

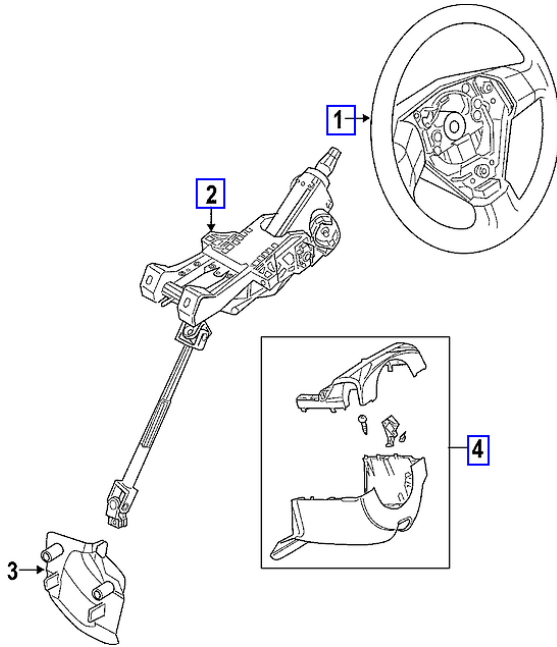
Component Procedures: Steering

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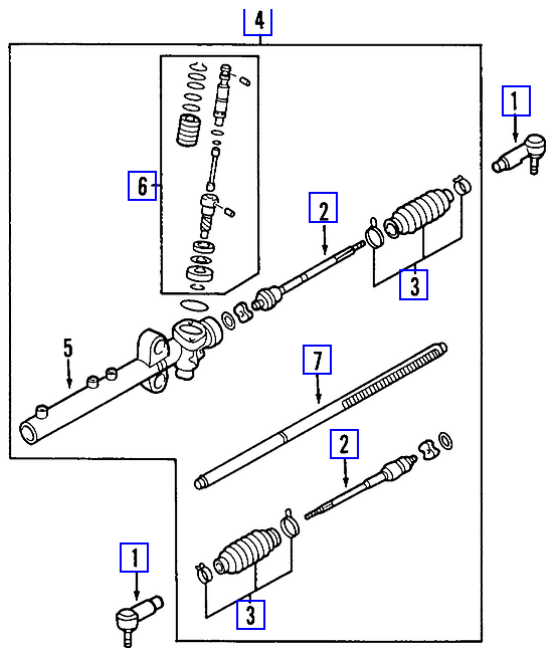
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Component Procedures: Steering

Steering Column (Article 809716)



Steering Gear (Article 809717)

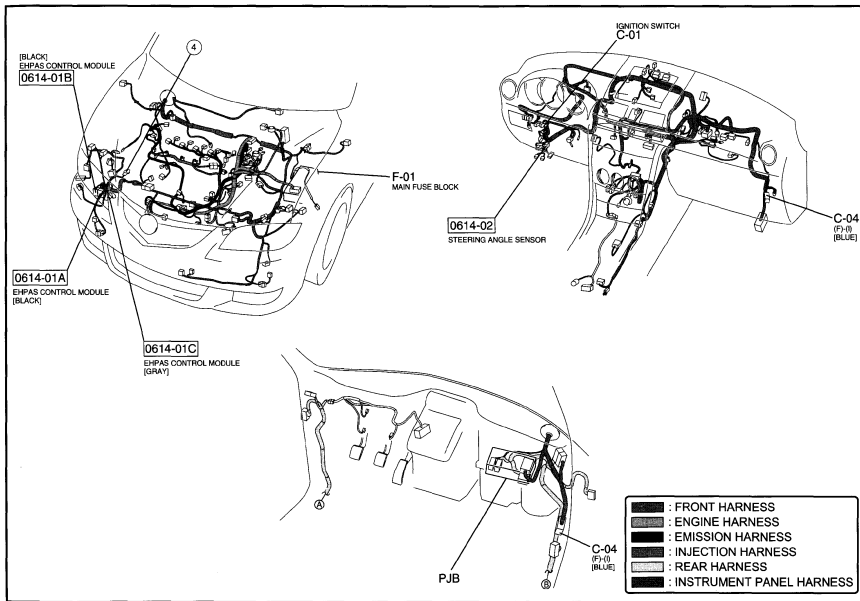
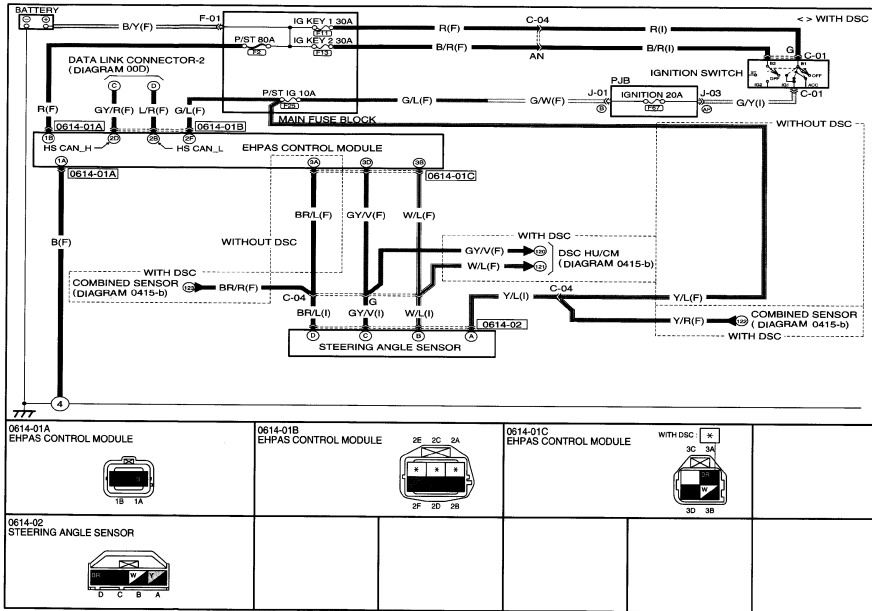


