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REPORT NUMBER: 8109-3

OFFICE OF MARKET INCENTIVES
SIDE IMPACT PROTECTION STUDY IN PRODUCTION VEHICLES
30/15 MPH 90° SIDE IMPACT TEST OF A
GENERAL MOTORS CORPORATION
1991 GEO TRACKER
MPV CONVERTIBLE WITH A MODIFIED MDB

NHTSA NUMBER: N/A

CALSPAN TEST NUMBER: Y48-3-1295

JUNE 17, 1993

CALSPAN CORPORATION
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FINAL REPORT

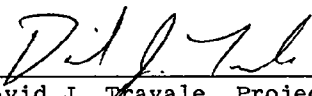
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CAMBRIDGE, MA 02142

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16. Abstract A 30/15 mph 90° Impact (Moving Deformable Barrier) Test was conducted on the subject 1991 Geo Tracker in accordance with the specifications of the Test Procedure TP-214D-02. The test was conducted at the Calspan Corporation Advanced Technology Center Crash Test Facility in Buffalo, New York, on June 17, 1993. The Moving Deformable Barrier (MDB) honeycomb top height was raised to 40 inches for this test. One SID was placed in the driver seating position. The impact velocity of the MDB was 33.7 mph, and the ambient temperature at the struck side (driver's) of the target vehicle at the time of impact was 78°F. The target vehicle post-test maximum crush was 16.5 inches at level 3. The MDB struck the vehicle 0.2 inches forward of the target. The test or target vehicle's performance is given below: <table border="0"> <tr> <td></td> <td style="text-align: center;"><u>Driver SID</u></td> </tr> <tr> <td>Left Upper Rib Acceleration</td> <td>138.7 g's</td> </tr> <tr> <td>Left Lower Rib Acceleration</td> <td>121.3 g's</td> </tr> <tr> <td>Upper Spine Acceleration</td> <td>103.3 g's</td> </tr> <tr> <td>Lower Spine Acceleration</td> <td>122.5 g's</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td>130.6 g's</td> </tr> <tr> <td>Pelvis Acceleration</td> <td>153.4 g's</td> </tr> </table> The door on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite door did not open during side impact event. No fuel leaked from the vehicle following the test nor during static rollover.							<u>Driver SID</u>	Left Upper Rib Acceleration	138.7 g's	Left Lower Rib Acceleration	121.3 g's	Upper Spine Acceleration	103.3 g's	Lower Spine Acceleration	122.5 g's	Thoracic Trauma Index (TTI)	130.6 g's	Pelvis Acceleration	153.4 g's
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TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	PURPOSE AND TEST PROCEDURE	1-1
2	SUMMARY OF SIDE IMPACT TEST	2-1
3	OCCUPANT AND VEHICLE INFORMATION	3-1
APPENDIX A	PHOTOGRAPHS	A-1
APPENDIX B	DATA PLOTS	B-1
APPENDIX C	SID CONFIGURATION AND PERFORMANCE VERIFICATION	C-1

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	PRE-TEST CONDITIONS	3-4
2	PRE- AND POST-TEST MEASUREMENTS	4-3
3	SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS	4-4
4	SIDE IMPACT DUMMY (SID) LATERAL CLEARANCE DIMENSIONS	4-5
5	VEHICLE SIDE MEASUREMENT	4-6
6	VEHICLE EXTERIOR STATIC CRUSH	4-8
7	TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY	4-14
8	MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS	4-16
9	HIGH SPEED CAMERA LOCATIONS AND DATA	4-17

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1	GENERAL TEST AND VEHICLE PARAMETER DATA	3-2
2	TEST VEHICLE DATA	3-3
3	CRASH TEST SUMMARY FOR TEST VEHICLE	3-5
4	CRASH TEST SUMMARY FOR SIDE IMPACTOR	3-6
5	POST-TEST OBSERVATIONS	3-7
6	SIDE IMPACT DUMMY (SID) TEST DATA SUMMARY	4-2
7	TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH DATA	4-8
8	EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR	4-13
9	TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY	4-15
10	FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA	4-18
11	FMVSS 301 STATIC ROLLOVER DATA SHEET	4-19

Section 1

PURPOSE AND TEST PROCEDURE

This side impact test is part of a Side Impact Protection Study Program sponsored by the National Highway Traffic Safety Administration (NHTSA) through the Research and Special Programs Administration, Volpe National Transportation Systems Center under Contract No. DTRS57-90-C-00104 (TTD #6). The purpose of this test was to evaluate side impact protection of a 1991 Geo Tracker MPV.

The side impact test was conducted in accordance with FMVSS 214D Side Impact Test procedure TP-214D-02, with modifications to the Moving Deformable Barrier (MDB).

Section 2

SUMMARY OF SIDE IMPACT TEST

A stationary 1991 Geo Tracker 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 33.7 mph on June 17, 1993. The orientation angle of the striking vehicle was 90° counterclockwise with respect to the longitudinal axis of the struck vehicle. Pre- and post-test photographs of the test vehicle, the moving deformable barrier (MDB), and the side impact dummies (SIDs) are shown in Appendix A.

Side Impact test procedure TP-214D-02 was used to prepare this test with the following modifications to the crabbed MDB. The top of the aluminum honeycomb face was raised 7 inches from the nominal 33 inch position to a 40 inch height.

One restrained Side Impact Dummy (SID) was placed in the driver (Pos. #1) designated seating position according to instructions specified in the TP-214D-02 Side Impact Test Procedure which is dated June 17, 1993. The side impact event was documented by ten high speed cameras. Camera locations and other pertinent camera information can be found in this report.

The SIDs were instrumented with the following accelerometers.

1. Left Upper Rib (LUR) uniaxial accelerometer (Y-direction)
2. Left Lower Rib (LLR) uniaxial accelerometer (Y-direction)
3. Upper Thoracic Spine (T₁) uniaxial accelerometer (Y-direction)
4. Lower Thoracic Spine (T₁₂) uniaxial accelerometer (Y-direction)
5. Head assembly triaxial accelerometer (X,Y,Z-directions)
6. Pelvic (PEV) section uniaxial accelerometer (Y-direction)

A summary of the side impact dummy (SID) configuration and performance verification test data can be found in Appendix C.

The SID Thorax and pelvis was first contacted by the incoming door. The SID rotated toward the MDB contacting its head on the top of the honeycomb face. The SID then rotated inboard toward the test vehicle center.

The SID driver HIC was not calculated as a result of questionable data after 43 msec. The Thoracic Trauma Index (TTI) of 130.6 g's occurred before 43 msec. Maximum pelvic Y acceleration was 153.3 g's.

Two anomalies occurred during the test. The driver lower spine Y primary accelerometer contained what appeared to be a mechanical spike superimposed on the actual data. For this reason the lower spine Y redundant data channel was used to calculate TTI. The second anomaly occurred as a result of accelerometer wires which were cut on the "B" pillar. The cut wires caused a data shift in all the channels after 43 milliseconds.

A total of 38 channels of data were recorded. Appendix B contains the vehicle and dummy response data traces.

No fuel leaked from the vehicle during the test nor during the static rollover

Section 3

SUMMARY OF TEST RESULTS

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1991 Geo Tracker 2 Door MPV
 Vehicle NHTSA No.: - VIN: 2CNBJ18UOM6923476
 Vehicle Body Color: Red Month & Year of Manufacture: -
 Engine Data: 4 cylinders; - CID; 1.6 Liters; - cc
 Placement X Longitudinal; or - Lateral
 Transmission: 5 speed; X Manual; - Automatic; - Overdrive
 Final Drive: - Rear Wheel Drive; - Front Wheel Drive; X Four Wheel Drive
 Odometer Reading 21465 miles
 Options: - A/C; X Power Steering.; X Pwr. Brakes; - Pwr. Windows

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 35 psi FRONT
35 psi REAR
 Recommended Tire Size: P205/75R15
 Tires on Test Vehicle: P205/75R15; Manufacturer: BF Goodrich
 Vehicle Capacity Data:
 Number of Occupants: 2 Front; 2 Rear; - 3rd Seat - Total
 Type of Front Seats: X Bucket; - Bench; - Split Bench
 Type of Front Seat Back: - Fixed; X Adjustable with X Lever
 Vehicle Maximum Capacity Loading = 800 lbs. (A)
 No. of Occupants x 150 lbs. = 600 lbs. (B)
 Cargo Capacity (A-B) = 200 lbs. 300 lbs. to match
 RK0504 test

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front = 630 lbs. Right Rear = 560 lbs.
 Left Front = 670 lbs. Left Rear = 530 lbs.
 TOTAL FRONT = 1300 lbs. TOTAL REAR = 1090 lbs.
 % of Total Vehicle Weight = 54.4 %; % of Total Weight = 45.6 %
 TOTAL WEIGHT = 2390 lbs.

Table 2

TEST VEHICLE DATA

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids = 2390 lbs.
 Maximum Cargo Carrying Capacity of Test Vehicle = 300 lbs.
 Weight of 1 Side Impact Dummy (168 lbs.) = 168 lbs.
 TEST VEHICLE TARGET WEIGHT: = 2858 lbs. *2845 lbs

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO:

Right Front = 730 lbs. Right Rear = 710 lbs.
 Left Front = 690 lbs. Left Rear = 720 lbs.
 TOTAL FRONT = 1420 lbs. TOTAL REAR = 1430 lbs.
 % of Total Weight = 49.8 % % of Total Weight = 50.2 %
 TOTAL TEST WEIGHT = 2850 lbs.

TEST VEHICLE ATTITUDE (all dimensions in inches):

AS DELIVERED:

right front 30.7 left front 30.3 right rear 32.0 left rear 31.5

FULLY LOADED:

right front 30.0 left front 29.8 right rear 30.1 left rear 29.8

READY FOR TEST:

right front 30.0 left front 30.1 right rear 30.5 left rear 31.0

Test Vehicle Wheelbase: 86.7 inches

C.G. = 43.5 inches rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

	Pre-Test	Post-Test
Right Side =	<u>136.4</u> inches	<u>137.9</u> inches
Left Side =	<u>136.5</u> inches	<u>137.1</u> inches
Centerline =	<u>139.1</u> inches	<u>139.2</u> inches

*Test weight to duplicate NHTSA Test No. RK0504.

Figure 1
PRE-TEST CONDITIONS

VEHICLE IDENTIFICATION:

Vehicle: 1991 Geo Tracker 2-Door MPV

NHTSA No. -

FRONT SEAT CUSHION PLACEMENT: Seat in mid-position of 13 total detents

Total Length of Adjustment Travel: 7.6 inches

Total Number of Adjustment Positions or Detents: 13

FRONT SEAT BACK ADJUSTMENT POSITION: 3rd notch from full upright (full upright = 0)

Seat Back Torso Angle = 25 degrees

SECOND POSITION SEAT:

Total Length of Fore/Aft Adjustment Travel: not adjustable inches

Seat Back Adjustment Position: not adjustable

ADJUSTABLE STEERING COLUMN POSITION:

steering column is not adjustable

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:

10.3 liters (92 to 94% of Usable Capacity)

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

Wheelbase: = 86.7 inches

Impact Point is 6.35 inches rearward of front axle centerline
(which is 37 inches forward of the wheelbase midpoint)

Table 3

CRASH TEST SUMMARY FOR TEST VEHICLEVEHICLE IDENTIFICATION:Vehicle Year/Make/Model: 1991 Geo Tracker 2-Door MPVBody Style: 4-Wheel Drive VIN: 2CNBJ18UOM6923476NHTSA No.: - Test Date: June 17, 1993Overall Length = 139.1 inches; Overall Width = 64.2 inchesTEST WEIGHT:Left Front = 690 lbs. Left Rear = 720 lbs.Right Front = 730 lbs. Right Rear = 710 lbs.TOTAL FRONT = 1320 lbs. TOTAL REAR = 1430 lbs.TOTAL VEHICLE WEIGHT 2750 lbs.Wheelbase = 86.7 inchesLongitudinal C.G. from Center of Front Axle = 46.9 inchesImpact Angle with Respect to Impactor = 90 degreesMAXIMUM EXTERIOR STATIC CRUSH:1. LEVEL 1 (13.5 in. above ground) = 8.6 inches2. LEVEL 2 (27.3 in. above ground) = 16.3 inches3. LEVEL 3 (28.8 in. above ground) = 16.5 inches4. LEVEL 4 (41.0 in. above ground) = 10.9 inches5. LEVEL 5 (61.3 in. above ground) = 3.7 inchesMaximum Post-Test Intrusion = 16.5 inchesOCCUPANTS:Front PassengerRear PassengerType of Dummy SID NoneRestraints Used 3-Point Manual Seat Belt N/AINSTRUMENTATION:Number of Vehicle Data Channels: = 16Number of Cameras: Onboard = 2Offboard = 5TOTAL = 7

Table 4

CRASH TEST SUMMARY FOR SIDE IMPACTOR

POSITION OF IMPACT (MDB) ON MONORAIL:

Crabbed 27° to left

MDB DETAILS:

Overall Width of Framework Carriage	=	<u>49.25</u> inches
Overall Length of MDB (incl. honeycomb impact face)	=	<u>162.0</u> inches
Wheelbase of Framework Carriage	=	<u>102.0</u> inches
Tread of Framework Carriage (Front & Rear)	=	<u>74.0</u> inches
C.G. Location Rearward of Front Axle	=	<u>45.1</u> inches

MDB WEIGHT (measured in crabbed position)

Left Front	=	<u>1000</u> lbs.	Left Rear	=	<u>490</u> lbs.
Right Front	=	<u>880</u> lbs.	Right Rear	=	<u>590</u> lbs.
TOTAL FRONT	=	<u>1880</u> lbs.	TOTAL REAR	=	<u>1080</u> lbs.

TOTAL MDB WEIGHT 2960 lbs.

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

Impact Speed = 33.7 mph

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

- | | | |
|--------------------------------|---|-------------------|
| 1. Row A at Bumper Level | = | <u>3.4</u> inches |
| 2. Row B at Mid-Stack Level | = | <u>2.1</u> inches |
| 3. Row C at Top of Stack Level | = | <u>2.9</u> inches |

INSTRUMENTATION:

Number of MDB Data Channels = 6

BARRIER HEIGHT:

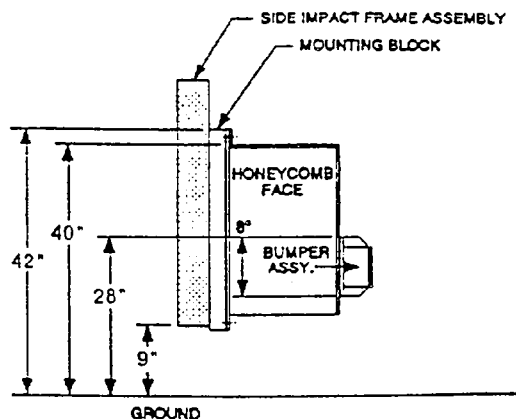


Table 5
POST-TEST OBSERVATIONS

TEST VEHICLE: 1991 Geo Tracker NHTSA No. -

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head	<u>Left forehead with barrier top</u>	<u>N/A</u>
Chest	<u>Left front door</u>	<u>N/A</u>
Abdomen	<u>Left front door</u>	<u>N/A</u>
Left Knee	<u>Left front door</u>	<u>N/A</u>
Right Knee	<u>-</u>	<u>N/A</u>

DOOR OPENING:

	<u>LEFT SIDE</u>	<u>RIGHT SIDE</u>
Front	<u>Closed</u>	<u>Closed</u>
Rear	<u>N/A</u>	<u>N/A</u>

MDB DISTANCE FROM TARGET IMPACT POINT: 0.2 inches forward of target.

ARM REST LOCATIONS:

Front: Arm rest at abdomen level, above pelvis and below thorax.
 Rear: N/A

SEAT MOVEMENT:

Driver bucket seat moved inboard.

GLAZING DAMAGE:

Left front door glass broken. Left side of windshield severely cracked.

PILLAR FAILURE:

None

SILL SEPARATION:

Sill rolled inboard. Pinch weld by left "B" pillar separated.

OTHER NOTABLE IMPACT EFFECTS:

Left side of instrument panel buckled and deformed.
Right side "B" pillar.

Section 4

OCCUPANT AND VEHICLE INFORMATION

Table 6

SIDE IMPACT DUMMY (SID) TEST DATA SUMMARYVehicle: 1991 Geo Tracker Test Date: June 17, 1993

	Front Dummy ID #904				Rear Dummy ID # N.A.			
	Pos. Direct.		Neg. Direct		Pos. Direct.		Neg. Direct	
	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
HEAD ACCELERATIONS:								
Longitudinal X	*				-			
Lateral Y	*				-			
Vertical Z	*				-			
RESULTANT R	*				-			
HIC								
RIB ACCELERATIONS:**								
Upper Rib Lateral Y	138.7	28.8	*		-			
Upper Rib Lateral .. Y(R)	136.4	29.4	*		-			
Lower Rib Lateral Y	121.3	29.4	*		-			
Lower Rib Lateral .. Y(R)	121.2	29.4	*		-			
SPINE ACCELERATIONS:**								
Upper Lateral Y	103.3		*		-			
Upper Lateral Y(R)	98.7		*		-			
Lower Lateral Y	***		*		-			
Lower Lateral Y(R)	122.5		*		-			
PELVIC ACCELERATIONS:**								
Lateral Y	153.3		*		-			
Lateral Y(R)	155.4		*		-			

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: Y(R) denotes redundant Y direction accelerometer.

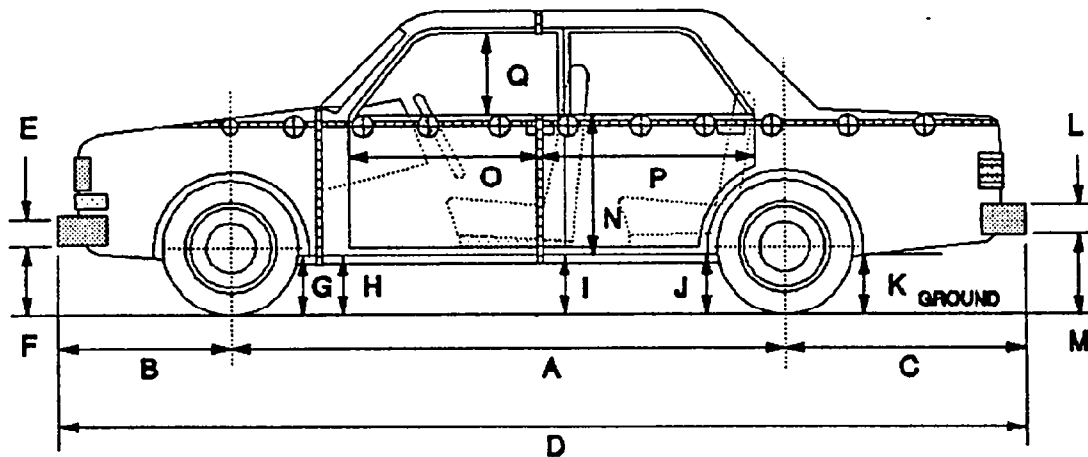
* - Data Questionable after 43 msec.

** - FIR filtered data

*** - Contained mechanical spike

Figure 2

PRE- AND POST-TEST MEASUREMENTS



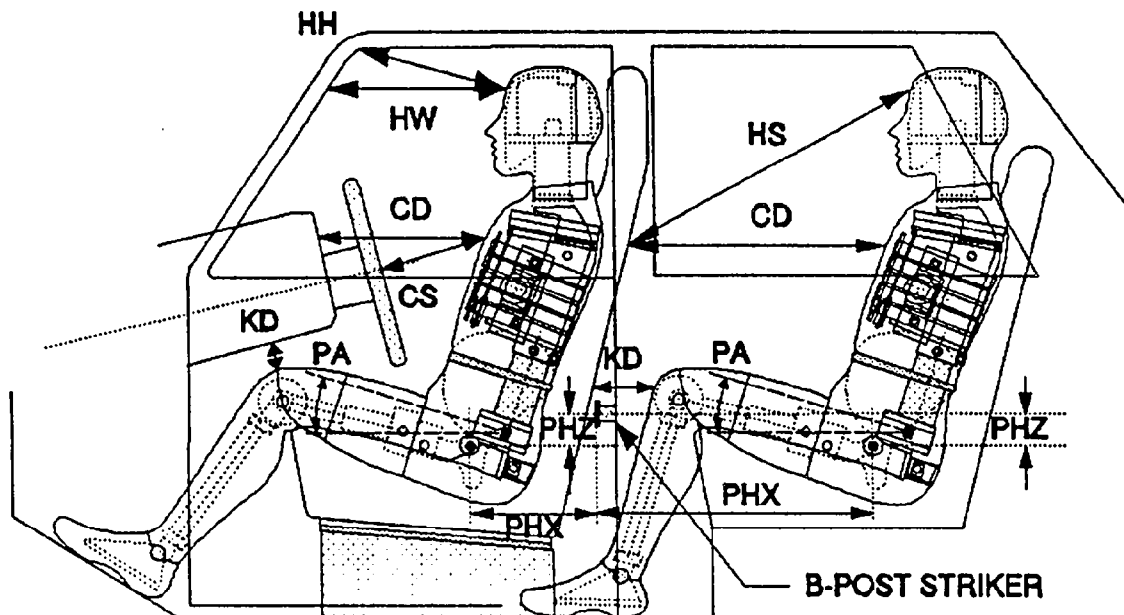
LEFT SIDE VIEW

NOTE: All dimensions are in inches

	PRE-TEST	POST-TEST	Δ CHANGE
A	86.6	86.4	0.2
B	25.2	25.1	0.1
C	26.2	26.0	0.2
D	139.1	139.2	0.1
E	4.4	4.4	0.0
F	18.7	18.7	0.0
G (Pinch Weld)	10.5	15.1	0.4
H	10.6	15.7	-5.1
I	11.3	15.7	-4.4
J	11.4	17.3	-5.9
K	12.8	12.8	0.0
L	10.0	10.0	0.0
M	15.7	15.7	0.0
N	27.0	22.4	4.6
O (Front of door)	18.2	18.0	0.2
P	NA	NA	NA
Q	18.9	19.2	0.3

Figure 3

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS



LEFT SIDE VIEW

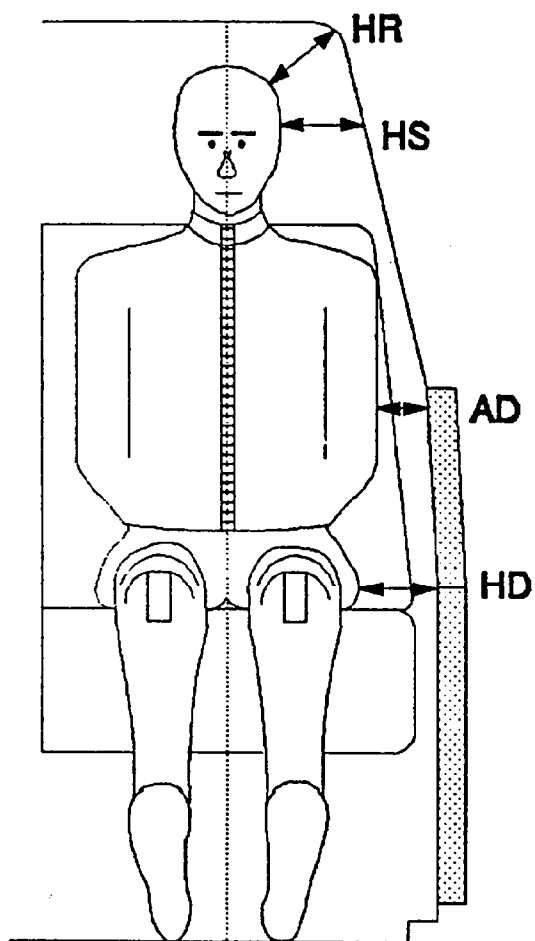
NOTE: All dimensions are in inches

	DRIVER ID # 904	LEFT REAR PASSENGER ID # -
HH	18.6	N/A
HW	24.3	N/A
HS	-	N/A
CD	21.8	N/A
CS	13.2	N/A
KDL	6.6	N/A
KDR	6.5	N/A
PA	23°	N/A
PHX	9.9	N/A
PHZ	3.0 below	N/A

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

Figure 4

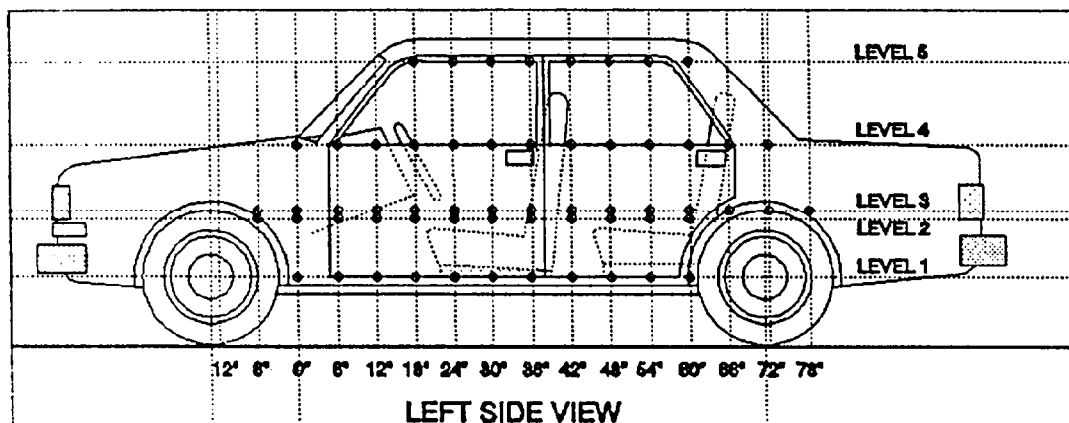
SIDE IMPACT DUMMY (SID) LATERAL CLEARANCE DIMENSIONS



NOTE: All dimensions are in inches

	DRIVER ID # 904	LEFT REAR PASSENGER ID # -
HR	8.0	N/A
HS	8.0	N/A
AD	2.3	N/A
HD	4.8	N/A

Figure 5
VEHICLE SIDE MEASUREMENT



Pre-Test Profile Measurements Along the Vertical 30" Line Shown Above:

30" Side Profile

Level 5 @ Window Top	=	<u>N/A</u>	inches
Level 4 @ Window Sill	=	<u>N/A</u>	inches
Level 3 @ Mid Door	=	<u>19.4</u>	inches
Level 2 @ Occupant H-Point	=	<u>19.5</u>	inches
Level 1 @ Axle Centerline Height (or Sill Top Height	=	<u>20.2</u>	inches

Measurement plane is 48 inches from test vehicle longitudinal centerline

Table 7

SIDE IMPACT CRUSH PROFILE

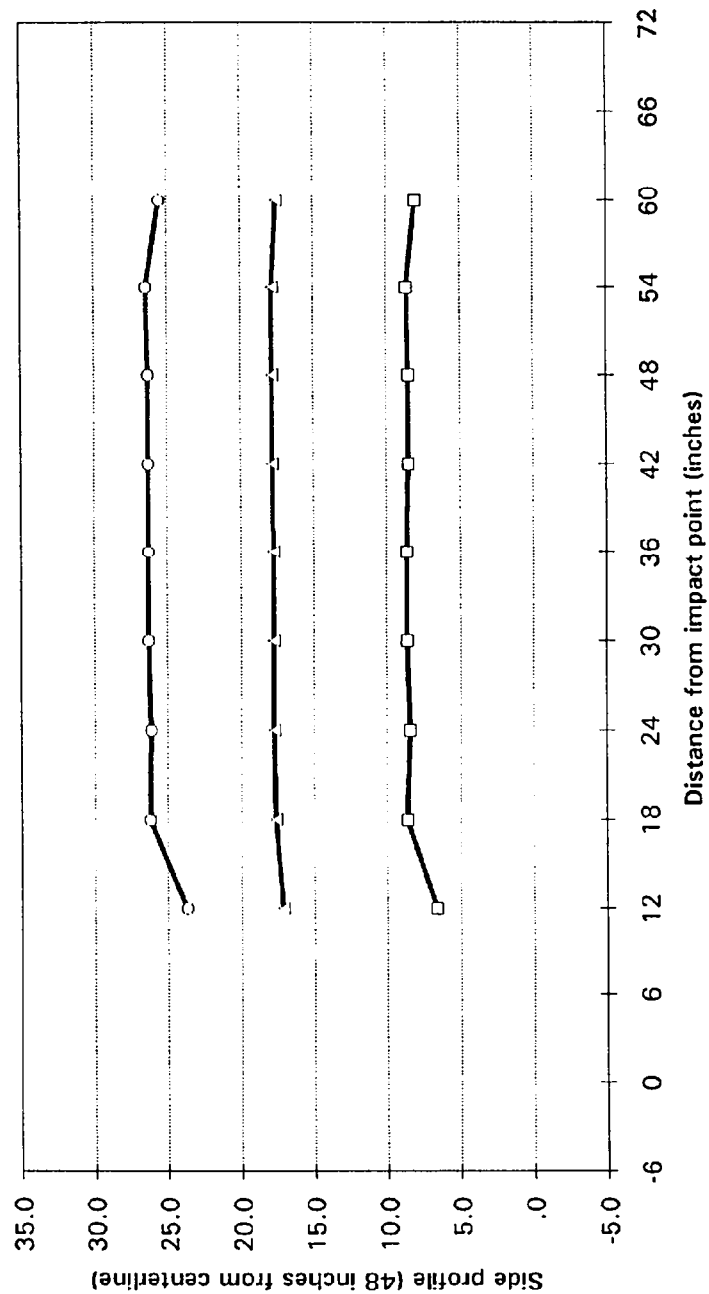
English units		Impact pt.															
		-6	0	6	12	18	24	30	36	42	48	54	60	66	72		
		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		
level 1	post-test	#N/A	#N/A	#N/A	23.7	26.2	26.1	26.3	26.3	26.3	26.3	26.3	25.5	#N/A	#N/A		
Height(in) =	pre-test	#N/A	#N/A	#N/A	17.1	17.6	17.7	17.7	17.7	17.8	17.8	17.8	17.5	#N/A	#N/A		
13.5	crush	#N/A	#N/A	#N/A	6.6	8.6	8.4	8.6	8.6	8.5	8.5	8.5	8.0	#N/A	#N/A		
level 2	post-test	#N/A	#N/A	29.9	30.8	32.0	32.2	32.3	32.6	32.6	32.8	32.8	33.1	32.5	#N/A		
Height(in) =	pre-test	#N/A	#N/A	16.1	16.8	17.2	17.1	17.0	17.0	17.1	17.1	17.1	17.1	16.2	#N/A		
27.3	crush	#N/A	#N/A	13.8	14.0	14.8	15.1	15.3	15.6	15.5	15.7	15.7	16.0	16.3	#N/A		
level 3	post-test	#N/A	#N/A	29.4	30.2	31.4	31.6	31.7	31.8	32.0	32.1	32.2	33.0	31.8	#N/A		
Height(in) =	pre-test	#N/A	#N/A	16.2	16.8	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	15.3	#N/A		
28.8	crush	#N/A	#N/A	13.2	13.4	14.3	14.5	14.6	14.7	14.9	15.0	15.1	15.9	16.5	#N/A		
level 4	post-test	#N/A	#N/A	#N/A	27.0	#N/A	#N/A	#N/A	28.4	28.4	28.7	29.1	29.3	29.5	29.0		
Height(in) =	pre-test	#N/A	#N/A	#N/A	19.1	#N/A	#N/A	#N/A	19.4	19.3	19.2	19.1	19.1	18.6	18.6		
41	crush	#N/A	#N/A	#N/A	7.9	#N/A	#N/A	#N/A	9.0	9.1	9.5	10.0	10.2	10.9	10.4		
level 5	post-test	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	27.5	27.2	26.9	26.7	29.0	#N/A	#N/A		
Height(in) =	pre-test	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	25.8	25.6	25.5	25.4	25.3	#N/A	#N/A		
61.3	crush	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1.7	1.6	1.4	1.3	3.7	#N/A	#N/A		

Figure 6

VEHICLE EXTERIOR STATUS CRUSH

SIDE PROFILE LEVEL 1

13.5 in. above ground level

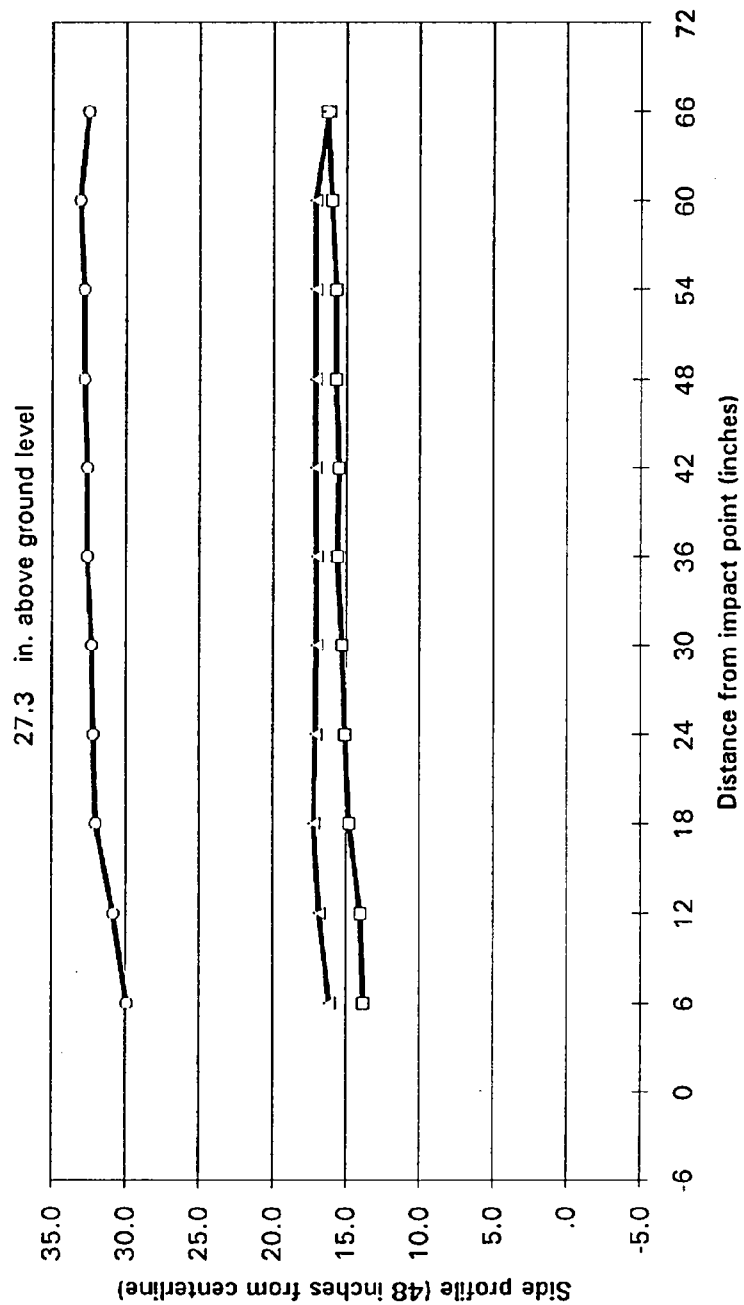


Note: All measurements in inches
Left side of vehicle only

Figure 6

VEHICLE EXTERIOR STATUS CRUSH (cont.)

SIDE PROFILE LEVEL 2

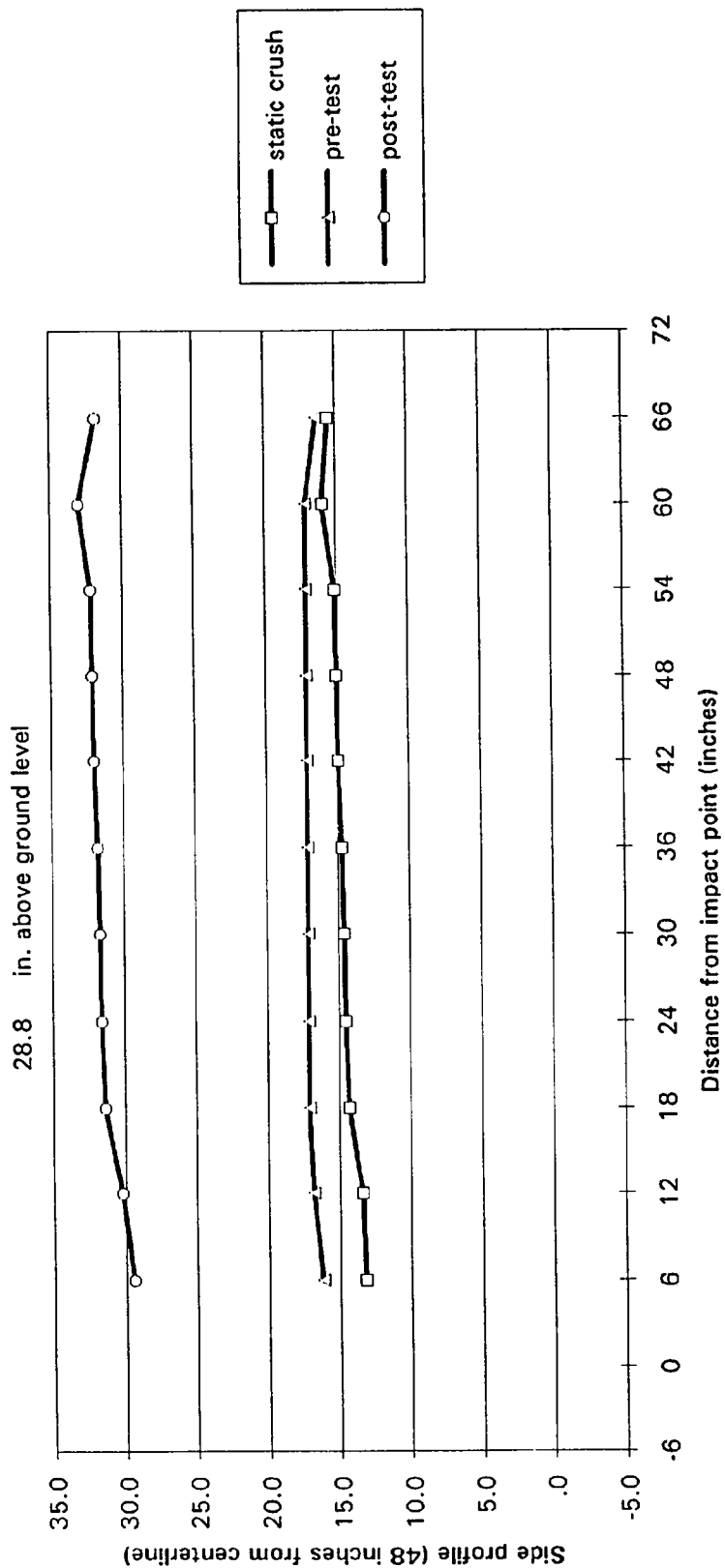


Note: All measurements in inches
Left side of vehicle only

Figure 6

VEHICLE EXTERIOR STATIC CRUSH (cont.)

