Component Procedures: Steering

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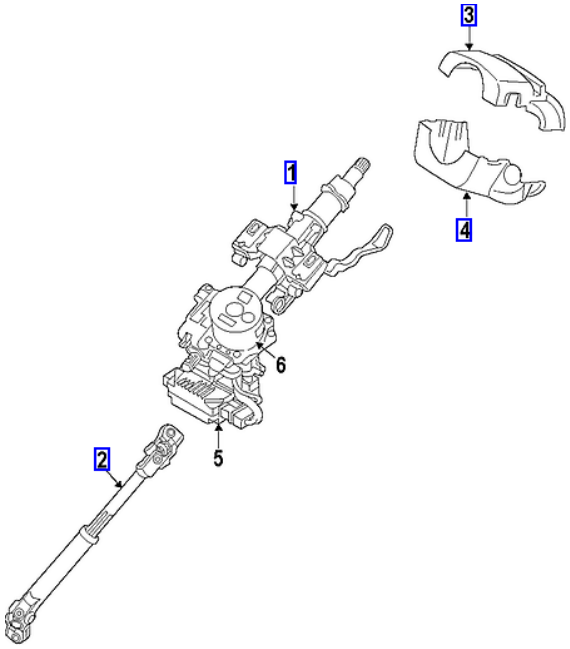
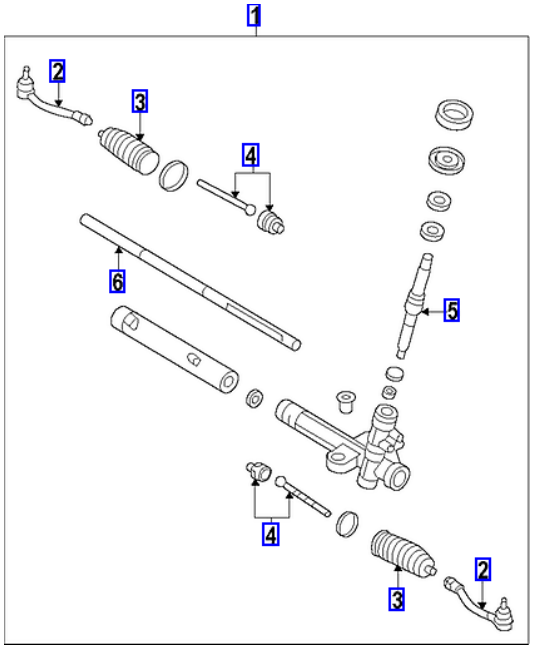
Component Procedures: Steering

Steering Column (Article 80009)



Steering Gear (Article 80002)



Parts and Labor (itype_189)

Parts

Qualifier	Part #	Name	Price	Note
Power > Steering Gear & Link?	56540F2000	4 - Inner Tie Rod	132.44	
Power > Steering Gear & Link?	56820F2000	2 - Left	149.48	
Power > Steering Gear & Link?	56825F2000	2 - Right	152.76	
Power > Steering Gear & Link?	56512J7000	5 - With Sport	173.40	
Power > Steering Gear & Link?	56512F2001	5 - Without Sport	179.61	
Power > Steering Gear & Link?	56531J7000	6 - With Sport	235.92	
Power > Steering Gear & Link?	56531F2000	6 - Without Sport	342.18	
Power > Steering Gear & Link?	56500F2300	1 - With Sport	1036.69	

Power > Steering Gear & Link?	56500F2000	1 - Without Sport	1238.61	
Power > Steering Gear & Link?	57740F2000	3 - Tie Rod Boot	23.79	

Labor

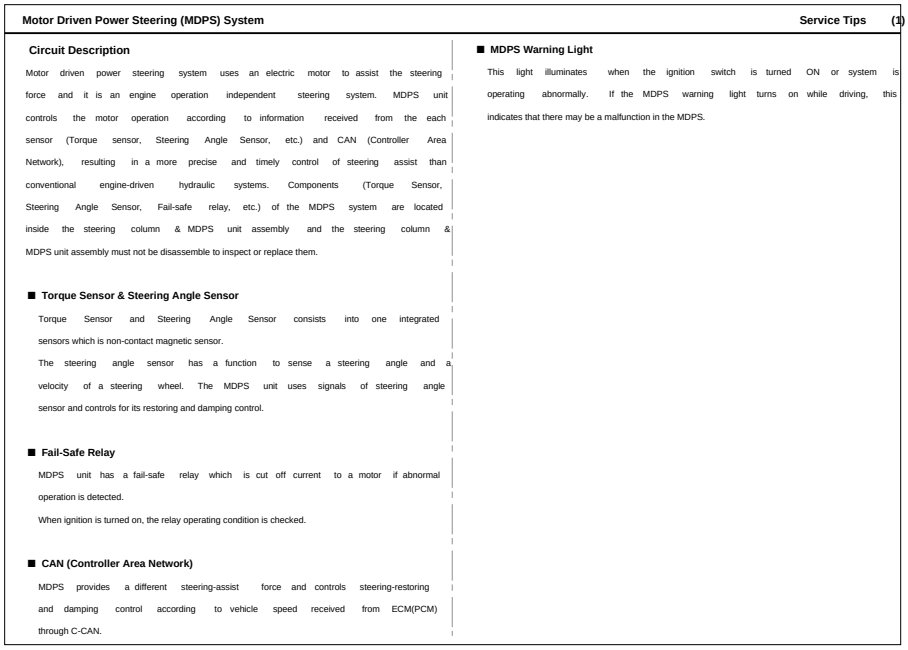
Operation	Qualifier Path	Skill	Std Hrs	Wty Hrs
Remove & Replace	Power > Steering Gear & Linkage > Inner Tie R?	B	0.7	0.0
Remove & Replace	Power > Steering Gear & Linkage > Inner Tie R?	B	1.0	0.0
Remove & Replace	Power > Steering Gear & Linkage > Outer Tie R?	B	0.4	0.0
Remove & Replace	Power > Steering Gear & Linkage > Outer Tie R?	B	0.7	0.0
Remove & Replace	Power > Steering Gear & Linkage > Steering Ge?	B	3.0	0.0
Remove & Replace	Power > Steering Gear & Linkage > Tie Rod Boo?	B	0.5	0.0
Remove & Replace	Power > Steering Gear & Linkage > Tie Rod Boo?	B	0.8	0.0
Remove & Install	Power > Steering Gear & Linkage > Steering Ge?	B	2.8	0.0
Remove & Install	Power > Steering Gear & Linkage > Steering Ge?		0.1	
Remove & Install	Power > Steering Gear & Linkage > Steering Ge?		0.6	

