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V4218

Report Number: 208S-TRC-006

Vehicle Safety Compliance Testing for FMVSS 208
for Occupant Crash Protection
Sled Test

Chevy Trucks Division of General Motors Corporation
2002 Chevrolet Avalanche 1500
NHTSA Number: C20104
TRC Inc. Test Number: S020410

Transportation Research Center Inc.
10820 State Route 347
East Liberty, OH 43319



Test Date: April 10, 2002
Report Date: April 22, 2002

Final Report

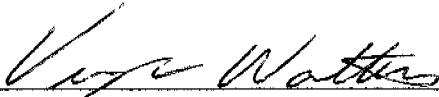
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Test Performed By: Ronald D. Stoner, Engineering Technician

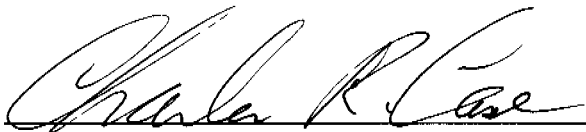
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Technical Report Documentation Page

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16. Abstract An FMVSS 208 Section 13 compliance sled test was conducted on a 2002 Chevrolet Avalanche 1500, NHTSA No C20104, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No TP208S-01 for the determination of FMVSS 208 compliance. Possible test failures identified were as follows: None			
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

1 in = 2.54 (exact) (1 in) For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13,14,286

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10 000 m ²)	2.5	acres	
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

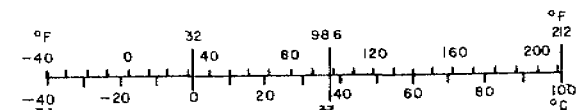


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Purpose

This Federal Motor Vehicle safety Standard (FMVSS) 208 compliance sled test is part of the FMVSS compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by the Transportation Research Center Inc. (TRC Inc.) under Contract No. DTNH22-98-D-01055. The purpose of this test was to determine if the subject vehicle, a 2002 Chevrolet Avalanche 1500, NHTSA No C20104, meets the performance requirements of FMVSS 208, "Occupant Crash Protection," in the impact simulation sled test mode.

Test Procedure

This test was conducted in accordance with NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-208S-01, dated January 15, 1998. Data was obtained relative to FMVSS 208, "Occupant Crash Protection," performance.

The sled test vehicle was instrumented with four (4) accelerometers to measure longitudinal accelerations. The sled was instrumented with one (1) longitudinal accelerometer, which is prefiltered with an analog filter to 200 Hz as an integral part of the sled firing circuit, and two (2) additional accelerometers: the primary accelerometer for pulse and integrated velocity determination and a backup accelerometer. In addition, the sled was instrumented with one (1) light trap to measure velocity and two (2) airbag firing timing circuits.

The sled test vehicle contained two (2) Part 572 E 50th percentile adult male anthropomorphic test devices (dummies). The dummies were positioned in the front outboard designated seating positions according to the dummy placement procedure specified in Appendix B of the Laboratory Test Procedure. The dummies were not restrained by seat belts.

Both dummies were instrumented with head and chest accelerometers to measure longitudinal, lateral, and vertical accelerations; chest deflection potentiometers; left and right femur load cells to measure axial forces; and upper neck load cells to measure longitudinal, lateral, and vertical forces and moments.

The forty-two (42) data channels were digitally sampled at 12,500 samples per second and processed per Sections 11.7 through 11.9 of the Laboratory Test Procedure.

The sled test event was recorded by one (1) real-time motion picture camera and six (6) high-speed motion picture cameras. The pre-test and post-test conditions were recorded by one (1) real-time motion picture camera.

Test Results Summary

This FMVSS 208 compliance sled test was conducted by TRC Inc. on April 10, 2002.

The test vehicle, a 2002 Chevrolet Avalanche 1500 MPV, NHTSA No. C20104, does appear to comply with the performance requirements of FMVSS 208 in the impact simulation sled test mode as measured by Hybrid III 50th percentile male dummies.

	FMVSS 208 Max. Allowable Injury Assessment Values	Driver	Passenger
HIC	1000	263	151
Chest g	60 g	45.1	27.6
Chest Displacement	3 inches	1.5	0.3
Left Femur	2250 lbs	1307	1080
Right Femur	2250 lbs	2002	1453
Neck Extension	57 Nm	15.3	27.6
Neck Flexion	190 Nm	56.9	45.0
Neck Tension	3300 N	1141	1721
Neck Compression	4000 N	1021	214
Neck Shear	3100 N	983	818

The subject vehicle, a 2002 Chevrolet Avalanche 1500 MPV, NHTSA No. C20104, appears to meet the other FMVSS 208 requirements for which it was tested. These results are shown in the data sheets that are included in this report.

The sled test vehicle was equipped with air bags at the driver and passenger seating positions. The dummies were not restrained by seat belts. The sled carriage was accelerated to 16.8 g with an integrated velocity change of 29.2 mph. The air bags were triggered at 20.16 milliseconds after 0.5 g acceleration was measured by the firing circuit. Following subsequent digital data processing and filtering the acceleration signal to Channel Class 60, the air bag event trigger signal was 21.36 ms after the 0.5 g acceleration level was indicated.

Data Acquisition Explanations

The strobe light used to indicate time-zero in camera views did not fire. Time-zero can be established from the LED lines on the film. See Appendix D for an explanation of this method.

Sled Test Summary

NHTSA number. C20104
Test type: Alternate FMVSS 208 sled test
Test date: 04/10/02
Test time: 12:12
Ambient temperature at impact area: 70.3° F
Vehicle year/make/ model/body style: 2002/Chevrolet/Avalanche 1500/MPV

<u>Dummy Info:</u>	Driver #339	Front #230
Type:	Hybrid III	Hybrid III
Location	Left Front	Right Front
Restraint:	Airbag, supplemental	Airbag, supplemental
Number of data channels:	15	15

Number of Cameras:

Real-time:	1
High-speed:	6

Door Opening Data:

Left Front.	Easy
Right Front:	Easy

Front Seat Data:

Seat track failure:	None	None
Seat back failure	None	None

Visible Dummy Contact Points:

Head:	Airbag, B-pillar	Airbag, sun visor
Chest:	Airbag	Airbag
Left knee:	Knee bolster	Glove box
Right knee:	Knee bolster	Glove box

General Test and Vehicle Parameter Data for the Sled Test Vehicle

Test Vehicle Information:

Vehicle year/make/
model/body style. 2002/Chevrolet/Avalanche 1500/MPV

Color: Pewter Metallic

VIN. 3GNEC13T62G228146

NHTSA number. C20104

Engine data.
Placement Inline V
Cylinders: 8
Displacement. 5 3 liters

Transmission data: 4 speed, ___ manual, X automatic, ___ overdrive

Final drive: ___ fwd, X rwd, ___ 4wd

Date vehicle received: 03/22/2002

Odometer reading: 138

Dealer's name Jeff Wyler
and address P.O. Box 345
Batavia, Ohio 45103

Major Options:

Power steering	Yes	Other: cruise control; 4-wheel disc brakes
Power brakes	Yes	with ABS, integrated safety belts; side
Power windows	Yes	impact air bags; locking differential
Air conditioning	Yes	rear axle
Power door locks	Yes	

Remarks:

General Test and Vehicle Parameter Data for the Sled Test Vehicle, Cont'd.

Data from Vehicle's Certification Label

Vehicle manufactured by: General Motors de Mexico, S. de R.L. de C.V.
Date of manufacture: 12/01
VIN: 3GNEC13T62G228146
GVWR: 6800 lbs
GAWR: Front: 3400 lbs
Rear: 4000 lbs

Data from Vehicle's Tire Placard:

Tire pressure with maximum capacity vehicle load:

Front. 44 psi
Rear 44 psi

Recommended tire size P265/70R16

Load range: N/A lbs

Recommended cold tire pressure:

Front: 35 psi
Rear 35 psi

Size of tires on vehicle P265/70R16

Spare tire: P265/70R16

Vehicle capacity data (from count of seat belts):

Type of front seats: Bucket (40/20/40 split)

Number of occupants:

Front 3
Rear 3
Total 6

Remarks:

General Test and Vehicle Parameter Data for the Sled Test Vehicle, Cont'd.

Weight of test vehicle as received (with maximum fluids):

Right front	1321.0 lbs	Right rear	1321.0 lbs
Left front	1466.9 lbs	Left rear	1316.1 lbs
Total front weight	2787.9 lbs	(51.4% of total vehicle weight)	
Total rear weight	2637.1 lbs	(48.6% of total vehicle weight)	
Total delivered weight	5425.0 lbs		

Calculation of test vehicle's target test weight:

RCLW¹ = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight (5425.0 lbs)

DSC = Designated Seating Capacity (6)

RCLW¹ = GVWR – UDW – 150 (DSC) = 475 lbs. > 300 lbs

Target test weight = UDW + RCLW + (Number of Hybrid III dummies x 167 lbs per dummy)

Target test weight = 5425.0 + 300 + 334 = 6059 lbs

Weight of test vehicle with two dummies and 301.6 lbs of cargo weight:

Right front	1413.1 lbs	Right rear	1553.8 lbs
Left front	1558.2 lbs	Left rear	1535.5 lbs
Total front weight	2971.3 lbs	(49% of total vehicle weight)	
Total rear weight	3089.3 lbs	(51% of total vehicle weight)	
Total test weight	6060.6 lbs		

Remarks:

Weight of ballast secured in vehicle cargo area: None

Components removed to meet target test weight: N/A

¹ RCLW is set at maximum of 300 lbs. for target test weight determination.

General Test and Vehicle Parameter Data for the Sled Test Vehicle, Cont'd.

Test Vehicle Attitude:

As delivered door sill angle: 1.7° Nose Down

As tested door sill angle: 1.6° Nose Down

Fully loaded door sill angle: 1.3° Nose Down

Vehicle Wheelbase: 130.0 inches

Fuel System Data:

Fuel system capacity from owner's manual: 31.0 gallons

Useable capacity figure furnished by COTR: 31.0 gallons

Remarks. The roll angle measurements were within 1 inch of each other.

The left and right side measurements were 35.2 inches and 35.1 inches respectively.

Post-Impact Data

Test number: S020410
NHTSA number: C20104
Test date: 04/10/02
Test time: 12 12
Test type: Alternate FMVSS 208 sled test
Impact angle: 0°
Ambient temperature
at impact area: 70 3° F
Temperature in
occupant compartment: 71° F

Sled carriage velocity:

Integrated velocity from the integration of the entire sled acceleration: 29.2 mph
Measured velocity from the light trap device attached to the sled (backup): 28.7 mph
Specified integrated velocity range: 28 to 30 mph

Sled carriage acceleration:

Acceleration: 16.8 g
Specified acceleration range: 16.0 g - 18.2 g

Sled carriage acceleration duration:

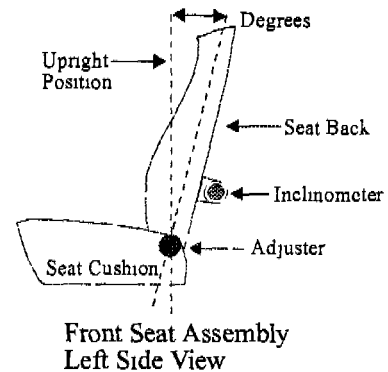
Time from T-0(-0.5 g) to 0.0 g: 124.0 ms
Specified acceleration duration: 120 - 130 ms

The sled acceleration curve was within the specified corridor.

Seat and Steering Column Positioning Data

Vehicle: 2002/Chevrolet/Avalanche 1500/ MPV

NHTSA No. C20104



Nominal Design Riding Position:

Driver Seat. Seat Back Angle = 16 1° Manual

The seat back was adjusted, prior to seating the dummy, by measuring 15.8° on the rearward surface of the outboard frame, approximately 9" above the pivot, per manufacturer's instructions. This resulted in a back angle of 16 1°, measured with dummy installed.

Passenger Seat. Seat Back Angle = 15.5° Manual

The seat back was adjusted, prior to seating the dummy, by measuring 15.5° on the rearward surface of the outboard frame, approximately 9" above the pivot, per manufacturer's instructions. This resulted in a back angle of 15.5°, measured with dummy installed.

Seat Fore and Aft Positions:

Driver Seat: Mid position – power adjustment

The seat was moved full forward and full rearward to locate the center of travel (full travel = 220 mm).

Passenger: Mid position – manual adjustment

The seat was set in the 12th locking notch (center) of 23 locking positions.

Steering Column Adjustments:

The steering column was set to 21.2° which is the mid-point of travel (11.3 to 31.3°). This was the center detent of 5 detent positions.

Dummy Measurement Data for Front Seat Occupants

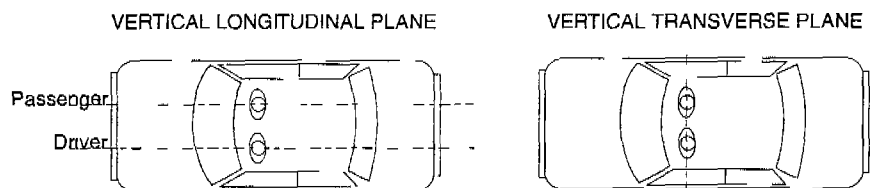
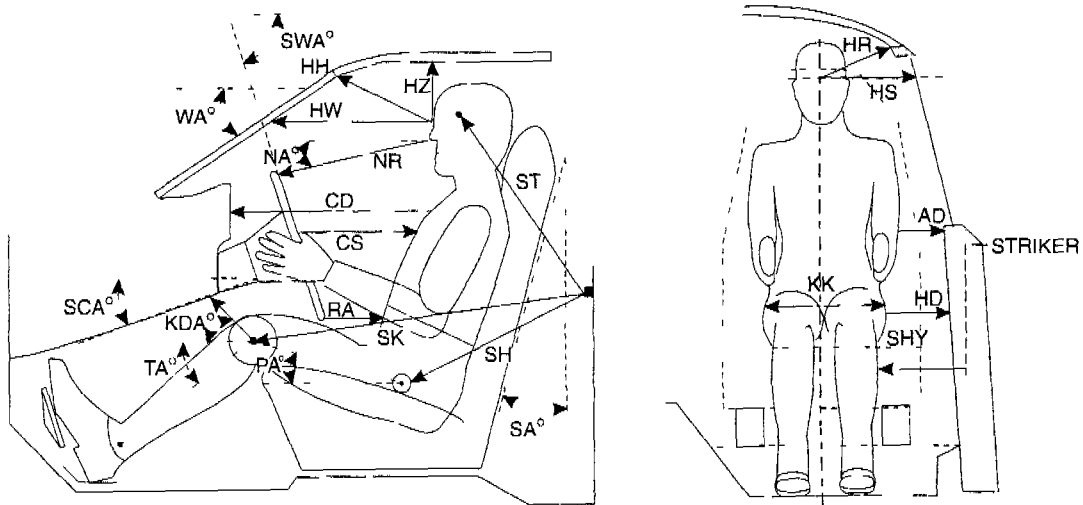
Designation	Type of Measurement	Driver (Serial #339)	Passenger (Serial #230)
WA	Windshield angle	38.1°	N/A
SWA	Steering wheel angle	21.2°	N/A
SCA	Steering column angle	24.0°	N/A
SA	Seat back angle	16.1°	15.5°
HZ	Head to roof	10.4 in	10.4 in
HH	Head to header	19.0 in	19.4 in
HW	Head to windshield	25.9 in	27.2 in
HR	Head to side header	10.5 in	10.9 in
NR	Nose to rim	14.7 in	N/A
NA	Nose to rim angle	9.0°	N/A
CD	Chest to dash	21.4 in	17.3 in
CS	Steering wheel to chest	11.9 in	N/A
RA	Rim to abdomen	7.2 in	N/A
KDL	Left knee to dash	6.8 in	5.0 in
KDR	Right knee to dash	6.8 in	5.5 in
KDA	Outboard knee to dash angle	14.0°	20.0°
PA	Pelvis angle	21.8°	24.0°
TA	Tibia angle	41.0°	48.0°
KK	Knee to knee	11.9 in	10.2 in
ST ¹	Striker to head	24.4 in	24.9 in
	Striker to head angle	-69.9°	-70.7°
SK ¹	Striker to knee	28.0 in	28.4 in
	Striker to knee angle	-4.7°	-1.8°
SH ¹	Striker to H-point	12.8 in	14.0 in
	Striker to H-point angle	12.8°	13.9°
SHY	Striker to H-point (Y dir)	9.4 in	10.3 in
HS	Head to side window	13.3 in	14.1 in
HD	H-point to door	6.0 in	6.2 in
AD	Arm to door	5.6 in	6.1 in

The seat back angle (SA°) is measured relative to vertical.

All other angles are measured relative to horizontal.

¹ A negative angle indicates the measurement point was located below the striker.

Dummy Measurement Locations for Front Seat Occupants



Descriptions of Dummy Measurements

When a level is to be used, it is to ensure that the line containing the two points described is either parallel or perpendicular to the ground. If a measurement to be made is less than 10 inches ignore the directions to use a level and approximate a level measurement. Also, when a measurement is to be taken to or from the center of a bolt on the dummy, take the measurement from the center of the bolt hole if the bolt is recessed.

The following measurements are to be made within a vertical longitudinal plane.

- * HH Head to Header, taken from the point where the dummy's nose meets his forehead (between his eyes) to the furthest point forward on the header.
- * HW Head to Windshield, taken from the point where the dummy's nose meets his forehead (between his eyes) to a point on the windshield. Use a level.
- HZ Head to Roof, taken from the point where the dummy's nose meets his forehead (between his eyes) to the point on the roof directly above it. Use a level.
- * CS Steering Wheel to Chest, taken from the center of the steering wheel hub to the dummy's chest. Use a level.
- * CD Chest to Dash, place a tape measure on the tip of the dummy's chin and rotate five inches of it downward toward the dummy to the point of contact on the transverse center of the dummy's chest. Then measure from this point to the closest point on the dashboard either between the upper part of the steering wheel between the hub and the rim, or measure to the dashboard placing the tape measure above the rim, whichever is a shorter measurement. See diagram.
- RA Steering Wheel Rim to Abdomen, taken from the bottommost point of the steering wheel rim horizontally rearward to the dummy. Use a level.
- NR Nose to Rim, taken from the tip of the dummy's nose to the closest point on the top of the steering wheel rim. Also indicate the angle this line makes with respect to the horizontal (NA).

* Measurement used in Data Tape Reference Guide

Descriptions of Dummy Measurements, Cont'd.

*¹ KDL,
KDR Left and Right Knees to Dashboard, taken from the center of the knee pivot bolt's outer surface to the closest point forward acquired by swinging the tape measure in continually larger arcs until it contacts the dashboard. Also reference the angle of this measurement with respect to the horizontal for the outboard knee (KDA). See diagram.

SH,
SK,
ST Striker to Hip, Knee, and Head, these measurements are to be taken in the X-Z plane measured from the forward most center point on the striker to the center of the H-point, outer knee bolt, and head target. When taking this measurement a firm device that can be rigidly connected to the striker should be used. Use a level. The angles of these measurements with respect to the horizontal should also be recorded. The measurement in the Y (transverse) direction from the striker to the H-point should also be taken (SHY). See diagram.

The following measurements are to be made within a vertical transverse plane.

- HS Head to Side Window, taken from the point where the dummy's nose meets his forehead (between his eyes) to the outside of the side window. In order to make this measurement, roll the window down to the exact height which allows a level measurement. Use a level. See diagram.
- * AD Arm to Door, taken from the outer surface of the elbow pivot bolt on a Hybrid II dummy to the first point it hits on the door. In the case of a Hybrid III dummy, measure from the bolt on the outer biceps. When a SID is used make the measurement from the center of the bottom of the arm segment where it meets the dummy's torso.
- * HD H-point to Door, taken from the H-point on the dummy to the closest point on the door. Use a level.
- * HR Head to Side Header, measure the shortest distance from the point where the dummy's nose meets his forehead (between his eyes) to the side edge of the header just above the window frame, directly adjacent to the dummy.

* Measurement used in Data Tape Reference Guide

¹ Only outboard measurement is referenced in Data Tape Reference Guide

Descriptions of Dummy Measurements, Cont'd.

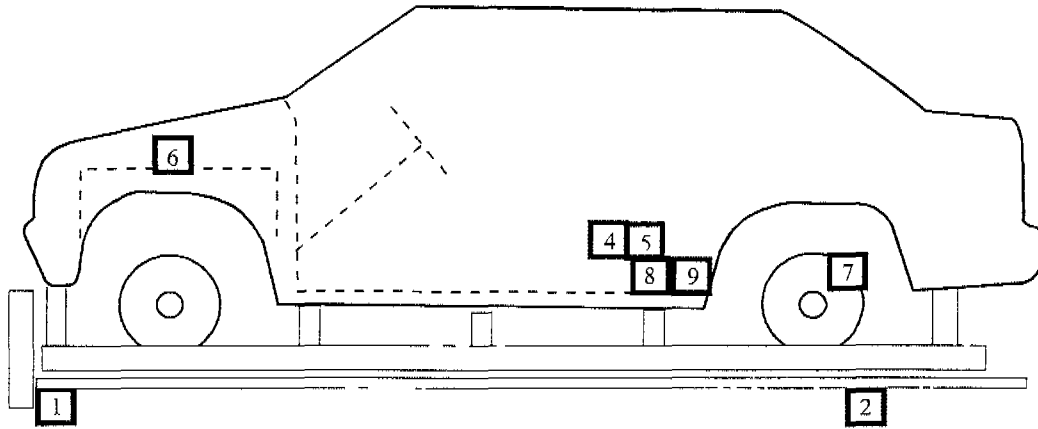
- SHY Striker to H-point, taken from a rod rigidly connected to the forward most center point on the striker to the H-point. Use a level. See diagram.
- KK Knee to Knee, for Hybrid II dummies measure the distance between knee pivot bolt head outer surfaces. For Hybrid III dummies measure the distance between the outboard knee clevis flange surfaces. (This measurement may not be exactly transverse)

Angles

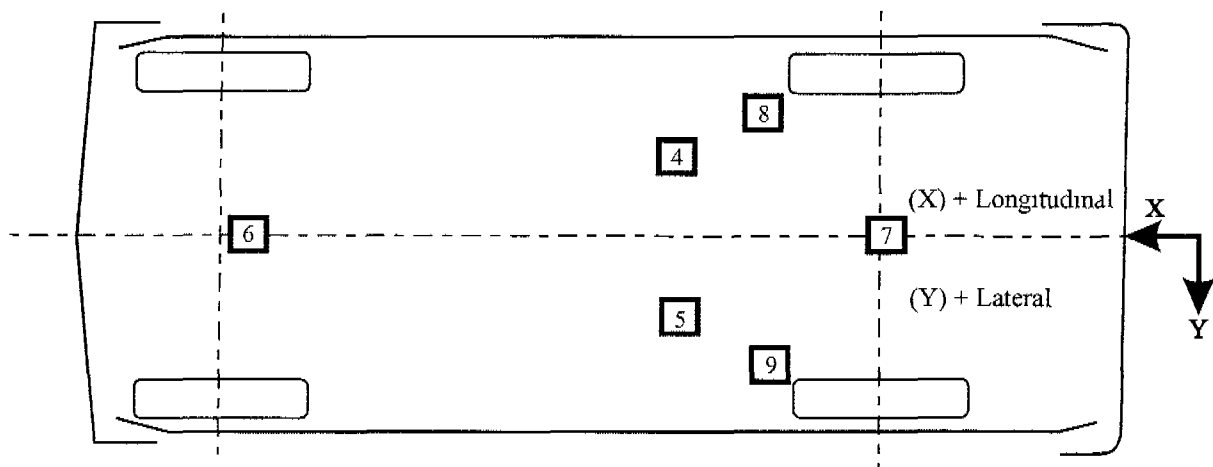
- SA Seat Back Angle, find this angle using the instructions provided by the manufacturer. If the manufacturer doesn't provide clear instructions contact the COTR.
- PA Pelvis or Femur Angle, taken by inserting the pelvic angle gauge into the H-point gauging hole on the SID or the Hybrid III dummies and taking this angle with respect to the horizontal. Measure the angle of the line connecting the H-point hole and the outer knee pivot bolt hole on a Hybrid II dummy with respect to the horizontal, to find the femur angle
- SWA Steering Wheel Angle, find this by placing a straight edge against the steering wheel rim along the longitudinal plane. Then measure the acute angle of the straight edge with respect to the horizontal.
- SCA Steering Column Angle, measured with respect to the horizontal by placing an inclinometer on the center of the underside of the steering column.
- NA Measure the angle made when taking the measurement NR with respect to the horizontal.
- KDA Knee to Dash Angle, the angle that the measurement KD is taken at with respect to the horizontal. Only get this angle for the outboard knee. See diagram.
- WA Windshield Angle, place an inclinometer along the transverse center of the windshield exterior (measurement is made with respect to horizontal).
- TA Tibia Angle, use a straight edge to connect the dummy's knee and ankle bolts. Then place an inclinometer on the straight edge and measure the angle with respect to the horizontal.

* Measurement used in Data Tape Reference Guide

Vehicle Accelerometer Placement



Side View



Bottom View

Vehicle Data Summary and Accelerometer Locations

TEST NUMBER: S020410
No. LOCATION

X

Y

POSITIVE
DIRECTION¹

NEGATIVE
DIRECTION¹

1 SLED ACCELERATION PRIMARY	165.6 in	-1.0 in	0.5 g @ 207.3 ms	16.8 g @ 65.1 ms
2 SLED ACCELERATION BACKUP REDUNDANT	165.6 in	-1.0 in	0.5 g @ 207.4 ms	17.0 g @ 64.9 ms
3 SLED VELOCITY MEASURED INTEGRATED ²			0.1 mph @ 7.0 ms --- ---	28.7 mph @ 151.8 ms 29.2 mph @ 150.2 ms
4 LEFT BODY AT REAR SEAT LONGITUDINAL	105.4 in	-19.1 in	2.9 g @ 134.7 ms	18.5 g @ 41.7 ms
5 RIGHT BODY AT REAR SEAT LONGITUDINAL	104.8 in	16.5 in	2.6 g @ 125.7 ms	18.7 g @ 42.0 ms
6 TOP ENGINE LONGITUDINAL	182.5 in	2.1 in	3.2 g @ 133.8 ms	20.5 g @ 55.1 ms
7 REAR AXLE LONGITUDINAL	47.8 in	-0.6 in	3.5 g @ 128.6 ms	20.4 g @ 47.8 ms
8 LEFT VEHICLE FRAME LONGITUDINAL	82.0 in	-24.8 in	2.0 g @ 127.4 ms	18.4 g @ 43.9 ms

Vehicle Data Summary and Accelerometer Locations, Cont'd.

TEST NUMBER: S020410
No. LOCATION

X

Y

POSITIVE
DIRECTION¹

NEGATIVE
DIRECTION¹

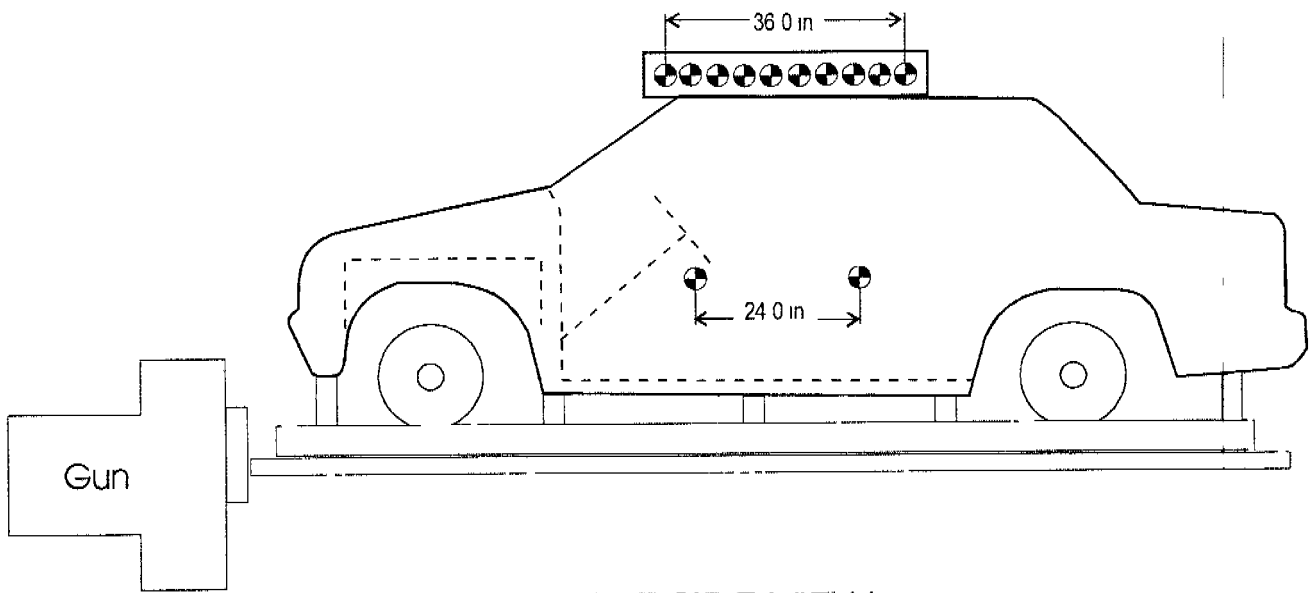
9 RIGHT VEHICLE FRAME LONGITUDINAL	81.5 in	24.8 in	1.8 g @ 129.4 ms	18.0 g @ 49.7 ms
10 DRIVER AIRBAG EVENT			1.0 volt @ 21.4 ms	--- ---
11 PASSENGER AIRBAG EVENT			1.0 volt @ 21.4 ms	--- ---

LOCATION REFERENCE: X: + FORWARD FROM VEHICLE REAR SURFACE
Y: + RIGHTWARD FROM SLED CARRIAGE CENTERLINE

¹ Sign Convention per SAE J211 March 1995

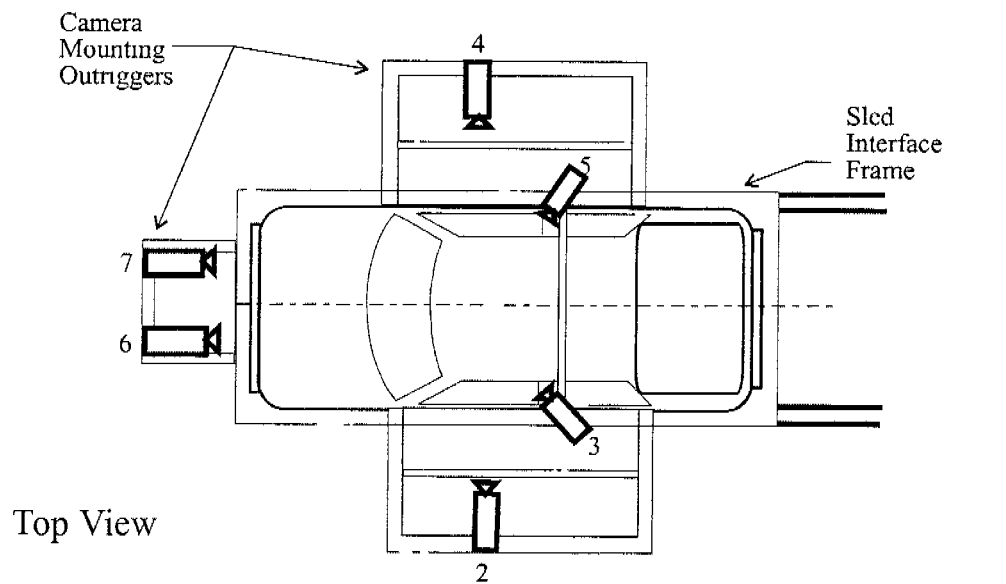
² No positive data in time frame of interest.

REFERENCE PHOTO TARGETS

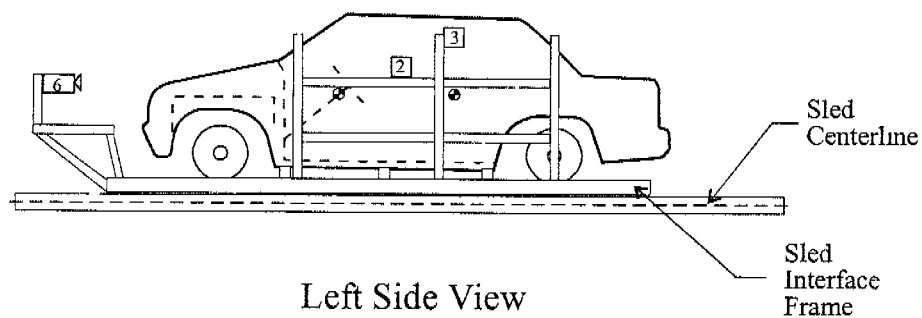


LEFT SIDE VIEW

Camera Positions



Camera Frame Rates
 #1 = 24 fps
 All Others = 1,000 fps



Motion Picture Camera Locations

Vehicle year/make/model/body style: 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No.: C20104

Test Number: S020410

Camera Number	View	Camera Positions ¹			Camera Angle ²	Film Plane to Head Target	Camera Lens	Film Speed
		X	Y	Z				
1	Left side view offboard	93.0 in	310.9 in	58.0 in	4°	290.0 in	10 mm	24 frames/s
2	Left side view wide	71.1 in	72.3 in	59.1 in	1.4°	52.5 in	8 mm	1010 frames/s
3	Left side view over shoulder	97.8 in	49.8 in	67.7 in	13.6°	33.0 in	8 mm	922 frames/s
4	Right side view wide	73.7 in	73.8 in	58.2 in	1.7°	54.5 in	8 mm	997 frames/s
5	Right side view over shoulder	99.5 in	50.6 in	66.5 in	11.5°	35.0 in	8 mm	997 frames/s
6	Front view - driver	27.5 in	17.3 in	65.6 in	5.8°	52.0 in	8 mm	1005 frames/s
7	Front view - passenger	27.9 in	14.9 in	65.7 in	6.2°	53.5 in	8 mm	955 frames/s

¹ X: Film plane to front of sled

Y: Film plane to sled centerline

Z: Film plane to top of sled

² Angle: Film plane of camera downward from horizontal plane

22

S020410

FMVSS 208 Occupant Injury Data

Vehicle: 2002/Chevrolet/Avalanche 1500/MPV NHTSA No.: C20104 Date: 04/10/02

Maximum Acceleration Values (g) ¹	Driver Dummy #339	Passenger Dummy #230
Head Channel X	86.3	-40.2
Head Channel Y	-8.7	11.6
Head Channel Z	31.0	21.1
HEAD RESULTANT	91.1	42.1
Chest Channel X	-45.4	-27.1
Chest Channel Y	-4.2	-2.2
Chest Channel Z	11.9	13.7
CHEST RESULTANT	46.3	27.8

Head Injury Criteria (HIC) Values:

HIC	263	151
$t_1 =$ (ms)	273.20	106.32
$t_2 =$ (ms)	278.88	142.32

The maximum HIC time interval from t_1 to t_2 is 36 milliseconds.

Chest Injury Criteria (Clip) Values:

CLIP (g)	45.1	27.6
$t_1 =$ (ms)	99.658	91.813
$t_2 =$ (ms)	102.618	94.773
Chest Deflection (in)	1.5	0.3

¹ Sign Convention per SAE J211, March 1995.

FMVSS 208 Occupant Injury Data, Cont'd.

Vehicle: 2002/Chevrolet/Avalanche 1500/MPV NHTSA No.: C20104 Date: 04/10/02

Max. Compressive Femur Forces:	Driver Dummy #339	Passenger Dummy #230
Left Side (lbs)	1307	1080
Right Side (lbs)	2002	1453

Neck Injury Criteria:	Driver Dummy #339	Passenger Dummy #230
Peak Flexion Bending Moment (N-m)	56.9	45.0
Peak Extension Bending Moment (N-m)	15.3	27.6
Peak Axial Tension (N)	1141	1721
Peak Axial Compression (N)	1021	214
Peak Positive X-axis Shear (N)	983.0	818.1
Peak Negative X-axis Shear (N)	236.9	280.7

FMVSS 208 Seat Belt Warning System Check

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No.: C20104

Technician: Steve Bell

Date: 03/26/2002

Complete the following to determine which seat belt warning system option (S7.3(a)(1) or S7.3(a)(2)) is used. (Manufacturers may use either option.)

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

A.1 S7.3(a)(1)

Time duration of audible warning signal = 6 seconds
(4 to 8 seconds)

Time duration of reminder light operation = 72 seconds
(no less than 60 seconds)

A.2 S7.3(a)(2)

Time duration of audible warning signal = seconds
(4 to 8 seconds) (see 49 USCS @ 30124)

Time duration of reminder light operation = seconds
(4 to 8 seconds)

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

B.1 S7.3(a)(1)

Time duration of audible warning signal = 0 seconds
(audible warning should not operate)

Time duration of reminder light operation = 0 seconds
(reminder light does not operate)

B.2 S7.3(a)(2)

Time duration of audible warning signal = seconds
(audible warning should not operate)

Time duration of reminder light operation = seconds
(4 to 8 seconds)

C. Note wording of visual warning:

Fasten Seat Belt

Fasten Belt

Symbol 101



FMVSS 208 Readiness Indicator

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No.: C20104

Technician Steve Bell

Date: 03/26/2002

An occupant restraint system that deploys in the event of a crash shall have a monitoring system with a readiness indicator. A totally mechanical system is exempt from this requirement (11/8/94 legal interpretation).

Is the system totally mechanical?

☐ Yes;

☒ No

Describe the location of the readiness indicator: Top right instrument panel

Is the readiness indicator clearly visible to the driver?

☒ Yes;

☐ No

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

☒ Yes;

☐ No

FMVSS 208 Air Bag Labels

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No.: C20104

Technician: Steve Bell

Date: 03/26/2002

1. Air Bag Maintenance Label and Owner's Manual Instructions:

1.1 Does the manufacturer recommend periodic maintenance or replacement of the air bag?

☐ Yes (Go to 1.2)

☒ No (Go to 2)

1.2 Does the Vehicle have a maintenance or replacement label?

☐ Yes-Pass

☐ No-Fail

1.3 Does the label contain one of the following?

☐ Yes-Pass

☐ No-Fail

☐ Schedule on label specifies month and year

☐ Schedule on label specifies vehicle mileage

☐ Schedule on label specifies interval measured from date on certification label

1.4 Is the label permanently affixed within the passenger compartment?

☐ Yes-Pass

☐ No-Fail

1.5 Is the label lettered in English?

☐ Yes-Pass

☐ No-Fail

1.6 Is the label in block capitals and numerals?

☐ Yes-Pass

☐ No-Fail

1.7 Are the letters and numerals at least 3/32 inch high?

☐ Yes-Pass

☐ No-Fail

1.8 Does the owner's manual set forth the recommended schedule for maintenance or replacement?

☐ Yes-Pass

☐ No-Fail

2. Does the owner's manual: (S4.5.1 (f))

2.1 Include a description of the vehicle's air bag system in an easily understandable format?

☒ Yes

☐ No-Fail

2.2 Include a statement that the vehicle is equipped with an air bag and a lap/shoulder belt at the front outboard seating positions?

☒ Yes

☐ No-Fail

FMVSS 208 Air Bag Labels, Cont'd.

SUN VISOR LABEL VISIBLE WHEN VISOR IS IN DOWN POSITION

LABEL OUTLINE, VERTICAL AND HORIZONTAL LINE BLACK

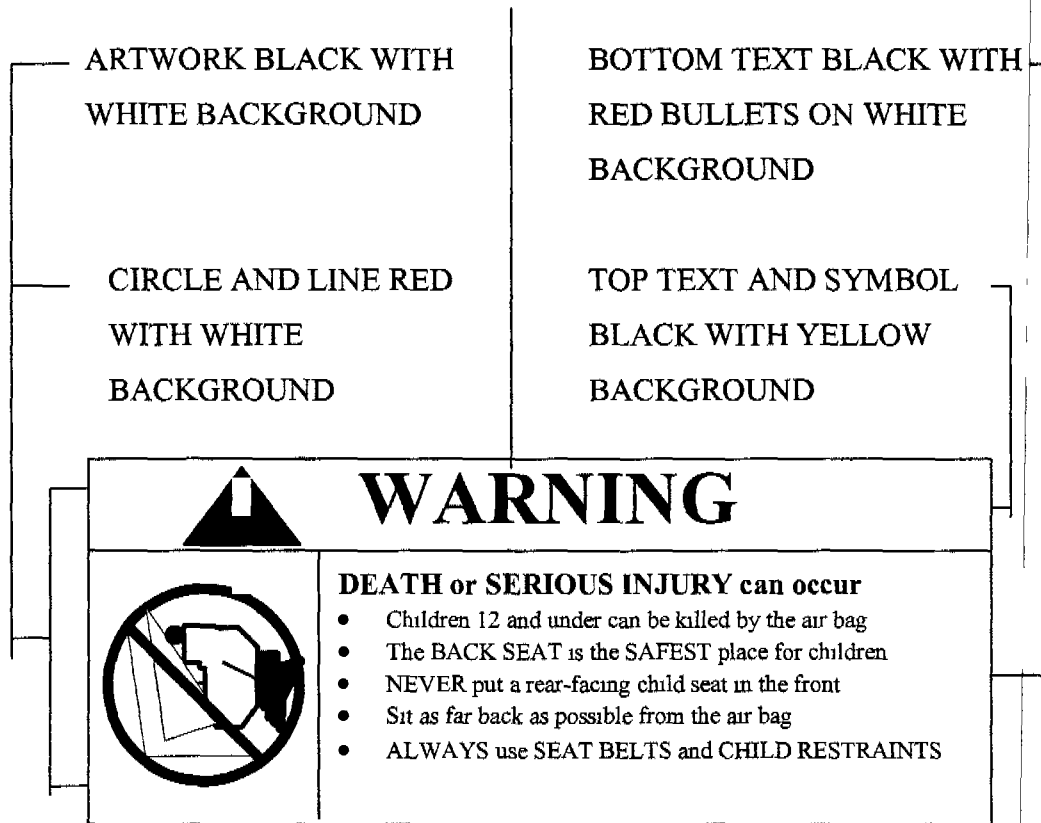


Figure 6a
(S4 5 1(b)(2))

FMVSS 208 Air Bag Labels, Cont'd.

SUN VISOR LABEL VISIBLE WHEN VISOR IS IN DOWN POSITION

LABEL OUTLINE, VERTICAL AND HORIZONTAL LINE BLACK

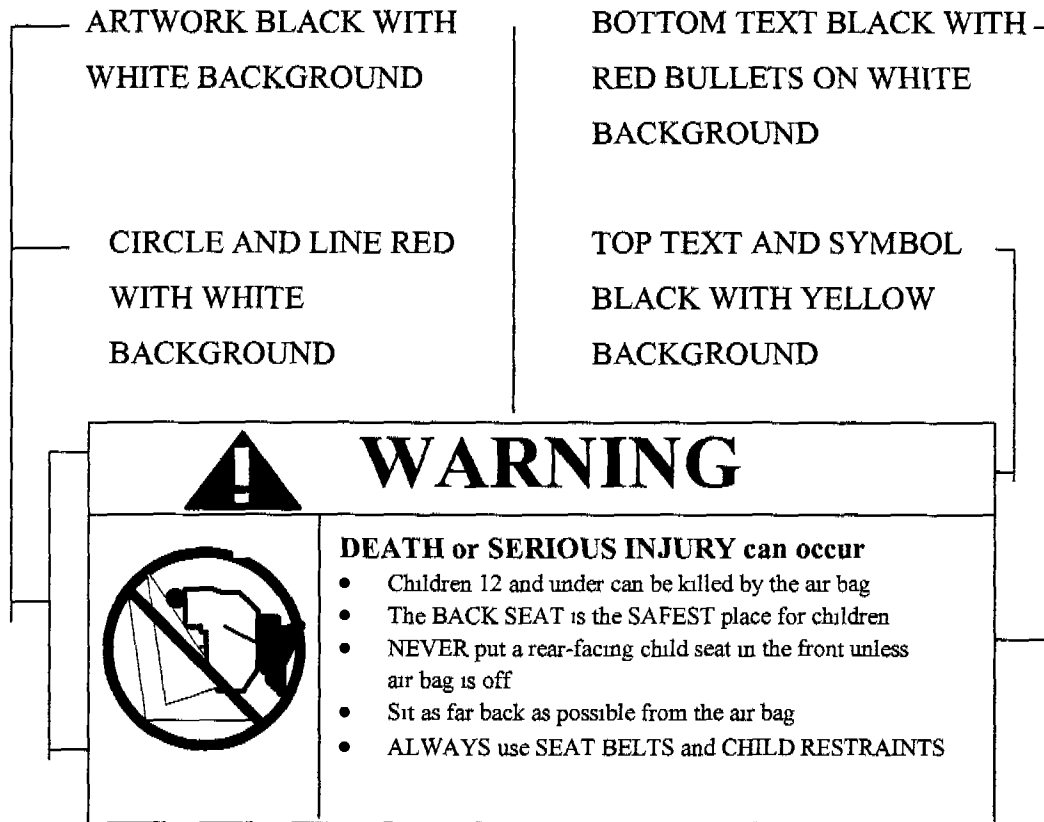


Figure 6b
(S4.5.1(b)(2))

4.3 Is the label heading area yellow with the word "warning" and the alert symbol in black? (S4.5.1(b)(2)(i))

Driver side ☒ Yes-Pass ☐ No-Fail

Passenger side ☒ Yes-Pass ☐ No-Fail

4.4 Is the message white with black text? (S4.5.1 (b)(2)(ii))

Driver side ☒ Yes-Pass ☐ No-Fail

Passenger side ☐ No air bag ☒ Yes-Pass ☐ No-Fail

4.5 Is the message area at least 30 cm²? (S4.5.1(b)(2)(ii))

Actual message area, driver side 40.5 cm²

Actual message area, passenger side 40.5 cm²

Driver side ☒ Yes-Pass ☐ No-Fail

Passenger side ☐ No air bag ☒ Yes-Pass ☐ No-Fail

FMVSS 208 Air Bag Labels, Cont'd.

- 6.4 Is the heading area yellow with the word "warning" and the alert symbol in black?
(S4.5.1(e)(i)) ☒ Yes-Pass ☐ No-Fail
- 6.5 Is the message white with black text? (S4.5.1(e)(ii)) ☒ Yes-Pass ☐ No-Fail
- 6.6 Is the message area at least 30 cm²? (S4.5.1(e)(ii))
Actual message area 32.4 cm² ☒ Yes-Pass ☐ No-Fail

FMVSS 208 Rear Outboard Seating Position Seat Belts

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No.: C20104

Technician: Ronald D. Stoner

Date: 04/10/02

Do all rear outboard seating positions have type 2 seat belts?



Yes;



No;



N/A (No Back Seat)

If No, describe the seat belt installed, the seat location, and any other information about the seat that would explain why a type 2 belt was not installed.

FMVSS 208 Lap Belt Lockability

Passenger cars, trucks, buses, and multipurpose passenger vehicles with a GVWR of 10,000 pounds or less. (S7.1.1.5)

Complete one of these forms for **each** designated seating position with forward-facing seats, other than the driver's seat, or seats that can be adjusted to forward-facing **and** that has seat belt retractors that are not automatic retractors. (S7.1.1.5(c))

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No · C20104

Technician: Steve Bell

Date: 03/27/2002

Designated Seating Position: Right Front

- ☒ 1. Record test seat position: Mid
(S7.1.1.5(c)(1)) (Any position is acceptable)
- ☒ 2. Buckle the seat belt. (S7.1.1.5(c)(1))
- ☒ 3. Complete any procedures recommended in the vehicle owner's manual to activate any locking feature. (S7.1.1.5(c)(1))
- ☒ 4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT have to be attached by the vehicle user to the seat belt webbing, retractor, or any other part to the vehicle?
(S7.1.1.5(a)) ☒ Yes-Pass ☐ No-Fail
- ☒ 5. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT require inverting, twisting or deforming of the belt webbing? (S7.1.1.5(a)) ☒ Yes-Pass ☐ No-Fail
- ☒ 6. Does the vehicle user need to take some action to activate the locking feature on the lap belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to forward-facing?

If yes, go to 6.1. If no, go to 7.

☒ Yes

☐ No

- 6.1 Does the vehicle owner's manual include a description in words and/or diagrams describing how to activate the locking feature so that the seat belt assembly can tightly secure a child restraint system and how to deactivate the locking feature to remove the child restraint system (S7.1.1.5(b)) ☒ Yes-Pass ☐ No-Fail

FMVSS 208 Lap Belt Lockability, Cont'd.

Vehicle Model Year/Make/Model/Body Style 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No.: C20104

Technician: Steve Bell

Date: 03/27/2002

Designated Seating Position: Right Front

- ☒ 7. Locate a reference point A on the seat belt buckle. (S7.1.1.5(c)(2))
- ☒ 8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2))
- ☒ 9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system. (S7.1.1.5(c)(2))
- ☒ 10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2)) Measured distance between A and B 61.0 inches.
- ☒ 11. Readjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing. (S7.1.1.5(c)(3))
- ☒ 12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device in figure 5. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees nor more than 15 degrees above the horizontal (S7.1.1.5(c)(4)) Measured force application angle 10 degrees. (Spec. 5~15 degrees)
- ☒ 13. Measure the length between points A and B along the longitudinal centerline of the webbing while the preload is being applied. (S7.1.1.5(c)(4)) Measured distance between A and B 29.3 inches.

FMVSS 208 Lap Belt Lockability, Cont'd.

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No.: C20104

Technician: Steve Bell

Date: 03/27/2002

Designated Seating Position: Right Front

- ☒ 14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second. Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.) Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline of the webbing. (S7.1.1.5(c)(5))

Record onset rate 25 lbs/sec (spec. 10 ~50 lb/sec)

The measured distance between A and B is 29.9 inches (S7.1.1.5(c)(6))

- ☒ 15. Subtract the measurement in 13 from the measurement in 14. Is the difference 2 inches or less? (S7.1.1.5(c)(7))

14-13= 0.6 inches

☒ Yes-Pass

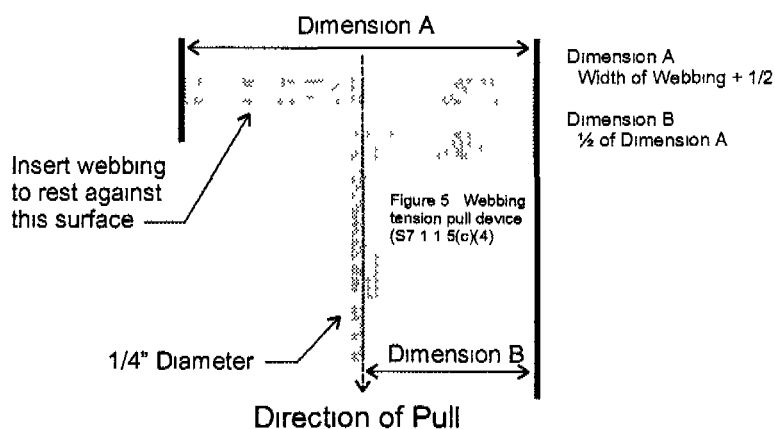
☐ No-Fail

- ☒ 16. Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more? (S7.1.1.5(c)(8))

10-14= 31.1 inches.

☒ Yes-Pass

☐ No-Fail



FMVSS 208 Lap Belt Lockability

Passenger cars, trucks, buses, and multipurpose passenger
vehicles with a GVWR of 10,000 pounds or less (S7.1.1.5)

Complete one of these forms for **each** designated seating position with forward-facing seats,
other than the driver's seat, or seats that can be adjusted to forward-facing **and** that has seat belt
retractors that are not automatic retractors. (S7.1.1.5(c))

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No.: C20104

Technician: Steve Bell

Date: 03/27/2002

Designated Seating Position: Right Rear

- ☒ 1. Record test seat position: Fixed
(S7.1.1.5(c)(1)) (Any position is acceptable.)
- ☒ 2. Buckle the seat belt. (S7.1.1.5(c)(1))
- ☒ 3. Complete any procedures recommended in the vehicle owner's manual to activate any
locking feature. (S7.1.1.5(c)(1))
- ☒ 4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be
adjusted to forward-facing consist of a locking device that does NOT have to be attached
by the vehicle user to the seat belt webbing, retractor, or any other part to the vehicle?
(S7.1.1.5(a)) ☒ Yes-Pass ☐ No-Fail
- ☒ 5. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be
adjusted to forward-facing consist of a locking device that does NOT require inverting,
twisting or deforming of the belt webbing? (S7.1.1.5(a)) ☒ Yes-Pass ☐ No-Fail
- ☒ 6. Does the vehicle user need to take some action to activate the locking feature on the lap
belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to
forward-facing?

If yes, go to 6.1. If no, go to 7.

☒ Yes

☐ No

- 6.1 Does the vehicle owner's manual include a description in words and/or diagrams
describing how to activate the locking feature so that the seat belt assembly can
tightly secure a child restraint system and how to deactivate the locking feature to
remove the child restraint system. (S7.1.1.5(b)) ☒ Yes-Pass ☐ No-Fail

FMVSS 208 Lap Belt Lockability, Cont'd.

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No.: C20104

Technician: Steve Bell

Date: 03/27/2002

Designated Seating Position: Right Rear

- ☒ 7. Locate a reference point A on the seat belt buckle (S7.1.1 5(c)(2))
- ☒ 8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2))
- ☒ 9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system. (S7 1.1.5(c)(2))
- ☒ 10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2)) Measured distance between A and B 58.3 inches.
- ☒ 11. Readjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing. (S7.1.1.5(c)(3))
- ☒ 12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device in figure 5. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees nor more than 15 degrees above the horizontal (S7.1 1.5(c)(4)) Measured force application angle 10 degrees. (Spec. 5~15 degrees)
- ☒ 13. Measure the length between points A and B along the longitudinal centerline of the webbing while the preload is being applied. (S7.1.1.5(c)(4)) Measured distance between A and B 30.3 inches.

FMVSS 208 Lap Belt Lockability, Cont'd.

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No.: C20104

Technician: Steve Bell

Date: 03/27/2002

Designated Seating Position: Right Rear

- ☒ 14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second. Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.) Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline of the webbing. (S7.1.1.5(c)(5))

Record onset rate 25 lbs/sec (spec. 10 ~50 lb/sec)

The measured distance between A and B is 30.7 inches (S7.1.1.5(c)(6))

- ☒ 15. Subtract the measurement in 13 from the measurement in 14. Is the difference 2 inches or less? (S7.1.1.5 (c)(7))

14-13= 0.4 inches

☒ Yes-Pass

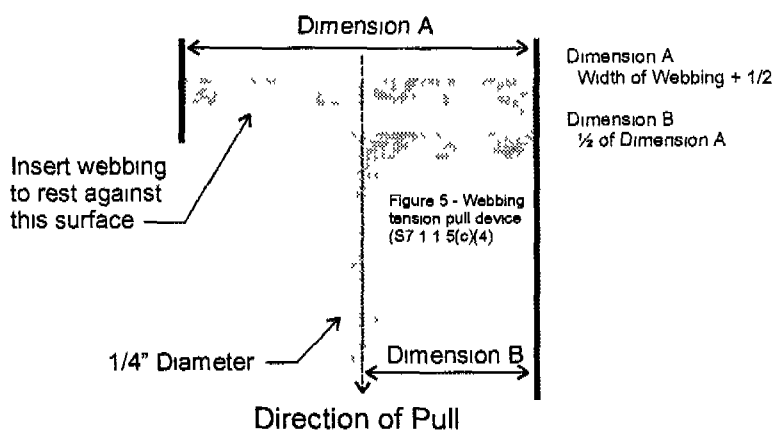
☐ No-Fail

- ☒ 16 Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more? (S7.1.1.5(c)(8))

10-14= 27.6 inches.

