



**Mazda<sup>®</sup>**

## MX-5 Power Retractable Hardtop PRHT Technical Training

### **Models**

2007-Present MX-5 with Power Retractable Hardtop (PRHT)

### **Description**

This job aid explains the following procedures:

Deck Panel Removal .....	3
Deck Panel Manual Open Procedure.....	9
Restore the Deck Panel After Repair .....	11
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## Technical Training

### Deck Panel Removal

1. Unlock and unlatch the top latch
2. Open the deck panel:
  - If the deck panel will open electronically go to step 2
  - If the deck panel will not open electronically go to page 9 Deck Panel Manual Open Procedure.



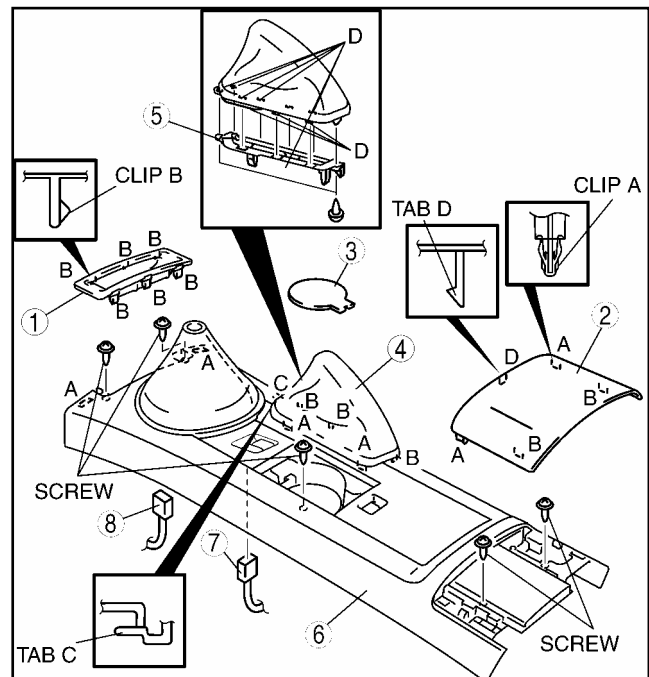
#### Normal Top Operation Requirements:

- a. Ignition ON
- b. Top unlocked and unlatched
- c. Battery between 9.5 and 16.5 volts
- d. Vehicle stopped (under 1.8mph)
- e. Trunk closed
- f. Press and hold the open or close switch until the deck panel is fully open

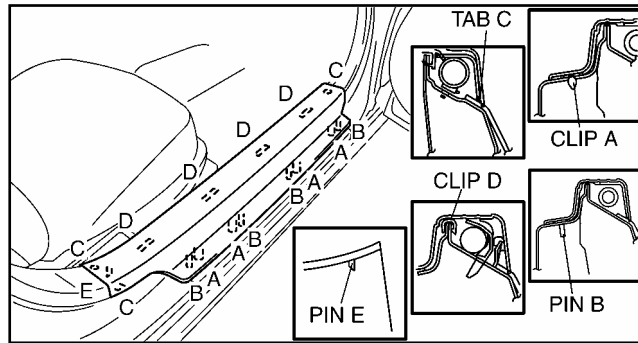


3. Lower the windows.
4. Remove the shift knob
5. Remove the center console observing the following step #s in the figure:

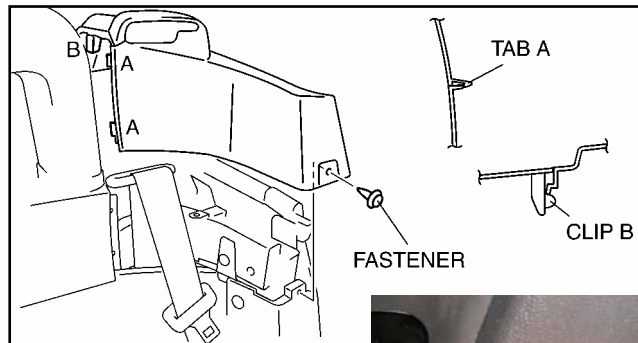
1. Remove the front finisher and two screws
2. Remove the rear finisher and two screws
3. Remove the cup holder finisher and screw
  - AT shift to D range
4. Unclip the parking brake boot
5. Skip this step in the diagram
6. Pull the center console up
7. and 8. Disconnect the power window switch



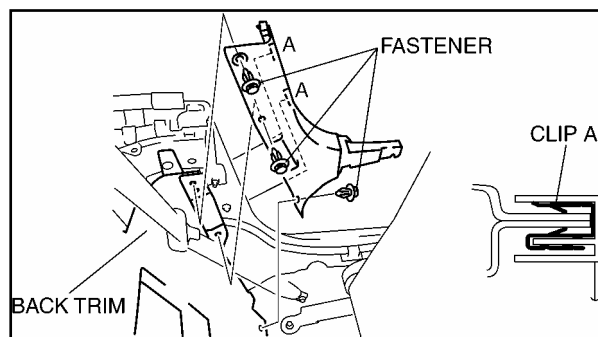
6. Remove the scuff plate



7. Remove both side trims



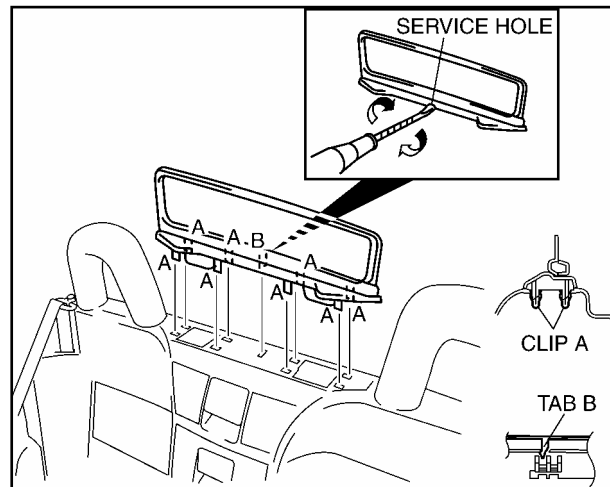
8. Remove both tire house trims



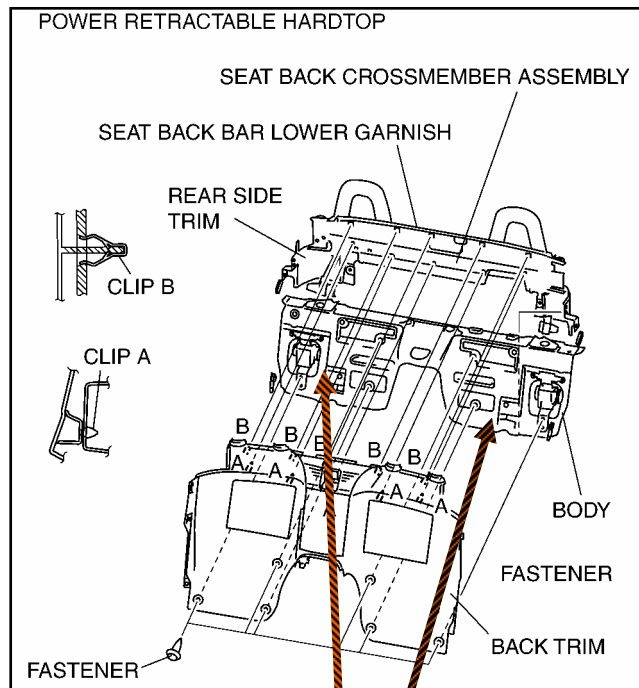
# Technical Training

## Deck Panel Removal Continued

9. Remove the aero board



10. Remove the back trim clips (three each side) then remove the back trim



11. Remove the two hidden rear side trim clips, one on each side



**Deck Panel Removal Continued**

12. Remove the three rear side trim clips, then the rear side trim



13. Locate the roof hook cable plastic guide cover behind the driver seat beneath the PRHT control module. Pry the plastic case open and remove the cable from the back of the metal sleeve (not the front as pictured).



