FINAL REPORT NUMBER 225-MGA-09-005

SAFETY COMPLIANCE TESTING FOR FMVSS 225
"Child Restraint Anchorage Systems"

Toyota Motor Manufacturing
2009 Toyota Sienna
NHTSA No. C95107

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083

Test Date: June 30-July 2, 2009
Report Date: July 10, 2009

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, SW
ROOM 6111 (NVS-220)
WASHINGTON, D.C. 20590

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Approved By: P. Michael Miller II, Vice President

Approval Date: 7/28/2009

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By: Edward E. Chan
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DN: CN = Edward E. Chan, C = US, O = National Highway Traffic Safety Administration, OU = Office of Vehicle Safety Compliance
Date: 2009.08.14 15:11:55 -04'00'

Acceptance Date:

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. 225-MGA-09-005	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Final Report of FMVSS 225 Compliance Testing of a 2009 Toyota Sienna, NHTSA No. C95107		5. Report Date July 10, 2009 6. Performing Organization Code MGA	
7. Author(s) Helen A. Kaleto, Laboratory Manager Fern Gatilao, Project Engineer Brad Reaume, Test Personnel		8. Performing Organization Report No. 225-MGA-09-005	
9. Performing Organization Name and Address MGA Research Corporation 446 Executive Drive Troy, Michigan 48083		10. Work Unit No. 11. Contract or Grant No. DTNH22-06-C-00030/0007	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance (NVS-220) 400 Seventh Street, SW Room 6111 Washington, DC 20590		13. Type of Report and Period Covered Final Test Report 14. Sponsoring Agency Code NVS-220	
15. Supplementary Notes			
16. Abstract A compliance test was conducted on the subject 2009 Toyota Sienna, NHTSA No. C95107, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-225-01 for the determination of FMVSS 225 compliance. The test was conducted at MGA Research Corporation in Troy, Michigan on June 30-July 2, 2009. Test failures identified were as follows: NONE The data recorded indicates that the 2009 Toyota Sienna tested appears to meet the requirements of FMVSS 225.			
17. Key Words Compliance Testing Safety Engineering FMVSS 225 2009 Toyota Sienna		18. Distribution Statement Copies of this report are available From: NHTSA Technical Reference Division, Mail Code: NPO-230 400 Seventh Street, SW, Room PL-403 Washington, D.C. 20590 Telephone No. (202) 366-4946	
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Form DOT F 1700.7 (8-70)

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1.0 PURPOSE AND PROCEDURE

PURPOSE

The child restraint anchorage testing results presented in this report are part of the Federal Motor Vehicle Safety Standard (FMVSS) No. 225 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by MGA Research Corporation (MGA) under Contract No. DTNH22-06-C-00030/0007. The purpose of the testing was to determine if the subject vehicle, a 2009 Toyota Sienna, NHTSA No. C95107 meets the performance requirements of FMVSS No. 225, "Child Restraint Anchorage Systems."

PROCEDURE

This testing was conducted in accordance with NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure TP-225-01 (4/11/05) and MGA's Laboratory Test Procedure, MGATP225GOV (6/23/06).

The rear occupant compartment consisted of two 2nd row 140% seats and a 3rd row 60/40 bench seat.. The 2nd row outboard left and right and 3rd row center and right seating positions were equipped with a child restraint anchorage system (one tether and two lower anchorages). The center-to-center spacing between the 2nd row outboard lower anchorages was approximately 819 mm and between the 3rd row outboard lower anchorages was approximately 460 mm. The 2nd row left and right outboard seating positions and 3rd row center and right seating positions were tested with the SFADII.

2.0 COMPLIANCE TEST AND DATA SUMMARY

TEST SUMMARY

The testing was conducted at MGA in Troy, Michigan on June 30-July 2, 2009.

Based on the test results, the 2009 Toyota Sienna appears to meet the requirements of FMVSS No. 225 for this testing.

The SFADII at the 2nd row left seating position sustained a maximum force of 10,965 N and held the required load for 3 seconds and the total displacement was 68 mm. The SFADII at the 2nd row right seating position sustained a maximum force of 14,988 N and held the required load for 3 seconds. The SFADII at the 3rd row center seating position sustained a maximum force of 11,058 N and held the required load for 3 seconds and the total displacement was 67 mm and the 3rd row seating position sustained a maximum force of 15,020 N and held the required load for 3 seconds.

DATA SUMMARY

Strength and displacement summary data are provided below. Data for the configuration and the location of each child restraint anchorage system are provided in Section 5.0. Photographs are found in Section 6.0 and test plots are found in Section 7.0.

Table 1. Summary Data for Strength and Displacement

MGA Test #	Fixture Type	Test Configuration	Seating Position	Max. Load (N)	Displacement (mm)
SC9246	SFADII	Forward Lower Only	2nd Row Left	10,965*	68
		Forward Lower Only w/Top Tether	2nd Row Right	14,988*	N/A
SC9247	SFADII	Forward Lower Only	3rd Row Center	5,071*	67
		Lower w/Top Tether	3rd Row Right	15,020*	N/A

REMARKS: * Applied force exceeded the force specified in the test procedure.

3.0 TEST VEHICLE INFORMATION

Table 2. General Test and Vehicle Parameter Data

VEH. MOD YR/MAKE/MODEL/BODY	2009 Toyota Sienna
VEH. NHTSA NO.	C95107
VIN	5TDZK23C09S262839
COLOR	Silver Pine
VEH. BUILD DATE	09/07
TEST DATE	June 30-July 2, 2009
TEST LABORATORY	MGA Research Corporation
OBSERVERS	Fern Gatilao , Brad Reaume, Kenney Godfrey

GENERAL INFORMATION:

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Toyota Motor Manufacturing, Indiana

Date of Manufacture: 10/08; VIN: 5TDZK23C09S262839

GVWR: 5690 lbs GAWR FRONT: 2845 lbs

GAWR REAR: 2845 lbs

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 35 psi REAR: 35 psi

Recommended Tire Size: P215/65R16

Recommended Cold Tire Pressure:

FRONT: 35 psi REAR: 35 psi

Size of Tire on Test Vehicle: P215/65R16

Size of Spare Tire: P215/65R16

VEHICLE CAPACITY DATA:

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

Number of Occupants: Front __2__; Middle__2___; Rear;_3__ TOTAL __7__.

4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

MGA Research Corporation 446 Executive Drive Troy, Michigan 48083	
Test Equipment Used for Testing	**Calibration Due Date**
MGA Hydraulic Test Frame	N/A
Three (3) Load Cell 10,000 lb Capability	S/N 256, 602 & 667 (11/29/09)
String Potentiometer Calibrated at each use	S/N I1704802A/A1600461A
Hydraulic Pump	N/A
MGA CRF Fixture	N/A
MGA SFADI	N/A
MGA SFADII	N/A
MGA 2-Dimensional Template	N/A
Linear Scale	TPM886 (9/5/09)
MGA Data Acquisition System	N/A
Digital Calipers	MGA00689 (3/10/10)
Force Gauge	MGA00800 (1/20/10)
Inclinometer (Digital)	MGA0715 (1/16/10)

5.0 DATA

Table 3. Child Restraint Tether Anchorage Configuration

Seating Position		Permit the attachment of a tether hook	Accessible without the need for any tool other than a screwdriver or coin	Ready for use without the need for any tools	Sealed to prevent the entry of exhaust fumes
Front Row		N/A	N/A	N/A	N/A
Second Row	LH	Yes	Yes	Yes	Yes
	Ctr.	N/A	N/A	N/A	N/A
	RH	Yes	Yes	Yes	Yes
Third Row	LH	N/A	N/A	N/A	N/A
	Ctr.	Yes	Yes	Yes	Yes
	RH	Yes	Yes	Yes	Yes

Note: AS DETERMINED USING THE PROCEDURES SPECIFIED IN TP-225-01.

REMARKS: NONE.

Table 4. Child Restraint Lower Anchorage Configuration

OBSERVED LOWER ANCHORAGE CONFIGURATION	SEAT POSITION					
		FRONT ROW	SECOND ROW		THIRD ROW	
			I/B	O/B	I/B	O/B
Above anchorage, permanently marked with a circle not less than 13 mm in Dia.; and whose color contrasts with its background; and its center is not less than 50 mm and not more than 100 mm above the bar, and in the vertical longitudinal plane that passes through the center of the bar.	LH	N/A	Yes		N/A	
	Ctr		N/A		N/A	
	RH		Yes		N/A	
Each of the bars is visible, without the compression of the seat cushion or seat back, when the bar is viewed, in a vertical longitudinal plane passing through the center of the bar, along a line marking an upward 30 degree angle with a horizontal plane.	LH	N/A	N/A		N/A	
	Ctr		N/A		Yes	
	RH		N/A		Yes	
Diameter of the bar (mm)	LH	N/A	5.9	6.0	N/A	N/A
	Ctr		N/A	N/A	5.9	5.9
	RH		5.9	5.9	5.9	5.9
Inspect if the bars are straight, horizontal and transverse	LH	N/A	Yes		N/A	
	Ctr		N/A		Yes	
	RH		Yes		Yes	
Optional Marking: At least one anchorage bar (when deployed for use, if storable anchorages), one guidance fixture, or one seat marking is visible.	LH	N/A	N/A		N/A	
	Ctr					
	RH					
Optional Marking: If guidance fixtures are used, the fixture(s) must be installed.	LH	N/A	N/A		N/A	
	Ctr					
	RH					
Measure the distance between Point "Z" of the CRF and the front surface of the anchorage bar (mm)	LH	N/A	51		N/A	
	Ctr		N/A		32	
	RH		56		33	
Measure the distance between the SRP to the front of the anchorage bar (mm)	LH	N/A	236	238	N/A	N/A
	Ctr		N/A	N/A	138	140
	RH		216	223	145	138

Table 4. Child Restraint Lower Anchorage Configuration (continued)

OBSERVED LOWER ANCHORAGE CONFIGURATION	SEAT POSITION							
			FRONT ROW	SECOND ROW		THIRD ROW	
				I/B	O/B	I/B	O/B
Inspect if the centroidal longitudinal axes are collinear within 5 degrees	LH		N/A	Yes		N/A	
	Ctr			Yes		Yes	
	RH			Yes		Yes	
Inspect if the inside surface of the bar that is straight and horizontal section of the bars, and determine they are not less than 25 mm, but not more than 60 mm in length (mm).	LH	Req't>25	N/A	34	35	N/A	N/A
		Req't<60		39	38	N/A	N/A
	Ctr	Req't>25		N/A	N/A	34	33
		Req't<60		N/A	N/A	41	39
	RH	Req't>25		31	34	36	35
		Req't<60		38	39	39	38
Inspect if the bars can be connected to, over their entire inside length by the connectors of child restraint system.	LH		N/A	Yes		N/A	
	Ctr			N/A		Yes	
	RH			Yes		Yes	
Inspect if the bars are an integral and permanent part of the vehicle.	LH		N/A	Yes		N/A	
	Ctr			N/A		Yes	
	RH			Yes		Yes	
Inspect if the bars are rigidly attached to the vehicle. If feasible, hold the bar firmly with two fingers and gently pull.	LH		N/A	Yes		N/A	
	Ctr			N/A		Yes	
	RH			Yes		Yes	

PITCH, YAW, & ROLL INFORMATION

SEAT POSITION	PITCH (deg)	YAW (deg)	ROLL (deg)
2nd Row Left	11.1	N/A	0.1
2nd Row Center	N/A	N/A	N/A
2nd Row Right	11.3	N/A	0.9
3rd Row Left	N/A	N/A	N/A
3rd Row Center	16.4	N/A	0.8
3rd Row Right	16.6	N/A	0.2

N/A indicates that there were no lower anchorages in the 2nd row center seating position.

Note: AS DETERMINED USING THE PROCEDURES SPECIFIED IN TP-225-01.

REMARKS: NONE

Table 5. Tether Location and Dimensional Measurements

SEAT POSITION FOR TETHER		TETHER ANCHORAGE LOCATION Located in the required zone?
Front Row		N/A
Second Row	LH	Yes
	Ctr.	Yes
	RH	Yes
Third Row	LH	N/A
	Ctr.	Yes
	RH	Yes

Note: AS DETERMINED USING THE PROCEDURES SPECIFIED IN TP-225-01.