Parts and Labor (itype_189)

Labor

Operation	Qualifier Path	Skill	Std Hrs	Wty Hrs
Diagnose/Test	System, Diagnosis	B	0.5	0.0

Diagrams and Routing Views (Article 1393170)



System Schematic (Article 1393171)

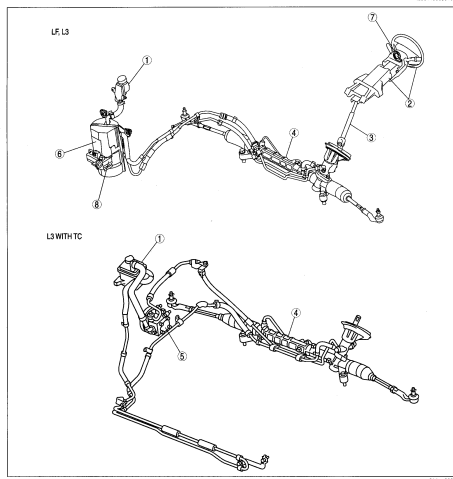
Non Standards

- Electro Hydraulic Power Assist Steering (EHPAS) System Wiring Diagram (1393172)
- Electro Hydraulic Power Assist Steering (EHPAS) System Wiring Diagram [Electro Hydraulic Power Assist Steering (EHPAS)] (1393173)
- System Wiring Diagram [Electro Hydraulic Power Assist Steering (EHPAS)] (1393174)

Steering Location Index (Article 1363728)

STEERING LOCATION INDEX

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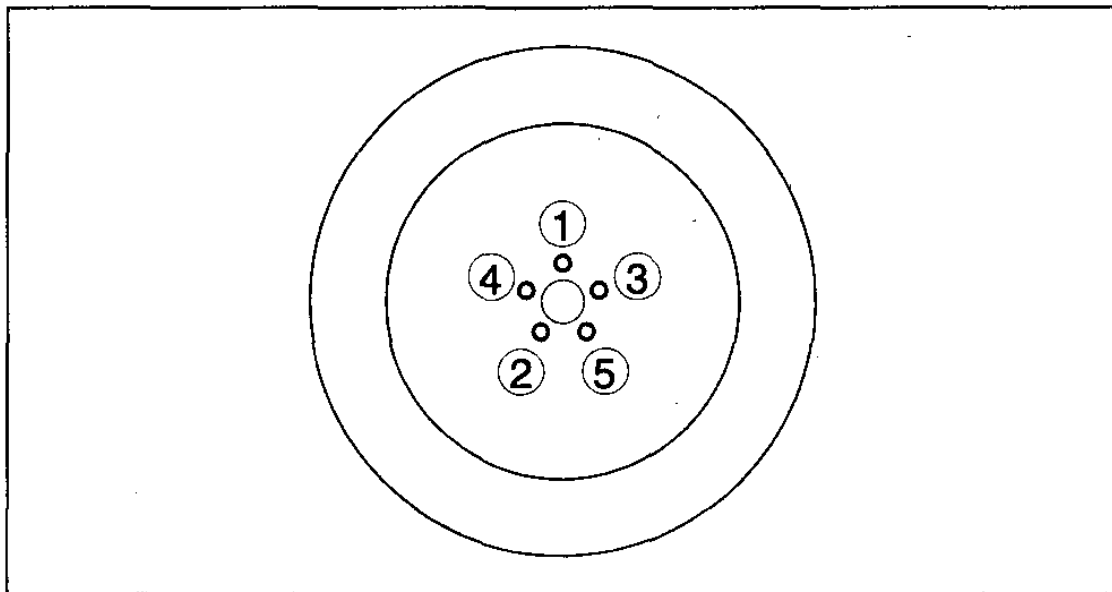


1	Power steering fluid (See POWER STEERING FLUID INSPECTION.)	4	Steering gear and linkage (See STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION.) (See STEERING GEAR AND LINKAGE DISASSEMBLY.) (See STEERING GEAR AND LINKAGE ASSEMBLY.)
2	Steering wheel and column (See STEERING WHEEL AND COLUMN INSPECTION.) (See STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION.)	5	Power steering oil pump (L3 WITH TC) (See POWER STEERING OIL PUMP REMOVAL/INSTALLATION (L3 WITH TC).) (See POWER STEERING OIL PUMP DISASSEMBLY/ASSEMBLY (L3 WITH TC).)
3	Steering shaft (See STEERING SHAFT INSPECTION.)		

6	Electric power steering oil pump (LF, L3) (See ELECTRIC POWER STEERING OIL PUMP REMOVAL/INSTALLATION [LF, L3].)
7	Steering angle sensor (LF, L3) (See CLOCK SPRING REMOVAL/INSTALLATION.) (See STEERING ANGLE SENSOR INSPECTION.)

