



EFI SYSTEM

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the DS-21 diagnosis tester or the OBD II generic scan tool.
this tester or tool.

Therefore, the following instructions given below must be observed.

1. About Use of DS-21 Diagnosis Tester or OBD II Generic Scan Tool

- Regions where type certification is implemented based on EC exhaust emission approval
Make sure to use the DS-21 diagnosis tester or the OBD II generic scan tool.
- Other regions
You may use or not use the DS-21 diagnosis tester or the OBD II generic scan tool.
You may perform the operation, employing whichever method that will be easier to you.

2. Instructions To Be Followed Concerning Trouble Codes

Trouble codes, such as P0105/31 (4-digit code/2-digit code) are posted additionally.

- Regions where type certification is implemented based on EC exhaust emission approval
Make sure to use only 4-digit trouble codes (e.g. P0105) which have been assigned according to the ISO regulations.
- Other regions
You may perform the operation using the 4-digit code, employing the DS-21 diagnosis tester or the OBD II generic scan tool. Or you may perform the operation using the 2-digit codes (e.g. 31), without the use of the tester or tool.
You may perform the operation, employing whichever method that will be easier to you.

NOTE:

- The OBD II generic scan tool means a scan tool complying with the ISO 14230 (KWP2000) format.
- In cases where the OBD II generic scan tool is employed, not all malfunction codes (4-digit codes) can be read out. It should be noted that only those trouble codes in which "zero" follows after "P", for example, P0XXX, can be read out.
- The accuracy of the 2-digit codes in diagnosing malfunctioning components is slightly inferior to that of the 4-digit codes.
- Hereinafter, those regions where the type certification is implemented based on the EC exhaust emission approval, is referred to as the "EU specifications."

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1.2 HANDLING INSTRUCTIONS ON CATALYTIC CONVERTER-EQUIPPED VEHICLES

WARNING:

- When a great amount of unburnt gas is admitted into the catalytic converter, overheating is prone to occur, resulting in a fire hazard.
To avoid such trouble in advance, be certain to observe the following precautions. Also, be sure to explain such precautions to your customers.
1. Use only unleaded gasoline to catalytic converter-equipped vehicles.
 2. Avoid idling the engine for a prolonged length of time.
Do not run the engine continuously at idle speed for more than 20 minutes.

WARNING:

- Immediately check and repair the vehicle if the fast idle speed or idle speed is unstable or the system exhibits malfunction. Failure to observe this warning may result in a fire hazard.
3. Be sure to observe the following points when performing the spark jump tests.
 - (1) The spark jump test must be limited to cases where such test is absolutely necessary. Also, be sure to finish the test in the shortest possible time.
 - (2) Never race the engine during the test.
 - (3) Be sure to shut off the fuel supply when performing the spark jump test in advance.
 4. Do not run the engine when the fuel tank becomes nearly empty.
Failure to observe this caution will cause misfiring. Also, it will apply excessive load to the catalytic converter, even leading to catalyst damage.
 5. Be sure to avoid coasting with the ignition switch turned OFF. Moreover, be certain to avoid applying the brake for a prolonged period of time.
 6. Do not dispose of the waste catalyst along with parts contaminated with gasoline or oil.

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1.3 ITEMS TO BE OBSERVED WHEN MOBILE COMMUNICATION SYSTEM IS MOUNTED

For those motor vehicles equipped with a mobile communication system, such as a bidirectional wireless telephone and cellular phone, be sure to observe the following precautionary measures.

1. Install the antenna as far away as possible from the ECU and sensors of the electronically-controlled system of the vehicle.
2. The wire of the antenna should be routed at least 30 cm away from the ECU and sensors of the electronically-controlled system of the vehicle. For details concerning the arrangement of the ECU and sensors, refer to the arrangement diagram of the components in the relevant section.
3. Do not wind the antenna feeder line together with other wires. Avoid routing the antenna feeder in parallel with other harnesses whenever possible.
4. The antenna and feeder line should be properly adjusted.
5. Never install a strong mobile communication system.

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1.4 IMMOBILIZER SYSTEM-EQUIPPED VEHICLES

1. The immobilizer system is formed by communication between the Immobilizer ECU and the EFI ECU by means of the rolling code. The rolling code will be automatically retained both in the immobilizer ECU and in the EFI ECU when the engine is started once with the key of the immobilizer system. The engine will not start if the rolling code in the immobilizer ECU and EFI ECU are not identical. Therefore, the engine will not start when using the EFI ECU which was mounted before on another vehicle with the immobilizer system without resetting the rolling code.
2. When the EFI ECU of a vehicle equipped with the immobilizer system was replaced, based on the results of the trouble shooting, and related troubles have been remedied, it is impossible, due to its construction, to confirm that the malfunction was caused by the former EFI ECU by installing the EFI ECU again. Incidentally, this confirmation is possible in the case of vehicles without the immobilizer system. Therefore, it is not necessary to install the former EFI ECU again to carry out the reconfirmation. In the case of vehicles without the immobilizer system, be sure to carry out this re-installation and reconfirmation.
3. In the case of vehicles equipped with the immobilizer system, once the engine is started for the confirmation test, etc. after the malfunction has been remedied, that EFI ECU can not be used for other vehicles with the immobilizer system, unless a measure is taken.

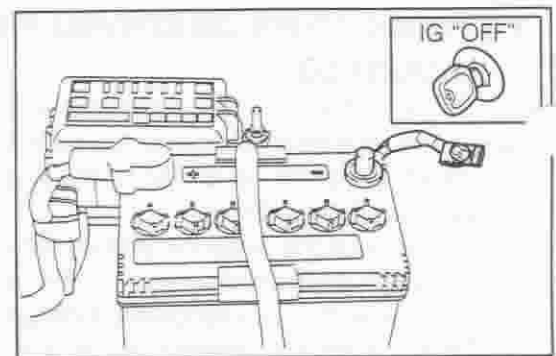
NOTE:

- When you would like to use each ECU of the vehicle concerned on vehicles equipped with other immobilizer system, initialize the ECU, using the diagnosis tester (DS-21), before removing the ECU from the vehicle. Then, remove the ECU and install it on another vehicle. If you perform the key registration, using the master key of this vehicle, each ECU can be used separately or as a set.
- When the EFI ECU is to be replaced with a new one, it is possible to start the engine by using the master key with the terminal T for immobilizer ECU (ECU-T) of the data link connector grounded with a jump wire.
- Please refer to Section BE of the service manual.

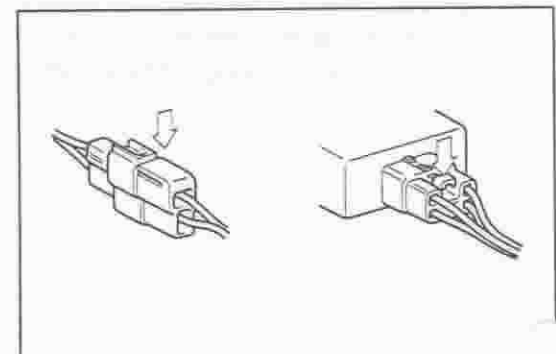
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1.5 ITEMS TO BE OBSERVED DURING SYSTEM CIRCUIT CHECK

1. Before connecting and disconnecting the connectors and terminals, be sure to turn OFF the ignition switch or disconnect the negative (-) terminal from the battery. Otherwise, the harness is judged to have an open wire, and the fail-safe function will be applied. On the other hand, when the negative (-) terminal of the battery is disconnected, the diagnosis code will be erased. Therefore, if it is necessary to confirm the diagnosis code, be sure to perform the confirmation in advance.
2. When disconnecting the connector, never pull the harness. Rather, hold the connector properly with the connector unlocked and pull it. When connecting the connector, be sure to positively insert the connector, until you hear a clicking sound when the lock is engaged.

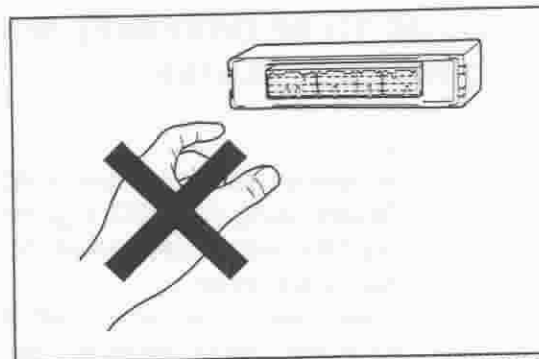


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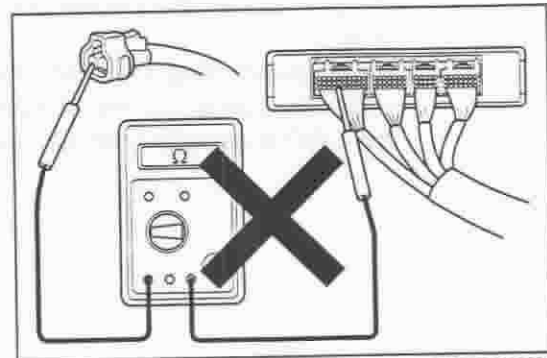
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3. Do not directly touch the terminals of parts which incorporate a microcomputer.
4. When a test probe is applied to the terminal to which a voltage is applied, care must be exercised so that two test probes may not come in contact with each other, so that short circuit may not take place.



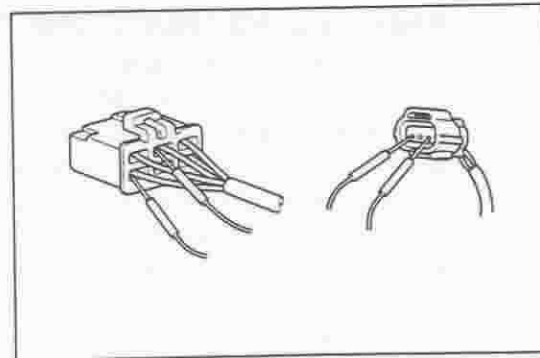
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5. When the connector is connected to the ECU, never connect an ohmmeter between the ECU connector and the sensor or actuator. Failure to observe this caution may damage the ECU or sensor or actuator.



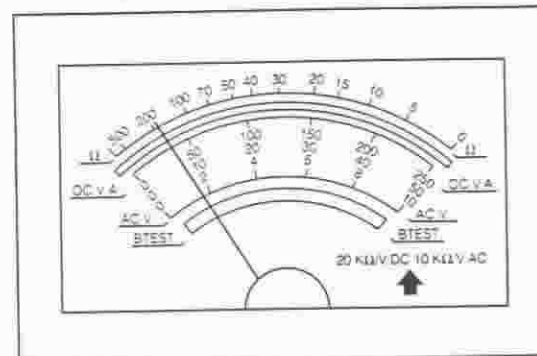
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6. When a test probe is applied to the connector, be sure to bring it from the rear side (harness side) of the connector. In the case of connectors where it is impossible to apply a test probe from the rear side, such as water-proof connectors, apply the test probe from the connector side. At this time, be very careful not to bend the male terminal of the connector or open the female terminal.



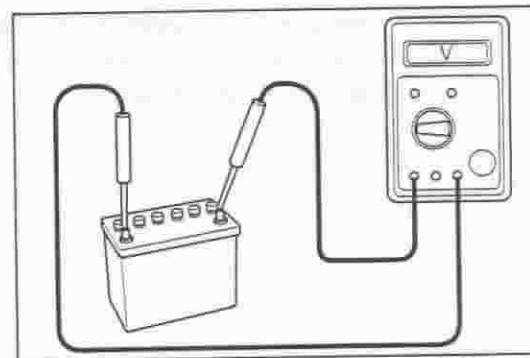
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7. Be sure to use a voltmeter/ohmmeter whose internal impedance is at least 10 k Ω /V. When a voltmeter/ohmmeter whose internal impedance is less than 10 k Ω /V is used, it may cause the ECU to malfunction or give a wrong evaluation.
8. When checking the terminal for the connecting condition, be sure to check the male terminal for a bend and the female terminal for an excessive opening. Furthermore, check both terminals for locking (looseness), rust formation, dust adhesion, etc.



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9. Prior to the measurement of the voltage of each terminal, make sure that the battery voltage is 11 V or more. If the terminal voltage is checked with a low battery voltage, it may lead to a wrong diagnosis.



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1.6 ITEMS TO BE OBSERVED WHEN USING OBD II GENERIC SCAN TOOL OR DS-21 DIAGNOSIS TESTER

CAUTION:

For enhanced safety, be sure to observe the following points:

- Before using the OBD II generic scan tool or the DS-21 diagnosis tester, be sure to thoroughly read the instruction manual of the OBD II generic scan tool or the instruction manual of the DS-21 diagnosis tester.
- When driving the vehicle with the OBD II generic scan tool or the DS-21 diagnosis tester connected to the vehicle, route the cables in such a way that they may not interfere with the driving. (That is to say, the cables should be routed away from the feet, pedals, steering wheel and shift lever.)
- When performing the test driving, using the OBD II generic scan tool or the DS-21 diagnosis tester, two persons are needed. One person drives the vehicle, while the other person operates the OBD II generic scan tool or the DS-21 diagnosis tester.

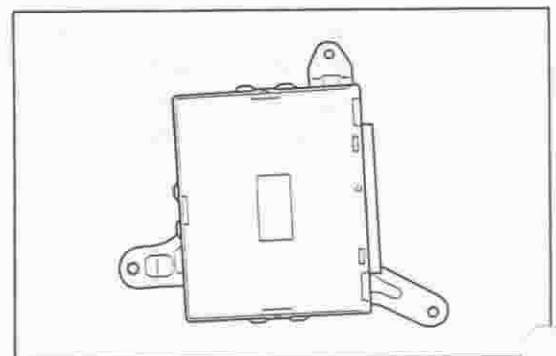
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1.7 HANDLING INSTRUCTIONS ON ENGINE CONTROL SYSTEM

1. The ECU, sensors, etc. are precision parts. Be very careful not to give strong impacts to those parts during the installation and removal. Never use those parts to which impacts have been given (for example, in cases where the parts were dropped on the floor).
2. When the test is carried out on a rainy day or the vehicle is washed, care must be exercised so that no water may be admitted and the ECU, connectors, sensors, actuators, etc. may not get wet.
3. Never disconnect the connector from the battery terminal while the engine is running. At the moment when the connector is disconnected from the battery terminal, a great counter electromotive force (approx. 100 V) may be generated, thus damaging the ECU.
4. Never connect the connectors to the wrong terminals of the battery. Failure to observe this caution may break the inside of the battery instantly.

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5. Never remove the cover from the ECU proper or the bracket on the ECU proper side. Furthermore, do not touch the attaching screws.



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6. In cases where the ECU was judged to be malfunctioning and the vehicle has been remedied by replacing it, install the removed ECU (which has been judged to be malfunctioning) again to confirm that the original malfunction is reproduced. Then, the ECU can be finally judged to have been malfunctioning.

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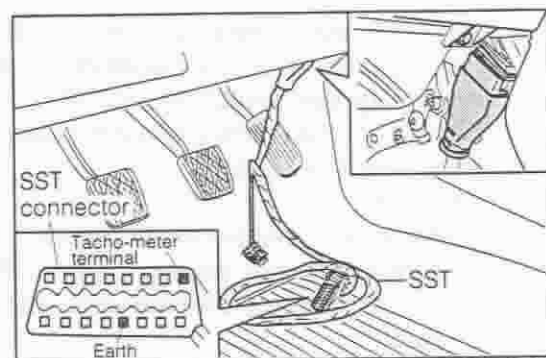
7. Tachometer connection

Connect the tachometer probe to the measuring terminal of the SST connector.

CAUTION:

- This does not apply if your tachometer is a pick-up type.
- Never allow the tachometer probe to touch the ground, for it could result in damage to the ignitor and/or ignition coil.
- Some kinds of tachometers may not be suited for the ignition system of the vehicle. Therefore, ensure that your tachometer is compatible with the ignition system of the vehicle.

SST: 09991-87404-000



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2. CONNECTING PROCEDURE FOR SST (EFI COMPUTER CHECK SUB-HARNESS)

When the ECU terminal voltage is measured with the ECU connector connected to the engine ECU, connect the SST, following the procedure given below.

NOTE:

- The terminal number of the SST connector is the same as the ECU connector (page EF-20).

- Turn OFF the ignition switch. Or, disconnect the battery ground cable from the negative (-) terminal of the battery with the ignition switch turned OFF. Disconnect the battery ground cable from the negative (-) terminal of the battery.

CAUTION:

- Be sure to memorize the malfunction code before disconnecting the battery cable. Otherwise the malfunction code(s) will be erased by disconnecting the battery cable.

- Remove the glove compartment sub assembly.

- Disconnect the wire harness connectors from the EFI ECU connectors at the cowl side of the passenger seat.
- Connect the following SST between the wire harness connectors and the EFI ECU connectors.

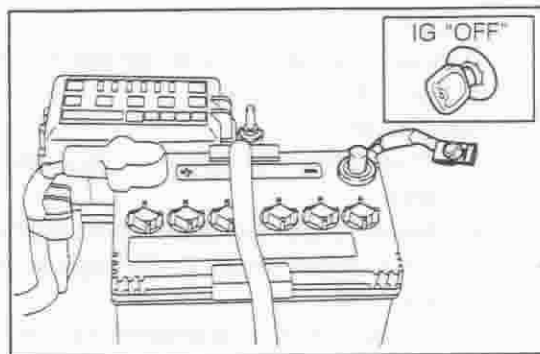
SST: 09842-97203-000

- Reconnect the battery ground cable to the negative (-) terminal of the battery.