☒ Yes-Pass

☐ No-Fail



FMVSS 208 Lap Belt Lockability

Passenger cars, trucks, buses, and multipurpose passenger
vehicles with a GVWR of 10,000 pounds or less (S7.1.1.5)

Complete one of these forms for **each** designated seating position with forward-facing seats,
other than the driver's seat, or seats that can be adjusted to forward-facing **and** that has seat belt
retractors that are not automatic retractors. (S7 1.1.5(c))

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No : C20104

Technician: Steve Bell

Date. 03/27/2002

Designated Seating Position: Left Rear

- ☒ 1. Record test seat position Fixed
(S7.1.1.5(c)(1)) (Any position is acceptable.)
- ☒ 2. Buckle the seat belt. (S7 1.1.5(c)(1))
- ☒ 3. Complete any procedures recommended in the vehicle owner's manual to activate any
locking feature. (S7.1.1 5(c)(1))
- ☒ 4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be
adjusted to forward-facing consist of a locking device that does NOT have to be attached
by the vehicle user to the seat belt webbing, retractor, or any other part to the vehicle?
(S7.1.1.5(a)) ☒ Yes-Pass ☐ No-Fail
- ☒ 5. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be
adjusted to forward-facing consist of a locking device that does NOT require inverting,
twisting or deforming of the belt webbing? (S7 1.1.5(a)) ☒ Yes-Pass ☐ No-Fail
- ☒ 6. Does the vehicle user need to take some action to activate the locking feature on the lap
belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to
forward-facing?

If yes, go to 6.1. If no, go to 7.

☒ Yes

☐ No

- 6.1 Does the vehicle owner's manual include a description in words and/or diagrams
describing how to activate the locking feature so that the seat belt assembly can
tightly secure a child restraint system and how to deactivate the locking feature to
remove the child restraint system. (S7.1.1.5(b)) ☒ Yes-Pass ☐ No-Fail

FMVSS 208 Lap Belt Lockability, Cont'd.

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No.: C20104

Technician: Steve Bell

Date: 03/27/2002

Designated Seating Position: Left Rear

- ☒ 7. Locate a reference point A on the seat belt buckle. (S7.1.1.5(c)(2))
- ☒ 8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2))
- ☒ 9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system (S7.1.1.5(c)(2))
- ☒ 10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2)) Measured distance between A and B 64.0 inches.
- ☒ 11. Readjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing (S7.1.1.5(c)(3))
- ☒ 12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device in figure 5. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees nor more than 15 degrees above the horizontal. (S7.1.1.5(c)(4)) Measured force application angle 10 degrees. (Spec. 5~15 degrees)
- ☒ 13. Measure the length between points A and B along the longitudinal centerline of the webbing while the preload is being applied. (S7.1.1.5(c)(4)) Measured distance between A and B 26.0 inches

FMVSS 208 Lap Belt Lockability, Cont'd.

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

NHTSA No.: C20104

Technician: Steve Bell

Date: 03/27/2002

Designated Seating Position: Left Rear

- ☒ 14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second. Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.) Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline of the webbing. (S7 1.1.5(c)(5))

Record onset rate 25 lbs/sec (spec. 10 ~50 lb/sec)

The measured distance between A and B is 26.4 inches (S7.1.1.5(c)(6))

- ☒ 15. Subtract the measurement in 13 from the measurement in 14. Is the difference 2 inches or less? (S7 1.1.5 (c)(7))

14-13= 0.4 inches

☒ Yes-Pass

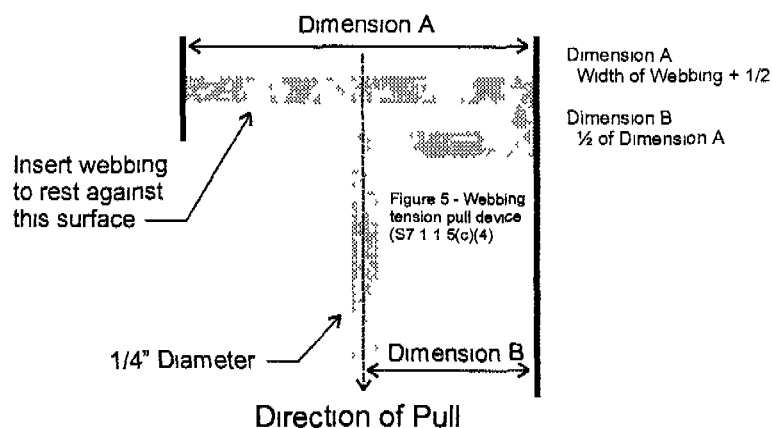
☐ No-Fail

- ☒ 16. Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more? (S7.1.1.5(c)(8))

10-14= 37.6 inches.

☒ Yes-Pass

☐ No-Fail



FMVSS 208 Seat Belt Comfort And Convenience Test

Belt Contact Force (S7.4.3)

Test Vehicle NHTSA No.: C20104

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

Designated Seating Position Tested Left Front

Date of Comfort and Convenience Check: 03/27/2002

Technician Performing Check: Steve Bell

GVWR: 6800 pounds

Test all Type 2 seat belts other than those in walk-in van-type vehicles and those at front outboard designated seating positions in passenger cars. Complete a form for each applicable seat belt.

1. Does the vehicle incorporate a webbing tension-relieving device?

☐ Yes-go to latchplate access
☒ No-continue with this check sheet

2. Adjustable seats are in the adjustment position midway between the forward most and rearmost positions. If an adjustment position does not exist midway between the forward most and rearmost positions, the next closest adjustment position to the rear of the midpoint is used. (S8.1.2)

☒ Check
☐ N/A

3. If separately adjustable in a vertical direction, the seats are at the lowest position.

☒ Check
☐ N/A

4. Place adjustable seat backs in the manufacturer's nominal design riding position in the manner specified by the manufacturer.

☒ Check
☐ N/A

5. Place any adjustable anchorages at the manufacturer's nominal design position for a 50th percentile adult male (50M) occupant. This information will be furnished by the COTR.

☐ Check
☒ N/A

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Belt Contact Force (S7.4.3)

6. Place each adjustable head restraint in its highest adjustment position.

☒ Check
☐ N/A

7. Adjustable lumbar supports are positioned so that the lumbar support is in its lowest adjustment position. (S8.1.3)

☒ Check
☐ N/A

8. Position the test dummy according to the dummy position placement instructions in Appendix B of the Laboratory Test Procedure.

☒ Check

9. Fasten the seat belt latch. Pull either 12 inches of belt webbing or the maximum available amount of belt webbing, whichever is less, from the retractor and then release it, allowing the belt webbing to return to the dummy's chest. Locate the point where the centerline of the upper torso belt webbing crosses the midsagittal line on the dummy's chest. At that point pull the belt webbing out 3 inches from the dummy's chest and release until it is within one inch from the dummy's chest. (S10.8) Measure the contact force exerted by the belt webbing on the dummy's chest. Contact the COTR if the contact force exceeds 0.7 pounds. Contact force is 0.6 pounds.

☒ 0.0 to 0.7 pounds - Pass
☐ greater than 0.7 pounds - FAIL*

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

FMVSS 208 Seat Belt Comfort And Convenience Test
Belt Contact Force (S7.4.3)

Test Vehicle NHTSA No.: C20104

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

Designated Seating Position Tested: Right Front

Date of Comfort and Convenience Check: 03/27/2002

Technician Performing Check: Steve Bell

GVWR. 6800 pounds

Test all Type 2 seat belts other than those in walk-in van-type vehicles and those at front outboard designated seating positions in passenger cars. Complete a form for each applicable seat belt.

- 1 Does the vehicle incorporate a webbing tension-relieving device?

☐ Yes-go to latchplate access
☒ No-continue with this check sheet

2. Adjustable seats are in the adjustment position midway between the forward most and rearmost positions. If an adjustment position does not exist midway between the forward most and rearmost positions, the next closest adjustment position to the rear of the midpoint is used. (S8.1.2)

☒ Check
☐ N/A

3. If separately adjustable in a vertical direction, the seats are at the lowest position.

☐ Check
☒ N/A

4. Place adjustable seat backs in the manufacturer's nominal design riding position in the manner specified by the manufacturer

☒ Check
☐ N/A

- 5 Place any adjustable anchorages at the manufacturer's nominal design position for a 50th percentile adult male (50M) occupant. This information will be furnished by the COTR.

☐ Check
☒ N/A

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Belt Contact Force (S7.4.3)

6. Place each adjustable head restraint in its highest adjustment position.

☒ Check
☐ N/A

7. Adjustable lumbar supports are positioned so that the lumbar support is in its lowest adjustment position. (S8 1 3)

☒ Check
☐ N/A

8. Position the test dummy according to the dummy position placement instructions in Appendix B of the Laboratory Test Procedure.

☒ Check

9. Fasten the seat belt latch. Pull either 12 inches of belt webbing or the maximum available amount of belt webbing, whichever is less, from the retractor and then release it, allowing the belt webbing to return to the dummy's chest. Locate the point where the centerline of the upper torso belt webbing crosses the midsagittal line on the dummy's chest. At that point pull the belt webbing out 3 inches from the dummy's chest and release until it is within one inch from the dummy's chest. (S10.8) Measure the contact force exerted by the belt webbing on the dummy's chest. Contact the COTR if the contact force exceeds 0.7 pounds. Contact force is 0.6 pounds.

☒ 0.0 to 0.7 pounds - Pass
☐ greater than 0.7 pounds - FAIL*

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

FMVSS 208 Seat Belt Comfort And Convenience Test

Belt Contact Force (S7.4.3)

Test Vehicle NHTSA No.: C20104

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

Designated Seating Position Tested: Right Rear

Date of Comfort and Convenience Check: 03/27/2002

Technician Performing Check: Steve Bell

GVWR: 6800 pounds

Test all Type 2 seat belts other than those in walk-in van-type vehicles and those at front outboard designated seating positions in passenger cars. Complete a form for each applicable seat belt.

- 1 Does the vehicle incorporate a webbing tension-relieving device?

☐ Yes-go to latchplate access
☒ No-continue with this check sheet

2. Adjustable seats are in the adjustment position midway between the forward most and rearmost positions. If an adjustment position does not exist midway between the forward most and rearmost positions, the next closest adjustment position to the rear of the midpoint is used. (S8.1.2)

☐ Check
☒ N/A

- 3 If separately adjustable in a vertical direction, the seats are at the lowest position.

☐ Check
☒ N/A

4. Place adjustable seat backs in the manufacturer's nominal design riding position in the manner specified by the manufacturer.

☐ Check
☒ N/A

5. Place any adjustable anchorages at the manufacturer's nominal design position for a 50th percentile adult male (50M) occupant. This information will be furnished by the COTR.

☐ Check
☒ N/A

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Belt Contact Force (S7.4.3)

6. Place each adjustable head restraint in its highest adjustment position.

☒ Check
☐ N/A

7. Adjustable lumbar supports are positioned so that the lumbar support is in its lowest adjustment position. (S8.1.3)

☐ Check
☒ N/A

8. Position the test dummy according to the dummy position placement instructions in Appendix B of the Laboratory Test Procedure.

☒ Check

9. Fasten the seat belt latch. Pull either 12 inches of belt webbing or the maximum available amount of belt webbing, whichever is less, from the retractor and then release it, allowing the belt webbing to return to the dummy's chest. Locate the point where the centerline of the upper torso belt webbing crosses the midsagittal line on the dummy's chest. At that point pull the belt webbing out 3 inches from the dummy's chest and release until it is within one inch from the dummy's chest. (S10 8) Measure the contact force exerted by the belt webbing on the dummy's chest. Contact the COTR if the contact force exceeds 0.7 pounds. Contact force is **0.6** pounds.

☒ 0.0 to 0.7 pounds - Pass
☐ greater than 0.7 pounds - FAIL*

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

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.
Latchplate Access (S7.4.4)

Test Vehicle NHTSA No.: C20104

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

Designated Seating Position Tested: Left Front

Date of Comfort and Convenience Check: 03/26/2002

Technician Performing Check: Steve Bell

GVWR: 6800 pounds

Test all front outboard seat belts other than those in walk-in van-type vehicles and those at front outboard designated seating positions in passenger cars. Complete a form for each applicable seat belt.

1. Position the seat in its forward most adjustment position. ☒ Check
2. Position the test dummy using the procedures in Appendix B of the Laboratory Test Procedure (Some modifications to the positioning procedure may need to be made because the seat is in its forward most position.) ☒ Check
3. Position the adjustable seat belt anchorage in the manufacturer's nominal design position for a 50th percentile adult male occupant ☒ Check
4. Attach the inboard and outboard reach string following the instructions on Figure 1C of the Laboratory Test Procedure. ☒ Check
5. Place the latch plate in the stowed position. ☒ Check
6. Extend each line backward and outboard to generate arcs of the reach envelope of the test dummy's arms. Is the latchplate within the reach envelope?
☒ Yes-Pass; ☐ No-Fail
7. Using the clearance test block, specified in Figure 2C of the Laboratory Test Procedure, determine if there is sufficient clearance between the vehicle seat and the side of vehicle to allow the test block to move unhindered to the latchplate or buckle.
☒ Yes-Pass; ☐ No-Fail

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Retraction (S7.4.5)

7. Adjustable lumbar supports are positioned so that the lumbar support is in its lowest adjustment position. (S8.1.3) ☒ Check
8. Use anthropomorphic test dummies whose arms have been removed and position the dummies in the front outboard designated seating positions according to instructions in Appendix B of the Laboratory Test Procedure. ☒ Check
9. Restrain the dummies using the belt systems for the position being tested. ☒ Check
10. Stow outboard armrests that are capable of being stowed. ☒ Check
- 11 Check the statement that applies to this test vehicle:
- (A) The torso and lap belt webbing of the seat belt system automatically retracts to a stowed position when the adjacent vehicle door is in an open position and the seat belt latchplate is released. ☒ Pass
- (B) The torso and lap belt webbing of the seat belt system automatically retracts when the seat belt latchplate is released. ☒ Pass
- (C) Neither A or B apply. ☐ Fail
12. With the webbing and hardware in the stowed position are the webbing and hardware prevented from being pinched when the door is closed?
- ☒ Yes-Pass; ☐ No-Fail
13. If this test vehicle has an open body (without doors) and has a belt system with a tension-relieving device, does the belt system fully retract when the tension-relieving device is deactivated?
- ☐ Yes-Pass; ☒ N/A ☐ No-Fail

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Retraction (S7.4.5)

Test Vehicle NHTSA No.: C20104

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

Designated Seating Position Tested: Right Front

Date of Comfort and Convenience Check: 03/26/2002

Technician Performing Check: Steve Bell

GVWR: 6800 pounds

Test all front outboard seat belts other than those in walk-in van-type vehicles and those at front outboard designated seating positions in passenger cars. Complete a form for each applicable seat belt.

1. Is the vehicle a passenger car or walk-in van-type vehicle? ☐ Yes
☒ No

If yes, go to seat belt guides and hardware.

2. Adjustable seats are in the adjustment position midway between the forward most and rearmost positions. If an adjustment position does not exist midway between the forward most and rearmost positions, the next closest adjustment position to the rear of the midpoint is used. (S8.1.2) ☒ Check
3. If separately adjustable in a vertical direction, the seats are at the lowest position. ☒ Check
4. Place any adjustable seat backs in the manufacturer's nominal design riding position in the manner specified by the manufacturer. ☒ Check
5. Place any adjustable anchorages at the manufacturer's nominal design position for a 50th percentile adult male (50M) occupant. This information will be furnished by the COTR. ☒ Check
6. Place each adjustable head restraint in its highest adjustment position. ☒ Check

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Retraction (S7.4.5)

7. Adjustable lumbar supports are positioned so that the lumbar support is in its lowest adjustment position. (S8.1.3) ☒ Check

8 Use anthropomorphic test dummies whose arms have been removed and position the dummies in the front outboard designated seating positions according to instructions in Appendix B. ☒ Check

9. Restrain the dummies using the belt systems for the position being tested. ☒ Check

10. Stow outboard armrests that are capable of being stowed. ☒ Check

11. Check the statement that applies to this test vehicle:

(A) The torso and lap belt webbing of the seat belt system automatically retracts to a stowed position when the adjacent vehicle door is in an open position and the seat belt latchplate is released. ☒ Pass

(B) The torso and lap belt webbing of the seat belt system automatically retracts when the seat belt latchplate is released. ☒ Pass

(C) Neither A or B apply. ☐ Fail

12. With the webbing and hardware in the stowed position are the webbing and hardware prevented from being pinched when the door is closed?

☒ Yes-Pass; ☐ No-Fail

13. If this test vehicle has an open body (without doors) and has a belt system with a tension-relieving device, does the belt system fully retract when the tension-relieving device is deactivated?

☒ N/A
☐ Yes-Pass; ☐ No-Fail

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Seat Belt Guides And Hardware (S7.4.6)

Test Vehicle NHTSA No.: C20104

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

Designated Seating Position Tested: Left Front

Date of Comfort and Convenience Check: 03/26/2002

Technician Performing Check: Steve Bell

GVWR: 6800 pounds

Test seat belts except those in walk-in van-type vehicles and those at front outboard designated seating positions in passenger cars. Complete a form for each applicable seat belt

The requirements for accessibility **DO NOT APPLY** to:

- A. Seats whose seat cushions are movable so that the seat back serves a function other than seating (S7.4.6.1(b)).
- B. Seats which are removable.
- C. Seats that are movable so that the space formerly occupied by the seat can be used for a secondary function.

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

- 1. Is the webbing designed to pass through the seat cushion or between the seat cushion and seat back?
☒ Yes: go to 2.
☐ No: this form is complete.
- 2. Does one of the following three parts, the seat belt latchplate, the buckle, or the seat belt webbing, stay on top of or above the seat cushion under normal conditions (i.e., conditions other than when belt hardware is intentionally pushed behind the seat by a vehicle occupant)?
☒ Yes-Pass; ☐ No-Fail
- 3. Are the remaining two seat belt parts accessible under normal conditions?
☒ Yes-Pass; ☐ No-Fail

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Seat Belt Guides And Hardware (S7.4.6)

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

(A) The belt is completely retracted or, if the belt is nonretractable, the belt is unlatched.

☒ Check

(B) The seat is moved to any position to which it is designed to be adjusted

☒ Check

(C) The seat back, if foldable, is folded forward as far as possible and then moved backward into position.

☒ Check

☒ Yes-Pass;

☐ No-Fail

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

☒ Yes-Pass;

☐ No-Fail

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Seat Belt Guides And Hardware (S7.4.6)

Test Vehicle NHTSA No.: C20104

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

Designated Seating Position Tested: Center Front – Does not apply for reason C below.

Date of Comfort and Convenience Check: 03/26/2002

Technician Performing Check: Steve Bell

GVWR: 6800 pounds

Test seat belts except those in walk-in van-type vehicles and those at front outboard designated seating positions in passenger cars. Complete a form for each applicable seat belt.

The requirements for accessibility **DO NOT APPLY** to:

- A. Seats whose seat cushions are movable so that the seat back serves a function other than seating (S7.4 6.1(b)).
- B. Seats which are removable.
- C. Seats that are movable so that the space formerly occupied by the seat can be used for a secondary function.

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

- 1. Is the webbing designed to pass through the seat cushion or between the seat cushion and seat back?
☐ Yes: go to 2.
☐ No: this form is complete.
- 2. Does one of the following three parts, the seat belt latchplate, the buckle, or the seat belt webbing, stay on top of or above the seat cushion under normal conditions (i.e., conditions other than when belt hardware is intentionally pushed behind the seat by a vehicle occupant)?
☐ Yes-Pass; ☐ No-Fail
- 3. Are the remaining two seat belt parts accessible under normal conditions?
☐ Yes-Pass; ☐ No-Fail

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Seat Belt Guides And Hardware (S7.4.6)

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

(A) The belt is completely retracted or, if the belt is nonretractable, the belt is unlatched.

☐ Check

(B) The seat is moved to any position to which it is designed to be adjusted.

☐ Check

(C) The seat back, if foldable, is folded forward as far as possible and then moved backward into position.

☐ Check

☐ Yes-Pass;

☐ No-Fail

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

☐ Yes-Pass;

☐ No-Fail

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Seat Belt Guides And Hardware (S7.4.6)

Test Vehicle NHTSA No.: C20104

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

Designated Seating Position Tested: Right Front

Date of Comfort and Convenience Check: 03/26/2002

Technician Performing Check: Steve Bell

GVWR: 6800 pounds

Test seat belts except those in walk-in van-type vehicles and those at front outboard designated seating positions in passenger cars. Complete a form for each applicable seat belt.

The requirements for accessibility **DO NOT APPLY** to:

- A. Seats whose seat cushions are movable so that the seat back serves a function other than seating (S7.4.6 1(b)).
- B. Seats which are removable.
- C. Seats that are movable so that the space formerly occupied by the seat can be used for a secondary function.

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

- 1. Is the webbing designed to pass through the seat cushion or between the seat cushion and seat back?
☒ Yes: go to 2.
☐ No: this form is complete.
- 2. Does one of the following three parts, the seat belt latchplate, the buckle, or the seat belt webbing, stay on top of or above the seat cushion under normal conditions (i.e., conditions other than when belt hardware is intentionally pushed behind the seat by a vehicle occupant)?
☒ Yes-Pass; ☐ No-Fail
- 3. Are the remaining two seat belt parts accessible under normal conditions?
☒ Yes-Pass; ☐ No-Fail

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Seat Belt Guides And Hardware (S7.4.6)

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

(A) The belt is completely retracted or, if the belt is nonretractable, the belt is unlatched.

☒ Check

(B) The seat is moved to any position to which it is designed to be adjusted.

☒ Check

(C) The seat back, if foldable, is folded forward as far as possible and then moved backward into position.

☒ Check

☒ Yes-Pass;

☐ No-Fail

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

☒ Yes-Pass;

☐ No-Fail

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Seat Belt Guides And Hardware (S7.4.6)

Test Vehicle NHTSA No.: C20104

Vehicle Model Year/Make/Model/Body Style: 2002/Chevrolet/Avalanche 1500/MPV

Designated Seating Position Tested: Right Rear, Center Rear, Left Rear – does not apply for reasons A and C below.

Date of Comfort and Convenience Check: 03/26/2002

Technician Performing Check: Steve Bell

GVWR: 6800 pounds

Test seat belts except those in walk-in van-type vehicles and those at front outboard designated seating positions in passenger cars. Complete a form for each applicable seat belt.

The requirements for accessibility **DO NOT APPLY** to:

- A. Seats whose seat cushions are movable so that the seat back serves a function other than seating (S7.4.6.1(b))
- B. Seats which are removable.
- C. Seats that are movable so that the space formerly occupied by the seat can be used for a secondary function.

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

- 1. Is the webbing designed to pass through the seat cushion or between the seat cushion and seat back?
☐ Yes: go to 2.
☐ No: this form is complete.
- 2. Does one of the following three parts, the seat belt latchplate, the buckle, or the seat belt webbing, stay on top of or above the seat cushion under normal conditions (i.e., conditions other than when belt hardware is intentionally pushed behind the seat by a vehicle occupant)?
☐ Yes-Pass; ☐ No-Fail
- 3. Are the remaining two seat belt parts accessible under normal conditions?
☐ Yes-Pass; ☐ No-Fail

FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.

Seat Belt Guides And Hardware (S7.4.6)

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

(A) The belt is completely retracted or, if the belt is nonretractable, the belt is unlatched.

☐ Check

(B) The seat is moved to any position to which it is designed to be adjusted.

☐ Check

(C) The seat back, if foldable, is folded forward as far as possible and then moved backward into position.

☐ Check

☐ Yes-Pass;

☐ No-Fail

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

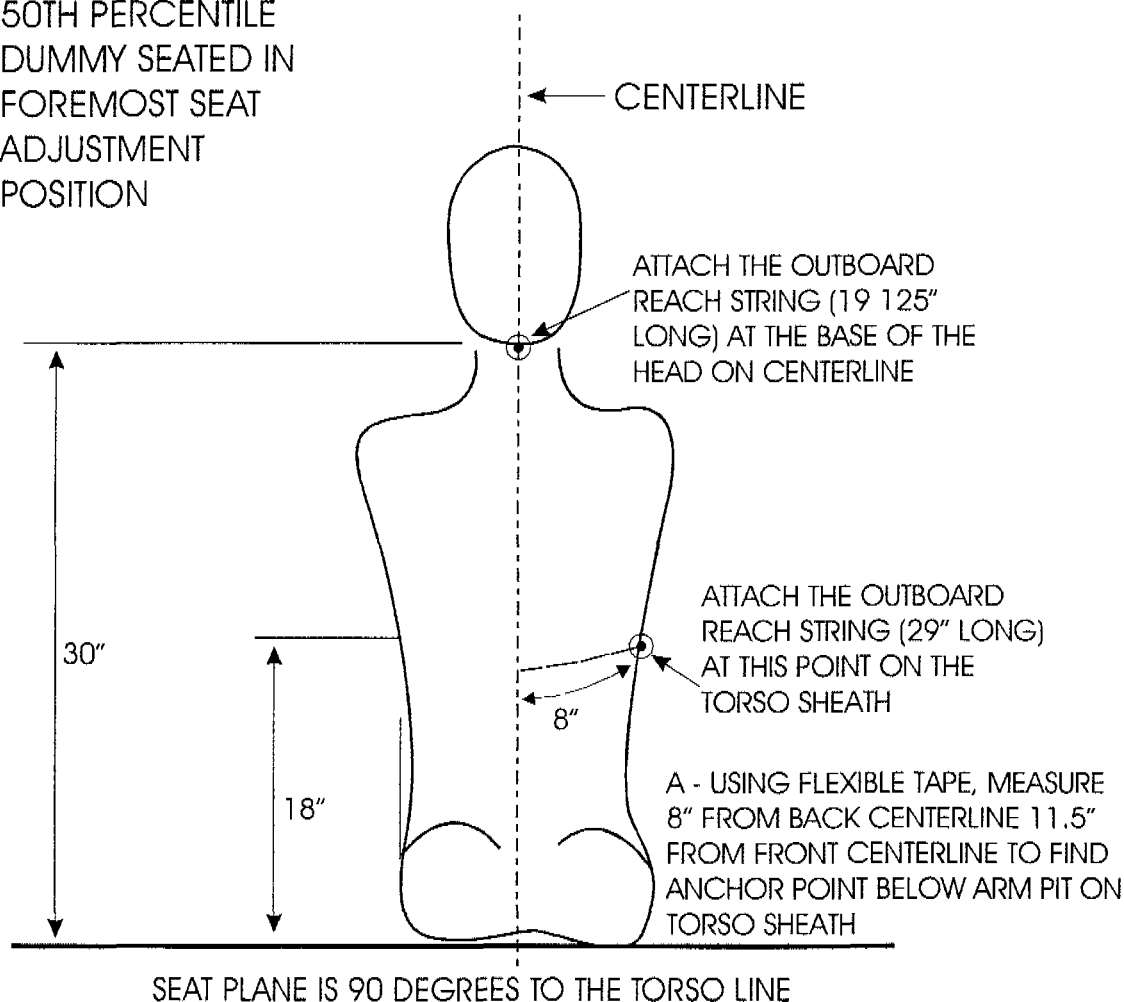
☐ Yes-Pass;