REMARKS: NONE

Table 6. Tether Anchorage Static Loading and Displacement

SEAT POSITION		Seat, Seat Back, & Head Restraint Positions			Type of SFAD Used	Angle (deg)	Initial Location (mm)	Onset Rate (N/sec.)	Force Applied (kN)	Max. Load (N)	Final Location (mm)	Horiz. Displ. (mm)
		Seat	Seat Back	Is There a H/R?								
Front Row		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Second Row	LH	Full Rwd	Most Upright	Yes	II	10.4	17	389	11,000	10,965*	85	68
	RH	Full Rwd		Yes	II	10.4	N/A	537	15,000	14,988*	N/A	N/A
Third Row	Ctr	Fixed	Most Upright	No	II	9.5	21	389	11,000	11,058*	88	67
	RH			No	II	9.5	N/A	537	15,000	15,020*	N/A	N/A

Note: AS DETERMINED USING THE PROCEDURES SPECIFIED IN TP-225-01.

REMARKS: * Applied force exceeded the force specified in the test procedure.

6.0 PHOTOGRAPHS

6.1 Front view

6.2 Rear view


SIENNA CE
TOYOTA
NHTSA 2009 Toyota Sienna
Rear View
FMVSS 225
C95107

6.3 Front left view

6.4 Front right view

6.5 Test vehicle's certification label

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6.6.5 Right front

6.6.6 Right rear

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6.7.1 2nd Row LH position photo