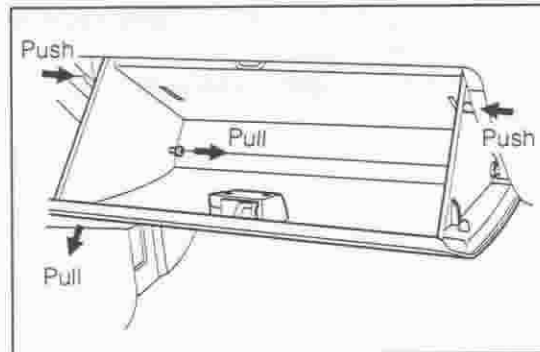
CAUTION:

- When disconnecting or reconnecting the EFI ECU connectors, be sure to disconnect the battery ground cable from the negative (-) terminal of the battery with the ignition switch and all accessory switches in the off state.
- When installing a new battery, care must be exercised not to mistake the battery polarity. Failure to observe this caution could cause ECU malfunction.
- Before using the SST, be sure to check to see if short or open wire exists between the terminals of the SST.

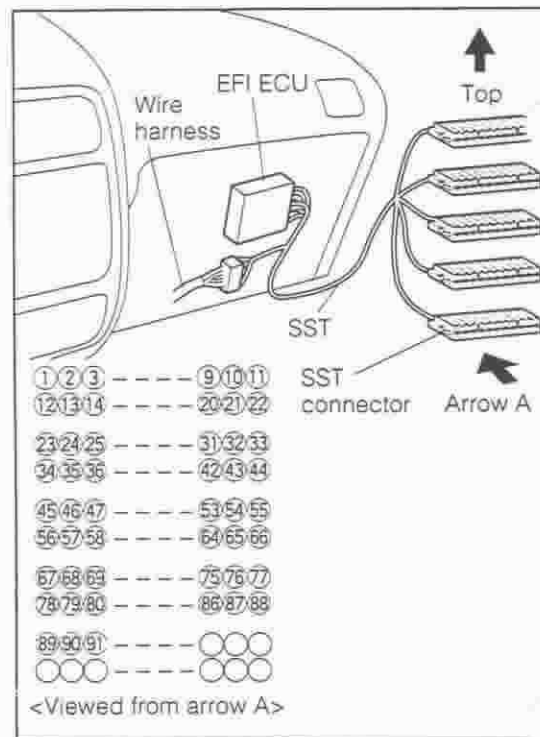
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JEF00019-00012

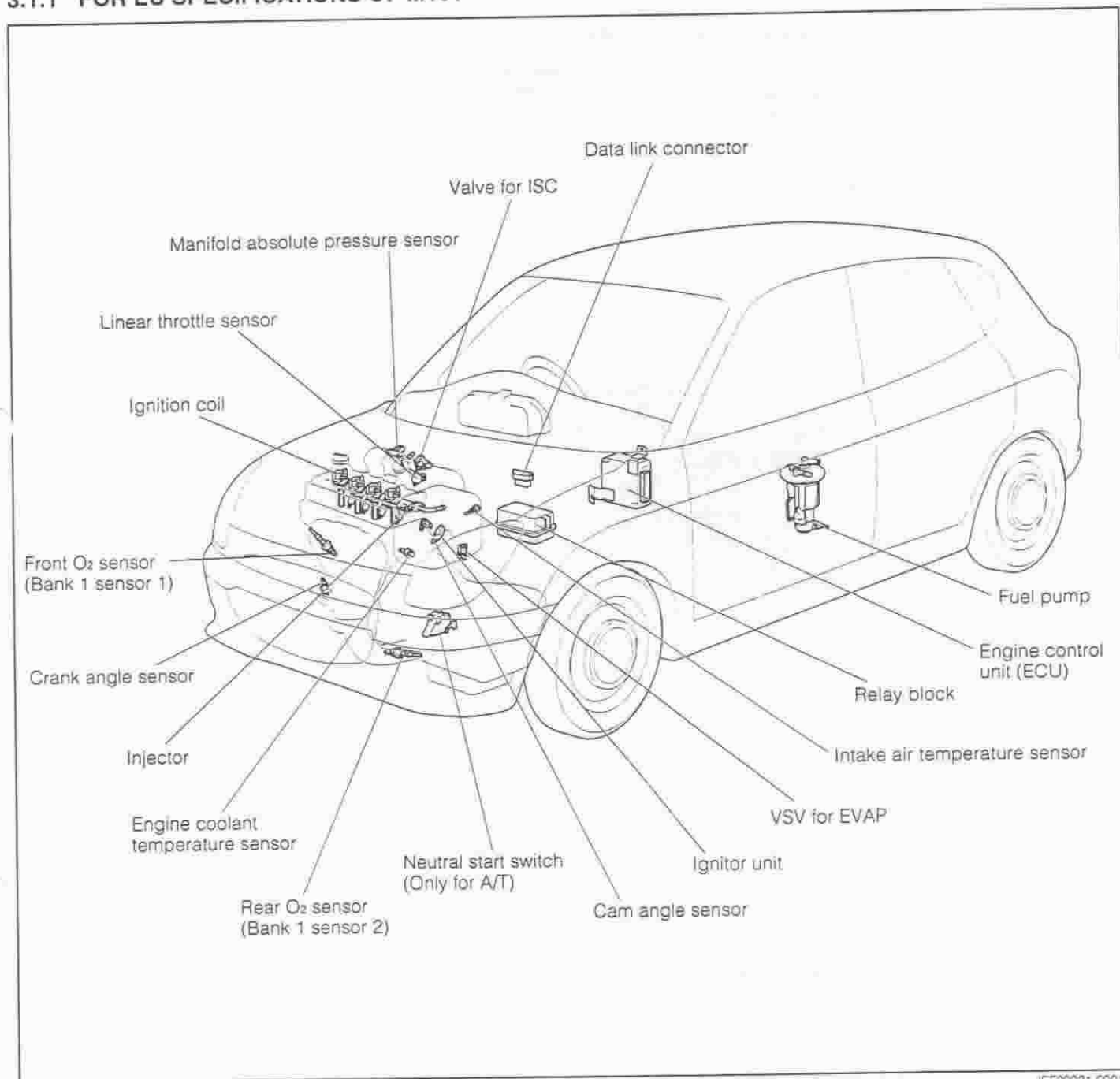


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3. SYSTEM DESCRIPTION

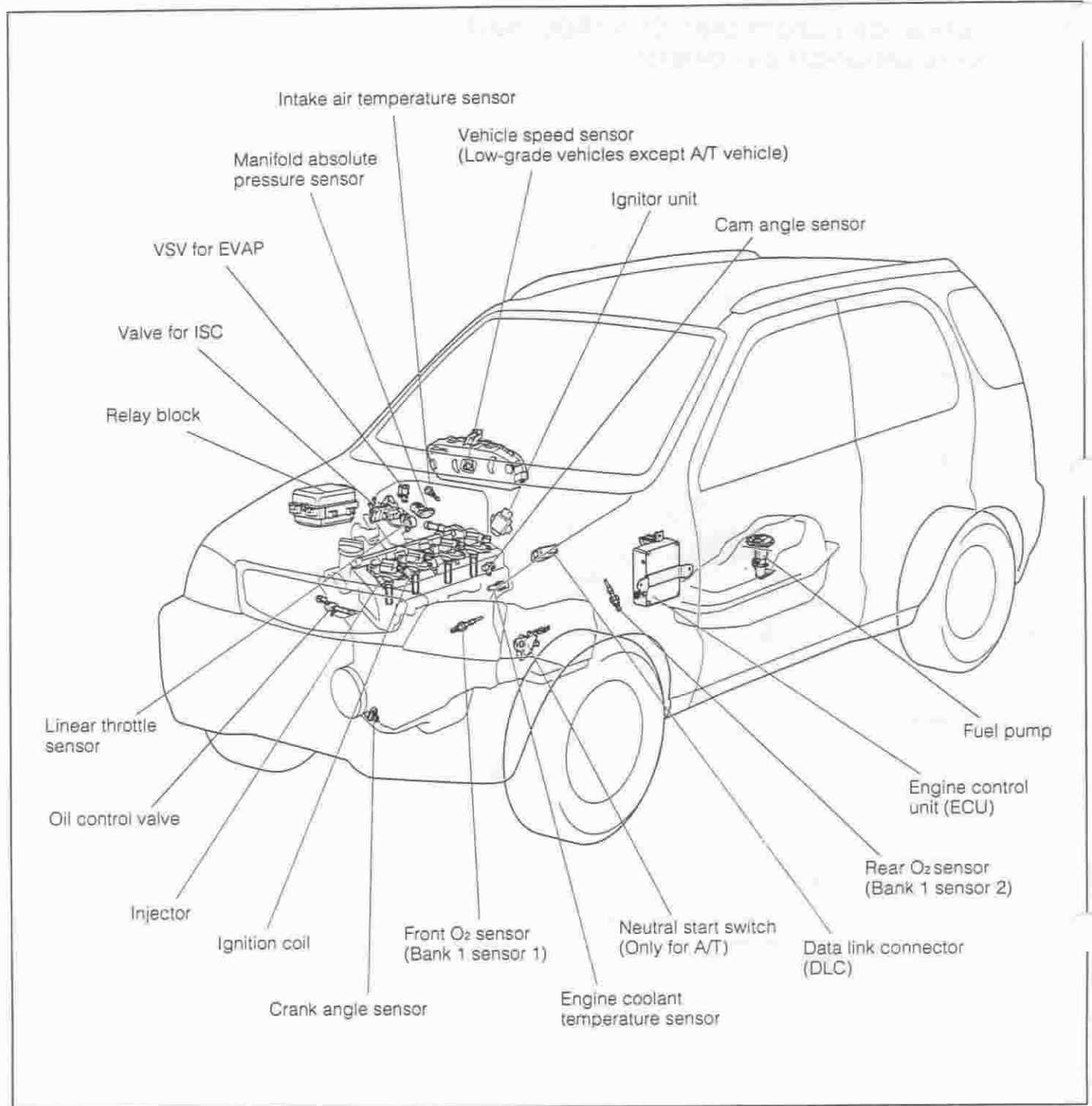
3.1 LOCATION OF ELECTRONIC CONTROL PARTS

3.1.1 FOR EU SPECIFICATIONS OF M101



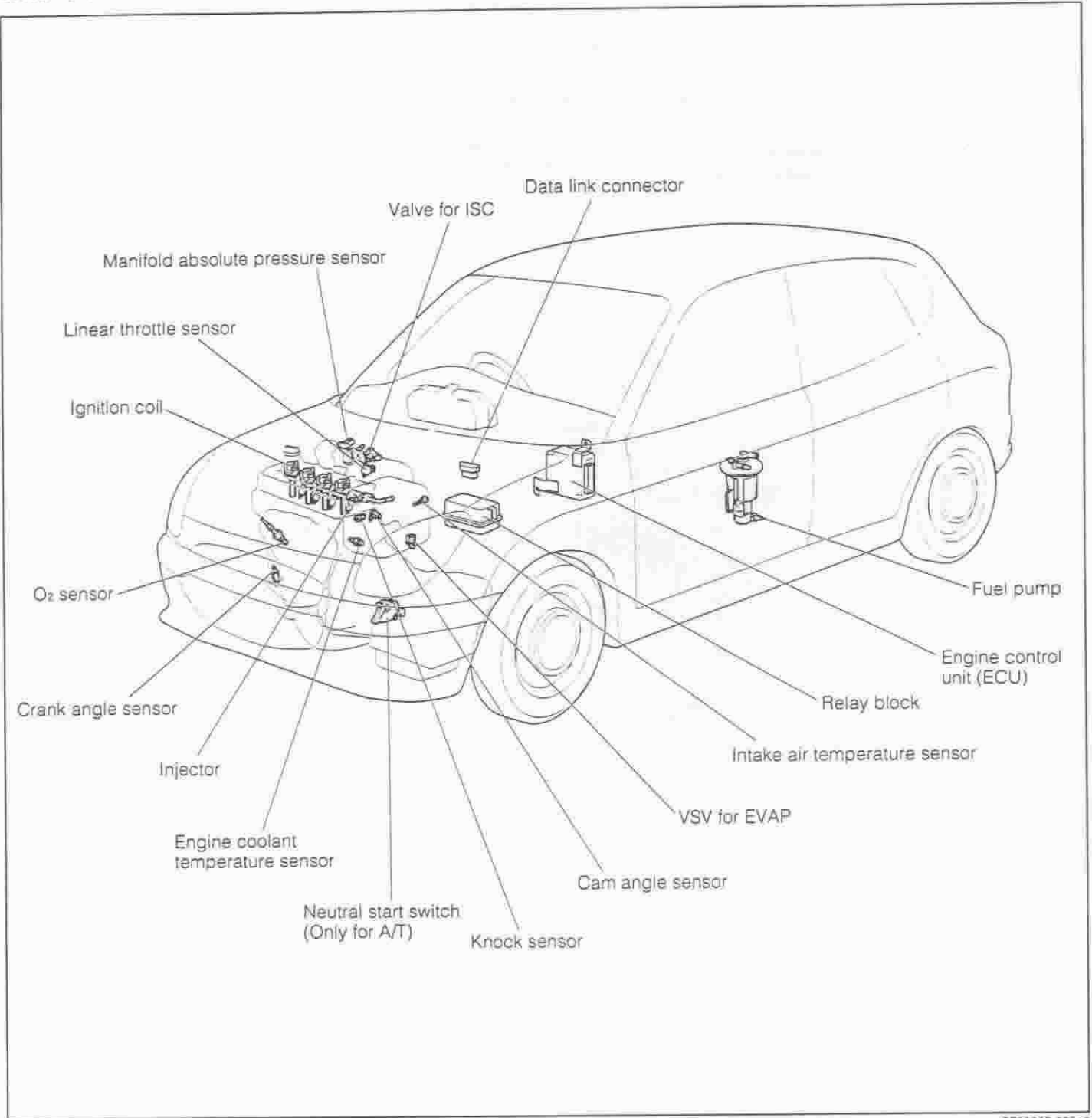
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3.1.2 FOR EU SPECIFICATIONS OF J102



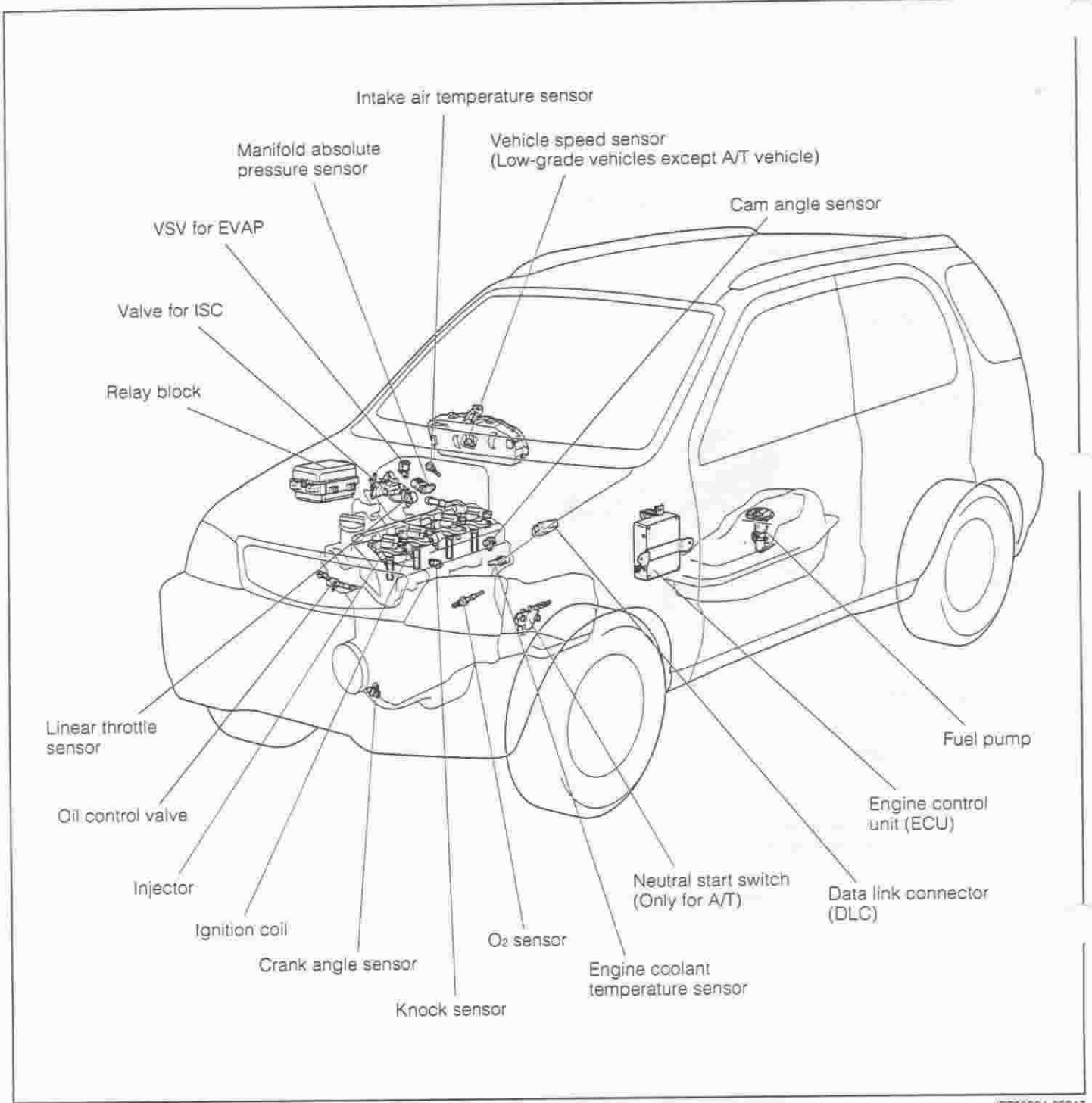
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3.1.3 FOR AUS AND GENERAL SPECIFICATIONS OF M101



