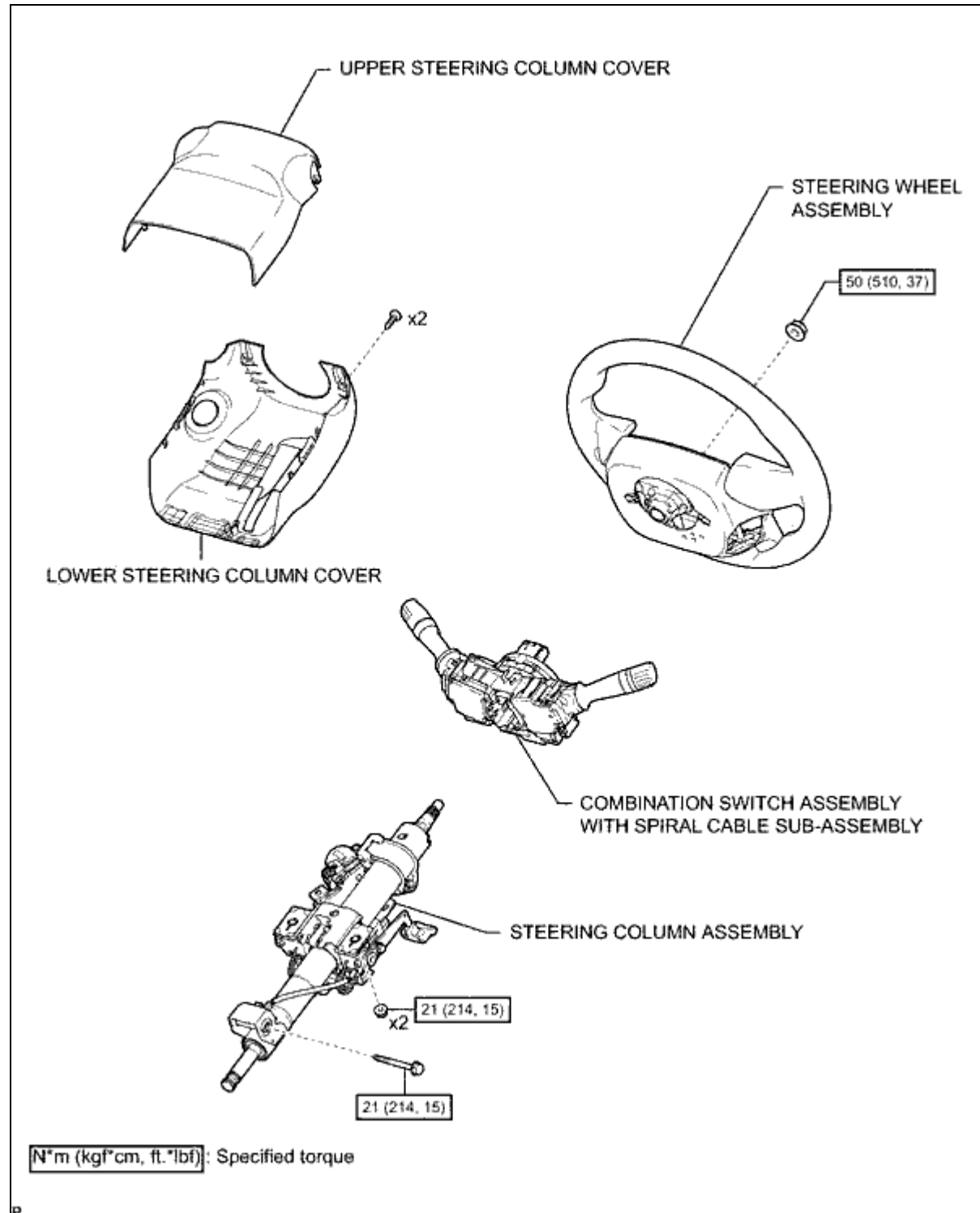


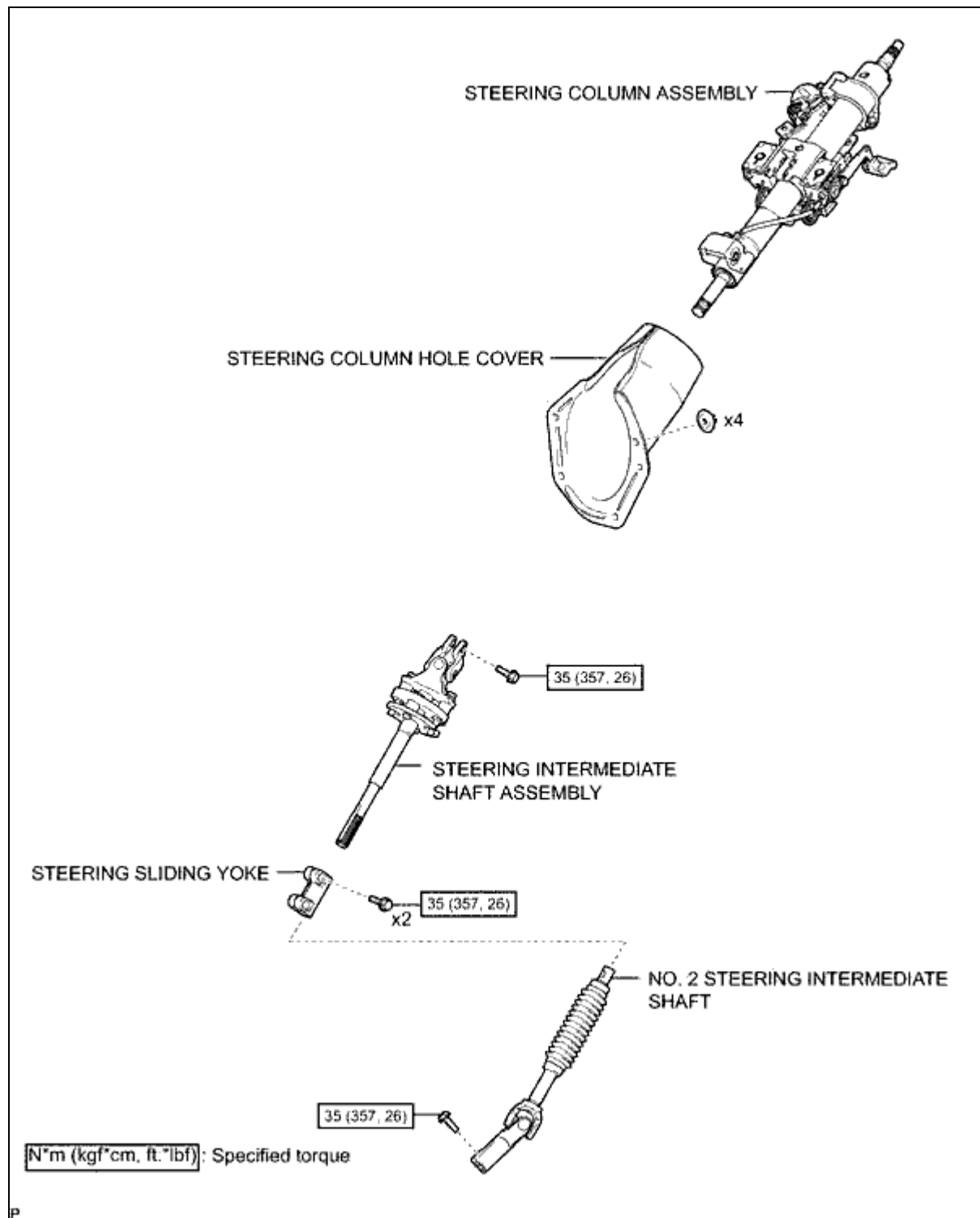
Last Modified: 11-13-2015	6.6 K	Doc ID: RM0000014ZS00JX
Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING COLUMN ASSEMBLY: COMPONENTS; 2016 MY Tacoma [08/2015 -]		

COMPONENTS

ILLUSTRATION

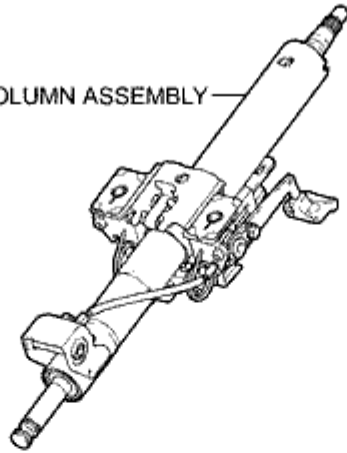


ILLUSTRATION



ILLUSTRATION

STEERING COLUMN ASSEMBLY



w/o Smart Key System:

UPPER STEERING
COLUMN BRACKET WITH
SWITCH ASSEMBLY



● TAPERED-HEAD BOLT

w/ Smart Key System:

STEERING LOCK
ACTUATOR ASSEMBLY

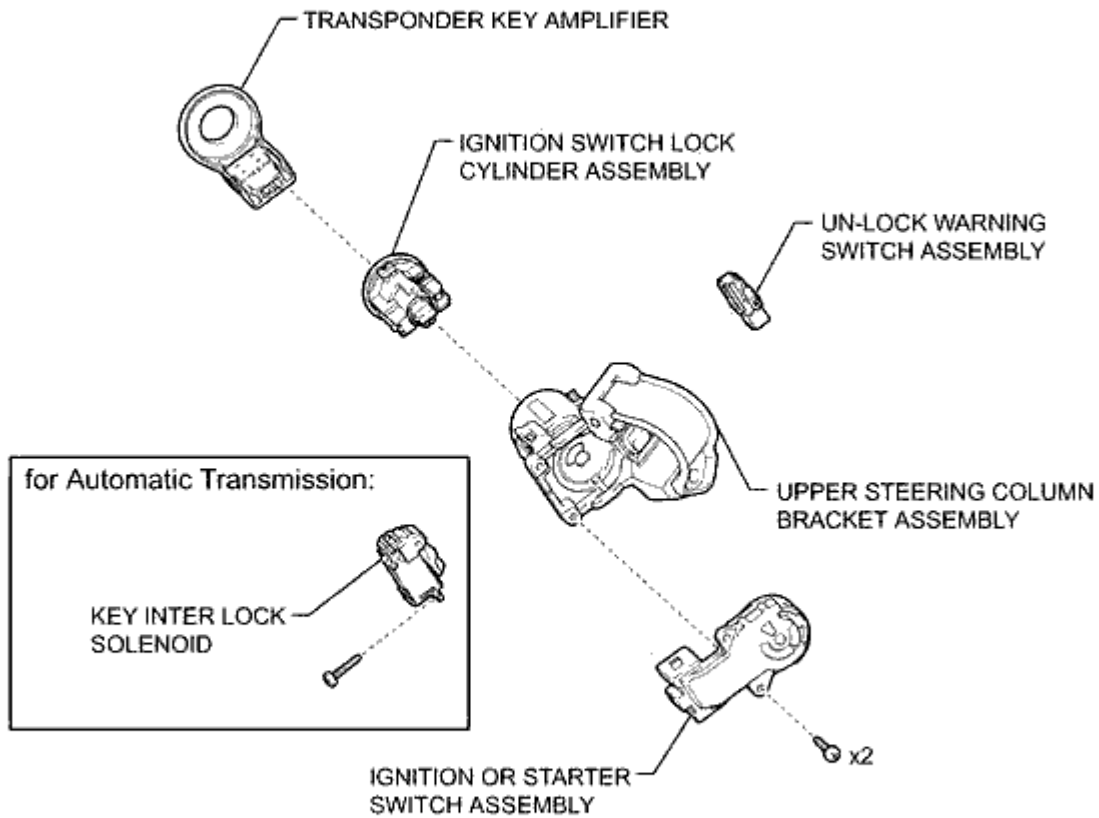


● TAPERED-HEAD BOLT

● Non-reusable part

ILLUSTRATION

w/o Smart Key System:

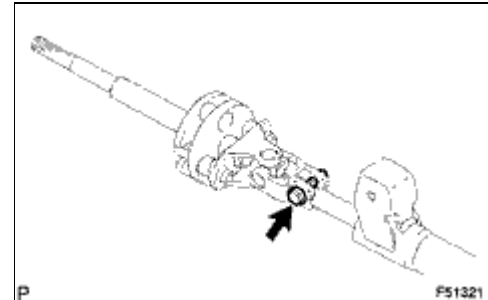


Last Modified: 11-13-2015	6.6 A	Doc ID: RM0000014ZU00BX
Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING COLUMN ASSEMBLY: DISASSEMBLY; 2016 MY Tacoma [08/2015 -]		

DISASSEMBLY

1. REMOVE STEERING INTERMEDIATE SHAFT ASSEMBLY

- Put matchmarks on the steering intermediate shaft assembly and steering main shaft assembly.
- Remove the bolt and steering intermediate shaft assembly.



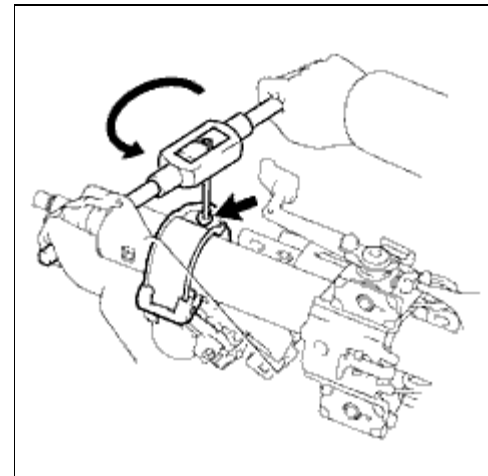
2. REMOVE UPPER STEERING COLUMN BRACKET WITH SWITCH ASSEMBLY (w/o Smart Key System)

- Secure the steering column assembly in a vise between aluminum plates.

NOTICE:

Do not overtighten the vise.

- Using a drill, drill a hole in the tapered-head bolt and insert a screw extractor.
- Using the screw extractor, remove the tapered-head bolt and upper steering column bracket with switch assembly.



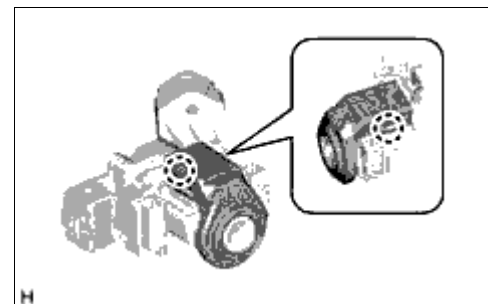
3. REMOVE STEERING LOCK ACTUATOR ASSEMBLY (w/ Smart Key System)

HINT:

Perform the same procedure as for the upper steering column bracket with switch assembly.

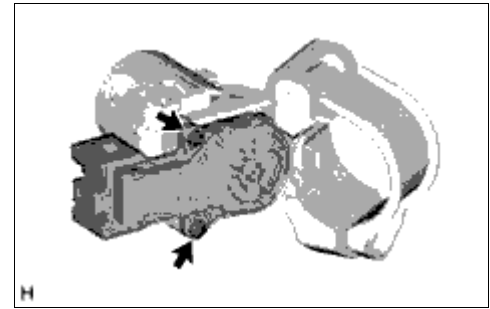
4. REMOVE TRANSPONDER KEY AMPLIFIER (w/o Smart Key System)

- Disengage the 2 claws to remove the transponder key amplifier.



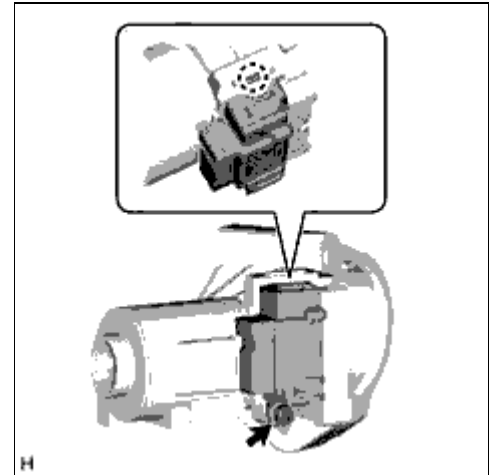
5. REMOVE IGNITION OR STARTER SWITCH ASSEMBLY (w/o Smart Key System)

- (a) Remove the 2 screws and ignition or starter switch assembly from the upper steering column bracket assembly.



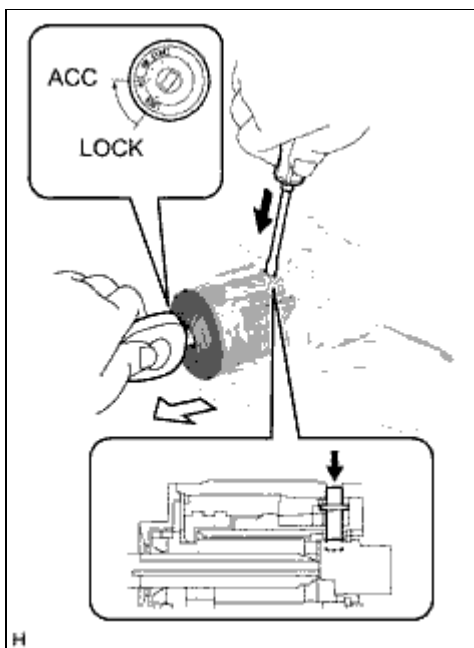
6. REMOVE KEY INTER LOCK SOLENOID (for Automatic Transmission without Smart Key System)

- (a) Remove the screw.
- (b) Disengage the claw to remove the key interlock solenoid from the upper steering column bracket assembly.



7. REMOVE IGNITION SWITCH LOCK CYLINDER ASSEMBLY (w/o Smart Key System)

- (a) Turn the ignition switch to ACC.
- (b) Insert the tip of a screwdriver into the hole in the upper steering column bracket assembly, as shown in the illustration, and pull the ignition switch lock cylinder assembly.



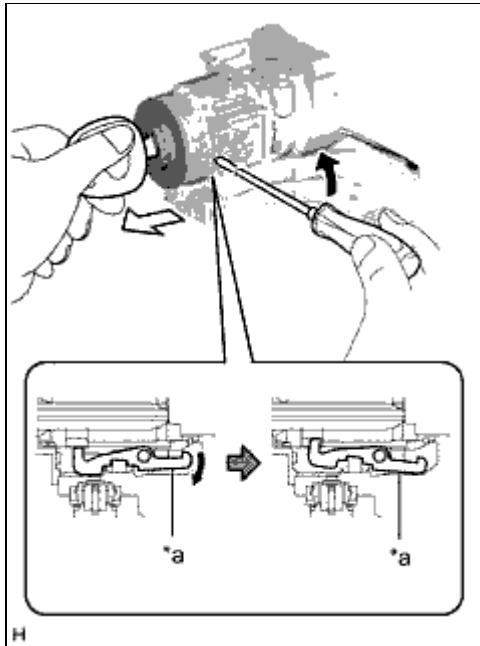
Text in Illustration



Push

➡	Pull
---	------

(c) Insert the tip of a screwdriver into the hole in the upper steering column bracket assembly and tilt it upward, as shown in the illustration, to disengage the claw on the ignition switch lock cylinder assembly. Then pull out the ignition switch lock cylinder assembly.



