

STEERING

06

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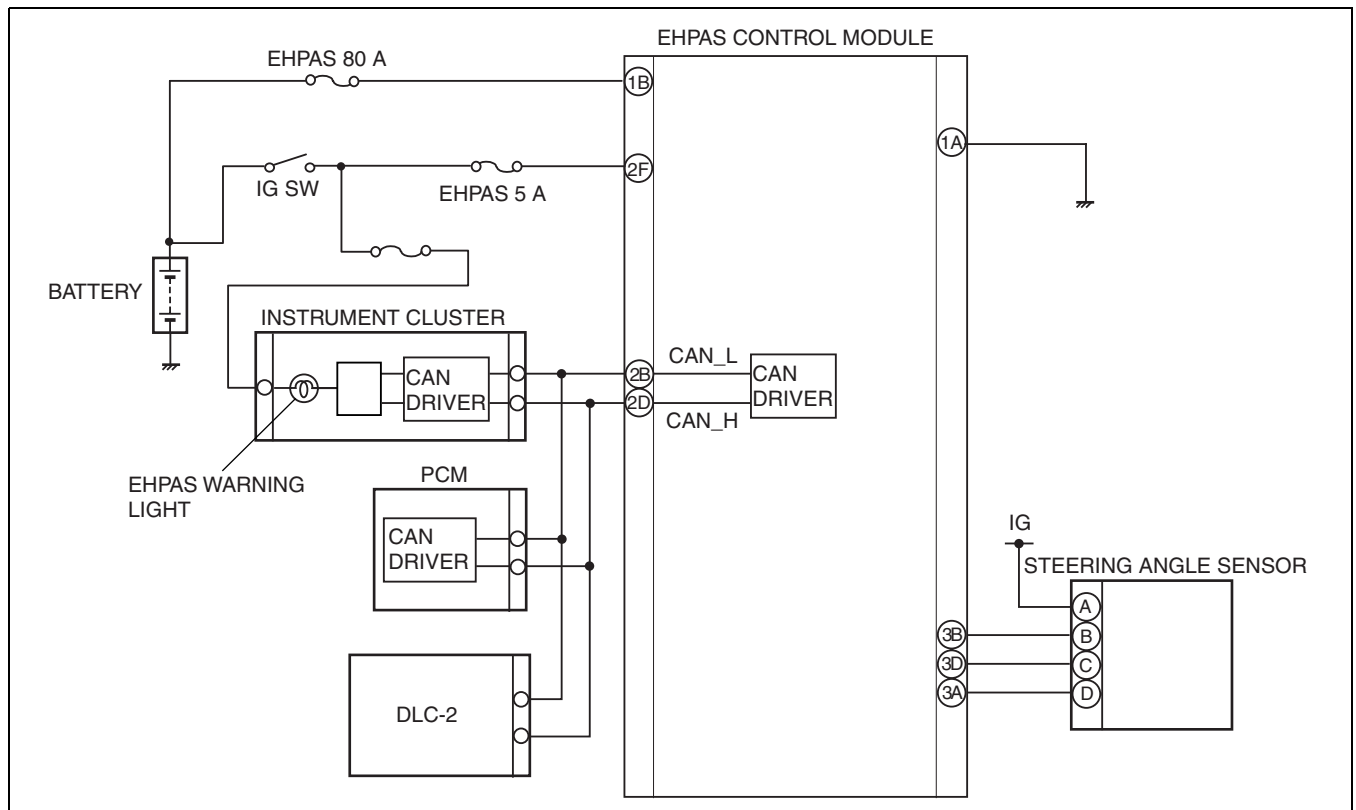
06-02 ON-BOARD DIAGNOSTIC

ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) SYSTEM WIRING		
DIAGRAM	06-02-1	DTC B1317, B1318
ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) ON-BOARD		DTC B1342
DIAGNOSIS	06-02-2	DTC B1352
DTC B1238	06-02-4	DTC B2477
		DTC C1099
		DTC C1278

ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) SYSTEM WIRING DIAGRAM

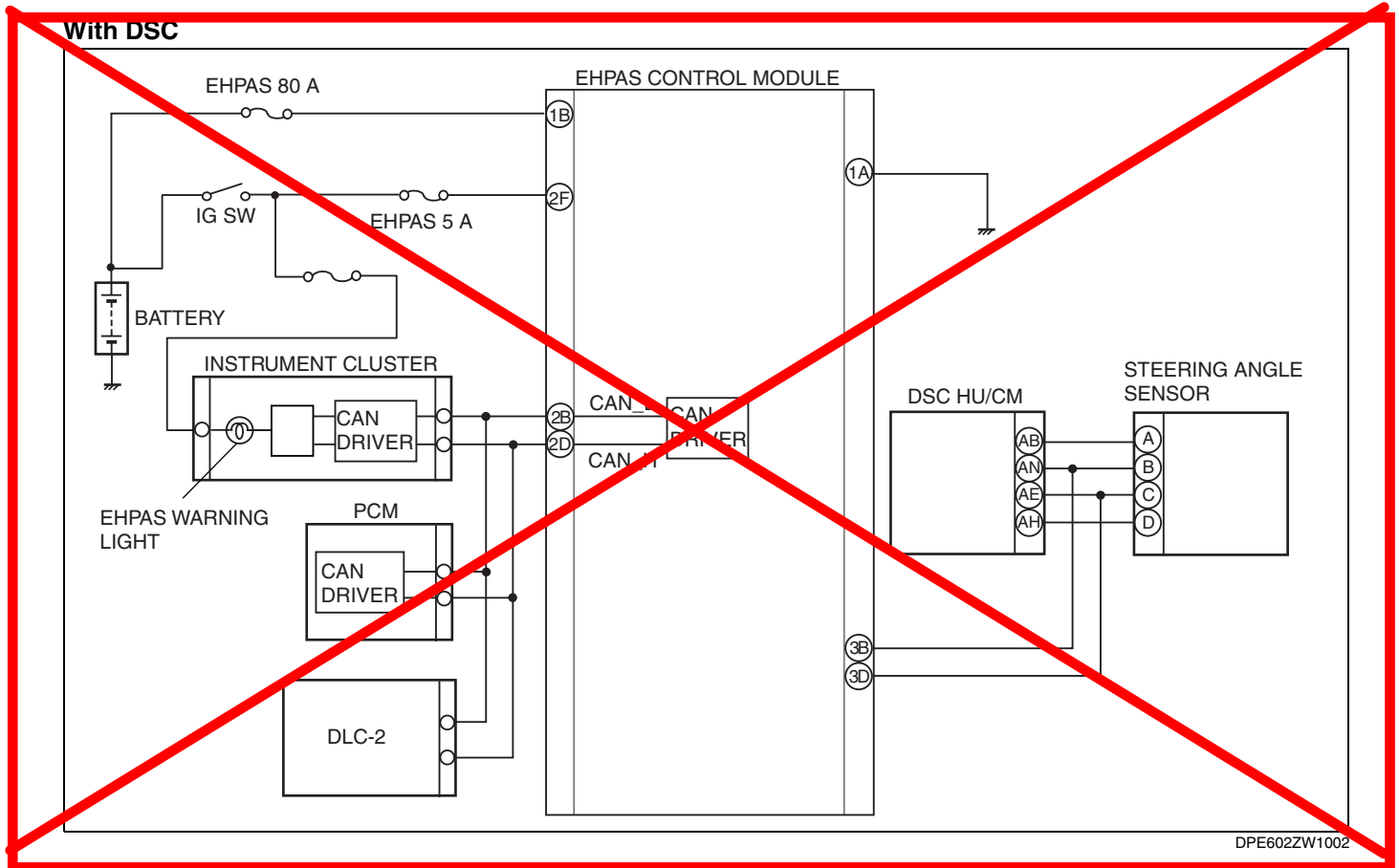
DPE06020000W01

~~With ABS~~



DPE602ZW1001

ON-BOARD DIAGNOSTIC



ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) ON-BOARD DIAGNOSIS

DPE06020000W02

On-Board Diagnostic (OBD) Test Description

- The OBD test inspects the integrity and function of the EHPAS and outputs the results when requested by the specific tests.
- On-board diagnostic test also:
 - Provides a quick inspection of the EHPAS usually performed at the start of each diagnostic procedure.
 - Provides verification after repairs to ensure that no other faults occurred during service.
- The OBD test is divided into 2 tests:
 - Read/clear diagnostic results, PID monitor and record.

Read/clear diagnostic results

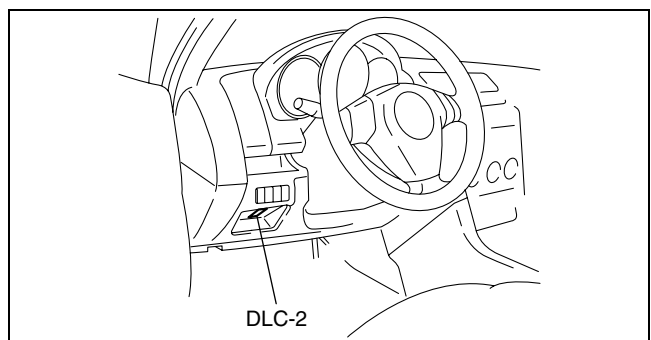
- This function allows reading or clearing of DTCs in the EHPAS control module memory.

PID/Data monitor and record

- This function allows access of certain data values, input signals, calculated values, and system status information.

Reading DTCs Procedure

1. Connect the WDS or equivalent to the vehicle DLC-2 connector.
2. Retrieve DTCs using the WDS or equivalent.



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Clearing DTCs Procedure

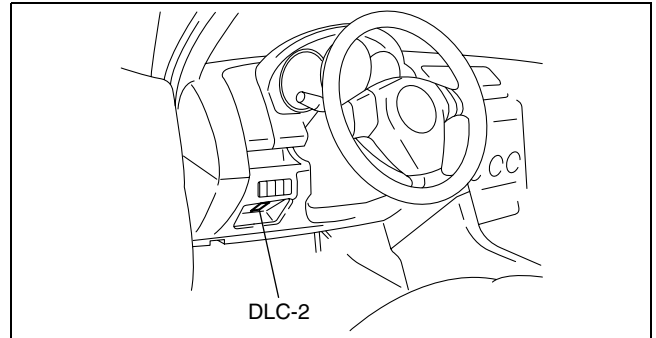
1. After repairs have been made, perform the **Reading DTCs Procedure**.

ON-BOARD DIAGNOSTIC

2. Clear DTCs using the WDS or equivalent.
3. Verify that the customer's concern has been resolved.

PID/Data Monitor and Record Procedure

1. Connect the WDS or equivalent to the vehicle DLC-2 connector.
2. Access and monitor PIDs using the WDS or equivalent.



DPE402AW1005

DTC Table

DTC	Diagnosis system component	Page
B1238	EHPAS control module	(See 06-02-4 DTC B1238.)
B1317	Battery power supply	(See 06-02-4 DTC B1317, B1318.)
B1318	Battery power supply	(See 06-02-4 DTC B1317, B1318.)
B1342	EHPAS control module	(See 06-02-6 DTC B1342.)
B1352	Ignition power supply	(See 06-02-6 DTC B1352.)
B2477	EHPAS control module configuration	(See 06-02-7 DTC B2477.)
C1099	Electric power steering oil pump (motor)	(See 06-02-7 DTC C1099.)
C1278	Steering angle sensor	(See 06-02-8 DTC C1278.)
U0073	CAN bus communication error	(See 09-02-1 MULTIPLEX COMMUNICATION SYSTEM.)
U0100	Lost communication with the PCM	(See 09-02-1 MULTIPLEX COMMUNICATION SYSTEM.)
U2023	Fault received from other modules	(See 09-02-1 MULTIPLEX COMMUNICATION SYSTEM.)

PID/DATA Monitor Table

PID Name (Definition)	Unit/Condition	Condition/Specification	Action	EHPAS control module terminal
CCNT (Number of continuous codes)	—	<ul style="list-style-type: none"> • DTCs are detected: 1—255 • No DTCs are detected: 0 	Perform inspection using appropriate DTC.	—
ENGRPM (Engine speed signal)	RPM	<ul style="list-style-type: none"> • Engine speed 1,000 rpm: 1000 RPM 	Inspect the PCM. (See 01-40B-10 PCM INSPECTION [MZR-CD (RF Turbo)].) (See 01-40A-7 PCM INSPECTION [L8, LF].)	—
MTR_AMP (Pump Motor Operation Current)	A	<ul style="list-style-type: none"> • Indicates pump motor operation current. 	Replace the EHPAS control module. (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION [L8, LF].)	—
RPM_ACT (Actual pump motor revolution per minutes)	RPM	<ul style="list-style-type: none"> • Indicates pump motor revolution per minutes. 	Replace the EHPAS control module. (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION [L8, LF].)	—

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ON-BOARD DIAGNOSTIC

PID Name (Definition)	Unit/Condition	Condition/Specification	Action	EHPAS control module terminal
RPM_TGT (Target pump motor revolution per minutes)	RPM	<ul style="list-style-type: none"> Indicates pump motor target revolution per minutes. 	Replace the EHPAS control module. (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION [L8, LF].)	—
STEER_RATE (Steering wheel rotation rate)	°/s	<ul style="list-style-type: none"> Indicates steering wheel rotation rate. 	Inspect steering angle sensor. (See 09-18-19 STEERING ANGLE SENSOR INSPECTION.)	3B, 3D
TEMP_BOARD (Printed circuit board temperature)	°C	<ul style="list-style-type: none"> Indicates circuit temperature. 	Replace the EHPAS control module. (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION [L8, LF].)	—
VPWR (Module supply voltage)	V	<ul style="list-style-type: none"> IG switch ON: B+ 	Inspect the battery. (See 01-17B-2 BATTERY INSPECTION [MZR-CD (RF Turbo)].) (See 01-17A-5 BATTERY INSPECTION [L8, LF].)	1B, 2F
VSS (Vehicle speed)	KPH/MPH	<ul style="list-style-type: none"> Vehicle is stopped: 0 KPH/0 MPH Vehicle speed 20 km/h {12 mph}: 20 KPH/12 MPH 	Inspect the PCM. (See 01-40B-10 PCM INSPECTION [MZR-CD (RF Turbo)].) (See 01-40A-7 PCM INSPECTION [L8, LF].) Inspect the instrument cluster. (See 09-22-3 INSTRUMENT CLUSTER INSPECTION.)	—

DTC B1238

DPE06020000W03

DTC B1238		Electro hydraulic power assist steering (EHPAS) control module
DETECTION CONDITION	<ul style="list-style-type: none"> Excessive load to electric power steering oil pump 	
POSSIBLE CAUSE	<ul style="list-style-type: none"> Due to the continuously static steering, being turned to the lock end, or other causes, the internal temperature of the electric power steering oil pump is more than the specified value. 	

Diagnostic procedure

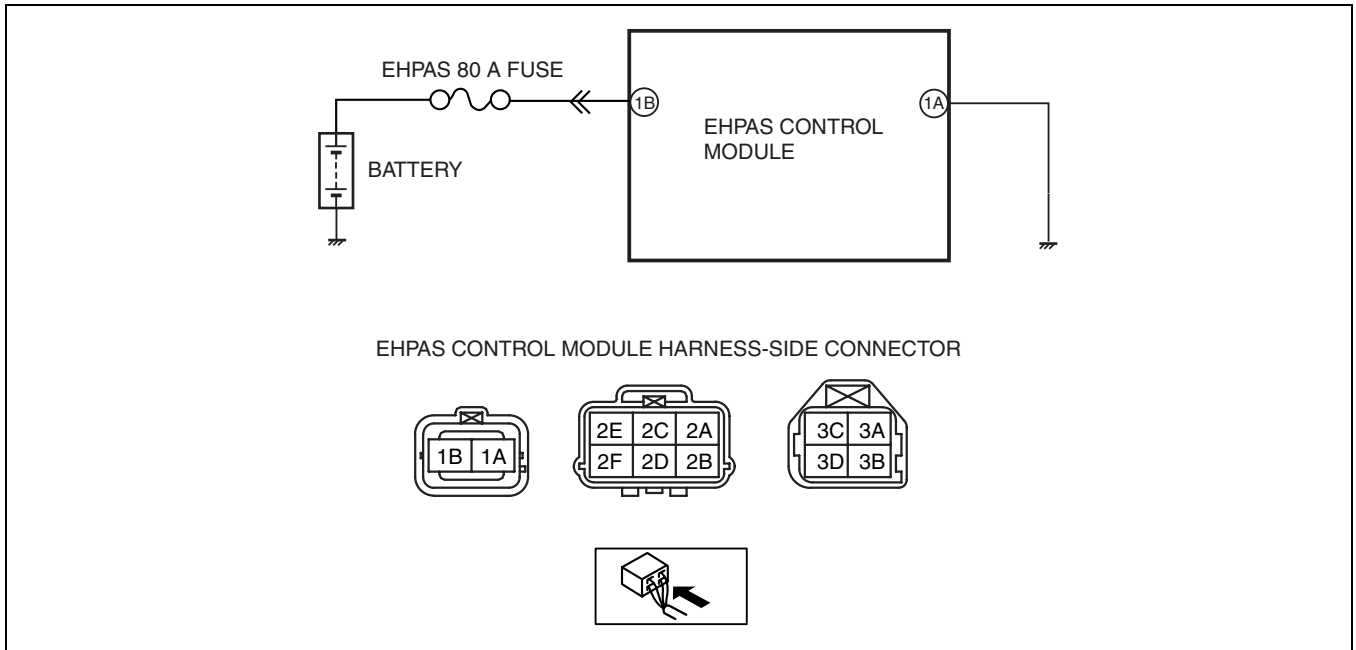
STEP	INSPECTION	ACTION	
1	TURN IGNITION SWITCH OFF AND ALLOW ELECTRIC POWER STEERING OIL PUMP TO COOL DOWN.		
2	VERIFY THAT THE SAME DTC IS NOT PRESENT <ul style="list-style-type: none"> Turn the ignition switch to the ON position. Clear the DTC from the memory. (See 06-02-2 Clearing DTCs Procedure.) Is the same DTC present? 	Yes	Replace the electric power steering oil pump, then go to the next step. (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
3	VERIFY THAT NO OTHER DTCs ARE PRESENT <ul style="list-style-type: none"> Are any other DTCs output? 	Yes	Go to the applicable DTC inspection. (See 06-02-3 DTC Table.)
		No	DTC troubleshooting completed.

DTC B1317, B1318

DPE06020000W04

DTC B1317, B1318		Battery power supply
DETECTION CONDITION	<ul style="list-style-type: none"> Low voltage or high voltage are detected at the voltage monitor. 	
POSSIBLE CAUSE	<ul style="list-style-type: none"> Open or short circuit in wiring harness between electro hydraulic power assist steering (EHPAS) control module terminal 1B and battery positive terminal Battery and/or generator malfunction 	

ON-BOARD DIAGNOSTIC



Diagnostic procedure

STEP	INSPECTION	ACTION	
1	INSPECT BATTERY VOLTAGE <ul style="list-style-type: none"> Is the battery terminal voltage normal? 	Yes	Make sure that battery terminal connection is okay. Go to the next step.
		No	Charge or replace the battery, then go to Step 6.
2	INSPECT BATTERY GRAVITY <ul style="list-style-type: none"> Is the battery specific gravity as specified? 	Yes	Go to the next step.
		No	Replace the battery, then go to Step 6.
3	INSPECT CHARGING SYSTEM <ul style="list-style-type: none"> Are the generator and drive belt tension normal? 	Yes	Go to the next step.
		No	Replace the generator and/or drive belt if necessary. Go to step 6.
4	INSPECT EHPAS CONTROL MODULE POWER SUPPLY CIRCUIT FOR OPEN OR SHORT CIRCUIT <ul style="list-style-type: none"> Start the engine. Measure the voltage between following EHPAS control module terminal (wiring harness-side) and ground. <ul style="list-style-type: none"> — EHPAS control module: 1B—ground Is the voltage 9 V or more? 	Yes	Go to the next Step.
		No	Repair or replace the wiring harness for open circuit between the EHPAS control module and ground, then go to Step 6.
5	INSPECT EHPAS CONTROL MODULE GROUND CIRCUIT FOR POOR GROUND OR OPEN CIRCUIT <ul style="list-style-type: none"> Turn the ignition switch off. Measure the resistance between the following EHPAS control module terminal (wiring harness-side) and ground. <ul style="list-style-type: none"> — EHPAS control module: 1A—ground Is the resistance within 0—1 ohm? 	Yes	Go to the next step.
		No	If there is no continuity: <ul style="list-style-type: none"> Repair or replace the wiring harness for open circuit between the EHPAS control module and ground, then go to the next step. If the resistance is not within 0—1 ohm : <ul style="list-style-type: none"> Repair or replace the wiring harness for poor ground, then go to the next step.
6	VERIFY THAT THE SAME DTC IS NOT PRESENT <ul style="list-style-type: none"> Make sure to reconnect all disconnected connectors. Clear the DTC from the memory. (See 06-02-2 Clearing DTCs Procedure.) Is the same DTC present? 	Yes	Replace the electric power steering oil pump, then go to the next step. (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION [L8, L7])
		No	Go to the next step.
7	VERIFY THAT NO OTHER DTCs ARE PRESENT <ul style="list-style-type: none"> Are any other DTCs output? 	Yes	Go to the applicable DTC inspection. (See 06-02-3 DTC Table.)
		No	DTC troubleshooting completed.

