REPORT NUMBER 202a-GTL-10-004

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 202aS HEAD RESTRAINTS – STATIC REQUIREMENTS

VOLVO CAR CORPORATION
2010 VOLVO S40, PASSENGER CAR
NHTSA NO. CA5900

GENERAL TESTING LABORATORIES, INC.
1623 LEEDSTOWN ROAD
COLONIAL BEACH, VIRGINIA 22443

August 30, 2010

FINAL REPORT

PREPARED FOR

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVE., SE
WASHINGTON, D.C. 20590

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Prepared By: Digitally signed by Debbie Messick
DN: cn=Debbie Messick, c=US, o=GTL, email=gtl@general-testing.com

Approved By: Digitally signed by Grant Farrand
DN: cn=Grant Farrand, c=US, o=GTL, email=gtl@general-testing.com

Approval Date: 08/30/10

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By: Edward E. Chan
Digitally signed by Edward E. Chan
DN: cn=Edward E. Chan, o=National Highway Traffic Safety Administration, ou=Office of Vehicle Safety Compliance, email=ed.chan@dot.gov, c=US
Date: 2010.08.25 14:19:38 -04'00'

Acceptance Date: _____

1. Report No. 202a-GTL-10-004	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A
4. Title and Subtitle Final Report of FMVSS 202a Compliance Testing of a 2010 VOLVO S40, PASSENGER CAR NHTSA No. CA5900		5. Report Date August 30, 2010 6. Performing Organ. Code GTL
7. Author(s) Grant Farrand, Project Engineer Debbie Messick, Project Manager		8. Performing Organ. Rep# GTL-DOT-10-202a-004
9. Performing Organization Name and Address General Testing Laboratories, Inc. 1623 Leedstown Road Colonial Beach, Va 22443		10. Work Unit No. (TRAIS) N/A 11. Contract or Grant No. DTNH22-06-C-00032
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Admin. Enforcement Office of Vehicle Safety Compliance (NVS-220) 1200 New Jersey Ave., S.E., Washington, DC 20590		13. Type of Report and Period Covered Final Test Report July 01 - July 23, 2010 14. Sponsoring Agency Code NVS-221
15. Supplementary Notes		
16. Abstract Compliance tests were conducted on the subject, 2010 Volvo S40 4-door Passenger Car in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-202aS-00 for the determination of FMVSS 202a compliance. Test failures identified were as follows: NONE		
17. Key Words Compliance Testing Safety Engineering FMVSS 202aS	18. Distribution Statement Copies of this report are available from NHTSA Technical Information Services (TIS) Room W45-212 (NPO-411) 1200 New Jersey Ave., S.E. Washington, DC 20590 Telephone No. (202) 366-4947	
19. Security Classif. (of this report) UNCLASSIFIED	21. No. of Pages 79	22. Price
20. Security Classif. (of this page) UNCLASSIFIED		

Form DOT F 1700.7 (8-72)

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SECTION 1

PURPOSE OF COMPLIANCE TEST

1.0 PURPOSE OF COMPLIANCE TEST

A 2010 Volvo S40 Passenger Car was subjected to Federal Motor Vehicle Safety Standard (FMVSS) No. 202a testing to determine if the vehicle was in compliance with the requirements of the standard. The purpose of this standard is to establish requirements for head restraints to reduce the frequency and severity of neck injury in rear end and other collisions.

1.1 The test vehicle was a 2010 Volvo S40 Passenger Car. Nomenclature applicable to the test vehicle are:

A. Vehicle Identification Number: YV1382MS9A2493156

B. NHTSA No.: CA5900

C. Manufacturer: VOLVO CAR CORPORATION

D. Manufacture Date: 09/09

E. Color: White

1.2 TEST DATE

The test vehicle was subjected to FMVSS No. 202a testing during the time period July 01 through July 23, 2010.

SECTION 2

COMPLIANCE TEST RESULTS

2.0 TEST RESULTS

All tests were conducted in accordance with NHTSA, Office of Vehicle Safety Compliance (OVSC) Laboratory Procedures, TP-202aS-00 dated 22 December 2004.

Based on the test performed, the 2010 Volvo S40 Passenger Car appeared to meet the requirements of FMVSS 202a testing.

SECTION 3

COMPLIANCE TEST DATA

3.0 TEST DATA

The following data sheets document the results of testing on the 2010 Volvo S40 Passenger Car.

DATA SHEET 1 (1 of 2)
SUMMARY OF RESULTS

VEH. MOD YR/MAKE/MODEL/BODY STYLE: 2010 VOLVO S40 PASSENGER CAR

VEH. NHTSA NO.: CA5900 ; VIN: YV1382MS9A2493156

VEH. BUILD DATE: 09/09 ; TEST DATE: July 1-23, 2010

TEST LABORATORY: GENERAL TESTING LABORATORIES

OBSERVERS: G. FARRAND, J. LATANE

A. VISUAL INSPECTION OF TEST VEHICLE

Upon receipt for completeness, function, and discrepancies or damage which might influence the testing.

RESULTS: OK for testing. Due to manufacture date of vehicle, rear DSP's are not required to meet 202a requirements.

B. DIMENSIONAL REQUIREMENTS	**PASS**	**FAIL**	**N/A**
Driver's Side	X		
Passenger's Side	X		
Rear Designated Seating Positions	X		

C. OWNER'S MANUAL	**PASS**	**FAIL**
	X	

D. REMOVABILITY	**PASS**	**FAIL**	**N/A**
Driver's Side	X		
Passenger's Side	X		
Rear Designated Seating Positions	X		

E. NON-USE POSITION	**PASS**	**FAIL**	**N/A**
Rear Designated Seating Positions			X

DATA SHEET 1 (2 of 2)
SUMMARY OF RESULTS

F.	**ENERGY ABSORPTION TEST**	**PASS**	**FAIL**	**N/A**
	Driver's Side			
	Passenger's Side			
	Rear Designated Seating Positions	X		
G.	**HEIGHT RETENTION TEST**	**PASS**	**FAIL**	**N/A**
	Driver's Side	X		
	Passenger's Side			
	Rear Designated Seating Positions			
H.	**BACKSET RETENTION TEST**	**PASS**	**FAIL**	**N/A**
	Driver's Side			
	Passenger's Side	X		
	Rear Designated Seating Positions			

RECORDED BY: G. FARRAND DATE: 07/23/10

APPROVED BY: D. MESSICK

DATA SHEET 2a (1 of 2)
DIMENSIONAL REQUIREMENTS FOR ADJUSTABLE HEAD RESTRAINTS

VEH. NHTSA NO.: CA5900 TEST DATE: 07/06/10

Seat Location: FRONT DRIVER

Height Measurement

SAE J826 three-dimensional manikin torso angle: 25.2°

Striker to H-Point (mm): 141 mm Striker to H-Point angle: Down

Position the head restraint in the highest position of vertical adjustment.
Height, Hh (mm): 828 mm X **PASS** **FAIL**

Hh > or = 800 mm for front seats.

If the head restraint is less than the required height, check for passage of the 25 mm diameter sphere. N/A

Position the head restraint in the lowest position of vertical adjustment.
Height, Hl (mm): 805 mm X **PASS** **FAIL**

Hl > or = 750 mm for front seats and rear seats with head restraints.

If the head restraint is less than the required height, check for passage of the 25 mm diameter sphere. N/A

Width Measurement

If the manikin is moved between the Height measurement and the Width measurement, re-record the torso angle, striker to H-Point distance and angle.

Position the head restraint in the highest position of vertical adjustment.

Width is measured 65 mm below the measured Height, Hh.

Height, Hw (= Hh – 65): 763 mm

Width, W (mm): 200 mm X **PASS** **FAIL**

Width must be greater than or equal to 170 mm. If a vehicle has a front center designated seating position the front outboard head restraints must be greater than or equal to 254 mm. N/A

DATA SHEET 2a (2 of 2)
DIMENSIONAL REQUIREMENTS FOR ADJUSTABLE HEAD RESTRAINTS

Backset Measurement (Front Head Restraints Only)

Position the HRMD and record the following measurements.

HRMD torso angle: 24.9°

Striker to H-Point (mm): 145 mm Striker to H-Point angle: Down

Position the head restraint at a height greater than or equal to 750 mm and less than or equal to 800 mm for front head restraints. Exception: head restraint with lowest position higher than 800 mm, adjust to lowest position.

Backset, B (mm): 29 mm X PASS FAIL

Backset must be less than or equal to 55 mm.

Gap Measurement

Position the head restraint in the lowest position of vertical adjustment.

Number of gaps within the gap measurement zone: One

Least dimension of each gap (measured with a steel tape): 25 mm

Size of each gap (as measured with the spherical head form):

Gap Size N/A X PASS FAIL

Gaps must be less than or equal to 60 mm.

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/01/10

APPROVED BY: D. MESSICK

DATA SHEET 2a(1 of 2)
DIMENSIONAL REQUIREMENTS FOR ADJUSTABLE HEAD RESTRAINTS

VEH. NHTSA NO.: CA5900 TEST DATE: 07/06/10

Seat Location: FRONT PASSENGER

Height Measurement

SAE J826 three-dimensional manikin torso angle: 25.4°

Striker to H-Point (mm): 125 mm (Ahead) Striker to H-Point angle: Down

Position the head restraint in the highest position of vertical adjustment.
Height, Hh (mm): 838 mm X **PASS** **FAIL**

Hh > or = 800 mm for front seats.

If the head restraint is less than the required height, check for passage of the 25 mm diameter sphere. N/A

Position the head restraint in the lowest position of vertical adjustment.
Height, Hl (mm): 815 mm X **PASS** **FAIL**

Hl > or = 750 mm for front seats and rear seats with head restraints.

If the head restraint is less than the required height, check for passage of the 25 mm diameter sphere. N/A

Width Measurement

If the manikin is moved between the Height measurement and the Width measurement, re-record the torso angle, striker to H-Point distance and angle.

Position the head restraint in the highest position of vertical adjustment.

Width is measured 65 mm below the measured Height, Hh.

Height, Hw (= Hh – 65): 773 mm

Width, W (mm): 195 mm X **PASS** **FAIL**

Width must be greater than or equal to 170 mm. If a vehicle has a front center designated seating position the front outboard head restraints must be greater than or equal to 254 mm. N/A

DATA SHEET 2a (2 of 2)
DIMENSIONAL REQUIREMENTS FOR ADJUSTABLE HEAD RESTRAINTS

Backset Measurement (Front Head Restraints Only)

Position the HRMD and record the following measurements.

HRMD torso angle: 24.9°

Striker to H-Point (mm): 123 mm Striker to H-Point angle: Down

Position the head restraint at a height greater than or equal to 750 mm and less than or equal to 800 mm for front head restraints. Exception: head restraint with lowest position higher than 800 mm, adjust to lowest position.

Backset, B (mm): 26 mm X PASS FAIL

Backset must be less than or equal to 55 mm.

Gap Measurement

Position the head restraint in the lowest position of vertical adjustment.

Number of gaps within the gap measurement zone: One

Least dimension of each gap (measured with a steel tape): 25 mm

Size of each gap (as measured with the spherical head form):

Gap Size N/A X PASS FAIL

Gaps must be less than or equal to 60 mm.

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/06/10

APPROVED BY: D. MESSICK

DATA SHEET 2a (1 of 2)
DIMENSIONAL REQUIREMENTS FOR ADJUSTABLE HEAD RESTRAINTS

VEH. NHTSA NO.: CA5900 TEST DATE: 07/06/10

Seat Location: REAR DRIVER

Height Measurement

SAE J826 three-dimensional manikin torso angle: 27.2°

Striker to H-Point (mm): 205 mm Striker to H-Point angle: Down

Position the head restraint in the highest position of vertical adjustment.
Height, Hh (mm): 812 mm X **PASS** **FAIL**

Hh > or = 800 mm for front seats.

If the head restraint is less than the required height, check for passage of the 25 mm diameter sphere. N/A

Position the head restraint in the lowest position of vertical adjustment.
Height, Hl (mm): 769 mm X **PASS** **FAIL**

Hl > or = 750 mm for front seats and rear seats with head restraints.

If the head restraint is less than the required height, check for passage of the 25 mm diameter sphere. N/A

Width Measurement

If the manikin is moved between the Height measurement and the Width measurement, re-record the torso angle, striker to H-Point distance and angle.

Position the head restraint in the highest position of vertical adjustment.

Width is measured 65 mm below the measured Height, Hh.

Height, Hw (= Hh – 65): 747 mm

Width, W (mm): 191 mm X **PASS** **FAIL**

Width must be greater than or equal to 170 mm. If a vehicle has a front center designated seating position the front outboard head restraints must be greater than or equal to 254 mm. N/A

DATA SHEET 2a (2 of 2)
DIMENSIONAL REQUIREMENTS FOR ADJUSTABLE HEAD RESTRAINTS

Backset Measurement (Front Head Restraints Only)

Position the HRMD and record the following measurements.