Text in Illustration

*a	Claw
➡	Tilt
➡	Pull

HINT:
When the ignition switch lock cylinder assembly disengages, a click sound is heard.

8. REMOVE UN-LOCK WARNING SWITCH ASSEMBLY (w/o Smart Key System)

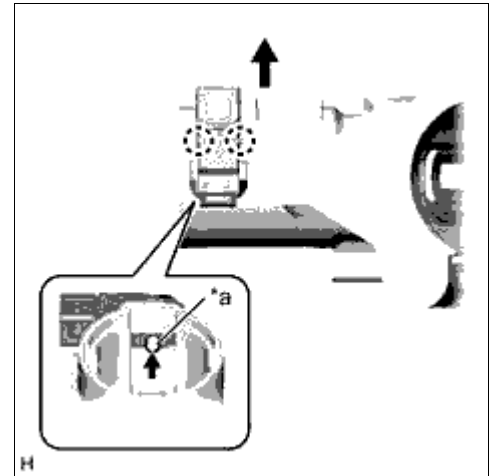
- (a) Remove the un-lock warning switch assembly by pushing up the center part and releasing the 2 claws.

Text in Illustration

*a	Center Part
----	-------------

HINT:

Slide the un-lock warning switch in the direction shown by the arrow in the illustration to remove it.



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Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING COLUMN ASSEMBLY: INSTALLATION; 2016 MY Tacoma [08/2015 -]		

INSTALLATION

1. INSTALL STEERING COLUMN ASSEMBLY

(a) Install the steering column assembly with the 2 nuts and bolt.

Torque:

21 N·m {214 kgf·cm, 15ft·lbf}

(b) Connect each of the connectors to the steering column assembly.

(c) Connect the wire harness clamps to the steering column assembly.

CAUTION:

Wipe any dirt off the installation plane and column body side.

NOTICE:

Be careful not to scratch or soil the installation plane of the steering column.

2. INSTALL NO. 2 STEERING INTERMEDIATE SHAFT

(a) Align the matchmarks on the power steering link and No. 2 steering intermediate shaft.

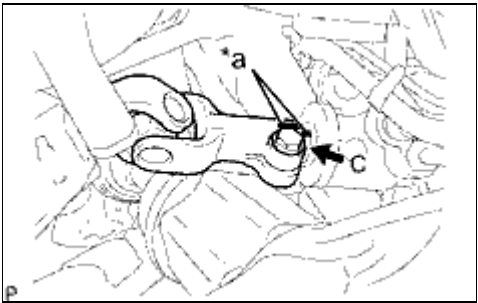
Text in Illustration

*a	Matchmark
----	-----------

(b) Install the No. 2 steering intermediate shaft to the power steering link with bolt C.

Torque:

35 N·m {357 kgf·cm, 26ft·lbf}



3. INSTALL STEERING SLIDING YOKE

(a) Align the matchmarks on the steering intermediate shaft assembly and steering sliding yoke.

Text in Illustration

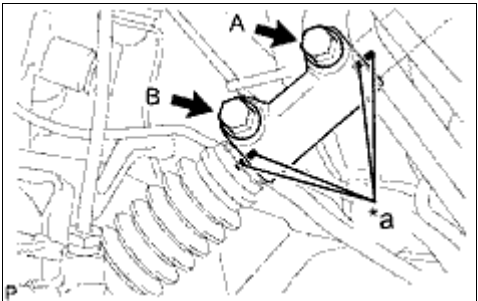
*a	Matchmarks
----	------------

(b) Install the steering sliding yoke to the steering intermediate shaft assembly and slide it upward.

(c) Align the matchmarks on the No. 2 steering intermediate shaft and steering sliding yoke.

(d) Install the steering sliding yoke to the No. 2 steering intermediate shaft with bolts A and B.

Torque:



35 N·m {357 kgf·cm, 26ft·lbf}

4. INSTALL NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY

- (a) Install the No. 1 engine under cover sub-assembly with the 4 bolts.

Torque:

30 N·m {306 kgf·cm, 22ft·lbf}

5. INSTALL STEERING COLUMN HOLE COVER

- (a) Install the steering column hole cover with the 4 clips.

6. INSTALL LOWER NO. 1 INSTRUMENT PANEL AIRBAG ASSEMBLY

INFO

7. INSTALL COMBINATION SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY

- (a) Engage the 3 claws to install the combination switch assembly with spiral cable sub-assembly to the steering column assembly.
- (b) Connect the connectors to the combination switch assembly with spiral cable sub-assembly.

8. INSTALL UPPER STEERING COLUMN COVER

- (a) Engage the claw to install the upper steering column cover.

9. INSTALL LOWER STEERING COLUMN COVER

- (a) Engage the 2 claws to install the lower steering column cover.
- (b) Install the lower steering column cover with the 2 screws.
- (c) Engage the claw.

10. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

11. ADJUST SPIRAL CABLE

INFO

12. INSTALL STEERING WHEEL ASSEMBLY

- (a) Align the matchmarks on the steering wheel assembly and steering main shaft assembly.
- (b) Install the steering wheel assembly set nut.

Torque:

50 N·m {510 kgf·cm, 37ft·lbf}

13. INSPECT STEERING WHEEL CENTER POINT

14. INSTALL STEERING PAD

INFO

15. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque:

5.4 N·m {55 kgf·cm, 48in·lbf}

16. INSPECT SRS WARNING LIGHT

INFO



Last Modified: 11-13-2015	6.6 A	Doc ID: RM0000014ZV00BX
Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING COLUMN ASSEMBLY: REASSEMBLY; 2016 MY Tacoma [08/2015 -]		

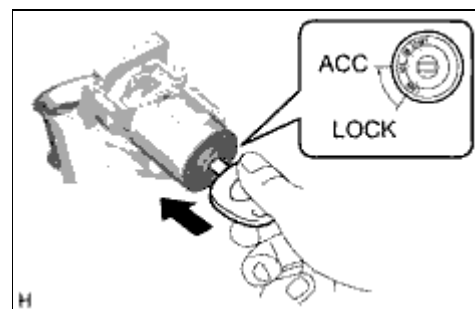
REASSEMBLY

1. INSTALL UN-LOCK WARNING SWITCH ASSEMBLY (w/o Smart Key System)

- (a) Engage the 2 claws to install the un-lock warning switch assembly to the upper steering column bracket assembly.

2. INSTALL IGNITION SWITCH LOCK CYLINDER ASSEMBLY (w/o Smart Key System)

- (a) Turn the ignition switch to ACC.



- (b) Install the ignition switch lock cylinder assembly to the upper steering column bracket assembly.
- (c) Make sure that the ignition switch lock cylinder assembly is securely installed into the upper steering column bracket assembly.

3. INSTALL KEY INTER LOCK SOLENOID (for Automatic Transmission without Smart Key System)

- (a) Engage the claw to install the key interlock solenoid to the upper steering column bracket assembly.
- (b) Install the screw.

4. INSTALL IGNITION OR STARTER SWITCH ASSEMBLY (w/o Smart Key System)

- (a) Install the ignition or starter switch assembly to the upper steering column bracket assembly with the 2 screws.

5. INSTALL TRANSPONDER KEY AMPLIFIER (w/o Smart Key System)

- (a) Engage the 2 claws to install the transponder key amplifier.

6. INSPECT STEERING LOCK OPERATION (w/o Smart Key System)

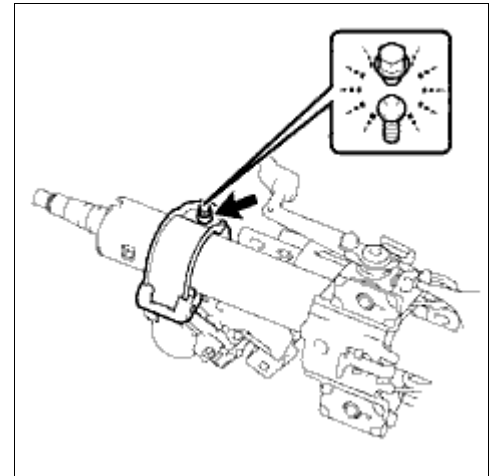
- (a) Check that the steering mechanism is activated when removing the key.
- (b) Check that the steering mechanism is deactivated when inserting the key and turning it to ACC position.

7. INSTALL UPPER STEERING COLUMN BRACKET WITH SWITCH ASSEMBLY (w/o Smart Key System)

- (a) Secure the steering column assembly in a vise between aluminum plates.

NOTICE:

Do not overtighten the vise.



- (b) Temporarily install the upper steering column bracket with switch assembly with a new tapered-head bolt.
(c) Tighten the tapered-head bolt until the bolt head breaks off.

8. INSTALL STEERING LOCK ACTUATOR ASSEMBLY (w/ Smart Key System)

HINT:

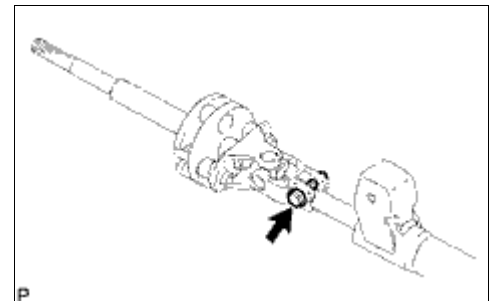
- Perform the same procedure as for the upper steering column bracket with switch assembly.
- When replacing the steering lock actuator assembly, perform initialization **INFO** .

9. INSTALL STEERING INTERMEDIATE SHAFT ASSEMBLY

- (a) Align the matchmarks on the steering intermediate shaft assembly and steering main shaft assembly.
(b) Install the steering intermediate shaft sub-assembly with the bolt.

Torque:

35 N·m {357 kgf·cm, 26ft·lbf}



Last Modified: 11-13-2015	6.6 A	Doc ID: RM0000014ZT00RX
Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING COLUMN ASSEMBLY: REMOVAL; 2016 MY Tacoma [08/2015 -]		

REMOVAL

CAUTION:

Some of these service operations affect the SRS. Read the precautionary notices concerning the SRS before servicing [INFO](#) .

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

After turning the ignition switch off, waiting time may be required before disconnecting the cable from the negative (-) battery terminal. Therefore, make sure to read the disconnecting the cable from the negative (-) battery terminal notices before proceeding with work [INFO](#) .

2. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

3. REMOVE STEERING PAD

[INFO](#)

4. REMOVE STEERING WHEEL ASSEMBLY

- Remove the steering wheel assembly set nut.
- Put matchmarks on the steering wheel assembly and steering main shaft assembly.
- Using SST, remove the steering wheel assembly.

Text in Illustration

*a	Matchmark
----	-----------

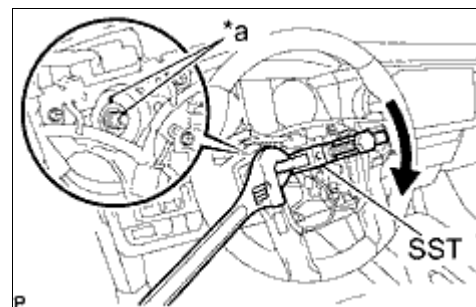
SST: 09950-50013

09951-05010

09952-05010

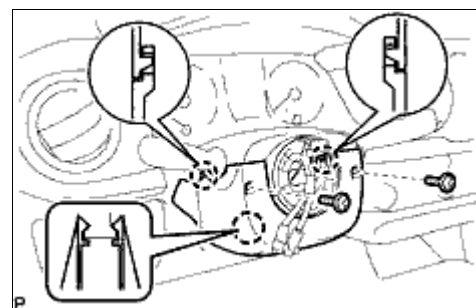
09953-05020

09954-05021



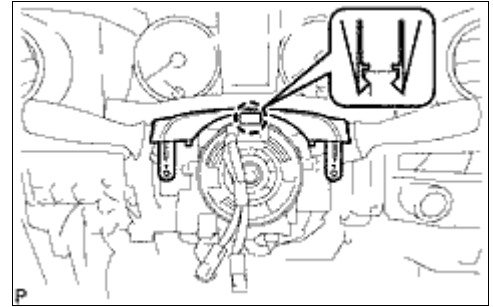
5. REMOVE LOWER STEERING COLUMN COVER

- Remove the 2 screws.
- Push the right and left sides of the lower steering column cover, and disengage the 2 claws.
- Insert a finger into the opening of the tilt lever of the lower steering column cover to disengage the claw and remove the lower steering column cover.



6. REMOVE UPPER STEERING COLUMN COVER

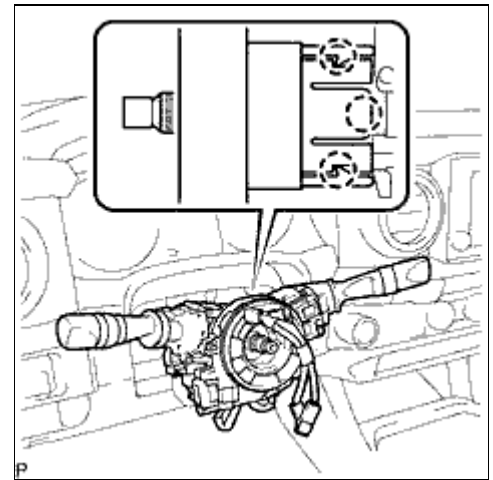
- (a) Disengage the claw to remove the upper steering column cover.



7. REMOVE COMBINATION SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY

- (a) Disconnect the connectors from the combination switch assembly with spiral cable sub-assembly.

- (b) Disengage the 3 claws to remove the combination switch assembly with spiral cable sub-assembly from the steering column assembly.

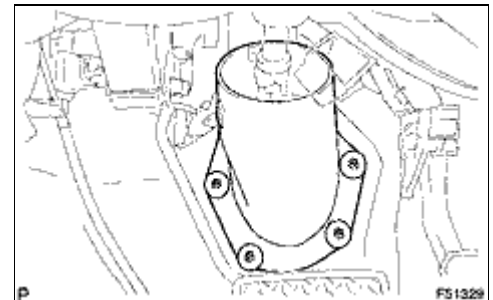


8. REMOVE LOWER NO. 1 INSTRUMENT PANEL AIRBAG ASSEMBLY

INFO

9. REMOVE STEERING COLUMN HOLE COVER

- (a) Remove the 4 clips and steering column hole cover.



10. REMOVE NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY

- (a) Remove the 4 bolts and No. 1 engine under cover sub-assembly.

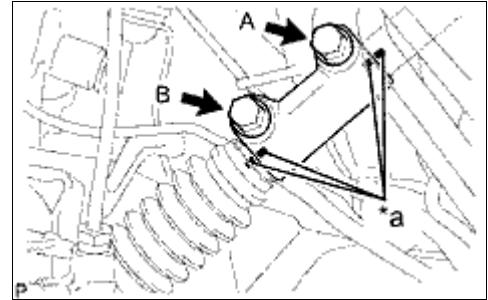
11. REMOVE STEERING SLIDING YOKE

- (a) Put matchmarks on the steering sliding yoke, No. 2 steering intermediate shaft and steering intermediate shaft assembly.

Text in Illustration

*a	Matchmark
----	-----------

- (b) Remove bolts A and B from the steering sliding yoke.
- (c) Slide the steering sliding yoke up and separate it from the No. 2 steering intermediate shaft.
- (d) Pull down the steering sliding yoke from the steering intermediate shaft assembly to remove.



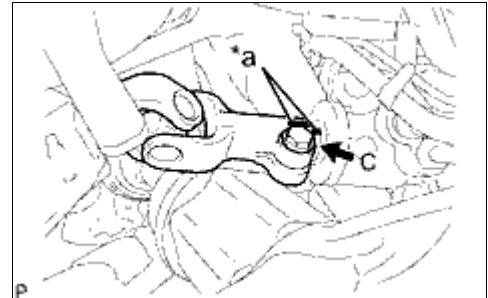
12. REMOVE NO. 2 STEERING INTERMEDIATE SHAFT

- (a) Put matchmarks on the No. 2 steering intermediate shaft and power steering link.

Text in Illustration

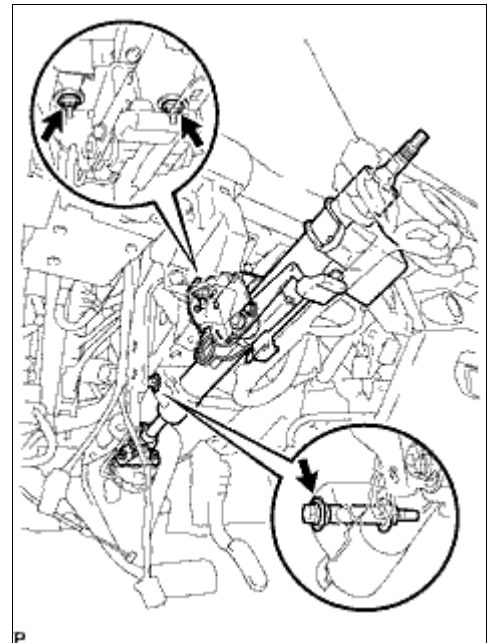
*a	Matchmark
----	-----------

- (b) Remove bolt C from the No. 2 steering intermediate shaft.
- (c) Slide the No. 2 steering intermediate shaft up to remove it from the power steering link.



13. REMOVE STEERING COLUMN ASSEMBLY

- (a) Disconnect the connectors and wire harness clamps.
- (b) Remove the bolt, 2 nuts and steering column assembly from the instrument panel reinforcement assembly.



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Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: B2781; Open / Short in Steering Lock ECU; 2016 MY Tacoma [08/2015 -]		

DTC	B2781	Open / Short in Steering Lock ECU
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DESCRIPTION

The steering lock ECU and steering lock motor are built into the steering lock actuator assembly.

The steering lock ECU (steering lock actuator or UPR bracket assembly) detects whether the steering lock is in the lock or unlock position by using the lock sensor and unlock sensor of the steering lock motor.

The steering lock ECU (steering lock actuator or UPR bracket assembly) receives lock and unlock request signals from the certification ECU (smart key ECU assembly) and responds with lock and unlock operation signals.

