

TRACTION CONTROL SYSTEM

1996 Toyota Supra

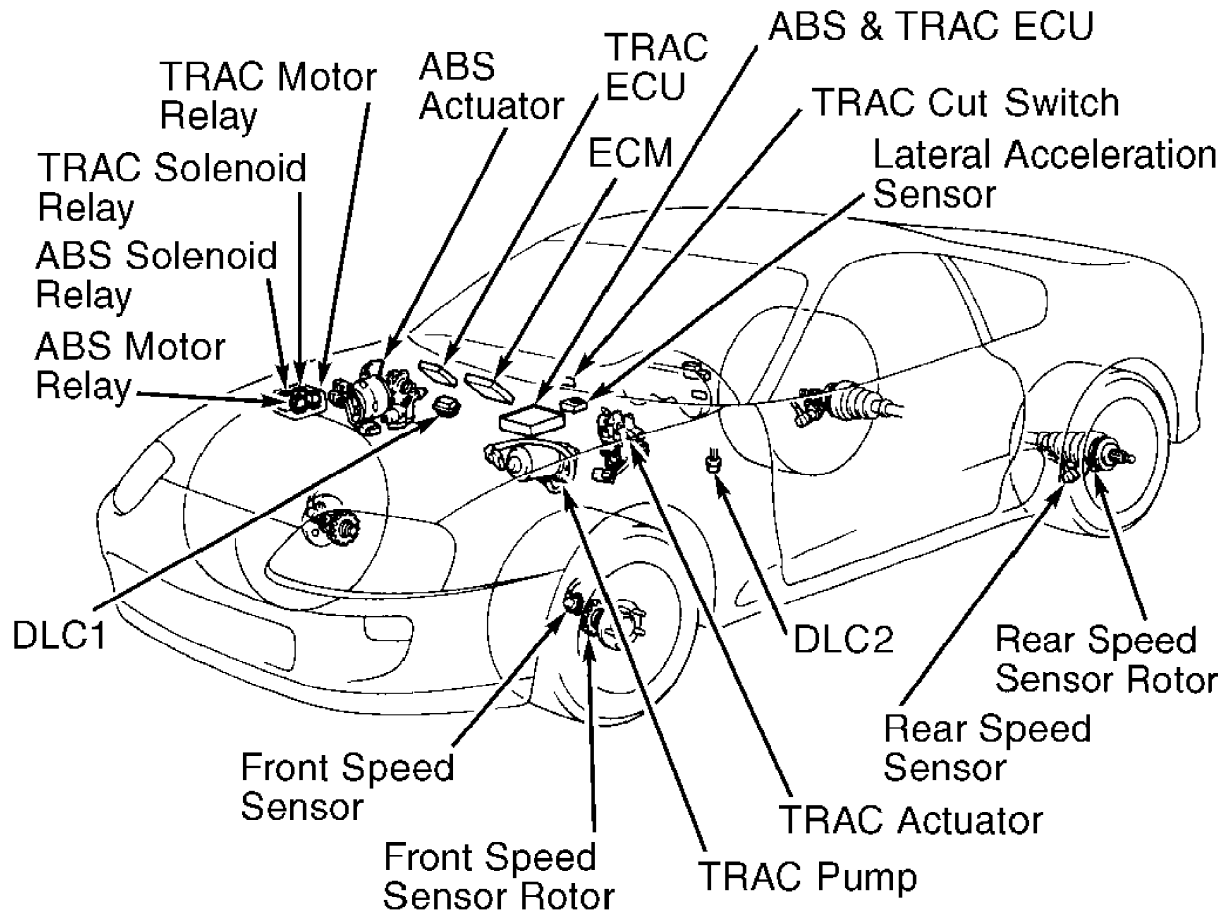
1995-96 BRAKES
Traction Control

Supra

DESCRIPTION

Toyota Traction Control (TRAC) system controls engine torque and braking of the driving wheels. TRAC system is available as an option on Supra. TRAC system consists of an actuator, pump, speed sensors, integrated ABS/TRAC ECU, relays, solenoids, on-off switch, light indicator and warning switch.

Integrated with the ABS, TRAC helps avoid slippage of driving wheels during starting and acceleration. System maintains optimal driving control during changing road surface conditions upon acceleration. System eliminates need for subtle acceleration pedal operation and improves vehicle stability when starting, accelerating or turning on slippery roads. See Fig. 1.



93C84600

Fig. 1: Locating TRAC Components
Courtesy of Toyota Motor Sales, U.S.A., Inc.

OPERATION

When either rear tire begins slipping during acceleration, TRAC system pulses the rear brakes and throttles back the engine to regain traction. The driver has the option of activating or deactivating TRAC system. Located on the instrument panel is a TRAC OFF switch and TRAC indicator light.

Pressing the TRAC OFF switch turns off TRAC system. Press TRAC OFF switch again turns on TRAC system. TRAC system is always operative after engine start. When TRAC system is operative, the TRAC indicator light blinks. When a malfunction occurs and ABS/TRAC ECU sets a diagnostic mode, this light blinks self-diagnostic results.

An actuator is fitted to the throttle body. The TRAC actuator controls sub-throttle valve according to signals from ABS/TRAC ECU, thus controlling the engine output.

Sensors fitted to the sub-throttle valve shaft convert the opening angle to voltage signal and send signal to ABS/TRAC ECU via engine and transmission ECU, controlling throttle position signals.

The TRAC system brake actuator consists of a pump and accumulator assembly which produces regulated fluid pressure in the disc brake calipers of the right and left rear wheels separately. This function is also controlled by signals from the ABS/TRAC ECU.

Brake fluid pressure in the right and left rear wheels is controlled separately in three control modes (pressure increase, holding and pressure reduction). This process is controlled by solenoid valves, pressure switches and sensors.

If a malfunction occurs while the TRAC system is inoperative, the ECU immediately turns off the TRAC throttle relay, TRAC motor relay and TRAC brake main relay.

If malfunction occurs while TRAC is operative, the ECU continues control (stops the control or fully opens the sub-throttle valve depending on the types of malfunction). If TRAC becomes inoperative, the engine and brake systems operate like vehicles without TRAC regulated. The ECU continues normal control even when a malfunction occurs.

BLEEDING BRAKE SYSTEM

BRAKE BLEEDING PROCEDURES

CAUTION: DO NOT allow reservoir to run dry during brake bleeding procedure. Use only clean brake fluid. Ensure no dirt or other foreign matter contaminates brake fluid. DO NOT mix different brands of brake fluid, as they may not be compatible. DO NOT spill brake fluid on vehicle, as it may damage paint. If brake fluid contacts paint, immediately wash with water.

1) If master cylinder is rebuilt or reservoir is empty, bleed master cylinder first. Bleed remaining wheels starting on wheel with longest hydraulic line and work toward wheel with shortest hydraulic line.

2) Raise and support vehicle. Ensure brake fluid reservoir remains at least half full during bleeding procedure. Connect one end of transparent vinyl tube to bleeder plug. Submerge other end of tube in a container half filled with clean brake fluid.

3) Have an assistant depress brake pedal several times and hold in depressed position. Loosen bleeder plug and drain fluid into container. Tighten bleeder plug.

NOTE: Ensure brake pedal remains depressed until bleeder plug is tightened.

4) Refill brake fluid reservoir as necessary. Repeat step 3) until air is no longer discharged. Tighten bleeder plug to 73 INCH lbs. (8.3 N.m). Ensure fluid leakage is not present. Add fluid to reservoir. Repeat procedure for remaining wheels.

TRACTION CONTROL BLEEDING

NOTE: Whenever the master cylinder and/or power booster is removed, the TRAC system must be bled.

1) Ensure battery voltage is 10-14.5 volts. Disconnect electrical connector from traction control pump. Connect one end of Actuator Bleed Wire (09990-00330) to pump. Connect one end of a clear vinyl tube to bleed port on traction control actuator. Submerge other end of tube in a container half filled with clean brake fluid.

2) Loosen bleeder plug and start engine. Connect actuator bleed wire leads to battery and allow actuator pump to run for at least 60 seconds. Tighten bleeder plug. Allow traction pump to run for about 30 seconds. Check master cylinder fluid level. Reconnect traction pump electrical connector. Turn engine off. Clear any DTCs stored. See CLEARING DTCS under SELF-DIAGNOSTIC SYSTEM.

ADJUSTMENTS

No adjustments to TRAC are required.

TROUBLE SHOOTING

For trouble shooting procedures, see CIRCUIT TESTS.

SYMPTOM DIAGNOSIS

If a normal DTC is displayed during DTC check but problem still occurs, check circuits for each problem symptom in order given, then see appropriate chart.

PROBLEM SYMPTOMS

| Symptom | Circuit | DTC, Chart Or Procedure |
|---------------------------------------|---|----------------------------------|
| TRAC Does Not Operate (1) | 1. Check DTC, Confirm Normal Code Is Output | RETRIEVING DTCs |
| | 2. IG Power Source Circuit | DTC 41 |
| | 3. Check For Hydraulic Leakage | Perform Visual Inspection |
| | 4. Speed Sensor Circuit | DTC 31-34 |
| | 5. Check Park/Neutral Switch | See TRANSMISSION section. |
| TRAC Indicator Light Abnormal | 1. TRAC Indicator Light Circuit | ... TRAC INDICATOR LIGHT CIRCUIT |
| | 2. TRAC ECU | INSPECTION PROCEDURE |
| TRAC OFF Indicator Light Abnormal (1) | 1. TRAC OFF Indicator Light Circuit | TRAC OFF INDICATOR |

Check suspect components in order given. See COMPONENT TESTING. Checks consist mainly of a visual inspection and continuity checks. For diagnostic flow charts, see CIRCUIT TESTS.

Code 24

Open or short in sub-throttle actuator circuit.

Code 25

Step motor does not move to a position commanded by ECU.

Code 26

Sub-throttle valve does not move even when the sub-throttle valve is controlled to fully open position by ECU.

Code 31

Right front wheel speed sensor signal malfunction.

Code 32

Left front wheel speed sensor signal malfunction.

Code 33

Right rear wheel speed sensor signal malfunction.

Code 34

Left rear wheel speed sensor signal malfunction.

Code 41

Low battery voltage or abnormally high battery voltage.

Code 43

Malfunction in ABS or TRAC system. If a malfunction is detected, TRAC OFF indicator light will be on.

Code 44

Open or short in NE signal circuit.

Code 45

Main throttle position sensor circuit malfunction.

Code 46

Open or short in main throttle position sensor circuit. Indicator light does not light up even if an error is detected.

Code 47

Sub-throttle position sensor circuit malfunction.

Code 48

Open or short in sub-throttle position sensor circuit.

Code 51

Engine and ECT system malfunction. If a malfunction is detected, TRAC OFF indicator light is on.

Code 53

Open or short in engine communication circuit.

Code 61

ABS/TRAC ECU communication circuit malfunction.

TRAC Indicator Light Always On
TRAC ECU malfunction.

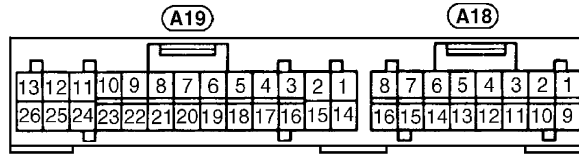
CLEARING DTCS

NOTE: DTCs can also be cleared by removing ECU-B fuse but other memory systems will be cleared.

Turn ignition on. Using a jumper wire, connect terminals Tc and E1 of DLC1 or DLC2. See Fig. 2. With vehicle stopped, depress brake pedal 8 or more times within 3 seconds. Ensure TRAC indicator light turns on. Remove jumper wire. DTCs are now erased.

