

V3598

REPORT NO. 208-MGA-2001-002

SAFETY COMPLIANCE SLED TESTING FOR FMVSS 208
OCCUPANT CRASH PROTECTION

Volvo Cars of North America, Inc
2001 Volvo S60 4 Door
NHTSA NO. C15900

MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date. February 23, 2001

Report Date: March 21, 2001

FINAL REPORT

Prepared For:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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16 Abstract A compliance test (sled test) was conducted on the subject 2001 Volvo S60 4 Door in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No TP208S-01 for the determination of FMVSS 208 compliance Test failures identified were as follows NONE Test Anomalies The second stages of the driver and passenger airbags were deployed simultaneously with the first stages of these airbags, 20 ms after the 0.5 g trigger The driver side airbag should have deployed at 25 ms and the passenger side airbag should have deployed at 35 ms			
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Purpose

This FMVSS 208 compliance sled test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 208 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by MGA Research Corporation (MGA) under Contract No DTNH22-98-D-11055. The purpose of this test was to determine if the subject vehicle, a 2001 Volvo S60 4 Door, NHTSA No. C15900, 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 test vehicle was instrumented with four (4) accelerometers to measure longitudinal axis accelerations.

The test vehicle contained two (2) Part 572 E 50th percentile adult male anthropomorphic test devices (dummies). The dummies were positioned in the front outboard seating positions according to the dummy placement procedures 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 thirty-nine (39) data channels were digitally sampled at 10,000 samples per second and processed per Sections 11.7 through 11.9 of the Laboratory Test Procedure.

The crash 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 at MGA Research Corporation on February 23, 2001

The test vehicle, a 2001 Volvo S60 4 Door, NHTSA No C15900, appeared 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. The test anomalies noted for the airbag deployments should be considered when using the injury data from this test.

	FMVSS 208 Max. Allowable Injury Assessment Values	Driver (Serial #401)	Passenger (Serial #403)
HIC	1000	95	111
Chest g	60 g	31.4 g	34.3 g
Chest displacement	3 inches	1.7 in.	0.4 in.
Left Femur	2250 lb	862 lb	919 lb
Right Femur	2250 lb	945 lb	871 lb
Neck Extension	57 Nm	6.2 Nm	20.0 Nm
Neck Flexion	190 Nm	55.7 Nm	63.5 Nm
Neck Tension	3300 N	442 N	515 N
Neck Compression	4000 N	141 N	712 N
Neck Shear	3100 N	720 N	1405 N

Note: The test anomalies noted for the airbag deployments should be considered when using the injury data from this test.

The vehicle also 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 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 17.8 g with an integrated velocity change of 30.1 mph. After filtering the acceleration signal to Channel Class 60, the airbag system was triggered 20.0 milliseconds after 0.5 g acceleration. The driver and passenger second stage airbags were triggered 19.9 and 20.3 milliseconds after 0.5 g acceleration, respectively.

TEST ANOMALIES

1. The second stages of the driver and passenger airbags were deployed simultaneously with the first stages of these airbags, 20 ms after the 0.5 g trigger. The driver side airbag should have deployed at 25 ms and the passenger side airbag should have deployed at 35 ms.
2. The airbag warning label on the dash was removed prior to receiving the vehicle. It is not known whether the label was removed by the dealer, by a potential customer, or not installed at all.

Sled Test Summary

Vehicle NHTSA No.: C15900 Test Mode: FMVSS 208 SLED TEST

Vehicle Yr/Make/Model/Body Style: 2001/Volvo/S60 4 Door

Test Date: February 23, 2001 Time 3:10 p m Temp: 72°F

Vehicle Test Weight: 3787 lbs.

DUMMY INFO.

DRIVER

PASSENGER

Dummy Type

Part 572E

Part 572E

Serial Number

401

403

Restraint System

Frontal air bag

Frontal air bag

No Data Channels

15

15

Number of Cameras:

1 Real Time

6 High Speed

Door Opening Data:

yes Left Front

yes Right Front

FRONT SEAT(S) DATA

DRIVER

PASSENGER

Seat Track Failure -

0.0 inches shift;

0.0 inches shift

Seat Back Failure -

no

no

VISIBLE DUMMY CONTACT POINTS:

DRIVER

PASSENGER

Head

Airbag, sunvisor, roof

Airbag, sunvisor

Chest

Airbag

Airbag

Left Knee

Knee bolster

Glove box

Right Knee

Knee bolster

Glove box

General Test And Vehicle Parameter DataVehicle Yr/Make/Model/Body Style: 2001/Volvo/S60 4 DoorVehicle NHTSA No.: C15900 VIN: YV1RS61N412003675 Color: Silver

Engine Data:

No Cylinders: 5; Liters: 2.4Placement: Longitudinal/Inline ____; Transverse/Lateral: X

Transmission Data:

Speeds: 4; Manual: ____; Automatic: X; Overdrive: ____

Final Drive:

Rear Wheel Drive: ____; Front Wheel Drive: X; Four Wheel Drive: ____

Major Options:

A/C: X; Pwr. Strg.: X; Pwr. Brakes: X; Pwr. Windows: XPwr. Dr. Locks: X; Other: Rear defogger, cruise control, tachometerDate Received: 1/15/01; Odometer Reading: 51 milesSelling Dealer: Wilde Volvo, 1603 E. Moreland Blvd., Waukesha, WI 53186

REMARKS: None

General Test And Vehicle Parameter Data (Cont)

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By. Volvo Cars of North America, Inc.

Date of Manufacture. 9/00; VIN YV1RS61N412003675

GVWR 4400 lbs, GAWR Front: 2330 lbs

GAWR Rear: 2220 lbs.

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 38 psi REAR: 38 psi

Recommended Tire Size: P195/65R15

Recommended Cold Tire Pressure:

FRONT 38 psi REAR 38 psi

Size of Tires on Test Vehicle: P195/65R15

Type of Spare Tire: T125/80R17, Space Saver: X; Standard:

Vehicle Capacity Data

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

Number of Occupants. 2 Front, 3 Rear; 3rd Seat; 5 TOTAL

REMARKS: None

VEHICLE CAPACITY WEIGHT (VCW) = 890 lbs.

No Of Occupants x 150 lbs = 750 lbs

Rated Cargo/Luggage Weight (RCWL) = 140 lbs (Difference)

General Test And Vehicle Parameter Data (Cont.)

WEIGHT OF TEST VEHICLE AS RECEIVED AT LABORATORY: (with maximum fluids)

Right Front =	<u>964</u> lbs.	Right Rear =	<u>662</u> lbs.
Left Front =	<u>981</u> lbs.	Left Rear =	<u>696</u> lbs.
TOTAL FRONT =	<u>1945</u> lbs.	TOTAL REAR =	<u>1358</u> lbs.
% Total Weight =	<u>58.9</u> %	% Total Weight =	<u>41.1</u> %

TOTAL DELIVERED WEIGHT = 3303 lbs.

WEIGHT OF FULLY LOADED TEST VEHICLE WITH TWO DUMMIES (344 LBS) AND 140 POUNDS OF CARGO WEIGHT

Right Front =	<u>1034</u> lbs.	Right Rear =	<u>834</u> lbs.
Left Front =	<u>1055</u> lbs.	Left Rear =	<u>864</u> lbs.
TOTAL FRONT =	<u>2089</u> lbs.	TOTAL REAR =	<u>1698</u> lbs.
% Total Weight =	<u>55.2</u> %	% Total Weight =	<u>44.8</u> %

TOTAL WEIGHT = 3787 lbs.

TEST VEHICLE ATTITUDE: (all measurements in degrees)

AS DELIVERED DOOR SILL ANGLE:	<u>0.2° nose down</u>
AS TESTED DOOR SILL ANGLE:	<u>0.2° nose down</u>
FULLY LOADED DOOR SILL ANGLE:	<u>0.2° nose up</u>

FUEL SYSTEM DATA:

Fuel System Capacity From Owner's Manual = 18.5 gallons

Usable Capacity Figure Furnished by COTR = 18.5 gallons

REMARKS: None

Post-Impact Data

Test number: HT01022301

NHTSA number: C15900

Test date: February 23, 2001

Test time: 3:10 p.m.

Test type: FMVSS 208 Compliance Sled Test

Impact angle: 0°

Ambient Temperature
at Impact Area: 72°F

Temperature in
Occupant Compartment: 72°F

Impact Velocity

Integrated velocity from the integration of the entire sled acceleration: 30.1 mph

Specified integrated velocity range: 28 to 30 mph

Sled Carriage Acceleration

Acceleration: 17.8 g

Specified Acceleration Range: 16.0 - 18.2 g

Sled Carriage Acceleration Duration

Time from T-0 (-0.5 g) to 0.0 g: 122.3 msec

Specified Acceleration Duration: 120.0 to 130.0 msec

The sled acceleration corridor was achieved.

Seat and Steering Column Positioning Data

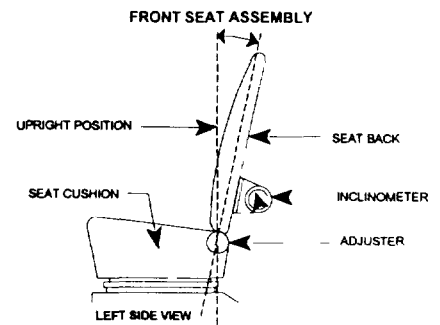
Vehicle Yr/Make/Model/Body Style: 2001/Volvo/S60 4 Door

Vehicle NHTSA No C15900 Test Date: February 23, 2001

NOMINAL DESIGN RIDING POSITION

Driver Seat: Seat Back Angle = 19.0°

Passenger Seat Seat Back Angle = 19.0°



SEAT FORE AND AFT POSITIONS:

Driver Seat The seat track had a total position movement of 17 notches and was positioned 8 notches rearward from the foremost position with the forward most locking position as zero.

Passenger Seat. The seat track had a total position movement of 17 notches and was positioned 8 notches rearward from the foremost position with the forward most locking position as zero.

STEERING COLUMN ADJUSTMENTS.

The steering column position was placed in the middle of its telescoping adjustment (30 mm) and angle (25°).

Dummy Positioning Measurement Table

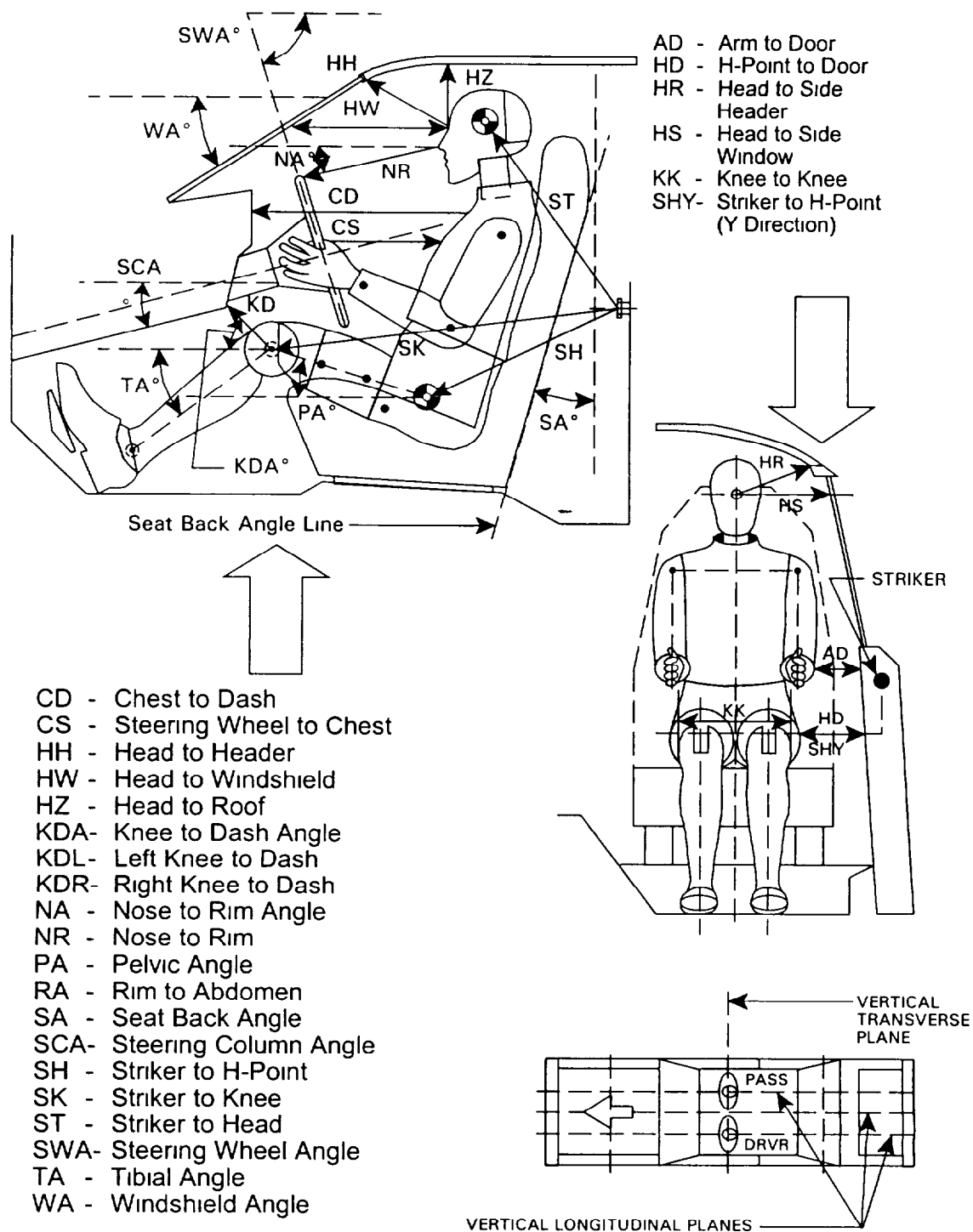
Vehicle Year/Make/Model/Body Style: 2001/Volvo/S60 4 Door

Vehicle NHTSA No.: C15900 Test Date: February 23, 2001

	DRIVER (Serial #401)	PASSENGER (Serial #403)
WA°	28.1°	
SWA°	24.5°	
SCA°	25.4°	
SA°	19.0°	
HZ	7.3	6.8
HH	13.9	14.1
HW	26.6	25.5
HR	9.3	9.3
NR	15.4 Angle (NA°) 12.4°	
CD	21.1	
CS	12.1	
RA	7.4	
KDL	7.0 Angle (KDA°) 9 2°	
KDR	7.0	
PA°	25.0°	24.6°
TA°	42.0°	38.2°
KK	13.0	9.6
ST	17.7 Angle 12.9°	17.1 Angle 10.8°
SK	24.0 Angle 99.6°	25.0 Angle 100.8°
SH	12.0 Angle 130.5°	11.7 Angle 134.2°
SHY	9.4	10.0
HS	12.5	12 5
HD	5.3	5.6
AD	4.7	3.9

Dummy Positioning Measurement Locations

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



Description 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 photograph.
- 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).
- *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 photograph.

* Measurement used in Data Tape Reference Guide

¹ Only outboard measurement is referenced in Data Tape Reference Guide

Description of Dummy Measurements (Cont.)

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 photograph

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 photograph.
*	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.
	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 photograph.
	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)

* Measurement used in Data Tape Reference Guide

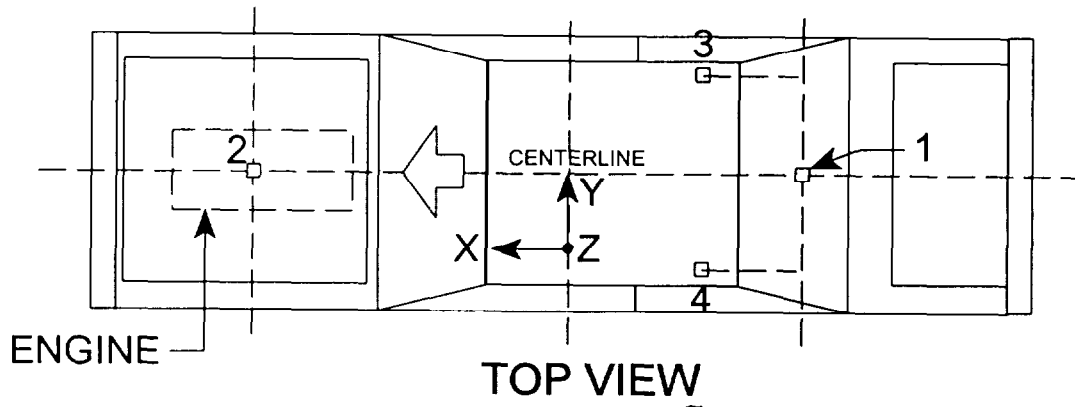
Description of Dummy Measurements (Cont.)**Angles**

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	Pelvic 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 photograph.
WA	Windshield Angle, place an inclinometer along the transverse center of the windshield exterior (measurement is made with respect to horizontal).
TA	Tibial 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.

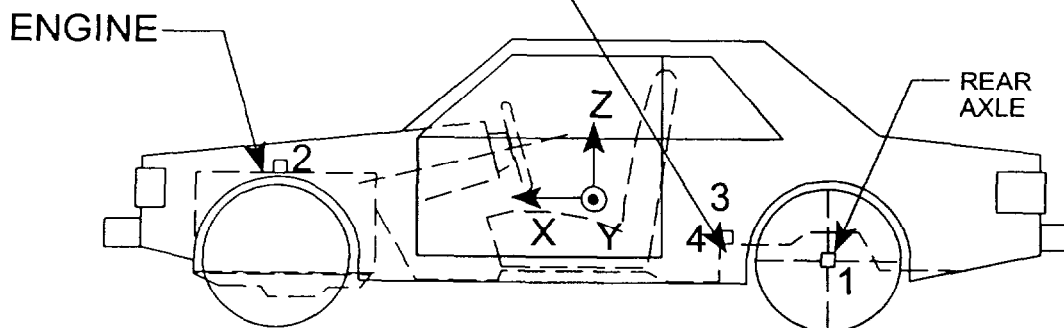
Vehicle Accelerometer Placement and Data Summary

Vehicle Year/Make/Model/Body Style: 2001/Volvo/S60 4 Door

Vehicle NHTSA No. C15900 Test Date: February 23, 2001



REAR SEAT CUSHION
ASSY. FRONT ATTACHMENT
BRACKET SUPPORT



LEFT SIDE VIEW

Vehicle Accelerometer Location Measurements and Data Summary

Vehicle Year/Make/Model/Body Style: 2001/Volvo/S60 4 Door

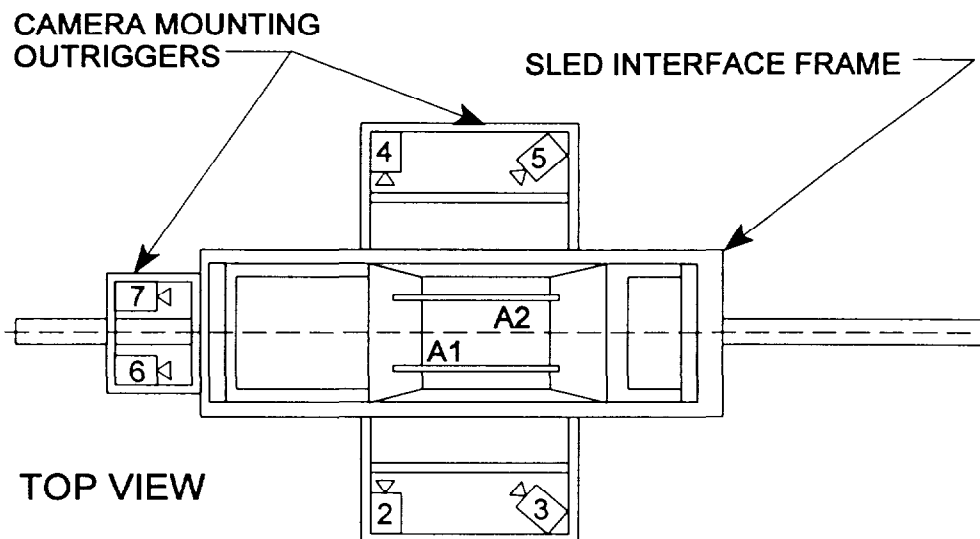
Vehicle NHTSA No. C15900 Test Date: February 23, 2001

No.	Location	X (in)	Y (in)	Positive Direction		Negative Direction	
	Sled Primary Longitudinal	67.0	0.0	17.8 g	64	-1.2 g	125
	Sled Redundant Longitudinal	67.0	3.5	17.8 g	64	-1.2 g	125
	Sled Velocity Measured Integrated	67.0	0.0	30.1 mph	122	--	--
1	Rear Axle Longitudinal	39.0	0.0	19.3 g	68	-1.7 g	148
2	Top Engine Longitudinal	148.0	0.0	19.3 g	59	-2.8 g	130
3	Right Rear Seat Member Longitudinal	69.0	18.5	18.1 g	50	-1.8 g	127
4	Left Rear Seat Member Longitudinal	69.0	-18.5	19.5 g	52	-1.7 g	127

Reference Points: X - From Rear Surface of Vehicle (+ forward)

Y - Vehicle Centerline (+ to right)

Camera Positions



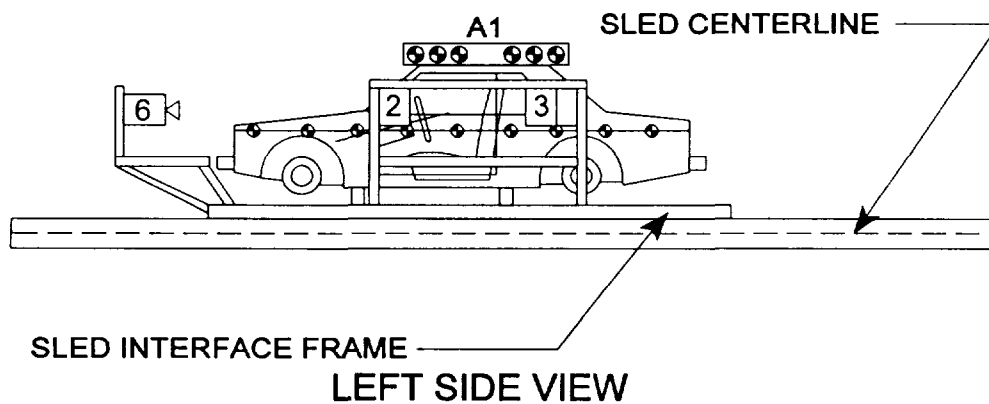
CAMERA FRAME RATES

#1 = 24 fps

All Others = 1,000 fps



REAL TIME CAMERA



Camera Location Measurements

Camera No.	VIEW	Camera Positions (inches)*			Angle (deg)	Film Plane To Head Target	Lens (mm)	Speed (fps)
		X	Y	Z				
1	Real-Time (Pre and Post)						10	24
2	Onboard Driver	70.6	88.6	38.4	90	67.1	13	905
3	Onboard Driver Angle	150.9	91.1	47.8			13	1005
4	Onboard Passenger	71.8	89.6	38.5	90	70.1	13	1000
5	Onboard Passenger Angle	146.7	88.5	47.9			13	1015
6	Onboard Windshield Driver	18.3	14.1	47.5			13	1042
7	Onboard Windshield Passenger	18.3	13.9	47.5			13	1005

Reference* X = Front of sled carriage
 Y = Center of sled carriage
 Z = Top of sled carriage

Occupant Injury Data

Vehicle Year/Make/Model/Body Style 2001/Volvo/S60 4 Door

Vehicle NHTSA No C15900 Test Date February 23, 2001

MAXIMUM ACCELERATION VALUES (g's)	DRIVER DUMMY #401	PASSENGER DUMMY #403
Head Channel X	-27.4	-31.5
Head Channel Y	5.7	7.2
Head Channel Z	19.1	16.5
HEAD RESULTANT	27.8	32.9
Chest Channel X	-30.1	-30.1
Chest Channel Y	3.0	2.8
Chest Channel Z	12.6	17.8
CHEST RESULTANT	32.1	35.0

HEAD INJURY CRITERIA (HIC) VALUES:

HIC	95	111
$t_1 =$ (msec)	73.1	83.0
$t_2 =$ (msec)	109.1	119.0

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

CHEST INJURY CRITERIA (CLIP) VALUES: (g's)

CLIP	31.4	34.3
$t_1 =$ (msec)	102.5	97.8
$t_2 =$ (msec)	105.5	100.8
CHEST DEFLECTION (in)	1.7	0.4

Note The test anomalies noted for the airbag deployments should be considered when using the injury data from this test.

Occupant Injury Data (Cont.)

MAX. COMPRESSIVE FEMUR FORCES	DRIVER DUMMY #401	PASSENGER DUMMY #403
Left Side (lbs)	862	919
Right Side (lbs)	945	871

NECK INJURY CRITERIA

Peak Flexion Bending Moment about the Occipital Condyle (N-m)	55.7	63.5
Peak Extension Bending Moment about the Occipital Condyle (N-m)	6.2	20.0
Peak Axial Tension (N)	442	515
Peak Axial Compression (N)	141	712
Peak Fore Shear (N)	720	1405
Peak Aft Shear (N)	195	268

Seat Belt Warning System Data

Vehicle Year/Make/Model/Body Style: 2001/Volvo/S60 4 Door

NHTSA No. C15900, Technician: Chad Gadberry,

Date: February 8, 2001

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 = 5 seconds
(4 to 8 seconds)

Time duration of reminder light operation = >60 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 ignition switch placed in "Start/On" position.

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

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

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

B 2 S7 3(a)(2)

Time duration of audible warning signal = _____ seconds
(audible warning not required)

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

C Note wording of visual warning

Fasten seat belt _____

Fasten Belt _____

Symbol 101 _____

X

Readiness IndicatorVehicle Year/Make/Model/Body Style. 2001/Volvo/S60 4 DoorNHTSA No C15900, Technician. Chad Gadberry;Date: February 8, 2001

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)

1. Is the system totally mechanical? ☐ Yes ☒ No
(If YES this Data Sheet is complete.)
2. Describe the location of the readiness indicator: Lower right of instrument panel
3. Is the readiness indicator clearly visible to the driver?
☒ Yes-Pass ☐ No-FAIL
4. Is a list of the elements in the occupant restraint system, being monitored by the readiness indicator, provided?
☒ Yes-Pass ☐ No-FAIL

Air Bag Labels Data

Vehicle Year/Make/Model/Body Style. 2001/Volvo/S60 4 Door

NHTSA No. C15900; Technician Chad Gadberry; Date: February 8, 2001

1 Air bag maintenance label and owner's manual instructions (S4.5 1(a)):

- 1.1. Does the manufacturer recommend periodic maintenance or replacement of the airbag? ☐ 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 (Date: _____)
- ☐ Schedule on label specifies vehicle mileage (Mileage: _____)
- ☐ Schedule on label specifies interval measured from date on certification label (Date: _____)
- 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 inches 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 airbag system in an easily understandable format? ☒ Yes-Pass ☐ No-FAIL
- 2.2. Include a statement that the vehicle is equipped with an airbag and a lap/shoulder belt at the front outboard seating positions? ☒ Yes-Pass ☐ No-FAIL

Air Bag Labels Data (Cont.)

- 2.3 Include a statement that the air bag is a supplemental restraint at the front outboard seating positions?
(X)Yes-Pass () No-FAIL
- 2.4 Emphasize that all occupants, including the driver, should always wear their seat belts whether or not an airbag is also provided at their seating positions to minimize the risk of severe injury or death in the event of a crash?
(X)Yes-Pass () No-FAIL
- 2.5 Provide any necessary precautions regarding the proper positioning of occupants, including children, at seating positions equipped with air bags to insure maximum safety protection for those occupants?
(X)Yes-Pass () No-FAIL
- 2.6 Explain that no objects should be placed over or near the air bag on the steering wheel or on the instrument panel, because any such objects could cause harm if the vehicle is in a crash severe enough to cause the air bag to inflate?
(X)Yes-Pass () No-FAIL

3. Does the vehicle.

- 3 1. Provide an automatic means to ensure that the airbag does not deploy when a child seat or child with a total mass of 30 kg or less is present on the front outboard passenger?
() Yes (X) No
- 3 2. Incorporate sensors, other than or in addition to weight sensors, which automatically prevent the passenger air bag from deploying in situations in which it might have an adverse effect on infants in rear-facing child seats, and unbelted or improperly belted children?
() Yes (X) No
- 3.3 Have a passenger air bag designed to deploy in a manner that does not create a risk of serious injury to infants in rear-facing child seats, and unbelted or improperly belted children?
() Yes (X) No

If yes to 3 1, or 3 2, or 3.3, the vehicle is not required to have a sunvisor warning label (S4.5.1(6)), an airbag alert label (S4 5.1(c)) or a label on the dash (S4.5 2(e)) and this check sheet is complete (S4.5 1). If no to 3 1, 3.2, and 3 3, go to 4.

4 Sun Visor Warning Label

- 4 1. Is the label permanently affixed (may be permanent marking or molding) to either side of the sunvisor at each front outboard seating position with an airbag? (S4 5 1(b)(2))
- | | | |
|------------------|-------------|-------------------------|
| Driver Side - | (X)Yes-Pass | () No-FAIL |
| Passenger Side - | () N/A | (X)Yes-Pass () No-FAIL |

Air Bag Labels Data (Cont.)

- 4.2. Does the label conform in content (vehicles without back seats may omit the statement: "The back seat is the safest place for children.") (S4.5.1(b)(2)(v))) to either label shown on the next page as appropriate at each front outboard seating position with an air bag? (S4.5.1(b)(2))

4.2.1 **Dual air bags:** ☐ Not Applicable
 Driver Side - ☒ Yes-Pass ☐ **No-FAIL**
 Passenger Side - ☒ Yes-Pass ☐ **No-FAIL**

4.2.2 **Vehicle with driver air bag ONLY - either 4.2.2.1 or 4.2.2.2 is applicable, not both.** (S4 5 1(b)(2)(iv))

4.2.2.1 Does the label conform in content to either label shown on the following page as appropriate?
 ☒ Not Applicable
 Driver Side - ☐ Yes-Pass ☐ **No-FAIL**

4.2.2.2 Does the label conform in content to the first label shown on the following page where the label can be modified to omit the pictogram and the message text may read:

DEATH or SERIOUS INJURY can occur.

- Sit as far back as possible from the air bag.
- ALWAYS use SEAT BELTS and CHILD RESTRAINTS
- The BACK SEAT is the SAFEST place for children.

☒ Not Applicable
 Driver Side - ☐ Yes-Pass ☐ **No-FAIL**

Air Bag Labels Data (Cont)

SUN VISOR LABEL VISIBLE WHEN VISOR IS IN DOWN POSITION

LABEL OUTLINE VERTICAL AND HORIZONTAL LINE BLACK

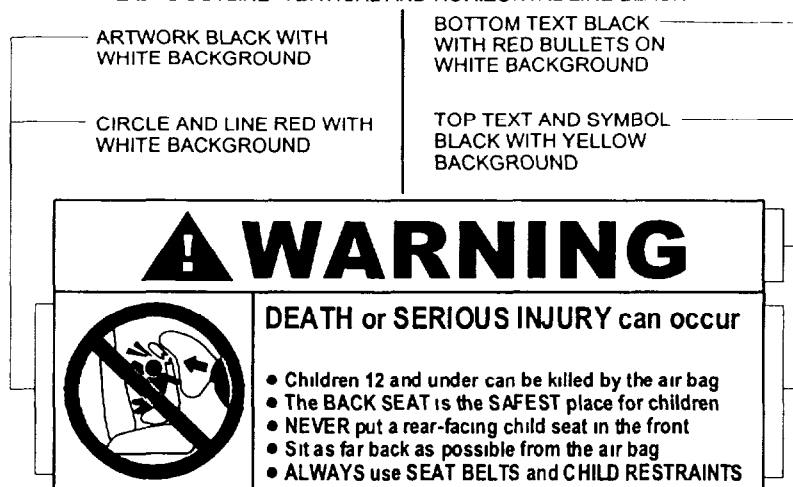


Figure 6a (S4.5.1(b)(2))

SUN VISOR LABEL VISIBLE WHEN VISOR IS IN DOWN POSITION

LABEL OUTLINE, VERTICAL AND HORIZONTAL LINE BLACK

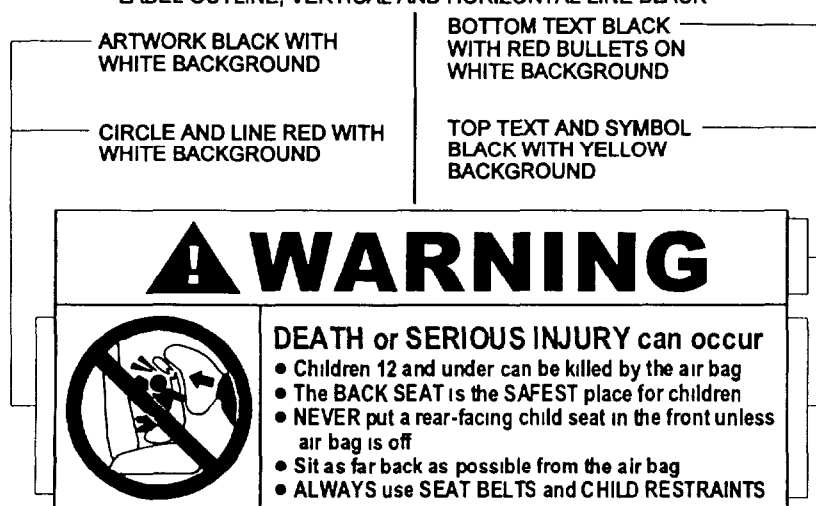


Figure 6b (S4.5.1(b)(2))

- 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 - (X) Yes-Pass () No-FAIL
 Passenger Side - () No air bag (X) Yes-Pass () No-FAIL
- 4 4 Is the message white with black text? (S4 5.1(b)(2)(ii))
 Driver Side - (X) Yes-Pass () No-FAIL
 Passenger Side - () No air bag (X) Yes-Pass () No-FAIL

Air Bag Labels Data (Cont)

- 5.4 Is the message area at least 20 cm²? (S4.5.1(c)(2)(i))
 Actual message area: 21 cm²
 Driver Side - (X)Yes-Pass () No-FAIL
 Passenger Side - ()No air bag (X)Yes-Pass () No-FAIL
- 5.5 Is the pictogram black with a red circle and slash on a white background?
 (S4.5.1(c)(2)(ii))
 For vehicles with driver side air bag ONLY () Not Applicable
 (X)Yes-Pass () No-FAIL
- 5.6 Is the pictogram at least 20 mm in diameter? (S4.5.1(c)(2)(ii))
 Actual diameter 22 mm
 For vehicles with driver side air bag ONLY () Not Applicable
 (X)Yes-Pass () No-FAIL



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

- 6 Label On the Dash
- 6.1 Does the vehicle have a passenger side air bag?
 (X)Yes () No, check sheet is complete.
- 6.2 Does the vehicle have a label on the dash or steering wheel hub? (S4.5.1(e))
 ()Yes (X) No
 Note. The airbag warning label on the dash was removed prior to receiving vehicle. It is not known whether the label was removed by the dealer, by a potential customer, or not installed at all.
- 6.3 Does the label conform in content (vehicles without back seats may omit the statement "The back seat is the safest place for children 12 and under." (S4.5.1(e)(iii)) to the label shown below (S4.5.1(e))
 ()Yes-Pass () No-FAIL

Air Bag Labels Data (Cont.)

- 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: ____ cm²
☐ Yes-Pass ☐ No-FAIL

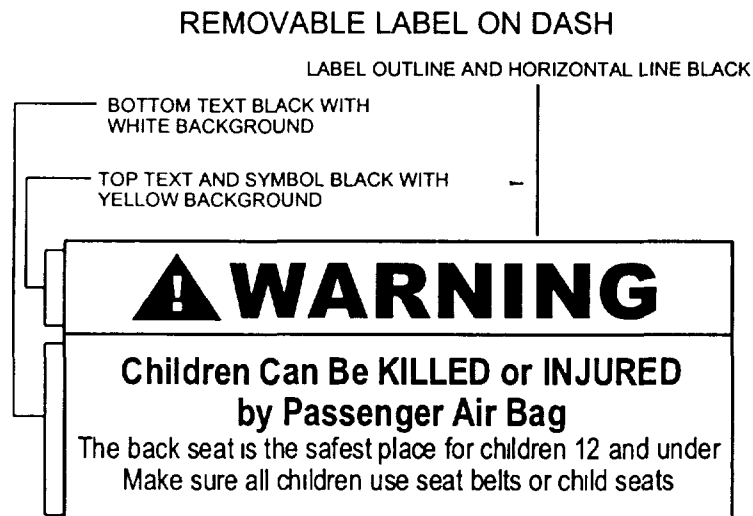


Figure 7 (S4.5.1(e))

Rear Outboard Seating Position Seat Belt DataVehicle Year/Make/Model/Body Style: 2001/Volvo/S60 4 DoorNHTSA No : C15900 ; Technician: Chad Gadberry ; Date: February 8, 2001

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

☒ Yes☐ No

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.

Lap Belt Lockability Data

Vehicle Year/Make/Model/Body Style: 2001/Volvo/S60 4 Door

NHTSA No.: C15900, Technician: Chad Gadberry,

Date: February 8, 2001

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 locking retractors (S7 1.1.5(c))

Designated Seating Position (DSP) Right front

1 Record the seating position. Fully rearward
(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 of the vehicle (S7.1.1 5(a))

(X)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))

(X)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? (X)Yes, go to 6 1 () No, go to 7

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))

(X)Yes-Pass () No-FAIL

7 Locate a reference point A on the seat belt buckle (S7 1 1 5(c)(2))

Lap Belt Lockability Data (Cont.)

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 is 52.5 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. 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))

The measured force application angle = 10 (spec. 5-15 degrees)

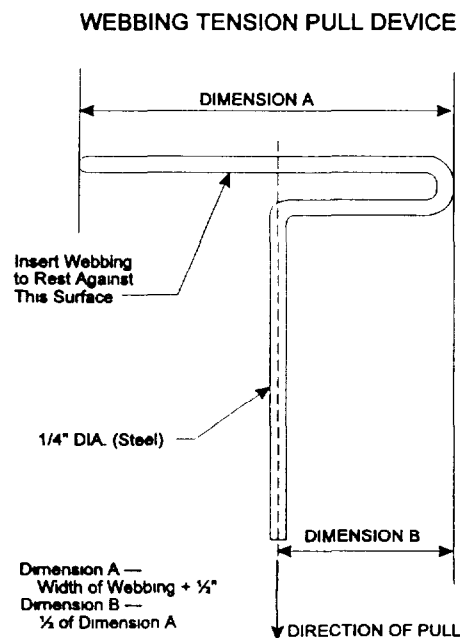


Figure 5 (S7.1.1.5(c)(4))

Lap Belt Lockability Data (Cont)

- 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 is 20.5 inches

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 10 lb/sec (Spec 10 to 50 lb/sec)

Measure distance between points A and B 21.5 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 = 1.0 inches

(X)Yes-Pass () **No-FAIL**

- 16 Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more?

10-14 = 31.0 inches

(X)Yes-Pass () **No-FAIL**

REMARKS None

Lap Belt Lockability Data (Cont.)