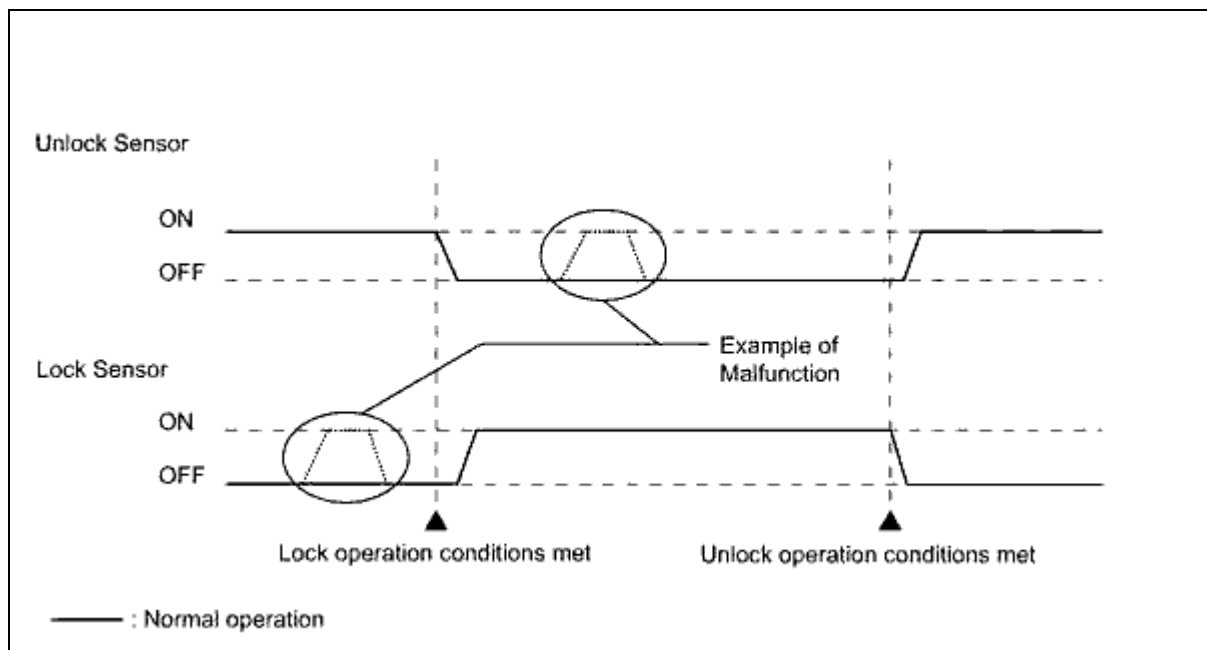
HINT:

The steering lock ECU (steering lock actuator or UPR bracket assembly) is not connected to the CAN communication system. However, the steering lock ECU (steering lock actuator or UPR bracket assembly) is connected to the certification ECU (smart key ECU assembly) via LIN communication and communicates with other components via CAN communication through the certification ECU (smart key ECU assembly).

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	NOTE
B2781	Open / Short in Steering Lock ECU	One of the following conditions is met (1-trip detection logic*1): • The steering lock sensor or unlock sensor is malfunctioning*2. • The steering lock motor activation circuit has a short circuit. • The steering lock motor activation circuit has an open circuit.	• Steering lock ECU (steering lock actuator or UPR bracket assembly) • LIN communication system	DTC Output Confirmation Operation: No confirmation operation is necessary (monitoring is continuous).

*1: Only output while a malfunction is present and the engine switch is on (IG).

*2: When both detection switches turn on, the system is determined to be malfunctioning.



Vehicle Condition and Fail-safe Function when Malfunction Detected

VEHICLE CONDITION WHEN MALFUNCTION DETECTED	FAIL-SAFE FUNCTION WHEN MALFUNCTION DETECTED
The steering cannot be locked or unlocked. For this reason, the engine cannot be started.	Prohibits the engine from being started (the engine does not crank).

Related Data List and Active Test Items

DTC NO.	DATA LIST ITEM	ACTIVE TEST ITEM
B2781	Smart Key • Sensor Value • Motor Driver Short	-

INSPECTION PROCEDURE

NOTICE:

- When using the Techstream with the engine switch off, connect the Techstream to the vehicle and turn a courtesy light switch on and off at intervals of 1.5 seconds or less until communication between the Techstream and the vehicle begins. Then select the vehicle type under manual mode and enter the following menus: Body Electrical / Smart Key. While using the Techstream, periodically turn a courtesy light switch on and off at intervals of 1.5 seconds or less to maintain communication between the Techstream and the vehicle.
- After performing repairs, confirm that no DTCs are output again INFO.
- When replacing the steering lock ECU (steering lock actuator or UPR bracket assembly), registration must be performed INFO.

HINT:

When all the ECUs that are connected via LIN communication cannot communicate with the certification ECU (smart key ECU assembly), DTC B2785 is stored.

PROCEDURE

1. CHECK DTC

(a) Using the Techstream, check if LIN communication DTC B2785 is output  .

HINT:

If a LIN communication DTC is output, perform troubleshooting for the LIN communication system  .

Result

RESULT	PROCEED TO
DTC B2785 is output.	A
DTC B2785 is not output.	B

B ► REPLACE STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)

A ► GO TO LIN COMMUNICATION SYSTEM (DTC B2785)



Last Modified: 11-13-2015	6.6 C	Doc ID: RM000005V84000X
Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: B2782; Power Source Control ECU Malfunction; 2016 MY Tacoma [08/2015 -]		

DTC	B2782	Power Source Control ECU Malfunction
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DESCRIPTION

DESCRIPTION The certification ECU (smart key ECU assembly) has a power source mode switching function.

This DTC is stored when the IGE input (the steering lock motor activation permission signal) sent directly from the certification ECU (smart key ECU assembly) to the steering lock ECU (steering lock actuator or UPR bracket assembly) is determined to be abnormal.

HINT:

The steering lock ECU (steering lock actuator or UPR bracket assembly) is not connected to the CAN communication system. However, the steering lock ECU (steering lock actuator or UPR bracket assembly) is connected to the certification ECU (smart key ECU assembly) via LIN communication and communicates with other components via CAN communication through the certification ECU (smart key ECU assembly).

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	NOTE
B2782	Power Source Control ECU Malfunction	Either of the following conditions is met (1-trip detection logic*) : - The steering lock motor activation command circuit has a short circuit. - The steering lock motor activation command circuit has an open circuit. HINT: If the power supply signal from the LIN communication line does not match the power supply signal from the direct line, the system is determined to be malfunctioning.	- Steering lock ECU (steering lock actuator or UPR bracket assembly) - Certification ECU (Smart key ECU assembly) - Harness or connector	DTC Output Confirmation Operation: Perform a steering lock/ unlock operation. (The steering locks when a door is opened with the shift lever in P and the engine switch off. The steering unlocks when the engine switch is turned on (ACC) or on (IG) while carrying the key.)

*: Only output while a malfunction is present and the engine switch is on (IG).

Vehicle Condition and Fail-safe Function when Malfunction Detected

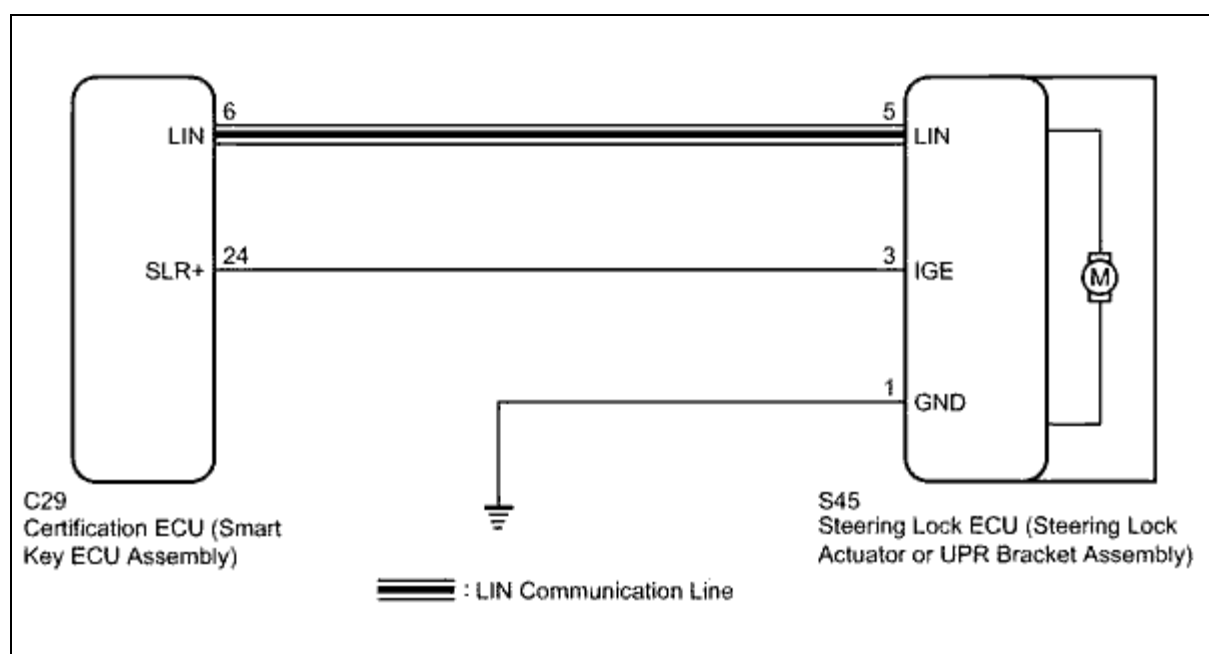
VEHICLE CONDITION WHEN MALFUNCTION DETECTED	FAIL-SAFE FUNCTION WHEN MALFUNCTION DETECTED
---	--

VEHICLE CONDITION WHEN MALFUNCTION DETECTED	FAIL-SAFE FUNCTION WHEN MALFUNCTION DETECTED
The steering cannot be locked or unlocked. For this reason, the engine cannot be started.	Prohibits the engine from being started (the engine does not crank).

Related Data List and Active Test Items

DTC NO.	DATA LIST ITEM	ACTIVE TEST ITEM
B2782	Smart Key Power Supply Short	-

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- When using the Techstream with the engine switch off, connect the Techstream to the vehicle and turn a courtesy light switch on and off at intervals of 1.5 seconds or less until communication between the Techstream and the vehicle begins. Then select the vehicle type under manual mode and enter the following menus: Body Electrical / Smart Key. While using the Techstream, periodically turn a courtesy light switch on and off at intervals of 1.5 seconds or less to maintain communication between the Techstream and the vehicle.
- The steering lock system uses LIN communication. First perform the inspections in "How to Proceed with Troubleshooting" to confirm that there are no communication malfunctions before proceeding with troubleshooting [INFO](#).
- When disconnecting the cable from the negative (-) battery terminal, some systems need to be initialized after the cable is reconnected [INFO](#).
- After performing repairs, perform the DTC output confirmation operation, and then confirm that no DTCs are output again [INFO](#).
- When replacing the steering lock ECU (steering lock actuator or UPR bracket assembly) or certification ECU (smart key ECU assembly), registration must be performed [INFO](#).

PROCEDURE

1.

INSPECT STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY (MOTOR ACTIVATION COMMAND SIGNAL)

- (a) Make sure that there is no looseness at the locking part and the connecting part of the connector.
- (b) Disconnect the steering lock ECU (steering lock actuator or UPR bracket assembly) connector.
- (c) Measure the resistance according to the value(s) in the table below.

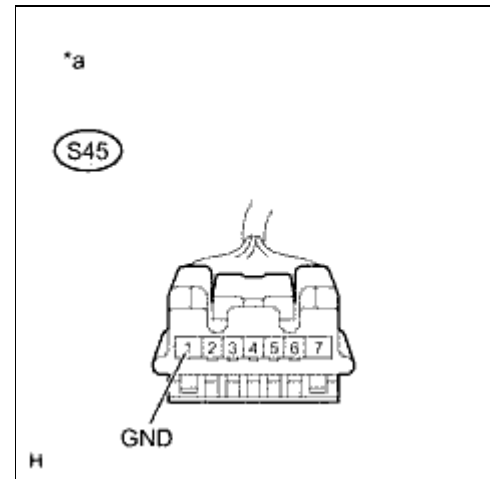
Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-1 (GND) - Body ground	Always	Below 1 Ω

Text in Illustration

*a

Front view of wire harness connector
(to Steering Lock ECU (Steering Lock Actuator or UPR Bracket Assembly))



- (d) Reconnect the steering lock ECU (steering lock actuator or UPR bracket assembly) connector.
- (e) Move the shift lever to P and turn the engine switch off.
- (f) Check the signal waveform according to the condition(s) in the table below.

Standard Frequency:

ITEM	CONTENT
Tester Connection	S45-3 (IGE) - S45-1 (GND)
Tool Setting	2 V/DIV., 200 ms./DIV.
Vehicle Condition	Steering lock motor not operating → Operating → Not operating

Text in Illustration

*a

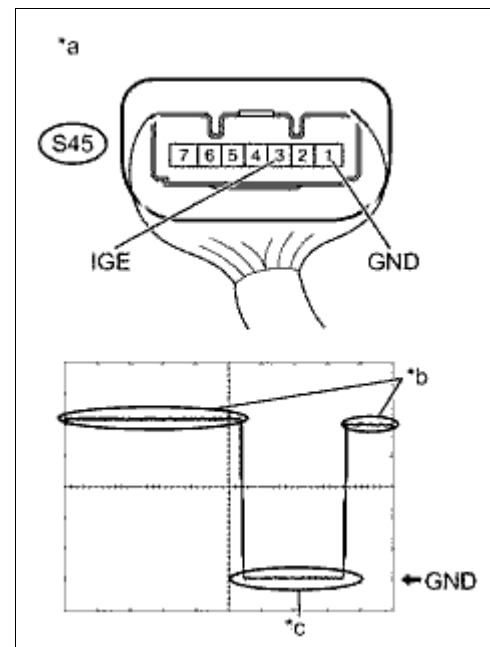
Component with harness connected
(Steering Lock ECU (Steering Lock Actuator or UPR Bracket Assembly))

*b

Steering Lock Motor not Operating

*c

Steering Lock Motor Operating



HINT:

- When taking measurements when the lock motor is stopped, it is not necessary to perform any operations.
- In order to take measurements when the lock motor is operating, perform either of the following operations:
 - To unlock the steering, carry the key and turn the engine switch on (ACC) or on (IG).
 - To lock the steering, turn the engine switch off with the shift lever in P, and then open a door.

NG  **GO TO STEP 4**

OK



2.	CLEAR DTC AND DATA LIST MALFUNCTION RECORD
-----------	---

(a) Clear the DTCs  .

(b) Disconnect the cable from the negative (-) battery terminal, wait for 30 seconds or more, and then reconnect the cable to the negative (-) battery terminal to clear the record of malfunctions stored in the Data List.

CAUTION:

After turning the engine switch off, waiting time may be required before disconnecting the cable from the battery terminal. Therefore, make sure to read the disconnecting the cable from the battery terminal notices before proceeding with work  .

NEXT



3.	READ VALUE USING TECHSTREAM (POWER SUPPLY SHORT)
-----------	---

(a) Perform the DTC output confirmation operation.

(b) Check if DTC B2782 is output  .

(c) Use the Data List to check if the steering lock control is functioning properly.

Smart Key

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Power Supply Short	Record of malfunction of signal sent to steering lock motor (steering lock actuator assembly) from certification ECU (smart key ECU assembly) (short circuit) (DTC B2782 is output) /	OK: No record of malfunction (short circuit) NG(Past): Record	This item records malfunctions in the circuit between the certification ECU (smart key ECU assembly) and steering lock motor (steering lock actuator assembly).

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
	OK or NG(Past)	of malfunction (short circuit) exists	

Result

RESULT	PROCEED TO
- DTC B2782 is not output. "OK" is displayed on the Techstream.	A
- DTC B2782 is output. "OK" is displayed on the Techstream.	B

B ▶ **REPLACE STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY**

A ▶ **SYSTEM RETURNED TO NORMAL (DTC STORED DUE TO BAD CONNECTION, BUT SYSTEM RETURNED TO NORMAL BY RECONNECTING CONNECTOR)**

4.	CHECK HARNESS AND CONNECTOR (STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY) - CERTIFICATION ECU (SMART KEY ECU ASSEMBLY))
-----------	--

(a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

(b) Disconnect the S45 steering lock ECU (steering lock actuator or UPR bracket assembly) connector.

(c) Disconnect the C29 certification ECU (smart key ECU assembly) connector.

(d) Check for deformation and corrosion of the connector case and terminals.

OK:

There is no deformation or corrosion of the connector case or terminals.

(e) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-3 (IGE) - C29-24 (SLR+)	Always	Below 1 Ω
S45-3 (IGE) or C29-24 (SLR+) - Body ground	Always	10 k Ω or higher

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU**

ASSEMBLY)



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Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: B2788; IG2 Signal Malfunction; 2016 MY Tacoma [08/2015 -]		

DTC	B2788	IG2 Signal Malfunction
------------	--------------	-------------------------------

DESCRIPTION

This DTC is stored when the steering lock ECU (steering lock actuator or UPR bracket assembly) detects an IG2 power supply malfunction.

HINT:

The steering lock ECU (steering lock actuator or UPR bracket assembly) is not connected to the CAN communication system. However, the steering lock ECU (steering lock actuator or UPR bracket assembly) is connected to the certification ECU (smart key ECU assembly) via LIN communication and communicates with other components via CAN communication through the certification ECU (smart key ECU assembly).

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	NOTE
B2788	IG2 Signal Malfunction	Mismatch between the steering lock ECU (steering lock actuator or UPR bracket assembly) IG2 input from the LIN communication system and from the direct line (1-trip detection logic*).	• IG2 fuse • Steering lock ECU (Steering lock actuator or UPR bracket assembly) • Harness or connector	DTC Output Confirmation Operation: No confirmation operation is necessary (monitoring is continuous).

*: Only output while a malfunction is present and the engine switch is on (IG).

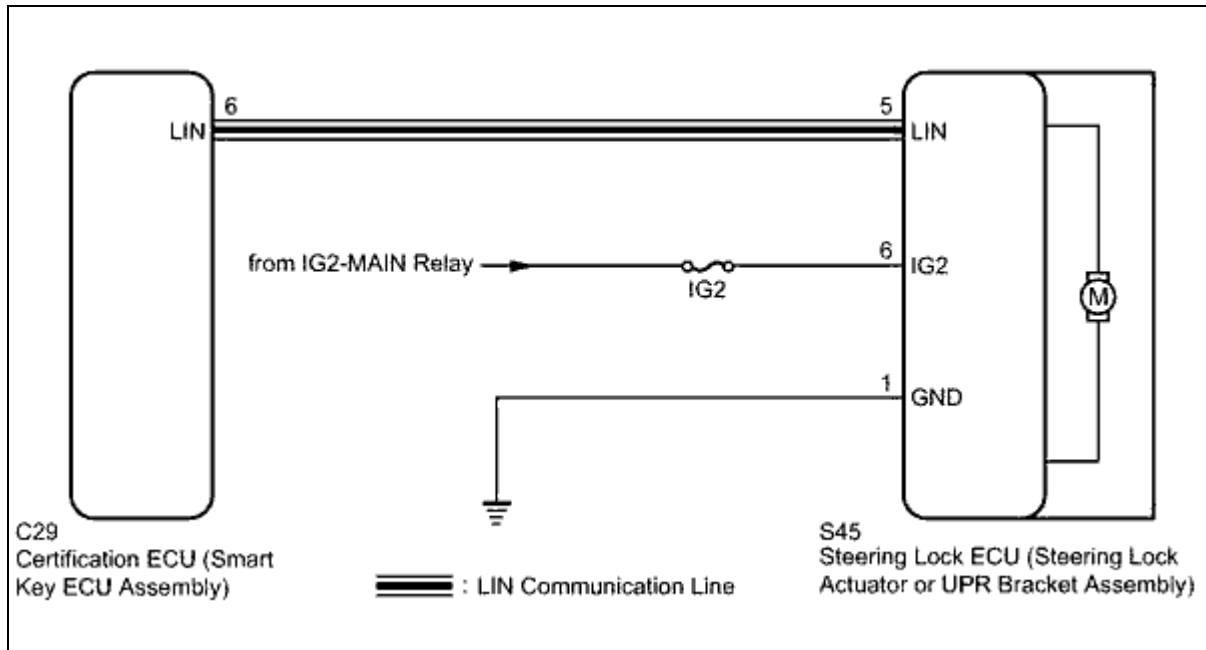
Vehicle Condition and Fail-safe Function when Malfunction Detected

VEHICLE CONDITION WHEN MALFUNCTION DETECTED	FAIL-SAFE FUNCTION WHEN MALFUNCTION DETECTED
The steering cannot be locked or unlocked. For this reason, the engine cannot be started.	-

Related Data List and Active Test Items

DTC NO.	DATA LIST ITEM	ACTIVE TEST ITEM
B2788	-	-

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- When using the Techstream with the engine switch off, connect the Techstream to the vehicle and turn a courtesy light switch on and off at intervals of 1.5 seconds or less until communication between the Techstream and the vehicle begins. Then select the vehicle type under manual mode and enter the following menus: Body Electrical / Smart Key. While using the Techstream, periodically turn a courtesy light switch on and off at intervals of 1.5 seconds or less to maintain communication between the Techstream and the vehicle.
- The steering lock system uses LIN communication. First perform the inspections in "How to Proceed with Troubleshooting" to confirm that there are no communication malfunctions before proceeding with troubleshooting [INFO](#).
- Inspect the fuses for circuits related to this system before performing the following procedure.
- After performing repairs, confirm that no DTCs are output again [INFO](#).
- When replacing the steering lock ECU (steering lock actuator or UPR bracket assembly), registration must be performed [INFO](#).