8	EHPAS control module (LF, L3) (See ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) CONTROL MODULE INSPECTION [LF, L3].) (See ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) CONTROL MODULE CONFIGURATION [LF, L3].)
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General Procedures (Steering) (Article 1392850)



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Steering Technical Data (Article 1393129)

STEERING TECHNICAL DATA

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Item	Specification
Power steering fluid type	ATF M-III or equivalent (e.g. Dexron ® II)
Power steering fluid capacity (approximate quantity)	LF, L3: 0.8 L {0.9 US qt, 0.7 Imp qt} L3 WITH TC: 1.12 L {1.18 US qt, 0.99 Imp qt}
Oil pump fluid pressure (oil temperature 50—60 °C {122—140 °F})	9.7—10.2 MPa {99.0—104.0 kgf/cm ² , 1,407—1,479 psi}
Gear housing fluid pressure (oil temperature 50—60 °C {122—140 °F})	9.7—10.2 MPa {99.0—104.0 kgf/cm ² , 1,407—1,479 psi}
Steering wheel play	0—30 mm {0—1.18 in} (When hydraulic operating)
Steering wheel force (reference value)	7.8 N·m {80 kgf·cm, 69 in·lbf} or less
Steering shaft length	315—320 mm {12.41—12.59 in}
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.
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°)	LF, L3: 0.88—1.48 N·m {8.98—15.0 kgf·cm, 7.79—13.0 in·lbf} [Pull scale reading: 0.88—1.48 N·m {8.98—15.0 kgf·cm, 7.79—13.0 in·lbf}/A (m {cm, in})] L3 WITH TC: 1.45—2.05 N·m {14.8—20.9 kgf·cm, 12.9—18.1 in·lbf} [Pull scale reading: 1.45—2.05 N·m {14.8—20.9 kgf·cm, 12.9—18.1 in·lbf}/A (m {cm, in})] A: Length from the pinion shaft center to application point of pull scale

All Technical Service Bulletins (itype_100)

Tsbs

- Steering - EHPAS Technical Supplement (0600111, 2011/03/18)
- Recall - Loss Of Power Steering Assist (6010H, 2010/09/15)
- Power Steering - High Steering Effort/MIL/DTC C1099 (0600110, 2010/04/09)
- Steering/Suspension - Steering Wheel Off-Center (0200510R, 2011/11/05)
- Steering - In/Out Steering Wheel Play (0600310, 2010/08/13)
- Recall 10V374000: Loss Power Steering Assist (NHTSA10V374000, 2010/08/12)
- Interior - Leather Steering Wheel Coming Apart (0600508, 2008/04/04)

Customer Interest Bulletins (itype_109)

Tsbs

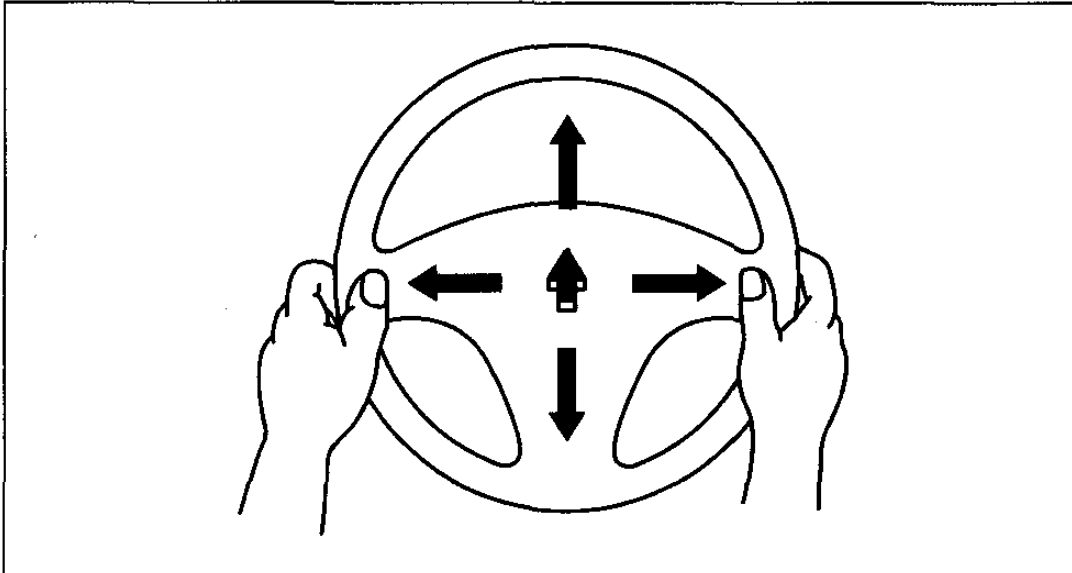
- Power Steering - High Steering Effort/MIL/DTC C1099 (0600110, 2010/04/09)
- Steering/Suspension - Steering Wheel Off-Center (0200510R, 2011/11/05)
- Steering - In/Out Steering Wheel Play (0600310, 2010/08/13)
- Interior - Leather Steering Wheel Coming Apart (0600508, 2008/04/04)

Repair Tips (itype_110)