6.7.2 2nd Row RH position photo

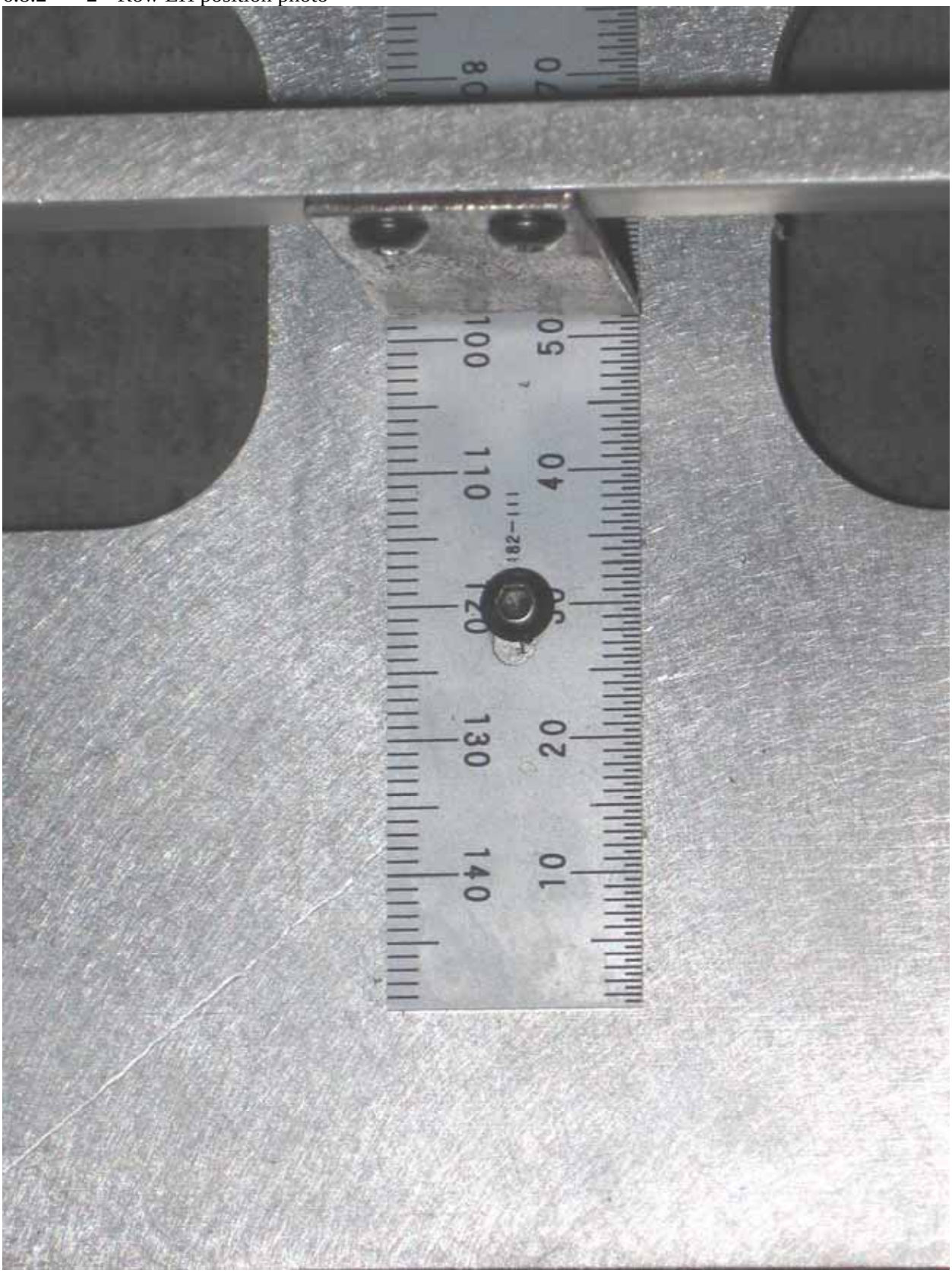
6.7.3 Center position photo

6.7.4 3rd Row RH position photo

6.8 CRF verification

6.8.1 2nd Row LH position photo

6.8.2 2nd Row LH position photo

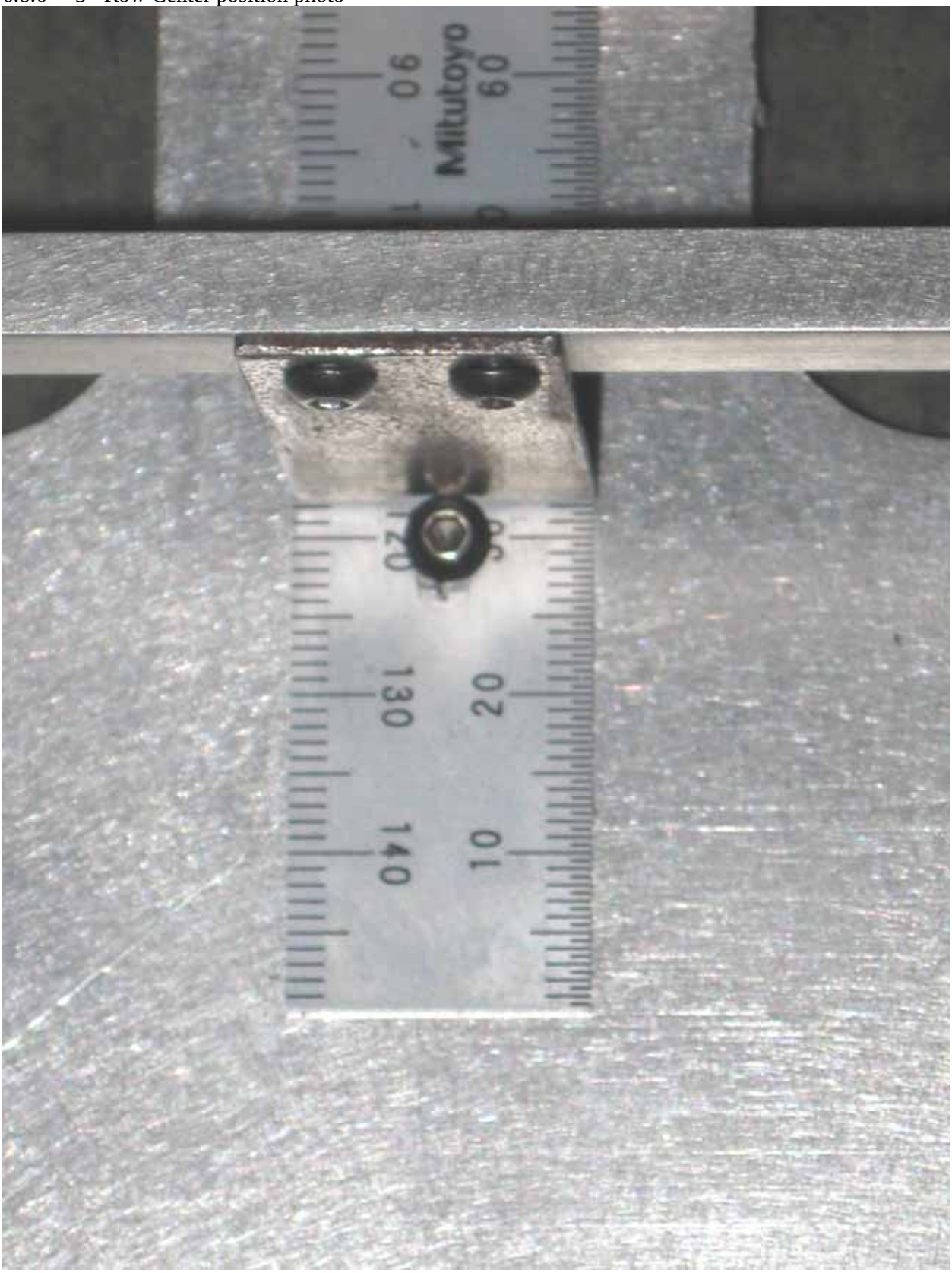


6.8.3 2nd Row RH position photo

6.8.4 2nd Row RH position photo

6.8.5 3rd Row Center position photo

6.8.6 3rd Row Center position photo



6.9 Front view of test vehicle with test apparatus in place

6.9.1 SFAD II LH & RH

6.9.2 SFAD II Center & RH

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6.10.1 Pre-test photo

6.10.2 Pre-test photo

6.10.3 Pre-test photo

6.10.4 Pre-test photo

6.10.5 Pre-test photo

6.10.6 Pre-test photo

6.10.7 Pre-test photo

6.10.8 Pre-test photo

6.10.9 Pre-test photo

6.10.10 Pre-test photo

6.11 Post-test condition of each child restraint anchorage system

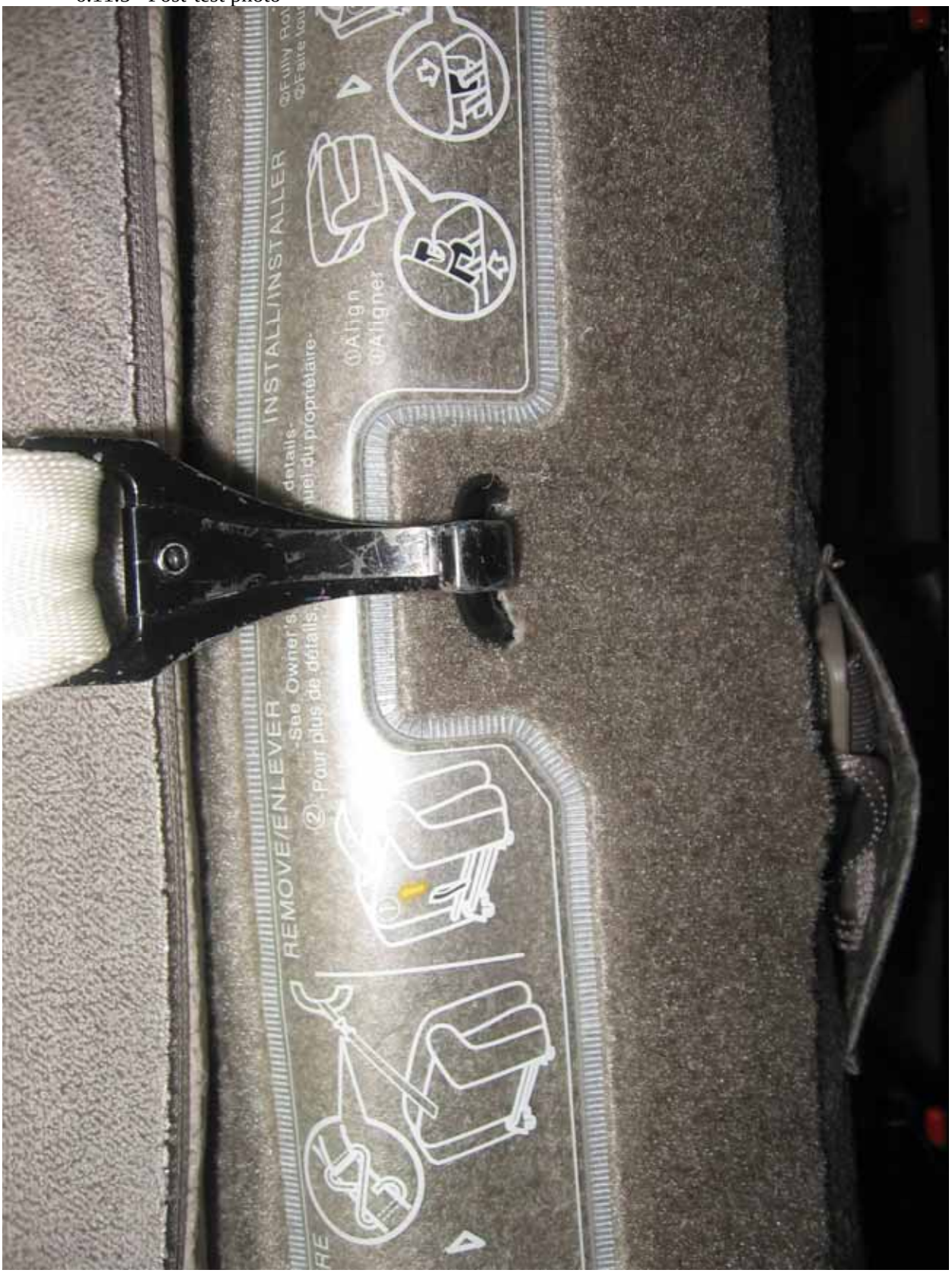
6.11.1 Post-test photo

6.11.2 Post-test photo

6.11.3 Post-test photo

6.11.4 Post-test photo

6.11.5 Post-test photo



6.11.6 Post-test photo

6.11.7 Post-test photo

6.11.8 Post-test photo

6.11.9 Post-test photo

6.11.10 Post-test photo