HRMD torso angle:_____

Striker to H-Point (mm):_____ Striker to H-Point angle:_____

Position the head restraint at a height greater than or equal to 750 mm and less than or equal to 800 mm for front head restraints. Exception: head restraint with lowest position higher than 800 mm, adjust to lowest position.

Backset, B (mm):_____ _____PASS _____FAIL

Backset must be less than or equal to 55 mm.

Gap Measurement

Position the head restraint in the lowest position of vertical adjustment.

Number of gaps within the gap measurement zone: None

Least dimension of each gap (measured with a steel tape): N/A

Size of each gap (as measured with the spherical head form):

Gap Size_____N/A_____ _____X____PASS _____FAIL

Gaps must be less than or equal to 60 mm.

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/06/10

APPROVED BY: D. MESSICK

DATA SHEET 2a(1 of 2)
DIMENSIONAL REQUIREMENTS FOR ADJUSTABLE HEAD RESTRAINTS

VEH. NHTSA NO.: CA5900 TEST DATE: 07/06/10

Seat Location: REAR PASSENGER

Height Measurement

SAE J826 three-dimensional manikin torso angle: 27.5°

Striker to H-Point (mm): 200 mm (Ahead) Striker to H-Point angle: Down

Position the head restraint in the highest position of vertical adjustment.
Height, Hh (mm): 810 mm X **PASS** **FAIL**

Hh > or = 800 mm for front seats.

If the head restraint is less than the required height, check for passage of the 25 mm diameter sphere. N/A

Position the head restraint in the lowest position of vertical adjustment.
Height, Hl (mm): 767 mm X **PASS** **FAIL**

Hl > or = 750 mm for front seats and rear seats with head restraints.

If the head restraint is less than the required height, check for passage of the 25 mm diameter sphere. N/A

Width Measurement

If the manikin is moved between the Height measurement and the Width measurement, re-record the torso angle, striker to H-Point distance and angle.

Position the head restraint in the highest position of vertical adjustment.

Width is measured 65 mm below the measured Height, Hh.

Height, Hw (= Hh – 65): 745 mm

Width, W (mm): 190 mm X **PASS** **FAIL**

Width must be greater than or equal to 170 mm. If a vehicle has a front center designated seating position the front outboard head restraints must be greater than or equal to 254 mm. N/A

DATA SHEET 2a (2 of 2)
DIMENSIONAL REQUIREMENTS FOR ADJUSTABLE HEAD RESTRAINTS

Backset Measurement (Front Head Restraints Only)

Position the HRMD and record the following measurements.

HRMD torso angle:_____

Striker to H-Point (mm):_____ Striker to H-Point angle:_____

Position the head restraint at a height greater than or equal to 750 mm and less than or equal to 800 mm for front head restraints. Exception: head restraint with lowest position higher than 800 mm, adjust to lowest position.

Backset, B (mm):_____ _____PASS _____FAIL

Backset must be less than or equal to 55 mm.

Gap Measurement

Position the head restraint in the lowest position of vertical adjustment.

Number of gaps within the gap measurement zone: None

Least dimension of each gap (measured with a steel tape): N/A

Size of each gap (as measured with the spherical head form):

Gap Size_____N/A_____ _____X____PASS _____FAIL

Gaps must be less than or equal to 60 mm.

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/06/10

APPROVED BY: D. MESSICK

DATA SHEET 3
OWNER'S MANUAL

VEH. NHTSA NO.: CA5900 TEST DATE: 07/06/10

Emphasize that all occupants should place their head restraint in a proper position prior to operating the vehicle in order to prevent the risk of serious injury.

PASS X FAIL _____

Description of the head restraint system and identification of which seats are equipped.

PASS X FAIL _____

If the head restraint is removable, instructions on how to properly remove and reinstall using a deliberate action distinct from any act necessary for adjustment.

PASS X FAIL _____ N/A _____

Warning that all head restraints must be reinstalled properly to protect occupants.

PASS X FAIL _____

Describe the adjustment of the head restraints and/or seat back to achieve proper head restraint position relative the head. The description must include the following:

1) a presentation and explanation of the main components of the vehicle's head restraints

2) the basic requirements for proper head restraint operation, including an explanation of the actions that may affect the proper functioning of the head restraints.

3) the basic requirements for proper positioning of a head restraint in relation to an occupant's head position, including information regarding the proper positioning of the center of gravity of an occupant's head in relation to the head restraint.

PASS X FAIL _____

Include copies of relevant pages from the owner's manual in the final report.

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/06/10

APPROVED BY: D. MESSICK

DATA SHEET 4
REMOVABILITY

VEH. NHTSA NO.: CA5900 TEST DATE: 07/06/10

Are the head restraints removable? X **YES** **NO**

If removable, does removal REQUIRE an action distinct from actions to adjust the head restraint?
* **YES (PASS)** **NO (FAIL)**

Description of action(s) for head restraint adjustment:

Push in adjustment button on left head restraint support and raise or lower head restraint to wanted position.

Description of distinct action for removal:

FRONT SEATS: Push in adjustment button on left head restraint support while also pushing in the release button on the right head restraint support with a screw driver or key and simultaneously pull up on the head restraint.

REAR SEATS: Push in adjustment button on left head restraint support and pull up on head restraint. (A second action is not required)

REMARKS: *REAR SEATS DO NOT NEED TO MEET THESE REQUIREMENTS UNTIL 2011.

RECORDED BY: G. FARRAND DATE: 07/06/10

APPROVED BY: D. MESSICK

DATA SHEET 5
ENERGY ABSORPTION TEST

VEH. NHTSA NO.: CA5900 TEST DATE: 07/23/10

Seat Location: REAR DRIVER Type of head restraint: ADJUSTABLE

Test Number: 6775

635 mm Height Measurement for lower boundary of the impact zone

SAE J826 three-dimensional manikin torso angle: 27°

Striker to H-Point (mm): 205 mm Striker to H-Point angle: Down

Accelerometer identification: FZ03 Accelerometer type/brand: ENDEVCO

Last calibration date: 07/10

Head form vertical angle (-2° - +2°): 0.0

Distance between head form and target location (> or = 25 mm): 50 mm

Impact velocity (23.6 kph ± 0.5 kph): 23.4 KpH

Impact location: Centerline of head restraint, 690 mm up from “H” point.

Maximum deceleration (< or = 785 m/s² (80 g)): 30.2 **PASS** X **FAIL**

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/23/10

APPROVED BY: D. MESSICK

DATA SHEET 6
HEIGHT RETENTION TEST
(ADJUSTABLE HEAD RESTRAINTS ONLY)

VEH. NHTSA NO.: CA5900 TEST DATE: 07/23/10

Seat Location: DRIVER Test Number: 6780, 6781

Pre-test measurements

SAE J826 Manikin torso angle: 25° Top of Head Restraint Height (mm): 828 mm

Striker to H-Point (mm): 141 mm Striker to H-Point angle: Down

Description of height retention lock: Pushbutton release located on left side post.

Test measurements

Initial load (50 N ± 1 N): 50 N Initial Displacement, D1 (mm): 6.2 mm

Initial Displacement (D1) < 25 mm 6.2mm **PASS** X **FAIL**

Maximum load (495 N ± 5 N): 495 N Maximum Displacement, D2 (mm): 24.0 mm

Return load (50 N ± 1 N): 50 N Return Displacement, D3 (mm): 9.4 mm

Total displacement (D3-D1) < 13 mm: 3.2 mm **PASS** X **FAIL**

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/23/10

APPROVED BY: D. MESSICK

DATA SHEET 7
BACKSET RETENTION TEST

VEH. NHTSA NO.: CA5900 TEST DATE: 07/22/10

Seat Location: PASSENGER Type of head restraint: ADJUSTABLE

Test Number: 6776, 6777, 6778, 6779

Pre-test measurements

SAE J826 Manikin torso angle: 25° Top of Head Restraint Height (mm): 815 mm

Striker to H-Point (mm): 125 mm Striker to H-Point angle: Down

Displacement torso reference line

Test device back pan angle: 25°

Distance from the H-point to the initial location of the load (0.290 ± 0.013 m): .29 m

Initial load (N): 1286 N Initial moment (373 ± 7.5 Nm): 373 Nm

Backset retention and strength

Distance from the H-point to the head form tangency point (m): .750 m

Initial load (N): 50 N Initial moment (37 ± 0.7 Nm): 37 Nm

Initial head form displacement, D1 (< or = 25 mm): 15.9 mm **PASS** X **FAIL**

Load range to generate a 373 ± 7.5 Nm rearward moment (N): 497 N

Actual load applied (N): 497N Resultant moment (Nm): 373 Nm

Maximum Head form displacement, D2 (< or = 102 mm): 76.9 mm **PASS** X **FAIL**

Final head form displacement, D3 (mm): 25.4 mm
measured at (37 ± 0.7 Nm)

Total displacement (D3-D1) < 13 mm : 9.5 mm **PASS** X **FAIL**

Maximum applied load (> or equal to 885 N): 885 N **PASS** X **FAIL**

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/22/10
APPROVED BY: D. MESSICK

SECTION 4
INSTRUMENTATION AND EQUIPMENT LIST

TABLE 1 – INSTRUMENTATION & EQUIPMENT LIST

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
HRMD	RONA KINETICS & ASSOCIATES LTD.	HRMD 0-62	N/A	N/A
J826 MANIKIN	ALDERSON RESEARCH LABS	3 DM/92	N/A	N/A
INCLINOMETER	MITUTOYO	PRO 360	BEFORE USE	BEFORE USE
STEEL TAPE	STANLEY	33-890	04/10	04/11
TORPEDO LEVEL	SANDS	500	BEFORE USE	BEFORE USE
FORCE GAUGE	CHATILLON	DPPN-50 870	BEFORE USE	BEFORE USE
LEVEL, LASER	BLACK & DECKER	360	BEFORE USE	BEFORE USE
LEVEL, LASER	SEAN & STEPHEN CORP	90º, 45º	BEFORE USE	BEFORE USE
LEVEL, LASER	GAERTNER	2789-A	BEFORE USE	BEFORE USE
ACCELEROMETER	ENDEVCO	FZ03	07/10	07/11
LOAD CELL	SENSOTEC	257818	07/10	07/11
LOAD CELL	INTERFACE	27246	02/10	02/11
LOAD CELL	INTERFACE	38068	02/10	02/11
STRING POT	WALDALE	102	BEFORE USE	BEFORE USE
STRING POT	CELESCO	69	BEFORE USE	BEFORE USE

SECTION 5
PHOTOGRAPHS

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.1
LEFT SIDE VIEW OF VEHICLE

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.2
RIGHT SIDE VIEW OF VEHICLE

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.3
¾ FRONTAL VIEW FROM LEFT SIDE OF VEHICLE

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.4
¾ REAR VIEW FROM RIGHT SIDE OF VEHICLE

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.5
VEHICLE CERTIFICATION LABEL

