This file is available for free download at http://www.iluvmyrx7.com

This file was not scanned to deprive Mazda of any money – it was scanned due to the rareness of the original manuals and the overwhelming need of the RX-7 owner to have this information so that they can accurately troubleshoot problems. Perhaps if Mazda's dealerships could support the Rotary Engine it wouldn't be so necessary for the owners to do so.

Many thanks to Anh Diep for scanning this file.

Before beginning any service procedure, refer to Section S of this manual for air bag system service precautions, and to Section T for audio anti-theft system cautions.

FUEL AND EMISSION CONTROL SYSTEMS

37U0FX-001

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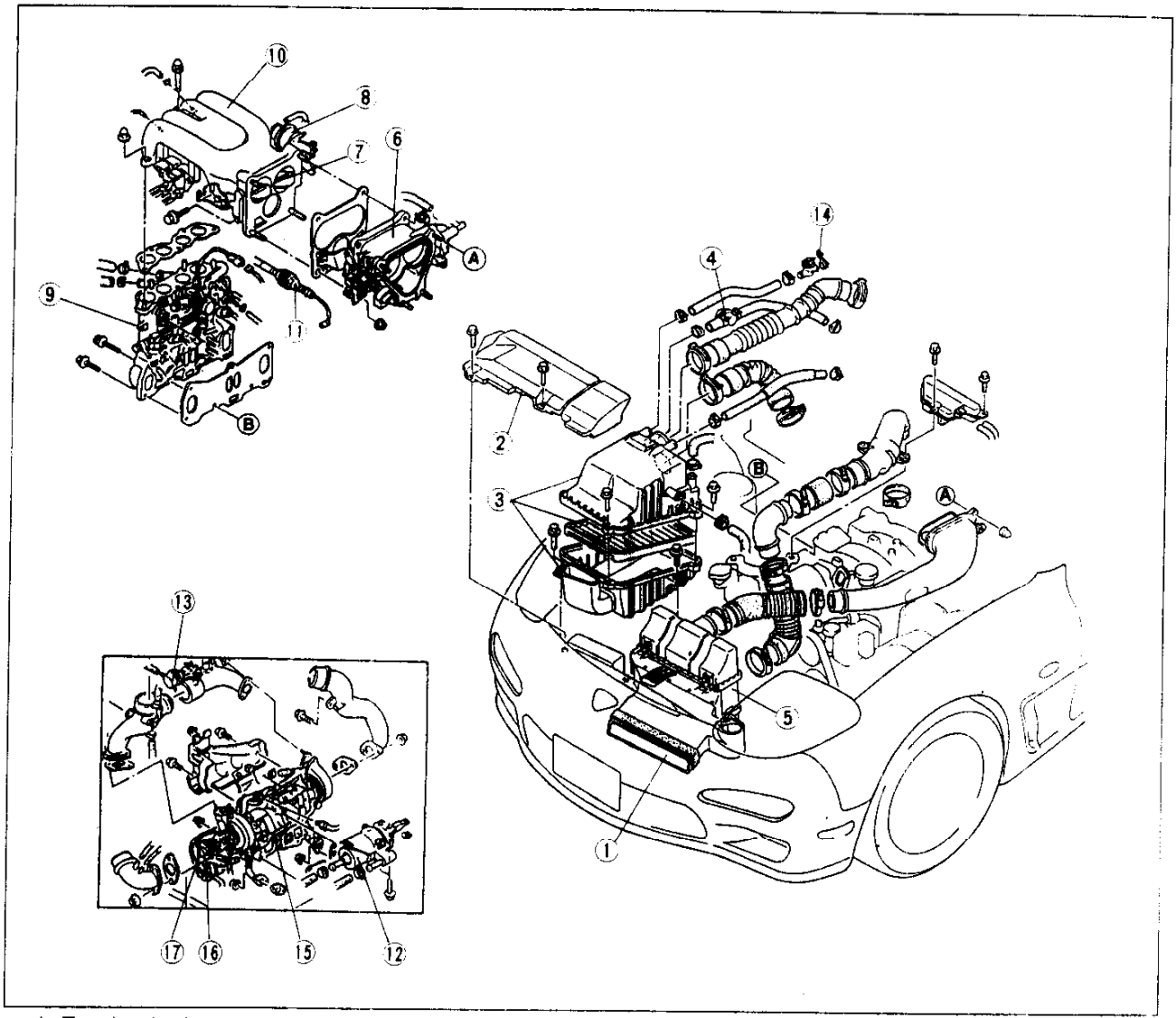

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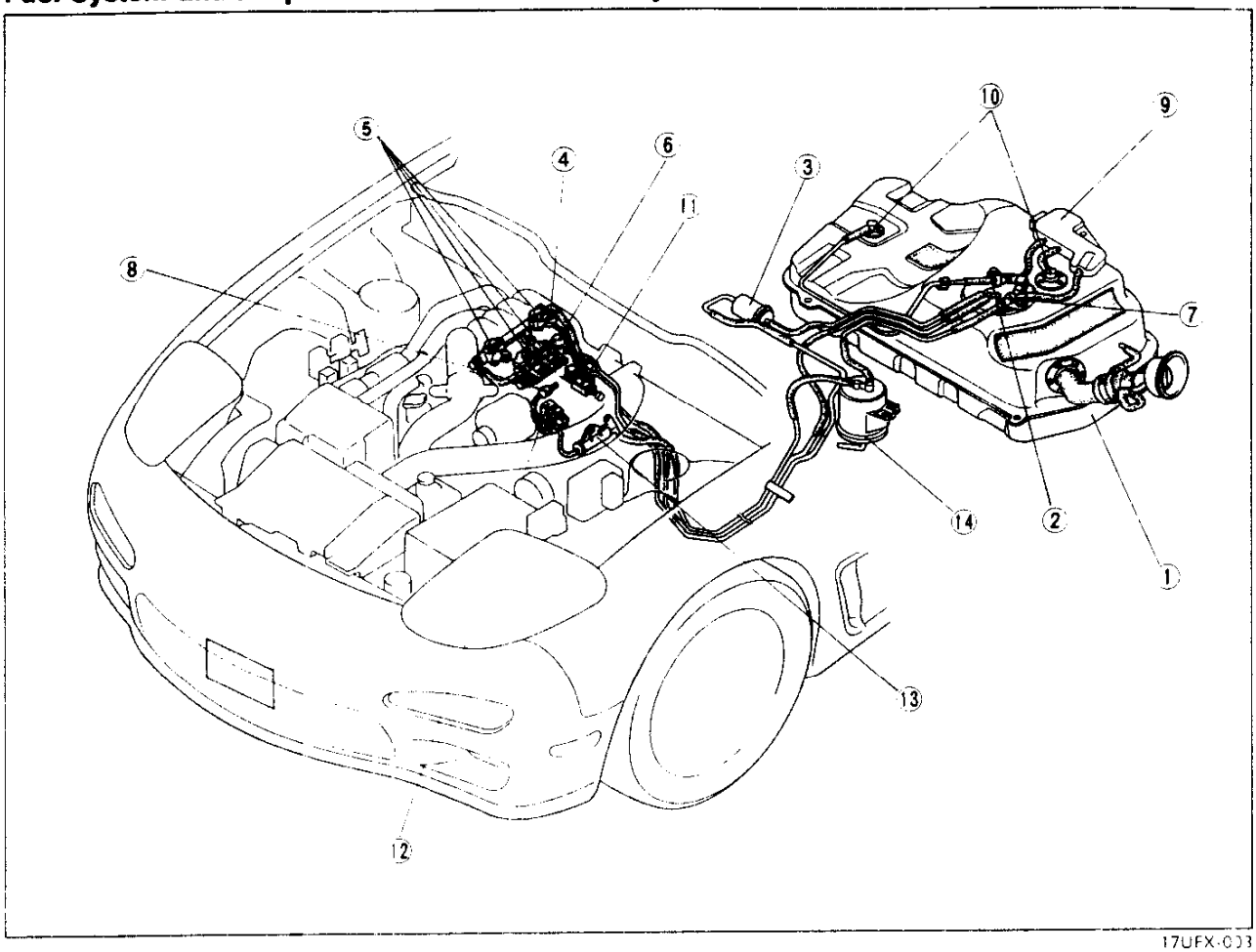
Fuel System and Evapolative Emission Control System.



17UFX-003

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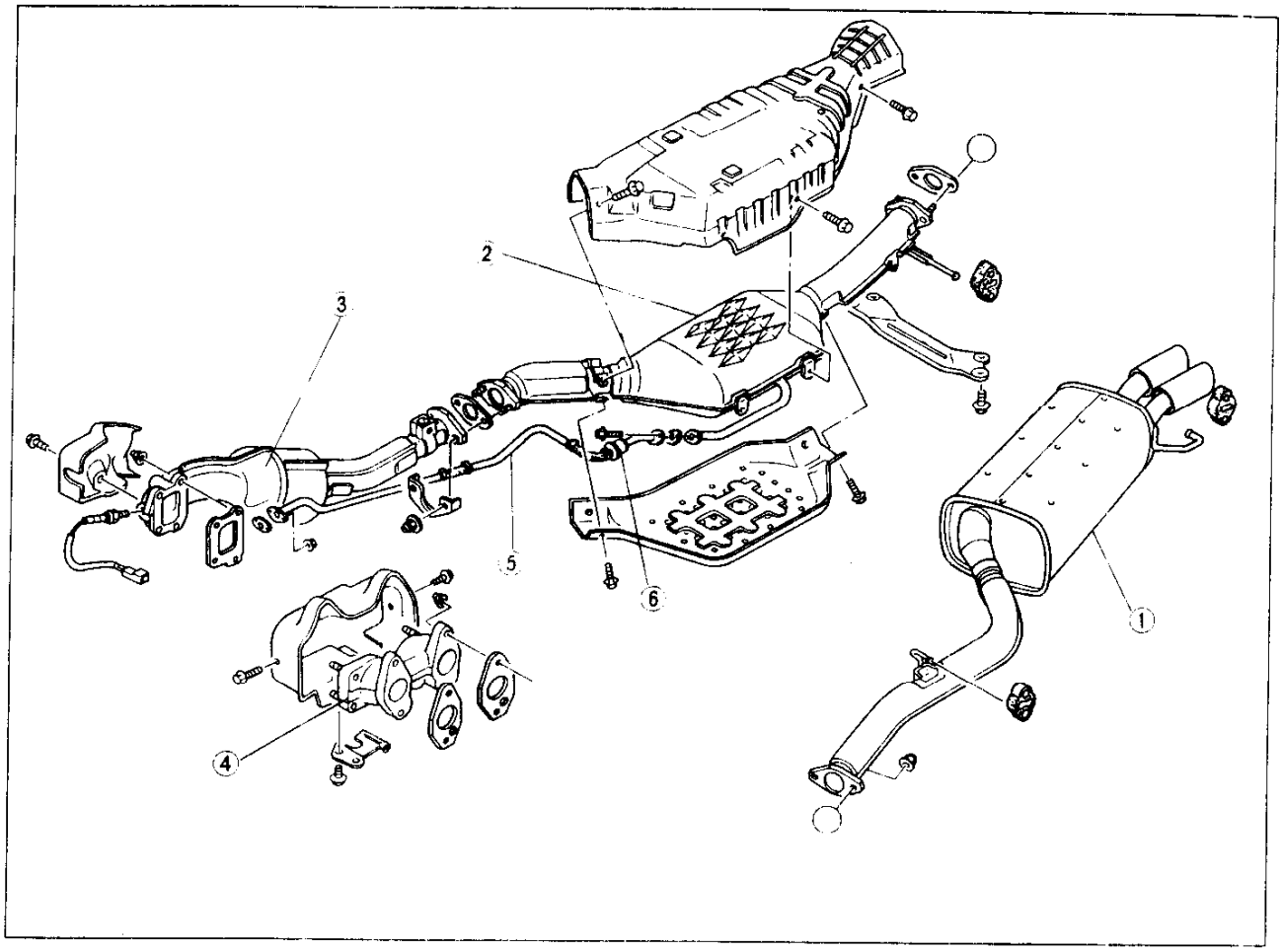

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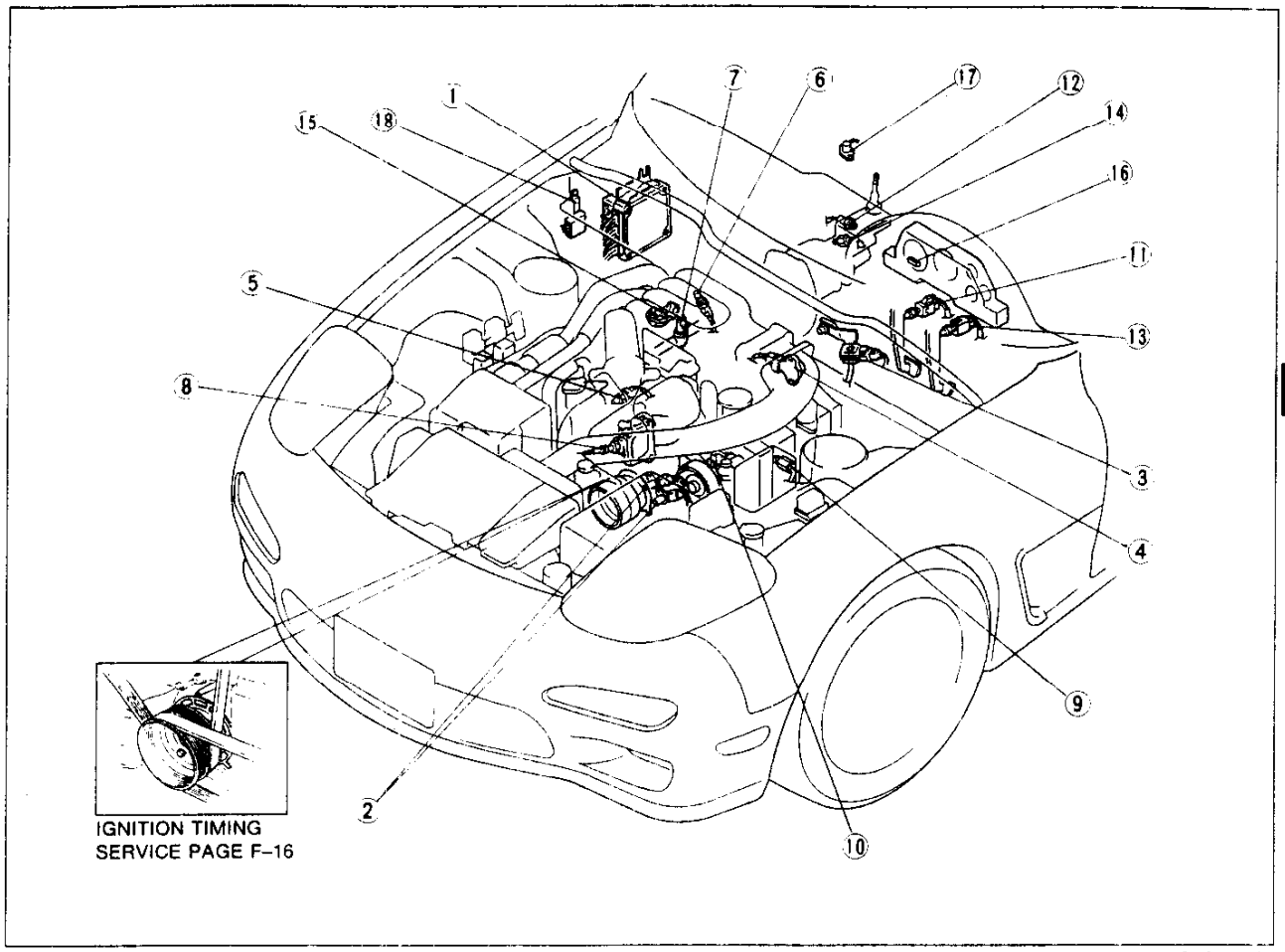
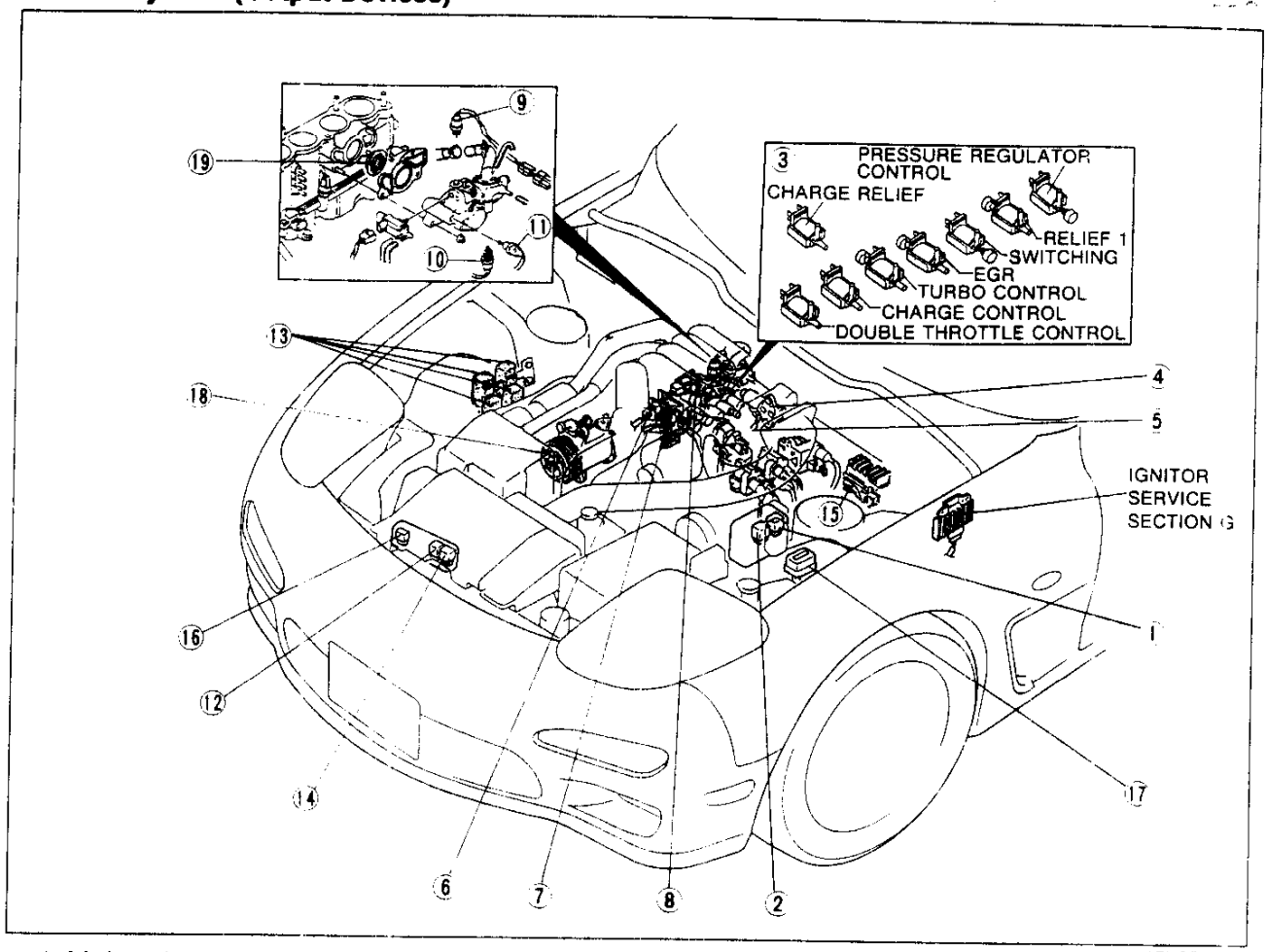


Control System (Output Devices)



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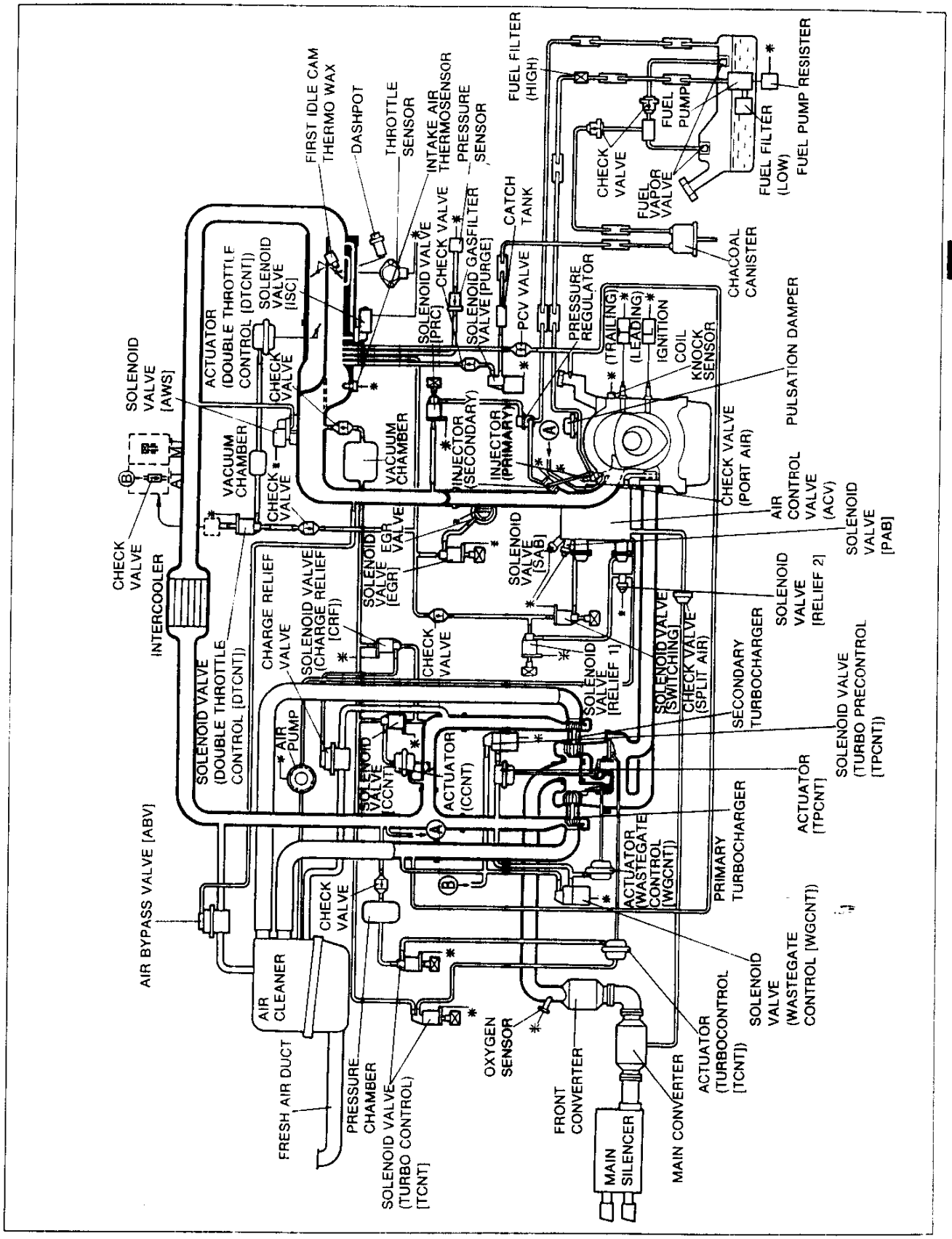
OUTLINE

SYSTEM DIAGRAM



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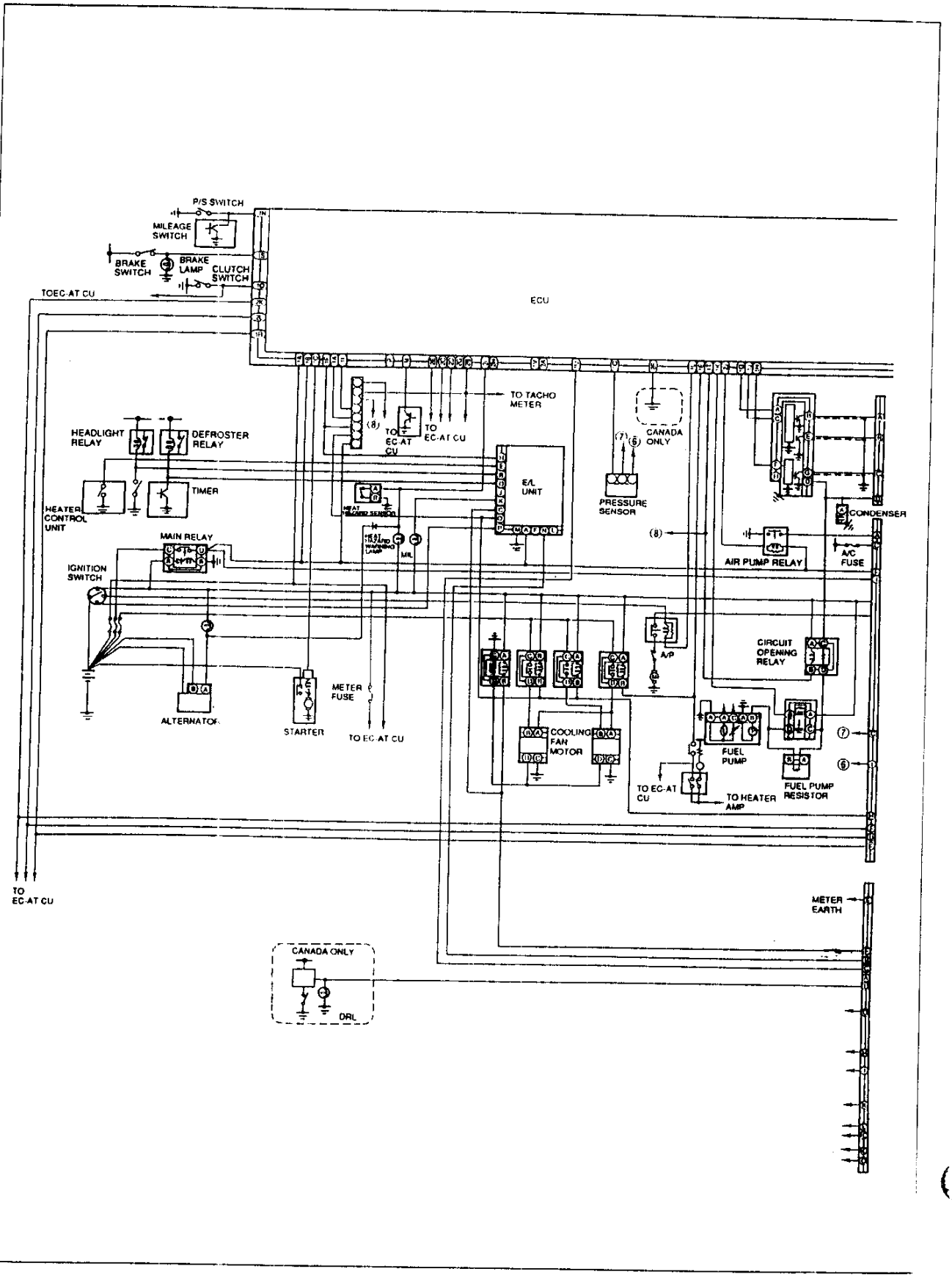
WIRING DIAGRAM



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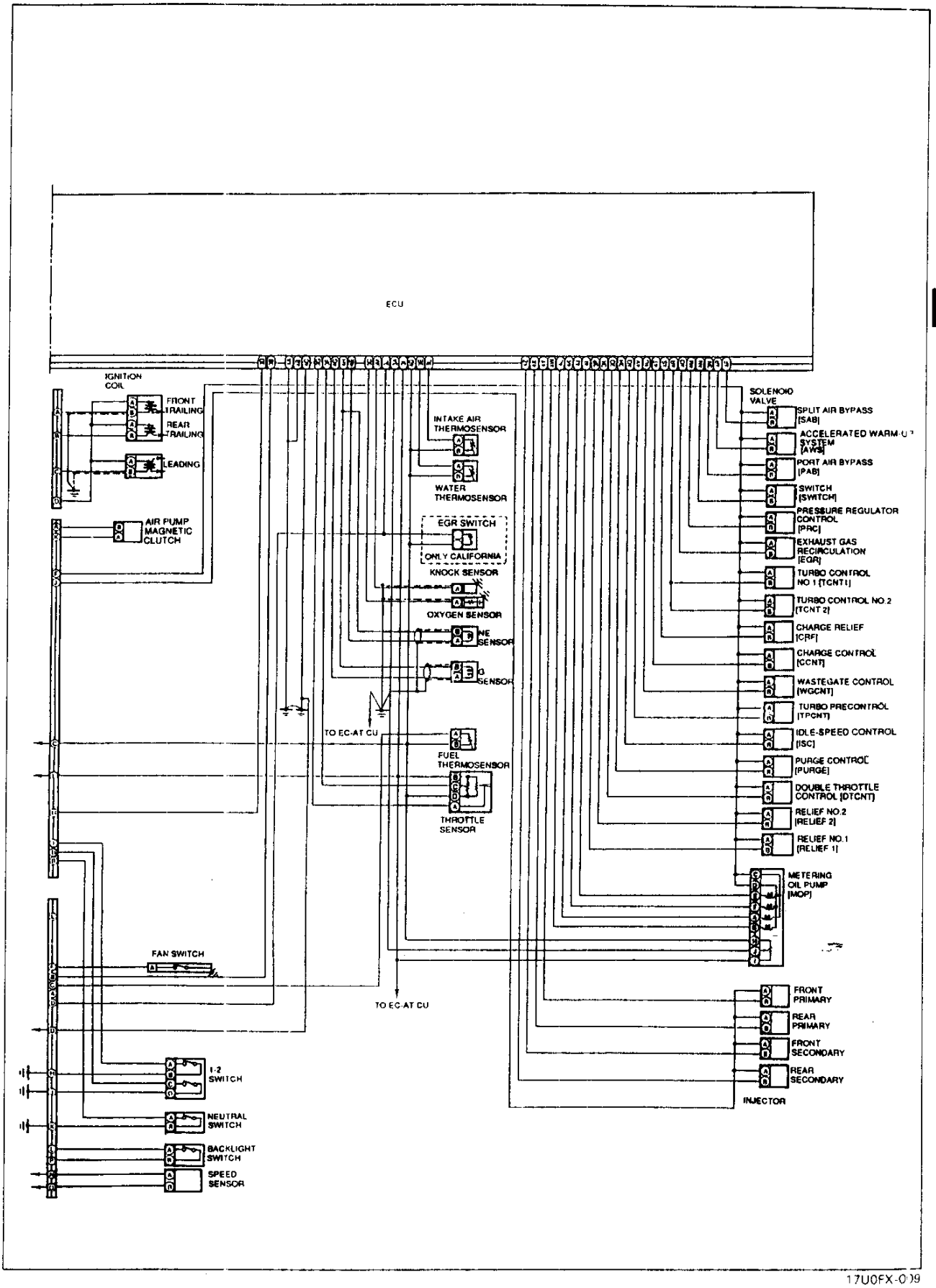
ECU
IGNITION COIL
FRONT TRAILING
REAR TRAILING
LEADING
AIR PUMP MAGNETIC CLUTCH
FAN SWITCH
1-2 SWITCH
NEUTRAL SWITCH
BACKLIGHT SWITCH
SPEED SENSOR
INTAKE AIR THERMOSENSOR
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ONLY CALIFORNIA
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TURBO PRECONTROL [TPCNT]
IDLE-SPEED CONTROL [ISC]
PURGE CONTROL [PURGE]
DOUBLE THROTTLE CONTROL [DTCNT]
RELIEF NO.2 [RELIEF 2]
RELIEF NO.1 [RELIEF 1]
METERING OIL PUMP [MOP]
FRONT PRIMARY
REAR PRIMARY
FRONT SECONDARY
REAR SECONDARY
INJECTOR

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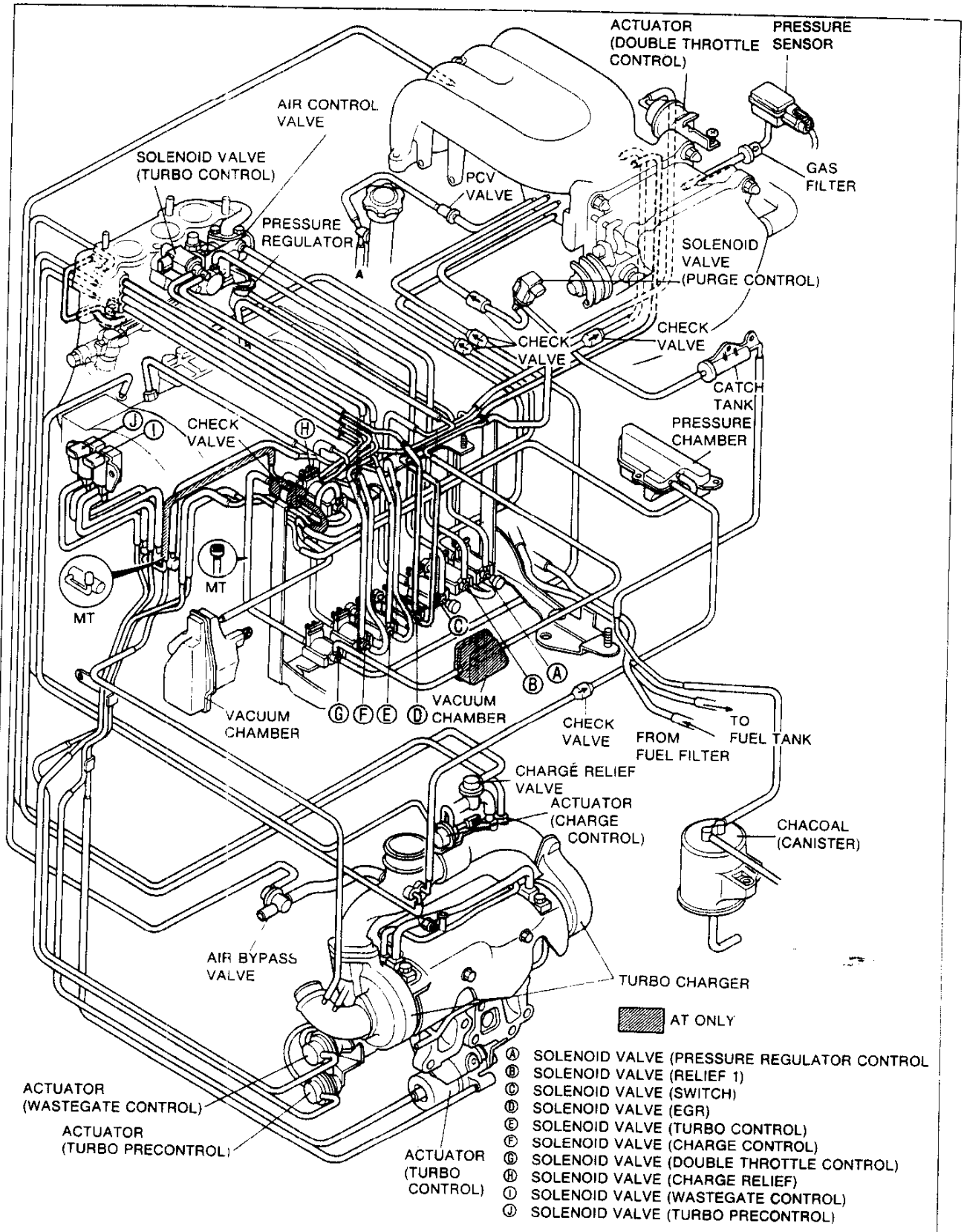
VACCUM HOSE ROUTING DIAGRAM



17U0FX-01

SPECIFICATIONS

Item			Specification
Idle speed*		rpm	700–750 (720 $^{+30}_{-20}$)
Ignition timing*	Leading	ATDC	5°
	Trailing	ATDC	20°
Air cleaner			
Element type			Oil permeated
Throttle body			
Type			Horizontal draft {2 stage–3 barrel}
Throat diameter	Primary	mm {in}	45 {1.772}
	Secondary	mm {in}	50 {1.969} × 2
Dashpot touch angle		°	8
Water thermovalve Operation (full open) temperature		°C {°F}	55–65 {131–149} or more
Intercooler			
Type			Air cooled
Core size {w × h × t}		mm {in}	294 × 114 × 65 {11.575 × 4.4882 × 2.5591}
Turbo charger			
System type			Sequential twin turbo charged
Cooling method			water + engine oil
Boost control actuator			turbo pre-control + wastegate control
Boost control method			Solenoid valve (duty-controled) × 2
Fuel tank			
Capacity		liters {US gal, Imp gal}	76 {20.1, 16.7}
Fuel filter			
Type	Low-pressure		Nylon element
	High-pressure		paper element
Pressure regulator			
Type			Diaphragm
Regulated pressure		kPa {kgf/cm^2, psi}	250–260 {2.5–2.6, 35.6–37.0}
Fuel pump			
Type			Impeller (In tank)
Output pressure		kPa {kgf/cm^2, psi}	490–740 {5.0–7.5, 71.1–106.7}
Injector			
Type			Side-feeding
Injection volume	Primary	cm^3 {cc}/min	550 {550}
	Secondary	cm^3 {cc}/min	850 {850}
Catalytic converter			
Type	Pri-converter		Metal
	Main converter		Monolithic
Air pump			
Capacity		cm^3 {cc}/rev	375 {375}
Output		L/min	MT 140–200, AT 160–200
Fuel			
Specification			Unleaded premium (RON95 or higher)

17U0FX-01

* TEN terminal of diagnosis connector is grounded.

COMPONENT DESCRIPTIONS

Component	Function	Remark
1-2 switch	Detects gear position (1st, 2nd)	MT only
Actuator (charge control)	Controls charge control valve	–
Actuator (Double throttle control)	Controls double throttle valve	Installed on extension manifold
Actuator (Turbo control)	Controls turbo control valve	Controlled by two solenoid valves
Actuator (Turbo precontrol)	Controls turbo precontrol valve	Part of turbocharger assembly
Actuator (Wastegate control)	Controls wastegate control valve	Part of turbocharger assembly
Air Bypass Valve	Reduces sound of intake air entering air cleaner from turbocharger deceleration	
Air Cleaner	Filters air entering throttle chamber	Oil permeated type
Air Control Valve	Directs air to one of three locations: exhaust port, main converter, or relief air silencer	Consists of two valves: Relief valve Switching valve
Air pump	Supplies secondary air to air control valve	With electromagnetic clutch
Atmospheric Pressure Sensor	Detects atmospheric pressure; sends signal to control unit	Built in ECU
Catalytic Converter	Reduces HC, CO and NOx	–
Charcoal Canister	Stores fuel tank fumes when engine is stoped	Vented to atmosphere through charcoal and air filter
Circuit opening relay	Voltage for fuel pump while engine running	–
Clutch switch	Detects clutch condition (engaged / disengaged)	MT only
Crank Angle Sensor	Detects eccentric shaft angle at 30° intervals and front rotor position; sends signal to control unit	–
Dashpot	Prevents sudden throttle valve closing during deceleration	–
Diagnosis connector	**Service connector terminals:** 1. EGI self-diagnosis 2. EC-AT self-diagnosis [AT] 3. Initial set 4. Fuel pump check 5. Engine speed output 6. Switch and oxygen sensor monitor 7. Supply battery voltage 8. Ground 9. A/C self-diagnosis 10. Cruise control self-diagnosis 11. Electrical cooling fan self-diagnosis	**25-pin (located near fuse box)** 1. FEN terminal 2. TAT and FAT terminal 3. TEN terminal 4. F/P terminal 5. IG- terminal 6. MEN terminal 7. +B terminal 8. GND terminal 9. TAC and FAC terminal 10. TSC and FSC terminal 11. TFA terminal

Component	Function	Remark
Engine control unit (ECU)	**Detects the following:**	
	1. Engine speed	1. Crank angle sensor
	2. Knocking signal	2. Knock sensor
	3. Vehicle speed	3. Speedometer sensor
	4. Engine coolant temperature	4. Water thermosensor
	5. Intake air temperature	5. Intake air thermosensor
	6. Throttle valve opening angle (full range)	6. Throttle sensor (full range)
	7. Intake manifold pressure	7. Pressure sensor
	8. Atmospheric pressure	8. Atmospheric pressure sensor
	9. Oxygen concentration	9. Oxygen sensor
	10. Air/Fuel ratio	10. Oxygen sensor
	11. Throttle valve opening angle (narrow range)	11. Throttle sensor (narrow range)
	12. Metering oil pump (MOP) position signal	12. MOP position sensor
	13. Fuel temperature	13. Fuel thermosensor
	14. Gear position	14. 1-2 switch (MT)
	15. Clutch condition	15. Clutch switch (MT)
	16. In-gear condition	16. Neutral switch (MT)
	17. Power steering operation	17. P/S pressure switch
	18. Braking signal	18. Stoplight switch
	19. Starter signal	19. Ignition switch
	20. Electrical Load (E/L) condition	20. E/L unit
	21. EGR condition	21. EGR swich
	Control operation of the following	
	1. Fuel injection system	Injector
	2. Ignition control system	Igniter
	3. Idle speed control (ISC) system	Solenoid valve (Idle speed control [ISC])
	4. Pressure negulaton control system	Solenoid valve (Pressure Regulator control [PRC)
	5. Secondary air injection system	Solenoid valve (Split air bypass [SAB])
		Solenoid valve (Port air bypass [PAB])
		Solenoid valve (Swich [SWITCHING])
		Solenoid valve (Relief No.2 [RELIEF2])
		Solenoid valve (Relief No.1 [RELIEF1])
	6. Accelerated warm-up System	Solenoid valve (AWS)
	7. Sequential twin turbocharger control system	Solenoid valve (Turbo control No.1 [TCNT1)
		Solenoid valve (Turbo control No.2 [TCNT2)
		Solenoid valve (Wastegate control [WGCNT)
		Solenoid valve (Turbo precontrol [TPCNT])
		Solenoid valve (Change control [CCNT])
		Solenoid valve (Change relief [CRF])
	8. Exhaust Gas Recirculation control system	Solenoid valve (EGR)
	9. Double throttle control system	Solenoid valve (DTCNT)
	10. A/C control system	A/C relay
	11. Electric cooling fan control system	Fan relay
	12. Lock-up control system	EC-AT CU
	13. Slip control system	EC-AT CU
	14.Self-diagnosis function	Self diagnosis checker or DT-S1000
	15 Monitor function	Self diagnosis checker or DT-S1000
	16 Simulation function	DT-S1000
	17 Real-time monitor function	DT-S1000
	18 Back up function	

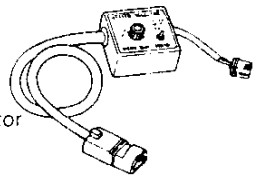
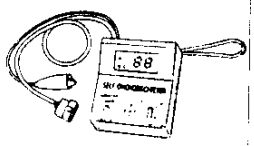
Component	Function	Remark
Fuel filter	Filters particles from fuel	
Fuel pump	Provides fuel to injectors	• Operates while engine running • In fuel tank
Igniter	Receives spark signal from ECU and generates high voltage in ignition coil	
Ignition switch (START position)	Sends engine cranking signal to ECU	–
Inhibitor switch (AT)	Detects load condition; sends signal to ECU	–
Injector	Injects fuel into intake port	• Controlled by signal from ECU (side-feed type)
Intake air thermosensor	Detects intake air temperature; sends signal to ECU	• Installed in extension manifold
Knock sensor	Detects engine knocking; sends signal to ECU	–
Main relay	Supplies current to output devices and ECU	–
Neutral/Clutch switches (MT)	Detects in-gear condition; sends signal to ECU	• Switch is ON in neutral
Oxygen sensor	Detects oxygen concentration; sends signal to ECU	• Zirconic and platinum coat
PCV valve	Controls blowby gas introduced into engine	–
Pressure regulator	Adjusts fuel pressure supply to injectors	–
Pressure sensor	Detects intake manifold pressure; sends signal to ECU	–
P/S pressure switch	Detects P/S operation	• P/S switch ON when steering wheel turned
Pulsation dumper	Absorbs fuel pulsations	–
Solenoid valve (ISC)	Supplies bypass air into intake manifold	• Controlled by duty signal from ECU
Solenoid valve (PRC)	Controls vacuum to pressure regulator	• Installed below extension manifold
Solenoid valve (SAB)	Controls split air volume	• Installed in ACV
Solenoid valve (SWITCHING)	Controls switching valve of air control valve	• Installed below extension manifold
Solenoid valve (RELIEF2)	Controls relief valve	• Installed in ACV
Solenoid valve (RELEF1)	Controls relief valve	• Installed below extension manifold
Solenoid valve (PAB)	Controls port air volume	• Installed in ACV
Solenoid valve (AWS)	Controls accelerated warm-up system	• Installed in extension manifold
Solenoid valve (TCNT1)	Controls turbo control valve	• Installed in ACV (perssure applied)
Solenoid valve (TCNT2)	Controls turbo control valve	• Installed below extension manifold (vacuum applied)
Solenoid valve (WGCNT)	Controls wastegate valve	• Controlled by duty signal from ECU
Solenoid valve (TPCNT)	Controls turbo precontrol valve	• Controlled by duty signal from ECU
Solenoid valve (CCNT)	Controls charge control valve	• Installed below extension manifold
Solenoid valve (CRF)	Controls charge relief valve	• Installed below extension manifold
Solenoid valve (EGR)	Controls EGR valve	• Installed below extension manifold
Solenoid valve (DTCNT)	Controls double throttle valve	• Installed below extension manifold
Solenoid valve (PURGE)	Controls evapolative fumes from chacoal canister to intake manifold	• Controlled by duty signal from ECU
Speedometer sensor	Detects vehicle speed; sends signal to ECU	• Installed in instrument cluster
Stoplight switch	Detects braking; sends signal to ECU	–
Throttle body	Controls intake air amount	–
Throttle sensor	Detects throttle valve opening angle	• Installed on throttle body
Water thermosensor	Detect coolant temperature; send signals to ECU	• Installed in engine

17U0FX-012

ENGINE TUNE-UP

PREPARATION

SST

49 B019 9A0 System Selector 	For inspection of ignition timing and idle speed and diagnosis	49 H018 9A1 Self Daguosis checker 	For diagnosis

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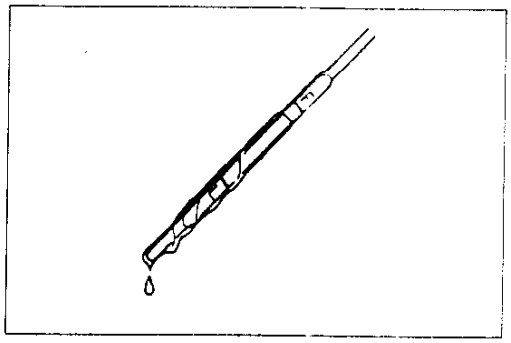
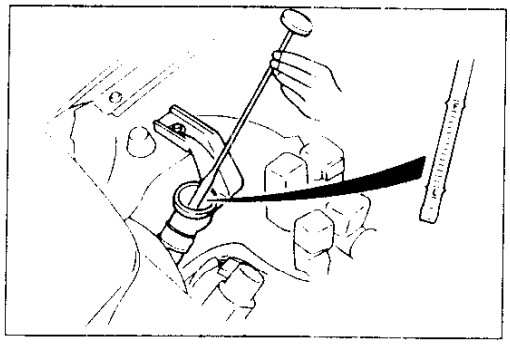


17U0FX-014

BASIC INSPECTION

Engine Oil

1. Remove the dipstick and check the engine oil level and condition.
2. Add or change oil as necessary.



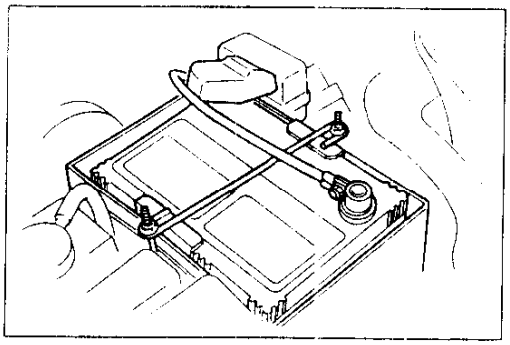
17U0FX-015

Coolant (engine cold)

Warning

- **Never remove the radiator cap while the engine is hot.**
- **Wrap a thick cloth around the cap before carefully removing it.**

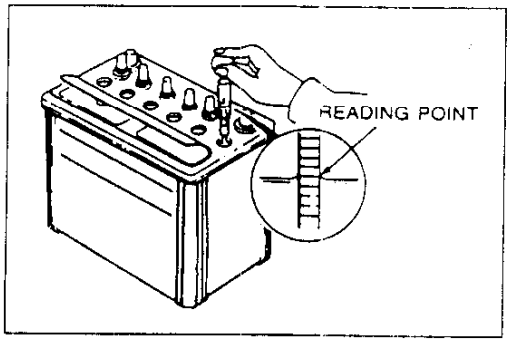
1. Remove the coolant level gauge from the coolant necervir.
2. Verify that the coolant level is between the and marks of the gauge.
3. Add coolant if necessary.



17U0FX-016

Battery

1. Check for corrosion on the terminals and for loose cable connections. If necessary, clean the clamps and tighten them firmly.
2. Make sure the electrolyte level is between the UPPER LEVEL and LOWER LEVEL marks.
3. Add distilled water if necessary.



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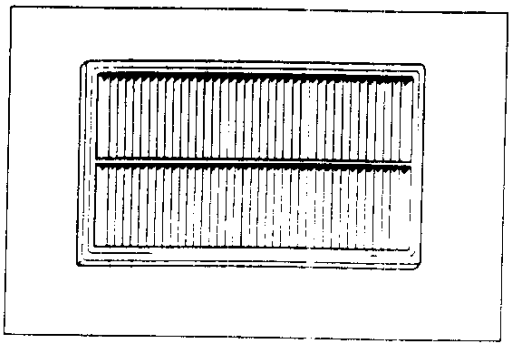
4. Check the specific gravity with a hydrometer.

Gravity: 1.27–1.29 {at 20°C [68°F]}



17U0FX-018

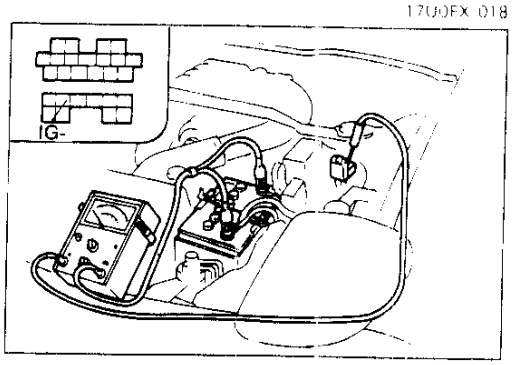
Air Cleaner Element Inspection

1. Check the air cleaner element for excessive dirt and tor oil and damage.

Caution

- **Do not blow the air cleaner element by compressed air to clean.**

2. Replace the element if necessary.

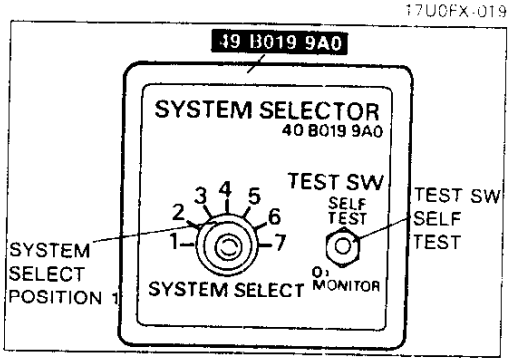


17U0FX-019

ADJUSTMENT

Preparation

1. Warm up the engine to normal operating temperature.
2. Turn all electric loads OFF.
3. Connect the **SST** to the diagnosis connector.
4. Connect a tachometer to the diagnosis connector **IG-** terminal as shown.



17U0FX-020

Ignition Timing

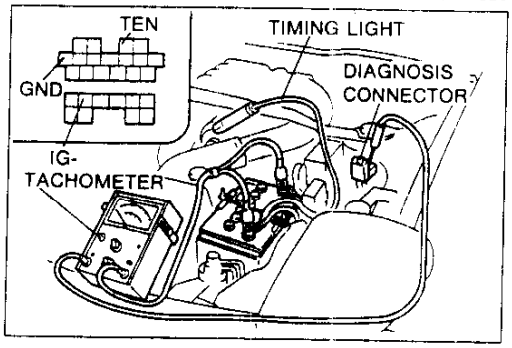
Caution

- **Do not adjust the ignition timing, it is set at the factory and must not be tempered with.**

1. Perform preparation (refer to above.)
2. Verify that the electric cooling fan does not operate.
3. Remove the fuel filler cap.
4. Set SYSTEM SELECT to position 1.
5. Set TEST SW to SELF-TEST.

