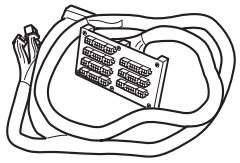
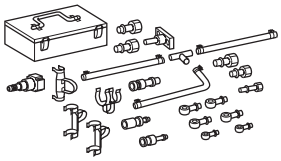
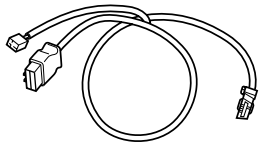
B8 ENGINE CONTROL SYSTEM

1 ENGINE CONTROL SYSTEM

1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09842-97209-000	Sub-harness, EFI computer check
	09842-30070-000	Wire, EFI inspection
	09268-31012 (09268-31011-000)	Tool set, injection measuring
	09991-87403-000	Wire, diagnosis check
	09991-87404-000 (09991-87401-000)	Wire, engine control system inspection
	09268-87701-000	Gauge, EFI fuel pressure

Instrument

Sound scope,Oscilloscope,Electrical tester,DS-Ⅱ

Lubricant,adhesive,others

Cloth

WARNING

- **Driving a vehicle with SST (EFI computer check sub－harness, etc.) being connected might cause an error operation to occur, which is extremely dangerous. Make sure that SST has been disconnected before driving the vehicle.**

1-2 HANDLING INSTRUCTIONS OF CONTROL SYSTEM

1-2-1 HOW TO USE THE SERVICE MANUAL.

1. The method used for assignment of the diagnostic trouble codes and for displaying / erasing the codes and the steps for checking are described together with the descriptions on the method of using the DS-Ⅱ or the OBD scan tool.
2. Carryout the troubleshooting by using the DS-Ⅱ or the OBD scan tool.
3. Diagnosis trouble codes are posted as both four-digit code and two-digit code, for example, like P0105/31.
   (1) When the DS-Ⅱ or the OBD scan tool is to be used, only four－digit codes are displayed.
   (2) When the scan tool is not to be used, two-digit code (e.g. 31) will be displayed on the engine check lamp.

NOTE

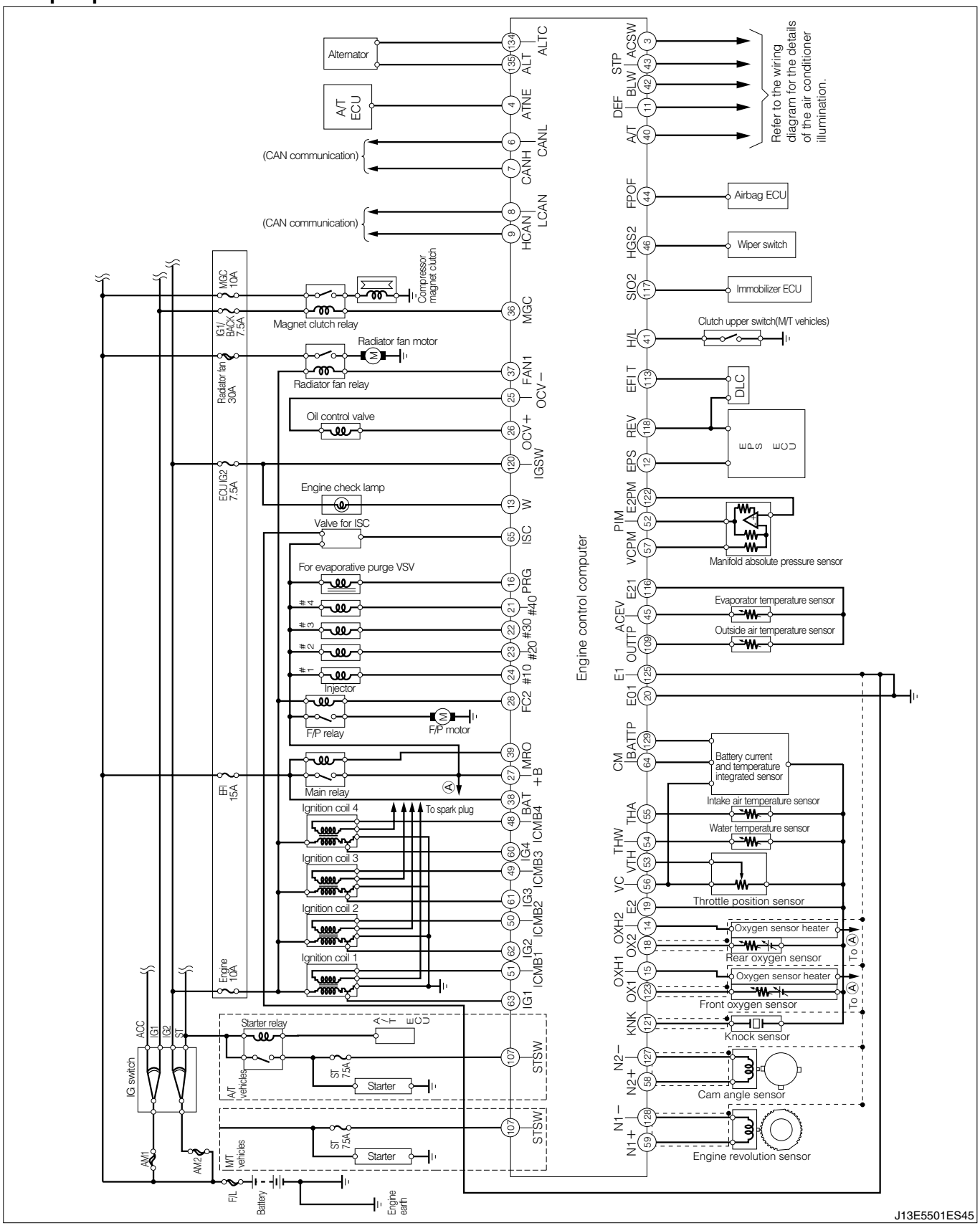
- **The OBD scan tool means a scan tool complying with the ISO 15765 format.**
- **When the OBD scan tool is used, all malfunction codes (4-digit code) cannot be read out. In this case, only the code which has zero after "P" (For example, P0XXX) can be read out.**
- **The accuracy of the two-digit codes in diagnosing malfunctioning components is slightly inferior to that of the four-digit codes.**

1-2-2 CAUTION WHEN CARRIED OUT A TROUBLESHOOTING

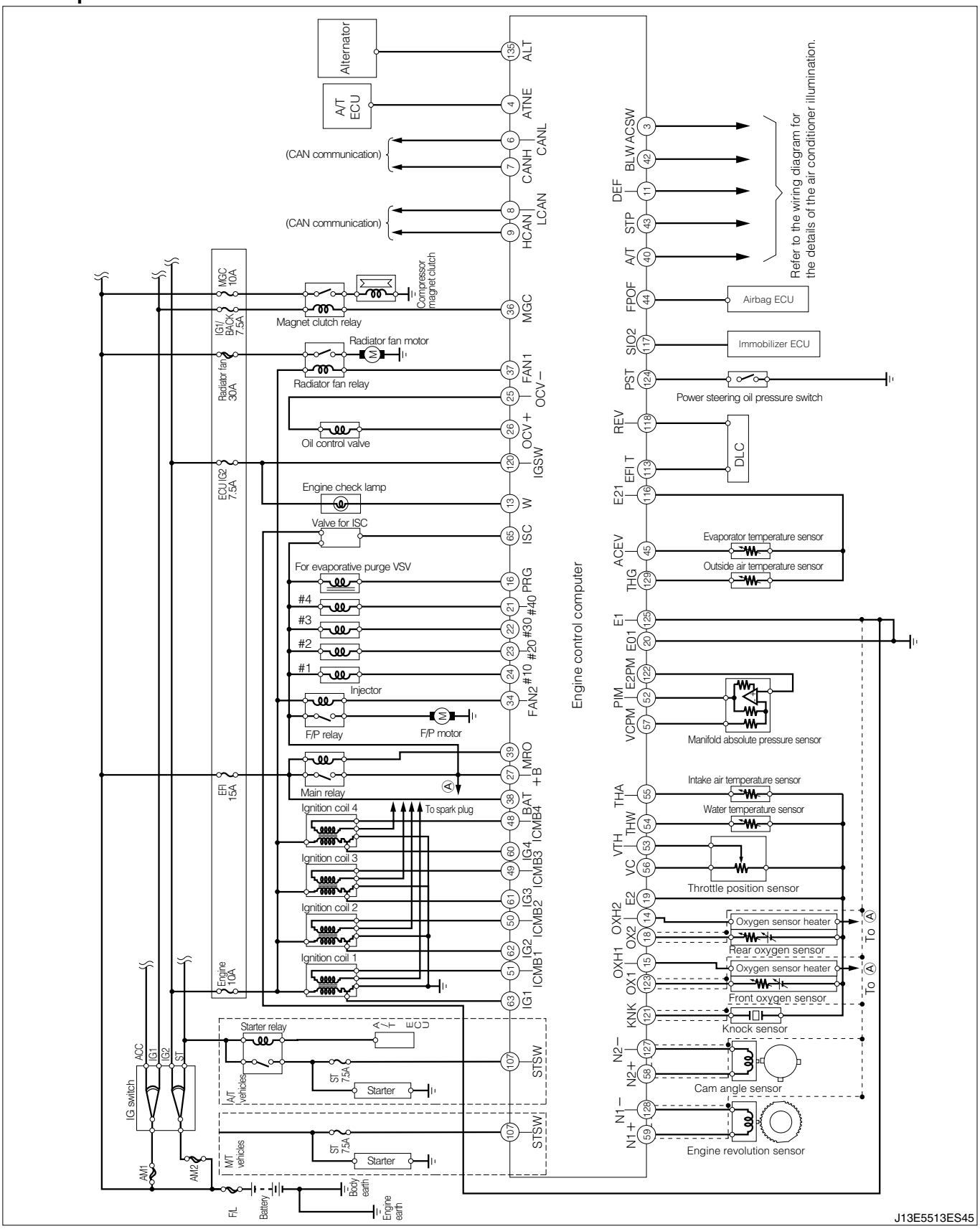
1. Do not disconnect the connector of EFI ECU, the battery cable from the battery, the ECU earth wire from the engine, or the main fuse before the diagnosis information memorized in the ECU memory is confirmed.
2. The diagnosis information memorized in the ECU memory can be erased by using the DS-Ⅱ or the OBD scan tool in the same way as for checking of diagnosis trouble codes. Therefore, before using the tester, carefully read its instruction manual to understand and familiarize yourself with the functions provided and the method of using these functions.
3. Priority in troubleshooting
   (1) If the priority in troubleshooting for a number of diagnostic trouble codes is given in the diagnosis code flow chart, be sure to carry out the troubleshooting by following the priority indicated.
   (2) If the priority is not given, follow the priority given below and perform the troubleshooting for each diagnostic trouble code.
   (1) In the case of diagnosis trouble codes other than No. P0171/25, No. P0172/26 (too rich /too lean in the fuel system), or No. P0300/17, No. P0301－P0304/17 (misfire detected).
   (2) In the case of diagnosis trouble codes of No. P0171/25, No. P0172/26 (too rich /too lean in the fuel system).
   (3) In the case of diagnosis trouble codes of No.P0300/17, No.P0301-P0304/17 (misfire detected).

1-3 SYSTEM WIRING DIAGRAM

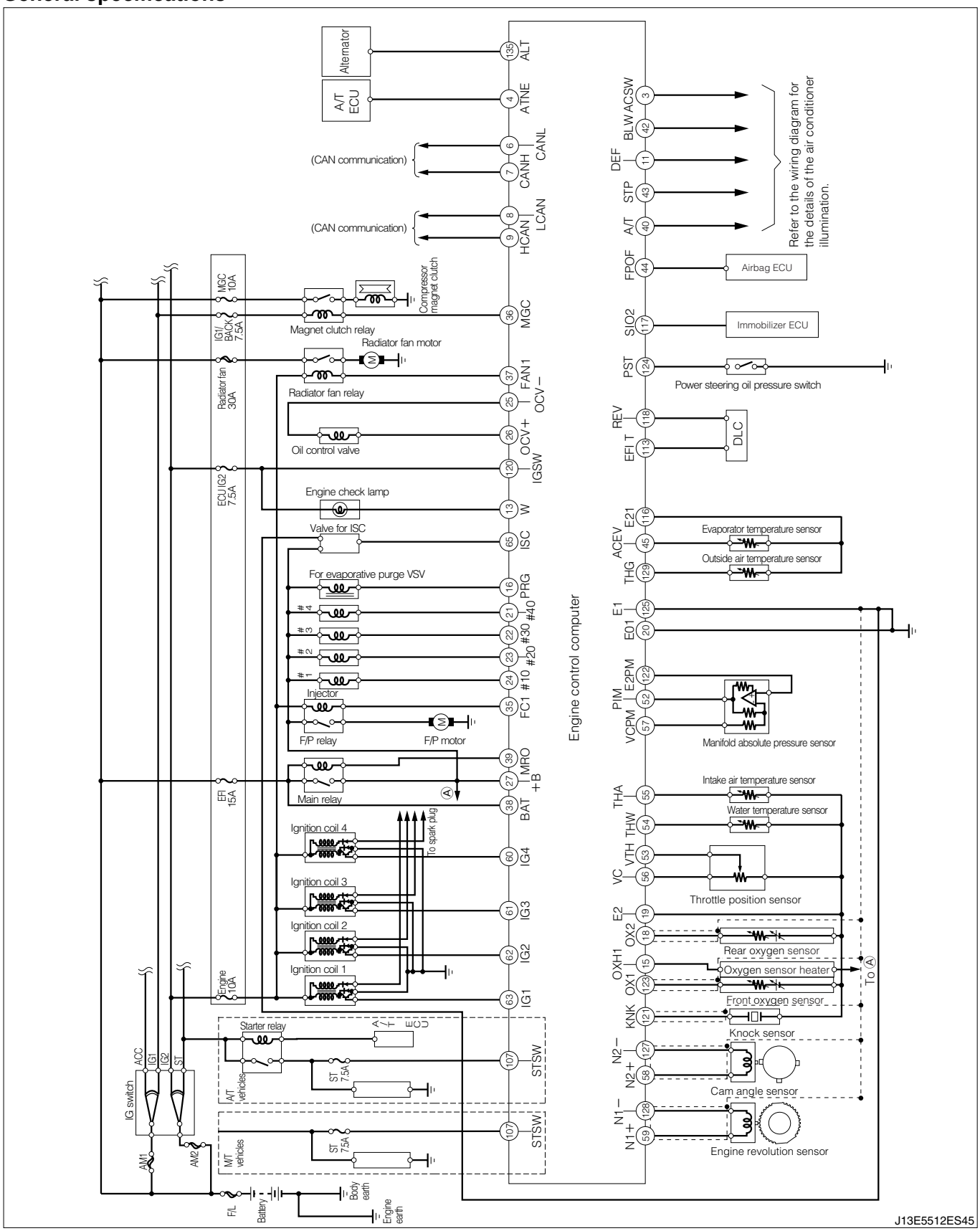
Europe specifications



China specifications



General specifications



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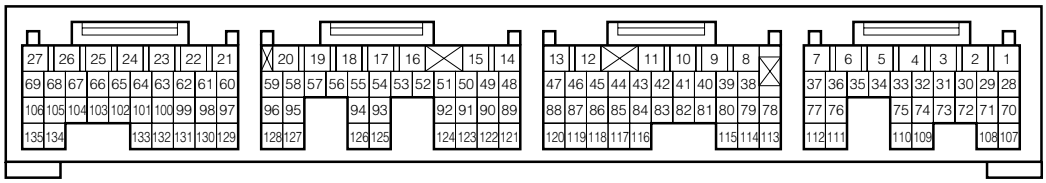
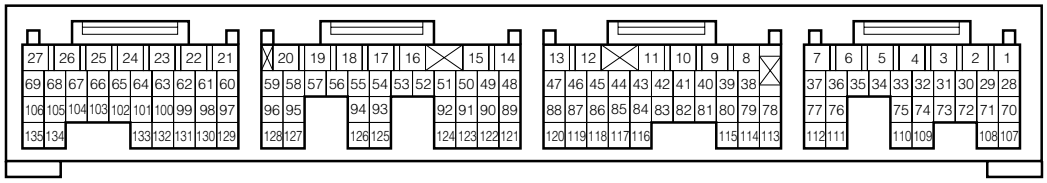
1-4 ARRANGEMENT OF ECU TERMINAL



H11E6091S10

Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	—	—	31	—	—
2	—	—	32	—	—
3	ACSW	Air conditioner switch	33	—	—
4	ATNE*1	Engine revolution speed signal	34	FAN2*3	Fuel pump relay
5	—	—	35	FC1*4	Fuel pump relay
6	CANL	CAN communication LO	36	MGC	Magnetic clutch relay
7	CANH	CAN communication HI	37	FAN1	Radiator fan relay
8	LCAN	CAN communication LO	38	BAT	Backup power supply
9	HCAN	CAN communication HI	39	MRO	Main relay
10	—	—	40	A/T	Wiper deicer (OPT)
11	DEF	Defogger signal	41	H/L*5	Clutch upper switch
12	EPS*2	EPS ECU idle-up request signal	42	BLW	Heater blower single
13	W	Engine check lamp	43	STP	Stop lamp signal
14	OXH2*2*3	Rear oxygen sensor heater	44	FPOF	Air bag fuel pump OFF request signal
15	OXH1	Front oxygen sensor heater	45	ACEV	Air－conditioner evaporator temperature sensor
16	PRG	Evaporator purge VSV	46	HGS2*2	Wiper switch
17	—	—	47	—	—
18	OX2	Rear oxygen sensor signal	48	ICMB4*2*3	Ion current combustion control signal (#4)
19	E2	Sensor system earth	49	ICMB3*2*3	Ion current combustion control signal (#3)
20	E01	Power system earth	50	ICMB2*2*3	Ion current combustion control signal (#2)
21	#40	Injector (#4)	51	ICMB1*2*3	Ion current combustion control signal (#1)
22	#30	Injector (#3)	52	PIM	Manifold absolute pressure sensor
23	#20	Injector (#2)	53	VTH	Throttle position sensor
24	#10	Injector (#1)	54	THW	Coolant temperature sensor
25	OCV－	Oil control valve (－)	55	THA	Intake air temperature sensor
26	OCV＋	Oil control valve (＋)	56	VC	Sensor power supply
27	＋B	EFI ECU power supply	57	VCPM	Manifold absolute pressure sensor power supply
28	FC2*2	Fuel pump relay	58	N2＋	Cam angle sensor (＋)
29	—	—	59	N1＋	Engine speed sensor (＋)
30	—	—	60	IG4	Ignition coil (#4)

*1:A/T vehicles
*2:Europe specifications
*3:China specifications
*4:General specifications
*5:European specification (M/T vehicless mounted with type 3SZ engines)

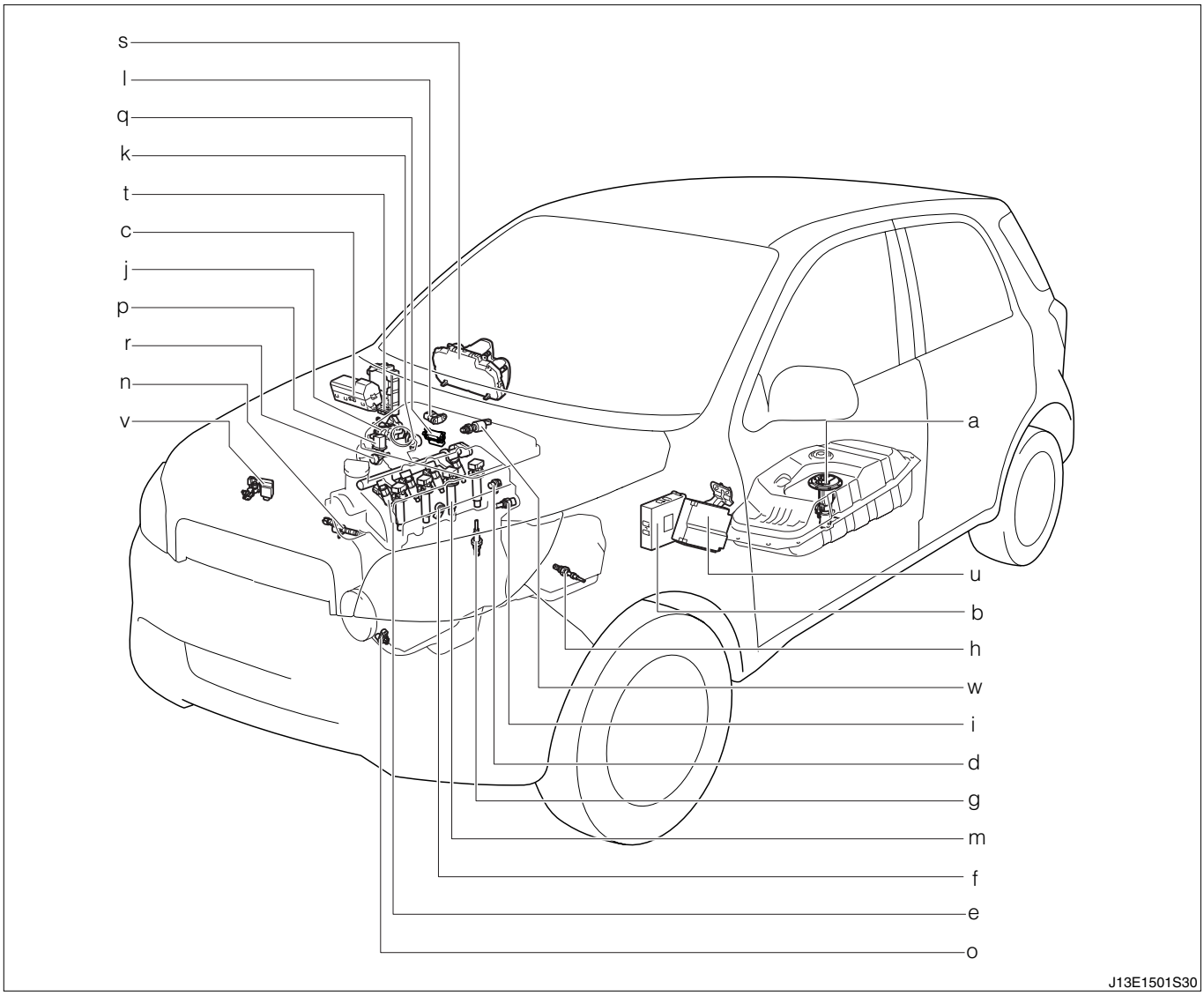


H11E6091S10

Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
61	IG3	Ignition coil (#3)	99	—	—
62	IG2	Ignition coil (#2)	100	—	—
63	IG1	Ignition coil (#1)	101	—	—
64	CM*1	Battery current sensor	102	—	—
65	ISC	Valve for ISC	103	—	—
66	—	—	104	—	—
67	—	—	105	—	—
68	—	—	106	—	—
69	—	—	107	STSW	Starter switch
70	—	—	108	—	—
71	—	—	109	OUTTP	External air temperature sensor
72	—	—	110	—	—
73	—	—	111	—	—
74	—	—	112	—	—
75	—	—	113	EFI T	EFI－T check terminal
76	—	—	114	—	—
77	—	—	115	—	—
78	—	—	116	E21	Body sensor earth
79	—	—	117	SIO2*2	Immobilizer communication
80	—	—	118	REV	DLC (REV terminal)
81	—	—	119	—	—
82	—	—	120	IGSW	IG switch
83	—	—	121	KNK	Knock sensor
84	—	—	122	E2PM	Sensor earth (Exclusively used for intake manifold pressure sensor)
85	—	—	123	OX1	Front oxygen sensor
86	—	—	124	PST*3*4	Power steering oil pressure switch
87	—	—	125	E1	Calculating system earth
88	—	—	126	—	—
89	—	—	127	N2－	Cam angle sensor (－)
90	—	—	128	N1－	Engine speed sensor (－)
91	—	—	129	BATTP*1	Battery temperature sensor
92	—	—	130	—	—
93	—	—	131	—	—
94	—	—	132	—	—
95	—	—	133	—	—
96	—	—	134	ALTC	Alternator voltage control output
97	—	—	135	ALT	Alternator cut control output
98	—	—	—	—	—

*1:Europe specifications
*2:Immobilizer equipped vehicles
*3:China specifications
*4:General specifications

1-5 LOCATION OF COMPONENTS



Code	Part name	Code	Part name
a	Fuel pump	m*1	Ignition coil
b	Engine control computer	n	Oil control valve
c	Relay block	o	Engine speed sensor
d	Cam angle sensor	p	VSV control for evaporative purge
e	Injector	q	DLC
f	Knock sensor	r	Intake air temperature sensor
g	Front oxygen sensor	s	Combination meter
h	Rear oxygen sensor	t	Fuse block
i	Engine coolant temperature sensor	u*2	A/T ECU
j	Rotary ISC	v*3	Battery current and temperature integrated sensor
k	Throttle position sensor	w*4	Clutch upper switch
l	Manifold absolute pressure sensor	–	–

*1:Ion current detection device built-in for Europe and China specifications
*2:A/T vehicles
*3:Europe specifications
*4:European specification (M/T vehicles mounted with type 3SZ engines)

1-6 HOW TO PROCEED WITH TROUBLE SHOOTING

1-6-1 DESCRIPTION

1. The engine control system is equipped with diagnosis functions that are capable of diagnosing malfunctioning sections. These functions give important clues in troubleshooting.
2. The diagnosis function of this system is equipped with the battery backup (which keeps supplying the power for diagnosis memory even when the IG switch is set to the "LOCK" position).

1-6-2 TROUBLE DIAGNOSIS PROCEDURE

≫1. Bringing－in of malfunctioning vehicles

▼ Go to ≫2.

≫2. Inquiry with the customer

1. Inquire the customer to obtain full information on the condition regarding how the failure occurred, the environment, and the problem.

▼ Go to ≫3.

≫3. CAN COMMUNICATION SYSTEM OPERATION CHECK

1. Check if CAN communication system is functioning normally.
   Refer to Page L2-7.

▼ If it is OK, go to ≫4.
▼ If it is NG, repair CAN communication system.

≫4. Confirmation and recording of the condition of the engine check lamp

1. Confirm and record the condition of how the engine check lamp is turned on when the IG switch is set to "ON" and after the engine is started.

	When the IG switch is set to "ON"	After the engine is started	Judgment
Engine check lamp	Illuminated	Extinguished	a
	Illuminated	Illuminated	b
	Extinguished	Extinguished	c

▼ In the case of a, or b, go to ≫5.
▼ In the case of c, carry out the following luck operations. If there is no problem, replace the combination meter.

(1) Check the harness and the connectors between the battery and combination meter.
(2) Check the harness and the connectors between the combination meter and EFI ECU.
(3) Check the power supply system and the earth system of EFI ECU

≫5. Confirmation and recording of the diagnosis trouble codes

1. Connect the DS-Ⅱ to the vehicle, and confirm and record the diagnosis code and the freeze data.
   Refer to Page B8-15.

▼ Go to ≫6.

≫6. Confirmation of the malfunction phenomenon

1. Confirm the malfunction phenomenon and confirm the condition of the malfunction.

▼ Go to ≫7.

≫7. Erasing diagnosis code

1. Carry out erasing of a diagnosis code.
   Refer to Page B8-15.

▼ Go to ≫8.

∑8. Confirm reproduction of the malfunction phenomenon.

1. Confirm if it is possible to reproduce the malfunction phenomenon.
   ▼ If the malfunction phenomenon could be reproduced, go to ∑9.
   ▼ If the most function phenomenon could not be reproduced, go to ∑10.

∑9. Reconfirmation of the diagnosis code

1. Reconfirm the diagnosis code.
   ▼ If an abnormal code is output, go to ∑11.
   ▼ If a normal code is output, go to ∑10.

∑10. Basic check

1. Perform basic checks.
   Refer to Page B8-25.

   ▼ Go to ∑12.

∑11. Troubleshooting according to diagnosis codes

1. Carry out troubleshooting concerning the diagnosis code being output.
   Refer to Page B8-31.

   ▼ After the repair work is completed, go to ∑13.

∑12. Troubleshooting according to malfunction phenomena

1. Presume the cause of the malfunction phenomenon and carry out the troubleshooting accordingly.
   Refer to Page B8-26.

   ▼ After the repair is completed, go to ∑13.

∑13. Erasing the diagnosis code

1. Erase the diagnosis code.
   Refer to Page B8-15.

   ▼ Go to ∑14.

∑14. Confirmation and recording of the diagnosis code

1. Confirm and record the diagnosis code.
   Refer to Page B8-15.

   ▼ If a normal code is output, go to ∑15.
   ▼ If an abnormal code is output, go back to ∑6 and carry out checking again.

∑15. Confirmation test

1. Confirm if the malfunction phenomenon complained by the customer for a vehicle has been positively solved, and if the vehicle has returned to the normal condition.
   ▼ If it is OK, terminate the work operation.
   ▼ If it is NG, go back to ∑3 and carry out checking once again.

1-6-3 CONNECTING PROCEDURE FOR THE CHECK SUB－HARNESS.

1. When the ECU terminal voltage is measured with the EFI ECU connector connected to the EFI ECU, connect the SST by following the procedure given below.
   NOTE
   - **Each of the terminal number of the SST connector is the same as the ECU connector.**

2. Set the ignition switch to "LOCK". Disconnect the battery ground cable from the negative (－) terminal of the battery with the ignition switch set to "LOCK".
   NOTE
   - **Be sure to record the diagnostic trouble code before disconnecting the negative (－) terminal of the battery cable.**

3. Connect the following SST between the EFI ECU connector and the wire harness connectors.
   SST: 09842-97209-000

4. Reconnect the battery ground cable to the negative (－) terminal of the battery.
   CAUTION
   - **When disconnecting the EFI ECU connectors, be sure to disconnect the negative (－) cable from the battery with the ignition switch and all accessory switches are set to "LOCK".**
   - **When installing a new battery, care must be taken not to mistake the battery polarity. Failure to observe this caution could cause an EFI ECU malfunction.**
   - **Before using the SST, be sure to check to see if short circuit or open wire exists between the terminals of the SST.**

1-7 INQUIRY

1-7-1 DESCRIPTION

1. In your attempt to remove the causes for a malfunction of the vehicle, you will not able to remove the causes unless you actually confirm the malfunctioning phenomenon. No matter how long you continue operations, the vehicle may not resume the normal state unless you confirm the malfunctioning phenomenon. The inquiry with the customer is a vital information collecting activity which is to be conducted previous to the confirmation of malfunctioning phenomenon.
2. The information obtained by the inquiry can be referred to during the troubleshooting. Hence, it is necessary to focus your questions on the items related to the malfunction.
3. Perform troubleshooting using the inquiry sheet on the next page.

1-7-2 DIAGNOSIS BY INTERVIEW SHEET FOR ENGINE CONTROL SYSTEM

[INQUIRY SHEET]

Inquiry sheet					
Name of customer		Vehicle model	Engine - N/A, T/C, S/C, carburetor, EFI, LPG	Transmission - 4M/T, 5M/T, 2WD, 4WD 2A/T, 3A/T, 4A/T	
Details of vehicle	Frame No.	Registration date · ·	Date of malfunction · ·	Running distance km	
	Equipment:				
	[Sex] of customer (driver) Male Female	[Age] Approx.	[Occupation]	[Places where vehicle is mainly used] Urban district/suburb/seacoast/mountain/others	[Parking place] Outdoor/indoor
Symptom	Poor starting	• No initial explosion takes place. • Explosion is incomplete although initial explosion takes place • Hard starting (cold engine, hot engine, always) • No cranking takes place. • Other ( )			
	Faulty idling	• Fast idling ineffective • Idling speed too low • Idling speed too high • Idling unstable (cold engine, hot engine, always) • Other ( )			
	Poor drive-ability	• Hesitation (during start, during acceleration, during deceleration, during a certain period) • Knocking • Backfire • Lack of power • Poor acceleration • Poor blow • Other ( )			
	Engine stall	• During idling (during warming up, after warming up) • At time of starting • During running ( ) • Immediately after vehicle stops (Re-start possible, Re-start impossible) • Under loaded state (Air conditioner, electric load, power steering) • Other ( )			
From when malfunction has started?		• Since vehicle was purchased as a new car • Recently (since what year/ month)			
Frequency of occurrence		• At all times • Under a certain condition ( ) • Sometimes			
Meteorological conditions	Weather	• At all times • Fine • Cloudy • Rain • Snow • Other ( )			
	Temperature	• Temperature (about ˚C) (Spring, summer, autumn, winter)			
Engine condition		• When cold • After warming-up • During warming-up (Water temperature about °C)			
Road		• Urban district • Suburb • Highway • Mountainous road (Uphill, downhill)			
Driving conditions		• No relation • During racing under no load • During running (Vehicle speed: km/h, Engine speed: rpm, MT Which gear?) • During turn (right curve, left curve)			
Other situations					

State of malfunction indicator lamp (MIL)	• Illuminated or flashing at all times • Illuminated or flashing sometimes • Will not go on.	
Indication of DTC • Reading out by using OBD Ⅱ generic scan tool • Reading-out of MIL flashing pattern by shorting terminal T	During checking	• Normal • Malfunction code ( )
	2nd time	• Normal • Malfunction code ( )

L21E3717ES40

1-8 SYMPTOM CONFIRMATION

1-8-1 CONFIRMATION OF THE MALFUNCTION PHENOMENON

1. In carrying out the trouble shooting, the operator cannot find out the cause before actually conforming the malfunctioning phenomenon. For this end, it is imperative to reproduce the malfunction phenomenon by creating conditions and environments similar to the situation where the malfunction took place, based on the information obtained by the diagnosis through inquiries.
2. As for the phenomenon that is difficult to be reproduced, it would be necessary to create the conditions similar to the running conditions under which the malfunction took place (road condition, meteorological condition and running condition), based on the information obtained by the diagnosis through inquiries. For this purpose, it is most important to try to reproduce the phenomenon patiently by applying external factors, such as vibration (moving wire harnesses or relays by hand), heat (applying hot wind) and water (giving humidity).
3. Furthermore, making a speculation on the possible section (part) that might have caused the malfunction and confirmation of the phenomenon by connecting and instruments such as a tester and the like would provide an opportunity at the same time for making judgment of the conformance or nonperformance of the section (part).

1-8-2 RECHECKING OF THE DIAGNOSIS CODE

1. By checking the diagnosis code after the malfunction phenomenon has been confirmed, it can be judged whether the code system that was displayed before the confirmation is still acceptable or not.

   NOTE

   - **With regards to diagnosis codes P0011/73, P0012/73, P0016/75, P0116/42, P0130/21, P0133/21, P0135/23, P0136/22, P0141/24, P0171/25, P0172/26, P0300/17, P0301/17, P0302/17, P0303/17, P0304/17, P0420/27, P0443/76, P0500/52, P0512/54, and P1399/36, if codes have been cleared due to the removal of a fuse or battery, etc., confirm that the diagnosis codes are output after the following procedure is performed; Turn the IG SW to ON→The engine operates→Turn the IG SW to LOCK and wait at least 10 seconds→Turn the IG SW to ON again→The engine operates. Be sure to start and operate the engine again after turning the IG SW to LOCK after engine operation. The malfunction codes will not be detected if these steps are not performed.**

2. If a malfunction should occur during checking and an abnormality code is displayed even after the confirmation has been completed, carry out troubleshooting according to individual codes.
3. When no abnormal code is indicated, although the occurrence of malfunction was observed during the confirmation of reproduction of malfunction, a malfunction other than those related to the diagnosis system is likely taking place. Proceed to the troubleshooting according to malfunctioning phenomena.
4. When no malfunction is observed during the confirmation of reproduction of malfunction, and the normal code is indicated at the check of the DTC, it is presumed that an abnormality, such as poor contacts at the harnesses and connectors, occurred in the past, but now they are functioning properly. Check the harnesses and connectors of those systems that was indicated before the confirmation of reproduction of the malfunctioning phenomenon.

1-9 CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE

1-9-1 OUTLINE

1. When any abnormality code of the diagnosis is indicated, it is necessary to confirm the relationship with the reproduced malfunction phenomenon by ascertaining whether the system malfunction has occurred in the past or it still persists up to the present. To this end, the diagnosis code should be indicated twice, i.e. before and after the confirmation of the phenomenon.

1-9-2 CHECKING METHOD OF DIAGNOSIS (INDICATION BY DS-II)

1. Stop the vehicle.
2. After setting the ignition switch to "LOCK", connect the DS-Ⅱ to DLC.
3. After setting the ignition switch to "ON", use the DS-Ⅱ to read out the diagnosis code.

1-9-3 DIAGNOSIS CODE DISPLAY METHOD(INDICATION BY THE ENGINE CHECK LAMP)

1. Stop the vehicle.
2. Short the terminals EFI－T(12) and E(4) of DLC by using the SST with the ignition switch set to "ON".

CAUTION

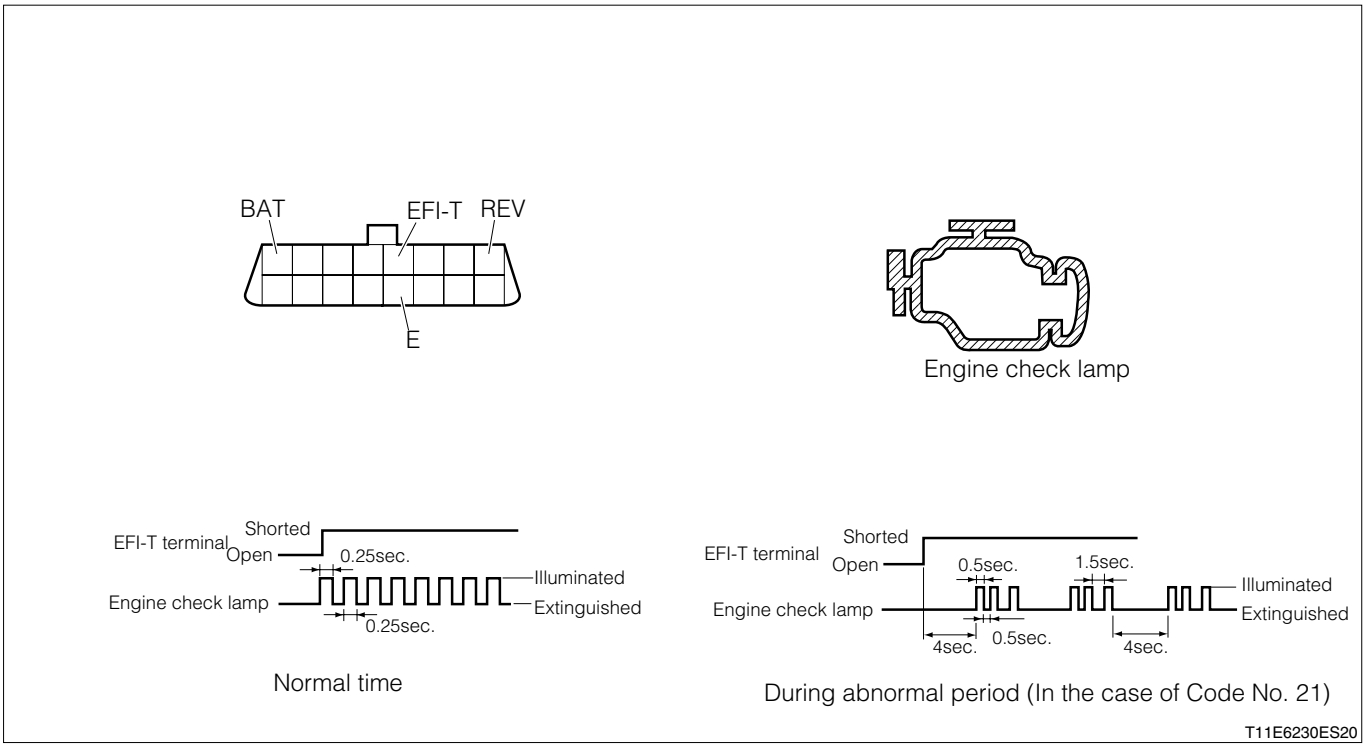
- **To short the terminals of DLC, be sure to use the specified SST.**
- **Be sure to short the correct terminals. If wrong terminals are shorted, it will lead to malfunction.**

SST: 09991-87403-000
09991-87404-000

NOTE

- **If the SST (engine control system inspection wire) is not to be used, carry out the work operation by disconnecting DLC from the bracket. After the work operation is completed, make sure that DLC is positively fastened to the bracket.**

3. The engine check lamp within the combination meter will blink and the diagnosis codes will be indicated.



NOTE

- **All diagnosis codes that are stored in the memory will be displayed repeatedly in the order starting from the smallest number.**

1-9-4 CANCELING METHOD OF DIAGNOSIS (ERASURE BY DS-II)

NOTE

- **After checking and repairing points for which an abnormality code has been emitted, erase the code in the ECU memory, following the procedure given below.**
- **If an abnormally take code cannot be eraced, performed checking and repairing of points where the abnormally codes occurred once again.**
- **When erasure of abnormality codes is carried out, the freeze frame data are also eraced. Check in advance if the erasure is permissible.**

1. Stop the vehicle.
2. After setting the ignition switch to "LOCK", connect the DS-Ⅱ to DLC.
3. After setting the ignition switch to "ON", use the DS-Ⅱ to erase the diagnosis codes.

1-9-5 DIAGNOSIS CODE ERASE METHOD(ERASURE BY DISCONNECTING THE FUSE)

1. Stop the vehicle.
2. Setting ignition switch to "LOCK", disconnect the EFI fuse by pulling it off for 60 seconds or more.
3. All codes stored in the memory can be erased by setting the ignition switch to "LOCK", and by disconnecting the EFI fuse for 60 seconds or more.

CAUTION

- **When disconnecting the backup fuse, output and confirm the diagnosis codes of other systems, and then record it for the sake of the safety.**

NOTE

- **As a rough standard, erasure can be achieved by disconnecting diffuse for approximately 60 seconds. In some cases, however, it may take more time.**
- **Erasure can be also achieved by disconnecting the part supply from the battery, or the backup circuit such as fusible link. The time, however, in this case required for erasure will be longer.**

1-9-6 CONTENTS OF DIAGNOSIS

(1) Table showing the diagnosis codes, the malfunction items, and the malfunction areas, etc.

1. The parameters indicated in the table may vary, depending upon the system types and specifications. This applies to vehicles for all destinations.

For details of the checking of each code, refer to the diagnosis code chart for each code.

Diagnosis code specified by ISO/SAE

DTC No.	Diagnosis items	Contents of diagnosis	The method for evaluating malfunctions	Warning indication
P0010/74	Oil control valve system	When an abnormality has occurred to the oil control valve controlling voltage	1trip	○
P0011/73, P0012/73	VVT control :Advance/delay angle faulty	When abnormalities take place two times consecutively in the valve timing control ·An abnormality in the oil control valve; admission of foreign matters in the oil passage	2 trips	○
P0016/62	Valve chain timing faulty	When deviations between the camshaft position sensor signal and the engine rotation sensor signal are detected 5 times consecutively · Extension of the timing chain	5 trips	–
P0016/75	Valve chain timing faulty	When abnormalities take place two times consecutively in the valve timing control ·Deviation the valve timing	2 trips	○
P0070/46	A/C Outside air temperature sensor	When an abnormality occurs in the signal from the outside air temperature sensor	1 trip	–
P0105/31	Pressure sensor signal	When an abnormality takes place in the signal from the intake manifold absolute pressure sensor ·Malfunction of a sensor, breaking of wire or short-circuiting of a wire in the signal system, etc	1 trip	○
P0110/43	Intake air temperature sensor	When an abnormality takes place in the signal from the intake temperature sensor ·Malfunction of a sensor, breaking of wire or short-circuiting of a wire in the signal system, etc	1 trip	○
P0115/42	Coolant temperature sensor(short,open)	When malfunction takes place in the signal from the coolant temperature sensor ·Malfunction of a sensor, breaking of wire or short-circuiting of a wire in the signal system, etc	1 trip	○
P0116/42*1*2	Coolant temperature circuit range/performance	When malfunction takes place two times consecutively in the signal from the coolant temperature sensor ·Abnormal combustion from the coolant temperature sensor, etc.	2 trip	○
P0120/41	Throttle sensor signal	When abnormality takes place in the signal from the throttle position sensor ·Malfunction of a sensor, breaking of wire or short-circuiting of a wire in the signal system, etc	1 trip	○

*1:Europe specifications
*2:China specifications

DTC No.	Diagnosis items	Contents of diagnosis	The method for evaluating malfunctions	Warning indication
P0130/21	Front oxygen sensor(range,open)	When abnormalities take place two times consecutively in the signal from the front oxygen sensor ·Malfunction of a sensor, breaking of wire or short-circuiting of a wire in the signal system, etc	2 trips	○
P0133/21*1*2	Front oxygen sensor circuit slow response	When abnormalities take place two times consecutively in the signal from the front oxygen sensor ·Malfunction of the sensor, abnormality in the fuel system, etc.	2 trips	○
P0135/23	Front oxygen sensor heater signal	When an abnormality takes place in the signal from the front oxygen sensor heater ·Breaking of wire or short-circuiting of a wire in the front oxygen sensor heater system	1 trip 2 trips*1	○
P0136/22	Rear oxygen sensor(range,open)	When abnormalities take place two times consecutively in the signal from the rear oxygen sensor ·Malfunction of a sensor, breaking of wire or short-circuiting of a wire in the signal system, etc	2 trips	○
P0141/24*1*2	Rear oxygen sensor heater signal	When an abnormality takes place in the signal from the rear oxygen sensor ·Breaking of wire or short-circuiting of a wire in the rear oxygen sensor heater system	2 trips	○
P0171/25	Fuel system (lean faulty)	When the air-to-fuel ratio deviates two times consecutively to the lean side due to abnormality of the fuel trim system ·Abnormal combustion pressure, injector, oxygen sensor abnormal, etc	2 trips	○
P0172/26	Fuel system (rich faulty)	When the air-to-fuel ratio deviates two times consecutively to the rich side due to abnormality of the fuel trim system ·Abnormal combustion pressure, injector, oxygen sensor abnormal, etc	2 trips	○
P0300/17*1*2	Missing	When an abnormality takes place in the signal from the ion current combustion control system	2 trips	During misfire detection, MIL will flash. ○
P0301/17*1*2 P0302/17*1*2 P0303/17*1*2 P0304/17*1*2	Missing (Cylinder #1) Missing (Cylinder #2) Missing (Cylinder #3) Missing (Cylinder #4)			
P0325/18	Vibrating-type knock sensor signal	When abnormality takes place in the signal from the knock sensor ·Malfunction of a sensor, breaking of wire or short-circuiting of a wire in the signal system, etc	1 trip	–
P0335/13	Crank angle sensor signal	When an abnormality takes place in the signal from the engine speed sensor ·Malfunction of a sensor, breaking of wire or short-circuiting of a wire in the signal system, etc	1 trip	○

*1:Europe specifications
*2:China specifications

DTC No.	Diagnosis items	Contents of diagnosis	The method for evaluating malfunctions	Warning indication
P0340/14	Cam angle sensor signal	When malfunction takes place in the signal from the camshaft position sensor ·Malfunction of a sensor, breaking of wire or short-circuiting of a wire in the signal system, etc	1 trip	○
P0350/16*1	Ignition system (Primary)	When the ignition signal is not input consecutively	1 trip	○
P0351/16*1 P0352/16*1 P0353/16*1 P0354/16*1	Ignition system No.1 cylinder (Primary) Ignition system No.2 cylinder (Primary) Ignition system No.3 cylinder (Primary) Ignition system No.4 cylinder (Primary)			
P0420/27*2*3	Catalyst system efficiency below threshold	When, after warming up the engine, and while the vehicle speed is 50km/h, the voltage of the rear oxygen sensor signal is high and a state of slow response continues for 40 seconds or more, and when these abnormal signals are detected twice or more ·Malfunction of the sensor, abnormality in the catalyst, etc.	2 trip	○
P0443/76	Evaporator purge VSV	When malfunction takes place in detection signal of the evaporative emission control system purge control valve ·Open wire or short circuit in evaporative emission control system purge control circuit.	1 trip 2 trips*1	○
P0500/52	Vehicle speed sensor signal system	When an abnormality occurs in the vehicle speed signal input ·Abnormality in the vehicle speed signal system, abnormality in the CAN communication system, etc.	1 trip 2 trips*1	○
P0505/71	ISC valve system	When an abnormality occurs in the detection signal for the ISC valve ·Malfunction of the ISC valve, open circuit or short circuit in the signal circuit, etc.	1 trip	○
P0512/54	Starter signal system	When an abnormality takes place in the signal from the starter ·Breaking of wire or short-circuiting of a wire in the signal system, etc	1 trip 2 trips*1	○
P0515/39*2	Battery temperature sensor signal	When a malfunction occurs in the battery temperature detection signal	1 trip	–

*1:General specifications
*2:Europe specifications
*3:China specifications

DTC No.	Diagnosis items	Contents of diagnosis	The method for evaluating malfunctions	Warning indication
P0535/44	A/C evaporator temperature sensor	When an abnormality takes place in the signal from the evaporator temperature sensor signal ·Malfunction of a sensor, breaking of wire or short-circuiting of a wire in the signal system, etc	1 trip	—
P0560/61*1*2	Abnormal backup system power supply	When an abnormality occurs in the ECU backup power system. ·Open circuits, short circuits, etc. of the backup power supply system.	1 trip	—
P0603/83*3	E2PROM Read/Write	When collation of the collation code in the communication with the immobilizer ECU due to an internal malfunction of the engine control computer system	1 trip	—
P0AC0/38*1	Battery current sensor signal	When a malfunction occurs in the battery current detection signal ·There is an open or short circuit, etc. in the signal system.	1 trip	—

*1:Europe specifications
*2:China specifications
*3:Immobilizer equipped vehicles

NOTE

- **1 trip: 1-time detection mechanism**
- **2 trips: 2-time detection mechanism**
- **MIL: warning lamp**
- **When the "O" mark is displayed in the MIL column, the engine check lamp will light up that diagnosis code number. However, when the "—" mark is displayed, the lamp will not light up that diagnosis code number. Therefore, it is possible to read out the diagnosis code number by using the DS-Ⅱ.**

The diagnosis codes specified by DMC

DTC No.	Diagnosis items	Contents of diagnosis	The method for evaluating malfunctions	Warning indication
P1399/36*1*2	Ion electric current system	When an abnormality takes place in the signal from the ion current combustion control system	2 trips	○
P2226/32*1*2	Atmospheric pressure sensor signal	When the signal from the atmospheric pressure sensor is not output consecutively for a certain length of time after the engine is started	1 trip	○
U0001/88	Communication with CAN	When all communication histories established with the CAN communication configuration ECU are not available ·Breaking of wire in the wiring for CAN communication terminals for EFI ECU	1 trip	○
U0101/82*3	Communication with A/T (Receive)	When communication signals from the A/T ECU cannot be received ·There are open circuits, short circuits, etc. in the wiring between the EFI ECU and the A/T ECU	1 trip	○
U0101/85*3	Communication with A/T (Send)	When communication signals from the A/T ECU cannot be sended ·There are open circuits, short circuits, etc. in the wiring between the EFI ECU and the A/T ECU	1 trip	○
U0121/86*4	Communication with ABS (Receive)	When the communication signal from the VSC actuator cannot be received ·Breaking of wire in the wiring between EFI ECU and VSC actuator	1 trip	○
U0156/87	Communication with Speedo meter (Receive)	When the communication signal from the combination meter cannot be received ·Breaking of wire in the wiring between EFI ECU and the combination meter	1 trip	○
U0164/89*5	Communication with A/C (Receive)	When the communication signals from the automatic air conditioner ECU cannot be received ·There is an open or short circuit, etc. in the wiring between the EFI ECU and the automatic air conditioner ECU.	1 trip	○
U0167/81*6	Communication with Immobilizer system	When a communication error with the immobilizer ECU occurs or when the code collation is mismatched.	1 trip	—

*1:Europe specifications
*2:China specifications
*3:A/T vehicles
*4:VSC equipped vehicles
*5:Automatic air conditioner equipped vehicles
*6:Immobilizer equipped vehicles

NOTE

- **1 trip: 1-time detection mechanism**
- **2 trips: 2-time detection mechanism**
- **MIL: warning lamp**
- **When the "O" mark is displayed in the MIL column, the engine check lamp will light up that diagnosis code number. However, when the "－" mark is displayed, the lamp will not light up that diagnosis code number. Therefore, it is possible to read out the diagnosis code number by using the DS-Ⅱ.**

1-10 FAIL-SAFE FUNCTION

1. When abnormality takes place in the signal from various sensors, or malfunctions take place in the control of the oil control valve for the variable valve timing, conditions such as engine failure, catalyst overheating may result, if the control is continued under such a condition. To prevent this, the fail－safe function uses the values stored in the computer in order to control operations.
   When the malfunction is remedied to the normal condition after an abnormality was detected, the fail－safe control will be released. However, the diagnosis result will be stored in the memory.

Fail-safe specifications

Item	Fail-safe execution conditions	Fail-safe specifications
Camshaft angle sensor system	When an abnormality occurs in the signal from the camshaft angle sensor	· The signal from the camshaft angle sensor is set to a constant value.
Ignition primary system*1	When malfunction takes place in the ignition signal	· Fuel injection is stopped. · The fuel to each cylinder is cut. · Air-to-fuel ratio feedback control is prohibited. · The target displacement angle is kept constant.
Knock sensor system	When abnormality takes place in the signal from the knock sensor circuit	·The ignition timing is retarded.
Rear oxygen sensor system*2	When malfunction takes place in the signal from the rear oxygen sensor	·The feedback control is turned to open control.
Manifold absolute pressure sensor signal system	When abnormality takes place in the signal from the manifold absolute pressure sensor	·The manifold absolute pressure is estimated by the throttle opening angle and the engine revolution speed. ·When abnormality occurs in the signal from the throttle position sensor, the signal from the manifold absolute pressure sensor is set to the constant value. ·If both the throttle opening angle and engine speed exceed their set values, the fuel is cut.
Throttle position sensor signal system	When malfunction takes place in the signal from the throttle position sensor	·The signal from the throttle position sensor is set to a constant value.
Water temperature sensor signal system	When malfunction takes place in the signal from the water temperature sensor	·The signal from the water temperature sensor is set to a constant value.
Intake air temperature sensor signal system	When malfunction takes place in the signal from the intake air temperature sensor	·The signal from the intake air temperature sensor is set to a constant value.
Air conditioner evaporator temperature sensor signal system	When malfunction takes place in the signal from the A/C evaporator temperature sensor	·The air conditioner will be cut.
Variable valve timing system	When an abnormality occurs in the valve timing control twice in a row	· The variable valve timing is set to the most retarded timing angle.
Rotary ISC system	When an abnormal signal occurs in the for ISC	·Cut off the energizing control for ISC.
Oil control valve system	When malfunction takes place in the control voltage for the oil control valve	·Prohibit the oil control valve energizing control.

*1:General specifications

*2:Rear oxygen sensor equipped vehicles

Item	Fail-safe execution conditions	Fail-specifications
Ion current control system*1*2	When an abnormality occurs in the ion current detection signal	· Ignition timing retarding control using ion current control is prohibited.
Battery current sensor signal system*1	When an abnormality occurs in the signal from the integrated battery current and temperature sensor	· Alternator electricity generation control is prohibited.
Battery temperature sensor signal system*1	When an abnormality occurs in the signal from the integrated battery current and temperature sensor	· Alternator electricity generation control is prohibited.
Starter relay drive output system	When an abnormality occurs in the starter relay output circuit or starter relay output monitor circuit	· Starter relay control is prohibited. · Fuel cut control is implemented. (When the engine revolution speed is 3500 rpm or more) · Prohibition of fuel injection at moment when vehicle starts moving
Communication with Immobilizer *3	When abnormality occur in the wring and reading-out of the rolling codes into/from the immobilizer ECU during immobilizer communication. When the rolling codes can not be exchanged between the EFI ECU and immobilizer ECU or rolling codes are not mached.	· Prohibition of fuel injection and ignition.
CAN communication system	When an abnormality occurs in the CAN communication system	· The values used for control are kept constant.

*1:Europe specifications
*2:China specifications
*3:Immobilizer equipped vehicles

1-11 BASIC CHECK

1-11-1 MEASUREMENT OF THE BATTERY VOLTAGE

1. Measure the battery voltage when the engine is stopped.

SPECIFIED VALUE: 10－14V

1-11-2 VISUALLY INSPECT THE CONNECTOR SECTIONS AND CHECK THE CONTACT PRESSURE.

1. After the ignition switch is set to "LOCK", disconnect the negative terminal of the battery.
2. Check the connector of EFI ECU.

1-11-3 POWER SUPPLY CIRCUIT CHECK

1. Disconnect the connector of EFI ECU, and measure the voltage between the connector terminal on the next ECU connection vehicle harness side and the body earth of the vehicle.
   (1) Between the ECU connected vehicle harness side connector 38 (BAT) terminal and the body earth.
   (2) Carry out the measurement between the ECU connection vehicle harness side connector 107 (STSW) terminal and the body earth (with the ignition switch set to "ST").
   (3) Between the ECU connection vehicle harness side connector 120 (IG SW) terminal and body earth (Perform the measurement with the IG SW in the ON position).

SPECIFIED VALUE: Battery voltage

1-11-4 EARTH CIRCUIT CHECK

1. Set the ignition switch to "LOCK" and disconnect the battery negative terminal.
2. Disconnect the connector of EFI ECU, and confirm the continuity between the connector terminal on the next ECU connection vehicle harness side and the body earth of the vehicle.
   (1) Between the ECU connected vehicle harness side connector 20 (E01) terminal and the body earth.
   (2) Between the ECU connected vehicle harness side connector 125 (E1) terminal and the body earth.

SPECIFIED VALUE: Continuity exists

1-11-5 CHECKING THE INJECTOR OPERATION.

1. Use a sound scope or a long screw driver to check the injector's operating sound.

1-11-6 CHECKING THE FUEL PRESSURE (SIMPLE).

1. Start the engine. Pinch the fuel hose with your finger and confirm that the fuel pressure (pulsation) can be felt.

1-11-7 SPARK CHECK

WARNING

- **The inspection will cause sparks to be generated, which is quite dangerous. Make sure no combustible materials are placed in the surrounding area.**

1. Warm up the engine.
2. Set the ignition switch to "LOCK".
3. Remove the fuel pump relay.
4. Start the engine. Keep on running the engine, until the engine stops naturally.
5. Set the ignition switch to "LOCK".

CAUTION

- **The above operation will stop the injection of fuel and prevent damage to the catalyst caused by unburnt gas.**

6. Remove the spark plug. Attach it to the ignition coil and ground the plug.
7. Check if the spark plug generates sparks when cranking is performed.

1-12 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

1-12-1 DESCRIPTION

1. In cases where no malfunction code was detected during the DTC check and malfunction can be still confirmed during the basic check, perform the troubleshooting, referring to the following table.
2. In the trouble shooting according to malfunction phenomena, first arrange in order of the contents of diagnosis through inquiries, basic checks and ECU circuit checks. Next, narrow down possible causes, referring to the table showing possible causes according to malfunction phenomena.

WARNING

- **Driving a vehicle with SST (EFI computer check sub－harness, etc.) being connected might cause an error operation to occur, which is extremely dangerous. Make sure that SST has been disconnected before driving the vehicle.**

NOTE

- **When checking each component, be sure to check the harness and connectors that are connected to the component part concerned.**
- **Two possible causes for no abnormality detected by the diagnosis function even though a malfunction phenomenon has been reproduced can be cited: it is possible that a malfunction has occurred outside the scope of diagnosis code output condition; or that a malfunction has occurred apart from the diagnosis system.**

1-12-2 LIST OF POSSIBLE CAUSES ACCORDING TO MALFUNCTION PHENOMENA

(1) Poor starting characteristics

Malfunction phenomena		Possible causes		
		System	Components	Malfunction mode
No initial ignition produced		Power supply system	EFI ECU power supply circuit	Breaking of wires, short－circuits
			IG switch	No turning "ON"
			Main relay	
			Starter relay	
		Engine earth system	Engine earth*	Breaking of wires, defective earth
		Fuel system	Fuel pump relay	No turning "ON"
			Fuel line, Fuel filter	Clogging
			Injector	No injection, always injection
			Fuel pump	No operation
		Ignition system	Engine fuse*	Fuse meltdown
			Ignition coil	No spark
			Spark plug	
			Ignition timing	Misalignment
		Control system	Engine speed sensor	No "NE signal" output
			Camshaft position sensor	Defective output signal
Initial ignition occurring no complete ignition		Fuel system	Fuel pump relay	No turning "ON"
			Fuel line, Fuel filter	Clogging
			Injector	Leakage, no injection, always injection
			Fuel pump	No operation
		Ignition system	Spark plug	Misfire
		Intake system	Air hose, etc.	Leak
		Control system	Manifold absolute pressure sensor	Deviation in the characteristics, breaking the liars, short－circuiting
			Coolant temperature sensor	
			Engine speed sensor	Output signal defective
			Camshaft position sensor	
			Oil control valve	Defective operation
Difficulty in starting	cold period	Intake system	Throttle body	Defective opening, no opening possible
		Control system	Coolant temperature sensor	Deviation in the characteristics, breaking the liars, short－circuiting
	Hot period	Fuel system	Injector	Leak
		Intake system	Valve for ISC	Defective opening, no opening possible
	At all times	Fuel system	Fuel pump relay	No turning "ON"
			Fuel line, Fuel filter	Clogging
			Injector	Leak
		Ignition system	Spark plug	Smoldering
		Intake system	Valve for ISC	Defective opening
			Air hoses	Leaks

*:If the ignition switch is set to "ON" when the connection between the engine earth (between 125 (E1) connecting earth and the engine block) is defective, the "ENGINE fuse(10A)" may sometimes melt down.

(2) Idling defective

Malfunction phenomena	Possible causes		
	System	Components	Malfunction mode
Fast idle not working	Intake system	Valve for ISC	Defective opening, no opening possible
	Control system	Coolant temperature sensor	Breaking of wires, short－circuits
Idling speed is high	Intake system	Air hose, etc.	Leak
		Throttle body	Closing defective
		Valve for ISC	Always open
	Control system	Manifold absolute pressure sensor	Deviation in the characteristics, breaking the liars, short－circuiting
		Coolant temperature sensor	
		Throttle position sensor	Deviation in the characteristics
		Defogger switch	Always "ON"
		Stop lamp switch	
		Heater blower switch	
Idling speed is low	Intake system	Air hose, etc.	Clogging
		Throttle body	
	Control system	Manifold absolute pressure sensor	Deviation in the characteristics
		Coolant temperature sensor	
		Defogger switch	No turning "ON"
		Stop lamp switch	
		Heater blower switch	
When idling hunting takes place	Intake system	Air hose, etc.	Leak
		Throttle body	
		Valve for ISC	Always open
	Control system	Manifold absolute pressure sensor	Deviation in the characteristics
		Camshaft position sensor	Output signal defective
		Oil control valve	Operation defective
Unstable idling	Fuel system	Injector	Leakage, no injection
		Fuel pump	Operation defective
	Intake system	Throttle body	Sucking in
	Ignition system	Ignition coil	Poor contacting
		Spark plug	Misfire
	Control system	Manifold absolute pressure sensor	Defective operation, defective contact
		Oxygen sensor	

(3) Engine stalled

Malfunction phenomena	Possible causes		
	System	Components	Malfunction mode
After starting the engine, it stops	Fuel system	Fuel pump relay	No turning "ON"
		Fuel line, Fuel filter	Clogging
		Fuel pump	No operation
	Control system	Coolant temperature sensor	Deviation in the characteristics
		Camshaft position sensor	Output signal defective
		Oil control valve	Operation defective
The engine stalls when pressing on the accelerator	Control system	Manifold absolute pressure sensor	Deviation in the characteristics
		Coolant temperature sensor	
		Camshaft position sensor	Output signal defective
		Oil control valve	Operation defective
The engine stalls when releasing the accelerator	Intake system	Throttle body	Operation defective
	Control system	Manifold absolute pressure sensor	Deviation in the characteristics
Engine stops when the air conditioner is turned on.	Intake system	Valve for ISC	Constantly closed
Engine stops, but can be restarted.	Power supply system	EFI ECU power supply circuit	Poor contacting
		IG switch	
		Main relay	
	Intake system	Valve for ISC	Constantly closed
	Ignition system	Ignition coil	Poor contacting
	Control system	Manifold absolute pressure sensor	Poor contacting
		Engine speed sensor	
The engine stalls when the vehicle starts moving	Control system	Clutch upper switch*	Always "ON"

*:M/T vehicles

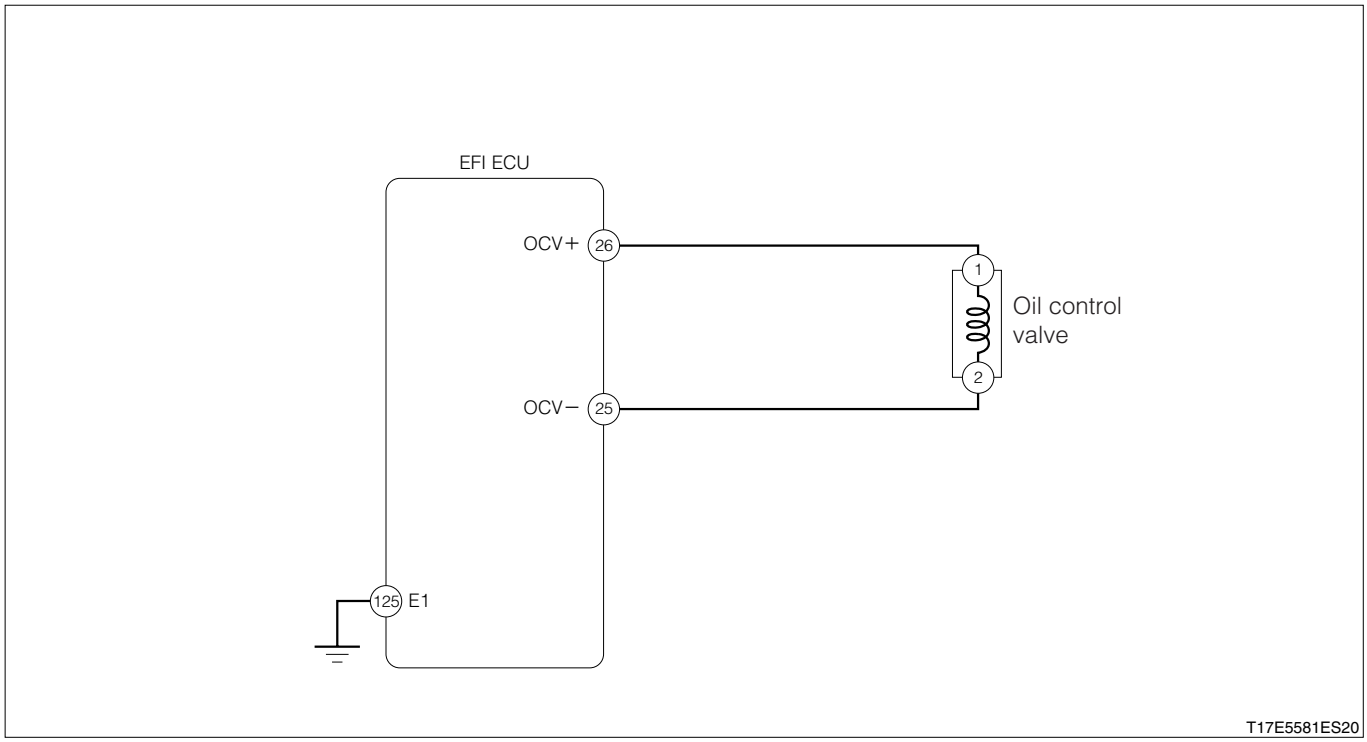
(4) Defective running

Malfunction phenomena	Possible causes		
	System	Components	Malfunction mode
Takes a pause when accelerating.	Fuel system	Fuel line, Fuel filter	Clogging
		Injector	Declining of the flow rate
		Fuel pump	
	Ignition system	Ignition coil	Missing ignition
		Spark plug	Misfire
		Ignition timing	Misalignment
	Control system	Manifold absolute pressure sensor	Deviation in the characteristics, breaking of wire, short－circuiting
		Coolant temperature sensor	
		Throttle position sensor	
		Knock sensor	Breaking of wires, short－circuits
Back fire After fire	Fuel system	Injector	Declining of the flow rate
	Ignition system	Ignition coil	Poor contacting
		Spark plug	Misfire
		Ignition timing	Misalignment
	Control system	Manifold absolute pressure sensor	Operation defective
		Intake air temperature sensor	Deviation in the characteristics
		Coolant temperature sensor	
		Camshaft position sensor	Output signal defective
		Oil control valve	Operation defective
Engine output insufficient	Fuel system	Fuel line, Fuel filter	Fuel pressure not increased
		Injector	Declining of the flow rate
		Fuel pump	Fuel pressure not increased
	Ignition system	Spark plug	Misfire
	Control system	Manifold absolute pressure sensor	Deviation in the characteristics, breaking of wire, short－circuiting
		Intake air temperature sensor	
		Coolant temperature sensor	
		Throttle position sensor	Deviation in the characteristics
		Camshaft position sensor	Output signal defective
		Oil control valve	Operation defective
Black smoke emitted	Fuel system	Injector	Always injection
	Control system	Manifold absolute pressure sensor	Deviation in the characteristics, breaking of wire, short－circuiting
		Intake air temperature sensor	Deviation in the characteristics
		Coolant temperature sensor	
		Throttle position sensor	
Hunting carried out during running	Fuel system	Fuel line, Fuel filter	Clogging
		Injector	Operation defective
	Ignition system	Ignition coil	Poor contacting
	Control system	Throttle position sensor	Deviation in the characteristics
		Camshaft position sensor	Output signal defective
		Oil control valve	Operation defective
Abnormal knocking takes place	Control system	Manifold absolute pressure sensor	Deviation in the characteristics, breaking of wire, short－circuiting
		Throttle position sensor	Deviation in the characteristics
		Knock sensor	Deviation in the characteristics, breaking of wire, short－circuiting

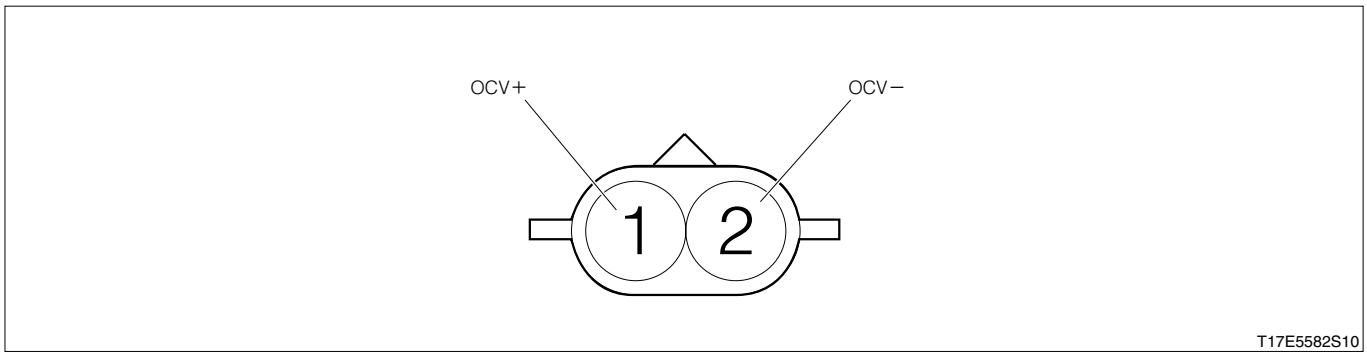
1-13 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

1-13-1 P0010/74 (OIL CONTROL VALVE SYSTEM)

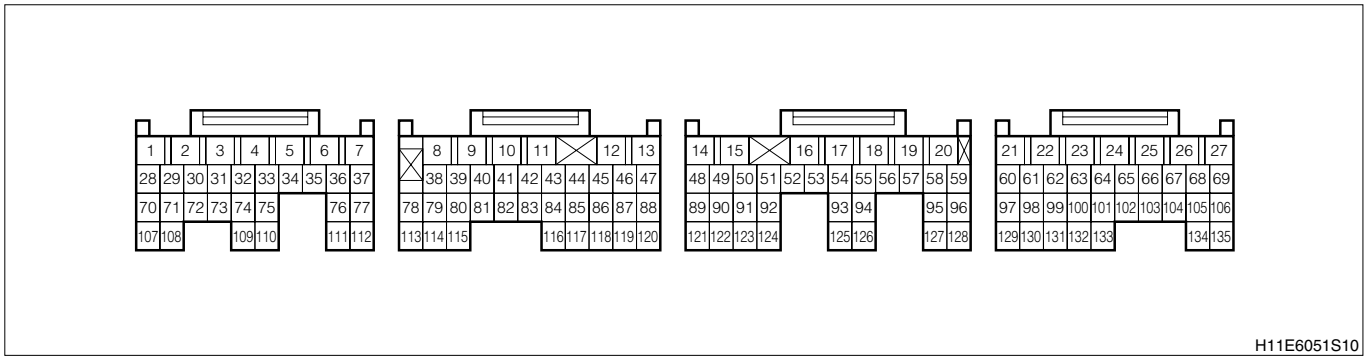
(1) System diagram



Oil control valve connected vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Output conditions

1. When either of the following conditions lasted for a certain length of time or longer with the battery voltage maintained at 12 V or higher
   (1) When the oil control valve voltage is lower than the criterion value with the output duty ratio at 99% or higher
   (2) When the oil control valve voltage is higher than the criterion value with the output duty ratio at 0%

(3) Checking points

1. Is the oil control valve control signal output correctly from EFI ECU?
2. Is the harness between the oil control valve and EFI ECU normal?