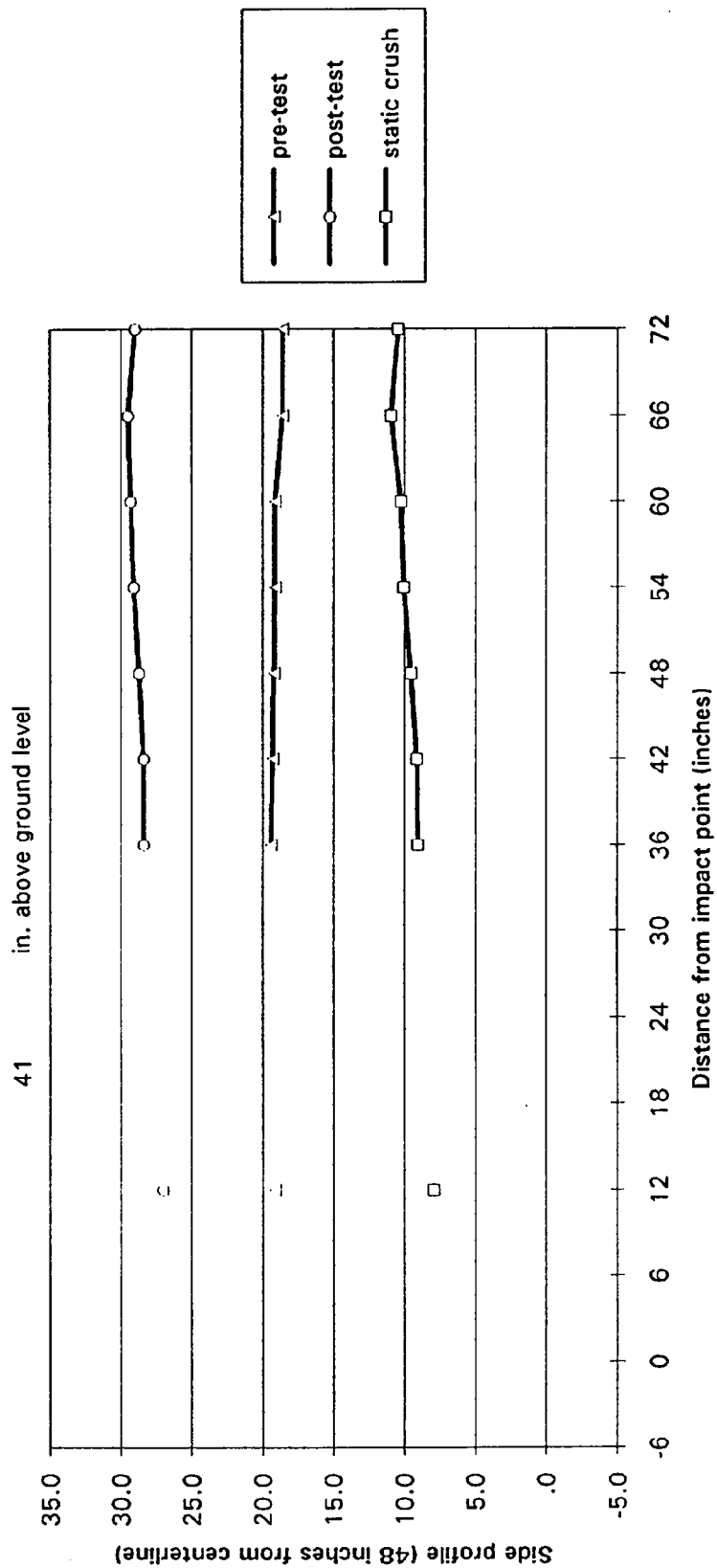
SIDE PROFILE LEVEL 3



Note: All measurements in inches
Left side of vehicle only

Figure 6
VEHICLE EXTERIOR STATIC CRUSH (cont.)

SIDE PROFILE LEVEL 4



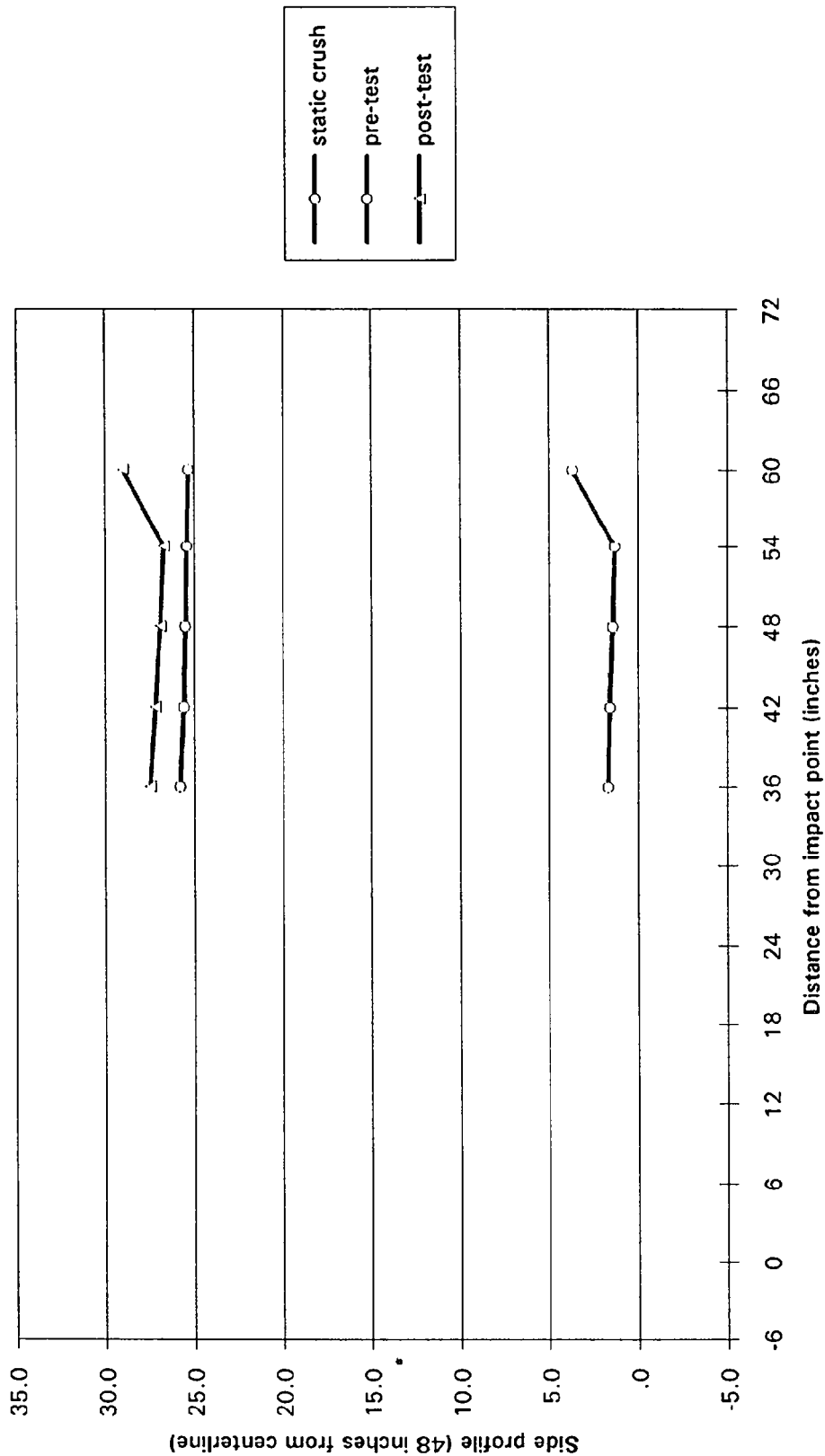
Note: All measurements in inches
 Left side of vehicle only

Figure 6

VEHICLE EXTERIOR STATIC CRUSH (cont.,)

SIDE PROFILE LEVEL 5

61.3 in. above ground level



Note: All measurements in inches
Left side of vehicle only

Table 8

EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

(Grid as looking at MDB from front.)

Test Date: June 17, 1993

Vehicle: 1991 Geo Tracker

Location	Height at C _L *	Distances Left of Center									Distances Right of Center							
		32"	28"	24"	20"	16"	12"	8"	4"		4"	8"	12"	16"	20"	24"	28"	32"
Top of Stack Level	39"	0.1	-0.2	0.0	-0.2	-0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.4	0.7	1.1	1.5	2.9	3.9
Mid-Stack Level	29"	0.5	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.5	0.5	0.6	0.7	0.8	0.9	1.2
Bumper Level	24"	1.8	1.2	0.8	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.6	0.7	0.8	0.9	0.9	1.9

*Heights measured above ground level.

**Impact side.

Figure 7

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 1991 Geo Tracker MPV

NHTSA No.: -

Test Date: June 17, 1993

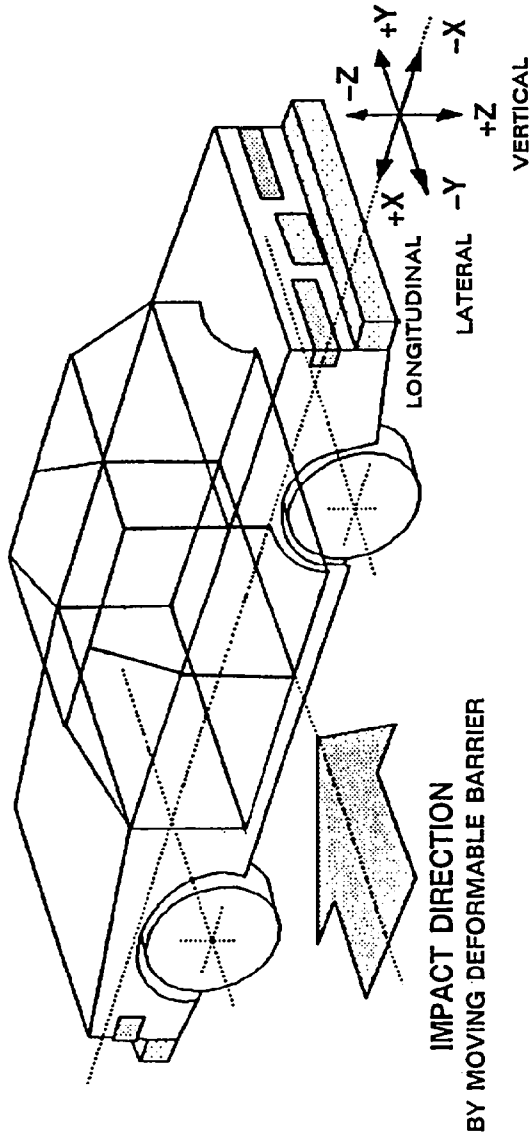


Table 9

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Accel. Time No.	Location	Coordinates (")			Long. (X) Pos./Neg.		Lat. (Y) Pos./Neg.		Vert. (Z) Pos./Neg.		Resultant Pos./Neg.	
		X*	Y*	Z*	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Tim (msec)	Max (g)	(msec)
1	Right Front Sill at Front Seat	82.0	22.5	16.0	7/ **	23/ **	**	**	11/ 24	**	-	-
2	Right Rear Sill at Rear Seat	-	-	-	-	-	-	-	-	-	-	-
3	Rear Floorpan Above Axle	26.7	3.5	28.0	**	**	**	**	**	**	-	-
4	Left Side Sill at Rear Seat	-	-	-	-	-	-	-	-	-	-	-
5	Left Side Sill at Front Seat	81.6	-22.5	16.0	-	-	111/ -98	3/ 8	-	-	-	-
6	Left Front Door on Centerline	74.9	-25.9	28.7	-	-	180/ -124	9/ 16	-	-	-	-
7	Right Rear Occupant Compartment	-	-	-	-	-	-	-	-	-	-	-
8	Midrear of Left Front Door	62.5	-25.9	30.5	-	-	163/ **	6/ **	-	-	-	-
9	Left Front Door Upper Centerline	70.2	-25.9	37.3	-	-	113/ **	11/ **	-	-	-	-
10	Midrear of Left Rear Door	-	-	-	-	-	-	-	-	-	-	-
11	Left Rear Door Upper Centerline	-	-	-	-	-	-	-	-	-	-	-
12	Left Upper A-Pillar	92.8	-23.8	25.3	-	-	171/ **	3/ **	-	-	-	-
13	Left Lower A-Pillar	92.8	23.8	19.8	-	-	135/ **	3/ **	-	-	-	-
14	Left Upper B-Pillar	50.8	-24.8	34.3	-	-	**	**	-	-	-	-
15	Left Lower B-Pillar	51.0	24.8	24.2	-	-	200/ **	2/ **	-	-	-	-

*Reference: X - Rear Bumper (+ Forward)

Y - Vehicle Centerline (+ To right)

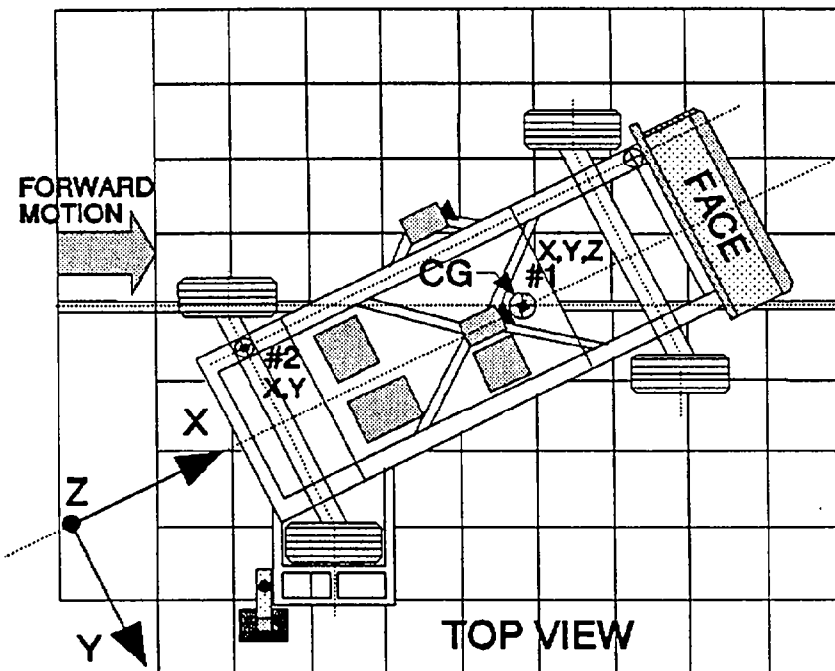
Z - Ground Level (+ Up)

**Data Questionable After 43 msec

Figure 8

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS

Test Vehicle: 1991 Geo Tracker MPV Test Date: June 17, 1993



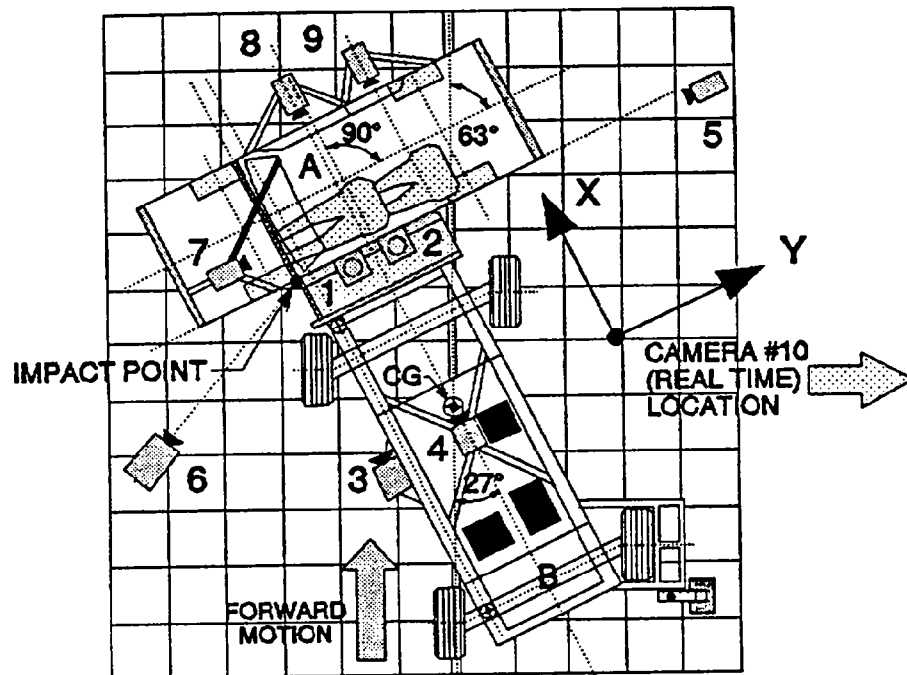
Accel. No.	Location	Coordinates (in)			Pos. Direct.		Neg. Direct.	
		X*	Y*	Z*	Max (g)	Time (msec)	Max (g)	Time (msec)
1	MDB Center of Gravity							
	Longitudinal ... X				**	**	-15.0	21.6
	Lateral Y				**	**	-2.7	29.9
	Vertical Z	73.7	0.8	13.2	18.2	19.9	-12.5	37.9
	Resultant R							
2	Rear Frame Member							
	Longitudinal ... X				**	**	-19.5	27.1
	Lateral Y	14.9	-25.0	25.1	5.9	28.6	**	**

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

**Data Questionable After 43 msec.

Figure 9

HIGH SPEED CAMERA LOCATIONS AND DATA



Camera No.	View	Coordinates (mm)			Angle	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Overhead Overall View	22	44	386	-90	13	575
2	Overhead Closeup View of Impact	16	38	386	-90	25	595
3	MDB Onboard Closeup of Impact	-	-	-	-	8	545
4	MDB Onboard View of Dummy	-	-	-	-	8	535
5	Right Side Ground Overall View	0	339	43	0	13	N.T.
6	Left Side Ground Overall View	-28	-278	41	-2	25	605
7	Test Vehicle Onboard Driver Front View	20	-6	57	-14	13	605
8	Test Vehicle Onboard Driver Side View	73	42	53	-18	8	570
9	Test Vehicle Onboard Passenger Side View	-	-	-	-	-	-
10	Real Time	-	-	-	-	-	24

*Reference: (from point of impact)
 +X = Forward
 +Y = To Right
 +Z = Upward

FMVSS NO. 301

--	--	--	--	--	--

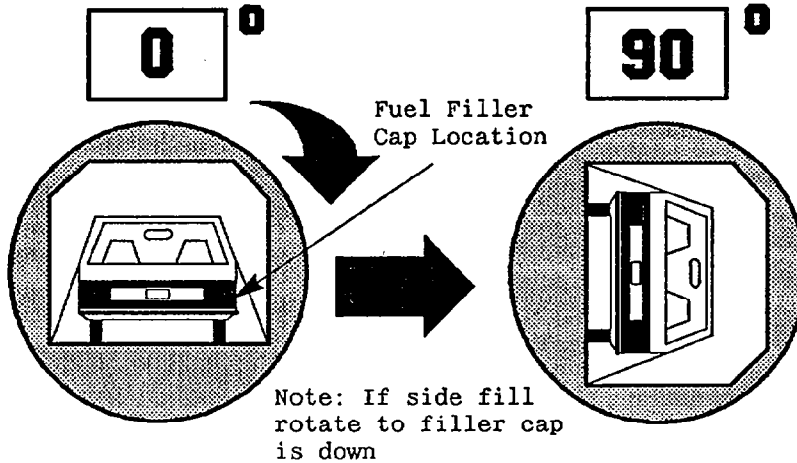
Test vehicle fuel tank filled to 92% to 94% of manufacturer's "usable" capacity and with electric fuel pump operating (if it will operate without engine operation). Part 572 test dummies located at each front designated seating position.

8109-3

Table 11
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:

Vehicle NHTSA ID No.: _____



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 05 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 00 seconds

TOTAL 7 minutes 05 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

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

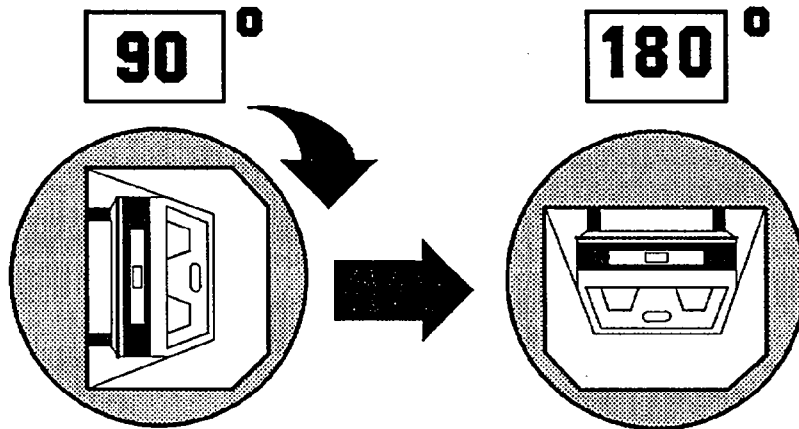
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 11
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.: _____



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time _____ 2 _____ minutes _____ 00 _____ seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + _____ 5 _____ minutes _____ 00 _____ seconds

TOTAL _____ 7 _____ minutes _____ 00 _____ seconds

Next whole minute interval _____ 7 _____ minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A
---	---	---	-----

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

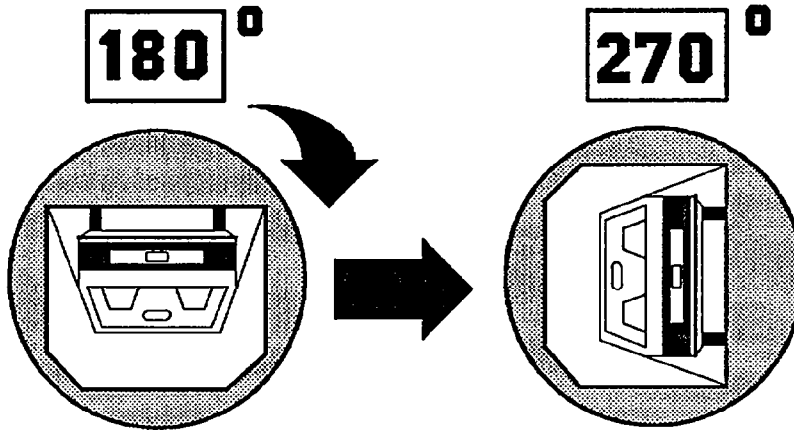
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 11
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.: _____



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time _____ 1 _____ minutes _____ 55 _____ seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + _____ 5 _____ minutes _____ 00 _____ seconds

TOTAL _____ 6 _____ minutes _____ 55 _____ seconds

Next whole minute interval _____ 7 _____ minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A
---	---	---	-----

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

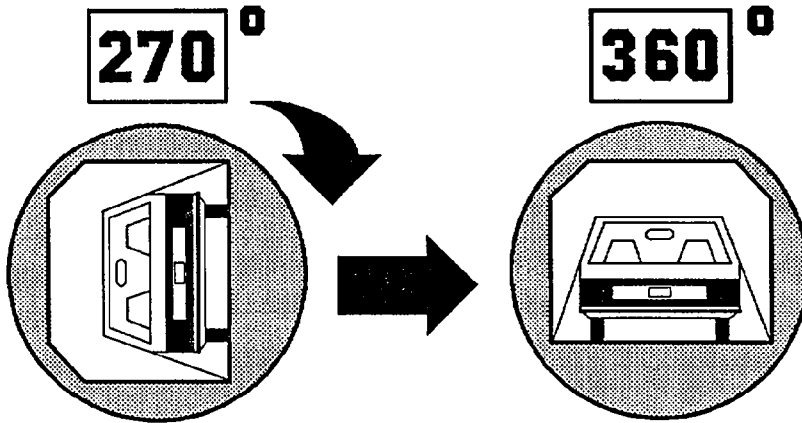
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 11
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.: _____



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time _____ 2 _____ minutes _____ 05 _____ seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + _____ 5 _____ minutes _____ 00 _____ seconds

TOTAL _____ 7 _____ minutes _____ 05 _____ seconds

Next whole minute interval _____ 8 _____ minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

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

IV. SOLVENT SPILLAGE LOCATION(S):

None

Appendix A
PHOTOGRAPHS

LIST OF PHOTOGRAPHS

<u>Figure</u>	<u>Photograph Title</u>	<u>Page No.</u>
Figure A-1	PRE-TEST OVERHEAD VIEW OF TEST VEHICLE	A-3
Figure A-2	POST-TEST OVERHEAD VIEW OF TEST VEHICLE	A-4
Figure A-3	PRE-TEST FRONT VIEW OF TEST VEHICLE	A-5
Figure A-4	POST TEST FRONT VIEW OF TEST VEHICLE	A-6
Figure A-5	PRE-TEST REAR VIEW OF TEST VEHICLE	A-7
Figure A-6	POST-TEST REAR VIEW OF TEST VEHICLE	A-8
Figure A-7	PRE-TEST LEFT SIDE VIEW OF TEST VEHICLE	A-9
Figure A-8	POST-TEST LEFT SIDE VIEW OF TEST VEHICLE	A-10
Figure A-9	PRE-TEST LEFT FRONT THREE QUARTER VIEW	A-11
Figure A-10	POST-TEST LEFT FRONT THREE QUARTER VIEW	A-12
Figure A-11	PRE-TEST LEFT REAR THREE QUARTER VIEW	A-13
Figure A-12	POST-TEST LEFT REAR THREE QUARTER VIEW	A-14
Figure A-13	PRE-TEST MDB AND VEHICLE LEFT SIDE FRONT VIEW	A-15
Figure A-14	POST-TEST MDB AND VEHICLE LEFT SIDE FRONT VIEW	A-16
Figure A-15	PRE-TEST MDB AND VEHICLE LEFT SIDE REAR VIEW	A-17
Figure A-16	POST-TEST MDB AND VEHICLE LEFT SIDE REAR VIEW	A-18
Figure A-17	POST-TEST VEHICLE TOP VIEW	A-19
Figure A-18	PRE-TEST MDB TOP VIEW	A-20
Figure A-19	POST-TEST MDB TOP VIEW	A-21
Figure A-20	PRE-TEST MDB FRONT VIEW	A-22
Figure A-21	POST-TEST MDB FRONT VIEW	A-23
Figure A-22	PRE-TEST MDB LEFT SIDE VIEW	A-24
Figure A-23	POST-TEST MDB LEFT SIDE VIEW	A-25
Figure A-24	PRE-TEST MDB RIGHT SIDE VIEW	A-26
Figure A-25	POST-TEST MDB RIGHT SIDE VIEW	A-27
Figure A-26	PRE-TEST POS. #1 DUMMY LEFT SIDE VIEW	A-28
Figure A-27	POST-TEST POS. #1 DUMMY LEFT SIDE VIEW	A-29
Figure A-28	PRE-TEST POS. #1 DUMMY RIGHT SIDE VIEW	A-30
Figure A-29	POST-TEST POS. #1 DUMMY RIGHT SIDE VIEW	A-31
Figure A-30	PRE-TEST DOOR THICKNESS	A-32
Figure A-31	POST-TEST VEHICLE INTERIOR	A-33
Figure A-32	IMPACT PHOTO	A-34