Specifications Quick Reference (itype_439)

Quick Specifications

- item

Motor Driven Power Steering (MDPS) System - Service Tips (Article 42657)



Motor Driven Power Steering (MDPS) System **Service Tips (1)**

Circuit Description

Motor driven power steering system uses an electric motor to assist the steering force and it is an engine operation independent steering system. MDPS unit controls the motor operation according to information received from the each sensor (Torque sensor, Steering Angle Sensor, etc.) and CAN (Controller Area Network), resulting in a more precise and timely control of steering assist than conventional engine-driven hydraulic systems. Components (Torque Sensor, Steering Angle Sensor, Fail-safe relay, etc.) of the MDPS system are located inside the steering column & MDPS unit assembly and the steering column & MDPS unit assembly must not be disassemble to inspect or replace them.

■ **Torque Sensor & Steering Angle Sensor**

Torque Sensor and Steering Angle Sensor consists into one integrated sensors which is non-contact magnetic sensor.

The steering angle sensor has a function to sense a steering angle and a velocity of a steering wheel. The MDPS unit uses signals of steering angle sensor and controls for its restoring and damping control.

■ **Fail-Safe Relay**

MDPS unit has a fail-safe relay which is cut off current to a motor if abnormal operation is detected.

When ignition is turned on, the relay operating condition is checked.

■ **CAN (Controller Area Network)**

MDPS provides a different steering-assist force and controls steering-restoring and damping control according to vehicle speed received from ECM(PCM) through C-CAN.

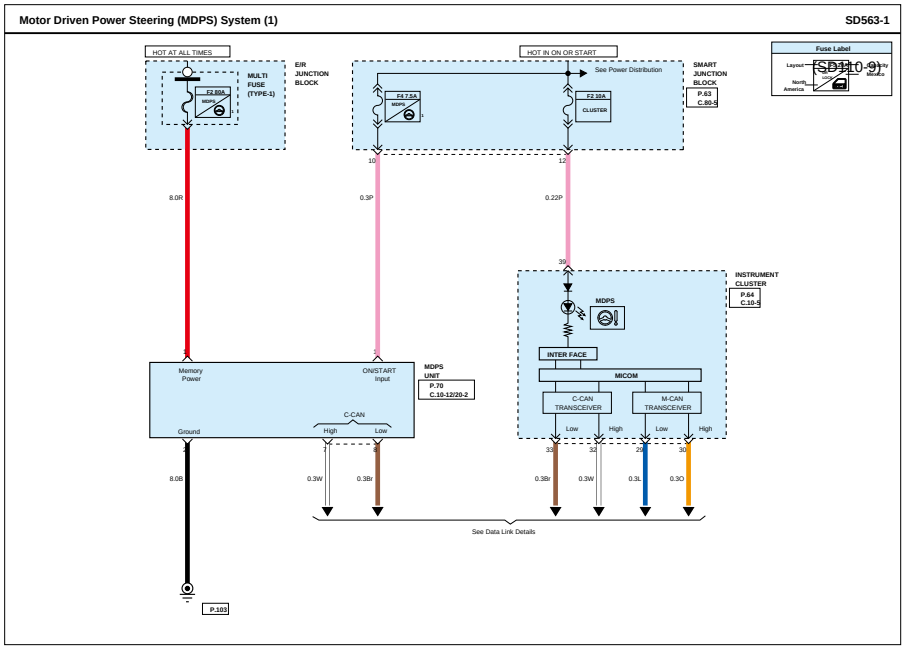
■ **MDPS Warning Light**

This light illuminates when the ignition switch is turned ON or system is operating abnormally. If the MDPS warning light turns on while driving, this indicates that there may be a malfunction in the MDPS.