6.11.11 Post-test photo

6.11.12 Post-test photo

6.11.13 Post-test photo

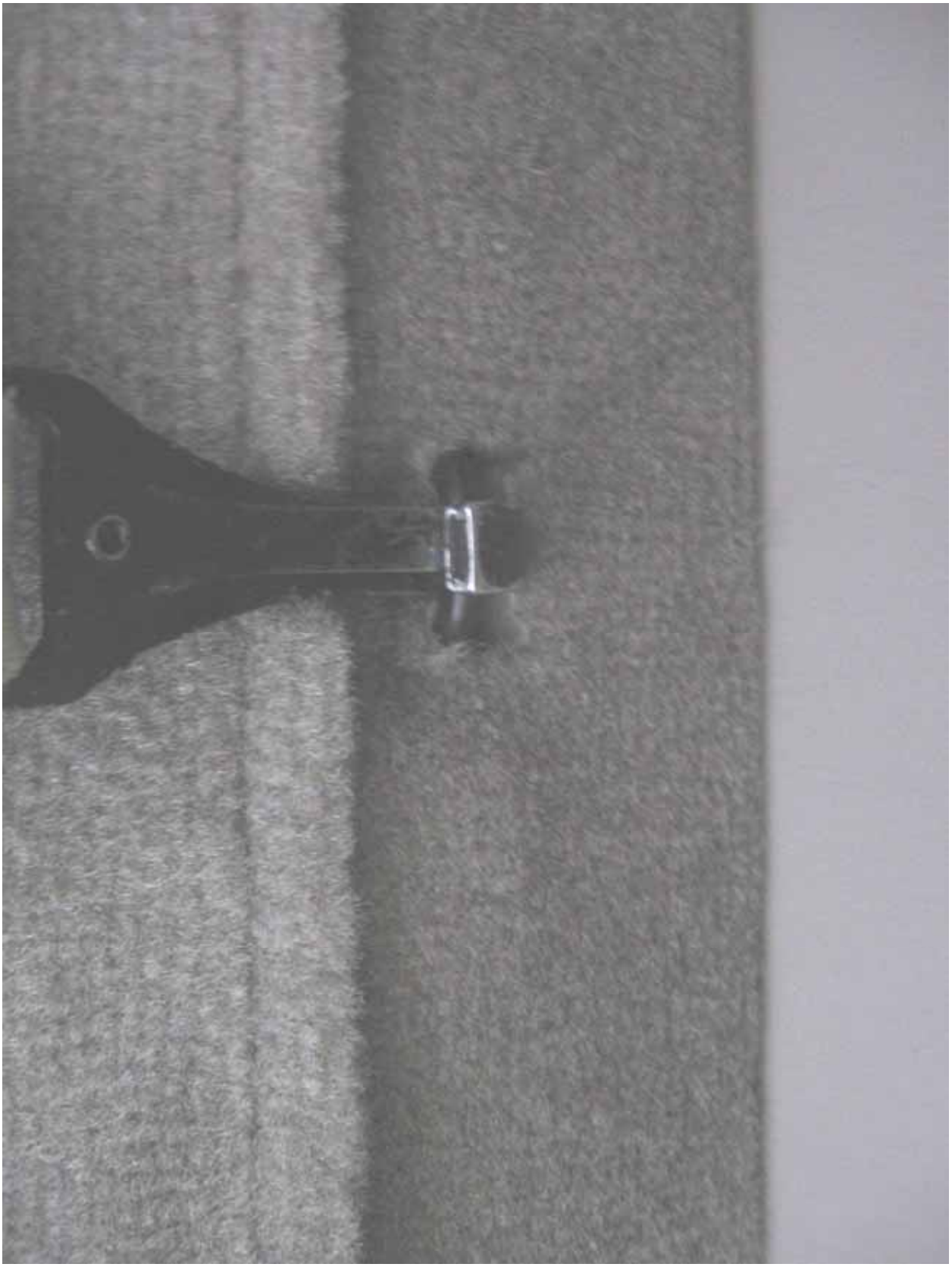
6.11.14 Post-test photo

6.11.15 Post-test photo

6.11.16 Post-test photo

6.11.17 Post-test photo

6.11.18 Post-test photo

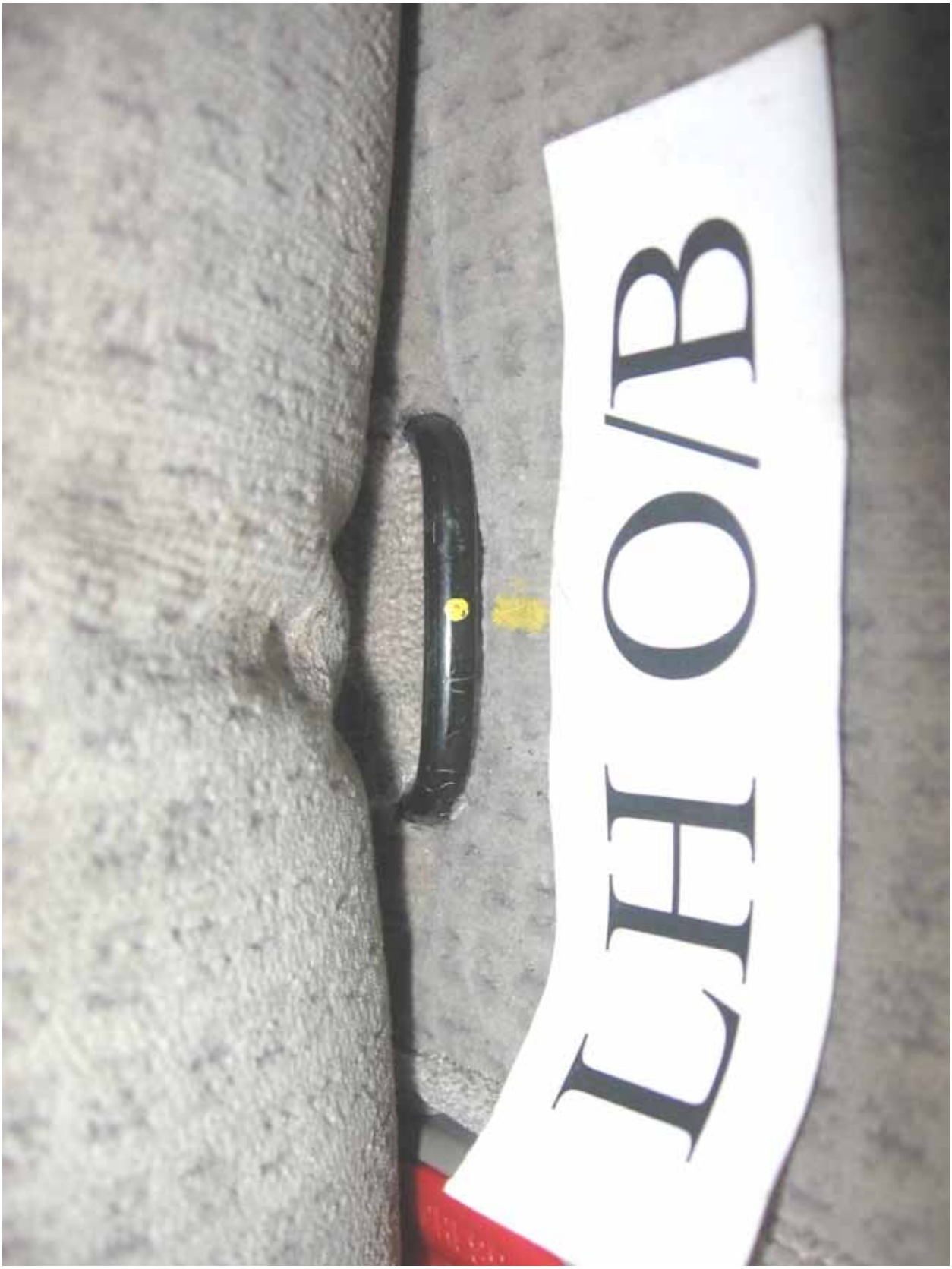


6.11.19 Post-test photo

6.11.20 Post-test photo

6.11.21 Post-test photo

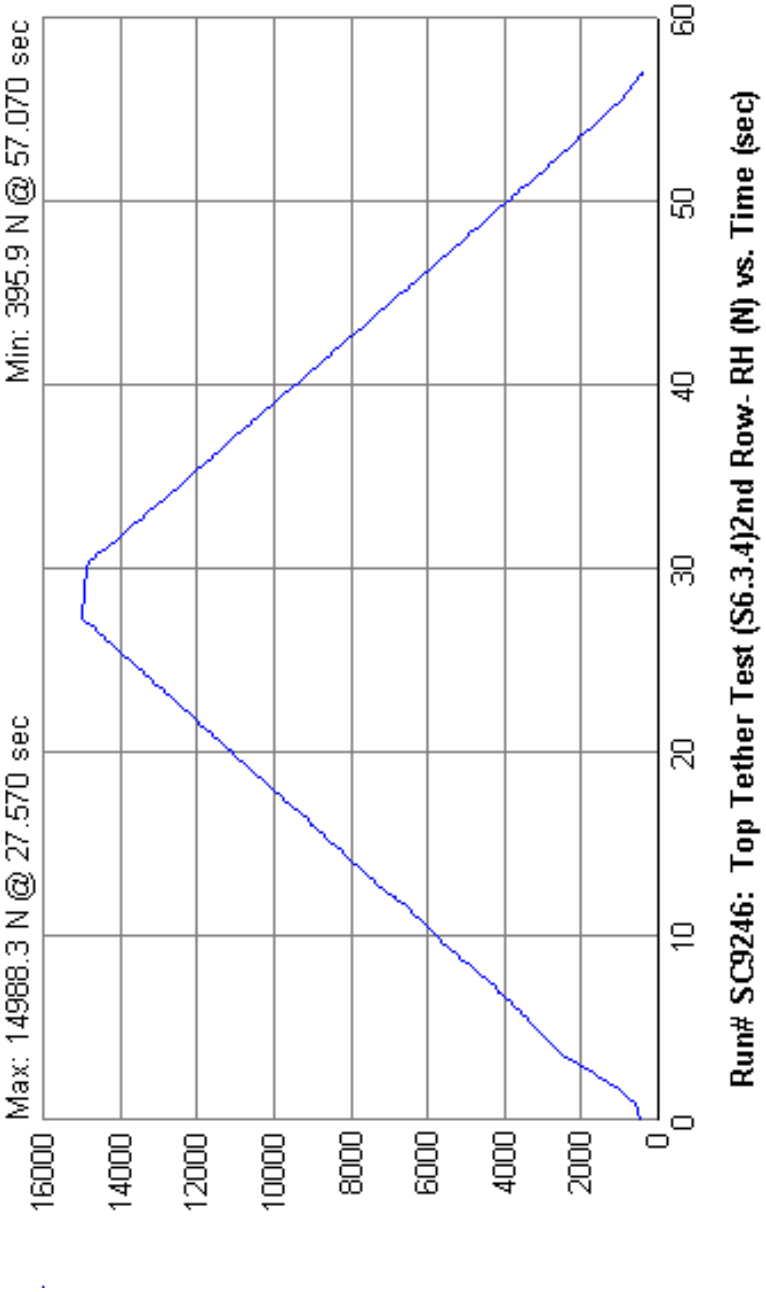
6.11.22 Post-test photo

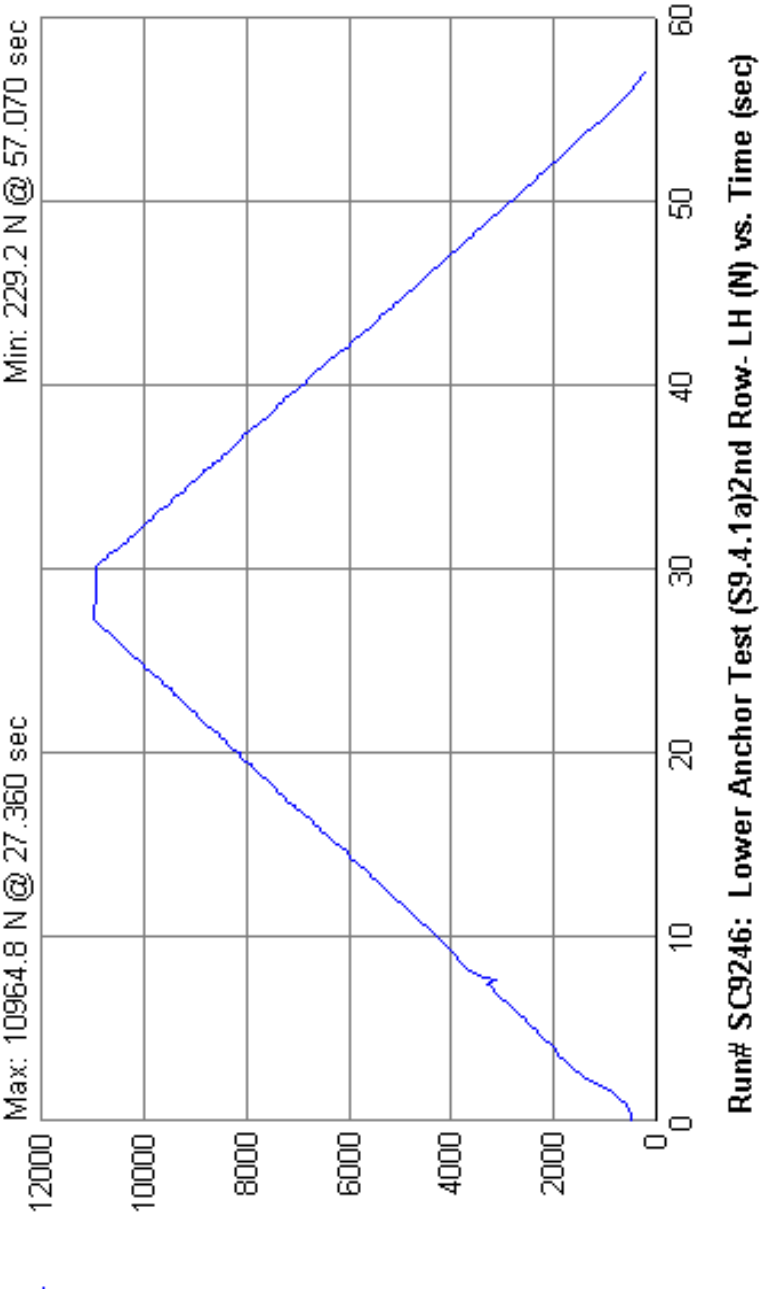


6.11.23 Post-test photo

6.11.24 Post-test photo

7.0 PLOTS


Max: 14988.3 N @ 27.570 sec
Min: 395.9 N @ 57.070 sec
16000
14000
12000
10000
8000
6000
4000
2000
0
0
10
20
30
40
50
60
Run# SC9246: Top Tether Test (S6.3.4)2nd Row- RH (N) vs. Time (sec)


Max: 10964.8 N @ 27.360 sec
Min: 229.2 N @ 57.070 sec
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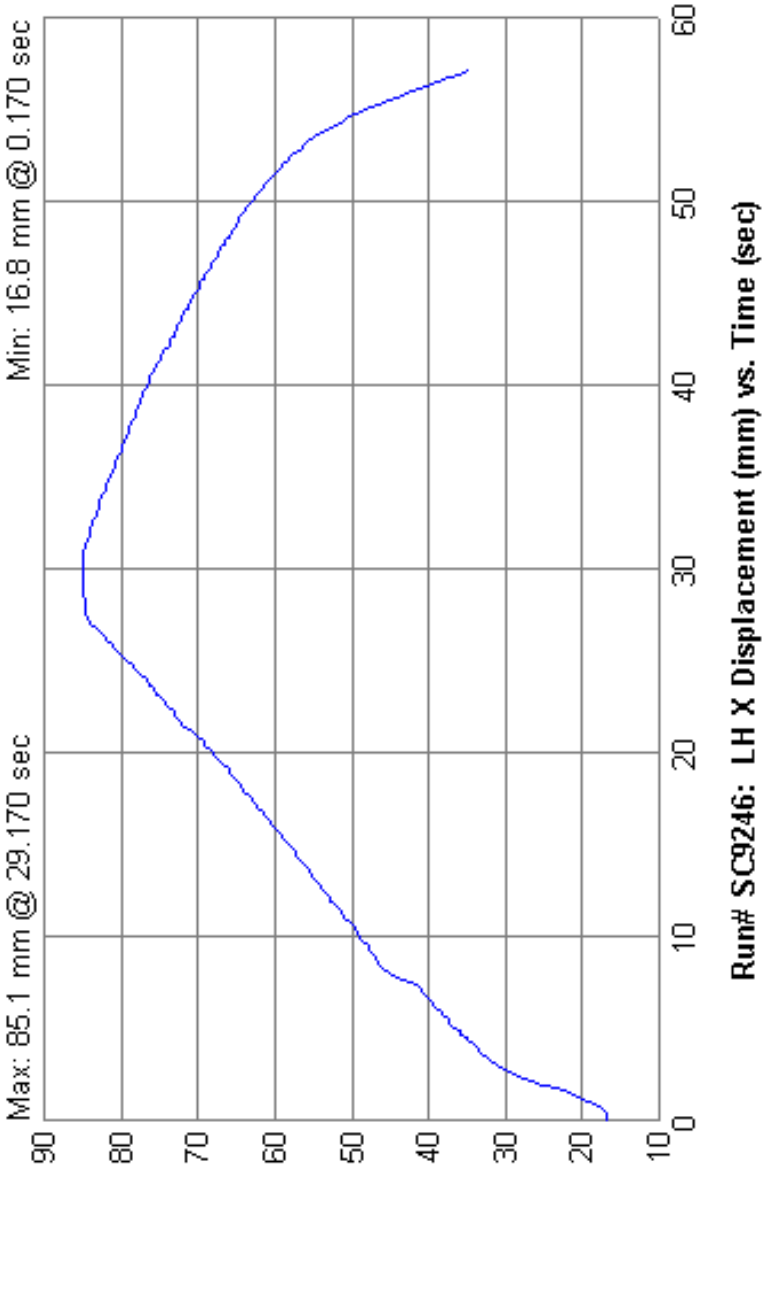
8000
6000
4000
2000
0
0
10
20
30
40
50
60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Min: 16.8 mm @ 0.170 sec
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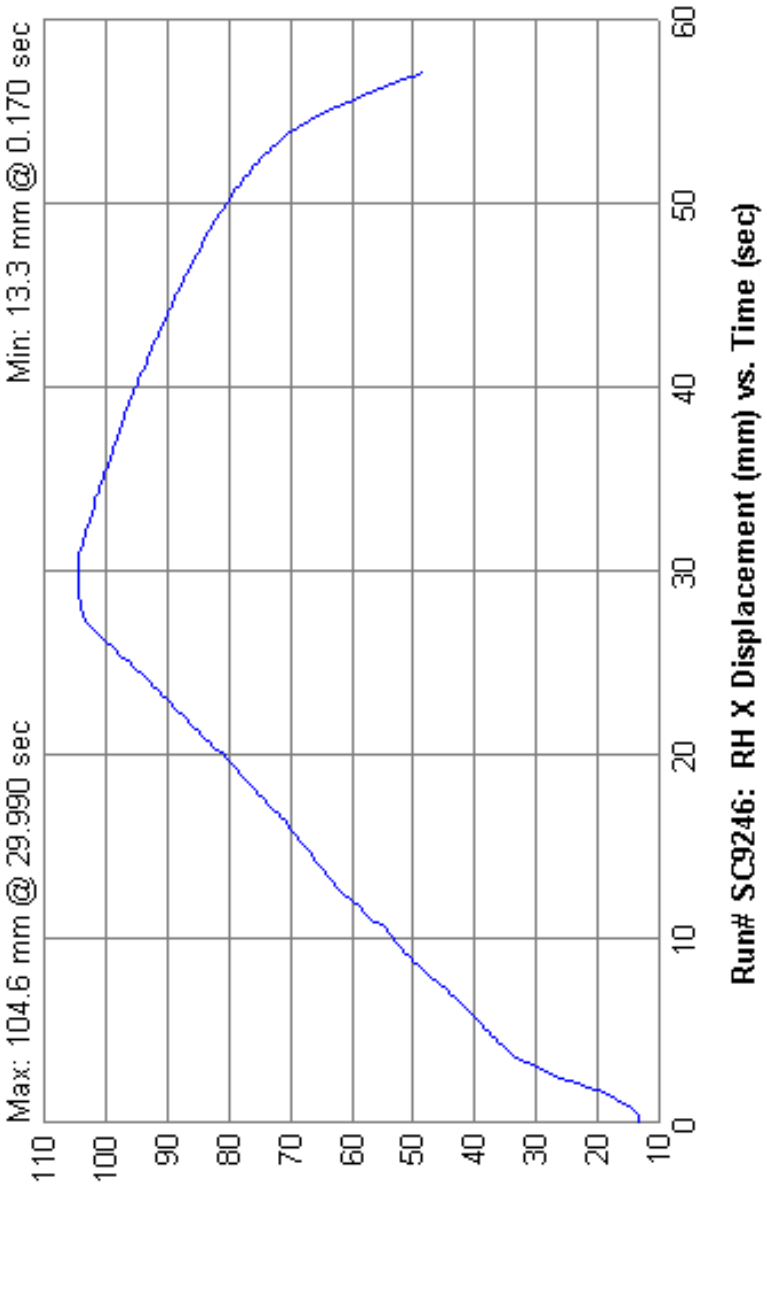
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60