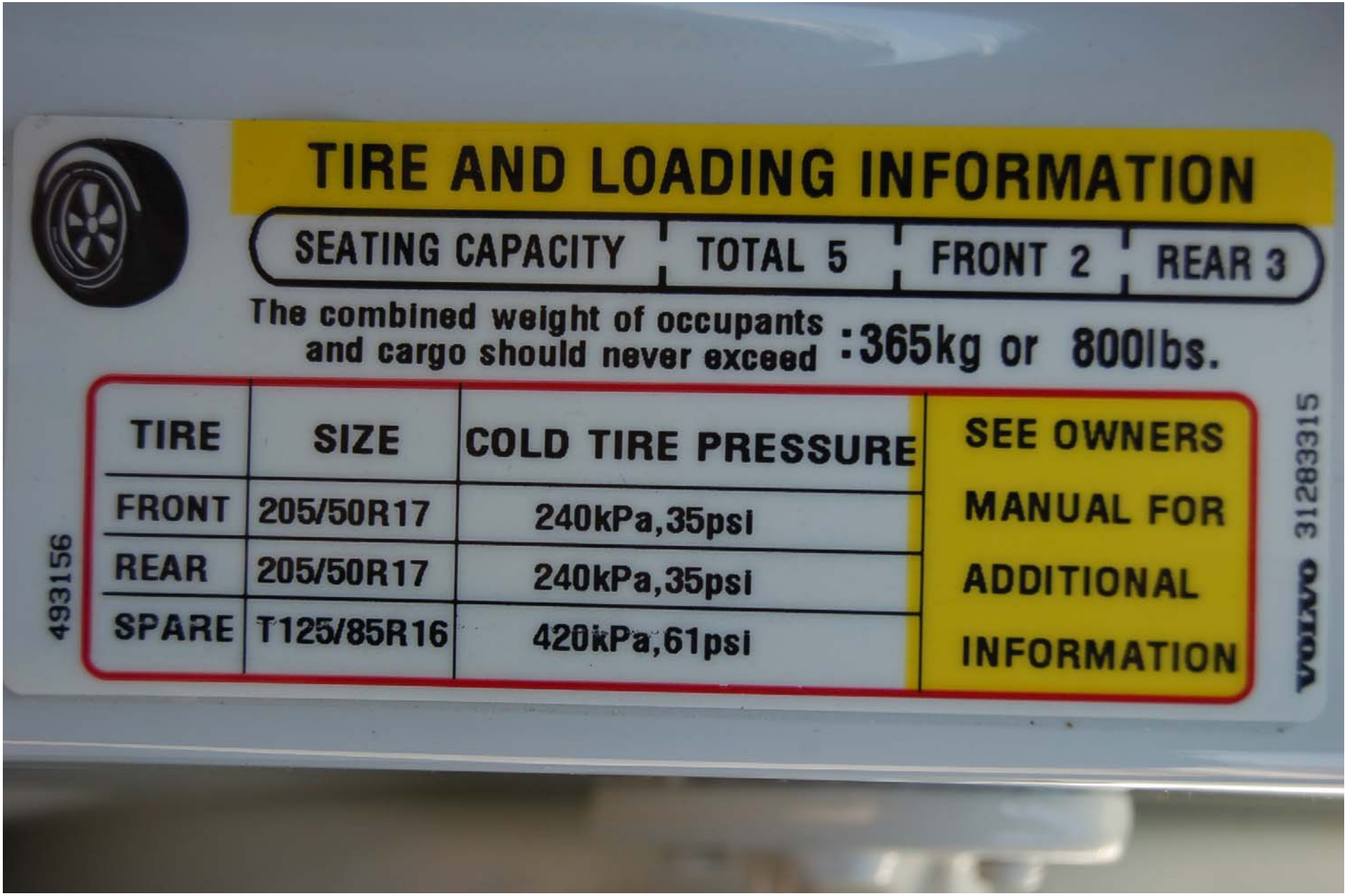

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FIGURE 5.6
VEHICLE TIRE INFORMATION LABEL

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.7
PRE-TEST VIEW OF DRIVER SEAT HEAD RESTRAINT IN HIGHEST POSITION

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.8
PRE-TEST VIEW OF PASSENGER SEAT HEAD RESTRAINT IN LOWEST POSITION

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.9
PRE-TEST VIEW OF PASSENGER SEAT HEAD RESTRAINT IN HIGHEST POSITION

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.10
FRONT HEAD RESTRAINT ADJUSTMENT BUTTON

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.11
FRONT HEAD RESTRAINT REMOVAL BUTTON

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.12
FRONT HEAD RESTRAINT GAP MEASUREMENT

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.13
PRE-TEST REAR DRIVER HEAD RESTRAINT IN HIGHEST POSITION

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

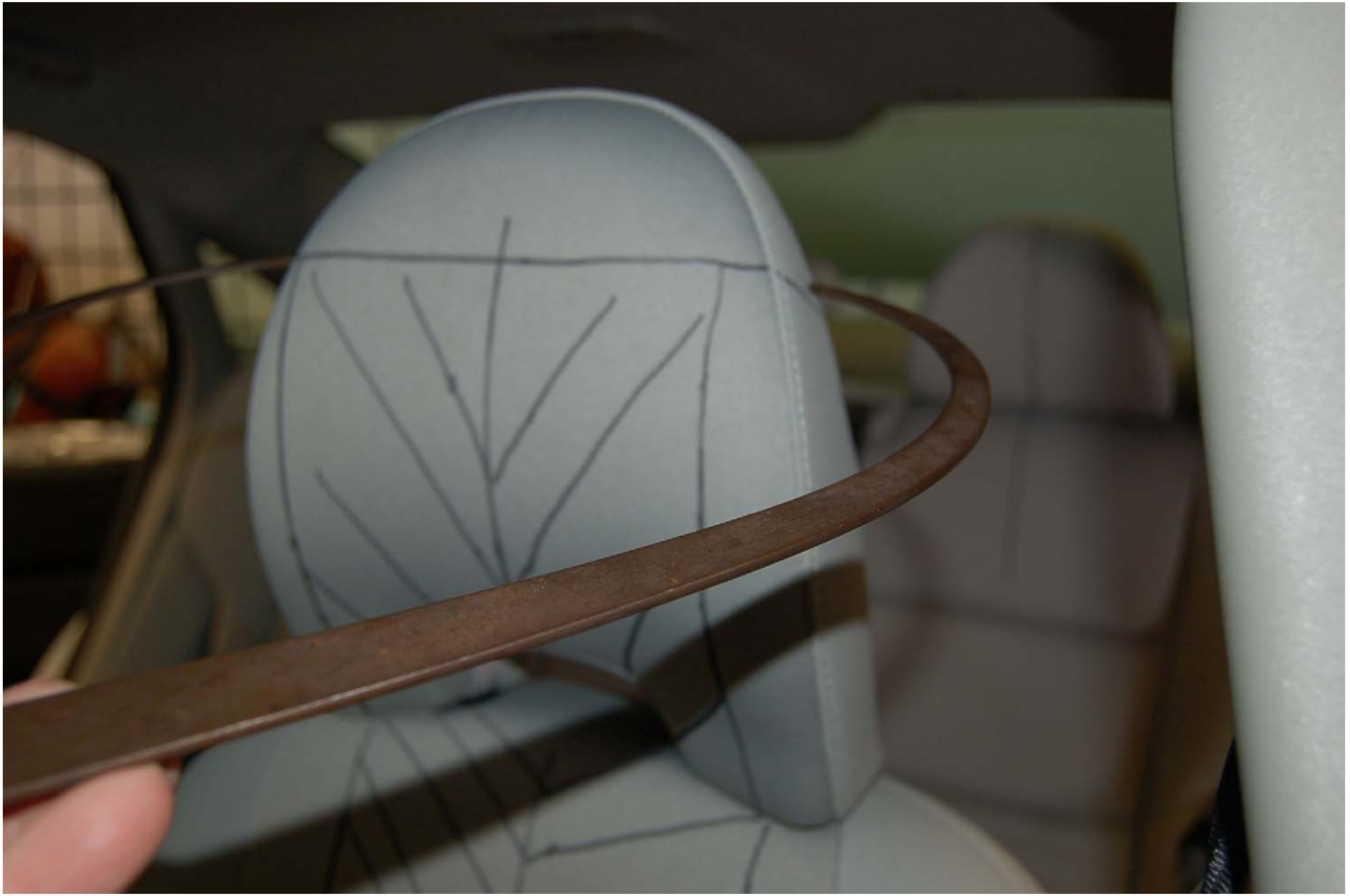
FIGURE 5.14
PRE-TEST REAR PASSENGER HEAD RESTRAINT IN LOWEST POSITION

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.15
PRE-TEST REAR PASSENGER HEAD RESTRAINT IN HIGHEST POSITION

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.16
REAR HEAD RESTRAINT ADJUSTMENT BUTTON

