

DIAGNOSTICS

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REFER TO FOLLOWING REPAIR MANUALS:

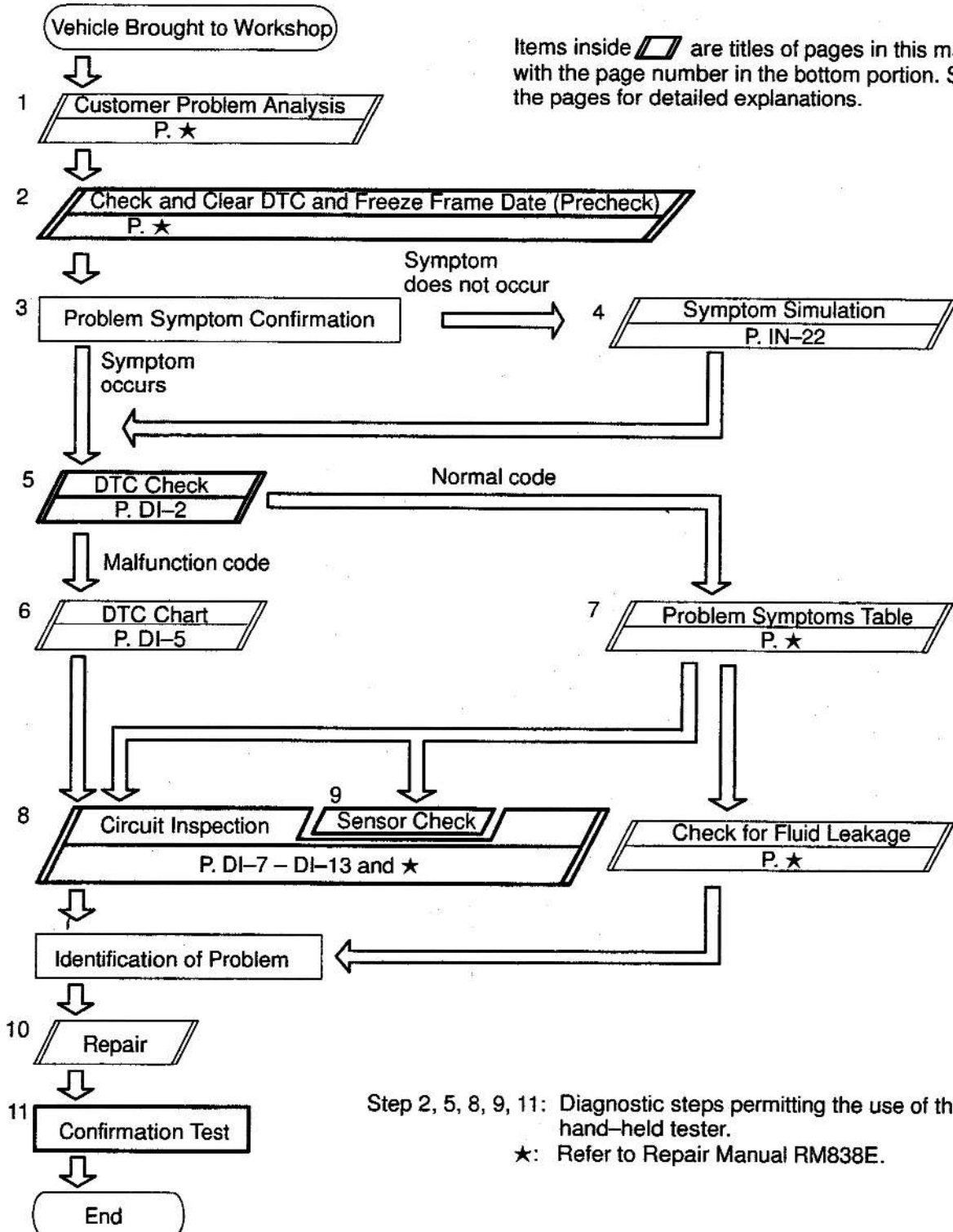
Manual Name	Pub. No.
YARIS / ECHO Chassis and Body Repair Manual	RM685E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Jan., 2001)	RM838E

NOTE: The above pages contain only the points which differ from the above listed manuals.

ANTI-LOCK BRAKE SYSTEM WITH ELECTRONIC BRAKE FORCE DISTRIBUTION (EBD) (1ND-TV)

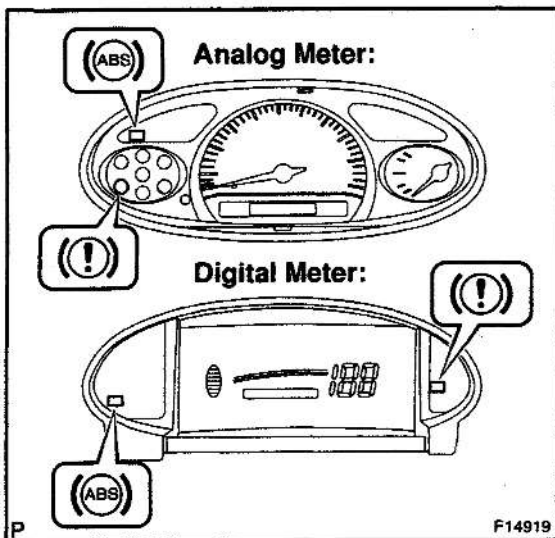
HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following pages.



Fail safe function:

When a failure occurs in the ABS system, the ABS warning light is lit and the ABS operation is prohibited. In addition to this, when the failure which disables the EBD operation occurs, the brake warning light is lit as well and the EBD operation is prohibited.



PRE-CHECK

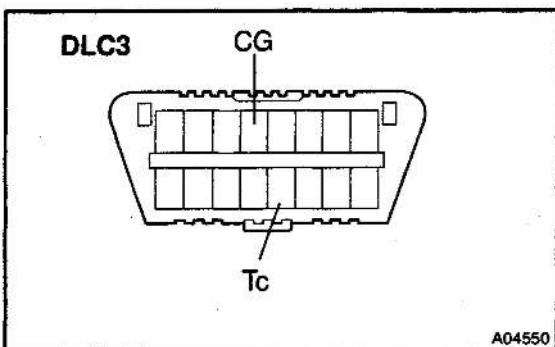
1. DIAGNOSIS SYSTEM

- Release the parking brake lever.
- Check the warning light.

When the ignition switch is turned ON, check that the ABS warning light and brake warning light goes on for 3 seconds.

HINT:

- When the parking brake is applied or the level of the brake fluid is low, the brake warning light is lit.
- If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit or brake warning light circuit (See page DI-7 or DI-13).

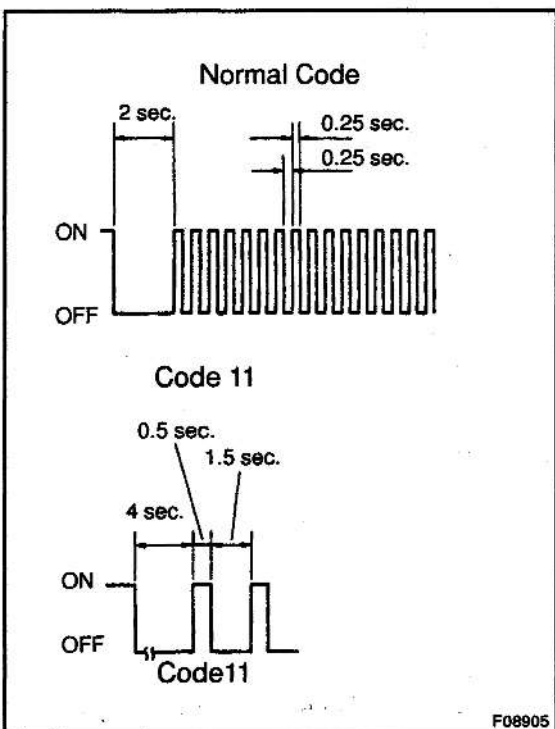


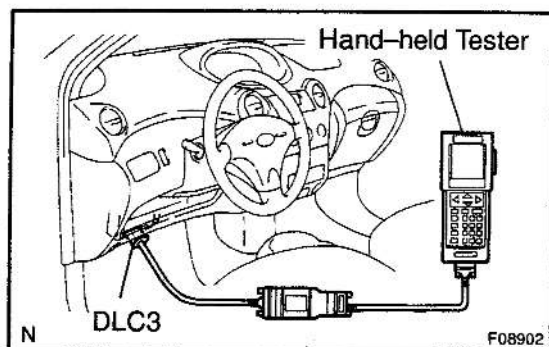
- In case of not using hand-held tester:
Check the DTC.

- Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040
- Turn the ignition switch ON.
- Read the DTC from the ABS warning light on the combination meter.

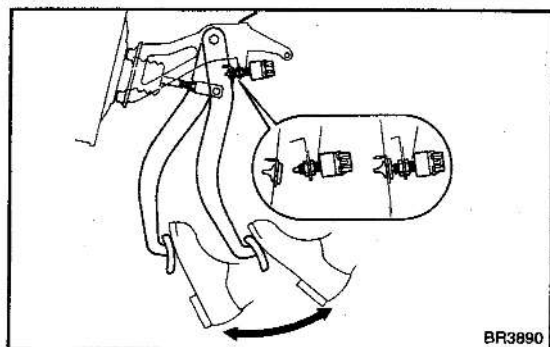
HINT:

- If no code appears, inspect the diagnostic circuit or ABS warning light circuit (See page DI-7 or DI-13).
- As an example, the blinking patterns for normal code and codes 11 are shown on the left.
- Codes are explained in the code table on page DI-5.
- After completing the check, disconnect terminals Tc and CG, and turn off the ignition switch.
Even if 2 or more malfunctions are detected, the lowest numbered DTC will be displayed.

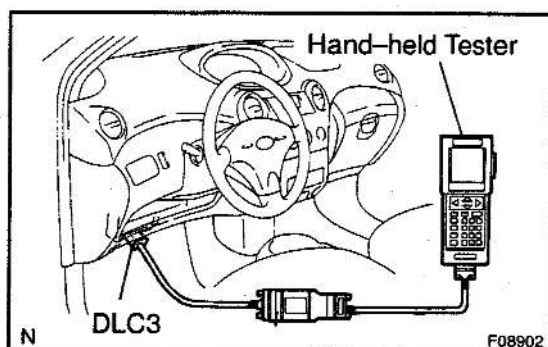




- (d) In case of using hand-held tester:
Check the DTC.
- (1) Hook up the hand-held tester to the DLC3.
 - (2) Turn the ignition switch ON.
 - (3) Read the DTC by following the prompts on the tester screen.
- Please refer to the hand-held tester operator's manual for further details.



- (e) In case of not using hand-held tester:
Clear the DTC.
- (1) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040
 - (2) Turn the ignition switch ON.
 - (3) Clear the DTC stored in ECU by depressing the brake pedal 8 or more times within 5 seconds.
 - (4) Check that the warning light shows the normal code.
 - (5) Remove the SST from the terminals of DLC3.
SST 09843-18040



- (f) In case of using hand-held tester:
Clear the DTC.
- (1) Hook up the hand-held tester to the DLC3.
 - (2) Turn the ignition switch ON.
 - (3) Operate the hand-held tester to erase code.
(See hand-held tester operator's manual.)

2. FREEZE FRAME DATA

- (a) The vehicle (sensor) status at the occurrence of abnormality of the diagnosis code and during the ABS operating can be memorized and displayed using the hand-held tester.
- (b) Only one record of freeze frame data is stored, however, freeze frame data during the ABS operating is always up-dated. After the storage of freeze frame data, up to 31 ignition "ON" operations are stored and displayed.

HINT:

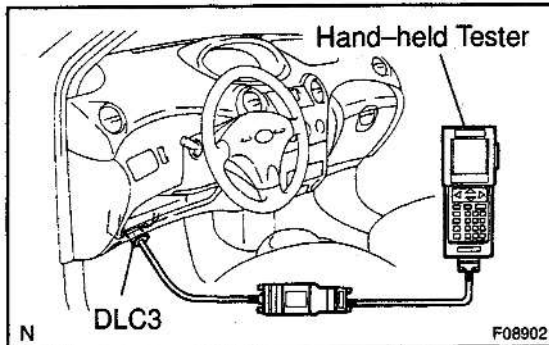
- If the ignition switch "ON" operation exceeds 31 times, "31" appears on the display.
- The ignition switch operation only does not count up. (Driving the vehicle is necessary for the count.)

- (c) If the diagnosis code abnormality occurs, the freeze frame data at the occurrence of the abnormality is stored but the ABS actuation data is deleted.

Hand-held tester display	Measurement Item	Reference Value*
VEHICLE SPD	Vehicle speed	Speed indication of a meter
SPD GRADE	Vehicle speed gradient	-1.5 - 1.5
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Numbers of operations of ignition switch ON after memorizing freeze frame data	0 - 31

*: If no conditions are specifically stated for "Idling", it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

DI



3. In case of using hand-held tester:

SPEED SENSOR SIGNAL CHECK (TEST MODE)

- Hook up the hand-held tester to the DLC3.
- Start the engine.
- Select the ACTIVE TEST mode on the hand-held tester.
- Drive vehicle faster than 45 km/h (28 mph) for several seconds.

HINT:

There is a case that the sensor check is not completed if the vehicle has its wheels spined or its steering wheel steered during this check.

- Read the DTC, from the hand-held tester screen.

HINT:

- See the list of DTC shown at the bottom of this page.
- Please refer to the hand-held tester operator's manual for further details.

DTC of speed sensor check function:

Code No.	Diagnosis	Trouble Area
C1271/71	Low output voltage of right front speed sensor	- Right front speed sensor - Right front speed sensor rotor - Sensor installation
C1272/72	Low output voltage of left front speed sensor	- Left front speed sensor - Left front speed sensor rotor - Sensor installation
C1273/73	Low output voltage of right rear speed sensor	- Right rear speed sensor - Right rear speed sensor rotor - Sensor installation
C1274/74	Low output voltage of left rear speed sensor	- Left rear speed sensor - Left rear speed sensor rotor - Sensor installation
C1275/75	Abnormal change in output voltage of right front speed sensor	Right front speed sensor rotor
C1276/76	Abnormal change in output voltage of left front speed sensor	Left front speed sensor rotor
C1277/77	Abnormal change in output voltage of right rear speed sensor	Right rear speed sensor rotor
C1278/78	Abnormal change in output voltage of left rear speed sensor	Left rear speed sensor rotor

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

When removing the part, turn the ignition switch OFF.