☐ No-Fail

LOCATION OF ANCHORING POINTS FOR LATCHPLATE REACH LIMITING CHAINS OR STRINGS TO TEST FOR LATCHPLATE ACCESSIBILITY

PART 572E DUMMY

50TH PERCENTILE
DUMMY SEATED IN
FOREMOST SEAT
ADJUSTMENT
POSITION



REAR VIEW
Laboratory Test Procedure Figure 1C



Appendix A

Photographs

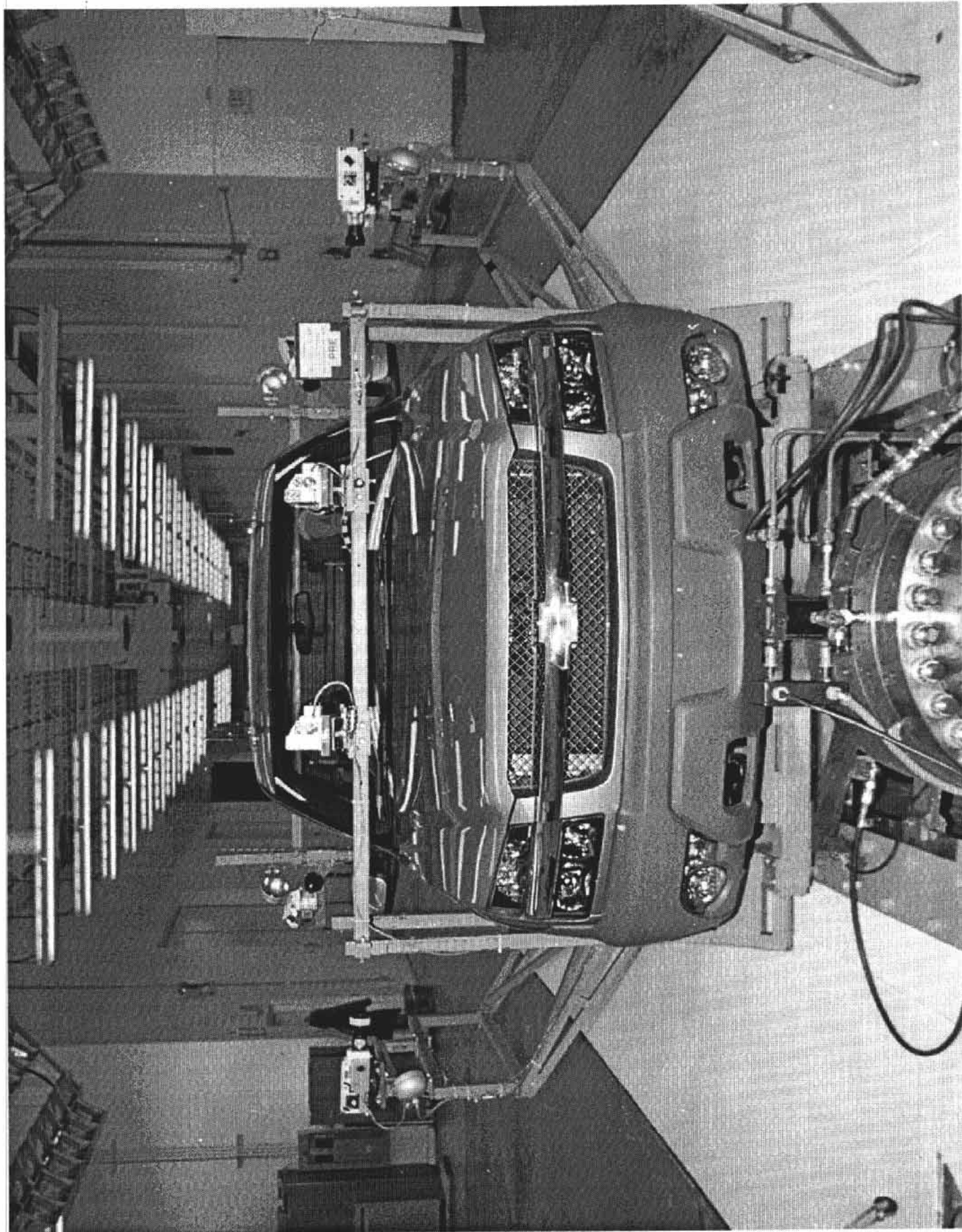


Figure A-1. Pre-Test Front View of Test Vehicle Mounted to Sled
A-2

S020410

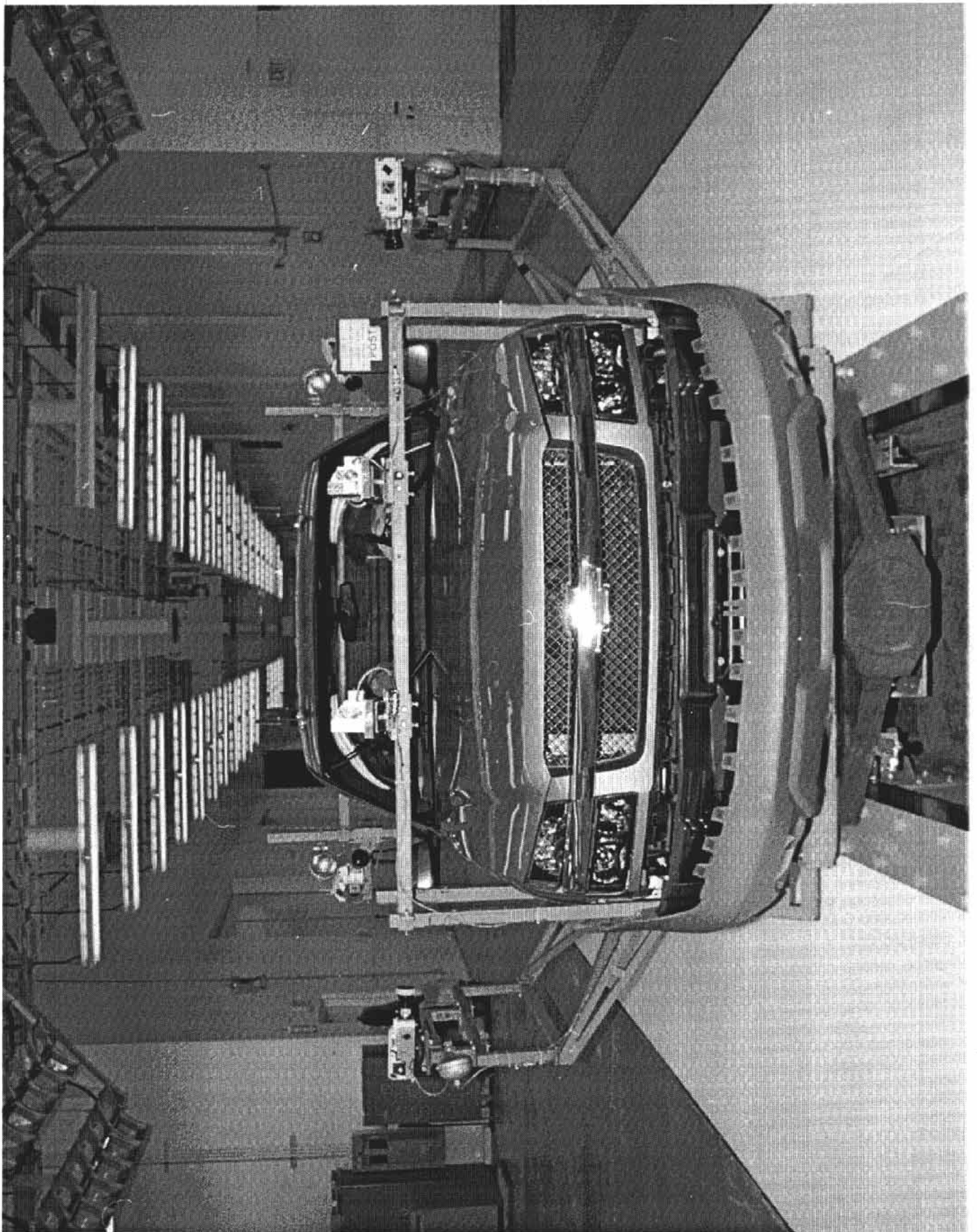


Figure A-2. Post-Test Front View of Test Vehicle Mounted to Sled
A-3

S020410

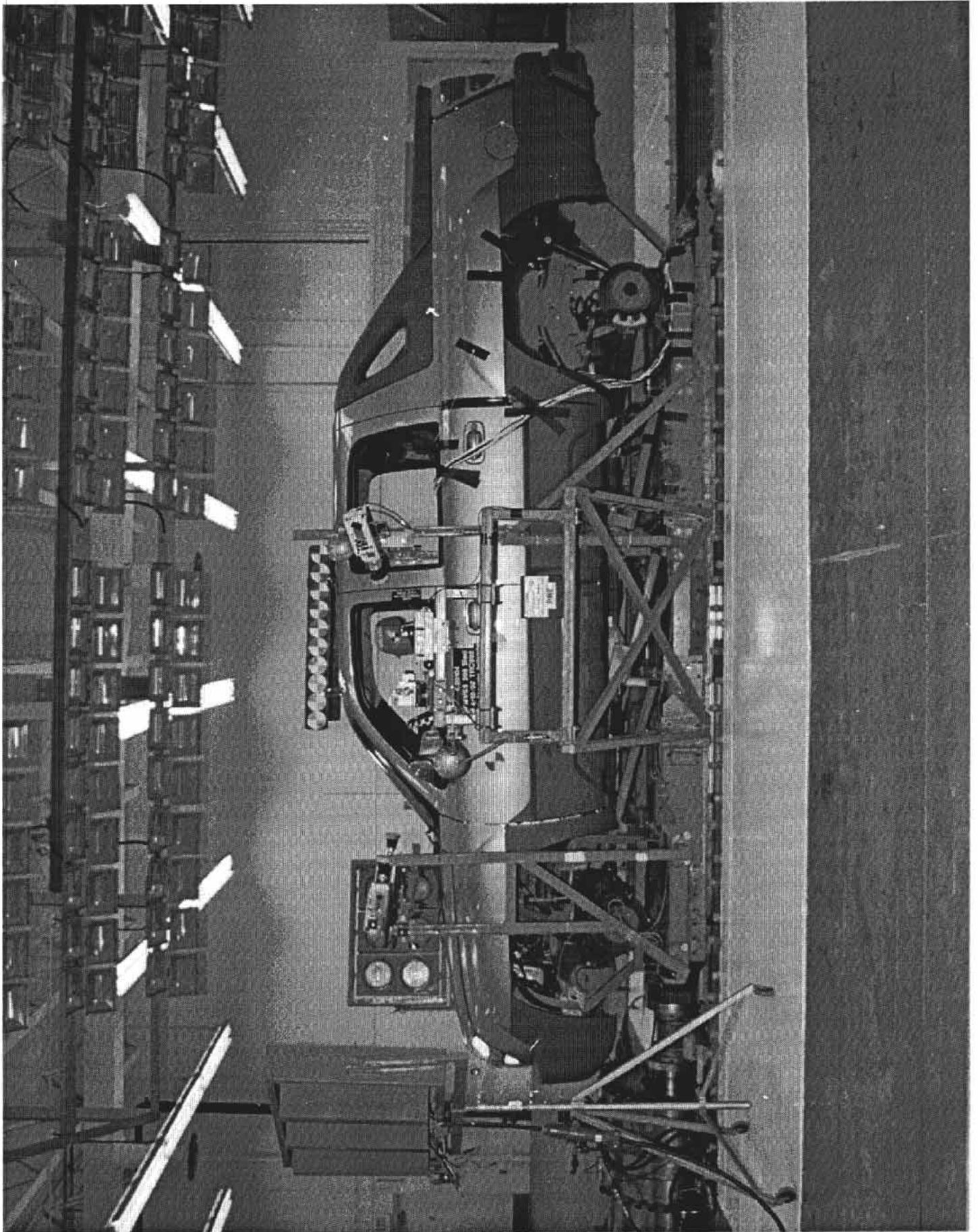


Figure A-3. Pre-Test Left Side View of Test Vehicle Mounted to Sled
A-4

S020410

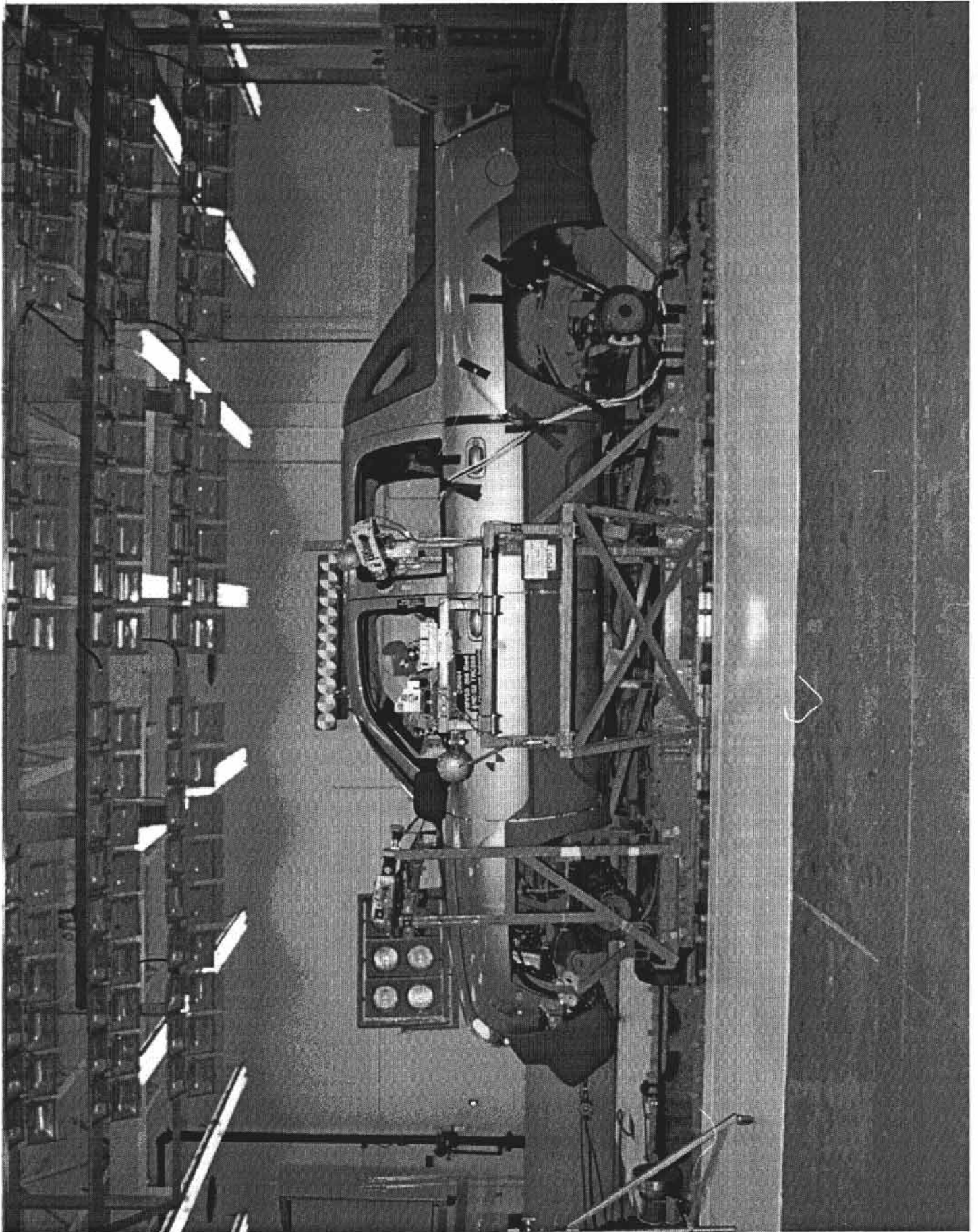


Figure A-4. Post-Test Left Side View of Test Vehicle Mounted to Sled
A-5

S020410

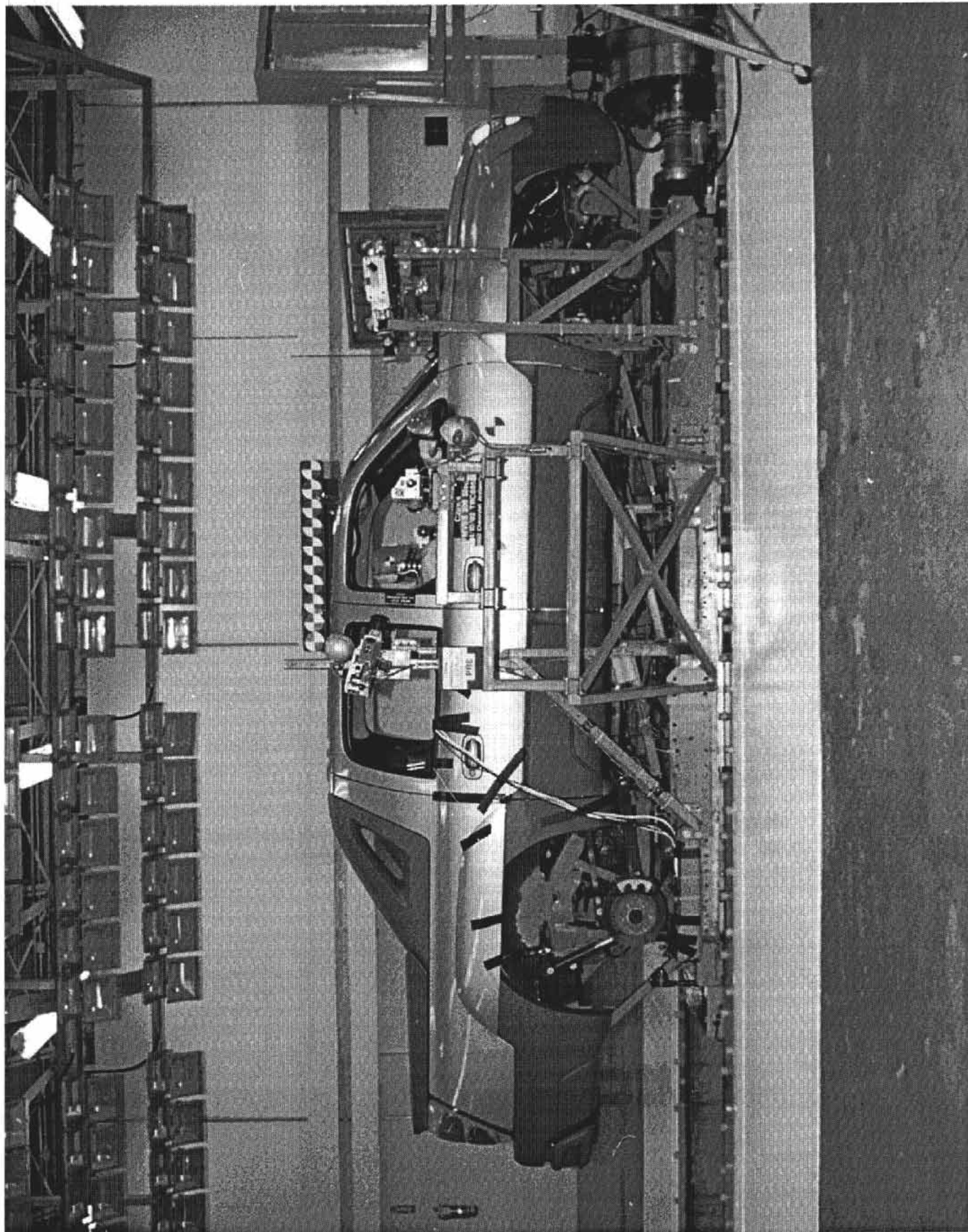


Figure A-5. Pre-Test Right Side View of Test Vehicle Mounted to Sled
A-6

S020410

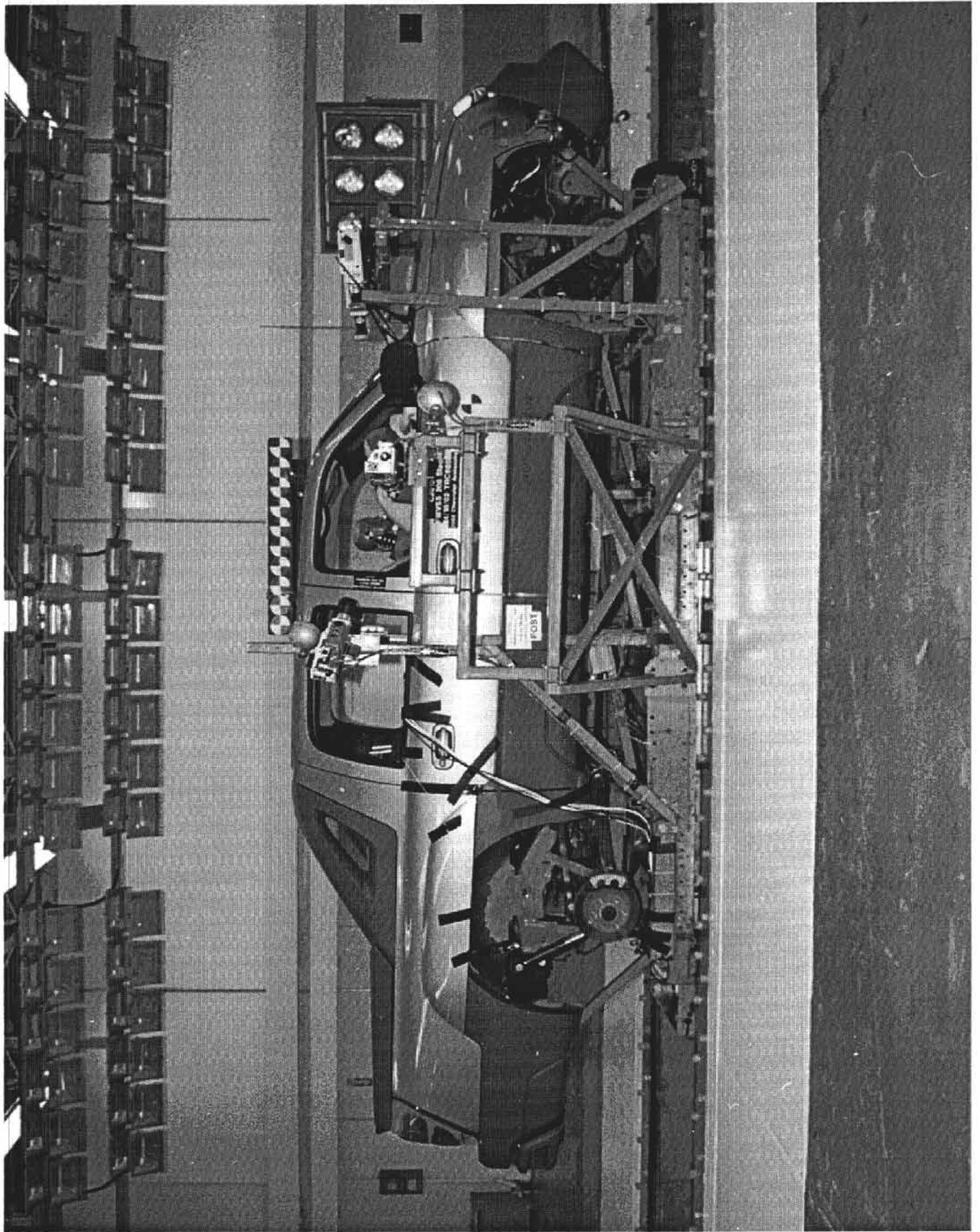


Figure A-6. Post-Test Right Side View of Test Vehicle Mounted to Sled
A-7

S020410



Figure A-7. Pre-Test Windshield View
A-8

S020410



Figure A-8. Post-Test Windshield View
A-9

S020410



Figure A-9. Pre-Test Driver Dummy Position View with Door Open

A-10

S020410



Figure A-10. Post-Test Driver Dummy Position View with Door Open
A-11

S020410



Figure A-11. Pre-Test Driver Seat Track Position View
A-12

S020410



Figure A-12. Post-Test Driver Seat Track Position View
A-13

S020410



Figure A-13. Pre-Test Driver Dummy Position Front View

A-14

S020410



Figure A-14. Post-Test Driver Dummy Position Front View
A-15

S020410



Figure A-15. Pre-Test Passenger Dummy Position View with Door Open
A-16

S020410



Figure A-16. Post-Test Passenger Dummy Position View with Door Open
A-17

S020410



Figure A-17. Pre-Test Passenger Seat Track Position View
A-18

S020410

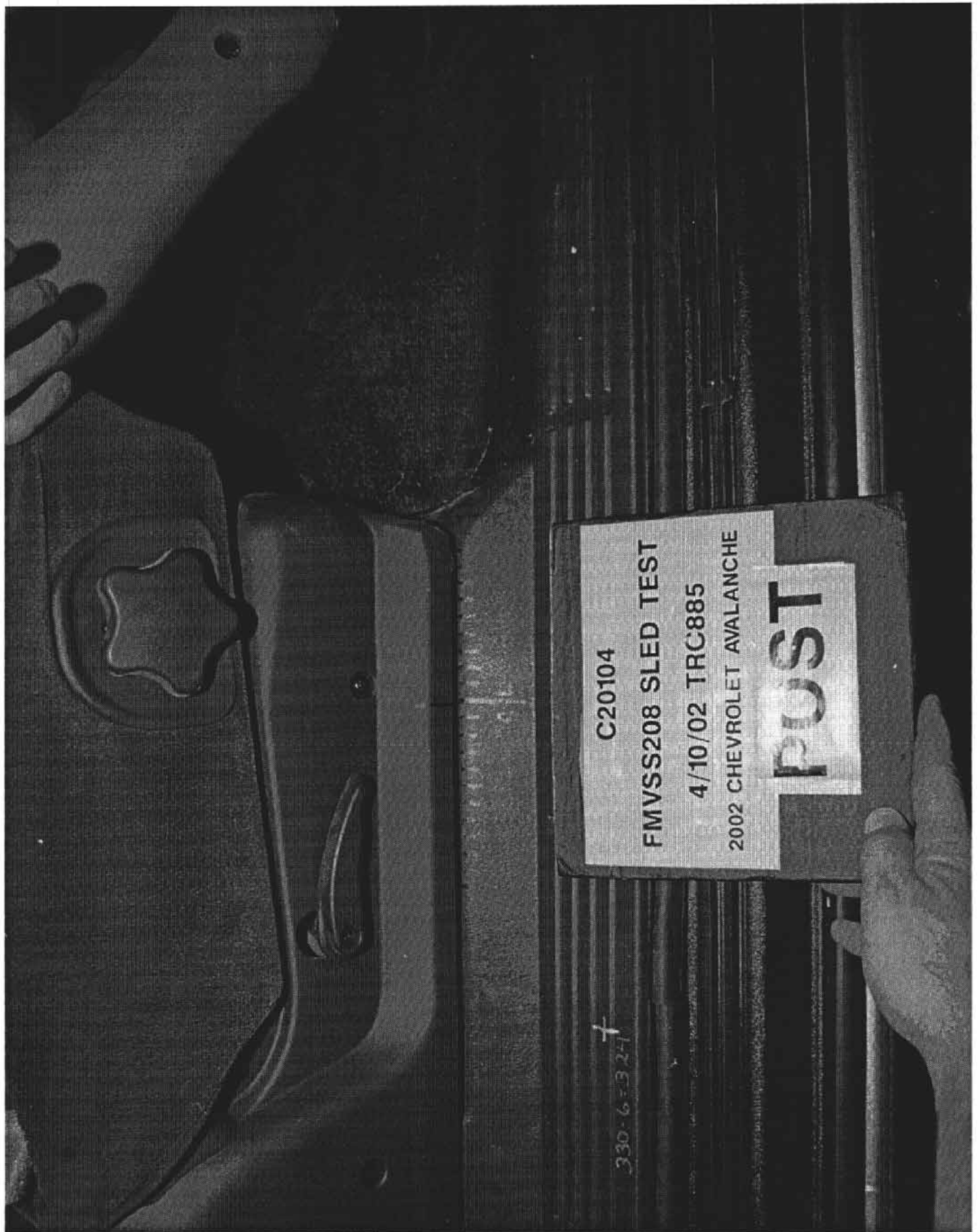


Figure A-18. Post-Test Passenger Seat Track Position View
A-19

S020410

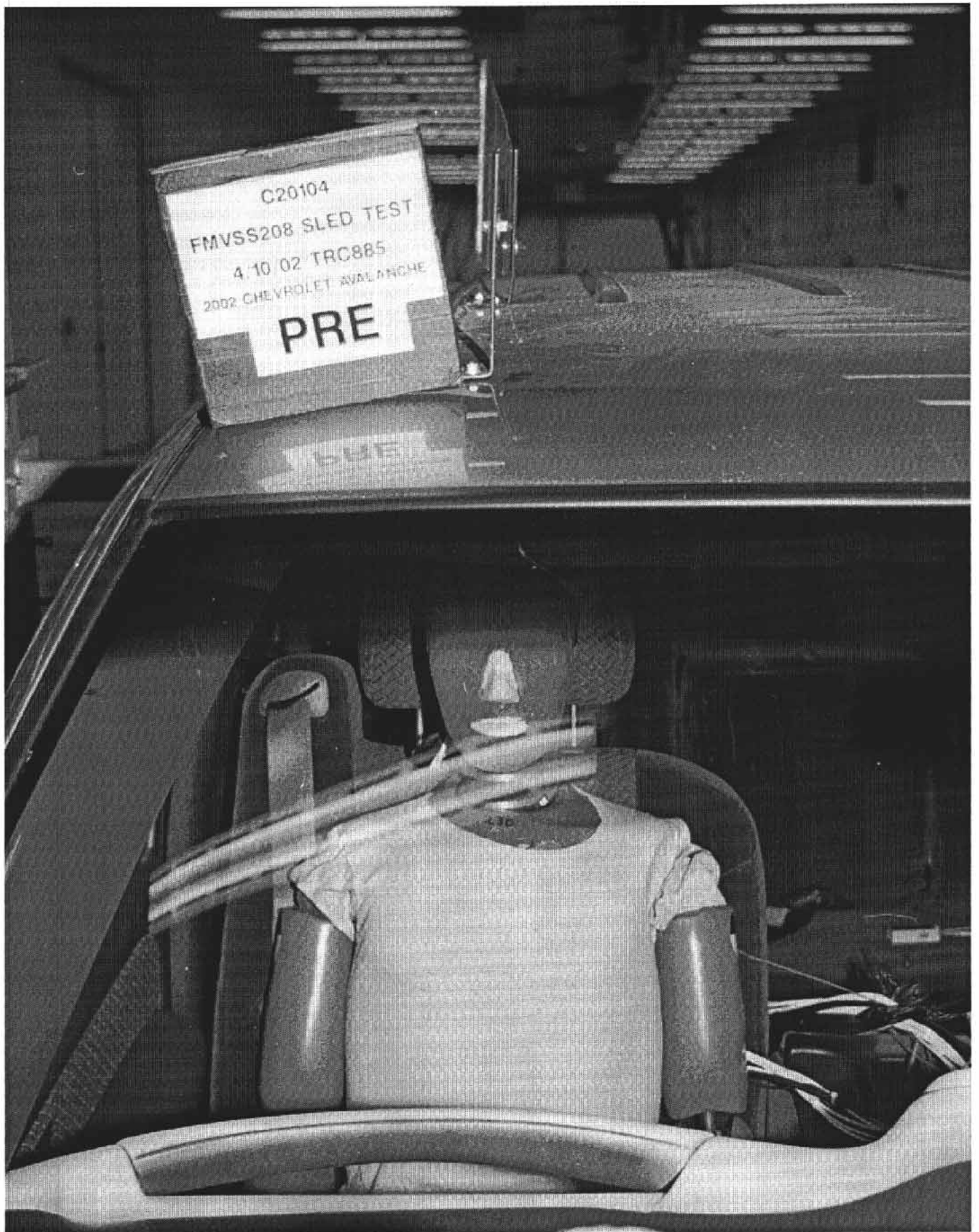


Figure A-19. Pre-Test Passenger Dummy Position Front View
A-20

S020410

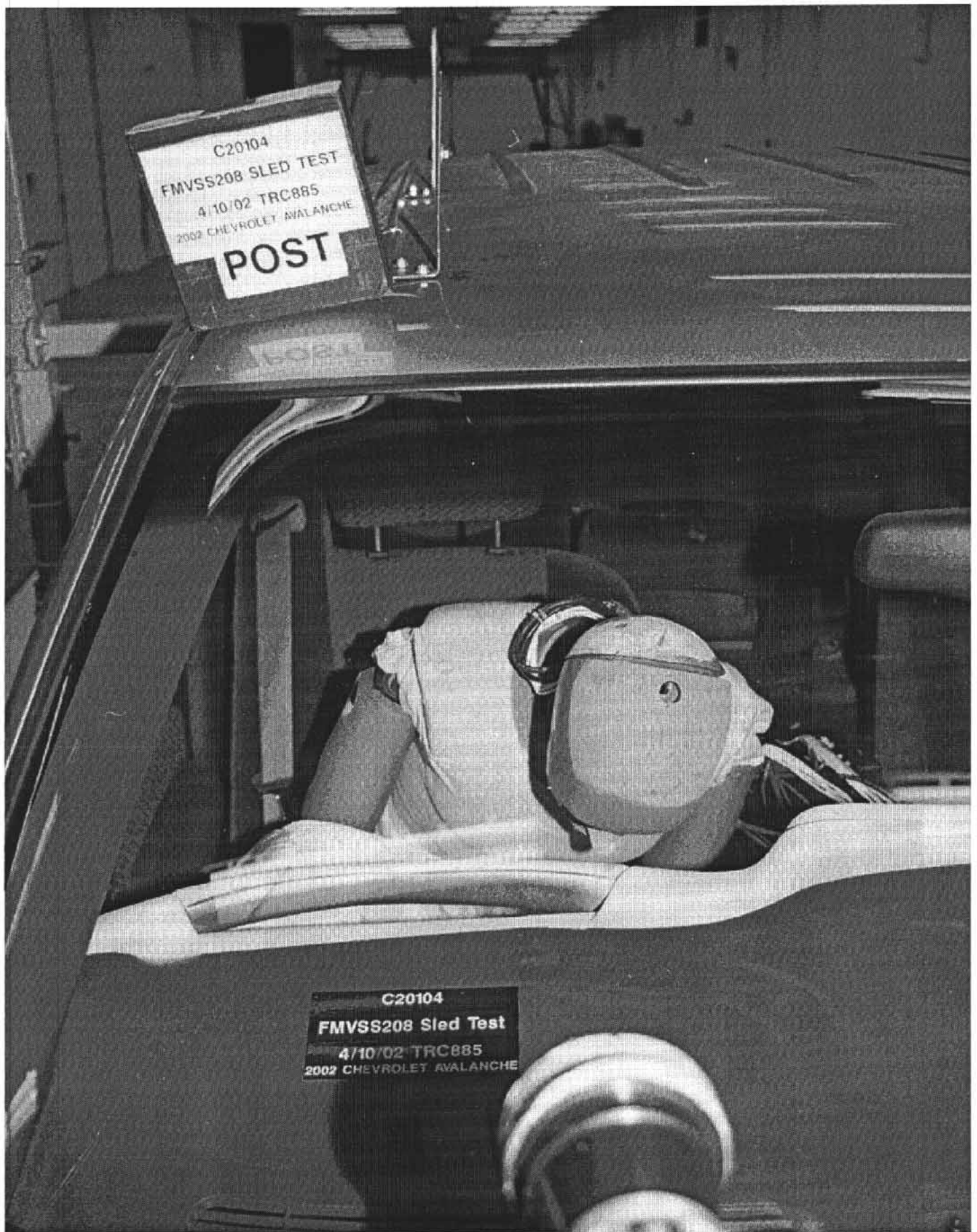


Figure A-20. Post-Test Passenger Dummy Position Front View
A-21

S020410

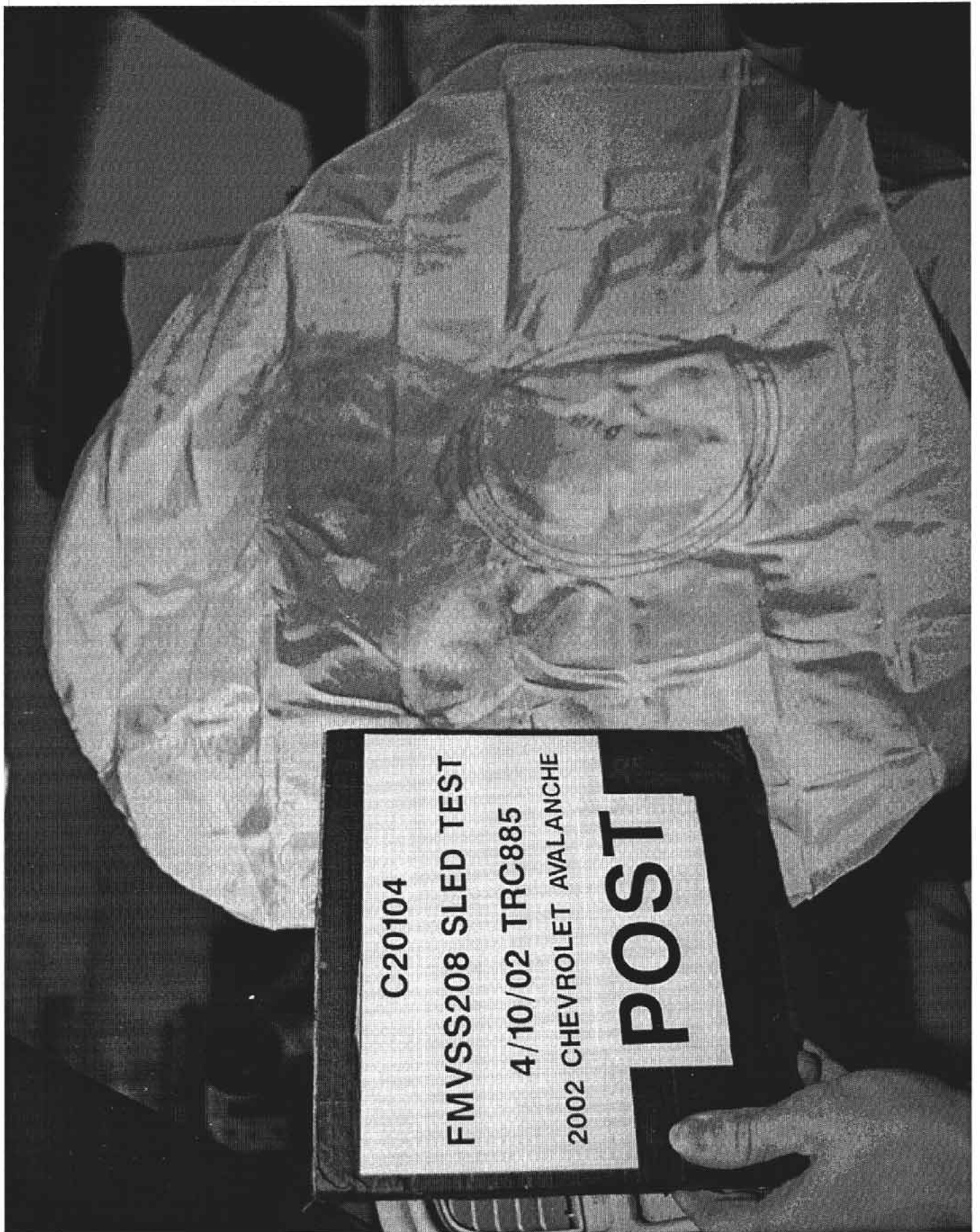


Figure A-21. Post-Test Driver Airbag View
A-22

S020410

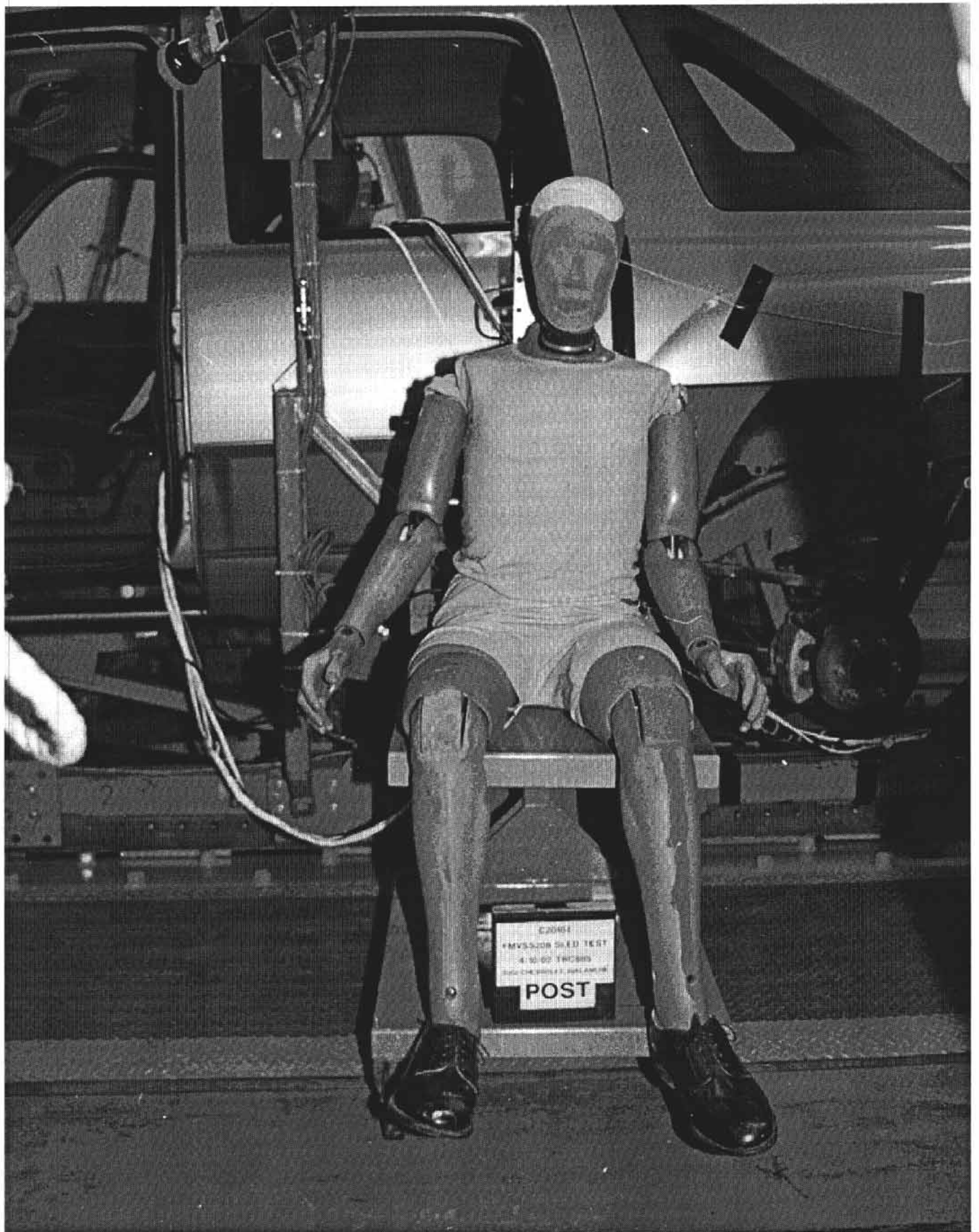


Figure A-22. Post-Test Driver Dummy Removed from Vehicle Overall View

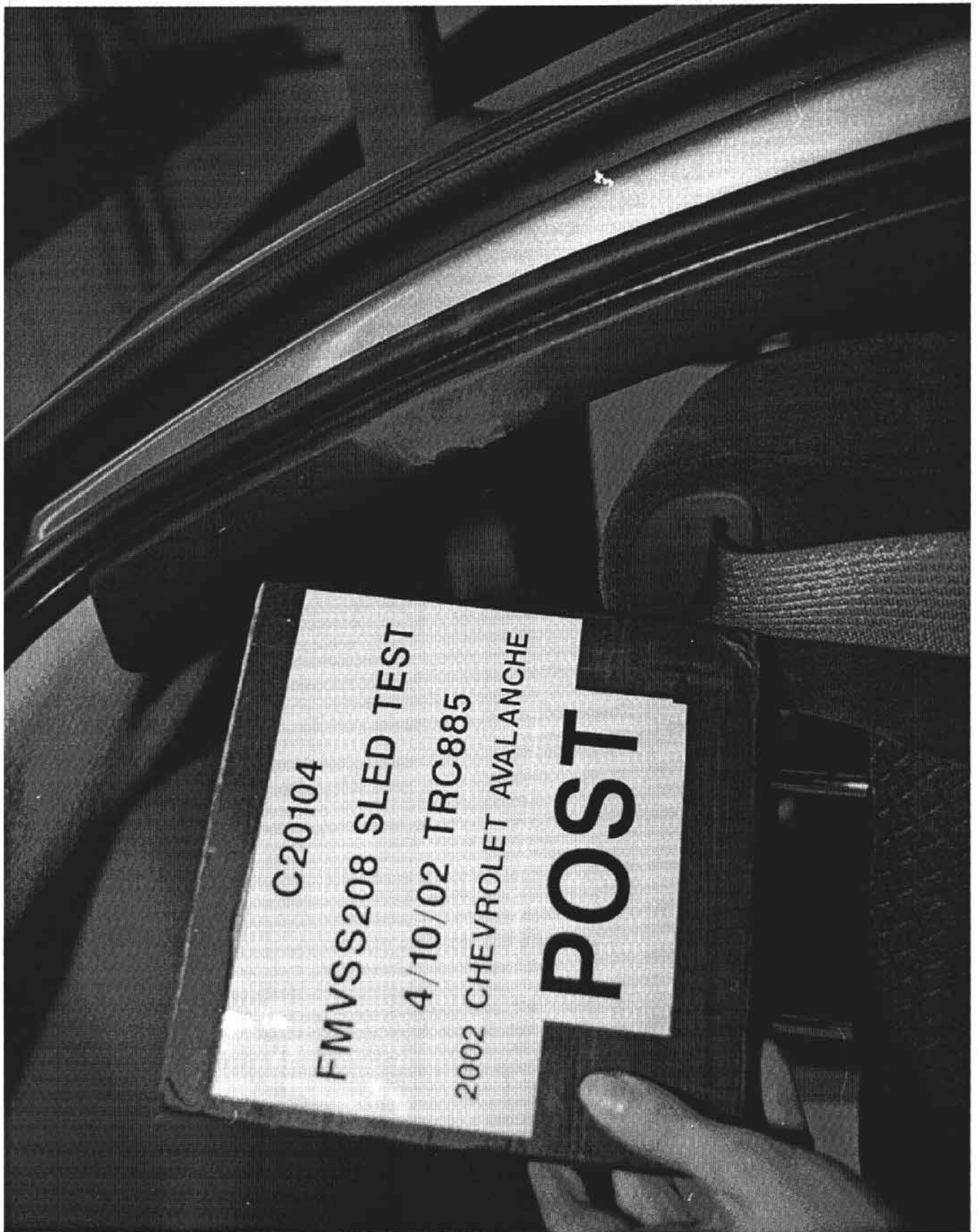


Figure A-23. Post-Test Driver Head Contact View

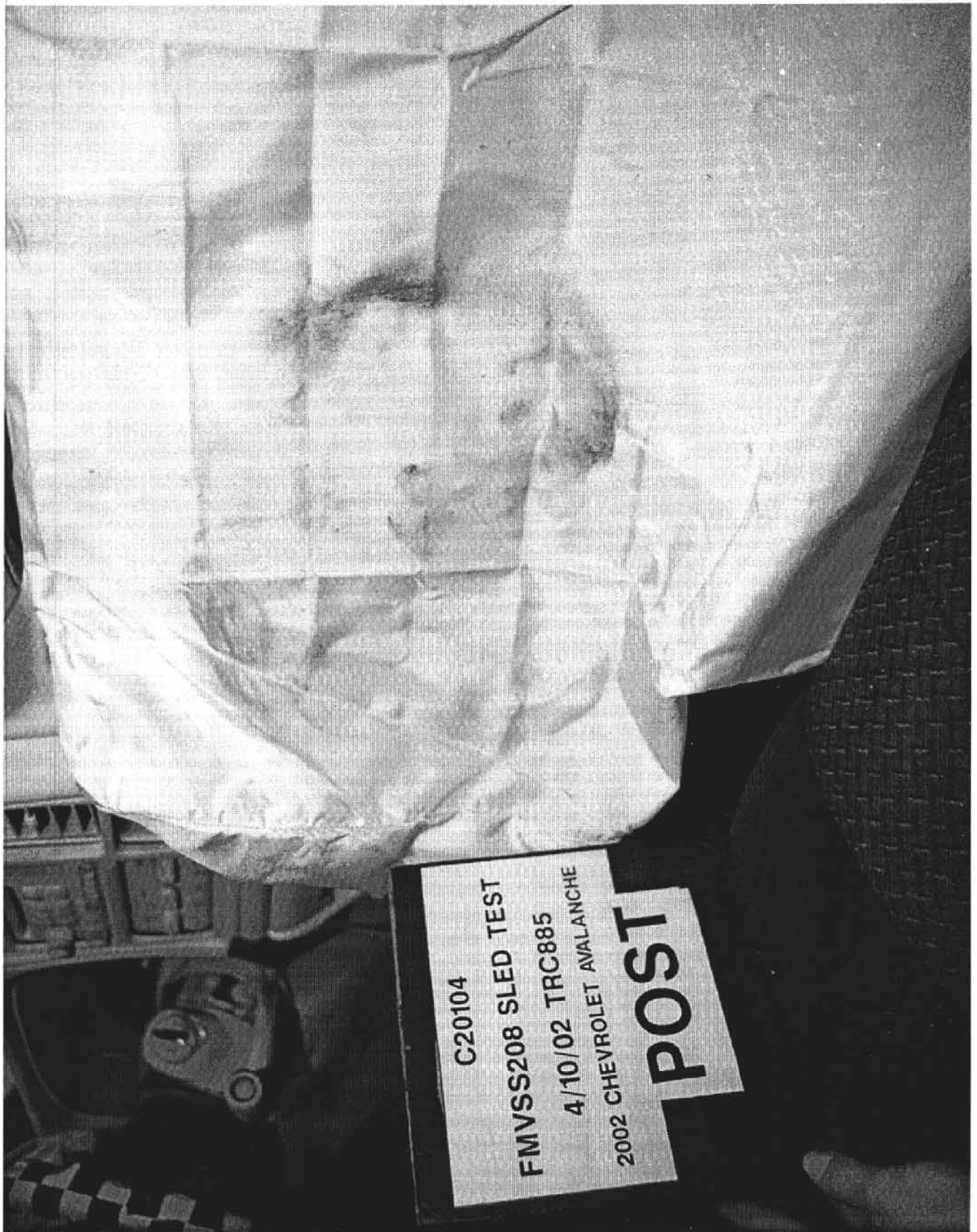


Figure A-24. Post-Test Passenger Airbag View
A-25

S020410

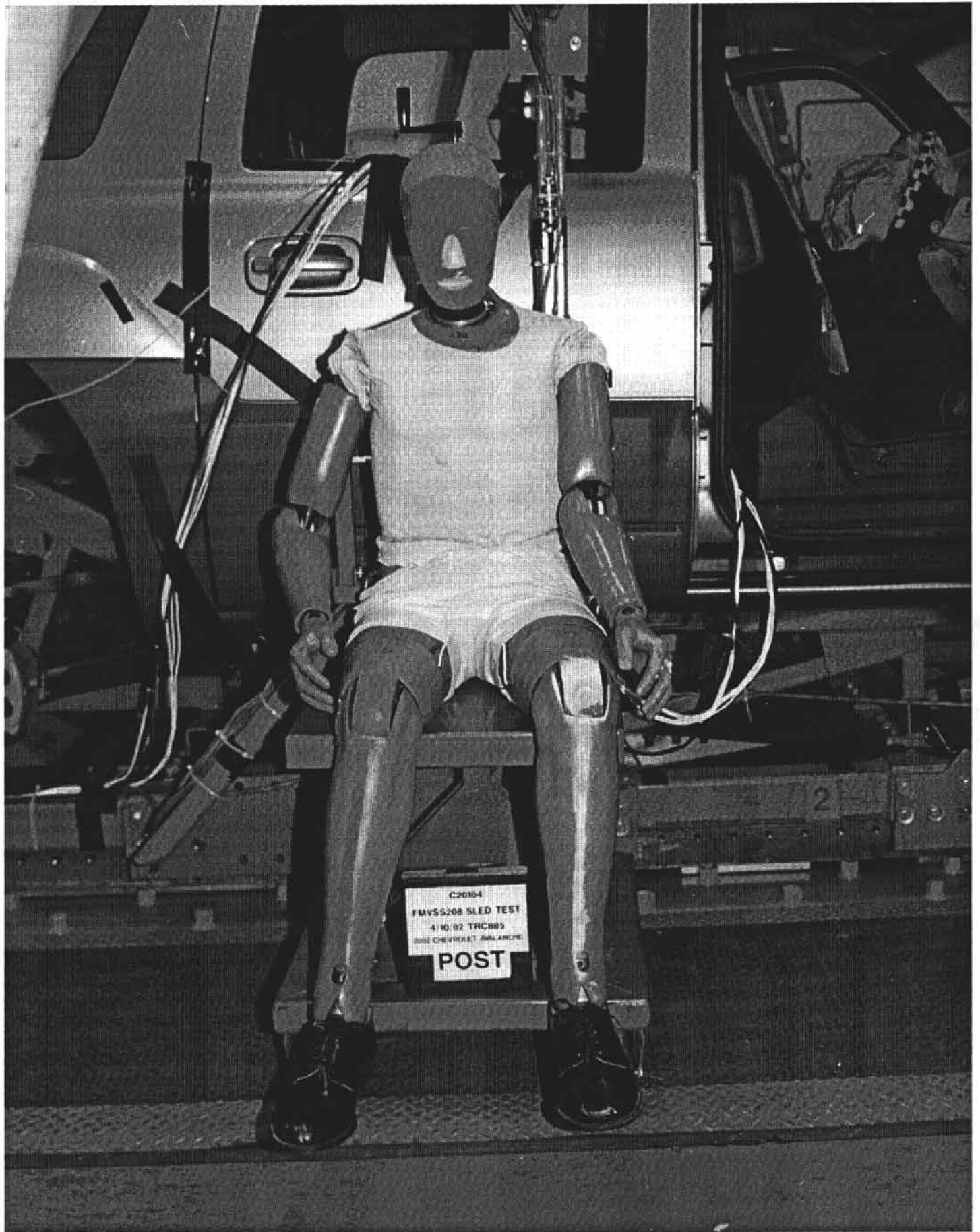


Figure A-25. Post-Test Passenger Dummy Removed from Vehicle Overall View

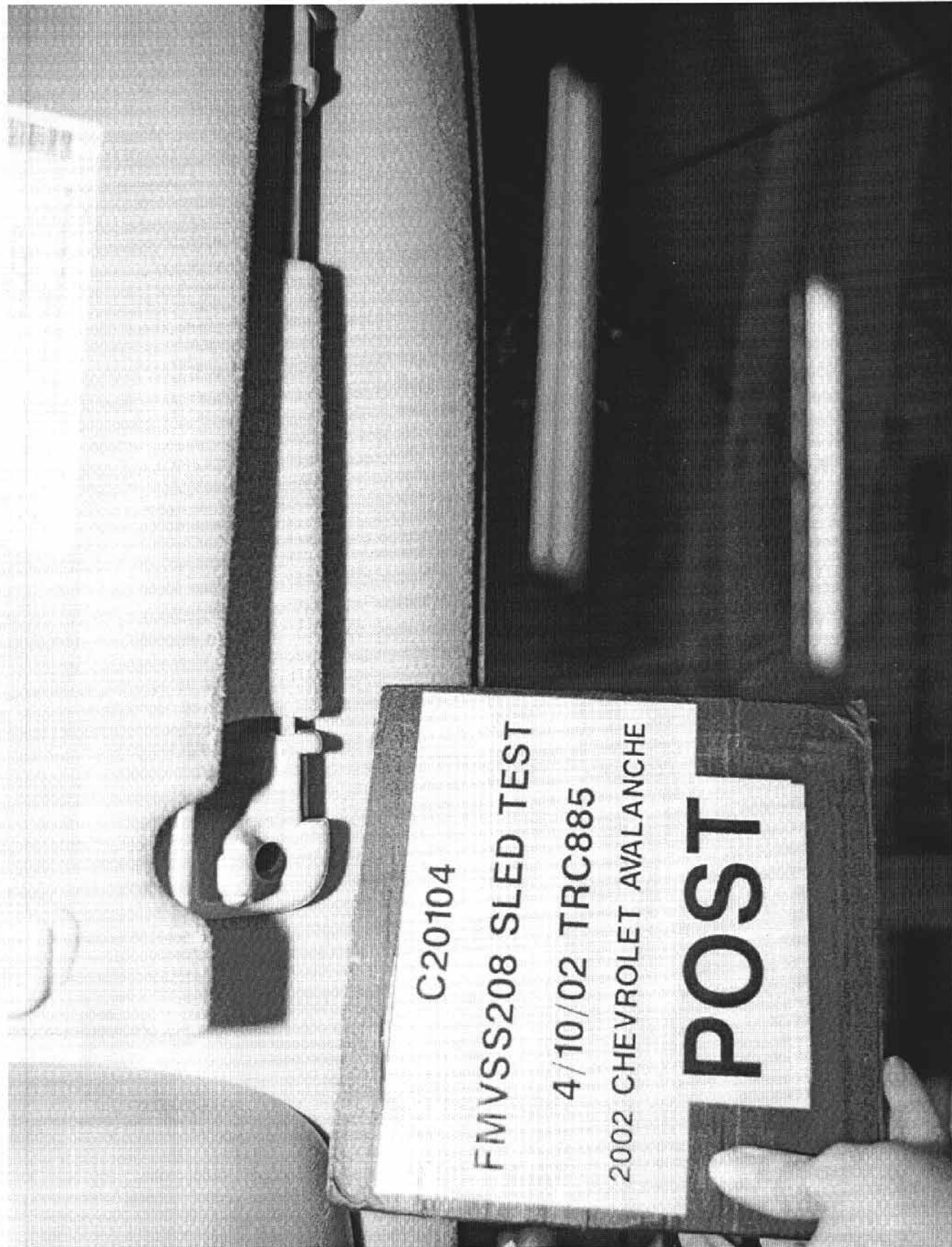


Figure A-26. Post-Test Passenger Head Contact View
A-27

S020410



Figure A-27. Pre-Test Driver Knee Bolster View
A-28

S020410

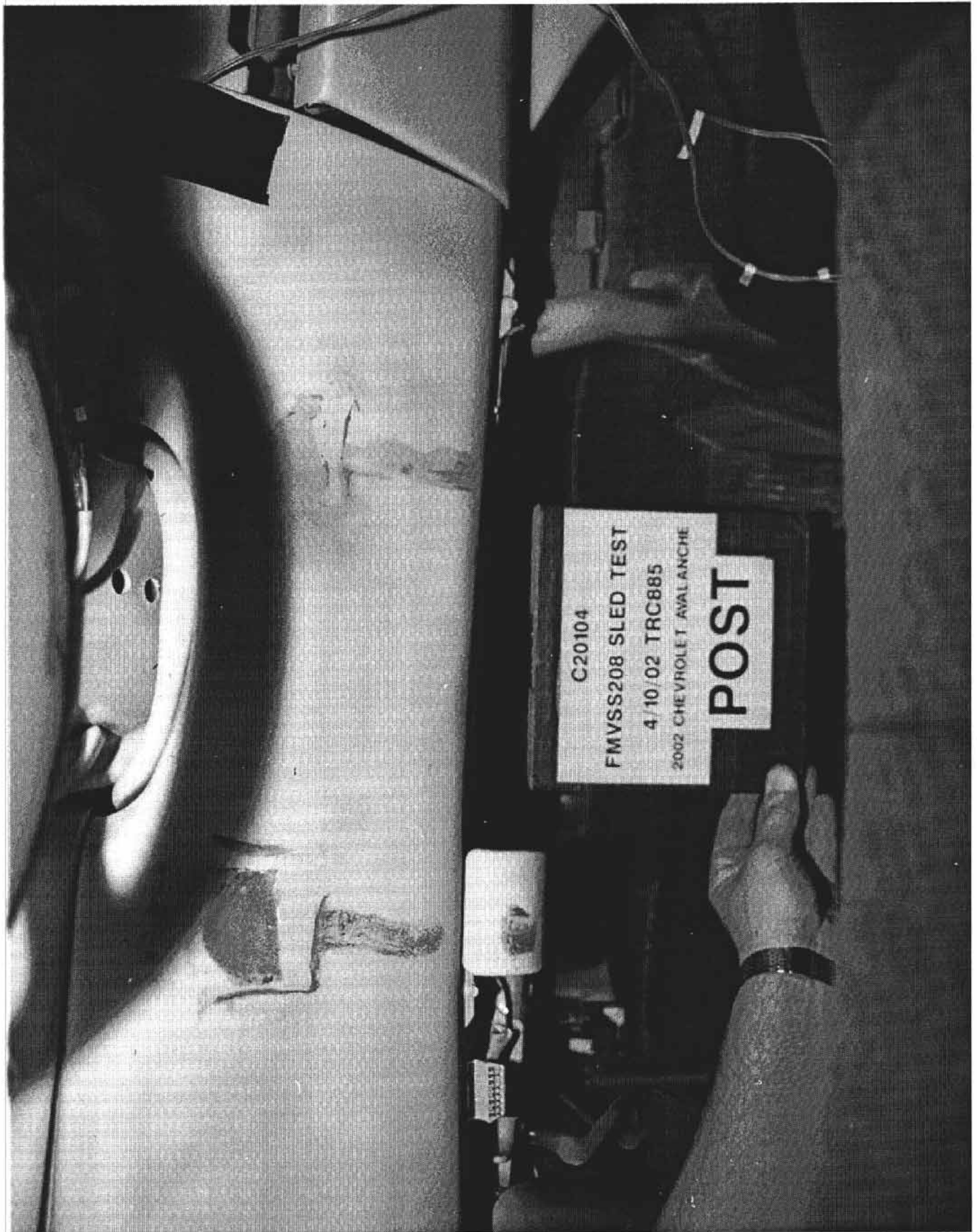


Figure A-28. Post-Test Driver Knee Bolster View
A-29

S020410



Figure A-29. Pre-Test Passenger Glove Box View
A-30

S020410



Figure A-30. Post-Test Passenger Glove Box View
A-31

S020410



Figure A-31. Pre-Test Steering Column Linkage in Engine Compartment View

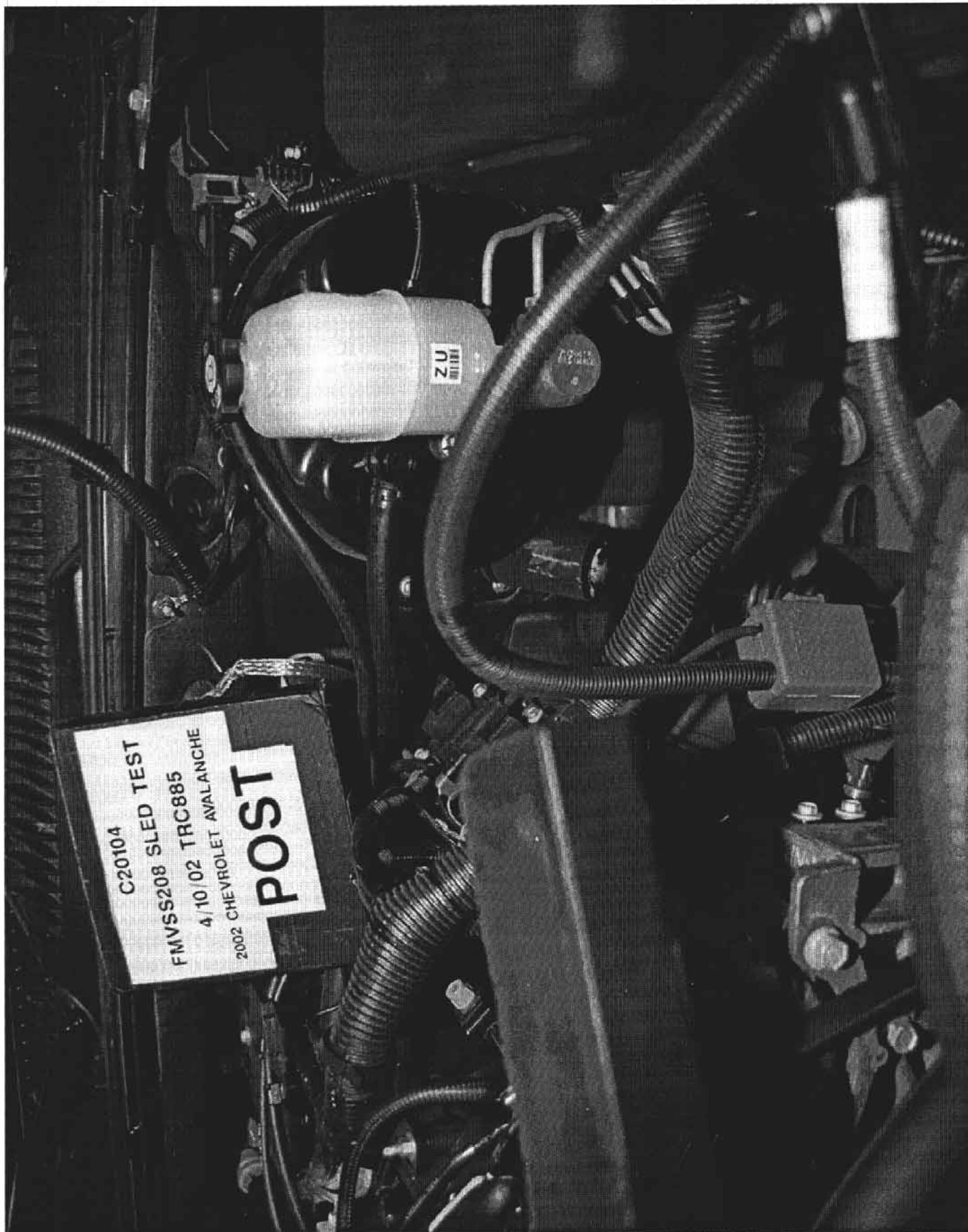


Figure A-32. Post-Test Steering Column Linkage in Engine Compartment View

C20104
4/10/02 TRC885

GM MFD BY GENERAL MOTORS DE MEXICO, S. DE R.L. DE C.V. 12/01
GVWR 3085KG(6800LB) GAWR FRT 1542KG(3400LB) GAWR RR 1814KG(4000LB)
THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR
VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF
MANUFACTURE SHOWN ABOVE.
3GNEC13T62G228146 TYPE: M.P.V.
MODEL: C15936
CPGT TIRE SIZE SPEED RTG RIM COLD TIRE PRESSURE
FRT P265/70R16 S 16X7J 240KPA(35PSI)
RR P265/70R16 S 16X7J 240KPA(35PSI)
SPA P265/70R16 S 16X7J 240KPA(35PSI)
SEE OWNER'S MANUAL  FOR MORE INFORMATION. F 176
T 327

Figure A-33. Post-Test Vehicle Certification and Tire Load Label View

Appendix B

Data Plots

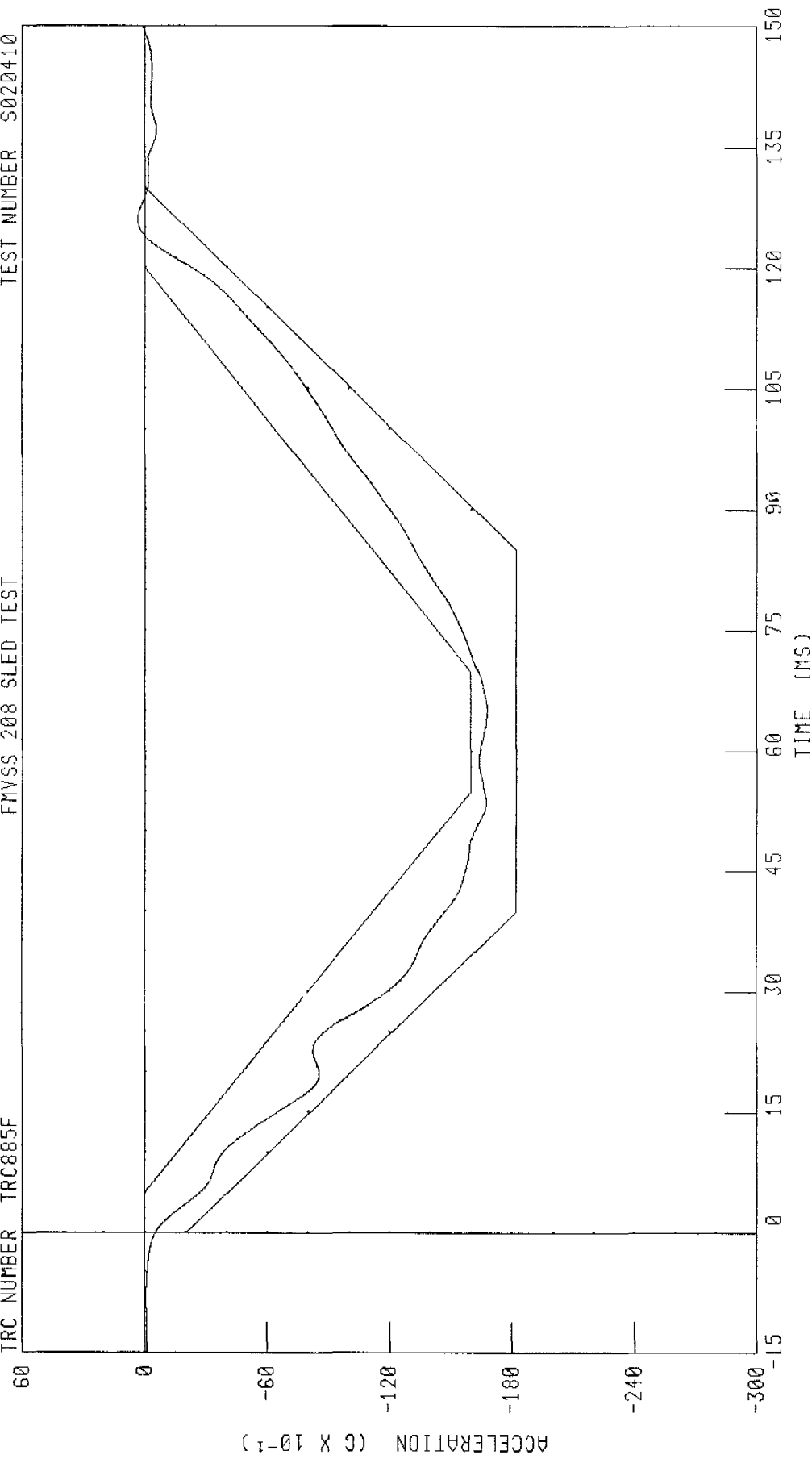
C20104 / 2002 CHEVROLET AVALANCHE 1500

SLED ACCELERATION

FMVSS 208 SLED TEST

TEST NUMBER S020410

TRC NUMBER TRC885F



CHANNEL SLDXC FILTER CH CLASS 60

PEAK DATA 0 37 G @ 126 08 MS, -16 30 G @ 65 12 MS

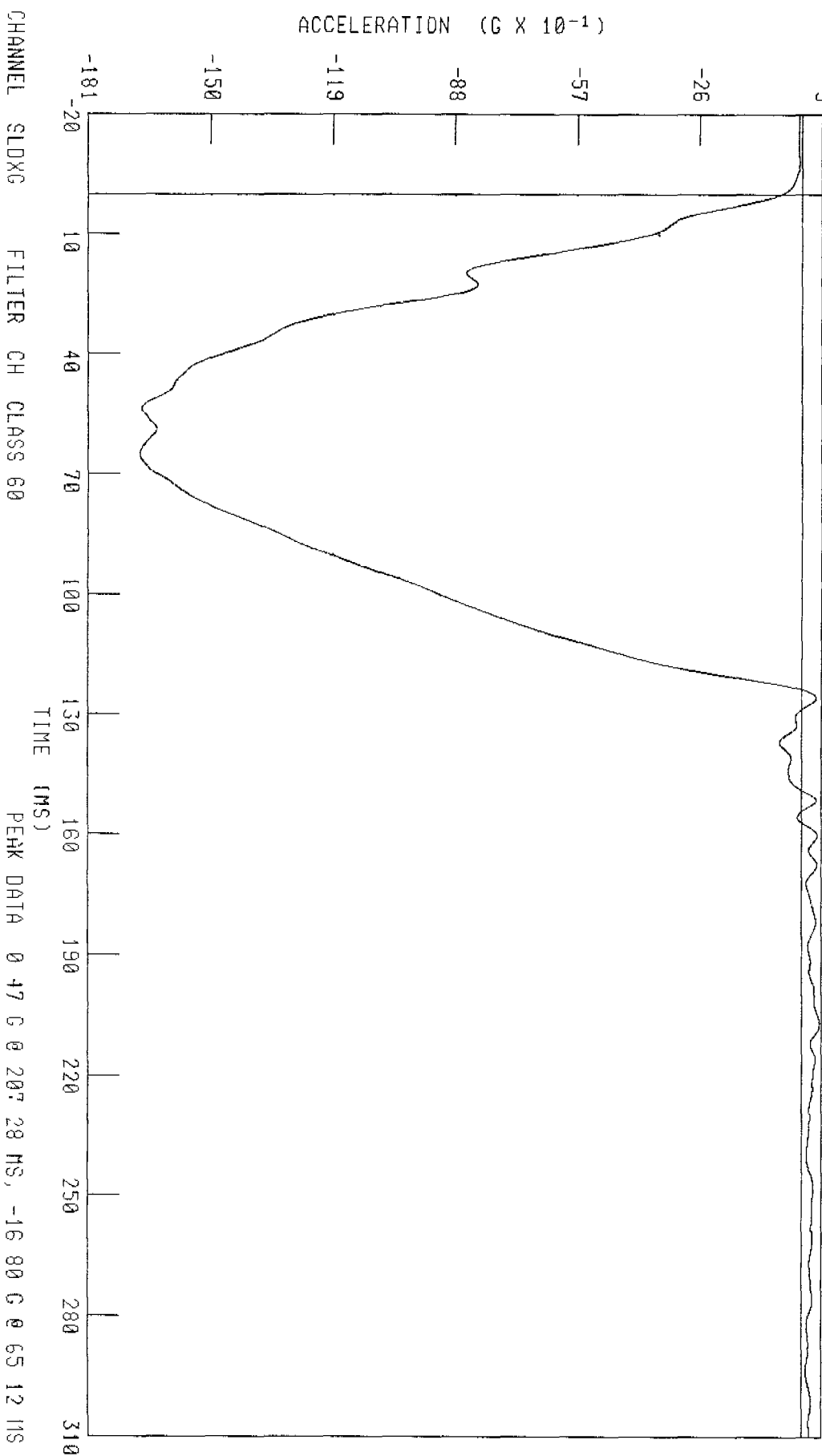
C20104 / 2002 CHEVROLET AVALANCHE 1500

SLED ACCELERATION

FMVSS 208 SLED TEST

TEST NUMBER S020410

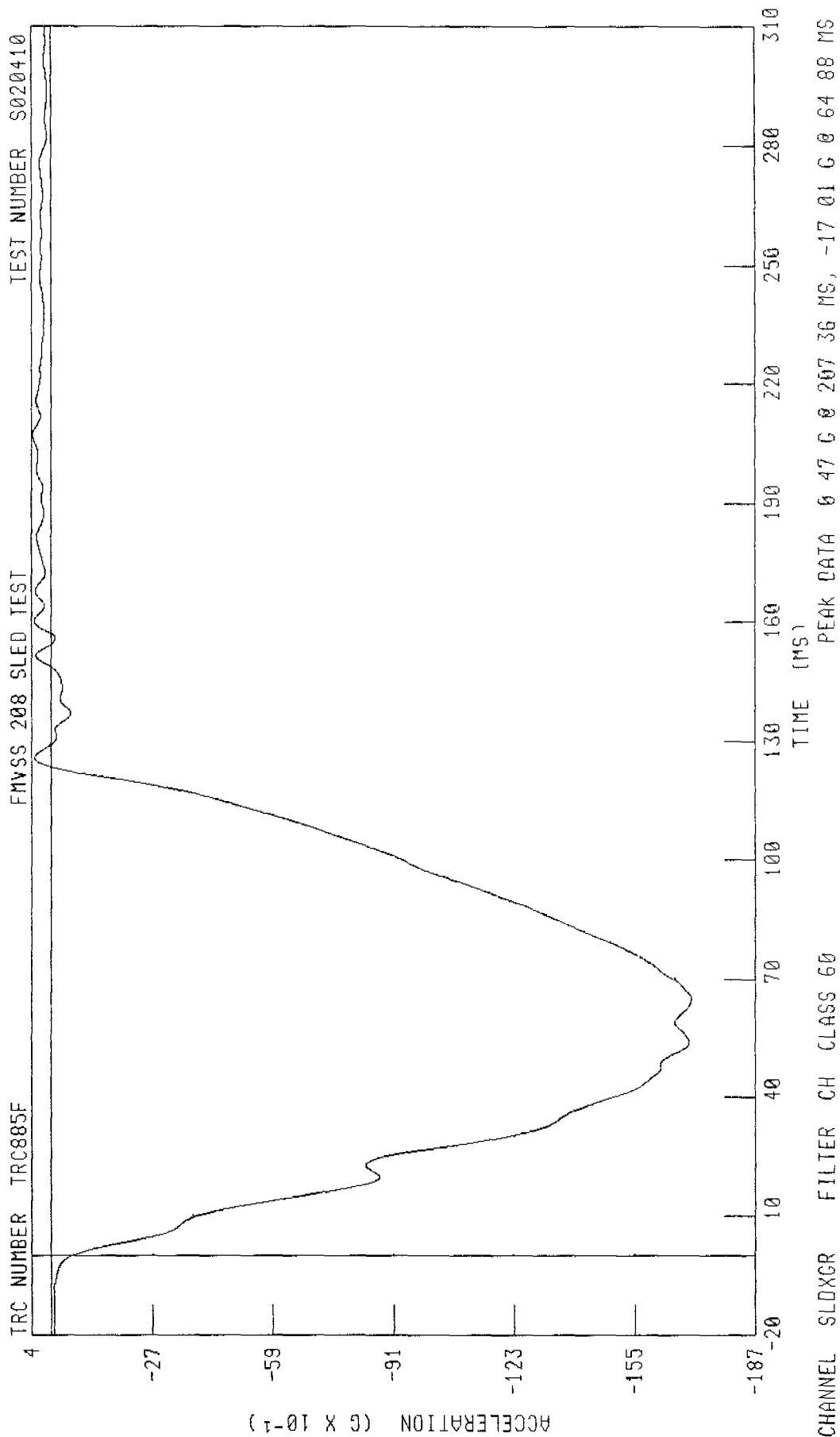
5 TRC NUMBER TPC885F



CHANNEL SLOXG FILTER CH CLASS 60

PEAK DATA 0 47 G 0 207 28 MS, -16 80 G 0 65 12 MS

C20104 / 2002 CHEVROLET AVALANCHE 1500
SLED ACCELERATION - BACKUP



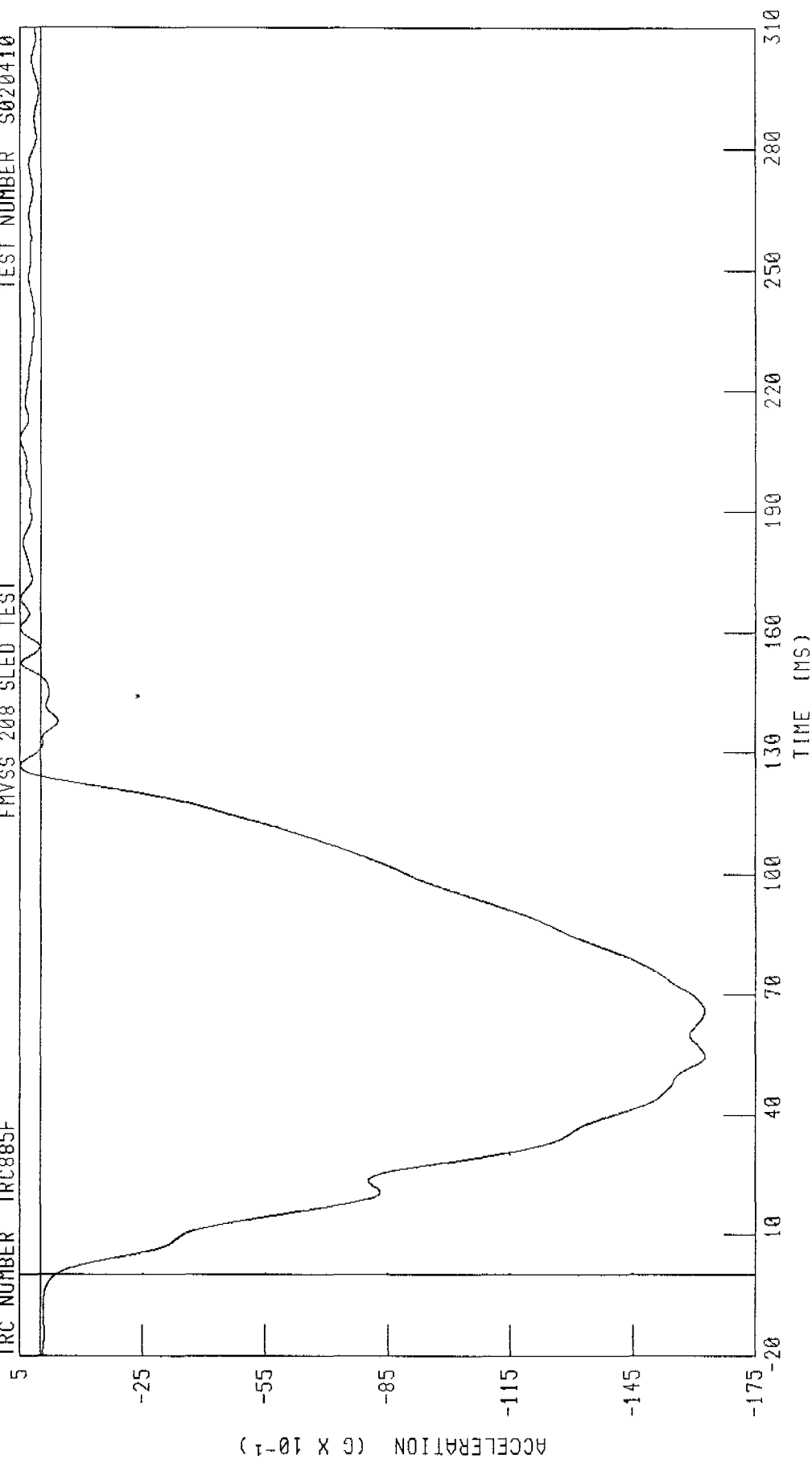
C20104 / 2002 CHEVROLET AVALANCHE 1500

SLED ACCELERATION FOR TIMING CIRCUIT

TRC NUMBER TRC805F

FMVSS 208 SLED TEST

TEST NUMBER S020410



CHANNEL SLDXGT FILTER CH CLASS 60

PEAK DATA 0 50 G @ 126 96 MS, -16 27 C @ 54 64 MS

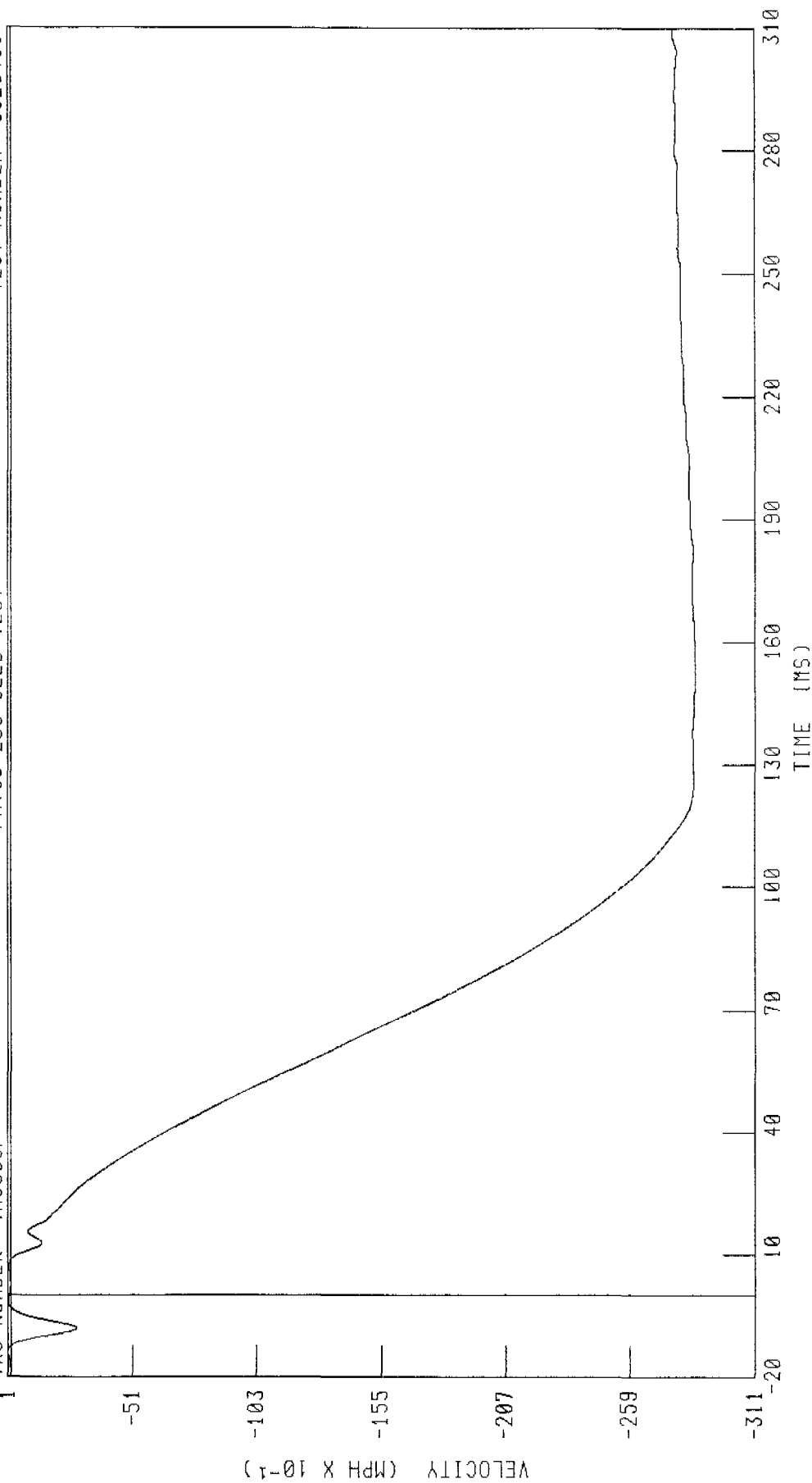
C20104 / 2002 CHEVROLET AVALANCHE 1500

MEASURED VELOCITY TRAP

TRC NUMBER TRC885F

FMVSS 208 SLED TEST

TEST NUMBER S020410



TIME (MS)