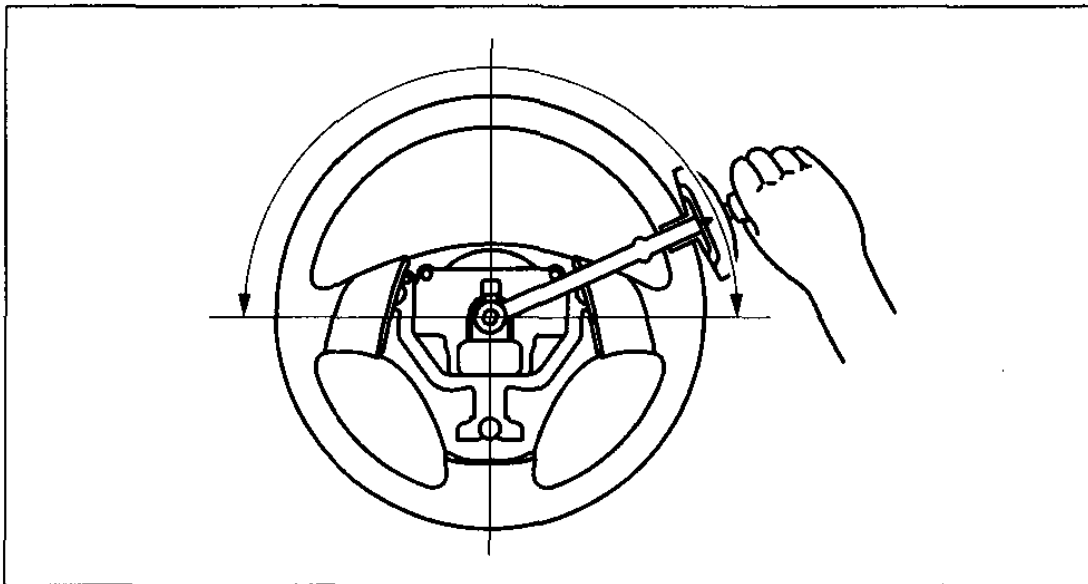
Tsbs

- Steering - EHPAS Technical Supplement (0600111, 2011/03/18)

Steering Wheel and Column Inspection (Article 1419330)



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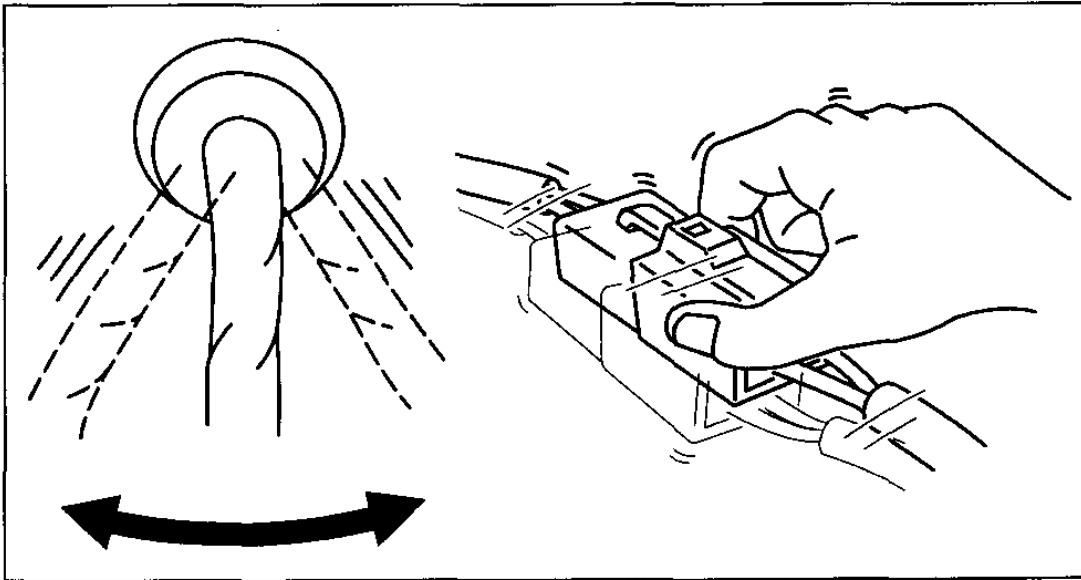
Foreword [Electro Hydraulic Power Assist Steering (EHPAS)] (Article 1419050)

FOREWORD [ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS)]

^ Before performing the steps in Symptom Troubleshooting, perform the On-board Diagnostic Inspection. To inspect the DTC, follow the DTC Inspection steps. (See ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS) ON-BOARD DIAGNOSIS [ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS)].)

See: Steering > Initial Inspection and Diagnostic Overview > On-Board Diagnostic (OBD) Test Description