14. Disconnect the left deck panel motor and the high mount brake light connector on the left linkage



15. Disconnect the right deck panel motor and the deck panel limit switch connector from the right deck panel linkage

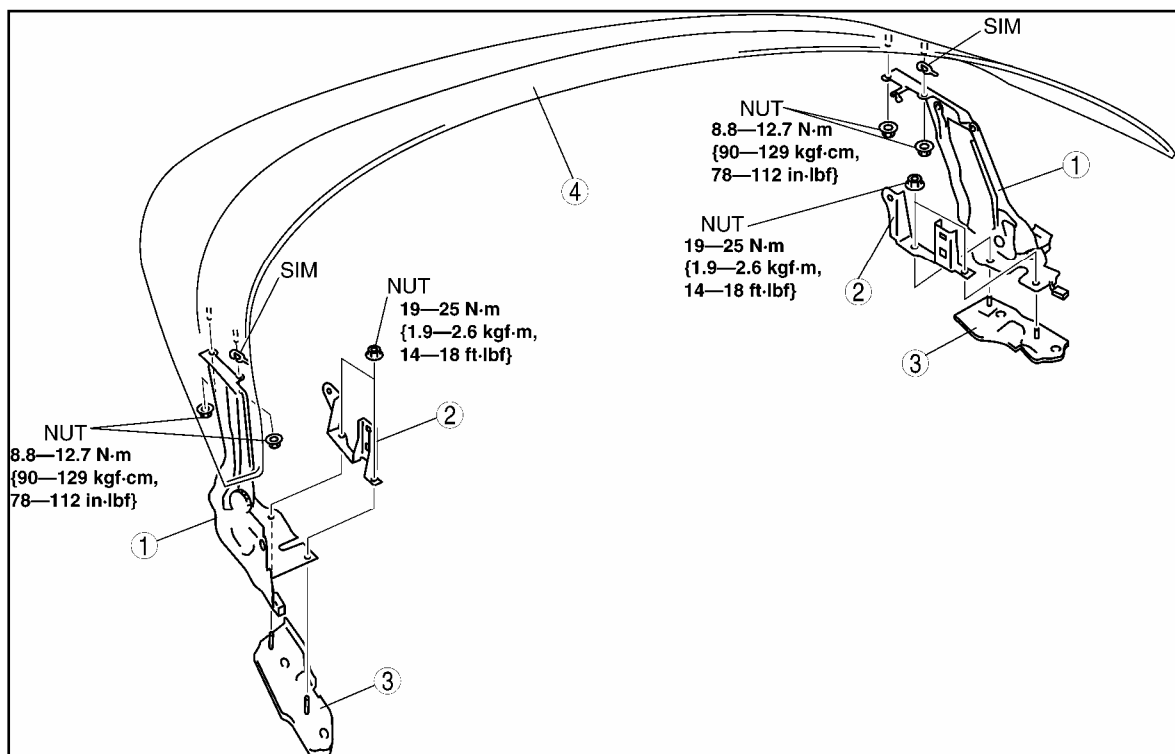
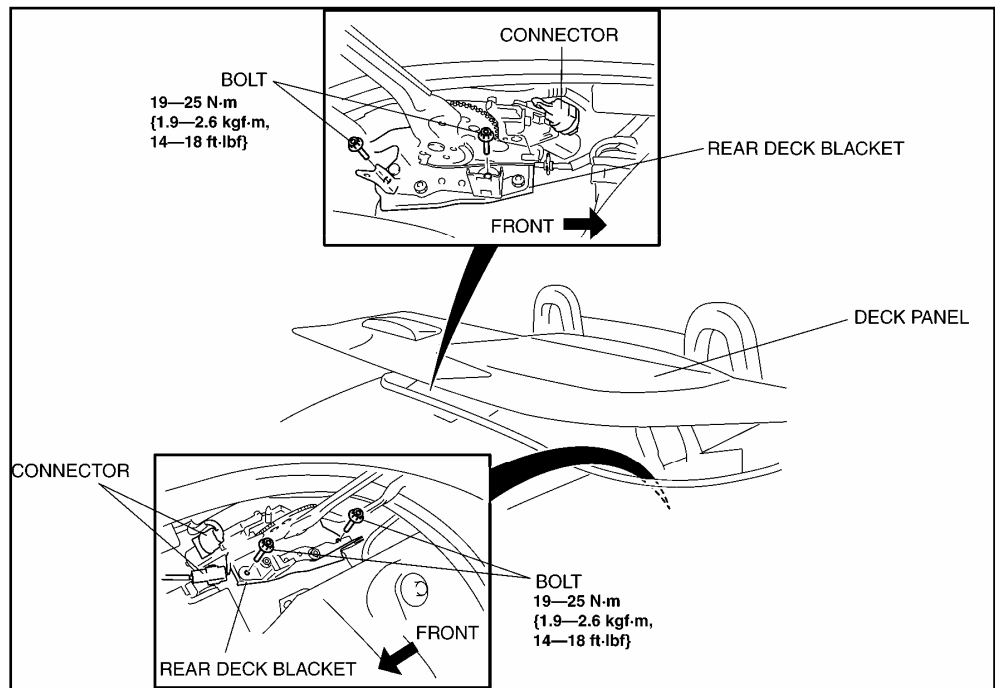


# Technical Training

## Deck Panel Removal Continued

16. Remove the four deck panel bolts, two each side

17. Remove the deck panel assembly with two people; make sure to guide the roof hook cable as you remove the panel to protect the paint



18. Installation is the reverse of removal

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## Technical Training

### Deck Panel Manual Open Procedure

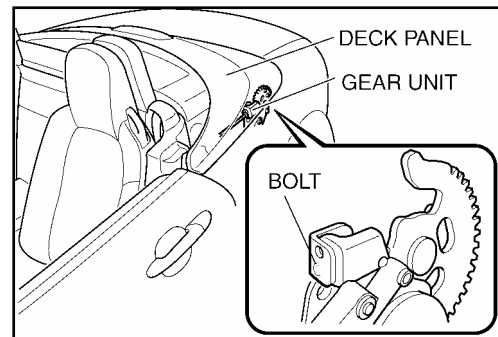
1. Open the tool kit found in the glove compartment