PEAK DATA 0 11 MPH @ -13 92 MS, -28 66 MPH @ 151 84 MS

CHANNEL SLOXY FILTER CH CLASS 60

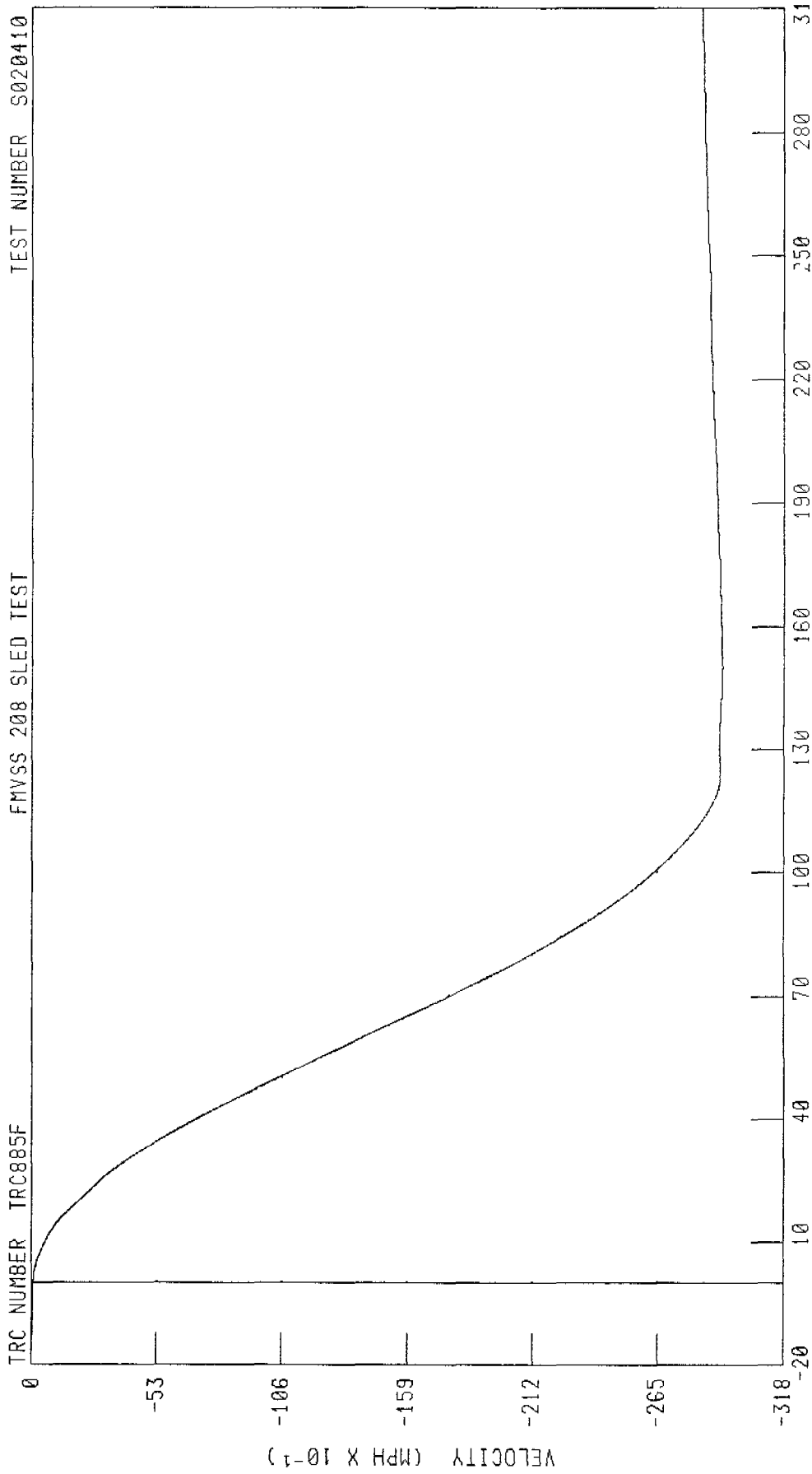
C20104 / 2002 CHEVROLET AVALANCHE 1500

SLED VELOCITY (INTEGRATED)

TEST NUMBER S020410

FMVSS 208 SLED TEST

TRC NUMBER TRC885F

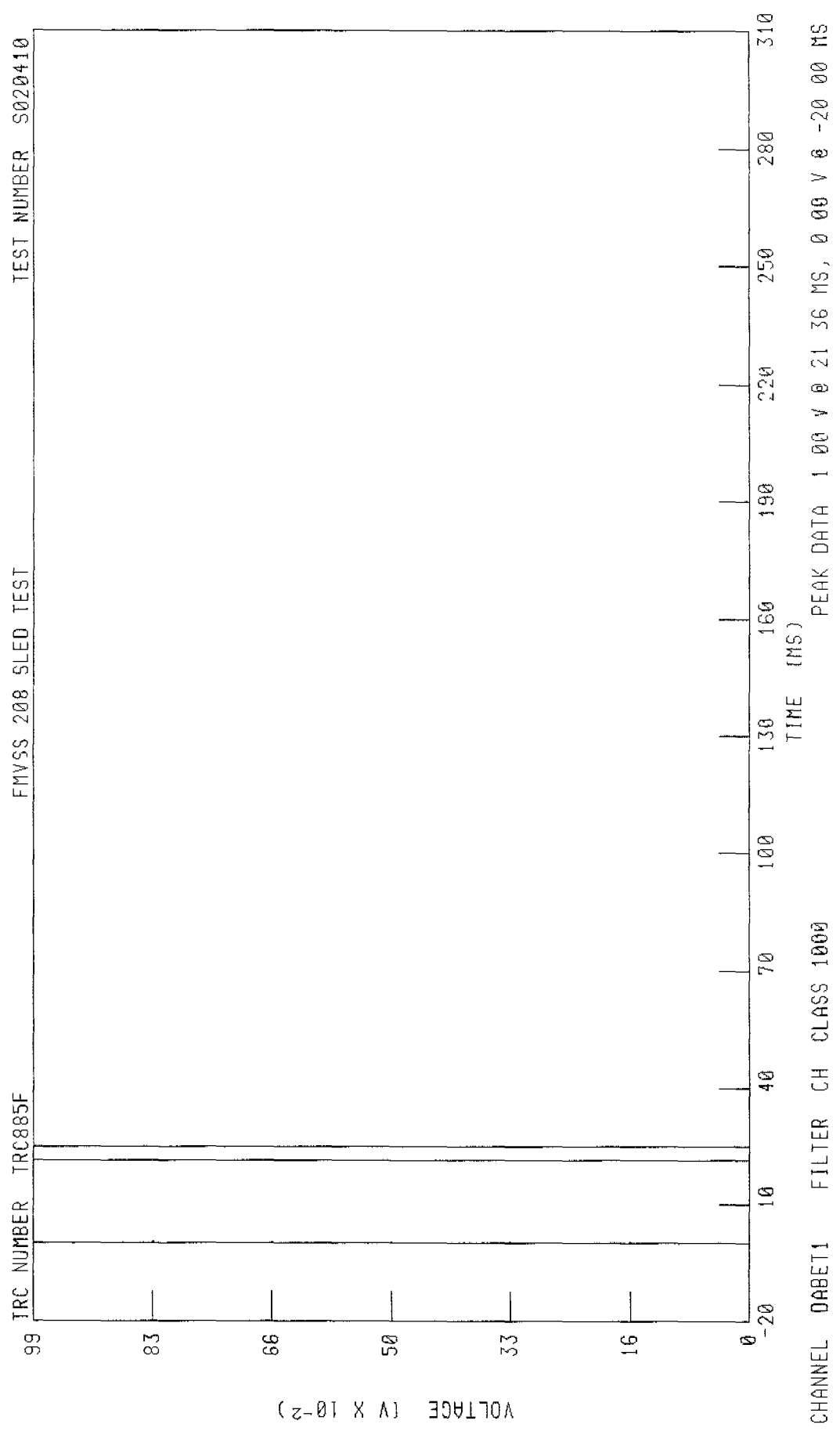


TIME (MS)

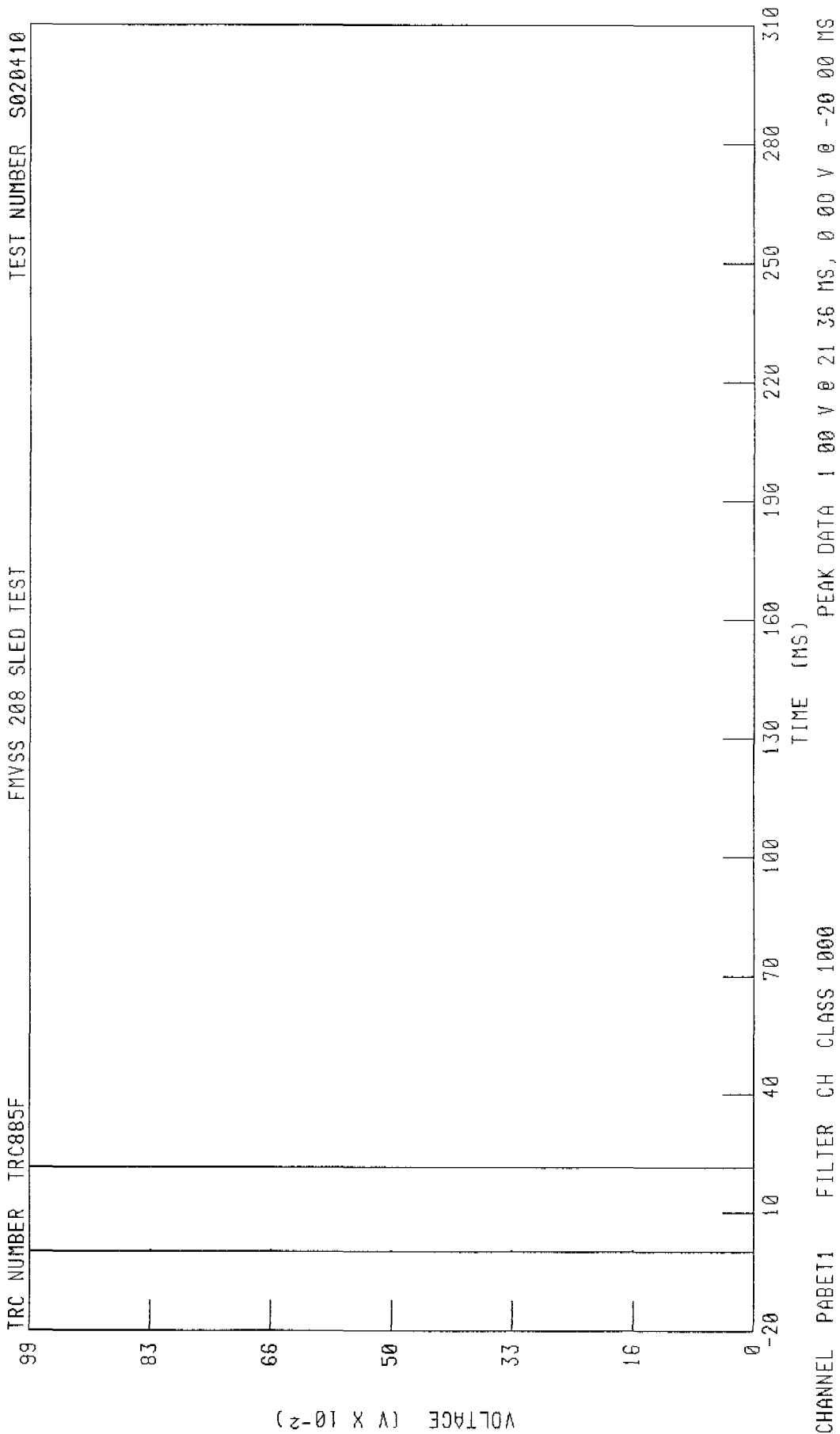
PEAK DATA 0 00 MPH @ -20 00 MS, -29 23 MPH @ 150 24 MS

CHANNEL SLOXVI FILTER CH CLASS 180

C20104 / 2002 CHEVROLET AVALANCHE 1500
 DRIVER PRIMARY AIRBAG EVENT



C20104 / 2002 CHEVROLET AVALANCHE 1500
PASSENGER PRIMARY AIRBAG EVENT



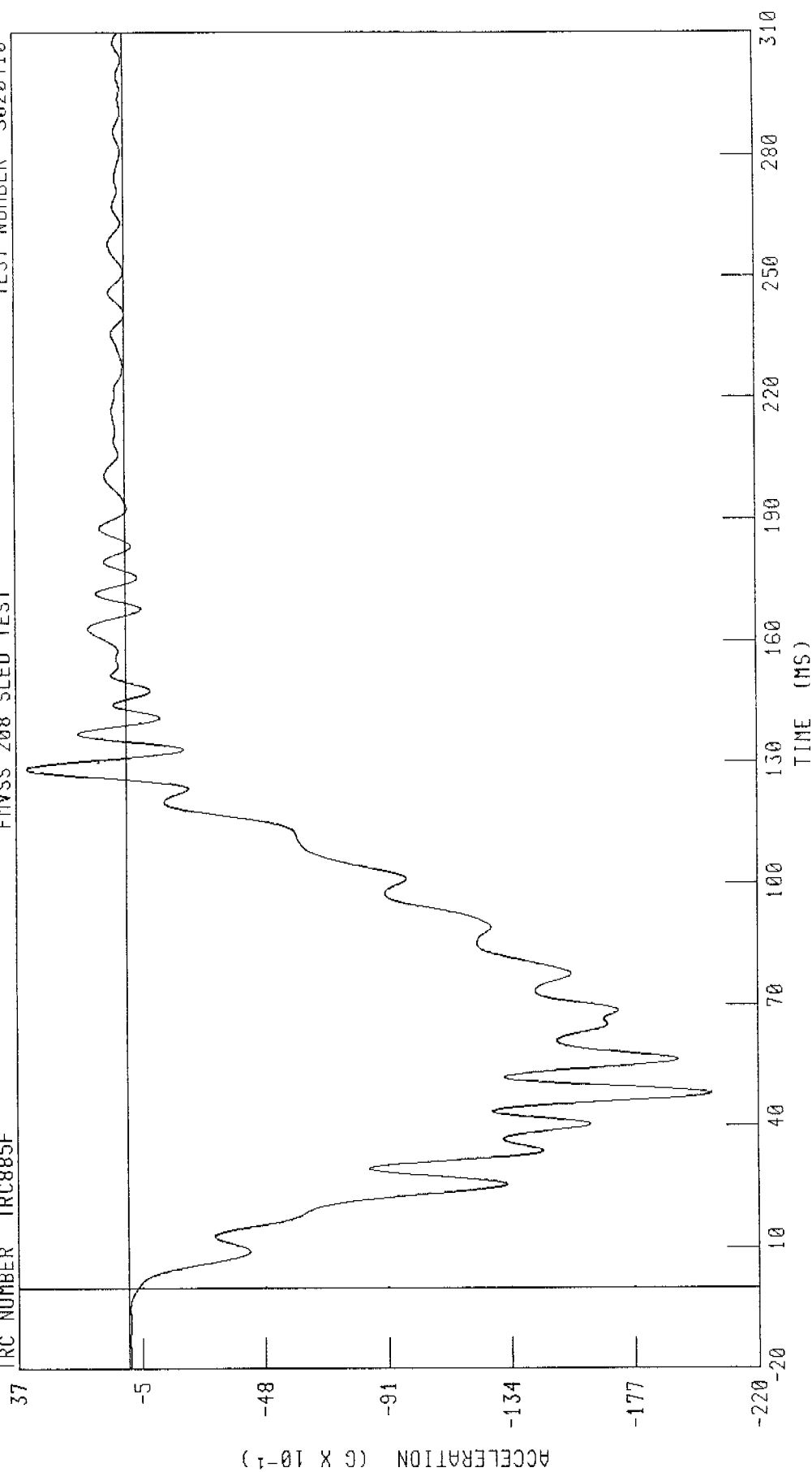
C20104 / 2002 CHEVROLET AVALANCHE 1500

REAR AXLE X-AXIS ACCELERATION

FMVSS 208 SLED TEST

TEST NUMBER S020410

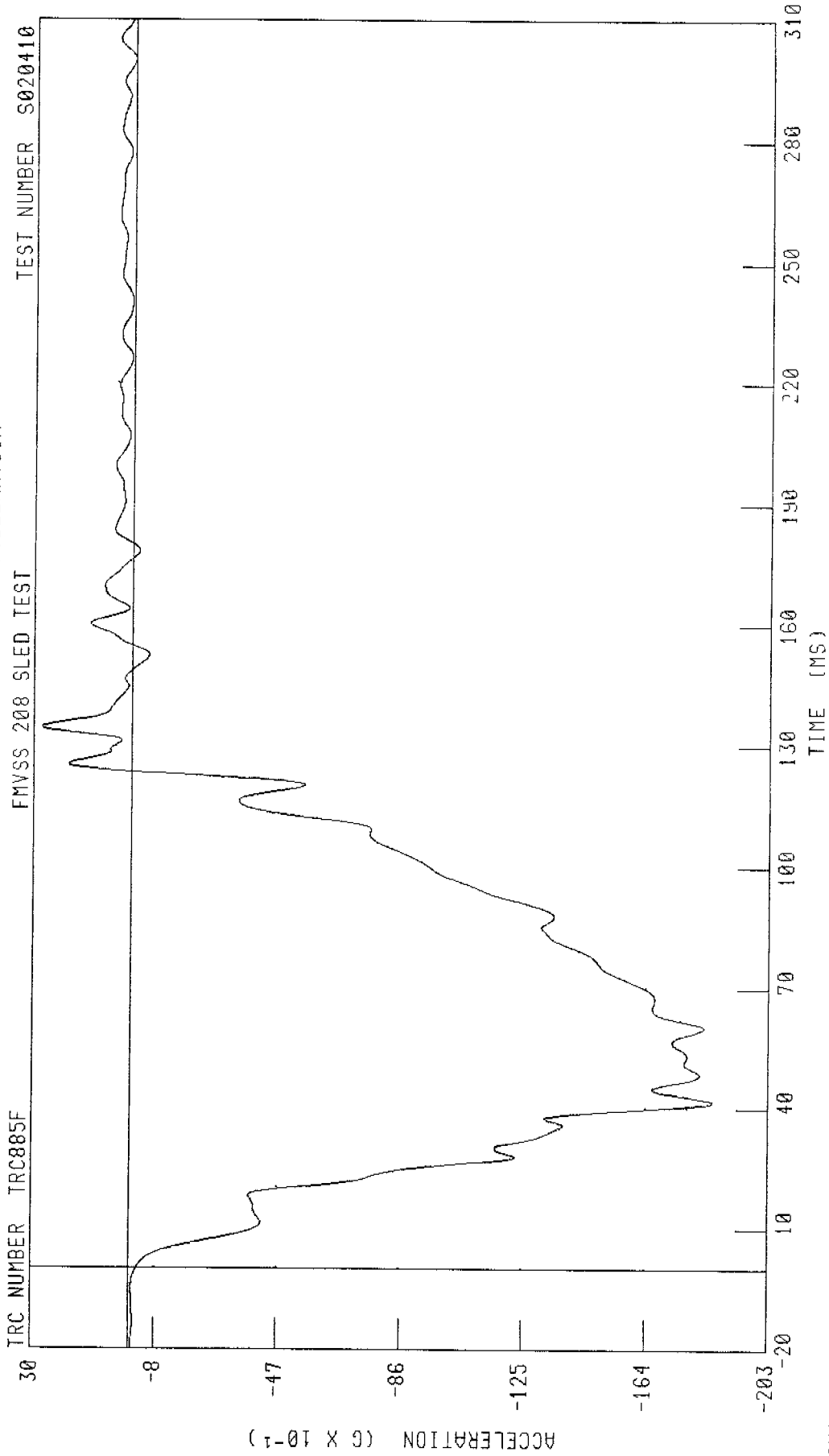
TRC NUMBER TRC885F



PEAK DATA 3 46 G @ 128 64 MS, -20 39 G @ 47 84 MS

CHANNEL RAXG FILTER CH CLASS 60

C20104 / 2002 CHEVROLET AVALANCHE 1500
LEFT BODY AT REAR SEAT X-AXIS ACCELERATION



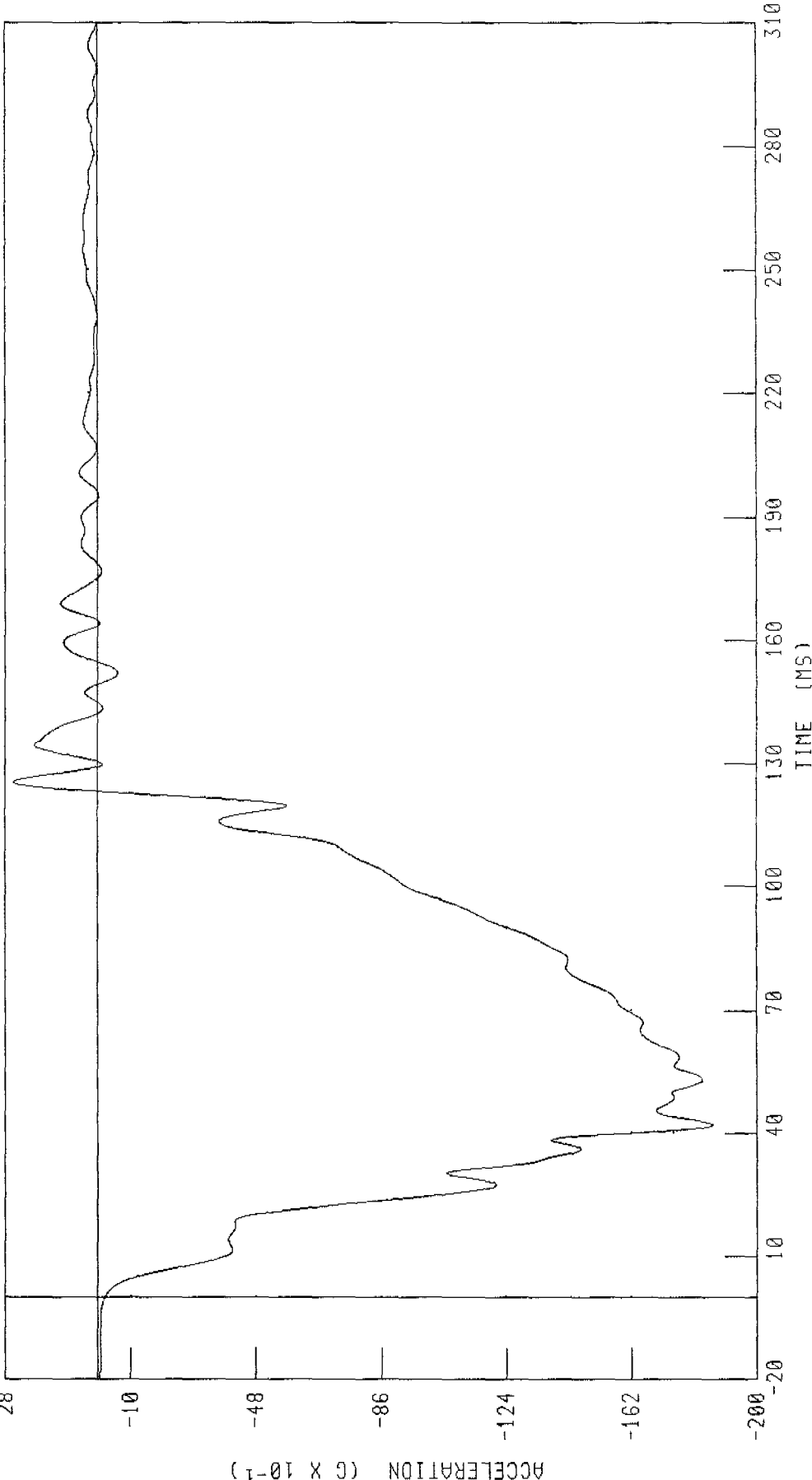
CHANNEL LSXXG FILTER CH CLASS 60
PEAK 04TA 2 86 G @ 134 72 MS, -18 53 G @ 41 68 MS

C20104 / 2002 CHEVROLET AVALANCHE 1500
RIGHT BODY AT REAR SEAT X-AXIS ACCELERATION

TEST NUMBER S020410

TRC NUMBER TRC885F

FMVSS 208 SLED TEST



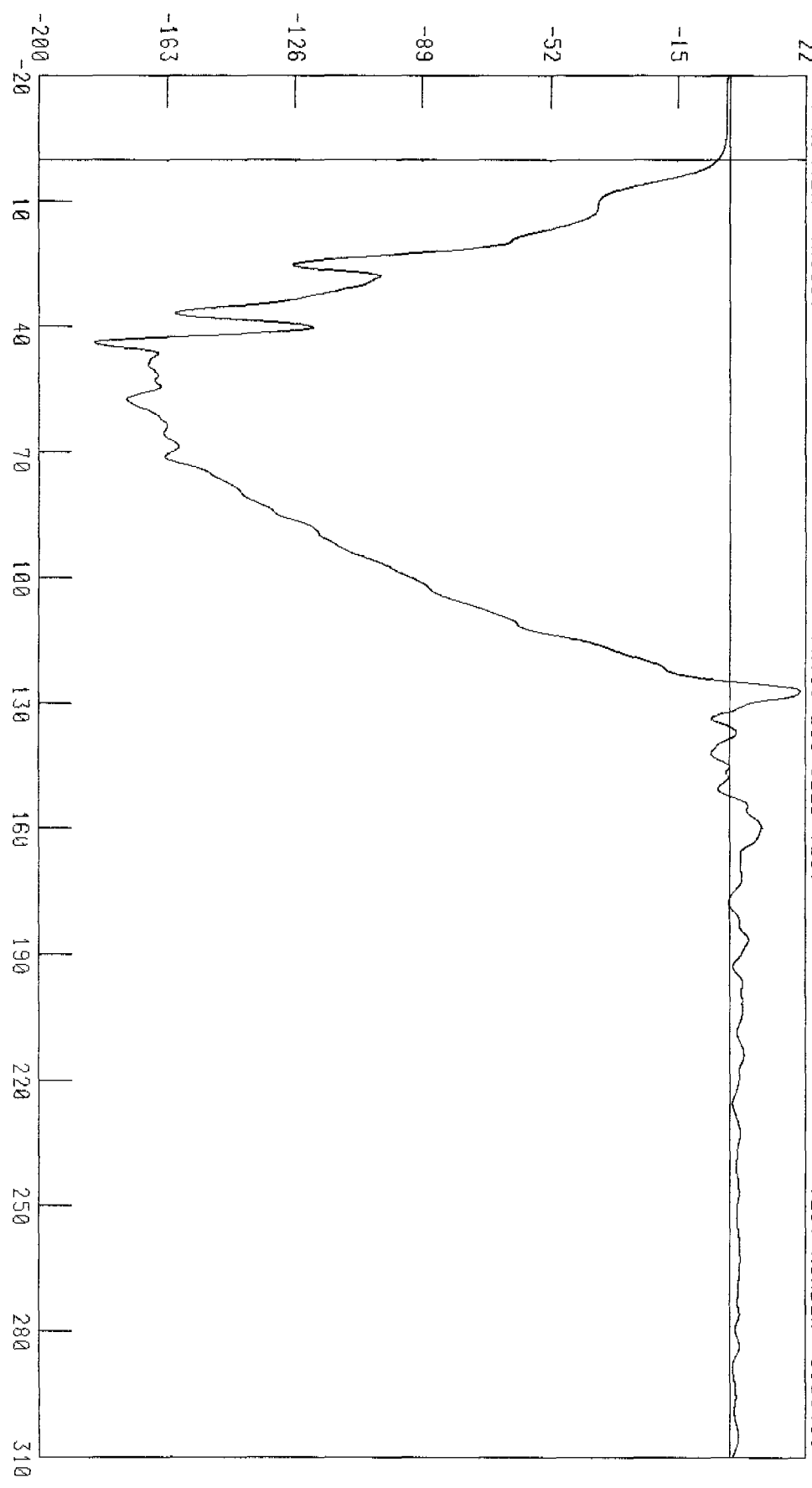
CHANNEL RSXXC FILTER CH (CLASS 60) PEAK DATA 2 56 C @ 125 68 MS, -18 68 G @ 42 00 MS

22 TRC NUMBER TRC85F

C20104 / 2002 CHEVROLET AVALANCHE 1500
LEFT VEHICLE FRAME X-AXIS ACCELERATION
FMVSS 208 SLED TEST

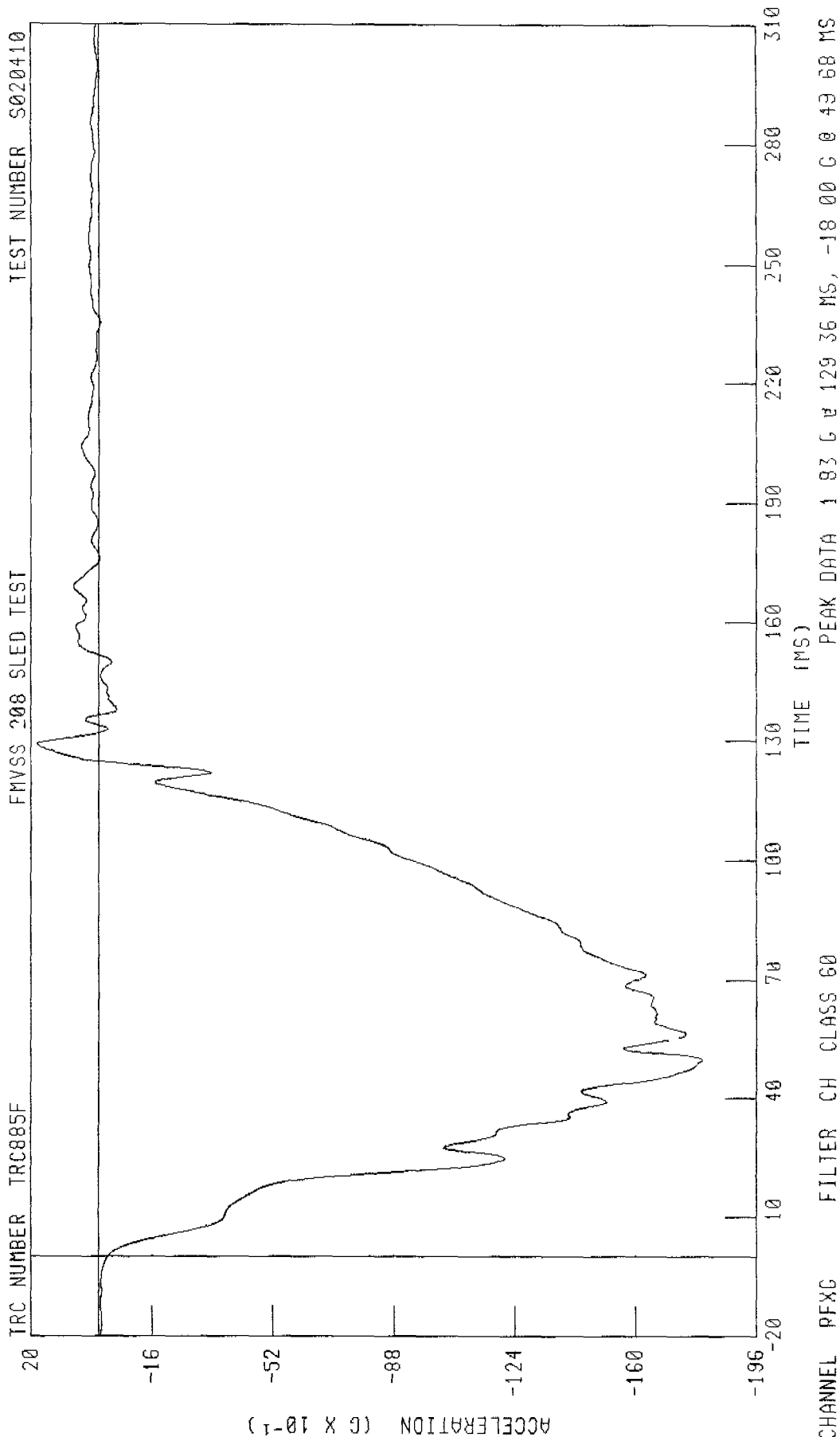
TEST NUMBER S020410

ACCELERATION (G X 10⁻¹)



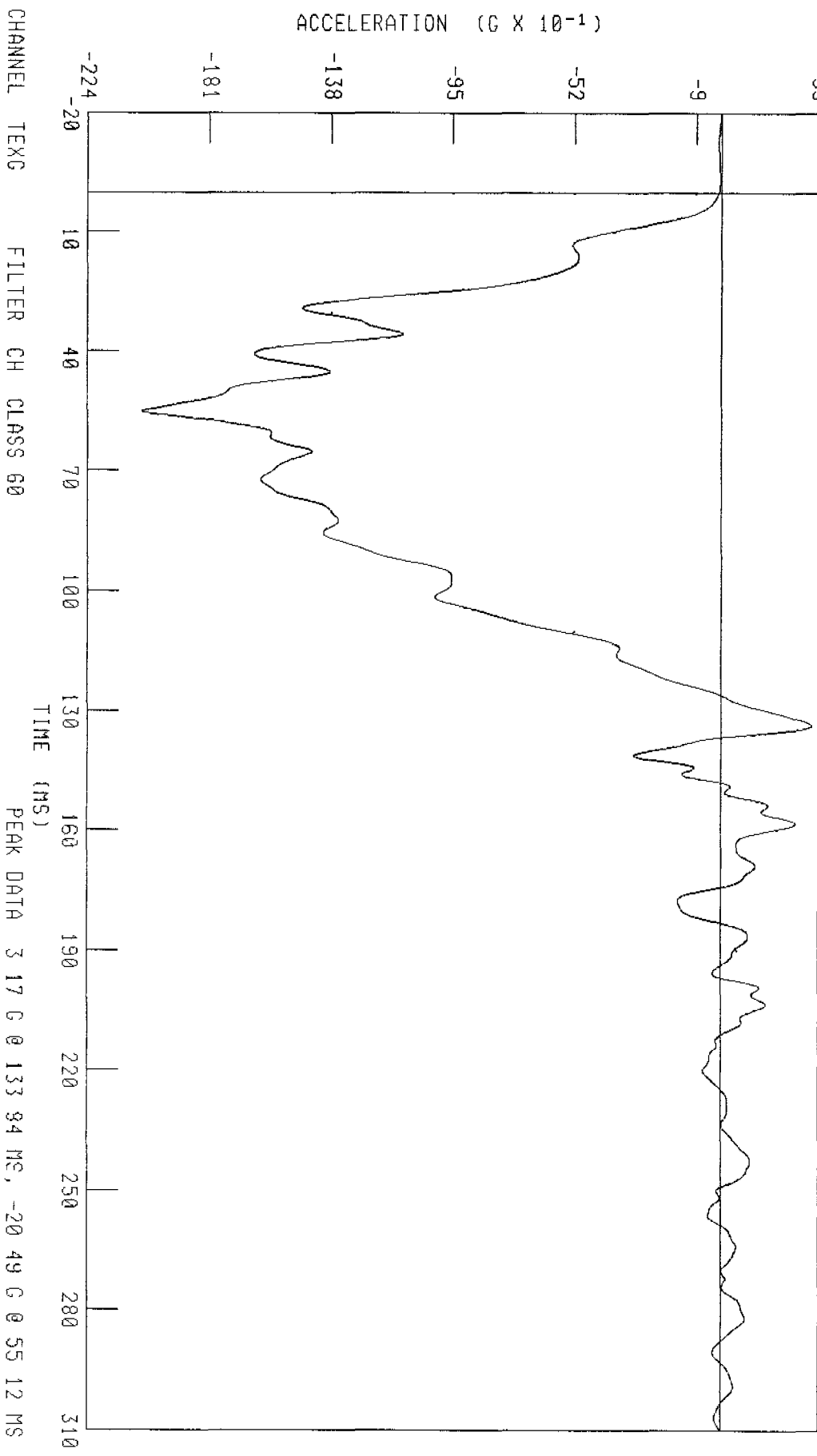
CHANNEL LFXG FILTER CH CLASS 60 TIME (MS) PEAK DATA 2 05 G 0 127 44 MS, -18 41 G 0 43 92 MS

C20104 / 2002 CHEVROLET AVALANCHE 1500
 RIGHT VEHICLE FRAME X-AXIS ACCELERATION



C20104 / 2002 CHEVROLET AVALANCHE 1500
TOP ENGINE X-AXIS ACCELERATION
FMVSS 208 SLED TEST

33 TRC NUMBER TRC885F TEST NUMBER S020410



CHANNEL TEXTG FILTER CH CLASS 60

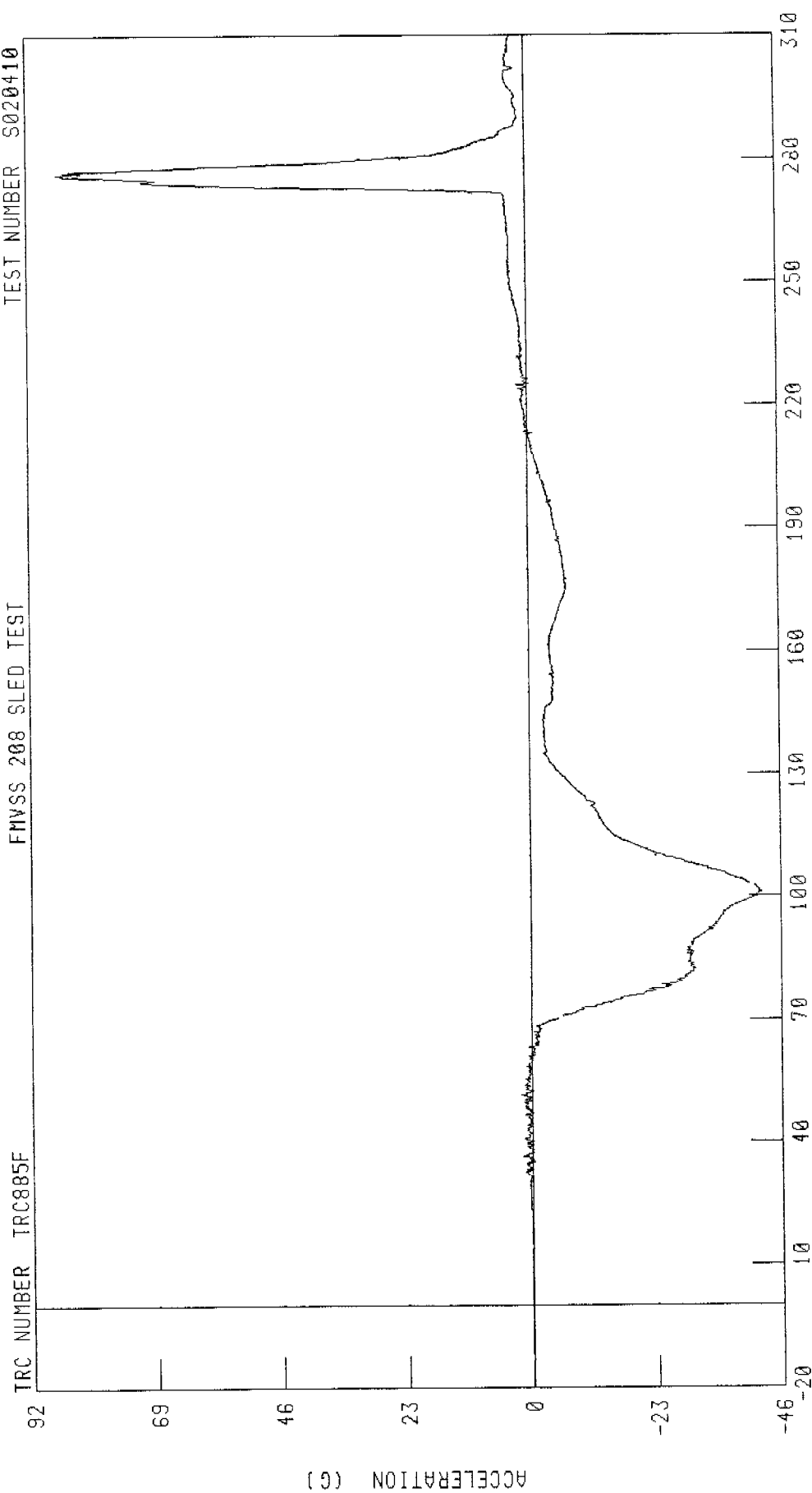
C20104 / 2002 CHEVROLET AVALANCHE 1500

DRIVER HEAD X-AXIS ACCELERATION

FMVSS 208 SLED TEST

TEST NUMBER S020410

TRC NUMBER TRC885F



TIME (MS)

PEAK DATA 86 34 G @ 276 64 MS, -42 54 G @ 101 04 MS

CHANNEL HEDXC1 FILTER CH CLASS 1000

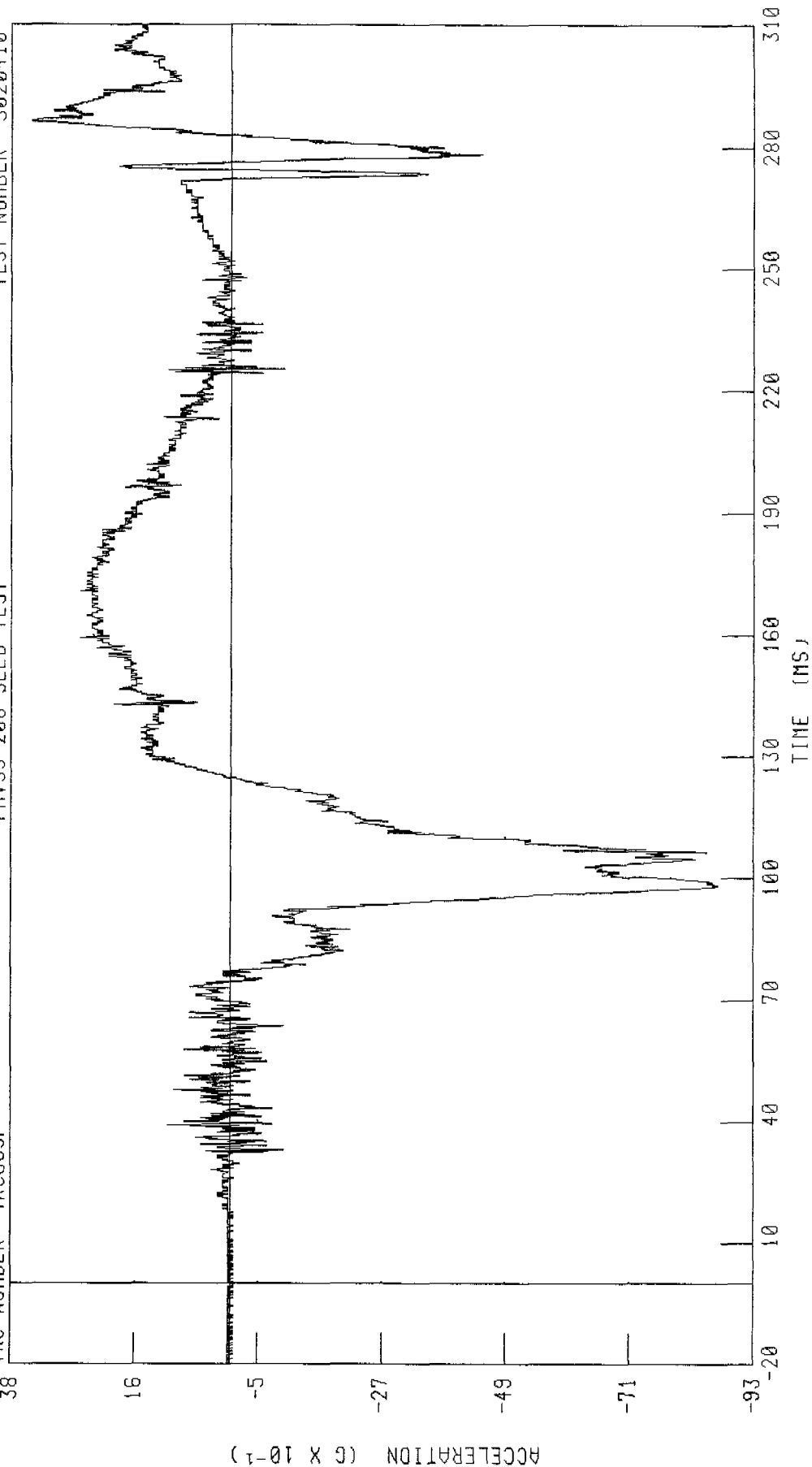
C20104 / 2002 CHEVROLET AVALANCHE 1500

DRIVER HEAD Y-AXIS ACCELERATION

TRC NUMBER TRC885F

FMVSS 208 SLED TEST

TEST NUMBER S020410



CHANNEL HEDYG1 FILTER CH CLASS 1000

PEAK DATA 3 55 C @ 286 40 MS, -8 67 C @ 98 00 MS

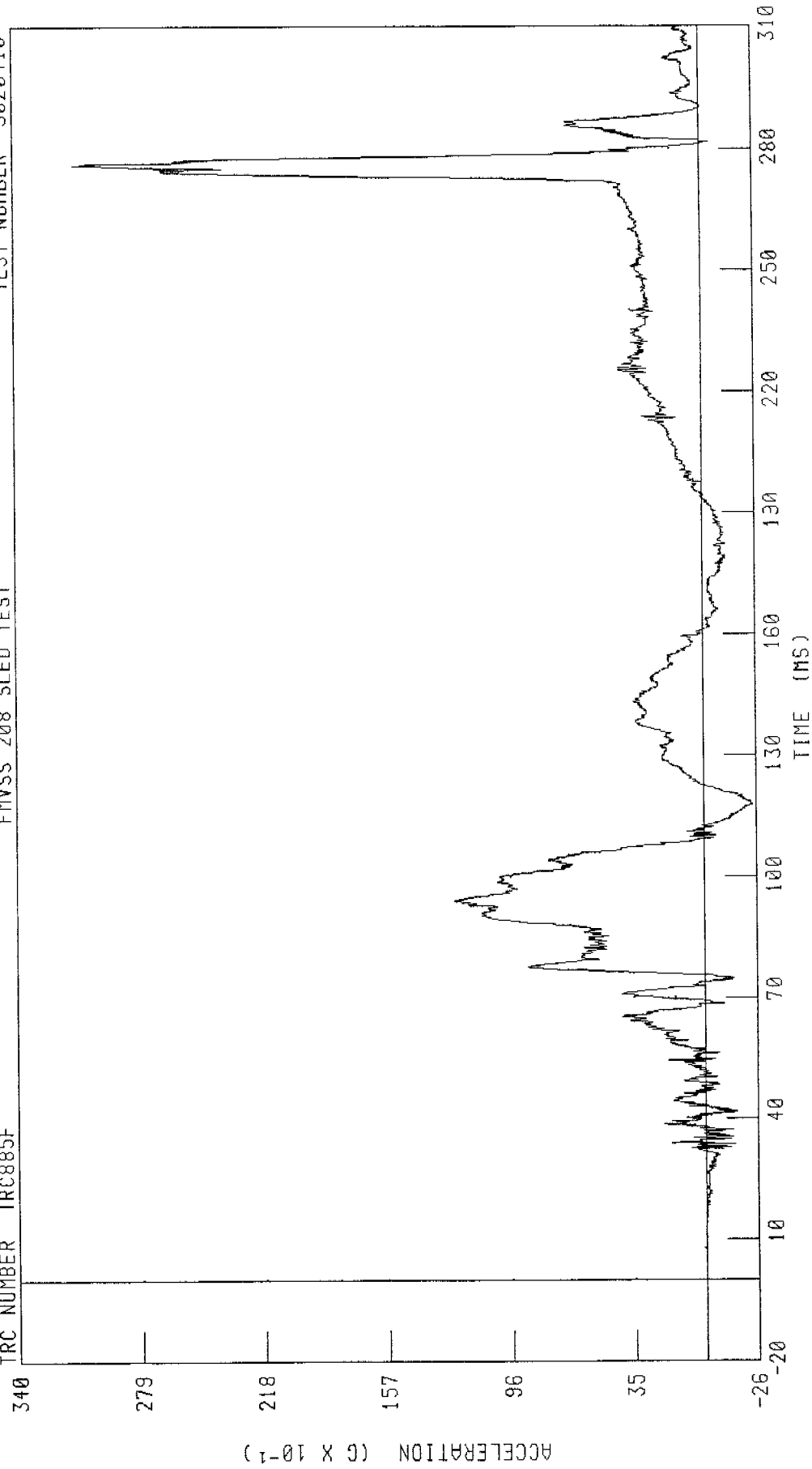
C20104 / 2002 CHEVROLET AVALANCHE 1500

DRIVER HEAD Z-AXIS ACCELERATION

FMVSS 208 SLED TEST

TEST NUMBER S020410

TRC NUMBER TRC885F



PEAK DATA 31 01 G 0 276 16 MS, -2 44 G 0 117 92 MS

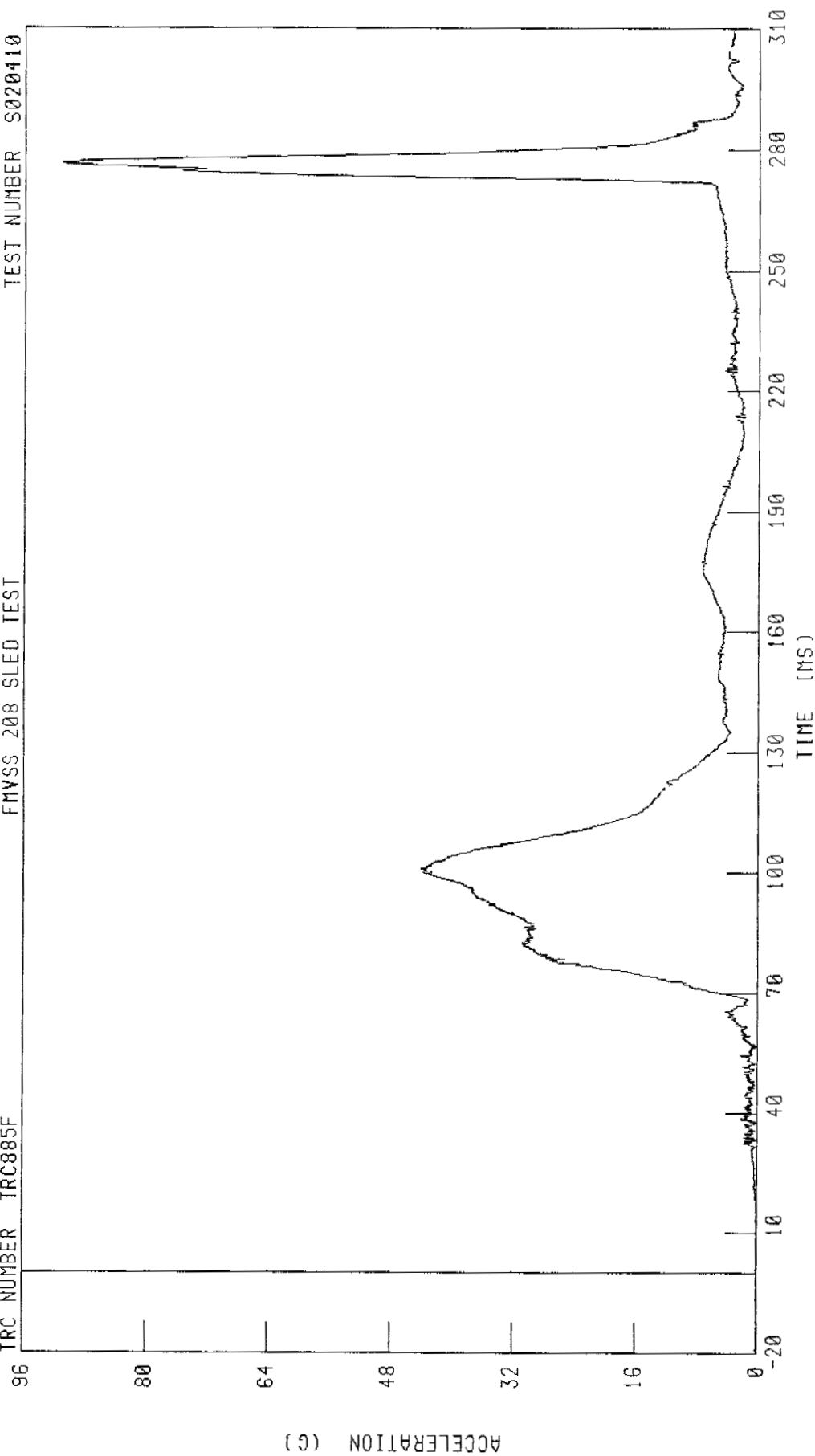
CHANNEL HEDZG1 FILTER CH CLASS 1000

C20104 / 2002 CHEVROLET AVALANCHE 1500
DRIVER HEAD RESULTANT ACCELERATION

TRC NUMBER TRC885F

FMVSS 208 SLED TEST

TEST NUMBER S020410



CHANNEL HEORG1 FILTER CH CLASS 1000

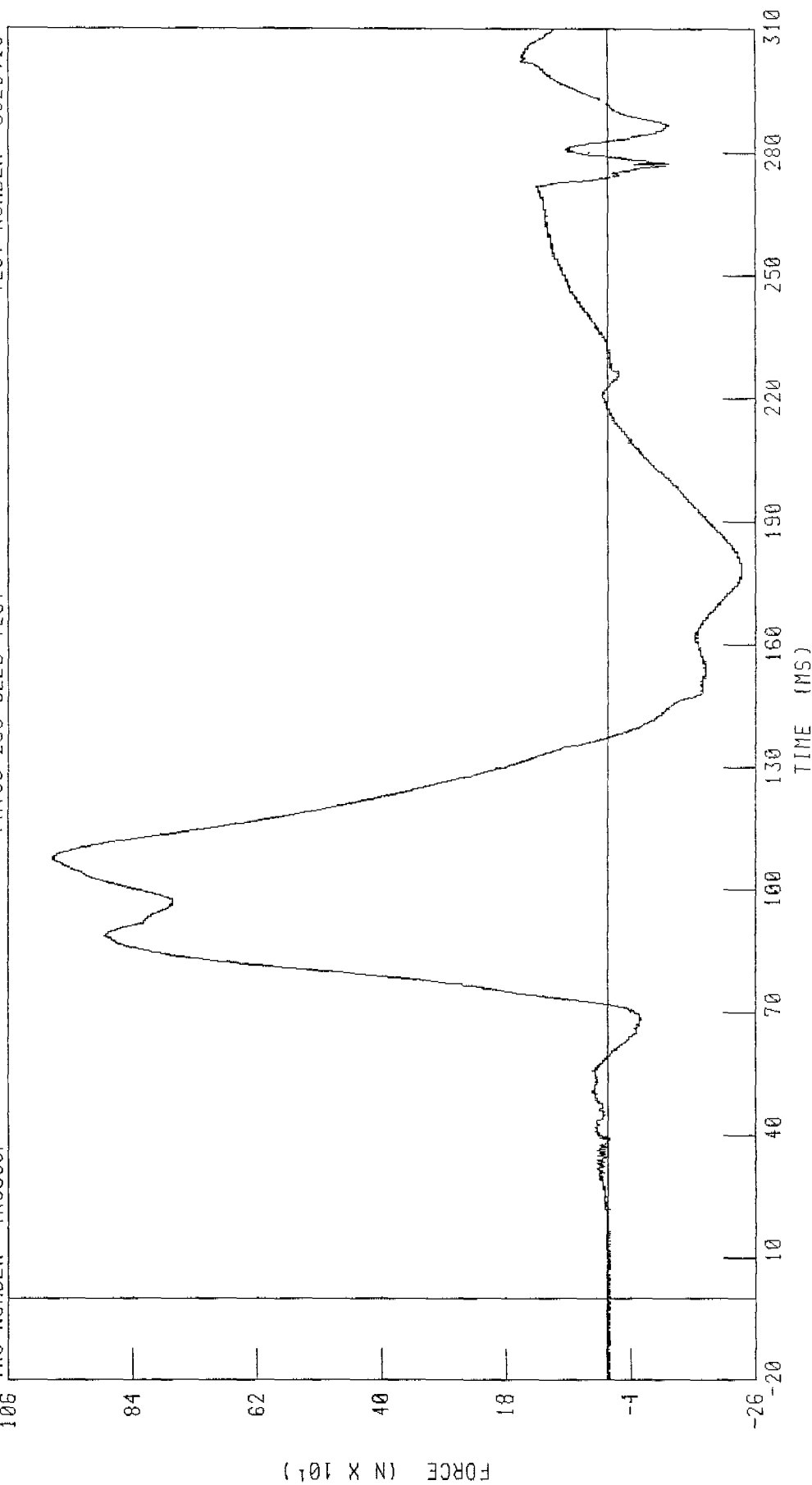
PEAK DATA 91 13 G @ 276 64 MS, 0 03 G @ -14 72 MS