HINT:

- Using SST 09843-18040, connect the terminals Tc and CG of DLC3.
- If any abnormality is found when inspecting parts, inspect the ECU.
- If a malfunction code is displayed during the DTC check, check the circuit listed for that code. For details of each code, turn to the page referred to under the "See page" for respective "DTC No." in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area
C0200/31* (★)	Right front wheel speed sensor signal malfunction	• Right front, left front, right rear and left rear speed sensor • Each speed sensor circuit • Sensor installation
C0205/32* (★)	Left front wheel speed sensor signal malfunction	
C0210/33* (★)	Right rear wheel speed sensor signal malfunction	
C0215/34* (★)	Left rear wheel speed sensor signal malfunction	
C0226/21 (★)	Right front solenoid valves faulty	ABS actuator (right front inlet or outlet solenoid valve)
C0236/22 (★)	Left front solenoid valves faulty	ABS actuator (left front inlet or outlet solenoid valve)
C0246/23 (★)	Right rear solenoid valves faulty	ABS actuator (right rear inlet or outlet solenoid valve)
C0256/24 (★)	Left rear solenoid valves faulty	ABS actuator (left rear inlet or outlet solenoid valve)
C0273/13 (★)	ABS pump motor faulty	• ABS motor relay • Pump motor voltage • Pump motor lead disconnected
C0278/11 (★)	ABS solenoid valve relay faulty	• ABS solenoid valve relay • Valve supply voltage
C1237/37 (★)	Speed sensor rotor is wrong number of teeth on one of the 4 wheels	• Speed sensor • Sensor rotor
C1241/41 (★)	Low battery voltage	• Battery • IC regulator • Power source circuit
C1249/58 (★)	Open circuit in stop light switch circuit	• Stop light switch • Stop light switch circuit
C1300/62 (★)	Malfunction in skid control ECU	• Battery • Skid control ECU
C1330/35* (★)	Open circuit in right front wheel speed sensor circuit	• Right front, left front speed sensor • Each speed sensor circuit
C1331/36* (★)	Open circuit in left front wheel speed sensor circuit	

C1332/38* (★)	Open circuit in right rear wheel speed sensor circuit	• Right rear, left rear speed sensor • Each speed sensor circuit
C1333/39* (★)	Open circuit in left rear wheel speed sensor circuit	
Always ON (★)	Malfunction in skid control ECU	• Charging system • ABS warning light circuit

*: As the DTC cannot only be erased by replacing parts, do either of the following operations.

(1) Clear DTC (See page DI-2).

(2) At a vehicle speed of 20 km/h (12 mph), drive the vehicle for 30 sec. or more.

★: Refer to Repair Manual RM838E.

CIRCUIT INSPECTION

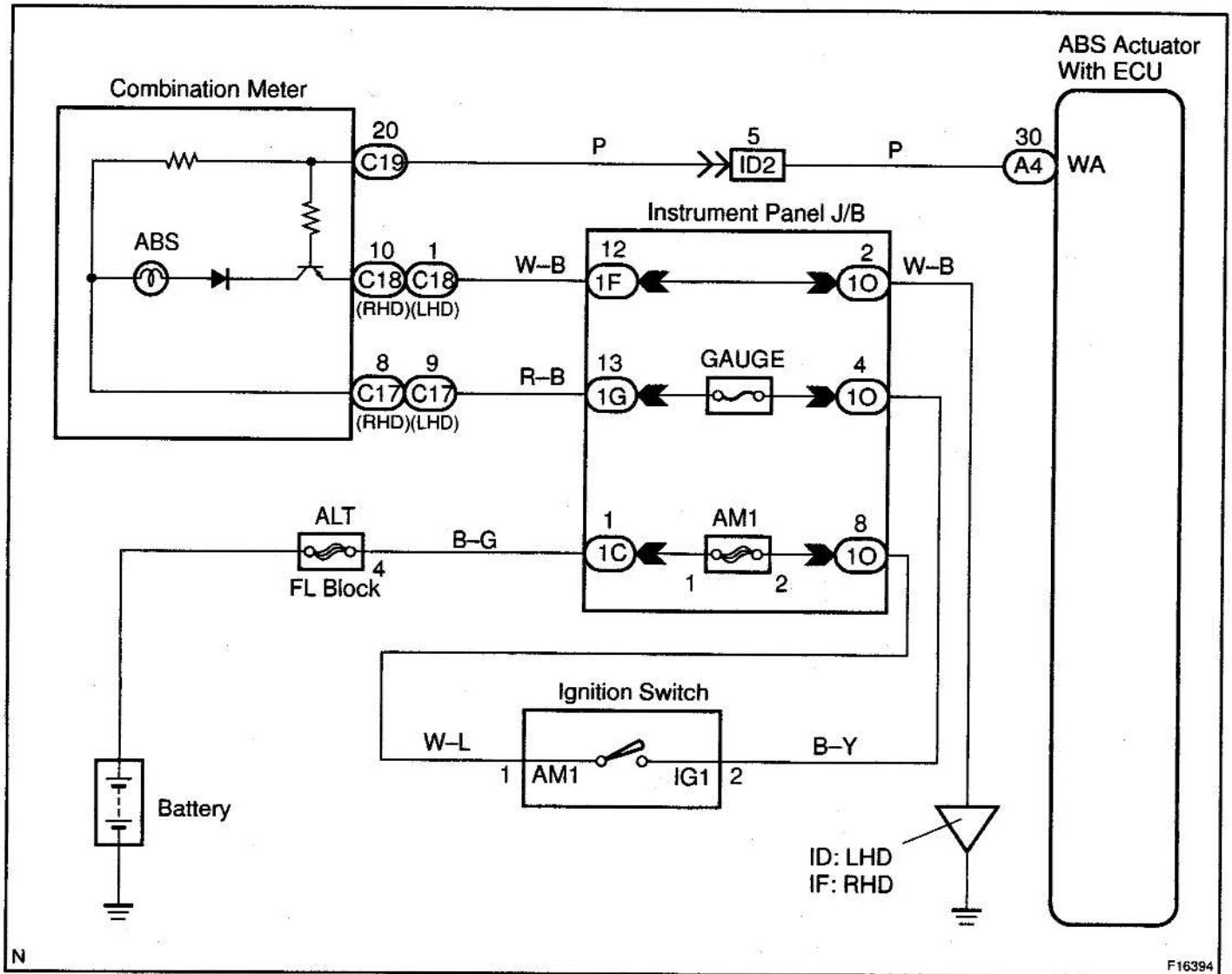
ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a DTC in memory.

Connecting terminals Tc and CG of the DLC3 makes the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

Troubleshoot in accordance with the table below for each trouble symptom.

ABS warning light does not light up	*1
ABS warning light remains on	*2

*1: Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using hand-held tester.

*2: After inspection with step 3, start the inspection from step 4 in case of using the hand-held tester and start from step 5 in case of not using hand-held tester.

DI 1 Check operation of the ABS warning light.
PREPARATION:

- (a) Connect the hand-held tester to the DLC3.
- (b) Turn the ignition switch ON and push the hand-held tester main switch ON.
- (c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check that "ON" and "OFF" of the ABS warning light can be shown on the combination meter by the hand-held tester.

OK

Check and replace ABS actuator assembly (See page IN-32).

NG

2 Check ABS warning light.

See combination meter troubleshooting on page BE-4.

NG

Replace bulb or combination meter assembly.

OK

Check for open circuit in harness and connector between GAUGE fuse and ABS warning light (See page IN-32).

3 Check that the ECU connectors are securely connected to the ECU.

NO

Connect the connector to the ECU.

YES

4 Check operation of the ABS warning light (See step 1).

OK

Check and replace ABS actuator assembly
(See page IN-32).

NG

5 Is DTC output?

Check DTC on page DI-2.

YES

Repair circuit indicated by the code output.