(4) Check procedure

∑1. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short－circuiting.
   (1) Between the EFI ECU and the oil control valve
   (2) Between the EFI ECU and body earth

   Refer to Page A1-37.

   SPECIFIED VALUE: Conduction with no short-circuiting

   ▼ If it is OK, go to ∑2.
   ▼ If it is NG, repair the malfunctioning harness and connectors or replace them if necessary, and then go to ∑3.

∑2. Checking the single unit of the oil control valve

1. Carry out the single unit checking of the oil control valve.

   Refer to Page B8-184.

   ▼ If it is OK, go to ∑3.
   ▼ If it is NG, replace the oil control valve, and then go to ∑3.

Refer to TERIOS SERVICE MANUAL

∑3. Confirmation test

1. Erase the diagnosis codes.
2. Start the engine, and drive the vehicle for at least 10 minutes.
3. Turn the IG SW to LOCK, and keep it in that position for at least 10 seconds.
4. Repeat Steps 2 and 3 at least 5 times.
5. After erasing the diagnosis codes, read any codes still output, using the DS-Ⅱ.
6. Check that diagnosis code No. P0010/74 is not output.

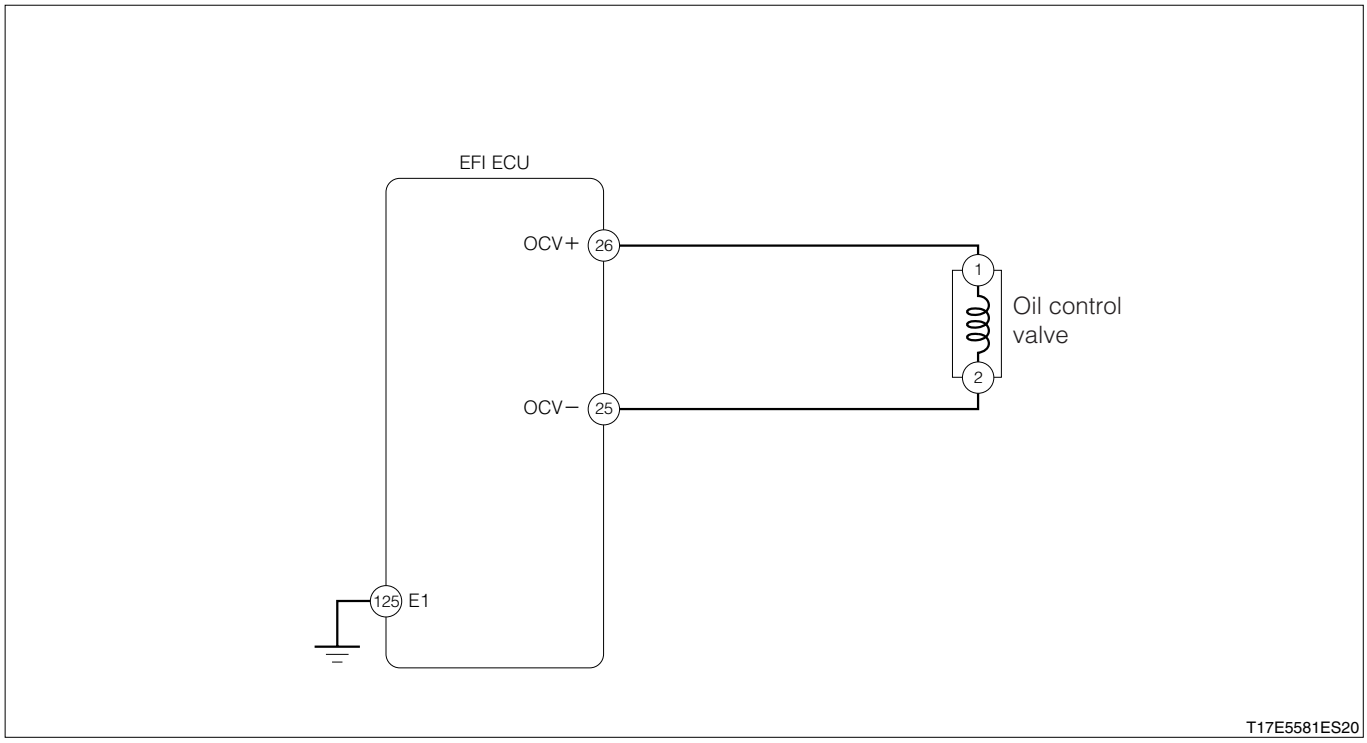
   SPECIFIED VALUE: P0010/74 (Oil control valve control system) is not output.

   ▼ If it is OK, end troubleshooting.
   ▼ If it is NG, replace the EFI ECU.

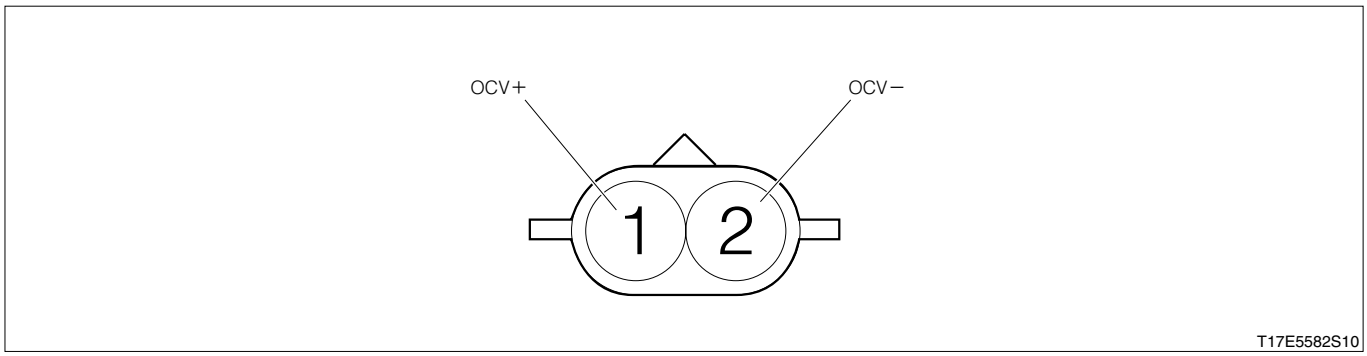
Refer to TERIOS SERVICE MANUAL

1-13-2 P0011/73 (VARIABLE VALVE TIMING CONTROL :ADVANCE ANGLE FAULTY),P0012/73 (VARIABLE VALVE TIMING CONTROL :DELAY ANGLE FAULTY)

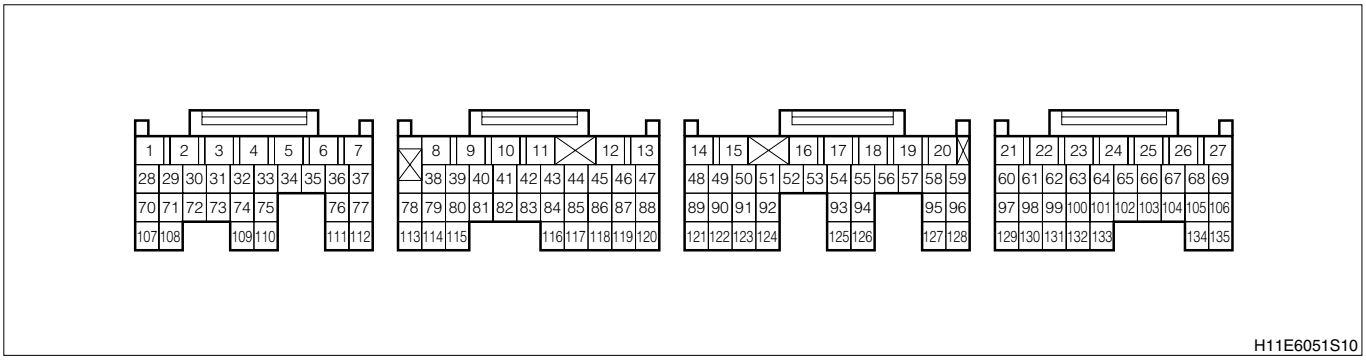
(1) System diagram



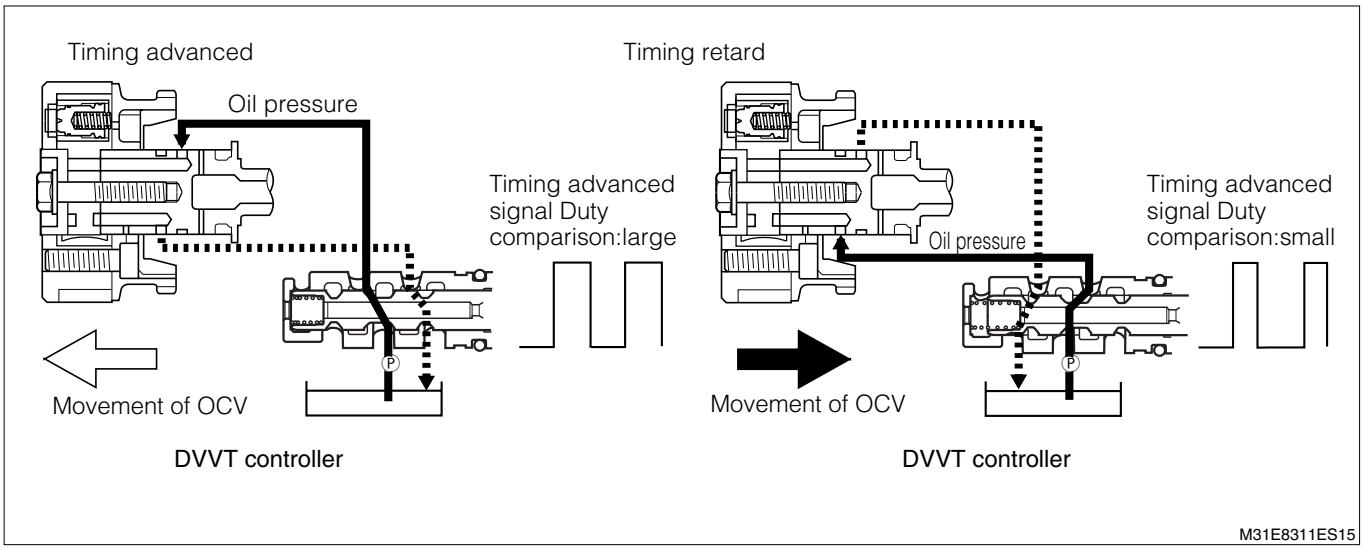
Oil control valve connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Outline of the variable valve timing control operation



(3) output condition

[1] No. P0011/73

1. When advance fail, of the variable valve timing has been depicted

[2] No. P0012/73

1. When retard fail, of the variable valve timing has been depicted

(4) Checking points

1. Is variable valve timing control operating normally?
1. Is there any misalignment in the timing of the valve? (Are the alignment mark in line?)

(5) Checking Method

⊳1. Diagnosis code checking

1. Use DS-Ⅱ to read out the diagnosis code.

SPECIFIED VALUE: P0016/62 (Chain timing faulty), P0016/75 (Valve timing faulty), P0010/74 (Oil control valve system) is not output.

▼ If P0016/62 and P0016/75 are output, perform checks of P0016/62 (Timing chain control system) and P0016/75 (Valve timing control system).

Refer to Page B8-38.

▼ If P0010/74 is output, check P0010/74 (Oil control valve system).

Refer to Page B8-31.

▼ If it is not output, go to ⊳2.

⊳2. Oil control valve operation checking

WARNING

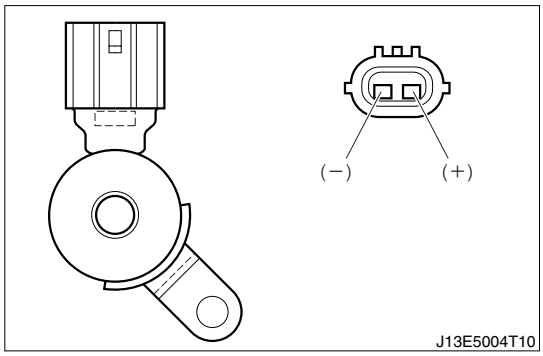
- **The inspection will cause sparks to be generated, which is quite dangerous. Make sure no combustible materials are placed in the surrounding area.**
- **It is an operation to be performed while the engine is running. Pay special attention to the safety while performing the operation.**

2. Disconnect the connector of the oil control valve.
3. Start the engine and keep idling.

4. Connect the positive terminal ⊕ of the battery to the OCV＋ terminal of the oil control valve, and the negative terminal ⊖ of the battery to the OCV－ terminal of the oil control valve.

CAUTION

- **Pay attention not to cause any short－circuiting to occur during work operation. (Connect the plus side via a fuse for the safety sake.)**
- **Make sure that the voltage is not applied for more than one minute.**



5. Confirm the idling condition of the engine.

SPECIFIED VALUE: Rough idling or stalling of the engine occurs.

▼ If it is OK, go to ▷3.

▼ If it is NG, go to ▷4.

∑3. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short－circuiting.
   (1) Between the EFI ECU and the oil control valve
   Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, go to ∑7.
▼ If it is NG, repair the malfunctioning harness and connectors or replace them if necessary, and then go to ∑8.

∑4. Checking the single unit of the oil control valve

1. Carry out the single unit checking of the oil control valve.
   Refer to Page B8-184.

▼ If it is OK, go to ∑5.
▼ If it is NG, replace the oil control valve, and then go to ∑8.

Refer to TERIOS SERVICE MANUAL

∑5. Checking the single unit of the DVVT controller

1. Carry out the single unit checking of the camshaft timing sprocket Ay.

Refer to TERIOS SERVICE MANUAL

▼ If it is OK, go to ∑6.
▼ If it is NG, replace the camshaft timing sprocket Ay, and then go to ∑8.

Refer to TERIOS SERVICE MANUAL

∑6. Oil passage checking

1. Check the passage of the engine oil.
   SPECIFIED VALUE: No clogging

▼ If it is OK, go to ∑7.
▼ If it is NG, repair the malfunctioning section of the oil passage, and then go to ∑8.

∑7. Camshaft gear deviation checking

1. Check the camshaft drive gear and camshaft driven gear for deviation.
   SPECIFIED VALUE: There is no misalignment.

▼ If it is OK, perform a check of the EFI ECU circuit, and then go to ∑8.
Refer to Page A1-39.

▼ If it is NG, reassemble the camshaft, and then go to ∑8.

Refer to TERIOS SERVICE MANUAL

⌦8. Confirmation test

1. Erase the diagnosis codes.
2. Start the engine, and drive the vehicle for at least 10 minutes.
3. Turn the IG SW to LOCK, and keep it in that position for at least 10 seconds.
4. Repeat Steps 2 and 3 at least 5 times.
5. After erasing the diagnosis codes, read any codes still output, using the DS-Ⅱ.
6. Check that diagnosis code No. P0011/73,P0012/73 is not output.

SPECIFIED VALUE: P0011/73 (Variable valve timing control system (Variable valve timing control :Advance angle faulty)) is not output.
P0012/73 (Variable valve timing control system (Variable valve timing control :Delay angle faulty)) is not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

Refer to TERIOS SERVICE MANUAL

1-13-3 P0016/62 (TIMING CHAIN SYSTEM)
P0016/75 (VALVE TIMING SYSTEM)

(1) output condition

[1] No. P0016/62

1. When deviations between the camshaft position sensor and the engine revolution sensor have been detected 5 times consecutively

[2] No. P0016/75

1. When a valve timing abnormality occurs twice in a row

(2) Checking points

1. Is the timing chain extended?
2. Has the timing chain been installed correctly?

(3) Check procedure

Σ1.

1. Check the installation status of the timing chain.

Refer to TERIOS SERVICE MANUAL

SPECIFIED VALUE: The timing chain has been installed correctly.

▼ If it is OK, check the EFI ECU circuit and go to Σ3.
Refer to Page A1-39.

▼ If an abnormality is found, reinstall the timing chain, and then go to Σ3.

Σ2. Confirmation test(1)

1. Erase the diagnosis codes.
2. Start the engine, and drive the vehicle for at least 10 minutes.
3. Turn the IG SW to LOCK, and keep it in that position for at least 10 seconds.
4. Repeat Steps 2 and 3 at least 5 times.
5. After erasing the diagnosis codes, read any codes still output, using the DS-Ⅱ.
6. Check that diagnosis code No. P0016/62,P0016/75 is not output.

SPECIFIED VALUE: P0016/62 (Timing chain system) is not output.
P0016/75 (Valve timing system) is not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the timing chain,and then go to Σ3.

Refer to TERIOS SERVICE MANUAL

Σ3. Confirmation test(2)

1. Erase the diagnosis codes.
2. Start the engine, and drive the vehicle for at least 10 minutes.
3. Turn the IG SW to LOCK, and keep it in that position for at least 10 seconds.
4. Repeat Steps 2 and 3 at least 5 times.
5. After erasing the diagnosis codes, read any codes still output, using the DS-Ⅱ.
6. Check that diagnosis code No. P0016/62,P0016/75 is not output.

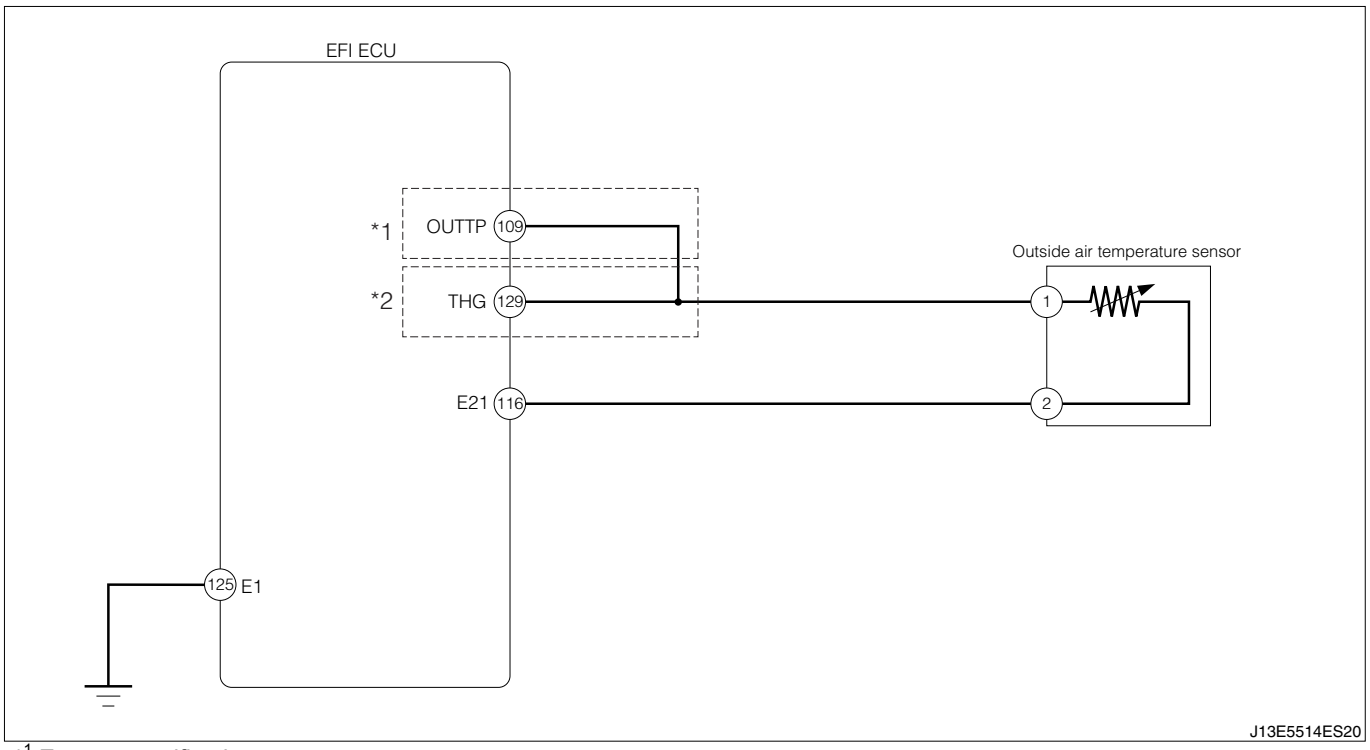
SPECIFIED VALUE: P0016/62 (Timing chain system) is not output.
P0016/75 (Valve timing system) is not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

Refer to TERIOS SERVICE MANUAL

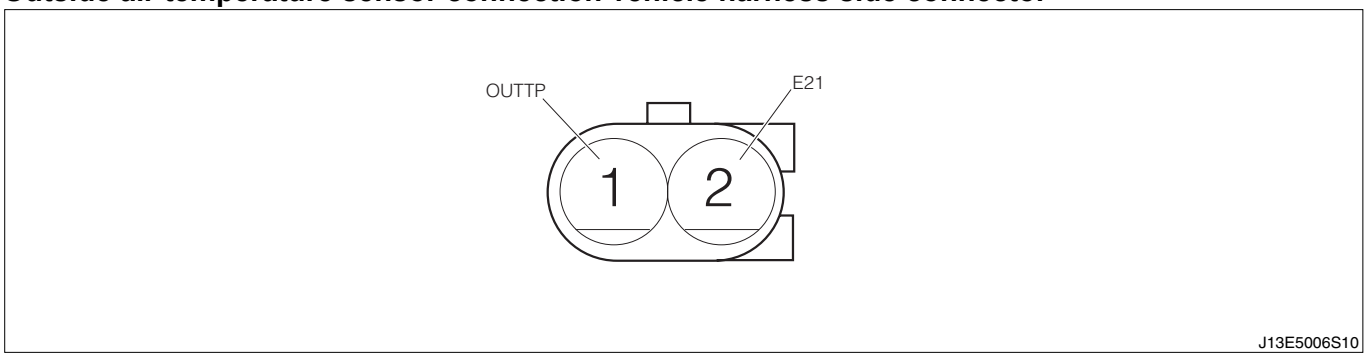
1-13-4 P0070/46 (A/C OUTSIDE AIR TEMPERATURE SENSOR)

(1) System diagram

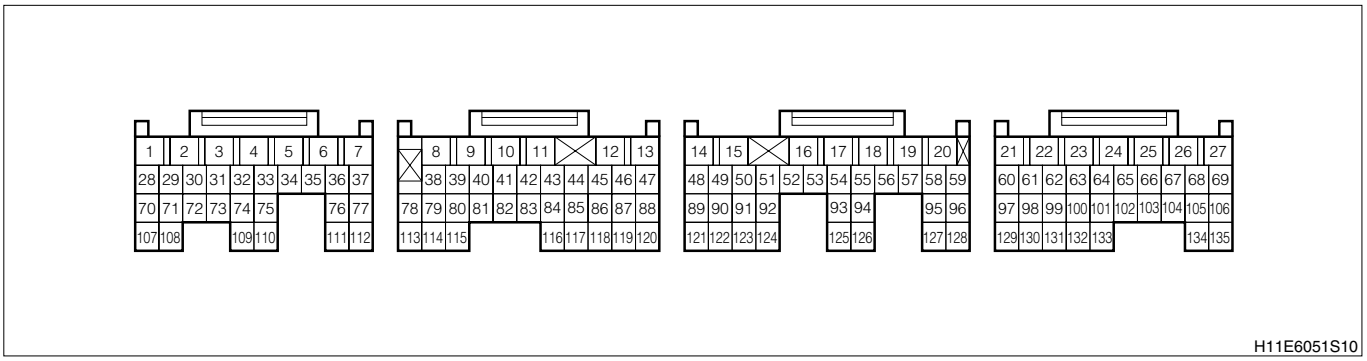


*1:Europe specifications
*2:China and General specifications

Outside air temperature sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Output conditions

1. When signals from the outside air temperature sensor are not output consecutively for a certain length of time after the start of operation

(3) Checking points

1. Does the EFI ECU recognize the output value of the outside air temperature sensor correctly?
2. Is the outside air temperature sensor functioning normally?
3. Are the harnesses, connectors and terminals between the outside air temperature sensor and the EFI ECU functioning normally?
4. Is the EFI ECU functioning normally?

(4) Check procedure

∑1.Unit check of outside air temperature sensor

1. Perform a unit check of the outside air temperature sensor.
   Refer to Page B8-184.

▼ If it is OK, go to ∑2.
▼ If it is NG, replace the outside air temperature sensor, and then go to ∑4.

∑2.Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short－circuiting.
   (1) Between the EFI ECU and the outside air temperature sensor
   (2) Between the EFI ECU and body earth
   Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, go to ∑3.
▼ If it is NG, repair the malfunctioning harness and connectors or replace them if necessary, and then go to ∑4.

∑3.EFI ECU signal check

1. Connect the SST.
   SST: 09842-97209-000

2. With the connectors of the outside air temperature sensor disconnected, turn the IG SW to ON and measure the voltage between the following terminals.
   (1) Between SST 109 (OUTTP) and SST 116 (E21)(Europe specifications)
   (2) Between SST 129 (THG) and SST 116 (E21)(China and General specifications)
   SPECIFIED VALUE: 4.5 V to 5.5 V

▼ If it is OK, perform a check of the connection status of each connector, and then go to ∑4.
▼ If it is NG, perform a check of the EFI ECU circuit, and then go to ∑4.
Refer to Page A1-39.

⊳4.Confirmation test

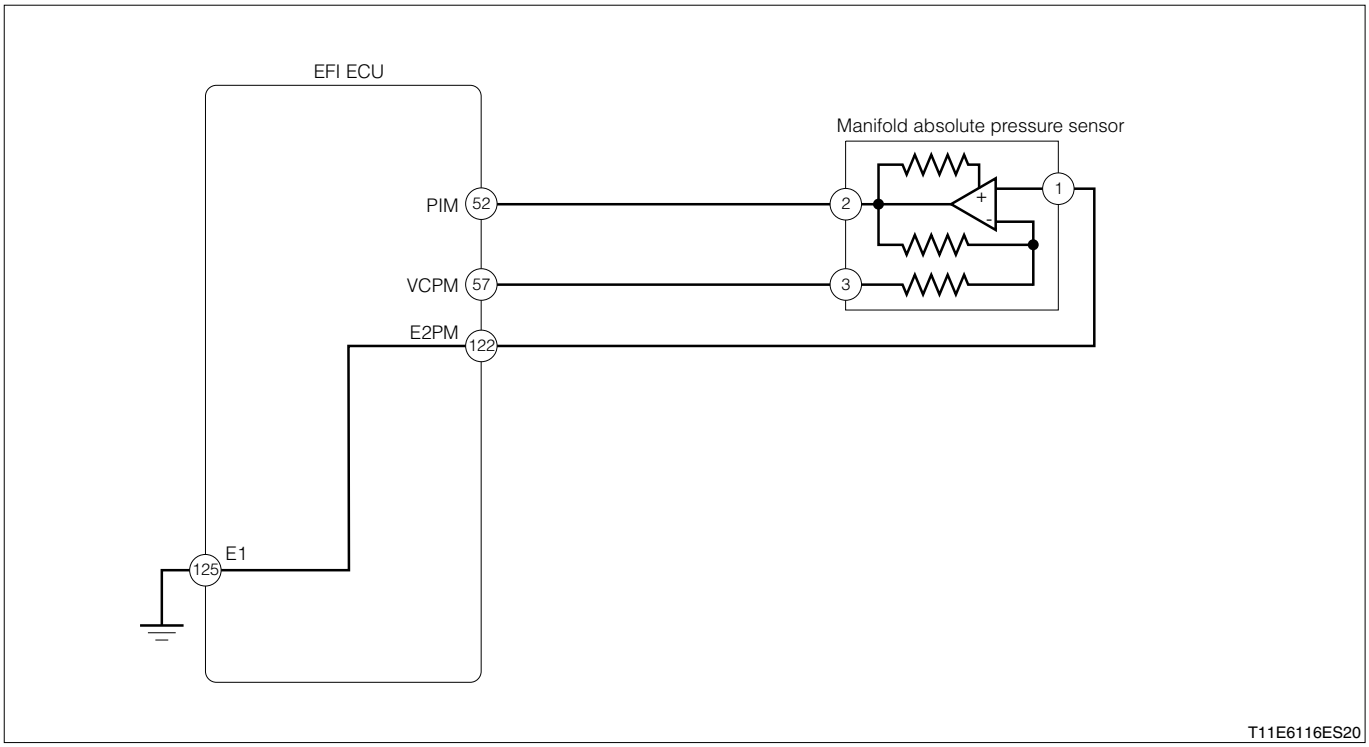
1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Read the diagnosis codes using the DS-Ⅱ.
4. Check that diagnosis code No. P0070/46 is not output.
   SPECIFIED VALUE: P0070/46 (Outside air temperature sensor system) is not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

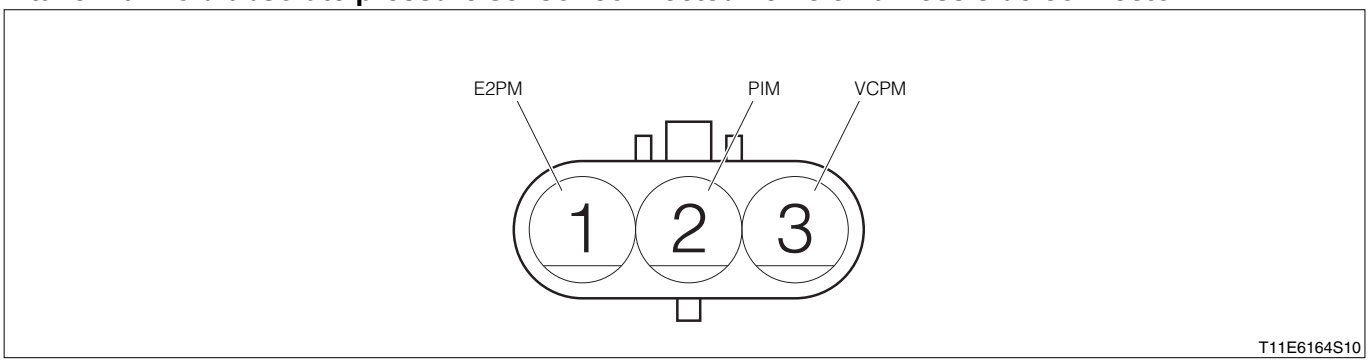
Refer to TERIOS SERVICE MANUAL

1-13-5 P0105/31 (PRESSURE SENSOR SIGNAL)

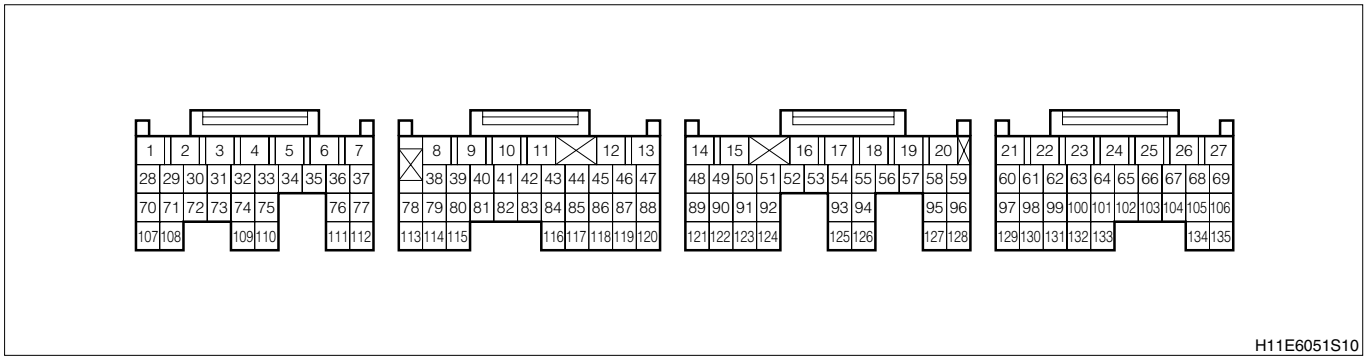
(1) System diagram



Intake manifold absolute pressure sensor connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

1. When the signal from the intake manifold absolute pressure sensor is not output continuously for more than the set period of time

(3) Checking points

1. Is the signal from the intake manifold absolute pressure sensor being input into the EFI ECU?
2. Is the harness between the intake manifold absolute pressure sensor and the EFI ECU normal?
3. Is the power supply voltage of the intake manifold absolute pressure sensor normal?
4. Is the output of the intake manifold absolute pressure sensor correct?

(4) Check procedure

≫1. Data monitor (1)

1. Use DS-Ⅱ to read out the data monitor [Intake manifold absolute pressure] with the IG SW set to "ON" and the engine stopped.
   SPECIFIED VALUE: 70－104 kPa (atmospheric pressure)

   ▼ If it is OK, go to ≫2.
   ▼ If it is NG, go to ≫3.

≫2. Data monitor (2)

1. Use DS-Ⅱ tester to read out the data monitor [intake manifold absolute pressure] with the engine idling.
   SPECIFIED VALUE: 20－40kPa

   ▼ If it is OK, it is possible that the system has returned to the normal condition. Therefore, leave the system as it is to observe the condition for a while.
   ▼ If it is NG, go to ≫3.

≫3. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between the EFI ECU and the manifold absolute pressure sensor
   (2) Between EFI ECU and the body earth
   Refer to Page A1-37.

   SPECIFIED VALUE: Conduction with no short-circuiting

   ▼ If it is OK, go to ≫4.
   ▼ If it is NG, repair the malfunctioning harness and connectors or replace them if necessary, and then go to ≫6.

≫4.Unit check of manifold absolute pressure sensor

1. Perform a unit check of the manifold absolute pressure sensor.
   Refer to Page B8-178.

   ▼ If it is OK, perform a check of the EFI ECU circuit, and then go to ≫5.
   Refer to Page A1-39.

   ▼ If it is NG, replace the intake manifold absolute pressure sensor, and then go to ≫6.

∑5.Data monitor(3)

1. Use DS-Ⅱ to read out the data monitor [Intake manifold absolute pressure] with the IG SW set to "ON" and the engine stopped when disconnecting the connector of intake manifold absolute pressure sensor.
   SPECIFIED VALUE: 255kpa

2. Short-circuit between 2(PIM) and 1(E2PM) of connector of intake manifold absolute sensor connected vehicle harness side when disconnecting the connector of manifold absolute pressure sensor.
   SPECIFIED VALUE: 0kPa

▼ If everything is OK, replace the intake manifold absolute pressure sensor, and then go to ∑6.
Refer to TERIOS SERVICE MANUAL

▼ If one of them is NG, perform a check of the EFI ECU circuit, and then go to ∑6.
Refer to Page A1-39.

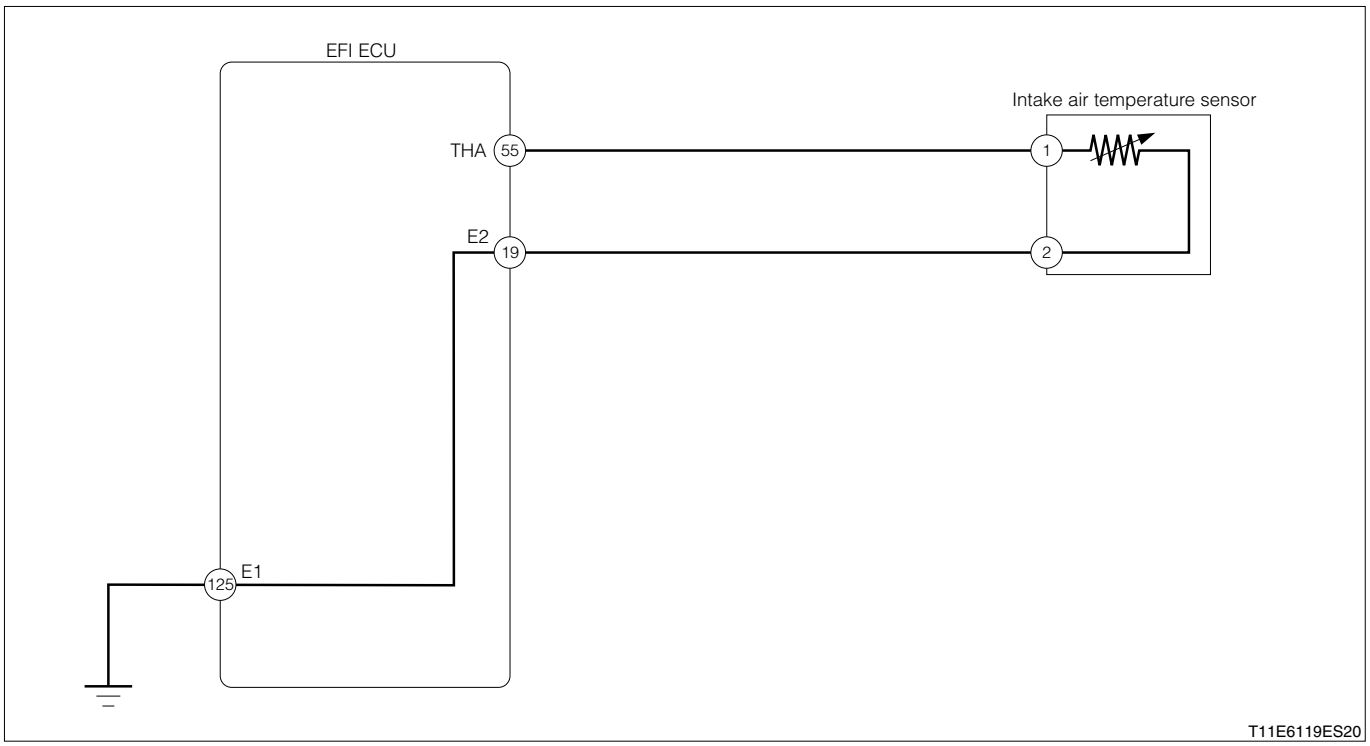
∑6. Confirmation test

1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. After erasing the diagnosis codes, read any codes still output, using the DS-Ⅱ.
4. Check that diagnosis code No. P0105/31 is not output.
   SPECIFIED VALUE: P0105/31 (Intake manifold absolute pressure sensor signal system) is not output.

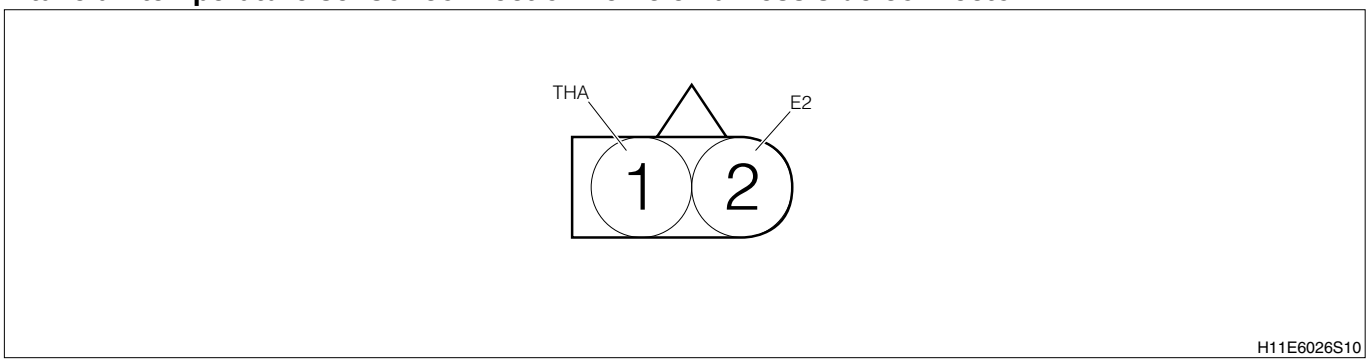
▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.
Refer to TERIOS SERVICE MANUAL

1-13-6 P0110/43 (INTAKE AIR TEMPERATURE SENSOR)

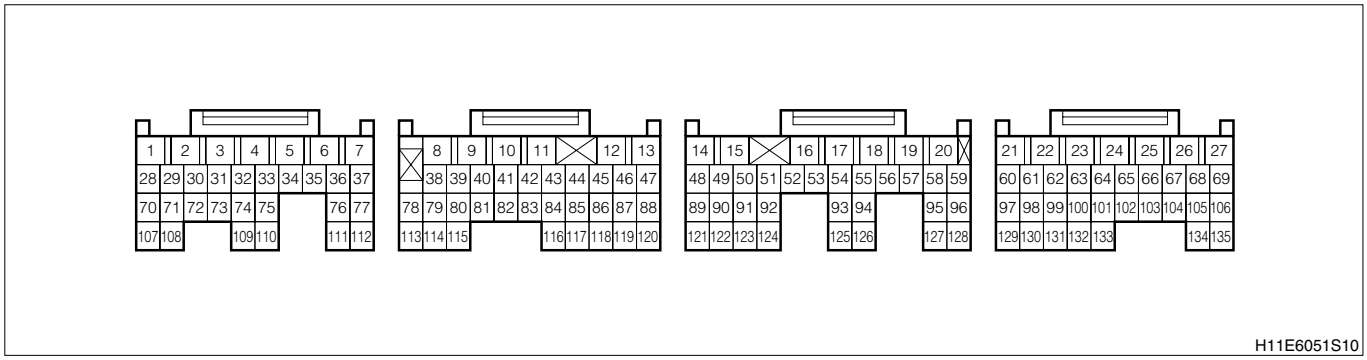
(1) System diagram



Intake air temperature sensor connection vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

1. When the signal from the intake air temperature sensor is not output continuously for more than the set period of time after starting the engine

(3) Checking Points

1. Is the signal from the intake air temperature sensor being input into the EFI ECU?
2. Is the harness between the intake air temperature sensor and the EFI ECU normal?
3. Is the output of the intake air temperature sensor correct?

(4) Check procedure

≫1. Data monitor

1. Use DS-Ⅱ to read out the data monitor [Intake air temperature].
   (1) Intake air temperature (IAT)

	Displayed data	Possible causes of the malfunction
a	No change from −40℃.	Possibility of open circuit in intake air temperature sensor system
b	No change from 140℃.	Possibility of short circuit in intake air temperature sensor system
c	Deviation from the real intake air temperature	Possibility of resistance abnormality in intake air temperature sensor system
d	Equivalent to the real intake air temperature	Possibility of a temporary malfunction

NOTE

- **There are cases where there is a great difference between the outside temperature and the temperature around the intake air temperature sensor at the time of the intake air temperature check, due to the heat that remains in the engine.**
- **The resistance characteristics (reference values) of the intake air temperature sensor are as follows.**

Temperature [℃]	−40	−20	20	80	140
Resistance	(1MΩ or higher) (wire breaking)	16.2±1.6kΩ	2.45±0.24kΩ	0.322±0.032kΩ	(1 Ω or lower) (short-circuiting)

▼ On the basis of the possible causes of malfunction, go to ≫2.

≫2.On-vehicle check of intake air temperature sensor

1. Disconnect the connector of the intake air temperature sensor. Then, measure the resistance between the terminals at an ambient temperature of 20℃.
   (1) Sensor side connector 1 (THA)−2 (E2)

SPECIFIED VALUE:

	resistance value	Possible causes of the malfunction
a	(1MΩ or higher)	Possibility of open circuit in intake air temperature sensor system
b	(1 Ω or lower)	Possibility of short circuit in intake air temperature sensor system
c	Abnormality in the resistance characteristics of the intake air temperature sensor	Possibility of resistance abnormality in the intake air temperature sensor
d	No abnormality in the resistance characteristics of the intake air temperature sensor	The intake air temperature sensor is normal.

▼ In the case of d, go to ≫3.

▼ In the case of a, b, or c, go to ≫5.

∑3. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between the EFI ECU and the intake air temperature sensor
   (2) Between EFI ECU and body earth
   Refer to Page A1-37.

   SPECIFIED VALUE: Conduction with no short-circuiting

   ▼ If it is OK, go to ∑4.
   ▼ If it is NG, repair the malfunctioning harness and connectors or replace them if necessary, and then go to ∑6.

∑4. EFI ECU signal checking

1. Connect the SST.
   SST: 09842-97209-000

2. With the connector of the intake air temperature sensor disconnected, turn the IG switch to ON. Then, measure the voltage between the following terminals.
   (1) Between SST55 (THA) and SST19 (E2)
   SPECIFIED VALUE: 4.5 V－5.5 V

   ▼ If it is OK, perform a check of the connection status of each connector, and then go to ∑6.
   ▼ If it is NG, perform a check of the EFI ECU circuit, and then go to ∑6.
   Refer to Page A1-39.

∑5. Unit check of intake air temperature sensor

1. Perform a unit check of the intake air temperature sensor.
   Refer to Page B8-179.

   ▼ If it is OK, perform a check of the connection status of each connector or the installation status of the intake air temperature sensor, and then go to ∑6.
   ▼ If it is NG, replace the intake air temperature sensor, and then go to ∑6.

Refer to TERIOS SERVICE MANUAL

∑6. Confirmation test

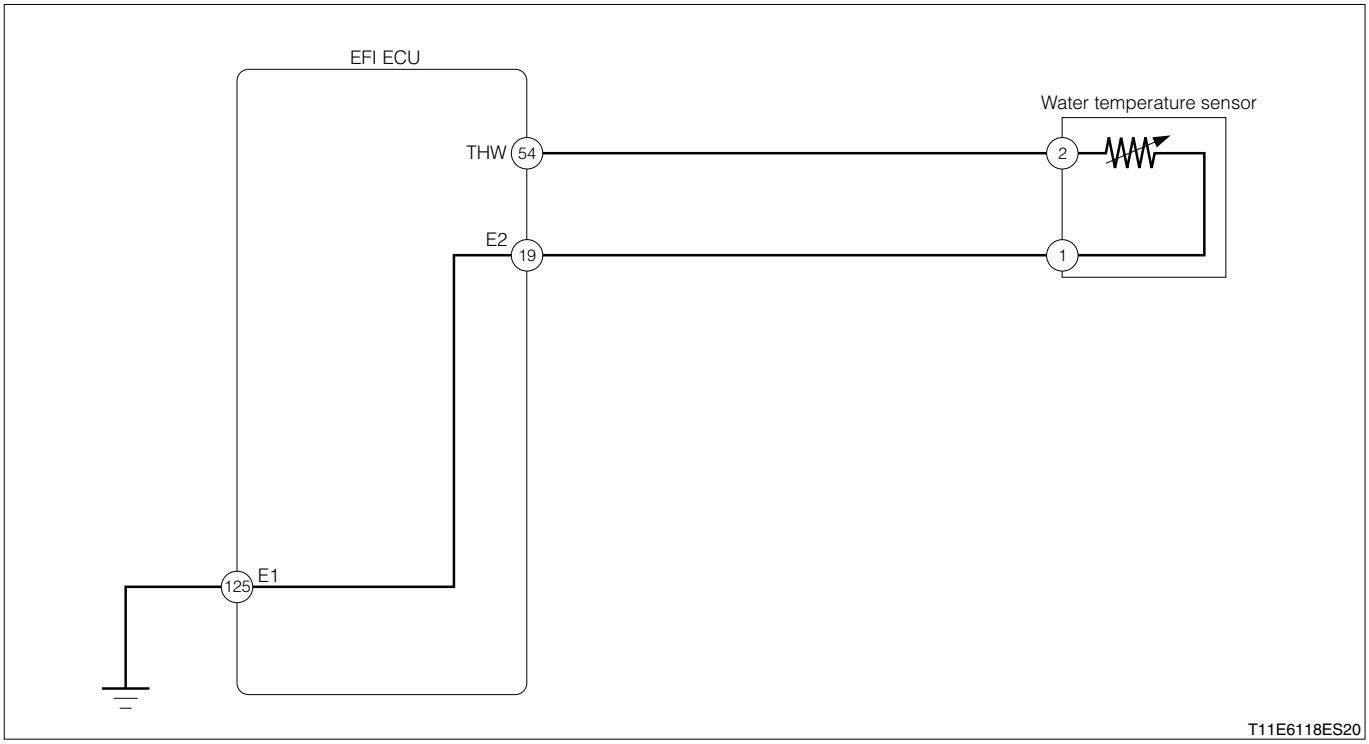
1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. After erasing the diagnosis codes, read any codes still output, using the DS-Ⅱ.
4. Check that diagnosis code No. P0110/43 is not output.
   SPECIFIED VALUE: P0110/43 (Intake air temperature sensor signal system) is not output.

   ▼ If it is OK, end troubleshooting.
   ▼ If it is NG, replace the EFI ECU.

Refer to TERIOS SERVICE MANUAL

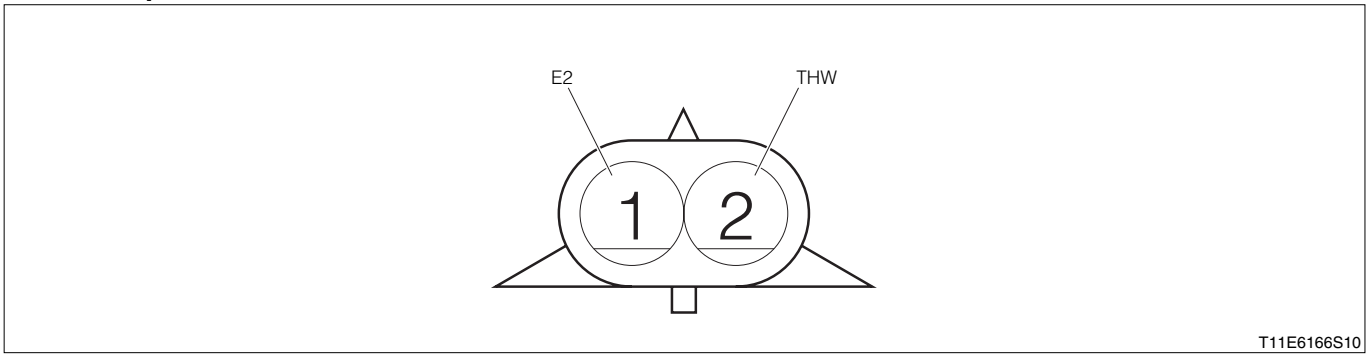
1-13-7 P0115/42 (COOLANT TEMPERATURE SENSOR(SHORT,OPEN))

(1) System diagram



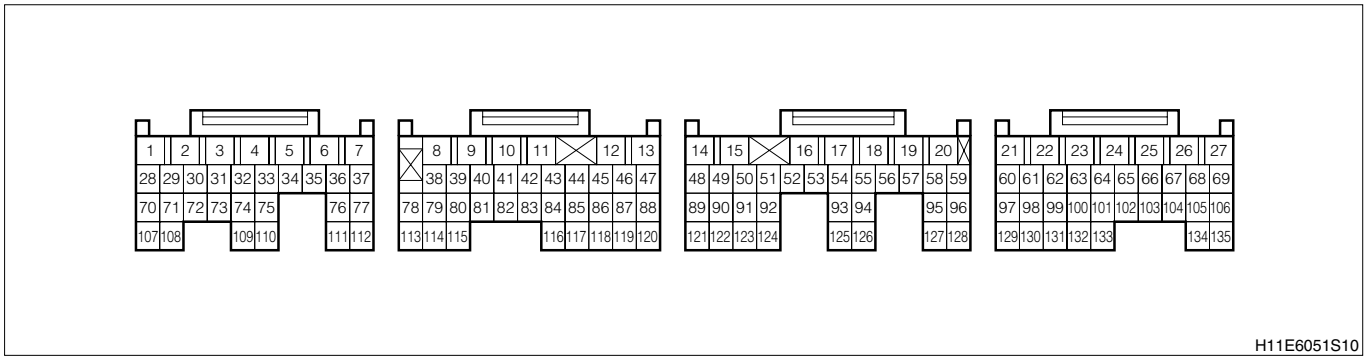
T11E6118ES20

Water temperature sensor connected vehicle harness side connector



T11E6166S10

EFI ECU connected vehicle harness side connector



H11E6051S10

(2) Output conditions

1. When the signal from the water temperature sensor is not output consecutively for a certain length of time after the engine is started

(3) Checking Points

1. Is the signal from the water temperature sensor input to EFI ECU?
2. Is the harness between the water temperature sensor and EFI ECU normal?
3. Is the output from the water temperature sensor correct?

(4) Checking procedure

Σ1. Data monitor

1. Use DS-Ⅱ to read the data monitor [water temperature].
   (1) Water temperature(ECT)

	Displayed data	Possible causes of the malfunction
a	No change from −40℃.	Possibility of wire breaking within the water temperature sensor system.
b	No change from 140℃.	Possibility of short-circuiting within the water temperature sensor system
c	Deviation from the real water temperature	Possibility of abnormality in the resistance value within the water temperature sensor system
d	Equivalent to the real water temperature	Possibility of temporary malfunction

NOTE

- **When confirming the water temperature, it is sometimes possible that a significant difference is produced between the temperature of the radiator and the hose and the surrounding temperature of the water temperature sensor, because of the function of the thermostat.**
- **The resistance characteristics (reference value) of the water temperature sensor are as shown below.**

Temperature[℃]	−40	−20	20	80	110	140
Resistance	(1MΩ or higher) (wire breaking)	$15.04^{+1.29}_{-1.20}$kΩ	$2.45^{+0.14}_{-0.13}$kΩ	0.318±0.008kΩ	0.1417±0.0018kΩ	(1 Ω or lower) (short-circuiting)

▼ On the basis of the possible causes of malfunction, go to Σ2.

Σ2. Water temperature sensor on-vehicle checking

1. Disconnect the connector of the water temperature sensor, and measure the resistance value between the terminals with the water temperature at 20℃.
   (1) Sensor side connector 2 (THW) − 1 (E2)

SPECIFIED VALUE:

	resistance value	Possible causes of the malfunction
a	1 MΩ or higher	Possibility of breaking of wire within the water temperature sensor
b	1 Ω or lower	Possibility of short-circuiting within the water temperature sensor system
c	Abnormality in the resistance characteristics within the water temperature sensor	Possibility of abnormality in the resistance value in the water temperature sensor
d	No abnormality in the resistance characteristics of the water temperature sensor	The water temperature sensor is normal.

▼ In the case of d, go to Σ3.
▼ In the case of a, b, or c, go to Σ5.

∑3. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the water temperature sensor
   (2) Between EFI ECU and body earth
   Refer to Page A1-37.

   SPECIFIED VALUE: Conduction with no short-circuiting

   ▼ If it is "OK", go to ∑4.
   ▼ If it is NG, repair the malfunctioning harness and connectors or replace them if necessary, and then go to ∑6.

∑4. EFI ECU signal checking

1. Connect the SST.
   SST: 09842-97209-000

2. With the connectors for the water temperature sensor disconnected, set the IG SW to "ON" and measure the voltage between the following terminals.
   (1) Between SST54 (THW) and SST19 (E2).
   SPECIFIED VALUE: 4.5 V－5.5 V

   ▼ If it is OK, perform a check of the connection status of each connector, and then go to ∑6.
   ▼ If it is NG, perform a check of the EFI ECU circuit, and then go to ∑6.
   Refer to Page A1-39.

∑5. Single unit checking of the water temperature sensor

1. Carry out single unit checking of the water temperature sensor.
   Refer to Page B8-179.

   ▼ If it is OK, perform a check of the connection status of each connector or the installation status of the water temperature sensor, and then go to ∑6.
   ▼ If it is NG, replace the water temperature sensor, and then go to ∑6.

Refer to TERIOS SERVICE MANUAL

∑6.Confirmation test

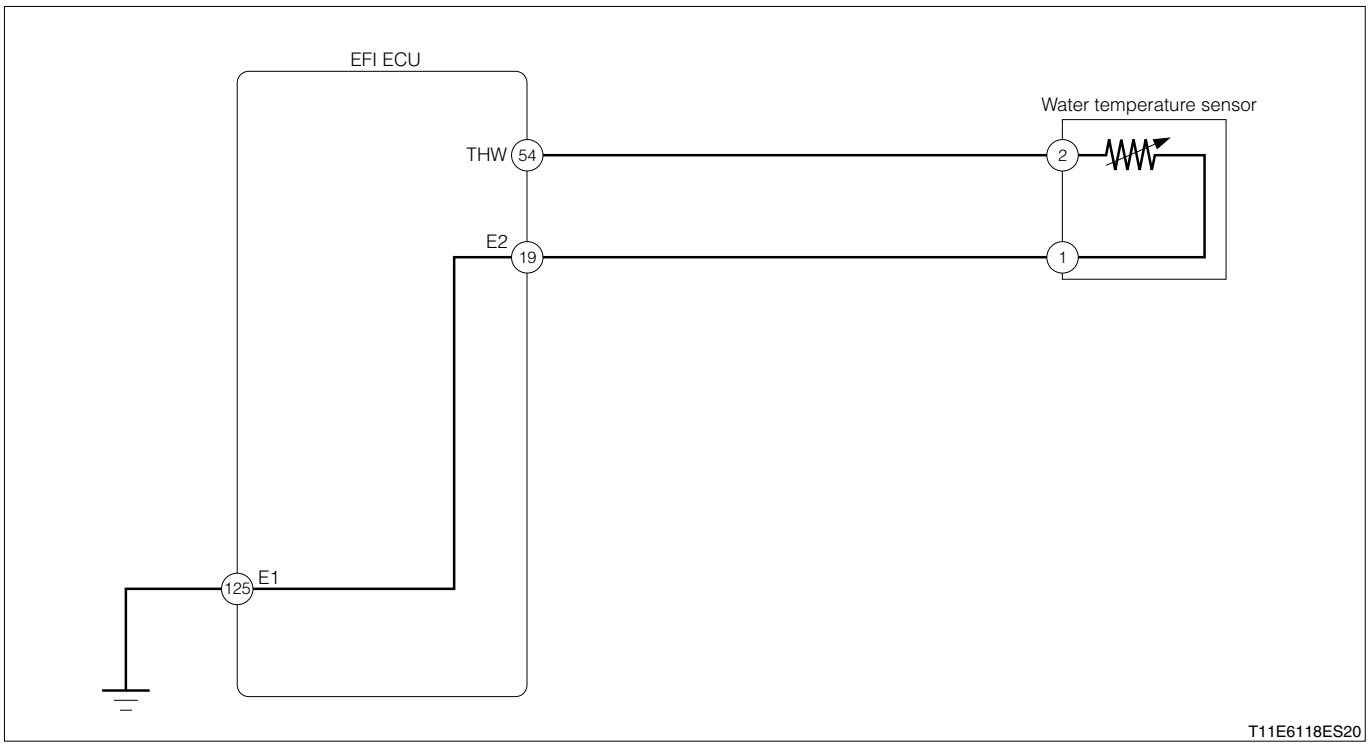
1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. After erasing the diagnosis codes, read any codes still output, using the DS-Ⅱ.
4. Check that diagnosis code No. P0115/42 is not output.
   SPECIFIED VALUE: P0115/42 (Water temperature sensor signal system) is not output.

   ▼ If it is OK, end troubleshooting.
   ▼ If it is NG, replace the EFI ECU.

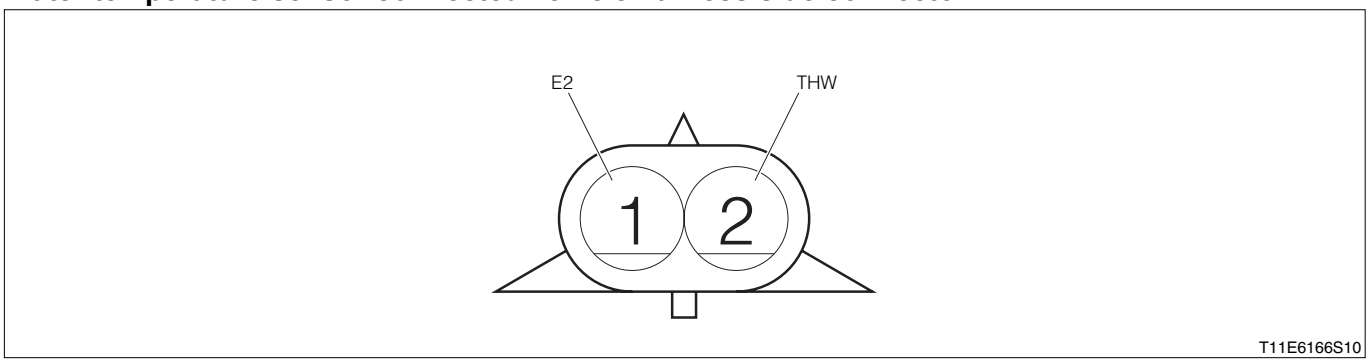
Refer to TERIOS SERVICE MANUAL

1-13-8 P0116/42 (COOLANT TEMPERATURE CIRCUIT RANGE/PERFORMANCE)

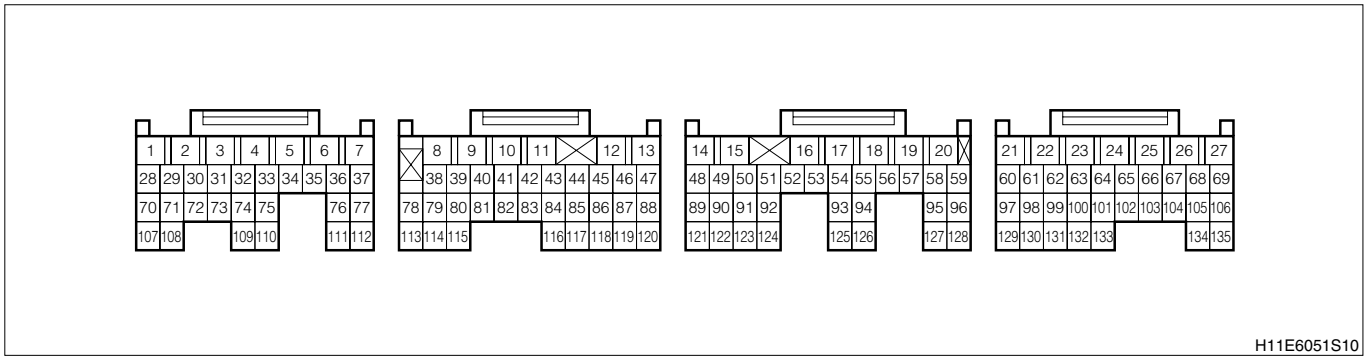
(1) System diagram



Water temperature sensor connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

1. After starthing, the signals from the water temperature sensor is abnormal.

(3) Check procedure

∑>1. Thermostat unit check

1. Remove the thermostat, and perform a unit check on it.

Refer to TERIOS SERVICE MANUAL

▼ If it is OK, go to ∑>2.

▼ If it is NG, replace the thermostat, and then go to ∑>3.

∑>2. Check of cooling device

1. Check the cooling device.

Refer to TERIOS SERVICE MANUAL

▼ If it is OK, replace the water temperature sensor, and then go to ∑>3.

▼ If it is NG, repair the malfunctioning section or replace it if necessary, and then go to ∑>3.

∑>3.Confirmation test

1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. After erasing the diagnosis codes, read any codes still output, using the DS-Ⅱ.
4. Check that diagnosis code No. P0115/42 is not output.

SPECIFIED VALUE: P0116/42 (Water temperature sensor function system) is not output.

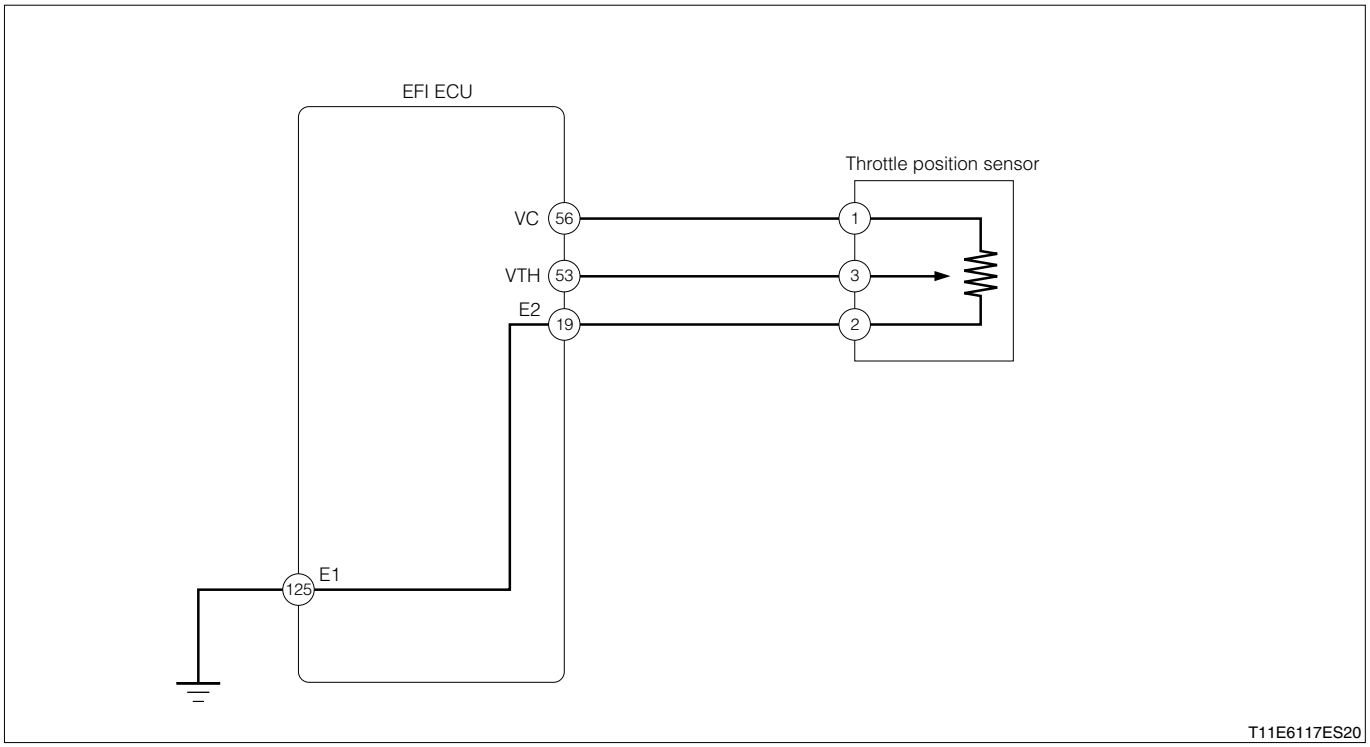
▼ If it is OK, end troubleshooting.

▼ If it is NG, replace the EFI ECU.