COMPONENT TESTING

For component testing, see CIRCUIT TESTS. TRAC ECU values can be measured using Toyota Hand-Held Tester and Break-Out Box. TRAC circuits and harness can also be tested by backprobing TRAC ECU connectors and comparing measured voltages with TRAC ECU standard values chart. See Fig. 3.



| Symbols (Terminals No.) | STD Voltage (V) | Condition |
|------------------------------------|-----------------|---|
| BAT (A19-25) — GND (A19-15) | 10 — 14 | Always |
| IG 1 (A19-12) — GND (A19-2) | 10 — 14 | IG switch ON |
| SR (A19-11) — R— (A19-24) | 9 — 14 | IG switch ON, ABS warning light OFF |
| MR (A19-23) — R— (A19-24) | Below 1.0 | IG switch ON |
| SFR (A19-1) — GND (A19-2) | 10 — 14 | IG switch ON, ABS warning light OFF |
| SFL (A19-13) — GND (A19-2) | 10 — 14 | IG switch ON, ABS warning light OFF |
| SRR (A19-26) — GND (A19-15) | 10 — 14 | IG switch ON, ABS warning light OFF |
| SRL (A19-14) — GND (A19-15) | 10 — 14 | IG switch ON, ABS warning light OFF |
| AST (A19-18) — GND (A19-15) | 10 — 14 | IG switch ON, ABS warning light OFF |
| WA (A18-13) — GND (A19-15) | Below 2.0 | IG switch ON, ABS warning light ON |
| | 10 — 14 | IG switch ON, ABS warning light OFF |
| PKB (A18-14) — GND (A19-15) | Below 1.5 | IG switch ON, PKB switch ON |
| | 8 — 14 | IG switch ON, PKB switch OFF |
| STP (A18-6) — GND (A19-2) | Below 1.5 | Stop light switch OFF |
| | 8 — 14 | Stop light switch ON |
| D/G (A18-4) — GND (A19-2) | 10 — 14 | IG switch ON, ABS warning light OFF |
| Tc (A19-5) — GND (A19-2) | 8 — 14 | IG switch ON |
| Ts (A18-15) — GND (A19-15) | 8 — 14 | IG switch ON |
| FR + (A19-16) — FR— (A19-3) | AC generation | IG switch ON Slowly turn right front wheel |
| FL + (A19-9) — FL— (A19-22) | AC generation | IG switch ON Slowly turn left front wheel |
| RR + (A18-8) — RR— (A18-16) | AC generation | IG switch ON Slowly turn right rear wheel |
| RL + (A18-9) — RL— (A18-1) | AC generation | IG switch ON Slowly turn left rear wheel |
| GS 1 (A18-12) — GND (A19-15) | 4 — 6 or 7 — 11 | IG switch ON, vehicle parked on a level surface |
| GS 2 (A18-3) — GND (A19-2) | 4 — 6 | IG switch ON, vehicle parked on a level surface |

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Fig. 3: TRAC ECU Standard Values Chart
Courtesy of Toyota Motor Sales, U.S.A., Inc.

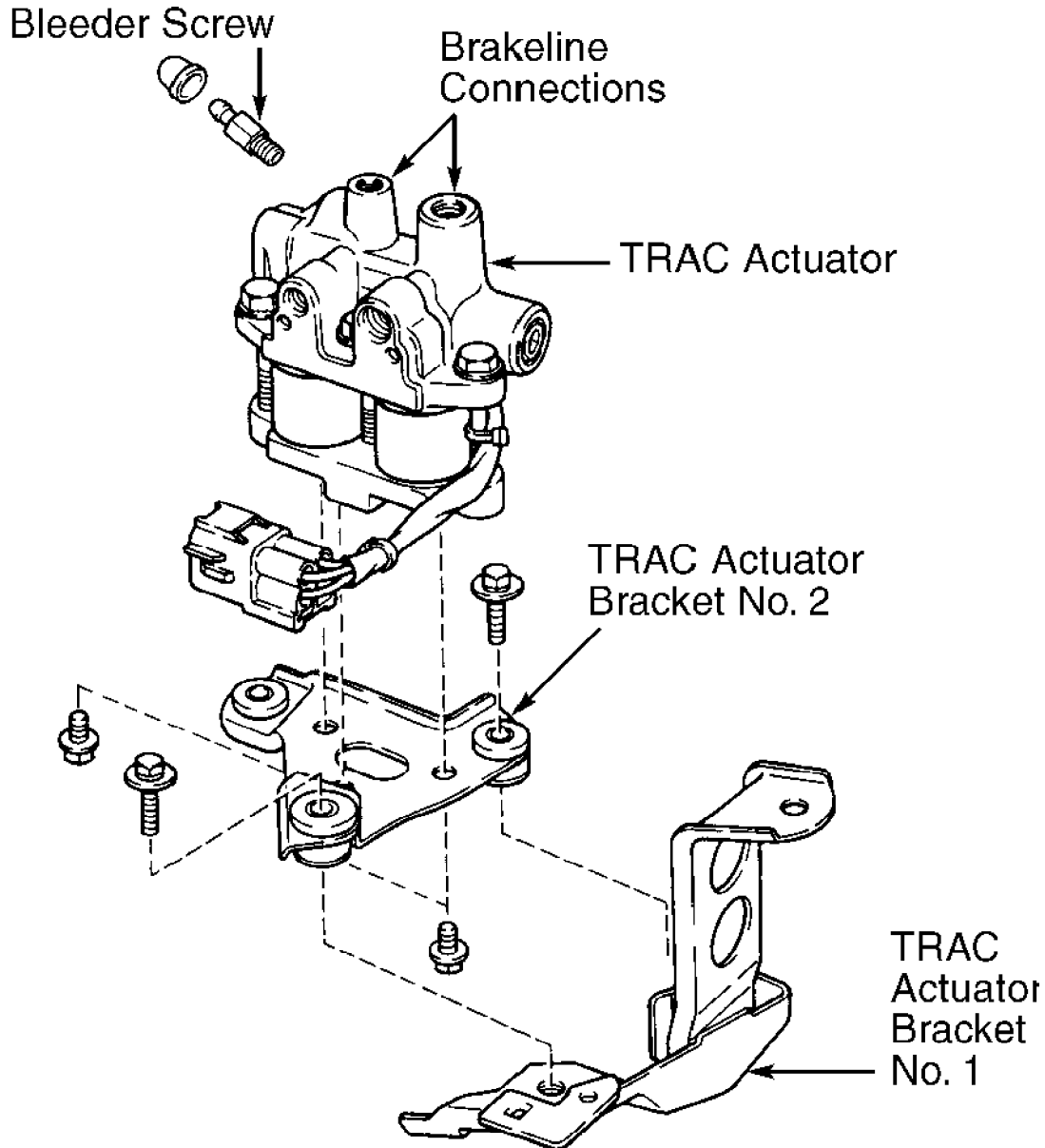
REMOVAL & INSTALLATION

TRAC ACTUATOR

Removal & Installation

1) Relieve pressure from fluid system. Disconnect TRAC solenoid relay (if necessary). Disconnect brakelines from actuator. Remove bolts and actuator assembly. See Fig. 4.

2) To install, reverse removal procedures. Tighten assembly mounting bolts. See TORQUE SPECIFICATIONS. Bleed brake and TRAC systems. See BLEEDING BRAKE SYSTEM.



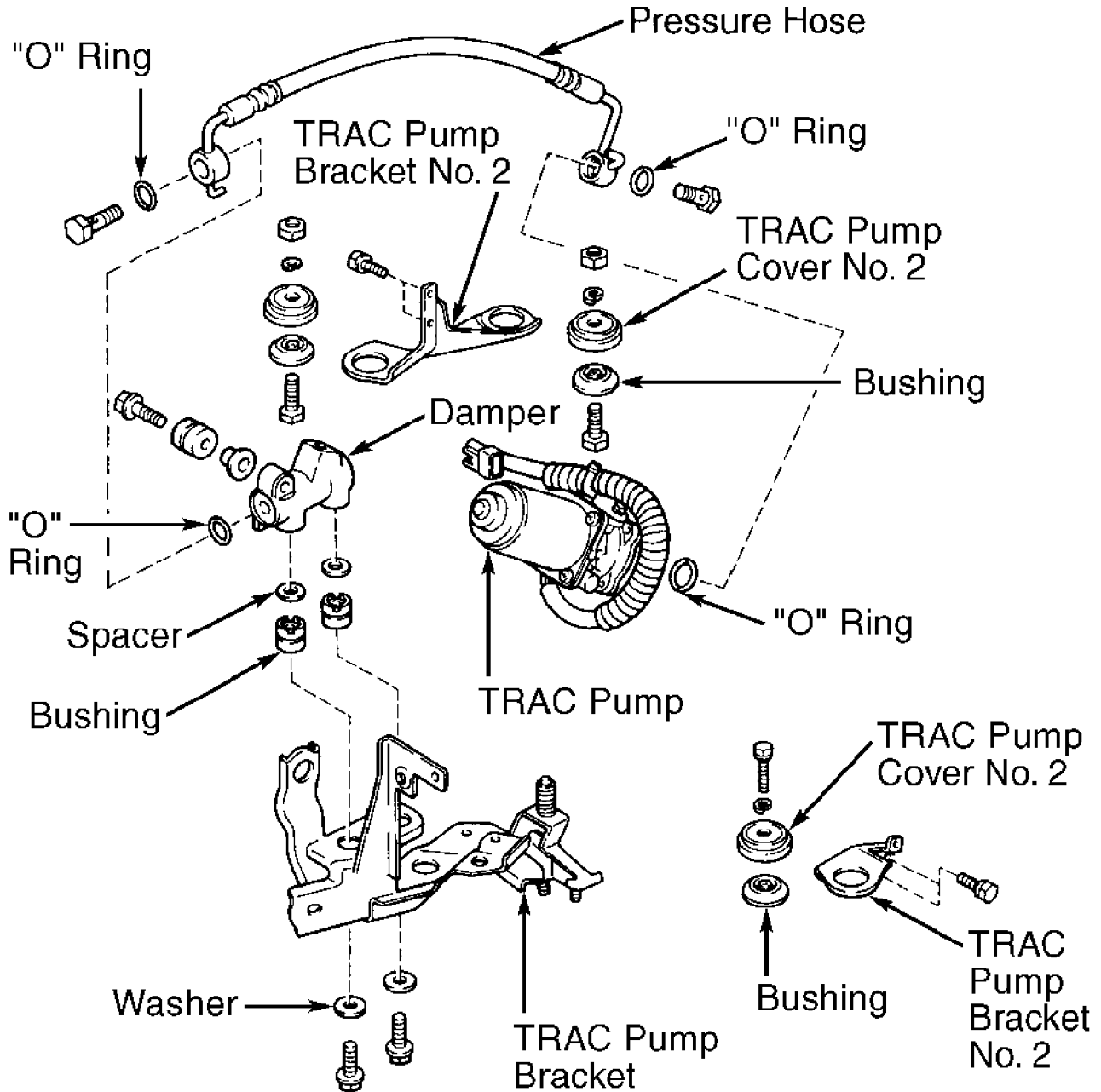
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Fig. 4: Exploded View Of TRAC Actuator Assembly
Courtesy of Toyota Motor Sales, U.S.A., Inc.

TRAC PUMP

Removal & Installation

Disconnect brakeline from actuator. Remove bolts and pump assembly. To install, reverse removal procedures. Tighten assembly and mounting bolts to specification. See TORQUE SPECIFICATIONS. Use 2 NEW "O" rings when installing union bolt and pressure hose onto pump assembly. See Fig. 5. Bleed brake and TRAC systems. See BLEEDING BRAKE SYSTEM.



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Fig. 5: Exploded View Of TRAC Pump Assembly
Courtesy of Toyota Motor Sales, U.S.A., Inc.

OVERHAUL

DO NOT attempt to overhaul or disassemble TRAC actuator or pump motor. If defective, replace entire assembly.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

| Application | Ft. Lbs. (N.m) |
|----------------------------------|----------------|
| Brakeline Connections | 11 (15) |
| Pressure Hose Bolt | 34 (46) |
| Pump Assembly Nuts & Bolts | 14 (19) |

| | INCH Lbs. (N.m) |
|-----------------------------------|-----------------|
| Actuator Assembly Bolts | 115 (13) |
| Bleeder Plug | 73 (8.3) |
| Pump Assembly Bracket Bolts | 69 (7.8) |