Note

- **If the SST is not used, jump across the TEN terminal and the GND terminal of the diagnosis connector.**



17U0FX-021

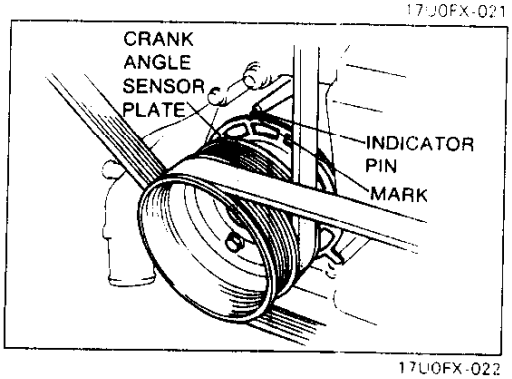
6. Make sure the idle speed is within specification; if not adjust the idle speed.
7. Connect a timing light to the high-tension lead of the front trailing-side.

Caution

- **Some timing lights will not illuminate even of the ignition system is normal.**

8. Verify that the timing mark (white) on the crank angle sensor plate is aligned with the indicator pin.

Ignition timing: Trailing side: 20° ATDC (– 20° BTDC)
Leading side: 5° ATDC (– 5° BTDC)
Idle speed (Neutral or P range): 550–950 rpm



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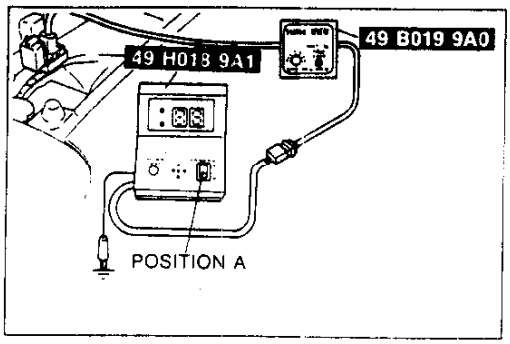

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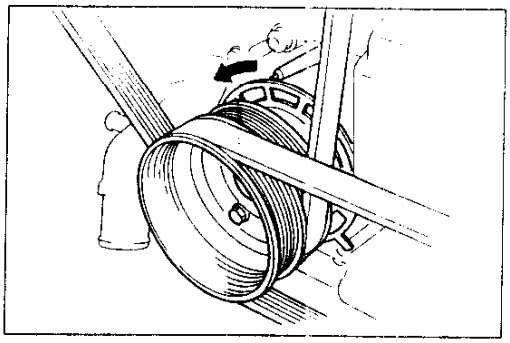
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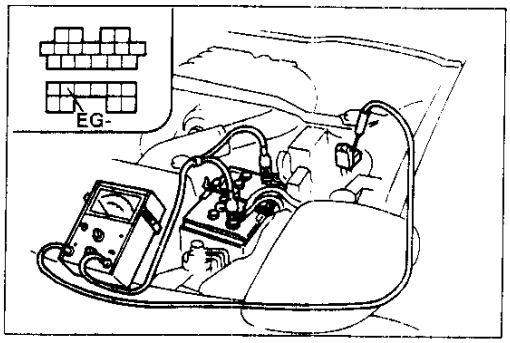
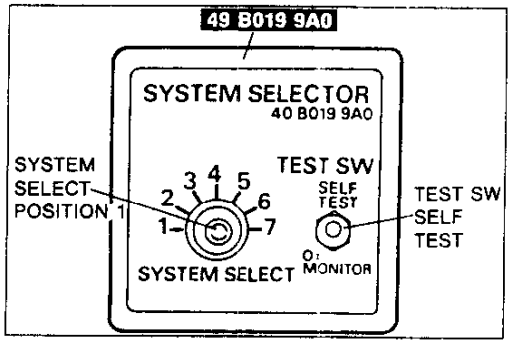
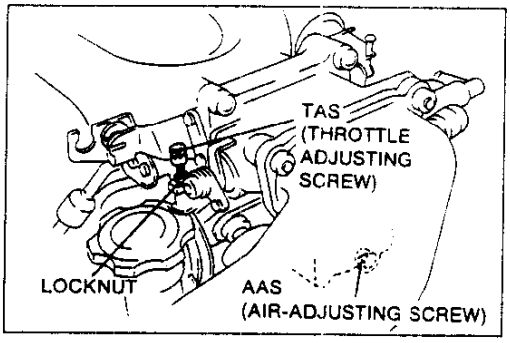


17U0FX-025



17U0FX-026



17U0FX-027

9. If the timing is incorrect, check the following procedure.
   - Verify that no service code number is present. If service code number present, check for cause referring to the specified check sequence. (Refer to page F–20)
   - 05–knock sensor
   - 13–Pressure sensor

Input devices
- E/L, P/S, A/C, Cooling fan
- Crank angle sensor (NE, signal)
- Pressure sensor
- Throttle sensor
- Neutral SW / Clutch SW (MT)
- Inhibitor signal (AT)

Others
ECU terminal 3I (Refer to page F–152)

10. Disconnect the **SST**.
11. Verify that the ignition timing advances when the engine is above 1,500 RPM.

Idle Speed

Note
- **Because the idle speed is controlled automatically by the ECU though the idle speed control (ISC) valve, usually it is not necessary to check and adjust the idle speed. However, the idle speed should adjust when rough idling occurs adjust the idle speed following procedure.**

1. Perform "Preparation". (Refer to page F–16)
2. Set SYSTEM SELECT to position 1
3. Set TEST SW to SELF TEST
4. Verify that the idle speed is within specification.

Idle speed: 700–750 (720 $^{+30}_{-20}$ rpm)

Caution
- **Check the idle speed with the electric cooling fan not operating.**

5. If not within the specification, adjust the idle by turning the air-adjusting screw (AAS).
6. If not within the specification when air adjusting screw fully closed, loosen the locknut and turn the throttle adjusting screw to set the idle.
7. Tighten the locknut and put a paint mark on the nut and throttle body.
8. Disconnect the **SST**.

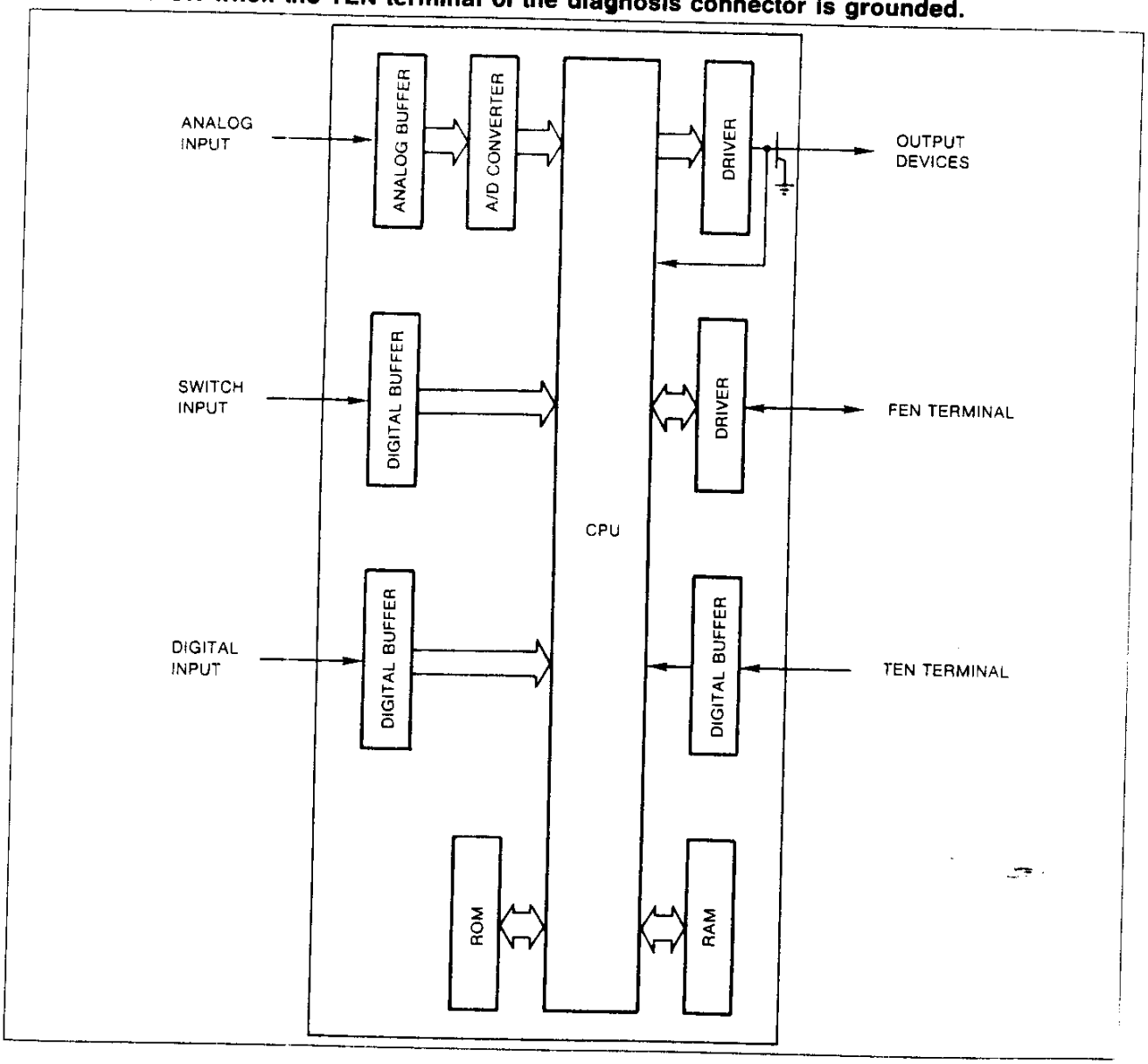
SELF-DIAGNOSIS FUNCTION

DESCRIPTION

When trouble occurs in the main input or output devices, check for the cause by using the **SST**. Failure of input and output devices is indicated and retrieved from the engine control unit (ECU) as service code numbers.

Note

- **The ECU constantly checks for malfunction of the input devices. But, it checks for malfunction of output devices only in a three-second period after the ignition switch is turned ON when the TEN terminal of the diagnosis connector is grounded.**

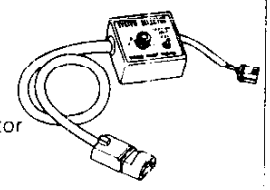
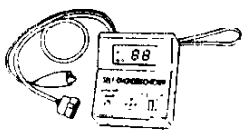
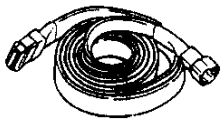
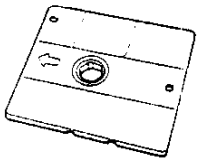


17U0FX-02E

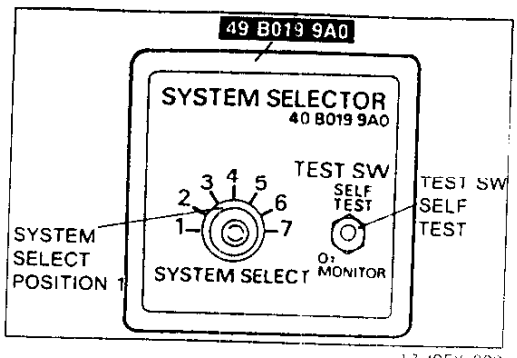
Function

	Self diagnosis checker	DT-S1000
Service Code Number Inspection	Yes	Yes
Monitor Function	Yes	Yes
Real Time Monitor Function	No	Yes
Simulation Function	No	Yes
Memory Function (DT-S1000)	No	Yes

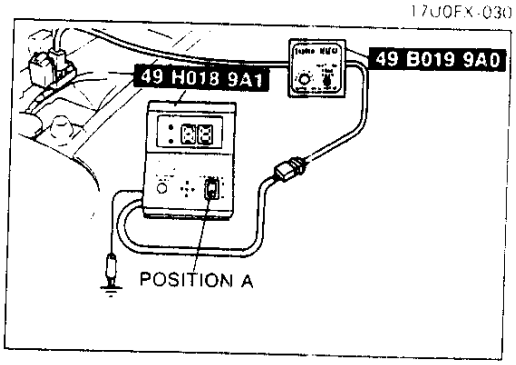
PREPARATION
SST

49 B019 9A0 System Selector 	For diagnosis	49 H018 9A1 Self-Diagnosis Checker 	For diagnosis
49 F088 001 DT-S1000 Base unit 	For diagnos s	49 F088 002 Power unit 	For diagnosis
49 F088 003 Harness power unit 	For diagnosis	49 F088 004 Interface adapter Type-1 	For diagnosis
49 F088 005 Harness Type-1 	For diagnosis	49 F088 011 System disk Type-1 (V1.00) 	For diagnosis

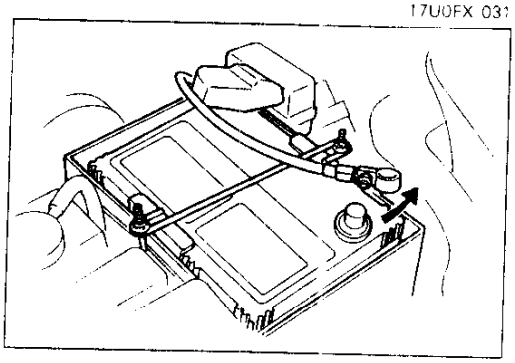
17U0FX-02



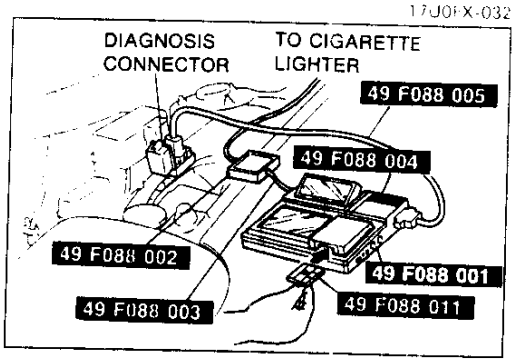
17U0FX-030



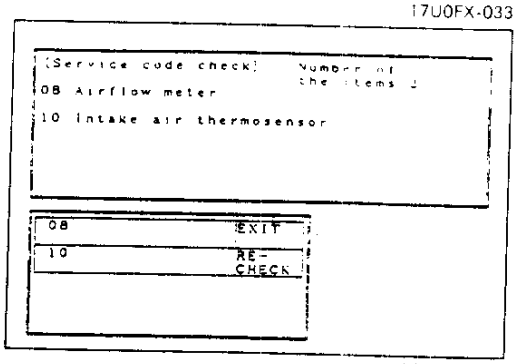
17U0FX-031



17U0FX-032



17U0FX-033



17U0FX-034

SERVICE CODE NUMBER

Inspection Procedure

1. Connect the **SST** to the Self-Diagnosis Checker to the diagnosis connector.
2. Set system select to position 1.
3. Set the test switch to SELF TEST.
4. Connect the **SST** to the System Selector and a ground.
5. Set the select switch to position A.
6. Turn the ignition switch ON.
7. Verify the "88" flashes on the digital display and the buzzer sounds for **3 sec.** after turning the ignition switch ON.
8. If "88" does not flash, check the main relay (refer to page F–188), power supply circuit, and diagnosis connector wiring.
9. If 88 flashes and the buzzer sounds continuously for more than **20 sec.**, check for a short circuit between the ECU terminal 1F and the diagnosis connector. Replace the ECU if necessary and perform Steps 3 and 7 again.
10. Note any code numbers and check for the causes by referring to the check sequences shown on pages **F–26 through F–65**. Repair as necessary.

Note

- **Cancel the code numbers by performing the after-repair procedure following repairs. (Refer to page F–66)**

DT-S1000

1. Connect the **SST** (DT-S1000) to the diagnosis connector.
2. Turn the ignition switch ON.
3. Check the service code and its cause on the **DT-S1000** display.

Note

- **If the DT-S1000 displays "No service codes", the problem will be in a system or area not covered by the self-diagnosis function.**
- **If the DT-S1000 displays "System error", verify the DT-S1000 connectiong and check for the cause(s) referring to the DT-S1000 instruction manual.**

4. Note any code number(s) and check for the cause(s). Repair as necessary.

Note

- **After repairs are made, recheck for code number(s) by performing the "After-Repair Procedure." (Refer to page F–66.)**

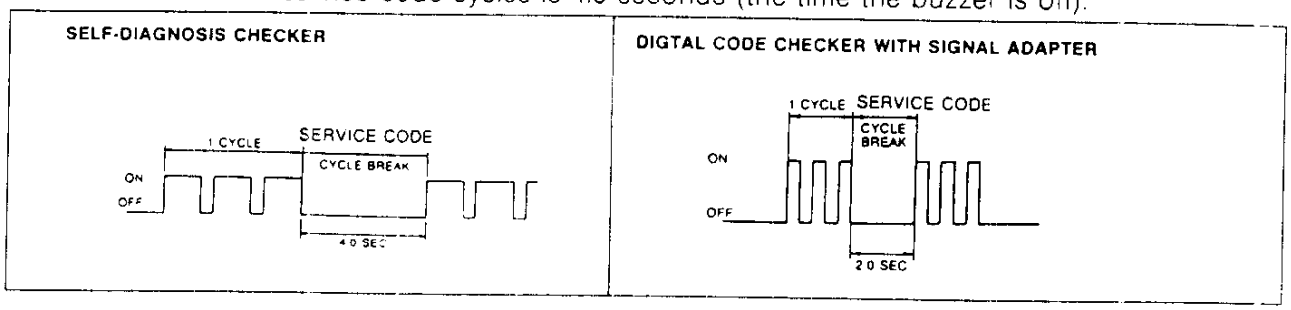
Principle of Code Cycle

Service codes are determined as shown below.

17U0FX-035

1. Code cycle break

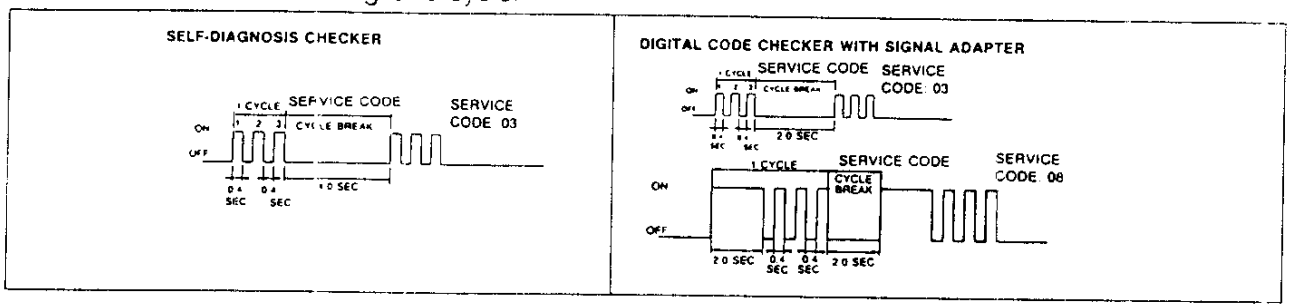
The time between service code cycles is 4.0 seconds (the time the buzzer is off).



17U0FX-036

2. Second digit of service code (ones position)

The digit in the ones position of the service code represents the number of times the buzzer sounds 0.4 second during one cycle.

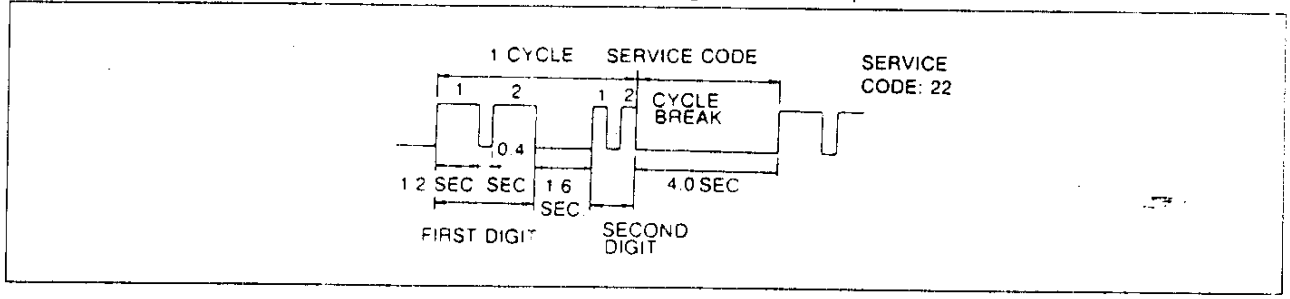


17U0FX-037

3. First digit of service code (tens position)

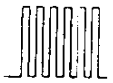
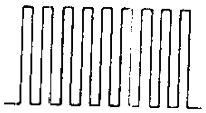
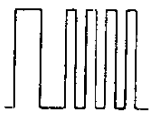
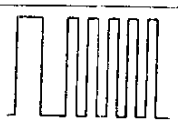
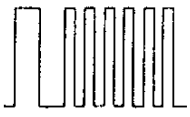
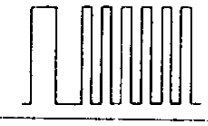
The digit in the tens position of the service code represents the number of times the buzzer is on 1.2 seconds during one cycle.

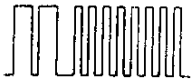
The buzzer is off for 1.6 seconds between the long and short pulses.



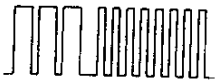
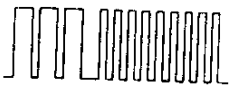
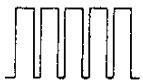
17U0FX-038

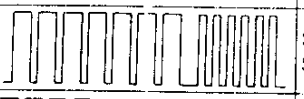
Service Code Numbers

No.	Indicator flashing pattern	Diagnosed circuit	Condition	Point	Memorized	Page
02	ON / OFF 	Crank angle sensor (NE signal)	No NE signal	• Crank angle sensor connector • Wiring from crank angle sensor to ECU • Crank angle sensor	Yes	F-26
03	ON / OFF 	Crank angle sensor (G signal)	No G signal	• Crank angle sensor connector • Wiring from crank angle sensor to ECU • Crank angle sensor	Yes	F-27
05	ON / OFF 	Knock sensor	Open or shout circuit	• Knock sensor connector • Wiring from knock sensor to ECU • Knock sensor	Yes	F-28
06	ON / OFF 	Speedometer Sensor	No speed meter sensor signal	• Speedometer sensor connector • Wiring from speedometer sensor to ECU	Yes	F-29
09	ON / OFF 	Water thermosensor	Open or short circuit	• Water thermosensor connector • Wiring from water thermosensor to ECU • Water thermosensor resistance	Yes	F-30
11	ON / OFF 	Intake air thermosensor		• Intake air thermosensor connector • Wiring from intake air thermosensor to ECU • Intake air thermosensor resistance	Yes	F-31
12	ON / OFF 	Throttle sensor (Full range)		• Throttle sensor connector • Wiring from throttle sensor to ECU	Yes	F-32
13	ON / OFF 	Pressure sensor		• Pressure sensor connector • Wiring from pressure sensor to ECU • Pressure sensor resistance	Yes	F-33
14	ON / OFF 	Atmospheric pressure sensor (in ECU)		• ECU	Yes	F-34
15	ON / OFF 	Oxygen sensor	Sensor output continues less than 0.55V 25 sec. in feedback zone	• Oxygen sensor connector • Wiring from oxygen sensor to ECU • Oxygen sensor	Yes	F-34
16	ON / OFF 	EGR switch (California only)	Open or short circuit	• EGR switch connector • Wiring from EGR switch to ECU • EGR switch	Yes	F-35
17	ON / OFF 	Feedback system	Sensor output not changed 120 sec. in feedback zone	• Fuel pressure • Injection fuel leakage • Ignition system • Air leakage • ECU	Yes	F-36
18	ON / OFF 	Throttle sensor (Narrow range)	Open or short circuit	• Throttle sensor connector • Wiring from throttle sensor to ECU	Yes	F-38

No.	Indicator flashing pattern	Diagnosed circuit	Condition	Point	Memorized	Page
20	ON / OFF 	Metering oil pump position sensor	Open or Short circuit	• MOP connector • Wiring from MOP position sensor to ECU • MOP position sensor continuity	Yes	F–39
23	ON / OFF 	Fuel thermosensor		• Fuel thermosensor connector • Wiring from Fuel thermosensor to ECU • Fuel thermosensor resistance	Yes	F–40
25	ON / OFF 	Solenoid valve (pressure regulator control)		• Solenoid valve connector • Wiring from solenoid valve to ECU • Solenoid valve continuity	No	F–41
26	ON / OFF 	Metering oil pump (stepping moter)		• MOP connector • Wiring from MOP to ECU • MOP continuity	No	F–42
27	ON / OFF 	Metering oil pump	Open or short circuit or Sticking of MOP sensor	• MOP connector • Wiring from MOP to ECU • Mop continuity	Yes	F–43
28	ON / OFF 	Solenoid valve (EGR)	Open or short circuit	• Solenoid valve connector • Wiring from solenoid valve to ECU • Solenoid valve continuity	No	F–44
30	ON / OFF 	Solenoid valve (Split air bypass)		• Solenoid valve connector • Wiring from solenoid valve to ECU • Solenoid valve continuity	No	F–45
31	ON / OFF 	Solenoid valve (Relief 1)		• Solenoid valve connector • Wiring from solenoid valve to ECU • Solenoid valve continuity	No	F–46
32	ON / OFF 	Solenoid valve (Switching)		• Solenoid valve connector • Wiring from solenoid valve to ECU • Solenoid valve continuity	No	F–47
33	ON / OFF 	Solenoid valve (Port air bypass)		• Solenoid valve connector • Wiring from solenoid valve to ECU • Solenoid valve continuity	No	F–48
34	ON / OFF 	Solenoid valve (Idle speed control)		• Solenoid valve connector • Wiring from solenoid valve to ECU • Solenoid valve continuity	No	F–49
37	ON / OFF 	Metering Oil Pump	Low battery voltage	• Charging system • MOP connector • Wiring from MOP to ECU	Yes	F–50

SELF-DIAGNOSIS FUNCTION

No.	Indicator flashing pattern	Diagnosed circuit	Condition	Point	Memorized	Page
38	ON / OFF 	Solenoid valve (Accelerated warm-up system)	Open or Short Circuit	• Solenoid valve connector • Wiring from Solenoid valve to ECU • Solenoid valve continuity	No	F-51
39	ON / OFF 	Solenoid valve (Relief 2)		• Solenoid valve connector • Wiring from Solenoid valve to ECU • Solenoid valve continuity	No	F-52
40	ON / OFF 	Solenoid valve (Purge control)		• Solenoid valve connector • Wiring from Solenoid valve to ECU • Solenoid valve continuity	No	F-53
42	ON / OFF 	Solenoid valve (Turbo precontrol)		• Solenoid valve connector • Wiring from Solenoid valve to ECU • Solenoid valve continuity	No	F-54
43	ON / OFF 	Solenoid valve (Wastegate control)		• Solenoid valve connector • Wiring from Solenoid valve to ECU • Solenoid valve continuity	No	F-55
44	ON / OFF 	Solenoid valve (Turbo control)		• Solenoid valve connector • Wiring from Solenoid valve to ECU • Solenoid valve continuity	No	F-56
45	ON / OFF 	Solenoid valve (Charge control)		• Solenoid valve connector • Wiring from Solenoid valve to ECU • Solenoid valve continuity	No	F-57
46	ON / OFF 	Solenoid valve (Charge relief)		• Solenoid valve connector • Wiring from Solenoid valve to ECU • Solenoid valve continuity	No	F-58
50	ON / OFF 	Solenoid valve (Double throttle control)		• Solenoid valve connector • Wiring from Solenoid valve to ECU • Solenoid valve continuity	No	F-59
51	ON / OFF 	Fuel pump relay		• Fuel pump relay connector • Wiring from relay to ECU • Relay continuity	No	F-60
54	ON / OFF 	Air pump relay		• Air pump relay connector • Wiring from relay to ECU • Relay continuity	No	F-61

No.	Indicator flashing pattern	Diagnosed circuit	Condition	Point	Memorized	Page
71	ON / OFF 	Injector (Front secondary)	Open circuit	• Injector connector • Wiring from Injector to ECU • Injector resistance	No	F-62
73	ON / OFF 	Injector (Rear secondary)		• Injector connector • Wiring from injector to ECU • Injector resistance	No	F-63
76	ON / OFF 	Slip Lock up off Signal (EC-AT CU)	Open or Short circuit	• EC-AT CU connector • Wiring from EC-AT CU to ECU	No	F-64
77	ON / OFF 	Torque reduced signal (EC-AT CU)		• EC-AT CU connector • Wiring from EC-AT CU to ECU	No	F-65

37U0F-039

Caution

- **If more than one failure is present, the code numbers will be indicated in numerical order, lowest number first.**
- **After repairing a failures, turn off the ignition switch and disconnect the negative battery cable for 20 seconds and depress the brake pedal to erase the service code(s) from the ECU memory.**

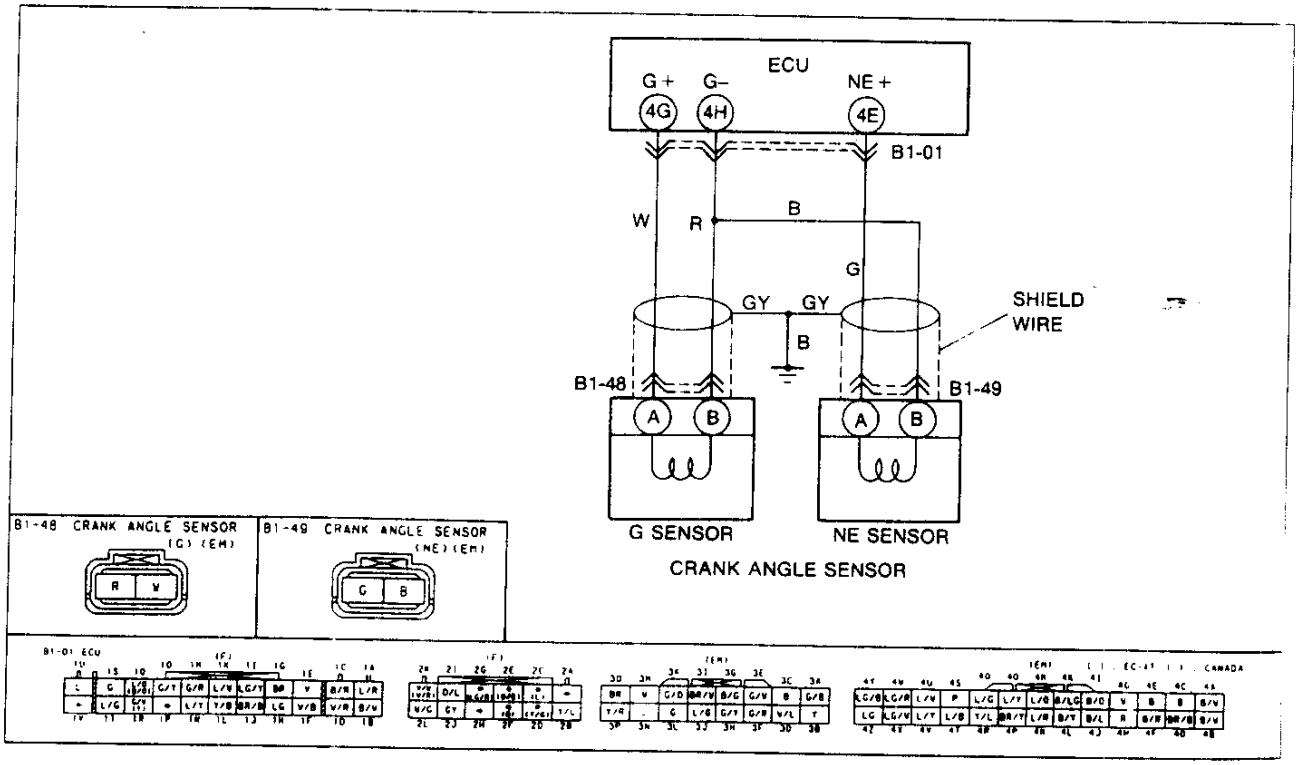
Troubleshooting

If a service code number is shown on the **SST,** check for the cause by referring to the related chart.

CODE No.	02 (CRANK ANGLE SENSOR [NE SENSOR])		
STEP	INSPECTION		ACTION
1	Is Code No.03 also present?	Yes	Go to next step
		No	Go to step 5
2	Does crank angle sensor circuit have poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
3	Is resistance of crank angle sensor [NE SENSOR] OK? **Resistance: 0.95–1.25 kΩ (20°F [68°F])**	Yes	Go to next step
		No	Replace crank angle sensor [NE SENSOR] **☞ page F–180**
4	Is clearance of crank angle sensor [NE signal] OK? **Clearance: 1.0–2.0 mm (0.039–0.078 in)**	Yes	Go to next step
		No	Adjust clearance **☞ page F–180**
5	Is there continuity between ground and 4E or ground and 4H terminal? (at harness side)	Yes	Check for short circuit in wiring (Crank angle sensor–4H or 4E terminal)
		No	Go to next step
6	Disconnect connector from ECU; is resistance between 4E (G) and 4H (R) terminals OK? **Resistance: 0.95–1.25 KΩ (20°C [68°F])**	Yes	Replace ECU **☞ page F–150**
		No	Check for open circuit in wiring (Crank angle sensor–4H or 4E terminal)

17U0FX-040

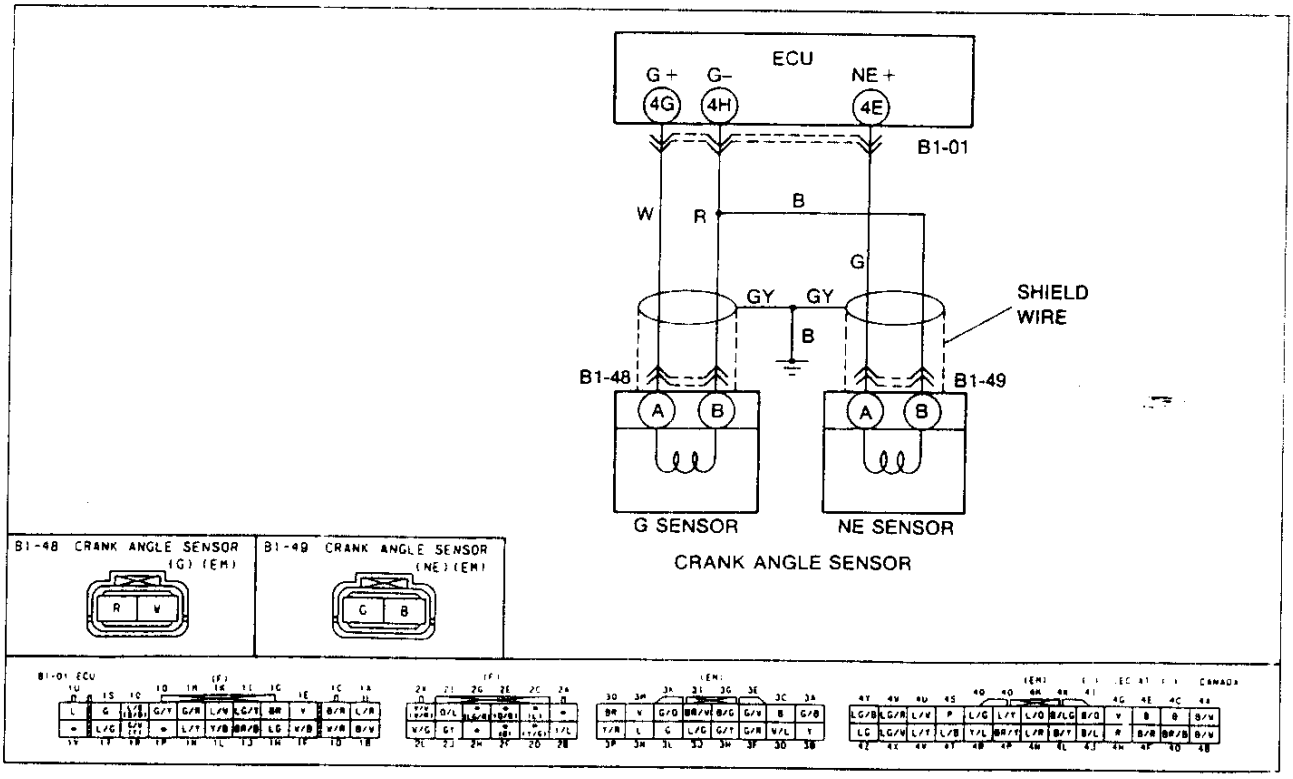
Circuit Diagram



CODE No.	03 (CRANK ANGLE SENSOR [G SENSOR])		
STEP	INSPECTION		ACTION
1	Is Code No.02 also present?	Yes	Go to next step
		No	Go to step 5
2	Does crank angle sensor circuit have poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
3	Is resistance of crank angle sensor [G SENSOR] OK? **Resistance: 0.95–1.25 KΩ (20°F [68°F])**	Yes	Go to next step
		No	Replace crank angle sensor [G SENSOR] ☞ **page F–180**
4	Is clearance of crank angle sensor [G signal] OK? **Clearance: 1.0–2.0 mm (0.039–0.0178 in)**	Yes	Go to step
		No	Adjust clearance ☞ **page F–180**
5	Is there continuity between ground and 4G or ground and 4H terminal? (at harness side)	Yes	Check for short circuit in wiring (Crank angle sensor–4H or 4G terminal)
		No	Go to next step
6	Disconnect connector from ECU; is resistance between 4G (W) and 4H (R) terminals OK? **Resistance: 0.95–1.25 KΩ (20°C [68°F])**	Yes	Replace ECU ☞ **page F–150**
		No	Check for open circuit in wiring (Crank angle sensor–4G or 4H terminal)

16E0F2-041

Circuit Diagram

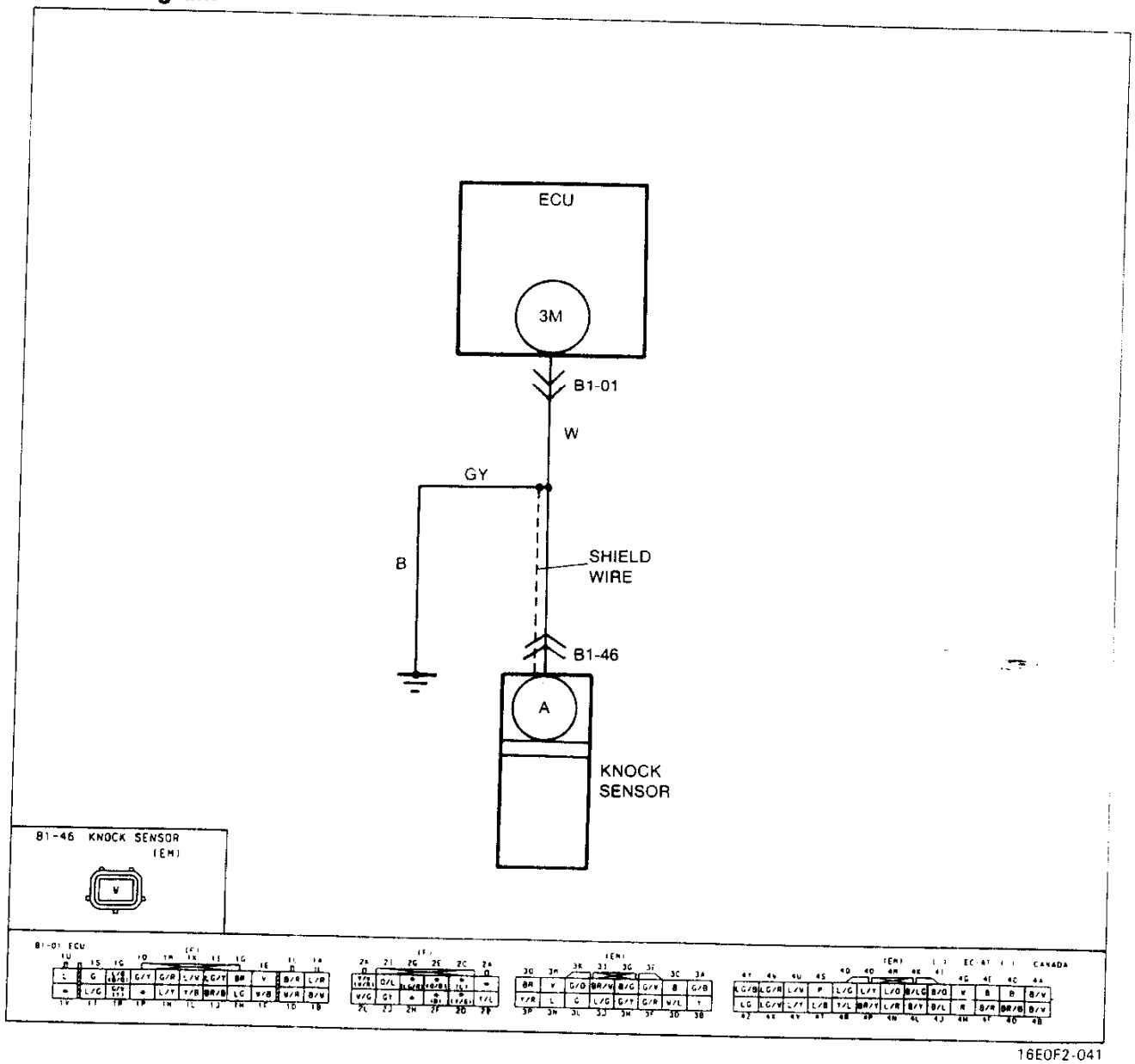


SELF-DIAGNOSIS FUNCTION

CODE No.	05 (KNOCK SENSOR)		
STEP	INSPECTION		ACTION
1	Does knock sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is there continuity between knock sensor and ECU terminal 3M (W)?	Yes	Check continuity between ECU terminal 3M (W) and ground ⇨ If continuity, repair or replace wiring ⇨ If no continuity, go to next step
		No	Repair wiring harness
3	Try known good knock sensor. Is same code No. present?	Yes	Replace ECU ☞ page F–180
		No	Replace knock sensor ☞ page F–185

Circuit Diagram

17U0FX-142

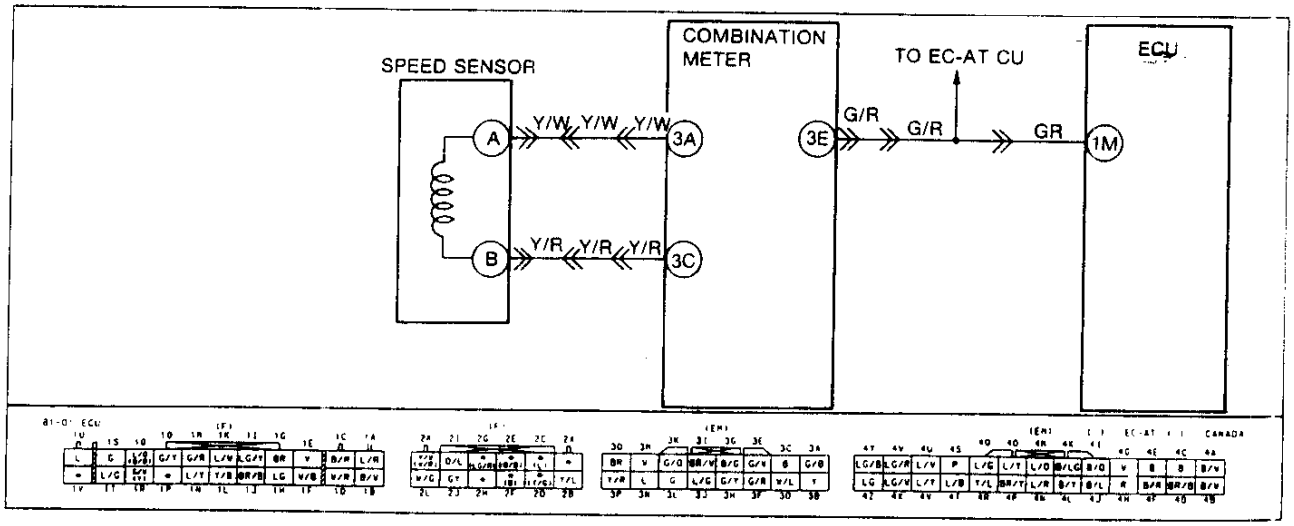


16E0F2-041

CODE No.	06 (SPEEDOMETER SENSOR)		
STEP	INSPECTION		ACTION
1	Is speedometer working correctry	Yes	Go to next step
		No	Go to step 5
2	Check for EC-AT CU service code. Is code No.07 also present?	Yes	Go to step 5
		No	Go to next step
3	Does speedometer sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
4	Is there speedometer sensor terminal 1M (G/R) voltage OK? Condition / Voltage: While driving 2–3V; Idle 4–5V	Yes	Check for open or short circuit wiring harness (Speedometer sensor terminal 3E (G/R)-ECU terminal 1M) ⇨ If OK go to step 8 ⇨ If not OK, repair wiring harness.
		No	Replace speedometer
5	Remove speed sensor Is resistance felt when turning speedometerdriven gear by hand?	Yes	Go to next step
		No	Replace speed sensor
6	Disconnect speed sensor connector and connect circuit tester Does pointer of circuit tester move slightly when driven gear is slowly turned?	Yes	Go to next step
		No	Replace speed sensor
7	Disconnect speed sensor connector Is continuity of sensor OK? **Resistance: Approx. 290 Ω (20°C [68°F]); (reference)**	Yes	Check wiring and connectors from speed sensor to speedometer ⇨ If OK, go to next step ⇨ If not OK, repair wiring and/or connector
		No	Replace speed sensor
8	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for service code Is service code displayed?	Yes	Replace ECU ☞ page F–150
		No	Intermittent poor connection Check for cause

17U0FX-043

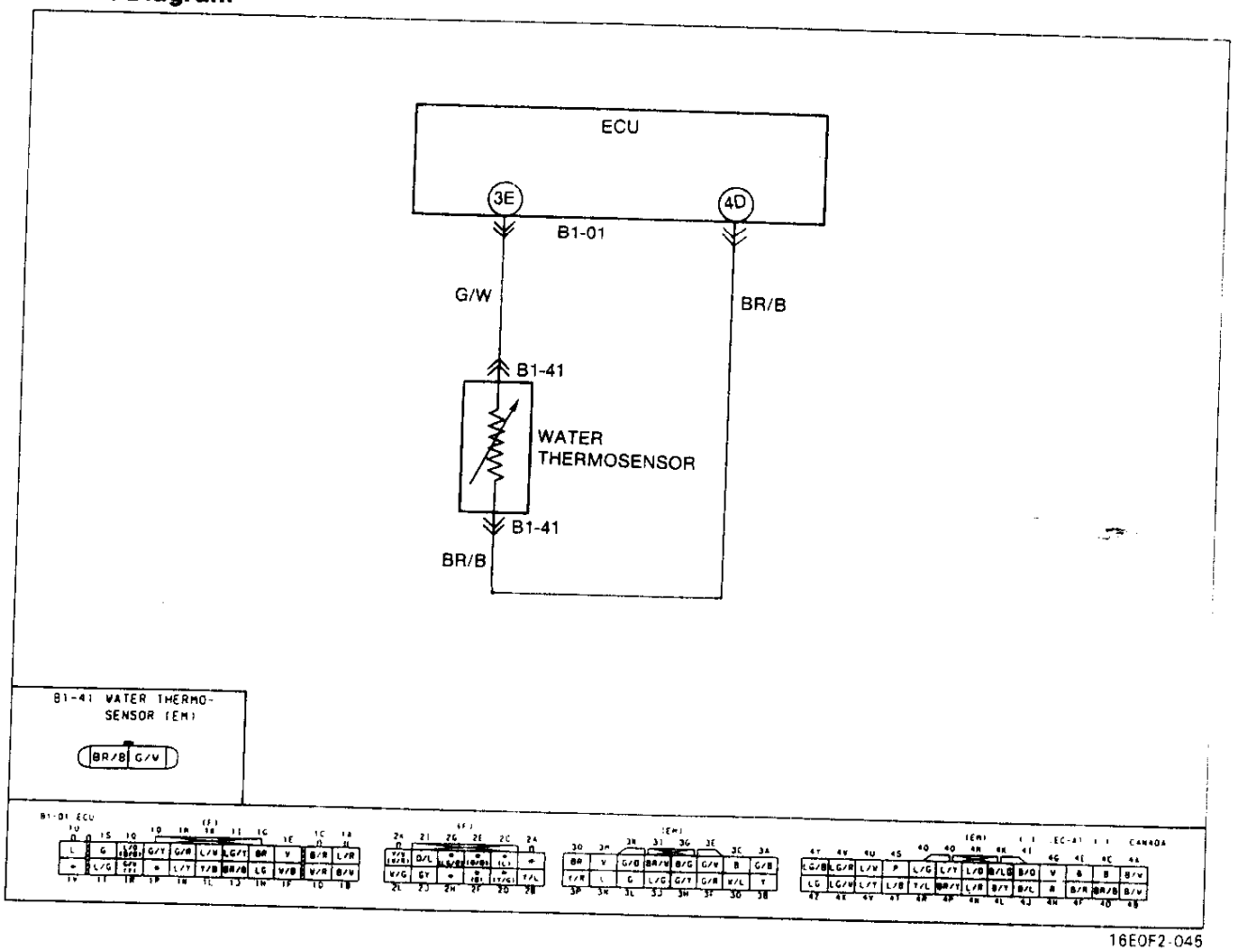
Circuit Diagram



CODE No.	09 (WATER THERMOSENSOR)		
STEP	INSPECTION		ACTION
1	Does the water thermosensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is water thermosensor terminal (G/W) Voltage OK with water thermosensor connector disconnected? Condition: Ignition switch ON — Voltage: Approx. 5.0V	Yes	Go to next step
		No	Check for short or open circuit in wiring harness (Water thermosensor terminal [G/W]–ECU terminal 3E) ⇨ If OK, replace ECU ⇨ If not OK, repair wiring harness
3	Is there continuity between water thermosensor terminal (BR/B) and a ground	Yes	Go to next step
		No	Repair wiring harness
4	Is resistance of water thermosensor OK? Coolant temp. –20°C {–4°F}: 14.6–17.8 kΩ 20°C {68°F}: 2.2–2.7 80°C {176°F}: 0.29–0.35	Yes	Replace ECU ☞ page F–150
		No	Replace water thermosensor ☞ page F–183