Motor Driven Power Steering - Description and Operation (Article 44254)

- Description

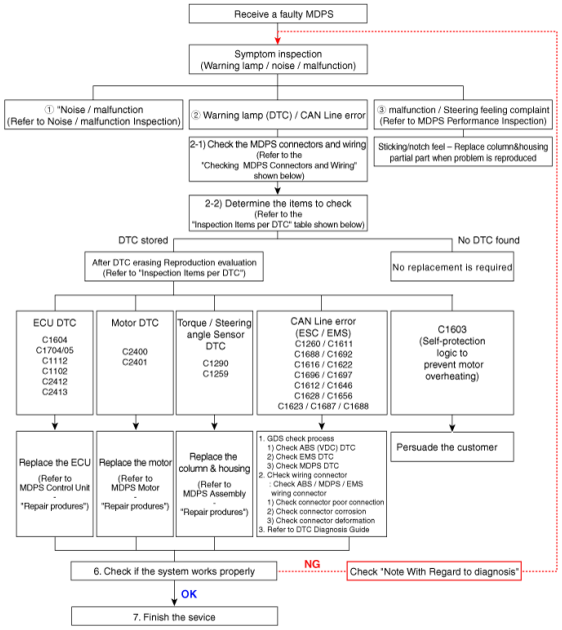
Motor Driven Power Steering (MDPS) System - Schematic Diagrams (Article 42656)



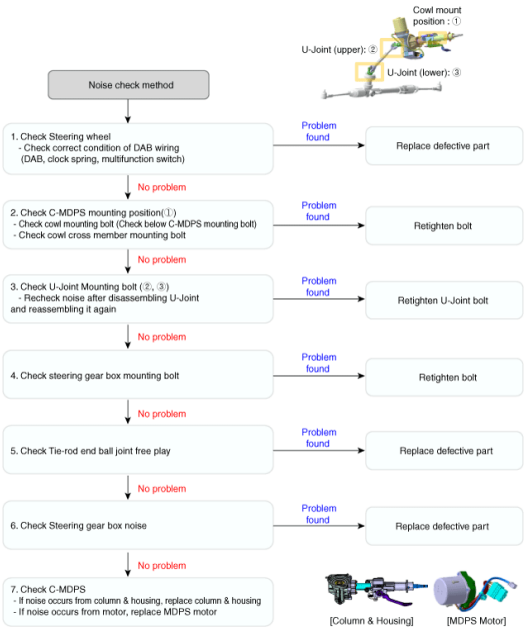
Motor Driven Power Steering - Repair Procedures (Article 44255)

- A/S Repair produres

MDPS System A/S Workflow



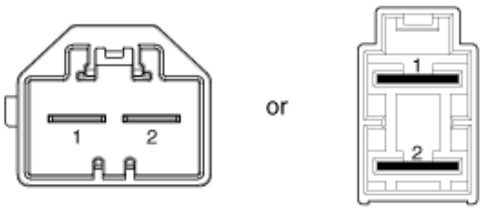
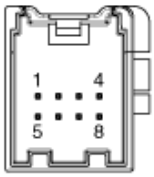
① Noise / malfunction Inspection



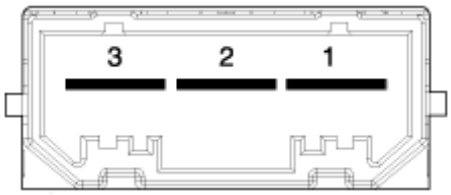
② Warning lamp (DTC) / CAN Line error

2 - 1 Checking Connectors and Wiring

- Checking Connectors and Wiring. Check for damage, push-back, or improper connection in each connector and wiring. Check the wiring on the vehicle side. Check for open / short - circuit due to faulty connection, damage, or foreign substance. Check the wiring on the ECU side (motor 3 - phase power). Check for open / short - circuit due to faulty connection, damage, or foreign substance. Check the motor connector. Terminal Expansion and damage Must be replaced the MDPS motor if occur terminal expansion and damage. Check the motor wiring. Must be replaced the MDPS motor if occur damage or problem. Remove the grommet (A) and then check the wiring on the TAS side (B) and ECU side (C). Check for damage, push-back, or improper connection in each connector and wiring. Must be replaced the MDPS assembly if occur damage or problem. Check the TAS wiring in case of C1259/C1290 DTC.
- Check the wiring on the vehicle side. Check for open / short - circuit due to faulty connection, damage, or foreign substance.
- Check for open / short - circuit due to faulty connection, damage, or foreign substance.

Battery Connector		Vehicle signal Connector	
			
Pin no	Pin name	Pin no	Pin name
1	Battery (+)	1	Igntion
2	Battery (-)	2	-
		3	-
		4	-
		5	-
		6	-
		7	CAN_High
		8	CAN_Low

- Check the wiring on the ECU side (motor 3 - phase power). Check for open / short - circuit due to faulty connection, damage, or foreign substance.



- Check the motor connector. Terminal Expansion and damage Must be replaced the MDPS motor if occur terminal expansion and damage.
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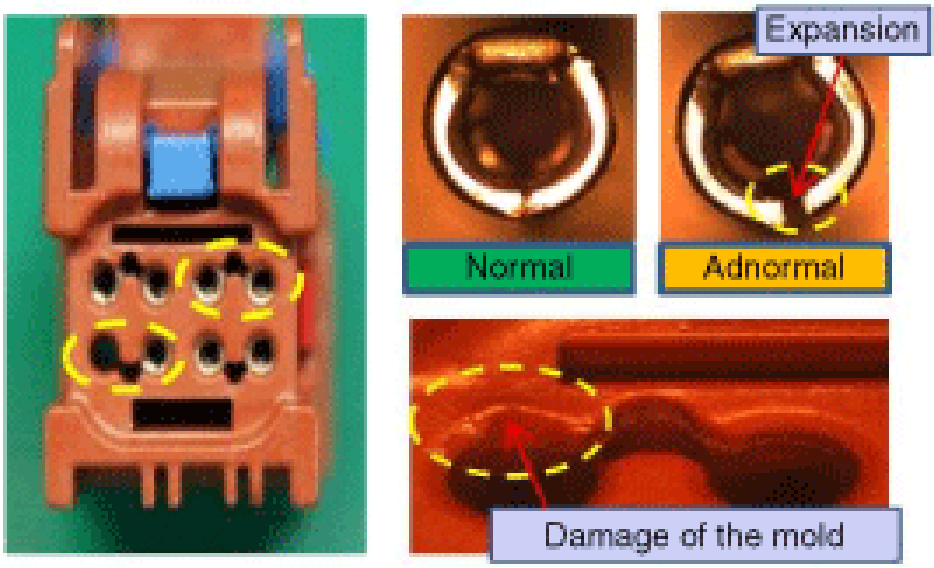