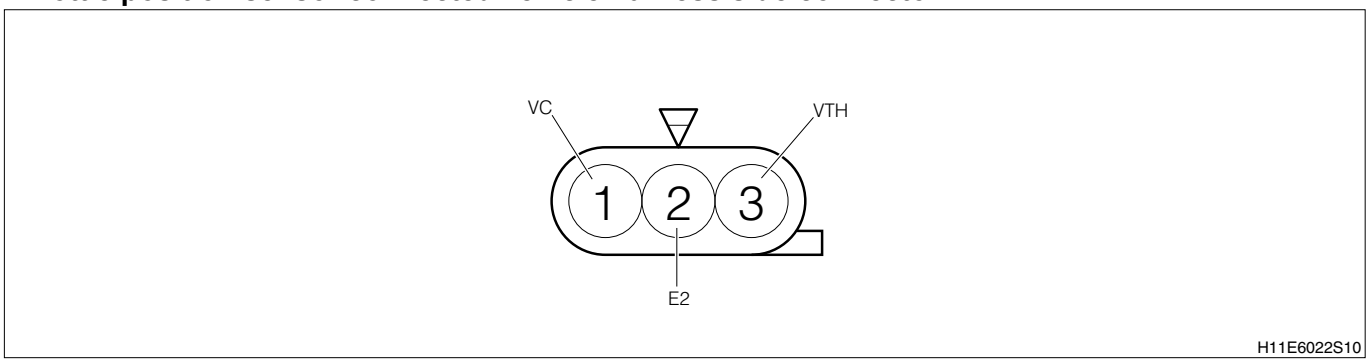
Refer to TERIOS SERVICE MANUAL

1-13-9 P0120/41 (THROTTLE SENSOR SIGNAL)

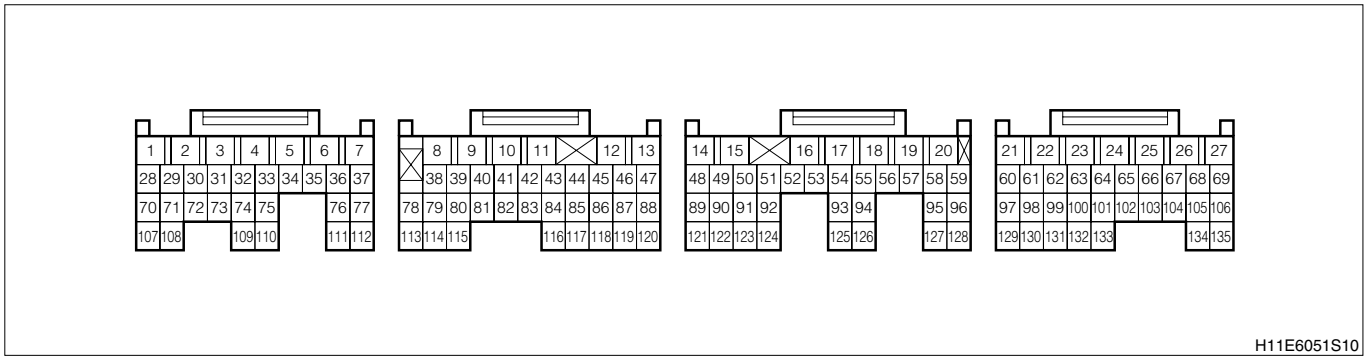
(1) System diagram



Throttle position sensor connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

1. When the signal from the throttle position sensor is not output for a certain length of time consecutively after the engine is started

(3) Checking Points

1. Is the signal from the throttle position sensor input to EFI ECU?
2. Is the harness between the throttle position sensor and EFI ECU normal?
3. Is the power supply voltage at the throttle position sensor normal?
4. Is the output from the throttle position sensor correct?

(4) Check procedure

≫1. Data monitor

1. Use DS-Ⅱ to read the data monitor [Absolute throttle position].

SPECIFIED VALUE:

Condition of the accelerator pedal	Displayed data
Fully closed	10－24%
Fully opened	64－96%
Totally closed ⇄ totally opened	It varies in proportion to the throttle lever opening.

▼ If it is OK, it is possible that the system has returned to the normal condition. Therefore, leave the system as it is to observe the condition for a while.

▼ If it is NG, go to ≫2.

≫2. Checking the signal unit of the throttle position sensor

1. Disconnect the connector of the throttle position sensor, and carry out the single unit checking of the throttle position sensor.
   Refer to Page B8-182.

▼ If it is OK, go to ≫3.

▼ If it is NG, replace the throttle position sensor, and then go to ≫5.

Refer to TERIOS SERVICE MANUAL

≫3. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the throttle position sensor
   (2) Between EFI ECU and body earth
   Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, go to ≫4.

▼ If it is NG, repair the malfunctioning harness and connectors or replace them if necessary, and then go to ≫5.

⊃4. Throttle position sensor voltage checking

1. Disconnect the connector of the throttle position sensor.
2. With the IG SW set to "ON", measure the voltage between the following terminals.
   (1) Between the throttle position sensor connected vehicle harness side connector 1 (VC) and body earth

SPECIFIED VALUE: 4.5 − 5.5V

▼ If it is OK, go to ⊃5.
▼ If it is NG, perform a check of the EFI ECU circuit, and then go to ⊃5.
Refer to Page A1-39.

⊃5. Confirmation test

1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. After erasing the diagnosis codes, read any codes still output, using the DS-Ⅱ.
4. Check that diagnosis code No. P0120/41 is not output.

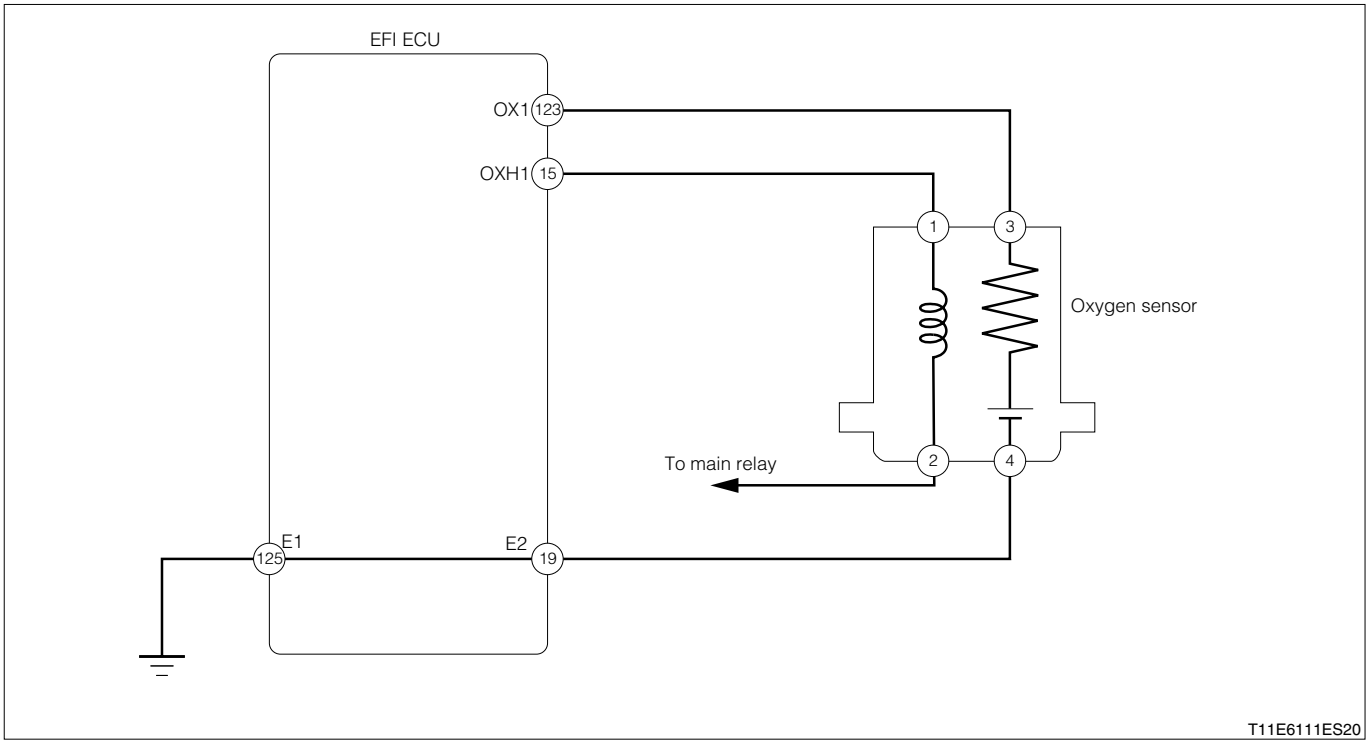
SPECIFIED VALUE: P0120/41 (Throttle sensor signal system) is not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

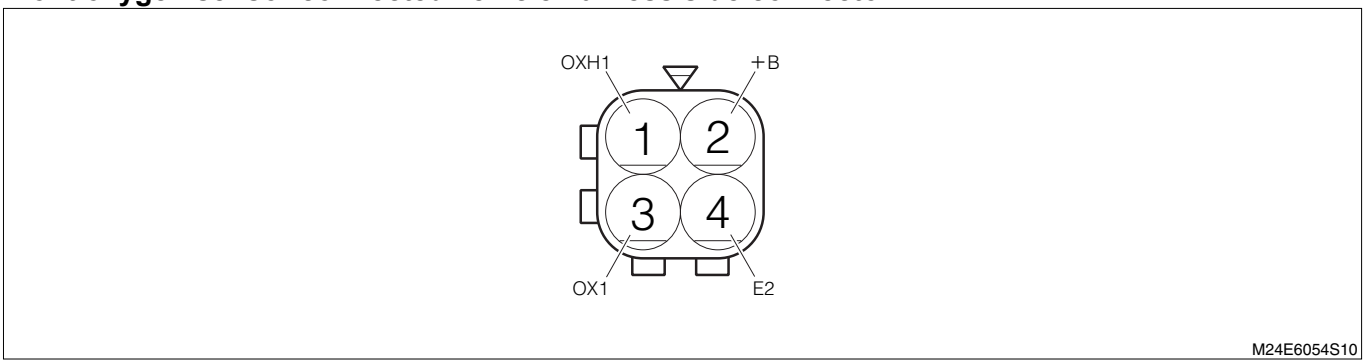
Refer to TERIOS SERVICE MANUAL

1-13-10 P0130/21 (FRONT OXYGEN SENSOR(RANGE,OPEN))

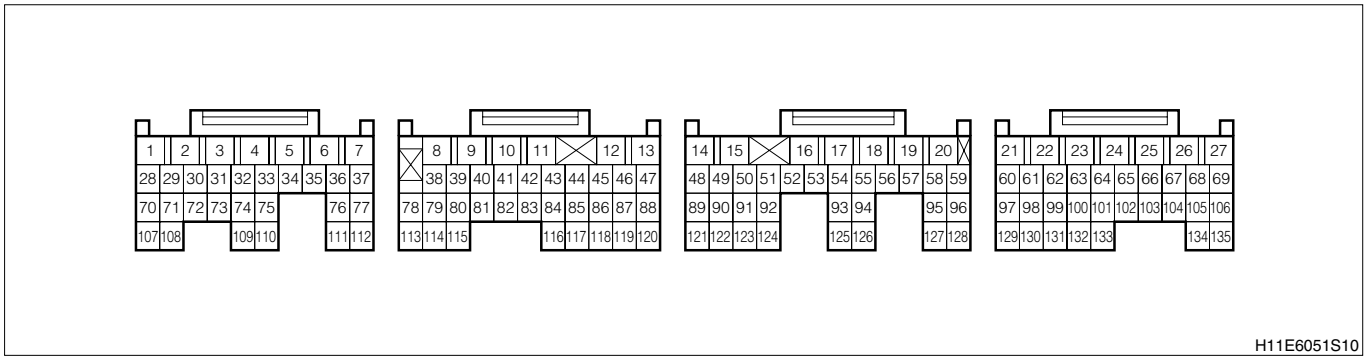
(1) System diagram



Front oxygen sensor connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

1. When the signal from the front oxygen sensor never reaches the rich side under the condition after the engine is warmed up in which the engine speed is maintained at 3000 rpm or higher and at the same time the power increase compensation at a value higher than the specified setting continued

(3) Checking Points

NOTE

- **If this code has been output at the same time with another code, carry out the checking from the other code first.**

1. Is the signal from the front oxygen sensor input to EFI ECU?
2. Is the harness between the front oxygen sensor and EFI ECU normal?
3. Is the output from the front oxygen sensor correct?

NOTE

- **If there is no cause for A/F to remain being lean (the oxygen condensation in the exhaust gas being too high), the front oxygen sensor should be judged as defective.**
- **Use DS-Ⅱ to confirm the output from the front oxygen sensor from the ECU data monitor. If the output voltage of the oxygen sensor is 0.1 V or lower, there is a high possibility for breaking of wire or short-circuiting in the sensor circuit.**

(4) Check procedure

⊵1. Front oxygen sensor feedback control checking

1. Start the engine and keep it running at 3000 rpm for 4 minutes to activate the front oxygen sensor.
2. Use DS-Ⅱ to carry out an active test [Terminal T].
3. Keep the engine speed at 2000 rpm or higher. And then, either press down the brake pedal or turn on the headlight.
4. Check to see if the engine check lamp in the combination meter flashes.

SPECIFIED VALUE: flashes

▼ If it is OK, it is possible that the system has returned to the normal condition. Therefore, go to ⊵6.
▼ If it is NG, go to ⊵2.

⊵2. Front oxygen sensor signal checking

1. Connect the SST.

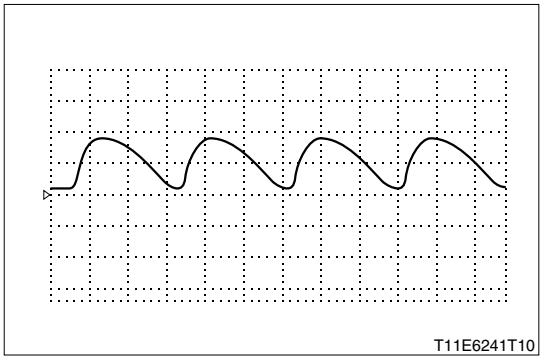
SST: 09842-97209-000

2. Start the engine and keep it running at 3000 rpm for 4 minutes to activate the front oxygen sensor.

3. Check the output between the following terminals by using an oscilloscope.
   (1) Between SST123 (OX1) ~ SST125 (E1)

Time axis	200ms / DIV
Voltage axis	500mV / DIV
Condition	The air conditioner set to "OFF"; no electric load applied; engine speed held at 3000 rpm

The condition under which the air conditioner is turned "OFF": the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".



NOTE
- **While identification of the waveform is not possible, check if the waveform as shown in the diagram (an example) is output.**

4. Check the following points.
   (1) The front oxygen sensor is activated and is outputting a waveform.
   (2) The waveform of 0⇄1 V is output.

NOTE
- **The signal from the front oxygen sensor cannot be checked for the correct output without using an oscilloscope.**

▼ If it is OK, go to ⋗3.
▼ If it is NG, go to ⋗4.

⋗3. Checking the wiring harness (1)

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and DLC
   (2) Between EFI ECU and the combination meter

   Refer to Page A1-37.

   SPECIFIED VALUE: Conduction with no short-circuiting

   ▼ If it is OK, check the EFI ECU circuit and go to ⋗6.
   Refer to Page A1-39.

   ▼ If it is NG, repair or replace the harness and the connectors of the malfunctioning section and go to ⋗6.

⋗4. Checking the single unit of the front oxygen sensor

1. Carry out the single unit checking of the front oxygen sensor.
   Refer to Page B8-180.

   ▼ If it is OK, go to ⋗5.
   ▼ If it is NG, replace the front oxygen sensor and go to ⋗6.

Refer to TERIOS SERVICE MANUAL

∑5. Checking the wiring harness (2)

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the front oxygen sensor
   (2) Between EFI ECU and body earth
   Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

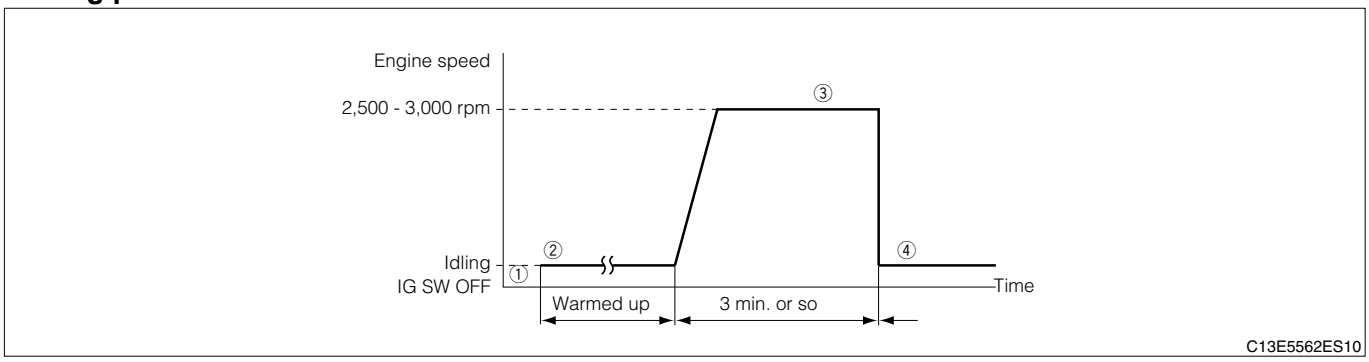
▼ If it is OK, check the EFI ECU circuit and go to ∑6.
Refer to Page A1-39.

▼ If it is NG, repair or replace the harness and the connectors of the malfunctioning section and go to ∑6.

∑6. Confirmation test

1. By observing the following procedure, confirm that the diagnosis code is not output again.

Driving pattern



(1) Erase the diagnosis codes. (① in the illustration)
(2) Check the diagnosis codes, and confirm that no abnormality code is output.(① in the illustration)
(3) Start the engine and warm it up until the radiator fan starts rotating. (② in the illustration)
(4) Maintain the engine speed at 2500－3000 rpm for approximately 3 minutes. (③ in the illustration)
(5) After letting the engine idle for 1 minute, turn the IG SW to LOCK, and keep it in that position for at least 10 seconds. (④ in the illustration)
(6) Repeat Steps (2) to (4).
(7) Confirm that the diagnosis code No. P0130/21 is not output.

NOTE

- **If this test condition cannot be observed faithfully, this malfunction cannot be detected.**

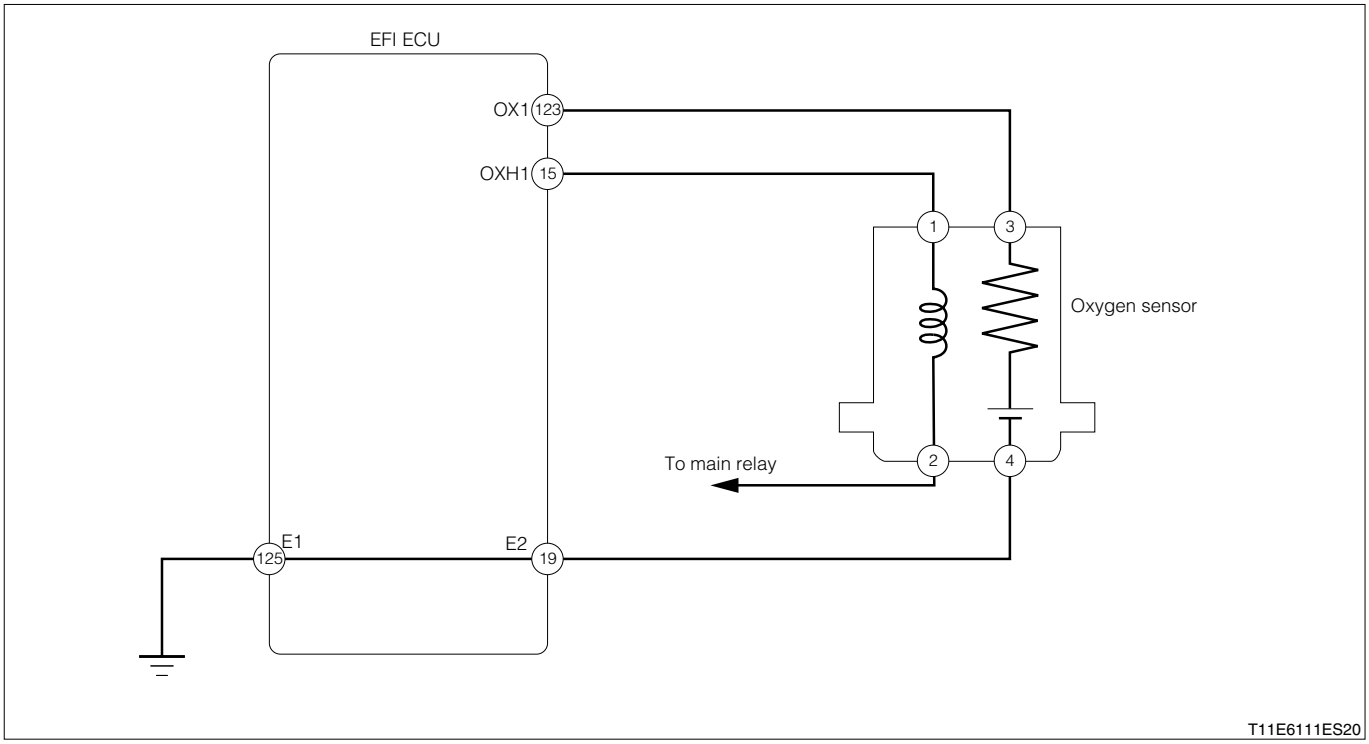
SPECIFIED VALUE: P0130/21 (front oxygen sensor signal system) is not output.

▼ If it is OK, terminate the troubleshooting.
▼ If it is NG, replace the EFI ECU.

Refer to TERIOS SERVICE MANUAL

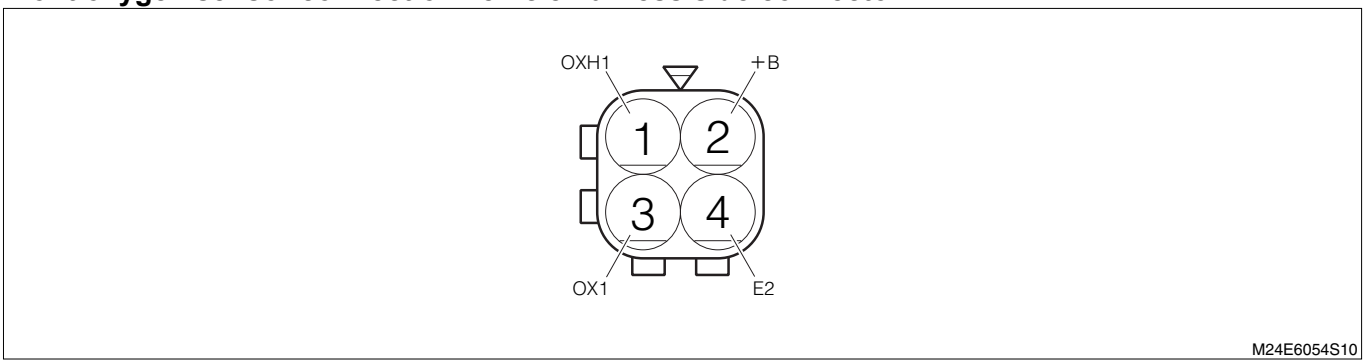
1-13-11 P0133/21 (FRONT OXYGEN SENSOR CIRCUIT SLOW RESPONSE)

(1) System diagram



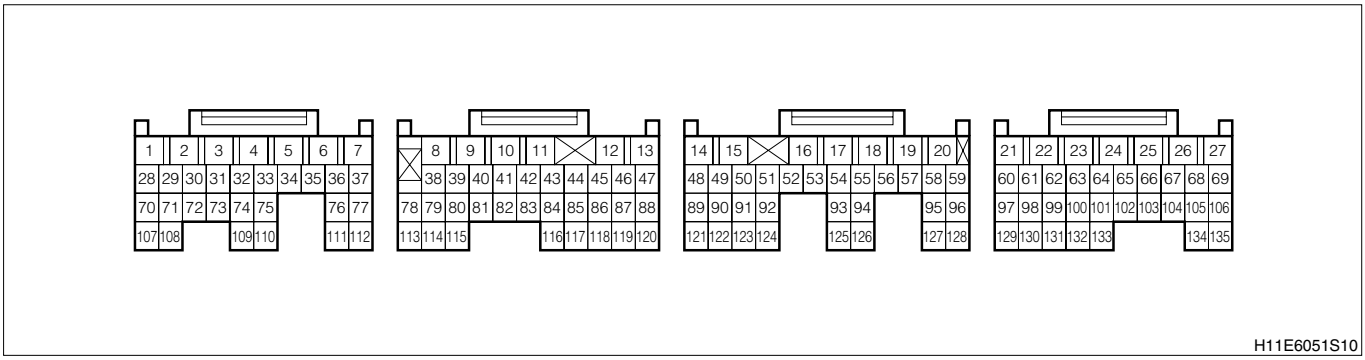
T11E6111ES20

Front oxygen sensor connection vehicle harness side connector



M24E6054S10

EFI ECU connection vehicle harness side connector



H11E6051S10

(2) Output conditions

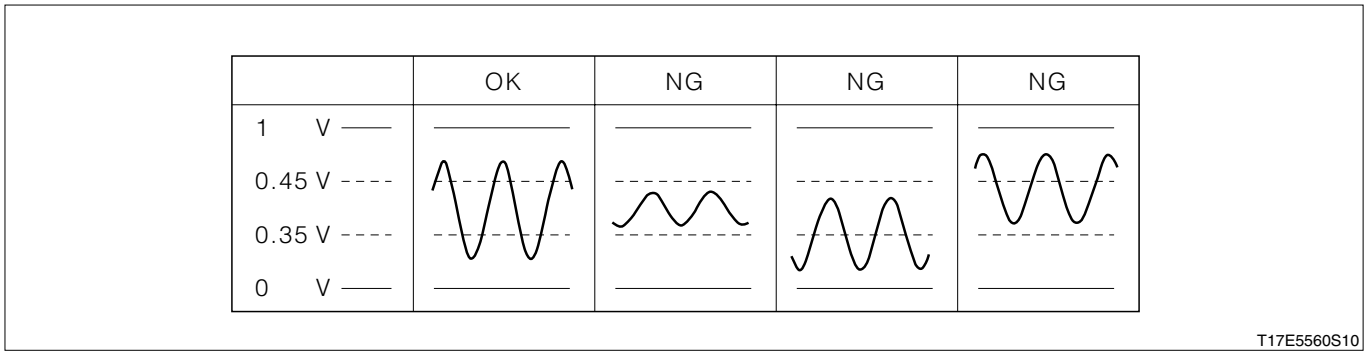
1. When the response time of the front oxygen sensor from rich to lean, or from lean to rich, is more than 1.5 seconds, after warming up the engine

(3) Check procedure

≫1. Data monitor

1. Connect the DS-Ⅱ to the DLC.
2. Warm up the engine at 2500 rpm for about 90 seconds.
3. Check the output voltage of the oxygen sensor during idling.

SPECIFIED VALUE: The voltage changes repeatedly across a range of between 0.35V (or less) and 0.45V (or more). (Refer to the illustration.)



▼ If it is OK, go to ≫10.
▼ If it is not output, go to ≫2.

≫2. Front oxygen sensor unit check

1. Perform a unit check of the oxygen sensor.
   Refer to Page B8-180.

▼ If it is OK, go to ≫3.
▼ If it is NG, replace the front oxygen sensor and go to ≫10.

Refer to TERIOS SERVICE MANUAL

≫3. Check of air intake passage

1. Check the following items.
   (1) Check of engine oil level gauge, oil filler cap, and PCV hose for disconnection
   (2) Check of components of the air induction system between the cylinder head and the throttle body for disconnection, looseness, or cracks.

▼ If it is OK, go to ≫4.
▼ If it is NG, repair or replace the intake air passage and go to ≫10.

≫4. Wire harness check

1. Check the wire harnesses between the parts listed below for open circuits and short circuits.
   (1) Between the EFI ECU and the front oxygen sensor
   (2) Between the EFI ECU and body earth
   Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, go to ≫5.
▼ If it is NG, repair or replace the harnesses or connectors of the defective sections and go to ≫10.

∑5. Check of charcoal canister

1. Check the charcoal canister.

Refer to TERIOS SERVICE MANUAL

▼ If it is OK, go to ∑6.

▼ If it is NG, repair or replace the charcoal canister and go to ∑10.

∑6. FUEL LEAKAGE CHECK

1. Check that there is no fuel leakage.

Refer to TERIOS SERVICE MANUAL

▼ If it is OK, go to ∑7.

▼ If it is NG, repair or replace the fuel system and go to ∑10.

∑7. Injector system check

1. Check the injector system.

Refer to Page B8-165.

▼ If it is OK, go to ∑8.

▼ If it is NG, repair the injector system, and go to ∑11.

∑8. Fuel pressure check

1. Check the fuel pressure.

Refer to Page B8-178.

▼ If it is OK, check the EFI ECU circuit, and go to ∑10.

Refer to Page A1-39.

▼ If it is NG, check or repair the following sections and go to ∑9.

(1) Fuel pump system

(2) Fuel line

∑9. Unit check of spark plugs

1. Perform a unit check of the spark plugs.

Refer to TERIOS SERVICE MANUAL

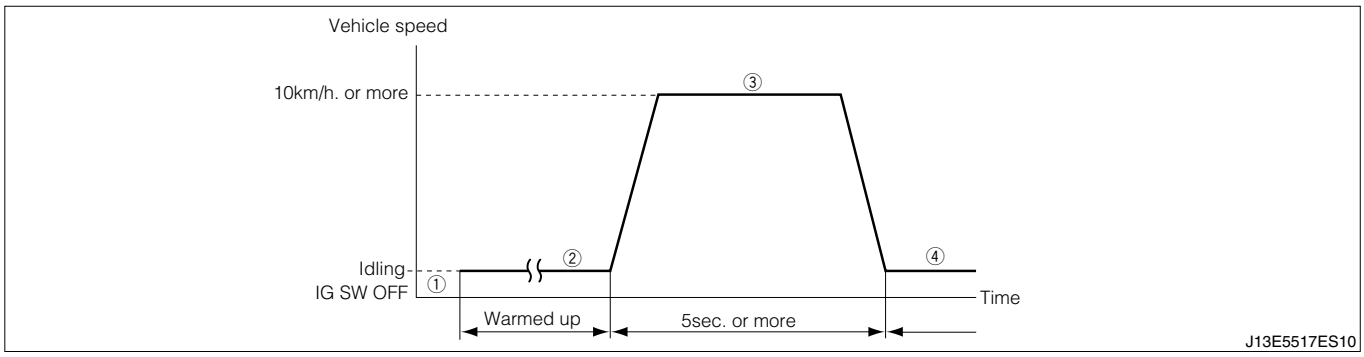
▼ If it is OK, go to ∑10.

▼ If it is NG, replace the spark plug, and go to ∑10.

⊳10. Confirmation test

1. Use the following procedure to confirm that the diagnosis code is not output again.

DRIVE PATTERN



(1) Erase the diagnosis codes. (① in the illustration)
(2) Check the diagnosis code and confirm that an abnormality code is not output.(① in the illustration)
(3) Start the engine, and warm it up for at least five minutes until the engine coolant temperature reaches 90℃ (or above).(② in the illustration)
(4) Select the 1st gear or [D]range, run the vehicle at least five seconds at a vehicle speed of 10km/h or more.(③ in the illustration)
(5) Keep the engine of the vehicle idling for at least five minutes.(④ in the illustration)
(6) Turn the IG SW to "LOCK". Then, repeat steps (2) through (4) above.
(7) Confirm that diagnosis code No.P0133/21 is not output.

NOTE

- **If the conditions for this test are not strictly followed, malfunctions will not be able to be detected.**

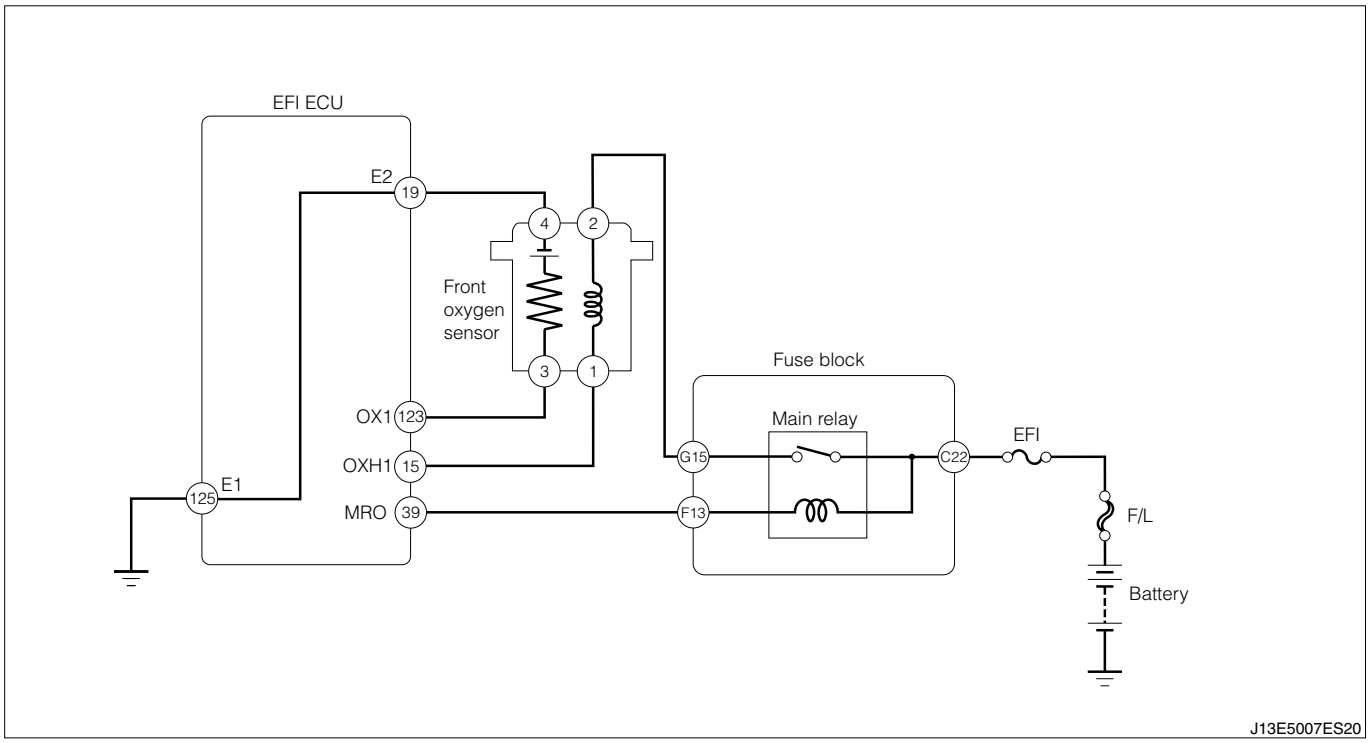
SPECIFIED VALUE: No. P0133/21 (front oxygen sensor (responsiveness)) is not output.

▼ If it is OK, finish the troubleshooting.
▼ If it is NG, replace the EFI ECU.

Refer to TERIOS SERVICE MANUAL

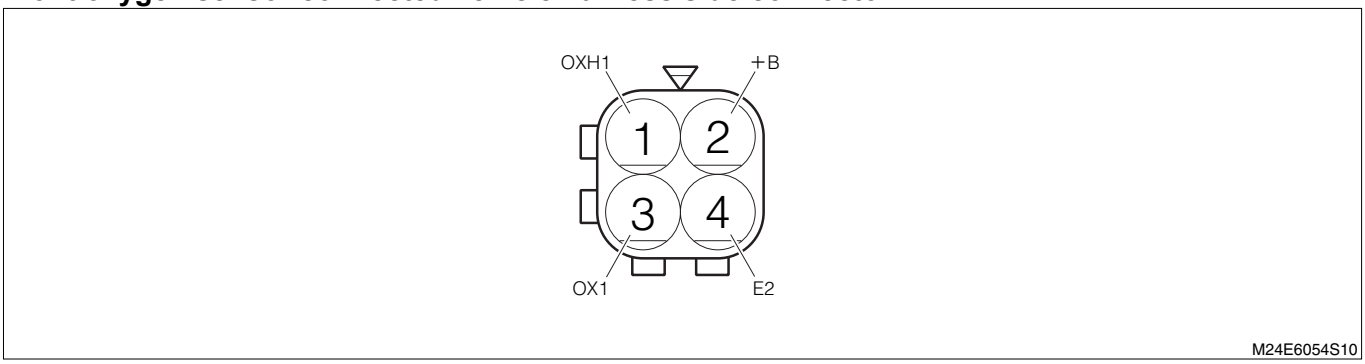
1-13-12 P0135/23 (FRONT OXYGEN SENSOR HEATER SIGNAL)

(1) System circuit diagram



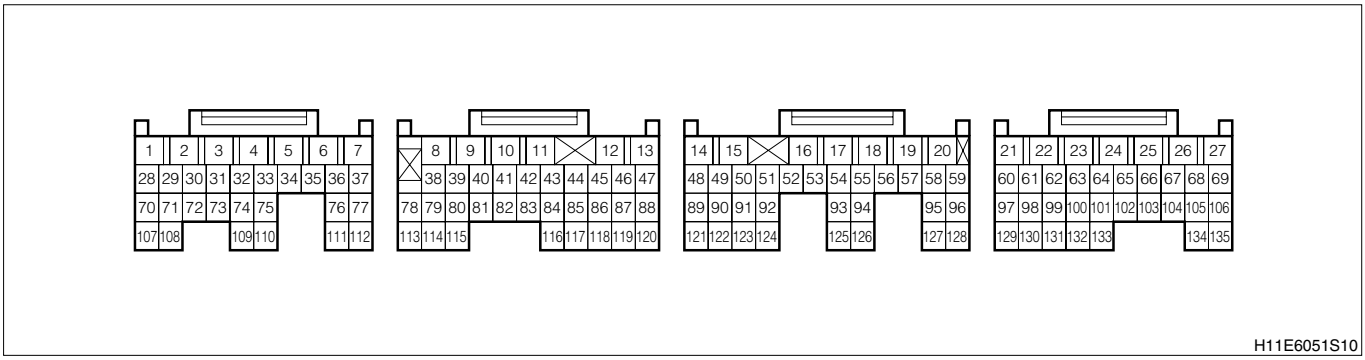
J13E5007ES20

Front oxygen sensor connected vehicle harness side connector



M24E6054S10

EFI ECU connection vehicle harness side connector



H11E6051S10

(2) Output conditions

1. When front oxygen sensor heater system has a breaking of wire or a short-circuiting.

(3) Inspection points

1. Is there any breaking of wire or short-circuiting in the front oxygen sensor heater system?

(4) Inspection procedure

⊳1. Checking the single unit of the front oxygen sensor

1. Carry out the single unit checking of the front oxygen sensor.
   Refer to Page B8-180.

   ▼ If it is OK, go to ⊳2.
   ▼ If it is NG, replace the front oxygen sensor, and then go to ⊳5.

Refer to TERIOS SERVICE MANUAL

⊳2. Front oxygen sensor voltage checking

1. Disconnect the connector of the front oxygen sensor.
2. Set the IG SW to "ON".
3. Measure the voltage between the following terminals.
   (1) Between the front oxygen sensor connected vehicle harness side connector 2 (+B) and the body earth.

   SPECIFIED VALUE: Battery voltage

   ▼ If it is OK, go to ⊳3.
   ▼ If it is NG, perform a check of the EFI ECU power supply system, and then go to ⊳5.
   Refer to Page B8-156.

⊳3. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the front oxygen sensor
   (2) Between EFI ECU and the body earth
   Refer to Page A1-37.

   SPECIFIED VALUE: Conduction with no short-circuiting

   ▼ If it is OK, go to ⊳4.
   ▼ If it is NG, repair or replace the harness and the connectors of the malfunctioning section and go to ⊳5.

⊳4. EFI ECU signal checking

1. Connect the connector of the front oxygen sensors.
2. Connect SST.
   SST: 09842-97209-000

3. Measure the voltage between the following terminals after the engine is started when it is cold
   (1) Between SST15 (OXH1) and SST125 (E1)
   SPECIFIED VALUE: Around 0V

   ▼ If it is OK, repair or replace the harness between the following terminals and go to ⊳5.
   (2) Between EFI ECU and the front oxygen sensor
   ▼ If it is NG, check the circuit of EFI ECU and go to ⊳5.
   Refer to Page A1-39.

∑5. Confirmation test

1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Read the diagnosis codes using the DS-Ⅱ.
4. Check that diagnosis code No. P0135/23 is not output.
   SPECIFIED VALUE: P0135/23 (Front oxygen sensor heater system) is not output.

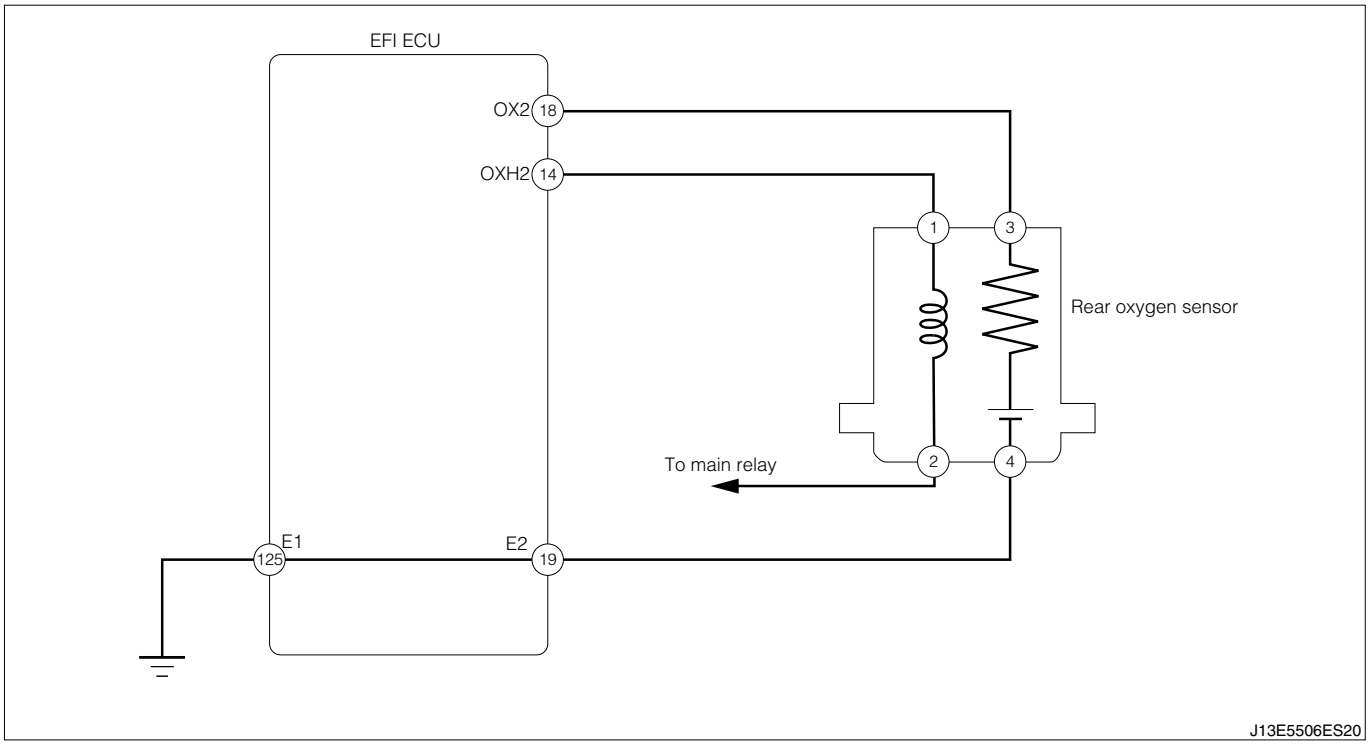
▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

Refer to TERIOS SERVICE MANUAL

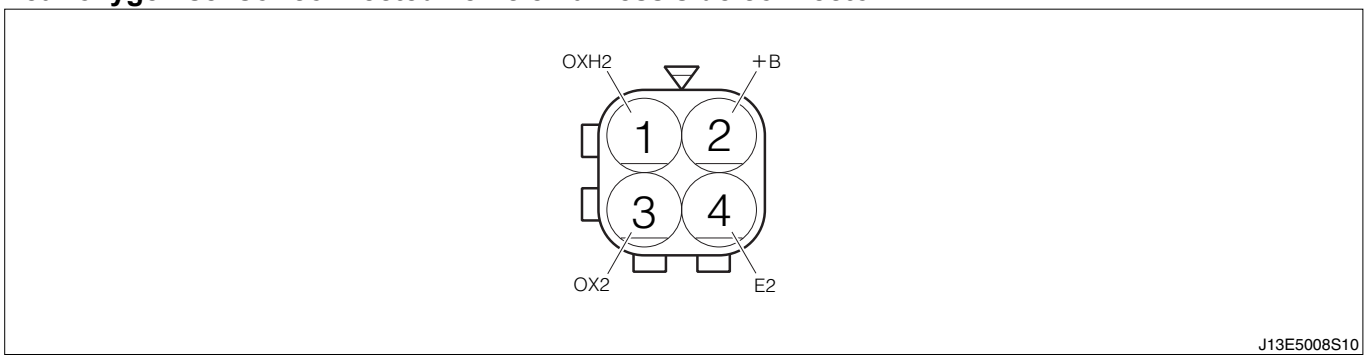
1-13-13 P0136/22 (REAR OXYGEN SENSOR(RANGE,OPEN))

(1) System diagram

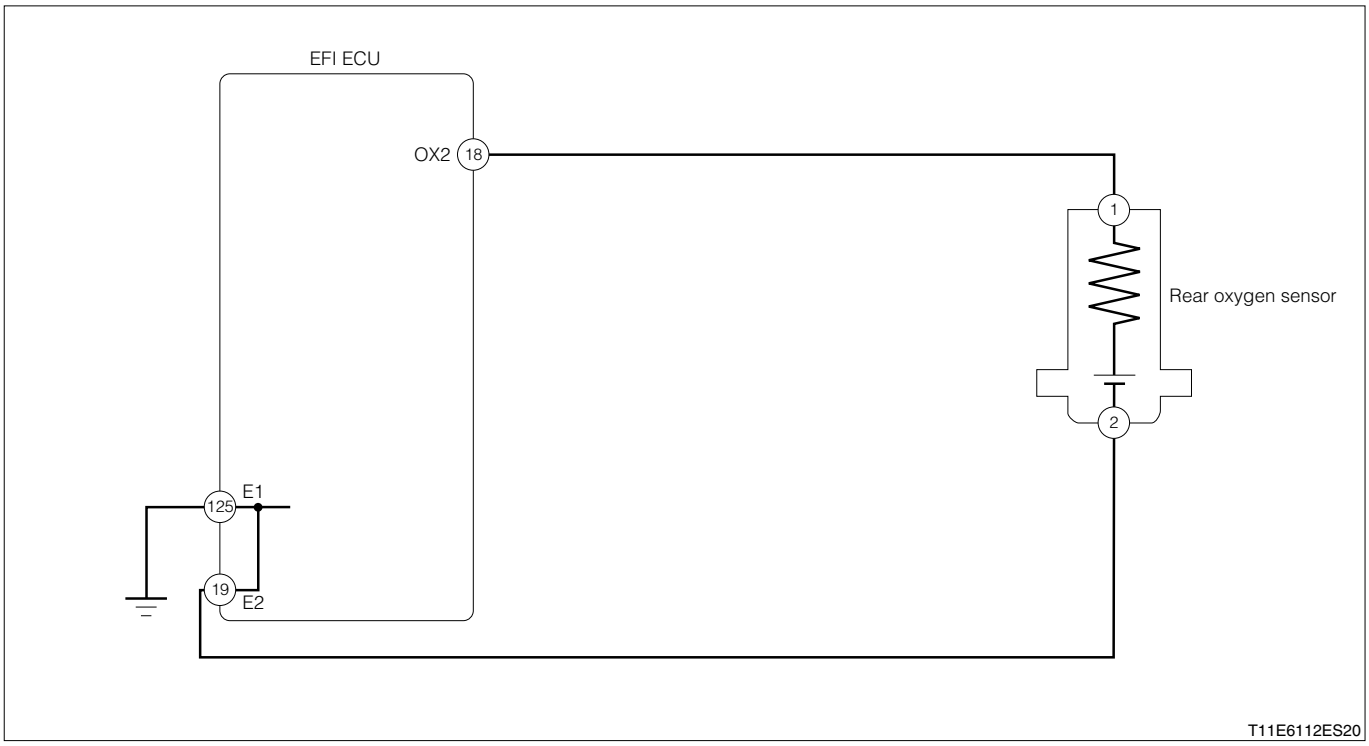
[1] Rear oxygen sensor(Equipped with heater)



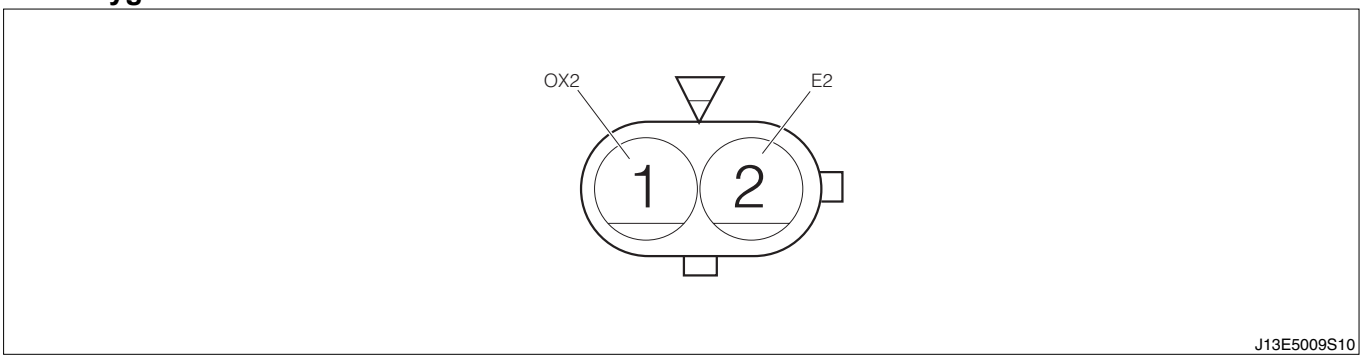
Rear oxygen sensor connected vehicle harness side connector



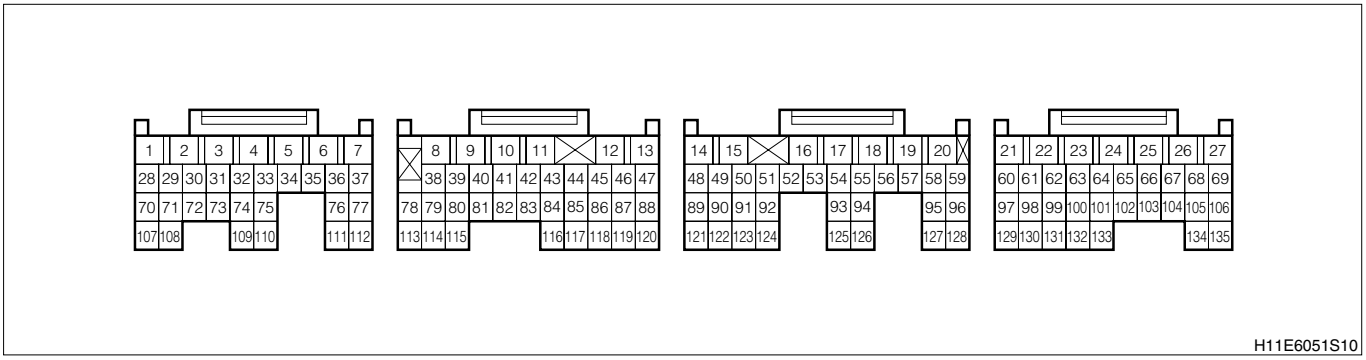
[2] Rear oxygen sensor(Not equipped with heater)



Rear oxygen sensor connection vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

1. When the signal from the rear oxygen sensor never reaches the rich side under the condition after the engine is warmed up in which the engine speed is maintained at 2000 rpm or higher and at the same time the power increase compensation at a value higher than the specified setting continued

(3) Checking Points

NOTE

- **If this code has been output at the same time with another code, carry out the checking from the other code first.**

1. Is the signal from the rear oxygen sensor input to EFI ECU?
2. Is the harness between the rear oxygen sensor and EFI ECU normal?
3. Is the output from the rear oxygen sensor correct?

(4) Check procedure

∑1. Data monitor

1. Continue racing at 2000 rpm or higher for approximately 5 minutes from the time when the rear oxygen] sensor is cold.
2. Use DS-Ⅱ to read out the data monitor [Output volt of rear oxygen SSR].

SPECIFIED VALUE:

The engine condition	Displayed data
When it is cold → when it is hot	0 → 0.55 or higher (the rich side)
Engine is stopped with IG SW set to "ON"	0.4 or lower *

*: Read out the data under the condition in which the rear oxygen sensor is detecting the oxygen (the lean condition).

▼ If it is OK, check the EFI ECU circuit and go to ∑4.

Refer to Page A1-39.

▼ If it is NG, go to ∑2.

∑2. Checking the single unit of the rear oxygen sensor.

1. Carry out the single unit checking of the rear oxygen sensor.

Refer to Page B8-181.

Refer to Page B8-181.

▼ If it is OK, go to ∑3.

▼ If it is NG, replace the rear oxygen sensor and go to ∑4.

Refer to TERIOS SERVICE MANUAL

∑3. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the rear oxygen sensor
   (2) Between EFI ECU and the body earth

Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

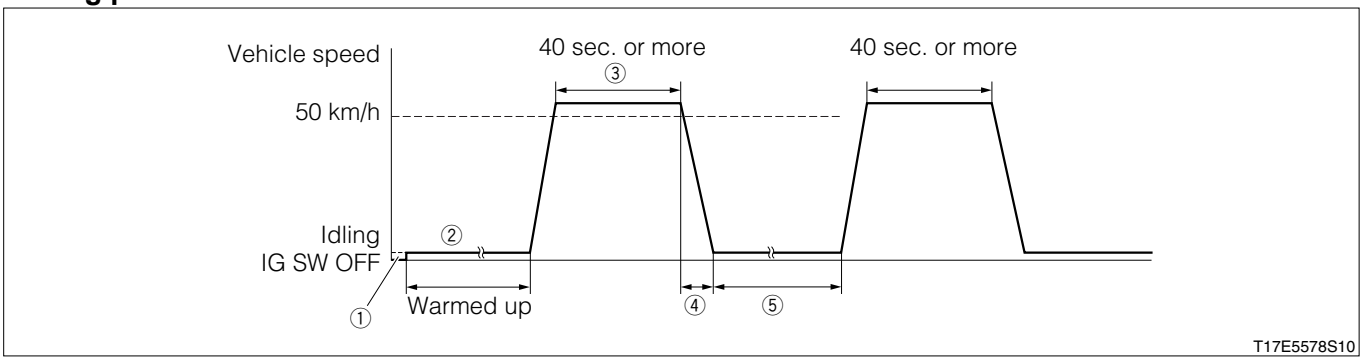
▼ If it is OK, go to ∑4.

▼ If it is NG, repair or replace the harness and the connectors of the malfunctioning section and go to ∑4.

⊳4. Confirmation test

1. By observing the following procedure, confirm that the diagnosis codes is not output again.

Driving pattern



(1) Erase the diagnosis codes. (① in the illustration)
(2) Check the diagnosis codes, and confirm that no abnormality code is output.(① in the illustration)
(3) Start the engine and warm it up for 10 minutes or more until the temperature of the engine cooling water reaches 90 ℃ or higher. (② in the illustration)
(4) Accelerate the vehicle until its speed reaches 50 km/h, and then drive it at 50 km/h or more for at least 40 seconds. (③ in the illustration)
(5) Release the accelerator pedal, and decrease the speed for about 5 seconds without using the foot brake. (④ in the illustration)
(6) Keep the engine idling. (⑤ in the illustration)
(7) Repeat the above steps (1) to (5) 3 times without operating the IG SW.
(8) Turn the IG SW to LOCK, and keep it in that position for at least 10 seconds.
(9) Repeat Steps (1) to (6) at least twice.
(10) Confirm that the diagnosis code No. P0136/22 is not output.

NOTE

- **If this test condition cannot be observed faithfully, this malfunction cannot be detected.**

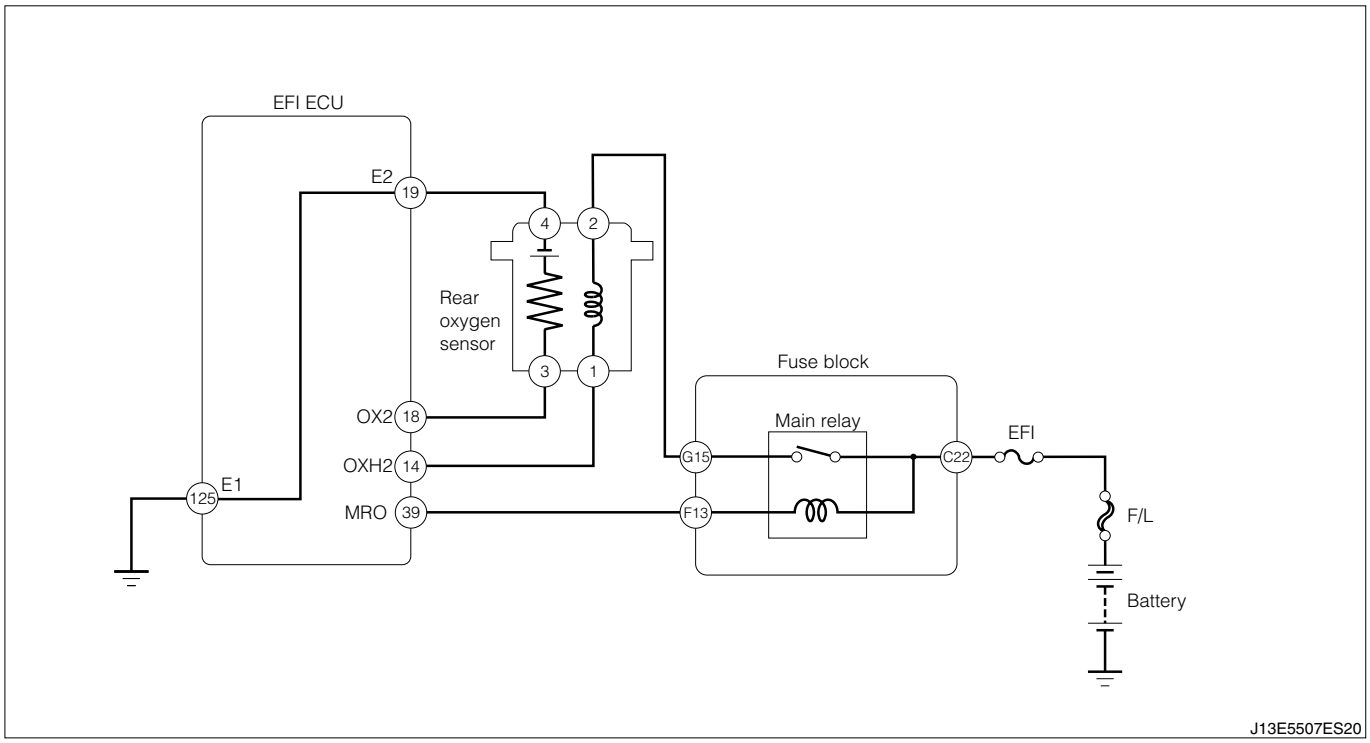
SPECIFIED VALUE: P0136/22 (the rear oxygen sensor signal system) is not output.

▼ If it is OK, terminate the troubleshooting.
▼ If it is NG, replace the EFI ECU.

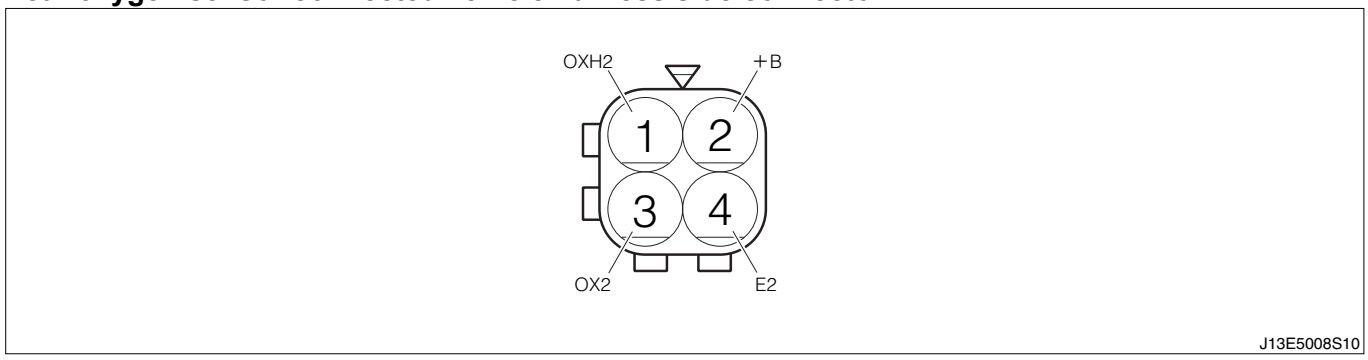
Refer to TERIOS SERVICE MANUAL

1-13-14 P0141/24 (REAR OXYGEN SENSOR HEATER SIGNAL)

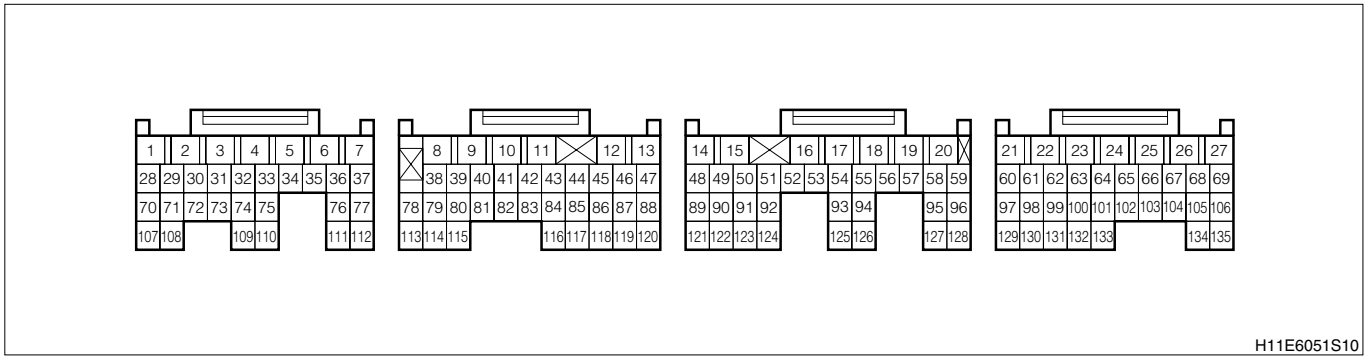
(1) System diagram



Rear oxygen sensor connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

1. When rear oxygen sensor heater system has a breaking of wire or a short-circuiting.

(3) Checking Points

1. Is there any breaking of wire or short-circuiting in the rear oxygen sensor heater system?

(4) Check procedure

∑1. Checking the single unit of the rear oxygen sensor

1. Carry out the single unit checking of the rear oxygen sensor.
   Refer to Page B8-181.

▼ If it is OK, go to ∑2.
▼ If it is NG, replace the rear oxygen sensor, and then go to ∑5.

Refer to TERIOS SERVICE MANUAL

∑2. Rear oxygen sensor voltage checking

1. Disconnect the connector of the rear oxygen sensor.
2. Set the IG SW to "ON".
3. Measure the voltage between the following terminals.
   (1) Between the rear oxygen sensor connected vehicle harness side connector 2 (+B) and the body earth.

SPECIFIED VALUE: Battery voltage

▼ If it is OK, go to ∑3.
▼ If it is NG, perform a check of the EFI ECU power supply system, and then go to ∑5.
Refer to Page B8-156.

∑3. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the rear oxygen sensor
   (2) Between EFI ECU and the body earth
   Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, go to ∑4.
▼ If it is NG, repair or replace the harness and the connectors of the malfunctioning section and go to ∑5.

∑4. EFI ECU signal checking

1. Connect the connector of the rear oxygen sensors.
2. Connect SST.
   SST: 09842-97209-000

3. Measure the voltage between the following terminals after the engine is started when it is cold
   (1) Between SST14 (OXH2) and SST125 (E1)
   SPECIFIED VALUE: Around 0V

▼ If it is OK, repair or replace the harness between the following terminals and go to ∑5.
(2) Between EFI ECU and the rear oxygen sensor
▼ If it is NG, check the circuit of EFI ECU and go to ∑5.
Refer to Page A1-39.

⌦5.Confirmation test

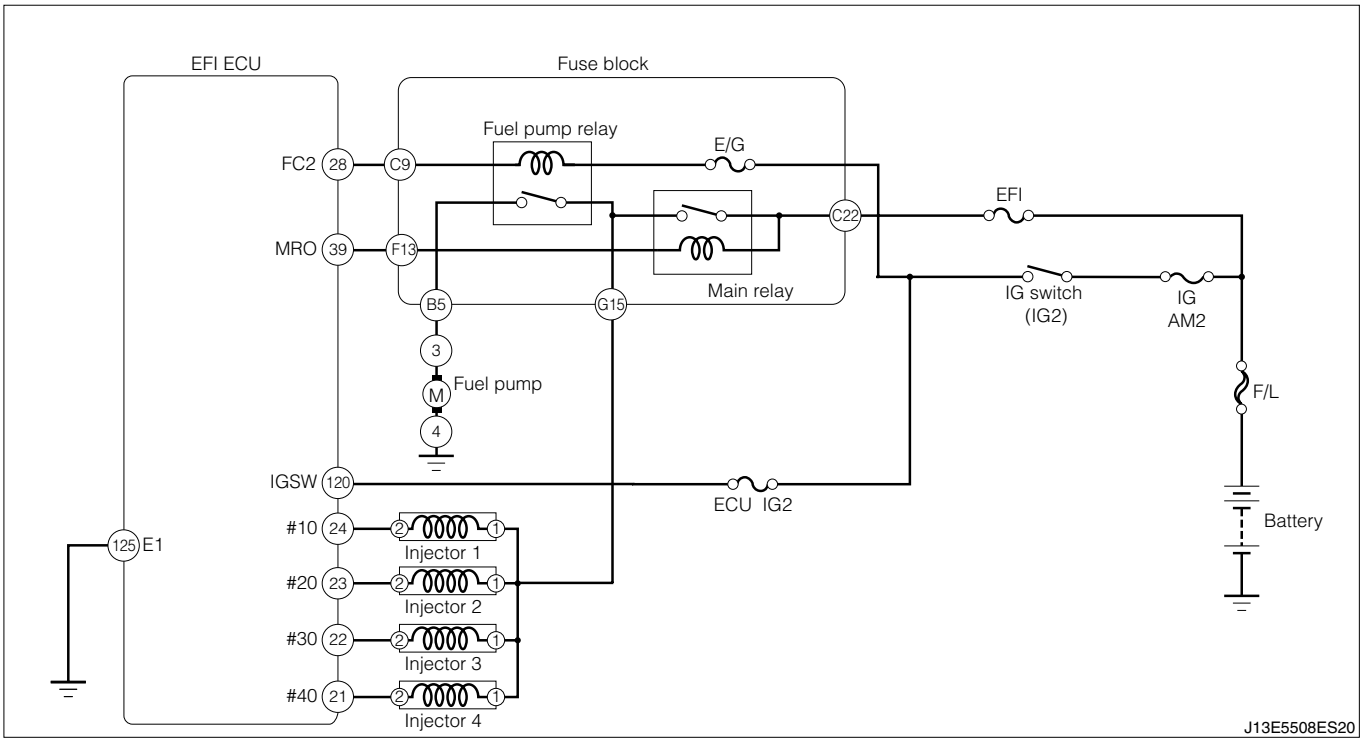
1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Read the diagnosis codes using the DS-Ⅱ.
4. Check that diagnosis code No. P0141/24 is not output.
   SPECIFIED VALUE: P0141/24 (Rear oxygen sensor heater signal) is not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

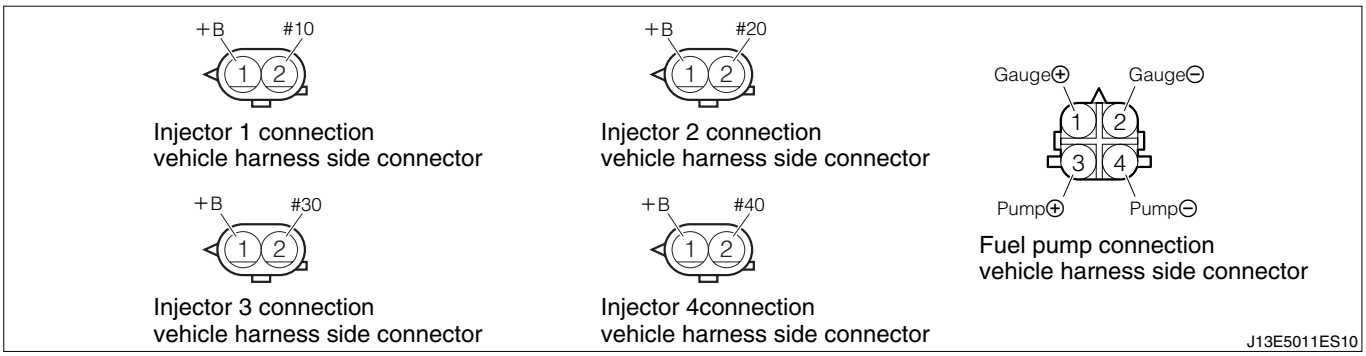
Refer to TERIOS SERVICE MANUAL

1-13-15 P0171/25 (FUEL SYSTEM (LEAN FAULTY))
P0172/26 (FUEL SYSTEM (RICH FAULTY))

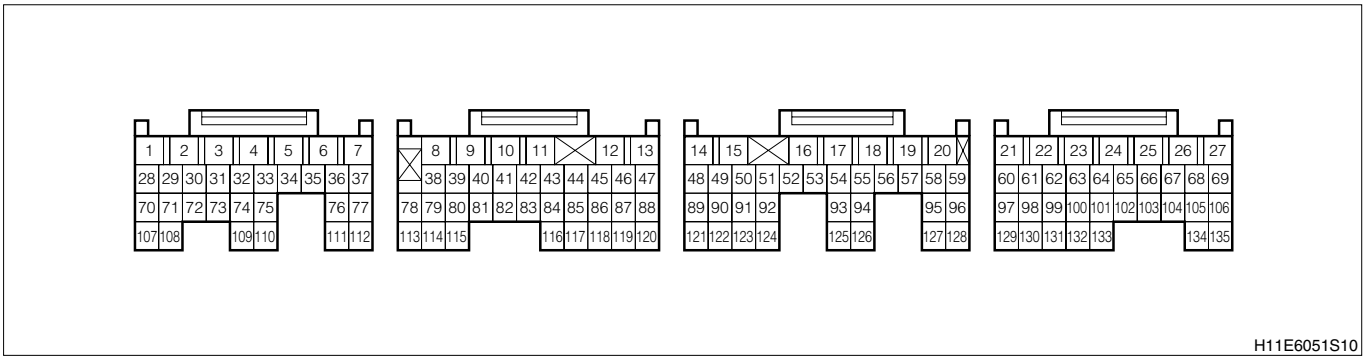
(1) System diagram



Unit connection vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

[1] P0171/25

1. When the coefficient of compensation during air/fuel ratio feedback clings to one side (the air/fuel ratio lean condition)

[2] P0172/26

1. When the coefficient of compensation during air/fuel ratio feedback clings to one side (the air/fuel ratio rich condition)

(3) Checking Points

1. Is the fuel pressure normal?
2. Is the injector normal?
3. Is the ignition system functioning normally?
4. Are the front and rear oxygen sensors functioning normally?