Max: 104.6 mm @ 29.990 sec
Min: 13.3 mm @ 0.170 sec
Run# SC9246: RH X Displacement (mm) vs. Time (sec)
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100
90
80
70
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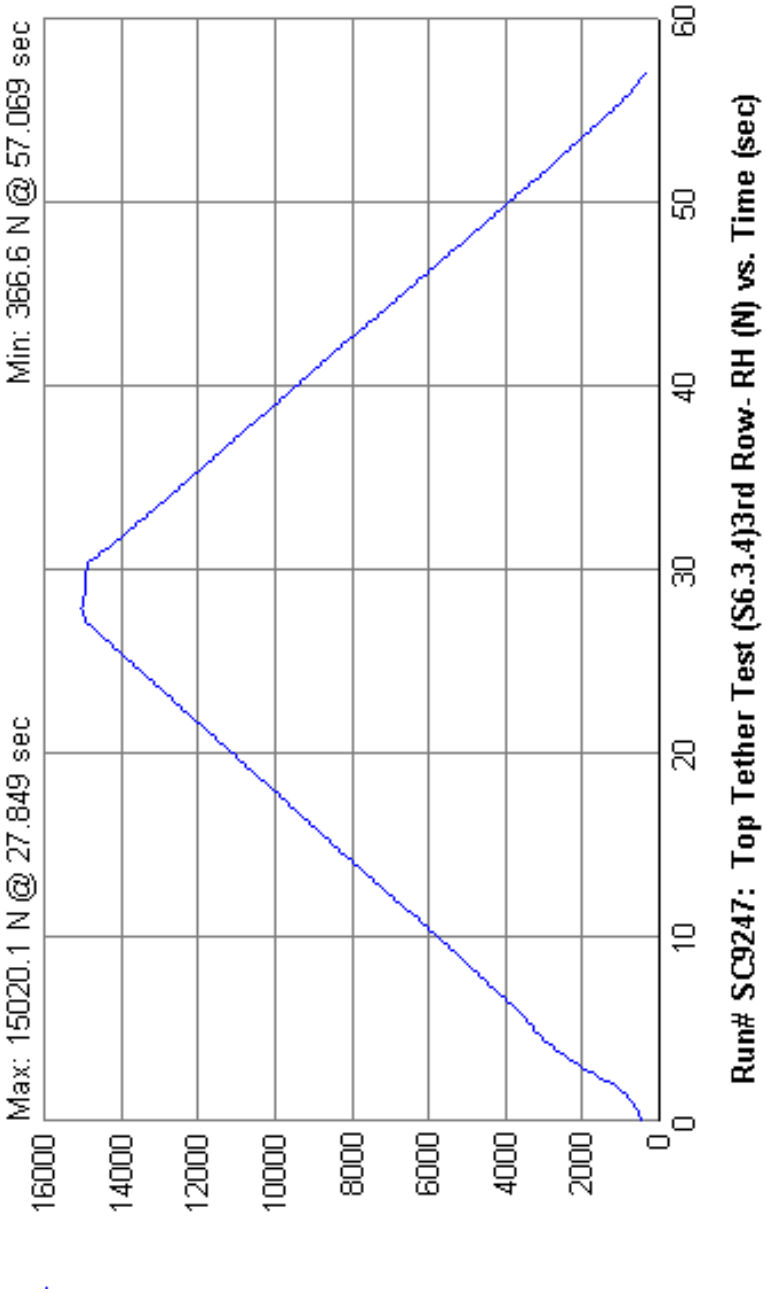
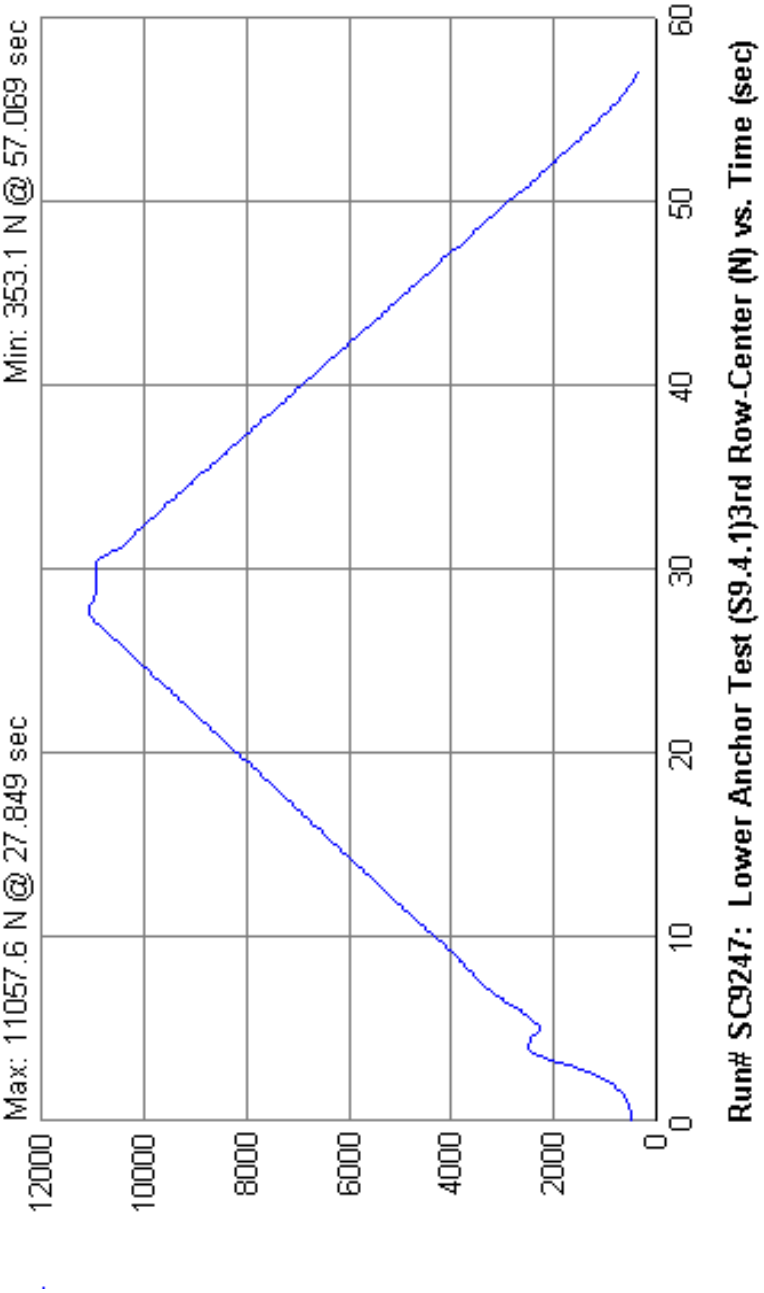
10
20
30
40
50
60


Max: 15020.1 N @ 27.849 sec
Min: 366.6 N @ 57.069 sec
16000
14000
12000
10000
8000
6000
4000
2000
0
0
10
20
30
40
50
60
Run# SC9247: Top Tether Test (S6.3.4)3rd Row- RH (N) vs. Time (sec)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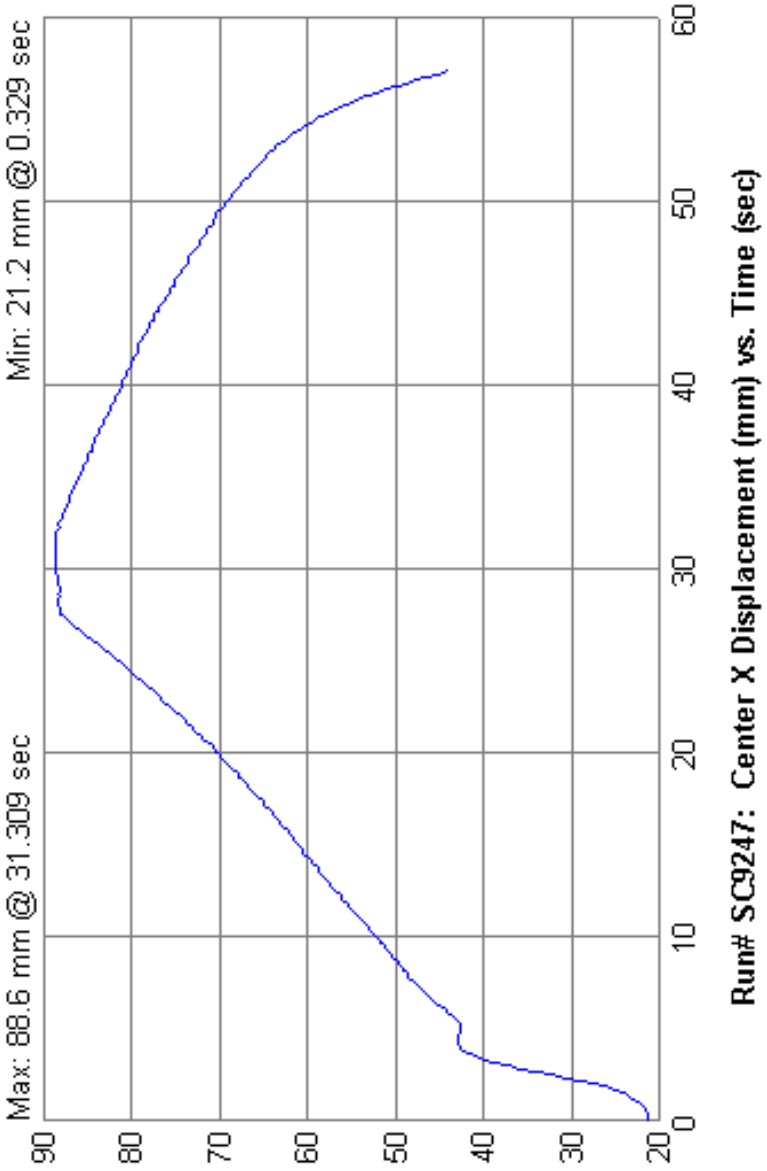
8000
6000
4000
2000
0
0
10
20
30
40
50
60


Run# SC9247: Center X Displacement (mm) vs. Time (sec)
Min: 21.2 mm @ 0.329 sec
Max: 88.6 mm @ 31.309 sec
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70
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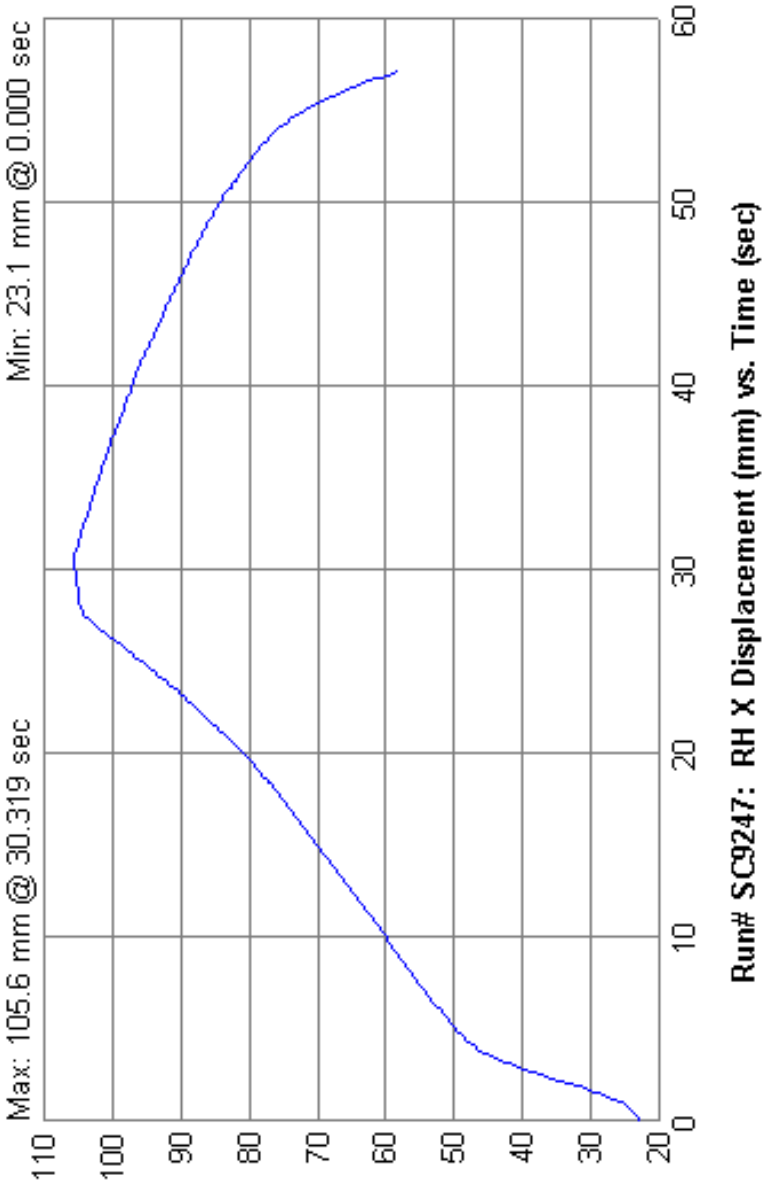
40
30
20
0
10
20
30
40
50
60