PROCEDURE

1.	INSPECT STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY) (POWER SOURCE MODE SIGNAL)
----	--

- Make sure that there is no looseness at the locking part and the connecting part of the connector.
- Disconnect the steering lock ECU (steering lock actuator or UPR bracket assembly) connector.

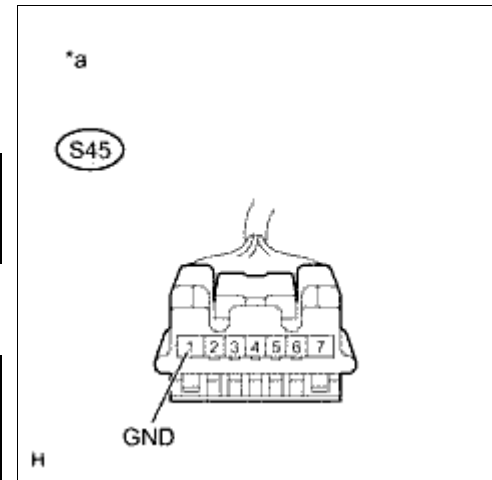
(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-1 (GND) - Body ground	Always	Below 1 Ω

Text in Illustration

*a	Front view of wire harness connector (to Steering Lock ECU (Steering Lock Actuator or UPR Bracket Assembly))
----	---



(d) Reconnect the steering lock ECU (steering lock actuator or UPR bracket assembly) connector.

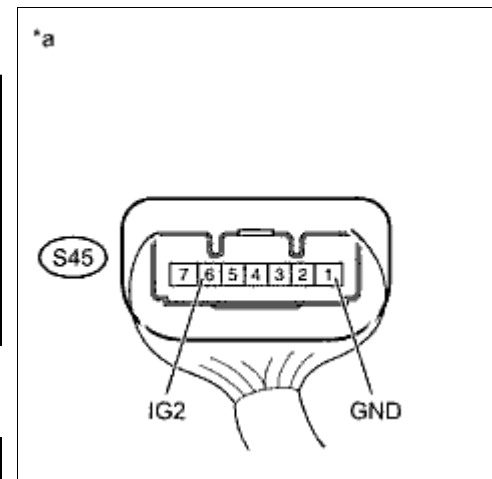
(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
S45-6 (IG2) - S45-1 (GND)	Engine switch on (IG)	11 to 14 V
S45-6 (IG2) - S45-1 (GND)	Engine switch off	Below 1 V

Text in Illustration

*a	Component with harness connected (Steering Lock ECU (Steering Lock Actuator or UPR Bracket Assembly))
----	--



NG ► REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ► REPLACE STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)



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Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: DATA LIST / ACTIVE TEST; 2016 MY Tacoma [08/2015 -]		

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

- Turn the engine switch off.
- Connect the Techstream to the DLC3.
- Turn the engine switch on (IG).
- Turn the Techstream on.
- Enter the following menus: Body Electrical / (desired system) / Data List.
- According to the display on the Techstream, read the Data List.
- Using the Techstream, confirm the Data List items to help determine the cause of the problem.

NOTICE:

- The steering lock ECU (steering lock actuator or UPR bracket assembly) communicates with the Techstream through the certification ECU (smart key ECU assembly) which uses CAN communication. If the CAN communication system or certification ECU (smart key ECU assembly) is malfunctioning, Data List items may not be normal.
- When using the Techstream with the engine switch off, connect the Techstream to the vehicle and turn a courtesy light switch on and off at intervals of 1.5 seconds or less until communication between the Techstream and the vehicle begins. Then select the vehicle type under manual mode and enter the following menus: Body Electrical / Smart Key. While using the Techstream, periodically turn a courtesy light switch on and off at intervals of 1.5 seconds or less to maintain communication between the Techstream and the vehicle.

Power Source Control

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Shift P Signal	Shift position (P) signal / ON or OFF	ON: Shift lever in P OFF: Shift lever not in P	- Use this item to determine if the shift position switch is malfunctioning. - The engine cannot be started when this item is "OFF".
Steering Unlock Switch	State of steering unlock sensor signal output from steering lock ECU (steering lock actuator or UPR	ON: Steering unlocked OFF: Steering	This item can be used to determine the cause of problems when the steering does not lock or unlock.

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
	bracket assembly) / ON or OFF	locked	HINT: - The steering is considered locked when the lock sensor is ON and the unlock sensor is OFF. - The steering is considered unlocked when the lock sensor is OFF and the unlock sensor is ON.
Str Lock/ Unlock Wait T-Out	Steering lock or unlock malfunction / Yes or No	Yes: Steering lock/unlock timed out (Lock bar stuck, etc.) No: Steering locks/unlocks normally within specified time	The engine cannot be started when this item is "Yes".

Smart Key

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
# Codes	Number of trouble codes / 0 to 255	Number of stored DTCs displayed	-
Immobiliser	State of immobiliser system determined by certification ECU (smart key ECU assembly) / Set or Unset	Set: Immobiliser set (engine start prohibited) (engine switch off) Unset: Immobiliser unset (engine start permitted) (engine switch on (ACC) or on (IG))	- When the immobiliser cannot be unset, this item can be used to determine whether the certification ECU (smart key ECU assembly) is part of the problem. - The engine cannot be started when this item displays "Set". HINT: - The state of the immobiliser (whether it is set or unset) can be determined through the certification ECU (smart key ECU assembly). If this item displays "Set", the communication between the certification ECU (smart key ECU assembly) and steering lock ECU (steering lock actuator or UPR bracket assembly) can be determined to be normal. - The security indicator light operation is only linked with the state of the immobiliser (set/unset), and is not related to the steering lock operation (lock/ unlock), when the immobiliser is set, the security indicator light blinks.
Steering Lock Sleep Cond	steering lock ECU (steering lock actuator or UPR bracket assembly) sleep availability /	Yes: Sleep available No: Sleep not available	-

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
	Yes or No		
Steering Lock Start Cond	steering lock ECU (steering lock actuator or UPR bracket assembly) wake up signal status / Yes or No	Yes: Wake up signal sent No: Wake up signal not sent	-
Engine Start Condition	State of engine start permission signal determined by steering lock ECU (steering lock actuator or UPR bracket assembly) sent to certification ECU (smart key ECU assembly) / OK or NG	OK: Engine start permitted NG: Engine start prohibited	- When this item displays "OK", the certification ECU (smart key ECU assembly) has received an unlock confirmation signal from the steering lock ECU (steering lock actuator or UPR bracket assembly) and has permitted fuel injection and engine combustion. - The engine cannot be started when this item displays "NG".
Sensor Value	Record of malfunction of lock or unlock sensor in steering lock ECU (steering lock actuator or UPR bracket assembly) (DTC B2781 is output) / OK or NG(Past)	OK: No record of lock/unlock sensor malfunction in steering lock ECU (steering lock actuator or UPR bracket assembly) NG(Past): Record of lock/unlock sensor in steering lock ECU (steering lock actuator or UPR bracket assembly) turning ON at same time exists	When this item displays "NG", the sensor inside the steering lock ECU (steering lock actuator or UPR bracket assembly) may be malfunctioning, or there may be a mechanical malfunction.
Power Supply Short	Record of malfunction of signal sent to steering lock motor (steering lock actuator assembly) from certification ECU (smart key ECU assembly) (short circuit) (DTC B2782 is output) / OK or NG(Past)	OK: No record of malfunction (short circuit) NG(Past): Record of malfunction (short circuit) exists	This item records malfunctions in the circuit between the certification ECU (smart key ECU assembly) and steering lock motor (steering lock actuator assembly).
Motor Driver Short	Record of malfunction of motor activation circuit in steering lock ECU (steering lock actuator or UPR bracket assembly) (short circuit) (DTC B2781 is	OK: No record of malfunction (short circuit) NG(Past): Record of malfunction (short circuit) exists	This item records malfunctions in the motor activation circuit inside the steering lock ECU (steering lock actuator or UPR bracket assembly) (short circuit).

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
	output) / OK or NG(Past)		
Lock/Unlock Receive	Reception state of steering lock or unlock request signal from certification ECU (smart key ECU assembly) / Yes or No	Yes: Record of receiving lock or unlock request signal exists No: No record of receiving lock or unlock request signal	-
Lock Bar Stuck Error	Record of lock bar not properly unlocking after being commanded to unlock for certain amount of time / OK or NG(Past)	OK: No record of stuck lock bar NG(Past): Record of stuck lock bar exist	-
Engine Start Request	Reception state of engine start permission signal determined by steering lock ECU (steering lock actuator or UPR bracket assembly) sent to certification ECU (smart key ECU assembly) / OK or NG	OK: Receiving signal NG: Not receiving signal	- When this item displays "OK", the certification ECU (smart key ECU assembly) has received an unlock confirmation signal from the steering lock ECU (steering lock actuator or UPR bracket assembly) and has permitted fuel injection and engine combustion. - The engine cannot be started when this item displays "NG".
L Code Check	Verification result between certification ECU (smart key ECU assembly) and steering lock ECU (steering lock actuator or UPR bracket assembly) / OK or NG	OK: Verification result normal NG: Verification result abnormal	When a malfunction is present: - The ID code for the certification ECU (smart key ECU assembly) or steering lock ECU (steering lock actuator or UPR bracket assembly) is not registered or the certification ECU (smart key ECU assembly) or steering lock ECU (steering lock actuator or UPR bracket assembly) is malfunctioning. - The steering cannot be locked. - The steering cannot be unlocked (the engine cannot be started).
Unlock Request Receive	Reception state of steering unlock request signal by certification ECU (smart key ECU assembly) / OK or NG HINT:	OK: Within 10 seconds of turning engine switch on (IG) or on (ACC) or starting engine NG: Except above	- If the unlock signal has not been received, the engine cannot be started. - If this item does not change to "OK" even though the steering unlock conditions are met, the

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
	- The reception state is maintained for 10 seconds. - When 10 seconds or more have elapsed after receiving the signal, the item changes to "NG".		certification ECU (smart key ECU assembly) may be malfunctioning.
Lock Request Receive	Reception state of steering lock request signal by certification ECU (smart key ECU assembly) / OK or NG HINT: - The reception state is maintained for 10 seconds. - When 10 seconds or more have elapsed after receiving the signal, the item changes to "NG".	OK: Within 10 seconds of opening any door with engine switch off and shift lever in P NG: Except above	If this item does not change to "OK" even though the steering lock conditions are met, the certification ECU (smart key ECU assembly) may be malfunctioning.
L Code Check(Past)	Verification result between certification ECU (smart key ECU assembly) and steering lock ECU (steering lock actuator or UPR bracket assembly) (Past) / OK or NG(Past)	OK: Verification result normal NG(Past): Verification result abnormal (Past)	-
Steering Lock	State of whether steering lock ECU (steering lock actuator or UPR bracket assembly) determined steering is locked / Set or Unset	Set: Steering locked Unset: Steering unlocked	If this item displays "Unset", the steering does not lock.
Steering Unlock	State of whether steering lock ECU (steering lock actuator or UPR bracket assembly) determined steering is unlocked / Set or Unset	Set: Steering unlocked Unset: Steering locked	If this item displays "Unset", the steering does not unlock (engine cannot be started).
Engine Start Indicator	Smart warning light / ON or OFF	Customization status displayed	-
Open in IG2	History of IG2 input of the steering lock ECU (steering lock actuator or UPR bracket assembly) / OK or NG(Past)	OK: History of open in IG2 exists NG(Past): No history of open in IG2 exists	When OK is displayed, the steering lock ECU (steering lock actuator or UPR bracket assembly) has an IG2 input circuit malfunction.

HINT:

Unlock operation conditions for the steering lock:

When the following condition is met, the unlock operation is performed:

The engine switch is on (ACC) or on (IG).

- When the engine switch is turned on (ACC) or on (IG) and the key and certification ECU (smart key ECU assembly) are verified, the steering is unlocked.

When any of the following conditions are met, key verification is performed.

- The brake pedal is depressed so that the engine can be started.
- 30 seconds have elapsed after opening and closing a door.
- The engine switch is pressed.

Key verification occurs when the code emitted from the key and the code stored in the certification ECU (smart key ECU assembly) are compared to check that they match.

Certification ECU (smart key ECU assembly) verification occurs when the L code is verified while the engine is being started or the engine switch is being pushed. The steering lock ECU (steering lock actuator or UPR bracket assembly) uses the L code to determine whether the certification ECU (smart key ECU assembly) is authorized.

Lock operation conditions for the steering:

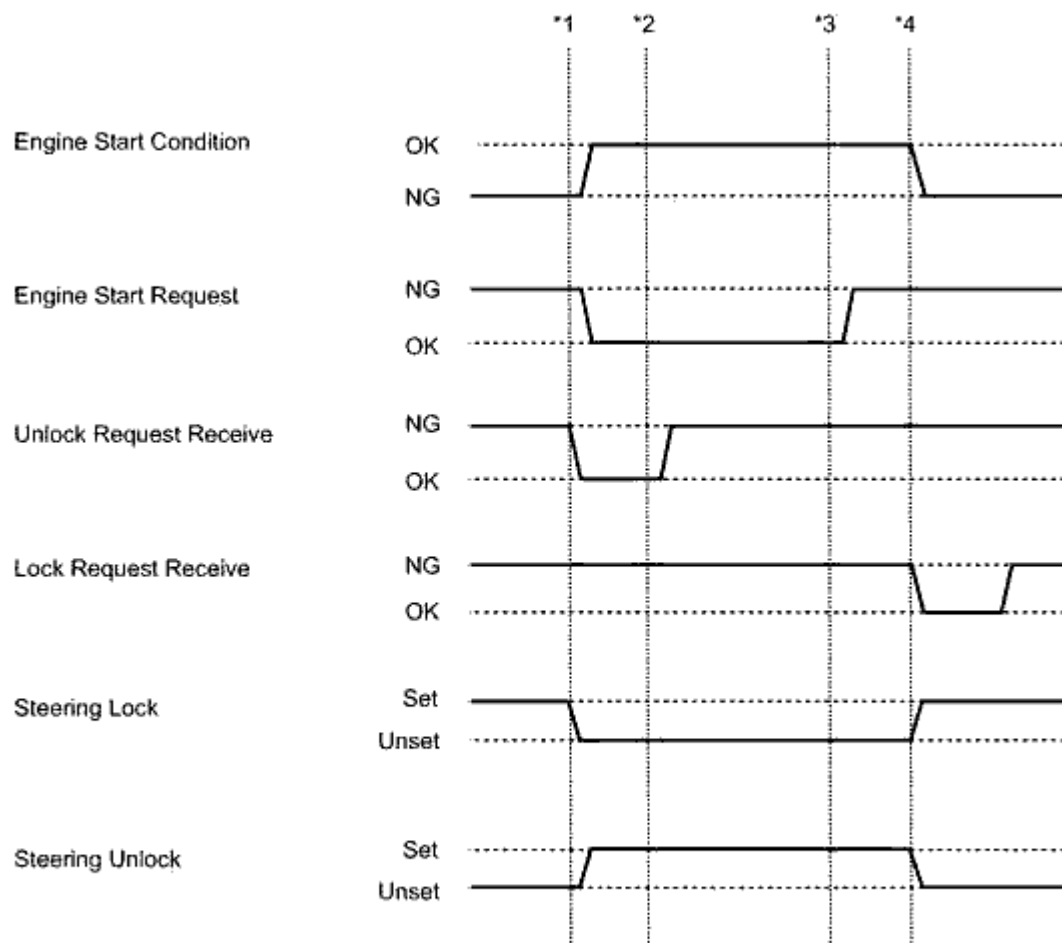
When the following conditions are met and the certification ECU (smart key ECU assembly) has been verified, the lock operation is performed.

- The engine switch is off.
- The shift lever is in P.
- A door is opened or a door lock operation (door lock, wireless door lock or key-linked lock) is performed.

HINT:

The following example shows the behavior of various Data List items when the shift lever is in P, the brake pedal is not depressed, the vehicle is normal and the power source mode changes.

Data List Display Changes when the Steering is Locked/Unlocked:



HINT:

Get into the vehicle while carrying the key. With the engine switch off, the shift lever in P and all the doors closed, perform the following procedures and check the power source mode.

- *1: Without depressing the brake pedal, press the engine switch and check that the power source mode changes to on (ACC).
- *2: Without depressing the brake pedal, press the engine switch and check that the power source mode changes to on (IG).
- *3: Press the engine switch and check that the power source mode changes to off.
- *4: Release the brake pedal, open the driver door and check that the steering locks.

Main Body

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
FL Door Courtesy SW	Front door courtesy light switch assembly LH / ON or OFF	ON: Front door LH open OFF: Front door LH closed	If this item does not change according to the actual state of the driver door, there is a malfunction in the door courtesy light switch or related part.

2. ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

- (a) Turn the engine switch off.
- (b) Connect the Techstream to the DLC3.
- (c) Turn the engine switch on (IG).
- (d) Turn the Techstream on.
- (e) Enter the following menus: Body Electrical / Power Source Control / Active Test.
- (f) According to the display on the Techstream, perform the Active Test.

Power Source Control

TESTER DISPLAY	TEST PART	CONTROL RANGE	DIAGNOSTIC NOTE
P Supply for Steering Lock	Certification ECU (smart key ECU assembly)	OFF/ON HINT: OFF: Power is not supplied ON: Power is supplied	When performing this Active Test, make sure the following condition is met: The engine switch is on (IG).