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

A-3

8109-3

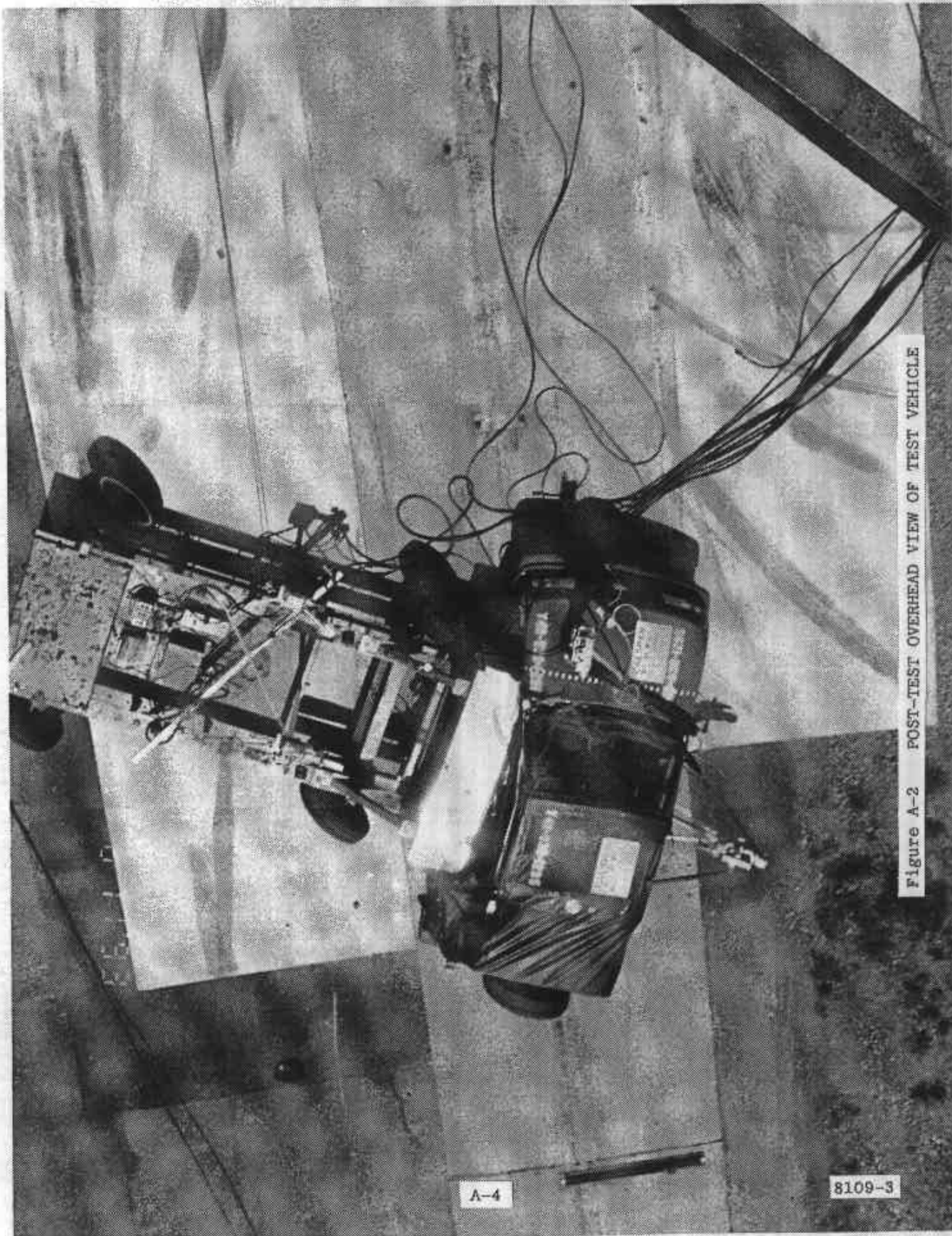


Figure A-2 POST-TEST OVERHEAD VIEW OF TEST VEHICLE

A-4

8109-3

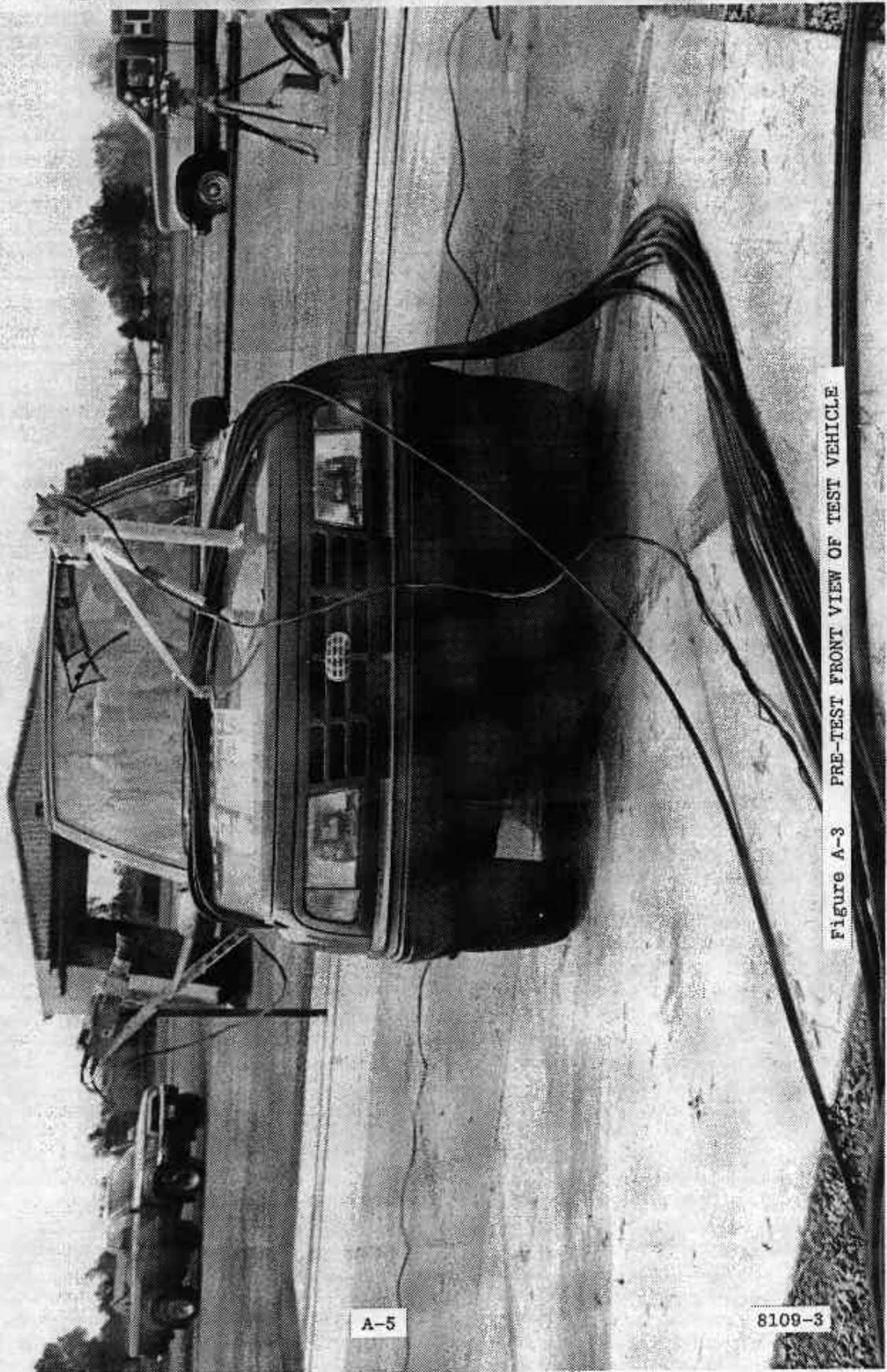


Figure A-3 PRE-TEST FRONT VIEW OF TEST VEHICLE

A-5

8109-3

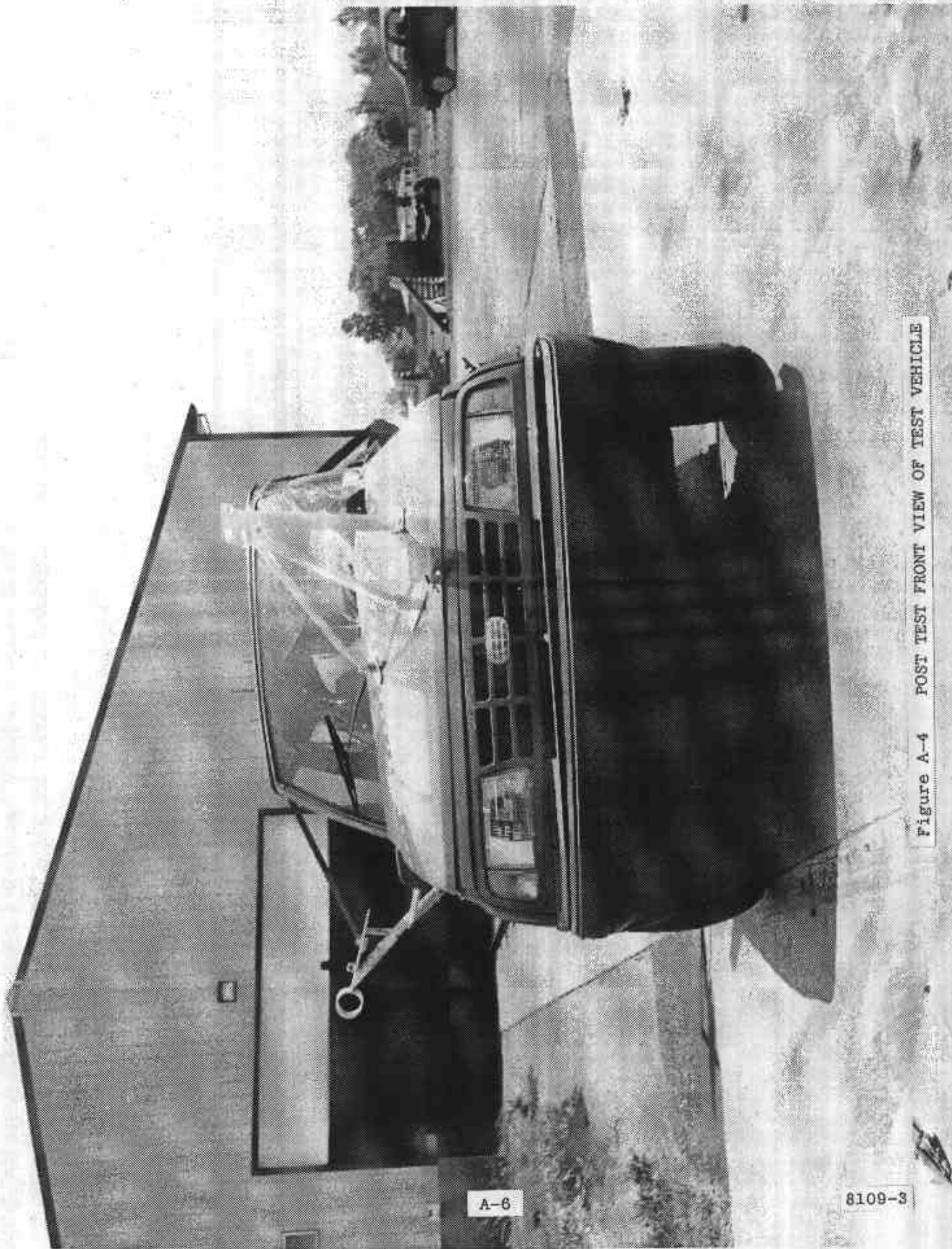


Figure A-4 POST TEST FRONT VIEW OF TEST VEHICLE

A-6

8109-3



Figure A-5 PRE-TEST REAR VIEW OF TEST VEHICLE

A-7

8109-3



Figure A-6 POST-TEST REAR VIEW OF TEST VEHICLE

A-8

8109-3

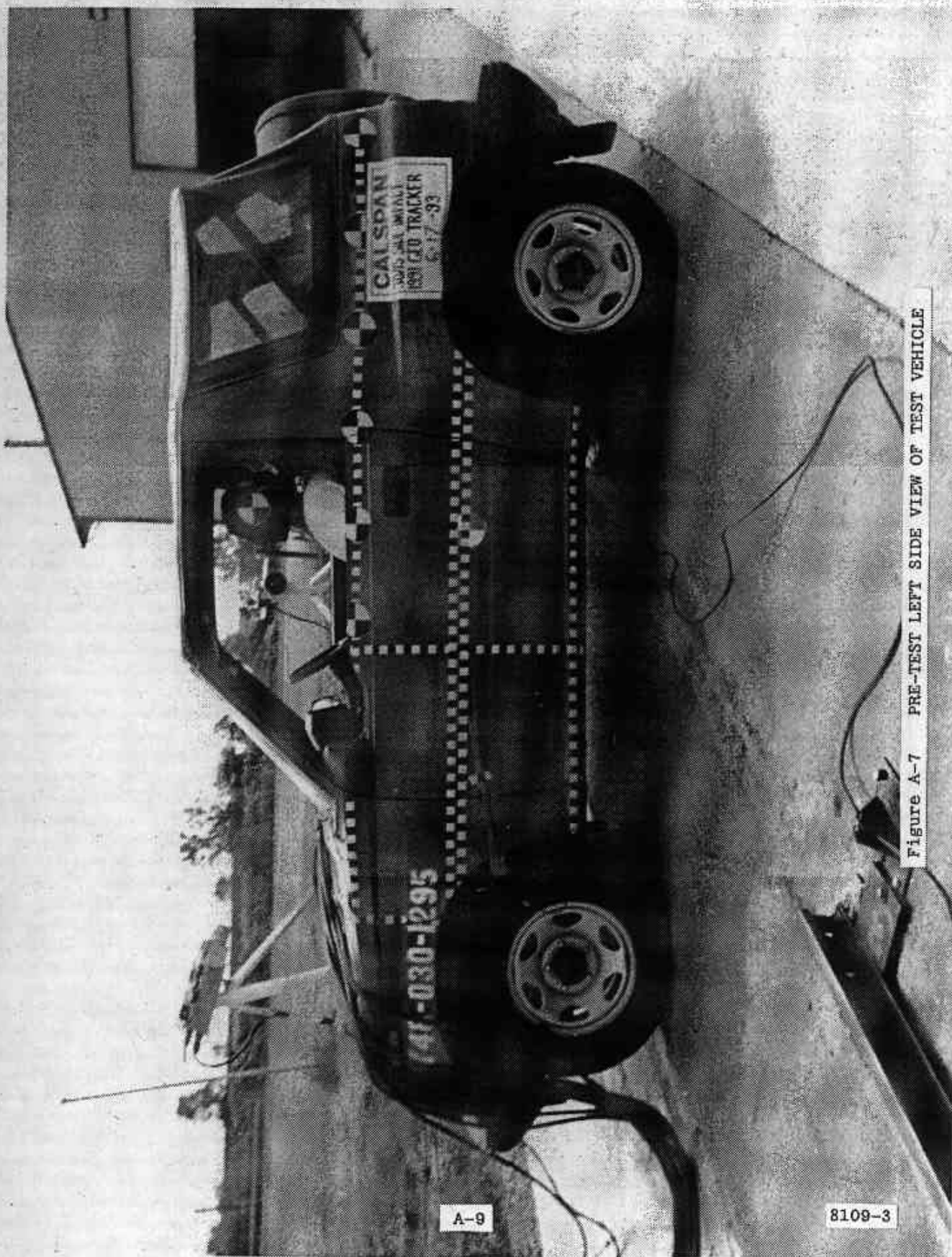


Figure A-7 PRE-TEST LEFT SIDE VIEW OF TEST VEHICLE

A-9

8109-3

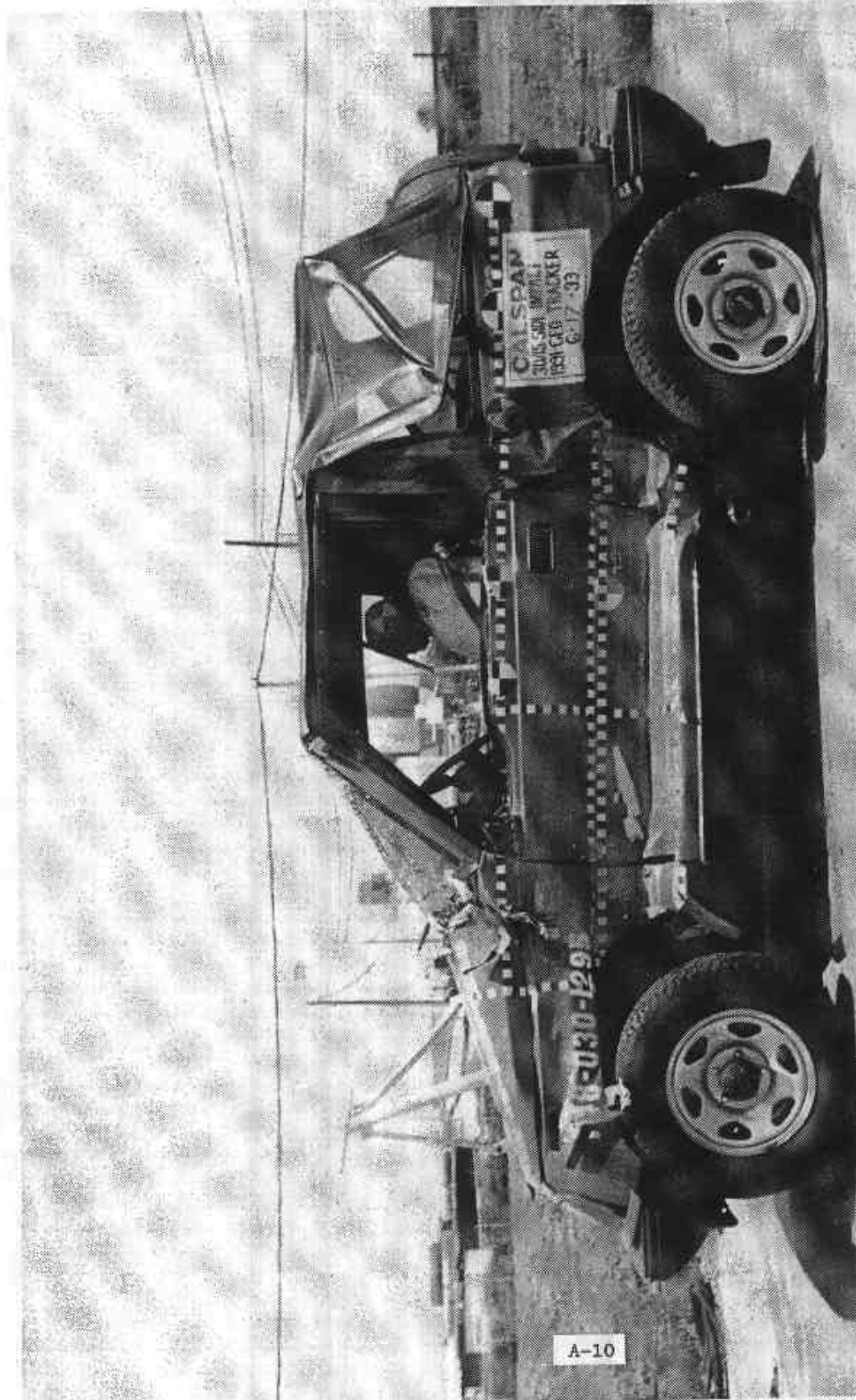
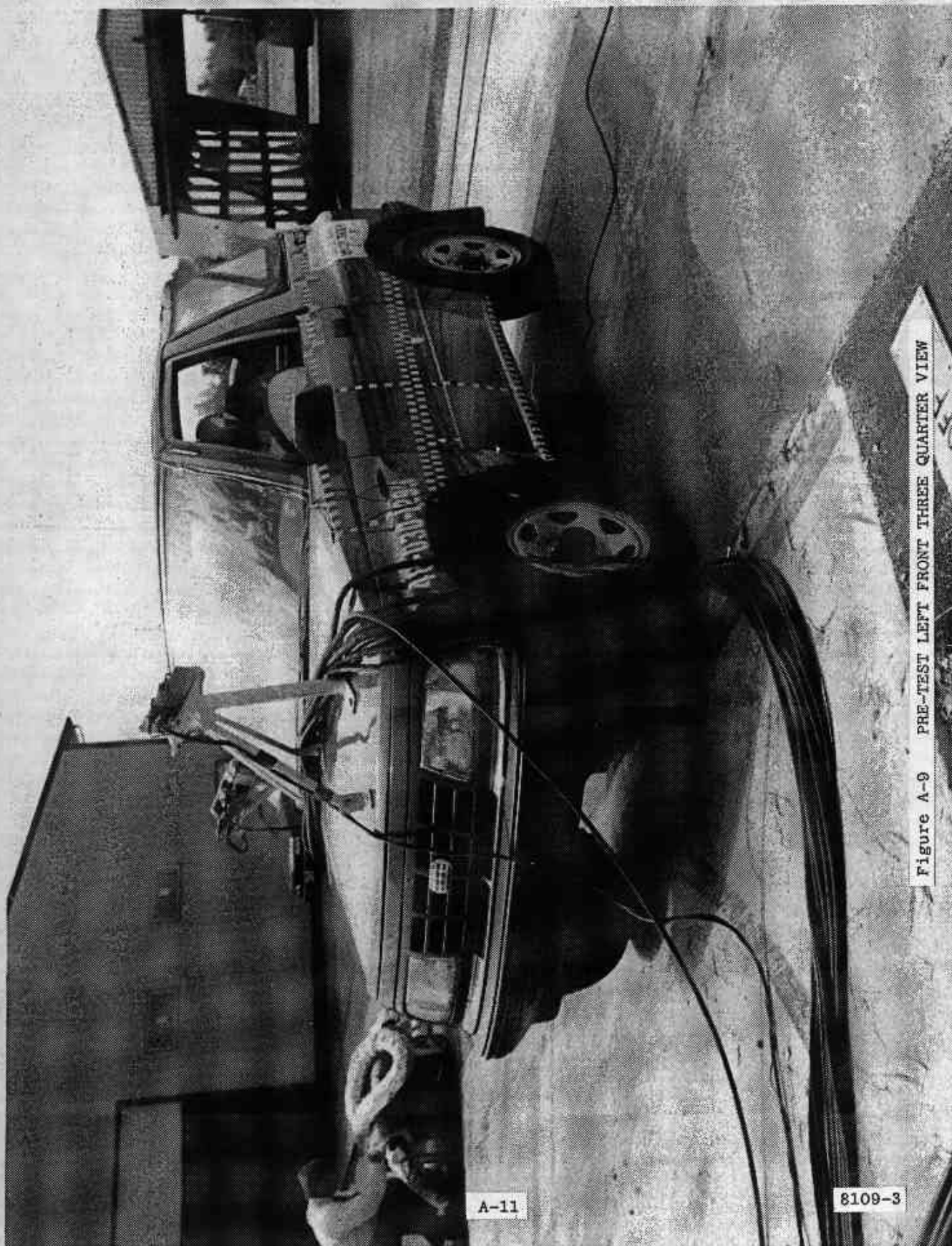


Figure A-8 POST-TEST LEFT SIDE VIEW OF TEST VEHICLE

A-10

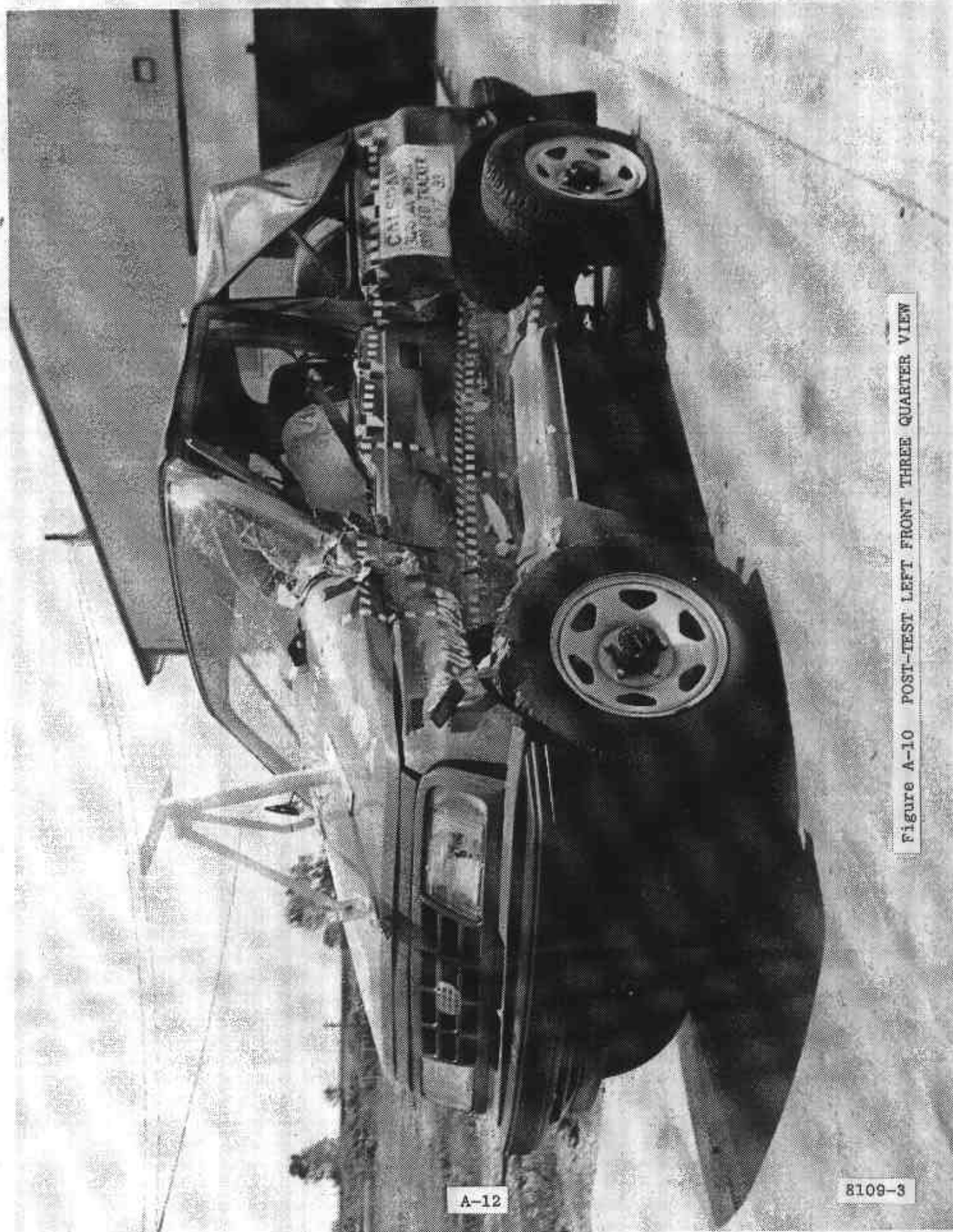
8109-3



A-11

8109-3

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



A-12

8109-3



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

A-13

8109-3

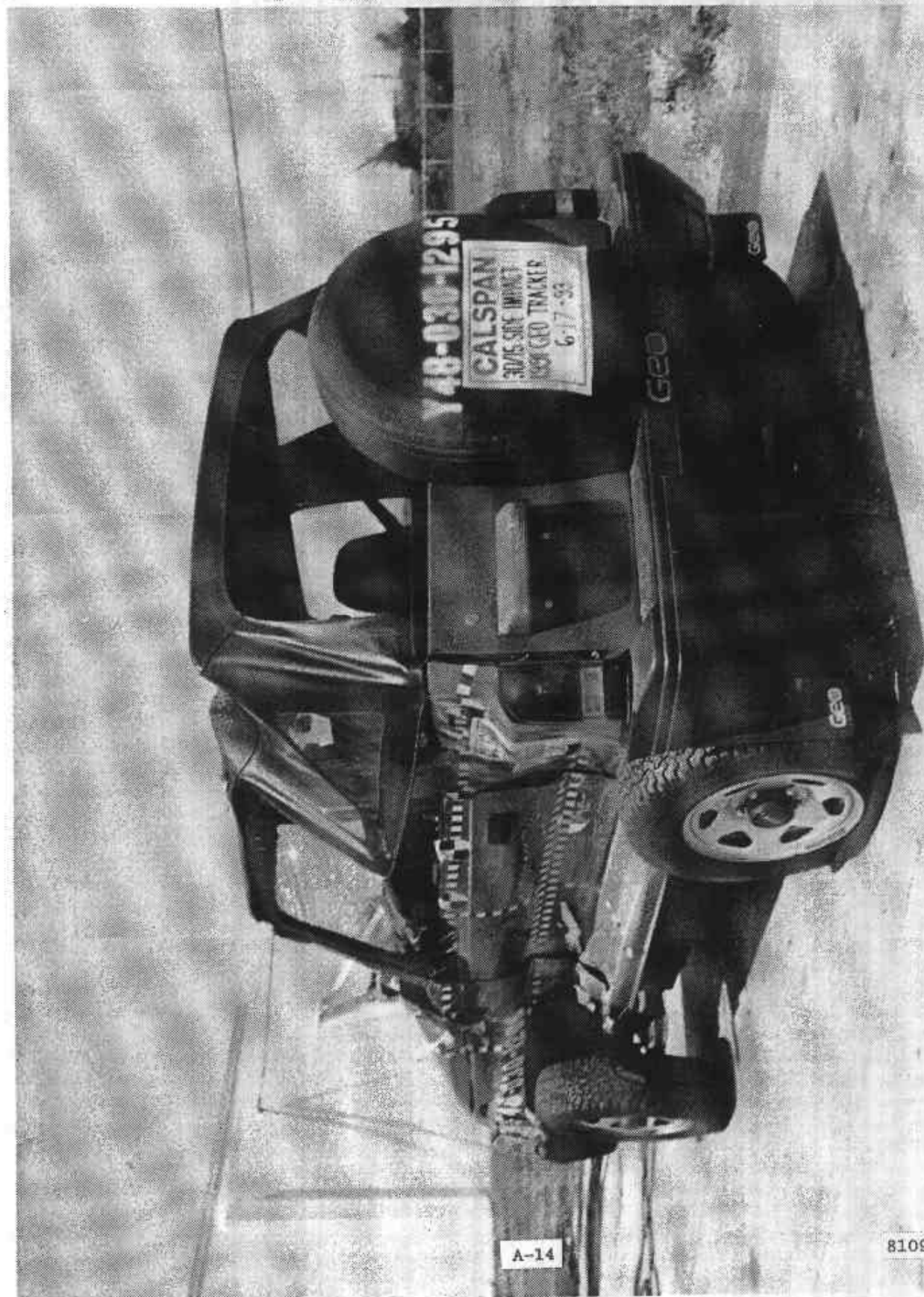


Figure A-12 POST-TEST LEFT REAR THREE QUARTER VIEW

A-14

8109-3



Figure A-13 PRE-TEST MDB AND VEHICLE LEFT SIDE FRONT VIEW

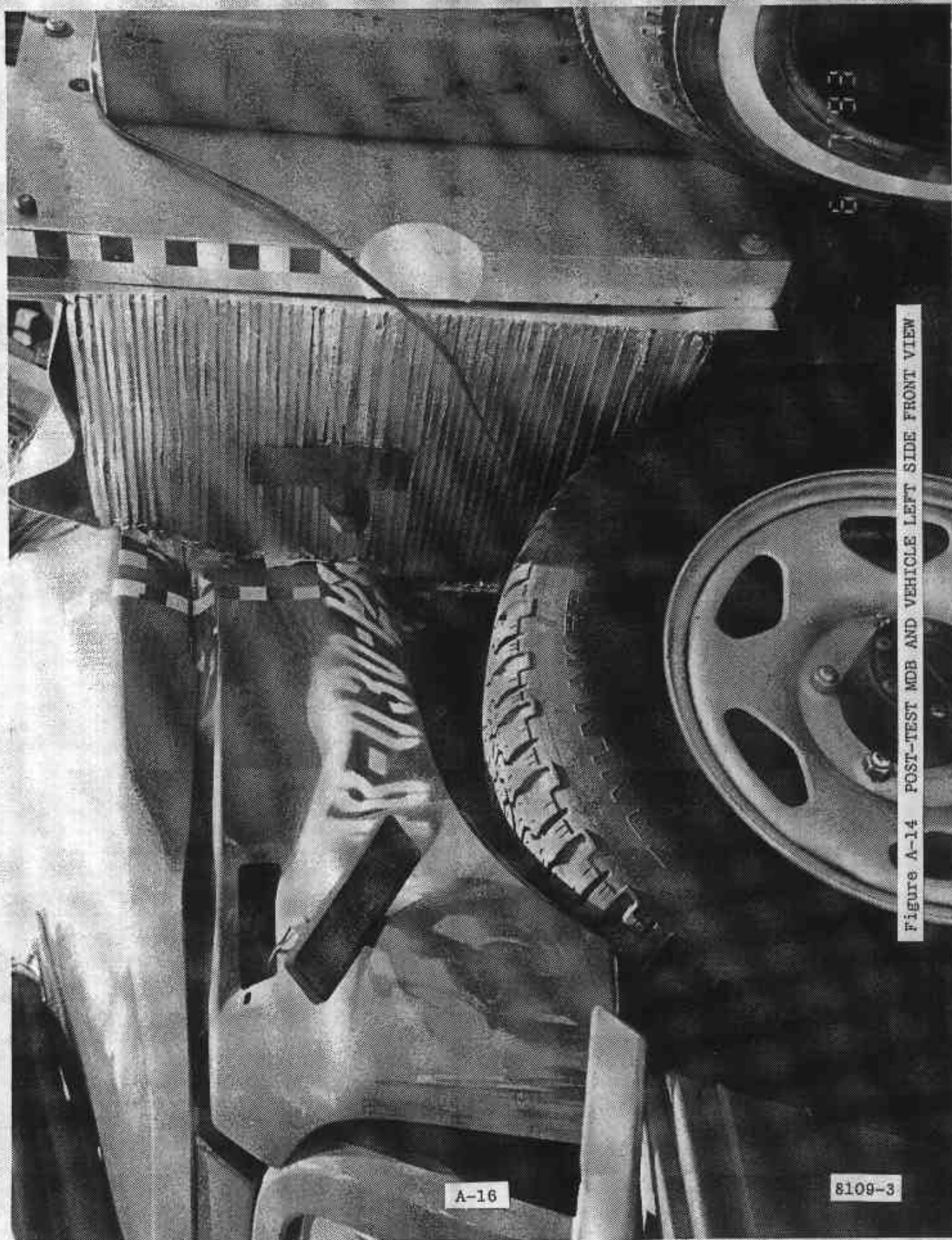


Figure A-14 POST-TEST MDB AND VEHICLE LEFT SIDE FRONT VIEW

A-16

8109-3

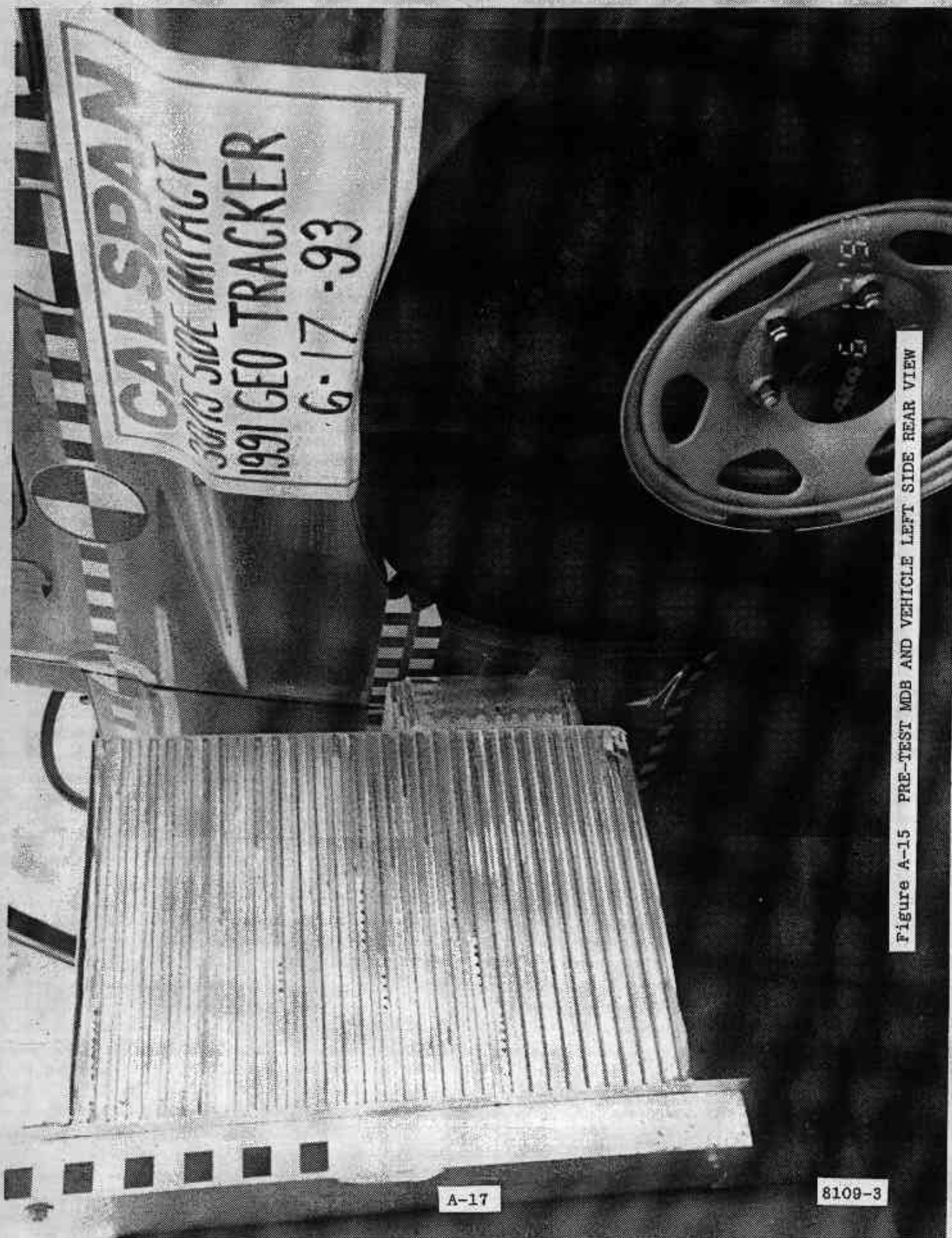


Figure A-15 PRE-TEST MDB AND VEHICLE LEFT SIDE REAR VIEW

A-17

8109-3



Figure A-16 POST-TEST MDB AND VEHICLE LEFT SIDE REAR VIEW

A-18

8109-3



Figure A-17 POST-TEST VEHICLE TOP VIEW

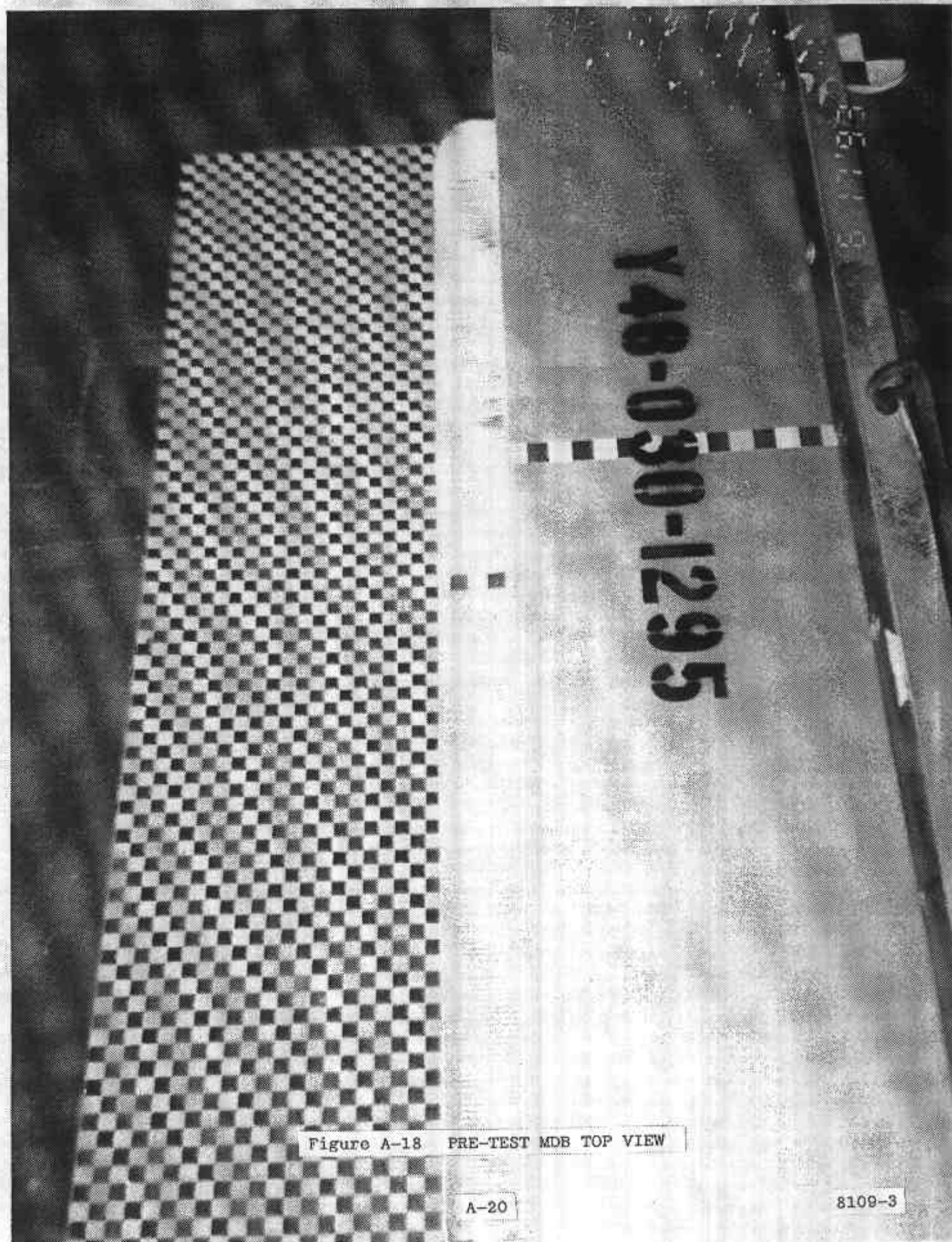


Figure A-18 PRE-TEST MDB TOP VIEW

A-20

8109-3

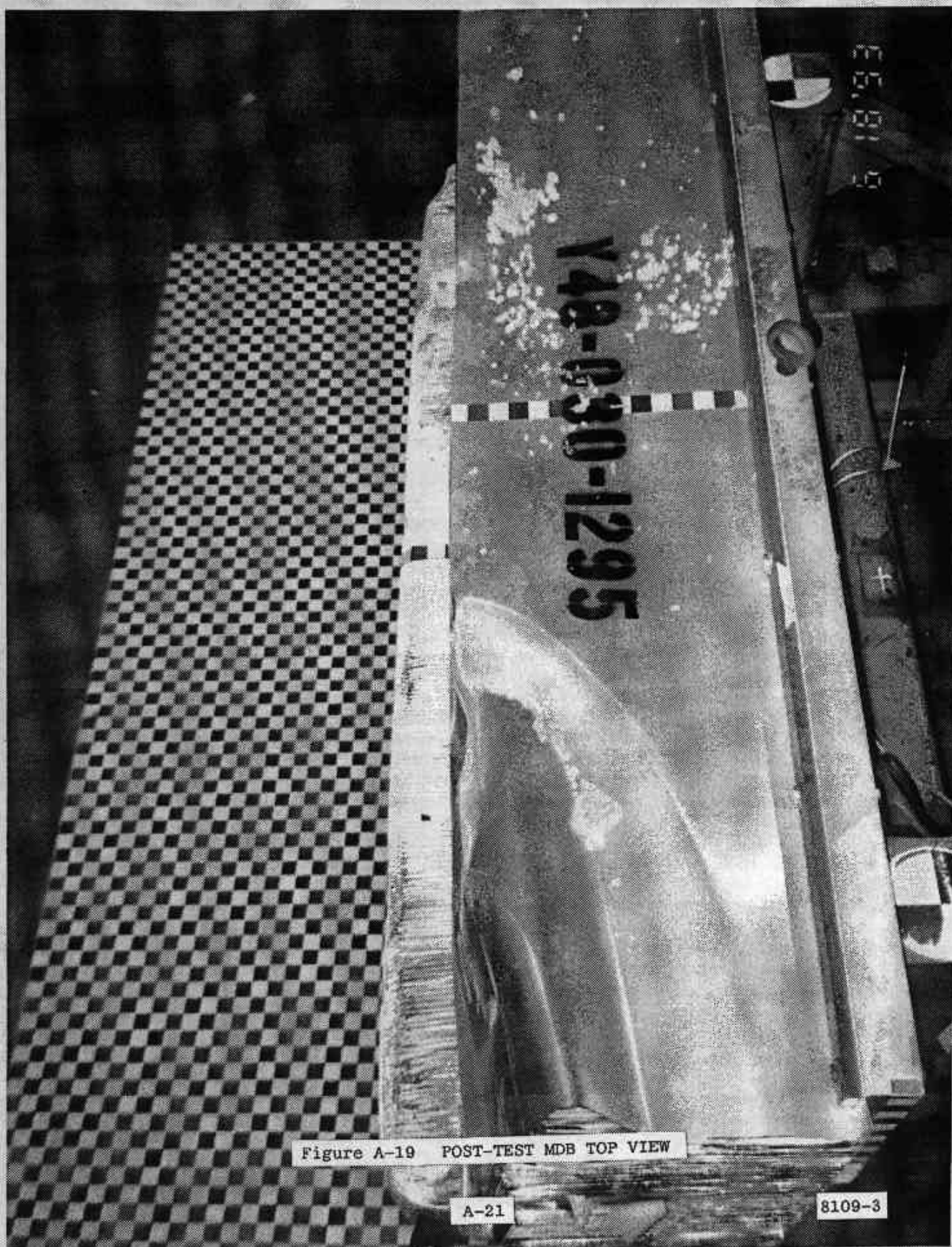
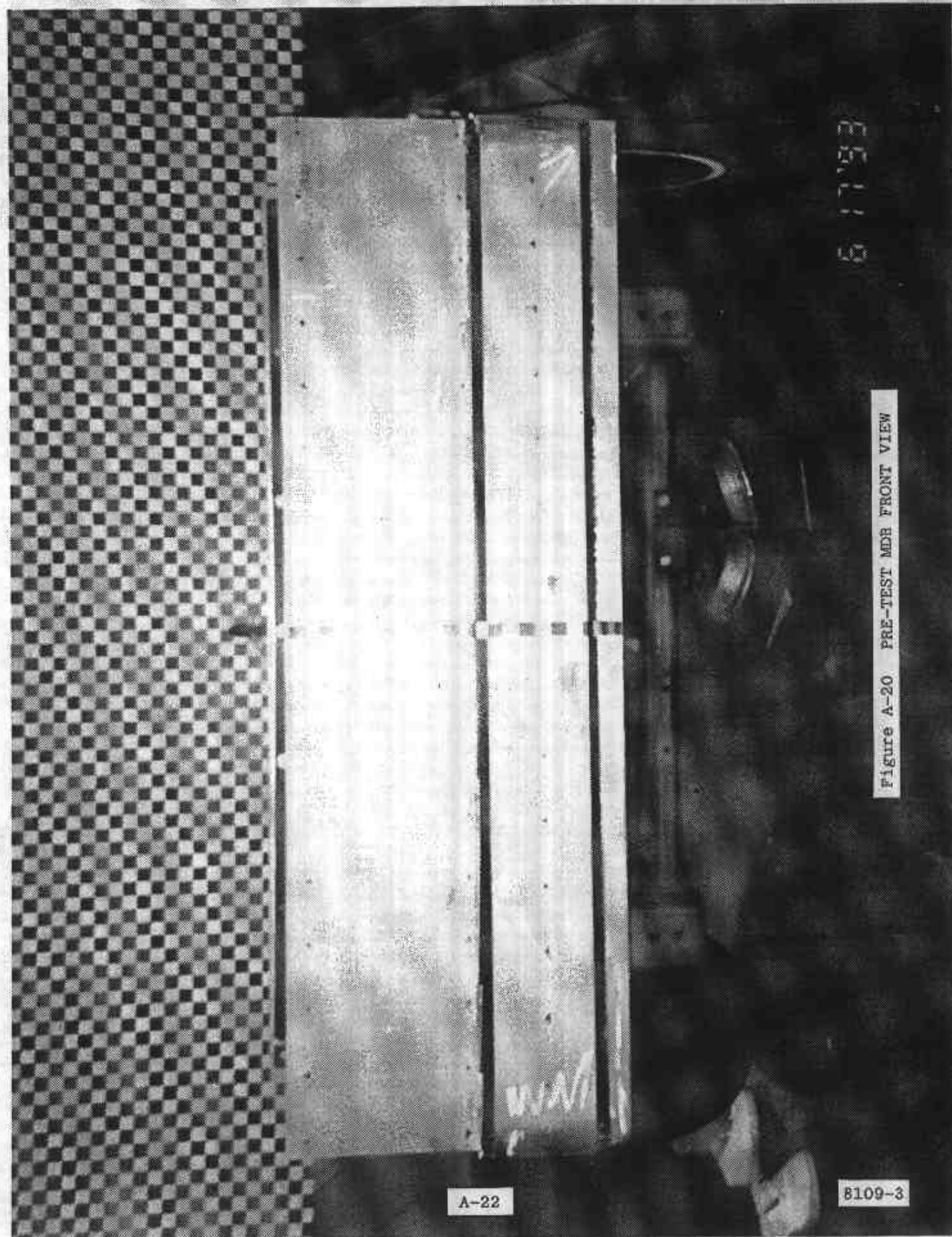