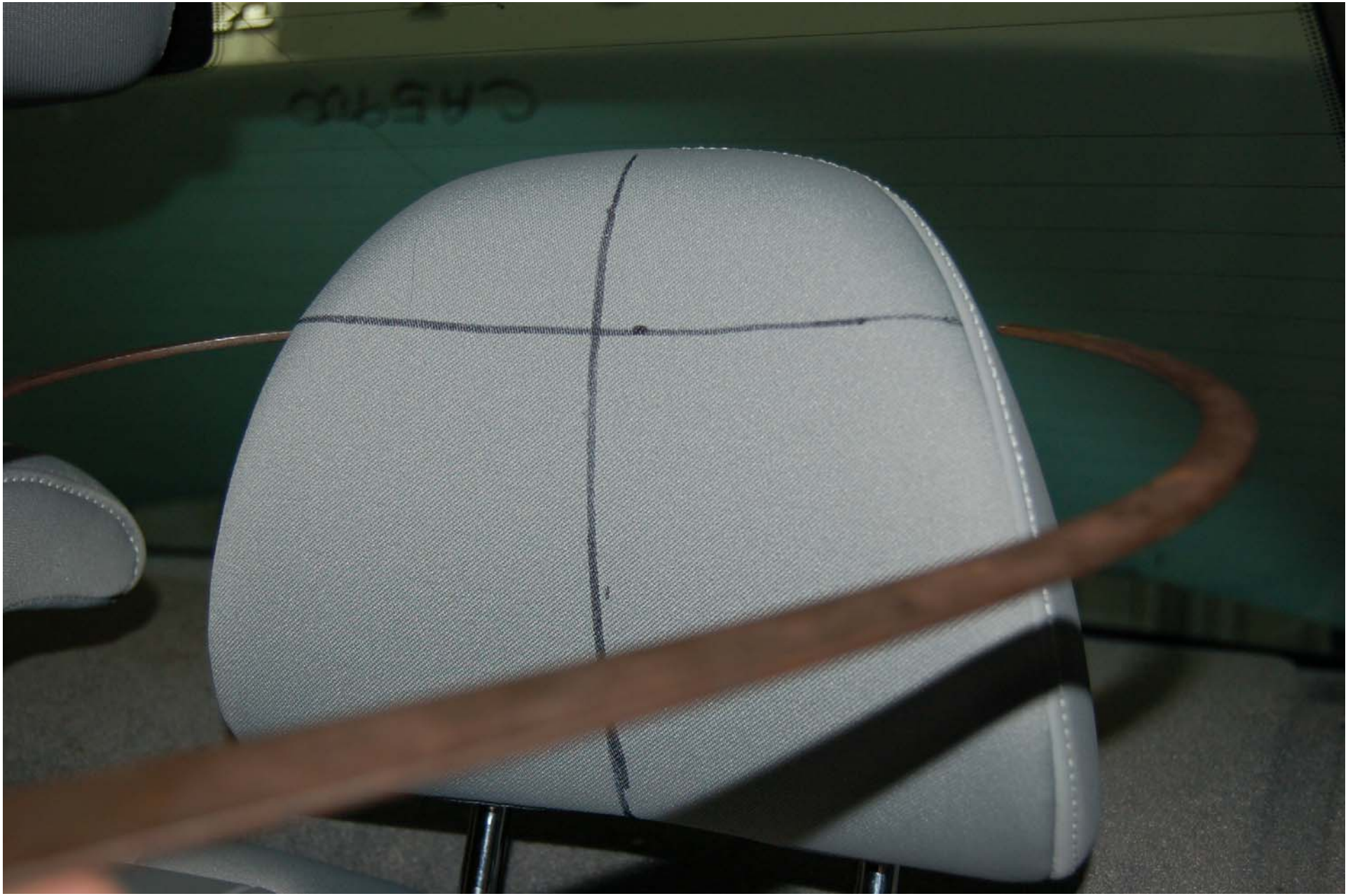


2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.17
WIDTH MEASUREMENT ON FRONT DRIVER SEAT HEAD RESTRAINT

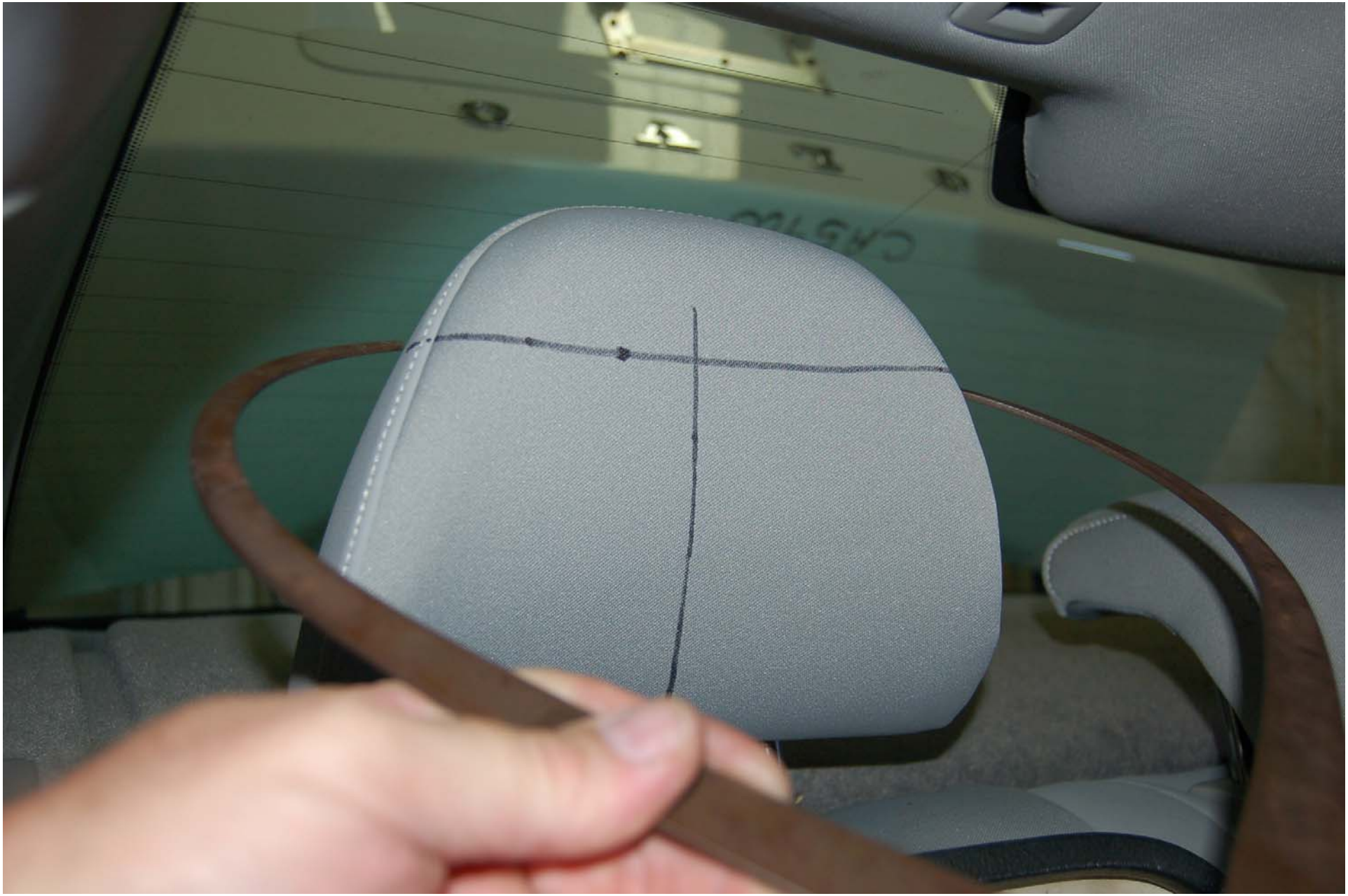
2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.18
WIDTH MEASUREMENT ON FRONT PASSENGER SEAT HEAD RESTRAINT



2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.19
WIDTH MEASUREMENT OF REAR DRIVER SEAT HEAD RESTRAINT



2010 VOLVO S40
NHTSA NO. CA5900
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FIGURE 5.20
WIDTH MEASUREMENT OF REAR PASSENGER SEAT HEAD RESTRAINT

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.21
SAE J826 MANIKIN IN FRONT DRIVER SEAT

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.22
HRMD IN FRONT DRIVER SEAT

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.23
MEASUREMENT OF FRONT DRIVER SEAT BACKSET

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.24
SAE J826 MANIKIN IN FRONT PASSENGER SEAT

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.25
HRMD IN FRONT PASSENGER SEAT

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.26
MEASUREMENT OF FRONT PASSENGER SEAT BACKSET

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

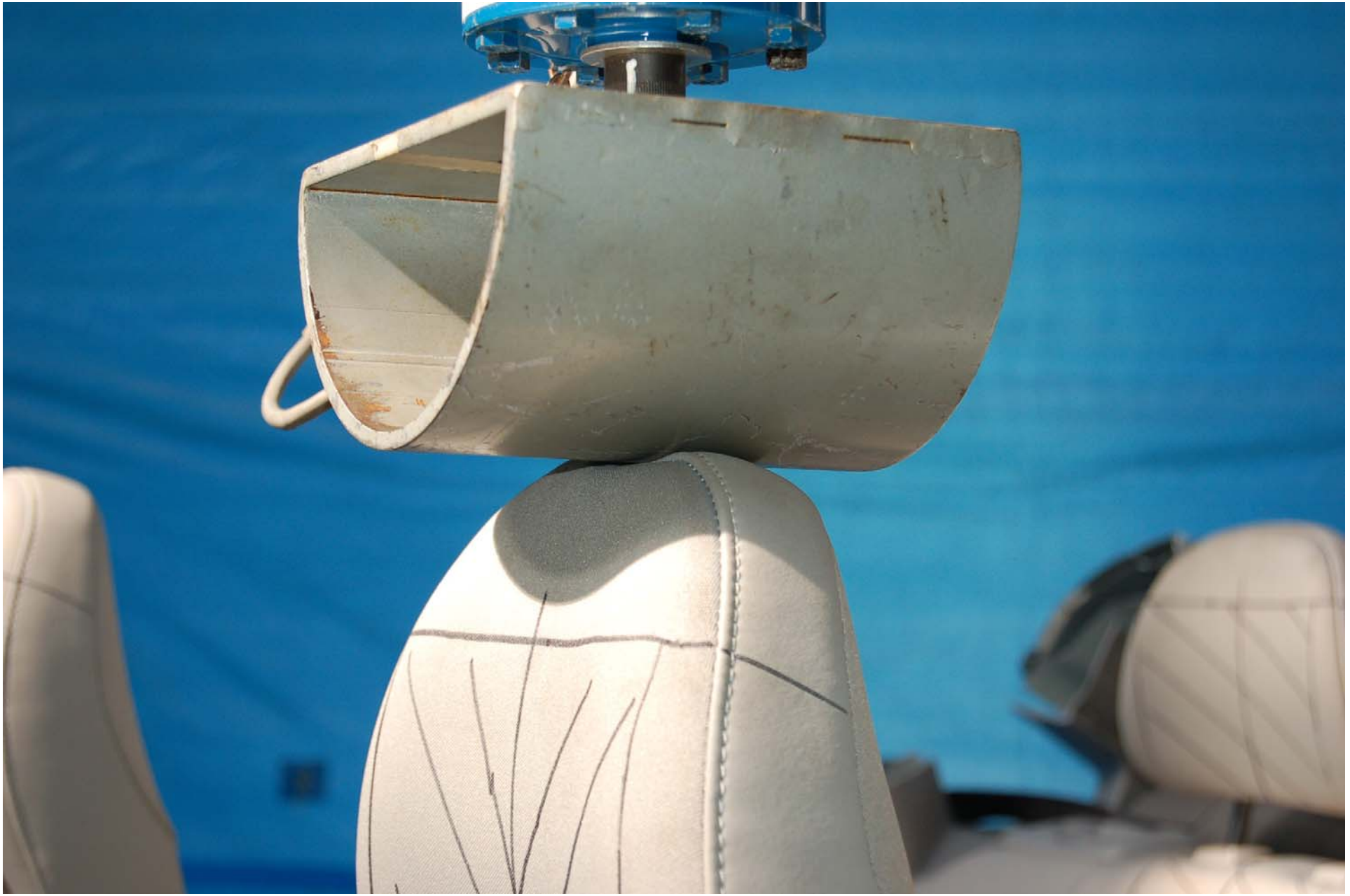
FIGURE 5.27
SAE J826 MANIKIN IN REAR DRIVER SEAT

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.28
SAE J826 MANIKIN IN REAR PASSENGER SEAT

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.29
PRE-TEST SET-UP FOR HEIGHT RETENTION



2010 VOLVO S40
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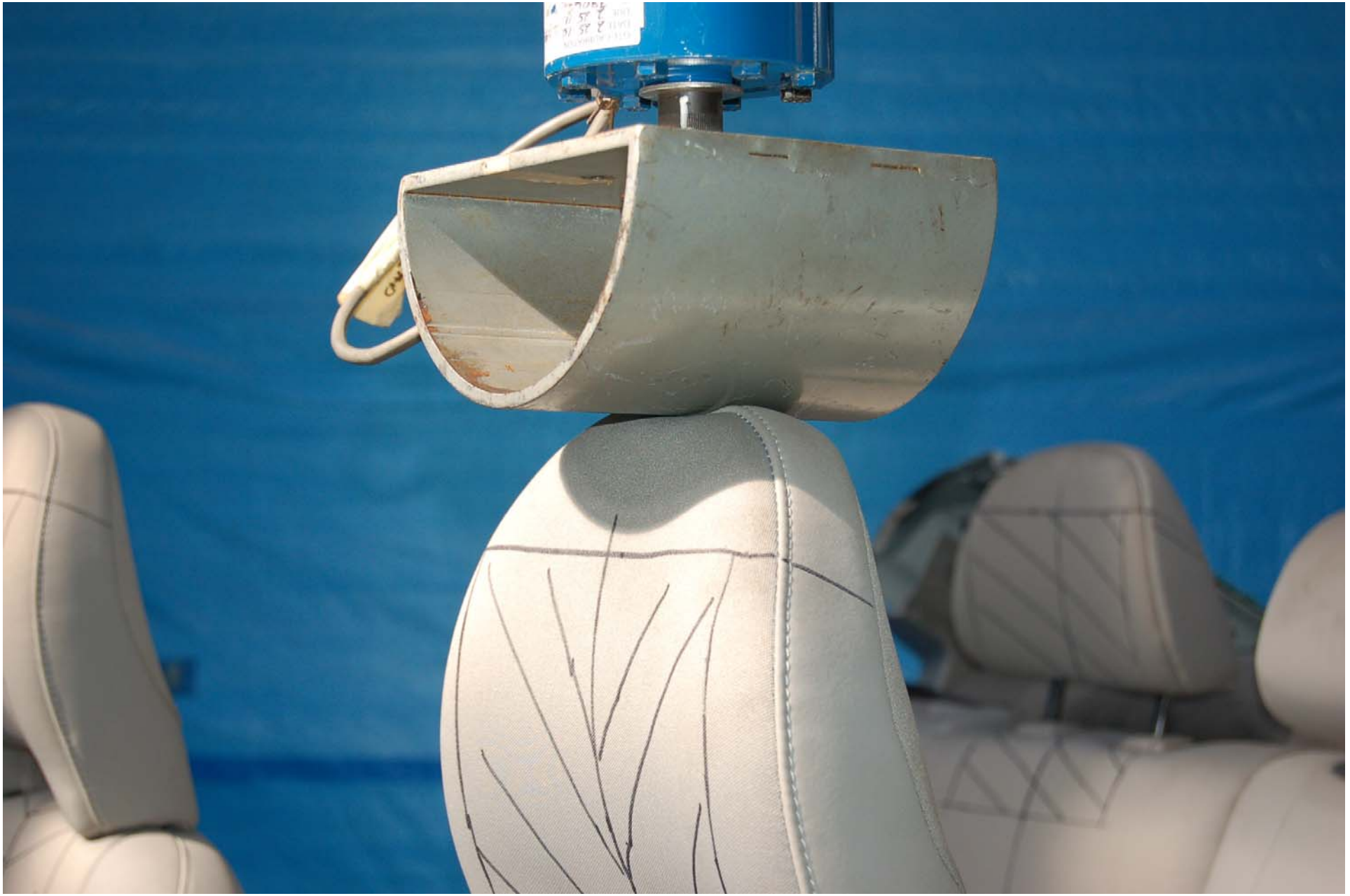
FIGURE 5.30
HEAD RESTRAINT AT INITIAL 50 N LOAD

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.31
HEAD RESTRAINT AT FULL LOAD



2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.32
HEAD RESTRAINT AT POST 50 N LOAD

