Last Modified: 3-10-2010	6.4 T	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM00000274X014X
Title: POWER ASSIST SYSTEMS: POWER STEERING SYSTEM (for 2AZ-FE): PROBLEM SYMPTOMS TABLE (2010 Corolla)		

PROBLEM SYMPTOMS TABLE

HINT:

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

Power Steering System

SYMPTOM	SUSPECTED AREA	SEE PAGE
Heavy steering	Front tires (improperly inflated, unevenly worn)	INFO
	Front wheel alignment (incorrect)	INFO
	Front suspension (lower ball joint)	INFO
	Steering column	INFO
	Torque sensor (built into steering column)	INFO
	Power steering motor	INFO
	Speed sensor (w/ VSC)	INFO
	Speed sensor (w/o VSC)	INFO
	Skid control ECU (w/ VSC)	INFO
	Skid control ECU (w/o VSC)	INFO
	Battery and power source system	-
	Power steering ECU power source voltage and relay	INFO
	Power steering ECU	INFO
Steering effort differs between right and left, or steering effort is uneven.	Initialization of rotation angle sensor and calibration of torque sensor zero point are not completed	INFO
	Front tires (improperly inflated, unevenly worn)	INFO
	Front wheel alignment (incorrect)	INFO

SYMPTOM	SUSPECTED AREA	SEE PAGE
	Front suspension (lower ball joint)	INFO
	Power steering gear	INFO
	Torque sensor (built into steering column)	INFO
	Steering column	INFO
	Power steering motor	INFO
	Power steering ECU	INFO
While driving, steering effort does not change in accordance with vehicle speed or the steering wheel does not return properly.	Front suspension (lower ball joint)	INFO
	Speed sensor (w/ VSC)	INFO
	Speed sensor (w/o VSC)	INFO
	Skid control ECU (w/ VSC)	INFO
	Skid control ECU (w/o VSC)	INFO
	Combination meter	INFO
	Torque sensor (built into steering column)	INFO
	Power steering motor	INFO
	Power steering ECU	INFO
	CAN communication system	INFO
A knocking (or cranking) sound occurs when turning the steering wheel back and forth while power steering is in operation.	Front suspension (lower ball joint)	INFO
	Steering intermediate shaft	INFO
	Power steering ECU	INFO
Noise occurs when turning the steering wheel during low-speed driving.	Power steering gear	INFO
	Steering column	INFO
Friction occurs when turning the steering wheel during low-speed driving.	Power steering motor	INFO
	Steering column	INFO
A high-pitched sound (squeaking) occurs when turning the steering wheel slowly with the vehicle stopped.	Power steering motor	INFO
The steering wheel vibrates and noise occurs when turning the steering wheel from lock to lock with the vehicle stopped.	Power steering gear	INFO
	Steering column	INFO
P/S warning is always indicated on the combination meter	Power source voltage of power steering ECU	INFO

SYMPTOM	SUSPECTED AREA	SEE PAGE
	Combination meter	INFO
	Power steering ECU	INFO

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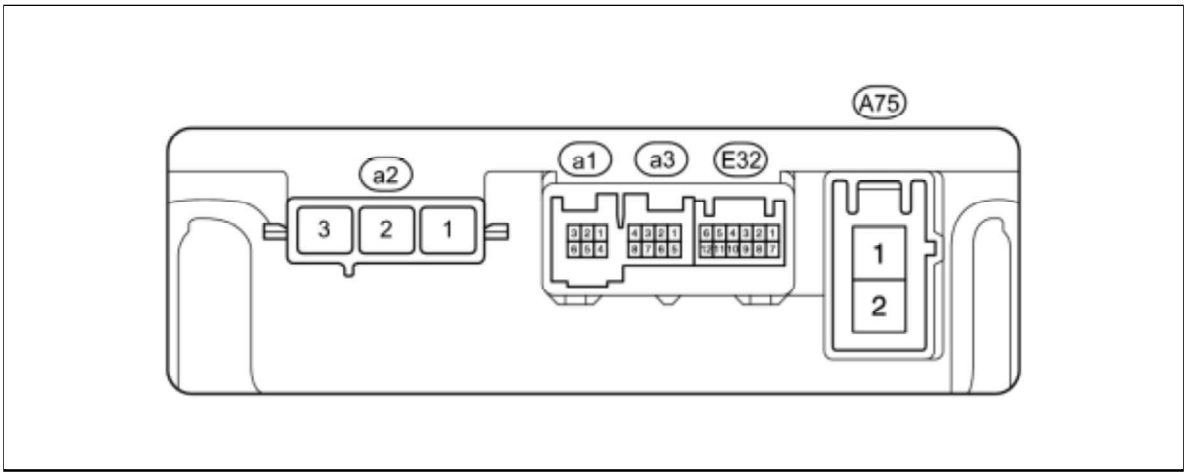
Title: POWER ASSIST SYSTEMS: POWER STEERING SYSTEM (for 2AZ-FE): TERMINALS OF ECU (2010 Corolla)		

TERMINALS OF ECU

1. CHECK POWER STEERING ECU



HINT:

As connector a2 uses a lock lever, each terminal cannot be checked while the connector is still connected to the power steering ECU.