Vehicle Year/Make/Model/Body Style: 2001/Volvo/S60 4 Door

NHTSA No C15900; Technician: Chad Gadberry;

Date: February 8, 2001

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 locking retractors. (S7.1.1.5(c))

Designated Seating Position (DSP) Left rear

- 1 Record the seating position. Non-adjustable
(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 of the vehicle (S7.1 1.5(a))

(X)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))

(X)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? (X)Yes, go to 6.1 () No, go to 7.
 - 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))

(X)Yes-Pass () No-FAIL
- 7 Locate a reference point A on the seat belt buckle (S7 1 1.5(c)(2))

Lap Belt Lockability Data (Cont.)

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 is 46.8 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. 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))

The measured force application angle = 10 (spec. 5-15 degrees)

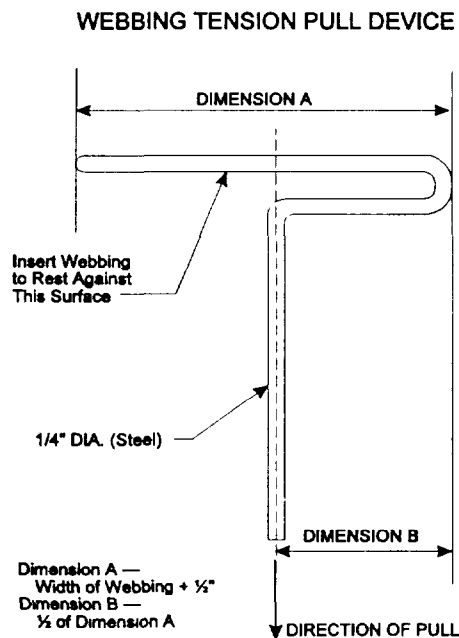


Figure 5 (S7.1.1.5(c)(4))

Lap Belt Lockability Data (Cont.)

- 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 is 21.5 inches.

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 10 lb/sec (Spec 10 to 50 lb/sec)

Measure distance between points A and B 22.0 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 = 0.5 inches

(X)Yes-Pass () **No-FAIL**

16. Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more?

10-14 = 24.8 inches

(X)Yes-Pass () **No-FAIL**

REMARKS: None

Lap Belt Lockability Data (Cont)

Vehicle Year/Make/Model/Body Style 2001/Volvo/S60 4 Door

NHTSA No C15900 ; Technician Chad Gadberry ; Date February 8, 2001

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 locking retractors. (S7.1 1.5(c))

Designated Seating Position (DSP): Center rear

- 1 Record the seating position Non-adjustable
(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 of the vehicle (S7.1.1.5(a))

(X)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))

(X)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?

(X)Yes, go to 6 1 () No, go to 7
- 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))

(X)Yes-Pass () No-FAIL
- 7 Locate a reference point A on the seat belt buckle (S7 1 1.5(c)(2))

Lap Belt Lockability Data (Cont.)

- 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 is 61.5 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. 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))

The measured force application angle = 10 (spec 5-15 degrees)

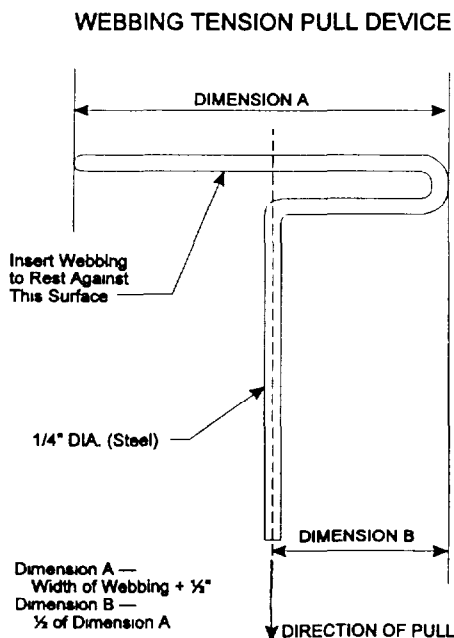


Figure 5 (S7.1 1 5(c)(4))

Lap Belt Lockability Data (Cont.)

- 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 is 23.0 inches.

- 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: 10 lb/sec (Spec. 10 to 50 lb/sec)

Measure distance between points A and B 23.3 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 = 0.3 inches

(X)Yes-Pass () **No-FAIL**

- 16 Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more?

10-14 = 38.2 inches

(X)Yes-Pass () **No-FAIL**

REMARKS: None

Lap Belt Lockability Data (Cont.)

Vehicle Year/Make/Model/Body Style. 2001/Volvo/S60 4 Door

NHTSA No C15900, Technician Chad Gadberry ;

Date February 8, 2001

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 locking retractors. (S7.1 1.5(c))

Designated Seating Position (DSP) Right rear

1. Record the seating position. Non-adjustable
(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 of the vehicle. (S7 1.1 5(a))

(X)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))

(X)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? (X)Yes, go to 6.1 () No, go to 7.
 - 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))

(X)Yes-Pass () No-FAIL
7. Locate a reference point A on the seat belt buckle (S7.1 1 5(c)(2))

Lap Belt Lockability Data (Cont.)

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 is 46.8 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. 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))

The measured force application angle = 10 (spec. 5-15 degrees)

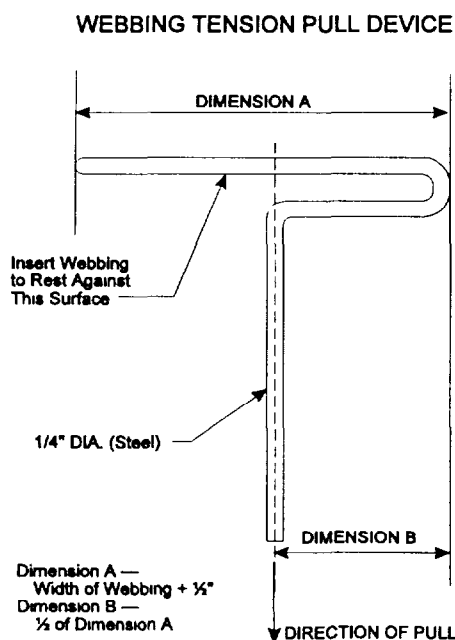


Figure 5 (S7.1.1.5(c)(4))

Lap Belt Lockability Data (Cont.)

- 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 is 20.0 inches.

- 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 10 lb/sec (Spec 10 to 50 lb/sec)

Measure distance between points A and B 19.5 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 = 0.5 inches

(X)Yes-Pass () No-FAIL

- 16 Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more?

10-14 = 27.3 inches

(X)Yes-Pass () No-FAIL

REMARKS. None

Seat Belt Comfort and Convenience Data

1 BELT CONTACT FORCE (S7.4.3)

Test Vehicle NHTSA No. C15900

Vehicle Model Year/Make/Model/Body Style: 2001/Volvo/S60 4 Door

Designated Seating Position Tested Left Rear

Date of Comfort/Convenience Check: February 8, 2001

Technician Performing Check: Chad Gadberry

GVWR: 4400 lbs

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

- 1.1 Does the vehicle incorporate a webbing tension-relieving device?
☐ Yes - go to latchplate access
☒ No - continue with this check sheet
- 1.2 Adjustable seats are in 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
- 1.3 If separately adjustable in a vertical direction, the seats are at the lowest position
☐ Check
☒ N/A
- 1.4 Place adjustable seat backs in the manufacturer's nominal design riding position in the manner specified by the manufacturer
☐ Check
☒ N/A
- 1.5 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
- 1.6 Place each adjustable head restraint in its highest adjustment position
☐ Check
☒ N/A

Seat Belt Comfort and Convenience Data (Cont)

- 1 7 Adjustable lumbar supports are positioned so that the lumbar support is in its lowest adjustment position (S8.1.3)
() Check
(X) N/A
- 1 8 Position the test dummies according to dummy position placement instructions in Appendix B
(X) Check
- 1.9 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 0 3 lb (X) 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

Seat Belt Comfort and Convenience Data (Cont)**1. BELT CONTACT FORCE (S7.4.3)**Test Vehicle NHTSA No : C15900Vehicle Model Year/Make/Model/Body Style: 2001/Volvo/S60 4 DoorDesignated Seating Position Tested Center RearDate of Comfort/Convenience Check: February 8, 2001Technician Performing Check: Chad GadberryGVWR 4400 lbs

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

() Yes - go to latchplate access

(X) No - continue with this check sheet

1.2 Adjustable seats are in 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

(X) N/A

1 3 If separately adjustable in a vertical direction, the seats are at the lowest position.

() Check

(X) N/A

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

() Check

(X) N/A

1 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

(X) N/A

1.6 Place each adjustable head restraint in its highest adjustment position

(X) Check

() N/A

Seat Belt Comfort and Convenience Data (Cont.)

- 1.7 Adjustable lumbar supports are positioned so that the lumbar support is in its lowest adjustment position (S8 1.3)
() Check
(X) N/A
- 1.8 Position the test dummies according to dummy position placement instructions in Appendix B
(X) Check
- 1.9 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 0.5 lb (X) 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.

Seat Belt Comfort and Convenience Data (Cont)

1 **BELT CONTACT FORCE (S7.4.3)**

Test Vehicle NHTSA No. C15900

Vehicle Model Year/Make/Model/Body Style 2001/Volvo/S60 4 Door

Designated Seating Position Tested: Right Rear

Date of Comfort/Convenience Check: February 8, 2001

Technician Performing Check Chad Gadberry

GVWR: 4400 lbs

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 1 Does the vehicle incorporate a webbing tension-relieving device?
☐ Yes - go to latchplate access
☒ No - continue with this check sheet
- 1 2 Adjustable seats are in 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
- 1 3 If separately adjustable in a vertical direction, the seats are at the lowest position
☐ Check
☒ N/A
- 1 4 Place adjustable seat backs in the manufacturer's nominal design riding position in the manner specified by the manufacturer.
☐ Check
☒ N/A
- 1 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
- 1 6 Place each adjustable head restraint in its highest adjustment position
☐ Check
☒ N/A

Seat Belt Comfort and Convenience Data (Cont)

- 1 7 Adjustable lumbar supports are positioned so that the lumbar support is in its lowest adjustment position (S8.1.3)

() Check

(X) N/A

- 1.8 Position the test dummies according to dummy position placement instructions in Appendix B

(X) Check

- 1 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 0.3 lb.

(X) 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

Seat Belt Comfort and Convenience Data (Cont.)

2 LATCHPLATE ACCESS (S7.4.4)

Test Vehicle NHTSA No C15900

Vehicle Model Year/Make/Model/Body Style: 2001/Volvo/S60 4 Door

Designated Seating Position Tested: Not Applicable - passenger car

Date of Comfort/Convenience Check: _____

Technician Performing Check: _____

GVWR _____

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.

- 2.1 Position the seat in its forward most adjustment position.
() Check
- 2.2 Position the test dummy using the procedures in Appendix B. (Some modifications to the positioning procedure may need to be made because the seat is in its forward most position.)
() Check
- 2.3 Position the adjustable seat belt anchorage in the manufacturer's nominal design position for a 50th percentile adult male occupant.
() Check
- 2.4 Attach the inboard and outboard reach string following the instructions on Figure 1C.
() Check
- 2.5 Place the latch plate in the stowed position.
() Check
- 2.6 Extend each line backward and outboard to generate arcs of the reach envelope of the test dummy's arms. Is the latch plate within the reach envelope?
() Yes-Pass () **No-FAIL**
- 2.7 Using the clearance test block, specified in Figure 2C, is there sufficient clearance between the vehicle seat and the side of vehicle interior to allow the test block to move unhindered to the latch plate or buckle?
() Yes-Pass () **No-FAIL**

Test Vehicle NHTSA No C15900

Vehicle Model Year/Make/Model/Body Style: 2001/Volvo/S60 4 Door

Designated Seating Position Tested: Not Applicable - passenger car

Date of Comfort/Convenience Check. _____

Technician Performing Check. _____

GVWR: _____

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.

- 3 1 Is the vehicle a passenger car or walk-in van-type vehicle?
(X) Yes If yes, go to seat belt guides and hardware.
() No
- 3 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 3 If separately adjustable in a vertical direction, the seats are at the lowest position.
() Check
- 3 4 Place adjustable seat backs in the manufacturer's nominal design riding position in the manner specified by the manufacturer
() Check
- 3 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
- 3 6 Place each adjustable head restraint in its highest adjustment position.
() Check
- 3 7 Adjustable lumbar supports are positioned so that the lumbar support is in its lowest adjustment position (S8 1 3)
() Check

Seat Belt Comfort and Convenience Data (Cont.)

- 3.8 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
- 3.9 Restrain the dummies using the belt systems for the position being tested.
() Check
- 3.10 Stow outboard armrests which are capable of being stowed.
() Check
- 3.11 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 latch plate is released.
() Pass
- (B) The torso and lap belt webbing of the seat belt system automatically retracts when the seat belt latch plate is released.
() Pass
- (C) Neither A or B apply.
() **FAIL**
- 3.12 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**
- 3.13 If this test vehicle has an open body (without doors) and has a seat 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**

Seat Belt Comfort and Convenience Data (Cont.)4. **SEAT BELT GUIDES AND HARDWARE (S7.4.6)**Test Vehicle NHTSA No. C15900Vehicle Model Year/Make/Model/Body Style: 2001/Volvo/S60 4 DoorDesignated Seating Position Tested: Left RearDate of Comfort/Convenience Check: February 8, 2001Technician Performing Check: Chad GadberryGVWR: 4400 lbs

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 which are movable so that the space formerly occupied by the seat can be used for a secondary function.

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

- 4.1 Is the webbing designed to pass through the seat cushion or between the seat cushion and seat back?

(X)Yes - Go to 4.2

() No - this form is complete

- 4.2 Does one of the following three parts, the seat belt latch plate, 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)?

(X)Yes - Pass

() No - FAIL

- 4.3 Are the remaining two seat belt parts accessible under normal conditions?

(X)Yes - Pass

() No - FAIL

Seat Belt Comfort and Convenience Data (Cont.)

- 4 4 The buckle and latch plate 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 (X) Check
- (B) The seat is moved to any position to which it is designed to be adjusted (X) Check
- (C) The seat back, if foldable, is folded forward as far as possible and then moved backward into position (X) Check
- (X) Yes - Pass
() No - FAIL
- 4 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)?
- (X) Yes - Pass
() No - FAIL

Seat Belt Comfort and Convenience Data (Cont.)

4 SEAT BELT GUIDES AND HARDWARE (S7.4.6)

Test Vehicle NHTSA No.: C15900

Vehicle Model Year/Make/Model/Body Style 2001/Volvo/S60 4 Door

Designated Seating Position Tested: Center Rear

Date of Comfort/Convenience Check February 8, 2001

Technician Performing Check: Chad Gadberry

GVWR 4400 lbs

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 which are movable so that the space formerly occupied by the seat can be used for a secondary function

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

- 4.1 Is the webbing designed to pass through the seat cushion or between the seat cushion and seat back?

☒ Yes - Go to 4.2

☐ No - this form is complete

- 4.2 Does one of the following three parts, the seat belt latch plate, 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

- 4.3 Are the remaining two seat belt parts accessible under normal conditions?

☒ Yes - Pass

☐ No - FAIL

Seat Belt Comfort and Convenience Data (Cont)

4 4 The buckle and latch plate 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 (X) Check

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

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

(X) Yes - Pass

() No - FAIL

4 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)?

(X) Yes - Pass

() No - FAIL

Seat Belt Comfort and Convenience Data (Cont.)

4 SEAT BELT GUIDES AND HARDWARE (S7.4.6)

Test Vehicle NHTSA No C15900

Vehicle Model Year/Make/Model/Body Style 2001/Volvo/S60 4 Door

Designated Seating Position Tested Right Rear

Date of Comfort/Convenience Check February 8, 2001

Technician Performing Check Chad Gadberry

GVWR 4400 lbs

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 which are movable so that the space formerly occupied by the seat can be used for a secondary function

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

- 4 1 Is the webbing designed to pass through the seat cushion or between the seat cushion and seat back?

(X)Yes - Go to 4 2.

() No - this form is complete

- 4 2 Does one of the following three parts, the seat belt latch plate, 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)?

(X)Yes - Pass

() No - FAIL

- 4 3 Are the remaining two seat belt parts accessible under normal conditions?

(X)Yes - Pass

() No - FAIL

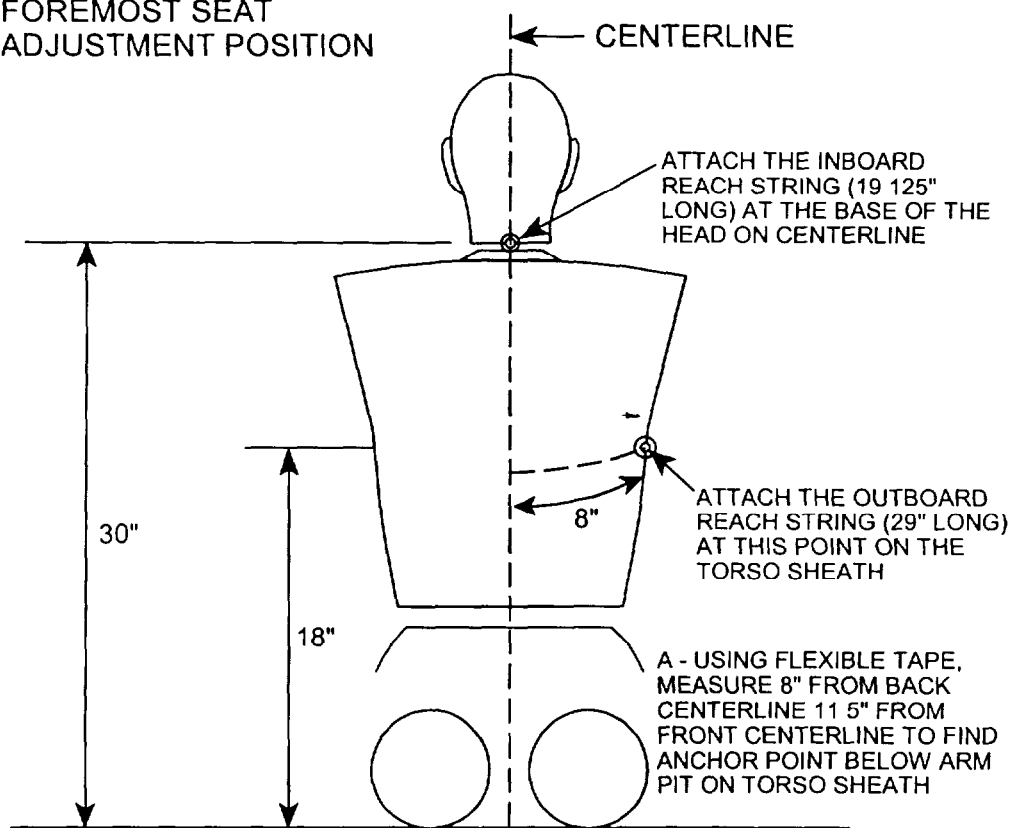
Seat Belt Comfort and Convenience Data (Cont)

- 4.4 The buckle and latch plate 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 (X) Check
 - (B) The seat is moved to any position to which it is designed to be adjusted. (X) Check
 - (C) The seat back, if foldable, is folded forward as far as possible and then moved backward into position. (X) Check
- (X) Yes - Pass
() No - FAIL
- 4.5 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)?
- (X) Yes - Pass
() No - FAIL

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

PART 572E DUMMY

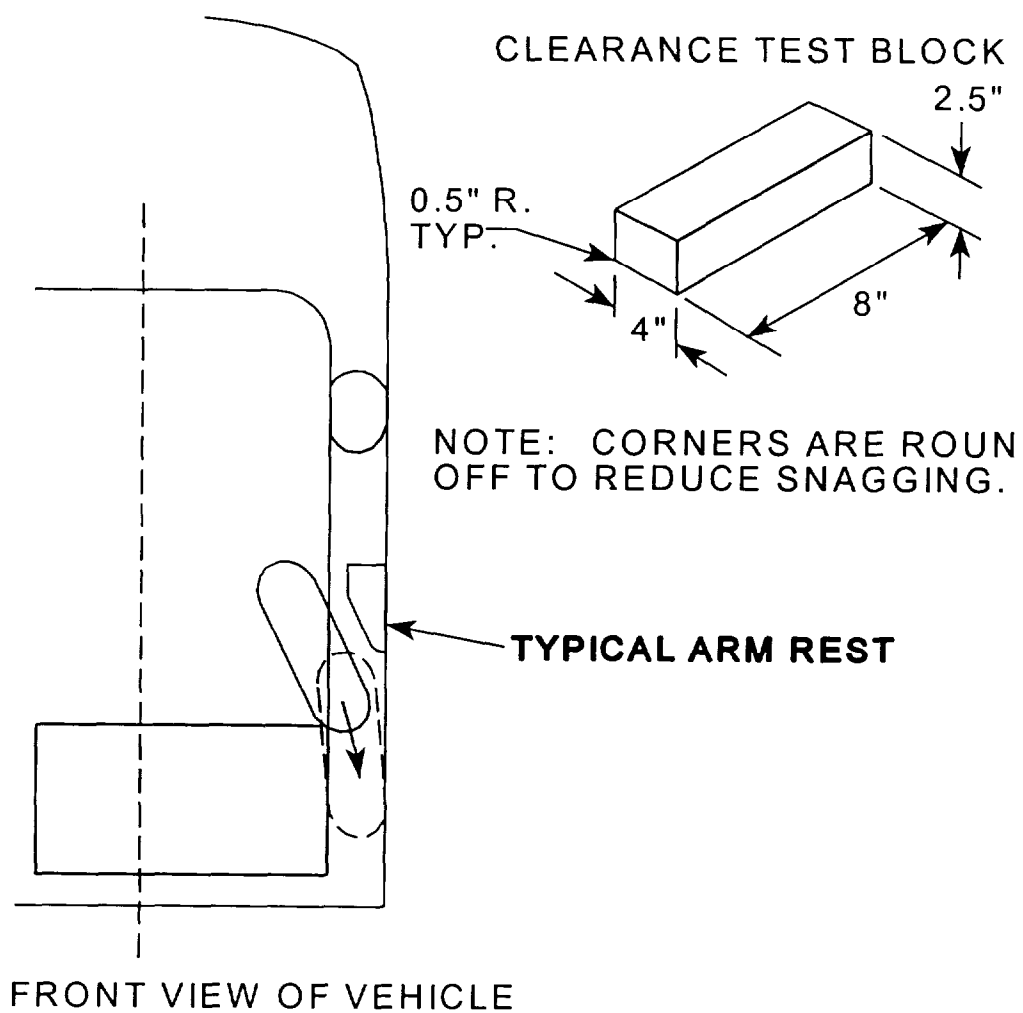
50TH PERCENTILE
DUMMY SEATED IN
FOREMOST SEAT
ADJUSTMENT POSITION



SEAT PLANE IS 90 DEGREES TO THE TORSO LINE

REAR VIEW

USE OF CLEARANCE TEST BLOCK TO DETERMINE HAND/ARM ACCESS



APPENDIX A
PHOTOGRAPHS

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Photo No A-27 - Post-Test Passenger Seat Position View	A-27
Photo No A-28 - Vehicle Certification Label	A-28
Photo No A-29 - FMVSS 110 Label	A-29

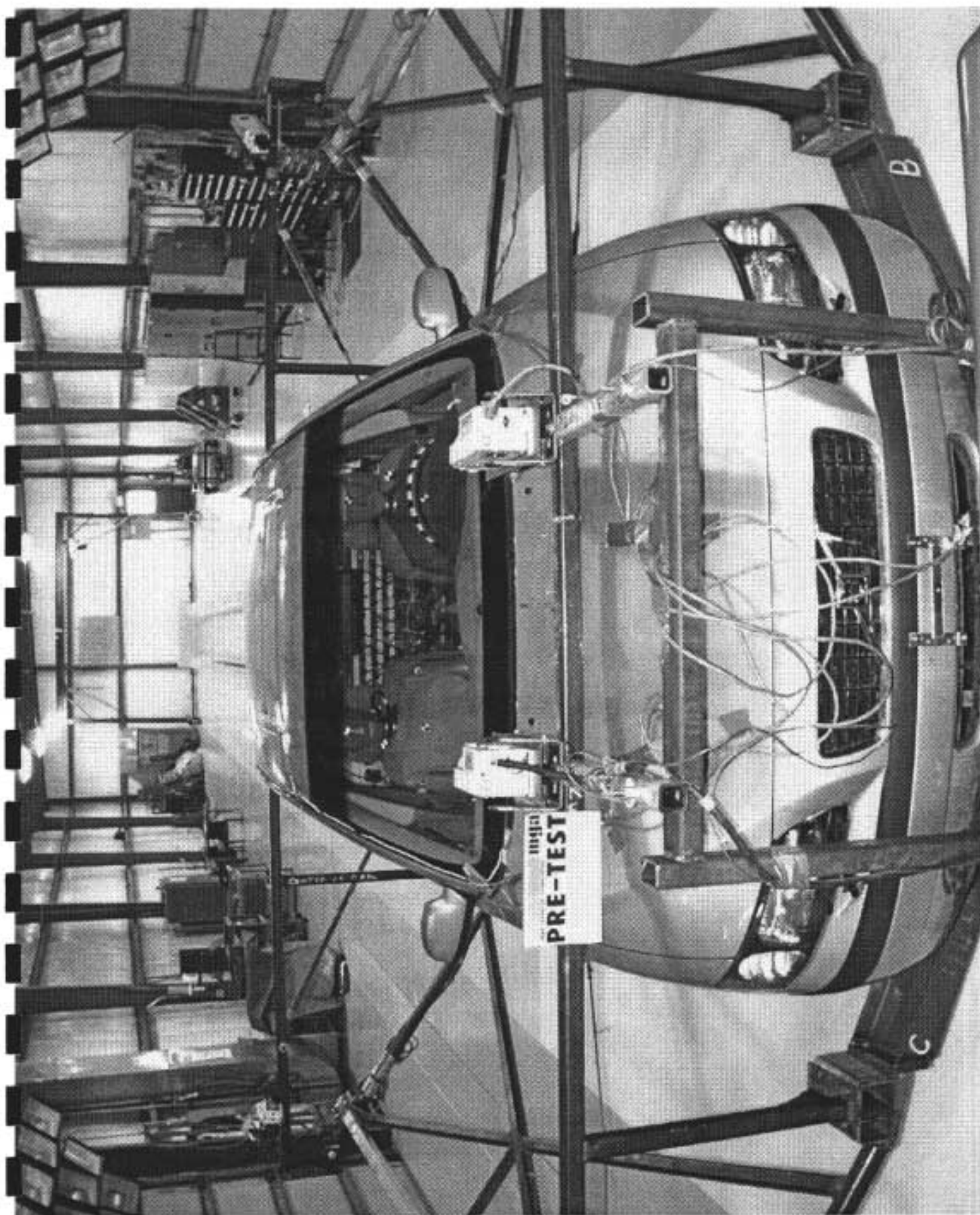


Photo No. A-1 - Pre-Test Frontal View

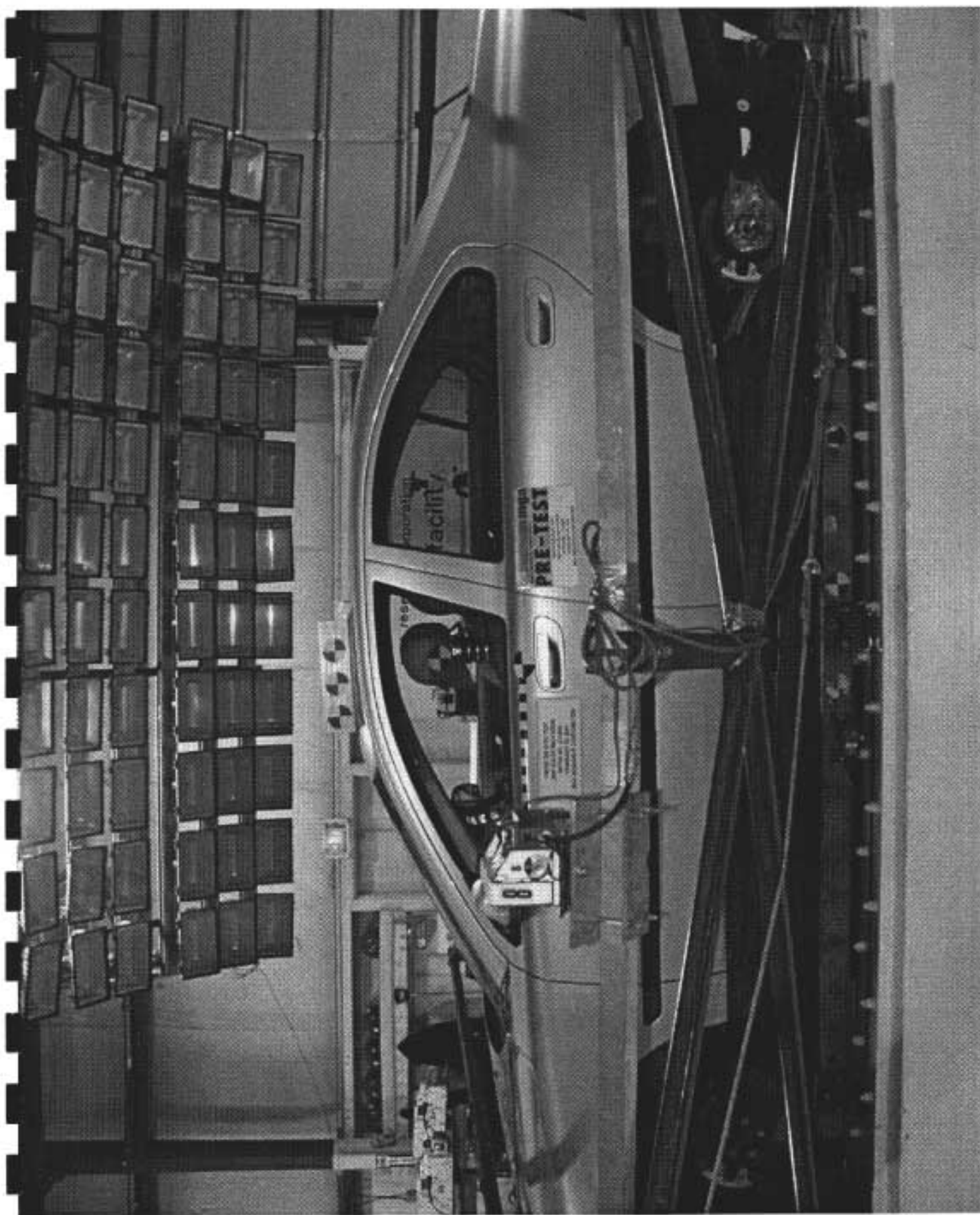


Photo No. A-2 - Pre-Test Left Side View

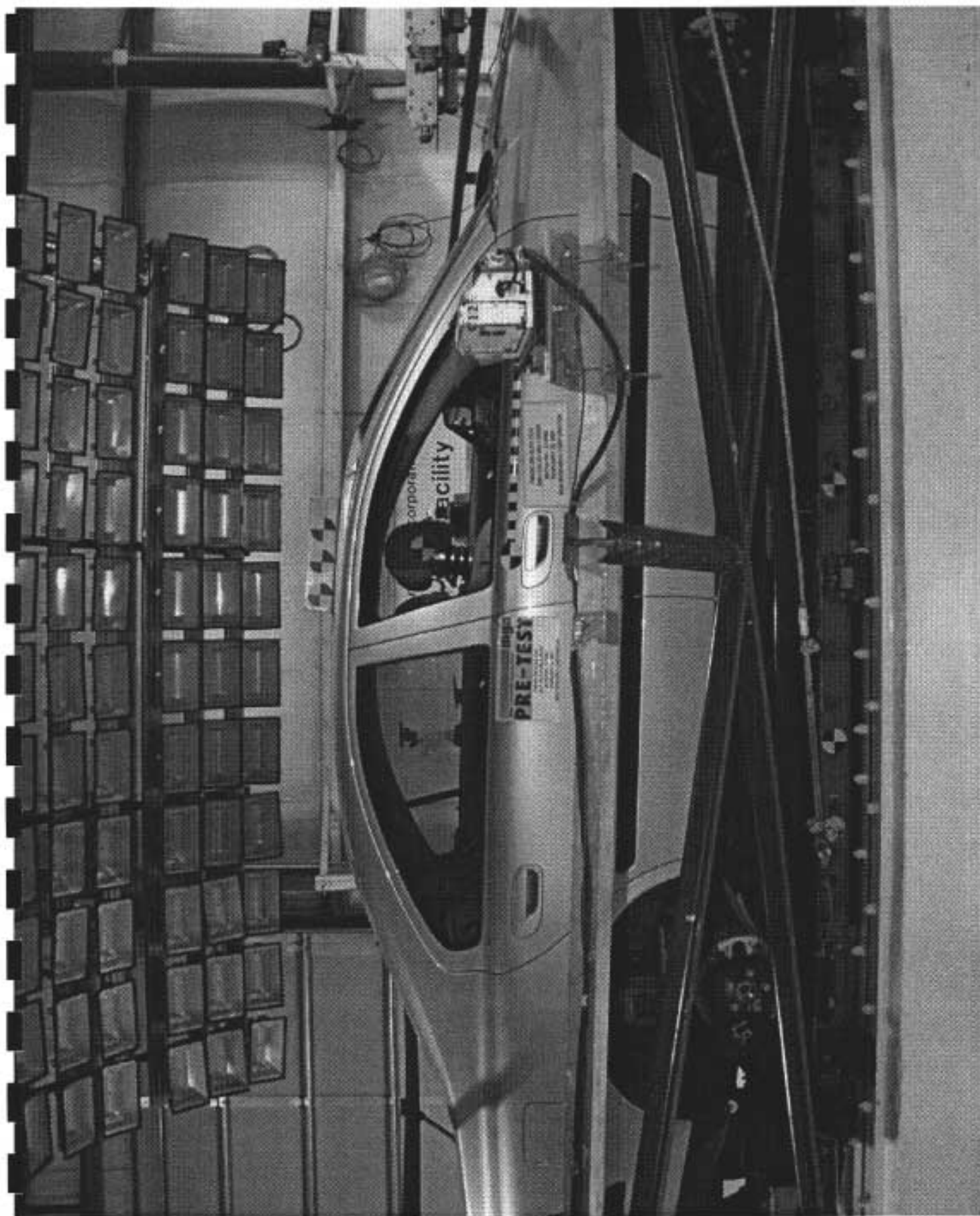


Photo No. A-3 - Pre-Test Right Side View

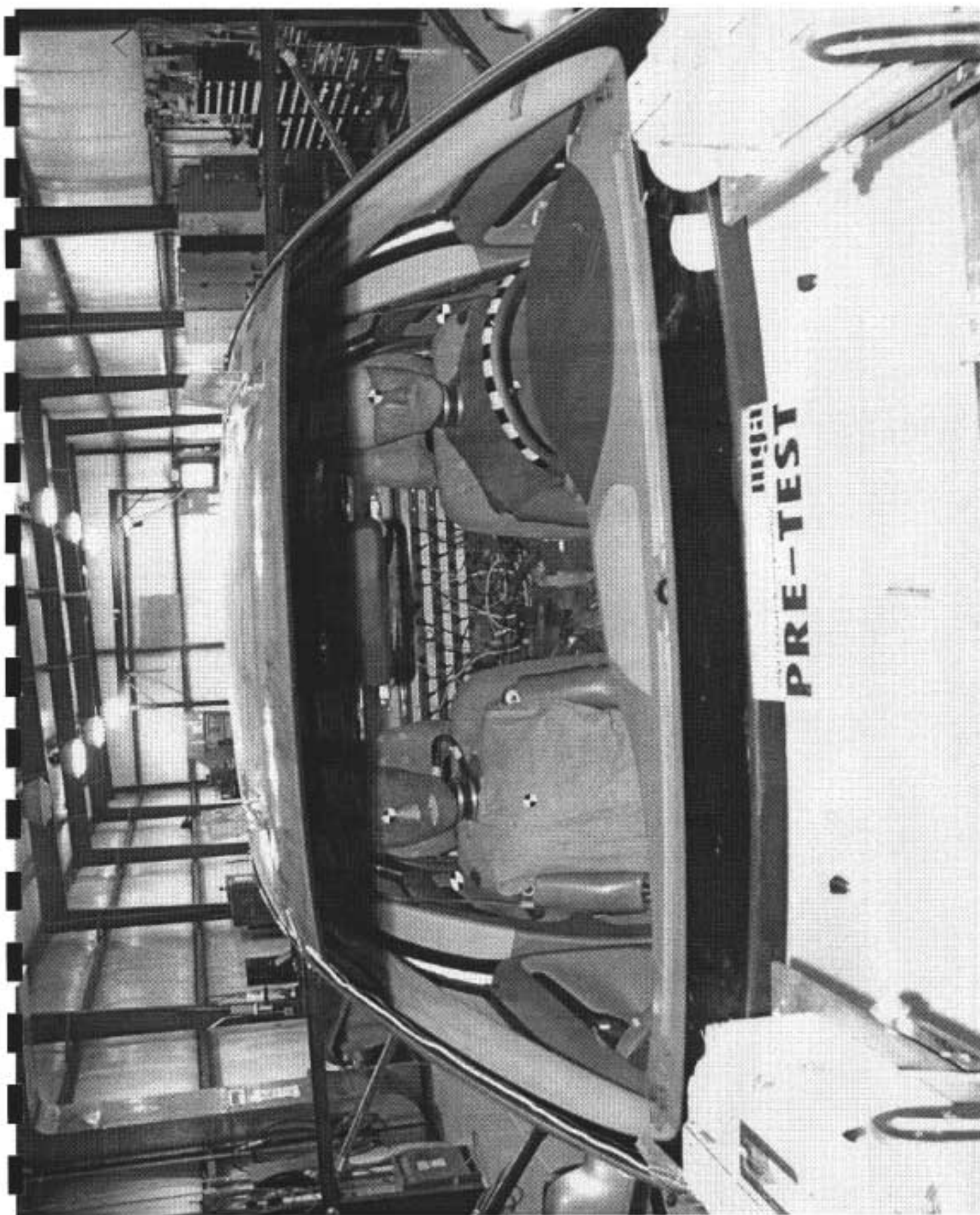


Photo No. A-4 - Pre-Test Windshield View

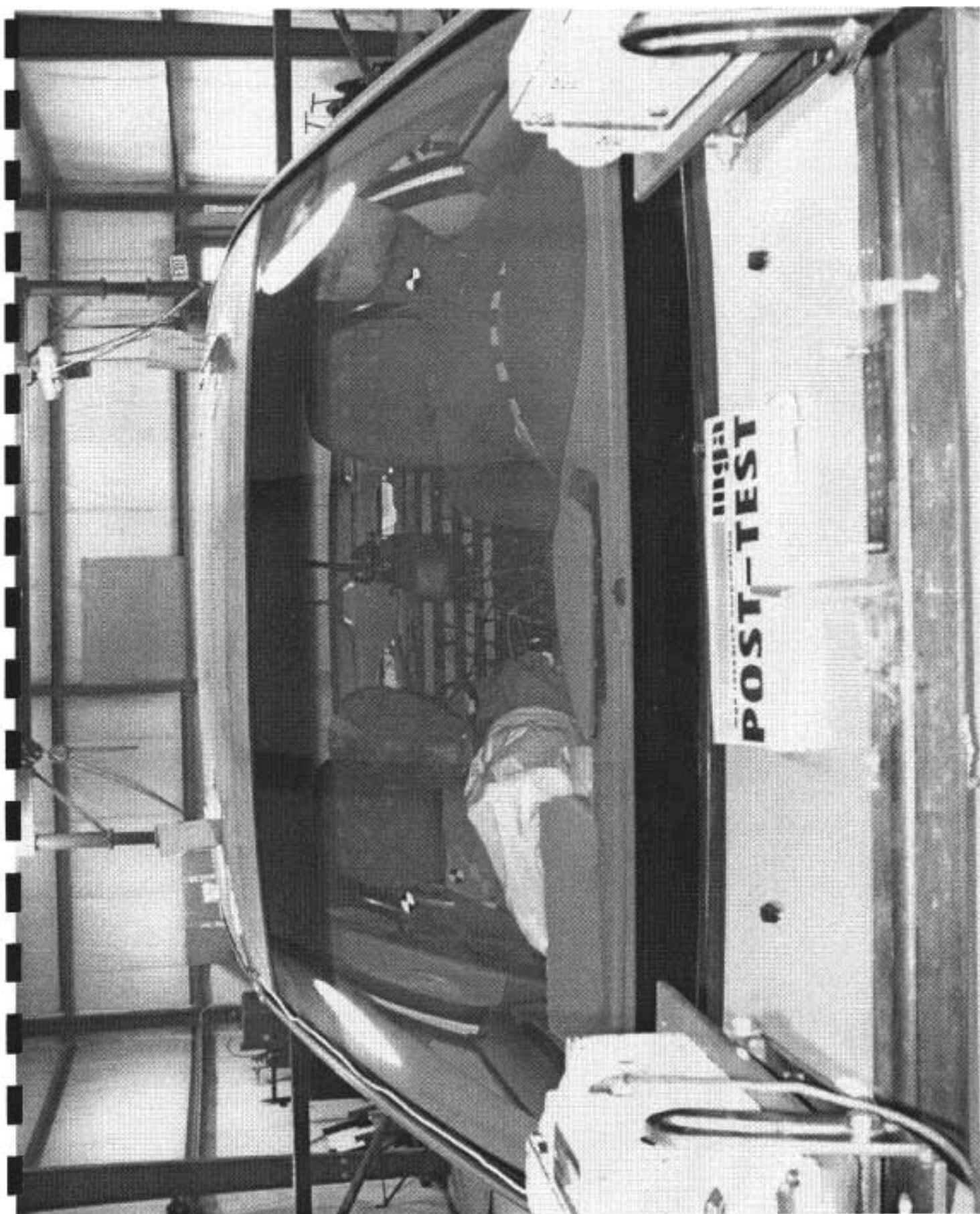


Photo No. A-5 - Post-Test Windshield View



Photo No. A-6 - Pre-Test Driver Dummy Position View (Door Open)