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

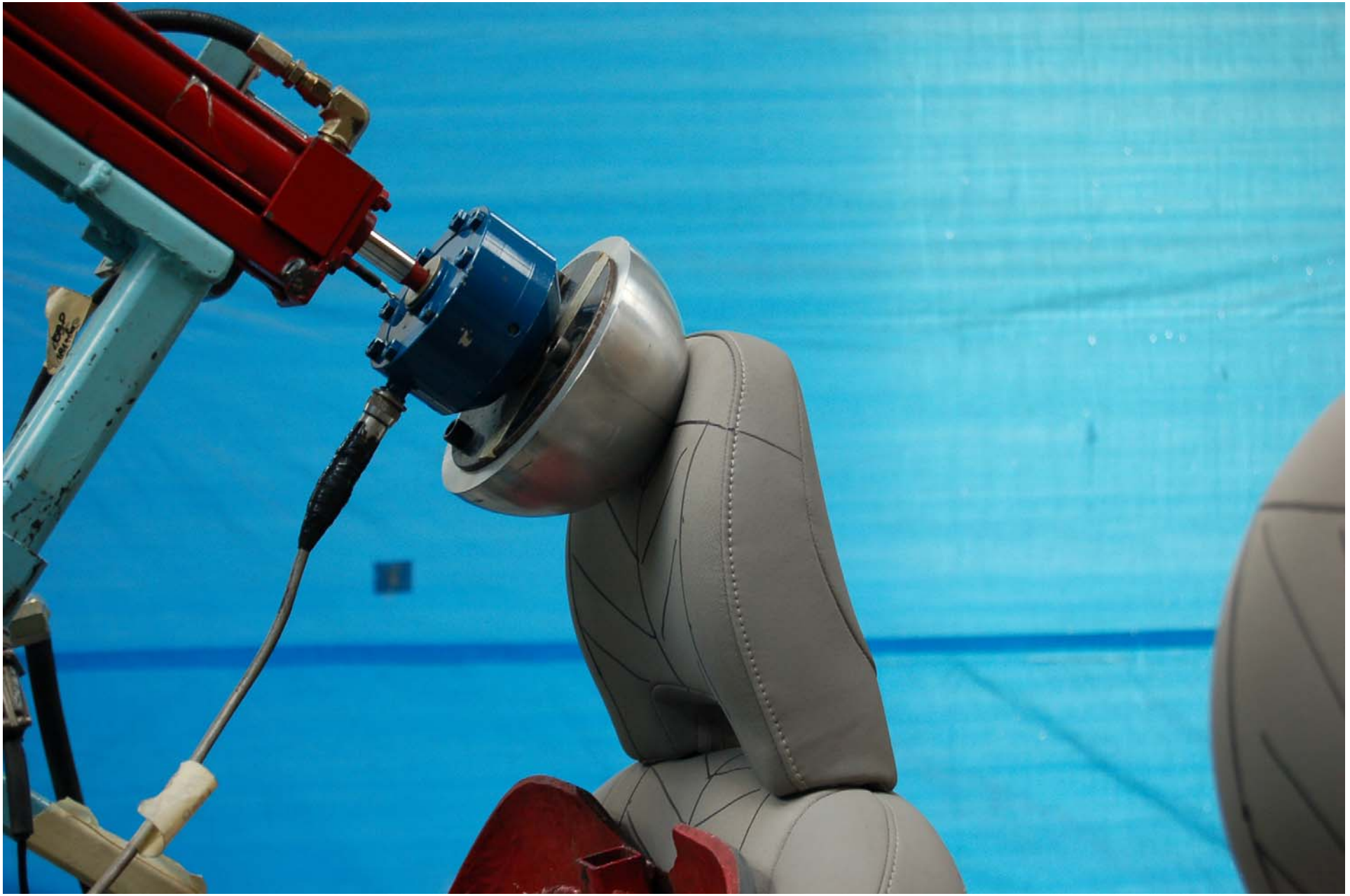
FIGURE 5.33
HEAD RESTRAINT POST TEST HEIGHT RETENTION

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.34
PRE-TEST SET-UP FOR BACKSET RETENTION

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.35
BACK PAN LOADED TO 373 Nm



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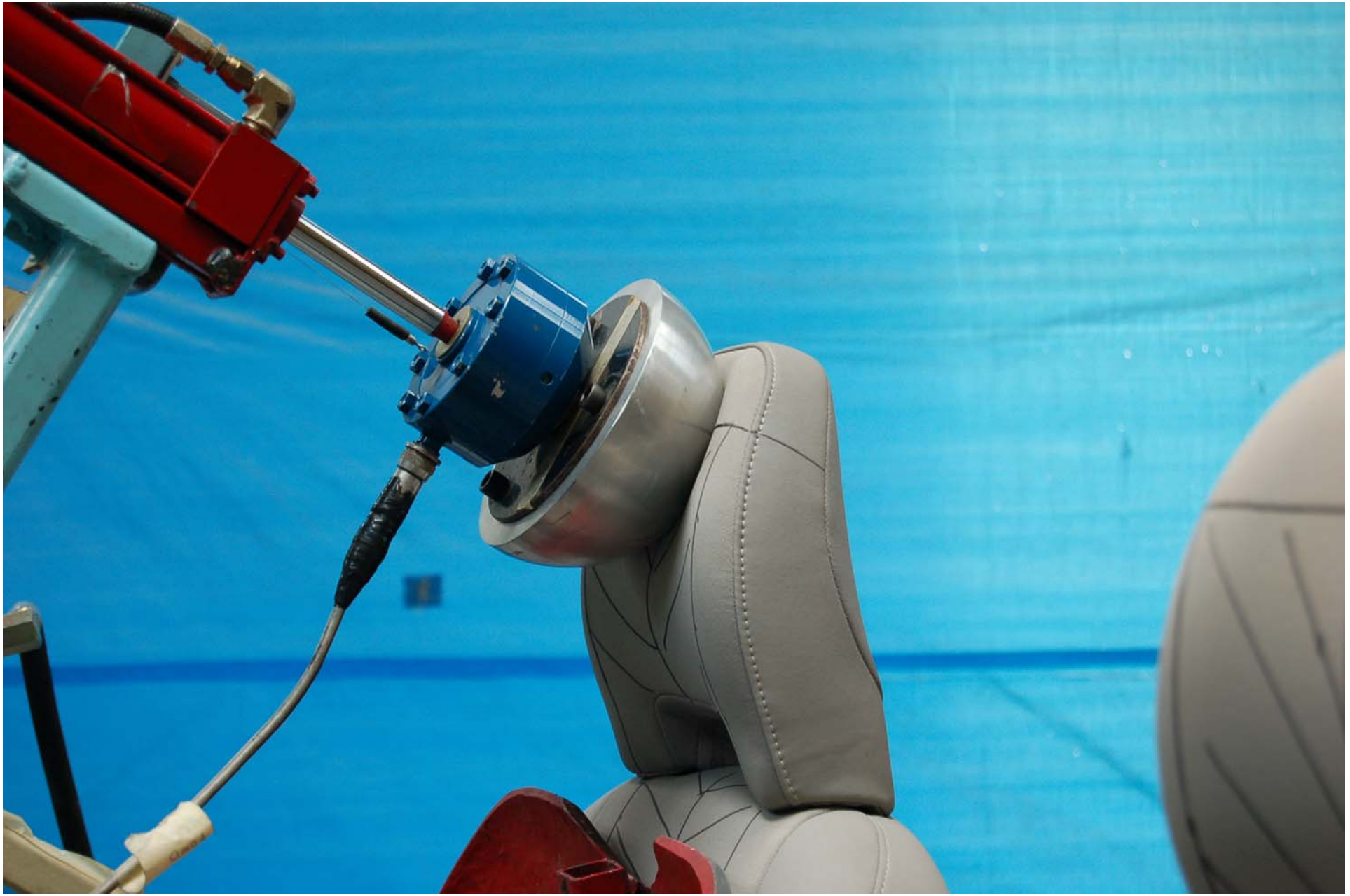
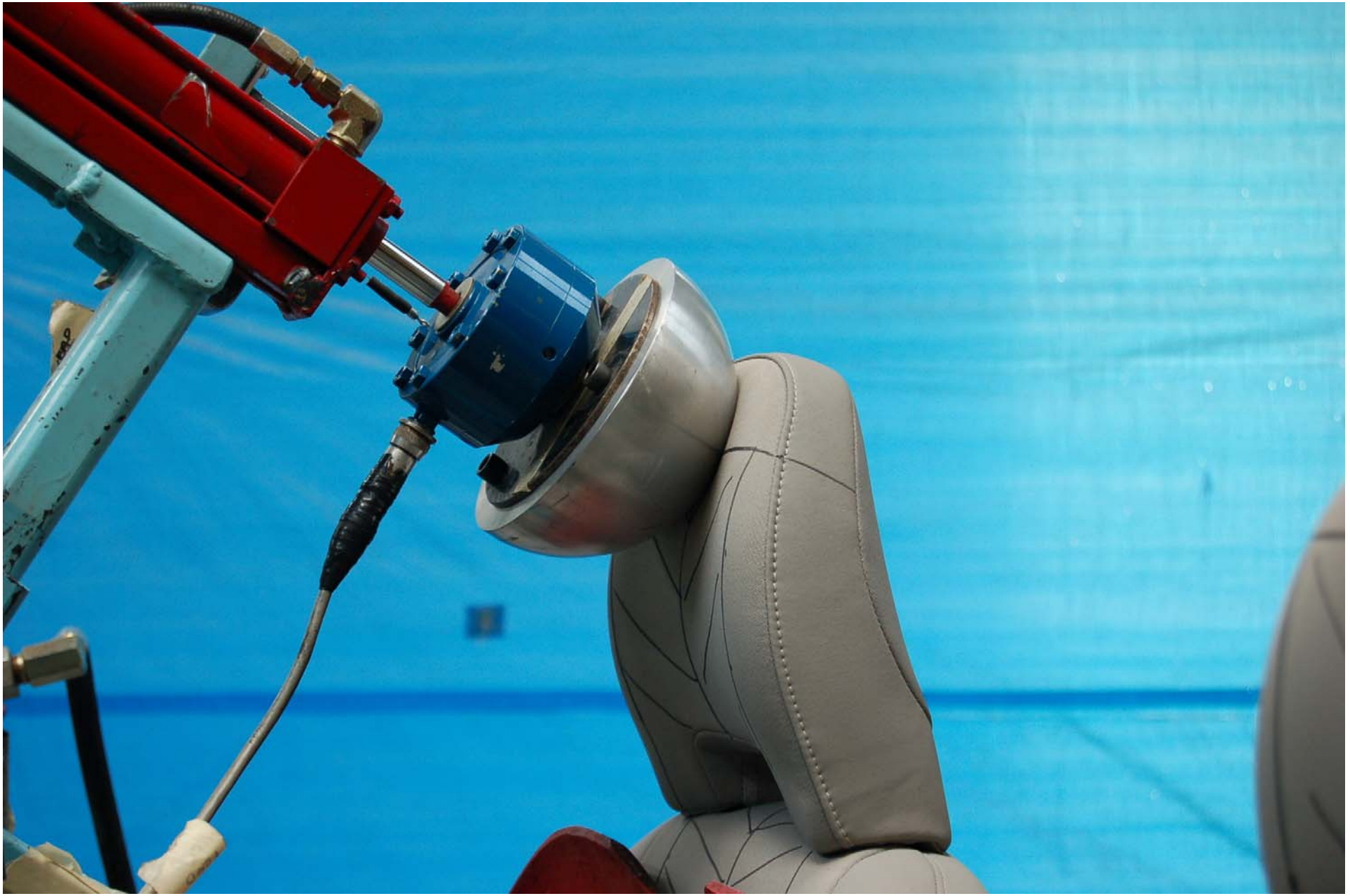
FMVSS NO. 202a

FIGURE 5.36
HEAD FORM AT INITIAL 37 Nm LOAD



2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.37
HEAD FORM AT 373 Nm LOAD



2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

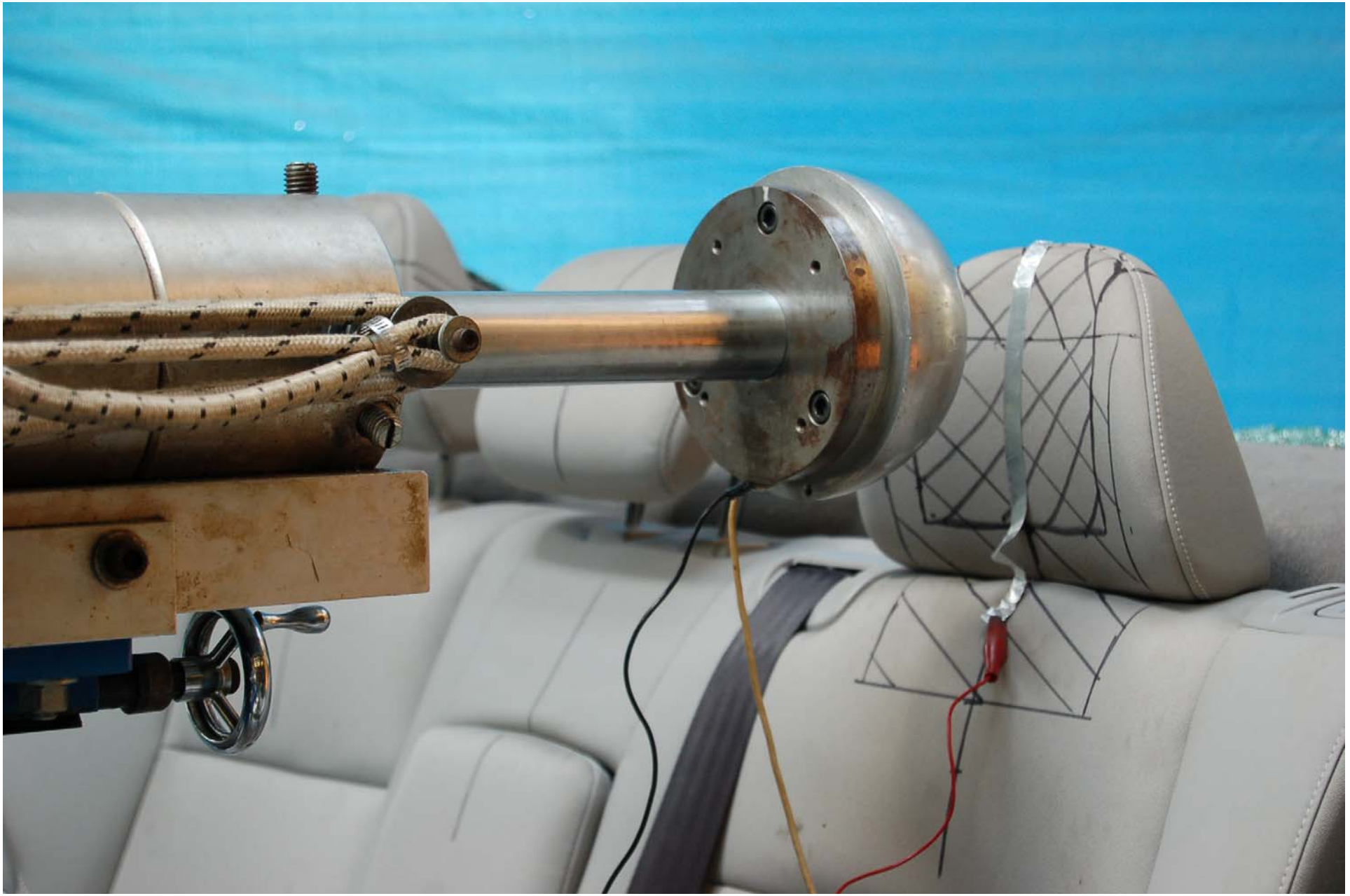
FIGURE 5.38
HEAD FORM AT POST 37 Nm LOAD