C20104 / 2002 CHEVROLET AVALANCHE 1500
DRIVER NECK X-AXIS SHEAR FORCE

TRC NUMBER TRC885F

TEST NUMBER S020410

FMVSS 208 SLED TEST

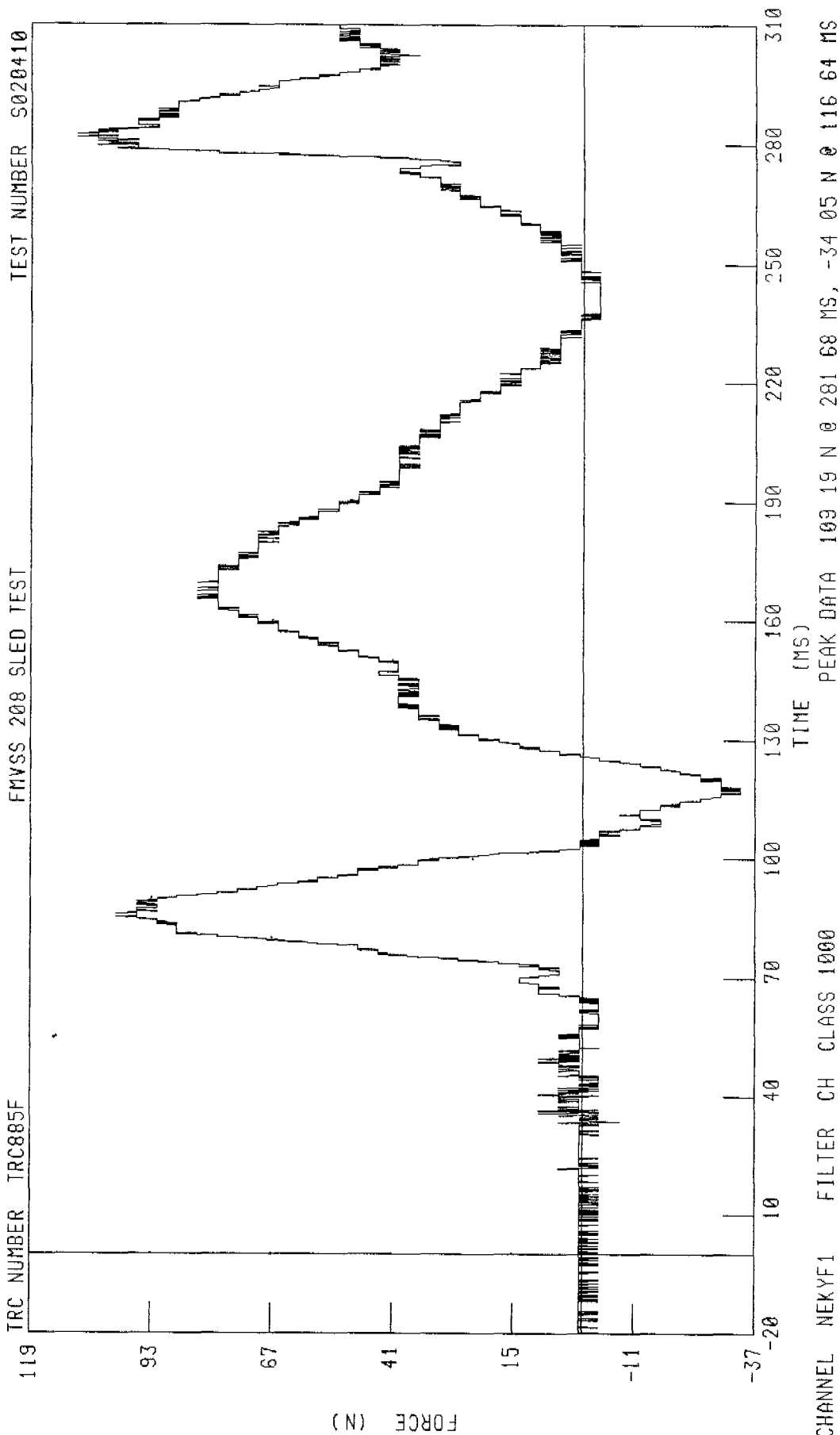


TIME (MS)

PEAK DATA 982 98 N @ 107 44 MS, -236 87 N @ 176 40 MS

CHANNEL NEKXF1 FILTER CH CLASS 1000

C20104 / 2002 CHEVROLET AVALANCHE 1500
 DRIVER NECK Y-AXIS SHEAR FORCE



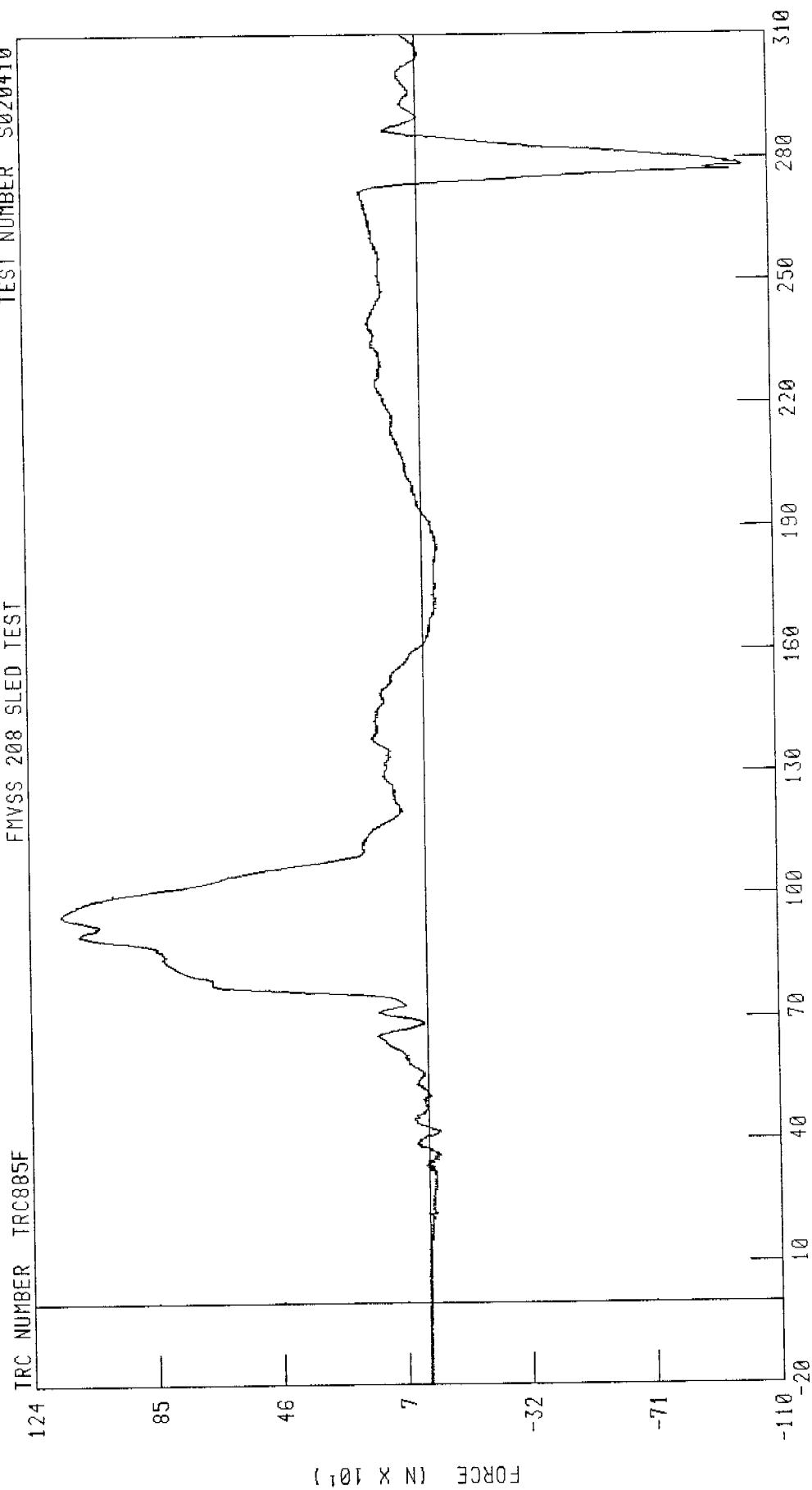
C20104 / 2002 CHEVROLET AVALANCHE 1500

DRIVER NECK Z-AXIS AXIAL FORCE

FMVSS 208 SLED TEST

TEST NUMBER S020410

TRC NUMBER TRC885F



TIME (MS)

PEAK DATA 1141 46 N @ 95 12 MS, -1021 34 N @ 278 09 MS

CHANNEL HEKZF1 FILTER CH CLASS 1000

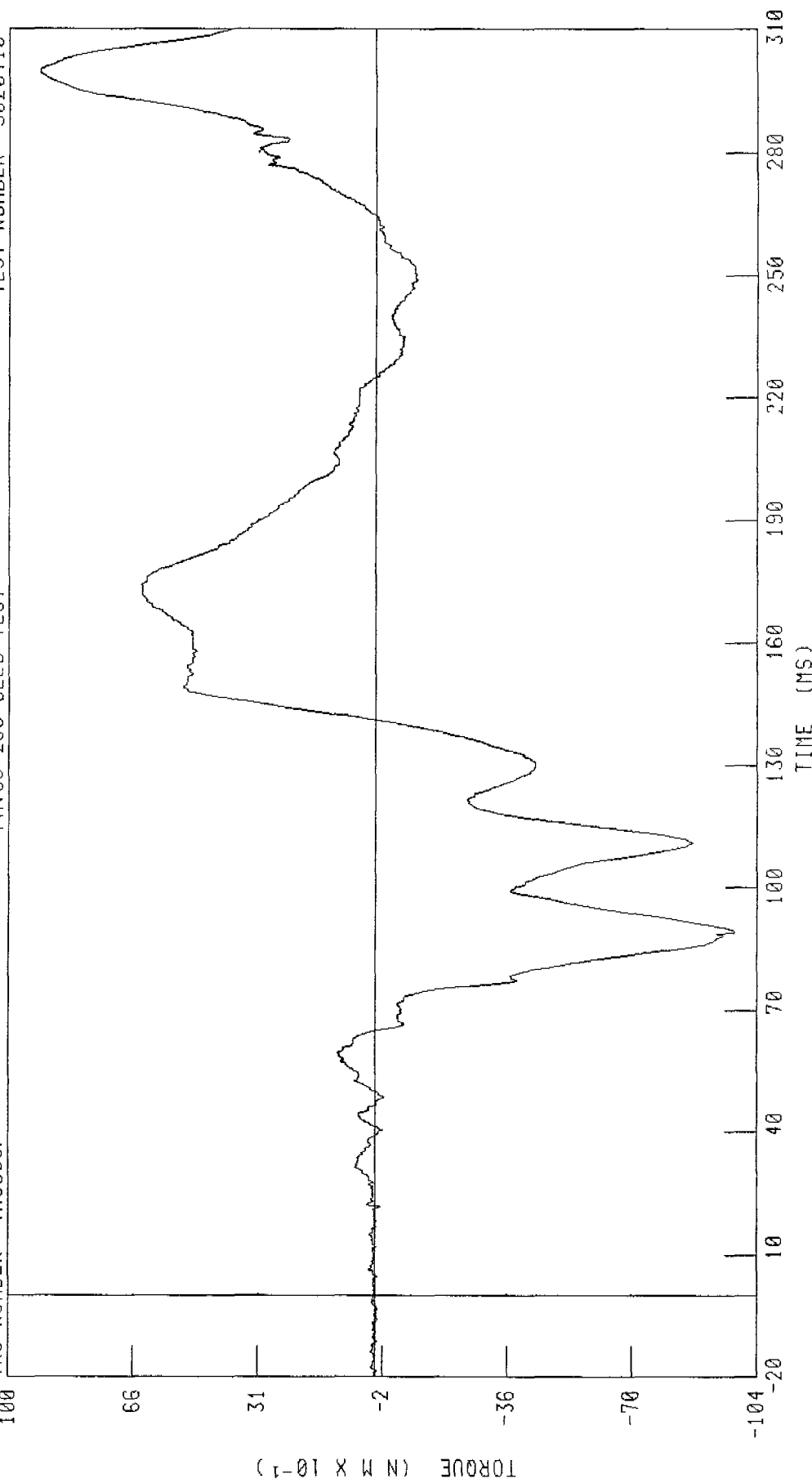
C20104 / 2002 CHEVROLET AVALANCHE 1500

DRIVER NECK MOMENT ABOUT X AXIS

TRC NUMBER TRC885F

FMVSS 208 SLED TEST

TEST NUMBER S020410



CHANNEL NEKXM1 FILTER CH CLASS 600

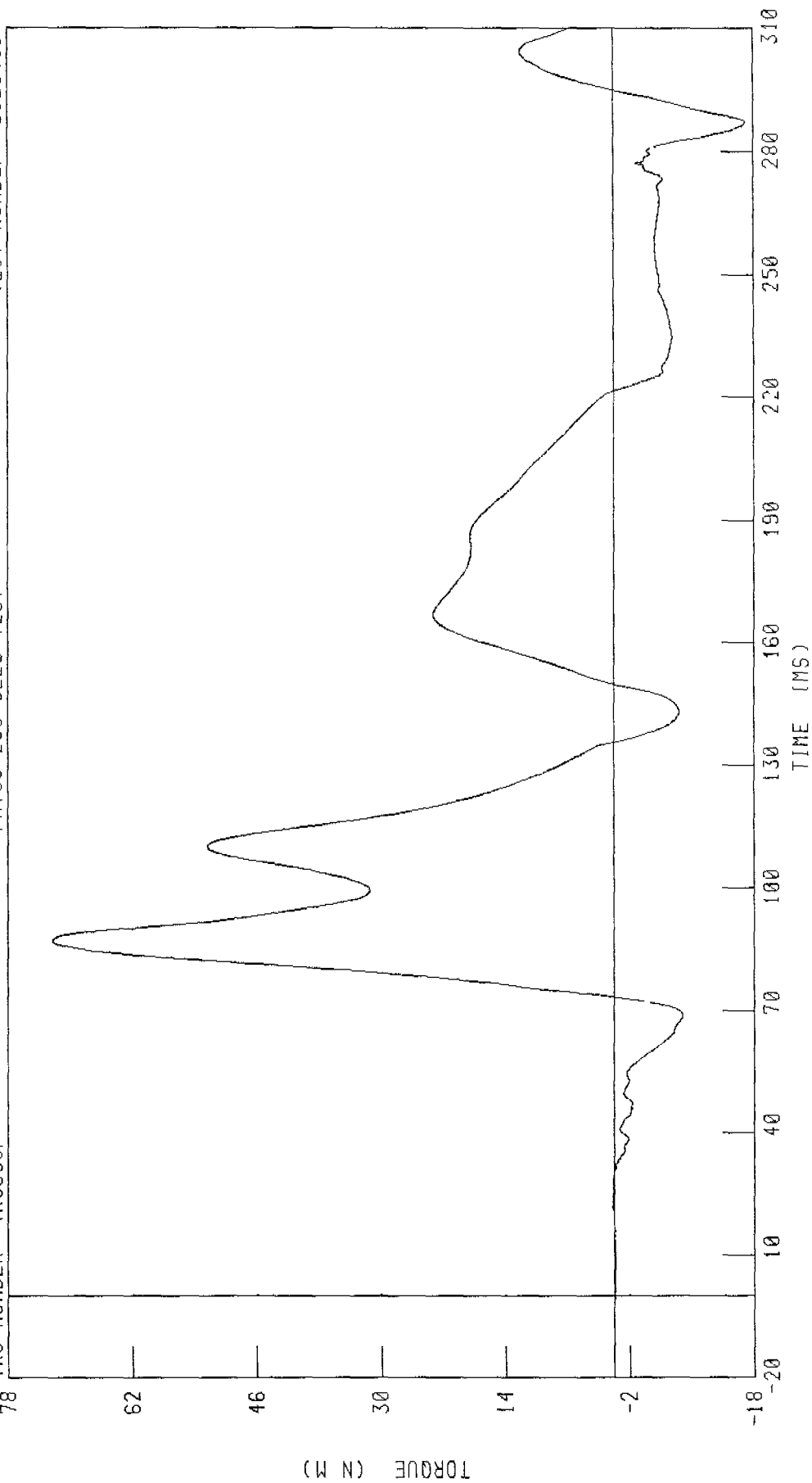
PEAK DATA 9 15 N M @ 299 84 MS, -9 79 N M @ 89 20 MS

C20104 / 2002 CHEVROLET AVALANCHE 1500
DRIVER NECK MOMENT ABOUT Y AXIS

FMVSS 208 SLED TEST

TRC NUMBER TRC885F

TEST NUMBER S020410



PEAK DATA 72 35 N M @ 87 12 MS, -16 97 N M @ 287 04 MS

CHANNEL HEKYM1 FILTER CH CLASS 600

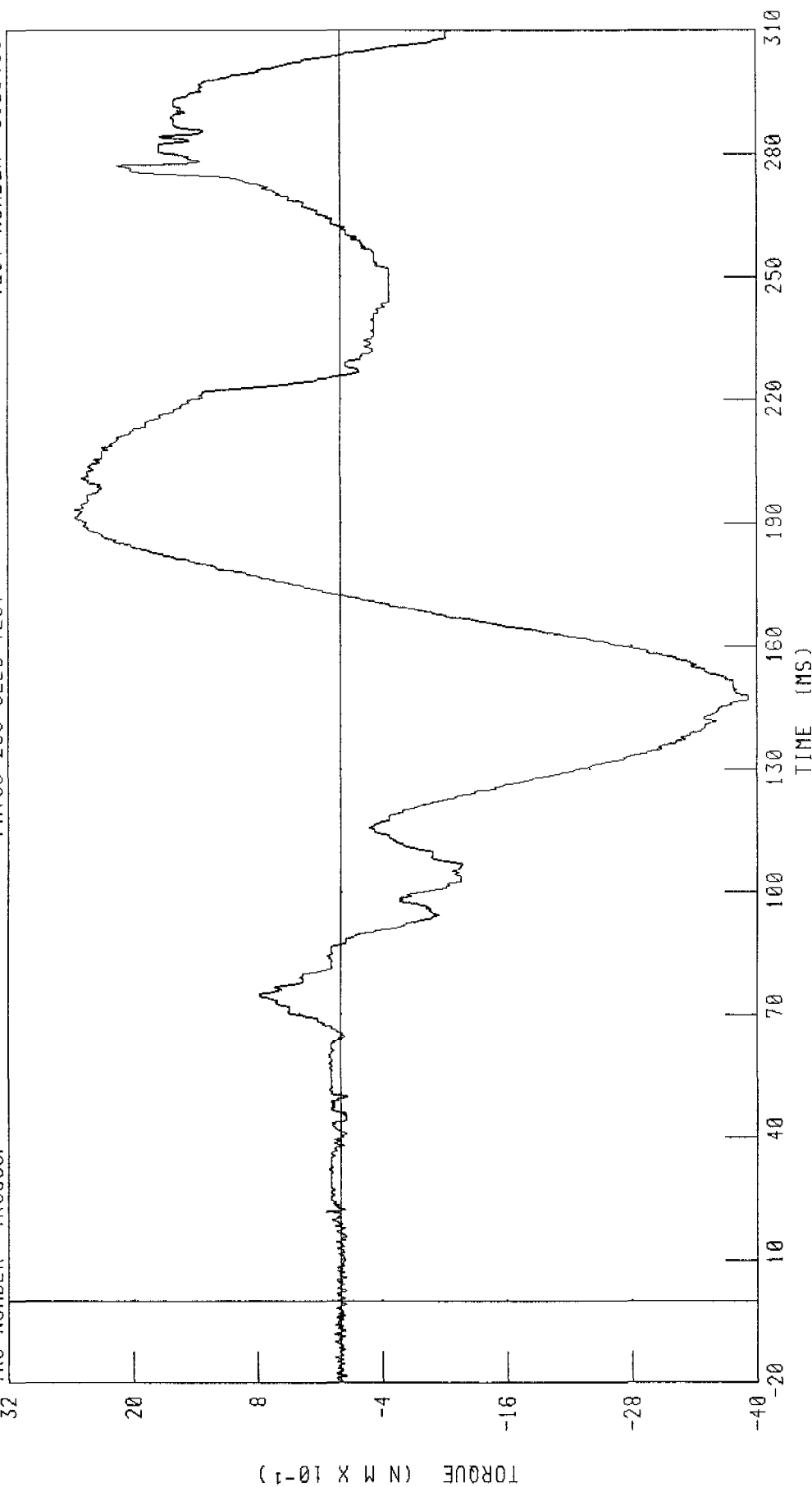
C20104 / 2002 CHEVROLET AVALANCHE 1500

DRIVER NECK MOMENT ABOUT Z AXIS

TRC NUMBER TRC885F

FMVSS 208 SLED TEST

TEST NUMBER S020410

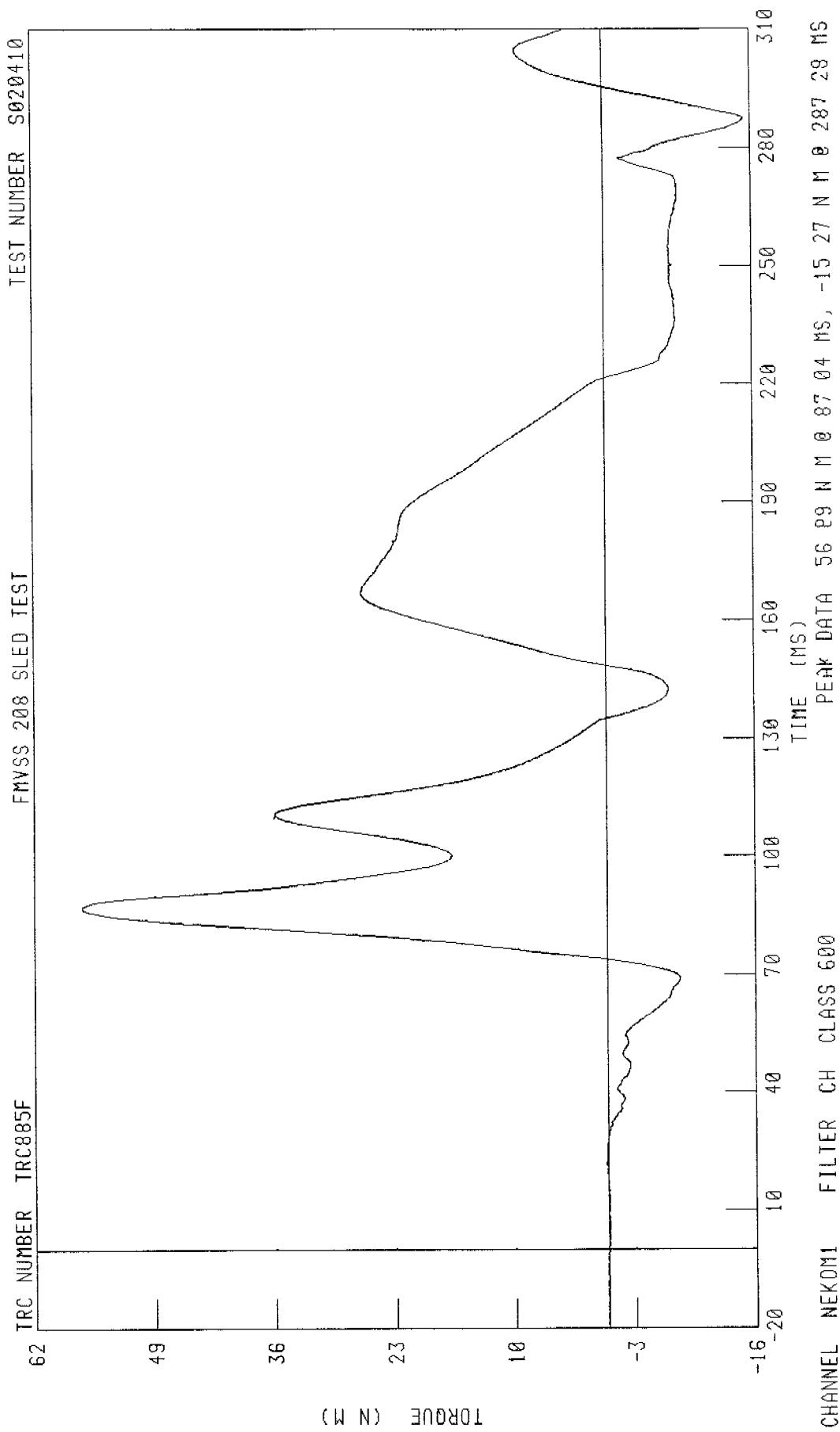


TIME (MS)

PEAK DATA 2 56 N M @ 191 52 MS, -3 92 N M @ 146 96 MS

CHANNEL NEKZM1 FILTER CH CLASS 600

C20104 / 2002 CHEVROLET AVALANCHE 1500
 DRIVER NECK MOMENT ABOUT Y AXIS OCCIPITAL CONDYLE



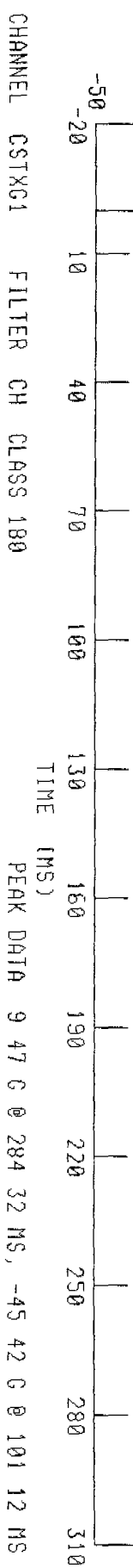
C20104 / 2002 CHEVROLET AVALANCHE 1500
DRIVER CHEST X-AXIS ACCELERATION

FMVSS 208 SLED TEST

TRC NUMBER TRC885F

TEST NUMBER S020410

ACCELERATION (G)



CHANNEL CSTXG1 FILTER CH CLASS 180

PEAK DATA 9 47 G @ 284 32 MS, -45 42 G @ 101 12 MS

B-27

020410

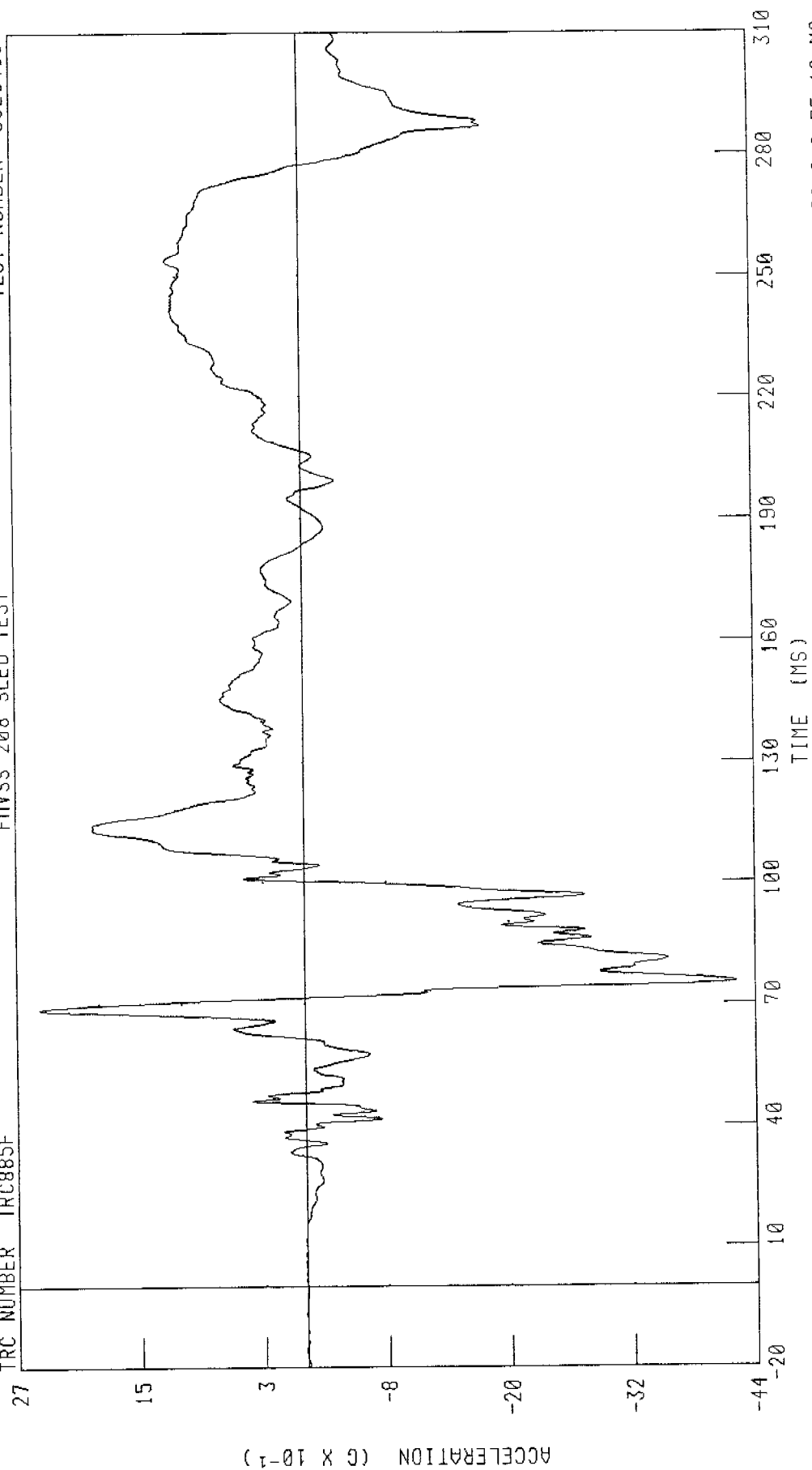
C20104 / 2002 CHEVROLET AVALANCHE 1500

DRIVER CHEST Y-AXIS ACCELERATION

FMVSS 208 SLED TEST

TEST NUMBER S020410

TRC NUMBER TRC885F



PEAK DATA 2 58 G @ 68 80 MS, -4 22 G @ 75 12 MS

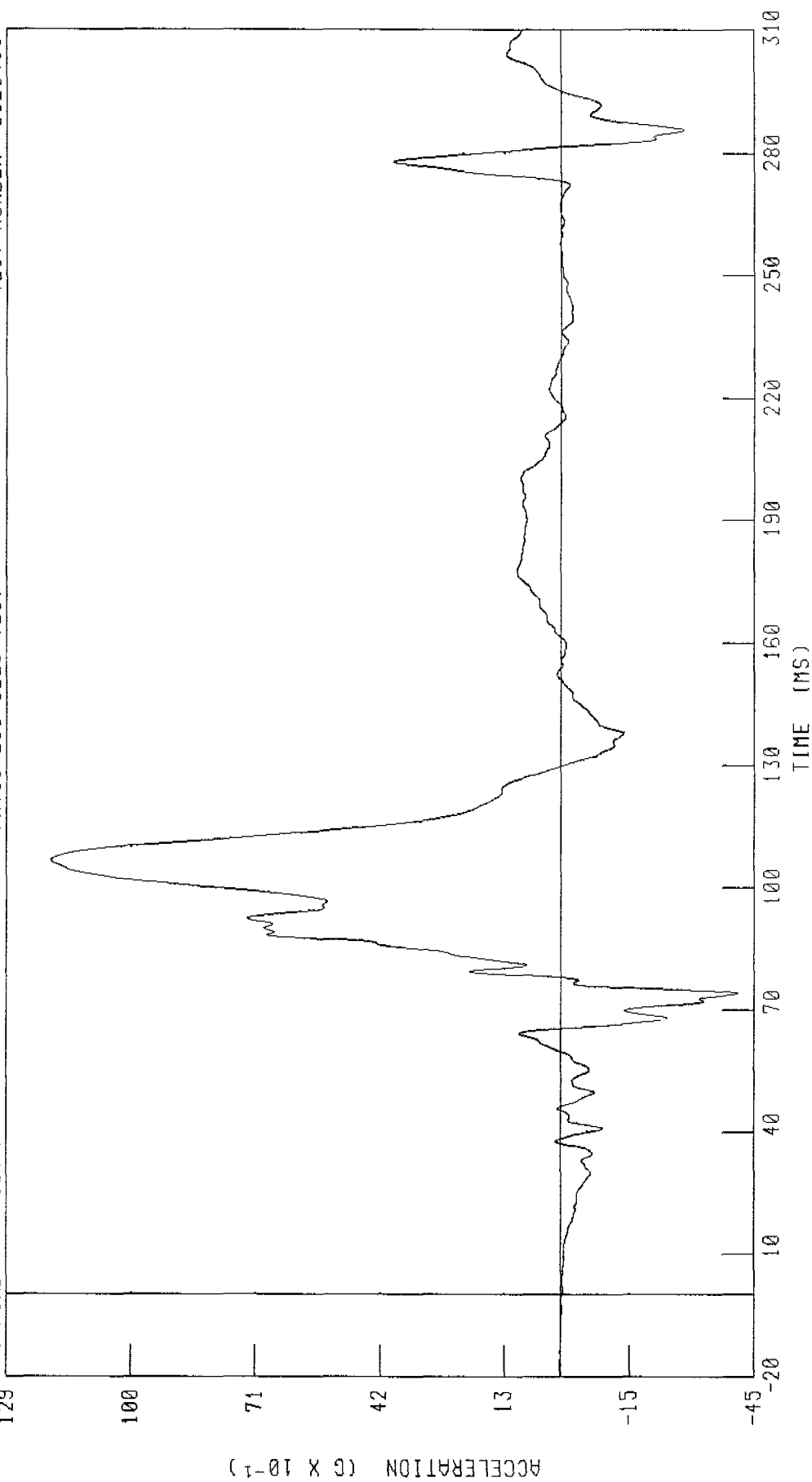
CHANNEL CSTYG1 FILTER CH CLASS 180

C20104 / 2002 CHEVROLET AVALANCHE 1500
DRIVER CHEST Z-AXIS ACCELERATION

TRC NUMBER TRC885F

FMVSS 208 SLED TEST

TEST NUMBER S020410



TIME (MS)

CHANNEL CSTZG1 FILTER CH CLASS 180

PEAK DATA 11 86 G @ 106 88 MS, -4 12 G @ 74 00 MS

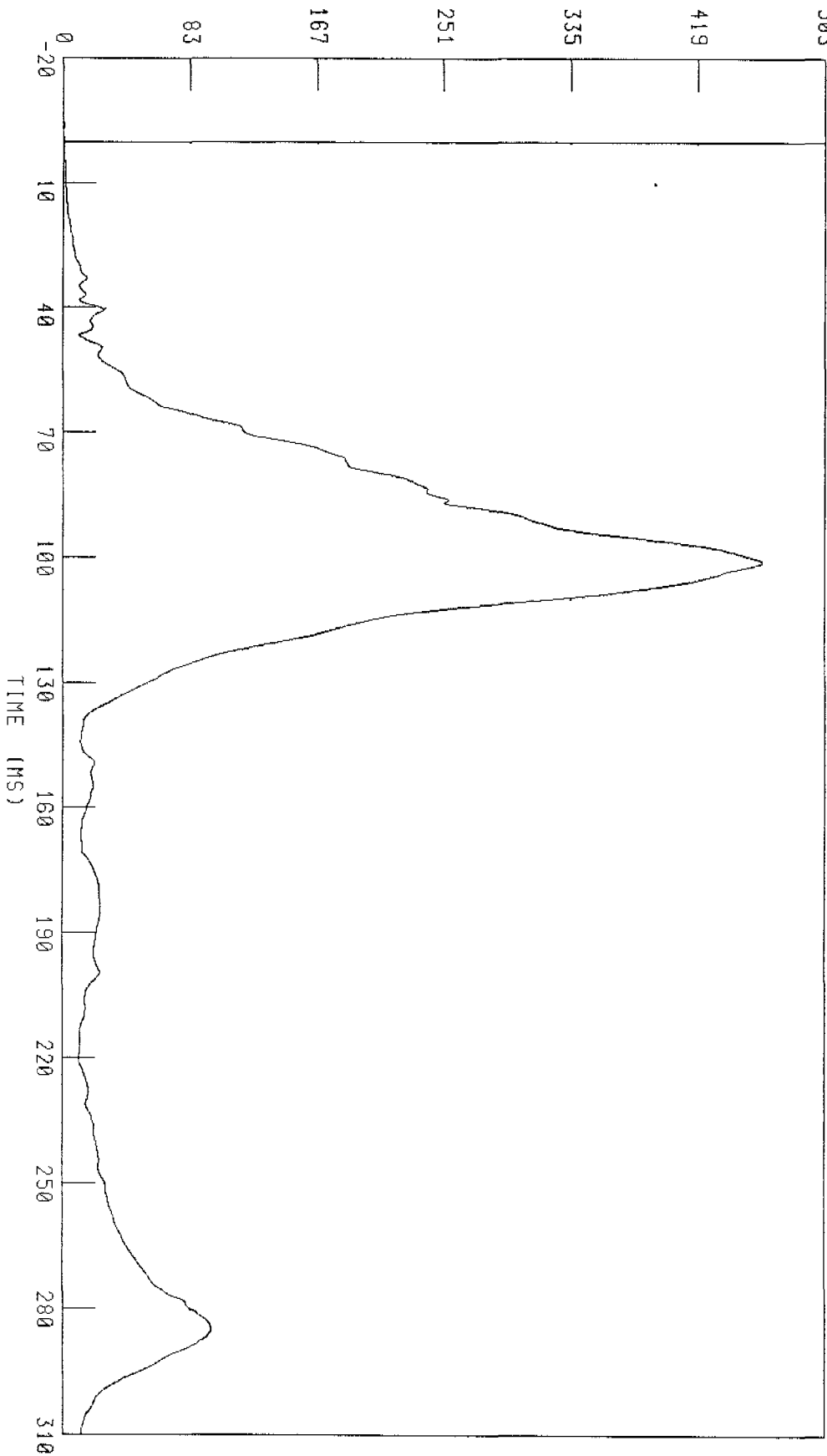
C20104 / 2002 CHEVROLET AVALANCHE 1500
DRIVER CHEST RESULTANT ACCELERATION

503 TRC NUMBER TRC885F

FMVSS 208 SLED TEST

TEST NUMBER S020410

ACCELERATION (G X 10⁻¹)



CHANNEL CSTRG1 FILTER CH CLASS 180

TIME (MS)

PEAK DATA 46 32 G @ 101 20 MS, 0 00 G @ -14 80 MS

B-30

020410

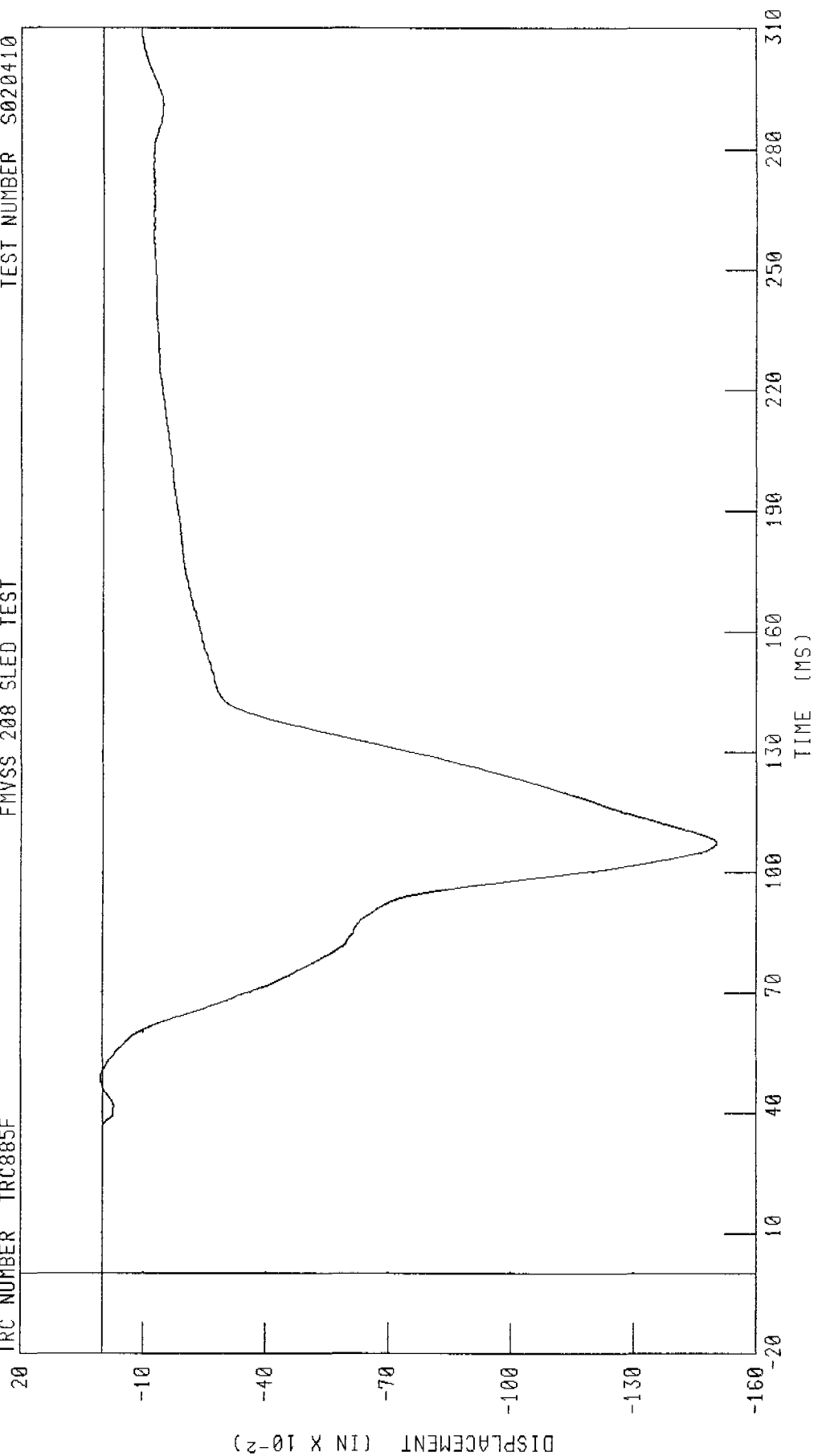
C20104 / 2002 CHEVROLET AVALANCHE 1500

DRIVER CHEST DEFLECTION

FMVSS 208 SLED TEST

TRC NUMBER TRC885F

TEST NUMBER S020410



CHANNEL CSTXD1 FILTER CH CLASS 600

PEAK DATA 0 01 IN @ 48 08 MS, -1 50 IN @ 107 28 MS

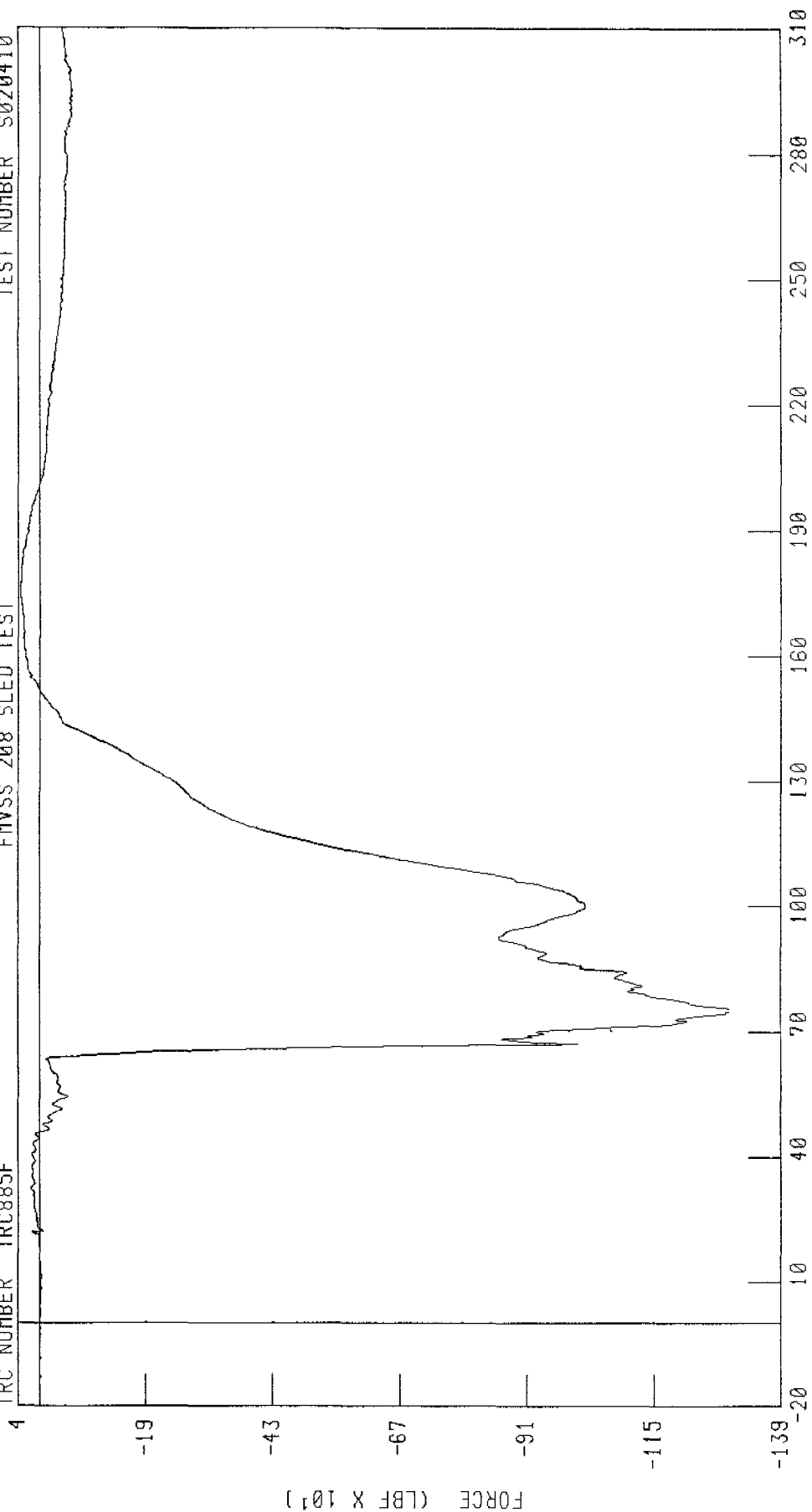
C20104 / 2002 CHEVROLET AVALANCHE 1500

DRIVER LEFT FEMUR FORCE

TRC NUMBER TRC885F

FMVSS 208 SLED TEST

TEST NUMBER S020410



TIME (MS)