Max: 105.6 mm @ 30.319 sec
Min: 23.1 mm @ 0.000 sec
Run# SC9247: RH X Displacement (mm) vs. Time (sec)
110
100
90
80
70
60
50
40
30
20
0
10
20
30
40
50
60

8.0 REPORT OF VEHICLE CONDITION

REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING

CONTRACT No.: DTNH22-02-D-11043 DATE: July 2, 2009

From: MGA Research Corporation, 446 Executive Drive, Troy, MI 48083

To: NHTSA, OVSC, NVS-220

The following vehicle has been subjected to compliance testing for FMVSS No. 225

The vehicle was inspected upon arrival at the laboratory for the test and found to contain all of the equipment listed below. All variances have been reported within 2 working days of vehicle arrival, by letter, to the NHTSA Industrial Property Manager (NAD0-30), with a copy to the OVSC COTR. The vehicle is again inspected, after the above test has been conducted, and all changes are noted below. The final condition of the vehicle is also noted in detail.

VEH. MOD YR/MAKE/MODEL/BODY: 2009 Toyota Sienna

VEH. NHTSA NO.: C95107 VIN: 5TDZK23C09S262839

COLOR: Silver Pine

ODOMETER READINGS:	ARRIVAL	52 miles	Date: 3/11/09
	COMPLETION	53 miles	Date: 7/2/09
PURCHASE PRICE: $25,910	DEALER'S NAME: Toyota of Waterford		
ENGINE DATA:	6 Cylinders	3.5 Liters	___ Cubic Inches
TRANSMISSION DATA:	X Automatic	__ Manual	No. of Speeds
FINAL DRIVE DATA:	____Rear Drive	X Front Drive	____4 Wheel Drive

CHECK APPROPRIATE BOXES FOR VEHICLE EQUIPMENT:

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Fern Gatilao, Brad Reaume, Kenney Godfrey

	Air Conditioning		Traction Control	X	Clock
X	Tinted Glass		All Wheel Drive	X	Roof Rack
X	Power Steering		Speed Control	X	Console
X	Power Windows	X	Rear Window Defroster	X	Driver Air Bag
X	Power Door Locks		Sun Roof or T-Top	X	Passenger Air Bag
	Power Seat(s)	X	Tachometer	X	Front Disc Brakes
X	Power Brakes	X	Tilt Steering Wheel	X	Rear Disc Brakes
X	Antilock Brake System	X	AM/FM/Compact Disc		Other

REMARKS:

Salvage only.

Equipment that is no longer on the test vehicle as noted on previous pages:

All equipment inventoried and placed in vehicle.

Explanation for equipment removal:

Test Vehicle Condition:

Windshield was removed for testing.

Salvage only.

RECORDED BY: Fern Gatilao, Kenney Godfrey DATE: June 30-July 2, 2009

APPROVED BY: Brad Reaume

APPENDIX A
OWNERS MANUAL CHILD RESTRAINT SYSTEMS

1-7. Safety information

Child restraint systems

A child restraint system for a small child or baby must be properly restrained on the seat with the lap portion of the lap/shoulder belt.

The laws of all 50 states of U.S.A. and Canada now require the use of child restraint systems.

Points to remember

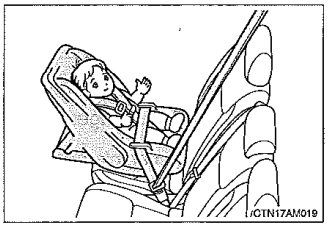
Studies have shown that installing a child restraint system on a rear seat is much safer than installing one to the front passenger seat.

- Choose a child restraint system that suits your vehicle and appropriate to the age and size of the child.
- For installation details, follow the instructions provided with the child restraint system.
  General installation instructions are provided in this manual.
  (→P. 139)

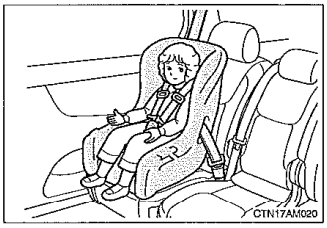
Types of child restraints

Child restraint systems are classified into the following 3 types according to the age and size of the child.

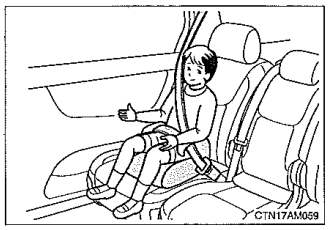
▶ Rear facing — Infant seat/convertible seat



▶ Forward facing — Convertible seat



▶ Booster seat



Selecting an appropriate child restraint system

- Use a child restraint system appropriate for the child until the child becomes large enough to properly wear the vehicle's seat belt.
- If a child is too large for a child restraint system, sit the child on a rear seat and use the vehicle's seat belt. (→P. 84)

CAUTION

Child restraint precautions

- For effective protection in automobile accidents and sudden stops, a child must be properly restrained, using a seat belt or child restraint system depending on the age and size of the child. Holding a child in your arms is not a substitute for a child restraint system. In an accident, the child can be crushed against the windshield, or between you and the vehicle's interior.
- Toyota strongly urges the use of a proper child restraint system that conforms to the size of the child, installed on the rear seat. According to accident statistics, the child is safer when properly restrained in the rear seat than in the front seat.
- Never install a rear-facing child restraint system on the front passenger seat even if the "AIR BAG OFF" indicator light is illuminated. In the event of an accident, the force of the rapid inflation of the front passenger airbag can cause death or serious injury to the child if the rear-facing child restraint system is installed on the front passenger seat.
- A forward-facing child restraint system may be installed on the front passenger seat only when it is unavoidable. A child restraint system that requires a top tether strap should not be used in the front passenger seat since there is no top tether strap anchor for the front passenger seat. Adjust the seatback as uprights as possible and always move the seat as far back as possible even if the "AIR BAG OFF" indicator light is illuminated, because the front passenger airbag could inflate with considerable speed and force. Otherwise, the child may be killed or seriously injured.

1-7. Safety information

⚠ CAUTION

■Child restraint precautions

- ●Do not use the seat belt extender when installing a child restraint system on the front or rear passenger seat. If installing a child restraint system with the seat belt extender connected to the seat belt, the seat belt will not securely hold the child restraint system, which could cause death or serious injury to the child or other passengers in the event of collision.
- ●Do not allow the child to lean his/her head or any part of his/her body against the side window or the area of the seat, front or side pillars or roof side rail from which the side airbags or curtain shield airbags deploy even if the child is seated in the child restraint system. It is dangerous if the side airbags and curtain shield airbags inflate, and the impact could cause death or serious injury to the child.
- ●Make sure you have complied with all installation instructions provided by the child restraint manufacturer and that the system is properly secured. If it is not secured properly, it may cause death or serious injury to the child in the event of a sudden stop or accident.

■Child restraint lock function belt precaution

Do not allow children to play with the child restraint lock function belt. If the belt becomes twisted around a child's neck, it will not be possible to pull the belt out leading to choking or other serious injuries that could result in death. If this occurs and the buckle cannot be unfastened, scissors should be used to cut the belt.

■When the child restraint system is not in use

- ●Keep the child restraint system properly secured on the seat even if it is not in use.
  Do not store the restraint unsecured in the passenger compartment.
- ●If it is necessary to detach the child restraint system, remove it from the vehicle or store it securely in the luggage compartment. This will prevent it from injuring passengers in the event of a sudden stop or accident.

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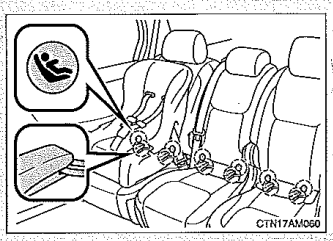
Installing child restraints

Follow the child restraint system manufacturer's instructions. Firmly secure child restraints to the rear seats using the LATCH anchors or a seat belt. Attach the top tether strap when installing a child restraint.

The lap/shoulder belt can be used if your child restraint system is not compatible with the LATCH (Lower Anchors and Tethers for Children) system.

■ Using the LATCH anchors

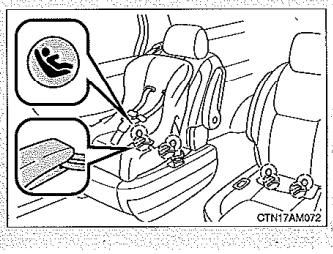
▶ Second seats (8-passenger models)



Child restraint LATCH anchors

LATCH anchors are provided for all second seats. (Buttons displaying the location of the anchors are attached to the seats.)

▶ Second seats (7-passenger models)

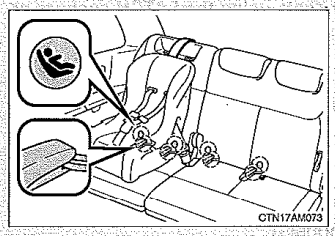


Child restraint LATCH anchors

LATCH anchors are provided for both second seats. (Buttons displaying the location of the anchors are attached to the seats.)

139

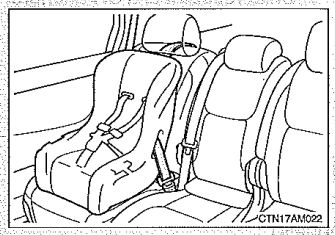
▶ Third seats



Child restraint LATCH anchors

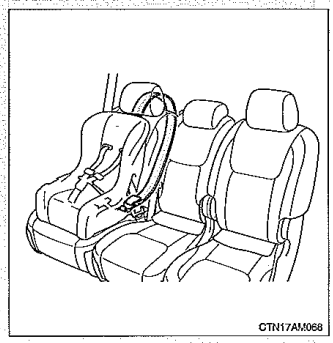
LATCH anchors are provided for right and center seats. (Buttons displaying the location of the anchors are attached to the seats.)

■ Using the seat belts



Seat belts equipped with a child restraint locking mechanism (ALR/ELR belts except driver's seat belt)

■ Using the top tether strap



Anchor brackets (for top tether strap)

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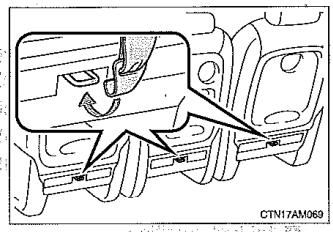
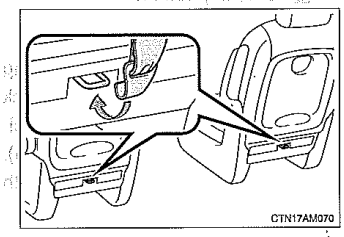
▶ Second seats (8-passenger models)



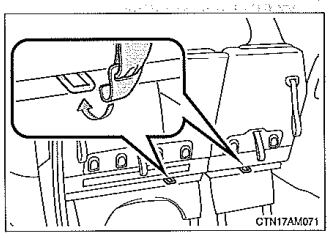
Anchor brackets are provided for all second seats.

▶ Second seats (7-passenger models)



Anchor brackets are provided for both second seats.

▶ Third seats



Anchor brackets are provided for right and center seats.