Must be replaced the MDPS motor if occur terminal expansion and damage.

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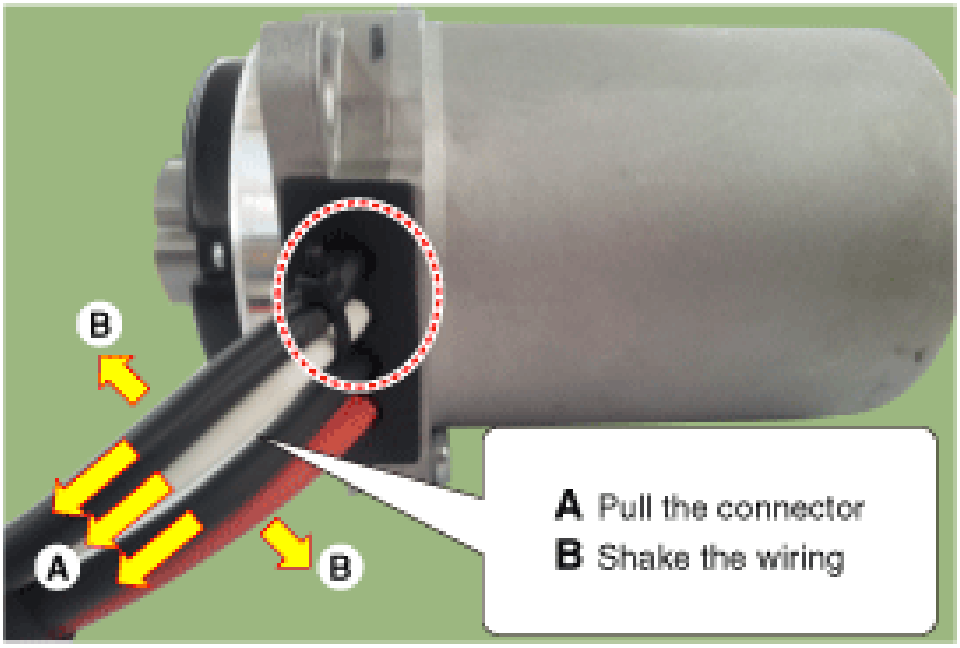
- Check the motor wiring. Must be replaced the MDPS motor if occur damage or problem.



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- Remove the grommet (A) and then check the wiring on the TAS side (B) and ECU side (C). Check for damage, push-back, or improper connection in each connector and wiring. Must be replaced the MDPS assembly if occur damage or problem. Check the TAS wiring in case of C1259/C1290 DTC.
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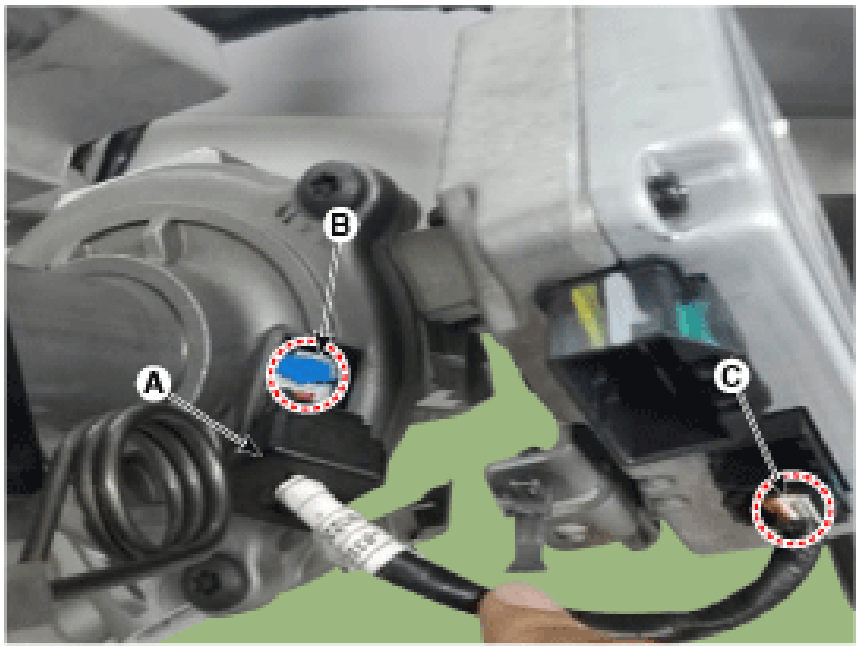


Must be replaced the MDPS assembly if occur damage or problem. Check the TAS wiring in case of C1259/C1290 DTC.