#### NOTE

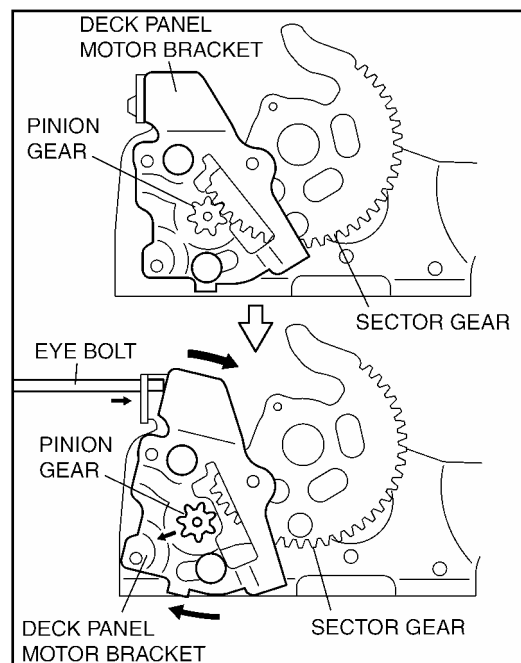
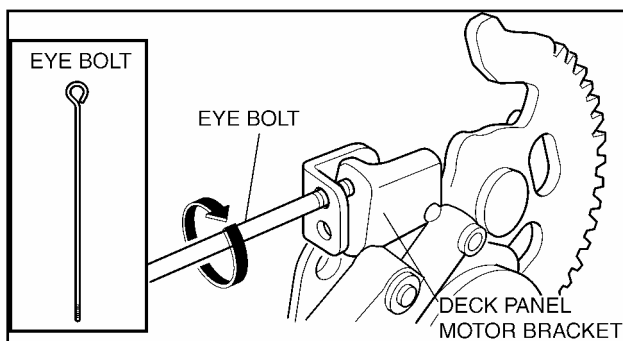
- You will only use the Allen wrench and the eye bolt. The rope is only used to secure the deck lid for safe driving.
- You must perform all steps on one side of the deck panel, and then repeat all steps on the other side of the deck panel



2. Remove the 6mm hex bolt

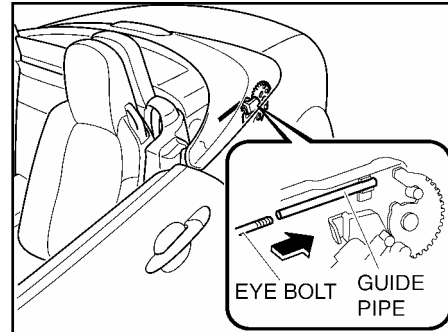
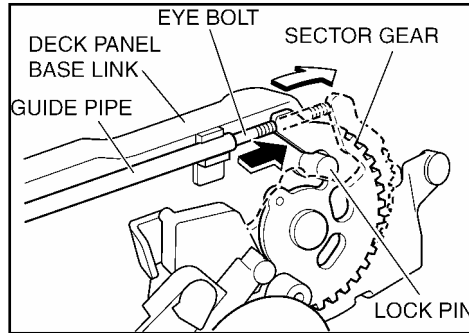


3. Tighten the eye bolt to separate the brackets

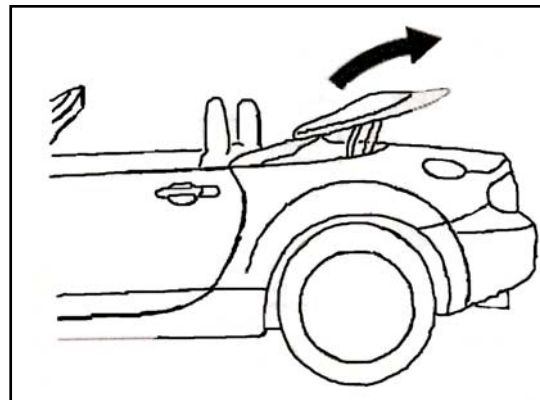


**Deck Panel Manual Open Procedure Continued**

4. Place the eye bolt inside the guide tube then push to separate the sector gear from the motor



5. Using two people, raise the deck panel from both sides evenly to the open position



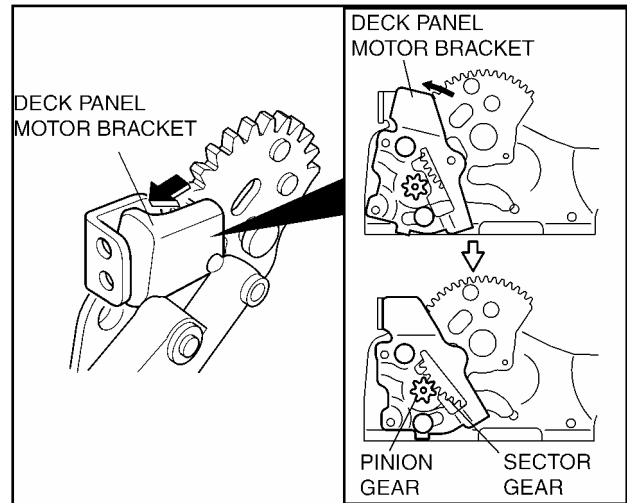
## Technical Training

### Restore the Deck Panel After Repair

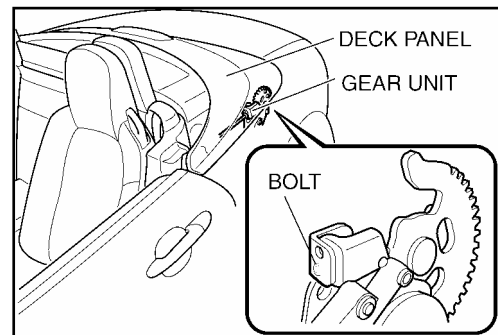
#### NOTE

- Perform these steps on both sides of the deck panel.
- The procedure requires the deck panel to be in the open position.

1. Rotate the deck panel motor bracket in the direction of the arrow to engage the pinion gear and the sector gear



2. Install the 6 mm hex bolt



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## Technical Training

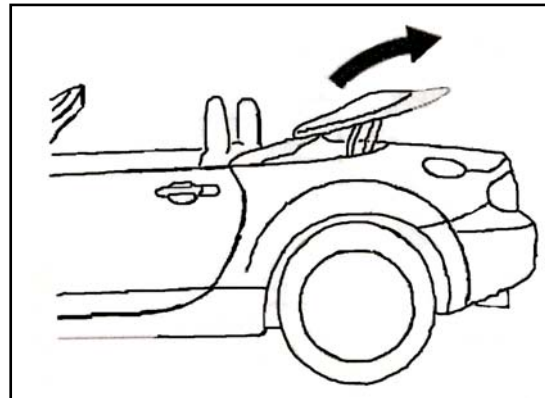
### Power Retractable Hardtop Removal

1. Open the deck panel:

- If the deck panel will open electrically go to step 3
- If the deck panel is stuck closed go to page 9 Deck Panel Manual Open Procedure

Normal Top Operation Requirements:

- g. Ignition ON
- h. Top unlocked and unlatched
- i. Battery between 9.5 and 16.5 volts
- j. Vehicle stopped (under 1.8mph)
- k. Trunk closed
- l. Press and hold the open or close switch until the deck panel is fully open



**Power Retractable Hardtop Removal Continued**

2. Lower the windows

3. Record the customers' radio station presets below. Reprogram the presets after assembly

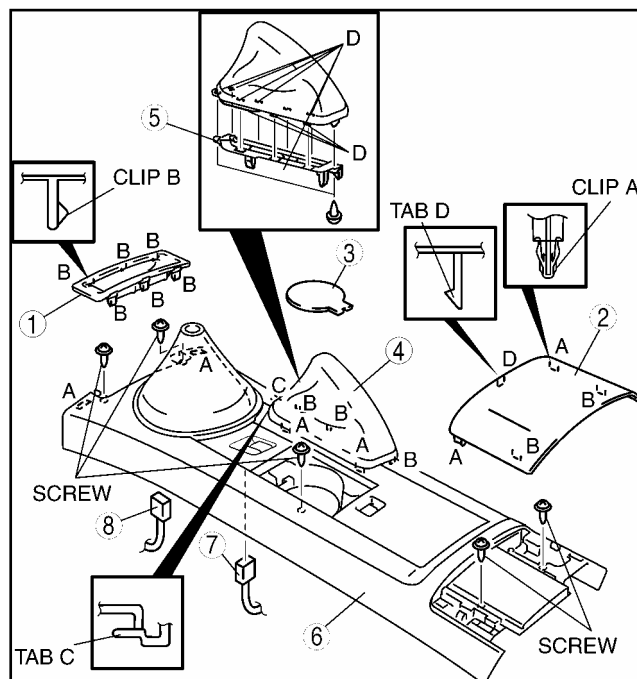
FM1					
Preset 1	Preset 2	Preset 3	Preset 4	Preset 5	Preset 6
FM2					
Preset 1	Preset 2	Preset 3	Preset 4	Preset 5	Preset 6
AM1					
Preset 1	Preset 2	Preset 3	Preset 4	Preset 5	Preset 6