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.39
HEAD FORM AT 895 N LOAD

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.40
HEAD RESTRAINT POST TEST

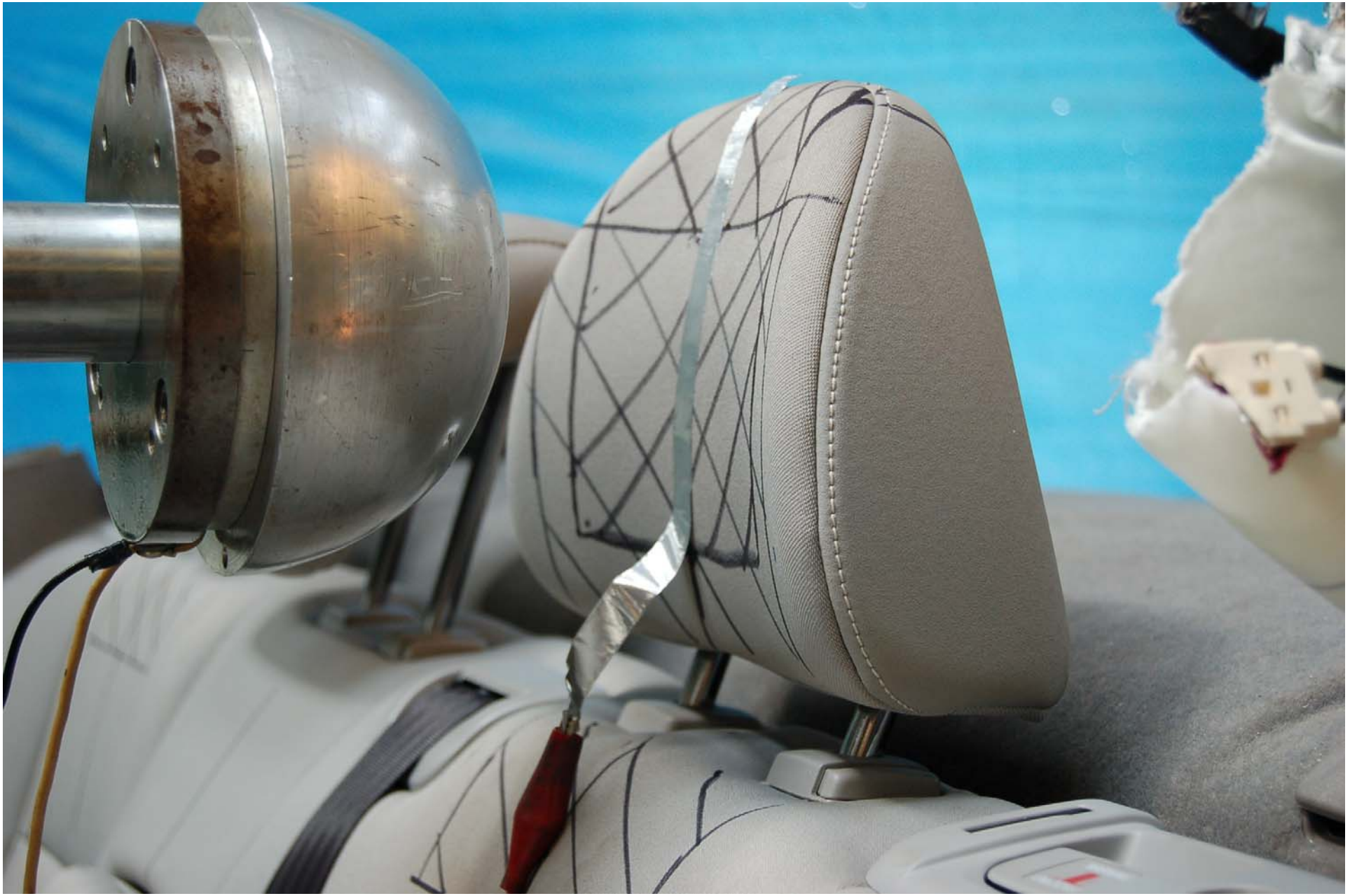


2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.41
PRE-TEST SET-UP FOR ENERGY ABSORPTION

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.42
PRE-TEST HEAD RESTRAINT FOR ENERGY ABSORPTION



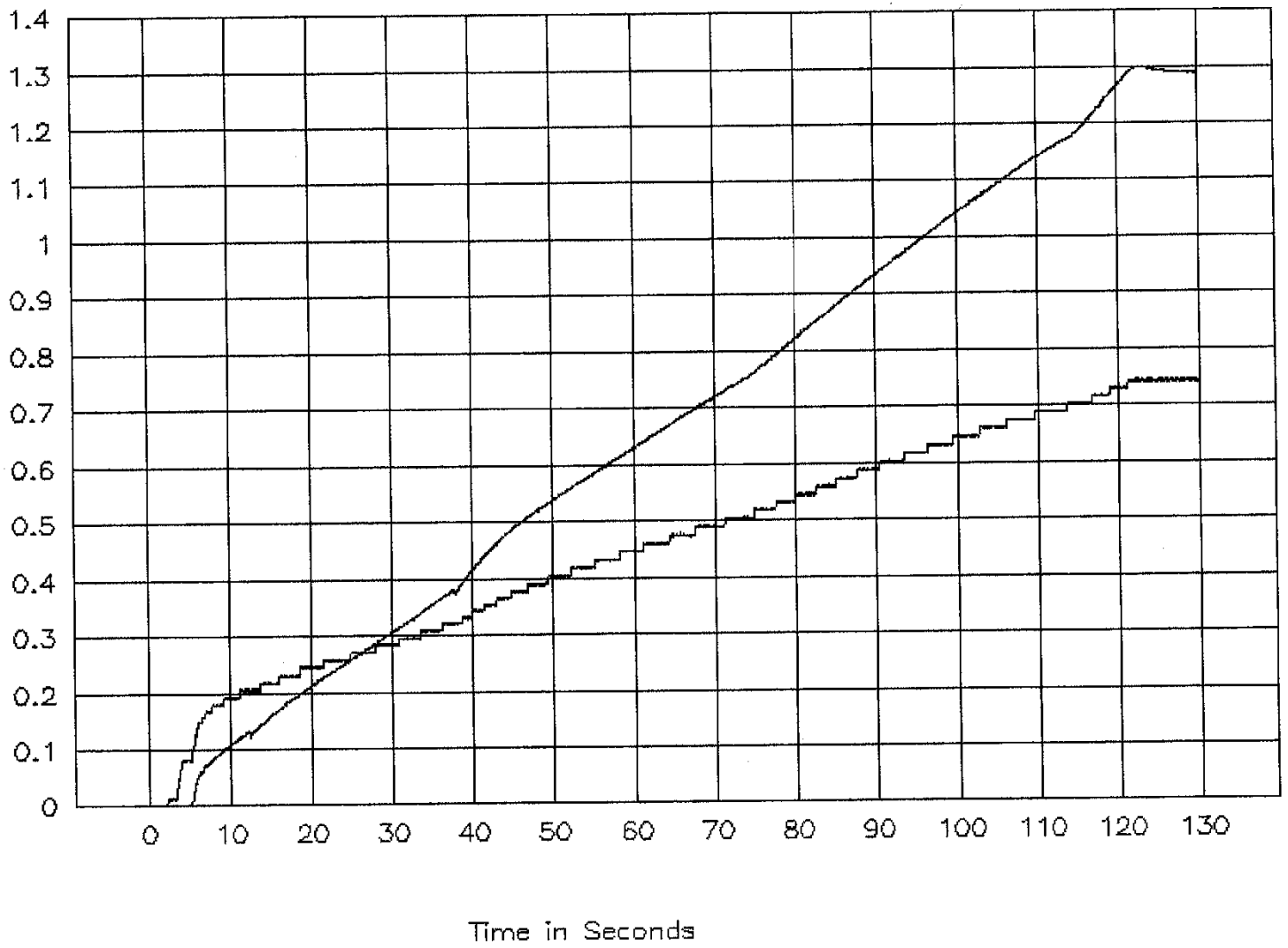
2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 202a

FIGURE 5.43
POST TEST HEAD RESTRAINT FOR ENERGY ABSORPTION

SECTION 6
TEST PLOTS

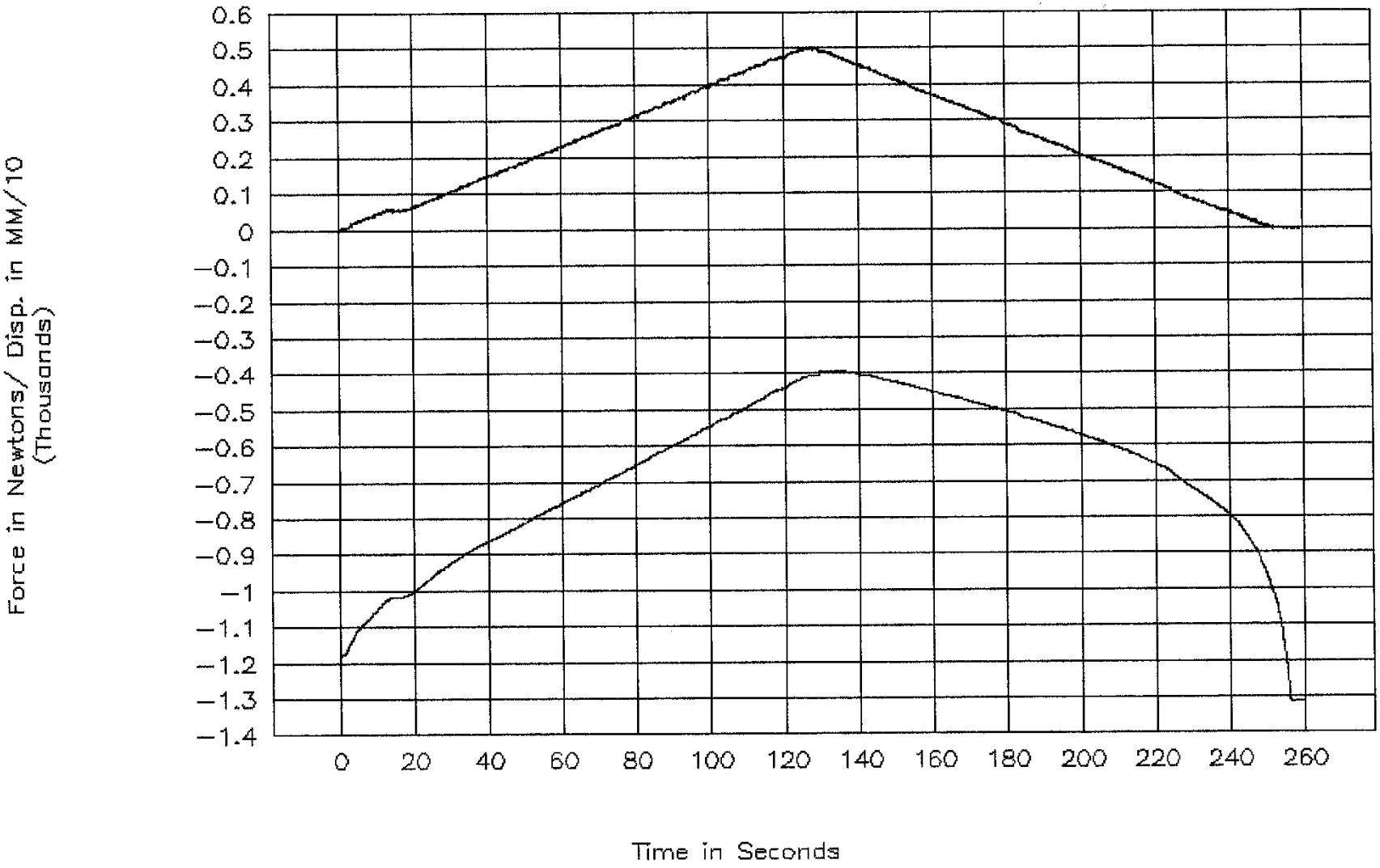
GTL 6776

202, Head Restraint Retention,Back Pan.