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Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: DIAGNOSIS SYSTEM; 2016 MY Tacoma [08/2015 -]		

DIAGNOSIS SYSTEM

1. DESCRIPTION

- (a) The steering lock ECU (steering lock actuator or UPR bracket assembly) stores DTCs when a malfunction occurs in the system. These DTCs can be confirmed by using the Techstream.

NOTICE:

- When using the Techstream with the engine switch off to confirm DTCs or Data List information related to the smart key system, the Techstream may not operate unless either of the following is performed: 1) Turn a courtesy light switch on and off at intervals of 1.5 seconds or less until communication between the Techstream and vehicle begins, or 2) connect the Techstream to the vehicle and select the vehicle type under manual mode and enter the following menus: Body Electrical / Smart Key.
 - Do not remove any fuses or disconnect the cable from the negative (-) battery terminal before confirming and recording DTCs as the data stored in the ECUs will be cleared.
 - DTCs may have been stored due to problems unrelated to the steering lock system. Be sure to confirm and record any DTCs output for other systems.
- (b) The steering lock ECU (steering lock actuator or UPR bracket assembly) is not connected to the CAN communication system. Therefore, communication with the Techstream is performed via the certification ECU (smart key ECU assembly).
- (c) The steering lock ECU (steering lock actuator or UPR bracket assembly) only stores DTCs for currently existing malfunctions. History DTCs are not stored.



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Title: STEERING COLUMN: STEERING LOCK SYSTEM: DIAGNOSTIC TROUBLE CODE CHART; 2016 MY Tacoma [08/2015 -]		

DIAGNOSTIC TROUBLE CODE CHART

Steering Lock System

DTC CODE	DETECTION ITEM	SEE PAGE
B2781	Open / Short in Steering Lock ECU	INFO
B2782	Power Source Control ECU Malfunction	INFO
B2788	IG2 Signal Malfunction	INFO



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Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: DTC CHECK / CLEAR; 2016 MY Tacoma [08/2015 -]		

DTC CHECK / CLEAR

NOTICE:

- The steering lock ECU (steering lock actuator or UPR bracket assembly) does not store history DTCs. If any DTCs are output, confirm and record them as soon as possible. Do not turn the engine switch off or clear the DTCs until the DTCs are confirmed and recorded.
- DTCs may have been stored due to problems unrelated to the steering lock system. Be sure to confirm and record any DTCs output for other systems.
- When using the Techstream with the engine switch off, connect the Techstream to the vehicle and turn a courtesy light switch on and off at intervals of 1.5 seconds or less until communication between the Techstream and the vehicle begins. Then select the vehicle type under manual mode and enter the following menus: Body Electrical / Smart Key. While using the Techstream, periodically turn a courtesy light switch on and off at intervals of 1.5 seconds or less to maintain communication between the Techstream and the vehicle.

1. CHECK FOR DTC (MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU))

- Turn the engine switch off.
- Connect the Techstream to the DLC3.
- Turn the engine switch on (IG).
- Turn the Techstream on.
- Enter the following menus: Body Electrical / Main Body / Trouble Codes.
- Check for DTCs.

2. CHECK FOR DTC (CERTIFICATION ECU (SMART KEY ECU ASSEMBLY))

HINT:

The steering lock system DTCs are output from the steering lock ECU (steering lock actuator or UPR bracket assembly) via the certification ECU (smart key ECU assembly).

- Turn the engine switch off.
- Connect the Techstream to the DLC3.
- Turn the engine switch on (IG).
- Turn the Techstream on.
- Enter the following menus: Body Electrical / Smart Key / Trouble Codes.
- Check for DTCs.

3. CLEAR DTC (MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU))

- Turn the engine switch off.
- Connect the Techstream to the DLC3.
- Turn the engine switch on (IG).
- Turn the Techstream on.
- Enter the following menus: Body Electrical / Main Body / Trouble Codes.
- Clear the DTCs.

4. CLEAR DTC (CERTIFICATION ECU (SMART KEY ECU ASSEMBLY))

- (a) Turn the engine switch off.
- (b) Connect the Techstream to the DLC3.
- (c) Turn the engine switch on (IG).
- (d) Turn the Techstream on.
- (e) Enter the following menus: Body Electrical / Smart Key / Trouble Codes.
- (f) Clear the DTCs.



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Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: HOW TO PROCEED WITH TROUBLESHOOTING; 2016 MY Tacoma [08/2015 -]		

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the steering lock system.
- *: Use the Techstream.

1.	VEHICLE BROUGHT TO WORKSHOP
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NEXT



2.	CUSTOMER PROBLEM ANALYSIS
-----------	----------------------------------

(a) Interview the customer and confirm the problem  .

NEXT



3.	CHECK BATTERY VOLTAGE
-----------	------------------------------

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

HINT:

A simple method to determine whether the battery is depleted is to operate the horn.

NEXT



4.	CHECK DTC*
-----------	-------------------

(a) Check for DTCs and make a note of any codes that are output  .

HINT:

When DTCs indicating CAN and/or LIN communication system malfunctions are output, repair the CAN and/or LIN communication systems before performing diagnosis.

- for CAN communication system: [INFO](#) .
- for LIN communication system: [INFO](#) .

Result

RESULT	PROCEED TO
DTCs are not output. (Problem symptom cannot be confirmed or reproduced.)	A
DTCs are not output. (Problem symptom can be confirmed and reproduced.)	B
Steering lock system DTCs are output.	C

HINT:

- When steering lock system DTCs are output, refer to Diagnostic Trouble Code Chart [INFO](#) .
- The steering lock system does not store history DTCs.

B ► GO TO STEP 6

C ► GO TO STEP 8

A



5.	SYMPTOM SIMULATION
-----------	---------------------------

(a) Proceed to How to Proceed with Troubleshooting [INFO](#) .

NEXT

6.	PROBLEM SYMPTOMS TABLE
-----------	-------------------------------

(a) Proceed to Problem Symptoms Table [INFO](#) .

Result

RESULT	PROCEED TO
Fault is not listed in Problem Symptoms Table.	A
Fault is listed in Problem Symptoms Table.	B

B ► GO TO STEP 8

A



7. OVERALL ANALYSIS AND TROUBLESHOOTING*

- (a) Proceed to Data List / Active Test [INFO](#) .
- (b) Proceed to Terminals of ECU [INFO](#) .

NEXT **GO TO STEP 9**

8. CIRCUIT INSPECTION*

NEXT



9. REPAIR OR REPLACE

NEXT



10. CHECK DTC AGAIN*

- (a) Clear the DTCs [INFO](#) .
- (b) Check for DTCs and make a note of any codes that are output [INFO](#) .

HINT:

Perform the DTC output confirmation operation.

Result

RESULT	PROCEED TO
DTCs are not output.	A
Steering lock system DTCs are output.	B

B **GO TO DIAGNOSTIC TROUBLE CODE CHART**

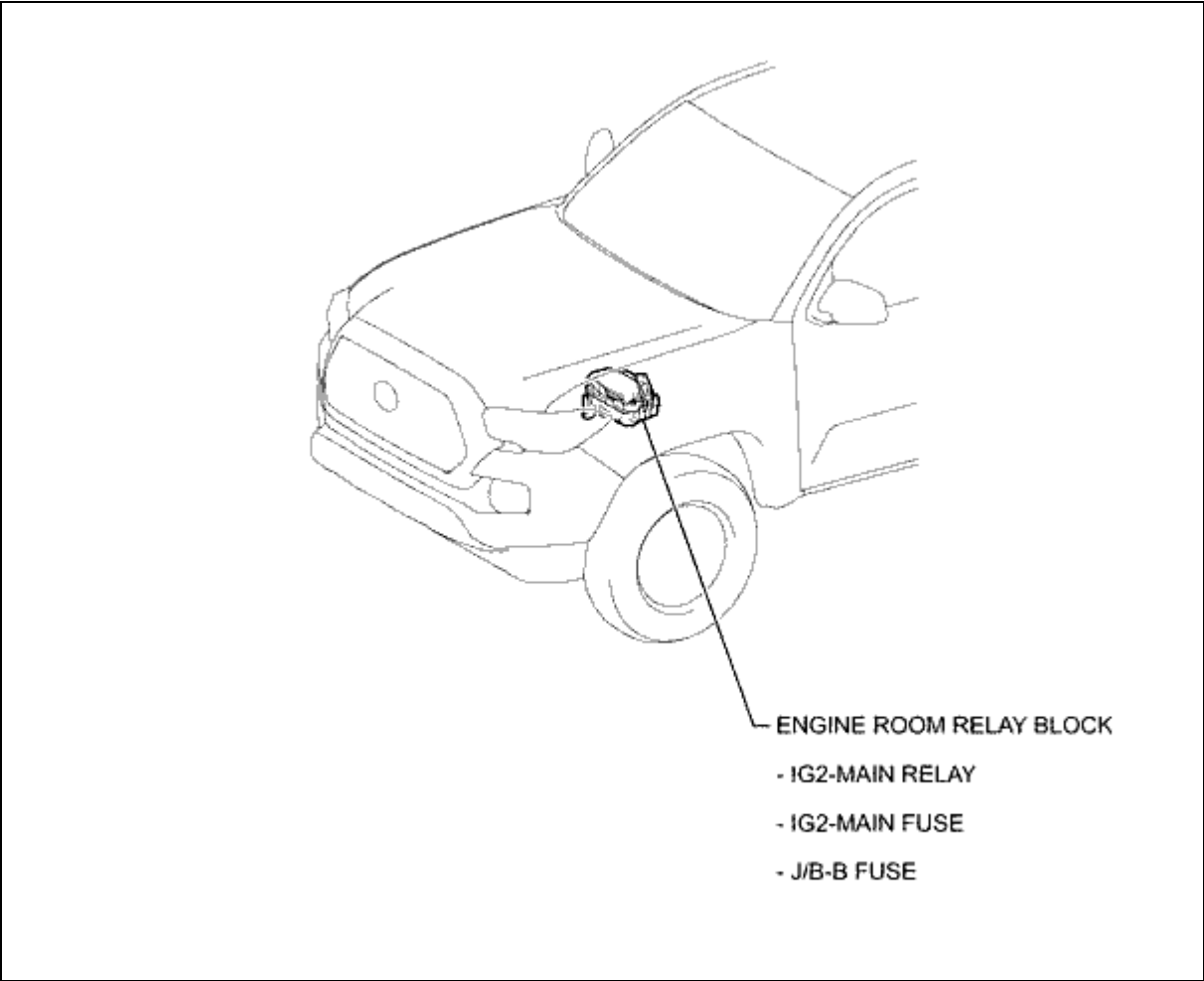
A  **END**



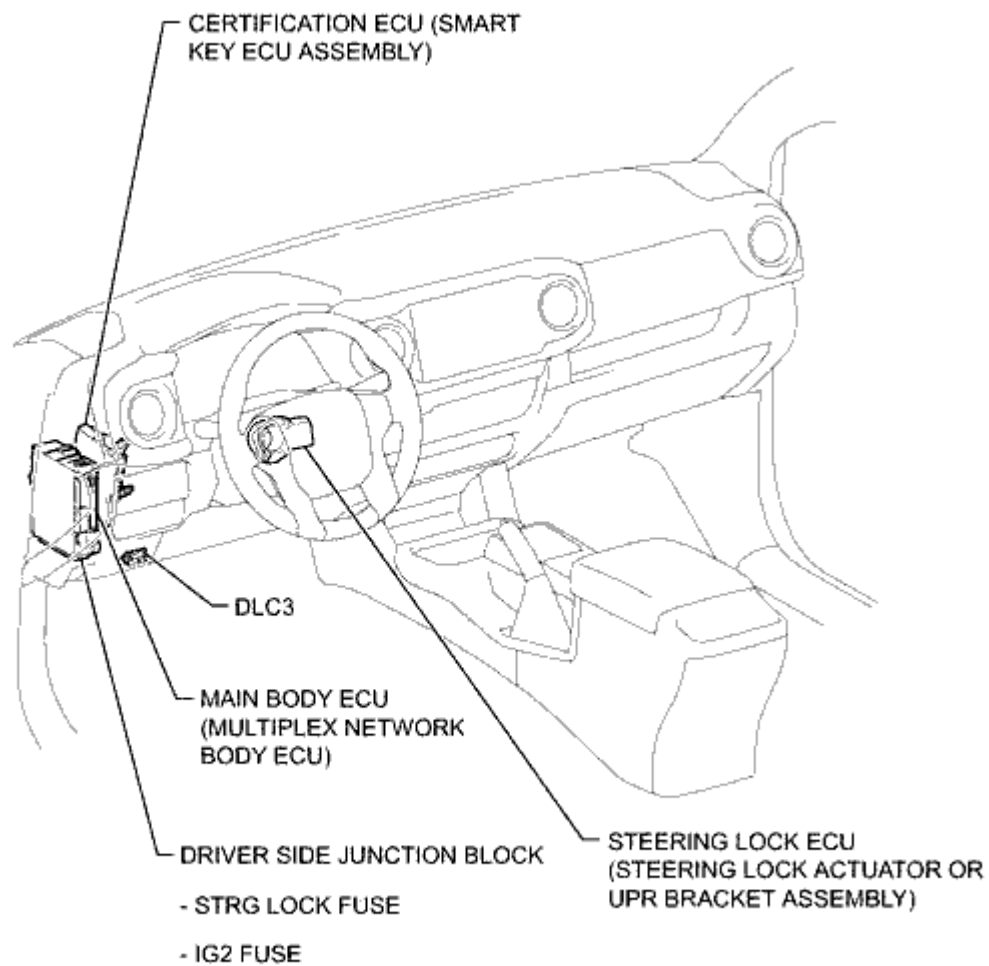
Last Modified: 11-13-2015	6.6 R	Doc ID: RM000005V7V000X
Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: PARTS LOCATION; 2016 MY Tacoma [08/2015 -]		

PARTS LOCATION

ILLUSTRATION



ILLUSTRATION



Last Modified: 11-13-2015	6.6 L	Doc ID: RM000005V7S000X
Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: PRECAUTION; 2016 MY Tacoma [08/2015 -]		

PRECAUTION

1. PRECAUTIONS WHEN CHECKING FOR DTCS

- (a) When the cable is disconnected from the negative (-) battery terminal, the DTCs stored in the steering lock ECU (steering lock actuator or UPR bracket assembly) are cleared. Be sure to record any output DTCs immediately.
- (b) Normally, with the engine switch off, even if the Techstream is connected to the vehicle, the information stored in the smart key system related ECUs (the certification ECU (smart key ECU assembly), main body ECU, etc.) cannot be read. However, smart key system DTCs and Data List information can be confirmed even if the engine switch is off using either of the two methods below:
 - Connect the Techstream to the vehicle and turn a courtesy light switch on and off at intervals of 1.5 seconds or less until communication between the Techstream and the vehicle begins (the Techstream screen changes when communication begins).
 - Connect the Techstream to the vehicle and select the vehicle type under manual mode and enter the following menus: Body Electrical / Smart Key.

2. PRECAUTIONS WHEN REPLACING STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)

- (a) If the steering lock ECU (steering lock actuator or UPR bracket assembly) is replaced, be sure to confirm that the steering is unlocked by turning the steering wheel to the left and right before starting the engine. If the steering is locked for any reason, open and close a door with the engine switch off, and then unlock the steering lock by pressing the engine switch. This prevents the engine from starting while the steering is locked.

3. PRECAUTION FOR REGISTRATION

- (a) If replacing any of the following parts, refer to the registration procedures  .
 - (1) Certification ECU (Smart key ECU assembly)
 - (2) Steering lock ECU (steering lock actuator or UPR bracket assembly)
 - (3) Main body ECU (Multiplex network body ECU)
 - (4) Electrical key transmitter sub-assembly
 - (5) ECM

4. PRECAUTIONS FOR STEERING LOCK / UNLOCK FUNCTION

- (a) After turning the engine switch off and opening and closing any of the doors, the steering wheel will be locked due to the steering lock function. Operating the engine switch again automatically cancels the steering lock function.
- (b) To prevent the steering lock motor from overheating, the motor operation may be suspended if the steering is locked and unlocked repeatedly in a short period of time. In this case, refrain from operating the engine switch. After about 10 seconds, the steering lock motor will resume functioning.



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Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: PROBLEM SYMPTOMS TABLE; 2016 MY Tacoma [08/2015 -]		

PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

Steering Lock System

SYMPTOM	SUSPECTED AREA	SEE PAGE
Steering lock does not lock	Refer to "Steering Lock does not Lock"	INFO
Steering does not unlock (engine cannot be started)	Refer to "Unable to Unlock Steering Wheel (Engine cannot Start)"	INFO



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Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: SYSTEM DESCRIPTION; 2016 MY Tacoma [08/2015 -]		

SYSTEM DESCRIPTION

1. UNLOCK OPERATION CONDITIONS FOR STEERING LOCK

(a) When the following condition is met, the unlock operation is performed.

- The engine switch is on (ACC) or on (IG).

HINT:

When the engine switch is turned on (ACC) or on (IG) and the key and certification ECU (smart key ECU assembly) are verified, the steering is unlocked.

(b) When any of the following conditions are met, key verification is performed.

- The engine switch is pressed.
- The brake pedal is depressed so that the engine can be started.
- 30 seconds have elapsed after opening and closing a door.

HINT:

- Key verification occurs when the code emitted from the key and the code stored by the certification ECU (smart key ECU assembly) are compared to check that they match.
- Certification ECU (smart key ECU assembly) verification occurs when the L code is verified while the engine is being started or the engine switch is being pushed. The steering lock ECU (steering lock actuator or UPR bracket assembly) uses the L code to determine whether the certification ECU (smart key ECU assembly) is authorized.

2. LOCK OPERATION CONDITIONS FOR STEERING LOCK

(a) When all of the following conditions are met and the certification ECU (smart key ECU assembly) has been verified, the lock operation is performed.

- The engine switch is off.
- The shift lever is in P.
- A door is opened or a door lock operation (door lock, wireless door lock or key-linked lock operation*) is performed.

HINT:

*: This is the lock/unlock operation with the mechanical key.

3. WARNING FUNCTION

(a) A check smart key system message is displayed on the multi-information display in the combination meter assembly when one of the following occurs: 1) A vehicle speed signal malfunction is detected, 2) a malfunction that interferes with steering lock ECU (steering lock actuator or UPR bracket assembly) operation is detected.

If a malfunction occurs which results in the message being displayed, the engine cannot be started once it is turned off.

HINT:

DTCs are stored in all cases listed above.