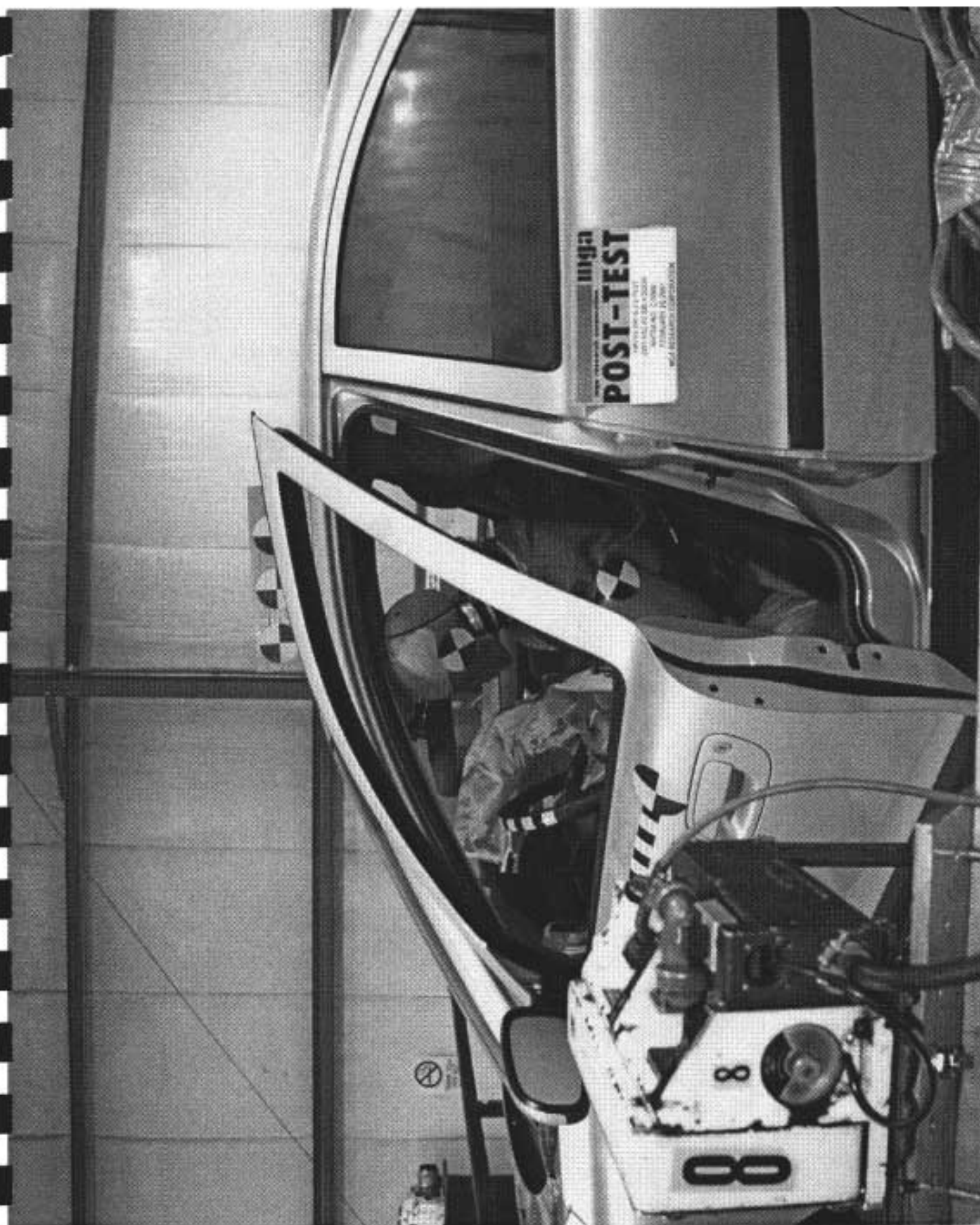


Photo No. A-7 - Post-Test Driver Dummy Position View (Door Open)

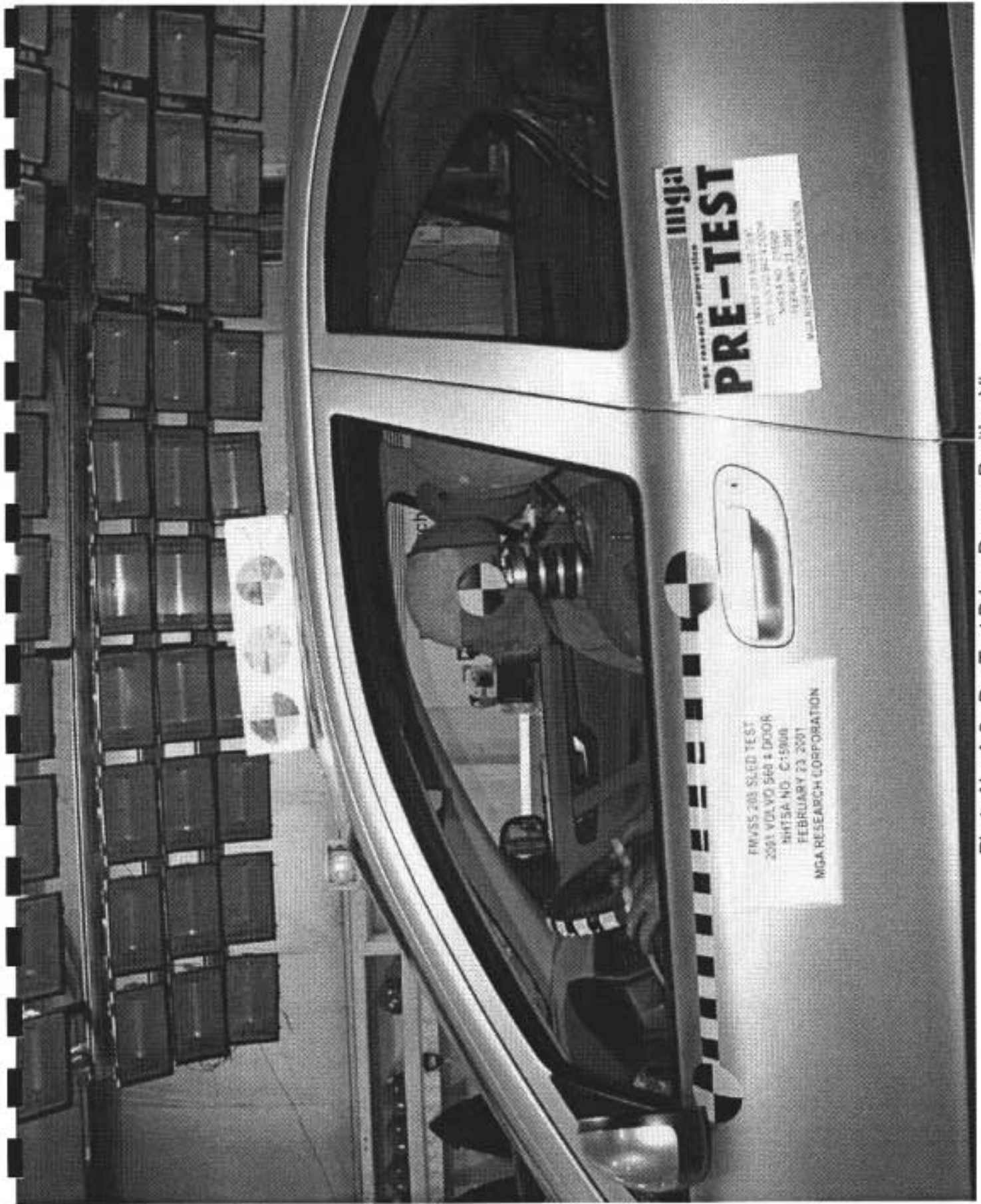


Photo No. A-8 - Pre-Test Driver Dummy Position View



Photo No. A-9 - Post-Test Driver Dummy Position View



Photo No. A-10 - Pre-Test Passenger Dummy Position View (Door Open)

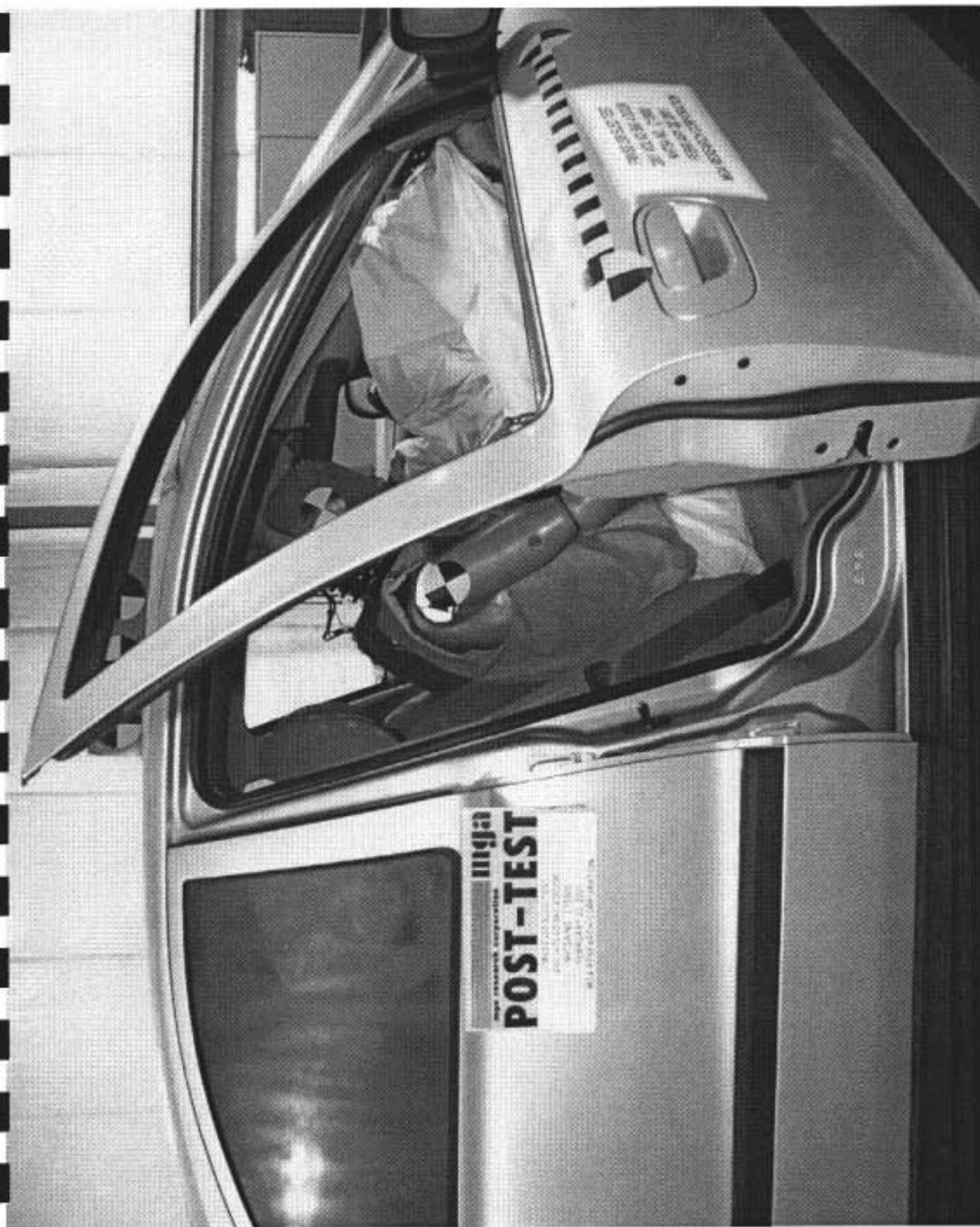


Photo No. A-11 - Post-Test Passenger Dummy Position View (Door Open)

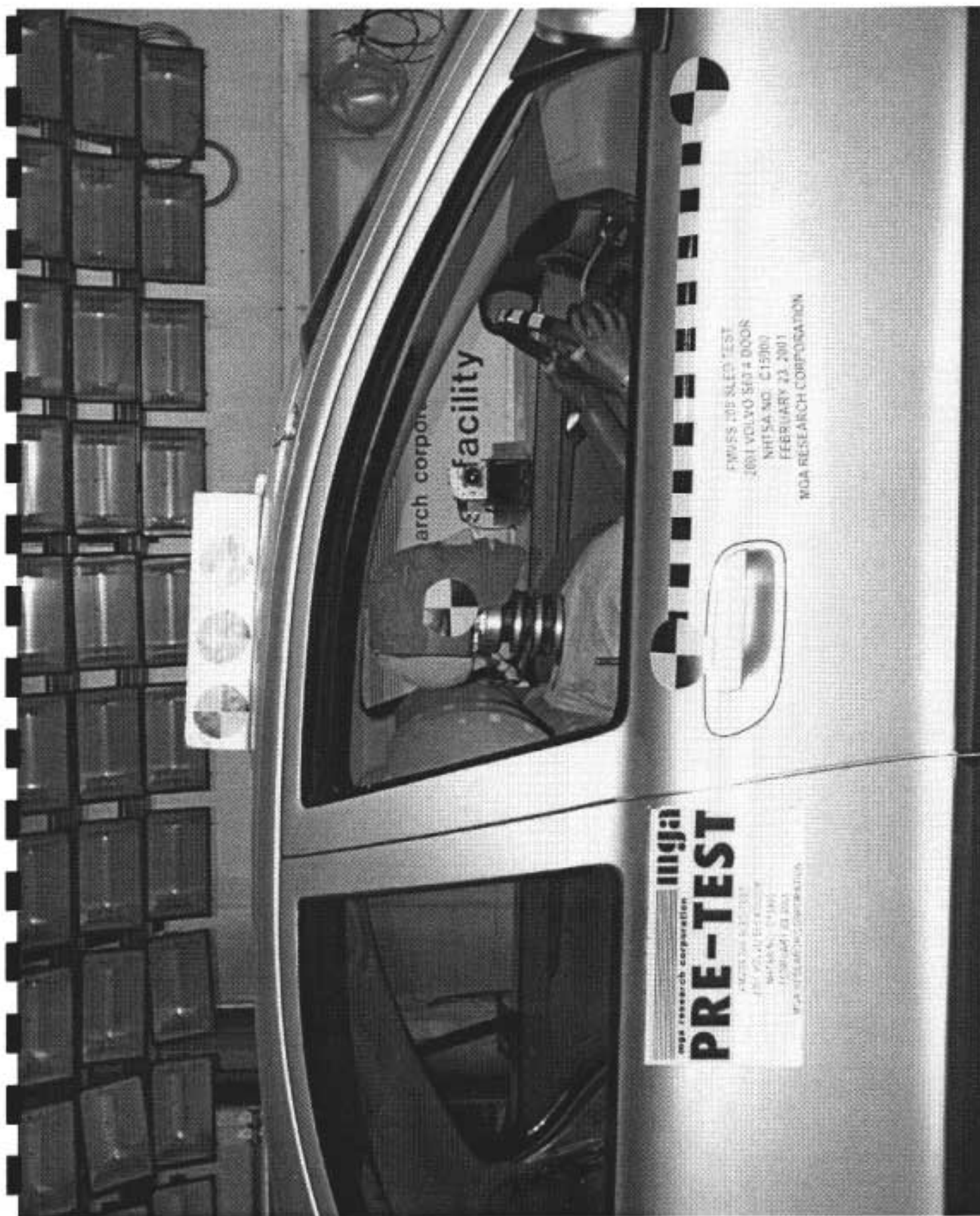


Photo No. A-12 - Pre-Test Passenger Dummy Position View

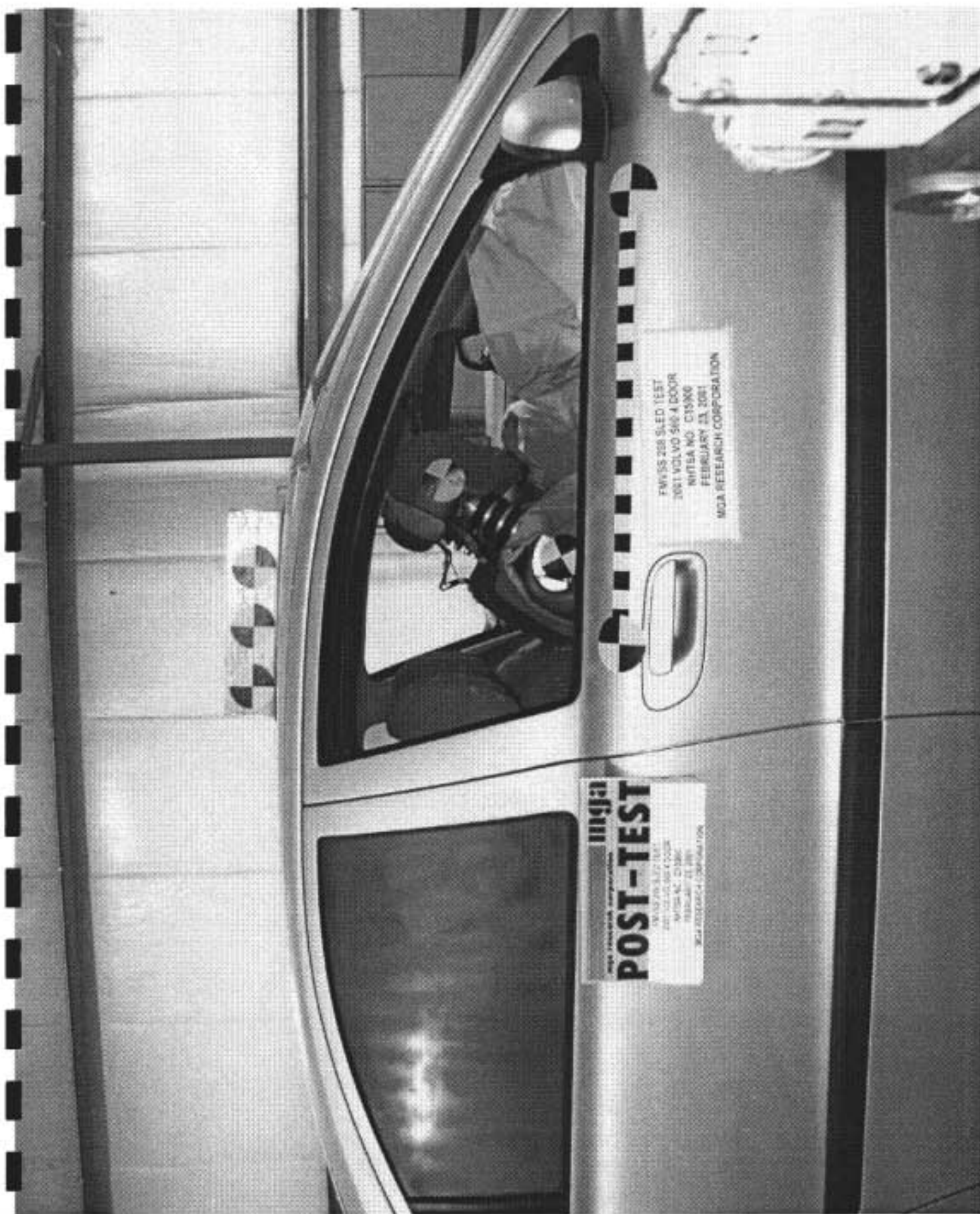


Photo No. A-13 - Post-Test Passenger Dummy Position View



Photo No. A-14 - Post-Test Driver Airbag View



Photo No. A-15 - Post-Test Driver Head Contact View



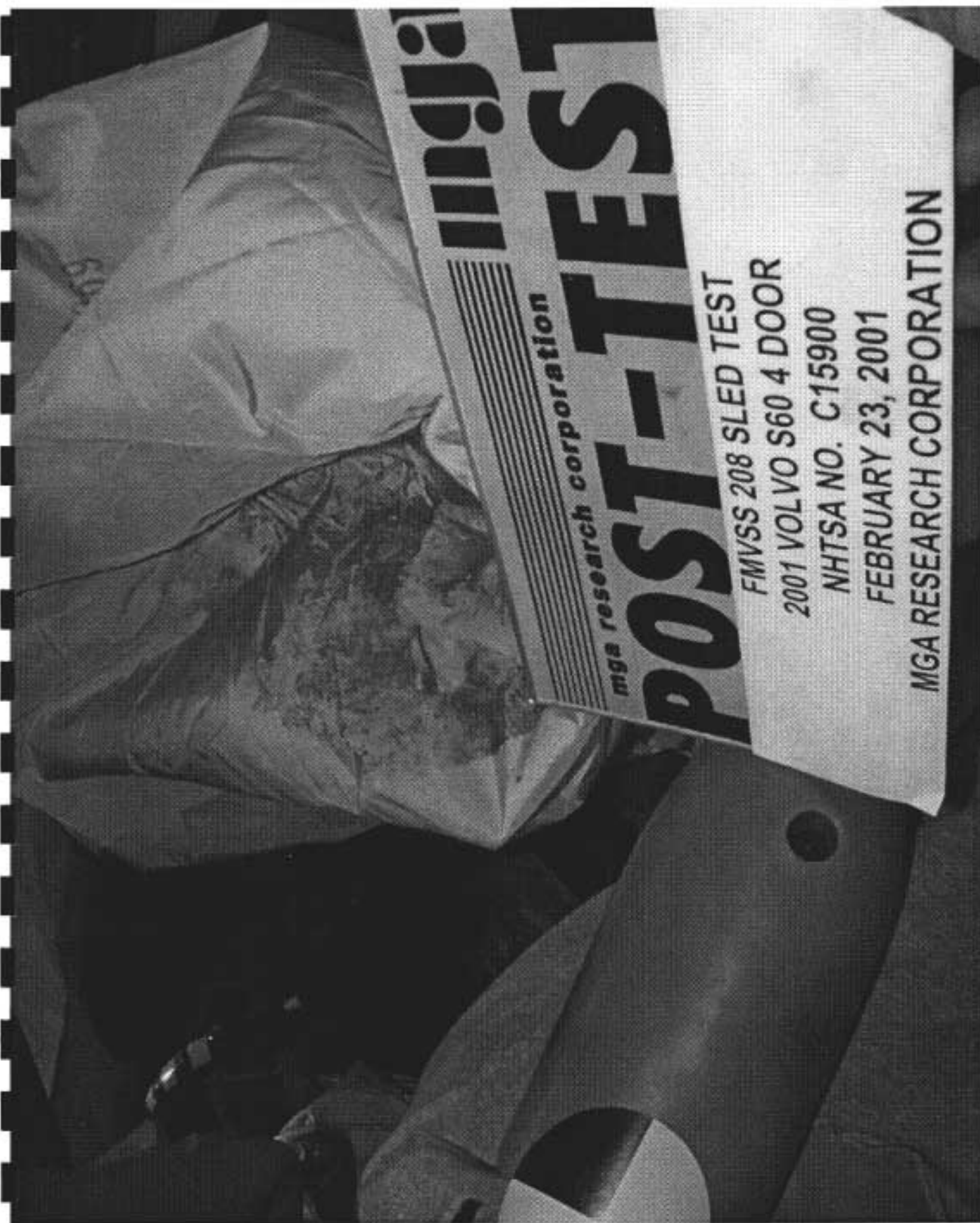


Photo No. A-17 - Post-Test Passenger Dummy Airbag View

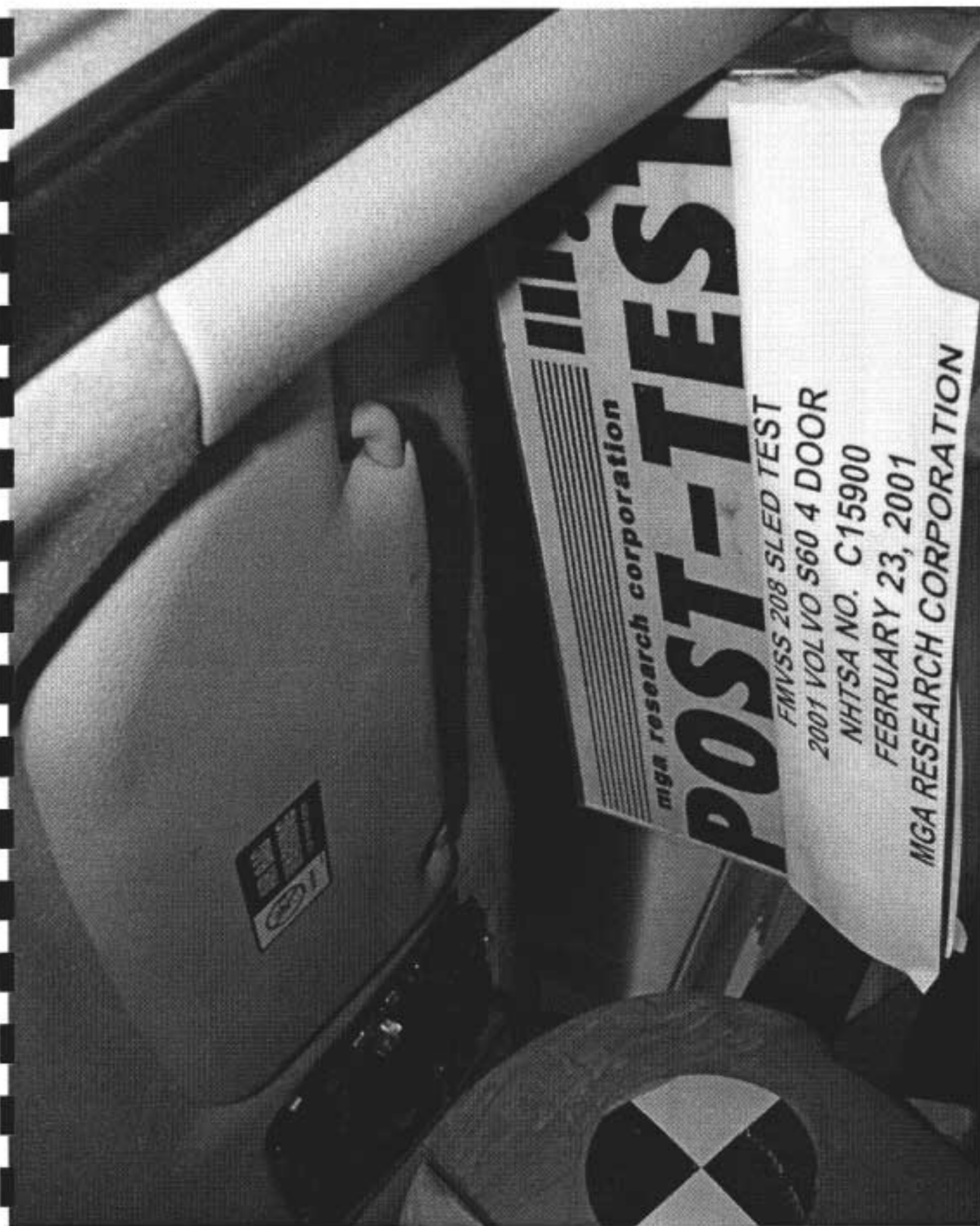


Photo No. A-18 - Post-Test Passenger Dummy Head Contact View (visor)



Photo No. A-19 - Post-Test Passenger Dummy Knee Contact View



Photo No. A-20 - Pre-Test Driver Knee Bolster View



Photo No. A-21 - Post-Test Driver Knee Bolster View



Photo No. A-22 - Pre-Test Passenger Knee Bolster View



Photo No. A-23 - Post-Test Passenger Knee Bolster View



Photo No. A-24 - Pre-Test Driver Seat Position View

mga
mga research corporation
POST-TEST

FMVSS 208 SLED TEST

2001 VOLVO S60 4 DOOR

NHTSA NO. C15900

FEBRUARY 23, 2001

MGA RESEARCH CORPORATION

mga research corporation

PRE-TEST

FMVSS 208 SLED TEST
2001 VOLVO S60 4 DOOR
NHTSA NO. C15900
FEBRUARY 23, 2001

MGA RESEARCH CORPORATION

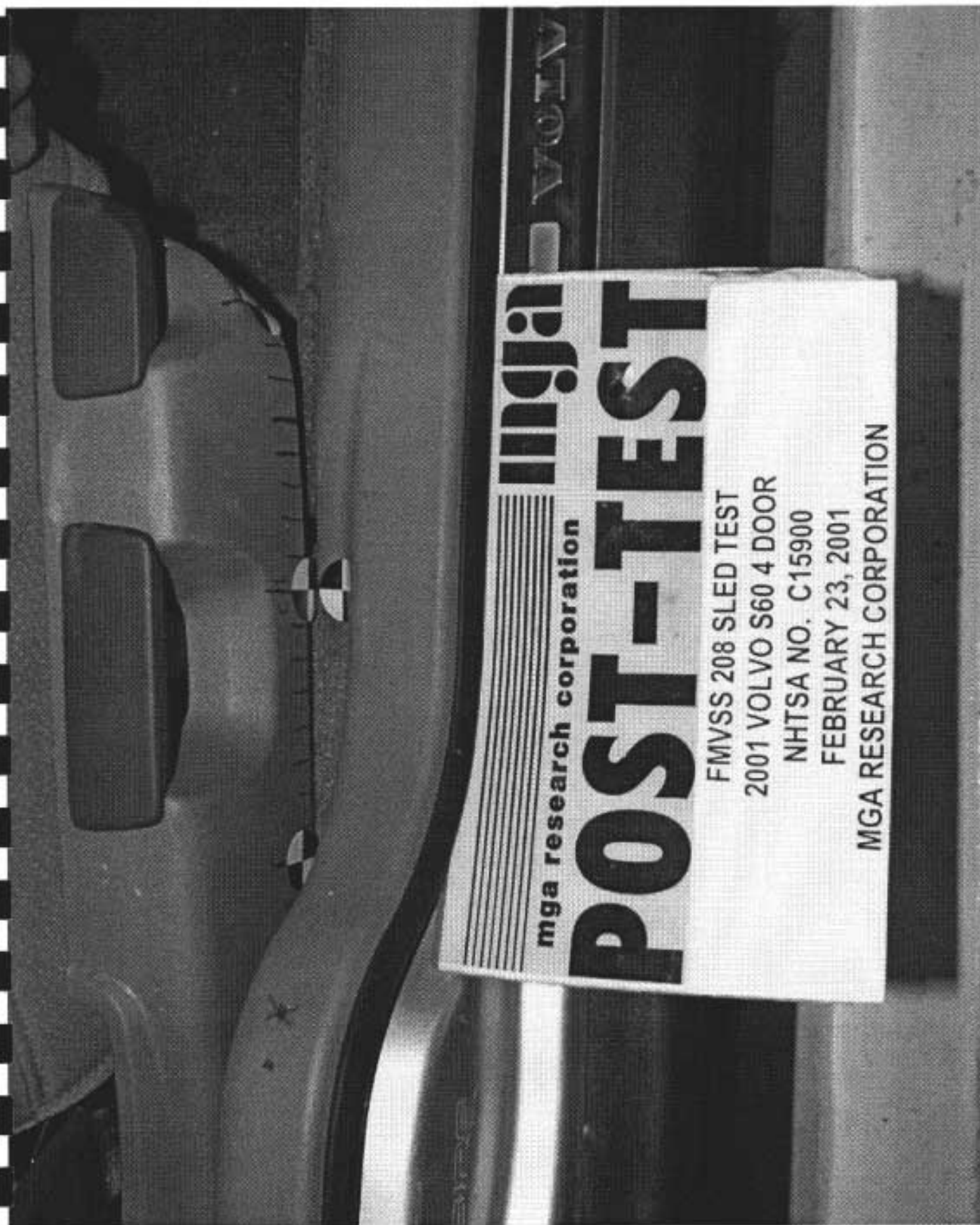
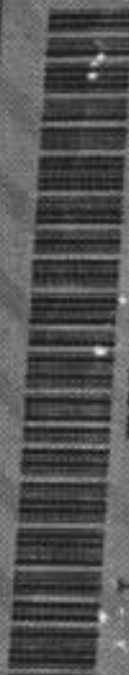


Photo No. A-27 - Post-Test Passenger Seat Position View

MFD. BY VOLVO GOTHENBURG SWEDEN
DATE 09/00 GVW 4400 GVW R FRONT 2330 GVW R REAR 2220 LB
THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL
MOTOR VEHICLE SAFETY, BUMPER AND THEFT PROTECTION
STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE
SHOWN ABOVE.

VIN YV1RS61N412003675 PASS CAR
0025358



VOLVO

2514635

VEHICLE CAPACITY		OCCUPANTS		COLD TIRE PRESSURE		
WEIGHT		FRT	RR	TOTAL	FRONT	REAR
MAX LOAD	890 LB	2	3	5	38	38

PSI

RECOMMENDED FOR FUEL ECONOMY

OPTIONAL PRESSURE

TIRE SIZE	2	1	3	29	29	PSI
T125/65R15						

IF TIRES ARE HOT FROM DRIVING ADD 4 PSI (23kPa) TO THESE RECOMMENDED PRESSURES

T125/80R17 SIZE SPARE TIRE INFLATION PRESSURE 60 PSI

SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION.

0025358 **VOLVO** 3514949



IMPORTANT



SEE OWNER'S MANUAL

STOP ENGINE BEFORE REFUELLING.
CLOSE CAP AFTER REFUELLING.

FAILURE TO FOLLOW THESE INSTRUCTIONS MAY CAUSE
ONBOARD DIAGNOSTIC SYSTEM TO MALFUNCTION AND
CHECK ENGINE LAMP TO ILLUMINATE.

SEE OWNER'S MANUAL.

