ENGINE TROUBLESHOOTING

HOW TO PROCEED WITH TROUBLESHOOTING

The Engine Control System broadly consists of the sensors, ECU and actuators. The ECU receives signals from various sensors, judges the operating conditions and determines the optimum injection duration, timing, ignition timing and idle speed.

In general, the Engine Control System is considered to be a very intricate system to troubleshoot. But, the fact is that if you proceed to inspect the circuit one by one following the procedures directed in this manual, troubleshooting of this system is not complex.

This section explains the most ideal method of troubleshooting and tells how to carry out the necessary repairs.

[1] CUSTOMER PROBLEM ANALYSIS

Using the customer problem analysis check sheet for reference, ask the customer in as much details as possible about the problem.

[2] CHECK AND CLEAR DIAGNOSTIC CODE (PRECHECK)

Before confirming the problem symptom, first check the diagnostic code and make a note of any malfunction code which is output, then clear the code.

HINT: Output of the malfunction code indicates that there is a malfunction in the circuit indicated. However, it does not indicate whether the malfunction is still occurring or occurred in the past and returned to normal. In order to determine this, the problem symptoms should be confirmed in [4] first and the diagnostic code be rechecked in [6].

Accordingly, if troubleshooting is begun based on the malfunction code only in diagnostic code check in [2], it could result in a misdiagnosis, leading to troubleshooting of circuits which are normal and making it more difficult to locate the cause of the problem.

[3] SETTING THE TEST MODE DIAGNOSIS, [4] PROBLEM SYMPTOM CONFIRMATION, [5] SYMPTOM SIMULATION

In order to find out the trouble more quickly, set the diagnosis check in test mode and with higher sensing ability of the ECU, confirm the problem symptoms. If the trouble does not reappear, use the symptom simulation method to make sure the trouble is reproduced.

[6] DIAGNOSTIC CODE CHECK IN TEST MODE

Check the diagnostic code in test mode. If the malfunction code is output, proceed to ”step [8] Diagnostic Code Chart”. If the normal code is output, proceed to ”step [7] Basic Inspection”.

[7] BASIC INSPECTION

Carry out basic inspection such as the spark check and fuel pressure check, etc.

[8] DIAGNOSTIC CODE CHART

If the malfunction code is displayed, proceed to inspect the circuit indicated by the chart for each code.

[9] MATRIX CHART OF PROBLEM SYMPTOMS

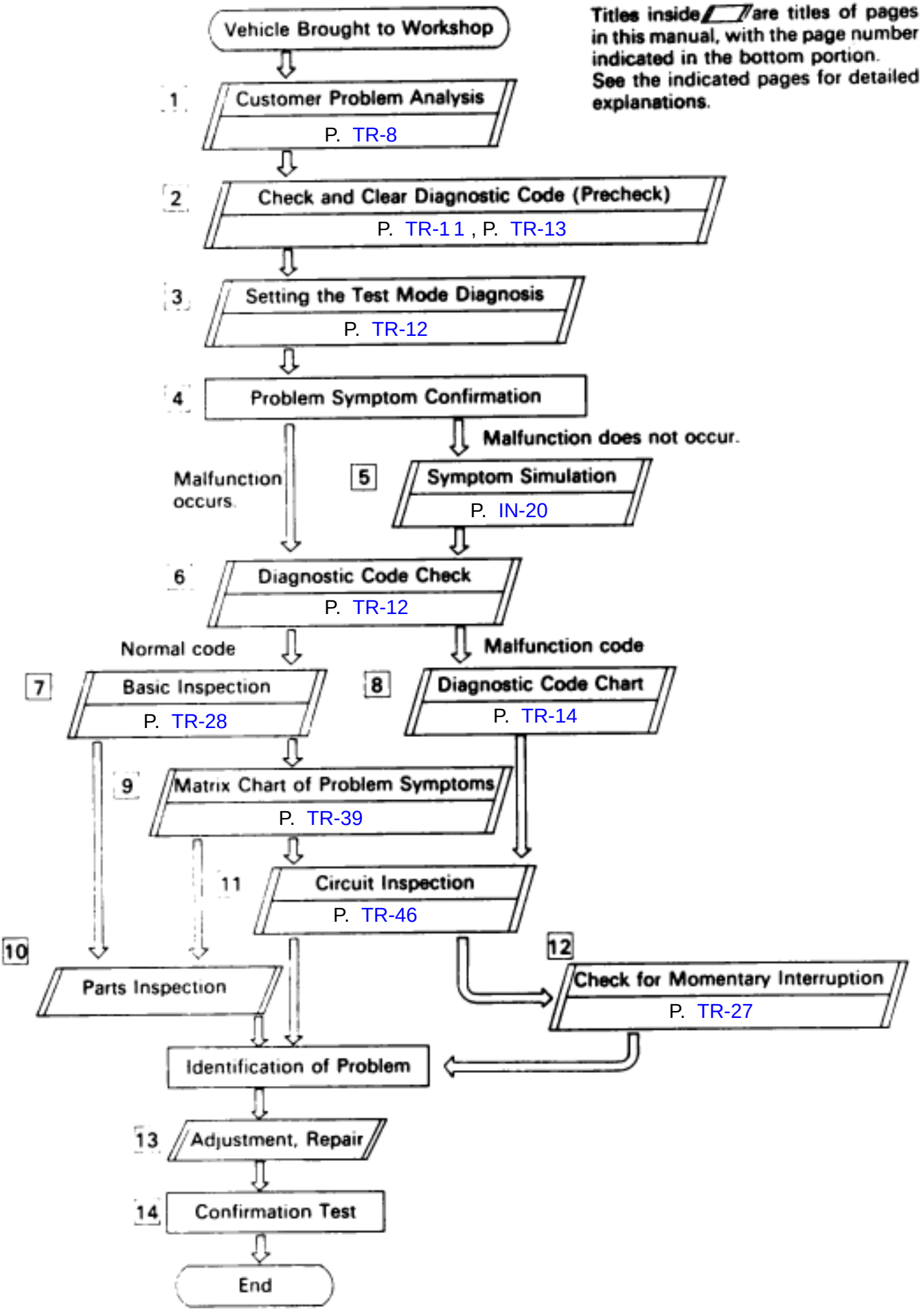
If the normal code is displayed in the diagnosis in test mode, perform troubleshooting according to the inspection order in the Matrix Chart of Problem Symptoms.

[10] PARTS INSPECTION

When the Matrix Chart of Problem Symptoms instructs to check the parts, proceed to parts inspection section included in this manual.

[11] CIRCUIT INSPECTION

Determine if the malfunction is the sensor, actuator, wire harness, connector or the ECU.


Titles inside are titles of pages in this manual, with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.
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4 Problem Symptom Confirmation
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11 Circuit Inspection
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10 Parts Inspection
12 Check for Momentary Interruption
P. TR-27
Identification of Problem
13 Adjustment, Repair
14 Confirmation Test
End

[12] CHECK FOR MOMENTARY INTERRUPTION

By performing the check for momentary interruption, the place where momentary interruptions or momentary shorts are occurring due to poor contacts can be isolated.

[13] ADJUSTMENT, REPAIR

After the cause of the problem is located, perform adjustment or repairs by following the inspection and replacement procedures in this manual.

[14] CONFIRMATION TEST

After completing adjustment or repairs, confirm not only that the malfunction is eliminated, but also conduct a test drive, etc., to make sure the entire Engine Control System is operating normally.

-MEMO-

How to Proceed with Troubleshooting Using Volt/Ohm Meter and TCCS Checker

For the explanation of steps [1] ~ [6], [8] and [0] ~ [16], see the explanation of steps with the same title on page TR-2 .

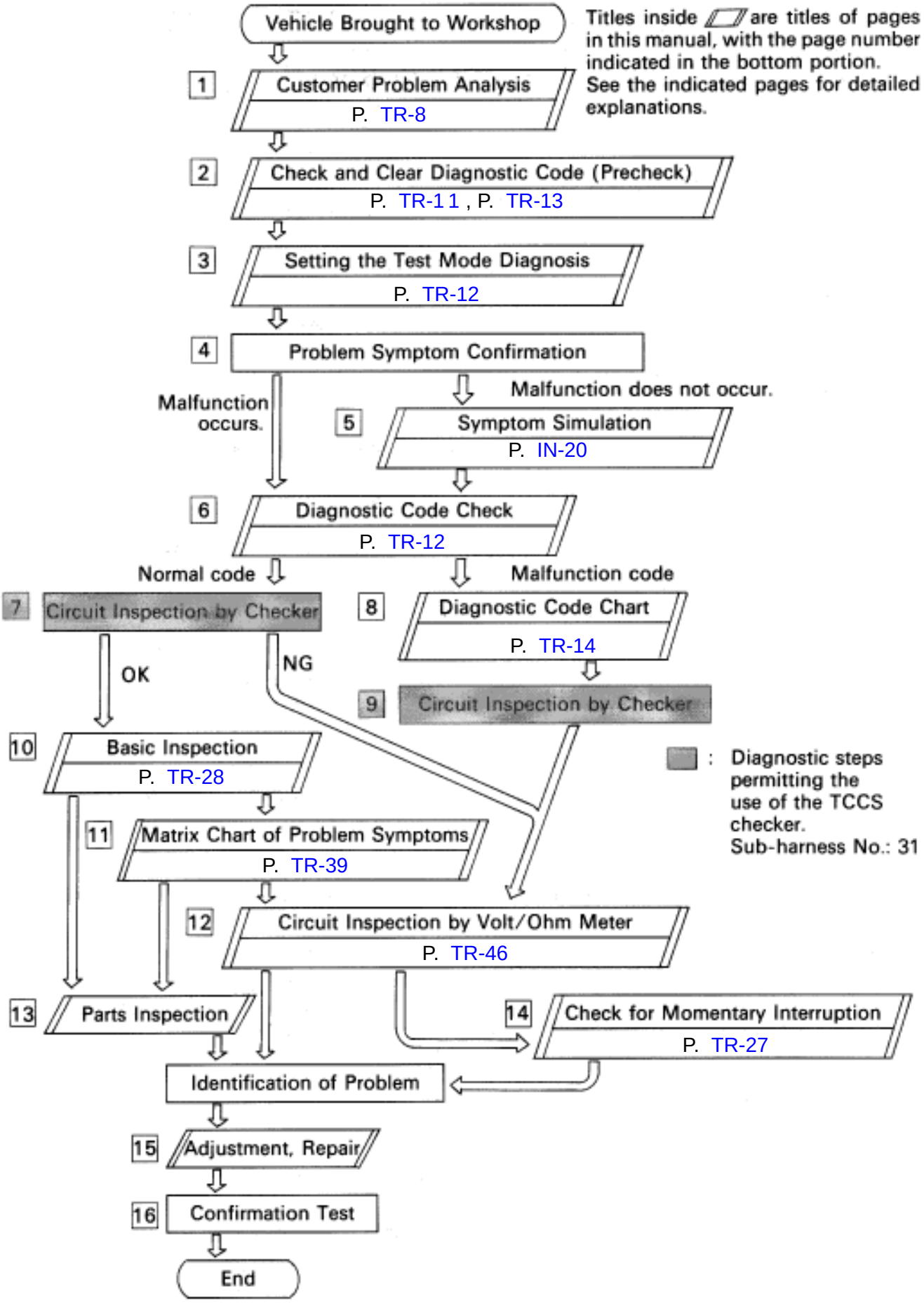
[7] [9] CIRCUIT INSPECTION BY CHECKER

If the Normal code is displayed in the diagnostic code check, connect the checker to the vehicle and check all the circuits which can be inspected using the checker.

If a malfunctioning circuit is then detected, proceed to ”Circuit Inspection by Volt/Ohm Meter” and check the applicable circuit using a volt/ohm meter. Determine if the malfunction is in the sensor, actuator, wire harness, connector or the ECU. If the malfunctioning circuit cannot be detected using the checker, proceed to ”Basic Inspection” and perform troubleshooting.

If a malfunction code is displayed in the diagnostic code check, use the checker to inspect the circuit indicated by the diagnostic code chart for the displayed code.

For instructions on how to connect the checker to the vehicle and how to use the checker, please refer to the Instruction Manual for TCCS checker.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1 Customer Problem Analysis
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OK
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: Diagnostic steps permitting the use of the TCCS checker.
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Identification of Problem
15 Adjustment, Repair
16 Confirmation Test
End

CUSTOMER PROBLEM ANALYSIS CHECK SHEET

ENGINE CONTROL System Check Sheet

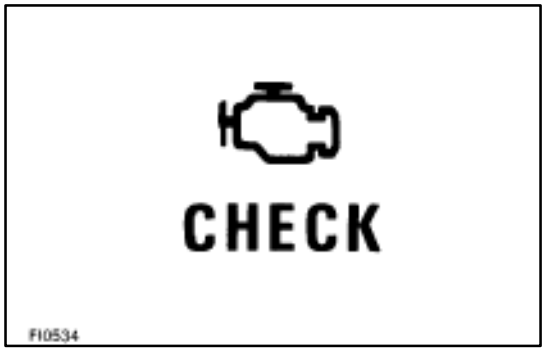
Inspector's Name :

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

Date of Problem Occurrence		
Frequency of Problem Occurrence		☐ Constant ☐ Sometime (times per day/month) ☐ Once only ☐ Other ( )
Conditions at Time of Problem Occurrence	Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Other
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))
	Place	☐ Highway ☐ Suburbs ☐ Inner City ☐ Hill (☐ Up, ☐ Down) ☐ Rough road ☐ Other ( )
	Engine Temp.	☐ Cold ☐ Warming up ☐ After warming up ☐ Any temp. ☐ Other
	Engine Operation	☐ Starting ☐ Just after starting ☐ Idling ☐ Racing without load ☐ Driving (☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ Other ( ))

Problem Symptoms	☐ Engine does not Start	☐ Engine does not crank ☐ No initial combustion ☐ No complete combustion
	☐ Difficult to Start	☐ Engine cranks slowly ☐ Other ( )
	☐ Poor Idling	☐ Incorrect first idle ☐ Idling rpm is abnormal [☐ High ☐ Low (rpm)] ☐ Rough idling ☐ Other ( )
	☐ Poor Driveability	☐ Hesitation ☐ Back fire ☐ Muffler explosion (after fire) ☐ Surging ☐ Knocking ☐ Other ( )
	☐ Engine Stall	☐ Engine stall soon after starting ☐ After acceleration pedal depressed ☐ After acceleration pedal released ☐ During A/C operation ☐ When N to D shift ☐ Other ( )
	☐ Others	

Condition of "CHECK" Engine Warning Light		☐ Remains on ☐ Sometimes lights up ☐ Does not light up
Diagnostic Code Inspection	Normal Mode (Precheck)	☐ Normal code ☐ Malfunction code [code]
	Test Mode	☐ Normal code ☐ Malfunction code [code]



DIAGNOSIS SYSTEM

DESCRIPTION

The ECU contains a built-in self-diagnosis system by which troubles with the engine signal network are detected and a "CHECK" engine warning light on the instrument panel lights up.

By analyzing various signals as shown in the later table (See page TR-14) the Electronic Control Unit (ECU) detects system malfunctions relating to the sensors or actuators.

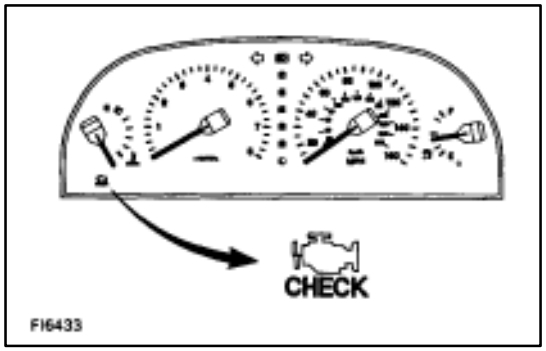
In the normal mode, the self-diagnosis system monitors 18 (USA specification vehicles with TRAC control) or 13 (USA (except for California) and Canadian specification vehicles with TRAC control) items, indicated by code No. as shown in TR-14 . A "CHECK" engine warning light informs the driver that a malfunction has been detected. The light goes off automatically when the malfunction has been repaired. But the diagnostic code(s) remains stored in the ECU memory (except for code Nos. 16 and 53). The ECU stores the code(s) until it is cleared by removing the EFI fuse with the ignition switch off.

The diagnostic code can be read by the number of blinks of the "CHECK" engine warning light when TE1 and E1 terminals on the TDCL or check connector are connected. When 2 or more codes are indicated, the lowest number (code) will appear first.

In the test mode, 13 (USA specification vehicles with TRAC control) or 10 (USA (except for California) and Canadian specification vehicles with TRAC control) items, indicated by code No. as shown in TR-14 are monitored. If a malfunction is detected in any one of the systems indicated by code Nos. 13, 21, 22, 24, 25, 26, 27, 28, 35, 41, 47, 71 and 78 (USA specification vehicles) or 13, 21, 22, 24, 25, 28, 35, 41, 47 and 78 (USA (except for California) and Canadian specification vehicles) the ECU lights the "CHECK" engine warning light to warn the technician that malfunction has been detected. In this case, TE2 and E1 terminals on the TDCL should be connected as shown later. (See page TR-12).

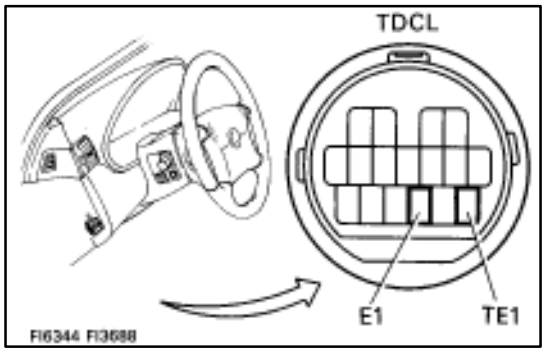
In the test mode, even if the malfunction is corrected, the malfunction code is stored in the ECU memory even when the ignition switch is off (except code Nos. 43 and 51). This also applies in the normal mode. The diagnostic mode (normal or test) and the output of the "CHECK" engine warning light can be selected by connecting the TE1, TE2 and E1 terminals on the check connector or TDCL, as shown later.

A test mode function has been added to the functions of the self-diagnosis system of the normal mode for the purpose of detecting malfunctions such as poor contact, which are difficult to detect in the normal mode.



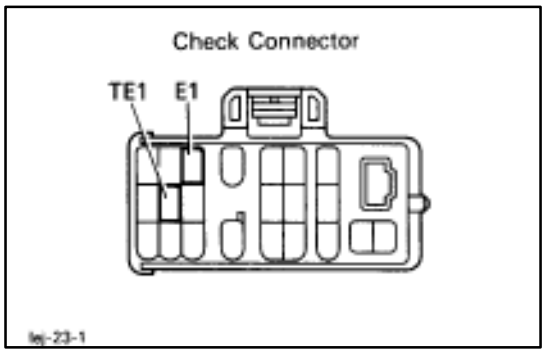
Diagnosis Inspection (Normal Mode) "CHECK" ENGINE WARNING LIGHT CHECK

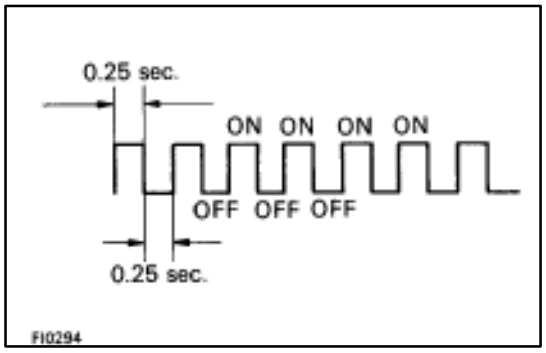
1. **The "CHECK" engine warning light will come on when the ignition switch is turned ON and the engine is not running.**
   HINT: If the "CHECK" engine warning light does not light up, proceed to troubleshooting of the combination meter (See page BE-146).
2. **When the engine is started, the "CHECK" engine warning light should go off.**
   If the light remains on, the diagnosis system has detected a malfunction or abnormality in the system.



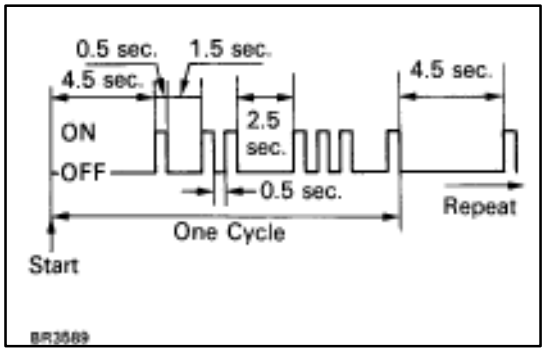
DIAGNOSTIC CODE CHECK

1. **Turn ignition switch on.**
2. **Using SST, connect terminals between TE1 and E1 of TDCL or check connector.**
   SST 09843-18020





3. **Read the diagnostic code from "CHECK" engine warning light.**
   HINT: If a diagnostic code is not output, check the TE1 terminal circuit (See page TR-140).



As an example, the blinking patterns for codes;normal, 12 and 31 are as shown on the illustration.

4. **Check the details of the malfunction using the diagnostic code table on page TR-14 .**
5. **After completing the check, disconnect terminals TE1 and E1, and turn off the display.**
   HINT: In the event of 2 or more malfunction codes, indication will begin from the smaller numbered code and continue in order to the larger.

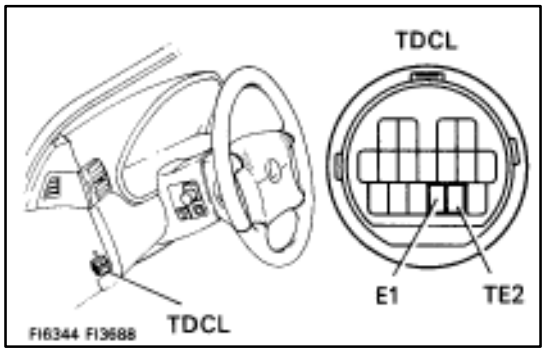
Diagnosis Inspection (Test Mode)

Compared to the normal mode, the test mode has high sensing ability to detect malfunctions.

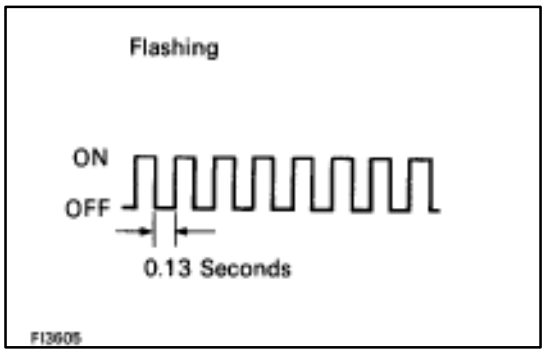
It can also detect malfunctions in the starter signal circuit, the IDL contact signal of the throttle position sensor, air conditioner signal and neutral start switch signal.

Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the test mode.

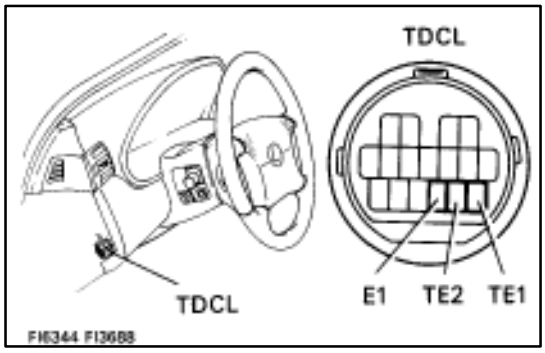
DIAGNOSTIC CODE CHECK



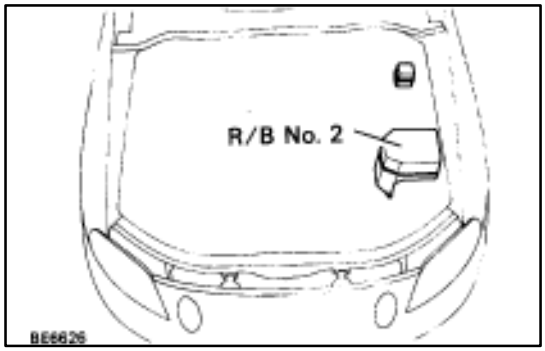
1. Initial conditions.
   (a) Battery voltage 11 V or more.
   (b) Throttle valve fully closed (throttle position sensor IDL points closed).
   (c) Transmission in neutral position.
   (d) Air conditioner switched off.
2. Turn ignition switch off.
3. Using SST, connect terminals TE2 and E1 of TDCL.
   SST 09843-18020

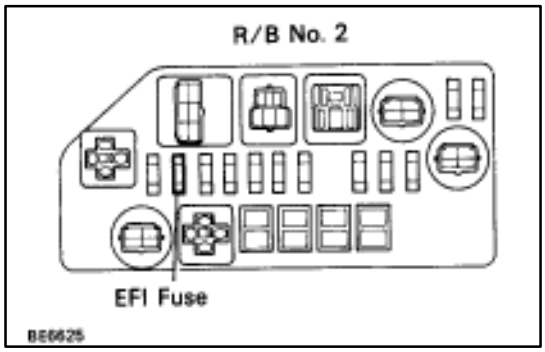


4. Turn ignition switch on.
   HINT:
   - To confirm that the test mode is operating, check that the "CHECK" engine warning light flashes when the ignition switch is turned to ON.
   - If the "CHECK" engine warning light does not flash, proceed to troubleshooting of the TE2 terminal circuit on page TR-140 .
5. Start the engine.
6. Simulate the conditions of the malfunction described by the customer.



7. After the road test, using SST, connect terminals TE1 and E1 of TDCL or check connector.
   SST 09843-18020
8. Read the diagnostic code on "CHECK" engine warning light on the combination meter (See page TR-1 1).
9. After completing the check, disconnect terminals TE1, TE2 and E1, and turn off the display.
   HINT:
   - The test mode will not start if terminals TE2 and E1 are connected after the ignition switch is turned on.
   - When the engine is not cranked, diag. codes "43" (Starter signal) output, but this is not abnormal.
   - When the automatic transmission shift lever is in the "D", "2", "L" or "R" shift position, or when the air conditioner is on or when the accelerator pedal is depressed, code "51" (Switch condition signal) is output, but this is not abnormal.





DIAGNOSTIC CODE CLEARANCE

1. After repair of the trouble areas, the diagnostic code retained in the ECU memory must be cleared out by removing the EFI fuse (30A) from R/B No. 2 for 10 seconds or more, with the ignition switch OFF.
   HINT:
   - Cancellation can also be done by removing the battery negative (-) terminal, but in this case, other memory systems (clock, etc.) will also be cancelled out.
   - If it is necessary to work on engine components requiring removal of the battery terminal, a check must first be made to see if a diagnostic code has been recorded.
2. After cancellation, road test the vehicle to check that a normal code is now read on the ”CHECK” engine warning light.
   If the same diagnostic code appears, it indicates that the trouble area has not been repaired thoroughly.

DIAGNOSTIC CODE CHART

HINT: Parameters listed in the chart may not be exactly same as your reading due to type of the instruments or other factors.

Code No.	Number of Check Engine Blinks	Circuit	Diagnostic Code Detecting Condition
—	 BE3931	Normal	No code is recorded.
12	 BE3931	RPM Signal	No NE or G1 and G2 signal to ECU within 2 sec. after cranking.
			Open in “G” circuit.
13	 BE3931	RPM Signal	No NE signal to ECU for 0.1 sec. or more at 1,000 rpm or more.
			No 12 pulses of NE to ECU during the interval between G1 and G2 pulses.
14	 BE3931	Ignition Signal	No IGF signal to ECU for 6 consecutive IGT signal.
16	 BE3931	ECT Control Signal	Fault in communications between the engine CPU and ECT CPU in the ECU.
21	 BE3932	Main Oxygen Sensor Signal (Front side)	(1) Main Oxygen sensor signal voltage is reduced to between 0.35 V and 0.70 V for 60 sec. under conditions (a) ~ (d). (2 trip detection logic) *5 (a) Coolant temp.: Between 80˚C (176˚F) and 95˚C (203˚F) (b) Engine speed: 1,500 rpm or more. (c) Load driving (Ex. ECT in 4th speed (5th for M/T). A/C ON, Flat road, 50 mph (80 km/h)). (d) Main oxygen sensor signal voltage: Alternating above and below 0.45V
			(1) Main Oxygen sensor signal voltage exceeds 0.70 V for 3 sec. or more during fuel cut.

*5: See page TR-25 .

If a malfunction code is displayed during the diagnostic code check in test mode, check the circuit for that code listed in the table below (Proceed to the page given for that circuit).

Trouble Area	"CHECK" Engine Warning Light*1		Memory*2	See page
	Normal Mode	Test Mode		
———	—	—	———	———
• Open or short in NE, G circuit • Distributor • Open or short in STA circuit • ECU	ON	N.A.	○	TR-46
• Open or short in NE circuit • Distributor • ECU	ON	N.A.	○	TR-50
• Open or short in NE circuit • Distributor • ECU	N.A.	ON		
• Open or short in IGF or IGT circuit from ignitor to ECU • Igniter • ECU	ON	N.A.	○	TR-52
• ECU	ON	N.A.	X	TR-58
• Main oxygen sensor circuit • Main oxygen sensor	ON	ON	○	TR-60
• Main oxygen sensor circuit • Main oxygen sensor				

*1,*2: See page TR-24 .

Code No.	Number of Check Engine Blinks	Circuit	Diagnostic Code Detecting Condition
22	 BE3932	Water Temp. Sensor Signal	Open or short in water temp. sensor circuit for 0.5 sec. or more.
24	 BE3932	Intake Air Temp. Sensor Signal	Open or short in water temp. sensor circuit for 0.5 sec. or more.
25	 BE3932	Air-Fuel Ratio Lean Malfunction	(1) Main oxygen sensor signal voltage is 0.45 V or less (lean) for 90 sec. under conditions (a) and (b) (2 trip detection logic) *6 (a) Coolant temp.: Between 70˚C (158˚F) or more (b) Engine speed: 1,500 rpm or more.
			(2)*3 Difference of air-fuel ratio feedback compensation value between front (No. ~ 3 cylinders) and rear (No. 4 ~ 6 cylinders) is more than 15 percentage for 20 sec. or more under conditions (a) and (b). (2 trip detection logic) *6 (a) Engine speed: 2000 rpm or more. (b) Coolant temp.: Between 60˚C (140˚F) and 95˚C (203˚F)
			(3)*3 Engine speed varies by more than 15 rpm over the preceding crank angle period during a period of 20 sec. or more under condition (a) and (b). (2 trip detection logic) *6 (a) Engine speed: idling (b) Coolant temp.: Between 60˚C (140˚F) and 95˚C (203˚F)

*3,*5: See page TR-24 , 25.

Trouble Area	"CHECK" Engine Warning Light*1		Memory*2	See page
	Normal Mode	Test Mode		
• Open or short in water temp. sensor circuit. • Water temp. sensor. • ECU	ON	ON	○	TR-64
• Open or short in intake air temp. sensor circuit. • Intake air temp. sensor • ECU	OFF	ON	○	TR-68
	ON*3			
• Open or short in main oxygen sensor circuit. • Main oxygen sensor • Ignition system. • ECU	ON	ON	○	TR-70
• Open or short in injector circuit. • Fuel line pressure (injector leak, blockage) • Mechanical system malfunction (skipping teeth of timing belt) • Ignition system • Compression pressure (foreign object caught in valve) • Air flow meter (air intake) • ECU				
• Open or short in injector circuit • Fuel line pressure (injector leak, blockage) • Mechanical system malfunction (skipping teeth of timing belt) • Ignition system • Compression pressure (foreign object caught in valve) • Air flow meter (air intake) • ECU				

*1,*2,*3: See page TR-24 .

Code No.	Number of Check Engine Blinks	Circuit	Diagnostic Code Detecting Condition
26*3	 BE3932	Air-Fuel Ratio Rich Malfunction	(2)*3 Difference of air-fuel ratio feedback compensation value between front (No. ~ 3 cylinders) and rear (No. 4 ~ 6 cylinders) is more than 15 percentage for 20 sec. or more under conditions (a) and (b). (2 trip detection logic) *6 (a) Engine speed: 2000 rpm or more. (b) Coolant temp.: Between 60˚C (140˚F) and 95˚C (203˚F)
			(2) Engine speed varies by more than 15 rpm over the preceding crank angle period during a period of 20 sec. or more under condition (a) and (b). (2 trip detection logic) *6 (a) Engine speed: 2,000 rpm or more. (b) Coolant temp.: Between 60˚C (140˚F) and 95˚C (203˚F)
27*3	 BE3932	Sub-Oxygen Sensor Signal	(1) Open or short in heater circuit of sub-oxygen sensor for 0.5 sec. or more.
			(1) Main oxygen sensor signal voltage is 0.45 V or more and sub-oxygen sensor signal is 0.45 V or less under conditions (a) ~ (c) (2 trip detection logic) *6 (a) Coolant temp.: 80˚C (176˚F) or more (b) Engine speed: 1,500 rpm or more. (c) Accel. pedal: Fully depressed for 2 sec. or more.
28	 BE3932	Main Oxygen Sensor Signal (rear side)	Same as code No.21.

Trouble Area	"CHECK" Engine Warning Light*1		Memory*2	See page
	Normal Mode	Test Mode		
• Open or short in injector circuit • Fuel line pressure (injector leak, blockage) • Mechanical system malfunction (skipping teeth of timing belt) • Ignition system • Compression pressure (foreign object caught in valve) • Volume air flow meter (air intake) • ECM	ON	ON	○	TR-70
• Open or short in injector circuit • Fuel line pressure (injector leak, blockage) • Mechanical system malfunction (skipping teeth of timing belt) • Ignition system • Compression pressure (foreign object caught in valve) • Air flow meter (air intake) • ECU				
• Open or short in heater circuit of sub-oxygen sensor. • Sub-oxygen sensor heater • ECU	ON	N.A.		
• Open or short in sub-oxygen sensor. • Sub-oxygen sensor • ECU	ON	ON	○	TR-76
Same as code No.21.	ON	ON	○	TR-60

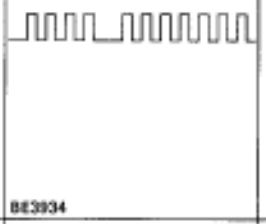
*1,*2: See page TR-24 .

Code No.	Number of Check Engine Blinks	Circuit	Diagnostic Code Detecting Condition
31	 BE3933	Air Flow Meter Signal	All conditions below are detected. (a) No air-flow meter signal to ECU for 2 sec. when engine speed is above 300 rpm. (b) Engine stall.
35	 BE3933	HAC Sensor Signal	Open or short in HAC sensor circuit for 0.5 sec. or more.
41	 BE3934	Throttle Position Sensor Signal	(1) Open or short in throttle position sensor circuit for 0.5 sec. or more. (2) IDL1 contact is ON and VTA1 output exceeds 1.5V for 0.5 sec.or more.
42	 BE3934	Vehicle Speed Sensor Signal (for ECT)	All conditions below are detected continuously for 8 sec. or more. (a) Vehicle speed signal: 0 km/h (mph). (b) Engine speed: Between 2,800 rpm or more. (c) Neutral start switch (NSW): OFF (d) Stop light switch: OFF
		Vehicle Speed Sensor Signal (for M/T)	All conditions below are detected continuously for 8 sec. or more. (a) Vehicle speed signal: 0 km/h (mph). (b) Engine speed: Between 2,350 rpm and 5,000 rpm.. (c) Coolant temp.: 80˚C (176˚F) or more (d) Load driving
43	 BE3934	Starter Signal	No starter signal to ECU.

*4: See page TR-24 .

Trouble Area	"CHECK" Engine Warning Light*1		Memory*2	See page
	Normal Mode	Test Mode		
• Open or short in air flow meter circuit • Air flow meter • ECU	ON	N.A.	○	TR-82
• ECU	ON	ON	○	TR-86
• Open or short in throttle position sensor circuit.	OFF	ON	○	TR-88
• Throttle position sensor. • ECU	(ON*3)			
• No. 1 speed sensor. • Combination meter. • Open or short in No.1 speed sensor circuit. • ECU	OFF	OFF	○	TR-92
• Open or short in starter signal circuit. • Open or short in ignition switch or starter relay circuit. • ECU	N.A.	OFF	X	TR-96

*1,*2,*3: See page TR-24 .

Code No.	Number of Check Engine Blinks	Circuit	Diagnostic Code Detecting Condition
47*4	 BE3934	Sub-Throttle Position Sensor Signal	(1) Open or short in sub-throttle position sensor circuit for 0.5 sec. or more. Open or short in HAC sensor circuit for 0.5 sec.or more.
			(2) IDL1 contact is ON and VTA2 output exceeds 1.5V for 0.5 sec.or more.
52	 BE3935	Knock Sensor Signal (front side)	No No. 1 knock sensor signal to ECU for 4 crank revolutions with engine speed between 1,600 rpm and 5,200 rpm.
53	 BE3935	Knock Control Signal	Engine control computer (for knock control) malfunction at engine speed between 650 rpm and 5,200 rpm.
55	 BE3935	Knock Sensor Signal (rear side)	No No. 2 knock sensor signal to ECU for 4 crank revolutions with engine speed between 1,600 rpm and 5,200 rpm.
71*3	 BE3937	EGR System Malfunction	EGR gas temp. is 70˚C (158˚F) or below for 1 ~ 4 min. under conditions (a) and (b). (2 trip detection logic)*5 (a) Coolant temp.: 63˚C (145˚F) or more. (b) EGR operation possible (Ex. ECT in 3rd speed (5th for M/T), A/C ON, 60 mph (96 km/h), Flat road).

*3,*4,*5: See page , 25.

Trouble Area	"CHECK" Engine Warning Light*1		Memory*2	See page
	Normal Mode	Test Mode		
• Open or short in sub-throttle position sensor circuit. • Sub-throttle position sensor. • ECU	OFF	ON	○	TR-80
• Open or short in No. 1 knock sensor circuit. • No. 1 knock sensor (looseness). • ECU	ON	N.A.	○	TR-98
• ECU	ON	N.A.	X	TR-98
• Open or short in No. 2 knock sensor circuit. • No. 2 knock sensor (looseness). • ECU	ON	N.A.	○	TR-98
• Open in EGR gas temp. sensor circuit. • Short in VSV circuit for EGR. • EGR hose disconnected, valve stuck. • Clogged EGR gas passage. • ECU	ON	ON	○	TR-104

*1,*2: See page TR-24 .

Code No.	Number of Check Engine Blinks	Circuit	Diagnostic Code Detecting Condition
78	 8E3937	Fuel Pump Control Signal	(1) Open or short in fuel pump circuit for 1 sec. or more with engine speed 1,000 rpm or less. (2 trip detection logic)*5
			(2) Open in input circuit of fuel pump ECU (FPC) with engine speed 1,000 rpm or less. (2 trip detection logic)*5
			(3) Open or short in diagnostic signal line (D1) of fuel pump ECU with engine speed 1,000 rpm or less. (2 trip detection logic)*5
51	 8E3935	Switch Condition Signal	(1) 3 sec. or more after engine starts, idle switch OFF (IDL1) (2) Neutral start switch OFF (NSW) (Shift position in “R”, “D”, “2”, or “1” (ranges). (3) A/C switch ON.

*1: ”ON” displayed in the diagnosis mode column indicates that the ”CHECK” Engine Warning Light is lighted up when a malfunction is detected. ”OFF” indicates that the ”CHECK” does not light up during malfunction diagnosis, even if a malfunction is detected. ”N.A.” indicates that the item is not included in malfunction diagnosis.

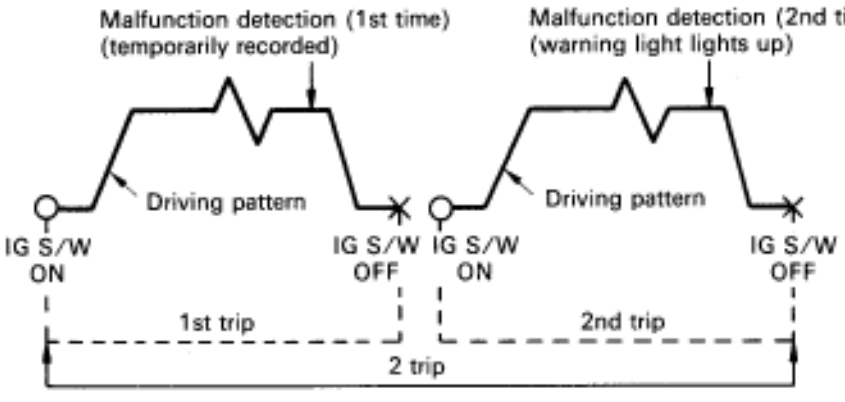
*2: ”O” in the memory column indicates that a diagnostic code is recorded in the ECU memory when a malfunction occurs. ”X” indicates that a diagnostic code is not recorded in the ECU memory even if a malfunction occurs. Accordingly, output of diagnostic results in normal or test mode is performed with the IG switch ON.

*3: Only for USA specification vehicles.

*4: Only vehicles with TRAC.

Trouble Area	"CHECK" Engine Warning Light*1		Memory*2	See page
	Normal Mode	Test Mode		
• Open or short in fuel pump ECU circuit. • Fuel pump ECU. • Fuel pump. • Engine (& ECT) ECU power source IDL circuit. • Engine (& ECT) ECU	N.A.	ON	○	TR-110
• A/C switch circuit. • Throttle position sensor IDL circuit. • Neutral start switch circuit. • Accelerator pedal and cable. • ECU	N.A.	OFF	X	TR-114

*5: This indicates items for which "2 trip detection logic" is used. With this logic, when a logic malfunction is first detected, the malfunction is temporarily stored in the ECU memory. If the same case is detected again during the second drive test, this second detection causes the "CHECK" Engine Warning Light to light up.
The 2 trip repeats the same mode a 2nd time. (However, the IG switch must be turned OFF between the 1st trip and 2nd trip).
In the Test Mode, the "CHECK" Engine Warning Light lights up the 1st trip a malfunction is detected.



EM9413

FAIL-SAFE CHART

If any of the following codes is recorded, the ECU enters fail-safe mode.

Code No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
14	Fuel cut	1 IGF detected in consecutive 3 ignitions.
16	Torque control prohibited.	Returned to normal condition.
22	THW is fixed at 80°C (176°F).	Returned to normal condition.
24	THA is fixed at 20°C (68°F).	Returned to normal condition.
31	• Ignition timing fixed at 10° BTDC. • Injection time fixed Starting 9 m sec. IDL ON 3.6 m sec. IDL OFF 6.7 m sec.	KS input 15 times/sec. or more.
35	Atmospheric pressure is fixed at 101.3 kPa (760 mmHg, 29.92 in.Hg).	Returned to normal condition.
41	VTA1 is fixed at 0°.	The following must each be repeated at least 2 time consecutively. (w/o TRAC) • 0.1 V ? VTA ? 0.95 V • IDL : ON (w/ TRAC) • 0.25 V ? VTA ? 0.95 V • IDL : ON
52	Max. timing retardation.	IG switch OFF.
53	Max. timing retardation.	Returned to normal condition.
55	Max. timing retardation.	IG switch OFF.