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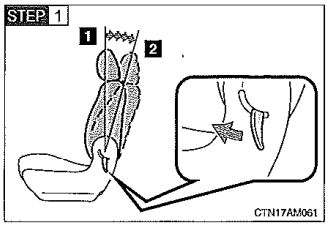
Installation with LATCH system (second seat)

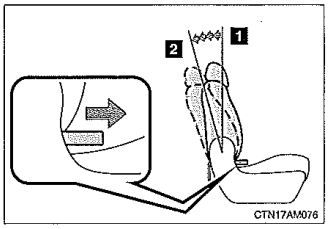
Outer seats



Fold the seatback while pulling the lever. Return the seatback and secure it at the 1st lock position (most upright position). Adjust the seatback to the 5th lock position. (→P. 59)

1 1st lock position
2 5th lock position

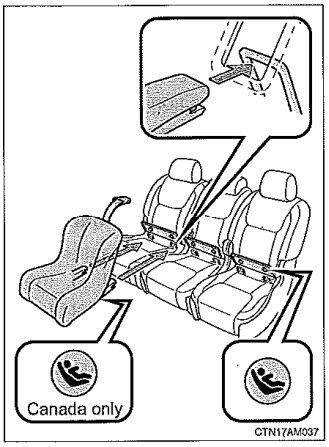
Center seat (if equipped)



Fold the seatback while pulling the strap. Return the seatback and secure it at the 1st lock position (most upright position). Adjust the seatback to the 5th lock position. (→P. 59)

1 1st lock position
2 5th lock position

▶ Type A



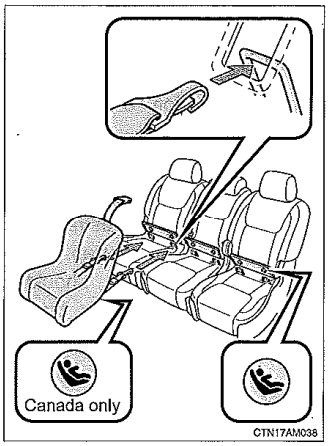
STEP 2 LATCH anchors are behind the button. Open the cover and confirm the position of the LATCH anchors.

STEP 3 Latch the buckles onto the LATCH anchors.

STEP 4 If the child restraint has a top tether strap, the top tether strap should be latched onto the top tether strap anchor. (→P. 151, 152)

For owners in Canada:
The symbol on a child restraint system indicates the presence of a lower connector system.

▶ Type B



STEP 2 LATCH anchors are behind the button. Open the cover and confirm the position of the LATCH anchors.

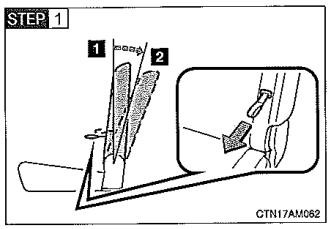
STEP 3 Latch the hooks of the lower straps onto the LATCH anchors.

STEP 4 If the child restraint has a top tether strap, the top tether strap should be latched onto the top tether strap anchor. (→P. 151, 152)

For owners in Canada:
The symbol on a child restraint system indicates the presence of a lower connector system.

Installation with LATCH system (third seat)

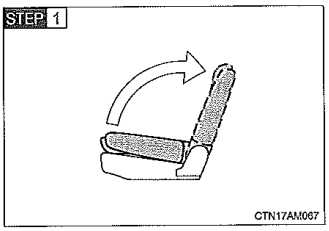
▶ Manual seat



Fold the seatback while pulling the lever. Return the seatback and secure it at the 1st lock position (most upright position). Adjust the seatback to the 11th lock position. (→P. 61)

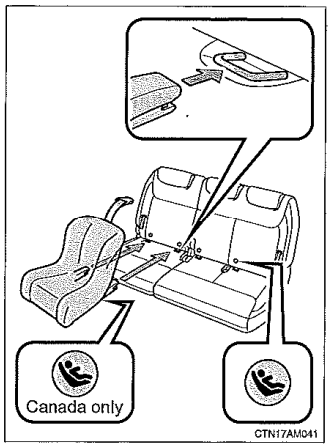
1 1st lock position
2 11th lock position

▶ Power seat



Fold down the seatback by pressing the folding/returning switch (→P. 72). Raise the seatback by pressing the same switch, the returning switch (→P. 76) or the seatback angle adjustment switch (→P. 61). (The seatback will automatically stop.) Do not touch the switch while the seatback is moving, because the operation will stop.

▶ Type A



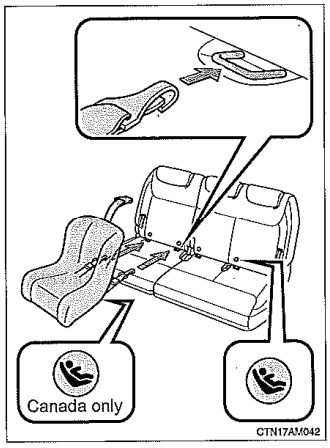
STEP 2 Widen the gap between the seat cushion and seatback slightly and confirm the position of the LATCH anchors near the button on the seatback.

STEP 3 Latch the buckles onto the LATCH anchors.

STEP 4 If the child restraint has a top tether strap, the top tether strap should be latched onto the top tether strap anchor. (→P. 151, 152)

For owners in Canada:
The symbol on a child restraint system indicates the presence of a lower connector system.

▶ Type B



STEP 2 Widen the gap between the seat cushion and seatback slightly and confirm the position of the LATCH anchors near the button on the seatback.

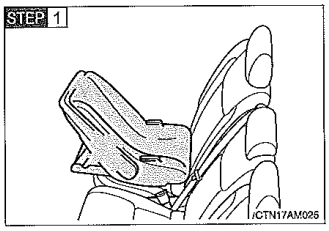
STEP 3 Latch the hooks of the lower straps onto the LATCH anchors.

STEP 4 If the child restraint has a top tether strap, the top tether strap should be latched onto the top tether strap anchor. (→P. 151, 152)

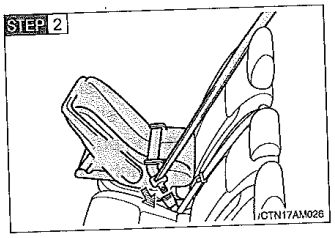
For owners in Canada:
The symbol on a child restraint system indicates the presence of a lower connector system.

Installing child restraints using a seat belt (child restraint lock function belt)

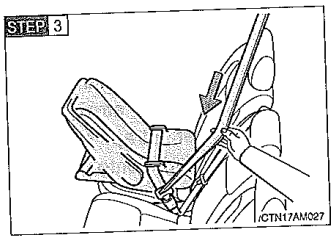
■ Rear facing — Infant seat/convertible seat



Place the child seat on the rear seat facing the rear of the vehicle.

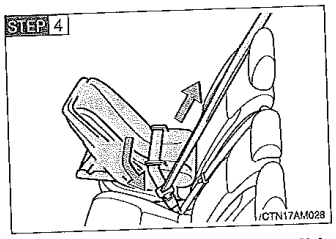


Run the seat belt through the child seat and insert the plate into the buckle. Make sure that the belt is not twisted.



Fully extend the shoulder belt and then allow it to retract slightly in order to activate the ALR lock mode.

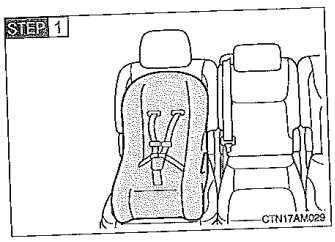
Lock mode allows the seat belt to retract only.



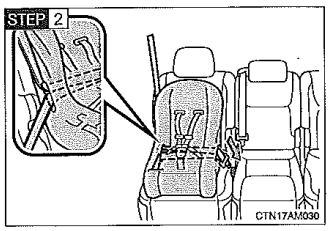
While pushing the child seat down into the rear seat, allow the shoulder belt to retract until the child seat is securely in place.

After the shoulder belt has retracted to a point where there is no slack in the belt, pull the belt to check that it cannot be extended.

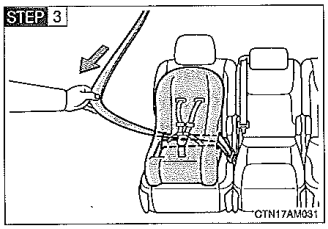
■ Forward facing — Convertible seat



Place the child seat on the seat facing the front of the vehicle.

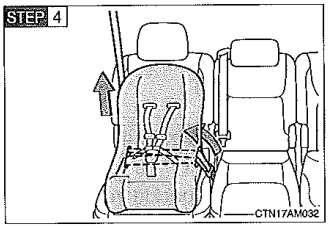


Run the seat belt through the child seat and insert the plate into the buckle. Make sure that the belt is not twisted.



Fully extend the shoulder strap and then allow it to retract slightly into the ALR lock mode.

Lock mode allows the seat belt to retract only.



While pushing the child seat into the rear seat, allow the shoulder belt to retract until the child seat is securely in place.

After the shoulder belt has retracted to a point where there is no slack in the belt, pull the belt to check that it cannot be extended.

STEP 5 If the child restraint has a top tether strap, the top tether strap should be latched onto the top tether strap anchor. (→P. 151, 152)

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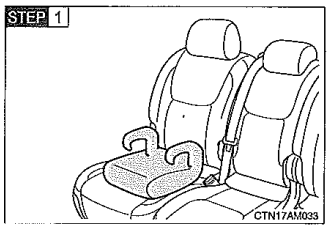
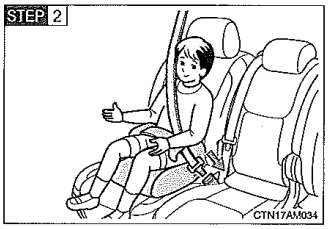
Booster seat

STEP 1



Place the booster seat on the seat facing the front of the vehicle.

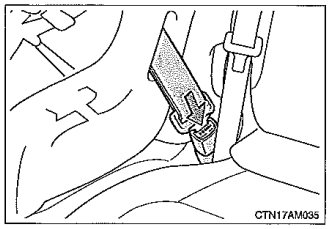
STEP 2



Sit the child in the booster seat. Fit the seat belt to the booster seat according to the manufacturer's instructions and insert the plate into the buckle. Make sure that the belt is not twisted.

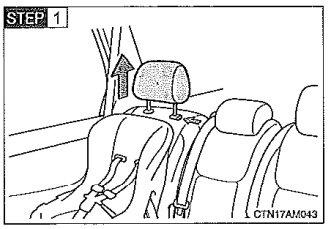
Check that the shoulder belt is correctly positioned over the child's shoulder, and that the lap belt is as low as possible.
(→P. 84)

Removing a child restraint installed with a seat belt

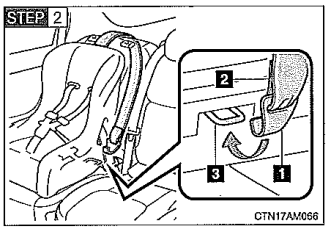


Push the buckle release button and fully retract the seat belt.

Child restraint systems with a top tether strap (second seat)



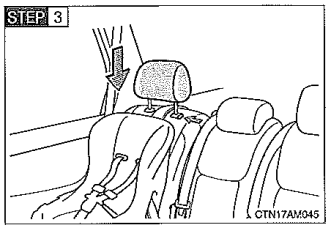
Secure the child restraint using the seat belt or LATCH anchors. Remove the head restraint.



Latch the hook onto the anchor bracket and tighten the top tether strap.

Make sure the top tether strap is securely latched.

1 Hook
2 Top tether strap
3 Anchor bracket



Replace the head restraint.

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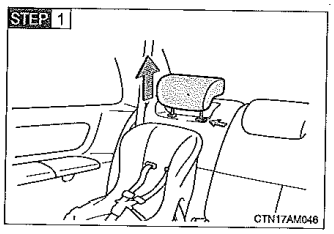
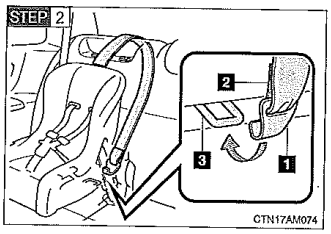
Child restraint systems with a top tether strap (third seat)

STEP 1



Secure the child restraint using the seat belt or LATCH anchors. Remove and safely stow the head restraint.