(4) Check procedure

⊳1. Front oxygen sensor feedback control checking

1. Connect DS-Ⅱ to the vehicle and set the power supply switch to "ON".
2. Start the engine and keep it running at 3000 rpm for 4 minutes to activate the front oxygen sensor.
3. Use DS-Ⅱ to carry out an active test [Terminal T].
4. Keep the engine speed at 2000 rpm or higher. And then, either press down the brake pedal or turn on the headlight.
5. Check the engine check lamp in the combination meter to confirm if it flashes.
   SPECIFIED VALUE: flashes

   NOTE
   - **The flashing intervals vary depending upon the activated condition of the front oxygen sensor.**

▼ If it is OK, go to ⊳2.
▼ If it is NG, go to ⊳6.

⊳2. PCV valve system checking

1. Carry out checking of the PCV valve and hoses.
   ▼ If it is OK, go to ⊳3.
   ▼ If it is NG, repair or replace the malfunctioning section and go to ⊳10.

⊳3. Single unit checking of the spark plug

1. Carry out single unit checking of the spark plug.

Refer to TERIOS SERVICE MANUAL

▼ If it is OK, go to ⊳4.
▼ If it is NG, replace the spark plug and go to ⊳10.

⊳4. Injector system checking

1. Check the injector system.
   Refer to Page B8-165.

▼ If it is OK, go to ⊳5.
▼ If it is NG, repair the injector system and go to ⊳10.

≫5. Fuel pressure checking

1. Carry out the fuel pressure checking.
   Refer to Page B8-178.

   ▼ If it is OK, check the EFI ECU circuit and go to ≫10.
   Refer to Page A1-39.

   ▼ If it is NG, check and repair the following section and go to ≫10.
   (1) Fuel pump system
   (2) Fuel line

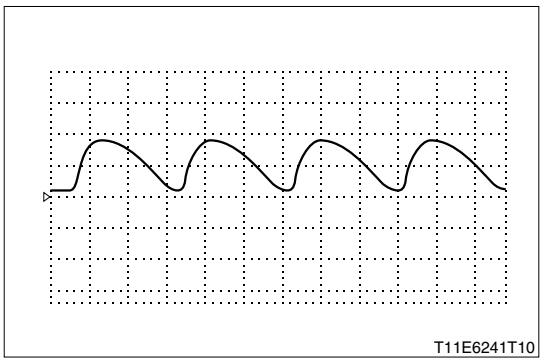
≫6. Front oxygen sensor signal checking

1. Connect the SST.
   SST: 09842-97209-000

2. Start the engine and keep it running at 3000 rpm for 4 minutes to activate the front oxygen sensor.
3. Carry out the output checking between the following terminals by using the oscilloscope.
   (1) Between SST123 (OX1) and SST125 (E1)

Time axis	200ms / DIV
Voltage axis	500mV / DIV
Condition	The air conditioner set to "OFF"; no electric load applied; engine speed held at 3000 rpm

The condition under which the air conditioner is turned "OFF," and the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF."



NOTE

- **While identification of the waveform is not possible, check if the waveform as shown in the diagram (an example) is output.**

4. Check the following points.
   (1) The front oxygen sensor is activated and is outputting a waveform.
   (2) The waveform of 0⇄1 V is output.

NOTE

- **The signal from the front oxygen sensor cannot be checked for the correct output without using an oscilloscope.**

▼ If it is OK, go to ≫7.
▼ If it is NG, go to ≫8.

∑7. Checking the wiring harness (1)

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and DLC
   (2) Between EFI ECU and the combination meter
   Refer to Page A1-37.

   SPECIFIED VALUE: Conduction with no short-circuiting

   ▼ If it is OK, check the EFI ECU circuit and go to ∑10.
   Refer to Page A1-39.

   ▼ If it is NG, repair or replace the harness and the connectors of the malfunctioning section and go to ∑10.

∑8.Checking of the single unit of the front oxygen sensor.

1. Carry out the single unit checking of the front oxygen sensor.
   Refer to Page B8-180.

   ▼ If it is OK, go to ∑9.
   ▼ If it is NG, replace the front oxygen sensor and go to ∑10.

Refer to TERIOS SERVICE MANUAL

≫9. Checking the wiring harness(2)

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the front oxygen sensor
   (2) Between EFI ECU and the body earth

   Refer to Page A1-37.

   SPECIFIED VALUE: Conduction with no short-circuiting

   ▼ If it is OK, check the EFI ECU circuit and go to ≫10.

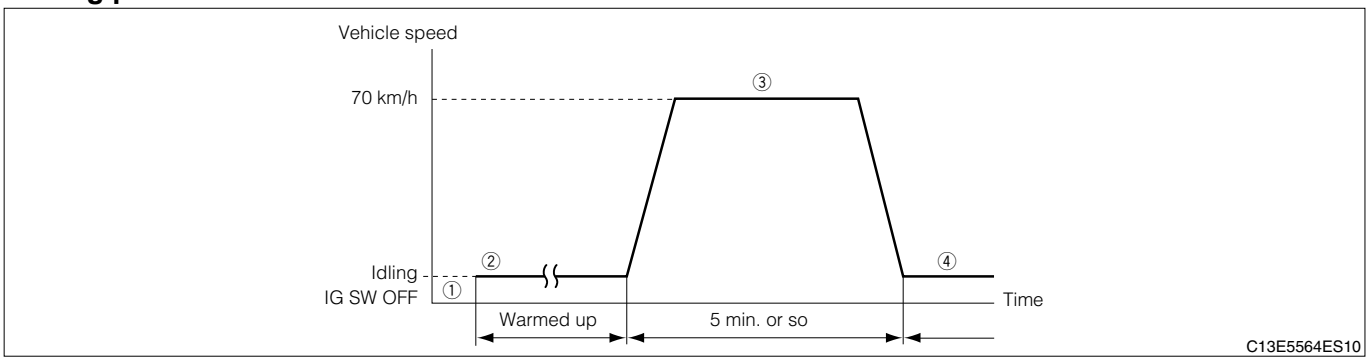
   Refer to Page A1-39.

   ▼ If it is NG, repair the malfunctioning harness and the connectors or replace them with new items, go to ≫10.

≫10. Confirmation test

1. By observing the following procedure, confirm that the diagnosis code is not output again.

Driving pattern



   (1) Erase the diagnosis codes. (① in the illustration)
   (2) Check the diagnosis codes, and confirm that no abnormality code is output.(① in the illustration)
   (3) Start the engine and warm it up for 5 minutes or more until the temperature of the engine cooling water reaches 90℃ or higher. (② in the illustration)
   (4) Put the gear lever into the 5th gear or select Ⓓ range, and drive the vehicle for 5minutes or more at a speed of 70 km/h or higher. (③ in the illustration)
   (5) Let the vehicle idle for 1 minute or longer. (④ in the illustration)
   (6) Turn the IG SW to LOCK, and keep it in that position for at least 10 seconds.
   (7) Repeat Steps (2) to (4).
   (8) Confirm that the diagnosis code No. P0171/25 or No.P172/26 is not output.

   NOTE

   - **If this test condition cannot be observed faithfully, this malfunction cannot be detected.**

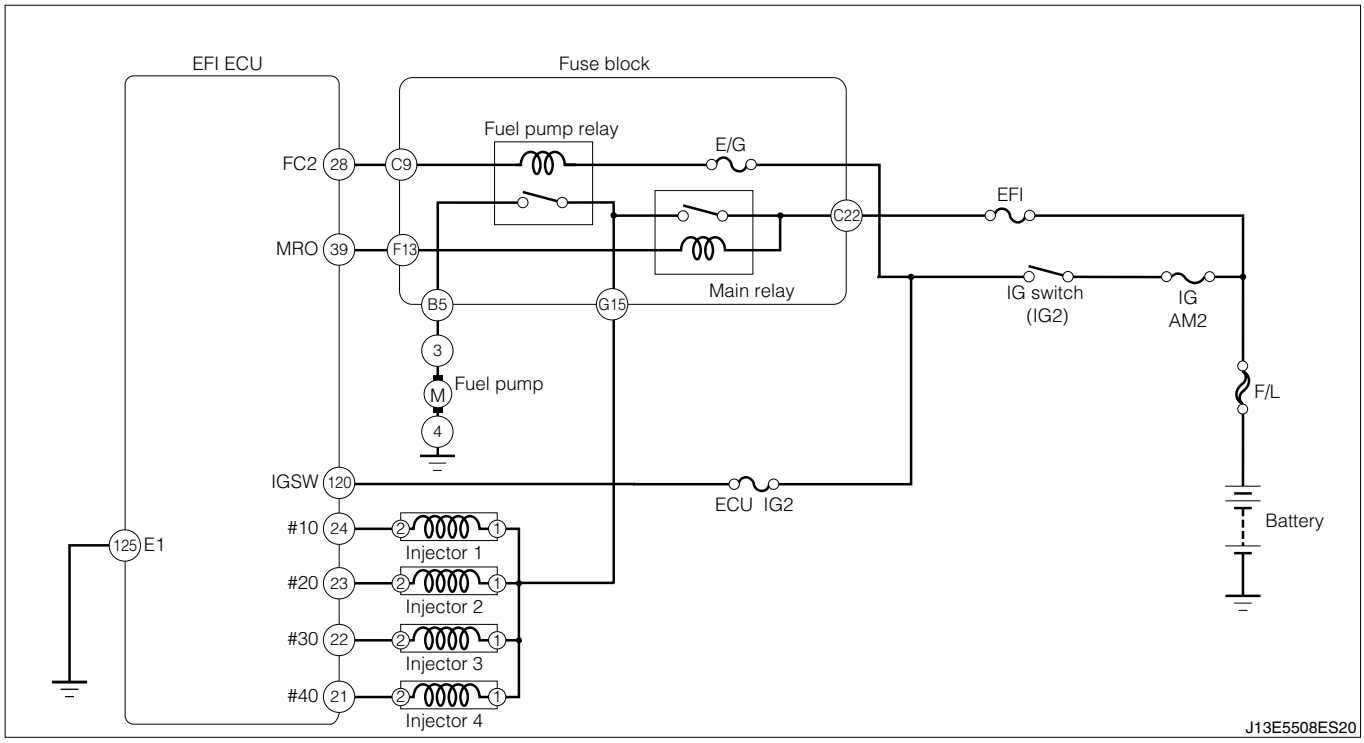
   SPECIFIED VALUE: P0171/25 (Fuel system (lean faulty)) or P0172/26 (Fuel system (rich faulty)) not output

   ▼ If it is OK, terminate the troubleshooting.
   ▼ If it is NG, replace the EFI ECU.

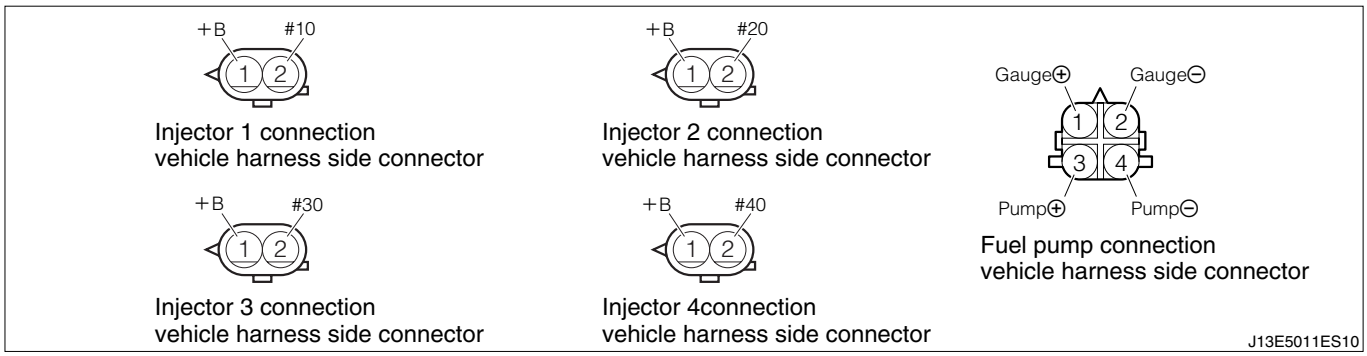
Refer to TERIOS SERVICE MANUAL

1-13-16 P0300/17 (MISSING), P0301/17 (MISSING (CYLINDER #1)), P0302/17 (MISSING (CYLINDER #2)), P0303/17 (MISSING (CYLINDER #3)), P0304/17 (MISSING (CYLINDER #4))

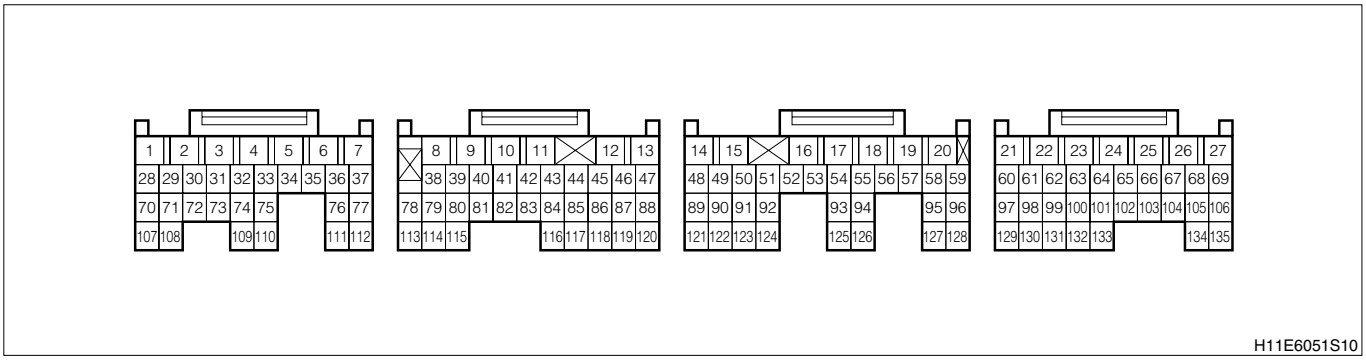
(1) System diagram



Unit connection vehicle harness side connector



EFI ECU connected vehicle hardness side connector



(2) Output conditions

[1] P0300/17

1. Misfires occurring in number of cylinders are detected while the spark plug is firing 400 times.

[2] P0301/17, P0302/17, P0303/17, or P0304/17

1. When misfire is detected from the specific cylinders while the spark plug is 400 times firing.
2. Output P0301/17 indicates # 1 cylinder, P0302/17 indicates # 2, P0303/17 indicates # 3, and P0304/17 indicates # 4.

NOTE

- **When misfires on several cylinders are not detected although two or more malfunctioned codes are repeatedly recorded, this indicates that misfires were detected but were recorded at different timing.**

(3) Checking Points

1. Is EFI ECU signal properly input from the ignition coil (the igniter section)?
2. Is ignition coil (the igniter section) operating normally?
3. Is the harness from EFI ECU to the injector normal?
4. Is the injector operating normally?
5. Is the harness between the water temperature sensor and EFI ECU normal?
6. Is the output from the water temperature sensor normal?

(4) Check procedure

NOTE

- **To record the malfunction codes for misfires, it is required that the following time operation should be carried out at the engine speed and the load applied as listed in the data list.**

Driving pattern

Engine revolution speed	Time
Idling	For 3 minutes and 30 seconds or more
1000 rpm	For 3 minutes or more
2000 rpm	For 1 minute and 30 seconds or more
3000 rpm	For 1 minute or more

NOTE

- **If other malfunction codes have been detected at the same time with the misfire malfunction, carry out troubleshooting for these malfunctions first.**
- **Read out the freeze frame data by using the DS-Ⅱ. The freeze frame data records the condition of the engine when a malfunction is detected. The data is quite effective when carrying out troubleshooting for determining whether the vehicle was running or was stopped, or whether the engine was warmed up or not; or whether the air-fuel ratio was good or bad, when the malfunction was detected.**
- **If the malfunction cannot be reproduced after the vehicle was brought into the factory, reproduce the malfunction according to the conditions indicated by the freeze frame data. Even after the repair work has been completed, follow that conditions to carry out the confirmation test.**

∑1. Visual inspection in the engine compartment

1. Check the connecting state of the wire harnesses and connectors.
2. Check vacuum hose, purge hose, fuel hose and piping for detachment and breakage.

▼ If it is OK, go to ∑2.

▼ If it is NG, repair the malfunctioning section, or replace it if necessary, and then go to ∑11.

⌦2. Check the spark plug and the cylinder in which misfires occurred for ignition.

1. Warm up the engine.
2. Set the ignition switch to "LOCK".
3. Remove the fuel pump relay.
4. Start the engine. Keep on running the engine, until the engine stops naturally.
5. Set the ignition switch to "LOCK".
6. Disconnect the connector of the injector.

CAUTION

- **The above operation will stop the fuel injection, and will protect the catalyst from being damaged by unburnt gas.**

7. Remove the ignition coil and the spark plug (from the misfiring cylinder).
8. Attach the spark plug to the ignition coil.
9. Ground the spark plug.
10. Start the engine at this time and check the spark plug to see if it ignites.

▼ If it is OK, go to ⌦3.

▼ If it is NG, carry out the following operations and go to ⌦11.

(1) Replace the spark plug.
(2) Check the ignition system and the ion current system.

CAUTION

- **Do not use any undesignated spark plug.**

⌦3. Checking of the output signal from the injector of the misfiring cylinder

1. With the ignition switch set to "LOCK", reinstall the system.
2. Connect the SST.

SST: 09842-97209-000

3. Set the ignition switch to "ON".
4. Measure the voltage of the injector of the misfiring cylinder between the following terminals.
   (1) Between SST24 (#10) and the body earth
   (2) Between SST23 (#20) and the body earth
   (3) Between SST22 (#30) and the body earth
   (4) Between SST21 (#40) and the body earth

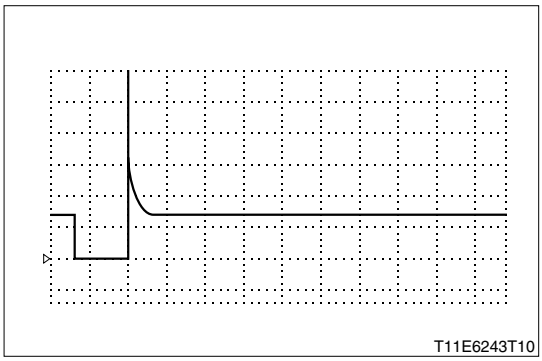
SPECIFIED VALUE: Battery voltage

5. Measure the injector waveform using oscilloscope (See the diagram).
6. Check the oscilloscope waveforms during idling between the following terminals.
   (1) Between SST24 (#10) and 125 (E1)
   (2) Between SST23 (#20) and 125 (E1)
   (3) Between SST22 (#30) and 125 (E1)
   (4) Between SST21 (#40) and 125 (E1)

7. In the case of the following measuring range and the measuring condition as an example of the result will be as shown in the diagram.

Time axis	2ms / DIV
Voltage axis	10V / DIV
Condition	The air conditioner set to "OFF"; no electric load applied; engine idling

The condition under which the air conditioner is turned "OFF": the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".



NOTE

- **While identification of the waveform is not possible, check if the waveform as shown in the diagram (an example) is output.**

8. Confirm the following points.
   (1) The battery voltage changes from 0V during fuel injection time.

▼ If it is OK, go to ⅀6.
▼ If it is NG, go to ⅀4.

⅀4. Checking of the single unit of the injector of the misfiring cylinder

1. Set the ignition switch to "LOCK".
2. Disconnect the connector from the injector of the misfiring cylinder.
3. Measure the resistance between the terminals of the injector (at the injector side).
   SPECIFIED VALUE: 12 Ω (at 20 ℃)

▼ If it is OK, go to ⅀5.
▼ If it is NG, replace the injector and go to ⅀11.

⌦5. Checking the wiring harness

1. Set the ignition switch to "LOCK".
2. Disconnect the connector of the SST from EFI ECU.
3. Check the harness and connector for breaking of wires.
   (1) Between injector 1 connected vehicle harness side connector 2 (#10) and EFI ECU connected vehicle harness side connector 24 (#10)
   (2) Between injector 2 connected vehicle harness side connector 2 (#20) and EFI ECU connected vehicle harness side connector 23 (#20)
   (3) Between injector 3 connected vehicle harness side connector 2 (#30) and EFI ECU connected vehicle harness side connector 22 (#30)
   (4) Between injector 4 connected vehicle harness side connector 2 (#40) and EFI ECU connected vehicle harness side connector 21 (#40)

   Refer to Page A1-37.

   SPECIFIED VALUE: Continuity exists

4. Check harnesses and connectors for short-circuiting.
   (1) Between injector 1 connected vehicle harness side connector 2 (#10) and the body earth
   (2) Between injector 2 connected vehicle harness side connector 2 (#20) and the body earth
   (3) Between injector 3 connected vehicle harness side connector 2 (#30) and the body earth
   (4) Between injector 4 connected vehicle harness side connector 2 (#40) and the body earth

   Refer to Page A1-37.

   SPECIFIED VALUE: No continuity exists

▼ If it is OK, check the EFI ECU circuit and go to ⌦11.
▼ If it is NG, repair the malfunctioning harness and connectors or replace them if necessary, and then go to ⌦11.

⌦6. Checking the ion system

1. Troubleshoot code No. P1399/36.
   Refer to Page B8-124.

▼ If it is OK, go to ⌦7.
▼ If it is NG, repair or replace the malfunctioning section.

⌦7. Checking of the fuel pressure

1. Check the fuel pressure.
   Refer to Page B8-178.

▼ If it is OK, go to ⌦8.
▼ If it is NG, repair or replace the fuel pump, the fuel line, and the fuel filter and go to ⌦11.

⌦8. Checking the single unit of the injector

1. Carry out the single unit checking of the injector.
   Refer to Page B8-184.

▼ If it is OK, go to ⌦9.
▼ If it is NG, replace the injector and go to ⌦11.

≫9. Unit check of manifold absolute pressure sensor

1. Perform a unit check of the manifold absolute pressure sensor.
   Refer to Page B8-178.

▼ If it is OK, go to ≫10.
▼ If it is NG, replace the intake manifold absolute pressure sensor and go to ≫11.

≫10. Checking the single unit of the water temperature sensor

1. Carry out the single unit checking of the water temperature sensor.
   Refer to Page B8-179.

▼ If it is OK, carry of checking of the following and go to ≫11.
(1) Compression pressure
Refer to TERIOS SERVICE MANUAL
(2) Valve clearance
Refer to TERIOS SERVICE MANUAL
▼ If it is NG, replace the water temperature sensor and go to ≫11.
Refer to TERIOS SERVICE MANUAL

≫11. Confirmation test

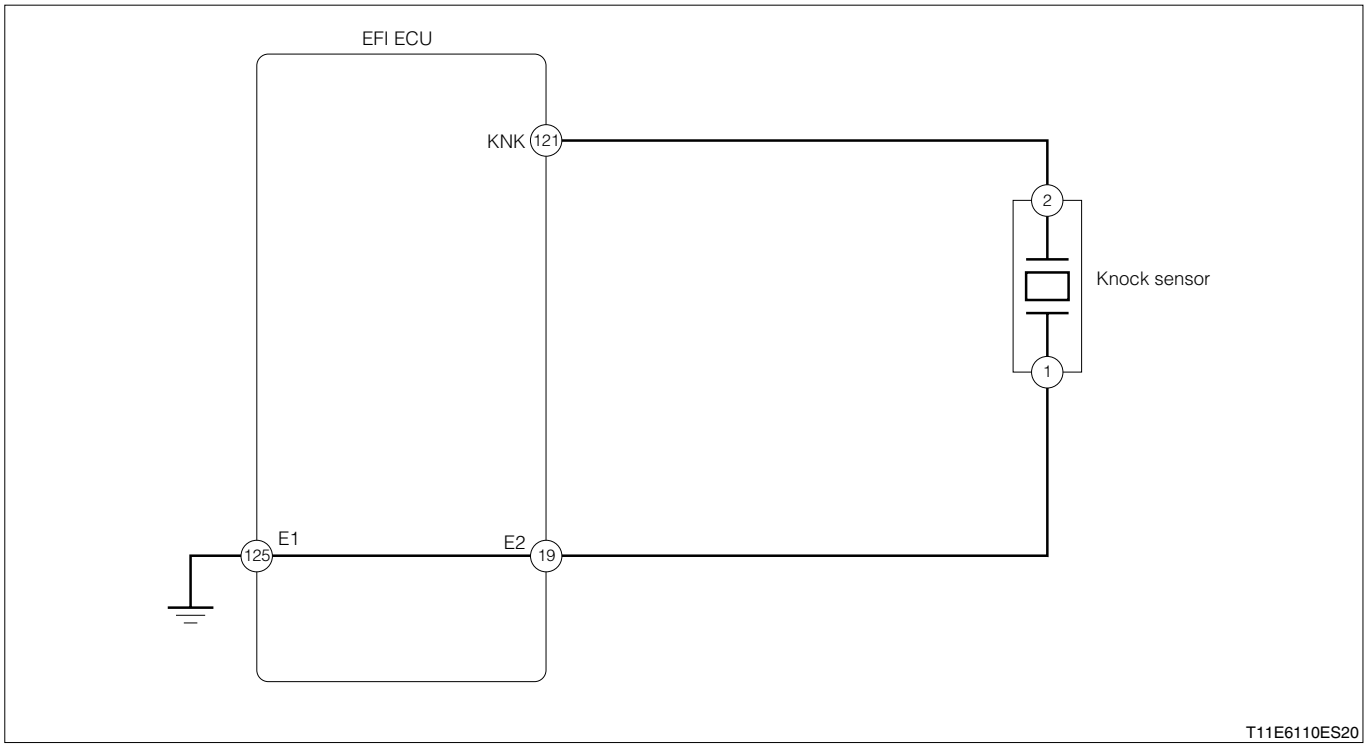
1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Turn the IG SW to LOCK, and keep it in that position for at least 10 seconds.
4. Repeat Steps 2 and 3 at least twice.
5. Read the diagnosis codes using the DS-Ⅱ.
6. Check that diagnosis codes No. P0350/16, P0351/16, P0352/16, P0353/16, and P0354/16 are not output.

SPECIFIED VALUE: P0300/17 (Misfire) is not output.
P0301/17 (Misfire (Cylinder #1)), P0302/17 (Misfire (Cylinder #2)), P0303/17 (Misfire (Cylinder #3)), and P0304/17 (Misfire (Cylinder #4)) are not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.
Refer to TERIOS SERVICE MANUAL

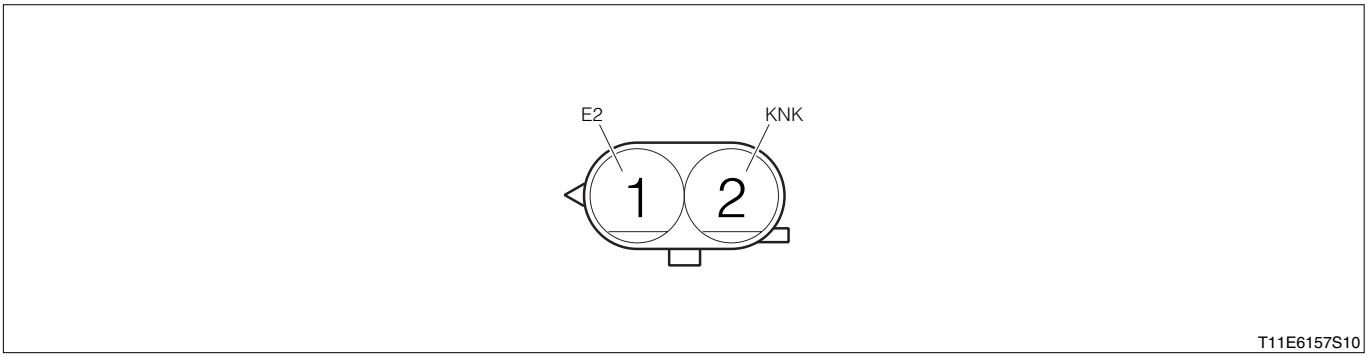
1-13-17 P0325/18 (VIBRATING-TYPE KNOCK SENSOR SIGNAL)

(1) System diagram



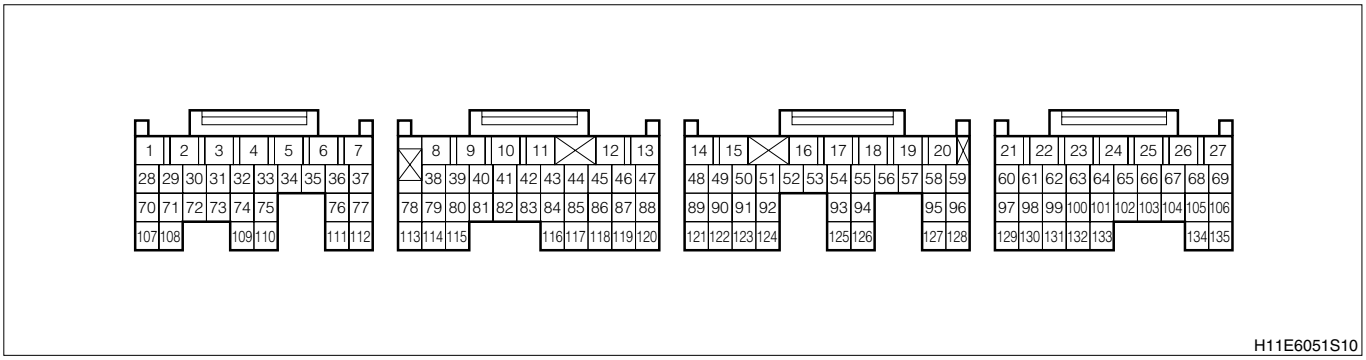
T11E6110ES20

Knock sensor connected vehicle harness side connector



T11E6157S10

EFI ECU connected vehicle harness side connector



H11E6051S10

(2) Output conditions

1. When the signals from the knock sensor are not outputted continuously for a certain length of time after starting the engine

(3) Check point

1. Is signal from the knock sensor inputted in EFI ECU?
2. Is harness between knock sensor and EFI ECU correct?
3. Is knock sensor output correct?

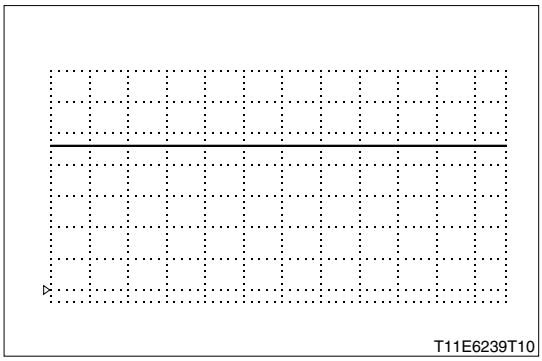
(4) Check procedure

∑1. Checking the EFI ECU signal

1. Connect the SST.
   SST: 09842-97209-000
2. Start the engine.
3. Check the output between the following terminals by using an oscilloscope.
   (1) Between SST121 (KNK) and SST19 (E2)

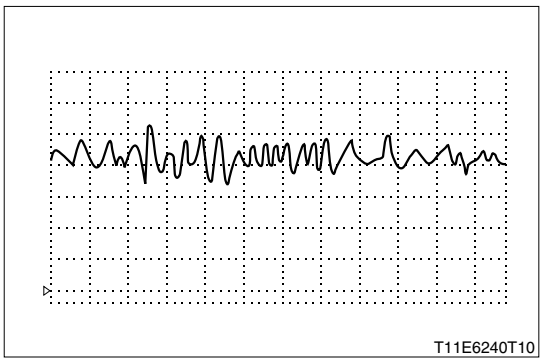
Time axis	50μs / DIV
Voltage axis	500mV / DIV
Condition	When the air conditioner turned "OFF", no electric load, and while idling

The condition under which the air conditioner is turned "OFF": the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".



Time axis	50μs / DIV
Voltage axis	500mV / DIV
Condition	When the air conditioner turned "OFF", no electric load, and while racing

The condition under which the air conditioner is turned "OFF": the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".



4. While identification of the waveform is not possible, check if the waveform as shown in the diagram (an example) is outputted.
   (1) Waveforms are supplied for the idling time and the racing time, respectively.

▼ If it is OK, perform a check of the EFI ECU circuit, and then go to ∑4.
Refer to Page A1-39.

▼ If it is NG, go to ∑2.

∑2. Checking the wire harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the knock sensor
   (2) Between EFI ECU and the body earth
   Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, perform a check of the installation status of the knock sensor, and then go to ∑3.
▼ If it is NG, repair the malfunctioning harness and connectors or replace them if necessary, and then go to ∑4.

∑3. Checking the signal unit of the knock sensor.

1. Carry out the single unit checking of the knock sensor.
   Refer to Page B8-182.

▼ If it is OK, perform a check of the EFI ECU circuit, and then go to ∑4.
▼ If it is NG, replace the knock sensor, and then go to ∑4.

Refer to TERIOS SERVICE MANUAL

∑4. Confirmation test

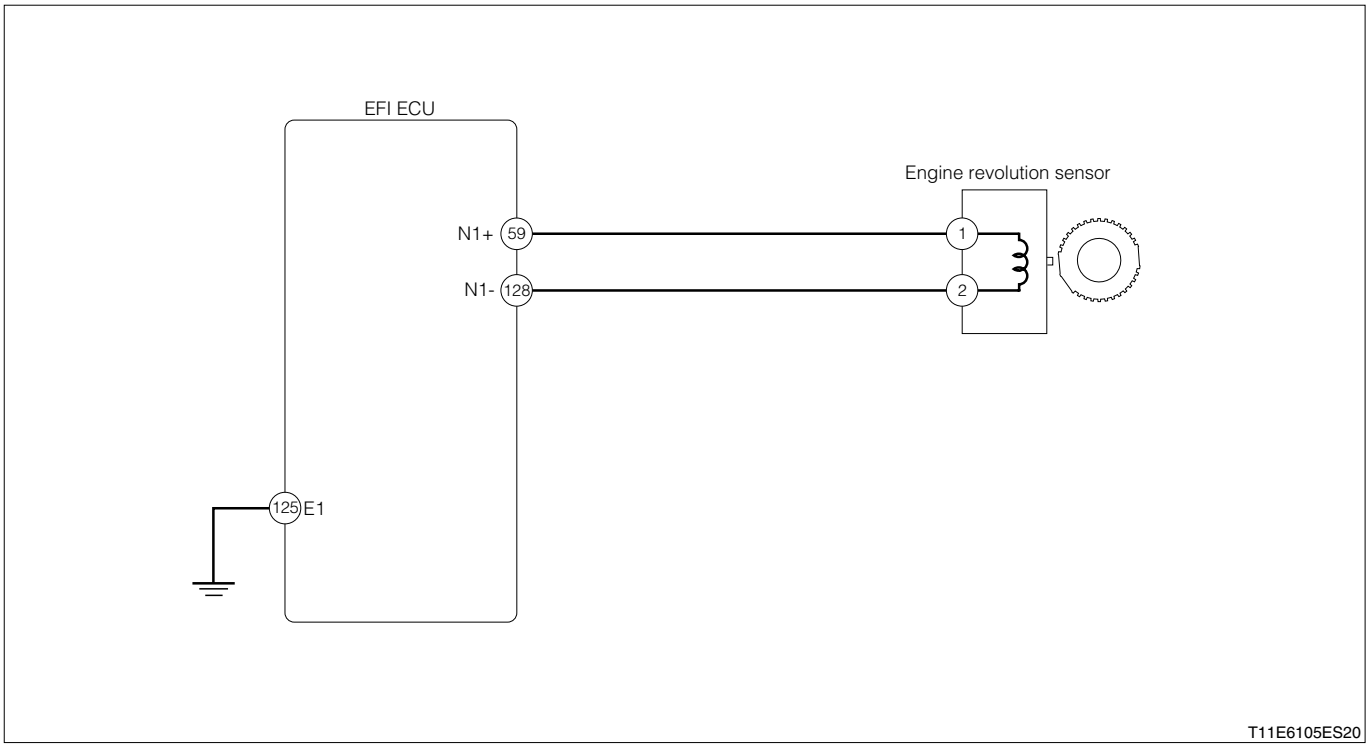
1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Read the diagnosis codes using the DS-Ⅱ.
4. Check that diagnosis code No. P0325/18 is not output.
   SPECIFIED VALUE: P0325/18 (Vibrating-type knock sensor signal) is not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

Refer to TERIOS SERVICE MANUAL

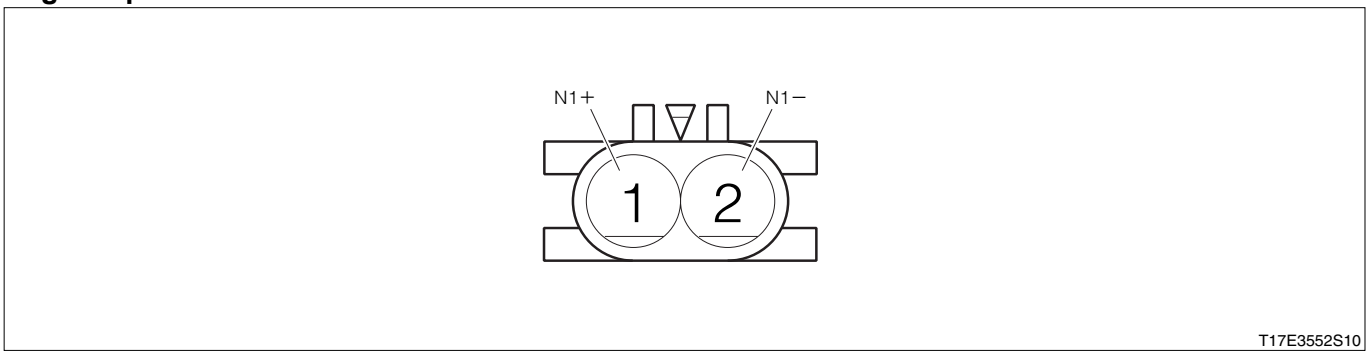
1-13-18 P0335/13 (CRANK ANGLE SENSOR SIGNAL)

(1) System diagram



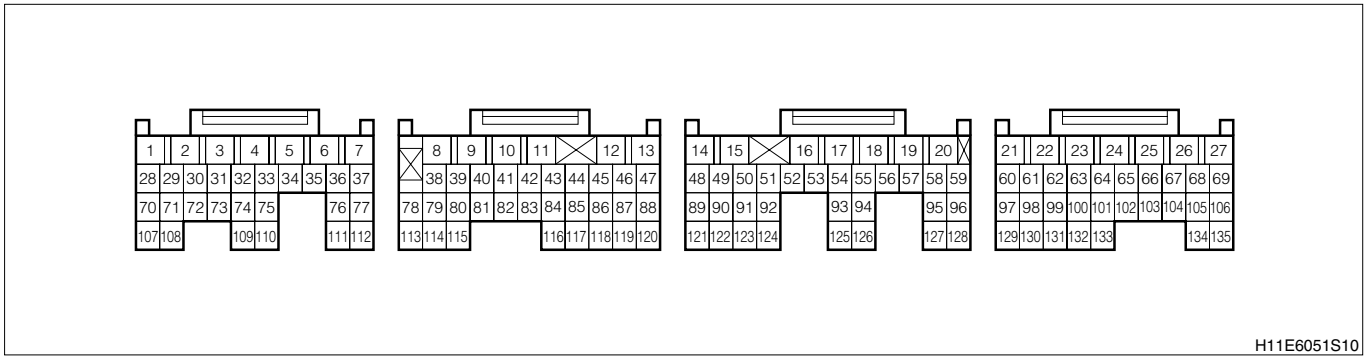
T11E6105ES20

Engine speed sensor connected vehicle harness side connector



T17E3552S10

EFI ECU connected vehicle harness side connector



H11E6051S10

(2) Output conditions

1. If no revolution speed signal is input while cranking is continued for several seconds

(3) Checking Points

1. Is the signal from the engine speed sensor input to EFI ECU?
2. Is the harness between the engine speed sensor and EFI ECU normal?
3. Is the output from the engine speed sensor correct?

(4) Check procedure

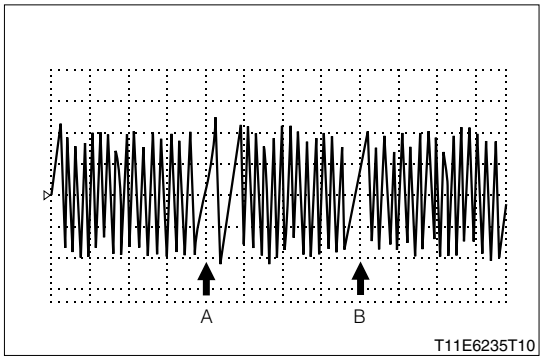
≫1. Checking the EFI ECU signal

1. Connect the SST.
   SST: 09842-97209-000

2. Check the output between the following terminals by using an oscilloscope.
   (1) Between SST59(N1＋) and SST128(N1－)

Time axis	10ms /DIV
Voltage axis	2V / DIV
Condition	The air conditioner is turned "OFF": no electric load applied; when the engine is "idling."

The condition under which the air conditioner is turned "OFF": the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".



NOTE

- **While identification of the waveform is not possible, check if the waveform as shown in the diagram (an example) is outputted.**

3. Check the following points.
   (1) The cylinder distinguishing signals (A) and (B) are supplied, respectively.
   (2) The waveform period becomes shorter as the engine speed becomes higher.

▼ If it is OK, perform a check of the EFI ECU circuit, and then go to ≫5.

▼ If it is NG, go to ≫2.

≫2. Checking the wire harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the engine speed sensor
   (2) Between EFI ECU and the body earth
   Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, go to ≫3.

▼ If it is NG, repair the malfunctioning harness and connectors or replace them if necessary, and then go to ≫5.

≫3. Checking the single unit of the engine speed sensor

1. Carry out the single unit checking of the engine speed sensor.
   Refer to Page B8-179.

▼ If it is OK, go to ≫4.

▼ If it is NG, replace the engine revolution speed sensor, and then go to ≫5.

Refer to TERIOS SERVICE MANUAL

≫4. Checking of the crank shaft

1. Visually check the signal rotor section of the crankshaft for any missing teeth or deformation.
   SPECIFIED VALUE: No missing teeth or deformation

▼ If it is OK, perform a check of the connection status of each connector or the installation status of the engine revolution speed sensor, and then go to ≫5.
▼ If it is NG, replace the signal rotor, and then go to ≫5.

≫5. Confirmation test

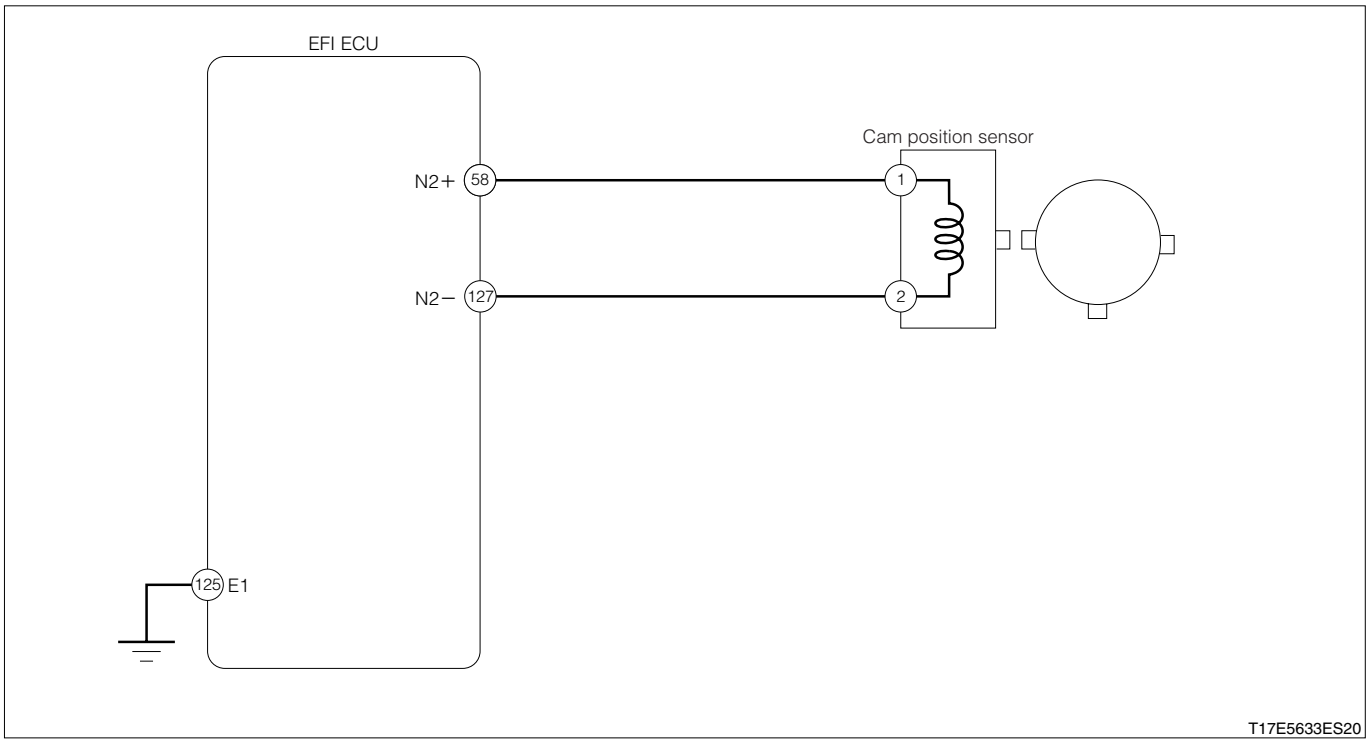
1. Erase the diagnosis codes.
2. Start the engine.
3. Read the diagnosis codes using the DS-Ⅱ.
4. Check that diagnosis code No. P0335/13 is not output.
   SPECIFIED VALUE: P0335/13 (Engine revolution speed sensor signal system) is not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

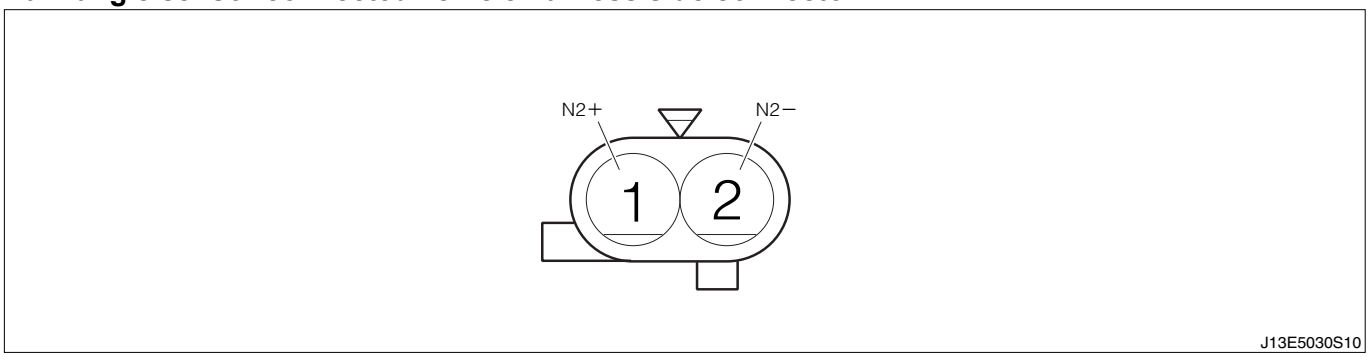
Refer to TERIOS SERVICE MANUAL

1-13-19 P0340/14 (CAM ANGLE SENSOR SIGNAL)

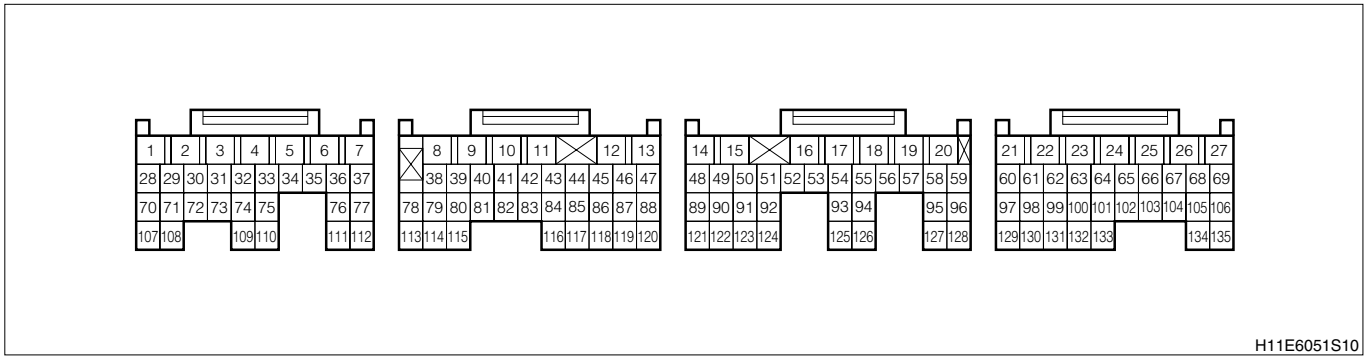
(1) System diagram



Cam angle sensor connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

1. When the signal from the cam angle sensor is not outputted consecutively for a certain length of time after the engine is started

(3) Checking Points

1. Is the signal from the cam angle sensor input to EFI ECU?
2. Is the harness between the cam angle sensor and EFI ECU correct?
3. Is the output from the cam angle sensor correct?

(4) Check procedure

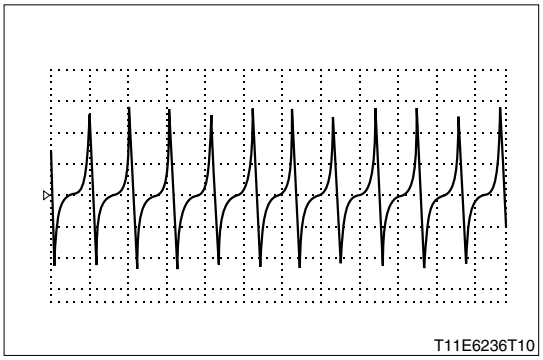
∑1. Checking the EFI ECU output signal

1. Connect the SST.
   SST: 09842-97209-000

2. Check the output waveforms between the following terminals by using an oscilloscope.
   (1) Between SST58(N2＋) and SST127(N2－)

Time axis	50ms / DIV
Voltage axis	1V / DIV
Condition	The air conditioner is turned "OFF": no electric load applied; when the engine is "idling."

The condition under which the air conditioner is turned "OFF," and the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF."



NOTE

- **While identification of the waveform is not possible, check if the waveform as shown on the diagram (an example) is outputted.**

3. Check the following points.
   (1) A periodic waveform is supplied.
   (2) The waveform period becomes shorter as the engine speed becomes higher.

▼ If it is OK, it is possible that the system has returned to the normal condition. Therefore, leave the system as it is to observe the condition for a while.

▼ If it is NG, go to ∑2.

∑2. Checking the wire harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the cam angle sensor
   (2) Between EFI ECU and the body earth
   Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, go to ∑3.

▼ If it is NG, repair the malfunctioning harness and connectors or replace them if necessary, and then go to ∑5.

∑3. Checking the single unit of the cam angle sensor

1. Carry out the single unit checking of the cam angle sensor.
   Refer to Page B8-179.

▼ If it is OK, go to ∑4.
▼ If it is NG, replace the camshaft angle sensor, and then go to ∑5.

Refer to TERIOS SERVICE MANUAL

∑4. Checking the cam shaft

1. Visually check the signal rotor section of the cam shaft for any missing teeth or deformation.
   SPECIFIED VALUE: No missing teeth or deformation

▼ If it is OK, perform a check of the connection status of each connector or the installation status of the camshaft angle sensor, and then go to ∑5.
▼ If it is NG, replace the camshaft, and then go to ∑5.

∑5. Confirmation test

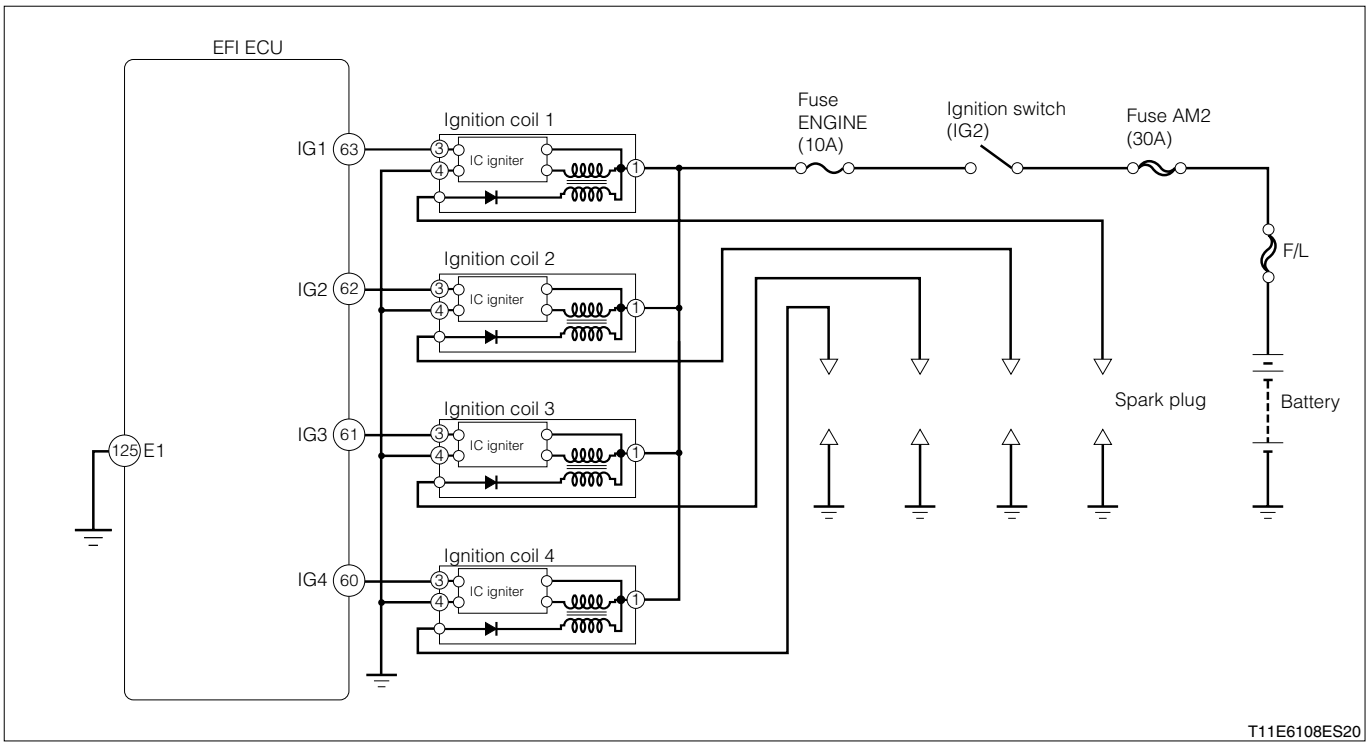
1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Read the diagnosis codes using the DS-Ⅱ.
4. Check that diagnosis code No. P0340/14 is not output.
   SPECIFIED VALUE: P0340/14 (Camshaft angle sensor signal system) is not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

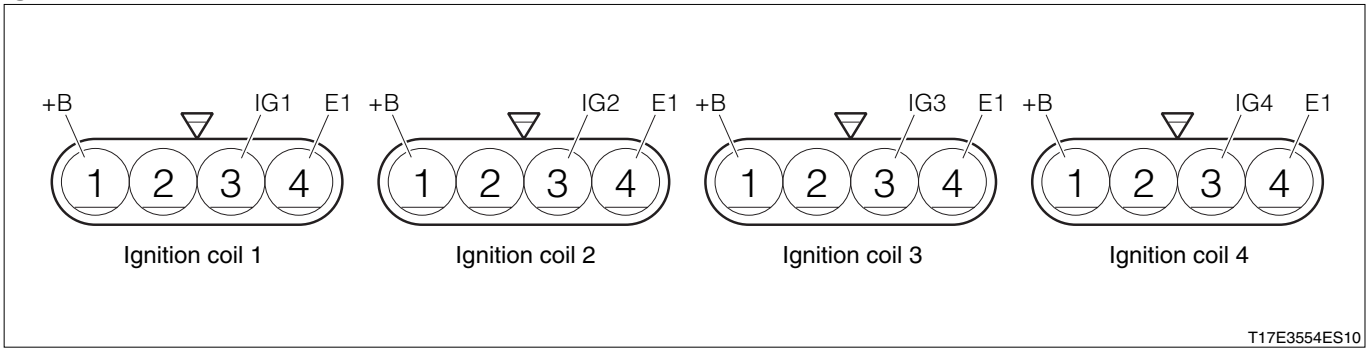
Refer to TERIOS SERVICE MANUAL

1-13-20 P0350/16 (IGNITION SYSTEM (PRIMARY)),P0351/16 (IGNITION SYSTEM (PRIMARY) (CYLINDER #1))
P0351/16 (IGNITION SYSTEM (PRIMARY) (CYLINDER #2)), P0351/16 (IGNITION SYSTEM (PRIMARY) (CYLINDER #3))
P0351/16 (IGNITION SYSTEM (PRIMARY) (CYLINDER #4)),

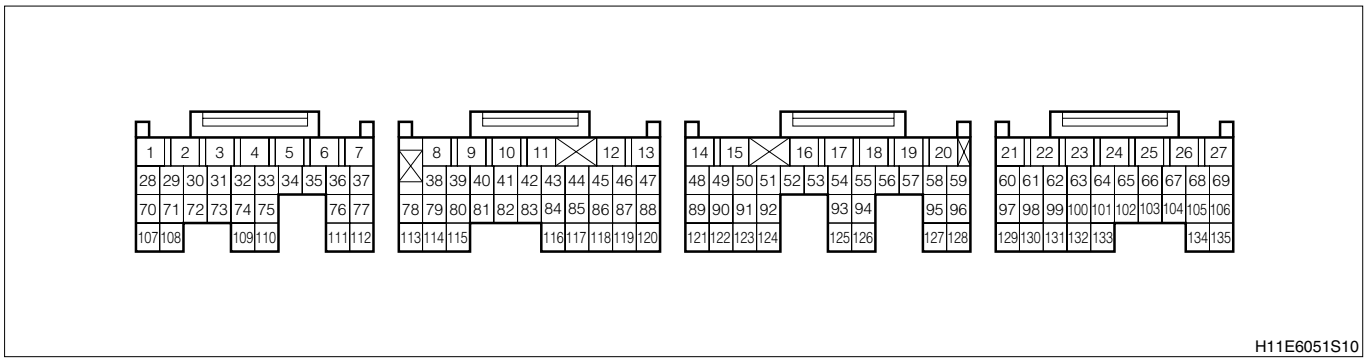
(1) System diagram



Ignition coil connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

[1] P0350/16

1. When the ignition signal is not outputted consecutively for a certain length of time after the engine is started

[2] P0351/16, P0352/16, P0353/16, P0354/16

1. When ignition signals of the relevant cylinder from the EFI ECU are not output consecutively for a certain length of time

(3) Checking Points

1. Is the power supply voltage at the ignition coil normal?
2. Is the harness between the ignition coil and EFI normal?
3. Are the sparks from the spark plug good?

(4) Check procedure

∑1. Spark check(1)

Refer to Page B8-25.

▼ If it is OK, it is possible that the system has returned to the normal condition. Therefore, leave the system as it is to observe the condition for a while.

▼ If it is NG, go to ∑2.

∑2. Spark check(2)

1. Perform the spark check after exchanging a malfunctioning ignition coil into a normal ignition coil.

SPECIFIED VALUE: Spark generates

▼ If it is OK, replace a malfunctioning ignition coil and go to ∑5

▼ If it is NG, go to ∑3.

∑3. Checking the ignition coil voltage

1. When the ignition switch is set to "ON", measure the voltage between each of the following terminals.
   (1) Between each ignition coil connected vehicle harness side connector (+B) and the body earth

SPECIFIED VALUE: Battery voltage

▼ If it is OK, go to ∑4.

▼ If it is NG, repair the harnesses between each ignition coil and the battery, or replace them if necessary, and then go to ∑5.

∑4. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and each ignition coil
   (2) Between EFI ECU and the body earth
   (3) Between each ignition coil connected vehicle harness side connector (E1) and the body earth

Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, perform a check of the EFI ECU circuit, and then go to ∑5.

Refer to TERIOS SERVICE MANUAL

▼ If it is NG, repair the malfunctioning harness and connectors, or replace them if necessary, and then go to ∑5.

⊳5. Confirmation test

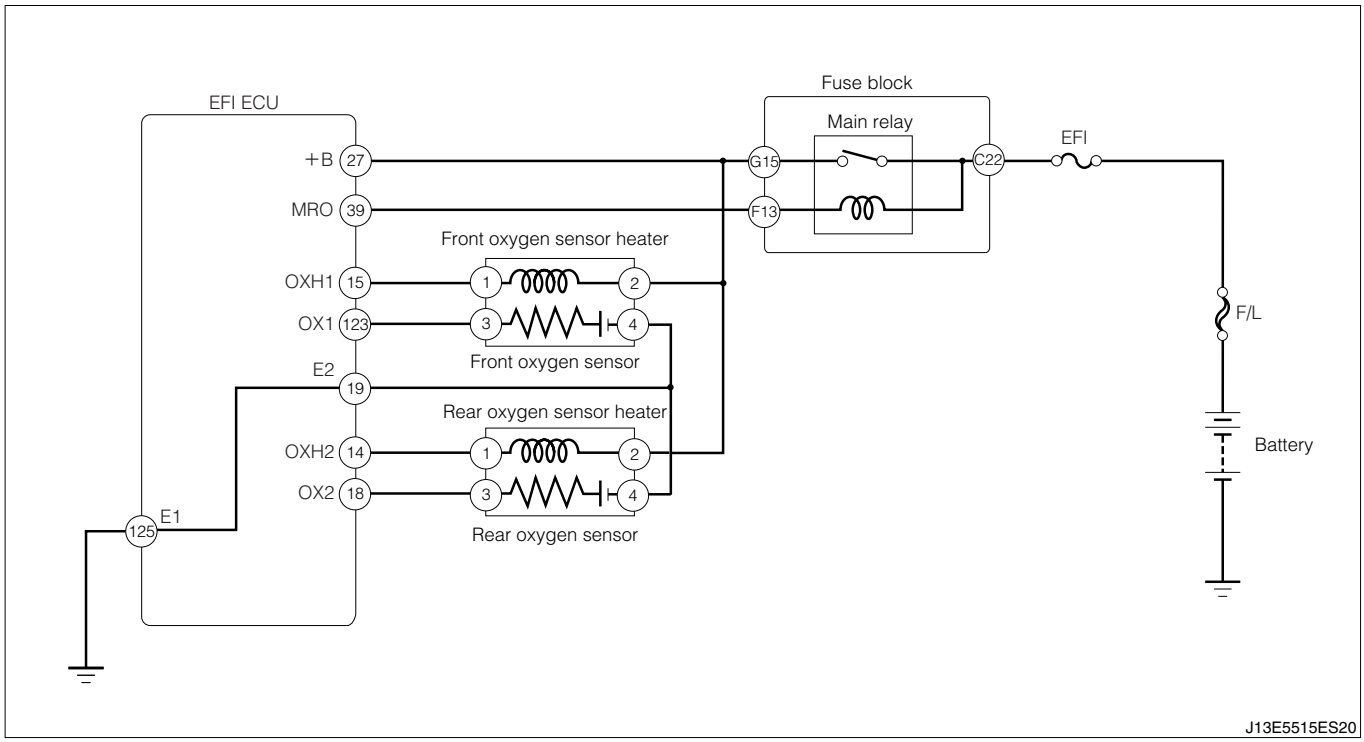
1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Read the diagnosis codes using the DS-Ⅱ.
4. Check that diagnosis codes No. P0350/16, P0351/16, P0352/16, P0353/16, and P0354/16 are not output.

SPECIFIED VALUE: P0350/16 (Primary ignition system) is not output.
P0351/16 (Primary ignition system (Cylinder #1)), P0352/16 (Primary ignition system (Cylinder #2)), P0353/16 (Primary ignition system (Cylinder #3)), and P0354/6 (Primary ignition system (Cylinder #4)) are not output.

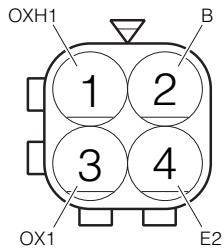
▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

Refer to TERIOS SERVICE MANUAL

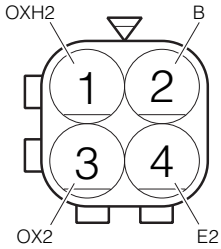
1-13-21 P0420/27 (CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD)
(1) SYSTEM DESCRIPTION



Oxygen sensor connected vehicle harness side connector



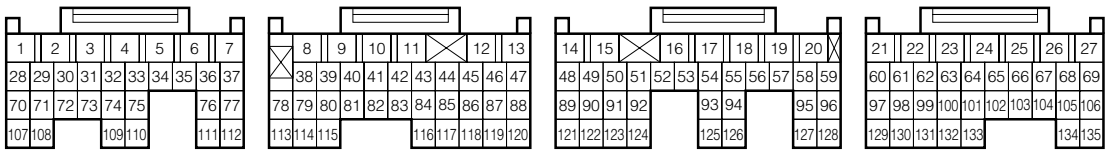
Front oxygen sensor connection vehicle harness side connector



Rear oxygen sensor connection vehicle harness side connector

J13E5509ES10

EFI ECU connected vehicle harness side connector



H11E6051S10

(2) Conditions for output

1. When, after warming up the engine, and while the vehicle speed is 50km/h, the voltage of the rear oxygen sensor signal is high and a state of slow response continues for 40 seconds or more, and when these abnormal signals are detected twice or more

(3) POINTS TO CHECK

NOTE

- **When this code is output at the same time as another code, perform the check starting with the other code.**

Is the signal from the rear oxygen sensor being input into the EFI ECU?
Is the output of the rear oxygen sensor correct?
Is the harness between the rear oxygen sensor and the EFI ECU normal?

(4) Check procedure

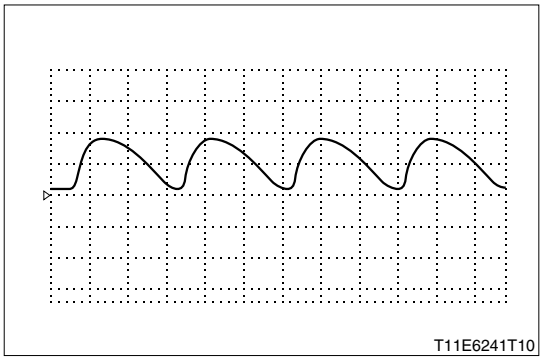
∑1. EFI ECU INPUT SIGNAL CHECK

1. Connect the SST to the vehicle.
   SST: 09842-97209-000

2. Check the input waveform between the following terminals, using an oscilloscope.
   (1) Between SST18 (OX2) and SST125 (E1)

Time axis	200ms / DIV
Voltage axis	500mV / DIV
Condition	The air conditioner is turned off, there is no electric load, and the engine speed is maintained at 3000rpm

The condition under which the air conditioner is turned "OFF", and the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".



NOTE

- **While identification of the waveform is not possible, check if the waveform as shown in the diagram (an example) is outputted.**

3. Check for the following points.
   (1) The front oxygen sensor is activated and a waveform is output.
   (2) The rear oxygen sensor is activated and a waveform is output.
   (3) The waveform 0 ⇄ 1V is output.

NOTE

- **The correct output for the oxygen sensor signal cannot be confirmed without using an oscilloscope.**

   (4) The output waveforms and voltages for the front oxygen sensor signal and the rear oxygen sensor signal are different.

▼ If it is OK, go to ∑2.
▼ If it is NG, go to ∑4.

⌦2. Unit check of oxygen sensor

1. Perform a unit check of the front and rear oxygen sensors
2. Front oxygen sensor
   Refer to Page B8-180.

3. Rear oxygen sensor
   Refer to Page B8-181.

   Refer to Page B8-181.

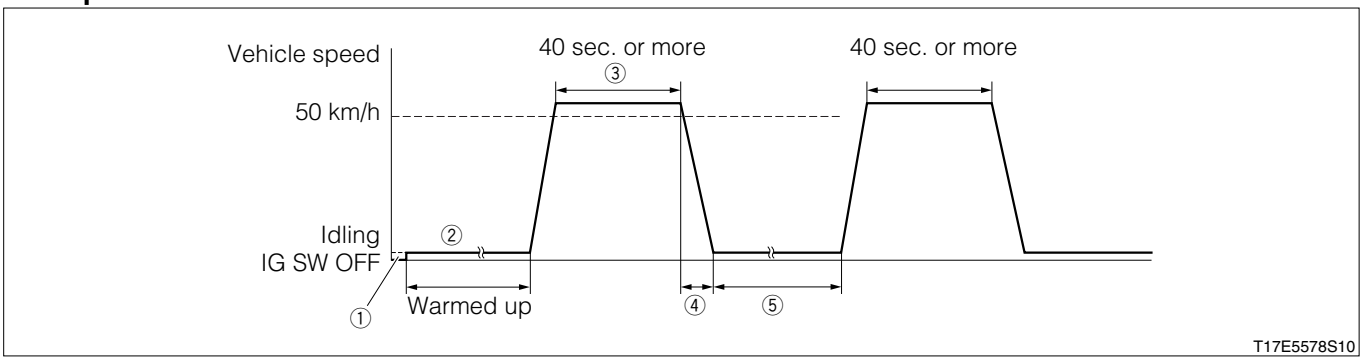
   ▼ If it is OK, go to ⌦3.
   ▼ If it is NG, replace the defective oxygen sensor and go to ⌦3.