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ON-BOARD DIAGNOSTIC

DTC B1342

DPE06020000W05

DTC B1342	Electro hydraulic power assist steering (EHPAS) control module
DETECTION CONDITION	<ul style="list-style-type: none"> The EHPAS control module on-board diagnostic function detects system malfunction.
POSSIBLE CAUSE	<ul style="list-style-type: none"> EHPAS control module internal malfunction Poor connection at connectors

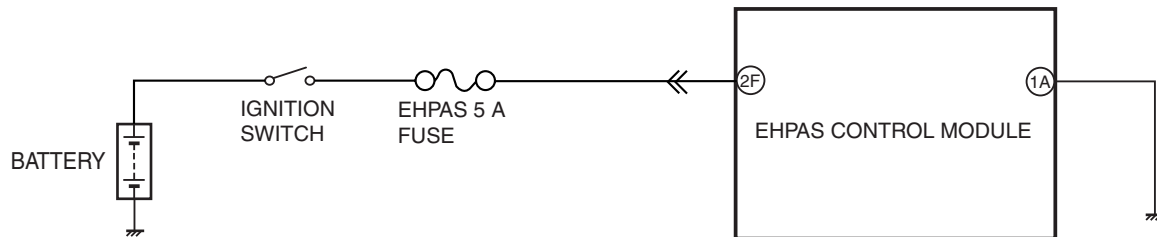
Diagnostic procedure

STEP	INSPECTION		ACTION
1	VERIFY THAT THE SAME DTC IS NOT PRESENT <ul style="list-style-type: none"> Clear the DTC from the memory. (See 06-02-2 Clearing DTCs Procedure.) Is the same DTC present? 	Yes	Replace the electric power steering oil pump, then go to the next step. (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION [E, F])
		No	Go to the next step.
2	VERIFY THAT NO OTHER DTCS ARE PRESENT <ul style="list-style-type: none"> Are any other DTCs output? 	Yes	Go to the applicable DTC inspection. (See 06-02-3 DTC Table.)
		No	DTC troubleshooting completed.

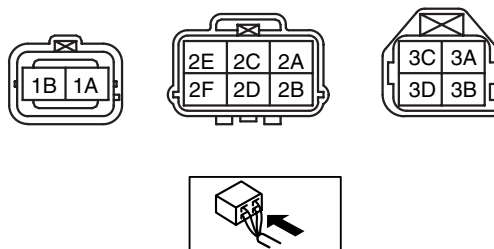
DTC B1352

DPE06020000W06

DTC B1352	Ignition power supply
DETECTION CONDITION	<ul style="list-style-type: none"> Less than 2.5 V detected at the voltage monitor of the electro hydraulic power assist steering (EHPAS) control module
POSSIBLE CAUSE	<ul style="list-style-type: none"> Short to ground in wiring harness between EHPAS control module terminal 2F and ignition switch Open circuit in wiring harness between EHPAS control module terminal 2F and ignition switch Poor connection at connectors



EHPAS CONTROL MODULE HARNESS-SIDE CONNECTOR



ON-BOARD DIAGNOSTIC

Diagnostic procedure

STEP	INSPECTION	ACTION	
1	INSPECT FUSES <ul style="list-style-type: none"> Are the fuses normal? 	Yes	Go to the next step.
		No	Repair or replace the fuses, then go to the step 3.
2	INSPECT EHPAS CONTROL MODULE POWER SUPPLY CIRCUIT FOR OPEN OR SHORT CIRCUIT <ul style="list-style-type: none"> Start the engine. Measure the voltage between following EHPAS control module terminal (wiring harness-side) and ground. <ul style="list-style-type: none"> — EHPAS control module: 2F—ground Is voltage 10 V or more? 	Yes	Go to the next step.
		No	Repair or replace the harness for open circuit between EHPAS control module and ground, then go to next step.
3	VERIFY THAT THE SAME DTC IS NOT PRESENT <ul style="list-style-type: none"> Make sure to reconnect all disconnected connectors. Clear the DTC from the memory. (See 06-02-2 Clearing DTCs Procedure.) Is same DTC present? 	Yes	Replace the electric power steering oil pump, then go to the next step. (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION [E, EF])
		No	Go to the next step.
4	VERIFY THAT NO OTHER DTCs ARE PRESENT <ul style="list-style-type: none"> Are any other DTCs output? 	Yes	Go to the applicable DTC inspection. (See 06-02-3 DTC Table.)
		No	Troubleshooting completed.

DTC B2477

DPE06020000W07

DTC B2477		Electro hydraulic power assist steering (EHPAS) control module configuration
DETECTION CONDITION	<ul style="list-style-type: none"> Configuration setting failure is detected. 	
POSSIBLE CAUSE	<ul style="list-style-type: none"> Module configuration procedure was not completed properly. 	

Diagnostic procedure

STEP	INSPECTION	ACTION	
1	VERIFY CONFIGURATION <ul style="list-style-type: none"> Has the EHPAS control module configuration been performed? 	Yes	Go to the next step.
		No	Perform configuration using the WDS or equivalent. (See 06-14-27 ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) CONTROL MODULE CONFIGURATION.)
2	VERIFY THAT THE SAME DTC IS NOT PRESENT <ul style="list-style-type: none"> Clear the DTC from the memory. (See 06-02-2 Clearing DTCs Procedure.) Is the same DTC present? 	Yes	Repeat the inspection from Step 1. If the malfunction recurs, replace the EHPAS control module. (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION [E, EF])
		No	Go to the next step.
3	VERIFY THAT NO OTHER DTCs ARE PRESENT <ul style="list-style-type: none"> Are any other DTCs output? 	Yes	Go to the applicable DTC inspection. (See 06-02-3 DTC Table.)
		No	DTC troubleshooting completed.

06

DTC C1099

DPE06020000W08

DTC C1099		Electric power steering oil pump (motor)
DETECTION CONDITION	<ul style="list-style-type: none"> The electro hydraulic power assist steering (EHPAS) control module detects that the motor speed is less than the specified value. 	
POSSIBLE CAUSE	<ul style="list-style-type: none"> Motor internal malfunction 	

ON-BOARD DIAGNOSTIC

Diagnostic procedure

STEP	INSPECTION	ACTION	
1	REPLACE ELECTRIC POWER STEERING OIL PUMP <ul style="list-style-type: none"> Replace the electric power steering oil pump, then go to the next step. (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION [L6, L7].) 		
2	VERIFY THAT NO OTHER DTCS ARE PRESENT <ul style="list-style-type: none"> Are any other DTCS output? 	Yes	Go to the applicable DTC inspection. (See 06-02-3 DTC Table.)
		No	DTC troubleshooting completed.

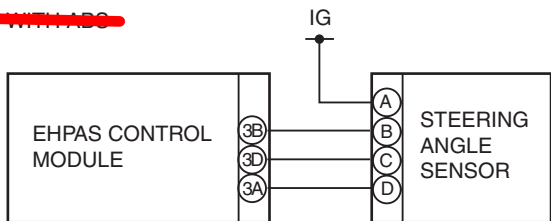
DTC C1278

DPE06020000W09

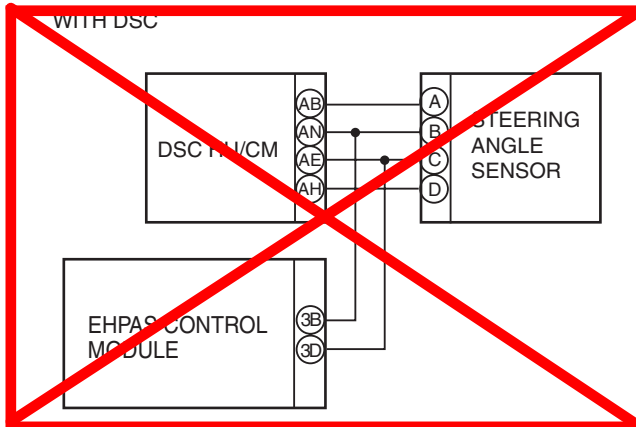
DTC C1278	Steering angle sensor
DETECTION CONDITION	<ul style="list-style-type: none"> The electro hydraulic power assist steering (EHPAS) control module detects that the monitor voltage from the steering angle sensor is more than 4.9 V or less than 0.8 V The EHPAS control module detects that the two monitor voltages modulate at the same phase a specified amount of phases or more. The EHPAS control module detects that the EHPAS sensor signal dose not change.
POSSIBLE CAUSE	<ul style="list-style-type: none"> Short to power supply, open circuit, or short to ground in wiring harness between EHPAS control module terminal 3B and steering angle sensor B Short to power supply, open circuit, or short to ground in wiring harness between EHPAS control module terminal 3D and steering angle sensor terminal C Open circuit in wiring harness between EHPAS control module terminal 3A and steering angle sensor terminal D (with ABC) Open circuit in wiring harness between DCC-HU/CM terminal AH and steering angle sensor terminal D (with DCC) Short circuit in wiring harness between steering angle sensor terminal A and D Steering angle sensor malfunction. Steering angle sensor ring has fallen off.

ON-BOARD DIAGNOSTIC

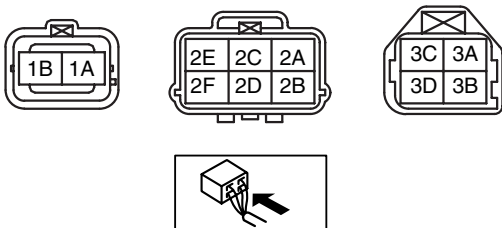
~~WITH ABS~~



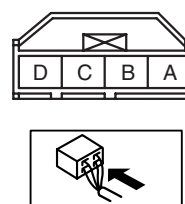
WITH DSC



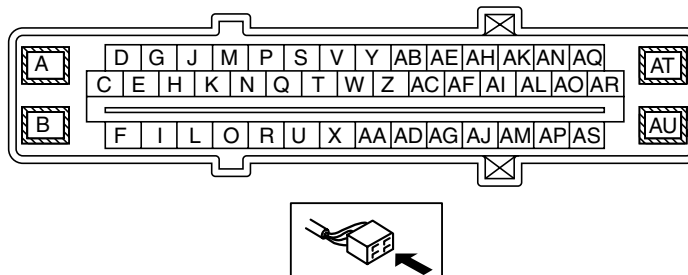
EHPAS CONTROL MODULE HARNESS-SIDE CONNECTOR



STEERING ANGLE SENSOR HARNESS-SIDE CONNECTOR



DSC HU/CM HARNESS-SIDE CONNECTOR



ON-BOARD DIAGNOSTIC

Diagnostic procedure

STEP	INSPECTION	ACTION	
1	INSPECT PID FOR STEERING ANGLE SENSOR MALFUNCTION USING WDS OR EQUIVALENT <ul style="list-style-type: none"> • Turn the ignition switch off. • Connect the WDS or equivalent to the DLC-2. • Select the "STEER_RATE" PID. • Verify that the WDS display changes correctly according to steering wheel operation. • Does it change correctly? 	Yes	Go to the next step.
		No	Replace the steering angle sensor. (See 08-10-13 CLOCK SPRING REMOVAL/INSTALLATION.)
2	INSPECT POWER SUPPLY VOLTAGE OF STEERING ANGLE SENSOR <ul style="list-style-type: none"> • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between steering angle sensor terminal A and ground. • Is the voltage B+? 	Yes	Go to the next step.
		No	With ABS <ul style="list-style-type: none"> • Repair or replace the wiring harness between ignition switch and steering angle sensor terminal A, then go to the step 7. with DSC <ul style="list-style-type: none"> • Repair or replace the wiring harness between DSC HU/CM terminal AB and steering angle sensor terminal A, then go to the step 7.
3	INSPECT GROUND CIRCUIT OF STEERING ANGLE SENSOR FOR OPEN CIRCUIT <ul style="list-style-type: none"> • Turn the ignition switch off. • Disconnect the EHPAS control module (with ABS) or DSC HU/CM (with DSC) and steering angle sensor connectors. • Inspect for continuity between EHPAS control module terminal 3A (with ABS) or DSC HU/CM terminal AH (with DSC) and steering angle sensor terminal D. • Is there continuity? 	Yes	Go to the next step.
		No	Repair or replace the wiring harness between EHPAS control module terminal 3A (with ABS) or DSC HU/CM terminal AH (with DSC) and steering angle sensor terminal D, then go to the step 7.
4	INSPECT STEERING ANGLE SENSOR SIGNAL CIRCUIT FOR SHORT TO POWER <ul style="list-style-type: none"> • Turn ignition key to ON (engine OFF). • Measure the voltage between the EHPAS control module and body ground at the following: <ul style="list-style-type: none"> — Sensor 1: EHPAS control module terminal 3B and body ground — Sensor 2: EHPAS control module terminal 3D and body ground • Is voltage B+? 	Yes	Repair or replace the related wiring harnesses between the EHPAS control module and steering angle sensor, then go to the step 7.
		No	Go to next step.
5	INSPECT STEERING ANGLE SENSOR SIGNAL CIRCUIT FOR SHORT TO GROUND <ul style="list-style-type: none"> • Turn the ignition switch off. • Inspect continuity between the EHPAS control module and body ground at the following: <ul style="list-style-type: none"> — Sensor 1: EHPAS control module terminal 3B and body ground — Sensor 2: EHPAS control module terminal 3D and body ground • Is there continuity? 	Yes	Repair or replace the related wiring harnesses between the EHPAS control module and steering angle sensor, then go to the step 7.
		No	Go to the next step.
6	INSPECT SENSORS 1 AND 2 OF THE STEERING ANGLE SENSOR FOR CONTINUITY <ul style="list-style-type: none"> • Turn the ignition switch off. • Disconnect the EHPAS control module and steering angle sensor connectors. • Inspect for continuity between steering angle sensor terminals B and C. • Is there continuity? 	Yes	Replace the steering angle sensor, then go to the step 7. (See 08-10-13 CLOCK SPRING REMOVAL/INSTALLATION.)
		No	Go to the next step.

ON-BOARD DIAGNOSTIC

STEP	INSPECTION	ACTION
7	VERIFY THAT THE SAME DTC IS NOT PRESENT <ul style="list-style-type: none"> • Reconnect all disconnected connectors. • Clear the DTC from the memory. (See 06-02-2 Clearing DTCs Procedure.) • Is the same DTC present? 	Yes <ul style="list-style-type: none"> • Repeat the inspection from Step 1. • If the malfunction recurs, replace the electric power steering oil pump. (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION [E8, E11])
		No <p>Go to the next step.</p>
8	VERIFY THAT NO OTHER DTCS ARE PRESENT <ul style="list-style-type: none"> • Are any other DTCs output? 	Yes <p>Go to the applicable DTC inspection. (See 06-02-3 DTC Table.)</p>
		No <p>DTC troubleshooting completed.</p>

SYMPTOM TROUBLESHOOTING

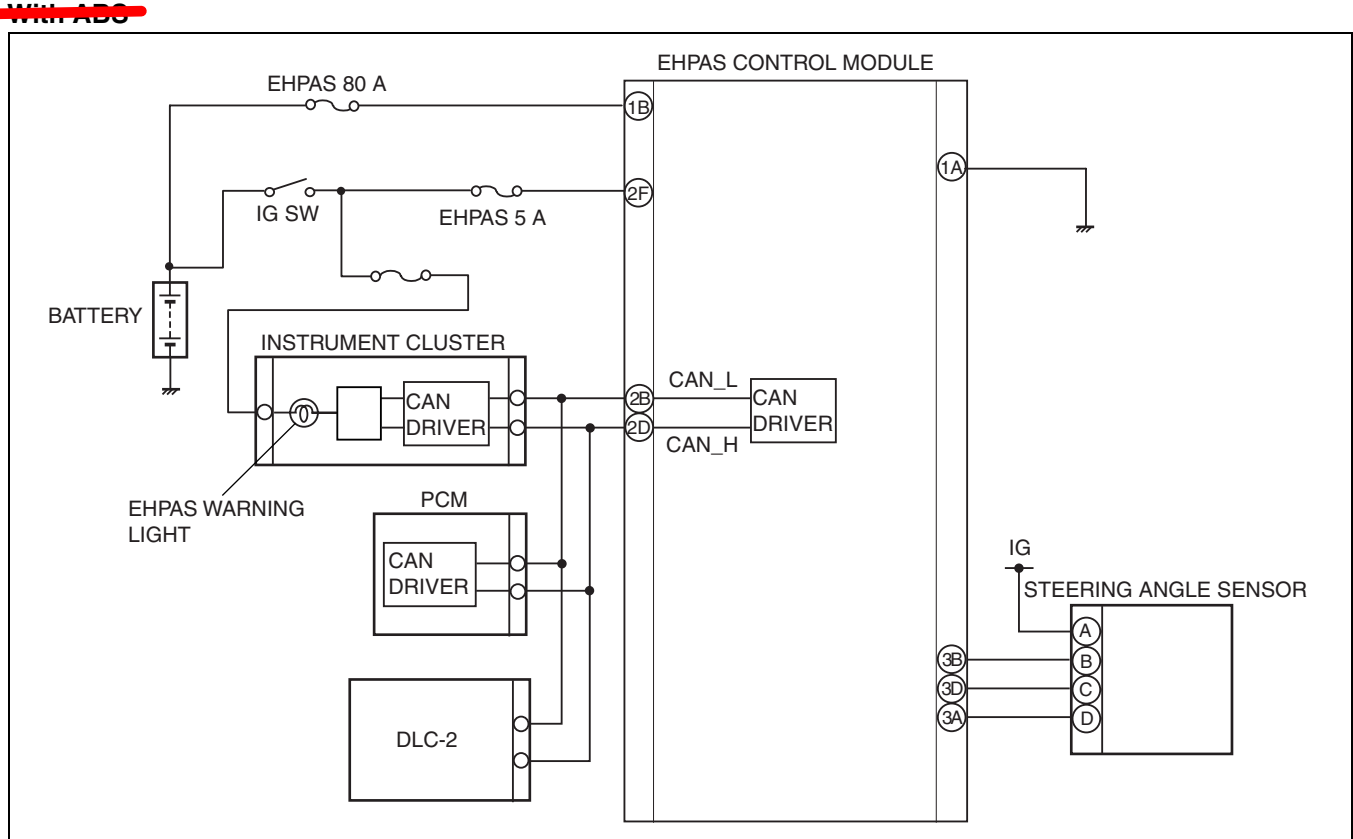
06-03 SYMPTOM TROUBLESHOOTING

ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) SYSTEM WIRING
 DIAGRAM 06-03-1
 FOREWORD 06-03-2