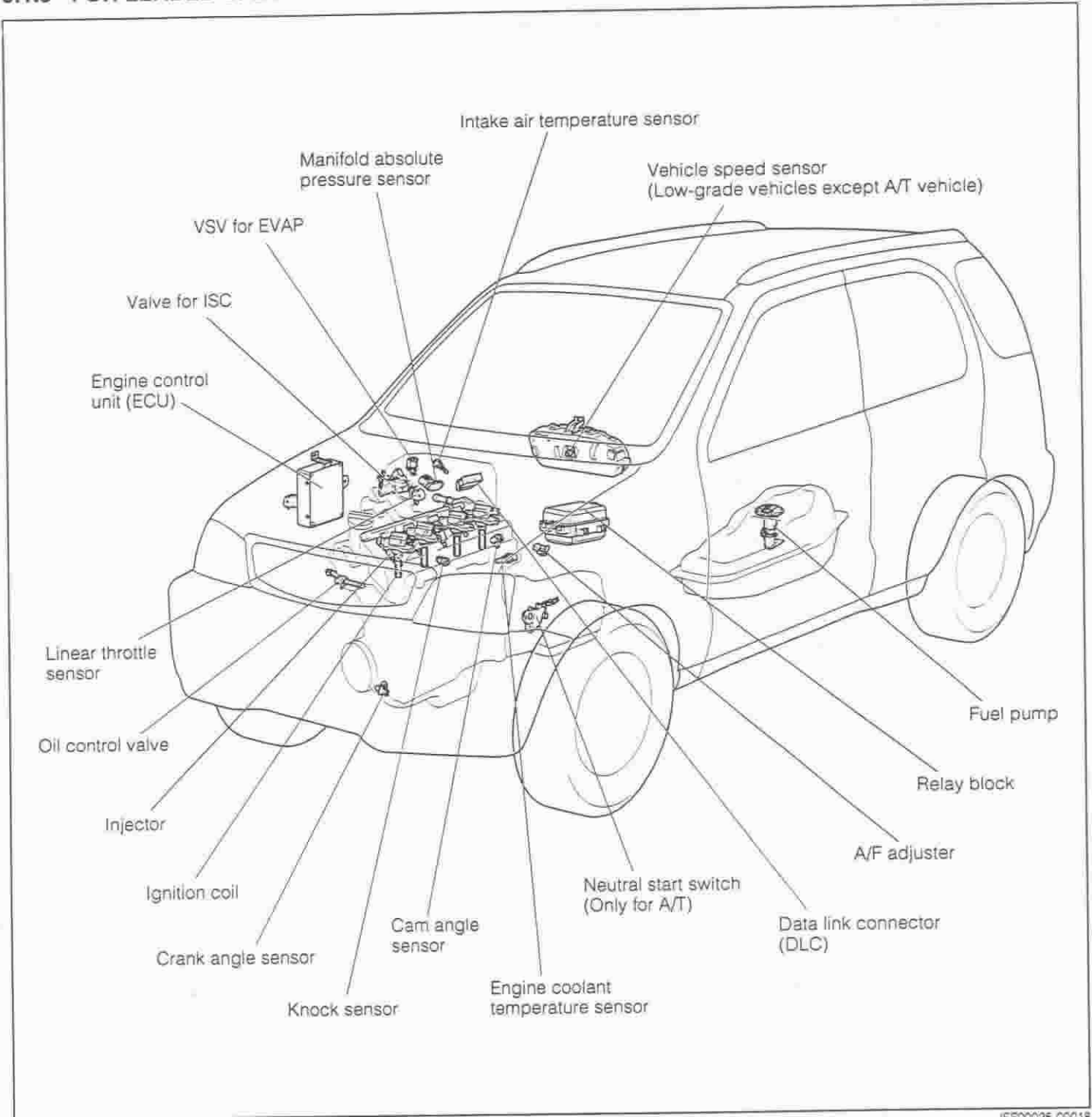
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3.1.4 FOR AUS AND GENERAL SPECIFICATIONS OF J102



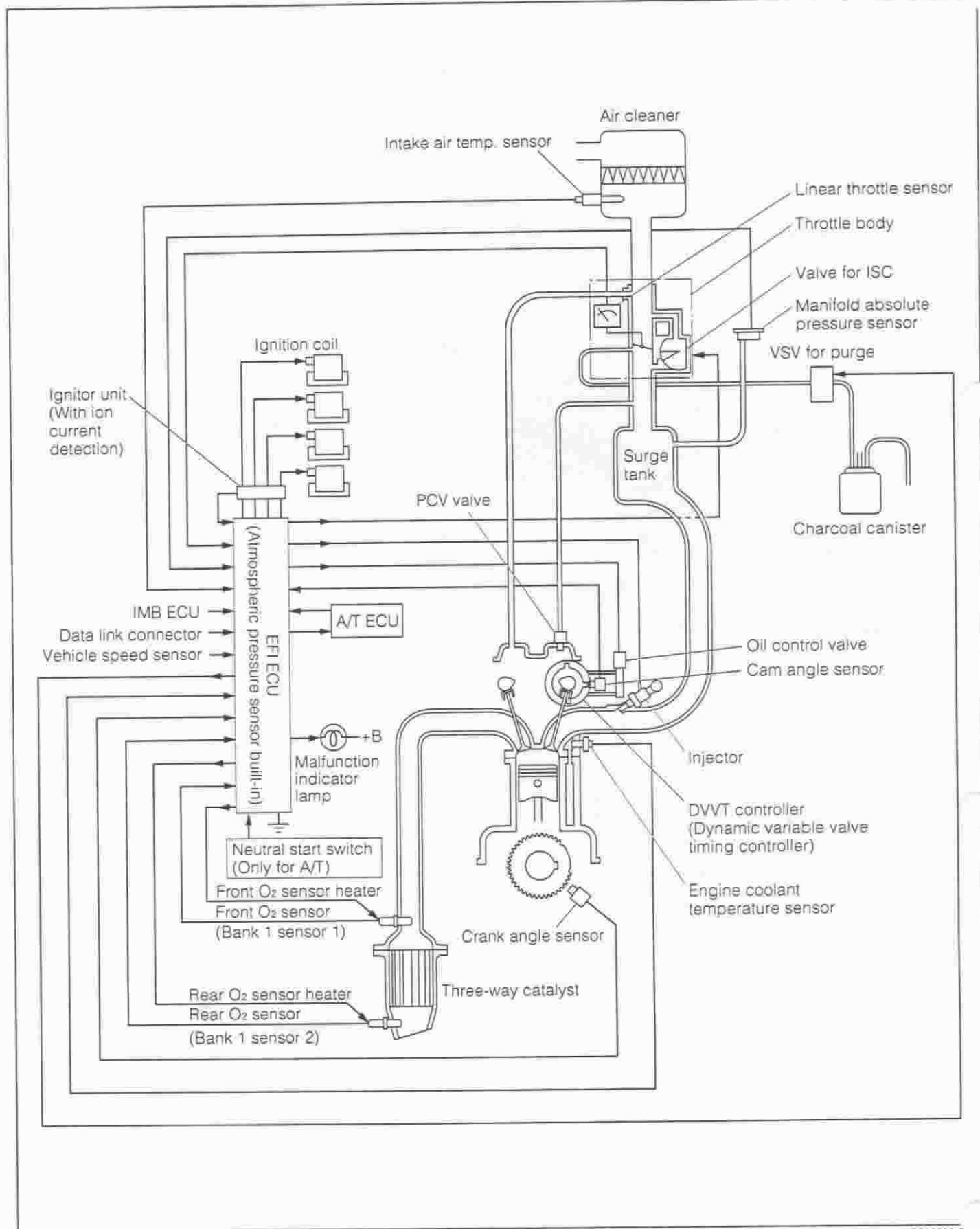
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3.1.5 FOR LEADED SPECIFICATIONS OF J102



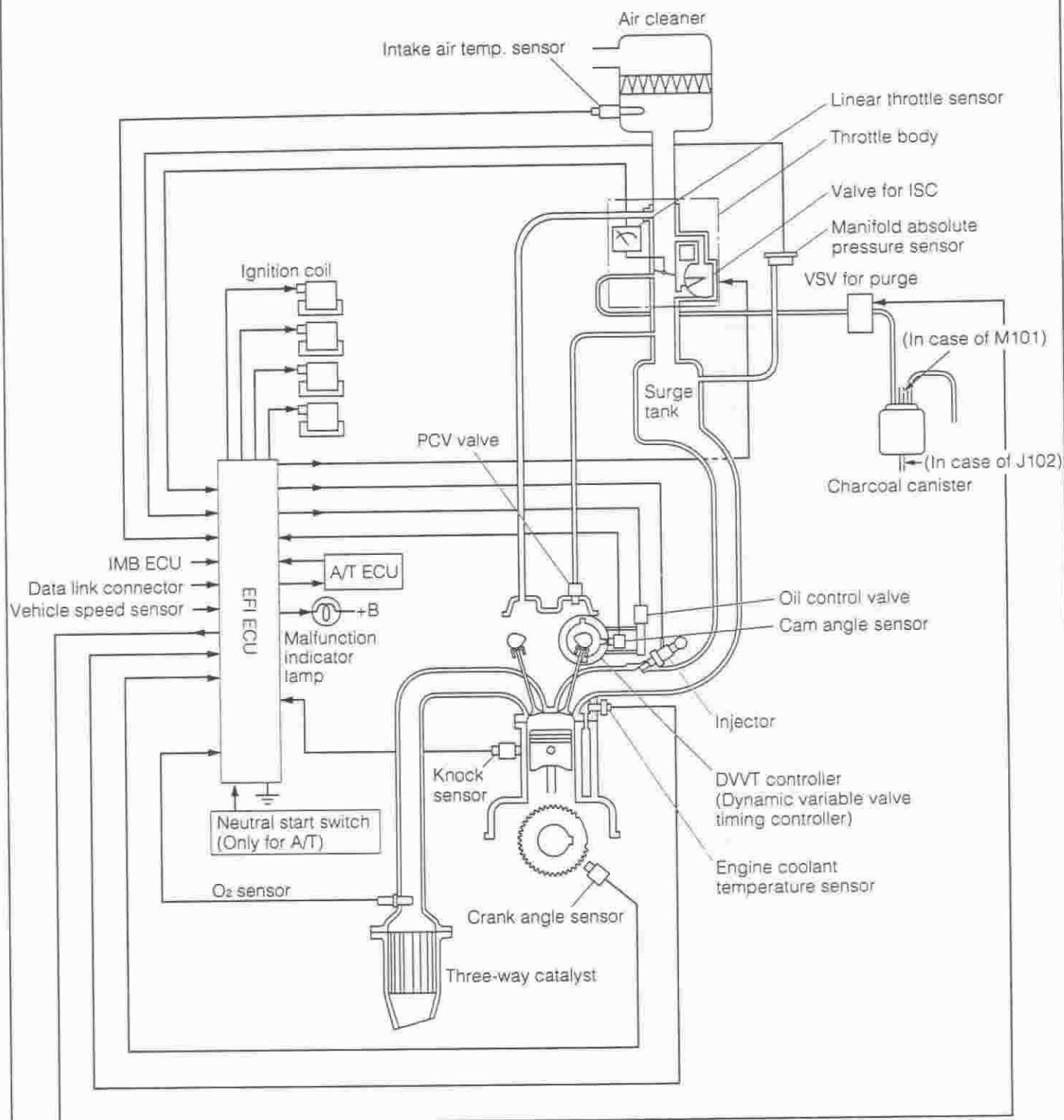
3.2 SYSTEM DIAGRAM

3.2.1 FOR EU SPECIFICATIONS OF M101 and J102



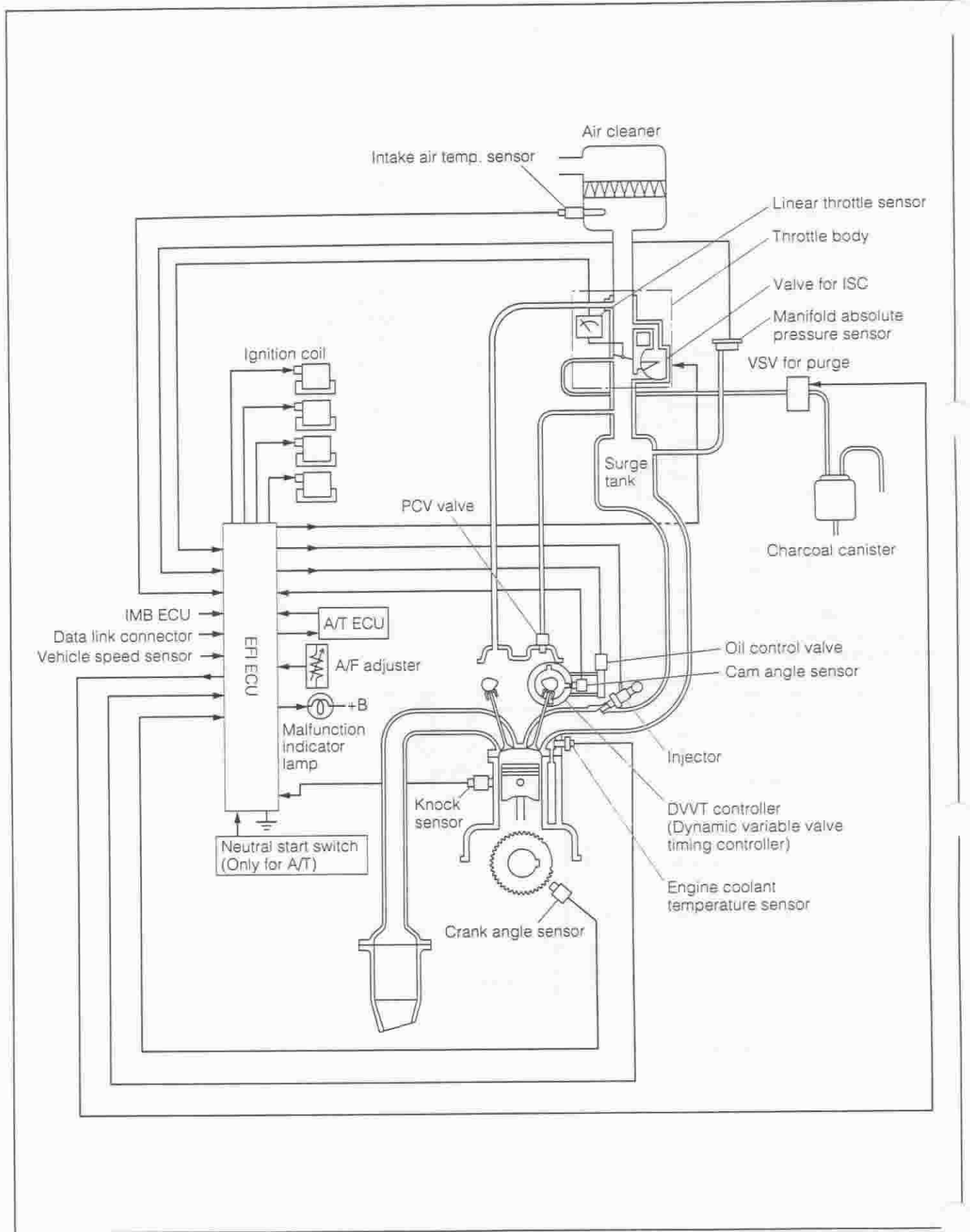
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3.2.2 FOR AUS AND GENERAL SPECIFICATIONS OF M101 and J102

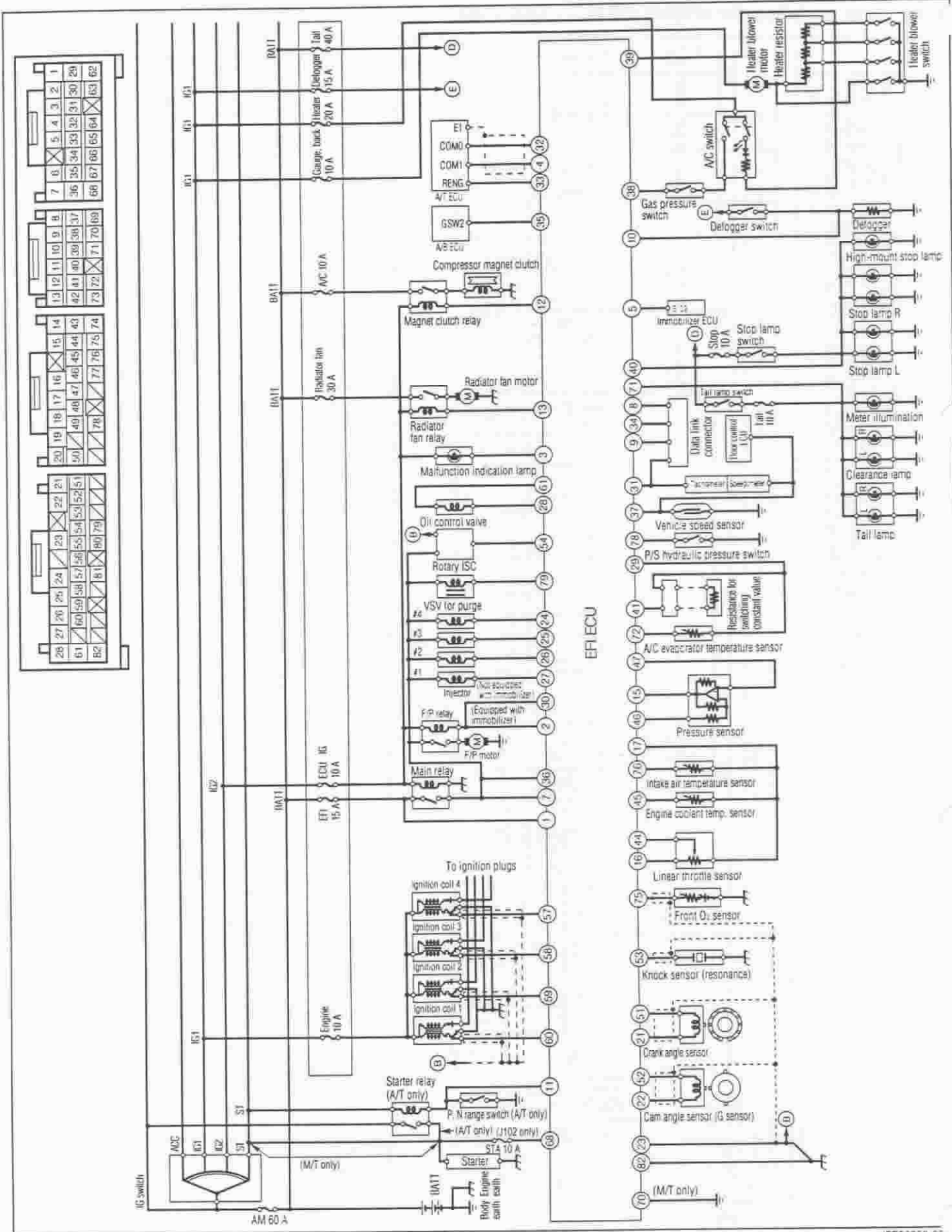


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3.2.3 FOR LEADED SPECIFICATIONS OF J102

