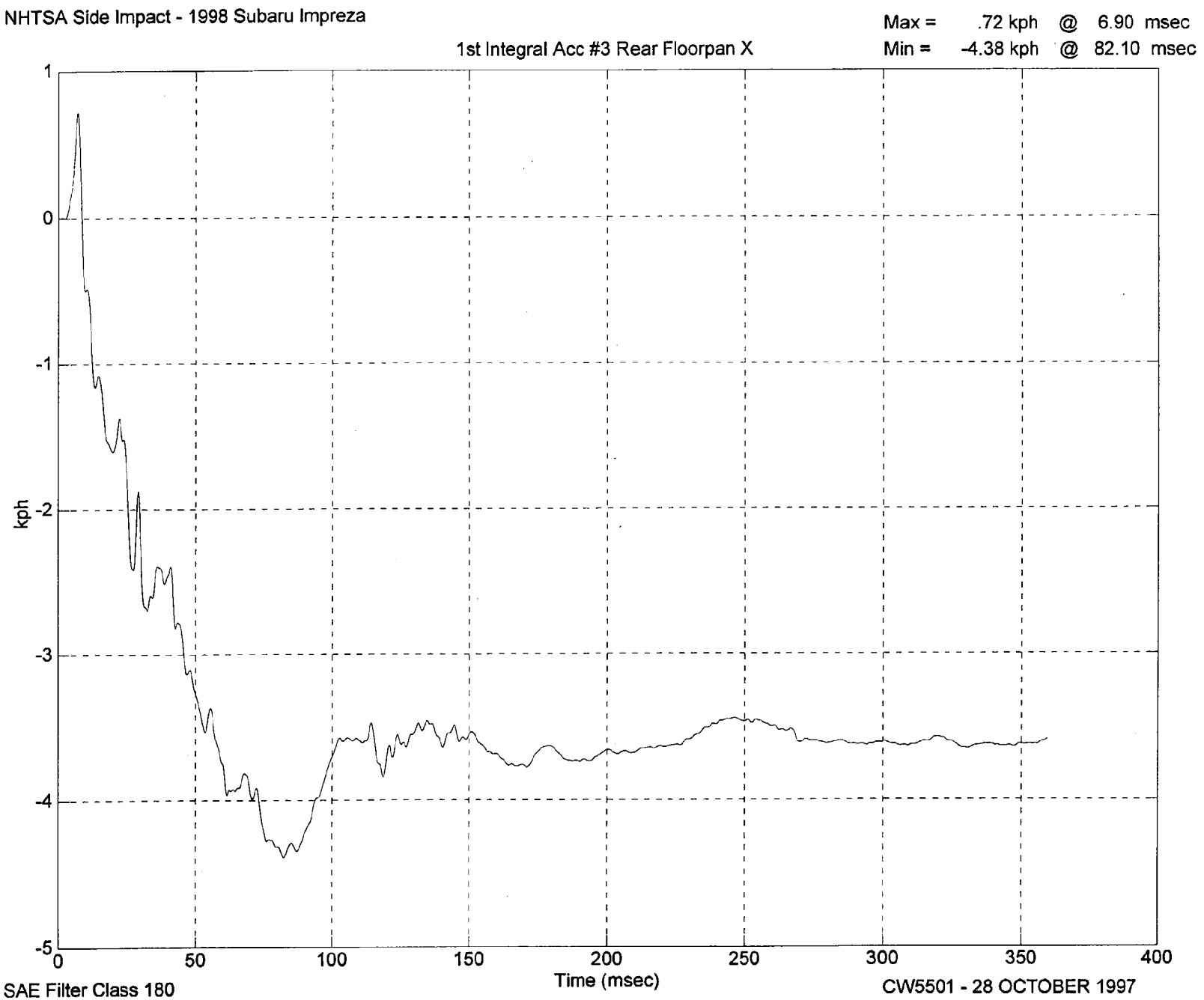
NHTSA Side Impact - 1998 Subaru Impreza
1st Integral Acc #3 Rear Floorpan X
Max = .72 kph @ 6.90 msec
Min = -4.38 kph @ 82.10 msec
kph
Time (msec)
SAE Filter Class 180
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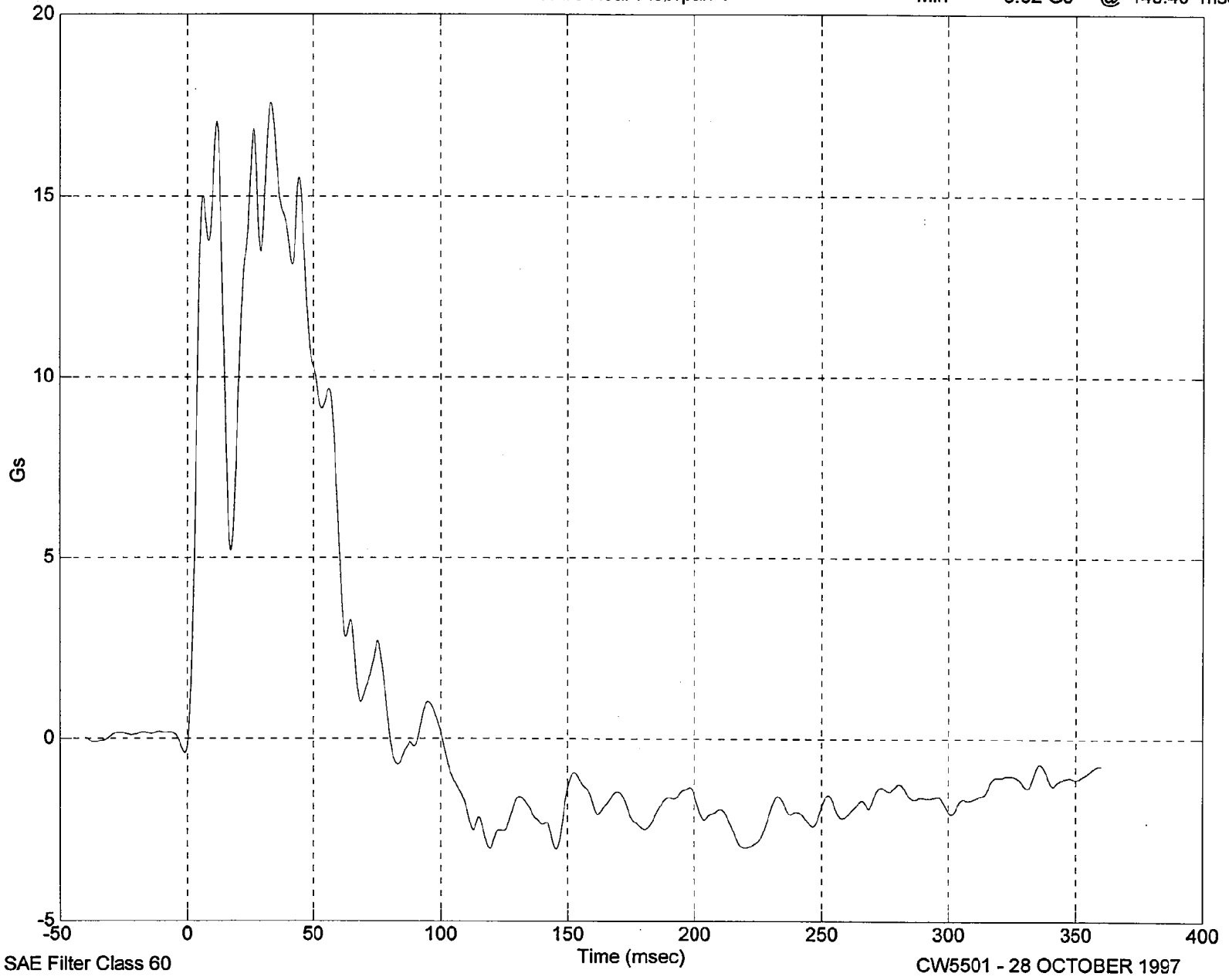
NHTSA Side Impact - 1998 Subaru Impreza

Acc #3 Rear Floorpan Y

Max = 17.57 Gs @ 33.20 msec
Min = -3.02 Gs @ 145.40 msec



SAE Filter Class 60

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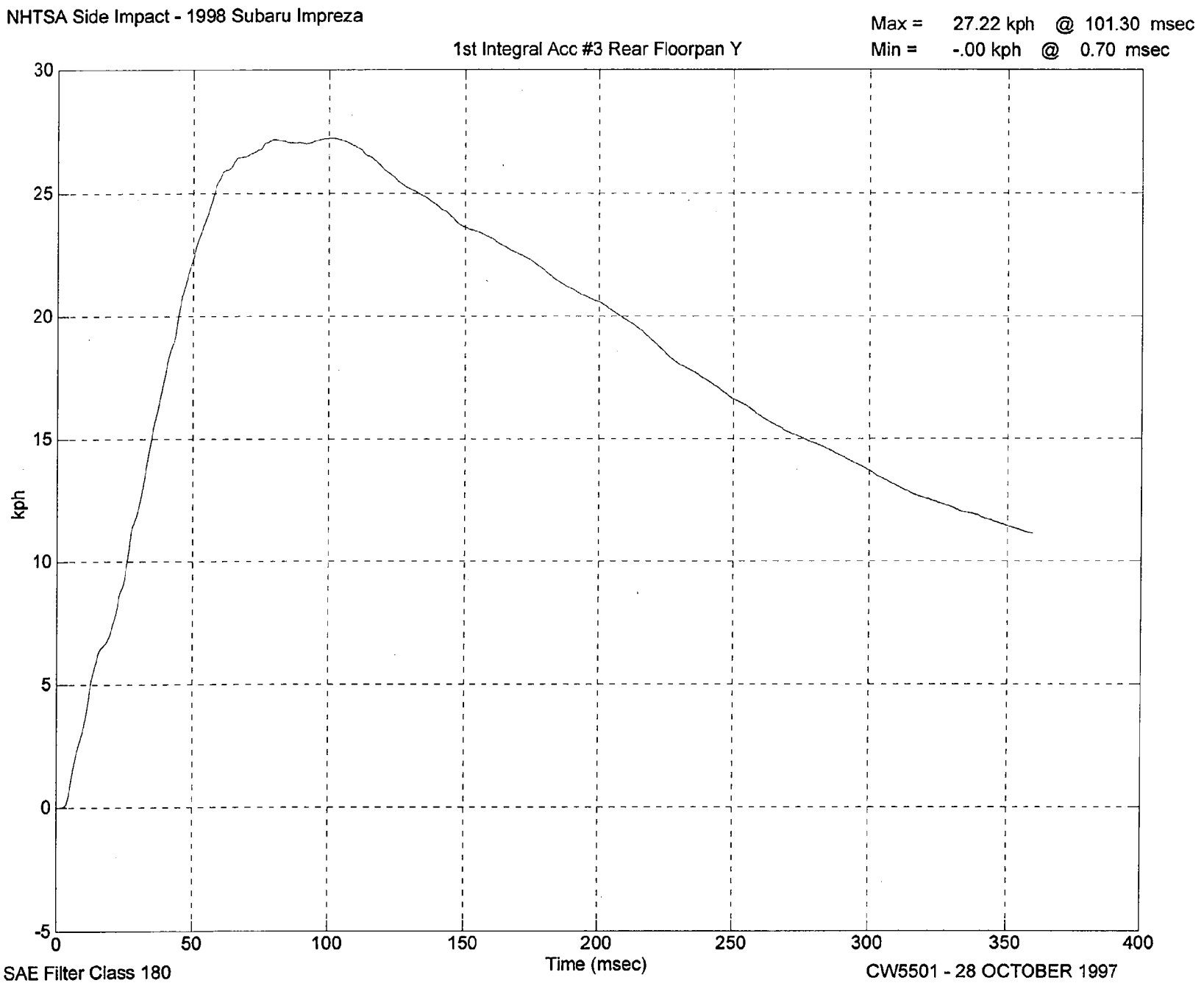
NHTSA Side Impact - 1998 Subaru Impreza
1st Integral Acc #3 Rear Floorpan Y
Max = 27.22 kph @ 101.30 msec
Min = -.00 kph @ 0.70 msec
30
25
20
15
10
5
0
-5
kph
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
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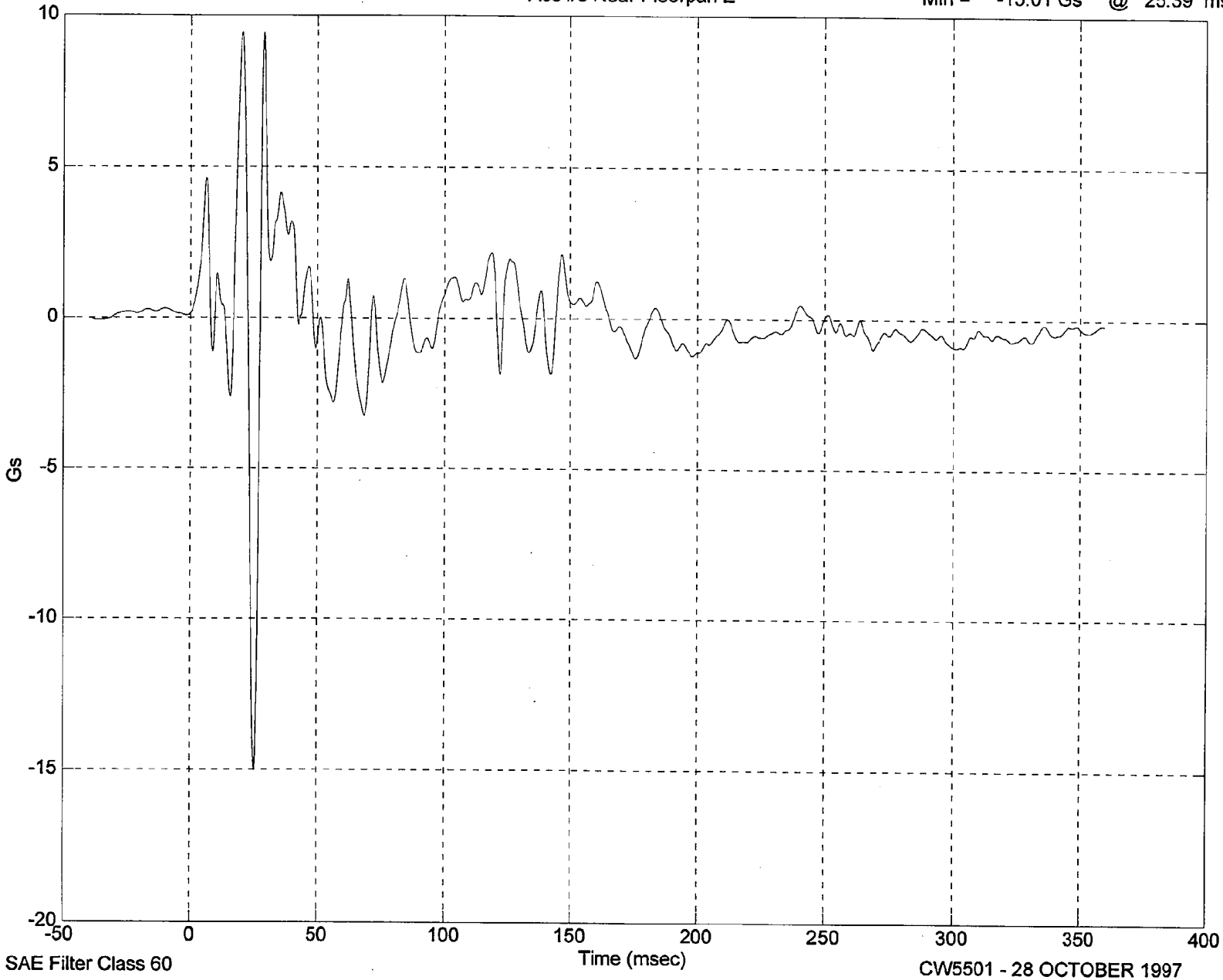
NHTSA Side Impact - 1998 Subaru Impreza

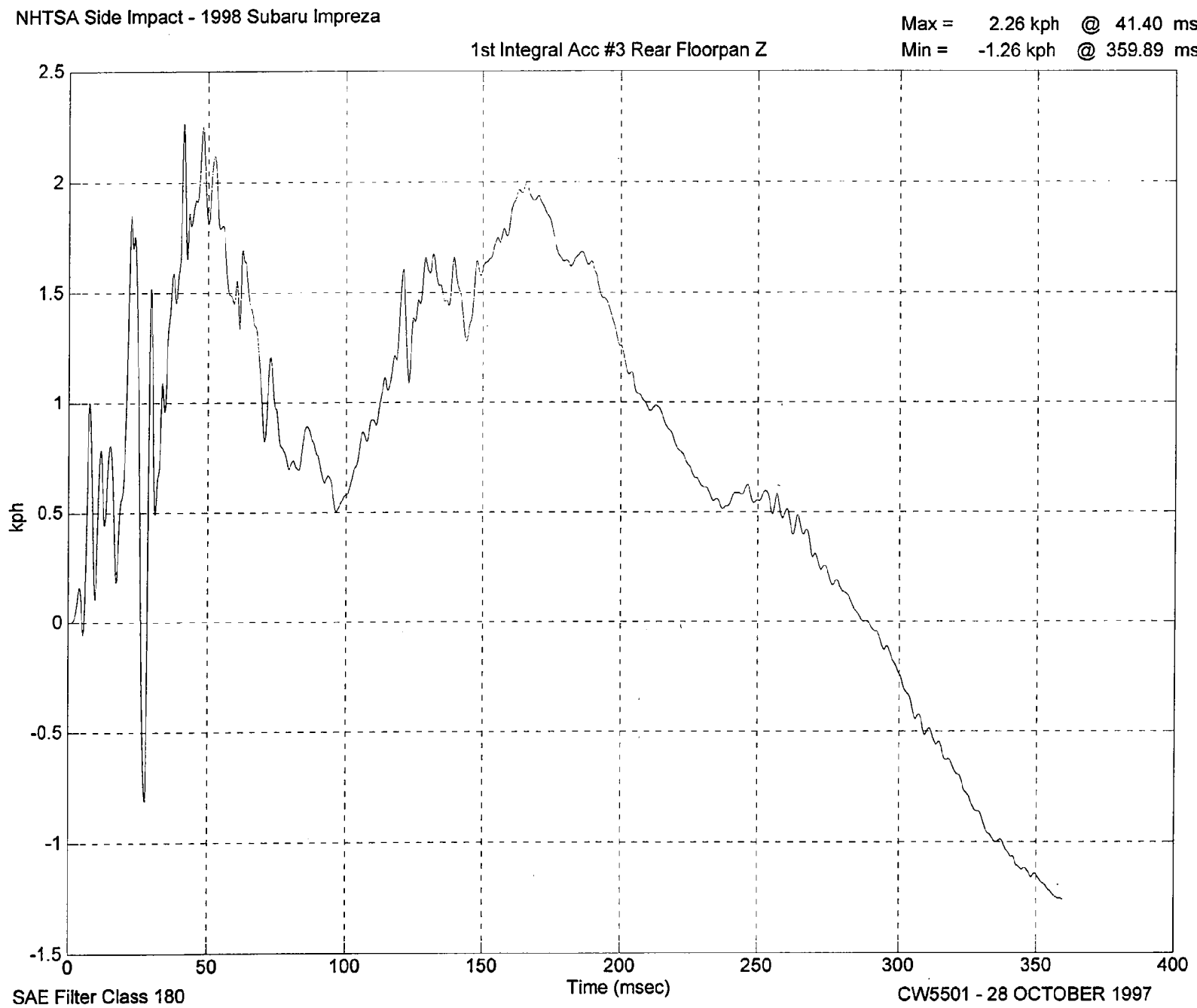
Acc #3 Rear Floorpan Z

Max = 9.43 Gs @ 20.49 msec
Min = -15.01 Gs @ 25.39 msec



SAE Filter Class 60

CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
1st Integral Acc #3 Rear Floorpan Z
Max = 2.26 kph @ 41.40 msec
Min = -1.26 kph @ 359.89 msec
kph
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
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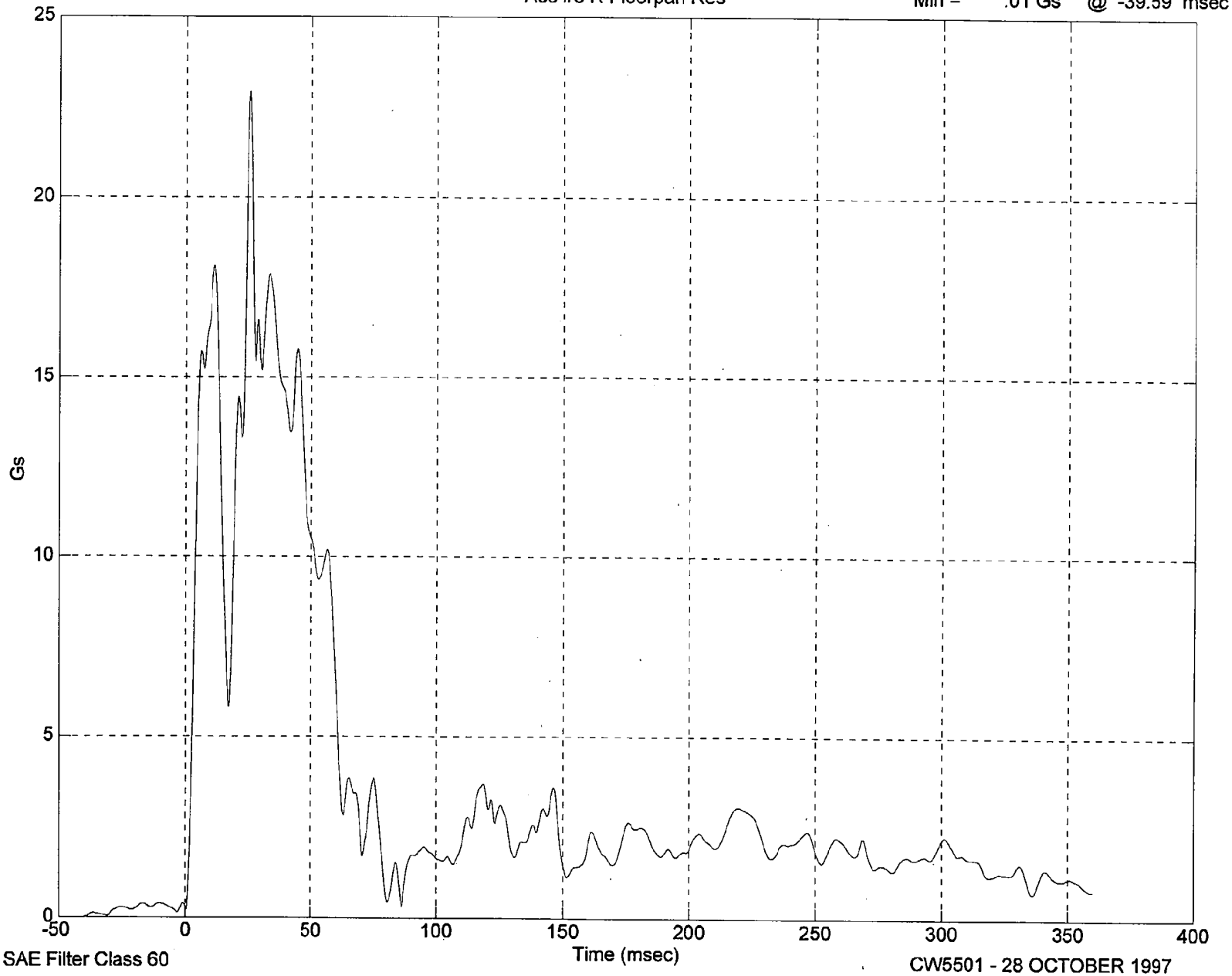
NHTSA Side Impact - 1998 Subaru Impreza

Acc #3 R Floorpan Res

Max = 22.90 Gs @ 25.50 msec
Min = .01 Gs @ -39.59 msec



SAE Filter Class 60

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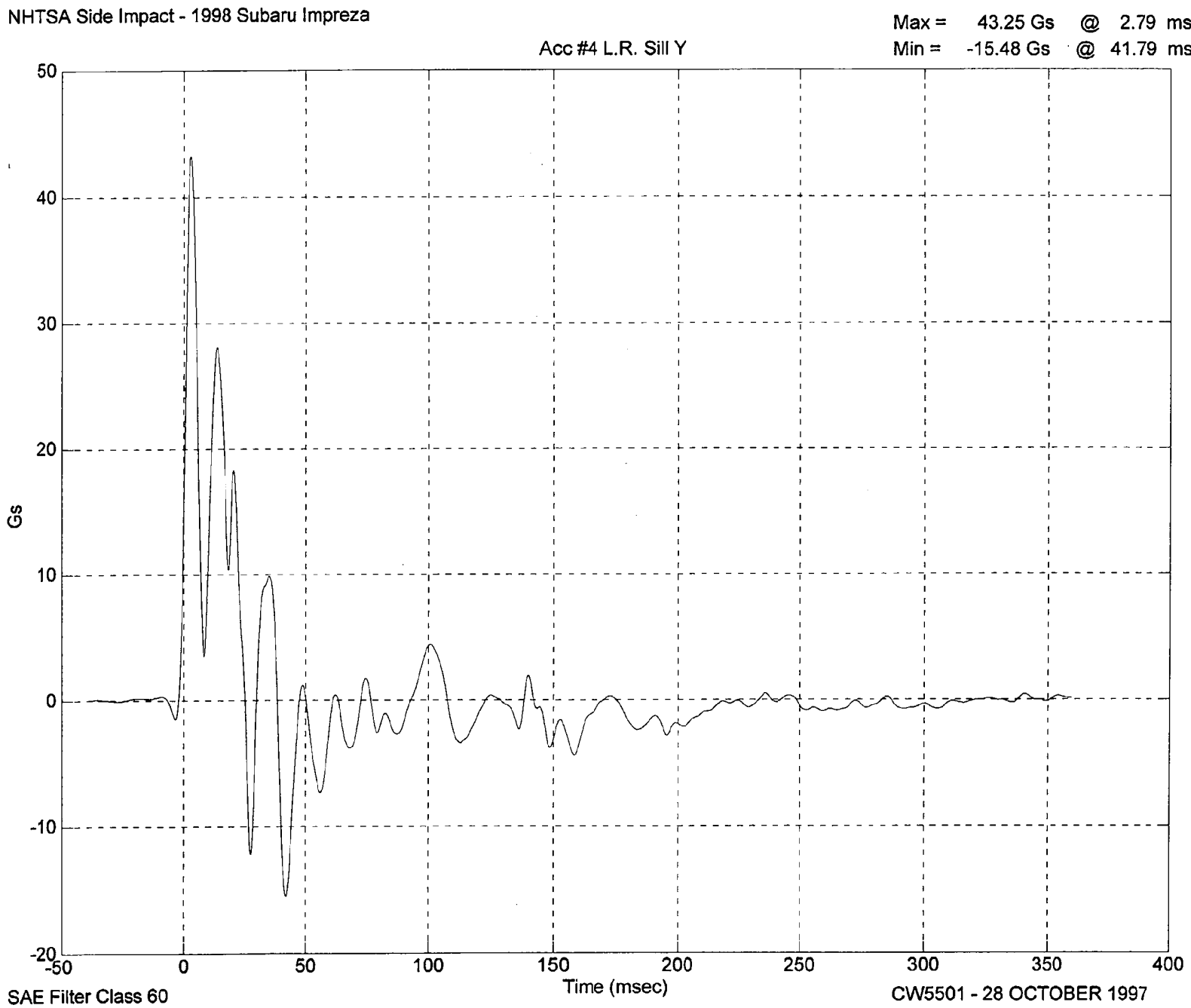
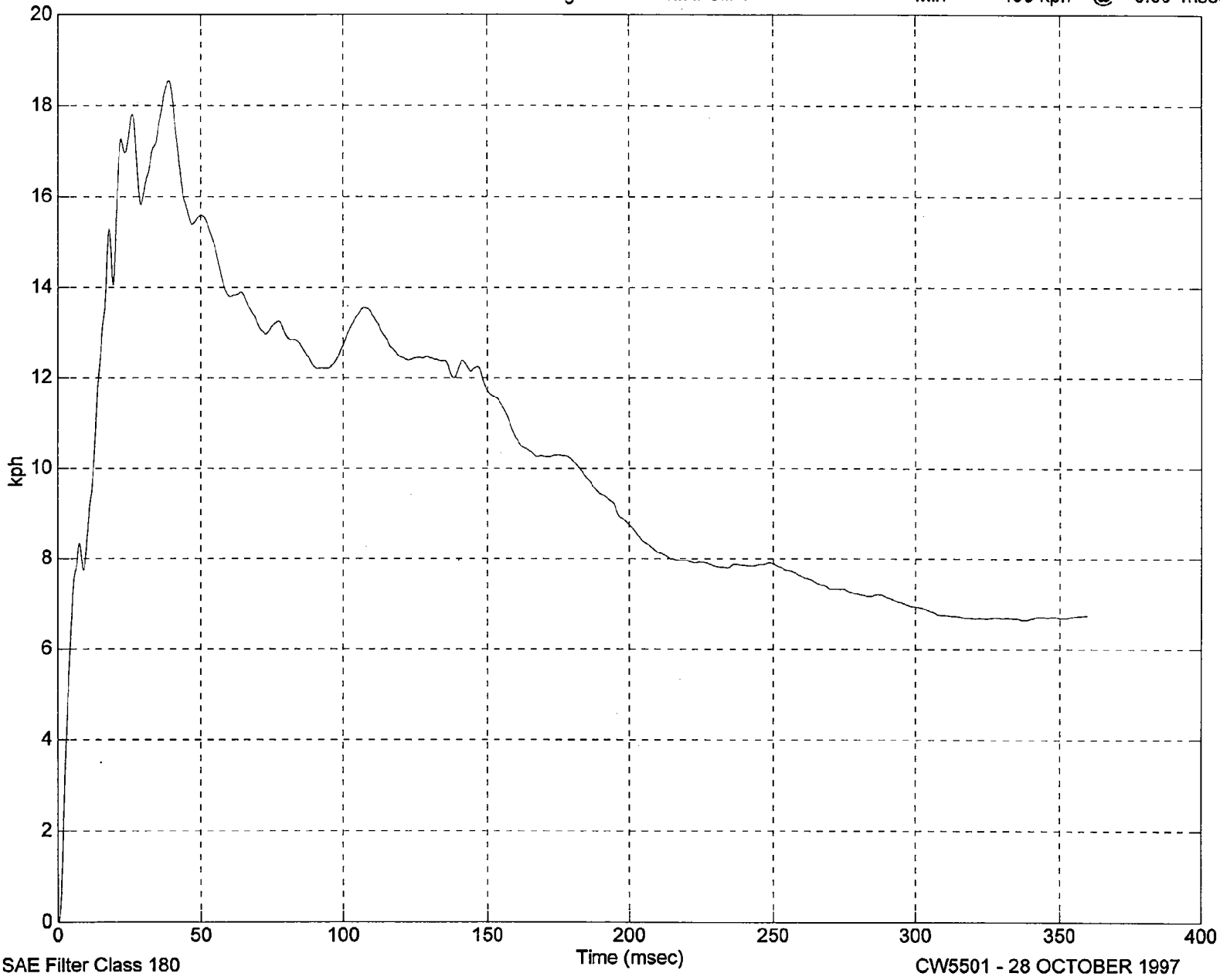

NHTSA Side Impact - 1998 Subaru Impreza
Acc #4 L.R. Sill Y
Max = 43.25 Gs @ 2.79 msec
Min = -15.48 Gs @ 41.79 msec
Gs
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza

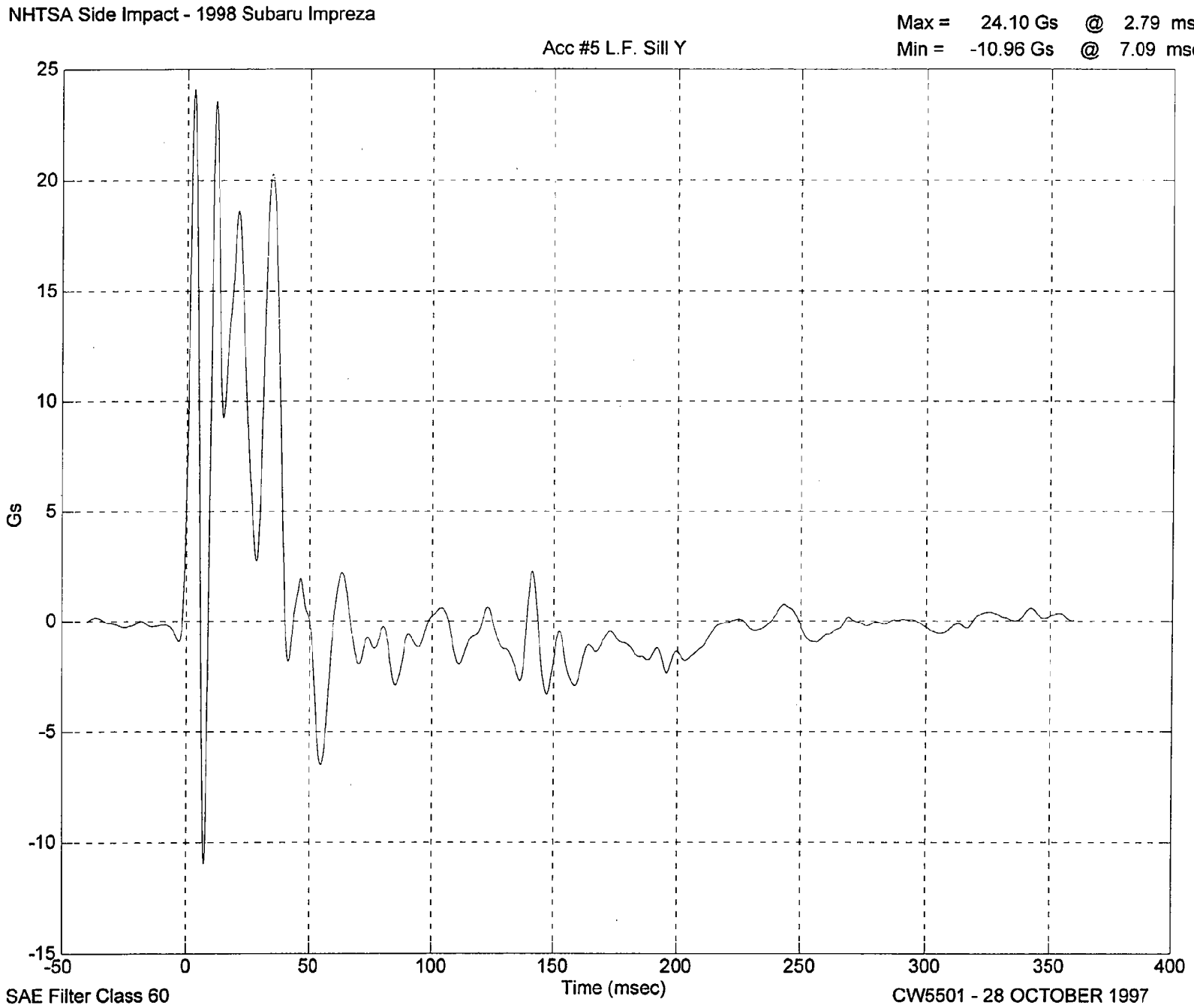
1st Integral Acc #4 L.R. Sill Y

Max = 18.53 kph @ 38.80 msec
Min = .00 kph @ 0.00 msec

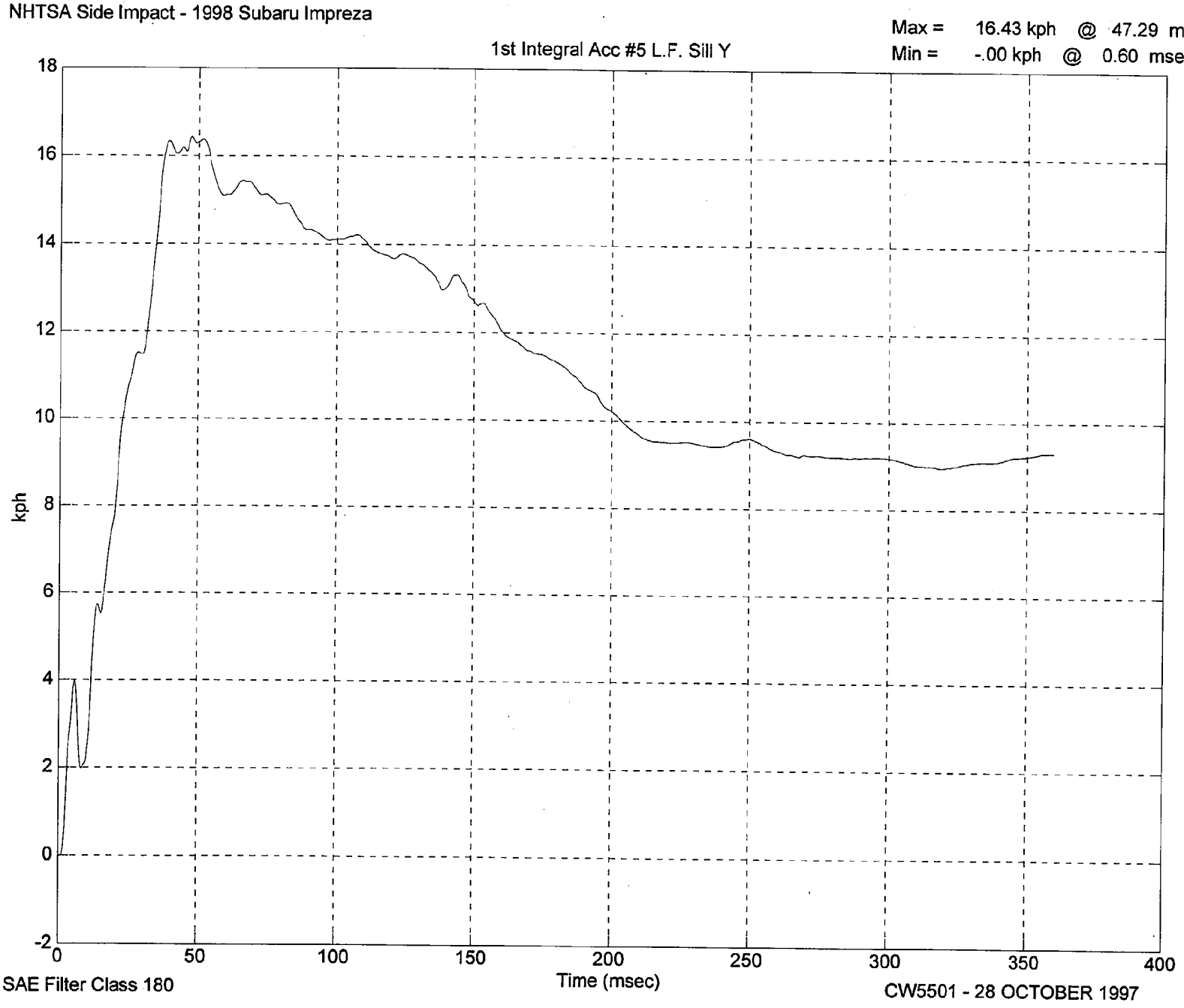


SAE Filter Class 180

CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
Acc #5 L.F. Sill Y
Max = 24.10 Gs @ 2.79 msec
Min = -10.96 Gs @ 7.09 msec
Gs
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza

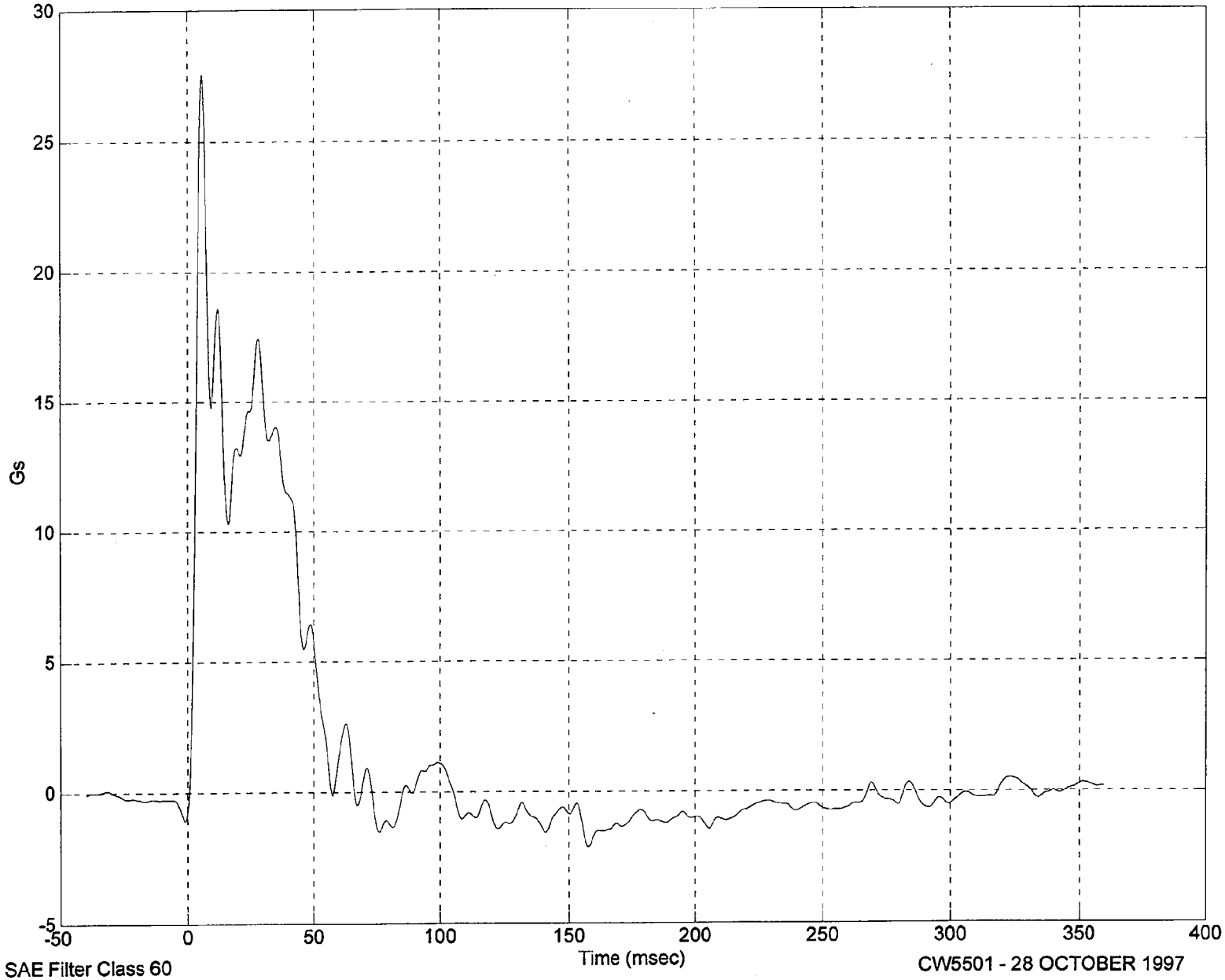


SAE Filter Class 180

CW5501 - 28 OCTOBER 1997

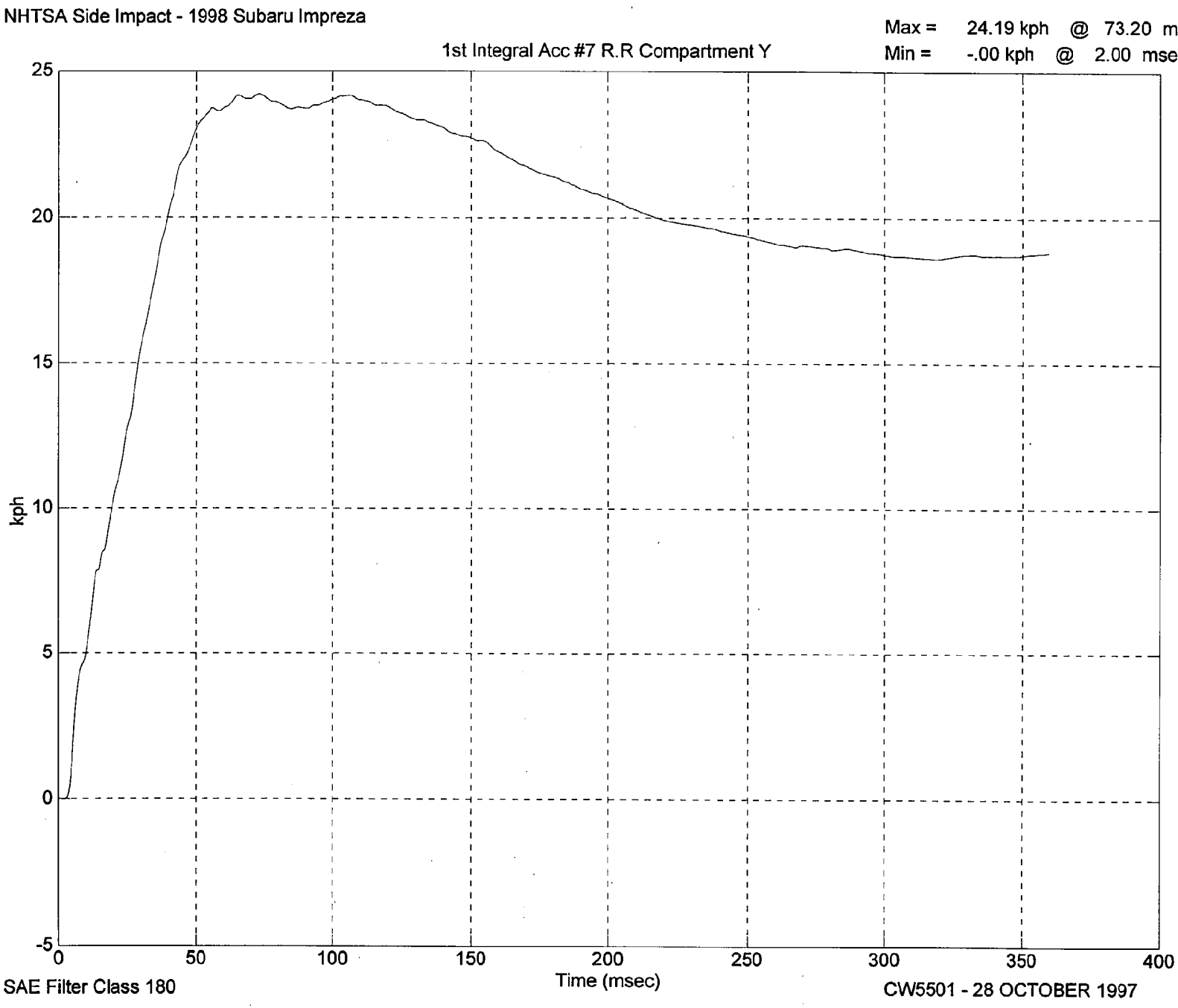
NHTSA Side Impact - 1998 Subaru Impreza

Max = 27.54 Gs @ 5.50 msec
Min = -2.10 Gs @ 157.69 msec



SAE Filter Class 60

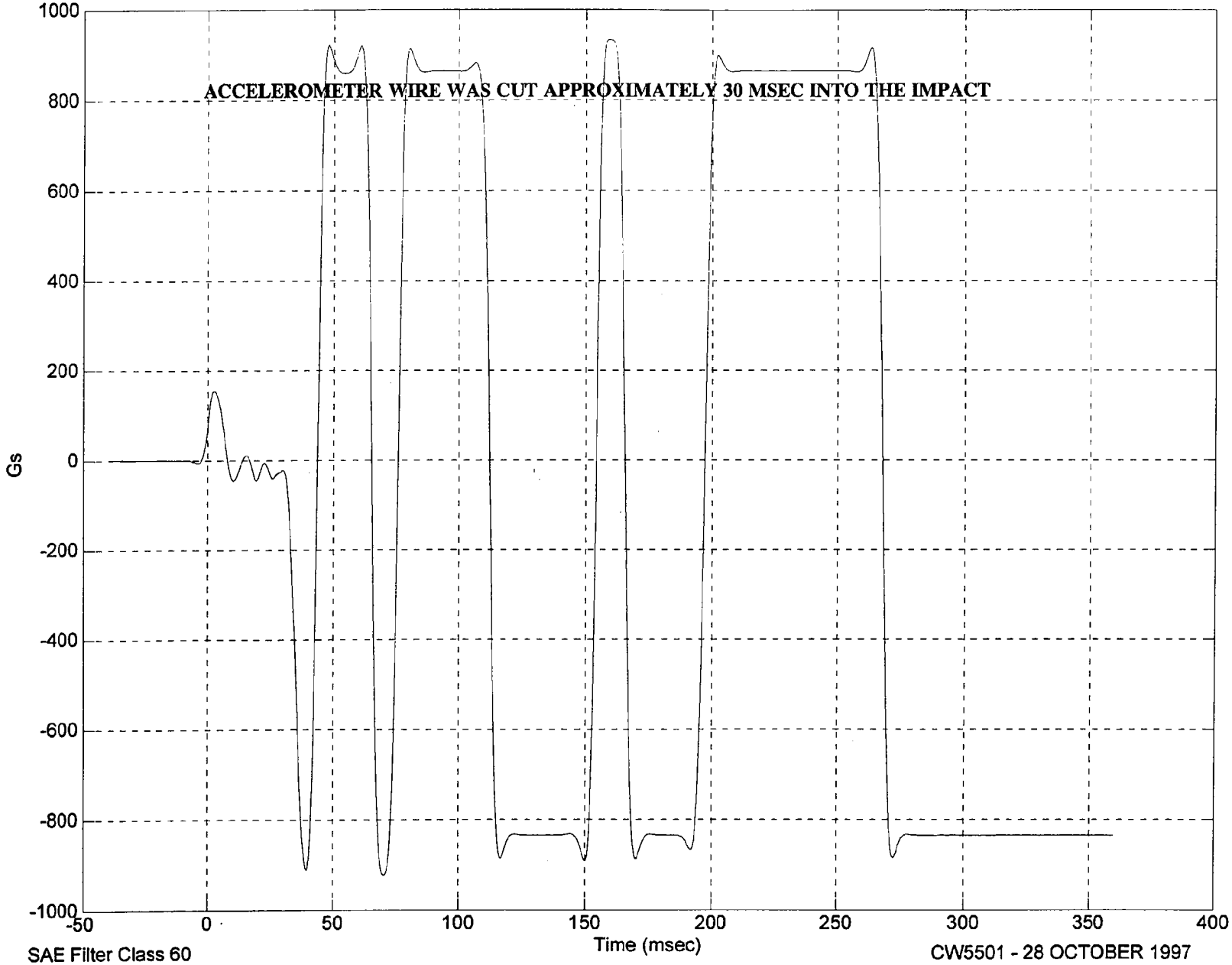
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
1st Integral Acc #7 R.R Compartment Y
Max = 24.19 kph @ 73.20 msec
Min = -.00 kph @ 2.00 msec
kph
25
20
15
10
5
0
-5
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza

Max = 934.05 Gs @ 159.09 msec
Min = -922.28 Gs @ 70.40 msec

Acc #12 L.L. B-Pillar Y



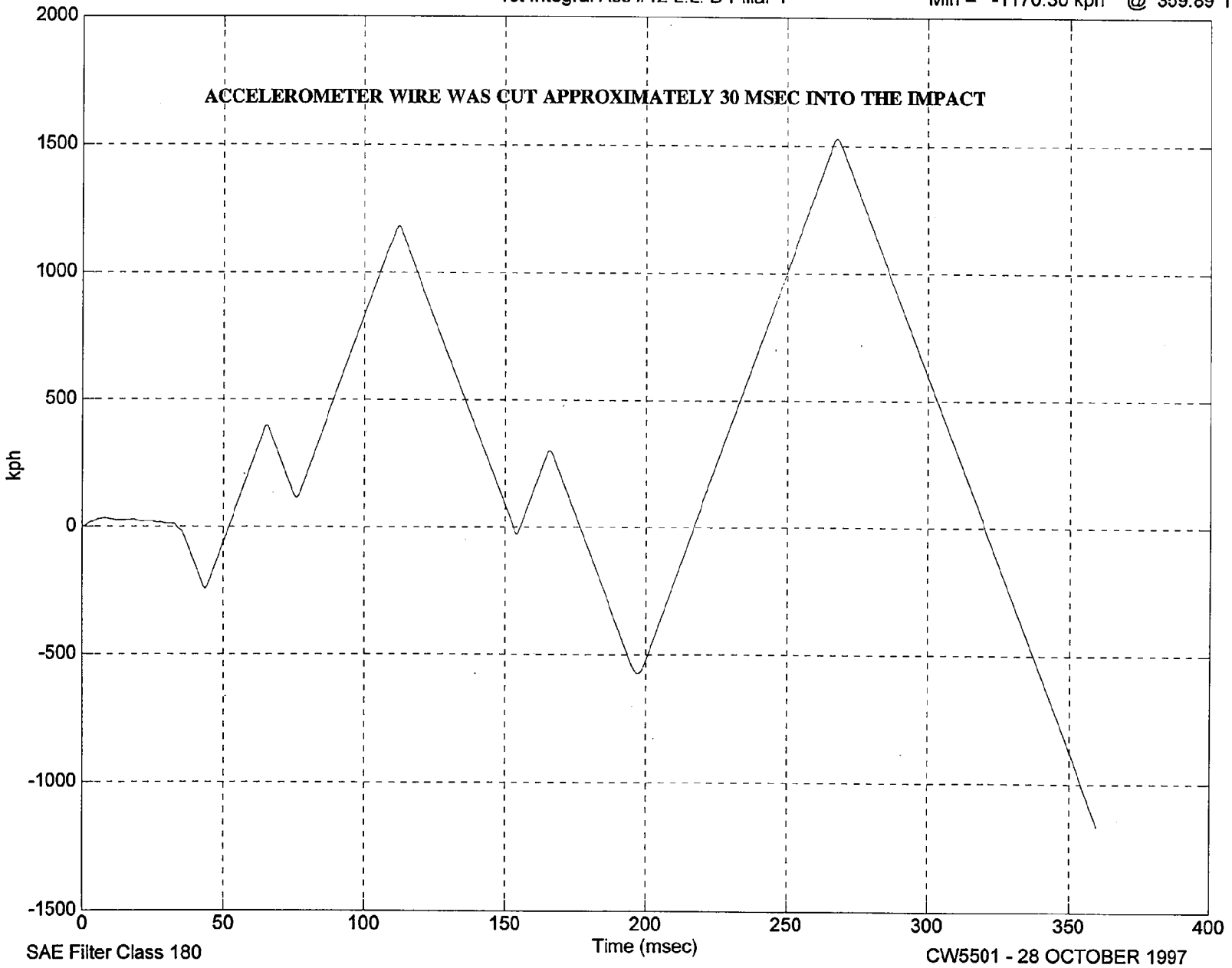
SAE Filter Class 60

CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza

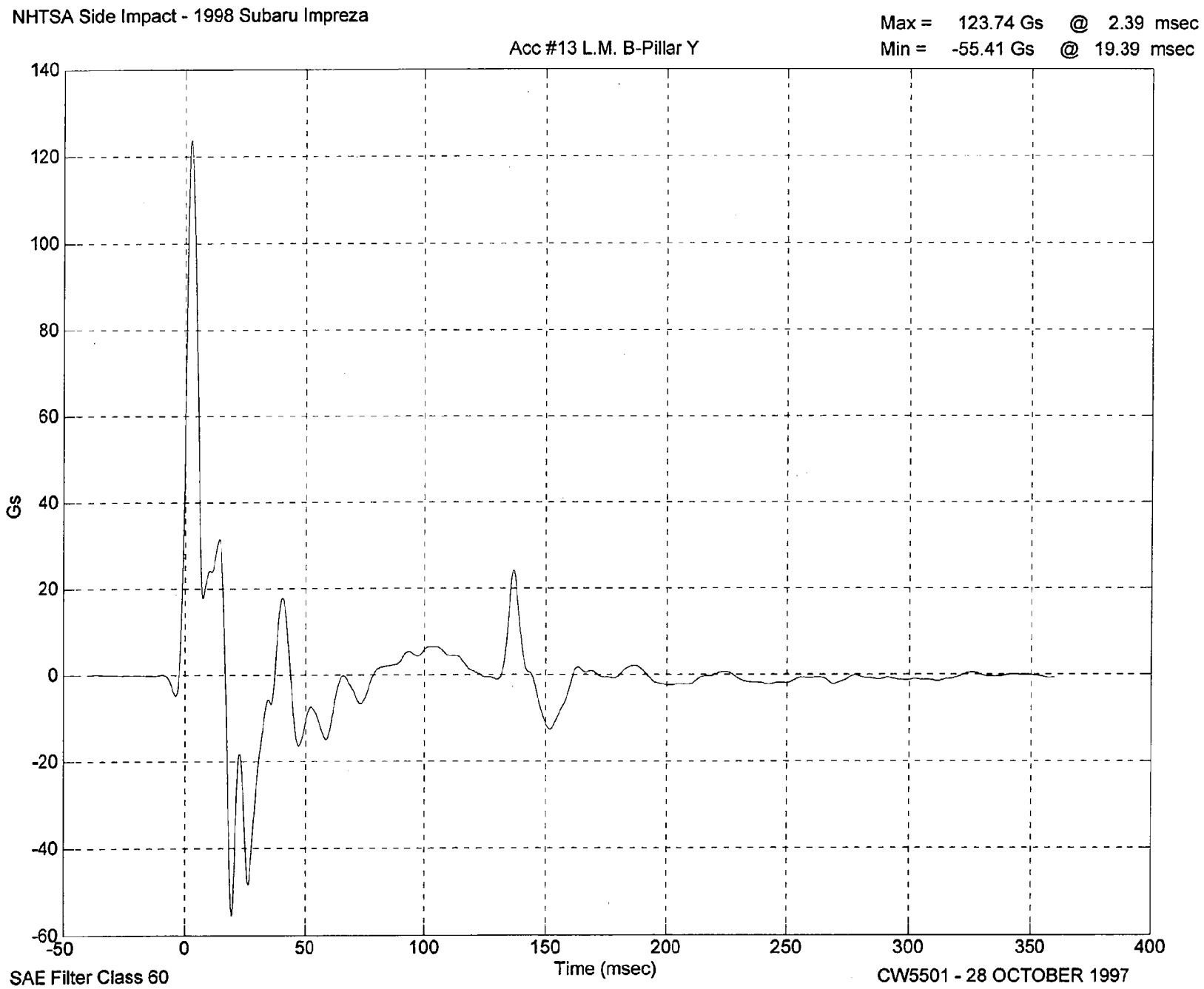
Max = 1529.19 kph @ 267.59 msec
Min = -1170.30 kph @ 359.89 msec