4. Disconnect the negative battery cable

5. Remove the shift knob

6. Remove the center console observing the following step #s in the figure:

1. Remove the front finisher and two screws
2. Remove the rear finisher and two screws
3. Remove the cup holder finisher and screw
  - AT shift to D range
4. Unclip the parking brake boot
5. and 6. Skip these steps in the diagram
  - Pull the center console up
7. and 8. Disconnect the power window switch connectors



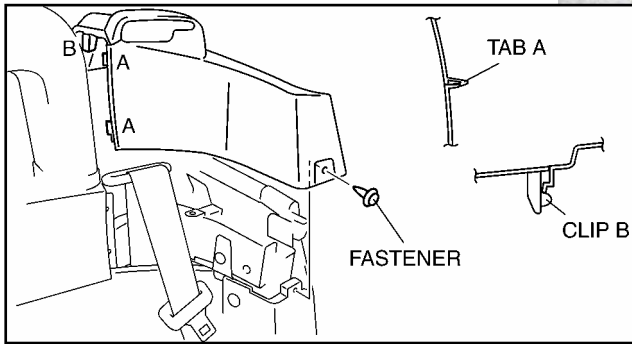
## Technical Training

### Power Retractable Hardtop Removal Continued

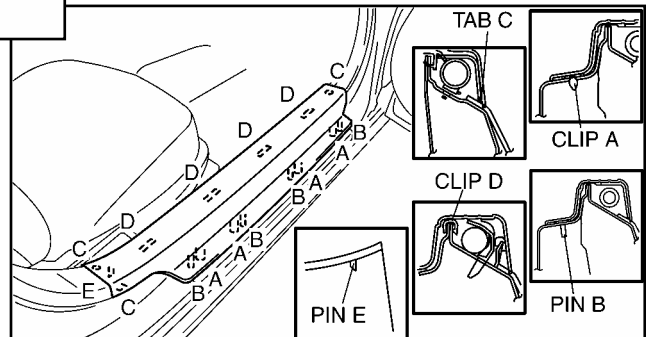
7. Remove the cab side weatherstrip (3-clips)



8. Remove the quarter trim

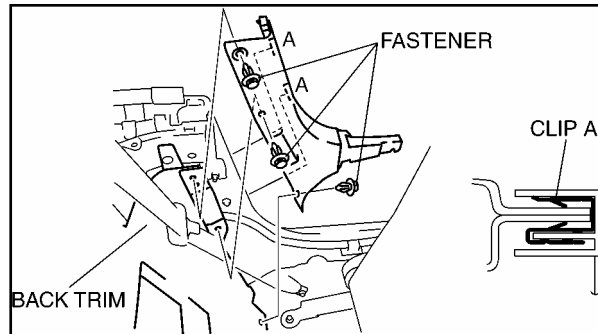


9. Remove the scuff plate

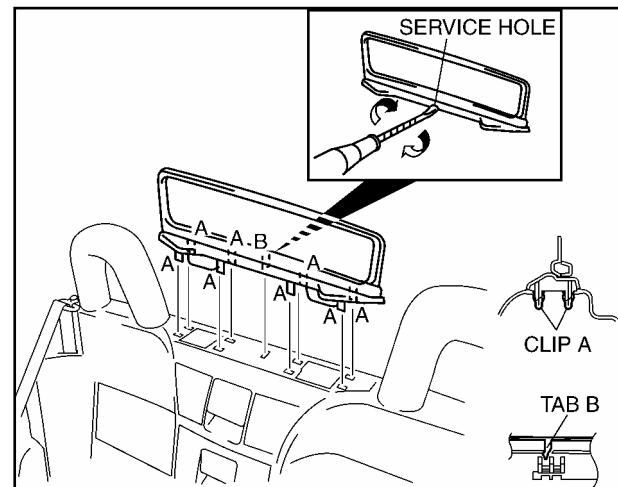


**Power Retractable Hardtop Removal Continued**

10. Remove the tire house trim

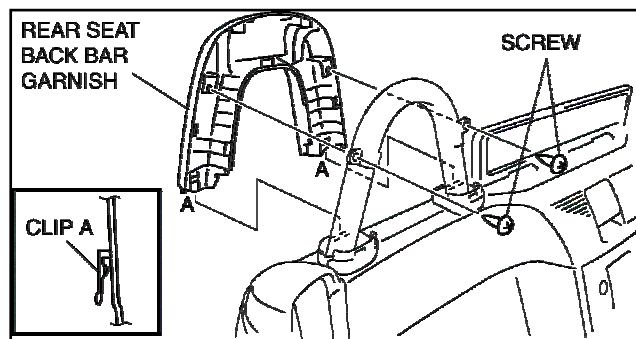


11. Remove the aero board



12. Remove both seat back bar garnishes

- a. Pull the front garnish off
- b. Remove the screws
- c. Pull the rear seat back garnish up and detach the clips

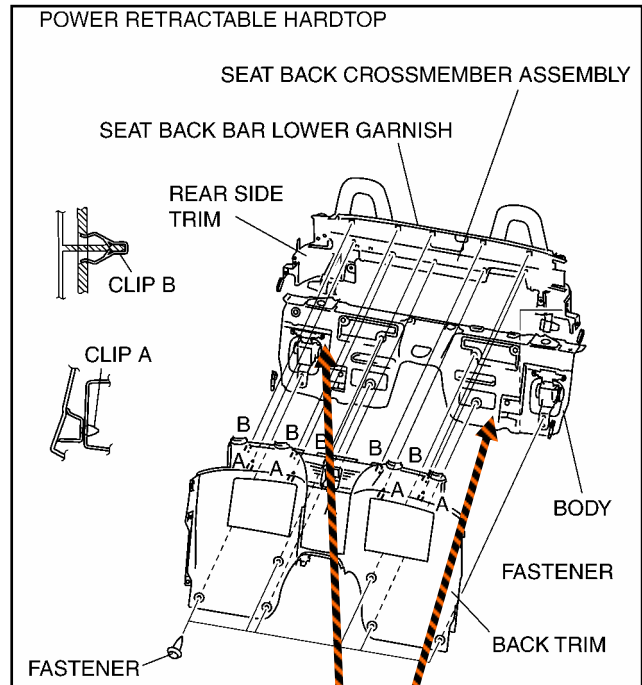




## Technical Training

### Power Retractable Hardtop Removal Continued

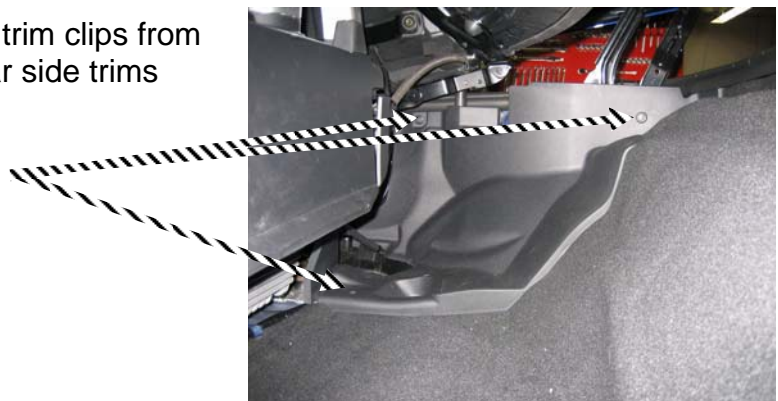
13. Remove the back trim clips (three each side) then remove the back trim