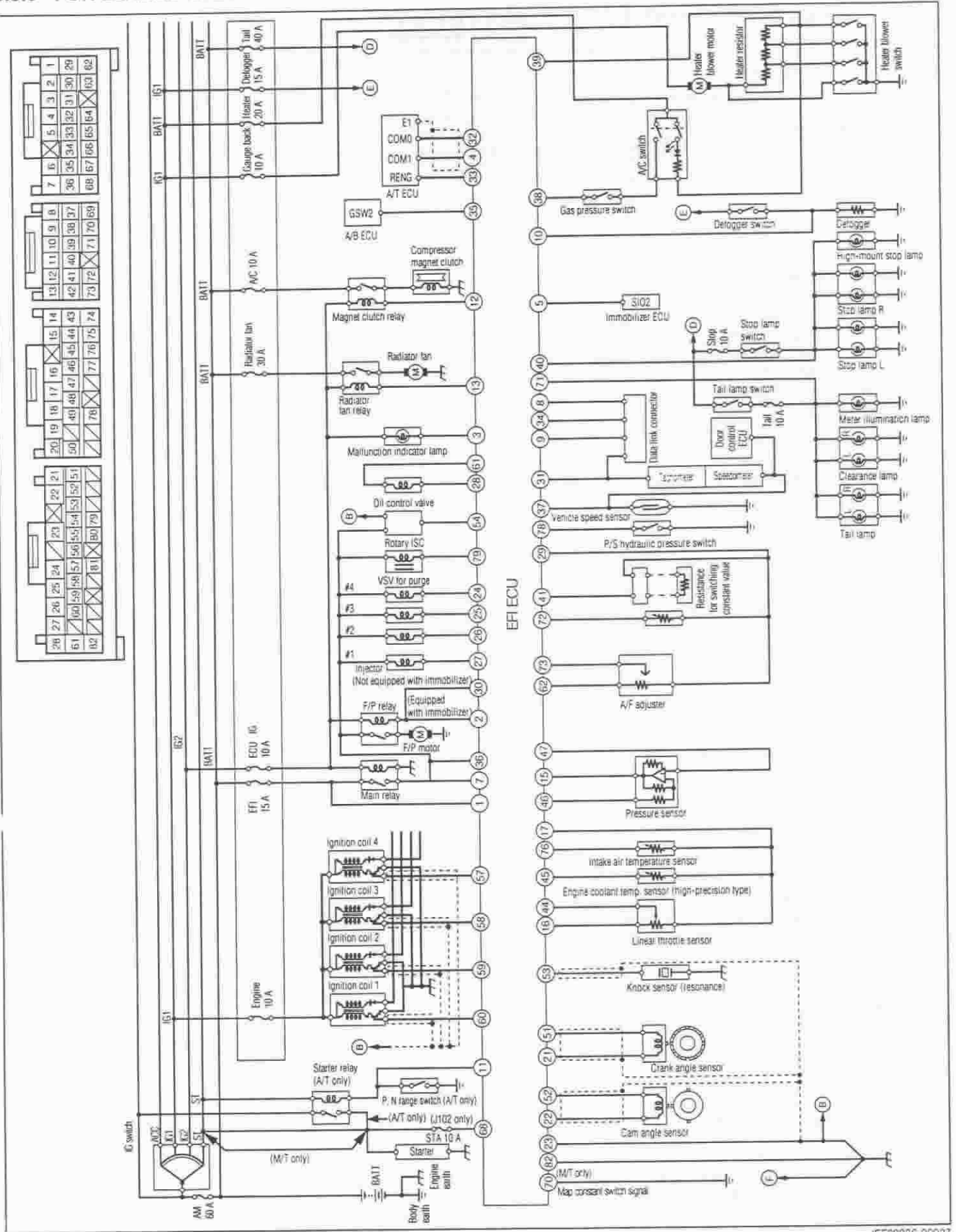


3.3.2 FOR AUS AND GENERAL SPECIFICATIONS OF M101 AND J102



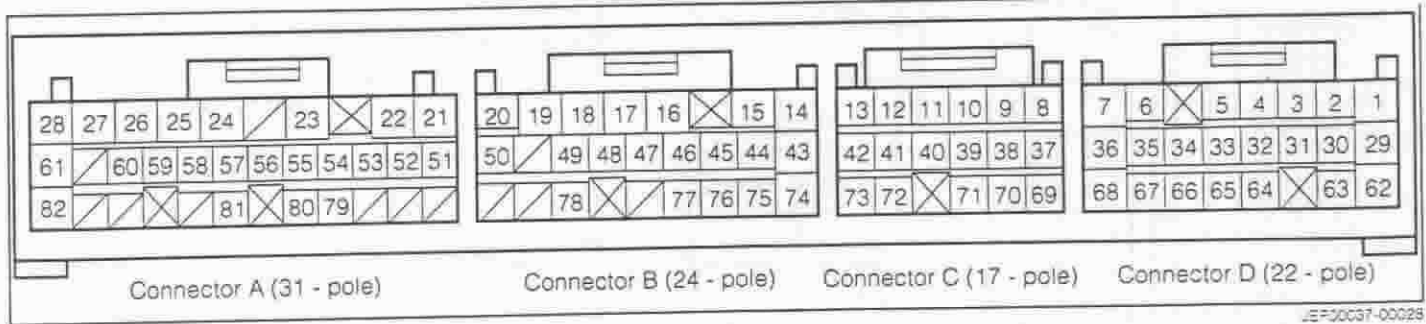
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3.3.3 FOR LEADED SPECIFICATIONS OF J102



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3.4 ARRANGEMENT OF EFI ECU TERMINAL
3.4.1 FOR EU SPECIFICATIONS OF M101 AND J102



JEF00037-00025

CONNECTOR A

No.	Contents of connection		No.	Contents of connection	
21	N1+	Crank angle sensor (+)	55	ALTC	—
22	N2+	Cam angle sensor (+)	56	VSV2	—
23	E1	Sensor system ground	57	IG4	Ignition signal (#4 cylinder)
24	#4C	Injector (#4 cylinder)	58	IG3	Ignition signal (#3 cylinder)
25	#3C	Injector (#3 cylinder)	59	IG2	Ignition signal (#2 cylinder)
26	#2C	Injector (#2 cylinder)	60	IG1	Ignition signal (#1 cylinder)
27	#1C	Injector (#1 cylinder)	61	OCV-	Oil control valve (-)
28	OCV+	Oil control valve (+)	79	PRG	Purge control VSV
51	N1-	Crank angle sensor (-)	80	VSV1	—
52	N2-	Cam angle sensor (-)	81	ALT	—
53	KNK	—	82	E01	Power supply system ground
54	ISC	Rotary ISC			

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CONNECTOR B

No.	Contents of connection		No.	Contents of connection	
14	ICMB	Ignitor unit (With ion current detection)	46	VCPM	Pressure sensor power supply
15	PIM	Pressure sensor signal	47	E2PM	Pressure sensor ground
16	VC	Linear throttle sensor power supply	48	ACLK	—
17	E2	Sensor ground	49	ACEN	—
18	FCCP	—	50	OXH2	Rear oxygen sensor heater
19	VFP	—	74	OX2	Rear oxygen sensor
20	OXH1	Front oxygen sensor heater	75	OX1	Front oxygen sensor
43	IE	Ion current sensor ground	76	THA	Intake air temperature sensor
44	VTH	Linear throttle sensor	77	ACVR	—
45	THW	Engine coolant temperature sensor	78	PST	P/S Pressure switch

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CONNECTOR C

No.	Contents of connection		No.	Contents of connection	
8	SIO1	Diagnosis tester	40	STP	Stop lamp switch
9	T	Test terminal	41	AUX	—
10	DEF	Defogger switch	42	FAN2	—
11	A/T	Neutral start switch (Only for A/T)	69	SEL2	—
12	MGC	A/C Magnet clutch relay	70	SEL1	Map constant switch signal (Only for M/T)
13	FAN1	Radiator fan relay (Without 2-step control)	71	H/L	Tail lamp switch
37	SPD	Vehicle speed sensor	72	ACEV	A/C Evaporator temp. sensor
38	ACSW	A/C Switch	73	OX3	—
39	BLW	Heater blower switch			

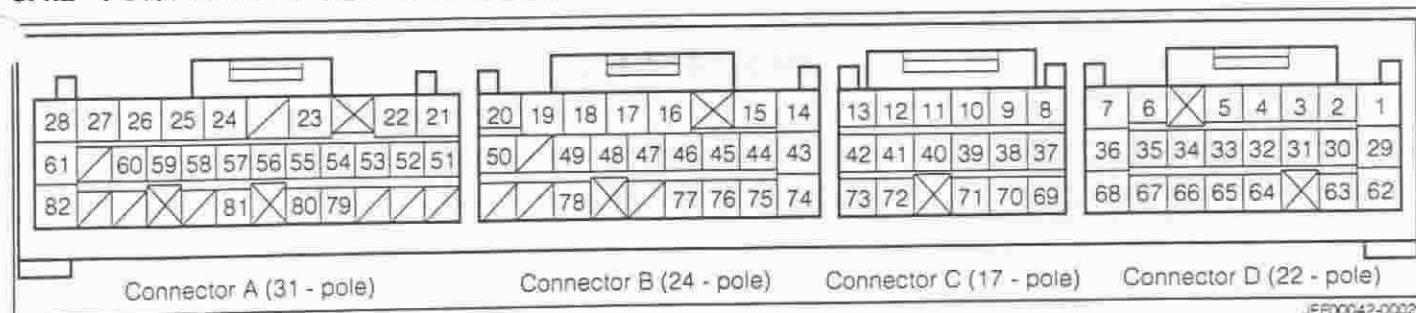
JEF00040-00000

CONNECTOR D

No.	Contents of connection		No.	Contents of connection	
1	BAT	Memory back-up supply	33	ATNE	Engine speed signal to A/T ECU
2	FC1	Fuel pump relay (With IMB)	34	VF	VF monitor terminal
3	W	Malfunction indicator lamp	35	FPOF	Fuel pump relay OFF
4	ATTX	Serial data transmission to A/T ECU	36	+B2	Power supply
5	SIO2	Serial port for IMB	62	VCO	—
6	TRRQ	—	63	VTHO	—
7	+B1	Power supply	64	IDLO	—
29	E21	A/C Evaporator temp. sensor ground	65	FCO	—
30	FC2	Fuel pump relay (Without IMB)	66	TRPR	—
31	REV	Engine speed signal	67	ACT	—
32	ATRX	Serial data reception from A/T ECU	68	STA	Starter signal

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3.4.2 FOR AUS AND GENERAL SPECIFICATIONS OF M101 AND J102



CONNECTOR A

No.	Contents of connection		No.	Contents of connection	
21	N1+	Crank angle sensor (+)	55	ALTC	—
22	N2+	Cam angle sensor (+)	56	VSV2	—
23	E1	Sensor system ground	57	IG4	Ignition signal (#4 cylinder)
24	#40	Injector (#4 cylinder)	58	IG3	Ignition signal (#3 cylinder)
25	#30	Injector (#3 cylinder)	59	IG2	Ignition signal (#2 cylinder)
26	#20	Injector (#2 cylinder)	60	IG1	Ignition signal (#1 cylinder)
27	#10	Injector (#1 cylinder)	61	OCV-	Oil control valve (-)
28	OCV+	Oil control valve (+)	79	PRG	Purge control VSV
51	N1-	Crank angle sensor (-)	80	VSV1	—
52	N2-	Cam angle sensor (-)	81	ALT	—
53	KNK	Knock sensor	82	E01	Power supply system ground
54	ISC	Rotary ISC			

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CONNECTOR B

No.	Contents of connection		No.	Contents of connection	
14	ICMB	—	46	VCPM	Pressure sensor power supply
15	PIM	Pressure sensor signal	47	E2PM	Pressure sensor ground
16	VC	Linear throttle sensor power supply	48	ACLK	—
17	E2	Sensor ground	49	ACEN	—
18	FCCP	—	50	OXH2	—
19	VFP	—	74	OX2	—
20	OXH1	—	75	OX1	Oxygen sensor
43	IE	—	76	THA	Intake air temperature sensor
44	VTH	Linear throttle sensor	77	ACVR	—
45	THW	Engine coolant temperature sensor	78	PST	P/S Pressure switch

JEF00044-00000

CONNECTOR C

No.	Contents of connection		No.	Contents of connection	
8	SIO1	Diagnosis tester	40	STP	Stop lamp switch
9	T	Test terminal	41	AUX	—
10	DEF	Defogger switch	42	FAN2	—
11	A/T	Neutral start switch (Only for A/T)	69	SEL2	—
12	MGC	A/C Magnet clutch relay	70	SEL1	Map constant switch signal (Only for M/T)
13	FAN1	Radiator fan relay (Without 2-step control)	71	H/L	Tail lamp switch
37	SPD	Vehicle speed sensor	72	ACEV	A/C Evaporator temp. sensor
38	ACSW	A/C Switch	73	OX3	—
39	BLW	Heater blower switch			

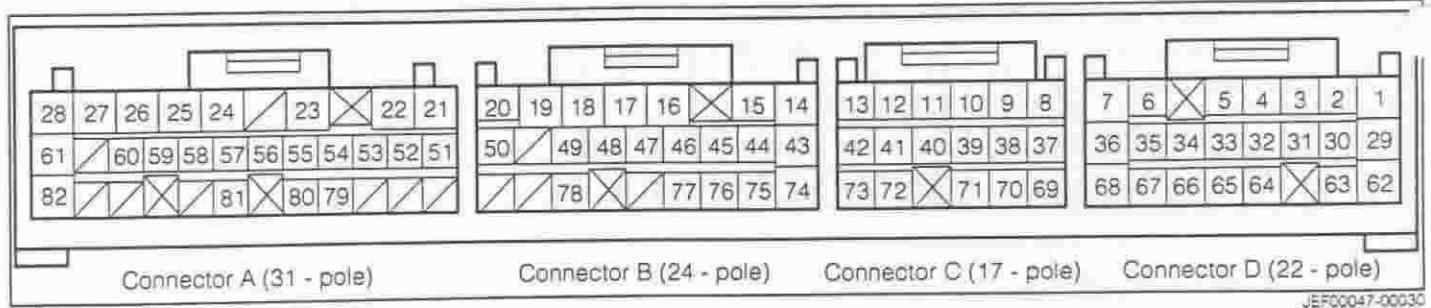
JEF00045-00000

CONNECTOR D

No.	Contents of connection		No.	Contents of connection	
1	BAT	Memory back-up supply	33	ATNE	Engine speed signal to A/T ECU
2	FC1	Fuel pump relay (With IMB)	34	VF	VF monitor terminal
3	W	Malfunction indicator lamp	35	FPOF	Fuel pump relay OFF
4	ATX	Serial data transmission to A/T ECU	36	+B2	Power supply
5	SIO2	Serial port for IMB	62	VCO	—
6	TRRO	—	63	VTHO	—
7	+B1	Power supply	64	IDLO	—
29	E21	A/C Evaporator temp. sensor ground	65	FCO	—
30	FC2	Fuel pump relay (Without IMB)	66	TRPR	—
31	REV	Engine speed signal	67	ACT	—
32	ATRX	Serial data reception from A/T ECU	68	STA	Starter signal

JEF00046-00000

3.4.3 FOR LEADED SPECIFICATIONS OF J102



CONNECTOR A

No.	Contents of connection	No.	Contents of connection
21	N1+ Crank angle sensor (+)	55	ALTC —
22	N2+ Cam angle sensor (+)	56	VSV2 —
23	E1 Sensor system ground	57	IG4 Ignition signal (#4 cylinder)
24	#40 Injector (#4 cylinder)	58	IG3 Ignition signal (#3 cylinder)
25	#30 Injector (#3 cylinder)	59	IG2 Ignition signal (#2 cylinder)
26	#20 Injector (#2 cylinder)	60	IG1 Ignition signal (#1 cylinder)
27	#10 Injector (#1 cylinder)	61	OCV- Oil control valve (-)
28	OCV+ Oil control valve (+)	79	PRG Purge control VSV
51	N1- Crank angle sensor (-)	80	VSV1 —
52	N2- Cam angle sensor (-)	81	ALT —
53	KNK Knock sensor	82	E01 Power supply system ground
54	ISC Rotary ISC		