WIRING DIAGRAMS

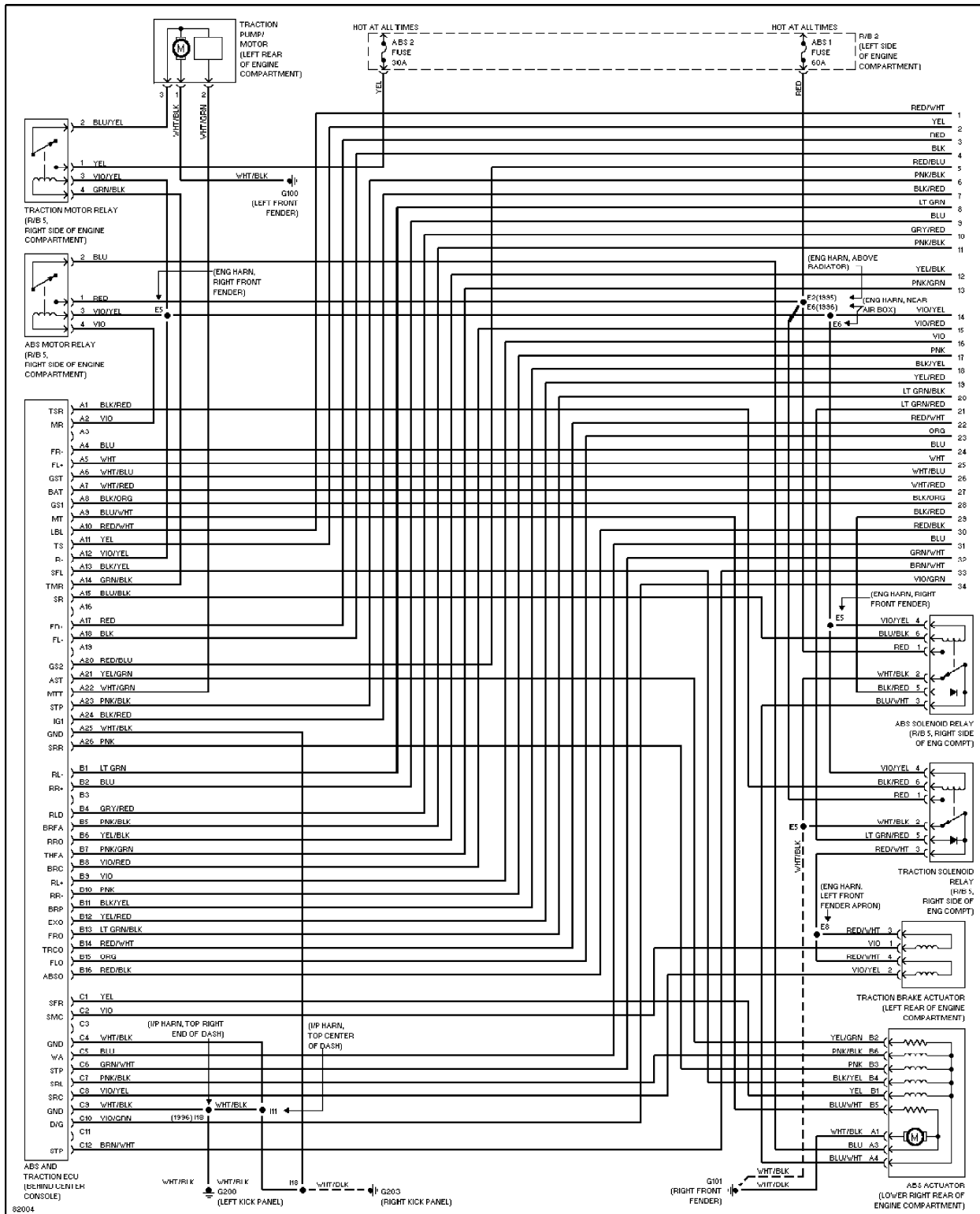


Fig. 6: Traction Control (TRAC) System Wiring Diagram (1 of 3)

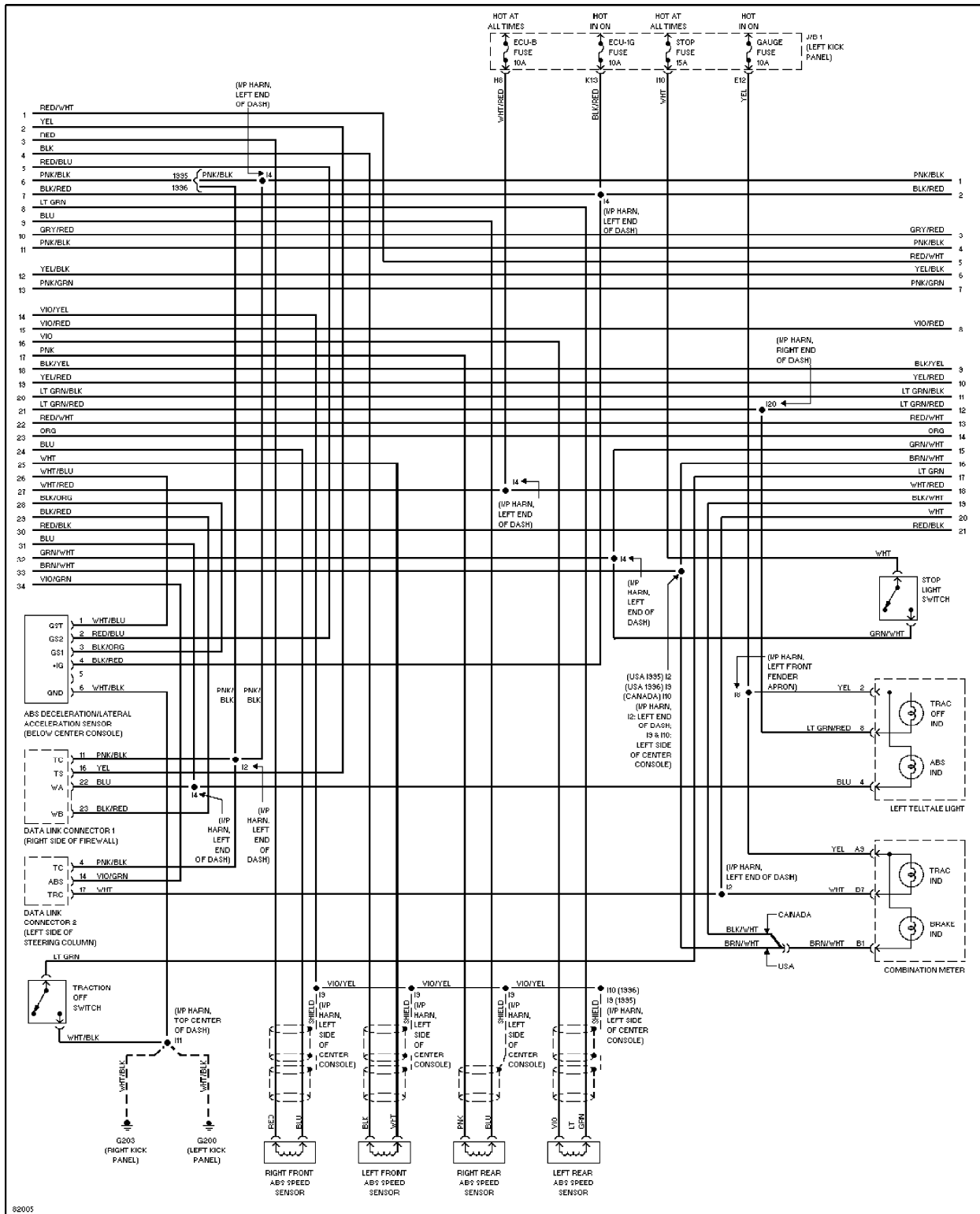
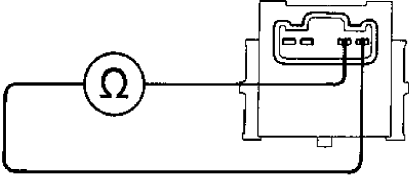


Fig. 7: Traction Control (TRAC) System Wiring Diagram (2 of 3)

INSPECTION PROCEDURE

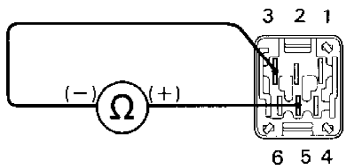
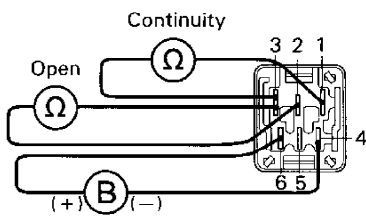
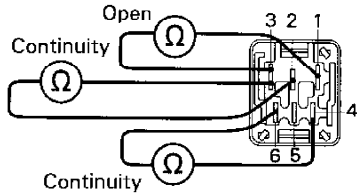
| 1 | Is DTC output? | | | | | | |
|--|--|-----------------|------------|-----------|------------|----------|----------------|
| Check DTC. | | | | | | | |
| NO | YES > Repair circuit indicated by the code output. | | | | | | |
| 2 | Check TRAC cut switch. | | | | | | |
|  | <p>P 1. Remove TRAC cut switch. 2. Disconnect TRAC cut switch connector.</p> <p>C Measure resistance between terminals 1 and 2 of TRAC cut switch when TRAC cut switch is on and off.</p> <p>OK</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>TRAC cut switch</th> <th>Resistance</th> </tr> </thead> <tbody> <tr> <td>Pushed in</td> <td>Continuity</td> </tr> <tr> <td>Released</td> <td>1 MΩ or higher</td> </tr> </tbody> </table> | TRAC cut switch | Resistance | Pushed in | Continuity | Released | 1 MΩ or higher |
| TRAC cut switch | Resistance | | | | | | |
| Pushed in | Continuity | | | | | | |
| Released | 1 MΩ or higher | | | | | | |
| OK | NG > Replace TRAC cut switch. | | | | | | |
| 3 | Check for open and short in harness and connector between terminal CSW of TRAC ECU and TRAC cut switch and body ground. | | | | | | |
| OK | NG > Repair or replace harness or connector. | | | | | | |
| 4 | Check TRAC OFF indicator light. | | | | | | |
| See INSTRUMENT CLUSTER TROUBLESHOOTING. | | | | | | | |
| OK | NG > Repair or replace instrument cluster. | | | | | | |

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Fig. 10: TRAC OFF INDICATOR - TRAC CUT SWITCH CIRCUIT CHART (2 OF 3)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

5

Check TRAC solenoid relay.



P Remove TRAC solenoid relay from R/B No.5.

C Check continuity between each terminal of TRAC solenoid relay.

OK

| | |
|-------------------|--------------------------------------|
| Terminals 4 and 6 | Continuity (Reference value 80 Ω) |
| Terminals 2 and 3 | Continuity |
| Terminals 1 and 3 | Open |

C 1. Apply battery positive voltage between terminals 4 and 6.
2. Check continuity between each terminal of TRAC solenoid relay.

OK

| | |
|-------------------|------------|
| Terminals 2 and 3 | Open |
| Terminals 1 and 3 | Continuity |

C Connect the ⊕ test lead to terminal 5 and the ⊖ lead to terminal 3. Check continuity between the terminals.

OK **Continuity**
If there is no continuity, connect the ⊖ test lead to terminal 5 and the ⊕ lead to terminal 3. Recheck continuity between terminals.

OK

NG Replace TRAC solenoid relay.

6

Check for open and short in harness and connector between terminal WT of TRAC ECU and battery or TRAC solenoid relay.

OK

NG Repair or replace harness or connector.

Check and replace TRAC ECU.

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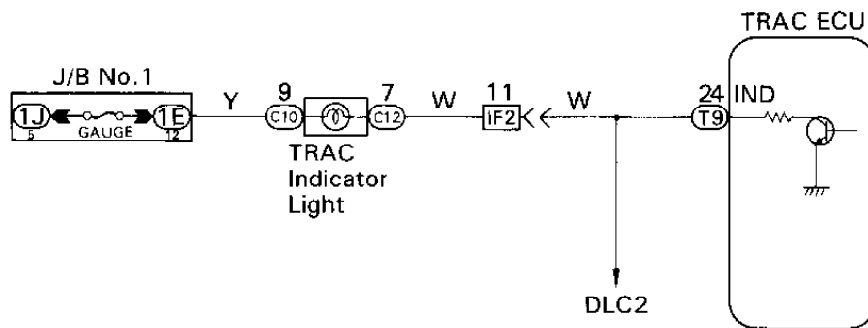
Fig. 11: TRAC OFF INDICATOR - TRAC CUT SWITCH CIRCUIT CHART (3 OF 3)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

TRAC Indicator Light Circuit

CIRCUIT DESCRIPTION

The TRAC indicator blinks during TRAC operation.
This indicator is also used for warnings when the trouble occurs and for displaying DTC.

WIRING DIAGRAM



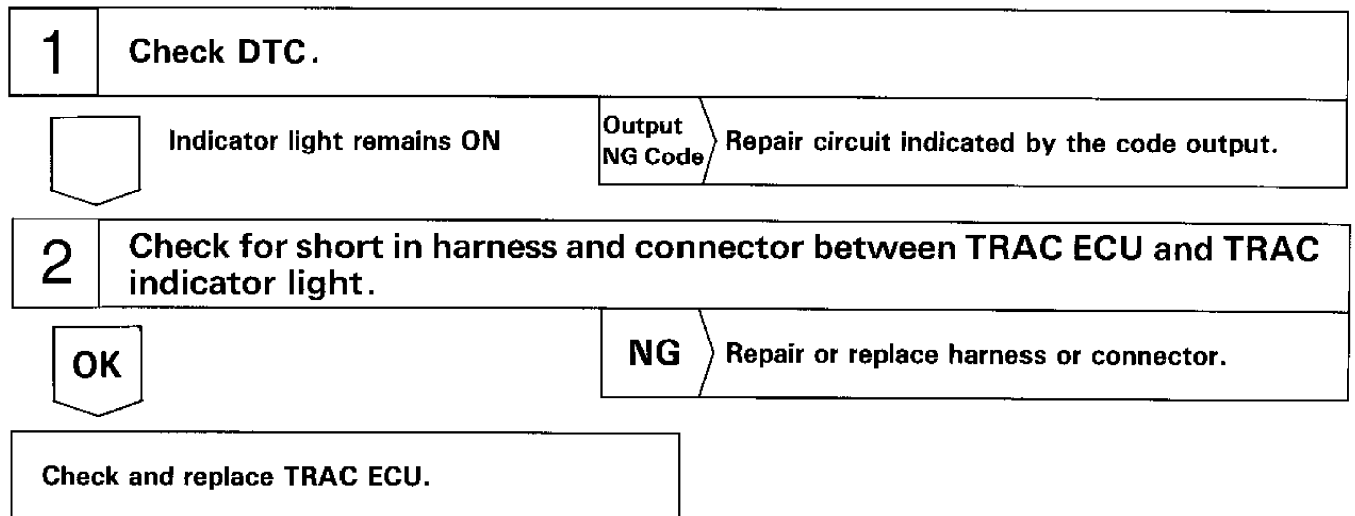
INSPECTION PROCEDURES

Troubleshoot in accordance with flow chart instructions for each trouble symptom.