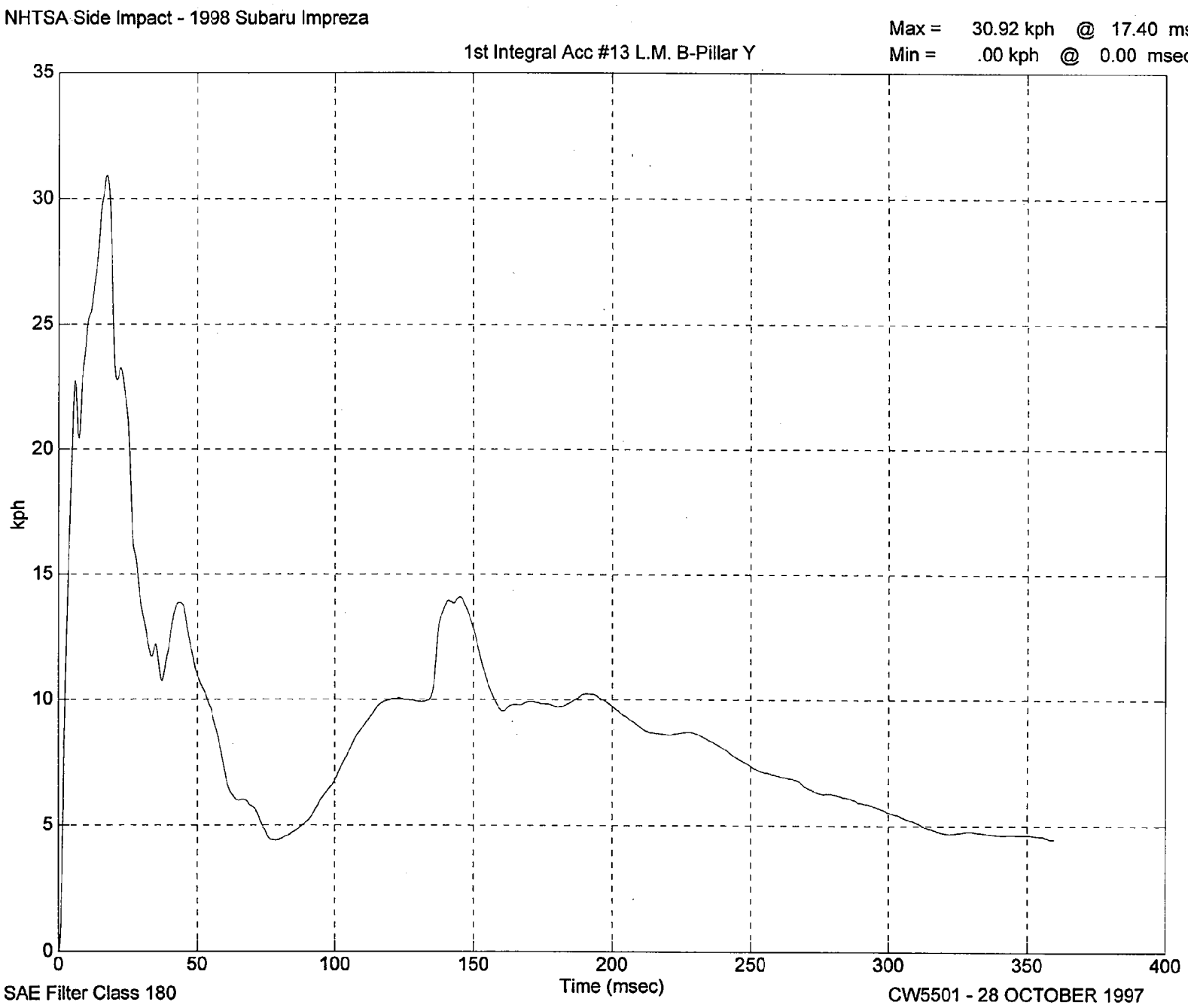
1st Integral Acc #12 L.L. B-Pillar Y

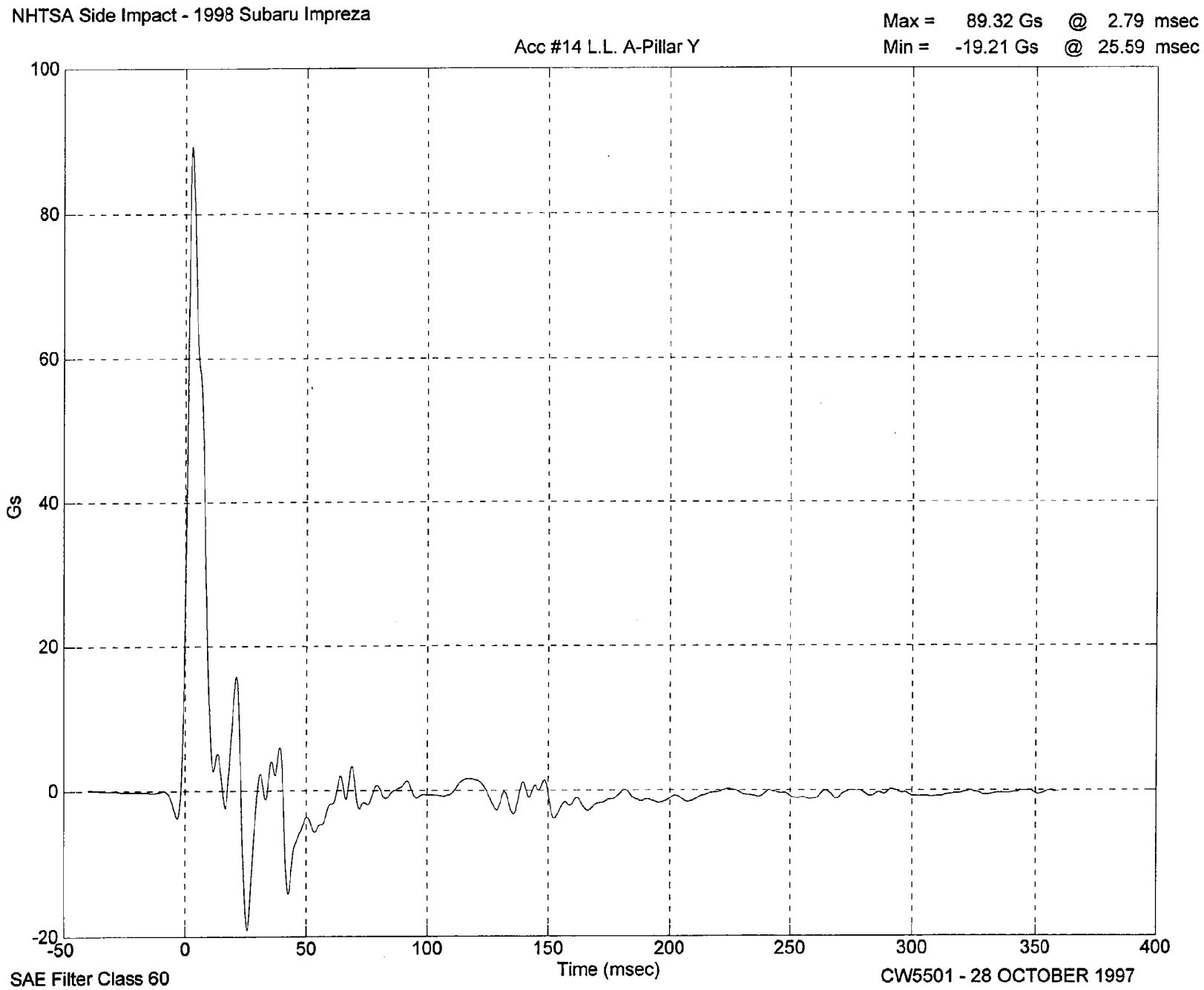


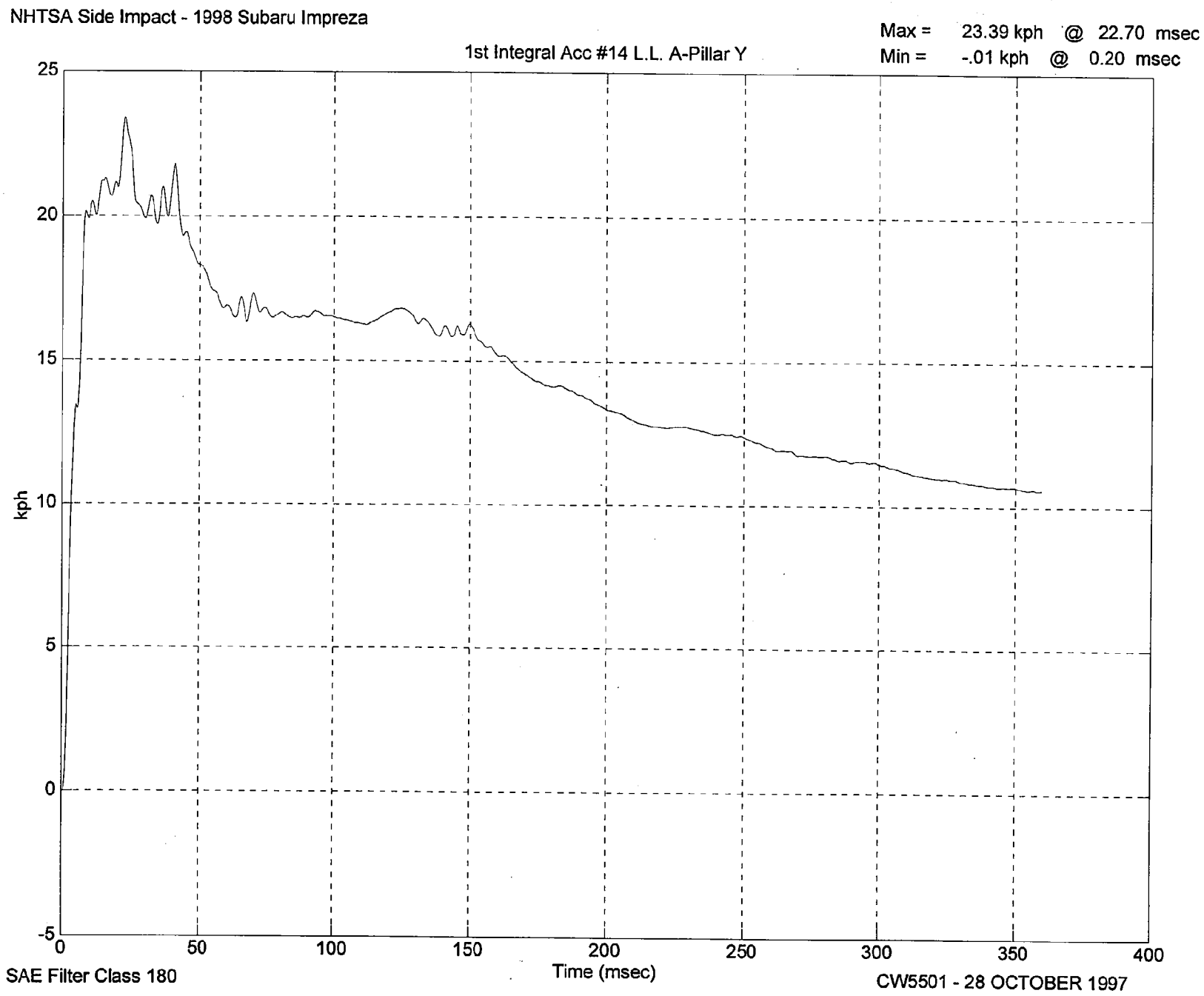
SAE Filter Class 180

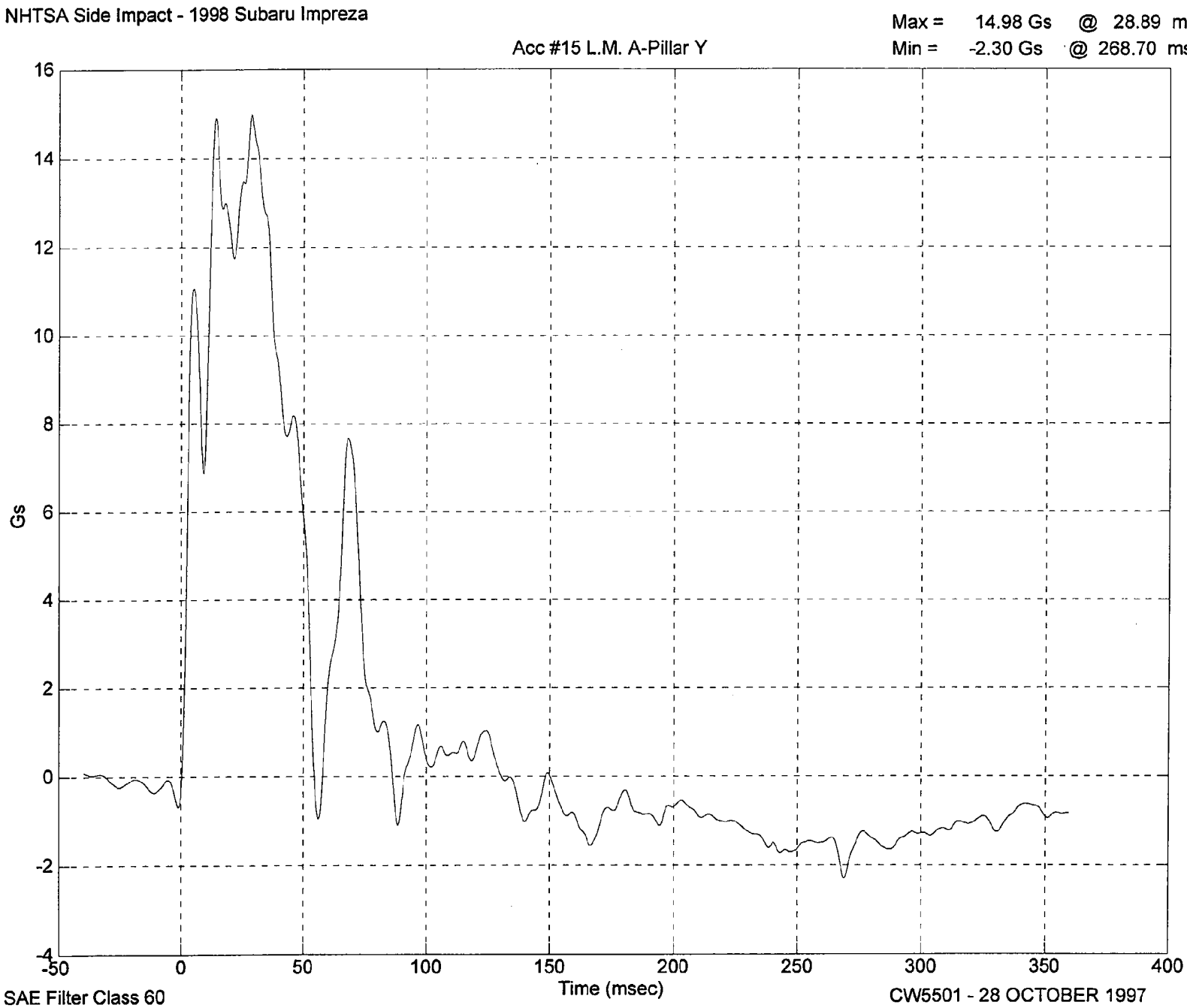
CW5501 - 28 OCTOBER 1997

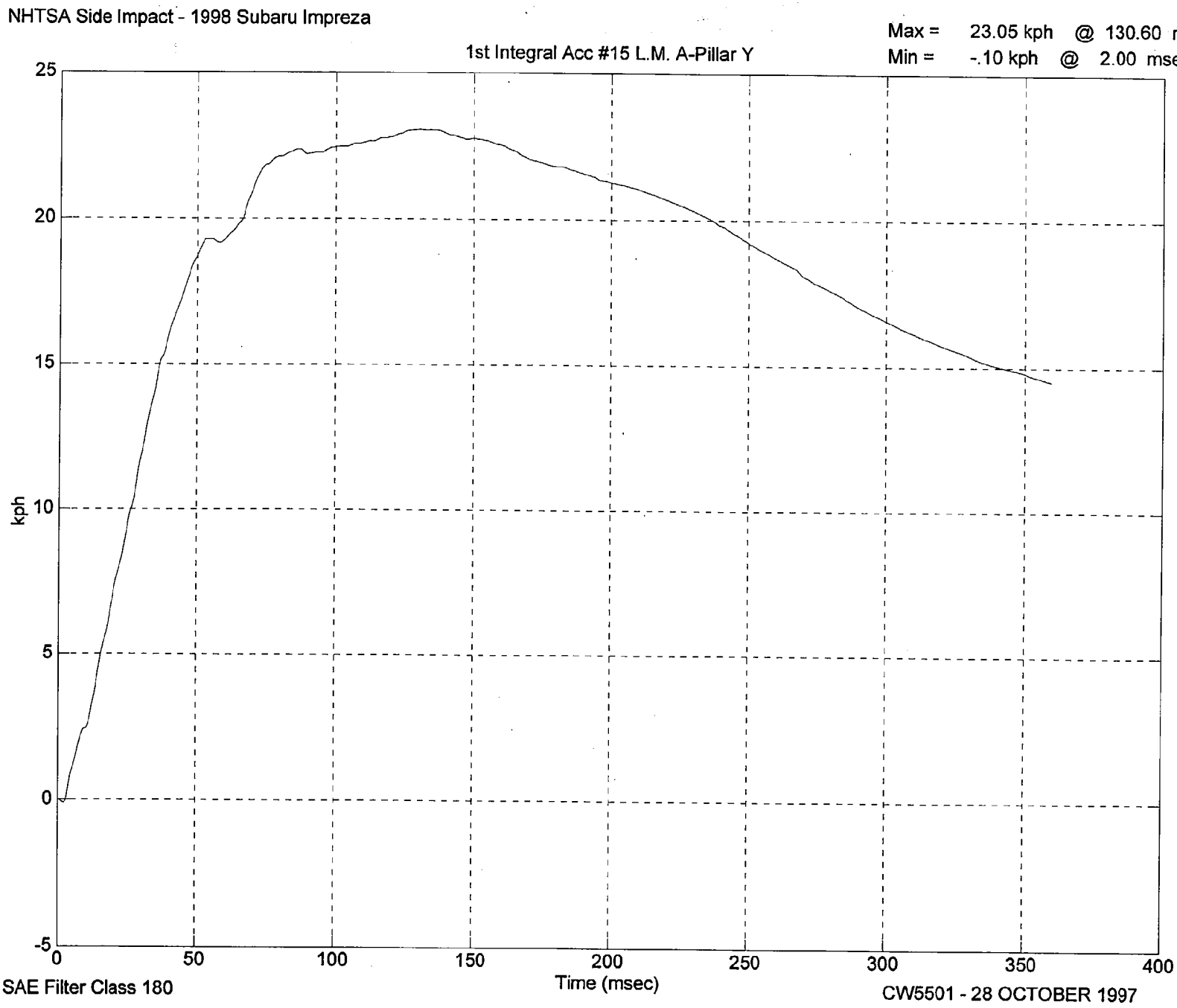

NHTSA Side Impact - 1998 Subaru Impreza
Acc #13 L.M. B-Pillar Y
Max = 123.74 Gs @ 2.39 msec
Min = -55.41 Gs @ 19.39 msec
Gs
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

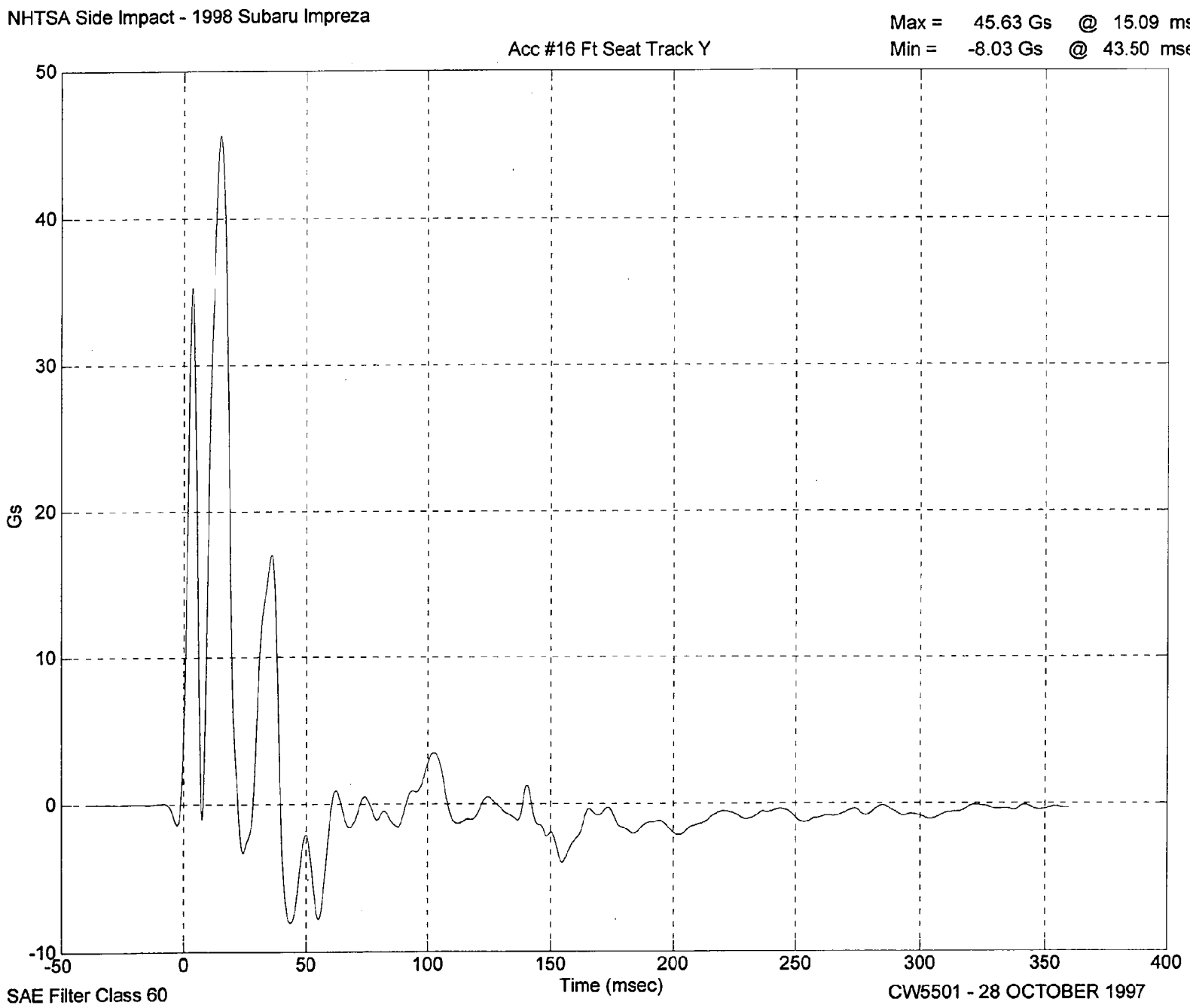

NHTSA Side Impact - 1998 Subaru Impreza
1st Integral Acc #13 L.M. B-Pillar Y
Max = 30.92 kph @ 17.40 msec
Min = .00 kph @ 0.00 msec
kph
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
Acc #14 L.L. A-Pillar Y
Max = 89.32 Gs @ 2.79 msec
Min = -19.21 Gs @ 25.59 msec
Gs
100
80
60
40
20
0
-20
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

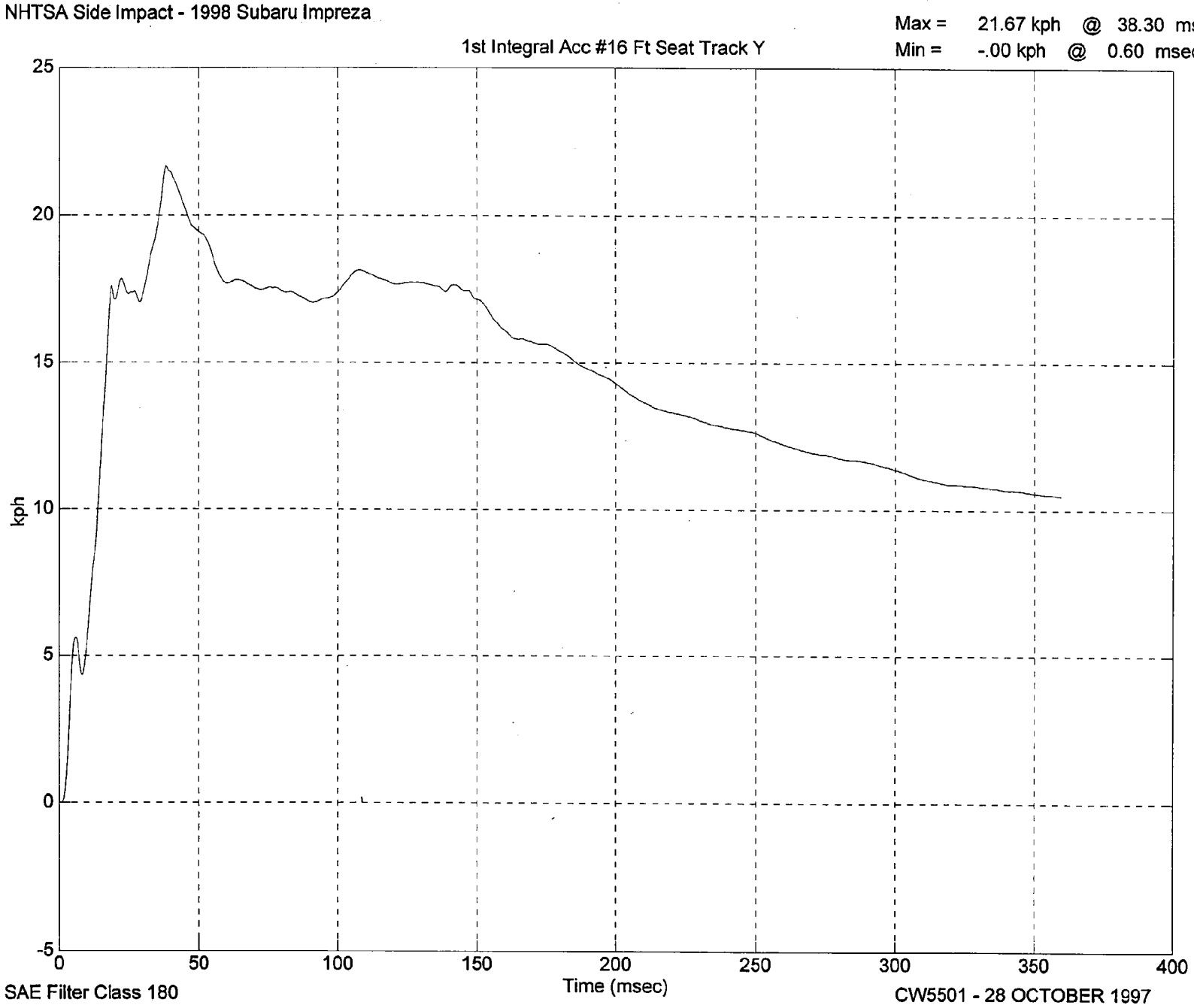

NHTSA Side Impact - 1998 Subaru Impreza
1st Integral Acc #14 L.L. A-Pillar Y
Max = 23.39 kph @ 22.70 msec
Min = -.01 kph @ 0.20 msec
25
20
15
10
5
0
-5
kph
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
Max = 14.98 Gs @ 28.89 msec
Acc #15 L.M. A-Pillar Y
Min = -2.30 Gs @ 268.70 msec
16
14
12
10
8
6
4
2
0
-2
-4
Gs
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
1st Integral Acc #15 L.M. A-Pillar Y
Max = 23.05 kph @ 130.60 msec
Min = -.10 kph @ 2.00 msec
kph
25
20
15
10
5
0
-5
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
Acc #16 Ft Seat Track Y
Max = 45.63 Gs @ 15.09 msec
Min = -8.03 Gs @ 43.50 msec
Gs
50
40
30
20
10
0
-10
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza



SAE Filter Class 180

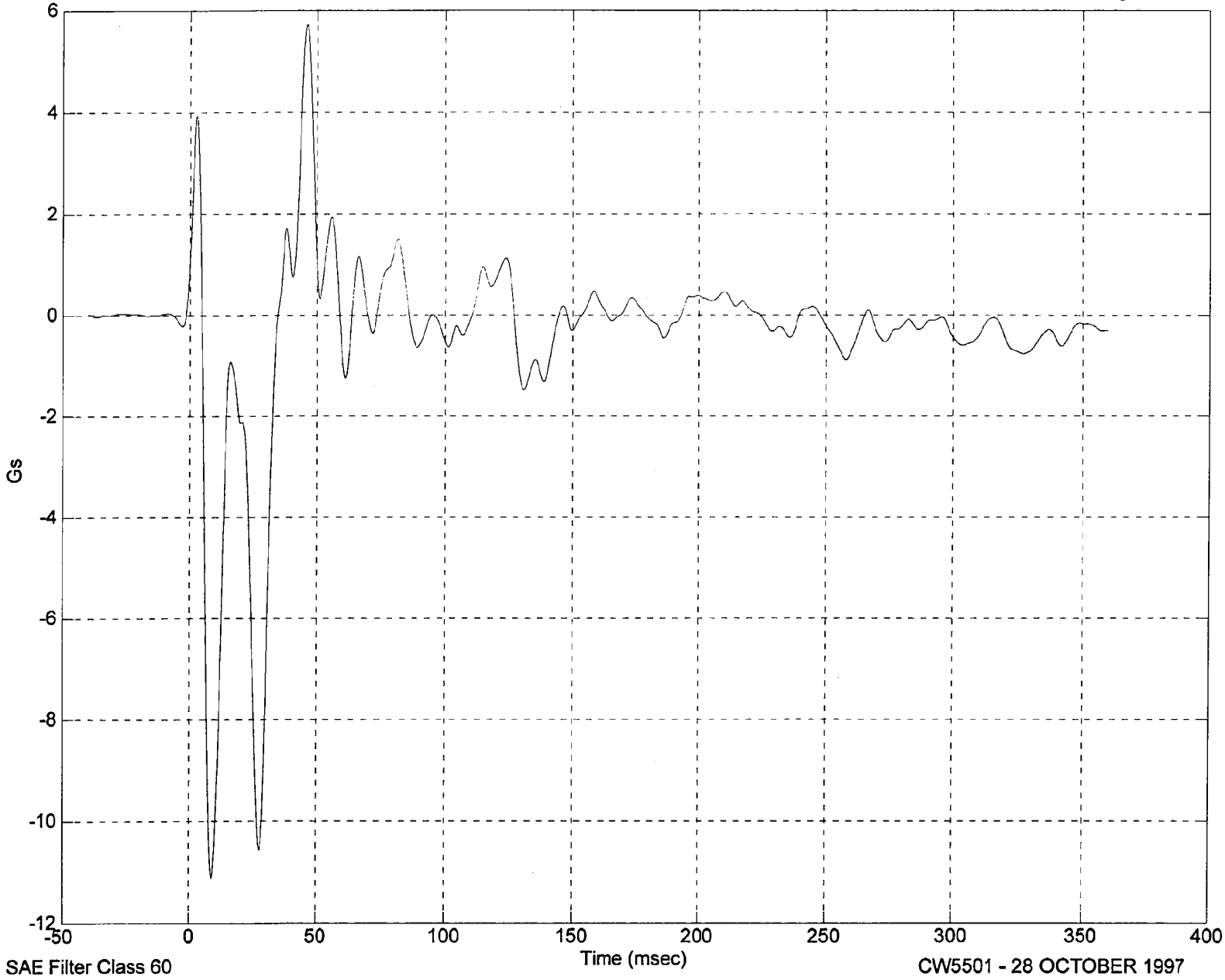
CW5501 - 28 OCTOBER 1997

REAR SEAT TRACK ACCELEROMETER #17 WAS NOT INSTALLED
(no accessible mounting location)

REAR SEAT TRACK ACCELEROMETER #17 WAS NOT INSTALLED
(no accessible mounting location)

NHTSA Side Impact - 1998 Subaru Impreza

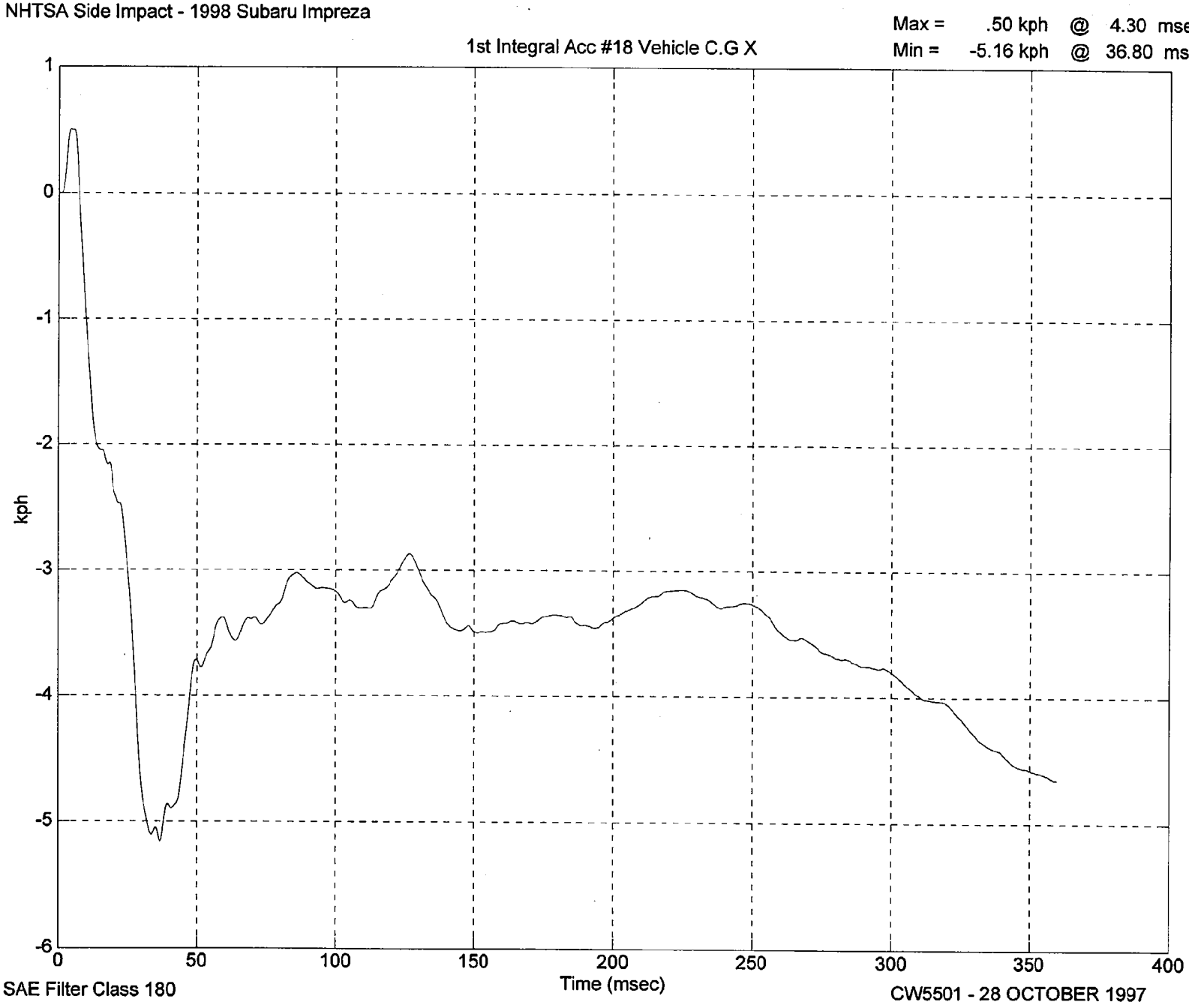
Max = 5.72 Gs @ 46.09 msec
Min = -11.12 Gs @ 8.80 msec

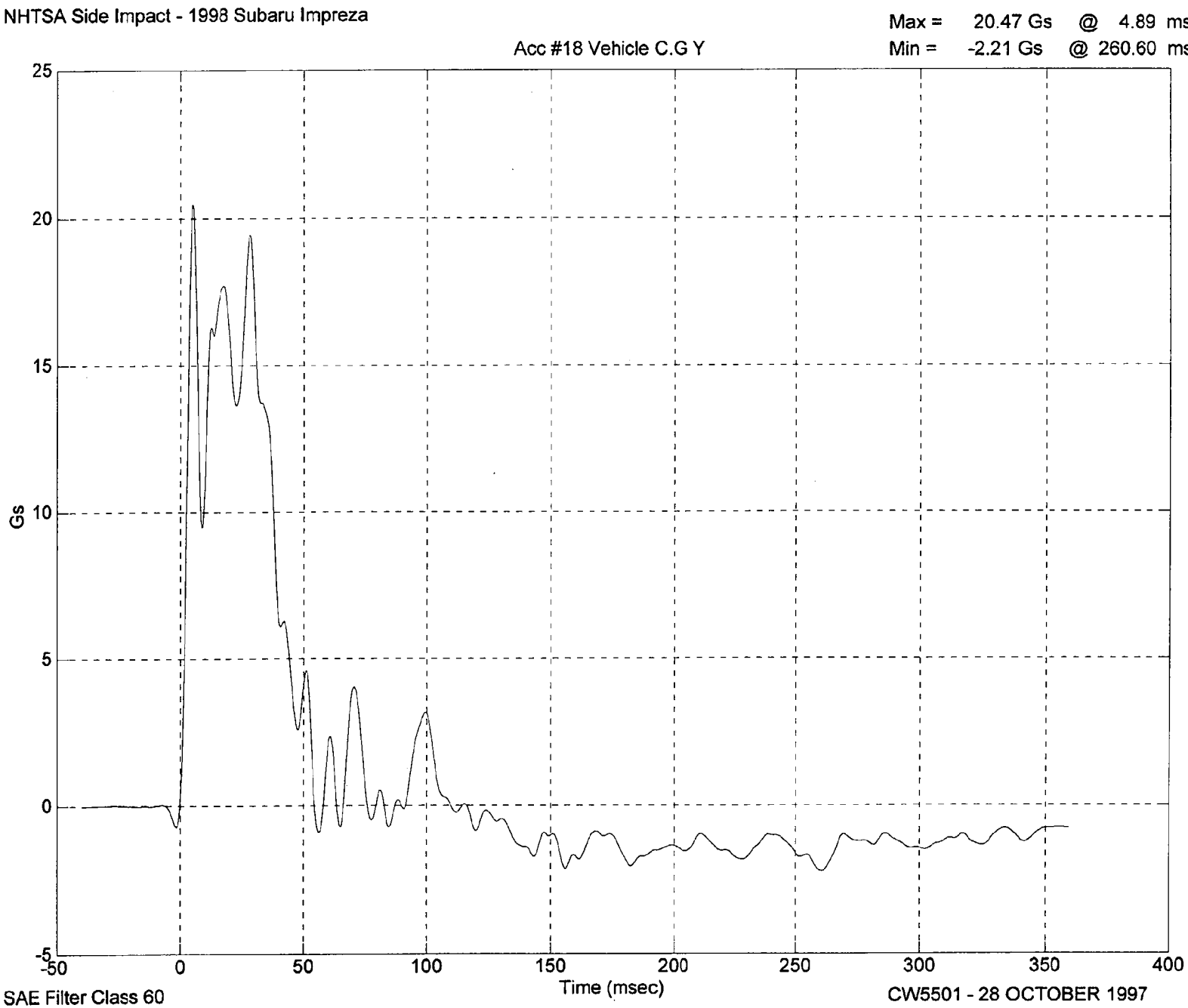


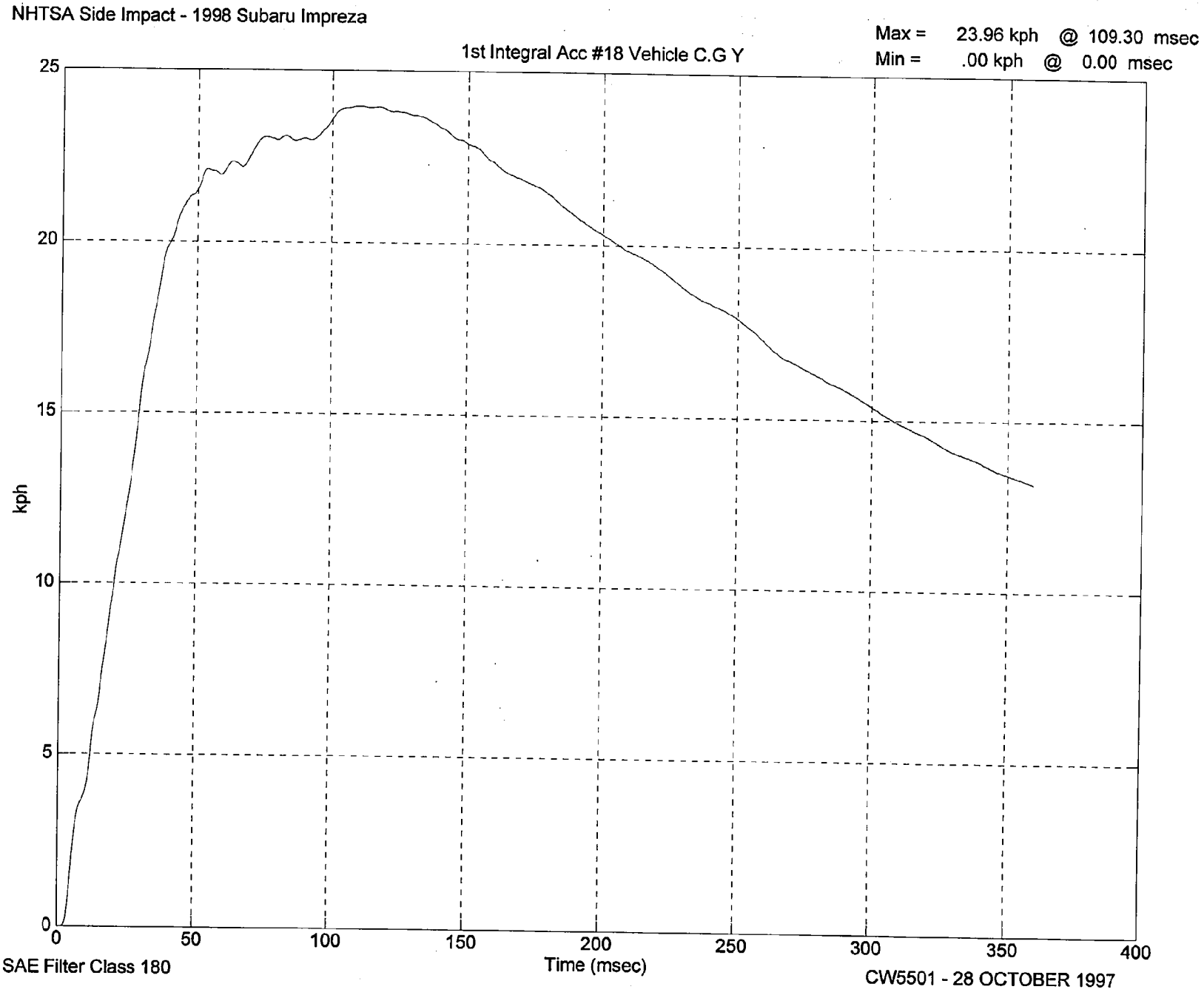
SAE Filter Class 60

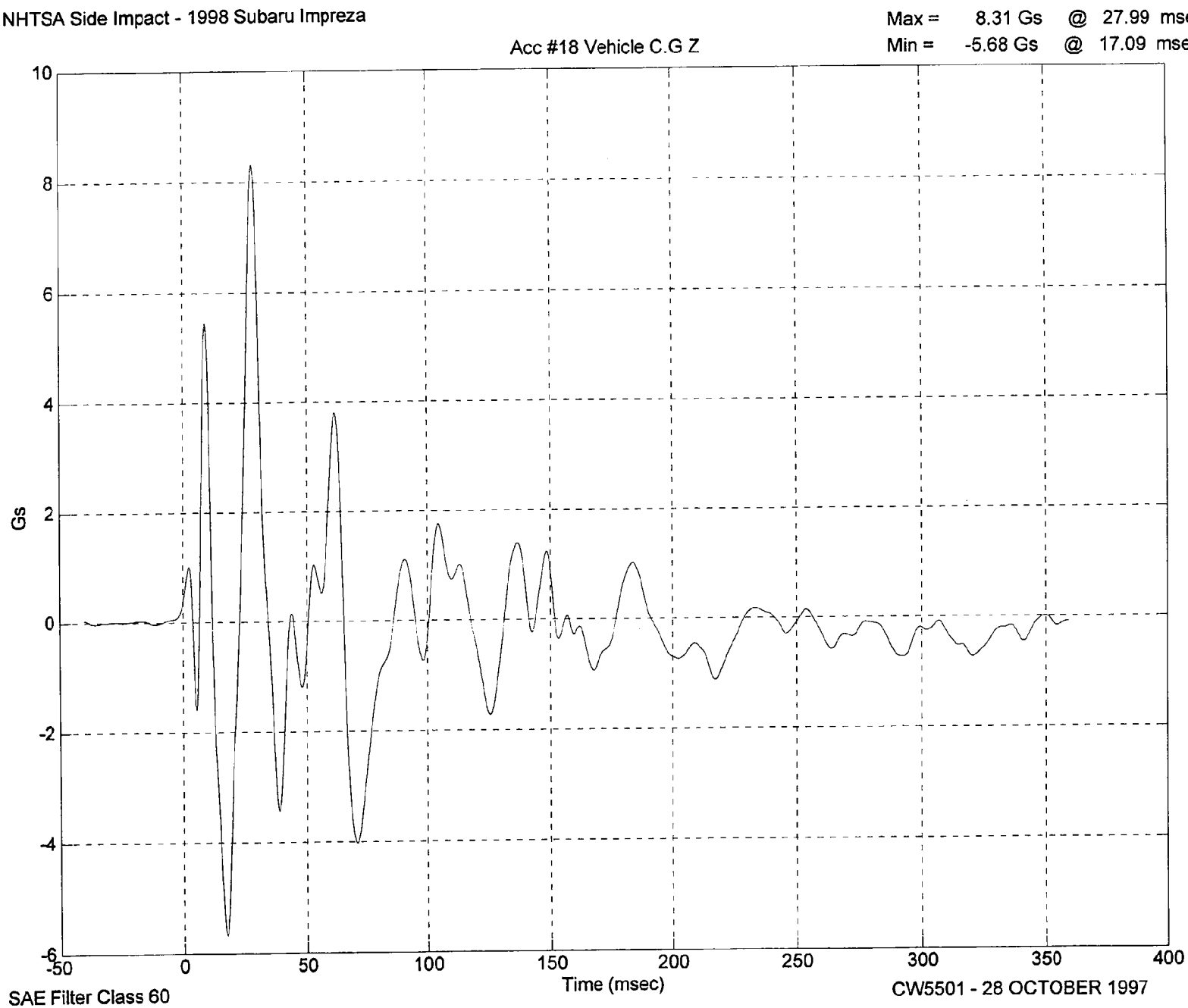
CW5501 - 28 OCTOBER 1997

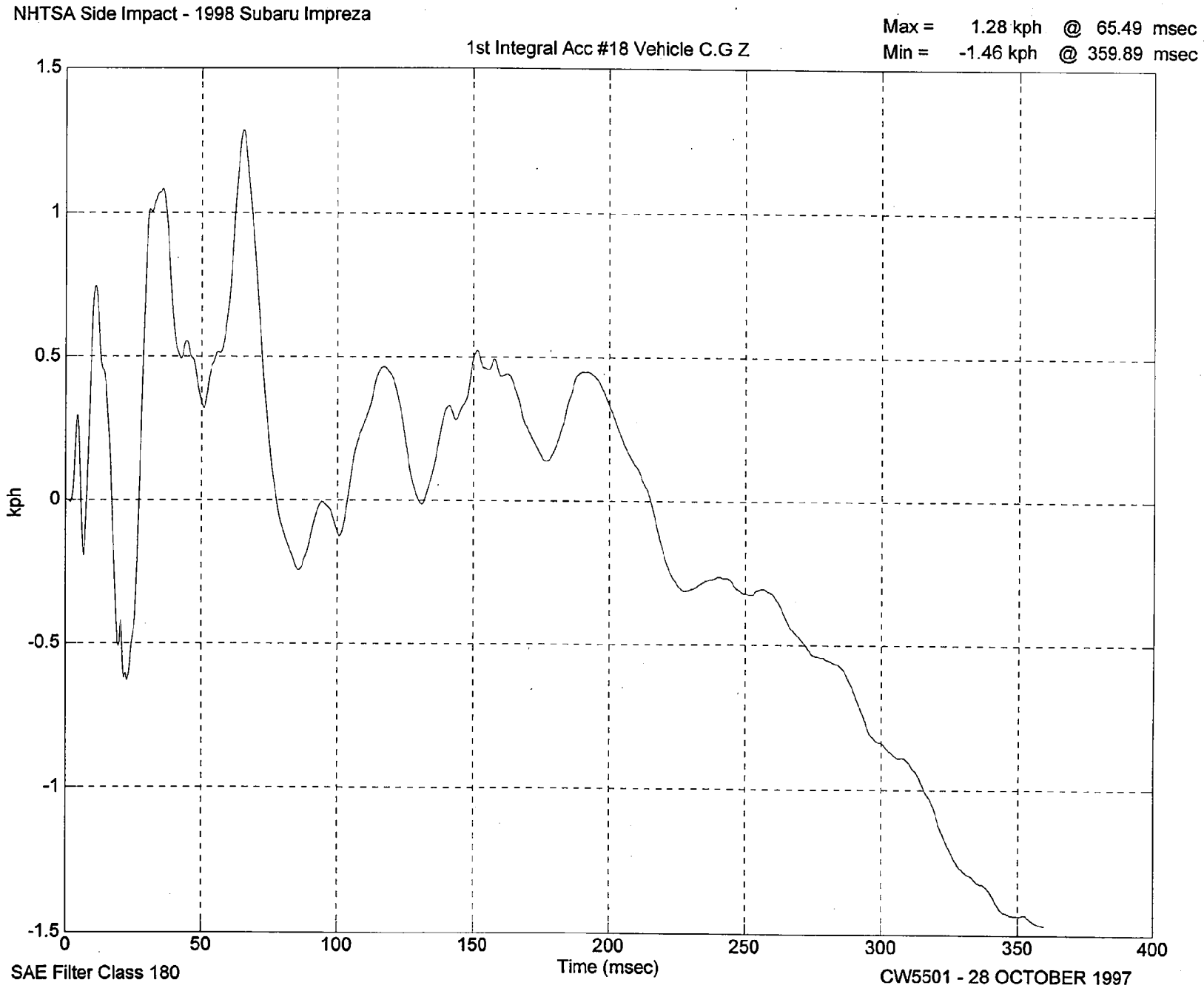
NHTSA Side Impact - 1998 Subaru Impreza

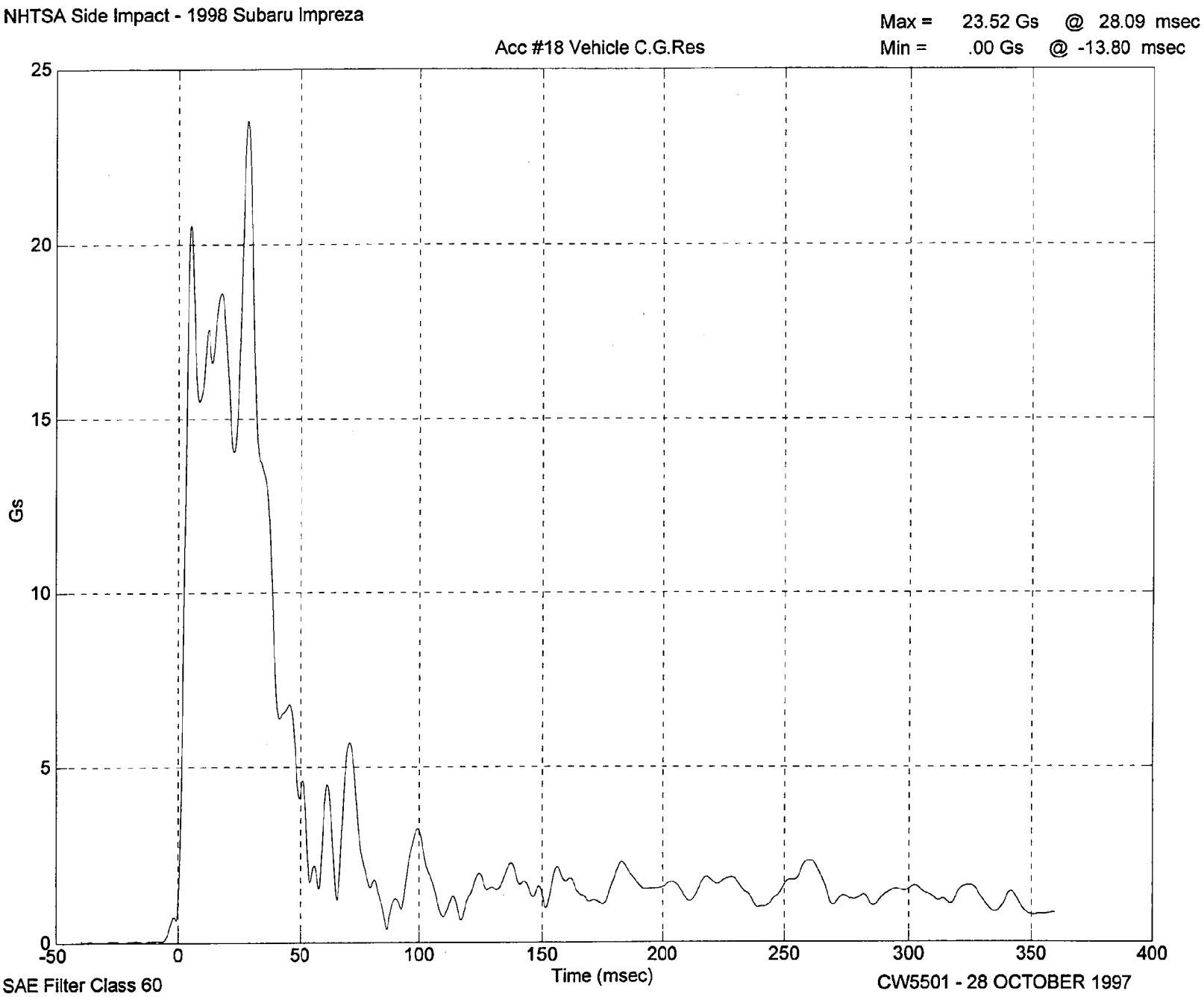



NHTSA Side Impact - 1998 Subaru Impreza
Max = 20.47 Gs @ 4.89 msec
Acc #18 Vehicle C.G Y
Min = -2.21 Gs @ 260.60 msec
25
20
15
10
5
0
-5
Gs
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

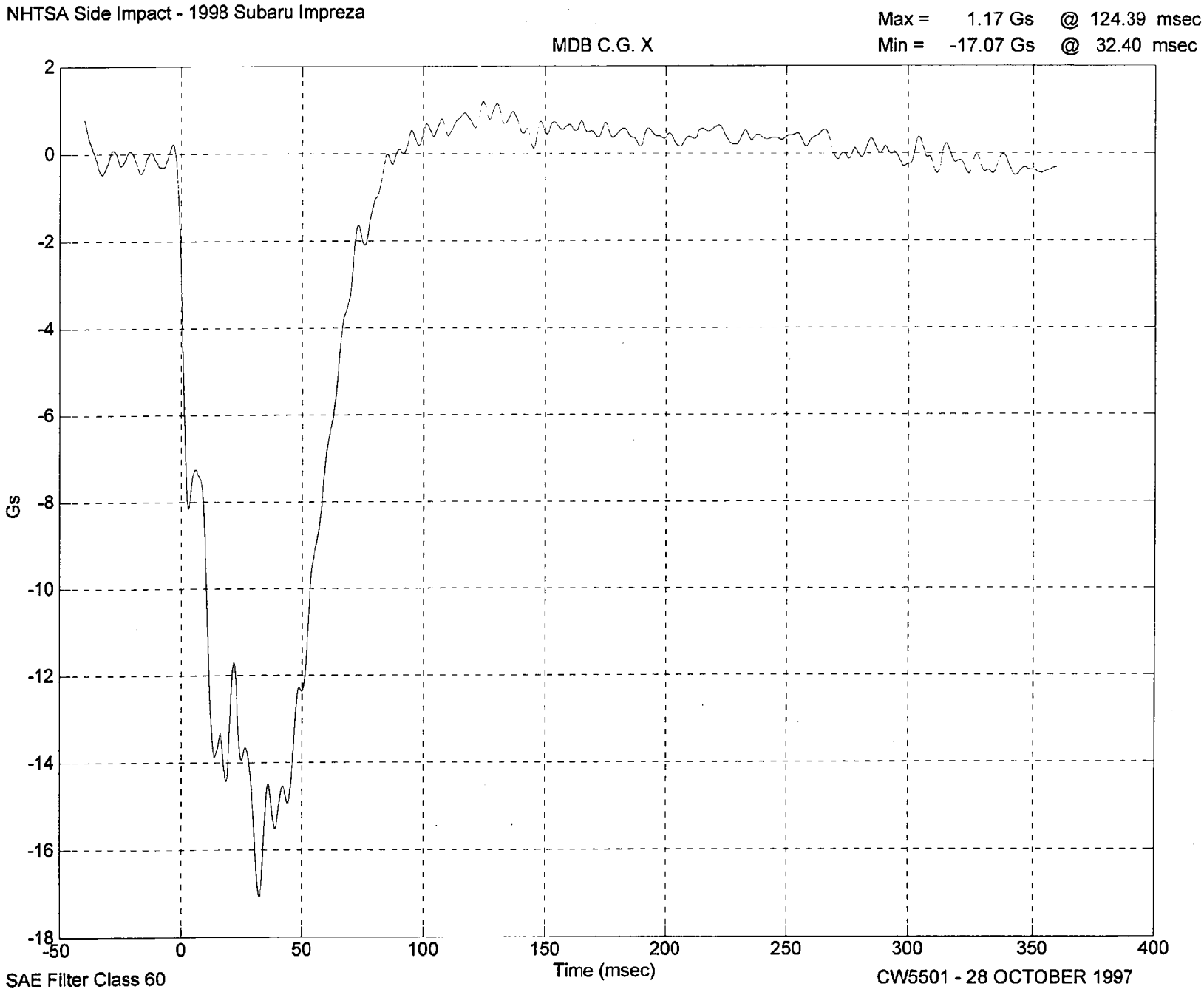

NHTSA Side Impact - 1998 Subaru Impreza
1st Integral Acc #18 Vehicle C.G Y
Max = 23.96 kph @ 109.30 msec
Min = .00 kph @ 0.00 msec
kph
25
20
15
10
5
0
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
Acc #18 Vehicle C.G Z
Max = 8.31 Gs @ 27.99 msec
Min = -5.68 Gs @ 17.09 msec
Gs
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