JEF00048-00000

CONNECTOR B

No.	Contents of connection	No.	Contents of connection
14	ICMB —	46	VCPM Pressure sensor power supply
15	PIM Pressure sensor signal	47	E2PM Pressure sensor ground
16	VC Linear throttle sensor power supply	48	ACLK —
17	E2 Sensor ground	49	ACEN —
18	FCCP —	50	OXH2 —
19	VFP —	74	OX2 —
20	OXH1 —	75	OX1 —
43	IE —	76	THA Intake air temperature sensor
44	VTH Linear throttle sensor	77	ACVR —
45	THW Engine coolant temperature sensor	78	PST P/S Pressure switch

JEF00049-00000

CONNECTOR C

No.	Contents of connection	No.	Contents of connection
8	SIO1 Diagnosis tester	40	STP Stop lamp switch
9	T Test terminal	41	AUX —
10	DEF Defogger switch	42	FAN2 —
11	A/T Neutral start switch (Only for A/T)	69	SEL2 —
12	MGC A/C Magnet clutch relay	70	SEL1 Map constant switch signal (Only for M/T)
13	FAN1 Radiator fan relay (Without 2-step control)	71	H/L Tail lamp switch
37	SPD Vehicle speed sensor	72	ACEV A/C Evaporator temp. sensor
38	ACSW A/C Switch	73	OX3 A/F adjuster
39	BLW Heater blower switch		

JEF00050-00000

CONNECTOR D

No.	Contents of connection	No.	Contents of connection
1	BAT Memory back-up supply	33	ATNE Engine speed signal to A/T ECU
2	FC1 Fuel pump relay (With IMB)	34	VF VF monitor terminal
3	W Malfunction indicator lamp	35	FPOF Fuel pump relay OFF
4	ATTX Serial data transmission to A/T ECU	36	+B2 Power supply
5	SIO2 Serial port for IMB	62	VCO A/F adjuster power supply
6	TRRQ —	63	VTHO —
7	+B1 Power supply	64	IDLO —
29	E21 A/C Evaporator temp. sensor ground	65	FCO —
30	FC2 Fuel pump relay (Without IMB)	66	TRPR —
31	REV Engine speed signal	67	ACT —
32	ATRX Serial data reception from A/T ECU	68	STA Starter signal

JEF00051-01

4. GENERAL PRECAUTIONARY MEASURES IN ENGINE DIAGNOSIS

4.1 PRECAUTIONARY MEASURES FOR REPAIRS OF FUEL SYSTEMS

1. Prior to performing operations of the fuel system, remove the cable of the negative (-) terminal from the battery.

NOTE:

- When the cable of the negative terminal is removed, the memories concerning the diagnosis codes and radio will be simultaneously erased. Therefore, before removing the cable of the negative terminal from the battery, the diagnosis codes should be outputted and checked. Also, the channels memorized in the radio should be recorded, if necessary.
2. Be sure not to smoke when performing operations of the fuel system. Also never carry out any operations near naked flame.
 3. The fuel supply line (between the fuel pump and fuel delivery pipe) is still pressurized even if the engine has been turned off. Therefore, before loosening or removing the fuel supply line, be sure to relieve the fuel pressure, following the "Fuel pressure relieving procedure."
Even if the fuel pressure has been relieved, a small amount of fuel will spill when the fuel supply line is disconnected. Hence, before removing, cover the portion to be removed with a cloth to prevent the fuel from splashing.

JEF00059-0003Z

4. The connection method of fuel hoses or evaporative emission hoses differs, depending upon the type of the pipe. When connecting the fuel hoses or evaporative emission hoses again, be sure to correctly connect and clamp them by referring to the figure on the right.

Ensure that no twist nor fault is present after connecting.

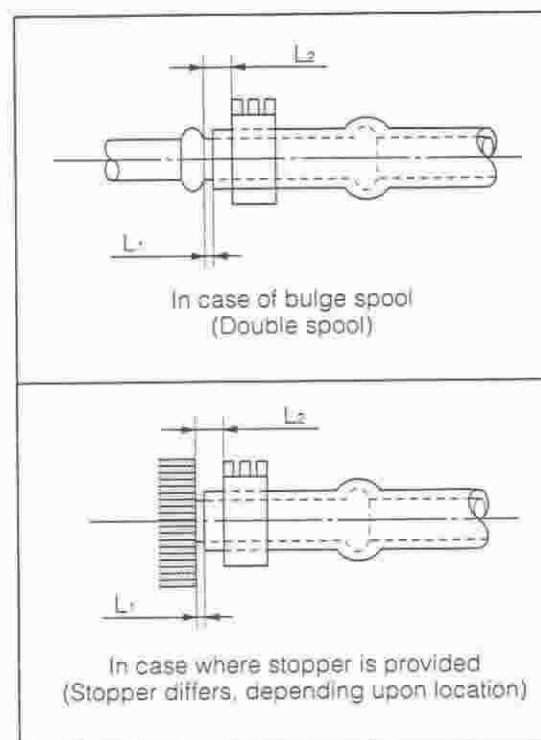
(1) Fuel hose

① Hose insertion length

Insert the hose in such a way that L_1 becomes 0 - 2 mm.

② Clip position

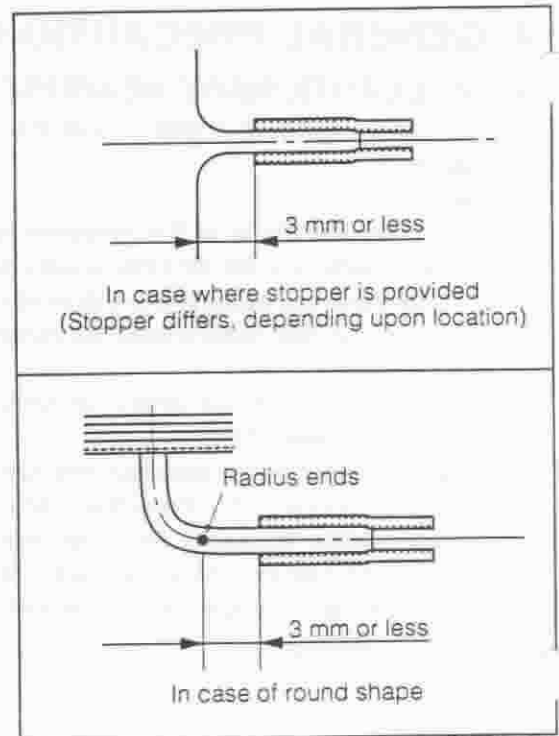
Clamp the hose in such a way that L_2 becomes 2 - 5 mm. (The clip shall not be placed at the bulge or spool of the pipe. Also the clip shall not go beyond the hose end.)



JEF00060-00033

(2) Vacuum hose

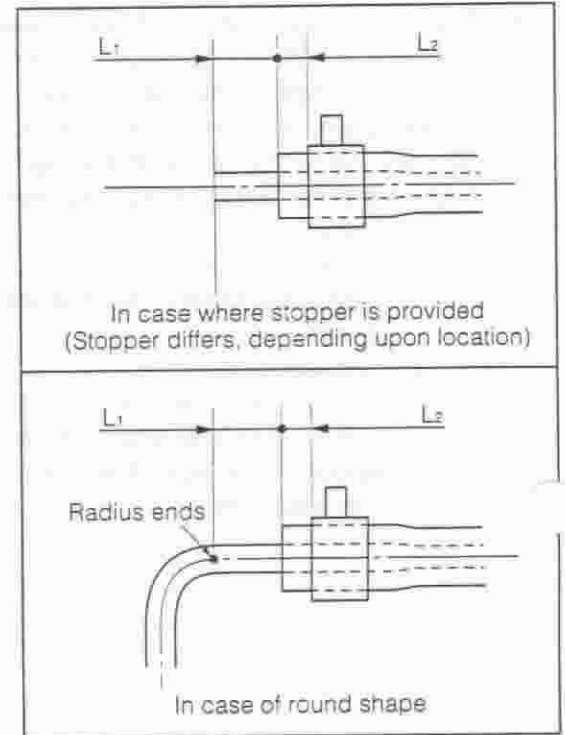
- ① Hose insertion length
Insert the hose in such a way as the figure on the right shows.
- ② Clip position
The clip end position is about 2 mm away from the hose end.



JEF00061-00034

(3) Purge hose

- ① Hose insertion length
Insert the hose in such a way that L_1 becomes 0 - 3 mm.
- ② Clip position
Clamp the hose in such a way that L_2 becomes 2 - 7 mm.



JEF00062-00035

5. When installing the fuel filter union bolt to the fuel filter, use a new gasket and tighten to the specified torque.
6. When installing the injector, fuel supply pipe, fuel pressure regulator or pulsation damper, use a new "O" ring or gasket. Apply gasoline or silicone oil to the "O" ring before assembling.

JEF00063-00000

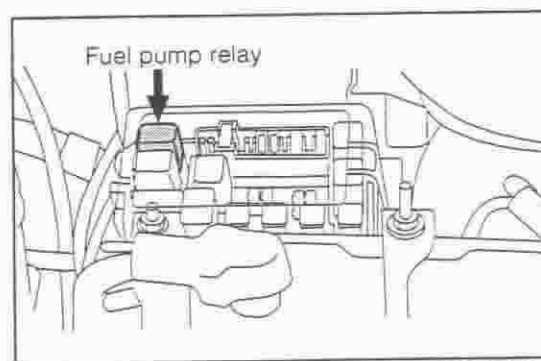
4.2 FUEL PRESSURE RELIEVING PROCEDURE

CAUTION:

- Never perform this operation while the engine is still hot. Failure to observe this caution may damage the catalyst.

After confirming that the engine is cold, relieve the fuel pressure, following the procedure given below.

1. Place the shift lever of the transmission in the "N" position.
In the case of automatic transmission vehicles, place the shift lever in the "P" position. Apply the parking brake and place chocks at the wheels. JEF00064-00000
2. Remove the relay block cover.
3. Remove the fuel pump relay from the relay block.
4. Start the engine. Leave the engine running, until it stops due to running-out of the fuel.
5. Install the fuel pump relay. Install the relay block cover.



JEF00065-00036

4.3 FUEL LEAK CHECK

After the fuel system has been repaired, perform the following check in order to ensure that no fuel leakage is present.

1. Turn ON the ignition switch for three seconds. Then turn it OFF. Repeat this operation three or four times so as to apply fuel pressure to the fuel system.
2. Under this state, ensure that the fuel system exhibits no fuel leakage at any point. JEF00066-00000

4.4 PRECAUTIONARY MEASURES DURING TROUBLE-SHOOTING

1. Before the diagnosis information memorized in the ECU memory is confirmed, never disconnect the connector from the ECU, the battery cable from the battery, the ECU earth wire from the engine, or the main fuse.
2. The diagnosis information memorized in the ECU memory can be erased by using the DS-21 diagnosis tester or the OBD-II generic scan tool in the same way as the check. Therefore, before using the tester, read its instruction manual so as to understand the functions furnished and how to use it.
3. Priority in trouble-shooting
If the priority in trouble-shooting for a number of diagnosis codes is given in the concerned DTC flow chart, make sure to follow the priority.
If not given, follow the priority given below and perform the trouble-shooting for each diagnosis trouble code (DTC).
 - (1) DTC's other than DTC P0171/25, DTC P0172/26 (too lean/too rich in fuel system), and DTC 0300/17, DTC P0301-P0304/17, DTC P0314/-(misfire found)
 - (2) DTC P0171/25, DTC P0172/26 (too lean/too rich in fuel system)
 - (3) DTC 0300/17, DTC P0301-P0304/17, DTC P0314/-(misfire found)
4. Before conducting checks, be sure to read the "Precautionary measures in checking system circuit." Carry out the diagnosis, while paying utmost attention to those points requiring such attention. JEF00067-00000

5. ENGINE DIAGNOSIS

5.1 GENERAL INFORMATION

The engine and engine control system of this vehicle are controlled by the ECU. Furthermore, the vehicle is provided with the on-board diagnosis system. Therefore, when any abnormality takes place in the input/output systems (sensors, actuators, harnesses, connectors, etc.) of the engine control system, the ECU memorizes the system concerned and informs the driver by making the malfunction indicator lamp (MIL, warning lamp) illuminate or flash. Also the malfunction is informed to the operator by means of the data link connector (DLC, diagnosis connector).

When trouble-shooting the engine, it is imperative for you to get the general idea of the onboard diagnostic system, and fully understand the precautionary measures in trouble-shooting, the items to be observed and how to use testers. Then, conduct the trouble-shooting, following the flow chart that indicates the correct procedure for the engine trouble-shooting.

JEF00068-00000

5.1.1 ON-BOARD DIAGNOSTIC SYSTEM OF VEHICLES FOR EUROPE

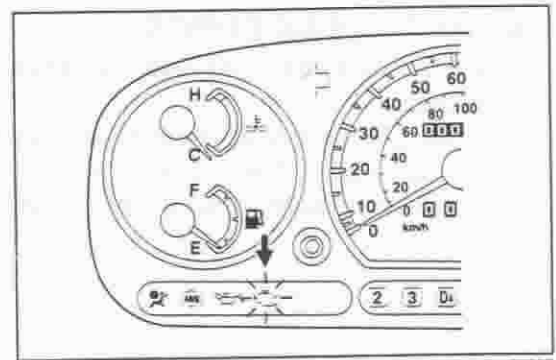
The vehicles for Europe have the following functions that comply with the 1999/102/EC (generally called EURO-OBD) standards.

1. When the ignition switch is turned ON, the malfunction indicator lamp (MIL) goes on. When no malfunction has been detected, the lamp will go out after the engine has started. (Check for a blown bulb)
2. While the engine is running, if the ECU detects any malfunction in the emission control system/components that will affect the emissions from the vehicle, or in the power train control components, or if any malfunction is detected in the ECU itself, the ECU illuminates or flashes the MIL (only when misfire is detected which will damage the catalyst). Then, the ECU memorizes the malfunction area (DTC by ISO15031-6/SAEJ2012).

If that malfunction will not occur in three successive runnings, the MIL is automatically turned off. However, the DTC will be recorded in the ECU memory.

NOTE:

- The MIL is illuminated only by the malfunction that affects the emissions from the vehicle. (Only items bearing a circle ("O") mark) in the MIL column on page EF-41)

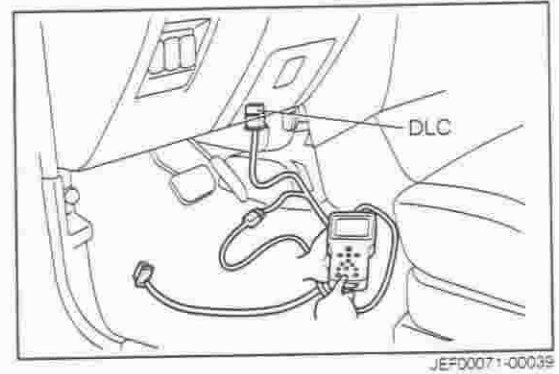


JEF00069-00037

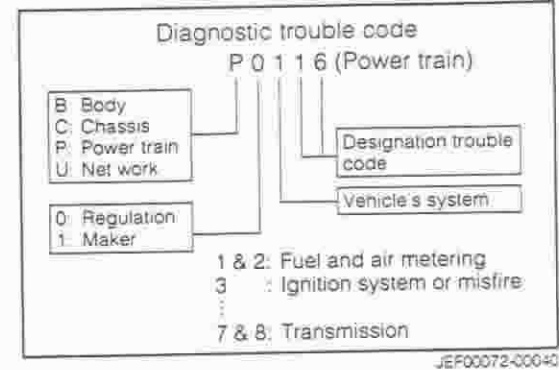
DTC No	Description	Malfunction evaluation method	MIL
P0105/31	Manifold pressure pressure	1 trip	○
P0110/43	Intake air malfunction	1 trip	○
P0115/42	Engine cool malfunction	1 trip	○
P0116/42	Engine cool circuit mande	2 trip	○
P0120/41	Throttle/P switch "A"	1 trip	○

JEF00070-00036

3. It is possible to read out various data from the engine ECU by connecting the OBD II generic scan tool which complies with the ISO 14230 format or DS-21 diagnosis tester to the DLC of the vehicle. You can perform trouble-shooting efficiently by checking these data (DTC, freeze-frame data, current data, O₂ sensor monitor data, etc.).



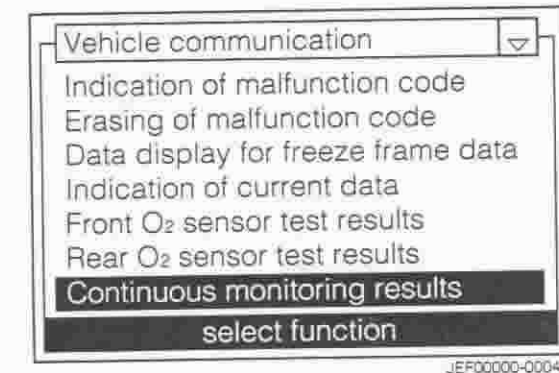
4. The DTC is composed of the ISO standard code (specified by ISO 15031-6) and the manufacturer's designation code. The ISO standard code should be set pursuant to the ISO. On the other hand, the manufacturer's designation code can be freely set forth by the manufacturer within a specified limit.



5. Many DTC's have a 2 trip detection logic which assures avoidance of wrong detection and functions only when a malfunction is surely occurring. However, another diagnosis mode is provided, in which only a one-time final confirmation test is necessary for a service mechanic to confirm that the malfunction has been completely remedied after the repair.