TRAC Indicator light does not light up

Go to INSTRUMENT CLUSTER TROUBLESHOOTING.

TRAC Indicator light remains ON



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Fig. 12: TRAC INDICATOR LIGHT CIRCUIT CHART
Courtesy of Toyota Motor Sales, U.S.A., Inc.

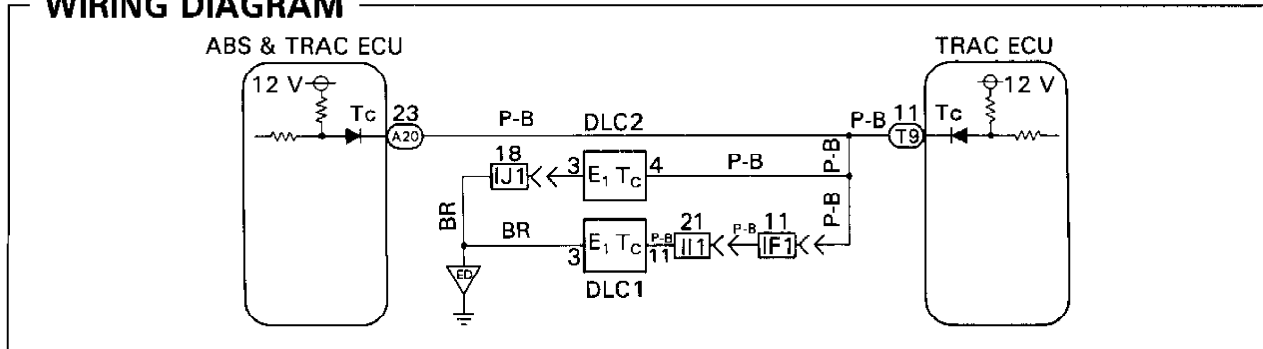
Tc TERMINAL CIRCUIT

Tc Terminal Circuit

CIRCUIT DESCRIPTION

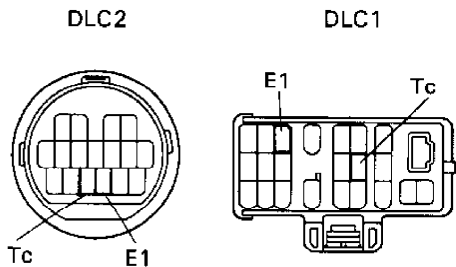
By connecting terminals Tc and E1 of DLC1 or DLC2, the ECU displays the DTC by blinking the TRAC indicator light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 Check voltage between terminals Tc and E1 of DLC2 or DLC1.



- P** Turn ignition switch ON.
- C** Measure voltage between terminals Tc and E1 of DLC2 or DLC1.
- OK** Voltage: 10 - 14 V

NG

OK Proceed to next circuit inspection shown on problem symptoms table.

2 Check for open and short in harness and connector between ABS & TRAC ECU, TRAC ECU and DLC2 or DLC1, DLC2 or DLC1 and body ground.

OK

NG Repair or replace harness or connector.

Check and replace TRAC ECU.

96J20536

Fig. 13: Tc TERMINAL CIRCUIT CHART
Courtesy of Toyota Motor Sales, U.S.A., Inc.

DTC 24 - TRAC SUB-THROTTLE ACTUATOR CIRCUIT

CIRCUIT INSPECTION

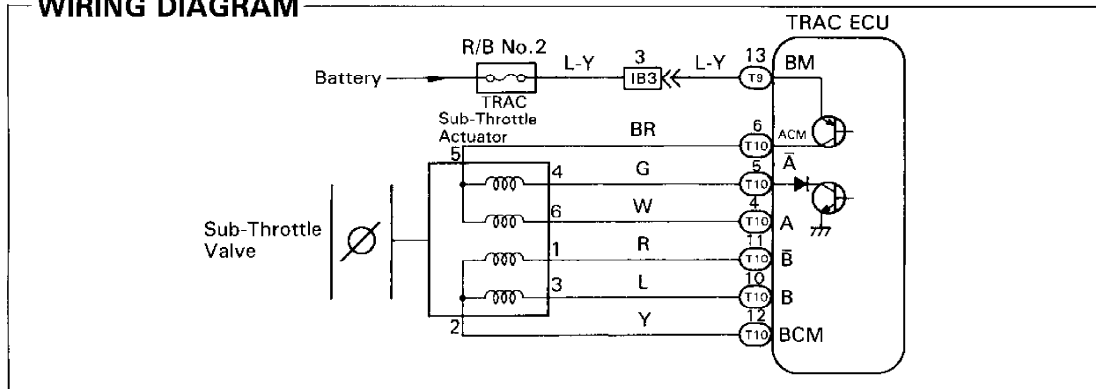
| | | |
|------------|-----------|---|
| DTC | 24 | TRAC Sub-Throttle Actuator Circuit |
|------------|-----------|---|

CIRCUIT DESCRIPTION

The sub-throttle actuator operates in accordance with signals from the ECU, controlling the opening and closing of the sub-throttle valve.

| DTC No. | DTC Detecting Condition | Trouble Area |
|-----------|---|---|
| 24 | Open or short in sub-throttle actuator circuit. | <ul style="list-style-type: none"> • TRAC fuse • Open or short in BM circuit • Sub-throttle actuator • Open or short in sub-throttle actuator circuit • TRAC ECU |

WIRING DIAGRAM



INSPECTION PROCEDURE

| | |
|------------------|--|
| 1 | Check TRAC fuse. |
| | <p>P Remove TRAC fuse from R/B No.2.</p> <p>C Check continuity of TRAC fuse.</p> <p>OK Continuity</p> |
| <p>OK</p> | <p>NG Check for short in all harness and components connected to TRAC fuse.</p> |

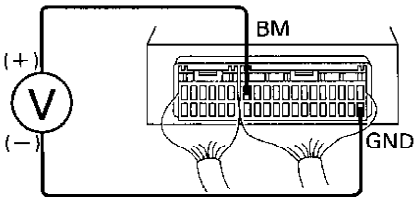
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Fig. 14: DTC 24 - TRAC SUB-THROTTLE ACTUATOR CIRCUIT CHART (1 OF 2)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

2

Check voltage between terminals BM and GND of TRAC ECU.

LOCK



P Remove TRAC ECU with connectors still connected.

C Measure voltage between terminals BM and GND of TRAC ECU.

OK Voltage: 10 – 14 V

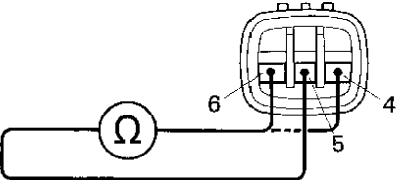
OK

NG

Check and repair harness or connector.

3

Check sub-throttle actuator.



The illustration shows checking for continuity between 4 – 5, and 5 – 6.

P Disconnect sub-throttle actuator connector.

C Check continuity between each terminal of sub-throttle actuator connector.

OK

| | |
|-------------------|---------------------------------------|
| Terminals 1 and 2 | Continuity (Reference value 0.9 Ω) |
| Terminals 2 and 3 | |
| Terminals 4 and 5 | |
| Terminals 5 and 6 | |

OK

NG

Replace sub-throttle actuator.

4

Check for open and short in harness and connector between TRAC ECU and sub-throttle actuator.

OK

NG

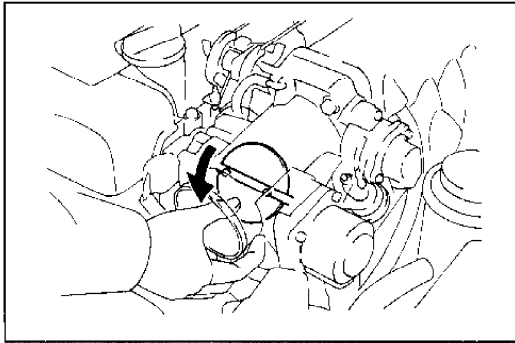
Repair or replace harness or connector.

Check and replace TRAC ECU.

96C20521
 Fig. 15: DTC 24 - TRAC SUB-THROTTLE ACTUATOR CIRCUIT CHART (2 OF 2)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

| | | |
|------------|--------------|--------------------------------|
| DTC | 25,26 | TRAC Sub-Throttle Valve |
|------------|--------------|--------------------------------|

| DTC No. | DTC Detecting Condition | Trouble Area |
|-----------|--|---|
| 25 | The difference between the sub-throttle sensor signal voltage and the voltage required by the step count is 1 V or more. | <ul style="list-style-type: none"> • Sub-throttle actuator • Throttle body (sub-throttle valve is stuck or operation is faulty) • Sub-throttle position sensor • Open or short in sub-throttle position sensor circuit • ECM • TRAC ECU |
| 26 | Even when sub-throttle valve is driven to the fully open position, input voltage at terminal VTA2 of ECM does not come within range of the specifications 3 – 4.5 V. | <ul style="list-style-type: none"> • Sub-throttle actuator • Throttle body (sub-throttle valve is stuck or operation is faulty) • Sub-throttle position sensor • Open or short in sub-throttle position sensor circuit • ECM • TRAC ECU |



- P** Remove air duct.
- C** Open and close the sub-throttle valve manually and check the condition during operation.
- OK** The valve should operate smoothly without catching.

HINT: If sub-throttle actuator, sub-throttle valve, sub-throttle position sensor and harness are free from any defect, ECM may be defective.

If ECM is free from any defect, TRAC ECU may be defective.

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Fig. 16: DTC 25 & 26 - TRAC SUB-THROTTLE VALVE CHART
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

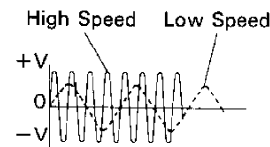
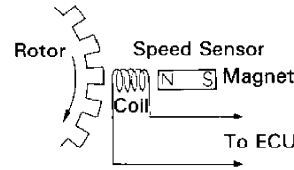
DTC 31, 32, 33 & 34 - SPEED SENSOR CIRCUIT

| | | |
|------------|------------------------|-----------------------------|
| DTC | 31,32 33,34 | Speed Sensor Circuit |
|------------|------------------------|-----------------------------|

CIRCUIT DESCRIPTION

The speed sensor detects the wheel speed and sends the appropriate signals to the ECU. These signals are used to control both the ABS and TRAC control systems. The front and rear rotors each have 48 serrations.

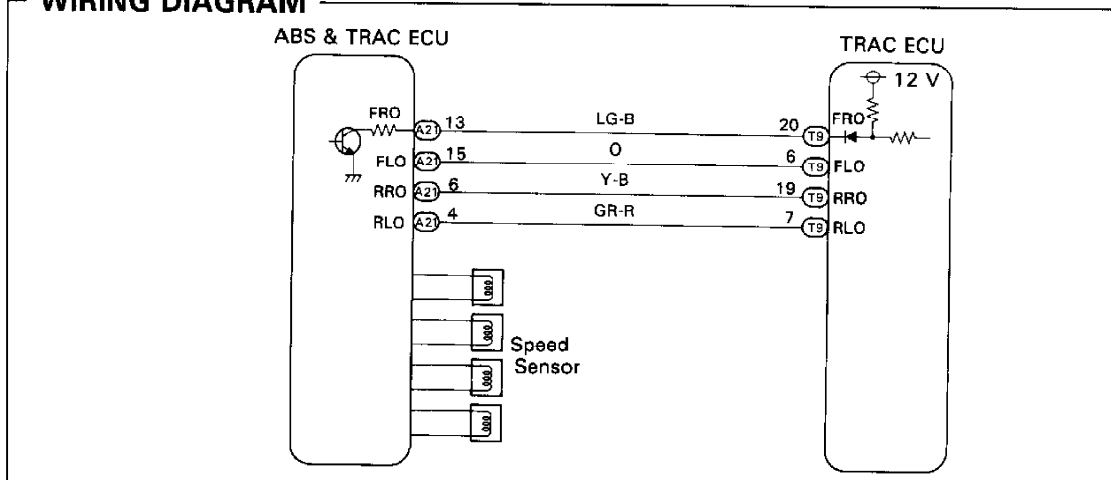
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.



| DTC No. | DTC Detecting Condition | Trouble Area |
|--------------------------|--|---|
| 31, 32 33, 34 | Detection of any of conditions (1) through (3): (1) At vehicle speed of 10 km/h (6 mph) or more, pulses are not input for 5 sec. (2) Momentary interruption of the vehicle speed sensor signal occurs at least 7 times in the time between switching the ignition switch ON and switching it OFF. (3) Abnormal fluctuation of speed sensor signals with the vehicle speed 20 km/h (12 mph) or more. | <ul style="list-style-type: none"> • Open or short in FRO, FLO, RRO, RLO circuit • Right front, left front, right rear and left rear speed sensor • Open or short in each speed sensor circuit • Sensor rotor • TRAC ECU |

HINT: DTC No.31 is for the right front speed sensor.
 DTC No.32 is for the left front speed sensor.
 DTC No.33 is for the right rear speed sensor.
 DTC No.34 is for the left rear speed sensor.