Refer to TERIOS SERVICE MANUAL

≫3. Confirmation test

1. Use the following procedure to confirm that the diagnosis code is not output again.

Drive pattern



(1) Check the diagnosis code, and ensure that an abnormality code is not output.(① in the illustration)
(2) Start the engine and warm it up until the radiator fan starts rotating. (② in the illustration)
(3) Follow the driving pattern, drive the vehicle at a vehicle speed of 50km/h or more for at least 40 seconds.(③ in the illustration)
(4) Decelerate to 50km/h or less.(④⑤ in the illustration)
(5) Accelerate again to 50km/h or more, and drive for at least 40 seconds.(⑥ in the illustration)
(6) Diagnosis code P0420/27 (catalyst deterioration) is not output.

NOTE

- **If the conditions for this test are not strictly followed, malfunctions will not be able to be detected.**

SPECIFIED VALUE: P0420/27 (catalyst deterioration) is not output.

▼ If it is OK, finish the troubleshooting.
▼ If it is NG, proceed to ≫4.

≫4. Exhaust gas leakage check

1. Lift up the vehicle and check for exhaust gas leakage at the front and rear of the catalyst.
SPECIFIED VALUE: Ensure that there is no leakage of exhaust gas

▼ If it is OK, go to ≫5.
▼ If it is NG, repair or replace the gaskets or the piping of the defective sections, and perform troubleshooting again from ≫3.

≫5. Replace exhaust manifold (three-way catalyst)

1. Replace the exhaust manifold (three-way catalyst)
(1) Exhaust manifold (three-way catalyst)

Refer to TERIOS SERVICE MANUAL

SPECIFIED VALUE: Ensure that there is no leakage of exhaust gas

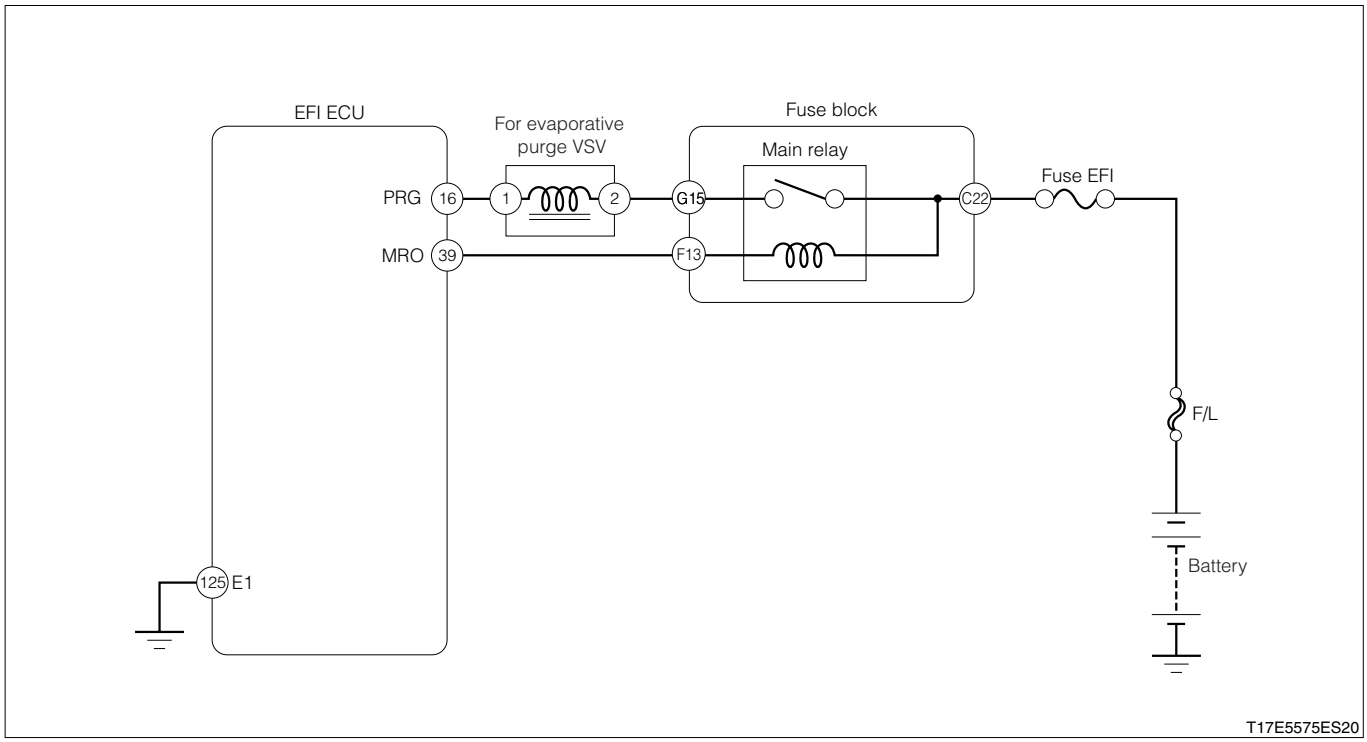
2. After completing the necessary replacements and checks, perform troubleshooting again.
SPECIFIED VALUE: Diagnosis code P0420/27 (catalyst deterioration) is not output.

▼ If it is OK, finish the troubleshooting.
▼ If it is NG, replace the EFI ECU.

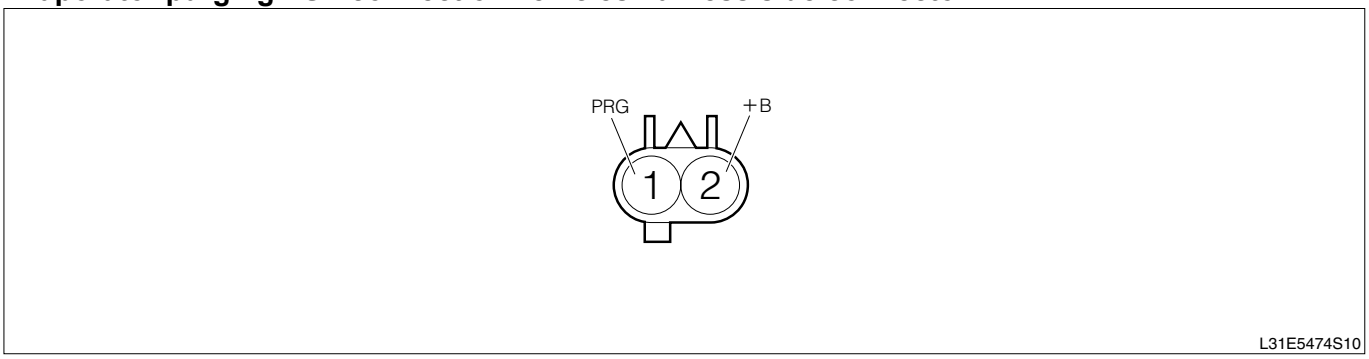
Refer to TERIOS SERVICE MANUAL

1-13-22 P0443/76 (EVAPORATOR PURGE VSV)

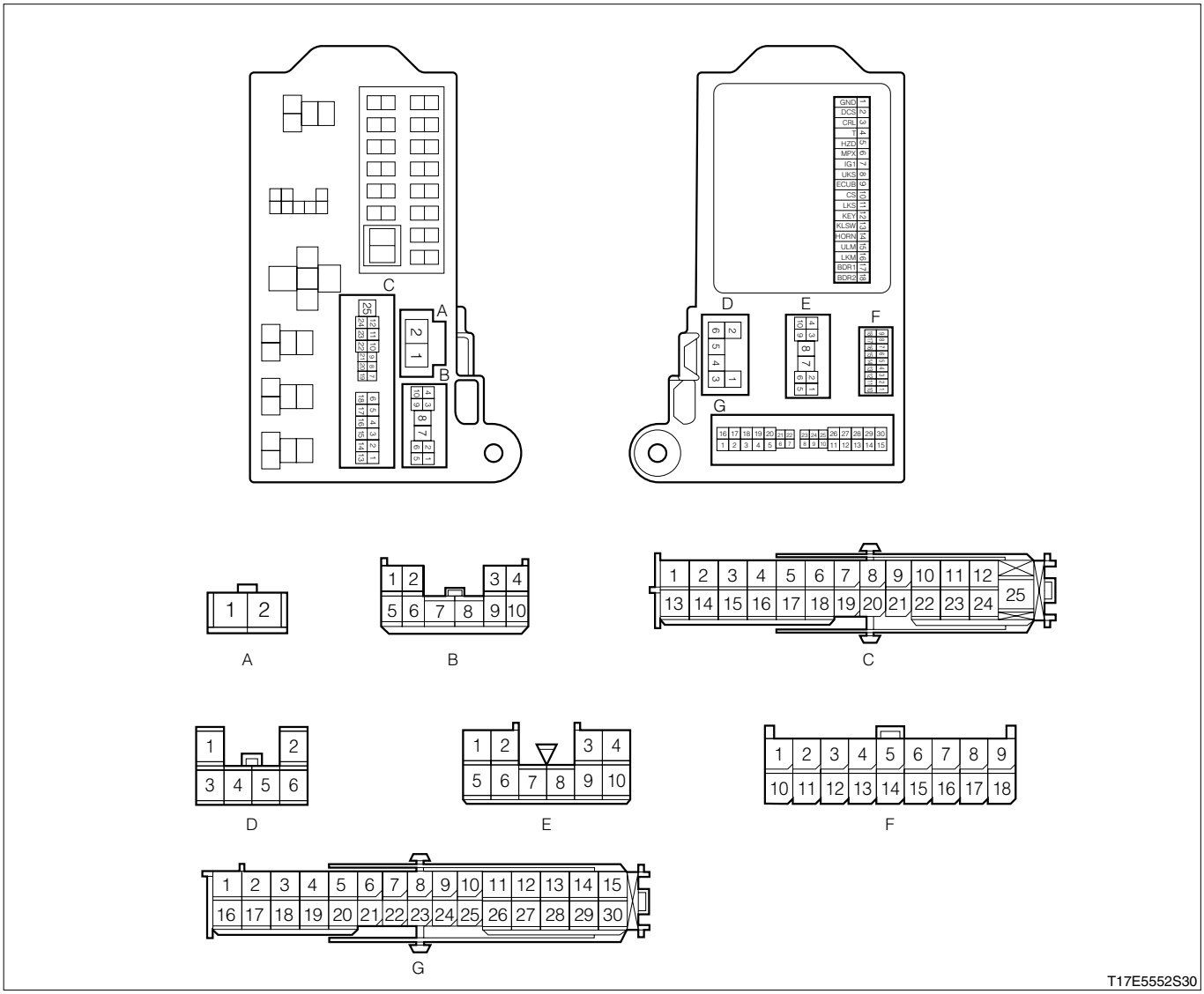
(1) System diagram



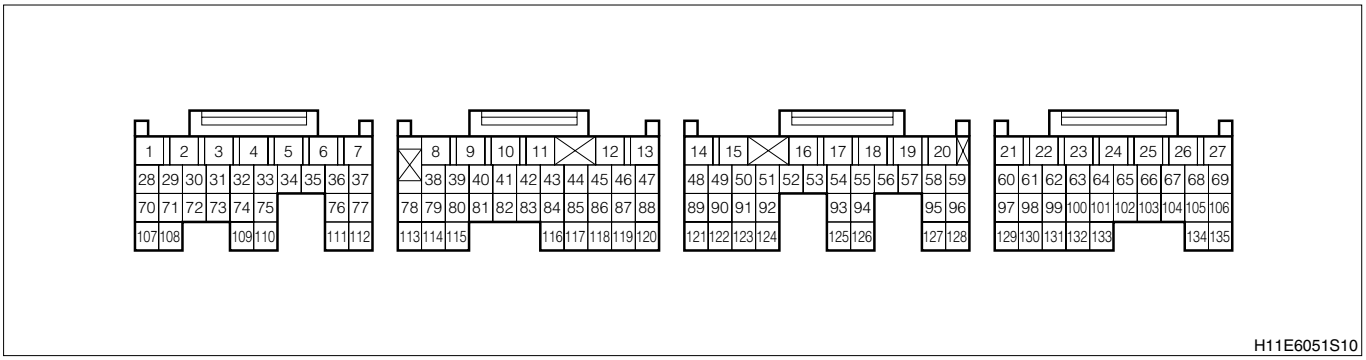
Evaporator purging VSV connection vehicles harness side connector



Fuse block connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

1. When it has never been turned "ON" or "OFF" by the VSV detection signal for the evaporator purge after the engine is started

(3) Checking Points

1. Is the harness between VSV for evaporator purge and EFI ECU normal?
2. Is the VSV control signal for evaporator purge correctly output from EFI ECU?
3. Is VSV for evaporator correctly operating?
4. Is the power supply voltage of the VSV for evaporative purge normal?

(4) Check procedure

≫1. Checking of the evaporator purge system hose

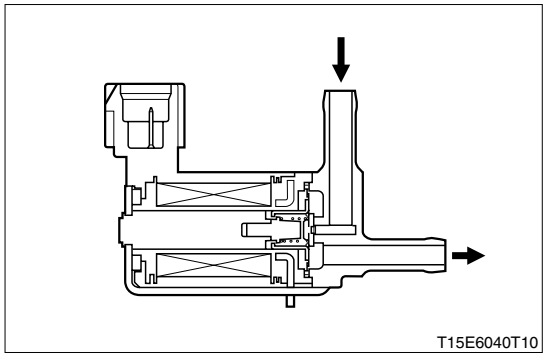
1. Check the hose for the evaporator purge system for missing or damages.
   SPECIFIED VALUE: No missing or damages existing

▼ If it is OK, go to ≫2.
▼ If it is NG, repair the hose, or replace it if necessary, and then go to ≫9.

≫2. Active test

1. Carry out the active test [Purge VSV] by using the DS-Ⅱ.
   SPECIFIED VALUE:

	Ventilation between ports
When it is "ON"	Ventilation existing
When it is "OFF"	No ventilation existing



▼ If it is OK, go to ≫8.
▼ If it is NG, go to ≫3.

≫3. Checking the fuse block (main relay resistance)

1. Disconnect the fuse connectors C and F of the fuse block.
2. Check the resistance between the following terminals.
   (1) Between the fuse block side C connector 22 (B) and the fuse block side F connector 13 (COL－)
   SPECIFIED VALUE: At 131－230Ω (20℃)

Refer to TERIOS SERVICE MANUAL

▼ If it is OK, go to ≫4.
▼ If it is NG, replace the fuse block, and then go to ≫9.

≫4. Checking the fuse block voltage (1)

1. Disconnect the connector C of the fuse block.
2. Measure the voltage between the following terminals with the ignition switch set to "ON".
   (1) Between fuse block connected vehicle harness side C connector 22 (B) and body earth
   SPECIFIED VALUE: Battery voltage

▼ If it is OK, go to ≫5.
▼ If it is NG, check the harness between the fuse block and the battery and the connectors, or repair them if necessary, and then go to ≫9.

≫5. Checking the fuse block voltage (2)

1. Disconnect the connector G of the fuse block.
2. Measure the voltage between the following terminals with the ignition switch set to "ON".
   (1) Between fuse block connection vehicle harness side connector G 15 (L) －body earth

SPECIFIED VALUE: Battery voltage

▼ If it is OK, go to ≫6.
▼ If it is NG, replace the fuse block, and then go to ≫9.

≫6. Checking the single unit of the VSV for evaporator purge

1. Carry out the single unit checking of the VSV for evaporator purge.
   Refer to Page B8-185.

▼ If it is OK, go to ≫7.
▼ If it is NG, replace the VSV for the evaporator.

≫7. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the fuse block
   (2) Between EFI ECU and the VSV for evaporator purge
   (3) Between EFI ECU and each ignition coil

   Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, perform a check of the EFI ECU circuit, and then go to ≫9.
Refer to Page A1-39.

▼ If it is NG, repair the malfunctioning harness and connectors, or replace them if necessary, and then go to ≫9.

≫8. Data monitor

1. Read out the data monitor [Evaporative purge output] by using the DS-Ⅱ.
   (1) After the engine is warmed up (after the radiator fan rotated one time or more), carry out the checking while stepping on the accelerator pedal (with the idling switch set to "OFF") for 2 minutes or more.

SPECIFIED VALUE:

The engine condition	Displayed data
Air conditioner turned "OFF"; no electrical load applied; engine speed at 2000 rpm retained	0－100*

The condition under which the air conditioner is turned "OFF," and the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF."

* Pulse generated by the duty control.

NOTE

- **VSV for the evaporator purge will operate only during air-to-fuel ratio feedback.**

▼ If it is OK, perform a check of the connection status of each connector or the installation status of the VSV for evaporative purge, and then go to ≫9.
▼ If it is NG, perform a check of the EFI ECU circuit, and then go to ≫9.
Refer to Page A1-39.

⊳9. Confirmation test

1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Drive the vehicle for at least 10 minutes.
4. After stopping the vehicle, keep the accelerator depressed (Idling switch OFF) for at least 2 minutes.
5. Read the diagnosis codes using the DS-Ⅱ.
6. Check that diagnosis code No. P0443/76 is not output.

SPECIFIED VALUE: P0443/76 (Evaporative purge VSV) is not output.

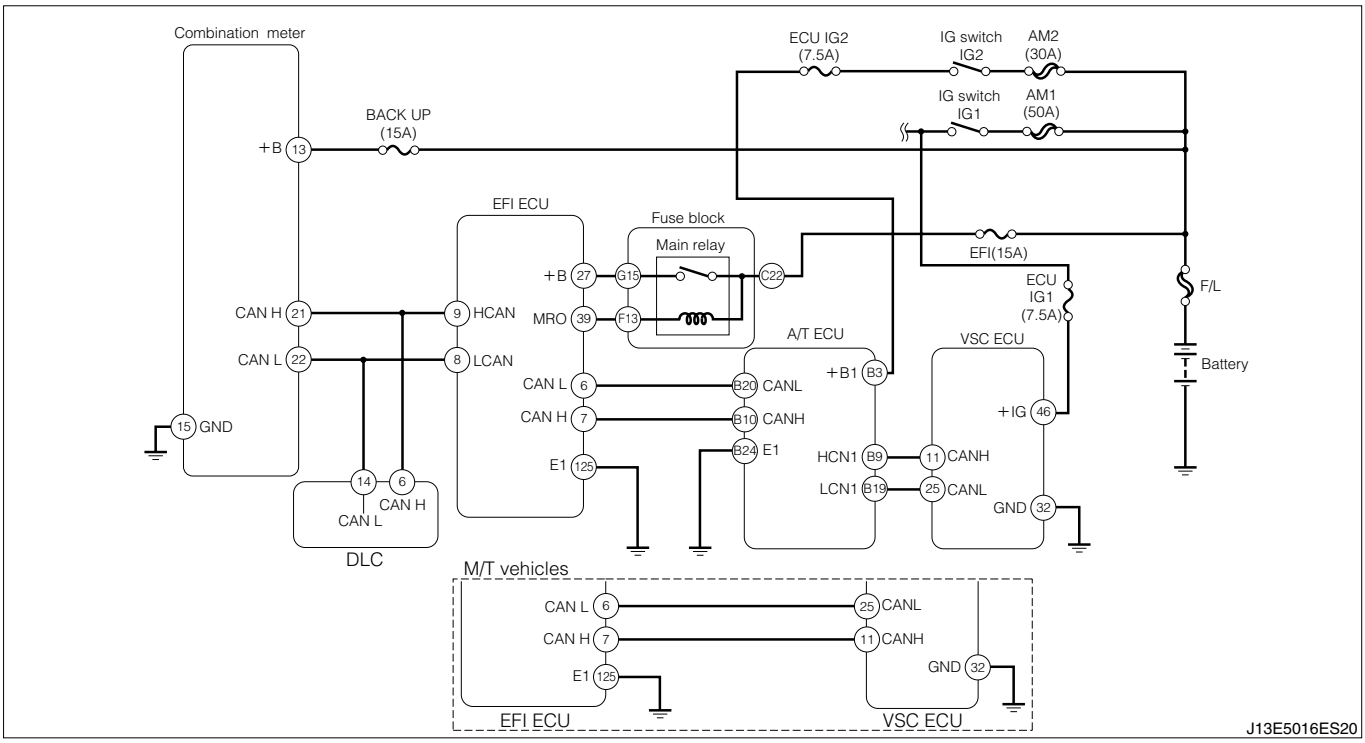
▼ If it is OK, end troubleshooting.

▼ If it is NG, replace the EFI ECU.

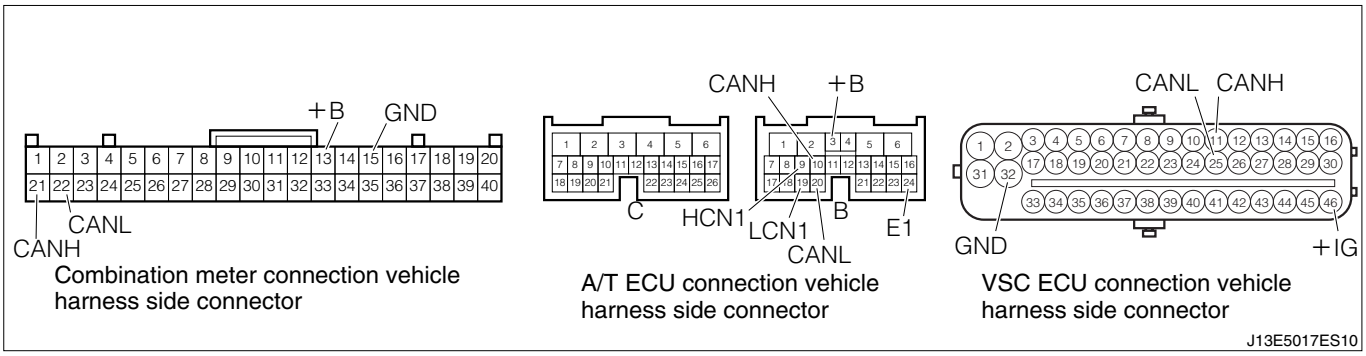
Refer to TERIOS SERVICE MANUAL

1-13-23 P0500/52 (VEHICLE SPEED SENSOR SIGNAL SYSTEM)

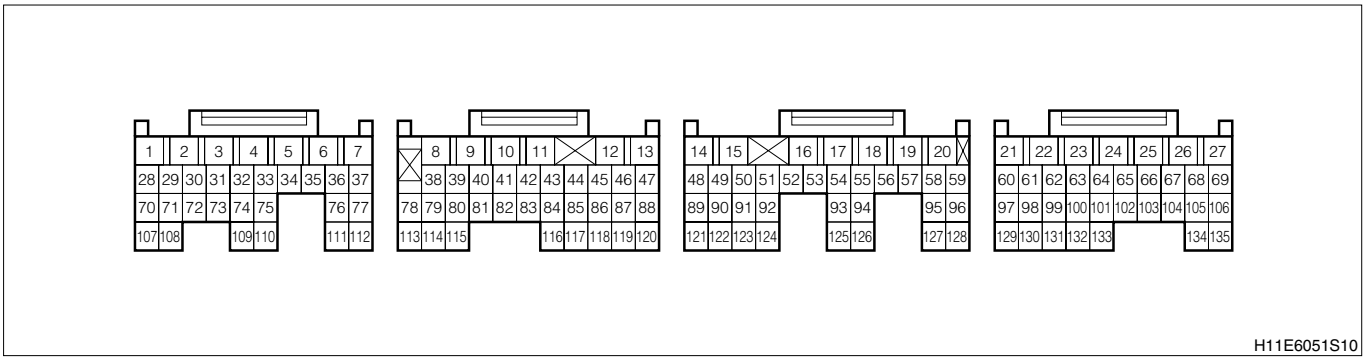
(1) System diagram



Unit connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Output conditions

When a condition in which the vehicle speed reached 0 km/h lasted for a certain length of time within the setting range of the engine speed at deceleration during fuel cutting

(3) Checking Point

1. Is the CAN communication system normal?
2. Is the vehicle speed signal system functioning normally?

(4) Checking method

∑1. Checking the CAN communication system

1. Perform the basic check for the CAN communication.
   Refer to Page L2-7.

   ▼ If it is OK, go to ∑2 (Vehicles equipped with VSC).
   ▼ If it is OK, go to ∑3 (Vehicles not equipped with VSC).
   ▼ If it is NG, repair the malfunctioning section or replace it if necessary, and then go to ∑4.

∑2. Diagnosis code confirmation (VSC-related codes)

1. Confirm the diagnosis codes.

Refer to TERIOS SERVICE MANUAL

   ▼ If it is OK, perform a check of the EFI ECU circuit, and then go to ∑4.
   Refer to Page A1-39.

   ▼ If it is NG, check the diagnosis codes output.

∑3. Speedometer check

1. Perform a function check for the speedometer.

Refer to TERIOS SERVICE MANUAL

   ▼ If it is OK, perform a check of the EFI ECU circuit, and then go to ∑4.
   Refer to Page A1-39.

   ▼ If it is NG, perform a check of the combination meter's input signal, and then go to ∑4.

∑4. Confirmation test

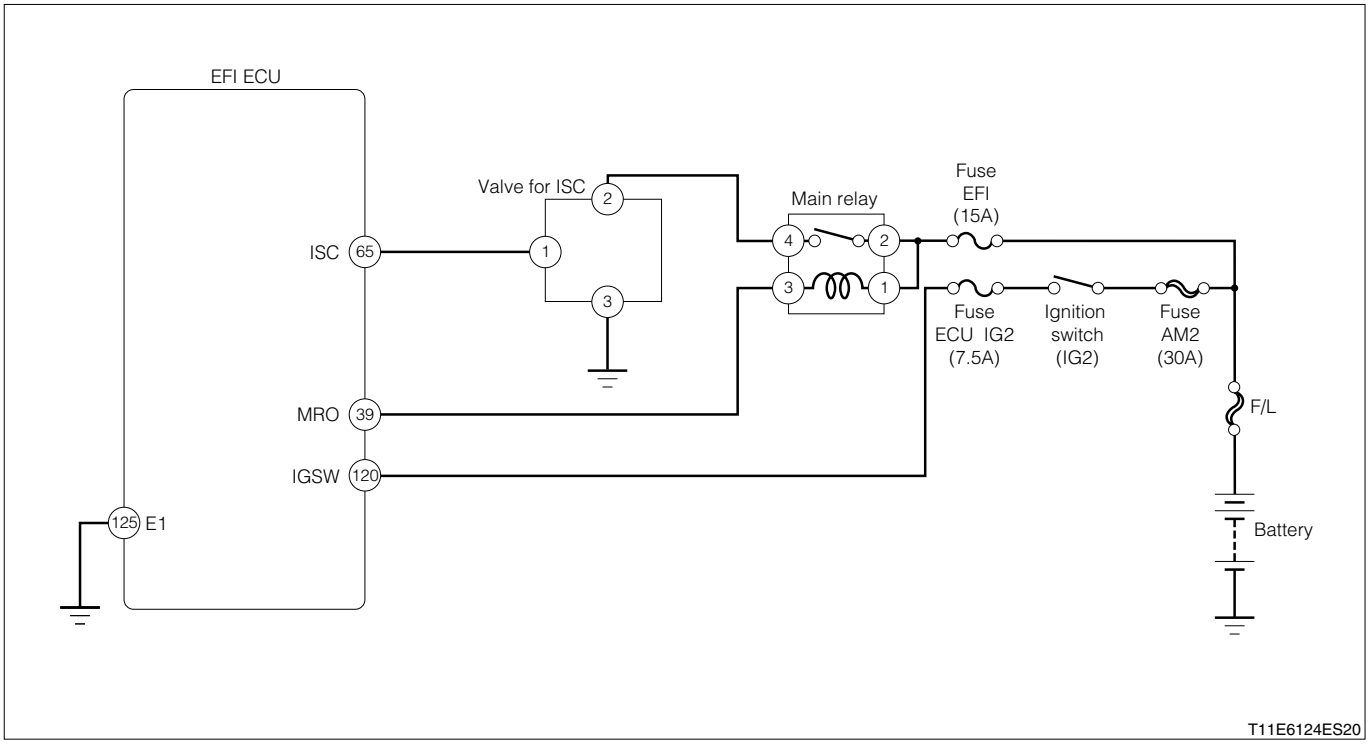
1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Select 1st gear or [2] range, and accelerate the vehicle to approximately 4000 rpm.
4. Decelerate slowly without using the brake.
5. Read the diagnosis codes using the DS-Ⅱ.
6. Check that diagnosis code No. P0500/52 is not output.
   SPECIFIED VALUE: P0500/52 (Vehicle speed sensor signal system) is not output.

   ▼ If it is OK, end troubleshooting.
   ▼ If it is NG, replace the EFI ECU.

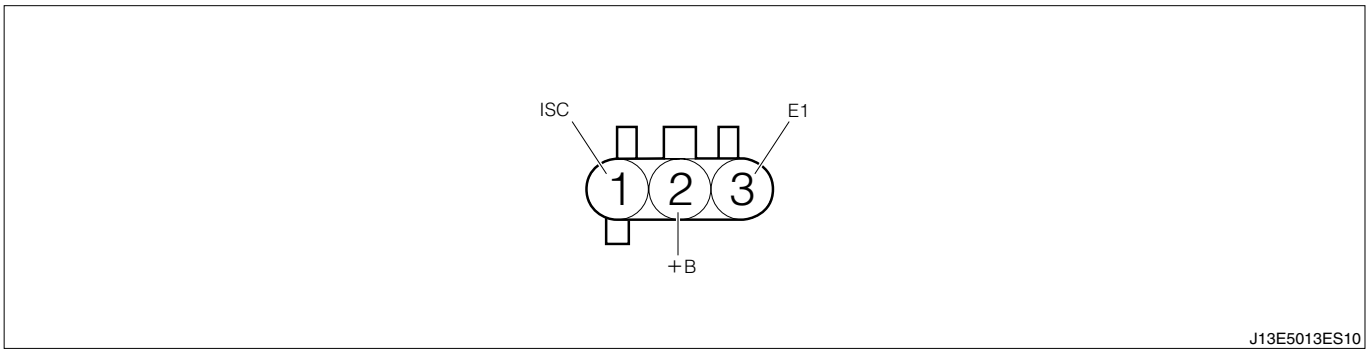
Refer to TERIOS SERVICE MANUAL

1-13-24 P0505/71 (ISC VALVE SYSTEM (IDLING CONTROL SYSTEM))

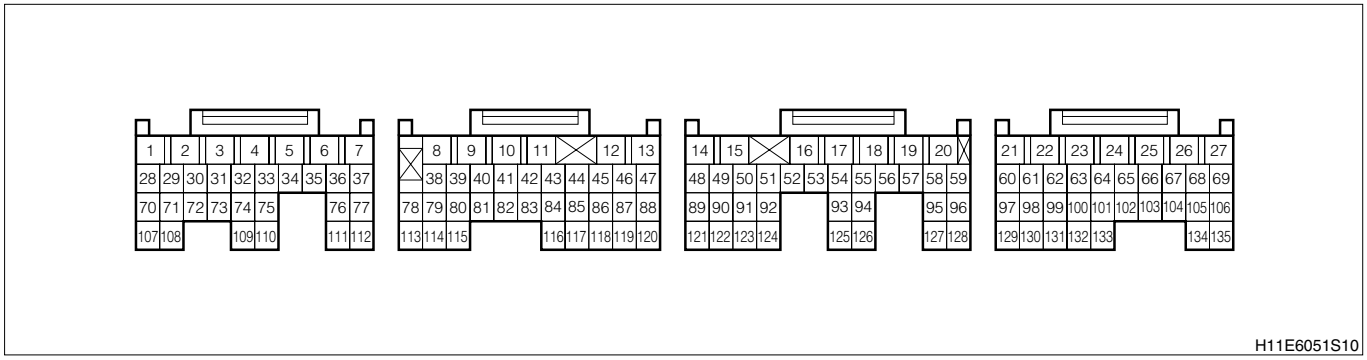
(1) System diagram



ISC valve connection vehicles harness side connector



EFI ECU connection vehicle harness side connector



(2) Conditions for output

1. When the valve detection signal for ISC use has not been turned on or off since the engine was started.

(3) POINTS TO CHECK

1. Is the harness between the ISC valve and the EFI ECU normal?
2. Is the power supply voltage of the ISC valve normal?
3. Is the ISC valve control signal being correctly output from the EFI ECU?
4. Is the harness between each sensor or switch and the EFI ECU normal?
5. Is the ISC valve operating correctly?

(4) Check procedure

≫1. Active test

1. Warm up the engine fully.
2. Carry out the active tesut "ISC" by using the DS-Ⅱ.
   (1) Ensure that the engine revolution speed increases when "50%" is selected, and that it decreases when "5%" is selected.

SPECIFIED VALUE: The engine revolution speed changes.

▼ If it is OK, go to ≫2.
▼ If it is NG, go to ≫3.

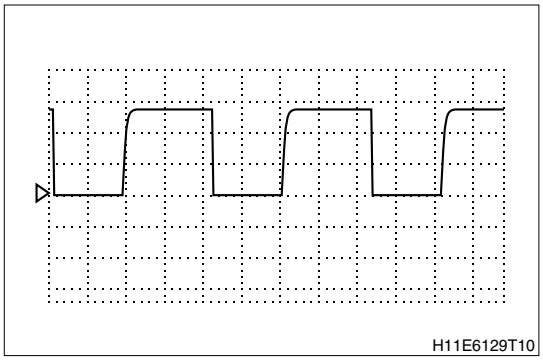
≫2. Check the EFI ECU signal

1. Connect the SST.
   SST: 09842-97209-000

2. Check the output between the following terminals by using an oscilloscope.
   (1) Between SST65 (ISC) and 125 (E1)

Time axis	1 ms/DIV
Voltage axis	5 V/DIV
Measuring conditions	When the air conditioner is set to ON, an electric load is being applied, and the engine is idling

Air conditioner set to ON: the air conditioner switch (ACSW), blower switch (BLW), and magnet clutch (MGC) are all set to ON.

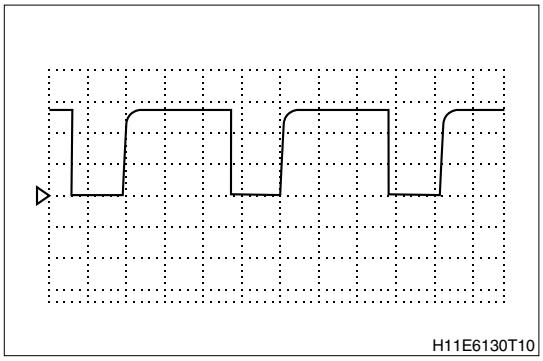

H11E6129T10

NOTE

- **The waveform cannot be specified, but check that a waveform like that shown in the diagram (example) is output.**

Time axis	1 ms/DIV
Voltage axis	5 V/DIV
Measuring conditions	When the air conditioner is set to OFF, no electric load is being applied, and the engine is idling

Air conditioner set to OFF: the air conditioner switch (ACSW), blower switch (BLW), and magnet clutch (MGC) are all set to OFF.


H11E6130T10

NOTE

- **The waveform cannot be specified, but check that a waveform like that shown in the diagram (example) is output.**

3. Check the following points.
   (1) 0 V ⇄ a battery voltage pulse is generated.
   (2) The duty ratio varies according to the electric load.

▼ If it is OK, go to ∑>6.

▼ If it is NG, check the EFI ECU circuit and go to ∑>6.

Refer to Page A1-39.

∑>3. Check wire harness continuity

1. Disconnect the connectors of the EFI ECU and the ISC valve.
2. Perform a check of the conduction between the following terminals.
   (1) Between the EFI ECU connected vehicle harness side connector 65 (ISC) and the ISC valve connected vehicle harness side connector 1 (ISC)
   (2) Between EFI ECU and the body earth

Refer to Page A1-37.

SPECIFIED VALUE: Continuity exists

3. Check the earth ground of the ISC valve.
   (1) Between the ISC valve connected vehicle harness side connector 3 (E1) and the body earth

SPECIFIED VALUE: Continuity exists

▼ If it is OK, go to ∑>4.

▼ If it is NG, repair the malfunctioning harness and connectors, or replace them if necessary, and then go to ∑>6.

∑>4. ISC valve voltage checking

1. Check the voltage of the ISC valve.
2. Disconnect the connector of the ISC valve.
3. With the IG switch set to ON, measure the voltage between the ISC valve connected vehicle harness side connector 2 (+B) and the body earth.

SPECIFIED VALUE: Battery voltage

▼ If it is OK, go to ∑>5.

▼ If it is NG, perform the following operations and go to ∑>6.

(1) Repair harness or connector
(2) Check relay and replace if necessary

∑>5. Single unit check of the ISC valve

1. Perform a single unit check of the ISC valve.

Refer to Page B8-183.

▼ If it is OK, check the EFI ECU circuit and go to ∑>6.

Refer to Page A1-39.

▼ If it is NG, replace the ISC valve and go to ∑>6.

Refer to TERIOS SERVICE MANUAL

⊳6. Confirmation test

1. Erase the diagnosis codes.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Read the diagnosis codes using the DS-Ⅱ.
4. Check that diagnosis code No. P0505/71 is not output.
   SPECIFIED VALUE: P0505/71 (ISC valve system) is not output.

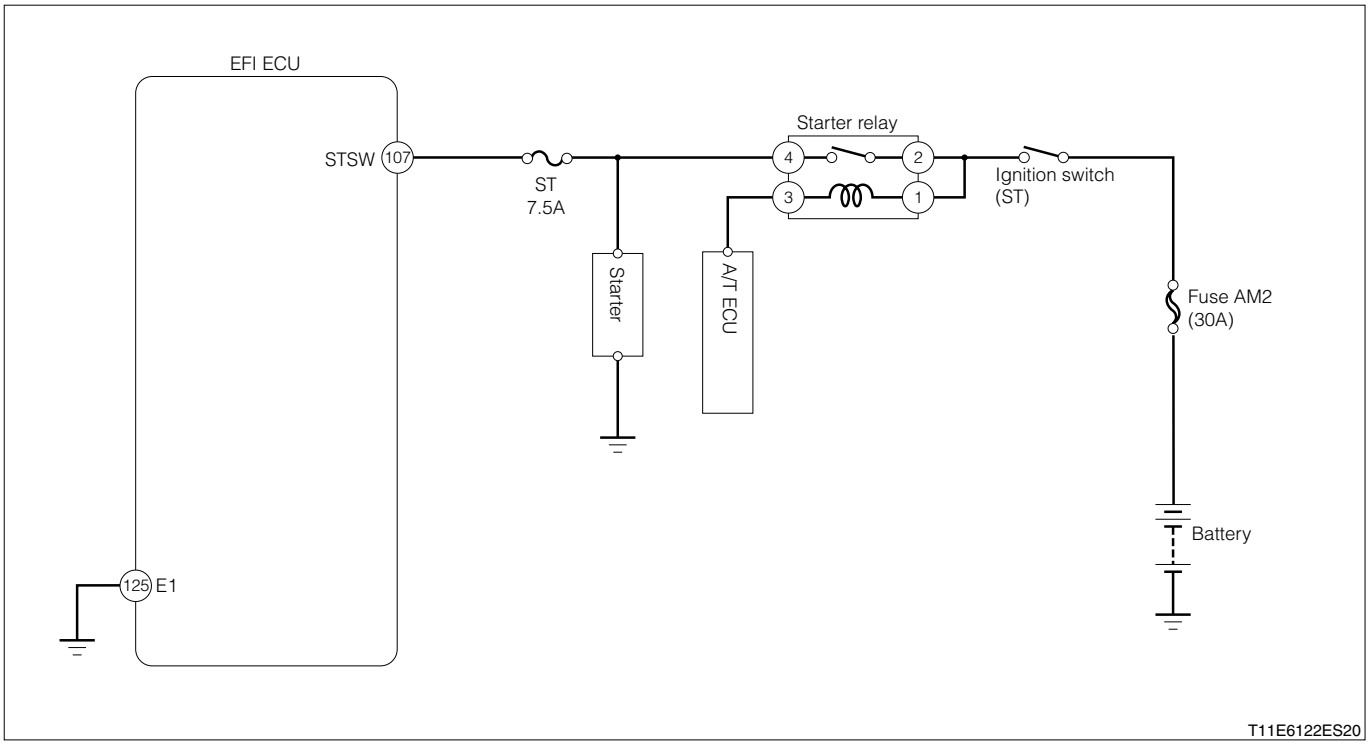
▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

Refer to TERIOS SERVICE MANUAL

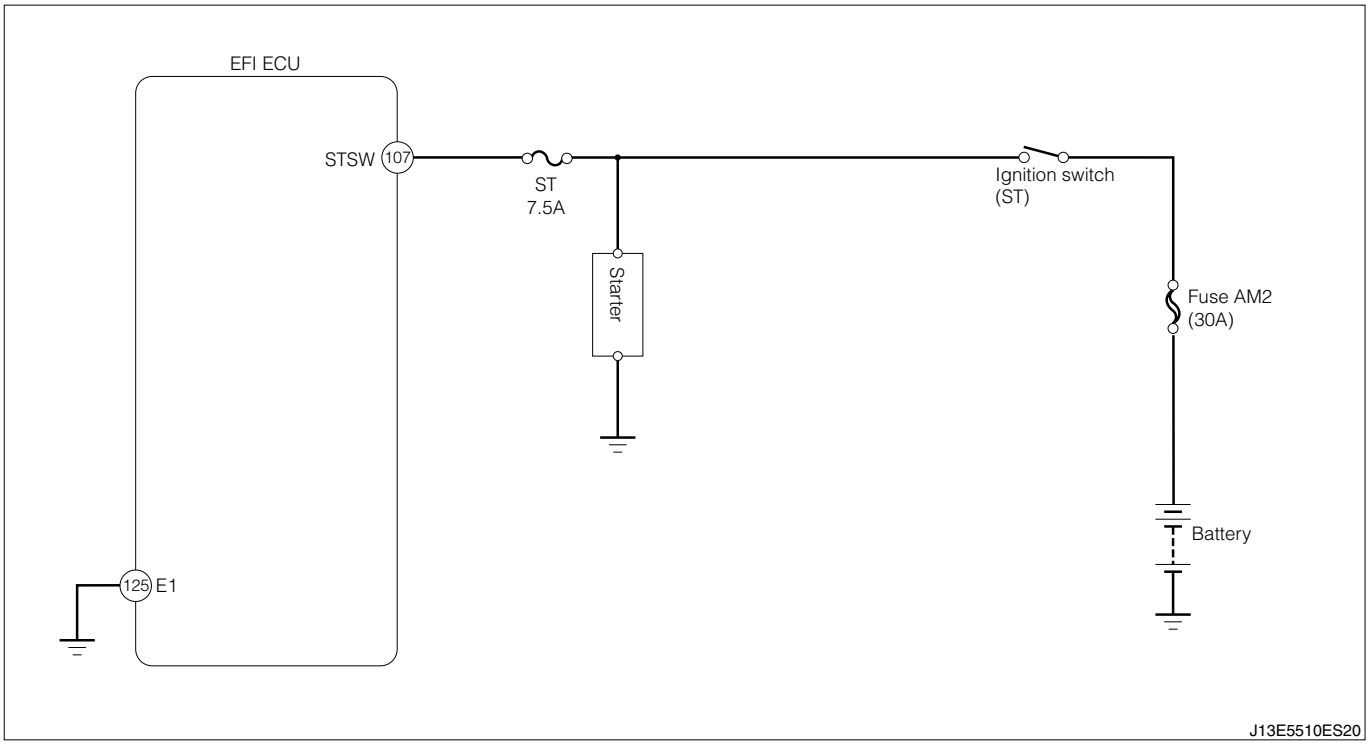
1-13-25 P0512/54 (STARTER SIGNAL SYSTEM)

(1) System diagram

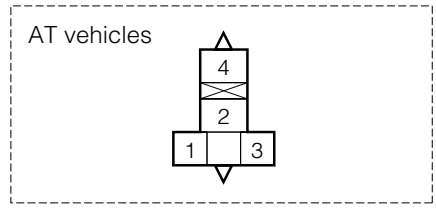
[1] A/T vehicle



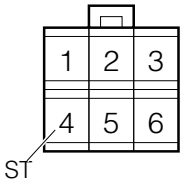
[2] M/T vehicle



Each unit, relay etc. connected vehicle harness side connector



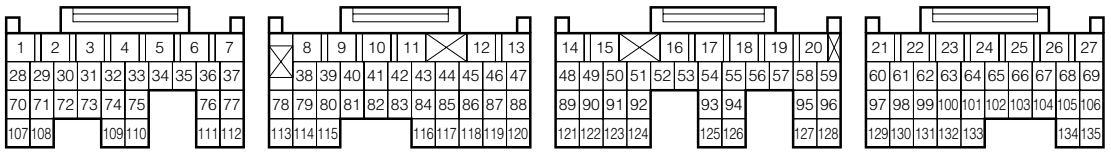
Starter relay connection junction block side connector



IG switch connection vehicle harness side connector

T17E5632ES10

EFI ECU connected vehicle harness side connector



H11E6051S10

(2) Output conditions

1. When "ON" signal is not output when the engine speed is higher than the specified value with the vehicle speed at 0 km/h

(3) Checking Point

1. Is the harness between the starter and EFI ECU normal?

(4) Check procedure

∑1. EFI ECU signal checking

1. Connect the SST.
   SST: 09842-97209-000

2. During cranking, measure the voltage between the following terminals
   (1) Between SST 107 (STSW) and SST 125 (E1)
   SPECIFIED VALUE: Battery voltage

▼ If it is OK, perform a check of the EFI ECU circuit, and then go to ∑3.
Refer to Page A1-39.

▼ If it is NG, go to ∑2.

∑2. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the ignition switch
   Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, perform a basic check of the CAN communication system, and then go to ∑3.
Refer to Page L2-7.

▼ If it is NG, repair the malfunctioning harness and connectors, or replace them if necessary, and then go to ∑3.

⊳3. Confirmation test

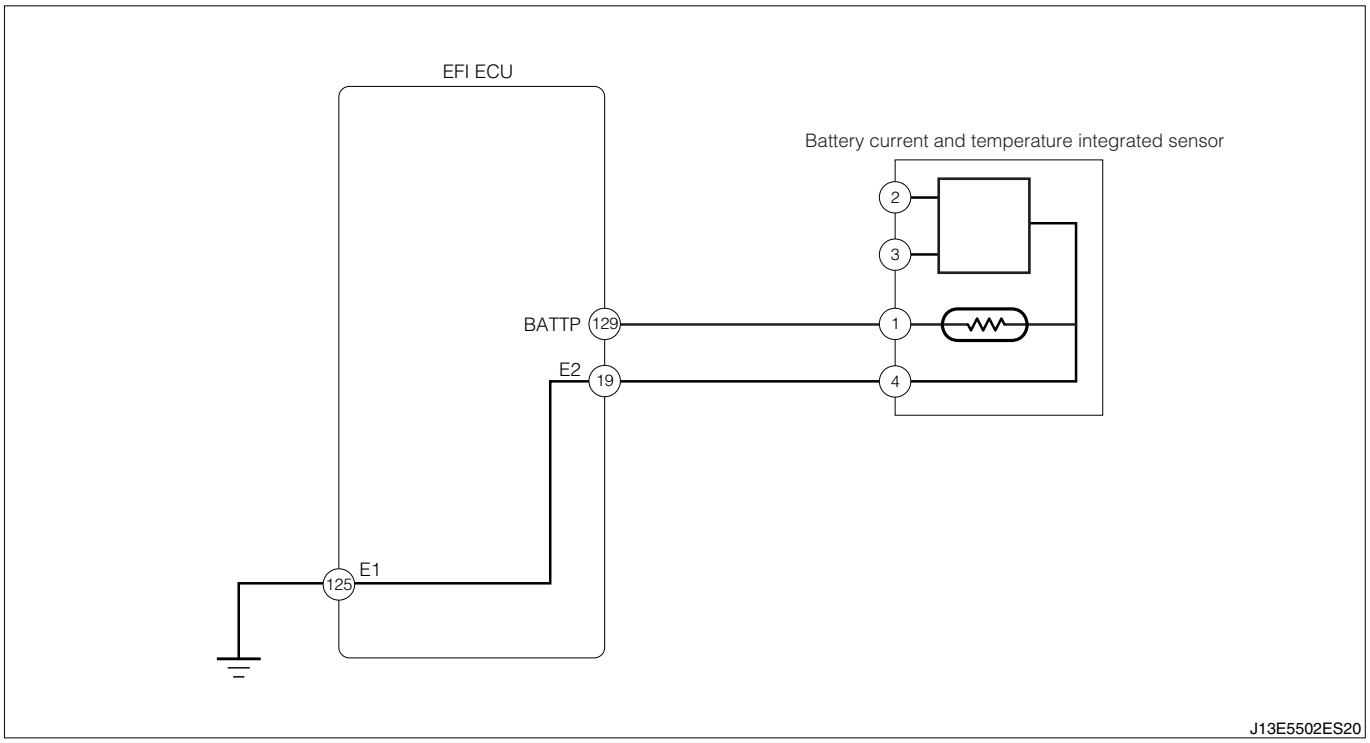
1. Erase the diagnosis code.
2. Start the engine.
3. Read the diagnosis codes using the DS-Ⅱ.
4. Check that diagnosis code No. P0512/54 is not output.
   SPECIFIED VALUE: P0512/54 (Starter signal system) is not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

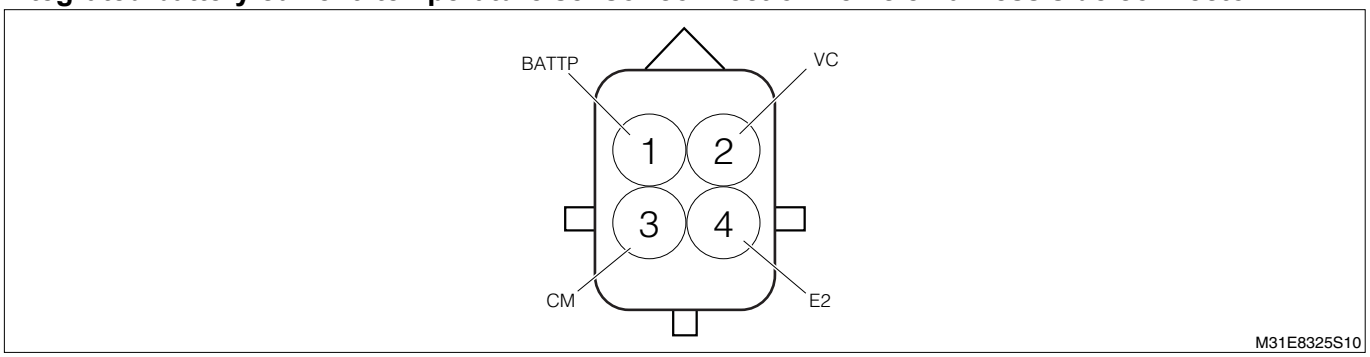
Refer to TERIOS SERVICE MANUAL

1-13-26 P0515/39 (BATTERY TEMPERATURE SENSOR SIGNAL)

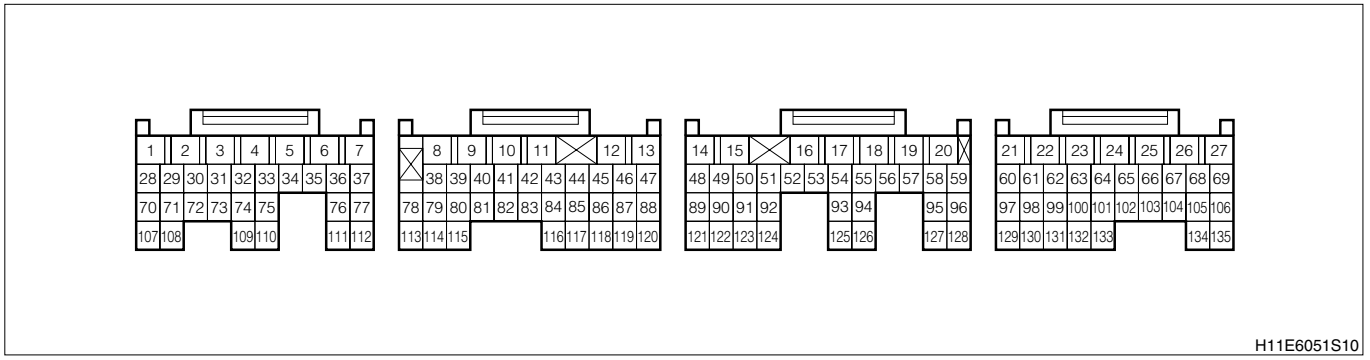
(1) System diagram



Integrated battery current·temperature sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Output conditions

1. The signals from the integrated battery current·temperature sensor (battery temperature sensor section) are not output continually for a certain length of time, after the engine has been started

(3) Checking Point

1. Are the signals from the integrated battery current·temperature sensor (battery temperature sensor section) being input into the EFI ECU?
2. Is the harness between the integrated battery current·temperature sensor (Battery temperature sensor section) and the EFI ECU functioning normally?
3. Is the integrated battery current·temperature sensor (Battery temperature sensor section) functioning normally?
4. Is the EFI ECU functioning normally?

(4) Check procedure

≫1.Data monitor

1. Read the data monitor [Charging control battery fluid temperature], using the DS-Ⅱ.
   (1) Charging control battery fluid temperature (THB)

	Displayed data	Possible causes of the malfunction
a	No change from −40℃.	Possibility of an open circuit in the integrated battery current·temperature sensor (battery temperature sensor section) system
b	No change from 140℃.	Possibility of short circuit in the integrated battery current·temperature sensor (battery temperature sensor section) system
c	There is deviation from the actual fluid temperature.	Possibility of a resistance value abnormality in the integrated battery current·temperature sensor (battery temperature sensor section) system
d	Equivalent to actual fluid temperature	Possibility of temporary malfunction

NOTE

- **The resistance characteristics (reference values) of the sensors are as follows.**

Temperature[℃]	−30	25	90
Resistance	25.1kΩ	2.0±0.1kΩ	0.24kΩ

▼ Consider the possible causes of the malfunction, and then go to ≫2.

≫2.On-vehicle check of integrated battery current·temperature sensor (Battery temperature sensor section)

1. Disconnect the connector of the integrated battery current·temperature sensor, and then measure the resistance between the terminals when the fluid temperature is 25 ℃.
   (1) Sensor side connectors 1 (BATP)−4 (E2)

   SPECIFIED VALUE: 2.0±0.1kΩ

▼ If it is OK, go to ≫3.
▼ If it is NG, go to ≫4.

⊃3.Checking the wiring harness

1. Check for open and short circuits in the wiring harnesses between the following.
   (1) Between the EFI ECU and the integrated battery current·temperature sensor
   (2) Between the EFI ECU and the body earth

   SPECIFIED VALUE: Conduction with no short-circuiting

   ▼ If it is OK, perform a check of the EFI ECU circuit, and then go to ⊃5.
   Refer to Page A1-39.

   ▼ If it is NG, repair the malfunctioning harness and connectors, or replace them if necessary, and then go to ⊃5.

⊃4.Unit check of integrated battery current·temperature sensor (Battery temperature sensor section)

1. Disconnect the connector of the integrated battery current·temperature sensor, and then perform a unit check of the battery temperature sensor section.
   Refer to Page B8-185.

   ▼ If it is OK, perform a check of the connection status of each connector or the installation status of the integrated battery current·temperature sensor, and then go to ⊃5.
   ▼ If it is NG, replace the integrated battery current·temperature sensor, and then go to ⊃5.
   Refer to Page J5-1.

⊃5.Confirmation test

1. Erase the diagnosis code.
2. Start the engine.
3. Read the diagnosis codes using the DS-Ⅱ.
4. Check that diagnosis code No. P0515/39 is not output.

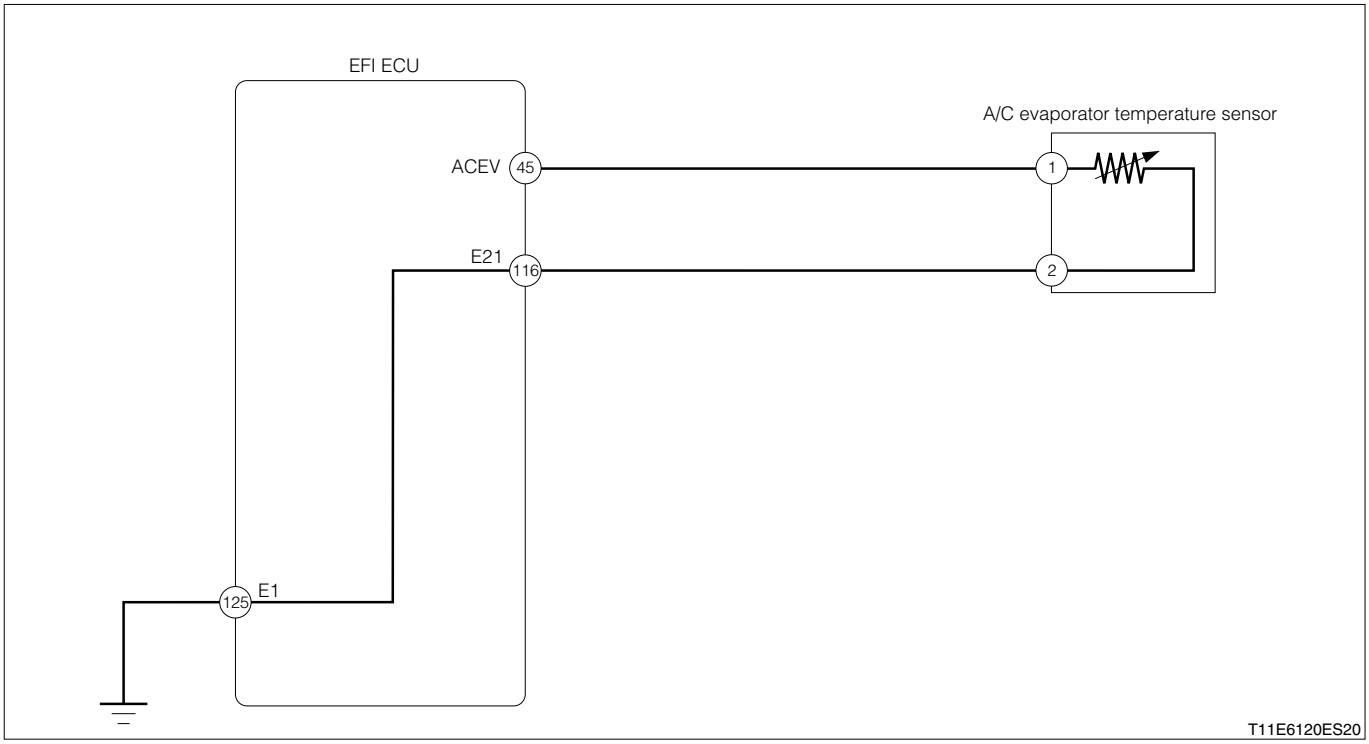
   SPECIFIED VALUE: P0515/39(Battery temperature sensor signal) is not output.

   ▼ If it is OK, end troubleshooting.
   ▼ If it is NG, replace the EFI ECU.

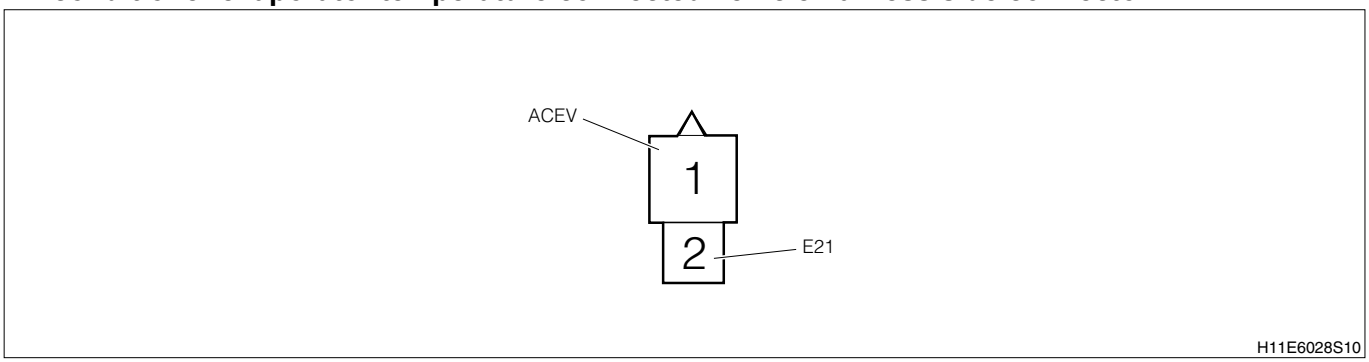
Refer to TERIOS SERVICE MANUAL

1-13-27 P0535/44 (A/C EVAPORATOR TEMPERATURE SENSOR)

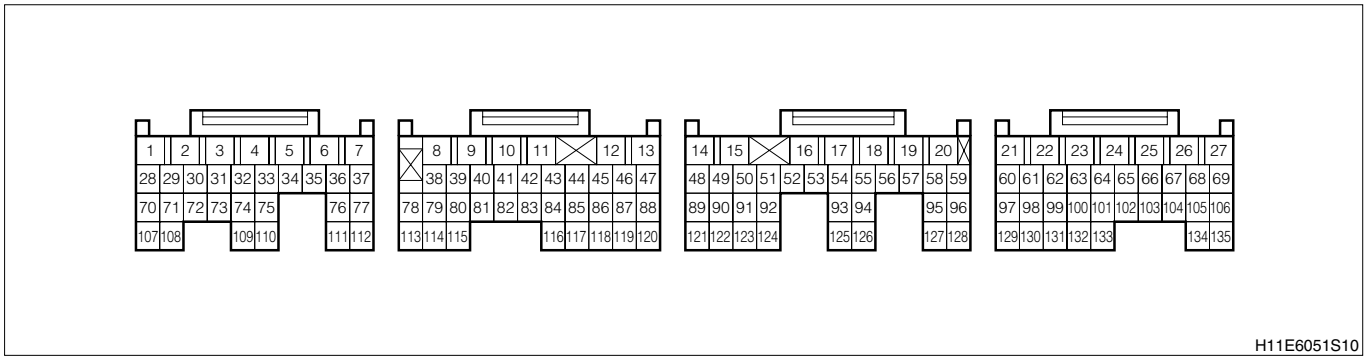
(1) System diagram



Air conditioner evaporator temperature connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

1. When the signal from the air conditioner evaporator temperature sensor is not outputted consecutively for a certain length of time with the air conditioner switch is set to "ON" after the engine is started

(3) Checking Points

1. Is the signal from the air conditioner evaporator temperature sensor input to the EFI ECU?
2. Is the harness between the air conditioner evaporator temperature sensor and EFI ECU normal?
3. Is the output from the air-conditioner evaporator temperature sensor correct?

(4) Check procedure

≫1. EFI ECU signal checking (1)

1. Connect the SST.
   SST: 09842-97209-000

2. With the ignition switch set to "ON", measure the voltage between the following terminals.
   (1) Between SST 45 (ACEV) and SST 116 (E21)
   SPECIFIED VALUE: 0.1 to 4.85 V (varies according to the temperature)

▼ If it is OK, go to ≫4.
▼ If it is NG, go to ≫2.

≫2. Checking the single unit of the air conditioner evaporator temperature sensor

1. Carry out the single unit checking of the air conditioner evaporator temperature sensor.
   (1) Vehicles equipped with manual air conditioners

Refer to TERIOS SERVICE MANUAL

   (2) Vehicles equipped with automatic air conditioners

Refer to TERIOS SERVICE MANUAL

▼ If it is OK, go to ≫3.
▼ If it is NG, replace the air conditioner evaporator temperature sensor and go to ≫5.

≫3. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the air conditioner evaporator temperature sensor
   (2) Between EFI ECU and the body earth
   Refer to Page A1-37.

   SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, go to ≫4.
▼ If it is NG, repair the malfunctioning harness and connectors, or replace them if necessary, and then go to ≫5.

≫4. EFI ECU signal checking (2)

1. With the air conditioner evaporator temperature sensor connector disconnected, turn the ignition switch to "ON" and measure the voltage between the following terminals.
   (1) Between SST 45 (ACEV) and SST 116 (E21)
   SPECIFIED VALUE: 4.5 V－5.5 V

▼ If it is OK, perform a check of the connection status of each connector or the installation status of the air conditioner evaporator temperature sensor, and then go to ≫5.
▼ If it is NG, perform a check of the EFI ECU circuit, and then go to ≫5.
Refer to Page A1-39.

≫5.Confirmation test

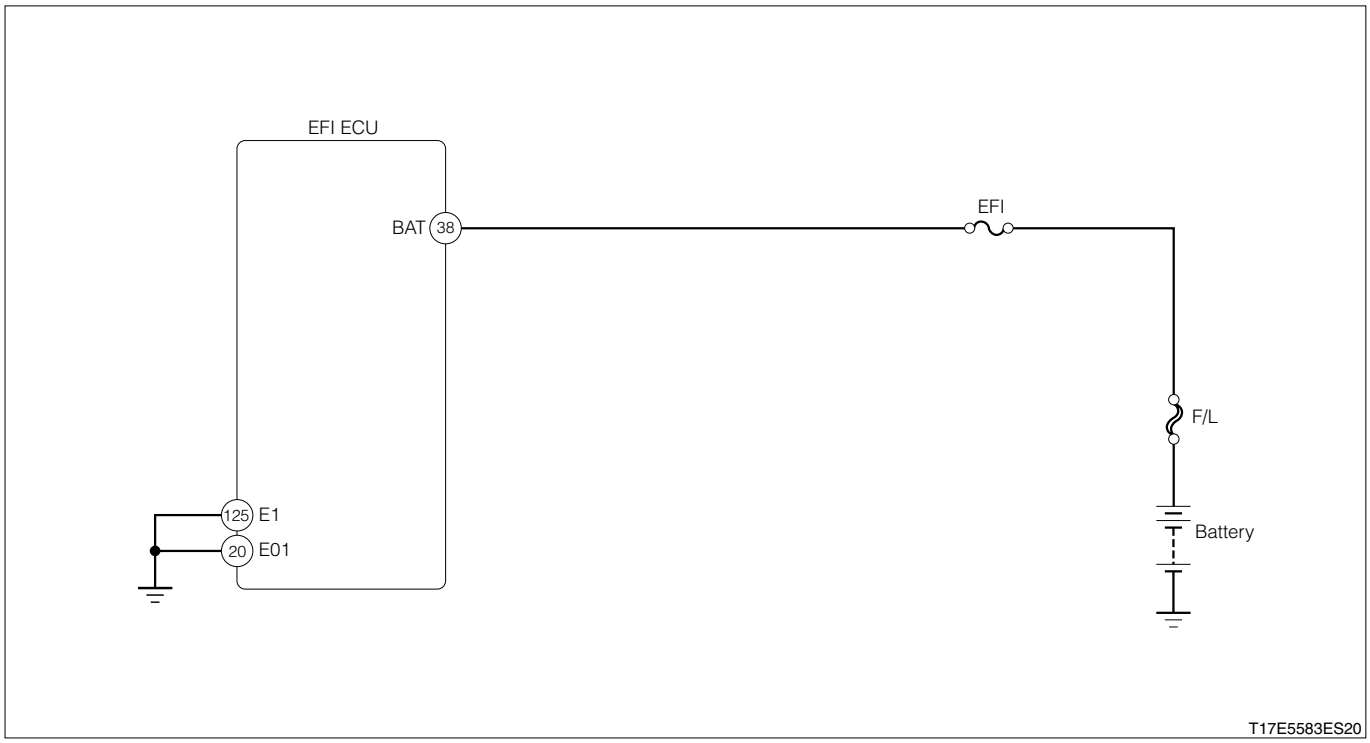
1. Erase the diagnosis code.
2. Start the engine, and turn the air conditioner switch to ON to operate the air conditioner.
3. Read the diagnosis codes using the DS-Ⅱ.
4. Check that diagnosis code No. P0535/44 is not output.
   SPECIFIED VALUE: P0535/44 (A/C evaporator temperature sensor) is not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

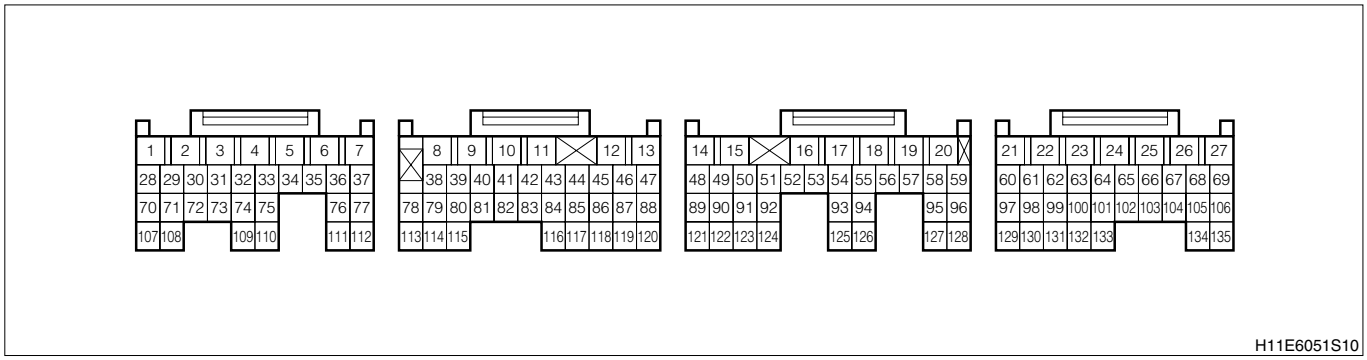
Refer to TERIOS SERVICE MANUAL

1-13-28 P0560/61 (ABNORMAL BACKUP SYSTEM POWER SUPPLY)

(1) System diagram



EFI ECU connected vehicle harness side connector



(2) Conditions for output

1. When battery power is not being supplied to the EFI ECU.

(3) POINTS TO CHECK

1. Is the harness between the EFI ECU and the battery normal?

(4) Check procedure

⌦1.EFI ECU voltage check

1. Disconnect the EFI ECU side connector. Then measure the voltage between the following terminals.
   (1) Between ECU connection vehicle harness side connector 38(BAT) and body earth

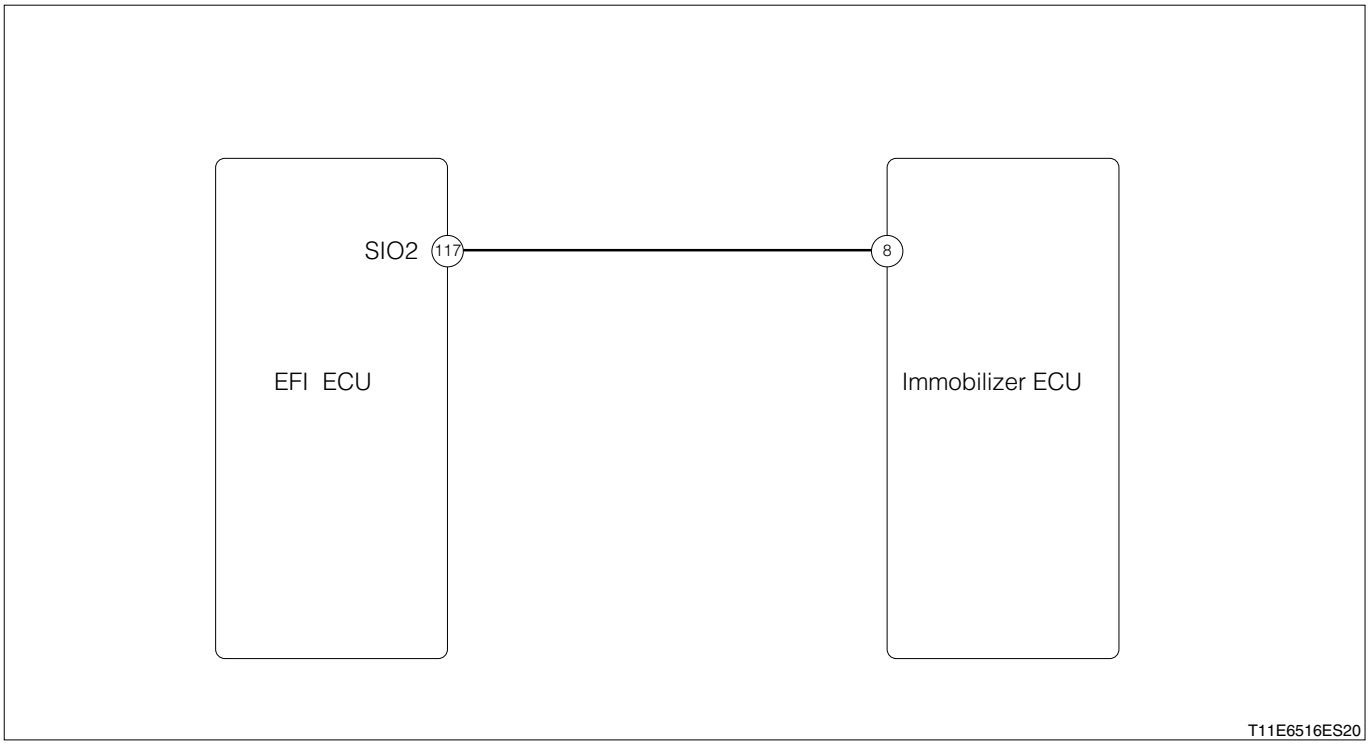
   SPECIFIED VALUE: Battery voltage

▼ If it is OK, finish the operation.