PRECAUTION.....06-03-2
SYMPTOM TROUBLESHOOTING.....06-03-3
NO.1 POOR POWER STEERING ASSIST.....06-03-3

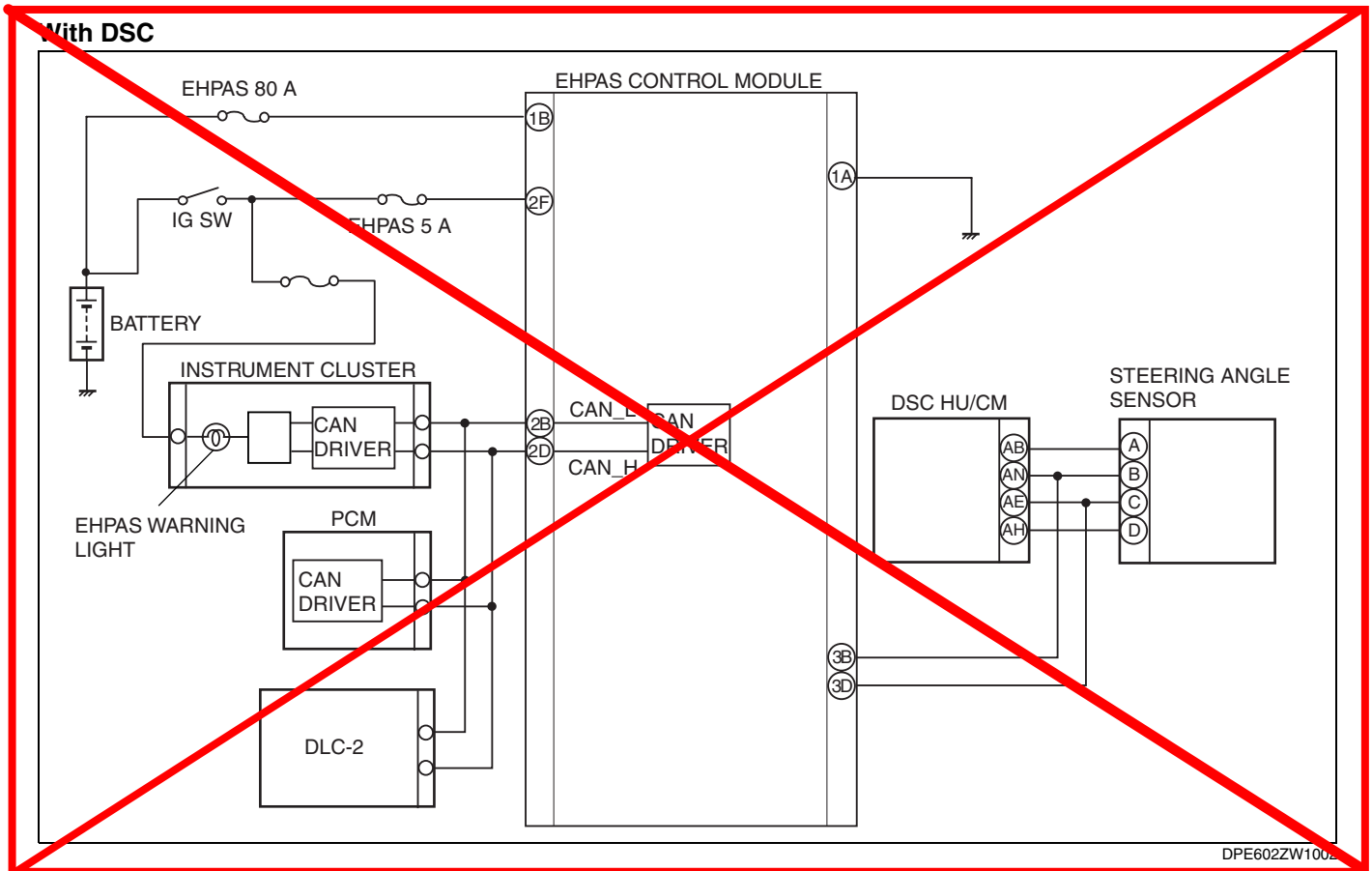
ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) SYSTEM WIRING DIAGRAM

DPE060300000W01



DPE602ZW1001

SYMPTOM TROUBLESHOOTING



FOREWORD

- Before performing the steps in Symptom Troubleshooting, perform the On-board Diagnostic Inspection. To inspect the DTC, follow the DTC Inspection steps. (See 06-02-3 DTC Table.)

DPE06030000W02

PRECAUTION

Intermittent Concern Troubleshooting

Vibration method

- If a malfunction occurs or becomes worse while driving on a rough road or when the engine is vibrating, perform the following steps.

DPE06030000W03

Note

- There are several reasons why vehicle or engine vibration could cause an electrical malfunction. Inspect the following:
 - Connectors not fully seated.
 - Wiring harnesses not having full play.
 - Wires laying across brackets or moving parts.
 - Wires routed too close to hot parts.
- An improperly routed, improperly clamped, or loose wiring harness can cause wiring to become pinched between parts.
- The connector joints, points of vibration, and places where wiring harness pass through the firewall, body panels and other panels are the major areas to be inspected.

Inspection method for switch and/or sensor connectors or wires

1. Connect the WDS or equivalent to the DLC-2.
2. Turn the ignition switch to the ON position (engine off).

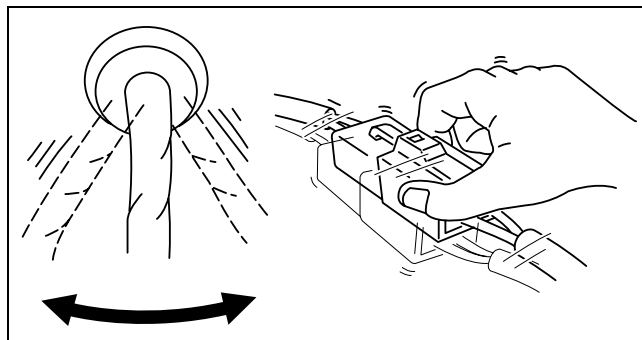
Note

- If the engine starts and runs, perform the following steps at idle.

3. Access PIDs for the switch you are inspecting.
4. Turn the switch on manually.

SYMPTOM TROUBLESHOOTING

5. Slightly shake each connector or wiring harness vertically and horizontally while monitoring the PID.
 - If the PID value is unstable, inspect for poor connection.



B3E0603W001

Inspection method for sensors

1. Connect the WDS or equivalent to the DLC-2.
2. Turn the ignition switch to the ON position (engine off).

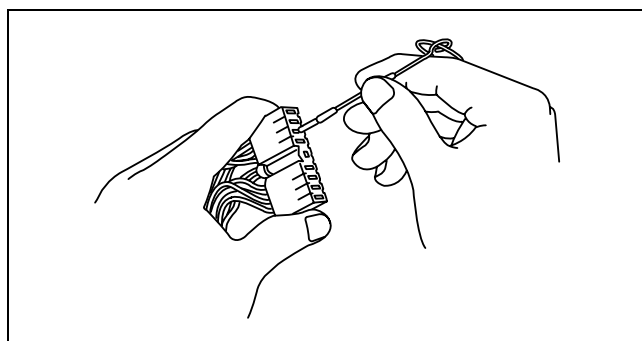
Note

- If the engine starts and runs, perform the following steps at idle.

3. Access PIDs for the switch you are inspecting.
4. Vibrate the sensor slightly with your finger.
 - If the PID value is unstable or a malfunction occurs, inspect for poor connection and/or poorly mounted sensor.

Connector terminal inspection method

1. Inspect the connection of each female terminal.
2. Insert the male terminal to the female terminal and inspect the female terminal for looseness.



B3E0603W002

SYMPTOM TROUBLESHOOTING

- Verify the symptom, and perform troubleshooting according to the appropriate number.

DPE060300000W04

06

No.	Symptom
1	Poor power steering assist

NO.1 POOR POWER STEERING ASSIST

DPE060300000W05

1	POOR POWER STEERING ASSIST
TROUBLESHOOTING HINTS	
<ul style="list-style-type: none"> • Power steering fluid leakage from electro hydraulic power assist steering (EHPAS) fluid line • Steering gear and linkage malfunction • EHPAS control module malfunction 	

SYMPTOM TROUBLESHOOTING

Diagnostic procedure

STEP	INSPECTION	ACTION	
1	RETRIEVE DTC FROM EHPAS CONTROL MODULE <ul style="list-style-type: none"> • Are any DTCs present? 	Yes	Record all DTC and go to the applicable DTC inspection.
		No	Go to the next step.
2	INSPECT STEERING WHEEL ASSIST FUNCTION <ul style="list-style-type: none"> • Disconnect the EHPAS control module connector (2-pin). • Is the power steering assist function changed? 	Yes	Go to the next step.
		No	Visually inspect the steering gear and linkage. Replace it if the malfunction is found.
3	INSPECT IF THERE IS ANY FLUID LEAK FROM THE EHPAS FLUID LINE <ul style="list-style-type: none"> • Is there fluid leakage? 	Yes	Replace it if necessary.
		No	Replace the EHPAS control module. (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION (L3, L7))

06-10 GENERAL PROCEDURES

GENERAL PROCEDURES

(STEERING) 06-10-1

GENERAL PROCEDURES (STEERING)

DPE06100000W01

Wheel and Tire Installation

1. When installing the wheels and tires, tighten the wheel nuts in a criss-cross pattern to the following tightening torque.

Tightening torque

88.2—117.6 N·m

{9.00—11.99kgf·m, 65.06—86.73 ft·lbf}

Connector Disconnection

1. Disconnect the negative battery cable before performing any work that requires handling of connectors. (See ~~01-17B-1 BATTERY REMOVAL/INSTALLATION [MZR-CD (RF Turbo)]~~.) (See 01-17A-1 BATTERY REMOVAL/INSTALLATION [L8, LF].)

Suspension Links Removal/Installation

1. For the joint sections with rubber bushings, raise the vehicle using a lift, and then temporarily tighten the installation bolts and nuts. Lower the vehicle to the ground and tighten them completely with the specified torque.

Power Steering Related Parts Installation

1. If any power steering fluid line has been disconnected, perform the following after installation of the power steering components. (See 06-14-4 AIR BLEEDING.) (See 06-14-4 POWER STEERING FLUID INSPECTION.)
 - Power steering fluid amount inspection
 - Power steering fluid leakage inspection
 - Air bleeding

Electro Hydraulic Power Assist Steering (EHPAS) Related Parts

Warning

- If the configuration procedure is not completed, the EHPAS will not operate properly and it might cause an unexpected accident. Therefore, when replacing or removing the electric power steering oil pump, make sure to perform the configuration procedure to ensure the proper EHPAS operation.

1. Make sure that there are no DTCs in the EHPAS memory after working on EHPAS related parts. If there are any codes in the memory, clear them.
2. When replacing or removing the electric power steering oil pump, perform the configuration procedures. (See 06-14-27 ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) CONTROL MODULE CONFIGURATION.)

POWER STEERING

06-14 POWER STEERING

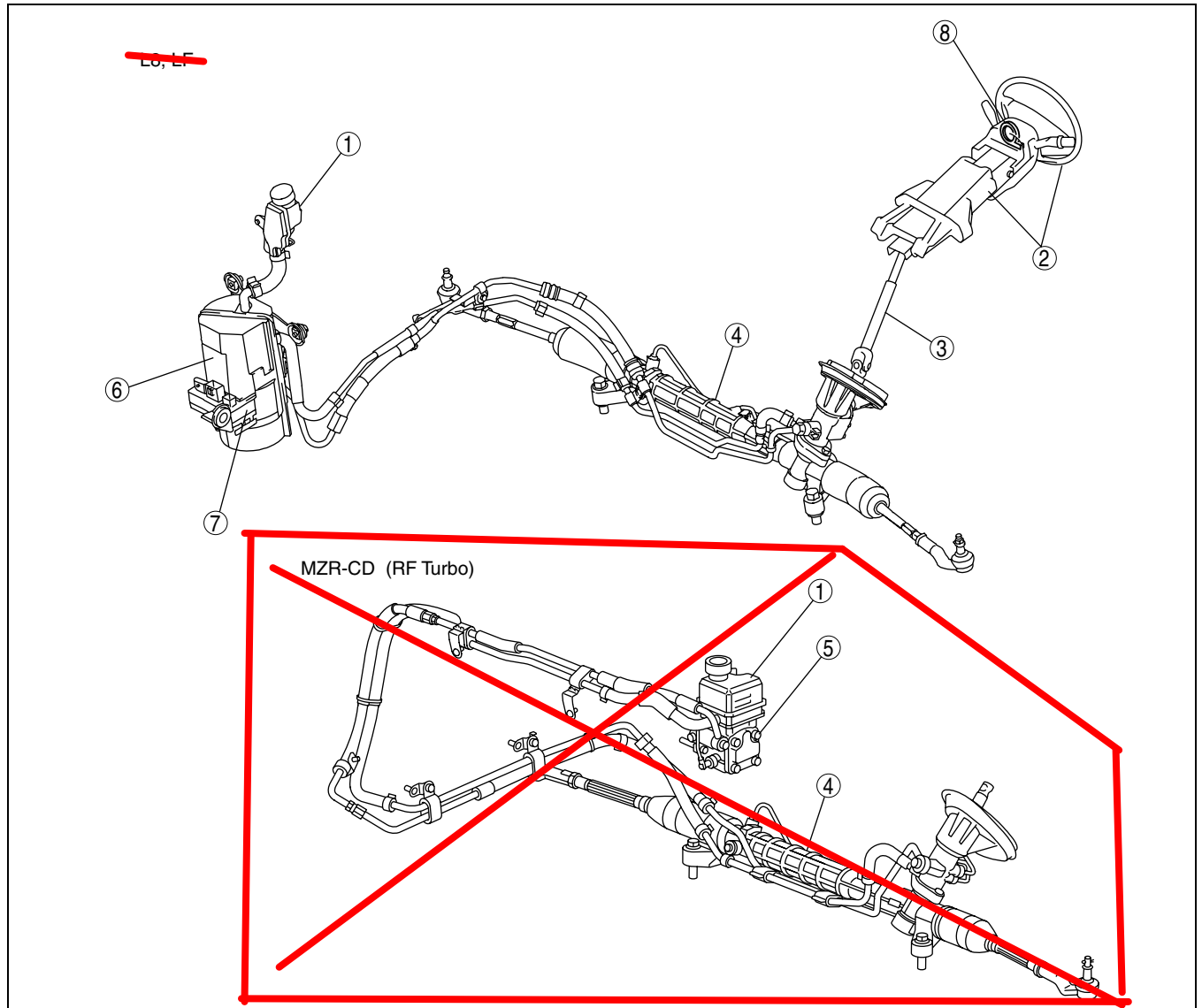
STEERING LOCATION INDEX 06-14-1
 AIR BLEEDING 06-14-4
 POWER STEERING FLUID
 INSPECTION 06-14-4
 STEERING WHEEL AND COLUMN
 INSPECTION 06-14-7
 STEERING WHEEL AND COLUMN REMOVAL/
 INSTALLATION 06-14-7
 STEERING SHAFT INSPECTION 06-14-10
 STEERING GEAR AND LINKAGE REMOVAL/
 INSTALLATION 06-14-11
 STEERING GEAR AND LINKAGE
 DISASSEMBLY 06-14-12
 STEERING GEAR AND LINKAGE
 INSPECTION 06-14-15

STEERING GEAR AND LINKAGE
 ASSEMBLY 06-14-16
~~POWER STEERING OIL PUMP REMOVAL/
 INSTALLATION [MZR-CD
 (RF Turbo)] 06-14-21
 POWER STEERING OIL PUMP DISASSEMBLY/
 ASSEMBLY [MZR-CD (RF Turbo)] 06-14-22~~
 ELECTRIC POWER STEERING OIL PUMP
 REMOVAL/INSTALLATION [L8, LF] . . . 06-14-25
 ELECTRO HYDRAULIC POWER ASSIST STEERING
 (EHPAS) CONTROL MODULE
 INSPECTION 06-14-26
 ELECTRO HYDRAULIC POWER ASSIST STEERING
 (EHPAS) CONTROL MODULE
 CONFIGURATION 06-14-27

STEERING LOCATION INDEX

DPE06140000W01

~~L.H.D.~~



06

DPE614ZW1001

POWER STEERING

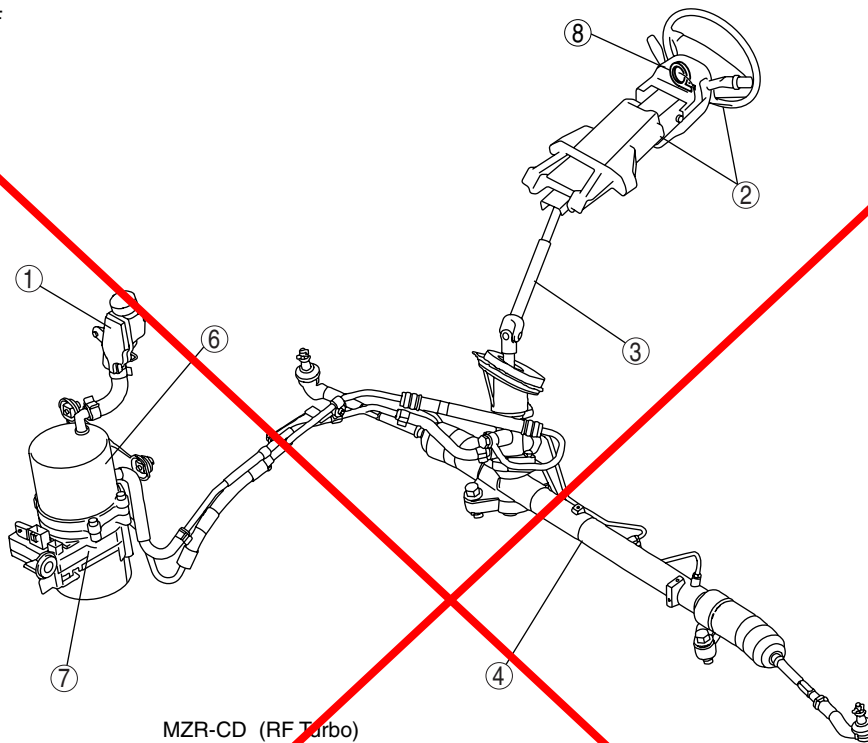
1	Power steering fluid (See 06-14-4 AIR BLEEDING.) (See 06-14-4 POWER STEERING FLUID INSPECTION.)
2	Steering wheel and column (See 06-14-7 STEERING WHEEL AND COLUMN INSPECTION.) (See 06-14-7 STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION.)
3	Steering shaft (See 06-14-10 STEERING SHAFT INSPECTION.)
4	Steering gear and linkage (See 06-14-11 STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION.) (See 06-14-12 STEERING GEAR AND LINKAGE DISASSEMBLY.) (See 06-14-15 STEERING GEAR AND LINKAGE INSPECTION.) (See 06-14-16 STEERING GEAR AND LINKAGE ASSEMBLY.)

5	Power steering oil pump (MZR-CD (RF Turbo)) (See 06-14-21 POWER STEERING OIL PUMP REMOVAL/INSTALLATION [MZR-CD (RF Turbo)].) (See 06-14-22 POWER STEERING OIL PUMP DISASSEMBLY/ASSEMBLY [MZR-CD (RF Turbo)].)
6	Electric power steering oil pump (L8, LF) (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION (L8, LF))
7	Electro hydraulic power assist steering (EHPAS) control module (L8, LF) (See 06-14-26 ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) CONTROL MODULE INSPECTION.) (See 06-14-27 ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) CONTROL MODULE CONFIGURATION.)
8	Steering angle sensor (See 08-10-13 CLOCK SPRING REMOVAL/INSTALLATION.) (See 09-18-19 STEERING ANGLE SENSOR INSPECTION.)