NO

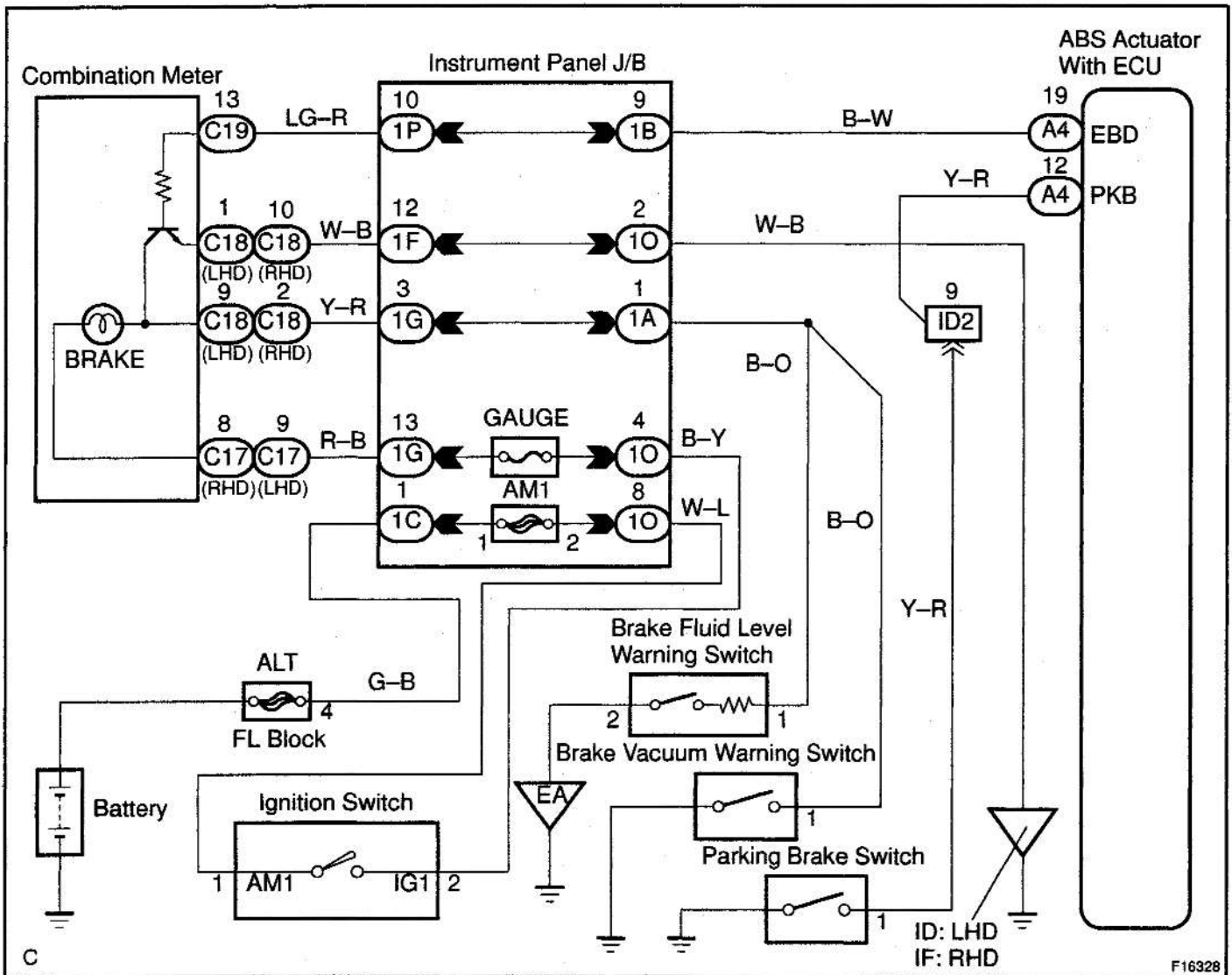
Check for short circuit in harness and connector between ABS warning light, DLC3 and skid control ECU (See page IN-32).

Brake Warning Light Circuit

CIRCUIT DESCRIPTION

The brake warning light lights up when the brake fluid is insufficient, parking brake is applied or the EBD is defective.

WIRING DIAGRAM



INSPECTION PROCEDURE

- 1 Check parking brake switch circuit (See Pub. No. RM685E on page BE-78).

NG

Repair or replace parking brake switch circuit.

OK

- 2 Check brake fluid level warning switch circuit (See Pub. No. RM685E on page BE-77).

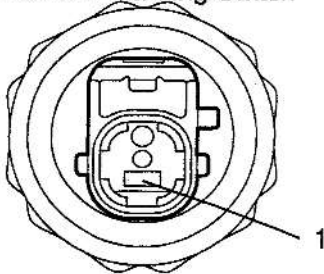
NG

Repair or replace brake fluid level warning switch circuit.

OK

- 3 Check vacuum warning switch circuit.

Vacuum Warning Switch



N

F16709

PREPARATION:

Disconnect the vacuum warning switch connector from the vacuum tank.

CHECK:

Check continuity terminal 1 of the vacuum warning switch and body ground.

OK:

Vacuum Tank	Condition
Fill vacuum	Open
No vacuum	Continuity

NG

Replace vacuum warning switch assembly.

OK

4 Is DTC output for ABS ?

Yes

Repair circuit indicated by the output code.

No

5 Check brake warning light.

See combination meter troubleshooting (See page BE-4).

NG

Repair or replace combination meter.

OK

6 Check for open or short circuit in harness and connector (See page IN-32).

NG

Repair or replace harness or connector.

OK

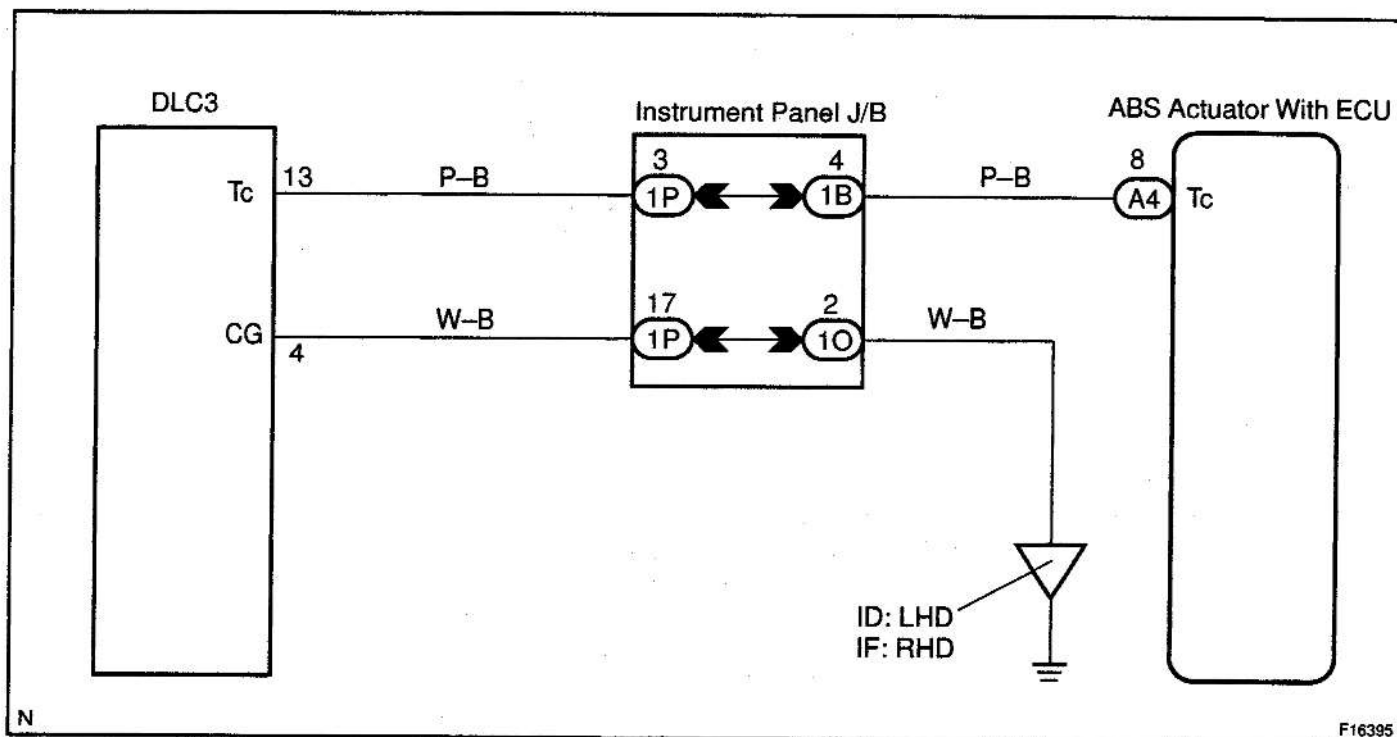
**Check and replace ABS actuator assembly
(See page IN-32).**