14. Remove the two hidden rear side trim clips one on each side



15. Remove the three rear side trim clips from both sides and remove both rear side trims

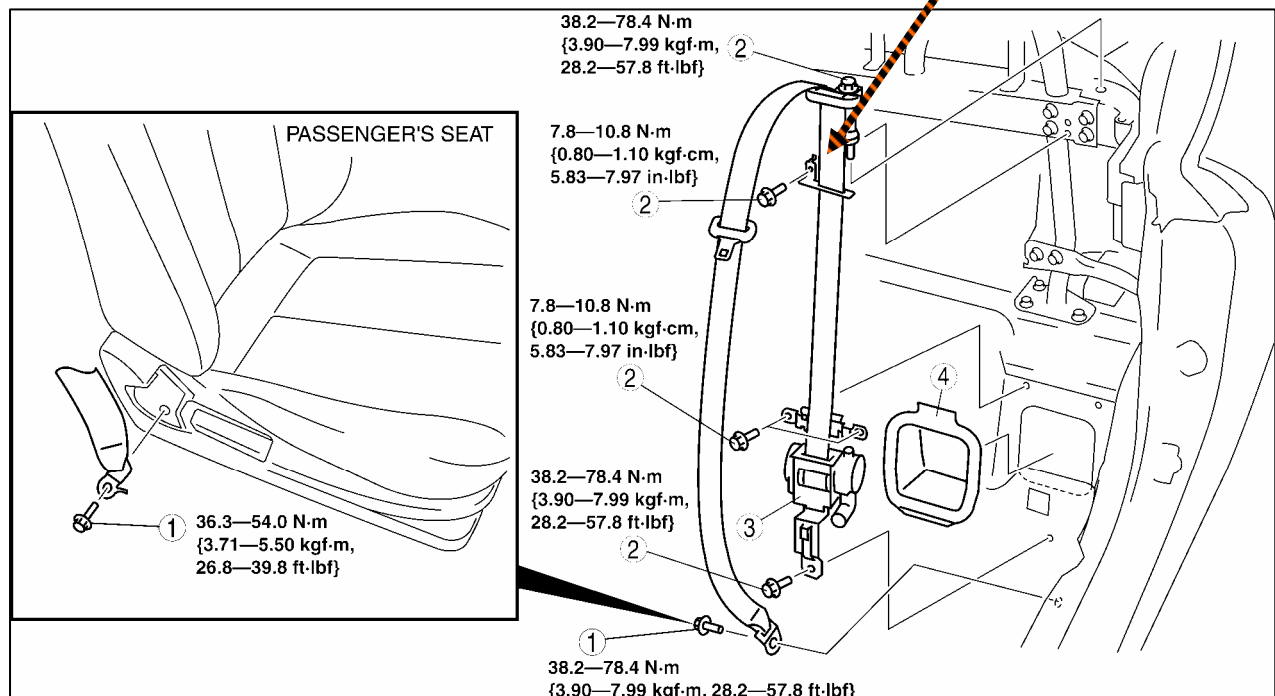


## Power Retractable Hardtop Removal Continued

16. Remove both seat belt upper anchor bolts



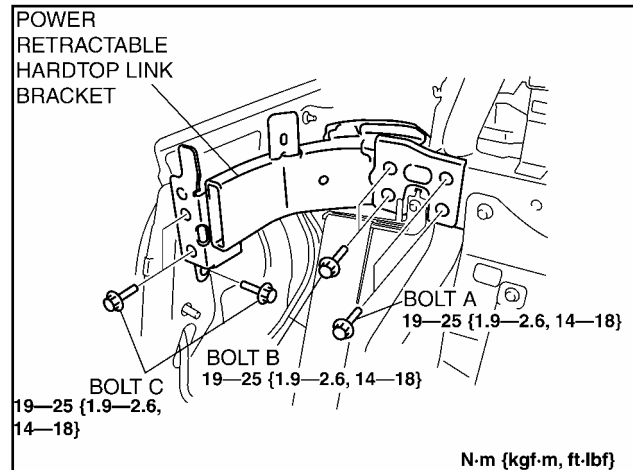
17. Remove both upper seat belt guide bolts



## Technical Training

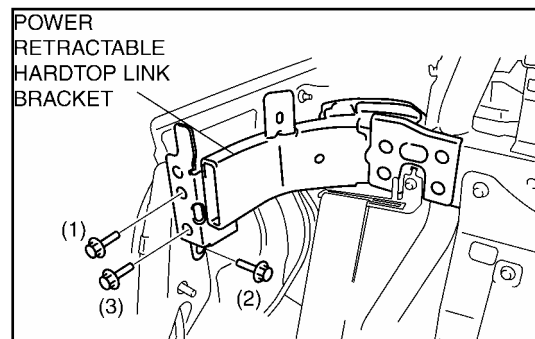
### Power Retractable Hardtop Removal Continued

18. Remove both power retractable hardtop link brackets



#### Link Bracket Install Note

Temporarily tighten the bolts in the order indicated in the figure. Then torque them to the specification in the figure above



19. Disconnect the roof motor electrical connectors from both sides

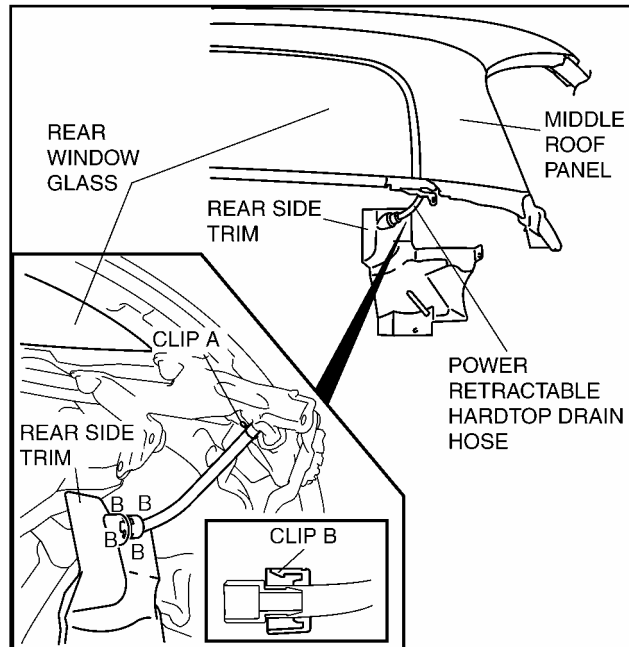
- Disconnect the roof motor limit switch from the right side
- Disconnect the rear window defroster connector for the left side (not pictured)