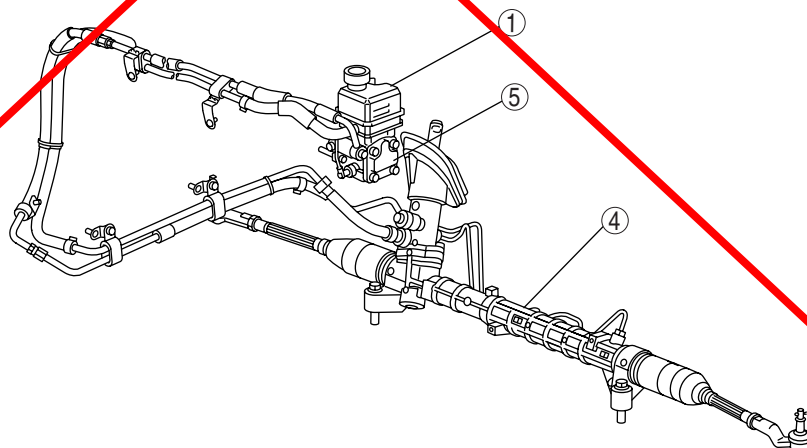
POWER STEERING

R.H.D.

L8, LF



MZR-CD (RF Turbo)



DPE614ZW1002

06

1	Power steering fluid (See 06-14-4 AIR BLEEDING.) (See 06-14-4 POWER STEERING FLUID INSPECTION.)
2	Steering wheel and column (See 06-14-7 STEERING WHEEL AND COLUMN INSPECTION.) (See 06-14-7 STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION.)
3	Steering shaft (See 06-14-10 STEERING SHAFT INSPECTION.)
4	Steering gear and linkage (See 06-14-11 STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION.) (See 06-14-12 STEERING GEAR AND LINKAGE DISASSEMBLY.) (See 06-14-15 STEERING GEAR AND LINKAGE INSPECTION.) (See 06-14-16 STEERING GEAR AND LINKAGE ASSEMBLY.)

5	Power steering oil pump (MZR-CD (RF Turbo)) (See 06-14-21 POWER STEERING OIL PUMP REMOVAL/INSTALLATION [MZR-CD (RF Turbo)].) (See 06-14-22 POWER STEERING OIL PUMP DISASSEMBLY/ASSEMBLY [MZR-CD (RF Turbo)].)
6	Electric power steering oil pump (L8, LF) (See 06-14-25 ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION [L8, LF].)
7	EHPAS control module (L8, LF) (See 06-14-26 ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) CONTROL MODULE INSPECTION.) (See 06-14-27 ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) CONTROL MODULE CONFIGURATION.)
8	Steering angle sensor (See 08-10-13 CLOCK SPRING REMOVAL/INSTALLATION.) (See 09-18-19 STEERING ANGLE SENSOR INSPECTION.)

POWER STEERING

AIR BLEEDING

DPE06140000W02

Caution

- **Do not maintain the steering wheel fully turned for 5 s or more. It is possible that oil temperature can rise and this will negatively affect the oil pump.**

1. Inspect the fluid level. (See 06-14-4 POWER STEERING FLUID INSPECTION.)
2. Turn the steering wheel fully to the left and right several times.
3. Reinspect the fluid level.
 - If the fluid level has dropped, add fluid.
4. Repeat Steps 2—3 until the fluid level stabilizes.
5. Start the engine and let it idle.
6. Turn the steering wheel fully to the left and right several times.
7. Repeat Step 6 until the fluid is not foamy and the fluid level has not dropped.
8. Inspect the fluid level, and if the fluid level has dropped, add fluid to a level between MAX and MIN of the reserve tank.

POWER STEERING FLUID INSPECTION

DPE061432040W01

Fluid Level Inspection

1. Verify that the fluid level is between MAX and MIN of the reserve tank when the engine is cold.
 - If the fluid is not at the specified level, adjust the fluid level (MIN-MAX on reserve tank) by adding/draining the fluid.

Power steering fluid type

ATF M-III or equivalent (e.g. Dexron ® II)

Power steering fluid capacity (approximate quantity)

~~MZR-CD (RF Turbo): 0.97 L {1.03 US qt, 0.85 Imp qt}~~
~~L8, L7: 0.8 L {0.85 US qt, 0.70 Imp qt}~~

Fluid Leakage Inspection

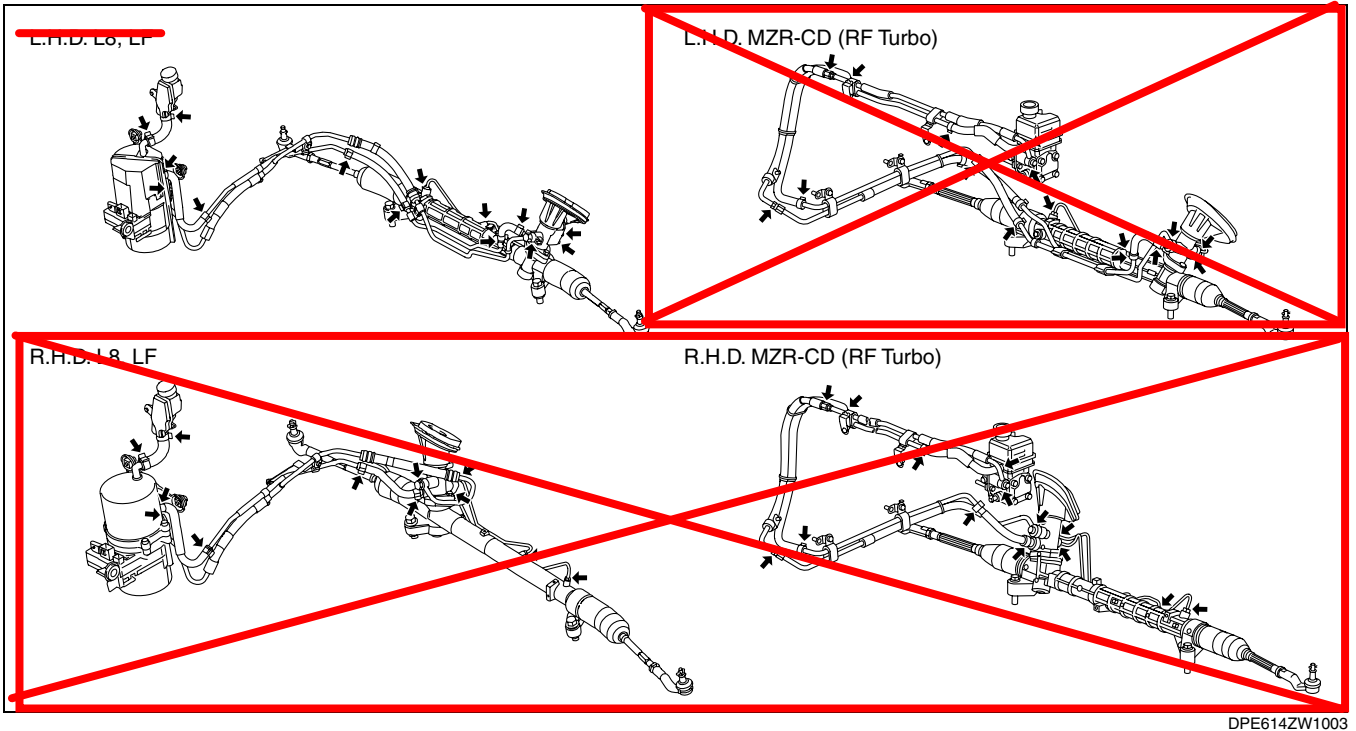
1. Start the engine and idle it.
2. Turn the steering wheel fully to left or right, to generate the fluid pressure.

Caution

- **Do not maintain the steering wheel fully turned for 5 s or more. It is possible that oil temperature can rise and this will negatively affect the oil pump.**

POWER STEERING

3. Inspect for the fluid leakage at the points indicated in the figure.

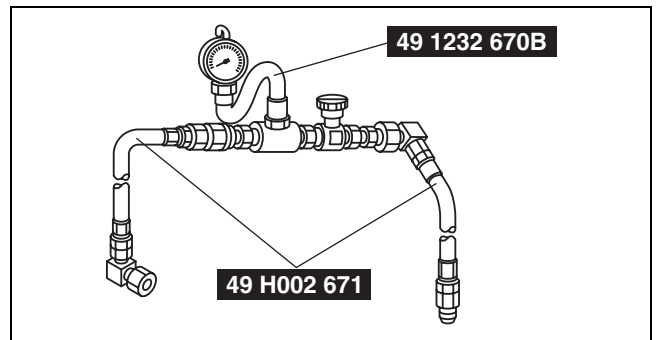


DPE614ZW1003

- If fluid leakage is found, repair the related parts.

Fluid pressure Inspection

1. Set the **SSTs** so that the valve of the **SST** faces toward the gear housing side as shown in the figure.



A6E0612W101

06

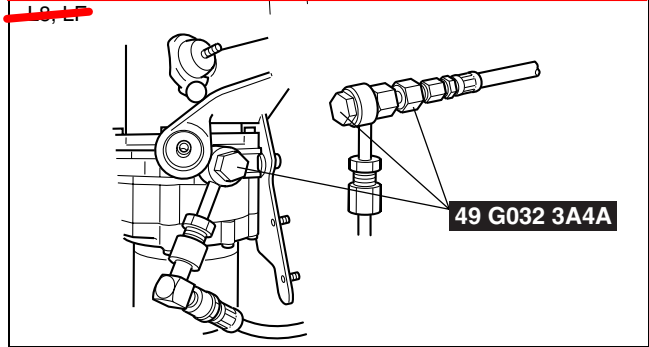
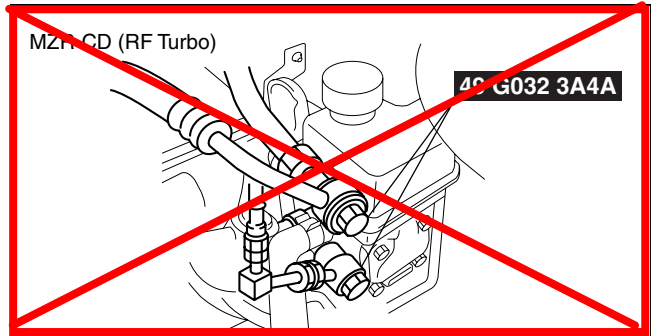
POWER STEERING

- Disconnect the oil pump side joint of the pressure hose, connect the **SSTs** set in the Step 1.

Tightening torque

29.4—44.1 N·m {3.00—4.49 kgf·m, 21.6—32.5 ft·lbf}

- Bleed the air from the system.
- Open the gauge valve fully.
- Start the engine, turn the steering wheel to the left and right to raise the power steering fluid to the appropriate temperature (**50—60 °C {122—140 °F}**).



DPE614ZW1004

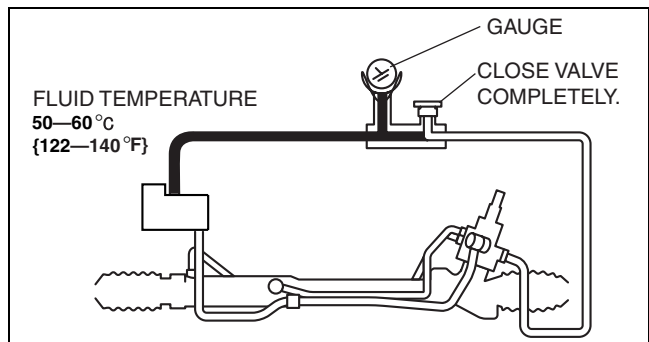
- Close the gauge valve completely.
- Increase the engine speed to **1,000—1,500 rpm** and measure the fluid pressure generated at the oil pump.

~~If it is less than the specification, repair or replace the oil pump component. (MZR-CD (RF Turbo))~~

- If it is less than the specification, replace the oil pump as a single unit. (~~L8, LF~~)

Caution

- Do not maintain the gauge valve fully closed for 5 s or more. It is possible that oil temperature can rise and this will negatively affect the oil pump.



B3E0614W024

Oil pump fluid pressure (oil temperature 50—60 °C {122—140 °F})

~~MZR-CD (RF Turbo): 10.50—10.99 MPa {107.1—112.0 kgf/cm², 1,523—1,593 psi}~~

~~L8, LF: 10.4—11.0 MPa {107—112 kgf/cm², 1,509—1,595 psi}~~

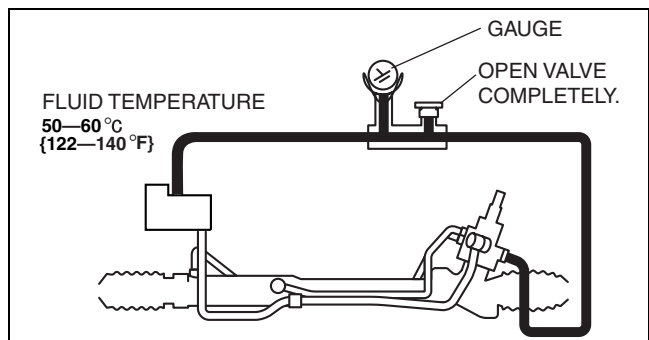
- Open the gauge valve fully and increase the engine speed to **1,000—1,500 rpm**.
- Turn the steering wheel fully to the left and right, then measure the fluid pressure generated at the gear housing.

Caution

- Do not maintain the steering wheel fully turned for 5 s or more. It is possible that oil temperature can rise and this will negatively affect the oil pump.

Note

- If the fluid pressure is less than the specification, it is possible that the oil pump or gear housing is not operating correctly.



B3E0614W025

Gear housing fluid pressure (oil temperature 50—60 °C {122—140 °F})

~~MZR-CD (RF Turbo): 10.50—10.99 MPa {107.1—112.0 kgf/cm², 1,523—1,593 psi}~~

~~L8, LF: 9.0—11.0 MPa {92—111 kgf/cm², 1,306—1,585 psi}~~

- After removing the **SSTs**, tighten the oil pump side joint of the pressure hose to the specified torque.

POWER STEERING

Tightening torque

29.4—44.1 N·m {3.00—4.49 kgf·m, 21.6—32.5 ft·lbf}

11. Bleed the air from the system.

STEERING WHEEL AND COLUMN INSPECTION

DPE061432010W01

Play Inspection

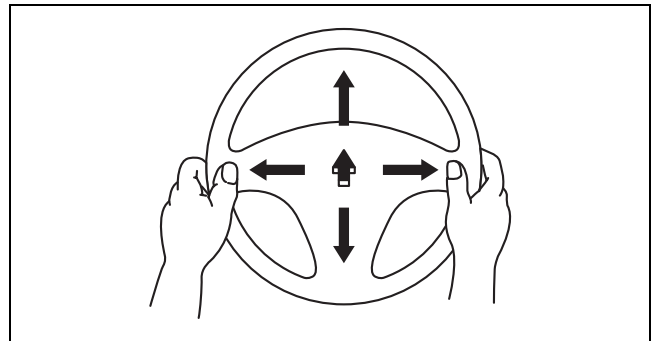
1. With the wheels in the straight-ahead position, start the engine.
2. Turn the steering wheel to the left and right gently, then verify that the steering wheel play is within the specification.

Steering wheel play

0—30 mm {0—1.18 in} (When hydraulic operating)

Looseness, Excessive Play Inspection

1. Inspect the steering wheel for looseness or excessive play in the axial direction of the shaft and four locations around the steering wheel.
 - If there is any malfunction, inspect the following, and repair or replace the applicable part.
 - Column bearing wear
 - Looseness of the steering wheel installation part
 - Looseness of the column installation area
 - Excessive play of the steering shaft joint
 - Excessive play of the steering gear



A6E0612W015

Steering Force Inspection

1. Verify that the equipped tire size and tire air pressure is as specified.
2. With the vehicle on a hard, level surface, put the wheels in the straight-ahead position.
3. Remove the air bag module. (See 08—10—5 DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)

Warning

- Handling the air bag module improperly can accidentally operate (deploy) the air bag module, which may seriously injure you. Read the service warnings before handling the air bag module. (See 08—10—2 SERVICE WARNINGS.) (See 08—10—4 SERVICE CAUTIONS.)

4. Start the engine and idle it.
5. Verify that the EHPAS warning light does not illuminate. (L8, LF)
6. Inspect the steering force using a torque wrench.

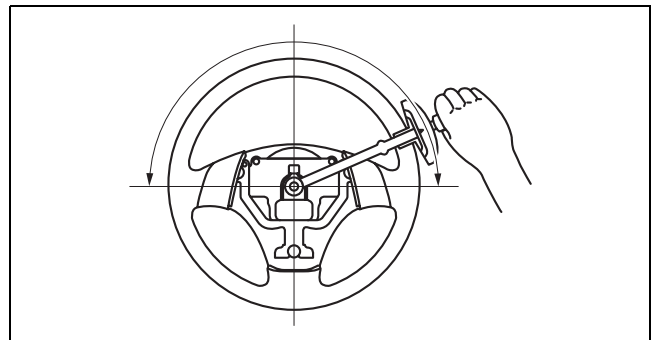
- If not within the specification, verify the following:
 - No air in steering system
 - No fluid leakage at hose or connectors
 - Function of oil pump and steering gear

Steering wheel force (reference value)

7.8 N·m {80 kgf·cm, 69 in·lbf} or less

Note

- Comparing another vehicle of the same model under the same conditions is an acceptable inspection method.
- The steering force varies with conditions indicated below.
 - Road conditions: Such as dry, wet, asphalt, or concrete
 - Tire condition: such as brand, wear, and tire pressure



A6E0612W016

STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION

DPE061432010W02

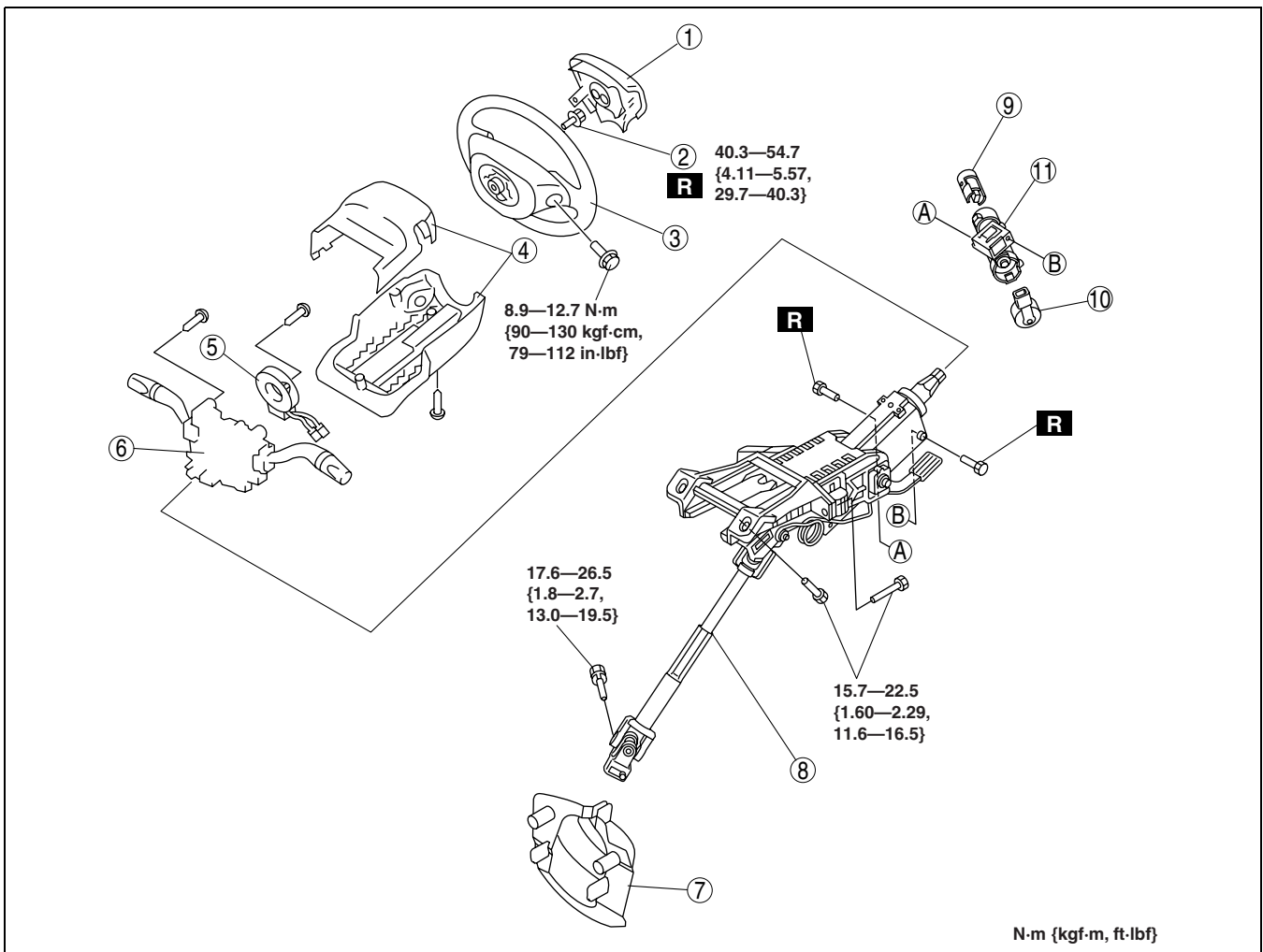
Warning

- Handling the air bag module improperly can accidentally operate (deploy) the air bag module, which may seriously injure you. Read the service warnings before handling the air bag module.