VOLVO

9454010

APPENDIX B
DATA PLOTS

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TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

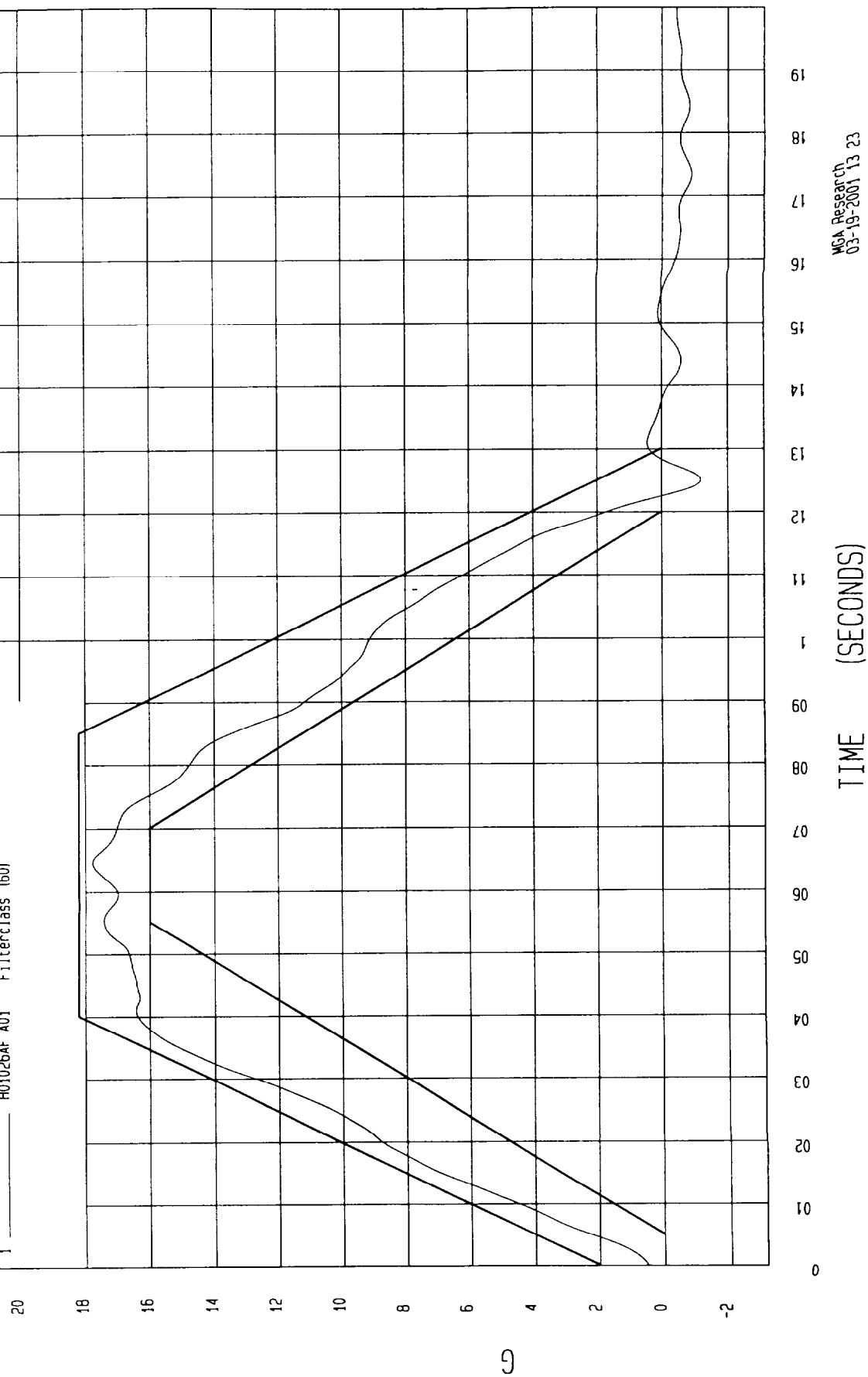
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum = -1.18 G at 125.1 msec

Maximum = 17.77 G at 64.6 msec

SLED X ACCELERATION

1 — H01026AF A01 Filterclass (60)



TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

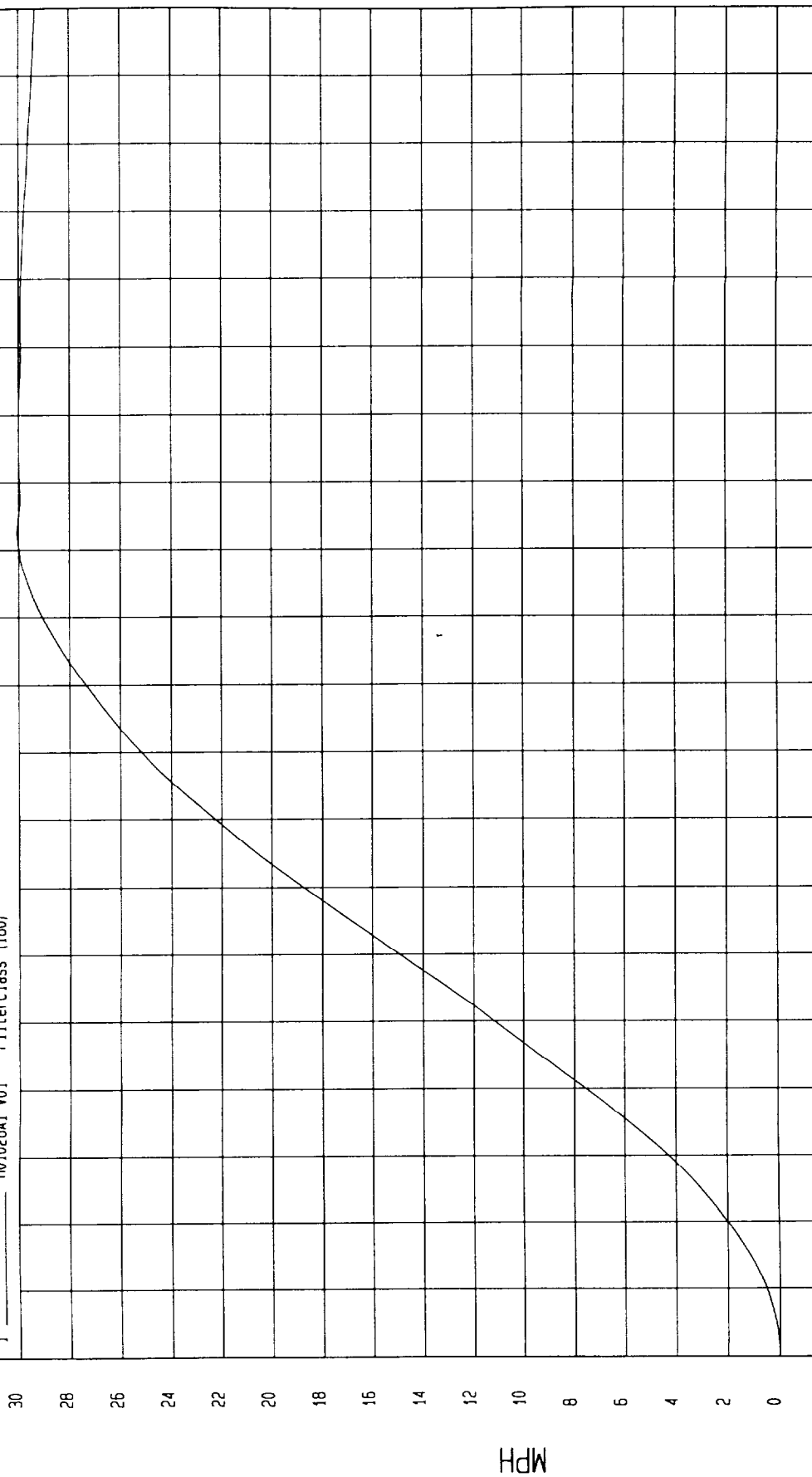
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum = 0 MPH at 0 msec

Maximum 30.06 MPH at 123 msec

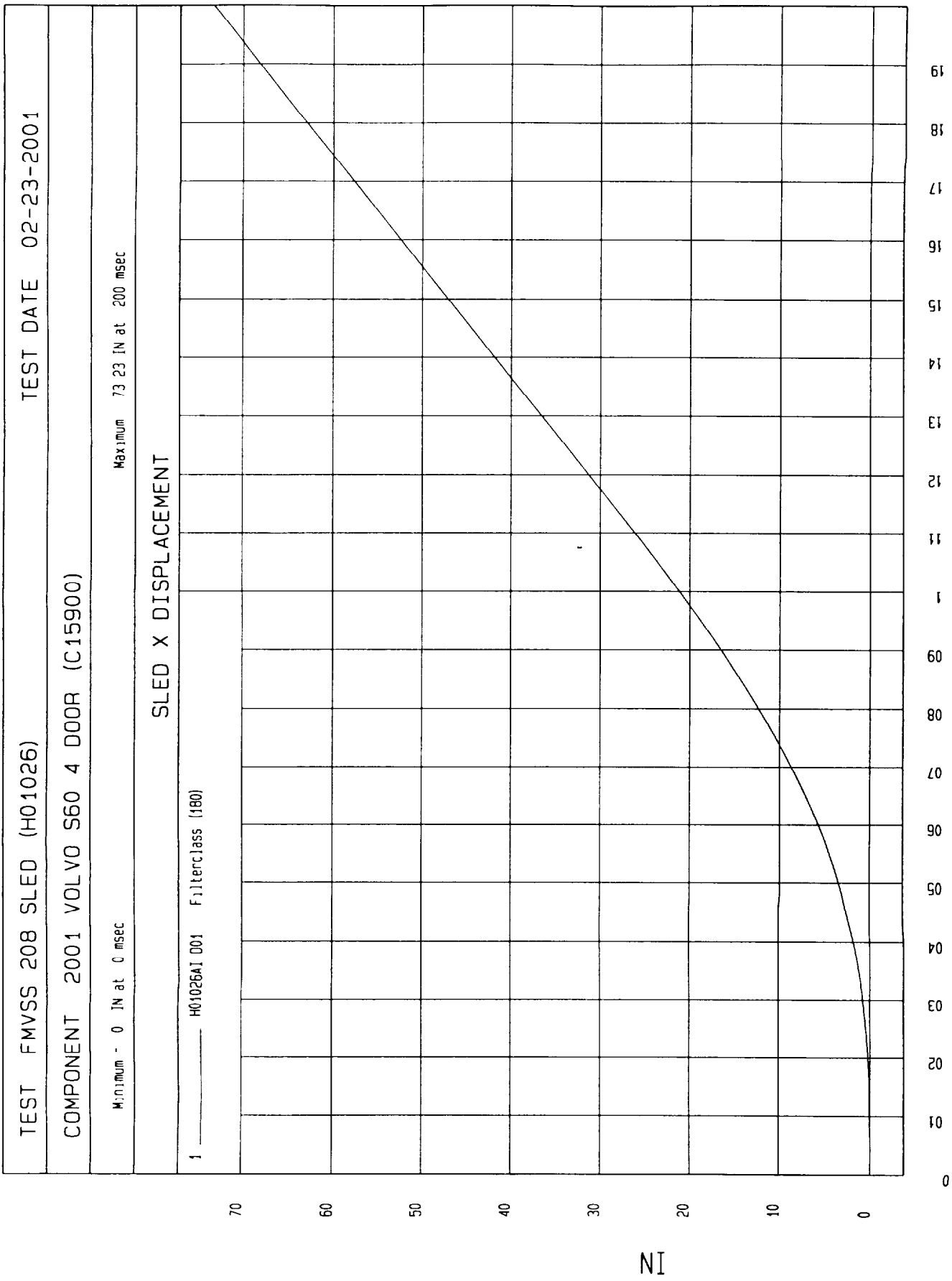
SLED X VELOCITY

1 H01026A1 V01 Filterclass (180)



TIME Seconds

MPH



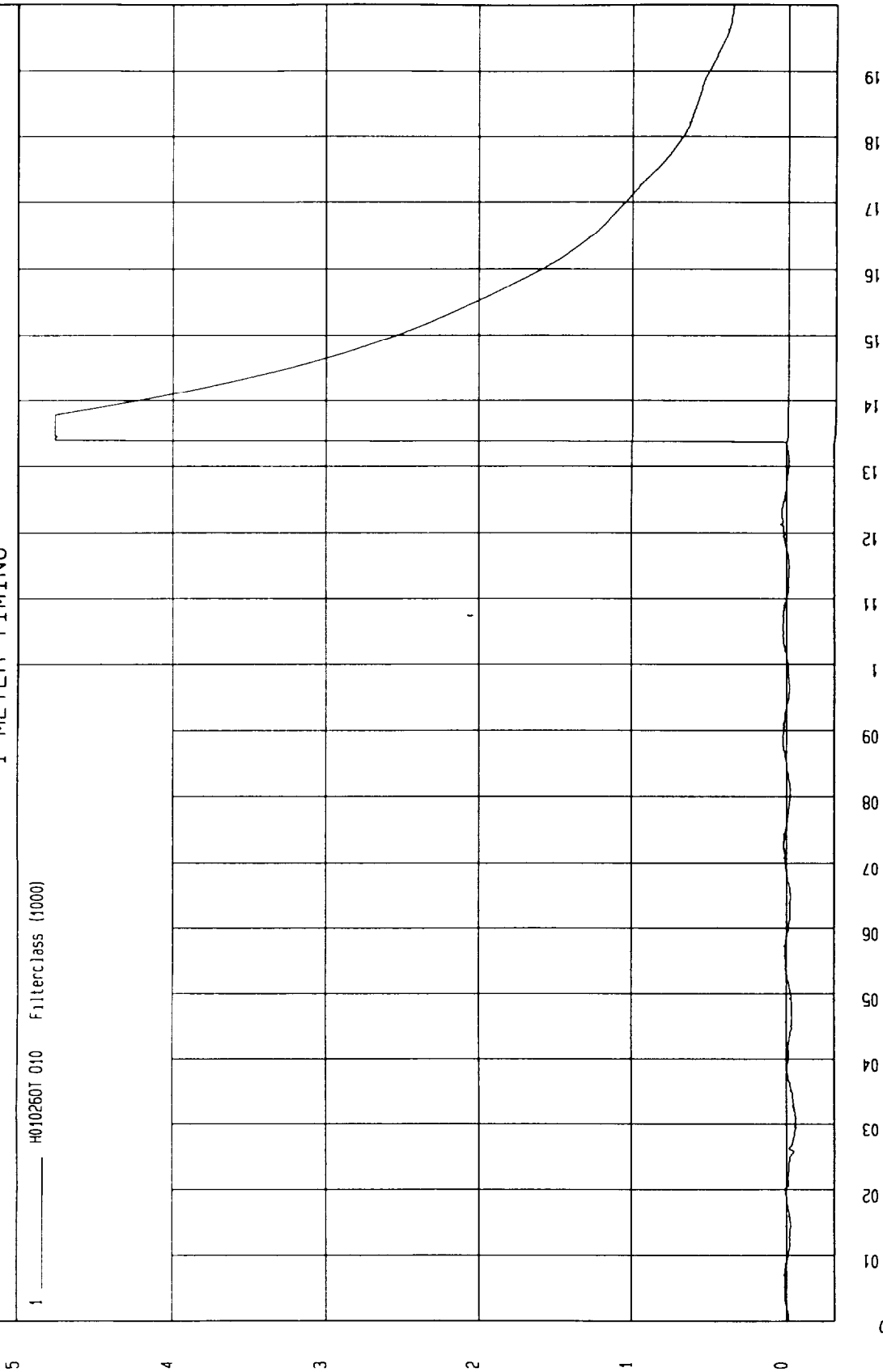
TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum - - 06 VOLTS at 30 msec Maximum - 476 VOLTS at 134 msec

1 METER TIMING

1 _____ H0102601 010 Filterclass (1000)



TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum - 11 V at 1 msec

Maximum 5.02 V at 20 msec

AIRBAG TIMING (FIRST STAGE)

1 _____ H010260T 047 Filterclass (1000)

5

4

3

2

1

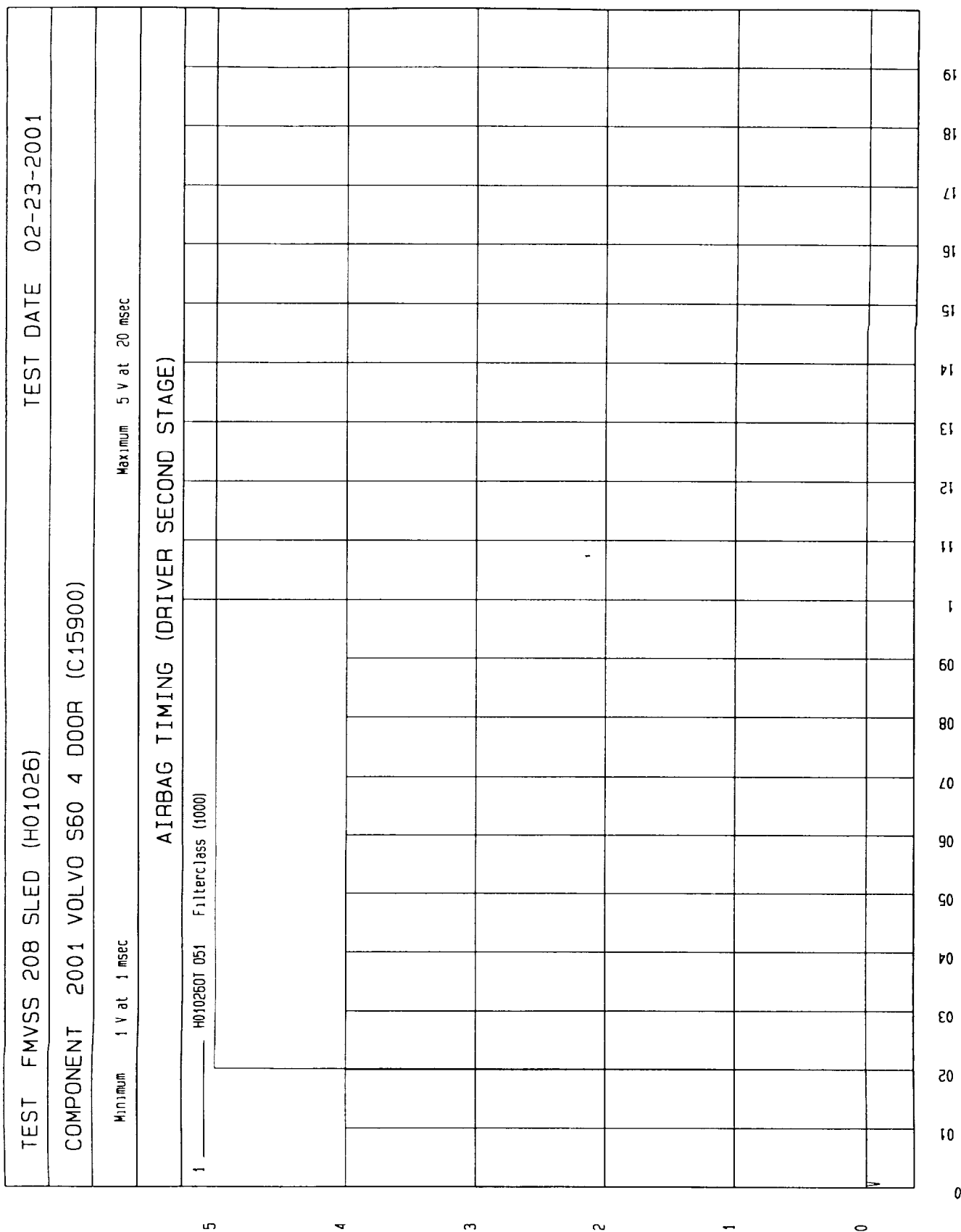
0

V

0 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19

TIME (SECONDS)

NSA Research
03-14-2001 11:04



TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

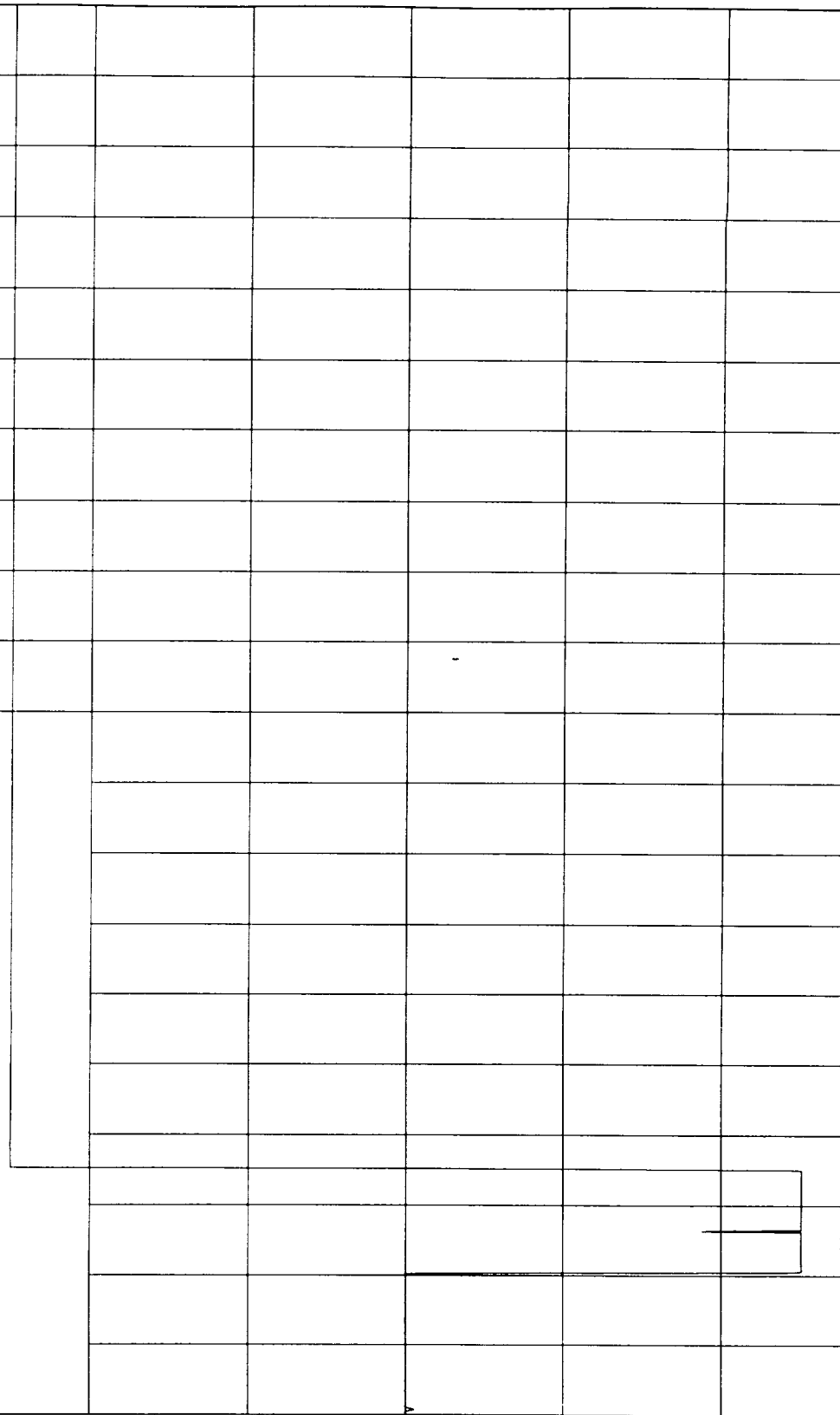
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum = -5 V at 21 msec

Maximum = 4.99 V at 35 msec

AIRBAG TIMING (PASSENGER SECOND STAGE)

1 H010260T 052 Filterclass (1000)



TIME (SECONDS)

TEST FMVSS 208 SLED (H01026)

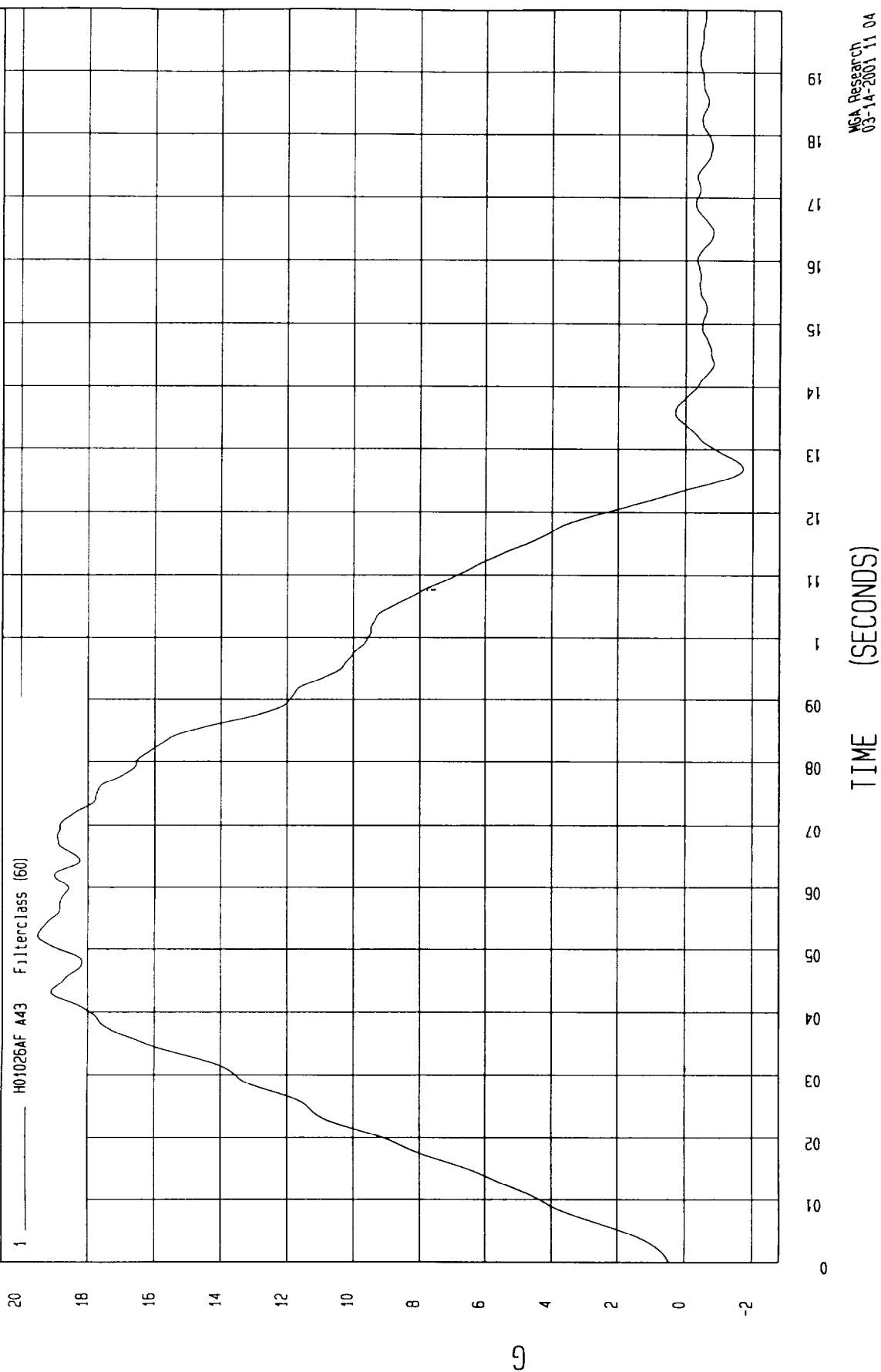
TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum = 1.72 G at 127 msec

Maximum 19.49 G at 52 msec

LEFT REAR SEAT CROSSMEMBER X ACCELERATION



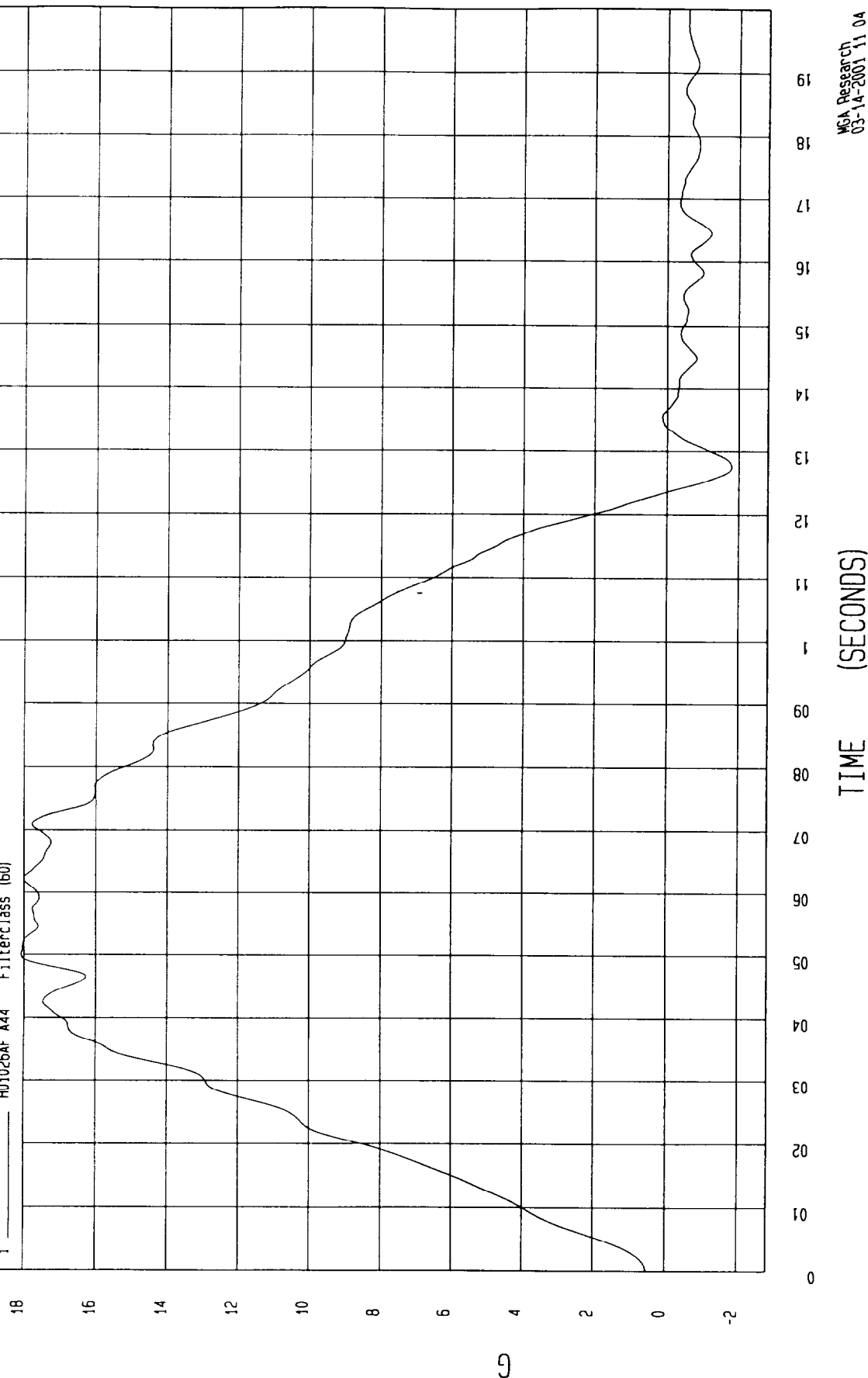
TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum = -1.8 G at 128 msec Maximum 18.07 G at 50 msec

RIGHT REAR SEAT CROSSMEMBER X ACCELERATION

1 H01026AF A44 Filterclass (60)

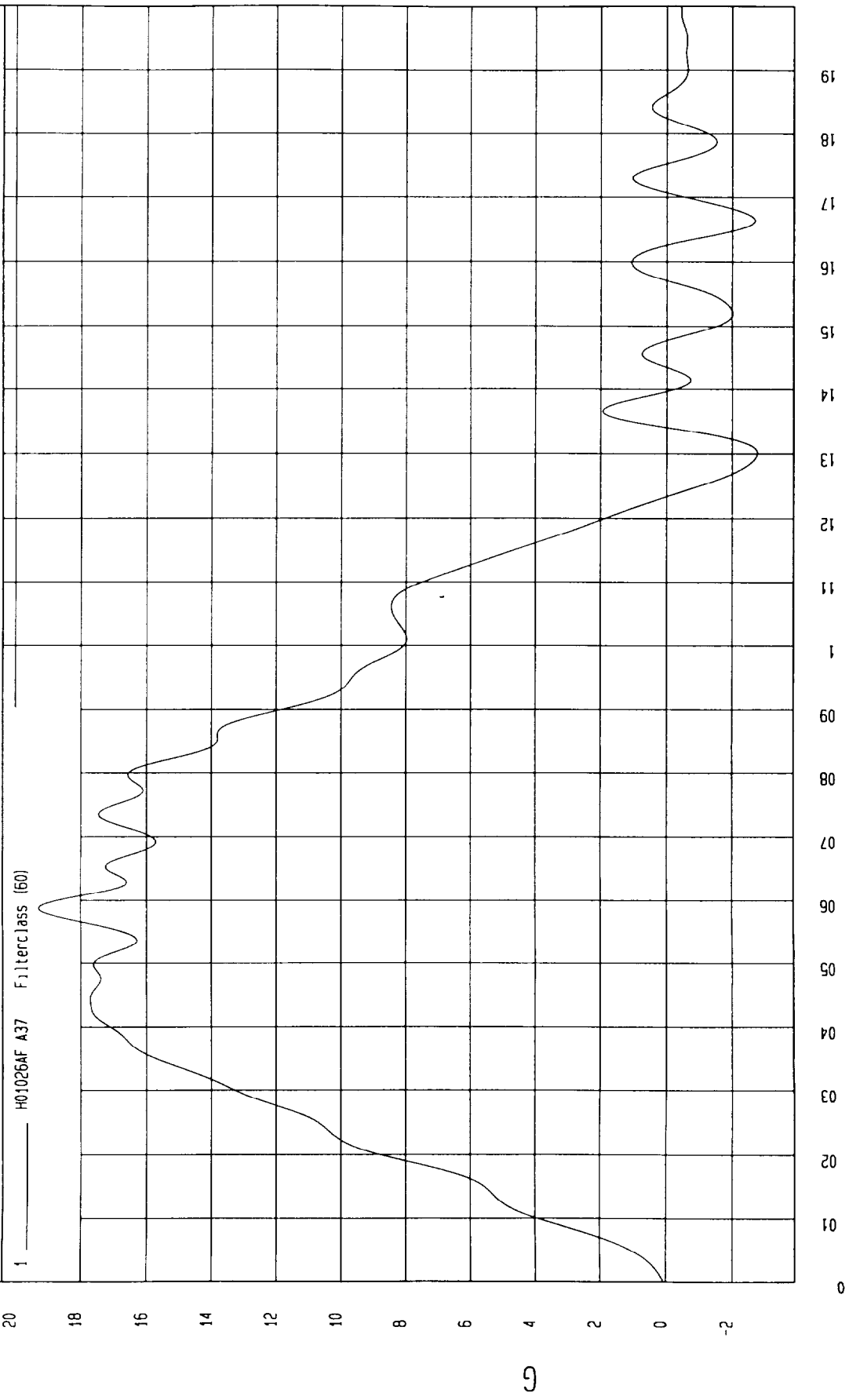


TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum = 2.77 G at 130 msec Maximum = 19.28 G at 59 msec

TOP OF ENGINE X ACCELERATION



TEST FMVSS 208 SLED (H01026)

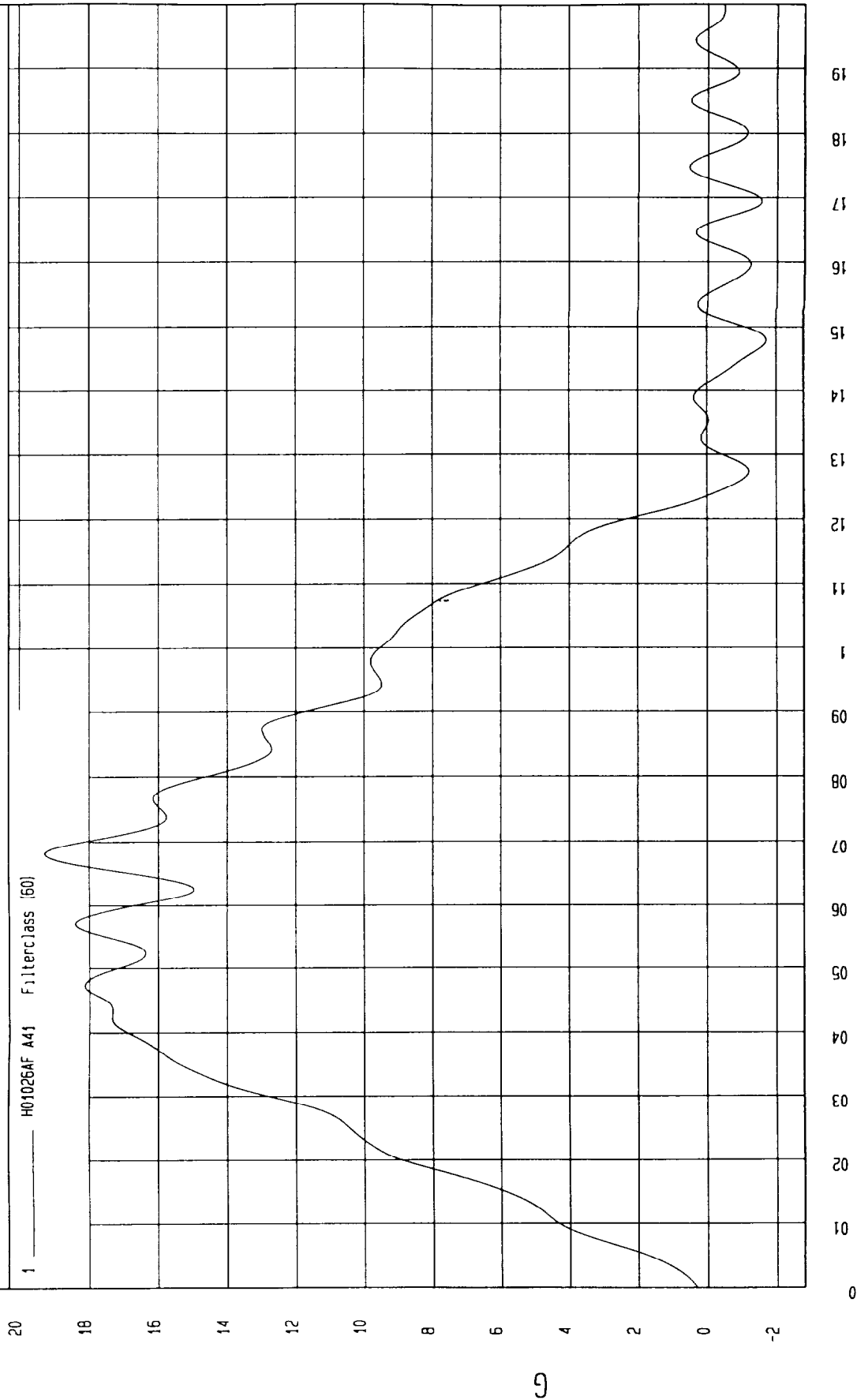
TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum - -1.72 G at 148 msec

Maximum 19.26 G at 68 msec

REAR AXLE X ACCELERATION



TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

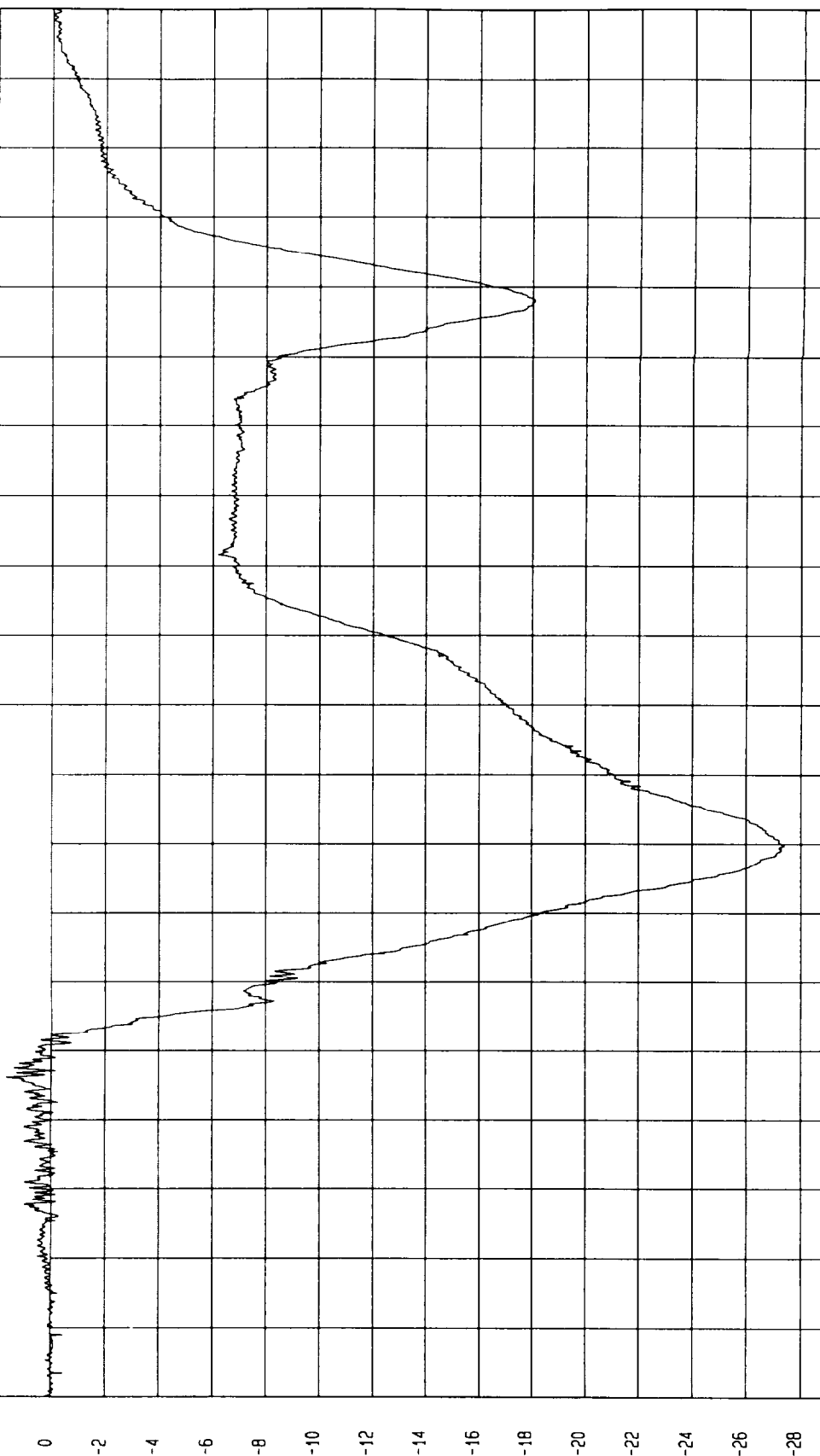
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum -27.41 G at 80 msec