Back-Up Function

If there is trouble with the program in the ECU and the ignition signals (IGT) are not output, the ECU controls fuel injection and ignition timing at predetermined levels as a back-up function to make it possible to continue to operate the vehicle.

Furthermore, the injection duration is calculated from the starting signal (STA) and the throttle position signal (IDL). Also, the ignition timing is fixed at the initial ignition timing, 10° BTDC, without relation to the engine speed.

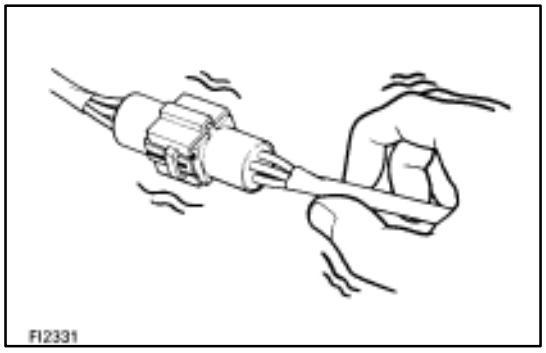
HINT: If the engine is controlled by the back-up function, the ”CHECK” engine warning light lights up to warn the driver of the malfunction but the diagnostic code is not output.

CHECK FOR MOMENTARY INTERRUPTION

As described in the preceding paragraph, abnormality detection ability in the test mode is increased compared to that in the normal mode, so that when momentary interruptions or momentary shorts occur in the ECU signal circuits (G1, G2, NE, THW, THA, VTA1, VTA2) shown in the table below, the appropriate diagnostic code is output.

Accordingly, when the diagnostic codes shown in the table below (13, 22, 24, 41, 47) are output during the diagnostic code check, and inspection of the appropriate circuits reveals no abnormality, perform the check for momentary interruption as described below. By performing the check for momentary interruption, the place where momentary interruptions or momentary shorts are occurring due to poor contacts can be isolated.

Diag. Code	Circuit
13	RPM signal circuit (No. 2)
22	Water temp. sensor circuit
24	Intake air temp. sensor circuit
41	Throttle position sensor circuit
47	Sub-throttle position sensor circuit

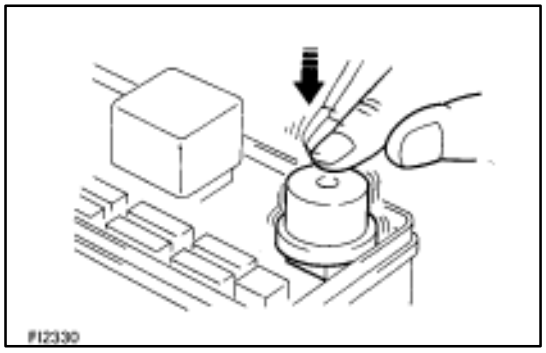


CLEAR DIAGNOSTIC CODES

See page TR-13 **.**

SET TEST MODE

1. With the ignition switch off, using SST, connect the terminals TE2 and E1 of the TDCL.
   SST 09843-18020
2. Start the engine and check to see the ”CHECK” engine warning light to go off.



PERFORM A SIMULATION TEST

Using the symptom simulation (See page IN-20), apply vibration to and pull lightly on the wire harness, connector or terminals in the circuit indicated by the malfunction code.

In this test, if the ”CHECK” engine warning light lights up, it indicates that the place where the wire harness, connector or terminals being pulled or vibrated has faulty contact. Check that point for loose connections, dirt on the terminals, poor fit or other problems and repair as necessary.

HINT: After cancelling out the diagnostic code in memory and set the test mode, if the ”CHECK” engine warning light does not go off after the engine is started, check thoroughly for faulty contact, etc., then try the check again. If the ”CHECK” engine warning light still does not go off, check and replace ECU.

BASIC INSPECTION

When the normal code is displayed in the diagnostic code check, troubleshooting should be performed in the order for all possible circuits to be considered as the causes of the problems.
In many cases, by carrying out the basic engine check shown in the following flow chart, the location causing the problem can be found quickly and efficiently. Therefore, use of this check is essential in engine troubleshooting.

1 **Is battery voltage 11 V or more when engine is stopped?**

YES

NO → **Charge or replace battery.**

2 **Is engine cranked?**

YES

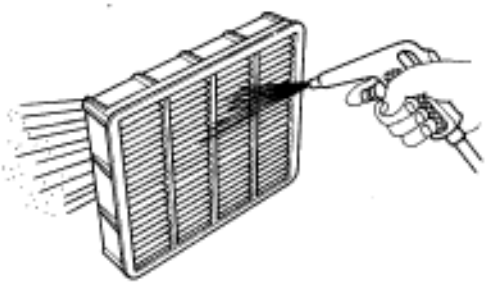
NO → **Proceed to matrix chart of problem symptoms on page TR-39 .**

3 **Does engine start?**

YES

NO → **Go to step 7 .**

4 **Check air filter.**


MA0688

P Remove air filter.

C Visually check that the air filter is not excessively damaged or oily.

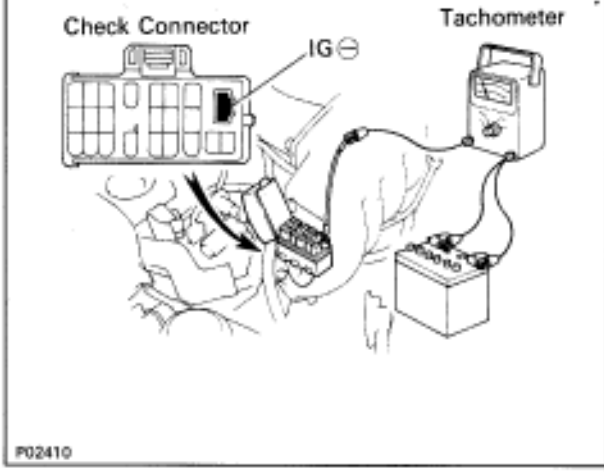
Hint If necessary, clean the air filter with compressed air. First blow from inside thoroughly, then blow off outside of the air filter.

OK

NG → **Repair or replace.**

Go to step 5 .

5 Check idle speed.



P (1) Shift transmission into “N” range or neutral
(2) Warm up engine at normal operating temperature.
(3) Switched off all accessories.
(4) Switched off air conditioner.
(5) Connect tachometer test probe to terminal IG (-) of check connector

C Check idle speed.

OK **Idle speed: Reference**
(M/T 700 rpm
(A/T 850 rpm (N range)

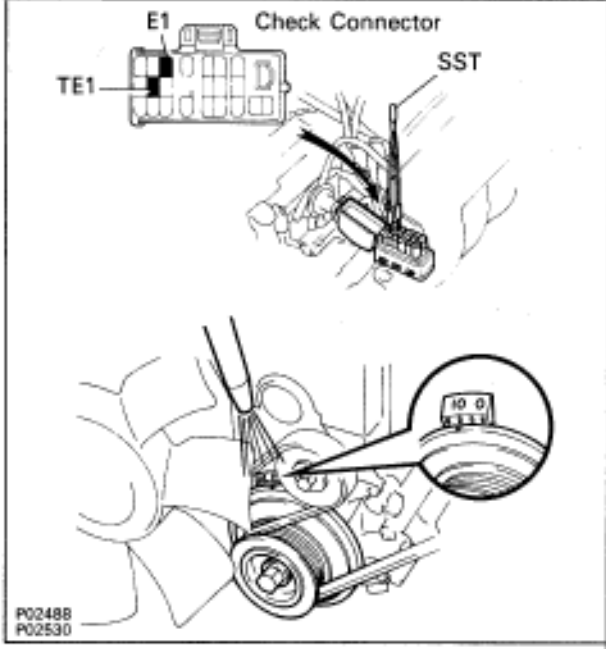
Caution **(6) NEVER allow tachotmeter test probe to touch ground as it could result in damage to igniter and/or ignition coil.**

(7) As some tachometers are not compatible with this ignition system, we recommended that you confirm compatibility of your unit before use.

OK

NG **Proceed to matrix chart of problem symptoms on page TR-39 .**

6 Check ignition timing.



P (1) Shift transmission into “N” range or neutral
(2) Warm up engine at normal operating temperature.
(3) Keep the engine speed at idle.
(4) Using SST, connect terminals TE1 and E1 of check connector.

SST 09843-18020

(5) Connect tachometer test probe to terminal IG (-) of check connector

C Check ignition timing

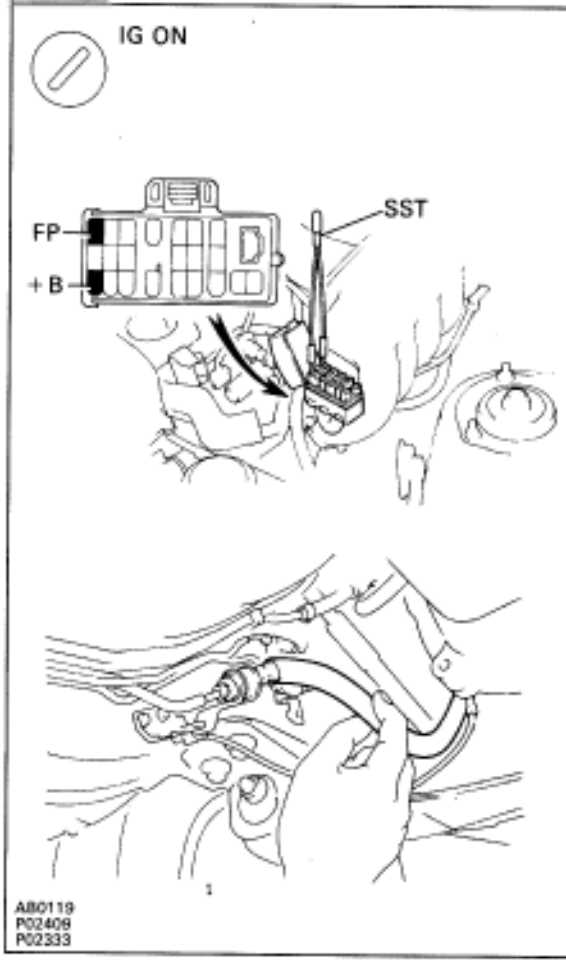
OK **Ignition timing: 10˚BTDC at idle**

OK

NG **Proceed to page IG-14 . and continue to troubleshoot.**

Proceed to matrix chart of problem symptoms on page TR-39 .

7 Check fuel pressure.



P
(1) Be sure that fuel is enough in tank.
(2) Turn ignition switch on.
(3) Using SST, connect terminals FP and +B of check connector.
SST 09843-18020

C Check that there is pressure in the hose from the fuel filter.

Hint At this time, you will hear fuel return noise.

Caution
Never make a mistake with the terminal connection position as this will cause a malfunction.

OK

NG **Proceed to page FI-17 . and continue to troubleshoot.**

8 Check for spark.

C Disconnect the high-tension cord from the distributor and, hold the end about 12.5 mm (1/2") from the ground, see if spark occurs while the engine is being cranked.

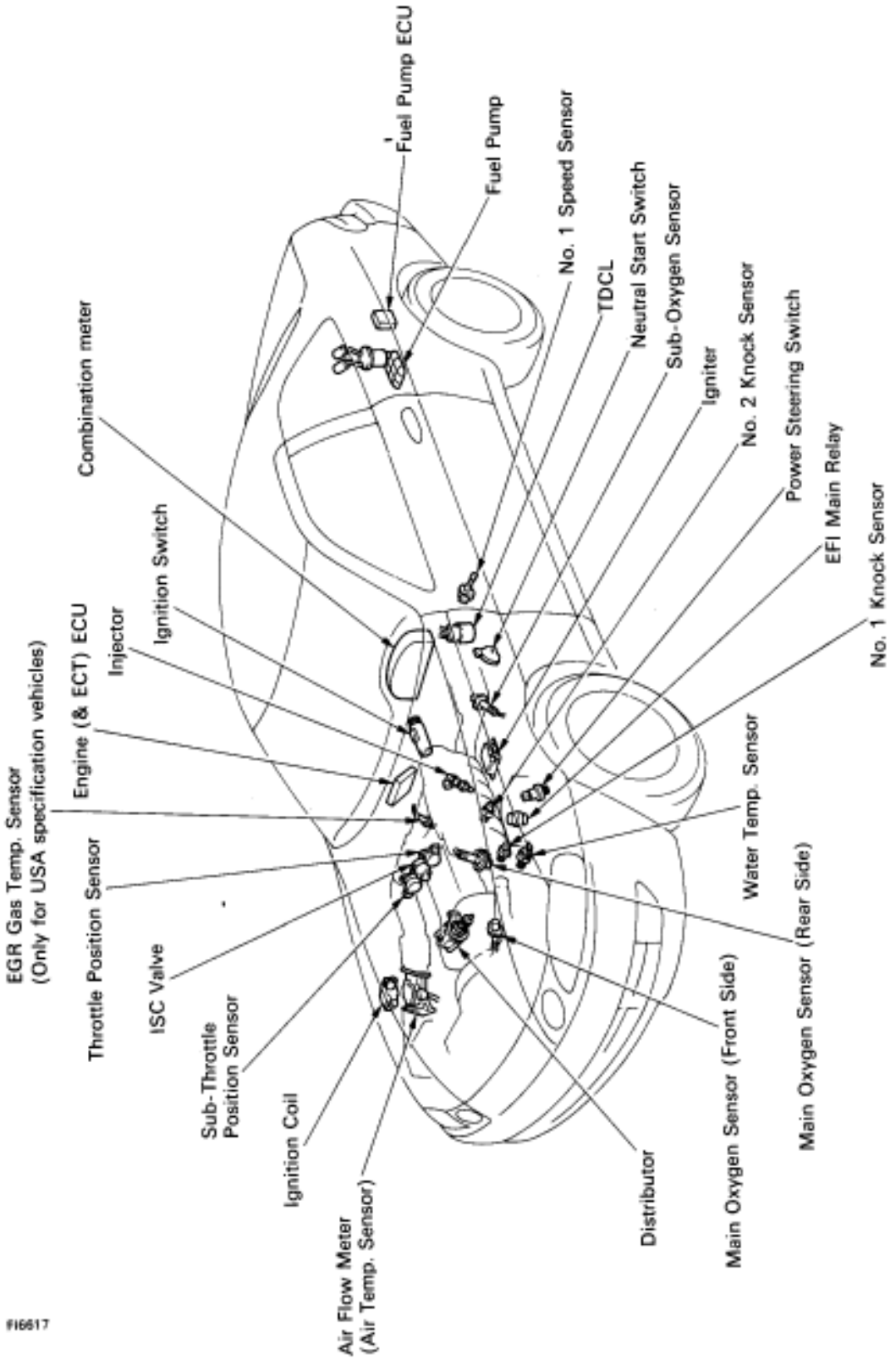
Hint To prevent excessive fuel injected from the injectors during this test, don't crank the engine for more than 1 – 2 seconds at a time.

OK

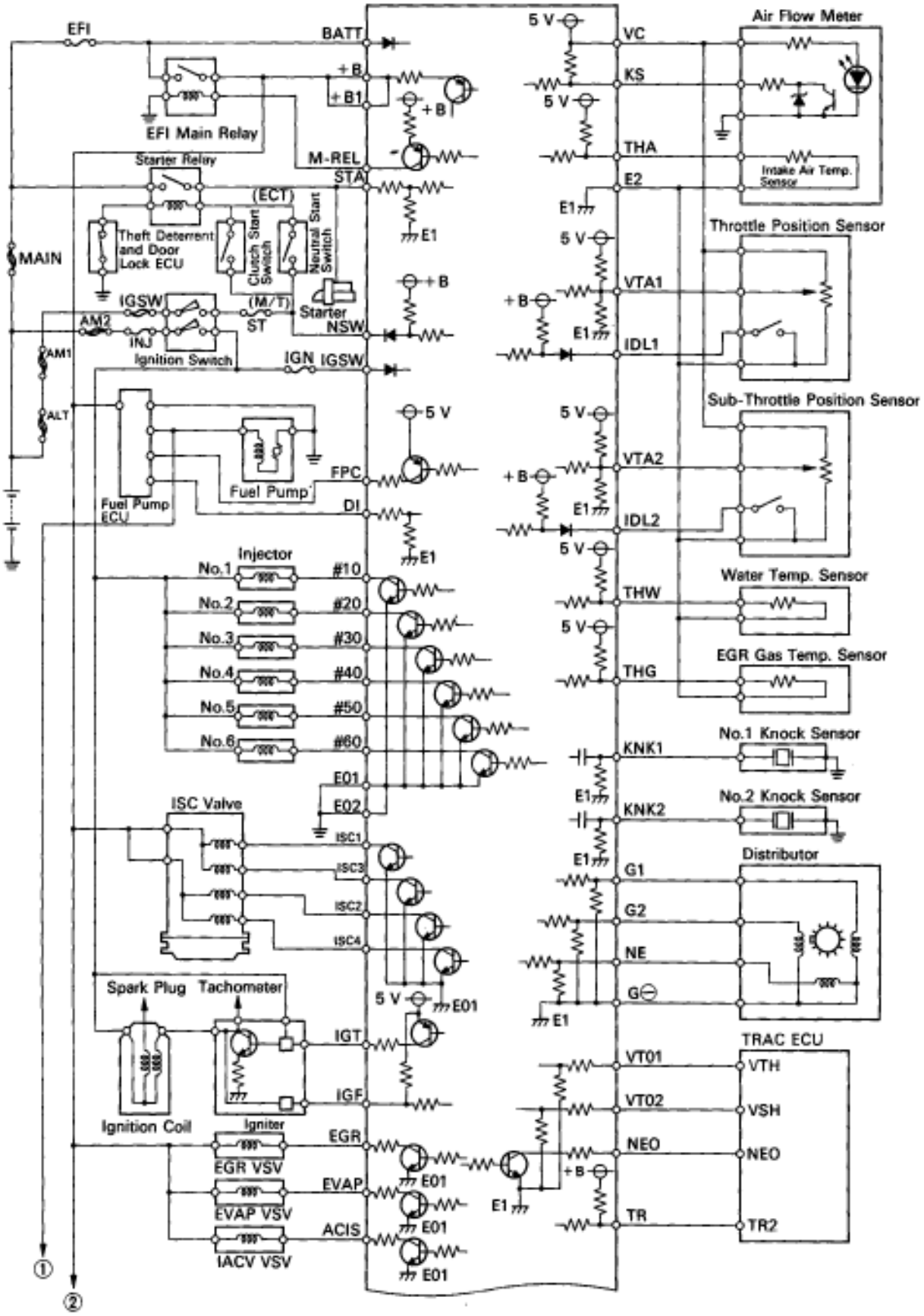
NG **Proceed to page IG-6 . and continue to troubleshoot.**

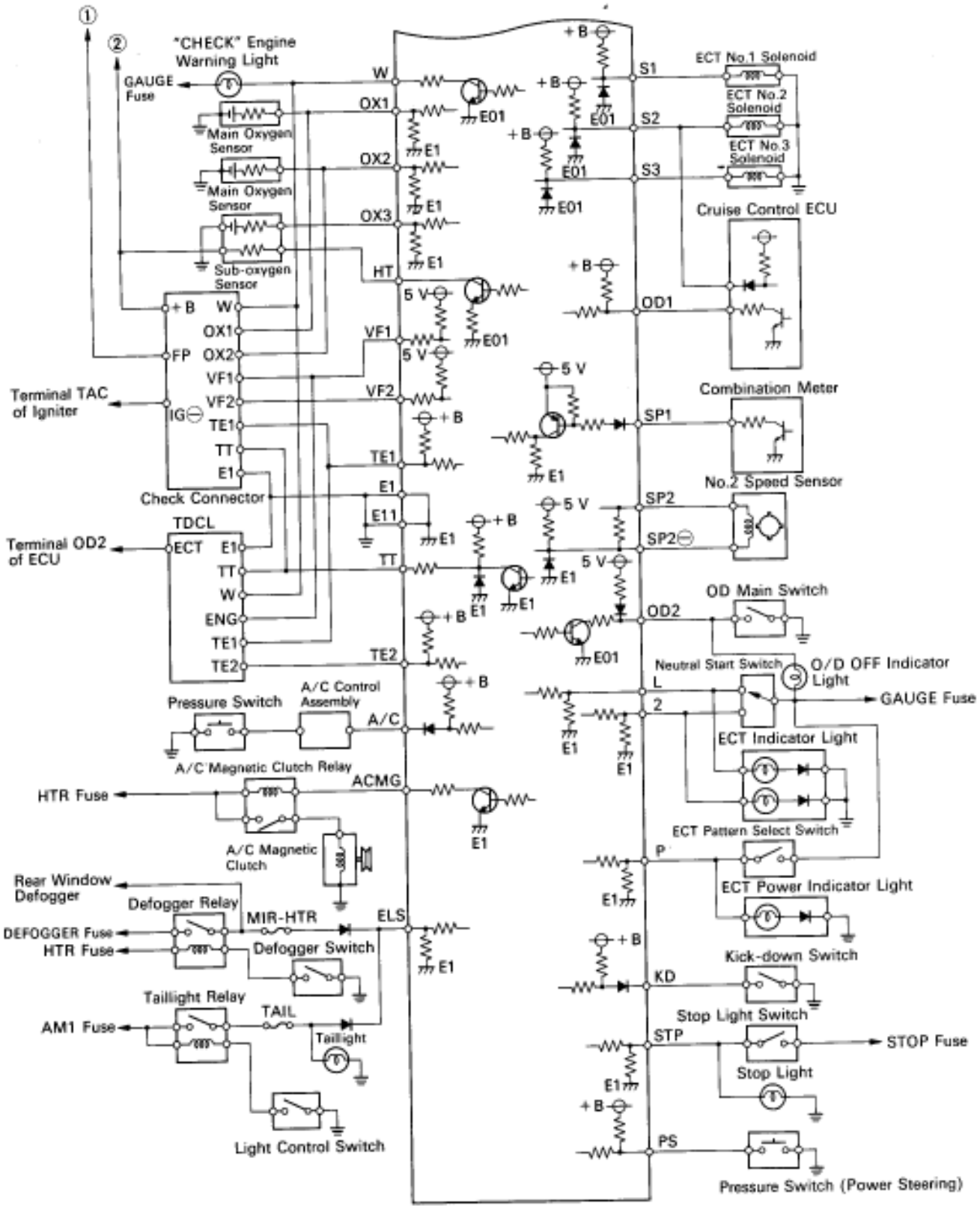
Proceed to matrix chart of problem symptoms on page TR-39 .

PARTS LOCATION

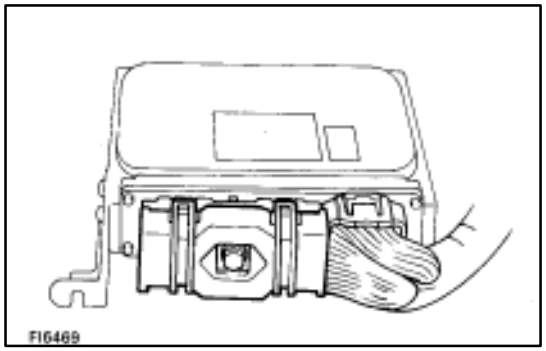


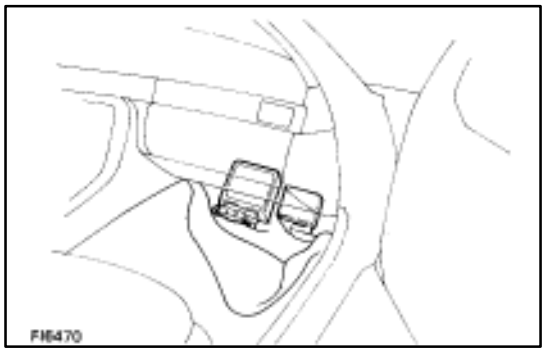
WIRING DIAGRAM

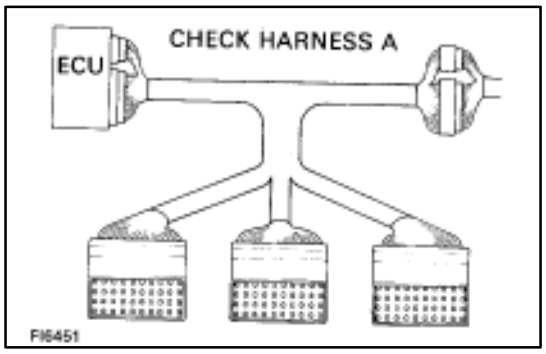


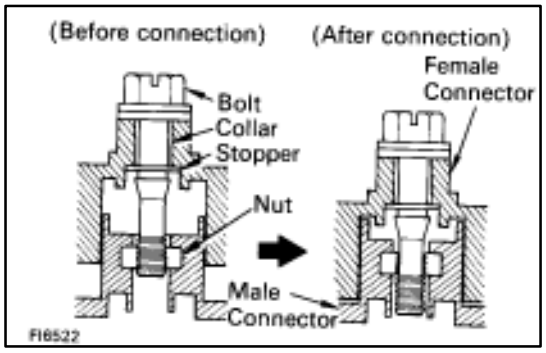

①
②
"CHECK" Engine Warning Light
GAUGE Fuse
Main Oxygen Sensor
Main Oxygen Sensor
Sub-oxygen Sensor
W
OX1
OX2
OX3
HT
VF1
VF2
TE1
TE2
E1
E01
E11
+B
5 V
FP
IG
TT
ECT
ENG
ACMG
A/C
ELS
MIR-HTR
TAIL
Terminal TAC of Igniter
Check Connector
TDCL
Terminal OD2 of ECU
Pressure Switch
A/C Control Assembly
A/C Magnetic Clutch Relay
HTR Fuse
A/C Magnetic Clutch
Rear Window Defogger
Defogger Relay
DEFOGGER Fuse
HTR Fuse
Defogger Switch
Taillight Relay
AM1 Fuse
Taillight
Light Control Switch
ECT No.1 Solenoid
ECT No.2 Solenoid
ECT No.3 Solenoid
S1
S2
S3
Cruise Control ECU
OD1
Combination Meter
SP1
No.2 Speed Sensor
SP2
OD Main Switch
OD2
Neutral Start Switch
O/D OFF Indicator Light
GAUGE Fuse
L
2
ECT Indicator Light
ECT Pattern Select Switch
P
ECT Power Indicator Light
Kick-down Switch
KD
Stop Light Switch
STP
STOP Fuse
Stop Light
PS
Pressure Switch (Power Steering)

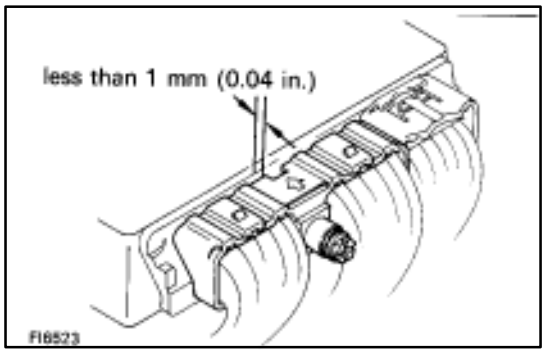
FI8841











TERMINALS OF ECU

Connectors of the engine (& ECT) ECU are water-proof and are the bolt type.

For water proof type connectors, in order to measure the voltage of ECU terminals and the resistance of connected parts, connect the inspection sub wire harness between the ECU and vehicle wire harness, then perform the inspection.

The inspection method of inserting a tester probe from the other side of connector noticeably reduces the water-proof ability.

Disconnect the connector by fully loosening the bolt.

PREPARATION

1. Turn the ignition switch to LOCK position.
2. Turn up the passenger side floor mat.
3. Remove the ECU protector.
4. Disconnect the connector from the ECU.

   After completely loosening the bolt, the two parts of the connector can be separated.

   NOTICE:

   - **Do not pully the wire harness when disconnecting the connector.**
   - **When disconnecting the connector, the ECU's backup power source is cut off, so the malfunction codes, etc. recorded in the ECU memory are cancelled.**
   - **Never insert a tester probe or male terminal used for inspection purposes into the female terminal of the vehicle wire harness. Otherwise, the female terminal may be widened, which can result in faulty connection.**

5. **Connect the Check Harness A between ECU and connector of vehicle wire harness.**

   SST 09990-01000

   HINT: The arrangement of the check connector terminals are the same as those of the ECU.

   See page TR-35
6. Disconnect the Check Harness A.
7. Reconnect the connector to the ECU.

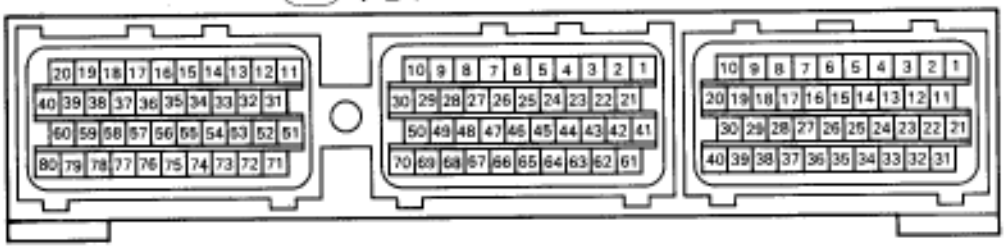
   (a) Match the male connector correctly with the female connector, then press them together.

   (b) Tighten the bolt

   Make sure the connector is completely connected, by tightening the bolt until there is a clearance of less than 1 mm (0.04 in.) between bottom of the male connector and end of the female connector.
8. Install the ECU protector and floor mat.

TERMINALS OF ECU

ECU Terminals



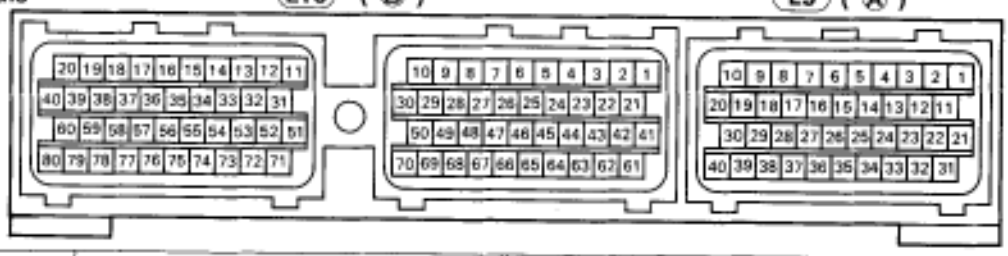
FI6460

Terminal No.	Symbol	Connection	Terminal No.	Symbol	Connection
E9 – 1	IGSW	Ignition switch	E9 – 31	+B	EFI main relay
2	SP1	Speed sensor No. 1	32	+B1	EFI main relay
3	KD*1	Kick-down switch	33	BATT	Battery
4	STP	Stop light switch	34	A/C	A/C control assembly
5	—	———	35	PS*1	PS pressure switch
6	W	"CHECK" engine warning light	36	—	———
7	—	———	37	TR	TRAC ECU
8	—	———	38	NEO	TRAC ECU
9	2*1	Neutral start switch	39	VTO2	TRAC ECU
10	L*1	Neutral start switch	40	VTO1	TRAC ECU
11	—	———	E10 – 1	—	———
12	OD1*1	Cruise control ECU	2	—	———
13	—	———	3	SP2⊖*1	No. 2 speed sensor
14	—	———	4	E11	ECU ground
15	ELS	Defogger relay, Taillight relay	5	—	———
16	—	———	6	—	———
17	TT*1	TDCL	7	G⊖	Distributor
18	P*1	ECT pattern select switch	8	S3*1	ECT No. 3 solenoid
19	TE2	Check connector	9	S2*1	ECT No. 2 solenoid
20	TE1	Check connector	10	S1*1	ECT No. 1 solenoid
21	DI	Fuel pump ECU	11	—	———
22	FPC	Fuel pump ECU	12	—	———
23	ACMG	A/C magnet clutch relay	13	—	———
24	M-REL	EFI main relay	14	—	———
25	—	———	15	# 60	No. 6 injector
26	—	———	16	# 50	No. 5 injector
27	—	———	17	# 40	No. 4 injector
28	OD2*1	O/D main switch	18	# 30	No. 3 injector
29	—	———	19	# 20	No. 2 injector
30	—	———	20	# 10	No. 1 injector

*1: Only vehicles with ECT.

TERMINALS OF ECU (Cont'd)

ECU Terminals E10 (B) E9 (A)



FI6460

Terminal No.	Symbol	Connection	Terminal No.	Symbol	Connection
E10 – 21	—	———	E10 – 51	—	———
22	—	———	52	—	———
23	SP2*1	No. 2 speed sensor	53	—	———
24	—	———	54	—	———
25	G2	Distributor	55	—	———
26	G1	Distributor	56	—	———
27	NE	Distributor	57	IGT	igniter
28	VF2	Check connector	58	IGF	igniter
29	VF1	Check connector	59	—	———
30	—	———	60	—	———
31	—	———	61	OX3*2	Sub-oxygen sensor
32	ISC4	ISC valve	62	—	———
33	ISC3	ISC valve	63	IDL2	Sub-throttle position sensor
34	ISC2	ISC valve	64	IDL1	Throttle position sensor
35	ISC1	ISC valve	65	E2	Sensor ground
36	—	———	66	KS	Air flow meter
37	—	———	67	—	———
38	—	———	68	—	———
39	ACIS	VSV (intake air control valve)	69	E1	ECU ground
40	—	———	70	—	———
41	VC	Throttle position sensor. Air flow meter.	71	HT*2	Sub-oxygen sensor heater
42	VTA2	Sub-throttle position sensor	72	—	———
43	VTA1	Throttle position sensor	73	—	———
44	THW	Water temp. sensor	74	EVAP	EVAP purge VSV
45	THA	Intake air temp. sensor	75	EGR	EGR VSV
46	THG*2	EGR gas temp. sensor	76	NSW	Neutral start switch
47	OX2	Main oxygen sensor (rear side)	77	STA	Starter relay
48	OX1	Main oxygen sensor (front side)	78	—	———
49	KNK2	No. 2 knock sensor (rear side)	79	EO2	Power ground
50	KNK1	No. 1 knock sensor (front side)	80	EO1	Power ground

*1: Only vehicles with ECT.
*2: Only for USA specification vehicles.

STANDARD VALUE OF ECU TERMINALS

(※: A=(E9), B=(E10))

※ Symbols (Terminals No.)	STD Voltage (V)	Condition
BATT (A33) – E1 (B69)	10 ~ 14	Always
IGSW (A1), +B (A31), +B1 (A32) – E1 (B69)	10 ~ 14	IG switch ON
VC (B41) – E2 (B65)	4.0 ~ 6.0	IG switch ON
IDL1 (B64), IDL2 (B63) – E2 (B65)	Below 1.0	IG switch ON Main or sub throttle valve fully closed.
	10 ~ 14	IG switch ON Main or sub throttle valve fully open.
VTA1 (B43), VTA2 (B42) – E2 (B65)	0.1 ~ 1.0	IG switch ON Throttle valve fully closed.
	3.0 ~ 6.0	IG switch ON Throttle valve fully open.
KS (B66) – E1 (B69)	Pulse generation (0 and 4 ~ 6)	Idling
THA (B45) – E2 (B65)	1.0 ~ 3.0	Idling, Intake air temp. 20°C (68°F).
THW (B44) – E2 (B65)	0.1 ~ 1.0	Idling, Engine coolant temp. 80°C (176°F).
STA (B77) – E1 (B69)	6.0 or more	Cranking
#10 (B20), #20 (B19), #30 (B18), #40 (B17), #50 (B16), #60 (B15) – E01 (B80)	10 ~ 14	IG switch ON
	Pulse generation	Idling
IGT (B57) – E1 (B69)	Pulse generation (0 and 4 ~ 6)	Idling
IGF (B58) – E1 (B69)	Below 1.0	IG switch ON
	Pulse generation (0 and 4 ~ 6)	Idling
G1 (B26), G2 (B25) – G⊖ (B6)	Pulse generation (Positive voltage peak 1.3 or higher)	Idling
NE (B27) – G⊖ (B6)	Pulse generation (Positive voltage peak 0.6 or higher)	Idling
M-REL (A24) – E1 (B69)	10 ~ 14	IG switch ON
FPC (A22) – E1 (B69)	4.2 ~ 6.0	Cranking, Sudden racing (6,000 rpm)
	Pulse generation (0 and 4 ~ 6)	Idling
DI (A21) – E1 (B69)	7.5 or more	Idling
ACIS (B39) – E01 (B80)	10 ~ 14	IG switch ON
EVAP (B74) – E01 (B80)	10 ~ 14	IG switch ON
EGR (B75) – E01 (B80)	Below 2.0	Idling
	10 ~ 14	Engine speed at 3,500 rpm

STANDARD VALUE OF ECM TERMINALS

(※: A=E9, B=E10)

※ Symbols (Terminals No.)	STD Voltage (V)	Condition
ISC1 (B35), ISC2 (B34) ISC3 (B33), ISC4 (B32) – E01 (B80)	10 ~ 14	IG switch ON
VF1 (B29), VF2 (B28) – E1 (B69)	1.0 ~ 4.0	Maintain engine speed at 2,500 rpm for two minutes after warming up then return to idling.
OX1 (B48), OX2 (B47) – E1 (B69)	Pulse generation (0 ~ 1.0)	Maintain engine speed at 2,500 rpm for two minutes after warming up.
HT (B71) – E01 (B80)*	Below 2.0	Idling
	10 ~ 14	IG switch ON
KNK1 (B50), KNK2 (B49) – E1 (B69)	Pulse generation (Frequency : 8.1 KHz)	Idling
NSW (B76) – E1 (B69)	10 ~ 14	IG switch ON Other shift position in "P", "N" positions.
	Below 1.0	IG switch ON Shift position in "P", "N" positions.
SP1 (A2) – E1 (B69)	Pulse generation (0 and 4 ~ 6)	IG switch ON Rotate driving wheel slowly.
TE1 (A20) – E1 (B69)	10 ~ 14	IG switch ON
TE2 (A19) – E1 (B69)	10 ~ 14	IG switch ON
W (A6) – E1 (B69)	10 ~ 14	Idling
	Below 2.0	IG switch ON
ODI (A12) – E1 (B69)	10 ~ 14	IG switch ON
A/C (A34) – E1 (B69)	Bellow 2.0	A/C switch ON (At idling)
	10 ~ 14	A/C switch OFF
ACMG (A23) – E1 (B69)	Below 2.0	A/C switch ON (At idling)
	10 ~ 14	A/C switch OFF
TR (A37) – E1 (B69)	10 ~ 14	IG switch ON
VTO1 (A40) VTO2 (A39) – E2 (B65)	Below 1.0	IG switch ON Main or sub throttle valve fully closed.
	3.0 ~ 5.5	IG switch ON Main or sub throttle valve fully open.
NEO (A38) – E1 (B69)	4.0 ~ 6.0	IG switch ON

* Only for USA specification vehicles.

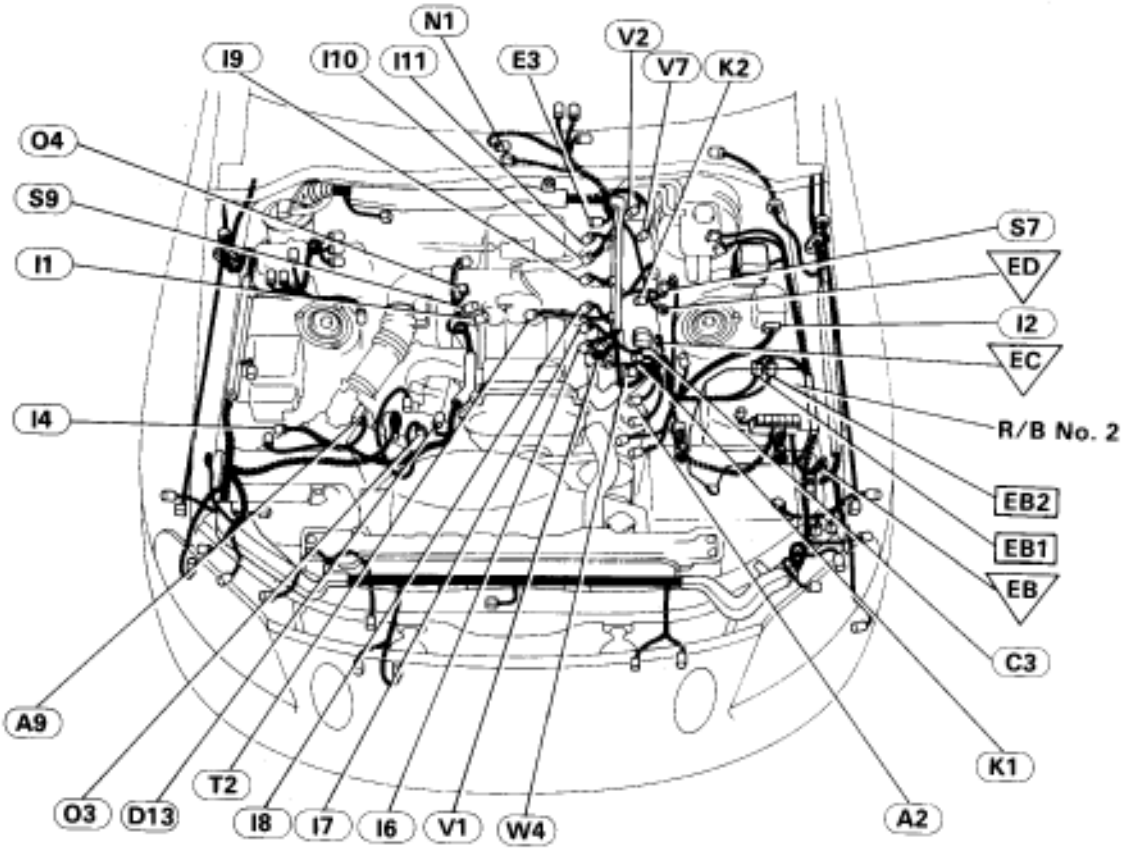
MATRIX CHART OF PROBLEM SYMPTOMS

When the malfunction code is not confirmed in the diagnostic trouble code check and the problem still can not be confirmed in the basic inspection, then proceed to this step and perform troubleshooting according to the numbered order given in the table below.
The circuits indicated by ※ on the matrix chart can be inspected using the TCCS checker.