17U0FX-044

Circuit Diagram

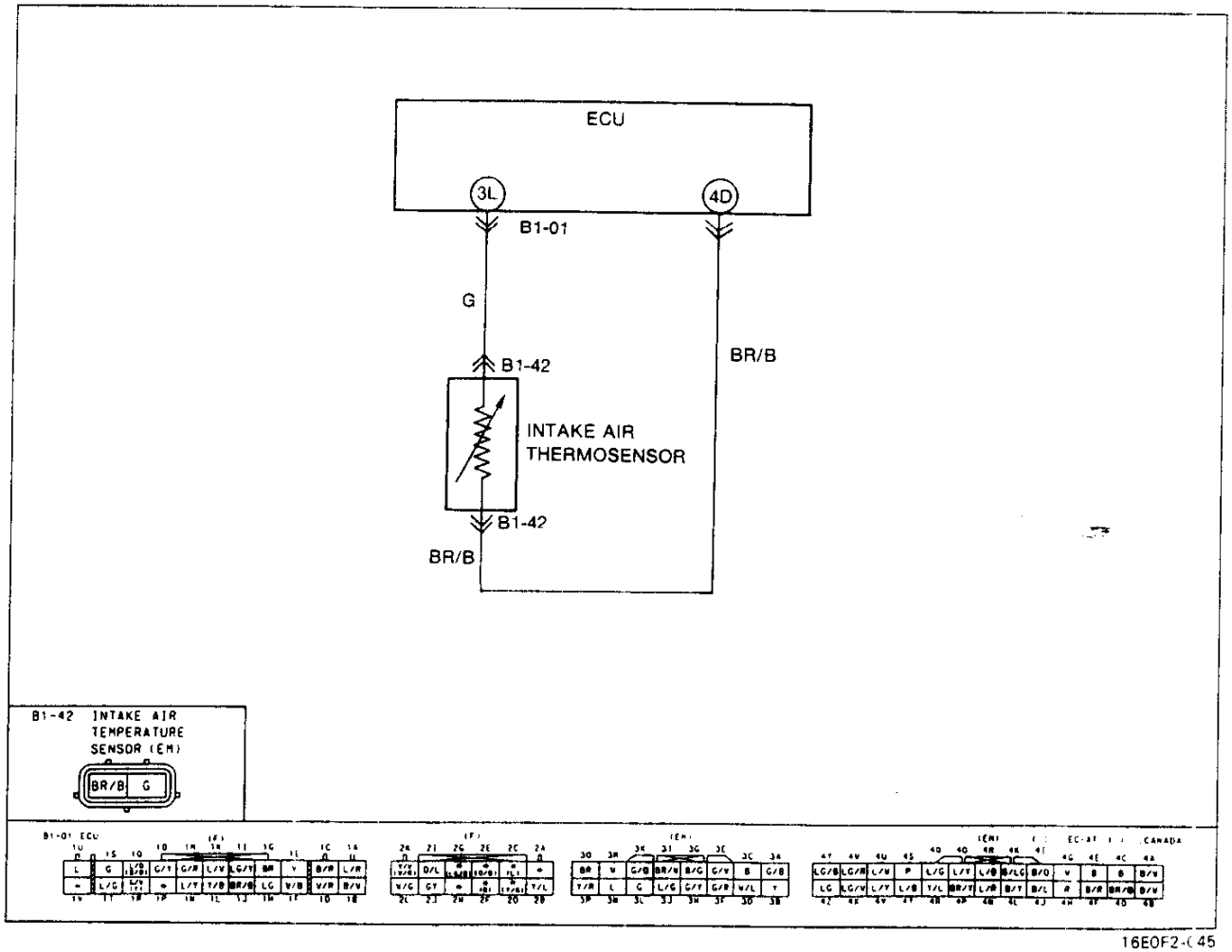


16E0F2-045

CODE No.	11(INTAKE AIR THERMOSENSOR)		
STEP	INSPECTION		ACTION
1	Does the water thermosensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is Intake air thermosensor terminal (G) voltage OK with Intake air thermosensor connector disconnected? Condition: Ignition switch ON — Voltage: Approx. 5.0V	Yes	Go to next step
		No	Check for short or open circuit in wiring harness (intake air thermosensor terminal [G]-ECU terminal 3L) ⇨ If OK, replace ECU ⇨ If not OK, repair wiring harness
3	Is there continuity between intake air thermosensor terminal (BR/B) and a ground	Yes	Go to next step
		No	Repair wiring harness
4	Is resistance of intake air thermosensor OK? Temperature: 20°C {68°F} — Resistance {kΩ}: 2.2–2.7 Temperature: 85°C {185°F} — Resistance {kΩ}: 0.29–0.35	Yes	Replace ECU ☞ page F–150
		No	Replace intake air thermosensor ☞ page F–183

17U0F-045

Circuit Diagram

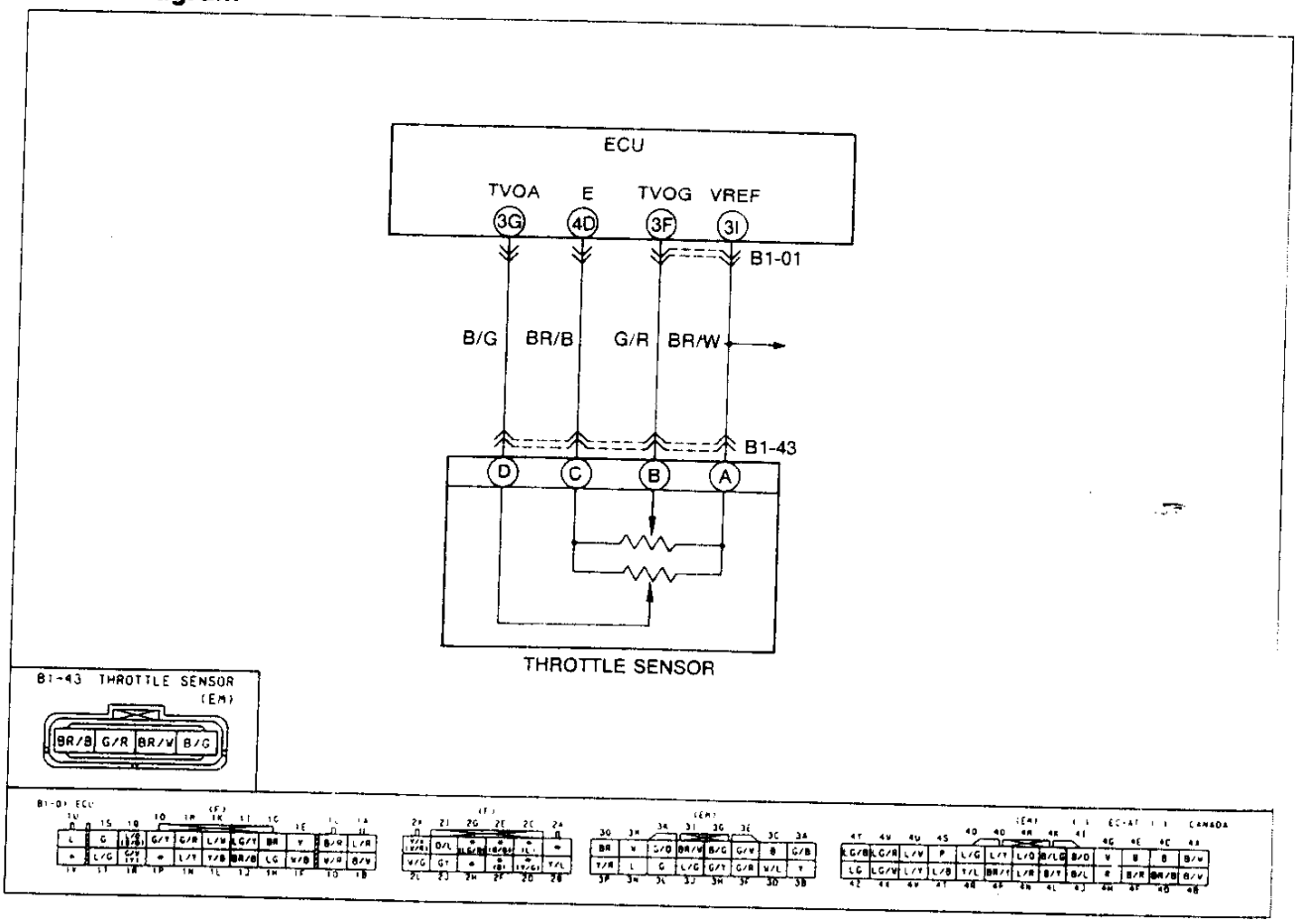


16E0F2-045

CODE No.	12 (THROTTLE SENSOR [FULL RANGE])		
STEP	INSPECTION		ACTION
1	Does throttle sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is throttle sensor terminal (BR/W) voltage OK with throttle sensor disconnected? Condition: Ignition switch ON — Voltage: Approx. 5.0V	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Throttle sensor terminal [BR/W]-ECU terminal 3I) ⇨ If OK, replace ECU ⇨ If not OK, repair wiring harness
3	Is there continuity between throttle sensor and ECU? Throttle sensor (B/G) — ECU 3G (B/G) Throttle sensor (BR/B) — ECU 4D (BR/B)	Yes	Check for short circuit in wiring harness (Throttle sensor terminal (B/G)-ECU terminal 3G) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is there continuity between terminals (BR/W) and (B/G) with throttle valve fully closed to fully opened OK?	Yes	Replace ECU ☞ page F–150
		No	Replace throttle sensor ☞ page F–182

17U0FX-046

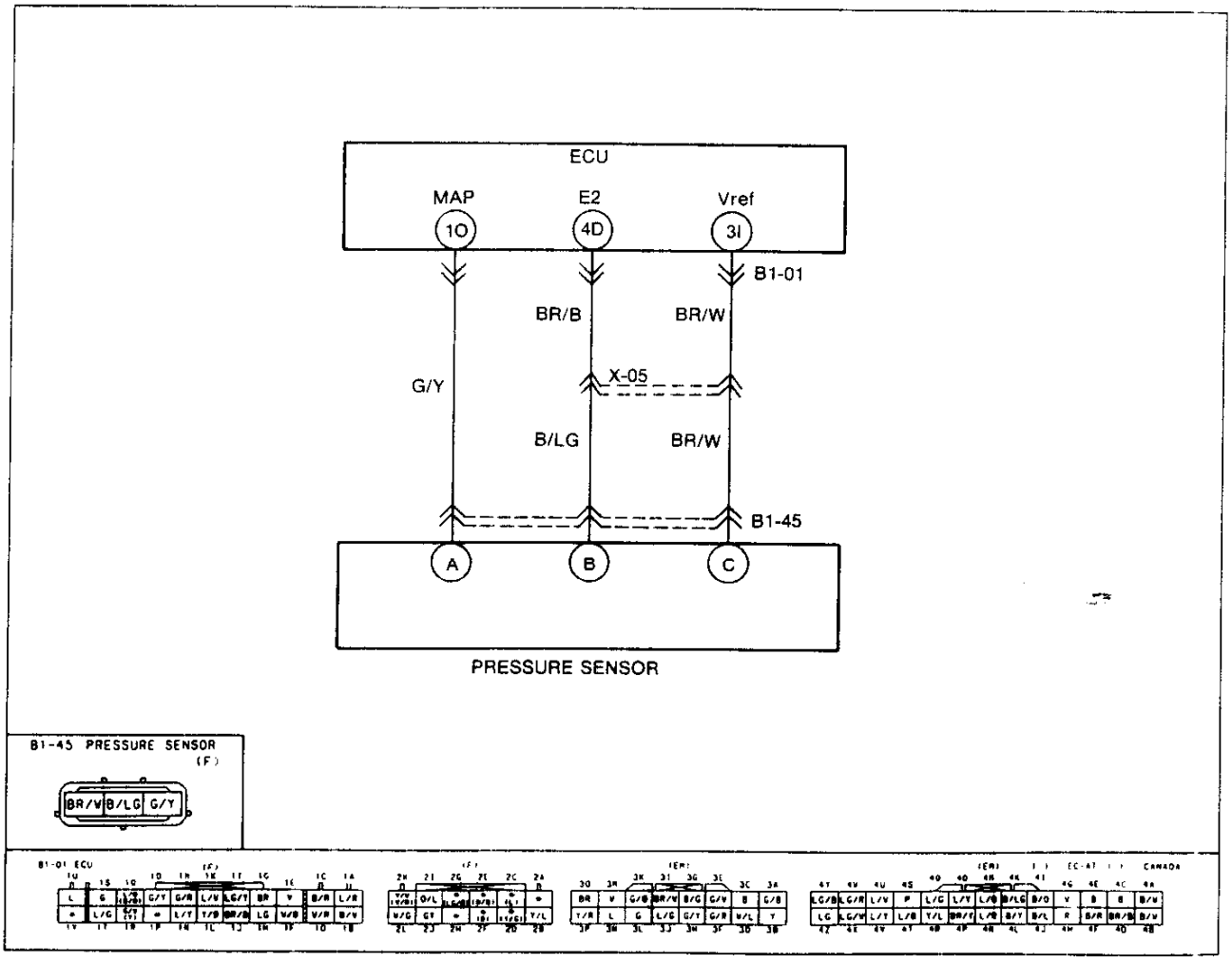
Circuit Diagram



CODE No.	13 (PRESSURE SENSOR)		
STEP	INSPECTION		ACTION
1	Does pressure sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (BR/W) voltage OK with pressure sensor connector disconnected? Condition: Ignition switch ON — Voltage: Approx. 5V	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (pressure sensor terminal [BR/W] ECU relay terminal [BR/W])
3	Is there continuity between pressure sensor terminal (BR/B) and ECU terminal 4D	Yes	Go to next step
		No	Repair wiring harness
4	Is output voltage (G/Y) of pressure sensor OK? Pressure or Vaccum — Voltage – 66 kPa {– 500 mmHg, 19.7 inHg} — 1.3–1.6V 0 kPa {0 mmHg, 0 inHg} — 2.3–2.8V 98.7 kPa {740 mmHg, 29.1 inHg} — 4.3–4.6V	Yes	Replace ECU ☞ page F–150
		No	Replace pressure sensor ☞ page F–181

17U0F1-047

Circuit Diagram



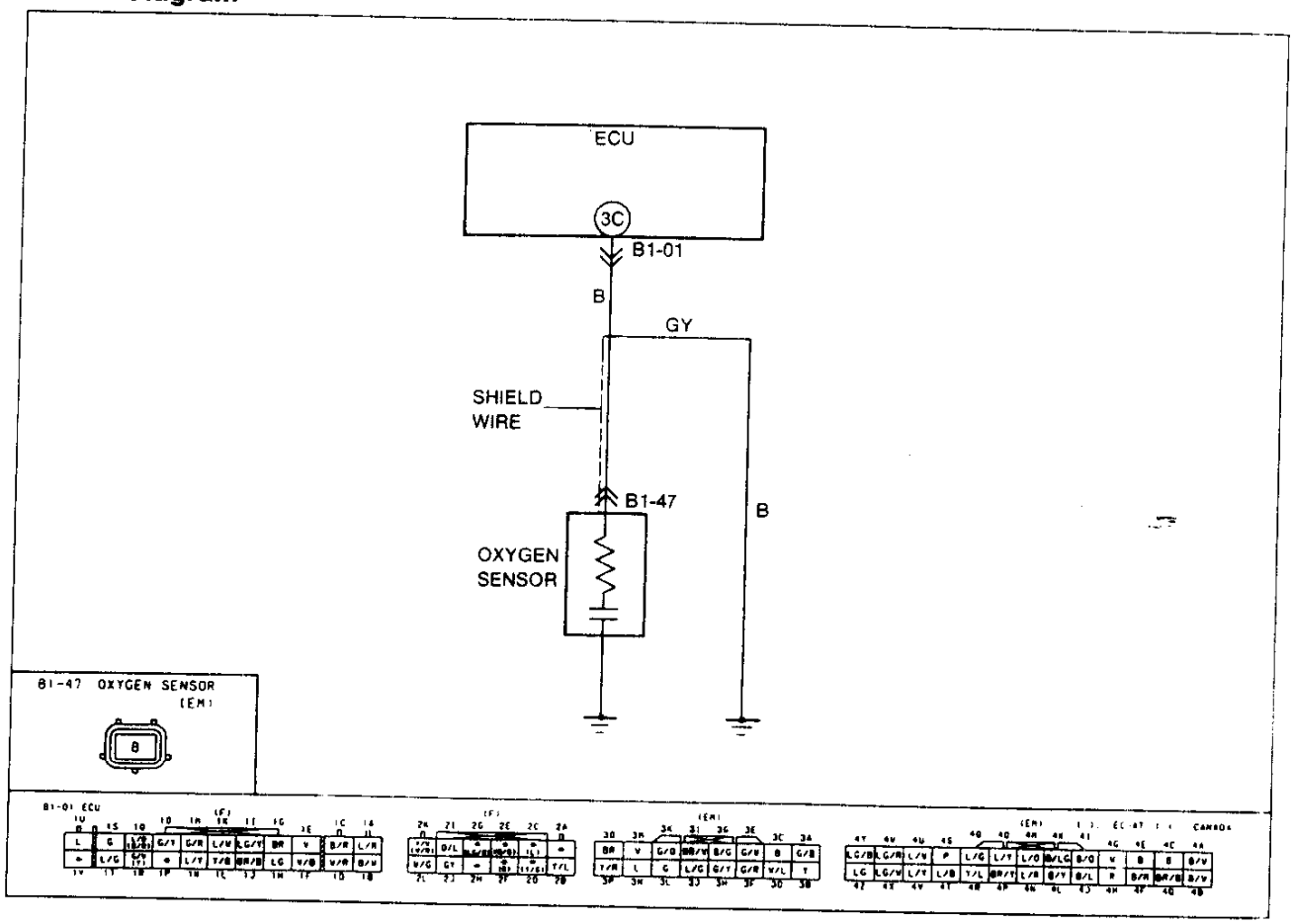
CODE No.	14 (ATMOSPHERIC PRESSURE SENSOR-IN ECU)
STEP	ACTION
1	Replace ECU ☞ page F-150

16EDI2-050

CODE No.	15 (OXYGEN SENSOR-INACTIVATION)		
Note ● If Code No.15 and 17 are both present, first perform the checking procedure for Code No.17.			
STEP	INSPECTION		ACTION
1	Does oxygen sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is oxygen sensor output voltage OK?	Yes	Go to next step
		No	Replace oxygen sensor ☞ page F-113
3	Is there continuity between oxygen sensor and ECU terminal 3C (B)?	Yes	Check for short circuit in wiring ☞ page F-150 ⇨ If OK, replace ECU ⇨ If not OK, repair wire harness
		No	Repair wiring harness

17U0FX 048

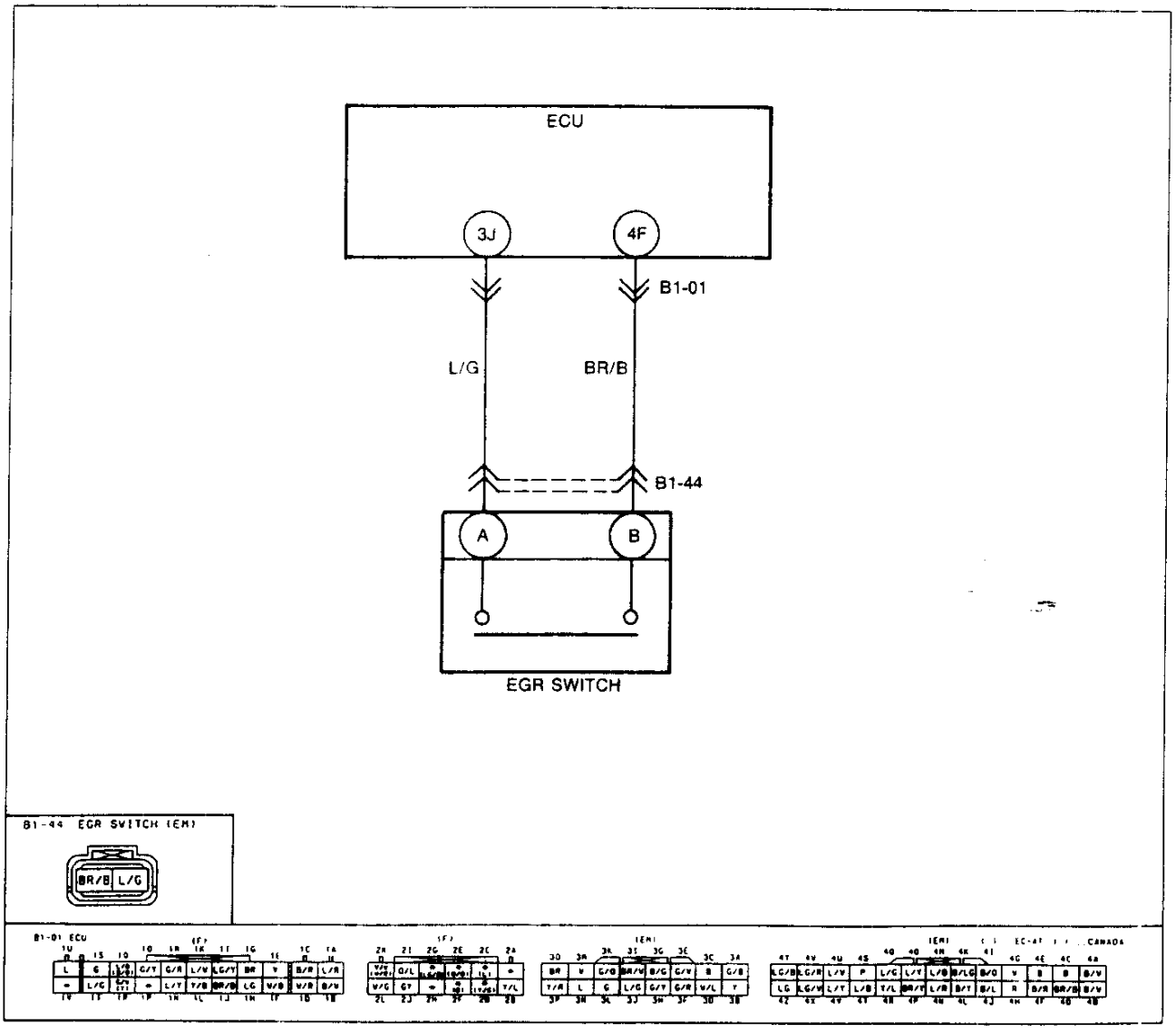
Circuit Diagram



CODE No.	16 (EGR SWITCH) — CALIFORNIA ONLY		
STEP	INSPECTION		ACTION
1	Does EGR switch circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (L/G) voltage OK with EGR switch connector disconnected.	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (EGR switch terminal [LG]-ECU terminal 3J)
3	Is there continuity between EGR switch terminal (BR/B) and ECU terminal 4F?	Yes	Go to next step
		No	Repair wiring harness
4	Is EGR switch OK? ☞ page F–127	Yes	Replace ECU ☞ page F–150
		No	Replace EGR valve

17U0F1-049

Circuit Diagram



SELF-DIAGNOSIS FUNCTION

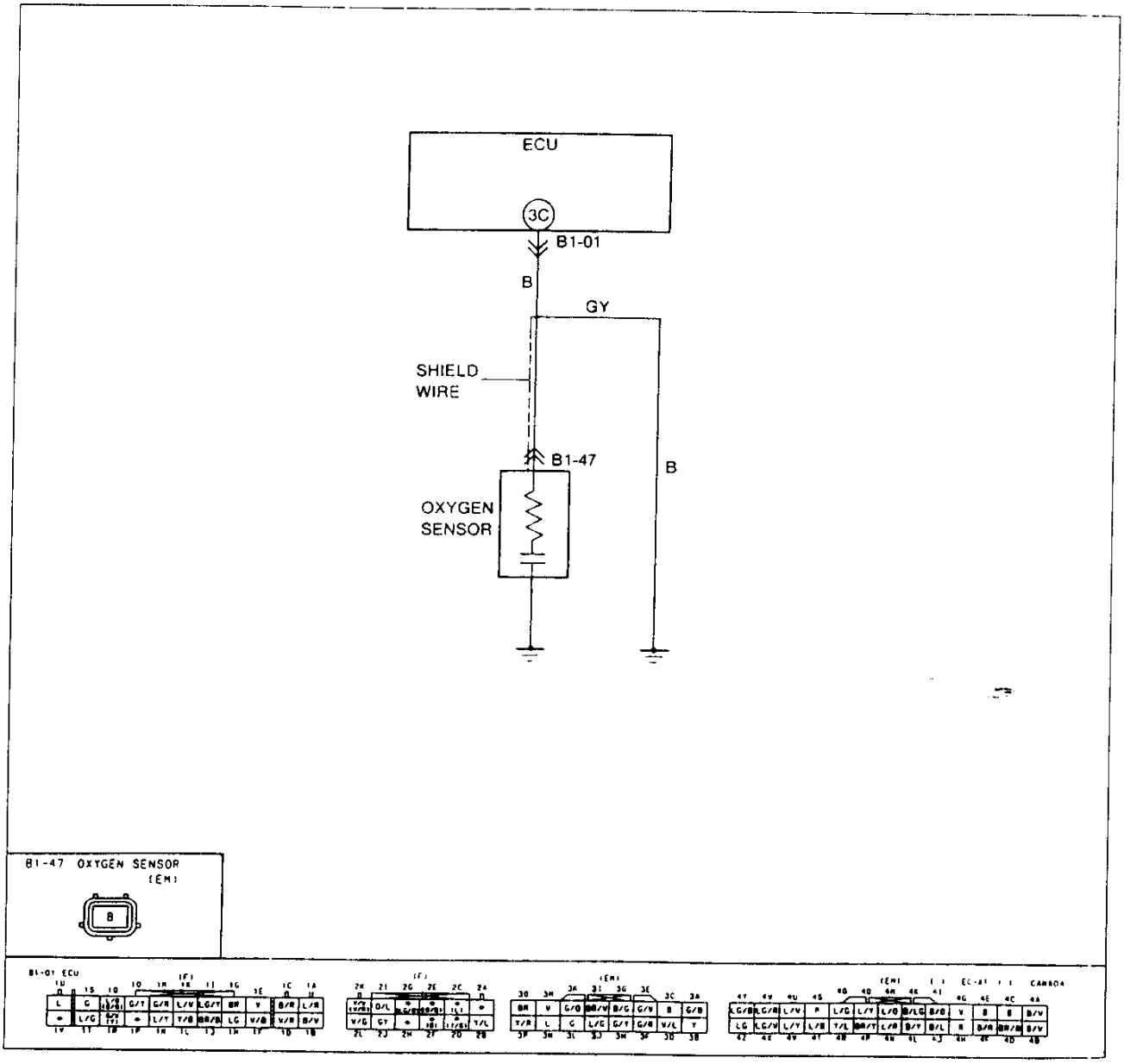
CODE No.	17 (FEEDBACK SYSTEM)		
STEP	INSPECTION		ACTION
1	Is the same Code No. present following afterrepair procedure? ☞ page F–66	Yes	Go to next step
		No	Check oxygen sensor circuit for a poor connection ⇨ If OK, perform troubleshooting Code No.15
2	Does monitor lamp of Self-Diagnosis Checker illuminate at idle after the engine has been warmed up and run at **2500–3000 rpm** for **3 min**?	Yes	Go to next step **Note** • **A/F mixture rich**
		No	Go to Step 5 **Note** • **A/F mixture is lean or misfire is occurring**
3	Is fuel line pressure correct at idle? ☞ page F–104 **Fuel line pressure:** **190–220 kPa {1.9–2.3 kgf/cm², 28–32 psi}**	Yes	Go to next step
		No	**High pressure** Check if fuel return hose is clogged or restricted ☞ page F–104 ⇨ If OK, replace pressure regulator
4	Is there fuel leakage at injector? ☞ page F–107	Yes	Replace injector ☞ page F–105
		No	Check water termosensor? ☞ page F–183 ⇨ If it is OK, replace oxygen sensor ⇨ If it is not OK, replace it
5	Disconnect each high tension lead at idle; does engine speed decrease equally at each rotor?	Yes	Go to next step
		No	Go to Step 8
6	Is fuel line pressure correct at idle? ☞ page F–97 **Fuel line pressure:** **190–220 kPa {1.9–2.3 kgf/cm², 28–32 psi}**	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose ⇨ If it **quickly** increases, check pressure regulator ☞ page F–104 ⇨ If it **gradually** increases, check for clogging between fuel pump and pressure regulator ⇨ If hose is not clogged, check fuel pump maximum pressure ☞ page F–101
7	Is there air leakage in intake air system components?	Yes	Replace oxygen sensor
		No	Repair ☞ page F–76
8	Is there a misfire of a dead rotor from Step 5 inspection?	Yes	Repair or replace ignition system component(s)
		No	Go to next step

V_B: Battery voltage

STEP	INSPECTION		ACTION
9	Is there an injector operating sound at idle of dead rotor from Step 5 inspection?	Yes	Go to next step
		No	Check for approx. V_B at injector terminal wire ⇨ If there is, replace injector ☞ page F-105 ⇨ If there is not, check for a short or open circuit in wire harness
10	Replace injector at dead rotor from Step 5 inspection ☞ page F-105 Is the same Code No. present following afterrepair procedure?	Yes	Try known good ECU
		No	System OK

17U0F-050

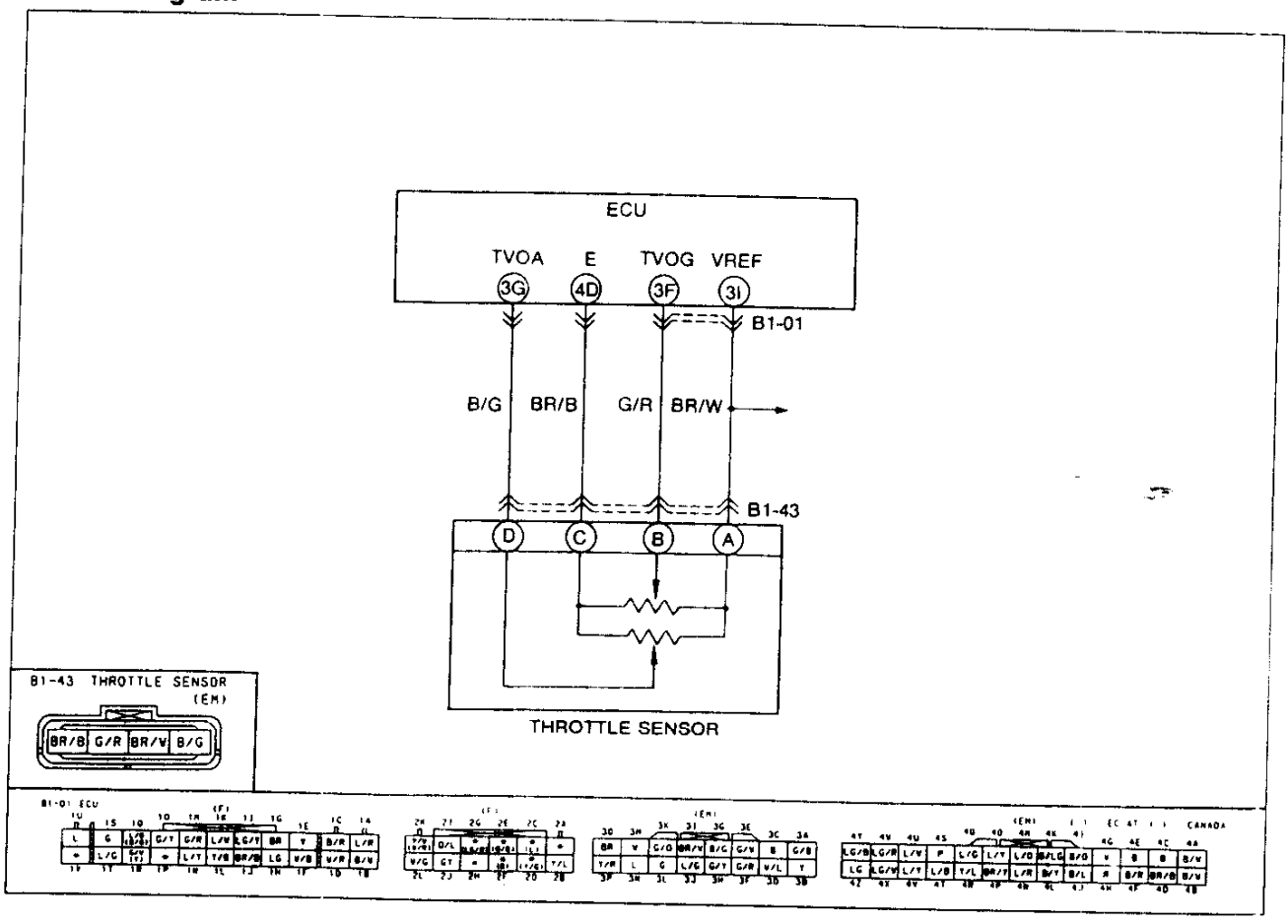
Circuit Diagram



CODE No.	18 (THROTTLE SENSOR [NARROW RANGE])		
STEP	INSPECTION		ACTION
1	Does throttle sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is throttle sensor terminal (BR/W) voltage OK with throttle sensor disconnected? Condition: Ignition switch ON — Voltage: Approx. 5.0V	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Throttle sensor terminal [BR/W]-ECU terminal 3I) ⇨ If OK, replace ECU ⇨ If not OK, repair wiring harness
3	Is there continuity between throttle sensor and ECU? Throttle sensor (G/R) — ECU 3F (G/R) Throttle sensor (BR/B) — ECU 4D (BR/B)	Yes	Check for short circuit in wiring harnes (Throttle sensor terminal (G/R)-ECU terminal 3F) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is there continuity between terminals (BR/W) and (G/R) with throttle valve closed to fully opened OK?	Yes	Replace ECU ☞ page F-150
		No	Replace throttle sensor ☞ page F-182

17U0FX 051

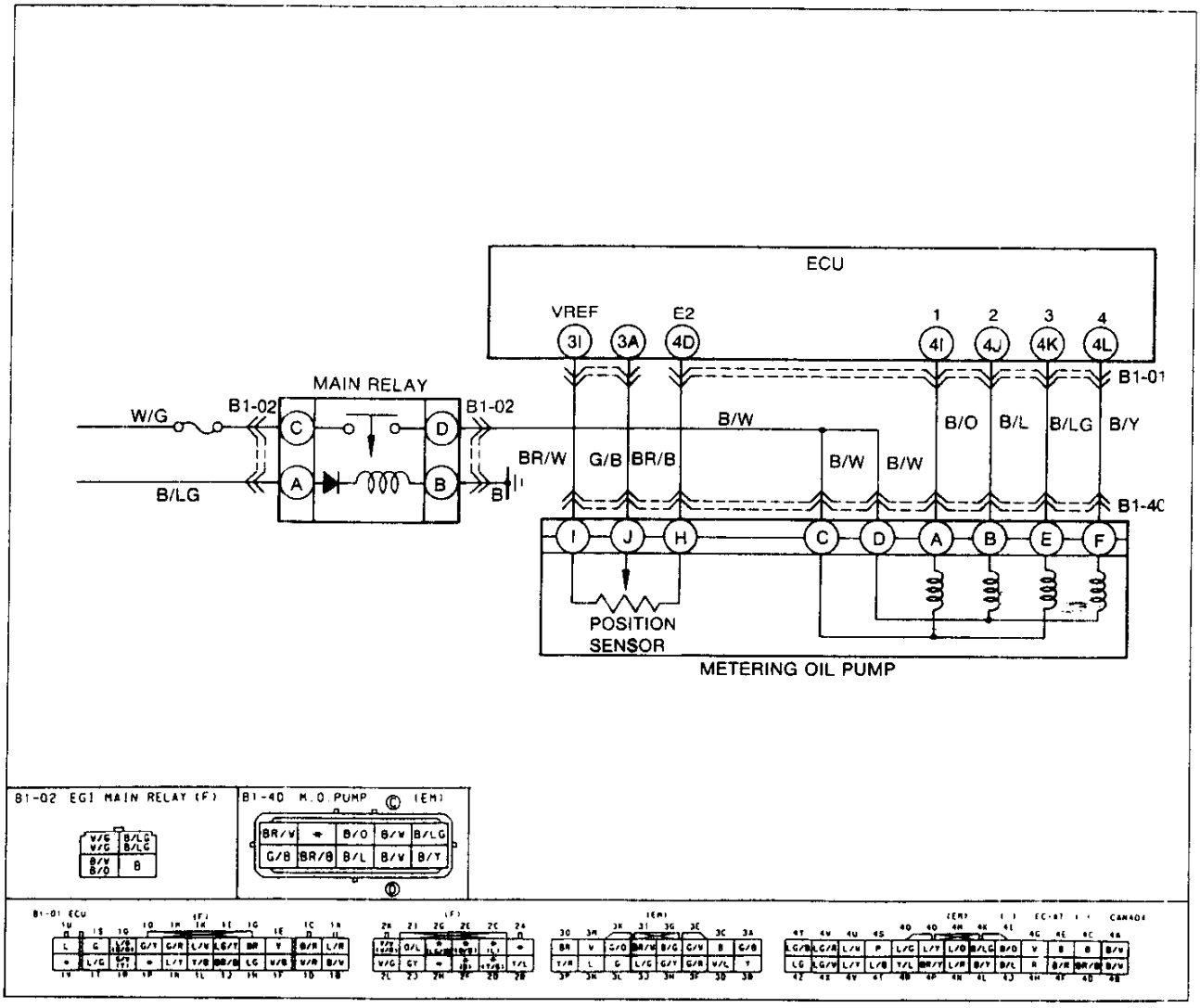
Circuit Diagram



CODE No.	20 (METERING OIL PUMP POSITION SENSOR)		
STEP	INSPECTION		ACTION
1	Are there any poor conections at metering oil pump and ECU connectors?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECU terminal 3A (G/B) voltage OK? Condition: Idle — Voltage: 1.1V Condition: Acceleration — Voltage: 1.1V–4.2V	Yes	Go to step 4
		No	Go to next step
3	Is resistance of MOP position sensor OK? Resistance: J–H 0.4–12 kΩ J–I 1.0–2 kΩ H–I 0.4–12 kΩ	Yes	Repair wiring harness (Mop position sensor-ECU terminal 3A)
		No	Replace MOP
4	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for sarvice code Is service code displayed?	Yes	Replace ECU
		No	Intermittent poor connection check for cause.

Circuit Diagram

17U0F)-052

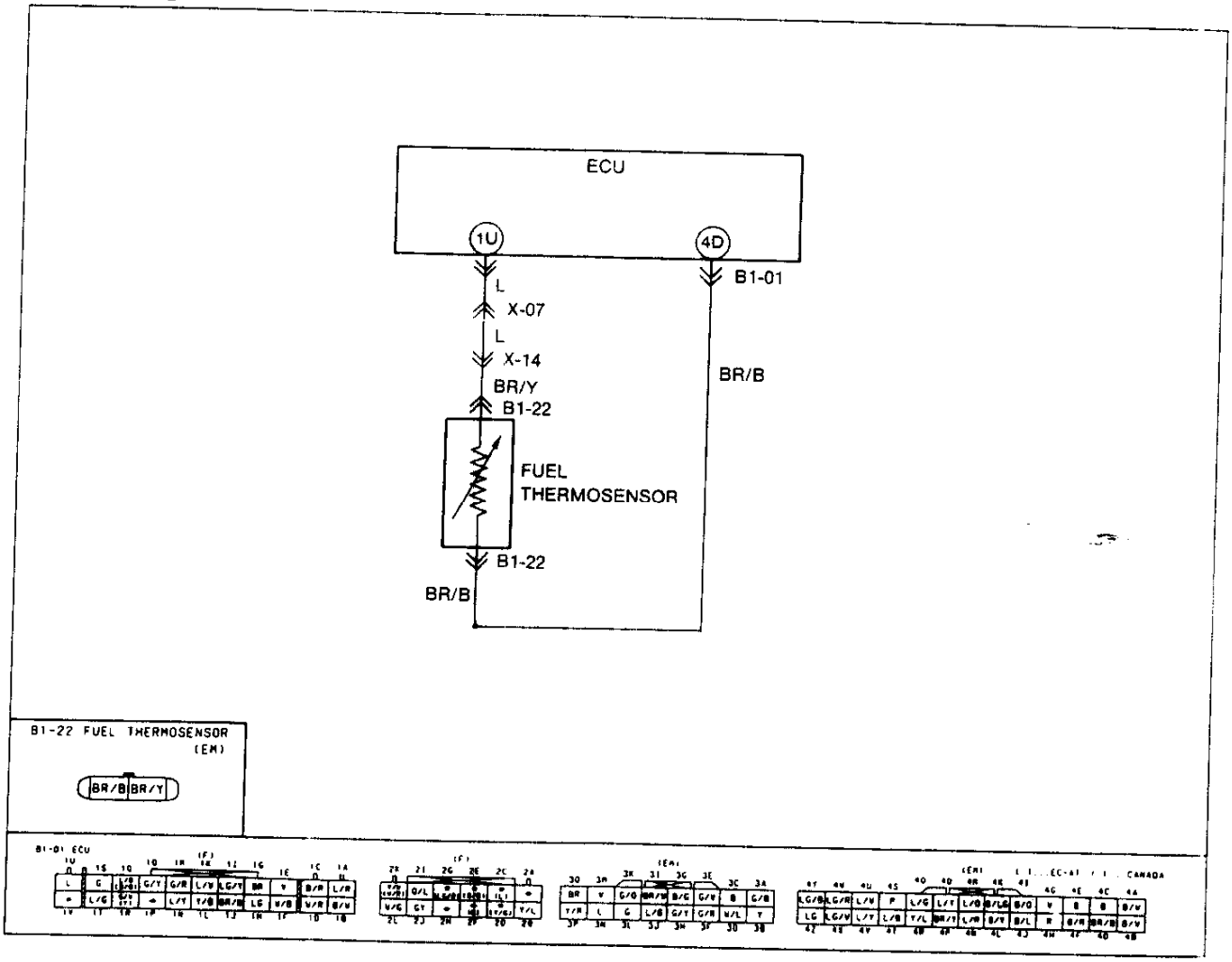


SELF-DIAGNOSIS FUNCTION

CODE No.	23 (FUEL THERMOSENSOR)		
STEP	INSPECTION		ACTION
1	Does the fuel thermosensor circuit have a poor connection?	Yes	Repair connector and/or harness
		No	Go to next step
2	Is fuel thermosensor terminal (BR/B) voltage OK with fuel thermosensor connector disconnected? Condition: Ignition switch ON — Voltage: Approx. 5.0 V	Yes	Go to next step
		No	Check for short or open circuit in wiring harness (fuel thermosensor terminal [BR/B]-ECU terminal 1U) ⇨ If OK, replace ECU ⇨ If not OK, repair wiring harness
3	Is there continuity between fuel thermosensor terminal (BR/Y) and a ground?	Yes	Go to next step
		No	Repair wiring harness
4	Is resistance of fuel thermosensor OK? Fuel temp: −20°C {−4°F} — Resistance {kΩ}: 14.6–17.8 20°C {68°F}: 2.2–2.7 80°C {176°F}: 0.29–0.35	Yes	Replace ECU ☞ page F–151
		No	Replace fuel thermosensor ☞ page F–184

17U0FX 053

Circuit Diagram

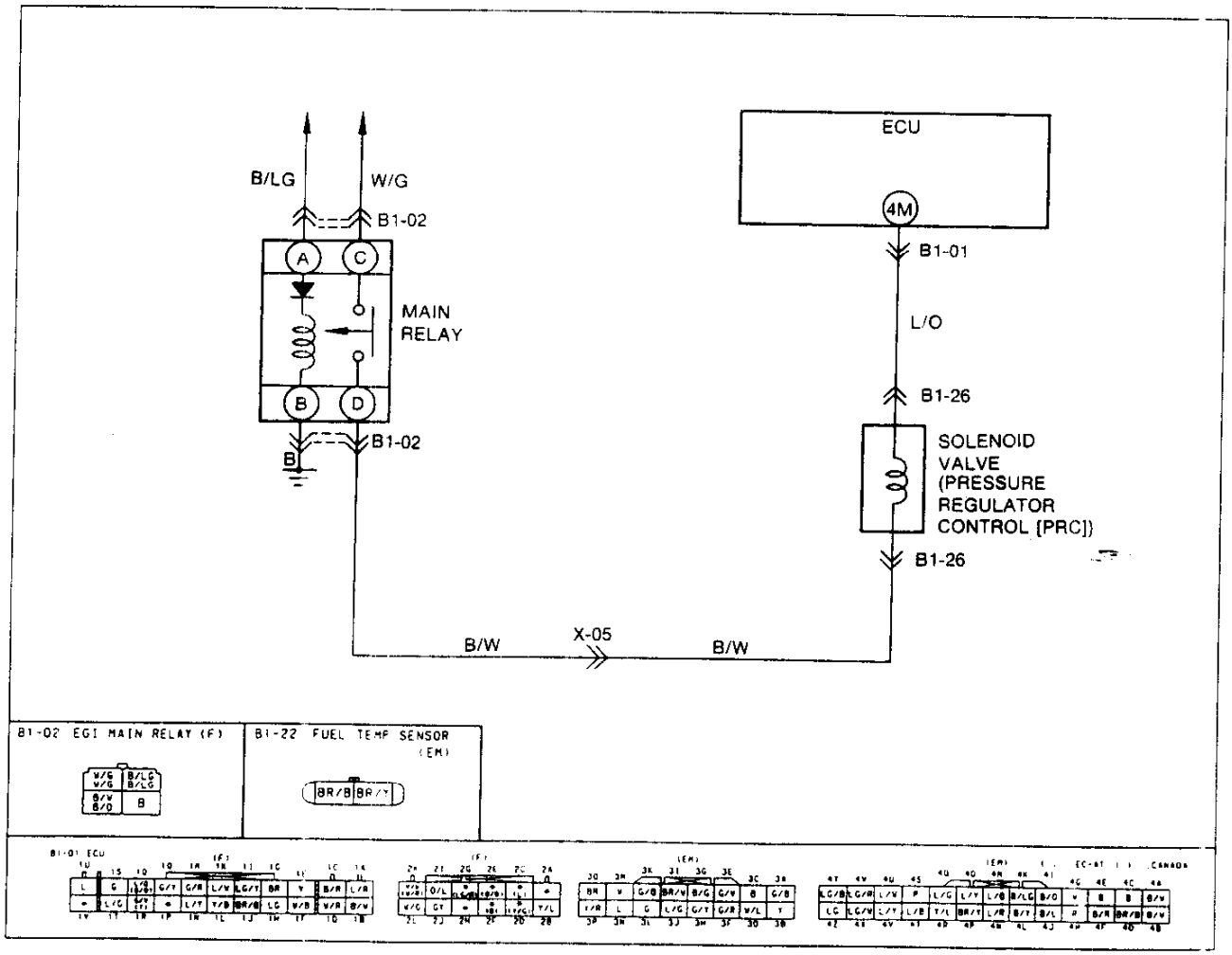


16E0F2-075

CODE No.	25 (SOLENOID VALVE–PRESSURE REGULATOR CONTROL [PRC])		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (L/O) and ECU terminal 4M?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [L/O]-ECU terminal 4M) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F-190	Yes	Replace ECU ☞ page F-150
		No	Replace solenoid valve

17U0FX 054

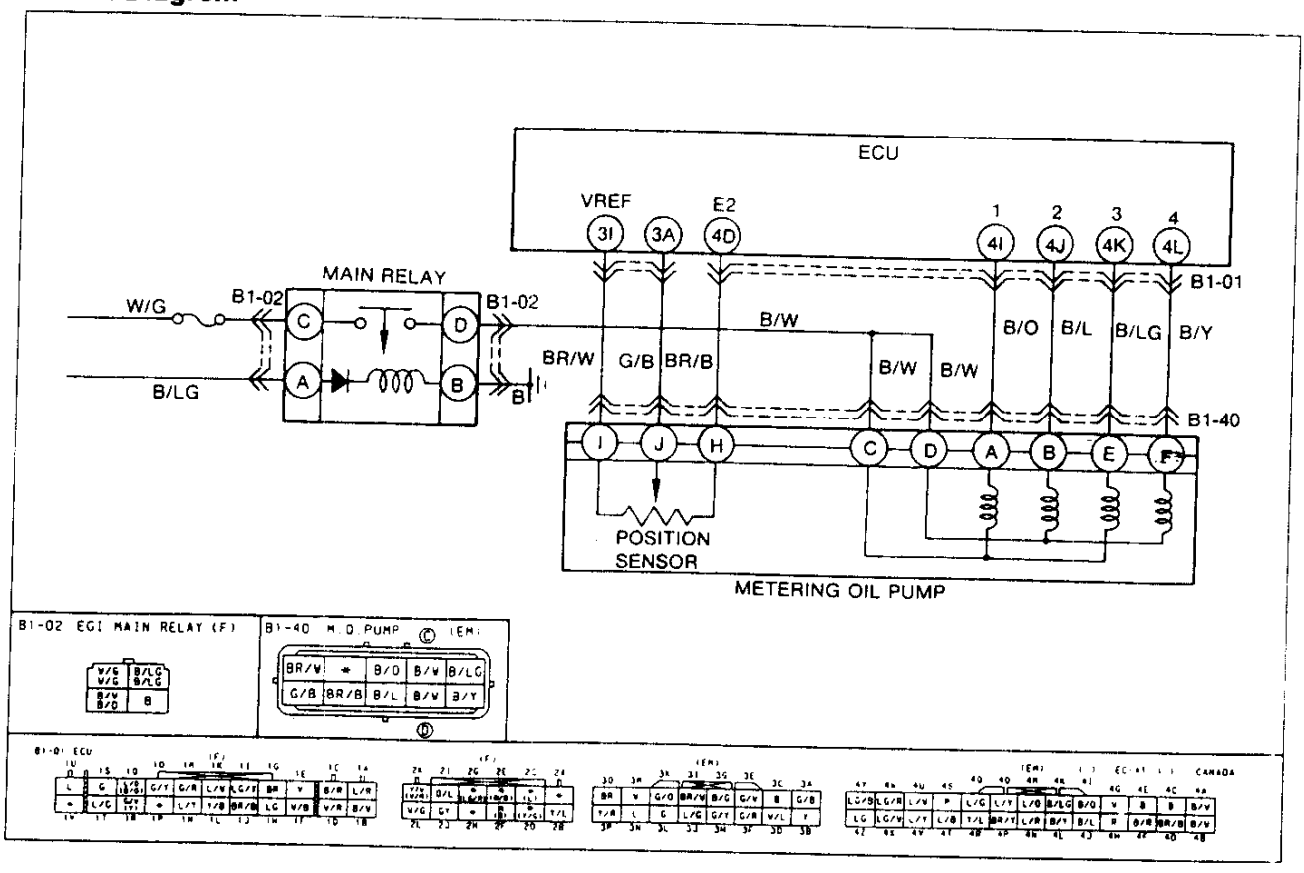
Circuit Diagrem



CODE No.	26 (METERING OIL PUMP STEPPING MOTOR)		
STEP	INSPECTION		ACTION
1	Are there any poor conections at metering oil pump and ECU connector?	Yes	Repair or replace connector
		No	Go to next step
2	Is resistance of MOP stepping motor OK? Resistance: terminal — kΩ C – SM1 A C – SM3 E D – SM2 B D – SM4 F 16–31	Yes	Go to next step
		No	Replace MOP
3	Is continuity between MOP stepping motor and ECU terminals OK? MOP terminal — ECU termina SM1 A — 4I (B/O) SM2 B — 4J (B/L) SM3 E — 4K (B/LG) SM4 F — 4L (B/Y)	Yes	Repair wiring harness (MOP-Main relay)
		No	Repair wiring harness (MOP-ECU terminals)
4	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for service code Is service code displayed?	Yes	Replace ECU
		No	Intermittent poor connection check for cause

17U0FX 055

Circuit Diagrem



CODE No. 27 (METERING OIL PUMP)

STEP	INSPECTION		ACTION
1	Are there any poor conections at metering oil pump and ECU connector?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECU terminal 3A voltage OK? Condition: Idle — Voltage: 1.1V Condition: Acceleration — Voltage: 1.0V–4.2V	Yes	Go to step 4
		No	Go to next step
3	Is resistance of MOP position sensor OK? Resistance: J–H 0.4–12 kΩ J–I 10–2 kΩ H–I 0.4–12 kΩ	Yes	Go to next step
		No	Replace MOP
4	Is ECU terminals voltage OK? Specification: (Idle) SM1 A — 4I (B/O) — One terminal: V_B SM2 B — 4J (B/L) — V_B SM3 E — 4K (B/LG) — Three terminals: 5–9 V SM4 F — 4L (B/Y) — 5–9 V	Yes	Go to step 7
		No	Go to next step
5	Is resistance of MOP stepping motor OK? Resistance: C – SM1 A: 16–31 kΩ C – SM3 E: 16–31 kΩ D – SM2 B: 16–31 kΩ D – SM4 F: 16–31 kΩ	Yes	Go to next step
		No	Replace MOP
6	Is continuity between MOP stepping motor and ECU terminals OK? SM1 A — 4I (B/O) SM2 B — 4J (B/L) SM3 E — 4K (B/LG) SM4 F — 4L (B/Y)	Yes	Repair wiring harness (MOP-Main relay)
		No	Repair wiring harness (MOP-ECU terminals)
7	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for service code Is service code displayed?	Yes	Replace ECU
		No	Intermittent poor connection check for cause