Maximum -1.69 G at 46 msec

DRIVER HEAD X ACCELERATION

1 H01026AT A03 Filterclass (1000)



TIME (SECONDS)

MSA Research
03-1A-2001 11 02

TEST FMVSS 208 SLED (H01026)

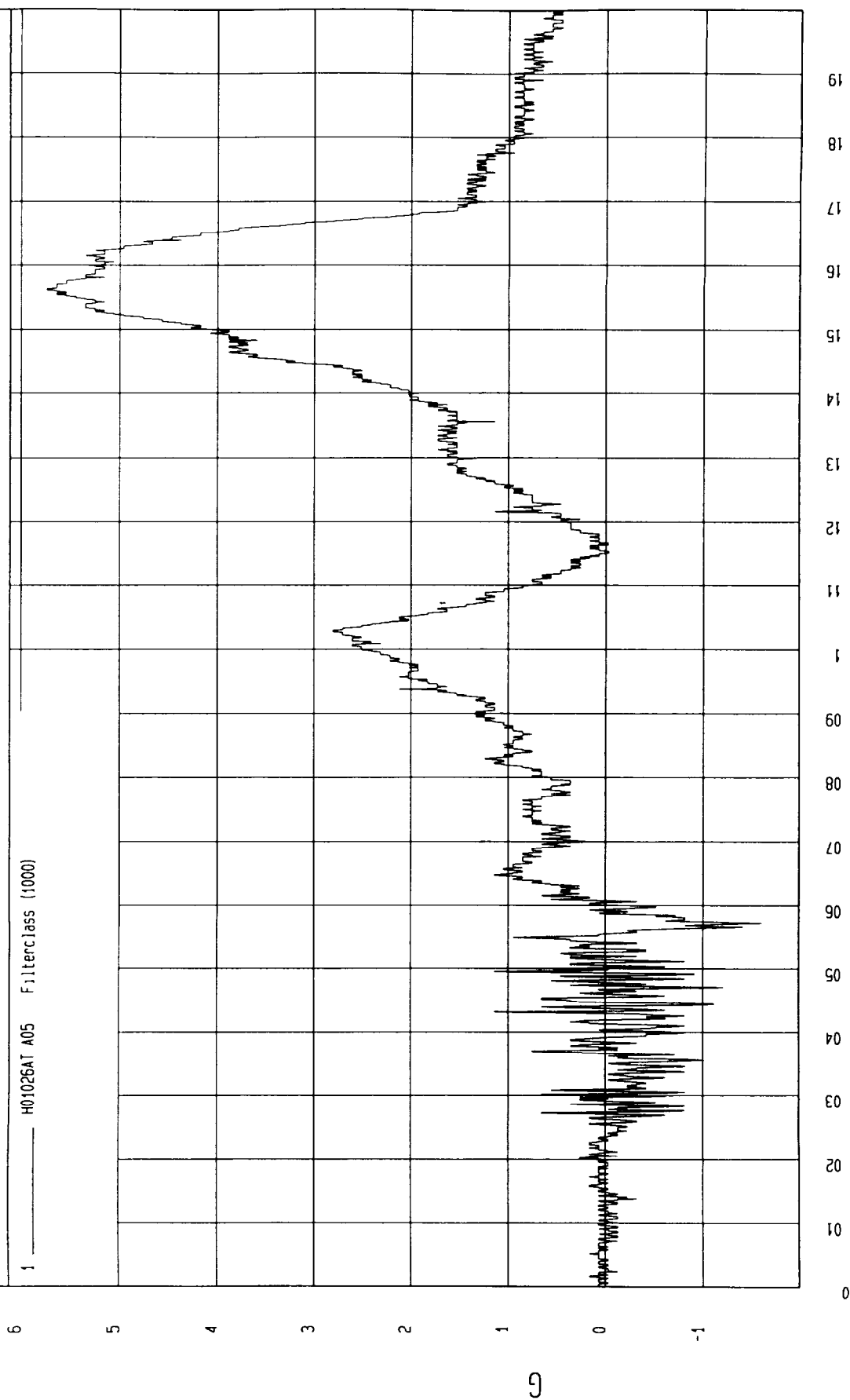
TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum = 1.6 G at 57 msec

Maximum = 5.74 G at 156 msec

DRIVER HEAD Y ACCELERATION



TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

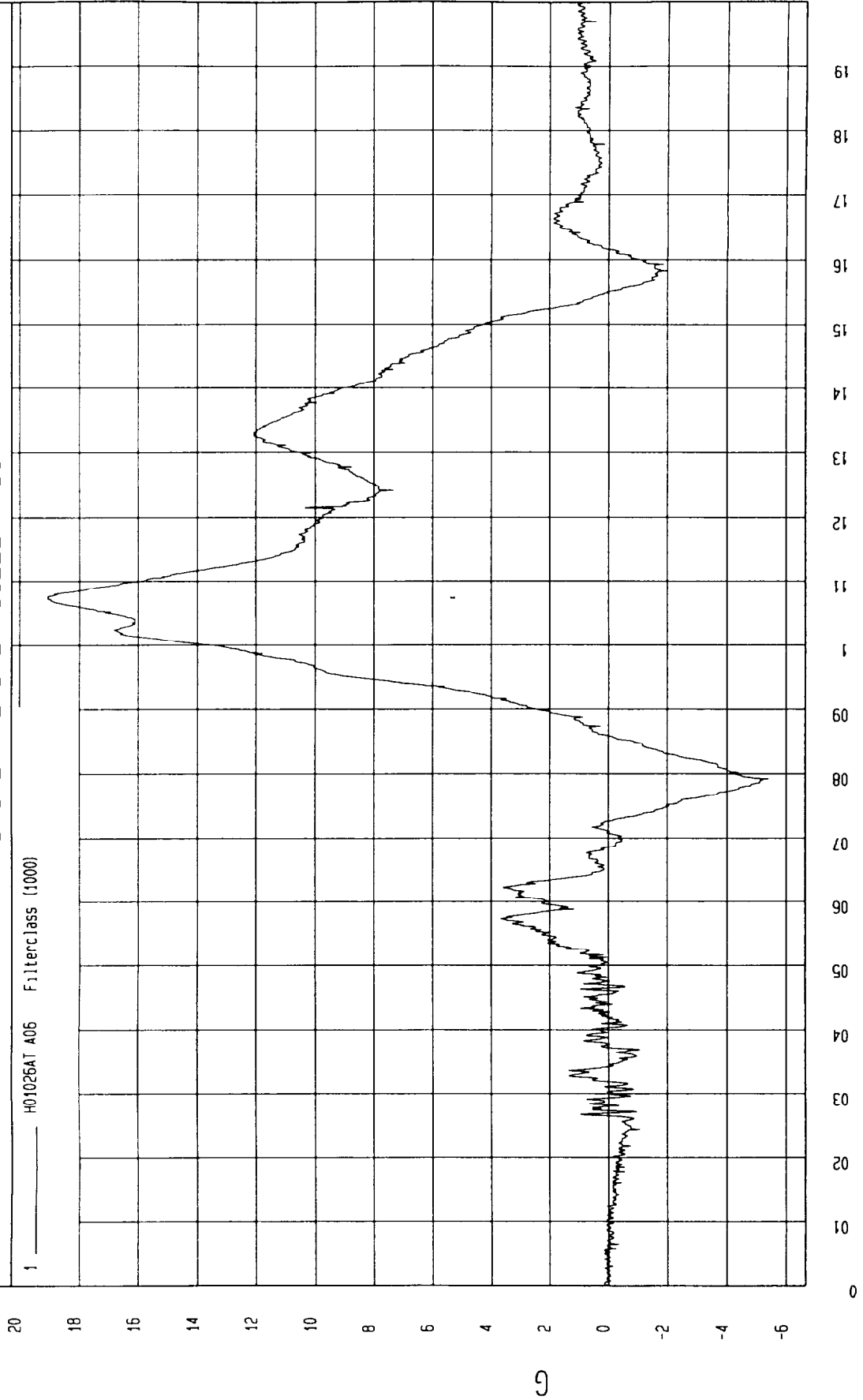
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 5.41 G at 79 msec

Maximum 19.05 G at 107 msec

DRIVER HEAD Z ACCELERATION

1 H01026A1 A06 FilterClass (1000)



TIME (SECONDS)

WGA Research
03-14-2001 11 03

TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

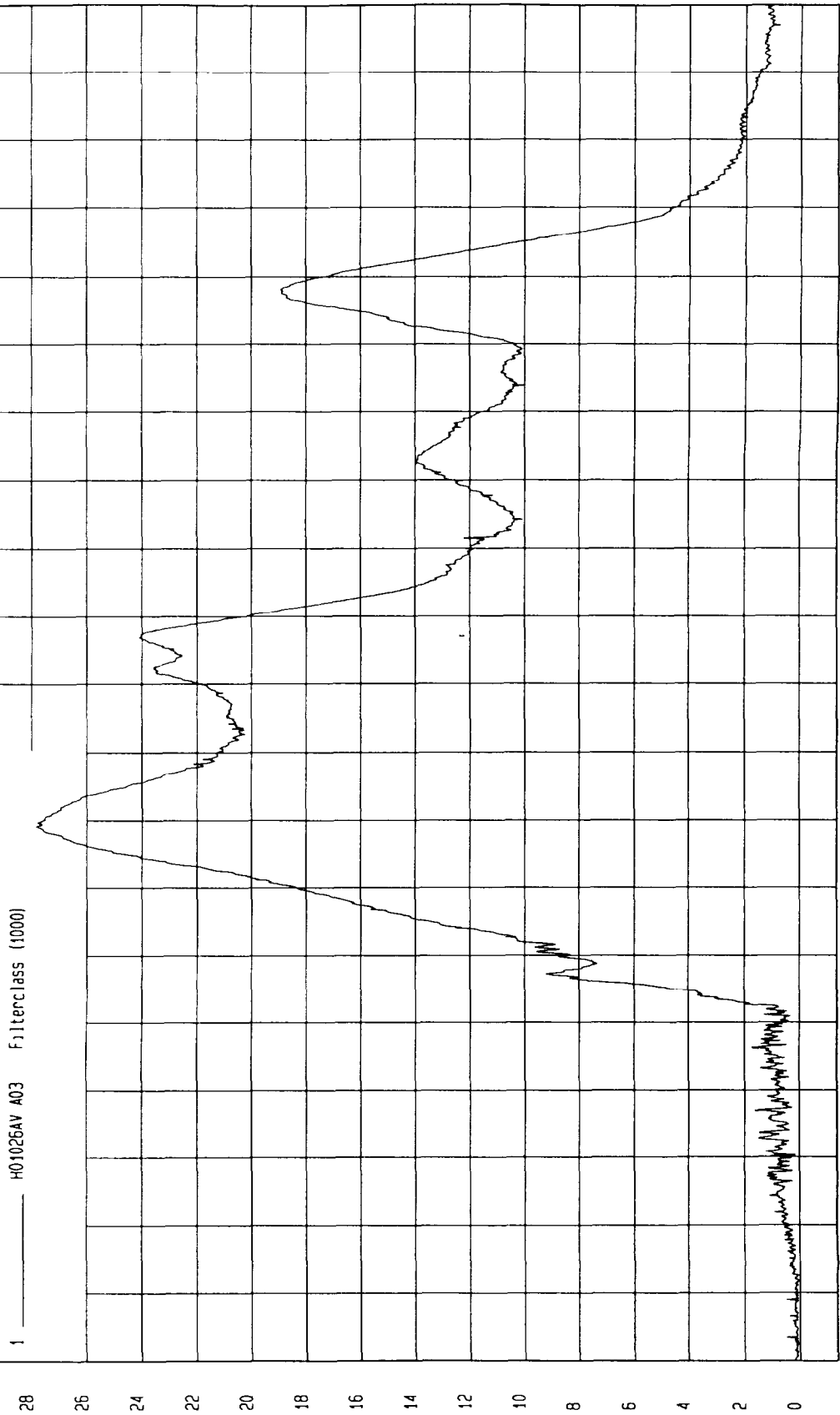
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum - 6.03E 02 G at 1 msec

Maximum = 27.84 G at 79 msec

DRIVER HEAD RESULTANT ACCELERATION

1 H01026AV A03 Filterclass (1000)



MSA Research
03-1A-2001 11 03

TIME (SECONDS)

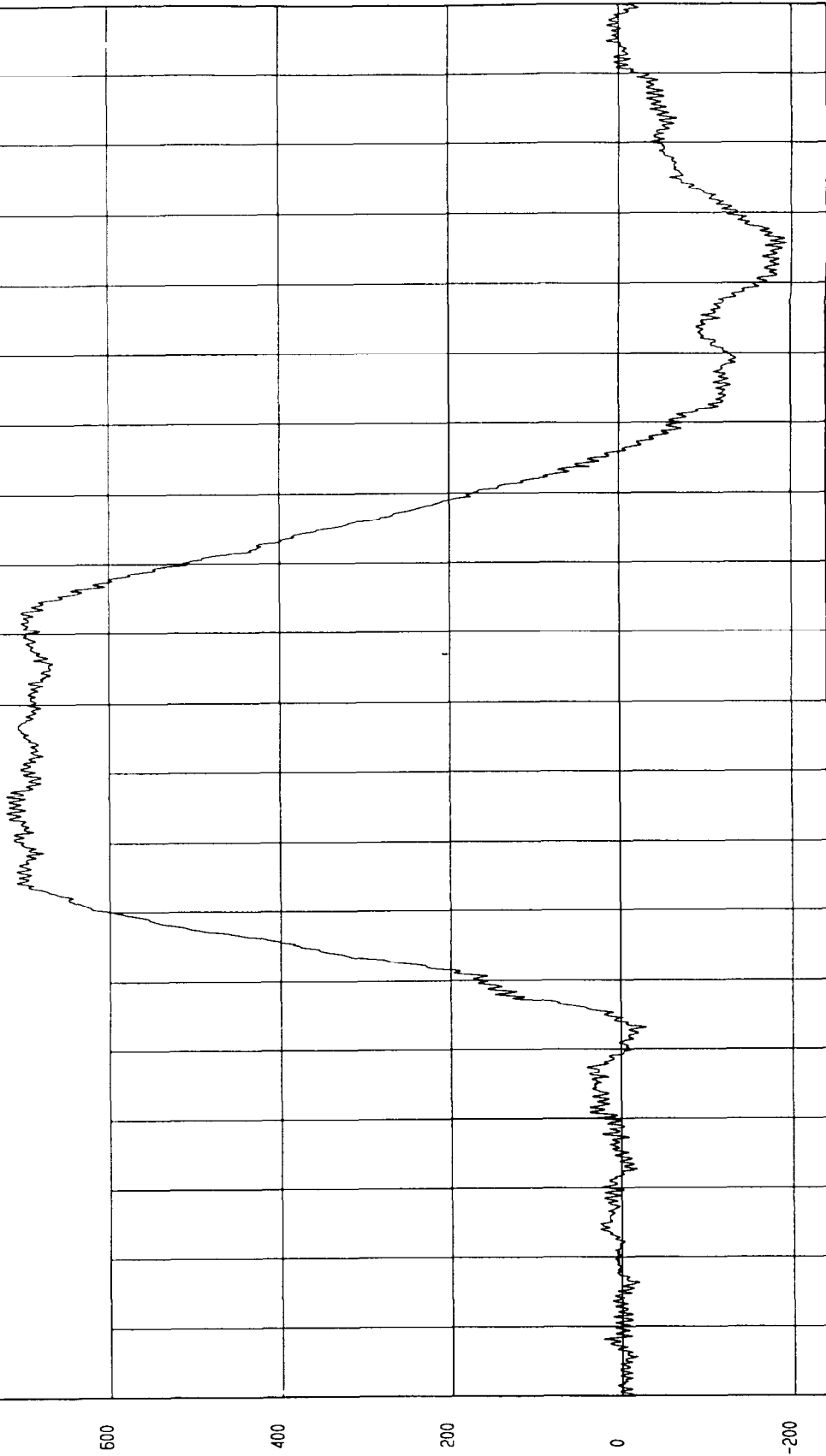
TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum - 194 92 N at 166 msec Maximum - 720 19 N at 84 msec

DRIVER NECK FORCE X

1 H01026FT F12 Filterclass (1000)



TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

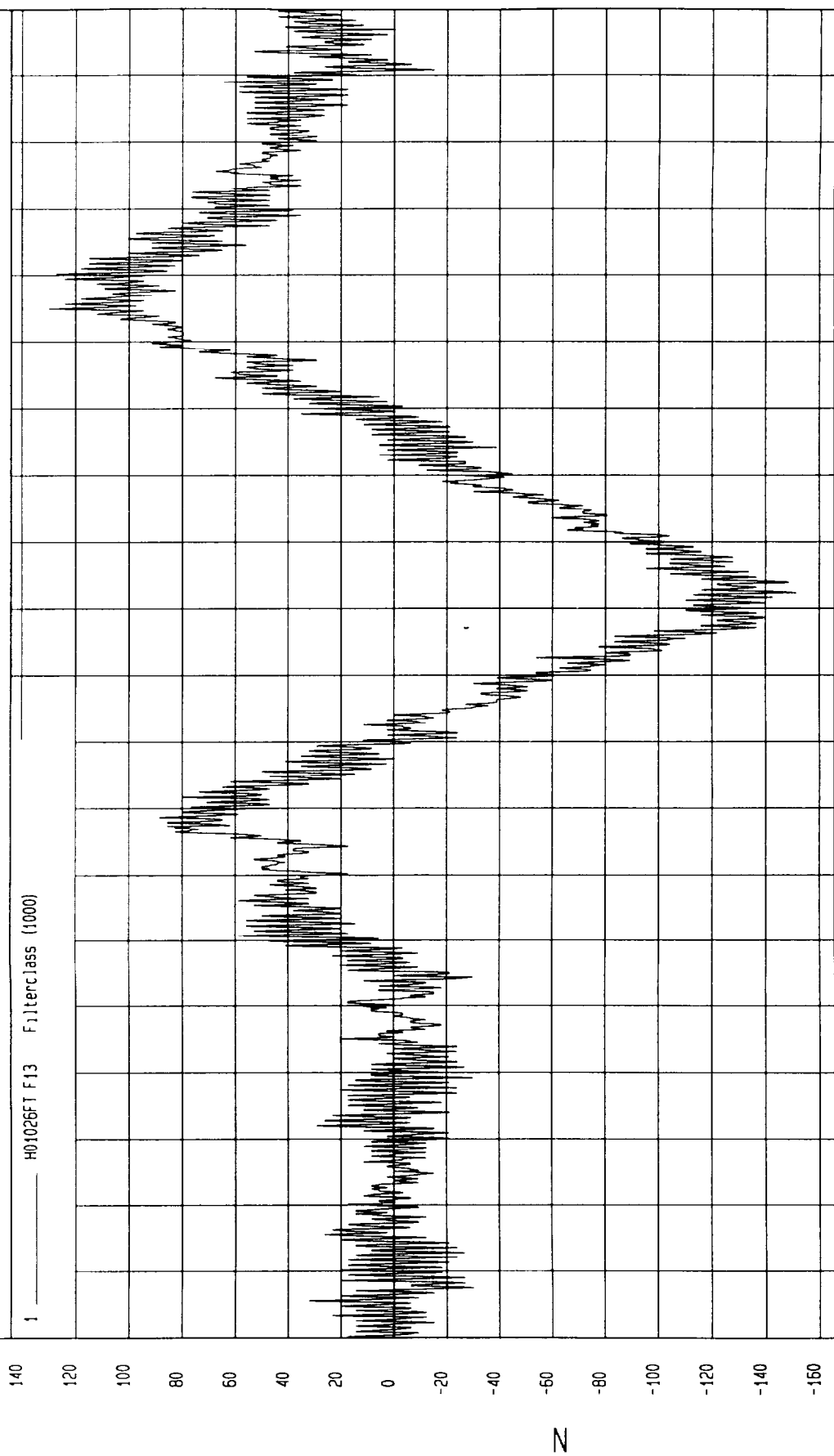
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum - 151 49 N at 112 msec

Maximum 130 N at 155 msec

DRIVER NECK FORCE Y

1 H01026T F13 Filterclass (1000)



TIME (SECONDS)

MGA Research
03-14-2001 11 03

TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

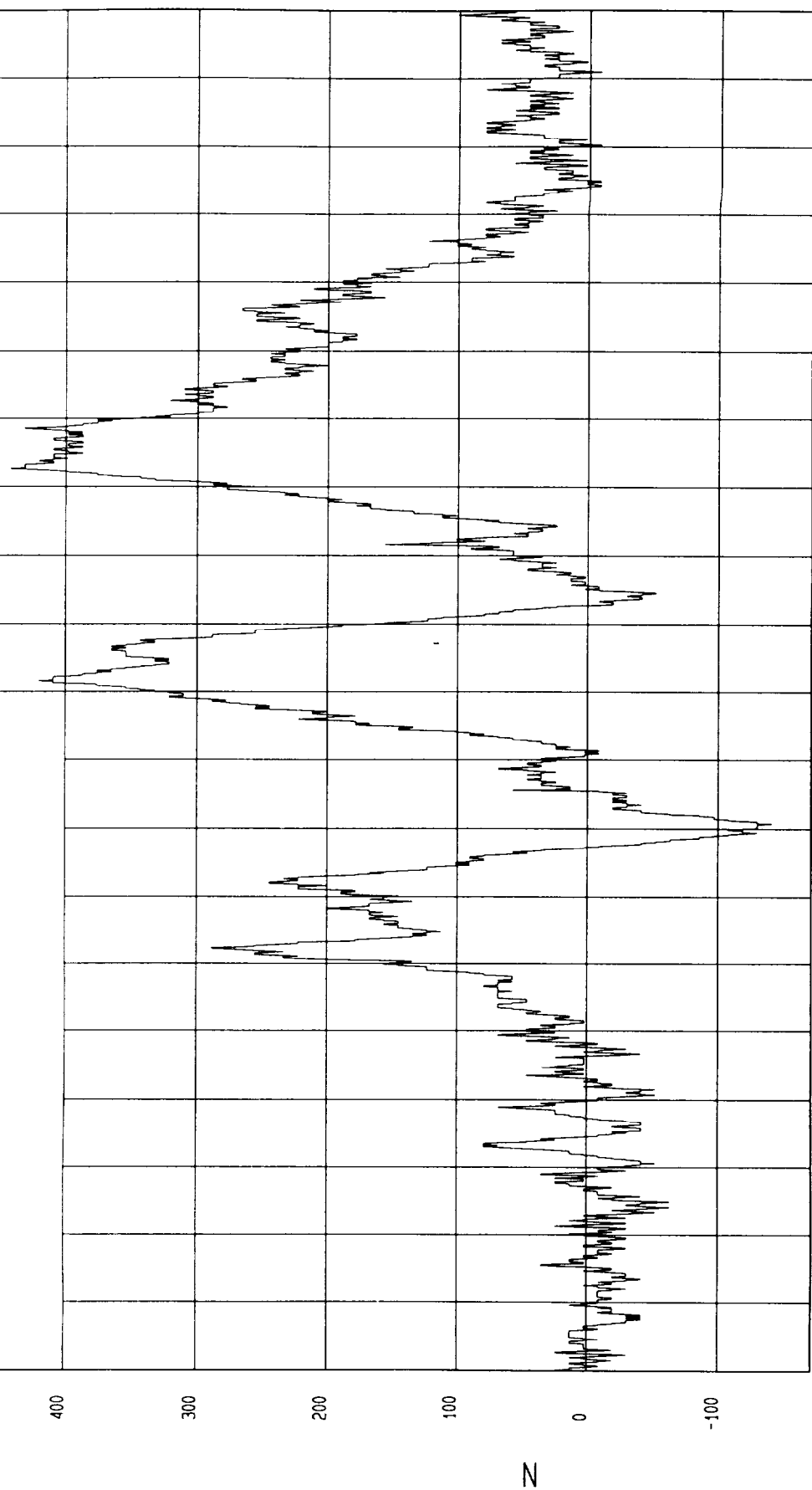
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 140 88 N at 81 msec

Maximum - 442 31 N at 133 msec

DRIVER NECK FORCE Z

1 ——— H01026T F14 Filterclass (1000)



TIME (SECONDS)

MSA Research
03-14-2001 11:03

TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 1.98 Nm at 62 msec

Maximum 7.56 Nm at 108 msec

DRIVER NECK MOMENT X

1 H01026MF M15 Filterclass (500)

8

6

4

2

Nm

-2

0

01

02

03

04

05

06

07

08

09

1

11

12

13

14

15

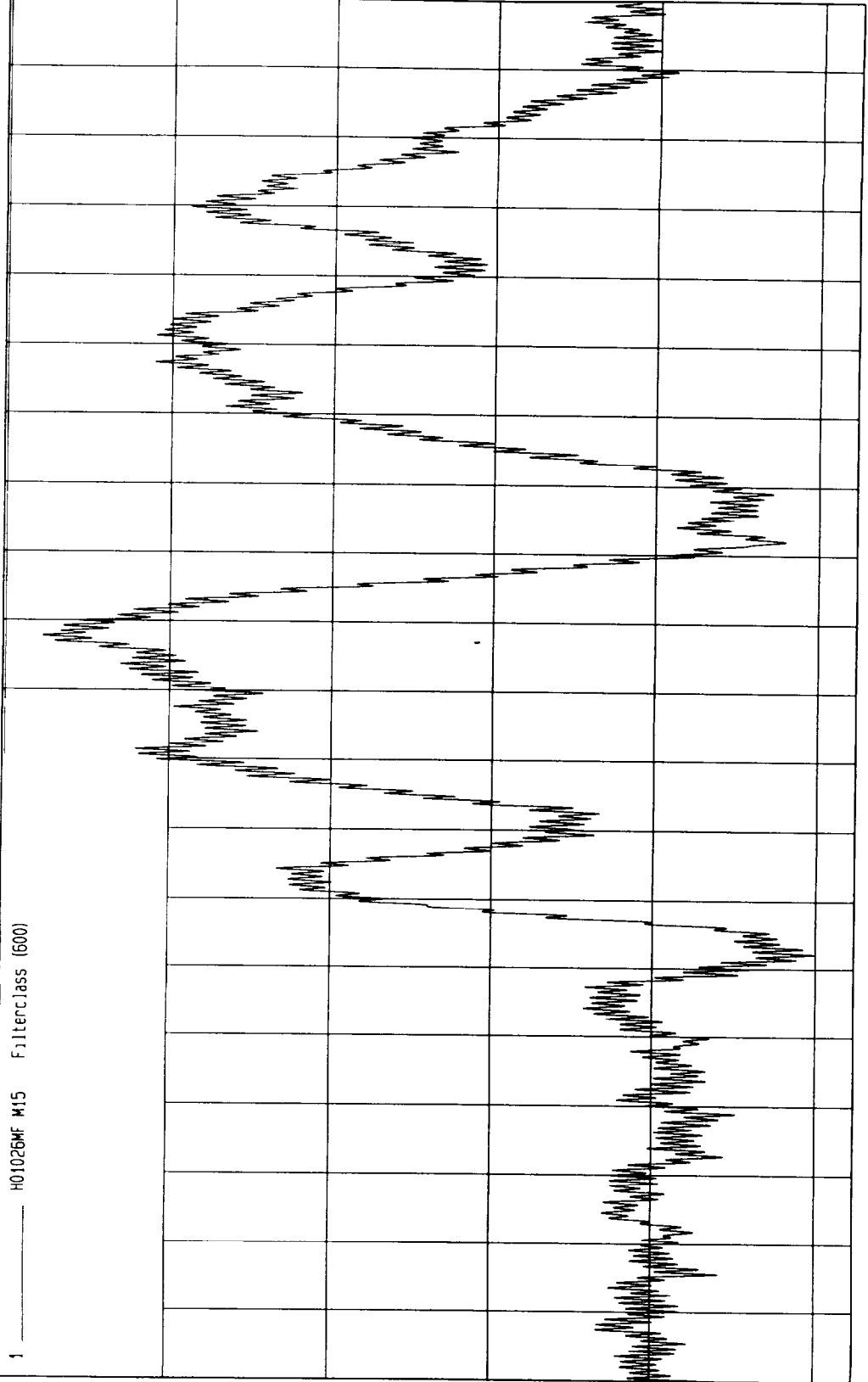
16

17

18

19

TIME (SECONDS)



TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

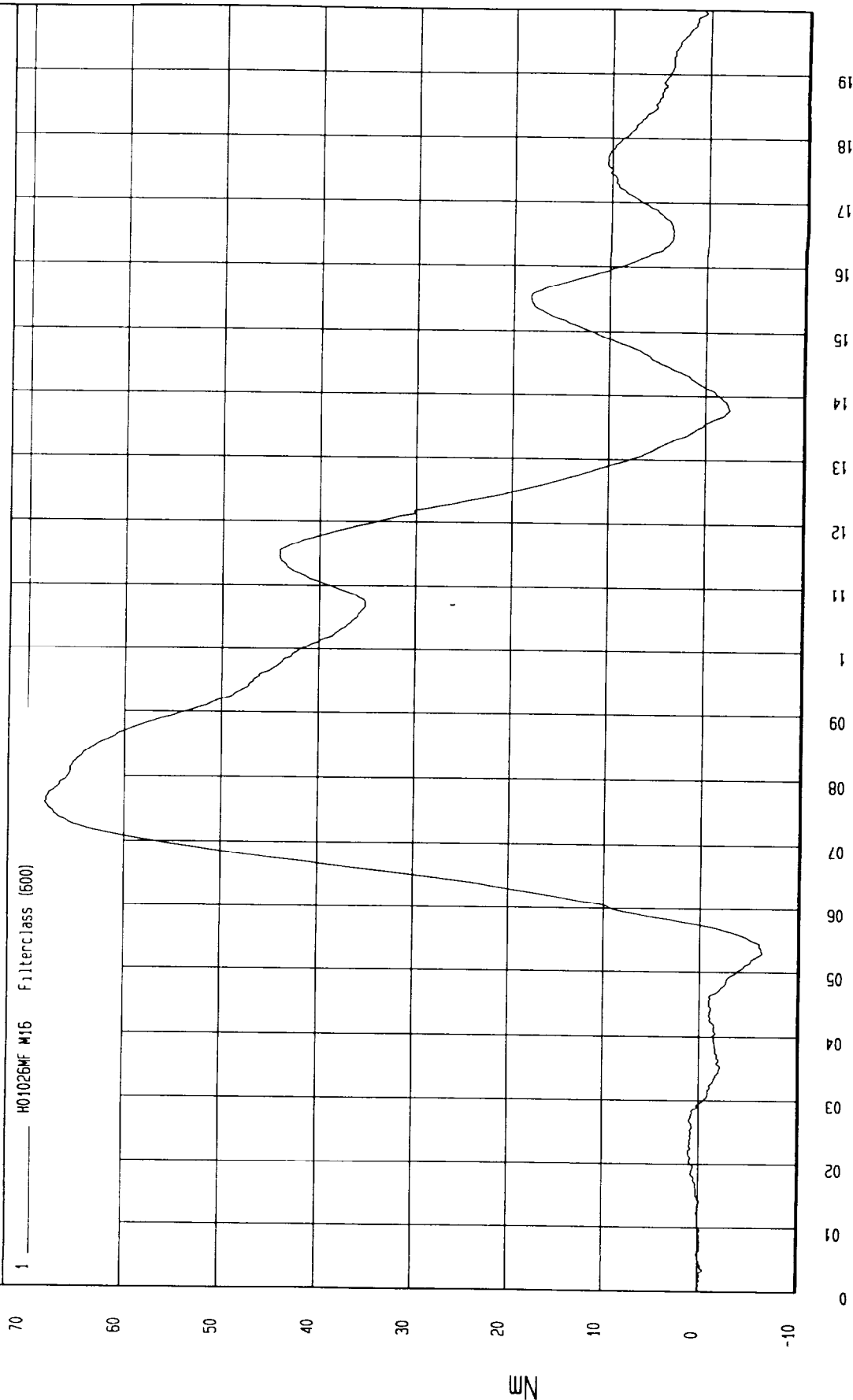
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum = 6.44 Nm at 53 msec

Maximum = 68.2 Nm at 76 msec

DRIVER NECK MOMENT Y

1 ——— H01026MF M16 Filterclass (500)



TIME (SECONDS)

MGA Research
03-14-2001 11:03

TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

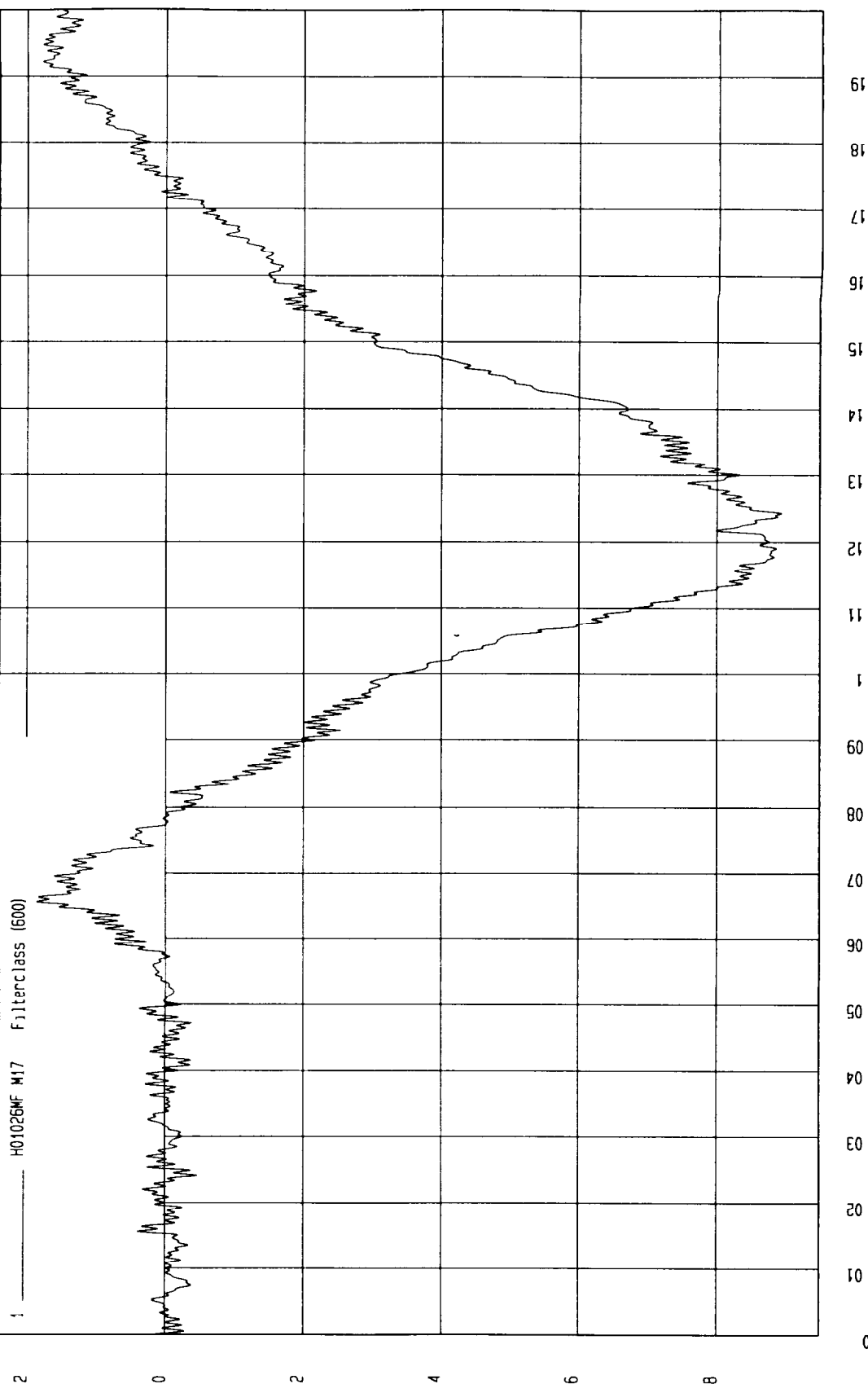
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum - -8.92 Nm at 124 msec