2 - 2 Inspection Items per DTC

DTC Problem First analysis method How to repair

C1290 Torque sensor signal error First erase DTC, check connector connection. In case of reoccurrence, replace column & housing.

C1112 Torque sensor voltage error Check connector between torque sensor and ECU. In case of reoccurrence, replace ECU.

C1705 ECU hardware error First erase DTC and then check, check ECU connector.

C1604 ECU over/discharge error

C2413 ECU hardware error

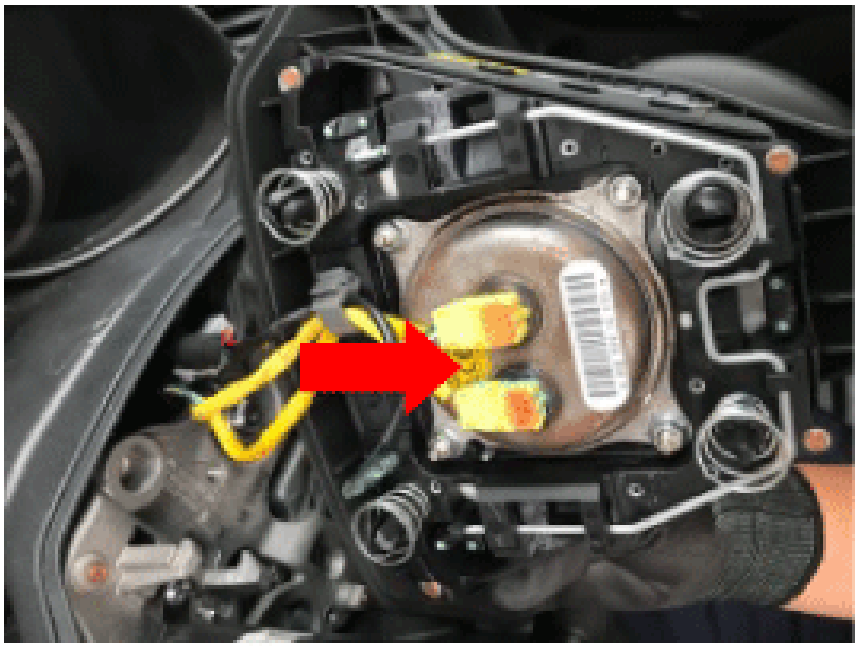
C2400 Motor signal error IIn case of reoccurrence, replace motor.
C2401 Motor circuit error
C2412 Motor voltage supply error First erase DTC and check, Check ECU/motor connector. First replace ECU. In case of reoccurrence, replace motor.
C1259 Angle sensor signal error After Resetting zero point & erasing DTC, check connector connection condition. In case of reoccurrence, replace column & Housing.
C1261 Zero-setting error After Resetting zero point, recheck. Reset the zero-setting.
C1102 Battery voltage problem Check battery voltage condition. Recharge battery voltage.
C1696,C1697 SPAS signal error Check SPAS. Erase DTC (MDPS is not to be replaced).
C1612,C1646 TCU signal error Check TCU.
C1628,C1656 Instrument cluster signal error Check instrument cluster.
C1692,C1693 VSM signal error Check VSM.
C1260 Angle sensor signal error After resetting the angle, recheck. If C1259 does not occur, check CAN line. Reset Angle sensor. Erase DTC.
C1611 CAN time out EMS 1. Check G-SCAN condition. 2. Check connector connection. 3. Check ECU CAN line. 4. Check MDPS ground line. Check the EMS CAN Line.
C1616 CAN BUS OFF Check the chassis CAN Line.
C1622 Vehicle speed signal error Check the EMS (Engine ECU).
C1623,C1687,C1688 Can time out Steering angle sensor 1. Check MDPS Power Connector & FUSE 2. Check MDPS Ground line 3. Check MDPS ECU / VSM CAN line 4. Communication status with GDS In case of reoccurrence, replace ECU (Heavy steering and no communication)

③ MDPS Performance Inspection

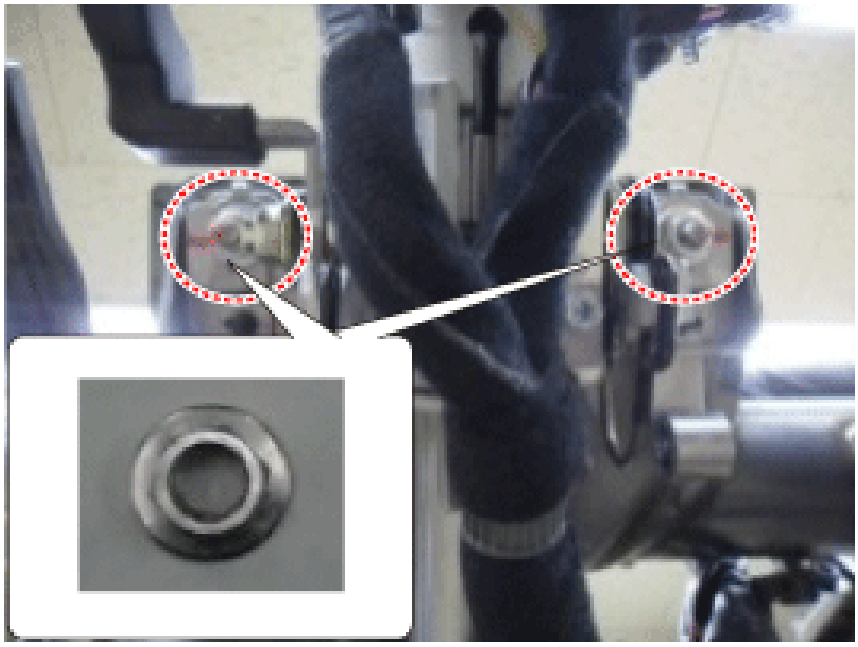
- Inspect steering angle and DTCs relevant to the steering system.
- Inspection for heavy steering effort Inspect tire pressure and width. Check DTCs relevant to the CAN communication error. Check the wheel alignment.
- Inspect tire pressure and width.
- Check DTCs relevant to the CAN communication error.
- Check the wheel alignment.