	See page	TR-82	TR-96	TR-104	TR-114	TR-118	TR-120	TR-126	TR-128	TR-132	TR-110	AC-68	ST-13 14	IG-6	IG-7	IG-10	IG-10	EM-22	AT-68	BE-398	IN-32
	Suspect area	※ Volume air flow meter circuit	※ Starter signal circuit	EGR System	Switch condition signal circuit	※ Park/Neutral position switch circuit	ECM power source circuit	Back up power source circuit	※ Injector circuit	※ IAC valve circuit	Fuel pump control circuit	A/C signal circuit (Compressor circuit)	Starter and Starter relay	Ignition signal circuit (Spark test)	Spark plug	Ignition coil	Distributor	Compression	Electronic Controlled Transmission faulty	Theft deterrent ECU	ECM
Symptom																					
Does not start	Engine does not crank					2							1							3	
	No initial combustion						1		5		3			2	4						
	No complete combustion								6		1			5	4	2	3				
Difficult to start	Difficult to start normally		1						8	2	3				6	4	5	7			
	Difficult to start cold		1						4	2	3				7	5	6				
	Difficult to start hot		1						4	2	3				7	5	6				
Poor Idling	Incorrect first idle				1					2											
	High engine idle speed				1	5	4	6		2		3									
	Low engine idle speed	7			3	4		8	6	1	5	2									
	Rough idling	3		5	1			12	4	2	8			6	11	9	10	7			
	Hunting	3			1		4			2	5										
Poor Driveability	Hesitation/Poor acceleration	2			1				3		4			5	8	6	7		9		
	Muffler explosion (after fire)				1				5						4	2	3				
	Surging				1				5		2				4		3				
Engine Stall	Engine stalls soon after starting	2								3	1										
	After acceleration pedal depressed	2			1																
	After acceleration pedal released								1	2											3
	During A/C operation									1		2									3
	When N to D shift					1				2											

LOCATION OF CONNECTORS

Location of Connectors in Engine Compartment



BE6673

A2

A/C Magnet Clutch

Ie-4-1

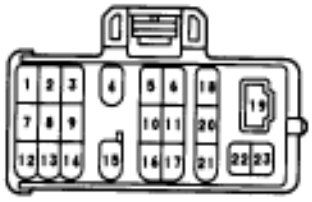
A9

Intake Air Temp. Sensor

IS-5-1

C3

Check Connector



Iej-23-1

D13

Distributor

Ie-4-1-E

E3

EGR Gas Temp. Sensor

Ie-2-1-C

I1

ISC Valve

Ie-6-1-D

I2

Igniter

Ie-5-1

I4
Ignition Coil

IS-2-1-L

I6 I8 I10
Injector
(Gray)

Ie-2-1-a

I7 I9 I11
Injector
(Dark gray)

Ie-2-1-a

K1 K2
No. 1, 2 Knock Sensor

Ie-1-1-B

N1
Neutral Start Switch

SH-9-1-A

O3 O4
Main Oxygen Sensor

Ie-4-1-B

S7
Starter Motor

H-1-1

S9
Sub-Throttle Position
Sensor

IS-4-1-E

T2
Throttle Position Sensor

IS-4-1-E

V1
EGR VSV

Ie-2-1-W

V2
EVAP VSV

Ie-2-1-X

V7
VSV
(For Intake Control Valve)

Ie-2-1-W

W4
Water Temp. Sensor

V-2-1-C

EB1

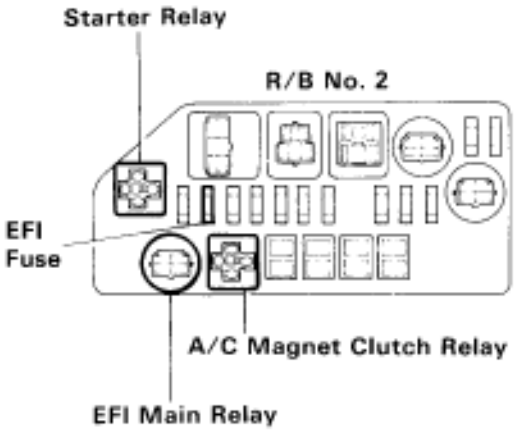
Ie-8-1-A

Ie-8-2-A

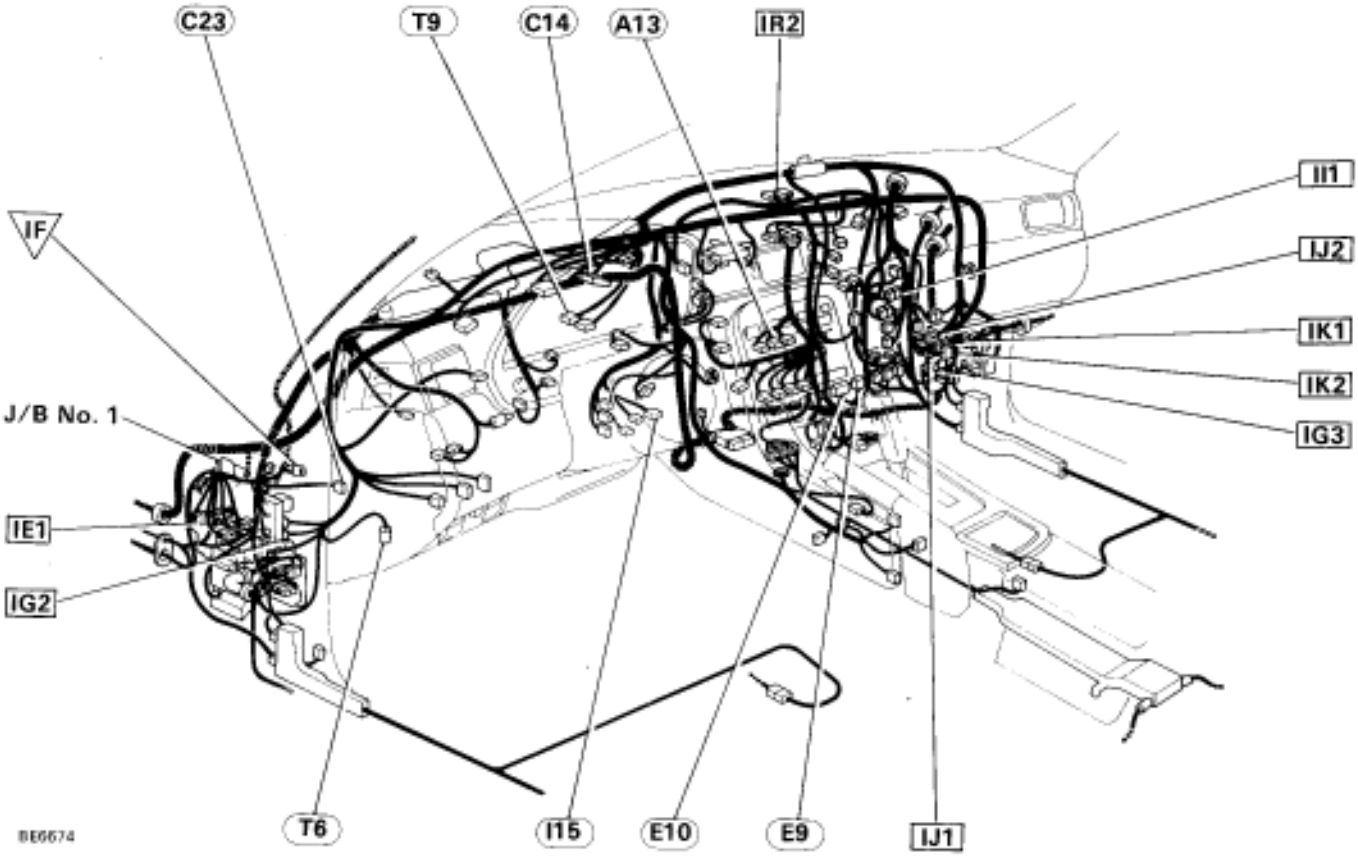
EB2

Ig-3-1-A

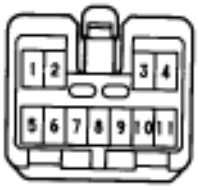
Ig-3-2-A



Location of Connectors in Instrument Panel



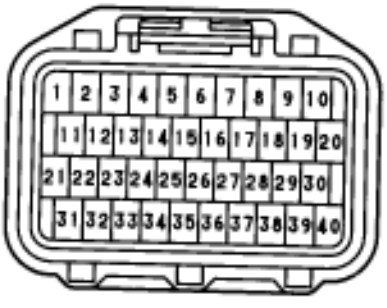
A13
A/C Control Assembly



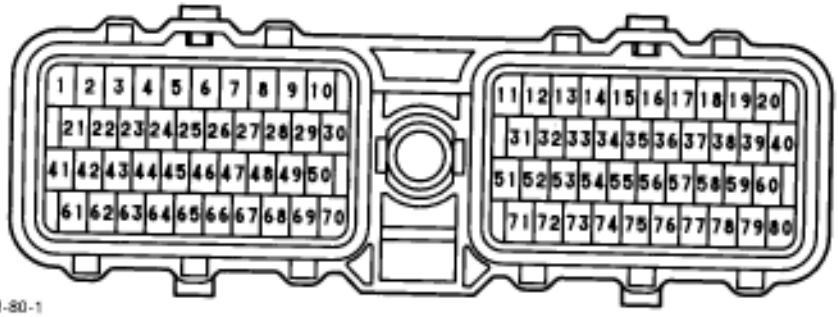
C14
Combination Meter

C23
Clutch Start Switch

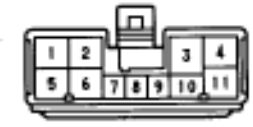
E9
Engine and ECT ECU



E10
Engine and ECT ECU



I15
IG Switch



eg-11-1

T6
TDCL

S-17-1

T9

e-20-1

IE1

eg-19-1

eg-19-2

IG2

e-10-1

e-10-2

IG3

e-15-1

e-15-2

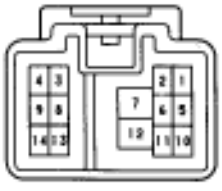
II1

e-12-1

e-12-2

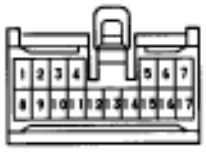
IJ1

e-14-1

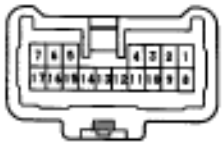


e-14-2

IJ2



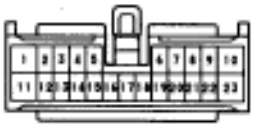
h-17-1



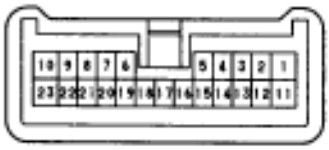
h-17-2

Location of Connectors in Instrument Panel (Cont'd)

IK1

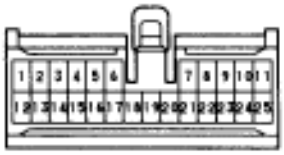


eh-23-1

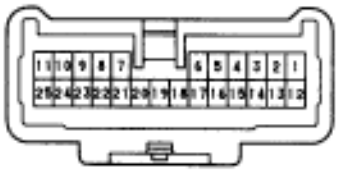


eh-23-2

IK2



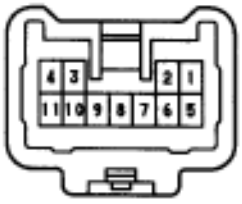
h-25-1-A



h-28-2-A

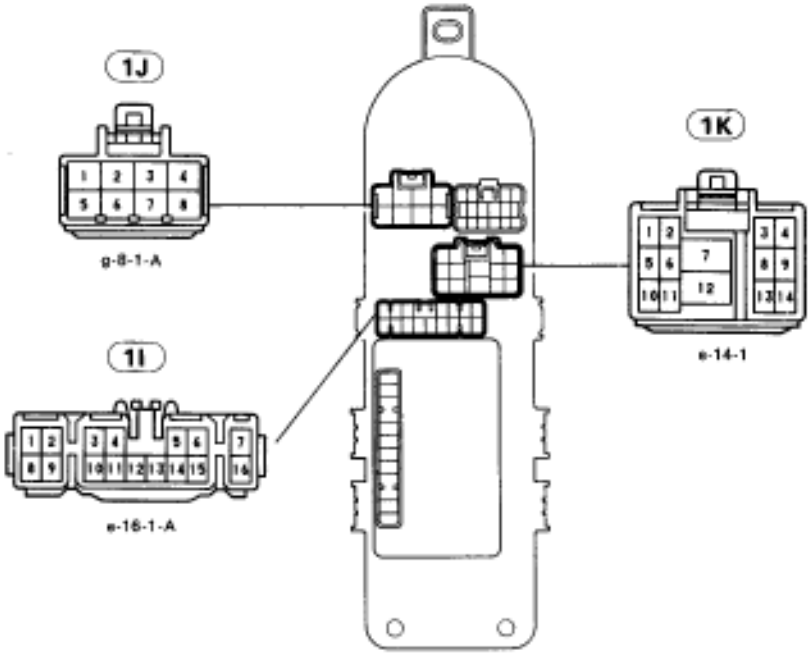
IR2

h-11-1-A



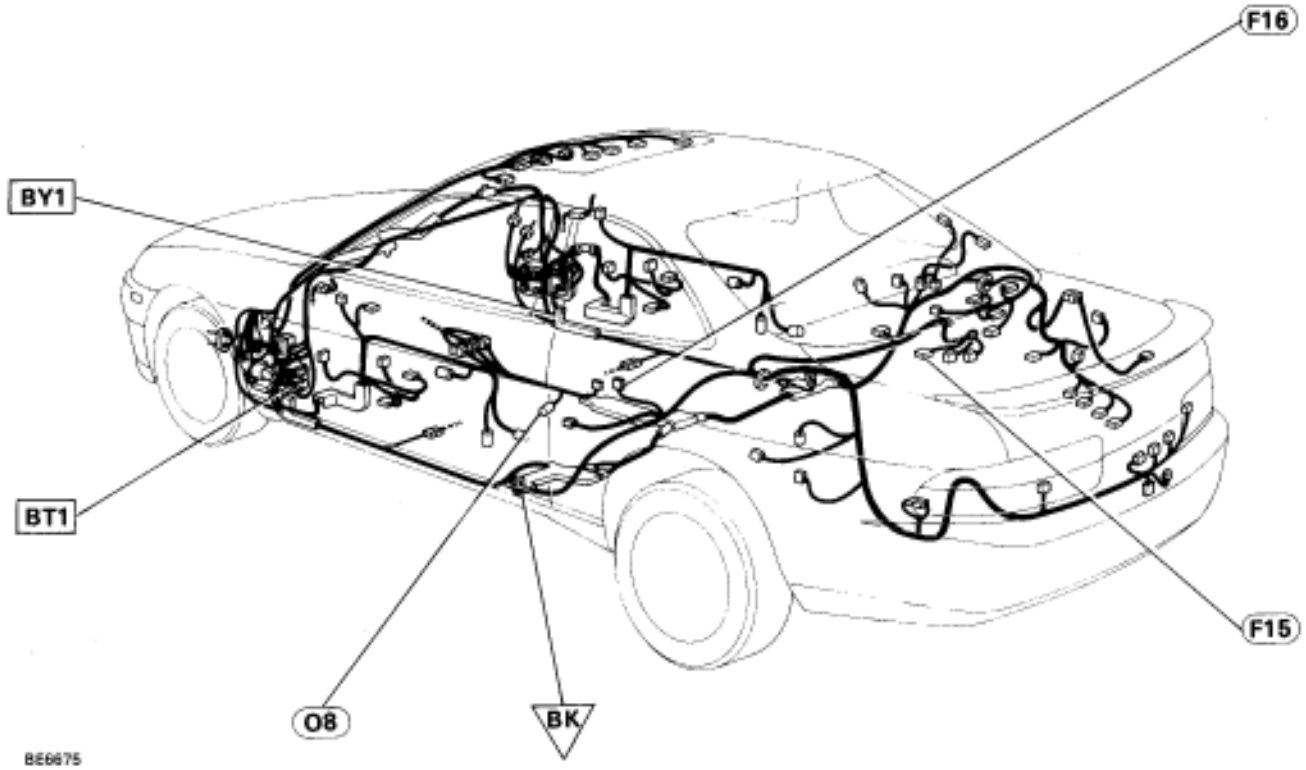
h-11-2-A

J/B No. 1



BE6624

Location of Connectors in Body



F15
Fuel Pump

g-2-1

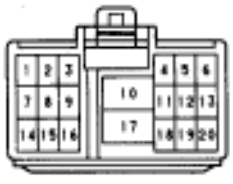
F16
Fuel Pump ECU

e-5-1

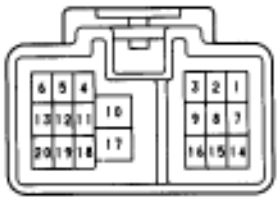
O8
Sub-Oxygen Sensor

le-4-1-0

BT1



e-20-1-B



e-20-2-B

BY1

e-10-1

e-10-2

CIRCUIT INSPECTION

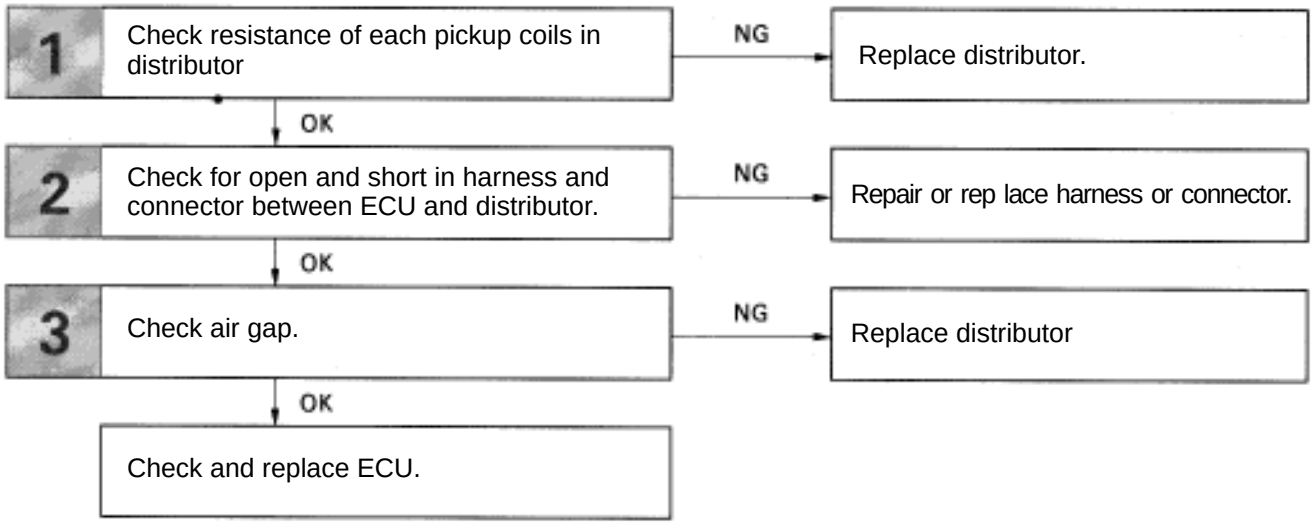
Diag. Code 12	RPM Signal Circuit (No. 1)

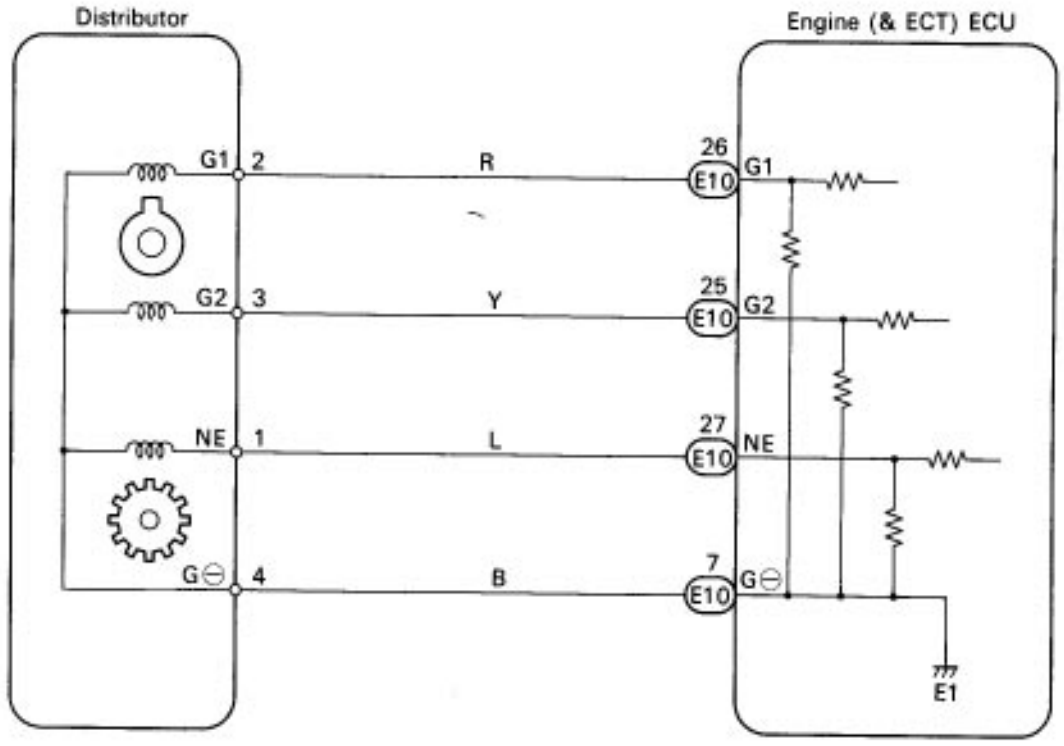
CIRCUIT DESCRIPTION

The distributor in the Engine Control System contains three pick-up coils (G1, G2 and NE).
The G1, G2 signals inform the ECU of the standard crankshaft angle.
The NE signals inform the ECU of the crankshaft angle and the engine speed.

Code No.	Diagnostic Code Detecting Condition	Trouble Area
12	No "NE" or "G1" and "G2" signal to ECU within 2 sec. after cranking.	● Open or short in NE, G circuit. ● Distributor ● Open or short in STA circuit. ● ECU
	Open in "G" ⊖ circuit.	

DIAGNOSTIC CHART

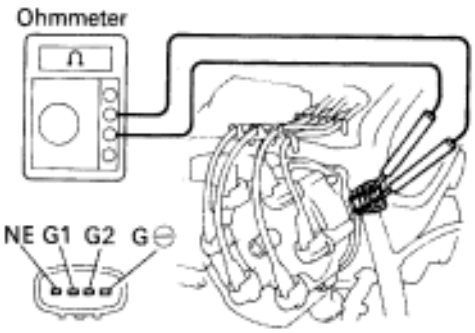




FI6543

INSPECTION PROCEDURE

1 Check resistance of each picup coils in distributor.



FI6631

P Disconnect distributor connector.

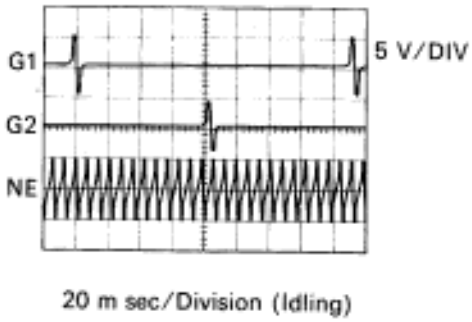
C Measure resistance between each terminal shown in table below.

OK

	Terminals	Resistance
G1 pickup coil (Cold)	G1 – G⊖	125 – 190 Ω
G2 pickup coil (Cold)	G2 – G⊖	125 – 190 Ω
NE pickup coil (Cold)	NE – G⊖	155 – 240 Ω

Reference INSPECTION USING OSCILLOSCOPE

G, NE signal waveforms



20 m sec/Division (Idling)

FI6519

- During cranking or idling, check between terminals G1, G2, NE and G⊖ of engine (&ECT) ECU.

HINT: The correct waveforms appears as shown in the illustration on the left.

OK

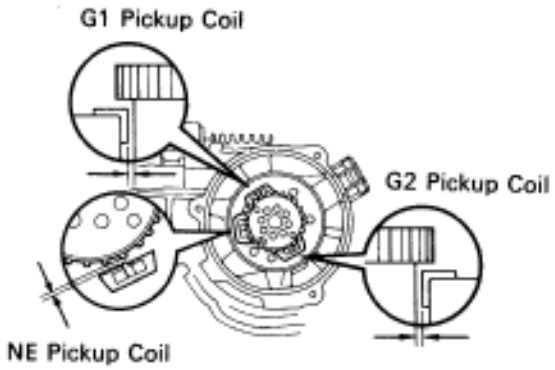
NG → **Replace distributor.**

2 Check for open and short in harness and connector between engine (&ECT) ECU and distributor (See page IN-27

OK

NG → **Repair or replace harness or connector.**

3 Check air gap.



P Remove distributor cap & rotor.

C Using SST (G1 and G2 pickups) and a thikness gauge (NE pickup). measure the air gap between the signal rotor projection and pickup coil.
SST 09240-00020 fro G1 and G2 pickups

OK **Air gap: 0.2-0.4 mm (0.008-0.016 in.)**

OK

NG > **Replace distributor.**

Check and replace engine (& ECT) ECU.

Diag. Code 13 | RPM Signal Circuit (No. 2)

CIRCUIT DESCRIPTION

Refer to RPM signal circuit (No. 1) on page TR-46 .

Code No.	Diagnostic Code Detecting Condition	Trouble Area
13	No NE signal to ECU for 0.1 sec. or more at 1,000 rpm or more.	• Open or short in NE circuit • Distributor • ECU
	No 12 pulses of NE to ECU during the interval between G1 and G2 pulses.	

DIAGNOSTIC CHART

This code indicates that a momentary interruption of the RPM signal from the distributor to the ECU has occurred, but that it is returned to normal. Note that although this problem may not necessarily appear at the time of inspection, it cannot be ignored because this diagnostic code is output, indicating that there is or was a malfunction in the RPM signal circuit; this ”malfunction” is usually a loose connector.
The distributor connector and the NE terminal of the ECU connector must therefore be checked for the following:

1. Loose connectors
2. Dirty connector terminals
3. Loose connector terminals

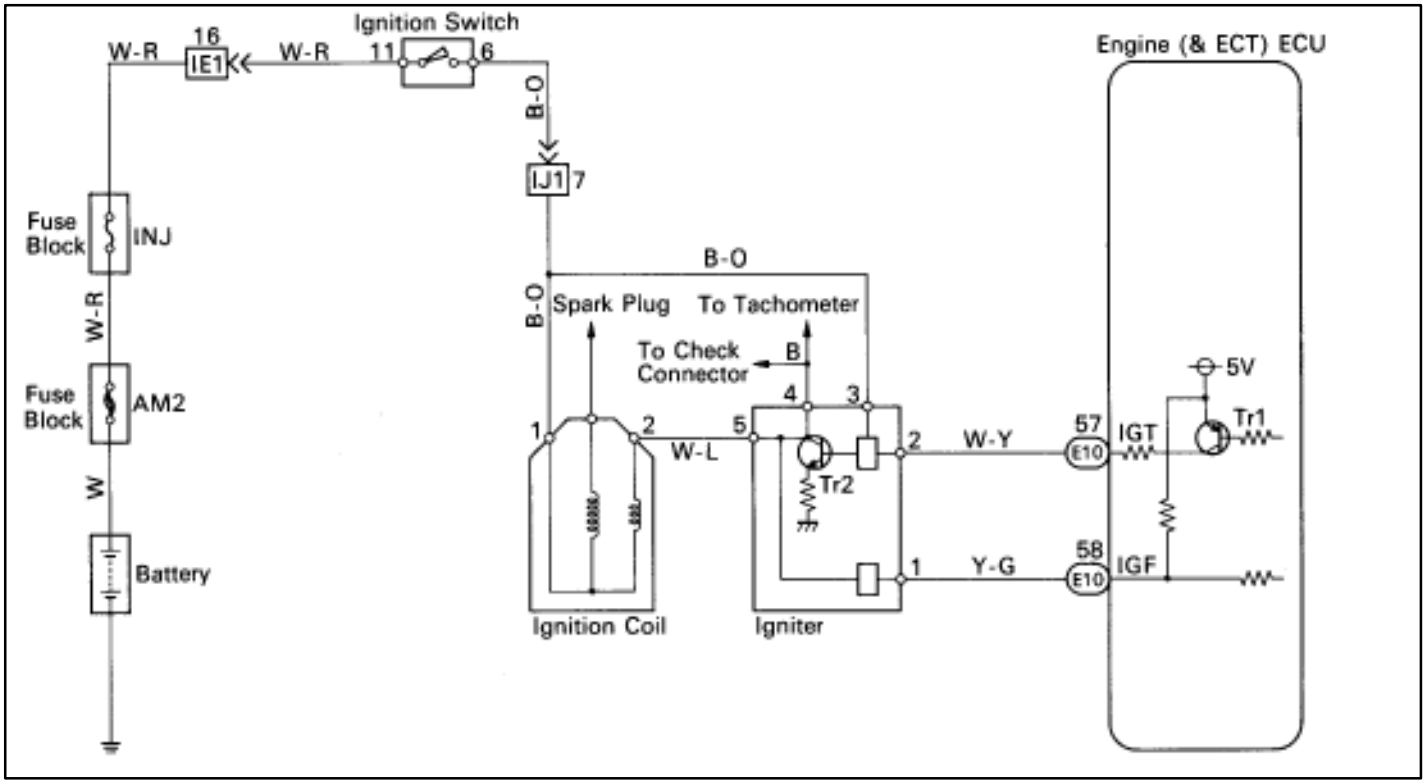
Diag. Code 14 | Ignition Signal Circuit

— CIRCUIT DESCRIPTION

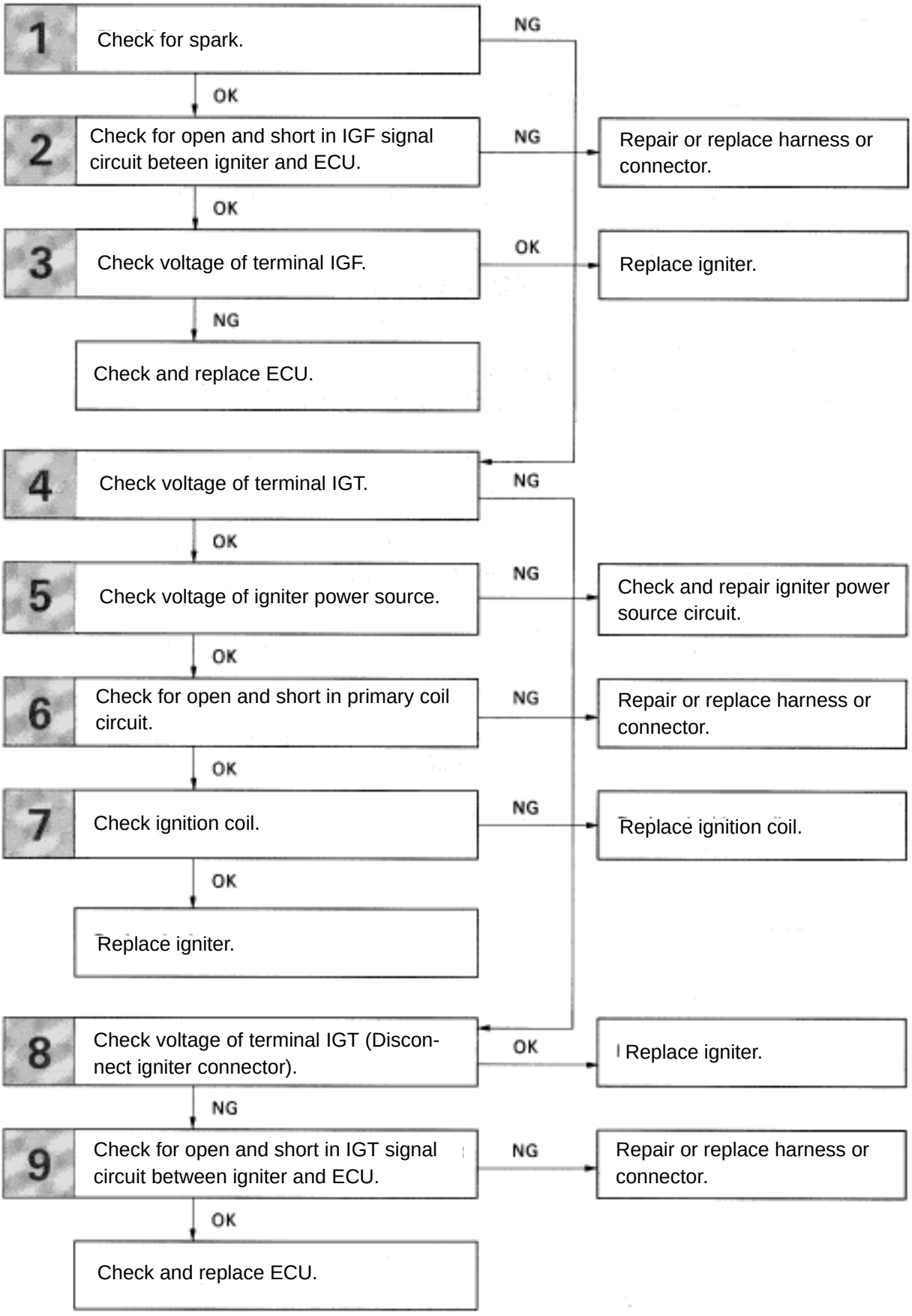
The ECU determines the ignition timing, turns on Tr1 at a predetermined angle (°CA) before the desired ignition timing and outputs an ignition signal (IGT) ”1” to the igniter.
Since the width of the IGT signal is constant, the dwell angle control circuit in the igniter determines the time the control circuit starts primary current flow to the ignition coil based on the engine rpm and ignition timing one revolution ago, that is, the time the Tr2 turns on.
When it reaches the ignition timing, the ECU turns Tr1 off and outputs the IGT signal ”O”.
This turns Tr2 off, interrupting the primary current flow and generating a high voltage in the secondary coil which causes the spark plug to spark. Also, by the counter electromotive force generated when the primary current is interrupted, the igniter sends an ignition confirmation signal (IGF) to the ECU.
The ECU stops fuel injection as a fail safe function when the IGF signal is not input to the ECU.

DTC No.	DTC Detecting Condition	Trouble Area
14	No IGF signal to ECU for 6 consecutive IGT signal.	•Open or short in IGF or IGT circuit from igniter to ECU. •Igniter •ECU

WIRING DIAGRAM



DIAGNOSTIC CHART



INSPECTION PROCEDURE

1	Check for spark.
C	Disconnect the high-tension cord from the distributor, hold its end about 12.5 mm (1/2”) from the ground, see if spark occurs while the engine is being cranked.
OK	**Spark should be generated.**
Hint	To prevent excessive fuel injected from the injectors during this check. Don’t crank the engine for more than 1 - 2 seconds at a time.

OK

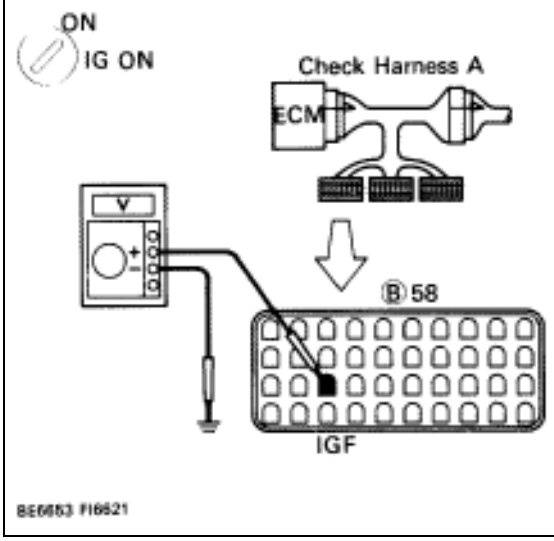
NG → **Go to step 4.**

2	Check for open and short in harness and connector in IGF signal circuit between engine (& ECT) ECU and igniter (See page IN-27).

OK

NG → **Repair or replace harness or connector.**

3	Disconnect igniter connector and check voltage between terminal IGF of engine (& ECT) ECU connector and body ground.



P
1. Disconnect igniter connector.
2. Connect the Check Harness A. (See page TR-34).
3. Turn ignition switch on.

C Measure voltage between terminal IGF of engine (& ECT) ECM connector and body ground.

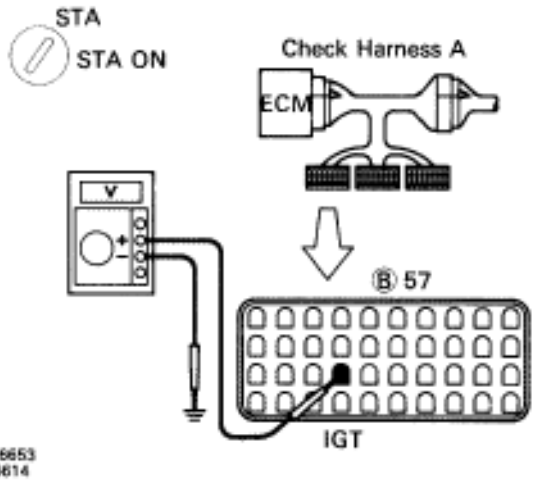
OK **Voltage: 4 - 6 V**

NG

OK → **Replace igniter.**

Check and replace engine (& ECT) ECM.

4 **Check voltage between terminal IGT of engine (& ECT) ECU connector and body ground.**

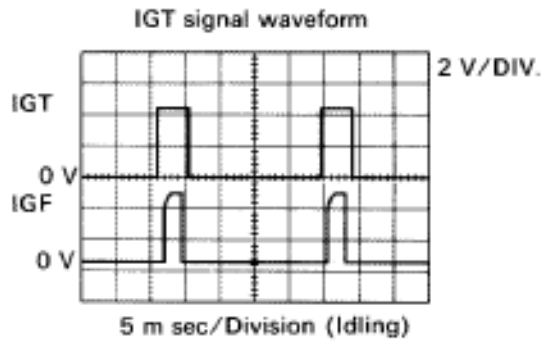


P Connect the Check Harness A. (See page TR-34).

C Measure voltage between terminal IGT of engine (& ECT) ECM connector and body ground when engine is cranked.

OK **Voltage:** **0.5 - 1.0 V**
(Neither 0 V nor 5 V)

Reference **INSPECTION USING OSCILLOSCOPE**

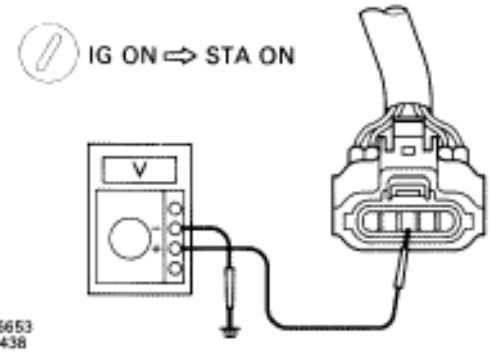


- During cranking or idling, check waveform between terminal IGT and E1 of engine (& ECT) ECU.

HINT: The correct waveform appears as shown in the illustration on the left, with rectangle waves.

OK → **NG** → **Go to step 8.**

5 **Check voltage between terminal 3 of igniter connector and body ground.**



P Disconnect igniter connector.

C Measure voltage between terminal 3 of igniter connector and body ground, when ignition switch is turned to "ON" and "STA" position.

OK **Voltage:** **10 - 14 V**

OK → **NG** → **Check and repair igniter power source circuit.**

6	Check for open and short in harness and connector between ignition switch and ignition coil, ignition coil and igniter (See page IN-27).

OK → NG: **Repair or replace harness or connector.**

7	Check ignition coil.

Primary Coil

Secondary Coil

P02518
P02519

P Disconnect ignition coil connector.

C
1. Check primary coil.
   Measure resistance between terminals of ignition coil connector.
2. Check secondary coil.
   Measure resistance between terminal ⊕ of ignition coil connector and high-tension terminal.

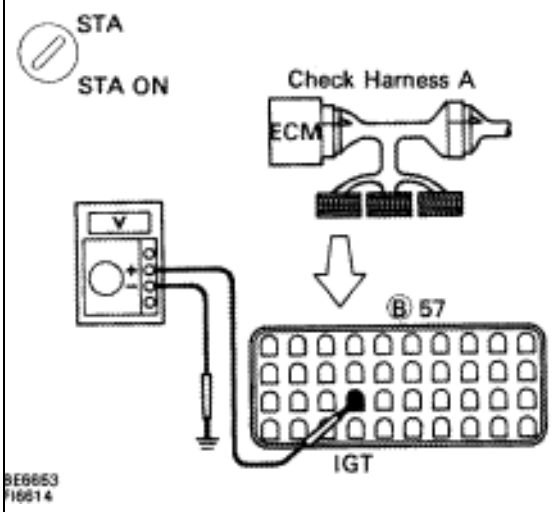
OK

	Resistance
Primary Coil (Cold)	0.2 – 0.3 Ω
Secondary Coil (Cold)	6 – 11 kΩ

OK → NG: **Replace ignition coil.**

Replace igniter.

8 **Disconnect igniter connector and check voltage between terminal IGT of engine (& ECT) ECU connector and body ground.**



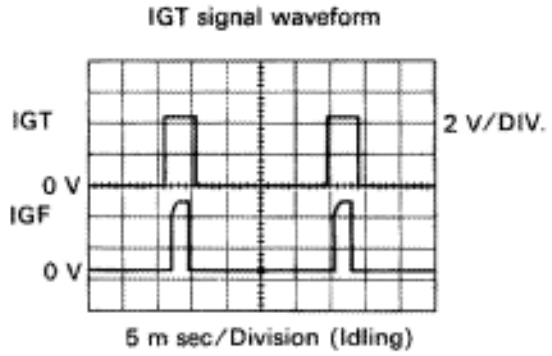
P Disconnect igniter connector.

C Measure voltage between terminal IGT of engine (& ECT) ECU connector and body ground when engine is cranked.

OK

Voltage: **0.5 - 1.0 V**
(Neither 0 V nor 5 V)

Reference **INSPECTION USING OSCILLOSCOPE**



- During cranking or idling, measure between terminal IGT and E1 of engine (& ECT) ECU.

HINT: The correct waveform appears as shown in the illustration on the left, with rectangle waves.

NG

OK **Replace igniter.**

9 **Check for open and short in harness and connector in IGT signal circuit between engine (& ECT) ECU and igniter (See page IN-27).**

OK

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

Check and replace engine (& ECT) ECU.