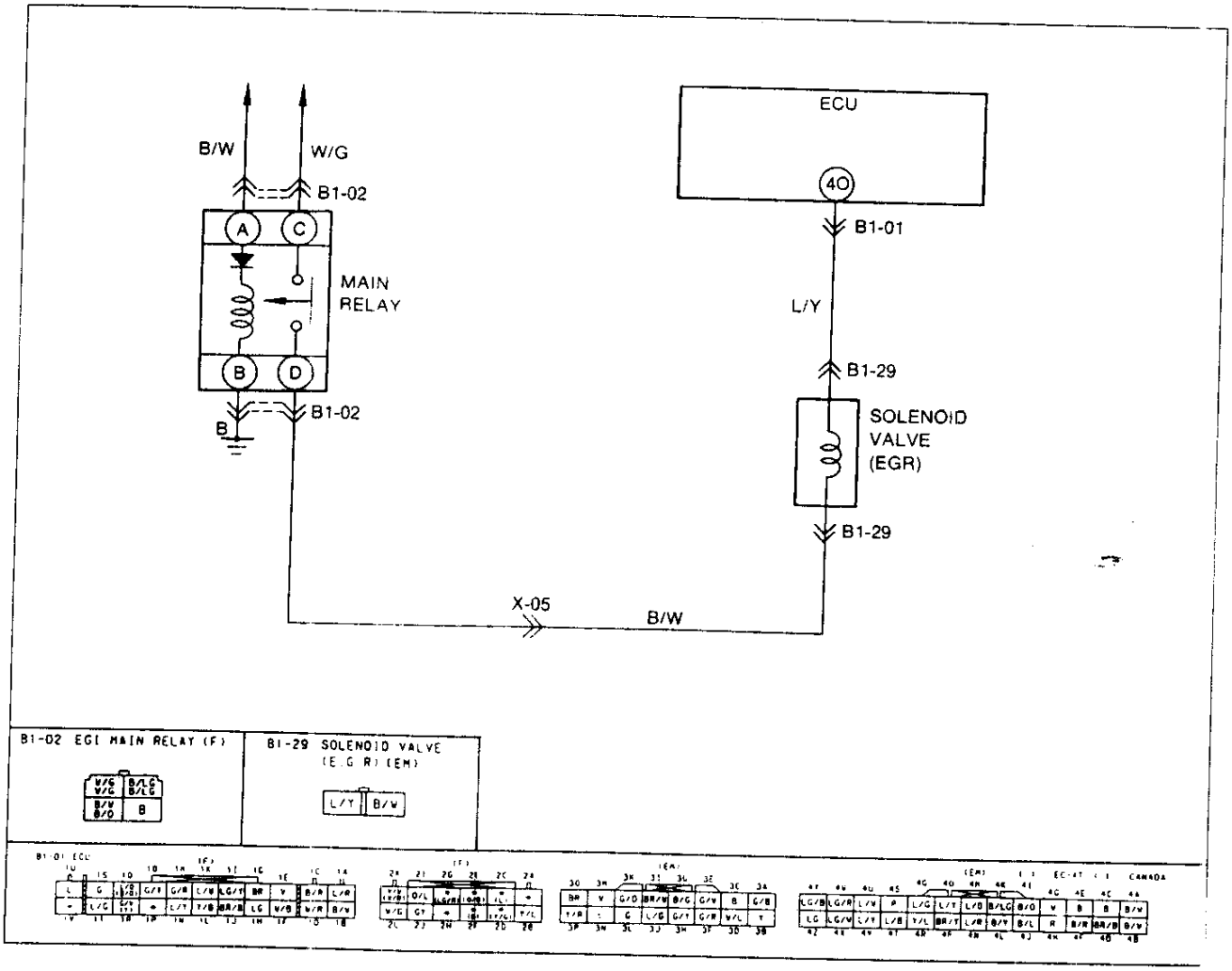
17U0FX-156

Circuit Diagrem
(Refer to page F–42)

CODE No.	28 (SOLENOID VALVE–EGR)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (L/Y) and ECU terminal 4O?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [L/Y]–ECU terminal 4O) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–190	Yes	Replace ECU ☞ page F–15(
		No	Replace solenoid valve

17U0FX 057

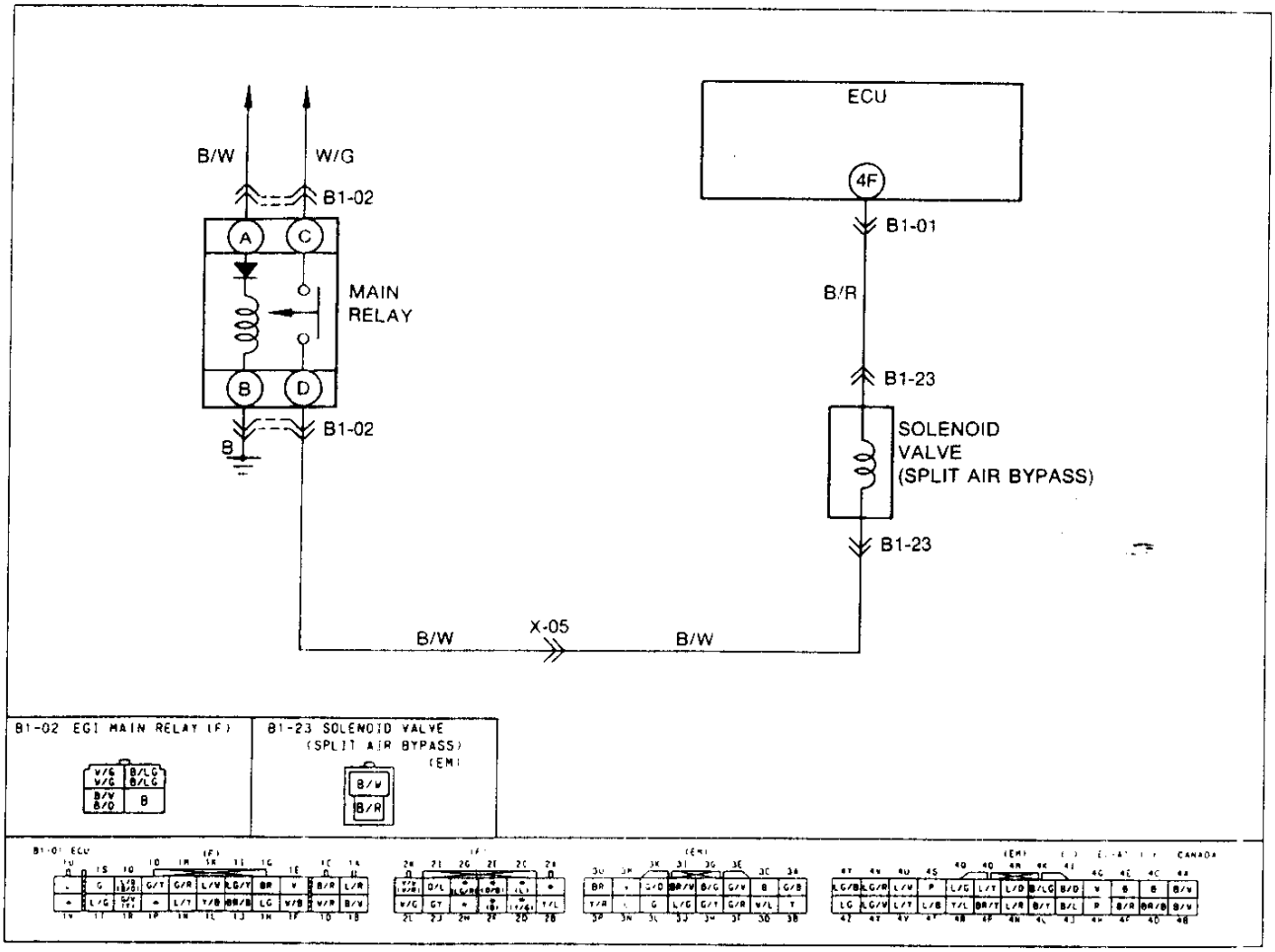
Circuit Diagrem



CODE No.	30 (SOLENOID VALVE–SPLIT AIR BYPASS)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (B/R) and ECU terminal 4F?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [B/R]–ECU terminal 4F) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–120	Yes	Replace ECU ☞ page F–15(
		No	Replace solenoid valve

17U0F)-058

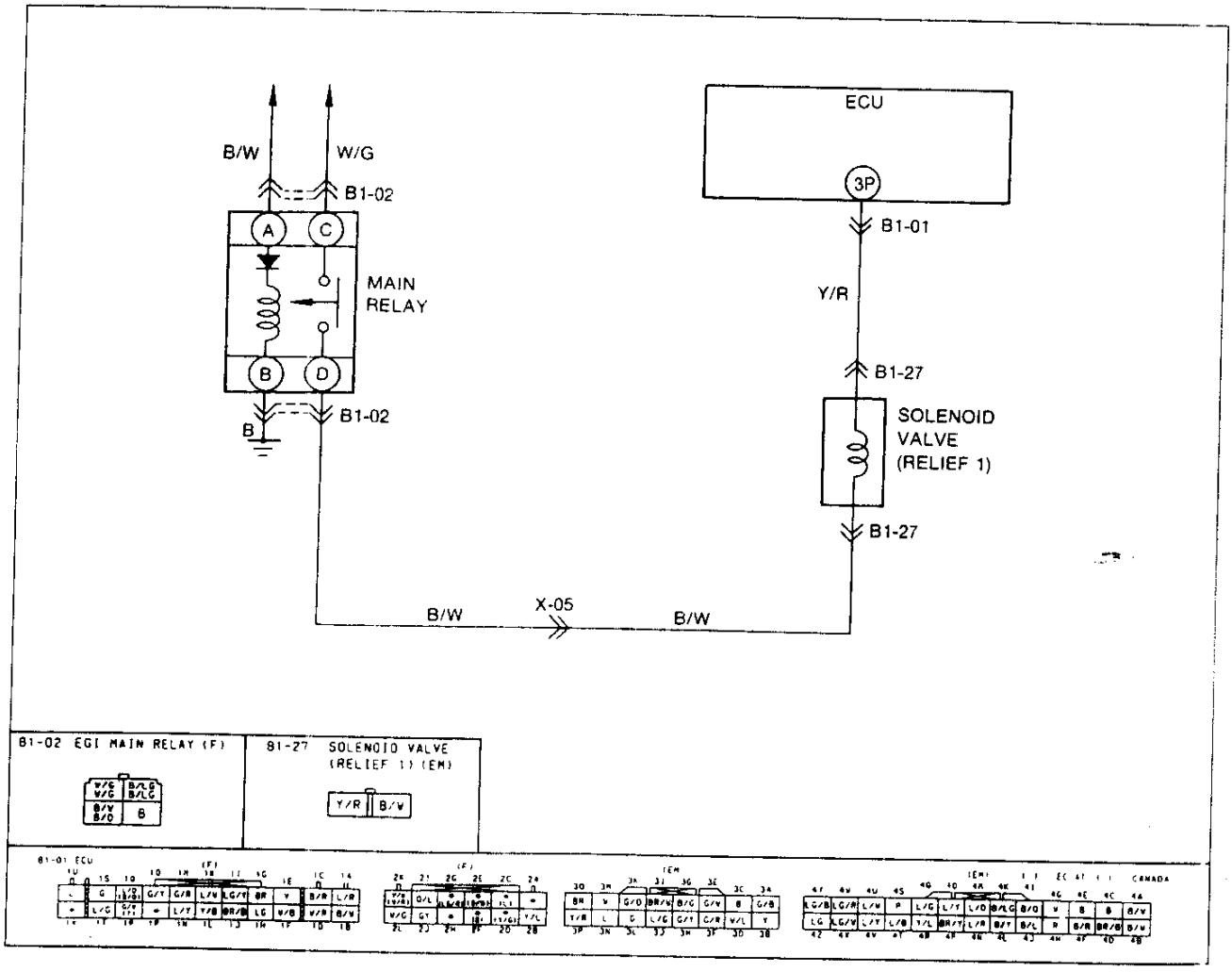
Circuit Diagrem



CODE No.	31 (SOLENOID VALVE–RELIEF 1)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (Y/R) and ECU terminal 3P?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [Y/R]–ECU terminal 3P) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F-123	Yes	Replace ECU ☞ page F-15(
		No	Replace solenoid valve

17U0FX 059

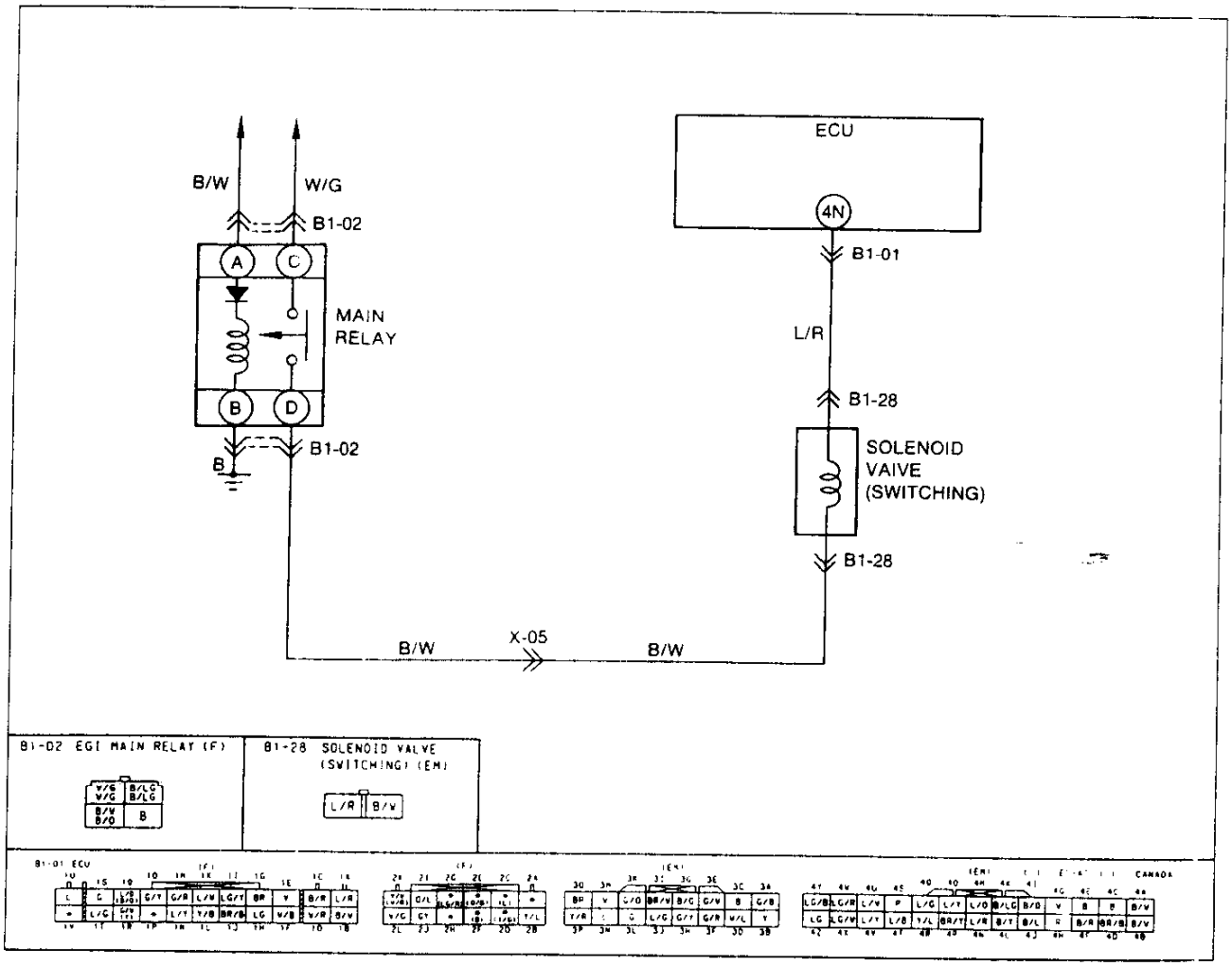
Circuit Diagrem



CODE No.	32 (SOLENOID VALVE–SWITCHING)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (L/R) and ECU terminal 4N?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [L/R]–ECU terminal 4N) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–190	Yes	Replace ECU ☞ page F–153
		No	Replace solenoid valve

17U0F0-060

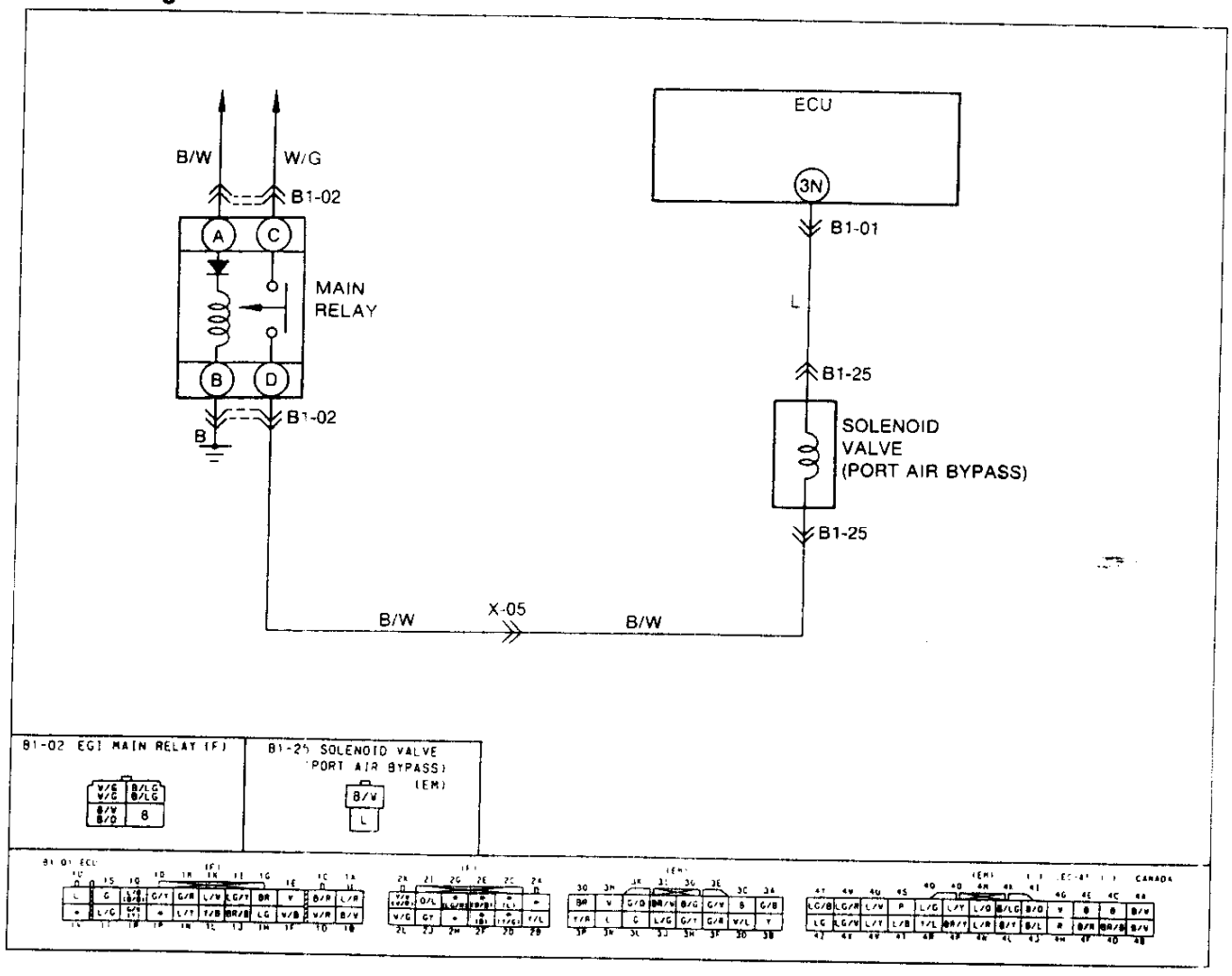
Circuit Diagrem



CODE No.	33 (SOLENOID VALVE–PORT AIR BYPASS)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (L) and ECU terminal 3N?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [L]–ECU terminal 3N) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–119	Yes	Replace ECU ☞ page F–150
		No	Replace solenoid valve

17U0FX 061

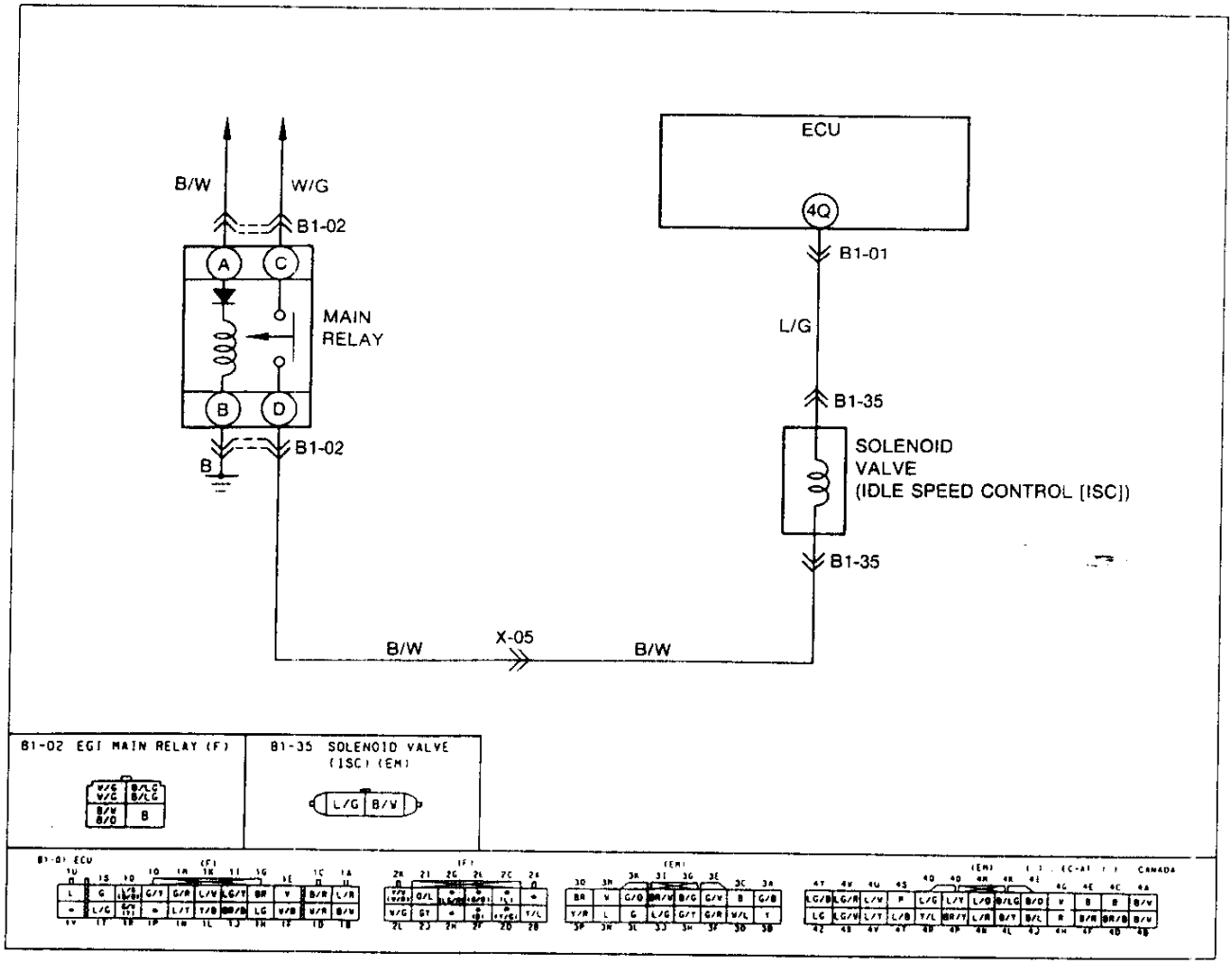
Circuit Diagrem



CODE No.	34 (SOLENOID VALVE–IDLE SPEED CONTROL)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (L/G) and ECU terminal 4Q?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [L/G]–ECU terminal 4Q) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–83	Yes	Replace ECU ☞ page F–150
		No	Replace solenoid valve

17U0F F-062

Circuit Diagrem

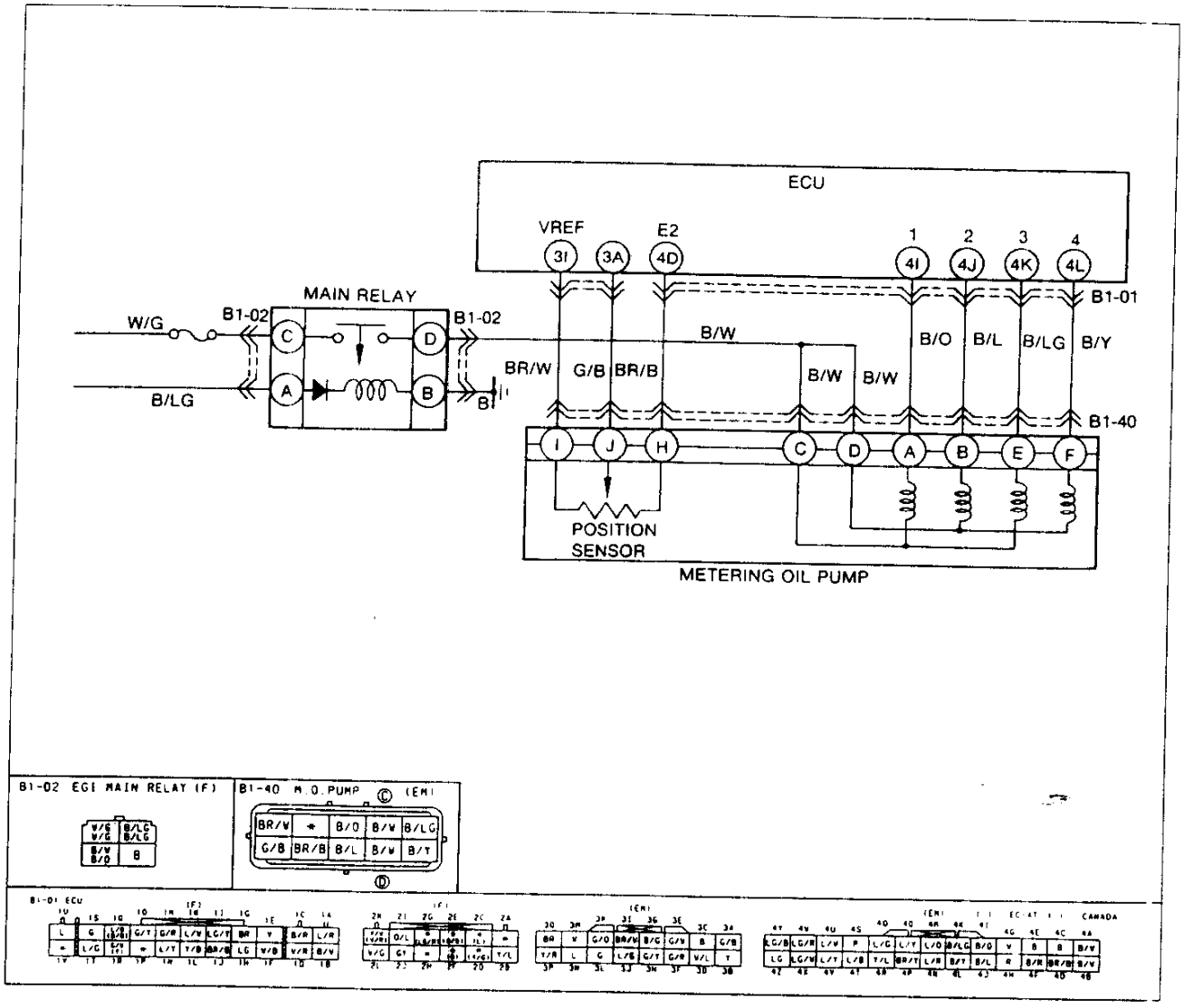


SELF-DIAGNOSIS FUNCTION

CODE No.	37 (METERING OIL PUMP)		
STEP	INSPECTION		ACTION
1	Is vattery voltage OK? **Specification: 12–14V (at Idle)**	Yes	Go to next step
		No	Repair charging system and/or Battery
2	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for service code Is service code displayed?	Yes	Replace ECU ☞ page F–150
		No	Intermittent poor connection Check for cause

17U0F -063

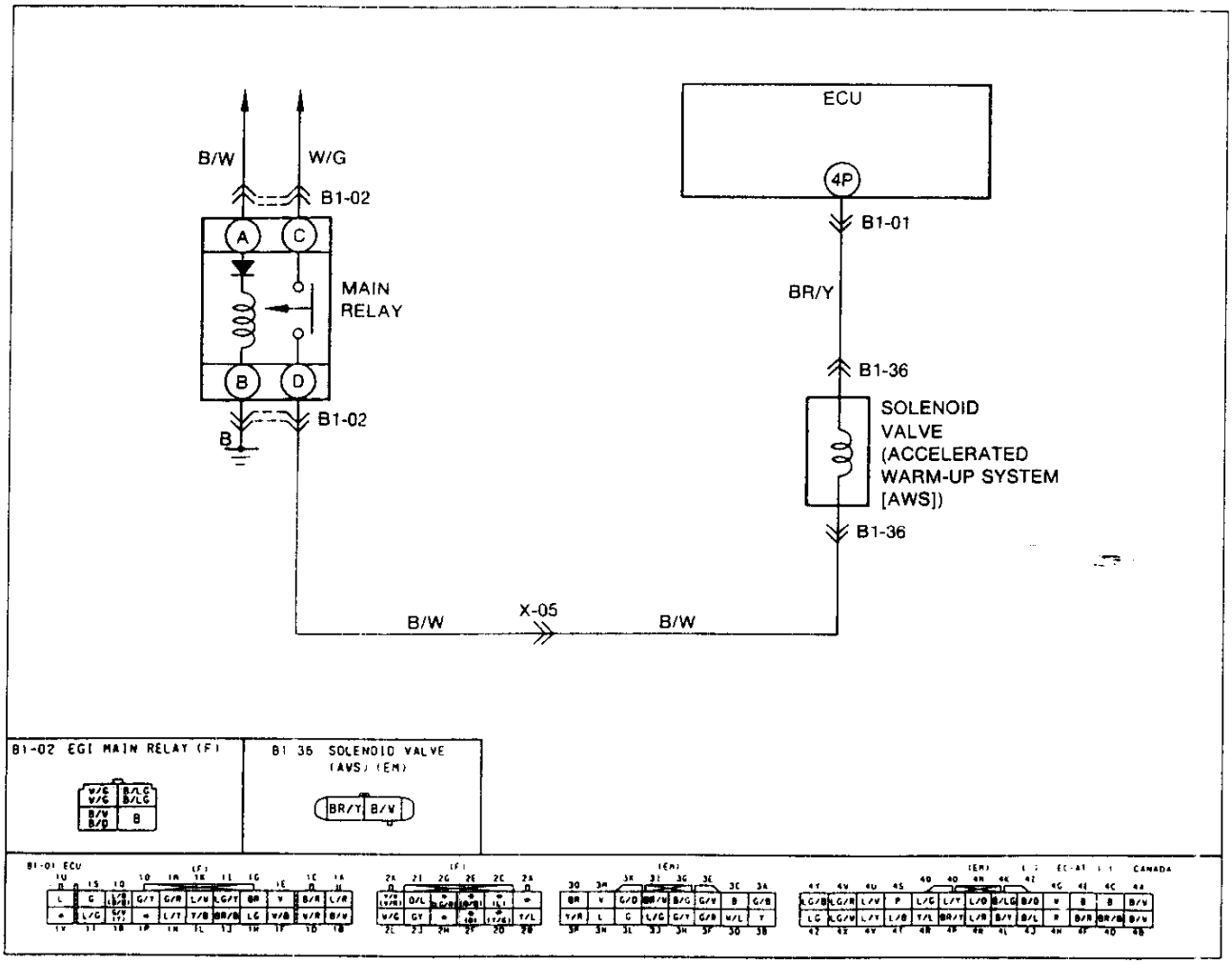
Circuit Diagram



CODE No.	38 (SOLENOID VALVE–ACCELERATED WARM-UP SYSTEM [AWS])		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (BR/Y) and ECU terminal 4P?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [BR/Y]–ECU terminal 4P) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–83	Yes	Replace ECU ☞ page F–15
		No	Replace solenoid valve

17UOF1-064

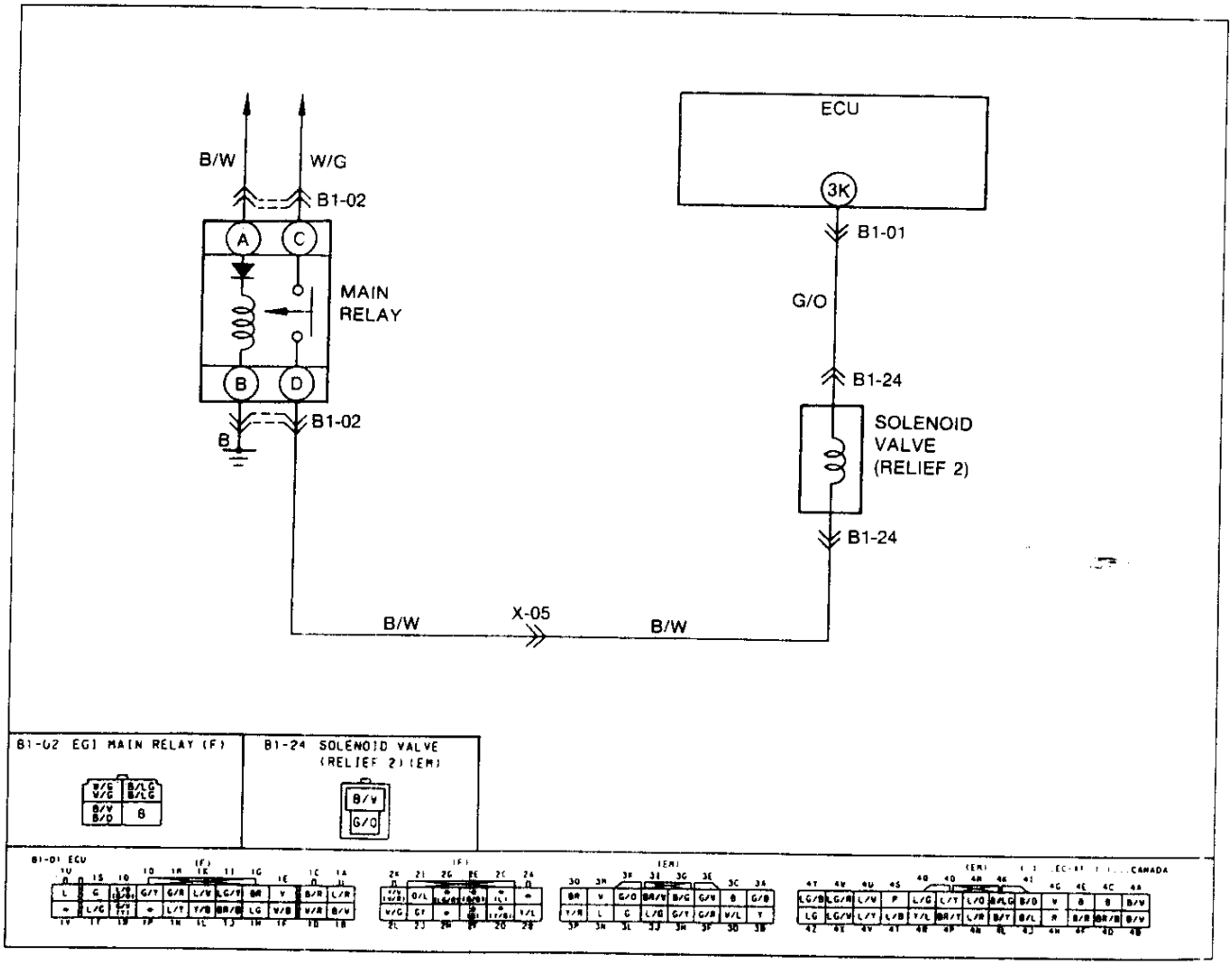
Circuit Diagram



CODE No.	39 (SOLENOID VALVE–RELIEF 2)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (G/O) and ECU terminal 3K?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [G/O]–ECU terminal 3K) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–123	Yes	Replace ECU ☞ page F–150
		No	Replace solenoid valve

17U0FX 065

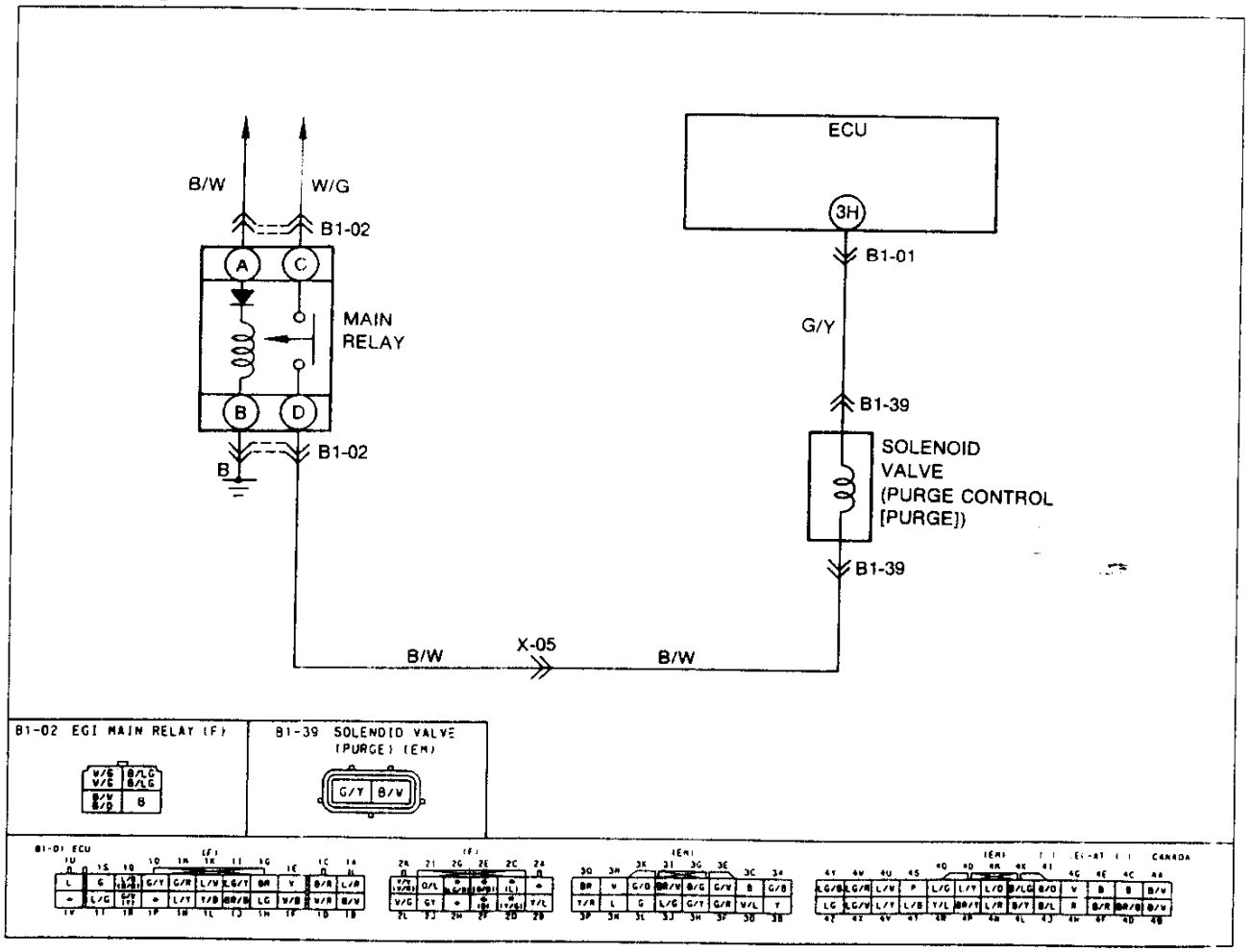
Circuit Diagram



CODE No.	40 (SOLENOID VALVE–PURGE CONTROL [PURGE])		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (G/Y) and ECU terminal 3H?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [G/Y]–ECU terminal 3H) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–131	Yes	Replace ECU ☞ page F–15
		No	Replace solenoid valve

117U0F-066

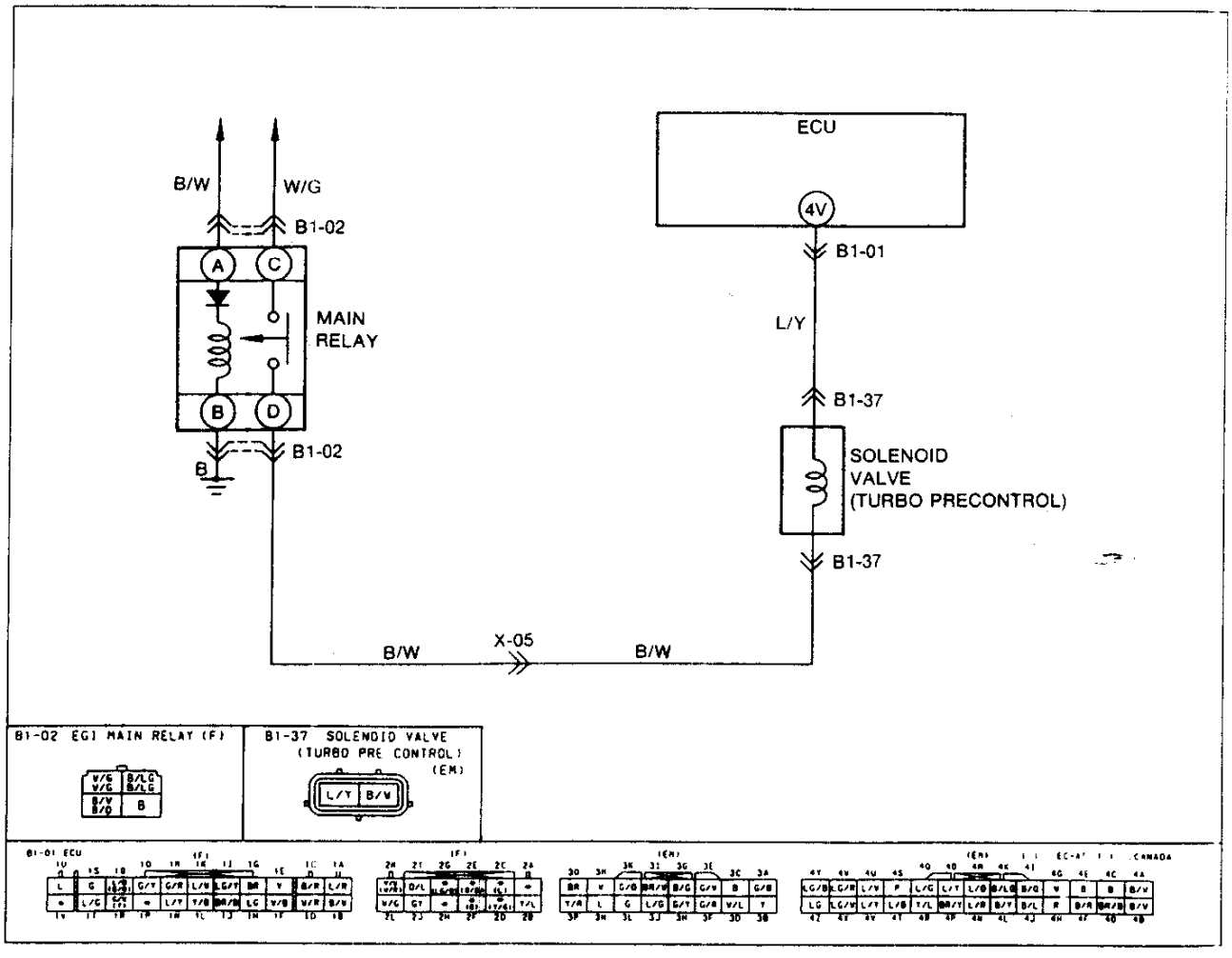
Circuit Diagram



CODE No.	42 (SOLENOID VALVE–TURBO PRECONTROL)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (L/Y) and ECU terminal 4V?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [L/Y]–ECU terminal 4V) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–93	Yes	Replace ECU ☞ page F–150
		No	Replace solenoid valve

17U0FX-07

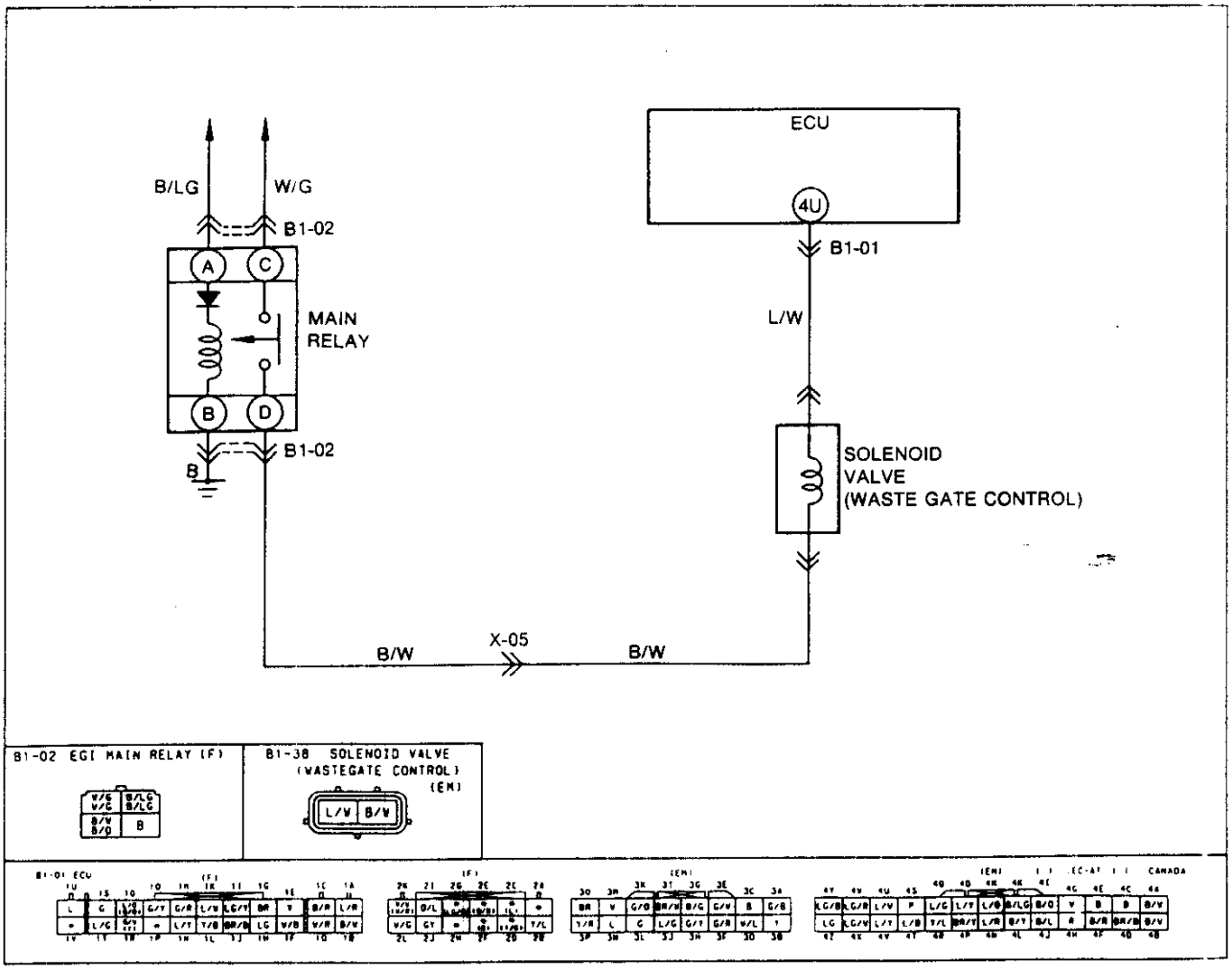
Circuit Diagram



CODE No.	43 (SOLENOID VALVE–WASTEGATE CONTROL)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (L/W) and ECU terminal 4U?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [L/W]–ECU terminal 4U) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–93	Yes	Replace ECU ☞ page F–150
		No	Replace solenoid valve

17U0FX-068

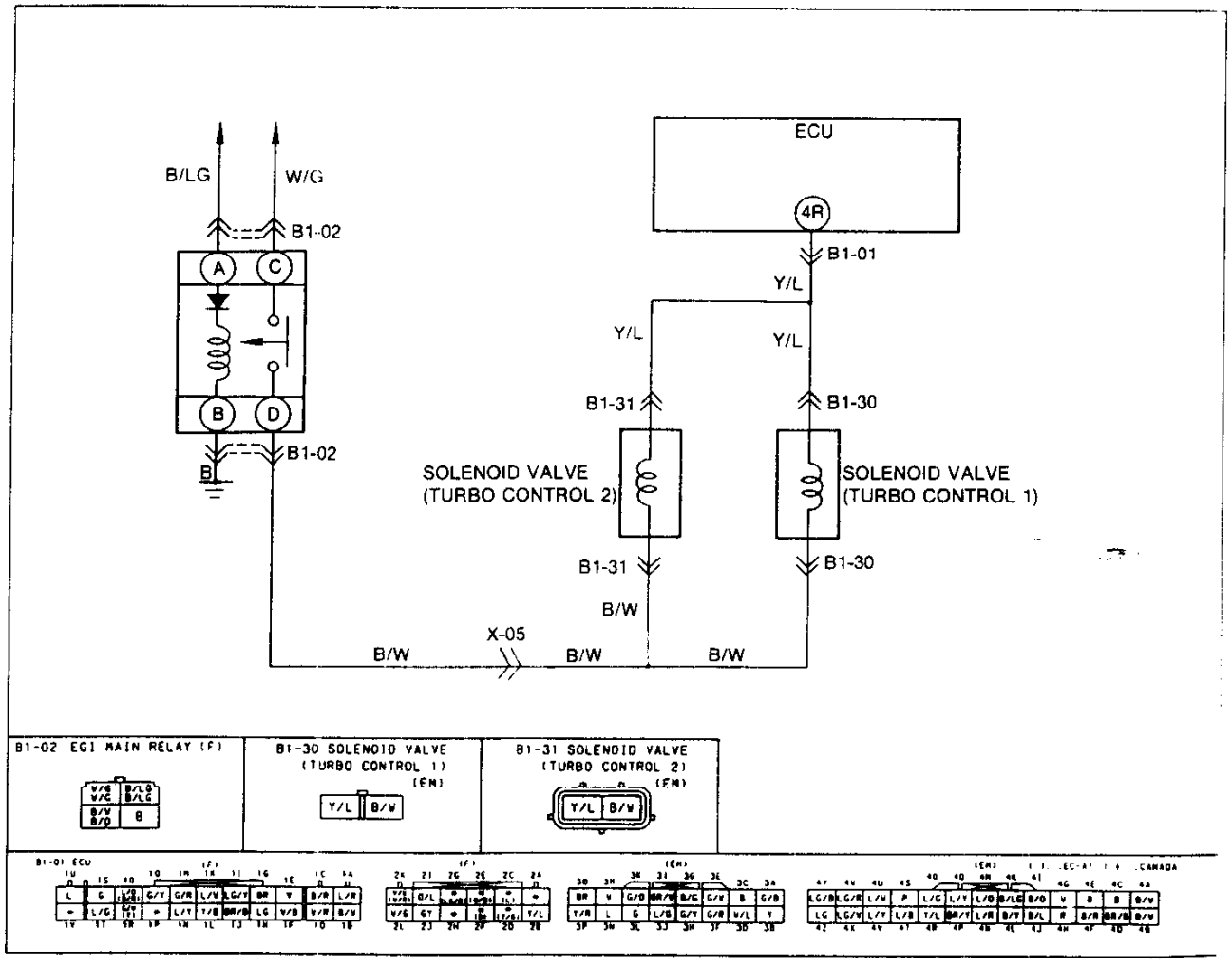
Circuit Diagram



CODE No.	44 (SOLENOID VALVE–TURBO CONTROL)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (Y/L) and ECU terminal 4R?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [Y/L]–ECU terminal 4R) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–93	Yes	Replace ECU ☞ page F–150
		No	Replace solenoid valve