Figure A-19 POST-TEST MDB TOP VIEW

A-21

8109-3



A-22

8109-3

Figure A-20 PRE-TEST MDR FRONT VIEW

8 17 93

6 18'93

Figure A-21 POST-TEST MDB FRONT VIEW

A-23

8109-3

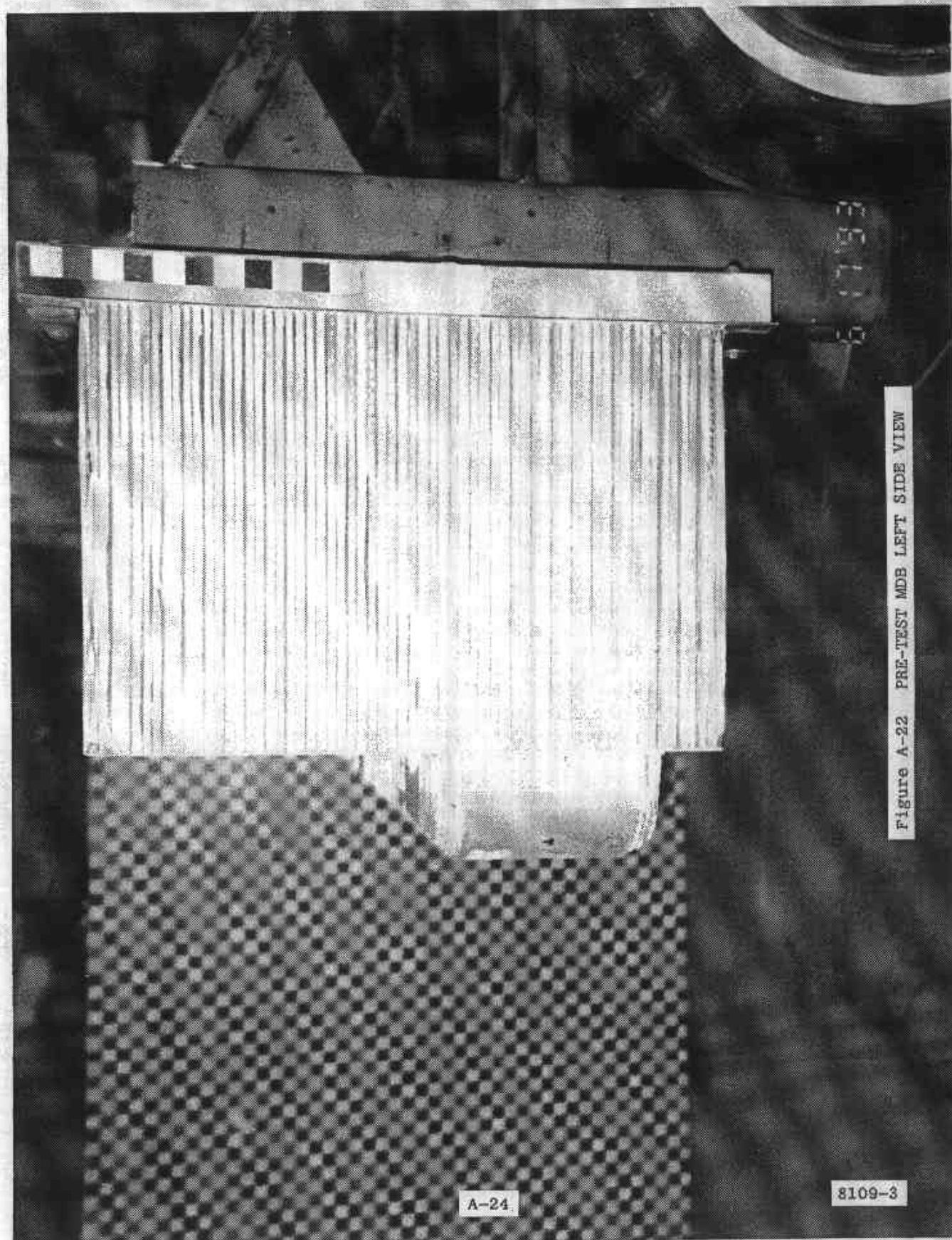


Figure A-22 PRE-TEST MDB LEFT SIDE VIEW

A-24

8109-3

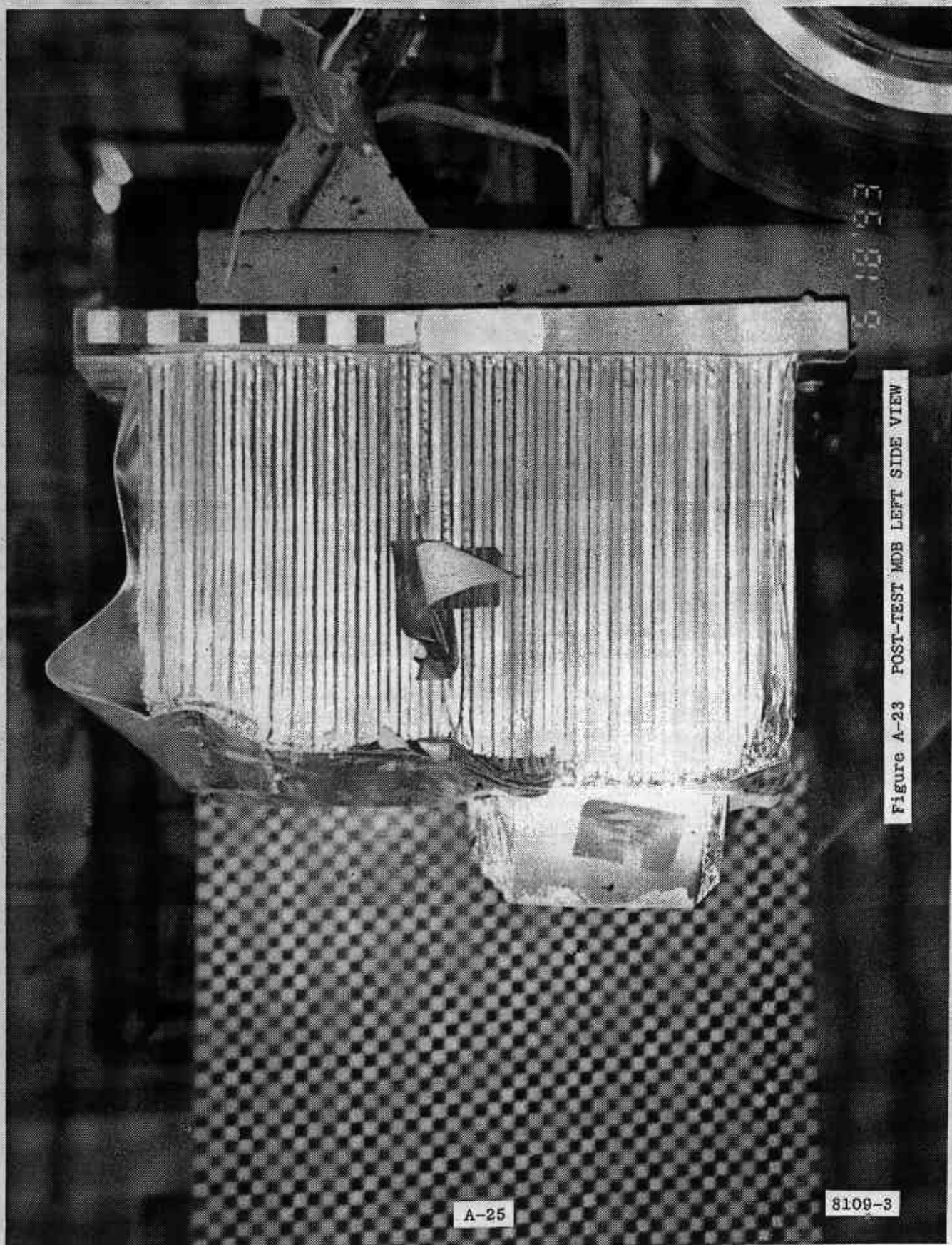


Figure A-23 POST-TEST MDB LEFT SIDE VIEW

A-25

8109-3

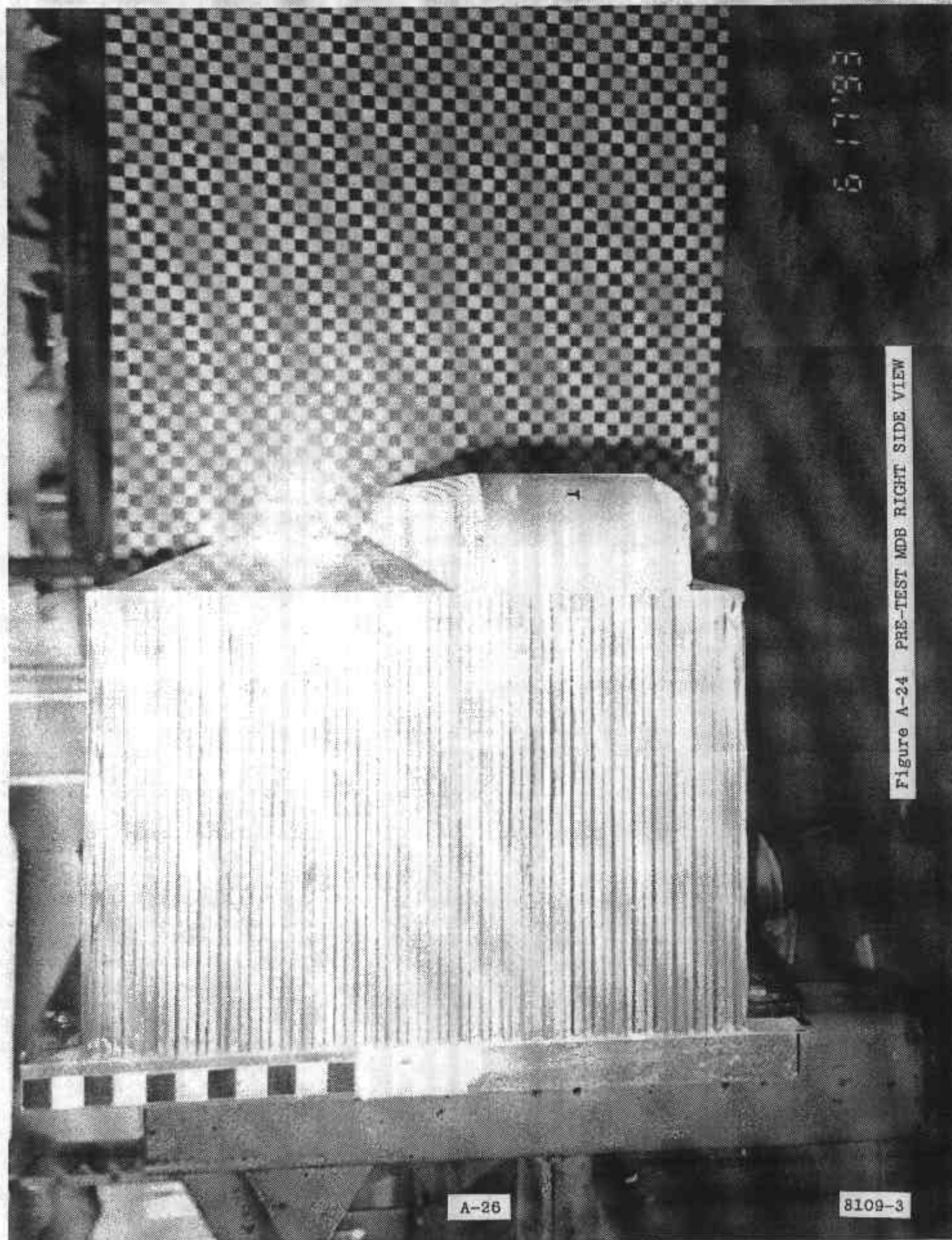


Figure A-24 PRE-TEST MDB RIGHT SIDE VIEW

A-26

8109-3

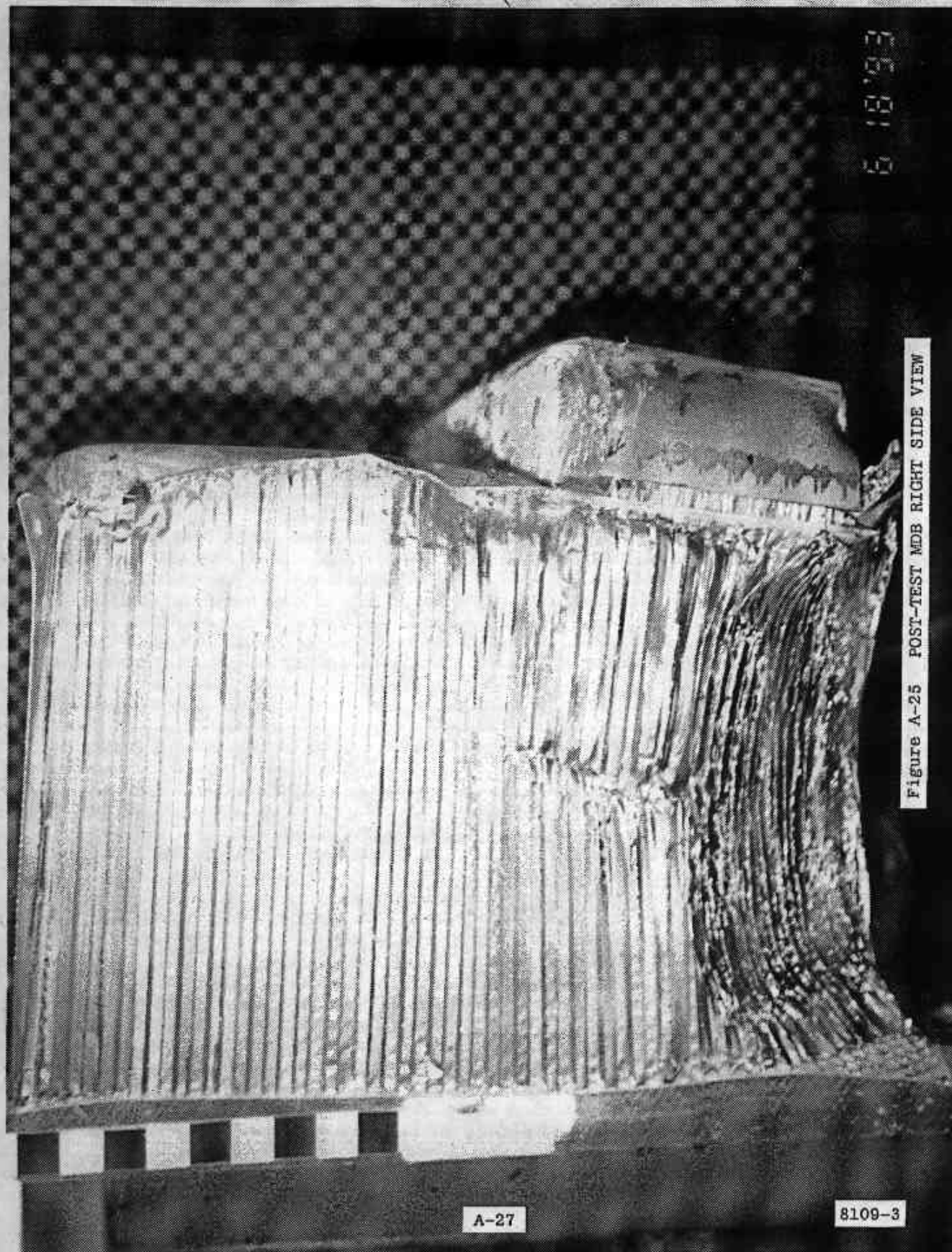
81793

8 18 '93

Figure A-25 POST-TEST MDB RIGHT SIDE VIEW

A-27

8109-3



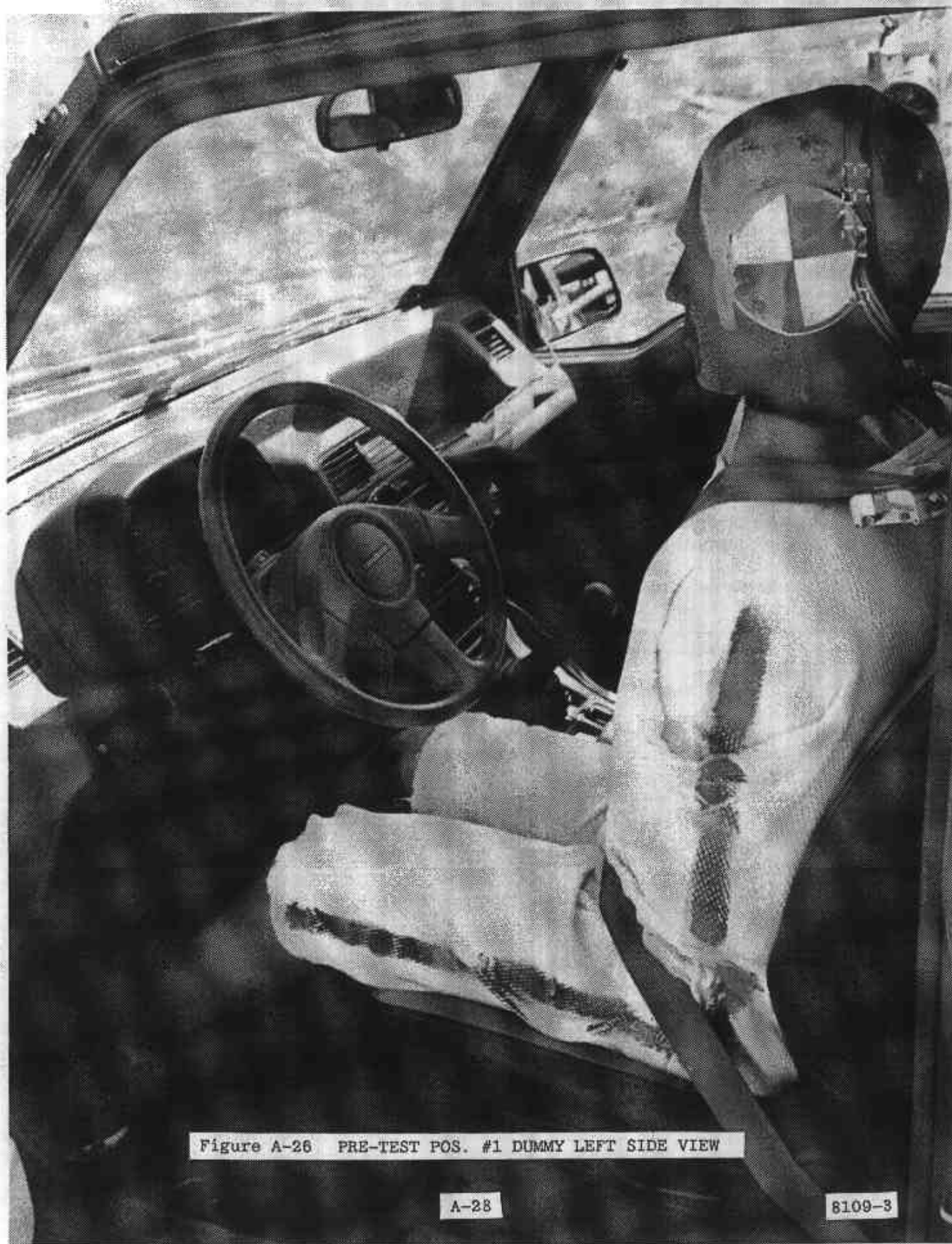


Figure A-26 PRE-TEST POS. #1 DUMMY LEFT SIDE VIEW

A-28

8109-3



Figure A-27 POST-TEST POS. #1 DUMMY LEFT SIDE VIEW

A-29

8109-3

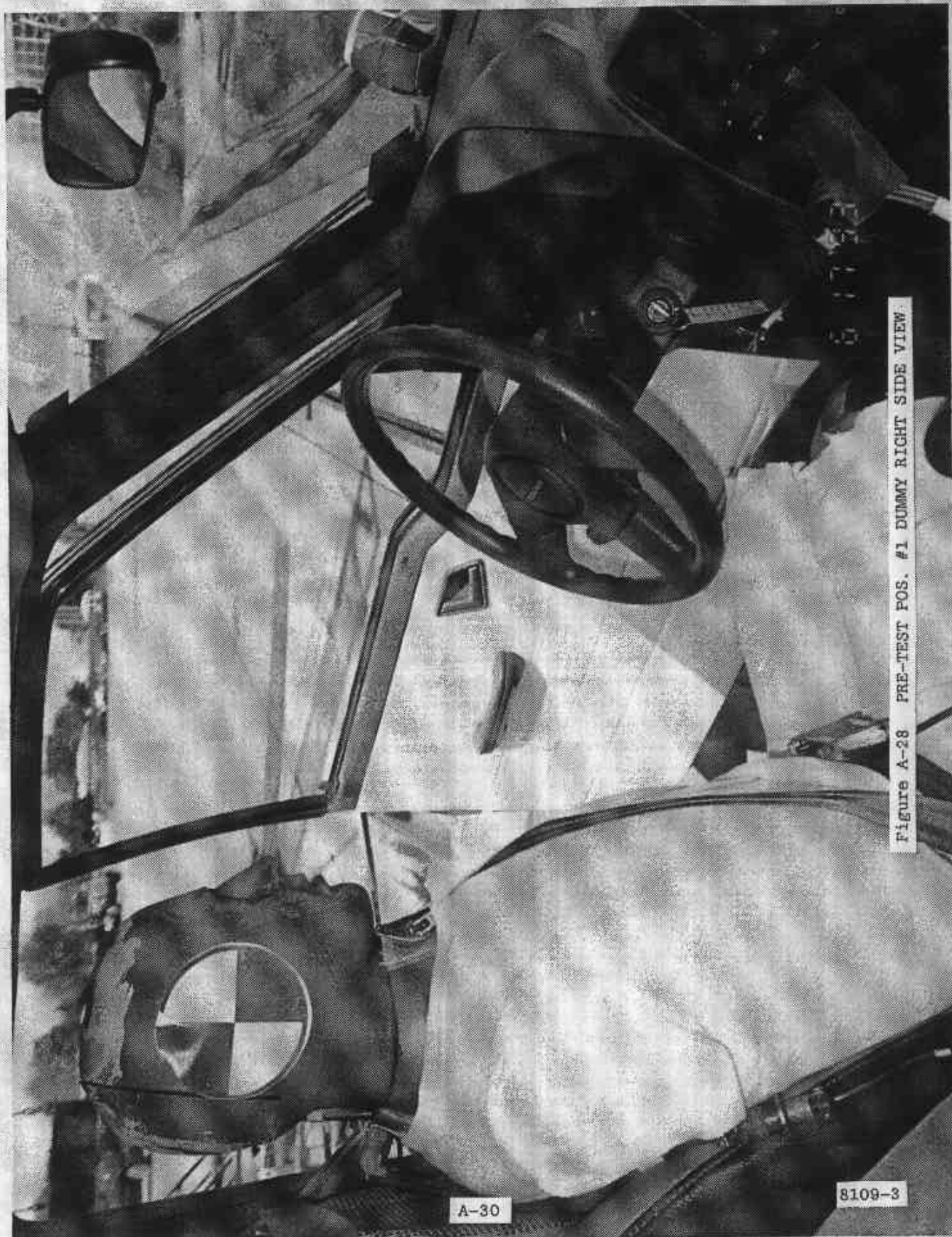


Figure A-28 PRE-TEST POS. #1 DUMMY RIGHT SIDE VIEW

A-30

8109-3



Figure A-29 POST-TEST POS. #1 DUMMY RIGHT SIDE VIEW

A-31

8109-3



Figure A-30 PRE-TEST DOOR THICKNESS

A-32

8109-3

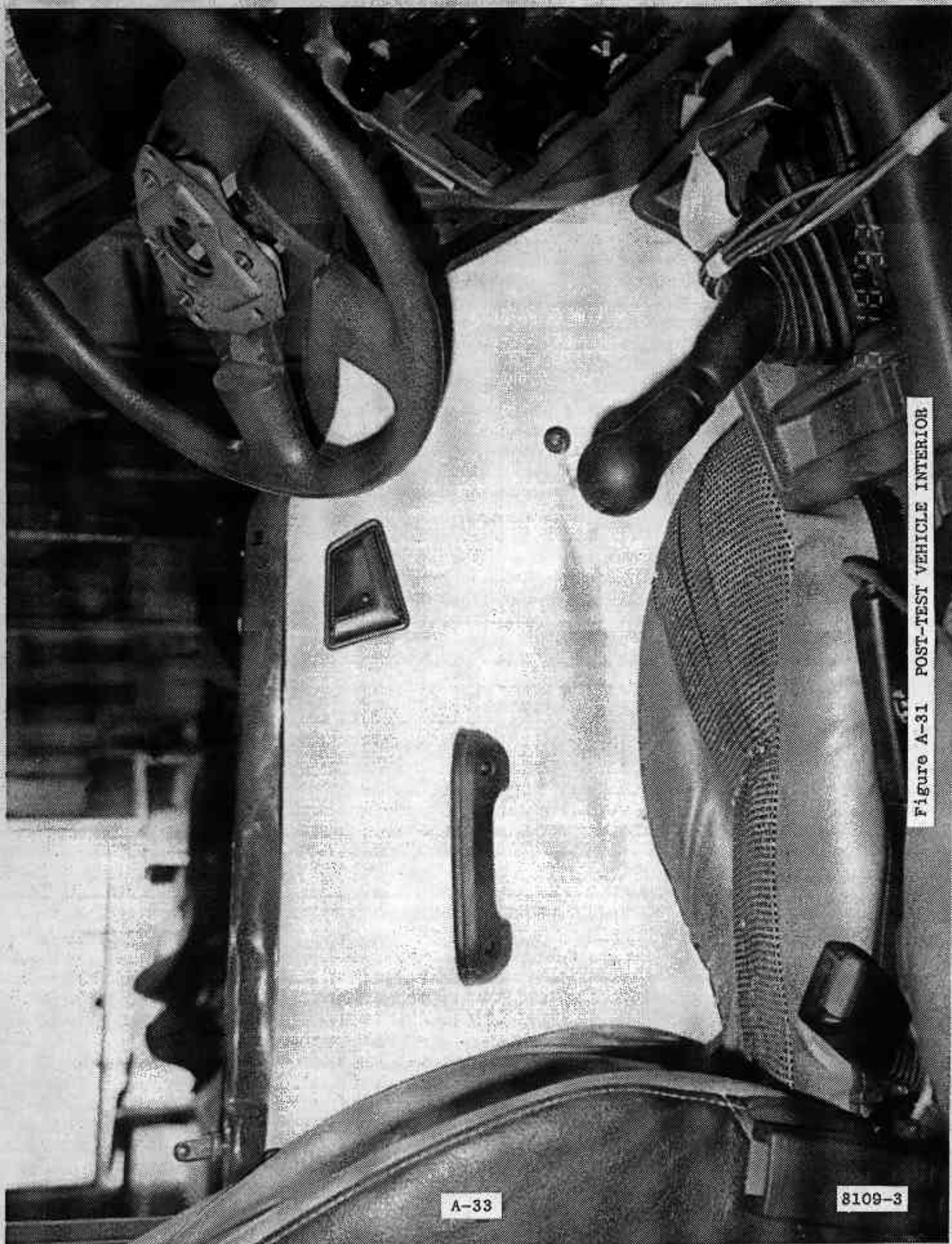


Figure A-31 POST-TEST VEHICLE INTERIOR

A-33

8109-3

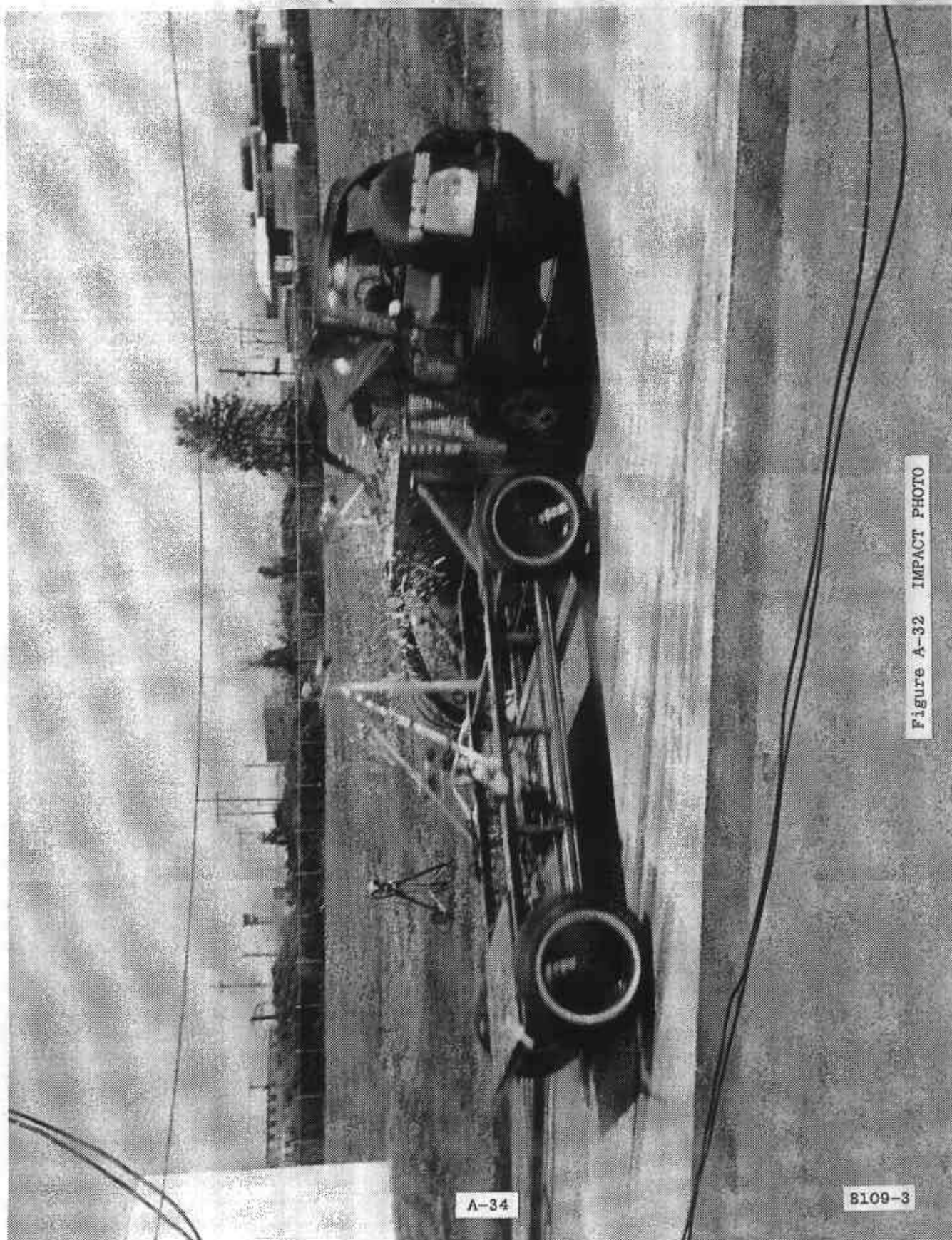


Figure A-32 IMPACT PHOTO

A-34

8109-3

Appendix B
DATA PLOTS

All vehicle data and dummy head and chest deflection data were filtered following SAE J211b. Data from the Side Impact Dummies' thorax and pelvis were filtered in the following manner:

- a. Filter the data with a 300 Hz SAE Class 180 filter;
- b. Subsample the data to a 1600 Hz sampling rate; and
- c. Filter the data with a Finite Impulse Response (FIR) filter having the following characteristics:
 1. Passband frequency 100 Hz
 2. Stopband frequency 189 Hz
 3. Stopband gain -50 dB
 4. Passband ripple 0.0225 dB

FIR filtered data is so noted in this appendix.