Diag. Code 16 | ECT Control Signal Malfunction

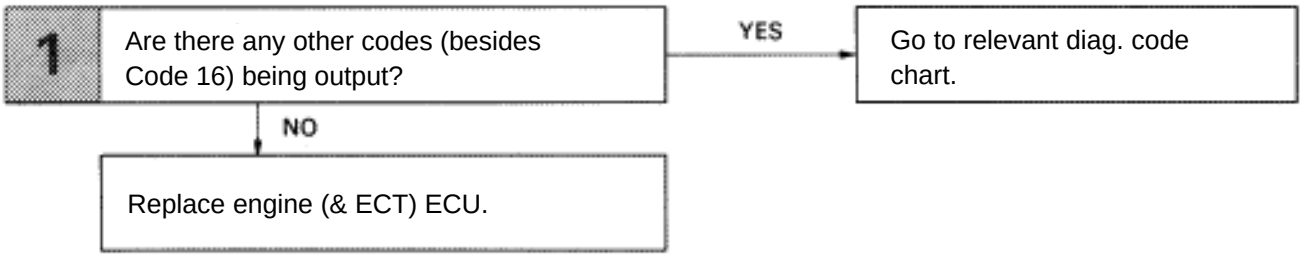
CIRCUIT DESCRIPTION

The signal from the ECT CPU retards the ignition timing of the engine during ECT gear shifting, thus momentarily reducing torque output of the engine for smooth clutch operation inside the transmission and reduced shift shock.
If the ECU records the diagnostic code ”16” in memory, it prohibits the torque control of the ECT which performs smooth gear shifting.

DTC No.	DTC Detecting Condition	Trouble Area
16	Fault in communications between the engine CPU and ECT CPU in the ECU.	• ECU

If the ECU records the diagnostic trouble code ”16” in memory, it prohibits the torque control of the ECT which performs smooth gear shifting.

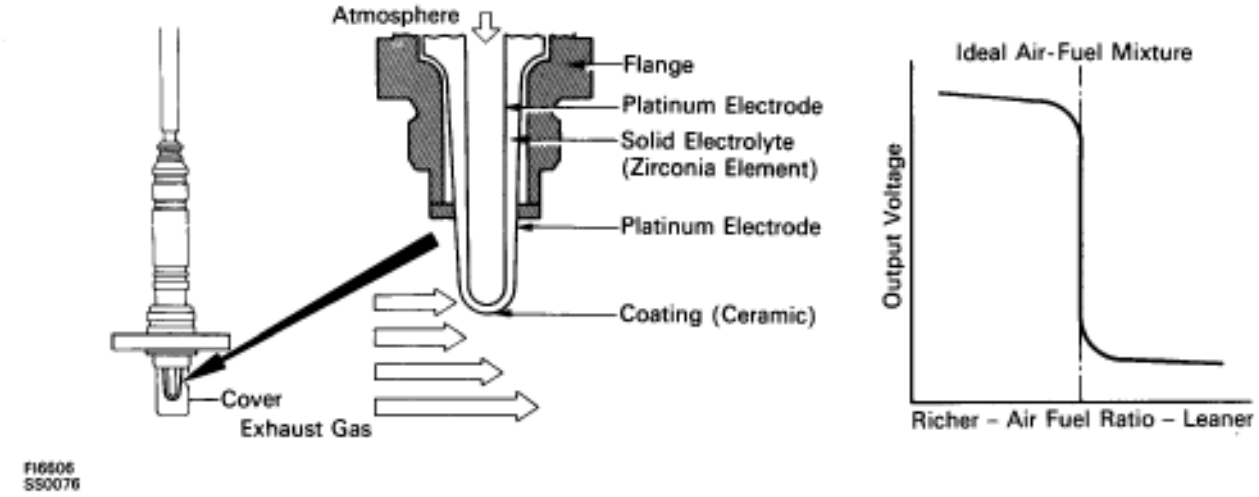
DIAGNOSTIC CHART



Diag. Code 21, 28 | Main Oxygen Sensor Circuit

— CIRCUIT DESCRIPTION

To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three-way catalyst is used, but for most efficient use of the three-way catalyst, the air-fuel ratio must be precisely controlled so that it is always close to the stoichiometric air-fuel ratio.
The oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. This characteristic is used to detect the oxygen concentration in the exhaust gas and provide feedback to the computer for control of the air-fuel ratio.
When the air-fuel ratio becomes LEAN, the oxygen concentration in the exhaust increases and the oxygen sensor informs the ECU of the LEAN condition (small electromotive force: 0 V).
When the air-fuel ratio is RICHER than the stoichiometric air-fuel ratio the oxygen concentration in the exhaust gas is reduced and the oxygen sensor informs the ECU of the RICH condition (large electromotive force: 1V).
The ECU judges by the electromotive force from the oxygen sensor whether the air-fuel ratio is RICH or LEAN and controls the injection time accordingly. However, if malfunction of the oxygen sensor causes output of abnormal electromotive force, the ECU is unable to perform accurate air-fuel ratio control.



DTC No.	DTC Detecting Condition	Trouble Area
21 . 28	(1) Main oxygen sensor signal voltage is reduced to tbetween 0.35 V and 0.70 V for 60 sec. under conditions (a) ~ (d). (2 trip detection logic)* (a) Coolant temp.: Between 80°C (176°F) and 95°C (203°F). (b) Engine speed: 1,500 rpm or more (c) Load driving (EX. ECT in 4th (5th for M/T) speed, A/C ON, Flat road, 50 mph (80km/h)). (d) Main oxygen sensor signal voltage: Alternating above and below 0.45 V.	•Main oxygen sensor circuit •Main oxygen sensor
	(2) Main oxygen sensor signal voltage exceeds 0.70 V for 3 sec. or more during fuel cut.	

*: See page TR-25 ..

HINT: Diag. trouble code 21 is for the front side main oxygen sensor circuit. Diag. trouble code 28 is for the rear side main oxygen sensor circuit.

CIRCUIT DESCRIPTION (Cont'd)

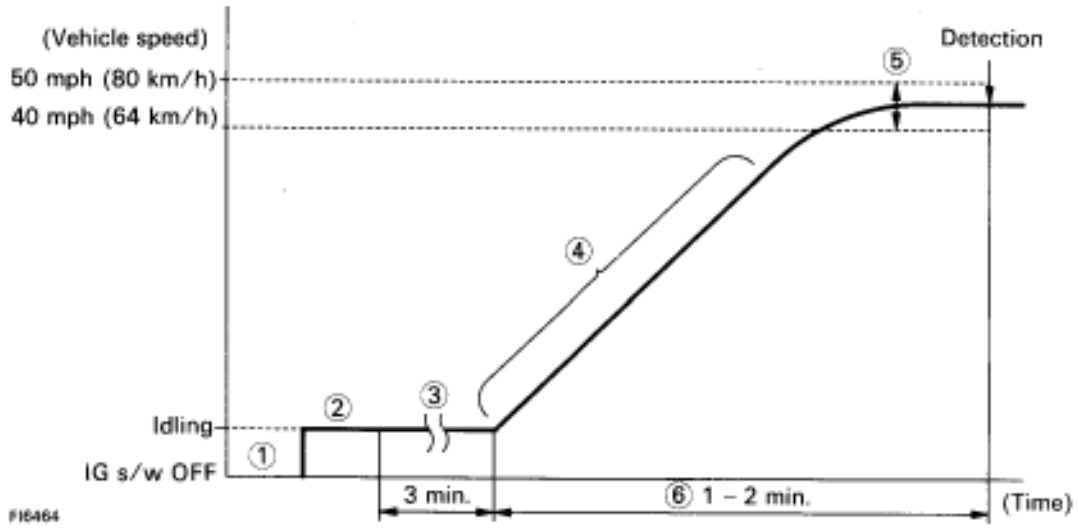
DIAGNOSIS CODE DETECTION DRIVING PATTERN

Purpose of the driving pattern.

(a) To simulate diag. code detecting condition after diag. code is recorded.

(b) To check that the malfunction is corrected when the repair is completed confirming that diag. code is no longer detected.

Malfunction: Main Oxygen Sensor Deterioration



① Disconnect the EFI fuse (15 A) for 10 sec. or more, with IG switch OFF.
Initiate test mode (Connect terminal TE2 and E1 of check connector or TDCL with IG switch OFF).

② Start the engine and warm up with all ACC switch OFF.

③ After the engine is warmed up, let it idle for 3 min.

④ After performing the idling in , perform gradual acceleration with in the range 1,300 1,700 rpm (centered around 1,500 rpm) with the A/C switch ON and D range for A/T (5th for M/T).
(Take care that the engine speed does not fall below 1,200 rpm when shifting. Gradually depress the accelerator pedal and kept it. Steady so that engine braking does not occur).

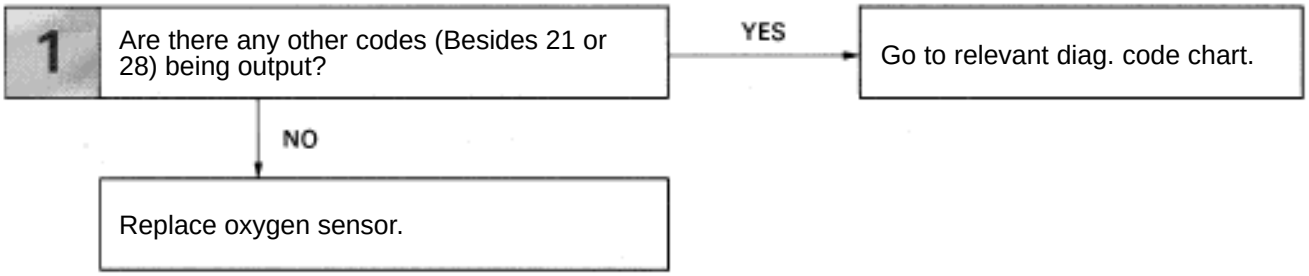
⑤ Maintain the vehicle speed at 40-50 mph (64-80 km/h).

⑥ Keep the vehicle running for 1-2 min. after starting acceleration.

HINT: If a malfunction exists, the "CHECK" engine warning light will light up after approx. 60 sec. from the start of acceleration.

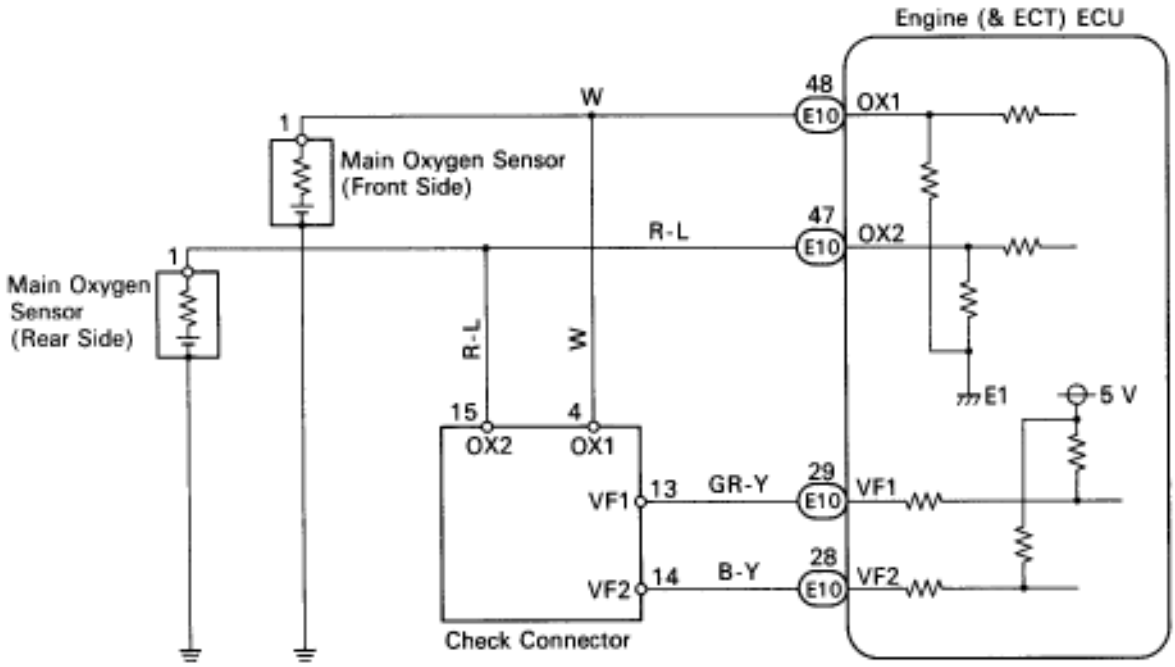
NOTICE: If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.

DIAGNOSTIC CHART



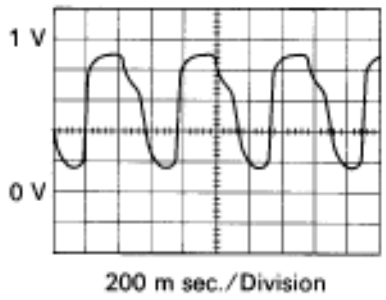
HINT: If diag. code 21 is output, replace the front side main oxygen sensor.
If diag. code 28 is output, replace the rear side main oxygen sensor.

WIRING DIAGRAM



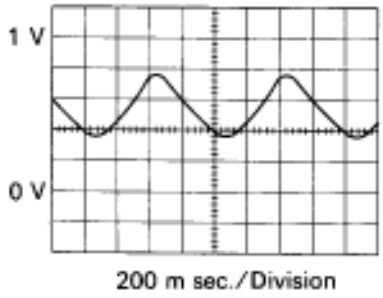
Reference INSPECTION USING OSCILLOSCOPE

Ox signal waveform



- With the engine racing (4,000 rpm) measure between terminals OX1, OX2 and E1 of engine (& ECT) ECU.

HINT: The correct waveform appears as shown in the illustration on the left, oscillating between approx. 0.1 V and 0.9 V



If the oxygen sensor is deteriorated, the amplitude of the voltage is reduced as shown on the left.

FI6514
FI6515

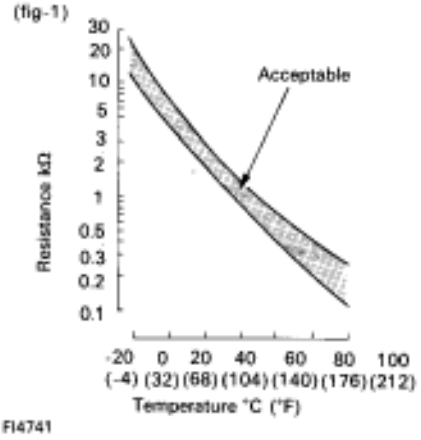
Diag. Code 22 | Water Temp. Sensor Circuit

CIRCUIT DESCRIPTION

The water temperature sensor senses the coolant temperature. A thermistor built in the sensor changes the resistance value according to the coolant temperature. The lower the coolant temperature, the greater the thermistor resistance value, and the higher the coolant temperature, the lower the thermistor resistance value (See Fig. 1.).

The water temperature sensor is connected to the ECU (See next page). The 5 V power source voltage in the ECU is applied to the water temperature sensor from the terminal THW via a resistor R. That is, the resistor R and the water temperature sensor are connected in series. When the resistance value of the water temperature sensor changes in accordance with changes in the coolant temperature, the potential at the terminal THW also changes. Based on this signal, the ECU increases the fuel injection volume to improve driveability during cold engine operation. If the ECU records the diagnostic code 22, it operates the fail safe function, keeping the coolant temperature at a constant 80˚C (176˚F).

(fig-1)



FI4741

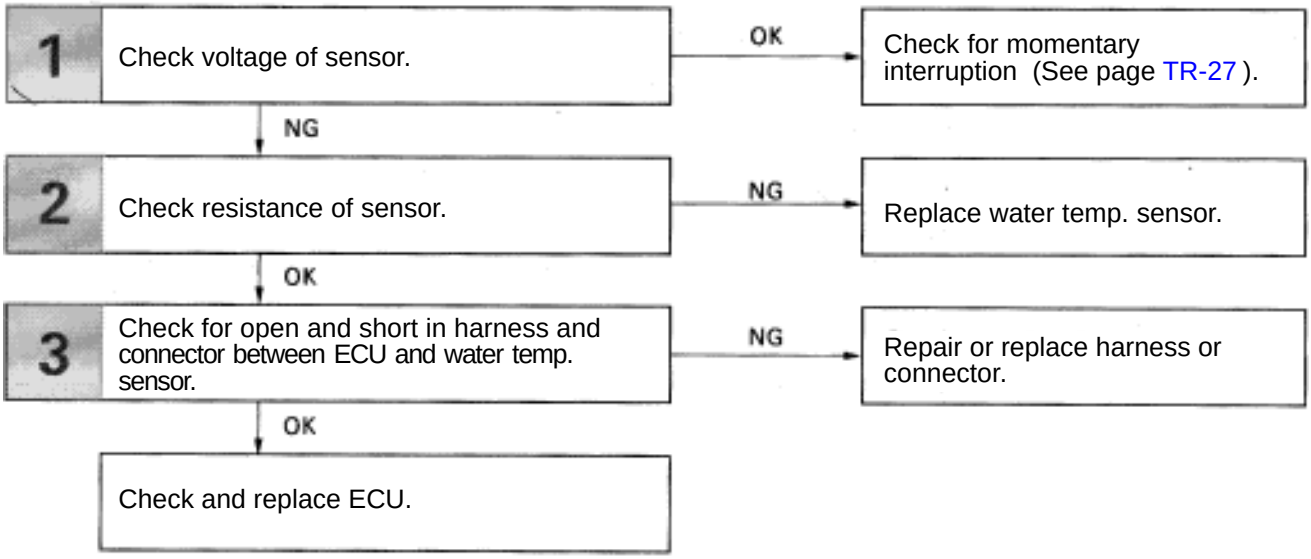
< Reference >

Water Temp. ˚C (˚F)	Resistance (kΩ)	Voltage (V)
-20 (-4)	16.0	4.3
0 (32)	5.9	3.4
20 (68)	2.5	2.4
40 (104)	1.2	1.5
60 (140)	0.6	0.9
80 (176)	0.3	0.5
100 (212)	0.2	0.3

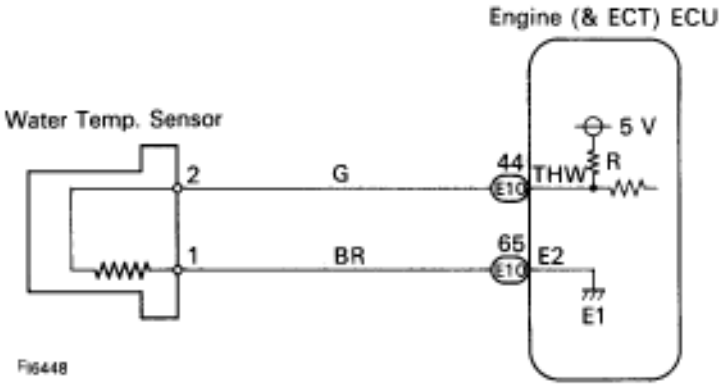
Code No.	Diagnostic Code Detecting System	Trouble Area
22	Open or short in water temp. sensor circuit for 0.5 sec. or more.	● Open or short in water temp. sensor circuit ● Water temp. sensor ● ECU

DIAGNOSTIC CHART

HINT: If diagnostic codes "22" (water temperature sensor circuit), "24" (intake air temperature sensor circuit) and "41" (throttle position sensor circuit) are output simultaneously, E2 (sensor ground) may be open.



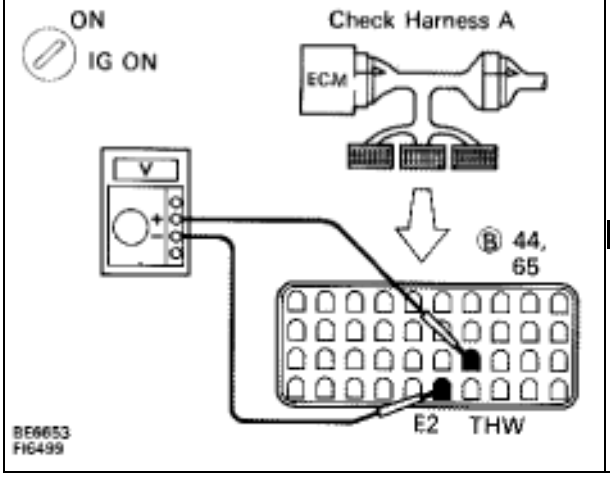
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT: If diagnostic codes "22" (water temperature sensor circuit), "24" (intake air temperature sensor circuit) and "41" (throttle position sensor circuit) are output simultaneously, E2 (sensor ground) may be open.

1 **Check voltage between terminals THW and E2 of engine (&ECT) ECU connector.**



P 1. Connect the Check Harness A. (See page TR-34)
2. Turn ignition switch on.

C Measure voltage between terminals THW and E2 of engine (& ECT) ECU connector.

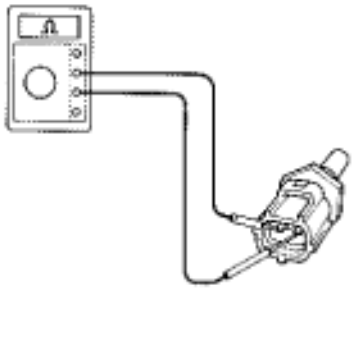
OK

Engine Coolant Temp. °C (°F)	Voltage
20 (68) (Engine is cool)	1 – 3 V
80 (176) (Engine is hot)	0.1 – 1.0 V

NG

OK **Check for momentary interruption (See page TR-27).**

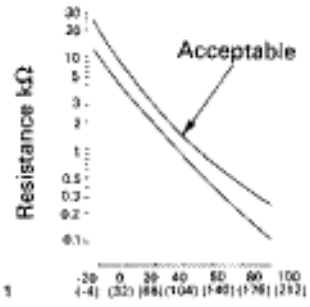
2 **Check water temp. sensor.**



P Disconnect the water temp. sensor connector.

C Measure resistance between terminals.

OK **Resistance is within Acceptable Zone on chart.**



Water temp. °C (°F)	Resistance
20 (68)	2 – 3 kΩ
80 (176)	0.2 – 0.4 kΩ

OK

NG **Replace water temp. sensor.**

3 **Check for open and short in harness and connector between engine (& ECT) ECU and water temp. sensor (See page IN-27).**

OK

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

Check and replace engine (& ECT) ECU.

Diag. Code 24 | Intake Air Temp. Sensor Circuit

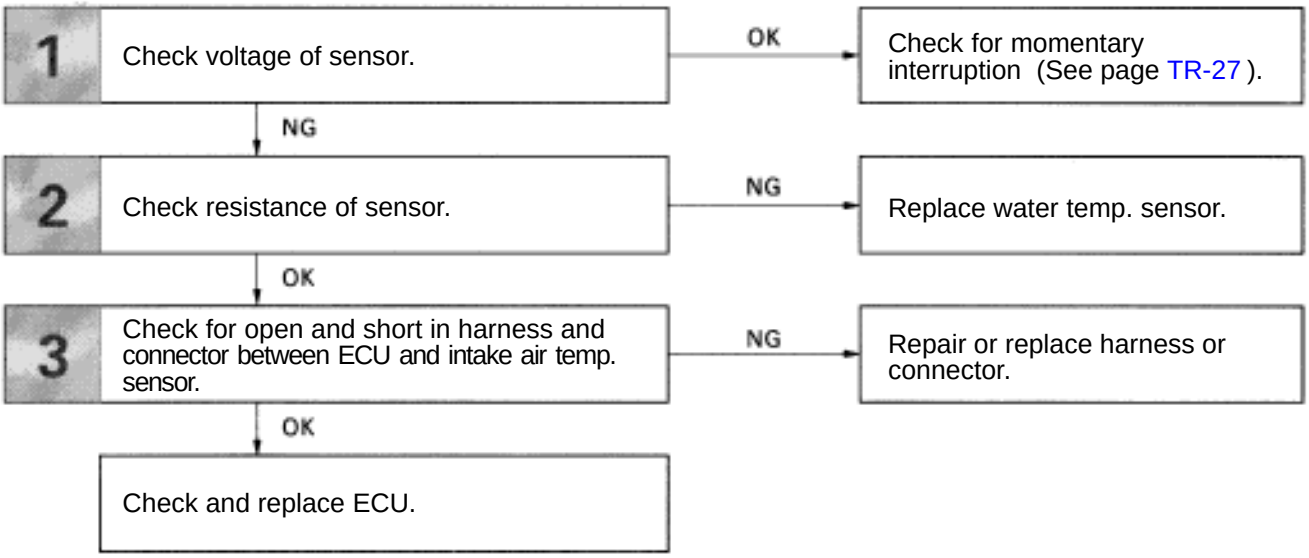
CIRCUIT DESCRIPTION

The intake air temp. sensor is built into the air flow meter and senses the intake air temperature. The structure of the sensor and connection to the ECU is the same as in the water temp. sensor shown on page TR-64 .
If the ECU records the diagnostic code ”24”, it operates the fail safe function, keeping the intake air temperature at a constant 20˚C (68˚F).

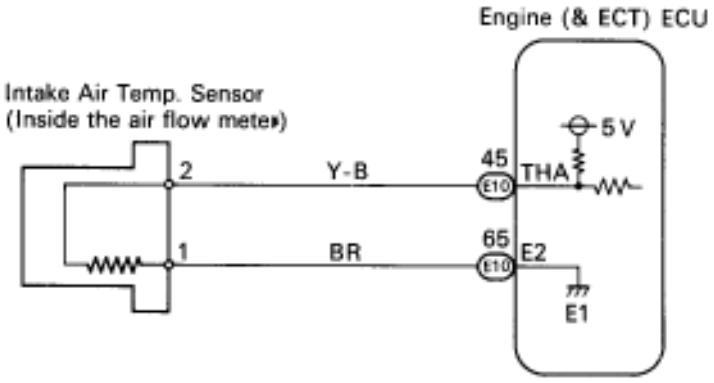
Code No.	Diagnostic Code Detecting System	Trouble Area
24	Open or short in intake air temp. sensor circuit for 0.5 sec. or more.	● Open or short in intake air temp. sensor circuit. ● Intake air temp. sensor ● ECU

DIAGNOSTIC CHART

HINT: If diagnostic codes ”22” (water temperature sensor circuit), ”24” (intake air temperature sensor circuit) and ”41” (throttle position sensor circuit) are output simultaneously, E2 (sensor ground) may be open.



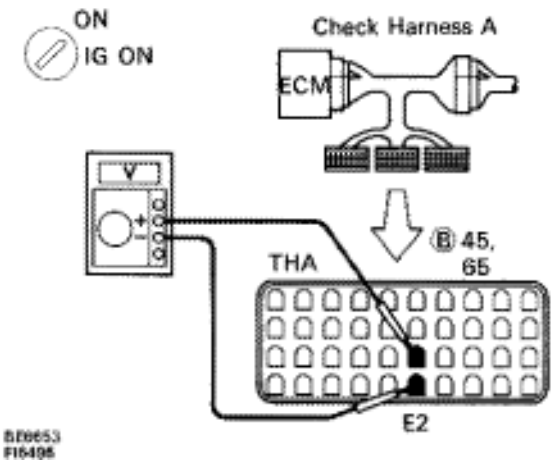
W



FI6448

INSPECTION PROCEDURE

1 **Check voltage between terminals THA and E2 of engine (& ECT) ECU connector.**



P 1. Connect the Check Harness A. (See page TR-34)
2. Turn ignition switch on.

C Measure voltage between terminals THA and E2 of engine (& ECT) ECU connector.

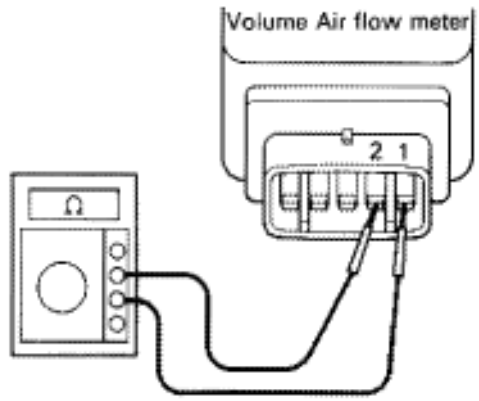
OK

Intake air temp. °C (°F)	Voltage
20 (68)	1 – 3 V
60 (140)	0.5 – 1.0 V

NG

OK **Check for momentary interruption (See page TR-27).**

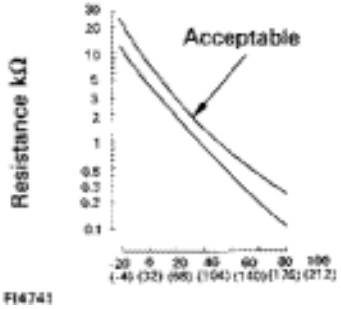
2 **Check intake air temp. sensor.**



P Disconnect the volume air flow meter connector.

C Measure resistance between terminals 1 and 2 of air flow meter connector.

OK **Resistance is within Acceptable Zone on chart.**



Intake air temp. °C (°F)	Resistance
20 (68)	2 – 3 kΩ
60 (140)	0.4 – 0.7 kΩ

OK

NG **Replace intake air temp. sensor (Replace air flow meter).**

3 **Check for open and short in harness and connector between engine (& ECT) ECU and intake air temp. sensor (See page IN-27).**

OK

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

Check and replace engine (& ECT) ECU.

Diag. Code 25, 26 — Air-Fuel Ratio Lean Malfunction / Air-Fuel Ratio Rich Malfunction

CIRCUIT DESCRIPTION

Refer to page TR-62 for the circuit description.

Code No.	Diagnostic Code Detecting System	Trouble Area
25	(1) Main oxygen sensor voltage is 0.45 V or less (lean) for 90 sec. under conditions (a) and (b). (2 trip detection logic)*2 (a) Coolant temp.: 70˚C (158˚F) or more. (b) Engine speed: 1,500 rpm or more.	● Open or short in main oxygen sensor circuit ● Main oxygen sensor ● Ignition system ● ECU
	(2)*1 Difference of air-fuel ratio feedback compensation value between front (No. 1 3 cylinders) and rear (No. 4 6 cylinders) is more than 15 percentage for 20 sec. or more under conditions (a) and (b). (2 trip detection logic)*2 (a) Engine speed: 2,000 rpm or more. (b) Coolant temp.: Between 60˚C (140˚F) and 95˚C (203˚F).	● Open and short in injector circuit. ● Fuel line pressure (injector leak, blockage) ● Mechanical system malfunction (skipping teeth of timing belt) ● Ignition system ● Compression pressure (foreign object caught in valve) ● Air flow meter (air intake) ● ECU
	(3)*1 Engine speed varies by more than 15 rpm over the preceding crank angle period during a period of 20 sec. or more under conditions (a) and (b). (2 trip detection logic)*2 (a) Engine speed: Idling (b) Coolant temp.: Between 60˚C (140˚F) and 95˚C (203˚F).	● Open and short in injector circuit. ● Fuel line pressure (injector leak, blockage) ● Mechanical system malfunction (skipping teeth of timing belt) ● Ignition system ● Compression pressure (foreign object caught in valve) ● Air flow meter (air intake) ● ECU
26*1	(1) Difference of air-fuel ratio feedback compensation value between front (No. 1 3 cylinders) and rear (No.4 6 cylinders) is more than 15 percentage for 20 sec. or more under conditions (a) and (b). (2 trip detection logic)*2 (a) Engine speed: 2,000 rpm or more. (b) Coolant temp.: Between 60˚C (140˚F) and 95˚C (203˚F).	● Open and short in injector circuit. ● Fuel line pressure (injector leak, blockage) ● Mechanical system malfunction (skipping teeth of timing belt) ● Ignition system ● Compression pressure (foreign object caught in valve) ● Air flow meter (air intake) ● ECU
	(2) Engine speed varies by more than 15 rpm over the preceding crank angle period during a period of 20 sec. or more under conditions (a) and (b). (2 trip detection logic)*2 (a) Engine speed: Idling (b) Coolant temp.: Between 60˚C (140˚F) and 95˚C (203˚F).	● Open and short in injector circuit. ● Fuel line pressure (injector leak, blockage) ● Mechanical system malfunction (skipping teeth of timing belt) ● Ignition system ● Compression pressure (foreign object caught in valve ● Air flow meter (air intake) ● ECU

*1: Only for USA specification vehicles.

*2: See page TR-25 .

CIRCUIT DESCRIPTION (Cont'd)

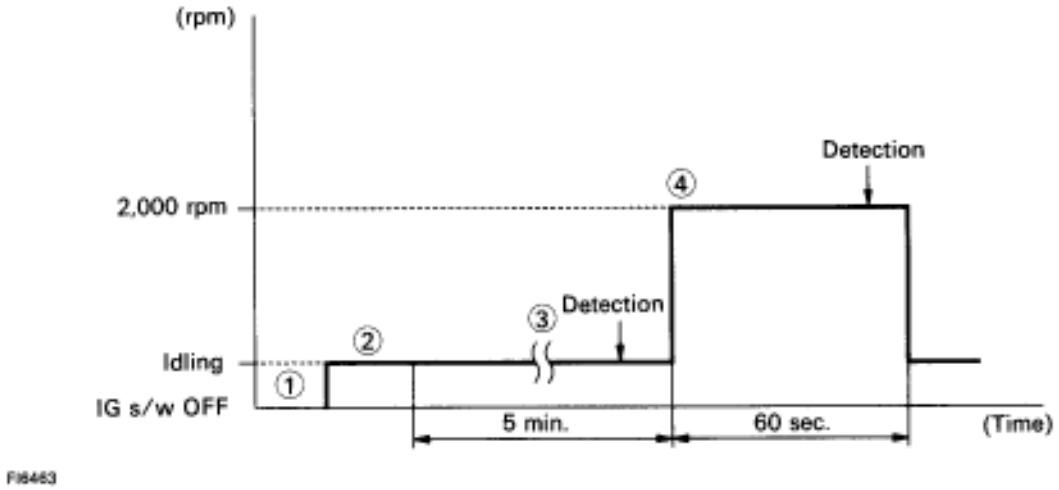
DIAGNOSIS CODE DETECTION DRIVING PATTERN

Purpose of the driving pattern.

(a) To simulate diag. code detecting condition after diag. code is recorded.

(b) To check that the malfunction is corrected when the repair is completed confirming that diag. code is no longer detected.

Malfunction: Open or Short in Injector circuit, Injector Leak or Blockage



① Disconnect the EFI fuse (15 A) for 10 sec. or more. with IG switch OFF.
Initiate test mode (Connect terminal TE2 and E1 of check connector or TDCL with IG switch OFF).

② Start engine and warm up with all ACC switch OFF.

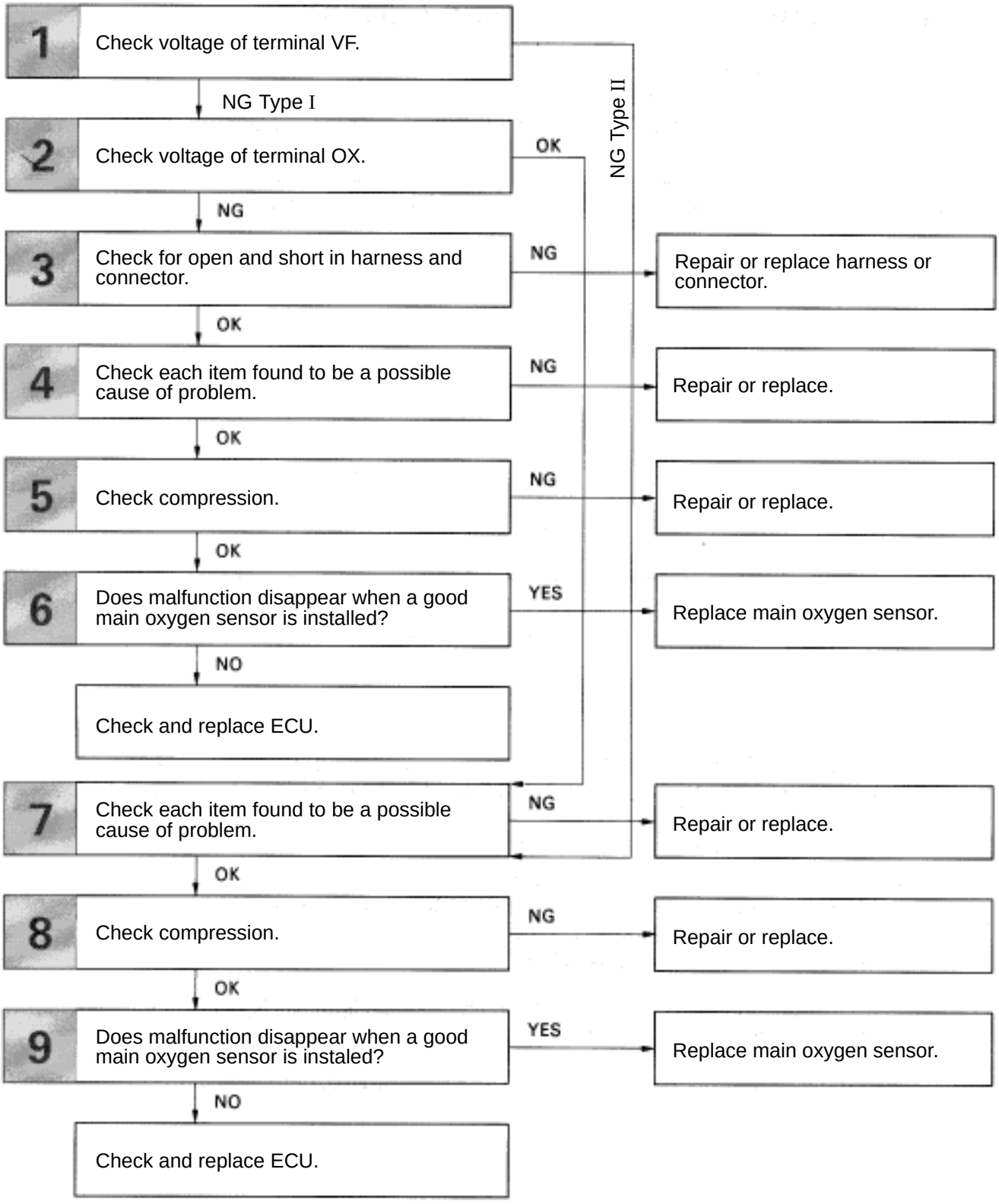
③ After engine is warmed up, let it idle for 5 min.
(After the engine is started, do not depress the accelerator pedal.)

④ If the malfunction is not detected during idling, perform racing without any load at approx. 2,000 rpm for 60 sec.

HINT: If a malfunction exists, the "CHECK" engine warning light will light up during the 5 min. idling period or within 60 sec. of starting racing.

NOTICE: If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.

DIAGNOSTIC CHART

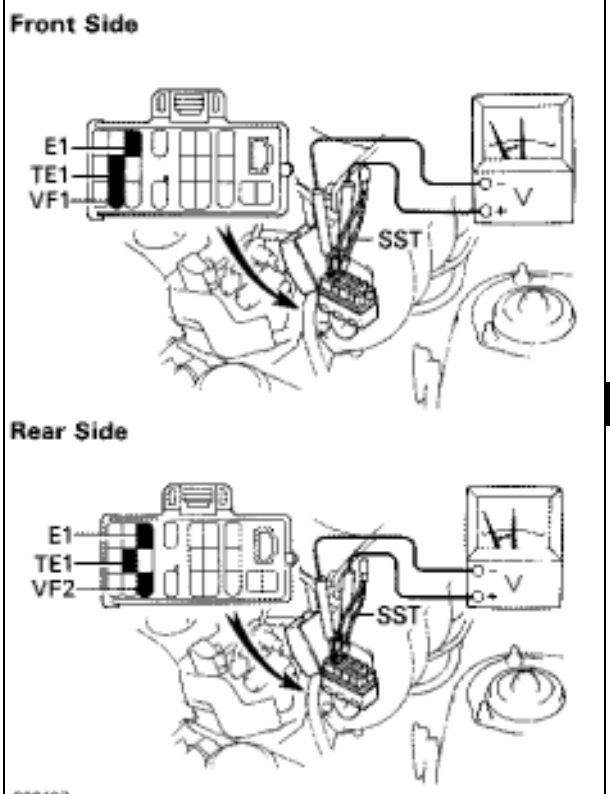


WIRING DIAGRAM

Refer to page TR-62 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

1 **Check voltage between terminals VF1, VF2 and E1 of check connector.**



P
1. Warm up engine at normal operating temperature
2. Connect terminals TE1 and E1 of check connector.
3. Connect positive prove to terminal VF1, VF2 and negative prove to terminal E1 of check connector.

C
1. Warm up the oxygen sensor by running engine at 2,500 rpm for about 2 minutes.
2. Then, maintaining engine at 2,500 rpm, count how many times needle of voltmeter fluctuates between 0 and 5 V.

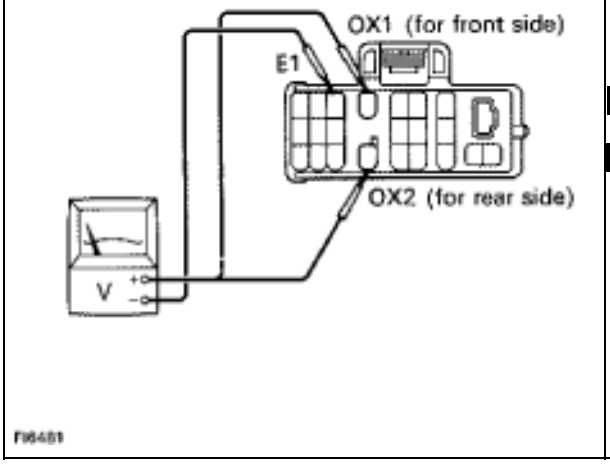
Caution

Result	
Needle fluctuates of 8 times for every ten seconds	OK
Continue at 0 V	NG Type I
Continue at 5 V	NG Type II

NG Type I

NG Type II **Go to step 7.**

2 **Check voltage between terminals OX1, OX2 and E1 of check connector.**



P Warm up engine at normal operating temperature.

C Measure voltage between terminals OX1, OX2 and E1 of check connector when engine is suddenly raced to full throttle.

OK **The voltage should be 0.5 V or higher at least once.**

Hint Perform inspection within 1 second.

NG

OK **Go to step 7.**

3	Check for open and short in harness and connector between engine (& ECT) ECU and main oxygen sensor, engine (& ECT) ECU and check connector (See page IN-27).

OK

NG → Repair or replace harness or connector.

4	Check each item found to be a possible cause of problem.

Check each circuit found to be a possible cause of trouble according to the results of the check in 1 or 2. The numbers in the table below show the order in which the checks should be performed.