17U0FX-0E 9

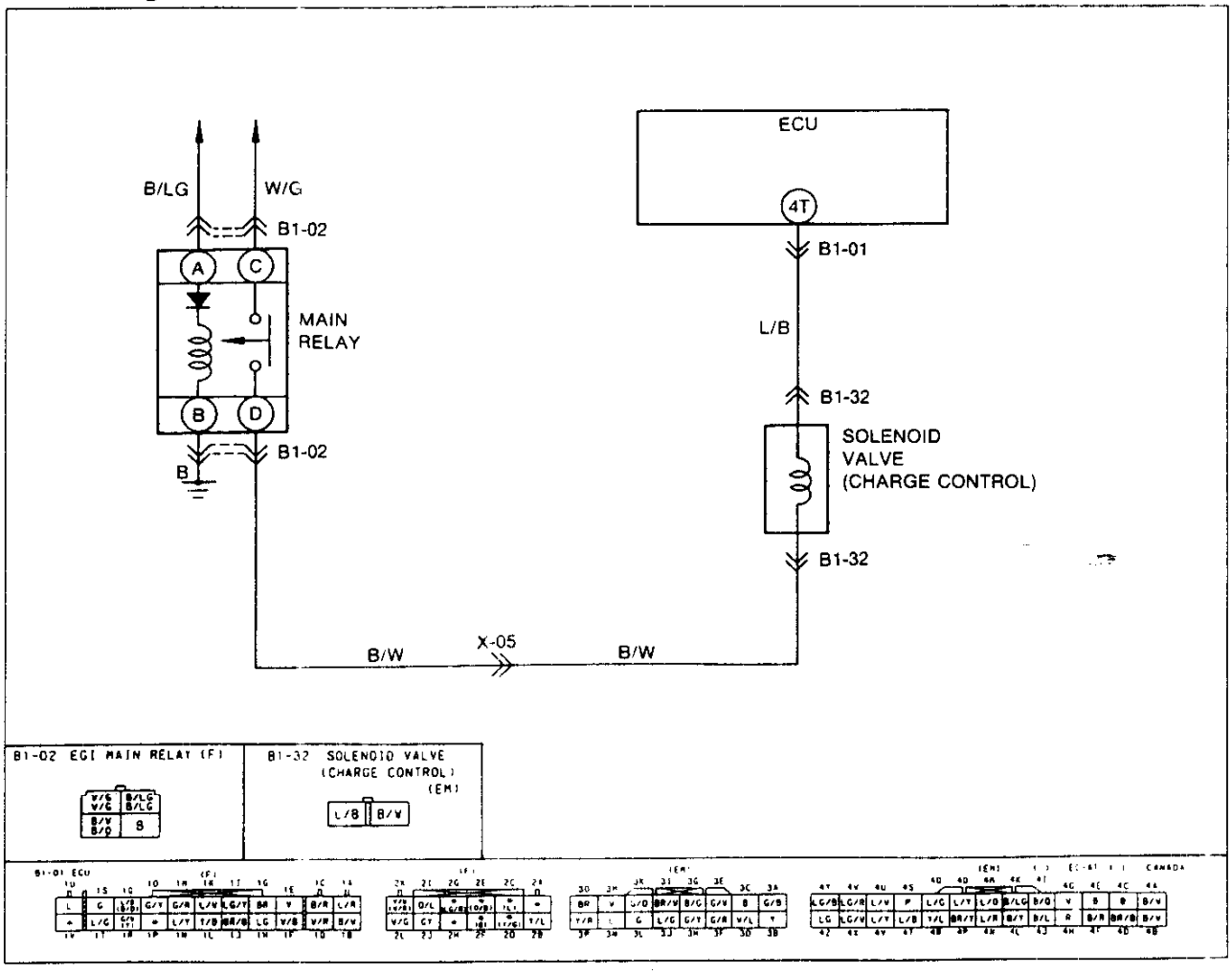
Circuit Diagram



CODE No.	45 (SOLENOID VALVE–CHARGE CONTROL)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (L/B) and ECU terminal 4T?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [L/B]–ECU terminal 4T) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–190	Yes	Replace ECU ☞ page F–150
		No	Replace solenoid valve

17U0FX-1170

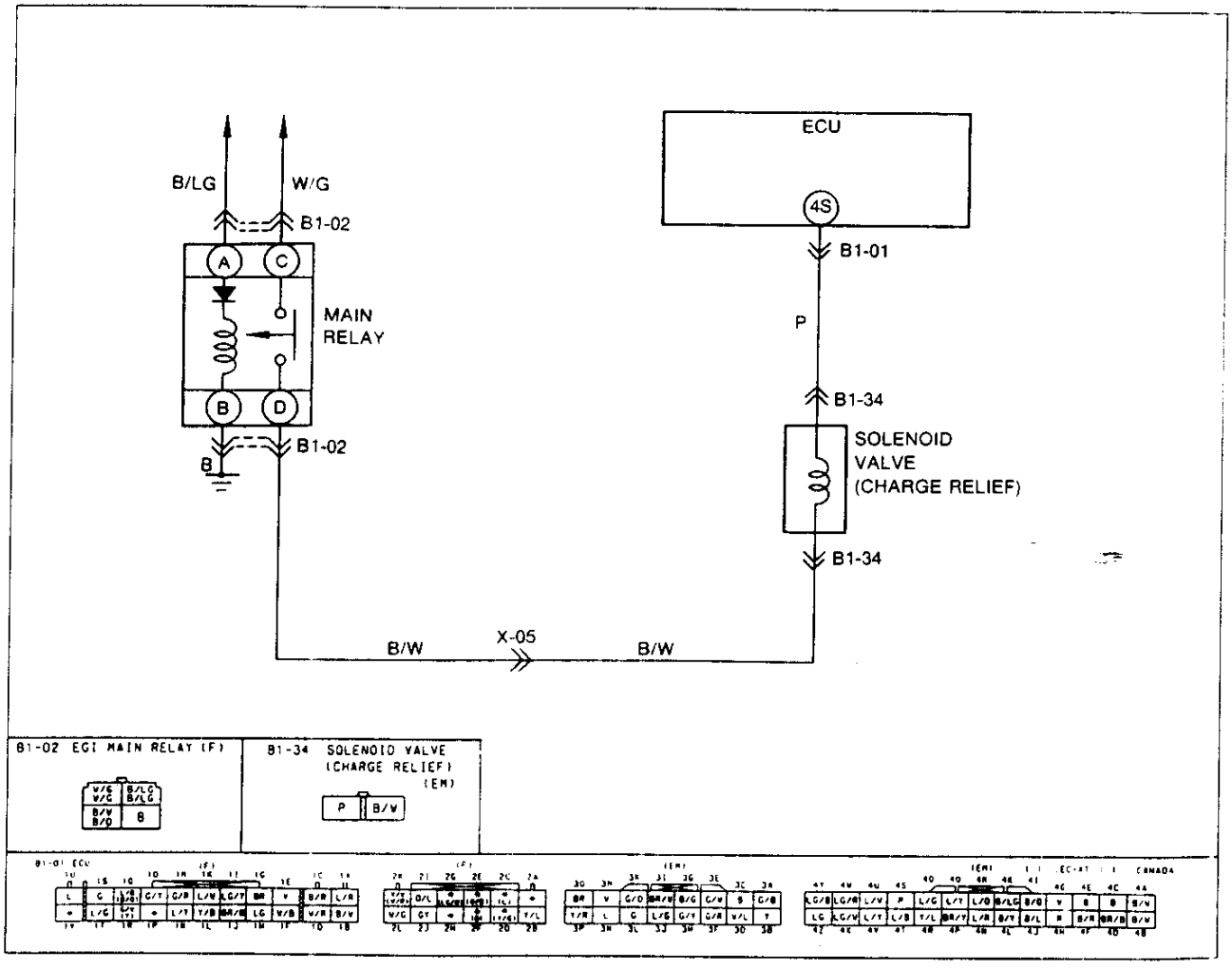
Circuit Diagram



CODE No.	46 (SOLENOID VALVE–CHARGE RELIEF CONTROL)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (B/R) and ECU terminal 4S?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [B/R]–ECU terminal 4S) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–190	Yes	Replace ECU ☞ page F–150
		No	Replace solenoid valve

17U0FX-071

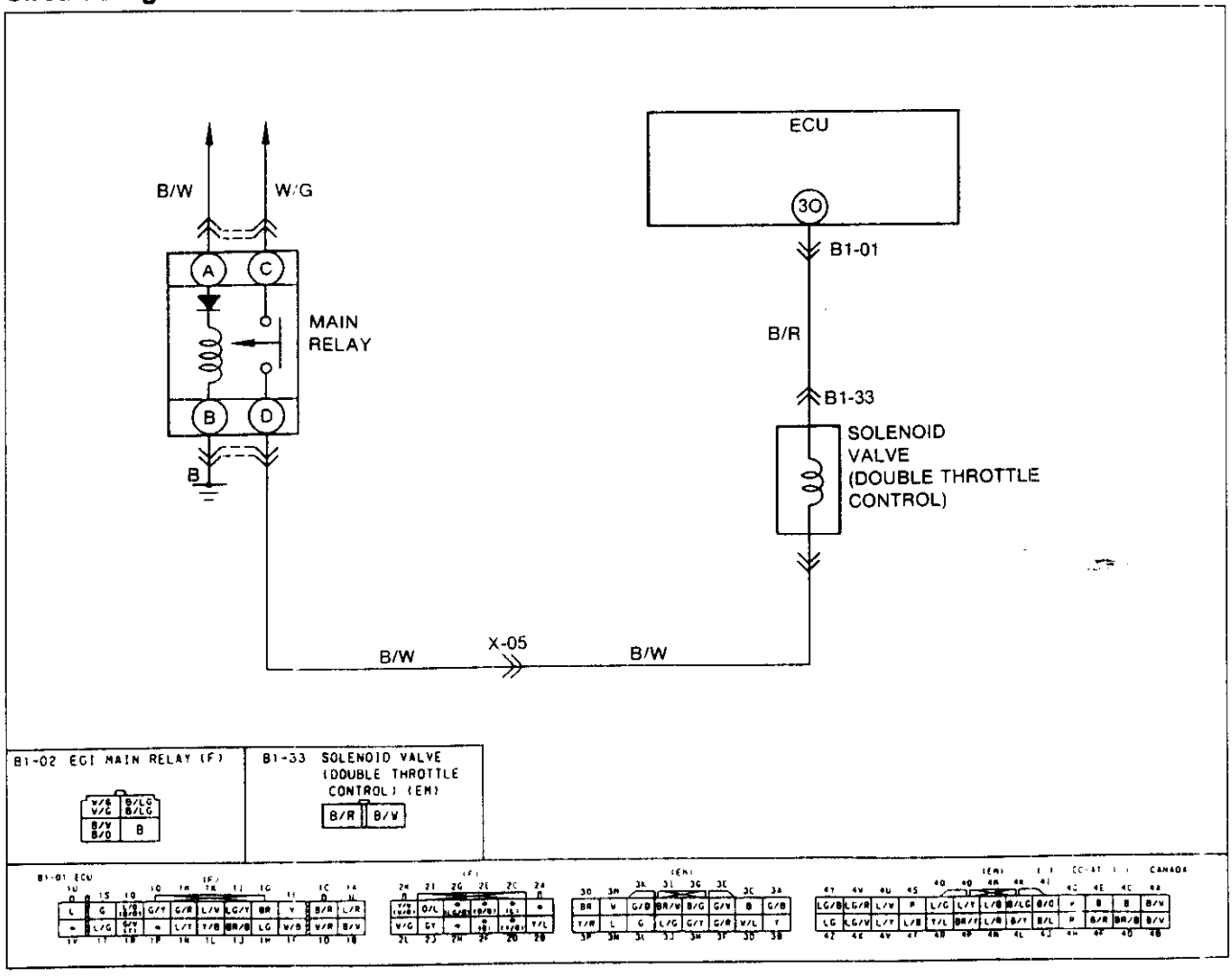
Circuit Diagram



CODE No.	50 (SOLENOID VALVE–DOUBLE THROTTLE CONTROL)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve terminal [B/W]–Main relay terminal [B/W])
3	Is there continuity between solenoid valve terminal (B/R) and ECU terminal 30?	Yes	Check for short circuit in wiring harness (Solenoid valve terminal [B/R]–ECU terminal 30) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞ page F–190	Yes	Replace ECU ☞ page F–150
		No	Replace solenoid valve

17U0FX-072

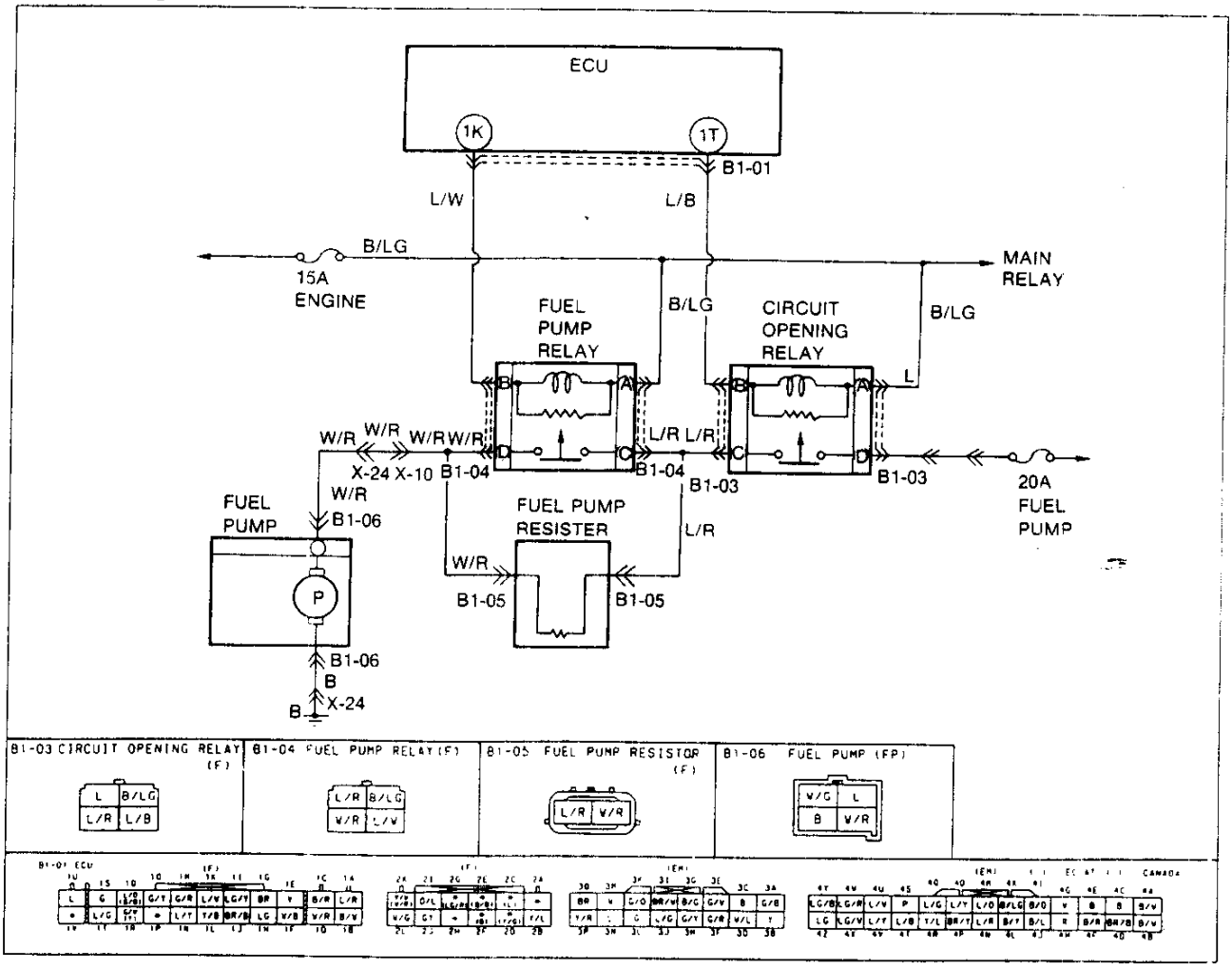
Circuit Diagram



CODE No.	51 (FUEL PUMP RELAY)		
STEP	INSPECTION		ACTION
1	Does fuel pump relay circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/LG) voltage OK with fuel pump relay connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Fuel pump relay terminal [B/LG]–Main relay terminal [B/LG])
3	Is there continuity between fuel pump relay terminal (L/W) and ECU terminal 1K?	Yes	Check for short circuit in wiring harness (Fuel pump relay terminal [L/W]–ECU terminal 1K) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is fuel pump relay OK? ☞ page F–110	Yes	Replace ECU ☞ page F–150
		No	Replace fuel pump relay

17U0FX-073

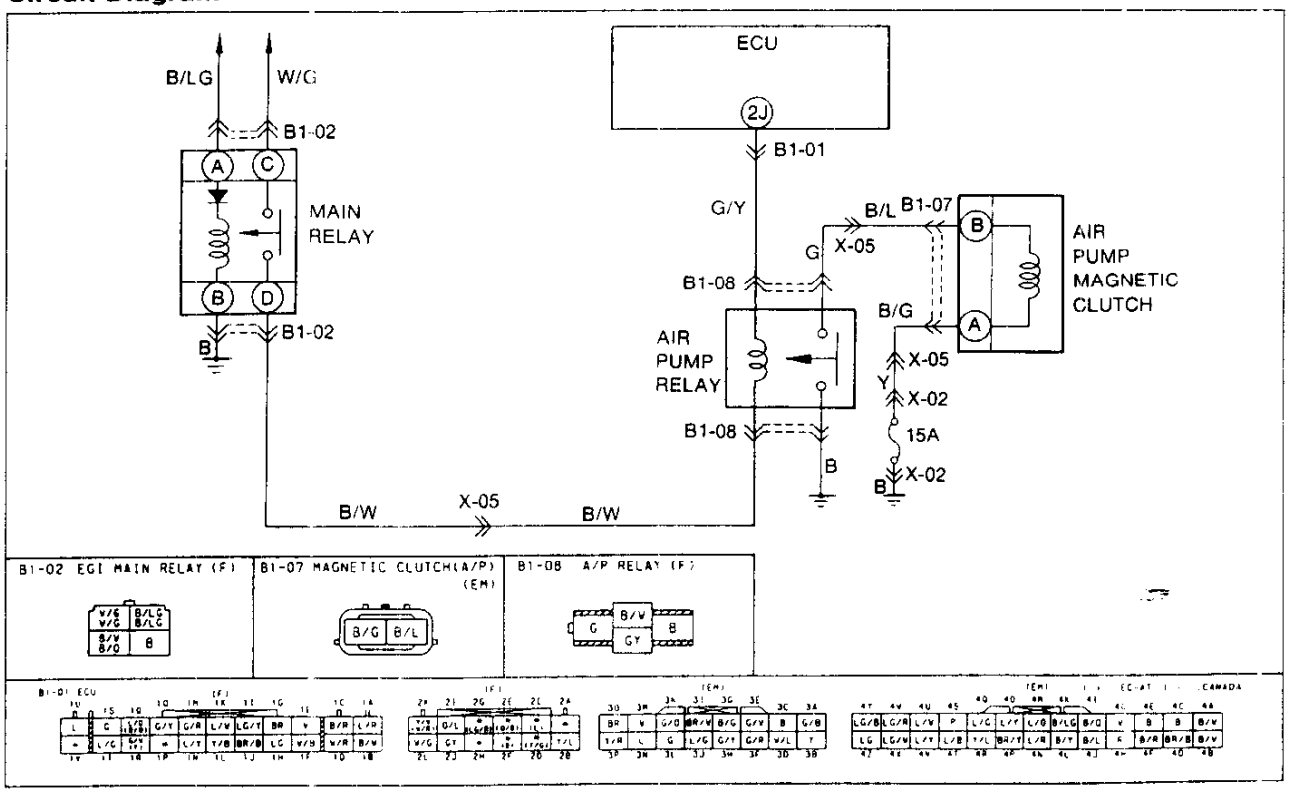
Circuit Diagram



CODE No.	54 (AIR PUMP RELAY)		
STEP	INSPECTION		ACTION
1	Does air pump relay circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/W) voltage OK with airpump relay connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (airpump relay [B/W]–Main relay terminal [B/W])
3	Is there continuity between airpump relay terminal (G/Y) and ECU terminal 2J?	Yes	Check for short circuit in wiring harness (Airpump relay [G/Y]–ECU terminal 2J) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is air pump relay OK? ☞ page F–122	Yes	Replace ECU ☞ page F–150
		No	Replace airpump relay

17U0FX-074

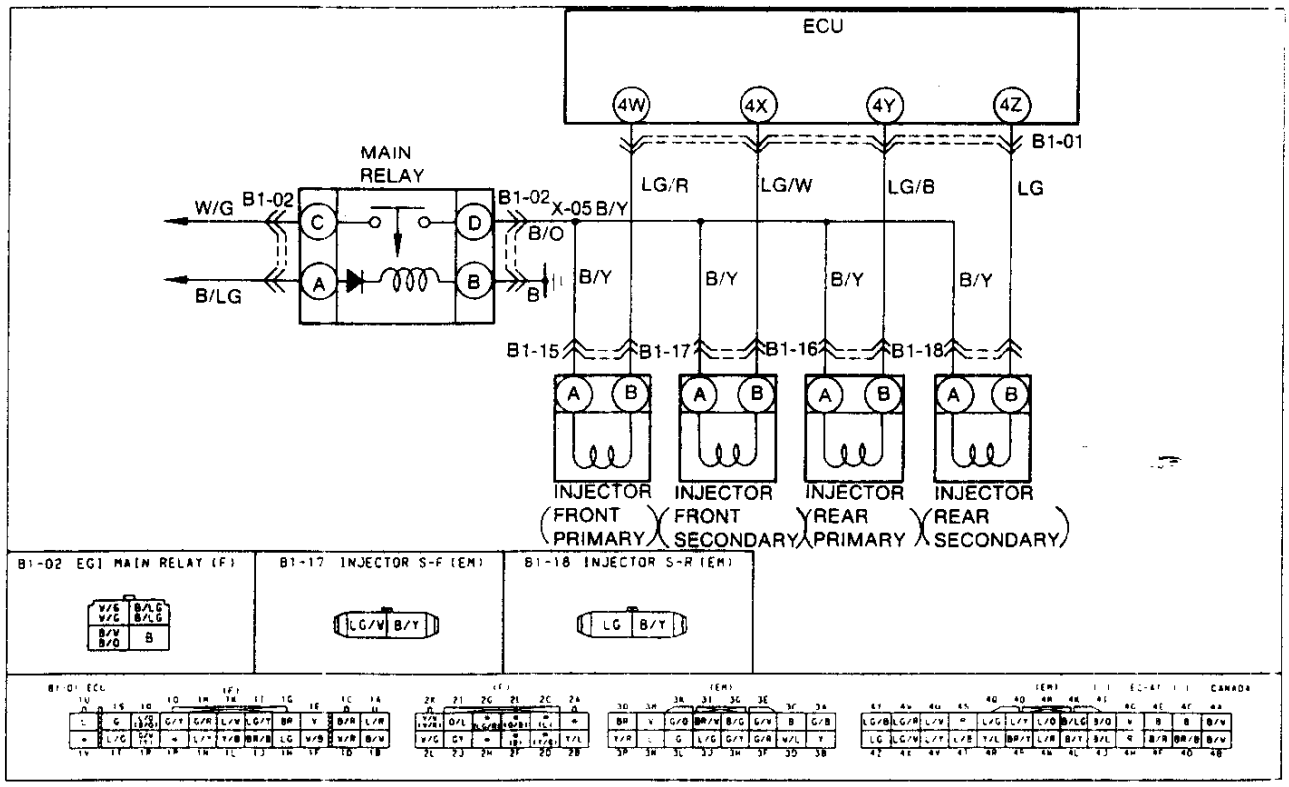
Circuit Diagram



CODE No.	71 (INJECTOR [FRONT SECONDARY])		
STEP	**INSPECTION**		**ACTION**
1	Does injector circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/Y) voltage OK with injector connector disconnected? **Condition**: Ignition switch ON; **Voltage**: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (injector terminal 4X [B/Y]–Main relay terminal [B/O])
3	Is injector resistance OK? **Resistance: 13.5 Ω (20°C [68°F])**	Yes	Go to next step
		No	Replace injector
4	Is there continuity between injector terminal and ECU terminal? INJECTOR: Front (LG/W); ECU: 4X	Yes	Check for short circuit in wiring harness Injector to ECU ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
5	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for service code Is service code displayed?	Yes	Replace ECU ☞ page F–150
		No	Intermittent poor connection Check for cause

17U0FX-05

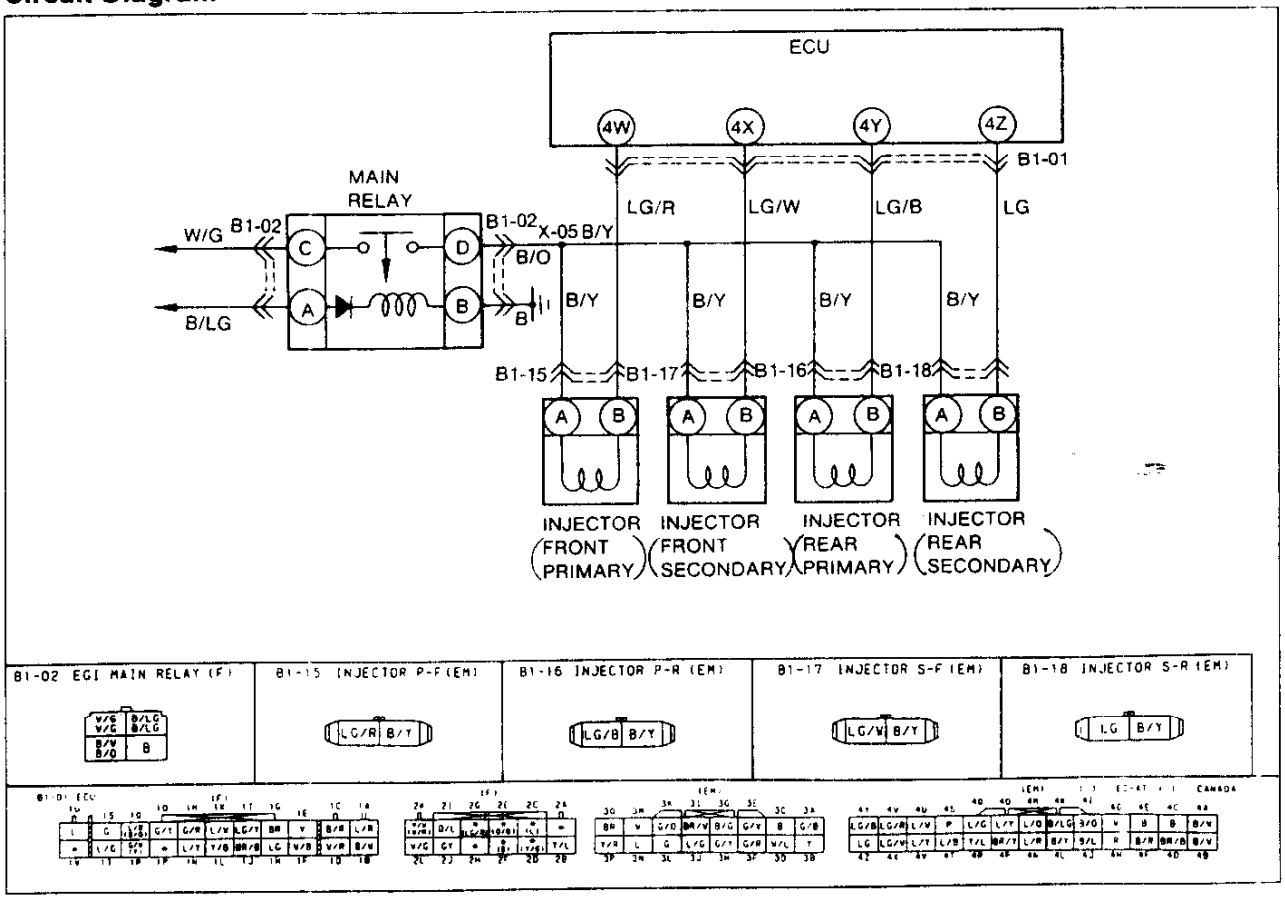
Circuit Diagram



CODE No.	73 (INJECTOR [REAR SECONDARY])		
STEP	INSPECTION		ACTION
1	Does injector circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal (B/Y) voltage OK with injector connector disconnected? Condition: Ignition switch ON — Voltage: Battery voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (injector terminal 4Z [B/Y] Main relay terminal [B/O])
3	Is injector resistance OK? **Resistance: 13.8 Ω (20°C [68°F])**	Yes	Go to next step
		No	Replace injector
4	Is there continuity between injector terminal and ECU terminal? INJECTOR: Rear (LG) — ECU: 4Z	Yes	Check for short circuit in wiring harness Injector to ECU ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
5	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for service code Is service code displayed?	Yes	Replace ECU ☞ page F-150
		No	Intermittent poor connection Check for cause

17U0FX-076

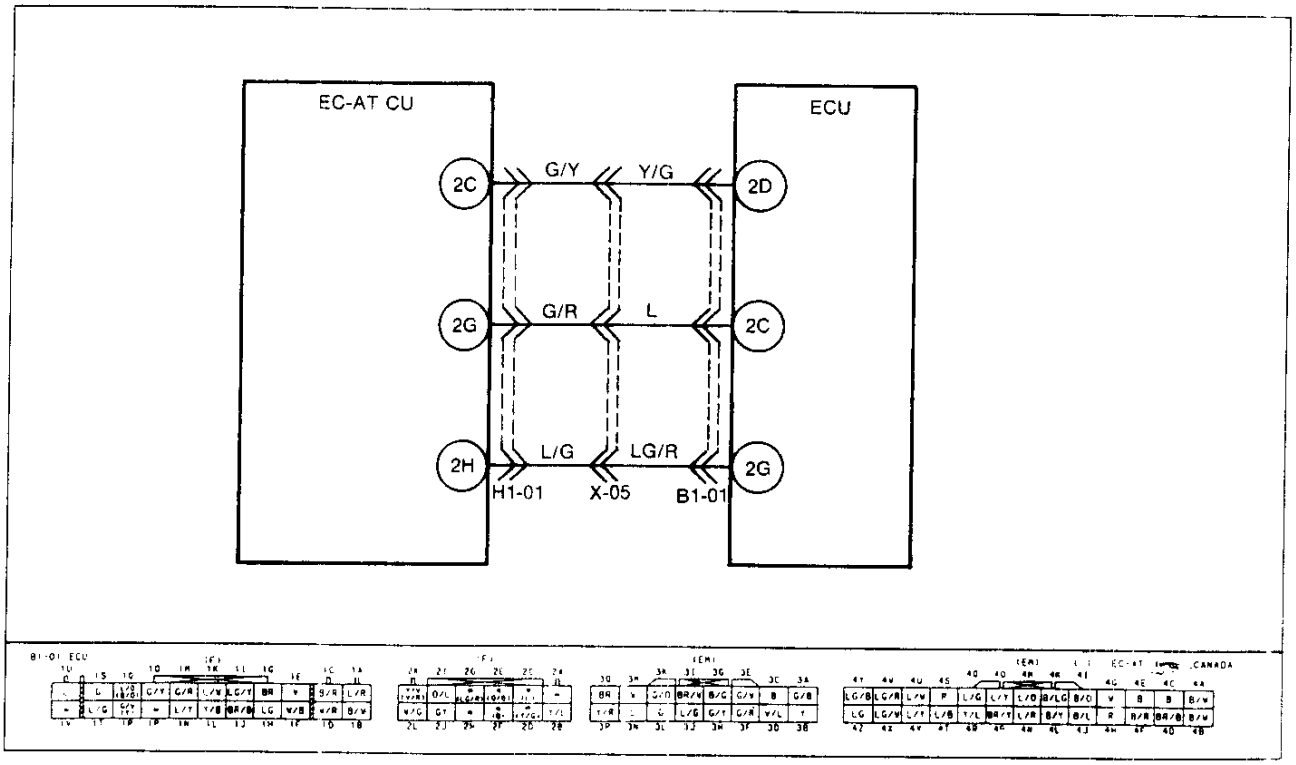
Circuit Diagram



Code No.	76 (SLIP LOCKUP OFF SIGNAL)		
STEP	INSPECTION		ACTION
1	Is there poor connection in Lockup off signal circuit between ECU and EC-AT CU?	Yes	Repair or replace connector
		No	Go to next step
2	Is there continuity between ECU terminal 2G and EC-AT CU terminal 2H	Yes	Go to next step
		No	Check for open circuit in wiring from EC-AT CU to ECU
3	Is EC-AT CU terminal 2H voltage OK?	Yes	Go to next step
		No	Check for cause ☞ page F-156
4	Is ECU terminal 2G voltage OK?	Yes	Replace ECU ☞ page F-150
		No	Check for short circuit in wiring from EC-AT CU to ECU

17U0PX-177

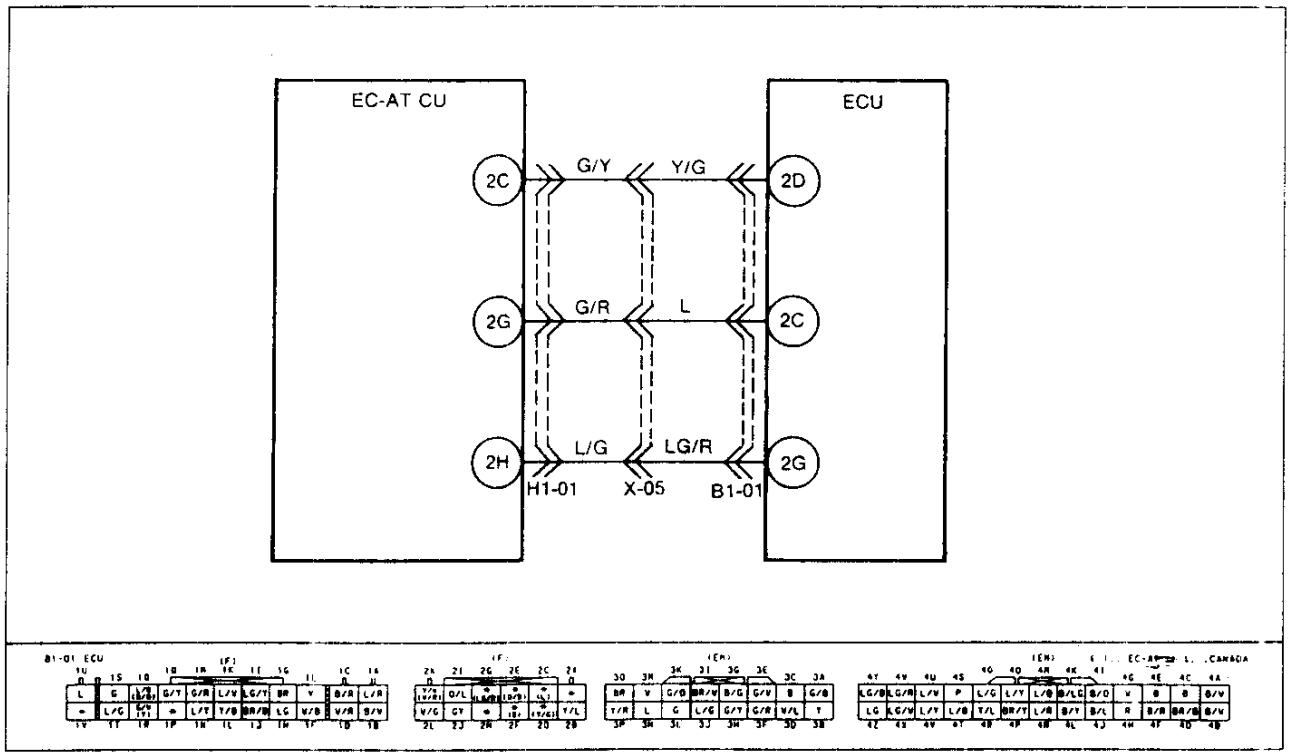
Circuit Diagram

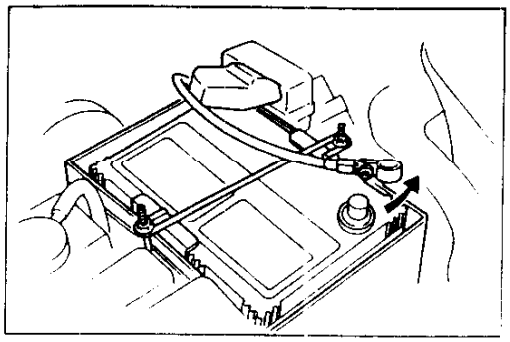


Code No.	77 (TORQUE REDUCED SIGNAL)		
STEP	INSPECTION		ACTION
1	Is there poor connection in Torque reduced signal circuit between ECU and EC-AT CU?	Yes	Repair or replace connector
		No	Go to next step
2	Is there continuity between ECU terminal 2D and EC-AT CU terminal 2C	Yes	Go to next step
		No	Check for open circuit in wiring from EC-AT CU to ECU
3	Is EC-AT CU terminal 2C voltage OK?	Yes	Go to next step
		No	Check for cause ☞ page F-156
4	Is ECU terminal 2D voltage OK?	Yes	Replace ECU ☞ page F-150
		No	Check for short circuit in wiring from EC-AT CU to ECU

17U0FX-078

Circuit Diagram

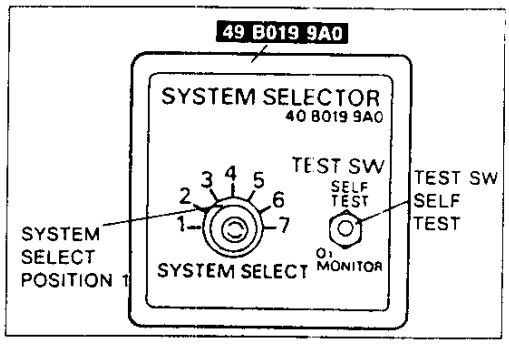




17U0FX-079

After-repair Procedure

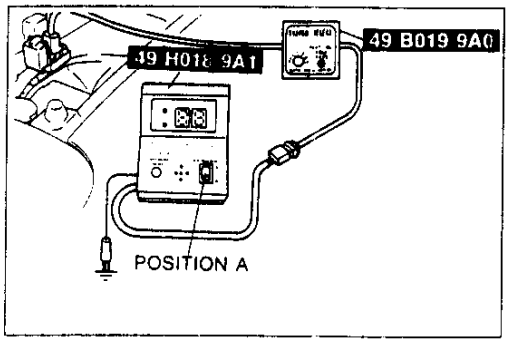
Cancel the memory of service code number by disconnecting the negative battery cable for **20 sec** and depress the brake pedal. Reconnect the negative battery cable



17U0FX 080

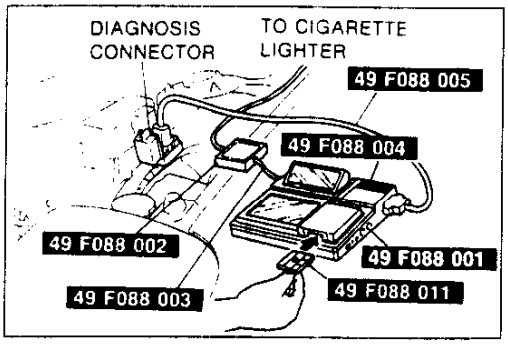
Self-diagnosis Checker

1. Connect the **SST** (System Selector) to the diagnosis connector.
2. Set system select to position 1.
3. Set the test switch to SELF TEST.



17U0FX-081

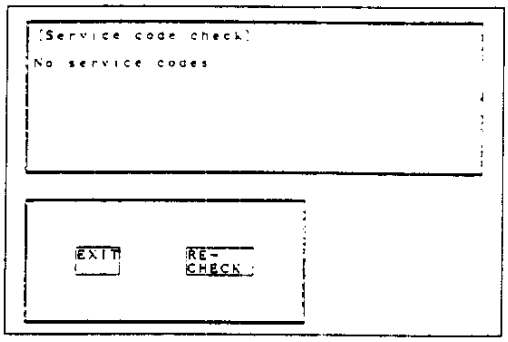
4. Connect the **SST** (Self-Diagnosis Checker) to the System Selector and a ground.
5. Set the select of the Self-Diagnosis Checker to position A.
6. Turn the ignition switch ON.
7. Verify that no service code numbers are displayed.



17U0FX-082

DT-S1000

1. Connect the **SST** (DT-S1000) to the diagnosis connector.
2. Select Service code check.
3. Turn the ignition switch ON.



17U0FX-083

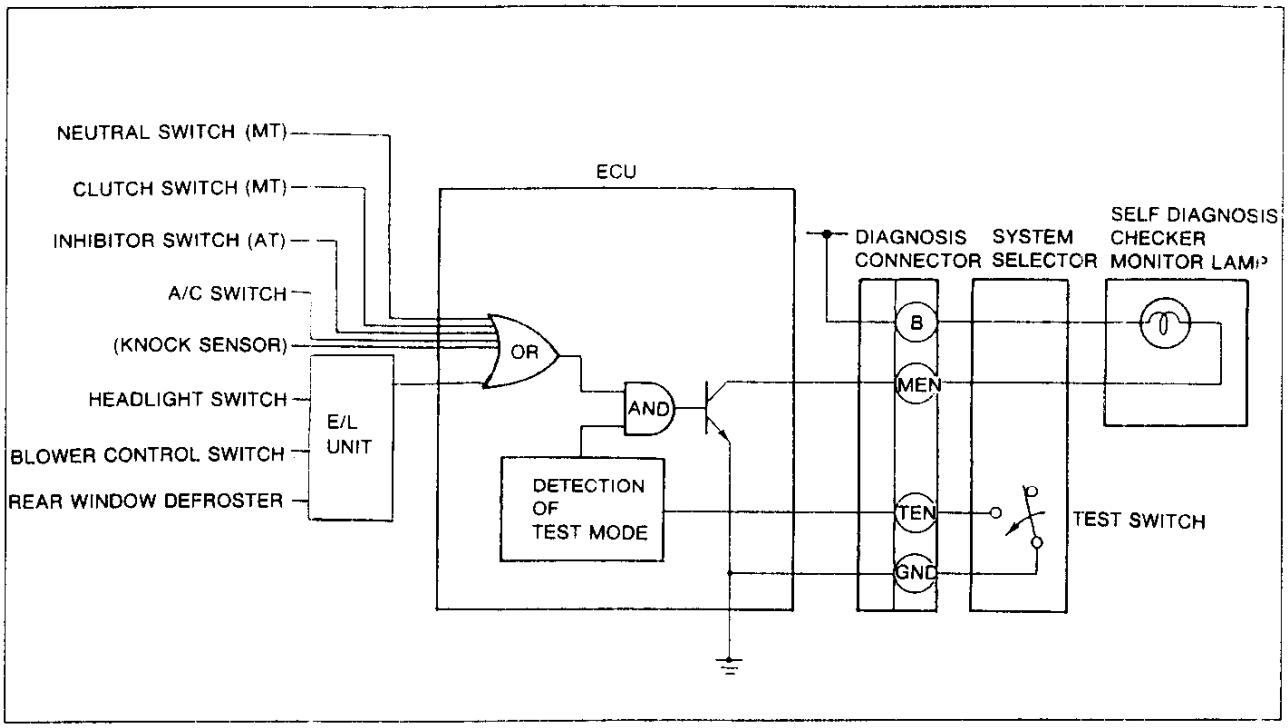
4. Verify that no service code numbers are displayed.

SWITCH MONITOR FUNCTION

Individual switches can be inspected by the **SST** (Self-Diagnosis Checker or DT-S1000)

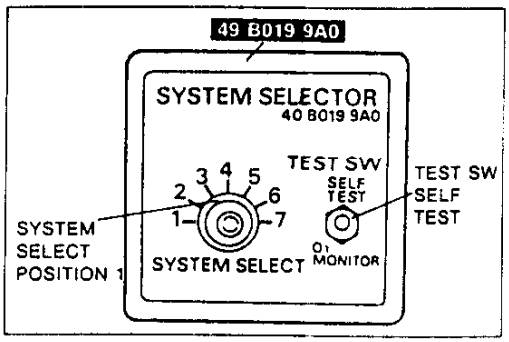
Note

- **The TEN terminal of the diagnosis connector must be grounded and the ignition switch ON (engine stopped).**
- **If either switch remains activated, the monitor lamp will be illuminated.**

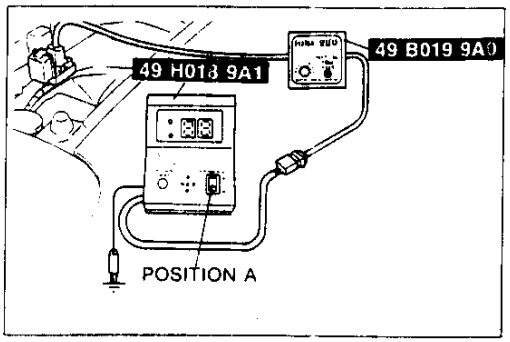


17U0FX-084

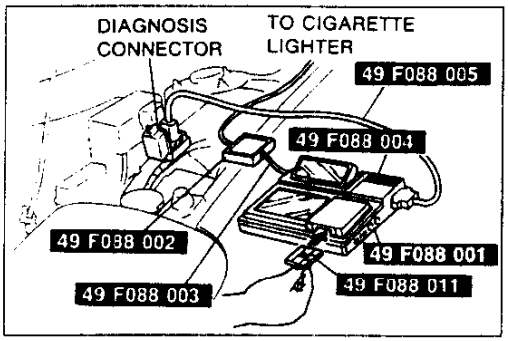
Switch	Self-Diagnosis Checker (Monitor lamp)		Remarks
	Light ON	Light OFF	
Clutch switch (MT)	Pedal released	Pedal depressed	In gear
Neutral switch (MT)	In gear	Neutral	Clutch pedal released
Inhibitor switch (AT)	L, S, D or R range	N or P range	–
Headlight switch	ON	OFF	Headlight switch I or II position
Blower switch	ON	OFF	At 3rd or 4th position
Rear window defroster switch	ON	OFF	–
A/C switch	ON	OFF	Blower switch at 1st or higher position



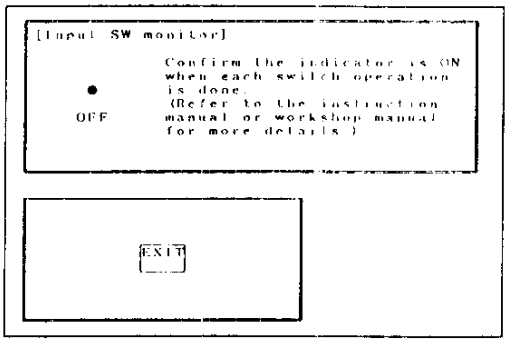
17U0FX-085



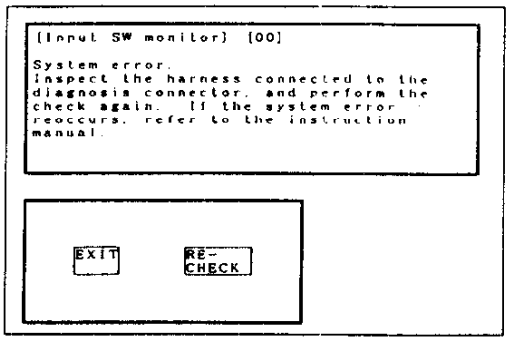
17U0FX-086



17U0FX-087



17U0FX-088



Inspection Procedure
Self-Diagnosis Checker

1. Connect the **SST** (System Selector) to the diagnosis connector.
2. Set system select to position 1.
3. Set TEST SW to SELF-TEST.

4. Connect the **SST** (Self-Diagnosis Checker) to the System Selector and a ground.
5. Set the select switch of the Self-Diagnosis Checker to position A.
6. Turn the ignition switch ON.
7. Check if the Monitor Lamp illuminates when each switch is made to function as described.

Caution
- **If either switch remains activated, the monitor lamp will be illuminated.**
- **Do not start the engine.**

DT-S1000

1. Connect the **SST** (DT-S1000) to the diagnosis connector.
2. Select switch monitor check.
3. Turn ignition switch ON.

4. Check if the Monitor indicator turn black to white when each switch is made to function as described.

Caution
- **If the DT-S1000 detects a system error as a result of diagnosis, the display on the left will appear.**
- **If this message appears refer to the instruction manual.**
- **Press EXIT to return function selection display.**

Procedure

Set conditions to deactivate each switch
- All accessories OFF
- Transmission in neutral
- All pedals released

Is monitor lamp illuminated?

YES →
Check each switch and related wire harness
- Clutch switch — ☞ page F-187
- Neutral switch — ☞ page F-186
- Headlight switch — ☞ 1993 RX-7 Body electrical troubleshooting manual
- Rear window defroster switch — ☞ 1993 RX-7 Body electrical troubleshooting manual
- Blower switch — ☞ 1993 RX-7 Body electrical troubleshooting manual
- A/C switch — ☞ 1993 RX-7 Body electrical troubleshooting manual
- Position switch — ☞ 1993 RX-7 Body electrical troubleshooting manual

NO ↓

Check each switch as described

16E0F2-083

Neutral switch (MT)

Shift transmission into in-gear (Clutch pedal released.)
Is monitor lamp illuminated?

NO →
PC
- Neutral switch malfunction — ☞ page F-186
- Open circuit in related wire harness
- ECU terminal 1R voltage incorrect — ☞ page F-150
- ECU malfunction

YES ↓

Neutral switch OK
Return transmission to neutral

Clutch switch (MT)

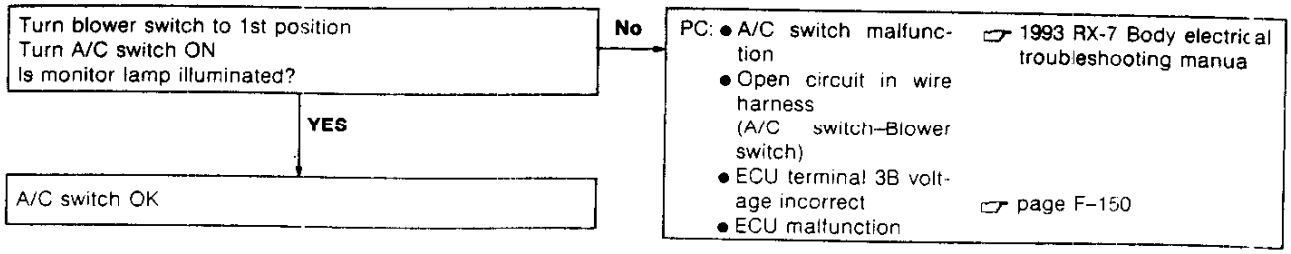
Clutch pedal released. (In gear)
Is monitor lamp illuminated?