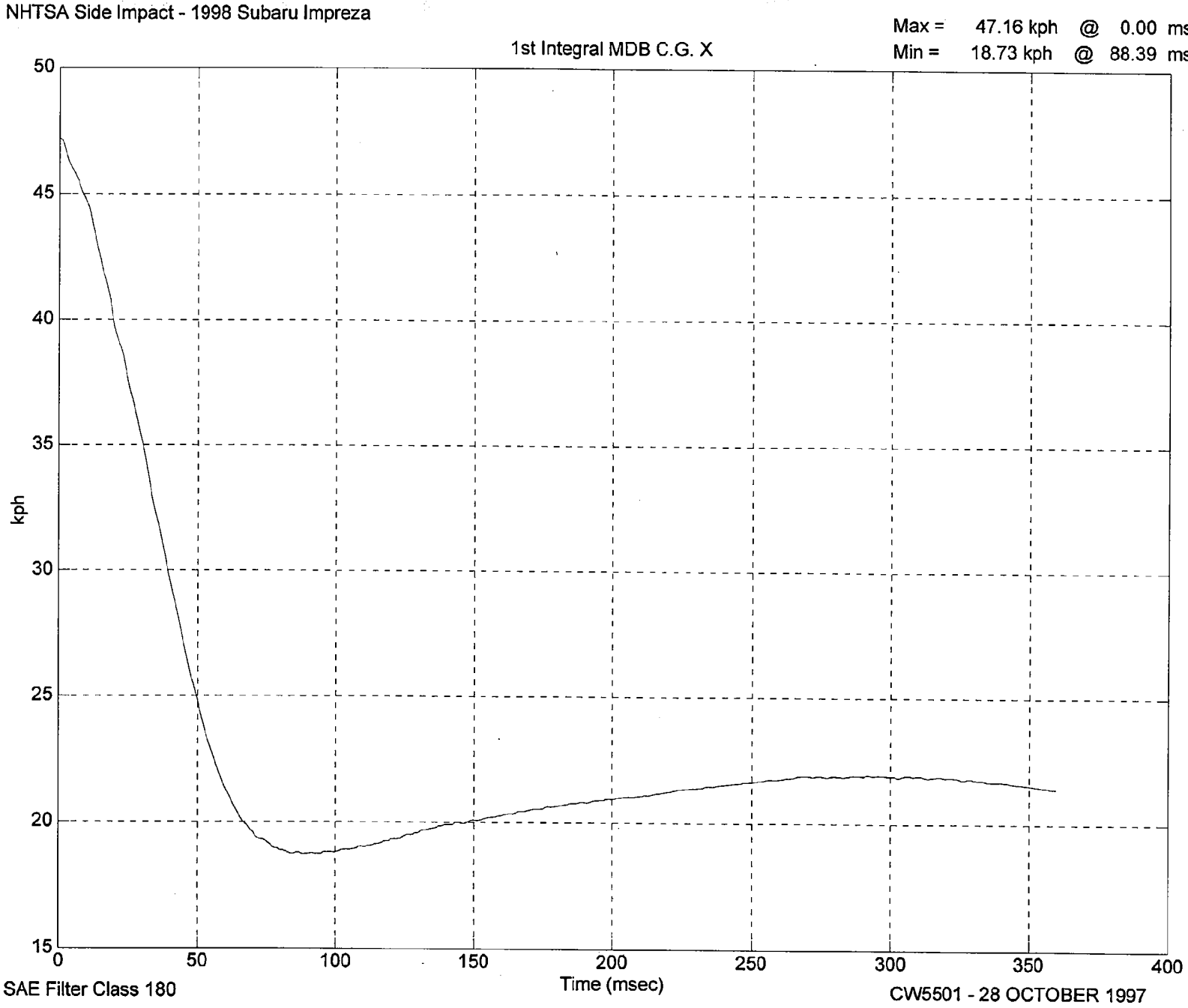

NHTSA Side Impact - 1998 Subaru Impreza
1st Integral Acc #18 Vehicle C.G Z
Max = 1.28 kph @ 65.49 msec
Min = -1.46 kph @ 359.89 msec
kph
1.5
1
0.5
0
-0.5
-1
-1.5
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
Acc #18 Vehicle C.G.Res
Max = 23.52 Gs @ 28.09 msec
Min = .00 Gs @ -13.80 msec
25
20
15
10
5
0
Gs
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

MDB INSTRUMENTATION PLOTS
ACCELERATION DATA - FILTER CLASS 60
INTEGRATION DATA - FILTER CLASS 180

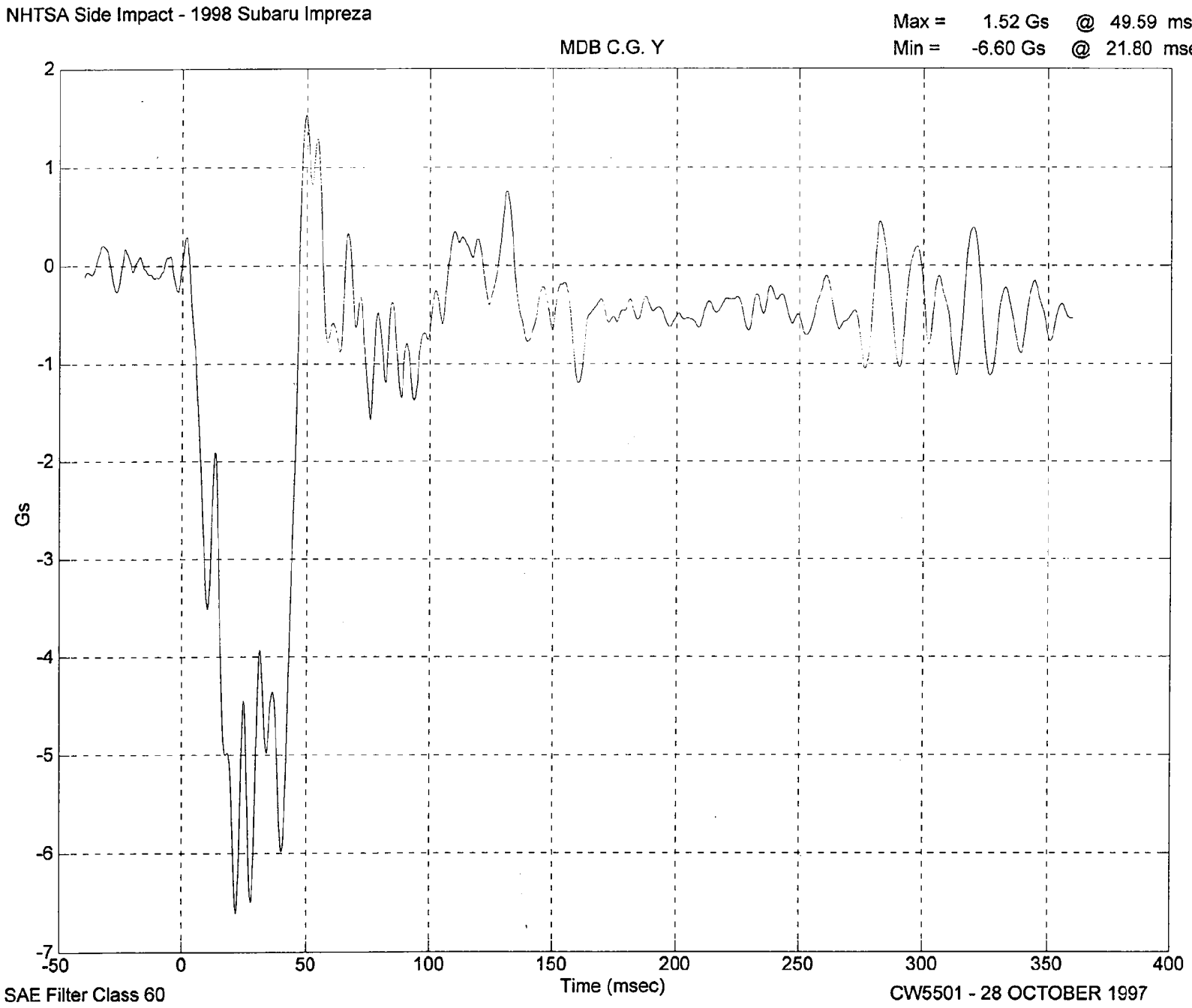

NHTSA Side Impact - 1998 Subaru Impreza
MDB C.G. X
Max = 1.17 Gs @ 124.39 msec
Min = -17.07 Gs @ 32.40 msec
Gs
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza

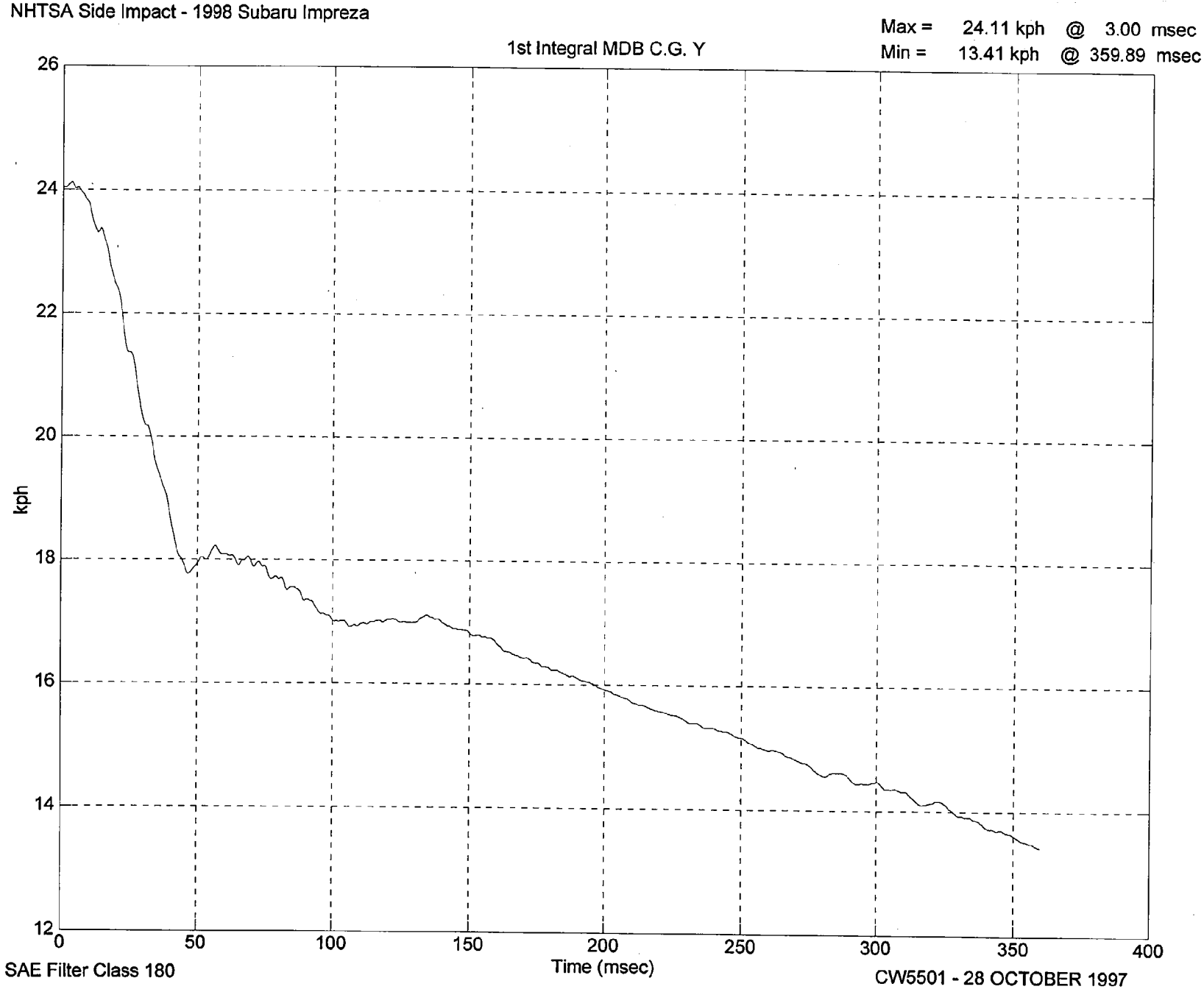


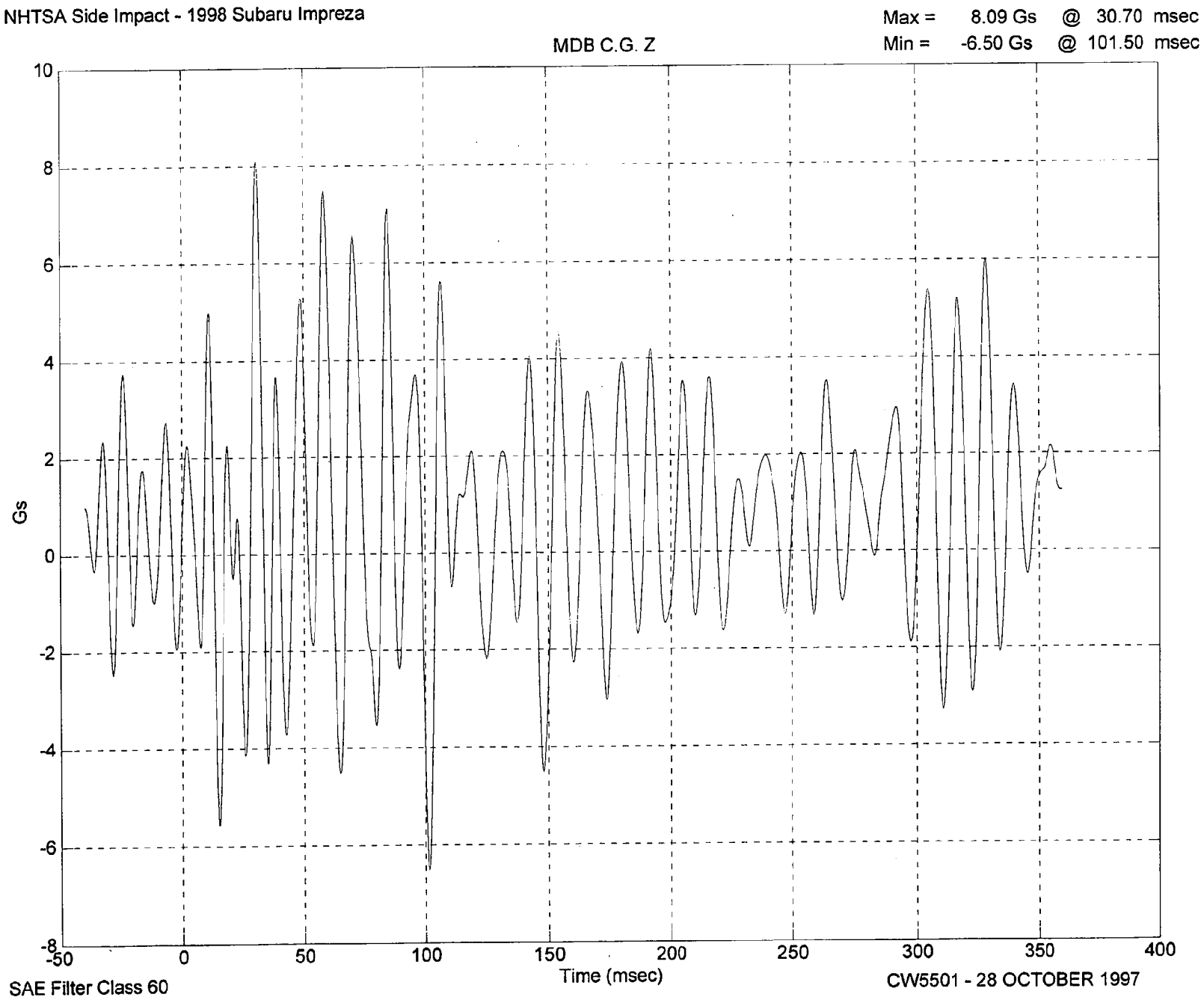
SAE Filter Class 180

CW5501 - 28 OCTOBER 1997

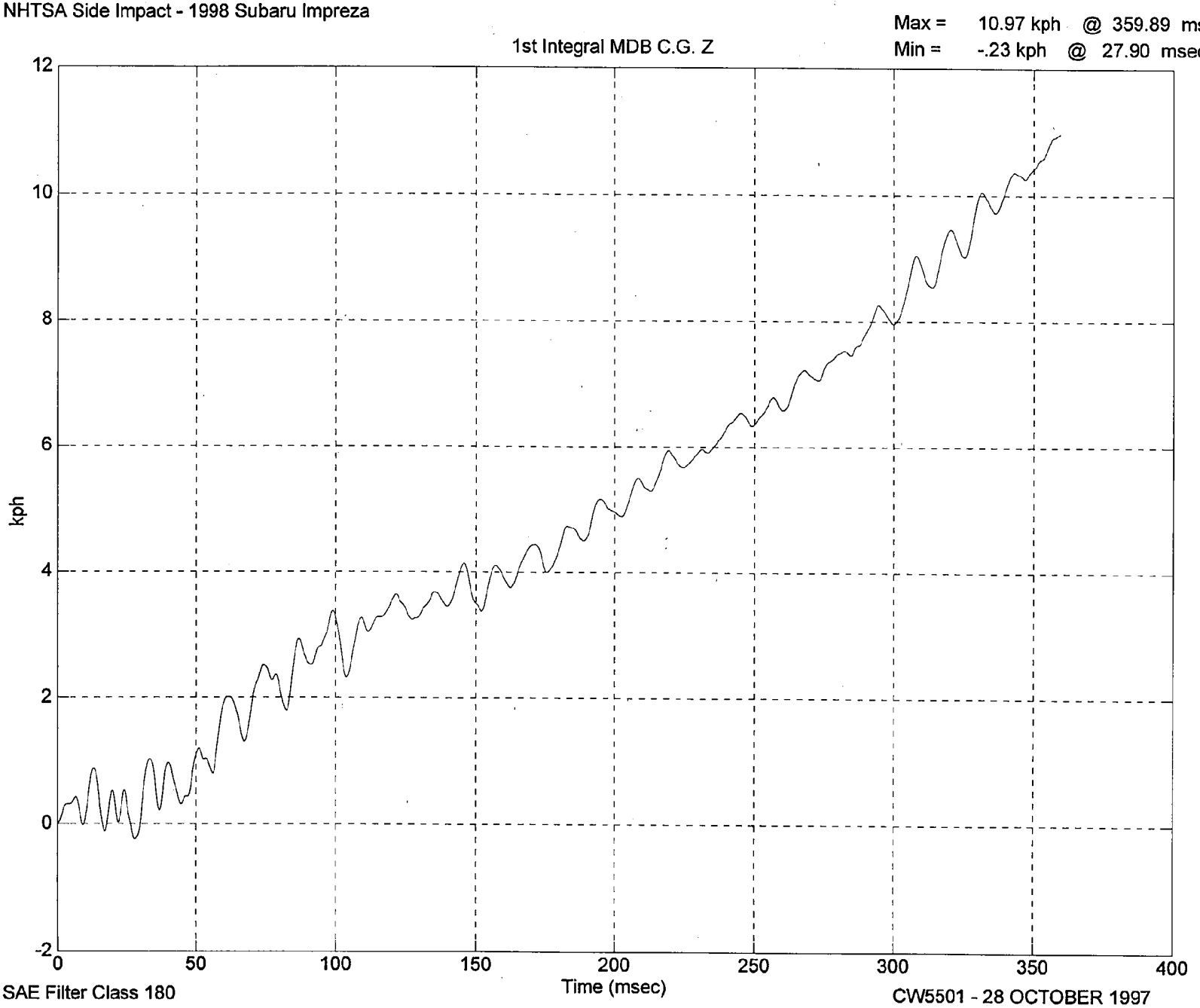

NHTSA Side Impact - 1998 Subaru Impreza
MDB C.G. Y
Max = 1.52 Gs @ 49.59 msec
Min = -6.60 Gs @ 21.80 msec
Gs
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza



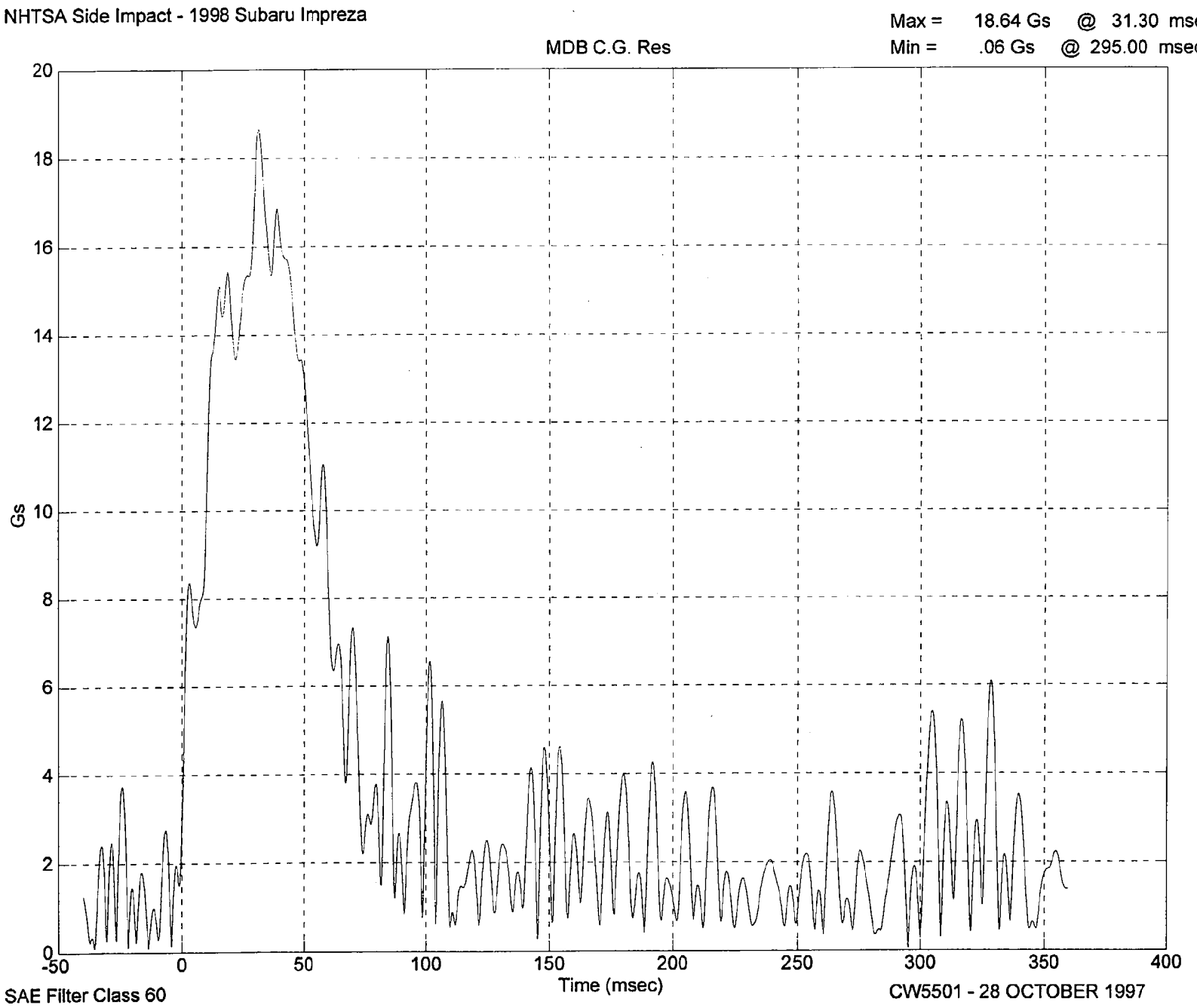

NHTSA Side Impact - 1998 Subaru Impreza
MDB C.G. Z
Max = 8.09 Gs @ 30.70 msec
Min = -6.50 Gs @ 101.50 msec
Gs
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza



SAE Filter Class 180

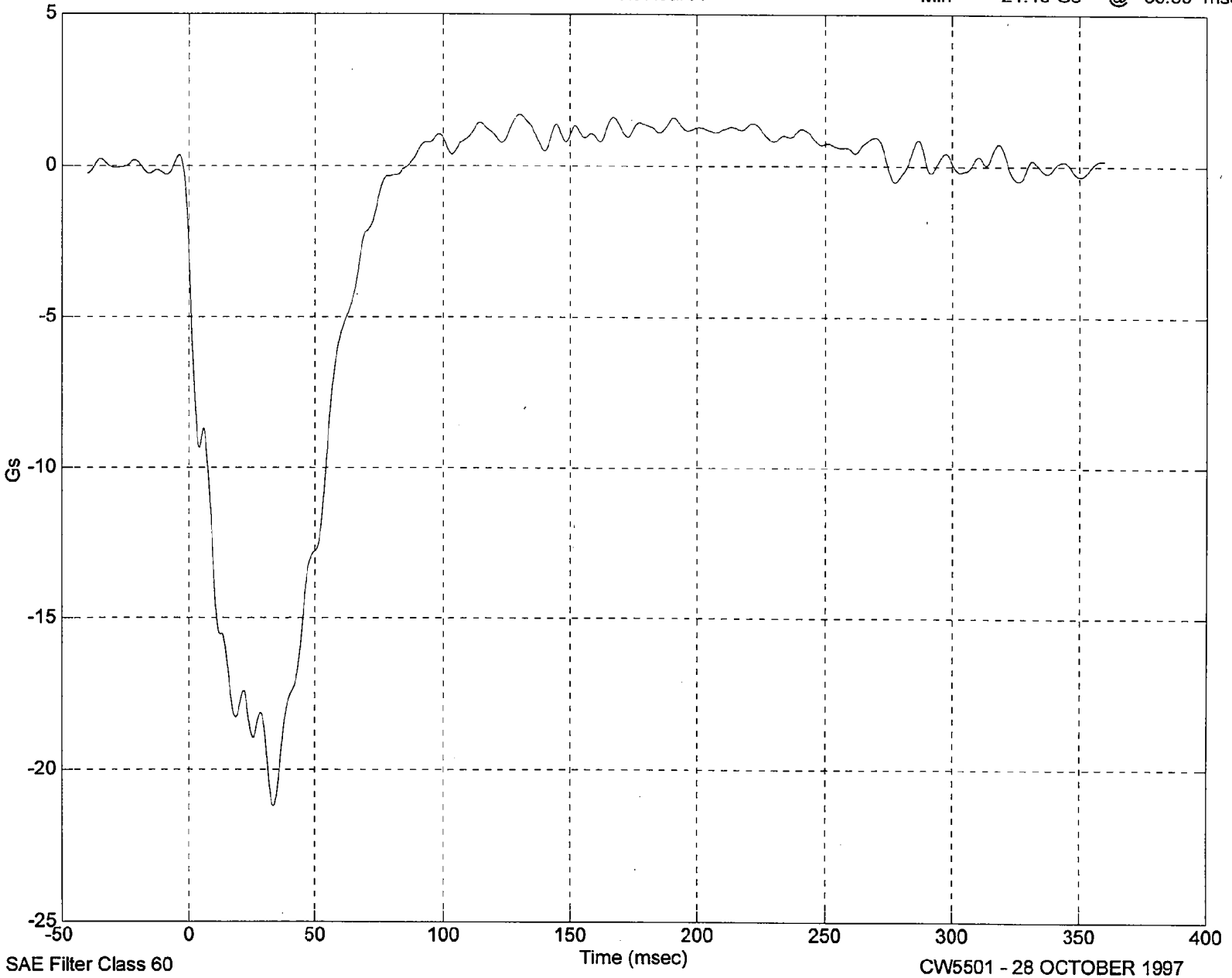
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
MDB C.G. Res
Max = 18.64 Gs @ 31.30 msec
Min = .06 Gs @ 295.00 msec
Gs
Time (msec)
SAE Filter Class 60
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza

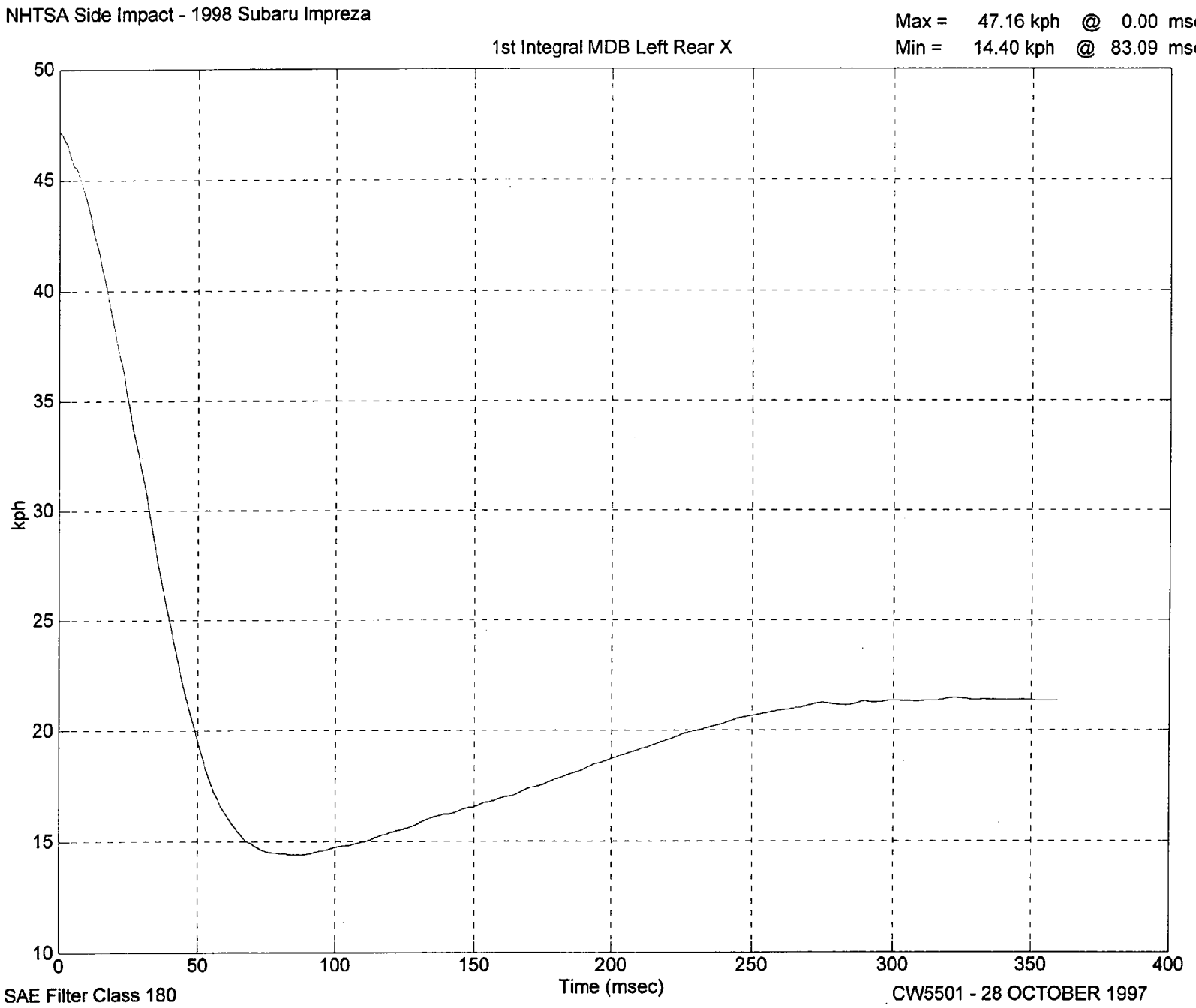
MDB Left Rear X

Max = 1.69 Gs @ 130.09 msec
Min = -21.19 Gs @ 33.39 msec



SAE Filter Class 60

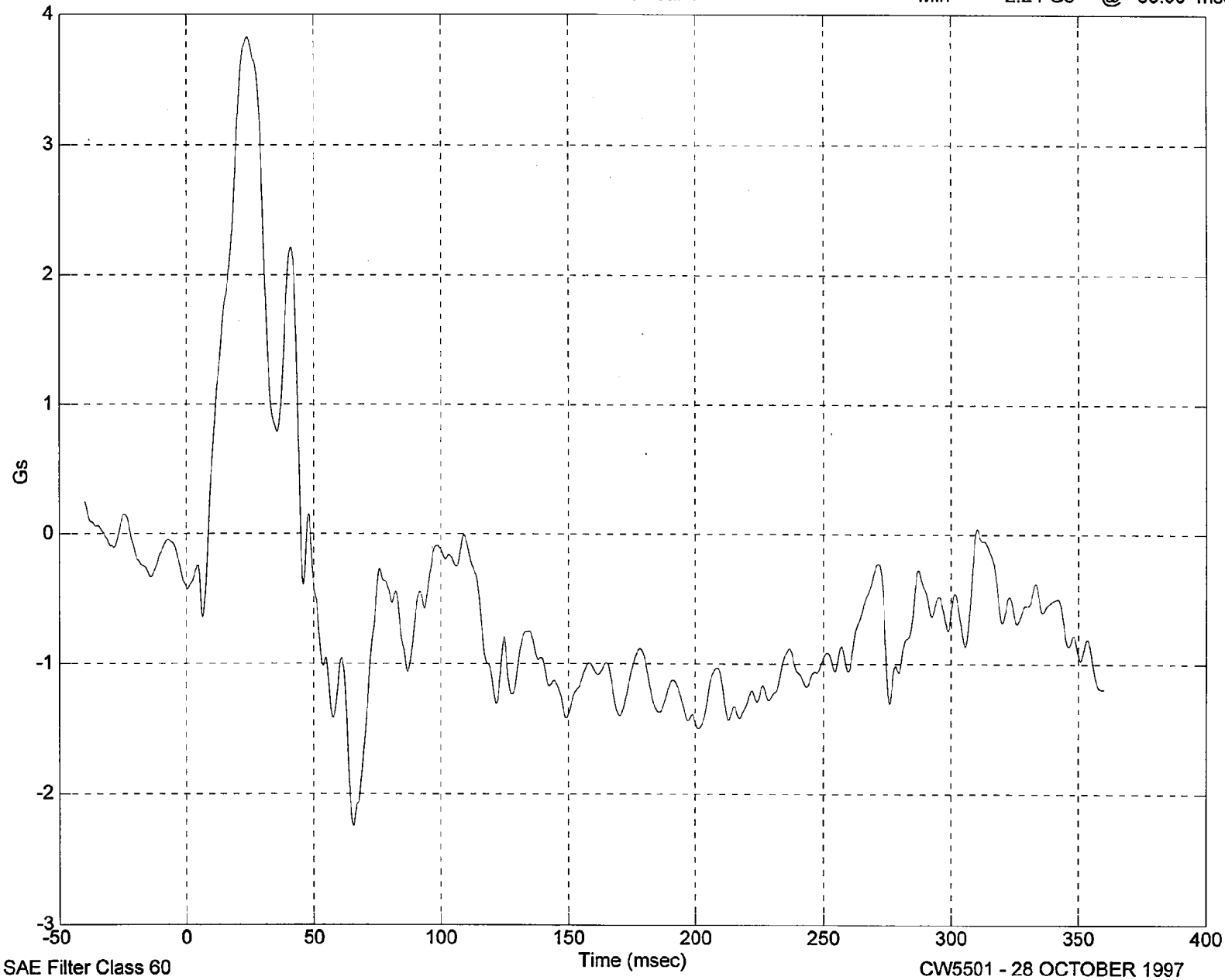
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
1st Integral MDB Left Rear X
Max = 47.16 kph @ 0.00 msec
Min = 14.40 kph @ 83.09 msec
kph
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza

MDB Left Rear Y

Max = 3.82 Gs @ 24.00 msec
Min = -2.24 Gs @ 65.50 msec



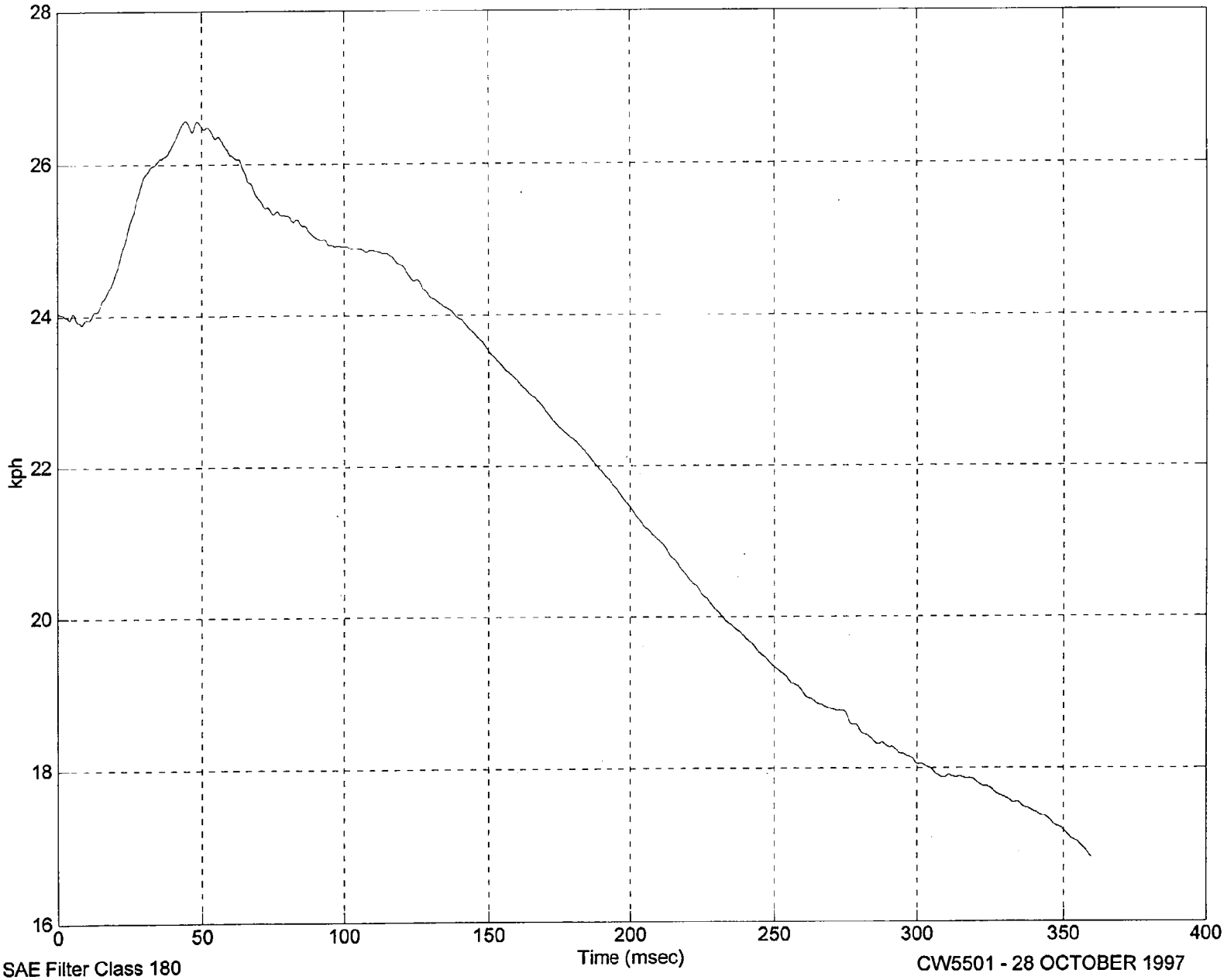
SAE Filter Class 60

CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza

1st Integral MDB Left Rear Y

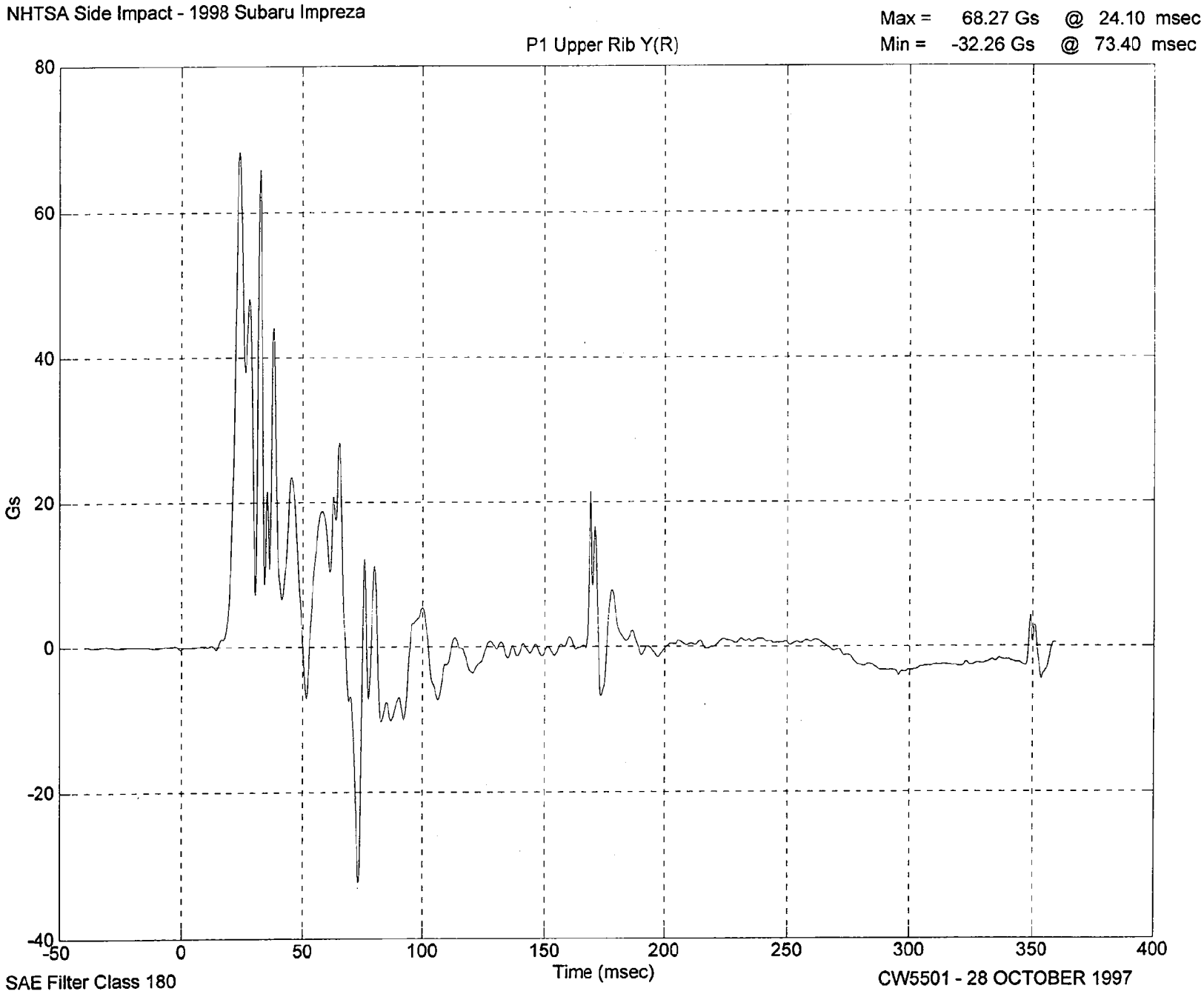
Max = 26.56 kph @ 44.50 msec
Min = 16.82 kph @ 359.89 msec



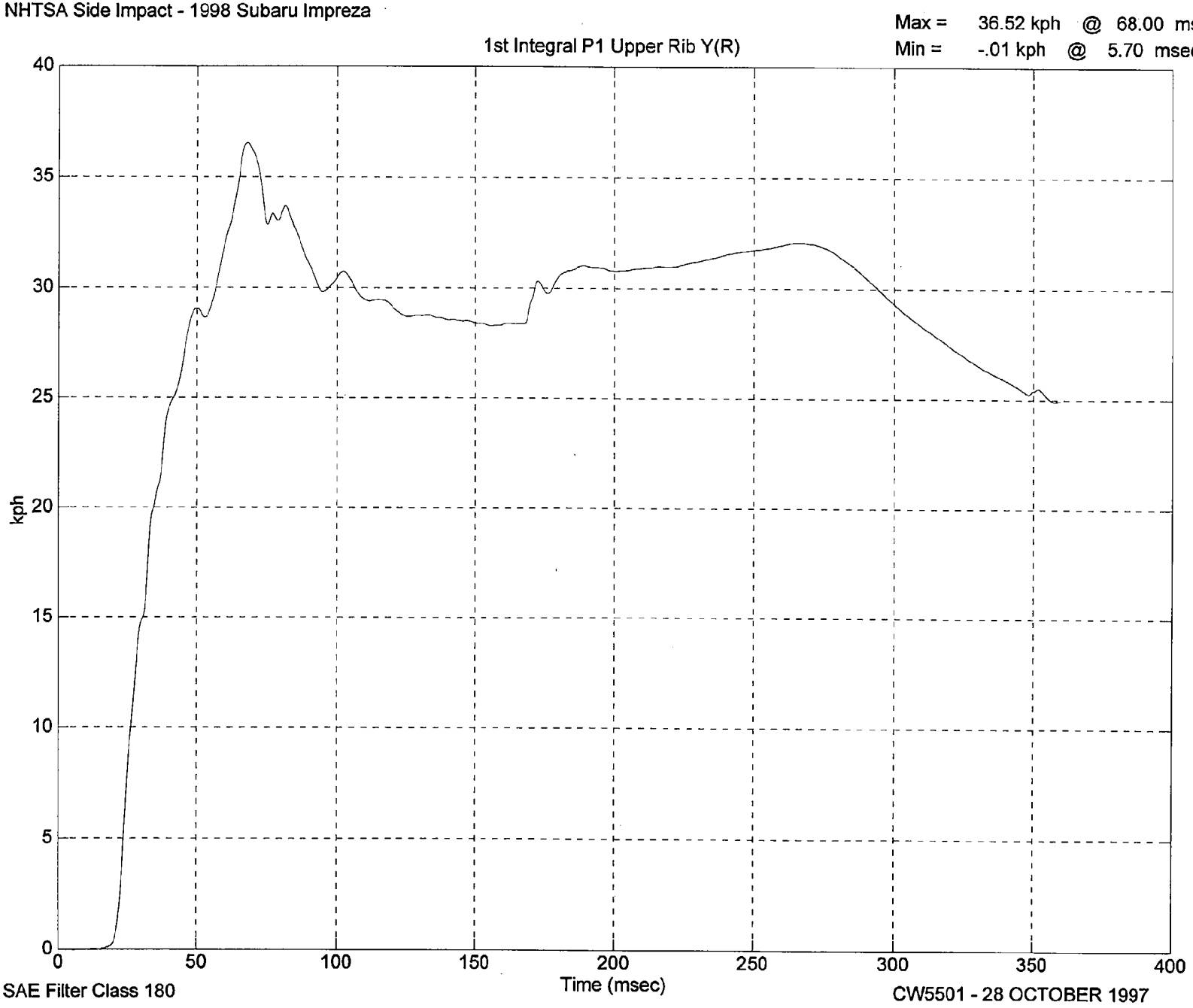
SAE Filter Class 180

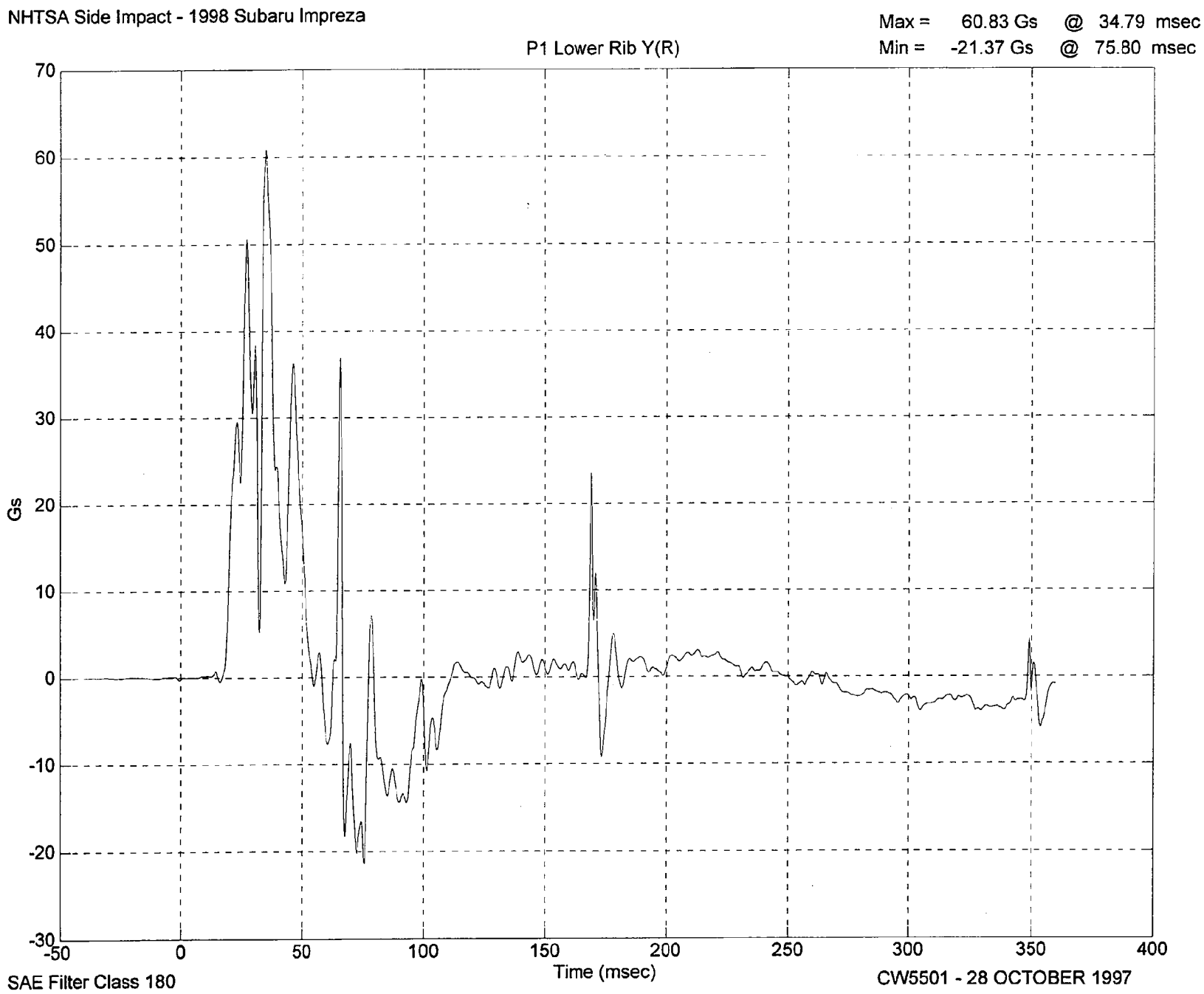
CW5501 - 28 OCTOBER 1997

DRIVER & PASSENGER DUMMY INSTRUMENTATION PLOTS (Redundant)
ACCELERATION DATA - FILTER CLASS 180
INTEGRATION DATA - FILTER CLASS 180

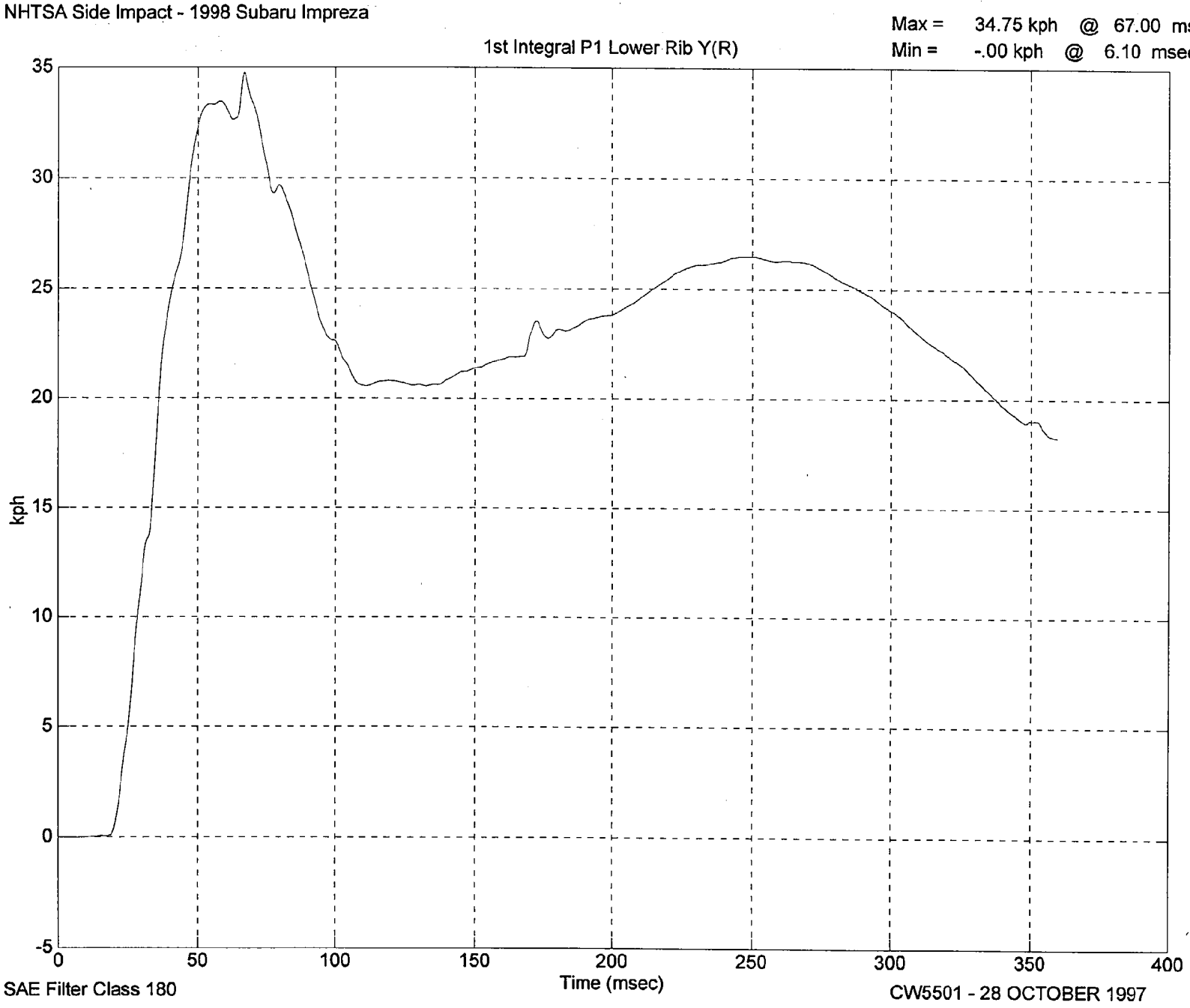

NHTSA Side Impact - 1998 Subaru Impreza
P1 Upper Rib Y(R)
Max = 68.27 Gs @ 24.10 msec
Min = -32.26 Gs @ 73.40 msec
80
60
40
20
0
-20
-40
Gs
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