**Power Retractable Hardtop Removal Continued**

20. Disconnect the power retractable hardtop drain hose from each side

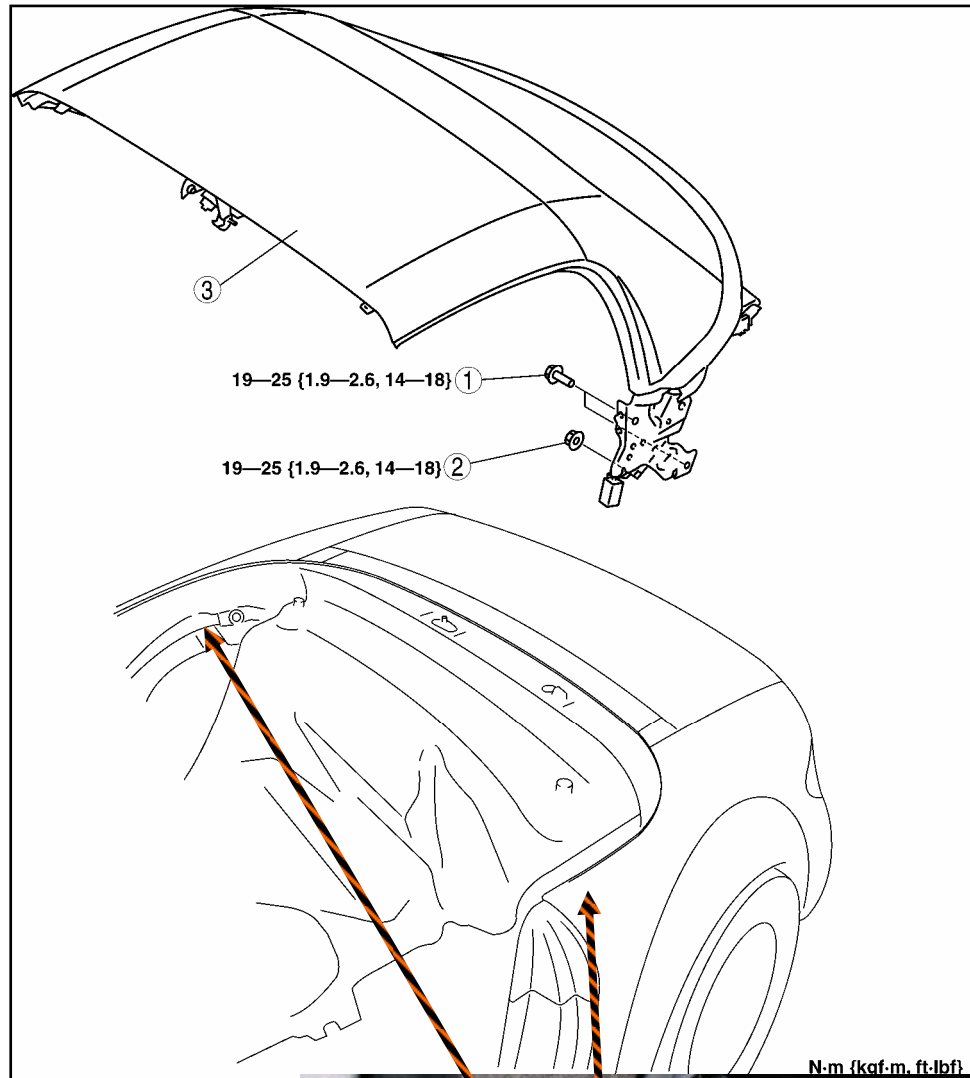
- a. Raise the retractable hardtop; this requires two people to raise the top evenly from both sides
- b. Remove clip A and remove the drain hose from the rear window glass



## Technical Training

### Power Retractable Hardtop Removal Continued

21. Remove the two bolts and one nut (1 and 2) from each side



- If the top has lowered, raise it again with tow people; two of the bolts are hidden behind the top



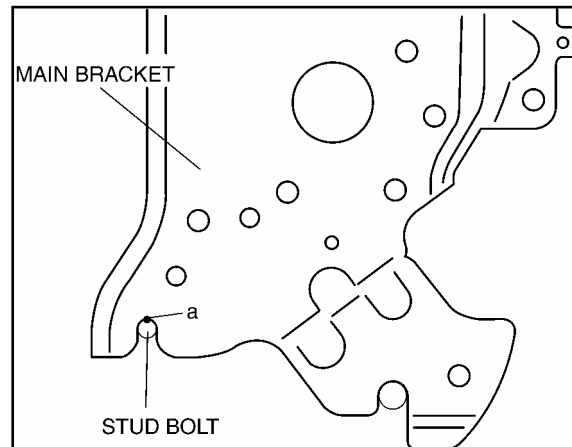
**Power Retractable Hardtop Removal Continued**

22. Remove the power retractable hard top from the vehicle with two people and set it on a soft surface to protect it from damage

23. Installation is the reverse of removal

**Top Installation Note:**

- a. Place the main bracket on the stud bolt
- b. Make sure there is no gap at "a"
- c. Tighten the bolts and nuts (1 and 2) in step 21 to: 19-25 Nm (14-18 ftlbf)



## PRHT PIDs

### ON-BOARD DIAGNOSTIC [POWER RETRACTABLE HARDTOP]

#### PID/DATA MONITOR TABLE[POWER RETRACTABLE HARDTOP]

id0902j2862100

#### PID/data monitor table

PID name (definition)	Unit/ Operation	Operation Condition (Reference)	Terminal
DTC_CNT (Number of continuous DTCs)	–	<ul style="list-style-type: none"> <li>DTCs detected: 1—255</li> <li>No DTCs detected: 0</li> </ul>	–
VPWR (Module supply voltage)	V	Ignition switch is at ON: B+	1X
VSS (Vehicle speed)	KPH, MPH	<ul style="list-style-type: none"> <li>Vehicle stopped: 0 KPH {0 MPH}</li> <li>Vehicle speed 25 km/h {16 mph}: 25 KPH {16 MPH}</li> </ul>	–
RHT_OP (Power retractable hardtop limit switch (Open position))	On/Off	<ul style="list-style-type: none"> <li>When power retractable hardtop is fully opened (Power retractable hardtop open position switch is on): On</li> <li>Others (Power retractable hardtop open position switch is off): Off</li> </ul>	1T
RHT_CL (Power retractable hardtop limit switch (Close position))	On/Off	<ul style="list-style-type: none"> <li>When power retractable hardtop is fully closed (Power retractable hardtop close position switch is on): On</li> <li>Others (Power retractable hardtop close position switch is off): Off</li> </ul>	1R
DECK_OP (Deck panel limit switch (Open position))	On/Off	<ul style="list-style-type: none"> <li>When deck panel is fully opened (Deck panel open position switch is on): On</li> <li>Others (Deck panel open position switch is off): Off</li> </ul>	3F
DECK_CL (Deck panel limit switch (Close position))	On/Off	<ul style="list-style-type: none"> <li>When deck panel is fully closed (Deck panel close position switch is off): Off</li> <li>Others (Deck panel close position switch is on): On</li> </ul>	3O
SW_OP (Power retractable hardtop open switch)	On/Off	<ul style="list-style-type: none"> <li>When power retractable hardtop open switch is pressed: On</li> <li>When power retractable hardtop open switch is released: Off</li> </ul>	1H
SW_CL (Power retractable hardtop close switch)	On/Off	<ul style="list-style-type: none"> <li>When power retractable hardtop close switch is pressed: On</li> <li>When power retractable hardtop close switch is released: Off</li> </ul>	1H
SW_STRIKER (Top lock switch)	On/Off	<ul style="list-style-type: none"> <li>When top lock is locked: On</li> <li>When top lock is unlocked: Off</li> </ul>	1D
SW_TRUNK (Trunk lid opener switch)	On/Off	<ul style="list-style-type: none"> <li>When trunk lid opener switch is pressed: On</li> <li>When trunk lid opener switch is released: Off</li> </ul>	1F
TR_OP_CTL (Trunk opener control)	On/Off	<ul style="list-style-type: none"> <li>Power retractable hardtop operating (Trunk open disabled): On</li> <li>Power retractable hardtop not operated (Trunk open enabled): Off</li> </ul>	–
Indicator (Power retractable hardtop indicator light)	On/Off	<ul style="list-style-type: none"> <li>When power retractable hardtop indicator light is illuminated: On</li> <li>When power retractable hardtop indicator light is turned off: Off</li> </ul>	2C