POWER STEERING

(See 08-10-2 SERVICE WARNINGS.) (See 08-10-4 SERVICE CAUTIONS.)

1. Remove the front scuff plate inner (driver's side). (See 09-17-19 FRONT SCUFF PLATE REMOVAL/INSTALLATION.)
2. Remove the front side trim (driver's side). (See 09-17-15 FRONT SIDE TRIM REMOVAL/INSTALLATION.)
3. Remove the side wall. (See 09-17-11 SIDE WALL REMOVAL/INSTALLATION.)
4. Remove the front console. (See 09-17-13 FRONT CONSOLE REMOVAL/INSTALLATION.)
5. Remove the bonnet release lever. (See 09-14-5 BONNET LATCH AND RELEASE LEVER REMOVAL/INSTALLATION.)
6. Remove the lower panel. (See 09-17-8 LOWER PANEL REMOVAL/INSTALLATION.)
7. Remove the meter hood. (See 09-17-7 METER HOOD REMOVAL/INSTALLATION.)
8. Remove the instrument cluster. (See 09-22-1 INSTRUMENT CLUSTER REMOVAL/INSTALLATION.)
9. Remove in the order indicated in the table.
10. Install in the reverse order of removal.
11. If the steering lock component of a vehicle equipped with the advanced keyless system is replaced, perform the following procedure after installation.
 - Without immobilizer system
 - Steering lock unit programming (See 09-14-21 STEERING LOCK UNIT ID CODE REGISTRATION.)
 - With immobilizer system
 - Immobilizer system resetting (See 09-14-29 IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING [WITH ADVANCED KEYLESS SYSTEM].)



DPE614ZW1005

1	Air bag module (See 08-10-5 DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
2	Lockbolt
3	Steering wheel (See 06-14-9 Steering Wheel Removal Note.) (See 06-14-10 Steering Wheel Installation Note.)

4	Column cover (See 09-17-7 COLUMN COVER REMOVAL/INSTALLATION.)
5	Clock spring (See 08-10-13 CLOCK SPRING REMOVAL/INSTALLATION.)

POWER STEERING

6	Combination switch (See 09-18-18 COMBINATION SWITCH REMOVAL/INSTALLATION.)
7	Dust cover
8	Steering shaft (See 06-14-10 Steering Shaft Installation Note.)
9	Outer cylinder (See 06-14-9 Outer Cylinder Removal Note.)
10	Ignition switch (See 09-21-1 IGNITION SWITCH REMOVAL/INSTALLATION.)
11	Steering lock component (See 06-14-9 Steering Lock Component Removal Note.) (See 06-14-10 Steering Lock component Installation Note.)

Steering Wheel Removal Note

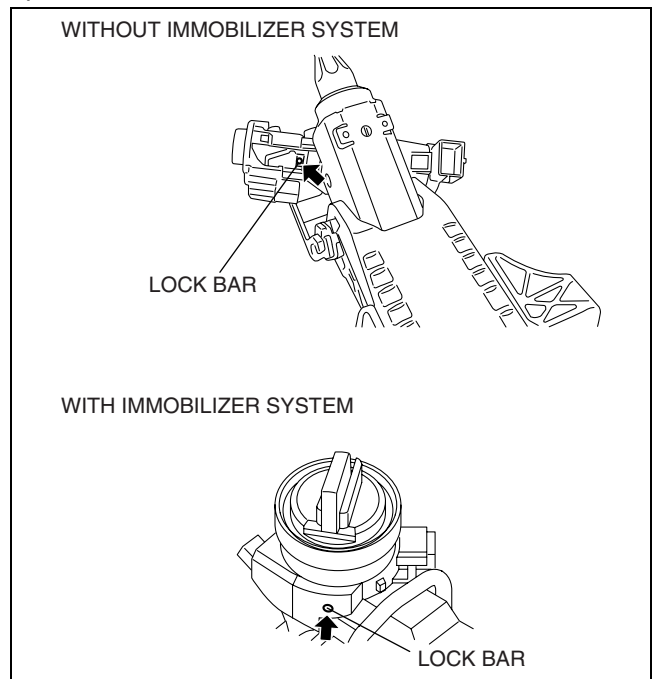
Caution

- Do not try to remove the steering wheel by hitting the shaft with a hammer. The column will be damaged.

1. Set the wheels in the straight-ahead position.
2. Remove the steering wheel using any commercially available puller.

Outer Cylinder Removal Note

1. Remove the coil antenna. (With immobilizer system) (See 09-14-28 COIL ANTENNA REMOVAL/INSTALLATION [ADVANCED KEYLESS SYSTEM].) (See 09-14-6 COIL ANTENNA REMOVAL/INSTALLATION [KEYLESS ENTRY SYSTEM].)
2. Insert the key into the key cylinder and turn it to the ACC position.
3. Insert a pin from the position indicated by the arrow in the figure, and while pressing the lock bar with the pin, remove the key cylinder from the steering lock component.



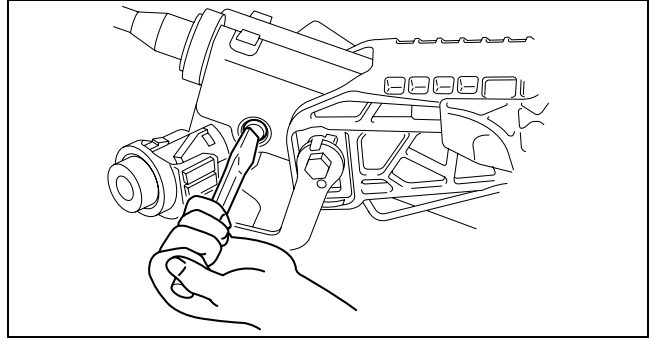
DPE614ZW1006

Steering Lock Component Removal Note

1. Remove the bolt using a flathead screwdriver, and then remove the steering lock component.

POWER STEERING

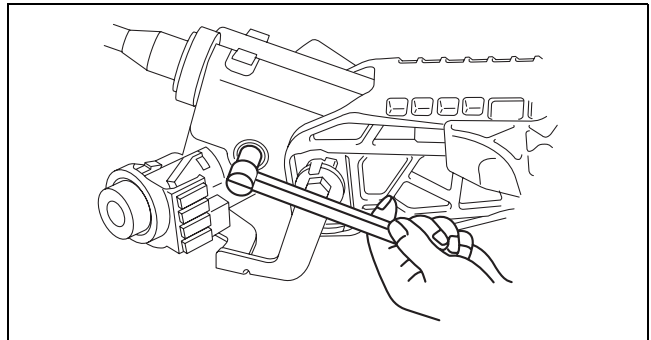
2. Make a groove in the heads of the steering lock mounting bolts using a chisel and hammer.
3. Remove the steering lock component.



B3A0614W011

Steering Lock component Installation Note

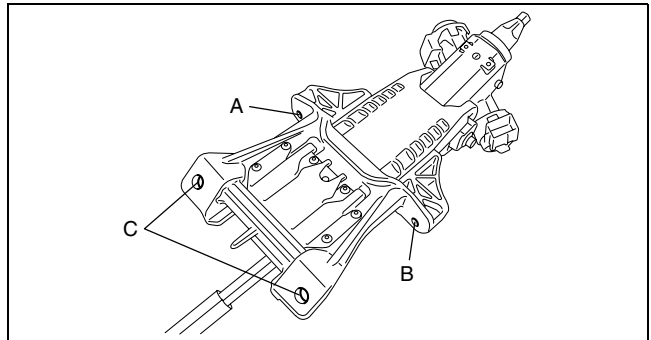
1. Install the steering lock component to the steering shaft.
2. Verify that the lock operates correctly.
3. Install new steering lock mounting bolts.
4. Tighten the bolts until the heads break off.



B3A0614W010

Steering Shaft Installation Note

1. Verify that the tilt / telescope lever is in the LOCK position.
2. Tighten the bolts in alphabetical order.



B3E0614W007

Steering Wheel Installation Note

1. Set the wheels in the straight-ahead position and install the steering wheel.

STEERING SHAFT INSPECTION

1. Inspect the column bearing for excessive play and damage.

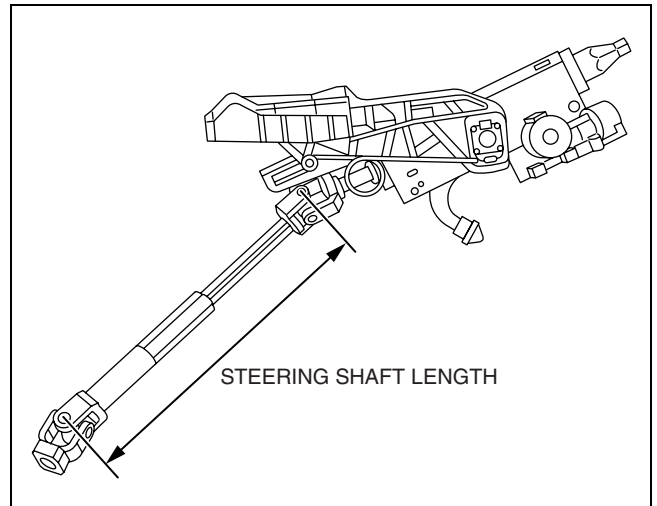
DPE061432100W01

POWER STEERING

- Verify that the measurement of the steering shaft indicated in the figure is as specified.
 - If not within the specification replace the steering shaft component.

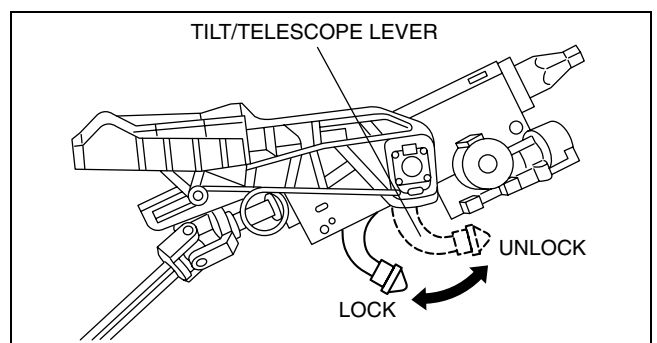
Steering shaft length

335.8—340.8 mm {13.23—13.41 in}



DPE614ZW1007

- Inspect the tilt/telescope mechanism operation for the following.
 - Tilt/telescope lever moves smoothly from the lock to the unlock position.
 - Steering shaft is fixed firmly when the tilt/telescope lever is locked.
 - If there is any malfunction, replace the steering shaft.



DPE614ZW1008

STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION

DPE061432960W01

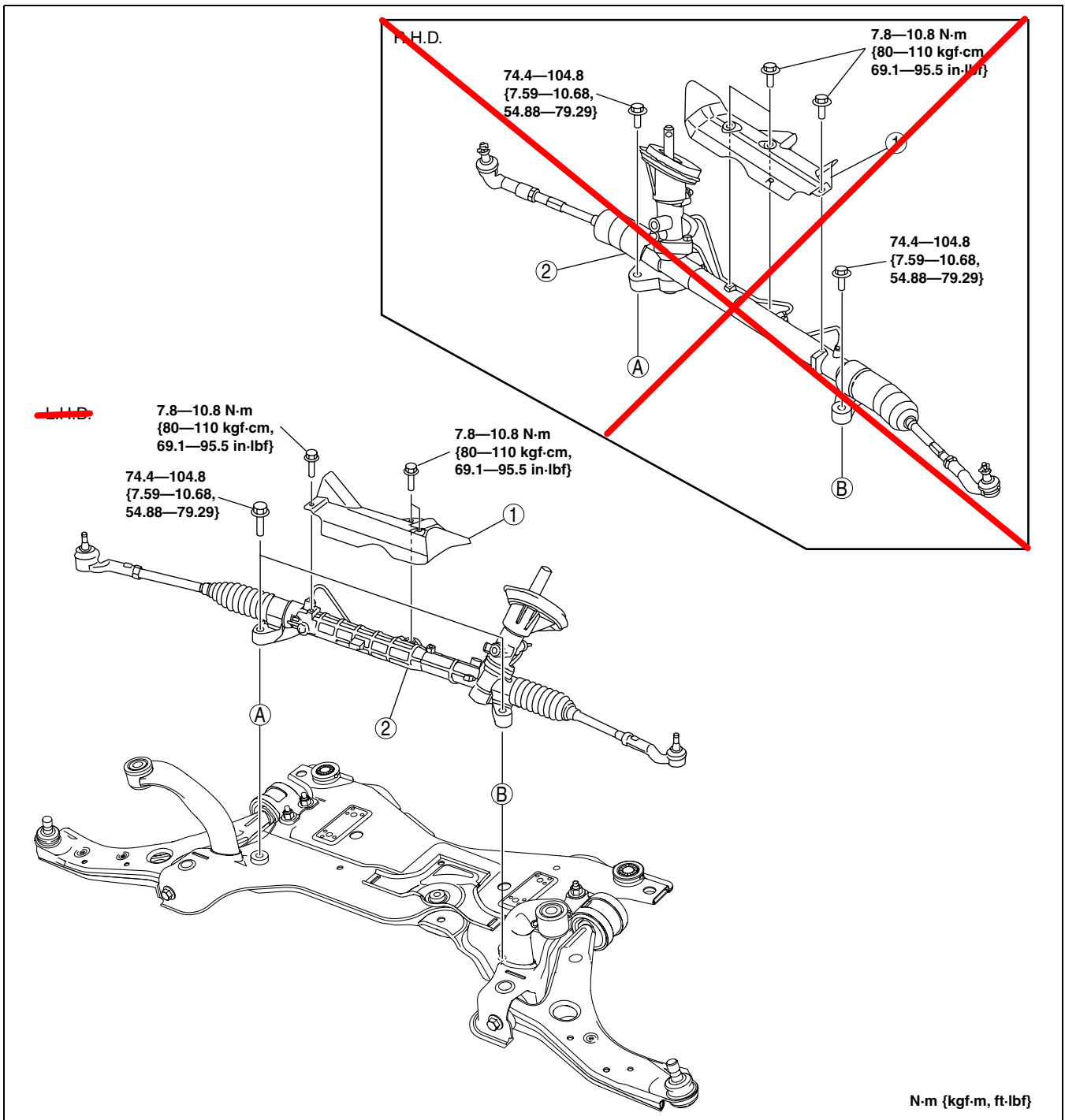
Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the wiring harness if it is pulled by mistake. Before performing the following procedures, disconnect the ABS wheel-speed sensor connector (axle side) and fix the wiring harness to an appropriate place where it will not be pulled by mistake while servicing the vehicle.

- Remove the front crossmember, lower arm, front stabilizer, and steering gear and linkage as a single unit. (See 02-13-11 FRONT CROSSMEMBER REMOVAL/INSTALLATION.)
- Remove the front stabilizer. (See 02-13-8 FRONT STABILIZER REMOVAL/INSTALLATION.)
- Remove in the order indicated in the table.
- Install in the reverse order of removal.

POWER STEERING

5. After installation, inspect the front wheel alignment and adjust it if necessary. (See 02-11-2 FRONT WHEEL ALIGNMENT.)



DPE614ZW1009

1	Insulator
---	-----------

2	Steering gear and linkage
---	---------------------------

STEERING GEAR AND LINKAGE DISASSEMBLY

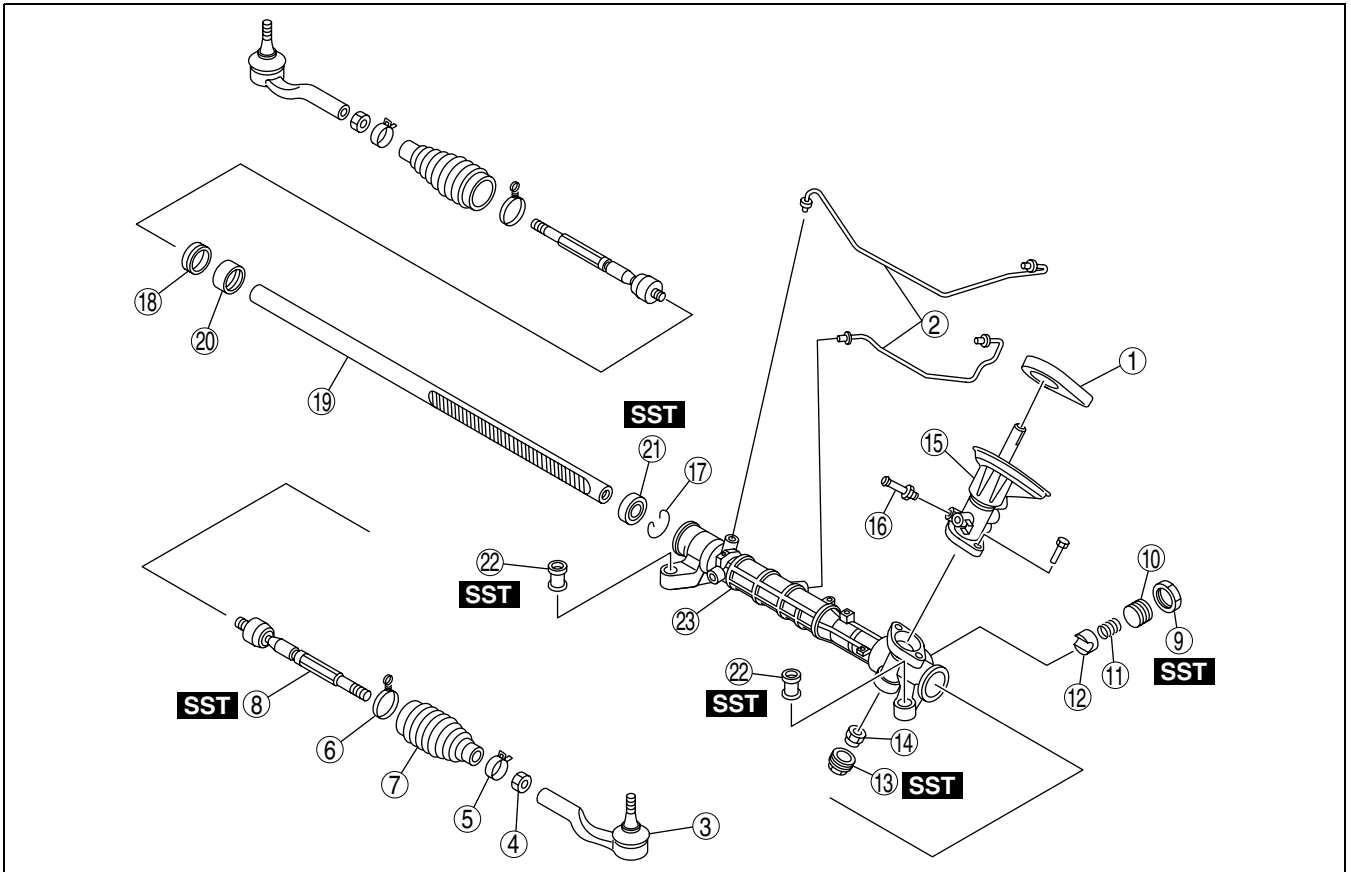
DPE061432960W02

Caution

- Place copper plates, rag, or similar material in a vise, when securing the mounting bracket portion of the steering gear.