STEP 2



Latch the hook onto the anchor bracket and tighten the top tether strap.

Make sure the top tether strap is securely latched.

1 Hook
2 Top tether strap
3 Anchor bracket

Laws and regulations pertaining to anchorages

The LATCH system conforms to FMVSS225 or CMVSS210.2.
Child restraint systems conforming to FMVSS213 or CMVSS213 specifications can be used.
This vehicle is designed to conform to the SAE J1819.

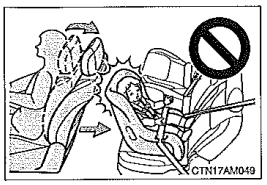
CAUTION

■When installing a booster seat

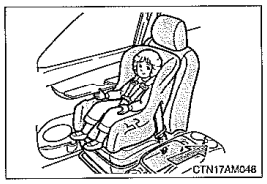
Do not fully extend the shoulder belt to prevent the belt from going to ALR lock mode: (→P. 87)
ALR mode causes the belt to tighten only which could cause injury or discomfort to the child.

■When installing a child restraint system

Follow the directions given in the child restraint system installation manual and fix the child restraint system securely in place.
If the child restraint system is not correctly fixed in place, the child or other passengers may be seriously injured or even killed in the event of sudden braking or an accident.



- If the driver's seat interferes with the child restraint system and prevents it from being attached correctly, attach the child restraint system to the right-hand rear seat.
- Adjust the front passenger seat or second seats so that it does not interfere with the child restraint system.



- Only put a forward-facing or booster child seat on the front seat when unavoidable. When installing a forward-facing or booster child seat on the front passenger seat, move the seat as far back as possible even if "AIR BAG OFF" indicator light is illuminated. Failing to do so may result in death or serious injury if the airbags deploy (inflate).

⚠ CAUTION

■ When installing a child restraint system

- When installing a child restraint system in the third center seat, adjust both seatbacks at the same angle. Otherwise, the child restraint system cannot be securely restrained and this may cause death or serious injuries in a collision.
- When using the LATCH anchors for a child restraint system, move the seat as far back as possible (second seat only), with the seatback close to the child restraint system.
- When a booster seat is installed, always ensure that the shoulder belt is positioned across the center of the child's shoulder. The belt should be kept away from the child's neck, but not so that it could fall off the child's shoulder. Failing to do so may result in death or serious injury in the event of an accident or sudden braking.
- Ensure that the belt and tab are securely locked and the seat belt is not twisted.
- Push and pull the child seat in different directions to be sure it is secure.
- After securing a child restraint system, never adjust the seat.
- Follow all installation instructions provided by the child restraint system manufacturer.
- Third seats: When a child restraint system with a top tether strap is installed, do not install the head restraint. The head restraint may interfere with the top tether strap preventing secure installation of the child restraint system.
- Make sure to properly store the removed head restraint in a secure place when you use the child restraint system on the third seat.

■ Do not use a seat belt extender

If a seat belt extender is used when installing a child restraint system, the seat belt will not securely hold the child restraint system, which could cause death or serious injury to the child or other passengers in the event of a collision.

⚠ CAUTION

■ To correctly attach a child restraint system to the anchors

When using the LATCH anchors, be sure that there are no foreign objects around the anchors and that the seat belt is not caught behind the child restraint. Make sure the child restraint system is securely attached, or it may cause death or serious injury to the child or other passengers in the event of a sudden stop or accident.

APPENDIX B
MANUFACTURER'S DATA (OVSC FORM 14)

Attachment 1
FORM – 225
Rev. 10/10/08

C95107

SEAT REFERENCE POINT (SRP) AND TORSO ANGLE DATA

FMVSS No. 225
(All dimensions in mm[1])

MODEL YEAR: 2009 / MAKE: TOYOTA / MODEL: SIENNA / BODY STYLE: 5DOOR WAGON

SEAT STYLE: FRONT ROW: SEPARATED / SECOND ROW: SEPARATED&BENCH / THIRD ROW: BENCH

Table 1. Seating Positions[1] and Torso Angles

		Left (Driver Side)	Center (if any)	Right
		(Driver) 342	NA	(Front Passenger) 342
A1		346	346	346
A2		345	345	345
A3		358	NA	358
B		1198	1168	1198
C		2073	2073	2073
D		21	NA	21
Torso Angle (degree)	Front Row	25	25	25
	Second Row	25	25	25
	Third Row			

Note: All dimensions are in mm. If not, provide the unit used.

FORM – 225

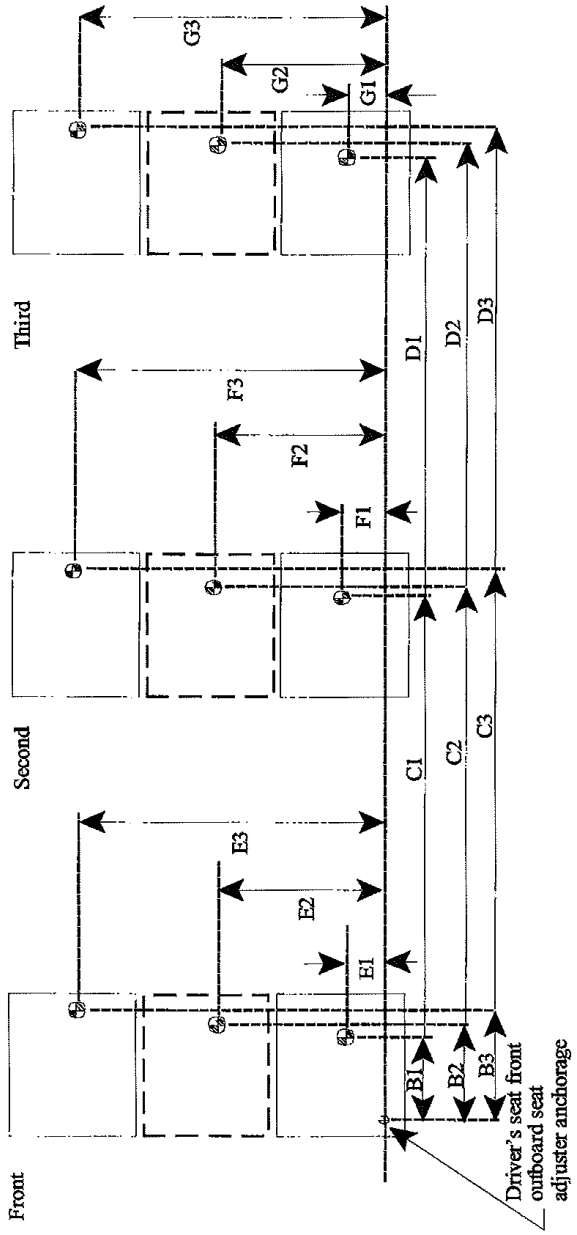
SEATING REFERENCE POINT

FMVSS No. 225

(All dimensions in mm)

MODEL YEAR: 2009 / MAKE: TOYOTA / MODEL: SIENNA / BODY STYLE: 5DOOR WAGON

SEAT STYLE: FRONT ROW: SEPARATED / SECOND ROW: SEPARATED&BENCH / THIRD ROW: BENCH



FORM – 225

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Table 2. Seating Reference Point and Tether Anchorage Locations

Seating Reference Point (SRP)		Distance from Driver's front outboard seat adjuster anchorage[1]
Front Row	B1	358
	E1	211
	B2	NA
	E2	NA
	B3	358
	E3	1073
Second Row	C1	1198
	F1	167(BENH), 227(SEPA)
	C2	1168
	F2	642
	C3	1198
	F3	1117(BENCH), 1057(SEP)
Third Row	D1	2073
	G1	287
	D2	2073
	G2	672
	D3	2073
	G3	997

Note: Use the center of anchorage.

TETHER ANCHORAGE LOCATIONS

FMVSS No. 225

(All dimensions in mm)

MODEL YEAR: 2009 / MAKE: TOYOTA / MODEL: SIENNA / BODY STYLE: 5DOOR WAGON

SEAT STYLE: FRONT ROW: SEPARATED / SECOND ROW: SEPARATED&BENCH / THIRD ROW: BENCH

⊕: SRP

⊕: Tether anchorage

Note: The location shall be measured at the center of anchorage.

FORM – 225

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Table 3. Seating Reference Point and Tether Anchorage Locations

Seating Reference Point (SRP)	Distance from SRP	
Front Row	H1	NA
	K1	NA
	H2	NA
	K2	NA
	H3	NA
	K3	NA
Second Row	I1	317
	L1	0
	I2	317
	L2	0
	I3	317
	L3	0
Third Row	J1	203
	M1	0
	J2	203
	M2	32
	J3	NA
	M3	NA

Note: Use the center of anchorage.

FORM – 225

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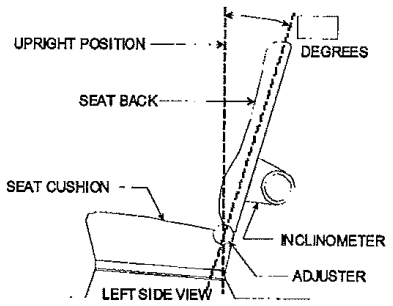
NOMINAL DESIGN RIDING POSITION

For adjustable driver, passenger, 2nd row and 3rd row seat backs, describe how to position the inclinometer to measure the seat back angle. Include a description of the location of the seat back adjustment latch detent if applicable. Indicate if applicable, how the detents are numbered (Is the first detent "0"or "1"?). Indicate if the seat back angle is measured with the dummy in the seat.



Seat back angle for driver's seat = 21 degrees.

Measurement Instructions:

Seat back angle for passenger's seat = 21 degrees.

Measurement Instructions:

Seat back angle for 2nd row seat = 25 degrees.

Measurement Instructions:

Seat back angle for 3rd row seat = 25 degrees.

Measurement Instructions:

FORM – 225

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TETHER ANCHORAGE LOCATIONS - VERTICAL

FMVSS No. 225
(All dimensions in mm)

MODEL YEAR: 2009 / MAKE: TOYOTA / MODEL: SIENNA / BODY STYLE: 5DOOR WAGON

SEAT STYLE: FRONT ROW: SEPARATED / SECOND ROW: SEPARATED&BENCH / THIRD ROW: BENCH

LEFT SIDE VIEW OF TEST VEHICLE

FORM – 225

Table 4. Vertical Dimension For The Tether Anchorage

Seating Row	Vertical Distance from Seating Reference Point	
Front Row	N1 (Driver)	N/A
	N2 (Center)	NA
	N3 (Right)	NA
Second Row	O1 (Left)	92
	O2 (Center)	92
	O3 (Right)	92
Third Row	P1 (Left)	178
	P2 (Center)	178
	P3 (Right)	NA

Note: All dimensions are in mm. If not, provide the unit anchorage.

FORM – 225

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For each vehicle, provide the following information:

1. How many designated seating positions exist in the vehicle?

Response 1:
The 2009 TOYOTA SIENNA has 8DSPs in bench seat and 7DSPs in separated seat.

2. How many designated seating positions are equipped with lower anchorages and tether anchorages? Specify which position(s).

Response 2:
Bench:3, Separated:2
Please see the table5 below.

Table 5. The position of lower anchorages and tether anchorages

	Left		Center		Right	
Seat type	Bench	Separated	Bench	Separated	Bench	Separated
1st row	X	X			X	X
2nd row	O	O	O		O	O
3rd row	X	X	X	X	X	X

FORM – 225

3. How many designated seating positions are equipped with tether anchorages? Specify which positions(s).

Response 3:
BENCH:5, SEPARATED:4
Please see the Table6 below.

Table 6. The position of tether anchorages

	Left		Center		Right	
Seat type	Bench	Separated	Bench	Separated	Bench	Separated
1st row	X	X			X	X
2nd row	O	O	O		O	O
3rd row	X	X	O	O	O	O

4. Lower Anchorages Marking and Conspicuity: Whether the anchorages are certified to S9.5(a) or S9.5(b) of FMVSS No. 225.

Response 4:
All anchorages installed in the 2009 TOYOTA SIENNA are certified to S9.5(a) of FMVSS225.