Main oxygen sensor signal from either side continues at 0 V.	Main oxygen sensor signals from both sides continue at 0 V.	Possible Cause	See page
1		Faulty sensor installation.	-
3		Injector circuit	TR-128
2	3	Misfire	IG-6
4		Valve timing	EM-22
	1	Air leakage	FI-7
	2	Fuel system	TR-1 10
	6	Characteristics deviation in air flow meter.	TR-82
	4	Characteristics deviation in water temp. sensor.	TR-64
	5	Characteristics deviation in intake air temp. sensor.	TR-68

OK

NG → Repair or replace.

5	Check compression (See page EM-22).

OK

NG → Repair or replace.

6	Does malfunction disappear when a good main oxygen sensor is installed?

NG

YES → Replace main oxygen sensor.

Check and replace engine (& ECT) ECU.

7 **Check each item found to be a possible cause of problem.**

Check each circuit found to be a possible cause of trouble according to the results of the check in 1. The numbers in the table below show the order in which the checks should be performed.

Main oxygen sensor signal from either side continues at 5 V.	Main oxygen sensor signals from both sides continue at 5 V.	Main oxygen sensor signals from both sides are normal.	Possible Cause	See page
1		7	Injector circuit	TR-128
		3	Misfire	IG-6
2		4	Valve timing	EM-22
		1	Air leakage	FI-7
	1	2	Fuel system	TR-1 10
	4	8	Characteristics deviation in air flow meter.	TR-82
	2	5	Characteristics deviation in water temp. sensor.	TR-64
	3	6	Characteristics deviation in intake air temp. sensor.	TR-68

OK

NG **Repair or replace.**

8 **Check compression (See page EM-22).**

OK

NG **Repair or replace.**

9 **Does malfunction disappear when a good main oxygen sensor is installed?**

NG

YES **Replace main oxygen sensor.**

Check and replace engine (& ECT) ECU.

Diag. Code 27	Sub-Oxygen Sensor Circuit (Only for USA spec.)

CIRCUIT DESCRIPTION

The sub-oxygen sensor is installed on the exhaust pipe. Its construction and operation is the same as the main oxygen sensor on page TR-60 .

Code No.	Diagnostic Code Detecting Condition	Trouble Area
27	(1) Open or short in heater circuit of sub-oxygen sensor for 0.5 sec. or more.	● Open or short in heater circuit of sub-oxygen sensor. ● Sub-oxygen sensor heater. ● ECU
	(2) Main oxygen sensor signal is 0.45 V or more and sub-oxygen sensor signal is 0.45 V or less under conditions (a) (c). (2 trip detection logic) * (a) Coolant temp.: 80˚C (176˚F) or more. (b) Engine speed: 1,500 rpm or more. (c) Accel. pedal: Fully depressed for 2 sec. or more.	● Open or short in sub-oxygen sensor circuit. ● Sub-oxygen sensor ● ECU

* : See page TR-25 .

CIRCUIT DESCRIPTION (Cont'd)

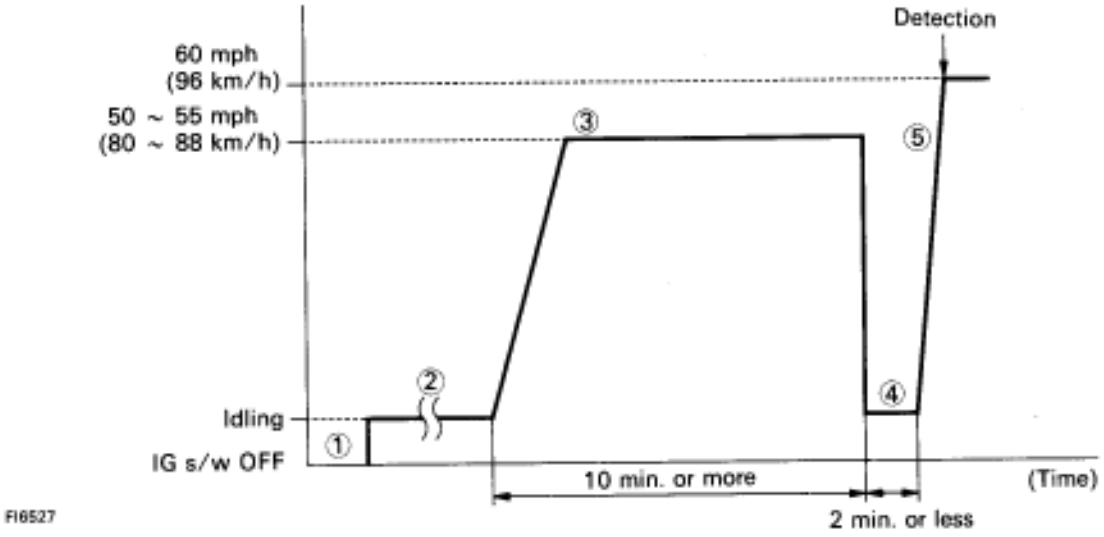
DIAGNOSIS CODE DETECTION DRIVING PATTERN

Purpose of the driving pattern.

(a) To simulate diag. code detecting condition after diag. code is recorded.

(b) To check that the malfunction is corrected when the repair is completed confirming that diag. code is no longer detected.

Malfunction: Open or Short in Sub-Oxygen Sensor



① Disconnect the EFI fuse (15 A) for 10 sec. or more, with IG switch OFF.
Initiate test mode (Connect terminal TE2 and E1 of check connector with IG switch OFF).

② Start the engine and warm up with all ACC switch OFF.

③ After the engine is warmed up, let it drive at 50 55 mph (80 88 km/h) for 10 min. or more.

④ After driving, stop at a safe place and perform idling for 2 min. or less.

⑤ After performing the idling in , perform acceleration to 60 mph (96 km/h) with the throttle valve fully open.

HINT: If a malfunction exists, the "CHECK" engine warning light will light up during step ⑤.

NOTICE: If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.

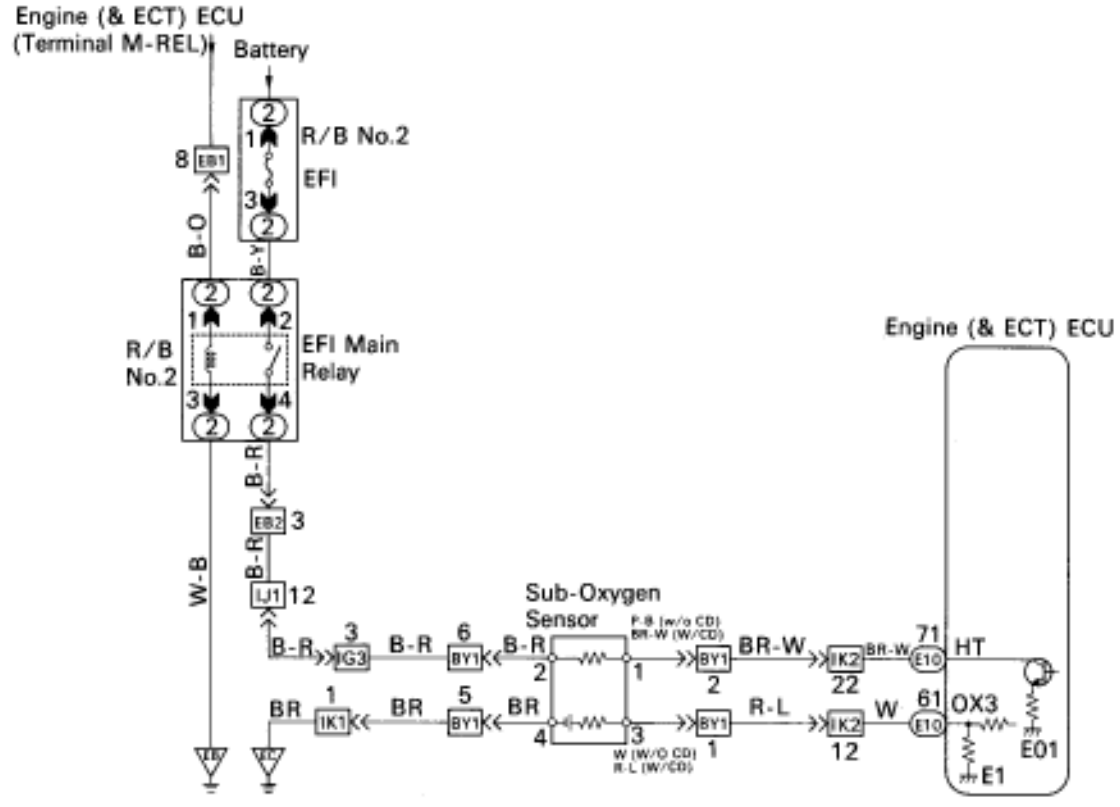
DIAGNOSTIC CHART

HINT: When other codes are output in addition to 27 at the same time, check the circuits for other codes first.

1. Check voltage between terminal HT.
   - OK → 4
   - NG → 2
2. Check resistance of sub-oxygen sensor heater.
   - NG → Replace sub-oxygen sensor.
   - OK → 3
3. Check for open and short in harness and connector between EFI main relay and ECU.
   - NG → Repair or replace harness or connector.
   - OK → Check and replace ECU.
4. Check operation of sub-oxygen sensor heater.
   - OK → Replace sub-oxygen sensor.*
   - NG → Check and replace ECU.

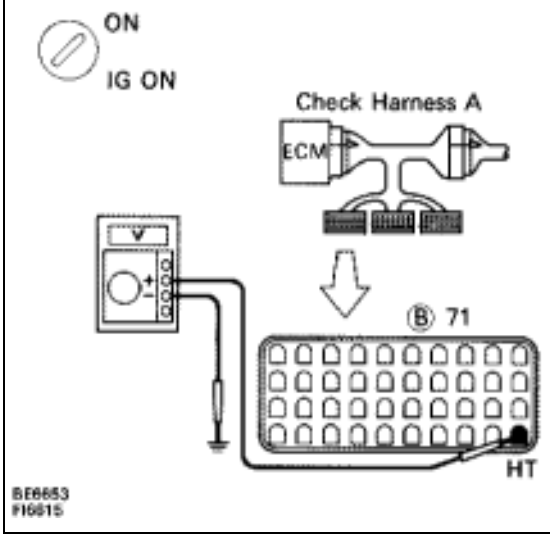
*: In this case, oxygen sensor can be deteriorated.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check voltage between terminal HT of engine (&ECT) ECU connector and body ground.**



P 1. Connect the Check Harness A. (See page TR-34).
2. Turn ignition switch on.

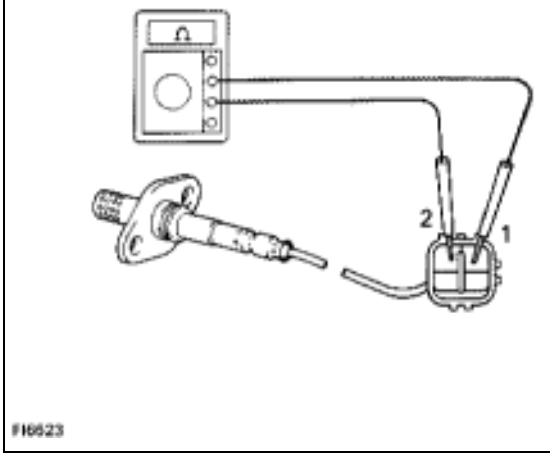
C Measure voltage between terminal HT of engine (& ECT) ECU connector and body ground.

OK **Voltage: 10 - 14 V**

NG

OK **Go to step 4.**

2 **Check sub-oxygen sensor heater.**



P Disconnect sub-oxygen sensor connector.
(See page FI-78).

C Measure resistance between terminals 1 and 2 of sub-oxygen sensor connector.

OK **Resistance: 5.1 - 6.3 Ω 20˚C (68˚F)**

OK

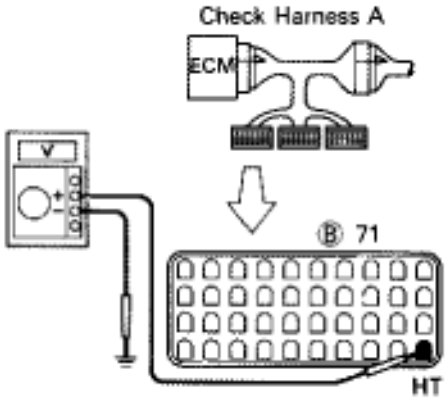
NG **Replace sub-oxygen sensor.**

3	Check for open and short in harness and connector between EFI main relay and engine (& ECT) ECU (See page IN-27).

OK → Check and replace engine (& ECT) ECU.

NG → Repair or replace harness or connector.

4	Check voltage between terminal HT of engine (& ECT) ECU connector and body ground.



FI6515

P Warm up engine to normal operating temperature.

C Measure voltage between terminal HT of engine (& ECT) ECU connector and body ground, when engine is idling and racing at 3,500 rpm.

OK

	Voltage
Idling	0 V
Racing at 3,500 rpm	10 – 14 V

NG → Check and replace engine (& ECT) ECU.

OK → Replace sub-oxygen sensor.*

*: In this case, oxygen sensor can be deteriorated.

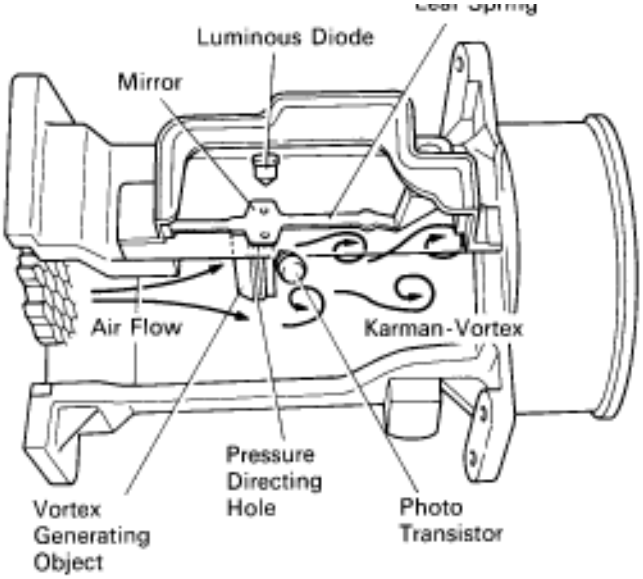
Diag. Code 31 | Air Flow Meter Circuit

CIRCUIT DESCRIPTION

As shown in the figure at right, when a pillar (Vortex generating body) is placed in the path of a uniform flow, vortices called Karman-Vortex are generated downstream of the object. Using this principle, a vortex generator is placed inside the air flow meter. By measuring the frequency of the vortices generated, the ECU can determine the volume of air flowing through the air flow meter. The vortices are detected by their exerting pressure on thin metal foil (mirror) surfaces and a light emitting element and light receptor (LED and photo transistor) positioned opposite the mirror which senses the vibrations in the mirror optically. The ECU uses these signals mainly for calculation of the basic injection volume and the basic ignition advance angle.

Karman-Vortex

FI4504

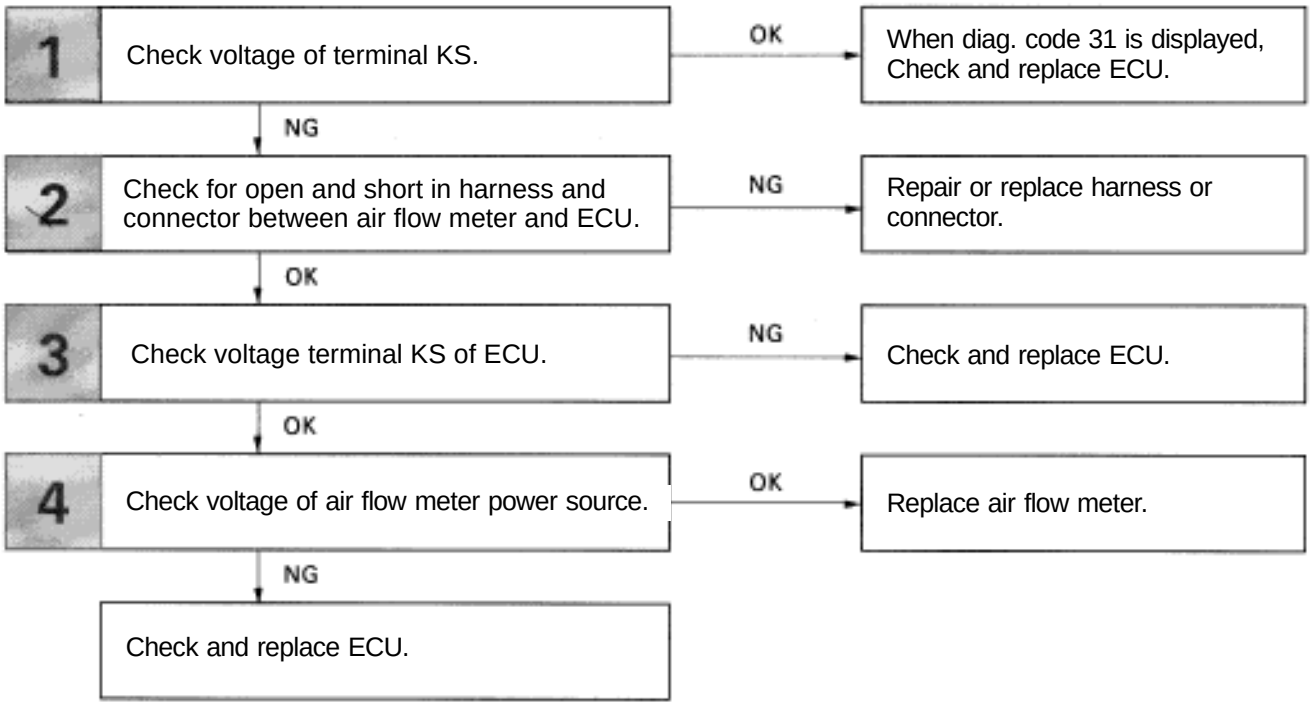


FI3045

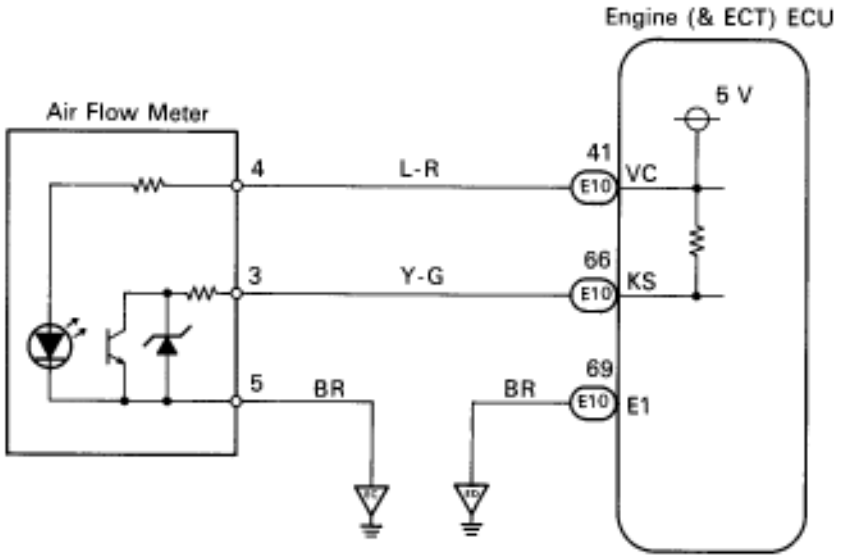
Code No.	Diagnostic Code Detecting Condition	Trouble Area
31	All conditions below are detected. (a) No air-flow meter signal to ECU for 2 sec. when engine speed is above 300 rpm. (b) Engine stall.	• Open or short in air flow meter ciruit • Air flow meter • ECU

If the ECU records diagnostic code ”31”, it operates the fail safe function, keeping the ignition timing and fuel injection volume constant and making it possible to drive the vehicle.

DIAGNOSTIC CHART



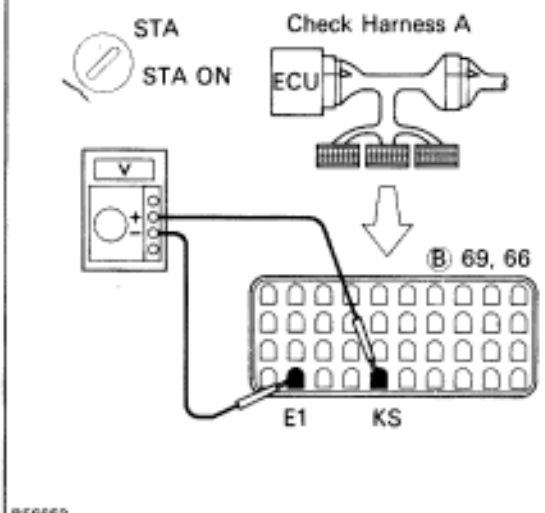
WIRING DIAGRAM



FI6458

INSPECTION PROCEDURE

1 Check voltage between terminasl KS and E1 of engine (& ECT) SCU connector

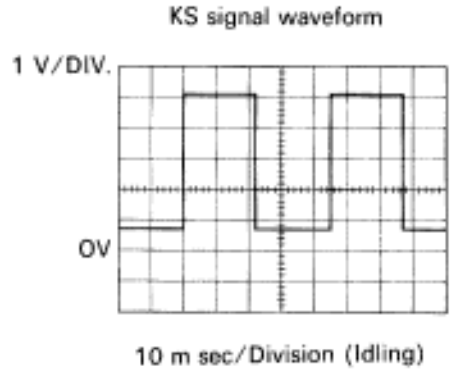


P Connect the Check Harness A.
(See page TR-34)

C Measure voltage between terminals KS and E1 of engine (& ECT) ECU connector while engine is cranked.

OK Voltage: 2.0 - 4.0 V
(Neither 0 V nor 5 V)

Reference **INSPECTION USING OSCILLOSCOPE**



- During cranking or idling, measure between terminals KS and E1 of engine (& ECT) ECU.

HINT: The correct waveform appears as shown in the illustration on the left, with rectangle waves.

NG

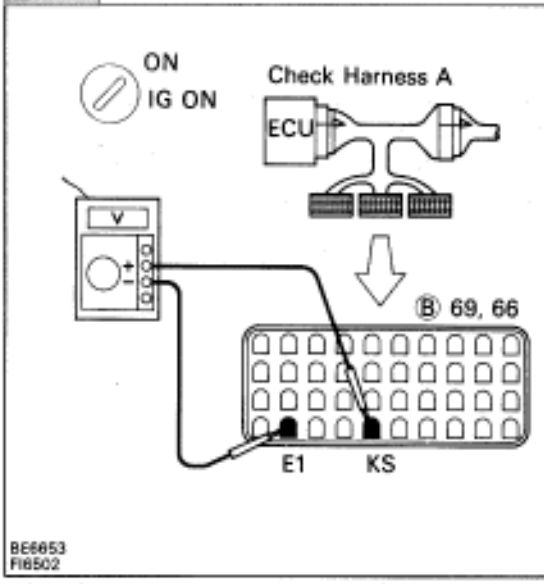
OK → **when diag. code 31 is displayed, check and replace engine (& ECT) ECU.**

2 Check for open and short in harness and connector between engine (&ECT) ECU and air flow meter (See page IN-27).

OK

NG → **Repair or replace harness or connector.**

3 Disconnect air flow meter conector and check voltage vetween terminals KS and E1 of engine (& ECT) ECU connector.



P (1) Disconnect the air flow meter connector.
(2) Turn ignition switch on.

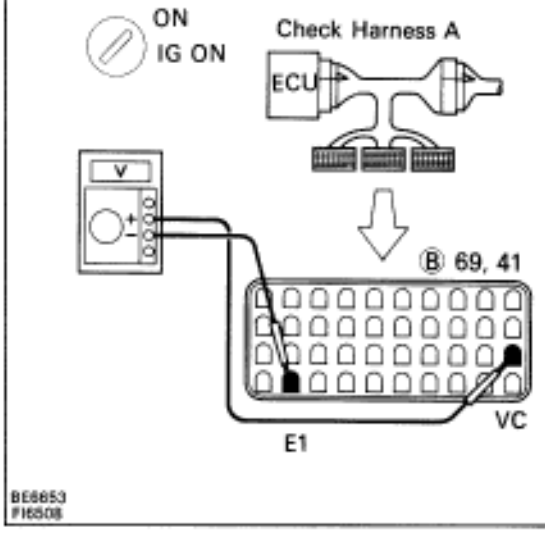
C Measure voltage between terminals KS and E1 of engine (& ECT) ECU connector.

OK **Voltage: 4-6V**

OK

NG > **Checkandreplaceengine(&ECT)ECU.**

4 Disconnect air flow meter connector and check voltage between terminals VC and E1 of engine (& ECT) ECU connector.



P (1) Disconnect the air flow meter connector.
(2) Turn ignition switch on.

C Measure voltage between terminals VC and E1 of engine (& ECT) ECU connector.

OK **Voltage: 4-6V**

NG

OK > **Replaceairflowmeter.**

Checkandreplaceengine(&ECT)ECU.

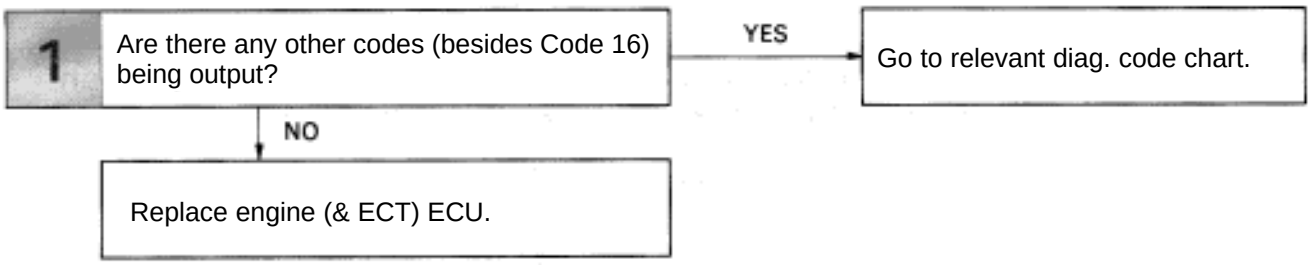
Diag. Code 35 — High Altitude Compensator Sensor (HAC Sensor) Circuit

CIRCUIT DESCRIPTION

The HAC sensor is built into the ECU. This is a semiconductor pressure sensor with properties which cause its electrical resistance to change when stress is applied to the sensor's crystal (silicon) (piezo-electric effect). This sensor is used to detect the atmospheric (absolute) pressure and outputs corresponding electrical signals. Fluctuations in the air pressure cause changes in the intake air density, which can cause deviations in the air-fuel ratio. The signals from HAC sensor are used to make corrections for these fluctuations. If the ECU records diagnostic code "35", the fail safe function operates and the atmospheric pressure is set at a constant 101.3 kPa (760 mmHg, 29.92 in.Hg).

Code No.	Diagnostic Code Detecting Condition	Trouble Area
35	Open or short in HAC sensor circuit for 0.5 sec. or more.	ECU

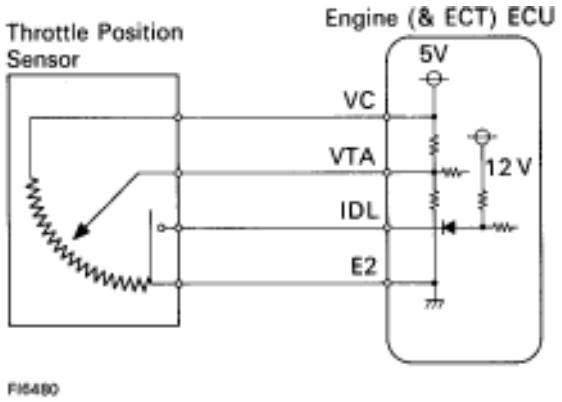
DIAGNOSTIC CHART



Diag. Code 41, 47 | (Sub-) Throttle Position Sensor Circuit

CIRCUIT DESCRIPTION

The throttle position sensor is mounted in the throttle body and detects the throttle valve opening angle. When the throttle valve is fully closed, the IDL contacts in the throttle position sensor are on, so the voltage at the terminal IDL of the ECU become 0 V. At this time, a voltage of approximately 0.7 V is applied to the terminal VTA of the ECU. When the throttle valve is opened, the IDL contacts go off and thus the power source voltage of approximately 12 V in the ECU is applied to the terminal IDL of the ECU. The voltage applied to the terminal VTA of the ECU increases in proportion to the opening angle of the throttle valve and becomes approximately 3.5-5.0 V when the throttle valve is fully opened. The ECU judges the vehicle driving conditions from these signals input from the terminals VTA and IDL, and uses them as one of the conditions for deciding the air-fuel ratio correction, power increase correction and fuel-cut control etc. The sub-throttle position sensor is built and operates in the same way as the main throttle position sensor. This sensor is used for traction control. The sub-throttle valve is opened and closed by the sub-throttle actuator according to signals from the TRAC ECU to control the engine output.



Code No.	Diagnostic Code Detecting Condition	Trouble Area
41	(1) Open or short in throttle position sensor circuit (VTA1) for 0.5 sec. or more.	● Open or short in throttle position sensor circuit.
	(2) IDL1 contact is ON and VTA1 output exceeds 1.5 V for 0.5 sec. or more.	● Throttle position sensor ● ECU
47	(1) Open or short in sub-throttle position sensor circuit (VTA2) for 0.5 sec. or more.	● Open or short in sub-throttle position sensor circuit.
	(2) IDL2 contact is ON and VTA2 output exceeds 1.5 V for 0.5 sec. or more.	● Sub-throttle position sensor ● ECU

HINT:
Diag. code 41 is for the throttle position sensor circuit.
Diag. code 47 is for the sub-throttle position sensor circuit.

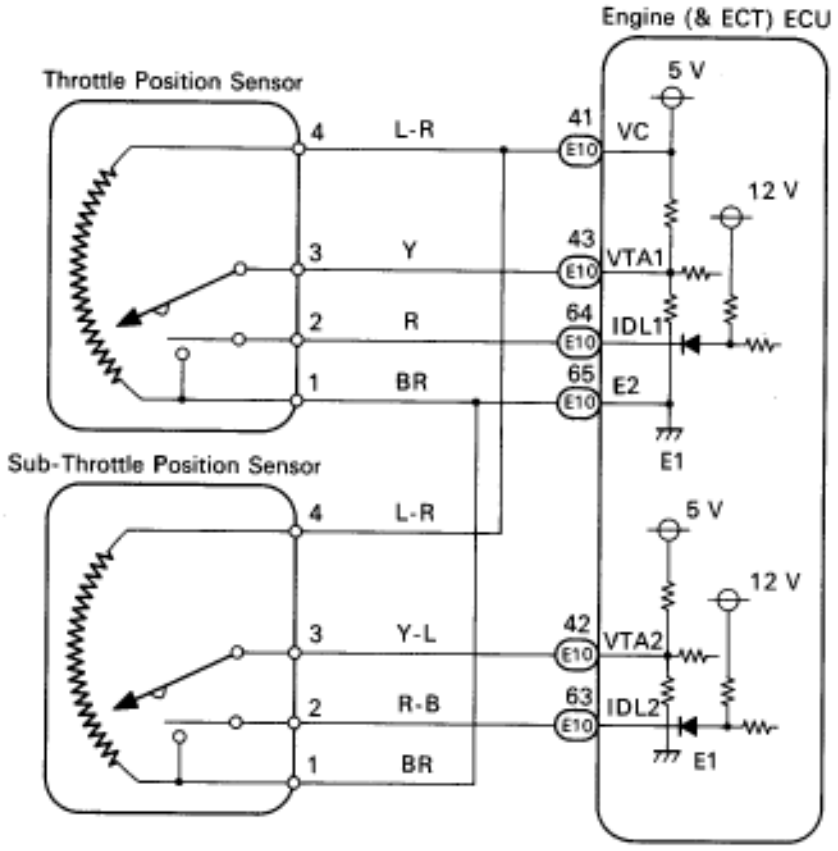
- When the connector for the (sub-) throttle position sensor is disconnected, diagnostic code 41 or 47 is not displayed. Diagnostic code 41 or 47 is displayed only when there is an open or short in the VTA signal circuit of the (sub-) throttle position sensor.
- Signals from the (sub-) throttle position sensor are also input to the TRAC ECU, So when a malfunction occurs on the TRAC side, code 41 or 47 may be displayed.

DIAGNOSTIC CHART

HINT:

- If diag. code 41 is displayed, check throttle position sensor circuit; if diag. code 47 is displayed, check sub-throttle position sensor circuit.
- If diag. codes "22" (water temperature sensor circuit), "24" (intake air temperature sensor circuit) and "41" (throttle position sensor circuit) are output simultaneously, E2 (sensor ground) may be open.
- WIRING DIAGRAM
- If diag. code 41 is displayed, check throttle position sensor circuit; if diag. code 47 is displayed, check

1	Check voltage of throttle position sensor.	OK	Check for momentary interruption (See page TR-27).
	NG		
2	Check operation for throttle position sensor.	NG	Adjust or replace throttle position sensor.
	OK		
3	Check for open and short in harness and connector between throttle position sensor and ECU.	NG	Repair or replace harness or connector.
	OK		
	Check and replace ECU.		

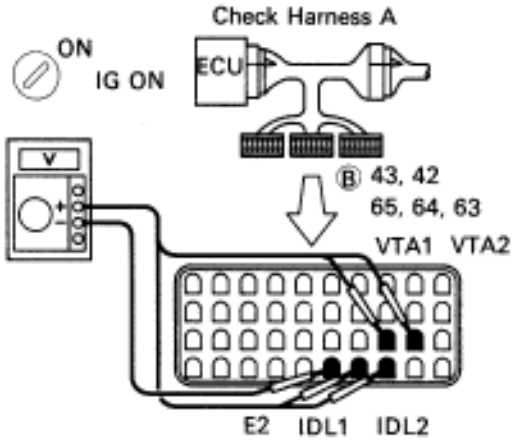


INSPECTION PROCEDURE

HINT:

- If diag. code 41 is displayed, check throttle position sensor circuit. If diag. code 47 is displayed, check sub-throttle position sensor circuit.
- If diag. codes ”22” (water temperature sensor circuit), ”24” (intake air temperature sensor circuit) and ”41” (throttle position sensor circuit) are output simultaneously, E2 (sensor ground) may be open.

1 Check voltage between terminals VTA1, 2, IDL1, 2 and E2 of engine (&ECT) ECU connector.



P (1) Connect the Check Harness A.
(See page TR-34).
(2) Turn ignition swithc on.
(3) For sub-throttle position sensor, remobe intake air duct and disconnect sub-throttle valve step motor connecto.

C Measure Voltage between terminals VTA1, 2, IDL1, 2 and E2 of engien (& ECT) ECU connector when the (sub-) throttle vlave is opened gradually from the closed condition.

OK

Terminal / Throttle Valve	VTA1, 2	IDL1, 2
Fully Closed	0.1 – 1.0 V	Below 1.0 V
Fully Open	3 – 5 V	10 – 14 V

Hint The voltage should increase steadily in proportion to the throttle vlalve opening angle.

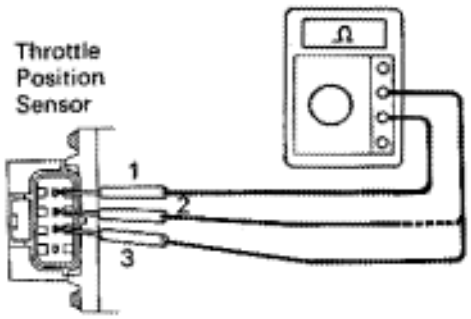
NG

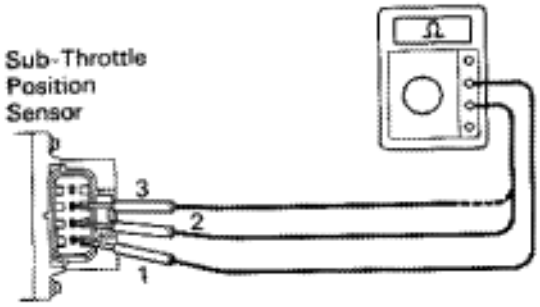
Gotostep(2).

OK

Checkformomentaryinterruption (SeepageTR-27).

2 **Check (sub-) throttle position sensor.**





P8650
P8651

P
1. Remove intake air duct.
2. Disconnect (sub-) throttle position sensor connector.

C Measure resistance between terminals 3, 2 and 1 of (sub-) throttle position sensor connector when the throttle valve is opened gradually from the closed condition.

OK

Terminal / Throttle Valve	3 - 1	2 - 1
Fully Closed	0.2 – 0.8 kΩ	Less than 0.5 kΩ
Fully Open	2.8 – 8.0 kΩ	1MΩ or higher

Hint Resistance between terminals 3 and1 should increase gradually in accordance with the throttle valve opening angle.

OK → **Check and replace engine (& ECT) ECU.**

NG → **Adjust or replace (sub-) throttle position sensor (See page FI-46).**

3 **Check for open and short in harness and connector between engine (& ECT) ECU and (sub-) throttle position sensor (See page IN-27).**

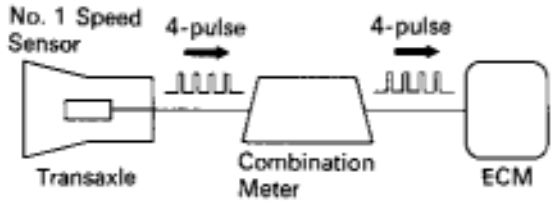
OK → **Check and replace engine (& ECT) ECU.**

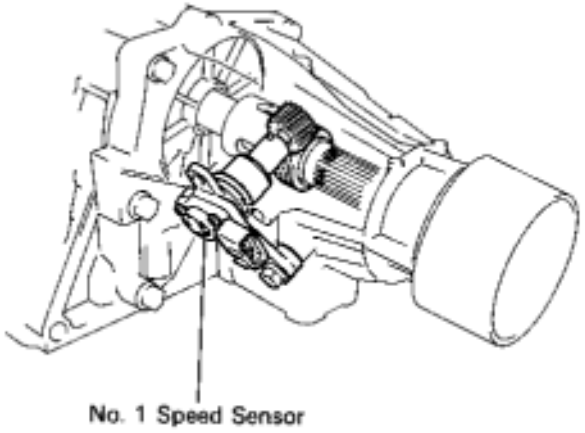
NG → **Repair or replace harness or connector.**

Diag. Code 42 | Vehicle Speed Sensor Signal Circuit

— CIRCUIT DESCRIPTION

The No. 1 speed sensor outputs a 4-pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular waveform by the waveform shaping, circuit inside the combination meter, it is then transmitted to the engine (& ECT) ECU. The ECU determines the vehicle speed based on the frequency of these pulse signals.



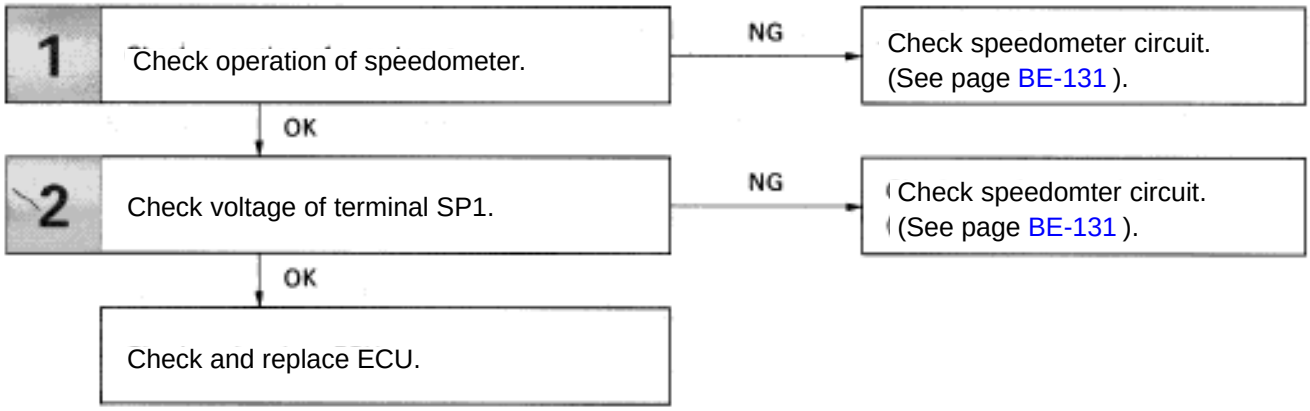


F18847 F18844

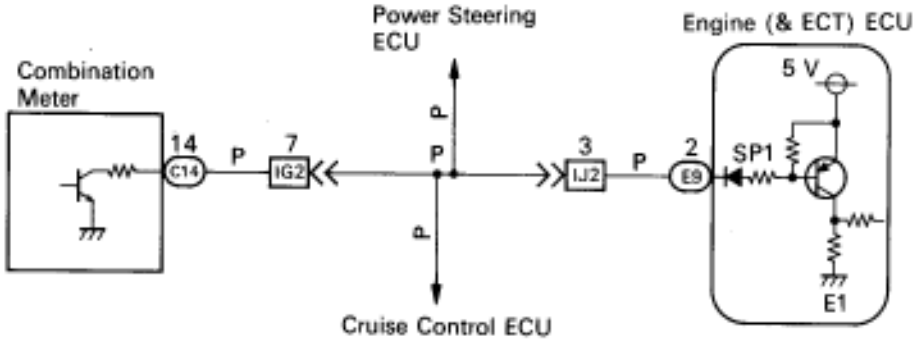
Code No.	Diagnostic Code Detecting Condition	Trouble Area
42	For ECT All conditions below are detected continuously for 8 sec. or more. (a) Vehicle speed signal: 0 km/h (mph) (b) Engine speed: 2,800 rpm or more (c) Neutral position switch (NSW): OFF (d) Stop light switch: OFF	•No.1 speed sensor •Combination meter •Open or short in No.1 speed sensor circuit. •ECM
	For M/T All conditions below are detected continuously for 8 sec. or more. (a) Vehicle speed signal: 0 km/h (mph) (b) Engine speed: Between 2,350 rpm and 5,000 rpm (c) Coolant temp.: 80°C (176°F) or more (d) Load driving	

HINT: In test mode, diag. trouble code 42 is output when vehicle speed is 5 km/h (3 mph) or below.

DIAGNOSTIC CHART



WIRING DIAGRAM



FI6446

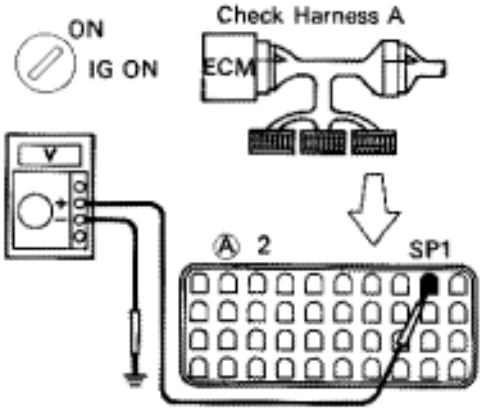
INSPECTION PROCEDURE

1	Check operation of speedometer.
C	Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.
Hint	The No. 1 speed sensor is operating normally if the speedometer display is normal.