WIRING DIAGRAM



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Fig. 17: DTC 31, 32, 33 & 34 - SPEED SENSOR CIRCUIT CHART (1 OF 3)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

INSPECTION PROCEDURE

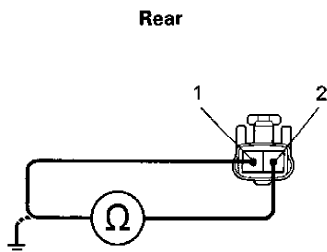
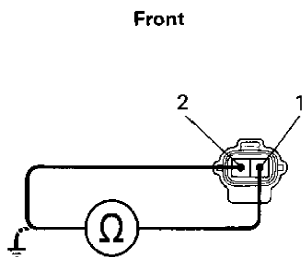
HINT: If the same code is output from the ABS warning light, troubleshoot the ABS first.

1 Check for open and short in harness and connector between terminals FRO, FLO, RRO, RLO of ABS & TRAC ECU and TRAC ECU.

OK

NG Repair or replace harness or connector.

2 Check speed sensor.



Front

- P** 1. Remove front fender splash shield.
2. Disconnect speed sensor connector.
- C** Measure resistance between terminals 1 and 2 of speed sensor connector.
- OK** Resistance: 0.7 – 1.7 kΩ
- C** Measure resistance between terminals 1 and 2 of speed sensor connector and body ground.
- OK** Resistance: 1 MΩ or higher

Rear

- P** 1. Remove rear seat cushion, seat back and quarter trim panel.
2. Disconnect speed sensor connector.
- C** Measure resistance between terminals 1 and 2 of speed sensor connector.
- OK** Resistance: 0.7 – 1.7 kΩ
- C** Measure resistance between terminals 1 and 2 of speed sensor connector and body ground.
- OK** Resistance: 1 MΩ or higher

OK

NG Replace speed sensor.

NOTICE: Check the speed sensor signal last.
See SPEED SENSOR DIAGNOSTICS
in ANTI-LOCK Supra article.

3 Check for open and short in harness and connector between each speed sensor and ECU.

OK

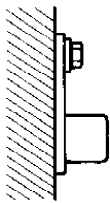
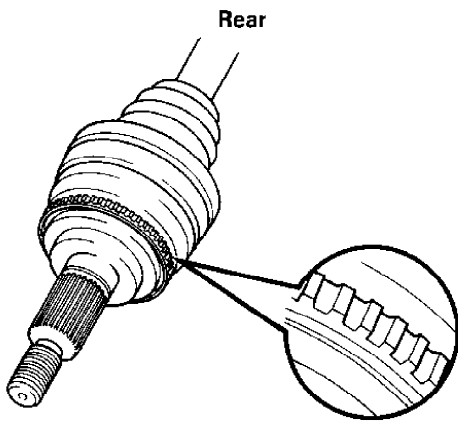
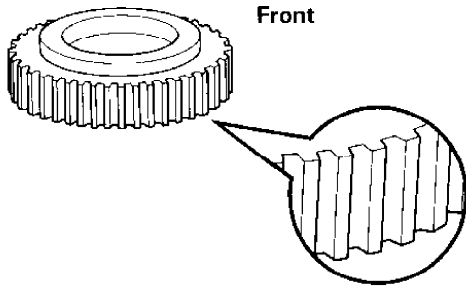
NG Repair or replace harness or connector.

96D20522

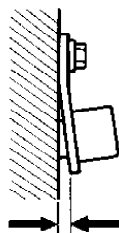
Fig. 18: DTC 31, 32, 33 & 34 - SPEED SENSOR CIRCUIT CHART (2 OF 3)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

4

Check sensor rotor and sensor installation.



OK



NG

Front

- P** Remove front speed sensor rotor.
- C** Check sensor rotor serrations.
- OK** No scratches or missing teeth or foreign objects.
- C** Check the front speed sensor installation.
- OK** The installation bolt is tightened properly.
- C** Check the sensor tip.
- OK** No scratches or foreign objects on the sensor tip.

Rear

- P** Remove the drive shaft.
- C** Check the sensor rotor serrations.
- OK** No scratches or missing teeth.
- C** Check the rear speed sensor installation.
- OK** The installation bolt is tightened properly and there is no clearance between the sensor and rear axle carrier.

OK

NG

Replace speed sensor and grease or rotor and grease.

NOTICE: Check the speed sensor signal last. See SPEED SENSOR DIAGNOSTICS in ANTI-LOCK Supra article.

Check and replace ABS (& TRAC) ECU.

96E20523

Fig. 19: DTC 31, 32, 33 & 34 - SPEED SENSOR CIRCUIT CHART (3 OF 3)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

DTC 41 - IG POWER SOURCE CIRCUIT

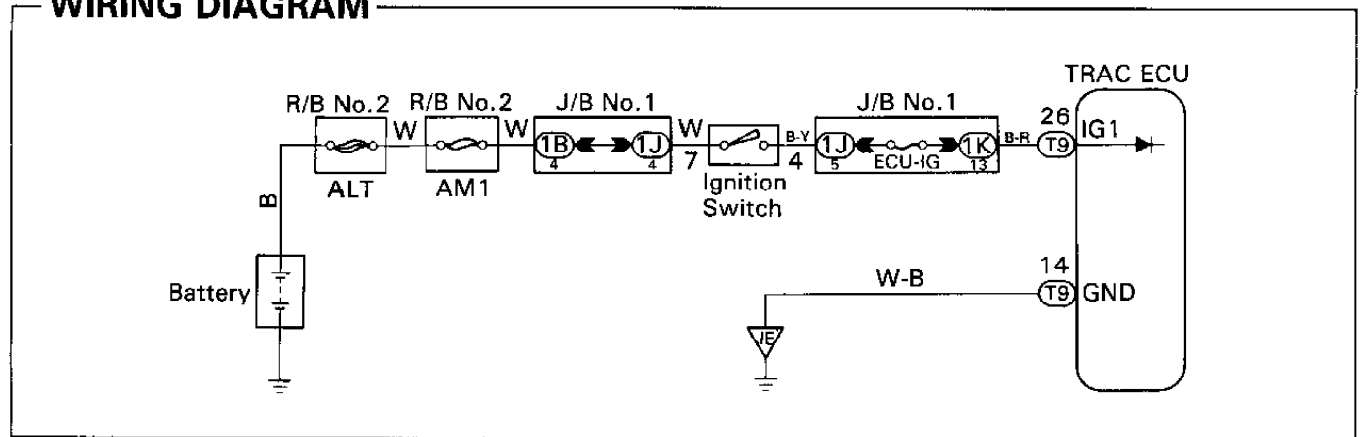
| | | |
|------------|-----------|--------------------------------|
| DTC | 41 | IG Power Source Circuit |
|------------|-----------|--------------------------------|

CIRCUIT DESCRIPTION

This is the power source for the ECU, hence the CPU and the actuators.

| DTC No. | DTC Detecting Condition | Trouble Area |
|-----------|---|--|
| 41 | When either of the following (1) or (2) is detected: (1) Voltage at ECU terminal IG1 is less than 9.5 V for more than 10 sec. while engine speed is 500 RPM or higher. (2) Voltage at ECU terminal IG1 is more than 17 V for more than 5 sec. | <ul style="list-style-type: none"> • Battery • IC regulator • Open or short in power source circuit • TRAC ECU |

WIRING DIAGRAM

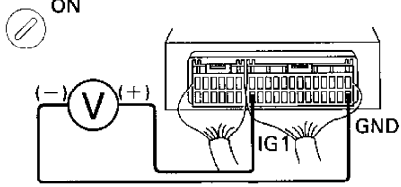
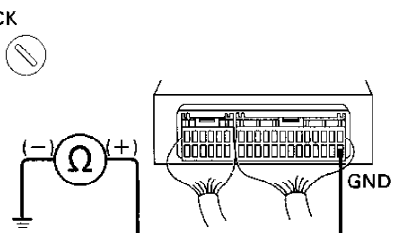
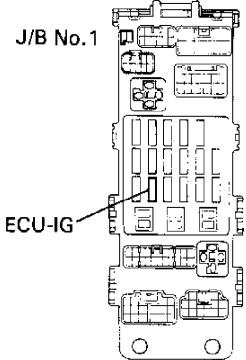


INSPECTION PROCEDURE

| | |
|-----------|---|
| 1 | Check battery positive voltage. |
| OK | Voltage: 10 – 14 V |
| OK | NG Check and repair the charging system. |

96G20525

Fig. 20: DTC 41 - IG POWER SOURCE CIRCUIT CHART (1 OF 2)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

| | |
|---|--|
| 2 | Check voltage between terminals IG1 and GND of TRAC ECU connector. |
|  | <p>P 1. Remove TRAC ECU with connectors still connected. 2. Turn ignition switch ON.</p> <p>C Measure voltage between terminals IG1 and GND of TRAC ECU connector.</p> <p>OK Voltage: 10 – 14 V</p> |
| <p>NG</p> | <p>OK Check and replace TRAC ECU.</p> |
| 3 | Check continuity between terminal GND of TRAC ECU connector and body ground. |
|  | <p>C Measure resistance between terminal GND of TRAC ECU connector and body ground.</p> <p>OK Resistance: 1 Ω or less</p> |
| <p>OK</p> | <p>NG Repair or replace harness or connector.</p> |
| 4 | Check ECU-IG fuse. |
|  | <p>P Remove ECU-IG fuse from J/B No. 1.</p> <p>C Check continuity of ECU-IG fuse.</p> <p>OK Continuity</p> |
| <p>OK</p> | <p>NG Check for short in all the harness and components connected to ECU-IG fuse.</p> |

Check for open in harness and connector between TRAC ECU and battery.

96F20524

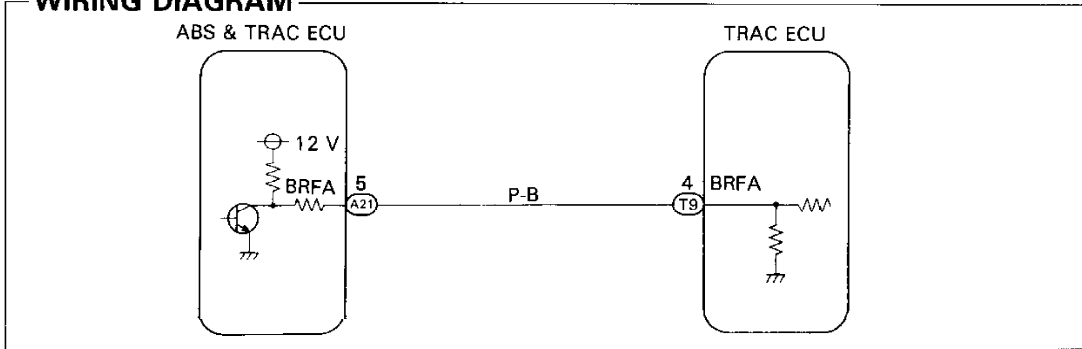
Fig. 21: DTC 41 - IG POWER SOURCE CIRCUIT CHART (2 OF 2)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

| | | |
|------------|-----------|---------------------------------------|
| DTC | 43 | ABS & TRAC ECU Malfunction |
|------------|-----------|---------------------------------------|

CIRCUIT DESCRIPTION

| DTC No. | DTC Detecting Condition | Trouble Area |
|-----------|---|--|
| 43 | ABS control system or TRAC (BRAKE) control system or communication circuit is abnormal. | <ul style="list-style-type: none"> • ABS & TRAC (BRAKE) control system • Open or short in BRFA circuit |

WIRING DIAGRAM



INSPECTION PROCEDURE

1 Is DTC output for the ABS & TRAC (BRAKE)?

Check DTC.