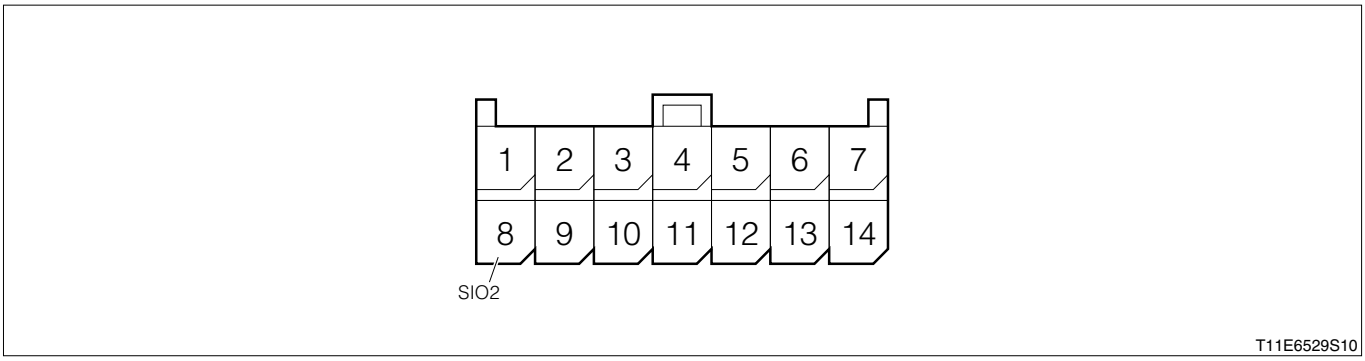
▼ If it is NG, repair or replace the harnesses and connectors of the defective sections.

1-13-29 P0603/83,U0167/81(E2PROM READ/WRITE,COMMUNICATION WITH IMMOBILIZER SYSTEM)

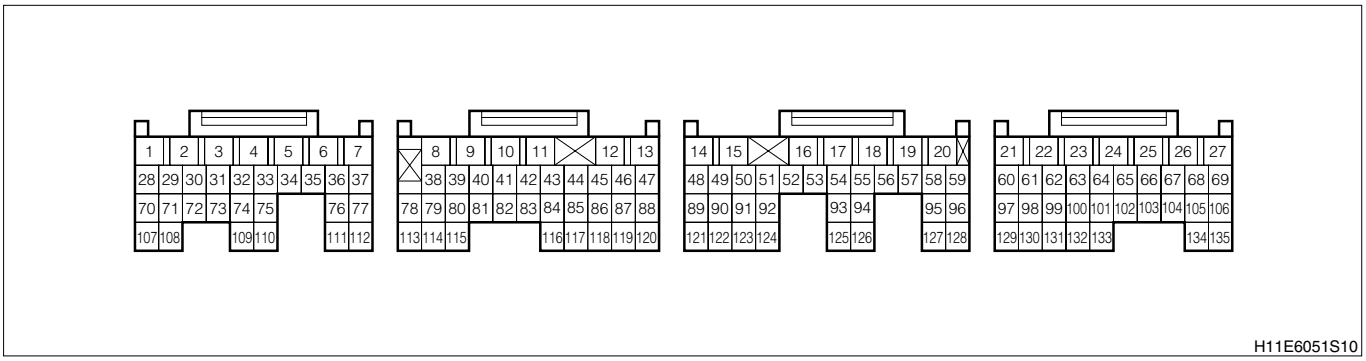
(1) System diagram



Immobilizer ECU connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) P0603/83 Conditions for output

1. When the collation of the codes for communicating with the immobilizer ECU cannot be performed due to a malfunction in the EFI ECU

(3) Handling procedure for P0603/83

1. Replace the EFI ECU.

(4) U0167/81 Conditions for output

1. When there is an error in the communication with the immobilizer ECU, or mismatching in the code collation

(5) POINTS TO CHECK

1. Is the harness between the immobilizer ECU and the EFI ECU functioning normally?

(6) Check procedure

≫1. Check of wire harness conduction

1. Disconnect the connectors of the EFI ECU and the immobilizer ECU.
2. Perform a check of the conduction between the following terminals.
   (1) Between EFI ECU connection vehicle harness side connector 117 (SIO2) and immobilizer ECU connection vehicle harness side connector 8 (SIO2)

Refer to Page A1-37.

CAUTION

- **Also check for contact and connection faults in the connectors, too.**

SPECIFIED VALUE: Continuity exists

▼ If it is OK, go to ≫2.
▼ If it is NG, repair the harness, or replace it if necessary.

≫2. Check of ECUs

1. Abnormalities such as the following may be occurring.
   (1) EFI ECU abnormality
   (2) Immobilizer ECU abnormality
   (3) The EFI ECU codes and immobilizer ECU codes are different from what they were at the time of code registration. (Mismatching in collation codes)
   (4) The operating conditions of the immobilizer are inappropriate. (Operational fault due to noise)
2. Perform checks of the EFI ECU and the immobilizer ECU, and replace them if necessary.

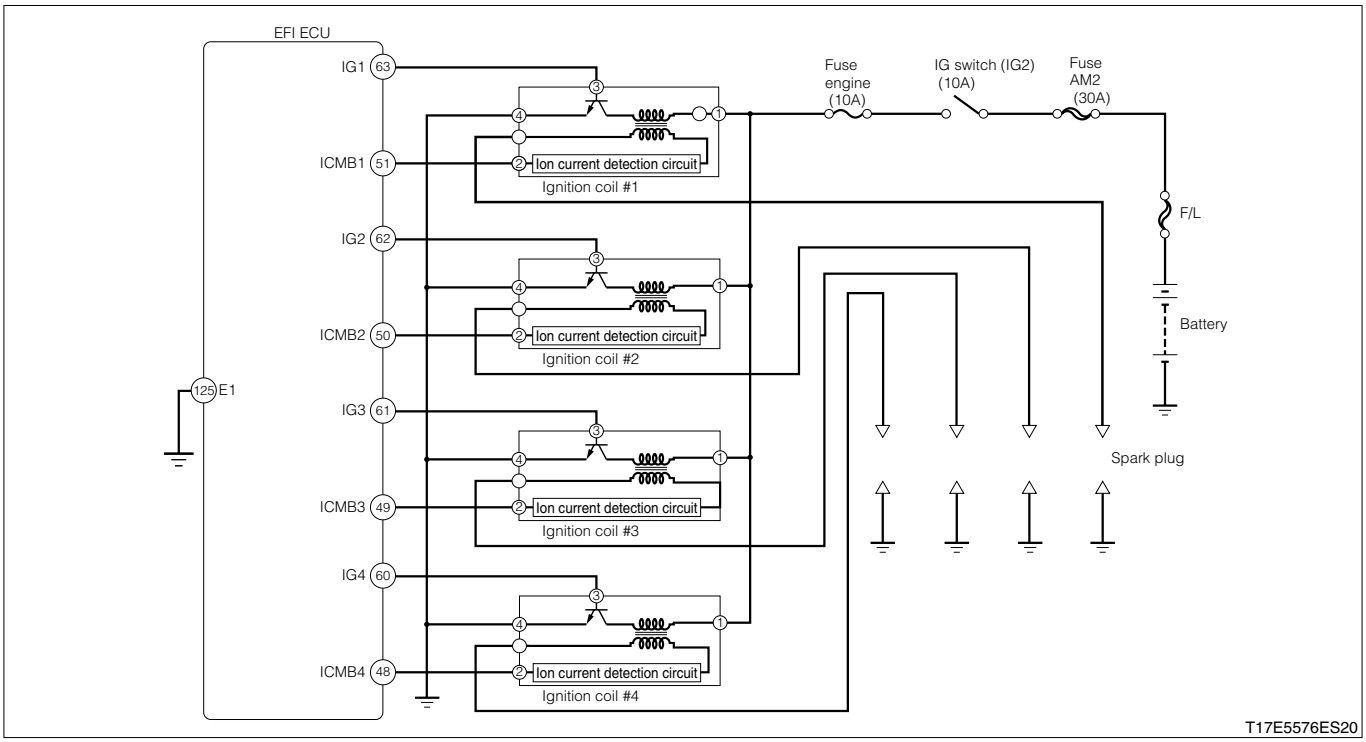
NOTE

- **Refer to the immobilizer system diagnosis check method described in the immobilizer troubleshooting section.**

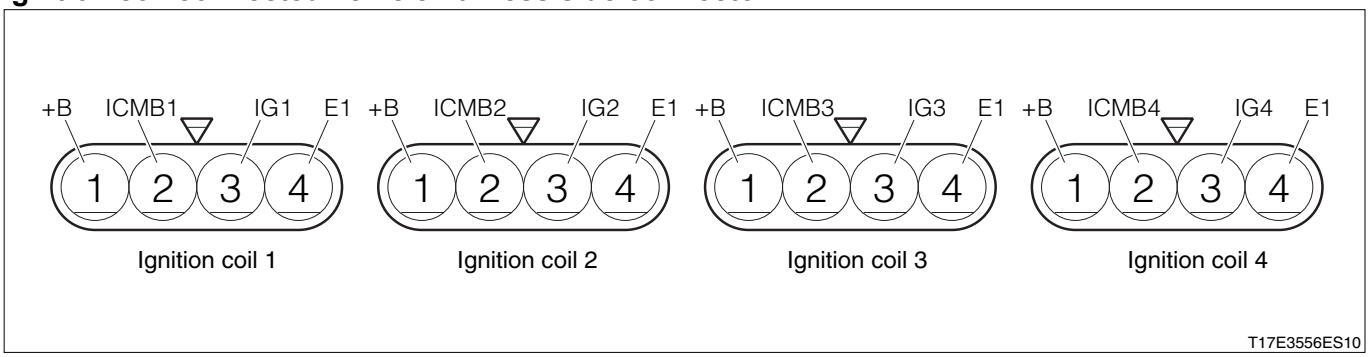
Refer to TERIOS SERVICE MANUAL

1-13-30 P1399/36 (ION ELECTRIC CURRENT SYSTEM)

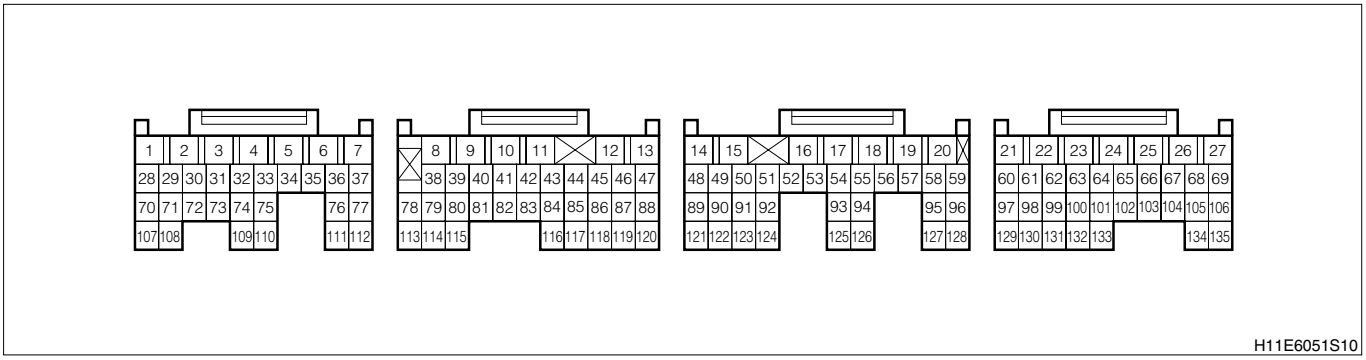
(1) System diagram



Ignition coil connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

1. When an abnormal signal (still no waveform output) from the ion current combustion control system is input into the EFI ECU while the engine is running, and after it has warmed up
2. When an abnormal signal (still clamped) from the ion current combustion control system is input into the EFI ECU while the engine is running, and after it has warmed up
3. When the signal from the ion current combustion control system is input to the EFI ECU during fuel cutting

(3) Checking Points

1. Is the ignition system normal?
2. Is the input signal from the ignition coil normal?
3. Is the harness between the ignition coil and EFI ECU normal?
4. Is the ignition coil normal?
5. Is EFI ECU normal?
6. Is the combustion status normal?

(4) Check procedure

∑1. Diagnosis code checking

1. Read out the diagnosis code by using the DS-Ⅱ.
   (1) Confirm that no diagnosis code other than P1399/36 is outputted
   SPECIFIED VALUE: It is not outputted

▼ If it is OK, go to ∑2.
▼ If it is NG, first, check and repair the section concerning the diagnosis code that was outputted.

∑2. Checking the single unit of the spark plug

1. Confirm if the designated spark plug is used.

Refer to TERIOS SERVICE MANUAL

2. Carry out the single unit checking of the spark plug.

Refer to TERIOS SERVICE MANUAL

▼ If it is OK, go to ∑3.
▼ If it is NG, clean the spark plugs, or replace them if necessary, and then go to ∑18.
▼ If an undesignated spark plug is used, replace it with a designated spark plug and go to ∑18.

∑3. Spark check

Refer to Page B8-25.

▼ If it is OK, go to ∑8.
▼ If it is NG, go to ∑4.

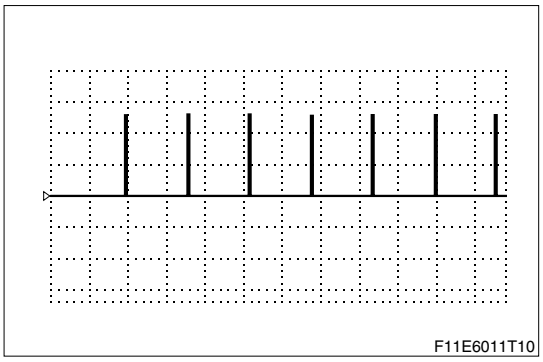
≫4. EFI ECU signal checking (1)

1. Connect the SST.
   SST: 09842-97209-000

2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Check the ignition signal waveforms output from individual cylinder when the engine is idling, by using an oscilloscope.
   (1) Between SST 63 (IG1) and SST 125 (E1)
   (2) Between SST 62 (IG2) and SST 125 (E1)
   (3) Between SST 61 (IG3) and SST 125 (E1)
   (4) Between SST 60 (IG4) and SST 125 (E1)

Time axis	100ms / DIV
Voltage axis	2V / DIV
Condition	The air conditioner is turned "OFF": no electric load applied; when the engine is "idling."

The condition under which the air conditioner is turned "OFF": the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".



NOTE

- **Check if a waveform as shown in the diagram (an example) is outputted**

4. Check the following points.
   (1) A pulse of 0 ⇄ 5V is generated.
   (2) A periodic waveform is supplied (no defect in the waveform).
   (3) The waveform period becomes shorter as the engine speed becomes higher.

NOTE

- **The ignition signal cannot be checked correctly without using an oscilloscope.**

▼ If it is OK, go to ≫5.

▼ If it is NG, perform a check of the EFI ECU circuit, and then go to ≫18.

Refer to Page A1-39.

≫5. Wire harness continuity checking (1)

1. Carry out continuity checking between the following terminals.
   (1) Between ignition coil 1 connected vehicle harness side connector 3 (IG1) and EFI ECU connected vehicle harness side connector 63 (IG1)
   (2) Between ignition coil 2 connected vehicle harness side connector 3 (IG2) and EFI ECU connected vehicle harness side connector 62 (IG2)
   (3) Between ignition coil 3 connected vehicle harness side connector 3 (IG3) and EFI ECU connected vehicle harness side connector 61 (IG3)
   (4) Between ignition coil 4 connected vehicle harness side connector 3 (IG4) and EFI ECU connected vehicle harness side connector 60 (IG4)

   Refer to Page A1-37.

   SPECIFIED VALUE: Continuity exists

   ▼ If it is OK, go to ≫6.
   ▼ If it is NG, repair the malfunctioning harness, or replace it if necessary, and then go to ≫18.

≫6. Checking the ignition coil voltage

1. When the ignition switch is set to "ON", measure the voltage between each of the following terminals.
   (1) Between each ignition coil connected vehicle harness side connector (＋B) and the body earth

   SPECIFIED VALUE: Battery voltage

   ▼ If it is OK, go to ≫7.
   ▼ If it is NG, repair the harnesses between the following terminals, or replace them if necessary, and then go to ≫18.
   (2) Between each ignition coil and the battery

≫7. Wire harness continuity checking (2)

1. Carry out continuity checking between the following terminals.
   (1) Between each ignition coil connected vehicle harness side connector 4 (E1) and EFI ECU connected vehicle harness side connector 125 (E1)

   Refer to Page A1-37.

   SPECIFIED VALUE: Continuity exists

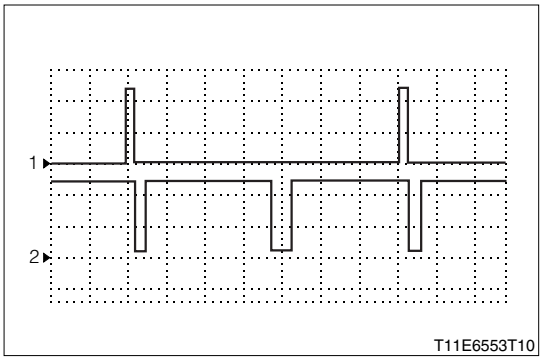
   ▼ If it is OK, replace the ignition coils, and then go to ≫18.

Refer to TERIOS SERVICE MANUAL

   ▼ If it is NG, repair the malfunctioning harness and connectors, or replace them if necessary, and then go to ≫18.

▷8. EFI ECU signal checking (2)

1. Start the engine, and warm it up until the radiator fan starts rotating.
2. Check the waveforms of the ignition signal (1▶) and the ion current combustion control signal (2▶) outputted from individual cylinder when the engine is idling, by using an oscilloscope.



	Channel	+ side measuring terminal	− side measuring terminal
Cylinder No.1	1▶	63(IG1)	125(E1)
	2▶	51(ICMB1)	125(E1)
Cylinder No.2	1▶	62(IG2)	125(E1)
	2▶	50(ICMB2)	125(E1)
Cylinder No.3	1▶	61(IG3)	125(E1)
	2▶	49(ICMB3)	125(E1)
Cylinder No.4	1▶	60(IG4)	125(E1)
	2▶	48(ICMB4)	125(E1)

Time axis	20ms / DIV
Voltage axis	2V / DIV
Condition	When the water temperature is 80℃ or higher, the air conditioner is turned "ON", an electric load is applied, and the air-conditioner idling-up evolution is carried out

Air conditioner ON: The air conditioner switch (ACSW), the blower switch (BLW) and the magnet clutch (MGC) are all turned on.
Electric load exists: The headlights (H/L) and the defogger (DEF) are both turned on.
Air conditioner idle up revolution speed: 850^{+100}_{-50}rpm(A/T vehicles), 800^{+100}_{-50} rpm(M/T vehicles), 850^{+100}_{-50}rpm(M/T vehicles mounted with type 3SZ engines)

NOTE

- **Check if a waveform as shown in the diagram (an example) is outputted**

3. Check the following points.
   (1) In correspondence with the output waveform of the ignition signal (channel 1 ▶), the ion current combustion control signal waveform (channel 2 ▶) is generated.
   (2) 5 ⇄ 0V waveform is generated.

NOTE

- **The ignition signal and the ion current combustion control signal cannot be checked correctly without using an oscilloscope.**

	Waveform (channel2 ▶) state
a	Normal
b	It stays at 0 V.
c	It stays at 5 V.
d	It stays at the battery voltage value.
e	The waveform is unstable*

*: A condition under which the output waveform of the ion current combustion control signal (channel 2 ▶) is not output in correspondence with the waveform of the ignition signal (channel 1 ▶).

▼ In the case of a, go to ≫9.
▼ In the case of b, go to ≫11.
▼ In the case of c, go to ≫13.
▼ In the case of d, go to ≫12.
▼ In the case of e, go to ≫16.

≫9. EFI ECU signal checking (3)

1. Maintain the measuring condition of ≫8.
2. Under the following condition, check wave of the ion current combustion control signal for each cylinder by using an oscilloscope.
   (1) Slowly increase the engine speed from the idling state up to 4000 rpm, and then suddenly close the throttle.

SPECIFIED VALUE: No waveform is outputted during fuel cutting.

▼ If it is OK, perform a check of the EFI ECU circuit, and then go to ≫18.
Refer to Page A1-39.

▼ If it is NG, go to ≫10.

≫10. Checking the fuel cutting operation

1. Check the output conditions between the following terminals by using an oscilloscope.
   (1) Between SST24 (#10) and SST 125 (E1)
   (2) Between SST23 (#20) and SST 125 (E1)
   (3) Between SST22 (#30) and SST 125 (E1)
   (4) Between SST21 (#40) and SST 125 (E1)
2. Check the injector operating sound when fuel is cut by using a sound scope.

NOTE

- **Check the operating sound while confirming the output waveform to the injector by using an oscilloscope.**

SPECIFIED VALUE: The injector operating sound stops during fuel cutting.

▼ If it is OK, replace the ignition coils, and then go to ≫18.
Refer to TERIOS SERVICE MANUAL
▼ If it is NG, perform a unit check of the injectors, and then go to ≫18.
Refer to Page B8-184.

⌦11. Checking the wiring harness for short-circuiting (1)

1. Carry out the continuity check on the cylinder on which the waveform consistently stays at 0 V.
   (1) Between the ignition coil 1 connected vehicle harness side connector 2 (ICMB 1) and the body earth
   (2) Between the ignition coil 2 connected vehicle harness side connector 2 (ICMB 2) and the body earth
   (3) Between the ignition coil 3 connected vehicle harness side connector 2 (ICMB 3) and the body earth
   (4) Between the ignition coil 4 connected vehicle harness side connector 2 (ICMB 4) and the body earth

   Refer to Page A1-37.

   SPECIFIED VALUE: No continuity exists

   ▼ If it is OK, replace the ignition coils, and then go to ⌦18.

Refer to TERIOS SERVICE MANUAL

   ▼ If it is NG, repair the malfunctioning harness and connectors, or replace them if necessary, and then go to ⌦18.

⌦12. Checking wire harness for short-circuiting (2)

1. Carry out the continuity check on the cylinder on which the waveform consistently stays at 0 V.
   (1) Between the ignition coil 1 connected vehicle harness side connector 2 (ICMB 1) and the positive terminal of the battery
   (2) Between the ignition coil 2 connected vehicle harness side connector 2 (ICMB 2) and the positive terminal of the battery
   (3) Between the ignition coil 3 connected vehicle harness side connector 2 (ICMB 3) and the positive terminal of the battery
   (4) Between the ignition coil 4 connected vehicle harness side connector 2 (ICMB 4) and the positive terminal of the battery

   Refer to Page A1-37.

   SPECIFIED VALUE: No continuity exists

   ▼ If it is OK, replace the ignition coils, and then go to ⌦18.

Refer to TERIOS SERVICE MANUAL

   ▼ If it is NG, repair the malfunctioning harness and connectors, or replace them if necessary, and then go to ⌦18.

⌦13. Checking wire harness for breaking of line

1. Carry out the continuity check on the cylinder on which the waveform consistently stays at 5 V.
   (1) Between the ignition coil 1 connected vehicle harness side connector 2 (ICMB 1) and the EFI ECU connected vehicle harness side connector 51 (ICMB 1)
   (2) Between the ignition coil 2 connected vehicle harness side connector 2 (ICMB 2) and the EFI ECU connected vehicle harness side connector 50 (ICMB 2)
   (3) Between the ignition coil 3 connected vehicle harness side connector 2 (ICMB 3) and the EFI ECU connected vehicle harness side connector 49 (ICMB 3)
   (4) Between the ignition coil 4 connected vehicle harness side connector 2 (ICMB 4) and the EFI ECU connected vehicle harness side connector 48 (ICMB 4)

   Refer to Page A1-37.

   SPECIFIED VALUE: Continuity exists

   ▼ If it is OK, go to ⌦14.
   ▼ If it is NG, repair the malfunctioning section, or replace it if necessary, and then go to ⌦18.

⌦14. Checking wire harness for short-circuiting

1. Check the cylinder on which the waveform consistently stays at 5 V to see if there is any short-circuiting in the wiring for the sensor system.

   NOTE
   - **The power voltage of the sensor system is 5V.**

   (1) Between the ignition coil 1 connected vehicle harness side connector 2 (ICMB 1) and the body earth
   (2) Between the ignition coil 2 connected vehicle harness side connector 2 (ICMB 2) and the body earth
   (3) Between the ignition coil 3 connected vehicle harness side connector 2 (ICMB 3) and the body earth
   (4) Between the ignition coil 4 connected vehicle harness side connector 2 (ICMB 4) and the body earth

   Refer to Page A1-37.

   SPECIFIED VALUE: 0V

   ▼ If it is OK, replace the ignition coil and go to ⌦15.

Refer to TERIOS SERVICE MANUAL

   ▼ If it is NG, repair the malfunctioning section, or replace it if necessary, and then go to ⌦18.

⌦15. Re-checking of the EFI ECU signal (1)

1. Carry out the re-checking of the cylinder on which the waveform consistently stays at 5 V under the condition of ⌦8.
2. Confirm that the waveform of the ion current combustion control signal (channel 2 ▶) does not stay at 5 V consistently.

   SPECIFIED VALUE: The waveform (channel 2 ▶) does not stay consistently at 5 V.

   ▼ If it is OK, go to ⌦18.
   ▼ If it is NG, misfire is conceivable. Identify the cause of the misfire, repair it, and then go to ⌦18.

▽16. Checking the harness and connectors

1. On cylinders of which waveforms are not stable, check each waveform if it changes when the following action is taken.
   (1) Lightly shake the connecter up and down, and right to left.
   (2) Lightly shake the harness up and down, and right to left.
   SPECIFIED VALUE: No change in the waveform

2. Carry out the following checking.
   (1) The engagement condition of the connector
   (2) Defective contact of connectors with terminals
   SPECIFIED VALUE: No abnormality exists.

▼ If it is OK, replace the ignition coil and go to ▽17.

Refer to TERIOS SERVICE MANUAL

▼ If it is NG, repair the malfunctioning section, or replace it if necessary, and then go to ▽18.

▽17. Re-checking of the EFI ECU signal (2)

1. Carry out the re-checking of the cylinder on which the waveform is unstable under the condition of ▽8.
2. Confirm that the waveform of the ion current combustion control signal (channel 2 ▶) is stably outputted.
   SPECIFIED VALUE: The waveform (channel 2 ▶) is stably outputted.

▼ If it is OK, go to ▽18.

▼ If it is NG, it is possible that the combustion is unstable. Investigate the cause of the unstable combustion and carry out the repair.

▽18.Confirmation test

1. Erase the diagnosis code.
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Turn the IG SW to LOCK, and keep it in that position for at least 10 seconds.
4. Repeat Steps 2 and 3 at least 2 times.
5. Read the diagnosis codes using the DS-Ⅱ.
6. Check that diagnosis code No. P1399/36 is not output.
   SPECIFIED VALUE: P1399/36 (Ion electric current system) is not output.

▼ If it is OK, end troubleshooting.

▼ If it is NG, replace the EFI ECU.

Refer to TERIOS SERVICE MANUAL

1-13-31 P2226/32 (ATMOSPHERIC PRESSURE SENSOR SIGNAL)

(1) DESCRIPTION

1. The atmospheric pressure sensor is built in the EFI ECU.

(2) Output conditions

1. When the signal from the atmospheric sensor is not outputted consecutively for a certain length of time after the engine is started

(3) Check procedure

⊳1. Checking the diagnosis

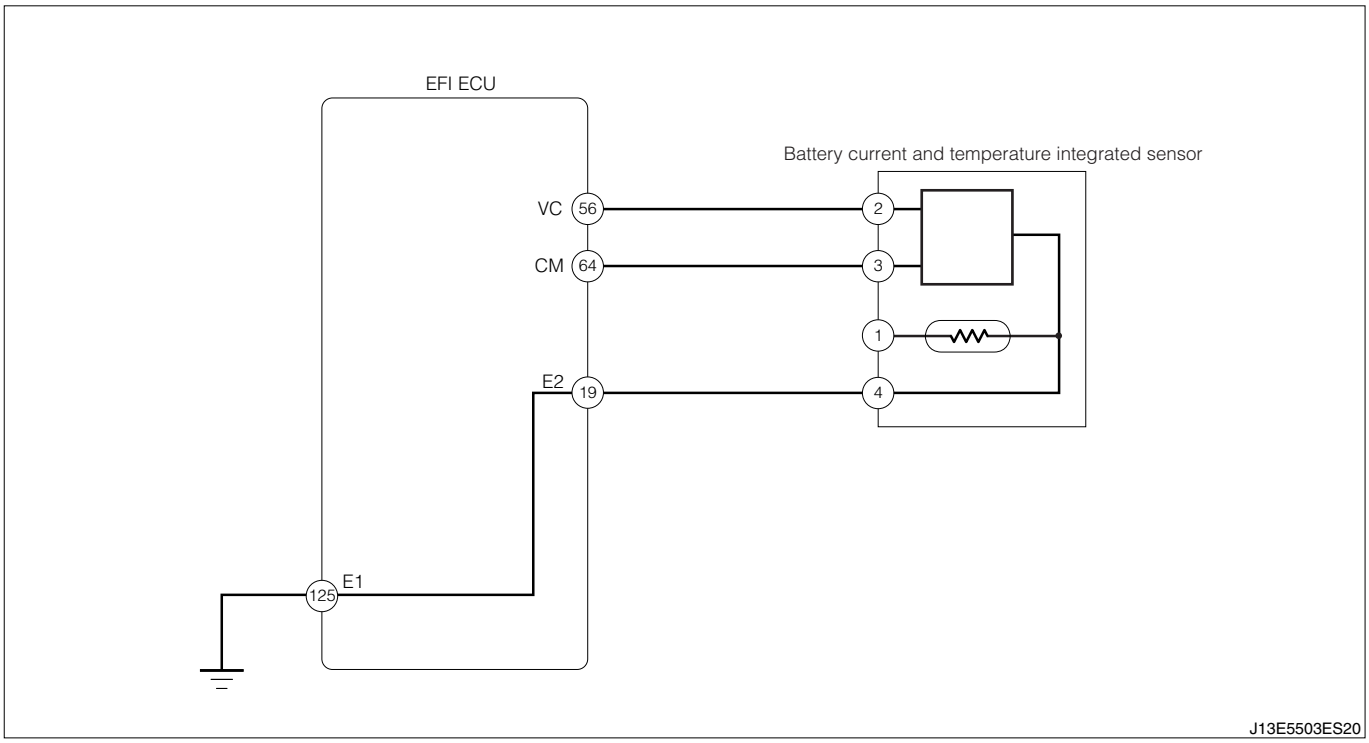
1. Erase the diagnosis code.
2. After erasing the code, check if the diagnosis code can be read out by using the DS-Ⅱ.
   (1) Check that diagnosis code P2226/32 is not outputted once again.
   SPECIFIED VALUE: P2226/32 (Atmospheric pressure sensor signal) is not output.

   ▼ If it is OK, perform a check of the EFI ECU circuit.
   ▼ If it is NG, replace the EFI ECU.

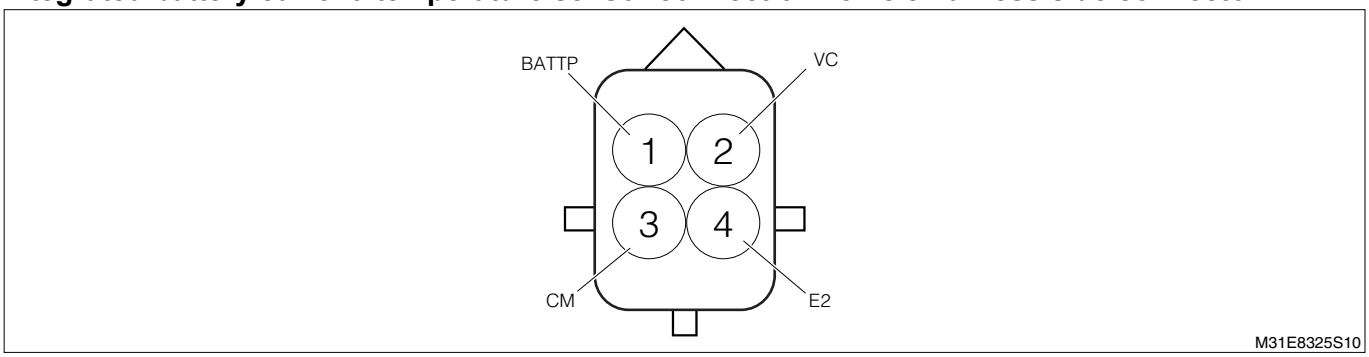
Refer to TERIOS SERVICE MANUAL

1-13-32 P0AC0/38 (BATTERY CURRENT SENSOR SIGNAL)

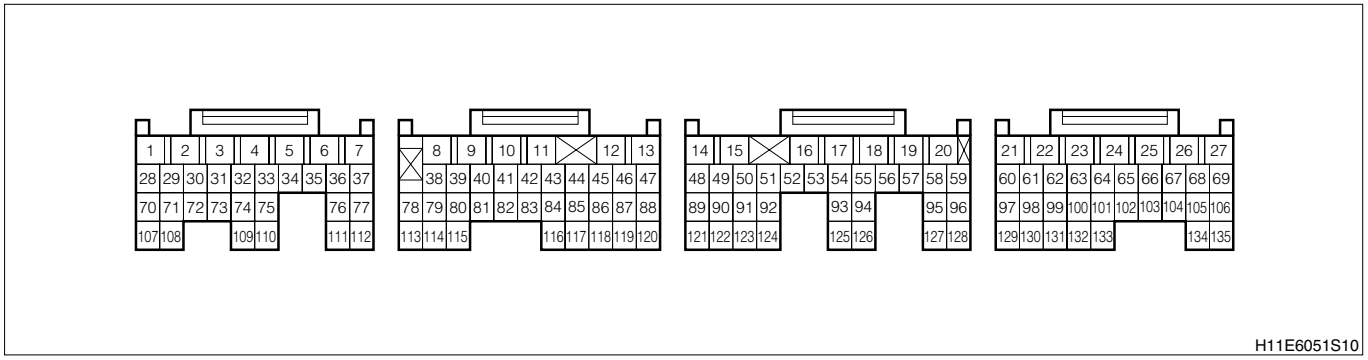
(1) System diagram



Integrated battery current · temperature sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Output conditions

1. The signals from the integrated battery current·temperature sensor (battery current sensor section) are not output continually for a certain length of time, after the engine has been started

(3) Checking Point

1. Are the signals from the integrated battery current·temperature sensor (battery current sensor section) being input into the EFI ECU?
2. Is the harness between the integrated battery current·temperature sensor (Battery current sensor section) and the EFI ECU functioning normally?
3. Is the integrated battery current·temperature sensor (Battery current sensor section) functioning normally?
4. Is the EFI ECU functioning normally?

(4) Check procedure

∑1.Data monitor

1. Read the data monitor [Charging control battery current], using the DS-Ⅱ.
   (1) Charging control battery current (CRNT)

	Displayed data	Possible causes of the malfunction
a	There is no change from －100A.	Possibility of earth short circuit in the integrated battery current·temperature sensor (Battery current sensor section) system
b	There is no change from 100A.	Possibility of power supply short circuit in the integrated battery current·temperature sensor (Battery current sensor section) system
c	There is deviation from the actual electric current.	Possibility of a sensor abnormality in the integrated battery current·temperature sensor (Battery current sensor section) system
d	Equivalent to actual electric current	Possibility of temporary malfunction

▼ In the case of a, b, or c, go to ∑2.
▼ In the case of d, go to ∑3.

∑2.Unit check of integrated battery current·temperature sensor (battery current sensor section)

1. Disconnect the connector of the integrated battery current·temperature sensor, and then perform a unit check of the battery current sensor.
   Refer to Page B8-185.

▼ If it is OK, go to ∑3.
▼ If it is NG, replace the integrated battery current·temperature sensor, and then go to ∑5.

∑3.Checking the wiring harness

1. Check for open and short circuits in the wiring harnesses between the following.
   (1) Between the EFI ECU and the integrated battery current·temperature sensor
   (2) Between the EFI ECU and the body earth
   Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, go to ∑4.
▼ If it is NG, repair the malfunctioning harness and connectors, or replace them if necessary, and then go to ∑5.

⊳4.Confirmation test

1. Erase the diagnosis codes.
2. Start the engine.
3. Read the diagnosis codes using the DS-Ⅱ.
4. Check that diagnosis code No. P0AC0/38 is not output.
   SPECIFIED VALUE: P0AC0/38 (Electric current sensor abnormality) is not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, replace the EFI ECU.

Refer to TERIOS SERVICE MANUAL

1-13-33 U0001/88 (COMMUNICATION WITH CAN)

(1) Output conditions

1. When all communication histories established with the CAN communication configuration ECU are not available

(2) Checking method

⌦1. Checking the diagnosis

1. Erase the diagnosis code.
2. After erasing the code, check if the diagnosis code can be read out by using the DS-Ⅱ.
   (1) Check that diagnosis code U0001/88 is not outputted once again.

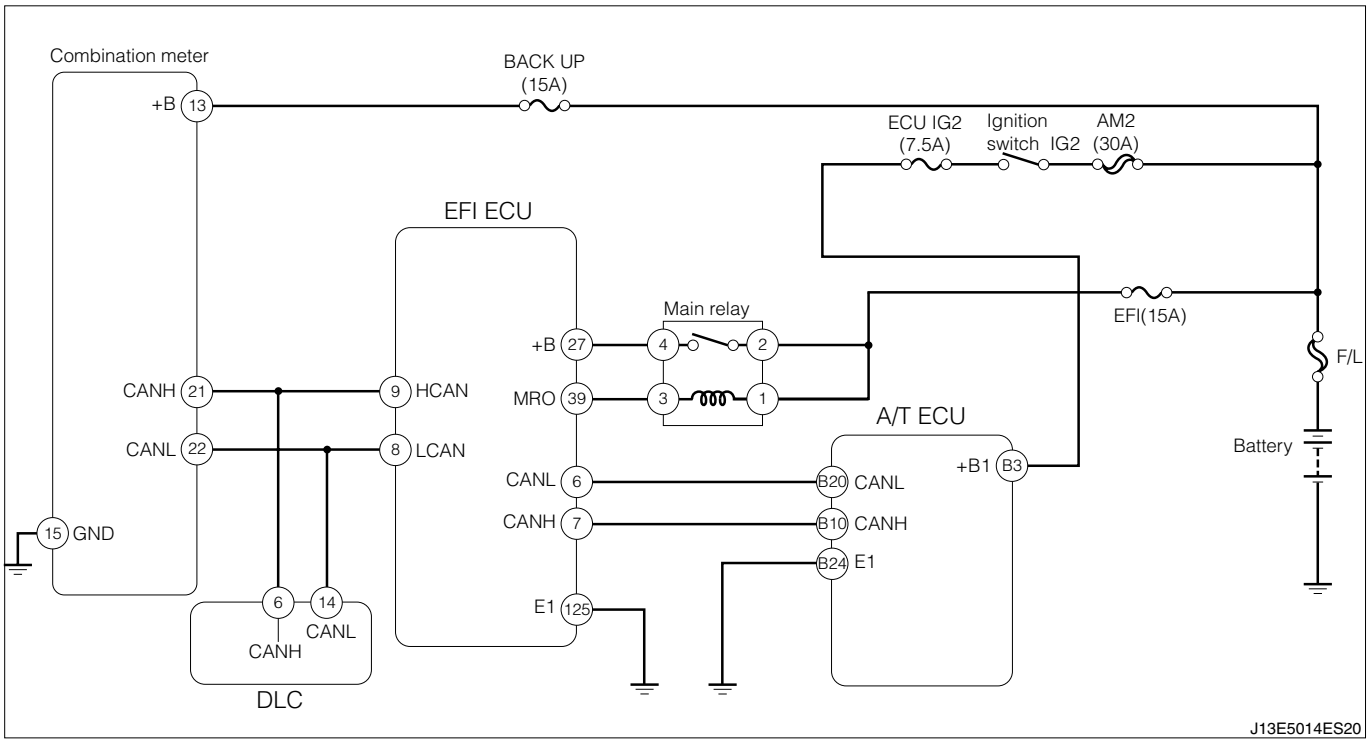
SPECIFIED VALUE: U0001/88 (CAN communication) is not output.

▼ If it is OK, perform a check of the EFI ECU circuit.
Refer to Page A1-39.

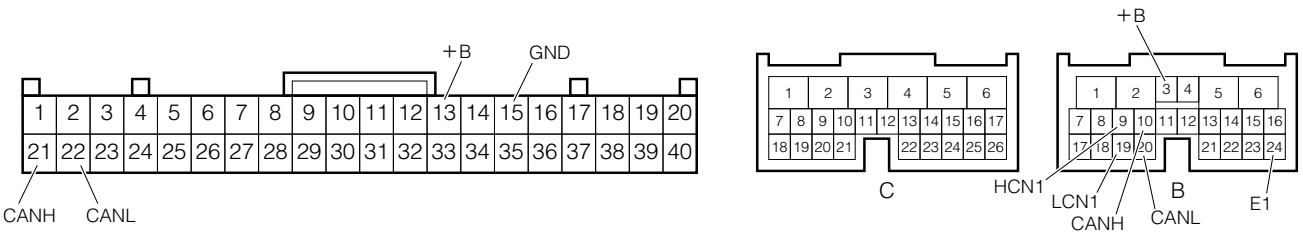
▼ If it is NG, perform a basic check of the CAN communication system.
Refer to Page L2-7.

1-13-34 U101/82 (COMMUNICATION WITH A/T (RECEIVE))

(1) System diagram



Each unit, relays connection vehicle harness side connector

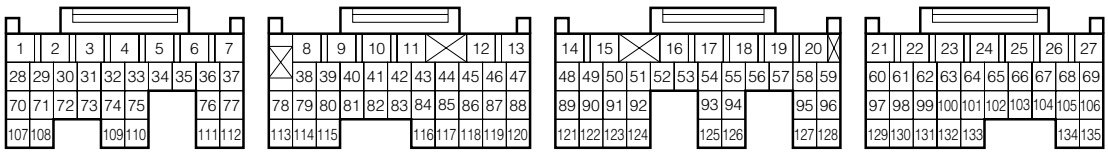


Combination meter connection vehicle harness side connector

A/T ECU connection vehicle harness side connector

J13E5015ES10

EFI ECU connection vehicle harness side connector



H11E6051S10

(2) Output conditions

1. When communication signal cannot be received from A/T ECU

(3) Checking points

1. Is the harness between EFI ECU - A/T ECU normal?
2. Is the A/T ECU normal?
3. Check whether there is any poor contact at the connector section.

(4) Checking method

≫1. Diagnosis code confirmation (A/T-related codes)

1. Read the A/T diagnosis codes using the DS-Ⅱ.

Refer to TERIOS SERVICE MANUAL

SPECIFIED VALUE: No diagnosis codes are output.

▼ If it is OK, go to ≫3.
▼ If it is NG, perform troubleshooting for the diagnosis codes output, and then go to ≫2.

Refer to TERIOS SERVICE MANUAL

≫2. Diagnosis code confirmation (EFI-related codes)

1. Cancel the diagnosis code of the EFI.
2. Read the EFI diagnosis codes using the DS-Ⅱ.

SPECIFIED VALUE: No diagnosis codes are output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, perform troubleshooting for the diagnosis codes output, and then go to ≫3.

Refer to Page B8-31.

≫3. Basic check of CAN communications

1. Perform a basic check of CAN communications.

Refer to Page L2-7.

▼ If it is OK, go to ≫3.
▼ If it is NG, repair or replace the malfunctioning section.

≫4. Check for shorting of the CAN line

1. Set the IG switch to LOCK.
2. Disconnect all connectors from the EFI ECU and the A/T ECU.
3. Check conduction between the following terminals.
   (1) Between the EFI ECU connected vehicle harness side connector 7 (CANH) and the positive terminal of the battery
   (2) Between the EFI ECU connected vehicle harness side connector 6 (CANL) and the positive terminal of the battery
   (3) Between the EFI ECU connected vehicle harness side connector 7 (CANH) and the body earth
   (4) Between the EFI ECU connected vehicle harness side connector 6 (CANL) and the body earth

SPECIFIED VALUE: Continuity does not exist

▼ If it is OK, go to ≫5.
▼ If it is NG, repair or replace the malfunctioning section.

⊃5. Checking the internal resistance of the EFI ECU

1. Measure the resistance value between the following terminals.
   (1) Between EFI ECU side connector 6 (CANL) and EFI ECU side connector 7 (CANH)
   (2) Between EFI ECU side connector 8 (LCAN) and EFI ECU side connector 9 (HCAN)

SPECIFIED VALUE: 110 to 130

▼ If it is OK, go to ⊃4.
▼ If it is NG, replace the EFI ECU.

⊃6. Check A/T ECU internal circuit

1. Check conduction between the following terminals.
   (1) Between A/T ECU side connector B10 (CANH) and A/T ECU side connector B20 (CANL)

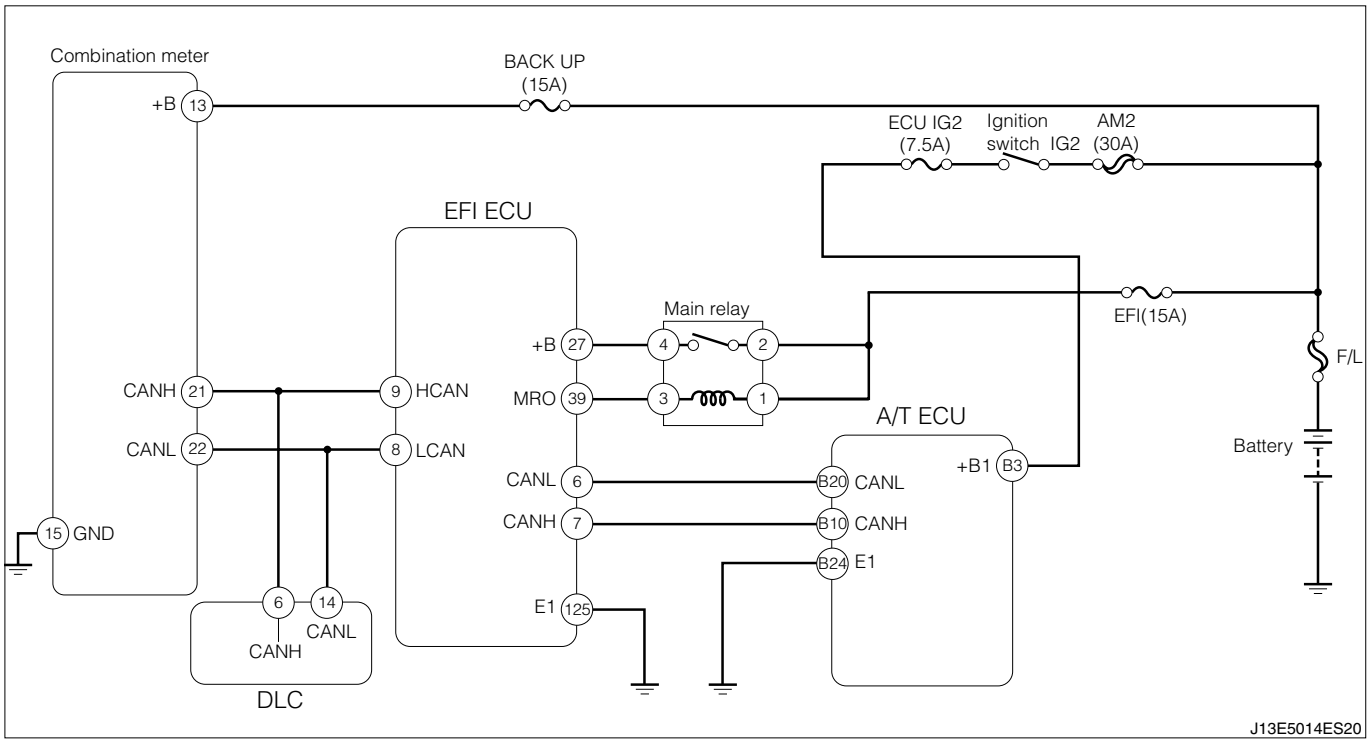
SPECIFIED VALUE: Continuity does not exist

▼ If it is OK, check the unit circuits of the EFI ECU and the A/T ECU.
Refer to Page A1-39.

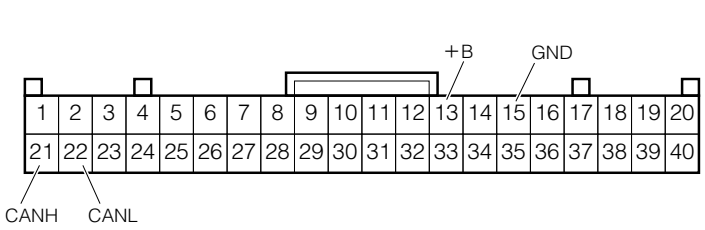
▼ If it is NG, replace the A/T ECU.
Refer to TERIOS SERVICE MANUAL

1-13-35 U0101/85 (COMMUNICATION WITH A/T)

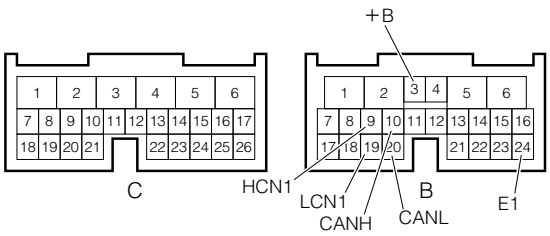
(1) System diagram



Each unit, relays connection vehicle harness side connector



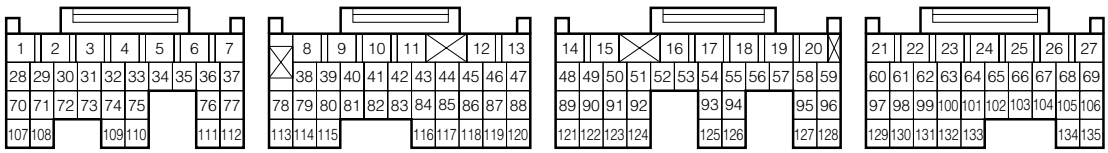
Combination meter connection vehicle harness side connector



A/T ECU connection vehicle harness side connector

J13E5015ES10

EFI ECU connection vehicle harness side connector



H11E6051S10

(2) Output conditions

1. When the communication signal to the A/T ECU cannot be transmitted

(3) Checking Points

1. Is the harness between the EFI ECU and the A/T ECU normal?
2. Is there a connector connection problem?

(4) Checking method

Σ1. Confirm the diagnosis code (EFI-related)

1. Read the EFI diagnosis codes using the DS-Ⅱ.

SPECIFIED VALUE: A diagnosis code other than U0101/85 is output.

▼ If it is OK, perform troubleshooting for the diagnosis codes output, and then go to Σ2.
Refer to Page B8-31.

▼ If it is NG, go to Σ3.

Σ2. Diagnosis code reconfirmation (EFI-related codes)

1. Erase the EFI diagnosis codes.
2. Read the EFI diagnosis codes using the DS-Ⅱ.

SPECIFIED VALUE: U0101/85 is not output.

▼ If it is OK, end troubleshooting.
▼ If it is NG, go to Σ3.

Σ3.Basic check of CAN communications

1. Perform a basic check of CAN communications.
Refer to Page L2-7.

▼ If it is OK, go to Σ4.
▼ If it is NG, repair or replace the malfunctioning section.

Σ4.Check for shorting of the CAN line

1. Set the IG switch to LOCK.
2. Disconnect all connectors from the EFI ECU and the A/T ECU.
3. Check conduction between the following terminals.
   (1) Between the EFI ECU connected vehicle harness side connector 7 (CANH) and the positive terminal of the battery
   (2) Between the EFI ECU connected vehicle harness side connector 6 (CANL) and the positive terminal of the battery
   (3) Between the EFI ECU connected vehicle harness side connector 7 (CANH) and the body earth
   (4) Between the EFI ECU connected vehicle harness side connector 6 (CANL) and the body earth

SPECIFIED VALUE: Continuity does not exist

▼ If it is OK, go to Σ5.
▼ If it is NG, repair or replace the malfunctioning section.

⌦5. Checking the internal resistance of the EFI ECU

1. Measure the resistance value between the following terminals.
   (1) Between EFI ECU side connector 6 (CANL) and EFI ECU side connector 7 (CANH)
   (2) Between EFI ECU side connector 8 (LCAN) and EFI ECU side connector 9 (HCAN)

   SPECIFIED VALUE: 110 to 130

   ▼ If it is OK, go to ⌦6.
   ▼ If it is NG, replace the EFI ECU.

⌦6. Check A/T ECU internal circuit

1. Check conduction between the following terminals.
   (1) Between A/T ECU side connector B10 (CANH) and A/T ECU side connector B20 (CANL)

   SPECIFIED VALUE: Continuity does not exist

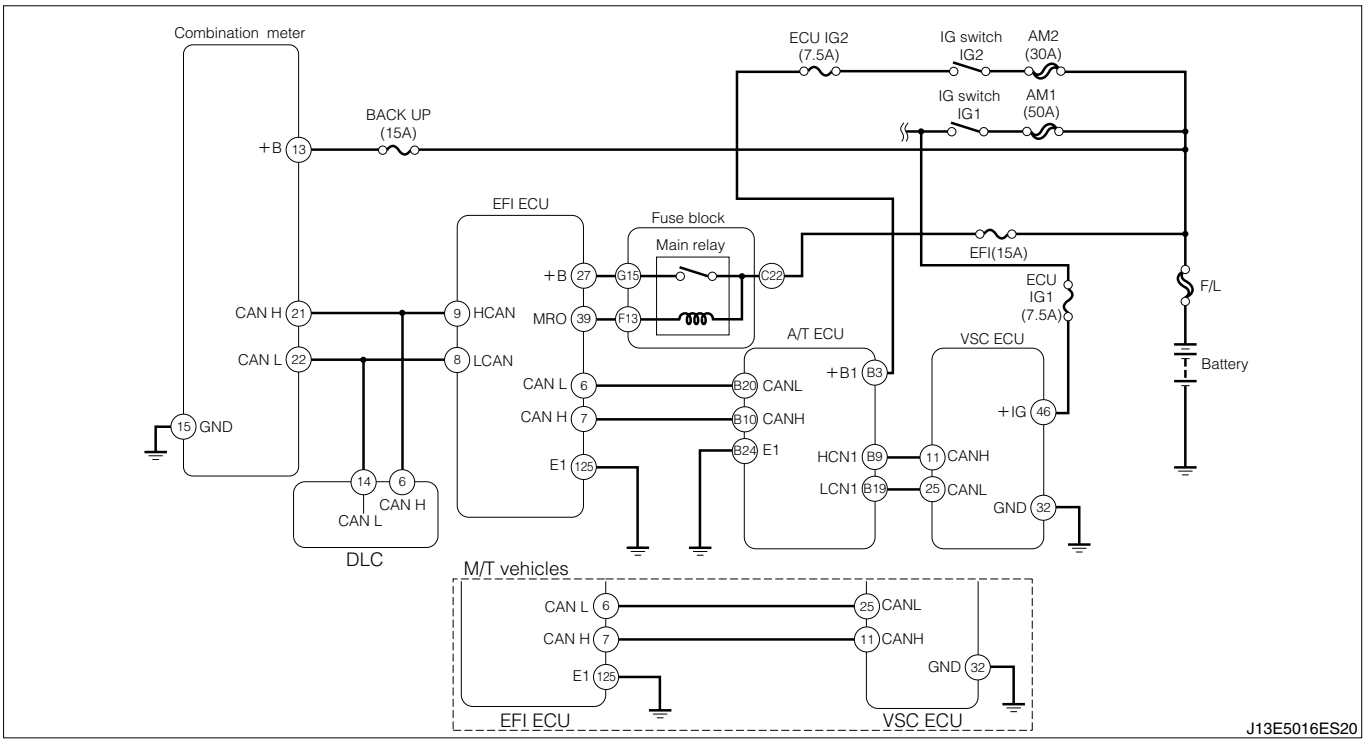
   ▼ If it is OK, check the unit circuits of the EFI ECU and the A/T ECU.
   Refer to Page A1-39.

   ▼ If it is NG, replace the A/T ECU.

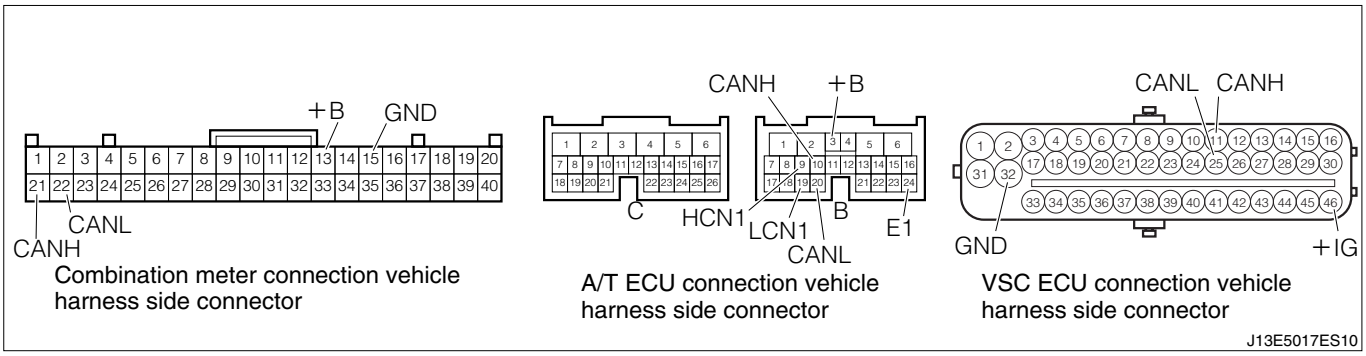
Refer to TERIOS SERVICE MANUAL

1-13-36 U0121/86 (COMMUNICATION WITH ABS (RECEIVE))(VEHICLES EQUIPPED WITH VSC)

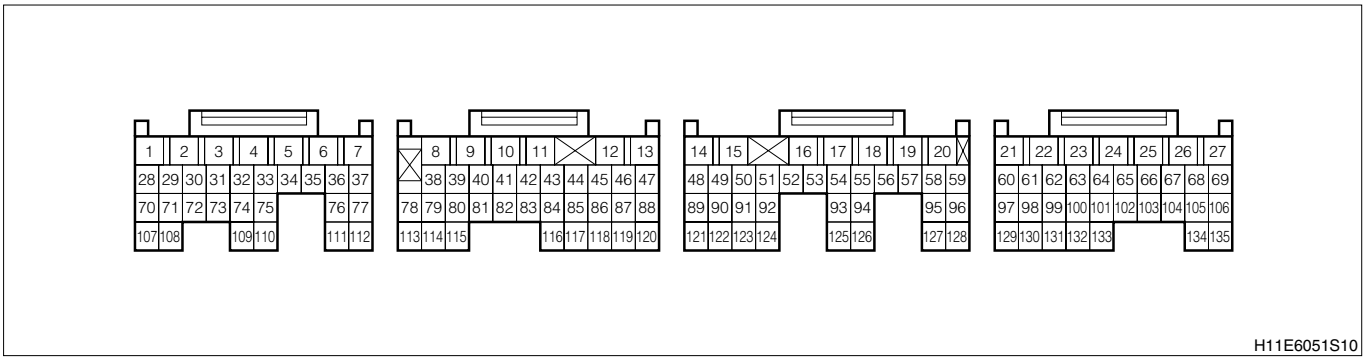
(1) System diagram



Each unit connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

1. When the communication signal from VSC ECU cannot be received

(3) Checking point

1. Is the harness between EFI ECU and VSC ECU normal?
2. Is the VSC ECU functioning normally?
3. Is there any defective contact in the connector section?

(4) Check procedure

∑1.Confirmation of the diagnosis code (related to ABS)

1. Read the ABS diagnosis codes using the DS-Ⅱ.

Refer to TERIOS SERVICE MANUAL

SPECIFIED VALUE: Diagnosis codes are output.

▼ If it is OK, perform troubleshooting for the diagnosis codes output, and then go to ∑2.

Refer to TERIOS SERVICE MANUAL

▼ If it is NG, go to ∑3.

∑2. Diagnosis code reconfirmation (EFI-related codes)

1. Erase the EFI diagnosis codes.
2. After the diagnosis codes have been erased, check whether EFI codes are still being output, using the DS-Ⅱ.

SPECIFIED VALUE: No diagnosis codes are output.

▼ If it is OK, the EFI system is functioning normally.

▼ If it is NG, go to ∑3.

∑3.Basic check of CAN communications

1. Perform a basic check of the CAN communication system.

Refer to Page L2-7.

▼ If it is OK, go to ∑4.

▼ If it is NG, repair the malfunctioning section, or replace it if necessary.

∑4. CAN line open circuit check

1. Set the ignition switch to "LOCK".
2. Disconnect all connectors from the EFI ECU, the VSC ECU, and the combination meter.
3. Perform the continuity check between the following terminals.
   (1) Between the EFI ECU connected vehicle harness side connector 6 (CANL) and EFI ECU connected vehicle harness side connector 7 (CANH)
   (2) Between A/T ECU connection vehicle harness side connector B10(CANH) and A/T ECU connection vehicle harness side connector B20 (CANL)(Automatic transaxle vehicle)
   (3) Between A/T ECU connection vehicle harness side connector B9(HCN1) and A/T ECU connection vehicle harness side connector B19 (LCN1)(Automatic transaxle vehicle)
   (4) Between VSC ECU connection vehicle harness side connector 11(CANH) and VSC ECU connection vehicle harness side connector 25(CANL)

SPECIFIED VALUE: Continuity does not exist

▼ If it is OK, go to ∑5.

▼ If it is NG, repair or replace the malfunctioning section.

∑5. Checking the internal resistance of the EFI ECU

1. Disconnect all connectors from the EFI ECU.
2. Measure the resistance between the following terminals.
   (1) Between EFI ECU side connector 6 (CANL) and the EFI ECU side connector 7 (CANH)
   (2) Between EFI ECU side connector 8 (LCAN) and the EFI ECU side connector 9 (HCAN)

   SPECIFIED VALUE: 110－130Ω

   ▼ If it is OK, go to ∑9.
   ▼ If it is NG, replace the EFI ECU.

∑6. Checking the internal resistance of the VSC ECU

1. Disconnect the connector of the VSC ECU.
2. Measure the resistance between the following terminals.
   (1) Between VSC ECU side connector 11 (CANH) and VSC ECU side connector 25 (CANL)

   SPECIFIED VALUE: Continuity does not exist

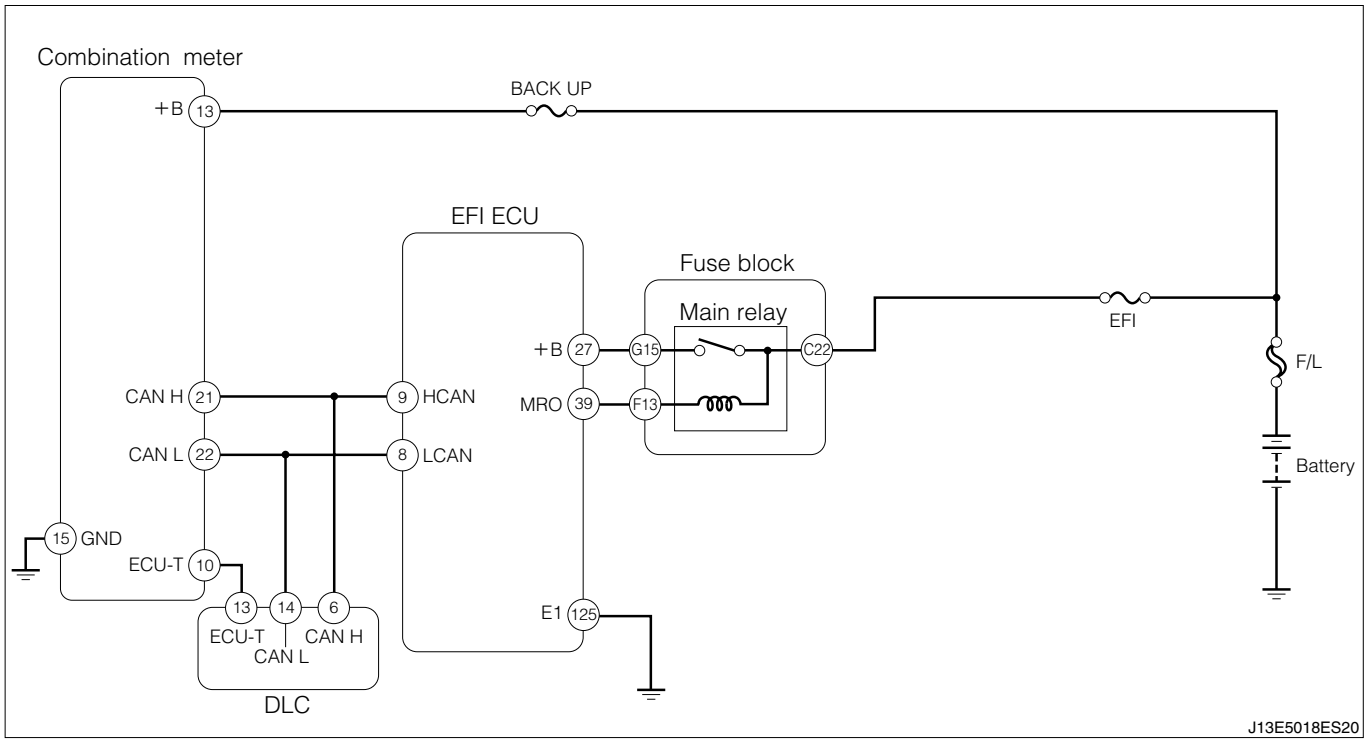
   ▼ If no abnormalities are found, perform checks of the unit circuits of the VSC ECU and the EFI ECU.
   Refer to Page A1-39.

   ▼ If it is NG, replace the VSC ECU.