DTC No.	Data	Malfunction evaluation method	MIL
P0141/24	Oxygen sens malfunction	2 trip	○
P0171/25	Fuel trim (Air-fuel malfunction)	2 trip	○
P0172/26	Fuel trim (Air-fuel malfunction)	2 trip	○

The mode can be switched on with the OBD II generic scan tool or the DS-21 diagnosis tester. (In the case of the DS-21 diagnosis tester, the "Continuous monitoring results" of "Vehicle communication in CARB mode" must be selected.



6. When a malfunction is detected, the engine and running conditions at that moment are memorized as a freeze-frame data in the ECU memory.

7. 2 trip detection logic
When a malfunction is detected for the first time, that malfunction is temporarily memorized in the engine ECU memory. (First running). If the same malfunction is detected again during the second running, the MIL is illuminated and the DTC is determined. (Second running).

(However, the ignition switch should be turned off between the first running and the second running.)

JEF00075-00043

8. Freeze-frame data

When a malfunction is detected for the first time, the engine and running conditions at that moment are memorized in the memory.

The engine and running conditions are recorded at the moment when the malfunction was found (fuel system, calculated load, engine coolant temperature, fuel trim, engine revolution speed, vehicle speed, etc.). Therefore, the freeze-frame data is useful during the trouble-shooting to determine whether the vehicle was running or stopped, the engine was hot or not, the air-to-fuel ratio was lean or rich when the malfunction occurred.

9. Updating freeze-frame data

Since the ECU is able to memorize the freeze-frame data for a single malfunction, the freeze-frame data shown in Item "1" below has priority when data is memorized.

If the freeze-frame data shown in Item "1" below is detected when the freeze-frame data shown in Item "2" below has already been memorized, the freeze-frame data "2" is replaced by the freeze-frame data "1".

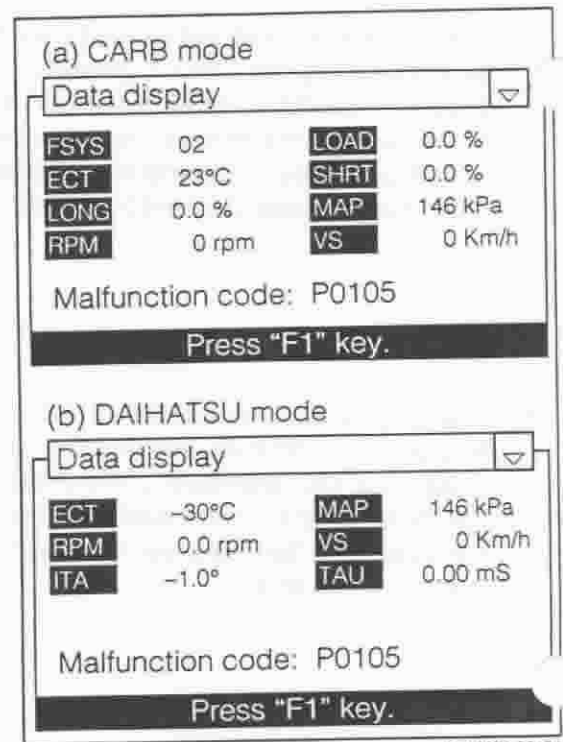
PRIORITY	FREEZE FRAME DATA
1	Freeze frame data at initial detection of malfunction among misfire detected (P0300-P0304 and P0314), fuel system too lean (P0171) and fuel system too rich (P0172)
2	Freeze frame data when a malfunction other than those in "1" above is detected

NOTE:

- If the malfunction which occurs later has a lower priority or the same priority as the former one, the data is not updated.

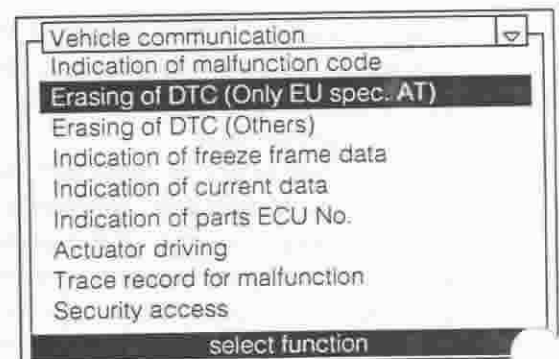
10. Erasing of MIL-related malfunction code (DTC)

In the case of electronically-controlled automatic transmission-equipped vehicles of EU spec. only, selecting "Erasing of DTC (Only EU spec. AT)" will erase all the DTC's on the EFI ECU side, MIL-related DTC's on the A/T ECU side (items with a circle in the MIL column on page EF-41) and freeze-frame data.



JEF00076-00104

JEF00077-00000

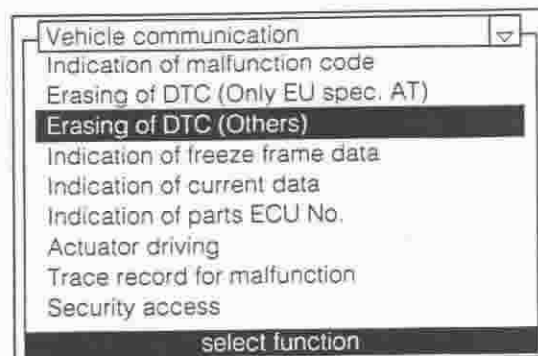


JEF00078-0

11. Erasing of freeze-frame data

The freeze-frame data is erased simultaneously when the DTC is erased.

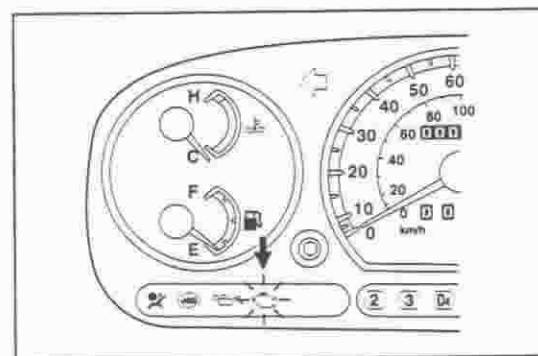
In the case of except for electrically-controlled automatic transmission-equipped vehicles, the freeze-frame data can be erased simultaneously by erasing the DTC through selection of the "Erasing of DTC (Others)"



JEF00079-00045

5.1.2 ON-BOARD DIAGNOSTIC SYSTEM OF VEHICLES OTHER THAN THOSE FOR EUROPE

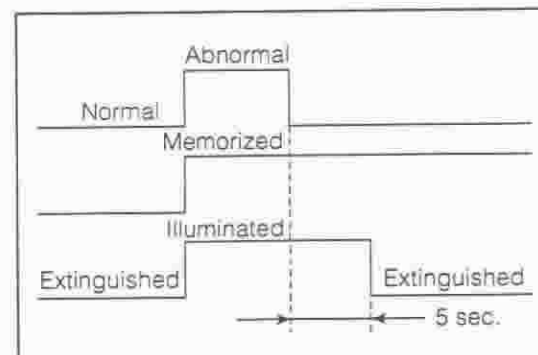
1. When the ignition switch is turned ON, the MIL goes on. When no malfunction has been detected, the lamp will go out after the engine has started. (Check for a blown bulb)



JEF00080-00046

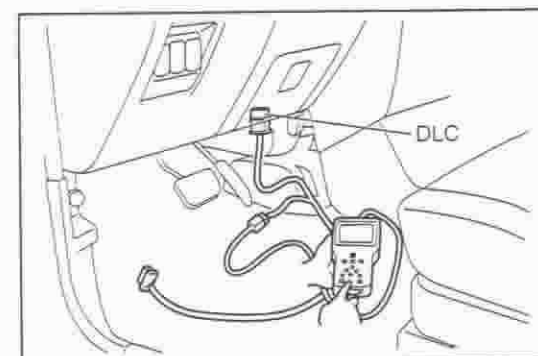
2. While the engine is running, if the ECU detects any malfunction in the engine control system/components, or if any malfunction is detected in the ECU itself, the ECU illuminates the MIL.

In addition to the illumination of the MIL, the corresponding diagnostic trouble code (DTC) is memorized in the engine ECU memory. When the malfunction has been remedied or the system returns to its normal state, the MIL automatically goes out. However, the DTC remains memorized in the engine ECU memory.



JEF00081-00047

3. It is possible to read out various data from the engine ECU by connecting the DS-21 diagnosis tester to the DLC of the vehicle. You can perform trouble-shooting accurately and efficiently by checking these data (DTC, freeze-frame data, current data, O₂ sensor monitor data, etc.). (Only when DS-21 diagnosis tester is used)



JEF00082-00048

4. The DTC (diagnostic trouble code) is set to a four-digit code in accordance with ISO standard. Furthermore, the conventional two-digit code is also provided. The four-digit code can be read out by the DS-21 diagnosis tester. The two-digit code has been set forth by the DMC itself. This code can be read by observing the flashing pattern of the MIL. (For details, see page EF-53.)

DTC No.	Detection item
4-digit code	2-digit code
P0105/31	Manifold absolute pressure/barometric pressure circuit malfunction
P0110/43	Intake air temp. circuit malfunc.

JEF00083-00049

5. Some DTC's have a 2 trip detection logic which assures avoidance of wrong detection and functions only when a malfunction is surely taking place.
6. When a malfunction is detected, the engine and running conditions at that moment are memorized as a freeze-frame data in the ECU memory.

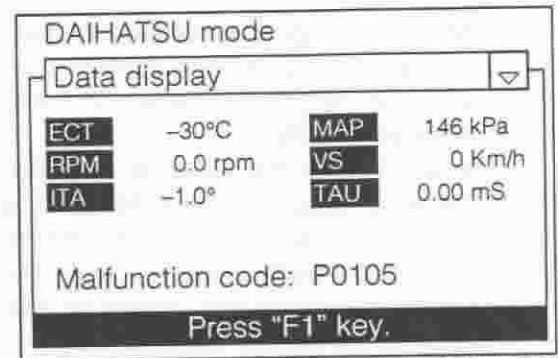
DTC No.	Defect	Malfunction evaluation method	MIL
P0141/24	Oxygen sens malfunction	2 trip	○
P0171/25	Fuel trim (Air-fuel malfunction)	2 trip	○
P0172/26	Fuel trim (Air-fuel malfunction)	2 trip	○

JEF00084-00050

7. 2 trip detection logic
 When a malfunction is initially detected, that malfunction is temporarily memorized in the engine ECU memory. (First running) If the same malfunction is detected again during the second running, the MIL is illuminated and the DTC is determined. (Second running)
 (However, the ignition switch should be turned off between the first running and the second running.)

JEF00085-00050

8. Freeze-frame data
 The ECU memorizes the engine and running conditions in its memory at the moment when the ECU detects a malfunction for the first time. (The figure on the right shows an example.)
 Therefore, it is possible to know the engine and running conditions when the malfunction was detected (such as whether the engine was hot or not, the vehicle was running or stopped, the air-to-fuel ratio was lean or rich) by checking the freeze-frame data. By utilizing the freeze-frame data, it is possible to proceed with the troubleshooting efficiently.
 The freeze-frame data can be read out only by using the DS-21 diagnosis tester.



JEF00086-00105

9. Updating freeze-frame data

Since the ECU is able to memorize the freeze-frame data for a single malfunction, the freeze-frame data shown in Item "1" below has priority when the data is memorized. If the freeze-frame data shown in Item "1" below is detected when the freeze-frame data shown in Item "2" below has already been memorized, the freeze-frame data "2" is replaced by the freeze-frame data "1".

PRIORITY	FREEZE FRAME DATA
1	Freeze frame data at initial detection of malfunction among fuel system too lean (P0171) and fuel system too rich (P0172)
2	Freeze frame data when a malfunction other than those in "1" above is detected

NOTE:

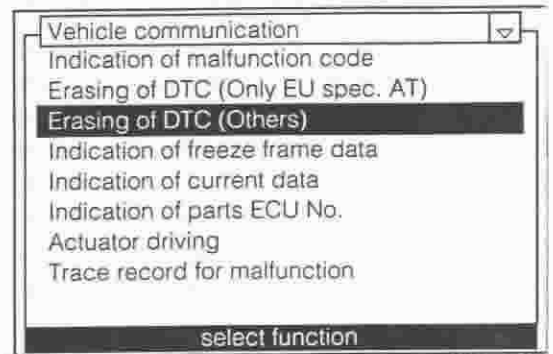
- If the malfunction which occurs later has lower priority or the same priority as the former one, the data is not updated.

JEF00087-0000

10. Erasing of freeze-frame data

The freeze-frame data is erased simultaneously when the DTC is erased.

- (1) When the DS-21 diagnosis tester is used:
Select "Erasing of DTC (Others)" of the "Vehicle communication." Press the execution key (F1 key).
- (2) When the DS-21 diagnosis tester is not used:
See page EF-58.



JEF00088-00051

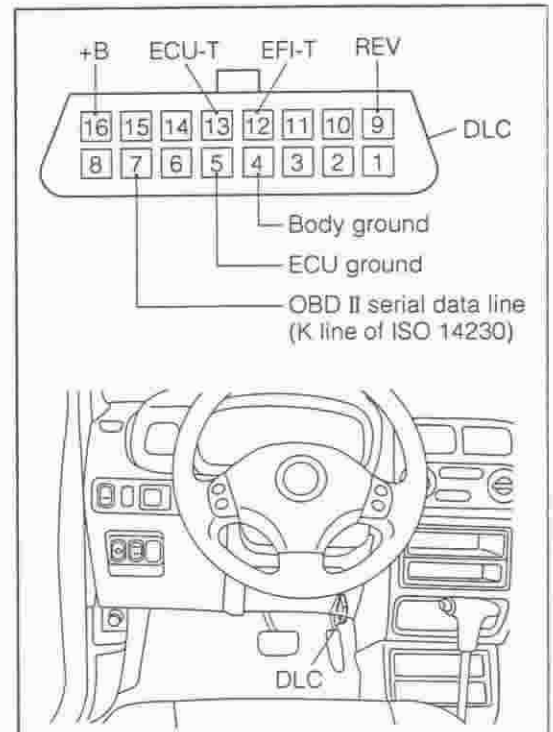
5.1.3 DATA LINK CONNECTOR (DLC, COMMON DESTINATIONS)

The vehicle engine ECU uses the ISO14230 (Euro-OBD) protocol.

As regards the position, connector shape and pin arrangement, the DLC is in accordance with the ISO 15031-3 (SAEJ1962) and has complied with the ISO14230 format.

The OBD II serial data line (K line of ISO14230) is used for the OBD II generic scan tool or the DS-21 diagnosis tester in order to communicate with the ECU.

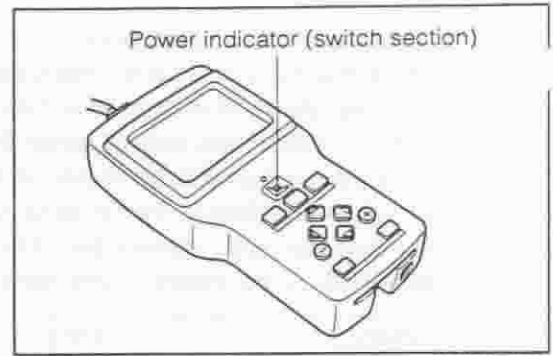
Terminal No.	Connection/voltage or resistance	Condition
7	Bus ϕ line/pulse generation	During transmission
4	Chassis ground/ \leftrightarrow Body ground 10 Ω or less	Always
16	Battery positive/ \leftrightarrow Body ground 9 - 14 V	Always



JEF00089-00052

NOTE:

- With the cable of the DS-21 diagnosis tester connected to the DLC through the SST, turn ON the ignition switch. If the power indicator of the tester will not go on, conduct the following checks and repair any malfunctioning parts.
SST: 09991-87404-000



JEF0090-00053

Connect the DS-21 diagnosis tester to another vehicle. Turn ON the ignition switch.

When Power indicator of DS-21 diagnosis tester goes on:	Malfunction on vehicle side Check DLC, +B and earth <ul style="list-style-type: none"> • Voltage check of BAT terminal • Continuity check between terminal E and body
When Power indicator of DS-21 diagnosis tester will not go on:	Malfunction of DS-21 diagnosis tester proper

JEF0091-00006

5.2 HOW TO PROCEED WITH TROUBLE-SHOOTING

The engine control system is equipped with diagnosis functions which are capable of diagnosing malfunctioning sections. These functions give important clues in trouble-shooting. The flow chart on the next page shows how to proceed with trouble-shooting by using these diagnosis functions.

The flow chart shows how the diagnostic trouble code check can be used effectively. Moreover, when its results are fully reviewed, you can determine whether you are going to do the trouble-shooting according to diagnosis trouble codes or the trouble-shooting according to malfunctioning phenomena.

The diagnosis of this system is equipped with a battery back-up function (a function which supplies power for diagnosis memory even if the ignition switch is turned OFF.)