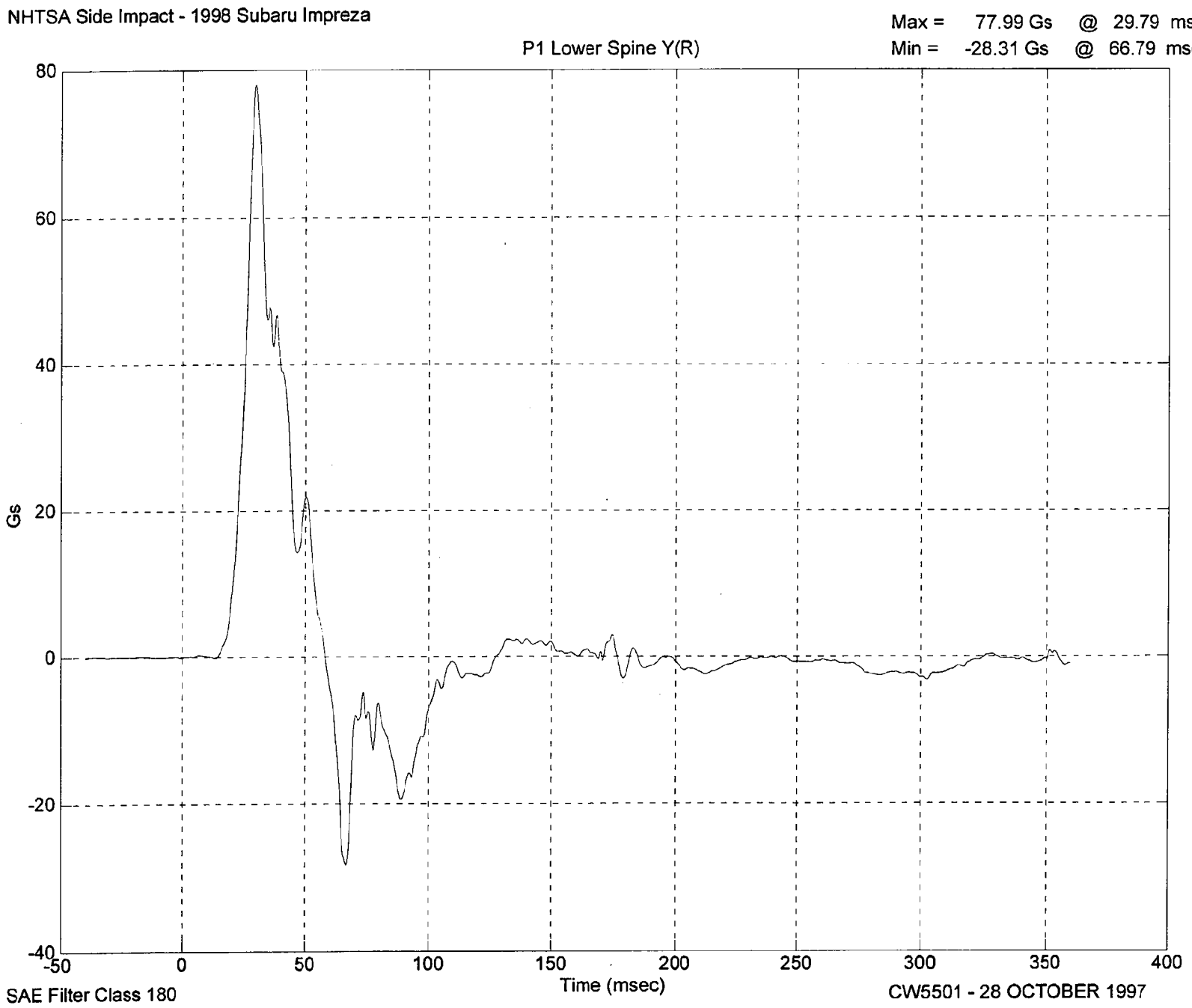
NHTSA Side Impact - 1998 Subaru Impreza



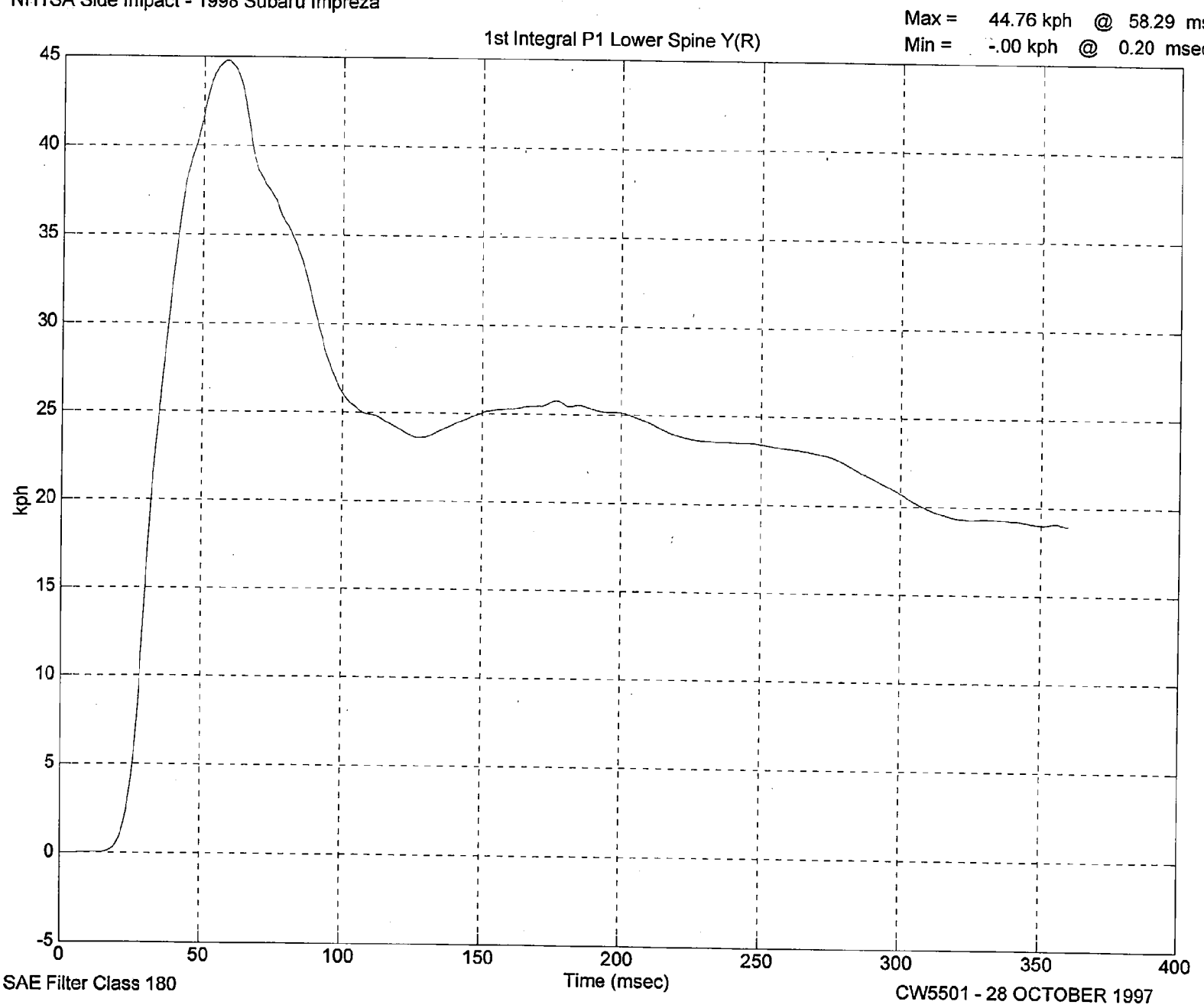

NHTSA Side Impact - 1998 Subaru Impreza
P1 Lower Rib Y(R)
Max = 60.83 Gs @ 34.79 msec
Min = -21.37 Gs @ 75.80 msec
Gs
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

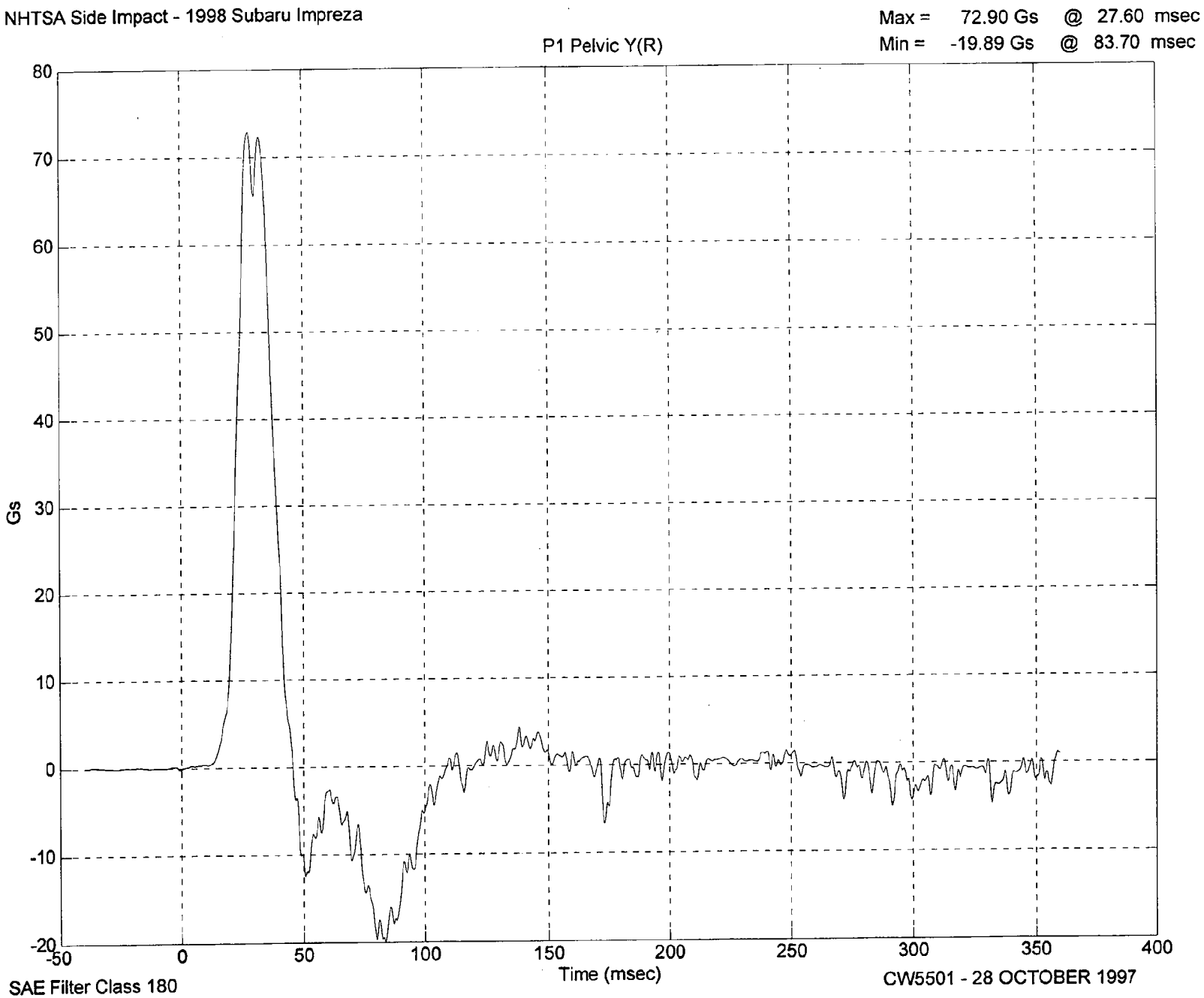
NHTSA Side Impact - 1998 Subaru Impreza



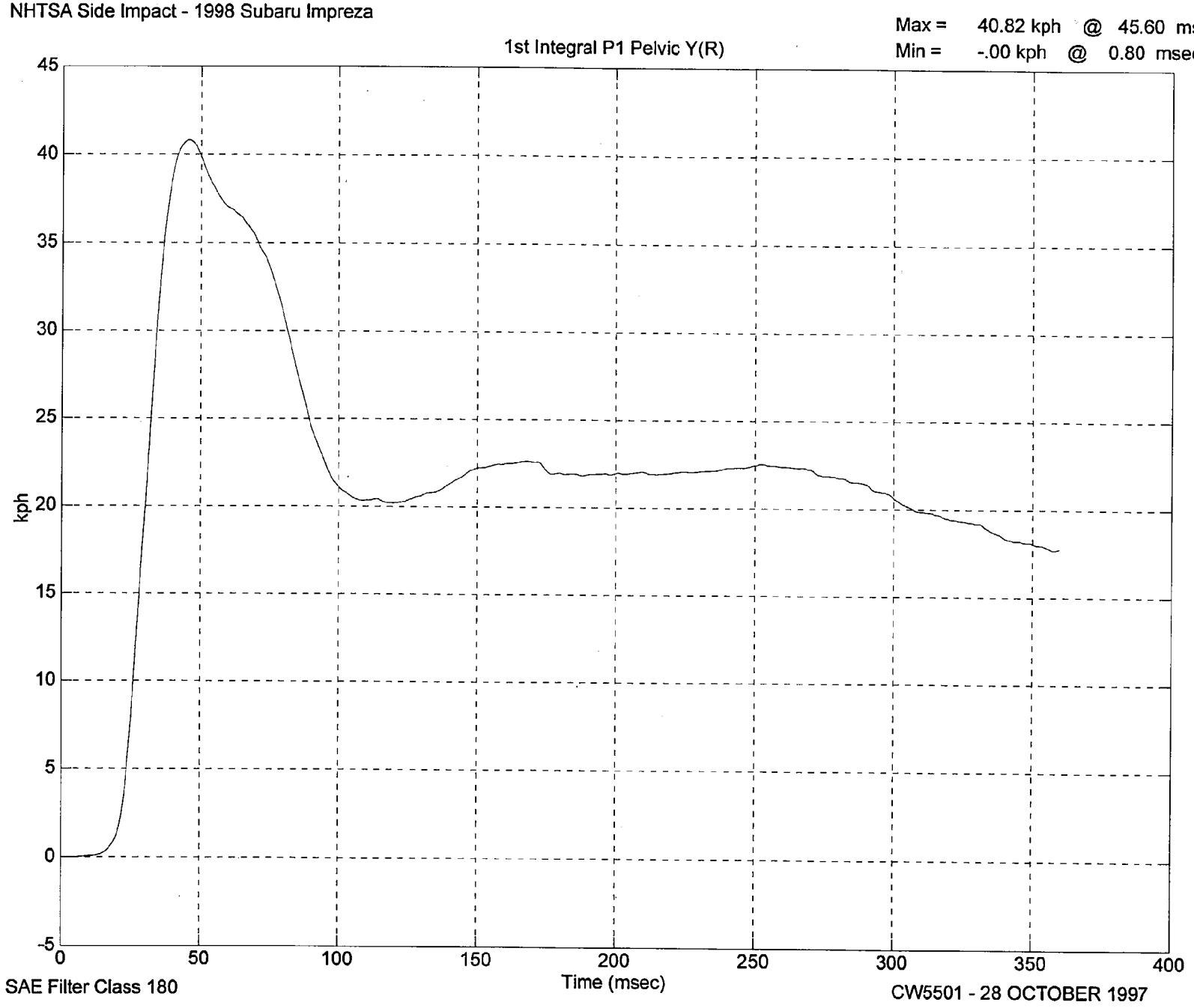

NHTSA Side Impact - 1998 Subaru Impreza
P1 Lower Spine Y(R)
Max = 77.99 Gs @ 29.79 msec
Min = -28.31 Gs @ 66.79 msec
80
60
40
20
0
-20
-40
Gs
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

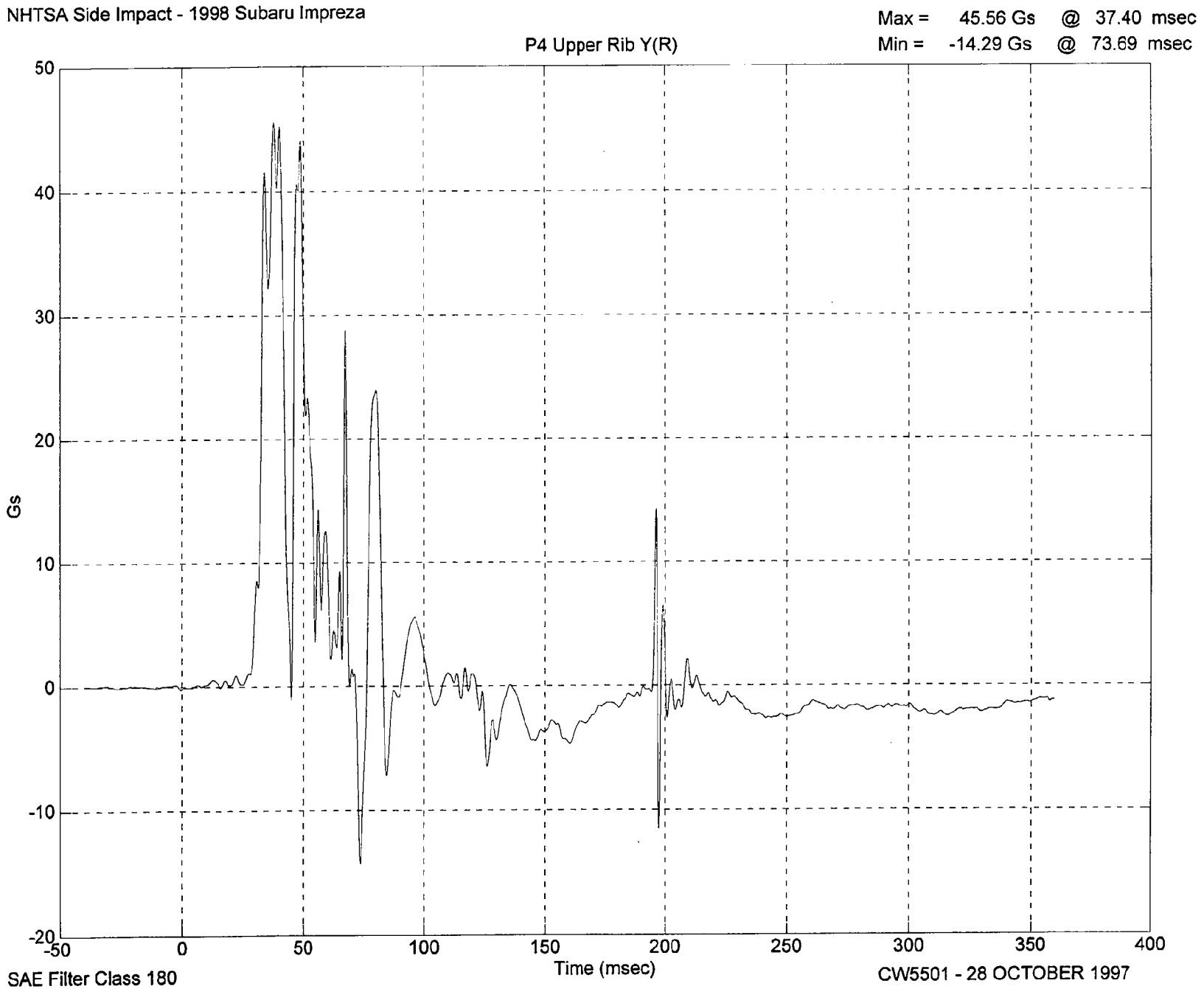
NHTSA Side Impact - 1998 Subaru Impreza



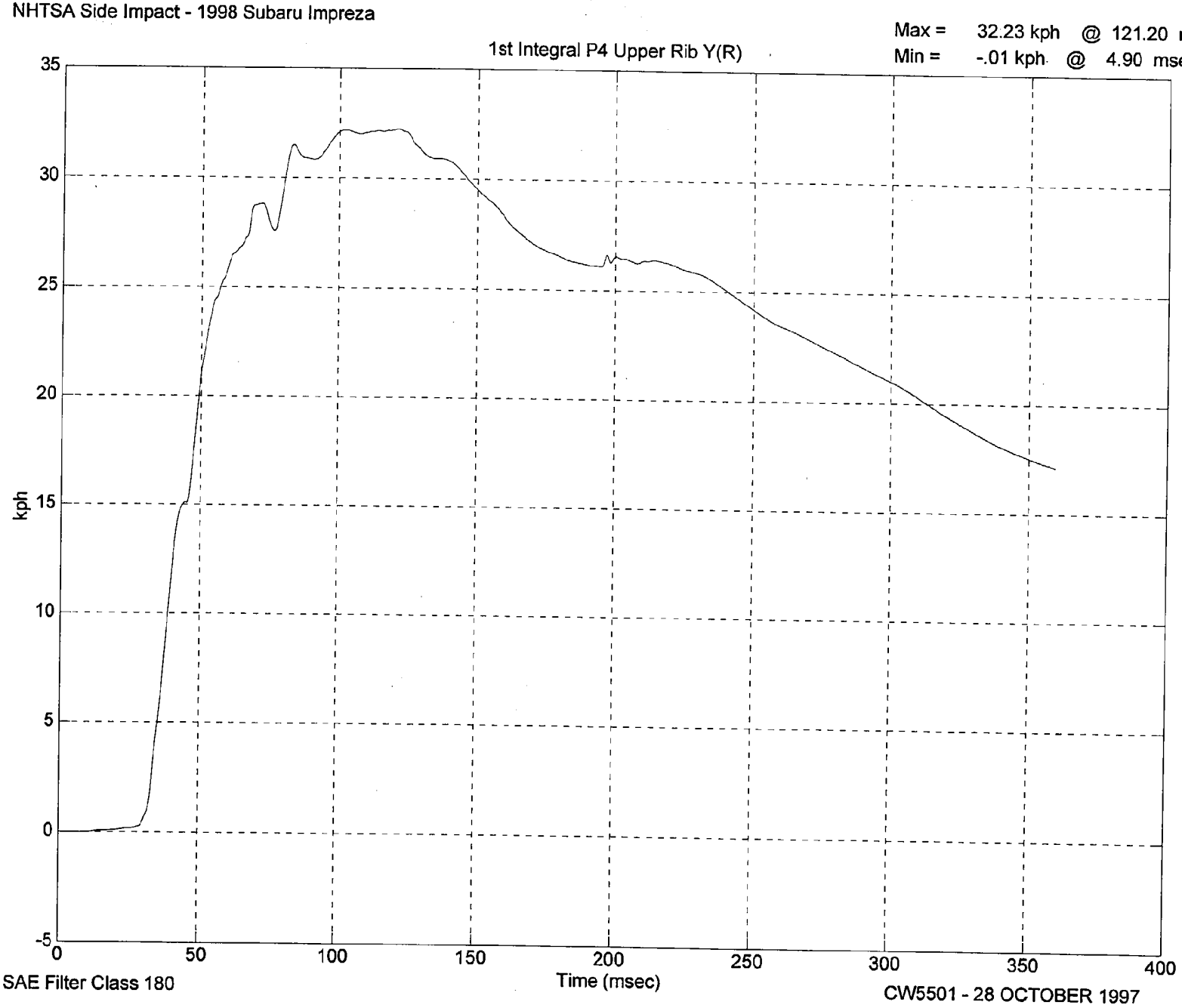

NHTSA Side Impact - 1998 Subaru Impreza
P1 Pelvic Y(R)
Max = 72.90 Gs @ 27.60 msec
Min = -19.89 Gs @ 83.70 msec
Gs
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

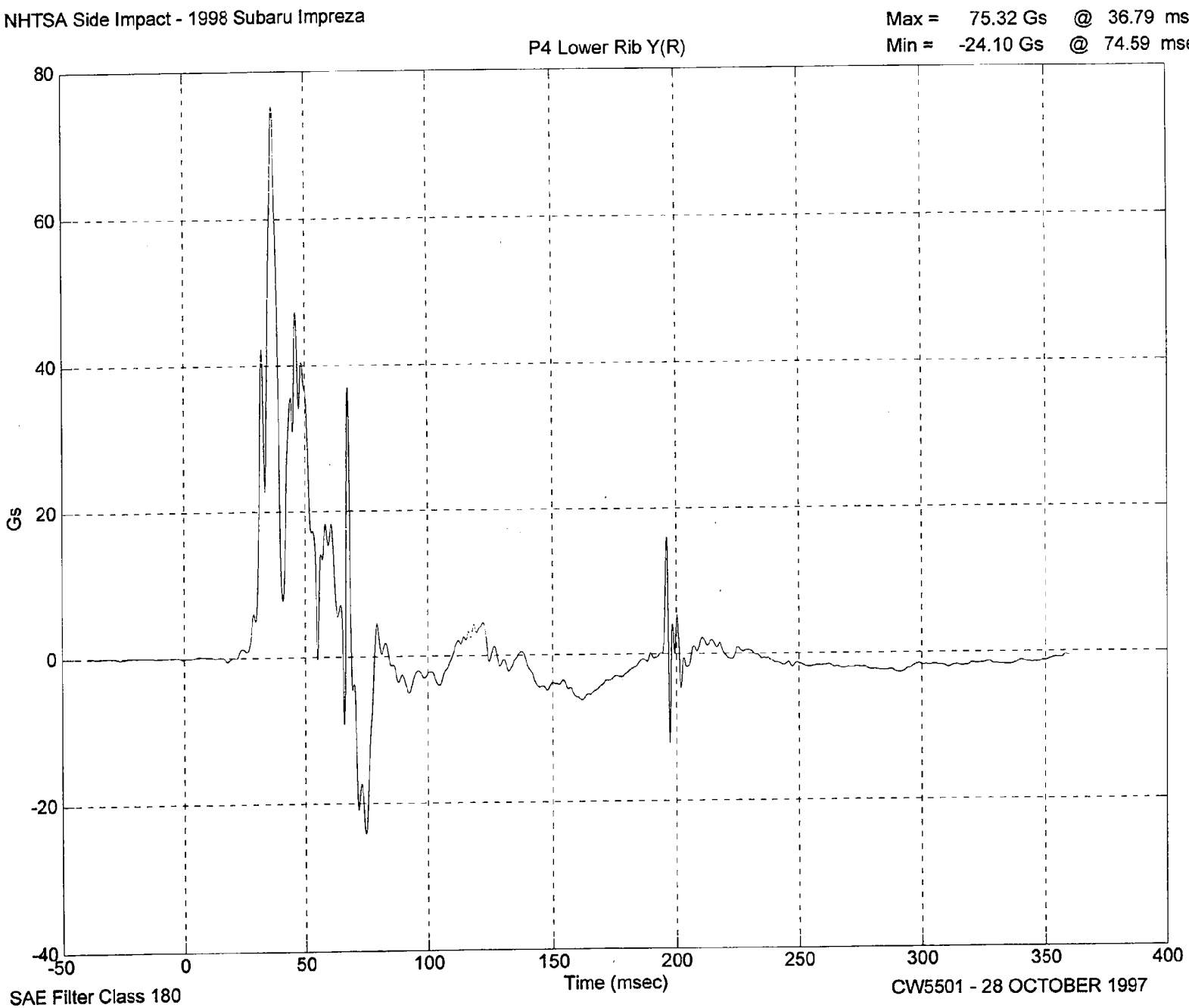
NHTSA Side Impact - 1998 Subaru Impreza



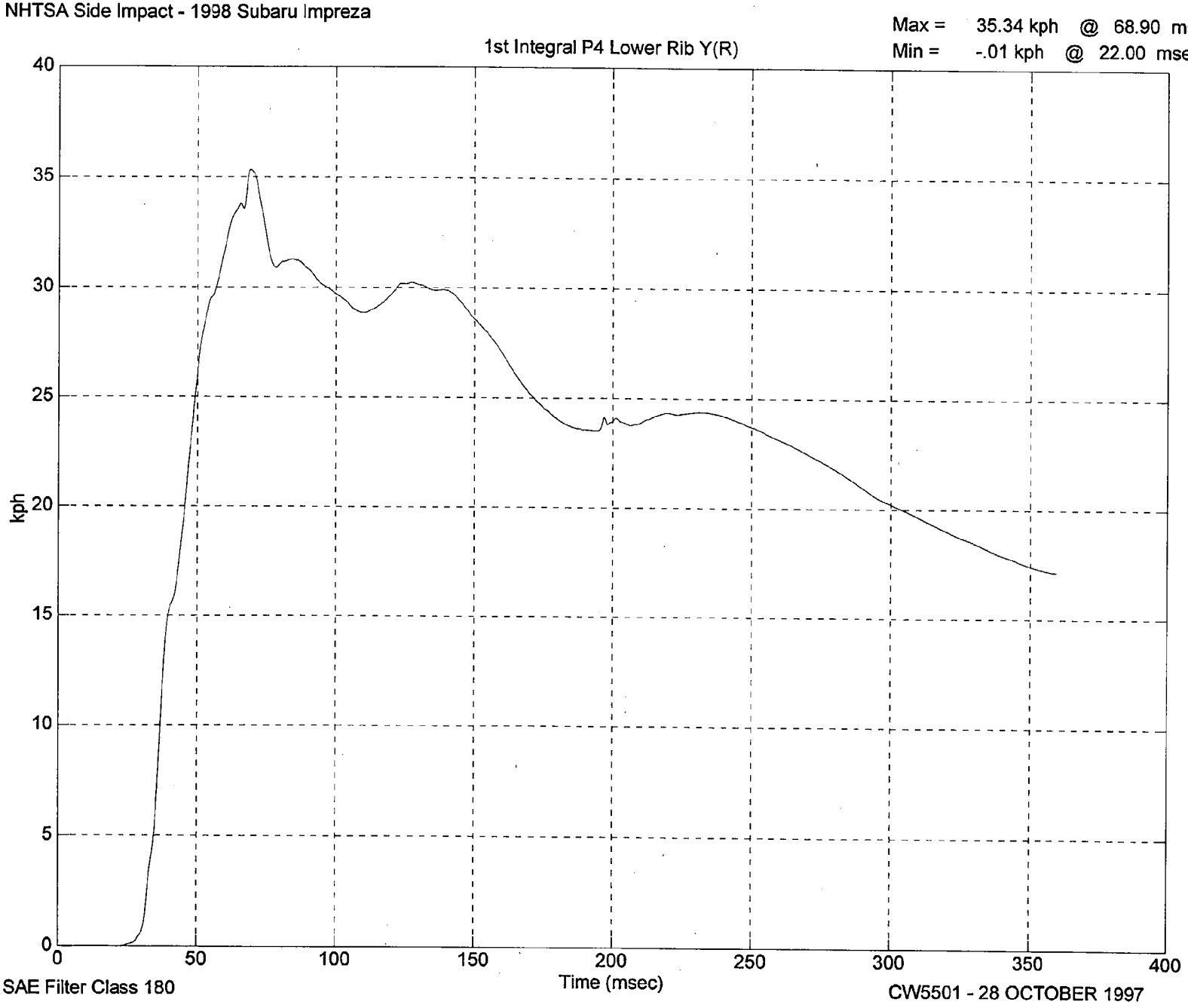

NHTSA Side Impact - 1998 Subaru Impreza
P4 Upper Rib Y(R)
Max = 45.56 Gs @ 37.40 msec
Min = -14.29 Gs @ 73.69 msec
Gs
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza




NHTSA Side Impact - 1998 Subaru Impreza
P4 Lower Rib Y(R)
Max = 75.32 Gs @ 36.79 msec
Min = -24.10 Gs @ 74.59 msec
80
60
40
20
0
-20
-40
Gs
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

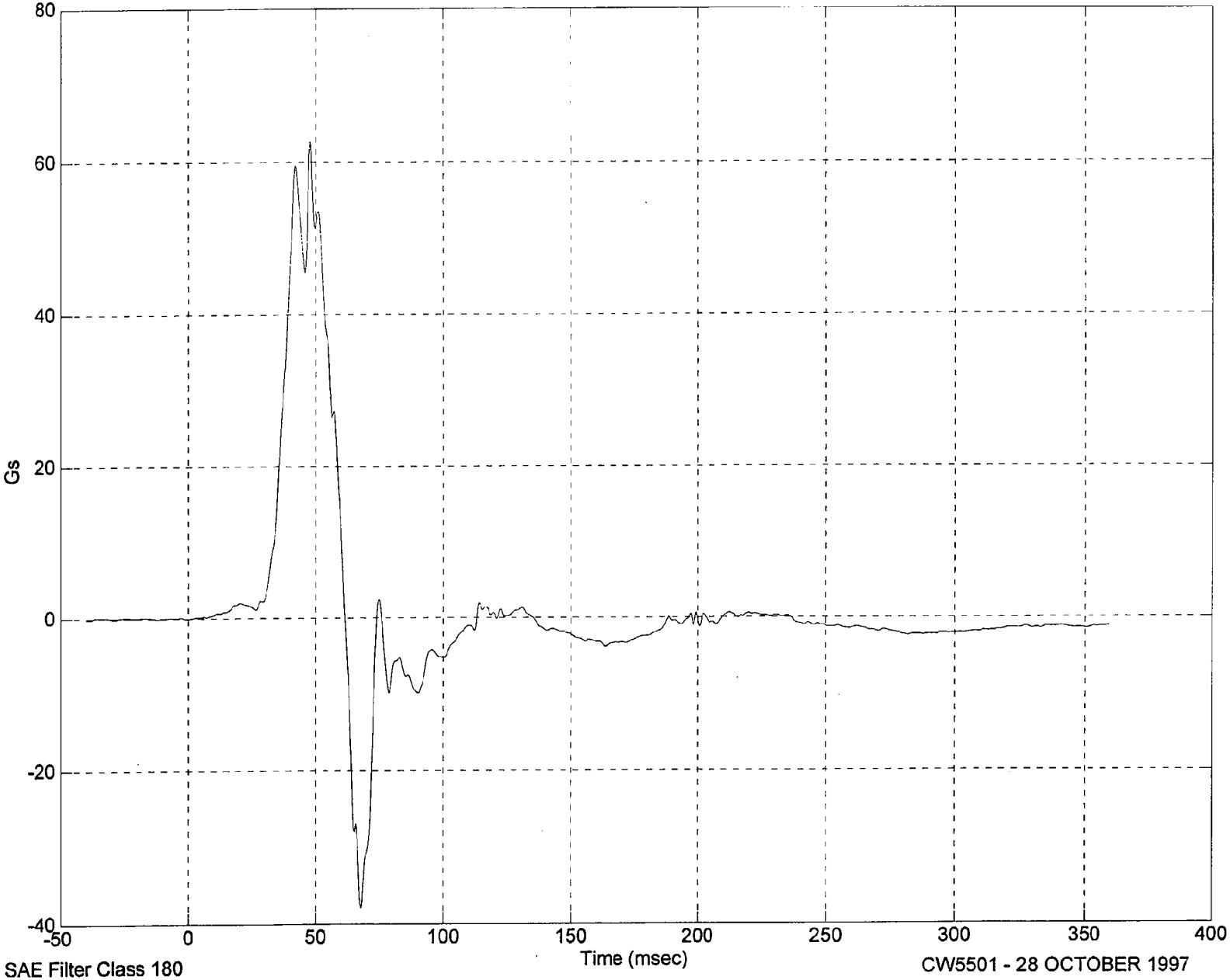
NHTSA Side Impact - 1998 Subaru Impreza



NHTSA Side Impact - 1998 Subaru Impreza

P4 Lower Spine Y(R)

Max = 62.73 Gs @ 47.79 msec
Min = -37.88 Gs @ 67.89 msec



SAE Filter Class 180

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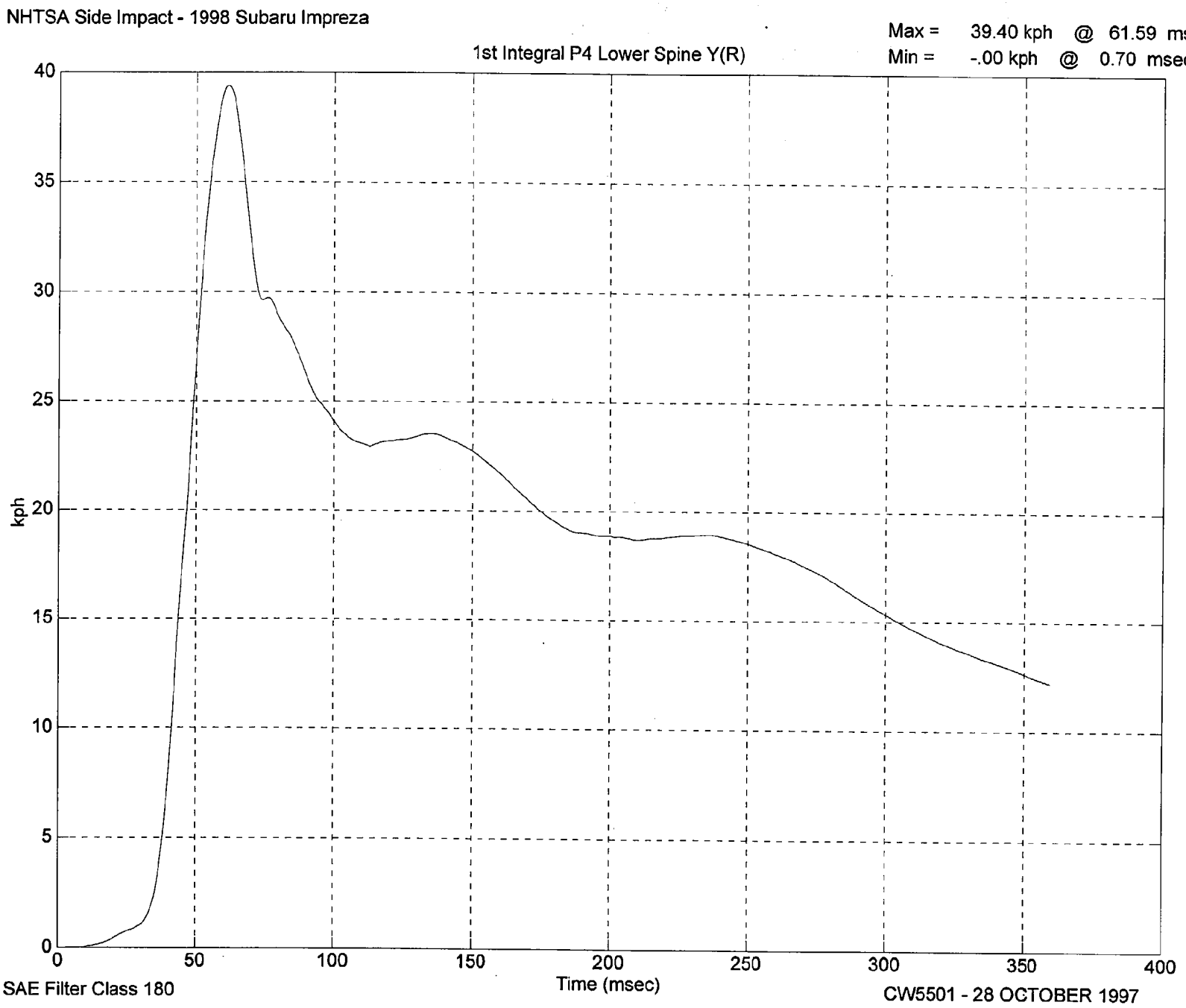
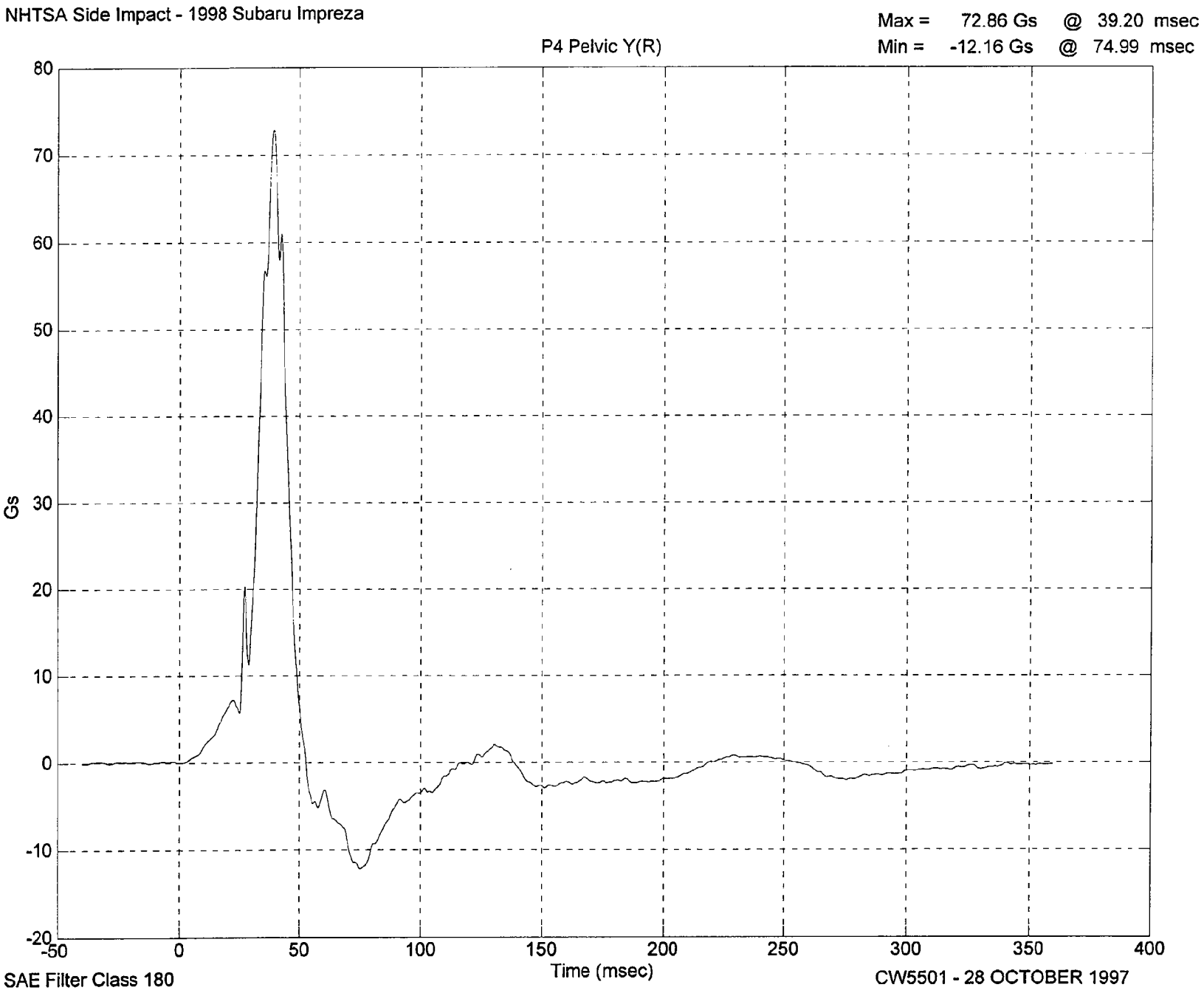
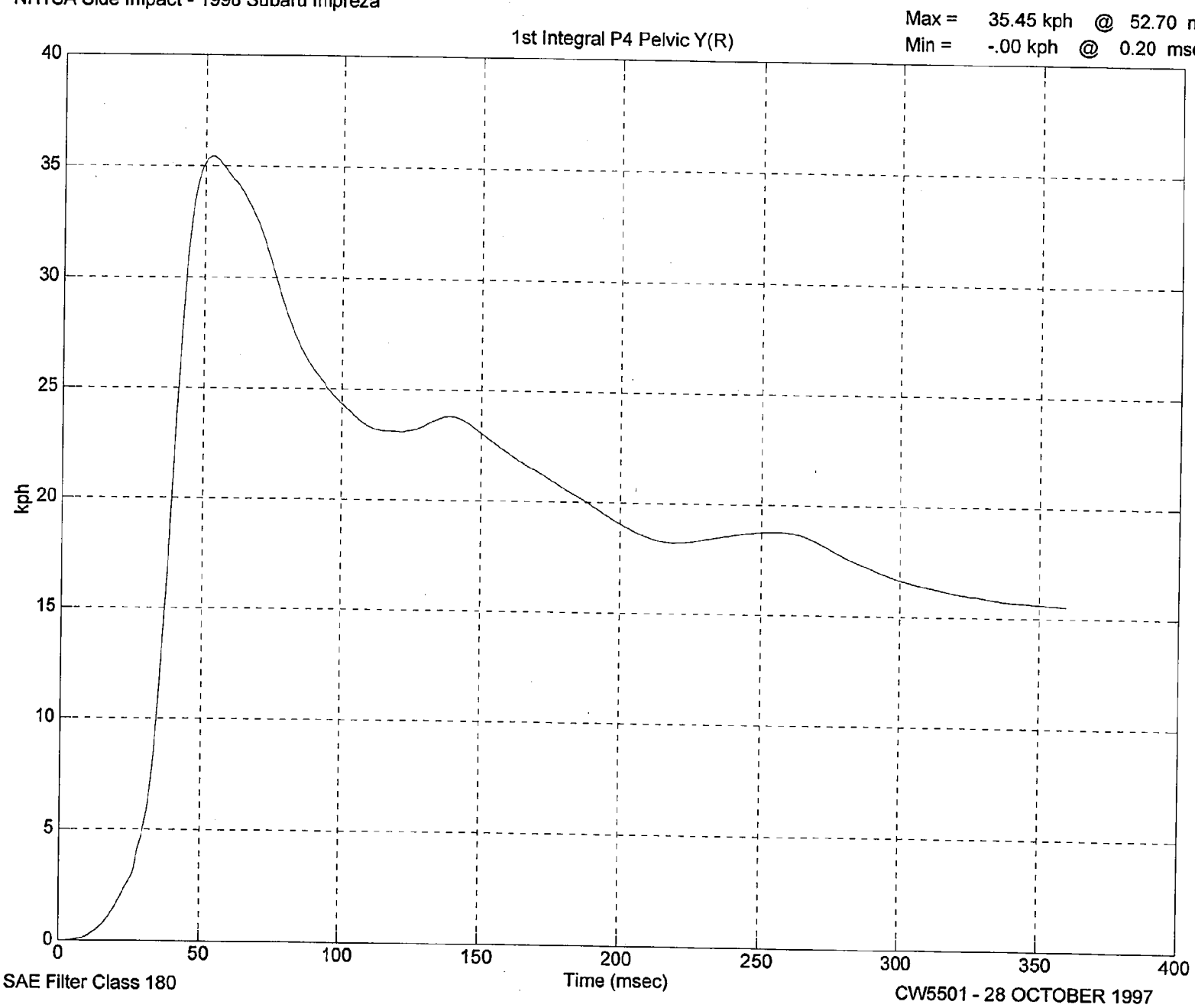

NHTSA Side Impact - 1998 Subaru Impreza
1st Integral P4 Lower Spine Y(R)
Max = 39.40 kph @ 61.59 msec
Min = -.00 kph @ 0.70 msec
kph
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
P4 Pelvic Y(R)
Max = 72.86 Gs @ 39.20 msec
Min = -12.16 Gs @ 74.99 msec
Gs
Time (msec)
SAE Filter Class 180
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza



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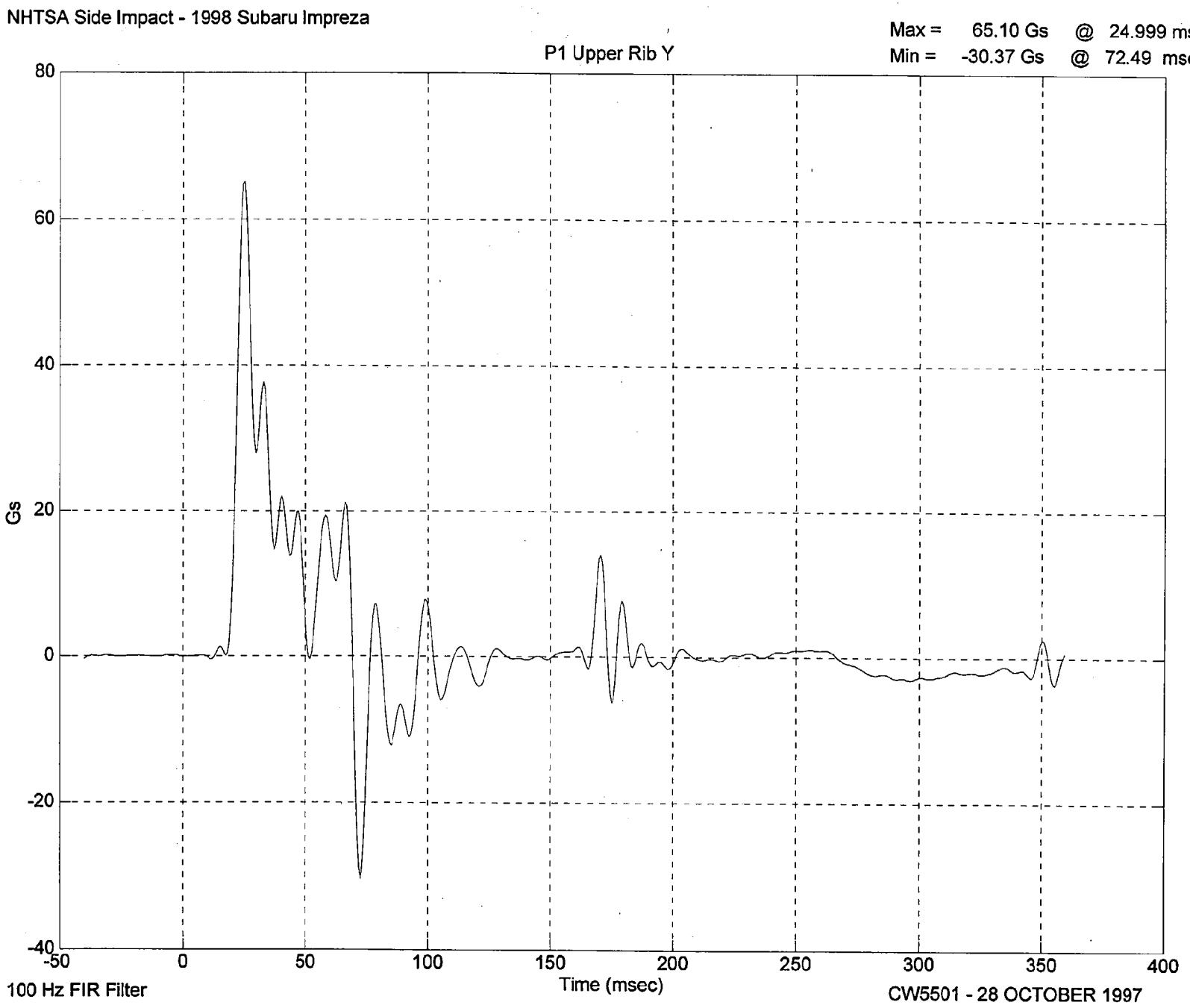
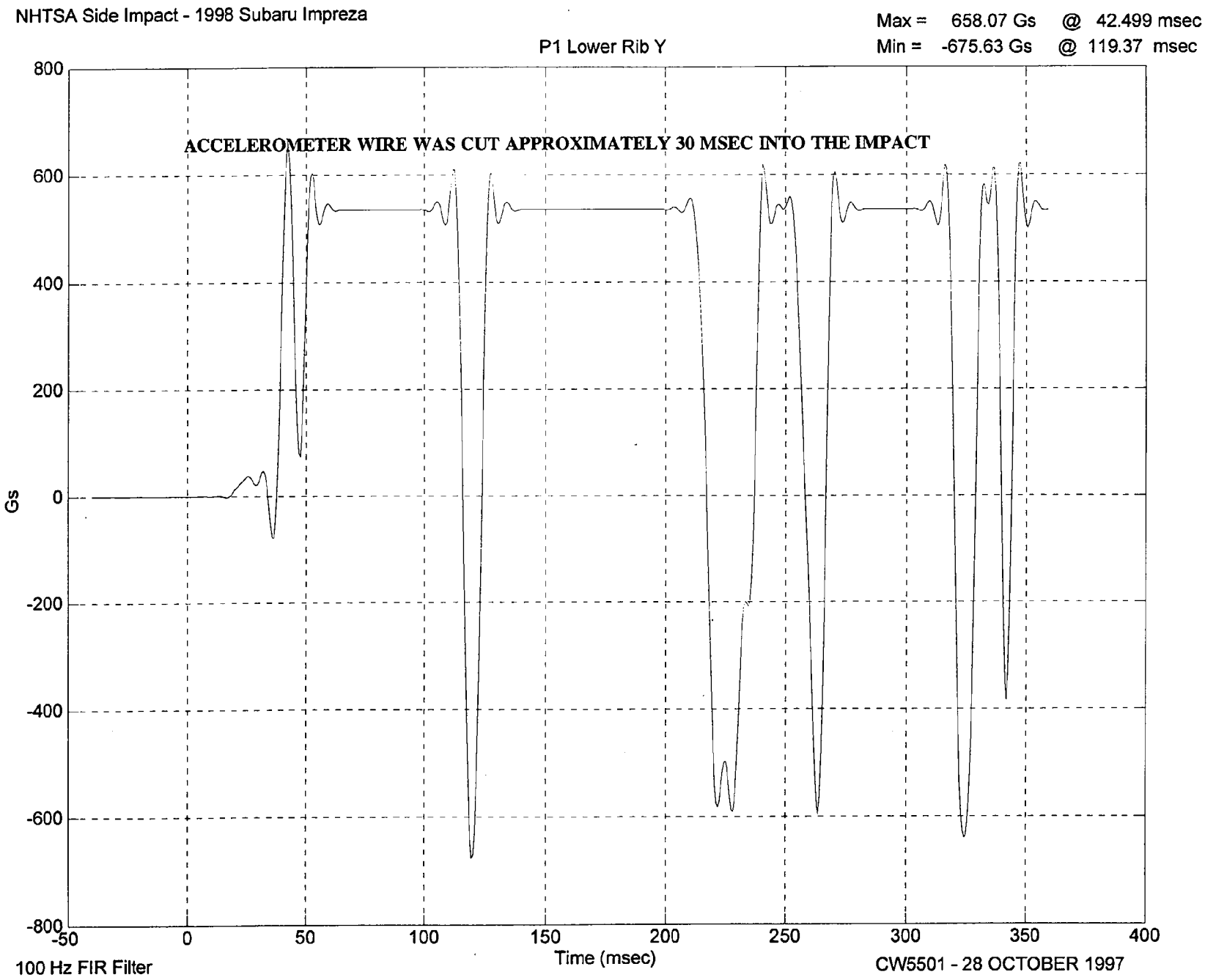
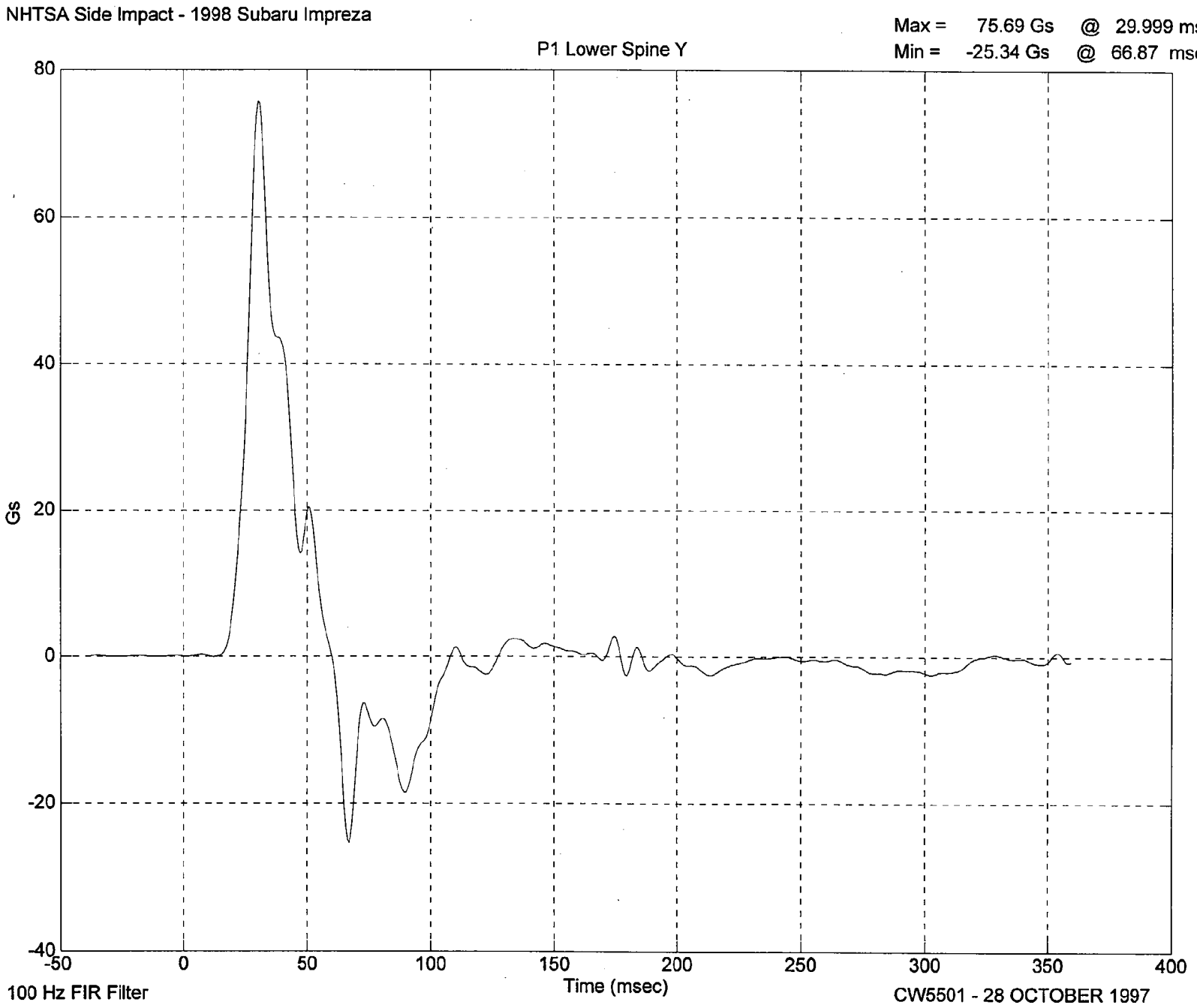
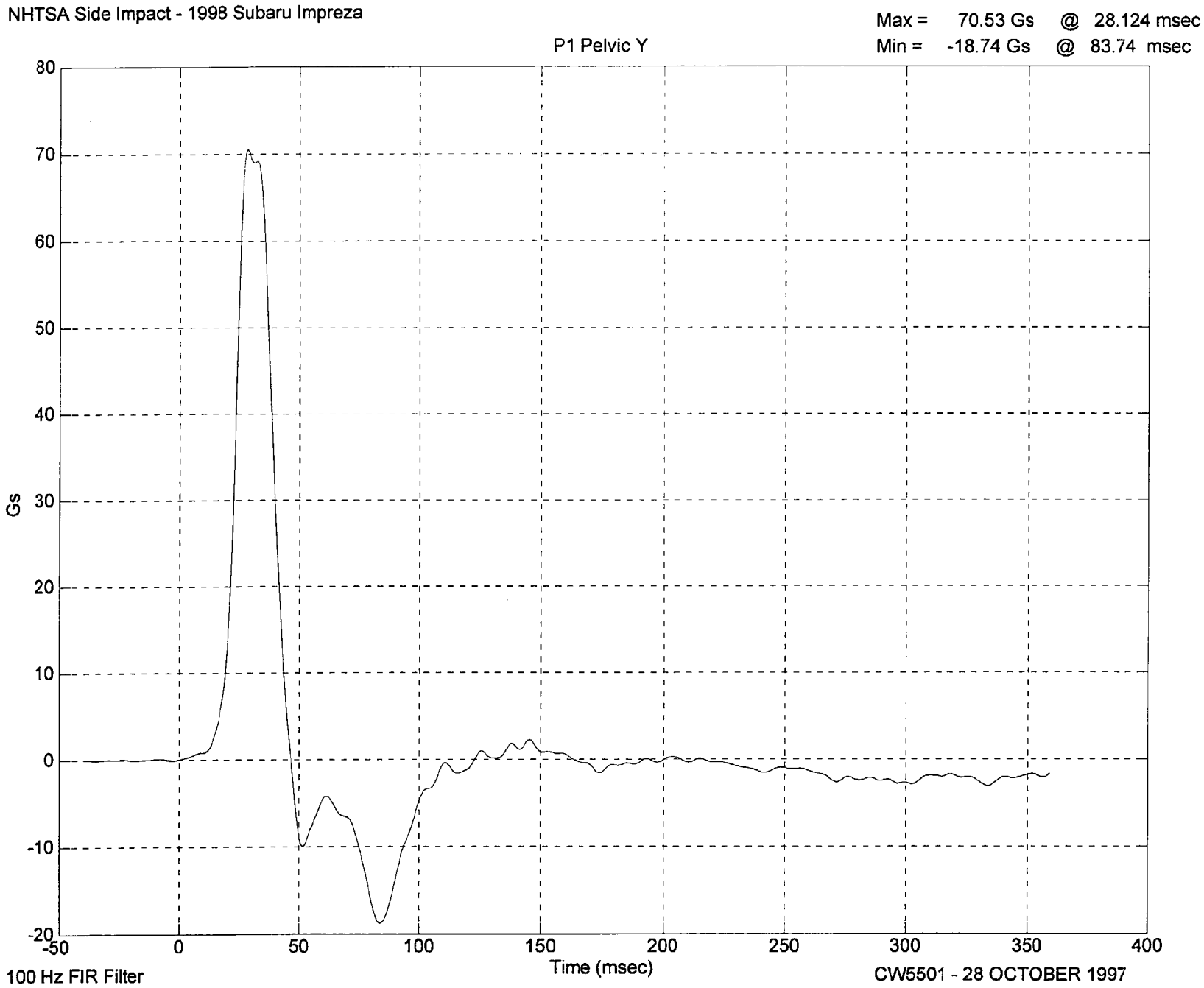
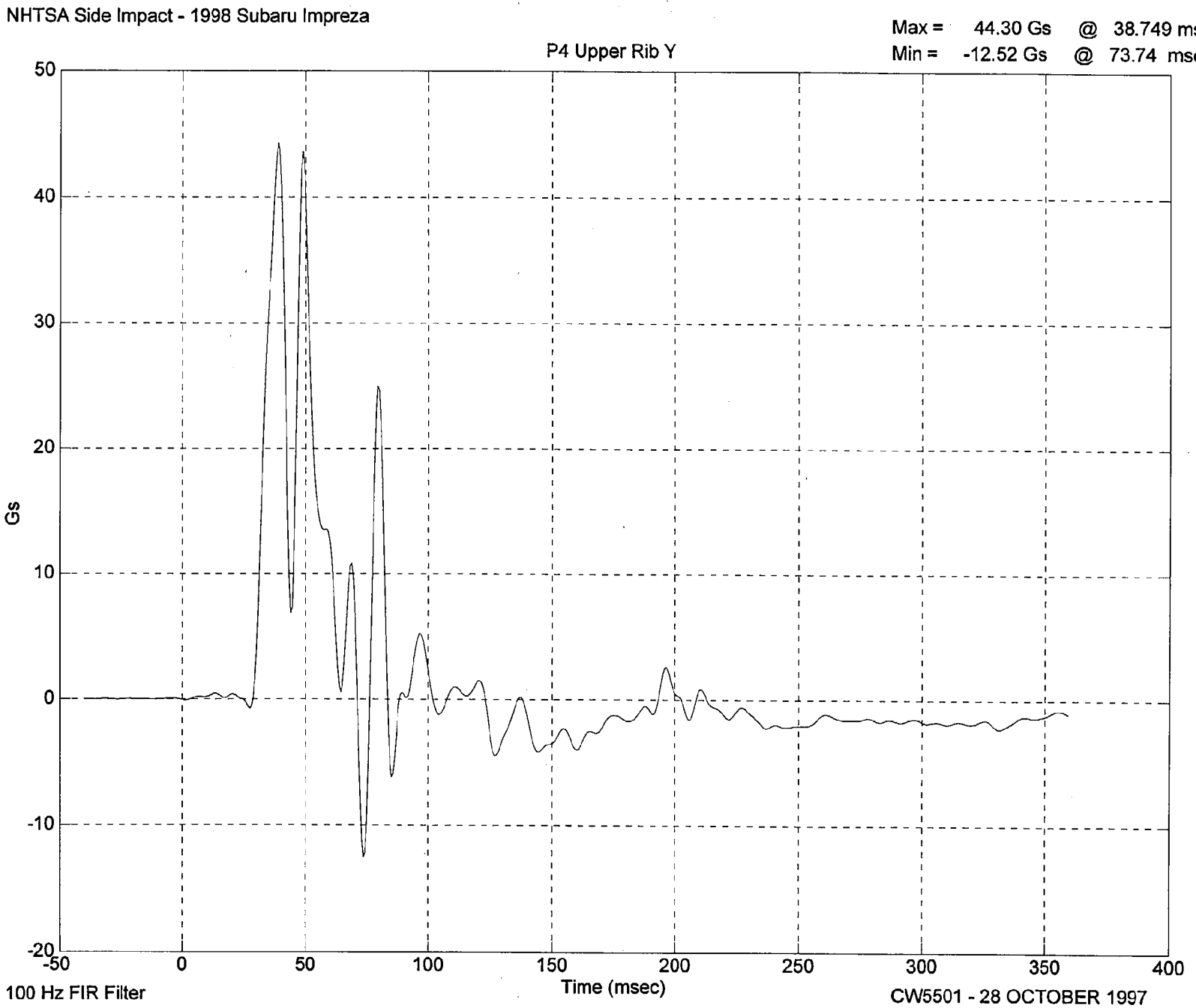
DRIVER & PASSENGER DUMMY INSTRUMENTATION PLOTS
ACCELERATION DATA - FIR FILTERED