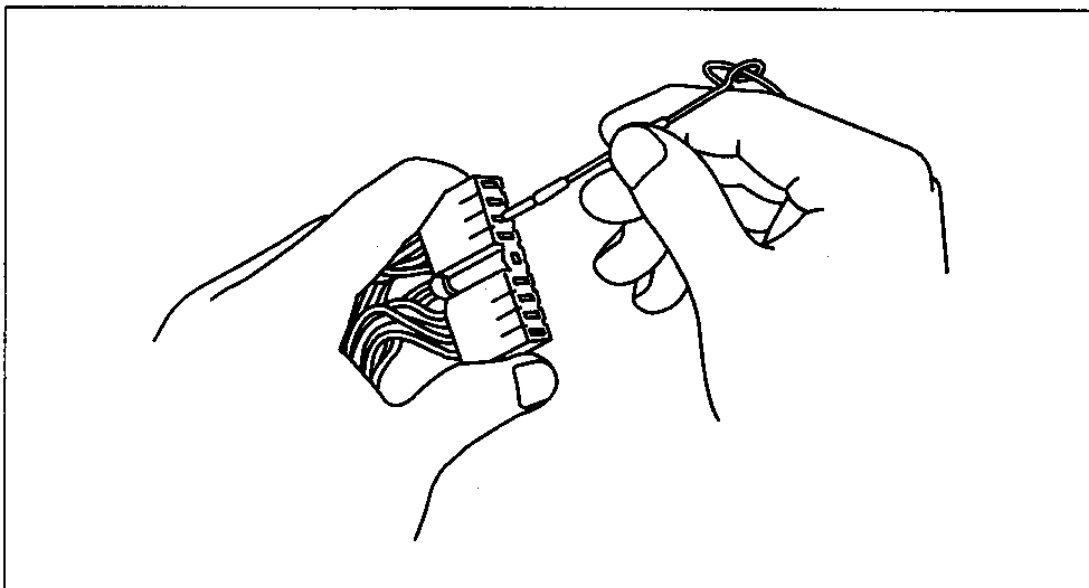
Precaution [Electro Hydraulic Power Assist Steering (EHPAS)] (Article 1419051)



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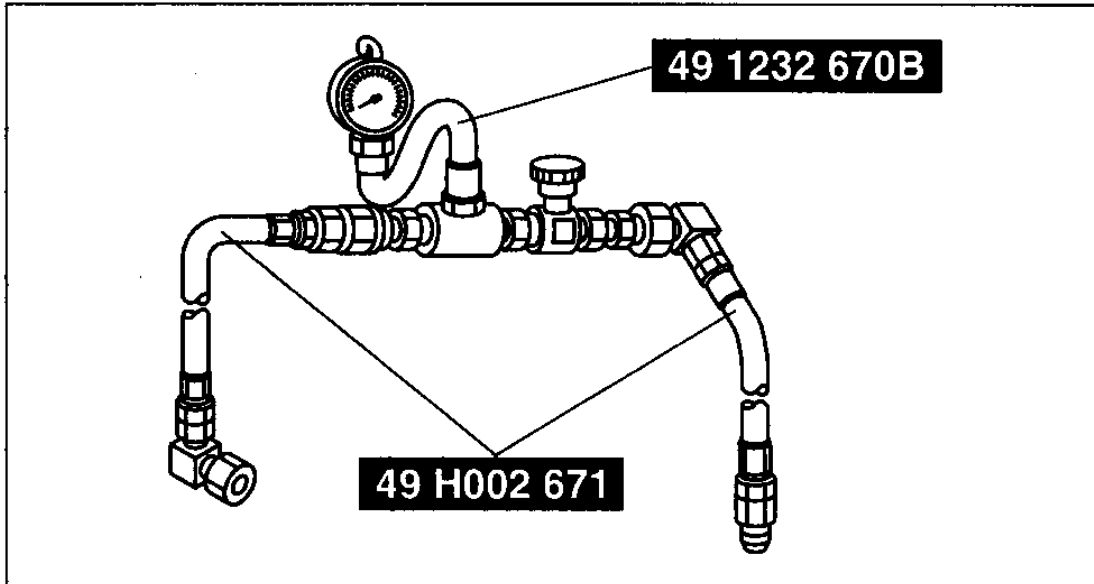
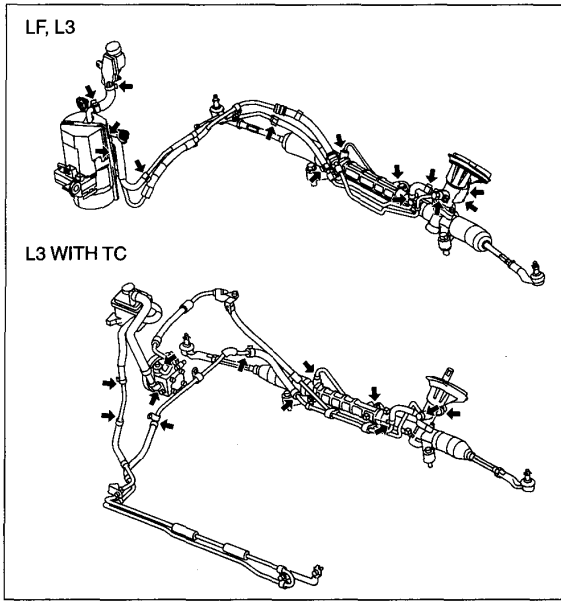
Diagnostic procedure