Pos. 1 SID TEST DATA

FACILITY: TRACK

TEST DATE: 17 Jun 1993

RUN #: 1295

TEST TIME: 10:18:52

SERIES #: 1

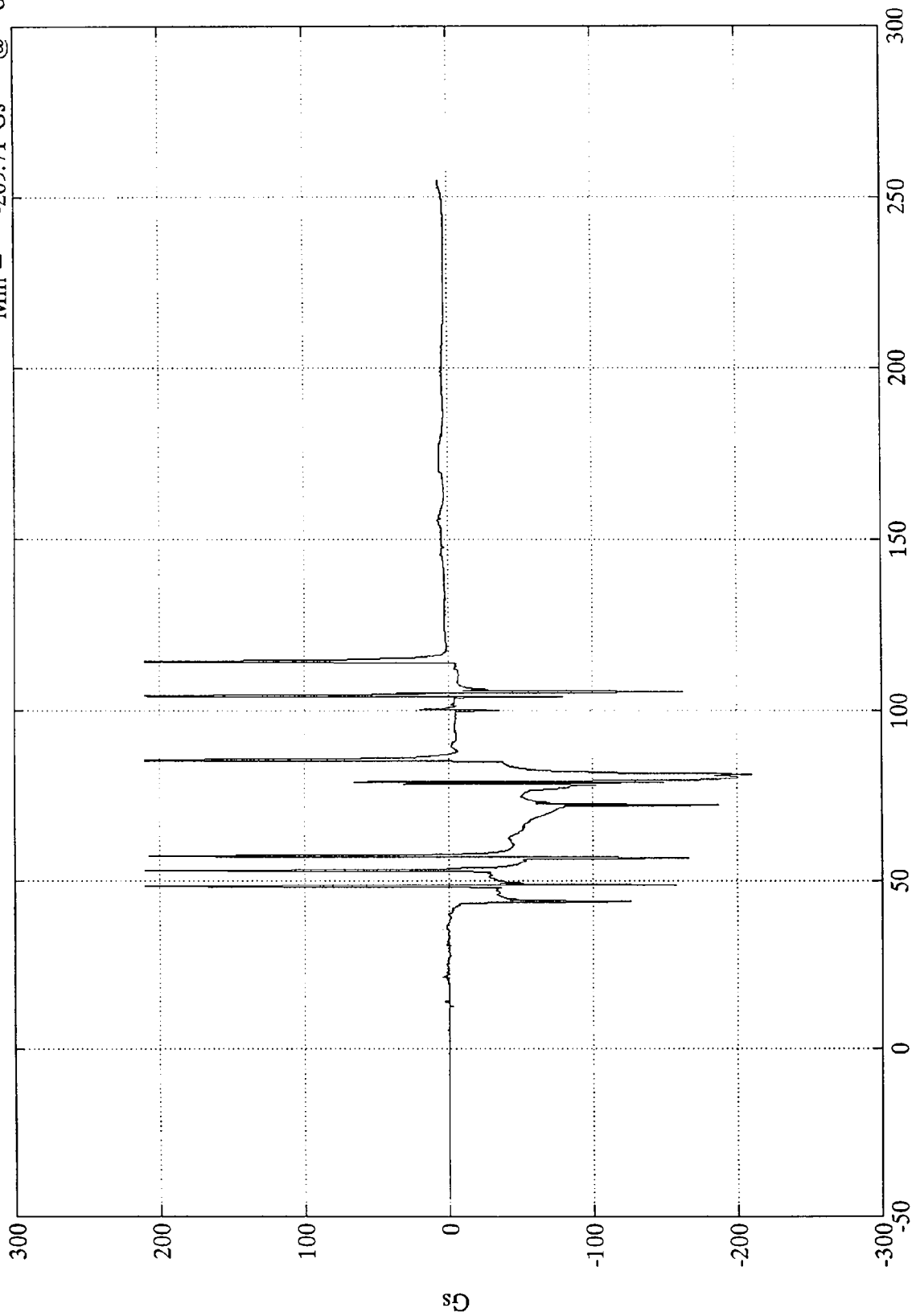
BOARD:

TITLE: Side Impact 3 - 1993 Geo Tracker

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM AMP	msec	MINIMUM AMP	msec	FILTER CLASS
1	P1 Head X	Gs	.0000	.0	.0000	.0	FIR
2	P1 Head Y	Gs	.0000	.0	.0000	.0	FIR
3	P1 Head Z	Gs	.0000	.0	.0000	.0	FIR
4	P1 Upper Rib Y	Gs	138.6901	28.8	-45.9946	105.0	FIR
5	P1 Upper Rib Y(R)	Gs	136.3895	29.4	-37.6226	86.9	FIR
6	P1 Lower Rib Y	Gs	121.3005	29.4	-15.9432	91.9	FIR
7	P1 Lower Rib Y(R)	Gs	121.2166	29.4	-41.8453	86.3	FIR
8	P1 Upper Spine Y	Gs	103.3460	34.4	-133.4957	58.8	FIR
9	P1 Upper Spine Y(R)	Gs	98.7281	34.4	-129.4978	58.1	FIR
10	P1 Lower Spine Y	Gs	133.4351	30.6	-87.1093	62.5	FIR
11	P1 Lower Spine Y(R)	Gs	122.5473	31.9	-111.7527	61.3	FIR
12	P1 Pelvic Y	Gs	153.3558	25.0	-16.9897	109.4	FIR
13	P1 Pelvic Y(R)	Gs	155.4220	25.0	-121.9730	70.6	FIR
14	P1 Lap Belt	Lbs	.0000	.0	.0000	.0	FIR
15	P1 Torso Belt	Lbs	.0000	.0	.0000	.0	FIR
16	NULL	Gs	.0000	.0	.0000	.0	FIR

Side Impact 3 - 1993 Geo Tracker

P1 Head X
Max = 210.38 Gs @ 114.36 msec
Min = -209.71 Gs @ 81.60 msec



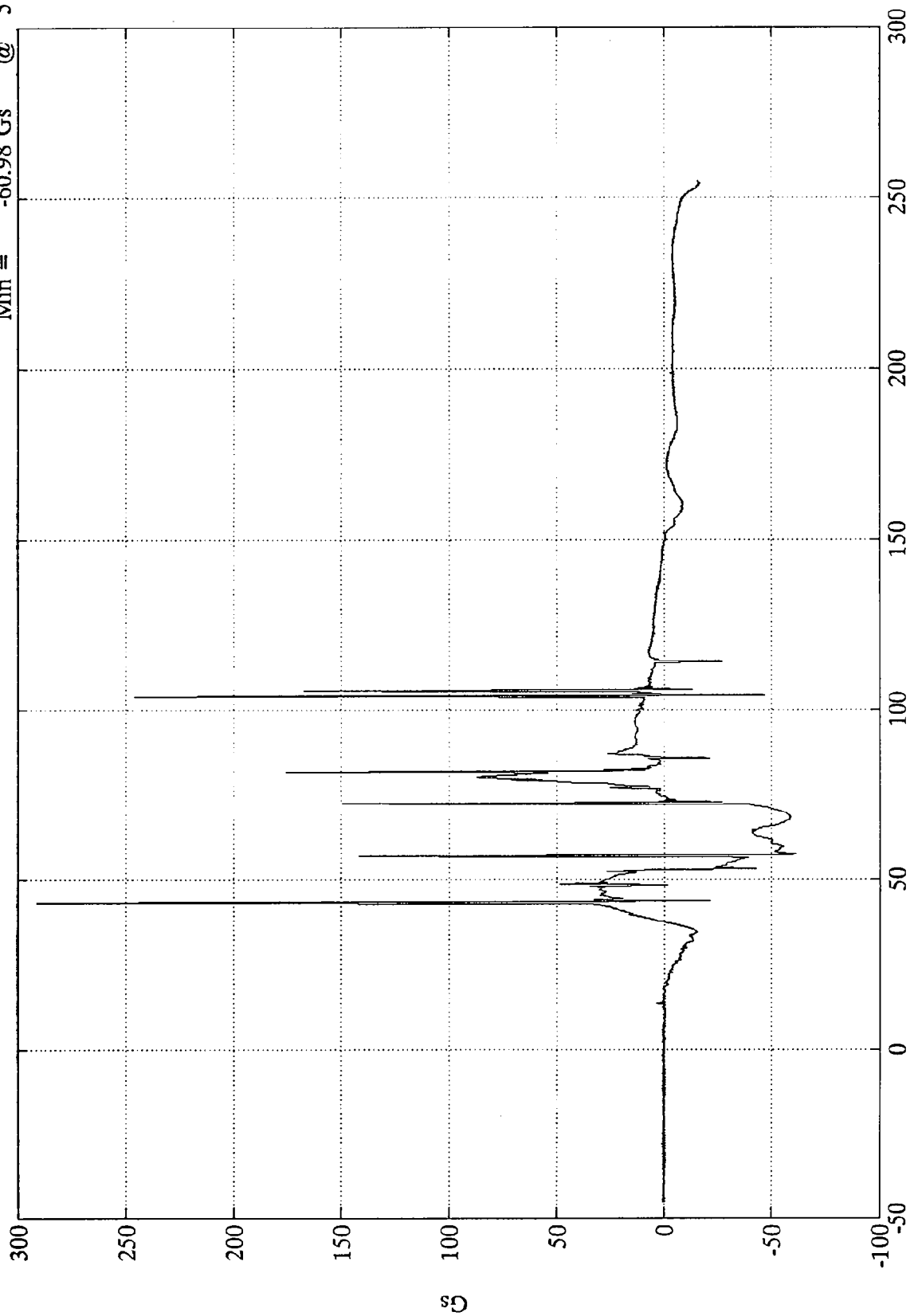
Time (msec) data questionable after 43 msec.

SAE Filter Class 1000

Side Impact 3 - 1993 Geo Tracker

P1 Head Y

Max = 291.29 Gs @ 43.31 msec
Min = -60.98 Gs @ 57.36 msec

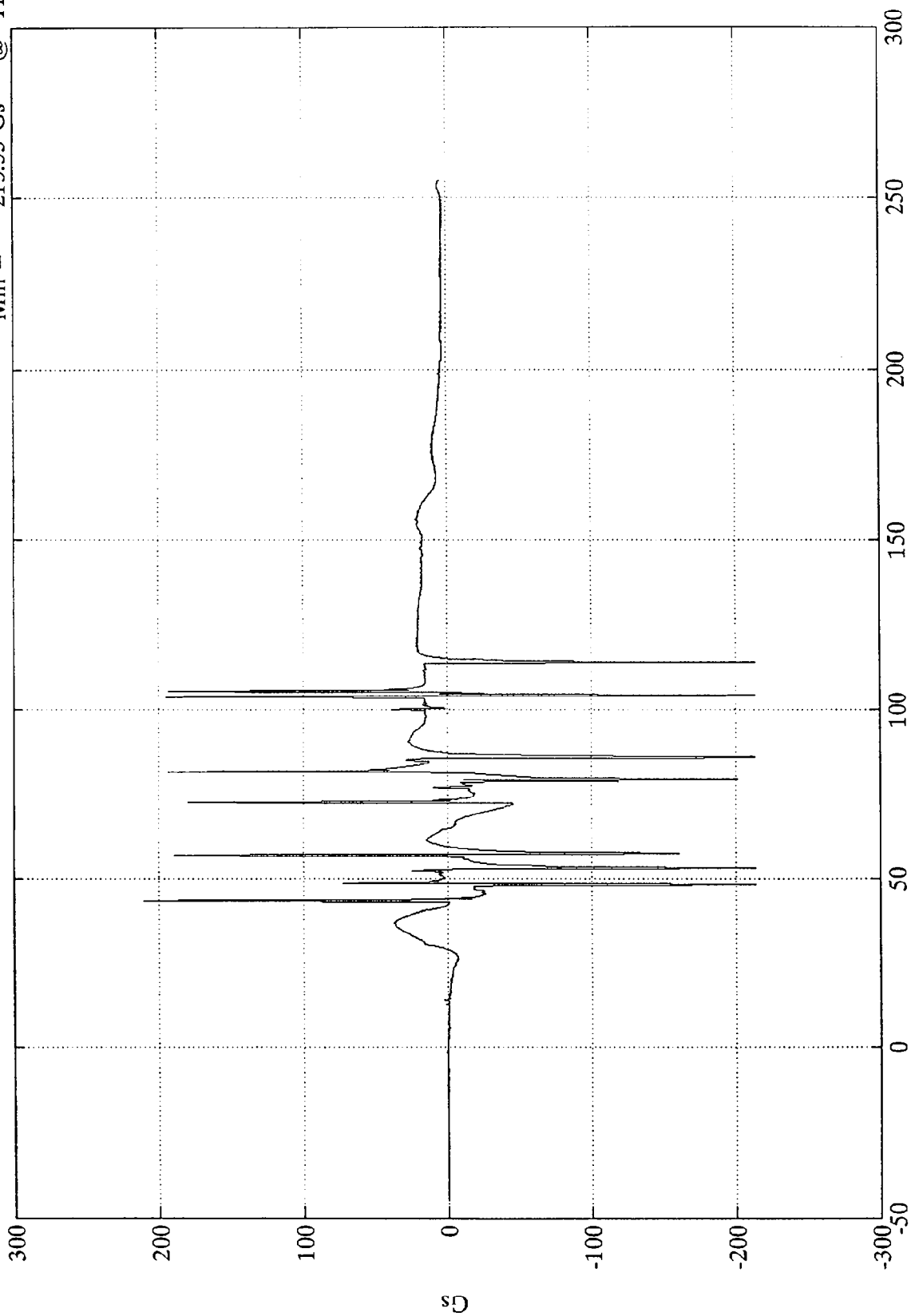


data questionable after 43 msec.

SAE Filter Class 1000

Side Impact 3 - 1993 Geo Tracker

P1 Head Z
 Max = 211.14 Gs @ 43.31 msec
 Min = -213.53 Gs @ 114.24 msec



Time (msec) data questionable after 43 msec.

SAE Filter Class 1000

Side Impact 3 - 1993 Geo Tracker

P1 Head Resultant

Max = 372.05 Gs @ 43.31 msec
Min = .11 Gs @ 0.11 msec



data questionable after 43 msec.

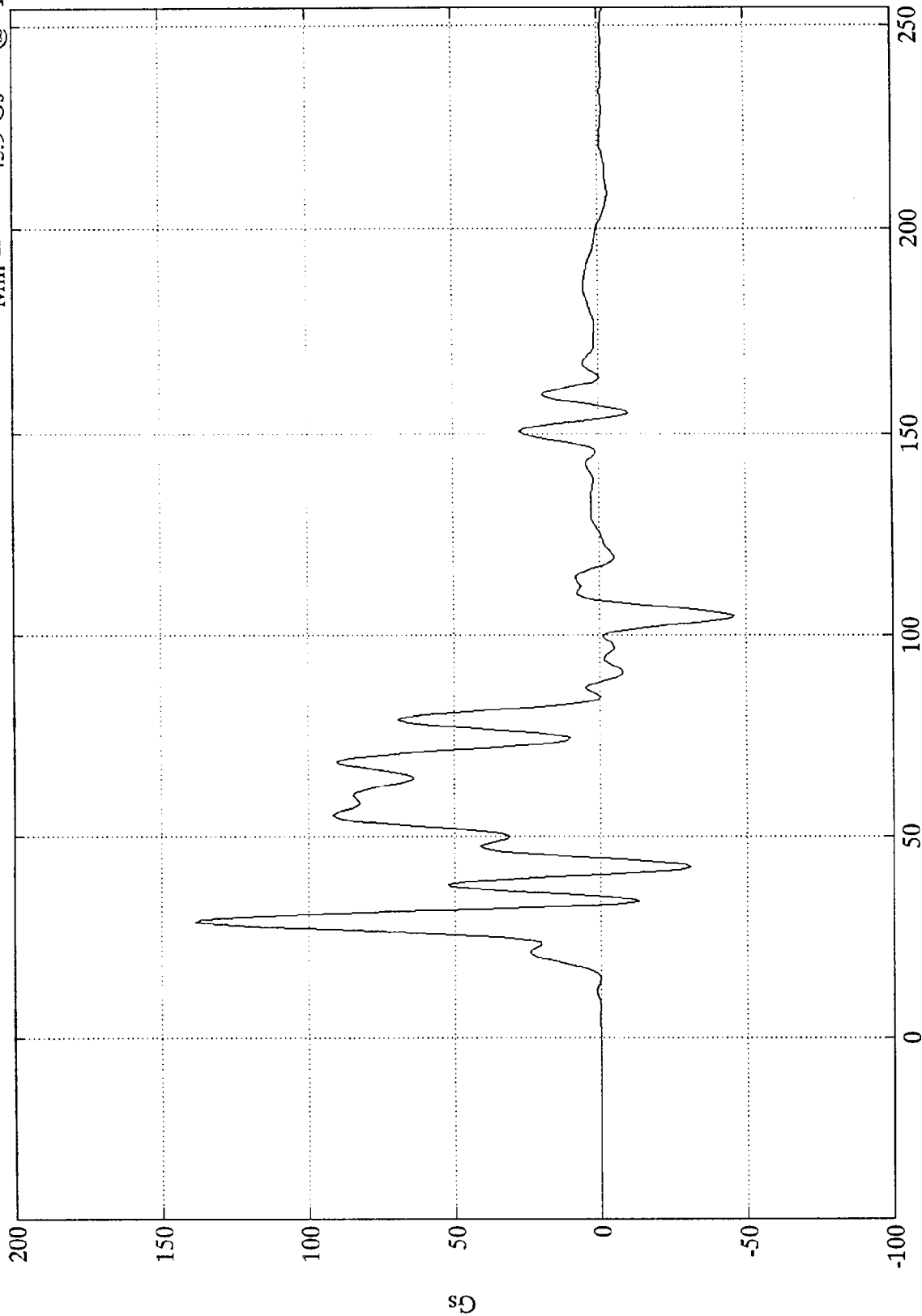
Time (msec)

SAE Filter Class 1000

Side Impact 3 - 1993 Geo Tracker

P1 Upper Rib Y

Max = 138.6 Gs @ 28.750 msec
Min = -45.9 Gs @ 105.00 msec



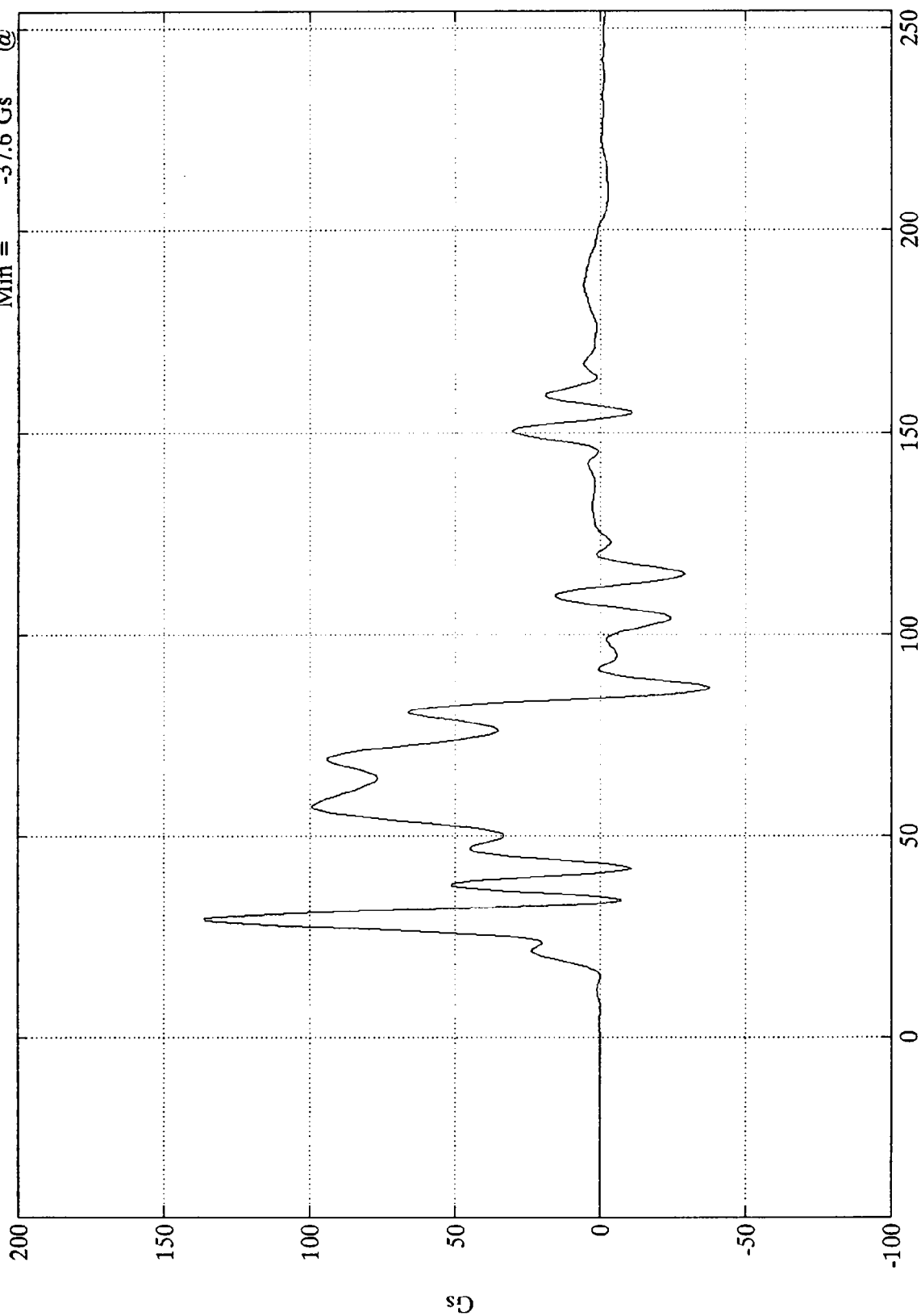
data questionable after 43 msec.

100 Hz FIR Filter

Side Impact 3 - 1993 Geo Tracker

P1 Upper Rib Y(R)

Max = 136.3 Gs @ 29.375 msec
Min = -37.6 Gs @ 86.87 msec



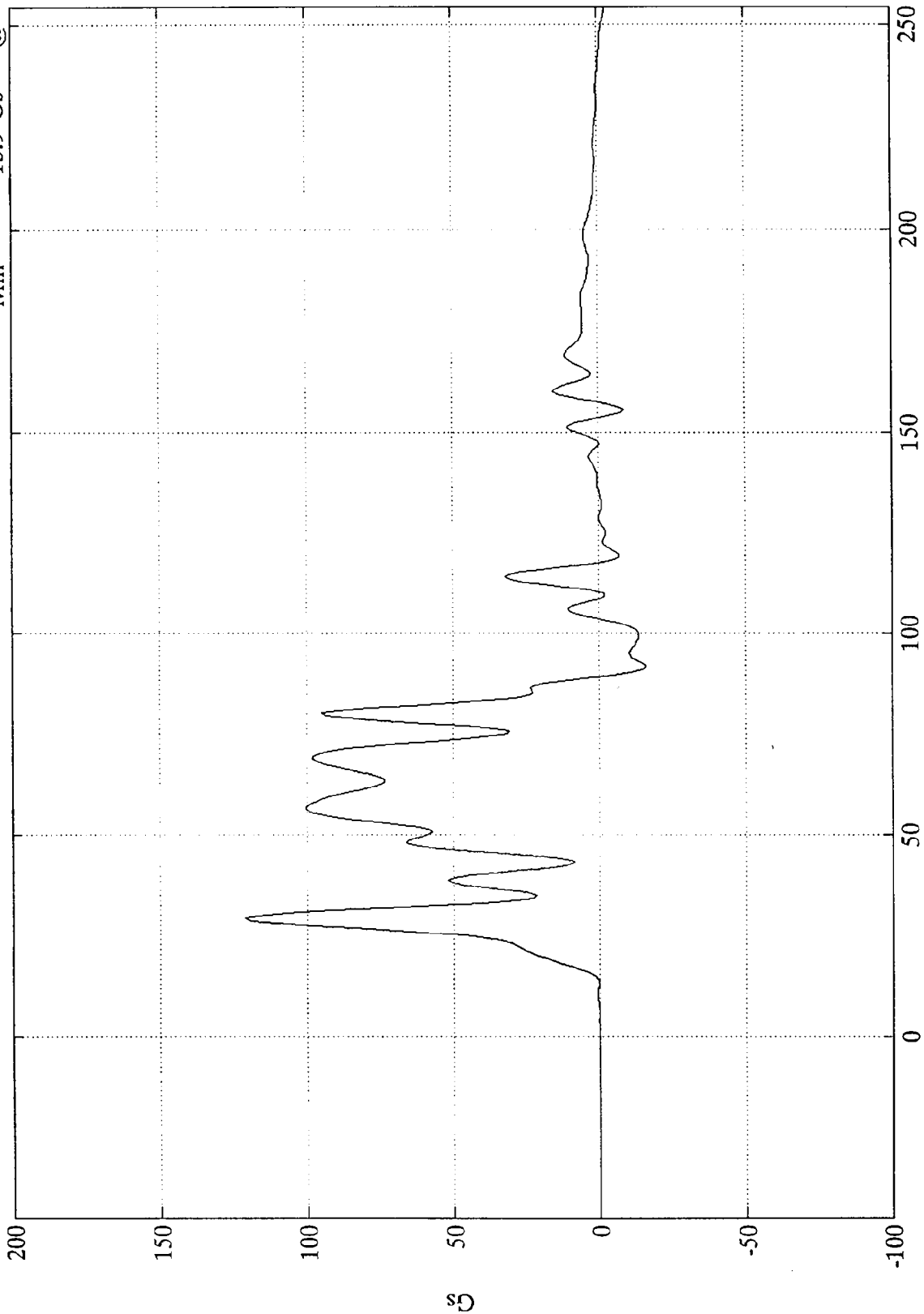
Time (msec) data questionable after 43 msec.

100 Hz FIR Filter

Side Impact 3 - 1993 Geo Tracker

P1 Lower Rib Y

Max = 121.3 Gs @ 29.375 msec
Min = -15.9 Gs @ 91.87 msec



data questionable after 43 msec.

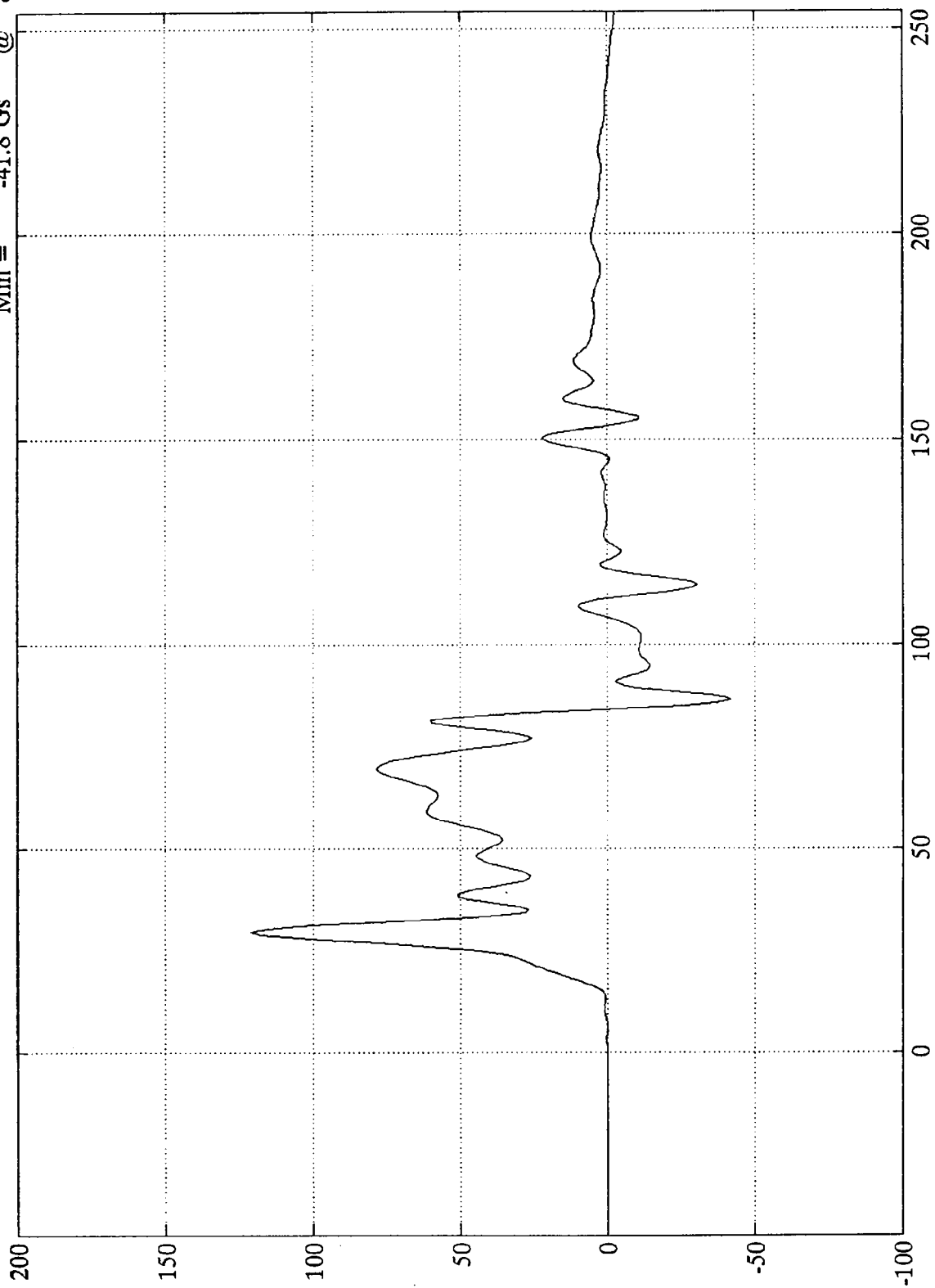
Time (msec)

100 Hz FIR Filter

Side Impact 3 - 1993 Geo Tracker

P1 Lower Rib Y(R)

Max = 121.2 Gs @ 29.375 msec
Min = -41.8 Gs @ 86.25 msec



Time (msec)

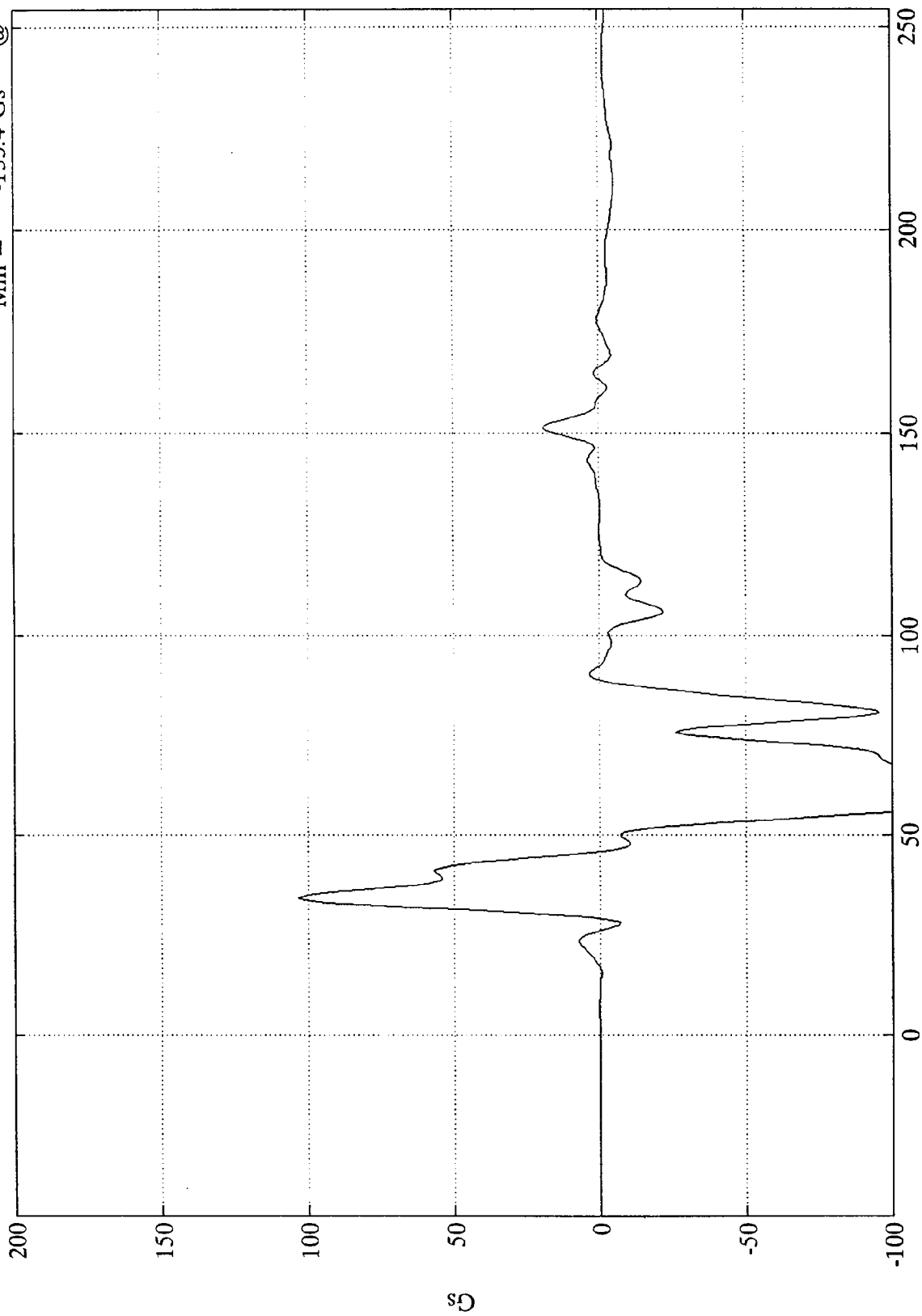
data questionable after 43 msec.

100 Hz FIR Filter

Side Impact 3 - 1993 Geo Tracker

P1 Upper Spine Y

Max = 103.3 Gs @ 34.375 msec
 Min = -133.4 Gs @ 58.75 msec



data questionable after 43 msec.

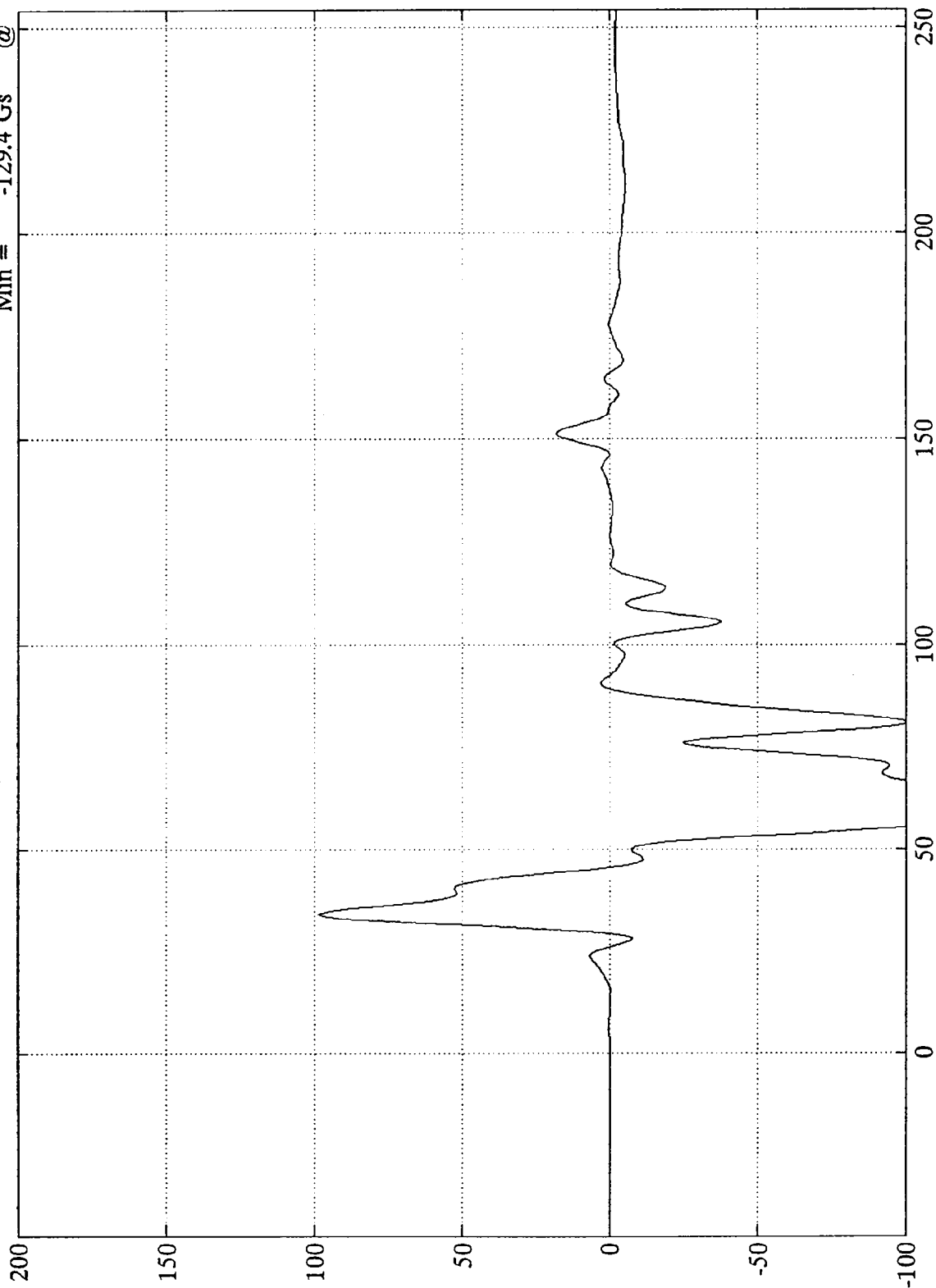
Time (msec)

100 Hz FIR Filter

Side Impact 3 - 1993 Geo Tracker

P1 Upper Spine Y(R)

Max = 98.7 Gs @ 34.375 msec
Min = -129.4 Gs @ 58.12 msec



Time (msec)

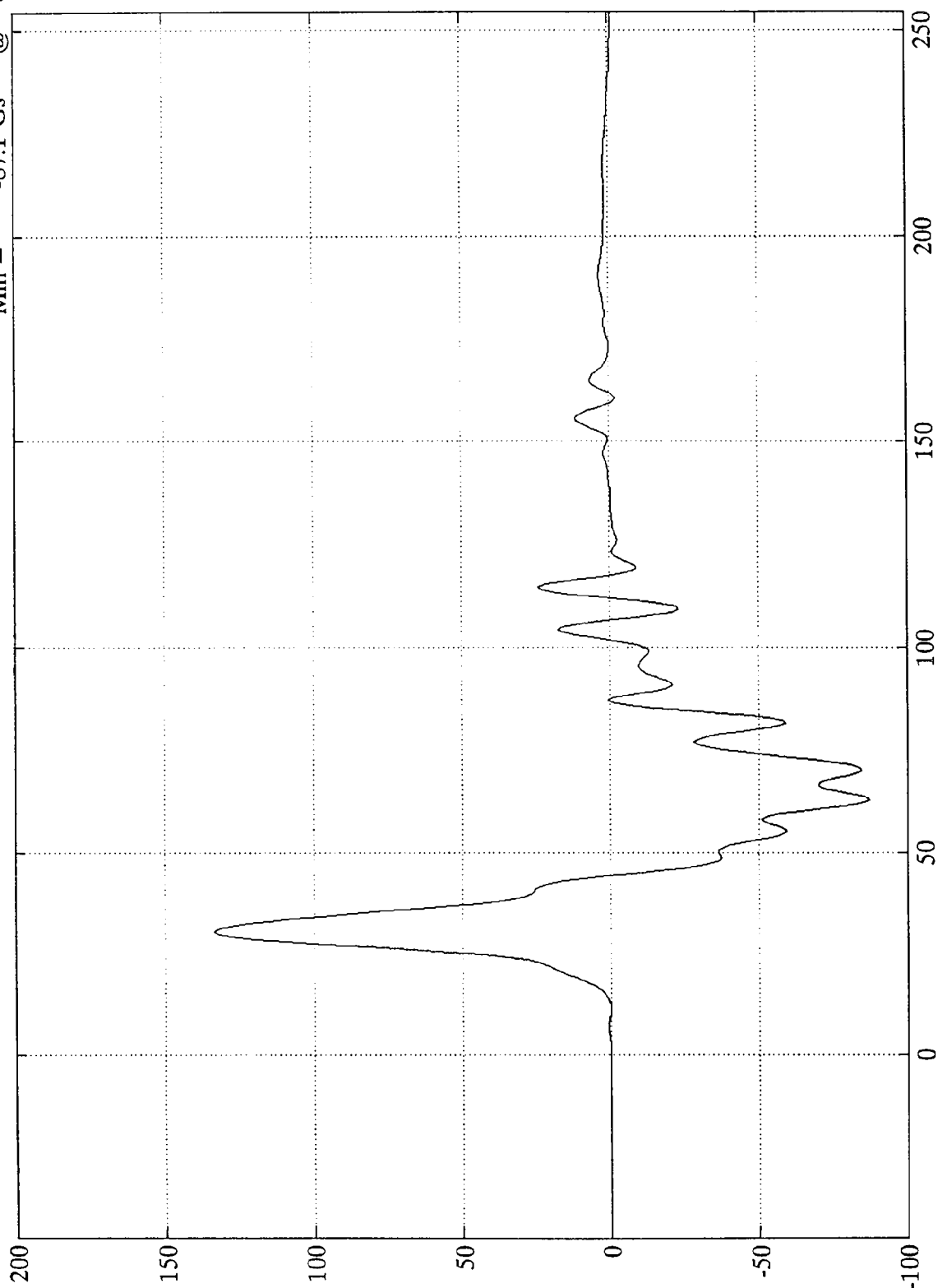
data questionable after 43 msec.