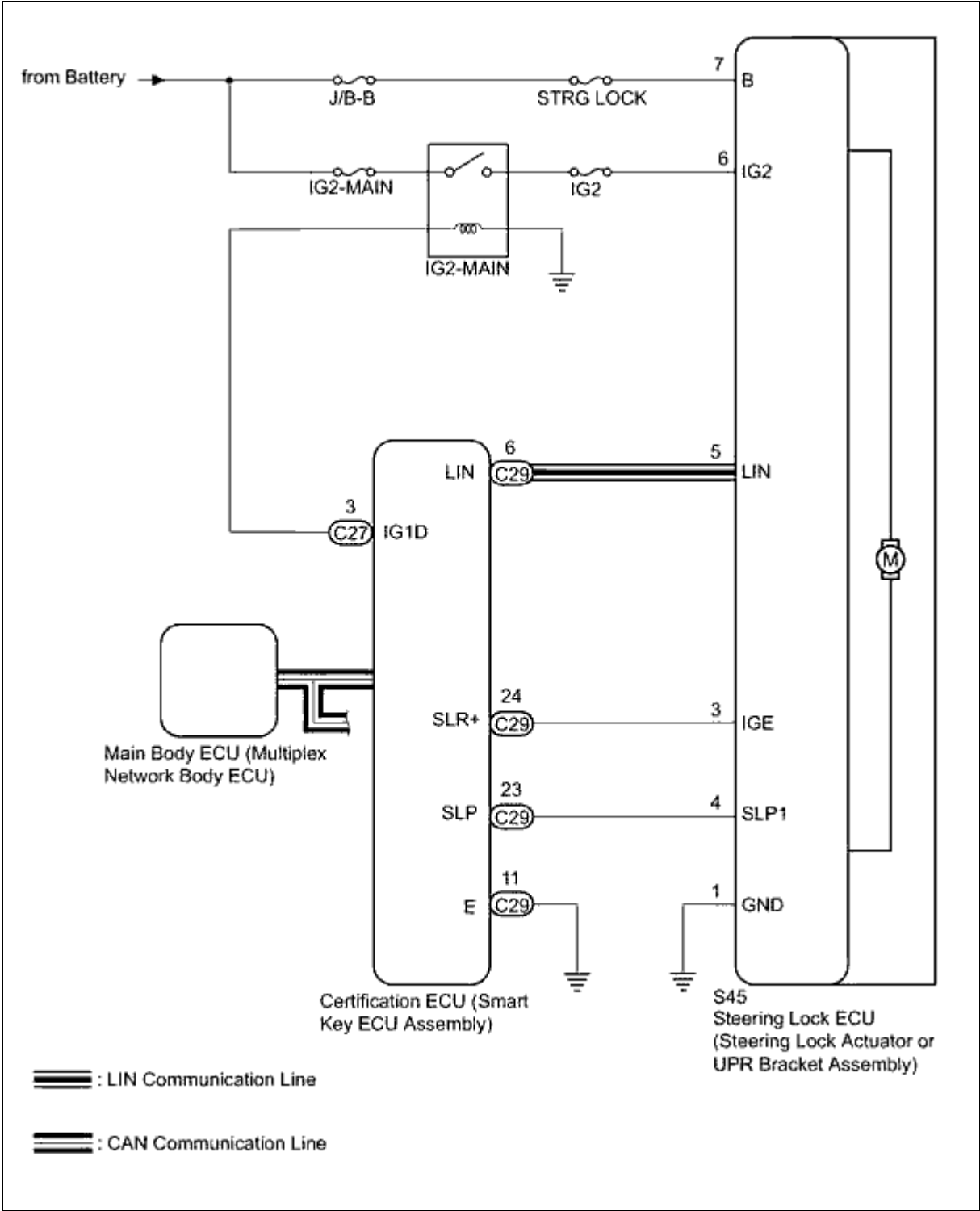
4. STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY) DESCRIPTION

- (a) The steering lock ECU and steering lock motor are built into the steering lock actuator assembly of the steering column assembly.
- (b) The steering lock ECU (steering lock actuator or UPR bracket assembly) is not connected to the CAN communication system. However, the steering lock ECU (steering lock actuator or UPR bracket assembly) is connected to the certification ECU (smart key ECU assembly) via LIN communication and communicates with other components via CAN communication through the certification ECU (smart key ECU assembly).



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Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: SYSTEM DIAGRAM; 2016 MY Tacoma [08/2015 -]		

SYSTEM DIAGRAM



Circuit Description

COMPONENT	OUTLINE
-----------	---------

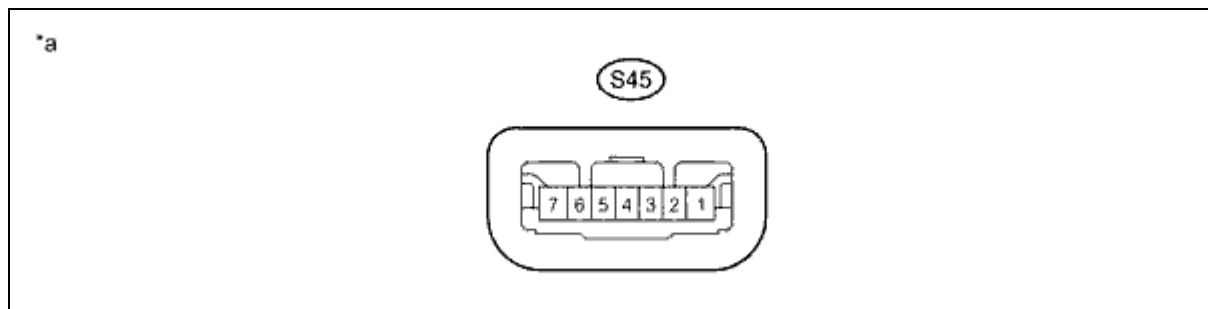
COMPONENT	OUTLINE
Steering Lock ECU (Steering Lock Actuator or UPR Bracket Assembly)	• The steering is locked and unlocked by communicating with the certification ECU (smart key ECU assembly) via LIN communication. • When the following conditions are met, the steering can be unlocked. ◦ The codes (L codes) of the certification ECU (smart key ECU assembly) and steering lock match. ◦ The certification ECU (smart key ECU assembly) and key ID codes match.
Certification ECU (Smart Key ECU Assembly)	• The ID code of the key the user is carrying is sent to the electrical key antenna. • The certification ECU (smart key ECU assembly) compares the key ID code it receives from the electrical key antenna with its own ID code. If they match, the certification ECU (smart key ECU assembly) permits the steering lock ECU (steering lock actuator or UPR bracket assembly) to turn the power on, start the engine and unlock and lock the steering. • Outputs a command to supply power to the steering lock motor based on the power source mode, shift position and vehicle speed signal.



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Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: TERMINALS OF ECU; 2016 MY Tacoma [08/2015 -]		

TERMINALS OF ECU

1. TERMINAL INSPECTION



Text in Illustration

*a	Component without harness connected (Steering Lock ECU (Steering Lock Actuator or UPR Bracket Assembly))	-	-
----	---	---	---

(a) Measure the voltage and resistance according to the value(s) in the table below.

TERMINAL NO. (SYMBOL)	INPUT/OUTPUT	WIRING COLOR	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION	RELATED DATA LIST ITEM
S45-1 (GND) - Body ground	-	W-B - Body ground	Ground*	Always	Below 1 Ω	-
S45-3 (IGE) - S45-1 (GND)	Input	Y - W-B	Steering lock motor activation command signal (motor activation command signal sent from certification ECU (smart key ECU assembly))	Any door opened when conditions below met, and then steering lock motor activated: • Shift lever in P • Steering lock unlocked in advance by carrying key and turning engine switch on (IG) • After above conditions	Pulse generation (see waveform)	Smart Key • Power Supply Short • Unlock Request Receive • Lock Request Receive

TERMINAL NO. (SYMBOL)	INPUT/OUTPUT	WIRING COLOR	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION	RELATED DATA LIST ITEM
				met, engine switch turned off		
S45-4 (SLP1) - S45-1 (GND)	Output	BE - W-B	Steering lock bar position signal (output signal from steering unlock sensor)	Steering locked → unlocked	11 to 14 V → Below 1.5 V	Smart Key • Sensor Value
S45-5 (LIN) - S45-1 (GND)	Input/Output	L - W-B	LIN communication line	-	-	Smart Key • Steering Lock Start Cond
S45-6 (IG2) - S45-1 (GND)	Input	B - W-B	Power source mode signal (IG2 power supply input for entire steering lock actuator assembly)*	Engine switch off → engine switch on (IG)	Below 1 V → 11 to 14 V	-
S45-7 (B) - Body ground	Input	R - Body ground	Power source*	Always	11 to 14 V	-

*: When there is a problem with the power source input, the certification ECU (smart key ECU assembly) may store DTC B2786.

NOTICE:

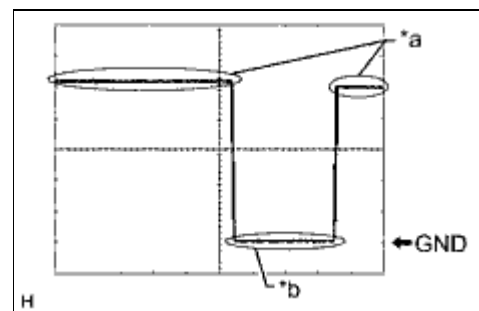
There is 1 motor and 2 sensors built into the steering lock actuator assembly.

HINT:

- When taking measurements when the lock motor is stopped, it is not necessary to perform any operations.
- In order to take measurements when the lock motor is operating, perform either of the following operations:
 - To unlock the steering, carry the key and turn the engine switch on (ACC) or on (IG).
 - To lock the steering, turn the engine switch off with the shift lever in P, and then open a door.

(1) Waveform

ITEM	CONTENT
Tester Connection	S45-3 (IGE) - S45-1 (GND)
Tool Setting	2 V/DIV., 200 ms./DIV.
Vehicle Condition	Steering lock motor not operating → Operating → Not operating



Text in Illustration

*a	Steering Lock Motor not Operating
*b	Steering Lock Motor Operating



Last Modified: 11-13-2015	6.6 J	Doc ID: RM000005V86000X
Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: Unable to Lock Steering Wheel; 2016 MY Tacoma [08/2015 -]		

Unable to Lock Steering Wheel

DESCRIPTION

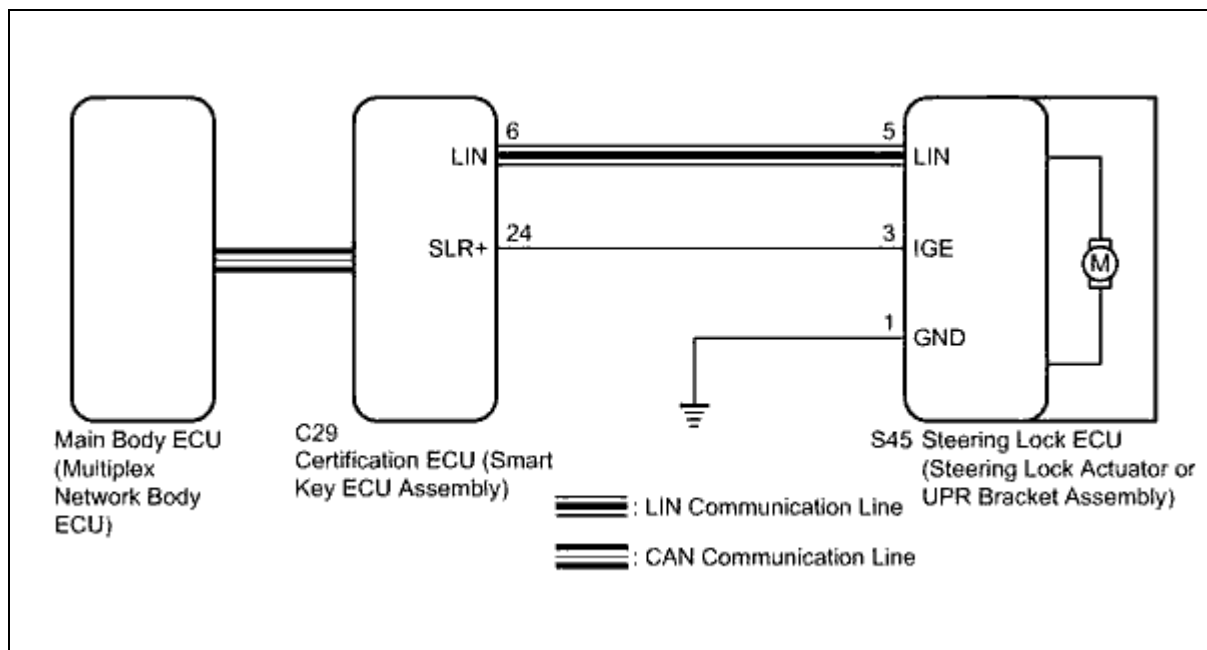
The steering lock actuator assembly activates the steering lock motor and moves the lock bar into the steering column to lock the steering.

When the steering lock is operating, the steering may not lock when the lock bar is not aligned with the lock hole of the steering column. In this case, the steering can be locked by turning the steering wheel a little, as is done for a vehicle with a mechanical key, to change the position of the lock hole.

Related Data List and Active Test Items

PROBLEM SYMPTOM	DATA LIST ITEM	ACTIVE TEST ITEM
Steering Lock does not Lock	Smart Key • Lock Request Receive • L Code Check • Steering Lock Main Body • FL Door Courtesy SW Power Source Control • Shift P Signal	-

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- When using the Techstream with the engine switch off, connect the Techstream to the vehicle and turn a courtesy light switch on and off at intervals of 1.5 seconds or less until communication between the Techstream and the vehicle begins. Then select the vehicle type under manual mode and enter the following menus: Body Electrical / Smart Key. While using the Techstream, periodically turn a courtesy light switch on and off at intervals of 1.5 seconds or less to maintain communication between the Techstream and the vehicle.
- Perform either of the following operations to lock/unlock the steering:
 - To unlock the steering, carry the key and turn the engine switch on (ACC) or on (IG).
 - To lock the steering, turn the engine switch off with the shift lever in P, and then open a door.
- Make sure that no DTCs are output. If any DTCs are output, proceed to the Diagnostic Trouble Code Chart [INFO](#).
- The steering lock system uses LIN communication. First perform the inspections in "How to Proceed with Troubleshooting" to confirm that there are no communication malfunctions before proceeding with troubleshooting [INFO](#).
- When replacing the steering lock ECU (steering lock actuator or UPR bracket assembly) or certification ECU (smart key ECU assembly), registration must be performed [INFO](#).
- After performing repairs, confirm that the problem does not recur.
- Inspect the fuses for circuits related to this system before performing the following procedure.
- When disconnecting the cable from the negative (-) battery terminal, some systems need to be initialized after the cable is reconnected [INFO](#).

PROCEDURE

1.	READ VALUE USING TECHSTREAM (LOCK REQUEST RECEIVE)
----	--

(a) Use the Data List to check if the steering lock command is functioning properly.

Smart Key

TESTER	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
--------	------------------------	------------------	-----------------

DISPLAY			
Lock Request Receive	Reception state of steering lock request signal by certification ECU (smart key ECU assembly) / OK or NG HINT: - The reception state is maintained for 10 seconds. - When 10 seconds or more elapsed after receiving the signal, the item changes to "NG".	OK: Within 10 seconds of opening any door with engine switch off and shift lever in P NG: Except above	If this item does not change to "OK" even though the steering lock conditions are met, the certification ECU (smart key ECU assembly) may be malfunctioning.

OK:

The certification ECU (smart key ECU assembly) receives a lock request signal within 10 seconds of turning the engine switch from on (IG) to on (ACC) or off and opening a door with the shift lever in P, and OK is displayed on the Techstream screen.

NG  **GO TO STEP 8**

OK



2.	READ VALUE USING TECHSTREAM (L CODE CHECK)
-----------	---

(a) Use the Data List to check if L code certification is functioning properly.

Smart Key

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
L Code Check	Verification result between certification ECU (smart key ECU assembly) and steering lock ECU (steering lock actuator or UPR bracket assembly) / OK or NG	OK: Verification result normal NG: Verification result abnormal	When a malfunction is present: - The ID code for the certification ECU (smart key ECU assembly) or steering lock ECU (steering lock actuator or UPR bracket assembly) is not registered or the certification ECU (smart key ECU assembly) or steering lock ECU (steering lock actuator or UPR bracket assembly) is malfunctioning. - The steering cannot be locked. - The steering cannot be unlocked (the engine cannot be started).

OK:

OK is displayed on the Techstream.

HINT:

Reasons for verification failure:

- The steering lock ECU (steering lock actuator or UPR bracket assembly) or certification ECU (smart key ECU assembly) is malfunctioning.
- There is a problem with the communication between ECUs.
- An ECU is replaced, but is not registered.
- An ECU is replaced with an ECU which has a code already stored in it.

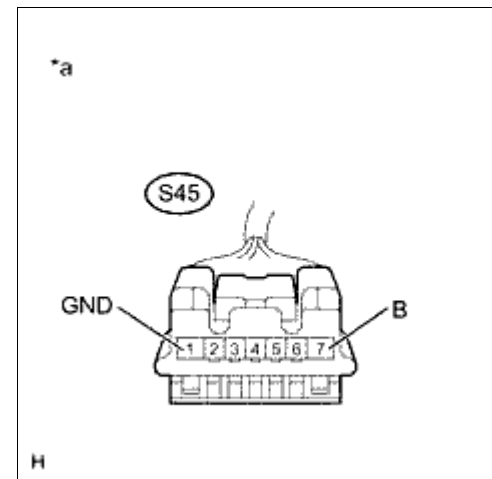
NG  **GO TO STEP 7**

OK



3. CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL)

- (a) Disconnect the steering lock ECU (steering lock actuator or UPR bracket assembly) connector.



- (b) Measure the resistance and voltage according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-1 (GND) - Body ground	Always	Below 1 Ω

NOTICE:

If the result is not as specified, check for looseness in the ground cable connection.

Standard Voltage:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-7 (B) - Body ground	Always	11 to 14 V

Text in Illustration

*a Front view of wire harness connector

(to Steering Lock ECU (steering lock actuator or UPR bracket assembly))

NG ► REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4.

INSPECT STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)

(a) Reconnect the steering lock ECU (steering lock actuator or UPR bracket assembly) connector.

(b) Check the signal waveform according to the condition(s) in the table below.

Standard Frequency

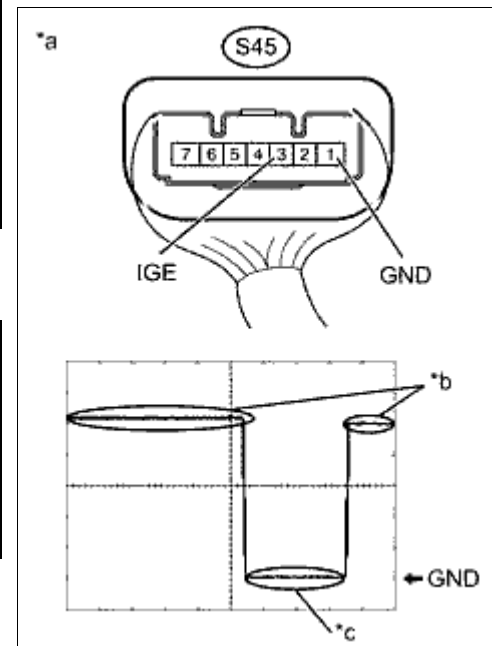
ITEM	CONTENT
Tester Connection	S45-3 (IGE) - S45-1 (GND)
Tool Setting	2 V/DIV., 200 ms./DIV.
Vehicle Condition	Steering lock motor not operating → Operating → Not operating

Text in Illustration

*a	Component with harness connected (Steering Lock ECU (Steering Lock Actuator or UPR Bracket Assembly))
*b	Steering Lock Motor not Operating
*c	Steering Lock Motor Operating

HINT:

- When taking measurements when the lock motor is stopped, it is not necessary to perform any operations.
- In order to take measurements when the lock motor is operating, perform either of the following operations:
 - To unlock the steering, carry the key and turn the engine switch on (ACC) or on (IG).
 - To lock the steering, turn the engine switch off with the shift lever in P, and then open a door.