Tc Terminal Circuit

CIRCUIT DESCRIPTION

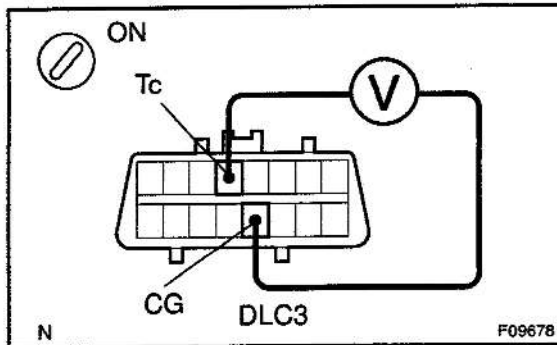
Connecting between terminals Tc and CG of the DLC3 causes the ECU to display the DTC by flashing the ABS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

- | | |
|----------|---|
| 1 | Check voltage between terminals Tc and CG of DLC3. |
|----------|---|

**CHECK:**

- (a) Turn the ignition switch ON.
- (b) Measure voltage between terminals Tc and CG of DLC3.

OK:

Voltage: 5.7 – 8.1 V

OK

If ABS warning light does not blink even after Tc and CG are connected, the ECU may be defective.

NG

- | | |
|----------|--|
| 2 | Check for open and short circuit in harness and connector between skid control ECU and DLC3, DLC3 and body ground (See page IN-32). |
|----------|--|

NG

Repair or replace harness or connector.

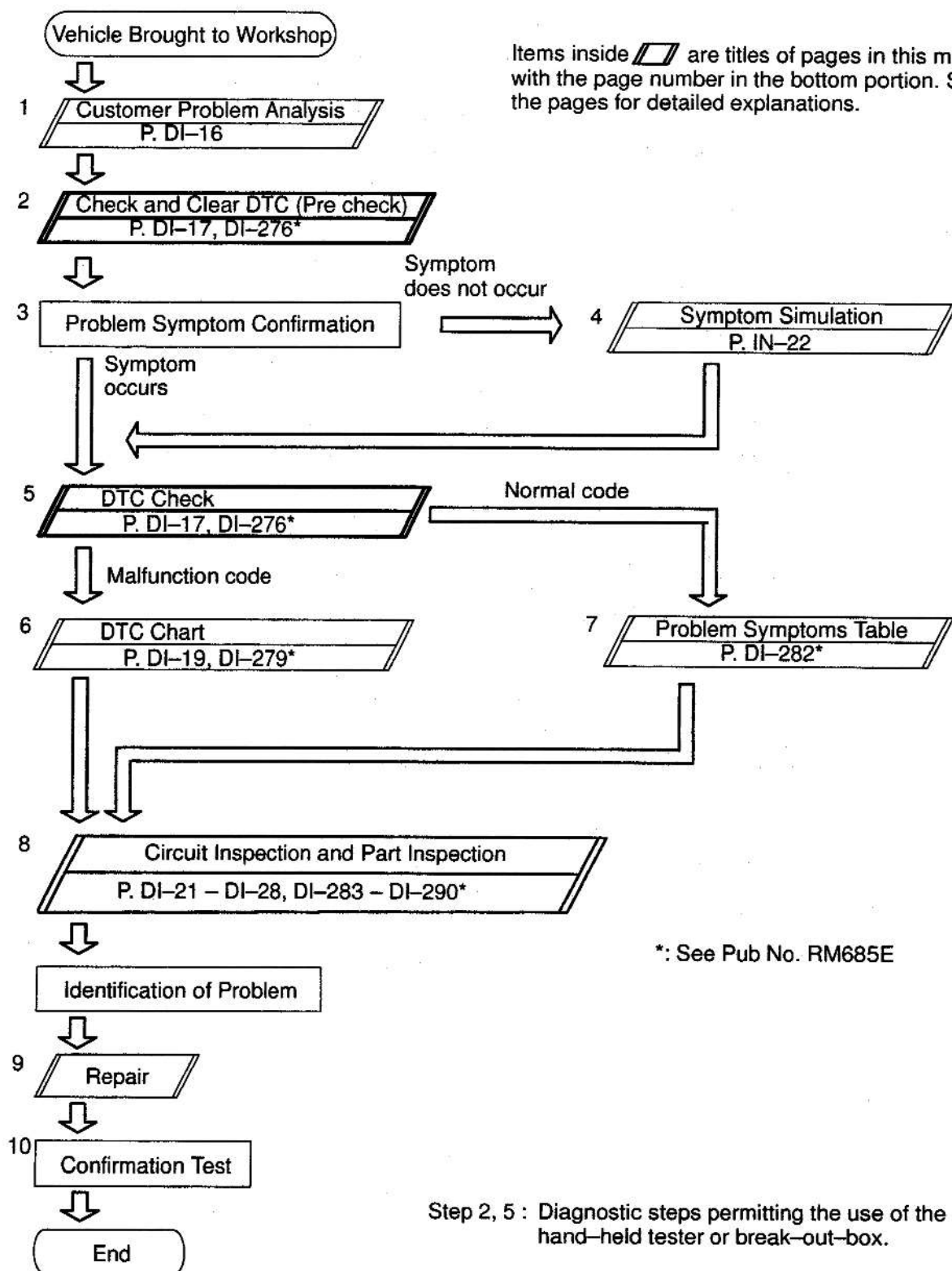
OK

Check and replace ABS actuator assembly (See page IN-32).

ENGINE IMMOBILISER SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following pages.



CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBILISER Check SheetInspector's
Name _____

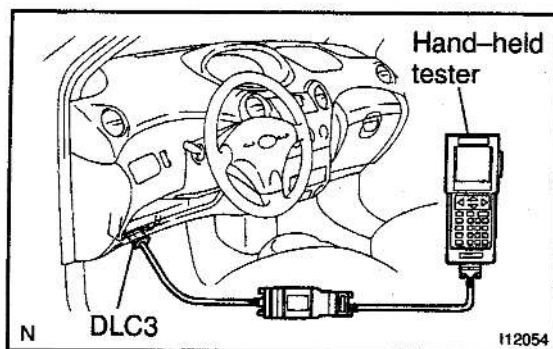
Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Immobiliser is not set. (Engine starts with key codes other than the registered key code.)
	☐ Engine does not start.

Check Item	Malfunction Indicator Lamp	☐ Normal ☐ Remains ON ☐ Does not Light Up
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DTC Check	1st Time	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

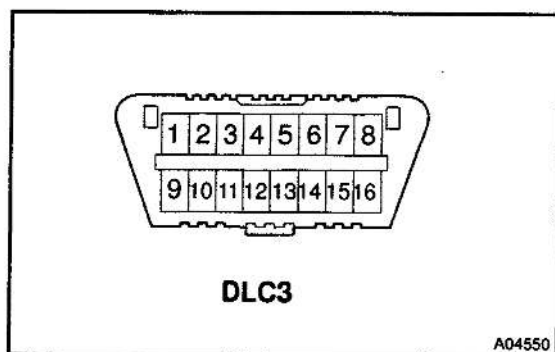


PRE-CHECK

1. 1ND-TV: DIAGNOSIS SYSTEM

(a) Description

ECU controls the function of immobiliser on this vehicle. Data of the immobiliser or DTC can be read from DLC3 of the vehicle. When a trouble occurs on immobiliser, MIL does not light up but DTC inspection is performed. Therefore when there seems to be a trouble on immobiliser, use hand-held tester or SST to check and trouble-shoot it.