OK

NG → **Check speedometer circuit. See combination meter troubleshooting on page BE-131 .**

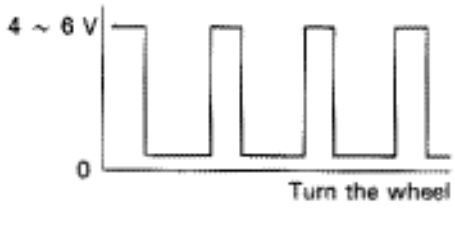
2	Check voltage between terminal SP1 of engine (& ECT) ECU connector and body ground.



P
1. Shift the shift lever to N position or neutral.
2. Jack up a rear wheel on one side.
3. Connect the Check Harness A. (See page TR-34)
4. Disconnect power sterring ECU connector and cruise control ECU connector.
5. Turn ignition switch on.

C Measure voltage between terminal SP1 of engine (& ECT) ECU connector and body ground when the wheel is turned slowly.

OK **Voltage is generated intermittently.**



OK

NG → **Check speedometer circuit. See combination meter troubleshooting on page BE-131 .**

Check and replace engine (& ECT) ECU.

Diag. Code 43 | Starter Signal Circuit

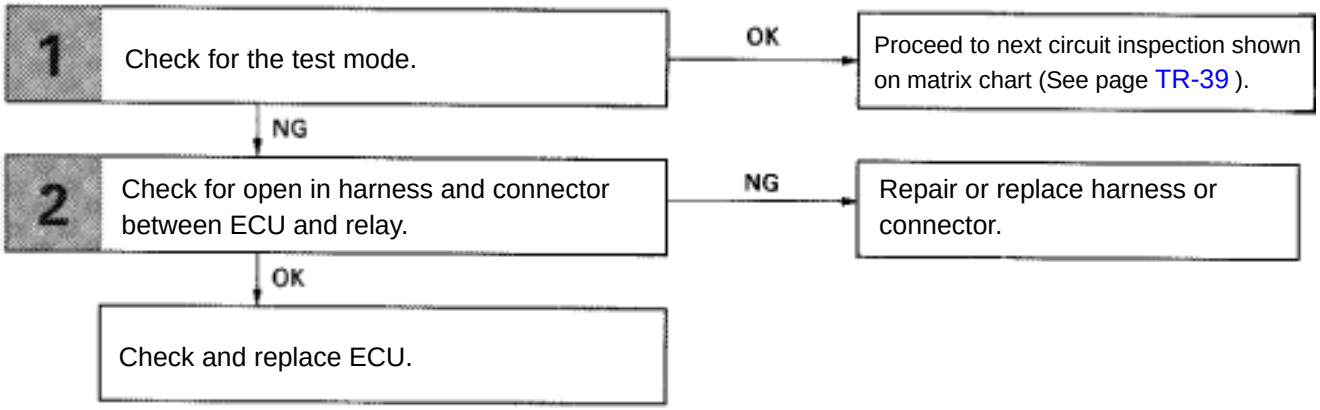
CIRCUIT DESCRIPTION

When the engine is cranked, the intake air flow is slow, so fuel vaporization is poor. A rich mixture is therefore necessary in order to achieve good startability. While the engine is being cranked, the battery voltage is applied to terminal STA of the ECU. The starter signal is mainly used to increase the fuel injection volume for the starting injection control and after-start injection control.

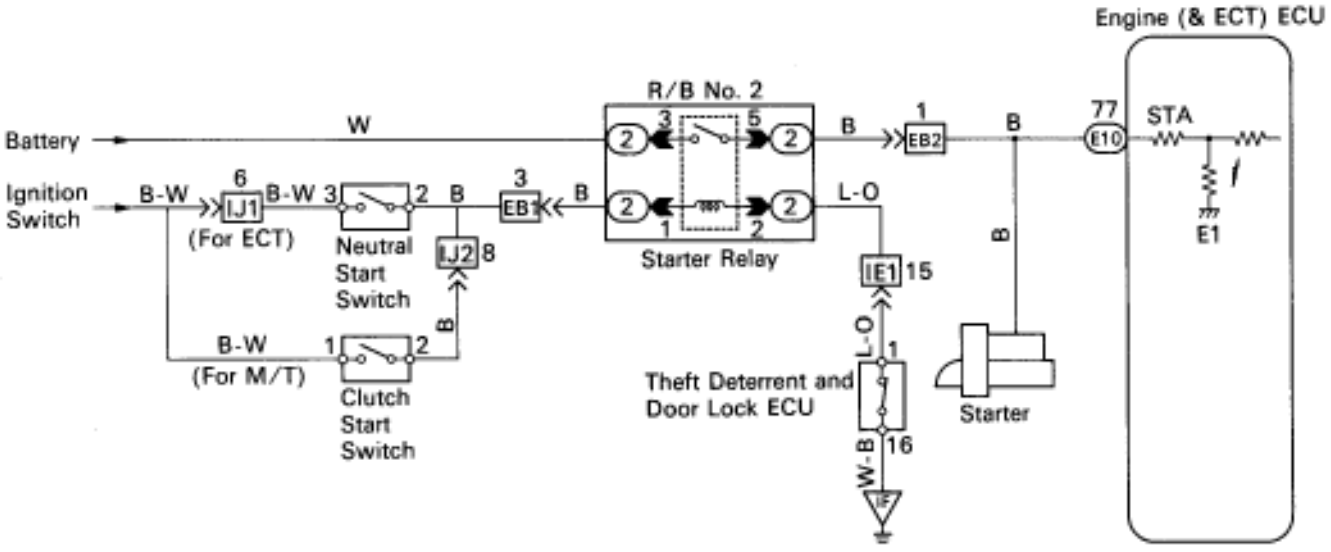
DTC No.	DTC Detecting Condition	Trouble Area
43	No starter signal to ECU.	•Open or short in starter signal circuit. •Open or short in ignition switch or starter relay circuit. •ECU

DIAGNOSTIC CHART

HINT: This diagnostic chart is based on the premise that the engine is cranked normally. If the engine is not cranked, proceed to the matrix chart of problem symptoms on page TR-39 .

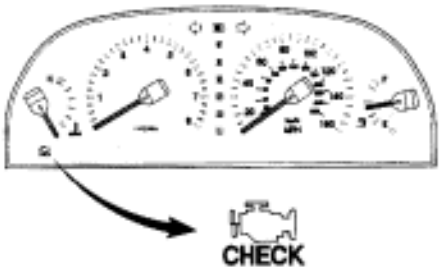


WIRING DIAGRAM



INSPECTION PROCEDURE

1 Check output condition of diag. code 43



FI6433

P Setting the test mode.
6. Turn ignition switch OFF.
7. Connect terminals TE2 and E1 of TDCL.
8. Turn ignition switch ON.
(Don't start the engine)
9. Connect terminals TE1 and E1 of TDCL.

C Check if code "43" is output by the "CHECK" engine warning light.

OK **Code "43" is output.**

C Start the engine.
Check if the code "43" disappear.

OK **Code "43" is not output.**

NG

OK → **Proceed to next circuit inspection shown on matrix chart (See page TR-39).**

2 Check for open in harness and connector between engine (& ECT) ECU and starter relay (See page IN-27)

OK

NG → **Repair or replace harness or connector.**

Check and replace engine (& ECT) ECU.

Diag. Code 52, 53, 55 | Knock Sensor Circuit

— CIRCUIT DESCRIPTION

Knock sensors are fitted one each to the front and rear of the left side of the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
52	No No. 1 knock sensor signal to ECU for 4 crank revolutions with engine speed between1,600 rpm ~ 5,200 rpm	•Open or short in No. 1 knock sensor circuit. •No. 1 knock sensor (looseness) •ECU
53	Engine control computer (for knock control) malfunction at engine speed between 650 rpm and 5,200 rpm.	•ECU
55	No No. 2 knock sensor signal to ECM for 4 crank revolutions with engine speed between1,600 rpm ~ 5,200 rpm.	•Open or short in No. 2 knock sensor circuit. •No. 2 knock sensor (looseness) •ECU

If the ECU detects the above diagnosis conditions, it operates the fail safe function in which the corrective retard angle value is set to the maximum value.

CIRCUIT DESCRIPTION (Cont'd)

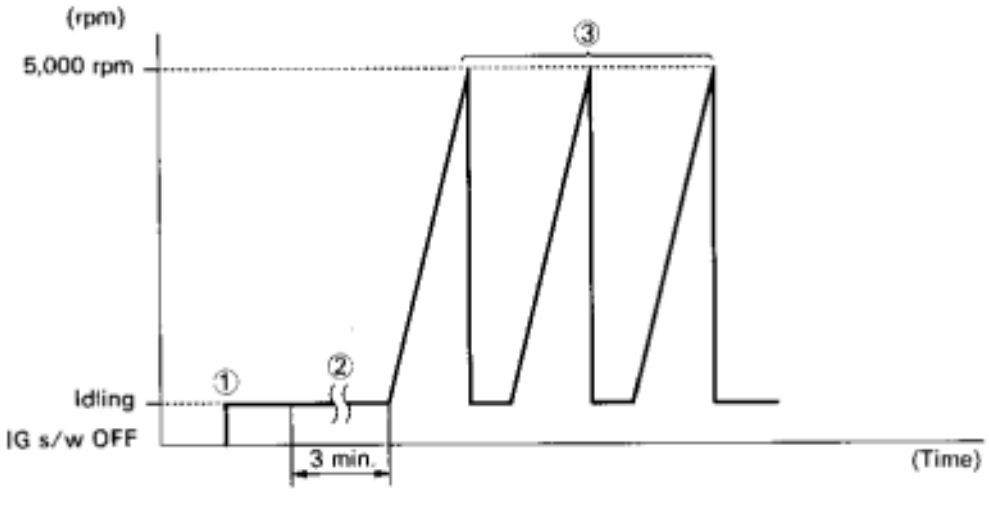
DIAGNOSIS TROUBLE CODE DETECTION DRIVING PATTERN

Purpose of the driving pattern.

(a) To simulate diag. trouble code detecting condition after diag. trouble code is recorded.

(b) To check that the malfunction is corrected when the repair is completed confirming that diag. trouble code is no longer detected.

Malfunction: Open or Short in Knock Sensor



FI6461

① Start the engine and warm up.

② After the engine is warmed up, let it idle for 3 min.

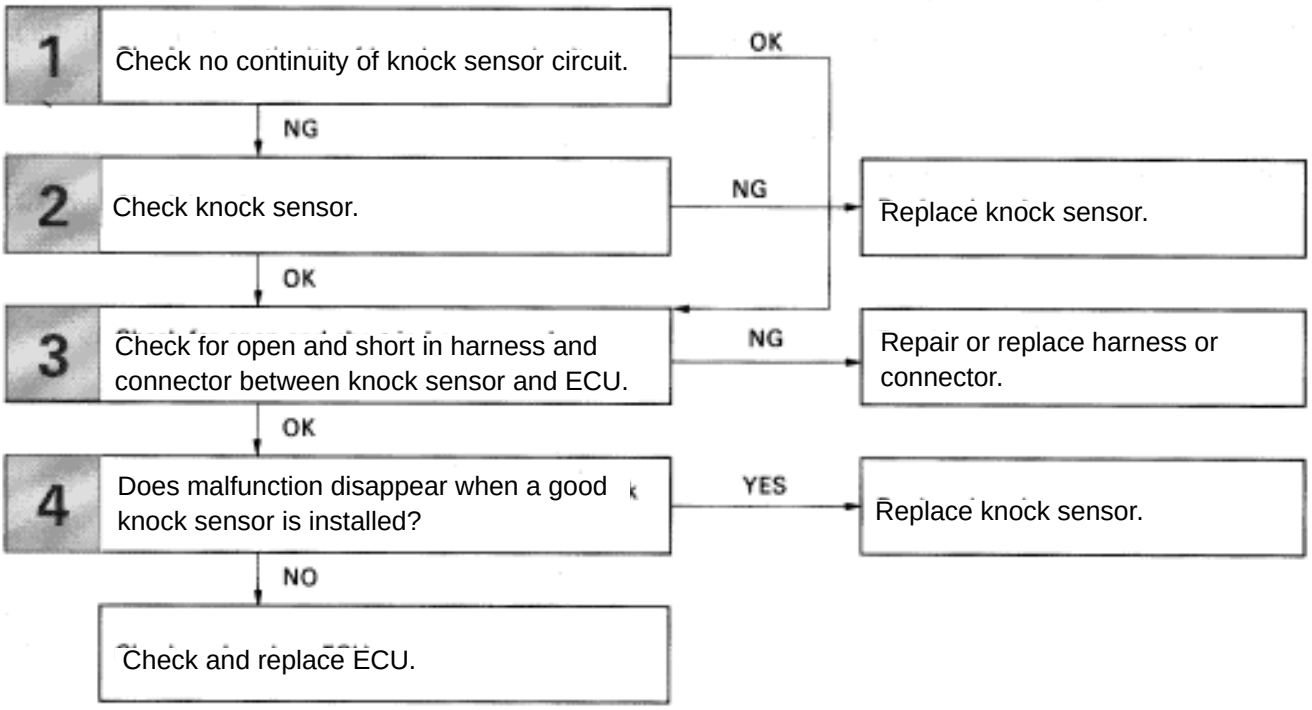
③ With the A/C ON, perform quick racing (5,000 rpm) three times.
(Rapidly depress the accelerator pedal and suddenly release it.)

HINT: If a malfunction exists, the "CHECK" engine warning light will light up when sudden racing is performed.

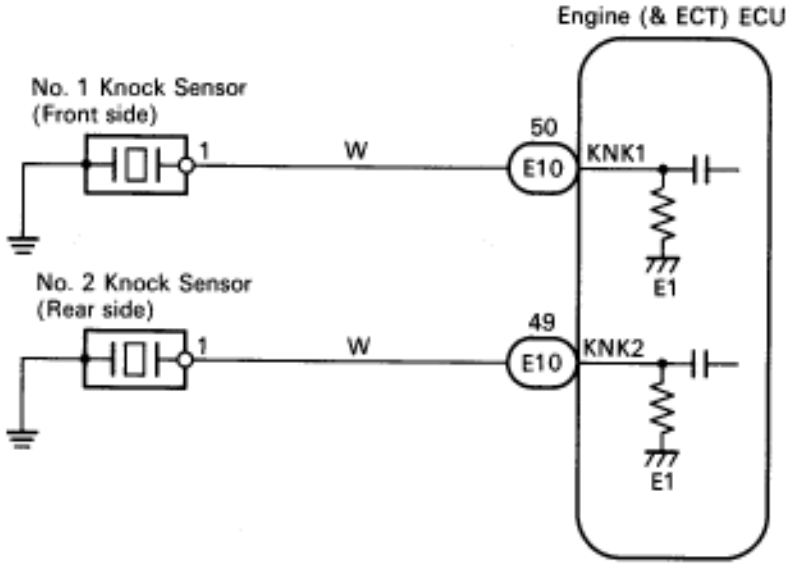
NOTICE: If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.

DIAGNOSTIC CHART

HINT: If diag. code 52 is displayed, check No. 1 knock sensor (for front side) circuit.
If diag. code 55 is displayed, check No. 2 knock sensor (for rear side) circuit.
If diag. code 53 is displayed, replace engine (& ECT) ECU.

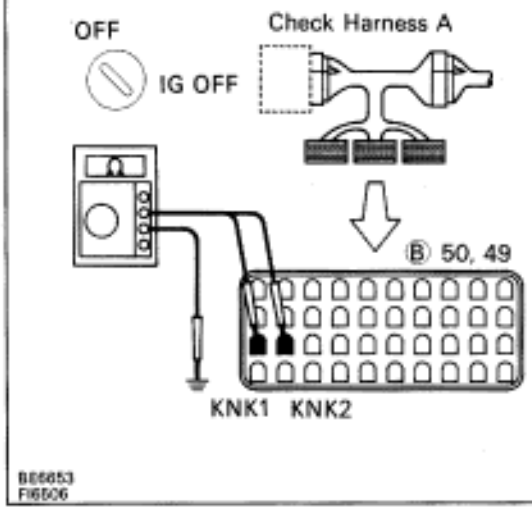


WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check continuity between terminals KNK1, KNK2 of engine (& ECT) ECU connector and body ground.**



P (1) Connect the Check Harness A. (See page TR-34).
(2) Disconnect the engine (& ECT) ECU.

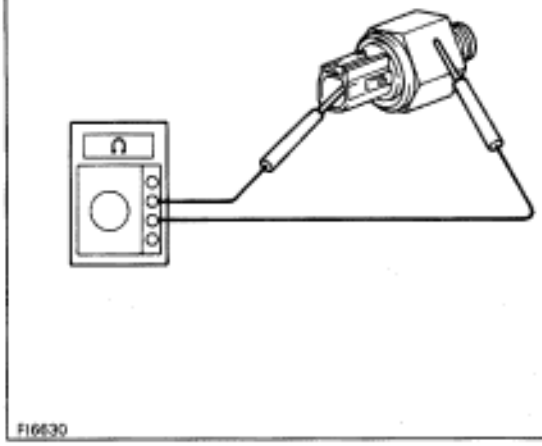
C Measure resistance between terminals KNK1, KNK2 of engine (&ECT) ECU connector and body ground.

OK **Resistance: 1MΩ or higher**

NG

OK > Go to step 3.

2 **Check knock sensor.**



P Disconnect knock sensor connector.

C Measure resistance between the knock sensor terminal and body.

OK **Resistance: 1MΩ or higher**

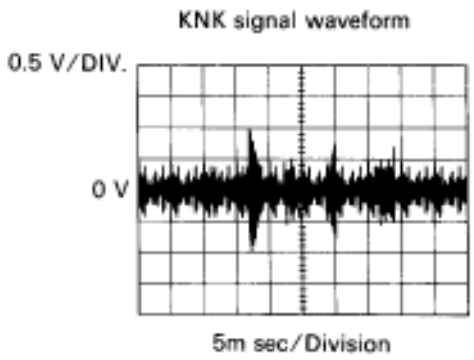
OK

NG > **Replace knock sensor (See page FI-70).**

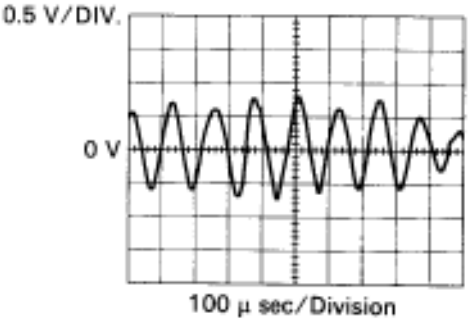
3	Check for open and short in harness and connector between engine (& ECT) ECU and knock sensor (See page IN-27).	
OK		NG → Repair or replace harness or connector.
4	Does malfunction disappear when a good knock sensor is installed.	
NO		YES → Replace knock sensor (See page FI-70).

Check and replace engine (& ECT) ECU.

Reference INSPECTION USING OSCILLOSCOPE



- With the engine racing (4,000 rpm) measure between terminals KNK1, KNK2 of engine (& ECT) ECU and body ground.
  HINT: The correct waveform appears as shown in the illustration on the left.



- Spread the time on the horizontal axis, and confirm that period of the wave is 123 sec. (Normal mode vibration frequency of knock sensor: 8.1 KHz).

HINT: If normal mode vibration frequency is not 8.1 KHz, the sensor is malfunctioning.

FI6510
FI6842

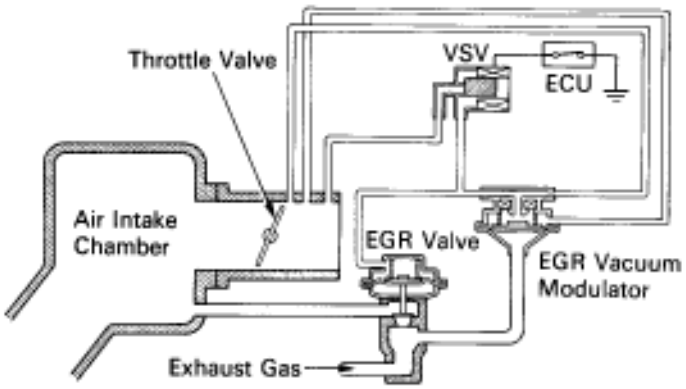
Diag. Code 71	EGR System Malfunction (Only for USA spec.)

CIRCUIT DESCRIPTION

The EGR system is designed to recirculate the exhaust gas properly controlled according to the driving condition back into the intake air-fuel mixture. It helps to slow down combustion in the cylinder and thus lower the combustion temperature which, in turn, reduces the amount of NOx emission. The amount of EGR is regulated by the EGR vacuum modulator according to the engine load.

If even one of the following conditions is fulfilled, the VSV is turned ON by a signal from the ECU. This results in atmospheric air acting on the EGR valve, closing the EGR valve and shutting off the exhaust gas (EGR cut-OFF).

- Coolant temp. below 50°C (122°F)
- During deceleration (throttle valve closed)
- Light engine load (amount of intake air very small).
- Engine speed over 5,200 rpm.



Code No.	Diagnostic Code Detecting Condition	Trouble Area
71	EGR gas temp. is 70°C (158°F) or below for 1 4 min. under conditions (a) and (b). (2 trip detection logic)* (a) Coolant temp.: 63°C (145°F) or more. (b) EGR operation possible (EX. ECT in 3rd speed (5th for M/T), A/C ON, 60 mph (96 km/h), Flat road).	• Open in EGR gas temp. sensor circuit. • Short in VSV circuit for EGR. • EGR hose disconnected, valve stuck. • Clogged EGR gas passage. • ECU

*: See page TR-25 .

CIRCUIT DESCRIPTION (Cont'd)

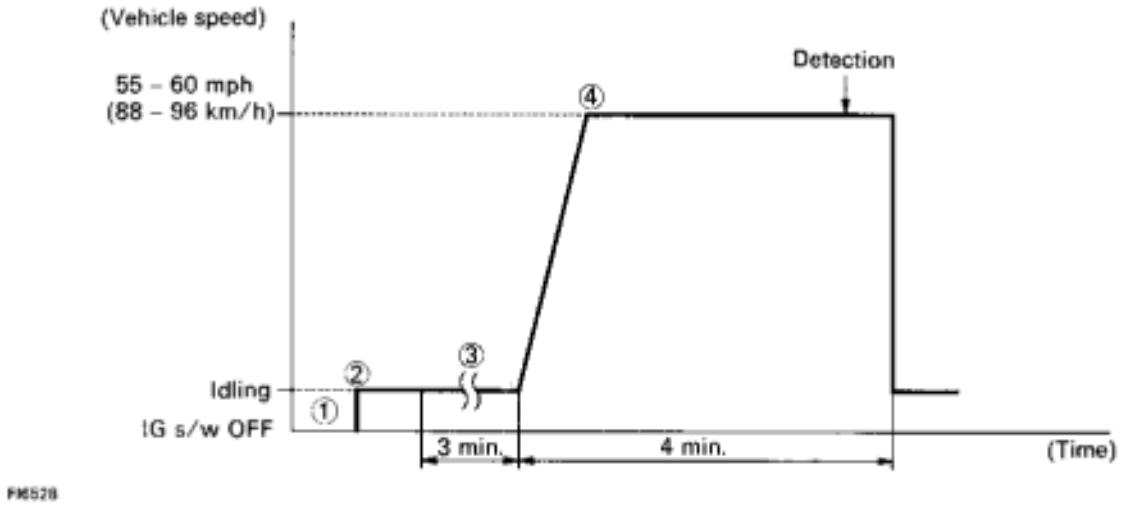
DIAGNOSIS TROUBLE CODE DETECTION DRIVING PATTERN

Purpose of the driving pattern.

(a) To simulate diag. trouble code detecting condition after diag. trouble code is recorded.

(b) To check that the malfunction is corrected when the repair is completed confirming that diag. trouble code is no longer detected.

Malfunction: Open in EGR gas temp. sensor circuit



① Disconnect the EFI fuse (15 A) for 10 sec. or more, with IG switch OFF.
Initiate test mode (Connect terminal TE2 and E1 of check connector or TDCL with IG switch OFF).

② Start the engine and warm up.

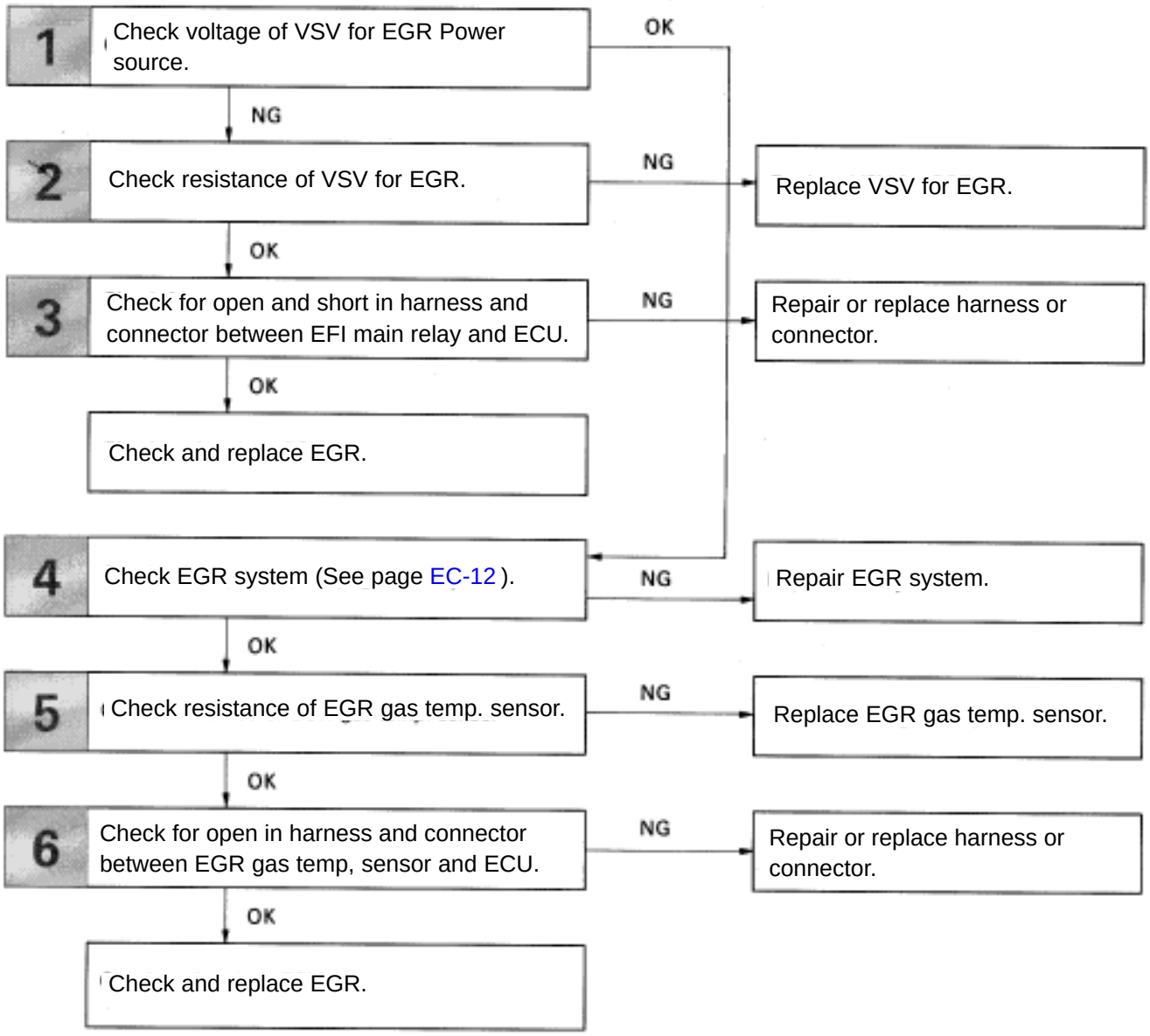
③ After the engine is warmed up, let it idle for 3 min.

④ With the A/C ON and transmission in 5th gear (ECT in 3rd speed) drive at 55 ~ 60 mph (88 ~ 96 km/h) for 4 min or less.

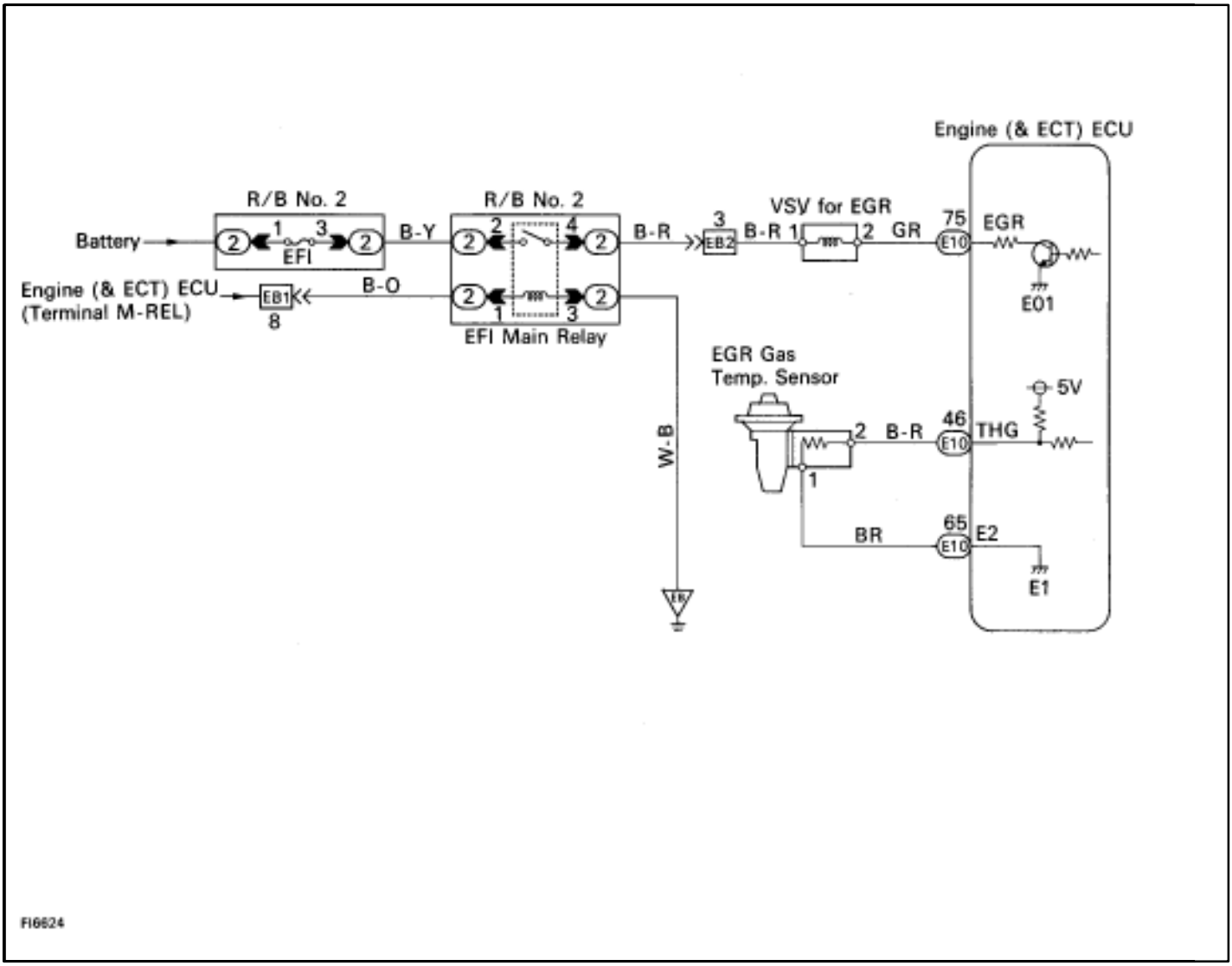
HINT: If a malfunction exists, the "CHECK" engine warning light will light up during step .

NOTICE: If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.

DIAGNOSTIC CHART

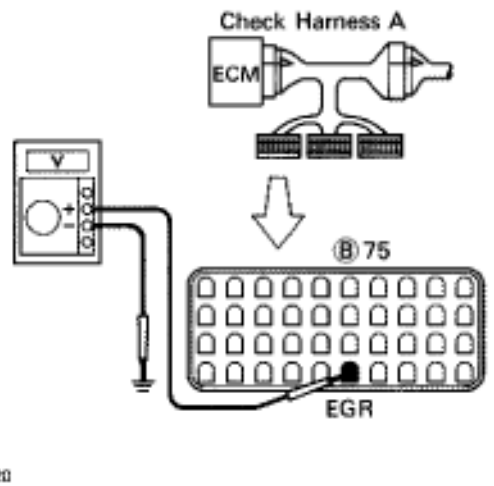


WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check voltage between terminal EGR of ECM connector and body ground.**



P 1. Connect the Check Harness A. (See page TR-34).
2. Warm up engine to normal operating temperature.

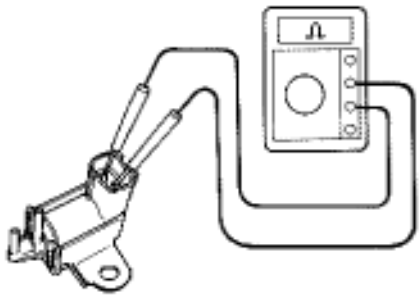
C Measure voltage between terminal EGR of engine (& ECT) ECU connector and body ground.

OK **Voltage:**

NG

OK **Go to step 4.**

2 **Check resistance between terminals of VSV for EGR.**



P Remove VSV for EGR. (See page EC-13).

C Measure resistance between terminals of VSV for EGR.

OK **Resistance: 38.5 - 44.5 Ω at 20° C (68° F)**

OK

NG **Replace VSV for EGR.**

3 **Check for open and short in harness and connector between EFI main relay and VSV for EGR, VSV for EGR and engine (& ECT) ECU. (See page IN-27)**

OK

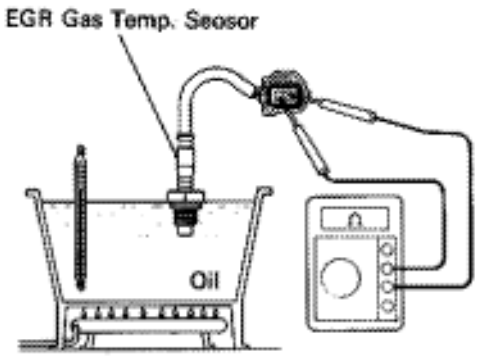
NG **Repair or replace harness or connector.**

Check and replace engine (& ECT) ECU.

4	Check EGR system (See page EC-12).

OK → NG: Repair EGR system.

5	Check resistance of EGR gas temp. sensor.



P Remove EGR gas temp. sensor.

C Measure resistance between terminals of EGR gas temp. sensor connector.

OK **Resistance: 69 - 89 kΩ at 50°C (122°F)**
12 - 15 kΩ at 100°C (212°F)
2 - 4 kΩ at 150°C (302°F)

OK → NG: Replace EGR gas temp. sensor.

6	Check for open in harness and connector between EGR gas temp. sensor and engine (& ECT) ECU. (See page IN-27).

OK → NG: Repair or replace harness or connector.

Check and replace engine (& ECT) ECU.

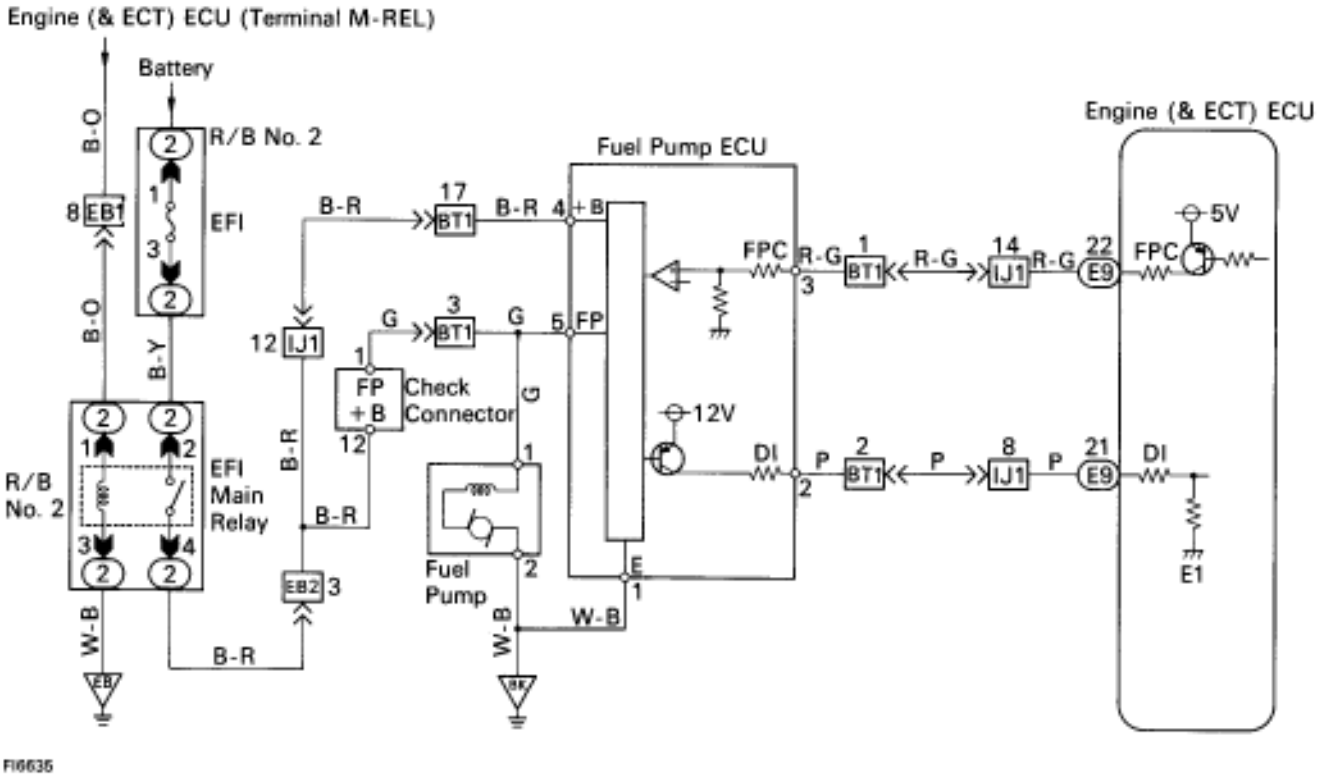
Diag. Code 78 | Fuel Pump Control Circuit

— CIRCUIT DESCRIPTION

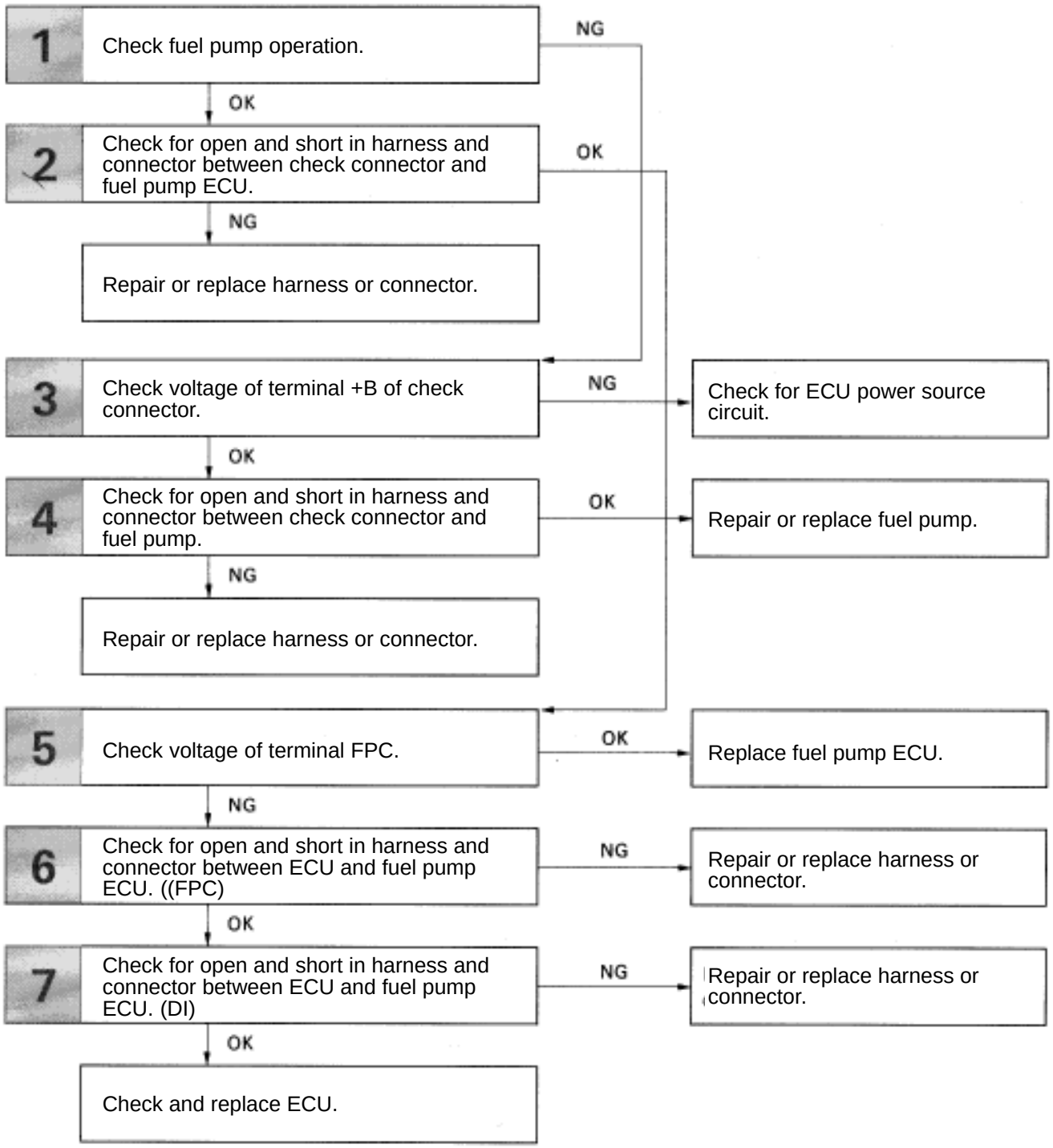
The fuel pump speed is controlled at two steps (high speed, low speed) by the condition of the engine (starting, light load, heavy load), when the engine starts (STA ON), the engine (& ECT) ECU sends a Hi signal to the fuel pump ECU (FPC terminal).
The fuel pump ECU then outputs Hi voltage (battery voltage) to the fuel pump so that the fuel pump operates at high speed.
After the engine starts, during idling or light loads, the engine (& ECT) ECU outputs a High Low signal to the fuel pump ECU, the fuel pump ECU outputs Lo battery voltage (about 9V) to the fuel pump and causes the fuel pump to operate at low speed.
If the intake air volume increases (high engine load), the engine (& ECT) ECU sends a Hi signal to the fuel pump ECU and causes the fuel pump to operate at high speed.