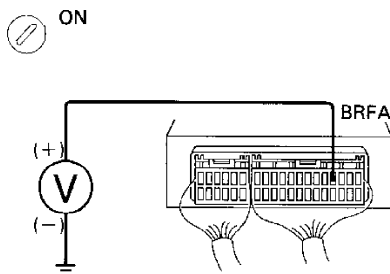


Malfunction indicator light remains on

Output NG Code

Repair ABS & TRAC (Brake) control system according to the code output.

2 Check voltage between terminal BRFA of TRAC ECU and body ground.



- P** 1. Remove TRAC ECU with connectors still connected.
2. Turn ignition switch ON.

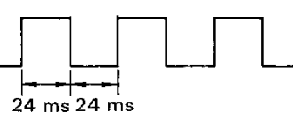
C Measure voltage between terminal BRFA of TRAC ECU and body ground.

OK Voltage: About 6 V (Pulse)

(Reference)

6 - 14 V

1 V or less

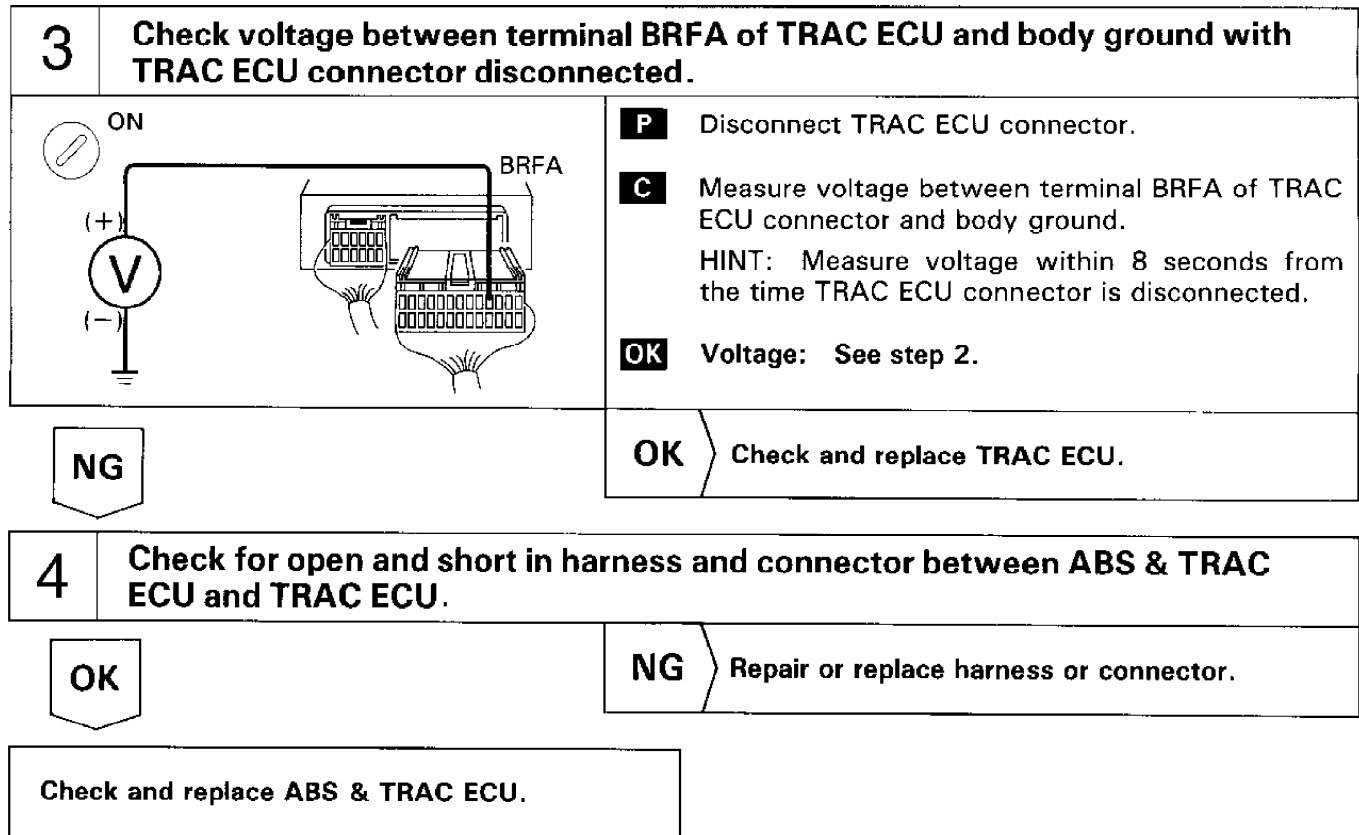


OK

Check and replace TRAC ECU.

93J84615

Fig. 22: DTC 43 - ABS & TRAC ECU MALFUNCTION CHART (1 OF 2)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



93A84616
 Fig. 23: DTC 43 - ABS & TRAC ECU MALFUNCTION CHART (2 OF 2)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

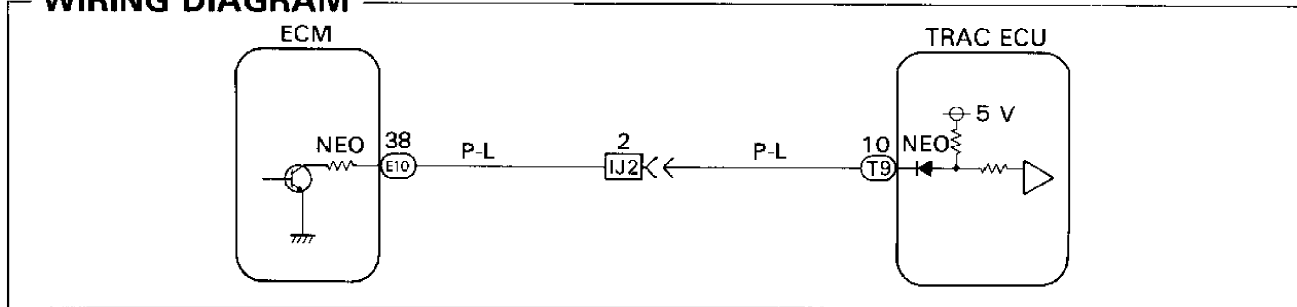
DTC 44 - NE SIGNAL CIRCUIT

CIRCUIT DESCRIPTION

The TRAC ECU receives engine speed signals (NE signals) from the ECM.

| DTC No. | DTC Detecting Condition | Trouble Area |
|-----------|---|---|
| 44 | No signal is input to terminal NEO 0.24 sec. after traction control is initiated. | <ul style="list-style-type: none"> • Open or short in NEO circuit • ECM • TRAC ECU |

WIRING DIAGRAM



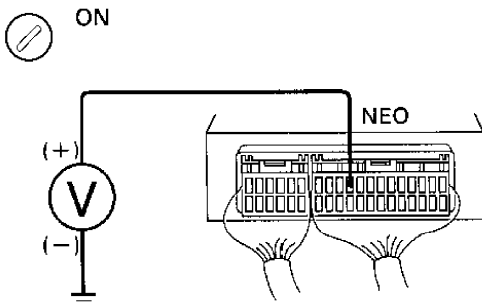
INSPECTION PROCEDURE

- 1 Check for open and short in harness and connector between terminal NEO of TRAC ECU and terminal NEO of ECM.

OK

NG Repair or replace harness or connector.

- 2 Check voltage between terminal NEO of TRAC ECU and body ground.



- P** 1. Remove TRAC ECU with connectors still connected.
2. Turn ignition switch ON.

- C** Measure voltage between terminal NEO of TRAC ECU and body ground for the engine conditions below.

| Engine condition | Voltage |
|------------------|----------------------|
| OFF (IG ON) | 4 - 6 V or Below 1 V |
| ON (Idling) | 2 - 3 V (Pulse) |

OK

NG Check and replace TRAC ECU or ECM.

If the same code is still output after the DTC is deleted, check the contact condition of each connection.

96H20526

Fig. 24: DTC 44 - NE SIGNAL CIRCUIT CHART
Courtesy of Toyota Motor Sales, U.S.A., Inc.

DTC 45 & 46 - MAIN THROTTLE POSITION SENSOR CIRCUIT

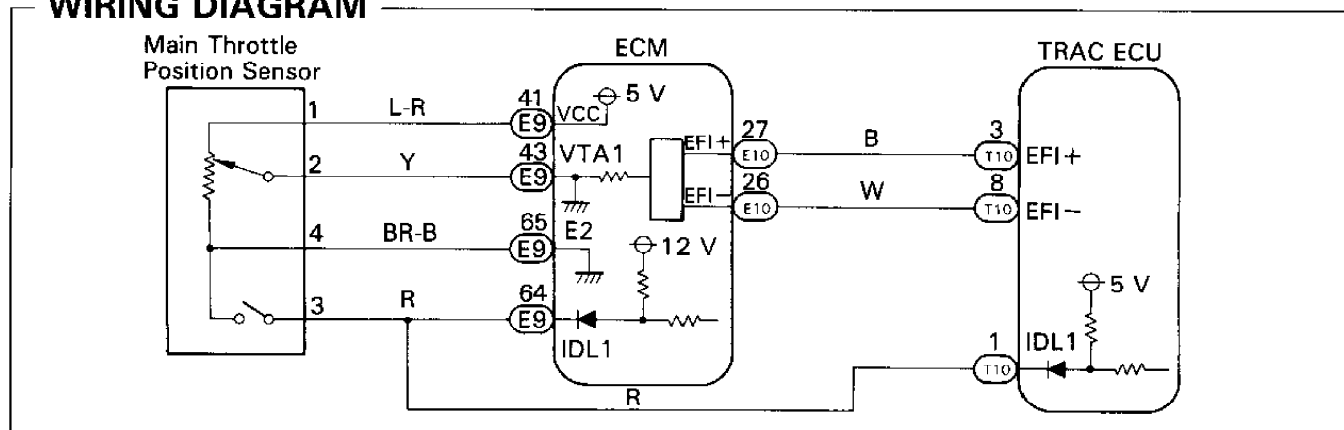
| | | |
|------------|--------------|--|
| DTC | 45,46 | Main Throttle Position Sensor Circuit |
|------------|--------------|--|

CIRCUIT DESCRIPTION

This circuit is not directly related to the TRAC control, but as it has an influence on TRAC control when trouble occurs in this circuit, it is used to switch off the TRAC system as a fail safe function.

| DTC No. | DTC Detecting Condition | Trouble Area |
|-----------|--|---|
| 45 | Conditions (1) and (2) continue for 0.31 sec.: (1) CTP switch of main throttle position sensor is ON. (2) Input voltage of ECM terminal VTA1: 1.5 V or more. | <ul style="list-style-type: none"> • Main throttle position sensor • Short in IDL1 circuit • ECM • TRAC ECU |
| 46 | Either of the following (1) or (2) continues for 0.6 sec.: (1) Input voltage of ECM terminal VTA1: 4.9 V or more. (2) Input voltage of ECM terminal VTA1: 0.1 V or less. | <ul style="list-style-type: none"> • Main throttle position sensor • Open or short in VTA1 circuit • ECM |

WIRING DIAGRAM



96I20527

Fig. 25: DTC 45 & 46 - MAIN THROTTLE POSITION SENSOR CIRCUIT

CHART (1 OF 3)

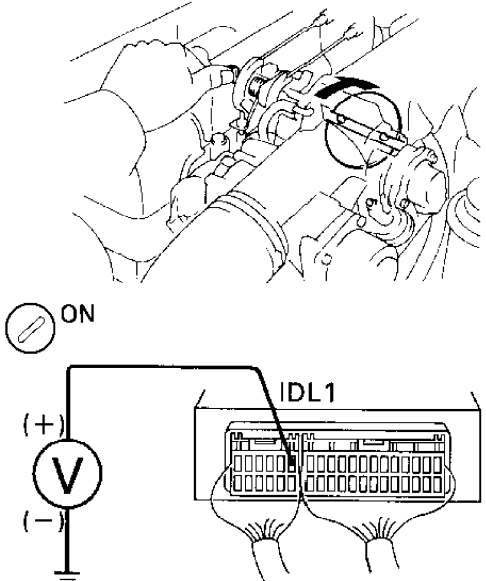
Courtesy of Toyota Motor Sales, U.S.A., Inc.

INSPECTION PROCEDURE

HINT: The main throttle position sensor signal is transmitted to the TRAC ECU from ECM, so if an error occurs at the engine side, the TRAC ECU also detects it.