NO →
PC
- Clutch switch malfunction — ☞ page F-187
- Open circuit in related wire harness
- ECU terminal 1Q voltage incorrect — ☞ page F1-150
- ECU malfunction

YES ↓

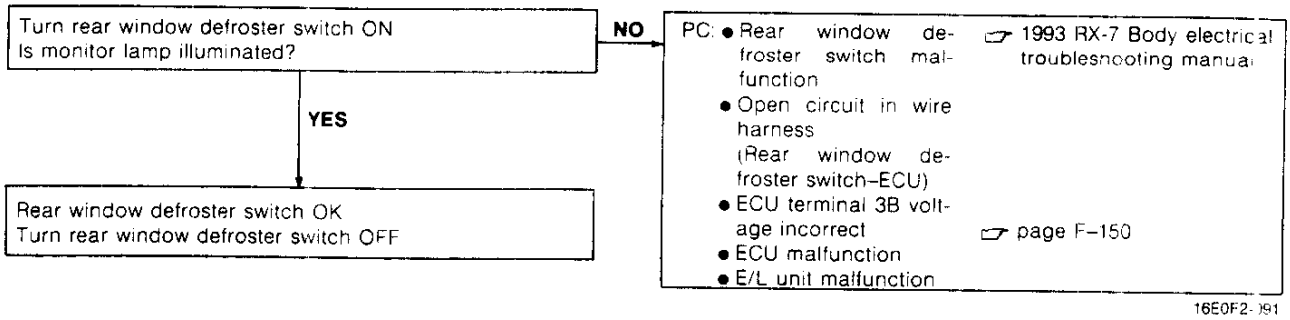
Clutch switch OK
Reture transmission to neutral

A/C switch



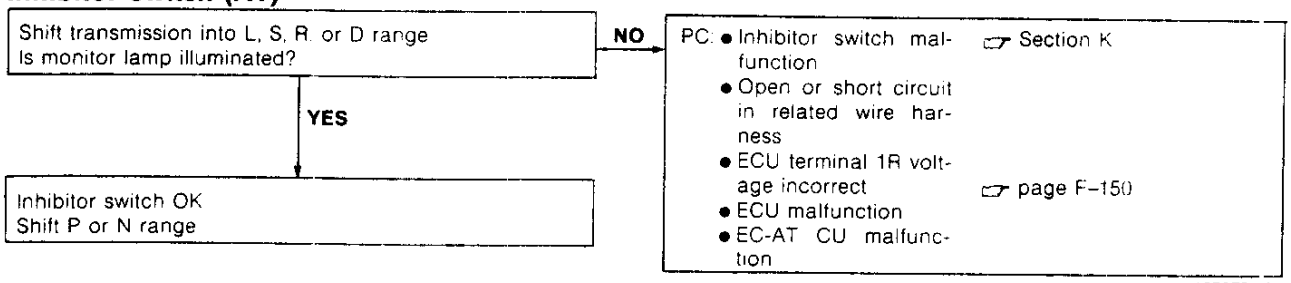
16E0F2-090

Rear window defroster switch



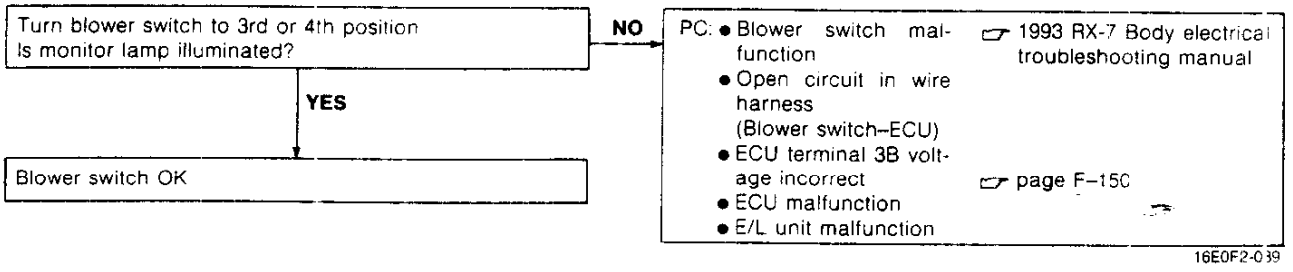
16E0F2-091

Inhibitor switch (AT)



16E0F2-092

Blower switch



16E0F2-039

OXYGEN SENSOR MONITOR FUNCTION

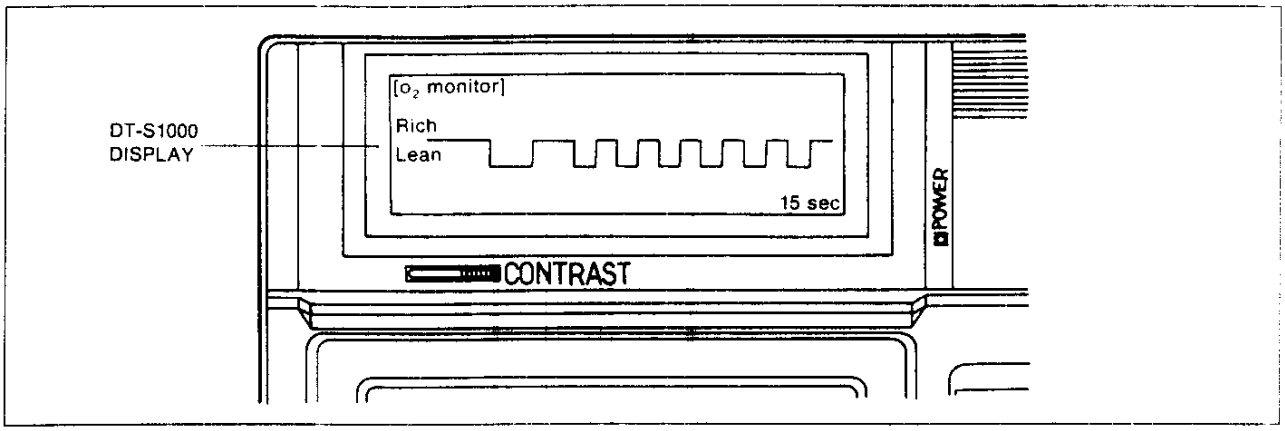
Engine Signal Monitor

With the **SST** see to O_2 Monitor, the oxygen sensor is monitored by the Self-Diagnosis checker as discribed.

Condition		Item monitored	Function
Engine	System selector switch		
Running	O_2 monitor	Oxygen sensor output signal	Oxygen sensor output more than 0.45 V Monitor lamp: Flashes

DT-S1000

With the DT-S1000 monitor check, the oxygen sensor signal is displayed as graph.



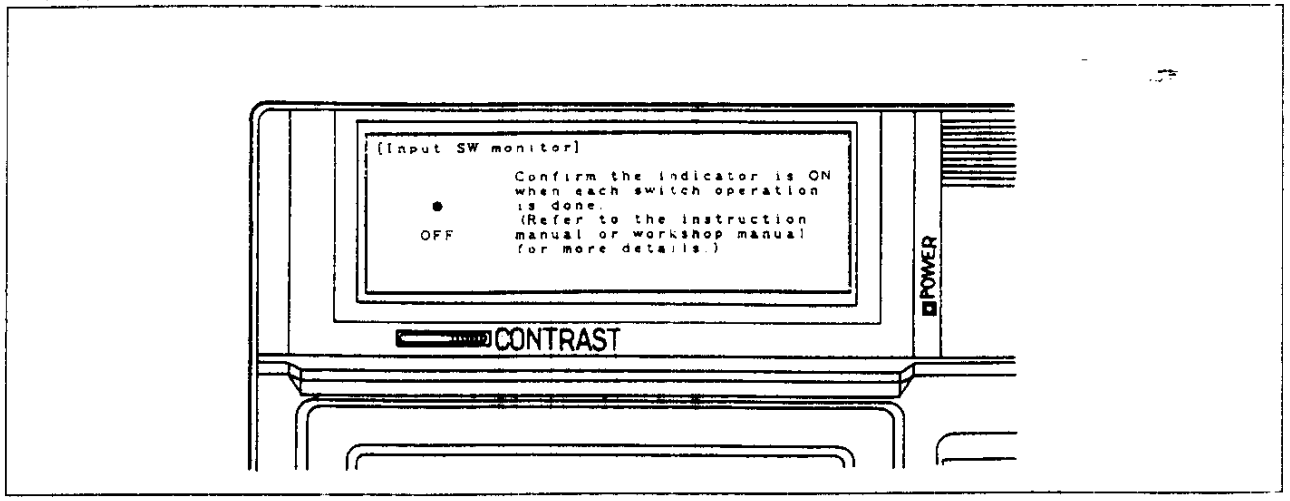
KNOCK SENSOR MONITOR FUNCTION

With the System selector set to Engine Signal Monitor. SELF-TEST the knock sensor is monitored by the Self-Diagnosis checker as described below.

Item monitored	Condition			Function
	Test	Ignition switch	System selector switch	
Knock sensor output signal	Tap the engine hanger lightly with hammer	ON	SELF-TEST	Monitor lamp: Flashes

DT-S1000

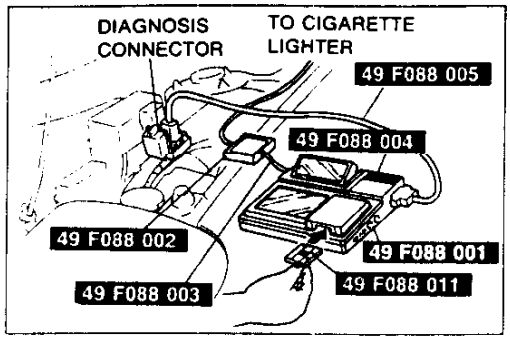
With the DT-S1000 at input Switch monitor check, operation of the knock sensor is monitored and displayed.



REAL TIME MONITOR FUNCTION (DT-S1000)

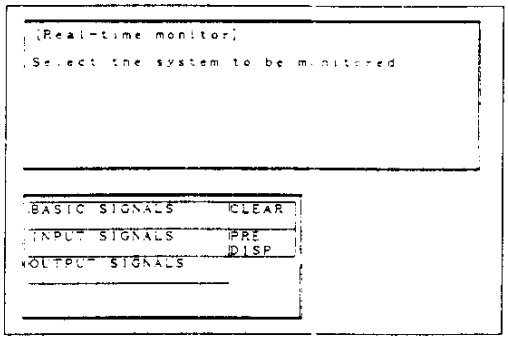
Indivisual input output signal can be inspected by the **SST** (DT-S1000).

Signal	Monitor Item		Unit	Remark
BASIC	Engine speed		[rpm]	
	Intake air pressure		[kPa]	
	Throttle opening amount (Narrow range)		[V]	
	Throttle opening amount (Full range)		[V]	
	Engine coolant temperature		[°C]	
	Solenoid valve (ISC)		[%]	Duty control
	Battery voltage		[V]	
	Ignition timing (IGT-L)		[BTDC°]	
	Ignition timing (IGT-T)		[BTDC°]	
	Injection drive signal (Primary)		[m sec]	
	Injector drive signal (Secondary)		[m sec]	
INPUT	Oxygen sensor voltage		[V]	
	Intake air temperature		[°C]	
	Fuel temperature		[°C]	
	Atmosphric pressure (in ECU)		[kPa]	in ECU
	Vehicle speed		[km/h]	
	MOP position (target figure)		[V]	
	MOP position sensor		[V]	Target figure
	Power steering pressure signal		[ON/OFF]	
	Starter signal		[ON/OFF]	
	Brake signal		[ON/OFF]	
	A/C signal		[ON/OFF]	
	E/L signal		[ON/OFF]	
	Heat hazard signal		[ON/OFF]	
	Canada switch (Canada only)		[ON/OFF]	
	DRL signal (Canada only)		[ON/OFF]	
	California switch (Carifornia only)		[ON/OFF]	
	EGR switch signal (California only)		[ON/OFF]	
	Neutral signal		[ON/OFF]	MT only
	Clutch signal		[ON/OFF]	
	1st gear signal		[ON/OFF]	
	2nd gear signal		[ON/OFF]	
	Inhibitor signal		[ON/OFF]	AT only
	Reduce torque signal		[ON/OFF]	
	Slip lock-up signal		[ON/OFF]	
	Shift solenoid A signal		[ON/OFF]	
	Shift solenoid B signal		[ON/OFF]	
OUTPUT	Solenoid valve	Solenoid valve (Turbo precontrol)	[%]	
		Solenoid valve (Wastegate control)	[%]	
		Solenoid valve (Purge control)	[%]	Duty control
		Solenoid valve (Charge relief)	[ON/OFF]	
		Solenoid valve (Charge control)	[ON/OFF]	
		Solenoid valve (Turbo control)	[ON/OFF]	
		Solenoid valve (Switching)	[ON/OFF]	Secondarg air injection system
		Solenoid valve (Relief1)	[ON/OFF]	
		Solenoid valve (Relief2)	[ON/OFF]	
		Solenoid valve (Port air bypass)	[ON/OFF]	
		Solenoid valve (Split air bypass)	[ON/OFF]	
		Solenoid valve (Pressure regulator control)	[ON/OFF]	Sequential twin turbo-charger control system
		Solenoid valve (Double throttle control)	[ON/OFF]	
		Solenoid valve (Exhaust gas recirculation)	[ON/OFF]	
		Solenoid valve (Accelerated warm-up system)	[ON/OFF]	
	Relay	Electric cooling fan relay	[ON/OFF]	
		A/C relay	[ON/OFF]	
		Air pump relay	[ON/OFF]	
		Fuel pump relay	[ON/OFF]	
	Signal	Torque reduced signal	[ON/OFF]	AT only
		Slip lock up OFF signal	[ON/OFF]	
		Idle signal	[ON/OFF]	



Inspection Procedure

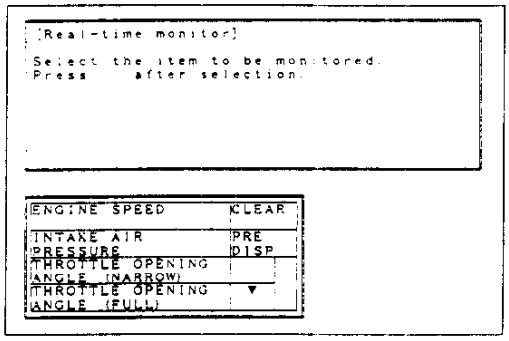
1. Connect the **DT-S1000** to the diagnosis connector as shown in figure.



2. Select the real time monitor from the **DT-S1000** display.
3. Turn ignition switch ON.

Caution

- **Do not turn the ignition switch OFF until real time monitor is completed.**

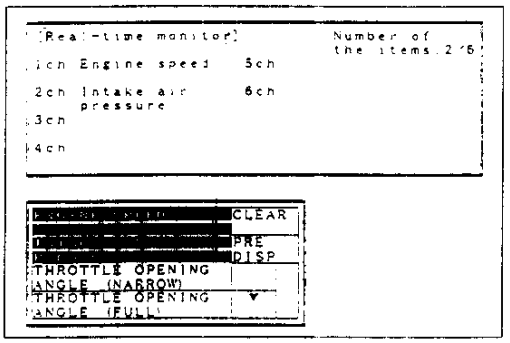


4. Select the inspection items.

Note

- **The maximum selection items are 8.**
- **Basic Input signal need two-channel, therefore if all selection items basic signal, The maximum selection item is 4.**

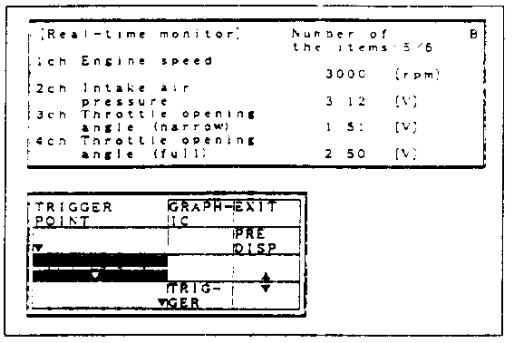
5. Verify indication of respective data item in each condition, referring to ECU terminal condition chart. (Refer to page F–166)



<Example>
When checking the of throtlle sensor operation pattern at engine speed and intake air pressure, the following steps are available.

Step 1.

Select the engine speed, intake air pressure and Throttlesensor from Basic signal.



Step 2.

Drive the vehicle and verify that the engine speed (rpm), intake air pressure (kPa), Throttlesensor output voltage (V) on the display.

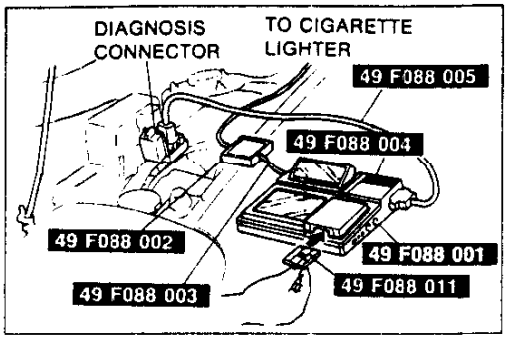
Note

- **Referring to the DT-S1000 instruction manual.**

SIMULATION FUNCTION (DT-S1000)

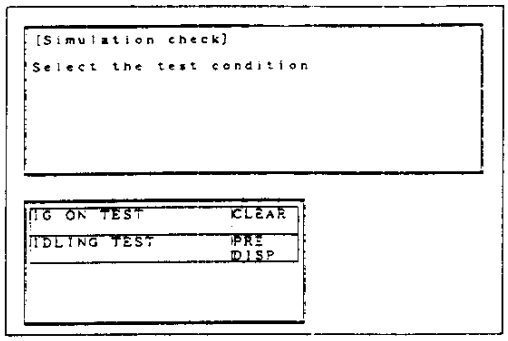
By using the simulation function, the following solenoid valves and relays can be externally driven. This function allows easy system checking.

Check condition	Simulation item	Operation
Ign ON	Solenoid valve (Turbo precontrol)	Driven with duty value of 50%
	Solenoid valve (Wastegate control)	Driven with duty value of 50%
	Solenoid valve (PURGE control)	Driven with duty valve of 50%
	Solenoid valve (Charge relief)	ON/OFF
	Solenoid valve (Charge control)	ON/OFF
	Solenoid valve (Turbo control)	ON/OFF
	Solenoid valve (Switching)	ON/OFF
	Solenoid valve (Relief1)	ON/OFF
	Solenoid valve (Relief2)	ON/OFF
	Solenoid valve (Port air bypass)	ON/OFF
	Solenoid valve (Split air bypass)	ON/OFF
	Solenoid valve (Pressure regulator control)	ON/OFF
	Solenoid valve (Double throttle control)	ON/OFF
	Solenoid valve (Exhaust gas recirculation)	ON/OFF
	Solenoid valve (Accelerated warm-up system)	ON/OFF
	Electric cooling fan relay	ON/OFF
	A/C relay	ON/OFF
	Air pump relay	ON/OFF
	F/P relay	ON/OFF
Idling	Injector (Front Primary)	Stopped
	Injector (Rear Primary)	Stopped
	Injector (Front primary)	Driven with 1 to 30% inclease or decrease injection time
	Injector (Rear primary)	
	Solenoid valve (Idle speed control [ISC])	Driven with any duty value
	Solenoid valve (Purge Control)	Driven with any duty valve
	Solenoid valve (Charge control)	ON/OFF
	Solenoid valve (Turbo control)	ON/OFF
	Solenoid valve (Switching)	ON/OFF
	Solenoid valve (Relief1)	ON/OFF
	Solenoid valve (Pressure regulation control)	ON/OFF
	Solenoid valve (Duoble throttle control)	ON/OFF
	Solenoid valve (Exhaust gas recirculation [EGR])	ON/OFF
	Solenoid valve (Accelerated warm-up system [AWS])	ON/OFF
	A/C relay	ON/OFF
	Air Pump relay	ON/OFF



Inspection Procedure

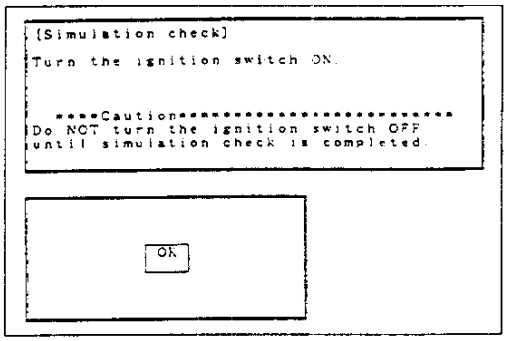
1. Connect the **DT-S1000** to the diagnosis connector as shown in figure.



2. Select the simulation function from the **DT-S1000** display.
3. Turn ignition switch ON.

Caution

- **Do not turn the ignition switch OFF until simulation check is completed.**



4. Select the check condition and simulation item.

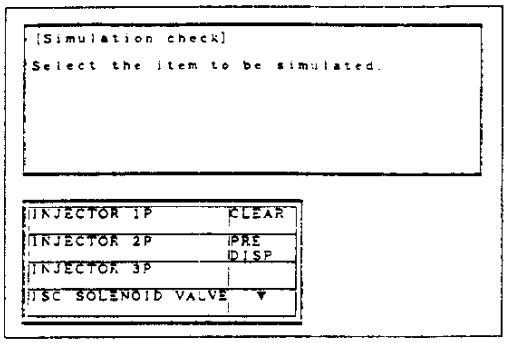
Note

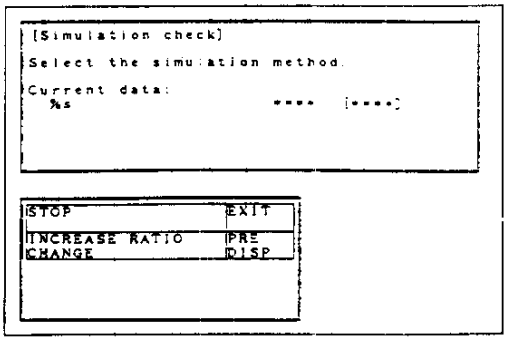
- **Selection item is 1.**

5. Start the engine, if necessary.
6. Verify operation (sound, engine condition, etc.) when solenoid valve or relay is ON.

Note

- **If the DT-S1000 displays "Communication error". Inspect the harness connected to the diagnosis connector, and perform the check again.**
- **Referring to the DT-S1000 instruction manual.**



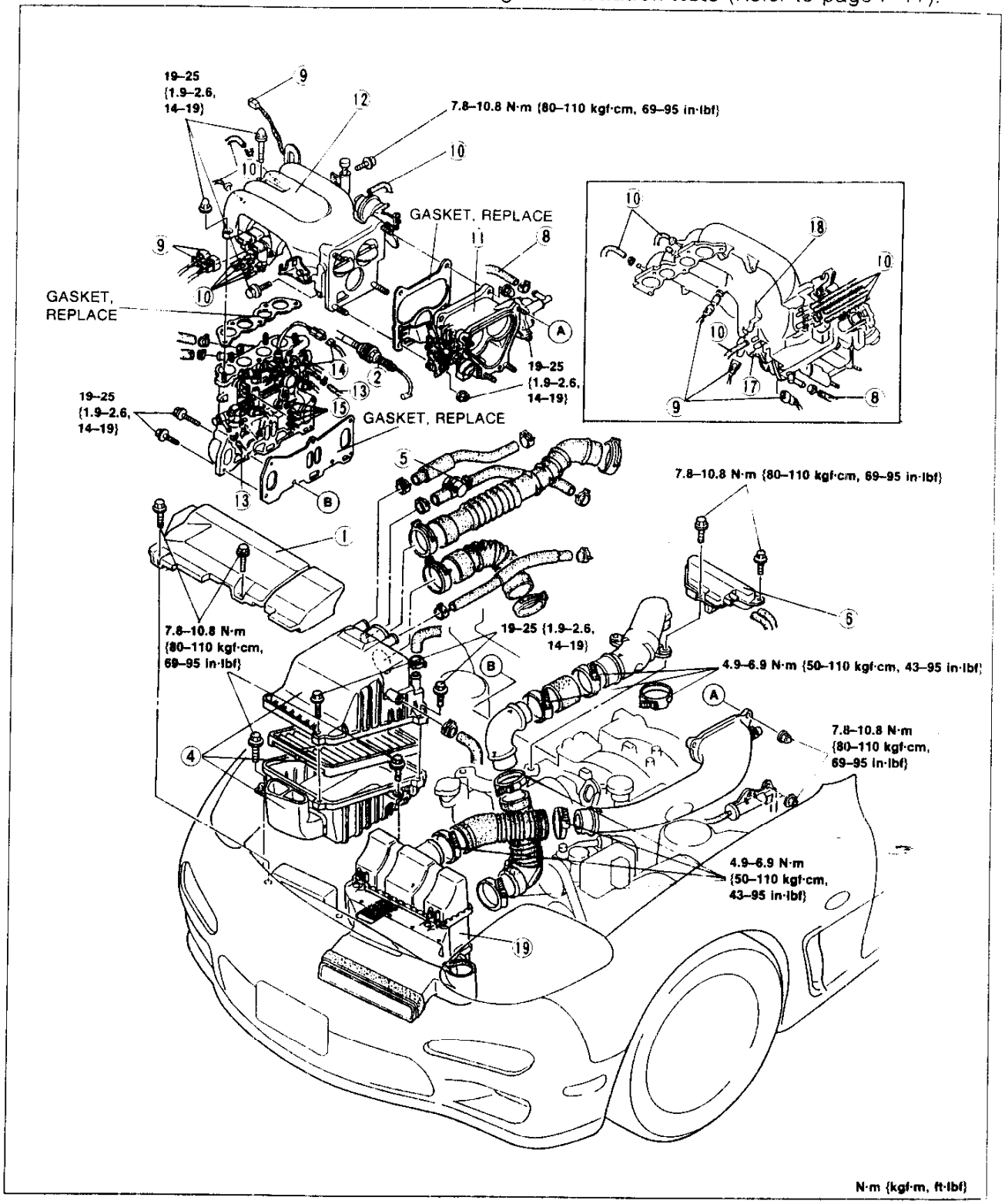


INTAKE AIR SYSTEM

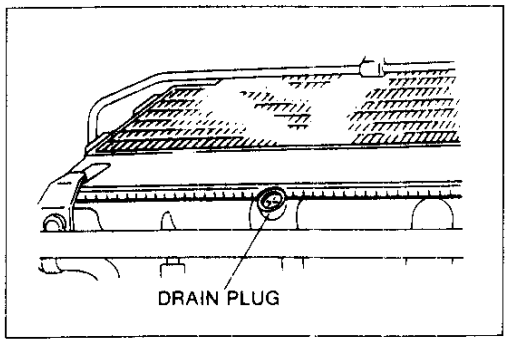
COMPONENT PARTS

Removal / Inspection / Installation

1. Remove in the order shown in the figure, reffering **Removal Note** (Refer to page F–77).
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, reffering to **Installation Note** (Refer to page F–77).

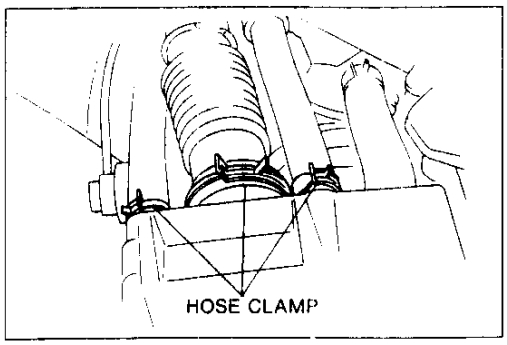


1. Fresh air duct
   Inspect for damage and cracks
2. Accelerator cable
3. Air intake hose
   Inspect for damage
4. Air cleaner
   Inspection ..... page F–16
5. Air bypass valve
   Inspection ..... page F–77
6. Pressure chamber
7. Air intake pipe
   Inspect for damage and cracks
8. Water hose
9. Connector
10. Vacuum hose
11. Throttle body
    Inspection ..... page F–79
12. Extension manifold
    Inspection ..... page F–79
13. Fuel hose
14. Connector
15. Vacuum hose
16. Intake manifold
    Inspection ..... page F–79
17. Solenoid valve (ISC)
    Inspection ..... page F–83
18. Solenoid valve (AWS)
    Inspection ..... page F–83
19. Intercooler
    Removal / Inspection / Installation ..... page F–78



Removal Note

1. Loosen the drain plug and radiator cap and drain the coolant from radiator.
2. Remove the water hose from the throttle body.
3. After installation of the throttle body, refill the radiator. (Refer to Section E)

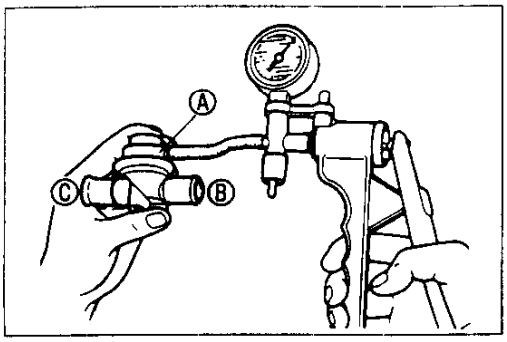


Installation Note

1. Install the air intake hoseclamp and hose same place as shown in figure.

Caution

- **Position the hose clamp in the original location on the hose, and squeeze it lightly with large pliers to ensure a good fit.**



AIR BYPASS VALVE

Inspection

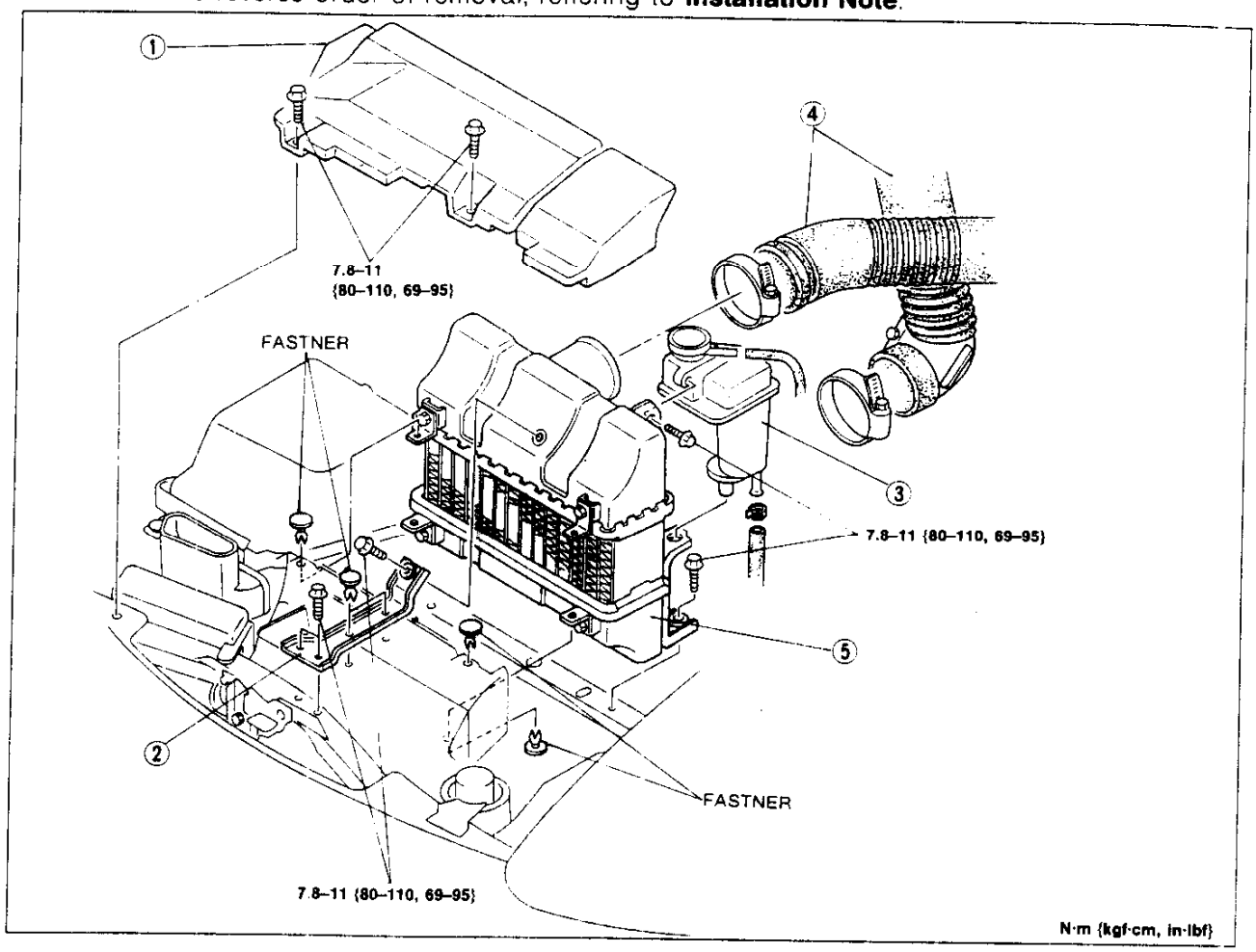
1. Remove the air bypass valve.
2. Connect a vaccum pump to the air bypass valve port A.
3. Check the operation of the air bypass valve.

Apply approx 14–22 kPa {100–170 mmHg, 3.9–6.7 inHg}	Air flow
Apply approx 31.3 kPa {235 mmHg, 9.2 inHg}	Fully open

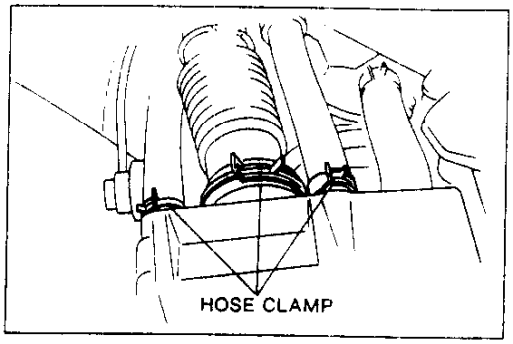
INTERCOOLER

Removal / Inspection / Installation

1. Remove in the order shown in figure.
2. Inspect the intercooler visually and repair or replace if necessary.
3. Install in the reverse order of removal, reffering to **Installation Note**.



1. Fresh air duct
2. Intercooler braket
3. Air separation tank
4. Air hose
5. Intercooler

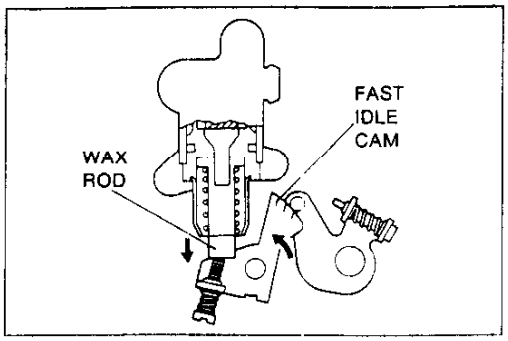


Installation Note

Install the air intake hose and hose clamp same place as show in figure.

Caution

- **Position the hose clamp in the original location on the hose, and squeeze it lightly with large pliers to ensure a good fit.**

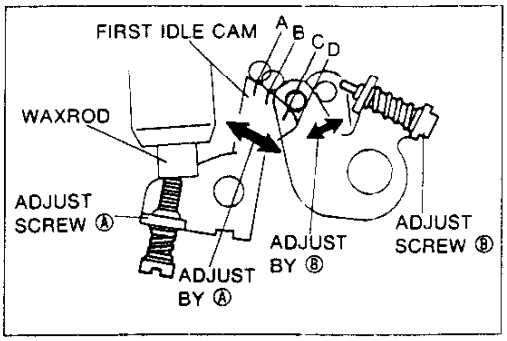


THROTTLE BODY

Inspection

Fast idle cam

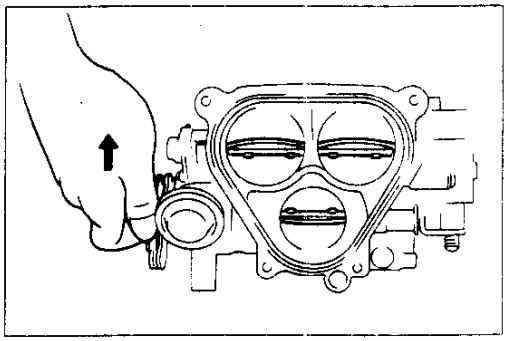
1. Verify that the indicated mark on the fast idle cam is aligned with the center of the cam.
2. Warm up the engine to operating temperature and verify that the waxrod extends outward fully and the idle cam separates from the roller at 55–65°C {131–149°F}.
3. Adjust the adjust screws if necessary.



Adjustment

1. To adjust the first idle cam separates point D turn adjust screw B.
2. To adjust the first idle cam opening temperature turn adjust screw A.

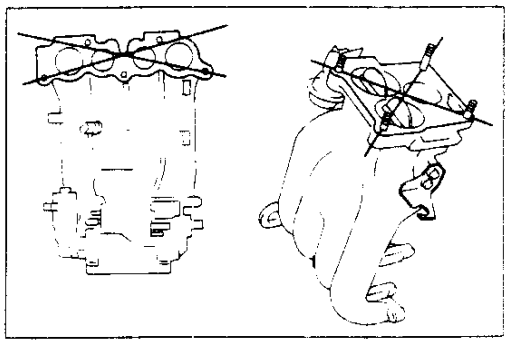
Temperature	Position
– 20°C {– 5°F}	A
0°C {0°F}	B
25°C {77°F}	C
60°C {140°F}	D



Double throttle valve

Inspection

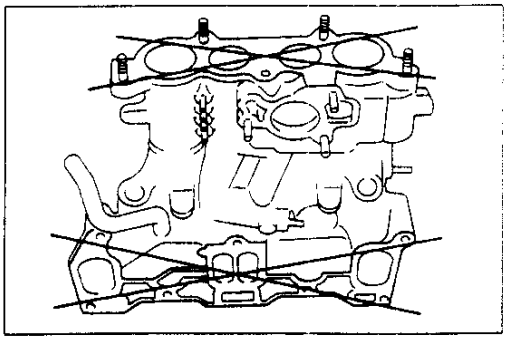
1. Verify that the No.2 secondary throttle valve and linkage move smoothly when primary throttle valve is fully opened.
2. Replace throttle body if necessary.



EXTENSION MANIFOLD

Inspection

1. Visually check for cracks or damage and replace it if necessary.
2. Check for distortion of extension manifold and replace if necessary.



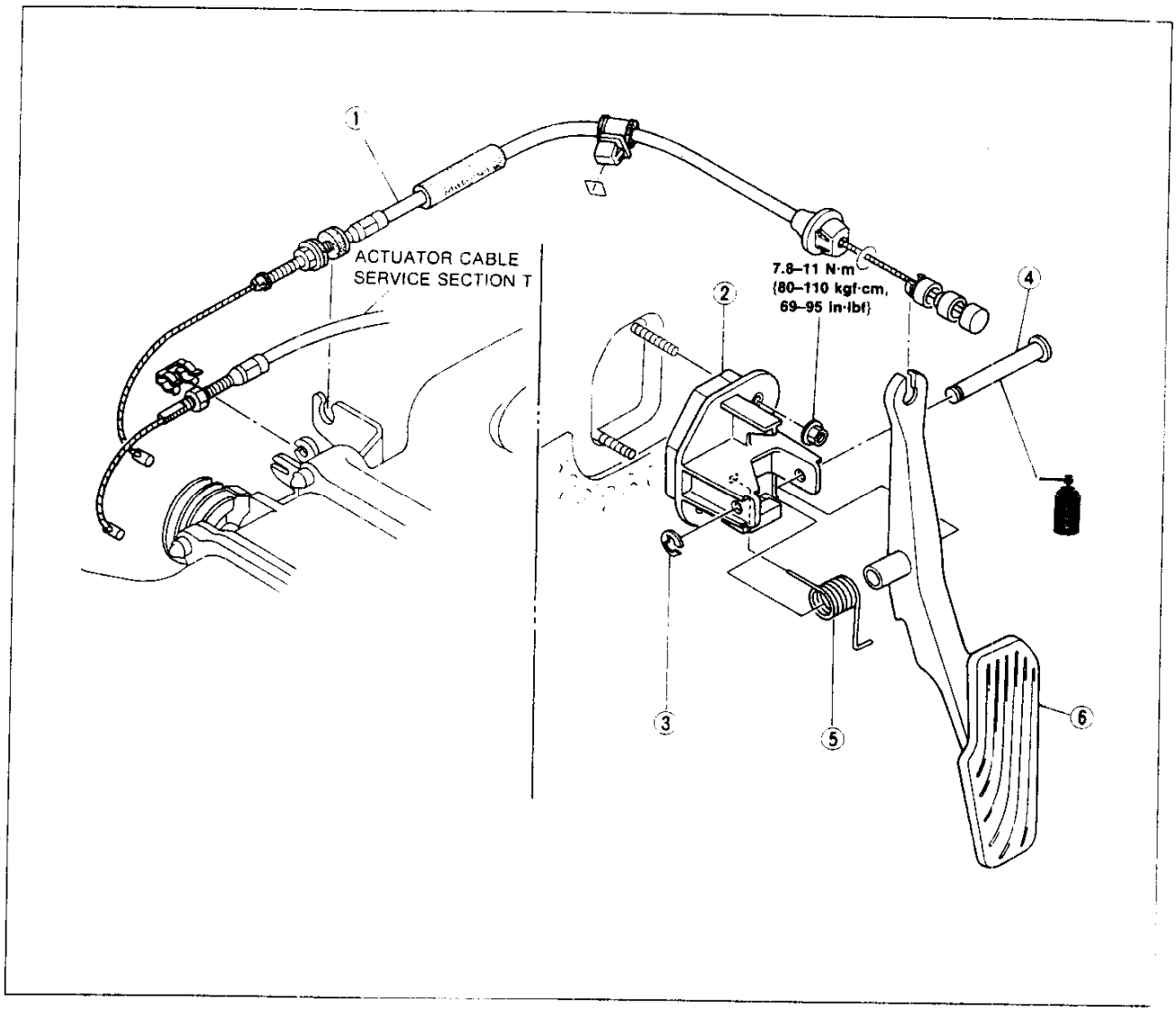
INTAKE MANIFOLD

1. Visually check for cracks or damage and replace if necessary.
2. Check for distortion of the intake manifold and replace it if necessary.

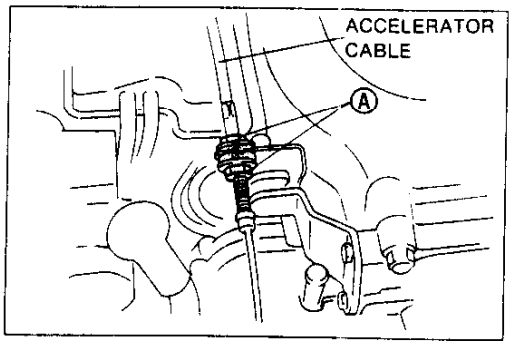
ACCELERATOR PEDAL

Removal / Inspection / Installation

1. Remove in the order as shown in the figure.
2. Visually check the accelerator pedal and retainer for cracks or damage.
3. Install in the reverse order of removal.



1. Accelerator cable
   Inspection / Adjustment ..... below
2. Retainer
3. Clip
4. Shaft
5. Return spring
6. Accelerator pedal



ACCELERATOR CABLE

Inspection / Adjustment

1. Warm up the engine at normal operating temperature.
2. Depress the accelerator pedal to the floor and check that the throttle valve is fully opened.
3. Inspect the play of the accelerator cable.

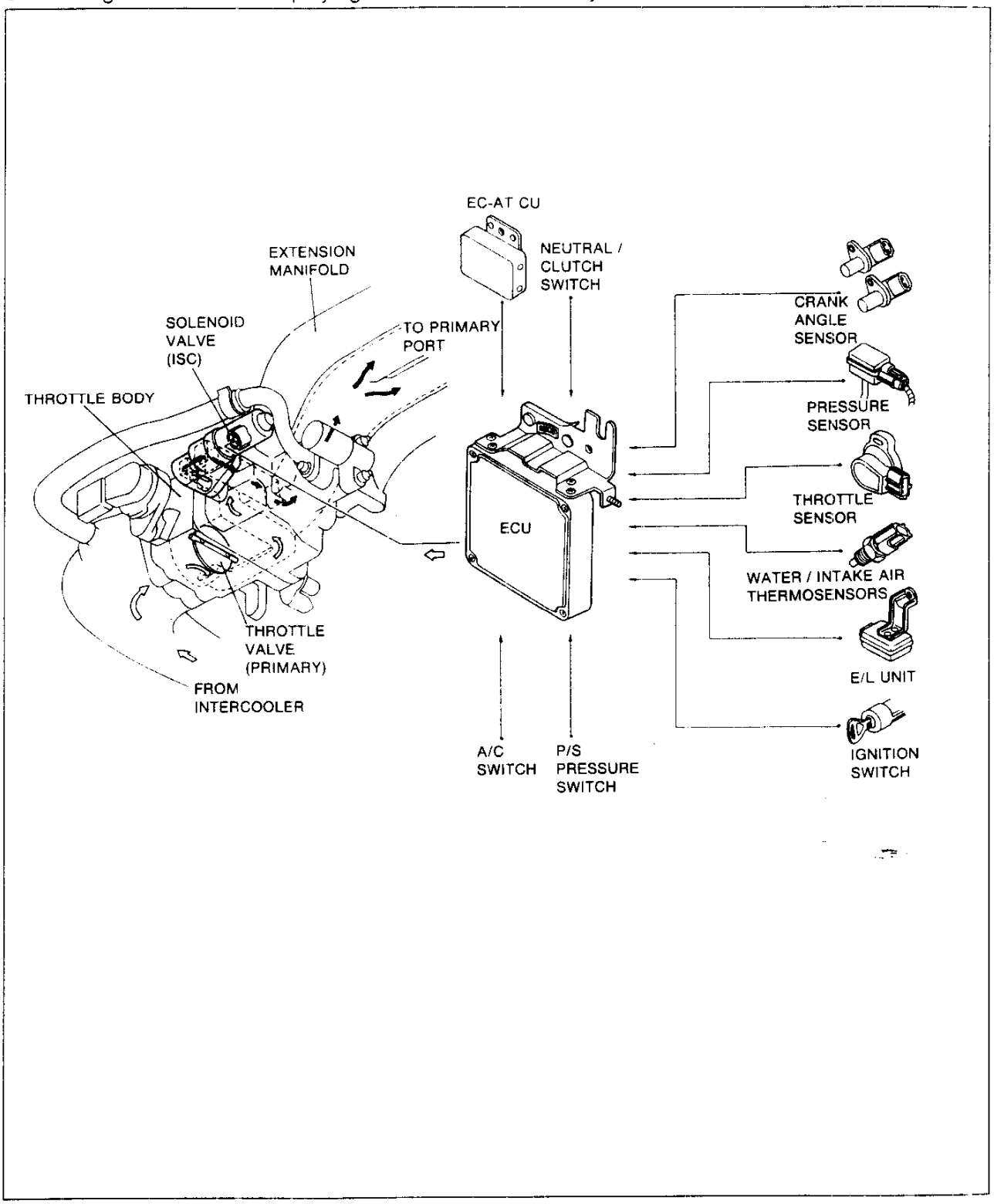
Play: 1–3 mm {0.04–0.12 in}

4. Loosen nuts A to adjust the play if necessary.

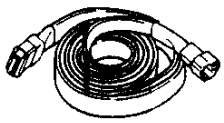
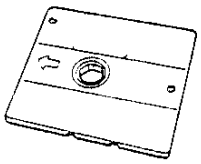
IDLE-SPEED CONTROL (ISC) SYSTEM

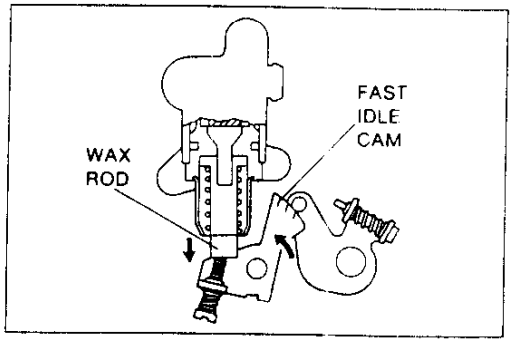
DESCRIPTION

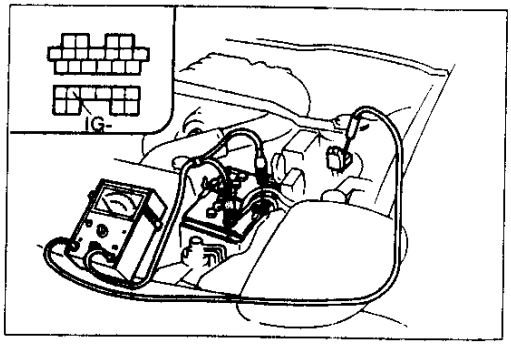
Idle speed control (ISC) system controls the bypass air amount that passes through the throttle valve, the idle-speed control system performs feedback control so that engine idle smoothly and at the target speed. The system also performs the function of the AAV (anti-afterburns valve), thereby eliminating the AAV and simplifying deceleration control system.

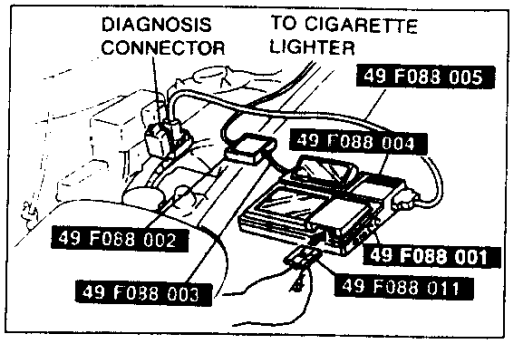


PREPARATION
SST

49 F088 001 DT-S1000 Base unit 	For inspection of solenoid valve and relay	49 F088 002 Power unit (DC12V) 	For inspection of solenoid valve
49 F088 003 Harness Power unit 	For inspection of solenoid valve	49 F088 004 Interface adapter Type-1 	For inspection of solenoid valve
49 F088 005 Harness Type-1 	For inspection of solenoid valve	49 F088 011 System disk Type-1 (Ver 1.00) 	For inspection of solenoid valve







SYSTEM OPERATION

1. Warm up the engine and run it idle.
2. Verify that the fast idle cam separates.
3. Turn all electrical loads OFF.

Note
- **Check the idle speed with the electric cooling fan not operating.**

4. Connect a tachometer to the diagnosis connector terminal IG-
5. Verify that the idle speed is within specification.

Idle speed (Neutral or P range): 700–750 (720 $^{+30}_{-20}$) rpm

6. Verify that the idle speed is within specification under the condition below.

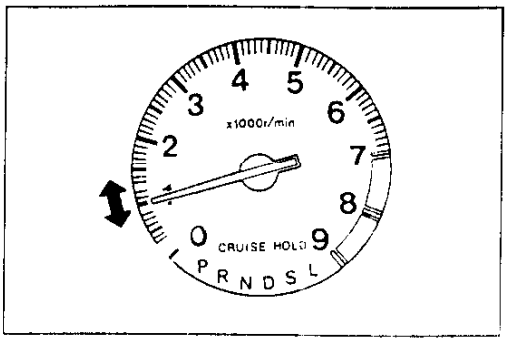
Condition	Idle speed (rpm)	
	M/T	A/T
No load	700–750 (720 $^{+30}_{-20}$)	
Electrical load ON	775–825	
Air conditioner ON	875–925	775–825

DT-S1000

1. Warm up the engine and run it idle.
2. Verify that the fast idle cam separates.
3. Connect the **SST** to the diagnosis connector.

Note
- **Check the idle speed with the electric cooling fan not operating.**

4. Connect a tachometer to the diagnosis connector terminal IG-

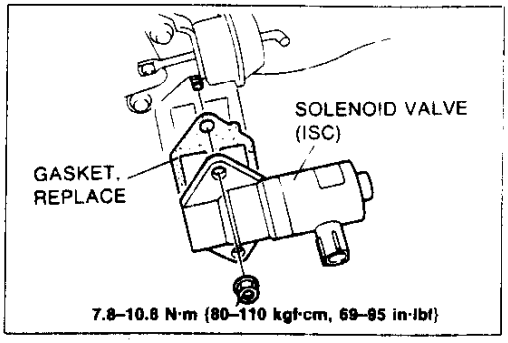


5. Verify that the idle speed is within specification.

Idle speed (Neutral or P range): 700–750 (720 ±30) rpm

6. Select simulation function and verify that the idle speed decrease and increase as the duty cycle changed.

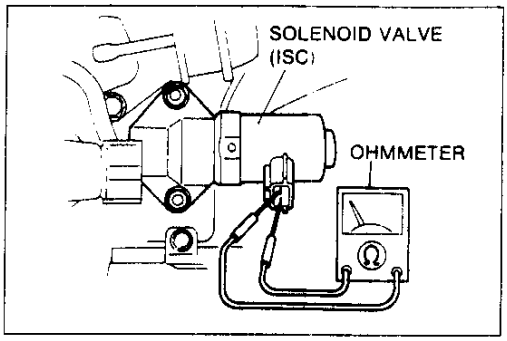
Standard Idle duty: 32–65 %



SOLENOID VALVE (IDLE SPEED CONTROL [ISC])

Removal / Installation

1. Disconnect Negative battery cable.
2. Remove the extension manifold. (Refer to Page F–76)
3. Disconnect the solenoid valve connector.
4. Remove the solenoid valve (ISC) as shown in figure.
5. Install in the reverse order of removal.

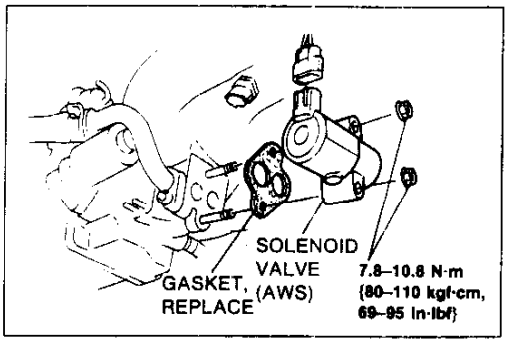


Inspection

1. Remove the solenoid valve. (Refer to above)
2. Measure the solenoid valve resistance with an ohmmeter.

Resistance: 10.7–12.3 Ω (20°C {68°F})

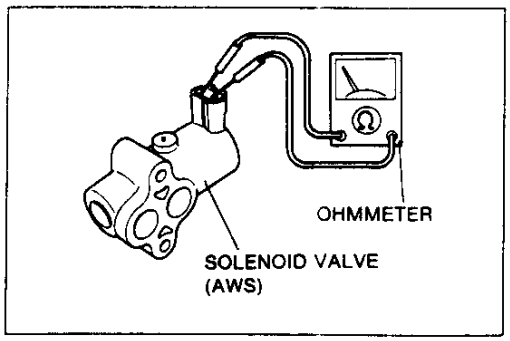
3. If not as specified, replace solenoid valve.