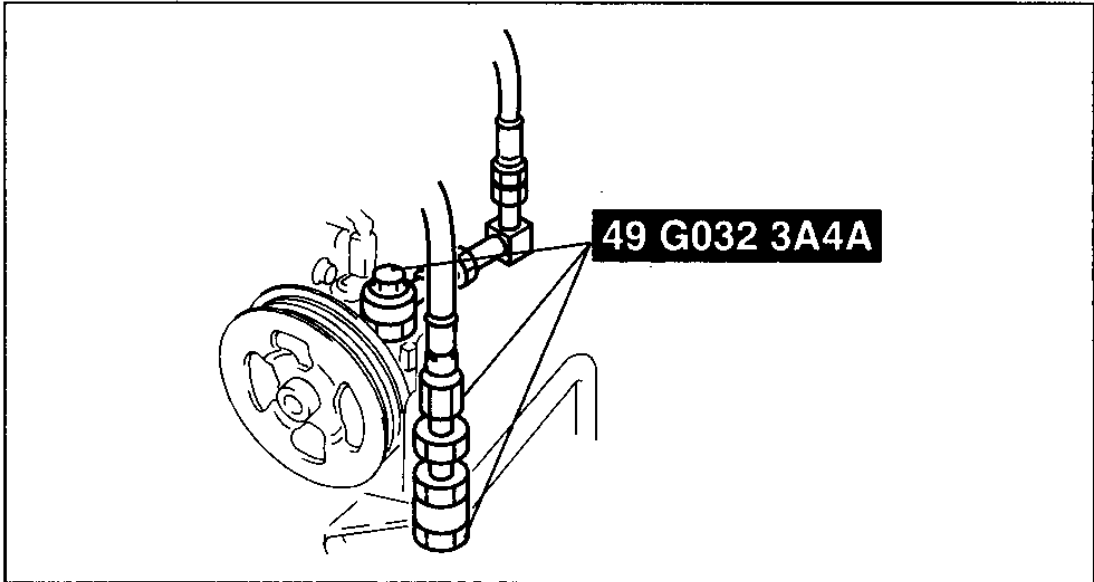
STEP	INSPECTION	ACTION	
1	RETRIEVE DTC FROM EHPAS CONTROL MODULE • Are any DTCs present?	Yes	Record all DTC and go to the applicable DTC inspection.
		No	Go to the next step.
2	INSPECT STEERING WHEEL ASSIST FUNCTION • Disconnect the EHPAS control module connector (2-pin). • Is the power steering assist 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 • Is there fluid leakage?	Yes	Replace it if necessary.
		No	Replace the EHPAS control module.



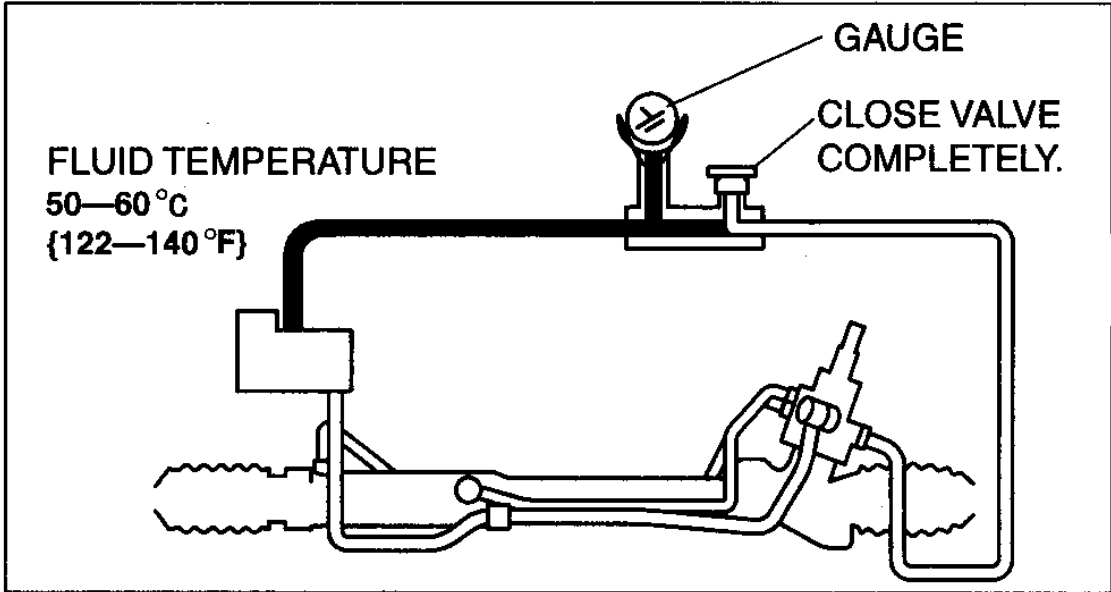
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Power Steering Fluid Inspection (Article 1419028)