DTC No.	DTC Detecting Condition	Trouble Area
78	(1) Open or short in fuel pump circuit for 1 sec. or more with engine speed 1,000 rpm or less. (2 trip detection logic)*	•Open or short in fuel pump ECU circuit. •Fuel pump ECU •Engine (& ECT) ECU power source circuit. •Fuel pump •Engine (& ECT) ECU
	(2) Open in input circuit of fuel pump ECU (FPC) with engine speed 1,000 rpm or less. (2 trip detection logic)*	
	(3) Open or short in diagnostic signal line (DI) of fuel pump ECU with engine speed 1,000 rpm or less. (2 trip detection logic)*	

*: See page TR-25 .

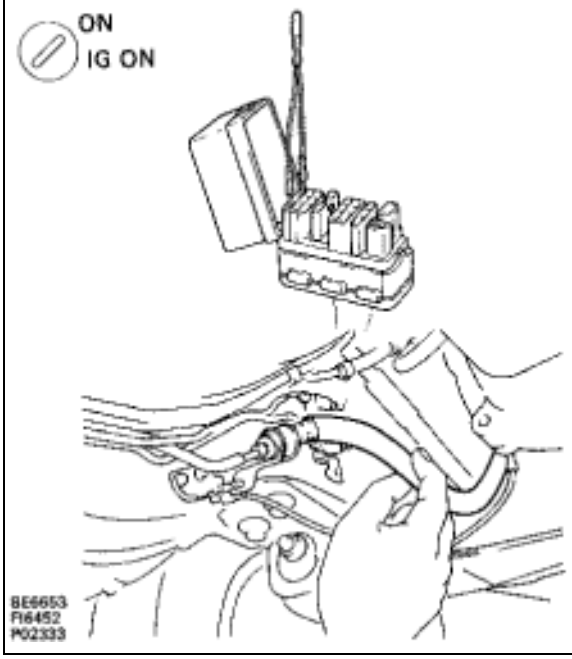


DIAGNOSTIC CHART



INSPECTION PROCEDURE

1 **Check fuel pump operation.**



P 1. Turn ignition switch ON.
2. Using SST, connect terminals +B and FP of check connector.

SST 09843-18020

C Check that there is pressure in the hose from the fuel filter.

OK **Fuel pressure can be felt.**

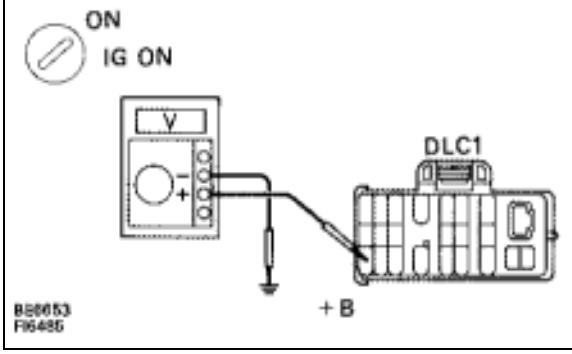
OK → **NG** → **Go to step 3.**

2 **Check for open and short in harness and connector between terminals +B ↔ +B, FP ↔ FP of the check connector and fuel pump ECU (See page IN-27).**

NG → **OK** → **Go to step 5.**

Repair or replace harness or connector.

3 **Check voltage of terminal +B of check connector.**



P Turn ignition switch ON.

C Measure voltage between terminal +B of check connector and body ground.

OK **Voltage: 10 - 14 V**

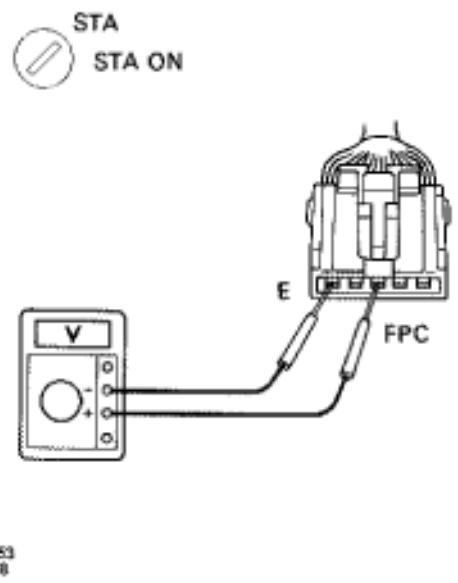
OK → **NG** → **Check for ECU power source circuit (See page TR-120), and check for open in harness and connector between terminal +B of check connector and main relay.**

4	Check for open and short in harness and connector between terminal FP of check connector, fuel pump and body ground (See page IN-27).

NG → Repair or replace harness or connector.

OK → Repair or replace fuel pump.

5	Check voltage between terminals FPC and E of fuel pump ECU connector.



P
1. Remove the LH quarter trim panel. (See page FI-81)
2. Disconnect fuel pump ECU connector.

C
Measure voltage between terminals FPC and E of fuel pump ECU connector when ignition switch is turned to start.

OK
Voltage: 4 - 6 V

NG → Replace fuel pump ECU.

OK → Check for open in harness and connector between terminal FPC of engine (& ECT) ECU and terminal FPC of fuel pump ECU, terminal E of fuel pump ECU and body ground (See page IN-27).

NG → Repair or replace harness or connector.

OK → Check for open and short in harness and connector between terminal DI of engine (& ECT) ECU and terminal DI of fuel pump ECU (See page IN-27).

NG → Repair or replace harness or connector.

OK → Check and replace engine (& ECT) ECU.

Diag. Code 51 | Switch Condition Signal Circuit

CIRCUIT DESCRIPTION

Neutral Start Switch Signal*

The ECU uses the signals from the neutral start switch to determine whether the transmission is in park or neutral, or in some other gear.

Air Conditioner Switch Signal

The ECU uses the output from the air conditioner switch to determine whether or not the air conditioner is operating so that it can increase the idling speed of the engine if necessary.

Throttle Position Sensor IDL Signal

The IDL contacts are mounted in the throttle position sensor, and detects the idle condition.

Code No.	Diagnostic Code Detecting Condition	Trouble Area
51	(1) 3 sec. or more after engine starts idle switch OFF (IDL1). (2)* Neutral start switch OFF (NSW). (Shift position in "R", "D", "2" or "1" ranges). (3) A/C switch ON.	● Throttle position sensor IDL circuit ● Accelerator pedal and cable ● Neutral start switch circuit ● A/C switch circuit ● ECU

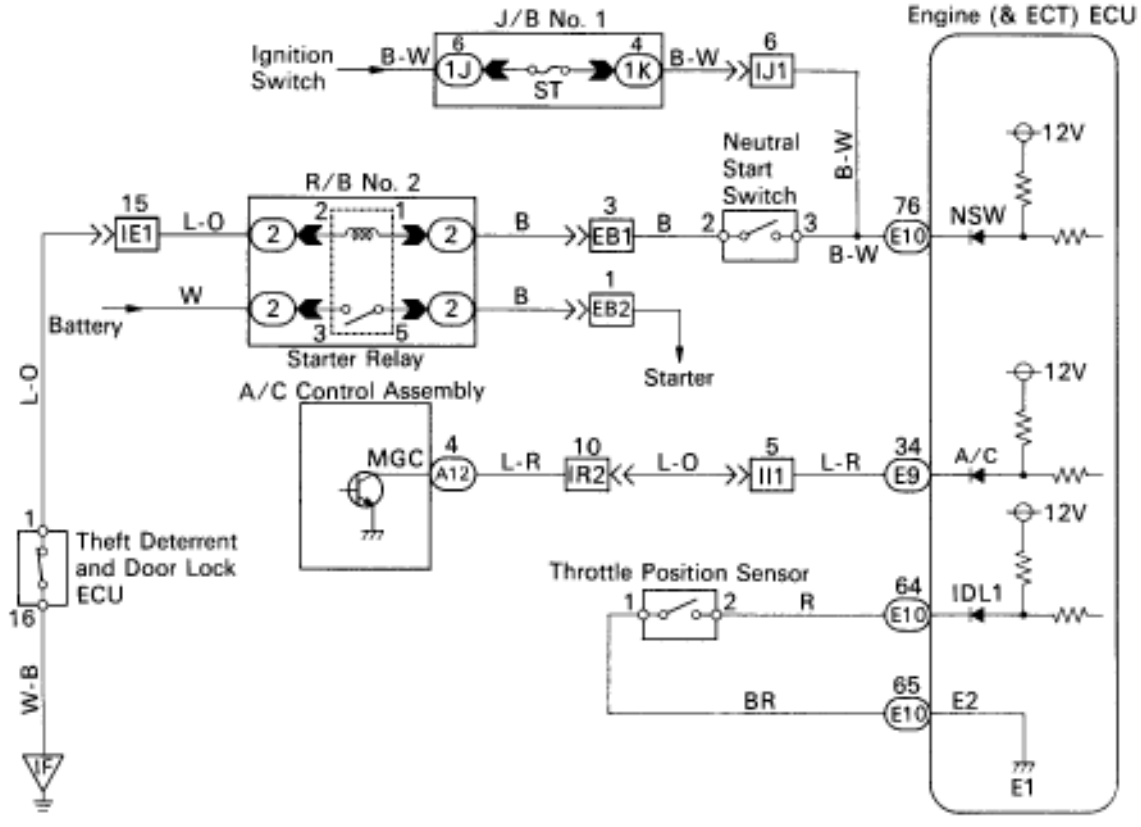
*: Only vehicles with ECT.

HINT: In this circuit, diagnosis can only be made in the test mode.

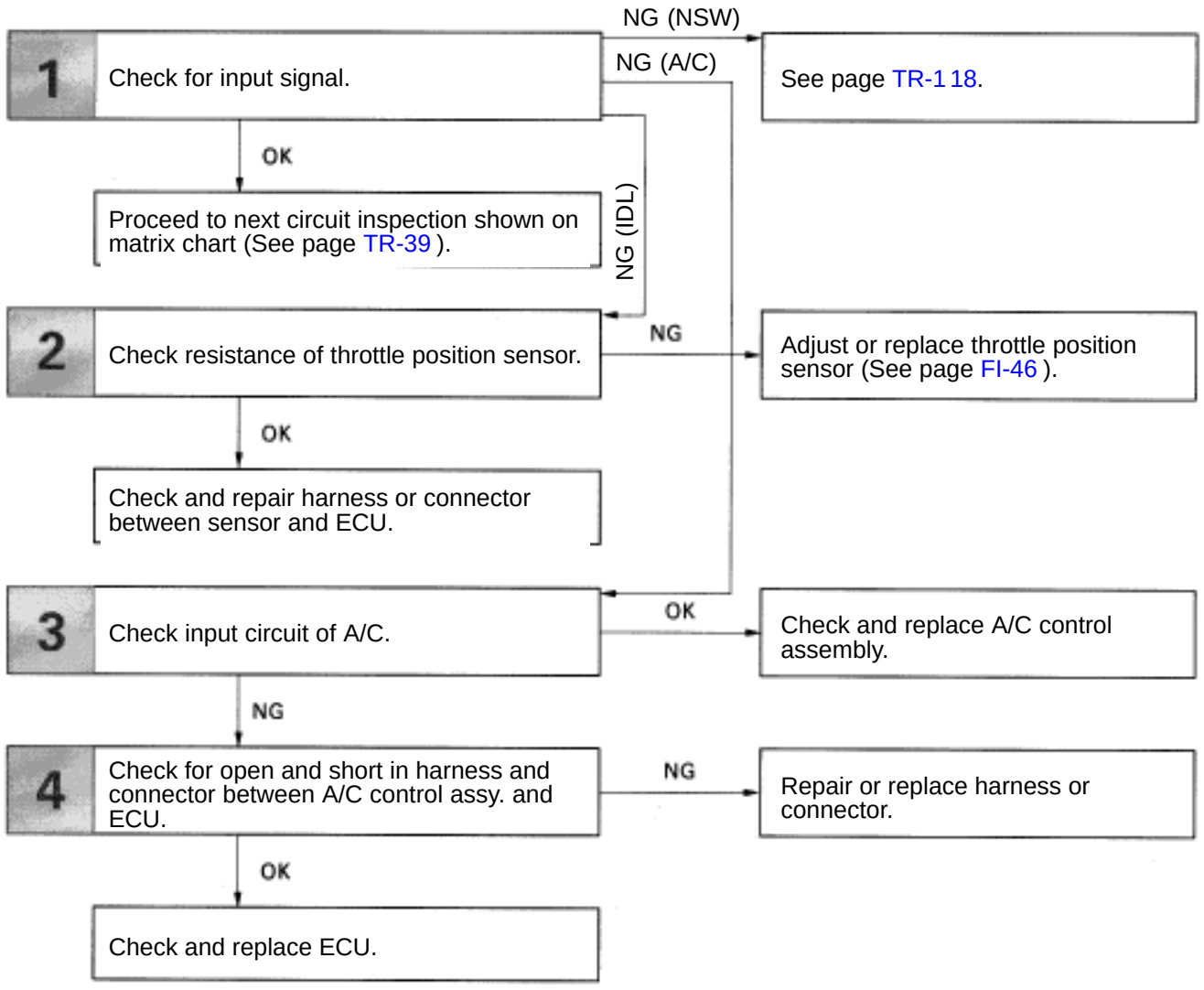
DIAGNOSTIC CHART

See next page for DIAGNOSTIC CHART

WIRING DIAGRAM

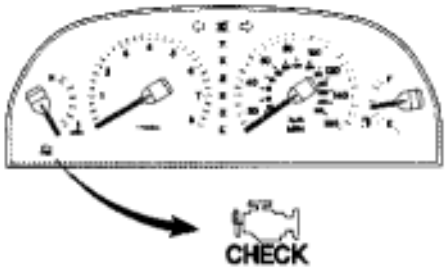


DIAGNOSTIC CHART



INSPECTION PROCEDURE

1 Check output condition of diag. trouble code 51.



FI6433

P Setting the test mode.

1. Turn ignition switch OFF.
2. Connect terminals TE2 and E1 of TDCL.
3. Turn ignition switch ON.
   (For checking terminal A/C, start the engine.)
4. Connect terminals TE1 and E1 of TDCL.

C Check if code “51” is output by the ”CHECK” engine warning light.

OK

	Condition	Code
Park/Neutral Position Switch (PNP)	P or N position	Normal*
	R,D,2 or L position	51*
Throttle Position Sensor (IDL1)	Accelerator pedal released	Normal*
	Accelerator pedal depressed	51*
A/C Switch (A/C)	A/C SW ON	51
	A/C SW OFF	Normal

*: Before the STA signal is input (ST is not ON), diagnostic trouble code 43 is also output.

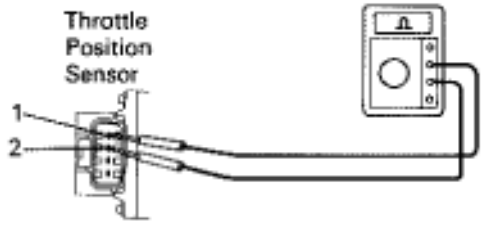
Hint Diag. trouble code 42 is output with vehicle speed 5 km/h (3 mph) or below.

OK

NG **IDL1…Go to step** 2
A/C…Go to step 3
PNP…Go to page TR-1 18

Proceed to next circuit inspection shown on matrix chart (See page TR-39).

2 Check throttle position sensor.



FI6847

P Disconnect throttle position sensor connector.

C Measure resistance between terminals 2 and 1 of throttle position sensor connector.

OK

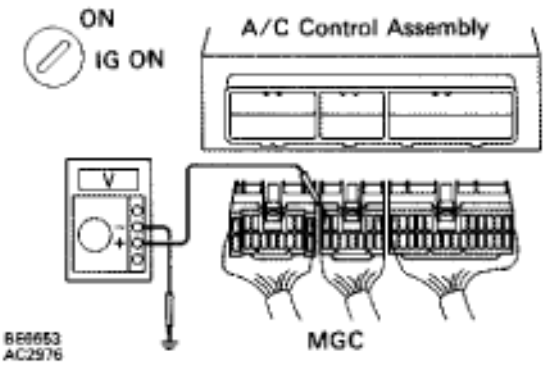
Throttle Valve	Resistance
Fully closed	Less than 0.5 kΩ
Opened	1 MΩ or higher

OK

NG **Adjust or replace throttle position sensor (See page FI-46).**

Check and repair harness or connector between engine (& ECT) ECU and throttle position sensor.

3	Disconnect A/C control assembly connector, check voltage between terminal MGC of A/C control assembly connector and body ground.



P
1. Remove air conditioning control assembly.
2. Disconnect air conditioning control assembly connector.
3. Turn ignition switch on.

C Measure voltage between terminal MGC of air conditioning control assembly connector and body ground.

OK **Voltage: 10 - 14 V**

NG

OK **Check and replace A/C control assembly.**

4	Check for open and short in harness and connector between engine (& ECT) ECU and A/C control assembly (See page IN-27).

OK

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

Check and replace engine (& ECT) ECU.

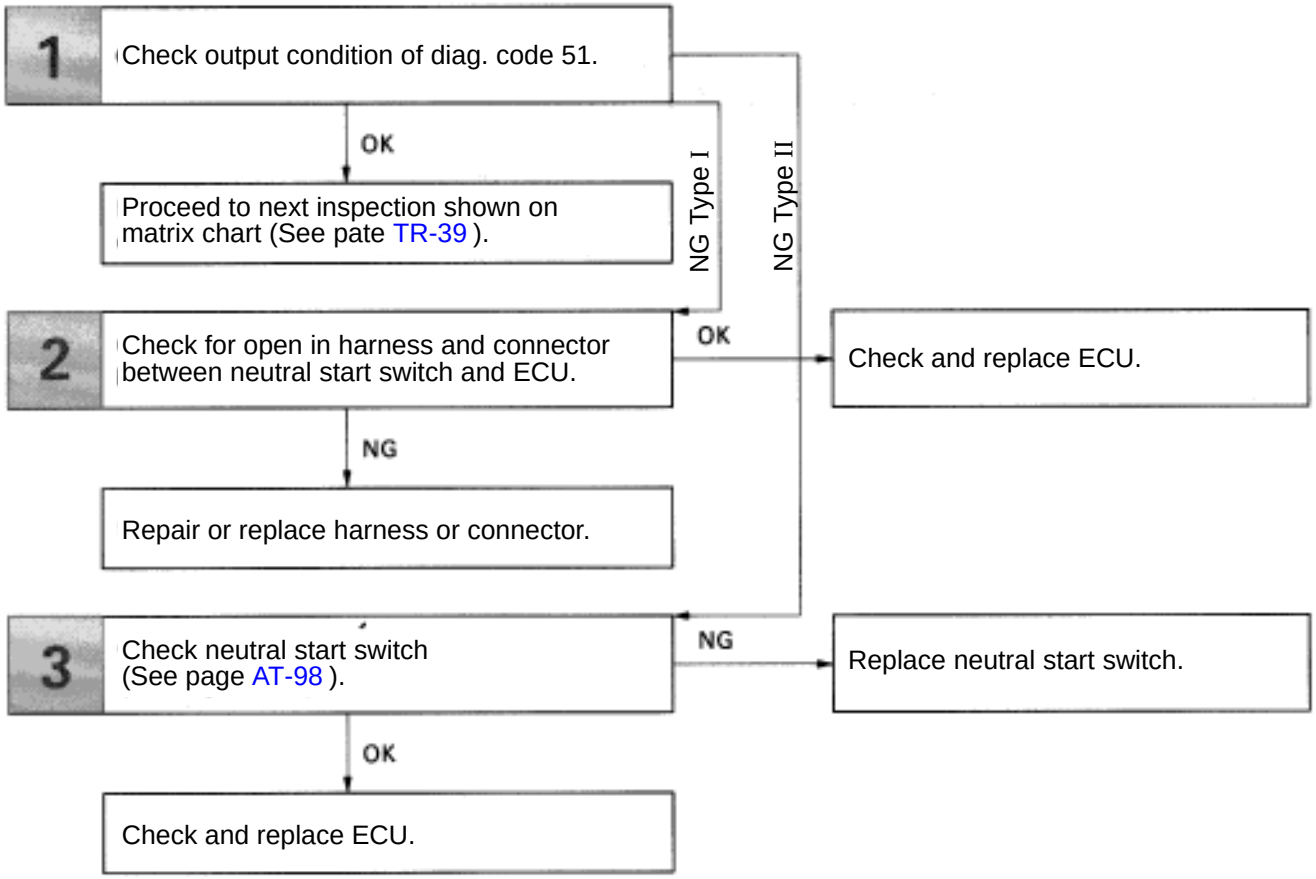
Neutral Start Switch Circuit (Only vehicles with ECT.)

CIRCUIT DESCRIPTION

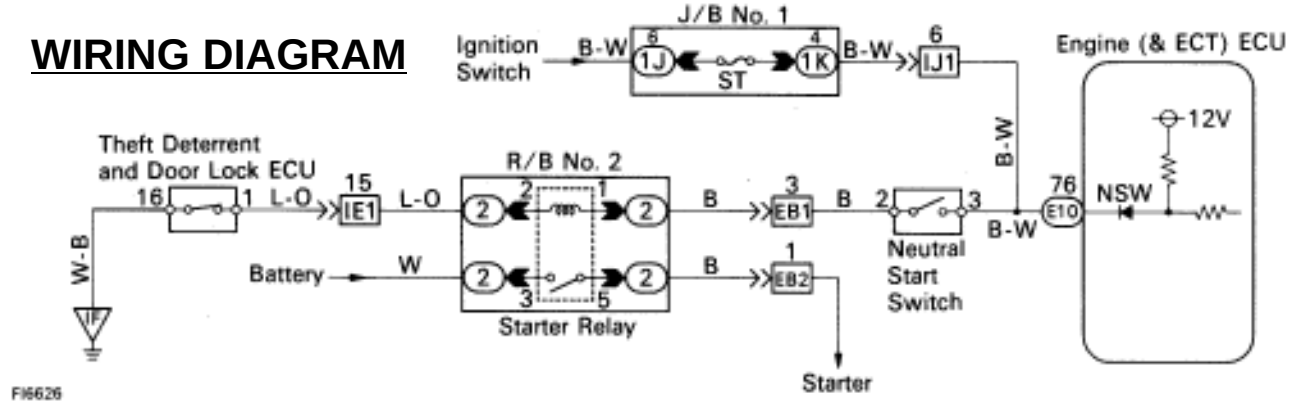
The neutral start switch goes on when the shift lever is in the N or P shift position. When it goes on the terminal NSW of the ECU is grounded to body ground via the starter relay and theft deterrent ECU, thus the terminal NSW voltage becomes 0V. When the shift lever is in the D, 2, L or R position, the neutral start switch goes off, so the voltage of ECU terminal NSW becomes battery voltage, the voltage of the ECU internal power source.
If the shift lever is moved from the N range to the D range, this signal is used for air-fuel ratio correction and for idle speed control (estimated control), etc.
When the neutral start switch is off, code "51" is output in the test mode diagnosis. (This is not abnormal.)

DIAGNOSTIC CHART

HINT: This diagnosis chart is based on premise that the engine is cranked normally. If the engine is not cranked, proceed to the matrix chart of problem symptoms on page TR-39 .

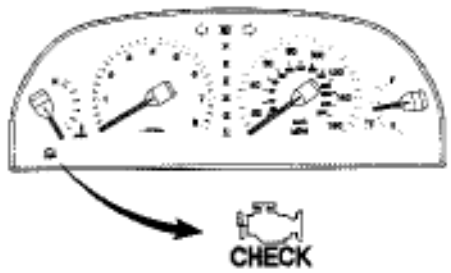


WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check output condition of diag. trouble code 51.**



FI6433

P
1. Connect terminals TE2 and E1 of TDCL.
2. Turn ignition switch on.
3. Crank the engine.
4. Connect terminals TE1 and E1 of TDCL.

C Check if diagnostic code “51” is output when the shift lever is in the P and D shift positions.

Result

Shift Position	Result		
	OK	NG Type I	NG Type II
"P"	Normal Code	Code 51	Normal Code
"D"	Code 51	Code 51	Normal Code

OK → **Proceed to next circuit inspection shown on matrix chart (See page TR-39).**

NG Type I → **Go to step 2.**

NG Type II → **Go to step 3.**

2 **Check for open in harness and connector between engine (& ECT) ECU and park/neutral position switch (See page IN-27).**

NG → **Repair or replace harness or connector.**

OK → **Check and replace engine (& ECT) ECU.**

3 **Check park/neutral position switch (See page AT-96).**

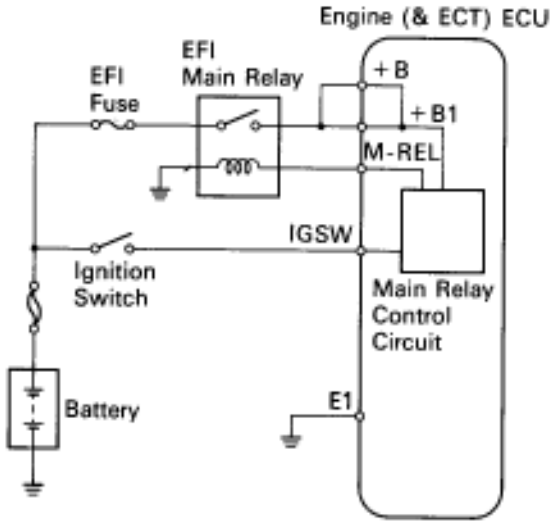
OK → **Check and replace engine (& ECT) ECU.**

NG → **Replace neutral start switch.**

ECU Power Source Circuit

CIRCUIT DESCRIPTION

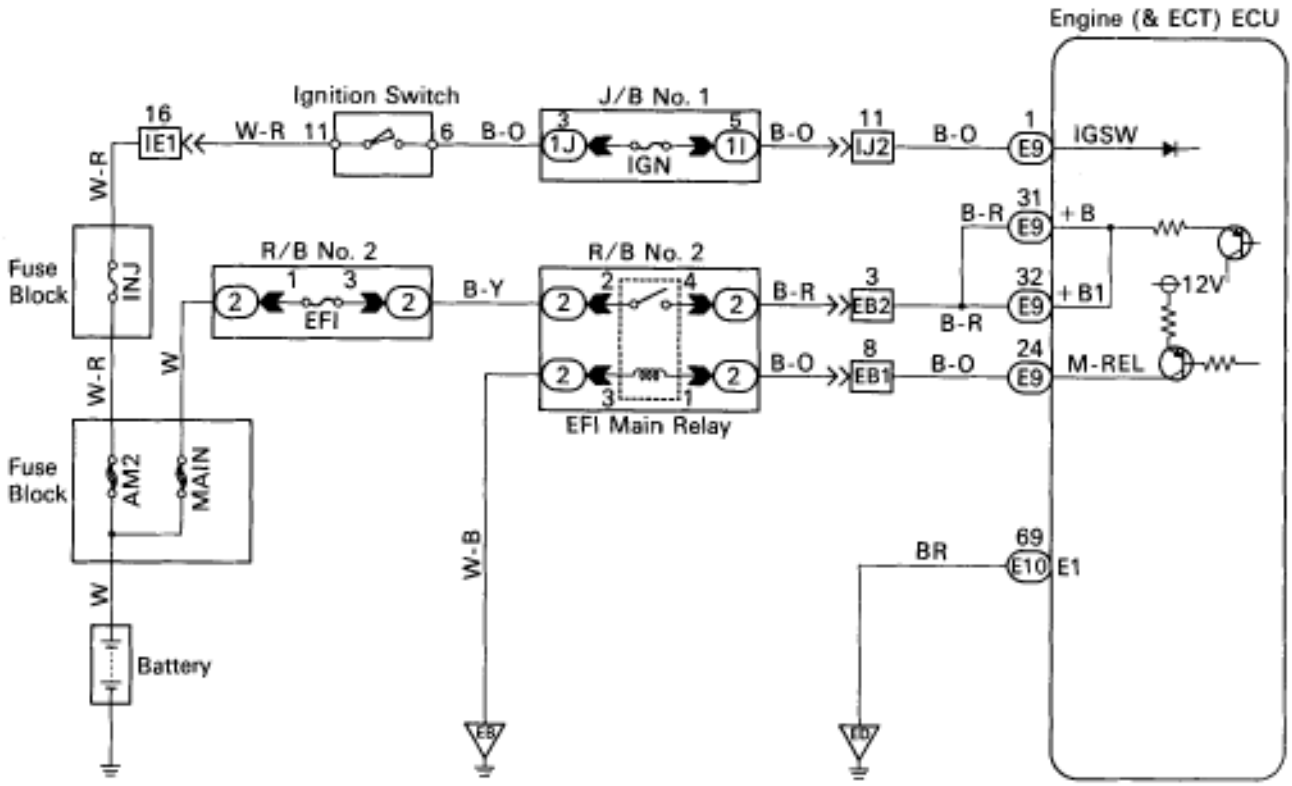
When the ignition switch is turned on, battery voltage is applied to the terminal IGSW of the ECU, and the main relay control circuit in the ECU sends a signal to the terminal M-REL of the ECU, switching on the main relay. This signal causes current to flow to the coil, closing the contacts of the main relay and supplying power to the terminals +B and +B1 of the ECU.
If the ignition switch is turned off, the ECU continues to switch on the main relay for a maximum of 2 seconds for the initial setting of the ISC valve.



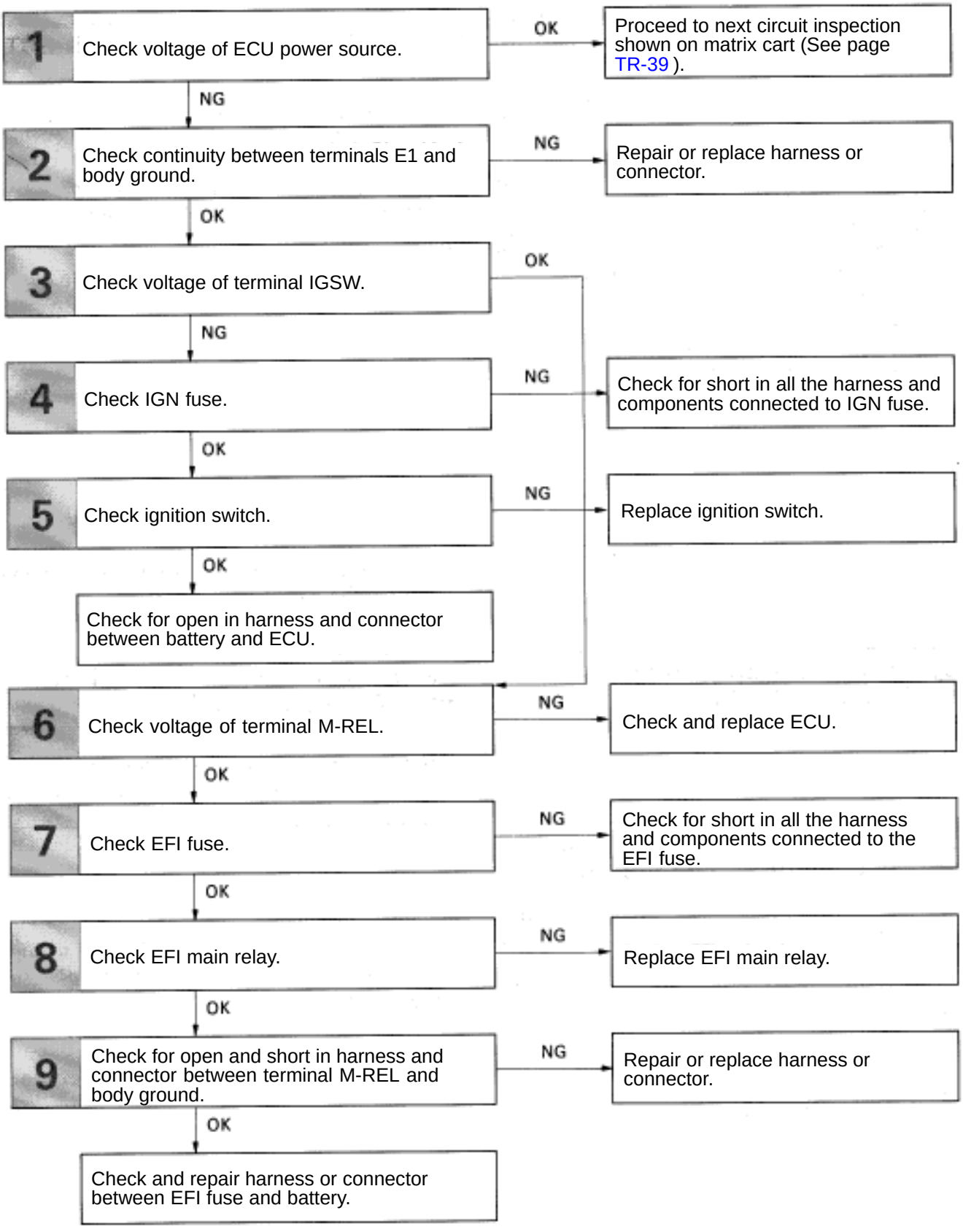
DIAGNOSTIC CHART

See next page for the DIAGNOSTIC CHART.

WIRING DIAGRAM

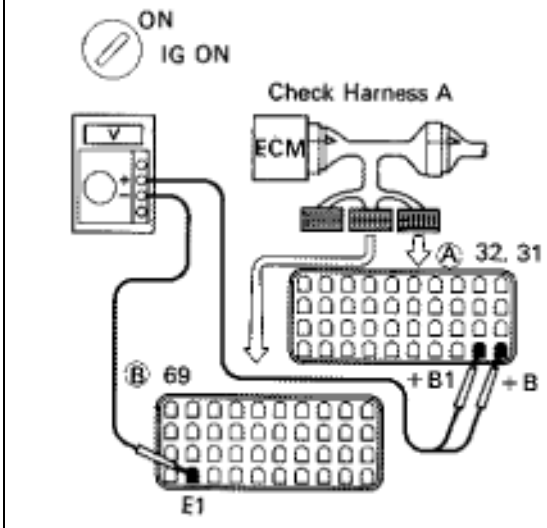


DIAGNOSTIC CHART



INSPECTION PROCEDURE

1 **Check voltage between terminals +B, +B1 and E1 of engine (& ECT) ECU connector.**



P
1. Connect the Check Harness A. (See page TR-34)
2. Turn ignition switch on.

C Measure voltage between terminals +B, +B1 and E1 of engine (& ECT) ECU connector.

OK **Voltage: 10 - 14 V**

NG

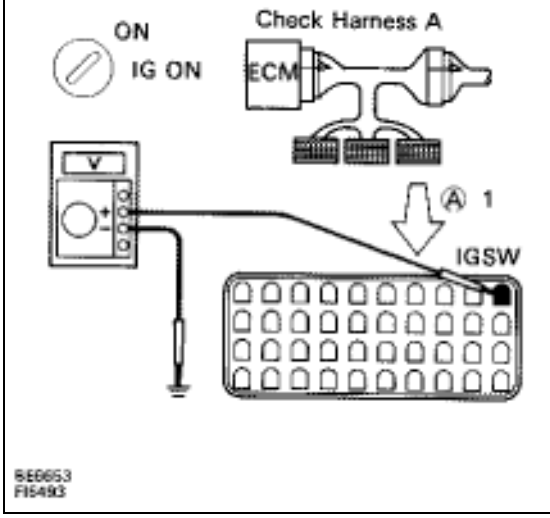
OK **Proceed to next circuit inspection shown on matrix chart (See page TR-39).**

2 **Check for open in harness and connector between terminal E1 of engine (& ECT) ECU and body ground. (See page IN-27).**

OK

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

3 **Check voltage between terminal IGSW of engine (& ECT) ECU connector and body ground.**



P Turn ignition switch on.

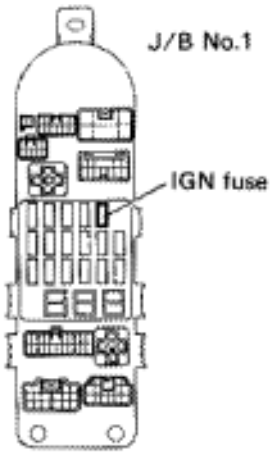
C Measure voltage between terminal IGSW of engine (& ECT) ECU connector and body ground.

OK **Voltage: 10 - 14 V**

NG

OK **Go to step 6.**

4 Check IGN fuse.



BE6624

P Remove IGN fuse from J/B No. 1.

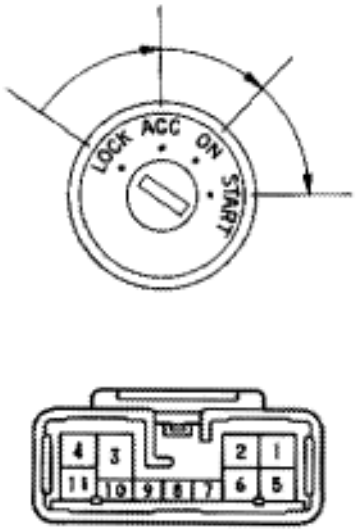
C Check continuity of IGN fuse.

OK **Continuity**

OK

NG **Check for short in all the harness and components connected to IGN fuse (See attached wiring diagram).**

5 Check ignition switch.



BE3582
eg-11-2

P Remove under cover and finish panel.

C Check continuity between terminals.

OK

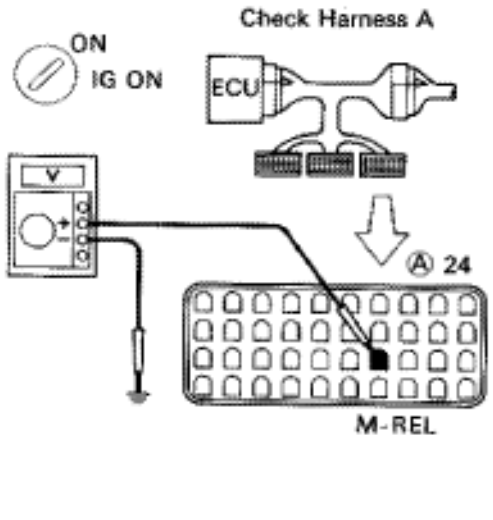
Terminal / Switch position	2	3	4	5	6	11
LOCK						
ACC		○—○				
ON	○	○	○		○	○
START	○		○	○	○	○

OK

NG **Replace ignition switch.**

Check and repair harness and connector between battery and ignition switch, ignition switch and engine (& ECT) ECU.

6	Check voltage between terminal M-REL of engine (& ECT) ECU connector and body ground.



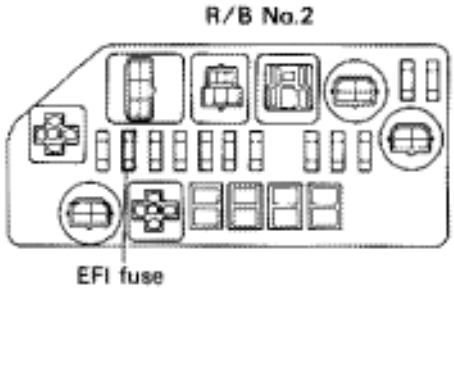
P Turn ignition switch on.

C Measure voltage between terminal M-REL of engine (& ECT) ECU connector and body ground.

OK **Voltage: 10 - 14 V**

OK → **NG** → **Check and replace engine (& ECT) ECU.**

7	Check EFI fuse.



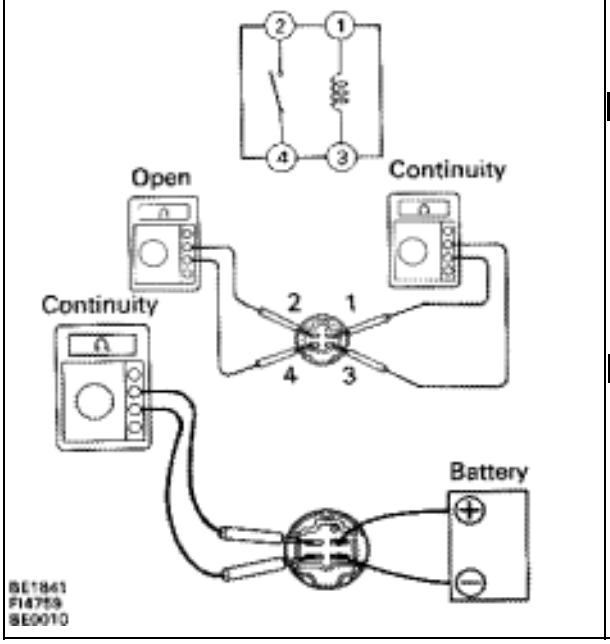
P Remove EFI fuse from R/B No. 2.

C Check continuity of EFI fuse.

OK **Continuity**

OK → **NG** → **Check for short in all the harness and components connected to EFI fuse (See attached wiring diagram).**

8 **Check EFI main relay.**



P Remove EFI main relay.

C Check continuity between terminals of EFI main relay shown below.

OK

Terminals 2 and 4	Open
Terminals 1 and 3	Continuity (Reference value 72 Ω)

C
1. Apply battery positive voltage between terminals 1 and 3.
2. Check continuity between terminals 2 and 4.

OK

Terminals 2 and 4	Continuity

OK → **NG** → **Replace EFI main relay.**

9 **Check for open and short in harness and connector between terminal M-REL of engine (& ECT) ECU and body ground (See page IN-27).**

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

Check and repair harness or connector between EFI fuse and battery.

Back Up Power Source Circuit

CIRCUIT DESCRIPTION

Battery voltage is supplied to terminal BATT of the ECU even when the ignition switch is off for use by the diagnostic code memory and air-fuel ratio adaptive control value memory, etc.