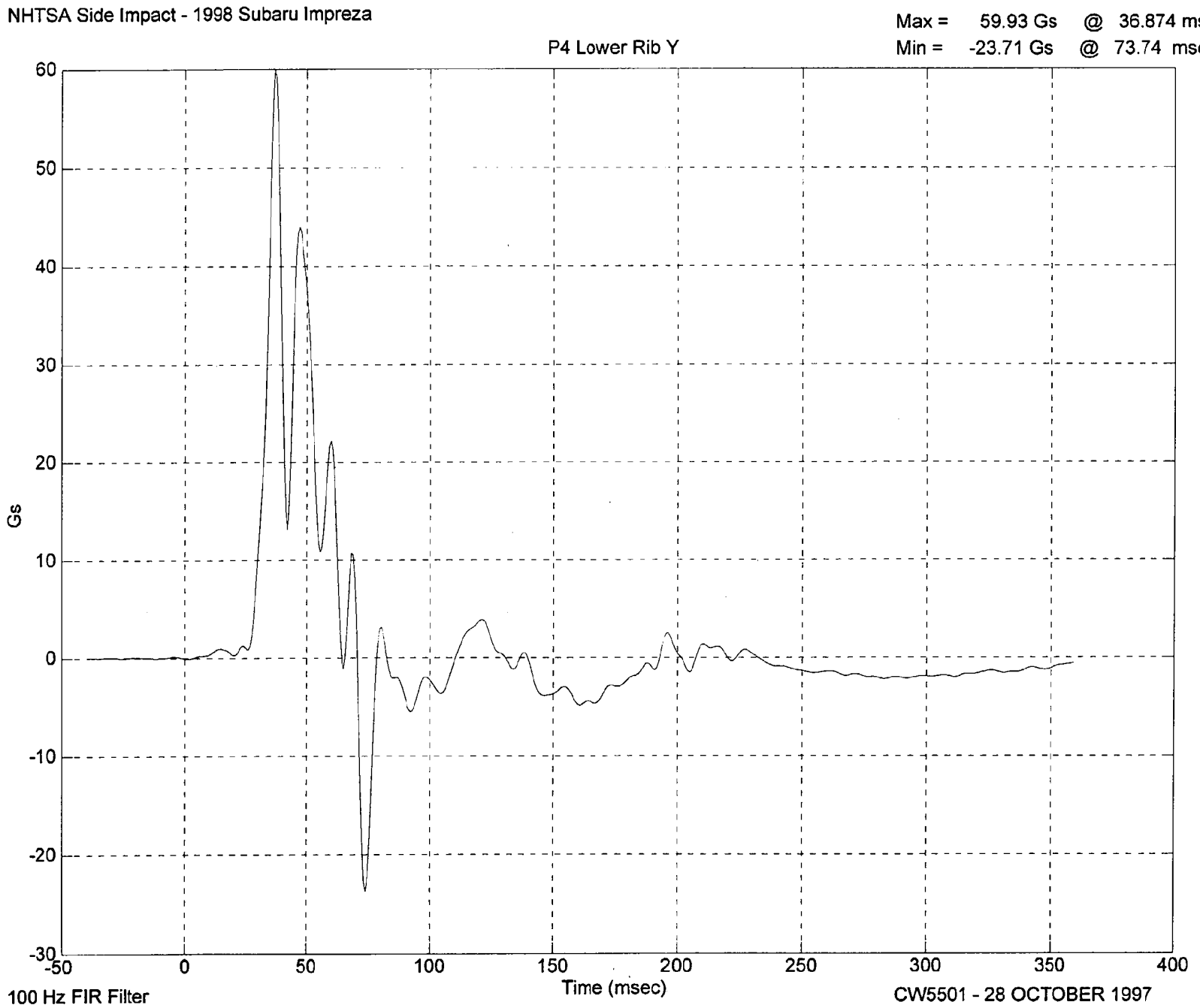

NHTSA Side Impact - 1998 Subaru Impreza
P1 Upper Rib Y
Max = 65.10 Gs @ 24.999 msec
Min = -30.37 Gs @ 72.49 msec
Gs
80
60
40
20
0
-20
-40
-50
0
50
100
150
200
250
300
350
400
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997

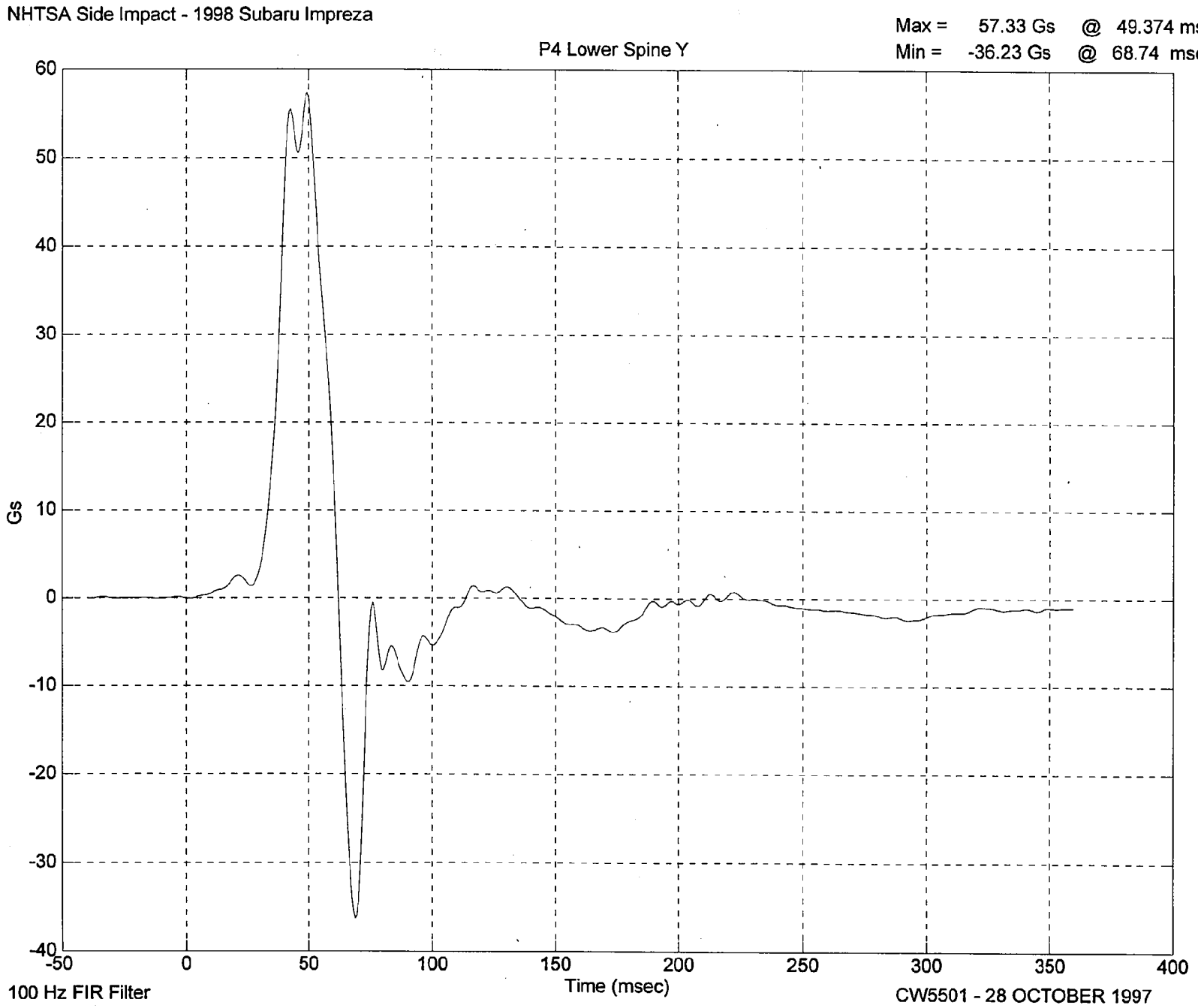

NHTSA Side Impact - 1998 Subaru Impreza
P1 Lower Rib Y
Max = 658.07 Gs @ 42.499 msec
Min = -675.63 Gs @ 119.37 msec
ACCELEROMETER WIRE WAS CUT APPROXIMATELY 30 MSEC INTO THE IMPACT
800
600
400
200
0
-200
-400
-600
-800
Gs
-50
0
50
100
150
200
250
300
350
400
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997

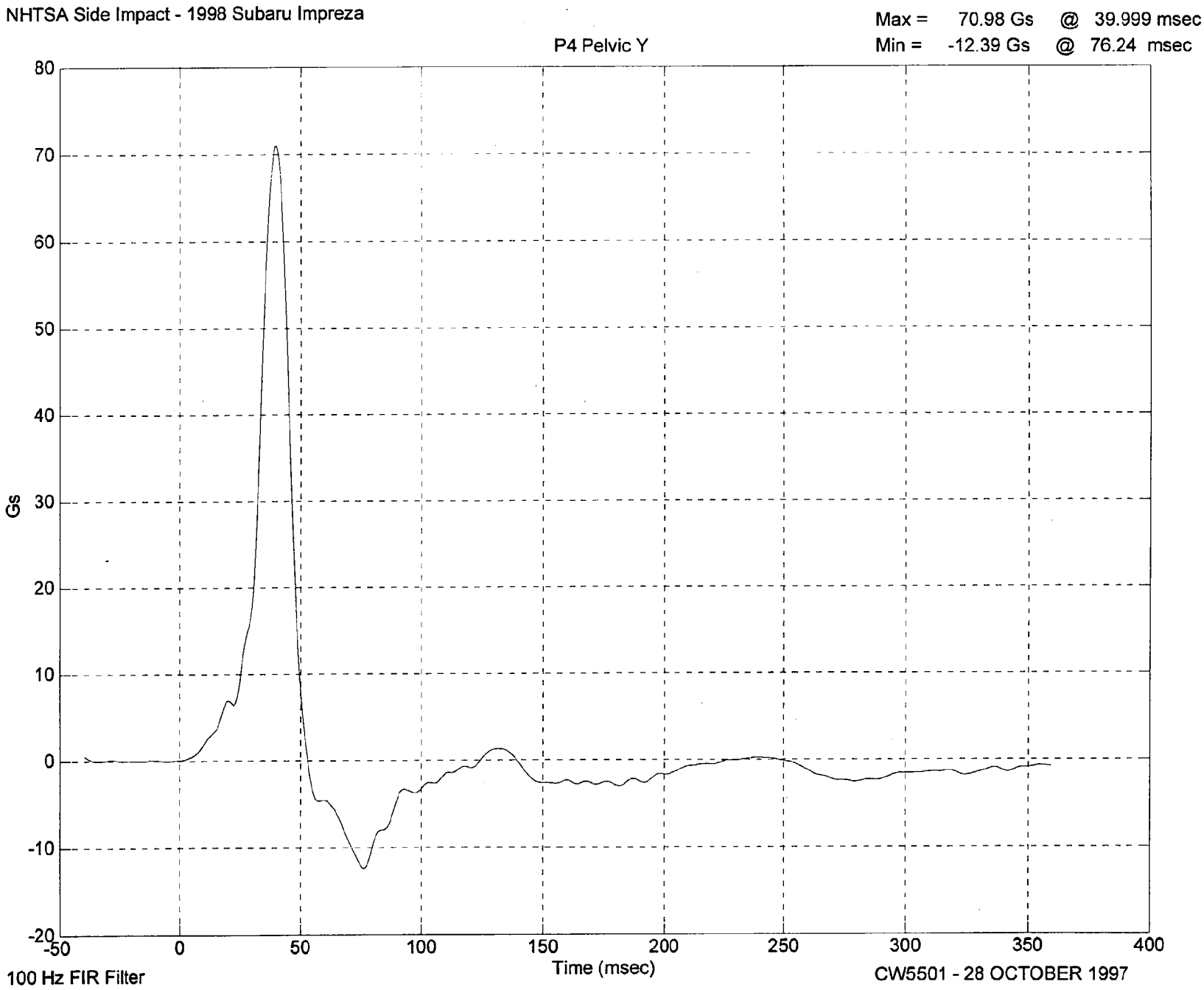

NHTSA Side Impact - 1998 Subaru Impreza
P1 Lower Spine Y
Max = 75.69 Gs @ 29.999 msec
Min = -25.34 Gs @ 66.87 msec
Gs
80
60
40
20
0
-20
-40
-50
0
50
100
150
200
250
300
350
400
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
Max = 70.53 Gs @ 28.124 msec
P1 Pelvic Y
Min = -18.74 Gs @ 83.74 msec
80
70
60
50
40
30
20
10
0
-10
-20
Gs
-50
0
50
100
150
200
250
300
350
400
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997

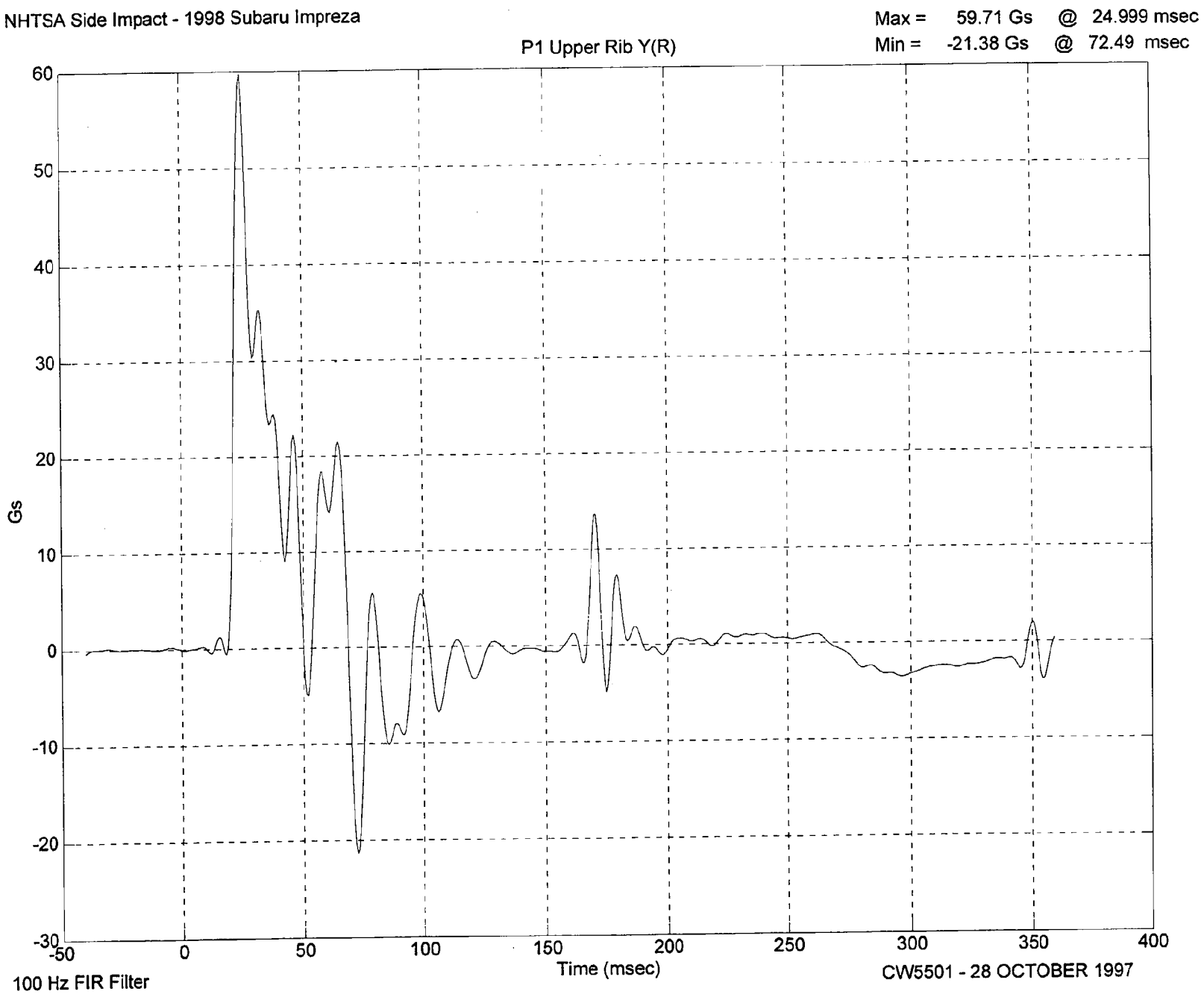

NHTSA Side Impact - 1998 Subaru Impreza
P4 Upper Rib Y
Max = 44.30 Gs @ 38.749 msec
Min = -12.52 Gs @ 73.74 msec
Gs
50
40
30
20
10
0
-10
-20
-50
0
50
100
150
200
250
300
350
400
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
P4 Lower Rib Y
Max = 59.93 Gs @ 36.874 msec
Min = -23.71 Gs @ 73.74 msec
Gs
60
50
40
30
20
10
0
-10
-20
-30
-50
0
50
100
150
200
250
300
350
400
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997

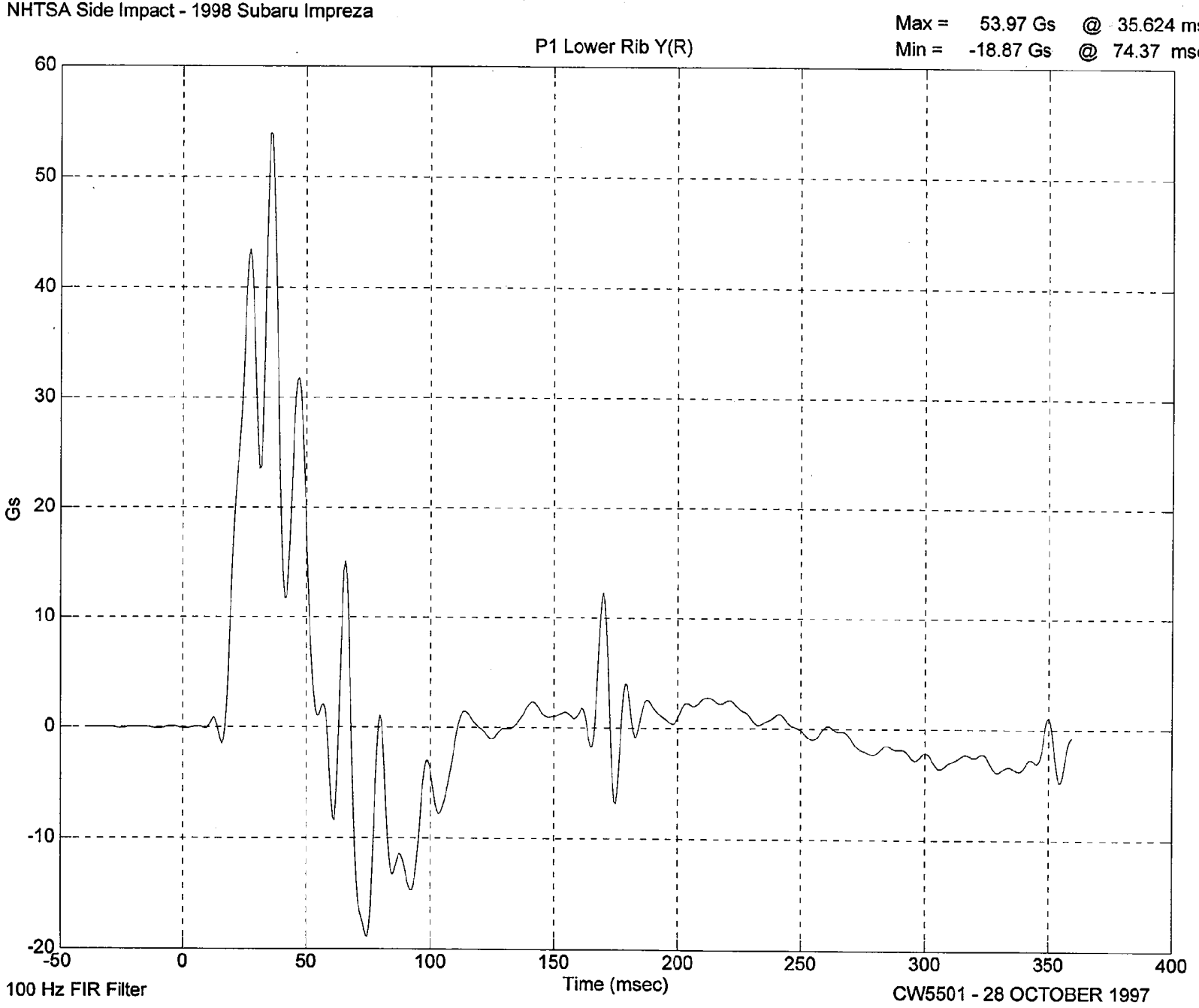

NHTSA Side Impact - 1998 Subaru Impreza
P4 Lower Spine Y
Max = 57.33 Gs @ 49.374 msec
Min = -36.23 Gs @ 68.74 msec
Gs
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
50
100
150
200
250
300
350
400
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997

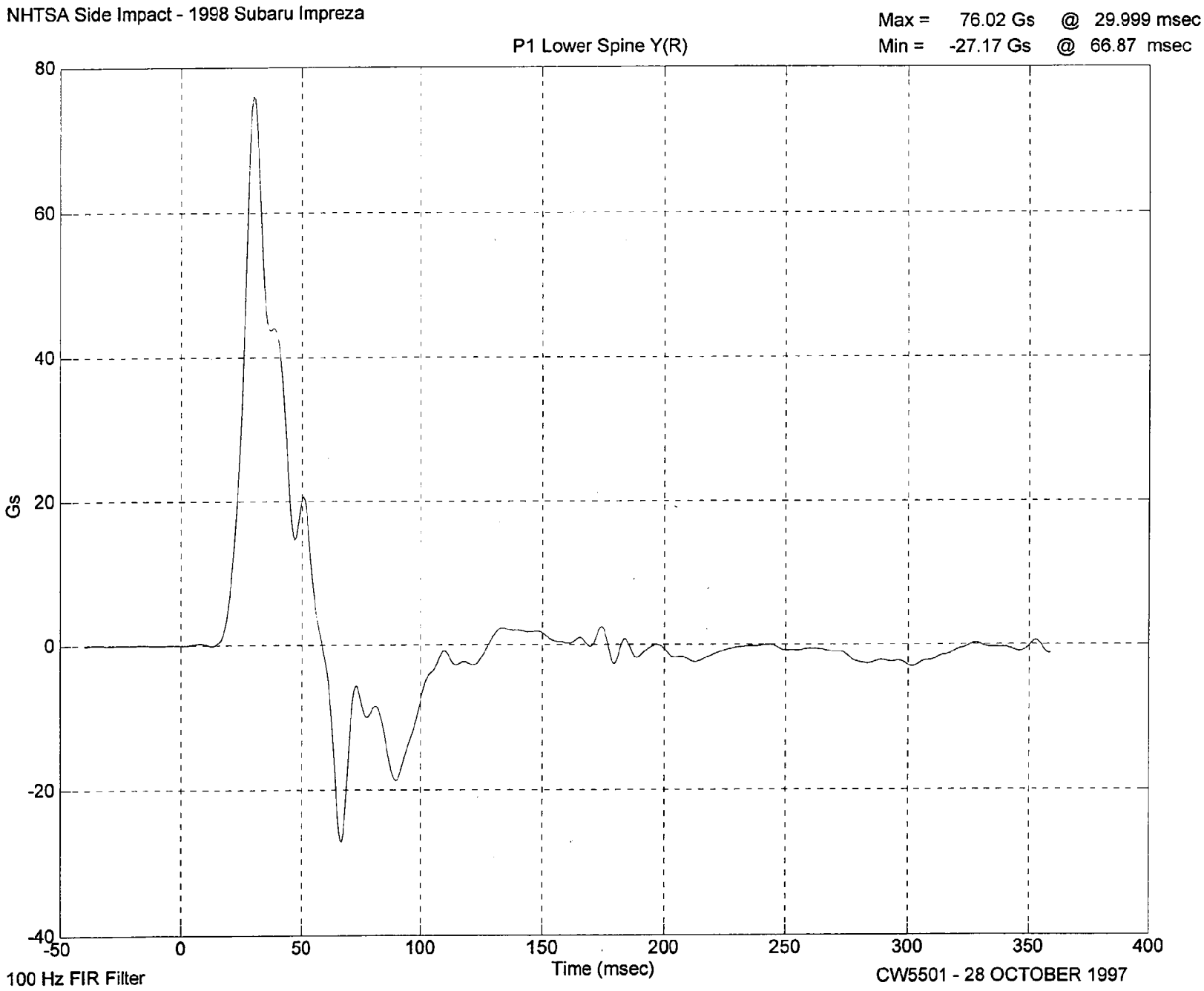

NHTSA Side Impact - 1998 Subaru Impreza
P4 Pelvic Y
Max = 70.98 Gs @ 39.999 msec
Min = -12.39 Gs @ 76.24 msec
Gs
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997

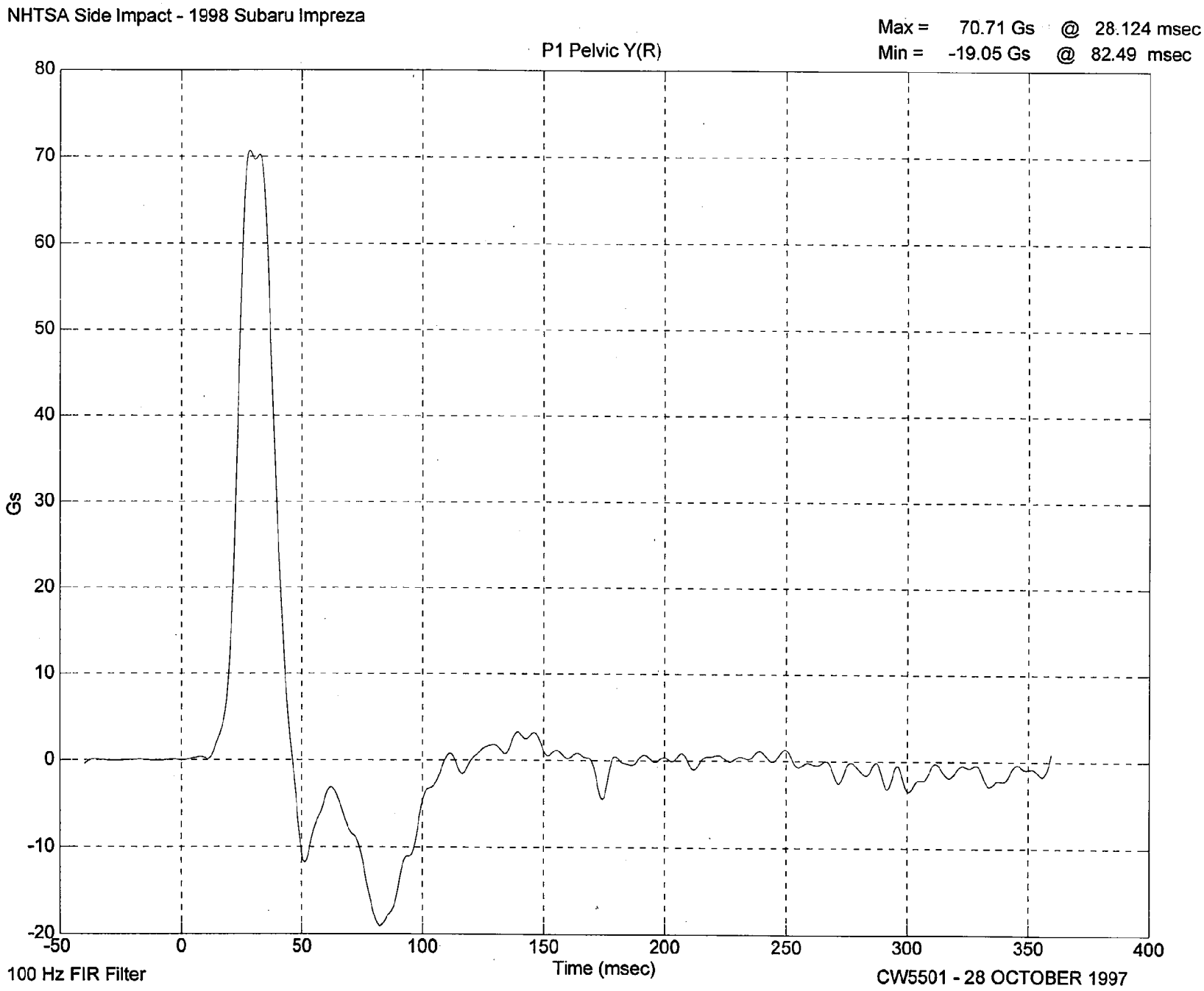
DRIVER & PASSENGER DUMMY INSTRUMENTATION PLOTS (redundant)
ACCELERATION DATA - FIR FILTERED

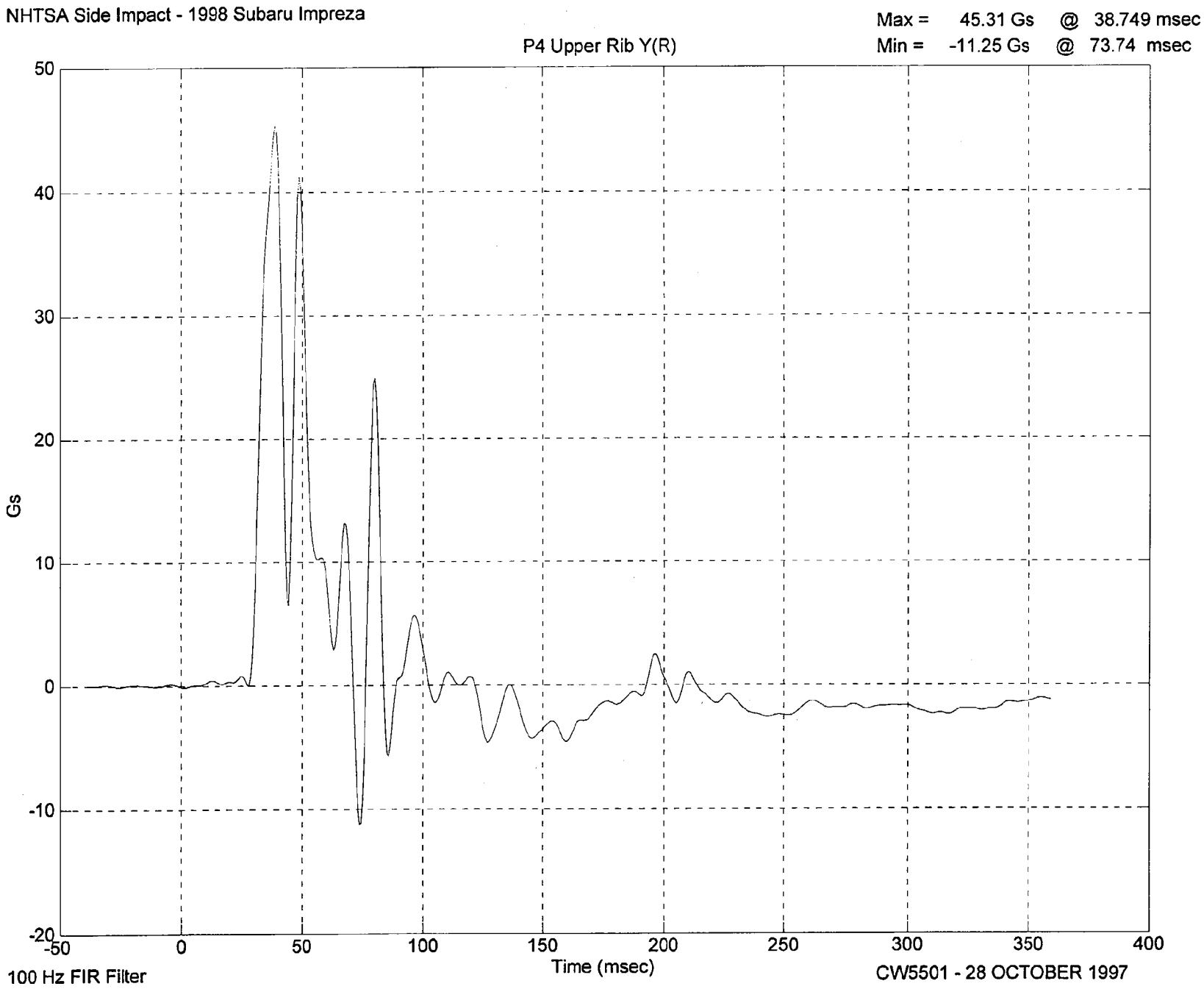

NHTSA Side Impact - 1998 Subaru Impreza
P1 Upper Rib Y(R)
Max = 59.71 Gs @ 24.999 msec
Min = -21.38 Gs @ 72.49 msec
Gs
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997

NHTSA Side Impact - 1998 Subaru Impreza




NHTSA Side Impact - 1998 Subaru Impreza
P1 Lower Spine Y(R)
Max = 76.02 Gs @ 29.999 msec
Min = -27.17 Gs @ 66.87 msec
Gs
80
60
40
20
0
-20
-40
-50
0
50
100
150
200
250
300
350
400
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
P1 Pelvic Y(R)
Max = 70.71 Gs @ 28.124 msec
Min = -19.05 Gs @ 82.49 msec
Gs
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
P4 Upper Rib Y(R)
Max = 45.31 Gs @ 38.749 msec
Min = -11.25 Gs @ 73.74 msec
Gs
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997

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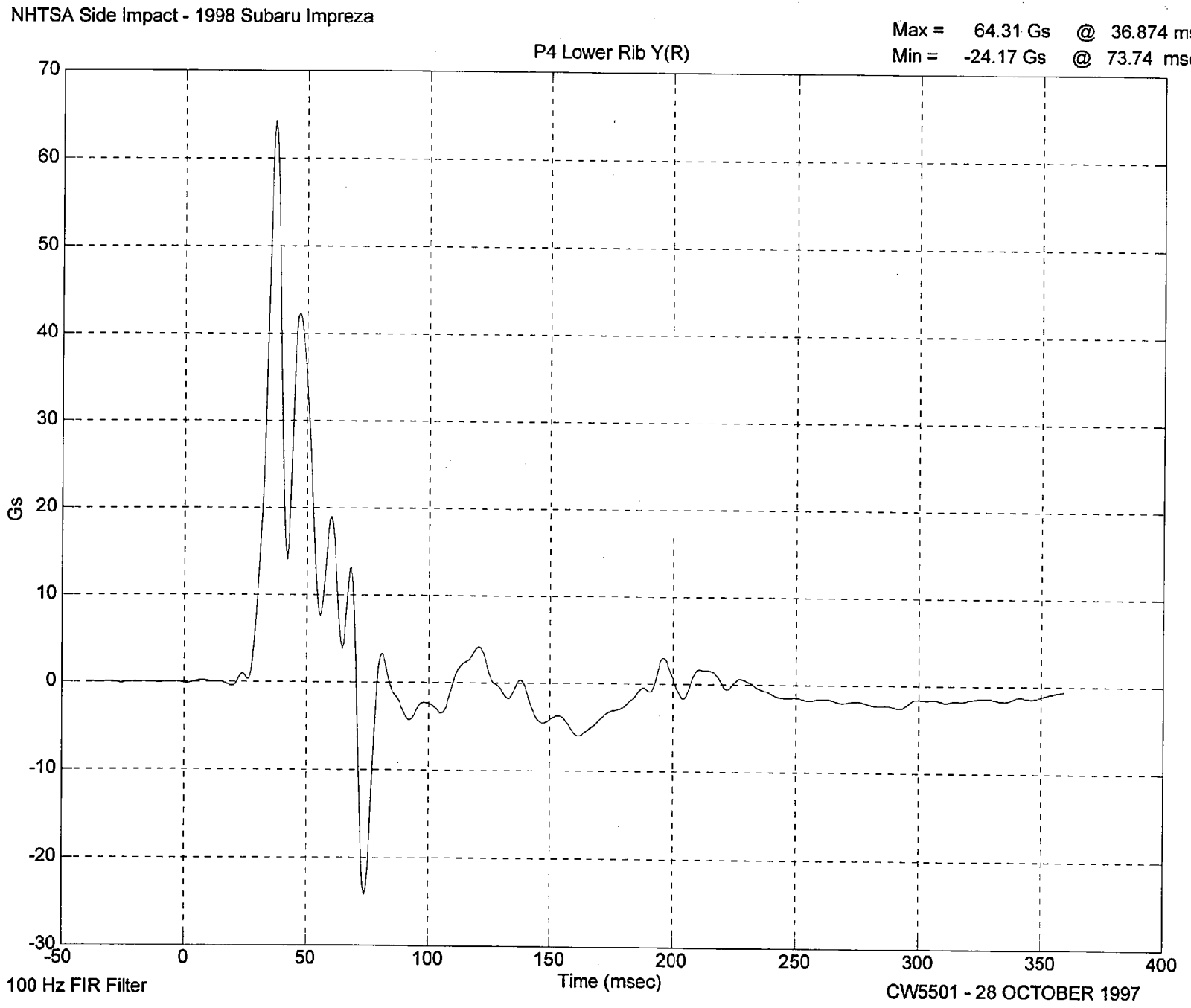
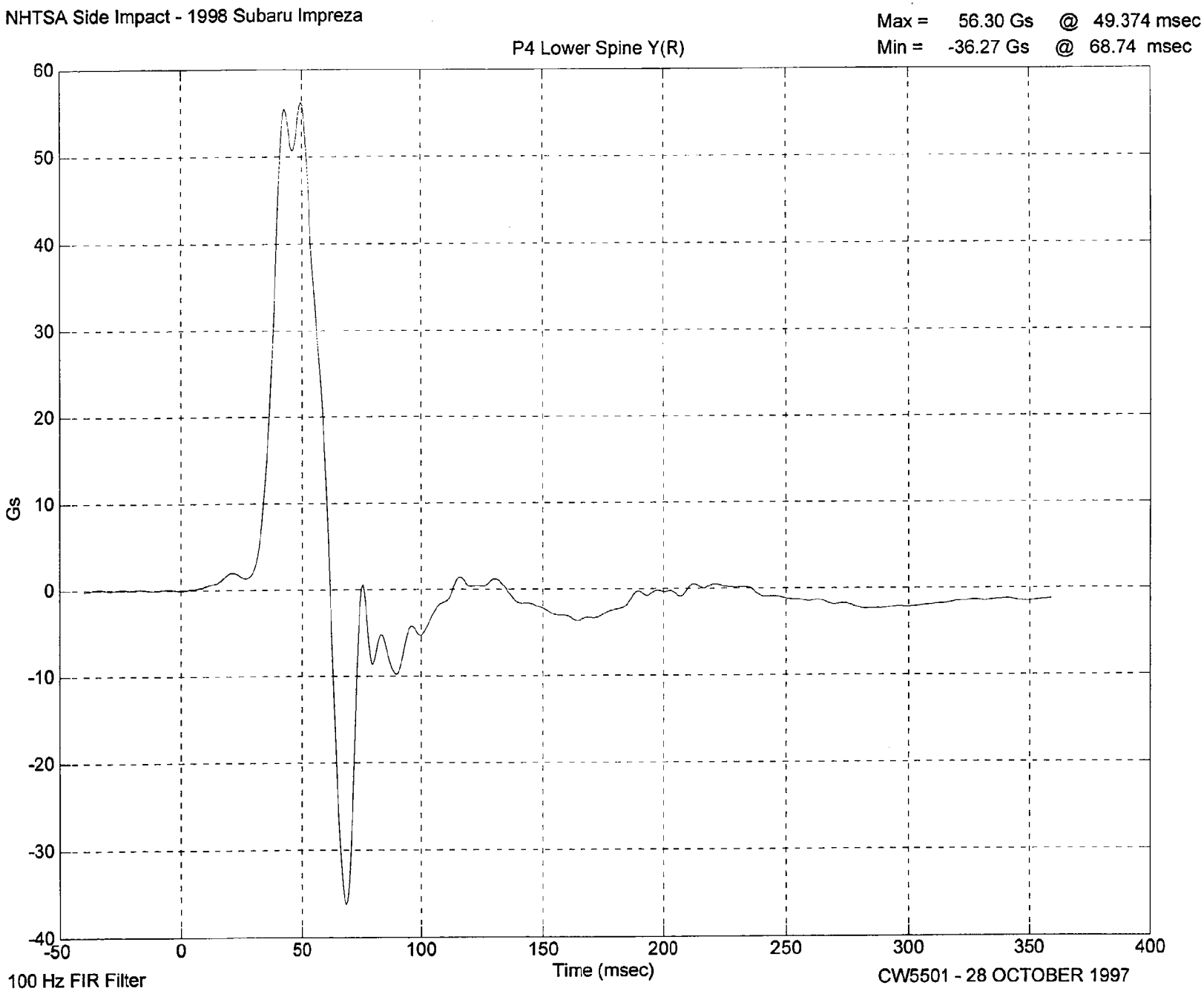
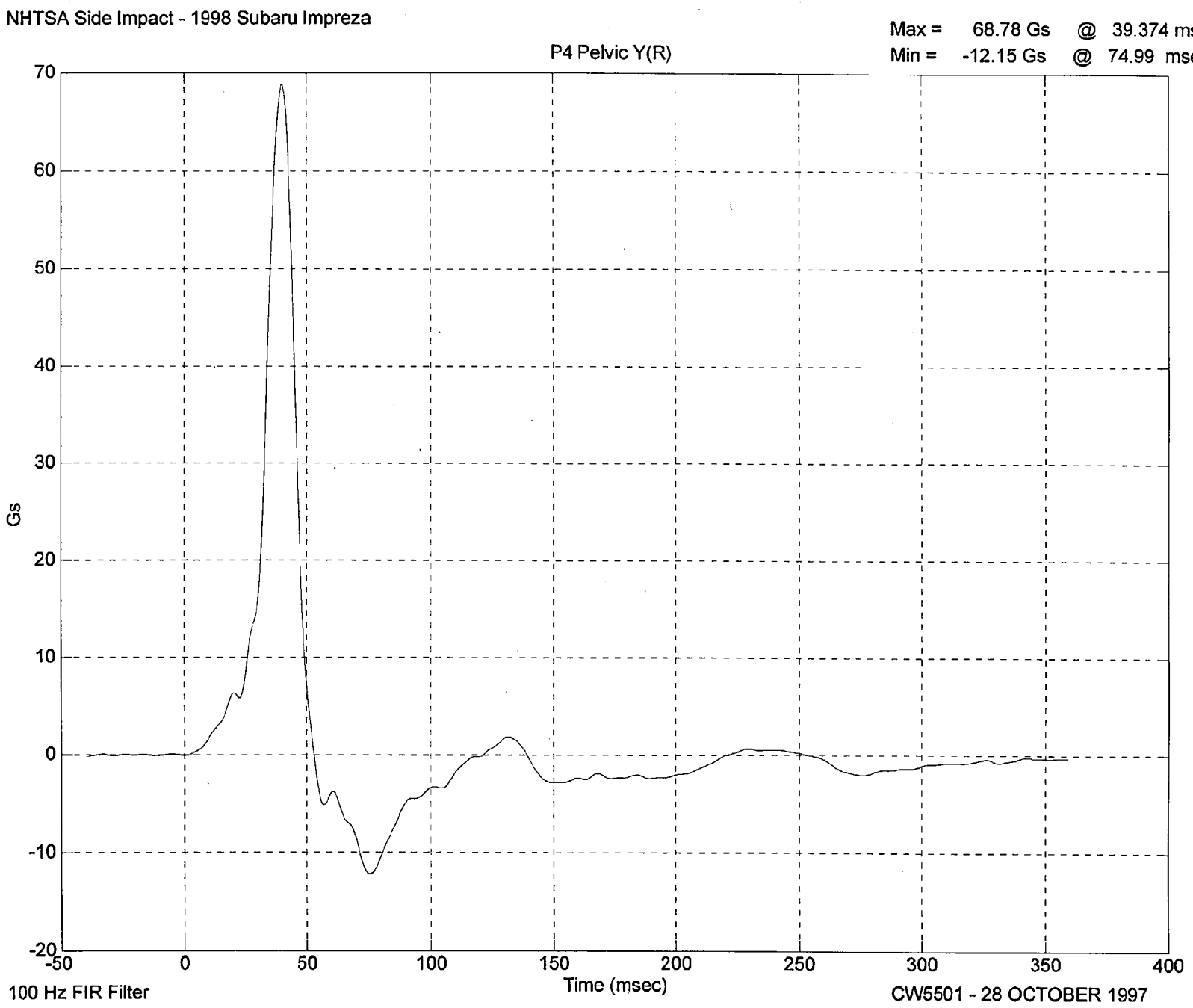

NHTSA Side Impact - 1998 Subaru Impreza
P4 Lower Rib Y(R)
Max = 64.31 Gs @ 36.874 msec
Min = -24.17 Gs @ 73.74 msec
Gs
70
60
50
40
30
20
10
0
-10
-20
-30
-50
0
50
100
150
200
250
300
350
400
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
P4 Lower Spine Y(R)
Max = 56.30 Gs @ 49.374 msec
Min = -36.27 Gs @ 68.74 msec
Gs
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
50
100
150
200
250
300
350
400
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997


NHTSA Side Impact - 1998 Subaru Impreza
P4 Pelvic Y(R)
Max = 68.78 Gs @ 39.374 msec
Min = -12.15 Gs @ 74.99 msec
Gs
70
60
50
40
30
20
10
0
-10
-20
-50
0
50
100
150
200
250
300
350
400
Time (msec)
100 Hz FIR Filter
CW5501 - 28 OCTOBER 1997

APPENDIX C

SID CONFIGURATION AND PERFORMANCE VERIFICATION DATA

SUMMARY
SID PRE & POST TEST CALIBRATION

CONFIGURED FOR LEFT SIDE IMPACT

Date: 10/24/97, 11/06/97

Calspan Sequential Test Number: 3, 4

Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	SID NO.: 268		SID NO.: 027	
		PRE TEST	POST TEST	PRE TEST	POST TEST
SH- Seated Height (mm)	889 - 909	899	902	907	906
RH- Rib Height (mm)	501 - 521	516	516	514	514
HP- Hip Pivot Height (mm)	99 ref.	99	99	99	99
RD- Rib from Back Line (mm)	229 - 241	230	232	235	235
KV- Knee Pivot from Back Line (mm)	511 - 526	521	520	514	515
SW- Knee Pivot to Floor (mm)	490 - 505	495	495	491	493
HW- Hip Width (mm)	356 - 391	370	370	364	365
THORAX IMPACTS					
TEMPERATURE (°C)	18.9 - 25.5	21.1	21.7	21.1	21.7
RELATIVE. HUMIDITY (%)	10 -70	30	35	30	35
PROBE SPEED (m/s)	4.27 - 4.33	4.27	4.28	4.27	4.28
UPPER RIB (g's)	37 - 46	38.7	43.3	42.0	39.9
LOWER RIB (g's)	37 - 46	43.9	39.6	41.7	42.2
LOWER SPINE (g's)	15 -22	20.3	20.7	20.5	20.8
PELVIS IMPACT					
TEMPERATURE (°C)	18.9 - 25.5	21.1	21.7	21.1	21.7
RELATIVE HUMIDITY (%)	10 - 70	30	35	30	35
PROBE SPEED (m/s)	4.27 - 4.33	4.30	4.29	4.32	4.30
PELVIS (g's)	40 -60	43.0	52.9	57.4	45.9

REMARKS: None

CALIBRATION TEST RESULTS
PRE-TEST

SID NO.: 268

CONFIGURED FOR LEFT SIDE IMPACT

CALIBRATION TEST RESULTS SUMMARY

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 268 Calspan Sequential Test Number: 3
Date: 10/24/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
THORACIC SHOCK ABSORBER TEST	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
ABDOMINAL COMPRESSION TEST*	Not requested by COTR.
LUMBAR FLEXION TEST*	Not requested by COTR.

* Test not required for SID certification.