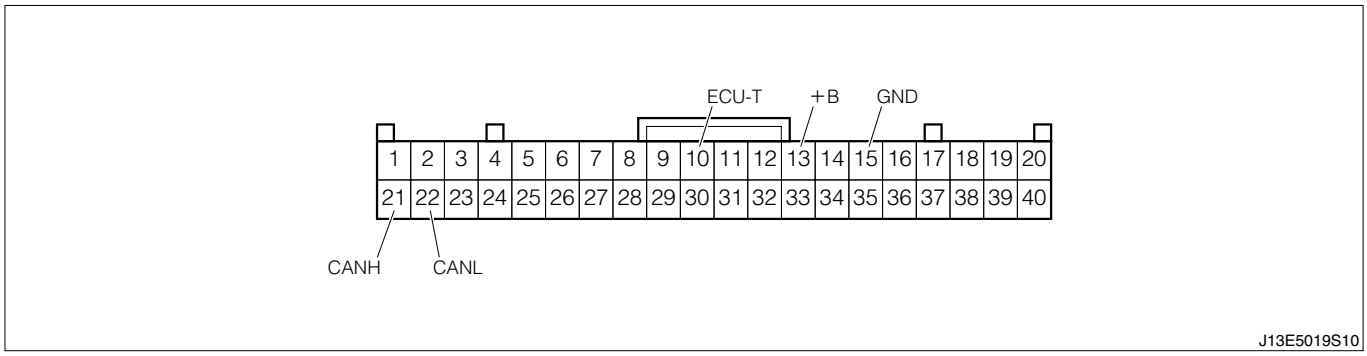
Refer to TERIOS SERVICE MANUAL

1-13-37 U0156/87 (COMMUNICATION WITH SPEEDO METER (RECEIVE))

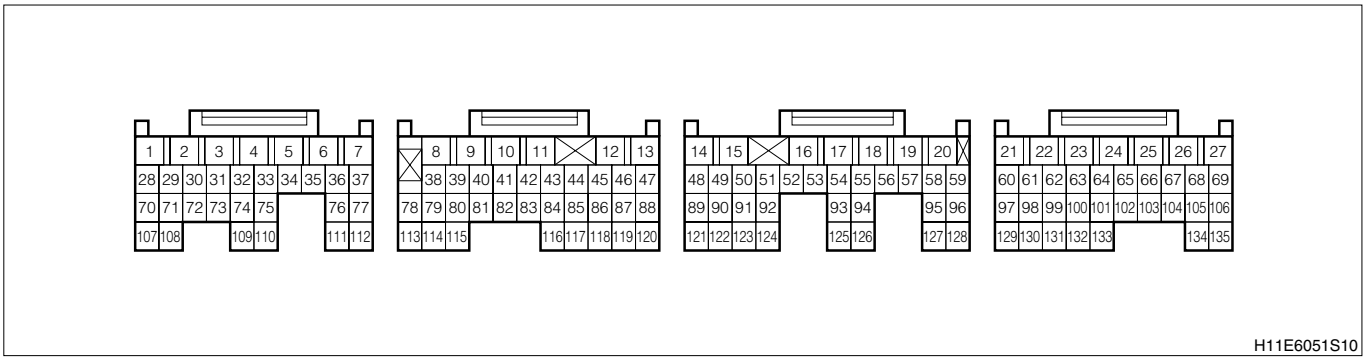
(1) System diagram



Each unit connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Output conditions

1. When the communication signal from the combination meter cannot be received

(3) Checking Points

1. Is the harness between EFI ECU and the combination meter normal?
2. Is the combination meter normal?
3. Is there any defective contact in the connector section?

(4) Check procedure

∑>1. Confirmation of the diagnosis code (related to meter)

1. Short-circuit DLC 13 (ECU－T) and 4 (E) by using the SST.

SST: 09991-87403-000
09991-87404-000

SPECIFIED VALUE: The meter diagnosis codes are output.

NOTE

- **Refer to the method for displaying the combination meter diagnosis code output**

Refer to TERIOS SERVICE MANUAL

▼If it is OK, perform troubleshooting, and then go to ∑>2.
▼If it is NG, go to ∑>3.

∑>2. Re-confirmation of the diagnosis code (related to EFI)

1. Erase the diagnosis code of EFI.
2. Check if the diagnosis code is outputted from the EFI by using the DS-Ⅱ.

SPECIFIED VALUE: No diagnosis codes are output.

▼If it is OK, the EFI system is normal.
▼If it is NG, go to ∑>3.

∑>3. Basic checks for the CAN communication

1. Carry out the basic checks for the CAN communication.

Refer to Page L2-7.

▼If it is OK, go to ∑>4.
▼If it is NG, repair or replace the malfunctioning section.

∑>4. CAN line open circuit check

1. Set the ignition switch to "LOCK".
2. Disconnect all connectors from the EFI ECU.
3. Measure the resistance between the following terminals.
   (1) Between EFI ECU connected vehicle harness side connector 8 (LCAN) and EFI ECU connected vehicle harness side connector 9 (HCAN)

SPECIFIED VALUE: 110－130Ω

▼If it is OK, go to ∑>5.
▼If it is NG, repair or replace the malfunctioning section.

⌦5. Checking the internal resistance of the EFI ECU

1. Disconnect all connectors from the EFI ECU.
2. Measure the resistance between the following terminals.
   (1) Between EFI ECU side connector 6 (CANL) and the EFI ECU side connector 7 (CANH)
   (2) Between EFI ECU side connector 8 (LCAN) and the EFI ECU side connector 9 (HCAN)

SPECIFIED VALUE: 110－130Ω

▼ If it is OK, go to ⌦6.
▼ If it is NG, replace the EFI ECU.
Refer to TERIOS SERVICE MANUAL

⌦6. Checking the internal resistance of the combination meter

1. Disconnect all connectors from the combination meter.
2. Measure the resistance between the following terminals.
   (1) Between combination meter side connector 21 (CANH) and combination meter side connector 22 (CANL)

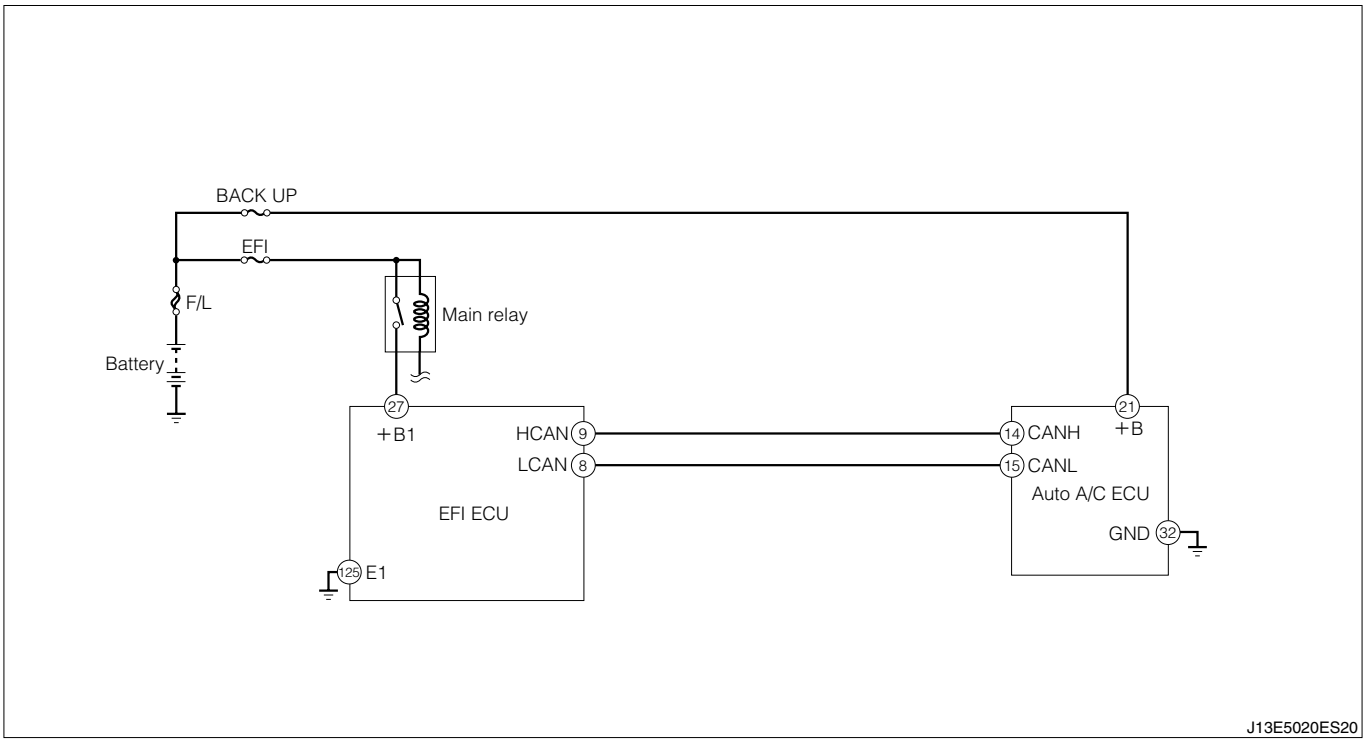
SPECIFIED VALUE: 110－130Ω

▼ If it is OK, check the unit circuitry of the combination meter and the EFI ECU.
Refer to Page A1-39.

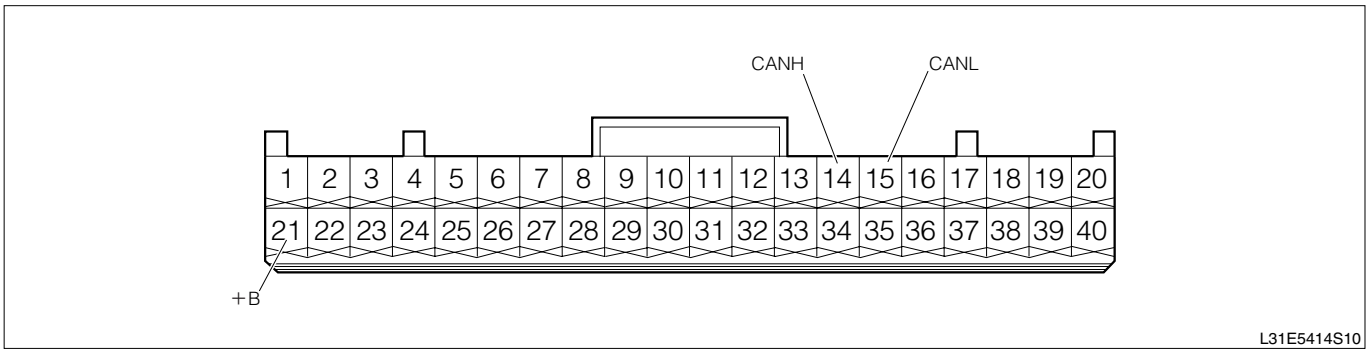
▼ If it is NG, replace the combination meter.
Refer to Page J3-1.

1-13-38 U0164/89 (COMMUNICATION WITH A/C (RECEIVE))

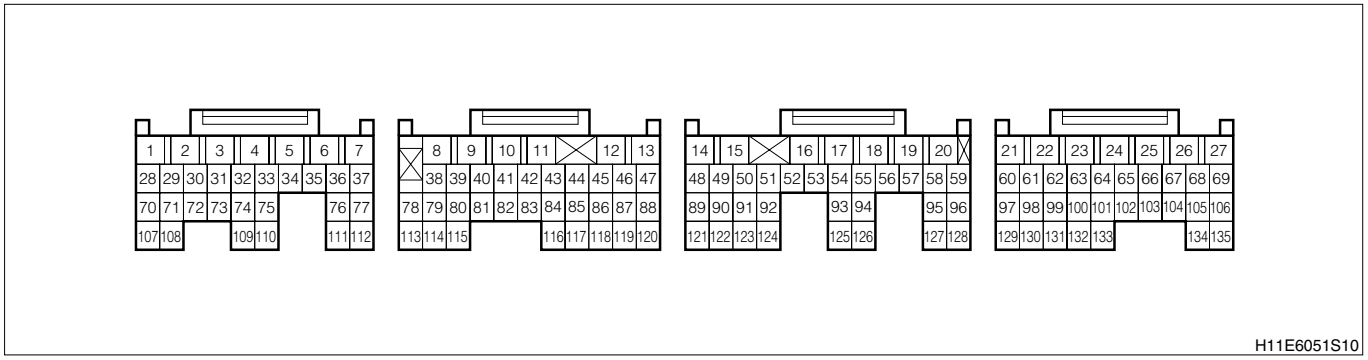
(1) System diagram



Automatic air conditioner ECU connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Output conditions

1. When the communication signals from the automatic air conditioner ECU cannot be received

(3) System diagram

1. Is the harness between the automatic air conditioner ECU and the EFI ECU functioning normally?
2. Is the automatic air conditioner ECU functioning normally?
3. Are there any contact faults in the connectors?

(4) Check procedure

≫1. Check of automatic air conditioner system

1. Perform a basic check of the automatic air conditioner system.
   Refer to Page K1-36.

   ▼ If it is OK, go to ≫3.
   ▼ If it is NG, perform troubleshooting for the automatic air conditioner, and then go to ≫2.
   Refer to Page K1-37.

≫2. Additional check of diagnosis codes

1. Erase the EFI diagnosis codes.
2. Check whether EFI diagnosis codes are output.
   SPECIFIED VALUE: No diagnosis codes are output.

   ▼ If it is OK, the EFI system is functioning normally.
   ▼ If it is NG, go to ≫3.

≫3.Basic check of CAN communications

1. Perform a basic check of the CAN communication system.
   Refer to Page L2-7.

   ▼ If it is OK, go to ≫4.
   ▼ If it is NG, repair the malfunctioning section, or replace it if necessary.

≫4. CAN line open circuit check

1. Disconnect the EFI ECU connectors, the combination meter connectors, and the automatic air conditioner ECU connectors.
2. Check the conduction between the following terminals.
   (1) Between EFI ECU connection vehicle harness side connector 8 (LCAN) and EFI ECU connection vehicle harness side connector 9 (HCAN)
   (2) Between automatic air conditioner ECU connection vehicle harness side connector 14 (CANH) and automatic air conditioner ECU connection vehicle harness side connector 15 (CANL)

   SPECIFIED VALUE: Continuity does not exist

   ▼ If it is OK, go to ≫5.
   ▼ If it is NG, repair the malfunctioning section, or replace it if necessary.

∑5. Checking the internal resistance of the EFI ECU

1. Disconnect all the EFI ECU connectors.
2. Measure the resistance between the following terminals.
   (1) Between EFI ECU side connector 6 (CANL) and EFI ECU side connector 7 (CANH)
   (2) Between EFI ECU side connector 8 (LCAN) and EFI ECU side connector 9 (HCAN)

SPECIFIED VALUE: 110－130Ω

▼If it is OK, go to ∑6.
▼If it is NG, replace the EFI ECU.

∑6. Check of automatic air conditioner ECU internal circuit

1. Disconnect the connectors of the automatic air conditioner ECU.
2. Check the conduction between the following terminals.
   (1) Between automatic air conditioner ECU side connector 14 (CANH) and automatic air conditioner ECU side connector 15 (CANL)

SPECIFIED VALUE: Continuity does not exist

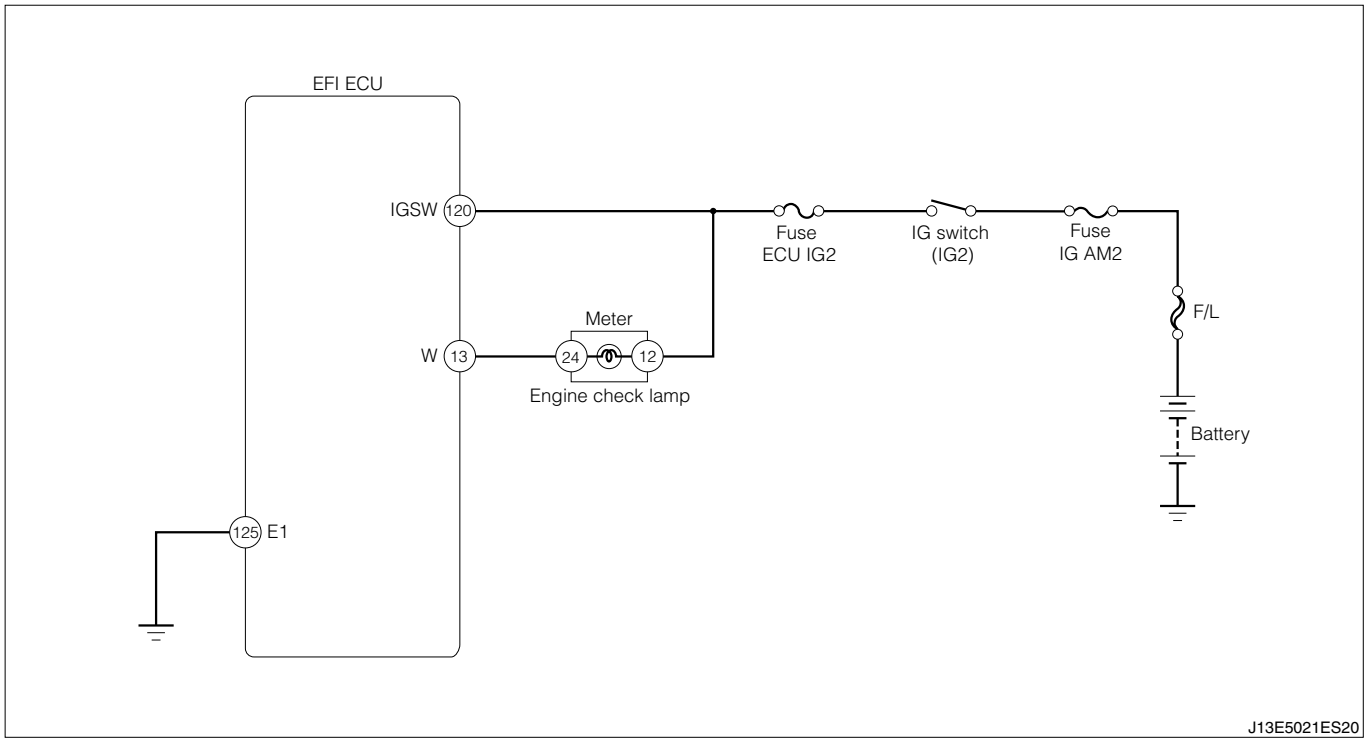
▼If no abnormalities are found, perform checks of the unit circuits of the automatic air conditioner ECU and the EFI ECU.
Refer to Page A1-39.

▼If it is NG, replace the automatic air conditioner ECU.
Refer to Page K1-14.

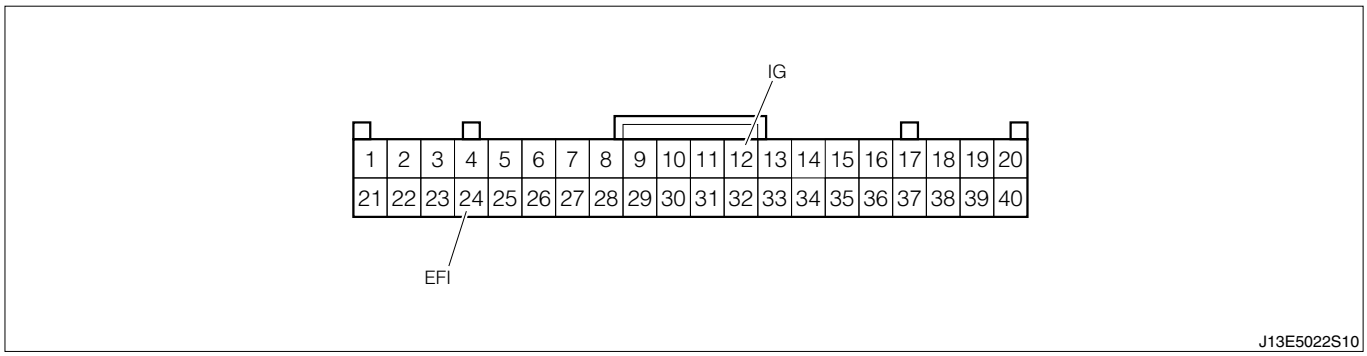
1-14 TROUBLE SHOOTING ACCORDING TO SYSTEM

1-14-1 CHECKING THE ENGINE CHECK LAMP SYSTEM

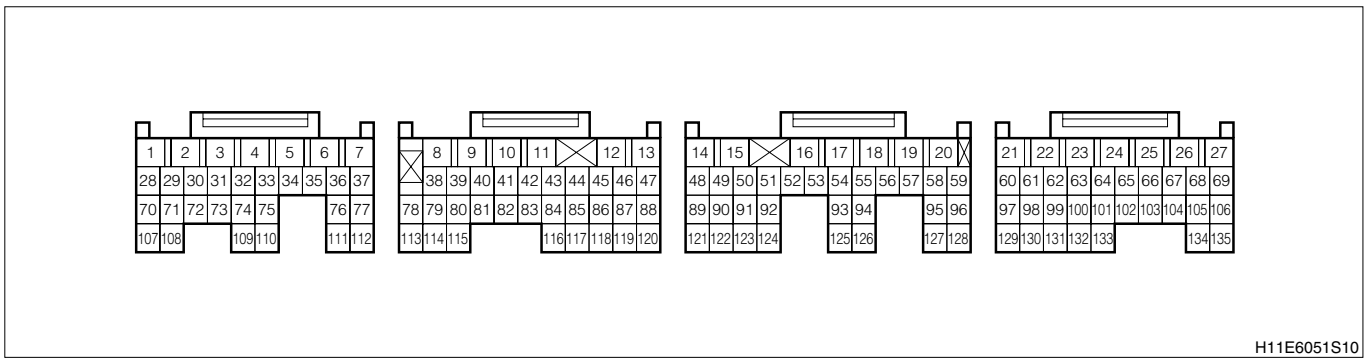
(1) System diagram



Combination meter connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Checking points

1. Is the engine check lamp bulb burn out?
2. Is the harness between EFI ECU and the combination meter normal?
3. Are the power supply voltage of EFI ECU and the earth circuit normal?

NOTE

- **If the sensor system power supply (5 V) is short-circuited to the earth side, the ECU circuit protection function may temporarily shut down the power supply of the EFI ECU. For this reason, be sure to carry out checking of the sensor system power supply circuit also.**

4. Are the power supply voltage of the combination meter and the earth circuit normal?

(3) Checking method

≫1. Checking the engine check lamp condition

1. Confirm that the engine check lamp turn on when the ignition switch is turned "ON", and the engine check lamp goes off when the engine is started.

SPECIFIED VALUE:

	The engine check lamp condition
a	Illuminated → extinguished
b	Remaining being illuminated
c	Does not go on (remaining being distinguished)

▼ In the case of a, there is no abnormality in the engine check lamp system.
▼ In the case of b, go to ≫2.
▼ In the case of c, go to ≫4.

≫2. Diagnosis code checking

1. Read out the diagnosis code by using the DS-Ⅱ.

▼ If the diagnosis code is not output but the lamp remains being illuminated, go to ≫3.
▼ If the diagnosis code is outputted, check the code that is outputted.

≫3. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the combination meter

Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, check the EFI ECU circuit and the combination meter circuit.

Refer to Page A1-39.

▼ If it is NG, repair or replace harness and connector at the faulty section.

⋗4. Checking the EFI ECU power supply voltage

1. Disconnect the connector on the EFI ECU side and measure the voltage between each of the terminals with the ignition switch set to "ON".
   (1) Between the ECU connected vehicle harness side connector 38 (BAT) and the ECU connected vehicle harness side connector 125 (E1)
   (2) Between the ECU connected vehicle harness side connector 120 (IGSW) and the ECU connected vehicle harness side connector 125 (E1)

SPECIFIED VALUE: Battery voltage

▼ If it is OK, go to ⋗5.
▼ If it is NG, check the EFI ECU power supply system.
Refer to Page B8-156.

⋗5. Checking the combination meter

1. Carry out checking of the combination meter.

Refer to TERIOS SERVICE MANUAL

▼ If it is OK, go to ⋗6.
▼ If it is NG, check the circuit of the combination meter.

Refer to TERIOS SERVICE MANUAL

⋗6. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the combination meter
   (2) Between EFI ECU and the body earth

Refer to Page A1-37.

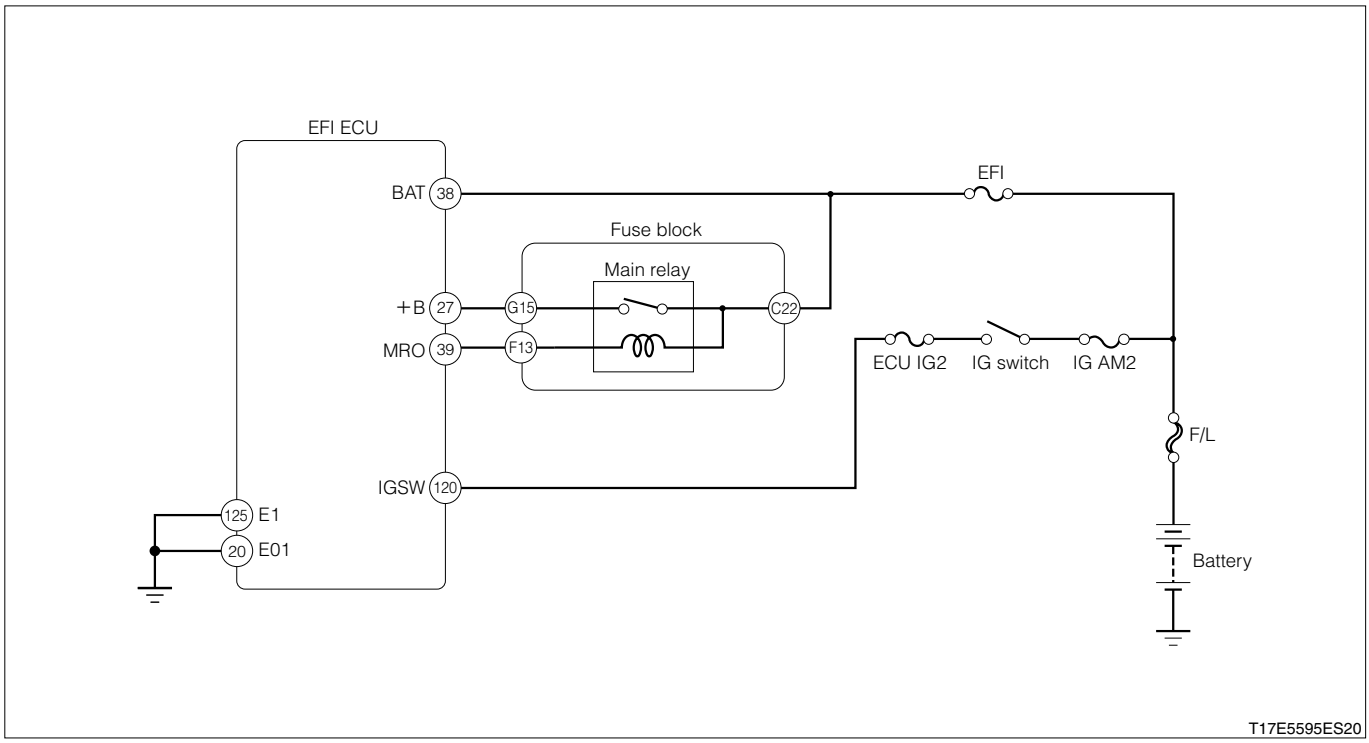
SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, check the EFI ECU circuit.
Refer to Page A1-39.

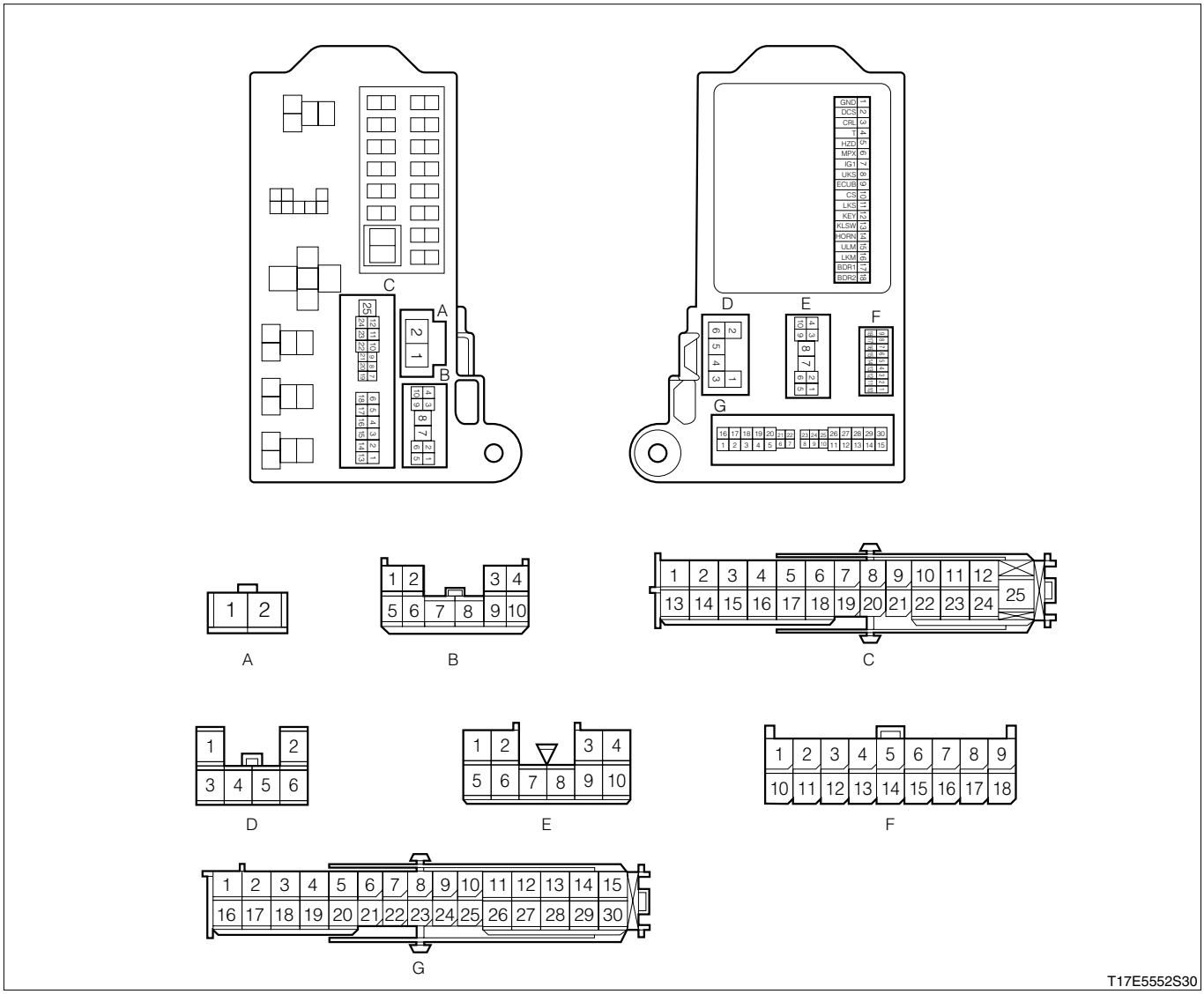
▼ If it is NG, repair or replace harness and connector at the faulty section.

1-14-2 CHECKING THE EFI ECU VOLTAGE SYSTEM

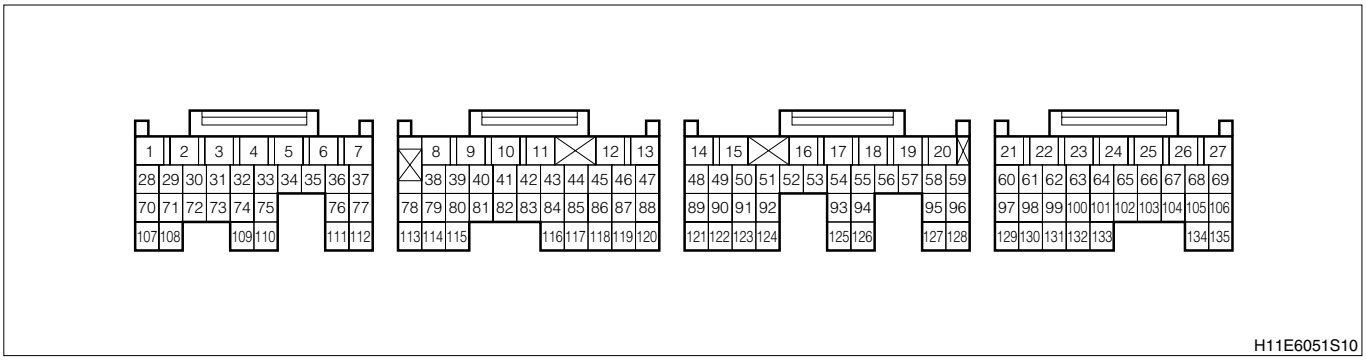
(1) System diagram



Fuse block connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Checking point

1. If the ignition switch is set to "ON", or when the engine check lamp does not go on when the diagnosis is displayed, it is possible that no power is supplied to the EFI ECU.

NOTE

- **When the sensor system power supply (5V) is shorted to the earth side, there are cases where the EFI ECU power supply voltage is temporarily shut down to protect the ECU circuit. For this reason, a check of the sensor system power supply circuit must also be performed.**

(3) Check procedure

⊿1. EFI ECU voltage check(1)

1. Disconnect EFI ECU side connector. Then measure the voltages between the next terminals.
   (1) Between ECU connection vehicles harness side connector 38(BAT)－body earth.
   SPECIFIED VALUE: Battery voltage

▼If it is OK, go to ⊿2.
▼If it is NG repair or replace harness and connector at the faulty section.

⊿2. EFI ECU input signal check

1. Disconnect EFI ECU side connector. Set IG SW to "ON". Then measure the voltages between the next terminals.
   (1) Between ECU connection vehicles harness side connector 120(IGSW)－body earth.
   SPECIFIED VALUE: Battery voltage

▼If it is OK, go to ⊿3.
▼If it is NG repair or replace harness and connector at the faulty section.

⊿3. EFI ECU voltage check (2)

1. Connect SST.
   SST: 09842-97209-000

2. Measure voltage between each terminal while IG SW is set to "ON".
   (1) Between SST27(＋B) and SST125(E1)
   SPECIFIED VALUE: Battery voltage

▼If it is OK, there is no abnormality in the EFI ECU power supply system.
▼If it is NG, go to ⊿4.

⊿4. EFI ECU output signal check

1. Connect SST.
   SST: 09842-97209-000

2. Measure voltage between each terminal while IG SW is set to "ON".
   (1) Between SST39(MRO) and SST125(E1)
   SPECIFIED VALUE: less than 1V

▼If it is OK, go to ⊿5.
▼If it is NG, check the EFI ECU circuit.
Refer to Page A1-39.

⊿5.Fuse block(main relay resistance) check

1. Disconnect the connector C,F of the fuse block.
2. Check the resistance of the next terminals.
   (1) Between fuse block side C connector 22 (B) and fuse block side F connector 13(COL－)
   SPECIFIED VALUE: 131－230Ω(20 ℃)

Refer to TERIOS SERVICE MANUAL
▼If it is OK, go to ⊿6.
▼If it is NG, replace the fuse block.

⌦6.Fuse block voltage check (1)

1. Disconnect connector C of the fuse block.
2. When IG SW is set to "ON" measure the voltage of the next terminals.
   (1) Fuse block connected vehicle harness side C connector 22 (B)－body earth

   SPECIFIED VALUE: Battery voltage

   ▼ If it is OK, go to ⌦7.
   ▼ If it is NG, repair or replace the harnesses between the following terminals.
   (2) Fuse block－battery

⌦7.Fuse block voltage check (2)

1. Disconnect connector G of the fuse block.
2. When IG SW is set to "ON" measure the voltage of the next terminals.
   (1) Fuse block connected vehicle harness side G connector 15 (L)－body earth

   SPECIFIED VALUE: Battery voltage

   ▼ If it is OK, go to ⌦8.
   ▼ If it is NG, replace the fuse block.

⌦8.Wire harness check

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) EFI ECU－fuse block

   Refer to Page A1-37.

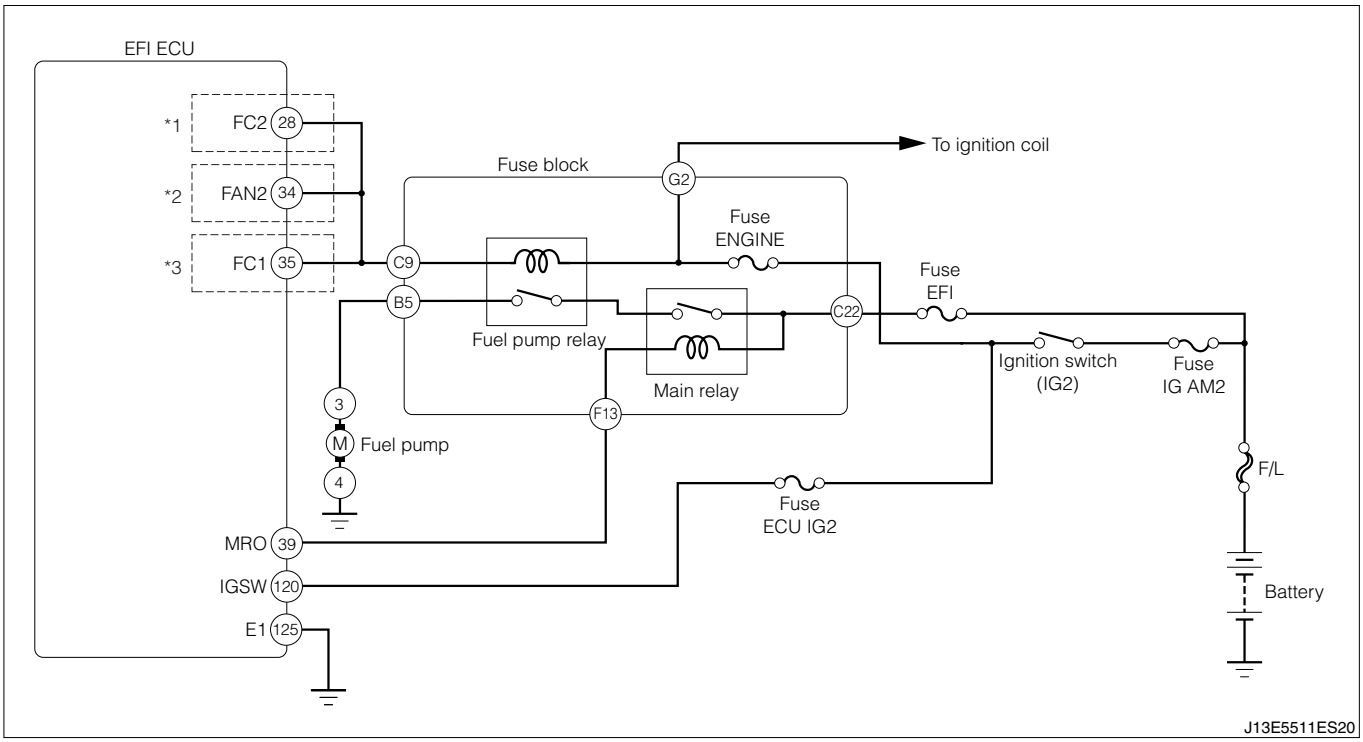
   SPECIFIED VALUE: Conduction with no short-circuiting

   ▼ If it is OK, check EFI ECU circuit.
   Refer to Page A1-39.

   ▼ If it is NG, repair or replace harness and connector at the faulty section.

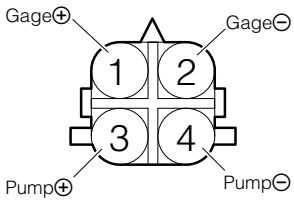
1-14-3 CHECKING THE FUEL PUMP SYSTEM

(1) System diagram

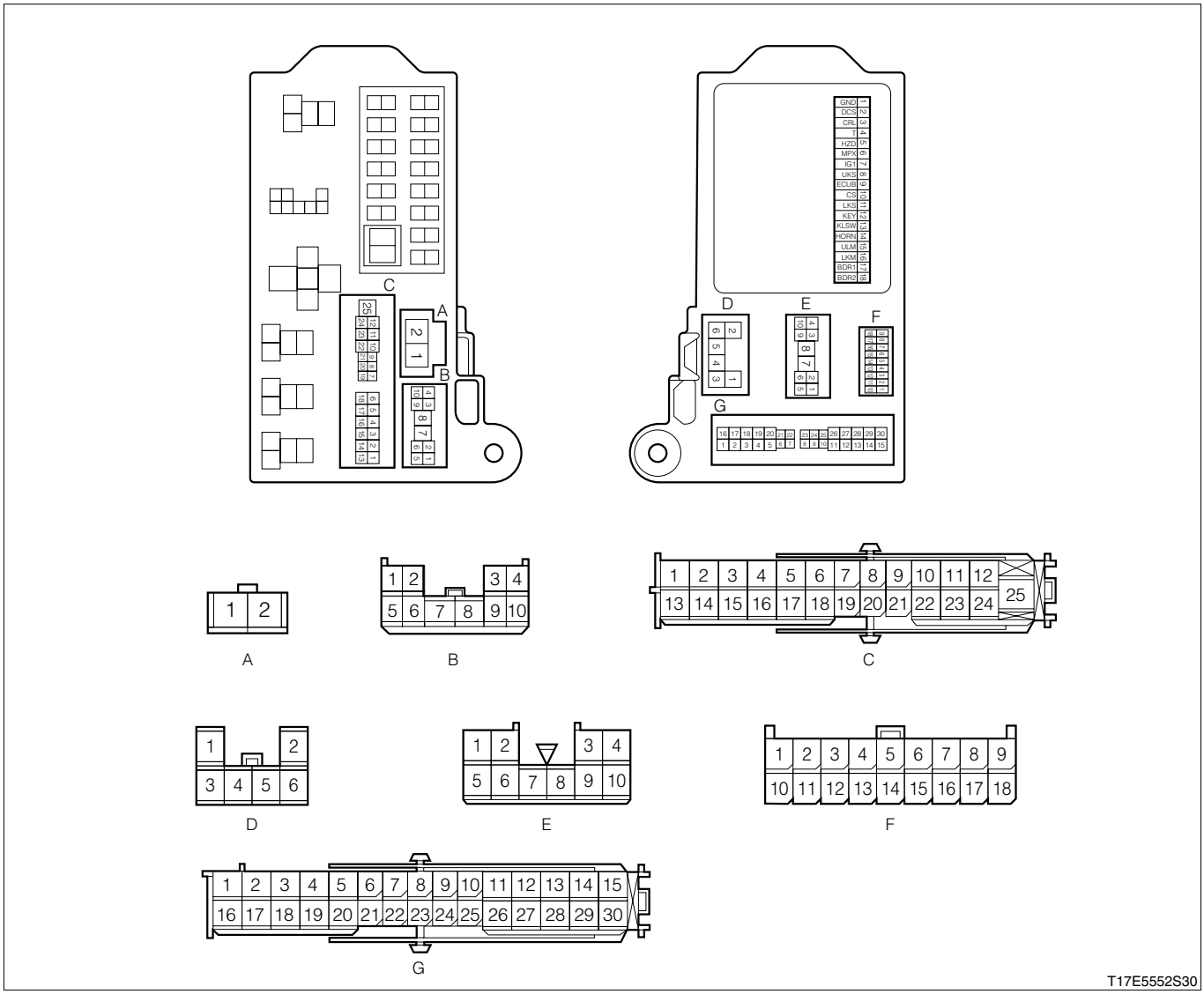


*1:Europe specifications
*2:China specifications
*3:General specifications

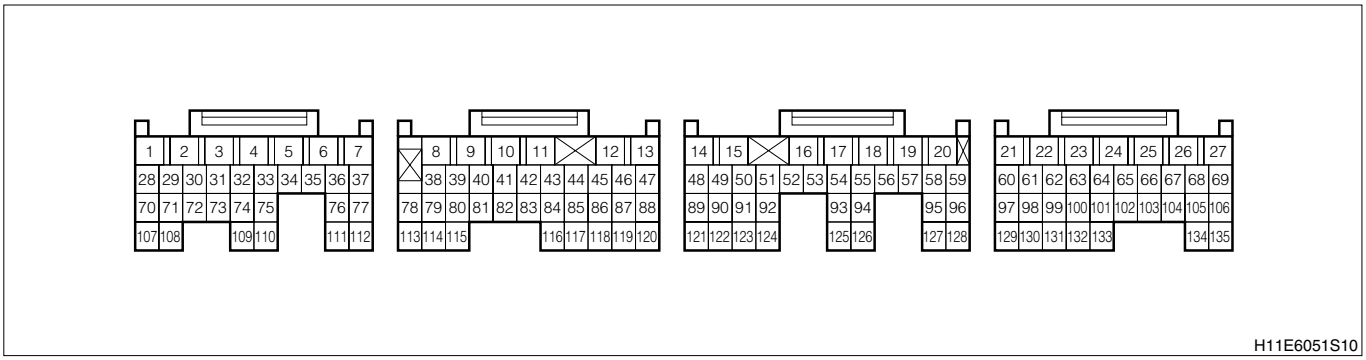
Fuel pump connection vehicles harness side connector



Fuse block connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Checking points

1. Is the power supply voltage at the fuse block (fuel pump relay) normal?
2. Is the fuse block (fuel pump relay) correctly operating?
3. Is the power supply voltage at the fuel pump relay normal?
4. Is the fuel pump correctly operating?

(3) Check procedure

∑1. Active test

1. Carry out the active test [Fuel pump] by using the DS-Ⅱ.

SPECIFIED VALUE:

	The fuel pump condition
When it is "ON"	Driving
When it is "OFF"	Stopped

NOTE

- **Check the operating sound at the fuel inlet side.**

▼ If it is OK, go to ∑2.

▼ If it is NG, go to ∑5.

∑2. Fuel pressure checking

1. Carry out the fuel pressure checking.

Refer to Page B8-178.

▼ If it is OK, go to ∑3.

▼ If it is NG, go to ∑4.

∑3. Checking the EFI ECU output signal (1)

1. Connect the SST.

SST: 09842-97209-000

2. Measure the voltage between terminals (SST28(FC2) and SST125(E1)under the following condition.(Europe specifications)
3. Measure the voltage between terminals (SST34(FAN2) and SST125(E1)under the following condition.(China specifications)
4. Measure the voltage between terminals (SST35(FC1) and SST125(E1)under the following condition.(General specifications)

SPECIFIED VALUE:

Condition	Specified value
2 seconds after the ignition switch is set to "ON"	1.2 V or lower
When 2 seconds or more have elapsed after the ignition switch is set to "ON"	Battery voltage
When idling	1.2 V or lower

▼ If it is OK, the fuel pump system is normal.

▼ If it is NG, check the EFI ECU circuit.

Refer to Page A1-39.

∑4. Checking the single unit of the fuel pump (1)

1. Carry out the single unit checking of the fuel pump.

Refer to Page B8-178.

▼ If it is OK, check or repair the fuel line.

▼ If it is NG, replace the fuel pump.

Refer to TERIOS SERVICE MANUAL

⊃5. Checking the fuse block (fuel pump relay resistance)

1. Disconnect the connectors C and G of the fuse block.
2. Measure the resistance between the following terminals.
   (1) Between the fuse block side C connector 9 (COL－) and the fuse block side G connector 2 (L2)
   SPECIFIED VALUE: At 131 to 230Ω (20 ℃)

▼ If it is OK, go to ⊃6.
▼ If it is NG, replace the fuse block.

⊃6. Checking the fuse block voltage (1)

1. Disconnect connector C of the fuse block.
2. Measure the voltage between the following terminals with the ignition switch set to "ON".
   (1) Between the fuse block connected vehicle harness side C connector 22 (B) and the body earth
   SPECIFIED VALUE: Battery voltage

▼ If it is OK, go to ⊃7.
▼ If it is NG, repair or replace the harnesses between the following terminals.
(2) Between the fuse block and the battery

⊃7. Checking the fuse block voltage (2)

1. Disconnect connector B of the fuse block.
2. Measure the voltage between the following terminals with the ignition switch set to "ON".
   (1) Between the fuse block connected vehicle harness side B connector 5 (L) and the body earth
   SPECIFIED VALUE: Battery voltage

▼ If it is OK, go to ⊃8.
▼ If it is NG, replace the fuse block.

⊃8. Carry out the single unit checking of the fuel pump (2)

1. Checking the single unit of the fuel pump.
   Refer to Page B8-178.

▼ If it is OK, go to ⊃9.
▼ If it is NG, replace the fuel pump.
Refer to TERIOS SERVICE MANUAL

⊃9. Checking the wiring harness

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between the fuel pump and the fuse block
   (2) Between the fuel pump and the body earth
   Refer to Page A1-37.

   SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, go to ⊃10.
▼ If it is NG, repair or replace the harness and the connectors of the malfunctioning section.

10. Checking the EFI ECU output signal (2)

1. Connect the SST.
   SST: 09842-97209-000

2. Measure the voltage between terminals (SST28(FC2) and SST125(E1)under the following condition.(Europe specifications)
3. Measure the voltage between terminals (SST34(FAN2) and SST125(E1)under the following condition.(China specifications)
4. Measure the voltage between terminals (SST35(FC1) and SST125(E1)under the following condition.(General specifications)

   SPECIFIED VALUE:

Condition	Specified value
2 seconds after the ignition switch is set to "ON"	1.2 V or lower
When 2 seconds or more have elapsed after the ignition switch is set to "ON"	Battery voltage
When idling	1.2 V or lower

▼ If it is OK, check or repair the harness and the connectors between the following terminals.

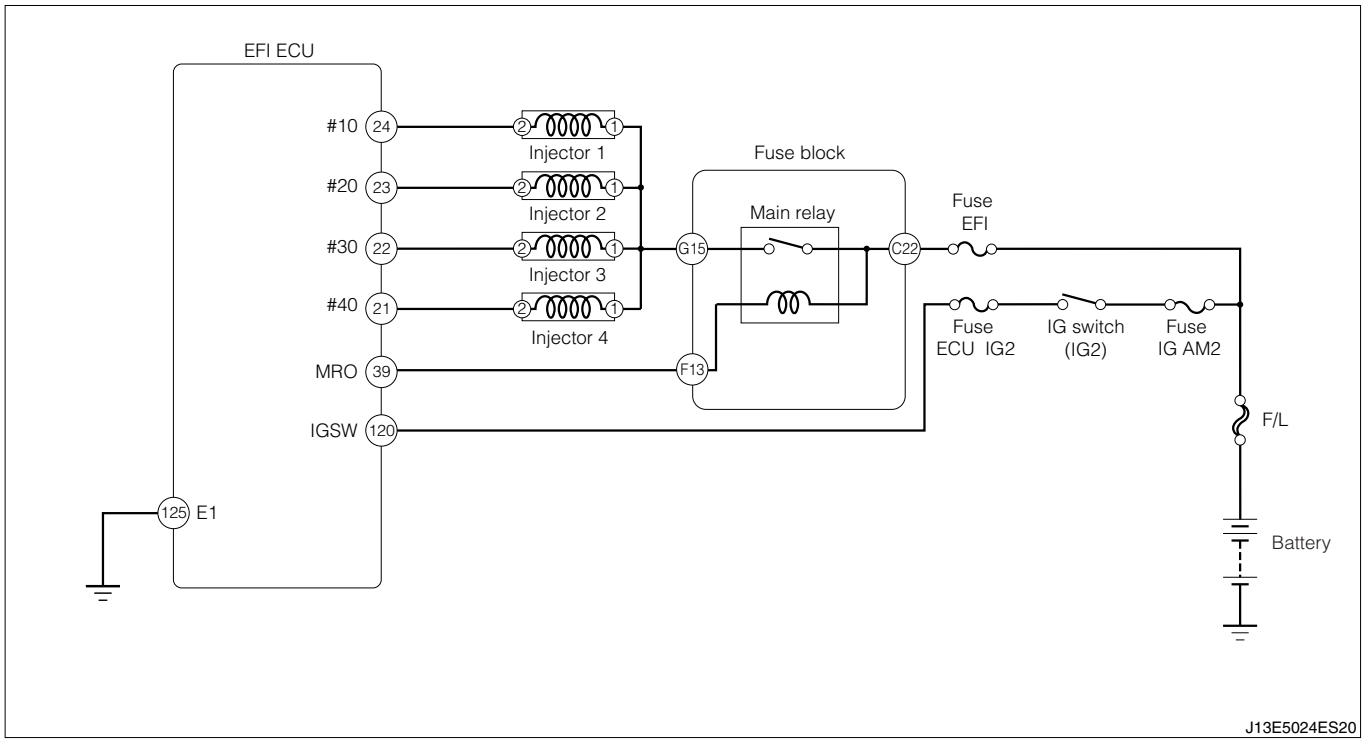
(1) Between EFI ECU and the fuse block

▼ If it is NG, check the EFI ECU circuit.

Refer to Page A1-39.

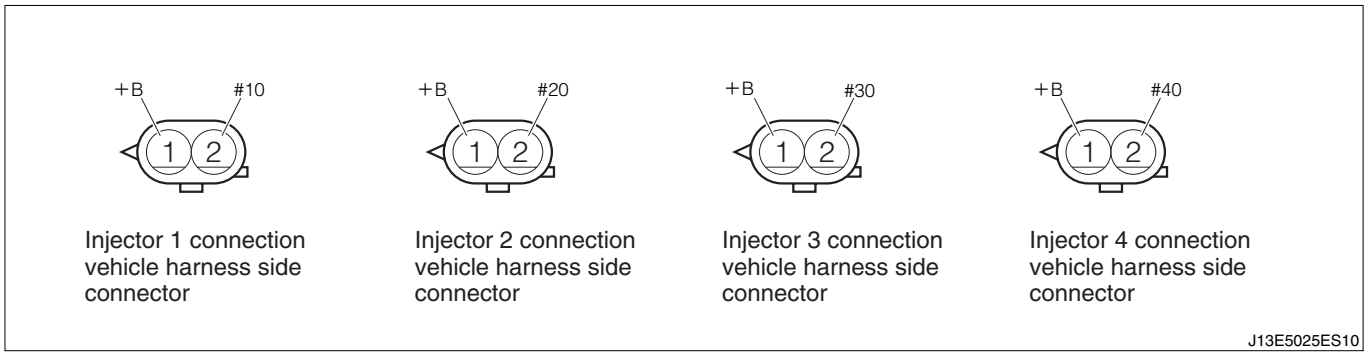
1-14-4 CHECKING THE INJECTOR SYSTEM

(1) System diagram



J13E5024ES20

Each unit connected vehicle harness side connector



Injector 1 connection vehicle harness side connector

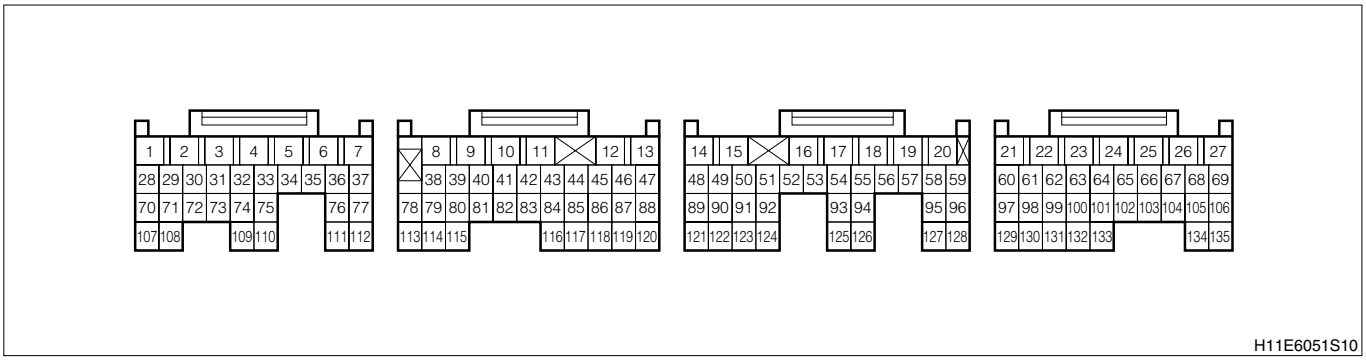
Injector 2 connection vehicle harness side connector

Injector 3 connection vehicle harness side connector

Injector 4 connection vehicle harness side connector

J13E5025ES10

EFI ECU connected vehicle harness side connector



H11E6051S10

(2) Checking points

1. Is the injector control signal correctly output from EFI ECU?
2. Is the power supply voltage of the injector normal?
3. Is the harness between the injector and EFI ECU normal?
4. Is the injection of the injector good?

(3) Check procedure

Σ1. Checking the injector operation.

1. Use a sound scope or a long screw driver to check if the injector's operating sound is generated.
   SPECIFIED VALUE: The operating sound is emitted.

▼ If it is OK, go to Σ2.
▼ If it is NG, go to Σ4.

Σ2. Fuel pressure check

1. Perform a fuel pressure check.
   Refer to Page B8-178.

▼ If it is OK, go to Σ3.
▼ If it is NG, perform a check of the fuel pump system.
Refer to Page B8-160.

Σ3. Carry out the single unit checking of the injector (1)

1. Carry out the single unit checking of the injector.
   Refer to Page B8-184.

▼ If it is OK, the injection system is normal.
▼ If it is NG, replace the injector.
Refer to TERIOS SERVICE MANUAL

Σ4. Checking of the injector voltage

1. Turn the IG SW to LOCK.
2. Disconnect all connectors at the injector side.
3. Measure the voltage between each of the terminals with the ignition switch set to "ON".
   (1) Between each injector connected vehicle harness side connector 1 (＋B) to the body earth
   SPECIFIED VALUE: Battery voltage

▼ If it is OK, go to Σ5.
▼ If it is NG, repair or replace the harnesses and the relay between the battery and the injector.

Σ5. Checking the single unit of the injector (2)

1. Carry out the single unit checking of the injector.
   Refer to Page B8-184.

▼ If it is OK, go to Σ6.
▼ If it is NG, replace the injector.
Refer to TERIOS SERVICE MANUAL

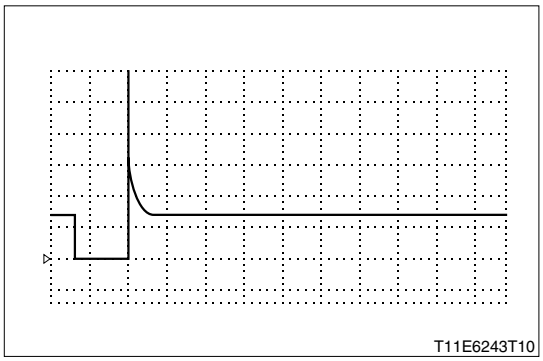
⌦6. EFI ECU output signal check

1. Connect the SST.
   SST: 09842-97209-000

2. Check the output between the following terminals, using an oscilloscope.
   (1) Between SST 24 (#10) and SST 125 (E1)
   (2) Between SST 23 (#20) and SST 125 (E1)
   (3) Between SST 22 (#30) and SST 125 (E1)
   (4) Between SST 21 (#40) and SST 125 (E1)
3. For example, in the case of the following measuring range and conditions, the oscilloscope waveform will appear as shown in the illustration.

Time axis	2ms / DIV
Voltage axis	10V / DIV
Condition	Air conditioner OFF, no electrical load, when idling

"Air conditioner OFF" refers to a status where the air conditioner switch (ACSW), the blower switch (BLW), and the magnetic clutch (MGC) are all OFF.



NOTE

- **A particular waveform cannot be specified. However, check that a waveform similar to the one shown in the illustration (example) is output.**

4. Check the following points.
   (1) The voltage changes from the battery voltage to 0V during fuel injection.

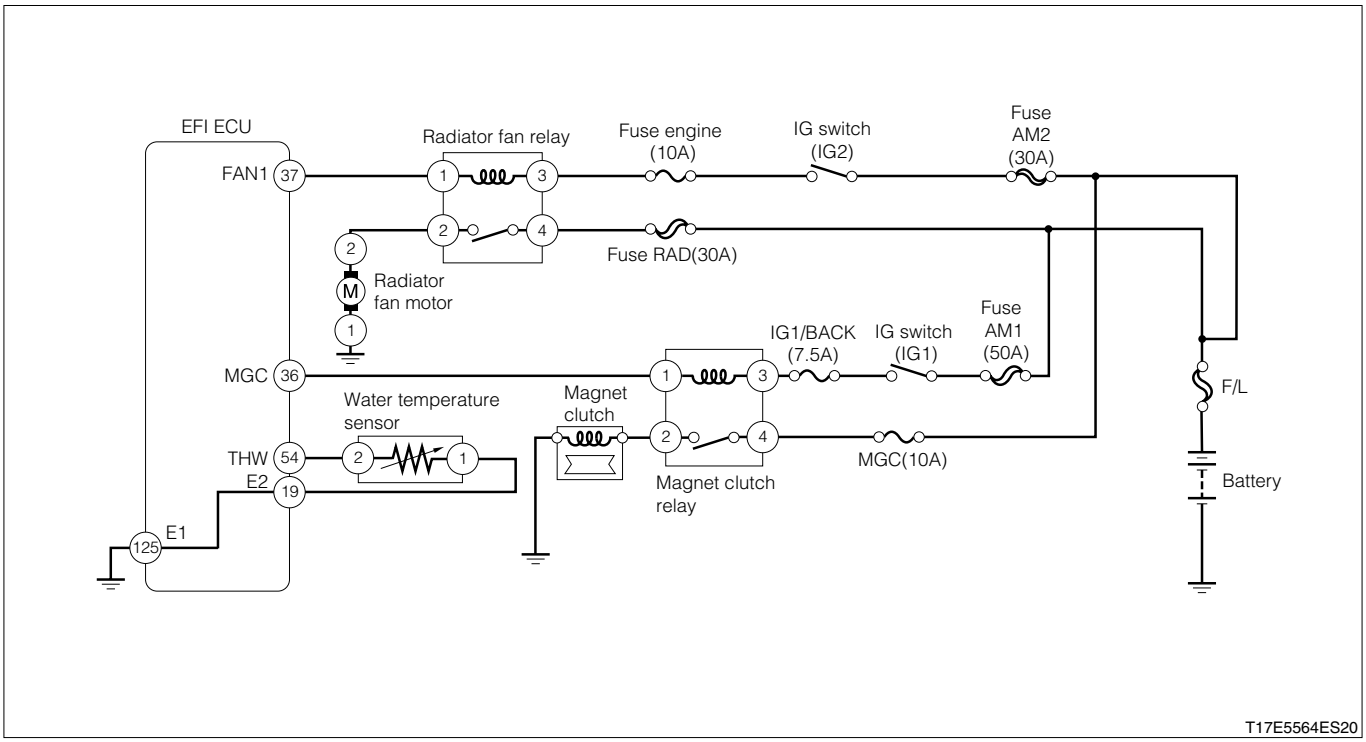
▼ If it is OK, check the harness and the connectors between the EFI ECU and the injectors, and repair them if necessary.

▼ If it is NG, perform a check of the EFI ECU circuit.

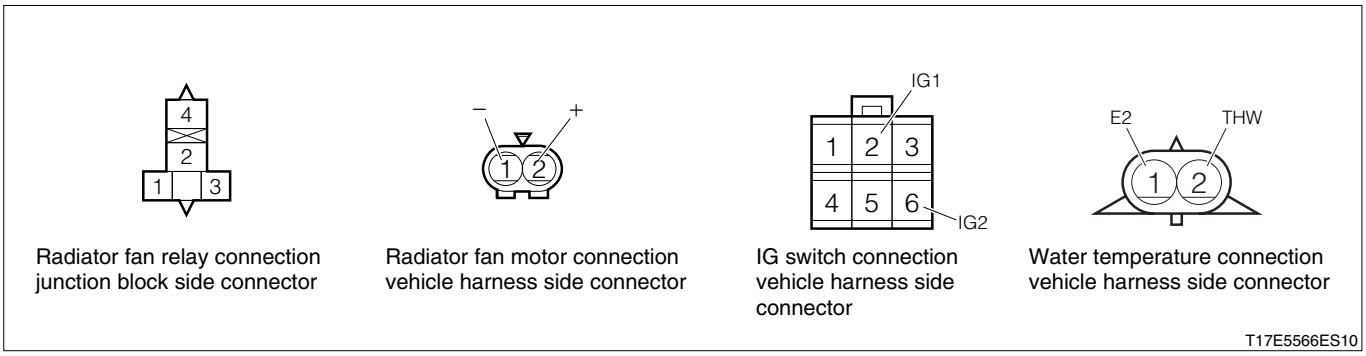
Refer to Page A1-39.

1-14-5 CHECKING THE RADIATOR FAN SYSTEM

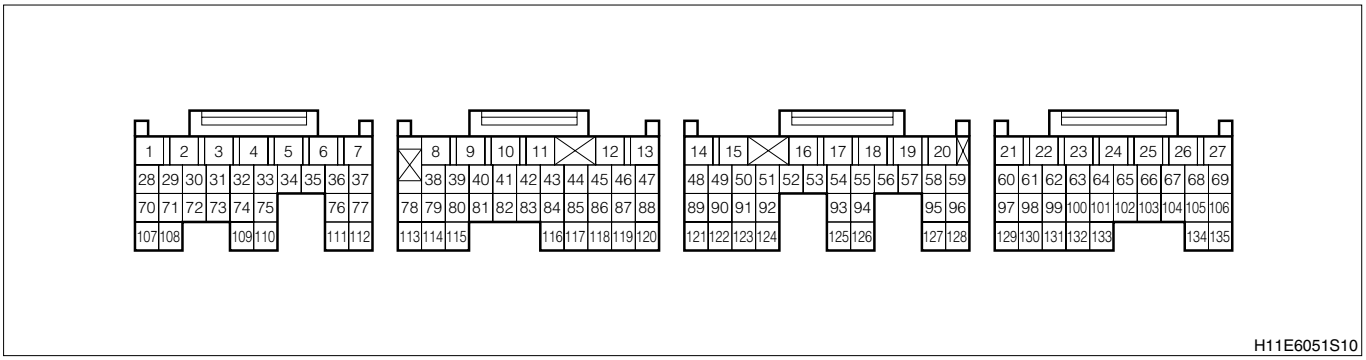
(1) System diagram



Each unit connected vehicle harness side connector



EFI ECU connected vehicle harness side connector



(2) Checking points

1. Is the signal from the water temperature sensor input to the EFI ECU?
2. Is the harness between the water temperature sensor and EFI ECU normal?
3. Is the water temperature sensor normal?
4. Is the signal from the magnet clutch relay input to EFI ECU?
5. Is the harness between the magnet clutch relay and EFI ECU normal?
6. Is the harness between the radiator fan relay and EFI ECU normal?
7. Is the radiator fan motor normal?

(3) Check procedure

Σ1. Diagnosis code checking

1. Read out the diagnosis code by using the DS-Ⅱ.
   SPECIFIED VALUE: No diagnosis codes are output.

   ▼ If it is OK, go to Σ2.
   ▼ If it is NG, check the code that is outputted.
   Refer to Page B8-31.

Σ2. Active test

1. When the air conditioner is "OFF", and when the engine is cold, carry out the active test [radiator fan] by using the DS-Ⅱ.
   SPECIFIED VALUE:

	Operating the DS-Ⅱ	The radiator fan condition
a	"ON"→"OFF"	Rotation → Stopped
b		No rotation
c		No stopping (always rotating)

Air conditioner "OFF": The air conditioner switch (ACSW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".

▼ In the case of a, go to Σ3.
▼ In the case of b, go to Σ8.
▼ In the case of c, go to Σ12.

Σ3. Confirmation of the operating status of the radiator fan (1)

1. Confirm the operating status of the radiator when the air conditioner is set to "OFF"→"ON" when the engine is cold.
   SPECIFIED VALUE:

The air conditioning condition	The radiator fan condition
"OFF"→"ON"	Stopped → Rotating

Air conditioner "ON": The air conditioner switch (ACSW), blower switch (BLW), magnet clutch (MGC) are all set to "ON".

▼ If it is OK, go to Σ5.
▼ If it is NG, go to Σ4.

⊳4. Checking the magnet clutch operation

1. Check that the magnet clutch operates normally when the air conditioner is turned "ON".
   SPECIFIED VALUE: The magnet clutch is set to "ON".

NOTE

- **"Air conditioner ON" refers to a status where the air conditioner switch (ACSW), the blower switch (BLW), and the magnetic clutch (MGC) are all ON.**

▼ If it is OK, check the EFI ECU circuit.
Refer to Page A1-39.

▼ If it is NG, carry out the checking of troubleshooting according to malfunction phenomena in the air conditioner system: the compressor magnet clutch does not turn on or off.
Refer to Page K1-48.

⊳5. Checking the radiator fan operating status (2)

1. Read out the data monitor [water temperature] by using the DS-Ⅱ.
2. Confirm the operating status of the radiator when the air conditioner is set to "OFF" and the coolant temperature 80 ℃ or less → 100 ℃ or over.
   SPECIFIED VALUE:

Water temperature condition	Radiator fan condition
At 80℃ or lower → 100℃	Stopped → Rotating

The condition under which the air conditioner is turned "OFF": The air conditioner switch (ACSW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".

▼ If it is OK, the radiator fan system is normal.
▼ If it is NG, go to ⊳6.

⊳6. Checking the single unit of the water temperature sensor

1. Carry out the single unit checking of the water temperature sensor.
   Refer to Page B8-179.

▼ If it is OK, go to ⊳7.
▼ If it is NG, replace the water temperature sensor.
Refer to TERIOS SERVICE MANUAL

⊳7. Checking the wiring harness (1)

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the water temperature sensor
   Refer to Page A1-37.

   SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, check the EFI ECU circuit.
Refer to Page A1-39.

▼ If it is NG, repair or replace harness and connector at the faulty section.

≫8. Checking the single unit of the radiator fan relay

1. Carry out the single unit checking of the radiator fan relay.
   Refer to Page B8-186.

▼ If it is OK, go to ≫9.
▼ If it is NG, replace the radiator fan relay.

≫9. Checking the EFI ECU signal (1)

1. Connect the SST.
   SST: 09842-97209-000

2. Carry out the active test [radiator fan] by using the DS-Ⅱ.
3. Measure the voltage between the following terminals when "ON" → "OFF" operation is performed.
   (1) Between SST 37 (FAN 1) and SST 125 (E1)
   SPECIFIED VALUE:

	Measurement value
ON	1V or less
OFF	Battery voltage

▼ If it is OK, go to ≫10.
▼ If it is NG, check the EFI ECU circuit.
Refer to Page A1-39.

≫10. Checking the radiator fan relay voltage

1. When the ignition switch is set to "ON", measure the voltage between each of the following terminals.
   (1) Between the radiator fan relay connected vehicle harness side connector 3 and the body earth
   (2) Between the radiator fan relay connected vehicle harness side connector 4 and the body earth
   SPECIFIED VALUE: Battery voltage

▼ If it is OK, go to ≫11.
▼ If it is NG, repair or replace the harnesses between the following terminals.
(3) Between the radiator fan relay and the battery

≫11. Checking the wiring harness (2)

1. Check the wiring harness between the following sections for breaking of wires, and short-circuiting.
   (1) Between EFI ECU and the radiator fan relay
   (2) Between the radiator fan relay and the radiator fan motor
   (3) Between the radiator fan motor and the body earth
   Refer to Page A1-37.

SPECIFIED VALUE: Conduction with no short-circuiting

▼ If it is OK, check the radiator fan motor.
▼ If it is NG, repair or replace harness and connector at the faulty section.