(b) Check the DLC3.

The vehicle's engine ECU uses ISO 14230 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 14230 format.

Terminal No.	Connection / Voltage or Resistance	Condition
7	Bus $\oplus$ Line / Pulse generation	During transmission
4	Chassis Ground $\leftrightarrow$ Body Ground / 1 Ω or less	Always
16	Battery Positive $\leftrightarrow$ Body Ground / 9 ~ 14 V	Always

HINT:

If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of the hand-held tester to DLC3, turned the ignition switch ON and operated the hand-held tester, there is a problem on the vehicle side or tool side.

- If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

2. 1ND-TV:**INSPECT DIAGNOSIS (Normal Mode)**

Check the DTC using hand-held tester.

NOTICE:

Hand-held tester only: When the diagnosis system is switched from normal mode to check mode, it erases all DTCs and freeze frame data recorded in normal mode. So before switching modes, always check the DTCs and freeze frame data, and note them down.

- (1) Prepare the hand-held tester.
- (2) Connect the hand-held tester to DLC3.
- (3) Turn the ignition switch ON and push the hand-held tester main switch ON.
- (4) Use the hand-held tester to check the DTCs and freeze frame data, note them down. (For operating instructions, see the hand-held tester instruction book.)
- (5) See page DI-19 to confirm the details of the DTCs.

DIAGNOSTIC TROUBLE CODE CHART**1ND-TV:**

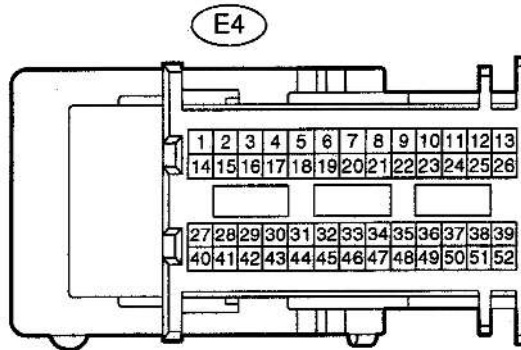
DTC No. (See Page)	Detection Item	Trouble Area
B2795 (DI-21)	Unmatched key code	• Key • Unregistered key inserted before
B2796 (DI-22)	No communication in immobiliser system	• Key • Transponder key amplifier • Wire harness • Engine ECU
B2797 (DI-24)	Communication malfunction No. 1	• Communication contents
B2798 (DI-26)	Communication malfunction No. 2	• Key • Transponder key amplifier • Wire harness • Engine ECU

HINT:

To reduce the unnecessary exchange of engine ECU, check that a trouble occurs with the original engine ECU at the time of exchanging engine ECU and the trouble will disappear with a new engine ECU.

TERMINALS OF ECU

1ND-TV:



C

I23732

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
TXCT – EOM (E4 – 25 ↔ E4 – 4)	L-B ↔ W-B	Ignition Switch ON	4.5 – 5.5
CODE – EOM (E4 – 26 ↔ E4 – 4)	Y-R ↔ W-B	Ignition Switch ON	10 – 14
RXCK – EOM (E4 – 18 ↔ E4 – 4)	Y-B ↔ W-B	Ignition Switch ON	10 – 14

CIRCUIT INSPECTION

DTC	B2795	Unmatched Key Code (1ND-TV)
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CIRCUIT DESCRIPTION

This DTC is output when an unregistered key is inserted. When this DTC is output, delete DTC and insert the key that a customer keeps to check that B2795 is output.

When a key that outputs B2795 is found, register this key. when B2795 is not output, there is a possibility that the unregistered key has been inserted before. (Engine ECU is normal.)

Inquire a customer the condition of using the system to find the cause of the trouble.

(Example: Another key has been inserted, etc..)

DTC No.	DTC Detecting Condition	Trouble Area
B2795/99	No communication	• Key

INSPECTION PROCEDURE

1	Delete DTC and insert all the presently available keys to check whether the engine starts or not.
----------	--

HINT:

When inserting the key that does not start the engine, DTC (B 2795) is stored in memory.

RESULT:

OK	All keys starts the engine.
NG	A specific key does not start the engine.

OK	No problem.
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HINT:

If the result is "OK", please confirm whether or not customers have ever inserted the unregistered key or the immobiliser key (with transponder chip) of other vehicle in the ignition key cylinder, and find out the cause of detecting DTC.



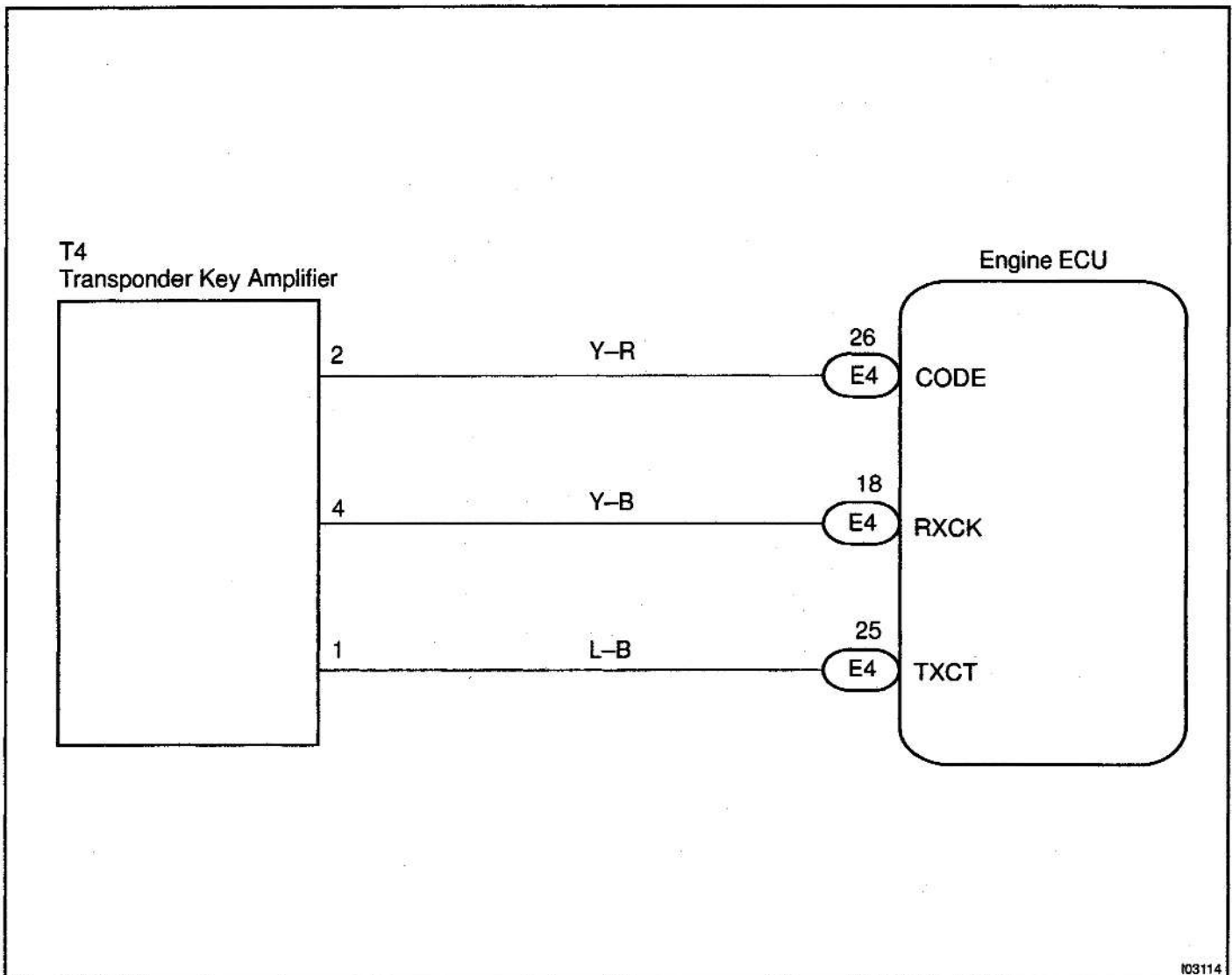
Register the key that does not start the engine.