REMARKS: None

EXTERNAL DIMENSIONS

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 268 Calspan Sequential Test Number: 3

Date: 10/24/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	899
RH- Rib Height (mm)	502 - 520	516
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 - 241	230
KH- Knee Pivot from Back Line (mm)	511 - 526	521
KV- Knee Pivot to Floor (mm)	490 - 505	495
HW- Hip Width (mm)	356 - 391	370

REMARKS: None

THORACIC SHOCK ABSORBER TESTS

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 268 Calspan Sequential Test Number: 1.3

Date: 10/09/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

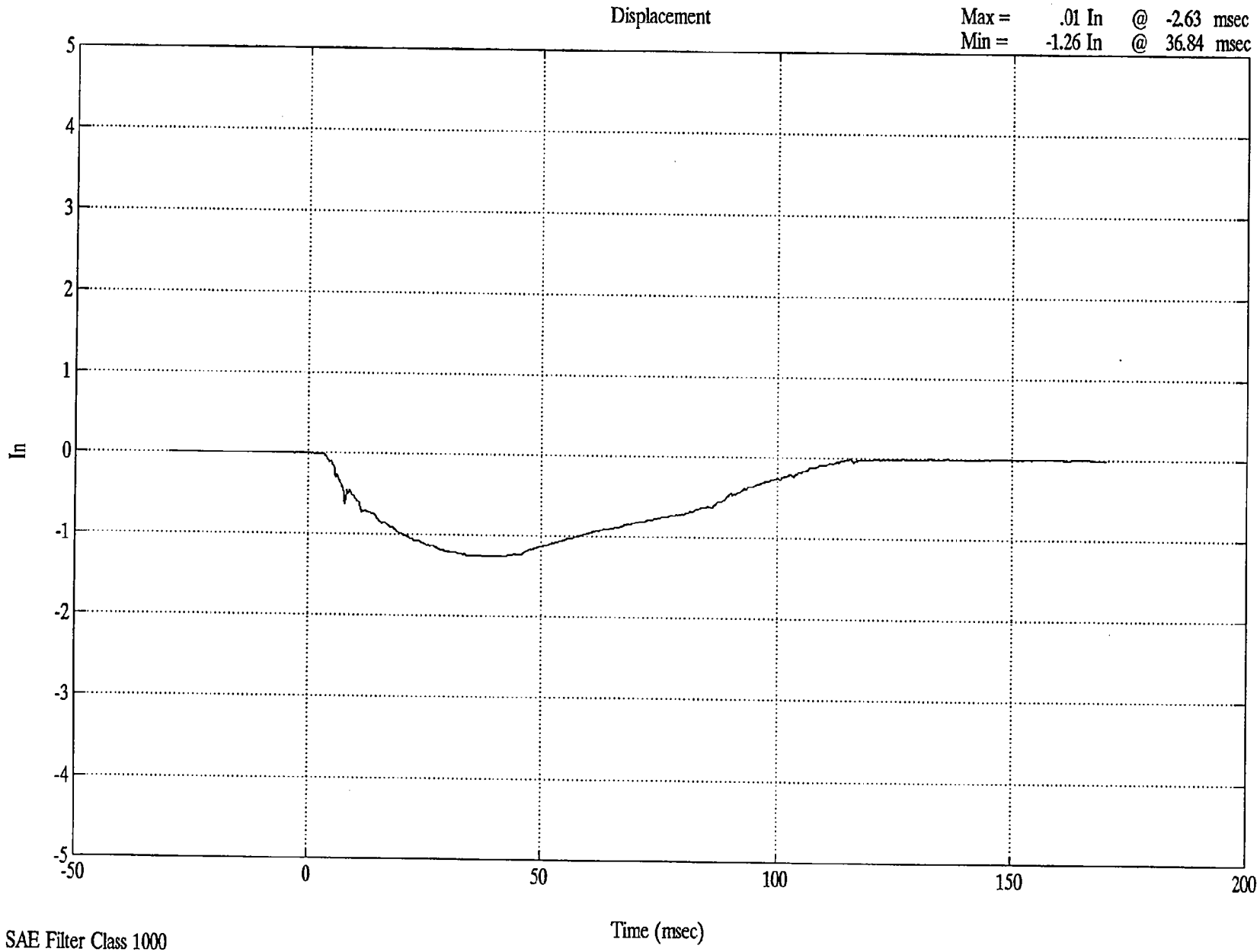
DAMPER IDENTIFICATION: 268

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)		18.9 - 25.5	21.7
RELATIVE HUMIDITY (%)		10 - 70	38
VELOCITY 3.05 m/s	FORCE (N)	836 - 1125	928
	DISPLACEMENT (mm)	30 - 35	32
VELOCITY 4.27 m/s	FORCE (N)	1730 - 2099	1898
	DISPLACEMENT (mm)	32 - 37	32
VELOCITY 6.10 m/s	FORCE (N)	3741 - 4448	3963
	DISPLACEMENT (mm)	33 - 40	36

DAMPER SETTING: 5

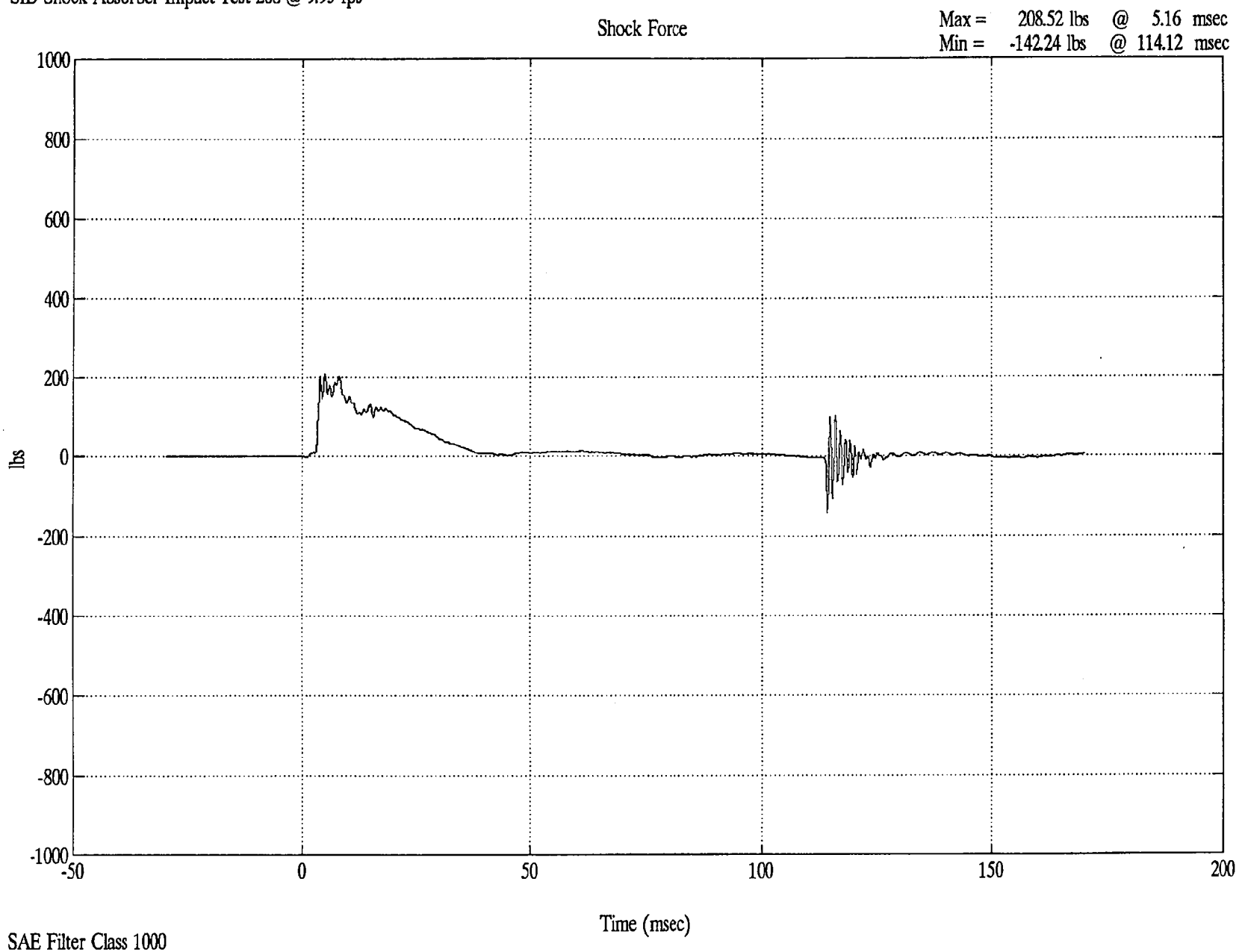
REMARKS: None

SID Shock Absorber Impact Test 268 @ 9.95 fps



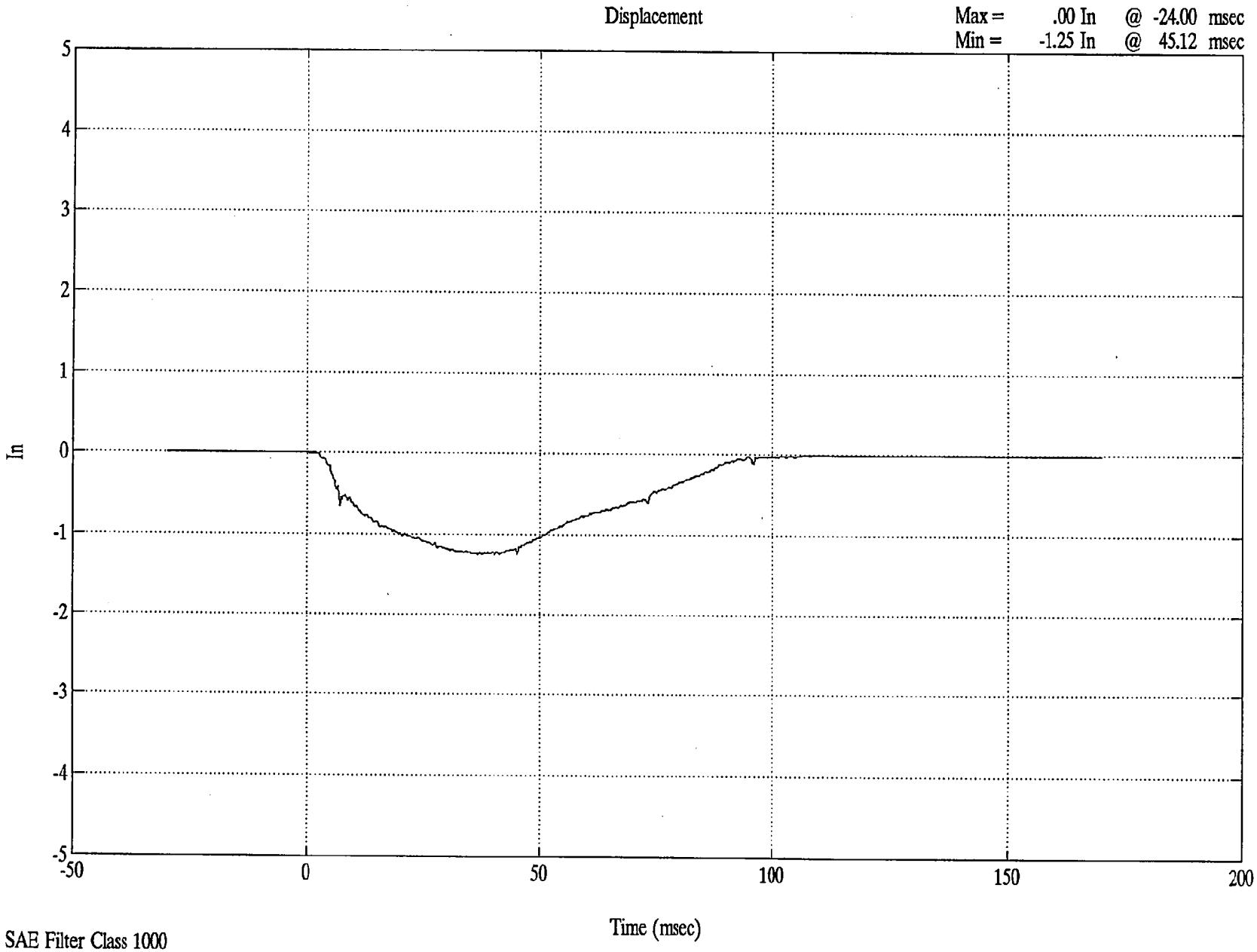
SAE Filter Class 1000

SID Shock Absorber Impact Test 268 @ 9.95 fps



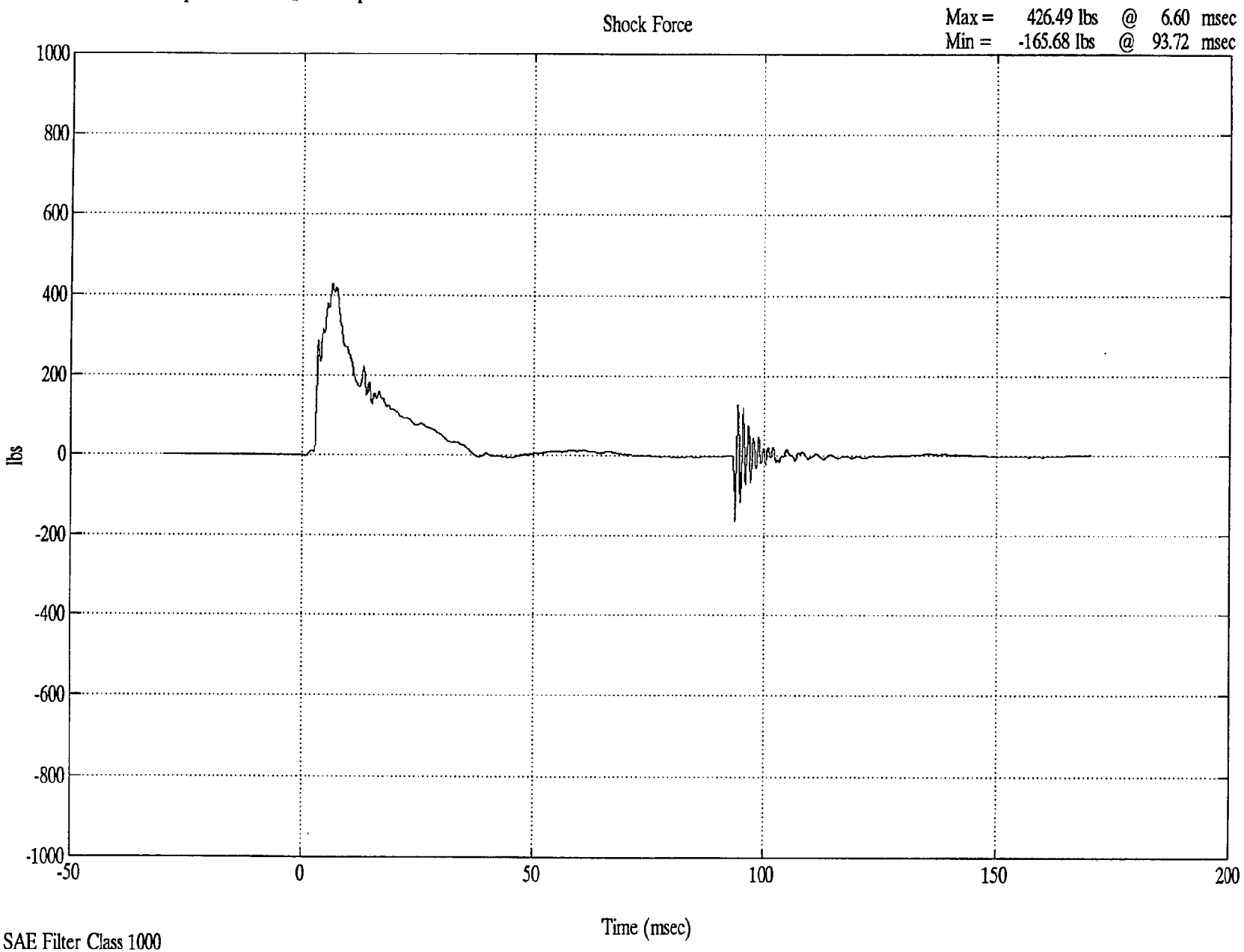
SAE Filter Class 1000

SID Shock Absorber Impact Test 268 @ 14.04 fps



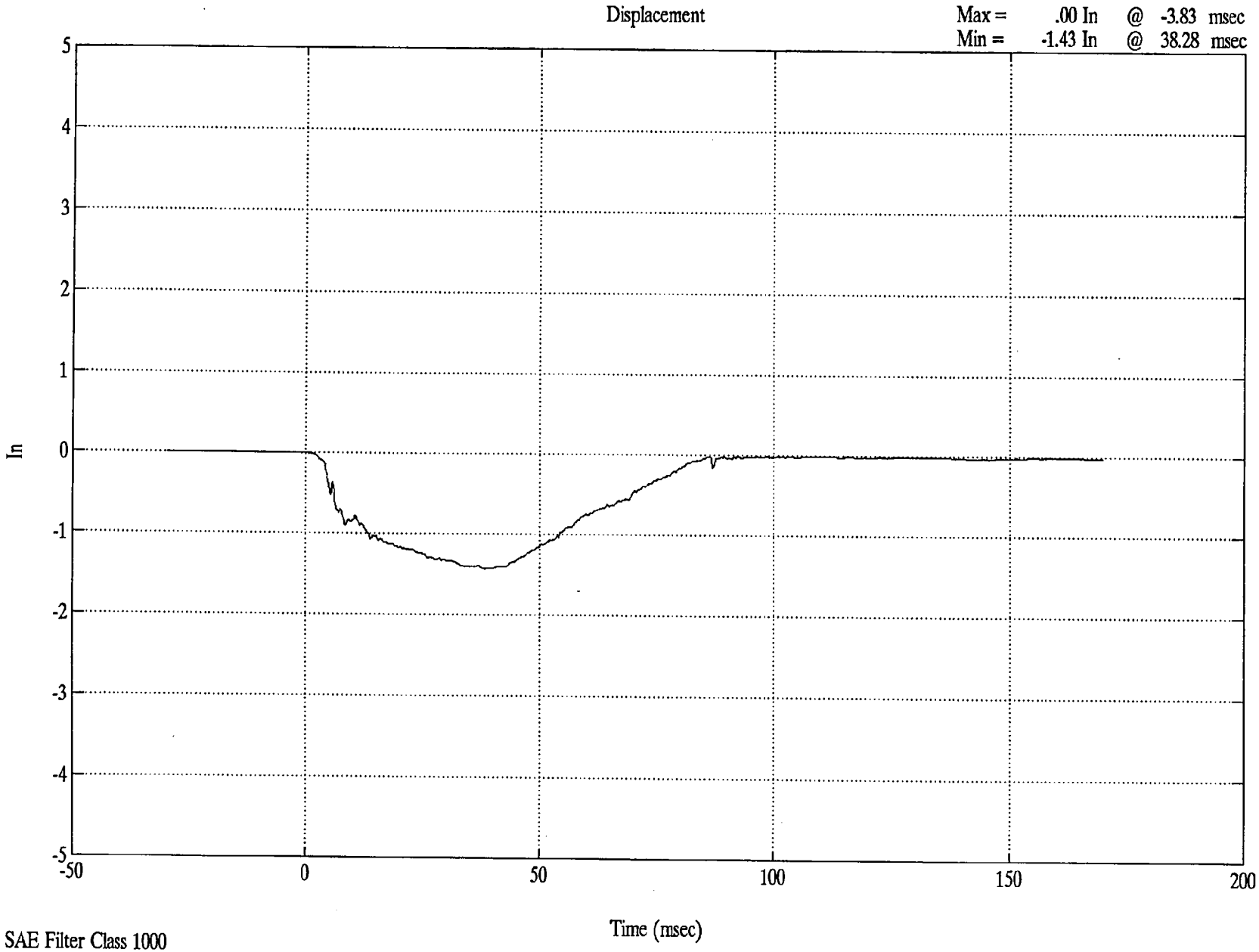
SAE Filter Class 1000

SID Shock Absorber Impact Test 268 @ 14.04 fps



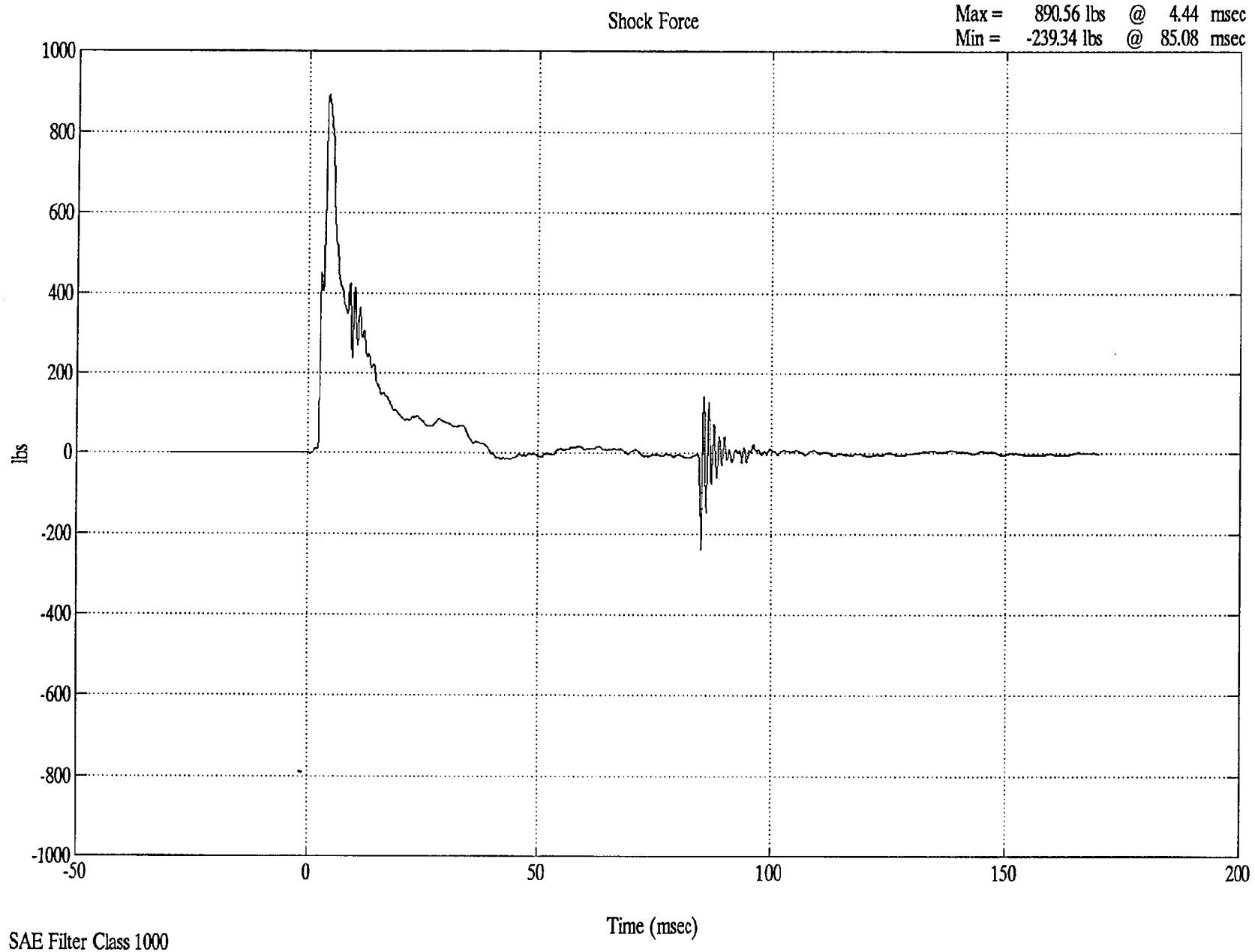
SAE Filter Class 1000

SID Shock Absorber Impact Test 268 @ 19.95 fps



SAE Filter Class 1000

SID Shock Absorber Impact Test 268 @ 19.95 fps



SAE Filter Class 1000

LATERAL THORAX IMPACT TEST

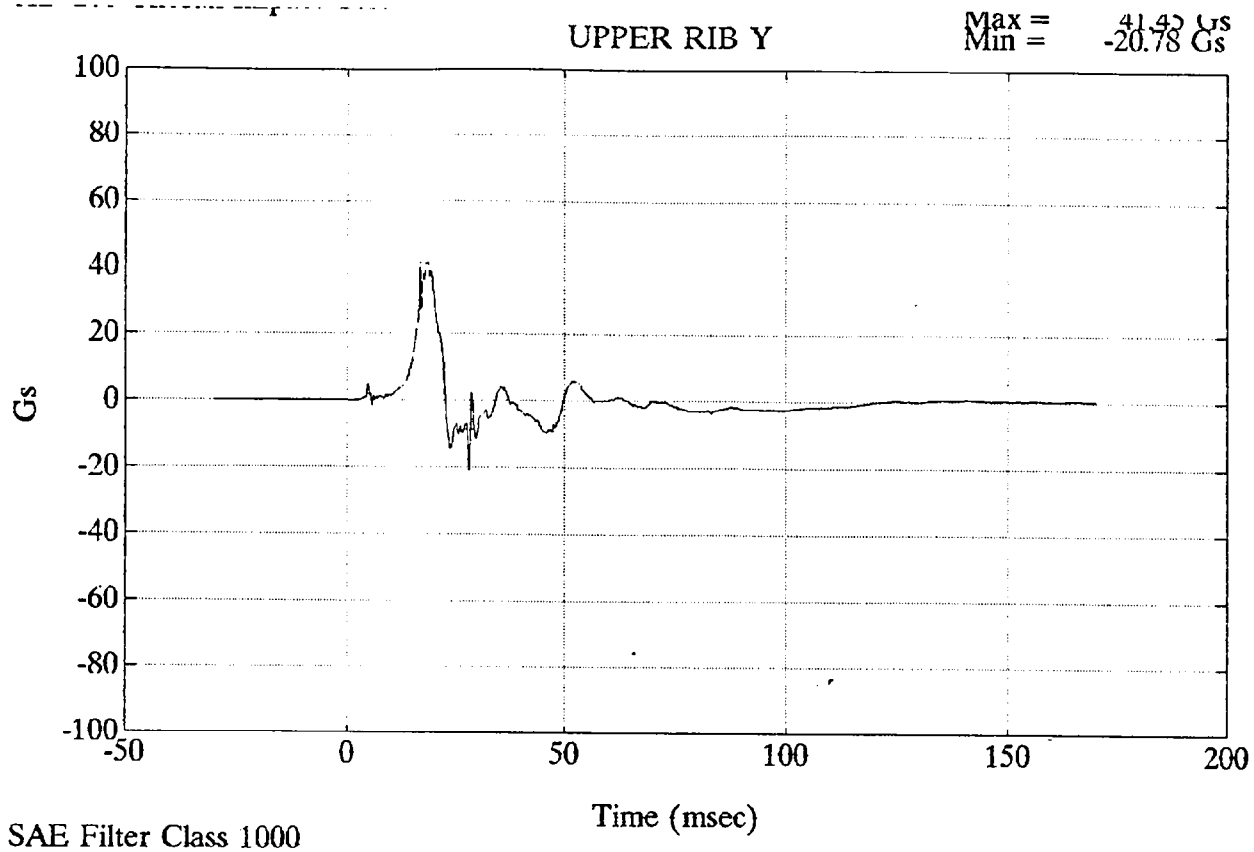
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 268 Calspan Sequential Test Number: 3

Date: 10/23/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE. HUMIDITY (%)	10 - 70	30
PROBE SPEED (m/s)	4.27 - 4.33	4.27
UPPER RIB (g's)	37 - 46	38.7
LOWER RIB (g's)	37 - 46	43.9
LOWER SPINE (g's)	15 - 22	20.3

REMARKS: None



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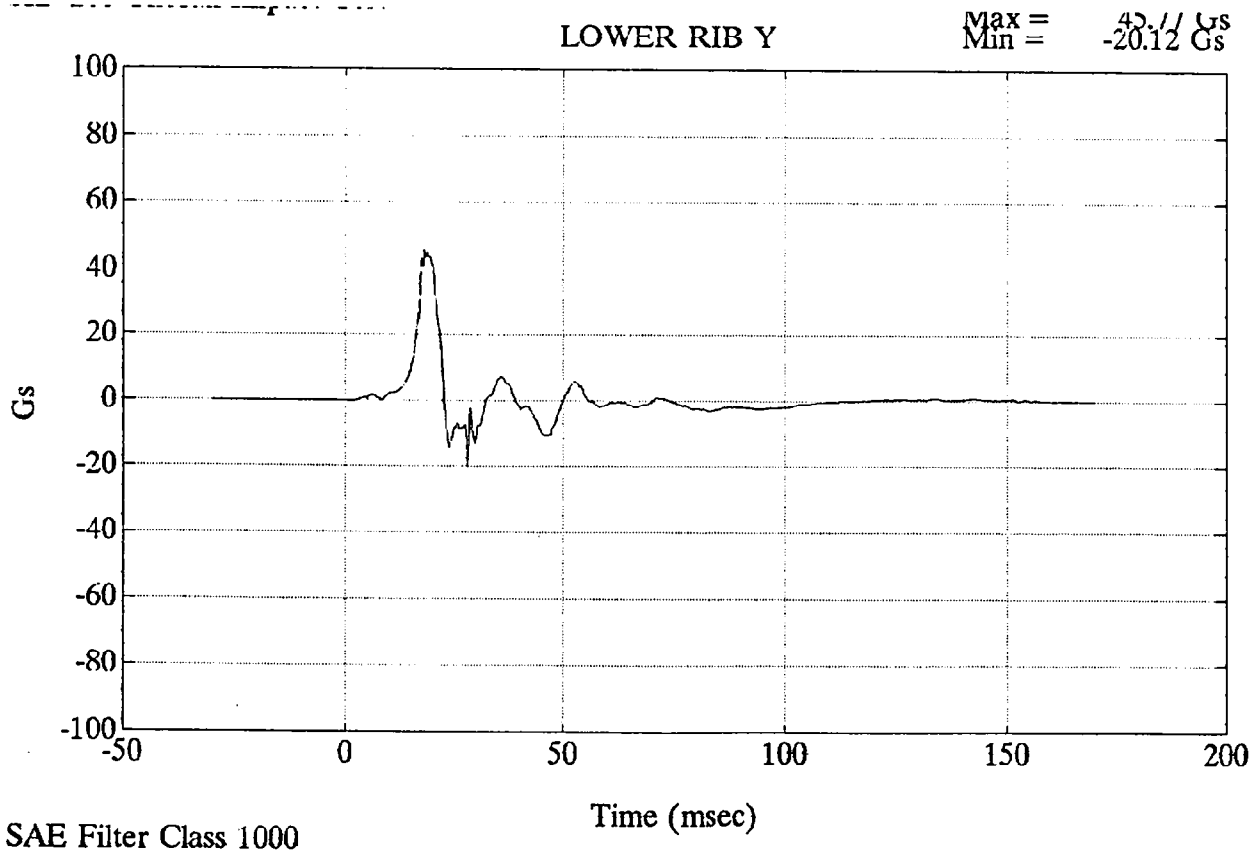

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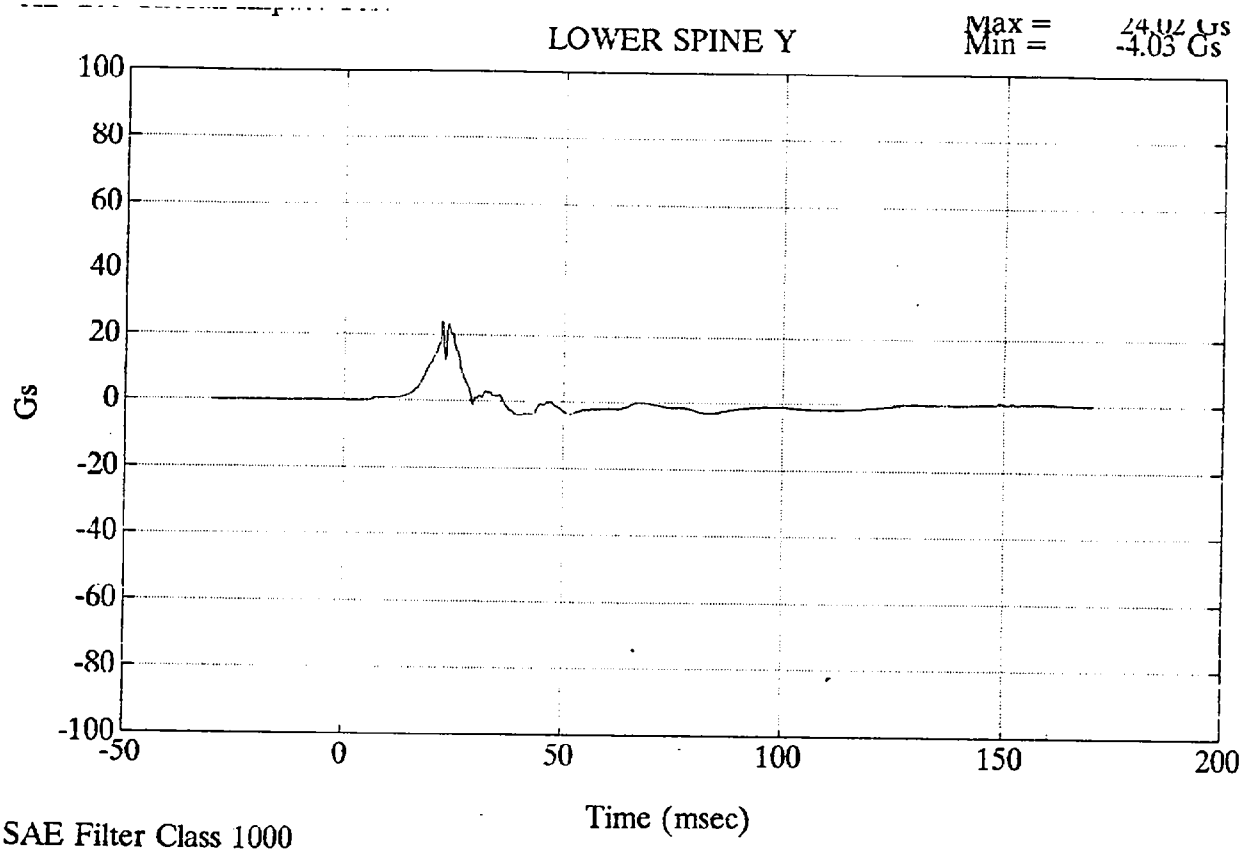
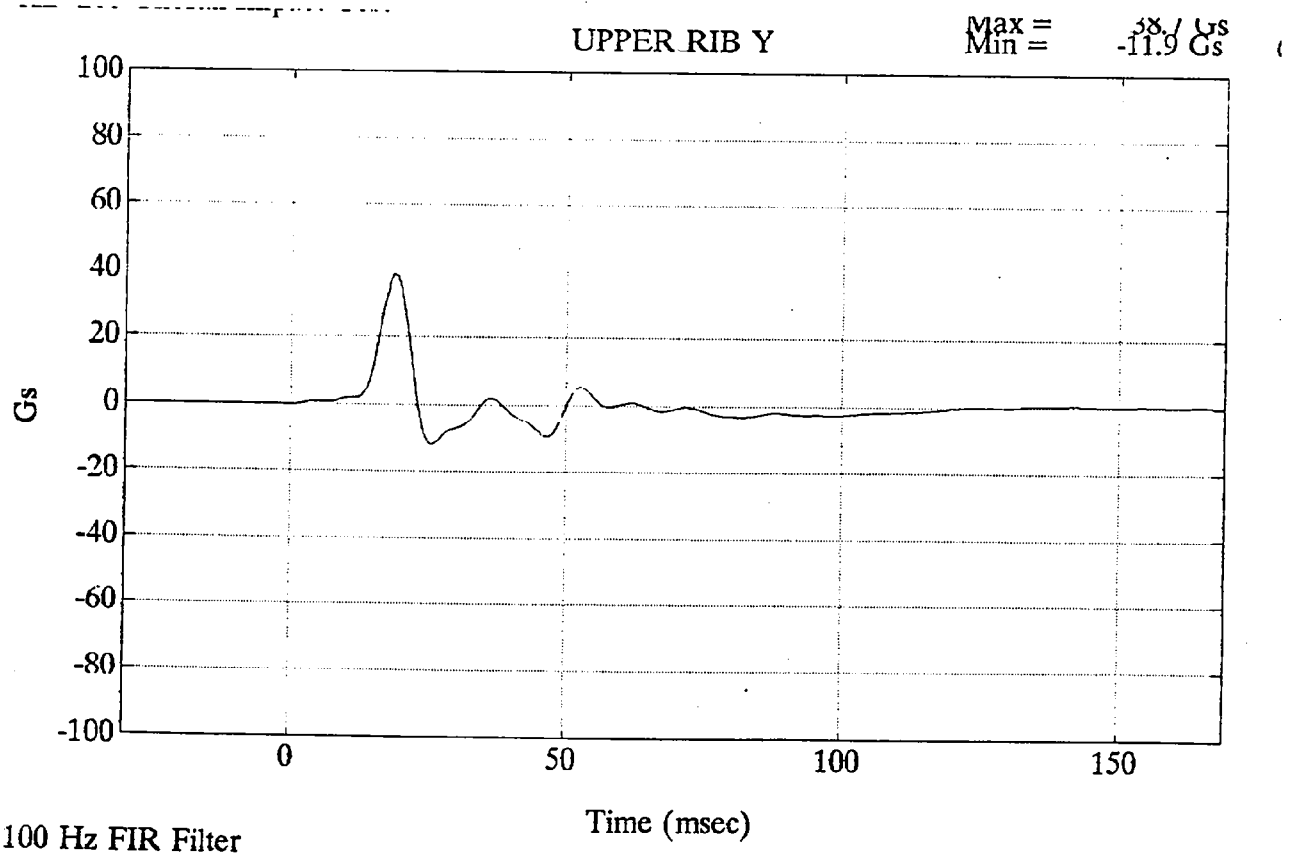
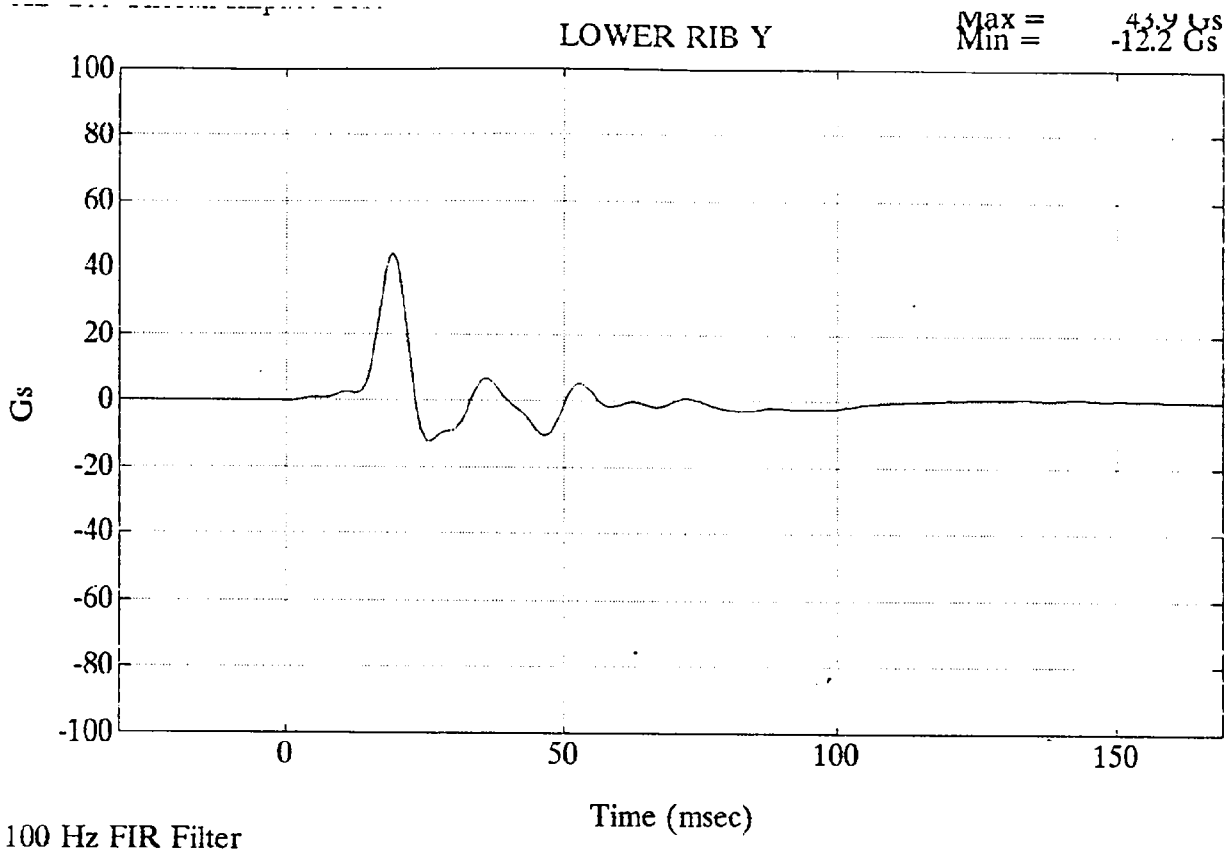


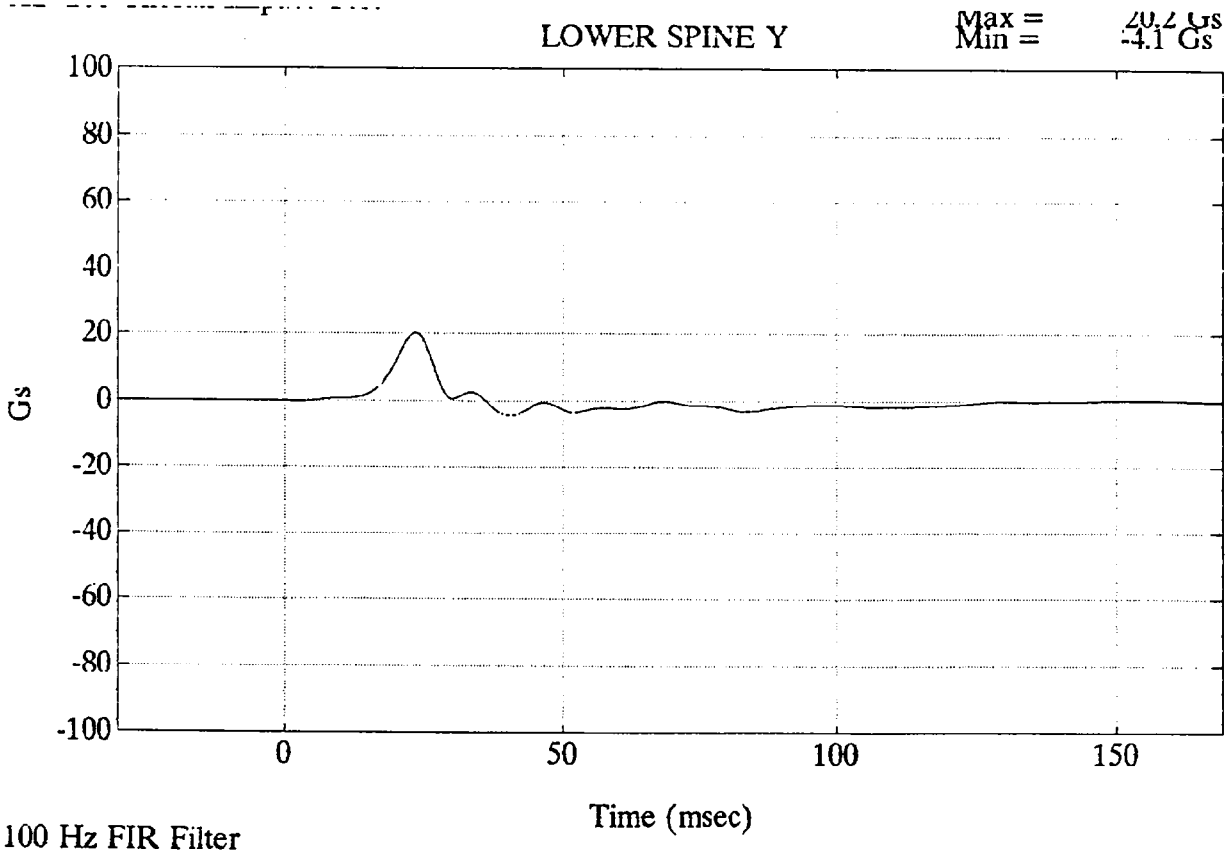
SAE Filter Class 1000



100 Hz FIR Filter



100 Hz FIR Filter



100 Hz FIR Filter

LATERAL PELVIS IMPACT TEST

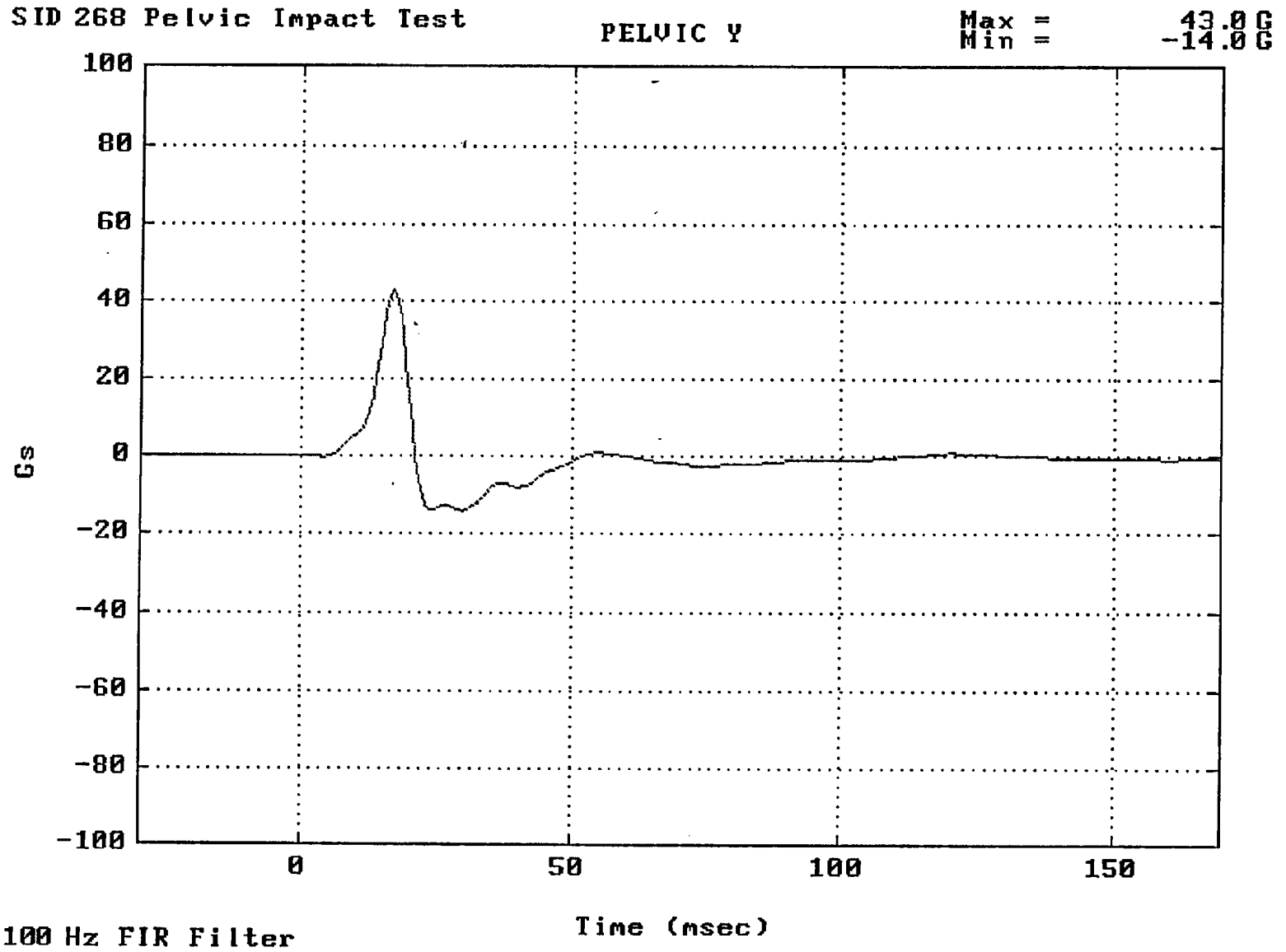
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 268 Calspan Sequential Test Number: 3

Date: 10/24/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE. HUMIDITY (%)	10 - 70	30
PROBE SPEED (m/s)	4.27 - 4.33	4.30
PELVIS ACCELERATION (g's)	40 - 60	43.0

REMARKS: None


SID 268 Pelvic Impact Test
PELVIC Y
Max = 43.0 G
Min = -14.0 G
100
80
60
40
20
0
-20
-40
-60
-80
-100
Gs
0
50
100
150
Time (msec)
100 Hz FIR Filter

PRE-TEST DUMMY INSPECTION LIST

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 268 Calspan Sequential Test Number: 3

Date: 10/24/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None

CALIBRATION TEST RESULTS
PRE-TEST

SID NO.: 027

CONFIGURED FOR LEFT SIDE IMPACT

CALIBRATION TEST RESULTS SUMMARY

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Calspan Sequential Test Number: 3

Date: 10/24/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
THORACIC SHOCK ABSORBER TEST	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
ABDOMINAL COMPRESSION TEST*	Not requested by COTR.
LUMBAR FLEXION TEST*	Not requested by COTR.

* Test not required for SID certification.

REMARKS: None

EXTERNAL DIMENSIONS

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Calspan Sequential Test Number: 3

Date: 10/24/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	907
RH- Rib Height (mm)	502 - 520	514
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 - 241	235
KH- Knee Pivot from Back Line (mm)	511 - 526	514
KV- Knee Pivot to Floor (mm)	490 - 505	491
HW- Hip Width (mm)	356 - 391	364

REMARKS: None

THORACIC SHOCK ABSORBER TESTS

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Calspan Sequential Test Number: 1.3

Date: 10/09/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

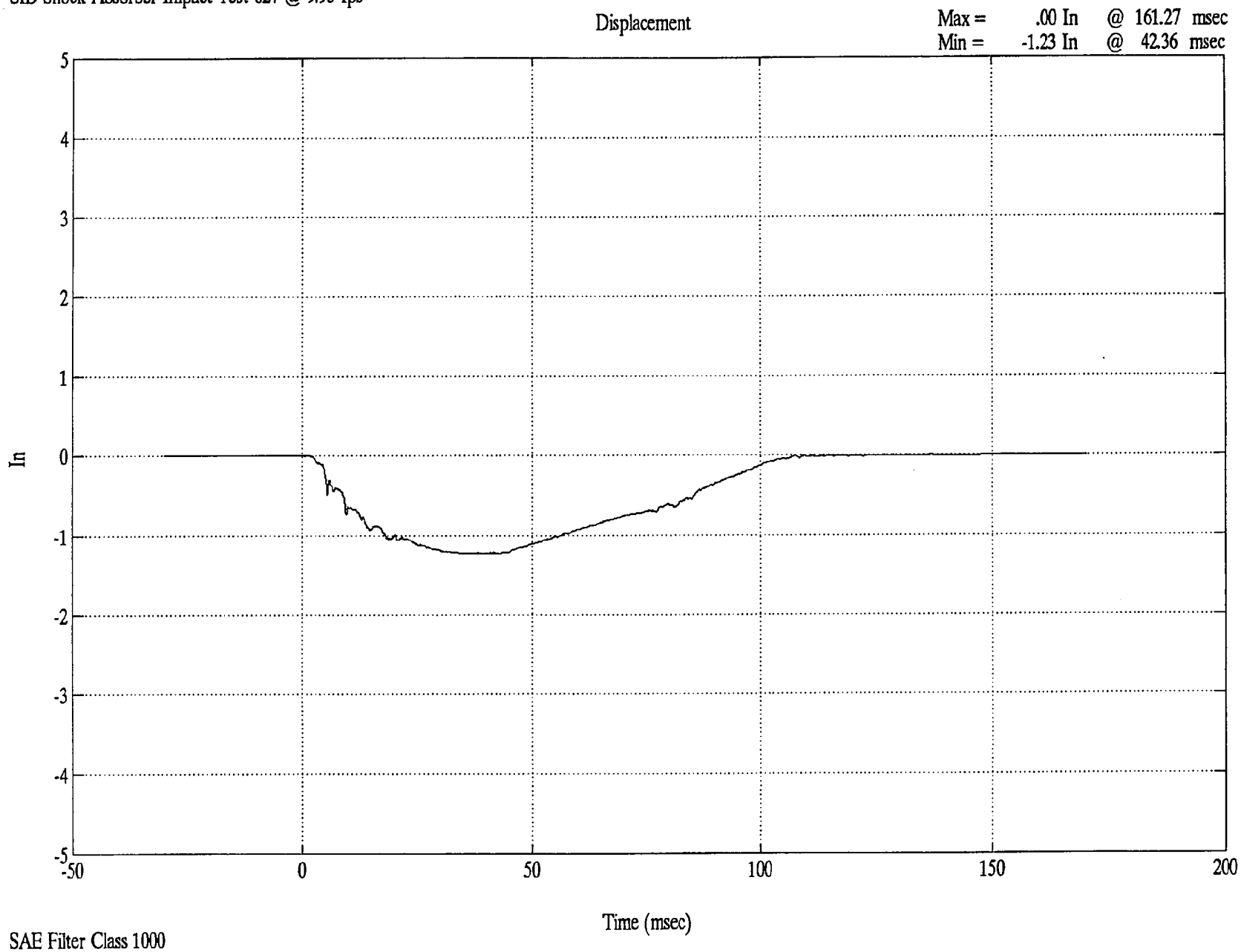
DAMPER IDENTIFICATION: 027

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)		18.9 - 25.5	21.7
RELATIVE HUMIDITY (%)		10 - 70	38
VELOCITY 3.05 m/s	FORCE (N)	836 - 1125	987
	DISPLACEMENT (mm)	30 - 35	31
VELOCITY 4.27 m/s	FORCE (N)	1730 - 2099	1851
	DISPLACEMENT (mm)	32 - 37	32
VELOCITY 6.10 m/s	FORCE (N)	3741 - 4448	3879
	DISPLACEMENT (mm)	33 - 40	38