**PRHT DTC's**
**ON-BOARD DIAGNOSTIC [POWER RETRACTABLE HARDTOP]**
**DTC TABLE[POWER RETRACTABLE HARDTOP]**
id0902j2060100

DTC M-MDS display	description	Page
B1342	Power retractable hardtop control module internal malfunction	(See 09-02G-4 DTC B1342[POWER RETRACTABLE HARDTOP].)
B1317	Battery power supply voltage increases (17.5 V or more)	(See 09-02G-5 DTC B1317/B1318[POWER RETRACTABLE HARDTOP].)
B1318	Battery power supply voltage decreases (less than 7.5 V )	
B296D	Hall sensor low power supply voltage	(See 09-02G-6 DTC B296D[POWER RETRACTABLE HARDTOP].)
U0030	Power window communication error (during power retractable hardtop operation)	(See 09-02G-7 DTC U0030/U0031[POWER RETRACTABLE HARDTOP].)
U0031	Power window communication error (during power retractable hardtop not operation)	
B296A	Roof motor pulse signal error (RH)	(See 09-02G-8 DTC B296A/U294B/B293C/B293B[POWER RETRACTABLE HARDTOP].)
U294B	Roof motor pulse signal error (LH)	
B293C	Deck panel motor pulse signal error (RH)	
B293B	Deck panel motor pulse signal error (LH)	
B293E	Roof motor circuit malfunction (RH)	(See 09-02G-11 DTC B293E/B293D/B294C/B293F[POWER RETRACTABLE HARDTOP].)
B293D	Roof motor circuit malfunction (LH)	
B294C	Deck panel motor circuit malfunction (RH)	
B293F	Deck panel motor circuit malfunction (LH)	
B294D	Roof motor opening angle does not match (Pulse count number do not match)	
B294E	Deck panel motor opening angle does not match (Pulse count number do not match)	
B294F	Power retractable hardtop/deck panel limit switch malfunction	(See 09-02G-17 DTC B294F[POWER RETRACTABLE HARDTOP].)
B296B	Top lock switch malfunction	(See 09-02G-20 DTC B296B[POWER RETRACTABLE HARDTOP].)
B296C	Power retractable hardtop switch malfunction	(See 09-02G-21 DTC B296C[POWER RETRACTABLE HARDTOP].)
U0073	CAN system communication error	(See 09-02D-1 DTC TABLE[MULTIPLEX COMMUNICATION SYSTEM].)
U0100	Communication error to PCM	
U0101	Communication error to TCM	
U2197	Vehicle speed signal communication error	



## PRHT Control Module Inspection

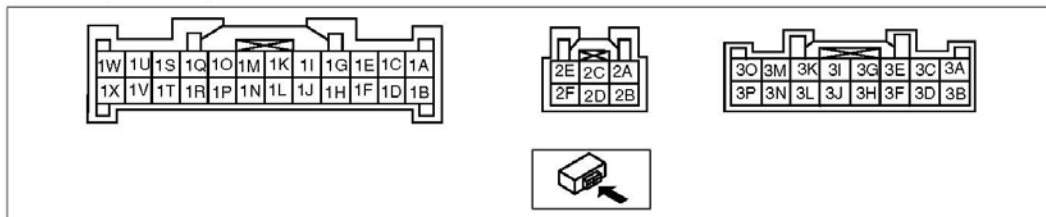
### EXTERIOR TRIM

#### POWER RETRACTABLE HARDTOP CONTROL MODULE INSPECTION

id091600809600

- Remove the following parts:
  - Console (See 09-17-11 CONSOLE REMOVAL/INSTALLATION.)
  - Quarter trim (See 09-17-13 QUARTER TRIM REMOVAL/INSTALLATION.)
  - Scuff plate (09-17-21 SCUFF PLATE REMOVAL/INSTALLATION.)
  - Tire house trim (See 09-17-19 TIRE HOUSE TRIM REMOVAL/INSTALLATION.)
  - Aeroboard (See 09-17-15 AEROBOARD REMOVAL/INSTALLATION.)
  - Front seat back bar garnish (See 09-17-17 SEAT BACK BAR GARNISH REMOVAL/INSTALLATION.)
  - Back trim (See 09-17-16 BACK TRIM REMOVAL/INSTALLATION.)
- Attach the tester lead to the power retractable hardtop control module wiring harness-side connector and inspect voltage, continuity, or resistance according to the standard (reference) on the table.

#### Standard (Reference)



amxulw0000003

Terminal	Signal	Connected to	Test condition	Standard	Inspection item
1A	Trunk lid opener relay output signal	Trunk lid opener relay system	When the trunk lid opener switch is pressed. When the trunk lid opener switch is not pressed.	1.0 or less B+	<ul style="list-style-type: none"> <li>Trunk lid opener relay</li> <li>Related wiring harness</li> </ul>
1B	—	—	—	—	—
1C	Power window input signal	Power window main switch	Under any condition: Inspect for continuity to power window main switch.	Continuity detected	<ul style="list-style-type: none"> <li>Power window main switch</li> <li>Related wiring harness</li> </ul>
1D	Top lock input signal	Top lock switch	Ignition switch is turned to the ON position When the top lock is locked. When the top lock is unlocked.	1.0 or less B+	<ul style="list-style-type: none"> <li>Top lock switch</li> <li>Related wiring harness</li> </ul>
1E	Power window full-open request signal (Output)	Power window main switch	Under any condition: Inspect for continuity to power window main switch.	Continuity detected	<ul style="list-style-type: none"> <li>Power window main switch</li> <li>Related wiring harness</li> </ul>
1F	Trunk lid latch switch signal	Trunk lid latch switch	When the trunk lid is open. When the trunk lid is closed.	1.0 or less B+	<ul style="list-style-type: none"> <li>Trunk lid latch switch</li> <li>Related wiring harness</li> </ul>
1G	Hall effect sensor power supply	<ul style="list-style-type: none"> <li>Roof Motor</li> <li>Deck panel motor</li> </ul>	Ignition switch is turned to the ON position When the roof panel or deck panel is not moving. When the roof panel or deck panel is moving.	1.0 or less B+	<ul style="list-style-type: none"> <li>Roof Motor</li> <li>Deck panel Motor</li> <li>Related wiring harness</li> </ul>
1H	Input signal of the roof panel open/close switch	Power retractable hardtop switch (hazard warning switch)	Ignition switch is turned to the ON position Opening switch on Closing switch on Other	approx. 2.5 approx. 3.4 approx. 5.0	<ul style="list-style-type: none"> <li>Power retractable hardtop switch</li> <li>Related wiring harness</li> </ul>
1I	Roof motor hall sensor input signal (RH)	Roof motor (RH)	When the roof is moving. Pulse is output. (See 09-16-33 Inspection using an oscilloscope (reference).)		<ul style="list-style-type: none"> <li>Roof motor (RH)</li> <li>Related wiring harness</li> </ul>