NG ► GO TO STEP 5

OK ► REPLACE STEERING LOCK ECU (STEERING LOCK

ACTUATOR OR UPR BRACKET ASSEMBLY)

5.

CHECK HARNESS AND CONNECTOR (STEERING LOCK ECU (STEERING LOCK ACTUATOR ASSEMBLY) - CERTIFICATION ECU (SMART KEY ECU ASSEMBLY))

- (a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.
- (b) Disconnect the S45 steering lock ECU (steering lock actuator or UPR bracket assembly) connector.
- (c) Disconnect the C29 certification ECU (smart key ECU assembly) connector.
- (d) Check for deformation and corrosion of the connector case and terminals.

OK:

There is no deformation or corrosion of the connector case or terminals.

- (e) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-3 (IGE) - C29-24 (SLR+)	Always	Below 1 Ω
S45-3 (IGE) or C29-24 (SLR+) - Body ground	Always	10 k Ω or higher

NG  **REPAIR OR REPLACE HARNESS OR CONNECTOR**

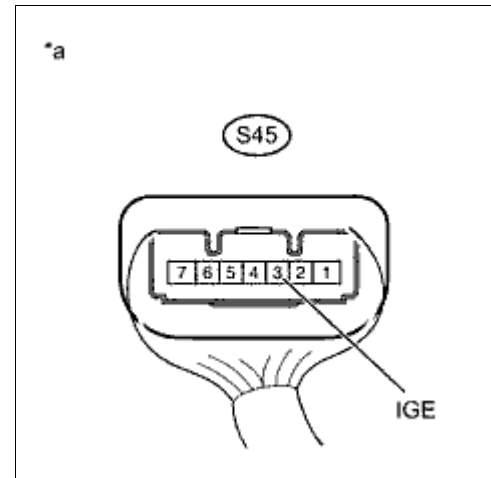
OK



6.

INSPECT STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)

- (a) Reconnect the S45 steering lock ECU (steering lock actuator or UPR bracket assembly) connector.



(b) Reconnect the C29 certification ECU (smart key ECU assembly) connector.

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-3 (IGE) - Body ground	Always	11 to 14 V

Text in Illustration

*a	Component with harness connected (Steering Lock ECU (Steering Lock Actuator or UPR Bracket Assembly))
----	--

NG ► **REPLACE STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)**

OK ► **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

7.	REPLACE STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)
-----------	---

(a) Replace the steering lock ECU (steering lock actuator or UPR bracket assembly) with a new one [INFO](#).

(b) Perform registration [INFO](#).

(c) Use the Data List to check if L code certification is functioning properly.

Smart Key

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
L Code Check	Verification result between certification ECU (smart key	OK: Verification	When a malfunction is present: • The ID code for the certification ECU (smart

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
	ECU assembly) and steering lock ECU (steering lock actuator or UPR bracket assembly) / OK or NG	result normal NG: Verification result abnormal	key ECU assembly) or steering lock ECU (steering lock actuator or UPR bracket assembly) is not registered or the certification ECU (smart key ECU assembly) or steering lock ECU (steering lock actuator or UPR bracket assembly) is malfunctioning. • The steering cannot be locked. • The steering cannot be unlocked (the engine cannot be started).

OK:

OK is displayed on the Techstream.

NG ► **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

OK ► **END**

8.	READ VALUE USING TECHSTREAM (DOOR COURTESY SW)
-----------	---

(a) Using the Techstream, check the following main body ECU (multiplex network body ECU) Data List item by opening and closing the driver door to confirm the state of the front door courtesy light switch assembly.

Main Body

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
FL Door Courtesy SW	Front door courtesy light switch assembly LH / ON or OFF	ON: Front door LH open OFF: Front door LH closed	If this item does not change according to the actual state of the driver door, there is a malfunction in the door courtesy light switch or related part.

OK:

The Data List item changes in accordance with the opening and closing of the driver door.

NG ► **GO TO LIGHTING SYSTEM (FRONT DOOR COURTESY SWITCH CIRCUIT)**

OK
▼

9.	READ VALUE USING TECHSTREAM (SHIFT P SIGNAL)
-----------	---

(a) Move the shift lever to P.

(b) Read the Data List according to the display on the Techstream.

Power Source Control

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Shift P Signal	Shift position (P) signal / ON or OFF	ON: Shift lever in P OFF: Shift lever not in P	• Use this item to determine if the shift position switch is malfunctioning. • The engine cannot be started when this item is "OFF".

OK:

ON is displayed on the Techstream.

NG ► **GO TO ENTRY AND START SYSTEM (for Start Function) (PROBLEM SYMPTOMS TABLE)**

OK



10.	READ VALUE USING TECHSTREAM (STEERING LOCK)
------------	--

(a) Check that the steering is unlocked.

(b) Read the Data List according to the display on the Techstream.

Smart Key

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Steering Lock	State of whether steering lock ECU (steering lock actuator or UPR bracket assembly) determined steering is locked / Set or Unset	Set: Steering locked Unset: Steering unlocked	If this item displays "Unset", the steering is not locked.

OK:

Set is displayed on the Techstream.

NG ► **REPLACE STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)**

OK



11. READ VALUE USING TECHSTREAM (LOCK REQUEST RECEIVE)

- (a) Replace the certification ECU (smart key ECU assembly) with a new one.
- (b) Perform registration  .
- (c) Turn the engine switch on (IG).
- (d) Use the Data List to check if the steering lock command is functioning properly.

Smart Key

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Lock Request Receive	Reception state of steering lock request signal by certification ECU (smart key ECU assembly) / OK or NG HINT: • The reception state is maintained for 10 seconds. • When 10 seconds or more have elapsed after receiving the signal, the item changes to "NG".	OK: Lock request received within 10 seconds of opening any door with engine switch off and shift lever in P NG: Except above	If this item does not change to "OK" even though the steering lock conditions are met, the certification ECU (smart key ECU assembly) may be malfunctioning.

OK:

The certification ECU (smart key ECU assembly) receives a lock request signal within 10 seconds of turning the engine switch from on (IG) to on (ACC) or off and opening a door with the shift lever in P, and OK is displayed on the Techstream screen.

NG  **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

OK  **END**



Last Modified: 11-13-2015	6.6 J	Doc ID: RM000005V85000X
Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING LOCK SYSTEM: Unable to Unlock Steering Wheel (Engine cannot Start); 2016 MY Tacoma [08/2015 -]		

Unable to Unlock Steering Wheel (Engine cannot Start)

DESCRIPTION

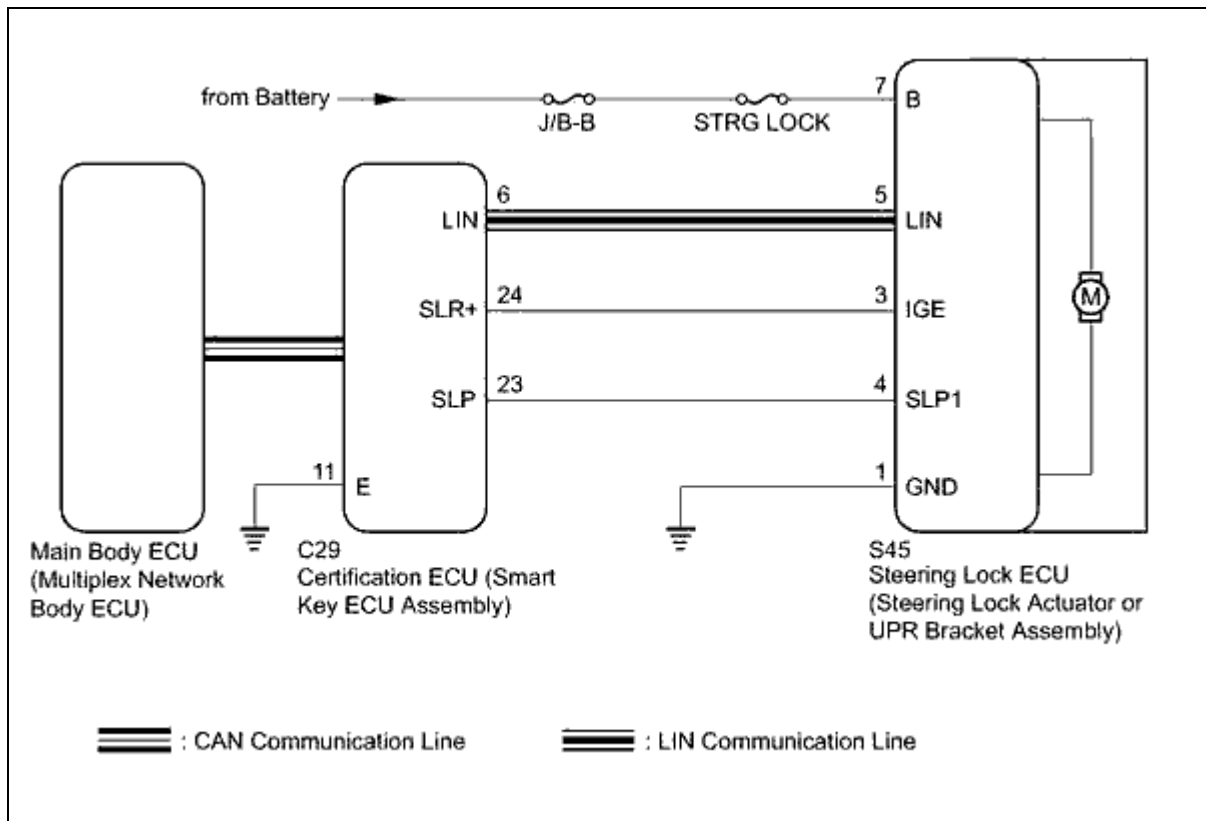
The steering lock actuator assembly activates the steering lock motor and moves the lock bar into the steering column to lock the steering.

The steering may not unlock when the lock bar gets stuck in the lock hole of the steering column. In this case, if the engine switch is turned on (IG) while shaking the steering wheel, as is done for a vehicle with a mechanical key, the lock bar will be unlocked. If the certification ECU (smart key ECU assembly) or ECM is replaced, the system needs to be initialized. Otherwise, the steering cannot be unlocked and the engine cannot be started.

Related Data List and Active Test Items

PROBLEM SYMPTOM	DATA LIST ITEM	ACTIVE TEST ITEM
Unable to unlock steering wheel (Engine cannot start)	Smart Key • Unlock Request Receive • L Code Check • Steering Unlock	-

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- When using the Techstream with the engine switch off, connect the Techstream to the vehicle and turn a courtesy light switch on and off at intervals of 1.5 seconds or less until communication between the Techstream and the vehicle begins. Then select the vehicle type under manual mode and enter the following menus: Body Electrical / Smart Key. While using the Techstream, periodically turn a courtesy light switch on and off at intervals of 1.5 seconds or less to maintain communication between the Techstream and the vehicle.
- Perform either of the following operations to lock/unlock the steering:
 - To unlock the steering, carry the key and turn the engine switch on (ACC) or on (IG).
 - To lock the steering, turn the engine switch off with the shift lever in P, and then open a door.
- The steering lock system uses LIN communication. First perform the inspections in "How to Proceed with Troubleshooting" to confirm that there are no communication malfunctions before proceeding with troubleshooting **INFO**.
- After performing repairs, confirm that the problem does not recur.
- Make sure that no DTCs are output. If any DTCs are output, proceed to the Diagnostic Trouble Code Chart **INFO**.
- Inspect the fuses for circuits related to this system before performing the following procedure.
- When replacing the steering lock ECU (steering lock actuator or UPR bracket assembly) or certification ECU (smart key ECU assembly), registration must be performed **INFO**.
- When disconnecting the cable from the negative (-) battery terminal, some systems need to be initialized after the cable is reconnected **INFO**.
- If the steering lock ECU (steering lock actuator or UPR bracket assembly) is replaced, be sure to confirm that the steering is unlocked by turning the steering wheel to the left and right before starting the engine. This function prevents the engine from starting while the steering is locked. If the steering is locked for any reason, open and close a door with the engine switch off, and then unlock the steering by pressing the engine switch.

PROCEDURE

1. CHECK ENGINE SWITCH (SWITCH CONDITION)

(a) Check the power source mode change.

(1) When the key is inside the vehicle and the shift lever is in P, check that pressing the engine switch with the brake pedal released causes the power source mode to change as follows:

OK:

Off → On (ACC) → On (IG) → Off

NG ► **GO TO ENTRY AND START SYSTEM (for Start Function) (PROBLEM SYMPTOMS TABLE)**

OK



2. CHECK INDICATOR

(a) With the engine switch on (IG), check that Steering Lock active is displayed on the multi-information display in the combination meter assembly.

Result

RESULT	PROCEED TO
Steering Lock active is displayed.	A
Steering Lock active are not displayed.	B

B ► **GO TO STEP 4**

A



3. CHECK STEERING LOCK

(a) Turn the steering wheel left and right, and then press the engine switch.

(b) Check that the steering is unlocked.

Result

RESULT	PROCEED TO
The steering is unlocked.	A

RESULT	PROCEED TO
The steering is not unlocked.	B

B ► **GO TO STEP 4**

A ► **END**

4.	CHECK FOR DTC
-----------	----------------------

(a) Using the Techstream, check if the certification ECU (smart key ECU assembly) DTC is output INFO.

Result

RESULT	PROCEED TO
DTCs are not output.	A
DTCs are output.	B

B ► **GO TO DIAGNOSTIC PROCEDURE INDICATED BY OUTPUT DTC**

A
▼

5.	READ VALUE USING TECHSTREAM (UNLOCK REQUEST RECEIVE)
-----------	---

(a) Use the Data List to check if the steering lock request is functioning properly.

Smart Key

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Unlock Request Receive	Reception state of steering unlock request signal by certification ECU (smart key ECU assembly) / OK or NG HINT: - The reception state is maintained for 10 seconds. - When 10 seconds or more have elapsed after receiving the	OK: Within 10 seconds of turning engine switch on (IG) or on (ACC) or starting engine NG: Except above	- If the unlock signal has not been received, the engine cannot be started. - If this item does not change to "OK" even though the steering unlock conditions are met, the certification ECU (smart key ECU assembly) may be malfunctioning.

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
	signal, the item changes to "NG".		

OK:

Within 10 seconds of turning the engine switch on (ACC) or on (IG) or starting the engine, the Data List item changes to "OK".

NG ► **GO TO STEP 12**

OK



6.	READ VALUE USING TECHSTREAM (L CODE CHECK)
-----------	---

(a) Use the Data List to check if L code certification is functioning properly.

Smart Key

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
L Code Check	Verification result between certification ECU (smart key ECU assembly) and steering lock ECU (steering lock actuator or UPR bracket assembly) / OK or NG	OK: Verification result normal NG: Verification result abnormal	When a malfunction is present: • The ID code for the certification ECU (smart key ECU assembly) or steering lock ECU (steering lock actuator or UPR bracket assembly) is not registered or the certification ECU (smart key ECU assembly) or steering lock ECU (steering lock actuator or UPR bracket assembly) is malfunctioning. • The steering cannot be locked. • The steering cannot be unlocked (the engine cannot be started).

OK:

OK is displayed on the Techstream.

HINT:

Reasons for verification failure:

- The steering lock ECU (steering lock actuator or UPR bracket assembly) or certification ECU (smart key ECU assembly) is malfunctioning.
- There is a problem with the communication between ECUs.
- An ECU is replaced, but is not registered.
- An ECU is replaced with an ECU which has a code already stored in it.

NG ► **GO TO STEP 11**

OK



7.	INSPECT STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)
----	---

(a) Measure the resistance and voltage according to the value(s) in the table below.

Standard Resistance:

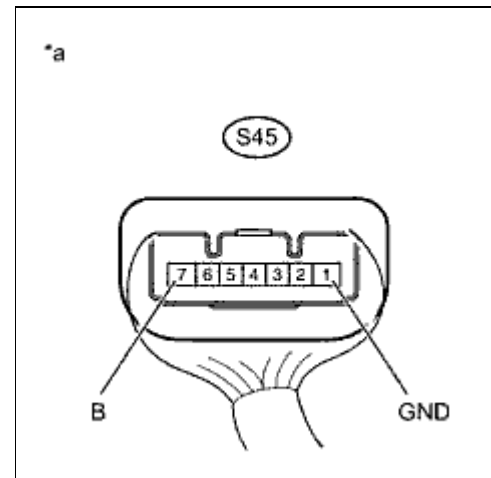
TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-1 (GND) - Body ground	Always	Below 1 Ω

NOTICE:

If the result is not as specified, check for looseness in the ground cable connection.

Standard Voltage:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-7 (B) - Body ground	Always	11 to 14 V



Text in Illustration

*a	Component with harness connected (Steering Lock ECU (Steering Lock Actuator or UPR Bracket Assembly))
----	--

NG **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK



8.	CHECK HARNESS AND CONNECTOR (GROUND)
----	---

(a) Disconnect the steering lock ECU (steering lock actuator or UPR bracket assembly) connector.

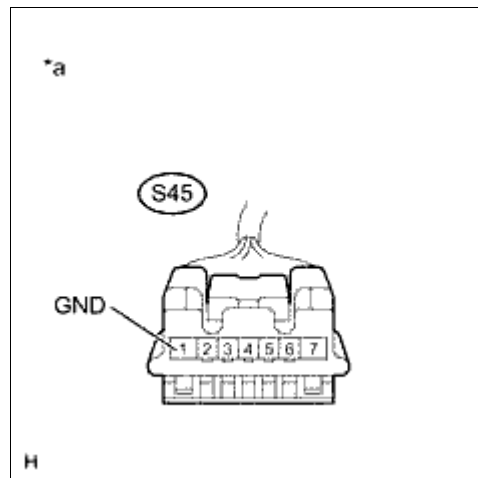
(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-1 (GND) - Body ground	Always	Below 1 Ω

Text in Illustration

*a	Front view of wire harness connector (to Steering Lock ECU (Steering Lock Actuator or UPR Bracket Assembly))
----	---



(c) Reconnect the steering lock ECU (steering lock actuator or UPR bracket assembly) connector.