DAMPER SETTING: 5

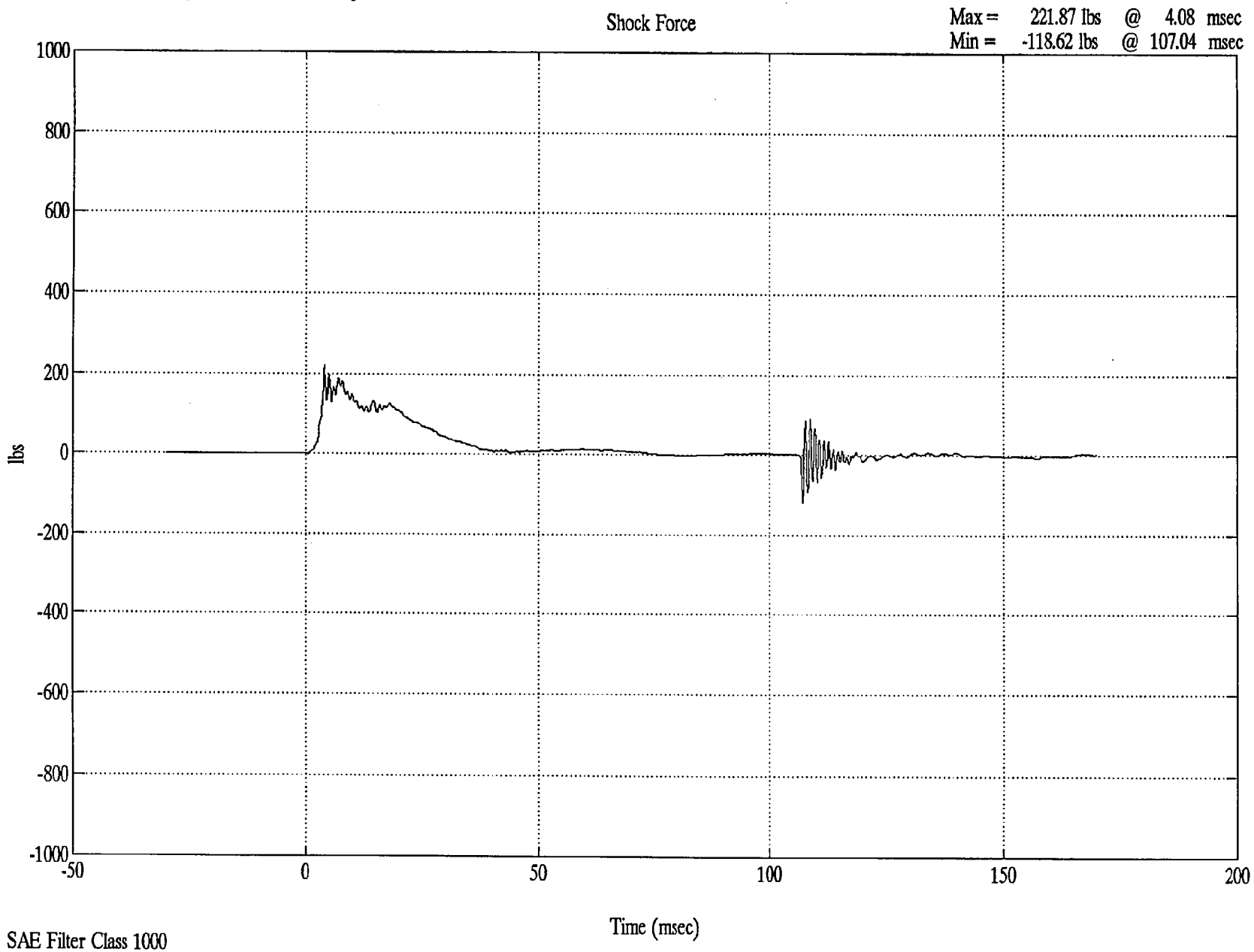
REMARKS: None

SID Shock Absorber Impact Test 027 @ 9.95 fps



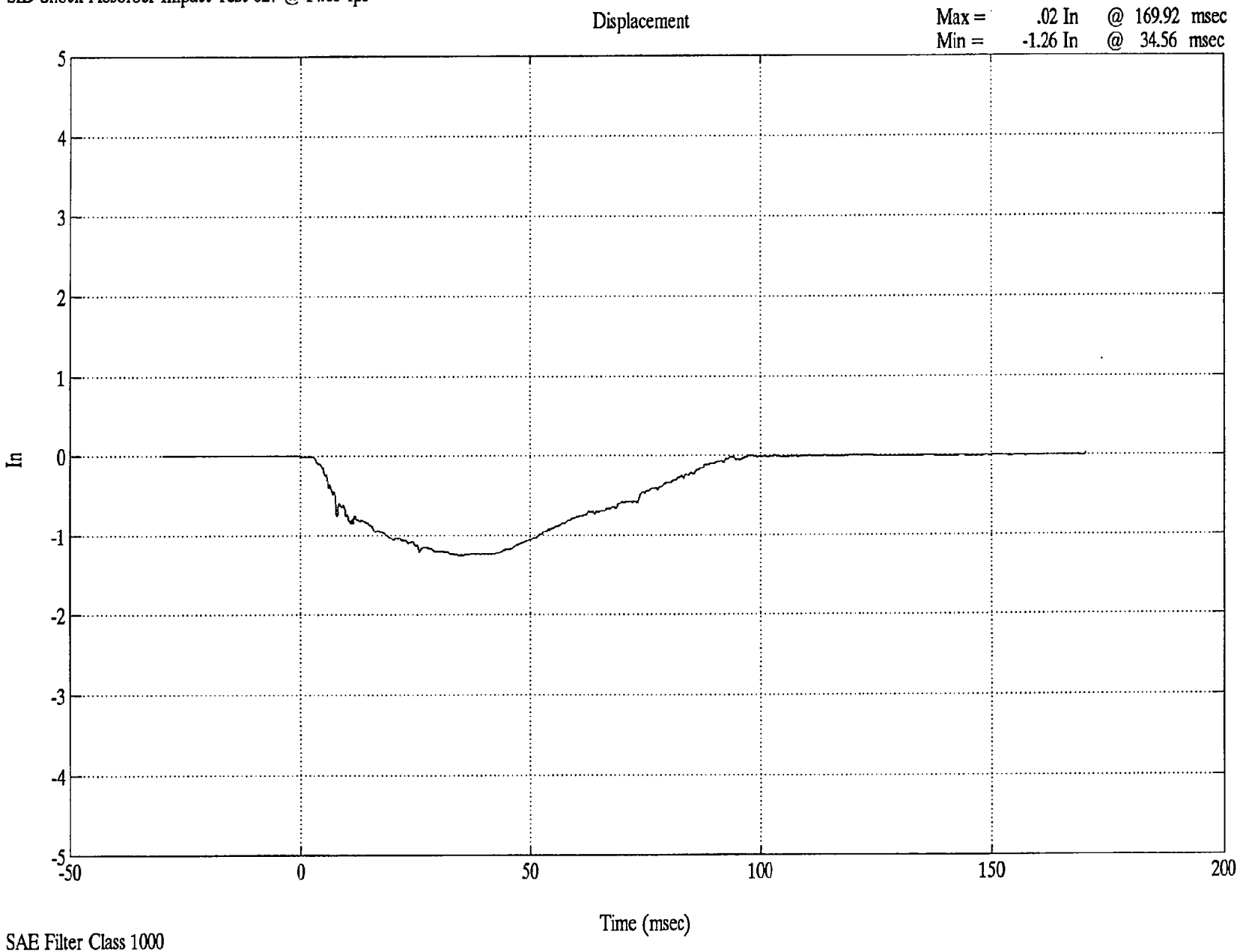
SAE Filter Class 1000

SID Shock Absorber Impact Test 027 @ 9.95 fps



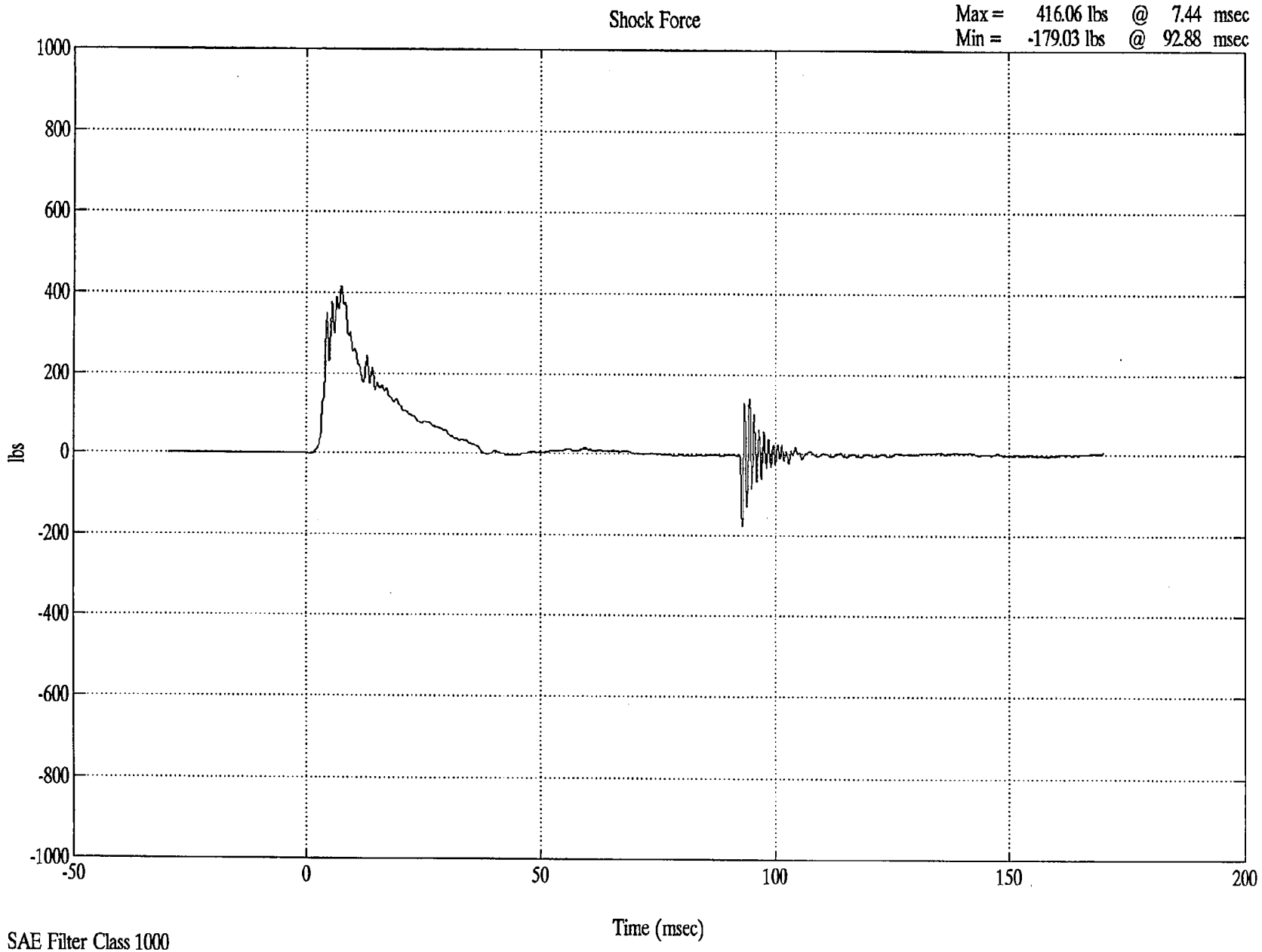
SAE Filter Class 1000

SID Shock Absorber Impact Test 027 @ 14.05 fps



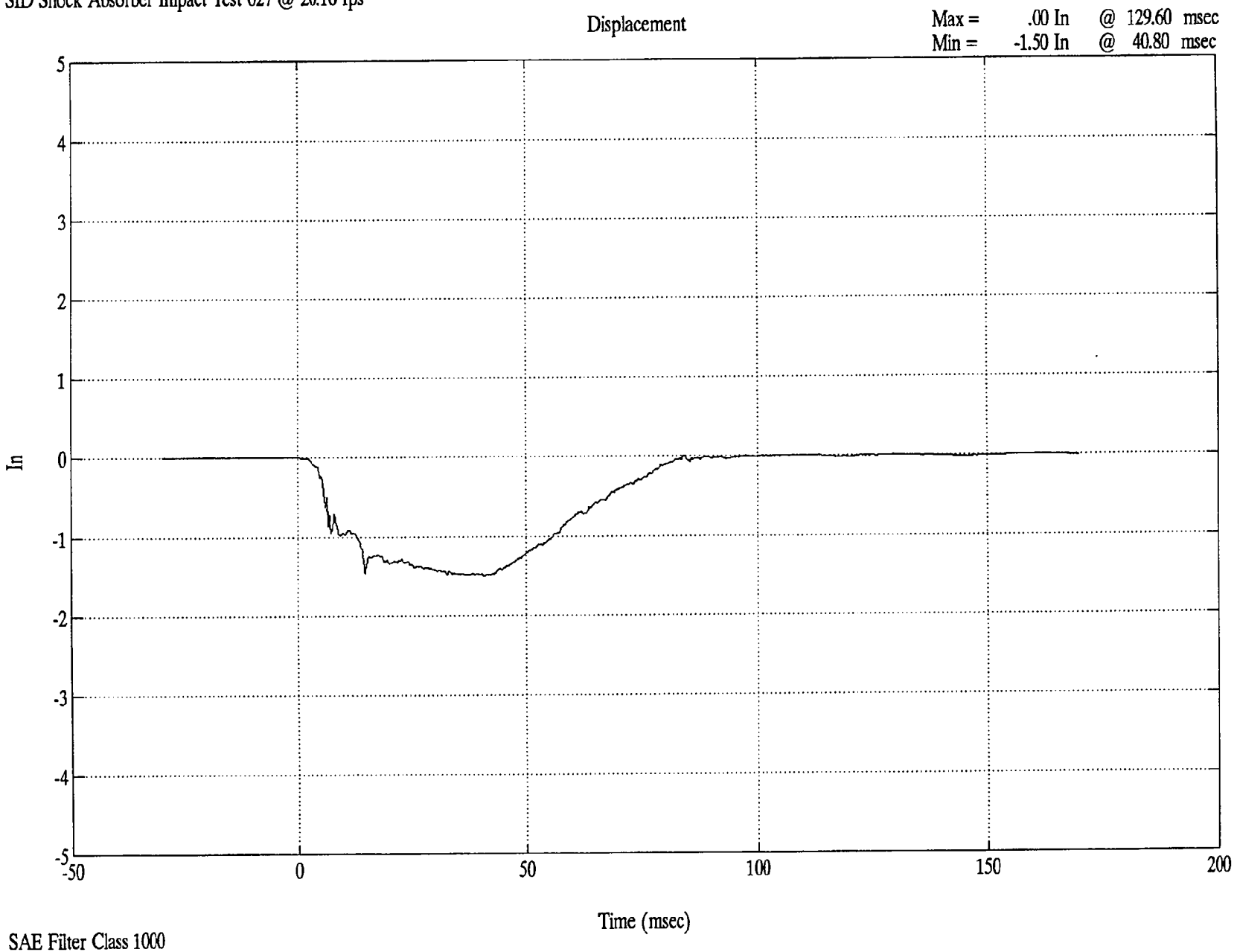
SAE Filter Class 1000

SID Shock Absorber Impact Test 027 @ 14.05 fps



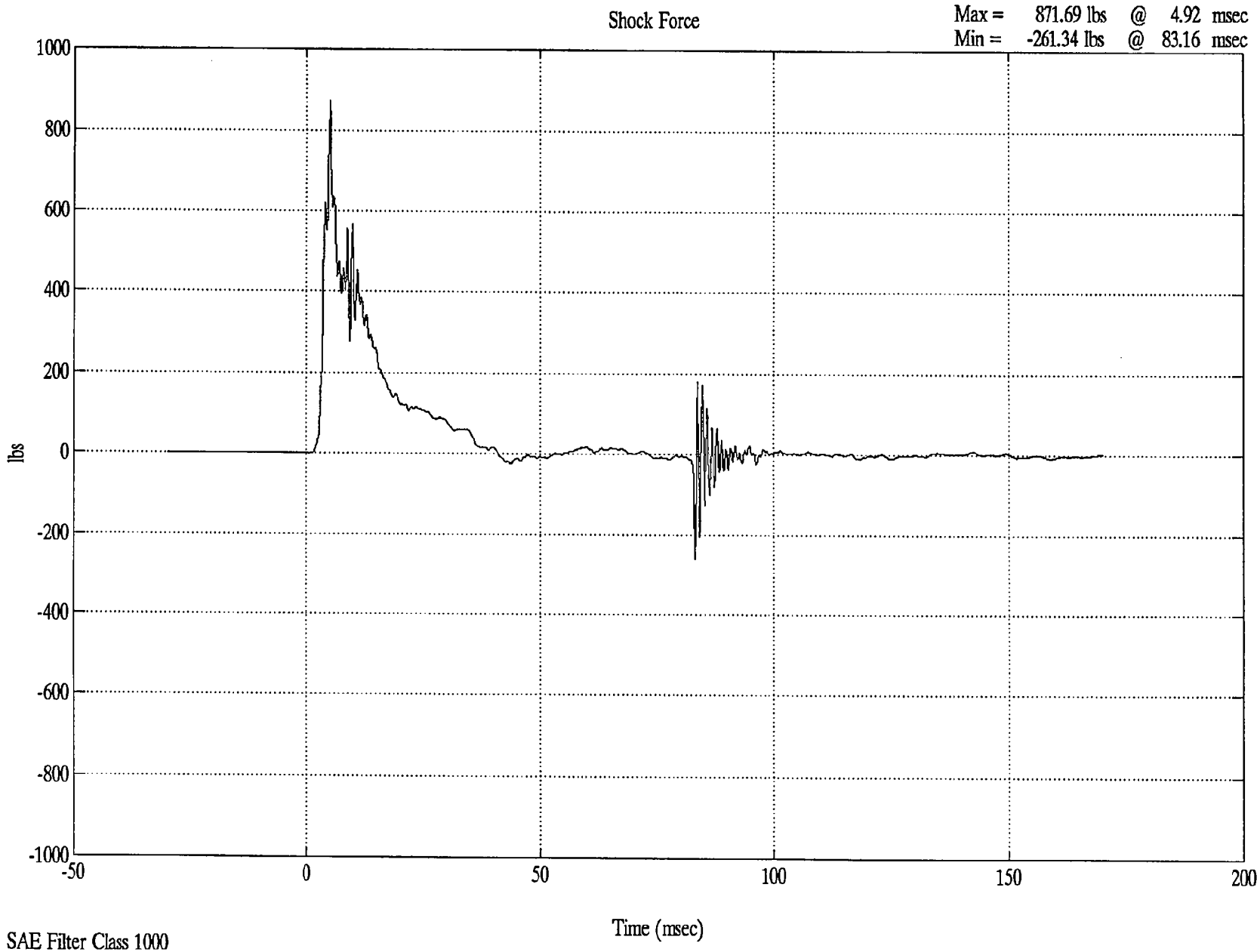
SAE Filter Class 1000

SID Shock Absorber Impact Test 027 @ 20.16 fps



SAE Filter Class 1000

SID Shock Absorber Impact Test 027 @ 20.16 fps



SAE Filter Class 1000

LATERAL THORAX IMPACT TEST

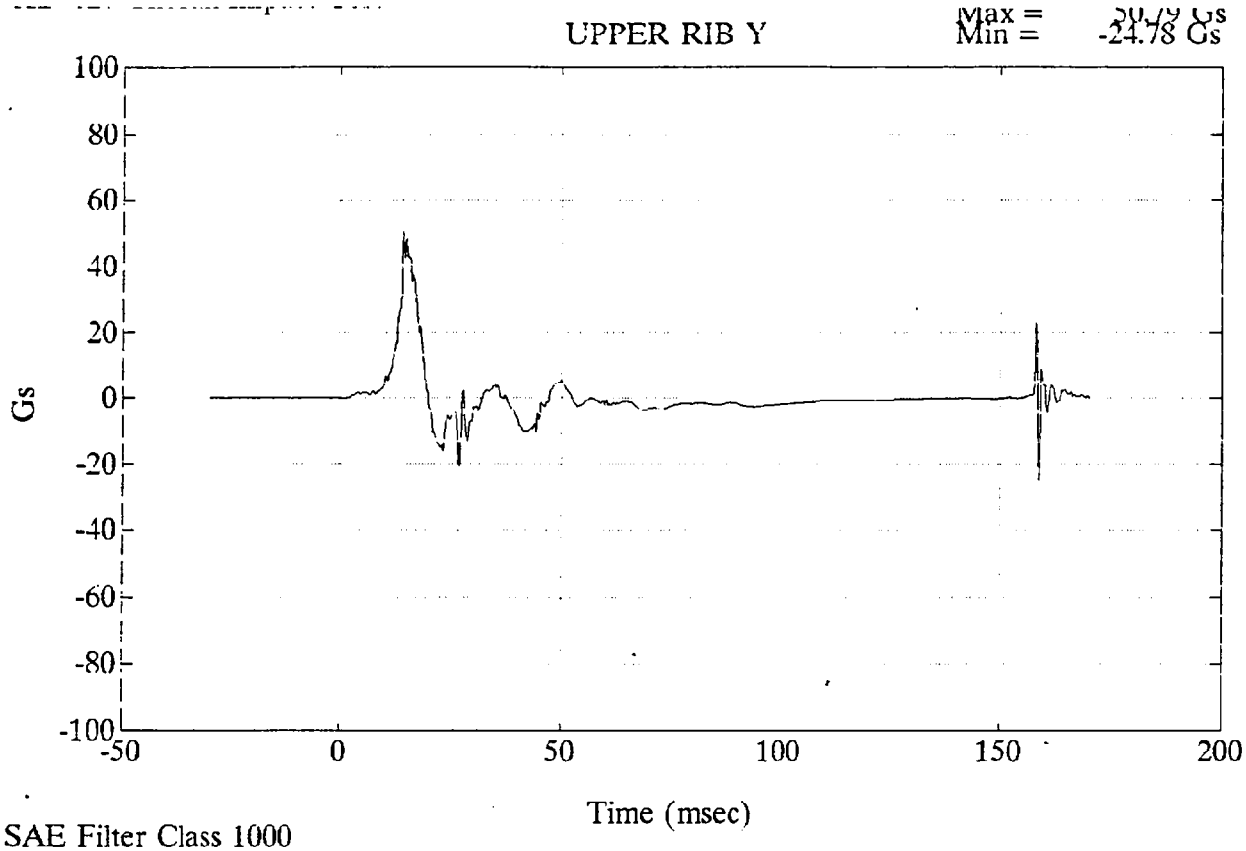
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Calspan Sequential Test Number: 3

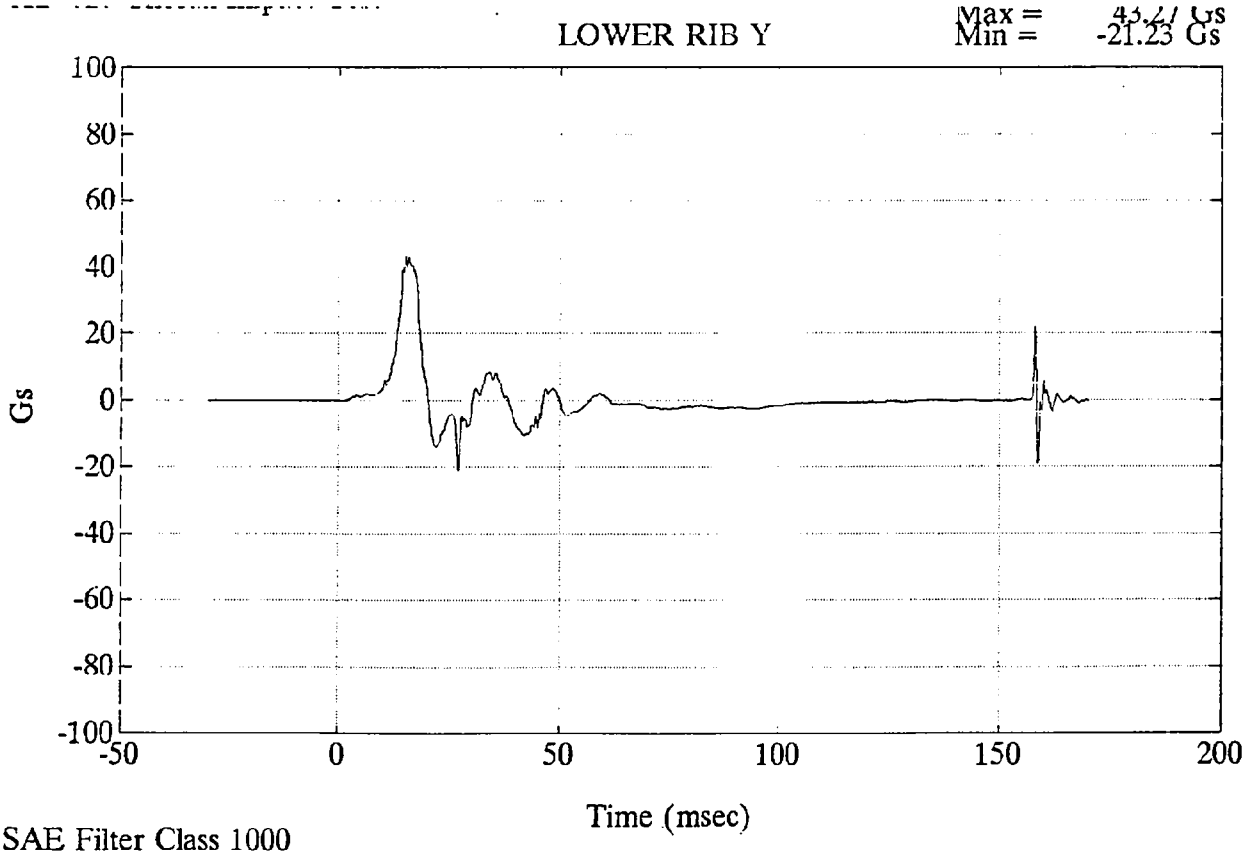
Date: 10/23/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE. HUMIDITY (%)	10 - 70	30
PROBE SPEED (m/s)	4.27 - 4.33	4.27
UPPER RIB (g's)	37 - 46	42.0
LOWER RIB (g's)	37 - 46	41.7
LOWER SPINE (g's)	15 - 22	20.5

REMARKS: None



SAE Filter Class 1000



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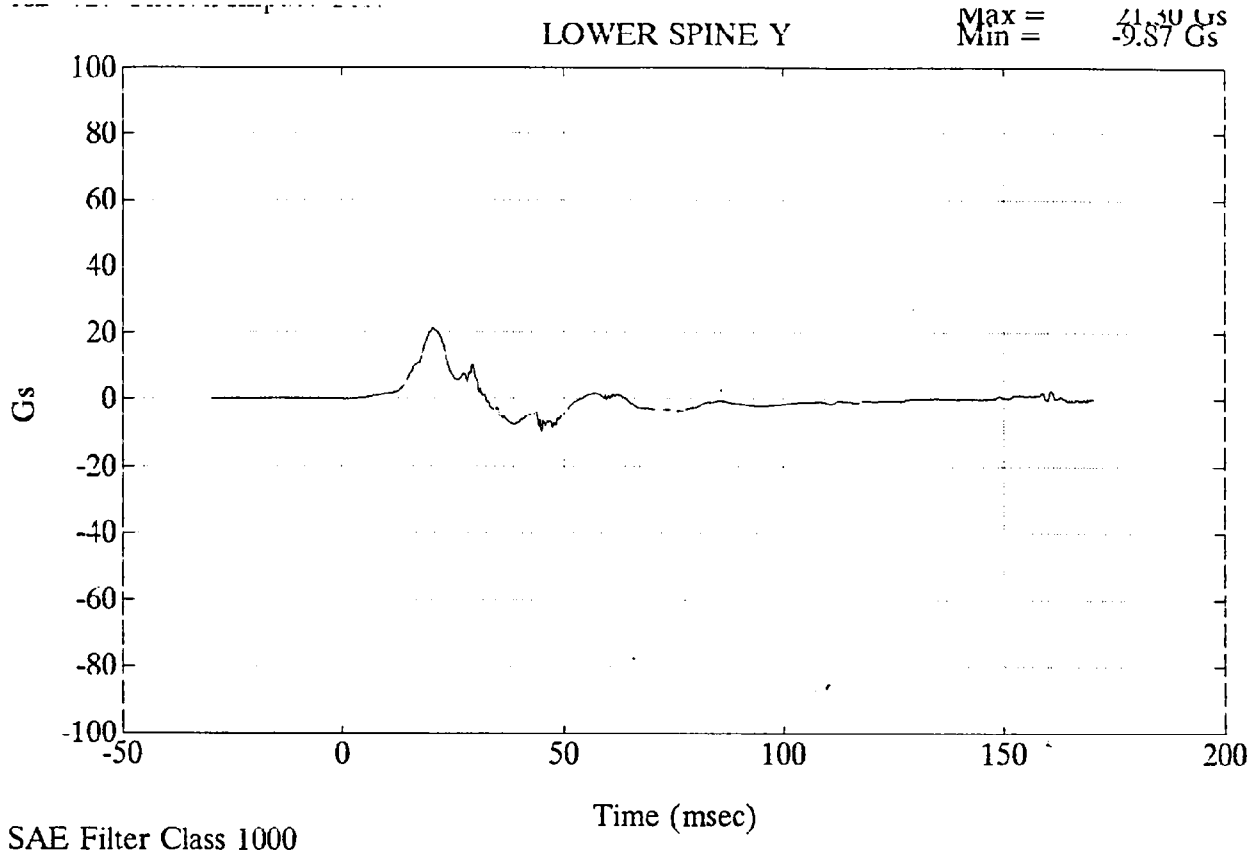

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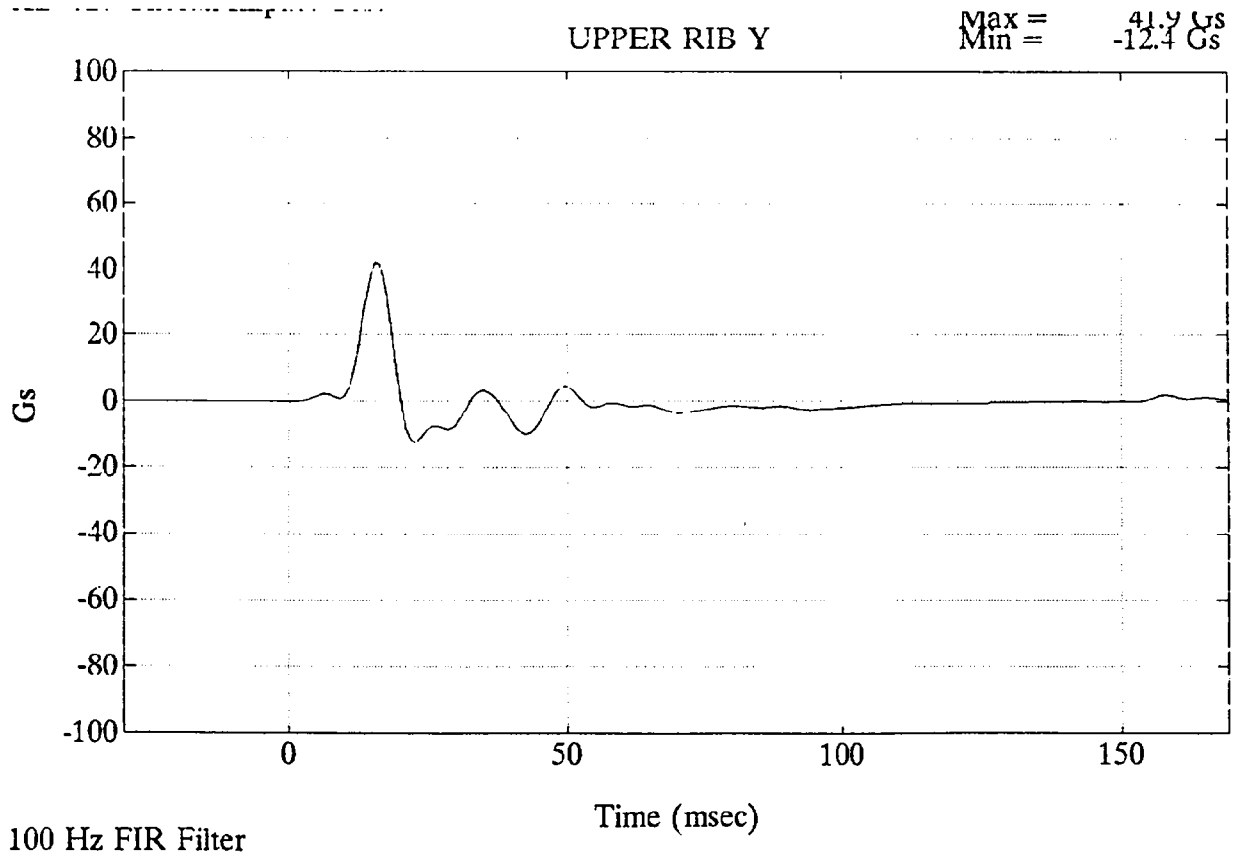
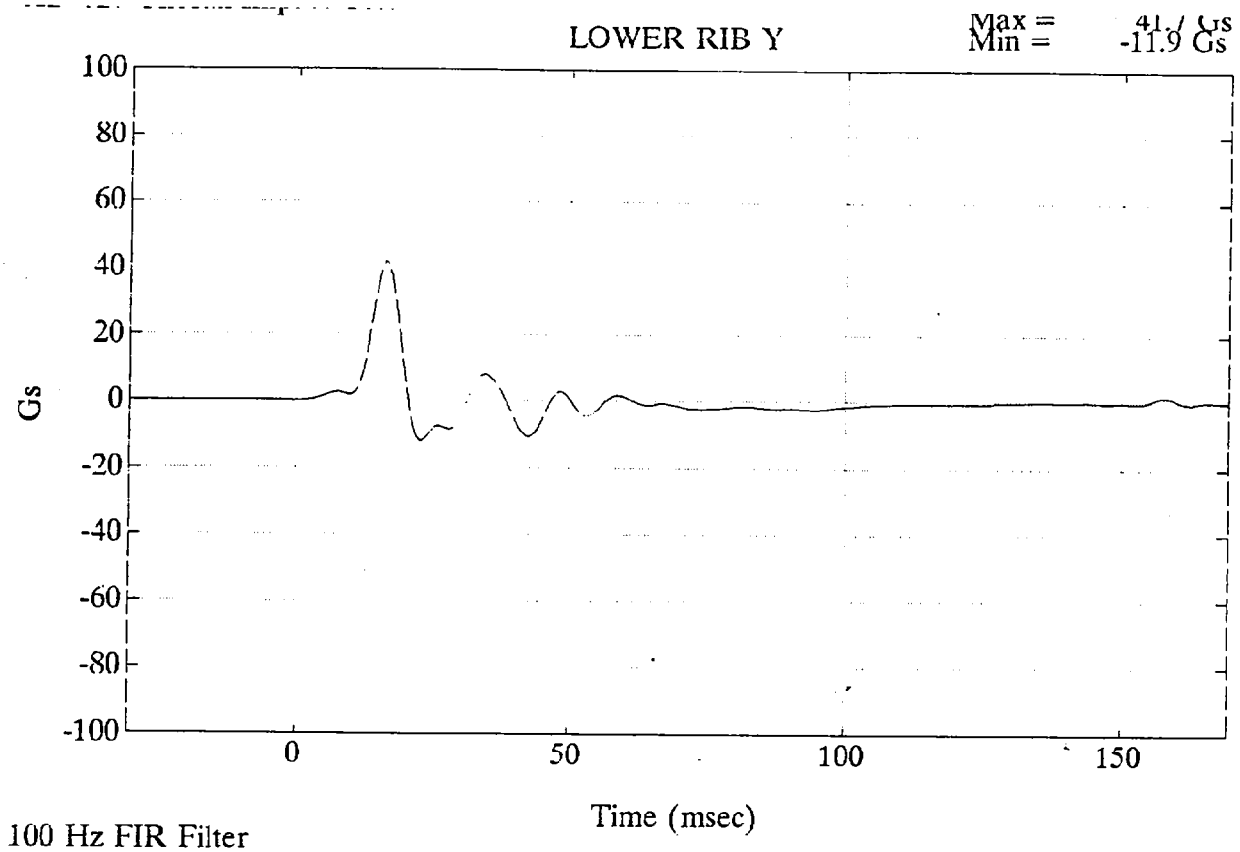
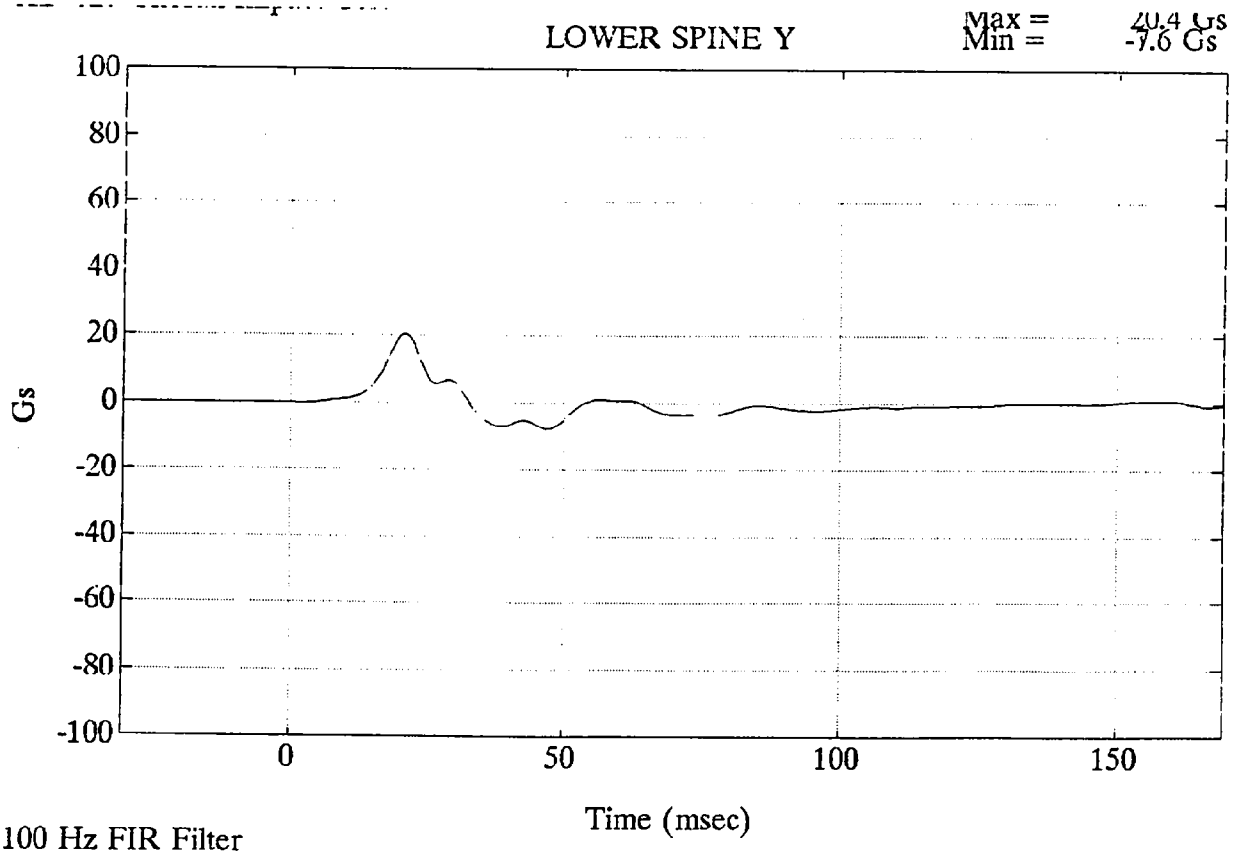


100 Hz FIR Filter



100 Hz FIR Filter



100 Hz FIR Filter

LATERAL PELVIS IMPACT TEST

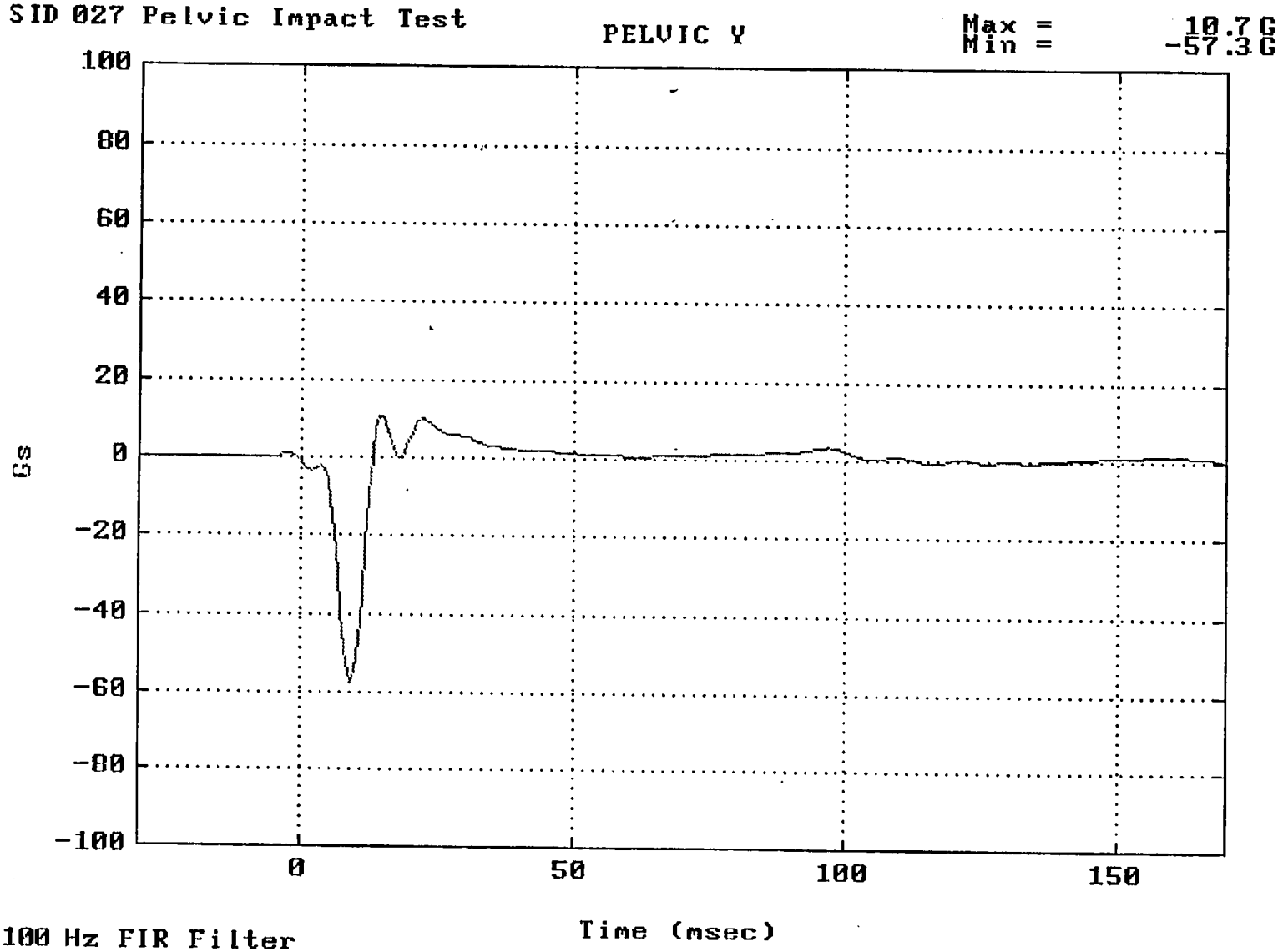
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Calspan Sequential Test Number: 3

Date: 10/24/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE. HUMIDITY (%)	10 - 70	30
PROBE SPEED (m/s)	4.27 - 4.33	4.32
PELVIS ACCELERATION (g's)	40 - 60	57.4

REMARKS: None


SID 027 Pelvic Impact Test
PELVIC Y
Max = 10.7 G
Min = -57.3 G
100
80
60
40
20
0
-20
-40
-60
-80
-100
g's
0
50
100
150
Time (msec)
100 Hz FIR Filter

PRE-TEST DUMMY INSPECTION LIST

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Calspan Sequential Test Number: 3

Date: 10/24/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None

CALIBRATION TEST RESULTS
POST TEST

SID NO.: 268

CONFIGURED FOR LEFT SIDE IMPACT

CALIBRATION TEST RESULTS SUMMARY

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 268 Calspan Sequential Test Number: 4

Date: 11/06/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
ABDOMINAL COMPRESSION TEST*	Passed all requirements.
LUMBAR FLEXION TEST*	Passed all requirements.

* Test not required for SID certification.

REMARKS: None

EXTERNAL DIMENSIONS

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 268 Calspan Sequential Test Number: 4

Date: 11/03/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	902
RH- Rib Height (mm)	502 - 520	516
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 - 241	232
KH- Knee Pivot from Back Line (mm)	511 - 526	520
KV- Knee Pivot to Floor (mm)	490 - 505	495
HW- Hip Width (mm)	356 - 391	370

REMARKS: None

LATERAL THORAX IMPACT TEST

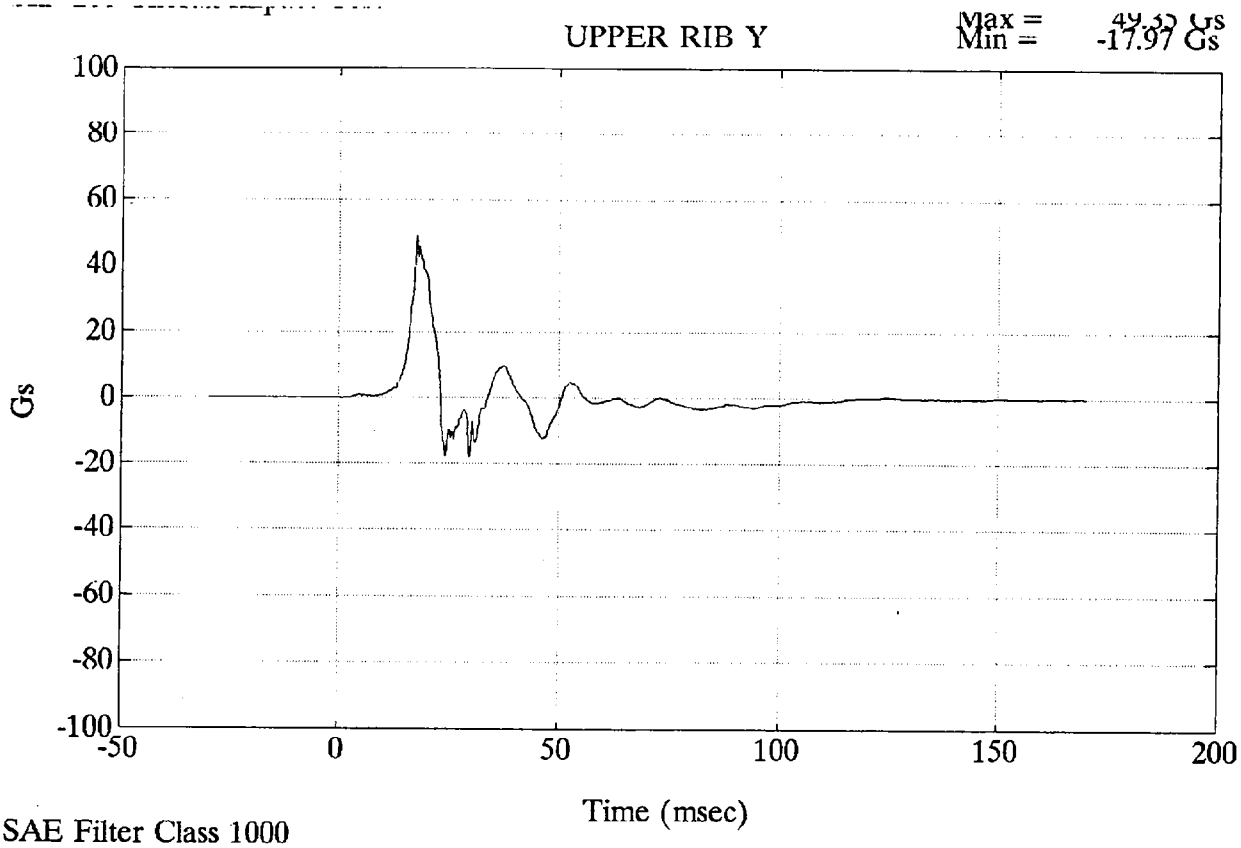
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 268 Calspan Sequential Test Number: 4

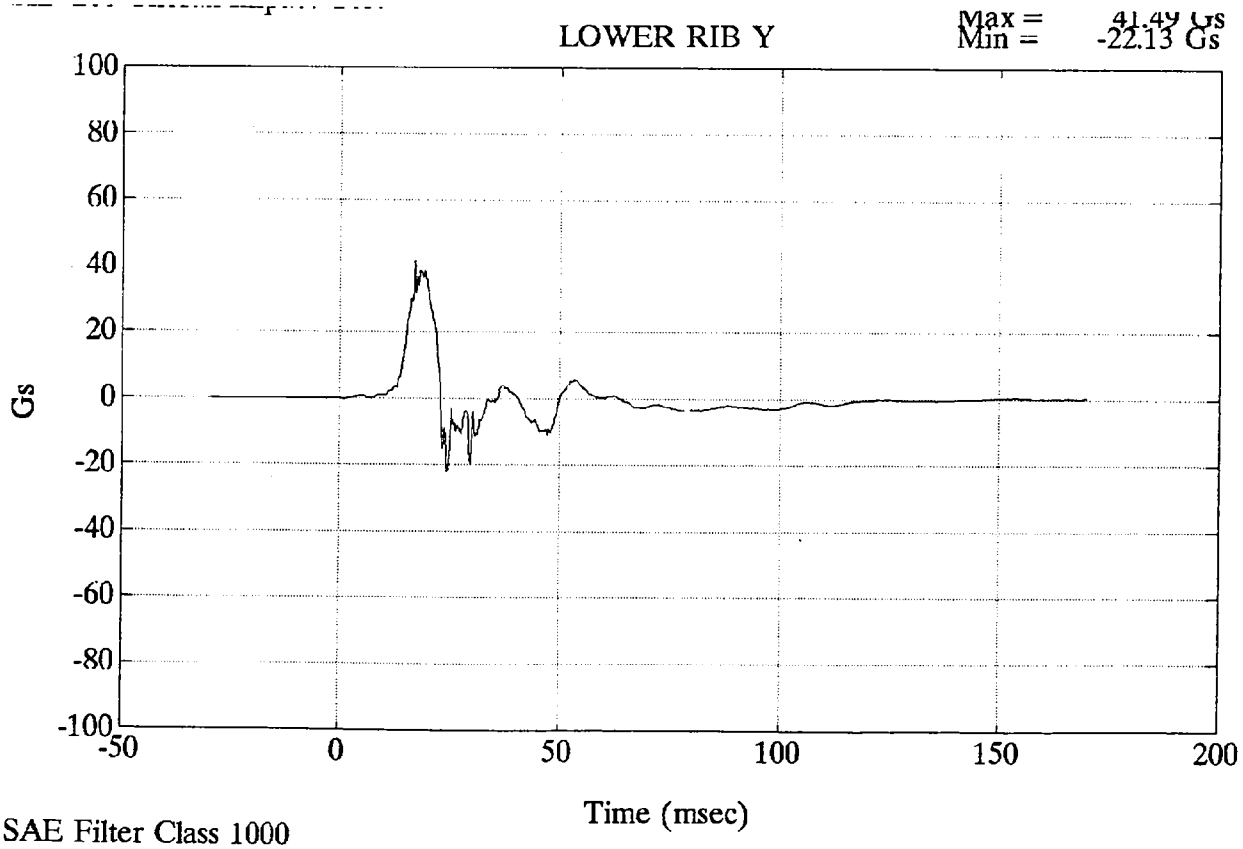
Date: 11/03/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.7
RELATIVE. HUMIDITY (%)	10 - 70	35
PROBE SPEED (m/s)	4.27 - 4.33	4.28
UPPER RIB (g's)	37 - 46	43.3
LOWER RIB (g's)	37 - 46	39.6
LOWER SPINE (g's)	15 - 22	20.7

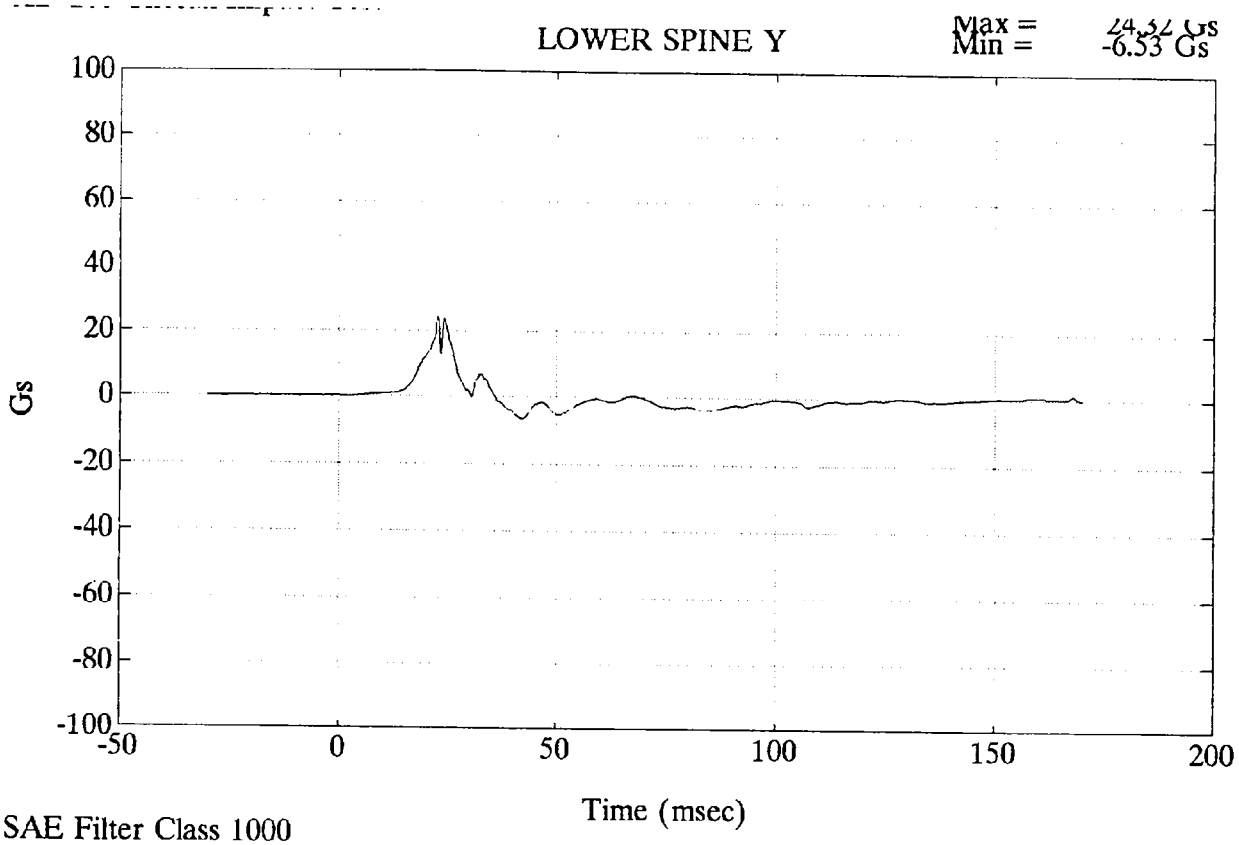
REMARKS: None



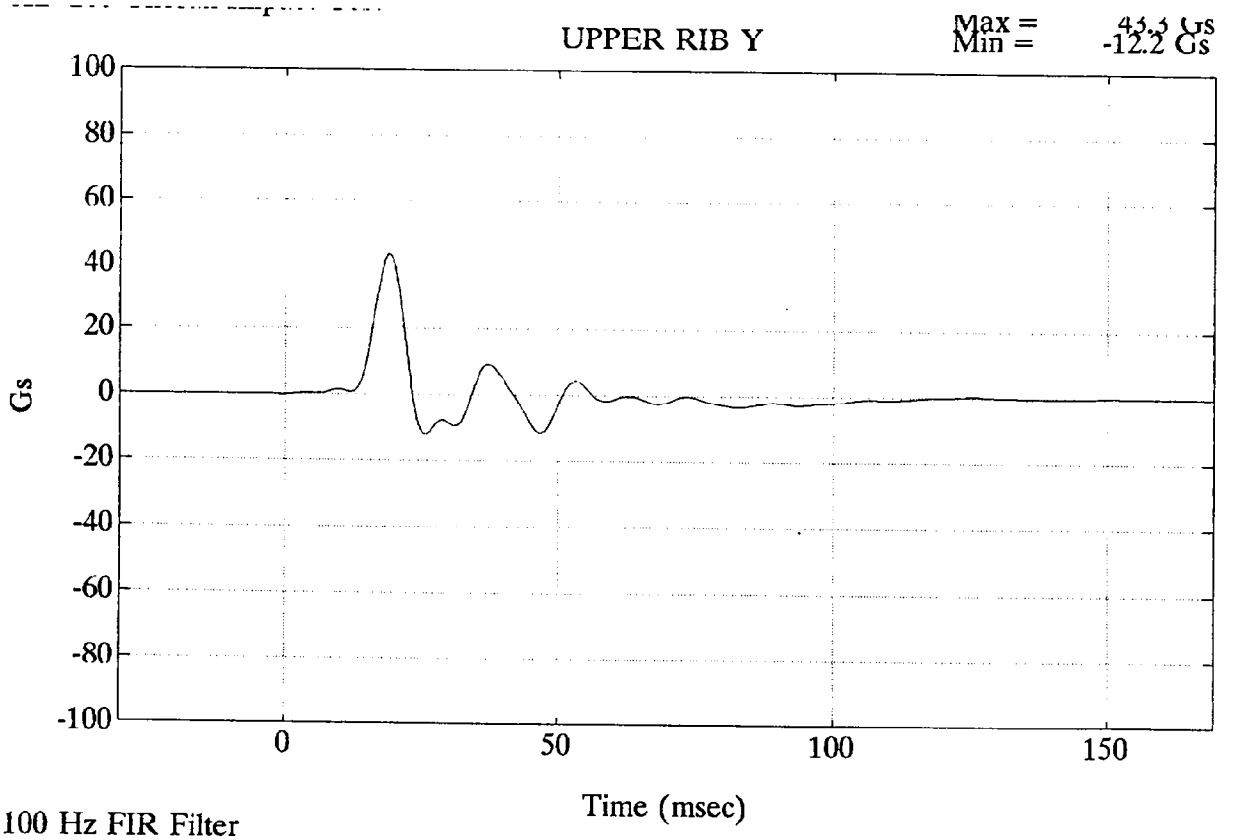
SAE Filter Class 1000



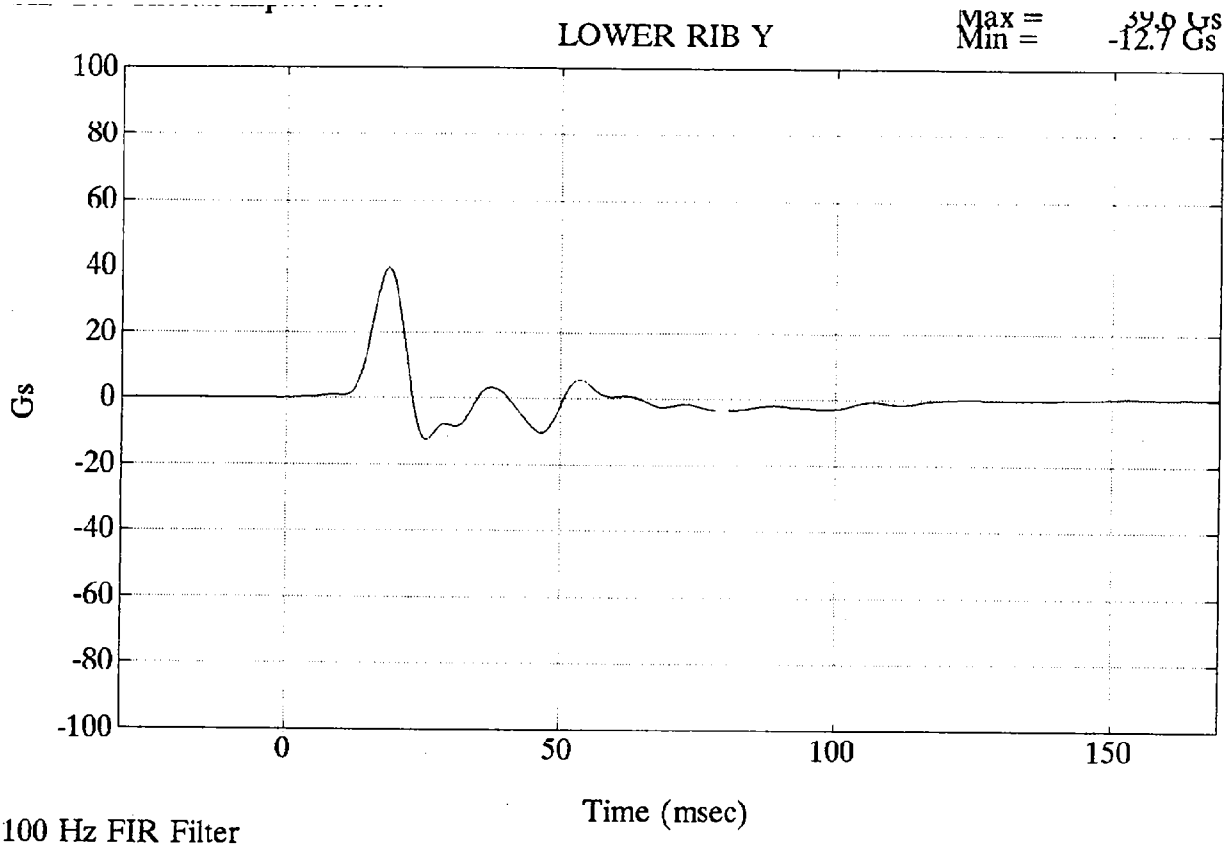
SAE Filter Class 1000



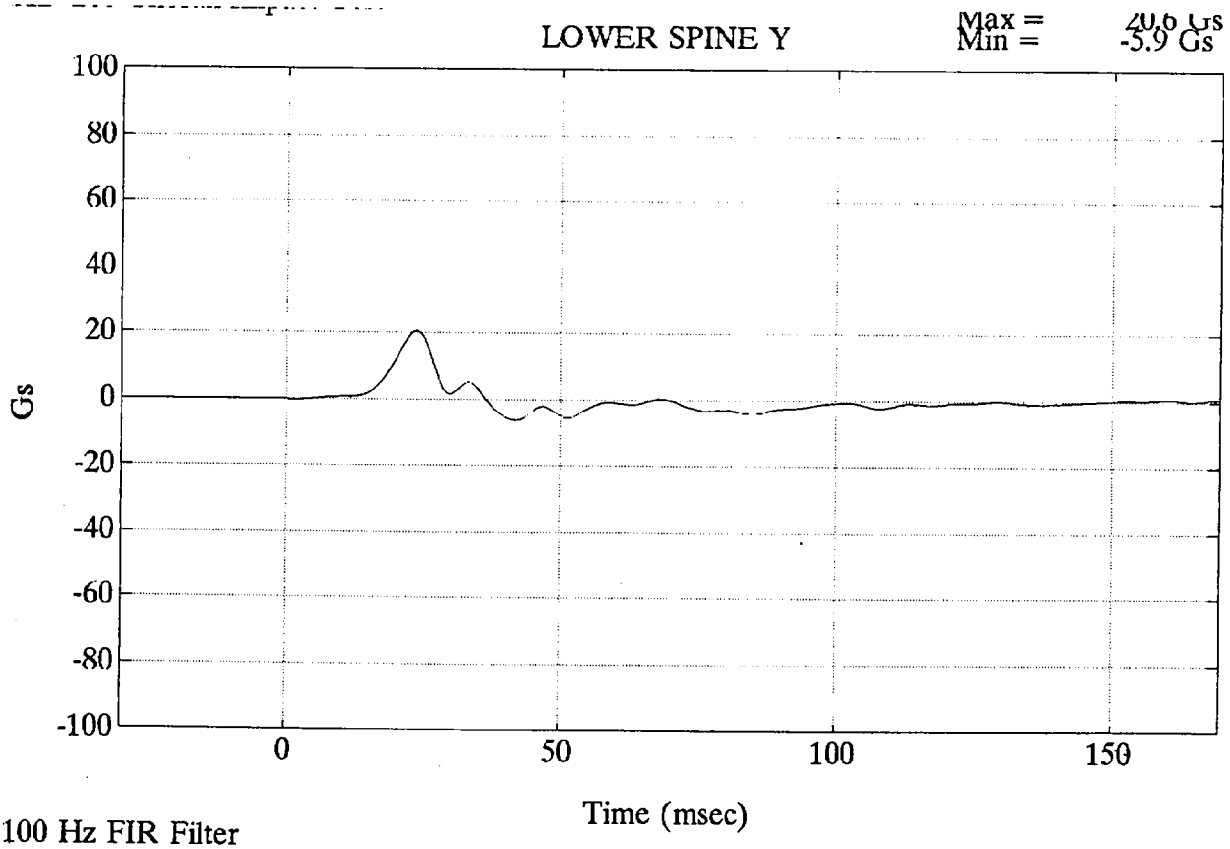
SAE Filter Class 1000



100 Hz FIR Filter



100 Hz FIR Filter



100 Hz FIR Filter

LATERAL PELVIS IMPACT TEST

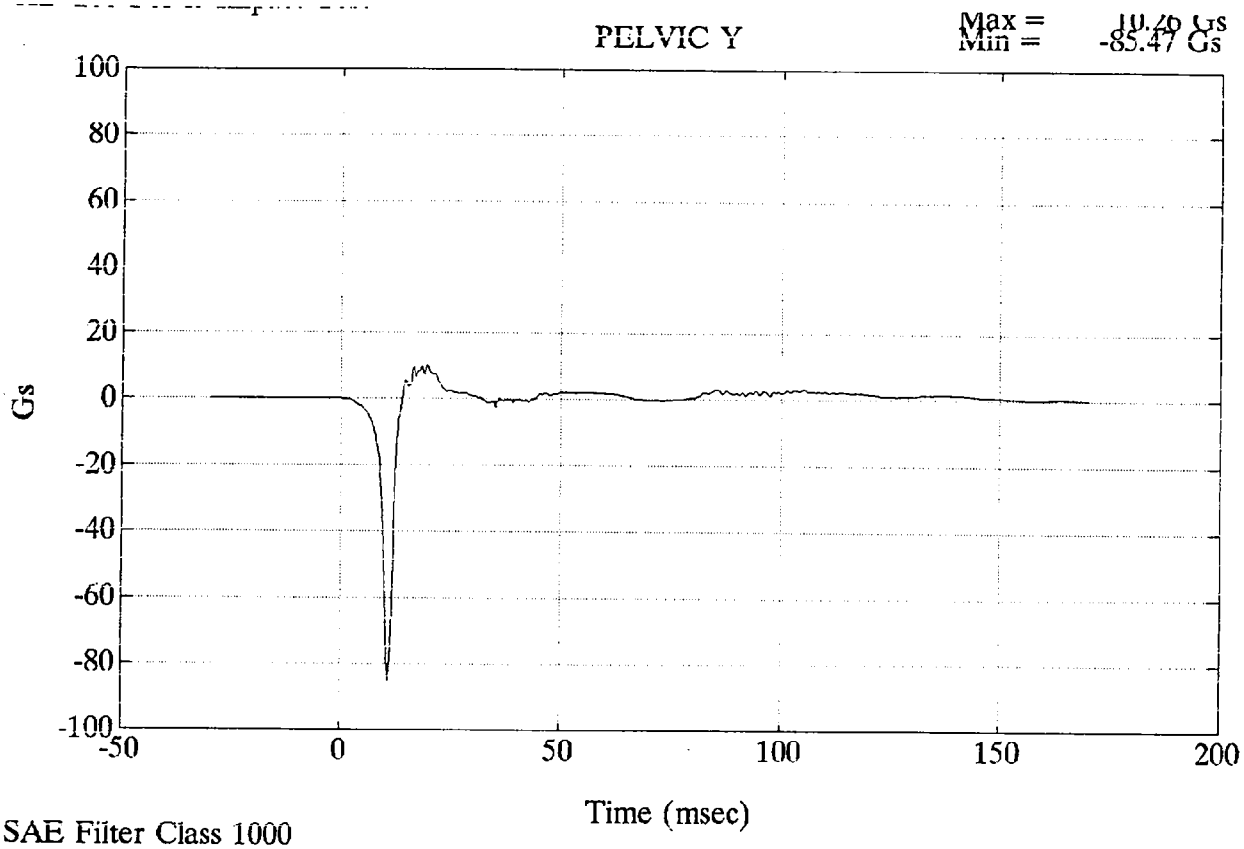
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 268 Calspan Sequential Test Number: 4