100 Hz FIR Filter

Side Impact 3 - 1993 Geo Tracker

Max = 133.4 Gs @ 30.625 msec
 Min = -87.1 Gs @ 62.50 msec

P1 Lower Spine Y



data questionable after 43 msec.

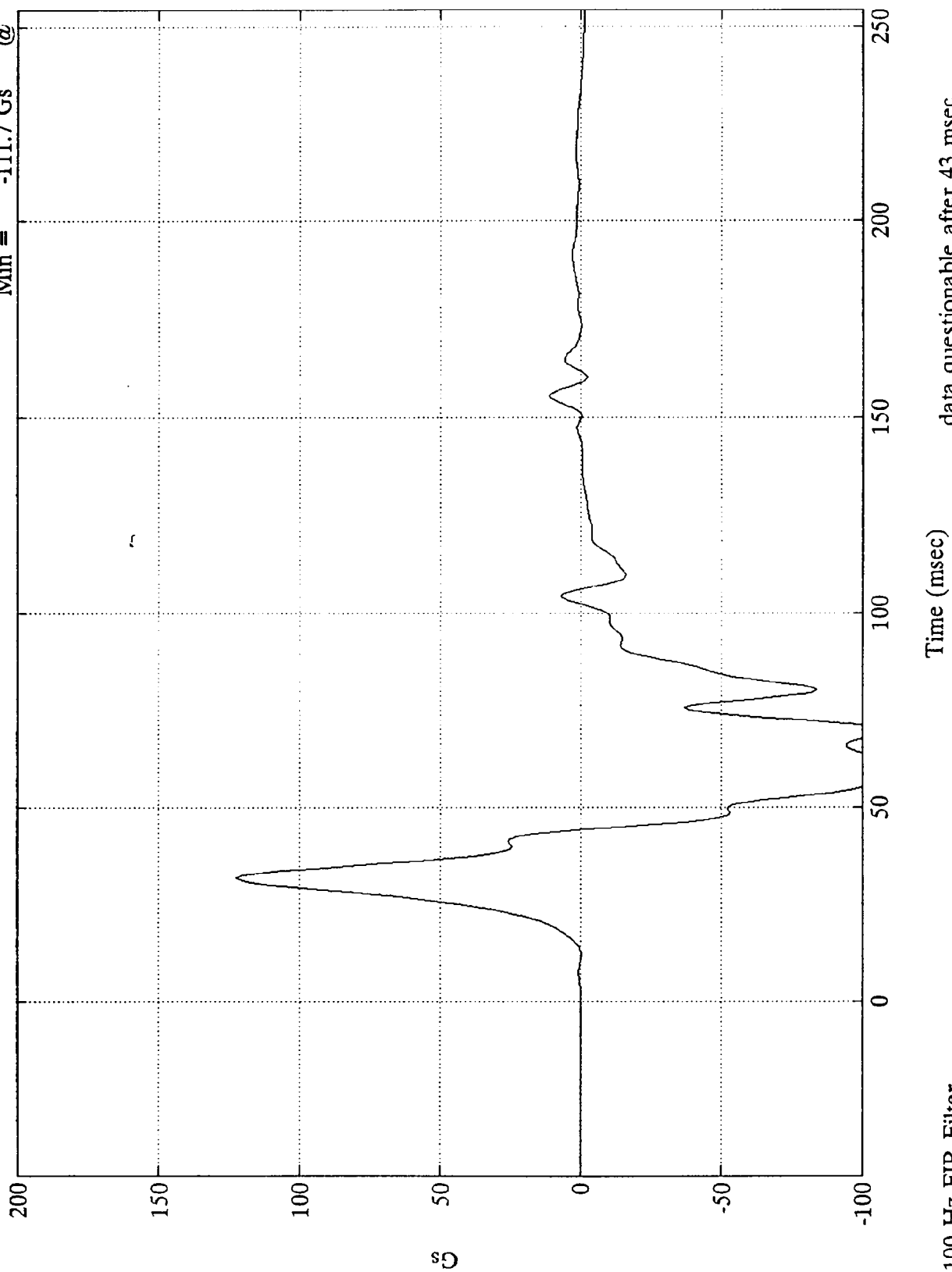
Time (msec)

100 Hz FIR Filter

Side Impact 3 - 1993 Geo Tracker

P1 Lower Spine Y(R)

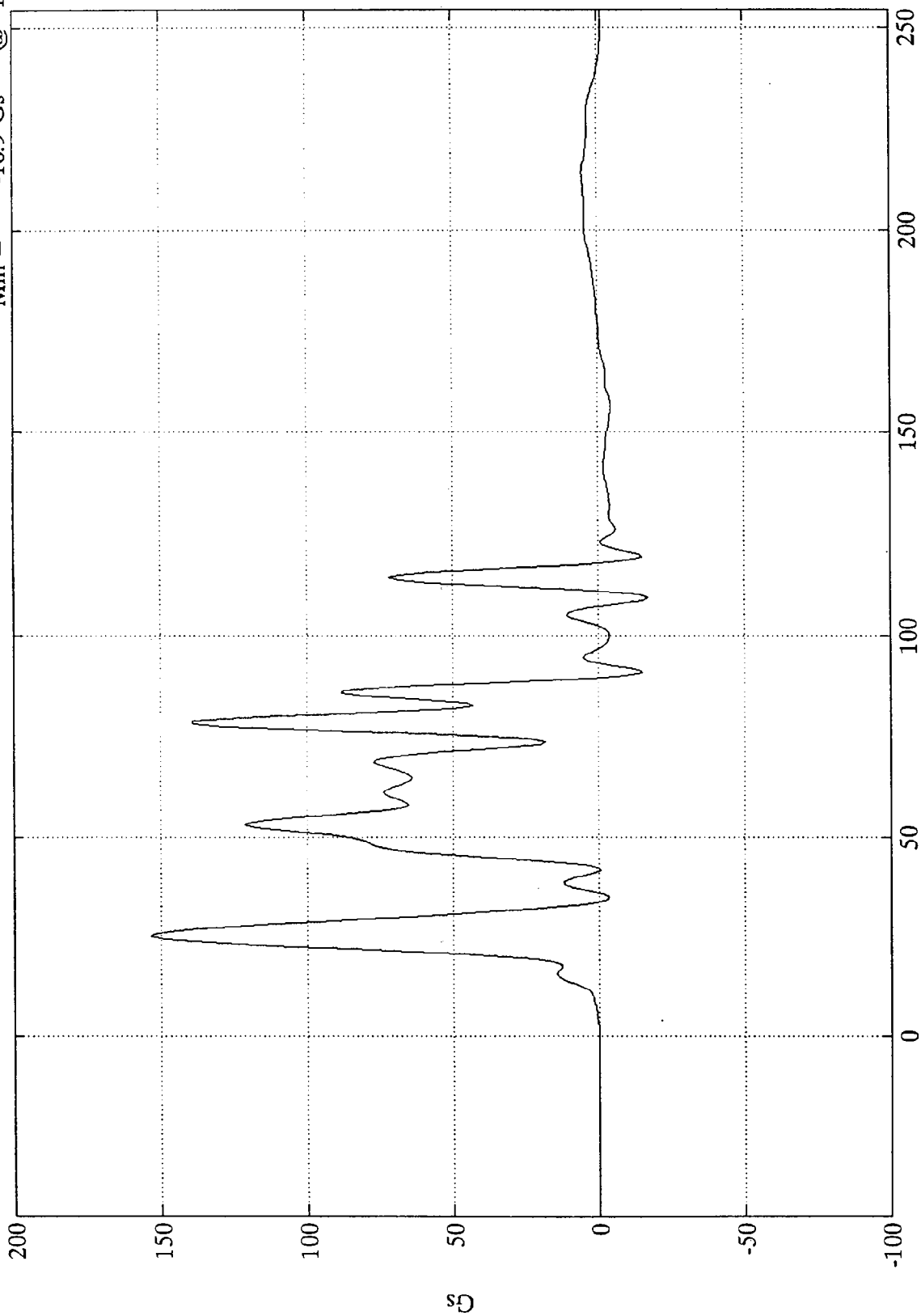
Max = 122.5 Gs @ 31.875 msec
Min = -111.7 Gs @ 61.25 msec



Side Impact 3 - 1993 Geo Tracker

Max = 153.3 Gs @ 25.000 msec
Min = -16.9 Gs @ 109.37 msec

P1 Pelvic Y

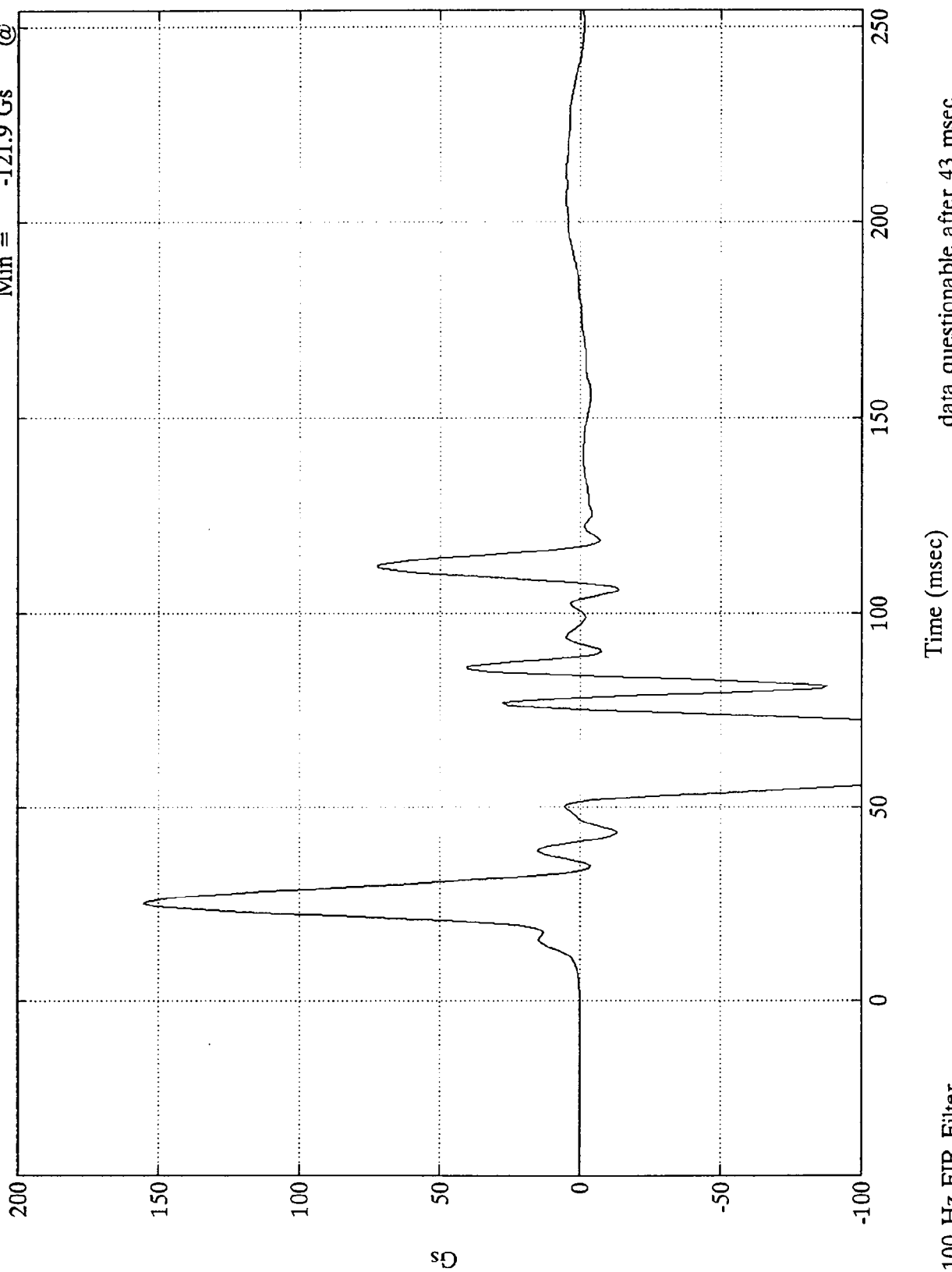


data questionable after 43 msec.

100 Hz FIR Filter

Side Impact 3 - 1993 Geo Tracker

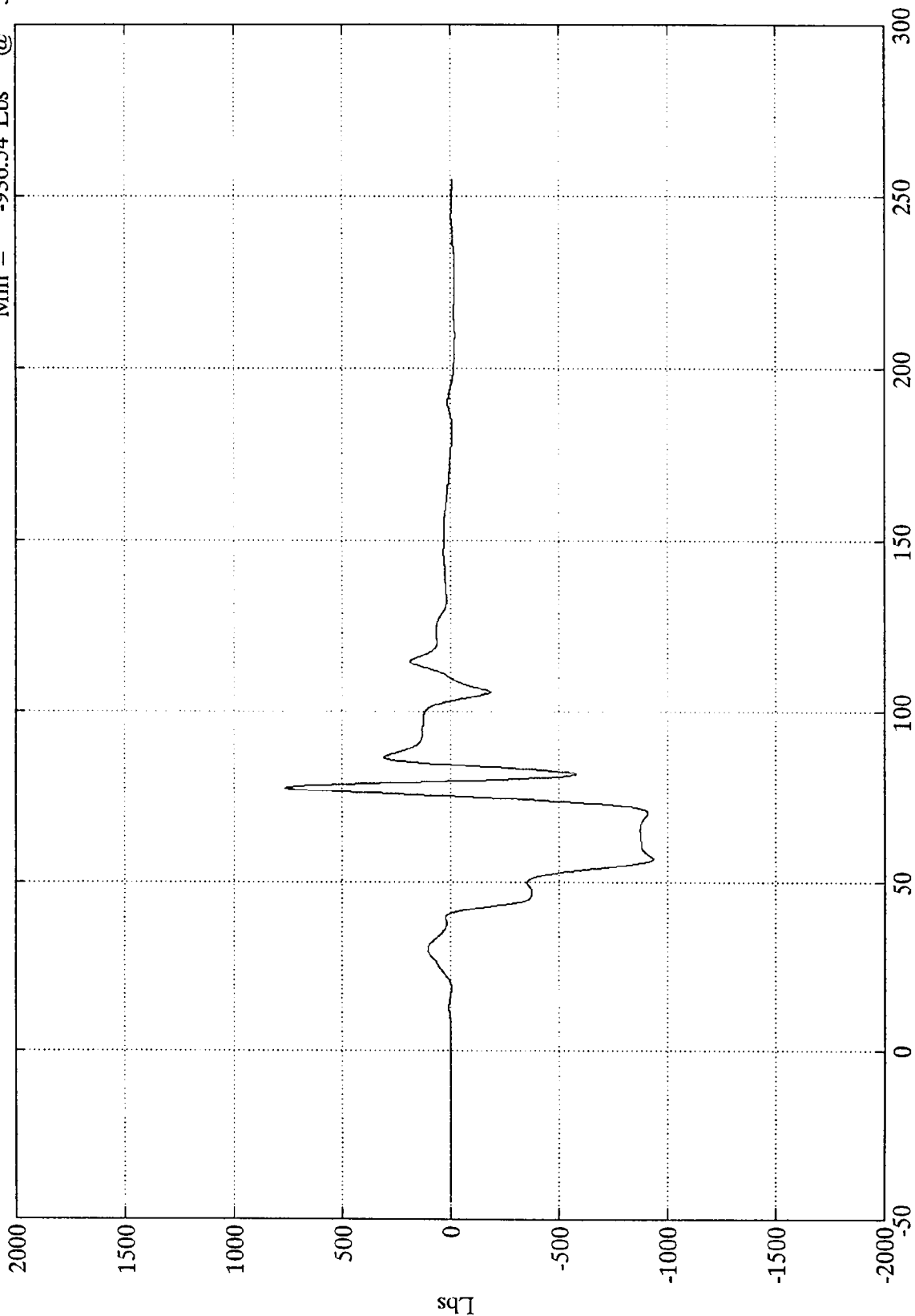
P1 Pelvic Y(R)
Max = 155.4 Gs @ 25.000 msec
Min = -121.9 Gs @ 70.62 msec



Side Impact 3 - 1993 Geo Tracker

Max = 764.12 Lbs @ 77.51 msec
Min = -936.54 Lbs @ 56.88 msec

P1 Lap Belt

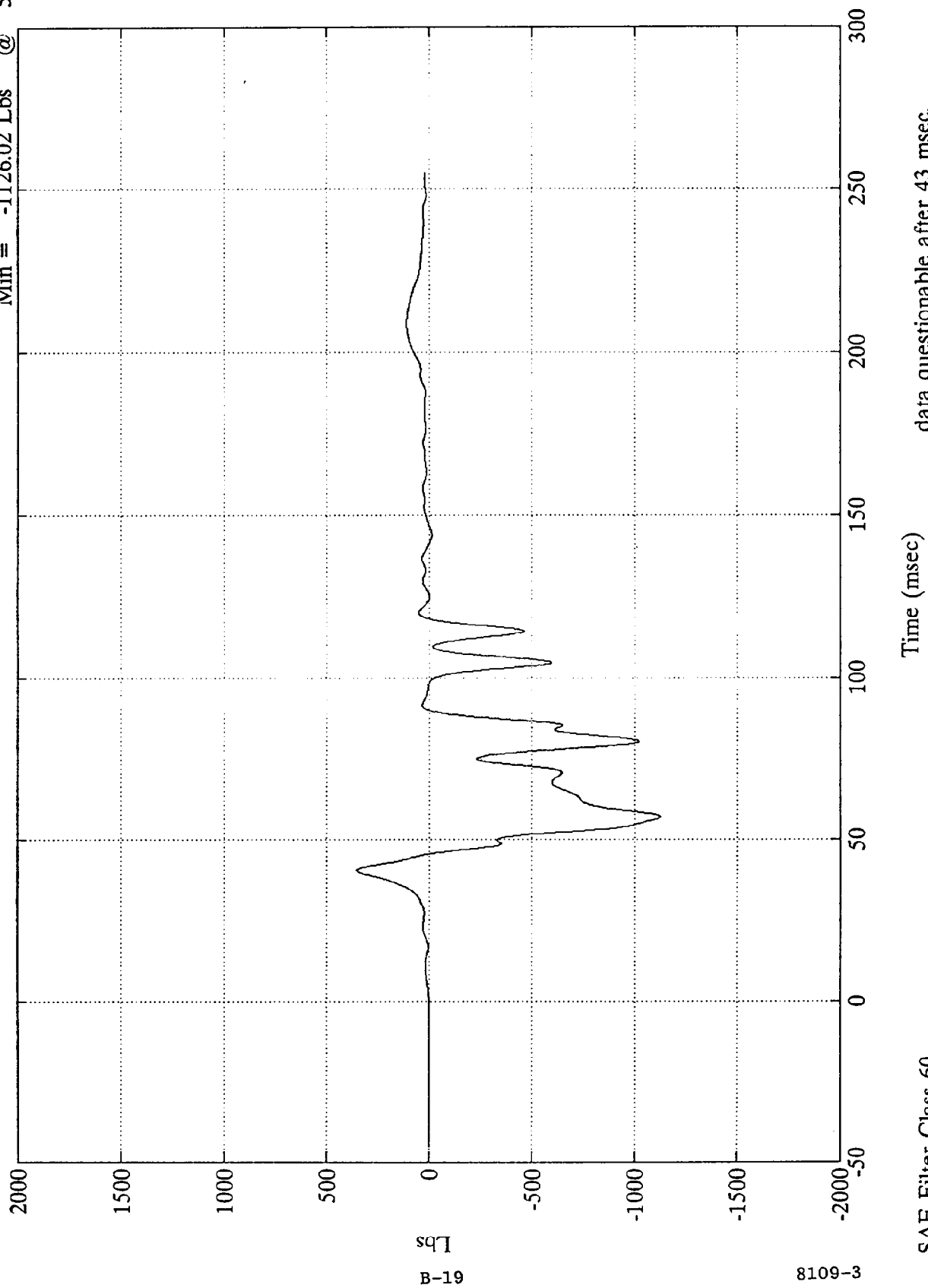


data questionable after 43 msec.

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

P1 Torso Belt
Max = 353.00 Lbs @ 40.44 msec
Min = -1126.02 Lbs @ 57.00 msec



SAE Filter Class 60

data questionable after 43 msec.

TEST VEHICLE AND MDB DATA

FACILITY: TRACK
RUN #: 1295
SERIES #: 1

TEST DATE: 17 Jun 1993
TEST TIME: 10:18:52
BOARD: b

TITLE: Side Impact 3 - 1993 Geo Tracker

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	RF Sill X	Gs	7.0	22.7	-88.7	54.7	60.0
2	RF Sill Y	Gs	44.0	114.5	-73.4	71.2	60.0
3	RF Sill Z	Gs	10.8	23.6	-61.4	57.1	60.0
4	LF Sill Y	Gs	111.1	2.8	-97.6	7.7	60.0
5	Trunk C/L X	Gs	15.3	114.0	-58.4	70.2	60.0
6	Trunk C/L Y	Gs	77.4	71.8	-23.7	114.4	60.0
7	Trunk C/L Z	Gs	23.5	114.1	-65.2	71.4	60.0
8	LF Door C/L Y	Gs	179.9	8.5	-124.4	16.4	60.0
9	LF Door Mid Rear Y	Gs	163.4	5.9	-110.7	57.5	60.0
10	LF Door Upper C/L Y	Gs	112.5	11.0	-105.6	69.2	60.0
11	LU A-Pillar Y	Gs	170.5	2.6	-262.8	76.7	60.0
12	LL A-Pillar Y	Gs	135.2	2.8	-97.9	62.8	60.0
13	LU B-Pillar Y	Gs	584.4	77.3	-542.7	68.2	60.0
14	LL B-Pillar Y	Gs	200.3	2.3	-119.6	57.0	60.0
15	NULL	Lbs	.0	254.9	.0	254.9	60.0
16	NULL	Lbs	.0	254.9	.0	254.9	60.0
17	RF Sill Resultant	Gs	119.5	57.0	.0	-38.6	60.0
18	Trunk C/L Resultant	Gs	115.5	71.4	.0	-35.9	60.0

FACILITY: TRACK TEST DATE: 17 Jun 1993
RUN #: 1295 TEST TIME: 10:18:52
SERIES #: 1 BOARD: c

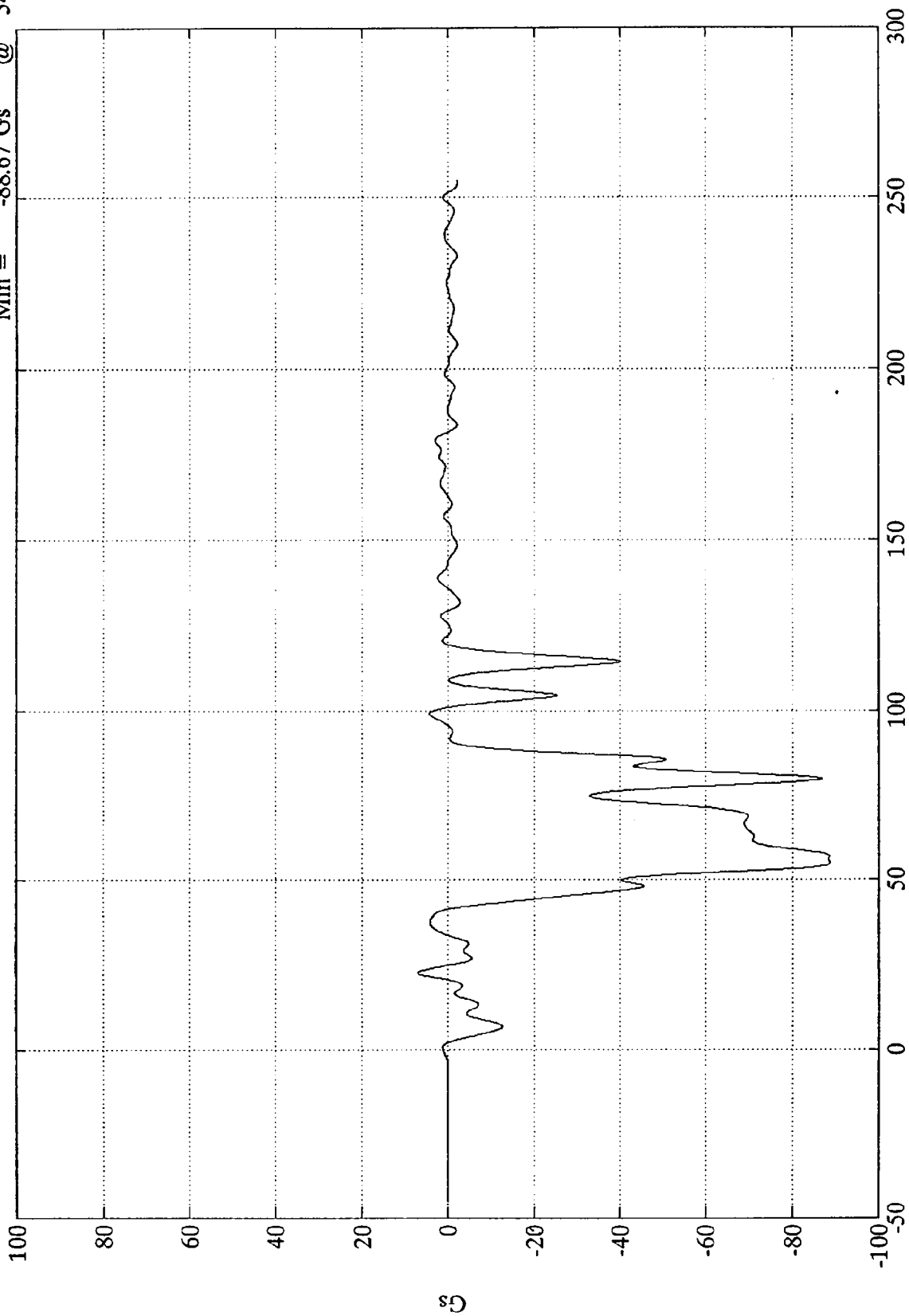
TITLE: Side Impact 3 - 1993 Geo Tracker

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	MDB C.G. X	Gs	1.4	134.5	-15.0	21.6	60.0
2	MDB C.G. Y	Gs	4.9	186.7	-2.7	29.9	60.0
3	MDB C.G. Z	Gs	18.2	19.9	-12.5	37.9	60.0
4	MDB Left Rear Rail X	Gs	1.1	117.4	-19.5	27.1	60.0
5	MDB Right Rear Rail Y	Gs	5.9	28.6	-3.3	109.6	60.0
6	NULL		.0	254.9	.0	254.9	1000.0
7	NULL		.0	254.9	.0	254.9	1000.0
8	NULL		.0	254.9	.0	254.9	1000.0
17	MDB C.G. Resultant	Gs	22.8	20.2	.1	-12.0	60.0

Side Impact 3 - 1993 Geo Tracker

RF Sill X

Max = 7.04 Gs @ 22.68 msec
Min = -88.67 Gs @ 54.72 msec



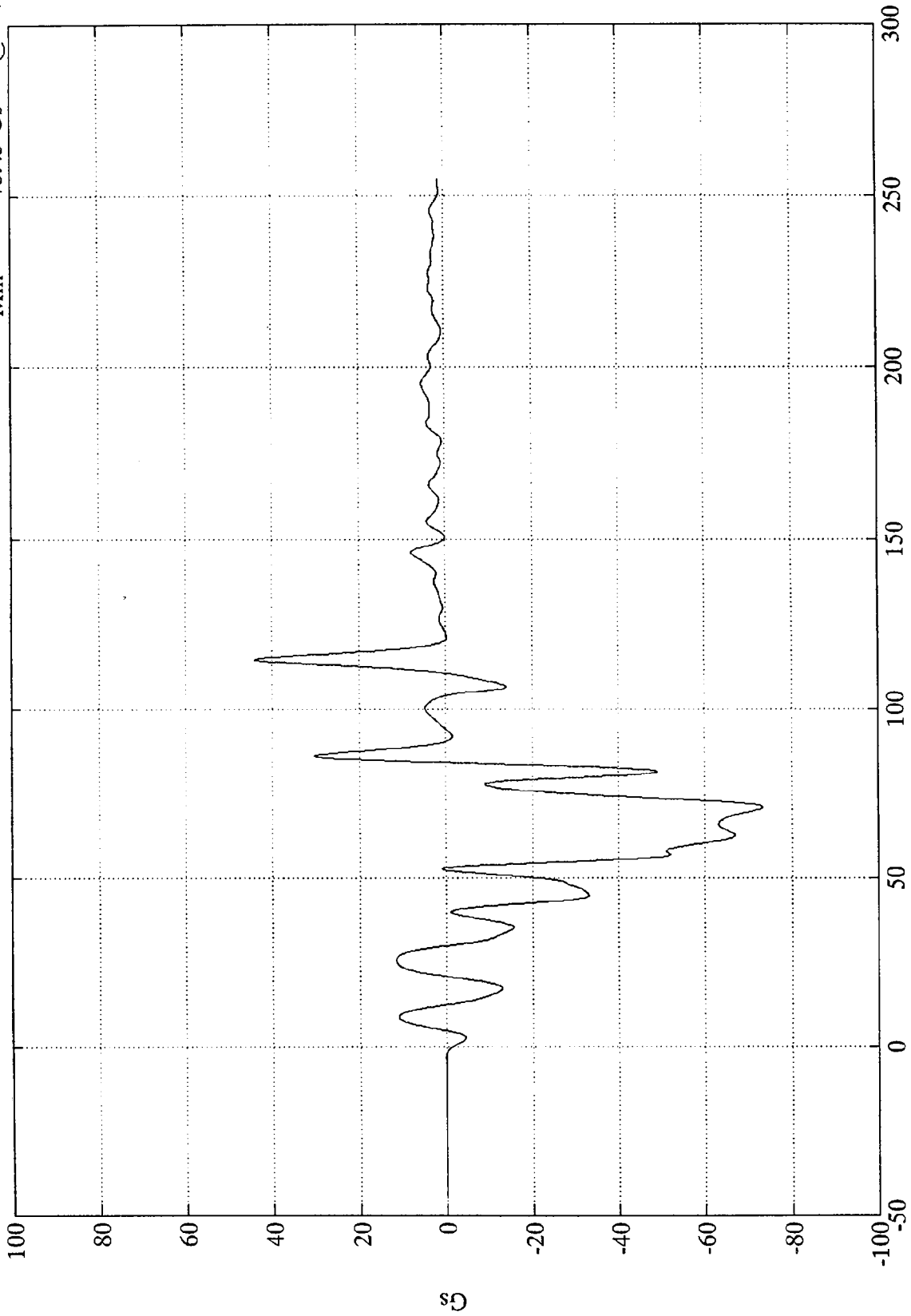
data questionable after 43 msec.

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

Max = 44.03 Gs @ 114.48 msec
Min = -73.43 Gs @ 71.16 msec

RF Sill Y



data questionable after 43 msec.

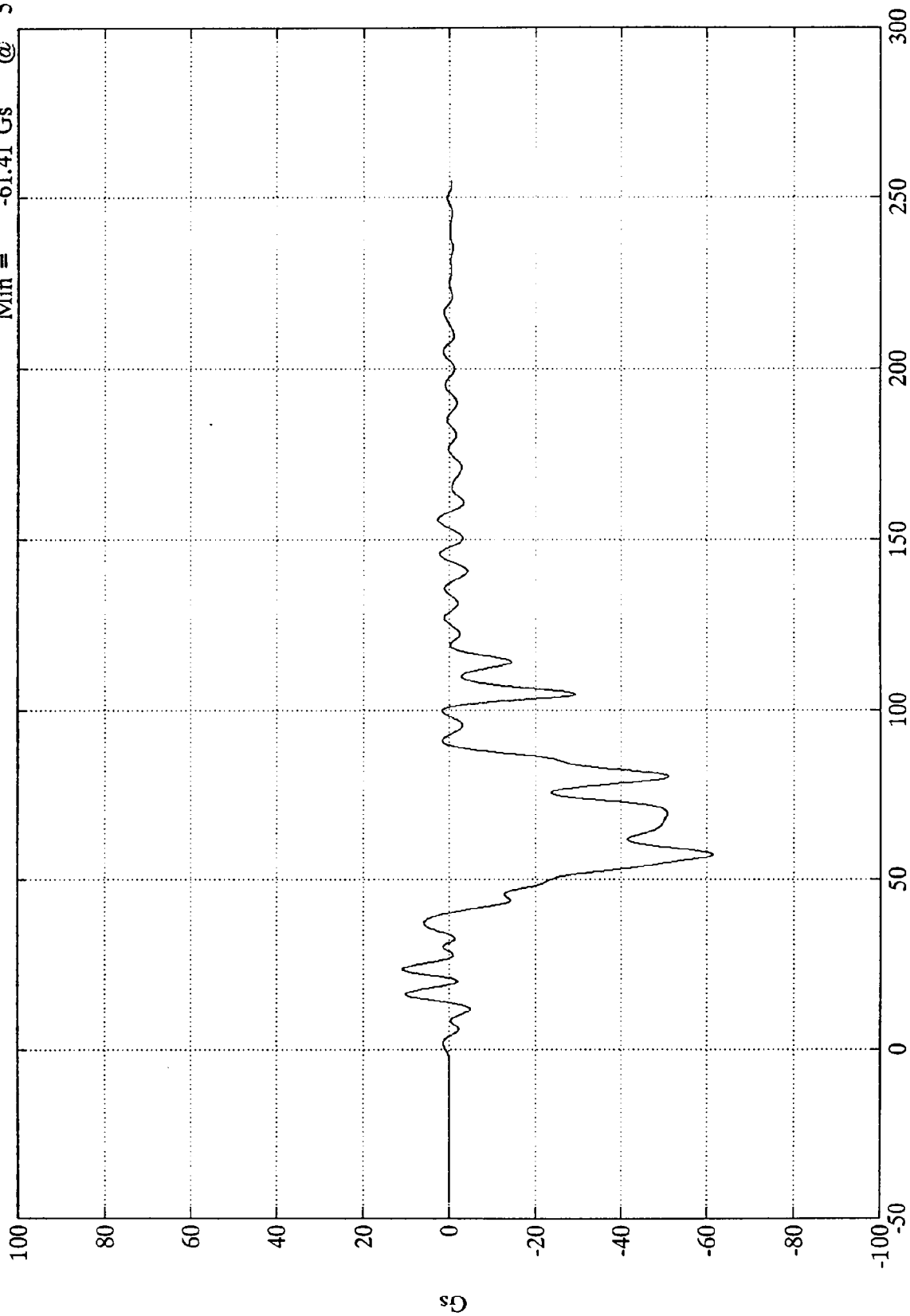
Time (msec)

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

Max = 10.83 Gs @ 23.63 msec
Min = -61.41 Gs @ 57.11 msec

RF Sill Z



data questionable after 43 msec.