POWER STEERING

1. Disassemble in the order indicated in the table.



DPE614ZW1010

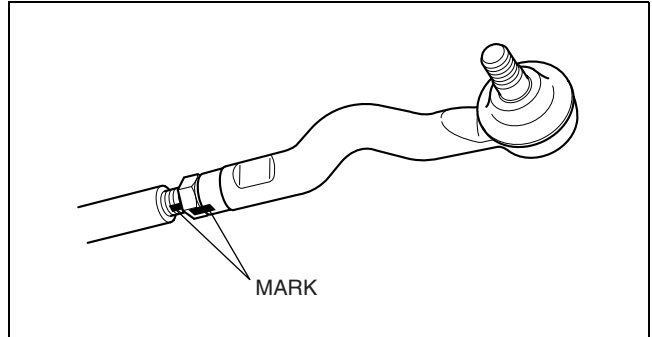
1	Floor seal
2	Oil pipe
3	Tie-rod end (See 06-14-14 Tie-rod End Disassembly Note.)
4	Locknut
5	Boot clamp
6	Boot band
7	Boot
8	Tie rod (See 06-14-14 Tie Rod Disassembly Note.)
9	Locknut (on adjusting cover) (See 06-14-14 Locknut (on Adjusting Cover), Adjusting Cover Disassembly Note.)
10	Adjusting cover (See 06-14-14 Locknut (on Adjusting Cover), Adjusting Cover Disassembly Note.)
11	Yoke spring
12	Support yoke
13	Housing cover
14	Locknut (on pinion shaft)
15	Pinion shaft and valve housing component
16	Return pipe
17	Clip
18	Stopper
19	Steering rack
20	Rack bushing
21	Oil seal (See 06-14-14 Oil Seal Disassembly Note.)

POWER STEERING

22	Mounting rubber (See 06-14-15 Mounting Rubber Disassembly Note.)
23	Gear housing

Tie-rod End Disassembly Note

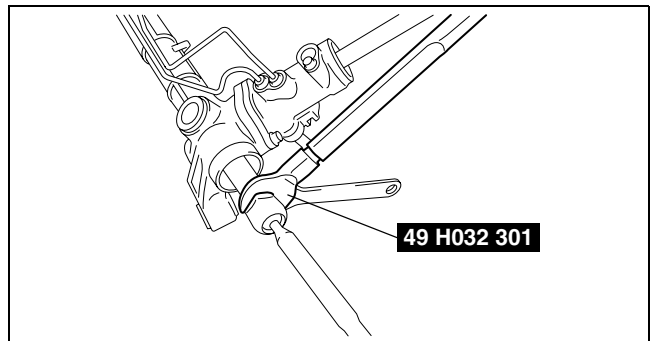
1. Place alignment marks as shown in the figure for proper installation.



B3E0614W029

Tie Rod Disassembly Note

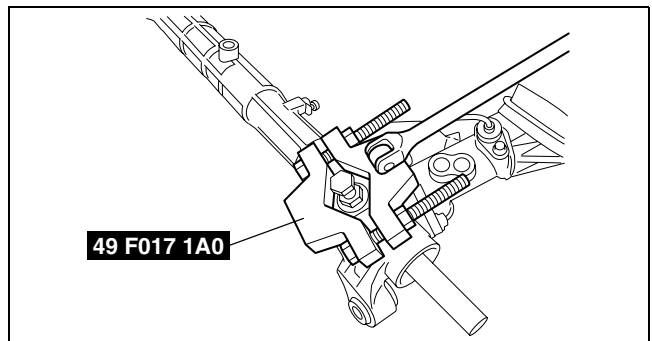
1. Fix the steering rack and remove the tie rod using the **SST**.



B3E0614W012

Locknut (on Adjusting Cover), Adjusting Cover Disassembly Note

1. Remove the locknut using the **SST**.
2. Remove the adjusting cover.



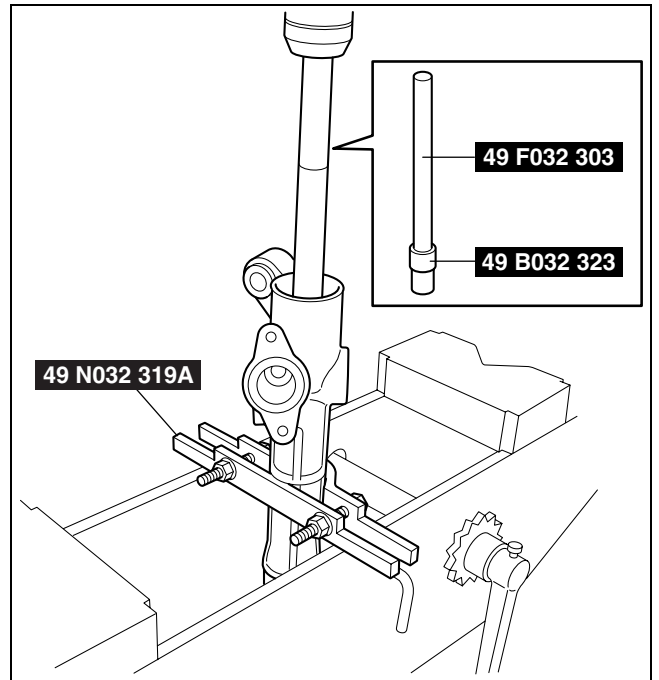
B3E0614W013

Oil Seal Disassembly Note

1. Install the **SST** (49 N032 319A) to the gear housing with the raised part facing up as shown in the figure.
2. Insert the **SSTs** (49 F032 303, 49 B032 323) into the valve housing side.

POWER STEERING

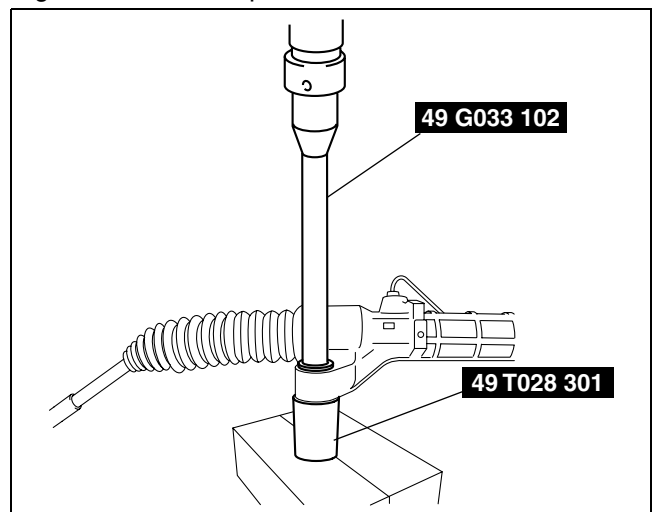
3. Remove the oil seal using a press.



B3E0614W014

Mounting Rubber Disassembly Note

- Press the mounting rubber out from the gear housing using the **SSTs** and a press.



DPE614ZW1018

STEERING GEAR AND LINKAGE INSPECTION

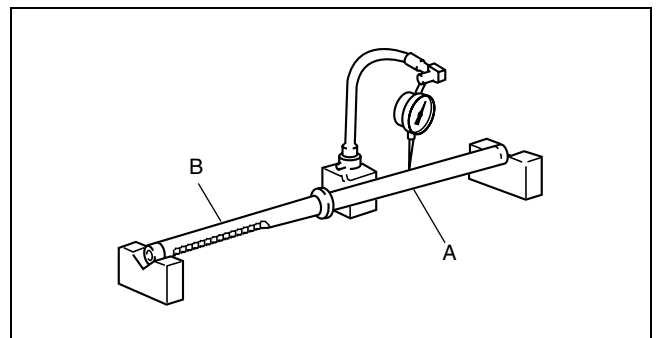
Steering Rack Inspection

1. Inspect for cracking, damage, and tooth wear.
 - If there is any malfunction, replace the steering rack.
2. Measure the steering rack warp.
 - If it exceeds the maximum specification, replace the steering rack.

Steering rack runout

Large diameter portion (near point A): 0.15 mm {0.006 in} max.

Small diameter portion (near point B): 0.20 mm {0.008 in} max.



A6E0612W041

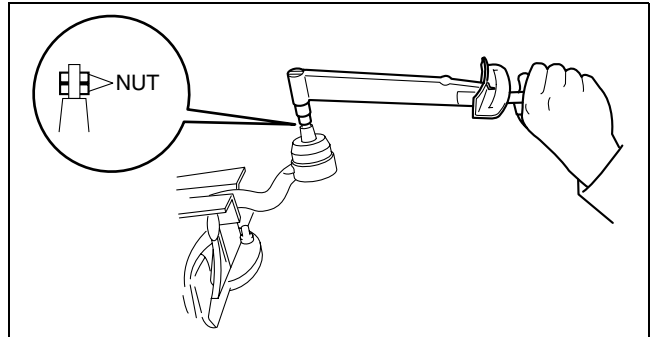
POWER STEERING

Tie-rod End Inspection

1. Inspect the tie-rod end for damage and the boot for cracks.
 - If there is any malfunction, replace the tie-rod end.
2. Inspect for excessive play.
 - If there is any malfunction, replace the tie-rod end.
3. Rotate the ball joint **10 times**.
4. Install two nuts to the ball joint and measure the tie-rod end rotational torque using a torque wrench.
 - If not within the specification, replace the tie-rod end.

Tie-rod end rotational torque

0.5—3.0 N·m {6—30 kgf·cm, 5—26 in·lbf}



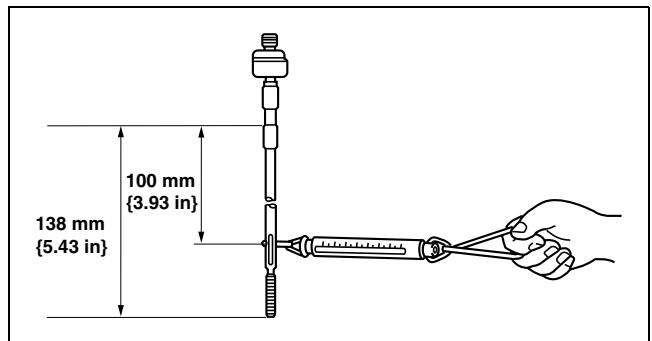
B3E0614W046

Tie rod Inspection

1. Inspect for bending and damage.
 - If there is any malfunction, replace the tie rod.
2. Inspect for excessive play.
 - If there is any malfunction, replace the tie rod.
3. Swing the ball joint **10 times**.
4. Measure the ball joint swing torque using a pull scale.
 - If it exceeds the specification, replace the tie rod.

Tie rod swing torque

0.4—4.0 N·m {5—40 kgf·cm, 4—35 in·lbf}
[Pull scale reading **0.6—29.3 N {0.06—2.98 kgf, 0.14—6.58 lbf}**]



ADA6613W019

STEERING GEAR AND LINKAGE ASSEMBLY

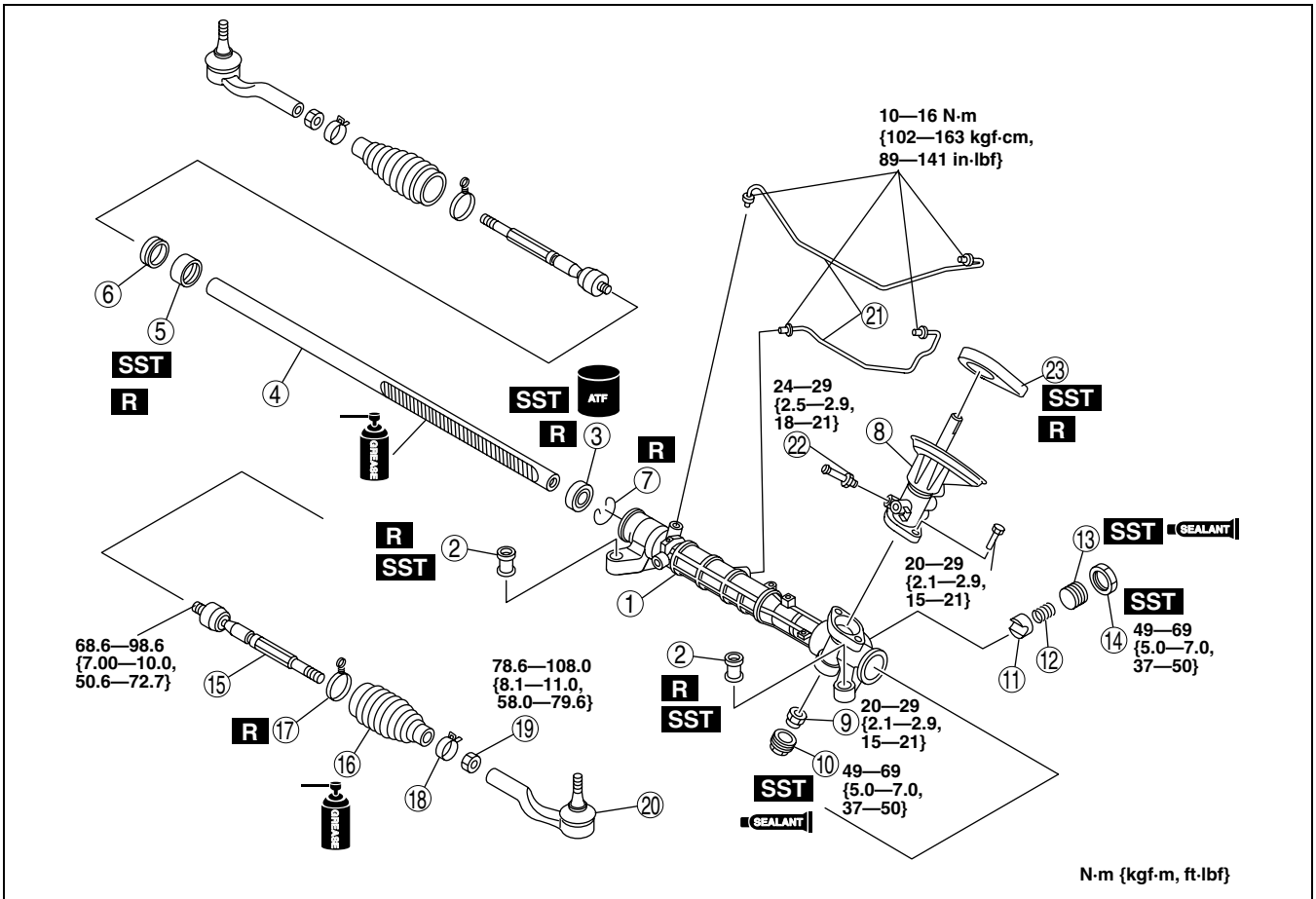
DPE061432960W04

Caution

- Place copper plates, rag, or similar material in a vise, when securing the mounting bracket portion of the steering gear.

POWER STEERING

1. Assemble in the order indicated in the table.



DPE614ZW1011

1	Gear housing
2	Mounting rubber (See 06-14-17 Mounting Rubber Assembly Note.)
3	Oil seal (See 06-14-18 Oil Seal Assembly Note.)
4	Steering rack (See 06-14-19 Steering Rack Assembly Note.)
5	Rack bushing (See 06-14-19 Rack Bushing Assembly Note.)
6	Stopper (See 06-14-19 Stopper Assembly Note.)
7	Clip
8	Pinion shaft and valve housing component (See 06-14-20 Pinion Shaft and Valve Housing Component Assembly Note.)
9	Locknut
10	Housing cover (See 06-14-20 Housing Cover Assembly Note.)

11	Support yoke
12	Yoke spring
13	Adjusting cover (See 06-14-20 Adjusting Cover Assembly Note.)
14	Locknut (on adjusting cover) (See 06-14-20 Locknut (on Adjusting Cover) Assembly Note.)
15	Tie rod
16	Boot (See 06-14-21 Boot Assembly Note.)
17	Boot band
18	Boot clamp
19	Locknut
20	Tie-rod end
21	Oil pipe
22	Return pipe
23	Floor seal (See 06-14-21 Floor Seal Assembly Note.)

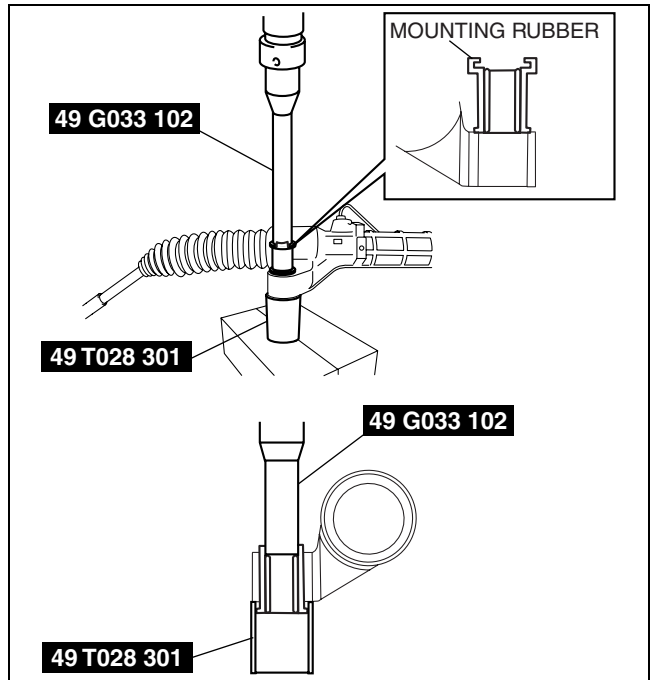
06

Mounting Rubber Assembly Note

1. Apply soapy water to the rubber part of the mounting rubber.
2. Install the mounting rubber so that two notches of the mounting rubber are parallel to the steering rack.

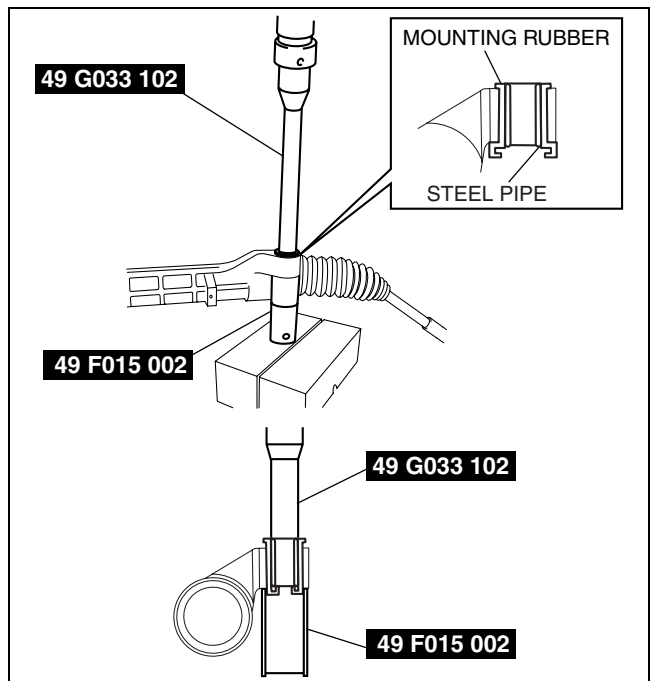
POWER STEERING

3. Press the mounting rubber until the mounting rubber end comes out completely from the gear housing using the **SSTs** and a press.



DPE614ZW1019

4. Reverse the gear housing, then press the mounting rubber until the mounting rubber end comes out completely from the other side. At this time, make sure that the mounting rubber and steel pipe are aligned.