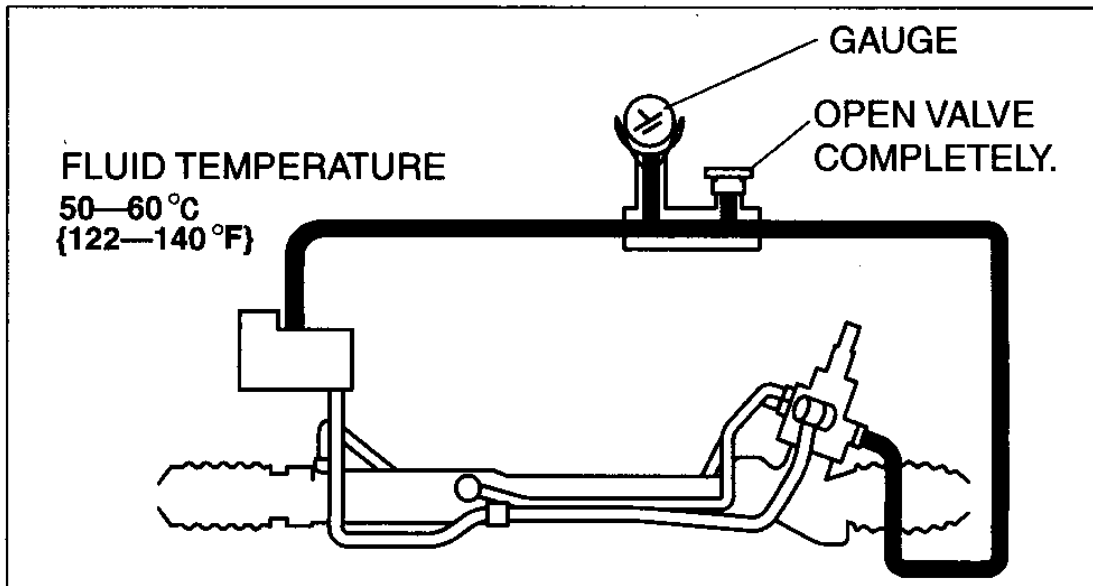




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On-Board Diagnostic (OBD) Test Description (Article 1392847)

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.

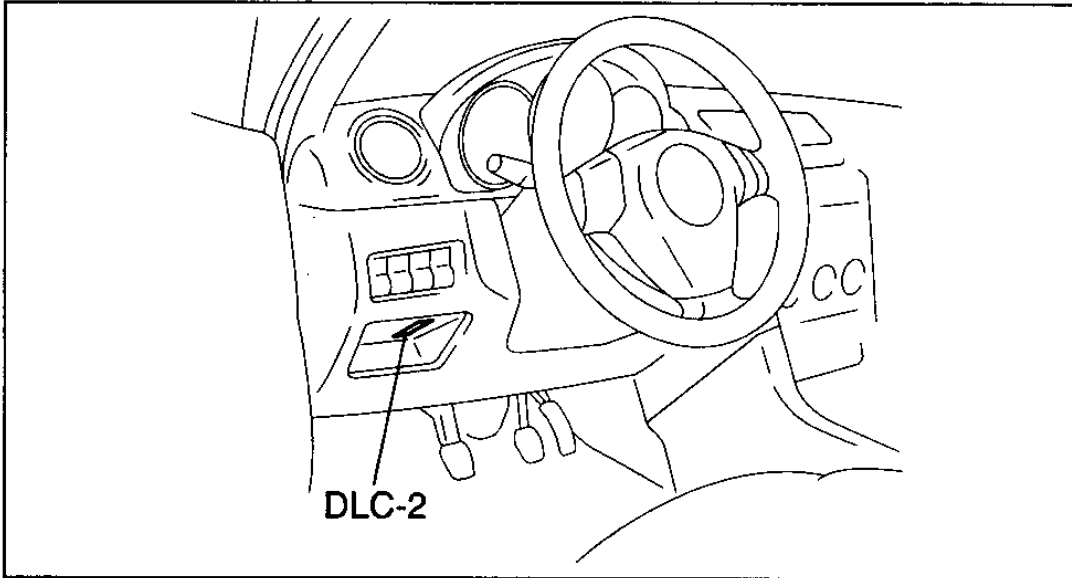
Read/clear diagnostic results

^ 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.

Electro Hydraulic Power Assist Steering (EHPAS) Control Module Configuration (Article 1392862)



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Reading Diagnostic Trouble Codes (Article 1418996)

Non Standards

- With Manufacturer's Scan Tool (1418997)

Clearing Diagnostic Trouble Codes (Article 1418998)

Non Standards

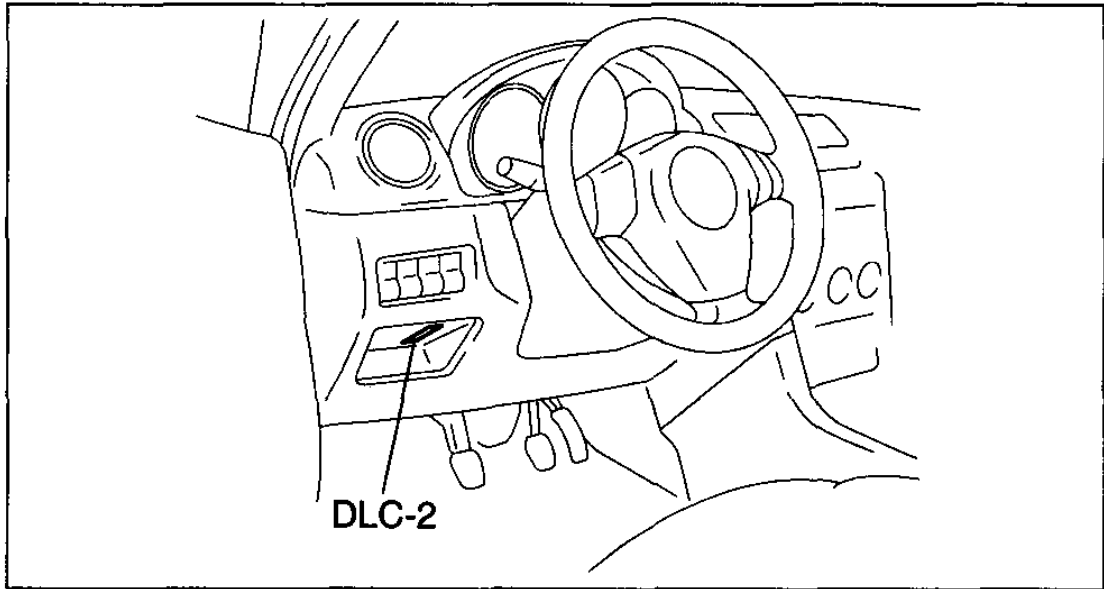
- With Manufacturer's Scan Tool (1418999)