09-16-30

**EXTERIOR TRIM**

Terminal	Signal	Connected to	Test condition		Standard	Inspection item
1J	Power supply	ROOM 15 A fuse	Under any condition		B+	<ul style="list-style-type: none"> <li>ROOM 15 A fuse</li> <li>Related wiring harness</li> </ul>
1K	Deck panel motor hall sensor input signal (RH)	Deck panel motor (RH)	When the deck panel is moving.	Pulse is output. (See 09-16-33 Inspection using an oscilloscope (reference).)		<ul style="list-style-type: none"> <li>Deck panel motor (RH)</li> <li>Related wiring harness</li> </ul>
1L	—	—	—		—	—
1M	Roof motor hall sensor input signal (LH)	Roof motor (LH)	When the roof is moving.	Pulse is output. (See 09-16-33 Inspection using an oscilloscope (reference).)		<ul style="list-style-type: none"> <li>Roof motor (LH)</li> <li>Related wiring harness</li> </ul>
1N	—	—	—		—	—
1O	Deck panel motor hall sensor input signal (LH)	Deck panel motor (LH)	When the deck panel is moving.	Pulse is output. (See 09-16-33 Inspection using an oscilloscope (reference).)		<ul style="list-style-type: none"> <li>Deck panel motor (LH)</li> <li>Related wiring harness</li> </ul>
1P	—	—	—		—	—
1Q	Hall effect sensor GND	GND	Under any condition: Inspect for continuity to GND.		Continuity detected	<ul style="list-style-type: none"> <li>Related wiring harness</li> </ul>
1R	Roof close position switch input signal	Power retractable hardtop limit switch	Ignition switch is turned to the ON position	When the roof panel is fully closed.	1.0 or less	<ul style="list-style-type: none"> <li>Power retractable hardtop limit switch</li> <li>Related wiring harness</li> </ul>
				When the roof panel is not fully closed.	B+	
1S	CAN-H	—	Because this terminal is for communication, good/no good judgment by terminal voltage is not possible.		—	<ul style="list-style-type: none"> <li>Related wiring harnesses</li> </ul>
1T	Roof open position switch input signal	Power retractable hardtop limit switch	Ignition switch is turned to the ON position	When the roof panel is fully open.	1.0 or less	<ul style="list-style-type: none"> <li>Power retractable hardtop limit switch</li> <li>Related wiring harness</li> </ul>
				When the roof panel is not fully open.	B+	
1U	CAN-L	—	Because this terminal is for communication, good/no good judgment by terminal voltage is not possible.		—	<ul style="list-style-type: none"> <li>Related wiring harnesses</li> </ul>
1V	Signal GND	Power retractable hardtop limit switch/deck panel limit switch	Ignition switch is turned to the ON position	Under any condition	1.0 or less	<ul style="list-style-type: none"> <li>Related wiring harness</li> </ul>
1W	Signal GND	GND	Under any condition: Inspect for continuity to GND.		Continuity detected	<ul style="list-style-type: none"> <li>Related wiring harness</li> </ul>
1X	IG1	ENGINE 15 A fuse	IG ON		B+	<ul style="list-style-type: none"> <li>Related wiring harness</li> </ul>
			When the ignition switch is not in the ON position.		1.0 or less	
2A	Power supply	Main fuse block	Under any condition		B+	<ul style="list-style-type: none"> <li>Related wiring harness</li> </ul>
2B	Power supply	Main fuse block	Under any condition		B+	<ul style="list-style-type: none"> <li>Related wiring harness</li> </ul>
2C	Indicator light output signal	Power retractable hardtop Indicator light (hazard warning switch)	Ignition switch is turned to the ON position	Illuminated	1.0 or less	<ul style="list-style-type: none"> <li>Hazard switch</li> <li>Related wiring harness</li> </ul>
				Not illuminated	B+	
2D	—	—	—		—	—
2E	Power GND	GND	Under any condition: Inspect for continuity to GND.		Continuity detected	<ul style="list-style-type: none"> <li>Related wiring harness</li> </ul>
2F	Power GND	GND	Under any condition: Inspect for continuity to GND.		Continuity detected	<ul style="list-style-type: none"> <li>Related wiring harness</li> </ul>

## EXTERIOR TRIM

Terminal	Signal	Connected to	Test condition		Standard	Inspection item
3A	Roof motor control (open)	Roof motor (RH)	Ignition switch is turned to the ON position	Roof panel open operation	1.0 or less <sup>*1</sup>	<ul style="list-style-type: none"> <li>Roof motor (RH)</li> <li>Related wiring harness</li> </ul>
				Roof panel close operation	B+	
				Other	approx. 2	—
3B	—	—	—	—	—	—
3C	—	—	—	—	—	—
3D	Roof motor control (close)	Roof motor (LH)	Ignition switch is turned to the ON position	Roof panel open operation	B+	<ul style="list-style-type: none"> <li>Roof motor (LH)</li> <li>Related wiring harness</li> </ul>
				Roof panel close operation	1.0 or less <sup>*1</sup>	
				Other	approx. 2	—
3E	Deck panel motor control (close)	Deck panel motor (RH)	Ignition switch is turned to the ON position	Deck panel open operation	1.0 or less <sup>*1</sup>	<ul style="list-style-type: none"> <li>Deck panel motor (RH)</li> <li>Related wiring harness</li> </ul>
				Deck panel close operation	B+	
3F	Deck panel open position sensor input signal	Deck panel limit switch	Ignition switch is turned to the ON position	When the deck panel is fully open.	1.0 or less	<ul style="list-style-type: none"> <li>Deck panel limit switch</li> <li>Related wiring harness</li> </ul>
				When the deck panel is not fully open.	B+	
3G	—	—	—	—	—	—
3H	Deck panel motor control (open)	Deck panel motor (LH)	Ignition switch is turned to the ON position	Deck panel open operation	B+	<ul style="list-style-type: none"> <li>Deck panel motor (LH)</li> <li>Related wiring harness</li> </ul>
				Deck panel close operation	1.0 or less <sup>*1</sup>	
3I	Roof motor control (close)	Roof motor (RH)	Ignition switch is turned to the ON position	Roof panel open operation	1.0 or less <sup>*1</sup>	<ul style="list-style-type: none"> <li>Roof motor (RH)</li> <li>Related wiring harness</li> </ul>
				Roof panel close operation	B+	
				Other	approx. 2	
3J	—	—	—	—	—	—
3K	—	—	—	—	—	—
3L	Roof motor control (open)	Roof motor (LH)	Ignition switch is turned to the ON position	Roof panel open operation	B+	<ul style="list-style-type: none"> <li>Roof motor (LH)</li> <li>Related wiring harness</li> </ul>
				Roof panel close operation	1.0 or less <sup>*1</sup>	
				Other	approx. 2	
3M	Deck panel motor control (open)	Deck panel motor (RH)	Ignition switch is turned to the ON position	Deck panel open operation	B+	<ul style="list-style-type: none"> <li>Deck panel motor (RH)</li> <li>Related wiring harness</li> </ul>
				Deck panel close operation	1.0 or less <sup>*1</sup>	
3N	—	—	—	—	—	—
3O	Deck panel close position sensor input signal	Deck panel limit switch	Ignition switch is turned to the ON position	Except closed position	1.0 or less	<ul style="list-style-type: none"> <li>Deck panel limit switch</li> <li>Related wiring harness</li> </ul>
				Closed position	B+	
3P	Deck panel motor control (close)	Deck panel motor (LH)	Ignition switch is turned to the ON position	Deck panel open operation	1.0 or less <sup>*1</sup>	<ul style="list-style-type: none"> <li>Deck panel motor (LH)</li> <li>Related wiring harness</li> </ul>
				Deck panel close operation	B+	

<sup>\*1</sup> : The voltage increases by several volts during slow control of the roof and deck panel operation speed.

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