PEAK DATA 37 90 LBF @ 176 00 MS, -1306 78 LBF @ 75 04 MS

CHANNEL LFMZF1 FILTER CH CLASS 600

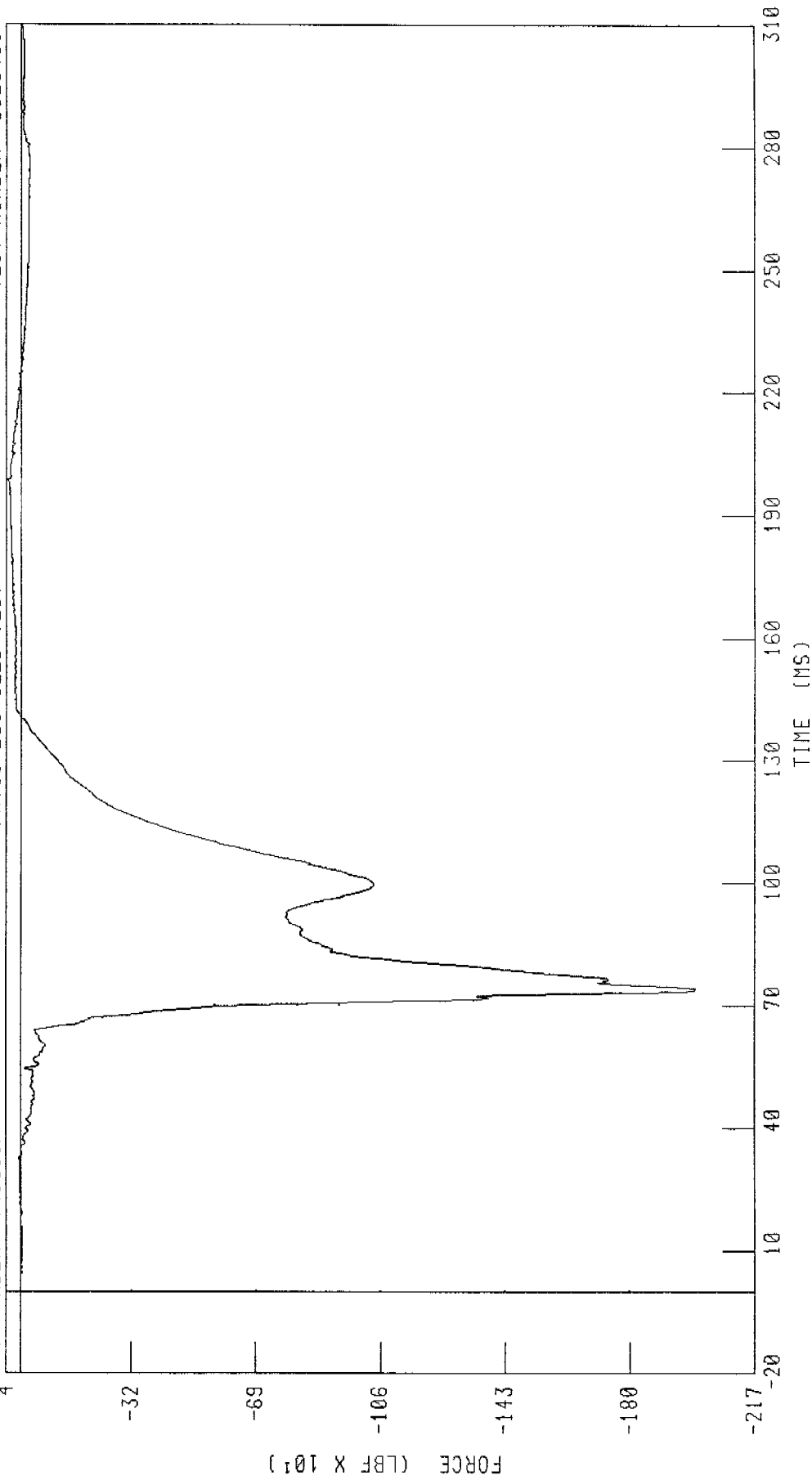
C20104 / 2002 CHEVROLET AVALANCHE 1500

DRIVER RIGHT FEMUR FORCE

TRC NUMBER TRC885F

FMVSS 208 SLED TEST

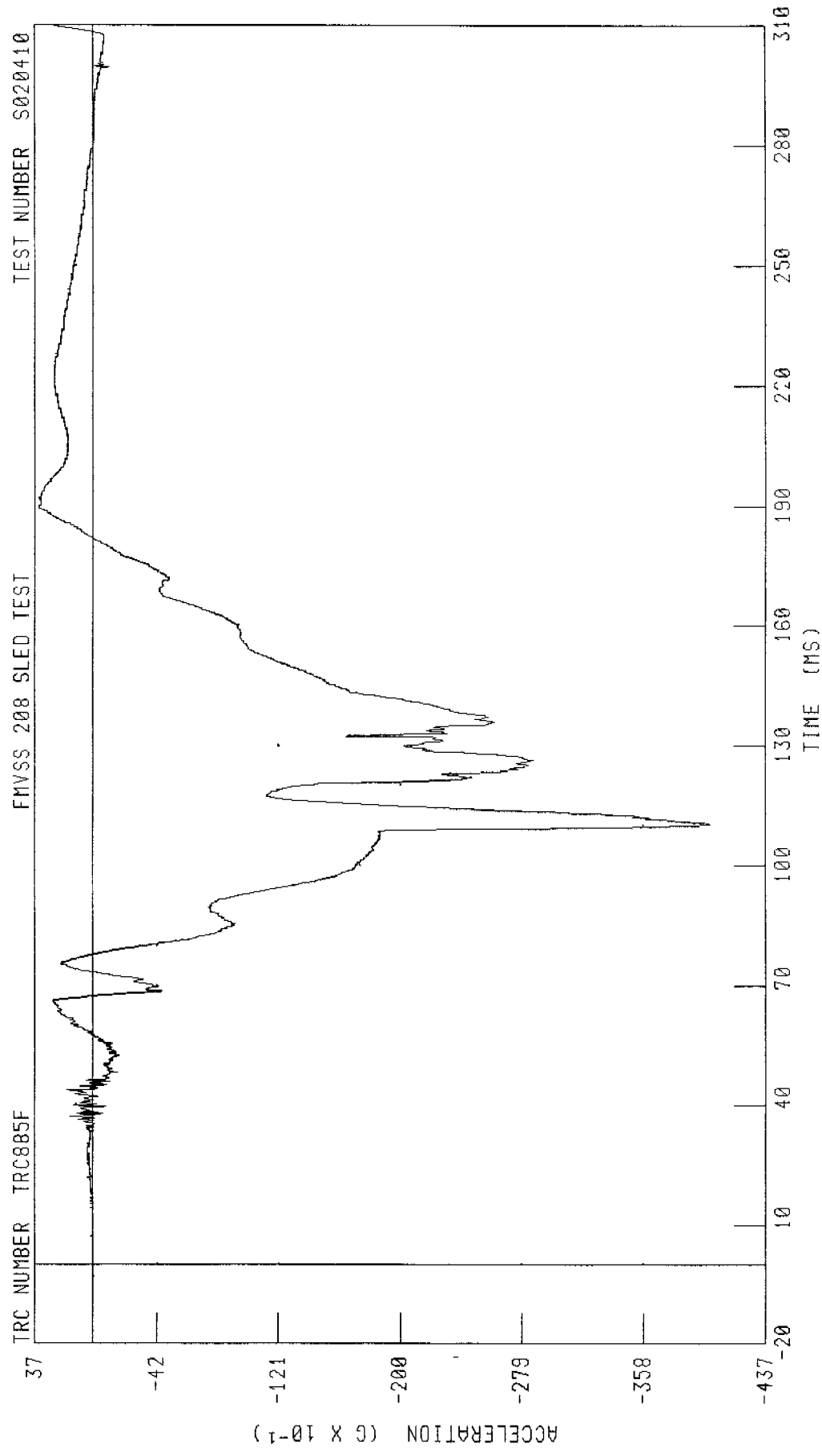
TEST NUMBER S020410



CHANNEL RFMZF1 FILTER CH CLASS 600

PEAK DATA 40 01 LBF @ 138 56 MS, -2001 95 LBF @ 74 00 MS

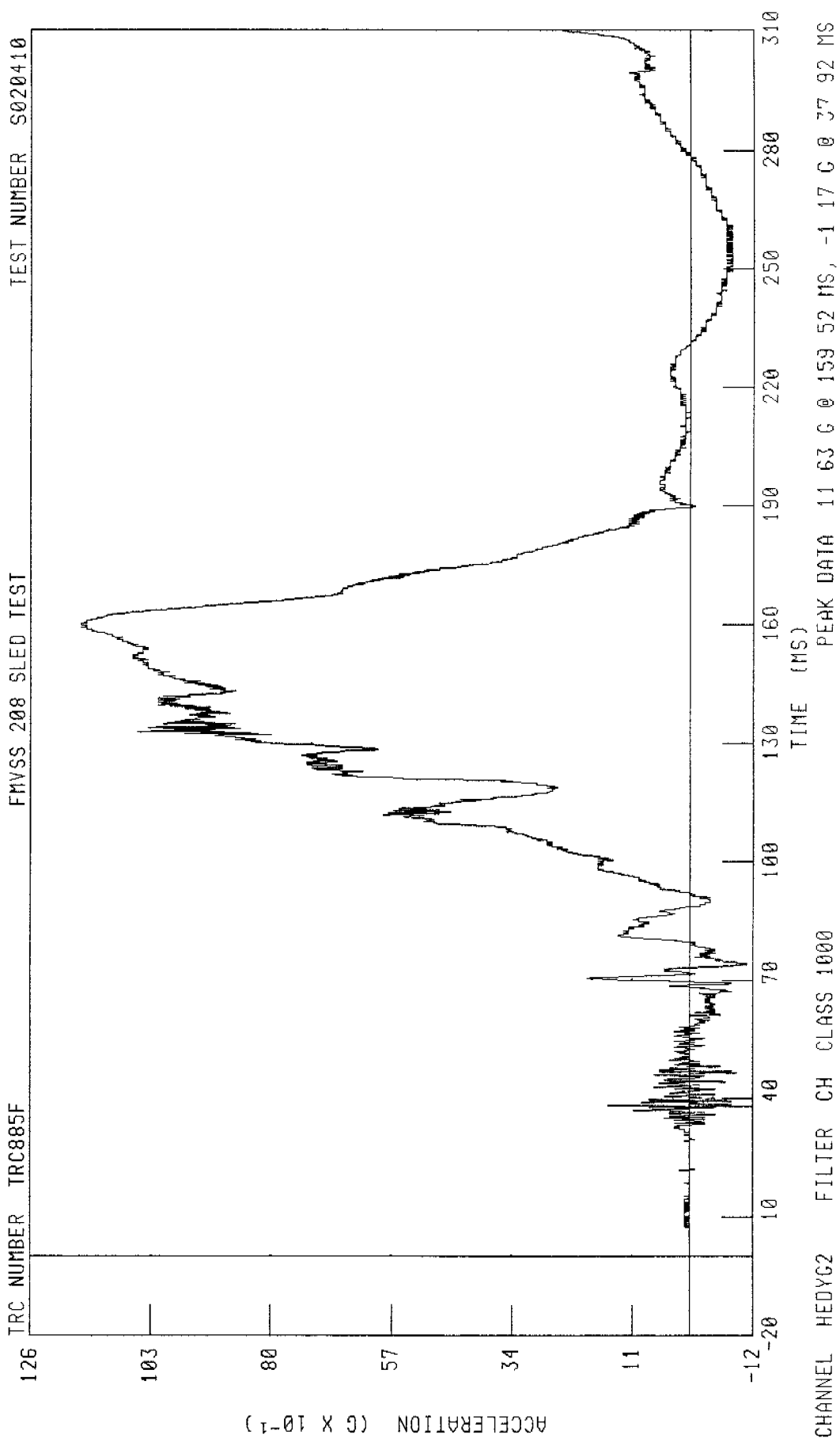
C20104 / 2002 CHEVROLET AVALANCHE 1500
 RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION



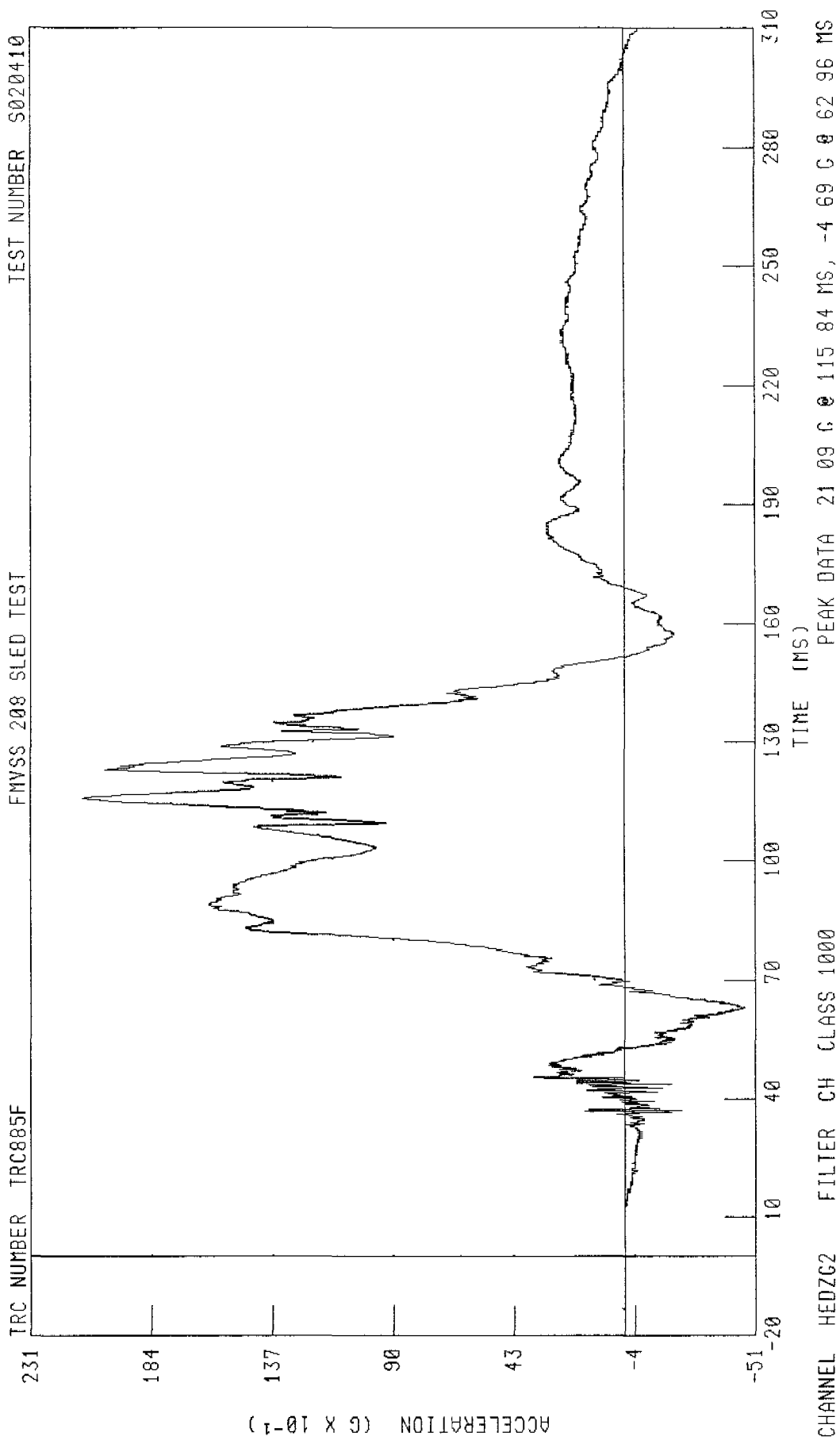
CHANNEL HEDXC2 FILTER CH CLASS 1000

PEAK DATA 3 42 G @ 189 60 MS, -40 17 G @ 110 24 MS

C20104 / 2002 CHEVROLET AVALANCHE 1500
 RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION



C20104 / 2002 CHEVROLET AVALANCHE 1500
 RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION



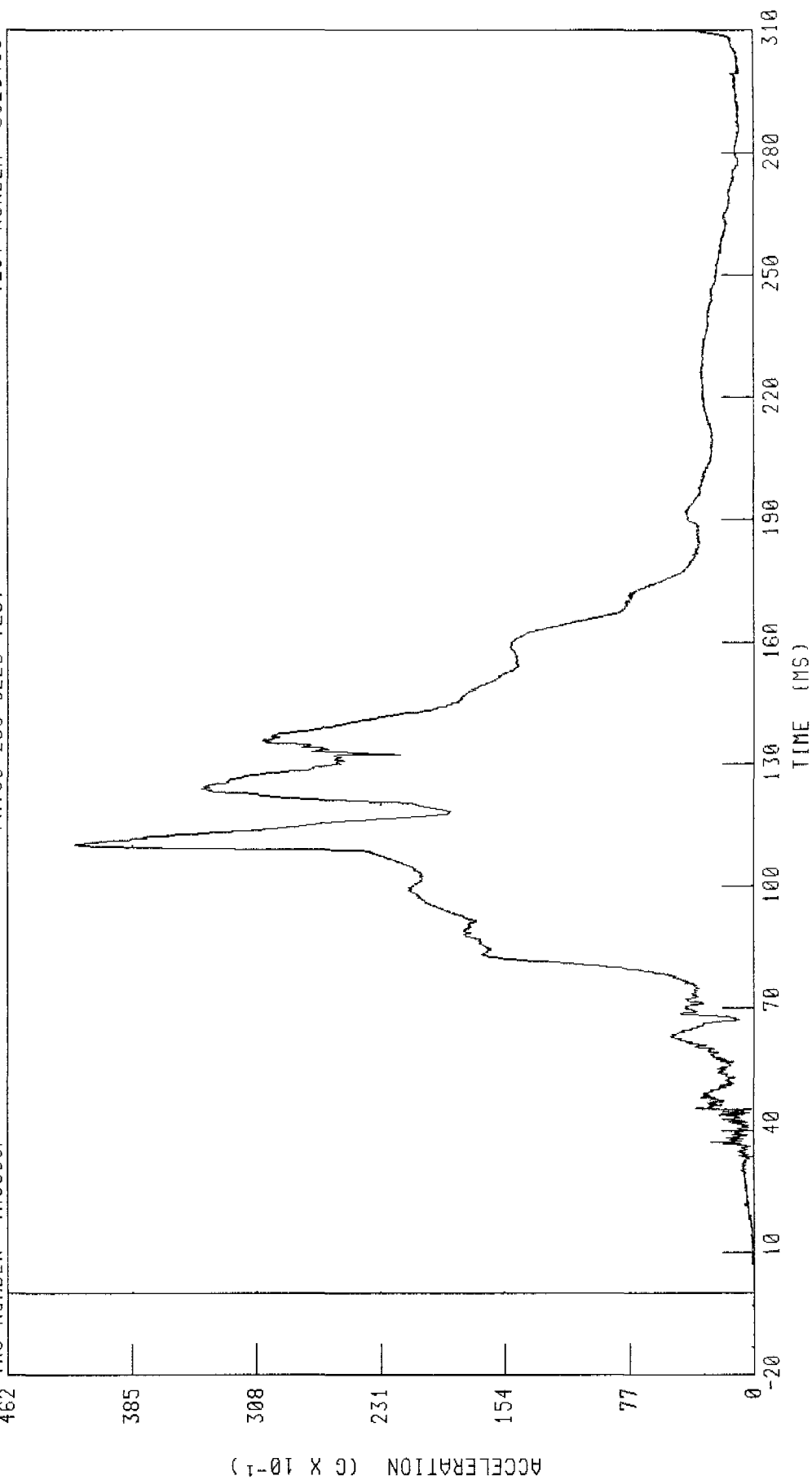
C20104 / 2002 CHEVROLET AVALANCHE 1500

RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION

TRC NUMBER TRC885F

FMVSS 208 SLED TEST

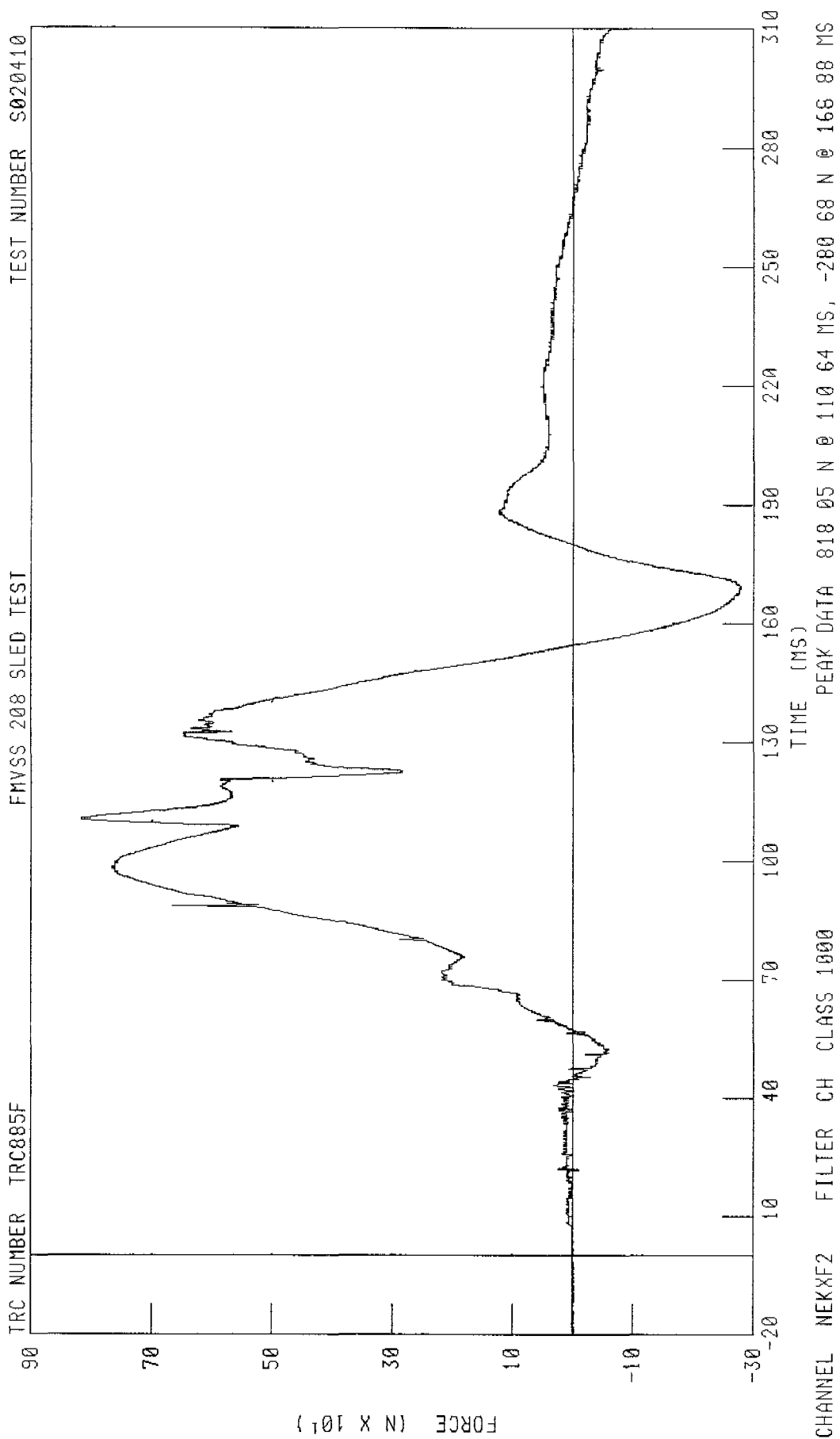
TEST NUMBER S020410



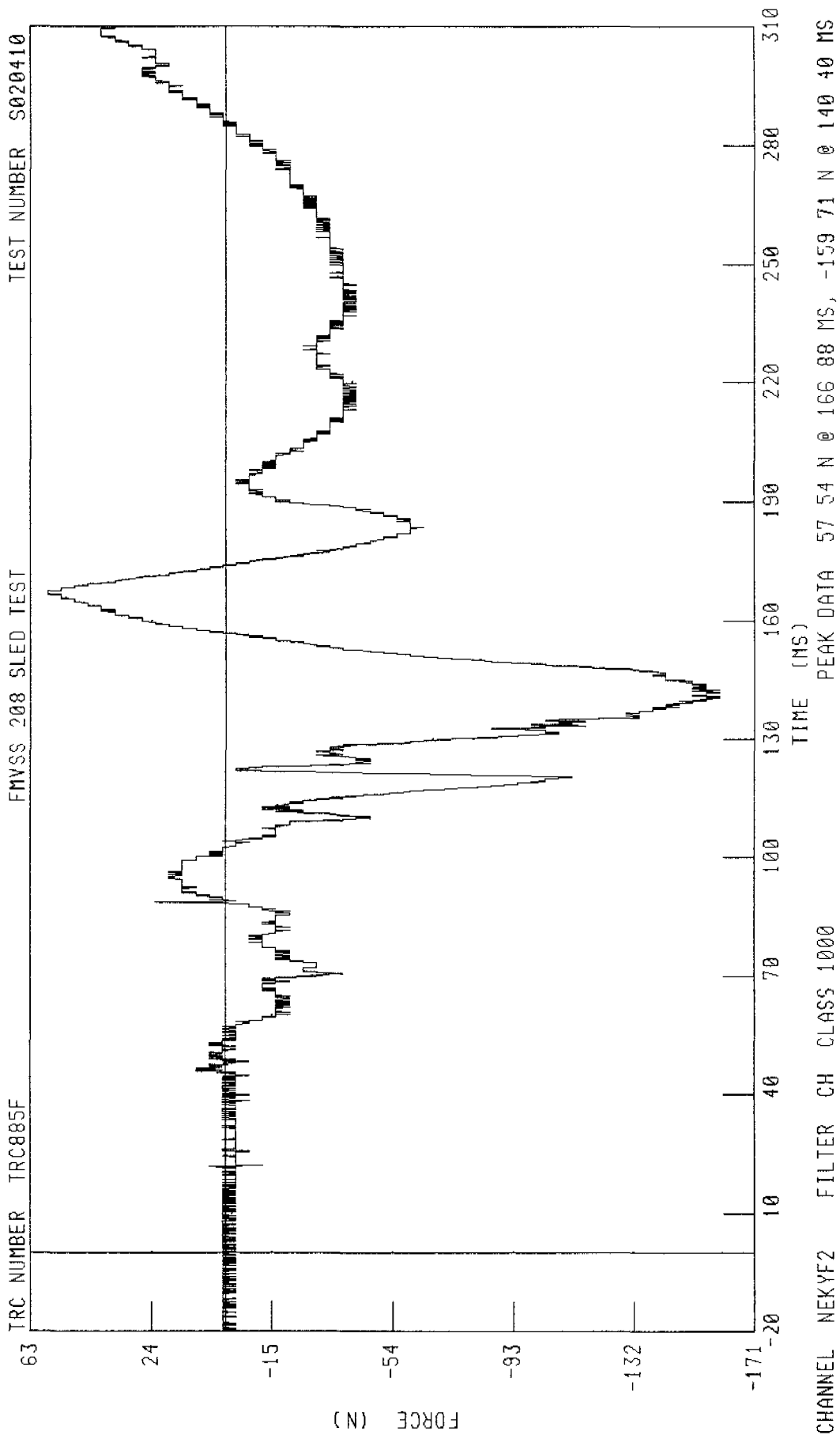
CHANNEL HEDRG2 FILTER CH CLASS 1000

PEAY DATA 42 07 G @ 110 56 MS, 0 00 G @ -20 00 MS

C20104 / 2002 CHEVROLET AVALANCHE 1500
 RIGHT FRONT PASSENGER NECK X-AXIS SHEAR FORCE



C20104 / 2002 CHEVROLET AVALANCHE 1500
 RIGHT FRONT PASSENGER NECK Y-AXIS SHEAR FORCE

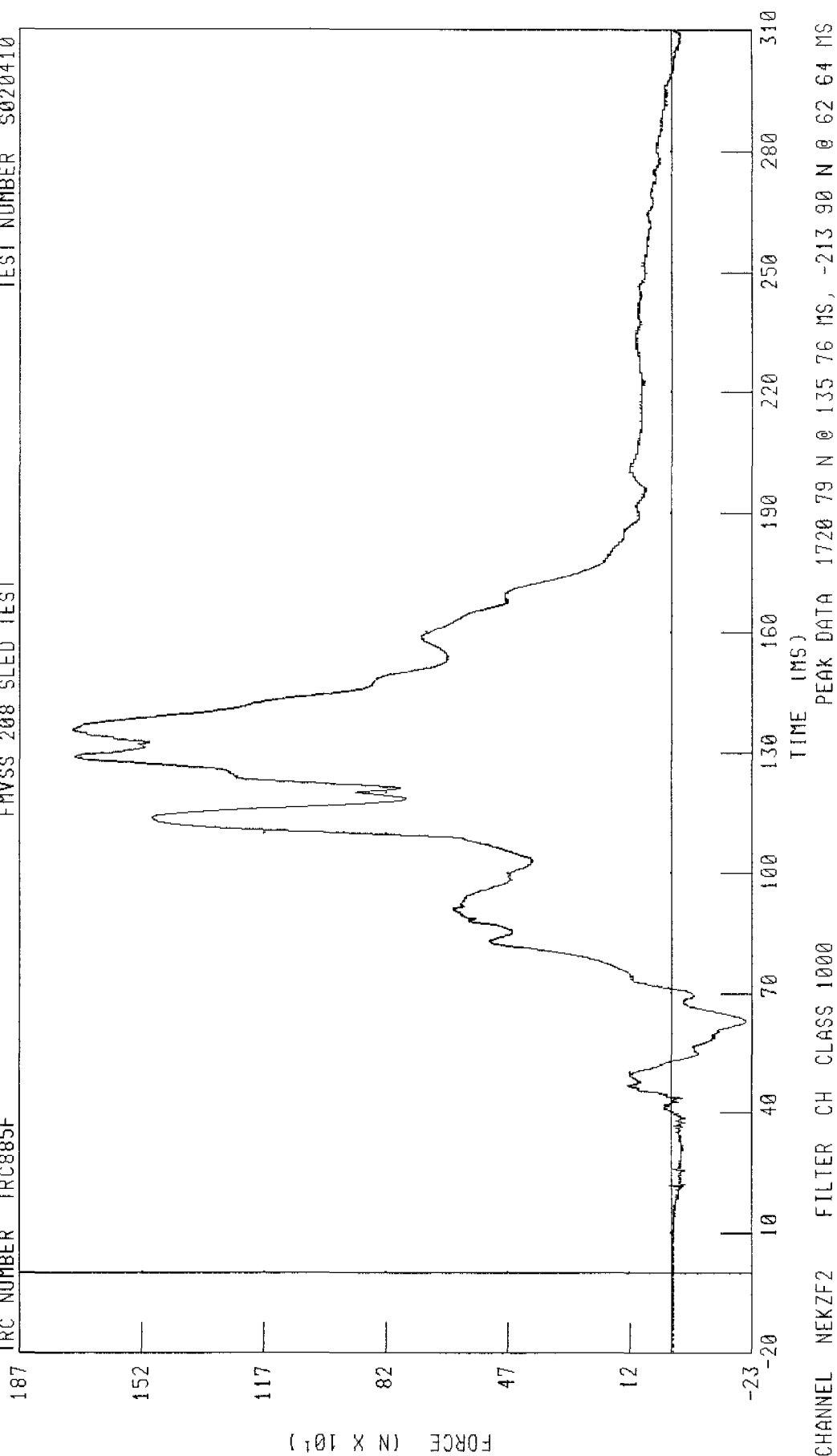


C20104 / 2002 CHEVROLET AVALANCHE 1500
 RIGHT FRONT PASSENGER NECK Z-AXIS AXIAL FORCE

TRC NUMBER TRC885F

FMVSS 208 SLED TEST

TEST NUMBER S020410



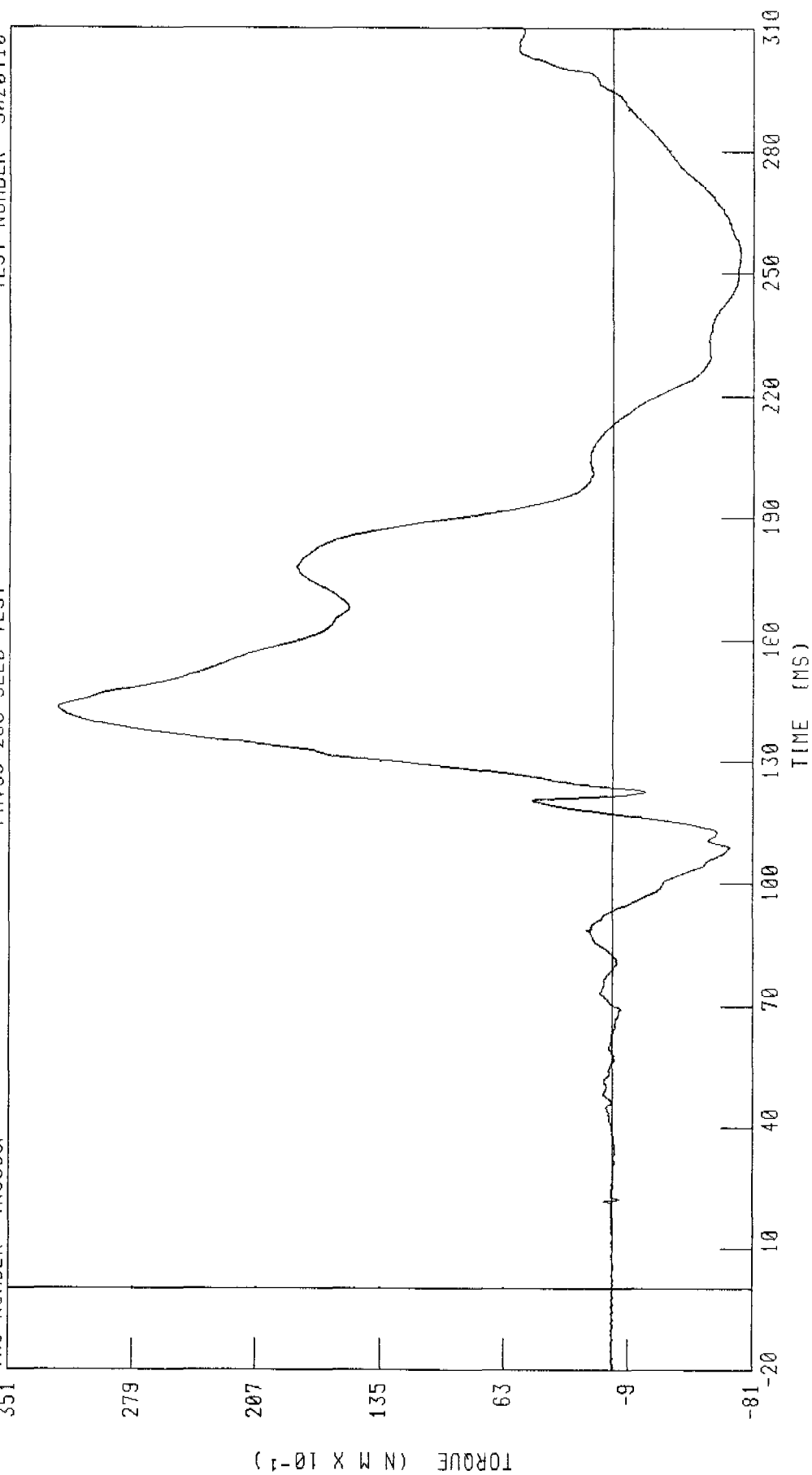
CHANNEL NEKZF2 FILTER CH CLASS 1000

C20104 / 2002 CHEVROLET AVALANCHE 1500
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TRC NUMBER TRC885F

FMVSS 208 SLED TEST

TEST NUMBER S020410



TIME (MS)

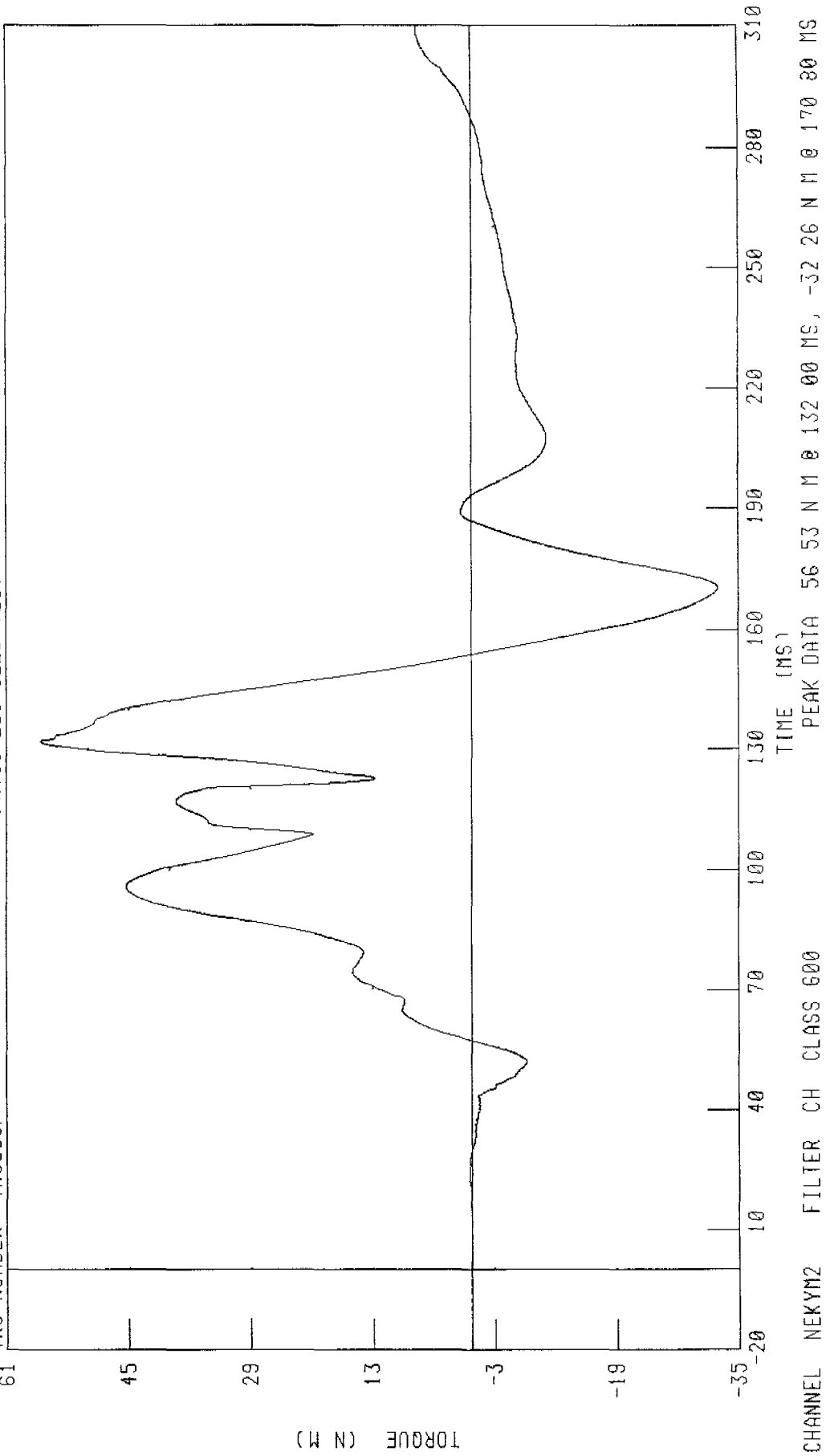
CHANNEL NEKXM2 FILTER CH CLASS 600 PEAK DATA 32 25 N M @ 143 36 MS, -7 37 N M @ 255 04 MS

C20104 / 2002 CHEVROLET AVALANCHE 1500
RIGHT FRONT PASSENGER NECK MOMENT ABOUT Y AXIS

TRC NUMBER TRC885F

FMVSS 208 SLED TEST

TEST NUMBER S020410



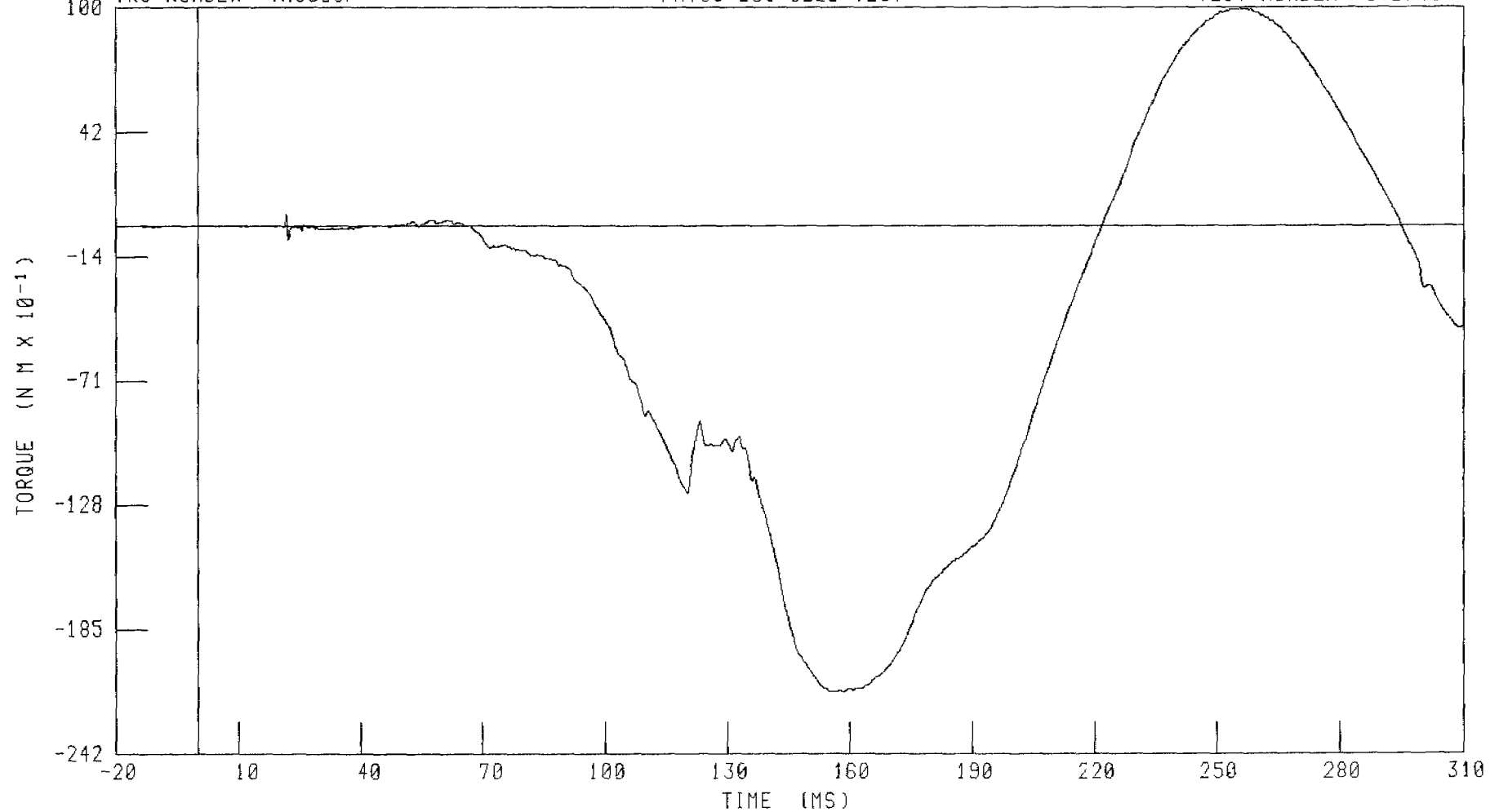
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CHANNEL NEKYM2 FILTER CH CLASS 600

C20104 / 2002 CHEVROLET AVALANCHE 1500
RIGHT FRONT PASSENGER NECK MOMENT ABOUT Z AXIS
FMVSS 208 SLED TEST

TRC NUMBER TRC885F

TEST NUMBER S020410



CHANNEL NEKZM2 FILTER CH CLASS 600

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020410

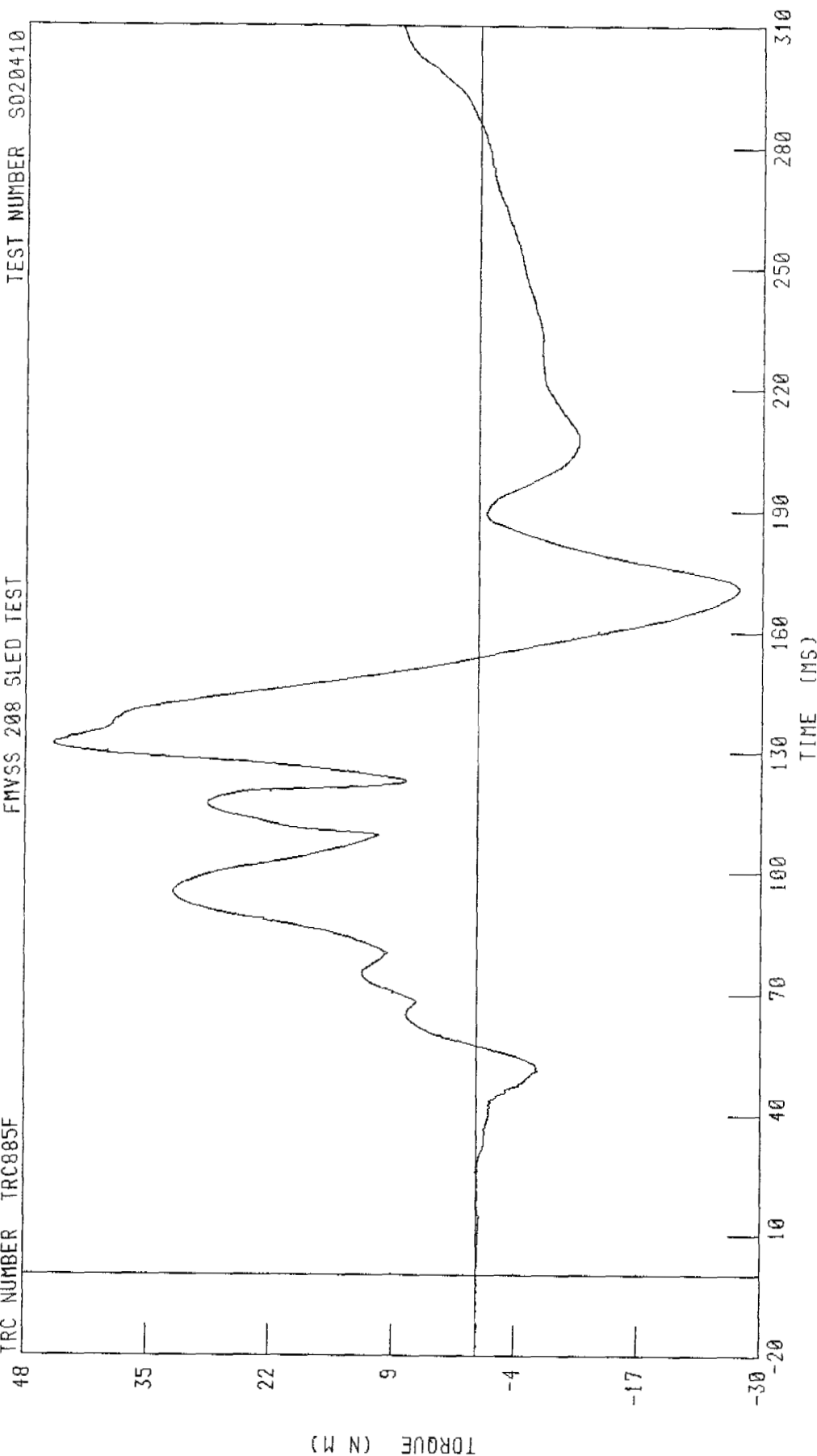
C20104 / 2002 CHEVROLET AVALANCHE 1500

RIGHT FRONT PASSENGER NECK MOMENT ABOUT Y AXIS OCCIPITAL CONDYLE

TRC NUMBER TRC885F

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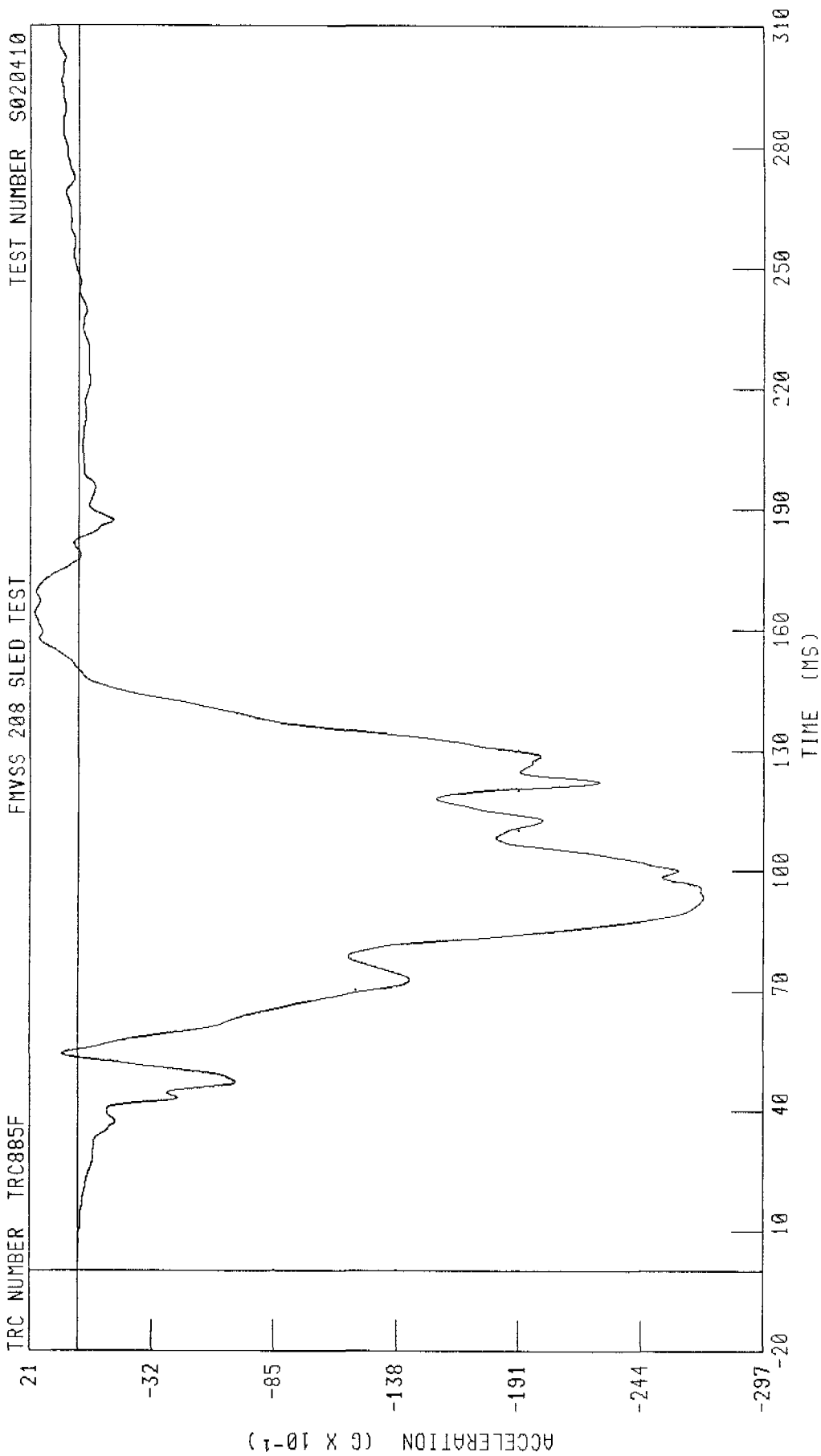
TEST NUMBER S020410



CHANNEL NEKM2 FILTER CH CLASS 600

PEAK DATA 45 01 N M @ 131 92 MS, -27 57 N M @ 171 04 MS

C20104 / 2002 CHEVROLET AVALANCHE 1500
 RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION



PEAK DATA 1 91 G @ 164 48 MS, -27 12 G @ 93 44 MS

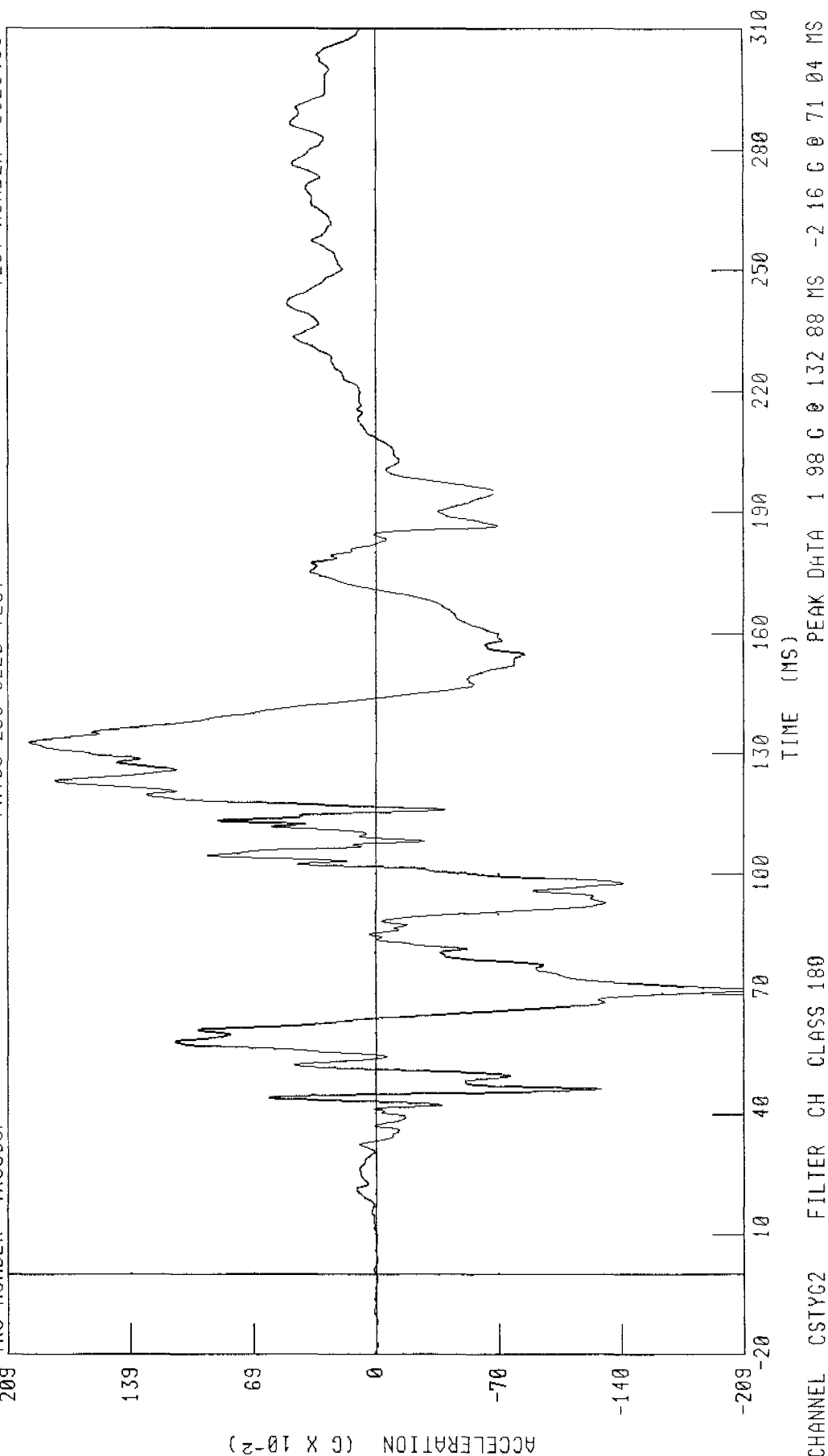
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C20104 / 2002 CHEVROLET AVALANCHE 1500
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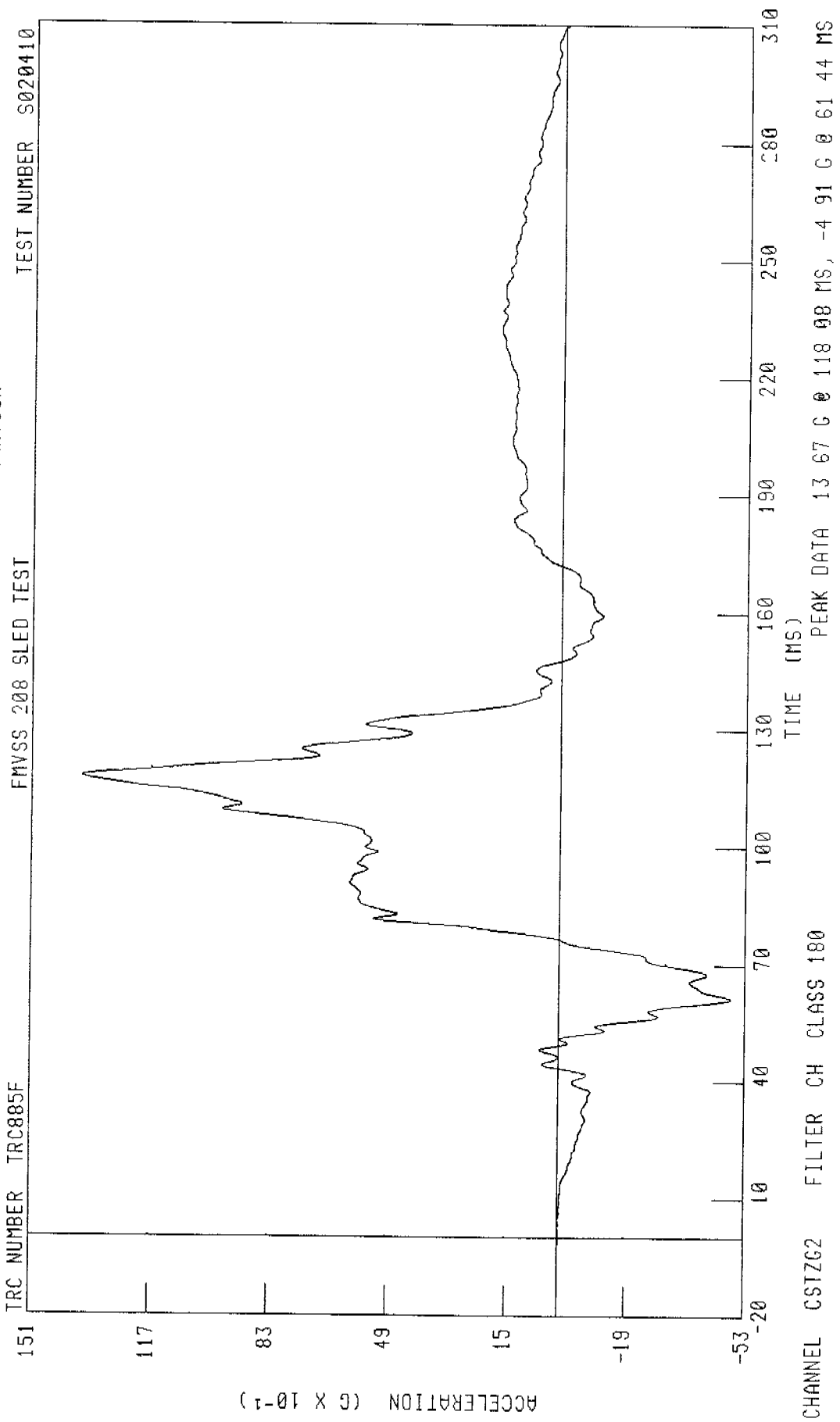
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FMVSS 208 SLED TEST