TERMINAL NO. (SYMBOLS)	WIRING COLOR	TERMINAL DESCRIPTION
a2-1 (V)	W	V phase motor output
a2-2 (U)	B	U phase motor output
a2-3 (W)	R	W phase motor output

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

NOTICE:

When the P/S warning light is illuminated during a malfunction, the fail-safe function may cause the voltage of the power steering ECU's terminals to become 0 V.

TERMINAL NO. (SYMBOLS)	WIRING COLOR	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
A75-1 (PIG) - A75-2 (PGND)	L - W-B	Power source	Always	11 to 14 V
A75-2 (PGND) - Body ground	W-B - Body ground	Power ground	Always	Below 1 Ω

TERMINAL NO. (SYMBOLS)	WIRING COLOR	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
E32-1 (CANH) - E32-7 (CANL)	SB - W	CAN communication line	Ignition switch off	54 to 69 Ω
E32-6 (IG) - A75-2 (PGND)	L - W-B	IG power source	Ignition switch on (IG)	11 to 14 V
a1-1 (RZV) - A75-2 (PGND)	- W-B	Rotation angle sensor excitation output signal	Ignition switch on (IG) Steering wheel is turned	0.68 to 4.42 V
a1-3 (RZG) - A75-2 (PGND)	- W-B	Rotation angle sensor excitation circuit GND	Always	Below 1 Ω
a1-5 (RZCS) - A75-2 (PGND)	- W-B	Rotation angle sensor COS aspect output signal	Ignition switch on (IG) Steering wheel is turned	0.68 to 4.42 V
a1-6 (RZSN) - A75-2 (PGND)	- W-B	Rotation angle sensor SIN aspect output signal	Ignition switch on (IG) Steering wheel is turned	0.68 to 4.42 V
a3-5 (TRQ1) - a3-8 (TRQG)	-	Torque sensor signal	Ignition switch on (IG) Steering wheel not turned (without load)	2.3 to 2.7 V
			Ignition switch on (IG) Steering wheel turned to right with vehicle stopped	2.5 to 3.8 V
			Ignition switch on (IG) Steering wheel turned to left with vehicle stopped	1.2 to 2.5 V
a3-6 (TRQV) - a3-8 (TRQG)	-	Torque sensor voltage source	Ignition switch on (IG)	4.5 to 5.5 V
a3-7 (TRQ2) - a3-8 (TRQG)	-	Torque sensor signal	Ignition switch on (IG) Steering wheel not turned (without load)	2.3 to 2.7 V
			Ignition switch on (IG) Steering wheel turned to right with vehicle stopped	1.2 to 2.5 V
			Ignition switch on (IG) Steering wheel turned to left with vehicle stopped	2.5 to 3.8 V
a3-8 (TRQG) - Body ground	- Body ground	Torque sensor ground	Always	Below 1 Ω

If the result is not as specified, the ECU may have a malfunction.

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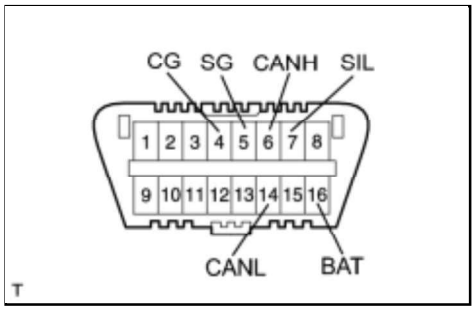
Title: POWER ASSIST SYSTEMS: POWER STEERING SYSTEM (for 2AZ-FE): DIAGNOSIS SYSTEM (2010 Corolla)		

DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



SYMBOL (TERMINAL NO.)	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch off*	6 Ω or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch off*	6 Ω or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch or any other switches or the doors.**