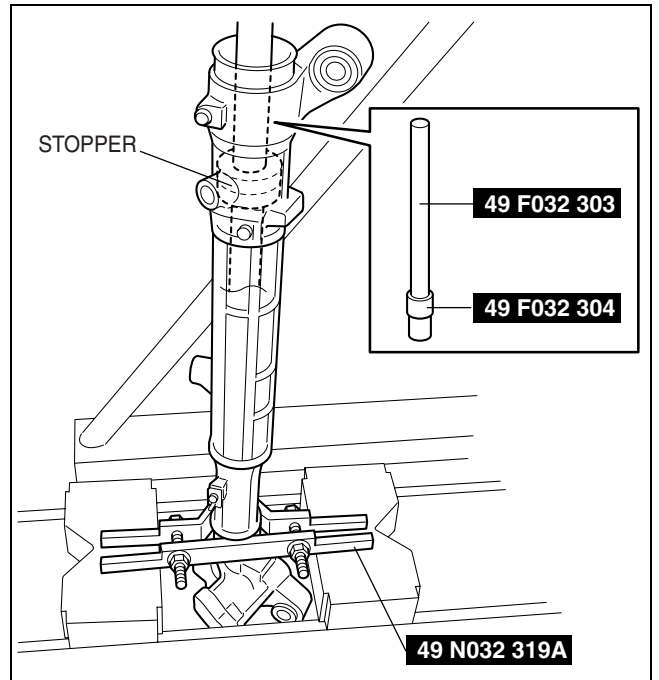
DPE614ZW1020

Oil Seal Assembly Note

1. Apply ATF to the lip of a new oil seal.
2. Install the **SST** (49 N032 319A) to the gear housing with the raised part facing up as shown in the figure.

POWER STEERING

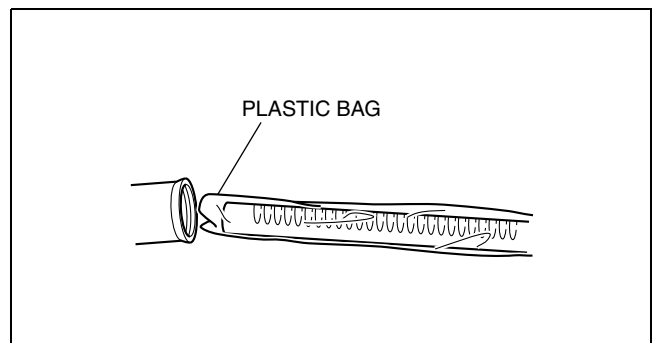
3. Set the stopper into the gear housing to hold the **SSTs** as shown in the figure.
4. Install the oil seal using the **SSTs** (49 F032 303, 49 F032 304) and a press.



B3E0614W019

Steering Rack Assembly Note

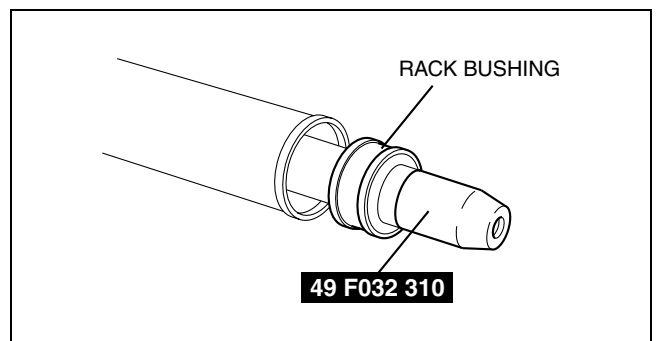
1. Apply multipurpose grease to the rack teeth.
2. Install a plastic bag to the rack teeth and insert the steering rack in the gear housing.



B3E0614W035

Rack Bushing Assembly Note

1. After installing the **SST** to the steering rack end, assemble the rack bushing to the rack housing.



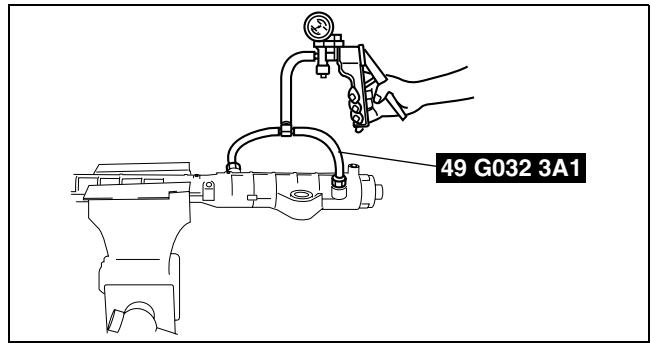
B3E0614W036

Stopper Assembly Note

1. Assemble the stopper.
2. Inspect airtightness.
 - (1) Connect the **SST** to the power cylinder section of the gear housing.

POWER STEERING

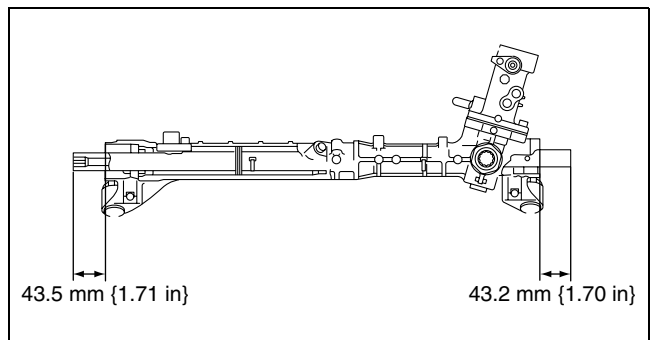
- (2) Apply **53.3 kPa {400 mmHg, 15.8 inHg}** vacuum with a vacuum pump and verify that it is held for **30 s**.
 - If the vacuum is not held, replace the oil seal.



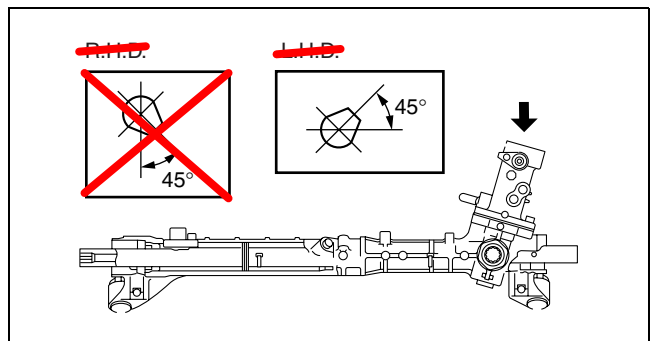
B3E0614W028

Pinion Shaft and Valve Housing Component Assembly Note

1. Set the rack in the center with the measurement between rack housing end and rack end as shown in the figure.
2. When the pinion shaft position is as shown in the figure with the rack in the center, insert the pinion shaft and valve housing component.



DPE614ZW1016



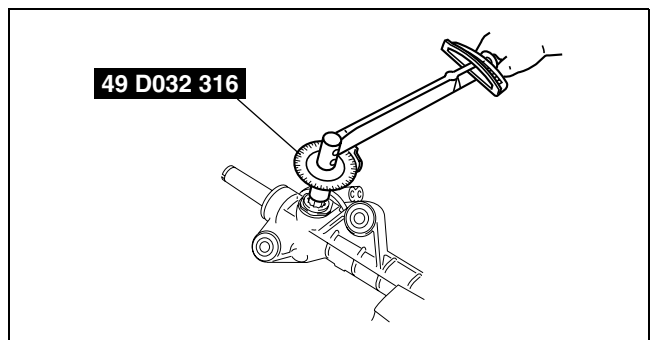
B3E0614W044

Housing Cover Assembly Note

1. Apply silicone sealant to the threads of the housing cover.
2. Assemble the housing cover.

Adjusting Cover Assembly Note

1. Apply sealant to the threads of the adjusting cover.
2. Using the **SST**, tighten the adjusting cover with a tightening torque of **20.0 N·m {2.0 kgf·m, 14.8 ft·lbf}**.
3. Using the **SST**, loosen the adjusting cover to **25—30°**.



A6E0612W062

Locknut (on Adjusting Cover) Assembly Note

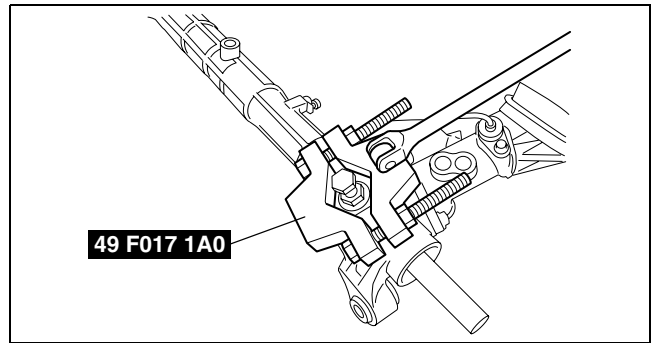
Caution

06-14-20

POWER STEERING

- Be sure that the adjusting cover will not turn together with the locknut.

1. Fix the adjusting cover and tighten the locknut.



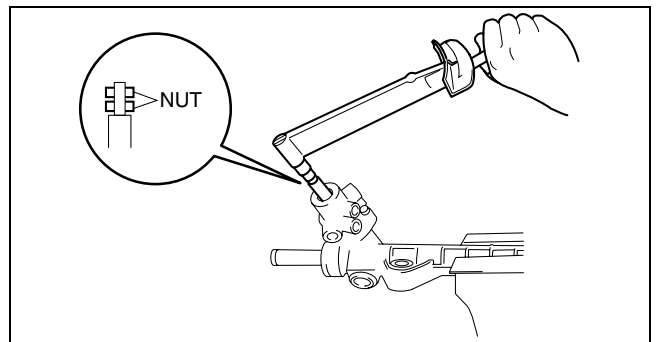
B3E0614W013

2. Measure the pinion torque using the torque wrench.

Pinion shaft rotation torque

Center of rack $\pm 90^\circ$: 0.88—1.48 N·m {8.98—15.0 kgf·cm, 7.79—13.0 in·lbf}

3. If not as specified, remove the locknut and adjust the adjust cover.



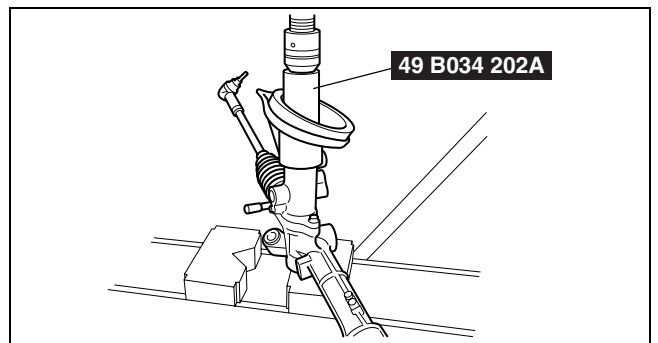
B3E0614W037

Boot Assembly Note

1. Apply silicone grease to the rubber lip groove.
2. Assemble the boot.

Floor Seal Assembly Note

1. Assemble a new floor seal using the SST and a press.



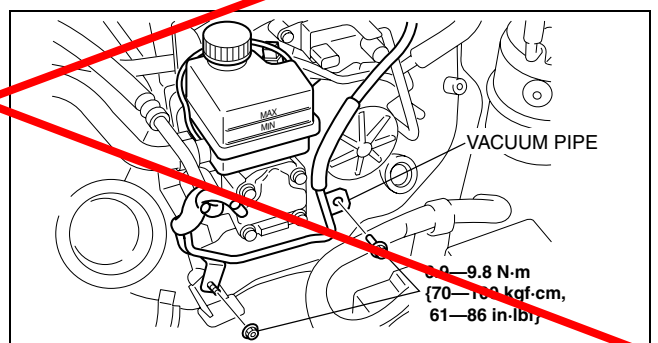
B3E0614W038

06

POWER STEERING OIL PUMP REMOVAL/INSTALLATION [MZR-CD (RF TURBO)]

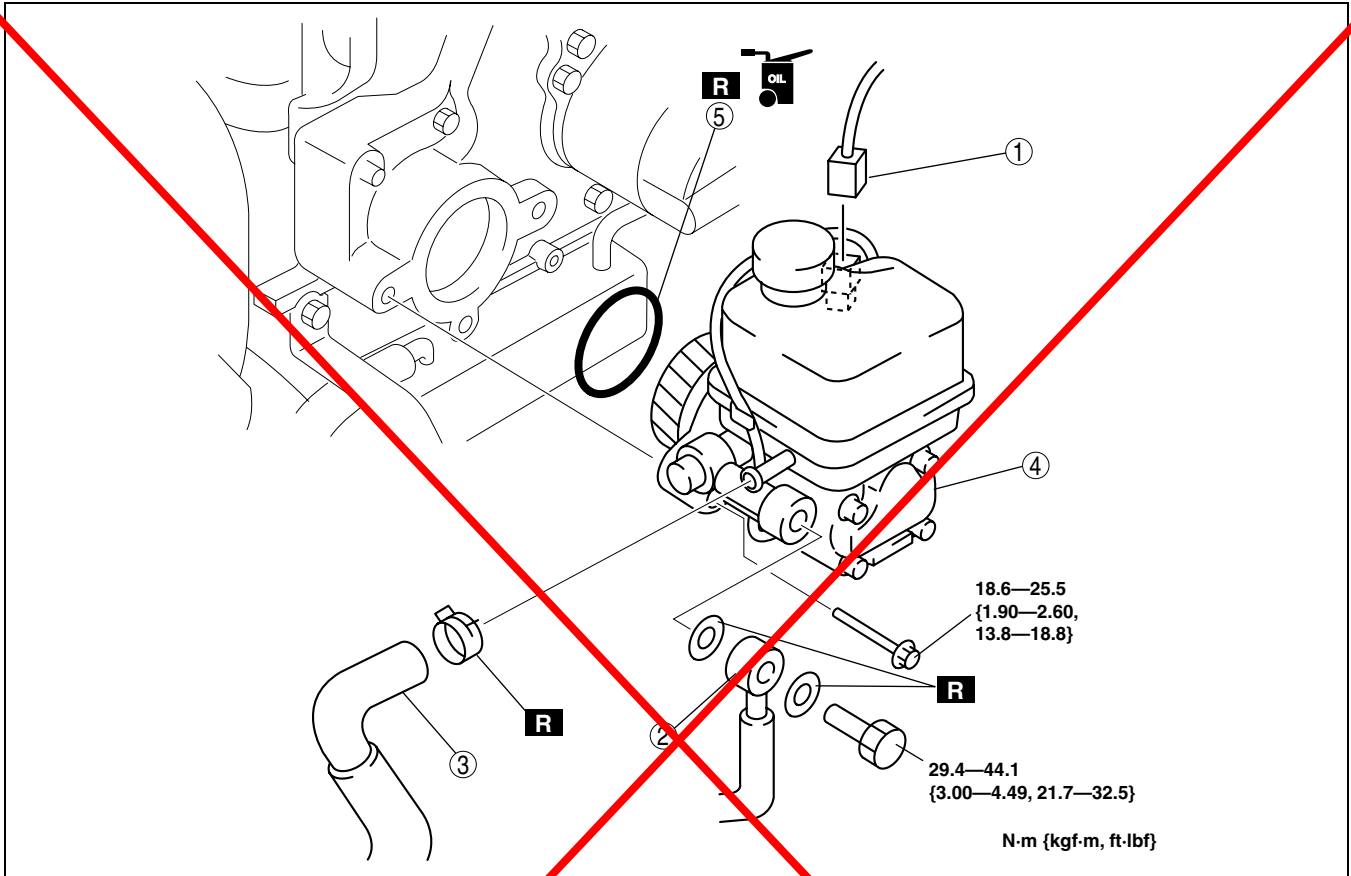
DPE061102650W08

1. Remove the battery and battery tray. (See 01-17B-1 BATTERY REMOVAL/INSTALLATION [MZR-CD (RF Turbo)].)
2. Remove the air cleaner. (See 01-13B-4 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [MZR-CD (RF Turbo)].)
3. Remove the vacuum pipe.
4. Remove the air pipe and the air hose. (turbocharger—charge air cooler) (See 01-13B-4 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [MZR-CD (RF Turbo)].)
5. Remove the air pipe and the air hose. (Air cleaner cover—turbocharger) (See 01-13B-4 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [MZR-CD (RF Turbo)].)
6. Remove in the order indicated in the table.
7. Install in the reverse order of removal.



DPE4117W1018

POWER STEERING



DPE614ZW1012

1	Pressure switch connector
2	Pressure pipe
3	Return hose

4	Power steering oil pump
5	O-ring

POWER STEERING OIL PUMP DISASSEMBLY/ASSEMBLY [MZR-CD (RF TURBO)]

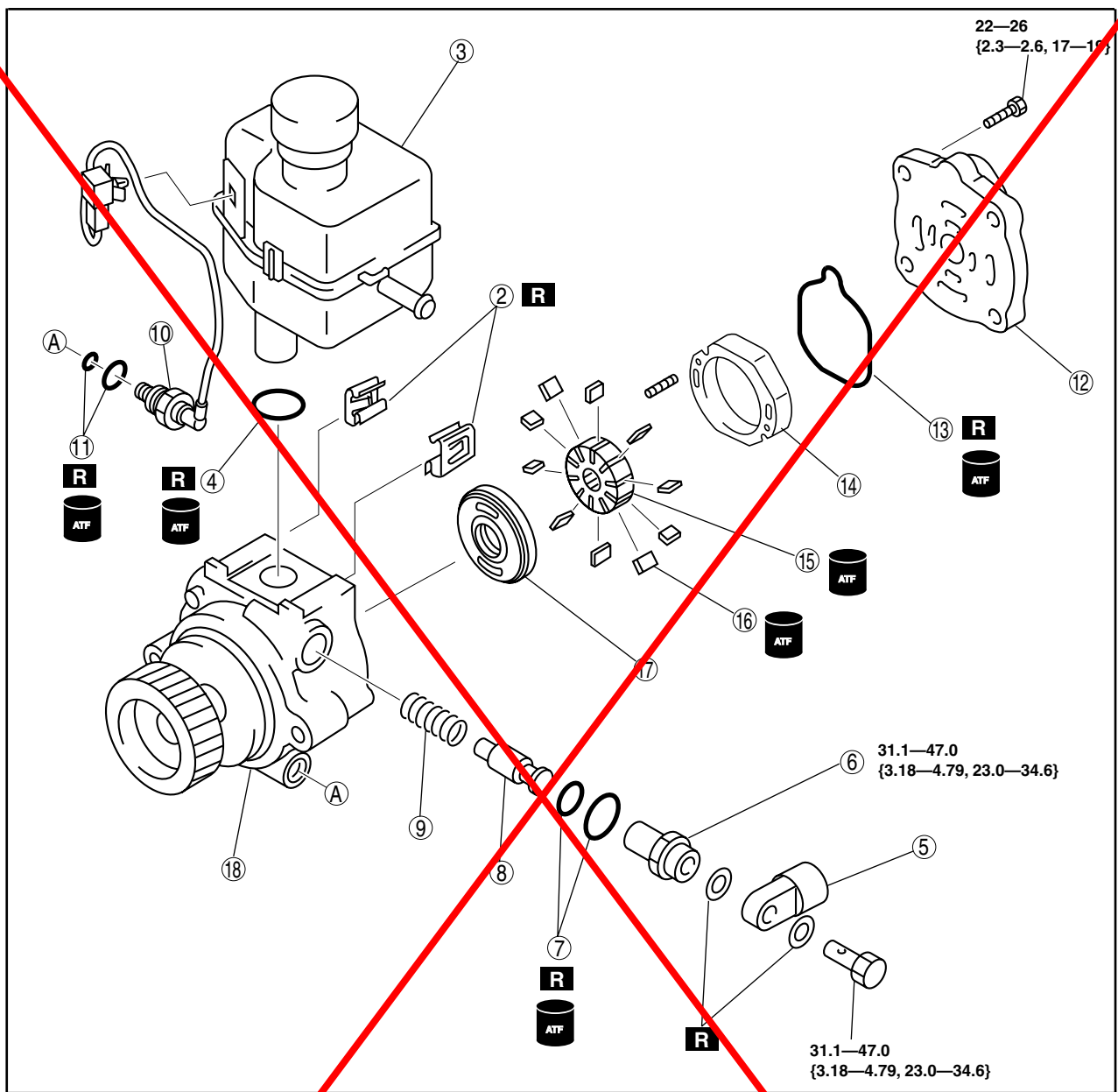
DPE061432650W10

Note

- The following procedure is for replacement of the O-ring and oil seal only. Replace the pump component if other repairs are necessary.

- Disassemble in the order indicated in the table.
- Assemble in the reverse order of disassembly.