TEST NUMBER S020410



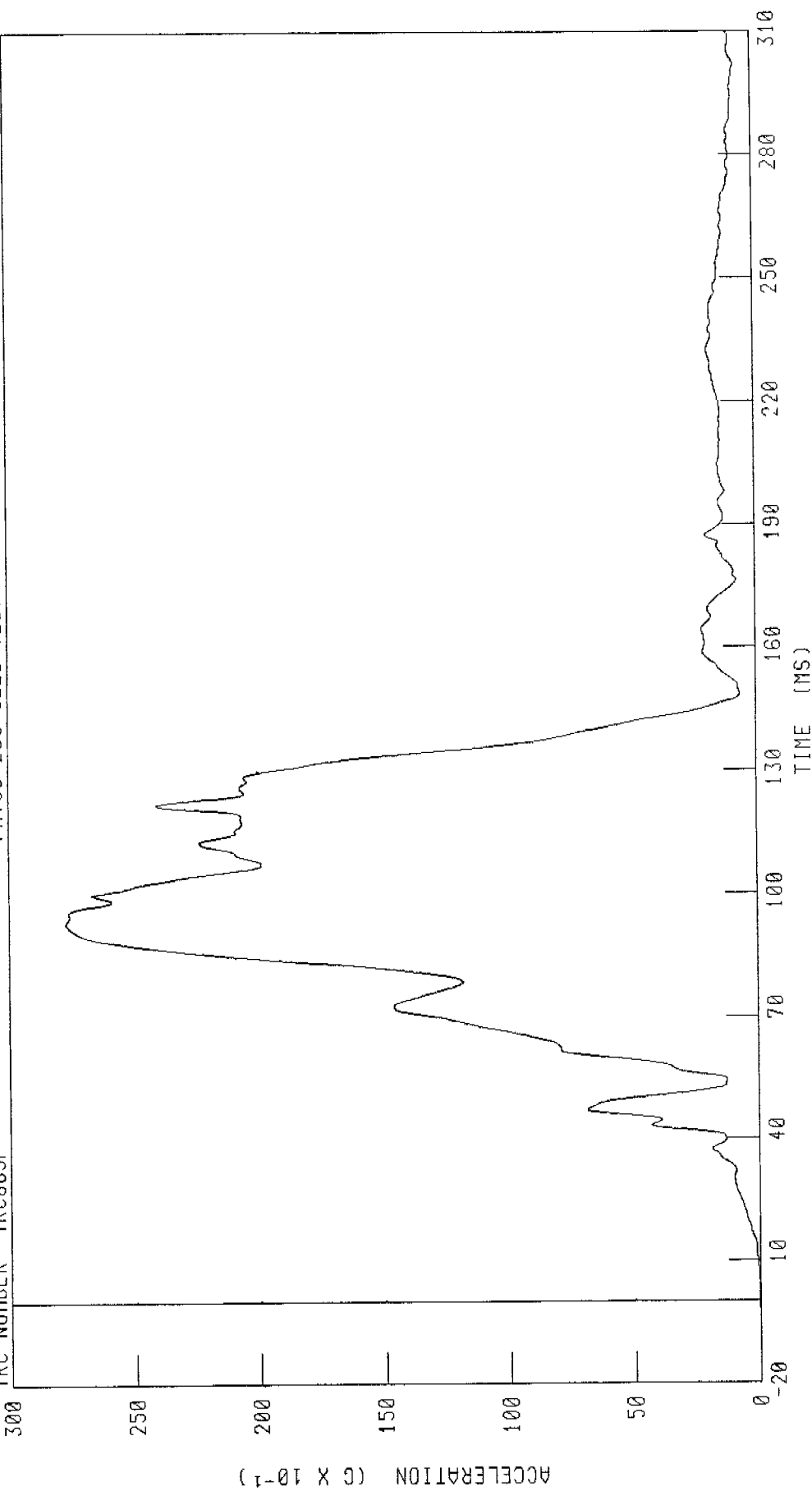
C20104 / 2002 CHEVROLET AVALANCHE 1500
 RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION



C20104 / 2002 CHEVROLET AVALANCHE 1500
 RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION
 FMVSS 208 SLED TEST

TEST NUMBER S020410

TRC NUMBER TRC885F



PEAK DATA 27 75 G @ 93 20 MS, 0 00 G @ -19 20 MS

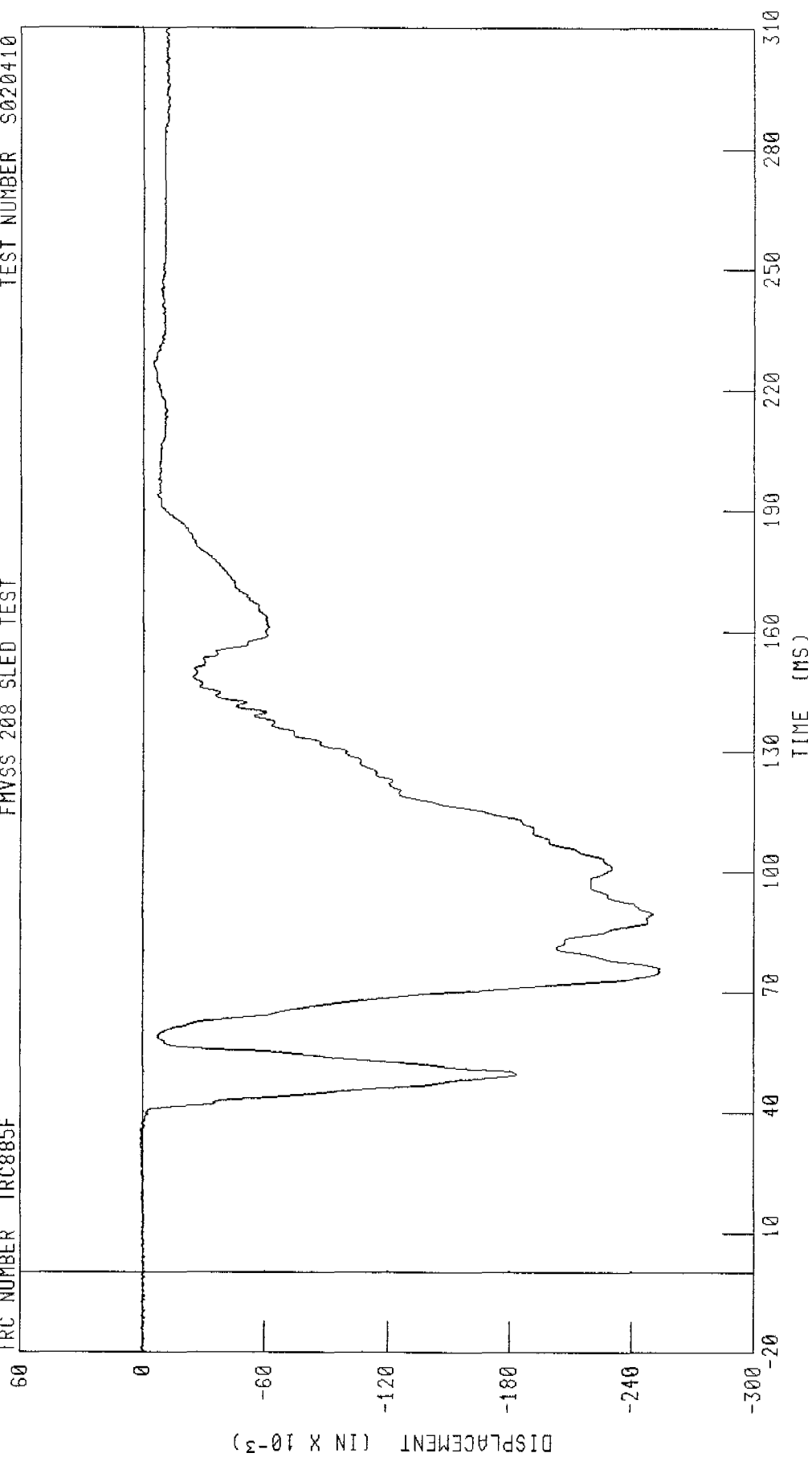
CHANNEL CSTRG2 FILTER CH CLASS 180

C20104 / 2002 CHEVROLET AVALANCHE 1500
RIGHT FRONT PASSENGER CHEST DEFLECTION

TRC NUMBER TRC885F

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TEST NUMBER S020410

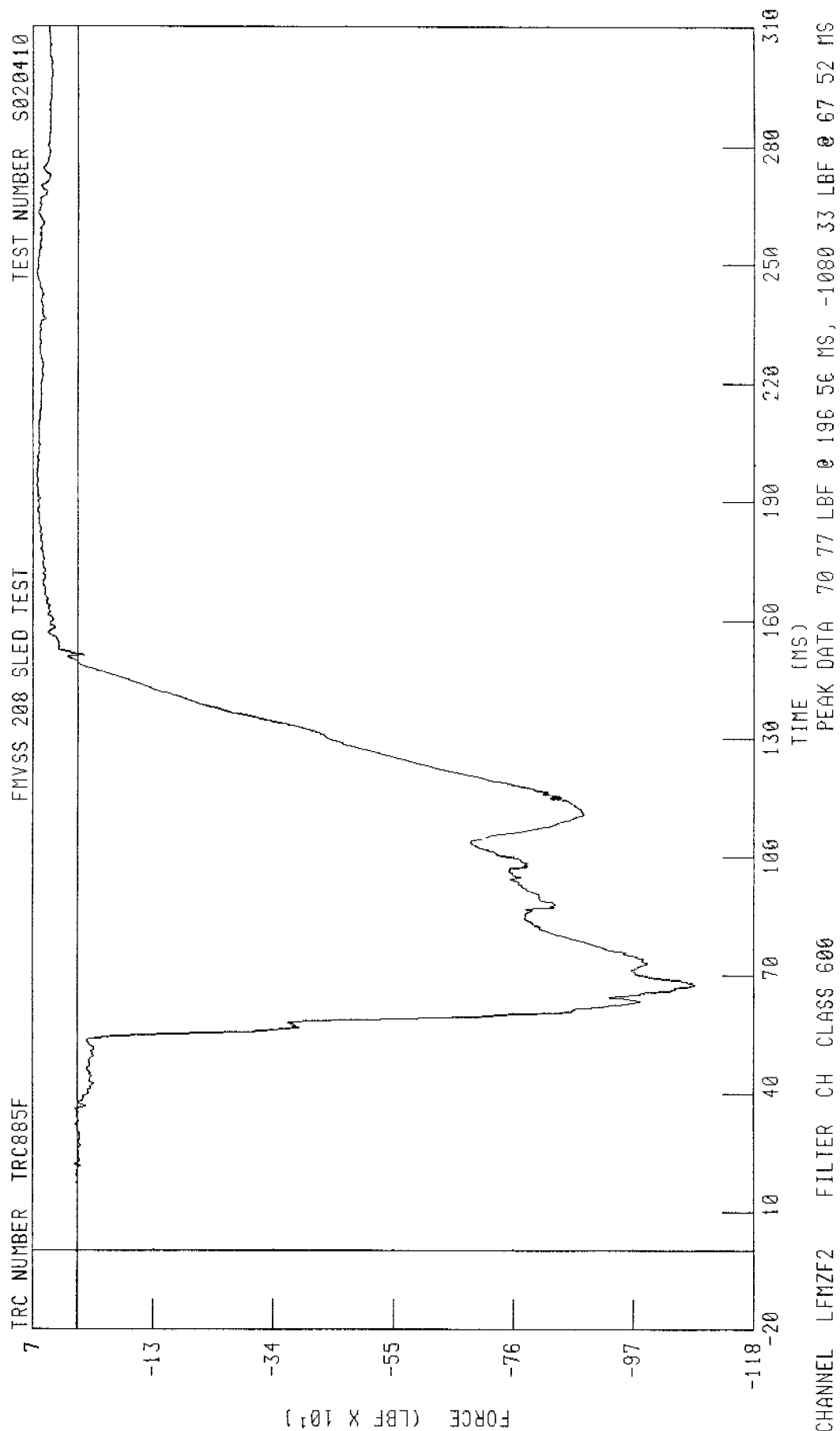


TIME (MS)

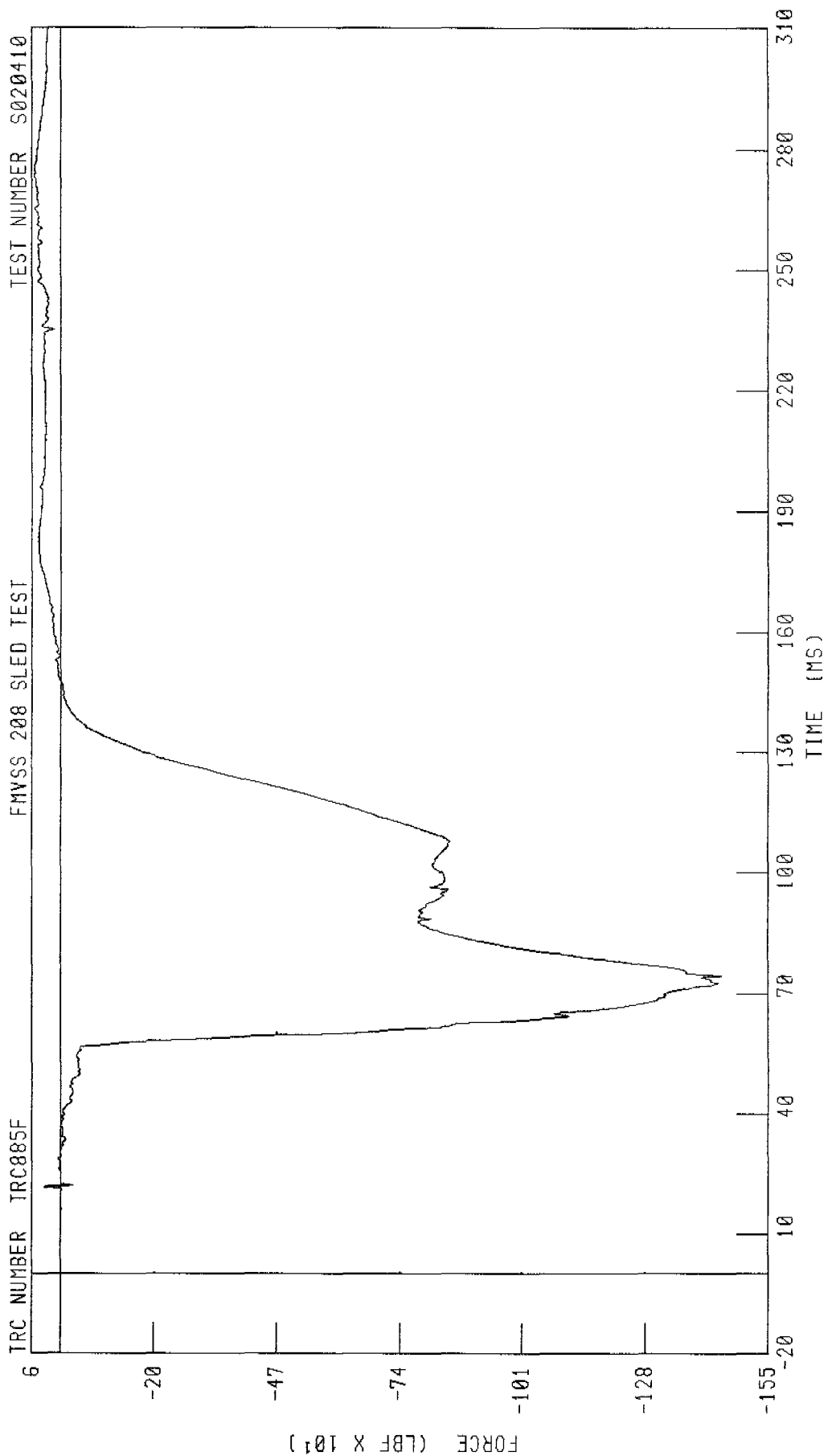
CHANNEL CSTXD2 FILTER CH CLASS 600

PEAK DATA 0 00 IN @ 31 68 MS -0 25 IN @ 75 84 MS

C20104 / 2002 CHEVROLET AVALANCHE 1500
RIGHT FRONT PASSENGER LEFT FEMUR FORCE



C20104 / 2002 CHEVROLET AVALANCHE 1500
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE



CHANNEL RFMZ F2 FILTER CH CLASS 600

Appendix C

Manufacturer's Vehicle Information

Section 1 Seats and Restraint Systems

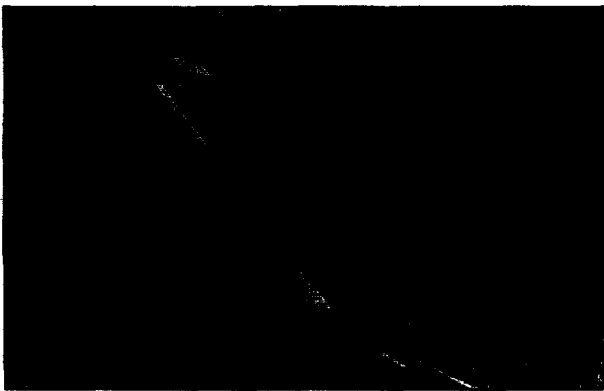
Here you'll find information about the seats in your vehicle and how to use your safety belts properly. You can also learn about some things you should *not* do with air bags and safety belts.

1-2	Seats and Seat Controls	1-34	Rear Seat Passengers
1-10	Safety Belts They're for Everyone	1-37	Rear Safety Belt Comfort Guides for Children and Small Adults
1-14	Here Are Questions Many People Ask About Safety Belts -- and the Answers	1-39	Children
1-15	How to Wear Safety Belts Properly	1-43	Restraint Systems for Children
1-16	Driver Position	1-55	Older Children
1-23	Safety Belt Use During Pregnancy	1-58	Safety Belt Extender
1-24	Right Front Passenger Position	1-58	Checking Your Restraint Systems
1-24	Air Bag Systems	1-58	Replacing Restraint System Parts After a Crash
1-33	Center Passenger Position		

1-1

Seats and Seat Controls

Manual Front Passenger Seat



If your vehicle has a manual front passenger split bench seat, you can adjust it with this lever located at the front of the seat.

Lift the lever at the front of the seat to unlock it. Using your body, slide the seat to where you want it. Then, release the lever and try to move the seat with your body to make sure that the seat is locked into place.

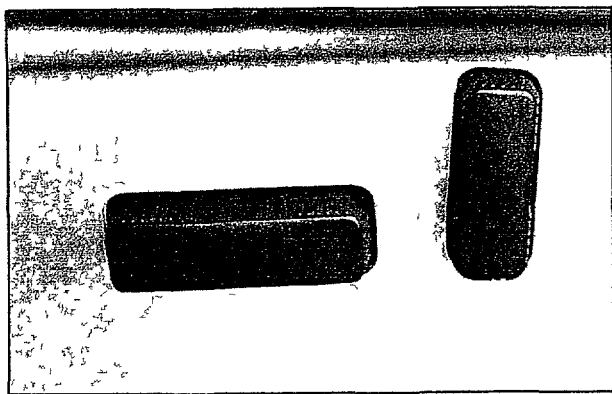
Manual Lumbar Control



If your vehicle has a lumbar adjustment knob, you can increase or decrease lumbar support in an area of the lower seatback. The lumbar knob is located on the outboard side of the seat cushion.

To increase or decrease support, turn the knob toward the front or rear of the vehicle.

Power Seat(s) (If Equipped)



Horizontal Control: If your vehicle has a power seat, you can adjust it with the horizontal control located on the outboard edge of the seat(s)

- Raise or lower the front of the seat by raising or lowering the forward edge of the control. Raise or lower the rear of the seat by raising or lowering the rear edge of the control.

Move the seat forward or rearward by moving the whole control toward the front or toward the rear of the vehicle

Moving the whole control up or down raises or lowers the entire seat cushion

Vertical Control: If your vehicle has power reclining seats, you can use the vertical control to adjust the angle of the seatback. Move the reclining front seatback rearward or forward by moving the control toward the rear or toward the front of the vehicle. See "Reclining Seatbacks" in the Index for further information.

Power Lumbar Control (If Equipped)



If you have power lumbar adjustment, you can increase or decrease lumbar support in the lower seatback. The control is located on the outboard side of the seat cushion.

1-3

To increase support in the lower back area, press and hold the front of the control. Let go of the control when the lower seatback reaches the desired level of support.

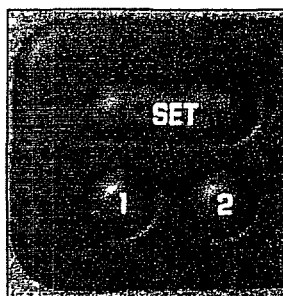
To decrease support in the lower back area, press and hold the rear of the control. Let go of the control when the lower seatback reaches the desired level of support.

You can also reshape the back wing area of the lower seatback.

To increase support in the wing area of the lower seatback, press and hold the top of the control. Let go of the control when the lower seatback reaches the desired level of support.

To decrease support in the wing area of the lower seatback, press and hold the bottom of the control. Let go of the control when the lower seatback reaches the desired level of support.

Memory Seat (If Equipped)



The memory function recalls the driver's seat cushion and recliner positions. The buttons are located on the driver's side door panel.

This feature does not store the lumbar or back support positions.

To set your memory seat, do the following:

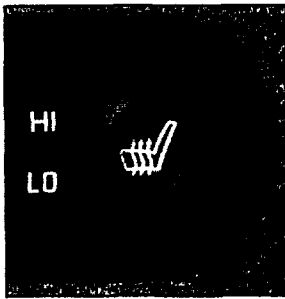
1. Adjust the driver's seat to the desired position.
2. Press the SET button and then press either the 1 or 2 memory button within five seconds.

When your vehicle is in PARK (P), press the same memory button to recall the seat setting.

To program the seat for a second driver, follow the preceding steps, but press the other memory button.

1-4

Heated Front Seats (If Equipped)



If your vehicle has this feature the button used to control the driver's side heated seat is located on the driver's side door panel. The button for the passenger's side heated seat is located on the passenger's side door panel.

The ignition must be in RUN for this feature to operate.

To activate the heated seats, press the button once for the HI heat setting. Press the button again for the LO heat setting. To turn off the heated seats, press the button a third time. An indicator light near the button will illuminate any time the heated seat feature is in use.

Reclining Seatbacks



To adjust the front seatback, lift the lever. The lever is located on the outboard side of the seat cushion. Release the lever to lock the seatback where you want it. Lift the lever without pushing on the seatback and the seatback will go to an upright position.

If your vehicle has power seats with a power recliner, see "Power Seats" in the Index for further information on how to operate the reclining seatback feature.

1-5



But don't have a seatback reclined if your vehicle is moving.

CAUTION:

Sitting in a reclined position when your vehicle is in motion can be dangerous. Even if you buckle up, your safety belts can't do their job when you're reclined like this.

The shoulder belt can't do its job. In a crash, you could go into it, receiving neck or other injuries.

The lap belt can't do its job either. In a crash the belt could go up over your abdomen. The belt forces would be there, not at your pelvic bones.

This could cause serious internal injuries.

For proper protection when the vehicle is in motion, have the seatback upright. Then sit well back in the seat and wear your safety belt properly.

Head Restraints



Adjust your head restraint so that the top of the restraint is closest to the top of your head. This position reduces the chance of a neck injury in a crash.

The head restraints may tilt forward and rearward also.

The rear seat head restraints in your vehicle are adjustable. They work the same as the front seat head restraints, except they do not tilt forward or rearward.

To tilt the front head restraints forward, grasp the top of the restraint and move it forward to where you want it to go until you hear a click. It will then be locked into that position until you need to move it again. Pulling it forward past the last position will allow the restraint to return to its upright position.

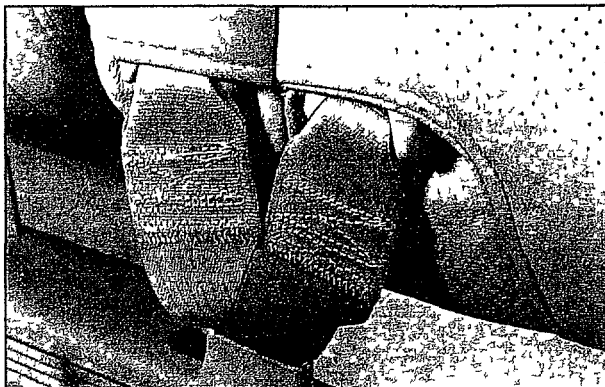
1-7

Rear Seats

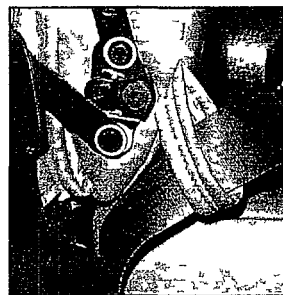
The rear seat is a 60/40 split rear seat that can be folded to give you more cargo space and access to the folding midgate. See "Midgate" in the Index for more information on operation of the folding midgate.

To fold either side of the seat do the following:

- 1 Push the rear head restraints all the way down.



Driver's Side



Passenger Side

- 2 Place the seat belt buckles through the loops/pockets on the seatback(s). This way, the seat belts will be easy to access when the seats are returned to the upright position.



- 3 Pull the seat loop located where the seatback and seat cushion meet. The seat will release and allow you to tilt it toward the front of the vehicle.

1-8



- 4 Grasp the seatback and pull it toward the front of the vehicle. Push it down until it is flat. You may have to move the front seats forward slightly to do this.

- 5 Repeat the procedure for the other side.

To return the seats to the normal position, pull the seatback up and fold the seat cushion down.

CAUTION:

If the seatback isn't locked, it could move forward in a sudden stop or crash. That could cause injury to the person sitting there. Always press rearward on the seatback to be sure it is locked.

CAUTION:

A safety belt that is improperly routed, not properly attached, or twisted won't provide the protection needed in a crash. The person wearing the belt could be seriously injured. After raising the rear seatback, always check to be sure that the safety belts are properly routed and attached, and are not twisted.

1-9

Safety Belts: They're for Everyone

This part of the manual tells you how to use safety belts properly. It also tells you some things you should not do with safety belts.

And it explains the air bag system.

CAUTION:

Don't let anyone ride where he or she can't wear a safety belt properly. If you are in a crash and you're not wearing a safety belt, your injuries can be much worse. You can hit things inside the vehicle or be ejected from it. You can be seriously injured or killed. In the same crash, you might not be if you are buckled up. Always fasten your safety belt, and check that your passengers' belts are fastened properly too.

CAUTION:

It is extremely dangerous to ride in a cargo area, inside or outside of a vehicle. In a collision, people riding in these areas are more likely to be seriously injured or killed. Do not allow people to ride in any area of your vehicle that is not equipped with seats and safety belts. Be sure everyone in your vehicle is in a seat and using a safety belt properly.



Your vehicle has a light that comes on as a reminder to buckle up. See "Safety Belt Reminder Light" in the Index.

In most states and Canadian provinces, the law says to wear safety belts. Here's why *They work*

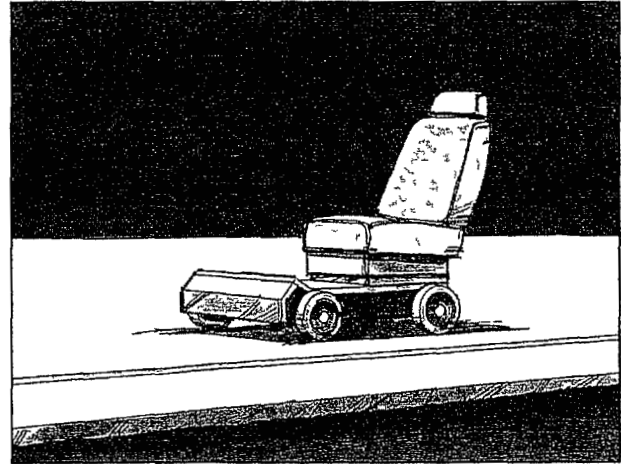
You never know if you'll be in a crash. If you do have a crash, you don't know if it will be a bad one.

A few crashes are mild, and some crashes can be so serious that even buckled up a person wouldn't survive. But most crashes are in between. In many of them, people who buckle up can survive and sometimes walk away. Without belts they could have been badly hurt or killed.

After more than 30 years of safety belts in vehicles, the facts are clear. In most crashes buckling up does matter a lot!

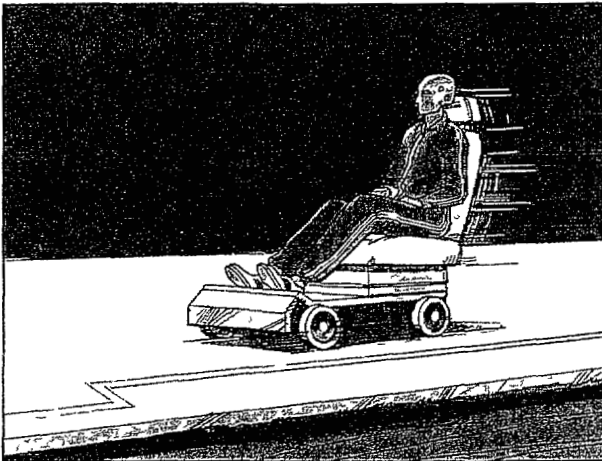
Why Safety Belts Work

When you ride in or on anything, you go as fast as it goes.

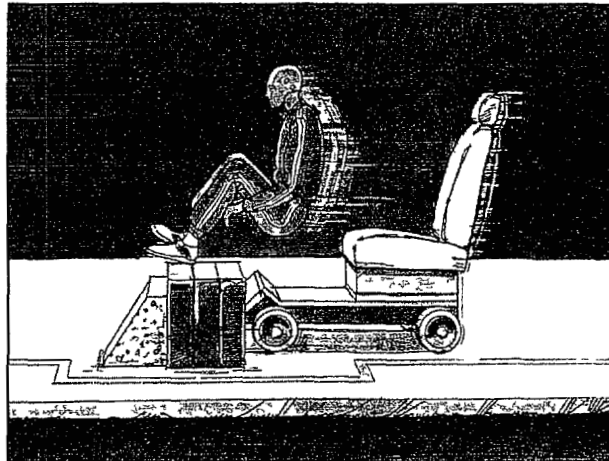


Take the simplest vehicle. Suppose it's just a seat on wheels.

1-11



Put someone on it.

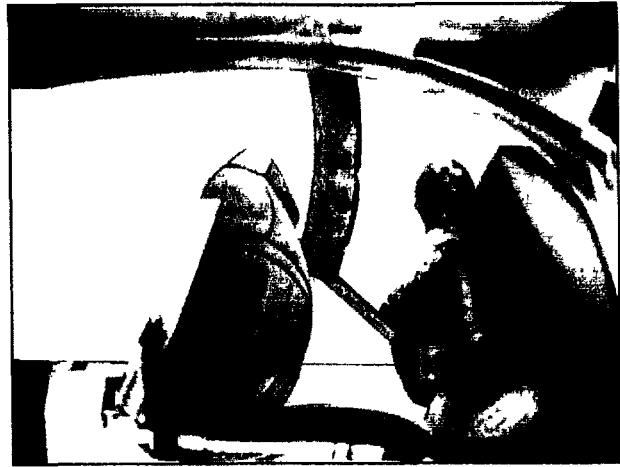


Get it up to speed. Then stop the vehicle. The rider doesn't stop.

1-12

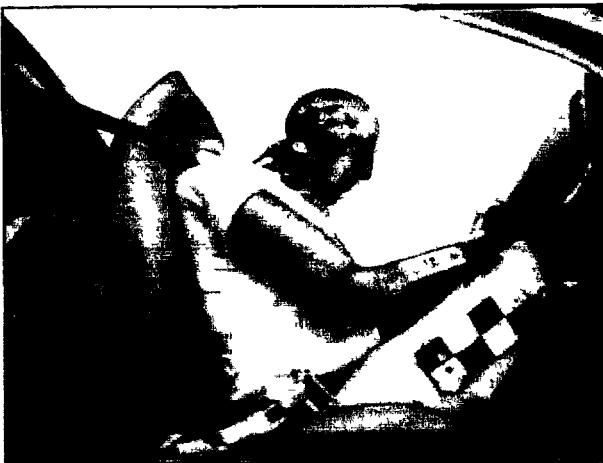


The person keeps going until stopped by something
In a real vehicle, it could be the windshield



or the instrument panel

1-13



or the safety belts!

With safety belts, you slow down as the vehicle does
You get more time to stop. You stop over more distance,
and your strongest bones take the forces. That's why
safety belts make such good sense.

Here Are Questions Many People Ask About Safety Belts -- and the Answers

Q: Won't I be trapped in the vehicle after an
accident if I'm wearing a safety belt?

A: You *could* be -- whether you're wearing a safety
belt or not. But you can unbuckle a safety belt,
even if you're upside down. And your chance of
being conscious during and after an accident, so
you *can* unbuckle and get out, is *much* greater
if you are belted.

Q: If my vehicle has air bags, why should I have
to wear safety belts?

A: Air bags are in many vehicles today and will
be in most of them in the future. But they are
supplemental systems only, so they work *with*
safety belts -- not instead of them. Every air bag
system ever offered for sale has required the use of
safety belts. Even if you're in a vehicle that has air
bags, you still have to buckle up to get the most
protection. That's true not only in frontal collisions,
but especially in side and other collisions.

1-14

Q: If I'm a good driver, and I never drive far from home, why should I wear safety belts?

A: You may be an excellent driver, but if you're in an accident -- even one that isn't your fault -- you and your passengers can be hurt. Being a good driver doesn't protect you from things beyond your control, such as bad drivers.

Most accidents occur within 25 miles (40 km) of home. And the greatest number of serious injuries and deaths occur at speeds of less than 40 mph (65 km/h).

Safety belts are for everyone.

How to Wear Safety Belts Properly

Adults

This part is only for people of adult size.

Be aware that there are special things to know about safety belts and children. And there are different rules for smaller children and babies. If a child will be riding in your vehicle, see the part of this manual called "Children." Follow those rules for everyone's protection.

First, you'll want to know which restraint systems your vehicle has.

We'll start with the driver position.

1-15

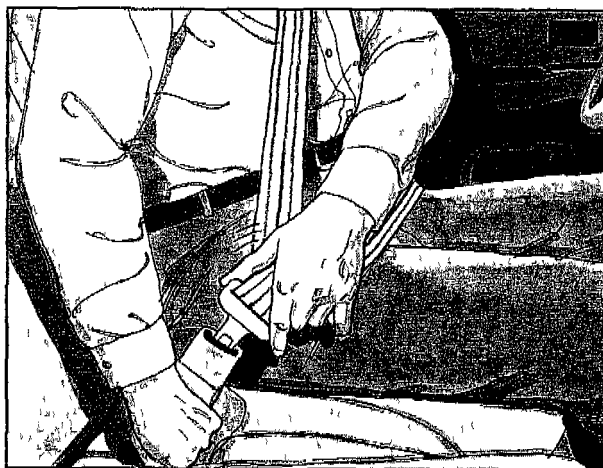
Driver Position

This part describes the driver's restraint system.

Lap-Shoulder Belt

The driver has a lap-shoulder belt. Here's how to wear it properly.

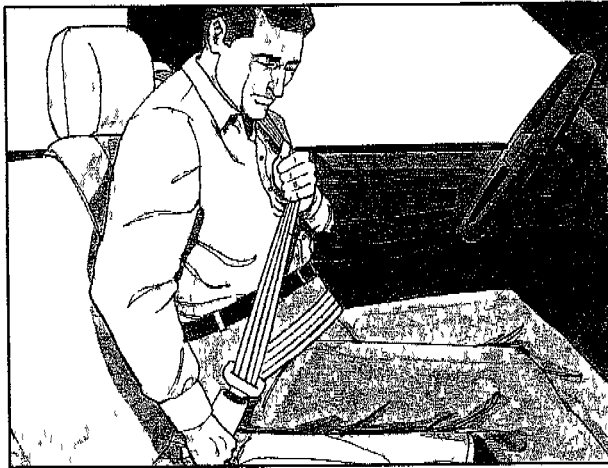
- 1 Close and lock the door.
- 2 Adjust the seat so you can sit up straight. To see how, see "Seats" in the Index.



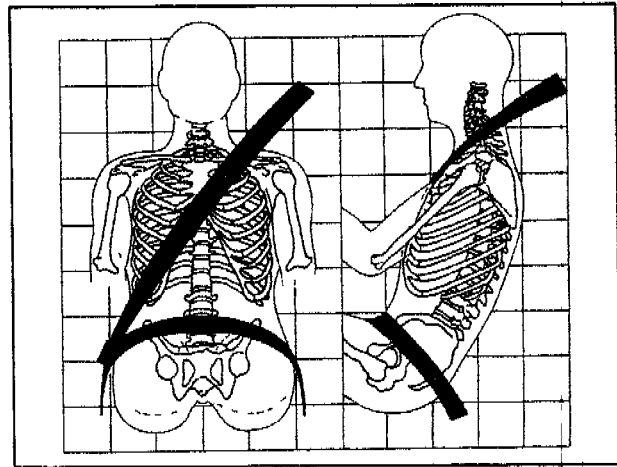
- 3 Pick up the latch plate and pull the belt across you. Don't let it get twisted.
- 4 Push the latch plate into the buckle until it clicks. Pull up on the latch plate to make sure it is secure. If the belt isn't long enough, see "Safety Belt Extender" at the end of this section.

Make sure the release button on the buckle is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.

1-16



- 5 To make the lap part tight, pull down on the buckle end of the belt as you pull up on the shoulder belt

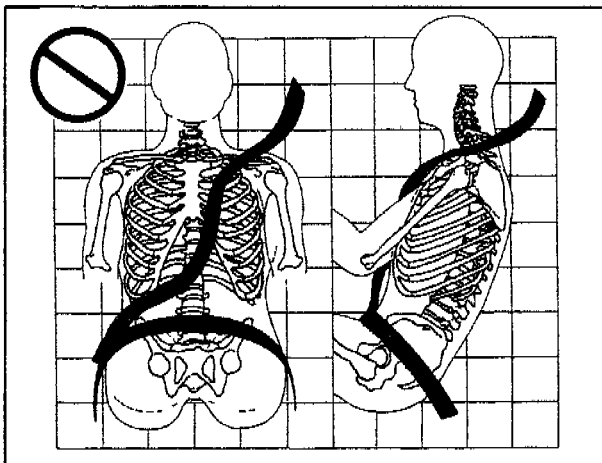


The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.

The safety belt locks if there's a sudden stop or a crash.

1-17

Q: What's wrong with this?



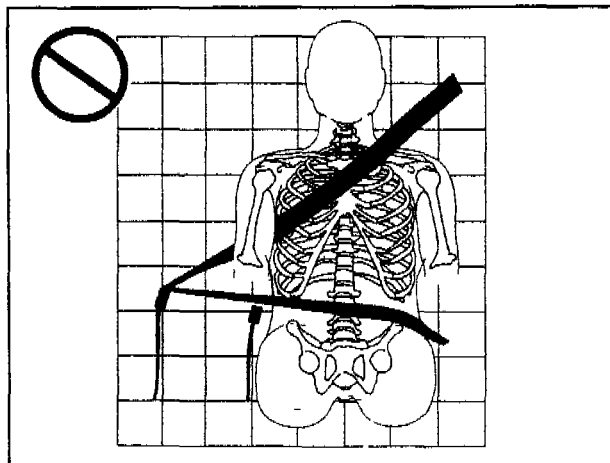
CAUTION:

You can be seriously hurt if your shoulder belt is too loose. In a crash, you would move forward too much, which could increase injury. The shoulder belt should fit against your body.

A: The shoulder belt is too loose. It won't give nearly as much protection this way.

1-18

Q: What's wrong with this?



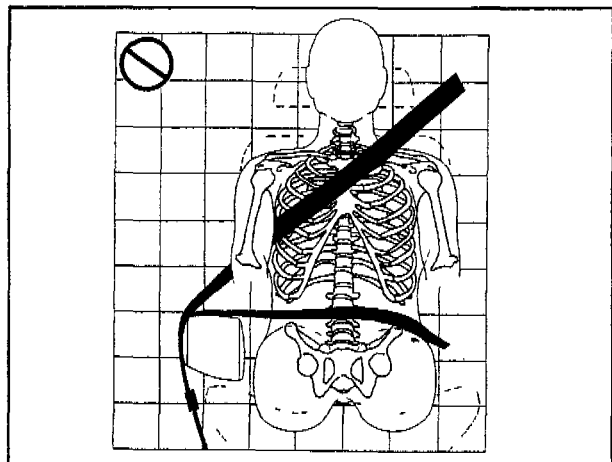
A: The belt is buckled in the wrong place

⚠ CAUTION:

You can be seriously injured if your belt is buckled in the wrong place like this. In a crash, the belt would go up over your abdomen. The belt forces would be there, not at the pelvic bones. This could cause serious internal injuries. Always buckle your belt into the buckle nearest you.

1-19

Q: What's wrong with this?



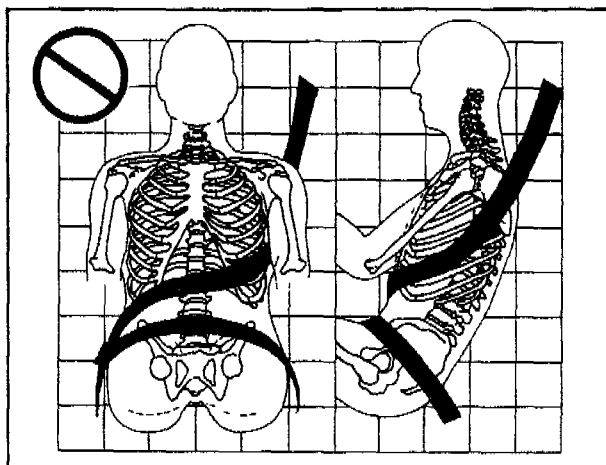
A: The belt is over an armrest

⚠ CAUTION:

You can be seriously injured if your belt goes over an armrest like this. The belt would be much too high. In a crash, you can slide under the belt. The belt force would then be applied at the abdomen, not at the pelvic bones, and that could cause serious or fatal injuries. Be sure the belt goes under the armrests.

1-20

Q: What's wrong with this?



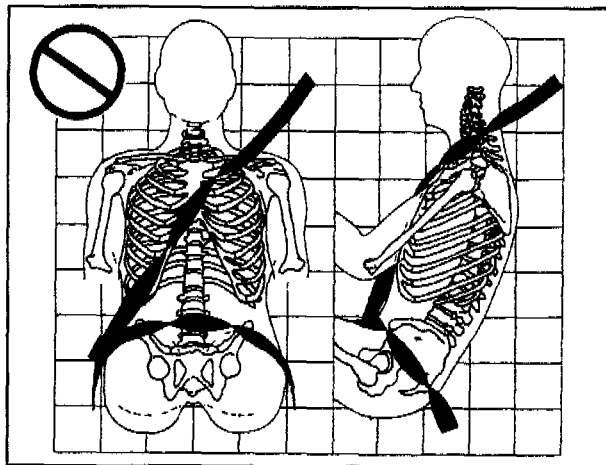
⚠ CAUTION:

You can be seriously injured if you wear the shoulder belt under your arm. In a crash, your body would move too far forward, which would increase the chance of head and neck injury. Also, the belt would apply too much force to the ribs, which aren't as strong as shoulder bones. You could also severely injure internal organs like your liver or spleen.

A: The shoulder belt is worn under the arm. It should be worn over the shoulder at all times

1-21

Q: What's wrong with this?

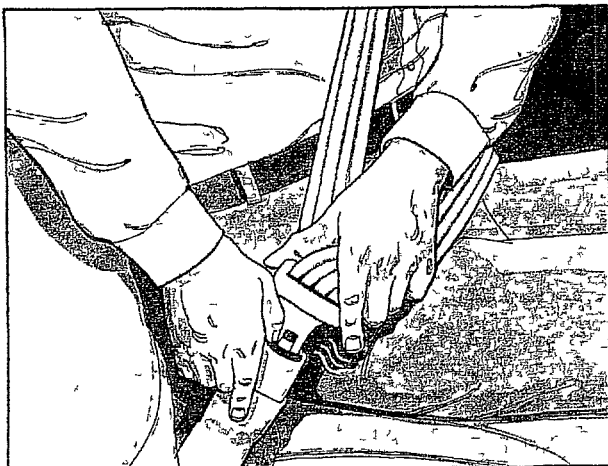


⚠ CAUTION:

You can be seriously injured by a twisted belt. In a crash, you wouldn't have the full width of the belt to spread impact forces. If a belt is twisted, make it straight so it can work properly, or ask your dealer to fix it.

A: The belt is twisted across the body

1-22

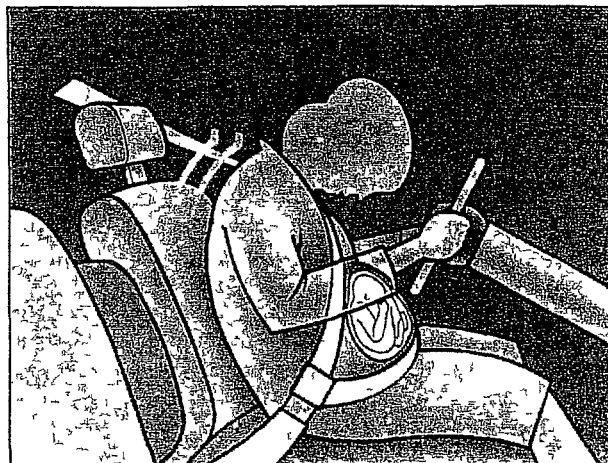


To unlatch the belt, just push the button on the buckle
The belt should go back out of the way

Before you close the door, be sure the belt is out of the way. If you slam the door on it, you can damage both the belt and your vehicle

Safety Belt Use During Pregnancy

Safety belts work for everyone, including pregnant women. Like all occupants, they are more likely to be seriously injured if they don't wear safety belts



A pregnant woman should wear a lap-shoulder belt, and the lap portion should be worn as low as possible, below the rounding, throughout the pregnancy

1-23

The best way to protect the fetus is to protect the mother. When a safety belt is worn properly, it's more likely that the fetus won't be hurt in a crash. For pregnant women, as for anyone, the key to making safety belts effective is wearing them properly

Right Front Passenger Position

To learn how to wear the right front passenger's safety belt properly, see "Driver Position" earlier in this section

The right front passenger's safety belt works the same way as the driver's safety belt -- except for one thing. If you ever pull the shoulder portion of the belt out all the way, you will engage the child restraint locking feature. If this happens, just let the belt go back all the way and start again

Air Bag Systems

This part explains the frontal and side impact air bag systems

Your vehicle has four air bags -- a frontal air bag for the driver, another frontal air bag for the right front passenger, a side impact air bag for the driver, and another side impact air bag for the right front passenger

Frontal air bags are designed to help reduce the risk of injury from the force of an inflating frontal air bag. But these air bags must inflate very quickly to do their job and comply with federal regulations

Here are the most important things to know about the air bag systems

CAUTION:

You can be severely injured or killed in a crash if you aren't wearing your safety belt -- even if you have air bags. Wearing your safety belt during a crash helps reduce your chance of hitting things inside the vehicle or being ejected from it. Air bags are designed to work with safety belts but don't replace them.

Frontal air bags for the driver and right front passenger are designed to work only in moderate to severe crashes where the front of your vehicle hits something.

CAUTION: (Continued)

CAUTION: (Continued)

They aren't designed to inflate at all in rollover, rear, side or low-speed frontal crashes. And, for some unrestrained occupants, frontal air bags may provide less protection in frontal crashes than more forceful air bags have provided in the past. The side impact air bags for the driver and right front passenger are designed to inflate only in moderate to severe crashes where something hits the side of your vehicle. They aren't designed to inflate in frontal, in rollover or in rear crashes. Everyone in your vehicle should wear a safety belt properly -- whether or not there's an air bag for that person.

 CAUTION:

Both frontal and side impact air bags inflate with great force, faster than the blink of an eye. If you're too close to an inflating air bag, as you would be if you were leaning forward, it could seriously injure you. Safety belts help keep you in position for air bag inflation before and during a crash. Always wear your safety belt, even with frontal air bags. The driver should sit as far back as possible while still maintaining control of the vehicle. Front occupants should not lean on or sleep against the door.

1-25

 CAUTION:

Anyone who is up against, or very close to, any air bag when it inflates can be seriously injured or killed. Air bags plus lap-shoulder belts offer the best protection for adults, but not for young children and infants. Neither the vehicle's safety belt system nor its air bag system is designed for them. Young children and infants need the protection that a child restraint system can provide. Always secure children properly in your vehicle. To read how, see the part of this manual called "Children."

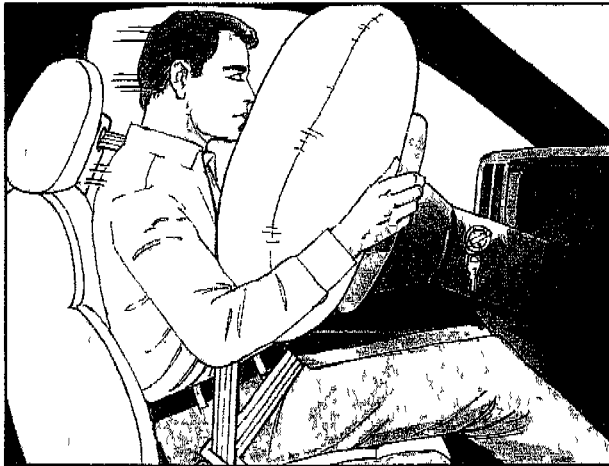


There is an air bag readiness light on the instrument panel, which shows the air bag symbol

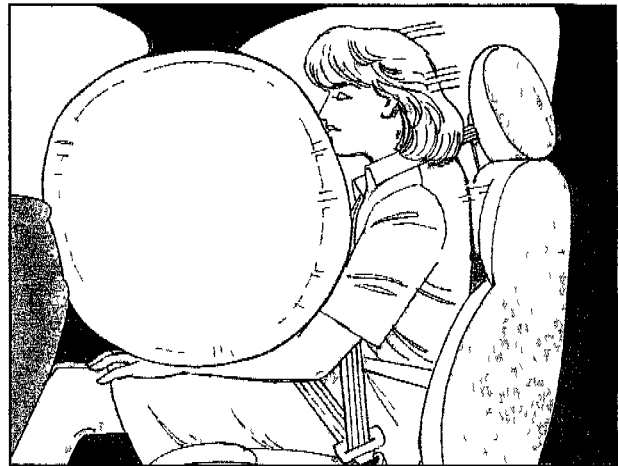
The system checks the air bag electrical system for malfunctions. The light tells you if there is an electrical problem. See "Air Bag Readiness Light" in the Index for more information.

How the Air Bag Systems Work

Where are the air bags?



The driver's frontal air bag is in the middle of the steering wheel



The right front passenger's frontal air bag is in the instrument panel on the passenger's side

The driver's side impact air bag is in the side of the driver's seatback closest to the door

1-27



The right front passenger's side impact air bag is in the side of the passenger's seatback closest to the door



CAUTION:

If something is between an occupant and an air bag, the bag might not inflate properly or it might force the object into that person causing severe injury or even death. The path of an inflating air bag must be kept clear. Don't put anything between an occupant and an air bag, and don't attach or put anything on the steering wheel hub or on or near any other air bag covering. Don't let seat covers block the inflation path of a side impact air bag.

When should an air bag inflate?

The driver's and right front passenger's frontal air bags are designed to inflate in moderate to severe frontal or near-frontal crashes. But they are designed to inflate only if the impact speed is above the system's designed "threshold level."

If your vehicle goes straight into a wall that doesn't move or deform, the threshold level is about 9 to 16 mph (14 to 26 km/h). The threshold level can vary, however, with specific vehicle design, so that it can be somewhat above or below this range.

If your vehicle strikes something that will move or deform, such as a parked car, the threshold level will be higher. The driver's and right front passenger's frontal air bags are not designed to inflate in rollovers, rear impacts, or in many side impacts because inflation would not help the occupant.

The side impact air bags are designed to inflate in moderate to severe side crashes. A side impact air bag will inflate if the crash severity is above the system's designed "threshold level." The threshold level can vary with specific vehicle design.

Side impact air bags are not designed to inflate in frontal or near-frontal impacts, rollovers or rear impacts, because inflation would not help the occupant. A side impact air bag will only deploy on the side of the vehicle that is struck.

In any particular crash, no one can say whether an air bag should have inflated simply because of the damage to a vehicle or because of what the repair costs were. For frontal air bags, inflation is determined by the angle of the impact and how quickly the vehicle slows down in frontal and near-frontal impacts. For side impact air bags, inflation is determined by the location and severity of the impact.

The air bag system is designed to work properly under a wide range of conditions, including off-road usage. Observe safe driving speeds, especially on rough terrain. As always, wear your safety belt. See "Off-Road Driving" in the Index for more tips on off-road driving.

1-29

What makes an air bag inflate?

In an impact of sufficient severity, the air bag sensing system detects that the vehicle is in a crash. For both frontal and side impact air bags, the sensing system triggers a release of gas from the inflator, which inflates the air bag. The inflator, air bag and related hardware are all part of the air bag modules inside the steering wheel, instrument panel and the side of the front seatbacks closest to the door.