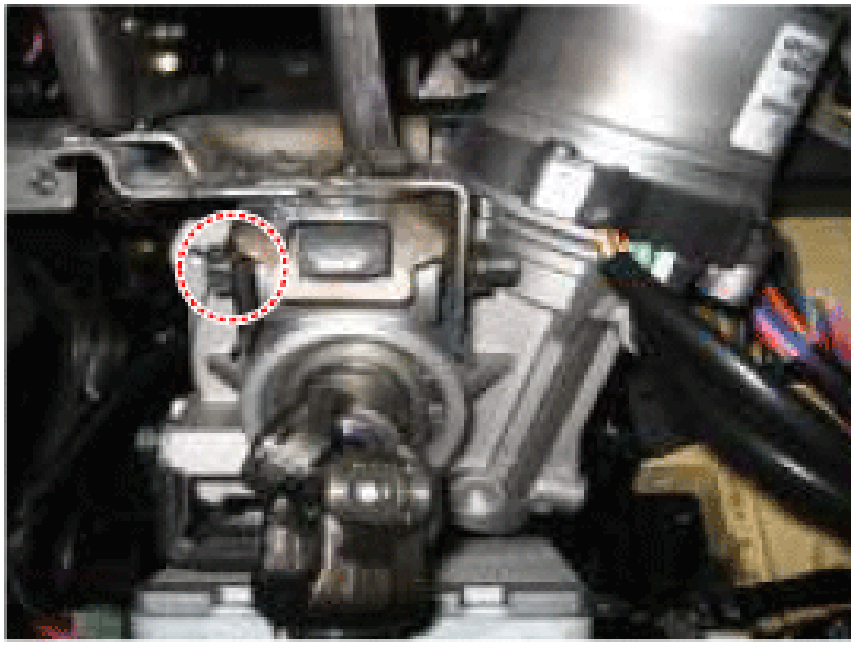
④ MDPS common problems

Case 1 Case 2 Case 3

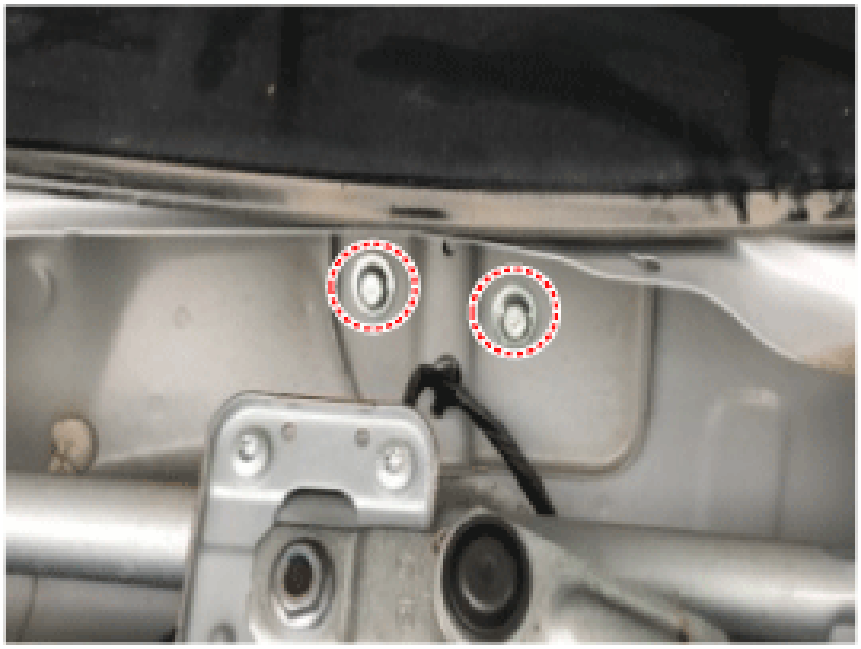


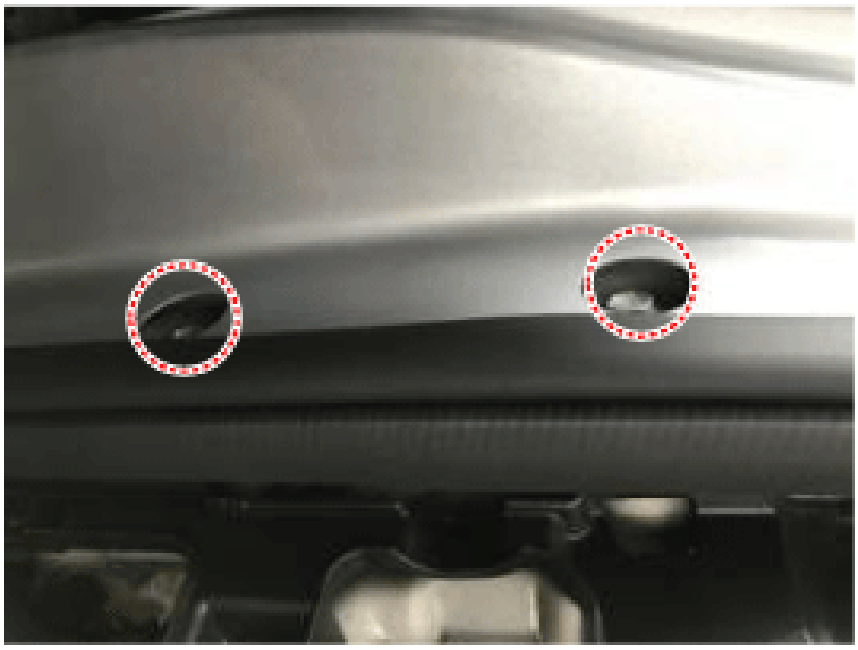
Multifunction switch noise Clock spring noise DAB / Wire noise
Retighten the bolt Replace clock spring Rearrange and replace DAB
Case 4 Case 5 Case 6



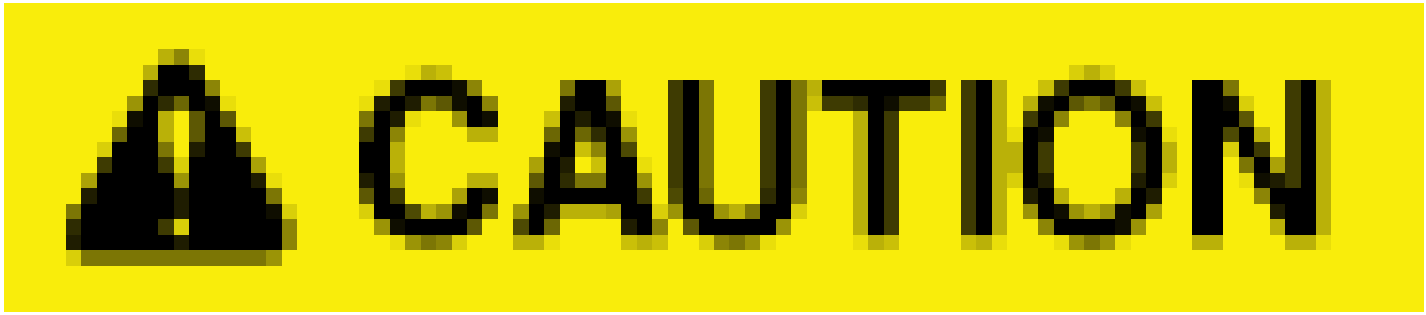


Multifunction switch noise MB nut mount defect M10 nut mount defect
Replace multifunction switch Retighten nut Retighten nut
Case 7 Case 8





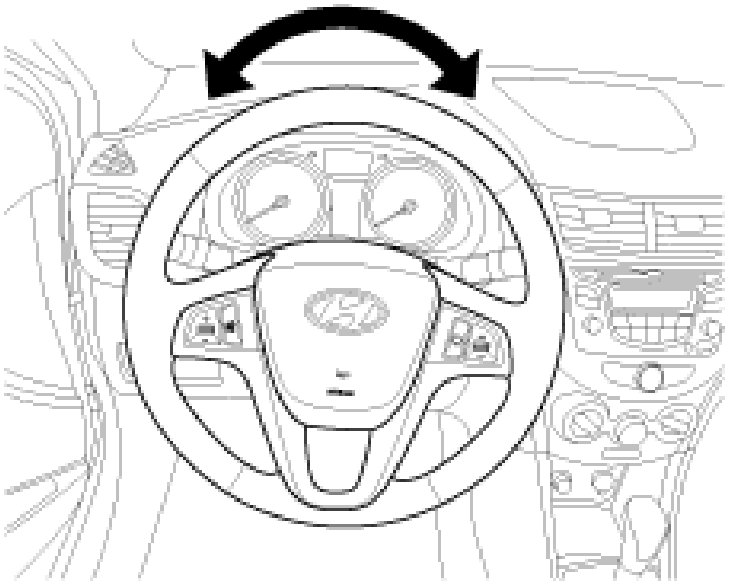
Cowl top bolt mount defect Cowl bar nut mount defect
Retighten cowl top bolt Replace clock spring
Cautions to be taken when handling the MDPS (Motor Driven Power Steering) Failure occurs due to internal damage because of the drop of and shock and excessive external force on the new partial component. → Be cautious of shock on the partial component and replace the damaged part (due to drop, etc.) with a new one.
When fastening the steering, excessive impact may result in twisting the center point of the torque sensor.
When removing/installing the connector the wiring may be damaged (deformed) by excessive external force. Be cautious when storing and replacing the partial components under the abnormal temperature and humidity conditions.