DTC	B2796	No Communication in Immobiliser system (1ND-TV)
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CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
B2796	No communication	• Key • Transponder Key Amplifier • Wire Harness • Engine ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

- 1** Delete DTC and insert all the presently available keys to check whether the engine starts or not.

RESULT:

A	All keys start the engine.
B	A specific key does not start the engine. In this case, DTC (B 2796) is stored in memory.
C	All keys do not start the engine. In this case, DTC (B 2796) is stored in memory.

A**No problem at this time.****HINT:**

If the result is "A", please confirm whether or not customers have ever inserted the key (without transponder chip) of other vehicle in the ignition key cylinder, and find out the cause of detecting DTC.

B**The transponder chip of a specific key is defective. Replace the key.****C**

- 2** Check harness and connector between transponder key amplifier and Engine ECU.

NG**Repair or replace harness and connector.****OK**

- 3** Does it operate normally after replacement of transponder key amplifier?

Yes**Replace transponder key amplifier.****No****Replace Engine ECU.**

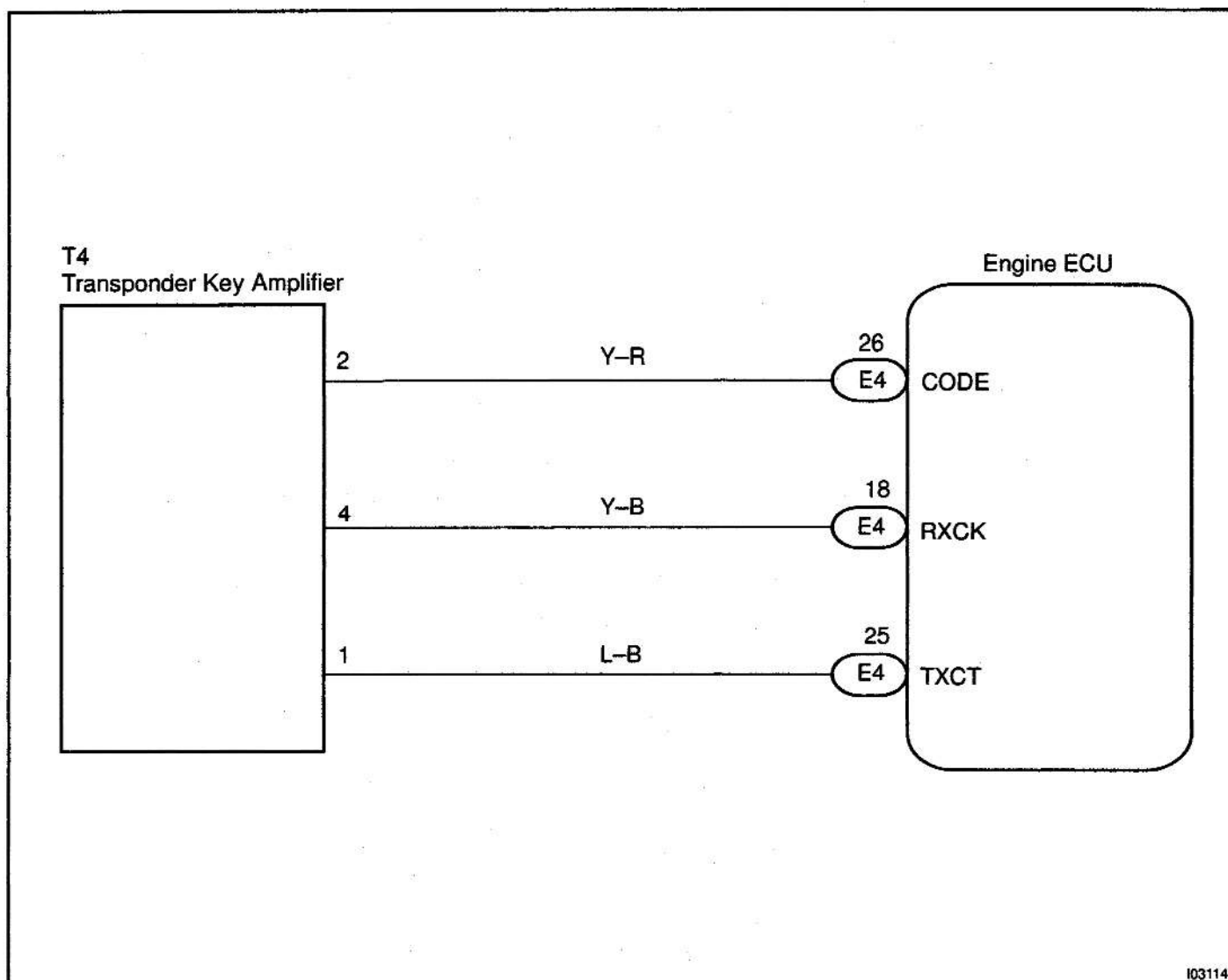
DTC	B2797	Communication Malfunction No. 1 (1ND-TV)
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CIRCUIT DESCRIPTION

This code is detected when although the communication has been performed normally, an error occurs.
(Example. Some noise is included in communication line.)

DTC No.	DTC Detecting Condition	Trouble Area
B2797	Communication error	• Wire Harness • Transponder Key Amplifier • Engine ECU

WIRING DIAGRAM



INSPECTION PROCEDURE**1 Noise check**

102681

PREPARATION:

Insert the already registered master key in the key cylinder.

CHECK:

Using an oscilloscope or hand-held tester, check that noise is included in the signals sent to the CODE terminal of Engine ECU.

OK:

No noise is detected.

NG

Try to find the cause of the noise and remove it.

OK**2 Does the system operate normally after replacement of transponder key amplifier?****Yes**

Replace transponder key amplifier.