How does an air bag restrain?

In moderate to severe frontal or near frontal collisions, even belted occupants can contact the steering wheel or the instrument panel. In moderate to severe side collisions, even belted occupants can contact the inside of the vehicle. The air bag supplements the protection provided by safety belts. Air bags distribute the force of the impact more evenly over the occupant's upper body, stopping the occupant more gradually. But the frontal air bags would not help you in many types of collisions, including rollovers, rear impacts, and many side impacts, primarily because an occupant's motion is not toward the air bag. Side impact air bags would not help you in many types of collisions, including frontal or near frontal collisions, rollovers, and rear impacts, primarily because an occupant's motion is not toward those air bags.

Air bags should never be regarded as anything more than a supplement to safety belts, and then only in moderate to severe frontal or near-frontal collisions for the driver's and right front passenger's frontal air bags, and only in moderate to severe side collisions for the driver's and right front passenger's side impact air bags.

What will you see after an air bag inflates?

After an air bag inflates, it quickly deflates, so quickly that some people may not even realize the air bag inflated. Some components of the air bag module -- the steering wheel hub for the driver's air bag, the instrument panel for the right front passenger's bag, the side of the seatback closest to the door for the driver and right front passenger's side impact air bags -- will be hot for a short time. The parts of the bag that come into contact with you may be warm, but not too hot to touch. There will be some smoke and dust coming from the vents in the deflated air bags. Air bag inflation doesn't prevent the driver from seeing or being able to steer the vehicle, nor does it stop people from leaving the vehicle.

CAUTION:

When an air bag inflates, there is dust in the air. This dust could cause breathing problems for people with a history of asthma or other breathing trouble. To avoid this, everyone in the vehicle should get out as soon as it is safe to do so. If you have breathing problems but can't get out of the vehicle after an air bag inflates, then get fresh air by opening a window or a door.

In many crashes severe enough to inflate an air bag, windshields are broken by vehicle deformation. Additional windshield breakage may also occur from the right front passenger air bag.

- Air bags are designed to inflate only once. After an air bag inflates, you'll need some new parts for your air bag system. If you don't get them, the air bag system won't be there to help protect you in another crash. A new system will include air bag modules and possibly other parts. The service manual for your vehicle covers the need to replace other parts.

- Your vehicle is equipped with a crash sensing and diagnostic module, which records information about the frontal air bag system. The module records information about the readiness of the system, when the system commands air bag inflation and driver's safety belt usage at deployment. The module also records speed, engine rpm, brake and throttle data.
- Let only qualified technicians work on your air bag systems. Improper service can mean that an air bag system won't work properly. See your dealer for service.

NOTICE:

If you damage the covering for the driver's or the right front passenger's air bag, or the air bag covering on the driver's and right front passenger's seatback, the bag may not work properly. You may have to replace the air bag module in the steering wheel, both the air bag module and the instrument panel for the right front passenger's air bag, or both the air bag module and seatback for the driver's and right front passenger's side impact air bag. Do not open or break the air bag coverings.

1-31

Servicing Your Air Bag-Equipped Vehicle

Air bags affect how your vehicle should be serviced. There are parts of the air bag systems in several places around your vehicle. Your dealer and the service manual have information about servicing your vehicle and the air bag systems. To purchase a service manual, see "Service and Owner Publications" in the Index.

CAUTION:

For up to 10 minutes after the ignition key is turned off and the battery is disconnected, an air bag can still inflate during improper service. You can be injured if you are close to an air bag when it inflates. Avoid yellow connectors. They are probably part of the air bag systems. Be sure to follow proper service procedures, and make sure the person performing work for you is qualified to do so.

The air bag systems do not need regular maintenance.

Adding Equipment to Your Air Bag-Equipped Vehicle

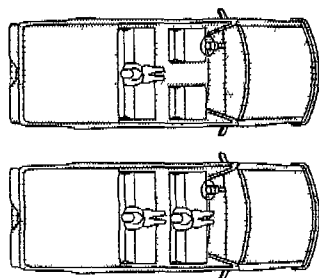
- Q:** If I add a push bumper or bicycle rack to the front of my vehicle, will it keep the air bags from working properly?
- A:** As long as the push bumper or bicycle rack is attached to your vehicle so that the vehicle's basic structure isn't changed, it's not likely to keep the air bags from working properly in a crash.
- Q:** Is there anything I might add to the front or sides of the vehicle that could keep the air bags from working properly?
- A:** Yes. If you add things that change your vehicle's frame, bumper system, front end or side sheet metal or height, they may keep the air bag system from working properly. Also, the air bag system may not work properly if you relocate any of the air bag sensors. If you have any questions about this, you should contact Customer Assistance before you modify your vehicle. The phone numbers and addresses for Customer Assistance are in Step Two of the Customer Satisfaction Procedure in this manual. See "Customer Satisfaction Procedure" in the Index.

1-32

Q: What if I add a snow plow? Will it keep the air bags from working properly?

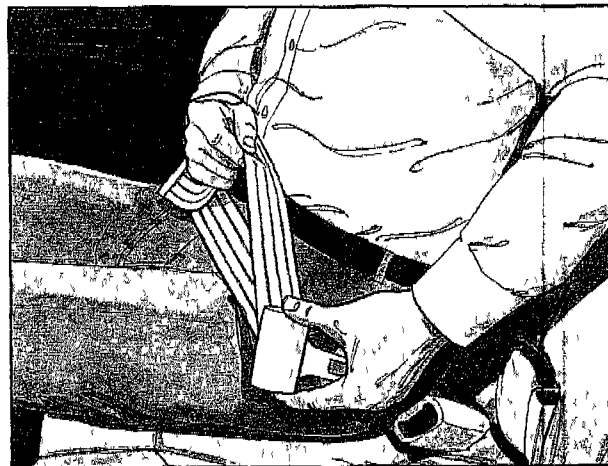
A: We've designed our air bag systems to work properly under a wide range of conditions, including snow plowing with vehicles equipped with the optional Snow Plow Prep Package (RPO VYU). But don't change or defeat the snow plow's "tripping mechanism." If you do, it can damage your snow plow and your vehicle, and it may cause an air bag inflation.

Center Passenger Position



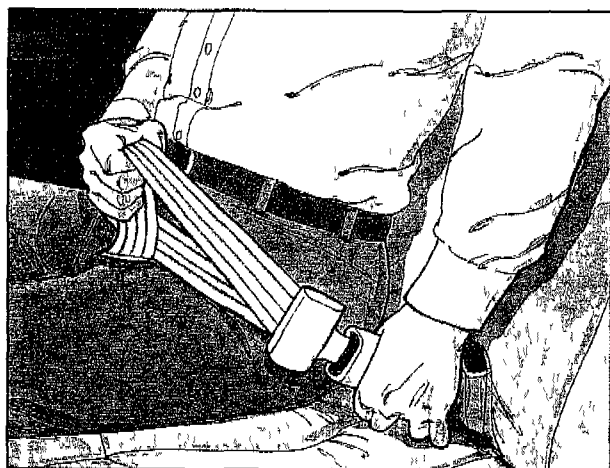
Lap Belt

If your vehicle has front and rear bench seats, someone can sit in the center positions.



When you sit in a center seating position, you have a lap safety belt, which has no retractor. To make the belt longer, tilt the latch plate and pull it along the belt.

1-33



To make the belt shorter, pull its free end as shown until the belt is snug.

Buckle, position and release it the same way as the lap part of a lap-shoulder belt. If the belt isn't long enough, see "Safety Belt Extender" at the end of this section.

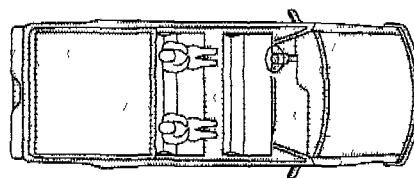
Make sure the release button on the buckle is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.

Rear Seat Passengers

It's very important for rear seat passengers to buckle up! Accident statistics show that unbelted people in the rear seat are hurt more often in crashes than those who are wearing safety belts.

Rear passengers who aren't safety belted can be thrown out of the vehicle in a crash. And they can strike others in the vehicle who are wearing safety belts.

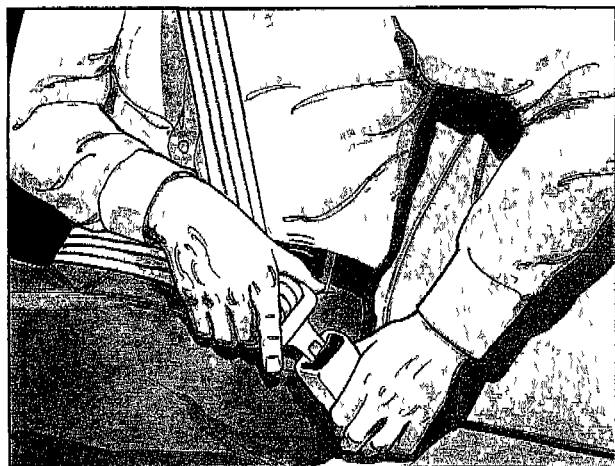
Rear Seat Outside Passenger Positions



1-34

Lap-Shoulder Belt

The positions next to the windows have lap-shoulder belts. Here's how to wear one properly

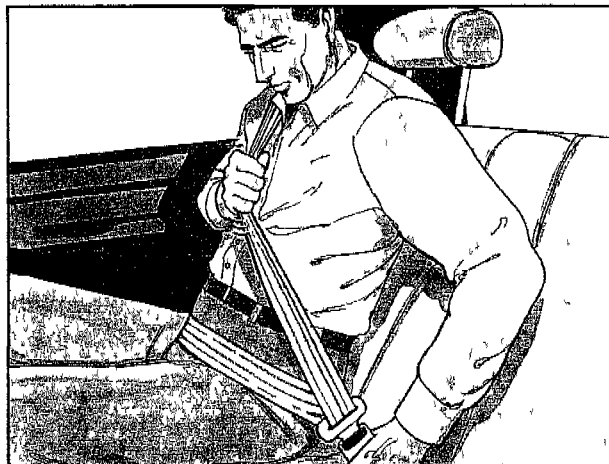


- 1 Pick up the latch plate and pull the belt across you. Don't let it get twisted.
- 2 Push the latch plate into the buckle until it clicks. Pull up on the latch plate to make sure it is secure.

When the shoulder belt is pulled out all the way, it will lock. If it does, let it go back all the way and start again.

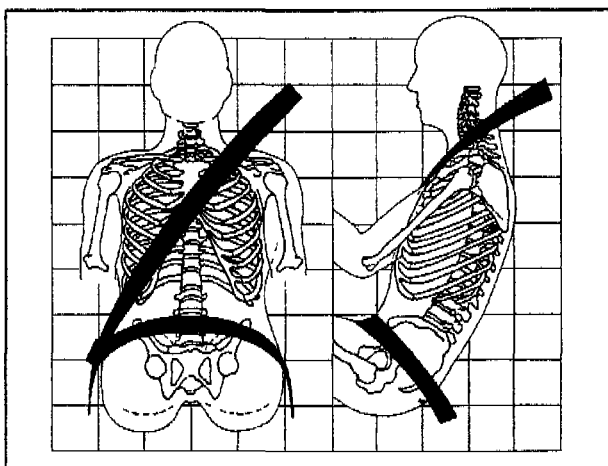
If the belt is not long enough, see "Safety Belt Extender" at the end of this section.

Make sure the release button on the buckle is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.



- 3 To make the lap part tight, pull down on the buckle end of the belt as you pull up on the shoulder part.

1-35

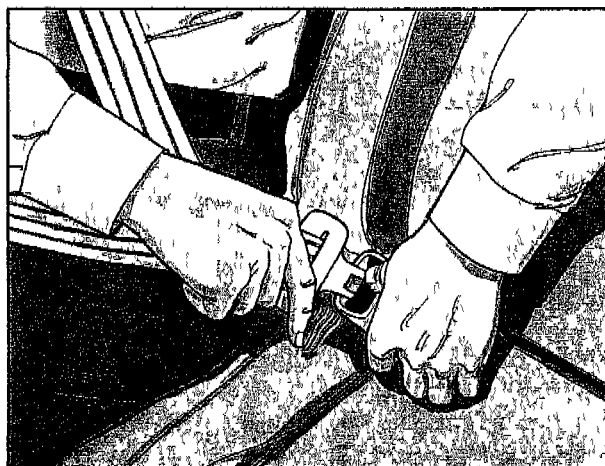


The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.

The safety belt locks if there's a sudden stop or a crash.

CAUTION:

You can be seriously hurt if your shoulder belt is too loose. In a crash, you would move forward too much, which could increase injury. The shoulder belt should fit against your body.



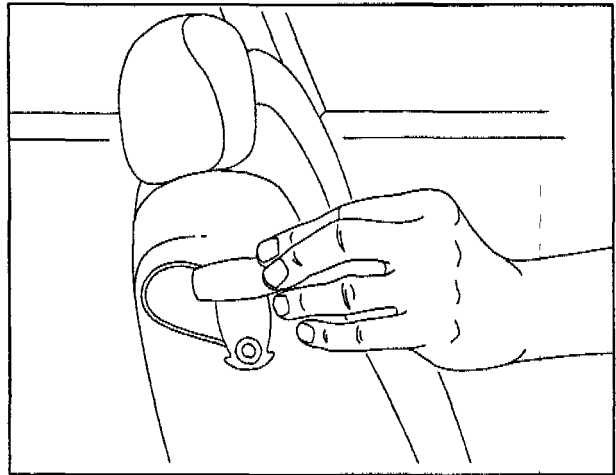
To unlatch the belt, just push the button on the buckle.

1-36

Rear Safety Belt Comfort Guides for Children and Small Adults

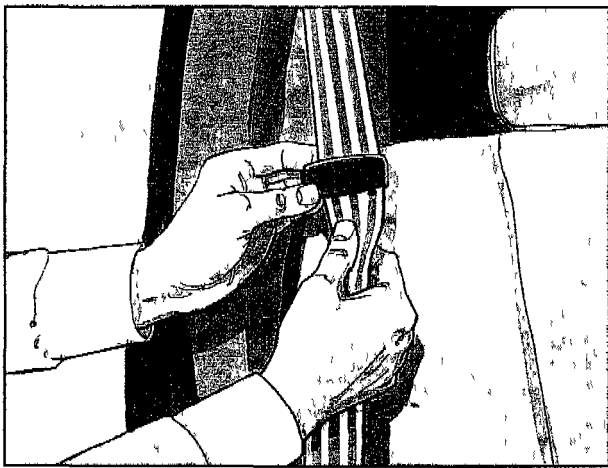
Rear shoulder belt comfort guides will provide added safety belt comfort for older children who have outgrown booster seats and for small adults. When installed on a shoulder belt, the comfort guide better positions the belt away from the neck and head.

There is one guide for each outside passenger in the rear seat. To provide added safety belt comfort for children who have outgrown child restraints and for smaller adults, the comfort guides may be installed on the shoulder belts. Here's how to install a comfort guide and use the safety belt.

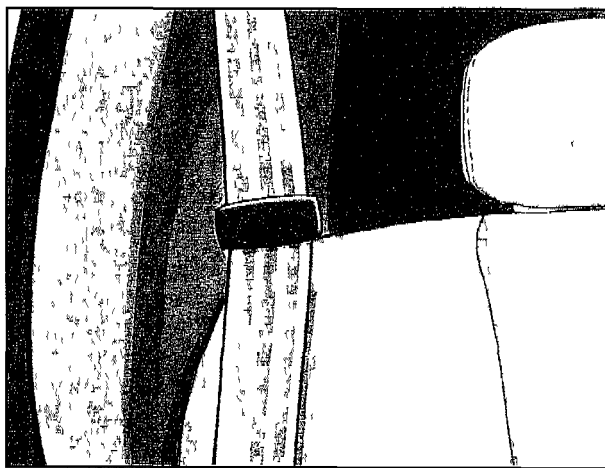


- 1 Remove the guide from the storage clip on the side of the rear seatback.

1-37

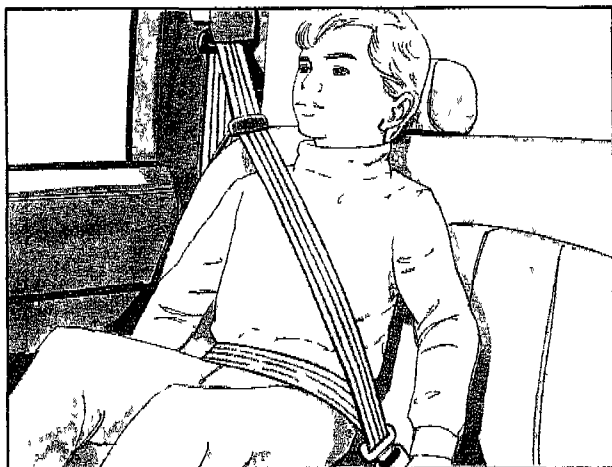


- 2 Place the guide over the belt and insert the two edges of the belt into the slots of the guide.



- 3 Be sure that the belt is not twisted and it lies flat. The guide must be on top of the belt.

1-38



Children

Everyone in a vehicle needs protection! This includes infants and all other children. Neither the distance traveled nor the age and size of the traveler changes the need, for everyone, to use safety restraints. In fact, the law in every state in the United States and in every Canadian province says children up to some age must be restrained while in a vehicle.

Infants and Young Children

Every time infants and young children ride in vehicles, they should have the protection provided by the appropriate restraint. Young children should not use the vehicle's safety belts, unless there is no other choice.

- 4 Buckle, position and release the safety belt as described in "Rear Seat Outside Passenger Positions" earlier in this section. Make sure that the shoulder belt crosses the shoulder.

To remove and store the comfort guides, squeeze the belt edges together so that you can take them out of the guides. Attach the guide onto the storage clip.

1-39



⚠ CAUTION:

People should never hold a baby in their arms while riding in a vehicle. A baby doesn't weigh much -- until a crash. During a crash a baby will become so heavy it is not possible to hold it.

CAUTION: (Continued)

CAUTION: (Continued)

For example, in a crash at only 25 mph (40 km/h), a 12-lb. (5.5 kg) baby will suddenly become a 240-lb. (110 kg) force on a person's arms. A baby should be secured in an appropriate restraint.



 CAUTION:

Children who are up against, or very close to, any air bag when it inflates can be seriously injured or killed. Air bags plus lap-shoulder belts offer outstanding protection for adults and older children, but not for young children and infants. Neither the vehicle's safety belt system nor its air bag system is designed for them. Young children and infants need the protection that a child restraint system can provide.

Q: What are the different types of add-on child restraints?

A: Add-on child restraints, which are purchased by the vehicle's owner, are available in four basic types. Selection of a particular restraint should take into consideration not only the child's weight, height and age but also whether or not the restraint will be compatible with the motor vehicle in which it will be used.

For most basic types of child restraints, there are many different models available. When purchasing a child restraint, be sure it is designed to be used in a motor vehicle. If it is, the restraint will have a label saying that it meets federal motor vehicle safety standards.

The restraint manufacturer's instructions that come with the restraint state the weight and height limitations for a particular child restraint. In addition, there are many kinds of restraints available for children with special needs.

1-41

 CAUTION:

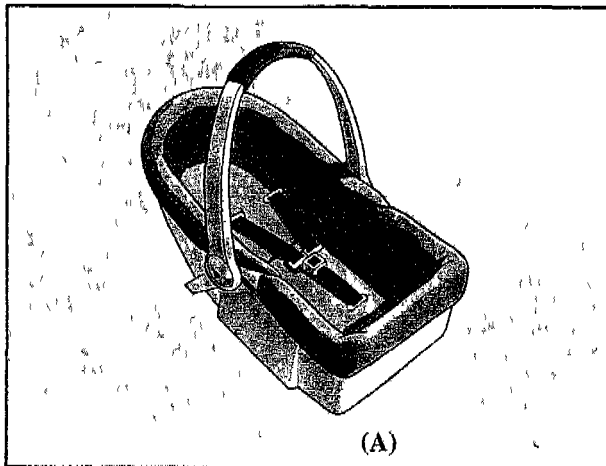
Newborn infants need complete support, including support for the head and neck. This is necessary because a newborn infant's neck is weak and its head weighs so much compared with the rest of its body. In a crash, an infant in a rear-facing seat settles into the restraint, so the crash forces can be distributed across the strongest part of an infant's body, the back and shoulders. Infants always should be secured in appropriate infant restraints.

 CAUTION:

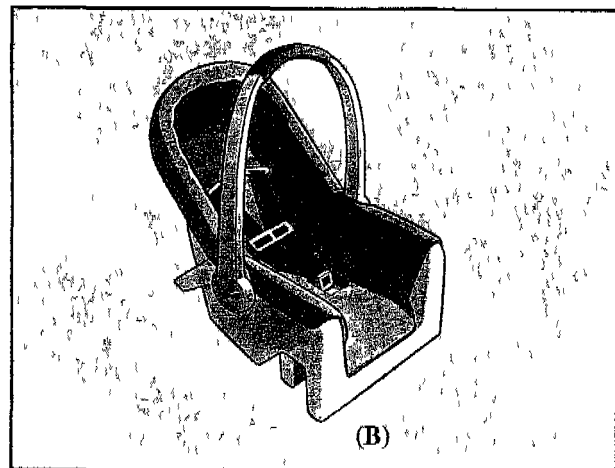
The body structure of a young child is quite unlike that of an adult or older child, for whom the safety belts are designed. A young child's hip bones are still so small that the vehicle's regular safety belt may not remain low on the hip bones, as it should. Instead, it may settle up around the child's abdomen. In a crash, the belt would apply force on a body area that's unprotected by any bony structure. This alone could cause serious or fatal injuries. Young children always should be secured in appropriate child restraints.

1-42

Restraint Systems for Children

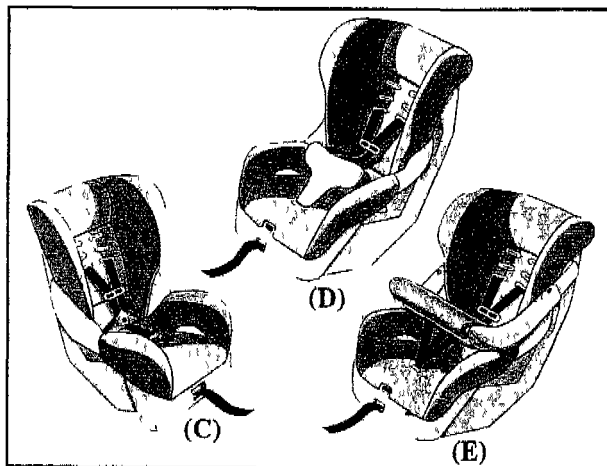


An infant car bed (A), a special bed made for use in a motor vehicle, is an infant restraint system designed to restrain or position a child on a continuous flat surface. Make sure that the infant's head rests toward the center of the vehicle.

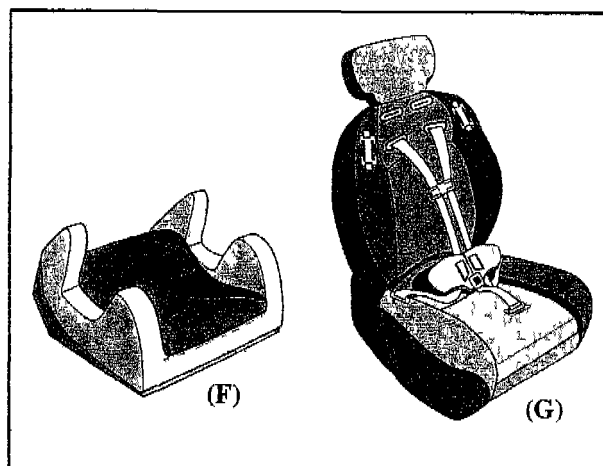


A rear-facing infant seat (B) provides restraint with the seating surface against the back of the infant. The harness system holds the infant in place and, in a crash, acts to keep the infant positioned in the restraint.

1-43



A forward-facing child seat (C-E) provides restraint for the child's body with the harness and also sometimes with surfaces such as T-shaped or shelf-like shields.



A booster seat (F-G) is a child restraint designed to improve the fit of the vehicle's safety belt system. Some booster seats have a shoulder belt positioner, and some high-back booster seats have a five-point harness. A booster seat can also help a child to see out the window.

1-44

Q: How do child restraints work?

A: A child restraint system is any device designed for use in a motor vehicle to restrain, seat, or position children. A built-in child restraint system is a permanent part of the motor vehicle. An add-on child restraint system is a portable one, which is purchased by the vehicle's owner.

For many years, add-on child restraints have used the adult belt system in the vehicle. To help reduce the chance of injury, the child also has to be secured within the restraint. The vehicle's belt system secures the add-on child restraint in the vehicle, and the add-on child restraint's harness system holds the child in place within the restraint.

One system, the three-point harness, has straps that come down over each of the infant's shoulders and buckle together at the crotch. The five-point harness system has two shoulder straps, two hip straps and a crotch strap. A shield may take the place of hip straps.

A T-shaped shield has shoulder straps that are attached to a flat pad which rests low against the child's body. A shelf- or armrest-type shield has straps that are attached to a wide, shelf-like shield that swings up or to the side.

When choosing a child restraint, be sure the child restraint is designed to be used in a vehicle. If it is, it will have a label saying that it meets federal motor vehicle safety standards.

Then follow the instructions for the restraint. You may find these instructions on the restraint itself or in a booklet, or both. These restraints use the belt system in your vehicle, but the child also has to be secured within the restraint to help reduce the chance of personal injury. When securing an add-on child restraint, refer to the instructions that come with the restraint which may be on the restraint itself or in a booklet, or both, and to this manual. The child restraint instructions are important, so if they are not available, obtain a replacement copy from the manufacturer.

1-45

Where to Put the Restraint

Accident statistics show that children are safer if they are restrained in the rear rather than the front seat. General Motors, therefore, recommends that child restraints be secured in a rear seat including an infant riding in a rear-facing infant seat, a child riding in a forward-facing child seat and an older child riding in a booster seat. *Never* put a rear-facing child restraint in the right front passenger seat. Here's why:

CAUTION:

A child in a rear-facing child restraint can be seriously injured or killed if the right front passenger's air bag inflates. This is because the back of the rear-facing child restraint would be very close to the inflating air bag. Always secure a rear-facing child restraint in a rear seat.

You may secure a forward-facing child restraint in the right front seat, but before you do, always move the front passenger seat as far back as it will go. It's better to secure the child restraint in a rear seat.

Wherever you install it, be sure to secure the child restraint properly.

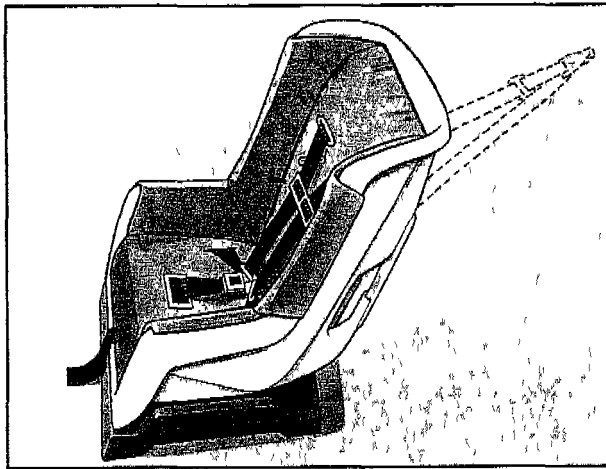
Keep in mind that an unsecured child restraint can move around in a collision or sudden stop and injure people in the vehicle. Be sure to properly secure any child restraint in your vehicle -- even when no child is in it.

Top Strap

Some child restraints have a top strap, or "top tether." It can help restrain the child restraint during a collision. For it to work, a top strap must be properly anchored to the vehicle. Some top strap-equipped child restraints are designed for use with or without the top strap being anchored. Others require the top strap always to be anchored. Be sure to read and follow the instructions for your child restraint. If yours requires that the top strap be anchored, don't use the restraint unless it is anchored properly.

If the child restraint does not have a top strap, one can be obtained, in kit form, for many child restraints. Ask the child restraint manufacturer whether or not a kit is available.

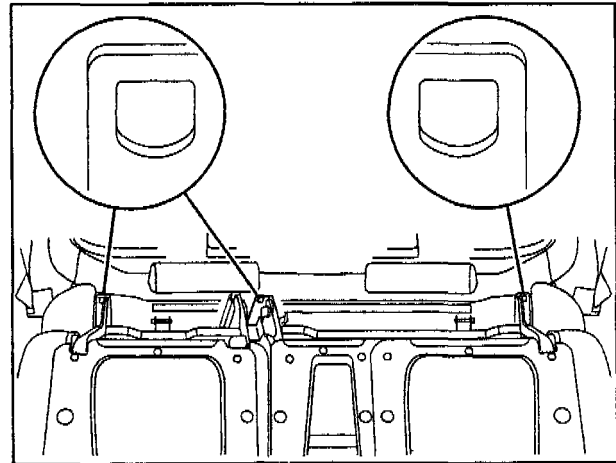
1-46



In Canada, the law requires that forward-facing child restraints have a top strap, and that the strap be anchored. In the United States, some child restraints also have a top strap. If your child restraint has a top strap, it should be anchored.

Anchor the top strap to one of the following anchor points. Be sure to use an anchor point located on the same side of the vehicle as the seating position where the child restraint will be placed. If you have an adjustable head restraint, raise the head restraint and route the top strap under it.

Once you have the top strap anchored, you'll be ready to secure the child restraint itself. Tighten the top strap when and as the child restraint manufacturer's instructions say.



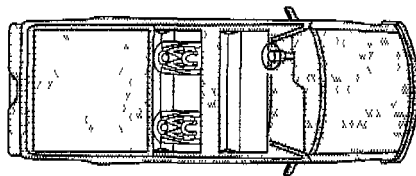
60/40 Split Rear Seat Folded

An anchor loop bracket for a top strap is located on the back of the rear seat frame above the floor for each rear seating position. In order to get to the brackets, you'll have to fold the rear seatback(s).

See "Rear Seats" in the Index for information on folding the rear seatbacks.

1-47

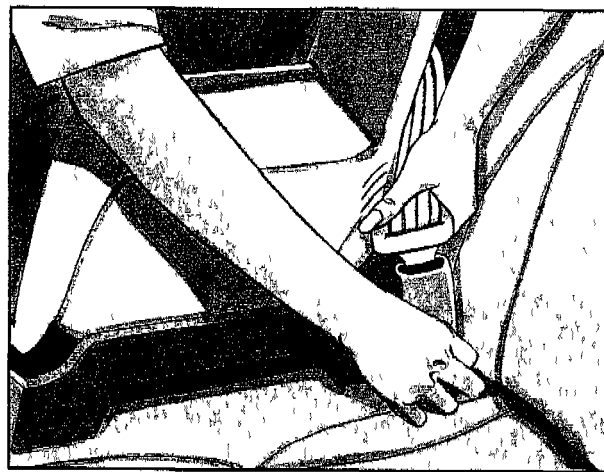
Securing a Child Restraint in a Rear Outside Seat Position



You'll be using the lap-shoulder belt. See the earlier part about the top strap if the child restraint has one. Be sure to follow the instructions that came with the child restraint. Secure the child in the child restraint when and as the instructions say.

- 1 Put the restraint on the seat.
- 2 Pick up the latch plate, and run the lap and shoulder portions of the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.

If the shoulder belt goes in front of the child's face or neck, put it behind the child restraint.



- 3 Buckle the belt. Make sure the release button is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.

1-48



- 4 Pull the rest of the shoulder belt all the way out of the retractor to set the lock

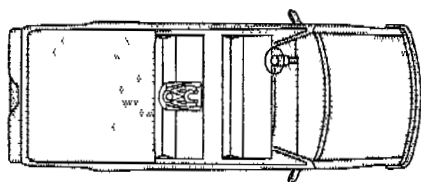


- 5 To tighten the belt, feed the shoulder belt back into the retractor while you push down on the child restraint. If you're using a forward-facing child restraint, you may find it helpful to use your knee to push down on the child restraint as you tighten the belt.
- 6 Push and pull the child restraint in different directions to be sure it is secure.

To remove the child restraint, just unbuckle the vehicle's safety belt and let it go back all the way. The safety belt will move freely again and be ready to work for an adult or larger child passenger.

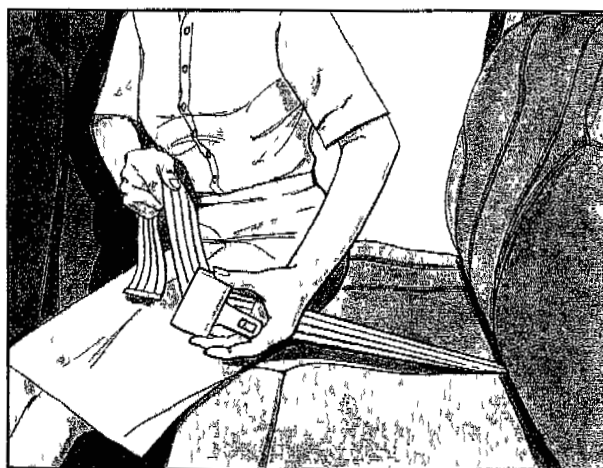
1-49

Securing a Child Restraint in a Center Rear Seat Position

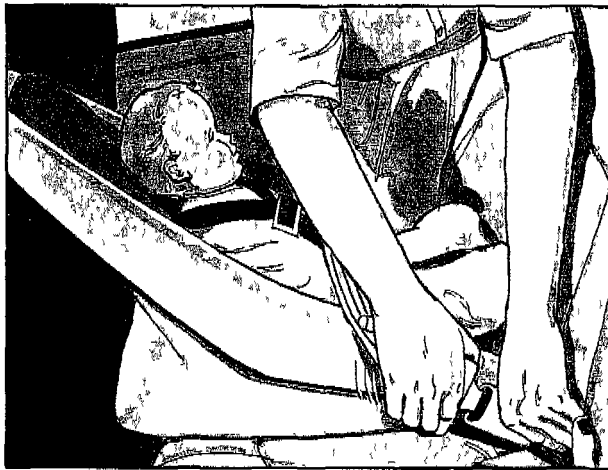


You'll be using the lap belt. Be sure to follow the instructions that came with the child restraint. Secure the child in the child restraint when and as the instructions say.

See the earlier part about the top strap if the child restraint has one.



- 1 Make the belt as long as possible by tilting the latch plate and pulling it along the belt.
- 2 Put the restraint on the seat.
- 3 Run the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.

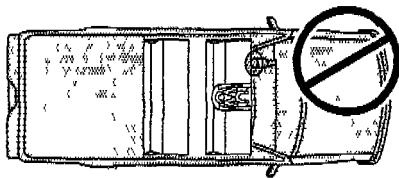


- 4 Buckle the belt. Make sure the release button is positioned so you would be able to unbuckle the safety belt quickly if you ever had to
- 5 To tighten the belt, pull its free end while you push down on the child restraint. If you're using a forward-facing child restraint, you may find it helpful to use your knee to push down on the child restraint as you tighten the belt
- 6 Push and pull the child restraint in different directions to be sure it is secure

To remove the child restraint, just unbuckle the vehicle's safety belt. It will be ready to work for an adult or larger child passenger.

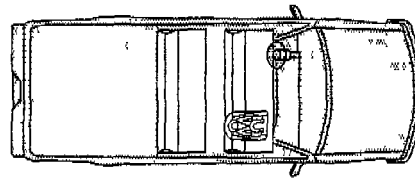
1-51

Securing a Child Restraint in the Center Front Seat Position



Don't use child restraints in this position. The restraints won't work properly.

Securing a Child Restraint in the Right Front Seat Position



Your vehicle has a right front passenger air bag. *Never* put a rear-facing child restraint in this seat. Here's why:

CAUTION:

A child in a rear-facing child restraint can be seriously injured or killed if the right front passenger's air bag inflates. This is because the back of the rear-facing child restraint would be very close to the inflating air bag. Always secure a rear-facing child restraint in the rear seat.

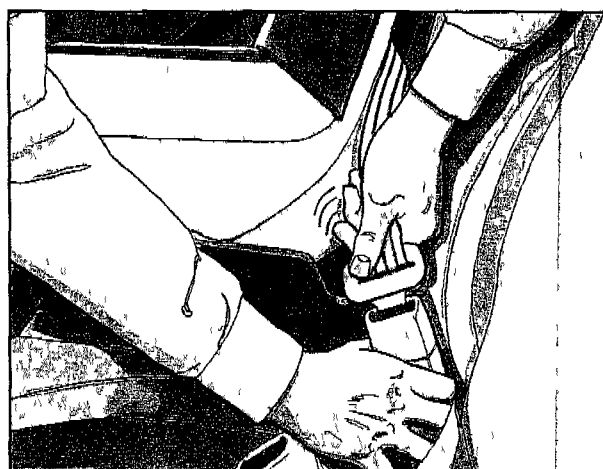
1-52

Although a rear seat is a safer place, you can secure a forward-facing child restraint in the right front seat

You'll be using the lap-shoulder belt. See the earlier part about the top strap if the child restraint has one. Be sure to follow the instructions that came with the child restraint. Secure the child in the child restraint when and as the instructions say

1. Because your vehicle has a right front passenger air bag, always move the seat as far back as it will go before securing a forward-facing child restraint. See "Seats" in the Index.
2. Put the restraint on the seat.
3. Pick up the latch plate, and run the lap and shoulder portions of the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.

If the shoulder belt goes in front of the child's face or neck, put it behind the child restraint

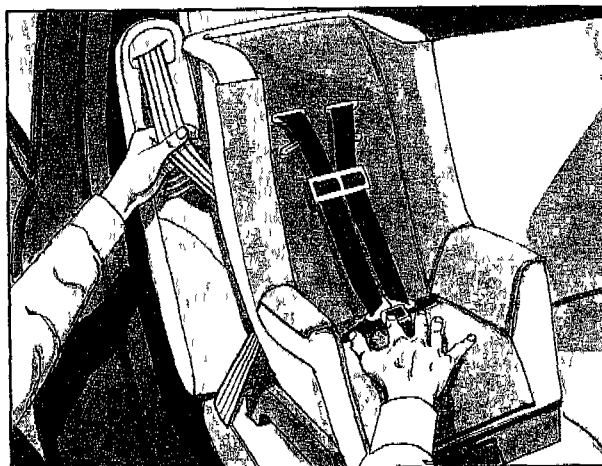


4. Buckle the belt. Make sure the release button is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.

1-53



5. Pull the rest of the shoulder belt all the way out of the retractor to set the lock.



6. To tighten the belt, feed the shoulder belt back into the retractor while you push down on the child restraint. You may find it helpful to use your knee to push down on the child restraint as you tighten the belt.
7. Push and pull the child restraint in different directions to be sure it is secure.

To remove the child restraint, just unbuckle the vehicle's safety belt and let it go back all the way. The safety belt will move freely again and be ready to work for an adult or larger child passenger.

1-54

Older Children



Older children who have outgrown booster seats should wear the vehicle's safety belts

If you have the choice, a child should sit next to a window so the child can wear a lap-shoulder belt and get the additional restraint a shoulder belt can provide

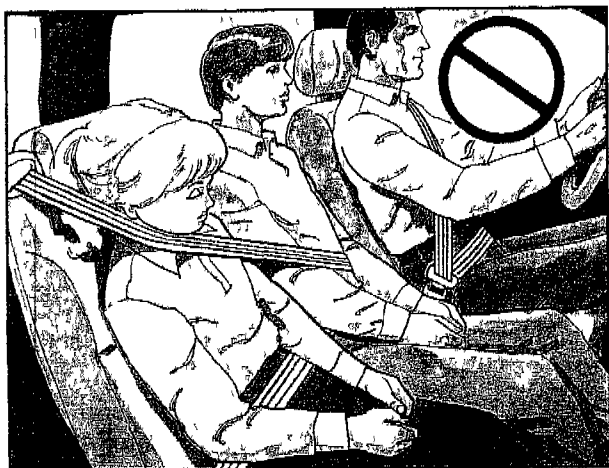
Q: What is the proper way to wear safety belts?

A: If possible, an older child should wear a lap-shoulder belt and get the additional restraint a shoulder belt can provide. The shoulder belt should not cross the face or neck. The lap belt should fit snugly below the hips, just touching the top of the thighs. It should never be worn over the abdomen, which could cause severe or even fatal internal injuries in a crash.

Accident statistics show that children are safer if they are restrained in the rear seat.

In a crash, children who are not buckled up can strike other people who are buckled up, or can be thrown out of the vehicle. Older children need to use safety belts properly.

1-55



CAUTION:

Never do this.

Here two children are wearing the same belt. The belt can't properly spread the impact forces. In a crash, the two children can be crushed together and seriously injured. A belt must be used by only one person at a time.

Q: What if a child is wearing a lap-shoulder belt, but the child is so small that the shoulder belt is very close to the child's face or neck?

A: Move the child toward the center of the vehicle, but be sure that the shoulder belt still is on the child's shoulder, so that in a crash the child's upper body would have the restraint that belts provide. If the child is sitting in a rear seat outside position, see "Rear Safety Belt Comfort Guides" in the Index. If the child is so small that the shoulder belt is still very close to the child's face or neck, you might want to place the child in a seat that has a lap belt, if your vehicle has one.

1-56



⚠ CAUTION:

Never do this.

Here a child is sitting in a seat that has a lap-shoulder belt, but the shoulder part is behind the child. If the child wears the belt in this way, in a crash the child might slide under the belt. The belt's force would then be applied right on the child's abdomen. That could cause serious or fatal injuries.

Wherever the child sits, the lap portion of the belt should be worn low and snug on the hips, just touching the child's thighs. This applies belt force to the child's pelvic bones in a crash.

1-57

Safety Belt Extender

If the vehicle's safety belt will fasten around you, you should use it.

But if a safety belt isn't long enough to fasten, your dealer will order you an extender. It's free. When you go in to order it, take the heaviest coat you will wear, so the extender will be long enough for you. The extender will be just for you, and just for the seat in your vehicle that you choose. Don't let someone else use it, and use it only for the seat it is made to fit. To wear it, just attach it to the regular safety belt.

Checking Your Restraint Systems

Now and then, make sure the safety belt reminder light and all your belts, buckles, latch plates, retractors and anchorages are working properly. Look for any other loose or damaged safety belt system parts. If you see anything that might keep a safety belt system from doing its job, have it repaired.

Torn or frayed safety belts may not protect you in a crash. They can rip apart under impact forces. If a belt is torn or frayed, get a new one right away.

Also look for any opened or broken air bag covers, and have them repaired or replaced. (The air bag system does not need regular maintenance.)

Replacing Restraint System Parts After a Crash

⚠ CAUTION:

A crash can damage the restraint systems in your vehicle. A damaged restraint system may not properly protect the person using it, resulting in serious injury or even death in a crash. To help make sure your restraint systems are working properly after a crash, have them inspected and any necessary replacements made as soon as possible.

If you've had a crash, do you need new belts?

After a very minor collision, nothing may be necessary. But if the belts were stretched, as they would be if worn during a more severe crash, then you need new parts.

If belts are cut or damaged, replace them. Collision damage also may mean you will need to have safety belt or seat parts repaired or replaced. New parts and repairs may be necessary even if the belt wasn't being used at the time of the collision.

If an air bag inflates, you'll need to replace air bag system parts. See the part on the air bag system earlier in this section.

1-58

Your vehicle also has a message center that works along with warning lights and gauges. See "Message Center" in the Index.

Safety Belt Reminder Light

When the key is turned to RUN or START, a chime will come on for several seconds to remind people to fasten their safety belts, unless the driver's safety belt is already buckled.



The safety belt light will also come on and stay on for several seconds, then it will flash for several more.

If the driver's belt is already buckled, neither the chime nor the light will come on.

Air Bag Readiness Light

There is an air bag readiness light on the instrument panel, which shows the air bag symbol. The system checks the air bag's electrical system for malfunctions. The light tells you if there is an electrical problem. The system check includes the air bag sensors, the air bag modules, the wiring, the passenger air bag suppression circuit and the crash sensing and diagnostic module. For more information on the air bag system, see "Air Bag" in the Index.



This light will come on when you start your vehicle, and it will flash for a few seconds. Then the light should go out. This means the system is ready.

Appendix D

Miscellaneous Test Information

Digital and System Channel Report

2002-04-08 12 14 33

Name of Test		020410-1	System	K3600	Name of DAU	DAU3
enabled Channel		Short Name	Type	Data File	Module Type	
Yes 3500		Dig3	dig0	DAT33500	KM3650 Sequencer	

bit position	bit selector	short name	long name	description	
MSB = bit 15	1	Switch	Pull-Apart Switch	Backup Trigger switch	
bit 14	1	DABET1	Driv Airbag Event - Pri	20 mS	1
bit 13	1	PABET1	Pass. Airbag Event - Pri	20 mS	2
bit 12	0				
bit 11	0				
bit 10	0				
bit 09	0				
bit 08	0				
bit 07	0				
bit 06	0				
bit 05	0				
bit 04	0				
bit 03	0				
bit 02	0				
bit 01	0				
LSB = bit 00	0				

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S020410

Dummy 339n Type HYBRID III 50TH Description NHTSA - 339n HYBRID III 50TH CAL DUE 10-1-02 (DKS 4-12-02) J211

Chsname	Location	Model	Name	Manufacturer	Sens./mV/V/U	Fullscale	Caldate	Pos Output	Flip
HEDXG	Head X-Axis Accel	7231C	GB86	Endevco	0 01956 g	750	11/20/01	Rwd	1
HEDYG	Head Y-Axis Accel	7231C	GB77	Endevco	0 01923 g	750	11/20/01	Lft	1
HEDZG	Head Z-Axis Accel	7231C	A54F	Endevco	0 0198 g	750	11/20/01	Up	1
NEKXF	Neck X-Axis Force	1716A	1716A-1222-FX	Denton	0 000196551 N	8896 4	4/1/02	Hd Fd,Cst Rr	1
NEKYF	Neck Y-Axis Force	1716A	1716A-1222-FY	Denton	0 000190718 N	8896 4	4/1/02	Hd Lt,Cst Rt	0
NEKZF	Neck Z-Axis Force	1716A	1716A-1222-FZ	Denton	0 000099808 N	13344 6	4/1/02	Hd Up,Cst Dn	0
NEKXM	Neck X-Axis Moment	1716A	1716A-1222-MX	Denton	0 006087788 N m	282 5	4/1/02	Rt Ear to Rt Shld	1
NEKYM	Neck Y-Axis Moment	1716A	1716A-1222-MY	Denton	0 00596885 N m	282 5	4/1/02	Chn to Strnm	0
NEKZM	Neck Z-Axis Moment	1716A	1716A-1222-MZ	Denton	0 008363894 N m	282 5	4/1/02	Chn to Lt Shld	0
CSTXG	Chest X-Axis Accel	7231C	C14135	Endevco	0 02737 g	750	10/4/01	Fwd	0
CSTYG	Chest Y-Axis Accel	7231C	C14317	Endevco	0 02736 g	750	10/4/01	Lft	1
CSTZG	Chest Z-Axis Accel	7231C	C14341	Endevco	0 02335 g	750	10/4/01	Down	0
CSTXD	Chest Displacement X	14CB1-2847	14CB1-2847-339	Servo	1 1318897 mm	100	4/11/02	Strnm Away Frm Spn	0
LFMZf	Left Femur Z-Axis 603	2430T	2430T-901	GSE	0 000071324 N	13344 7	4/1/02	Knee Fd,Pel Rr	0
RFMZf	Right Femur Z-Axis 744	2430T	2430T-902	GSE	0 000070118 N	13344 7	4/1/02	Knee Fd,Pel Rr	0

D-5

S020410

Dummy 230n Type HYBRID III 50TH Description NHTSA - 230n HYBRID III 50TH CAL DUE 10-2-02 (DKS 4-12-02) J211

Chsname	Location	Model	Name	Manufacturer	Sens./mV/V/U	Fullscale	Caldate	Pos Output	Flip
HEDXG	Head X-Axis Accel	7231C	AD4H9	Endevco	0 01983 g	750	10/4/01	Rear	1
HEDYG	Head Y-Axis Accel	7231C	AD4J7	Endevco	0 01968 g	750	10/4/01	Left	1
HEDZG	Head Z-Axis Accel	7231C	AD4J8	Endevco	0 0194 g	750	10/4/01	Up	1
NEKXF	Neck X-Axis Force	1716A	1716A-1221-FX	Denton	0 000195472 N	8896 4	4/3/02	Hd Fd,Cst Rr	1
NEKYF	Neck Y-Axis Force	1716A	1716A-1221-FY	Denton	0 000189268 N	8896 4	4/3/02	Hd Lt,Cst Rt	0
NEKZF	Neck Z-Axis Force	1716A	1716A-1221-FZ	Denton	0 000099943 N	13344 6	4/3/02	Hd Up,Cst Dn	0
NEKXM	Neck X-Axis Moment	1716A	1716A-1221-MX	Denton	0 005971327 N m	282 5	4/3/02	Rt Ear to Rt Shld	1
NEKYM	Neck Y-Axis Moment	1716A	1716A-1221-MY	Denton	0 005979469 N m	282 5	4/3/02	Chn to Strnm	0
NEKZM	Neck Z-Axis Moment	1716A	1716A-1221-MZ	Denton	0 008397876 N m	282 5	4/3/02	Chn to Lt Shld	0
CSTXG	Chest X-Axis Accel	7231C	ACTR4	Endevco	0 01971 g	750	10/4/01	Fwd	0
CSTYG	Chest Y-Axis Accel	7231C	ACTT4	Endevco	0 01908 g	750	10/4/01	Left	1
CSTZG	Chest Z-Axis Accel	7231C	ACTW0	Endevco	0 01971 g	750	10/4/01	Down	0
CSTXD	Chest Displacement	14CB1-2847	85427-1	Servo	1 1347019 mm	100	4/2/02	Strnm Away Frm Spn	0
LFMZP	Left Femur Z-Axis 60	2430T	2430T-984	GSE	0 000070515 N	13344 7	4/2/02	Knee Fd,Pel Rr	0
RFMZP	Right Femur Z-Axis 28	2430T	2430T-985	GSE	0 000068964 N	13344 7	4/2/02	Knee Fd,Pel Rr	0

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S020410

Friday, April 19, 2002

230n

Page 1 of 1

Description Of Timing Marks On TRC High-Speed Film

All TRC high-speed cameras are equipped with red LEDs which put timing marks on the right edge of the film. TRC uses a single timing generator to generate the timing for all cameras. This allows the timing marks to be common to all cameras. The timing marks can be used to measure camera speed (frames per second) or to locate a point in time before or after the time-zero event.

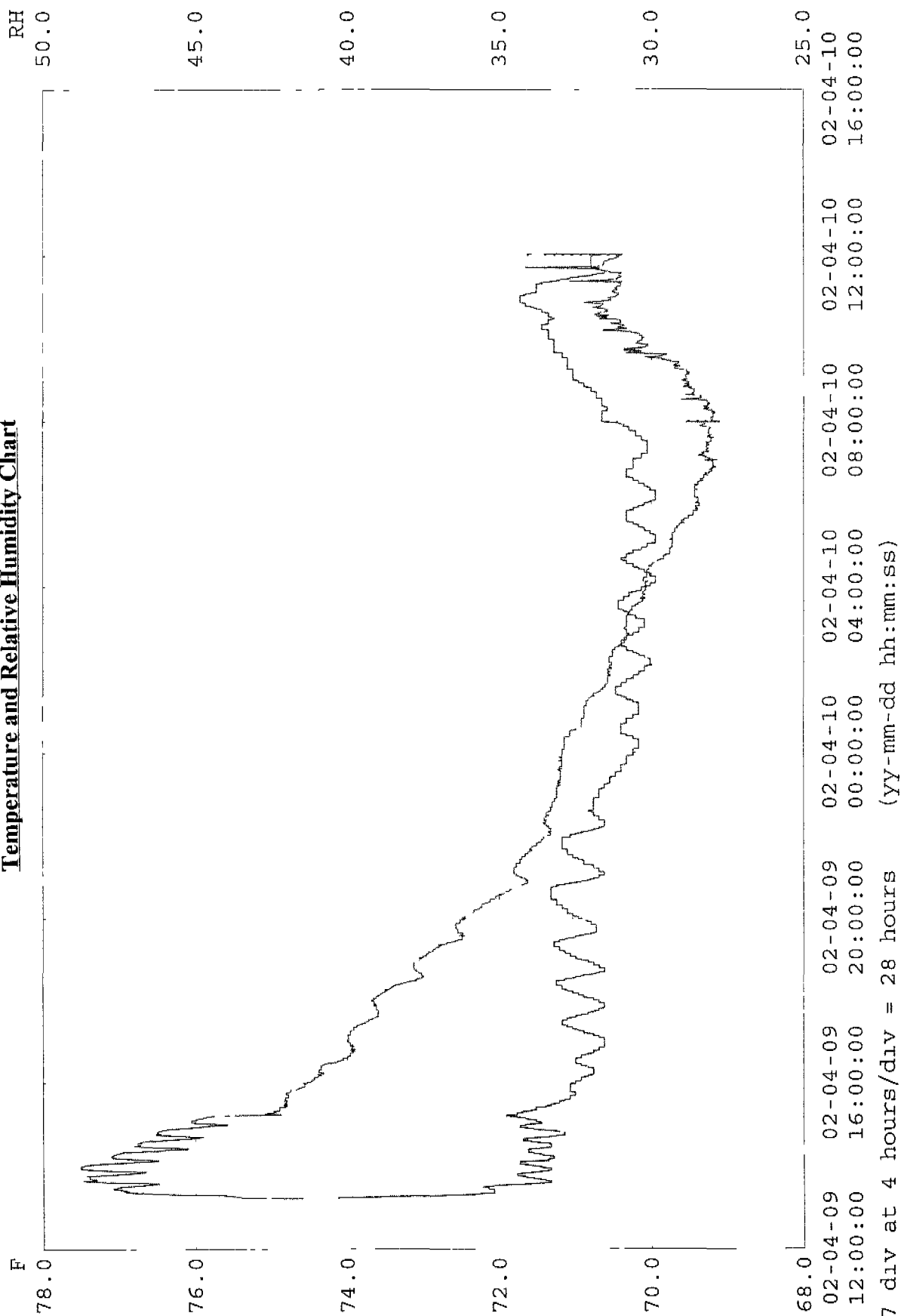
The timing marks appear on the film as small red marks on the right edge of the film.

The timing generator puts out a pulse for every millisecond plus it generates additional pulses for hundredths and tenths of seconds. To explain this further, we can use an example of a camera running at 1000 frames per second.

1. Every frame will have **one** LED appear in it. This indicates a *millisecond* pulse.
2. Every ten frames will have **two** LEDs appear in it. These indicate a *millisecond* pulse plus a *hundredth of a second* pulse.
3. Every one hundred frames will have **three** LEDs appear in it. These indicate a *millisecond* pulse, a *hundredth of a second* pulse, and a *tenth of a second* pulse.

To locate time-zero, observe the continuous LED that is visible on the left side of the frame at the beginning of each view. Locate the frame where the left side LED is fully extinguished and reverse 4 frames for the Photosonic cameras. This frame is time-zero

Temperature and Relative Humidity Chart



020410.SPL
020410 SPL

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RH



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