DIAGNOSTIC CHART

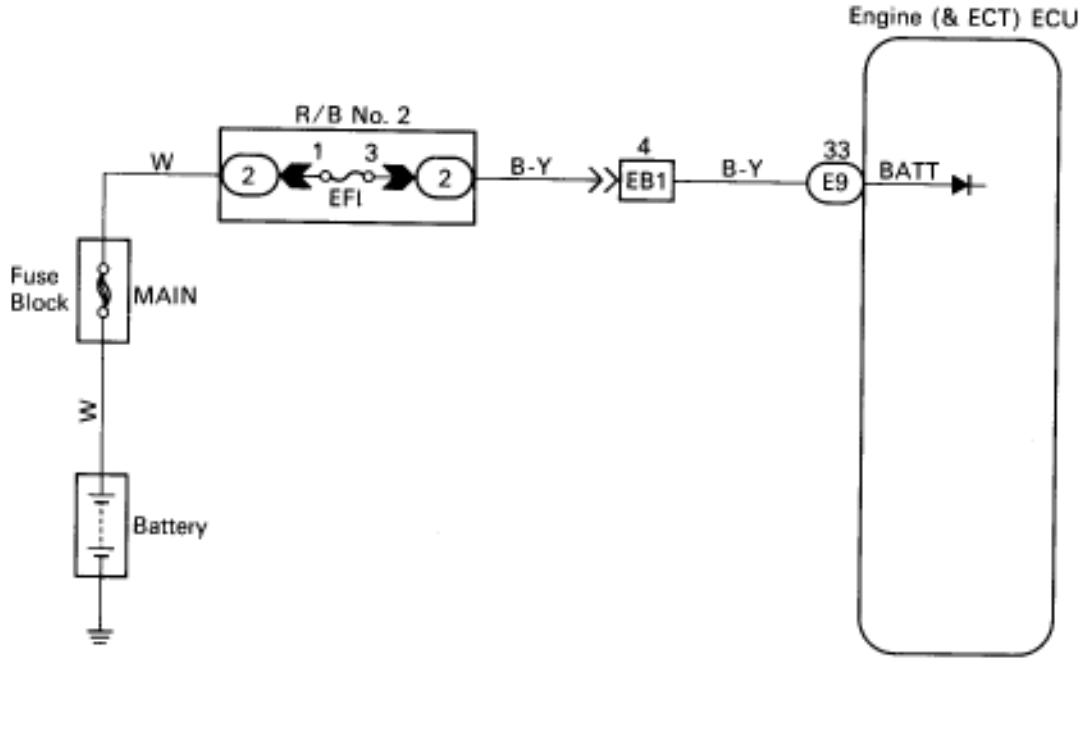
1 Check EFI fuse.
- NG → Check for short in all the harness and components connected to EFI fuse.
- OK ↓

2 Check voltage of terminal BATT.
- NG → Check and repair harness or connector between battery, EFI fuse and ECU.
- OK ↓

3 Check operation for the back-up.
- NG → Check and replace fuse.
- OK ↓

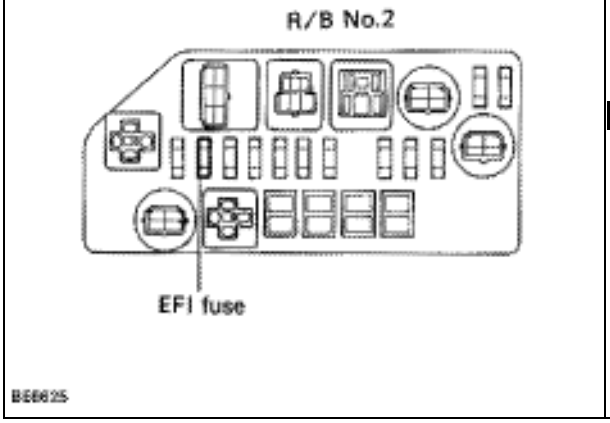
Proceed to next circuit inspection shown on matrix chart (See page TR-39).

WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check EFI fuse.**



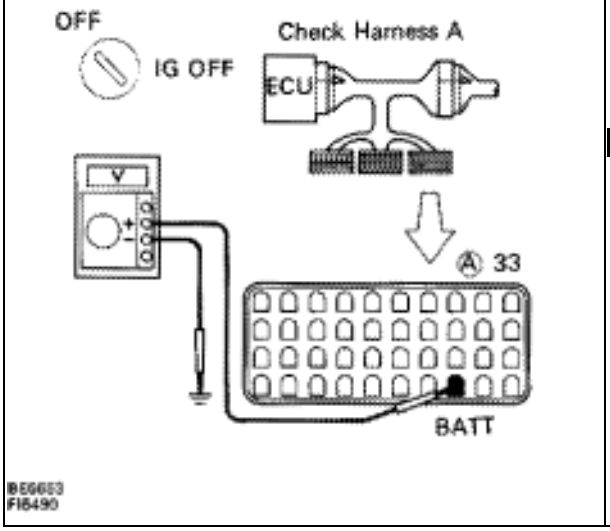
P Remove EFI fuse from R/B No. 2

C Check continuity of EFI fuse.

OK **Continuity**

OK → **NG** → **Check for short in all the harness and components connected to EFI fuse (See attached wiring diagram).**

2 **Check voltage between terminal BATT of engine (& ECT) ECU connector and body ground.**



P Connect the Check Harness A. (See page TR-34)

C Measure voltage between terminal BATT of engine (& ECT) ECU connector and body ground.

OK **Voltage: 10 - 14 V**

OK → **NG** → **Check and repair harness or connector between engine (& ECT) ECU and EFI fuse, EFI fuse and battery.**

3 **Are the diagnostic trouble codes still in the memory when the ignition switch is turned OFF?**

YES → **NO** → **Check and replace engine (& ECT) ECU.**

Proceed to next circuit inspection shown on matrix chart (See page TR-39).

Injector Circuit

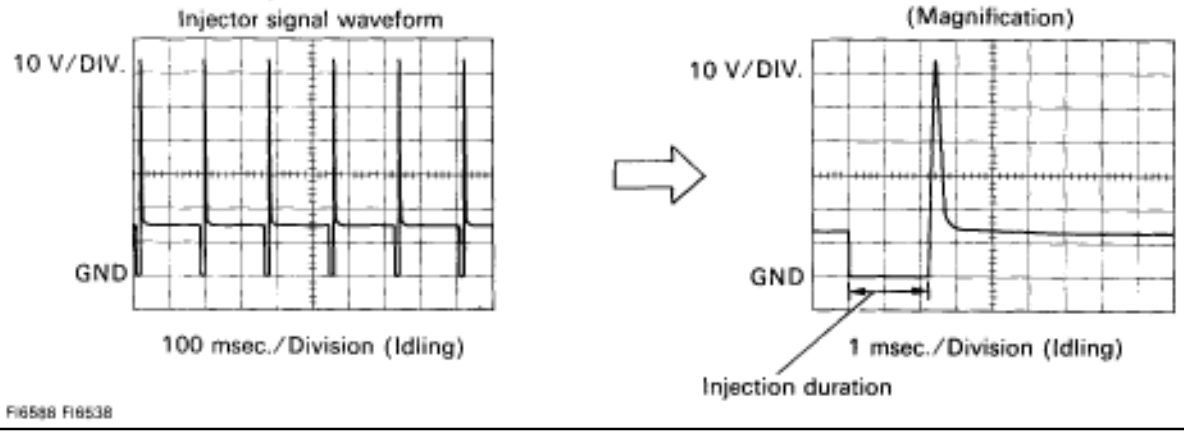
CIRCUIT DESCRIPTION

The injectors are provided to the intake manifold. They inject fuel into the cylinders based on the signals from the engine (& ECT) ECU.

Reference INSPECTION USING OSCILLOSCOPE

- With the engine idling measure between terminals #10 ~ 60 and E01 of engine (& ECT) ECU.

HINT: The correct waveform appears as shown in the illustration on the below.



DIAGNOSTIC CHART

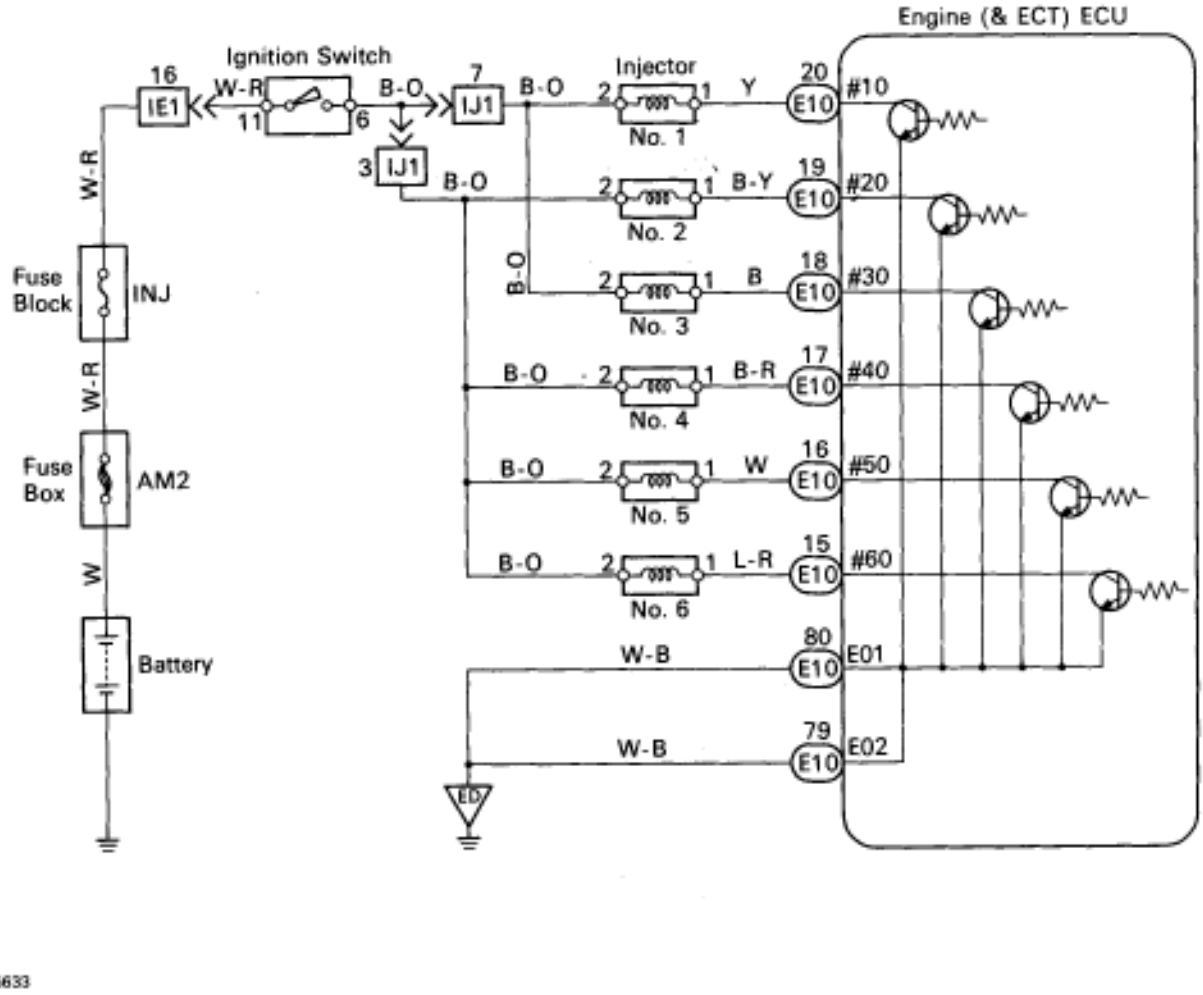
1 Check voltage of terminals #10 ~ 60.
- OK → 3
- NG → 2

2 Check AM2 and INJ fuses.
- NG → Check for short in all the harness and components connected to AM2 and INJ fuses.
- OK → Check for open in harness and connector between ECU and battery.

3 Check continuity between terminals E01, E02 and body ground.
- NG → Repair or replace harness or connector.
- OK → 4

4 Check operation for injectors.
- NG → Replace injector.
- OK → Check and replace ECU.

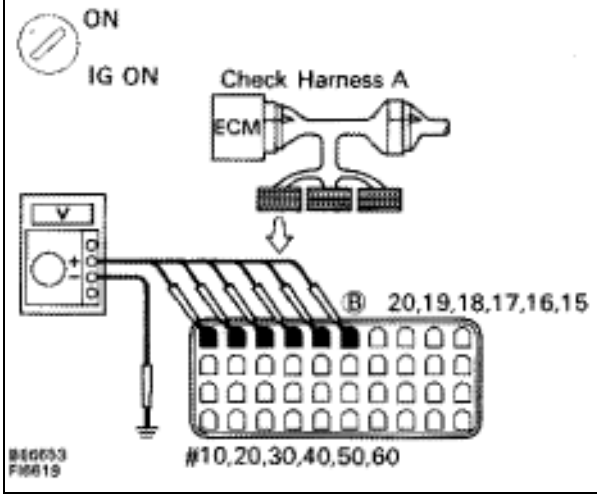
WIRING DIAGRAM



FI6633

INSPECTION PROCEDURE

1 **Check voltage between terminals #10 60 of engine (& ECT) ECU and body ground.**



P (2) Connect the Check Harness A. (See page TR-34)
(2) Turn ignition switch on.

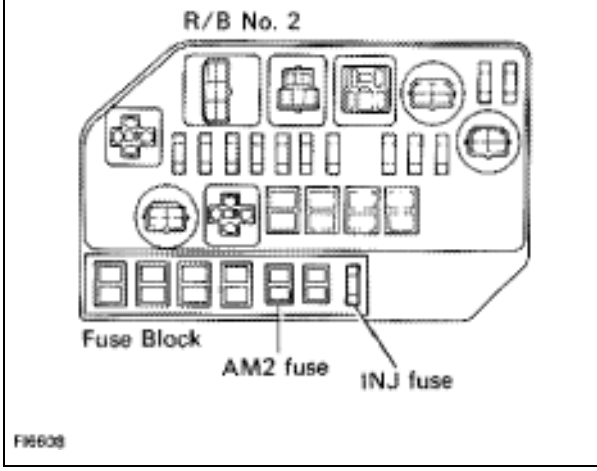
C Measure voltage between terminals #10 ~ 60 of engine (& ECT) ECU and body ground.

OK **Voltage: 10 - 14 V**

NG

OK **Go to step 3.**

2 **Check AM2 and INK fuses.**



P Remove AM2 and INJ fuses from fuse block.

C Check continuity of AM2 of INJ fuses.

OK **Continuity**

OK

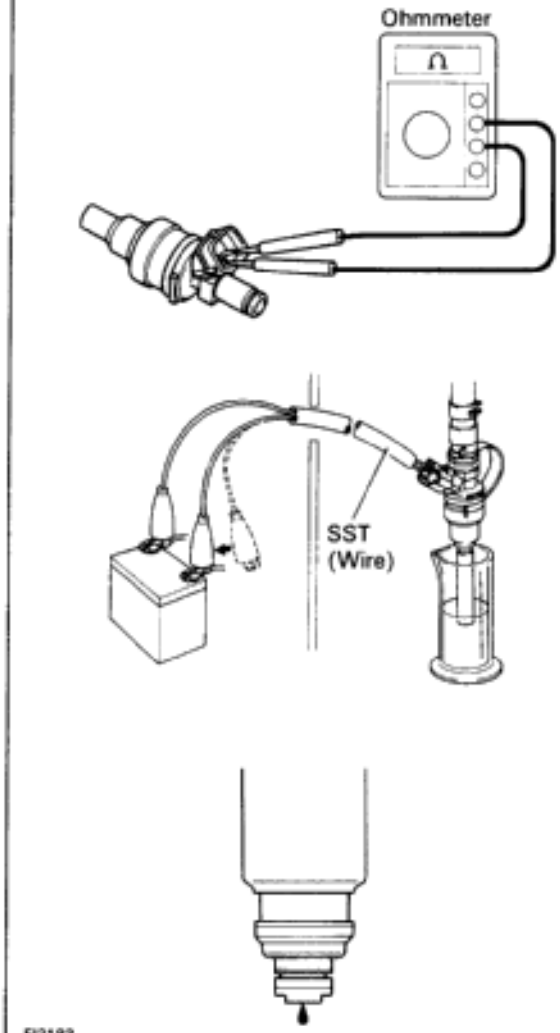
NG **Check for short in all the harness and components connected to AM2 and INJ fuses.**

Check for open in harness and connector between engine (& ECT) ECU and battery.

3 **Check for open in harness and connector between terminals E01, E02 of engine (& ECT) ECU connector and body ground (See page IN-27).**

OK → NG: **Repair or replace harness or connector.**

4 **Check injectors.**



P Disconnect injector connector (See page FI-26

C Measure resistance of injector.

OK **Resistance: 13.4 - 14.2 Ω at 20˚C (68˚F)**

C Check injection volume of injector (See page FI-30).

OK
- **Injection volume**
  70 - 88 cc/15 sec. (4.3 - 5.4 cu in.)
  Difference between each injector:
  Less than 9 cc (0.5 cu in.)
- **Leakage**
  Fuel drop: One drop or less per minute.

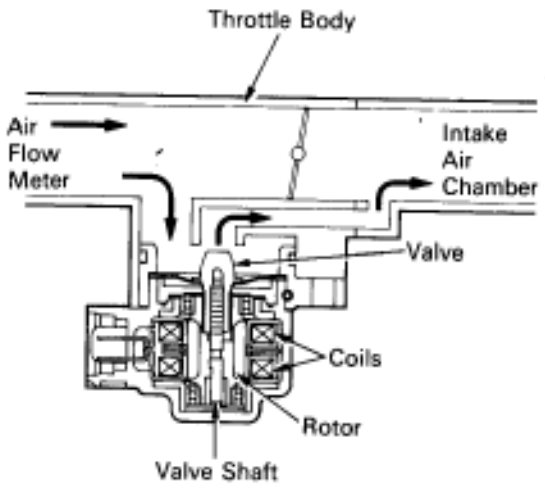
OK → NG: **Replace injector.**

Check and replace engine (& ECT) ECU.

ISC Valve Circuit

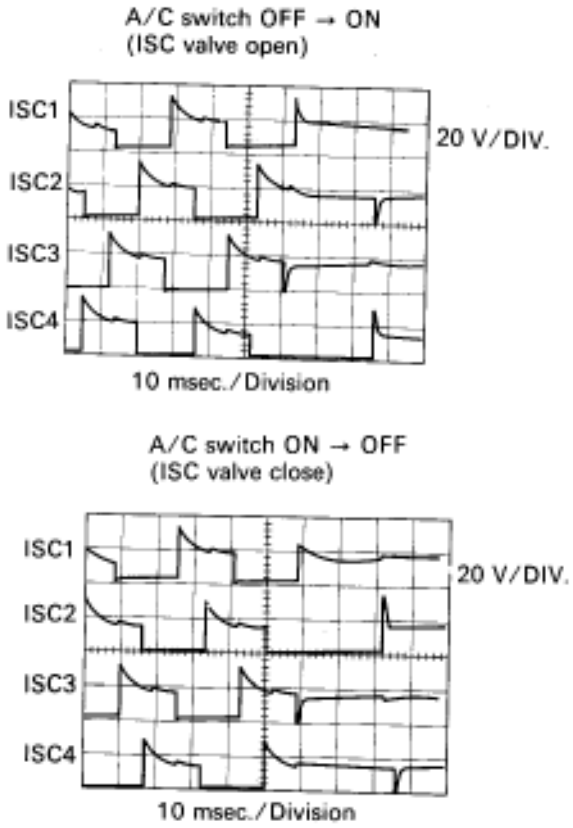
CIRCUIT DESCRIPTION

The ISC valve is provided on the intake air chamber and intake air bypassing the throttle valve is directed to the ISC valve through a passage.
A step motor is built into the ISC valve. It consists of four coils, the magnetic rotor, valve shaft and valve.
When current flows to the coils due to signals from the ECU, the rotor turns and moves the valve shaft forward or backward, changing the clearance between the valve and the valve seat.
In this way the intake air volume bypassing the throttle valve is regulated, controlling the engine speed.
There are 125 possible positions to which the valve can be opened.



FI6611

Reference INSPECTION USING OSCILLOSCOPE



FI6536
FI6537

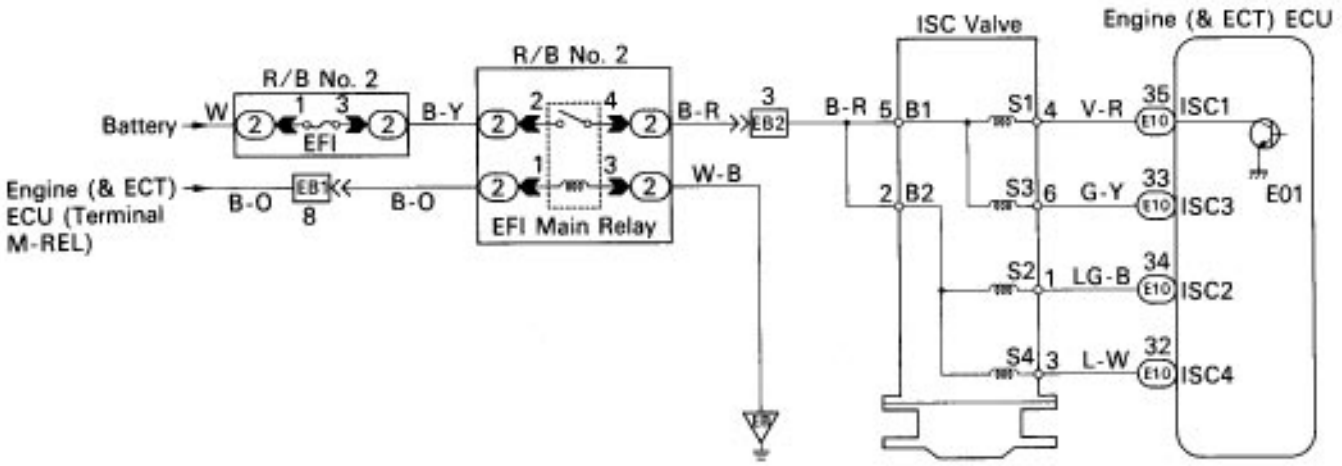
- With the engine idling measure between terminals ISC1, ISC2, ISC3, ISC4 and E01 of engine (& ECT) ECU when A/C switch ON or OFF.

HINT:
The correct waveform appears as shown in the illustration on the left.

DIAGNOSTIC CHART

1	Check operation for ISC valve.	NG	Replace ISC valve.
OK			
2	Check harness and connector between EFI main relay, ISC valve and ECU.	NG	Repair or replace harness or connector.
OK			
Proceed to next circuit inspection shown on matrix chart (See page TR-39).			

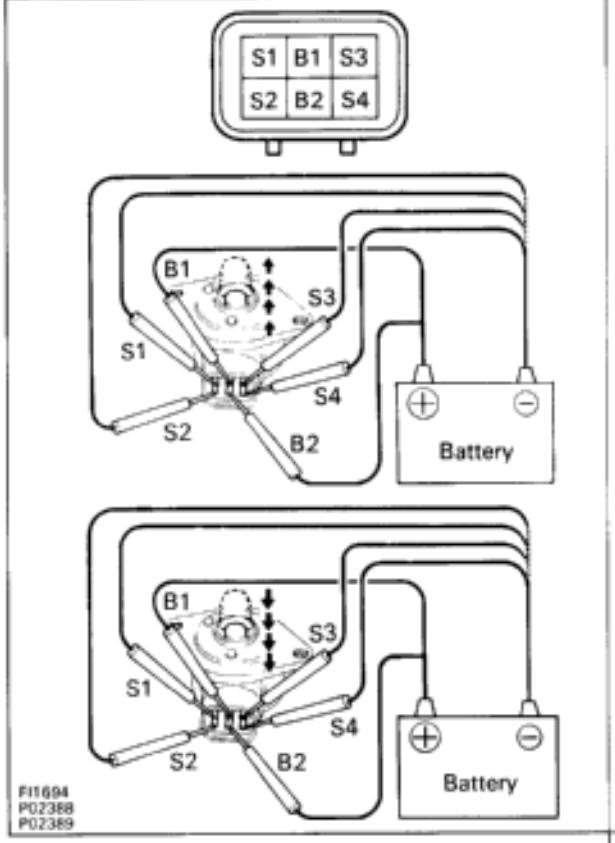
WIRING DIAGRAM



34

INSPECTION PROCEDURE

1 **Check ISC valve.**



P Disconnect ISC valve connector.

C Measure resistance between terminals shown below.

OK

Terminal	Resistance
B1 – S1	10 Ω – 30 Ω
B1 – S3	10 Ω – 30 Ω
B2 – S2	10 Ω – 30 Ω
B2 – S4	10 Ω – 30 Ω

P Remove ISC Valve.

C (1) Connect the battery positive lead to terminals B1 and B2, and the negative lead to terminals S1-S2-S3-S4 in that order.

(2) Connect the battery positive lead to terminals B1 and B2, and the negative lead to terminals S4-S3-S2-S1 in that order.

OK **(1) The valve moves in the closing direction.**
(2) The valve moves in the opening direction.

OK

NG → **Replace ISC valve.**

2 **Check for open and short in harness and connector between EFI main relay and ISC valve, ISC valve and engine (& ECT) ECU (See page IN-27).**

OK

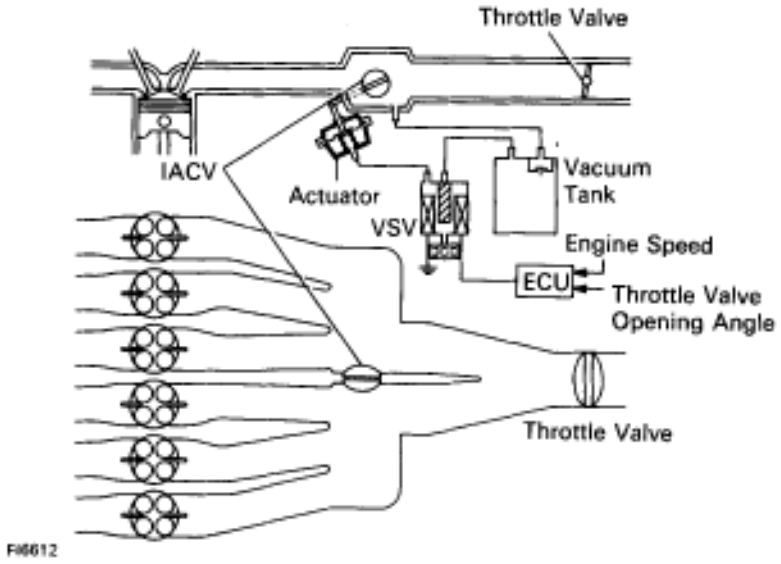
NG → **Repair or replace harness or connector.**

Proceed to next circuit inspection shown on matrix chart (See page FI-39)

IACV Control VSV Circuit

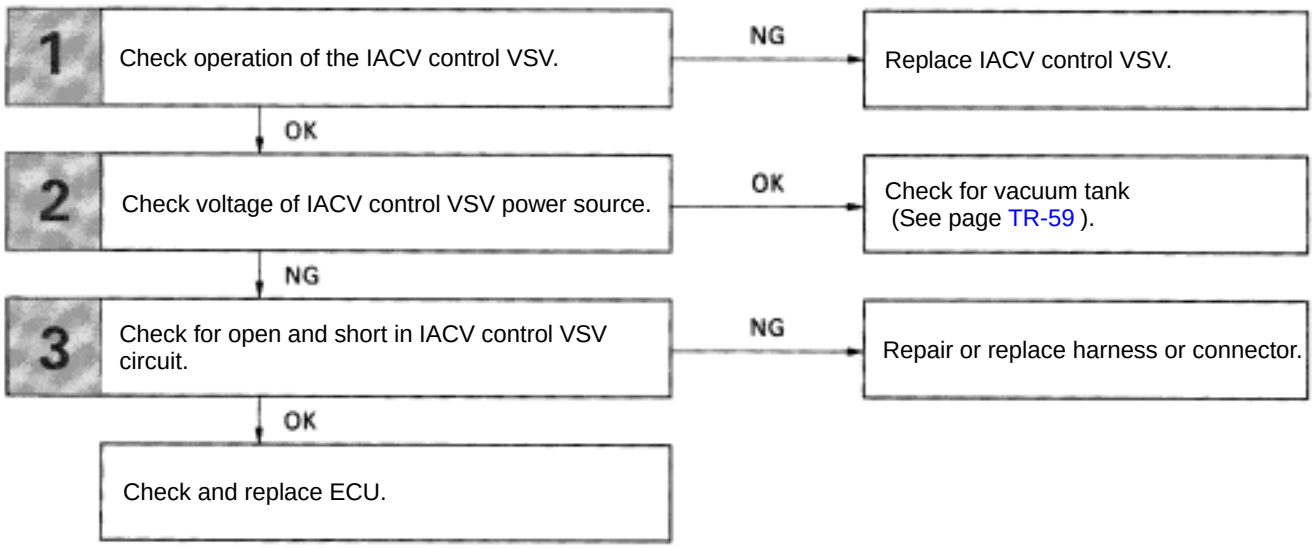
CIRCUIT DESCRIPTION

The circuit opens and closes the IACV (Intake Air Control Valve) in response to the engine load in order to increase the intake efficiency (ACIS: Acoustic Control Induction System).
When the engine speed is 4,500 rpm or less and throttle valve opening angle is 30° or more, or engine speed is 4,500 rpm or more and throttle valve opening angle is 30° or less, the engine (& ECT) ECU turns the VSV ON and closes the IACV. At all other times, the VSV is OFF, so the IACV is open.

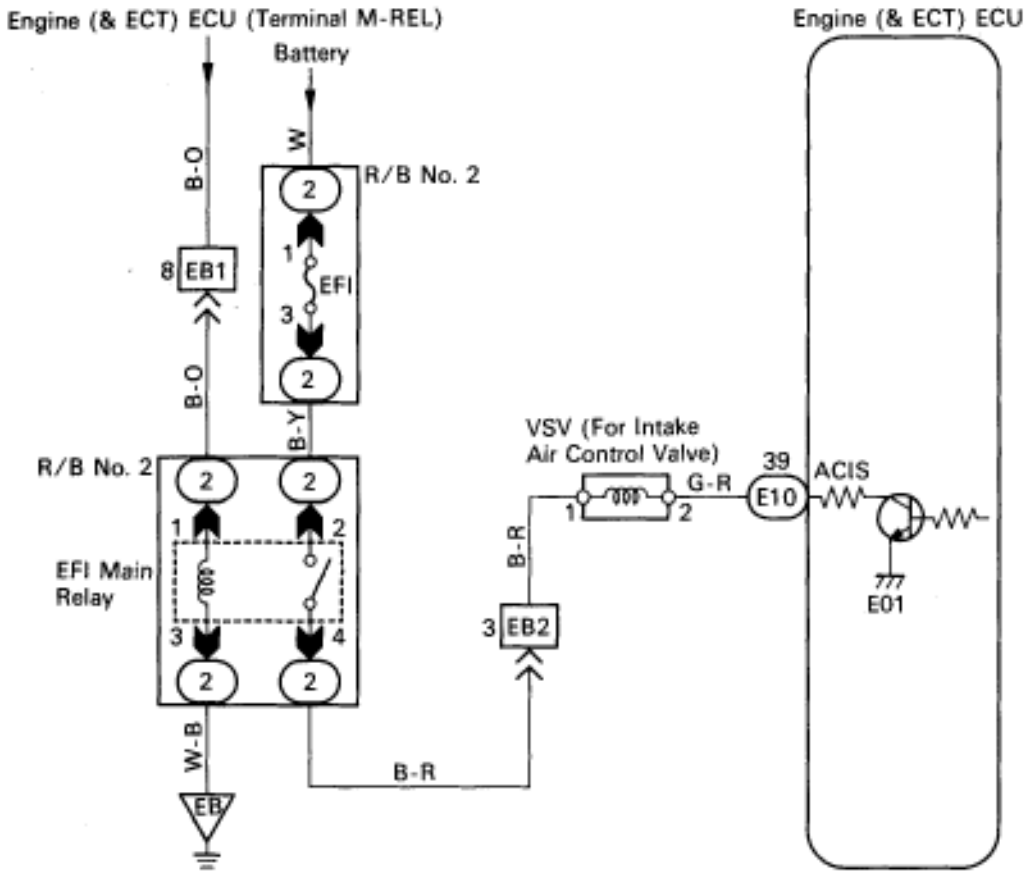


VSV	IACV
ON	closed
OFF	open

DIAGNOSTIC CHART

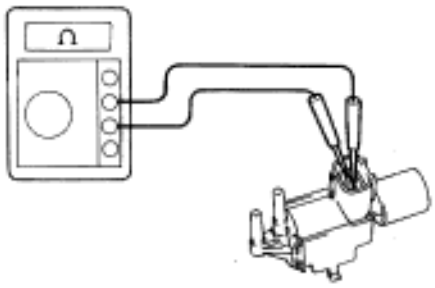


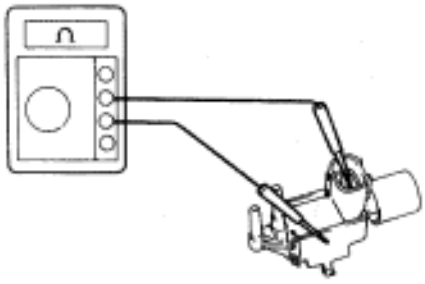
WIRING DIAGRAM

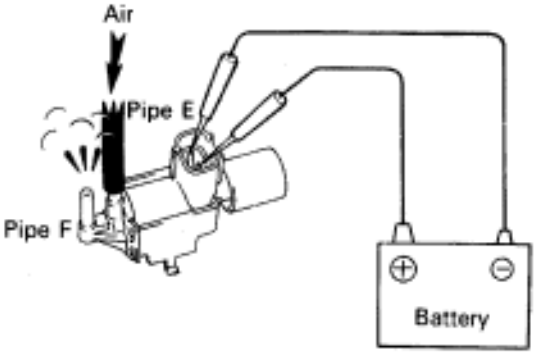


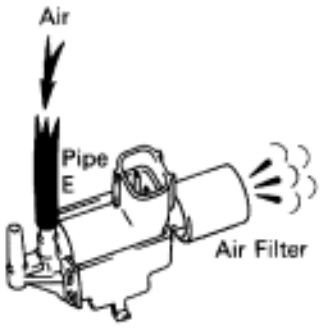
INSPECTION PROCEDURE

1 **Check IACV control VSV.**









FI6645
FI6646
P02690
P02689

P (1) Remove IACV control VSV.
(2) Disconnect IACV control VSV connector.

C (1) Measure resistance between terminals.
(2) Measure resistance between each terminal and the body.

OK **(1) Resistance: 38.5 - 44.5 Ω at 20˚C (68˚F)**
(2) Resistance: 1MΩ at 20˚C (68˚F) or higher

C Check operation of EACV control VSV when battery voltage is applied to the terminals of IACV control VSV connector or not.

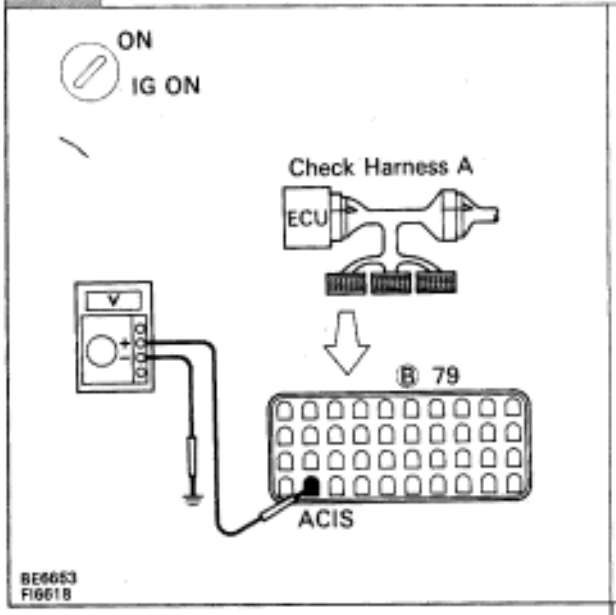
OK **Battery voltage is applied:**
The air from pipe E is flowing out through pipe F.

Battery voltage is applied:
The air from pipe E is flowing out through the air filter.

OK

NG **Replace IACV control VSV.**

2 **Check voltage between terminal ACIS of engine (& ECT) ECU connector and body ground.**



P (1) Connect the Check Harness A. (See page TR-34)
(2) Turn ignition switch on.

C Measure voltage between terminal ACIS of engine (& ECT) ECU connector and body ground.

OK **Voltage: 10 - 14 V**

NG

OK → **Check for vacuum tank. (See page FI-59)**

3 **Check for open and short in harness and connector between EFI main relay and engine (& ECT) ECU (See page IN-27).**

OK

NG → **Repair or replace harness or connector.**

Check and replace engine (& ECT) ECU.

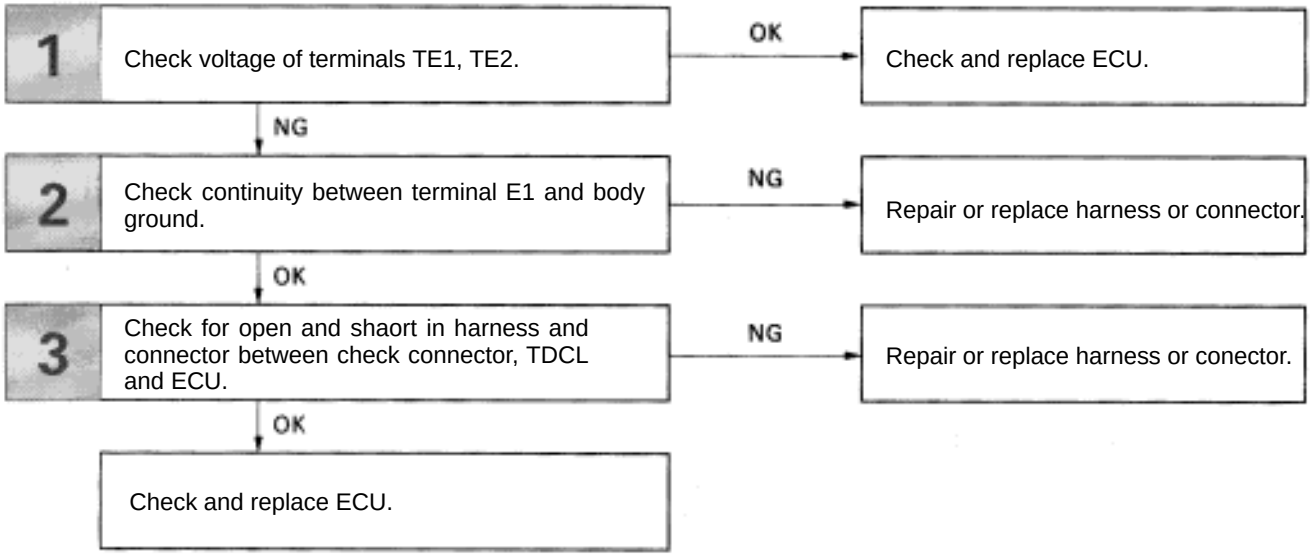
TE1, TE2 Terminal Circuit

CIRCUIT DESCRIPTION

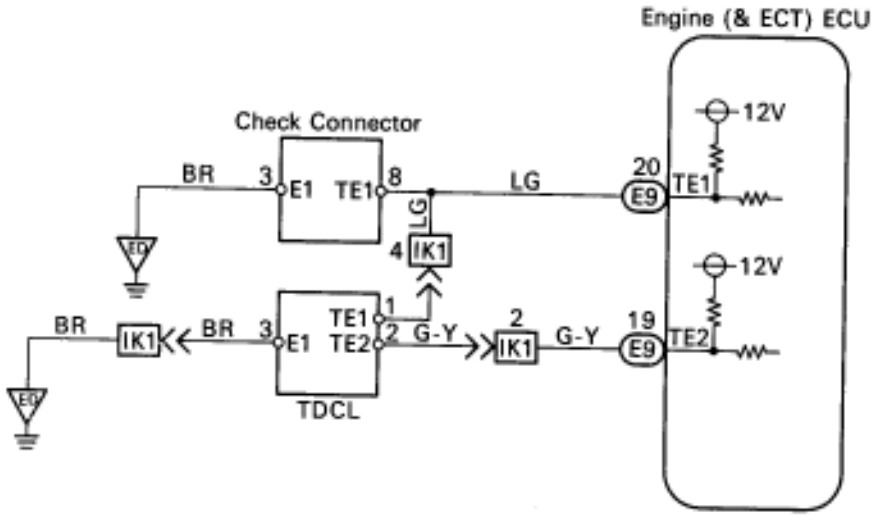
Terminal TE1 is located in the check connector in the engine compartment and terminals TE1 and TE2 are located in the TDCL in the cabin. When these terminals are connected with the E1 terminal, diagnostic codes in normal mode or test mode can be read from the ”CHECK” engine warning light on the combination meter.

DIAGNOSTIC CHART

HINT: If terminals TE1 and TE2 are connected with terminal E1, diagnostic code is not output or test mode is not activated.
Even though terminal TE1 is not connected with terminal E1, the ”CHECK” engine warning light blinks.
For the above phenomenon, the likely cause is an open or short in the wire harness, or malfunction inside the ECU.



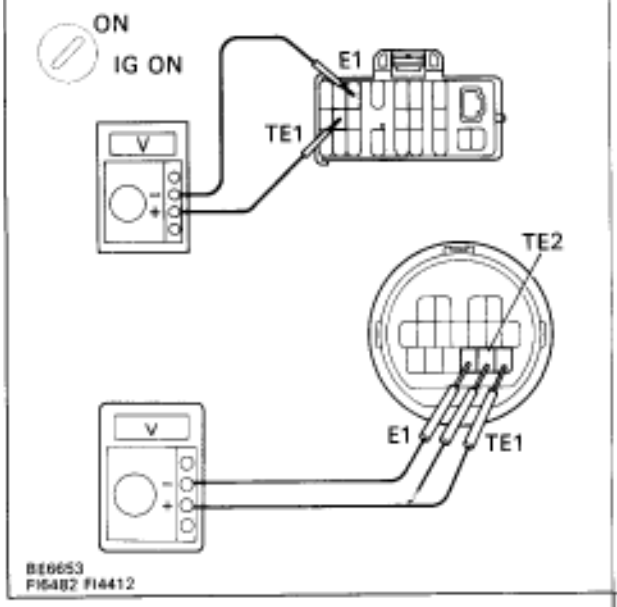
WIRING DIAGRAM



FI4391

INSPECTION PROCEDURE

1 **Check voltage between terminal ACIS of engine (& ECT) ECU connector and body ground.**



P Turn ignition switch on.

C Measure voltage between terminals TE1, TE2 and E1 of check connector, TDCL.

OK **Voltage: 10 - 14 V**

NG

OK → **Check and replace engine (& ECT) ECU.**

2 **Check continuity between terminal E1 of check connector, TDCL and body ground.**

OK

NG → **Repair or replace harness or connector.**

3 **Check for open and short in harness and connector between engine (& ECT) ECU and check connector, TDCL (See page IN-27).**

OK

NG → **Repair or replace harness or connector.**

Check and replace engine (& ECT) ECU.