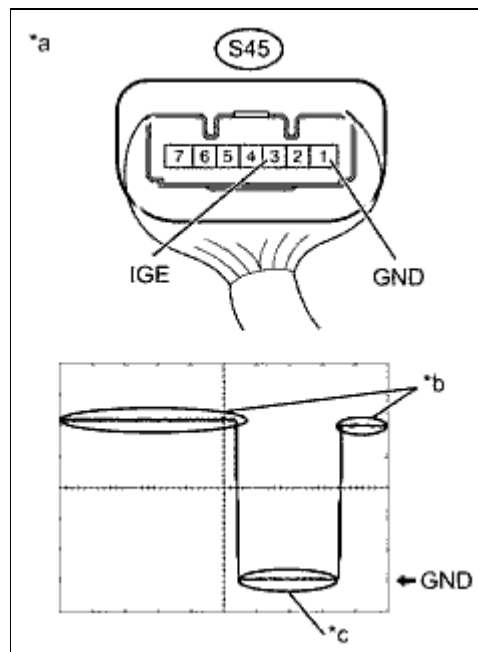
(d) Check the signal waveform according to the condition(s) in the table below.

Standard Frequency:

ITEM	CONTENT
Tester Connection	S45-3 (IGE) - S45-1 (GND)
Tool Setting	2 V/DIV., 200 ms./DIV.
Vehicle Condition	Steering lock motor not operating → Operating → Not operating

Text in Illustration

*a	Component with harness connected (Steering Lock ECU (Steering Lock Actuator or UPR Bracket Assembly))
*b	Steering Lock Motor not Operating
*c	Steering Lock Motor Operating



HINT:

- When taking measurements when the lock motor is stopped, it is not necessary to perform any operations.
- In order to take measurements when the lock motor is operating, perform either of the following operations:
 - To unlock the steering, carry the key and turn the engine switch on (ACC) or on (IG).
 - To lock the steering, turn the engine switch off with the shift lever in P, and then open a door.

OK  **REPLACE STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)**

9. CHECK HARNESS AND CONNECTOR (STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY) - CERTIFICATION ECU (SMART KEY ECU ASSEMBLY))

- (a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.
- (b) Disconnect the S45 steering lock ECU (steering lock actuator or UPR bracket assembly) connector.
- (c) Disconnect the C29 certification ECU (smart key ECU assembly) connector.
- (d) Check for deformation and corrosion of the connector case and terminals.

OK:

There is no deformation or corrosion of the connector case or terminals.

- (e) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-3 (IGE) - C29-24 (SLR+)	Always	Below 1 Ω
S45-3 (IGE) or C29-24 (SLR+) - Body ground	Always	10 k Ω or higher

NG  **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK



10. INSPECT STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)

- (a) Reconnect the steering lock ECU (steering lock actuator or UPR bracket assembly) connector.
- (b) Reconnect the C29 certification ECU (smart key ECU assembly) connector.

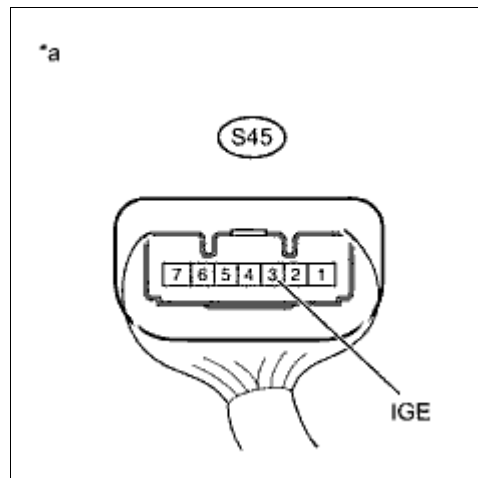
(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-3 (IGE) - Body ground	Always	11 to 14 V

Text in Illustration

*a	Component with harness connected (Steering Lock ECU (Steering Lock Actuator or UPR Bracket Assembly))
----	--



NG ► **REPLACE STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)**

OK ► **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

11.	REPLACE STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)
------------	---

(a) Replace the steering lock ECU (steering lock actuator or UPR bracket assembly) with a new one INFO.

(b) Perform registration INFO.

(c) Turn the engine switch on (IG).

(d) Use the Data List to check if L code certification is functioning properly again.

Smart Key

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
L Code Check	Verification result between certification ECU (smart key ECU assembly) and steering lock ECU (steering lock actuator or UPR bracket assembly) / OK or NG	OK: Verification result normal NG: Verification result abnormal	When a malfunction is present: - The ID code for the certification ECU (smart key ECU assembly) or steering lock ECU (steering lock actuator or UPR bracket assembly) is not registered or the certification ECU (smart key ECU assembly) or steering lock ECU (steering lock actuator or UPR bracket assembly) is malfunctioning. - The steering cannot be locked. - The steering cannot be unlocked (the engine cannot be started).

OK:

OK is displayed on the Techstream.

NG ► **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

OK ► **END**

12. INSPECT STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)

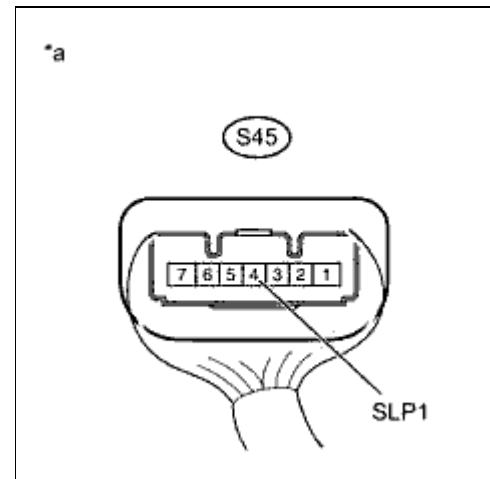
(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-4 (SLP1) - Body ground	Always	11 to 14 V

Text in Illustration

*a
Component with harness connected
(Steering Lock ECU (Steering Lock Actuator or UPR Bracket Assembly))



NG ► **GO TO STEP 15**

OK

13. READ VALUE USING TECHSTREAM (STEERING UNLOCK)

(a) Check that the steering is locked.

(b) Read the Data List according to the display on the Techstream.

Smart Key

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Steering Unlock	State of whether steering lock ECU (steering lock actuator or UPR bracket assembly) determined steering is unlocked / Set or Unset	Set: Steering unlocked Unset: Steering	If this item displays "Unset", the steering does not unlock (engine cannot be started).

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
		locked	

OK:

Set is displayed on the Techstream.

NG ► **REPLACE STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)**

OK



14.	READ VALUE USING TECHSTREAM (UNLOCK REQUEST RECEIVE)
------------	---

(a) Replace the certification ECU (smart key ECU assembly) with a new one.

(b) Perform registration  .

(c) Turn the engine switch on (IG).

(d) Use the Data List to check if the steering lock request is functioning properly.

Smart Key

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Unlock Request Receive	Reception state of steering unlock request signal by certification ECU (smart key ECU assembly) / OK or NG HINT: - The reception state is maintained for 10 seconds. - When 10 seconds or more have elapsed after receiving the signal, the item changes to "NG".	OK: Within 10 seconds of turning engine switch on (IG) or on (ACC) or starting engine NG: Except above	- If the unlock signal has not been received, the engine cannot be started. - If this item does not change to "OK" even though the steering unlock conditions are met, the certification ECU (smart key ECU assembly) may be malfunctioning.

OK:

Within 10 seconds of turning the engine switch on (ACC) or on (IG) or starting the engine, the Data List item changes to "OK".

NG ► **REPLACE STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY)**

OK  **END**

15.	CHECK HARNESS AND CONNECTOR (STEERING LOCK ECU (STEERING LOCK ACTUATOR OR UPR BRACKET ASSEMBLY) - CERTIFICATION ECU (SMART KEY ECU ASSEMBLY))
------------	--

- (a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.
- (b) Disconnect the S45 steering lock ECU (steering lock actuator or UPR bracket assembly) connector.
- (c) Disconnect the C29 certification ECU (smart key ECU assembly) connector.
- (d) Check for deformation and corrosion of the connector case and terminals.

OK:

There is no deformation or corrosion of the connector case or terminals.

- (e) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
S45-4 (SLP1) - C29-23 (SLP)	Always	Below 1 Ω
S45-4 (SLP1) or C29-23 (SLP) - Body ground	Always	10 k Ω or higher

NG  **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK



16.	READ VALUE USING TECHSTREAM (UNLOCK REQUEST RECEIVE)
------------	---

- (a) Replace the steering lock ECU (steering lock actuator or UPR bracket assembly) with a new one.
- (b) Perform registration .
- (c) Turn the engine switch on (IG).
- (d) Use the Data List to check if the steering lock request is functioning properly.

Smart Key

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Unlock Request Receive	Reception state of steering unlock request signal by certification ECU (smart key ECU assembly) /	OK: Within 10 seconds of turning engine switch on (IG) or on (ACC) or	If the unlock signal has not been received, the engine cannot be started.

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
	OK or NG HINT: • The reception state is maintained for 10 seconds. • When 10 seconds or more have elapsed after receiving the signal, the item changes to "NG".	starting engine NG: Except above	• If this item does not change to "OK" even though the steering unlock conditions are met, the certification ECU (smart key ECU assembly) may be malfunctioning.

OK:

Within 10 seconds of turning the engine switch on (ACC) or on (IG) or starting the engine, the Data List item changes to "OK".

NG ► **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

OK ► **END**



Last Modified: 11-13-2015	6.6 G	Doc ID: RM000000WB708TX
Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING SYSTEM: ON-VEHICLE INSPECTION; 2016 MY Tacoma [08/2015 -]		

ON-VEHICLE INSPECTION

1. CHECK STEERING WHEEL FREE PLAY

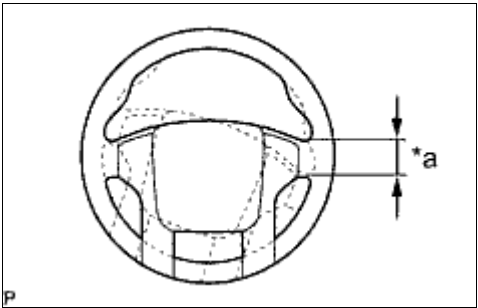
- (a) Stop the vehicle and align the tires facing straight ahead.
- (b) Gently turn the steering wheel right and left by hand, and check the steering wheel free play.

Maximum free play:
30 mm (1.18 in.)

Text in Illustration

*a	Maximum Free Play
----	-------------------

If the free play exceeds the maximum, replace the steering intermediate shaft or steering gear.



Last Modified: 11-13-2015	6.6 L	Doc ID: RM000000WB50A8X
Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING SYSTEM: PRECAUTION; 2016 MY Tacoma [08/2015 -]		

PRECAUTION

1. HANDLING PRECAUTIONS ON STEERING SYSTEM

- (a) Care must be taken when replacing parts. Incorrect replacement may affect the performance of the steering system and result in driving hazards.

2. HANDLING PRECAUTIONS ON SRS AIRBAG SYSTEM

- (a) The vehicle is equipped with a SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing. This may cause a serious accident. Before servicing (including inspection, replacement, removal and installation of parts), be sure to read the precautionary notices for the Supplemental Restraint System  .



Last Modified: 11-13-2015	6.6 T	Doc ID: RM000000WB60B8X
Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING SYSTEM: PROBLEM SYMPTOMS TABLE; 2016 MY Tacoma [08/2015 -]		

PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

STEERING SYSTEM

SYMPTOM	SUSPECTED AREA	SEE PAGE
Hard steering	1. Tires (Improperly inflated)	INFO
	2. Power steering fluid level (Low)	INFO
	3. Drive belt (Loose)	INFO
	5. Front wheel alignment (Incorrect)	INFO
	6. Steering system joints (Worn)	-
	8. Suspension arm ball joints (Worn)	INFO
	9. Steering column (Binding)	-
	10. Power steering vane pump (for 2TR-FE)	INFO
	11. Power steering vane pump (for 2GR-FKS)	INFO
	12. Power steering gear	INFO
Poor return	1. Tires (Improperly inflated)	INFO
	3. Front wheel alignment (Incorrect)	INFO
	4. Steering column (Binding)	-
	5. Power steering gear	INFO
Excessive free play	1. Steering system joints (Worn)	-
	3. Suspension arm ball joints (Worn)	INFO
	4. Intermediate shaft sliding yoke (Worn)	-
	6. Front wheel bearing (Worn)	INFO
	7. Power steering gear	INFO
Abnormal noise	1. Power steering fluid level (Low)	INFO
	2. Steering system joints (Worn)	-
	3. Power steering vane pump (2TR-FE)	INFO
	4. Power steering vane pump (2GR-FKS)	INFO
	5. Power steering gear	INFO



Last Modified: 11-13-2015	6.6 A	Doc ID: RM000000WB8014X
Model Year Start: 2016	Model: Tacoma	Prod Date Range: [08/2015 -]
Title: STEERING COLUMN: STEERING SYSTEM: REPAIR; 2016 MY Tacoma [08/2015 -]		

REPAIR

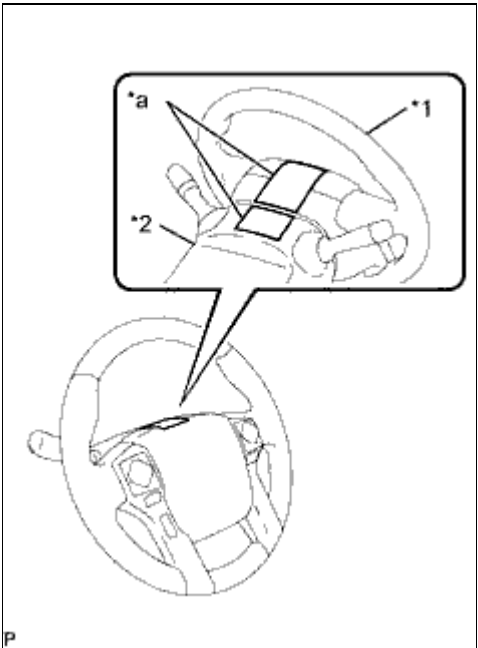
1. STEERING OFF CENTER REPAIR PROCEDURE

(a) Check if the steering wheel is off center.

(1) Apply masking tape to the top center of the steering wheel and upper steering column cover.

Text in Illustration

*1	Steering Wheel
*2	Upper Steering Column Cover
*a	Masking Tape

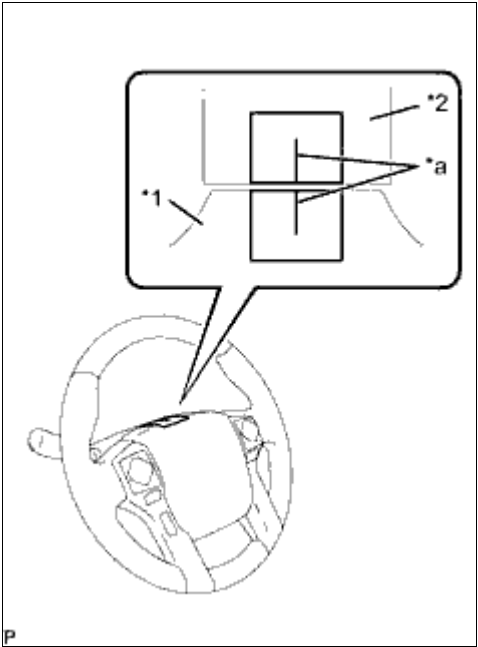


(2) Drive the vehicle in a straight line for 100 m (328 ft.) at a constant speed of 56 km/h (35 mph), and hold the steering wheel to maintain the course.

(3) Draw a line on the masking tape as shown in the illustration.

Text in Illustration

*1	Steering Wheel
*2	Upper Steering Column Cover
*a	Marked Line



(4) Turn the steering wheel to its straight position.

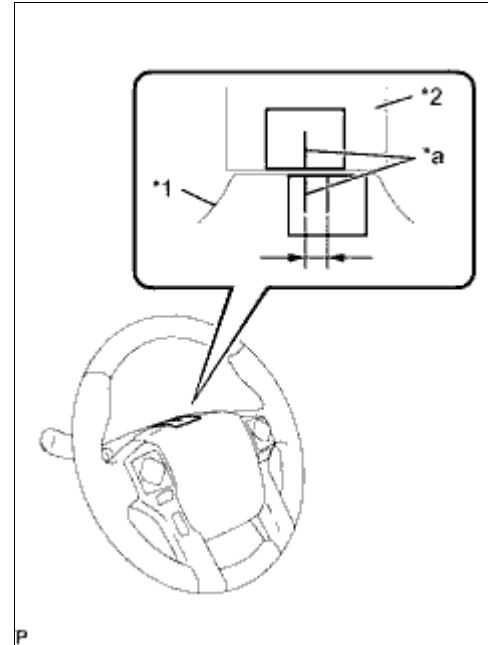
HINT:

Look at the upper surface of the steering wheel, steering spoke and SRS airbag line to find the center position.

(5) Draw a new line on the masking tape on the steering wheel as shown in the illustration.

Text in Illustration

*1	Steering Wheel
*2	Upper Steering Column Cover
*a	Marked Line



(6) Measure the distance between the 2 lines on the masking tape of the steering wheel.

(7) Convert the measured distance to the steering angle.

HINT:

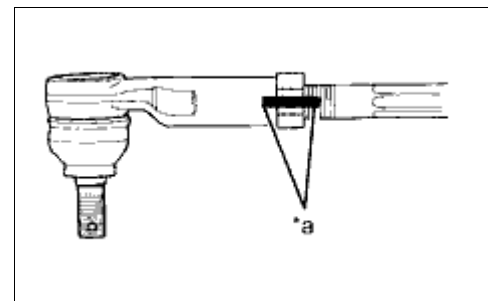
- Measured distance 1 mm (0.0394 in.) = Steering angle of approximately 1°.
- Make a note of the steering angle.

(b) Adjust the steering angle.

(1) Draw a line on the RH and LH tie rods and on the RH and LH rack ends which can easily be seen.

Text in Illustration

*a	Matchmark
----	-----------

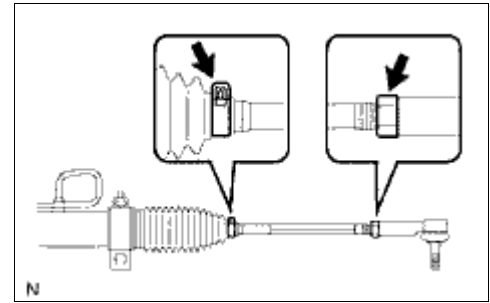


(2) Using a paper gauge, measure the distance from a RH and LH tie rod ends to the rack end screws.

HINT:

- Measure both the RH and LH sides.
- Make a note of the measured values.

(3) Remove the RH and LH boot clips from the rack boots.



(4) Loosen the RH and LH lock nuts.

(5) Turn the RH and LH rack ends by the same amount (but in different directions) according to the steering angle.

HINT:

One 360° turn of a rack end (1.5 mm (0.0591 in.) horizontal movement) is equal to a 12° change in steering angle.

(6) Tighten the RH and LH lock nuts.

Torque:

56 N·m {566 kgf·cm, 41ft·lbf}

NOTICE:

Make sure that the difference in length between the RH and LH tie rod ends and rack end screws is less than 1.5 mm (0.059 in.).

(7) Install the RH and LH boot clips.