SOLENOID VALVE (ACCELERATED WARM-UP SYSTEM [AWS])

Removal / Installation

1. Disconnect Negative battery cable.
2. Remove the extension manifold. (Refer to Page F–76
3. Disconnect the solenoid valve connector.
4. Remove the solenoid valve (AWS) as shown in figure
5. Install in the reverse order of removal.



Inspection

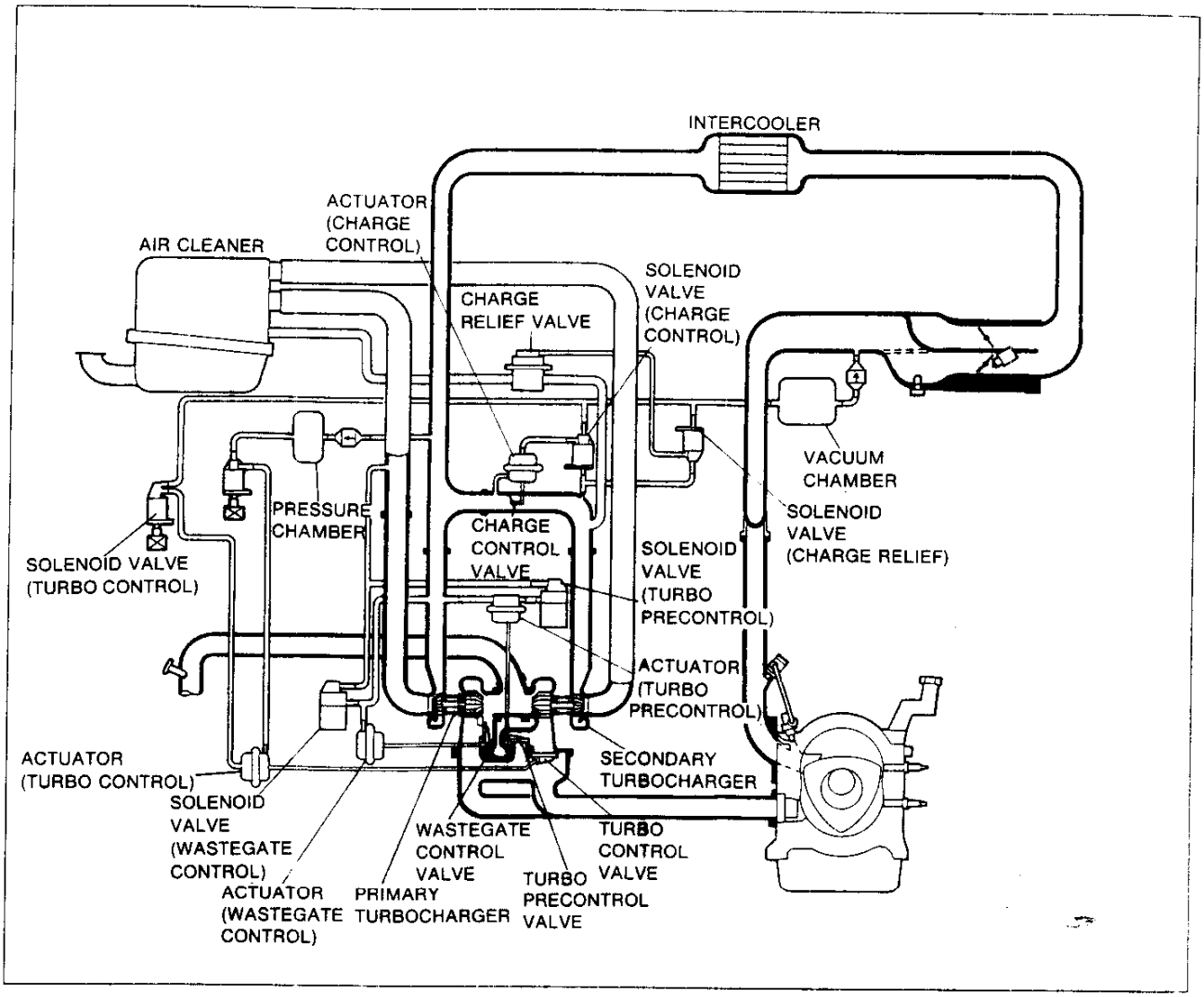
1. Remove the solenoid valve (Refer to above F–76)
2. Measure the solenoid valve resistance with an ohmmeter

Resistance: 9.3–11.3 Ω (20°C {68°F})

3. If not as specified, replace solenoid valve.

SEQUENTIAL TWIN TURBOCHARGER SYSTEM

- The sequential twin turbocharger system consists of two turbochargers (primary and secondary) fitted in line with each other. In the low-speed, light-load range, turbocharging is done only by the primary turbocharger; in the high-speed, heavy-load range, turbocharging is done by the primary and secondary turbochargers in union.
- To prevent a drop of boost pressure when the secondary turbocharger begins to operate, the secondary turbocharger is made to spin prior to its operation.
- The sequential twin turbocharger system consists of the primary and secondary turbochargers and the actuators and solenoid valves (turbo precontrol, turbo control, wastegate control, charge control, charge relief).

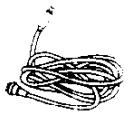
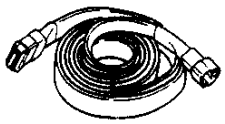
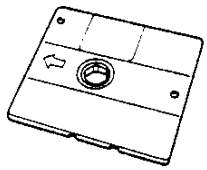
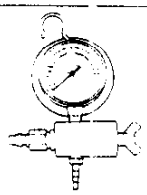
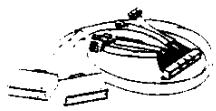


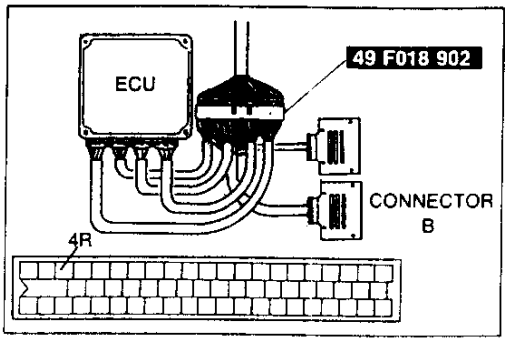
37U0FX-519

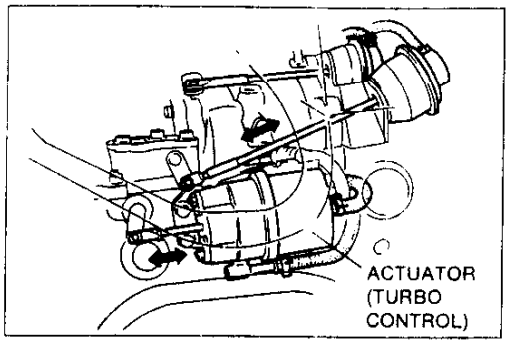
Operation

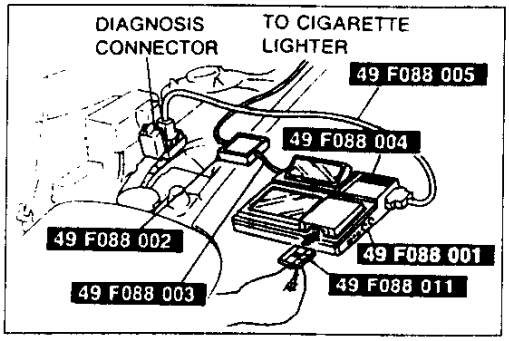
Devices \ Engine speed		Low-speed → High-speed Light-load → Heavy-load		
Turbocharger	Primary	Boost pressure		
	Secondary	Stop	Preliminary rotation	Boost
Solenoid valve	Turbo precontrol	Duty control		Duty 5% (Fully open)
	Wastegate control	Duty 95% (Fully closed)		Duty control
	Charge relief	OFF		ON
	Charge control	ON		OFF
	Turbo control	OFF		ON

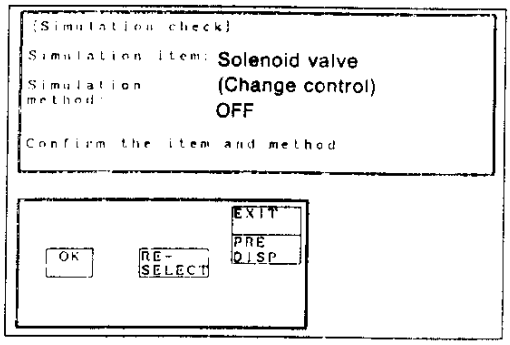
PREPARATION
SST

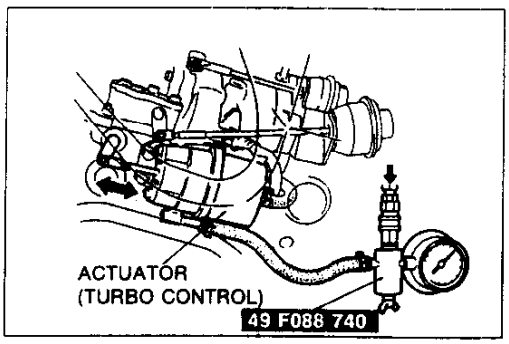
49 F088 001 DT-S1000 Base unit 	For inspection of solenoid valve	49 F088 002 Power unit 	For inspection of solenoid valve
49 F088 003 Harness power unit 	For inspection of solenoid valve	49 F088 004 Interface adapter type-1 	For inspection of solenoid valve
49 F088 005 harness type-1 	For inspection of solenoid valve	49 F088 011 System disk type-1 (V1.00) 	For inspection of solenoid valve
49 F088 740 Pressure tester 	For inspection of turbocharger	49 F018 902 Adapter harness 	For inspection of solenoid valve











ACTUATOR (TURBO CONTROL [TCNT])

System Operation

Engine signal monitor

1. Connect the **SST** (Engine signal Monitor Adaptor Harness) to the ECU as shown.
2. Start the engine and verify that the actuator rod is moved once.
3. Run it idle.
4. Short the ECU terminal 4R and verify that the actuator rod is pulled into the actuator.
5. If the actuator rod is not moved, check the following condition below.

- Vaccum tube
  Inspect vaccum line fitting, connections and components for leaks. (Refer to page F–10)
- Vaccum and pressure chamber
  Visually check for clogging damage or crack.
- Solenoid valve (Turbo control)
  Inspection (Refer to page F–190)
- Actuator (Turbo control)
  Inspection (Refer to below)

DT-S1000

1. Connect the **SSTs** (DT-S1000 and Harness) to the Diagnosis connector as shown.
2. Start the engine and run it idle.
3. Select the simulation check and verify that the actuator rod is moved when solenoid valve ON and OFF.
4. If the actuator rod is not moved, check the condition above.

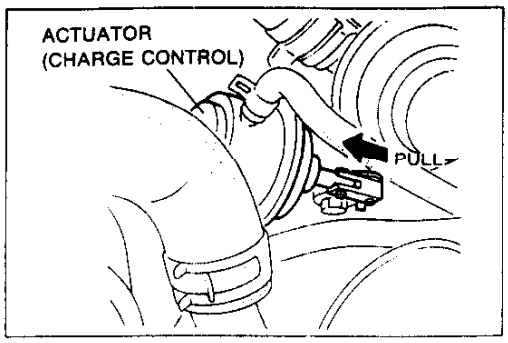
Inspection

1. Disconnect the air hose and attached it to the **SST** as shown.
2. Adjust the compressioned air pressure to 49 kPa. {0.5 kg·f/cm^2, 7.1 psi}
3. Verify that the actuator rod is move when appying and releasing air pressure.

Caution

- **Do not apply compressed air higher than 79.4 kPa {0.81 kg·f/cm^2, 11.5 psi}.**

4. If not as specified replace the actuator. (Refer to page F–91)

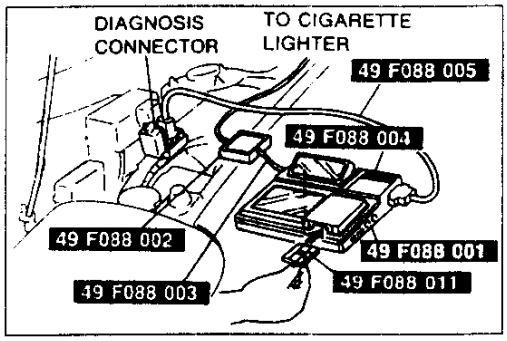


ACTUATOR (CHARGE CONTROL)

System Operation

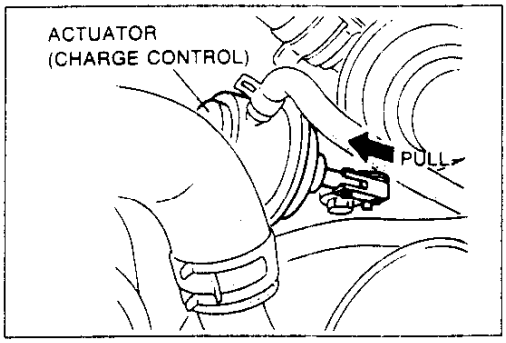
1. Start the engine and verify that the actuator rod is pulled into the actuator.
2. If the actuator rod is not pulled, check the following condition below.

- Vacuum tube
  Inspect vaccum line fitting, connections and components for leak. (Refer to page F–10)
- Vacuum chamber
  Inspect the damage or crack.
- Solenoid valve (Charge control)
  Inspection (Refer to page F–190)
- Actuator (Charge control)
  Inspection (Refer to below)
- Shutter valve
  Inspection (Refer to below)

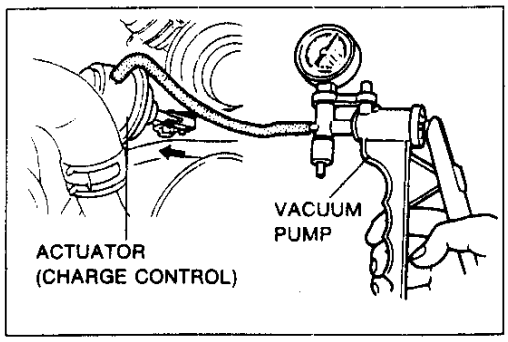


DT-S1000

1. Connect the **SSTs** (DT-S1000 and Harness) to the diagnosis connector as shown.

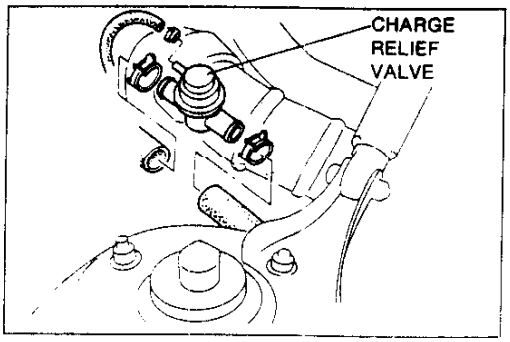


2. Select the simulation function and verify that the actuator rod is pulled when solenoid valve OFF.
3. If the actuator rod is not pulled, check the condition above.



Inspection

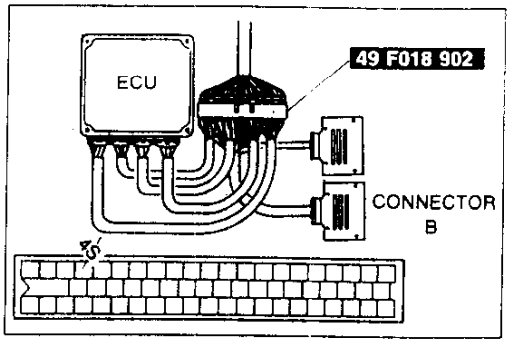
1. Disconnect the vacuum hose from the actuator.
2. Connect a vacuum pump.
3. Verify that the actuator rod is pulled when applying vacuum more than 6.7 kPa {50 mmHg, 1.9 inHg}
4. If not as specified, replace the actuator. (Refer to page F–91)



CHARGE RELIEF VALVE

Removal / Installation

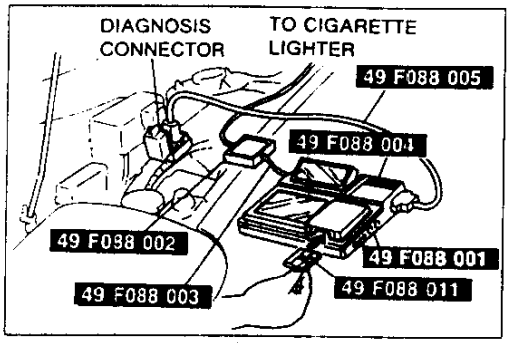
1. Remove in the order shown in figure.
2. Install in the reverse order of removal.



Engine Signal Monitor

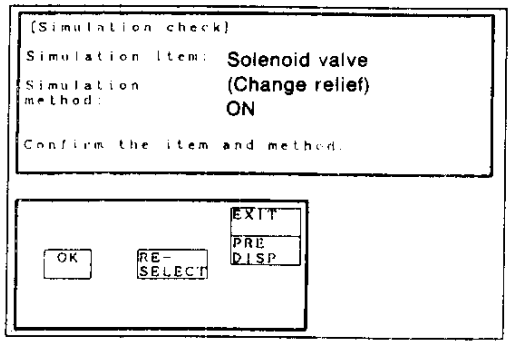
System operation

1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the ECU as shown.
2. Turn ignition switch to ON.
3. Short the ECU terminal 4S and verify that the operating sound is heard when the solenoid valve ON.
4. If no sound is heard, check the solenoid valve. (Refer to page F–190)

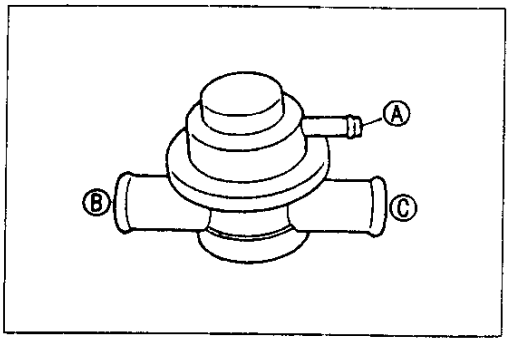


DT-S1000

1. Connect the **SSTs** (DT-S1000 and Harness) to the diagnosis connector.
2. Turn ignition switch to ON.

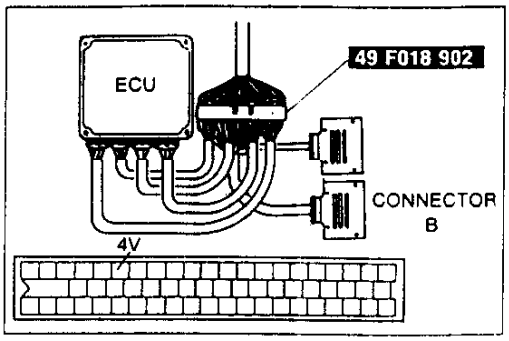


3. Select the simulation function and verify that the operating sound is heard when the solenoid valve ON and OFF.
4. If no sound is heard, check the solenoid valve. (Refer to page F–190)



Inspection

1. Remove the charge relief valve.
2. Connect a vacuum pump to port A.
3. Apply approx 26.7 kPa {200 mmHg, 7.87 inHg} to port A and verify that air flows between B and C.
4. Replace if necessary.



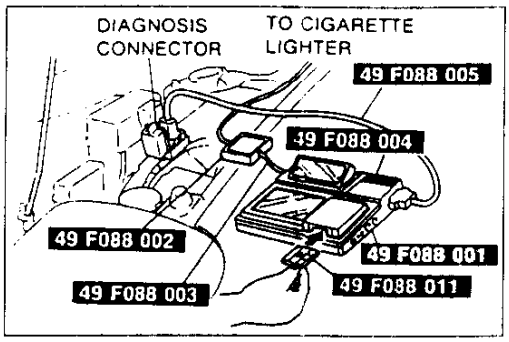
TURBOCHARGER

Actuator (Turbo precontrol)

Engine Signal Monitor

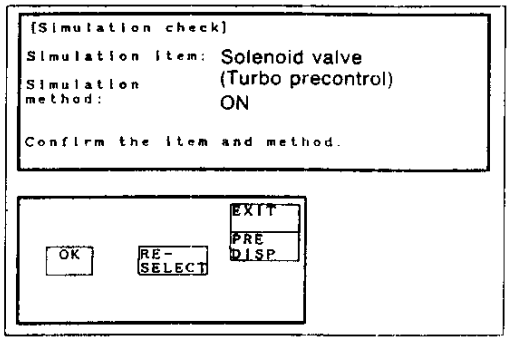
System operation

1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the ECU.
2. Turn ignition switch to ON.
3. Short the ECU terminal 4V and verify that the operating sound is heard.
4. If no sound is heard, check the solenoid valve. (Refer to page F–93)

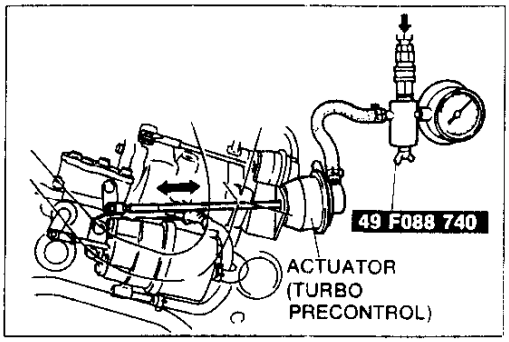


DT-S1000

1. Connect the **SSTs** (DT-S1000 and Harness) to the Diagnosis connector as shown.
2. Turn ignition switch to ON.



3. Select the simulation function and verify that the operating sound is heard when solenoid valve ON and OFF.



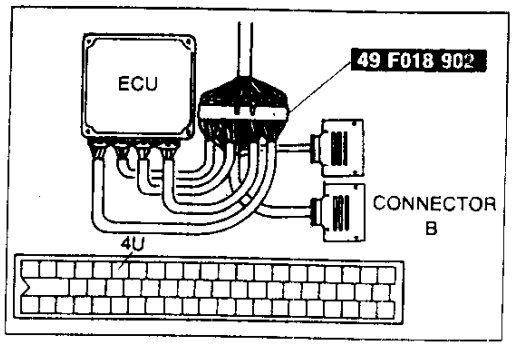
Inspection

1. Disconnect the air hoses and attached one to the **SST** and plug the other pipe as shown.
2. Verify that the actuator rod is moved when applying compressed air pressure to 69–98 kPa {0.7–1.0 kgf/cm^2, 10–14 psi}

Caution

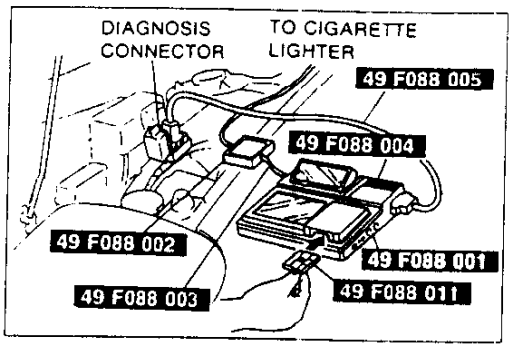
- **Do not apply compressed air higher than 98 kPa {1.0 kgf/cm^2, 14 psi}**

3. Replace turbocharger, if necessary. (Refer to page F–91)



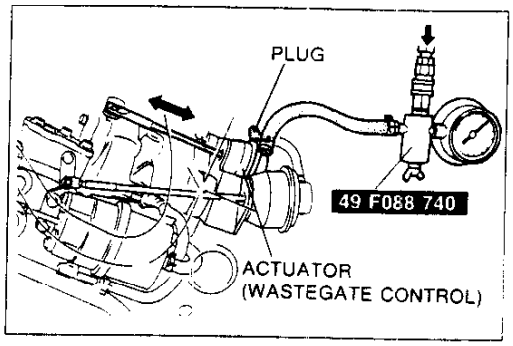
Actuator (wastegate control)
Engine Signal Monitor
System Operation

1. Connect the **SSTs** (Engine Signal Monitor and Adaptor Harness) to the ECU.
2. Turn ignition switch to ON.
3. Short the ECU terminal 4U and verify that the operating sound is heard.
4. If no sound is heard check the solenoid valve (Refer to page F–93)



DT-S1000

1. Connect the **SSTs** (DT-S1000 and Harness) to the Diagnosis connector as shown.
2. Turn ignition switch to ON.
3. Select the simulation function and verify that the operating sound is heard when solenoid valve ON and OFF.



Inspection

1. Disconnect the air hoses and attached one to the **SST** and plug the other pipe as shown.
2. Verify that the actuator rod is moved when applying pressed air pressure to 69–98 kPa {0.7–1.0 kgf/cm^2 10–14 psi}

Caution
- **Do not apply compressed air higher than 98 kPa {1.0 kgf/cm^2 14 psi}**

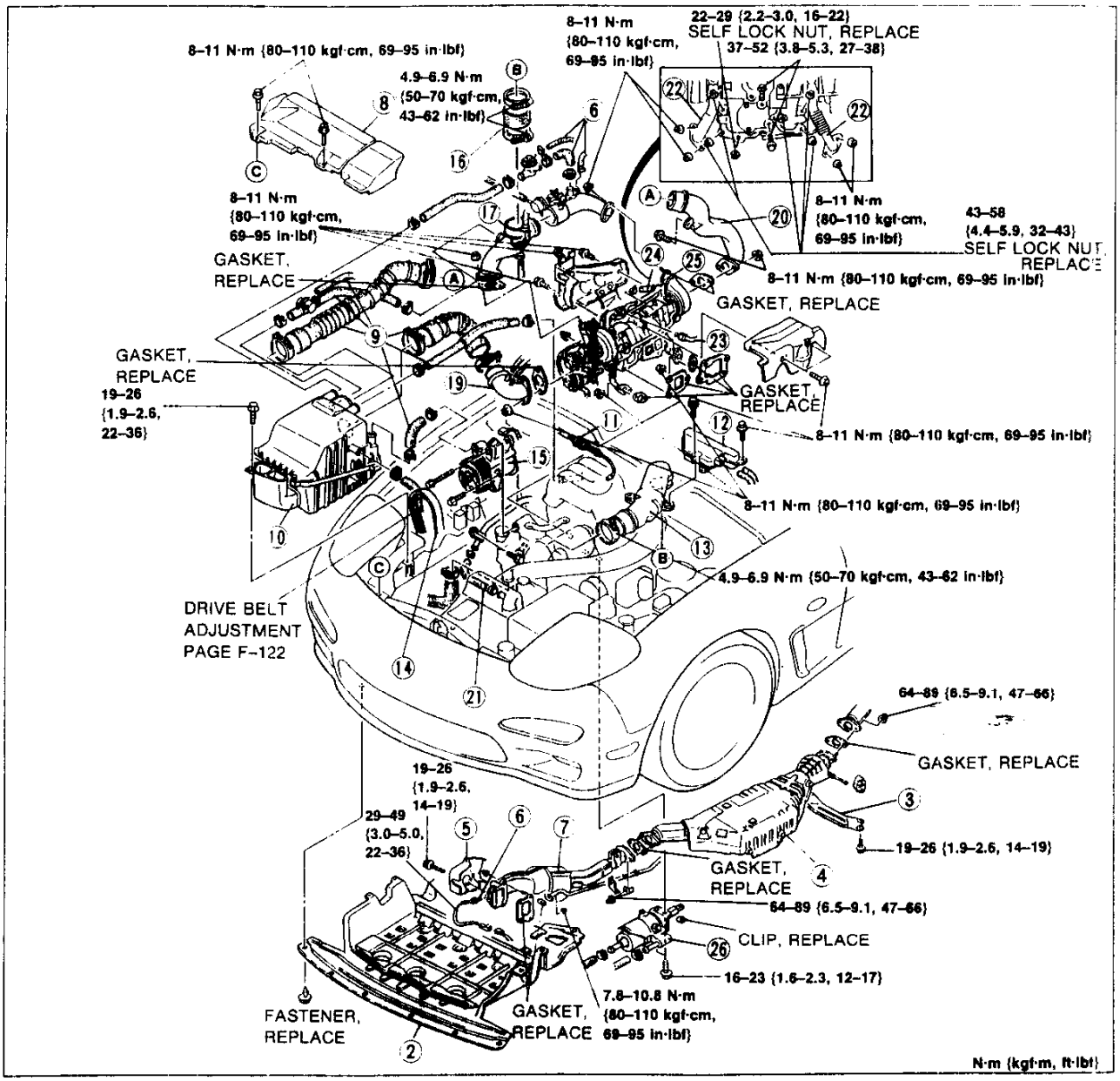
3. Replace turbocharger, if necessary. (Refer to page F–91)

Removal / Installation

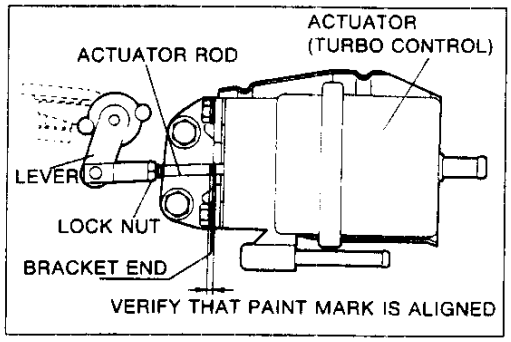
Caution

- **Be careful of following points after turbocharger removal.**
- **Do not hold the actuator rod or hose when carring the turbocharger.**
- **Do not damage the actuator and actuator rod.**
- **Cover the turbocharger compressor air inlet / outlet, turbine exhaust inlet / outlet and oil passage to prevent dirt or other material from entering**
- **Set the turbocharger down with turbine shaft horizontal.**
- **Use the specified new studs when installing the turbocharger.**

1. Disconnect the negative battery cable.
2. Lift up the vehicle.
3. Drain the engine coolant.
4. Remove in the order shown in the figure.
5. Install in the reverse order of removal, reffering to **Installation Note**.

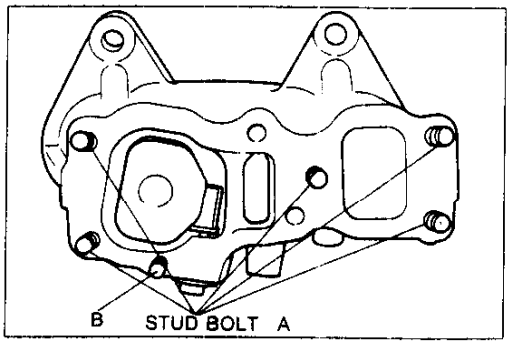


1. Negative battery cable
2. Under cover
3. Braket
4. Main converter assembly
5. Insulator
6. Oxygen sensor
7. Front converter
8. Fresh air duct
9. Air hoses
10. Air cleaner
11. Accelerater cable
    Removal / Installation ..... page F–80
    Inspection / Adjustment ..... page F–80
12. Pressure chamber
13. Air pipe
14. Drive belt
15. Air pump
16. Air hose
17. Air pipe
18. Charge control valve assembly
    Inspection ..... page F–87
19. Air intake pipe (Secondary)
20. Air intake pipe (Primary)
21. Water hose
22. Oil return pipes
23. Oil pipe
24. Water hose
25. Turbocharger
    Inspection ..... below
26. Actuator (Turbo control)
    Inspection ..... page F–86



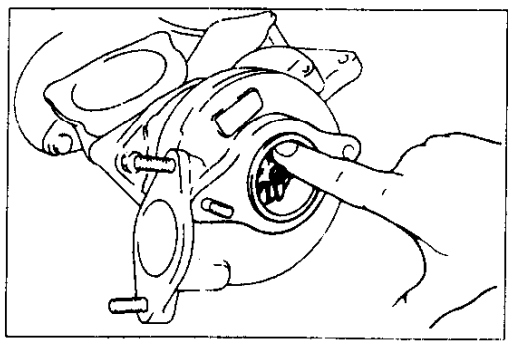
Installation Note

1. Verify that the paint mark on the actuator rod is aligned with actuator braket end.
2. If the mark is not aligned, adjust the actuator rod length



3. Check the stud bolt tighting torque before installing turbocharger.

Tighting torque
A: 16–24 N·m {1.6–2.4 kgf·m, 12–17 ft·lbf}
B: 8–12 N·m {0.8–1.2 kgf·m, 5.8–8.7 ft·lbf}



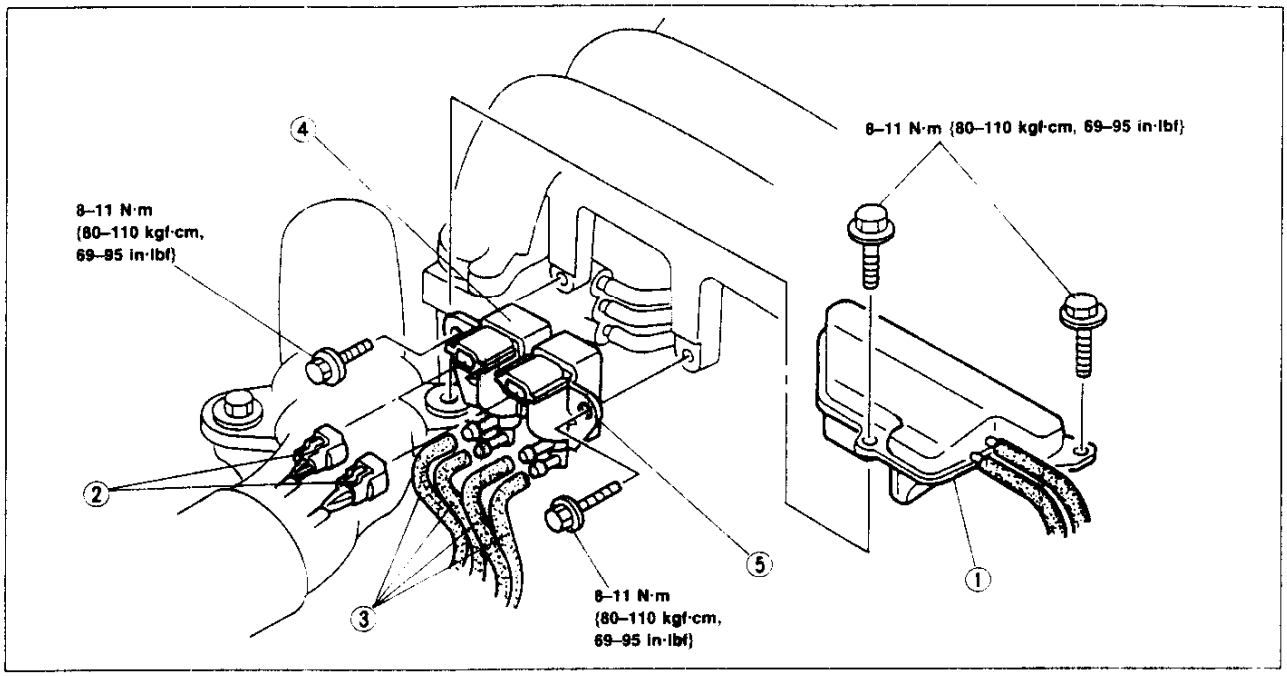
Inspection

1. Be sure the engine is cool
2. Remove the turbocharger.
3. Check that the compressor wheel assembly turns smoothly.
4. If there is excessive drag or noise, replace the turbocharger.

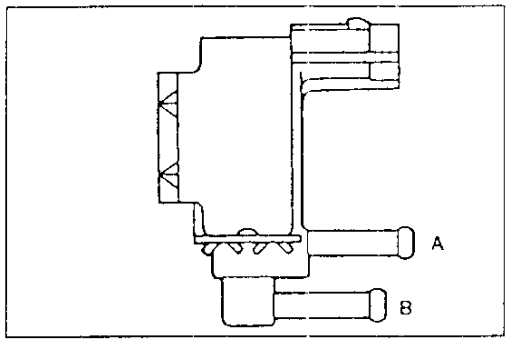
SOLENOID VALVE (TURBO PRECONTROL, WASTEGASTE CONTROL)

Removal / Installation

1. Remove in the order shown in figure.
2. Install in the reverse order of removal.

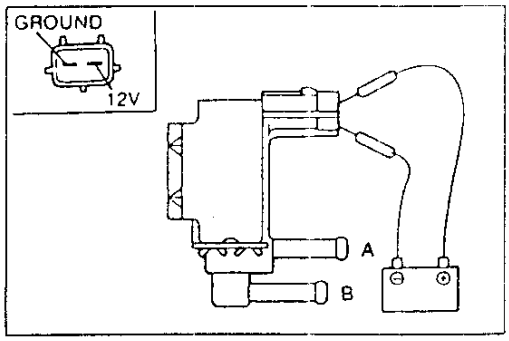


1. Pressure chamber
2. Connectors
3. Vaccum hoses
4. Solenoid valve. (Turbo precontrol)
   Inspection ..... below
5. Solenoid valve. (Wastegate control)
   Inspection ..... below



Inspection

1. Remove the solenoid valve.
2. Blow through the solenoid valve from hose A and check that air does not flows from B to A.



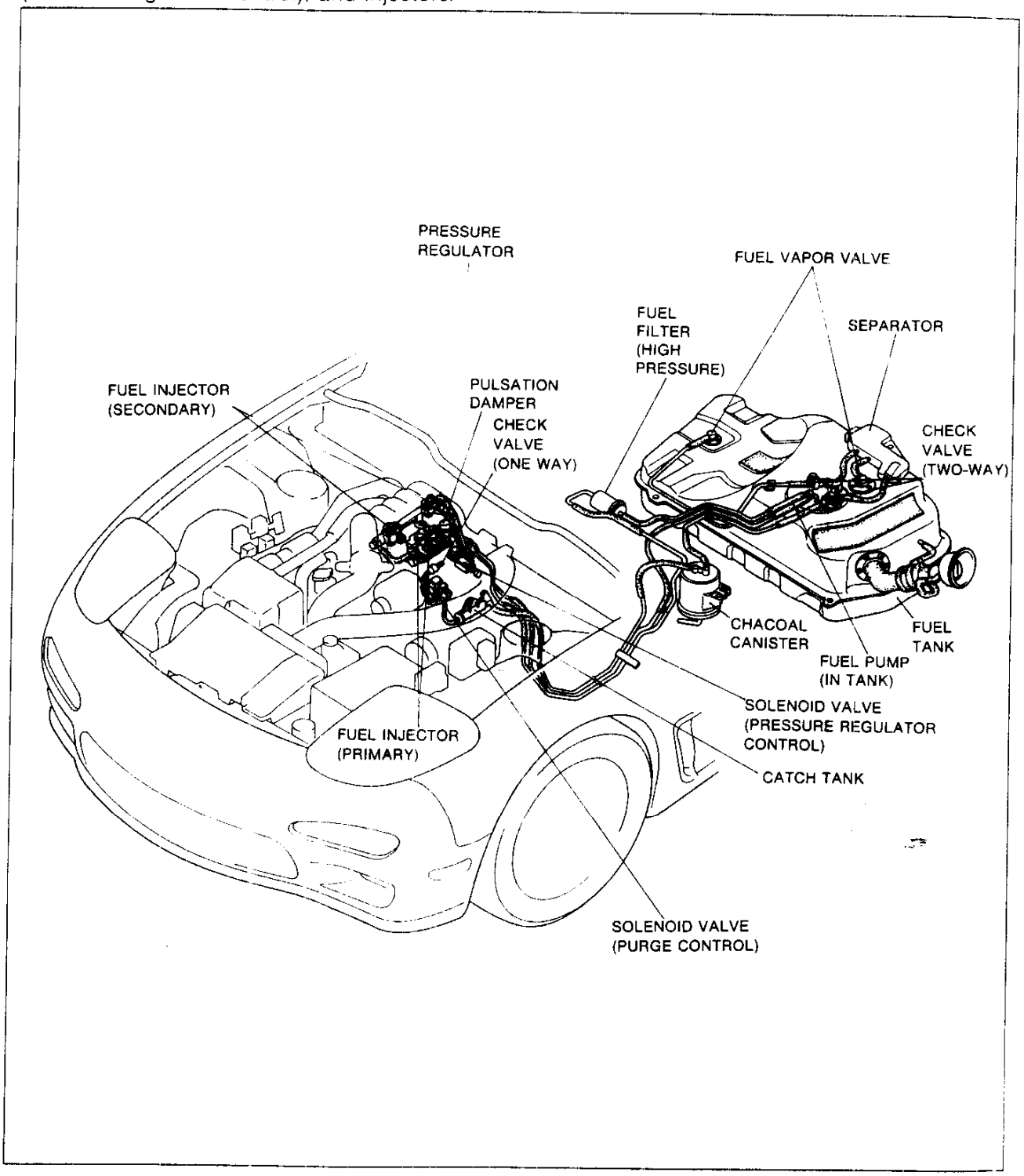
3. Apply battery voltage to solenoid valve and check that air does flow the solenoid valve from A to B.
4. If not as specified measure the resistance.

Resistance: 29–33 Ω {20°C [68°F]}

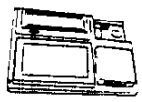
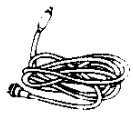
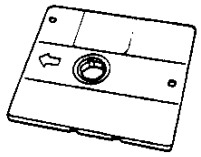
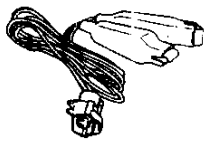
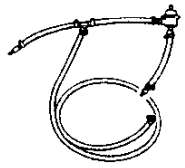
FUEL SYSTEM

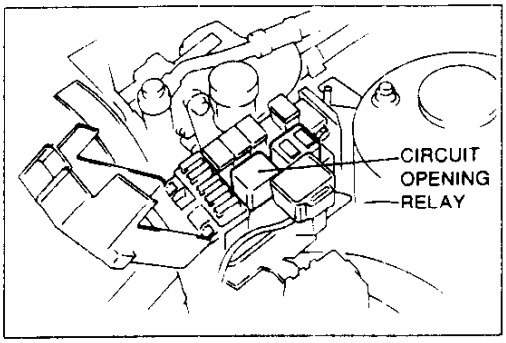
DESCRIPTION

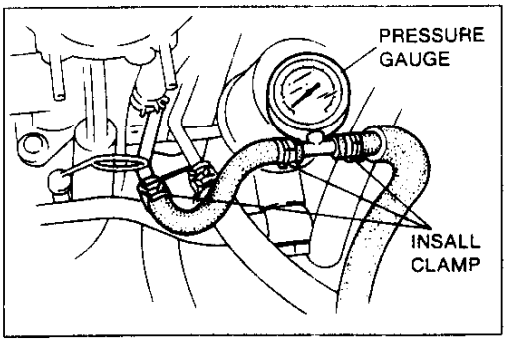
This system supplies the necessary fuel at constant pressure to the injectors.
Fuel is metered and injected into intake manifold and intake port according to the injection control signals from the ECU. (Engine Control Unit)
This system consists of fuel pump, fuel filters, pressure regulator, pulsation dumper, solenoid valve (Pressure regulator control), and injectors.



PREPARATION
SST

49 F088 001 DT-S1000 Base unit 	For inspection of relay	49 F088 002 Power unit DC-12V 	For inspection of relay
49 F088 003 Power unit Harness 	For inspection of relay	49 F088 004 Interface Adaptor Type-1 	For inspection of relay
49 F088 005 Harness Type-1 	For inspection of relay	49 F088 011 System disk Type-1 (Ver 1.00) 	For inspection of relay
49 L018 901 Injector checker 	For inspection of injector	49 F013 102 Injector checker Hose 	For inspection of injector





PRECAUTION

Fuel Pressure Release and Servicing Fuel system

Fuel in the fuel system remains under high pressure even when the engine is not running.

Before disconnecting any fuel line, release the fuel pressure from the fuel system as described to reduce the posibility of injury or fire.

1. Start the engine.
2. Remove the circuit opening relay.
3. After the engine stalls, turn OFF the ignition switch.
4. Install the circuit opening relay.

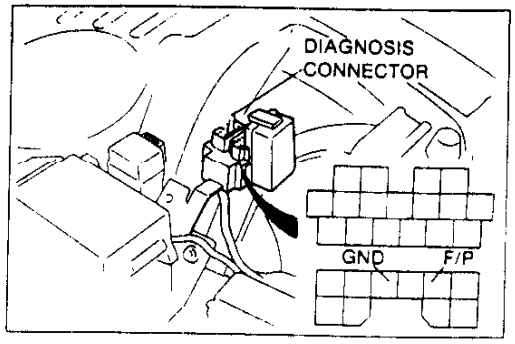
Use a rag as protection from fuel spray when disconnecting the hoses.

Plug the hoses after removal.

When inspecting the fuel system, use a fuel pressure gauge.

Caution

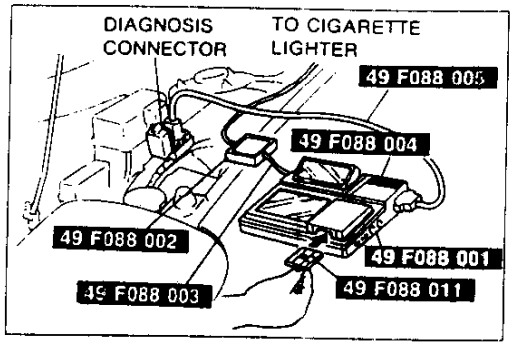
- **Install hose clamps to secure the fuel pressure gauge to the fuel pipe and the fuel main hose to prevent fuel leakage.**



Priming Fuel System

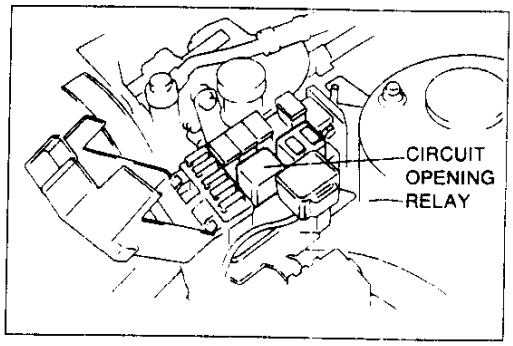
After releasing the fuel pressure for repairs or inspection, the system must be primed to avoid excessive cranking when first starting the engine. Follow the steps below.

1. Connect the diagnosis connector terminals **F/P** and **GND** with a jumper wire.
2. Turn the ignition switch ON for Approximately 10 (ten) seconds and check for fuel leaks.
3. Turn the ignition switch OFF and remove the jumper wire.



SYSTEM OPERATION

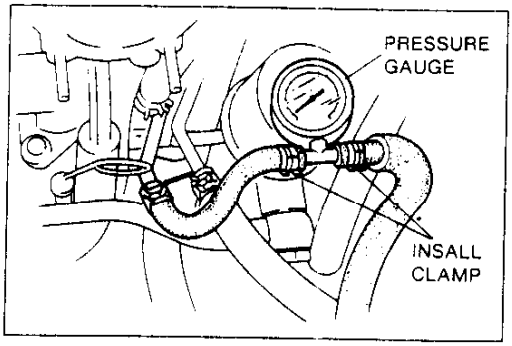
1. Connect the **SSTs** (DT-S1000 and Harness) to the diagnosis connector.
2. Start the engine and run it idle.
3. Select the simulation check and verify that the engine speed is dropped when injector stopped.



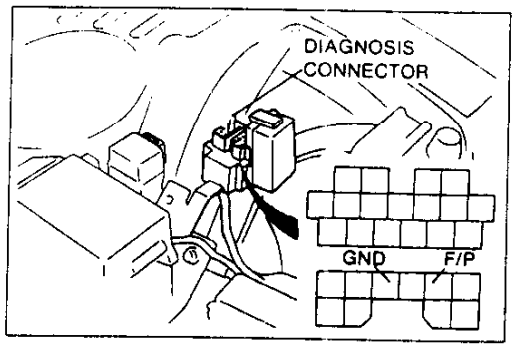
Fuel Pressure Hold Inspection

Warning

- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F–96)**



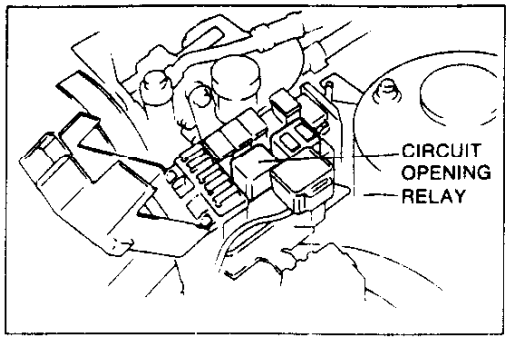
1. Disconnect the negative battery terminal.
2. Install a fuel pressure gauge as shown.
3. Connect the negative battery terminal.



4. Connect the diagnosis connector terminals **F/P** and **GND** with a jumper wire.
5. Turn the ignition switch ON for **10 seconds** to operate the fuel pump.
6. Turn the ignition switch OFF and disconnect the jumper wire.
7. Observe the fuel pressure **5 minutes**.

   Fuel pressure:
   More than 150 kPa {1.5 kgf/cm², 21 psi}

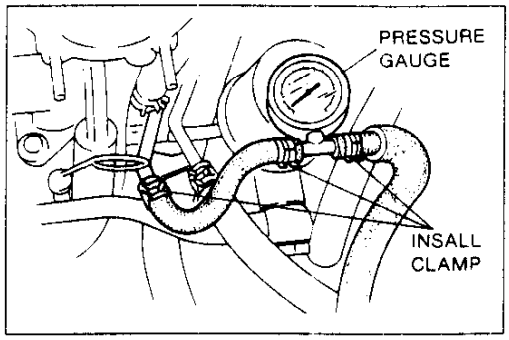
8. If not as specified, perform the following inspections.
   - Fuel pump hold pressure. (Refer to page F–100)
   - Pressure regulator fuel line pressure. (Refer to page F–104)
   - Injector fuel leakage. (Refer to page F–107)



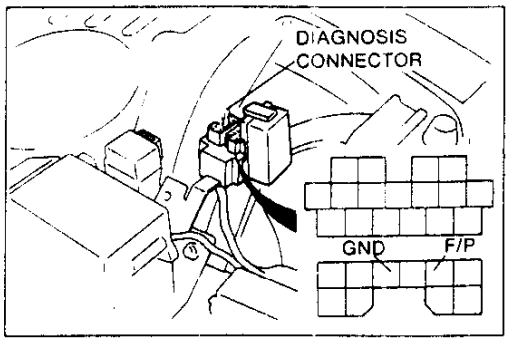
Fuel Line Pressure Inspection

Warning

- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury fire. (Refer to page F–95)**



1. Disconnect the negative battery cable.
2. Install a fuel pressure gauge as shown in the figure.
3. Connect the negative battery cable.



4. Connect diagnosis connector terminals **F/P** and **GND** with a jumper wire.
5. Turn the ignition switch ON.
6. Measure the fuel line pressure.

Fuel line pressure:
250–260 kPa {2.5–2.7 kg/cm^2, 36–38 psi}

Pressure low – Measure fuel pump maximum pressure. (Refer to page F–101) If as specified, the fuel line or fuel filter might be clogged or restricted.