POWER STEERING



① SST

N-m {kgf-m, ft-lbf}

DPE614ZW1013

1	Power steering oil pump component (See 06-14-24 Power Steering Oil Pump Component Disassembly Note)
2	Clip (See 06-14-24 Clip Disassembly Note) (See 06-14-25 Clip Assembly Note)
3	Reserve tank
4	O-ring
5	Joint
6	Connector
7	O-ring
8	Control valve
9	Spring

10	Pressure switch
11	O-ring
12	Rear pump body (See 06-14-25 Rear Pump Body Assembly Note)
13	Gasket
14	Cam ring (See 06-14-25 Cam Ring Assembly Note)
15	Rotor
16	Vane (See 06-14-24 Vane Assembly Note)
17	Side plate
18	Power steering oil pump

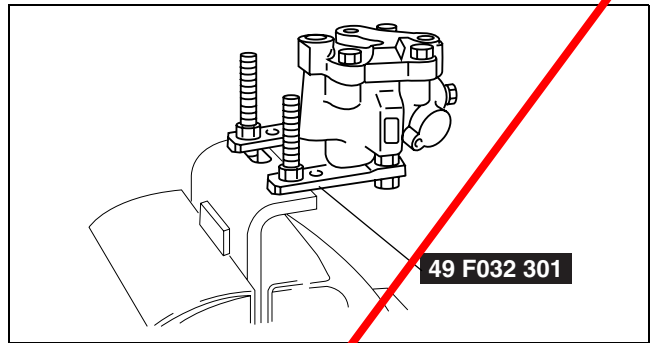
POWER STEERING

Power Steering Oil Pump Component Disassembly Note

1. Secure the power pressure oil pump using the SST.

Caution

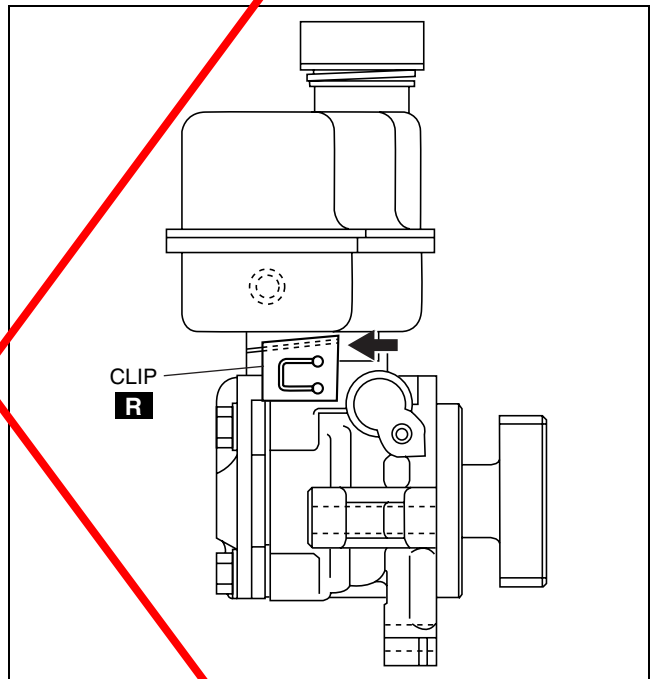
- Use the SST to prevent damage to the pump when securing it in a vise.



A6E66142010

Clip Disassembly Note

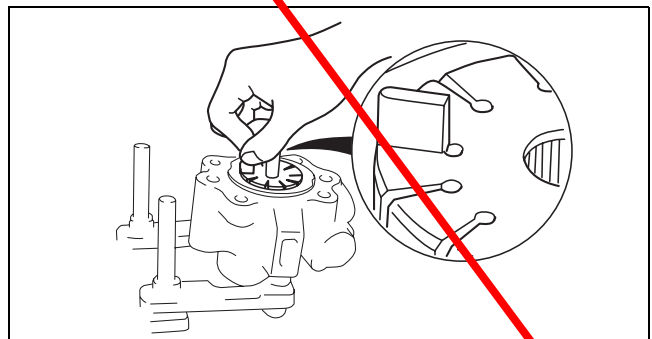
1. Lift up the clip tab using a flathead screwdriver.
2. Remove the clip by pushing it with a flathead screwdriver and a hammer as shown in the figure.



A6E66142008

Vane Assembly Note

1. Place the vanes in the rotor with the rounded edges contacting the cam.

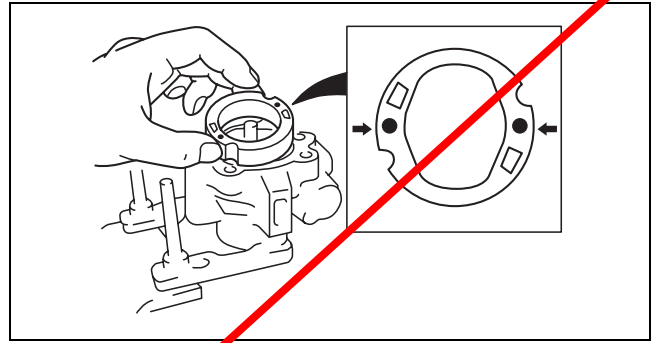


A6E6316W013

POWER STEERING

Cam Ring Assembly Note

1. Install the cam ring in the front pump body with the mark facing upward.



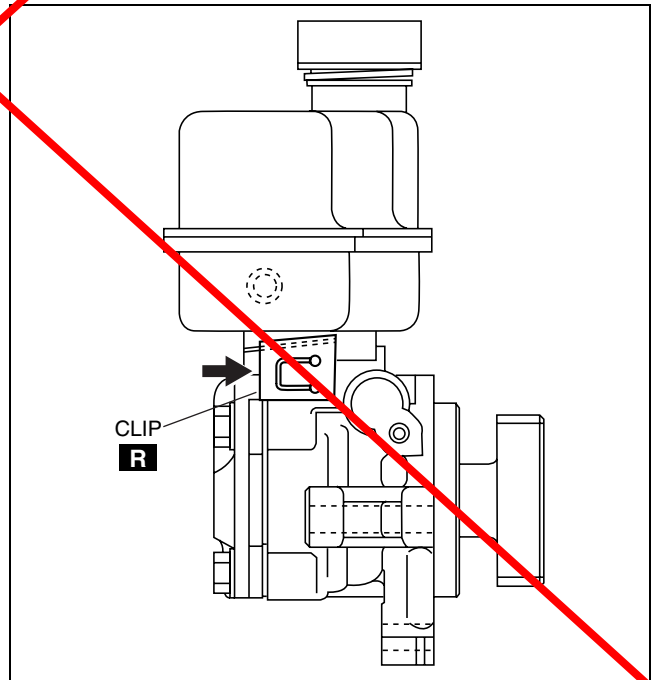
A6E6316W014

Rear Pump Body Assembly Note

1. After installing the rear body, manually turn the shaft to verify that it rotates smoothly.

Clip Assembly Note

1. Push the clip slowly in the direction shown in the figure.
2. Confirm that the clip tab is securely fastened.



A6E66142009

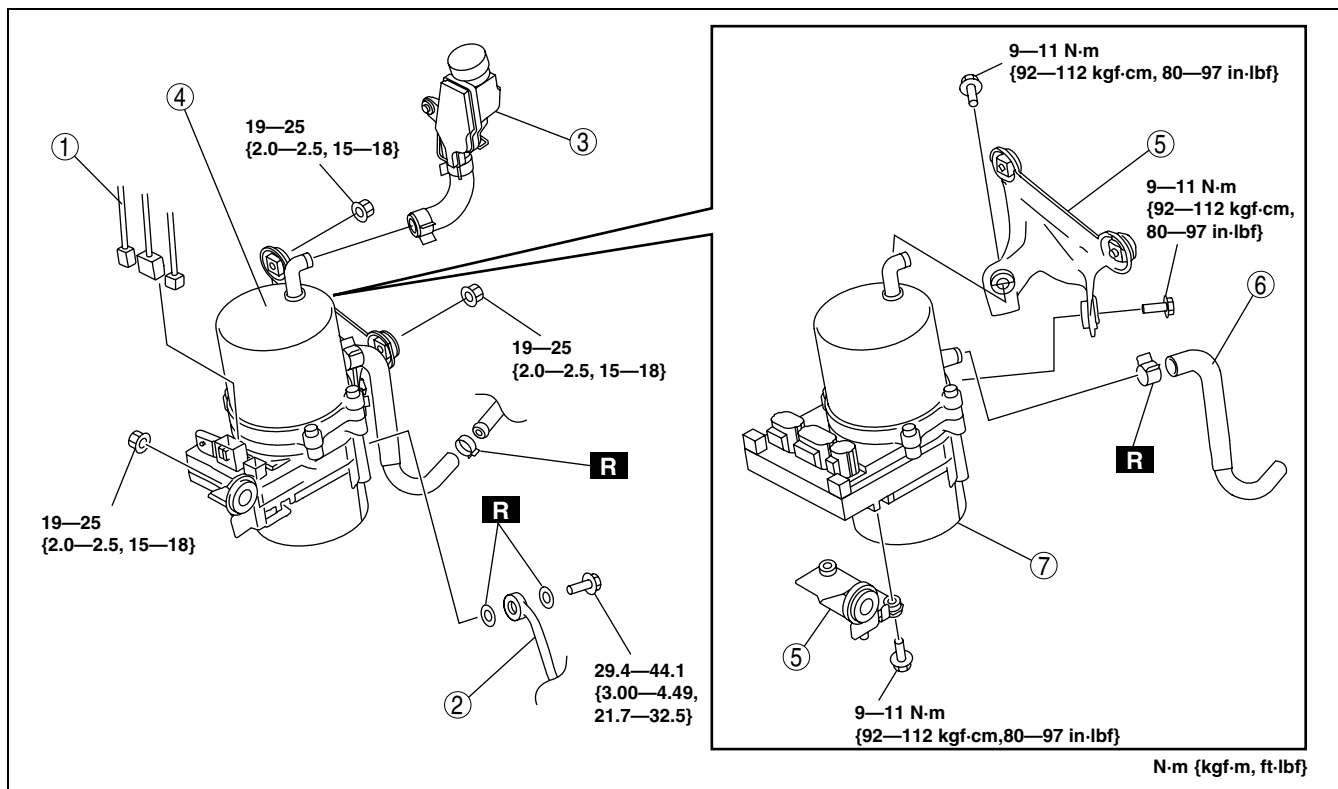
ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION ~~[L8, LF]~~

DPE061432650W06

1. Remove the under cover, splash shield and mudguard.
2. Remove the front bumper. (See 09-10-5 FRONT BUMPER REMOVAL/INSTALLATION.)
3. Remove the washer tank. (See 09-19-6 WASHER TANK REMOVAL/INSTALLATION.)
4. Remove in the order indicated in the table.

POWER STEERING

5. Install in the reverse order of removal.



DPE614ZW1014

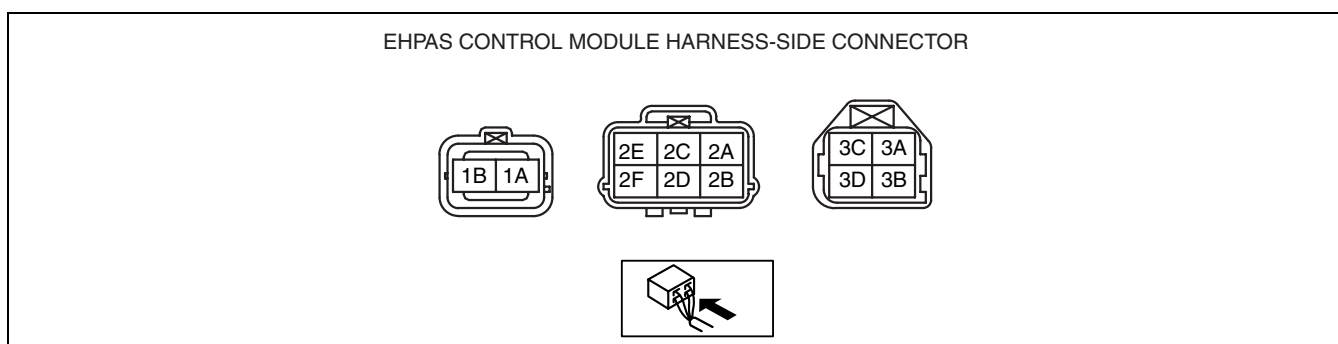
1	Connector
2	Pressure pipe
3	Sub-tank
4	Electric power steering oil pump and bracket component

5	Bracket
6	Return hose
7	Electric power steering oil pump

ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) CONTROL MODULE INSPECTION

DPE061432650W03

Terminal Voltage Table (Reference)



DPE614ZW1015

Terminal	Signal name	Connected to	Measured item	Measured terminal (measured condition)	Standard	Inspection item(s)
1A	Ground	Ground point	Voltage	Under any condition	1 V or less	<ul style="list-style-type: none"> Wiring harness (1A—ground point)
1B	Battery power supply	Battery	Voltage	Under any condition	B+	<ul style="list-style-type: none"> Wiring harness (1B—battery) Fuse (EHPAS 80 A)
2A	—	—	—	—	—	—
2B	CAN-L	—	Inspect under DTC inspection.			—
2C	—	—	—	—	—	—
2D	CAN-H	—	Inspect under DTC inspection.			—

POWER STEERING

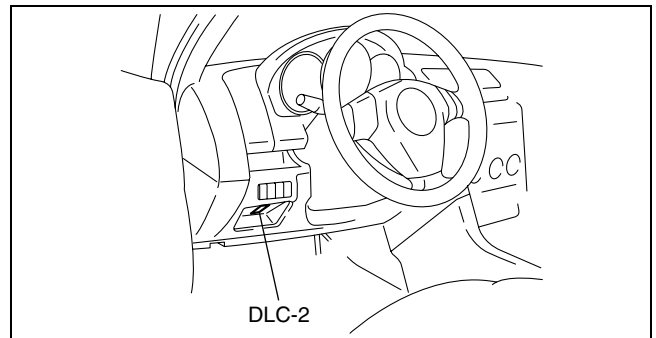
Terminal	Signal name	Connected to	Measured item	Measured terminal (measured condition)	Standard	Inspection item(s)
2E	—	—	—	—	—	—
2F	Ignition power supply	Ignition switch	Voltage	Ignition switch is ON	B+	<ul style="list-style-type: none"> Wiring harness (2F—ignition switch—battery) Fuse (EHPAS 5A)
				Ignition switch is OFF	1 V or less	
3A*	Steering angle sensor ground	Steering angle sensor	Continuity	Continuity	Continuity detected	<ul style="list-style-type: none"> Wiring harness (3A—steering angle sensor D)
3B	Steering angle sensor (signal 1)	Steering angle sensor	Continuity	Continuity	Continuity detected	<ul style="list-style-type: none"> Wiring harness (3B—steering angle sensor B)
3D	Steering angle sensor (signal 2)	Steering angle sensor	Continuity	Continuity	Continuity detected	<ul style="list-style-type: none"> Wiring harness (3D—steering angle sensor C)

* : With ABS

ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) CONTROL MODULE CONFIGURATION

DPE061432650W05

1. Turn the ignition switch off.
2. Connect the WDS or equivalent to the DLC-2.
3. Input vehicle information following the directions on the screen of the WDS or equivalent.
4. Select "Module programming" from the WDS or equivalent menu.
5. Select "Programmable Module Installation".
6. Select "EPS".
7. Clear DTCs using the WDS or equivalent, then verify that there is no DTC present.



DPE402AW1005

TECHNICAL DATA

06-50 TECHNICAL DATA

STEERING TECHNICAL DATA 06-50-1

STEERING TECHNICAL DATA

DPE06500000W01

Item	Specification
Power steering fluid type	ATF M-III or equivalent (e.g. Dexron ® II)
Power steering fluid capacity* (approximate quantity)	L8, LF: 0.8 L {0.85 US qt, 0.70 Imp qt} MZR-CD (RF Turbo): 0.97 L {1.03 US qt, 0.85 Imp qt}
Oil pump fluid pressure (oil temperature 50—60 °C {122—140 °F})	L8, LF: 10.4—11.0 MPa {107—112 kgf/cm², 1509—1595 psi} MZR-CD (RF Turbo): 10.50—10.99 MPa {107.1—112.0 kgf/cm², 1520—1598 psi}
Gear housing fluid pressure (oil temperature 50—60 °C {122—140 °F})	L8, LF: 9.0—11.0 MPa {92—111 kgf/cm², 1,306—1,585 psi} MZR-CD (RF Turbo): 10.50—10.99 MPa {107.1—112.0 kgf/cm², 1,520—1,598 psi}
Steering wheel play	0—30 mm {0—1.18 in} (When hydraulic operating)
Steering wheel force	7.8 N·m {80 kgf·cm, 69 in·lbf} or less (reference value)
Steering shaft length	335.8—340.8 mm {13.23—13.41 in}
Steering rack runout	Large diameter portion: 0.15 mm {0.006 in} max. Small diameter portion: 0.20 mm {0.008 in} max.
Tie-rod end rotational torque	0.5—3.0 N·m {6—30 kgf·cm, 5—26 in·lbf}
Tie rod swing torque	0.4—4.0 N·m {5—40 kgf·cm, 4—35 in·lbf} [Pull scale reading 0.6—29.3 N {0.06—2.98 kgf, 0.14—6.58 lbf}]
Pinion shaft rotation torque	Center of rack ± 90°: 0.88—1.48 N·m {8.98—15.0 kgf·cm, 7.79—13.0 in·lbf}

* : When reservoir tank is at maximum volume.

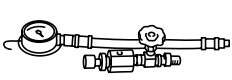
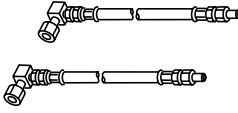
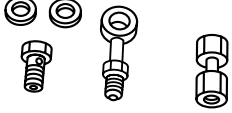
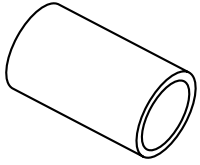
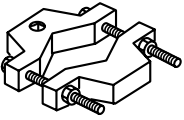
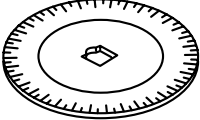
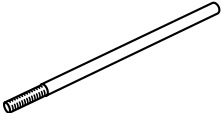
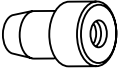
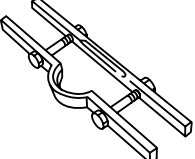
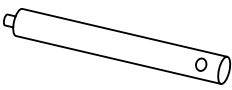
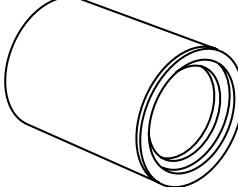
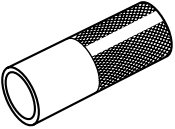


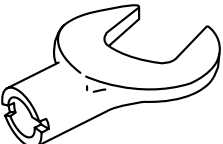
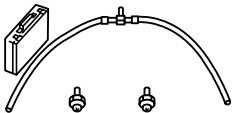
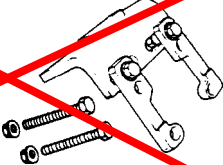
SERVICE TOOLS

06-60 SERVICE TOOLS

STEERING SST..... 06-60-1

STEERING SST

DPE066000000W01

<p>49 1232 670B Power steering gauge set</p> 	<p>49 H002 671 Adapter</p> 	<p>49 G032 3A4A Power steering gauge adapter set</p> 
<p>49 B034 202A Support block</p> 	<p>49 F017 1A0 Universal wrench</p> 	<p>49 D032 316 Protractor</p> 
<p>49 F032 303 Handle</p> 	<p>49 B032 323 Rod seal remover body</p> 	<p>49 N032 319A Support plate</p> 
<p>49 G033 102 Handle</p> 	<p>49 T028 301 Dust boot installer</p> 	<p>49 F015 002 Water seal installer</p> 
<p>49 F032 304 Body</p> 	<p>49 F032 310 Protector</p> 	<p>49 H032 301 Wrench</p> 
<p>49 G032 3A1 Joint hose set</p> 	<p>49 F032 301 Power steering pump hanger</p> 	<p>WDS</p> 