(b) If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

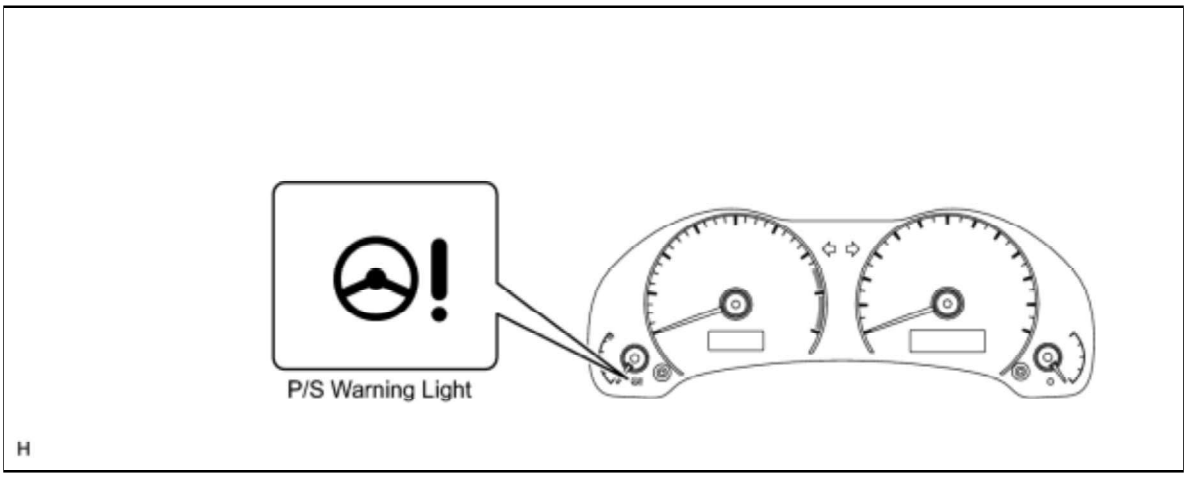
Connect the Techstream cable to the DLC3, turn the ignition switch on (IG) and attempt to use the Techstream.

If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the Techstream.

- If communication is normal when the Techstream is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the Techstream is connected to another vehicle, the problem may be in the Techstream itself. Consult the Service Department listed in the Techstream instruction manual.

2. CHECK WARNING LIGHT

(a) When a problem occurs in the power steering system, the P/S warning light on the combination meter comes on to inform the driver of the problem.



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Title: POWER ASSIST SYSTEMS: POWER STEERING SYSTEM (for 2AZ-FE): DTC CHECK / CLEAR (2010 Corolla)		

DTC CHECK / CLEAR

1. CHECK DTC

(a) Turn the ignition switch off.

(b) Connect the Techstream to the DLC3.

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

(d) Turn the Techstream on.

(e) Read the DTCs following the display on the Techstream. Enter the following menus: Chassis / EMPS / Trouble Codes.

(f) Refer to the Diagnostic Trouble Code Chart for DTC information INFO .

2. CLEAR DTC

(a) Turn the ignition switch off.

(b) Connect the Techstream to the DLC3.

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

(d) Turn the Techstream on.

(e) Clear the DTCs following the display on the Techstream. Enter the following menus: Chassis / EMPS / Trouble Codes.

(f) According to the display on the Techstream, select the trouble code data display with the clear button.

(g) Turn the ignition switch off.

(h) Disconnect the Techstream from the DLC3.

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Title: POWER ASSIST SYSTEMS: POWER STEERING SYSTEM (for 2AZ-FE): FREEZE FRAME DATA (2010 Corolla)		

FREEZE FRAME DATA

1. FREEZE FRAME DATA

NOTICE:

- It is difficult to show the specified values (judgment values) clearly because freeze frame data values change significantly due to differences in measurement conditions, surroundings, or vehicle conditions. For this reason, there may be a problem even when the values are within specifications.
- Turn the ignition switch on (IG) and park the vehicle on level ground. Check the freeze frame data by using the Techstream.

(a) Turn the ignition switch off.

(b) Connect the Techstream to the DLC3.

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

(d) Turn the Techstream on.

(e) Check the freeze frame data on the Techstream.

EMPS

TESTER DISPLAY	ITEM DESCRIPTION/RANGE (DISPLAY)	INSPECTION CONDITION	REFERENCE VALUE
Meter Vehicle Velocity	Vehicle speed from meter/ Min.: 0 km/h (0 mph) Max.: 300 km/h (186.4 mph)	Vehicle stopped	0 km/h (0 mph)
		Vehicle driven at a constant speed	No significant fluctuation
Engine Revolution	Engine revolution/ Min.: 0 rpm Max.: 12800 rpm	Engine is running at a constant speed	No significant fluctuation
Motor Actual Current	Amount of current to motor/ Min.: -327.68 A Max.: 327.67 A	Power steering is in operation	Value changes in proportion to steering effort
Command Value Current	Demanded amount of current to motor/ Min.: -327.68 A Max.: 327.67 A	Power steering is in operation	Value changes in proportion to steering effort
Steering Angle Velocity	Steering angle speed/ Min.: -32768 deg/s Max.: 32767 deg/s	Steering wheel is turned	Value changes in proportion to steering effort