Maximum 1.86 Nm at 56 msec

DRIVER NECK MOMENT Z

1 H01026NF M17 Filterclass (500)



TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

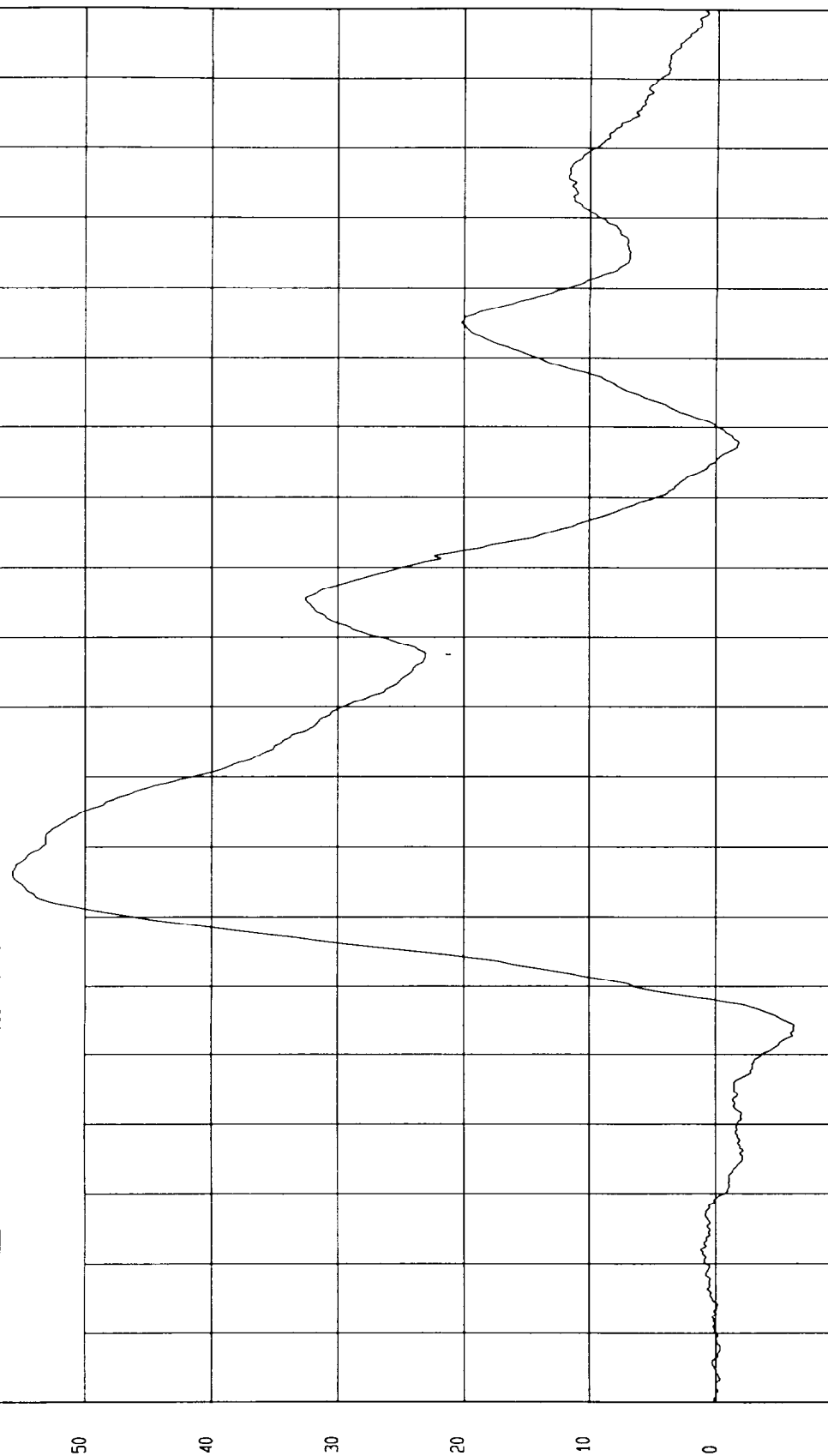
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum = -6.23 Nm at 54 msec

Maximum = 55.72 Nm at 76 msec

DRIVER OCCIPITAL CONDYLE MOMENT Y

1 H01026M0 M16 Filterclass (600)



TIME (SECONDS)

WGA Research
03-14-2001 11 07

TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

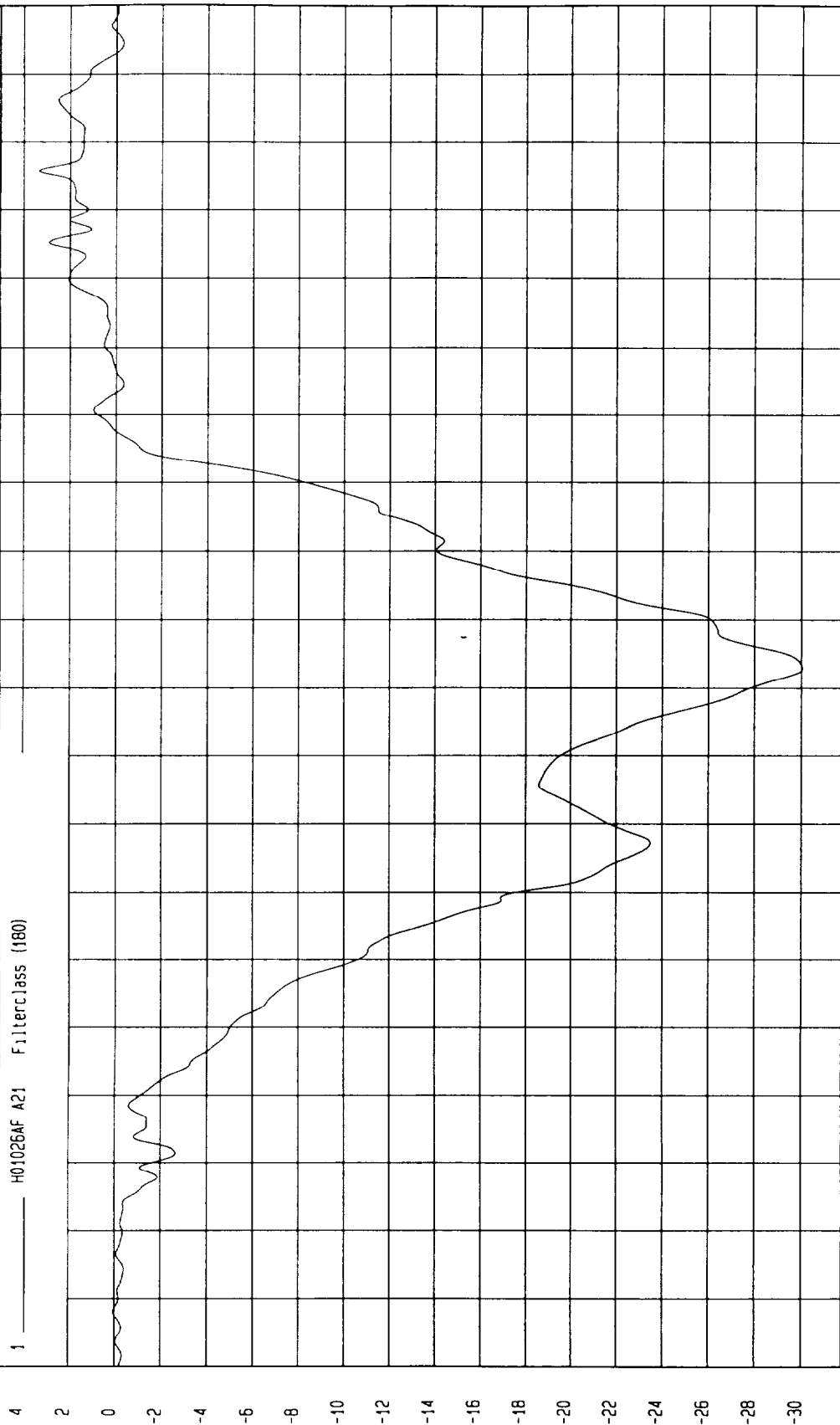
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 30.05 G at 103 msec

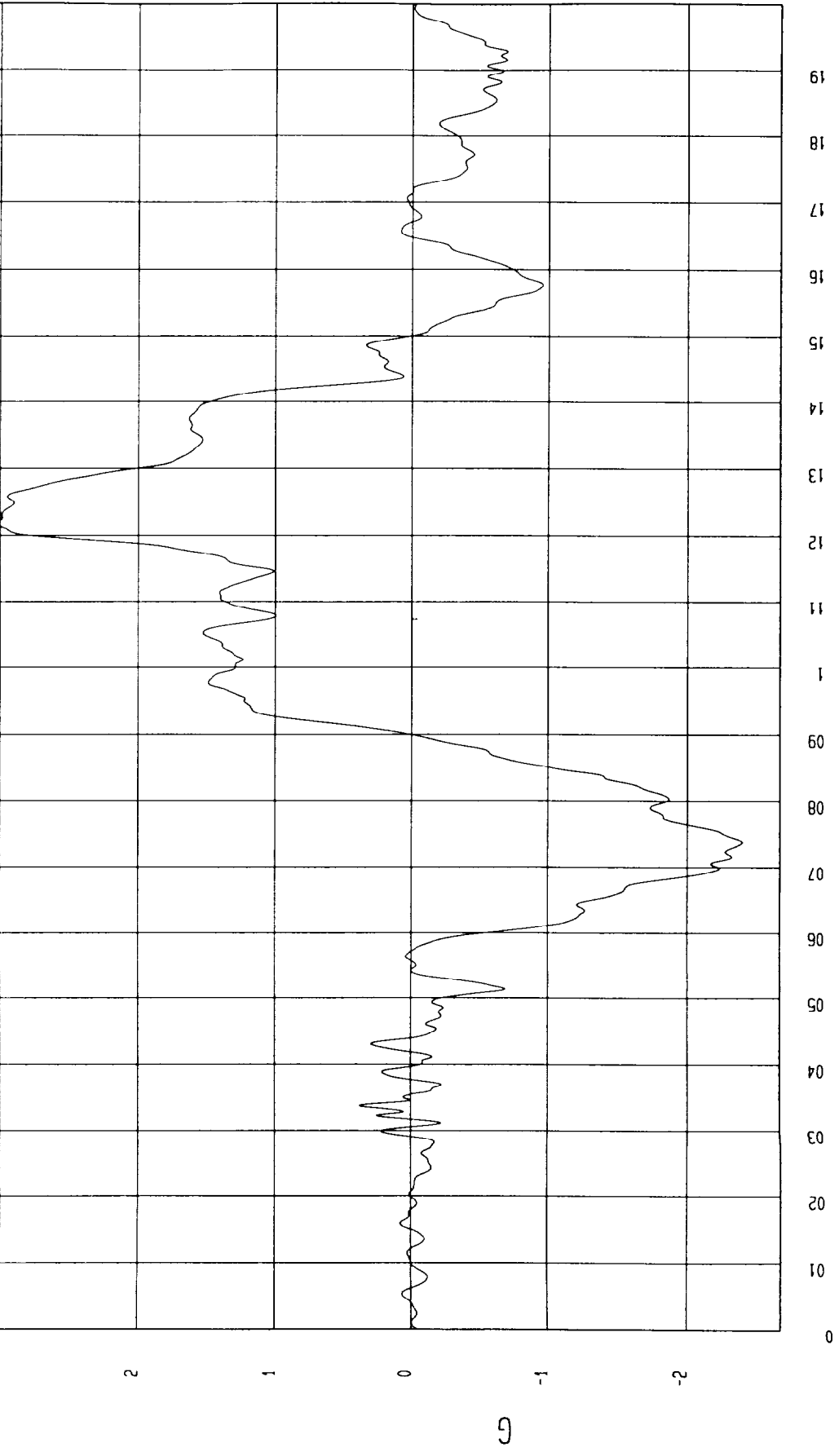
Maximum - 3.34 G at 176 msec

DRIVER CHEST X ACCELERATION

1 H01026AF A21 FilterClass (f80)



TEST FMVSS 208 SLED (H01026)	TEST DATE 02-23-2001
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)	
Minimum 2.4 G at 74 msec	Maximum 3.03 G at 122 msec
DRIVER CHEST Y ACCELERATION	
1 H01026AF A22 FilterClass (180)	



TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

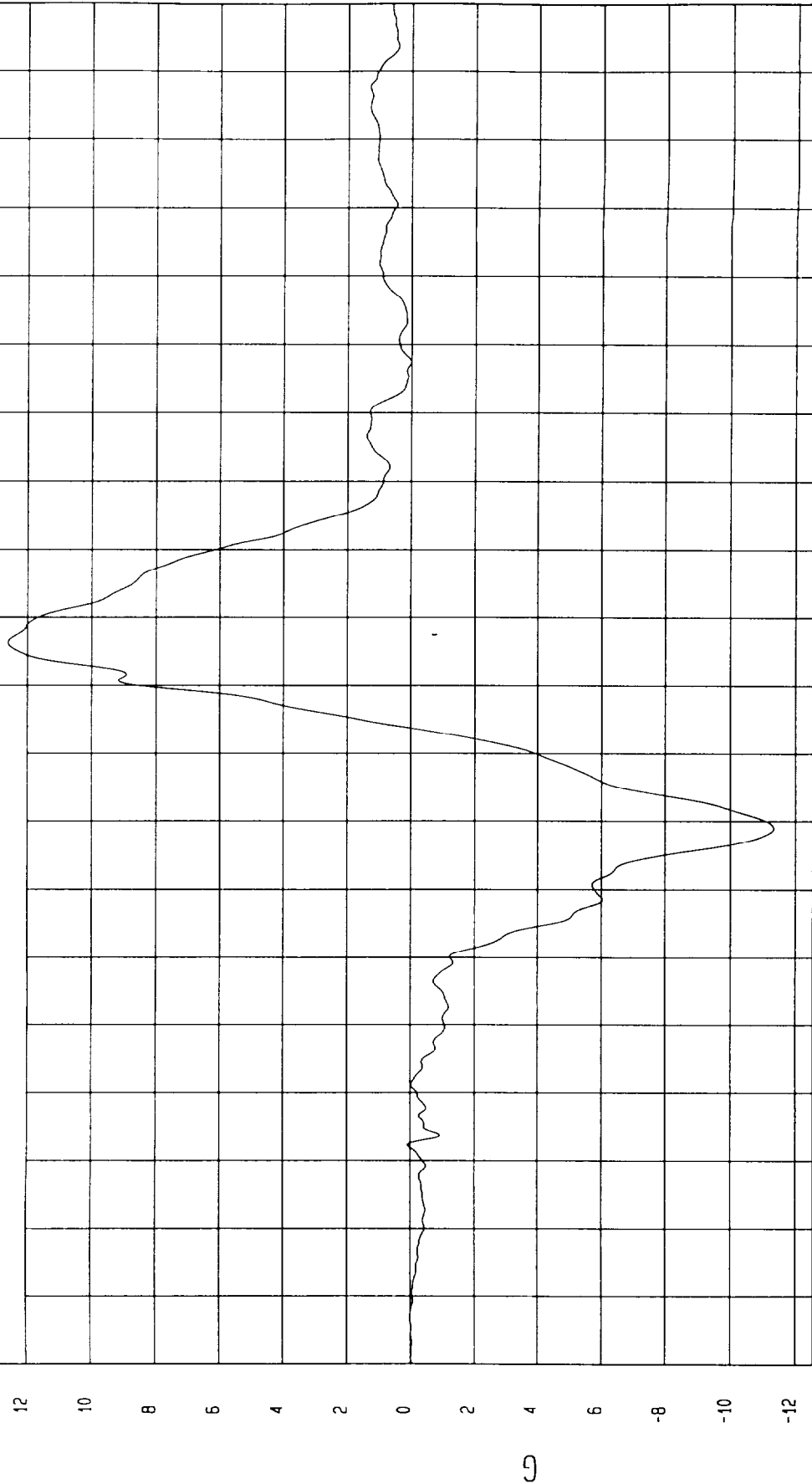
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum - 11.33 G at 79 msec

Maximum 12.6 G at 105 msec

DRIVER CHEST Z ACCELERATION

1 H01026AF A23 Filterclass (180)



TIME (SECONDS)

MGA Research
03-14-2001 11:03

TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

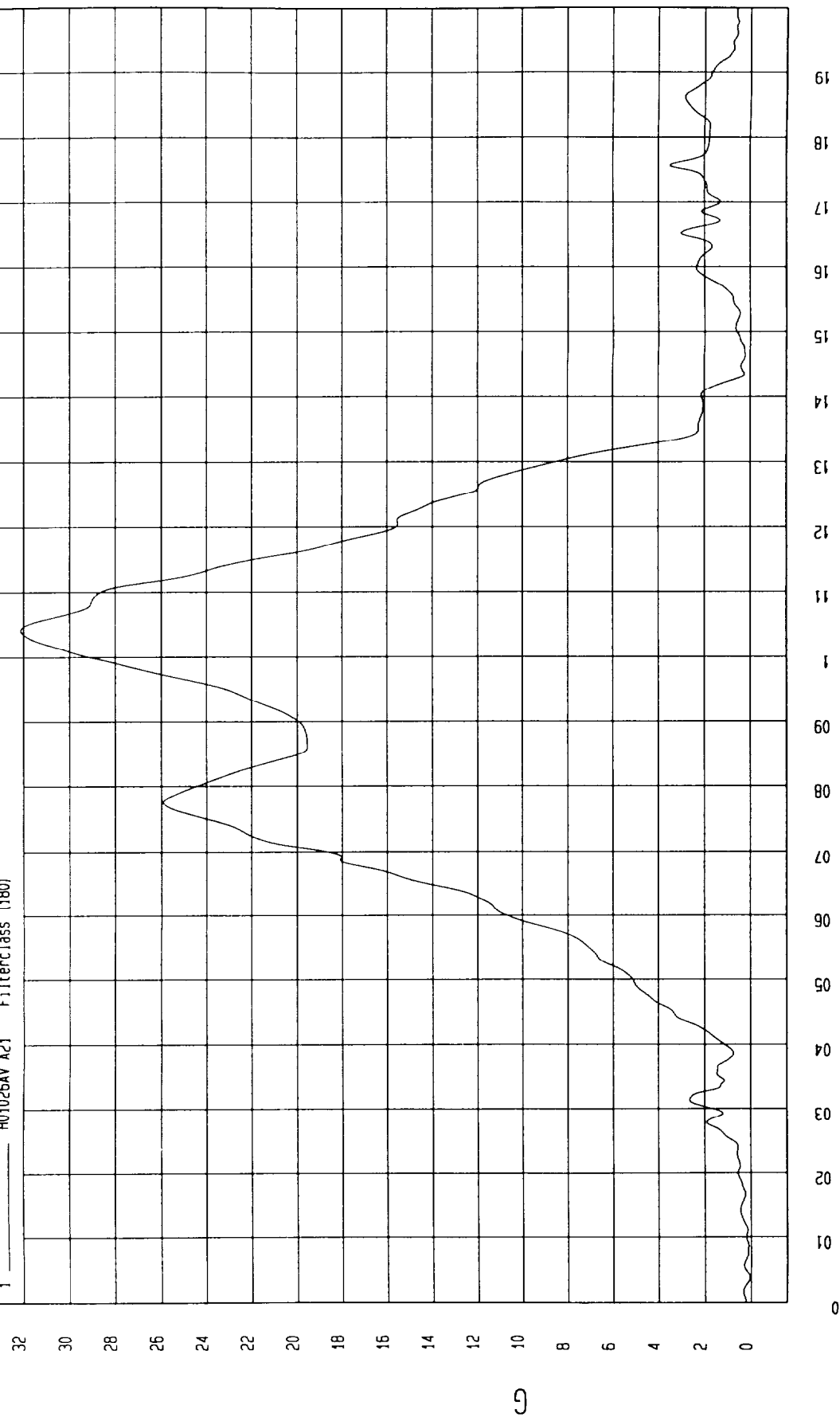
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 05 G at 4 msec

Maximum - 32 13 G at 104 msec

DRIVER CHEST RESULTANT ACCELERATION

1 H01026AV A21 Filterclass (180)



TIME (SECONDS)

MGA Research
03-14-2001 11:03

TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

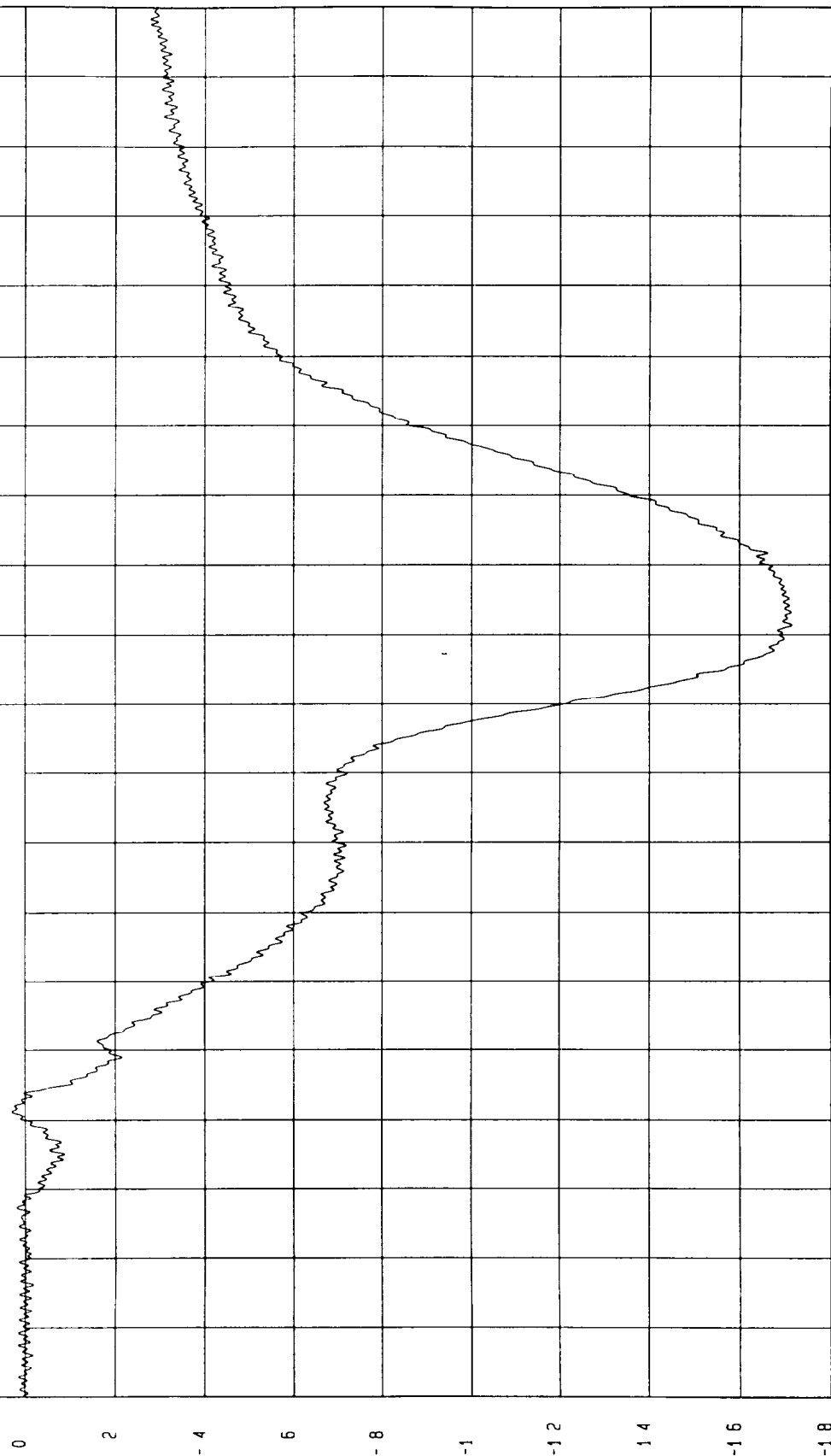
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum -1.72 INCHES at 111 msec

Maximum 3.01E 02 INCHES at 41 msec

DRIVER CHEST COMPRESSION

1 H01026DF 038 Filterclass (600)



TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

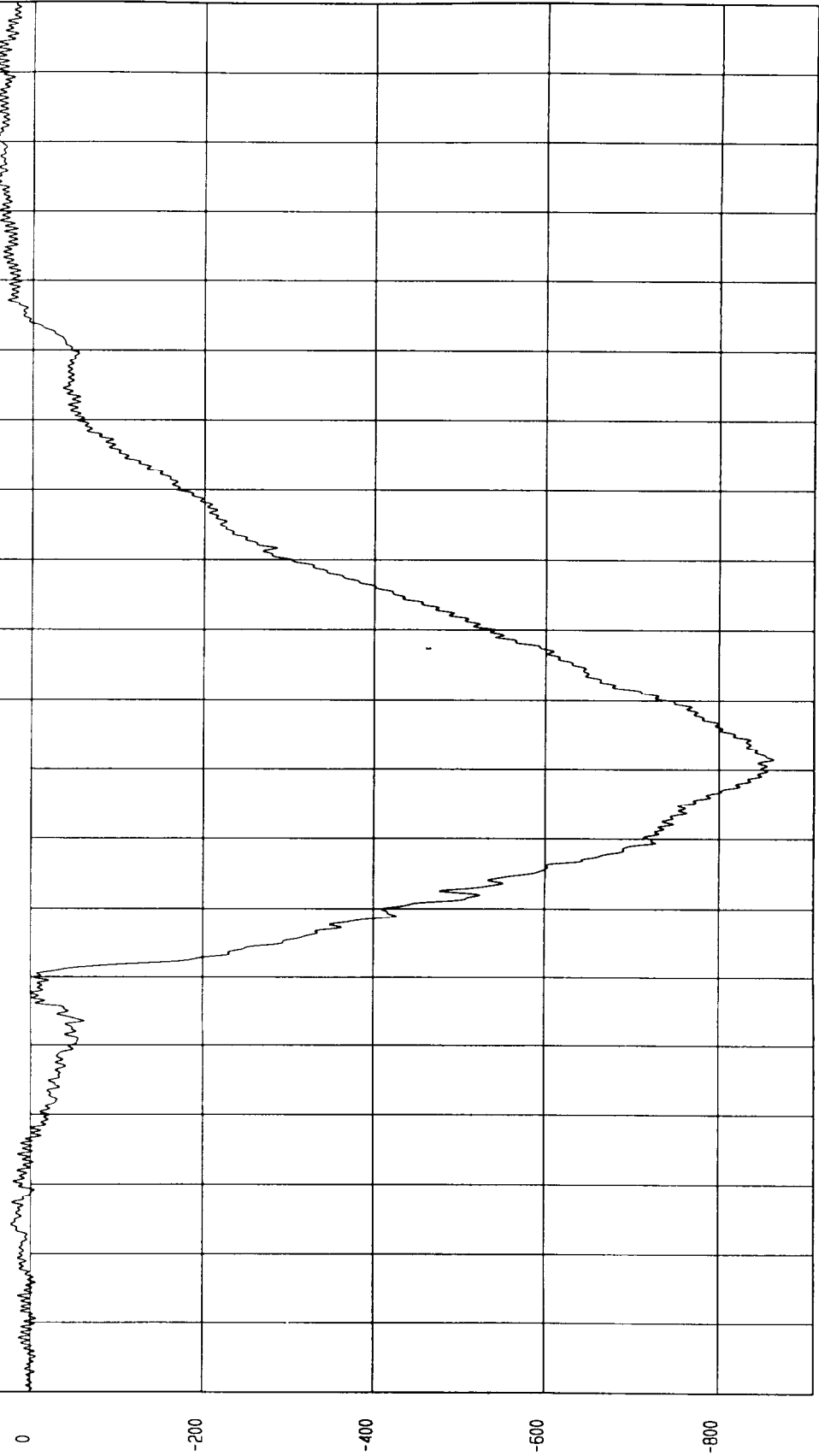
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum - -862 43 LB at 92 msec

Maximum 47 69 LB at 192 msec

DRIVER LEFT FEMUR FORCE

1 H01026FF F08 Filterclass (600)



TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

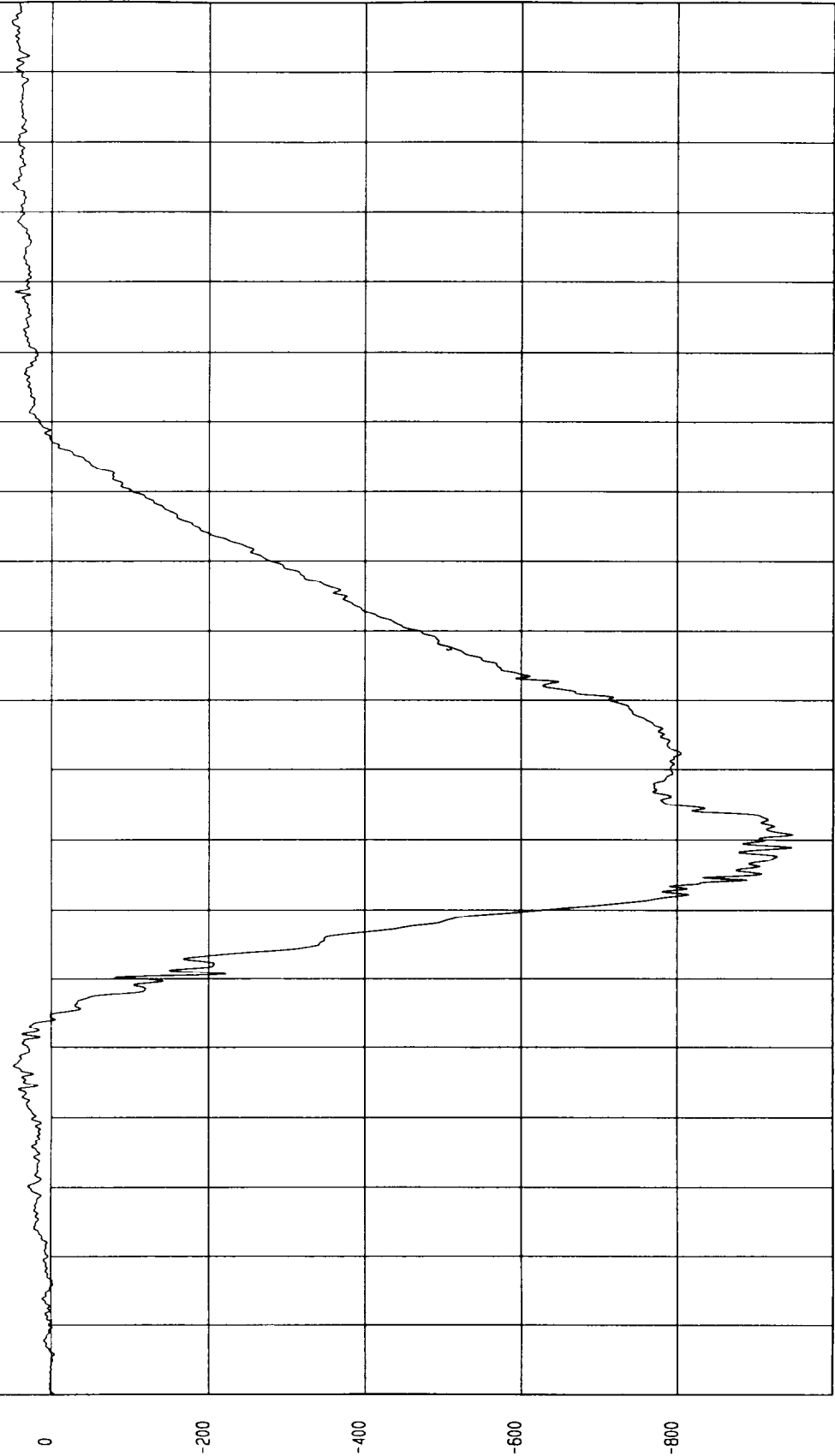
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum = 945 4 LB at 81 msec

Maximum = 51 66 LB at 197 msec

DRIVER RIGHT FEMUR FORCE

1 — H01026FF F09 Filterclass (600)



TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

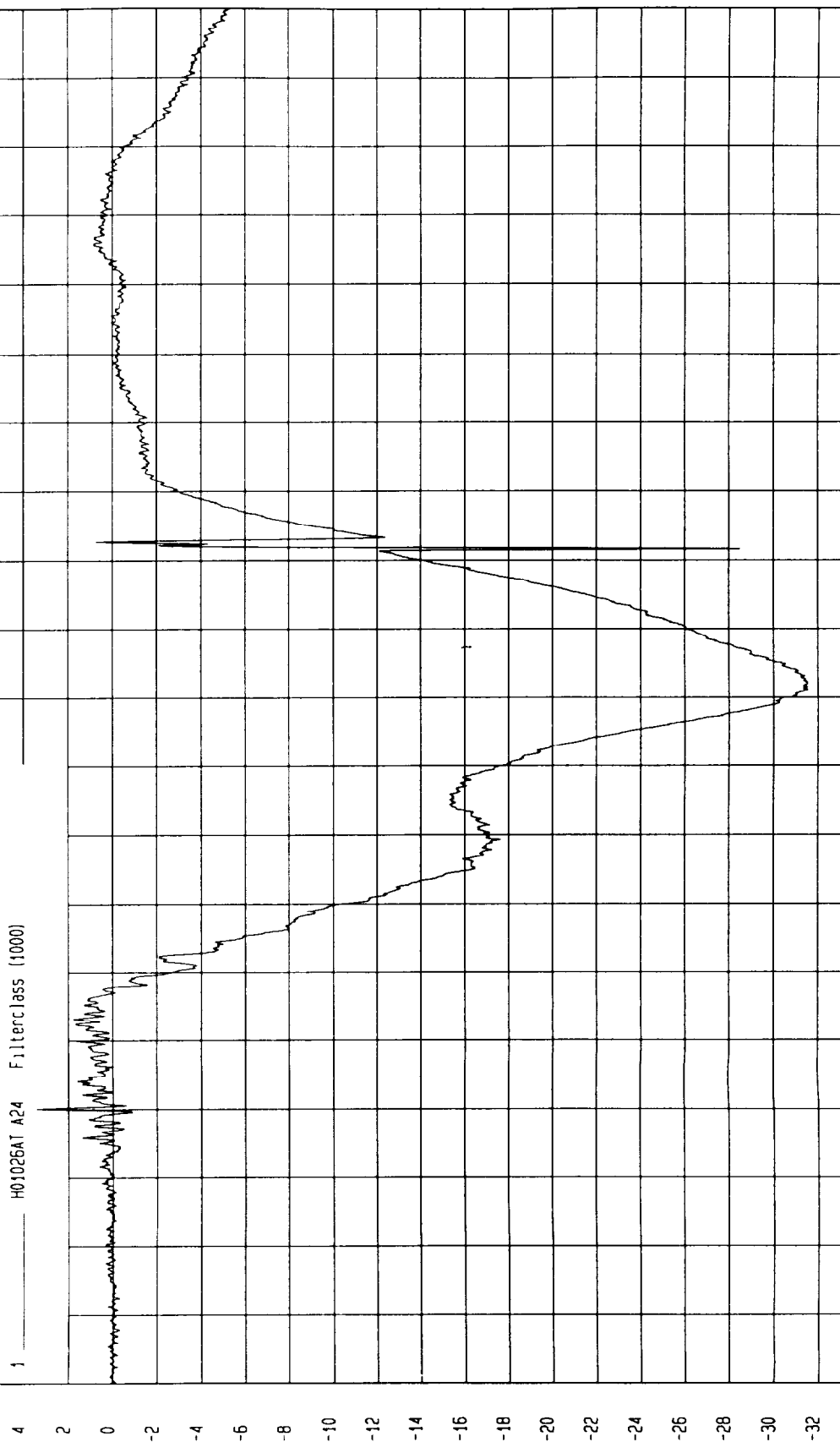
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum = -31.53 G at 101 msec

Maximum = 3.45 G at 40 msec

PASSENGER HEAD X ACCELERATION

1 H01026AT A24 Filterclass (1000)



TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

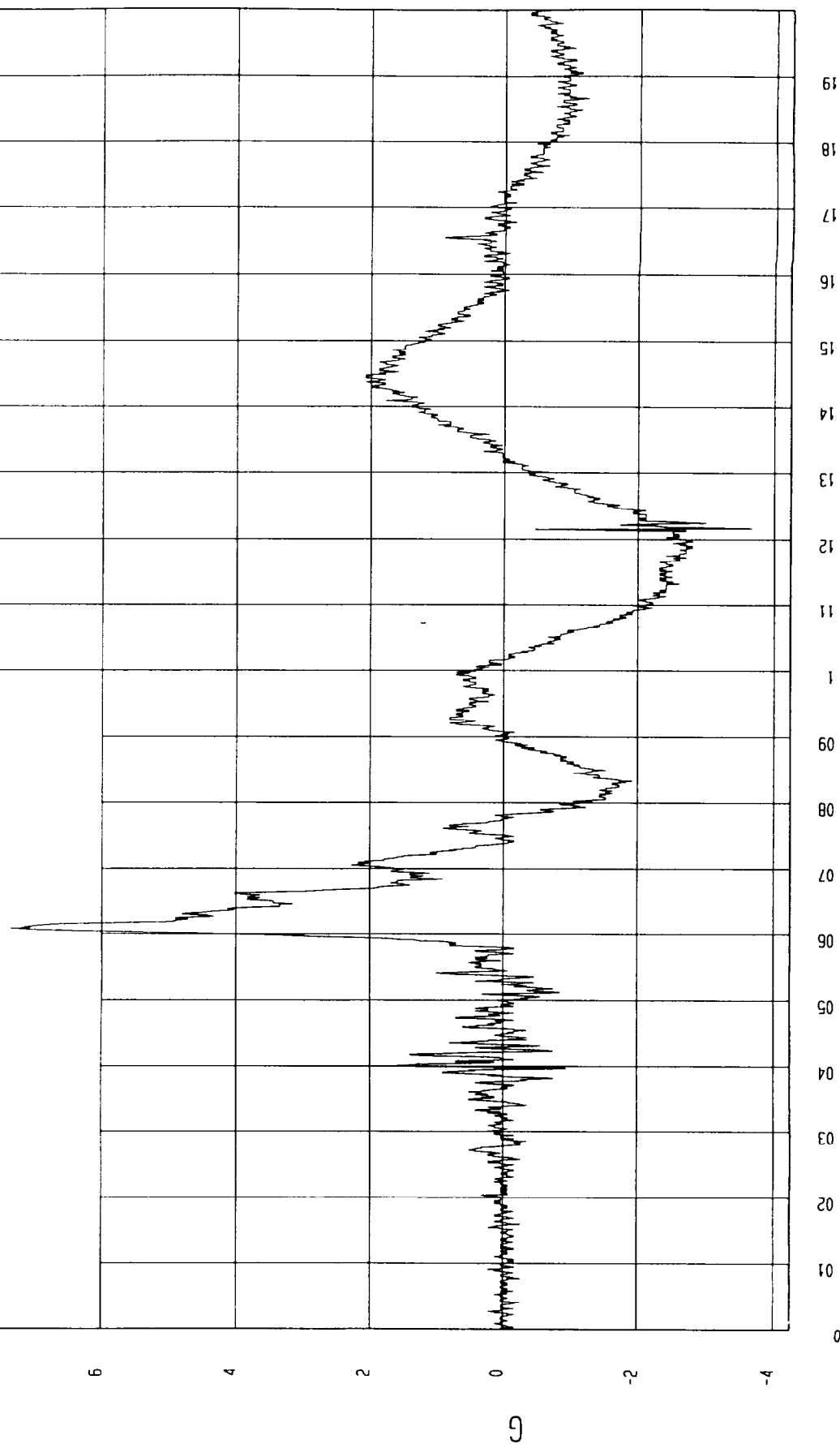
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 3.68 G at 122 msec

Maximum - 7.35 G at 61 msec

PASSENGER HEAD Y ACCELERATION

1 ——— H01026AT A25 Filterclass (1000)



TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

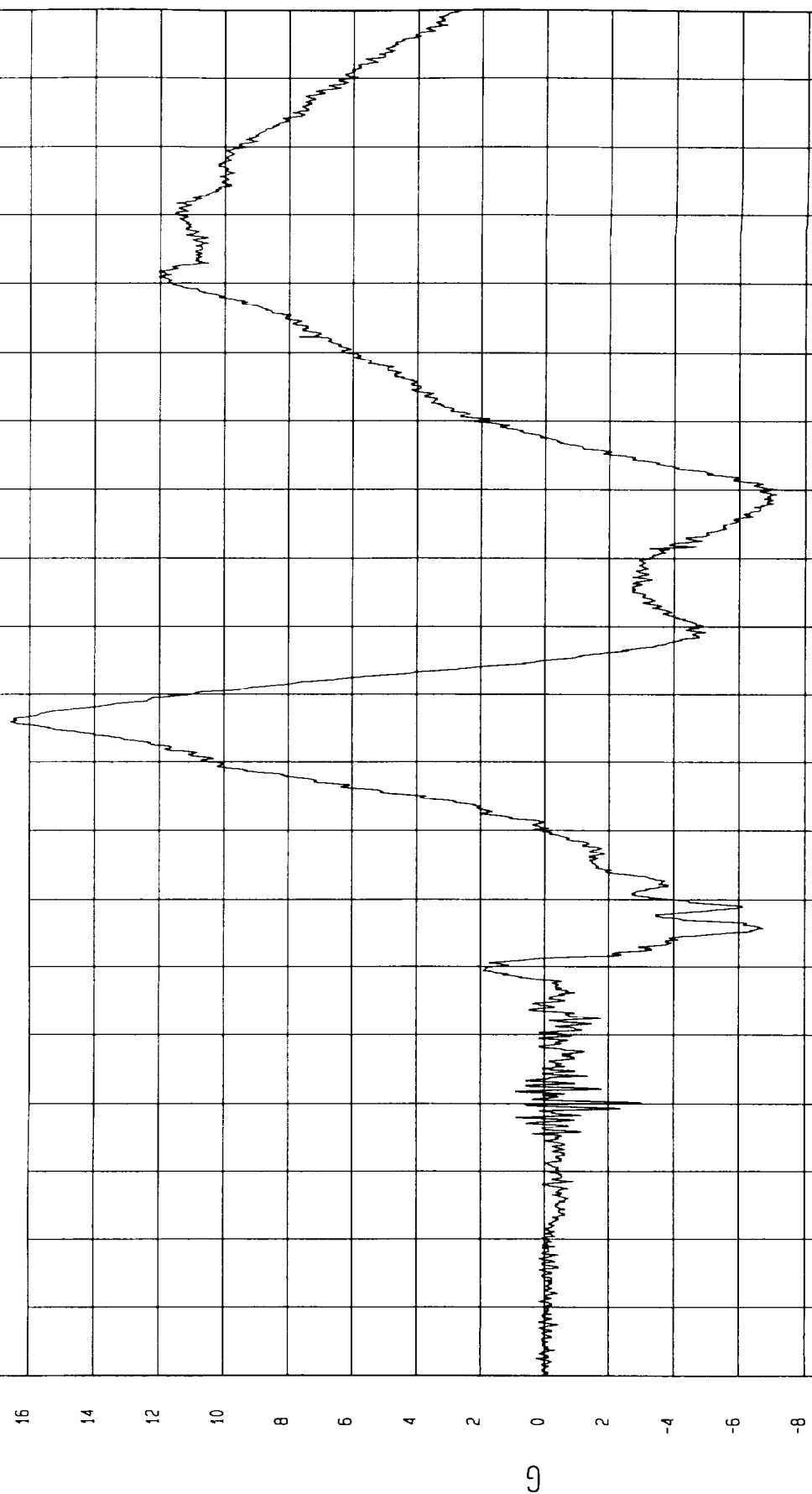
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum -7.15 G at 129 msec

Maximum 16.6 G at 96 msec

PASSENGER HEAD Z ACCELERATION

1 ——— H01026AT A26 Filterclass (1000)



TIME (SECONDS)

MCA Research
03-14-2001 11 03

TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

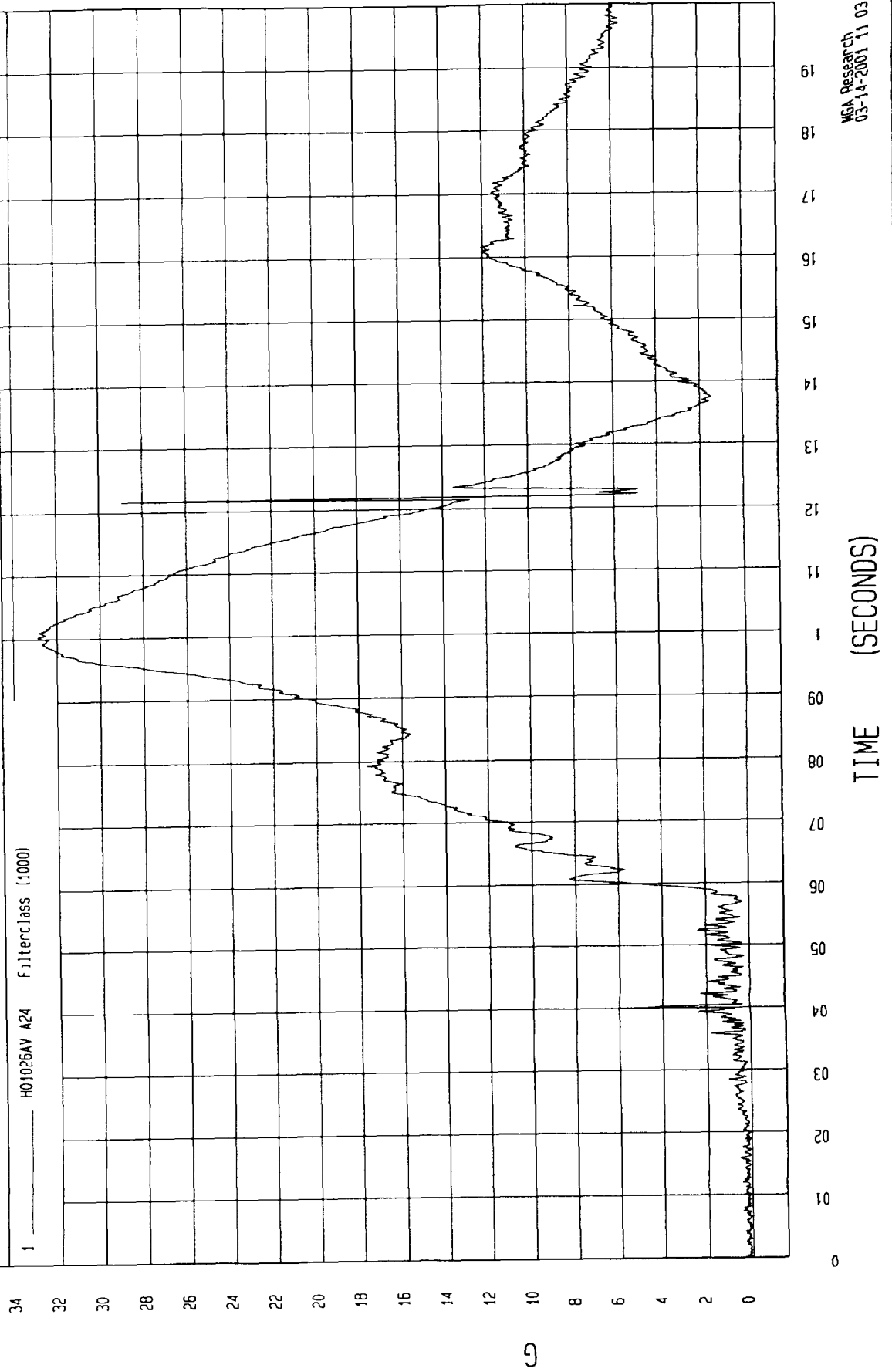
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 5.97E 02 G at 0 msec

Maximum 32.87 G at 100 msec

PASSENGER HEAD RESULTANT ACCELERATION

1 H01026AV A24 Filterclass (1000)



TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum - -267 54 N at 199 msec

Maximum 1404 93 N at 108 msec

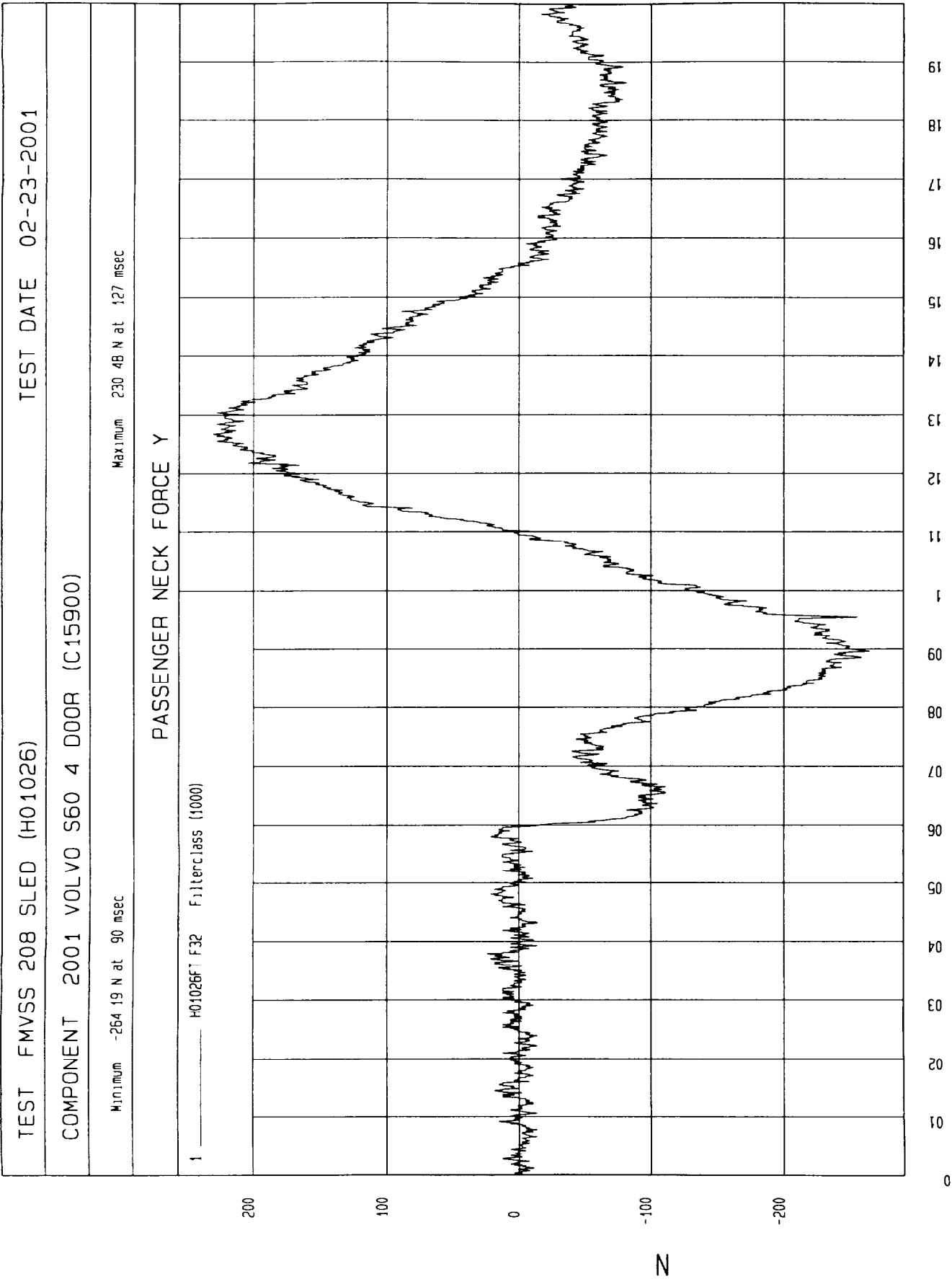
PASSENGER NECK FORCE X

1 — H01026T F31 Filterclass (1000)



TIME (SECONDS)

WCA Research
03-14-2001 11 03



TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

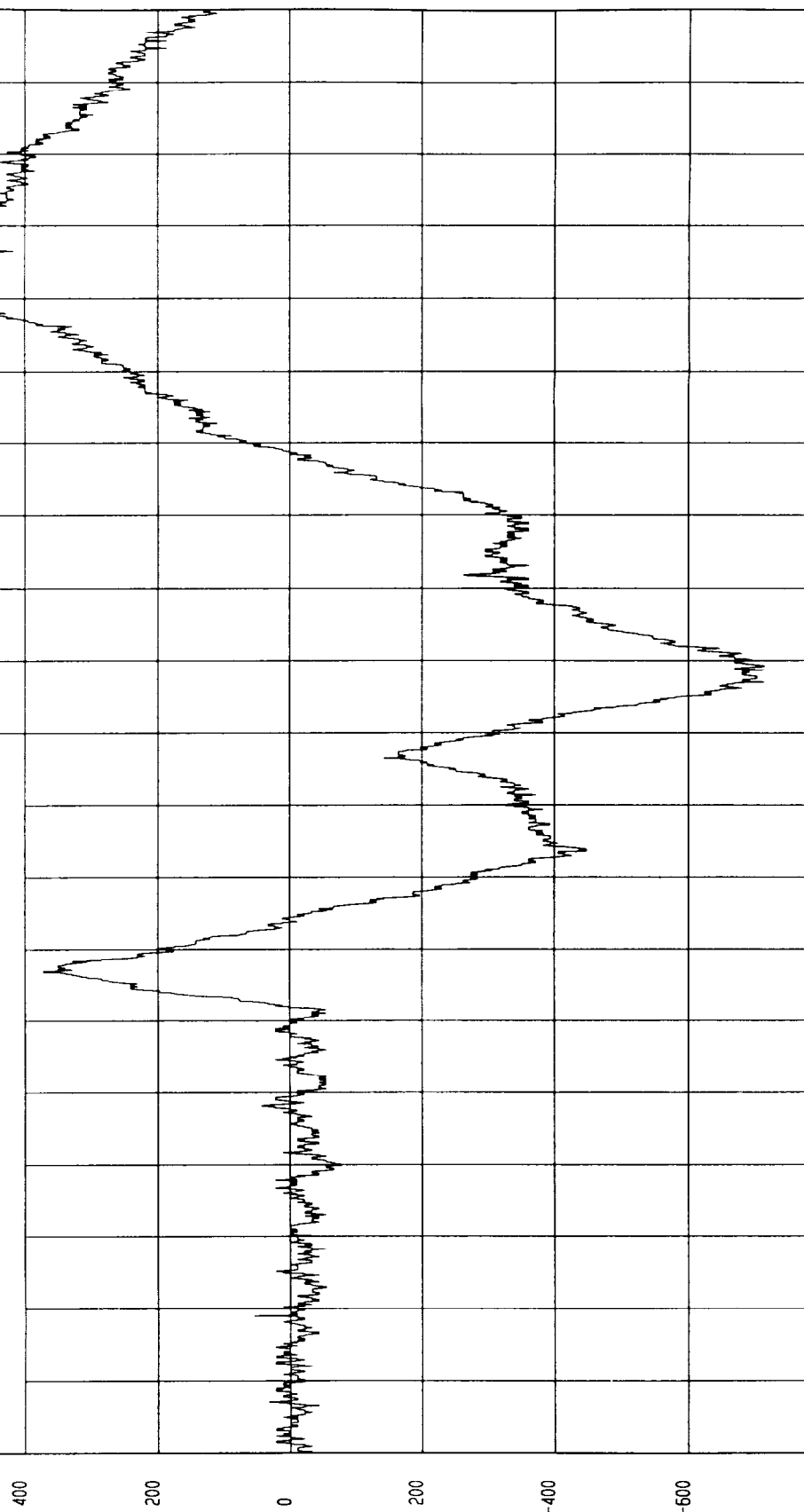
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

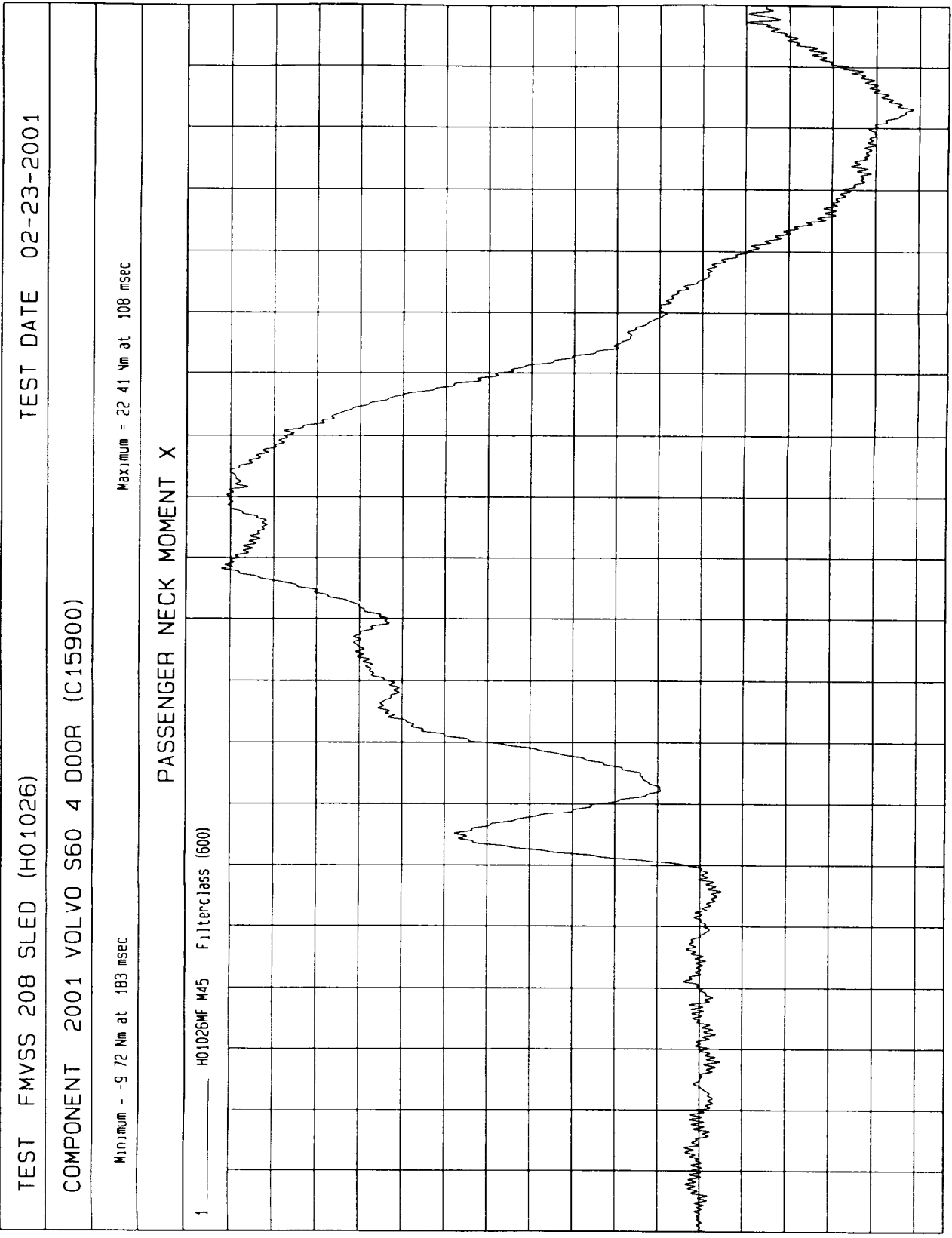
Minimum - 711 55 N at 107 msec

Maximum = 514 95 N at 159 msec

PASSENGER NECK FORCE Z

1 _____ H01026T F33 Filterclass (1000)





TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

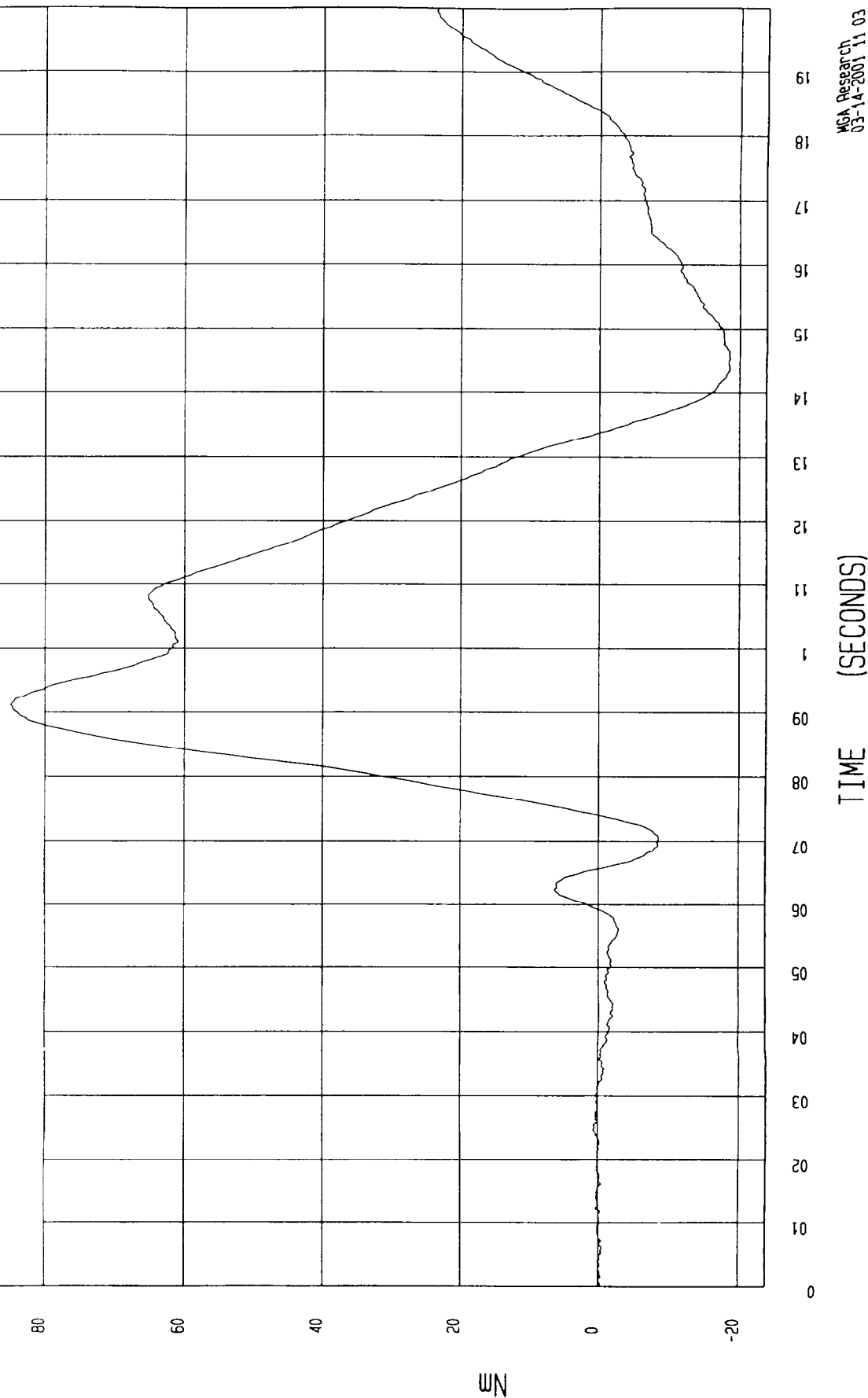
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 18.63 Nm at 145 msec

Maximum = 84.81 Nm at 91 msec

PASSENGER NECK MOMENT Y

1 H01026MF M35 Filterclass (600)



TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum - 10 14 Nm at 199 msec

Maximum 22 99 Nm at 126 msec

PASSENGER NECK MOMENT Z

1 H01026MF M36 Filterclass (600)

24

22

20

18

16

14

12

10

8

6

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2

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-2

-4

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-8

-10

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03

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19

TIME (SECONDS)

TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

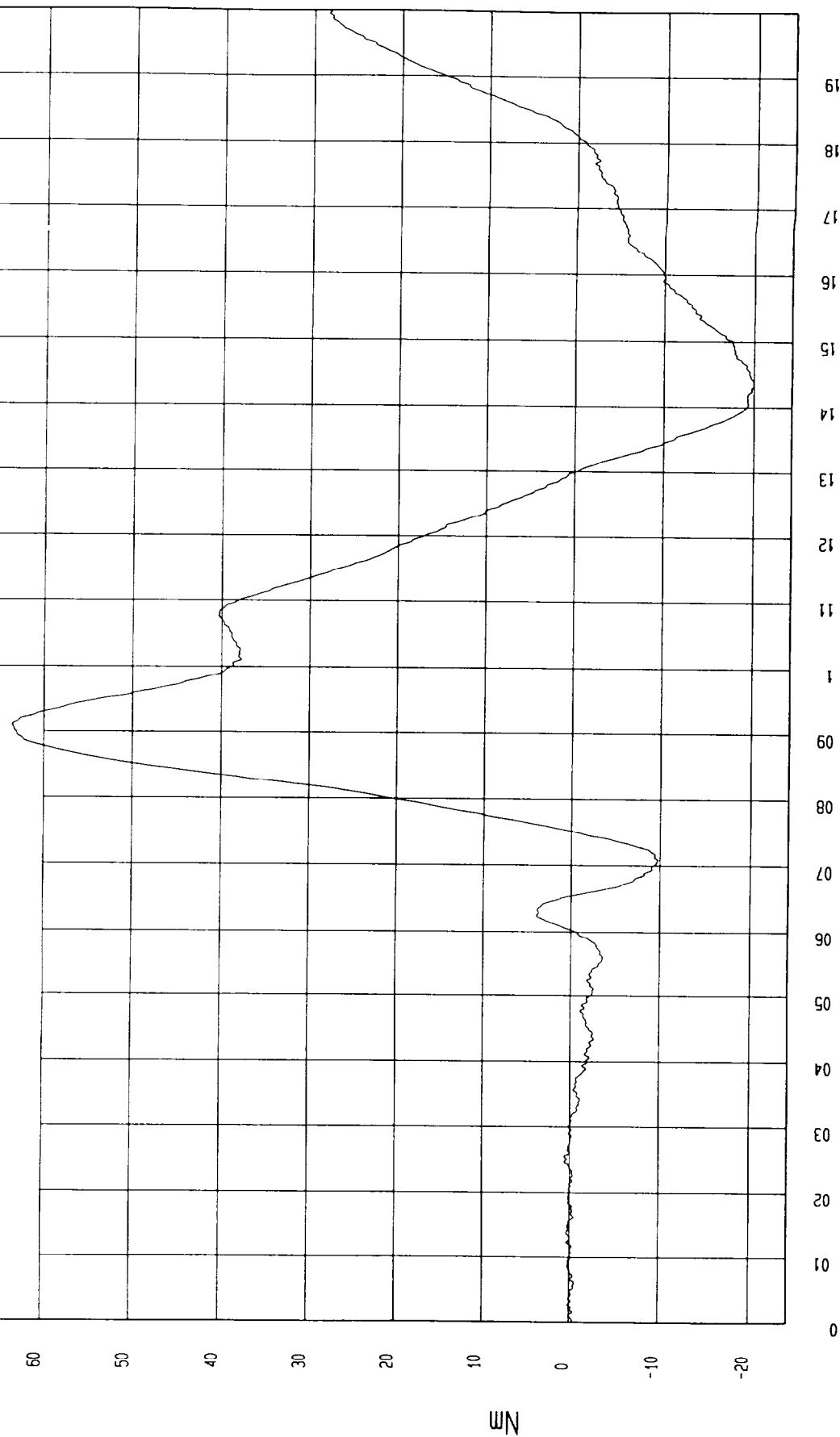
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum = -20.01 Nm at 143 msec

Maximum = 63.53 Nm at 91 msec

PASSENGER OCCIPITAL CONDYLE MOMENT Y

1 ——— H01026M0 M35 Filterclass (600)



TIME (SECONDS)

TEST FMVSS 208 SLED (H01026)

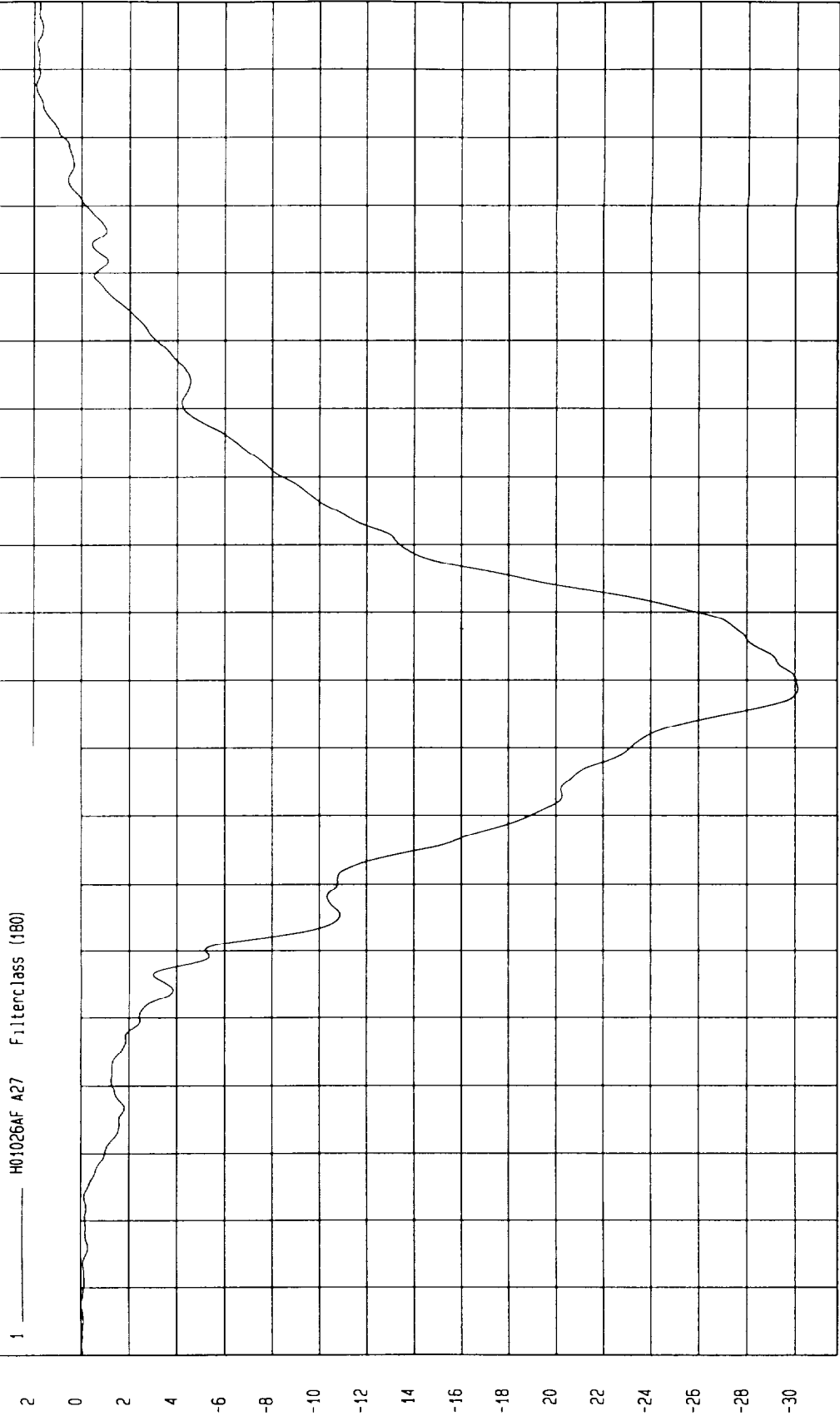
TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 30 13 G at 99 msec

Maximum 19 G at 188 msec

PASSENGER CHEST X ACCELERATION



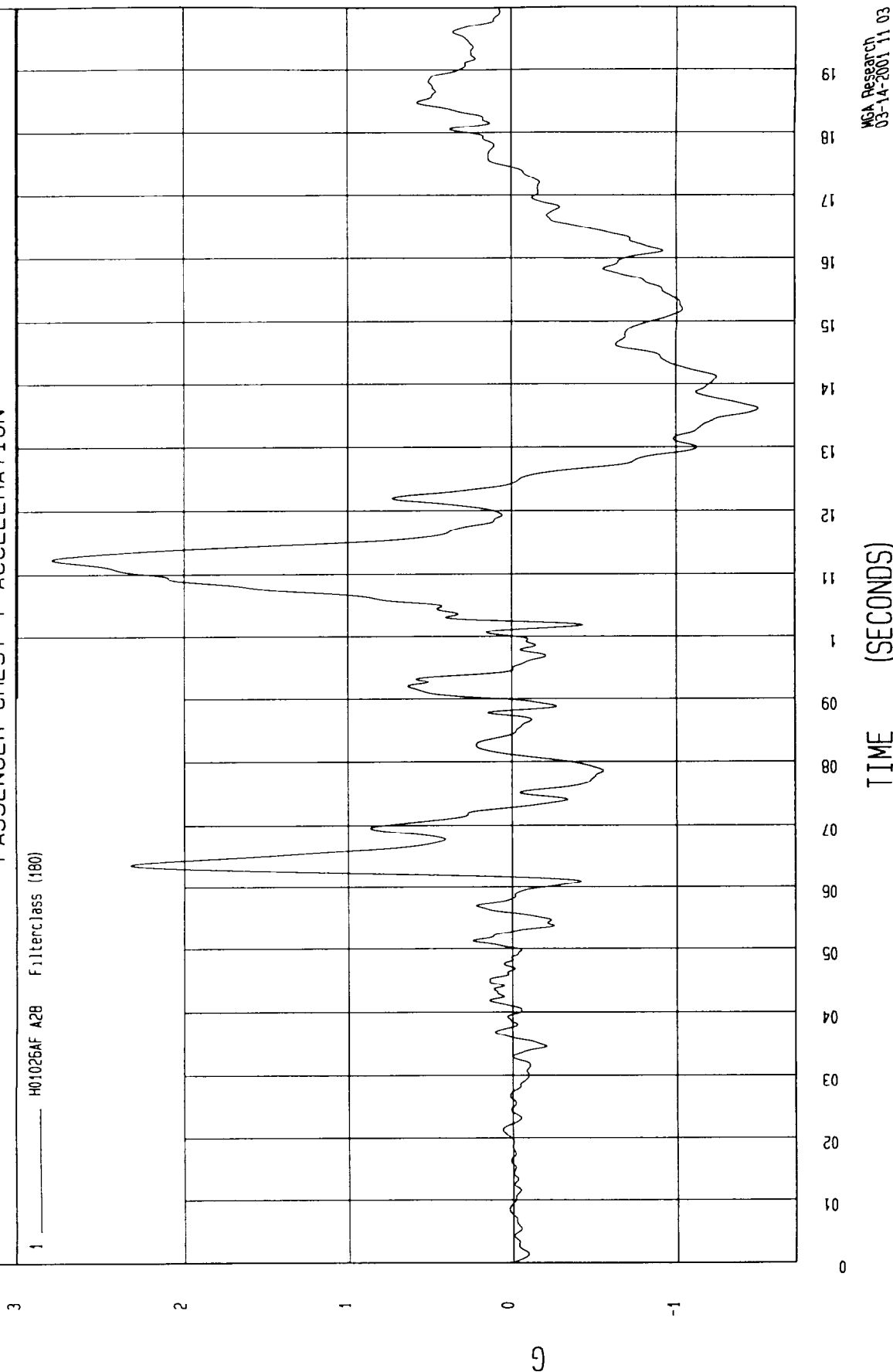
TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 1.5 G at 136 msec Maximum 2.8 G at 112 msec

PASSENGER CHEST Y ACCELERATION

1 H01026AF A2B Filterclass (180)



TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

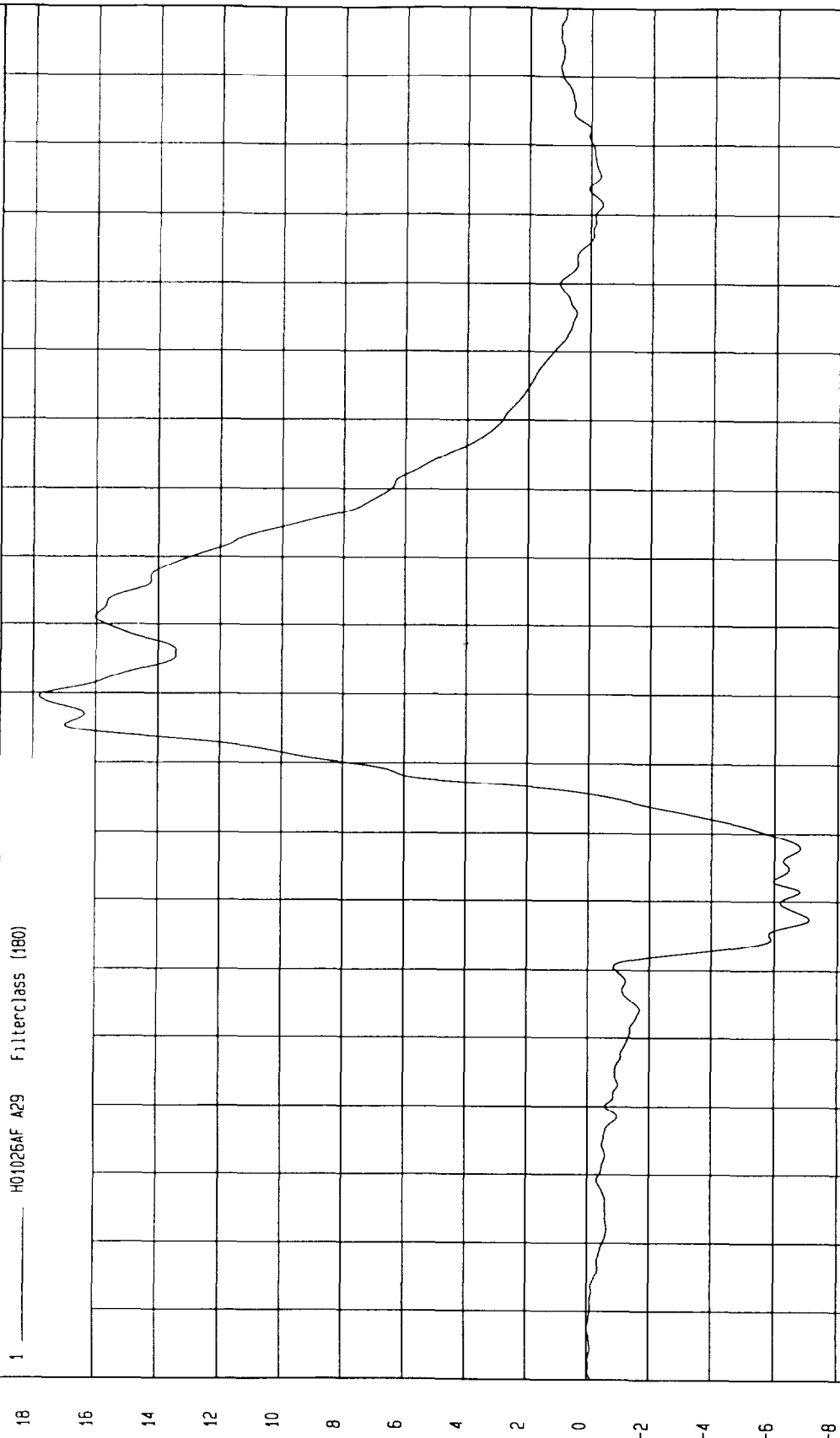
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 7.11 G at 67 msec

Maximum 17.8 G at 100 msec

PASSENGER CHEST Z ACCELERATION

1 H01026AF A29 Filterclass (180)



TIME (SECONDS)