NOTE:

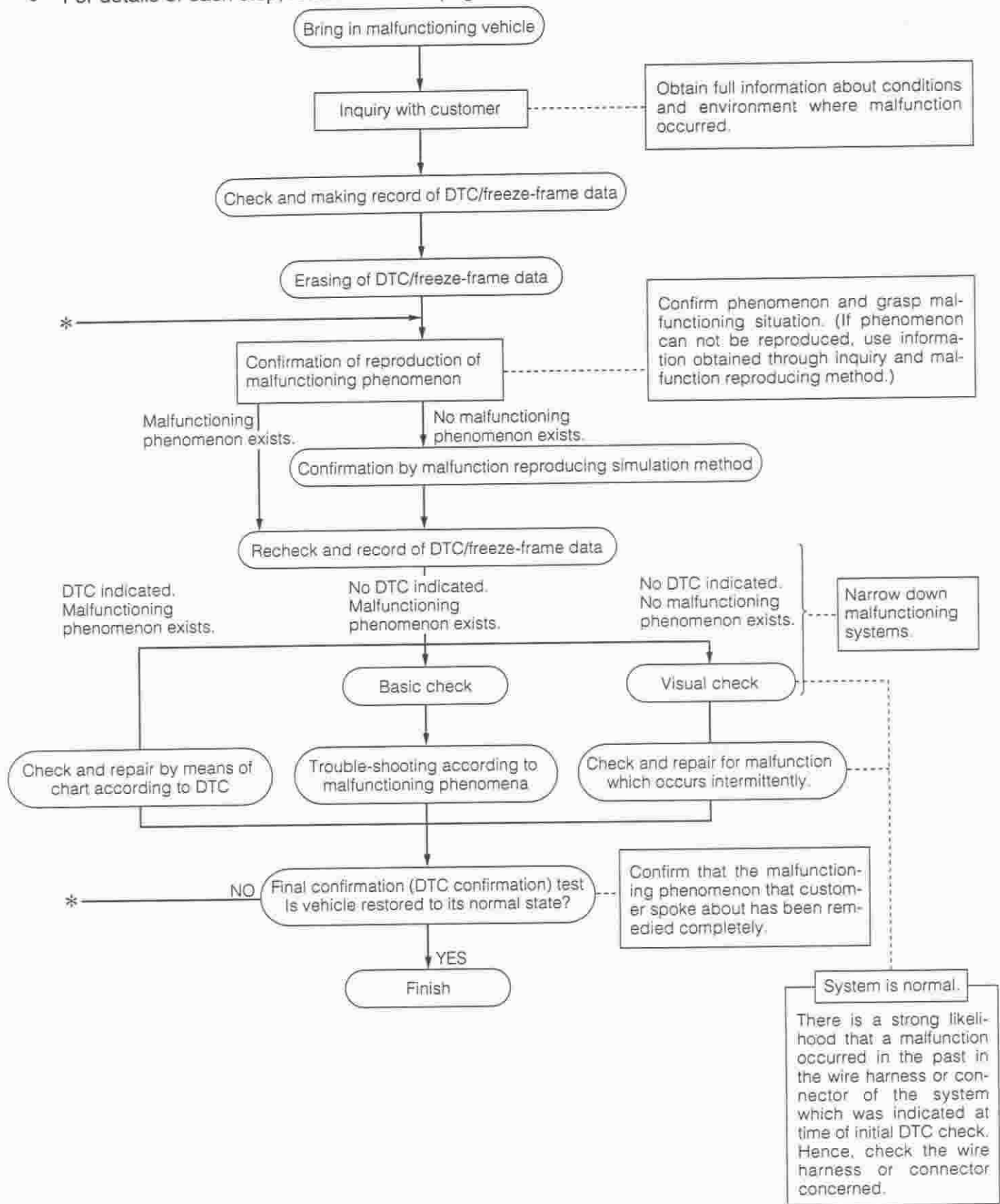
- When no DS-21 diagnosis tester or OBD-II generic scan tool is used, the DTC or freeze-frame data in the flow chart can not be read out.

JEF0092-00000

5.2.1 ENGINE DIAGNOSIS FLOW CHART

NOTE:

- For details of each step, refer to the next page.



JEF00093-00000

5.2.2 INQUIRY WITH CUSTOMER

In your attempt to remove the causes for a malfunction of the vehicle, you will not be 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. This inquiry will provide you with an important clue in an effort to reproduce the malfunctioning phenomenon.

Furthermore, the information obtained by the inquiry can be referred to during the trouble-shooting. Hence, instead of making general questions, it is necessary to focus your questions on the items related to the malfunction.

The following five main points of the inquiry given below are the most important points in analyzing the malfunction. In some cases, the information about malfunctions which took place in the past and about the history of previous repairs, which seem to have nothing to do with the current malfunction, may prove to be helpful in solving the malfunction. Hence, it is important to obtain as much information as possible and keep them accurately in mind as reference information when trouble-shooting the malfunctioning phenomenon.

Main points in analysis of malfunction told by customer

- What? Vehicle model, name of system
- When? Date, time, frequency of occurrence
- Where? Condition of road
- Under what conditions? ... Running conditions, driving conditions, weather conditions
- What happened? How customer felt about malfunctioning phenomenon

JEF00094-00000

5.2.3 CHECK, RECORD AND ERASING OF DTC/FREEZE-FRAME DATA

When the DTC of the diagnosis is indicated, it is necessary to confirm whether that a system malfunction took place in the past or is still taking place, and confirm how the malfunction is related with the reproduced malfunction. To confirm this, you have to indicate the DTC/freeze-frame data twice. That is to say you indicate the DTC/freeze-frame data, erase the data, and confirm the malfunctioning phenomenon. Then, you indicate the DTC/freeze-frame data again.

Please check the DTC's (including unidentified DTC's) by referring to the "DTC checking procedure" section. When any DTC's are indicated, print or write down the DTC and freeze-frame data. Then, erase them by referring to the "DTC erasing procedure." If you fail to erase the DTC at this time, you may make a wrong diagnosis, conclude that the normal circuit is malfunctioning, or face difficulty in trouble-shooting.

JEF00095-00000

5.2.4 CONFIRMATION OF REPRODUCTION OF MALFUNCTIONING PHENOMENA

In the course of trouble-shooting, the operator can not pinpoint the cause for the malfunction unless he confirms the phenomenon. For this purpose, it is indispensable to reproduce the malfunctioning phenomenon by creating conditions and environments that are similar to those where the malfunction occurred, based on the information obtained through the inquiry with the customer.

As for phenomena which can not be reproduced easily, it is necessary to produce running conditions that are similar to those when the malfunction occurred (road surface condition, weather condition, driving condition). For this end, it is of great importance to try to reproduce the malfunction persistently by applying external factors, such as vibration (moving wire harnesses and relays by hand), heat (applying hot air) and water (applying moisture).

Vibration, heat or moisture can constitute causes for malfunction that are difficult to reproduce. Therefore, with the vehicle in a stationary state, you can perform the following malfunction reproduction simulation tests given below.

Moreover, if you presume a section (part) which can cause a malfunction and connect a tester, etc. to that section so as to confirm the malfunctioning phenomenon, you can also achieve a function evaluation of that section (part).

JEF00096-00000

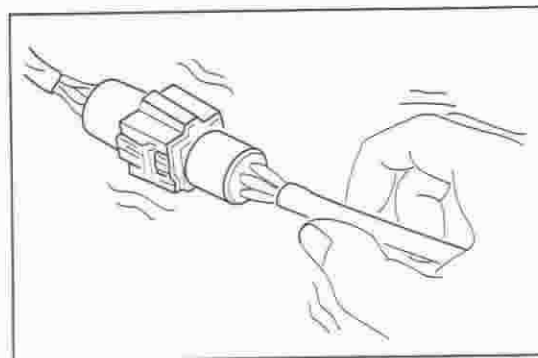
MALFUNCTION REPRODUCTION SIMULATION TEST METHODS

1. Vibration method:

When vibration is thought to be the main cause

(1) Connector

Lightly shake the connector vertically and laterally.

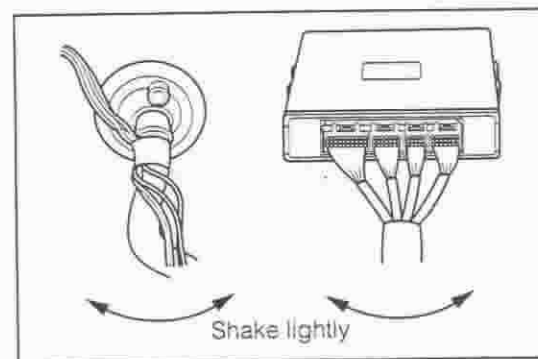


JEF00097-00054

(2) Wire harness

Lightly shake the wire harness vertically and laterally.

The points to be checked are connector joints, the vibrating point and the section where the wire harness is passing through the body.



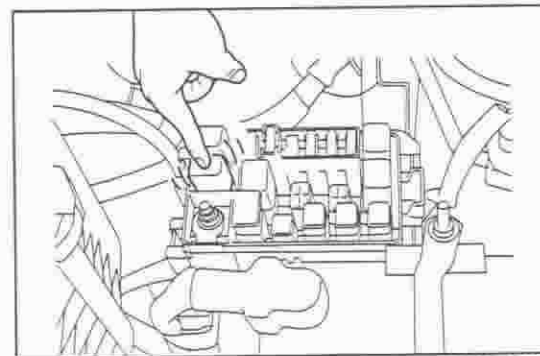
JEF00098-00055

(3) Parts, sensors

With your finger, apply light vibrations to a part of the sensor which is presumed to be the cause for the malfunction. Check to see if the malfunction is reproduced.

NOTE:

- Be careful not to apply too strong vibration to a relay, for it can cause an open wire in the relay.



JEF00099-00056

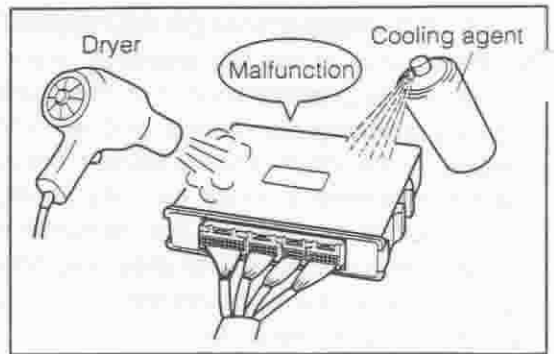
2. Cool/hot method:

When a suspected section is likely causing the malfunction when it is cold or hot

Heat a component which is presumed to be causing the malfunction by using a dryer or the like. Check to see if the malfunction occurs.

CAUTION:

- Do not heat the section beyond 60°C. (Temperature limit to assure that no damage be made to the component.)
- Do not directly heat the parts inside the ECU.



JEF00100-00057

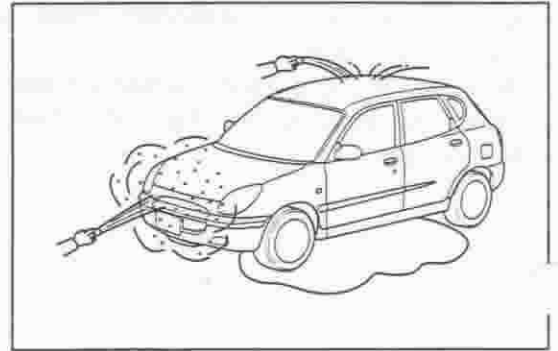
3. Water applying method:

When the malfunction is believed to occur on rainy days or under humid conditions

Apply water to the vehicle. Check to see if the malfunction occurs.

NOTE:

- Never apply water directly to the engine compartment. By applying water to the front of the radiator, you can indirectly change the temperature and humidity.
- Never apply water directly to the electronic parts.
- If rain leaks into the vehicle compartment, rain may get into the inside of the ECU through the wire harnesses. If the vehicle has experienced any rain leakage before, utmost attention must be paid in respect to this point.

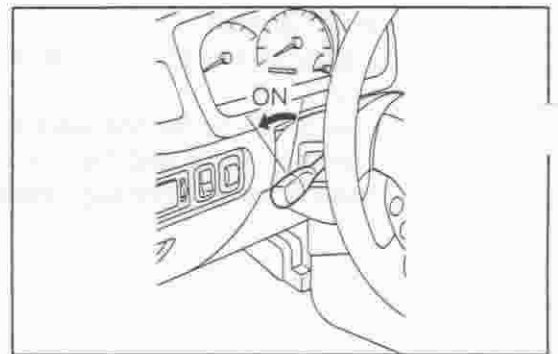


JEF00101-00058

4. Others:

When the malfunction is believed to occur when a heavy electric load is applied

Turn ON all electric loads, including the heater blower, headlights, rear window defogger, etc. Check to see if the malfunction occurs.



JEF00102-00059

5.2.5 RECHECK AND MAKING RECORD OF DTC/FREEZE-FRAME DATA

By checking the DTC/freeze-frame data after confirming the reproduction of the malfunctioning phenomenon, it is possible to judge whether the system related to the DTC that was indicated before confirmation of the reproduction is now functioning properly or not. Then, you are to proceed to one of the following three steps.

1. When a DTC was indicated at the time of checking the DTC and the same DTC is indicated after the confirmation of reproduction of the malfunction, it indicates that the malfunction is still persisting in the diagnosis circuit. Proceed to the trouble-shooting according codes.
2. 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 trouble-shooting according to malfunctioning phenomena.
3. 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 related to the DTC that was indicated before the confirmation of reproduction of the malfunctioning phenomenon.

JEF00103-00000

5.2.6 BASIC CHECK

It is possible to narrow down the malfunctioning sections by performing the basic engine check, following the "basic engine check flow chart."

JEF00104-00000

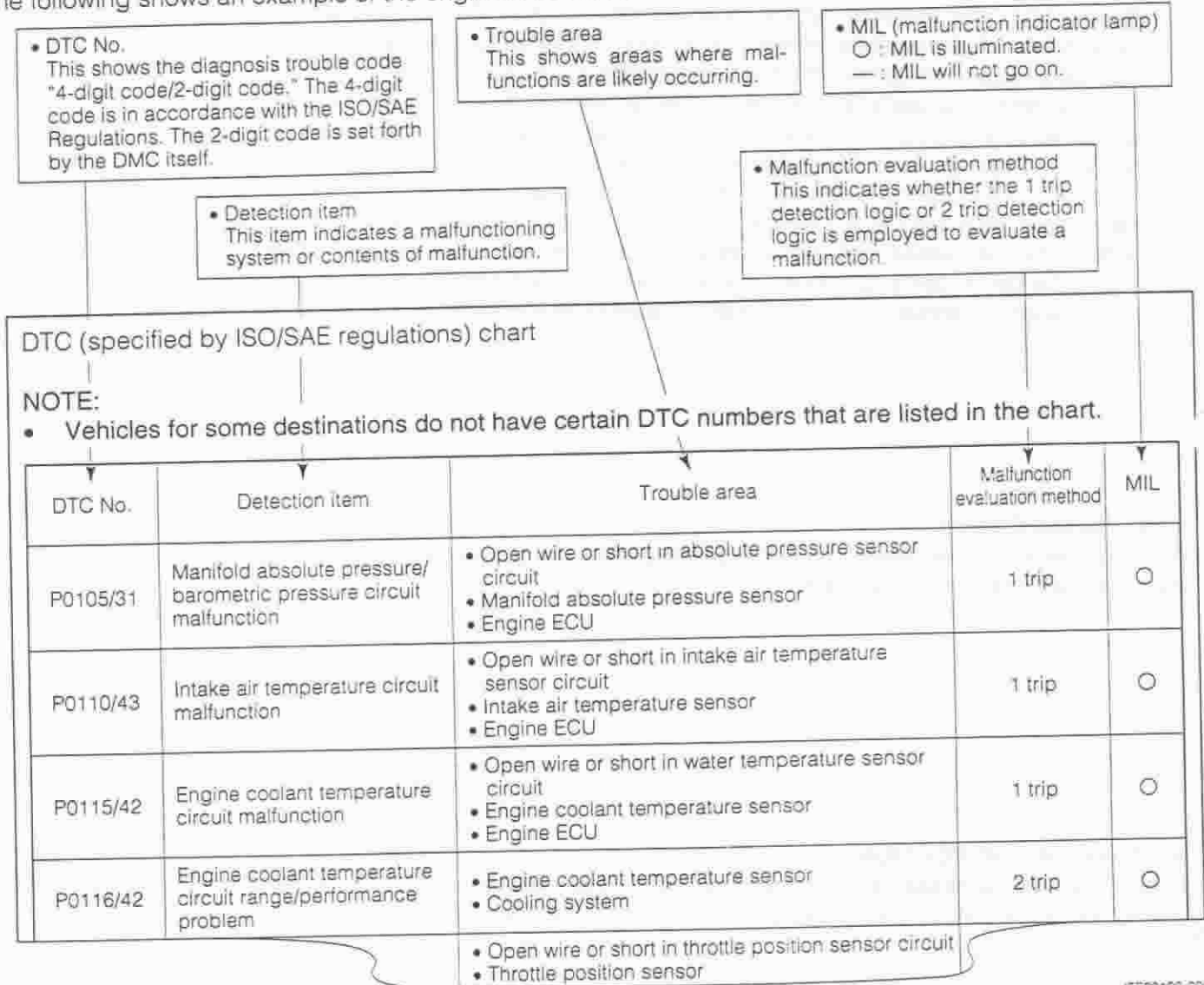
5.2.7 VISUAL INSPECTION

Check the wire harnesses and connectors of the systems that were indicated at the initial DTC check, following the procedure of the "visual and contact pressure checks."

JEF00105-00000

5.2.8 CHECK AND REPAIR BY CHART ACCORDING TO DTC'S

The following table shows the checking procedure. You can perform efficient and accurate trouble-shooting by utilizing the DTC indicated at the time of rechecking the DTC. Perform the trouble-shooting by following the checking procedure shown in the flow corresponding to each DTC. The following shows an example of the engine DTC chart.



JEF00106-00061

5.2.9 CHECK AND REPAIR BY MATRIX TABLE FOR TROUBLESHOOTING ACCORDING TO MALFUNCTIONING PHENOMENA

This table can be used when trouble-shooting a malfunction which persists although the normal code is indicated at time of the DTC recheck. However, before performing trouble-shooting, carry out the basic check to narrow down possible causes for the malfunction. For example, if the spark check of the basic check proves that there is no problem, it can be presumed that the ignition system is normal. Also, you can narrow down further possible causes based on the information obtained through inquiry to the customer.

NOTE:

- If any malfunction can not be detected by the diagnosis system although the malfunctioning phenomenon exists, that malfunction is not covered by the detection range of the diagnosis system or the malfunction exists in a system other than the diagnosis-related systems.