PID/Data Monitor Table (Article 1419279)

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 PCM INSPECTION [L.F. L3] in Computers.)	—
MTR_AMP (Pump Motor Operation Current)	A	<ul style="list-style-type: none"> • Indicates pump motor operation current. 	Replace the EHPAS control module.	—
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.	—
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.	—
STEER_RATE (Steering wheel rotation rate)	°/s	<ul style="list-style-type: none"> • Indicates steering wheel rotation rate. 	Inspect steering angle sensor. (See STEERING ANGLE SENSOR INSPECTION.)	3B, 3D
BOARD_T (Printed circuit board temperature)	°F, °C	<ul style="list-style-type: none"> • Indicates circuit temperature. 	Replace the EHPAS control module.	—
VPWR (Module supply voltage)	V	<ul style="list-style-type: none"> • IG switch ON: B+ 	Inspect the battery. (See BATTERY INSPECTION [L.F. L3].)	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 PCM INSPECTION [L.F. L3] in Computers.) Inspect the instrument cluster. (See INSTRUMENT CLUSTER INSPECTION.)	—

PID/Data Monitor and Record Procedure (Article 1419280)



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Symptom Troubleshooting [Electro Hydraulic Power Assist Steering (EHPAS)] (Article 1419249)

No.	Symptom
1	Poor power steering assist
2	Excessive noise from electric power steering oil pump

No.1 Poor Power Steering Assist [Electro Hydraulic Power Assist Steering (EHPAS)] (Article 1419250)

NO.1 POOR POWER STEERING ASSIST [ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS)]

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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 	

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.

No.2 Excessive Noise From Electric Power Steering Oil Pump [Electro Hydraulic Power Assist Steering (EHPAS)] (Article 1419272)

NO.2 EXCESSIVE NOISE FROM ELECTRIC POWER STEERING OIL PUMP [ELECTRO HYDRAULIC POWER ASSIST STEERING (EHPAS)]















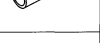



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2	Excessive noise from electric power steering pump
TROUBLESHOOTING HINTS	
<ul style="list-style-type: none"> • Air in EHPAS fluid line • Low power steering fluid level • Electric power steering oil pump is poor installation • Mount rubber (on bracket) is deterioration 	

Diagnostic procedure

STEP	INSPECTION		ACTION
1	INSPECT POWER STEERING FLUID LEVEL <ul style="list-style-type: none"> • Inspect power steering fluid level when engine is cold. • Is power steering fluid level between MAX and MIN of the reserve tank? 	Yes	Go to the next step.
		No	Perform the Fluid Leakage Inspection and add the fluid. (See POWER STEERING FLUID INSPECTION.)
2	INSPECT AIR IN EHPAS FLUID LINE <ul style="list-style-type: none"> • Perform the air bleed. (See AIR BLEEDING.) • Is the symptom solved? 	Yes	Troubleshooting completed.
		No	Go to next step.
3	INSPECT ELECTRIC POWER STEERING OIL PUMP INSTALLATION <ul style="list-style-type: none"> • Inspect the electric power steering oil pump installation condition. • Is the electric power steering oil pump installed properly? 	Yes	Inspect the mount rubber condition. If the mount rubber is deterioration, replace the mount rubber.
		No	Install the electric power steering oil pump properly.

Steering SST (Article 1419779)

STEERING SST		
49 1232 670B Power steering gauge set 	49 H002 671 Adapter 	49 G032 3A4A Power steering gauge adapter set 
49 B034 202A Support block 	49 F017 1A0 Universal wrench 	49 D032 316 Protractor 
49 F032 303 Handle 	49 B032 323 Remover body rod seal 	49 N032 319A Support plate 
49 G033 102 Handle 	49 T028 301 Dust boot installer 	49 F015 002 Water seal installer 
49 F032 304 Body 	49 F032 310 Protector 	49 H032 301 Wrench 
49 G032 3A1 Joint hose set 	49 F032 301 Power steering pump hanger 	49 F032 320 Installer A (Part of 49 F032 3A2) 

Abnormal wear/deterioration (itype_122)

Tsbs

- Interior - Leather Steering Wheel Coming Apart (0600508, 2008/04/04)

Difficult steering (itype_130)

Tsbs

- Power Steering - High Steering Effort/MIL/DTC C1099 (0600110, 2010/04/09)

Improper Alignment (itype_145)

Tsbs

- Steering/Suspension - Steering Wheel Off-Center (0200510R, 2011/11/05)

New / Updated Parts (itype_117)

Tsbs

- Steering - In/Out Steering Wheel Play (0600310, 2010/08/13)
- Interior - Leather Steering Wheel Coming Apart (0600508, 2008/04/04)

Safety (itype_107)

Tsbs

- Recall - Loss Of Power Steering Assist (6010H, 2010/09/15)
- Recall 10V374000: Loss Power Steering Assist (NHTSA10V374000, 2010/08/12)