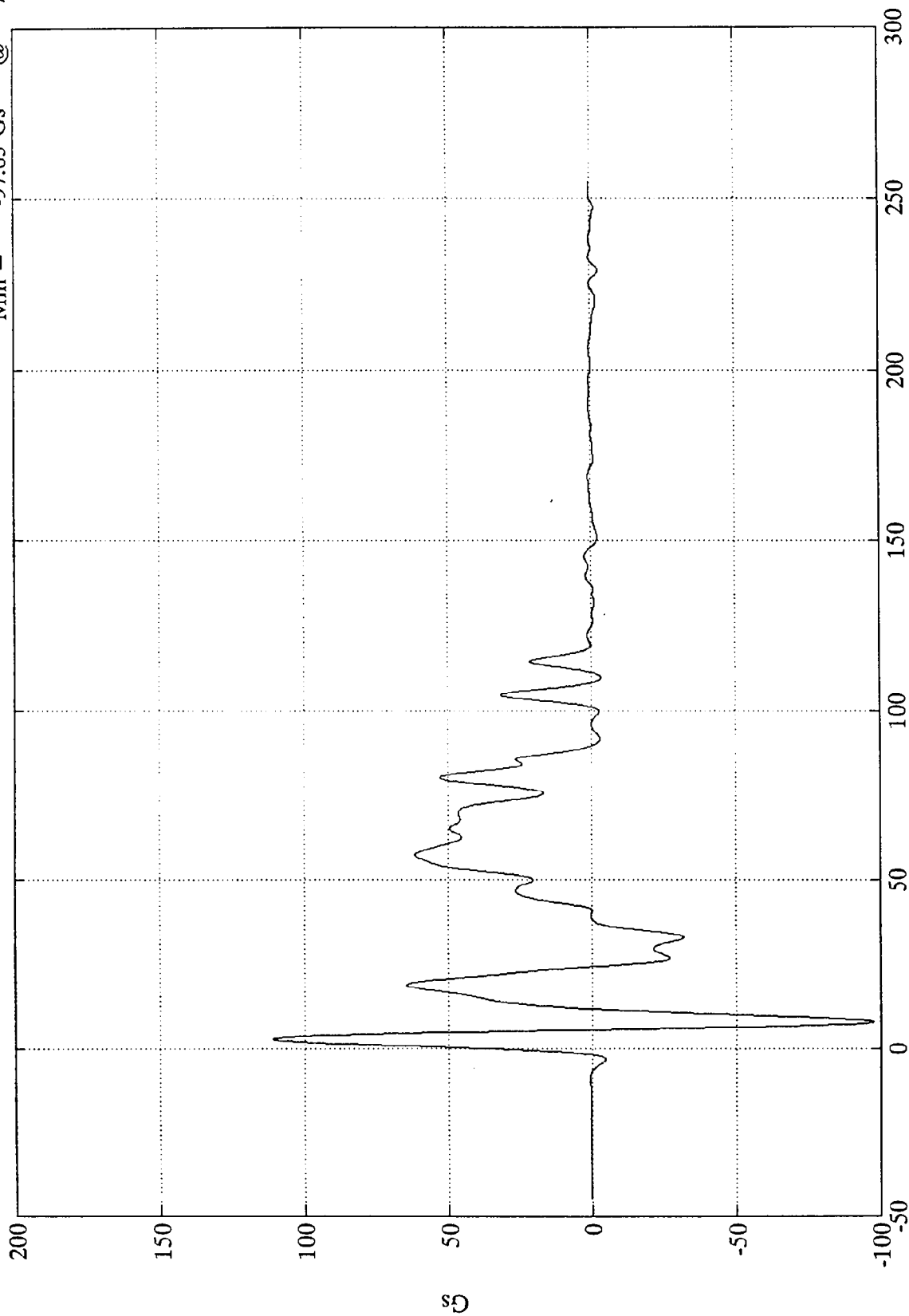
Time (msec)

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

Max = 111.13 Gs @ 2.75 msec
 Min = -97.63 Gs @ 7.67 msec

LF Sill Y



data questionable after 150 msec.

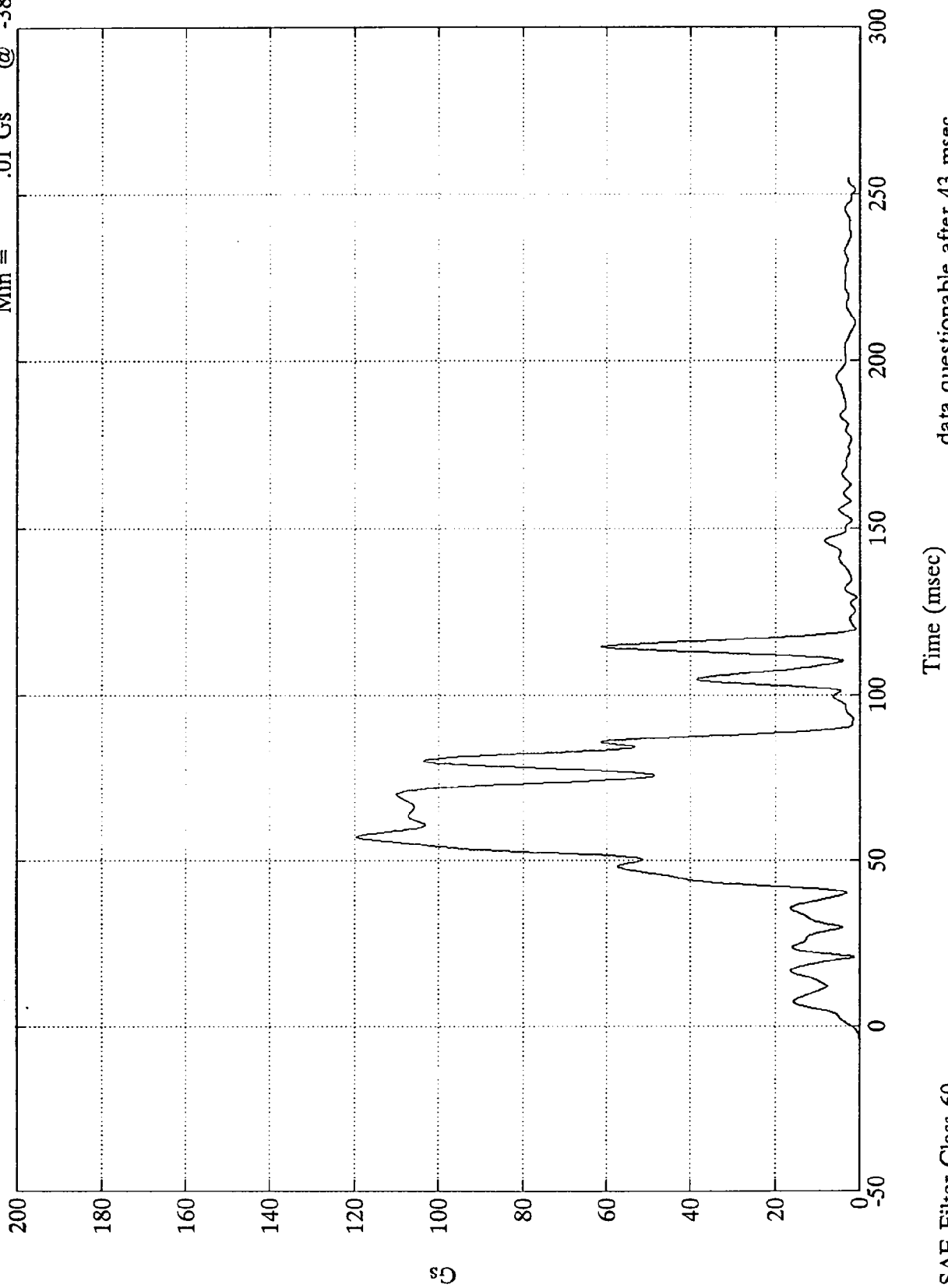
Time (msec)

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

Max = 119.54 Gs @ 57.00 msec
Min = .01 Gs @ -38.64 msec

RF Sill Resultant



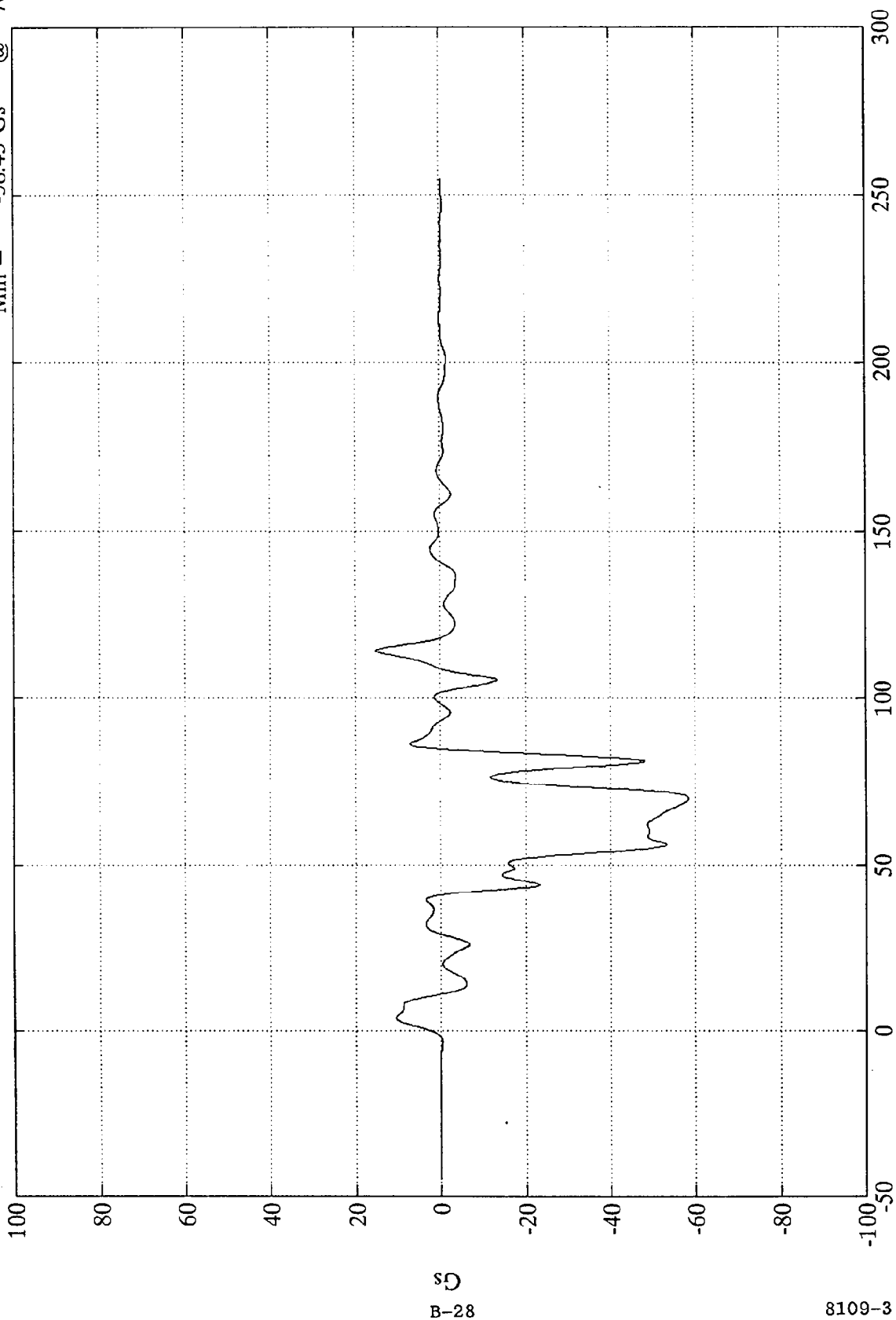
SAE Filter Class 60

data questionable after 43 msec.

Side Impact 3 - 1993 Geo Tracker

Max = 15.27 Gs @ 114.00 msec
Min = -58.43 Gs @ 70.20 msec

Trunk C/L X



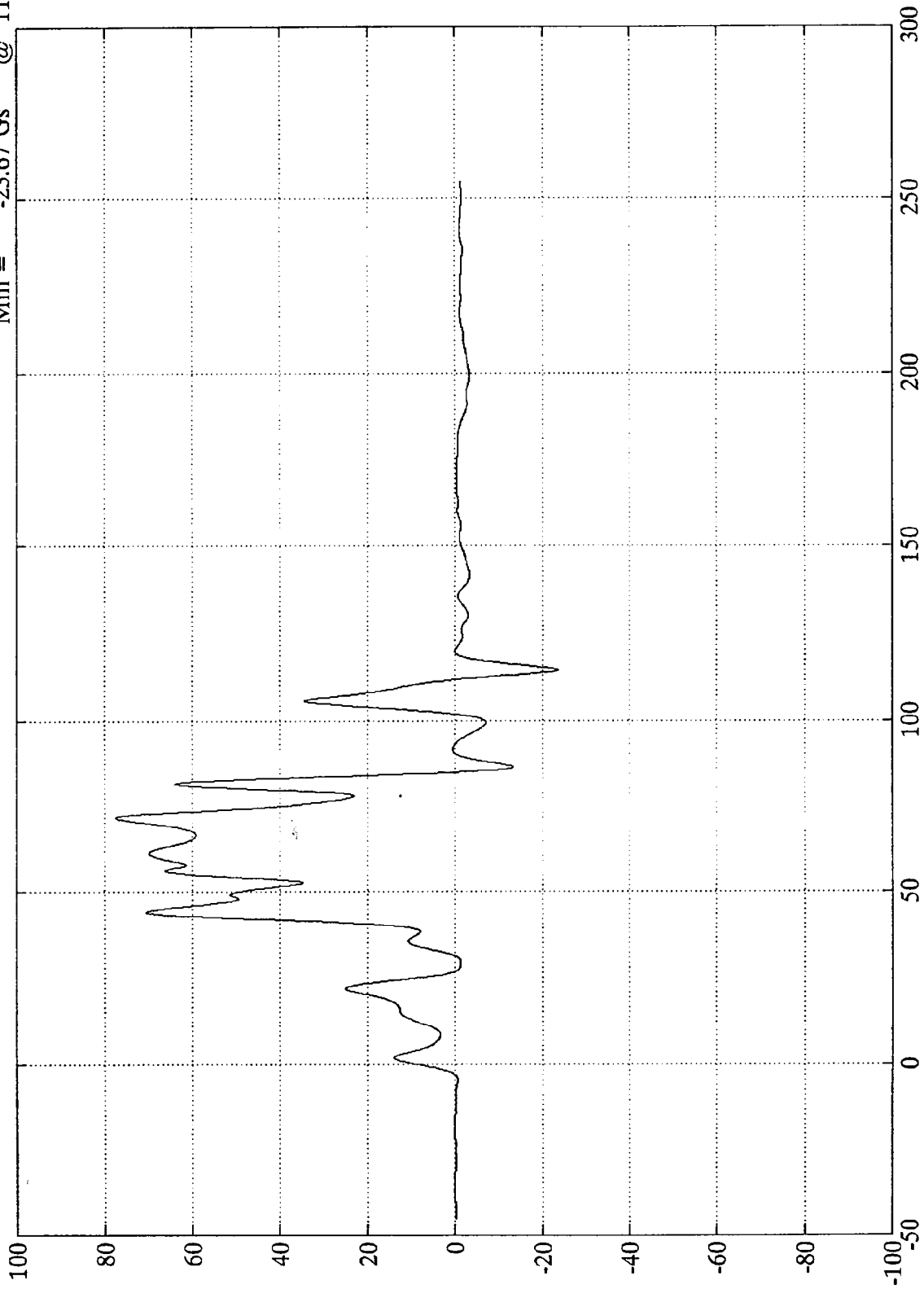
data questionable after 43 msec.

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

Max = 77.38 Gs @ 71.76 msec
Min = -23.67 Gs @ 114.36 msec

Trunk C/L Y



data questionable after 43 msec.

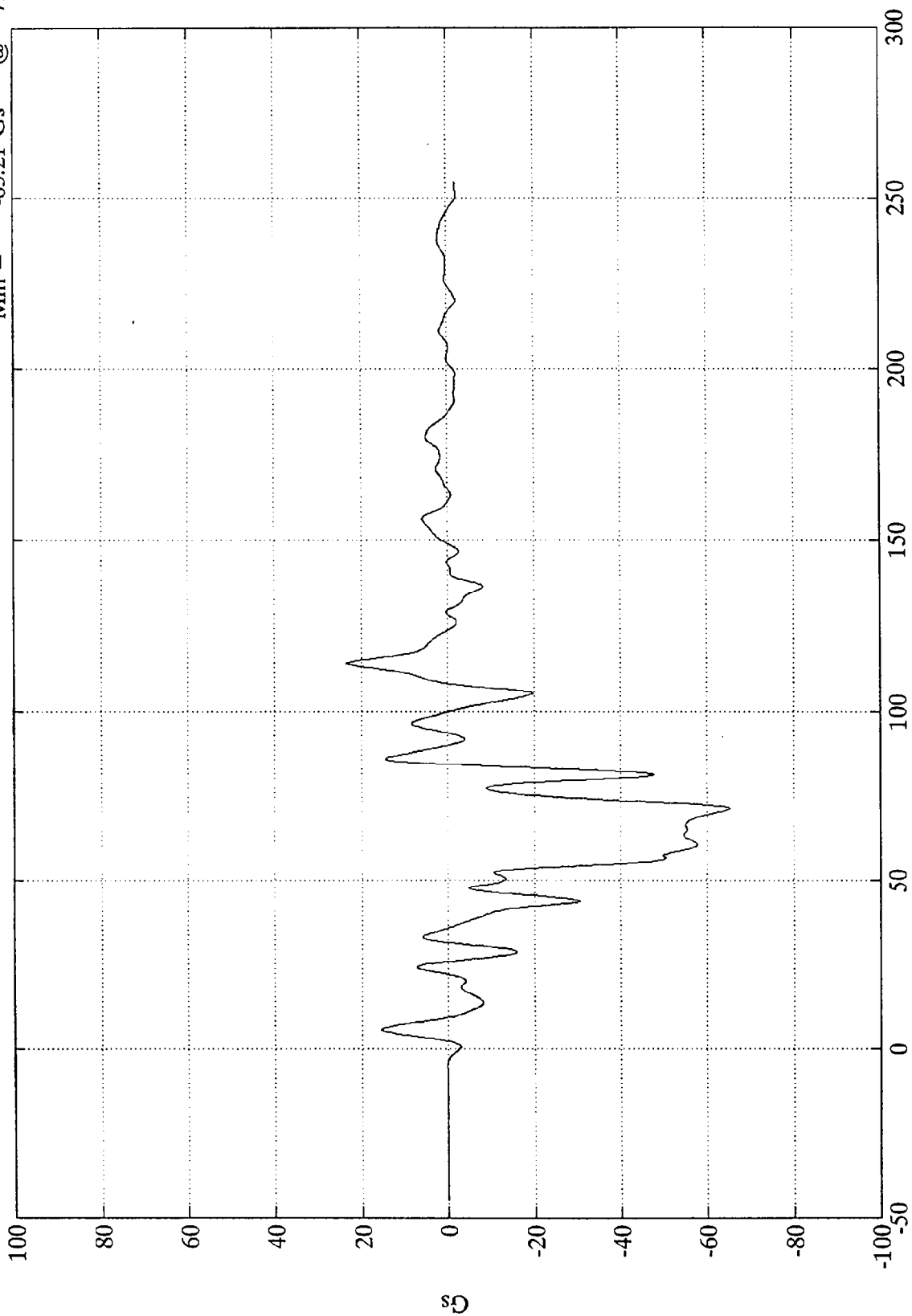
Time (msec)

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

Max = 23.46 Gs @ 114.12 msec
Min = -65.21 Gs @ 71.40 msec

Trunk C/L Z



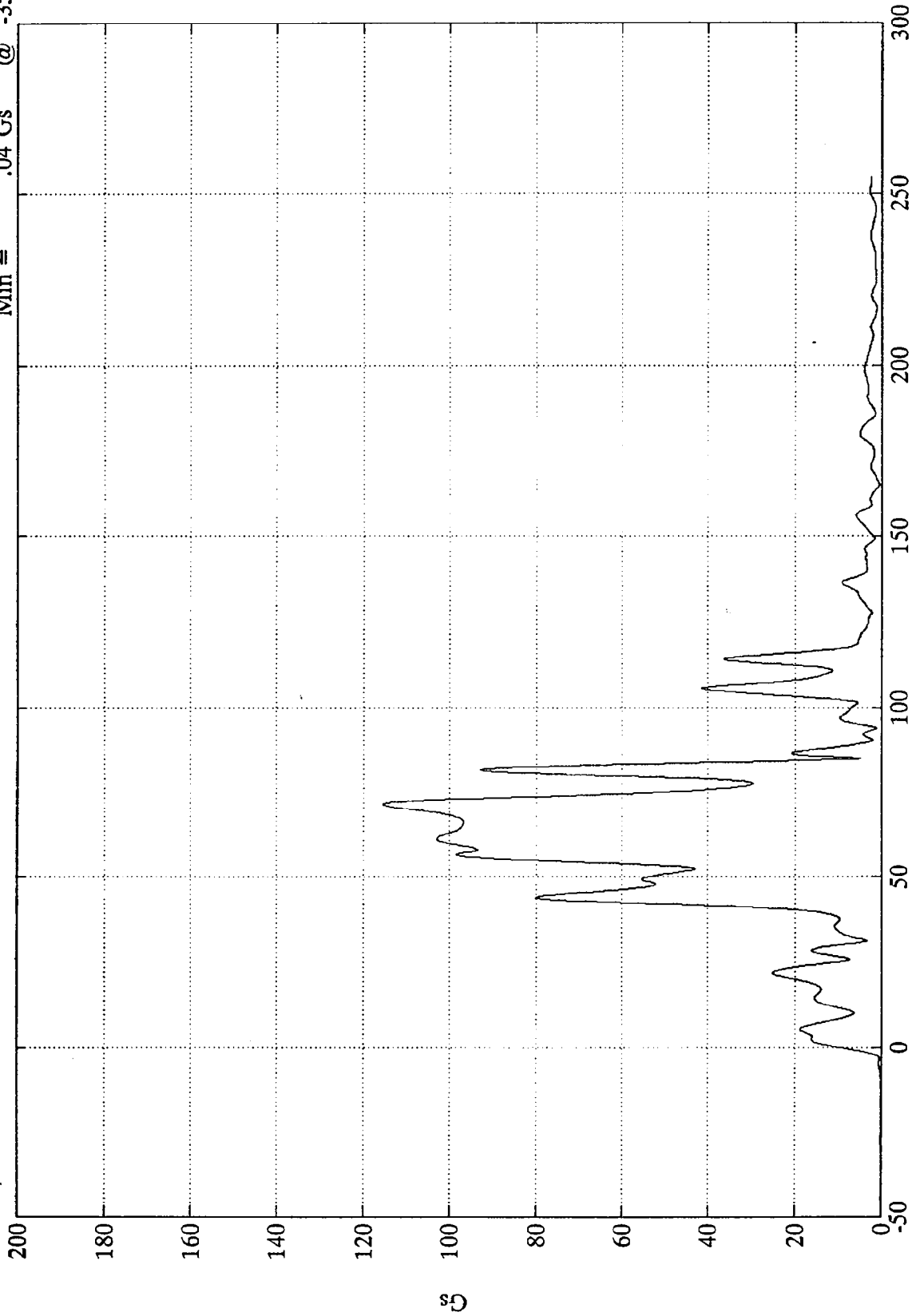
data questionable after 43 msec.

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

Trunk C/L Resultant

Max = 115.49 Gs @ 71.40 msec
Min = .04 Gs @ -35.88 msec



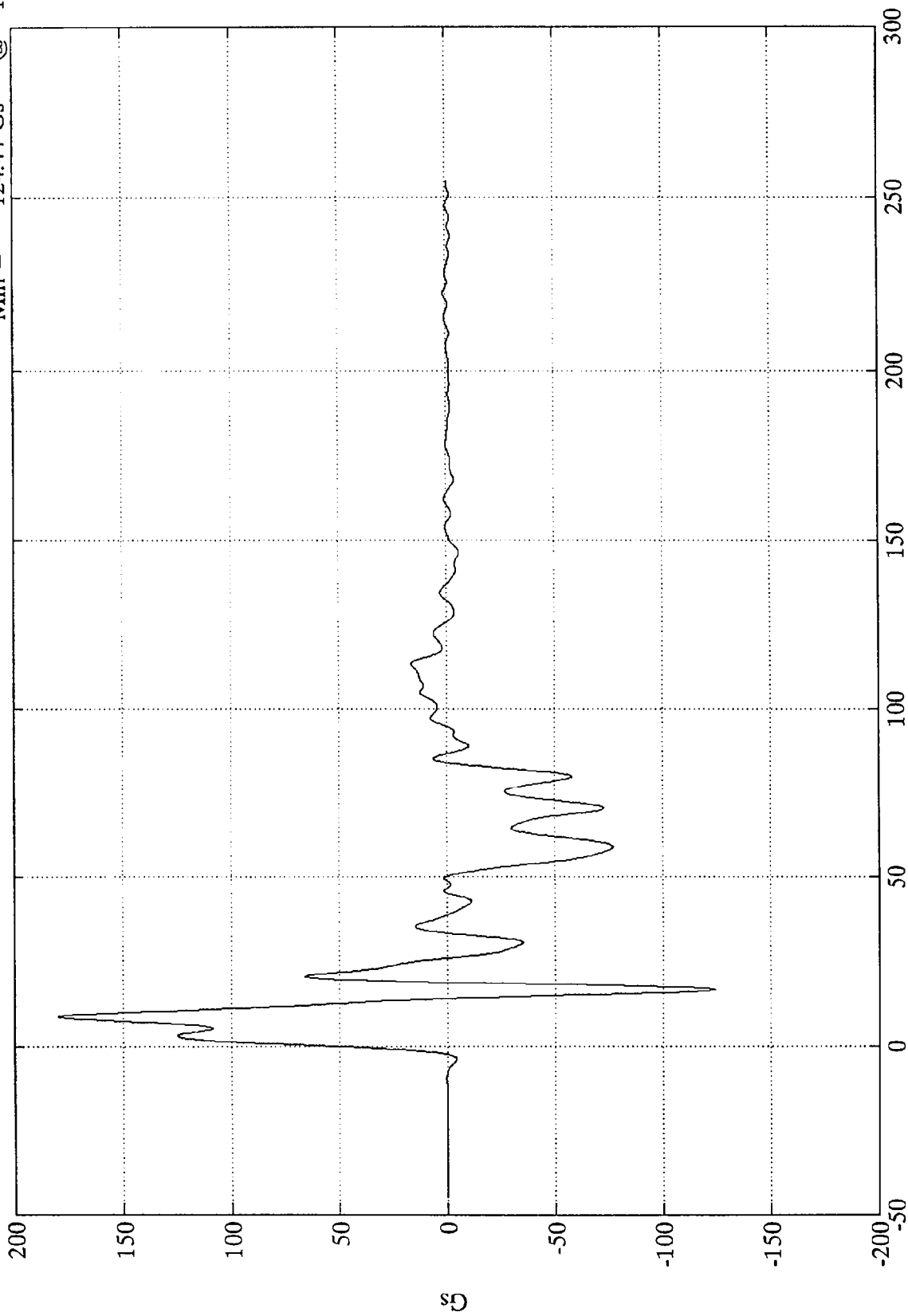
data questionable after 43 msec.

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

Max = 179.93 Gs @ 8.51 msec
 Min = -124.44 Gs @ 16.43 msec

LF Door C/L Y



data questionable after 43 msec.

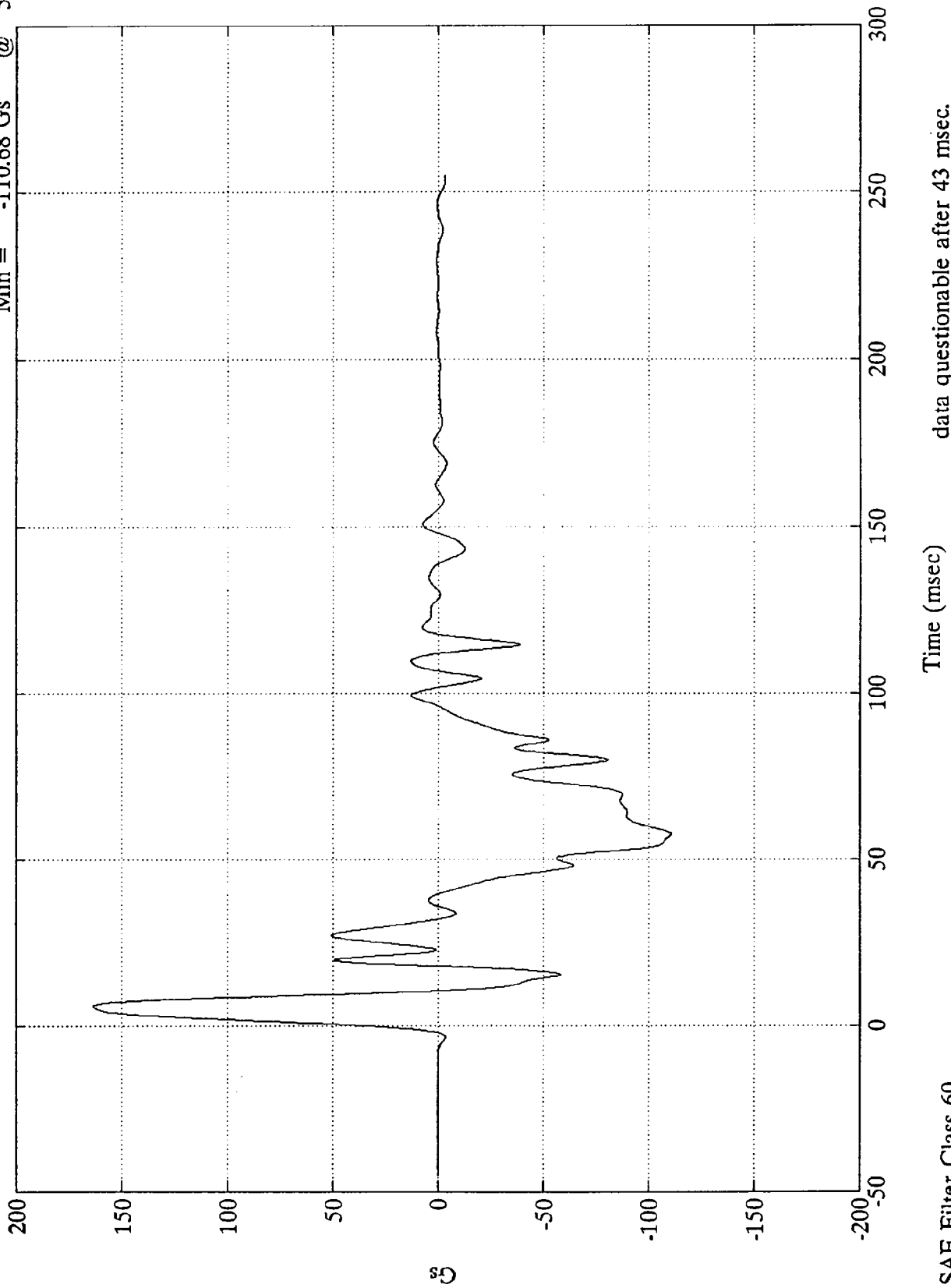
Time (msec)

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

LF Door Mid Rear Y

Max = 163.40 Gs @ 5.87 msec
Min = -110.68 Gs @ 57.47 msec

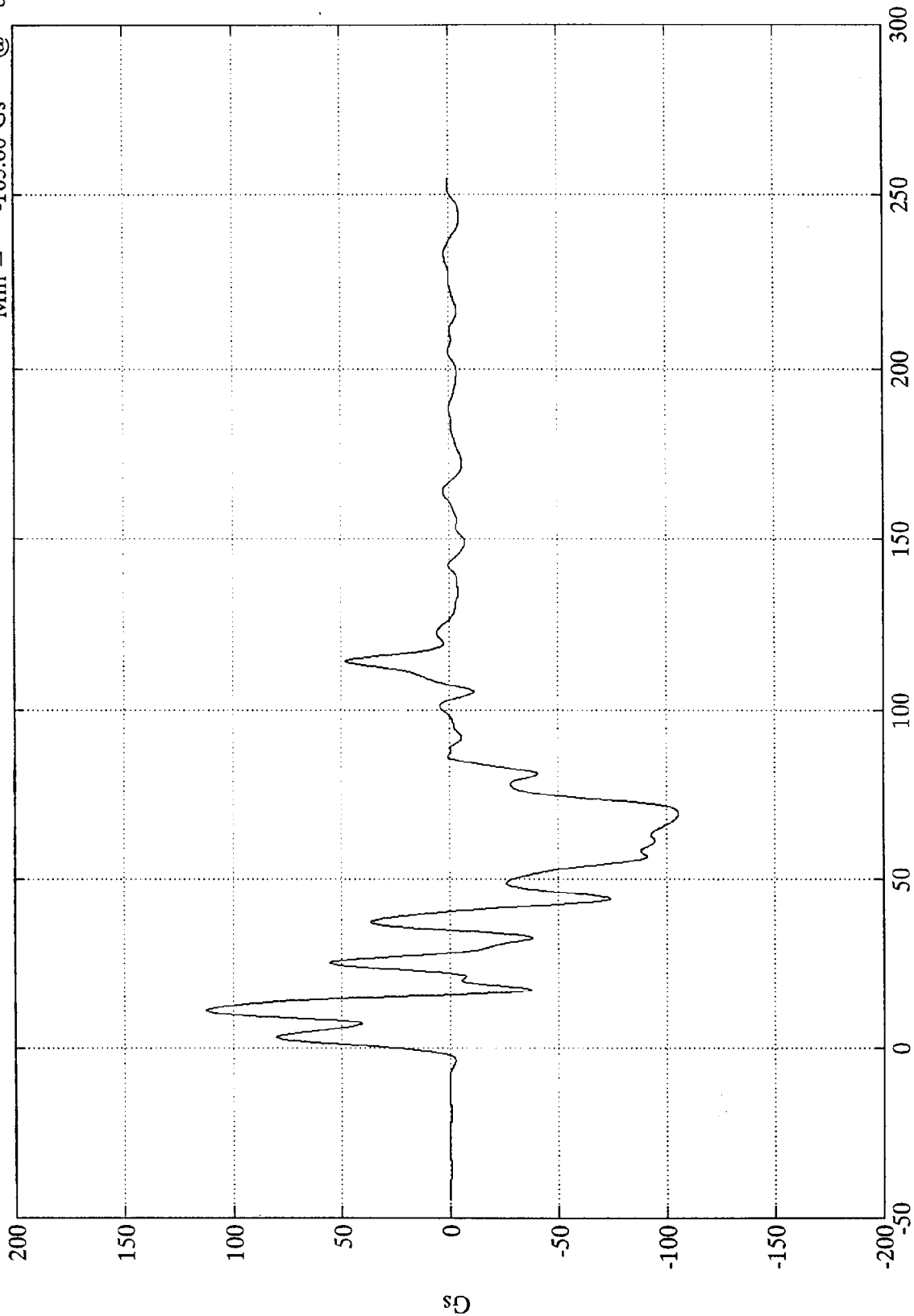


SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

LF Door Upper C/L Y

Max = 112.48 Gs @ 11.03 msec
Min = -105.60 Gs @ 69.24 msec



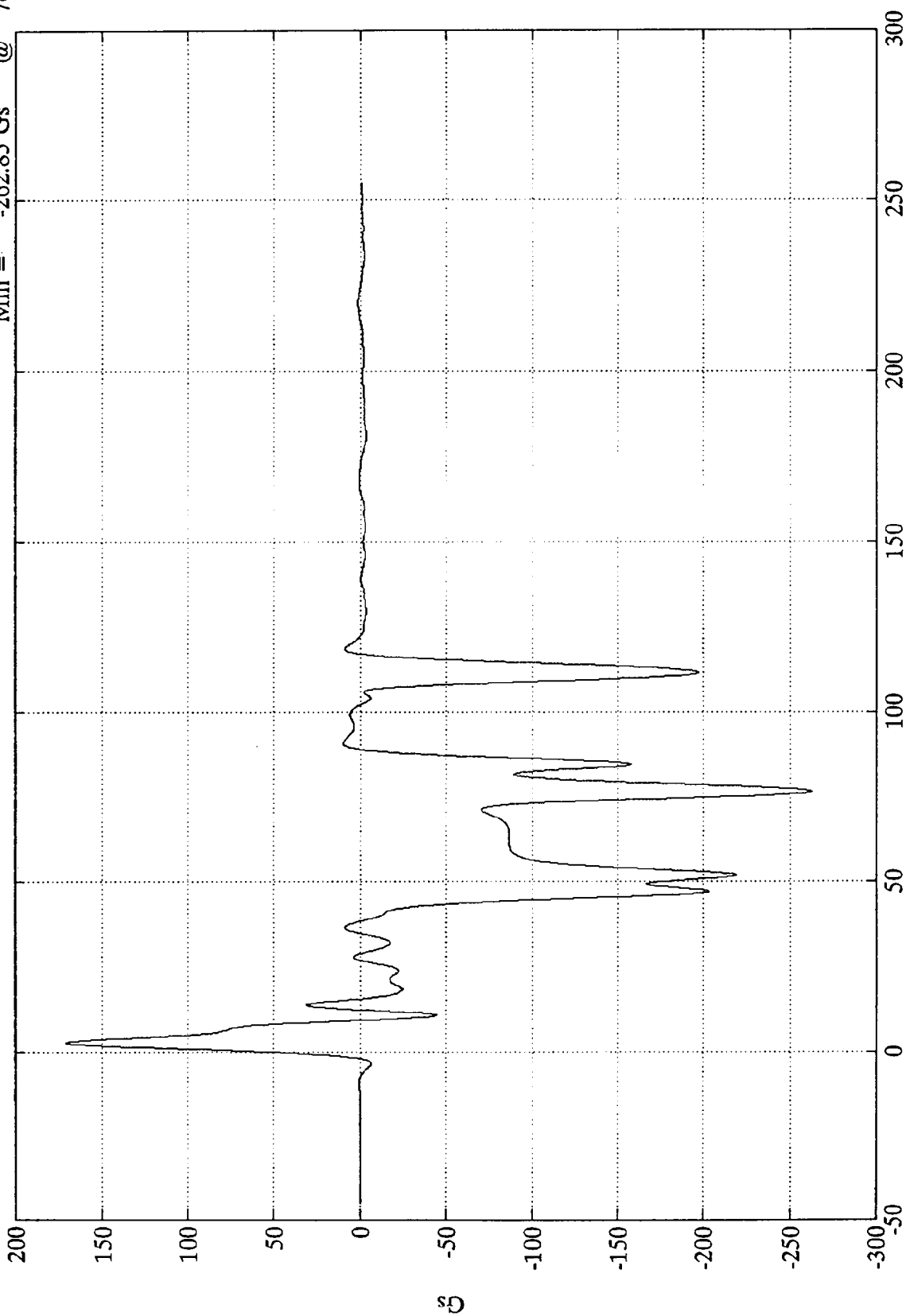
Time (msec) data questionable after 43 msec.