If DTC No.41 is being output for the engine, troubleshoot the engine first.

| | |
|------------|---|
| 1 | Is DTC output for the engine? |
| Check DTC. | |
| NO | YES Repair circuit indicated by the code output. |

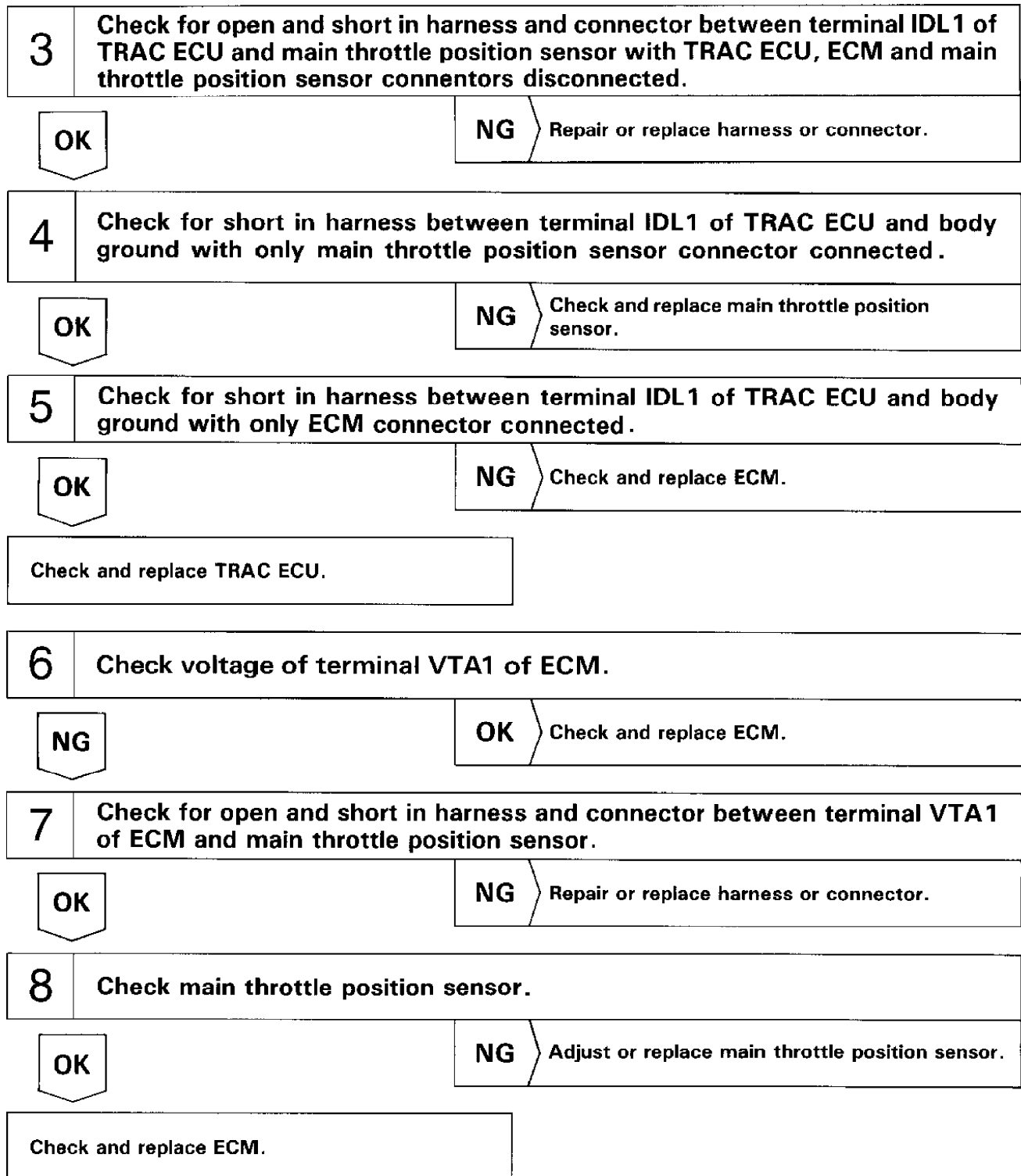
| 2 | Check voltage between terminal IDL1 of TRAC ECU and body ground. | | | | | | |
|--|---|------------------------------|---------|--------------|-------------|------------|-----------|
|  | <p>P 1. Remove TRAC ECU with connectors still connected. 2. Disconnect the vacuum hose from the throttle opener, and apply vacuum to the throttle opener. 3. Turn ignition switch ON.</p> <p>C Measure voltage between terminal IDL1 of TRAC ECU and body ground, when the main throttle valve is fully closed and fully open.</p> <p>OK</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: left;">Main throttle valve position</th> <th style="text-align: left;">Voltage</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Fully closed</td> <td style="text-align: center;">Below 1.0 V</td> </tr> <tr> <td style="text-align: center;">Fully open</td> <td style="text-align: center;">10 - 14 V</td> </tr> </tbody> </table> | Main throttle valve position | Voltage | Fully closed | Below 1.0 V | Fully open | 10 - 14 V |
| Main throttle valve position | Voltage | | | | | | |
| Fully closed | Below 1.0 V | | | | | | |
| Fully open | 10 - 14 V | | | | | | |
| NG | OK Go to step 6 . | | | | | | |

96J20528

Fig. 26: DTC 45 & 46 - MAIN THROTTLE POSITION SENSOR CIRCUIT

CHART (2 OF 3)

Courtesy of Toyota Motor Sales, U.S.A., Inc.



96A20529

Fig. 27: DTC 45 & 46 - MAIN THROTTLE POSITION SENSOR CIRCUIT CHART (3 OF 3)

Courtesy of Toyota Motor Sales, U.S.A., Inc.

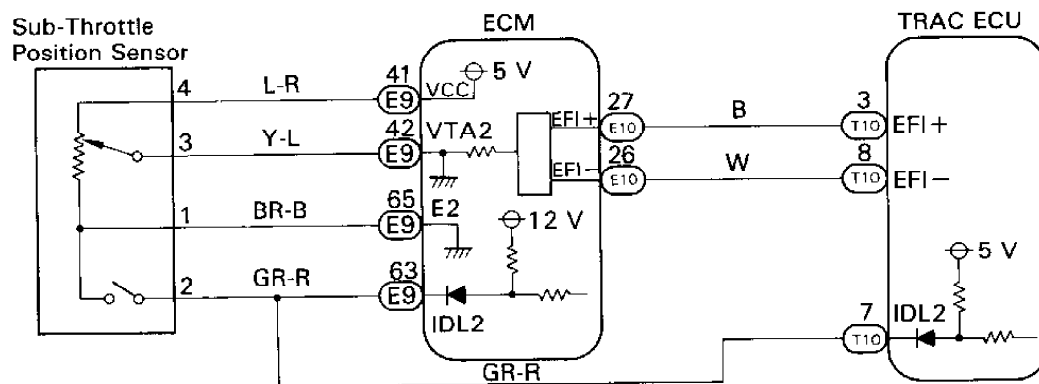
| | | |
|------------|--------------|---|
| DTC | 47,48 | Sub-Throttle Position Sensor Circuit |
|------------|--------------|---|

CIRCUIT DESCRIPTION

This sensor detects the opening angle of the sub-throttle valve and sends the appropriate signals to the ECU. If a trouble signal is input, the ECU prohibits TRAC control.

| DTC No. | DTC Detecting Condition | Trouble Area |
|-----------|---|--|
| 47 | <p>When any of the following (1) through (3) is detected:</p> <p>(1) Deviation of 5 steps or more to the closed side of the idle step during sub-throttle initial check.</p> <p>(2) Voltage at terminal IDL2 does not become 0 V even after sub-throttle is driven to fully closed position during sub-throttle initial check.</p> <p>(3) Voltage at terminal VTA2 of ECM is 1.5 V or more for at least 0.31 sec. while CTP switch is ON.</p> | <ul style="list-style-type: none"> • Sub-throttle position sensor • Open or short in IDL2 circuit • ECM • TRAC ECU |
| 48 | <p>Either of the following (1) or (2) continues for at least 0.26 sec.:</p> <p>(1) Input voltage of ECM terminal VTA2: 4.9 V or more.</p> <p>(2) Input voltage of ECM terminal VTA2: 0.1 V or less.</p> | <ul style="list-style-type: none"> • Sub-throttle position sensor • Open or short in VTA2 circuit • ECM |

WIRING DIAGRAM



96D20530

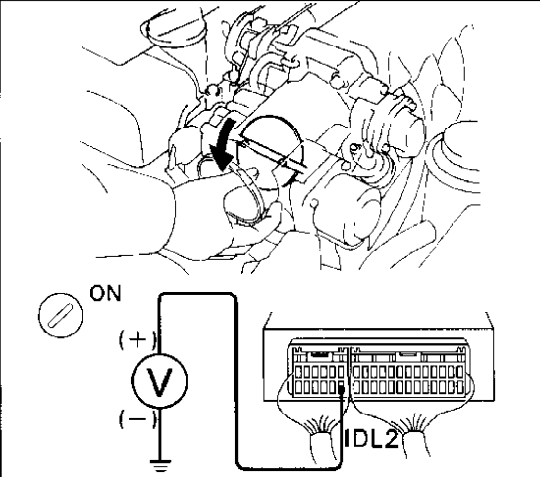
Fig. 28: DTC 47 & 48 - SUB-THROTTLE POSITION SENSOR CIRCUIT CHART
(1 OF 3)

Courtesy of Toyota Motor Sales, U.S.A., Inc.

INSPECTION PROCEDURE

HINT: The sub-throttle position sensor signal is transmitted to the TRAC ECU from ECM, so if an error occurs at the engine side, the TRAC ECU also detects it.
If DTC No.47 is being output for the engine, troubleshoot the engine first.

| | |
|------------|---|
| 1 | Is DTC output for the engine? |
| Check DTC. | |
| NO | YES Repair circuit indicated by the code output. |

| 2 | Check voltage between terminal IDL2 of TRAC ECU and body ground. | | | | | | |
|--|---|-----------------------------|---------|--------------|-------------|------------|-----------|
|  | <p>P 1. Remove TRAC ECU with connectors still connected. 2. Remove intake air duct. 3. Disconnect step motor connector. 4. Turn ignition switch ON.</p> <p>C Measure voltage between terminal IDL2 of TRAC ECU and body ground, when the sub-throttle valve is fully closed and fully open.</p> <p>OK</p> <table border="1"> <thead> <tr> <th>Sub-throttle valve position</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Fully closed</td> <td>Below 1.0 V</td> </tr> <tr> <td>Fully open</td> <td>10 - 14 V</td> </tr> </tbody> </table> | Sub-throttle valve position | Voltage | Fully closed | Below 1.0 V | Fully open | 10 - 14 V |
| Sub-throttle valve position | Voltage | | | | | | |
| Fully closed | Below 1.0 V | | | | | | |
| Fully open | 10 - 14 V | | | | | | |
| NG | OK Go to step 6 . | | | | | | |

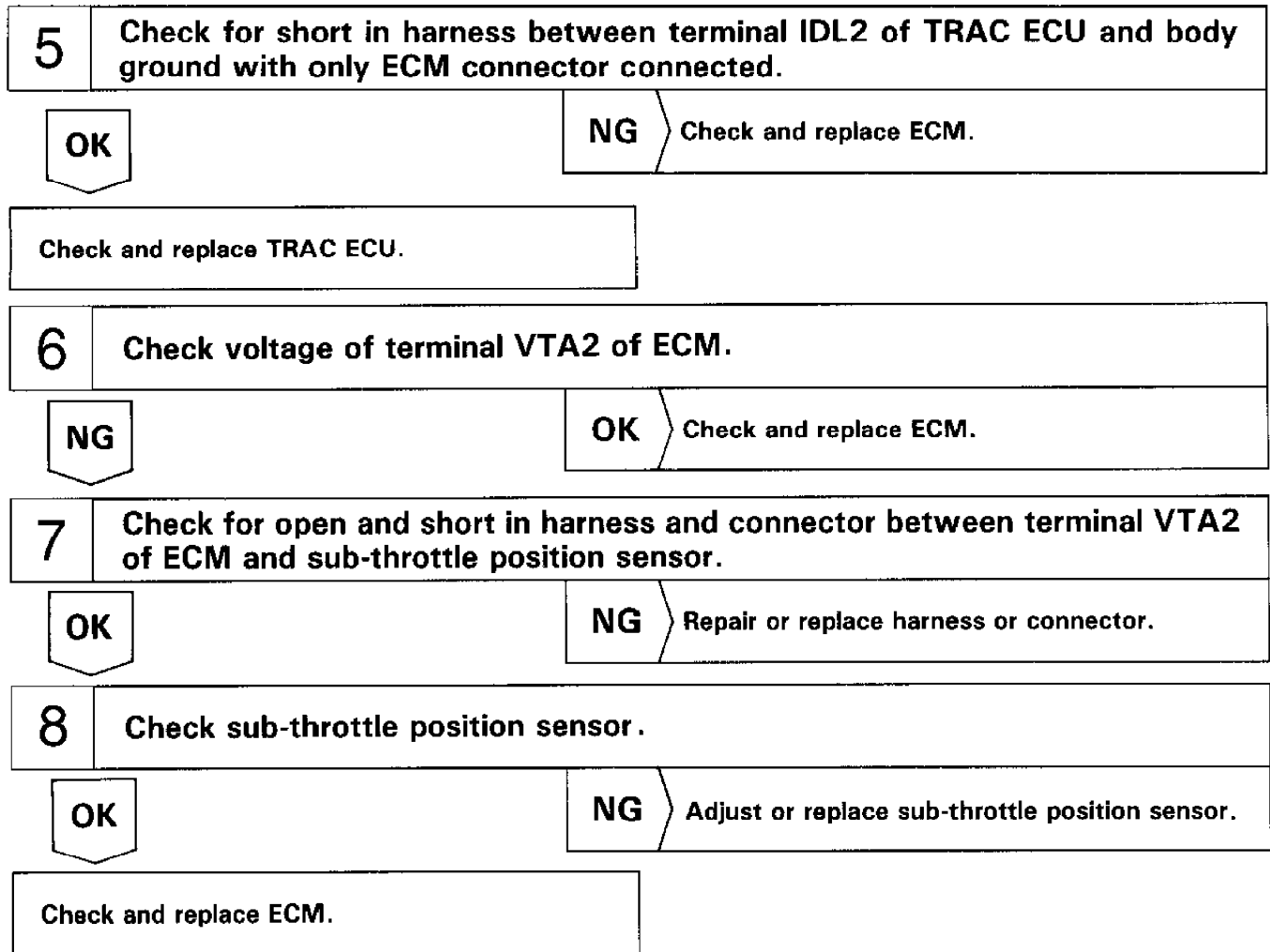
| | |
|-----------|--|
| 3 | Check for open and short in harness and connector between terminal IDL2 of TRAC ECU and sub-throttle position sensor with TRAC ECU, ECM and sub-throttle position sensor connectors disconnected. |
| OK | NG Repair or replace harness or connector. |

| | |
|-----------|---|
| 4 | Check for short in harness between terminal IDL2 of TRAC ECU and body ground with only sub-throttle position sensor connector connected. |
| OK | NG Check and replace sub-throttle position sensor. |