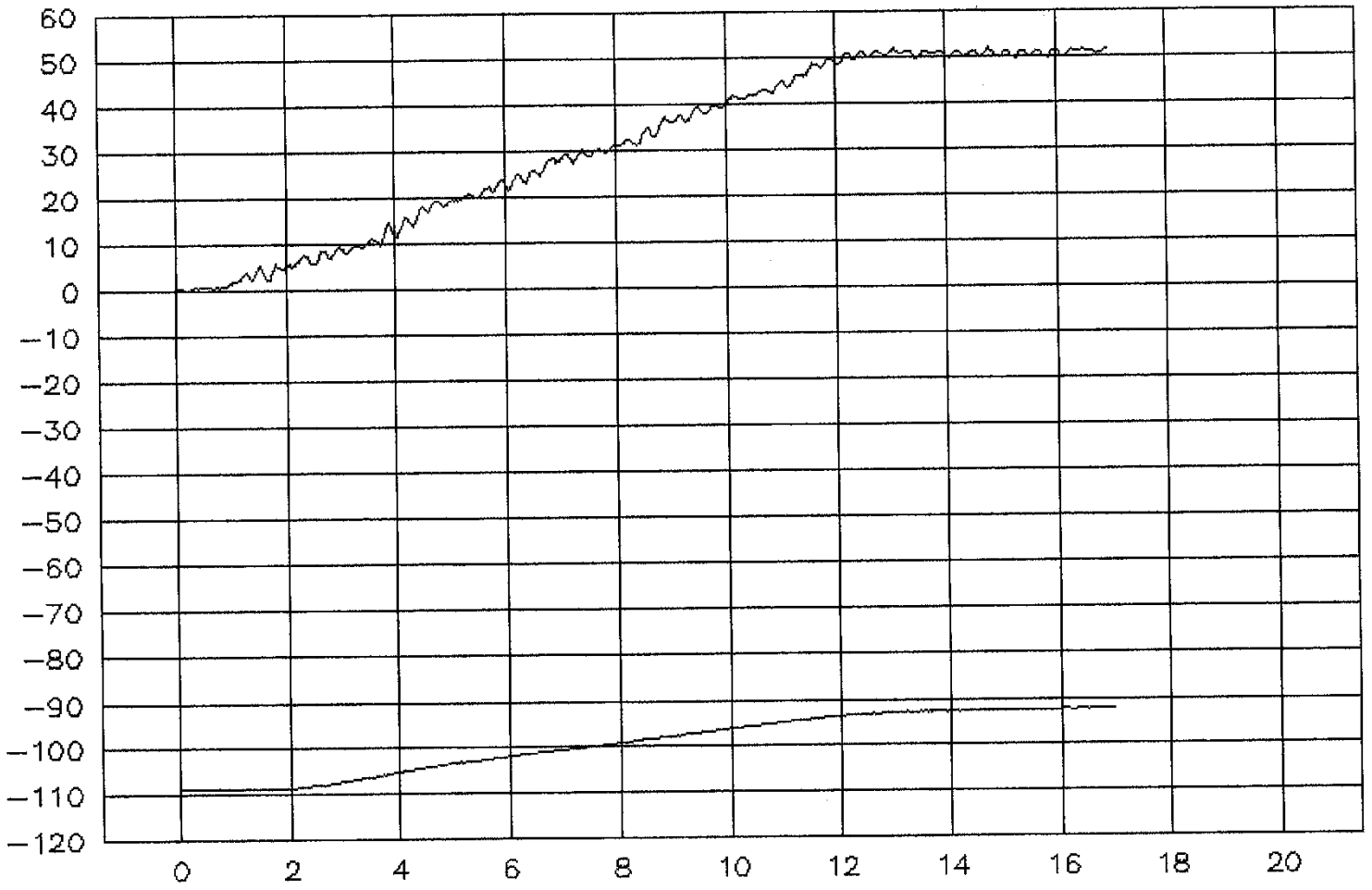
GTL 6777

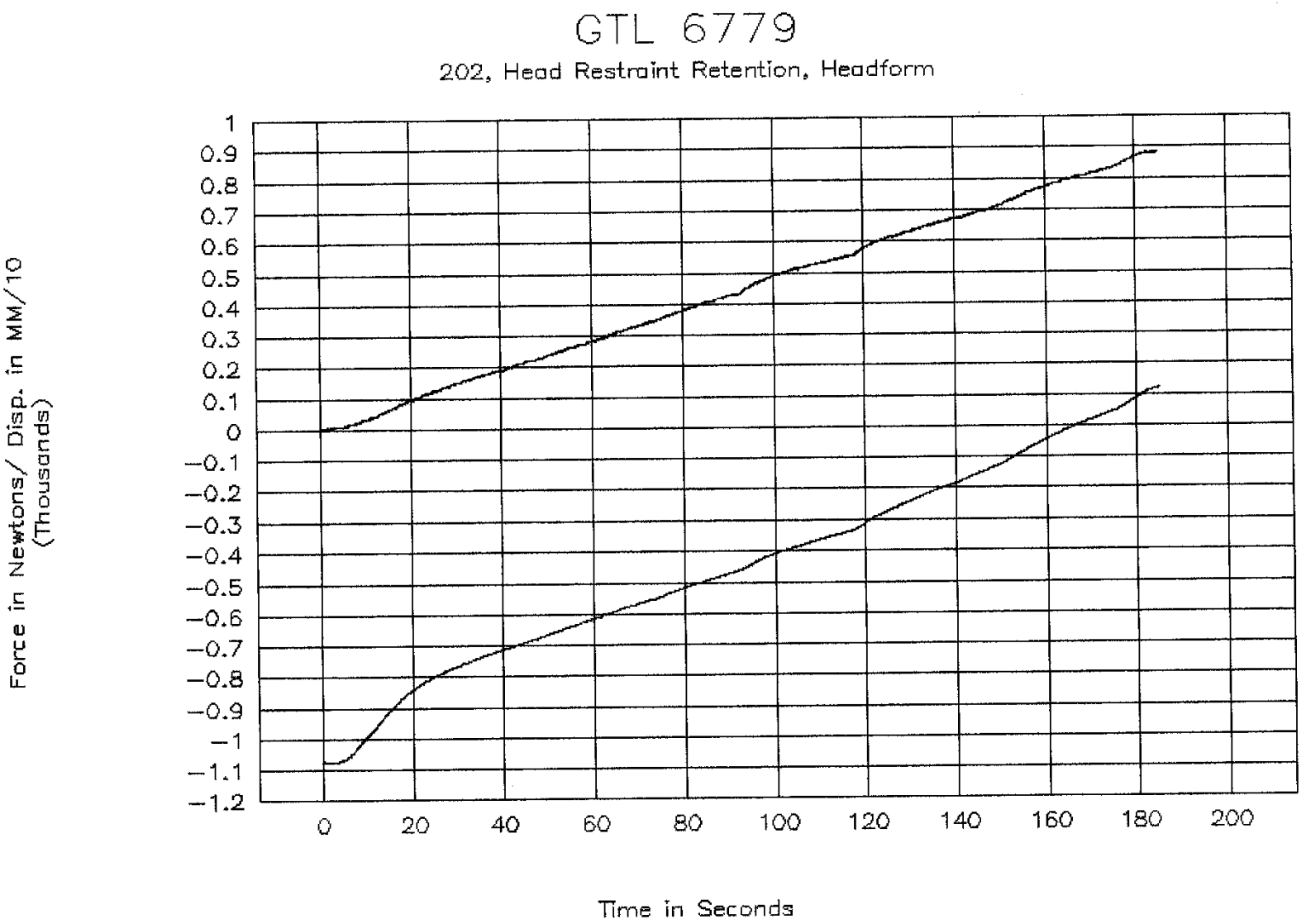
202, Head Restraint Retention, Headform

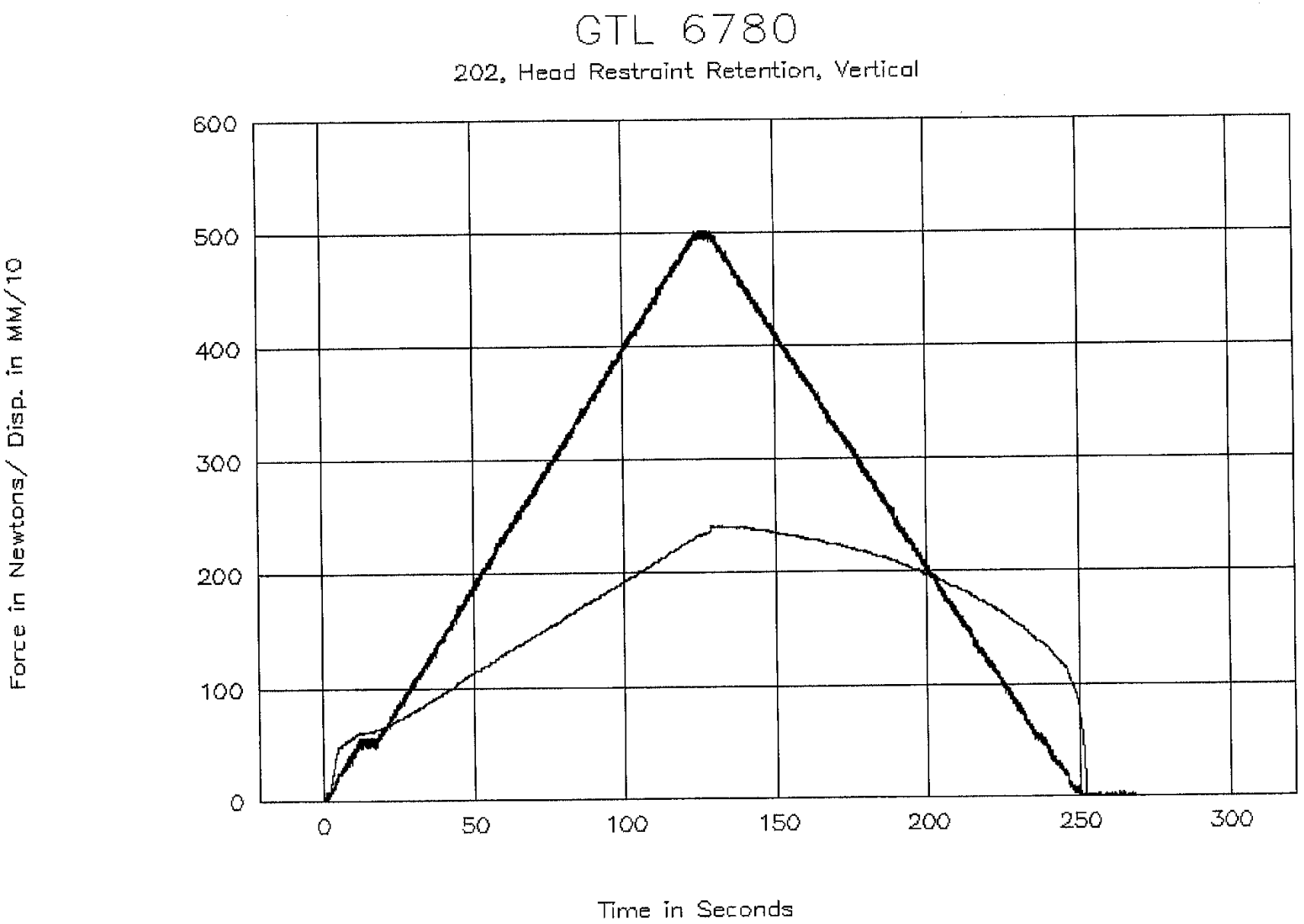


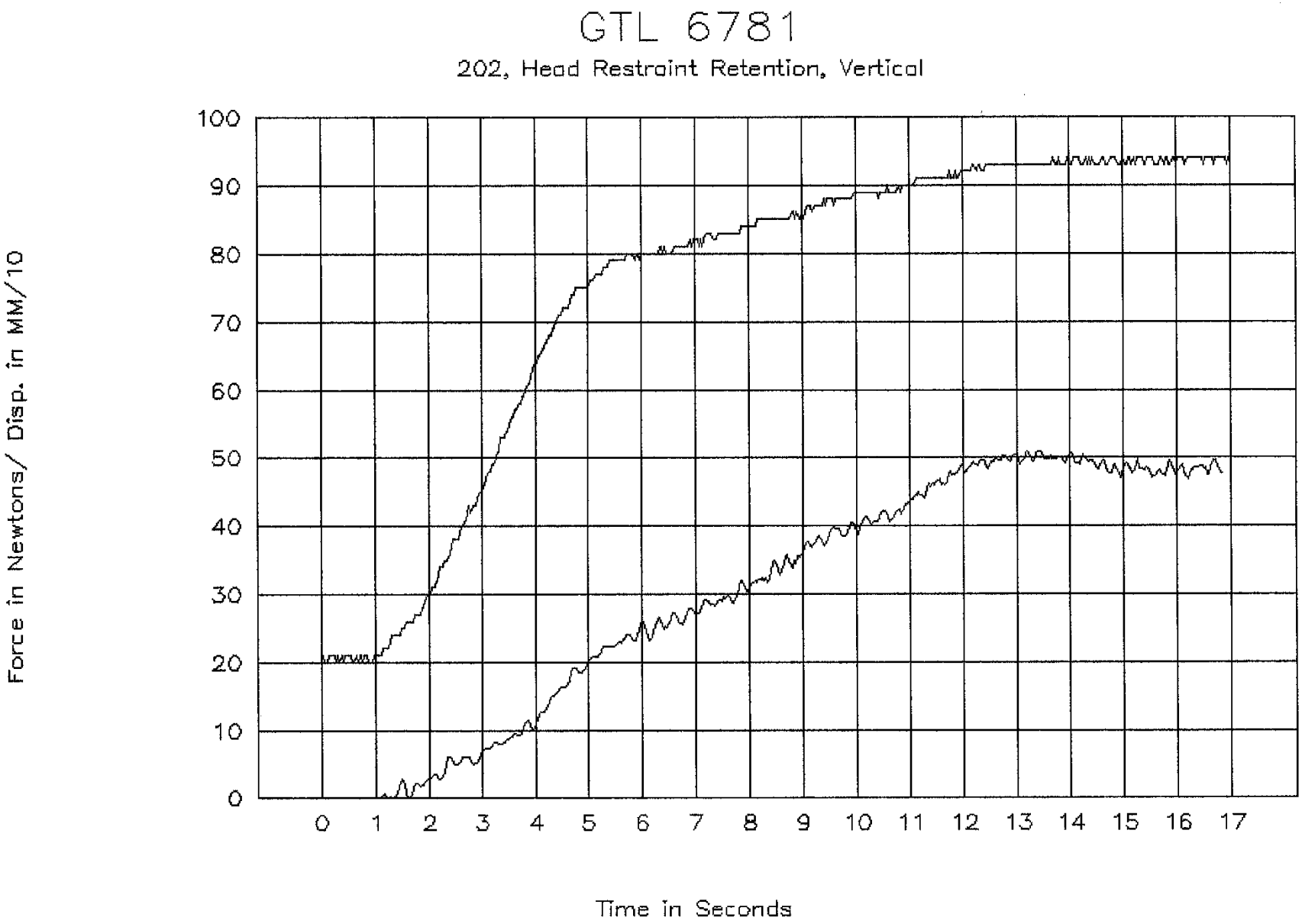
GTL 6778

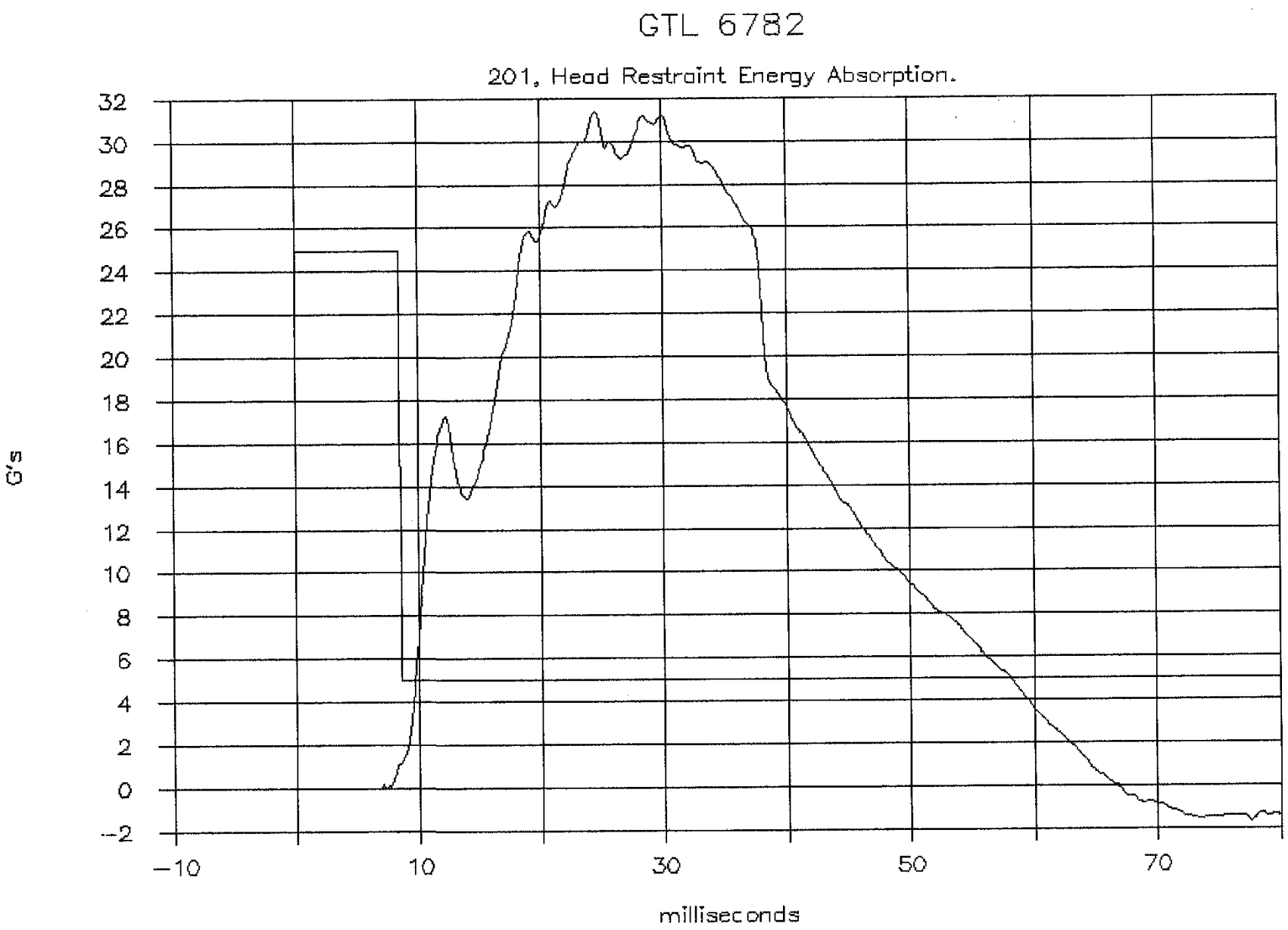
202, Head Restraint Retention, Headform




GTL 6779
202, Head Restraint Retention, Headform
Force in Newtons/ Disp. in MM/10
(Thousands)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
−0.4
−0.5
−0.6
−0.7
−0.8
−0.9
−1
−1.1
−1.2
0
20
40
60
80
100
120
140
160
180
200
Time in Seconds

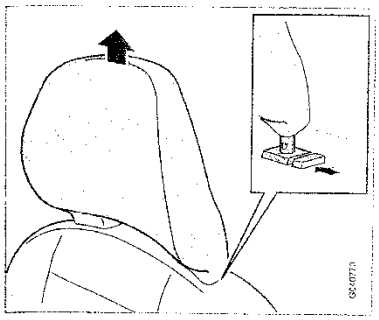

GTL 6780
202, Head Restraint Retention, Vertical
Force in Newtons/ Disp. in MM/10
600
500
400
300
200
100
0
0
50
100
150
200
250
300
Time in Seconds


GTL 6781
202, Head Restraint Retention, Vertical
Force in Newtons/ Disp. in MM/10
100
90
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Time in Seconds


GTL 6782
201, Head Restraint Energy Absorption.
G's
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-10
10
30
50
70
milliseconds

SECTION 7
OWNER'S MANUAL INFORMATION

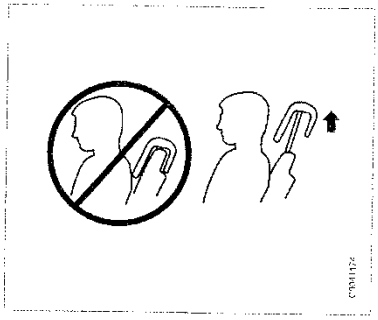
Adjusting the front seat head restraints



The front seat head restraints are designed so that they can be adjusted to two different height positions.

- When the vehicle leaves the factory, the front seat head restraints will be in the lower position.
- It is advisable to have the head restraints in the lower position if you wish to fold down the seat's backrest.

The head restraints should be put in the upper or lower position according to the height of the occupant of the seat.



The upper edge of the head restraint should be at least on a level with the upper-most point of the seat occupant's ear (see illustration).

To raise or lower a head restraint:

Raising or lowering a head restraint

1. Release the head restraint by pressing the button underneath its left side, at the base of the support (see the illustration).
2. Move the head restraint until it clicks (locks) into the upper or lower position.

WARNING

After adjusting the head restraint, be sure that it is securely locked in the new position by pressing and/or pulling it.

Removing a head restraint

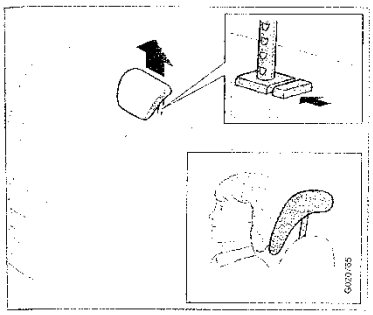
The front seat head restraints can be removed, for example, when cleaning the upholstery or if the front passenger's seat backrest is folded down to accommodate a long load. To do so:

1. Release the head restraint by pressing the release button underneath its left side, at the base of the support.
2. While holding in the release button, press the locking button at the base of the head restraint's right support with a screw driver, etc., and lift the head restraint until it can be removed completely.

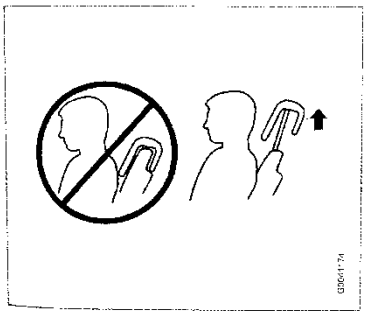
WARNING

- If a front seat head restraint has been removed, it must be put properly back in place and it must lock (click) into one of the available adjustment positions before the seat is occupied.
- The front seat head restraints must be in position and properly adjusted to the height of the person sitting in the seat when the vehicle is driven and when the front passenger's seat is occupied.

Rear seat head restraints



Adjust the head restraint vertically



Each of the rear seating positions is equipped with a head restraint that can be adjusted vertically to suit the height of the passenger. The upper edge of the head restraint should be at least on a level with the upper-most point of the seat occupant's ear (see illustration).

⚠ WARNING

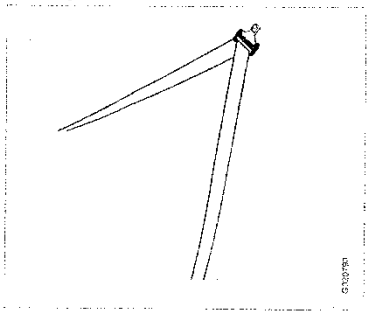
The center rear seat head restraint should only be in its lowest position when this seat is NOT occupied. When the center position is occupied, the head restraint should be correctly adjusted to the passenger's height. The upper edge of the head restraint should be at least on a level with the upper-most point of the seat occupant's ear.

- To raise: Slide the head restraint up to the desired height.
- To lower: Press the catch at the base of the right support and press the head restraint down.
- To remove: Pull the head restraint up far as possible. Press the catch at the base of the right support and pull the head restraint out of the its holders.

⚠ WARNING

If a head restraint has been removed, it must be put properly back in place and it must lock (click) into one of the available adjustment positions before the seat is occupied.

Folding down the rear seat backrests



Both sections of the rear seat backrest can be folded down, together or separately, to enable you to transport long objects. Before folding down the rear seat backrests, the outboard seat belts can be attached to the clothes hook as shown in the illustration.

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