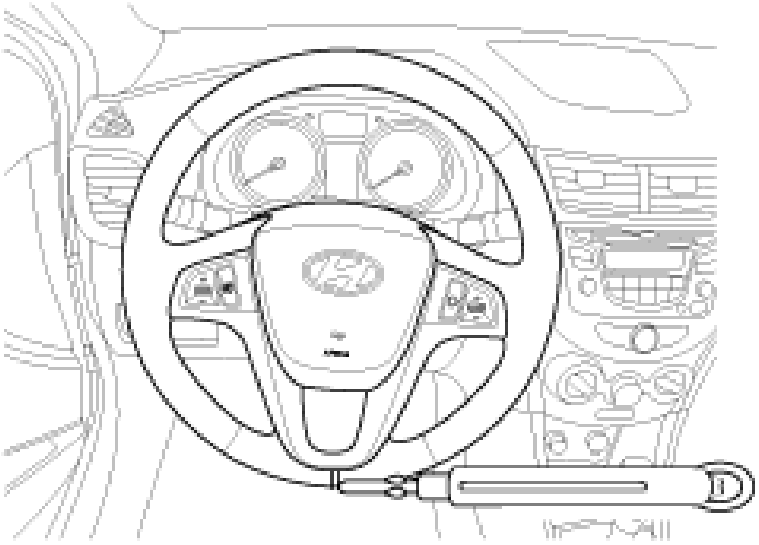
- Failure occurs due to internal damage because of the drop of and shock and excessive external force on the new partial component. → Be cautious of shock on the partial component and replace the damaged part (due to drop, etc.) with a new one.
- When fastening the steering, excessive impact may result in twisting the center point of the torque sensor.
- When removing/installing the connector the wiring may be damaged (deformed) by excessive external force.
- Be cautious when storing and replacing the partial components under the abnormal temperature and humidity conditions.

Steering System - Repair Procedures (Article 44244)

- Inspection
Steering Wheel Play Inspection
- Turn the steering wheel so that the front wheels can face straight ahead.
- Measure the distance the steering wheel can be turned without moving the front wheels. Standard value : 30mm (1.18in.) or less



- If the play exceeds standard value, inspect the steering column , shaft, and linkages.
Checking stationary steering effort
- Position the vehicle on a level surface and place the steering wheel in the straight ahead position.
- Attach a spring scale to the steering wheel. With the engine speed 600 ±100 rpm, pull the scale and read it as soon as the tires begin to turn. Standard value : 3.0kgf or less



- If the measured value exceeds standard value, inspect the power steering gear box and ESP system

Steering System - Specifications (Article 44240)

- Specifications
Item Specification
Type Electric Power Steering System
Steering gear Type Rack ■ Pinion
Rack stroke 154±1 mm (6.07±0.04 in)
Steering angle (Max.) Inner 39.4°+0.5° / -1.5°
Outer 32.6°
Tightening Torques
Item Tightening torque (kgf.m)
N.m kgf.m lb-ft

Hub nut s 107.9 ~ 127.5 11.0 ~ 13.0 79.6 ~ 94.0
Steering wheel lock nut 44.1 ~ 49.0 4.5 ~ 5.0 32.5 ~ 36.2
Steering column mounting Bolt 53.9 ~ 58.8 5.5 ~ 6.0 39.8 ~ 43.4
Nuts 25.0 ~ 29.4 2.5 ~ 3.0 14.5 ~ 21.7
Steering column to Universal joint 49.0 ~ 58.8 5.0 ~ 6.0 39.8 ~ 43.4
Bolt connecting universal joint to pinion 32.4 ~ 38.3 3.3 ~ 3.8 23.9 ~ 27.5
Tie rod end castle nut 24.5 ~ 34.3 2.5 ~ 3.5 18.1 ~ 25.3
Lower arm to front axle 58.8 ~ 70.6 6.0 ~ 7.2 43.4 ~ 52.1
Steering gear box to sub frame 88.3 ~ 107.9 9.0 ~ 11.0 65.1 ~ 79.6
Stabilizer link nut 98.1 ~ 117.7 10.0 ~ 12.0 72.3 ~ 86.8
Sub frame mounting bolts ■ nuts 156.9 ~ 176.5 16.0 ~ 18.0 115.7 ~ 130.2

All New Technical Service Bulletins (itype_432)

Tsbs
- SERVICE GUIDE FOR STEERING WHEEL INSPECTION AND REPLACEMENT (25-BD-008H, 2025/06/16)

All Technical Service Bulletins (itype_100)

Tsbs
- COLUMN-MOUNTED MDPS REPAIR INFORMATION (22-ST-002H, 2022/01/06)
- C-MDPS WORM SHAFT BEARING NOISE (22-ST-004H, 2022/04/04)
- SERVICE GUIDE FOR STEERING WHEEL INSPECTION AND REPLACEMENT (25-BD-008H, 2025/06/16)

Steering System - Troubleshooting (Article 44243)

- Troubleshooting

Trouble Symptom Cause of the symptom Remedy
Excessive play in steering Loose U-joint bolt Retighten or replace as necessary
Loose yoke plug Retighten
Loose steering gear mounting bolts Retighten
Loose or worn tie rod end Retighten or replace as necessary
Steering wheel does not return to its original position Excessive turning resistance of tie rod end Replace
Yoke plug excessively tight Adjust
Tie rod and/or ball joint cannot turn smoothly Replace
Loose mounting of gear box at the subframe Retighten
Worn steering shaft joint and/or body grommet Correct or replace
Distorted rack Replace
Rattling or chucking noise in the rack and pinion Loose steering gear box mounting Reposition
Loose tie rod end and/or ball joint Repace
Worn tie rod and/or ball joint Repace
Loose yoke plug Replace

Noise (itype_156)

Tsbs
- C-MDPS WORM SHAFT BEARING NOISE (22-ST-004H, 2022/04/04)