≫12. Checking the single unit of the radiator fan really (2)

1. Carry out the single unit checking of the radiator fan relay.
   Refer to Page B8-186.

▼ If it is OK, go to ≫13.
▼ If it is NG, replace the radiator fan relay.

⊳13. Checking the EFI ECU signal (2)

1. Connect the SST.
   SST: 09842-97209-000

2. Carry out the active test [radiator fan] by using the DS-Ⅱ.
3. Measure the voltage between the following terminals when "ON" → "OFF" operation is performed.
   (1) Between SST 37 (FAN 1) and SST 125 (E1)

SPECIFIED VALUE:

	Measurement value
ON	1V or less
OFF	Battery voltage

▼ If it is OK, check or repair the harness and the connectors between the following terminals.

(2) Between the radiator fan motor and the radiator fan relay

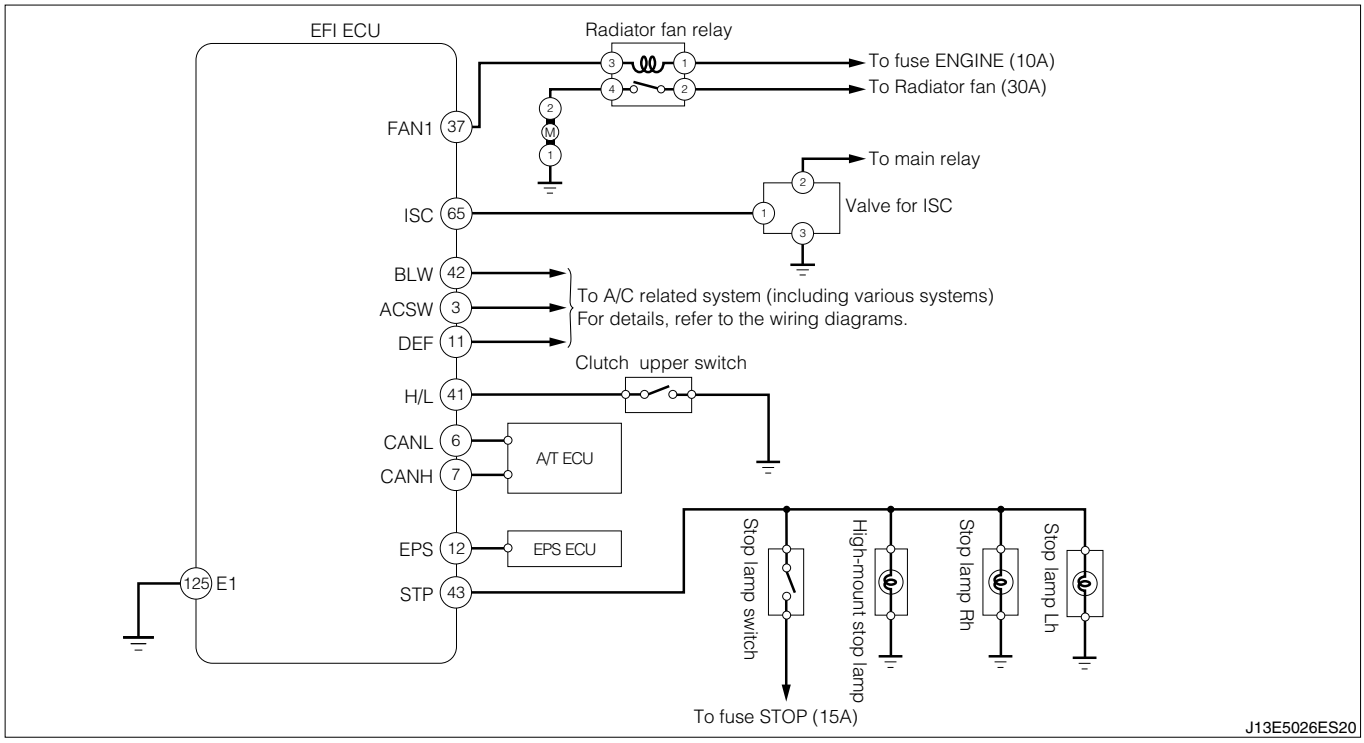
▼ If it is NG, check the EFI ECU circuit.

Refer to Page A1-39.

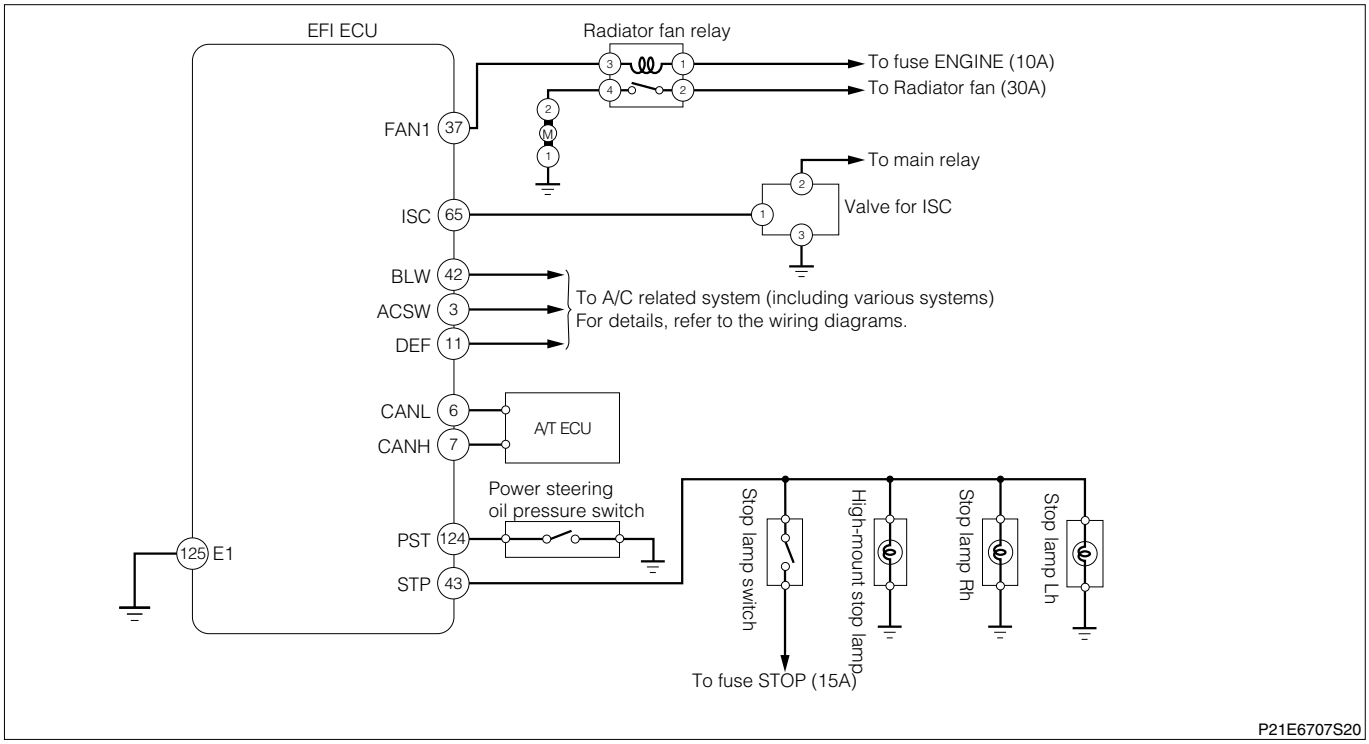
1-14-6 CHECKING THE ISC IDLE－UP CONTROL SYSTEM

(1) System diagram

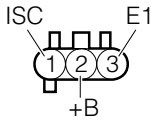
[1] Europe specifications



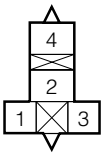
[2] China specifications · General specifications



Each unit, relay etc. connected vehicle harness side connector



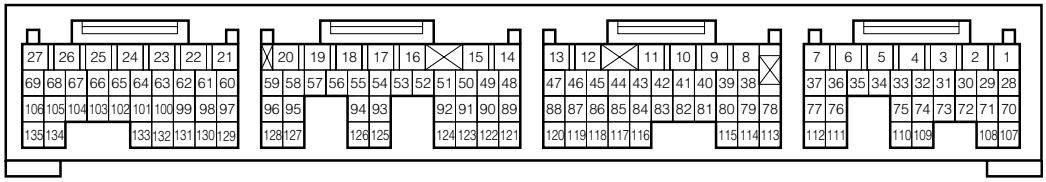
ISC valve connection vehicle harness side connector



Radiator fan relay connection junction block side connector

T11E6174ES10

EFI ECU connected vehicle harness side connector



H11E6091S10

(2) Checking Points

1. Is the harness between the ISC valve and the EFI ECU normal?
2. Is the power supply voltage of the ISC valve normal?
3. Is the ISC valve control signal being correctly output from the EFI ECU?
4. Is the harness between each sensor or switch and the EFI ECU normal?
5. Is the ISC valve operating correctly?

(3) Check procedure

≫1.Data monitor(1)

1. Warm up the engine.
2. Read the data monitor [Engine revolution speed], using the DS-Ⅱ.

NOTE

- **For AT vehicles, perform the check in P·N range.**
- **For M/T vehicles, perform the check in neutral.**

(1) Europe specifications

SPECIFIED VALUE:

	Displayed data(3SZ)	Displayed data(K3)
When Electrical load is ON or when power steering is operated	650^{+100}_{-50}rpm(A/T vehicles) 650^{+100}_{-50}rpm(M/T vehicles)	650^{+100}_{-50}rpm
When air conditioner is ON	900^{+100}_{-50}rpm(A/T vehicles) 900^{+100}_{-50}rpm(M/T vehicles)	900^{+100}_{-50}rpm
When clutch pedal is depressed	650^{+100}_{-50}rpm(M/T vehicles)	–

Electrical load ON is a status where the headlights, the defogger, the heater blower, or the radiator fan are ON.
The condition under which the air conditioner is turned "ON", and the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "ON".

(2) Except Europe specifications

SPECIFIED VALUE:

	Displayed data
When Electrical load is ON or when power steering is operated	700^{+100}_{-50}rpm
When air conditioner is ON	900^{+100}_{-50}rpm

Electrical load ON is a status where the headlights, the defogger, the heater blower, or the radiator fan are ON.
"Air conditioner ON" refers to a status where the air conditioner switch (ACSW), the blower switch (BLW), and the magnetic clutch (MGC) are all ON.

▼ If it is OK, leave the system for a while and observe its status, as there is the possibility that it will return to normal.

▼ If it is NG, go to ≫2.

≫2.Data monitor(2)

1. Read the following data, using the DS-Ⅱ.

(1) Electrical load (DSW)

Switch condition	Displayed data
The defogger, the heater blower, or the radiator fan is ON.	ON
The defogger, the heater blower, and the radiator fan are all OFF.	OFF

(2) Air conditioner signal (AC)

Switch condition	Displayed data
Air conditioner switch is ON.	ON
Air conditioner switch is OFF.	OFF

(3) Power steering signal (PST)

Steering status	Displayed data
When vehicle is stationary and steering wheel is turned	ON
When vehicle is stationary and steering wheel is not turned	OFF

(4) Stop lamp signal (STP)

Switch condition	Displayed data
When brake pedal is depressed	ON
When brake pedal is released	OFF

(5) Clutch upper switch signal*(H/L)

Switch condition	Displayed data
When clutch pedal is released	ON
When clutch pedal is depressed	OFF

*:European specification (M/T vehicless mounted with type 3SZ engines)

▼ If it is OK, perform a check for P0505/71 (ISC idling control system).

Refer to Page B8-108.

▼ If it is NG, go to ≫3.

⌦3. Check the EFI ECU signal

1. Connect the SST.
   SST: 09842-97209-000

2. Turn the IG SW to ON, and measure the voltage between the terminals for which the data monitor indicated a malfunction signal.
   (1) Defogger: between SST 11 (DEF) and SST 125 (E1)
   (2) Heater blower: between SST42 (BLW) and SST 125 (E1)
   (3) Radiator fan: between SST 37 (FAN1) and SST 125 (E1)
   (4) Air conditioner switch: between SST 3 (ACSW) and SST 125 (E1)
   (5) Power steering switch: between SST 12 (EPS) and SST 125 (E1) (EPS specification vehicles)
   (6) Power steering switch: between SST 124 (PST) and SST 125 (E1) (Hydraulic power steering specification vehicles)
   (7) Stop lamp: between SST 43 (STP) and SST 125 (E1)
   (8) Clutch upper switch: between SST 41 (H/L) and SST 125 (E1) (European specification M/T vehicles mounted with type 3SZ engines)

SPECIFIED VALUE:

Check signal	Terminal	Condition	Specified value
Defogger	11 (DEF)－125 (E1)	When defogger switch is ON	Battery voltage
		When defogger switch is OFF	Around 0V
Heater blower	42 (BLW)－125 (E1)	When heater blower switch is ON	Around 0V
		When heater blower switch is OFF	Battery voltage
Radiator fan	37 (FAN1)－ 125 (E1)	When Radiator fan is ON	Around 0V
		When Radiator fan is OFF	Battery voltage
Air conditioner switch	3 (ACSW)－125 (E1)	When air conditioner is operating	Battery voltage
		When air conditioner is not operating	Around 0V
Power steering switch(EPS specification vehicles)	12 (EPS)－125 (E1)	When vehicle is stationary and steering wheel is turned	Around 0V
		When vehicle is stationary and steering wheel is not turned	Battery voltage
Power steering switch (Hydraulic power steering specification vehicles)	124 (PST)－125 (E1)	When oil pressure switch is ON	Around 0V
		When oil pressure switch is OFF	Battery voltage
Stop lamp switch	43 (STP)－125 (E1)	When brake pedal is depressed	Battery voltage
		When brake pedal is released	Around 0V
Clutch upper switch*	41 (H/L)－125 (E1)	When clutch pedal is released	Around 0V
		When clutch pedal is depressed	Battery voltage

*:European specification (M/T vehicless mounted with type 3SZ engines)

▼ If it is OK, perform a check of the EFI ECU circuit.
Refer to Page A1-39.

▼ If it is NG, repair or replace the circuit, the harness, the relay, and the switch of the malfunctioning section.

1-15 UNIT CHECK

WARNING

- **Driving a vehicle with SST (EFI computer check sub-harness, etc.) being connected might cause an error operation to occur, which is extremely dangerous. Make sure that SST has been disconnected before driving the vehicle.**

1-15-1 FUEL PRESSURE CHECKING

WARNING

- **Never use fire during the work.**
  Place cloth, etc. to prevent fuel from splashing.

1. Connect DS-Ⅱ.
2. Disconnect the fuel hose from the fuel delivery pipe inlet and attach the fuel pressure gage to the pipe via a 3 way.
3. Set the ignition switch to "ON".
4. Carry out the active test [fuel pump] by using the DS-Ⅱ.
5. Measure the fuel pressure when the fuel pump is driven.

SPECIFIED VALUE: 324±5 kPa {3.3± 0.05 kgf/cm^2
No significant variation taking place.

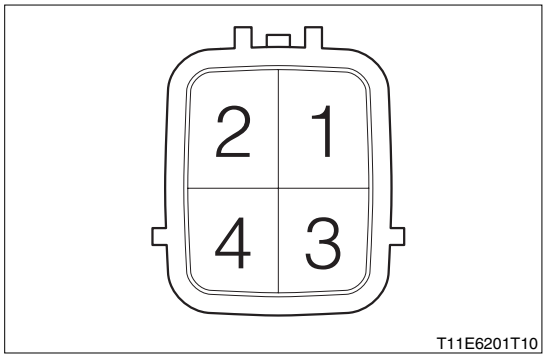
1-15-2 FUEL PUMP

WARNING

- **Never use fire during the work.**

1. Set the ignition switch to "LOCK".
2. Disconnect the pump connector on the fuel tank.
3. Measure the resistance between 3 (pump＋) and 4 (pump －).

SPECIFIED VALUE: 0.2－3.0Ω



1-15-3 MANIFOLD ABSOLUTE PRESSURE SENSOR

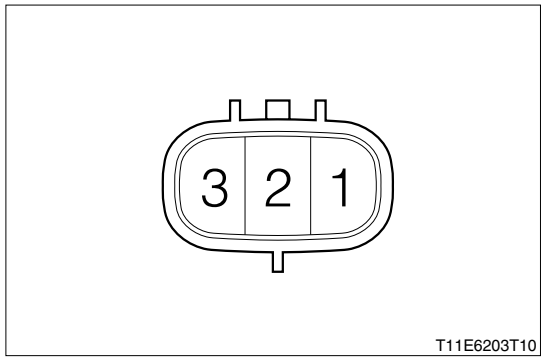
1. Connect the SST.
   SST: 09842-97209-000

2. With the ignition switch set to "ON", measure the voltage between the following terminals.
   (1) Between SST57 (VCPM) and 122 (E2PM)

   SPECIFIED VALUE: 4.5－5.5V
3. With the ignition switch set to "ON", measure the voltage between the following terminals.
   (1) Between SST52 (PIM) and 122 (E2PM)

   SPECIFIED VALUE: 3.1－4.1V
4. Disconnect the connector of the fuel pump and perform cranking. And then, measure the voltage between the following terminals.
   (1) Between SST52 (PIM) and 122 (E2PM)

   SPECIFIED VALUE: The voltage values vary.



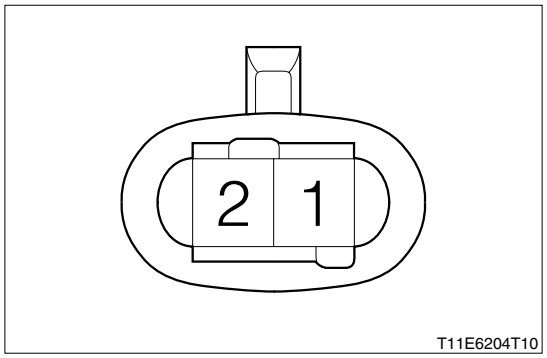
1-15-4 INTAKE AIR TEMPERATURE SENSOR

1. Measure the resistance value between the following sensor terminals.
   (1) 1 (THA) and 2 (E2)

Characteristics of intake air temperature sensor

Temperature (℃)	−30	−20	20	80	120
Resistance (kΩ)	(28.6)	16.2±1.6	2.45±0.24	0.322±0.032	(0.117)

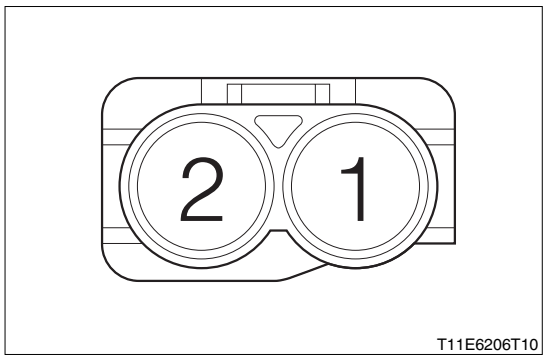
Figures inside parentheses show reference values.



T11E6204T10

1-15-5 ENGINE SPEED SENSOR

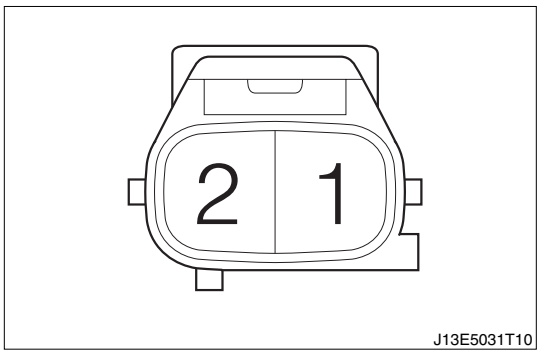
1. Measure the resistance value between the following terminals.
   (1) Between 1 (N1+) and 2(N1−)
   SPECIFIED VALUE: At 2.15±0.3kΩ (20℃)



T11E6206T10

1-15-6 CAMSHAFT POSITION SENSOR

1. Measure the resistance value between the following terminals.
   (1) Between 1 (N2+) and 2(N2−)
   SPECIFIED VALUE: At 2.15±300kΩ (20℃)

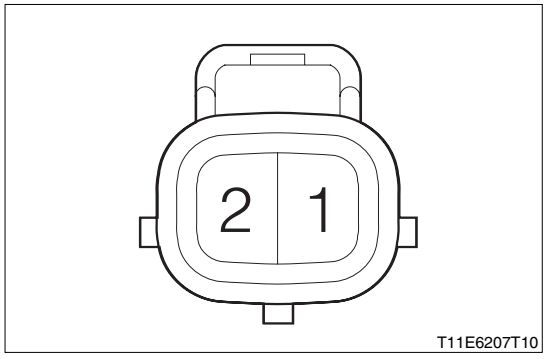


J13E5031T10

1-15-7 COOLANT TEMPERATURE SENSOR

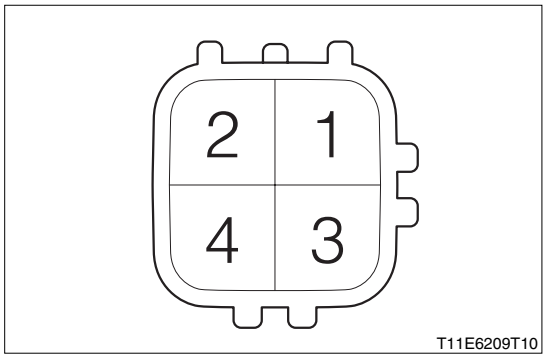
1. Measure the resistance value between the following terminals.
   (1) Between 1 (E2) and 2 (THW)

Temperature (℃)	−20	20	80	110
Resistance (kΩ)	15.04[+1.29,−1.20]	2.45[+0.14,−0.13]	0.318±0.008	0.1417±0.0018



T11E6207T10

1-15-8 FRONT OXYGEN SENSOR



1. Measure the resistance value between the following terminals.
   (1) Between 1 (OXH1) and 2(+)

   SPECIFIED VALUE: $5.6^{+1.4}_{-0.6}\Omega$ (20±1℃)
2. Confirm that there is no continuity existing between the following terminals.
   (1) Between the front oxygen sensor main unit and 3 (OX1)
   (2) Between front oxygen sensor main unit and 4 (E2)
   (3) Between front oxygen sensor main unit and 1 (OXH1)
   (4) Between front oxygen sensor main unit and 2(+B)
   (5) Between 3 (OX1) and 1 (OXH1)
   (6) Between 3 (OX1) and 2(+B)
   (7) Between 4 (E2) and 1 (OXH1)
   (8) Between 4 (E2) and 2 (+B)

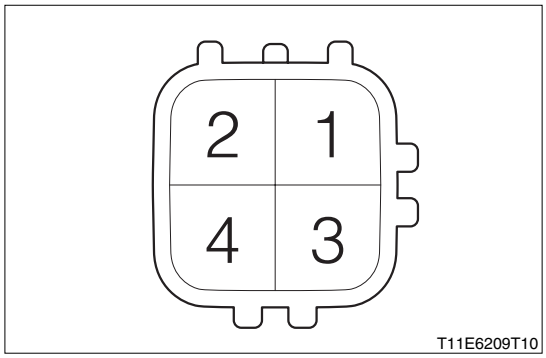
   SPECIFIED VALUE: No continuity exists

NOTE

- **A part from the above checking of a single unit, carry out checking of voltage of the front oxygen sensor under the condition that the sensor is attached to the vehicle.**
  (Refer to the troubleshooting according to diagnosis code P0130/21, P0135/23).

Refer to Page B8-31.

1-15-9 REAR OXYGEN SENSOR(EQUIPPED WITH HEATER)



1. Measure the resistance value between the following terminals.
   (1) Between 1 (OXH2) and 2(+)

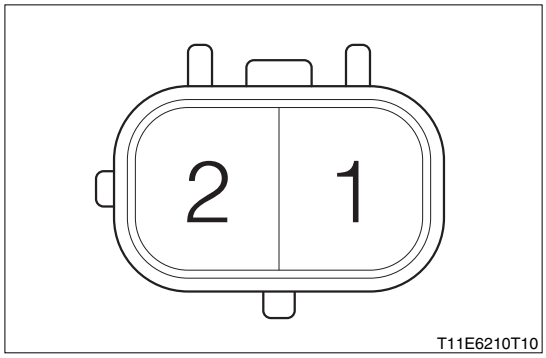
   SPECIFIED VALUE: $13.0^{+1.5}_{-1.3}\Omega$ (20±1℃)
2. Confirmed that there is no continuity between the following terminals.
   (1) Between the rear oxygen sensor main unit and 3 (OX2)
   (2) Between the rear oxygen sensor main unit and 4 (E2)
   (3) Between the rear oxygen sensor main unit and 1 (OXH2)
   (4) Between the rear oxygen sensor main unit and 2 (+B)
   (5) Between 3 (OX2) and 1 (OXH2)
   (6) Between 3 (OX2) and 2 (+B)
   (7) Between 4 (E2) and 1 (OXH2)
   (8) Between 4 (E2) and 2 (+B)

   SPECIFIED VALUE: No continuity exists

   NOTE
   - **Apart from the above checking of single units, carry out checking of voltage of the rear oxygen sensor under the condition that the sensor is attached to the vehicle.**
     (Refer to the troubleshooting according to diagnosis code P0136/22,P0141/24).

   Refer to Page B8-31.

1-15-10 REAR OXYGEN SENSOR(NOT EQUIPPED WITH HEATER)



1. Check that there is no continuity between the rear oxygen sensor and each terminal.
   (1) Between the rear oxygen sensor main unit and 1 (OX2)
   (2) Between the rear oxygen sensor main unit and 2 (E2)

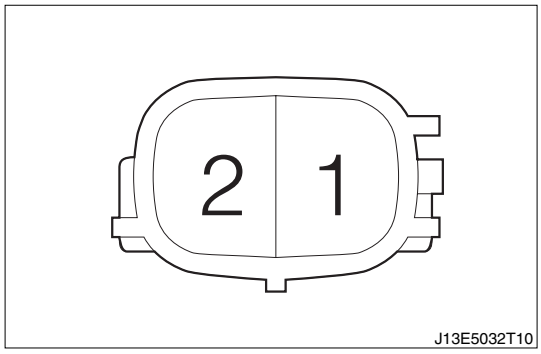
   SPECIFIED VALUE: No continuity exists

   NOTE
   - **Apart from the above checking of single units, carry out checking of voltage of the rear oxygen sensor under the condition that the sensor is attached to the vehicle.**
     (Refer to the troubleshooting according to diagnosis code P0136/22).

   Refer to Page B8-31.

1-15-11 KNOCK SENSOR

1. Measure the resistance value between the following terminals.
   (1) Between 1 (E2) and 2 (KNK1)
   SPECIFIED VALUE: 200 ± 80kΩ

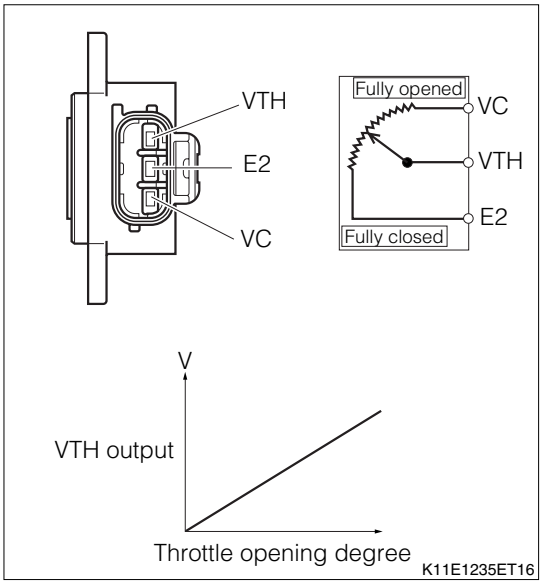


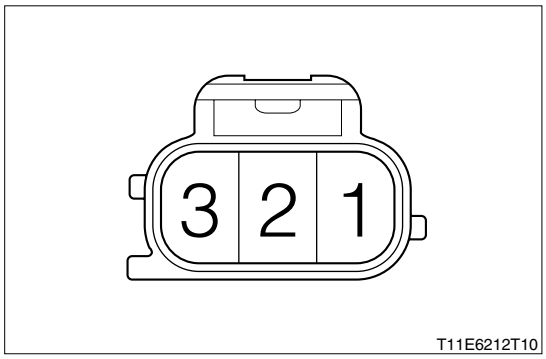
1-15-12 THROTTLE POSITION SENSOR

1. Measure the resistance between the following terminals.
   (1) Between 1 (VC) − 2 (E2)
   SPECIFIED VALUE: 2.5 − 5.0kΩ
2. Measure the resistance between the following terminals.
   (1) Between 3 (VTH) − 2 (E2)
   SPECIFIED VALUE: The resistance value will increase proportionally to the throttle lever opening.

NOTE

- **The resistance value when the throttle lever is fully opened: R_O**
  The resistance value when the throttle lever is fully closed: R_C
  Resistance value between 1(VC) − 2(E2): R_A
  $R_O = R_C + 0.7 \times R_A$





1-15-13 ISC VALVE

1. Start the engine, and warm it up until the radiator fan starts rotating.
2. Confirm the engine speed when the engine is idling with no electric load such as air conditioner and the like applied.

SPECIFIED VALUE: The engine is idling at the specified
The idling engine speed

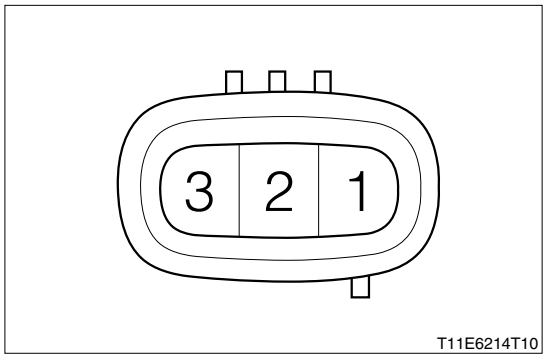
Europe specifications(3SZ)	Europe specifications(K3)	General specifications·China specifications
650^{+100}_{-50}rpm(A/T vehicles) 600^{+100}_{-50}rpm(M/T vehicles)	650^{+100}_{-50}rpm	700^{+100}_{-50}rpm

CAUTION

- **Do not supply battery power to terminals 1(ISC) and 3(E1) of the valve for ISC. If the battery power is supplied to the terminals, the internal circuit of the unit may be damaged.**

NOTE

- **It is difficult to perform an operation check of the coil resistance or a unit check, as the valve for ISC incorporates an IC circuit and the duty signal from the EFI ECU is converted in the driving circuit.**



T11E6214T10

1-15-14 AIR CONDITIONER EVAPORATOR TEMPERATURE SENSOR

1. Measure the resistance between the sensor side connector terminals
2. Connect the connectors, and turned "ON" the air conditioner, and then wait for 5 minutes.

NOTE

- **Air conditioner "ON": The air conditioner switch (ACSW), blower switch (BLW), magnet clutch (MGC) are all set to "ON".**

3. Turn the air conditioner to "OFF," and measure the resistance value of the following terminals.

NOTE

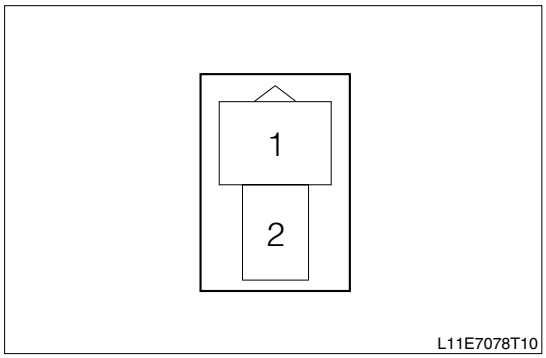
- **The condition under which the air conditioner is turned "OFF": The air conditioner switch (ACSW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".**

(1) Between 1 (ACEV) and 2 (E21)

SPECIFIED VALUE: The resistance value varies before and after the operation of the air conditioner.

NOTE

- **The resistance value increases as the temperature goes down.**
- **The resistance characteristics (reference values) of the air conditioner evaporator temperature sensor are as follows.**



L11E7078T10

Temperature [℃]	0	15
Resistance kΩ	4.8－4.9	2.2－2.4

1-15-15 INJECTOR

WARNING

- **Never use fire during the work.**
- **Be sure to prevent the fuel from splashing by using waste cloths.**

1. Remove the injector before carrying out the checking.

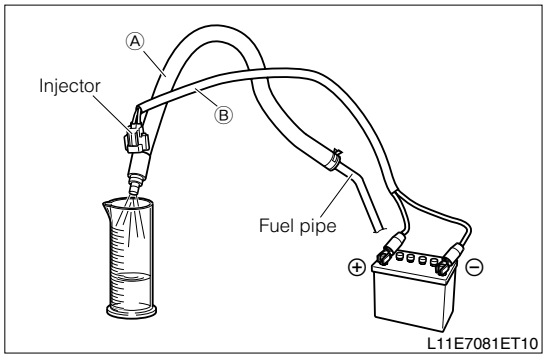
CAUTION

- **Install a substitute injector to prevent foreign matters from entering.**

2. Disconnect the fuel hose between the fuel inlet pipe and the fuel pipe.
3. Use the SST (a Tool set, injection measuring and Wire, EFI inspection) to connect the injector to be checked to the disconnected fuel hose (see the diagram).

   SST: 09268-31012(A)
   09842-30070-000(B)
4. Carry out the active test [fuel pump] by using the DS-Ⅱ.
5. Confirm that the injector injects the fuel when the voltage from the battery voltage is applied to the injector.

   SPECIFIED VALUE: The injector injects the fuel.



L11E7081ET10

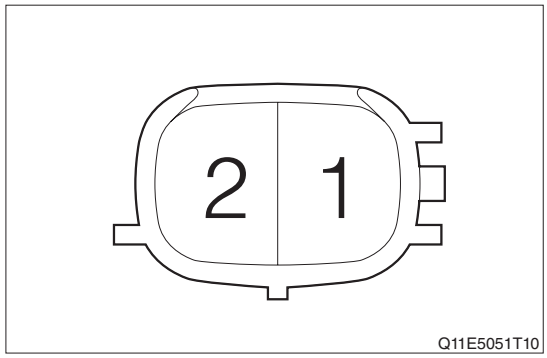
CAUTION

- **Switching of "ON" or "OFF" is carried out at the battery side.**

6. Disconnect the battery in the condition under checking fuel injection, and measure the amount of fuel that leaks from the injector during the period of 1 minute.

   SPECIFIED VALUE: One drop or less
7. Measure the resistance value between the injector terminals.

   SPECIFIED VALUE: 12 Ω (20℃)

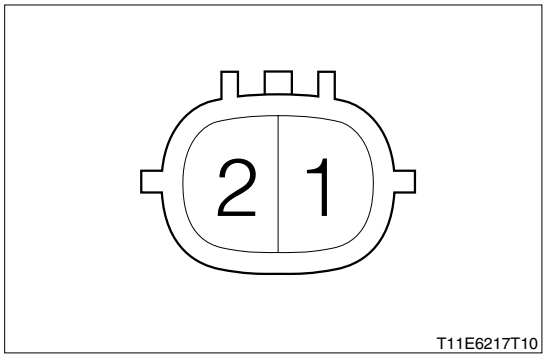


Q11E5051T10

1-15-16 OIL CONTROL VALVE

1. Visually check the operation of the oil control valve when the battery voltage is applied to the connector terminals of the oil control valve.

	The target of the connection
Positive terminal of the battery	1(OCV＋)
Negative battery of the battery	2(OCV－)



T11E6217T10

CAUTION

- **Make sure that the battery voltage is applied no more than 1 minute.**

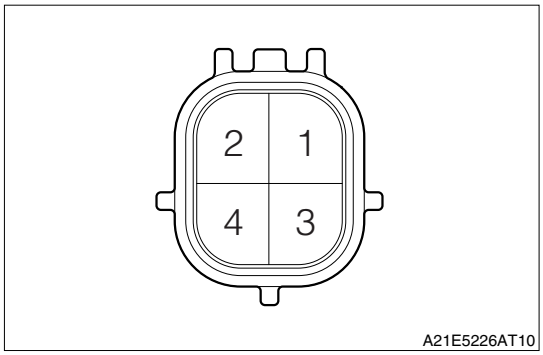
SPECIFIED VALUE: The valve operates when the battery voltage is applied.

2. Measure the resistance between the terminals of the oil control valve.

   SPECIFIED VALUE: 7.4±0.5Ω (At 20℃)

1-15-17 INTEGRATED BATTERY CURRENT· TEMPERATURE SENSOR

1. Measure the resistance between the following terminals.
   (1) Between 2 (VC) and 4 (E2)
   (2) Between 3 (CM) and 4 (E2)
   SPECIFIED VALUE: 3－10kΩ
2. Measure the resistance between the following terminals.
   (1) Between 2 (VC) and 3 (CM)
   SPECIFIED VALUE: 0.5kΩ or less
3. Measure the resistance between the following terminals.
   (1) Between 1 (BATTP) and 4 (E2)

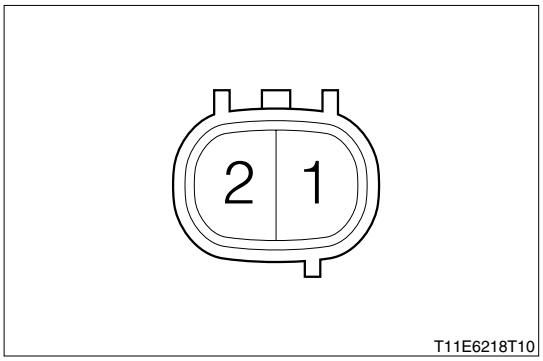


Characteristics of battery temperature sensor

Temperature (℃)	－30	25	90
Resistance (kΩ)	25.1	1.9－2.1	0.24

1-15-18 EVAPORATOR PURGE VSV

1. Check the ventilation between the ports.
   SPECIFIED VALUE: No ventilation
2. Check the ventilation between the ports when the battery voltage is applied to the connectors on the VSV side for evaporator purge.
   SPECIFIED VALUE: Ventilation existing
3. Measure the resistance between the following terminals.
   (1) Between 1 (PRG) and 2 (＋B)
   SPECIFIED VALUE: 30－34Ω(20℃)

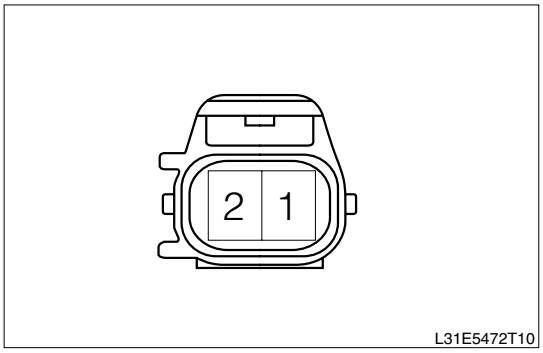


1-15-19 OUTSIDE AIR SENSOR

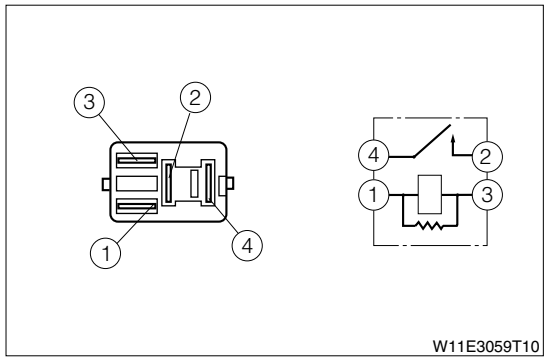
1. Measure the resistance between the following terminals.
   (1) Between Terminal 1 (OUTTP) and Terminal 2 (E23)

Characteristics of outside air temperature sensor

Outside air temperature (℃)	25
Resistance (Ω)	1700±85



1-15-20 RADIATOR FAN RELAY (RAD), MAGNET LATCH RELAY (MGC),STARTER RELAY (STA)



1. Check if the relay operates when the ignition switch is set to "ON" by means of sound and vibration.
   WARNING
   - **Do not touch the relay with your hand as it may become hot during operation.**
2. Measure the resistance between the relay side terminals 1 and 3
   SPECIFIED VALUE: 131 to 230 Ω (at 20℃)
   NOTE
   - **Carry out the measurement when the temperature inside the relay reaches the same value as the surrounding temperature (20℃).**
     (Carry out the measurement after waiting 1 hour with the relay turned "OFF" with the temperature maintained at the surrounding temperature of 20℃.)
3. Confirm that there is no continuity existing between terminals other than between terminals 1 and 3 at the relay side.
4. When the battery voltage is applied to terminals 1 and 3 at the relay side, confirm that the continuity exists between terminals 2 and 4 at the relay side.

1-16 ECU INPUT/OUTPUT SIGNAL CHECK

1-16-1 CHECKING METHOD

WARNING

- **Driving a vehicle with SST (EFI computer check sub-harness, etc.) being connected might cause an error operation to occur, which is extremely dangerous. Make sure that SST has been disconnected before driving the vehicle.**

1-16-2 SPECIFIED VALUE FOR INPUT/ OUTPUT SIGNAL

Check	Terminal	Measuring condition	Specified value
Power supply system	38 (BAT)－125 (E1)	At all times	Battery voltage
	27 (＋B1)－125 (E1)	When IG SW is ON	
	120 (IGSW)－125 (E1)	When IG SW is ON	
	39 (MRO)－125 (E1)	When IG SW is ON	Around 0V
		When IG SW is OFF	Battery voltage
Manifold absolute pressure sensor system	57 (VCPM)－122 (E2PM)	When IG SW is ON	4.5－5.5V
	52 (PIM)－122 (E2PM)	When sensor is exposed to air	3.1－4.1V
		After engine has been started	Changes in accordance with degree of opening angle of accelerator
Throttle position sensor system	56 (VC)－19 (E2)	When IG SW is ON	4.5－5.5V
	53 (VTH)－19 (E2)	When throttle valve is fully closed	0.4－0.8V
		When throttle valve is fully open	3.2－5.0V
Water temperature sensor system	54 (THW)－19 (E2)	When engine has warmed up (Water temperature: 60－120℃)	0.3－1.3V
Intake air temperature sensor system	55 (THA)－19 (E2)	When engine has warmed up	0.5－4.3V
Knock sensor system	121 (KNK)－19 (E2)	When engine is idling	Pulse is generated
Engine revolution speed sensor system	59 (N1＋)－128 (N1－)	When engine is idling	Pulse is generated
Camshaft angle sensor system	58 (N2＋)－127 (N2－)	When engine is idling	Pulse is generated
Front O_2 sensor system	123 (OX1)－19 (E2)	When engine revolution speed is kept at 3000rpm, after the O_2 sensor has warmed up	Pulse is generated
Front O_2 sensor heater system	15 (OXH1)－125 (E1)	The engine has been idling for at least 5 seconds.	Around 0V
		When IG SW is ON	Battery voltage
Rear O_2 sensor system	18 (OX2)－19 (E2)	When engine revolution speed is kept at 3000rpm, after the O_2 sensor has warmed up	Pulse is generated
Rear O_2 sensor heater system *1*2	14 (OXH2)－125 (E1)	The engine has been idling for at least 5 seconds.	Around 0V
		When IG SW is ON	Battery voltage

*1:Europe specifications
*2:China specifications

Check	Terminal	Measuring condition	Specified value
Injector system	24 (#10)－125 (E1)	When engine is idling	Pulse is generated
	23 (#20)－125 (E1)		
	22 (#30)－125 (E1)		
	21 (#40)－125 (E1)		
Ignition system	63 (IG1)－125 (E1)	When engine is idling	Pulse is generated
	62 (IG2)－125 (E1)		
	61 (IG3)－125 (E1)		
	60 (IG4)－125 (E1)		
Ion current combustion control system*1*2	51 (ICMB1)－125 (E1)	When engine is idling (When air conditioner is ON and electrical load exists)	Pulse is generated
	50 (ICMB2)－125 (E1)		
	49 (ICMB3)－125 (E1)		
	48 (ICMB4)－125 (E1)		
ISC drive signal system	65 (ISC)－125 (E1)	When engine is idling Air conditioner switch is turned from OFF to ON.	Pulse is generated
Power steering single system*2*3	124 (PST)－125 (E1)	When the oil pressure switch is set to "ON"	Around 0V
		When the oil pressure switch is set to "OFF"	Battery voltage
Power steering signal system*1	12 (EPS)－125 (E1)	When vehicle is stationary and steering wheel is turned	Around 0V
		When vehicle is stationary and steering wheel is not turned	Battery voltage
Fuel pump system*1	28 (FC2)－125 (E1)	When IG SW is ON	Battery voltage
		When engine is idling (or cranking)	Around 0V
Fuel pump system*2	34 (FAN2)－125 (E1)	When IG SW is ON	Battery voltage
		When engine is idling (or cranking)	Around 0V
Fuel pump system*3	35 (FC1)－125 (E1)	When IG SW is ON	Battery voltage
		When engine is idling (or cranking)	Around 0V
Engine check lamp system	13 (W)－125 (E1)	When engine is idling (When engine check lamp is not illuminated)	Battery voltage
		Disconnect connector of water temperature sensor (When engine check lamp is not illuminated)	0－3.5V

*1:Europe specifications
*2:China specifications
*3:General specifications

Check	Terminal	Measuring condition	Specified value
Starter switch signal system	107 (STSW)－125 (E1)	When starter switch is ON	Battery voltage
Air conditioner evaporator temperature sensor system	45 (ACEV)－116 (E21)	When air conditioner is operating	0.15－4.8V
Magnetic clutch relay system	36 (MGC)－125 (E1)	When Magnetic clutch relay is ON	Around 0V
		When Magnetic clutch relay is OFF	Battery voltage
Stop lamp system	43 (STP)－125 (E1)	When brake pedal is depressed	Battery voltage
		When brake pedal is released	Around 0V
Defogger system	11 (DEF)－125 (E1)	When defogger switch is ON	Battery voltage
		When defogger switch is OFF	Around 0V
Blower system	42 (BLW)－125 (E1)	When heater blower switch is ON	Around 0V
		When heater blower switch is OFF	Battery voltage
Engine revolution speed signal system for A/T*1	4 (ATNE)－125 (E1)	When IG SW is ON	Battery voltage
		When accelerator pedal is operated, after engine has warmed up	Pulse is generated
Radiator fan control system	37 (FAN1)－125 (E1)	When Radiator fan relay is ON	Around 0V
		When Radiator fan relay is OFF	Battery voltage
Variable valve timing control system	26 (OCV＋)－25 (OCV－)	When engine is idling	Pulse is generated
Engine revolution speed output system	118 (REV)－125 (E1)	When engine is idling	Pulse is generated
Clutch upper switch system *2	41 (H/L)－125 (E1)	When clutch pedal is depressed	Battery voltage
		When clutch pedal is released	Around 0V
Battery current sensor system*3	64 (CM)－19 (E2)	When engine is idling, after having warmed up	0.4－4.5V
Battery temperature sensor system*3	129 (BATTP)－19 (E2)	When engine is not operating, even though IG SW has been turned to ON (Outside air temperature: 60－120℃)	0.4－4.5V
Alternator system	134 (ALTC)－125 (E1)	When IG SW is ON	Battery voltage
	135 (ALT)－125 (E1)	When IG SW is ON	Battery voltage
Earth system	Between Terminal 19 (E2) and the body	At all times	Conduction
	Between 20 (E01) and the body		
	Between Terminal 116 (E21) and the body		
	Between 125 (E1) and the body		

*1:A/T vehicles
*2:European specification (M/T vehicles mounted with type 3SZ engines)
*3:Europe specifications

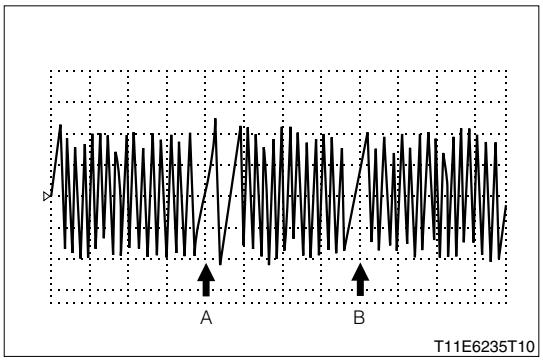
1-16-3 OSCILLOSCOPE WAVEFORMS

(1) Engine speed sensor

1. Connect SST.
   SST: 09842-97209-000
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Use an oscilloscope to check output between the next terminals.
   (1) Between SST59(N1＋) and SST128(N1－)
4. For example, in the case of the following measuring range and conditions, the oscilloscope waveform will appear as shown in the illustration.

Time axis	10ms / DIV
Voltage axis	2V / DIV
Condition	The air conditioner is turned "OFF": no electric load applied; when the engine is "idling."

The condition under which the air conditioner is turned "OFF," and the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".



NOTE

- **While identification of the waveform is not possible, check if the waveform as shown in the diagram (an example) is outputted.**

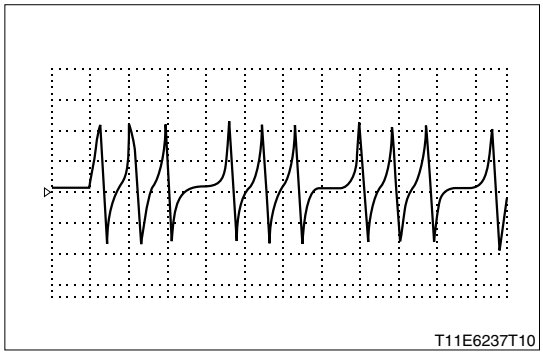
5. Check the following points.
   (1) Cylinder signals (A), (B) are outputted.
   (2) The waveform cycle becomes shorter as the engine revolution speed rises.

(2) Cam angle sensor

1. Connect SST.
   SST: 09842-97209-000
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Use an oscilloscope to check output between the next terminals.
   (1) Between SST58(N2＋) and SST127(N2－)
4. For example, in the case of the following measuring range and conditions, the oscilloscope waveform will appear as shown in the illustration.

Time axis	50ms / DIV
Voltage axis	1V / DIV
Condition	The air conditioner is turned "OFF": no electric load applied; when the engine is "idling."

The condition under which the air conditioner is turned "OFF," and the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".



NOTE

- **While identification of the waveform is not possible, check if the waveform as shown in the diagram (an example) is outputted.**

5. Check the following points.
   (1) The waveform cycle becomes shorter as the engine revolution speed rises.

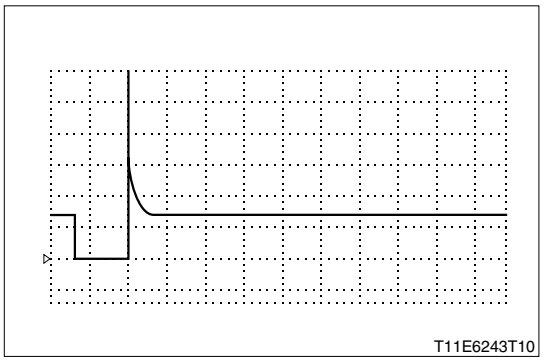
(3) Injector

1. Connect the SST.
   SST: 09842-97209-000

2. Check the output between the following terminals by using an oscilloscope.
   (1) Between SST 24 (#10) and SST 125 (E1)
   (2) Between SST 23 (#20) and SST 125 (E1)
   (3) Between SST 22 (#30) and SST 125 (E1)
   (4) Between SST 22 (#30) and SST 125 (E1)
3. For example, in the case of the following measuring range and conditions, the oscilloscope waveform will appear as shown in the illustration.

Time axis	2ms / DIV
Voltage axis	10V / DIV
Condition	The air conditioner is turned "OFF": no electric load applied; when the engine is "idling."

The condition under which the air conditioner is turned "OFF": The air conditioner switch (ACSW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".



NOTE

- **While identification of the waveform is not possible, check if the waveform as shown in the diagram (an example) is outputted.**

4. Check the following points.
   (1) The voltage changes from the battery voltage to 0 V during fuel injection time.

(4) Ignition signal

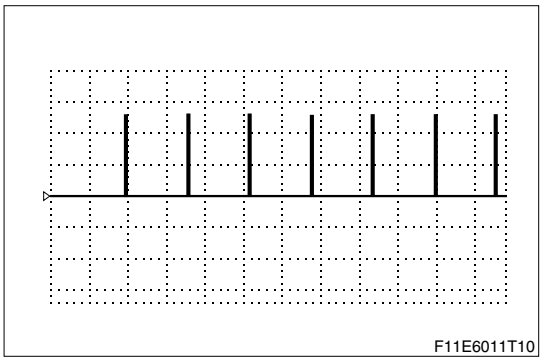
1. Connect SST.
   SST: 09842-97209-000

2. Check the output across the following terminals, using an oscilloscope.
   (1) Between SST63(IG1) and SST125(E1)
   (2) Between SST62(IG1) and SST125(E1)
   (3) Between SST61(IG1) and SST125(E1)
   (4) Between SST60(IG1) and SST125(E1)

3. For example, in the case of the following measuring range and conditions, the oscilloscope waveform will appear as shown in the illustration.

Time axis	100ms / DIV
Voltage axis	2V / DIV
Measuring condition	Air conditioner turned OFF, no electric load, and while idling

The condition under which the air conditioner is turned "OFF": The air conditioner switch (ACSW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".



NOTE

- **While identification of the waveform is not possible, check if the waveform as shown in the diagram (an example) is outputted.**

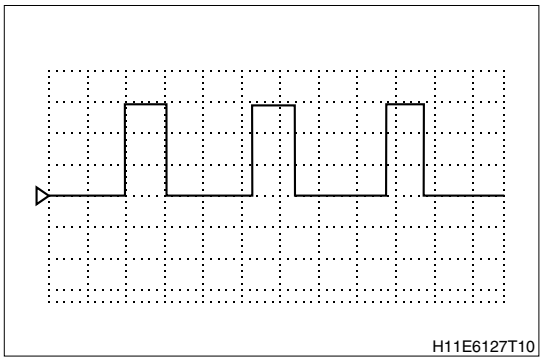
4. Check the following points.
   (1) 0⇄5V pulse is generated.
   (2) The waveform cycle becomes shorter as the engine revolution speed rises.

NOTE

- **Use an oscilloscope to obtain correct evaluation of the ignition signal.**

(5) Oil control valve

1. Connect the SST.
   SST: 09842-97209-000
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Check the output between the following terminals by using an oscilloscope.
   (1) SST26(OCV＋) and SST25(OCV－)
4. For example, in the case of the following measuring range and conditions, the oscilloscope waveform will appear as shown in the illustration.



Time axis	1ms / DIV
Voltage axis	5V / DIV
Condition	The air conditioner is turned "OFF": no electric load applied; when the engine is "idling."

The condition under which the air conditioner is turned "OFF," and the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".

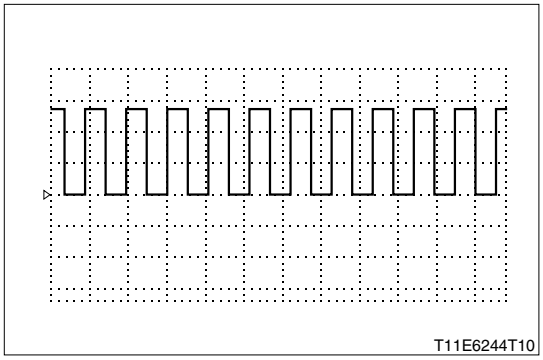
NOTE

- **While identification of the waveform is not possible, check if the waveform as shown in the diagram (an example) is outputted.**

5. Check the following points.
   (1) 0 ⇄ a battery voltage is generated.

(6) Engine speed output signal

1. Connect the SST.
   SST: 09842-97209-000
2. Start the engine, and warm it up until the radiator fan starts rotating.
3. Check the output between the following terminals by using an oscilloscope.
   (1) SST118(REV) and SST125(E1)
4. For example, in the case of the following measuring range and conditions, the oscilloscope waveform will appear as shown in the illustration.



Time axis	50ms / DIV
Voltage axis	5V / DIV
Condition	The air conditioner is turned "OFF": no electric load applied; when the engine is "idling."

The condition under which the air conditioner is turned "OFF," and the air conditioner switch (ASCW), blower switch (BLW), magnet clutch (MGC) are all set to "OFF".

NOTE

- **While identification of the waveform is not possible, check if the waveform as shown on the diagram (an example) is outputted.**

5. Check the following points.
   (1) 0 ⇄ a battery voltage is generated.
   (2) The waveform period becomes shorter as the engine speed rises.

1-17 ECU DATA MONITOR/FREEZE FRAME DATA

1-17-1 LIST OF ECU DATA MONITOR REFERENCE VALUES

(1) Scanning data

1. The following data values are the typical values obtained by using the DS-Ⅱ or the OBD scan tool under the normal condition. Use these values as your reference.

   Even if the measurement values may differ from those values listed here, it is possible that the system may be operating normally. Therefore, the judgment concerning the system as to whether a malfunction has occurred or not must not be made by only on the basis of these data values under the so-called "normal condition."

CAUTION

- **The values produced by the data monitor tend to show discrepancies over time due to measuring errors and changes in operating environments, making it difficult to display accurate reference values (deciding values). Therefore, poor operation may develop even when values are within the reference range.**
- **A technique involving gathering data using a vehicle of the same model tested under the same conditions is used to assess such difficult to assess events as second wind and rough idling. Assessments are broadly based on all items covered by the data monitor.**

Scanning data

The data name (Abbreviated name)	Explanations of items	Checking condition	Reference value	During an abnormality Major checking items
MIL Status (MIL)	Indicates the illuminating condition of the check engine warning lamp (ON: Illuminated, OFF: Extinguished)	Engine check lamp Illuminated → extinguished	ON → OFF	W voltage
Fuel system 1 status (FS1)	Indicates the fuel status (bank 1). (OL: The condition for shifting from the open loop to the closed loop has not been satisfied yet.) CL: Closed loop － As feedback for fuel control, the other hand sensor is used. OL-Drive: Open loop by the driving condition (increased output, increased deceleration) OL-Fault: Open loop by detection of system malfunctions OL-Fault: Closed loop - However, at least one malfunction of oxygen sensors - Only one oxygen sensor is used for fuel control.	When idling after the engine is warmed up	CL	OX1 voltage
Fuel system 2 status (FS2)	Indicates the fuel status (Bank 2) (OL: The condition for shifting from the open loop to the closed loop has not been satisfied yet.) CL: Closed loop - As feedback for fuel control, the other hand sensor is used. OL-Drive: Open loop by the driving condition (increased output, increased deceleration) OL-Fault: Open loop by detection of system malfunctions OL-Fault: Closed loop - However, at least one malfunction of oxygen sensors - Only one oxygen sensor is used for fuel control.	－	－	－
Calculated load value (LOAD)	Indicates the magnitude of the engine load. (0 to 100%)	When idling (Air-conditioner "OFF," Ⓝ range)	0 to 5%	The air cleaner condition The throttle valve condition
		2000rpm (Air-conditioner "OFF," Ⓝ range, when racing)	5 to 7%	
Engine coolant temperature (ECT)	Indicates the temperature of the engine cooling water. (－40 to 140℃)	Complete warming up	80 to 102℃	THW voltage
		When the sensor is short-circuited	119 to 140℃	
		When the sensor wire is broken	－40℃	
Short Term Fuel Trim Bank 1 (SHRTET1)	Indicates the front oxygen sensor feedback coefficient of compensation (－ 100 to 99.2%)	When the engine is running at a certain speed (with no engine load applied) 2500rpm	－20 to ＋20%	OX1 voltage

The data name (Abbreviated name)	Explanations of items	Checking condition	Reference value	During an abnormality Major checking items
Long Term Fuel Trim Bank 1 (LONGFT1)	Indicates the front oxygen sensor feedback coefficient of compensation (－100 to 99.2%)	When the engine is running at a certain speed (with no engine load applied) 2500rpm	－16 to ＋16%	OX1 voltage
Manifold absolute pressure (MAP)	Indicates the pressure in the intake manifold by using the absolute pressure (0 to 120kPa)	Engine stopped	70 to 104kPa	VCPM voltage PIM voltage
		When idling after the engine is warmed up (Air conditioner set to "OFF," with no engine load applied)	20 to 40kPa	
		When the engine is running at a certain speed (with the air conditioner OFF, and no load applied to the engine) 2000rpm	19 to 39kPa	
Engine revolution speed (RPM)	Indicates the engine speed.	When the engine is running at a certain speed	No significant variation	N2 voltage
Vehicle speed (VS)	Indicates the vehicle speed.	When a certain amount of distance has been traveled	No significant variation	SPD voltage
Ignition timing advance (ITA)	Indicates the ignition timing of the first cylinder. (BTDC63.5 － ATDC64 degrees)	When cranking	4 － 8 degrees	IG1 voltage Each sensor voltage
		When idling after the engine is warmed up (Air conditioner set to "OFF," with no engine load applied)	0 － 15 degrees	
		When the engine is running at a certain speed (air conditioner "OFF," with no engine load applied) 2000rpm	20 － 40 degrees	
Intake air temperature (IAT)	Indicate the intake air temperature (－40 to 140℃)	Ignition switch set to "ON"	Equivalent to the surrounding temperature	THA voltage
		When the sensor is short－circuited	119 to 140℃	
		When the sensor wire is broken	－40℃	
Abs. throttle position SSR (TP)	Indicates the throttle valve opening (0 to 100%)	When the accelerator pedal is fully closed	10 to 24%	VC temperature VTH temperature
		When the accelerator pedal is fully opened	64 to 96%	
Output volt of FR O2 SSR (O2FV)	Indicates the output voltage of the front oxygen sensor (0 － 1.275V)	When the engine is running at a certain speed (with no engine load applied) 2500rpm	0 － 1.0V	OX1 voltage
Short term of FR O2 SSR (O2FP)	Indicates the feedback compensation coefficient of the front oxygen sensor (－100 to 99.2%)	When the engine is running at a certain speed (with no engine load applied) 2500rpm	－20 to ＋20%	OX1 voltage

Data name (Abbreviated name)	Explanations of items	Checking condition	Reference value	Major checking items when an abnormality occurred
Output volt of RR O2 SSR (O2RV)	Indicates the output voltage of the rear oxygen sensor (0 － 1.275V)	When the engine is running at a certain speed (with no engine load applied) 2500rpm	0.1 － 0.95V	OX2 voltage
Short term of RR O2 SSR (O2RP)	Indicates the output voltage of the rear oxygen sensor (－100 to 99.2%)	When the engine is running at a certain speed (with no engine load applied) 2500rpm	－16 to 16%	OX2 voltage
Distance when MIL is ON (DWM)	Indicates the traveling distance when a diagnosis was detected (0 - 65535km)	－	0 － 65535km	－
Total fuel trim bank 1 (TFC)/(TFAK)	Indicates the compensation amount (compensation time) for the fuel basic injection amount (injection time) as a coefficient	After the engine is warmed up, at 3000rpm (with no engine load applied)	0.74－1.49	Intake system, fuel system, ignition system, exhaust system
Evaporative Purge output (EVAP)	Display duty rate of the VSV for evaporative purge control signal	IG SW "ON", engine stopped	0%	PRG voltage
		When engine revolution speed is constant (Air conditioner "OFF", No engine load): 2000rpm	0－100%	
Barometric Pressure (BARO)	Indicate atmospheric pressure	IG SW "ON", engine stopped	Same as atmospheric pressure	EFI ECU
Battery voltage (VPWR)	Indicates the battery voltage	IG SW "ON", engine stopped	11－14V	Power source voltage
Relative throttle position (TP_R)	Indicates the relative opening of the throttle valve.	When the accelerator pedal is fully closed (IG SW "ON")	0－1.6%	VTH temperature
ISC learning value (DLRN)	Indicates the ISC value of learning	When idling after the engine is warmed up (Air conditioner set to "OFF," with no engine load applied,Ⓟ range)	6－14%	ISC motor voltage
Knock corr. advance angle (AKNK)	Indicates the corrected angle of displacement when knocking is generated	When idling after the engine is warmed up	0 － 3 degrees CA	KNK voltage
Purge corr. coefficient (FPG)	Indicates the feedback correction coefficient of the evapolator purge control	IG SW "ON", engine stopped	0%	PRG voltage
		When engine revolution speed is constant (Air conditioner "OFF", No engine load): 2000rpm	30－40%	
Gear position (GEAR)	Indicates the shift transmissin condition	IG SW "ON", engine stopped	0－6	EFI ECU,A/T ECU,CAN communication system
Number of diagnosis codes (DIAG)	Indicatives the number of diagnosis codes	－	0	－

Data name (Abbreviated name)	Explanations of items	Checking condition	Reference value	Major checking items when an abnormality occurred
Idle switch position (IDL)	Display when idle SW is set to "ON" or "OFF"	When the accelerator pedal is fully closed→ fully opened	ON → OFF	VTH voltage
Air conditioner signal (AC)	Indicates the input of the air conditioner signal	Air conditioner switch "OFF" state → "ON" state	OFF → ON	ACSW voltage
Electric load (DSW)	Indicates the conditions of the headlight, the defogger, the heater blower, and the radiator fan	Any of the headlight, the defogger, the heater blower, or the radiator fan is set to "ON"	ON	Each switch voltage
		All of the headlight, the defogger, the heater blower, or the radiator fan are set to "OFF"	OFF	
Stop lamp signal (STP)	Display either stop lamp signal "ON" or "OFF"	When brake pedal is stepped on	ON	STP voltage
		When brake pedal is released	OFF	
Power steering signal (PST)	Display either power steering signal "ON" or "OFF"	Vehicle stopped, steering controlled	ON	EPS voltage
		Vehicle stopped, steering not controlled	OFF	
Target angle of intake cam (VTT)	Indicates the target angle of displacement of VVT control of the intake cam (0 － 50 degrees CA)	When idling after the engine is warmed up (Electric load "OFF," with no engine load)	0 － 5 degrees CA	OCV voltage
Actual angle of intake cam (VT)	Air intake camshaft actual displacement angle is displayed. (0－50 degrees CA)	After the engine is warmed up, engine idling (Electric load "OFF," with no engine load)	0 －5 degrees CA	
VVT control duty ratio (DVT)	Display duty rate of the DVVT control OCV driving signal	After engine is warmed up, and the engine is idling (Electric load "OFF," with no engine load)	20－50%	PIM,N1,N2,THW voltage
		During Ⓓ range stalled testing is on (A/T equipped vehicles)	20－50%	
TVVT angle converted val. (VTB)	Display VVT zero point learning value	After engine is warmed up, and the engine is idling (Electric load "OFF," with no engine load)	15－ 52degrees	N1,N2 voltage
ISC duty ration (ISC)	Indicates the duty ratio of the ISC driving signal (0 to100%)	When idling after the engine is warmed up (Air conditioner set to "OFF," with no engine load applied)	6 － 14%	VC voltage VTH voltage THW voltage
		When idling after the engine is warmed up (Air conditioner set to "OFF")	20 － 60%	

Data name (Abbreviated name)	Explanations of items	Checking condition	Reference value	Major checking items when an abnormality occurred
Manifold absolute pressure2 (PMVTB)	Manifold absolute pressure is indicated as absolute pressure	IG SW "ON", engine stopped	80－110MPa	PIM voltage
		Engine is idling	20－40MPa	
		After engine is warmed up, and the accelerator pedal is fully depressed, 2000rpm	19－39MPa	
Injection volume (TAUX)	Indicate injection amount	－	0－2ml	Injector voltage
Injection time (TAU)	Indicates the injection time of the injector (0－3.264ms)	Cold start → Complete warming up (Air conditioner is set to "OFF," with no engine load)	1.4－2.5ms	PIM voltage THW voltage OX1 voltage
		When idling after the engine is warmed up (Air conditioner is set to "OFF," with no engine load)	1.4－1.8ms	
		At 2000 rpm (Air conditioner is set to "OFF," with no engine load)	1.3－1.8ms	
VF monitor (VF)	Fuel-to-air ratio is revised to display a learning value	After the engine is warmed up, engine is running at constant speed(engine under no load) 2500rpm	0.75－1.25	Intake system, fuel system, ignition system, exhaust system
Oxygen sensor signal (OX)	Display "RICH" or "LEAN"	After the engine is warmed up, engine is running at constant speed(engine under no load) 2500rpm	Lean⇄Rich	OX1 voltage
Battery current (CRNT)	Display the battery's electric current balance	When idling after the engine is warmed up	－100 to 100A	Electric current sensor system power supply
Battery temperature (THB)	Indicate the battery temperature	IG SW "ON", engine stopped	Equivalent to the outside air temperature	Electric current sensor system power supply
Alternator field duty (ALTFD)	Display the alternator's electricity generation status duty ratio	When idling after the engine is warmed up	0－100%	Alternator field duty Signal system
Alternator C terminal duty (ALTCD)	Display the duty ratio of the drive signal sent from the EFI ECU	When idling after the engine is warmed up	0－100%	ALTDO signal system Alternator side power supply
Upper clutch SW signal (UCSW)	Display the clutch SW upper signal's ON or OFF status	When clutch pedal is released(M/T vehicles)	ON	H/L voltage
		When clutch pedal is stepped on(M/T vehicles)	OFF	

1-17-2 LIST OF FREEZE FRAME DATA

(1) Freeze frame data

1. If the phenomena of the outputted diagnosis code cannot be reproduced, check the freeze-frame data.

List of the freeze frame data

Item names	Abbreviation	Unit	Minimum value of variation
DTC that caused FFD	DTC	—	1
Engine coolant temperature	ECT	℃	1
Manifold absolute pressure	MAP	kPa	1
Engine revolution speed	RPM	rpm	1
Vehicle speed	VS	km/h	1
Ignition timing advance	ITA	°	0.1
Injection volume	TAUX	ml	0.001
Injection time	TAUZ	ms	0.01

1-18 ACTIVE TEST

CAUTION

- **Pay attention to the fact that the normal control is not activated during the active test. (Such as overheating caused by stopping driving of the fan for the radiator; or over－run caused by the ISC driving.)**
- **After an active test is completed, make sure to confirm that the normal condition has been resumed.**

DS-Ⅱ item	Contents	control condition
ISC	The ISC duty ratio is regulated to be between 5% (open side) and 50% (close side).	Vehicle stopped, engine is idling
Fuel pump	Control of "ON" (driving) or "OFF" (stop) of the fuel pump	—
Purge VSV	Control of "ON" (energized) or "OFF" (not energized) to the purge VSV	—
Radiator fan	Control of "ON" (driving) and "OFF" (stop) of the radiator fan	—
Terminal C duty	Controlled between 0% and 100% (amount of electricity generated) of alternator Terminal C duty	—
Terminal T	Control of ON (short circuit) and OFF (release) of T terminal	—