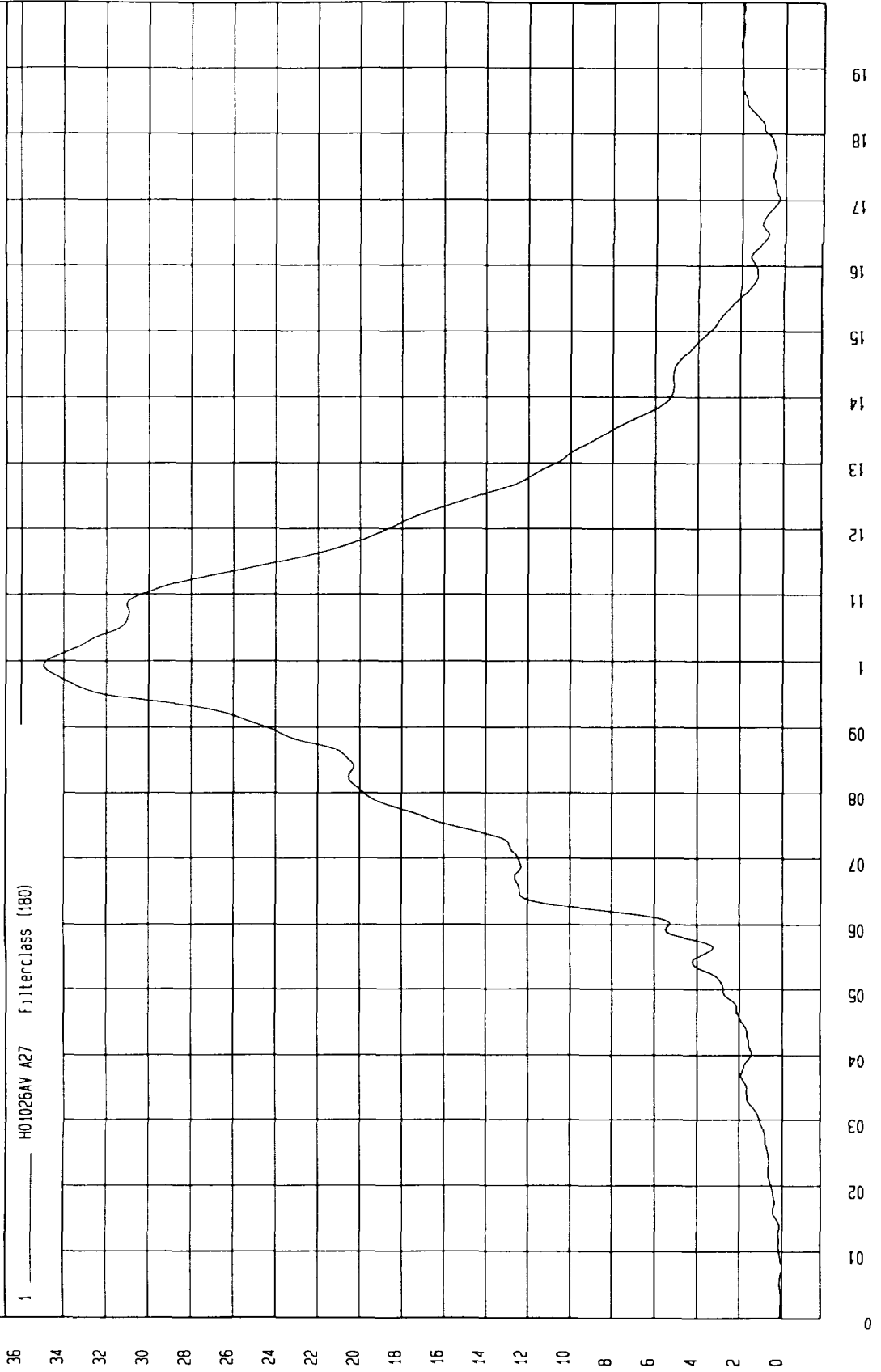
MGA Research
03-14-2001 11 03

TEST FMVSS 208 SLED (H01026) TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 6 34E 03 G at 8 msec Maximum = 34 95 G at 99 msec

PASSENGER CHEST RESULTANT ACCELERATION



TEST FMVSS 208 SLED (H01026)

TEST DATE 02-23-2001

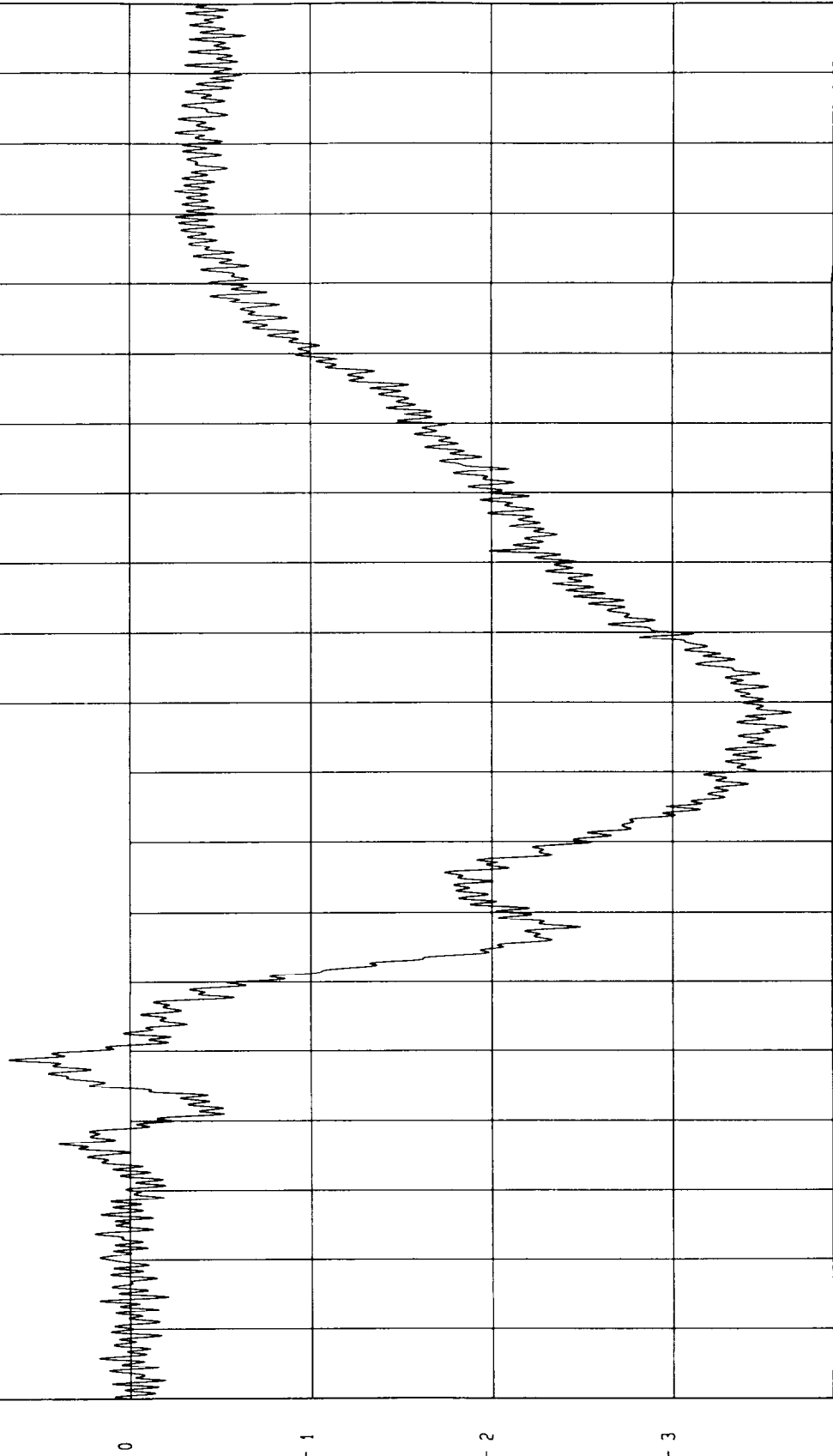
COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum - 36 INCHES at 98 msec

Maximum 6.69E-02 INCHES at 49 msec

PASSENGER CHEST COMPRESSION

1 _____ H01026DF 039 Filterclass (600)



TEST FMVSS 208 SLED (H01026)

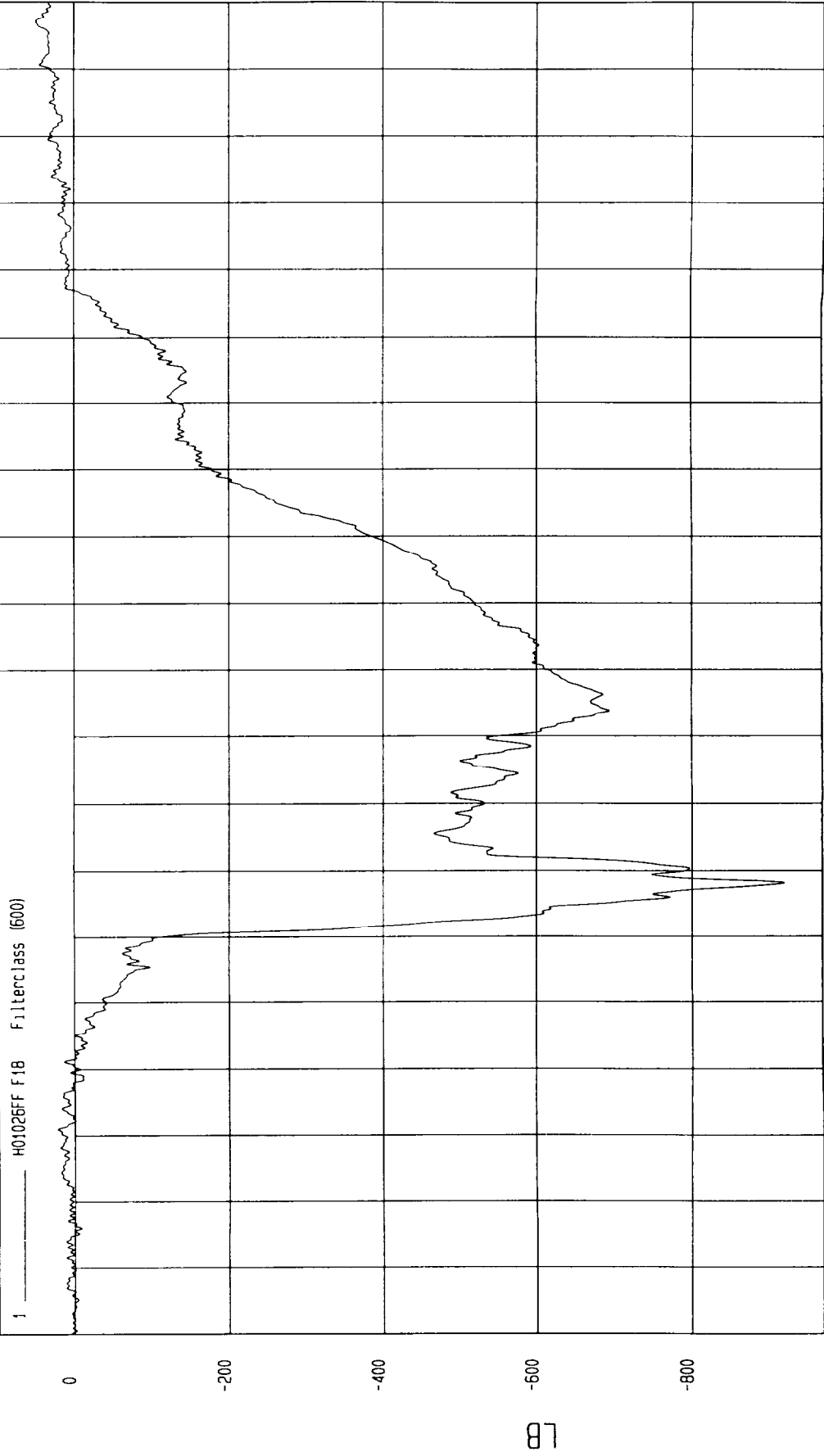
TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 919 19 LB at 68 msec

Maximum - 49 09 LB at 197 msec

PASSENGER LEFT FEMUR FORCE



TEST FMVSS 208 SLED (H01026)

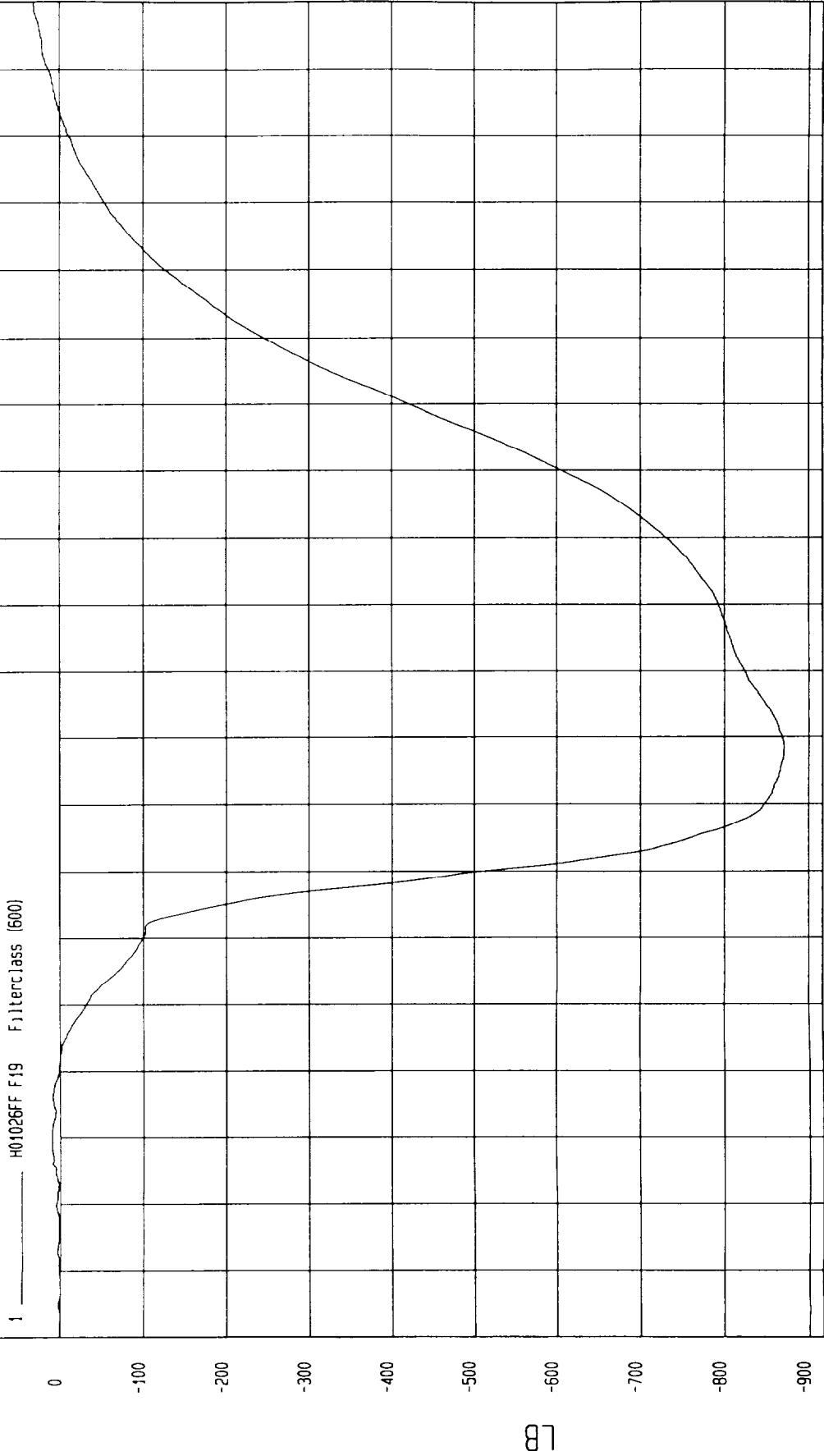
TEST DATE 02-23-2001

COMPONENT 2001 VOLVO S60 4 DOOR (C15900)

Minimum 870 95 LB at 88 msec

Maximum = 31 06 LB at 200 msec

PASSENGER RIGHT FEMUR FORCE



APPENDIX C
MANUFACTURER'S VEHICLE INFORMATION



Volvo Cars of North America, Inc.
January 11, 2001

Ms Marilynne Jacobs, Director
Office of Vehicle Safety Compliance
National Highway Traffic Safety Administration
400 Seventh Street, SW
Washington, D C 20590

NSA-31CCa
OA-208-001019E

Dear Ms Jacobs:

This letter transmits the information you requested, regarding compliance testing of the model year 2001 Volvo S60 Sedan to FMVSS 208, in your October 23, 2000 letter

1 Please inform the OVSC if the air bag restraint system is certified to meet the requirements of S4 1 5 1(a)(1) or S13

RESPONSE: Volvo has certified the MY01 S60 to meet the requirements of S13 of FMVSS 208

If the air bags were installed to meet the requirements of S13 please provide a copy of the certification test reports for the front/angular barrier impact tests of the automatic restraint system with the manual safety belts fastened and the certification test reports for the sled test using only the automatic restraint system

RESPONSE: The following certification test reports are provided (see Attachment 1) for the MY01 S60 (Volvo project name P24) and MY01 V70 (Volvo project name P26)

35 mph-- 0 degrees, Belted, 50% H3-----Volvo Report # LM-259966*
Volvo Report # LM-258329*
Volvo Report # LM-258679*

30 mph--30 degrees (L), Belted, 50% H3-----Volvo Report # LM-260492

30 mph--30 degrees (R), Belted, 50% H3-----Volvo Report # LM-259967

Sled Unbelted, 50% H3-----Volvo Report # LM-257324**
Volvo Report # LM-257385**

* = These tests were conducted at 35 mph

** = These tests are valid for both the MY01 V70 (Volvo project name P26) and the MY01 S60 (Volvo project name P24) Both models have the same front seat compartment and air bag system

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2 Provide the following

(1) describe the difference between the MY01 and the MY00 air bag systems

RESPONSE.

This question does not apply, MY2001 is the first model year for the S60

(2) explain what other restraint changes have been made

RESPONSE.

This question does not apply, MY2001 is the first model year for the S60

(3) explain what other vehicle changes have been made that might have affected FMVSS 208 performance

RESPONSE:

This question does not apply, MY2001 is the first model year for the S60

(4) describe any features that might affect performance with respect to children and out of position occupants

RESPONSE:

The S60 has a dual stage air bag system, with multiple thresholds and belt detection, that adapts the air bag pressure to the crash severity.

3. If the vehicle was certified with unrestrained dummies to meet the requirements of S13, describe how to disconnect the air bags from the vehicle sensors and connect them to the triggering mechanism used in the sled test. Describe the method used in certification to determine when to trigger the air bag and the system used to trigger the air bag

RESPONSE:

The S60 is equipped with dual stage air bags on both the driver and passenger side

A detailed description of how to disconnect and connect the air bags is provided in Attachment 2

The crash severity in the sled pulse has a severity, which in the Volvo S60 threshold matrix for the deployment for the restraint level, is above the threshold for the unbelted occupants where the high-pressure air bag level is activated (see CONFIDENTIAL Attachment 3).

4 State for any safety belt system in this vehicle whether or not it is equipped with a tension-relieving device. Provide a copy of the information furnished in accordance with S7 4 2 if the tension-relieving device is used

RESPONSE

The S60's safety belts are not equipped with any tension-relieving device

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5 FMVSS No 208, S8 1 5 allows the manufacturer the option of having movable vehicle windows and vents placed in the closed position. State whether the vehicle's movable windows and vents were open or closed for the certification tests

RESPONSE

The windows and vents were

- opened in the 35 mph , 0 degree barrier certification test,
- opened in the 30 mph , 30deg barrier certification test,
- closed in the sled certification tests that were performed in two reinforced sled bodies without doors

6 Submit dummy placement measurements, including diagrams or photographs that show exactly where each measurement was taken. Enclosed is a diagram of some of OVSC's dummy measurements. Where possible, use each dimension shown in the diagram to provide the individual dummy placement measurements

RESPONSE.

For dummy placement measurements and descriptions

- for driver dummy placement, see Attachment 4, Appendix 1,
- for passenger dummy placement, see Attachment 4, Appendix 2;
- for how and where to measure, see Attachment 4, Appendix 3

The vehicle has a footrest for the driver

7 Provide the seat positioning, steering column positioning, and fuel tank data on the enclosed form. If more than one front seating, steering column or fuel tank configuration is available on this vehicle, provide separate information for each. In addition, provide the seating reference point for each seat for the lockable seat belt requirement in S7.1 1 5

RESPONSE

(1) Driver and passenger seat positions:

a Seat height adjustment

The front and rear, of the driver and passenger seat, can be individually adjusted in height. Both the front and the rear of each seat should be in the full down position

Power seats are maneuvered by electrical switches at the outboard side of the seat
Mechanical seats are maneuvered by handles at the outboard side of the seat

b Seat back angle

Press a bar against the centerline of the seat back. When car attitude angle is 0°, the angle of the seat back should be 19° from vertical

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c. Seat fore and aft positions

The seats shall be positioned in the mid position

Power seats - mark the extremes of travel (total travel length = 280 mm) and position the seat in the mid position

Mechanical seats - there are a total of 17 possible positions (spacing 14 mm , total travel length = 224 mm) The mid position is the 9th position from the most forward.

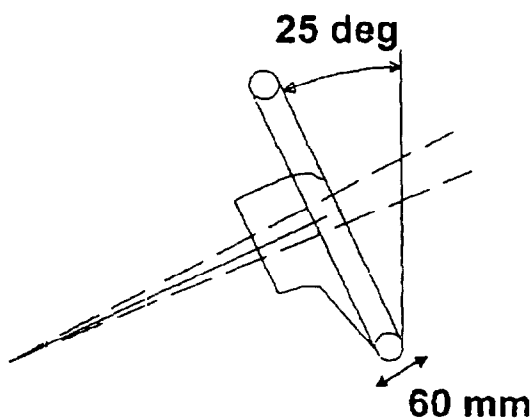
(2) Steering column adjustments

The steering column is adjustable in both tilt and length. Tilt and length are adjustable when the handle to the left of the steering wheel is released.

a. Tilt

The test position is in the middle of the tilt range;

- press a bar against the steering wheel rim;
- when car attitude angle is 0°;
- the angle of the steering wheel should be 25° from vertical (see figure below)



b. Length:

The test position is in the middle of the adjustable length range. The total adjustable length is 60 mm (see figure above)

(3) Fuel tank capacity data

The MY01 Volvo S60 has a fuel tank capacity of 70 or 80 liters depending on engine variant:

- turbocharged engines have a fuel tank of 80 liters,
- non-turbocharged engines have a fuel tank of 70 liters

The amount of Stoddard added = 93%

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- a "Usable Capacity" of standard equipment fuel tank
- S60 with non-turbocharged engine = 18.5 gallons (70 liters)
 - S60 with turbocharged engine = 21.1 gallons (80 liters)
- b "Usable Capacity" of optional equipment fuel tank = NA
- c Capacity used when certification testing to requirements of FMVSS 301.
- S60 with non-turbocharged engine = 18.5 gallons (70 liters)
 - S60 with turbocharged engine = 21.1 gallons (80 liters)
- (There is no unusable capacity)
- c Amount of Stoddard solvent added to vehicle(s) used for certification test(s):
- S60 with non-turbocharged engine = 17.2 gallons (65 liters)
 - S60 with turbocharged engine = 19.8 gallons (75 liters)
- e. The vehicle is equipped with an electric fuel pump. With the ignition on, the pump works a few seconds and then stops when the pressure is 3 bars. The fuel pump can only operate continuously if the engine is running.
8. If the vehicle is equipped with adjustable seat belt anchorages, provide the manufacturer's nominal design position for a 50th percentile adult male occupant.

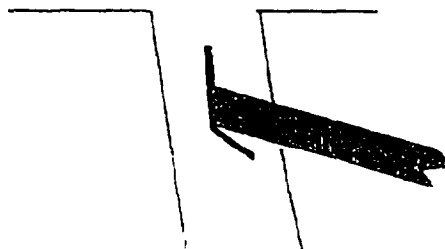
RESPONSE:

The front seat safety belts in the S60 are equipped with both pyrotechnical pretensioners and load limiters.

Please note: Force transducers on the shoulder portion of the belts will reduce the effectiveness of the pretensioner and must not be used!

The seat belts are self-adjustable at the upper anchorage on the B-pillar. The test position is the "mid" position in the panel slot. The procedure to obtain this position is:

- (1) fasten the seat belt,
- (2) pull out all the webbing from the retractor,
- (3) feed webbing back to upper part of the slot until approximately 200 mm. remains;
- (4) guide the remaining 200 mm of webbing gradually towards the mid position of the slot (see figure below)



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9 For barrier tests provide the speed at impact, vehicle test weight, and resulting injury criteria (i.e., HIC, chest acceleration, chest compression, and femur loads) recorded for all certification tests conducted to meet the requirements of S4.1.51(a)(1). For sled tests, provide the resulting injury criteria (i.e., HIC, chest acceleration, chest compression, femur loads, and neck moments and forces) recorded for all certification tests conducted to meet the requirements of S13.

RESPONSE:**35 mph, 0 degree barrier (also valid for 30 mph, 0 degree) - belted occupant**

Volvo report no			LM-259966	LM-258329	LM258679
Vehicle data					
Impact speed		mph	34.9	35.0	35.2
Test weight	total	kg	1824	1835	1818
	front	kg	1017	1037	983
	rear	kg	807	798	835
Injury criteria Driver					
Head	HIC ₁₅		420	414	486
Chest	Cr _{3ms}	g	51.6	47.0	47.2
	C _{defl}	mm	43.5	41.7	40.0
Femur	Right	N	3090	n.m.*	2841
	Left	N	5982	6369	4343
Injury criteria Front pass					
Head	HIC ₁₅		321	282	284
Chest	Cr _{3ms}	g	45	44.6	39.6
	C _{defl}	mm	40.4	34.9	35.5
Femur	Right	N	3545	2809	1938
	Left	N	3545	3791	2971

* Measuring device on driver right knee failed, usually much lower than left knee

30 mph, 30 degree left and right barrier - belted occupant

Volvo Report No.			LM-260492	LM-259967
Vehicle data			30 deg Left	30 deg Right
Impact speed		mph	30.1	30.2
Test weight	total	kg	1713	1853
	front	kg	917	955
	rear	kg	796	898
Injury criteria - Driver				
Head	HIC ₁₅		340	257
Chest	Cr _{3ms}	g	46.0	31.8
	C _{defl}	mm	38.2	32.6
Femur	Right	N	5165	3891
	Left	N	2000	3518
Injury criteria - Fr Pass				
Head	HIC ₁₅		170	204
Chest	Cr _{3ms}	g	35.7	31.8
	C _{defl}	mm	29.4	29.6
Femur	Right	N	3291	2617
	Left	N	3510	2512

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Note Tests were conducted in a V70 sled body, but are also valid for S60. This is because the V70 and S60 have the same design and geometry in the front seat compartment and air bag system

Volvo Report No.			LM-257324	LM-257324	LM-257324
Test No			990081 - 1	990081 - 2	990081 - 3
Air bag data					
Driver delta t	airbag, stage 1->2	ms	5	5	5
Pass delta t	airbag, stage 1->2	ms	15	15	15
Injury criteria-Driver					
Head	HIC ₃₆		107	96	135
Upper neck	Flexion My	Nm	51.6	54.4	59.3
	Extension My	Nm	-7.4	-6.5	-5.6
	Tension Fz	N	475	299	441
	Compression Fz	N	-1849	-309	-1894
	Shear force Fx	N	684	725	757
Chest	Cr _{3ms}	g	29.6	28.2	28.2
	C _{defl}	mm	39	38	38
Femur	Right	kN	-3.4	-3.6	-3.6
	Left	kN	-4.0	-3.7	-3.3
Injury criteria-Fr. Pass.					
Head	HIC ₃₆		108	151	101
Upper neck	Flexion My	Nm	75.0	69.7	63.3
	Extension My	Nm	-12.9	-16.3	-16.3
	Tension Fz	N	544	606	583
	Compression Fz	N	-1534	-1970	-703
	Shear force Fx	N	1104	1265	1147
Chest	Cr _{3ms}	g	25.8	28.5	27.4
	C _{defl}	mm	9.7	8.2	8.5
Femur	Right	kN	-4.2	-4.4	-4.1
	Left	kN	-4.4	-4.1	4.4

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Volvo report no			LM-257385	LM-257324	LM-257324
test no			990110 - 3	990110 - 4	990110 - 5Dr 990110 - 6Pa
Air bag data					
Driver delta t	airbag stage 1->2	ms	5	5	5
Pass delta t	airbag stage 1->2	ms	15	15	15
Injury criteria Driver					
Head	HIC ₃₆		117	83	129
Upper neck	Flexion My	Nm	46	50	44
	Extension My	Nm	4	4	3
	Tension Fz	N	306	379	438
	Compression Fz	N	2848	1125	2226
	Shear force Fx	N	726	733	733
Chest	Cr _{3ms}	g	27.8	29.2	29.6
	C _{defl}	mm	43	44	42
Femur	Right	kN	3.4	3.8	4.1
	Left	kN	3.5	3.6	4.0
Injury criteria Front pass					
Head	HIC ₃₆		139	141	112
Upper neck	Flexion My	Nm	64	70	76
	Extension My	Nm	20	21	11
	Tension Fz	N	535	651	320
	Compression Fz	N	1830	1779	887
	Shear force Fx	N	1213	1243	1117
Chest	Cr _{3ms}	g	30.2	30.8	31.4
	C _{defl}	mm	8	9	9
Femur	Right	kN	4.3	4.4	4.8
	Left	kN	4.6	4.6	3.9

10 When vehicle components must be removed to obtain the proper test weight for the barrier test, what components do you recommend for removal and in what priority order do you recommend removal?

RESPONSE

The following parts can be removed to obtain the proper crash weight: spare wheel, rear bumper, carpet and interior carpets and panels in trunk compartment.

11 If the vehicle uses a pressure vessel to inflate the air bag, provide a copy of the test reports or engineering analysis to demonstrate that it meets all the requirements of §9.2.

RESPONSE

The passenger air bag is equipped with a pressure vessel to inflate the air bag.

12 If the vehicle uses an explosive device to inflate the air bag, provide a copy of the test report or engineering analysis to demonstrate that it meets all the requirements of §9.2.

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RESPONSE

The driver air bag is equipped with an explosive device to inflate the air bag (see Attachment 5)

13 Miscellaneous

RESPONSE:

An external battery must not be connected in parallel with the test vehicle's battery. If an external battery is used, then the positive pole of the test vehicle's battery must be disconnected and isolated

Before making any connections, turn the ignition off, remove the key from the ignition and wait for about one minute

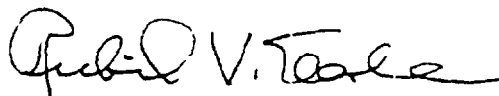
Attachment 3 is submitted as a Confidential attachment. One copy of Attachment 3 has been sent, under separate cover, to the NHTSA Office of Chief Counsel along with certification as to the confidentiality of the material (see Attachment 6). Two copies of Volvo's submission are enclosed with this letter. One copy is for OVSC use and includes the Confidential Attachment 3; a "public version," without the Confidential Attachment 3, is also enclosed

If NHTSA chooses to conduct FMVSS 208 compliance tests on the model year 2001 S60, Volvo would like to have its representatives attend the testing. If this is possible, we would request that you notify us in sufficient time, to allow our colleagues at Volvo Car Corporation (Sweden), to make arrangements to attend

If you have any questions, or require additional information, please contact me at (201) 768-7300, extension 7249 or by e-mail at tearler@mail.volvo.com

Sincerely yours,

VOLVO CARS OF NORTH AMERICA, INC
Aftersales Business Unit



Richard V. Tearle
Manager, Compliance Programs
Regulations and Compliance

Attachments

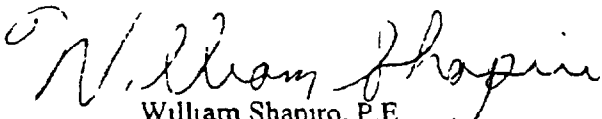
- Attachment 1 - non-confidential
- Attachment 2 - non-confidential
- Attachment 3 - Confidential (not enclosed)
- Attachment 4 - non-confidential
- Attachment 5 - non-confidential
- Attachment 6 - non-confidential

CERTIFICATE IN SUPPORT OF REQUEST FOR CONFIDENTIALITY

I, William Shapiro, pursuant to the provisions of 49 CFR Part 512, state as follows

- (1) I am Manager, Regulatory and Product Compliance and I am authorized by Volvo Cars of North America, Inc (VCNA) to execute documents on its behalf,
- (2) Attachment 3 to VCNA letter, dated January 11, 2001, to Ms. Marilynne Jacobs has been marked "Confidential," and consists of Volvo proprietary product information which is being submitted with the claim that it is entitled to confidential treatment pursuant to 5 USC 552(b)(4) and Section 112(e) of the National Traffic and Motor Vehicle Safety Act of 1966, as amended and implemented in 49 CFR Part 512;
- (3) I, or members of my staff, have personally inquired of the responsible VCNA personnel who have the authority, in the normal course of business to release the information for which a claim of confidentiality has been made, to ascertain whether such information has ever been released outside VCNA,
- (4) Based upon such inquiries and to the best of my knowledge, information and belief, the information for which VCNA has claimed confidential treatment has never been released or become available outside VCNA, except as needed by VCNA to enter into appropriate confidentiality;
- (5) I make no representations beyond those contained in the certificate and in particular, I make no representations as to whether this information may become available outside VCNA because of unauthorized or inadvertent disclosure, and
- (6) I certify under penalty of perjury that the foregoing is true and correct, to the best of my information and belief

Executed on this day, the 11th of January, 2001



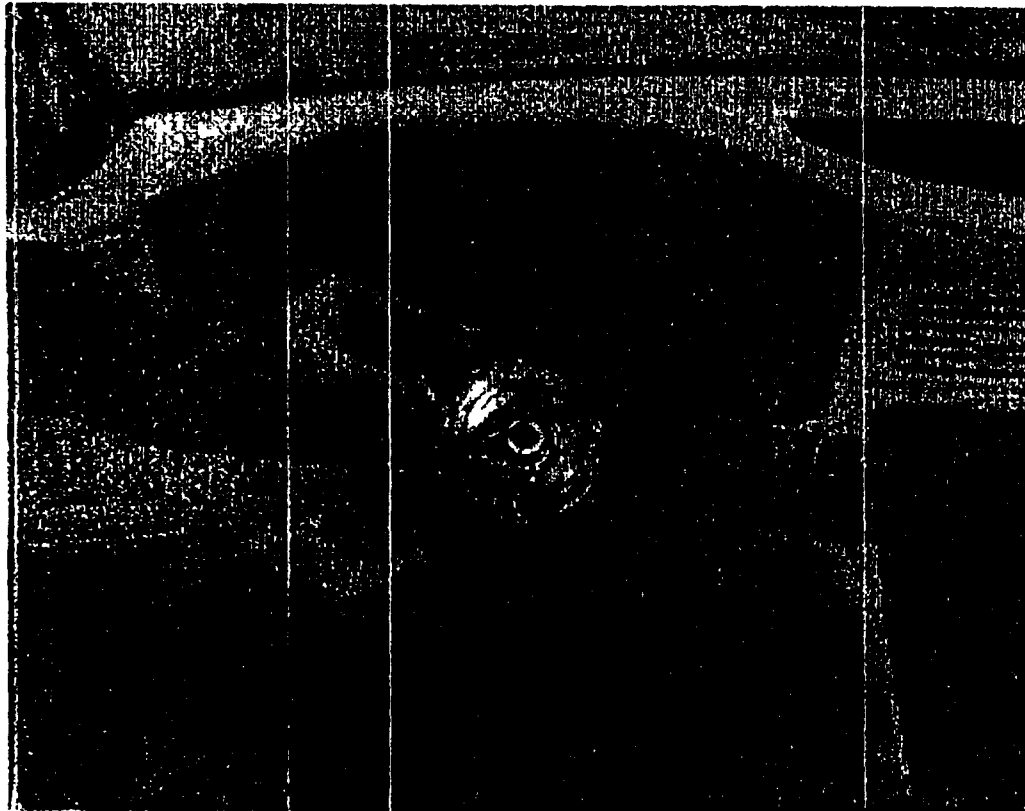
William Shapiro, P.E
Volvo Cars of North America, Inc
Aftersales Business Unit
Manager, Regulatory and Product Compliance

ATTACHMENT 2 -- Page 1 (NSA-31Cca/ OA-208-001019E)How to disconnect and connect air bags in the Volvo S60, MY2001

The frontal air bags are dual stage and have two connectors each. To activate the air bags, in a sled test with timer, the connectors have to be switched to a DC-type. (These connectors will be provided by Volvo for the upcoming test.)

How to disconnect and connect the driver air bag.

- 1) The air bag is attached by two "quickfix" in the steering wheel, one on the left side and one on the right side. Turn the steering wheel 90 degrees. On the steering wheel's flat surface, towards the "coconest," there is a hole. Put a flat screwdriver in the hole and push it sideways so the "quickfix" releases the air bag on one of the two sides. Turn the steering wheel 180 degrees and release the second "quickfix."
- 2) With the air bag loose, you can see two connectors to the air bag, one green and one purple. Disconnect these two and connect the two DC-connectors, which are to be provided by Volvo, green to green and purple to purple. On the airbag module, above the connectors, the two stages are marked "1" and "2." Stage number 1 is marked in green.

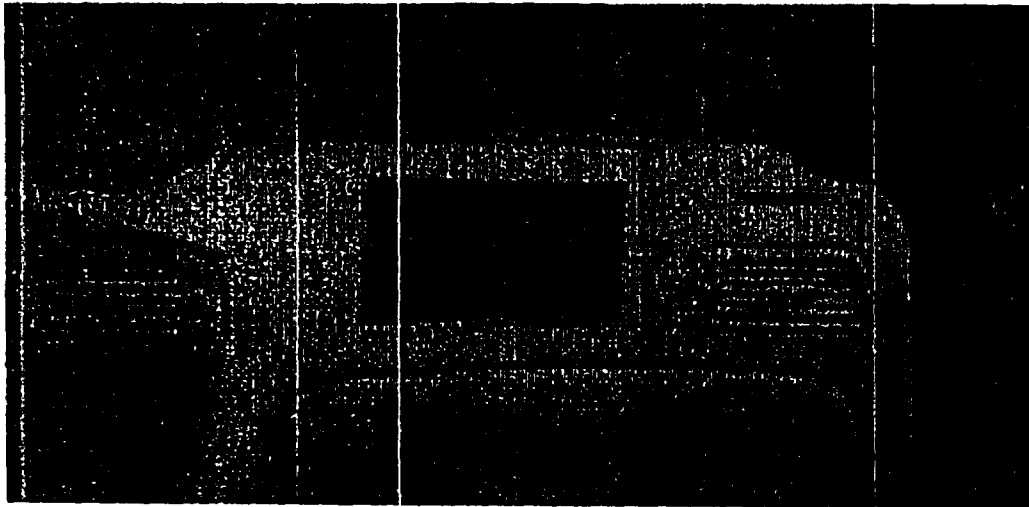


- 3) Attach the air bag module by pushing the module into the steering wheel.

ATTACHMENT 2 – Page 2 (NSA-31Cca/ OA-208-001019E)

How to disconnect and connect the passenger side air bag.

- 1) The air bag is located above the glove compartment.



ATTACHMENT 4 - APPENDIX 3