JEF00107-00000

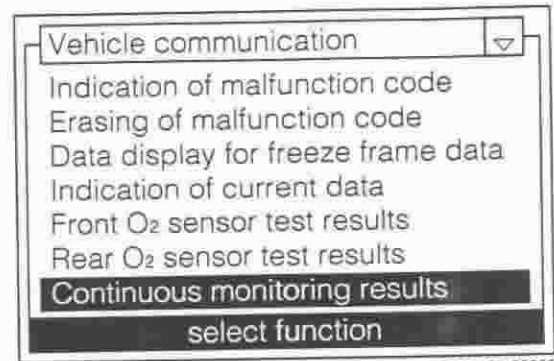
5.2.10 CHECK OF MALFUNCTIONS WHICH OCCUR INTERMITTENTLY

Check parts where malfunctions occur intermittently, such as wire harnesses and connectors, by following the section "Check of malfunctions which occur intermittently and poor contacts." At that time, focus checks on the circuits related to the systems of the DTC's that were indicated at the time of initial DTC check.

JEF00108-00000

5.2.11 FINAL CONFIRMATION TEST

Confirm that the malfunctioning phenomenon pinpointed by the customer has been completely eliminated. If the remedied parts are related to the DTC, erase the DTC once and carry out the DTC confirmation test. Ensure that no DTC is indicated. At this time, for improved efficiency of operations, use the "continuous monitoring results" function. (In the case of the DS-21 diagnosis tester, select the "Continuous monitoring results" of the vehicle communication in CARB mode.)



JEF00109-00062

5.3 INQUIRY SHEET

If you make an inquiry sheet in advance, as shown in the example below, you can completely make all necessary inquiries.

The following shows a standard form. This should be altered according to the characteristic of conditions of each market.

[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	<ul style="list-style-type: none"> No initial explosion takes place. Hard starting (cold engine, hot engine, always) Other () 		<ul style="list-style-type: none"> Explosion is incomplete although initial explosion takes place. No cranking takes place. 	
	Faulty idling	<ul style="list-style-type: none"> Fast idling ineffective Idling speed too high Other () 		<ul style="list-style-type: none"> Idling speed too low Idling unstable (cold engine, hot engine, always) 	
	Poor drive-ability	<ul style="list-style-type: none"> Hesitation (during start, during acceleration, during deceleration, during a certain period) Backfire Other () 		<ul style="list-style-type: none"> Lack of power Poor acceleration Poor blow 	
	Engine stall	<ul style="list-style-type: none"> During idling (during warming up, after warming up) Immediately after vehicle stops (Re-start possible, Re-start impossible) Other () 		<ul style="list-style-type: none"> At time of starting Under loaded state (Air conditioner, electric load, power steering) During running () 	
From when malfunction has started?		<ul style="list-style-type: none"> Since vehicle was purchased as a new car Recently (since what year/ month) 			
Frequency of occurrence		<ul style="list-style-type: none"> At all times Under a certain condition () Sometimes 			
Meteorological conditions	Weather	<ul style="list-style-type: none"> At all times Fine Cloudy Rain Snow Other () 			
	Temperature	<ul style="list-style-type: none"> Temperature (about °C) (Spring, summer, autumn, winter) 			
Engine condition		<ul style="list-style-type: none"> When cold After warming-up During warming-up (Water temperature about °C) 			
Road		<ul style="list-style-type: none"> Urban district Suburb Highway Mountainous road (Uphill, downhill) 			
Driving conditions		<ul style="list-style-type: none"> 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)		<ul style="list-style-type: none"> Illuminated or flashing at all times Illuminated or flashing sometimes Will not go on. 			
Indication of DTC <ul style="list-style-type: none"> Reading out by using OBD II generic scan tool or DS-21 diagnosis tester Reading-out of MIL flashing pattern by shorting terminal T 		During checking	<ul style="list-style-type: none"> Normal Malfunction code () 		
		2nd time	<ul style="list-style-type: none"> Normal Malfunction code () 		

JEF00110-00563

5.4 DTC CHART SPECIFICATIONS FOR M101 AND J102

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 DTC chart for each code.

JEF00111-00000

5.4.1 DTC CHART SPECIFICATIONS

1. Codes specified by ISO/SAE

DTC No.	Detection item	Trouble area	Malfunction evaluation method	MIL
P0105/31	Manifold absolute pressure/ barometric pressure circuit malfunction	<ul style="list-style-type: none"> • Open wire or short in manifold absolute pressure sensor circuit • Manifold absolute pressure sensor • Engine ECU 	1 trip	○
P0110/43	Intake air temp. circuit malfunction	<ul style="list-style-type: none"> • Open wire or short in intake air temp. sensor circuit • Intake air temp. sensor • Engine ECU 	1 trip	○
P0115/42	Engine coolant temp. circuit malfunction	<ul style="list-style-type: none"> • Open wire or short in water temp. sensor circuit • Engine coolant temperature sensor • Engine ECU 	1 trip	○
P0116/42*1	Engine coolant temp. circuit range/performance problem	<ul style="list-style-type: none"> • Engine coolant temp. sensor • Cooling system 	2 trip	○
P0120/41	Throttle/pedal position sensor/switch "A" circuit malfunction	<ul style="list-style-type: none"> • Open wire or short in throttle position sensor circuit • Throttle position sensor • Engine ECU 	1 trip	○
P0130/21	Oxygen sensor circuit malfunction (Bank 1 sensor 1)	<ul style="list-style-type: none"> • Air induction system • Fuel pressure • Injector injection • Open wire or short in heated oxygen sensor circuit • Heated oxygen sensor 	2 trip	○
P0133/21*1	Oxygen sensor circuit slow response (Bank 1 sensor 1)	<ul style="list-style-type: none"> • Air induction system • Fuel pressure • Injector injection • Open wire or short in heated oxygen sensor circuit • Heated oxygen sensor • Engine ECU 	2 trip	○
P0135/23*1	Oxygen sensor heater circuit malfunction (Bank 1 sensor 1)	<ul style="list-style-type: none"> • Open wire or short in heater circuit of oxygen sensor • Oxygen sensor heater • Engine ECU 	2 trip	○
P0136/22*1	Oxygen sensor circuit malfunction (Bank 1 sensor 2)	<ul style="list-style-type: none"> • Open wire or short in heater circuit of oxygen sensor • Oxygen sensor • Engine ECU 	2 trip	○
P0141/24*1	Oxygen sensor heater circuit malfunction (Bank 1 sensor 2)	• Same as DTC No. P0135/23	2 trip	○
P0171/25	Fuel trim system too lean (Air-fuel ratio lean malfunction, bank 1)	<ul style="list-style-type: none"> • Air intake (hose loose) • Fuel line pressure • Injector blockage or leakage • Open wire or short in oxygen sensor circuit • Oxygen sensor 	2 trip	○
P0172/26	Fuel trim system too rich (Air-fuel ratio rich malfunction, bank 1)	<ul style="list-style-type: none"> • Manifold absolute pressure sensor • Engine coolant temperature sensor • Gas leakage on exhaust system • Purge VSV for EVAP • Engine ECU 	2 trip	○

DTC No.	Detection item	Trouble area	Malfunction evaluation method	MIL
P0300/17*1	Random/multiple cylinder misfire detected	<ul style="list-style-type: none"> • Ignition system • Injector • Fuel pressure • Compression pressure • Valve clearance • Valve timing • Ion current sensor • Engine coolant temperature sensor • Open wire or short in engine wire • Connector connection • Manifold absolute pressure sensor • Engine ECU 	2 trip	MIL flashing during misfire detection ○
P0301/17*1 P0302/17*1 P0303/17*1 P0304/17*1	Misfire detected -Cylinder 1 -Cylinder 2 -Cylinder 3 -Cylinder 4			
P0314/—*1	Single cylinder misfire (Cylinder not specified) (EU regulation)			
P0325/18*4	Knock sensor 1 circuit malfunction			
P0335/13	Crankshaft position sensor "A" circuit malfunction	<ul style="list-style-type: none"> • Open wire or short in crank angle sensor circuit • Crank angle sensor • Signal rotor • Engine ECU 	1 trip	○
P0340/14	Camshaft position sensor circuit malfunction	<ul style="list-style-type: none"> • Open wire or short in cam angle sensor circuit • Cam angle sensor • Engine ECU 	1 trip	○
P0420/27*1	Catalyst system efficiency below threshold	<ul style="list-style-type: none"> • Three-way catalytic converter • Open wire or short in (heated) oxygen sensor circuit • (Heated) oxygen sensor 	2 trip	○
P0443/76	Evaporative emission control system purge control valve circuit malfunction	<ul style="list-style-type: none"> • Open wire or short in VSV circuit for EVAP • VSV for EVAP • Engine ECU 	2 trip	○
P0500/52*6	Vehicle speed sensor malfunction	<ul style="list-style-type: none"> • Open wire or short in vehicle speed sensor circuit • Combination meter • Vehicle speed sensor • Engine ECU 	2 trip	○
P0500/52	Vehicle speed sensor malfunction	<ul style="list-style-type: none"> • Combination meter • Open wire or short in signal line from A/T ECU or ABS ECU or vehicle speed sensor • Engine ECU or A/T ECU or ABS ECU • Vehicle speed sensor 	2 trip	○
P0505/71	Idle control system malfunction	<ul style="list-style-type: none"> • Open wire or short in ISC valve circuit • Engine ECU 	1 trip	○
P0710/38*3	Transmission fluid temperature sensor circuit malfunction	Refer to the AT section	1 trip	○
P0711/38*3	Transmission fluid temperature sensor circuit range/performance		2 trip	○
P0715/37*3	Turbine speed sensor circuit malfunction		1 trip	○
P0720/42*3	Output speed sensor circuit malfunction		2 trip	○
P0725/86*3	Engine speed input circuit malfunction		2 trip	○
P0753/61*5	Solenoid No. 1		1 trip	○
P0758/62*3	Solenoid No. 2		1 trip	○
P0763/63*3	Solenoid No. 3		1 trip	○
P0768/64*3	Duty solenoid		1 trip	○
P0773/65*3	Lock up solenoid circuit malfunction		1 trip	○

2. Codes specified by DMC

DTC No.	Detection item	Trouble area	Malfunction evaluation method	MIL
P1105/32*1	Barometric pressure sensor circuit malfunction	<ul style="list-style-type: none"> • Engine ECU 	1 trip	—
P1130/29*5	A/F adjuster circuit malfunction	<ul style="list-style-type: none"> • Open wire or short in A/F adjuster circuit malfunction • A/F adjuster • Engine ECU 	1 trip	—
P1300/36*1	Ign system malfunction	<ul style="list-style-type: none"> • Open wire or short in Ign system circuit • Ignitor unit • Ignition coil (All cylinders) • Spark plug (All cylinders) • Engine ECU 	2 trip	○
P1346/75	VVT sensor circuit range/performance problem	<ul style="list-style-type: none"> • Mechanical system (Skipping teeth of timing chain, wrong installation of timing chain and chain tensioner) • Engine ECU 	2 trip	○
P1349/73	VVT system malfunction	<ul style="list-style-type: none"> • Valve timing • OCV • VVT controller assembly • Engine ECU 	2 trip	○
P1510/54	Starter signal circuit malfunction	<ul style="list-style-type: none"> • Open wire in starter signal circuit • Engine ECU 	2 trip	○
P1520/51	Switch signal circuit malfunction	<ul style="list-style-type: none"> • Open wire or short in A/C switch circuit • A/C switch • Open wire or short in linear throttle sensor circuit • Linear throttle sensor • Open wire or short in neutral start switch circuit • Neutral start switch 	1 trip	—
P1530/44	A/C evaporator temp. sensor circuit malfunction	<ul style="list-style-type: none"> • Open wire or short in A/C evaporator temp. sensor circuit • A/C evaporator temp. sensor • Engine ECU 	1 trip	—
P1560/61	ECU back up power source circuit malfunction	<ul style="list-style-type: none"> • Open wire in back up power source circuit • Engine ECU 	1 trip	○
P1600/83*2	Immobilizer signal malfunction	<ul style="list-style-type: none"> • Engine ECU 	1 trip	—
P1601/81*2	Immobilizer signal circuit malfunction	<ul style="list-style-type: none"> • Open wire or short in immobilizer signal circuit • Immobilizer ECU • Engine ECU 	1 trip	—
P1602/82*3	Serial communication problem between EFI ECU and A/T ECU	<ul style="list-style-type: none"> • Open wire or short in serial communication circuit • A/T ECU • Engine ECU 	1 trip	○
P1656/74	OCV circuit malfunction	<ul style="list-style-type: none"> • Open wire or short in OCV circuit • OCV • Engine ECU 	1 trip	○
P1703/72*3	Lock-up clutch status malfunction	Refer to AT section	2 trip	○
P1780/66*3	Switch solenoid		1 trip	○

NOTE:

- MIL Malfunction indicator lamp.
However, in the case of A/T vehicles of M101, the 2-digit codes of DTC No. can be read out through the flashing pattern of the D range lamp.
In the other hand, in case of A/T vehicles of J102, the 2-digit codes of DTC No. can be read out through the flashing pattern of the O/D OFF lamp.
- When the "O" mark is shown in the MIL column, the lamp will go on for that DTC No., but when the "—" mark is shown, the lamp will not go on for that DTC No. However, the data other than the switch signal system (P1520/51) are memorized in the backup memory. Therefore, it is possible to read out the DTC No. by using the diagnosis tester DS-21.
- DTC No. with *1 mark Only for European specifications
But, only in the case of DTC No. P0314, it is possible to read out this DTC No. by means of the "continuous monitoring results" function of the CARB mode.
- DTC No. with *2 mark Only for vehicles with immobilizer
- DTC No. with *3 mark Only for vehicles with electronically-controlled A/T
- DTC No. with *4 mark Not provided only for European specifications
- DTC No. with *5 mark Only for leaded specifications of J102
- DTC No. with *6 mark Low-grade vehicles of J102 except for A/T vehicle

JEF00115-00*

5.5 FAIL-SAFE FUNCTION FOR M101 AND J102

When any of the following DTC's has been detected, the ECU enters the fail-safe mode in order to make it possible for the vehicle to drive for evacuation and to ensure safety. When the malfunction is remedied to a normal condition, the fail-safe control will be released.

However, the diagnosis results will remain memorized. Hence, it is necessary to determine whether the malfunction still persists or not.

JEF00116-00000

5.5.2 FAIL-SAFE SPECIFICATIONS

DTC No.	Detected Item	Fail-safe operation
P0105/31	When the signal from the intake manifold pressure sensor exhibits an open wire or short circuit	<ul style="list-style-type: none"> The signal from the intake manifold pressure sensor is set to the value determined from the throttle opening angle, engine revolution speed and ISC opening angle. The ignition timing is changed to the control based on the pressure determined from the engine revolution speed and the above value. The fuel will be cut when the throttle opening angle and engine revolution speed exceeds the respective set values.
P0110/43	When the signal from the intake air temperature sensor exhibits an open wire or short circuit	<ul style="list-style-type: none"> The signal from the water temperature sensor is set to a constant value.
P0115/42	When the signal from the engine coolant temperature sensor becomes open or shorted.	<ul style="list-style-type: none"> The signal from the engine coolant temperature sensor becomes a constant value. At this time, the radiator fan is turned on. (Except for EU spec.)
P0120/41	When the signal from the throttle position sensor exhibits an open wire or short circuit	<ul style="list-style-type: none"> The signal from the throttle position sensor is set to a constant value.
P0136/22*1	When an abnormality is encountered in the signal from the rear O ₂ sensor	<ul style="list-style-type: none"> The feedback of the rear O₂ sensor is stopped. The correction coefficient of the feedback of the rear O₂ sensor is set to the value determined from the engine revolution speed and pressure.
P0325/18*3	When the signal from the knock sensor becomes open or shorted.	<ul style="list-style-type: none"> The ignition timing is retarded.
P1105/32*1	When the signal from the atmospheric pressure sensor exhibits an open wire or short circuit	<ul style="list-style-type: none"> The signal from the atmospheric pressure sensor is set to a constant value.
P1300/36*1	When the ion current signal from the ignitor unit becomes open or shorted.	<ul style="list-style-type: none"> The ignition timing is retarded.
P1349/73	When an abnormality is encountered in the valve timing control	<ul style="list-style-type: none"> The learning of the most retard timing is prohibited. The control of air-to-fuel ratio learning is prohibited. The idle speed control is changed.
P1530/44	When the signal from the evaporator temperature sensor exhibits an open wire or short circuit for more than a certain length of time	<ul style="list-style-type: none"> The air conditioner will be cut.
P1600/83*2	When abnormality occurs in writing and reading-out of the rolling codes into/from the E ² PROM during the immobilizer communication	<ul style="list-style-type: none"> The injection and ignition are prohibited. (Only for vehicles with the EU, Israel, AUS and Saudi Arabian specifications)
P1601/81*2	When the rolling codes cannot be exchanged between the EFI ECU and the immobilizer ECU or the rolling codes are not matched	

DTC No.	Detected Item	Fail-safe operation
P1602/82	When the signal from A/T ECU or from the EFI ECU becomes open or shorted.	<ul style="list-style-type: none">• The signal from the A/T ECU or from the EFI ECU becomes a constant value.
P1656/74	When an abnormality is encountered in the control voltage of the oil control valve for more than a certain length of time	<ul style="list-style-type: none">• The continuity control of the oil control valve is prohibited.

NOTE:

- DTC No. with *1 mark Only for vehicles with European specifications
- DTC No. with *2 mark Only for vehicles equipped with immobilizer
- DTC No. with *3 mark Except for vehicles with European specifications

JEF00118-00003