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

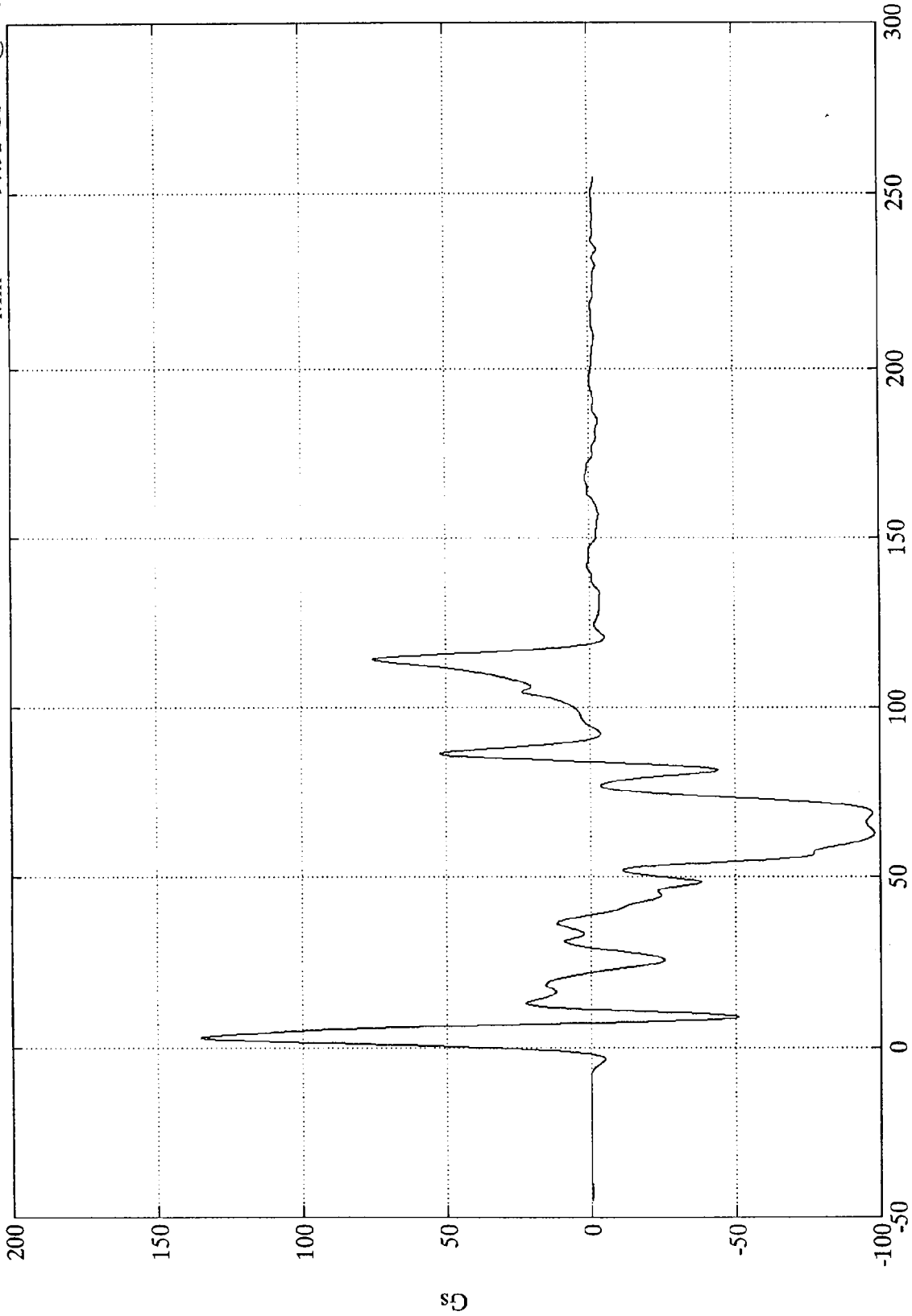
LU A-Pillar Y

Max = 170.47 Gs @ 2.63 msec
Min = -262.85 Gs @ 76.68 msec



Side Impact 3 - 1993 Geo Tracker

LL A-Pillar Y
 Max = 135.17 Gs @ 2.75 msec
 Min = -97.91 Gs @ 62.76 msec



data questionable after 43 msec.

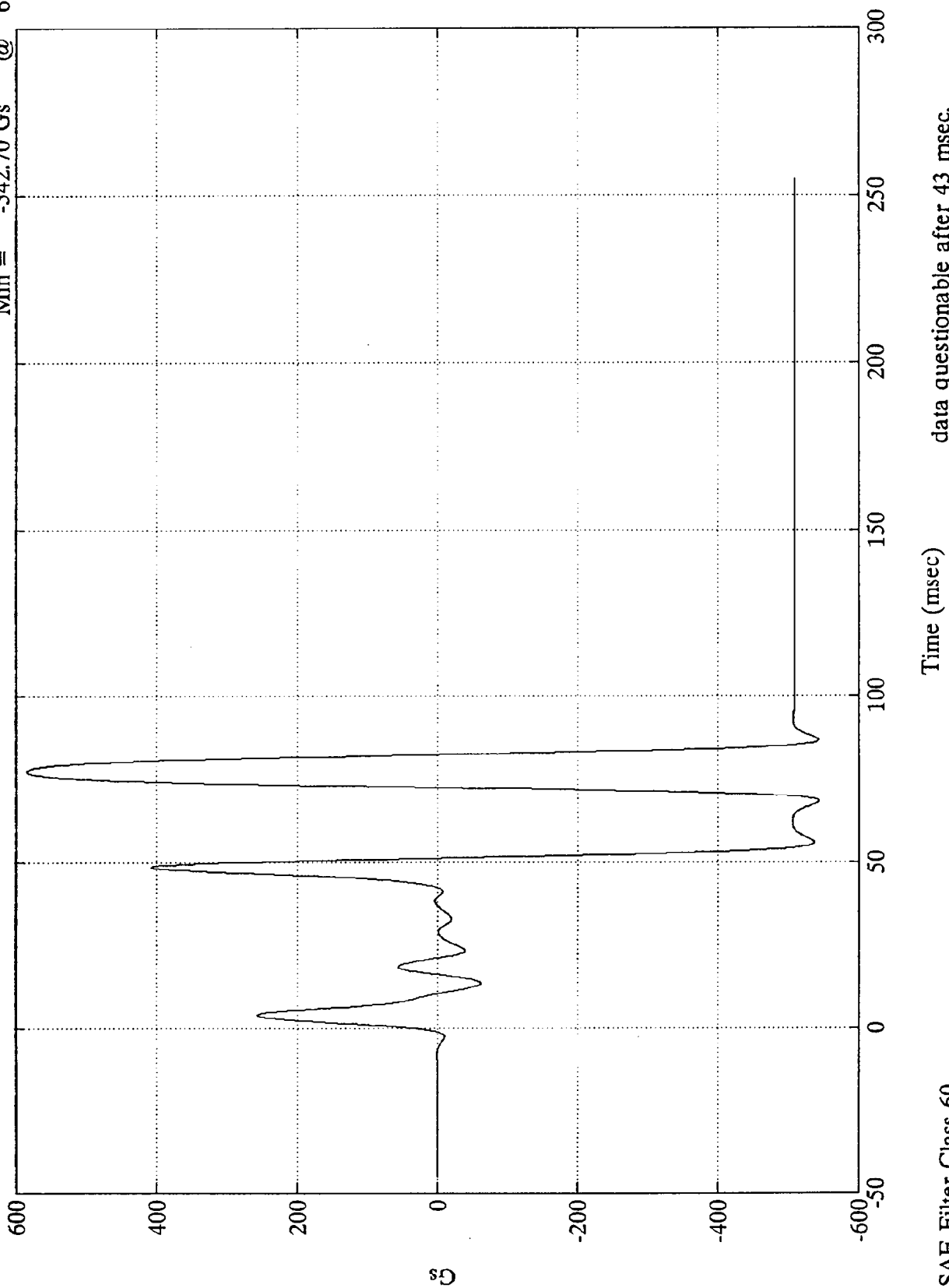
Time (msec)

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

LU B-Pillar Y

Max = 584.35 Gs @ 77.27 msec
Min = -542.70 Gs @ 68.16 msec



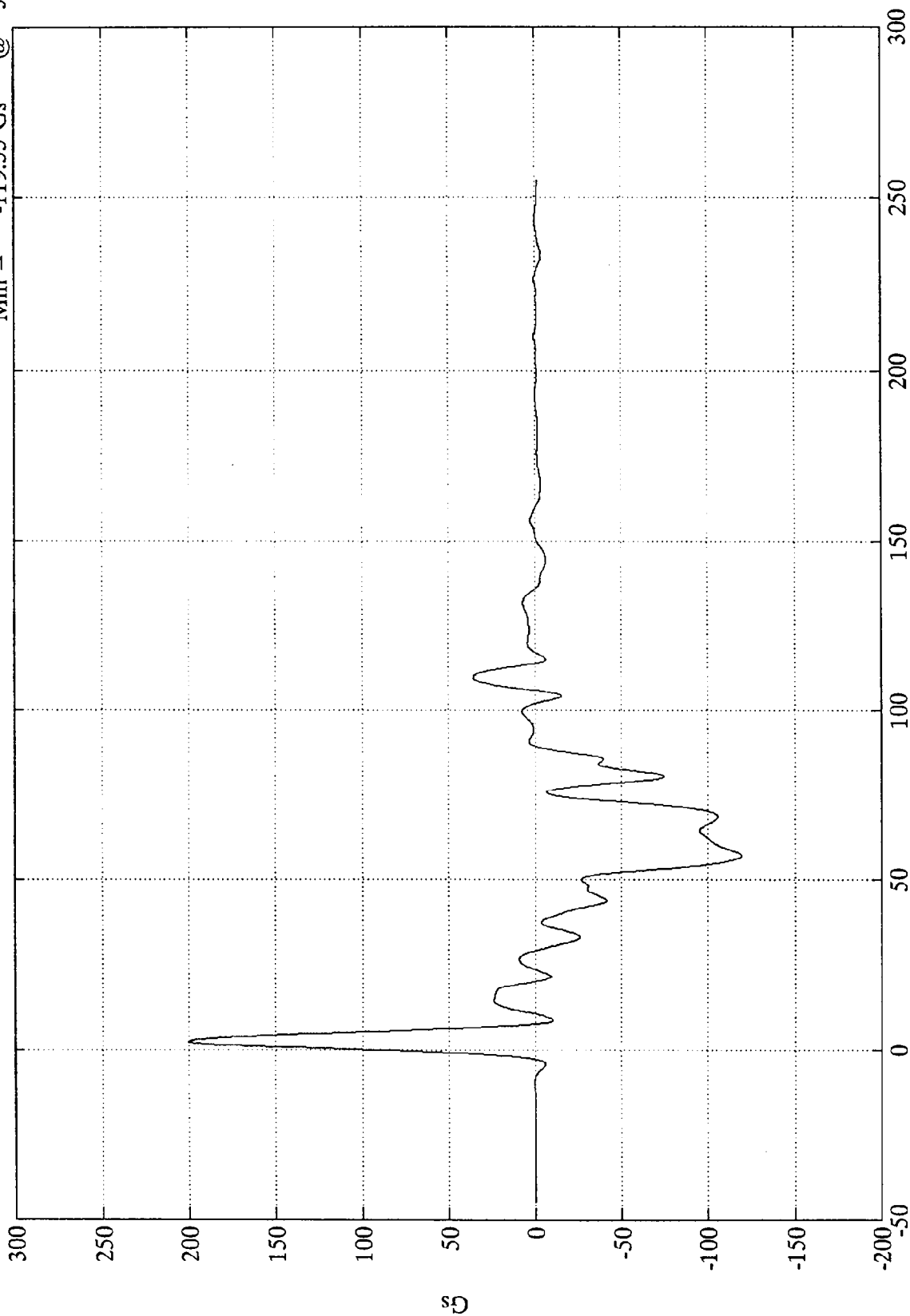
SAE Filter Class 60

Time (msec) data questionable after 43 msec.

Side Impact 3 - 1993 Geo Tracker

Max = 200.32 Gs @ 2.27 msec
Min = -119.55 Gs @ 57.00 msec

LL B-Pillar Y



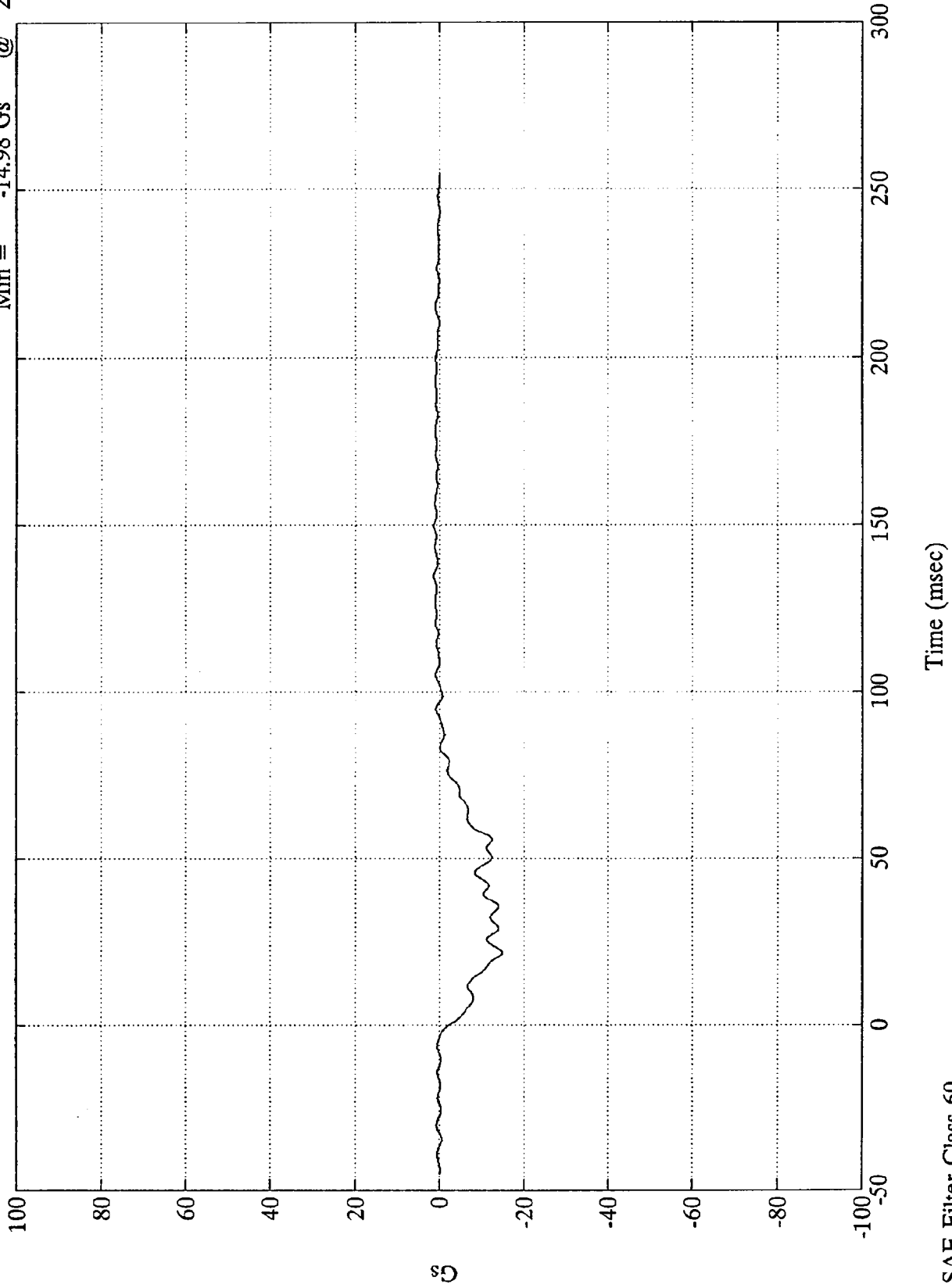
data questionable after 43 msec.

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

Max = 1.36 Gs @ 134.52 msec
Min = -14.98 Gs @ 21.59 msec

MDB C.G. X



B-39

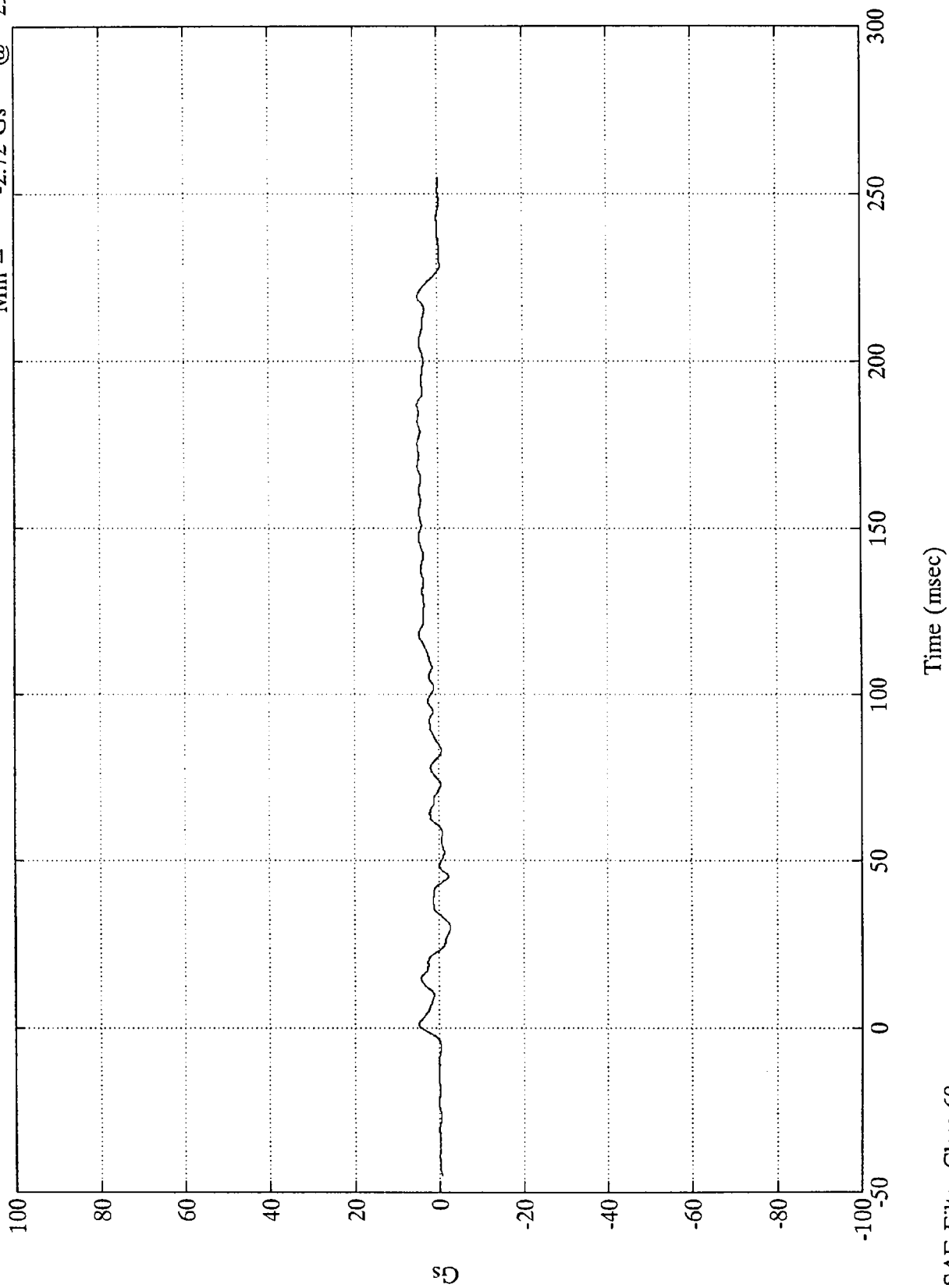
8109-3

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

Max = 4.87 Gs @ 186.72 msec
Min = -2.72 Gs @ 29.88 msec

MDB C.G. Y



B-40

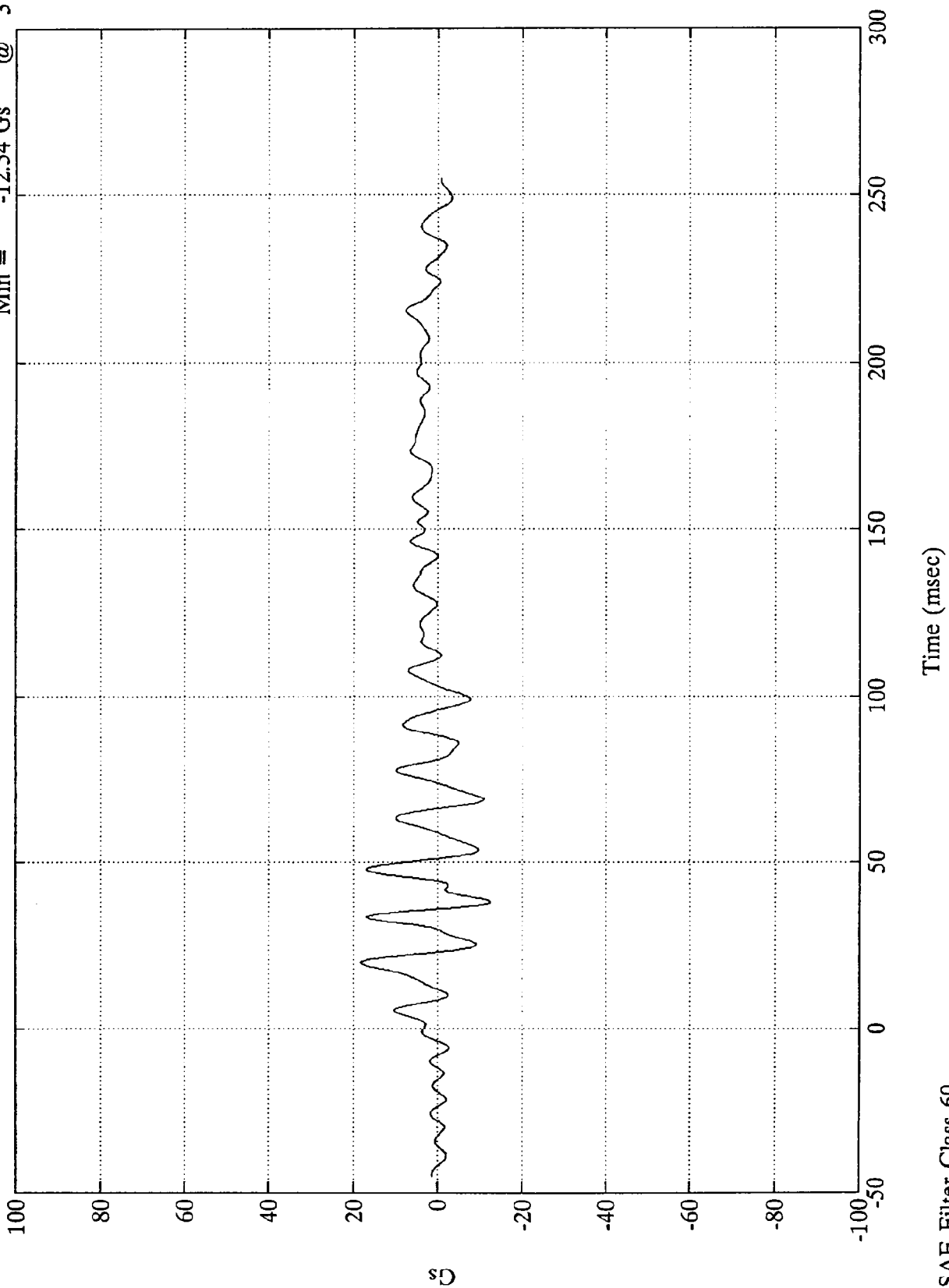
8109-3

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

MDB C.G. Z

Max = 18.22 Gs @ 19.91 msec
Min = -12.54 Gs @ 37.92 msec



B-41

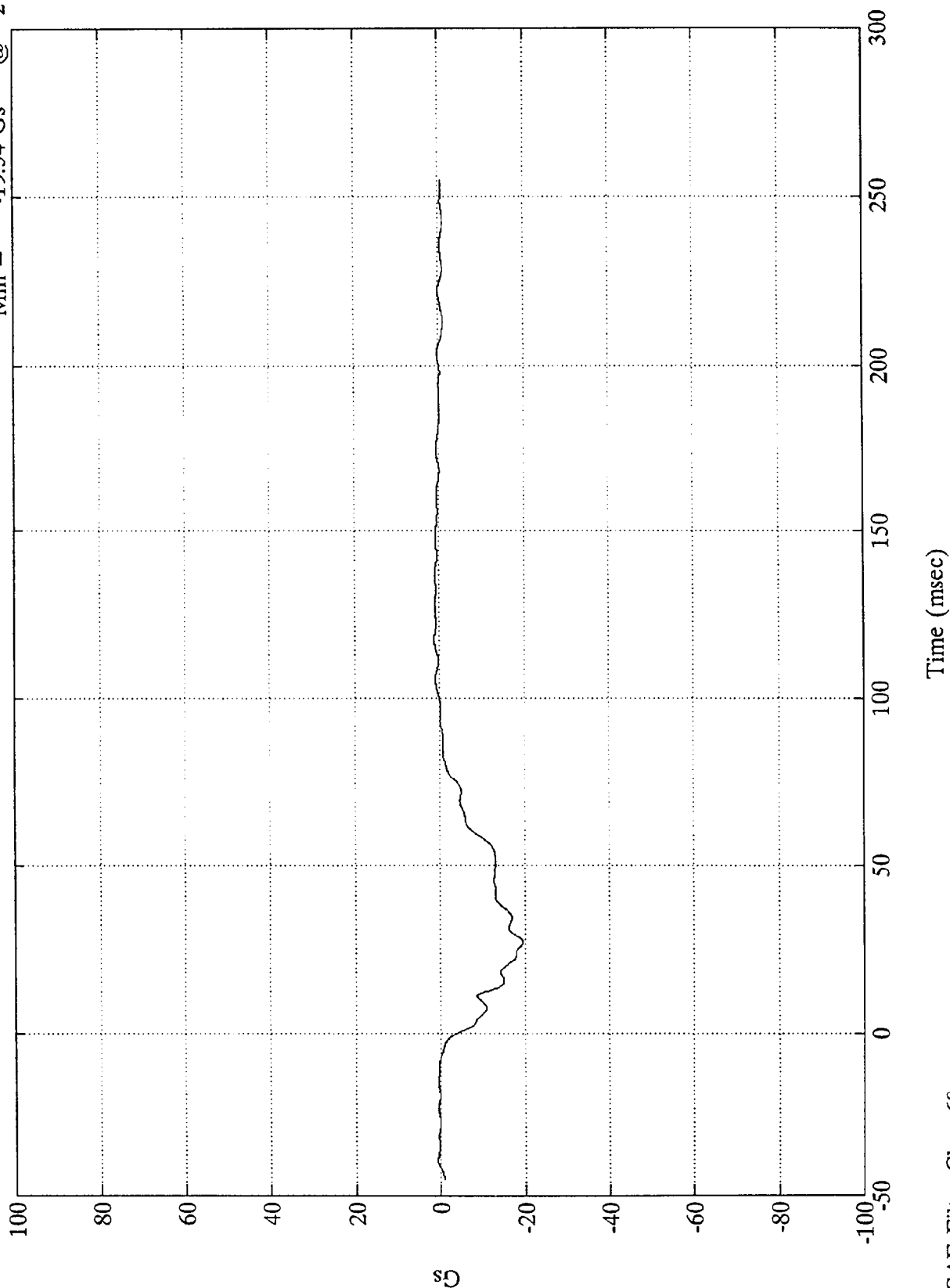
8109-3

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

Max = 1.14 Gs @ 117.36 msec
Min = -19.54 Gs @ 27.11 msec

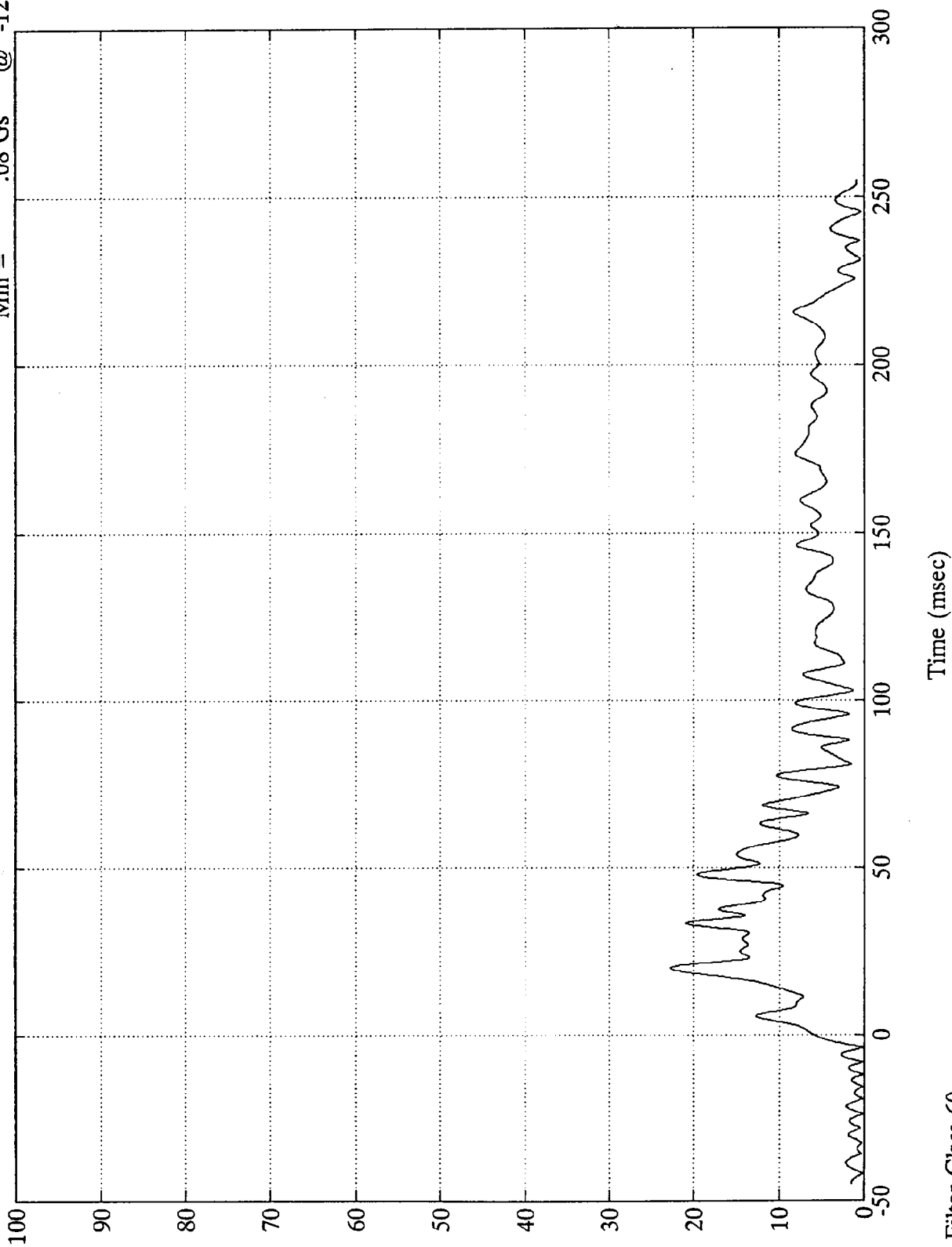
MDB Left Rear Rail X



Side Impact 3 - 1993 Geo Tracker

MDB C.G. Resultant

Max = 22.80 Gs @ 20.15 msec
Min = .08 Gs @ -12.00 msec



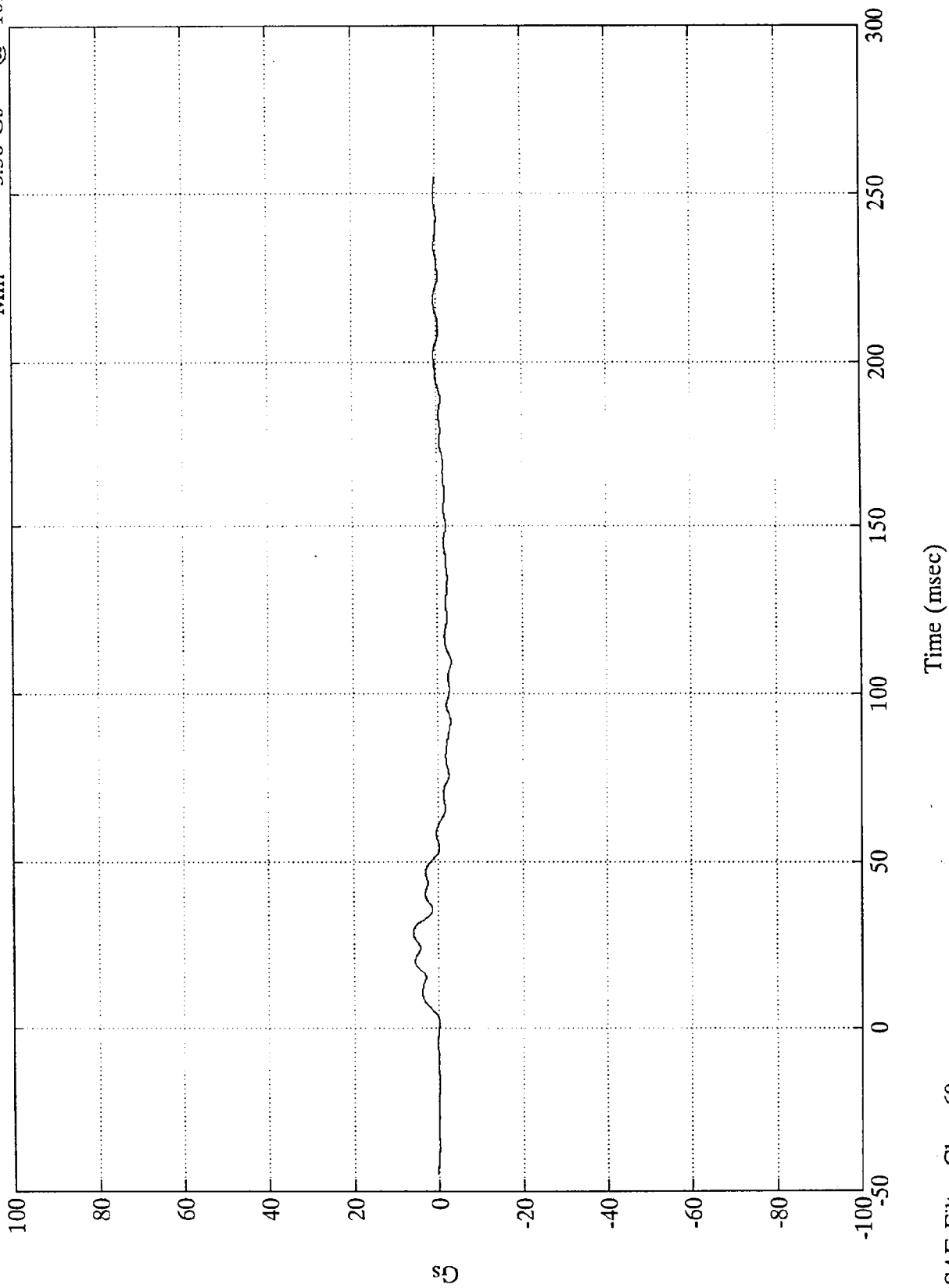
B-43

8109-3

SAE Filter Class 60

Side Impact 3 - 1993 Geo Tracker

MDB Right Rear Rail Y
Max = 5.94 Gs @ 28.55 msec
Min = -3.30 Gs @ 109.56 msec



Appendix C

SID CONFIGURATION AND PERFORMANCE VERIFICATION DATA

SID PRE-TEST INSPECTION

Prior to each test, each SID is inspected to ensure the integrity of its components. The inspection includes observation of the head and neck areas for lacerations and/or reduction in stiffness. Inspection of the legs is performed to adjust joints to the specified torques and to identify any component failures. Inspection of the thorax is performed to verify the integrity of the SID outer jacket; location of "arm" foam; rib wrap assembly, rib anti-sag device; rib assembly; piston, and spine. The abdomen is inspected to identify any reduction in stiffness.

These inspections are performed prior to every test in addition to the verification tests performed on the following pages at the selected intervals.

SID IMPACT CALIBRATION SUMMARY SHEET

Serial No. 904

Test Parameter	Requirement	Date/ Velocity/ Temp	Pretest Cal.
Thorax Impact Test:		6/1/93 13.83 ft/sec 69°F	
Accelerations			
A. Upper Rib	37-46 g's		43.8 g's
B. Lower Rib	37-46 g's		44.5 g's
C. Lower Spine	15-22 g's		18.4 g's
Pelvic Impact Test:		6/8/93 14.13 ft/sec	
Pelvic Acceleration	40-60 g's		56.4 g's