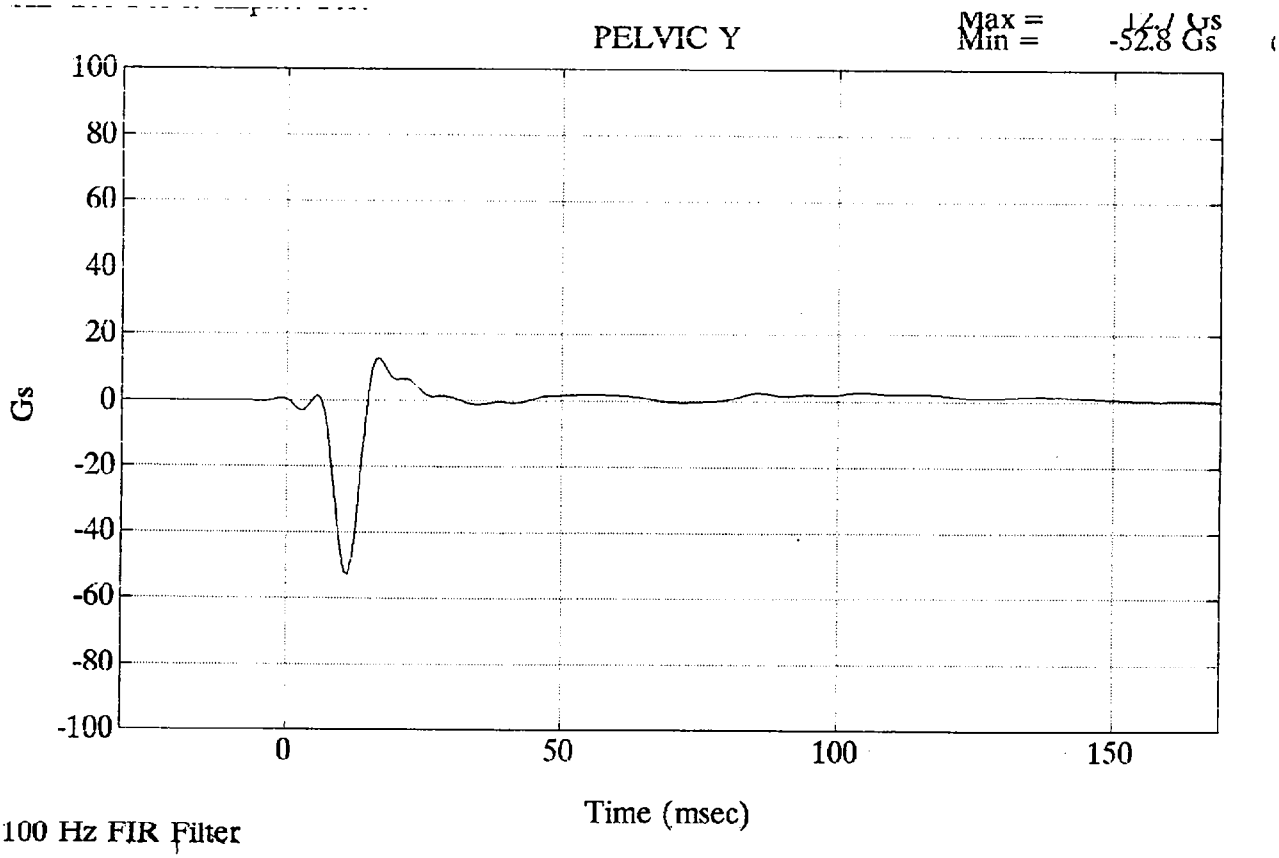
Date: 11/03/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.7
RELATIVE. HUMIDITY (%)	10 - 70	35
PROBE SPEED (m/s)	4.27 - 4.33	4.29
PELVIS ACCELERATION (g's)	40 - 60	52.9

REMARKS: None



SAE Filter Class 1000



100 Hz FIR Filter

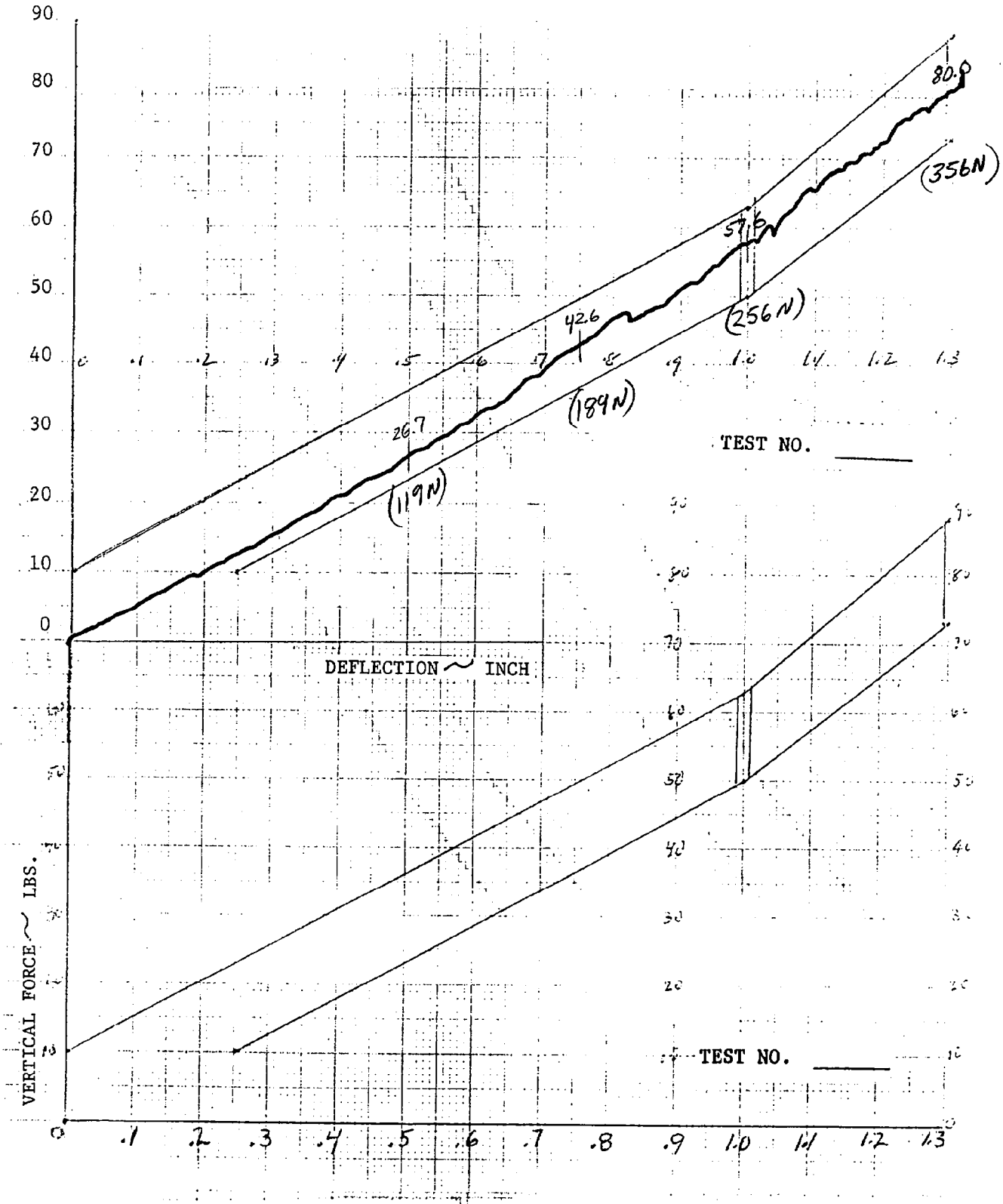
ABDOMINAL COMPRESSION TEST
(Test not required for SID certification)

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 268 Calspan Sequential Test Number: 3
Date: 11/06/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.7
RELATIVE HUMIDITY (%)	10 - 70	35
FORCE @ 13 mm (N)	104 - 162	119
FORCE @ 19 mm (N)	163 - 221	189
FORCE @ 25 mm (N)	222 - 280	256
FORCE @ 33 mm (N)	325 - 391	356

REMARKS: None



DUMMY S/N 268

DATE 11/6/97

CONTRACT AUTHORIZATION

TEMP. 71° HUMIDITY 35

PERFORMED BY Q. BS

PART 572
ABDOMEN STATIC PRESS
DOT - 13 DEC. '77

LUMBAR FLEXION TEST

(Test not required for SID certification)

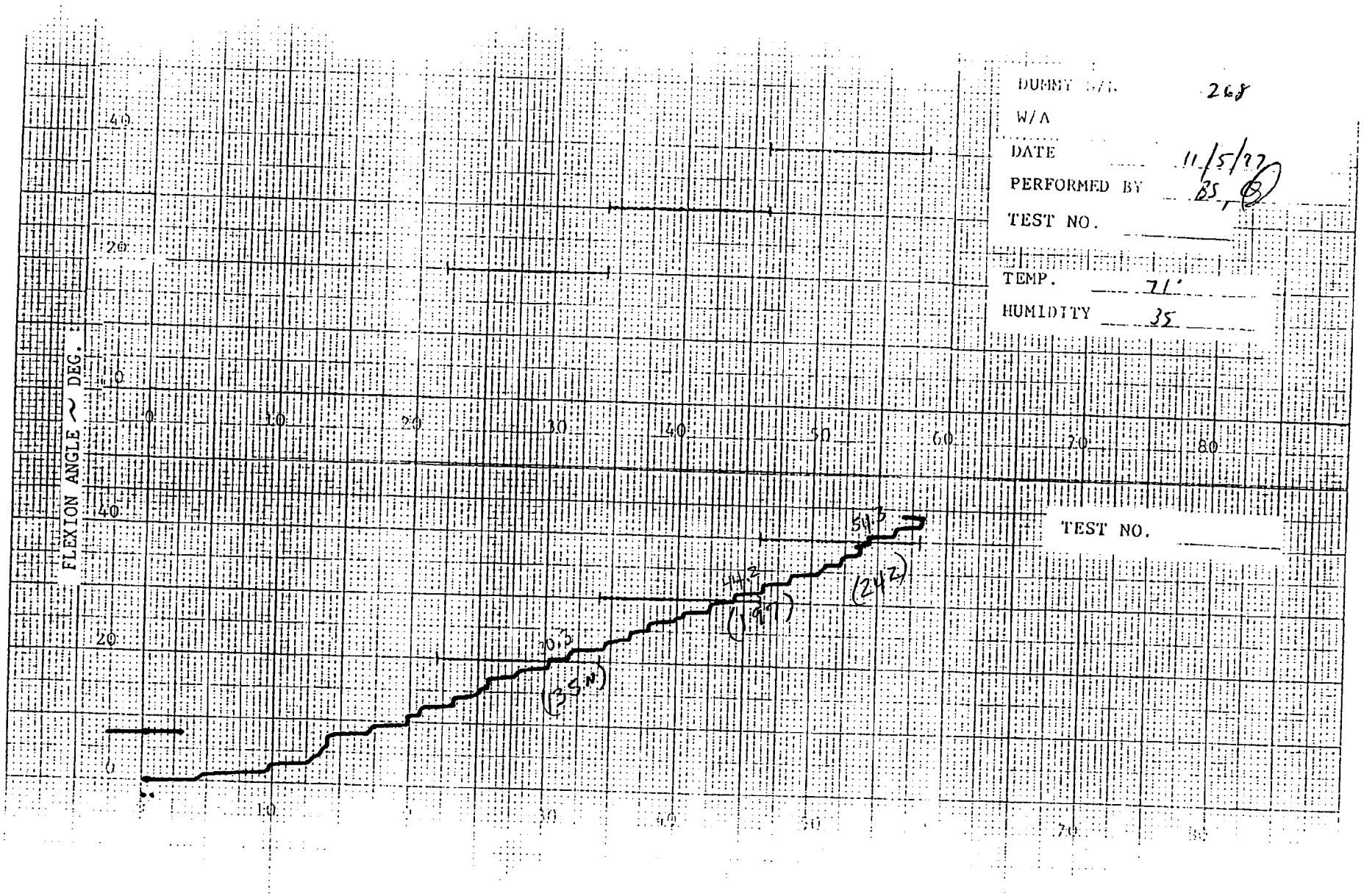
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 268 Calspan Sequential Test Number: 3

Date: 11/05/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.7
RELATIVE HUMIDITY (%)	10 - 70	35
FORCE @ 0° (N)	0 - 26.7	0
FORCE @ 20° (N)	97.8 - 151.2	135
FORCE @ 30° (N)	151.2 - 204.6	197
FORCE @ 40° (N)	204.6 - 258	242
RETURN ANGLE	12° max.	7.4

REMARKS: None


DUMMY S/N 268
W/A
DATE 11/5/97
PERFORMED BY DS
TEST NO.
TEMP. 71
HUMIDITY 35
TEST NO.
FLEXION ANGLE ~ DEG.
0
10
20
30
40
50
60
70
80
51.3
44.3
30.3
(24.2)
(19.1)
(7.7)

POST TEST DUMMY INSPECTION LIST

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 268 Calspan Sequential Test Number: 4

Date: 11/06/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None

CALIBRATION TEST RESULTS
POST TEST

SID NO.: 027

CONFIGURED FOR LEFT SIDE IMPACT

CALIBRATION TEST RESULTS SUMMARY

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Calspan Sequential Test Number: 4

Date: 11/06/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
ABDOMINAL COMPRESSION TEST*	Passed all requirements.
LUMBAR FLEXION TEST*	Passed all requirements.

* Test not required for SID certification.

REMARKS: None

EXTERNAL DIMENSIONS

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Calspan Sequential Test Number: 4

Date: 11/03/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	906
RH- Rib Height (mm)	502 - 520	514
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 - 241	235
KH- Knee Pivot from Back Line (mm)	511 - 526	515
KV- Knee Pivot to Floor (mm)	490 - 505	493
HW- Hip Width (mm)	356 - 391	365

REMARKS: None

LATERAL THORAX IMPACT TEST

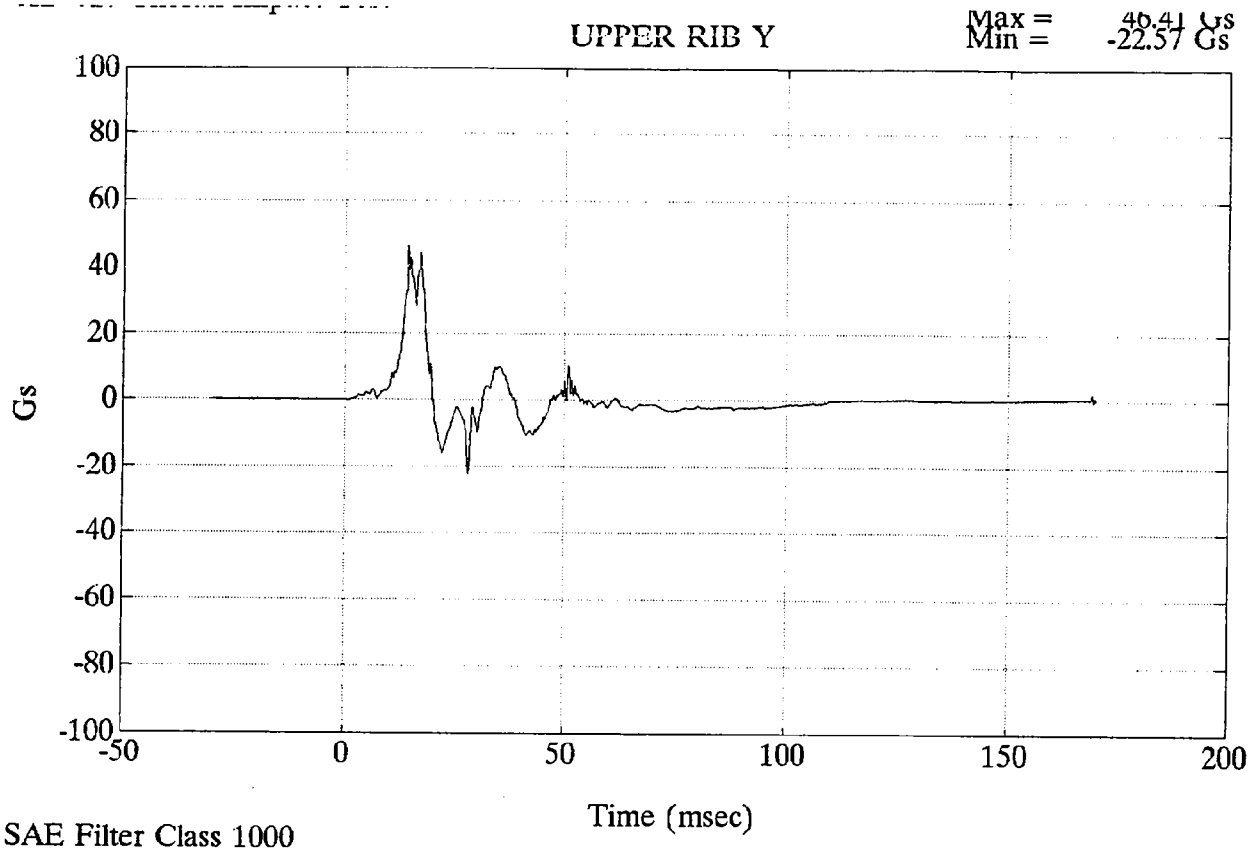
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Calspan Sequential Test Number: 4

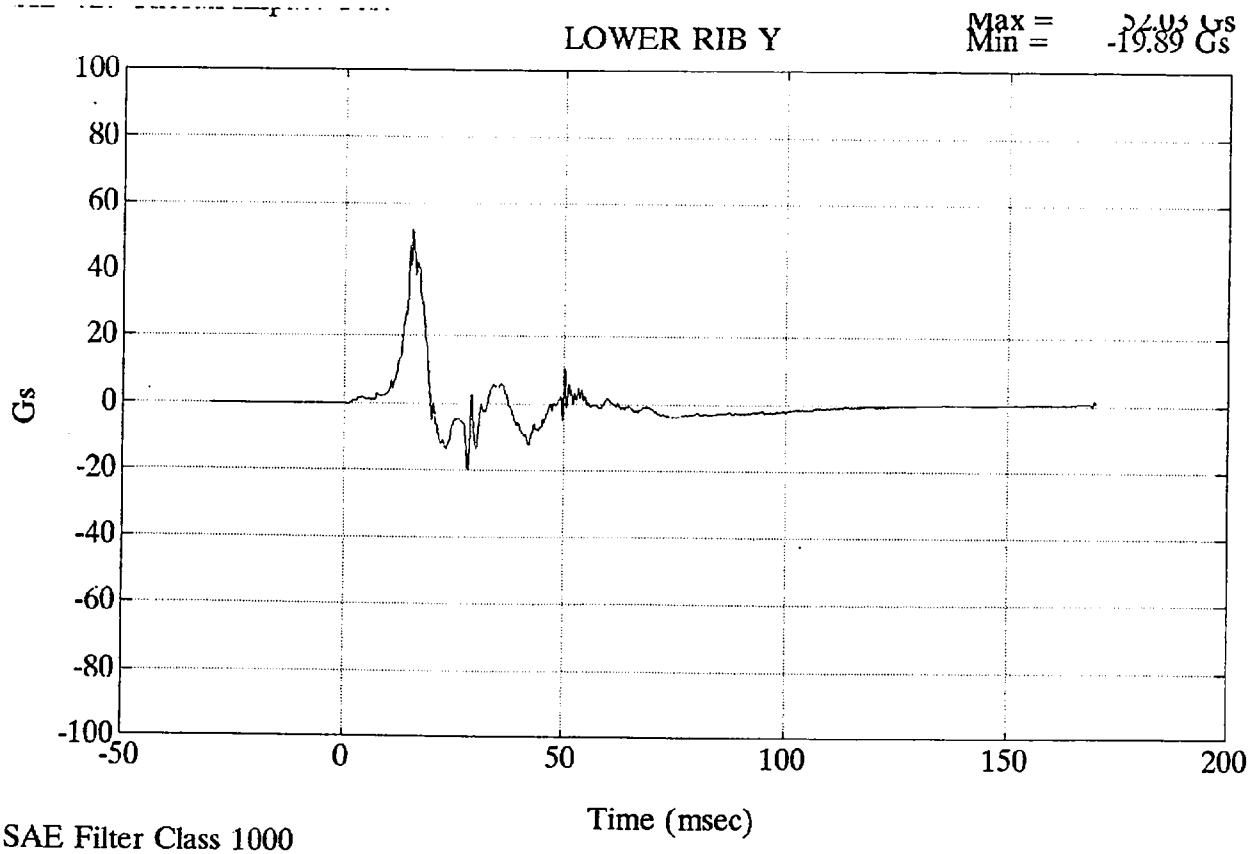
Date: 11/03/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.7
RELATIVE. HUMIDITY (%)	10 - 70	35
PROBE SPEED (m/s)	4.27 - 4.33	4.28
UPPER RIB (g's)	37 - 46	39.9
LOWER RIB (g's)	37 - 46	42.2
LOWER SPINE (g's)	15 - 22	20.8

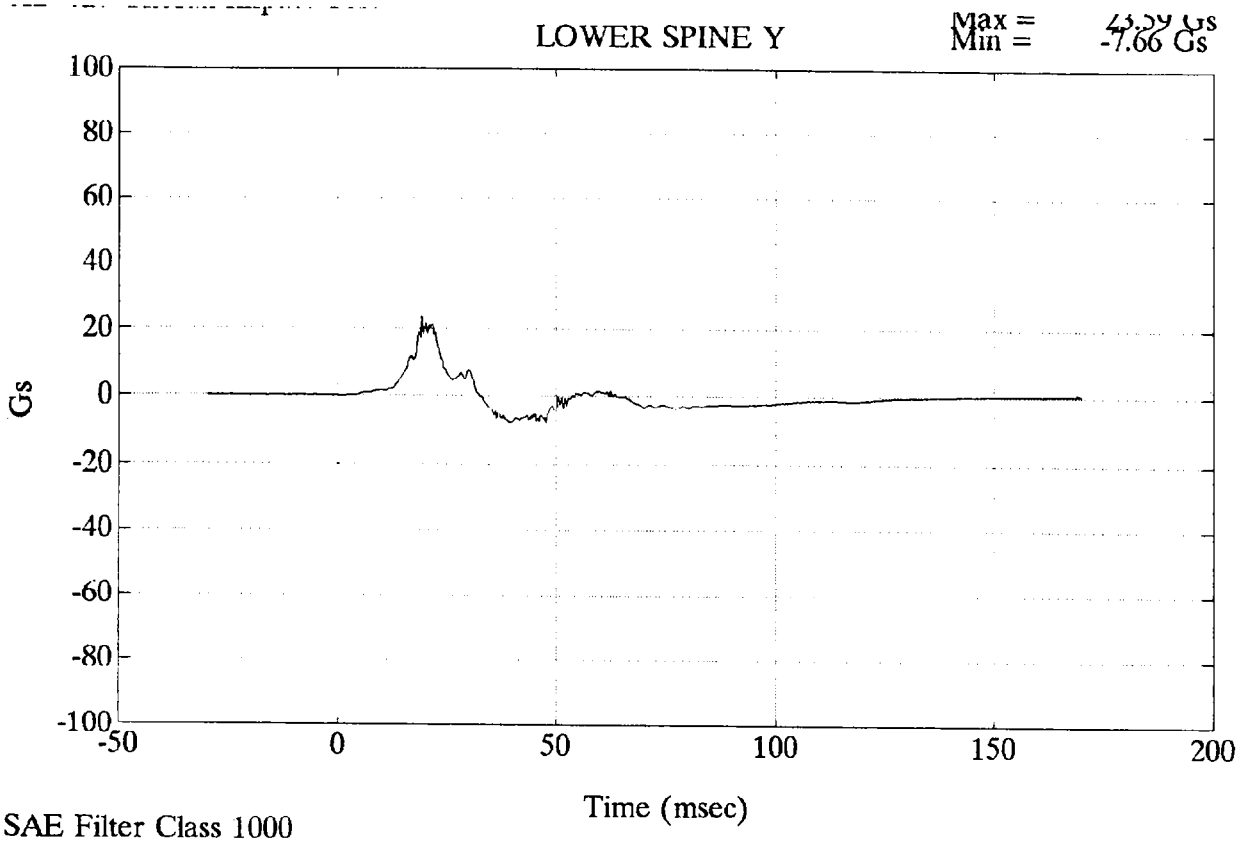
REMARKS: None



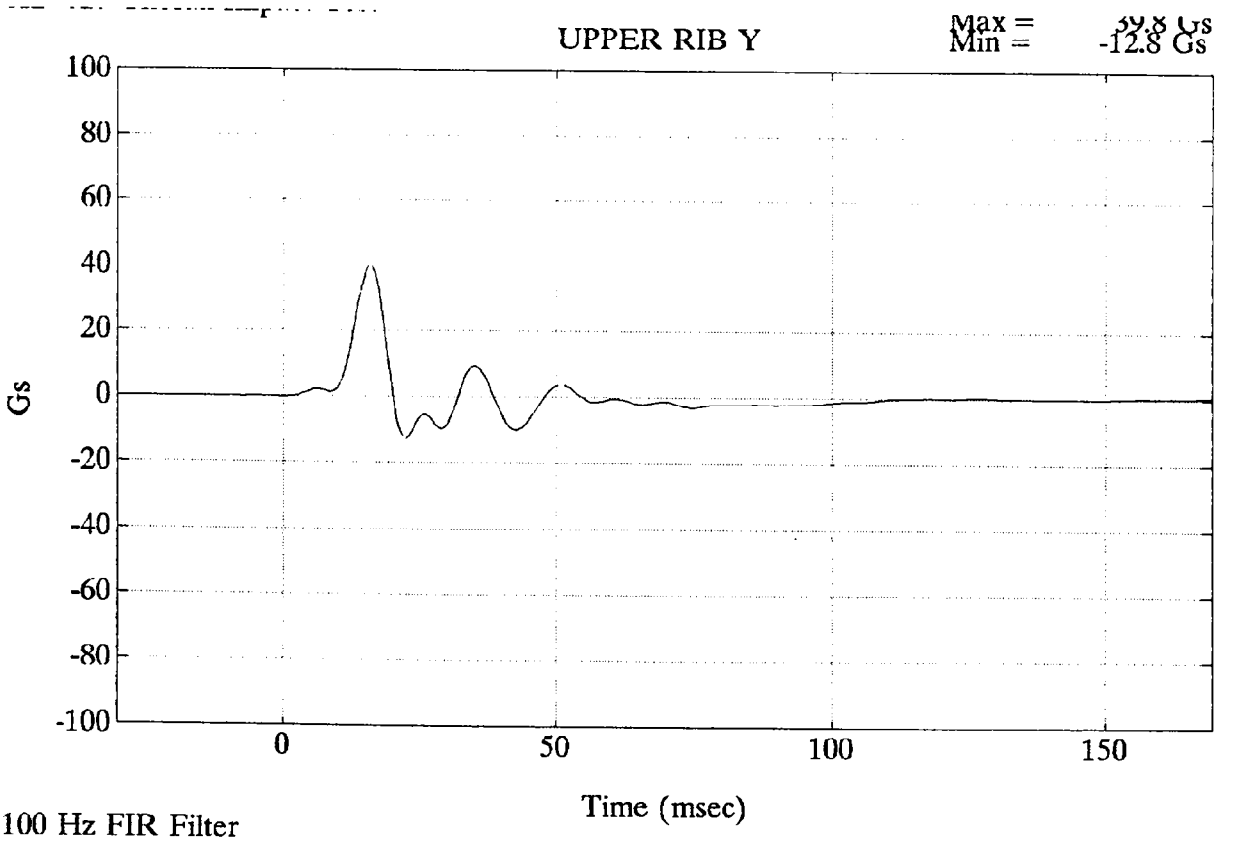
SAE Filter Class 1000



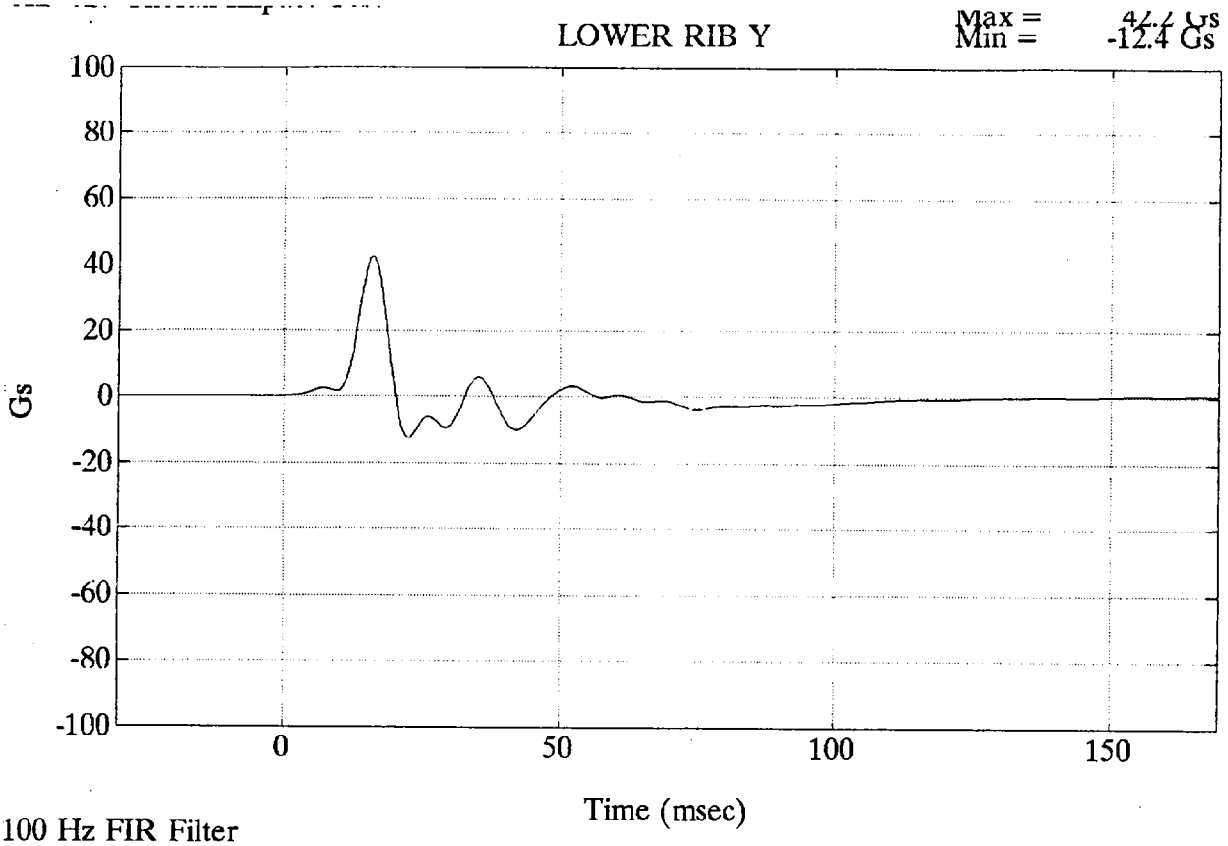
SAE Filter Class 1000



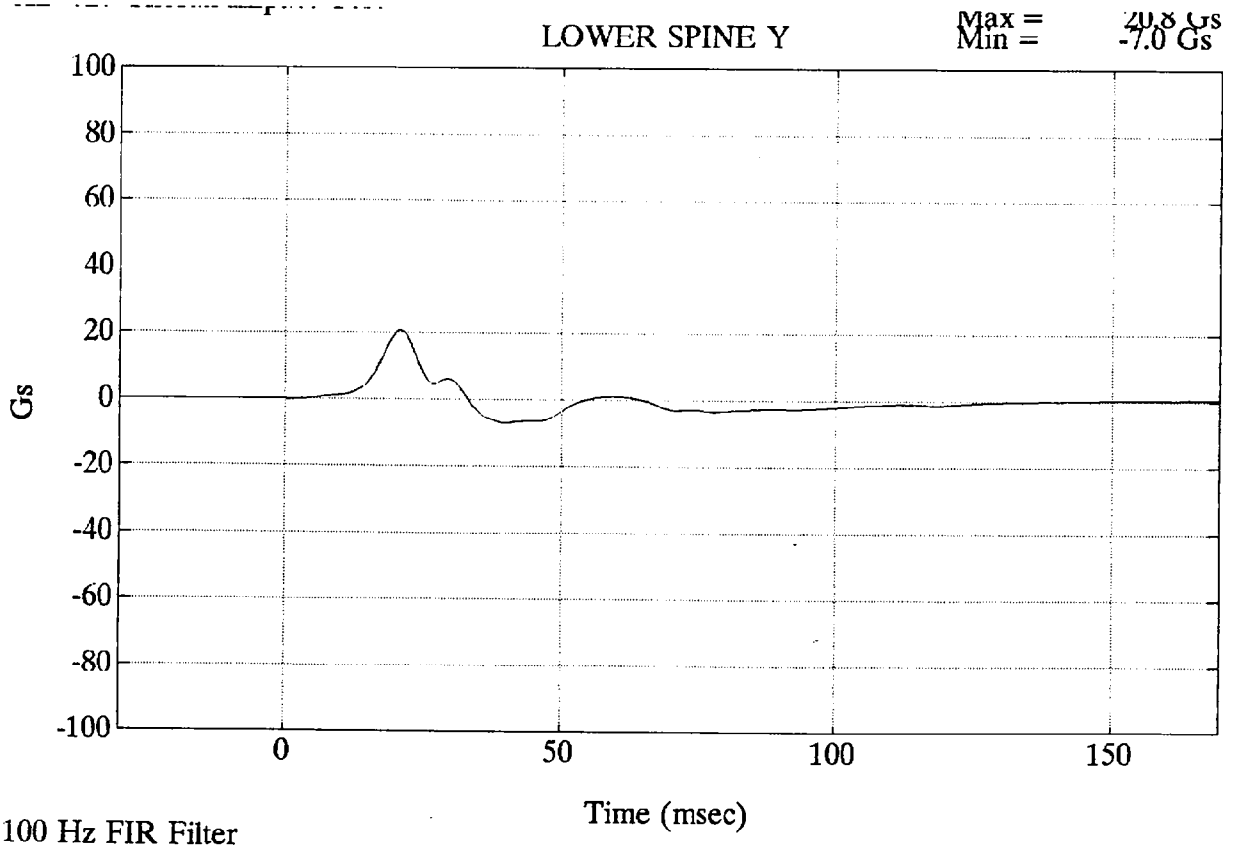
SAE Filter Class 1000



100 Hz FIR Filter



100 Hz FIR Filter



100 Hz FIR Filter

LATERAL PELVIS IMPACT TEST

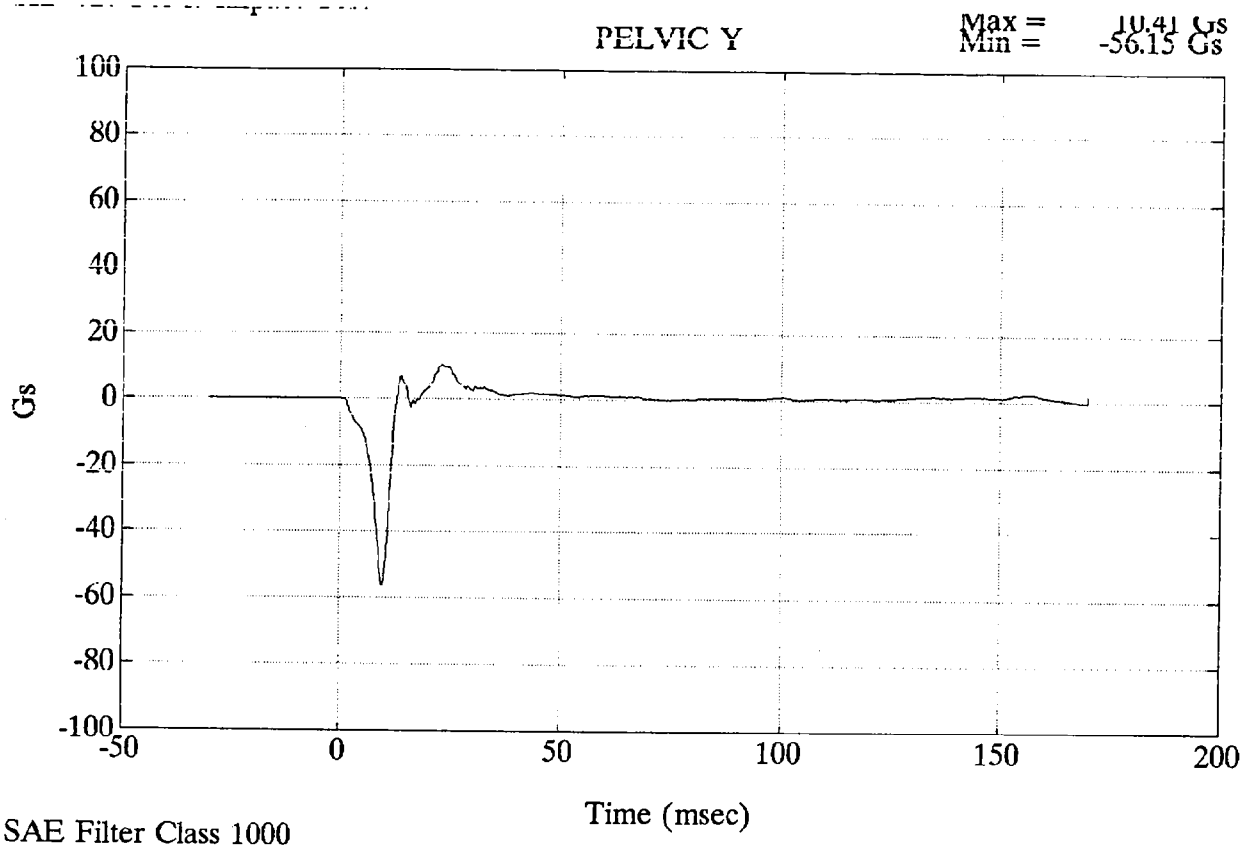
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Calspan Sequential Test Number: 4

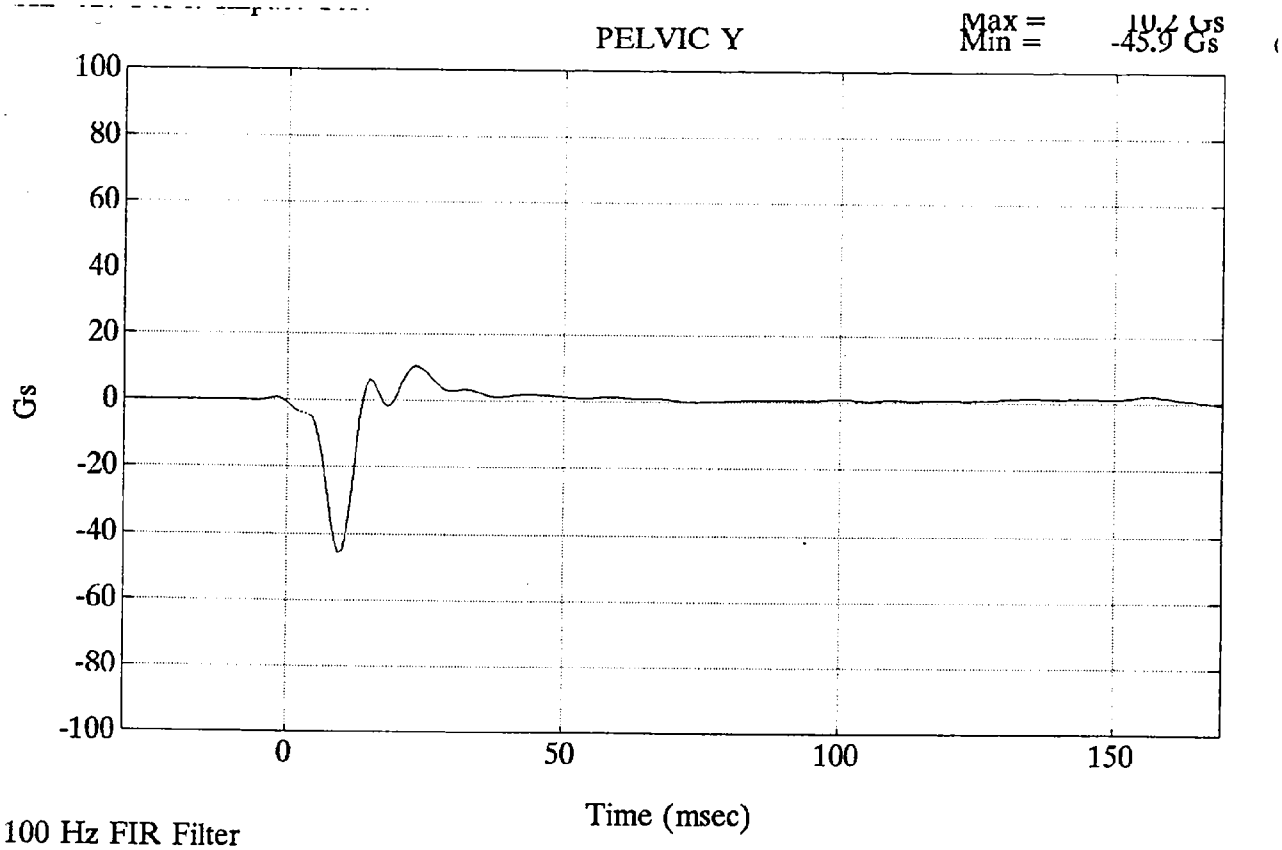
Date: 11/03/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.7
RELATIVE. HUMIDITY (%)	10 - 70	35
PROBE SPEED (m/s)	4.27 - 4.33	4.30
PELVIS ACCELERATION (g's)	40 - 60	45.9

REMARKS: None



SAE Filter Class 1000



100 Hz FIR Filter

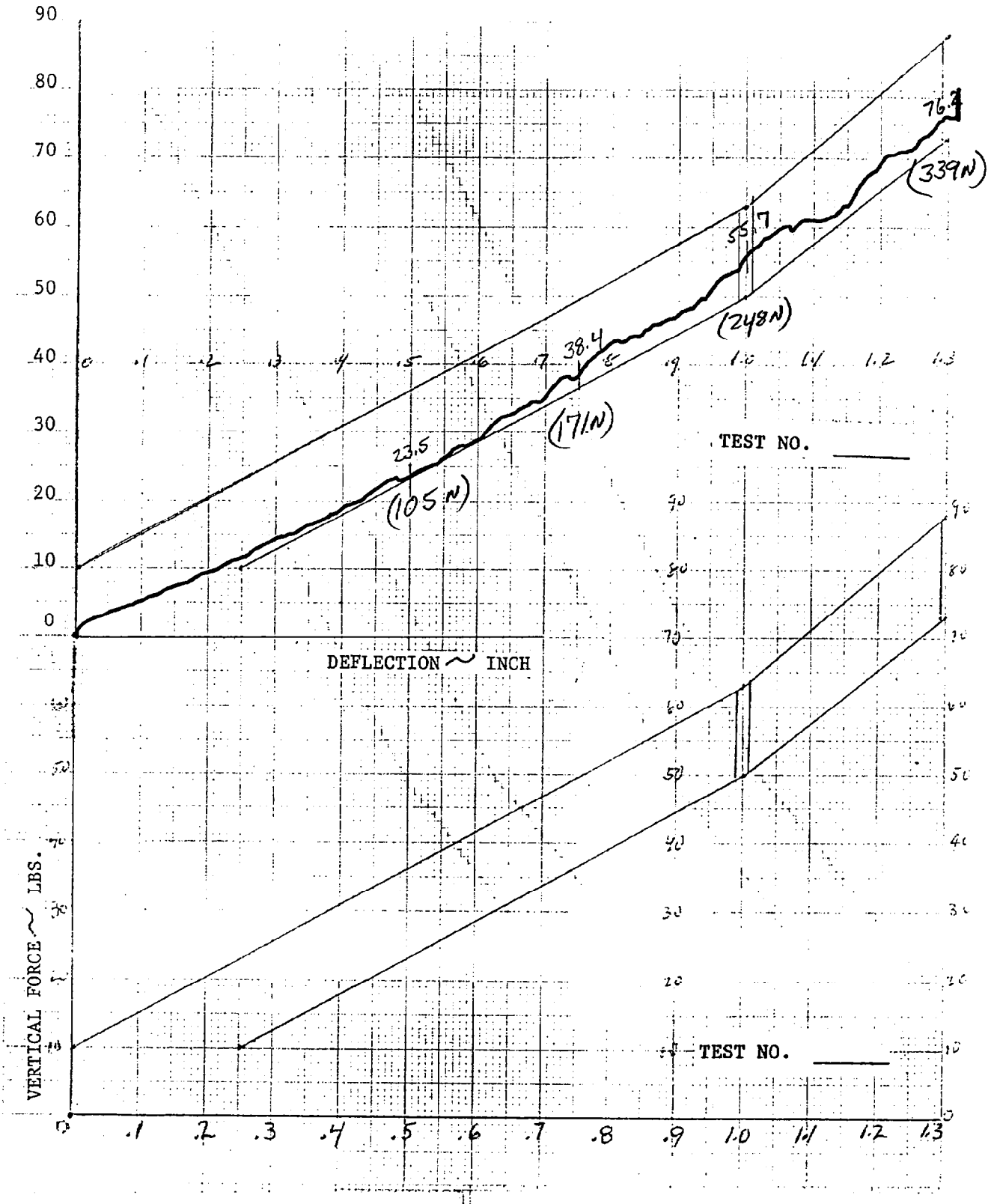
ABDOMINAL COMPRESSION TEST
(Test not required for SID certification)

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Calspan Sequential Test Number: 3
Date: 11/06/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.7
RELATIVE HUMIDITY (%)	10 - 70	35
FORCE @ 13 mm (N)	104 - 162	105
FORCE @ 19 mm (N)	163 - 221	171
FORCE @ 25 mm (N)	222 - 280	248
FORCE @ 33 mm (N)	325 - 391	339

REMARKS: None



DUMMY S/N 027

DATE 11/6/97

CONTRACT AUTHORIZATION

TEMP. 71° HUMIDITY 35

PERFORMED BY (C), BJ

PART 572
ABDOMEN STATIC PRESS
DOT - 13 DEC. '77

LUMBAR FLEXION TEST

(Test not required for SID certification)

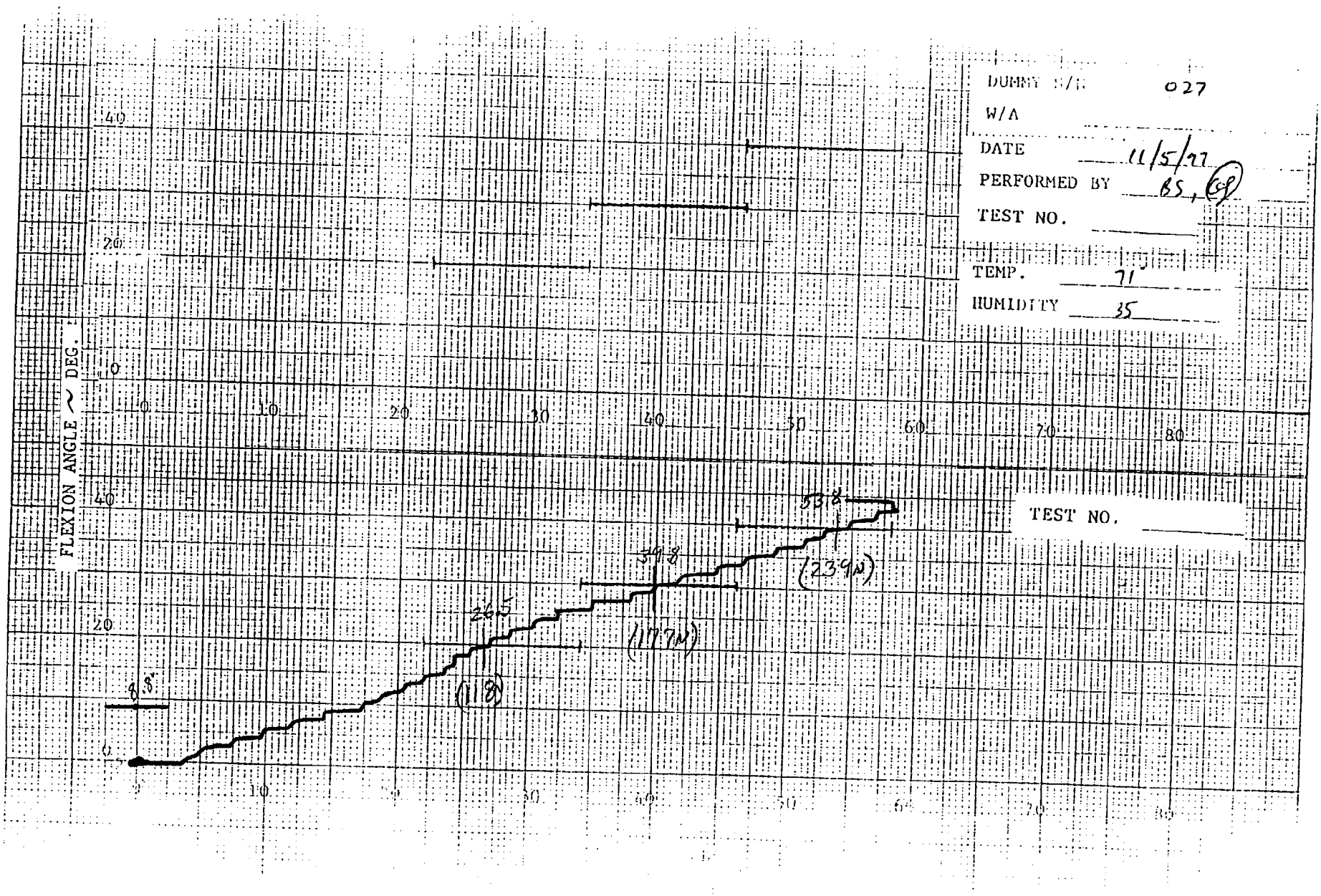
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Calspan Sequential Test Number: 3

Date: 11/05/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.7
RELATIVE HUMIDITY (%)	10 - 70	35
FORCE @ 0° (N)	0 - 26.7	0
FORCE @ 20° (N)	97.8 - 151.2	118
FORCE @ 30° (N)	151.2 - 204.6	177
FORCE @ 40° (N)	204.6 - 258	239
RETURN ANGLE	12° max.	8.8

REMARKS: None


DUMMY S/N: 027
W/A
DATE 11/5/77
PERFORMED BY BS, GP
TEST NO.
TEMP. 71
HUMIDITY 35
TEST NO.
FLEXION ANGLE ~ DEG.
40
20
0
0
10
20
30
40
50
60
70
80
6.8
(1.1 N)
26.5
(11.8)
39.8
(17.7N)
53.8
(23.9N)

POST TEST DUMMY INSPECTION LIST

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Calspan Sequential Test Number: 4

Date: 11/06/97 Laboratory Technician: B. Swiecicki, G. Serbinowski

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None

APPENDIX D

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

SID INSTRUMENTATION

	FRONT SID NO.: 268		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
UPPER RIB	A13546	ENDEVCO	9/97
LOWER RIB	A11584	ENDEVCO	9/97
LOWER SPINE	A13012	ENDEVCO	9/97
PELVIS	A13492	ENDEVCO	9/97
UPPER RIB REDUNDANT	A13850	ENDEVCO	9/97
LOWER RIB REDUNDANT	A12607	ENDEVCO	9/97
LOWER SPINE REDUNDANT	B11351	ENDEVCO	6/97
PELVIS REDUNDANT	A13498	ENDEVCO	9/97

	REAR SID NO.: 027		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
UPPER RIB	A12480	ENDEVCO	9/97
LOWER RIB	A12776	ENDEVCO	9/97
LOWER SPINE	A14173	ENDEVCO	9/97
PELVIS	A13568	ENDEVCO	9/97
UPPER RIB REDUNDANT	A13565	ENDEVCO	9/97
LOWER RIB REDUNDANT	A13990	ENDEVCO	9/97
LOWER SPINE REDUNDANT	B11118	ENDEVCO	6/97
PELVIS REDUNDANT	A13599	ENDEVCO	9/97

REMARKS: None

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

VEHICLE AND MDB INSTRUMENTATION

	VEHICLE AND MDB INSTRUMENTS		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
RIGHT FRONT SILL (X)	MB19	ENTRAN	10/97
RIGHT FRONT SILL (Y)	MB08	ENTRAN	10/97
RIGHT FRONT SILL (Z)	MB10	ENTRAN	10/97
RIGHT REAR SILL (X)	A13828	ENDEVCO	10/97
RIGHT REAR SILL (Y)	A13811	ENDEVCO	10/97
RIGHT REAR SILL (Z)	A13883	ENDEVCO	10/97
REAR FLOORPAN ABOVE AXLE (X)	MB12	ENTRAN	10/97
REAR FLOORPAN ABOVE AXLE (Y)	D12	ENTRAN	10/97
REAR FLOORPAN ABOVE AXLE (Z)	D03	ENTRAN	10/97
LEFT REAR SILL (Y)	AP1B6	ENDEVCO	10/97
LEFT FRONT SILL (Y)	AP065	ENDEVCO	10/97
RIGHT REAR SEAT OCCUPANT COMP. (Y)	Y93	ICS	8/97
LOWER LEFT B- PILLAR (Y)	AY03	ENDEVCO	8/97
MIDDLE LEFT B-PILLAR (Y)	BB51	ENDEVCO	8/97
LOWER LEFT A-PILLAR (Y)	X24	ICS	10/97
UPPER LEFT A-PILLAR (Y)	D19	ENTRAN	10/97
FRONT SEAT TRACK (Y)	AZ17	ENDEVCO	10/97
REAR SEAT TRACK (Y)	-	-	-
VEHICLE CG (X)	AC814	ENDEVCO	10/97
VEHICLE CG (Y)	AC7Y3	ENDEVCO	10/97
VEHICLE CG (Z)	MB18	ENTRAN	5/97
MDB CG (X)	CL60	ENDEVCO	9/97
MDB CG (Y)	CJ54	ENDEVCO	9/97
MDB CG (Z)	CH35	ENDEVCO	9/97
MDB REAR FRAME MEMBER (X)	FL04	ENDEVCO	9/97
MDB REAR FRAME MEMBER (Y)	GL77	ENDEVCO	9/97

REMARKS: None