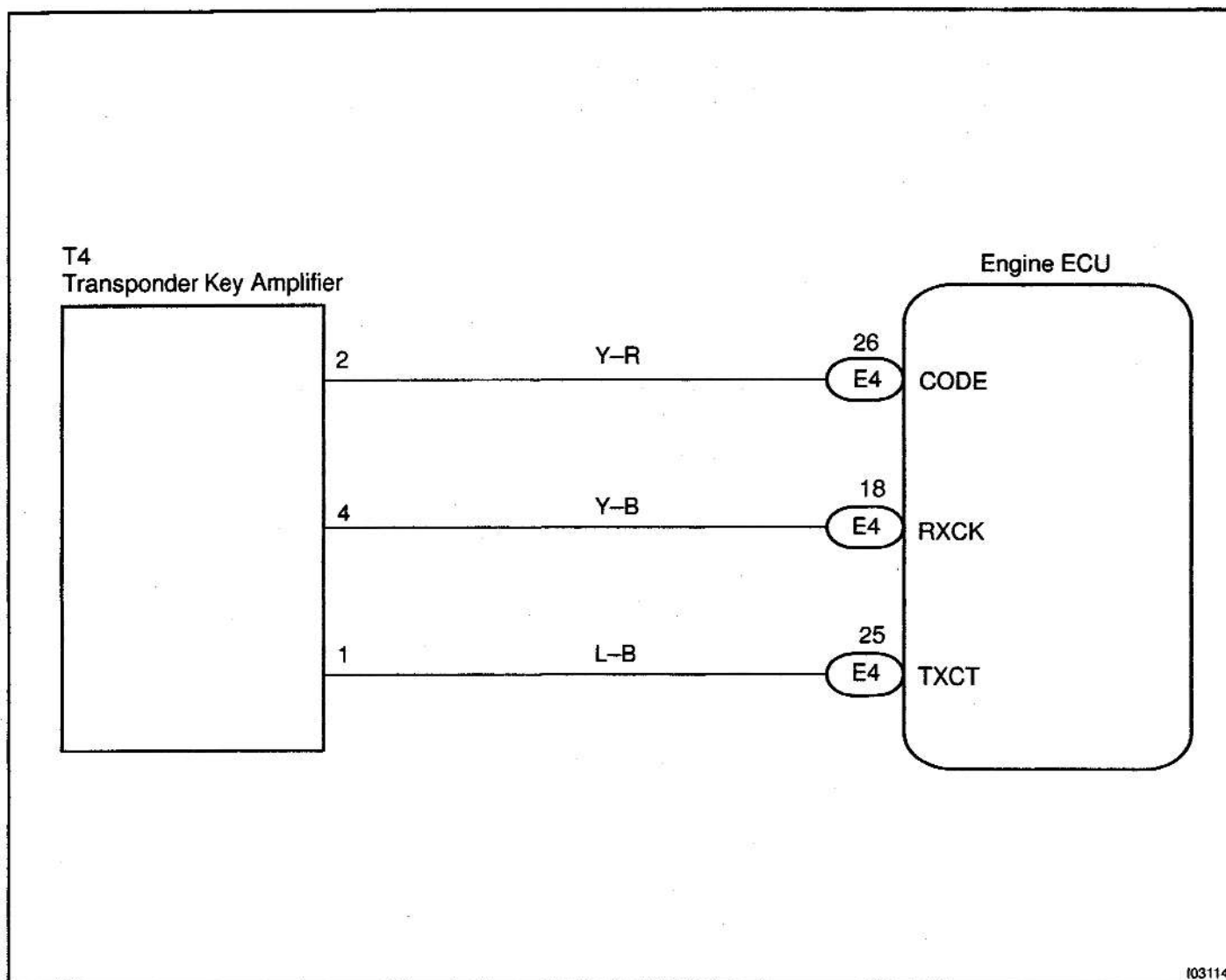
No

Replace Engine ECU.

DTC	B2798	Communication malfunction No. 2 (1ND-TV)
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CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
B2798	Communication error	• Key • Transponder Key Amplifier • Wire harness • Engine ECU

WIRING DIAGRAM

INSPECTION PROCEDURE

1	Check harness and connector between transponder key amplifier and Engine ECU.
----------	--

NG**Repair or replace harness and connector****OK**

2	Does it operate normally after replacement of transponder key amplifier?
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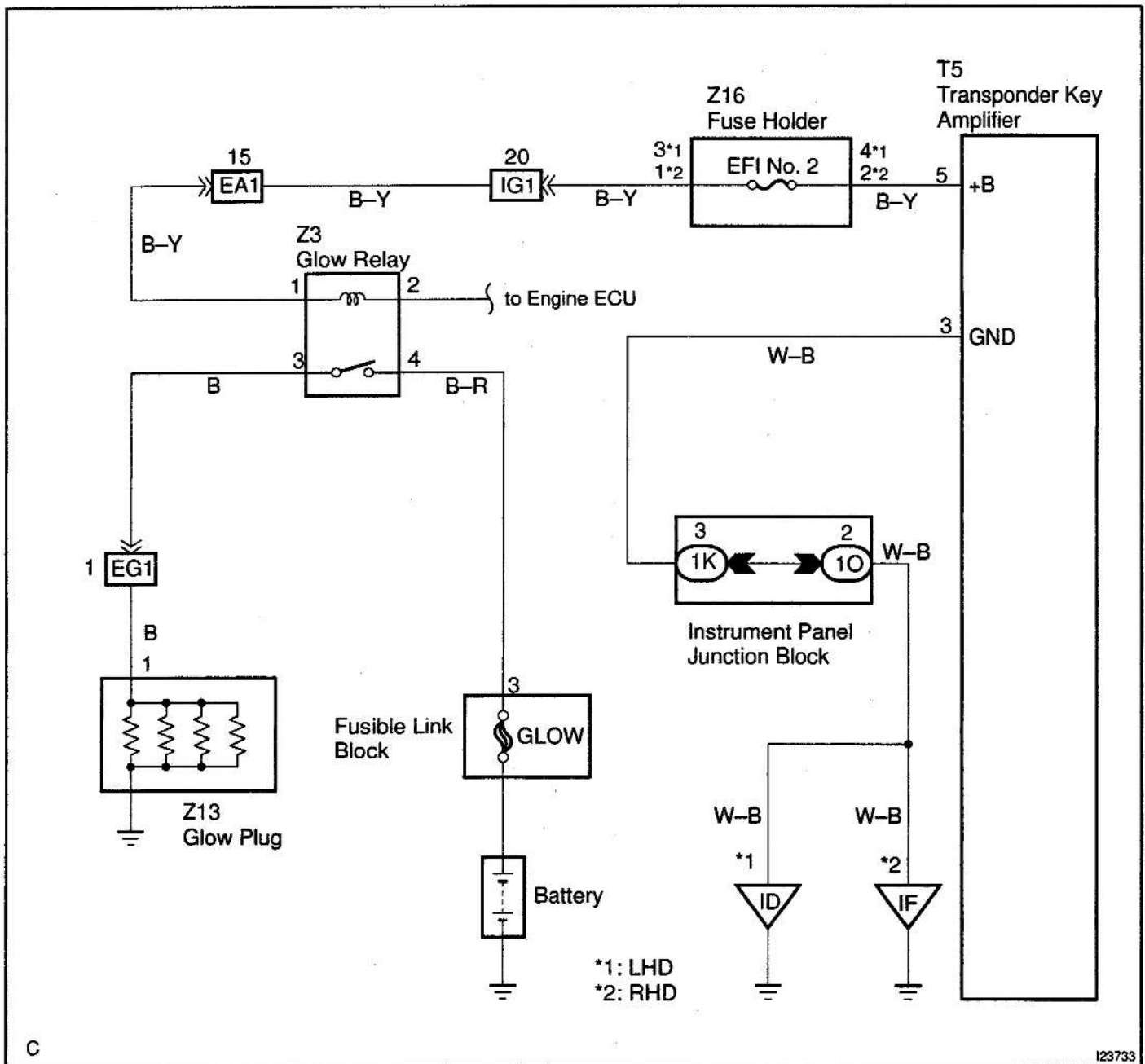
Yes**Replace transponder key amplifier.****No****Replace Engine ECU.**

Power source circuit (1ND-TV)

CIRCUIT DESCRIPTION

This circuit provides power to operate the Transponder Key Amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE**1** Check EFI No. 2 fuse.**CHECK:**

Check continuity of EFI No. 2 fuse.

OK:

Continuity

NG

Replace the failure fuse.

OK

2 Check voltage between terminals +B and GND of Transponder Key Amplifier connector.**PREPARATION:**

- (a) Turn ignition switch OFF.
- (b) Disconnect the Transponder Key Amplifier connector.

CHECK:

Measure voltage between terminals +B and GND.

OK:

Voltage: 10 – 14 V

OK

Proceed to next circuit inspection shown on problem symptoms table. (See Pub No. RM685E on page DI-282)

NG

3 Check wire harness and connector between Transponder Key Amplifier and body ground.

NG

Repair or replace wire harness or connector.

OK

Check and repair wire harness and connector between Transponder Key Amplifier and Battery.