96E20531

Fig. 29: DTC 47 & 48 - SUB-THROTTLE POSITION SENSOR CIRCUIT CHART
(2 OF 3)

Courtesy of Toyota Motor Sales, U.S.A., Inc.



96F20532

Fig. 30: DTC 47 & 48 - SUB-THROTTLE POSITION SENSOR CIRCUIT CHART (3 OF 3)

Courtesy of Toyota Motor Sales, U.S.A., Inc.

DTC 51 - ENGINE MALFUNCTION DETECTION CIRCUIT

| DTC | 51 | Engine Malfunction Detection Circuit |
|---|--|---|
| CIRCUIT DESCRIPTION | | |
| If trouble in the engine control system causes the malfunction indicator light to light up, this information is transmitted from the ECM to the TRAC ECU. The TRAC ECU may prohibit TRAC control as a result. | | |
| DTC No. | DTC Detecting Condition | Trouble Area |
| 51 | Conditions (1) and (2) continue for more than 1 sec.: (1) Engine speed: 500 rpm or more (2) Malfunction information is input from the ECM. | • Engine control system |
| INSPECTION PROCEDURE | | |
| 1 | Check the DTC for the engine. | |
| OK | Malfunction Indicator light remains ON. | Output NG Code / Repair engine control system according to the code output. |
| Check for short in all the harness and ECU connected to malfunction indicator light. | | |

93RR4641

Fig. 31: DTC 51 - ENGINE MALFUNCTION DETECTION CIRCUIT CHART

Courtesy of Toyota Motor Sales, U.S.A., Inc.

DTC 53 - ECM COMMUNICATION CIRCUIT MALFUNCTION

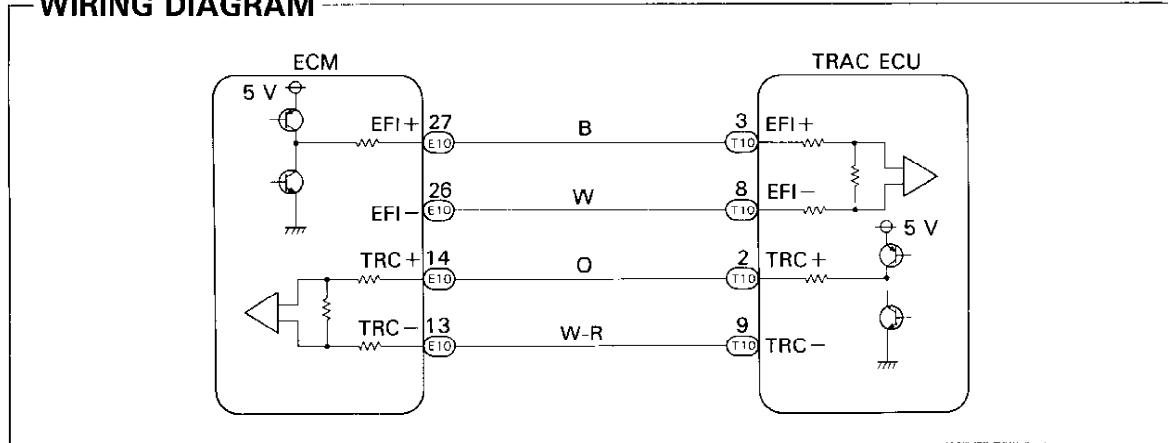
| | | |
|------------|-----------|--|
| DTC | 53 | ECM Communication Circuit Malfunction |
|------------|-----------|--|

CIRCUIT DESCRIPTION

This circuit is used to send TRAC control information from the TRAC ECU to the ECM (TRC+, TRC-), and engine control information from the ECM to the TRAC ECU (EFI+, EFI-).

| DTC No. | DTC Detecting Condition | Trouble Area |
|-----------|---|---|
| 53 | Either of the following (1) or (2) continues for 5 sec.: (1) A signal is received from the ECM indicating trouble in the TRC+ or TRC- circuit. (2) No EFI ± data is received from the ECM when the engine speed is 500 RPM or more, or the vehicle speed is 60 km/h (37 mph) or more. | <ul style="list-style-type: none"> • Open or short in TRC+ or TRC- circuit • Open or short in EFI+ or EFI- circuit • ECM • TRAC ECU |

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT: When the TRAC indicator light is ON, there is a problem in the EFI ± circuit, and when the TRAC indicator light is OFF, there is a problem in the TRC ± circuit.

| | |
|---|--|
| 1 | Check for open and short in harness and connector between terminals EFI+, EFI-, TRC+ and TRC- of ECU and ECM. |
| OK | NG Repair or replace harness or connector. |
| Check and replace ECM or TRAC ECU. | |

93C84642
 Fig. 32: DTC 53 - ECM COMMUNICATION CIRCUIT MALFUNCTION CHART
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

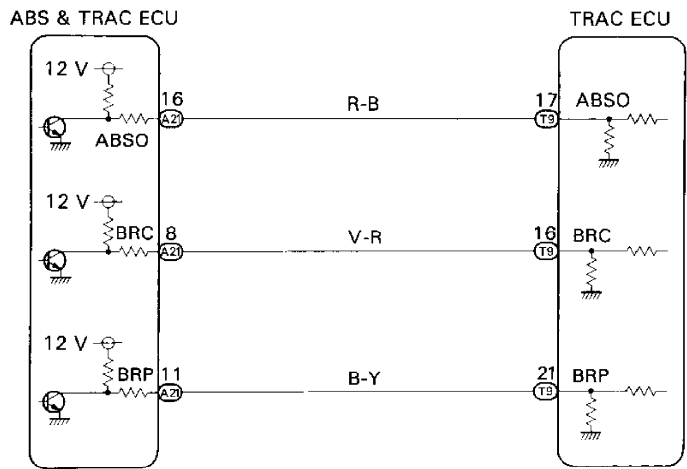
DTC 61 - ABS & TRAC ECU COMMUNICATION CIRCUIT MALFUNCTION

| | | |
|------------|-----------|---|
| DTC | 61 | ABS & TRAC ECU Communication Circuit Malfunction |
|------------|-----------|---|

CIRCUIT DESCRIPTION

| DTC No. | DTC Detecting Condition | Trouble Area |
|-----------|--|---|
| 61 | Malfunction in ABS & TRAC ECU communication circuit. | <ul style="list-style-type: none"> • Open or short in ABSO, BRC, BRP circuit • ABS & TRAC ECU • TRAC ECU |

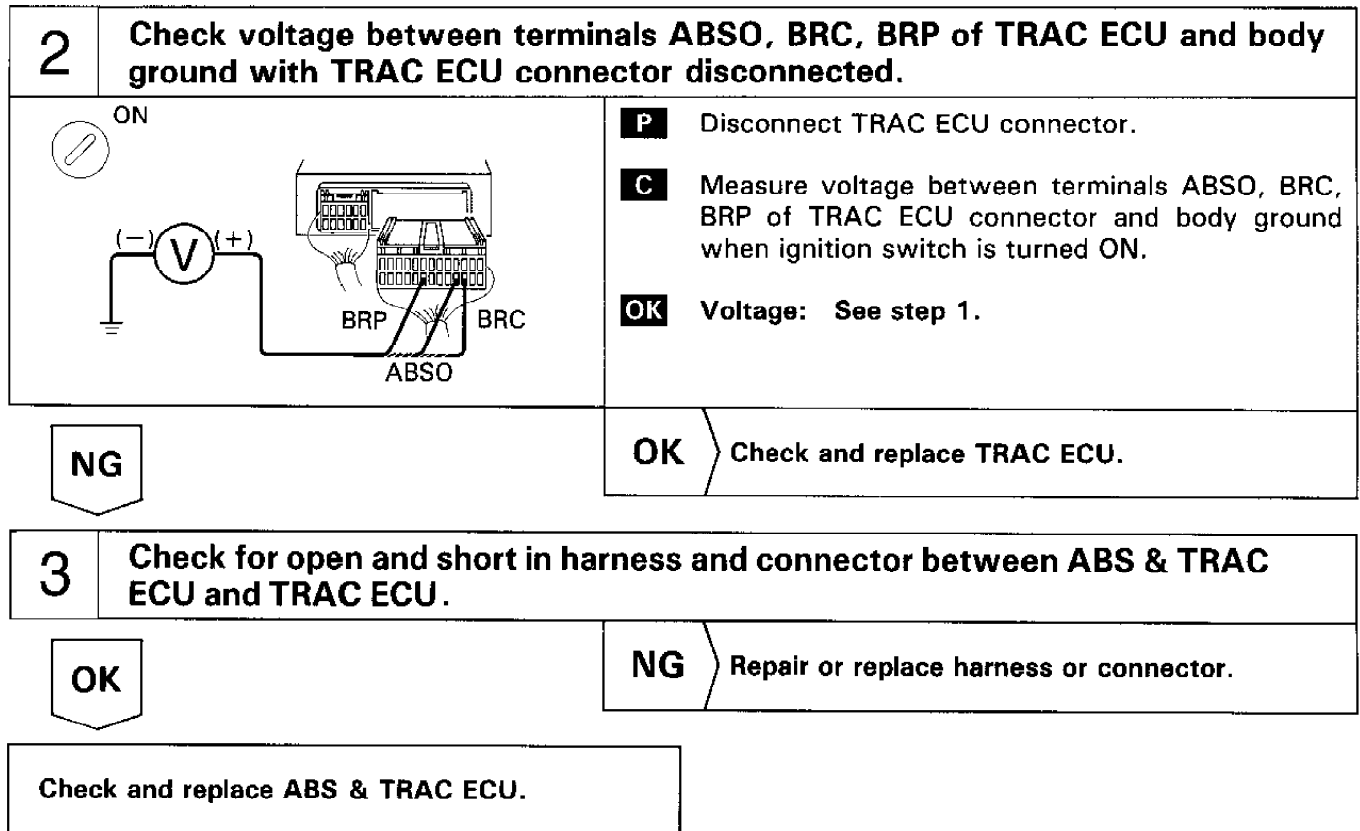
WIRING DIAGRAM



INSPECTION PROCEDURE

| | |
|-----------|--|
| 1 | Check voltage between terminals ABSO, BRC, BRP of TRAC ECU and body ground. |
| | <p>P Remove TRAC ECU with connectors still connected.</p> <p>C Measure voltage between terminals ABSO, BRC, BRP of TRAC ECU and body ground when ignition switch is turned ON.</p> <p>OK Voltage: ABSO, BRC: 6 – 14 V BRP: About 7 V (Pulse) (Reference) 6 – 14 V 1 V or less 3 ms 200 ms</p> |
| NG | OK Check and replace TRAC ECU. |

93D84643
 Fig. 33: DTC 61 - ABS & TRAC ECU COMMUNICATION CIRCUIT
 MALFUNCTION CHART (1 OF 2)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



93E84644

Fig. 34: DTC 61 - ABS & TRAC ECU COMMUNICATION CIRCUIT MALFUNCTION CHART (2 OF 2)

Courtesy of Toyota Motor Sales, U.S.A., Inc.