Pressure high – Replace the pressure regulator. (Refer to page F–105)

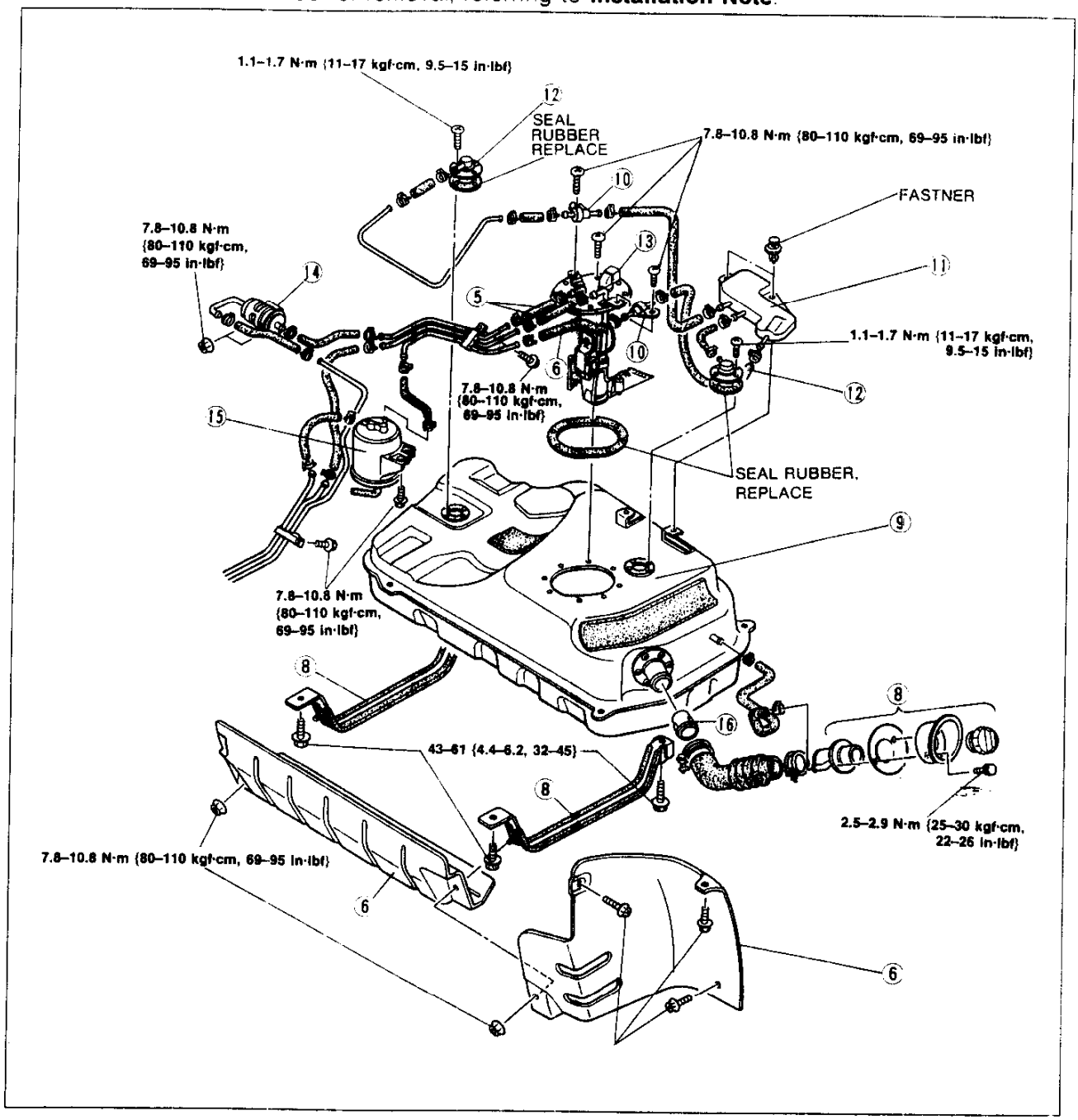
FUEL TANK

Removal / Inspection / Installation

Warning

- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F–95.)**
- **When removing the fuel tank, keep sparks, cigarettes, and open flames away from it.**
- **Before repairing the fuel tank, clean it thoroughly with steam to remove all explosive gas.**

1. Remove in the order shown in the figure.
2. Inspect the fuel tank components visually and repair or replace if necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.



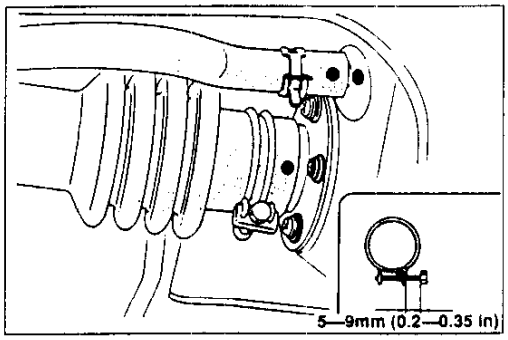
Note

- **Drain the fuel from the fuel tank before removing the fuel tank.**

1. Battery cable
2. Fuel hoses
   Installation Note ..... page F–99
3. Evapolative hoses
   Installation Note ..... page F–99
4. Under cover
5. Fuel filler pipe
6. Fuel tank strap
7. Fuel tank
   Inspect for cracks and corrosion
8. Check valve
   Inspection ..... page F–132
9. Separator
   Inspect for cracks and corrosion
10. Fuel vapor valve
    Inspection ..... page F–132
11. Fuel pump
    Inspection
    Removal / Installation
    Assembly / Disassembly ..... page F–102
12. Nonreturn valve

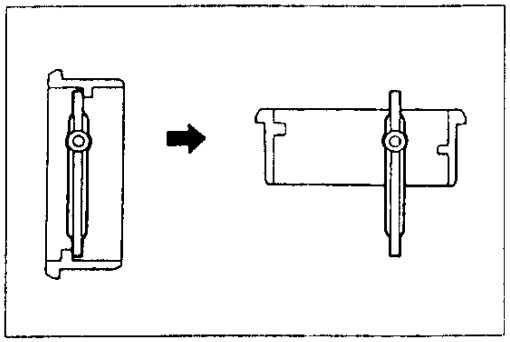
Installation Note

1. Push the ends of the main fuel hose, fuel return hose, and evaporative hoses onto the fuel tank fittings **at least 25 mm {1.0 in}**.
2. Push the fuel filter hose onto the fuel tank pipe and filter pipe **at least 35 mm {1.4 in}**.
3. Push the evaporative hoses onto the fuel vapor valve **at least 20 mm {0.8 in}**.
4. Push the evaporative hoses onto the check valve **at least 17 mm {0.7 in}**.



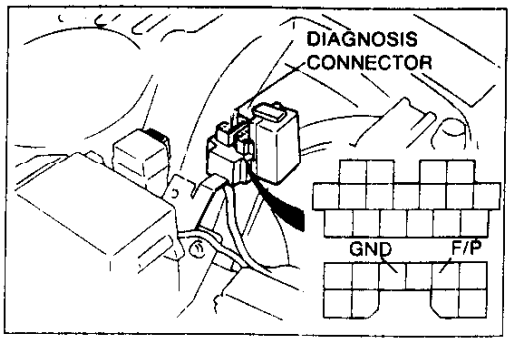
19U0FX-145

5. Connect the fuel filler hose and breather hose onto the fuel tank as shown in the figure.



Nonreturn Valve

Verify that the nonreturn valve operates under its own weight as shown in the figure.

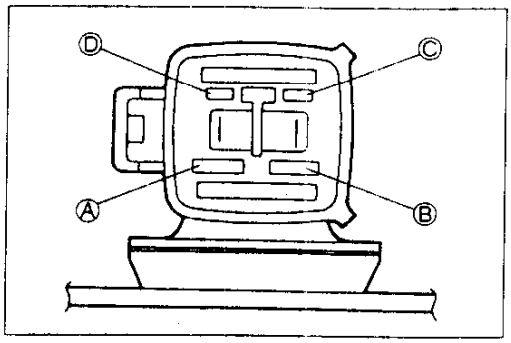


FUEL PUMP

Inspection

Fuel pump operation

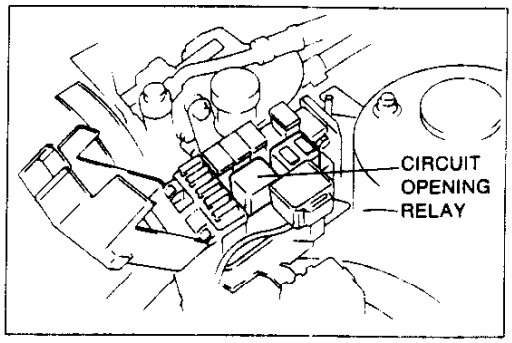
1. Connect the diagnosis connector terminals **F/P** and **GND** with a jumper wire.
2. Remove the fuel filler cap.
3. Turn the ignition switch ON.
4. Listen for operational sound of the fuel pump at the filler inlet.
5. Install the fuel filler cap.



6. If no sound was heard, measure the voltage between the fuel pump connector wire W/R to ground.

   Voltage: Battery voltage

7. If not correct, check the circuit opening relay and its circuits. (Refer to page F–110.)
8. If the voltage is normal, check for continuity between fuel pump connector A and B.
9. If there is continuity, replace the fuel pump.
10. If there is no continuity, repair the ground circuit.

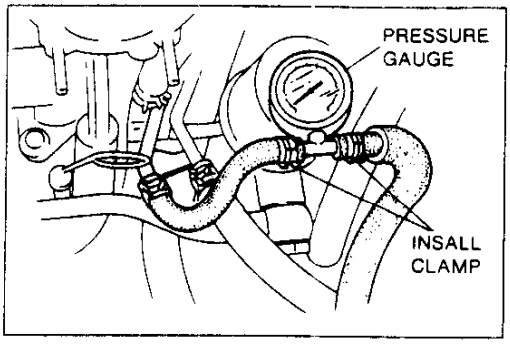


Hold pressure

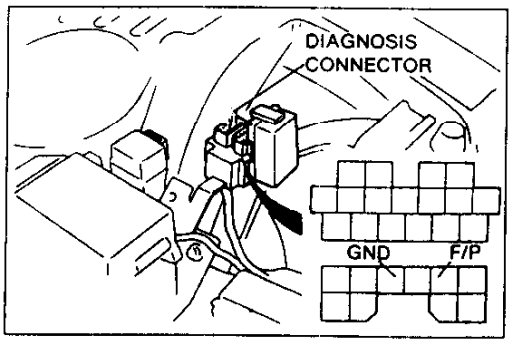
Perform the inspection if the fuel pressure hold inspection is not as specified.

Warning

- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F–96.)**



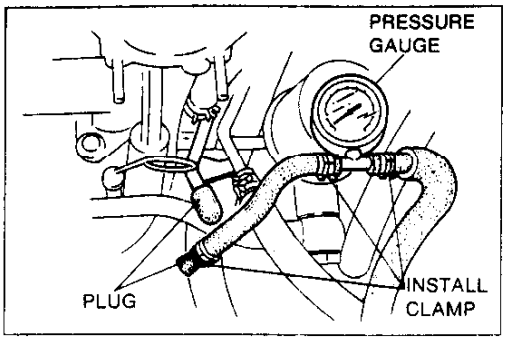
1. Disconnect the negative battery terminal.
2. Connect a fuel pressure gauge to the fuel main pipe and plug the outlet of the fuel pressure gauge as shown. (Install clamps as shown.)
3. Connect the negative battery terminal.



4. Connect diagnosis connector terminals **F/P** and **GND** with a jumper wire.
5. Turn the ignition switch ON and measure the fuel pressure.

   Fuel pressure:
   490–740 kPa {5.0–7.5 kgf/cm², 71–106 psi}

6. Turn the ignition switch OFF and disconnect the jumper wire.
7. If not as specified, replace the fuel pump.

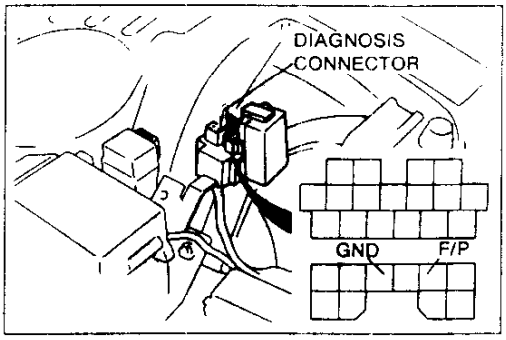


Fuel pump maximum pressure

Warning

- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F–96.)**

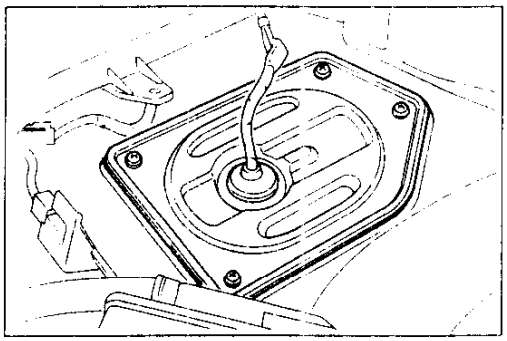
1. Disconnect the negative battery terminal.
2. Connect a fuel pressure gauge to the fuel main pipe and plug the outlet of the gauge as shown. (Install clamps as shown.)



3. Connect the negative battery terminal.
4. Connect diagnosis connector terminals **F/P** and **GND** with a jumper wire.
5. Turn the ignition switch ON to operate the fuel pump.
6. Measure the pump maximum pressure.

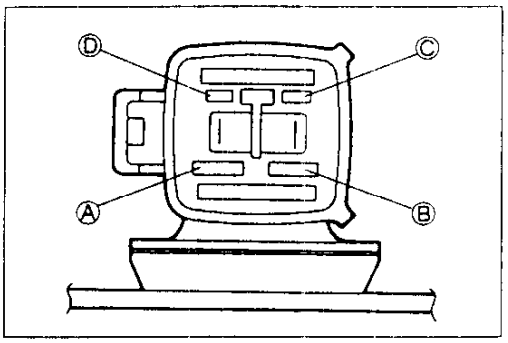
Fuel pump maximum pressure:
490–740 kPa {5.0–7.5 kgf/cm^2, 71–107 psi}

7. Turn the ignition switch OFF and disconnect the jumper wire.
8. If not as specified, replace the fuel pump.



Continuity Inspection

1. Remove the luggage room carpet.
2. Remove the acoustic wave guide assembly. (if eqeipped)
3. Disconnect the fuel pump connector.



4. Check for continuity between the fuel pump connector A and B.
5. If there is none, replace the fuel pump.

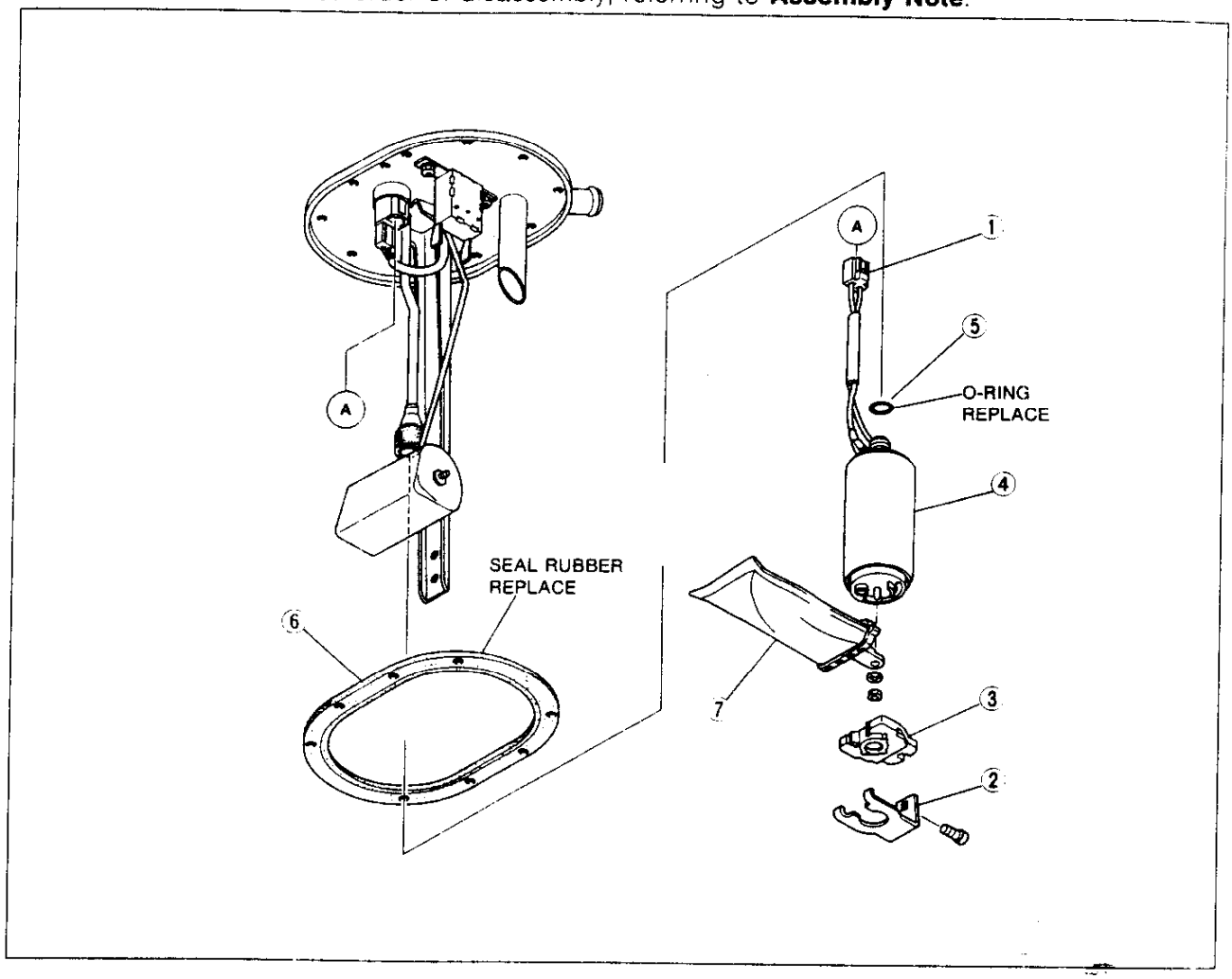
Remove / Installation
(Refer to page F–98)

Disassembly / Assembly

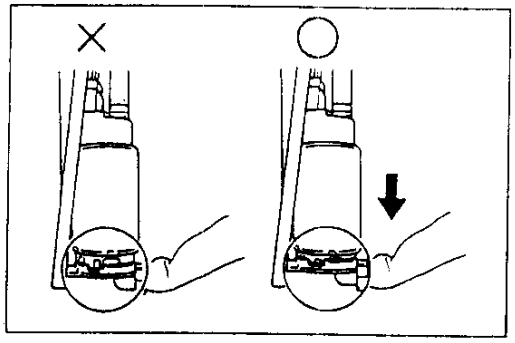
Warning

- **When replacing the fuel system parts, keep sparks, cigarettes, and open flames away from the fuel.**
- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F–96).**

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



1. Fuel pump connector
2. Bracket
3. Mounting rubber
4. Fuel pump
5. O-ring
6. Seal rubber
7. Fuel filter (Low pressure side)



Assembly Note

After installing the fuel pump to the braket, pull the pump down so that it is tight against the braket.

FUEL FILTER

Replacement

Warning

- **Always work away from sparks and open flames.**

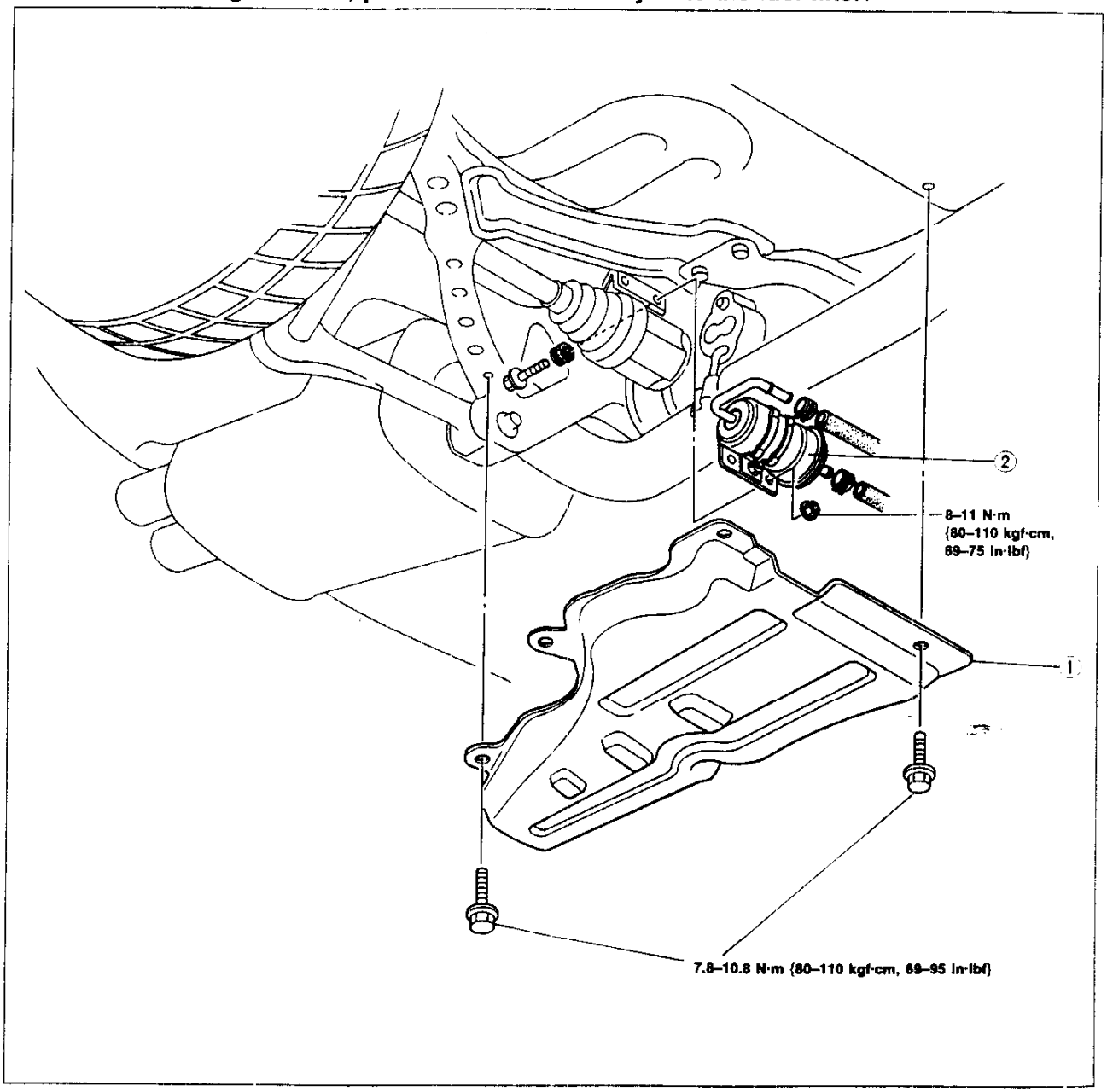
High-pressure side

The fuel filter must be replaced at the intervals outlined in the maintenance schedule.

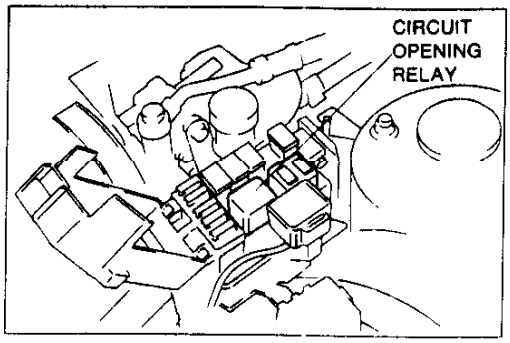
1. Before removing the fuel filter, release the fuel pressure from the fuel system.
2. Remove in the order shown in figure.
3. Install in the reverse order of removal.

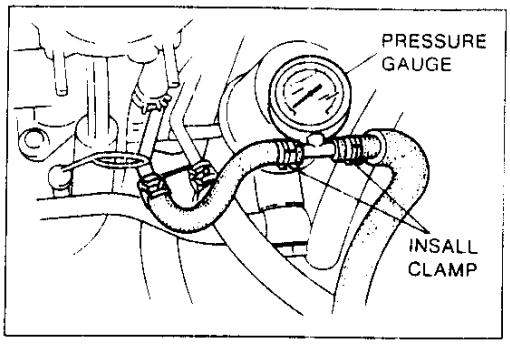
Note

- **When installing the filter, push the fuel hoses fully onto the fuel filter.**



1. Under cover
2. Fuel filter (High-pressure side)





PRESSURE REGULATOR

Inspection

Fuel line pressure

Warning

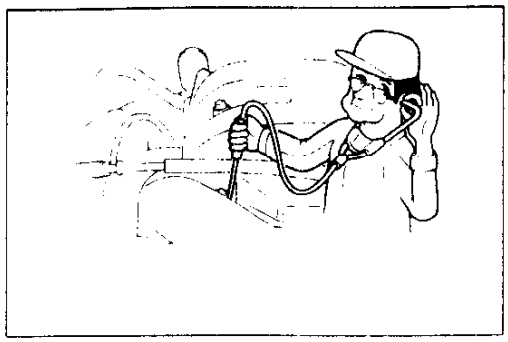
- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F-96.)**

1. Disconnect the negative battery terminal.
2. Connect a fuel pressure gauge between the fuel filter and the fuel main hose. (Install clamps as shown.)
3. Connect the negative battery terminal.
4. Start the engine and run at idle.
5. Measure the fuel line pressure.

Fuel line pressure:
190–220 kPa {1.9–2.3 kgf/cm^2, 28–32 psi}

Removal / Installation

(Refer to page F–105)



INJECTOR

Inspection (On-vehicle)

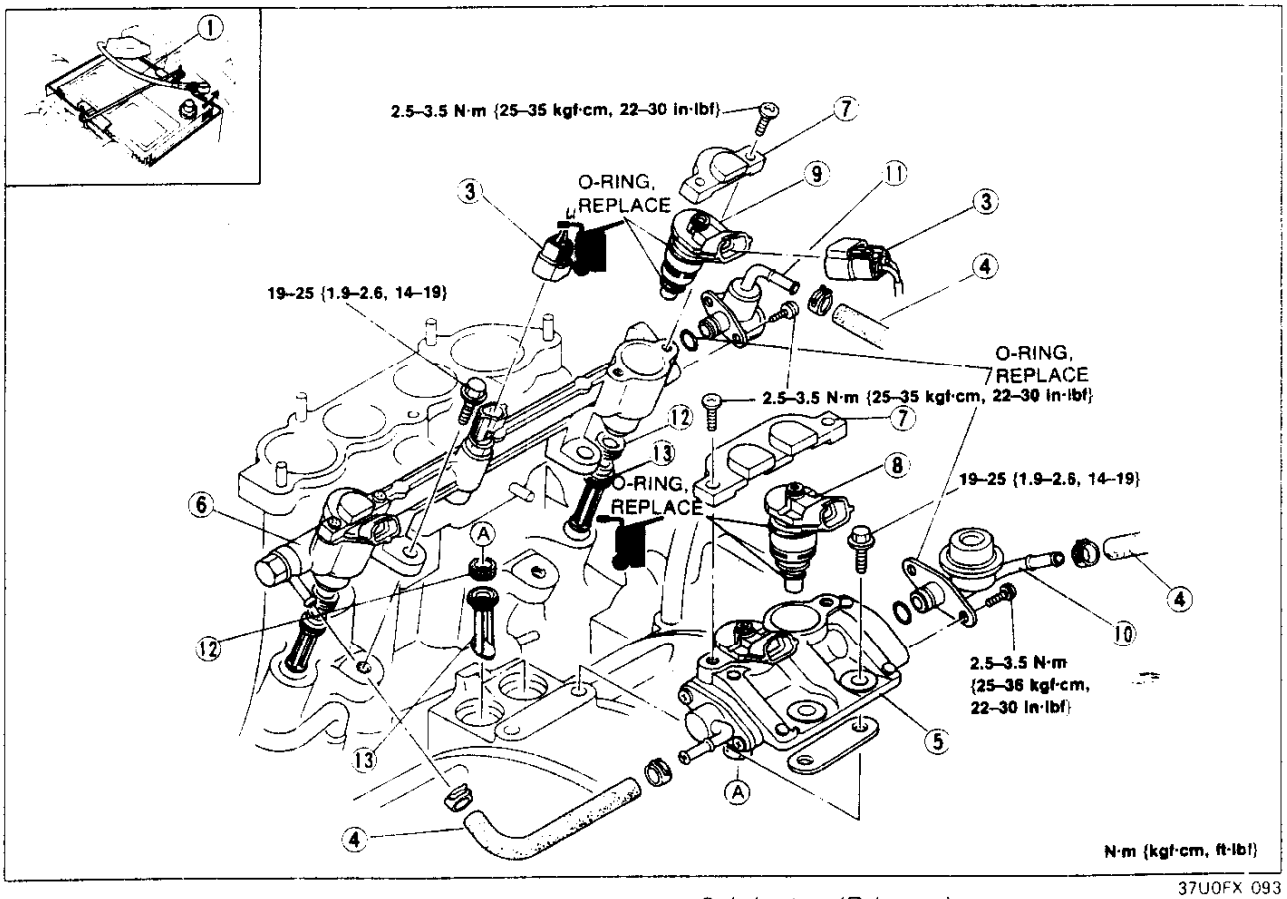
1. Warm up the engine and run it idle.
2. Listen for the operational sound of primary injector with a screwdriver or a sound scope.

Removal / Installation

Warning

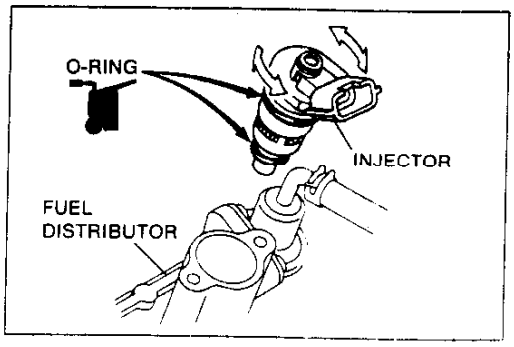
- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F–96.)**
- **When removing the fuel system components, keep sparks, cigarettes, and open flames away from the fuel.**

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal, referring to Installation Note.



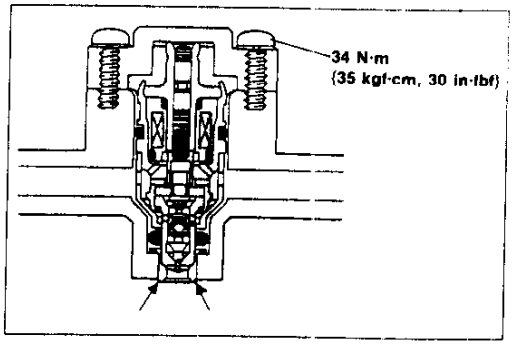
37U0FX 093

1. Negative battery cable
2. Extension manifold (Refer to page F–76)
3. Connector
4. Fuel hoses
5. Fuel distributor assembly (Primary)
6. Fuel distributor assembly (Secondary)
7. Cover
8. Injector (Primary)
   Inspection ..... page F–107
9. Injector (Secondary)
   Inspection ..... page F–107
10. Pulsation damper
11. Pressure regulator
    Inspection ..... page F–104
12. Insulator
13. Air bleed socket



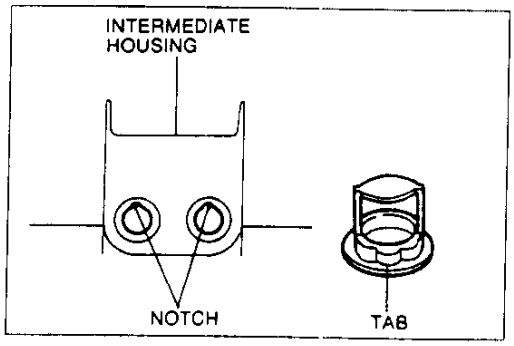
Installation Note
Injector installation

1. Use new O-rings.
2. Apply a small amount of clean engine oil to the O-rings before installing them.
3. Install the injector squarely into fuel distributor and gradually twist it.
4. Verify that the deposit is not to the holder inside of fuel distributor.
5. If there is, clean the holder inside by used to gasoline.



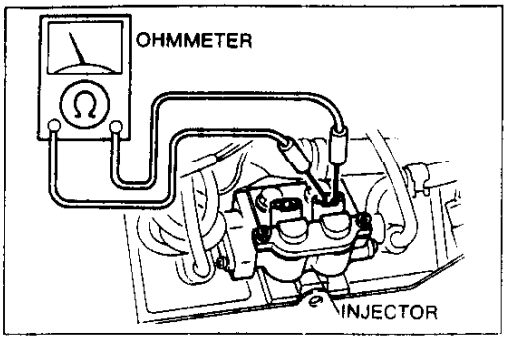
Fuel leakage test

1. Install the fuel hose.
2. Connect the diagnosis connector terminals F/P and GND with a jumper wire.
3. Turn the ignition switch ON and check for fuel leaks from the fuel distributor.
4. If fuel leaks check the injector O-ring and fuel distributor.



Air bleed socket installation

Align the tab of the air bleed socket with the notches in the intermediate housing.



Inspection

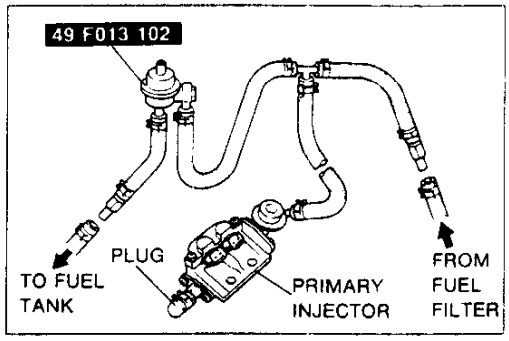
Caution

- **Do not remove the injector from the fuel distributor if it is not necessary.**

Injector resistance

1. Disconnect injector connector as shown in figure.
2. Measure the resistance of the injection with an ohmmeter.

   Resistance: Approx. 13.8 Ω {20°C [68°F]}

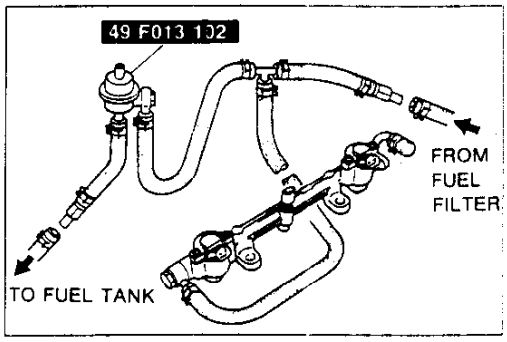


3. If not as specified, replace the injector.

Fuel leakage test

1. Remove the injector together with fuel distributor.
2. Connect the **SST** as shown in figure.
3. Connect the diagnosis connector terminals F/P and GND with a jumper wire.
4. Turn the ignition switch ON and check for fuel leaks from the injector.

   Fuel leakage: Less than 1 drop / 5 min.

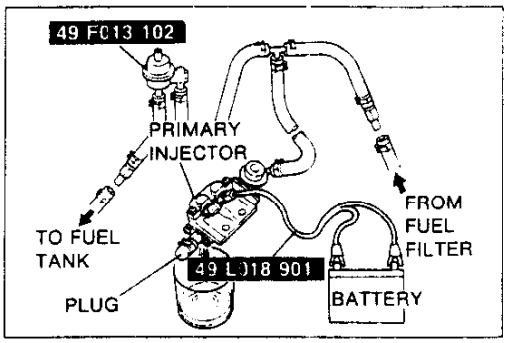


5. If not as specified, check the injector O-ring and fuel distributor contact face.

Note

- **Perform the following installation carefully to prevent fuel leakage from O-ring.**

6. Install the injector.
7. Turn the ignition switch ON and check for fuel leaks from injector.
8. If not as specified replace the injector.



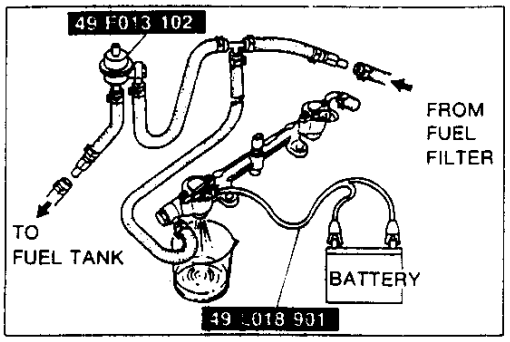
Volume Test

1. Remove the injectors together with the fuel distributor.
2. Connect the **SST** as shown in figure.

Warning

- **Be extremely careful when working with fuel. Always work away from sparks and open flames.**

3. Check the injection volume with a graduated container.



Injection volume

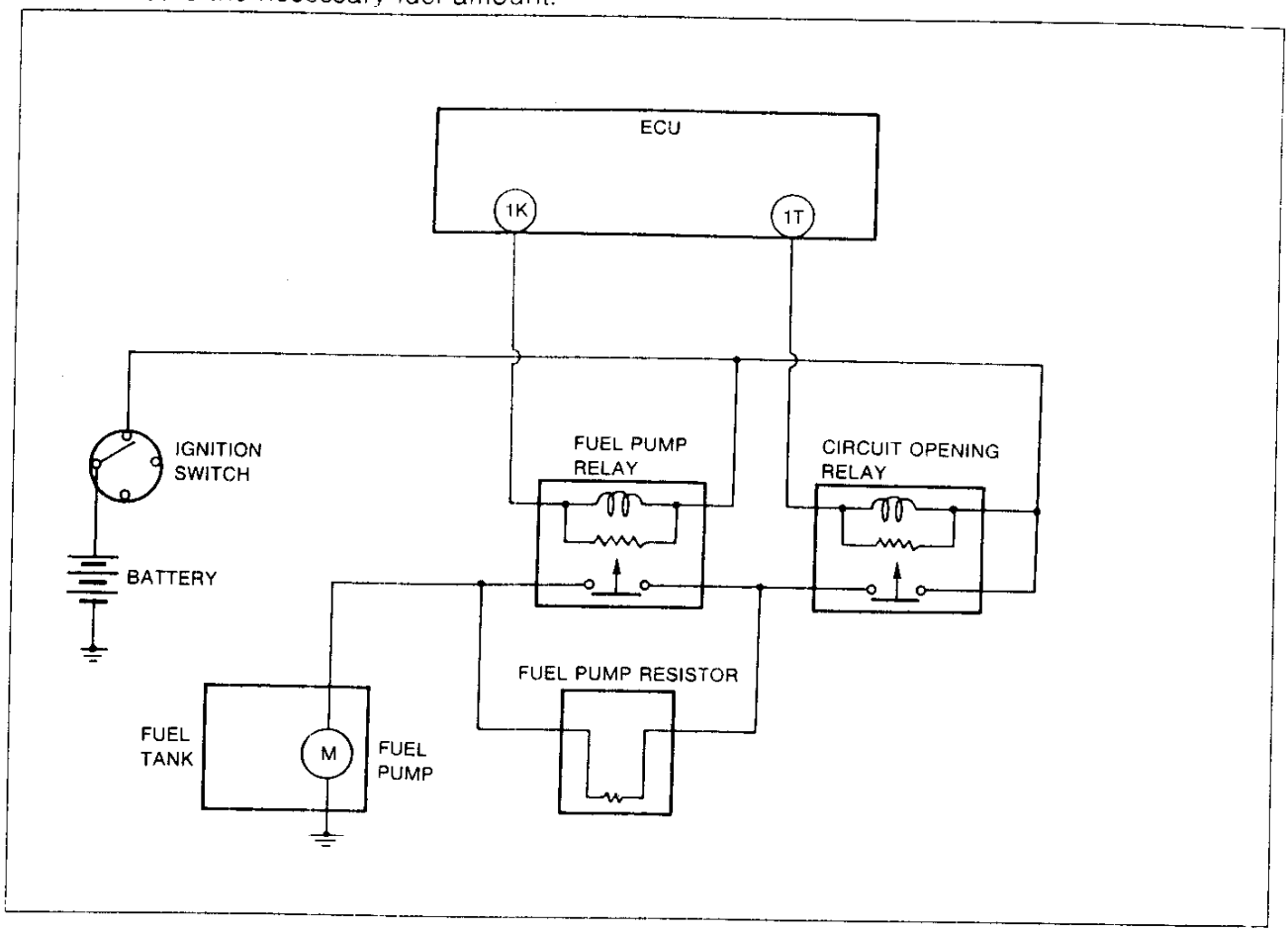
Primary injector:
128–147 cc {7.8–8.9 cuin} / 15 sec.
Secondary injector:
198–227 cc {12.0–13.8 cuin} / 15 sec.

4. If not as specified, replace the injector.

FUEL PUMP CONTROL SYSTEM

Description

- The ECU turns the fuel pump ON/OFF via the circuit opening relay. By controlling the fuel pump relay, the ECU also controls fuel pump operation in two phases to improve fuel pump reliability and ensure the necessary fuel amount.



Circuit opening relay

- The circuit opening relay is controlled by the ECU and turns the fuel pump ON/OFF.

Fuel pump relay

- The fuel pump relay is controlled by the ECU and controls fuel pump operation voltage via the fuel pump relay.

Fuel pump resister

- The fuel pump resister controls fuel pump operation voltage. During low-speed engine operation, fuel pump voltage is supplied via the fuel pump resistor.

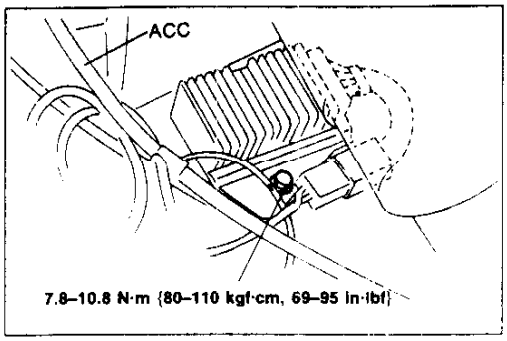
Operation

(1) In low-speed range (1K terminal of ECU is battery voltage)
- The fuel pump is driven by voltage from the fuel pump resister.

(2) In high-speed range (1K terminal of is 0V)
- The fuel pump is driven by battery voltage.

Operating conditions

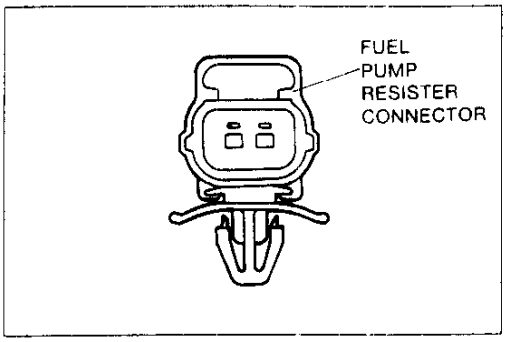
The system operates when either of the following conditions is met.
- During engine start-up
- Solenoid valve (pressure regulator control) operating
- High speed and heavy load



FUEL PUMP RESISTOR

Removal / Installation

1. Remove in the order as shown in the figure.
2. Install in the reverse order of removal.

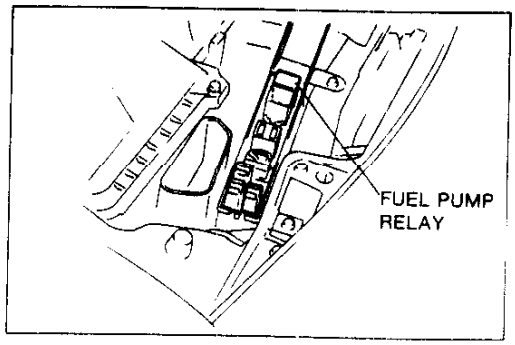


Inspection

1. Disconnect fuel pump resistor connector.
2. Measure resistance of the fuel pump resistor with an ohmmeter.

   Resistance 0.57–0.70 Ω {at 20°C [68°F]}

3. Replace the fuel pump resistor if necessary.

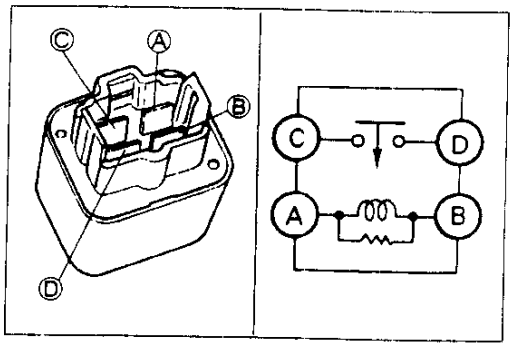


FUEL PUMP RELAY

Inspection

Operation check

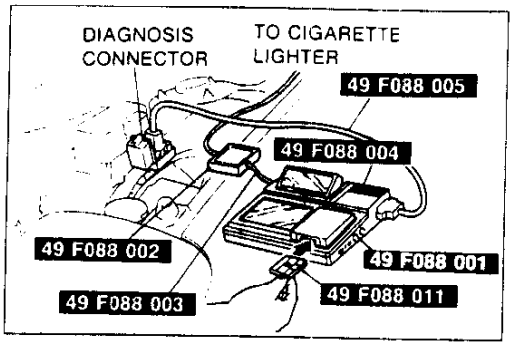
Listen for operational sound of the fuel pump relay when ignition switch ON.



Continuity inspection

Check continuity between the terminals with ohmmeter.

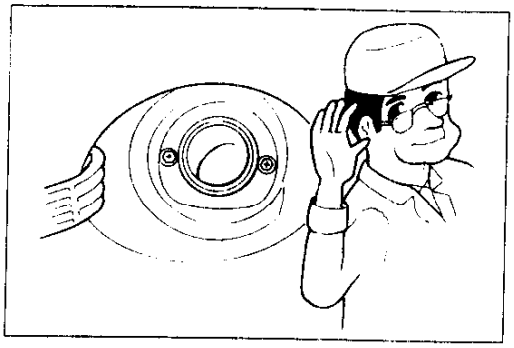
Terminal A–B	Terminal C–D
Apply V_B	Yes
Not apply V_B	No



DT-S1000

Operation check

1. Connect the **SSTs** (DT-S1000 and Harness) to the diagnosis connector as shown.
2. Turn ignition switch ON.

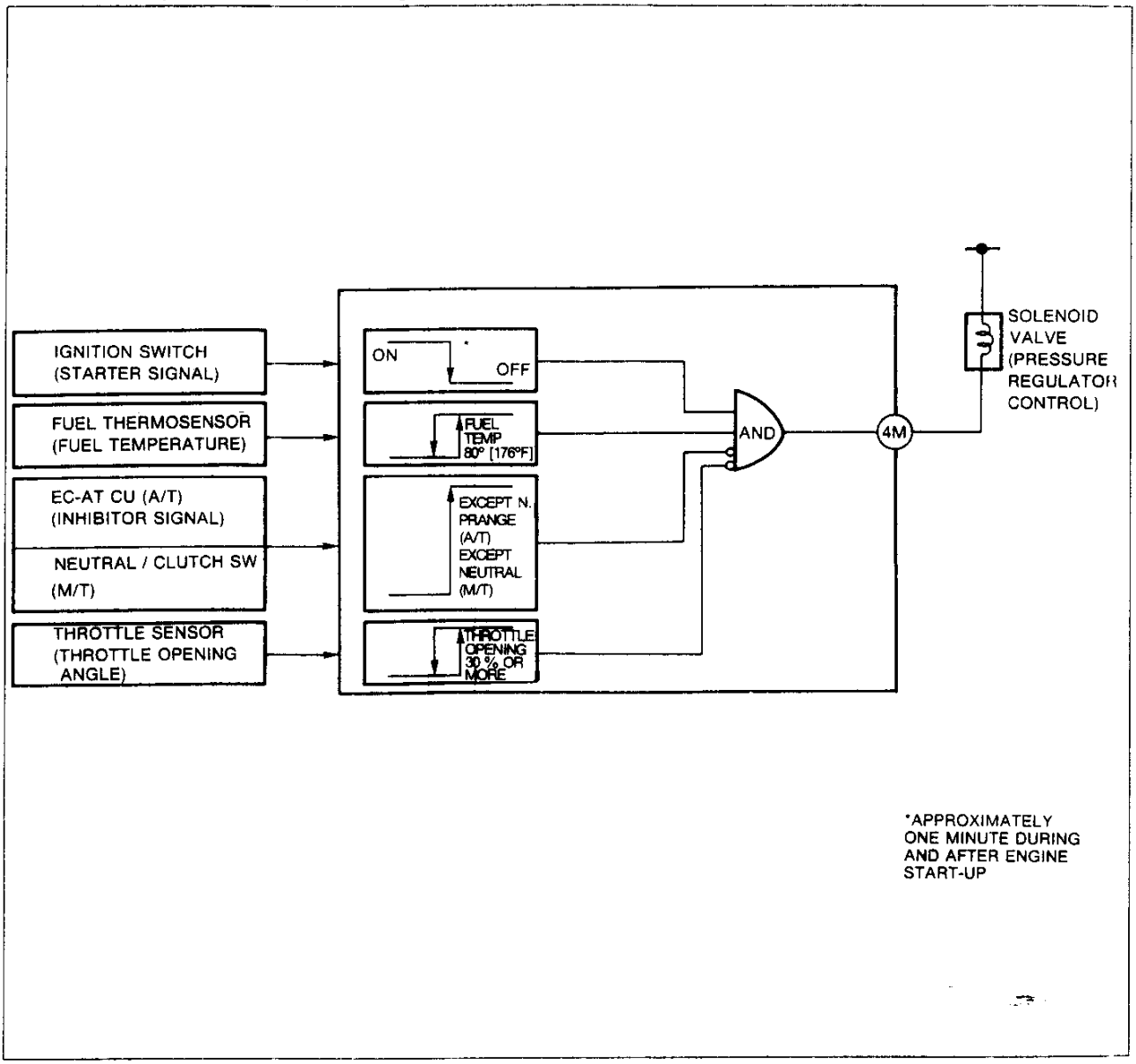


3. Select the simulation check and verify that the fuel pump relay operation sound is heard.
4. If no sound is heard check continuity of fuel pump relay.

PRESSURE REGULATOR CONTROL (PRC) SYSTEM

DESCRIPTION

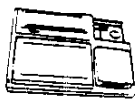
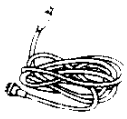
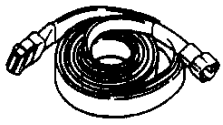
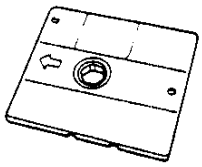
- This system cancels the vacuum applied to the pressure regulator and increases the fuel pressure during hot engine start-up and for a period immediately following engine start-up. This improves hot starting as well as providing smooth idle.

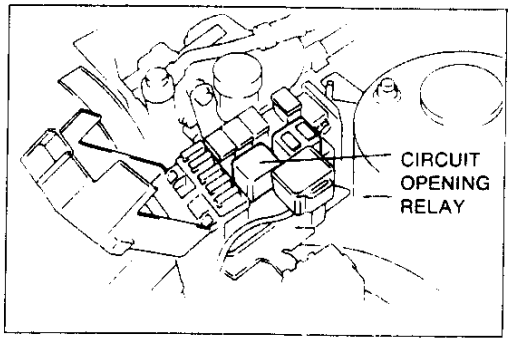


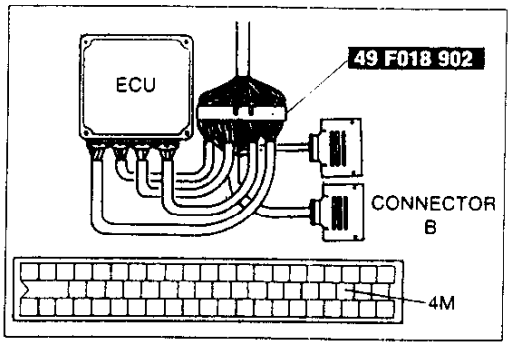
Operation

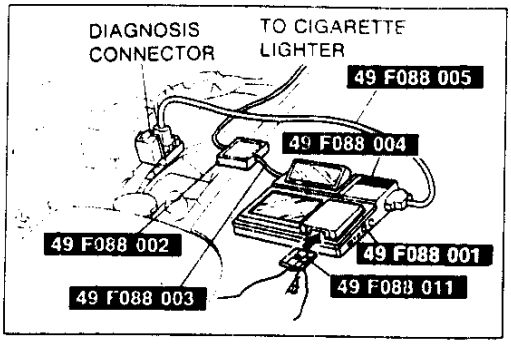
To prevent vapor-lock during hot restart idle, vacuum to the pressure regulator is momentarily cut, and fuel injection pressure is increased.

PREPARATION
SST

49 F088 001 DT-S1000 Base unit 	For inspection of solenoid valve and relay	49 F088 002 Power unit (DC12V) 	For inspection of solenoid valve
49 F088 003 Harness Power unit 	For inspection of solenoid valve	49 F088 004 Interface adapter Type-1 	For inspection of solenoid valve
49 F088 005 Harness Type-1 	For inspection of solenoid valve	49 F088 011 System disk Type-1 (Ver 1.00) 	For inspection of solenoid valve







SYSTEM OPERATION

Warning

- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F-96.)**

1. Remove the circuit opening relay.
2. Connect a fuel pressure gauge to the main hose.
3. Connect the circuit opening relay.
4. Start the engine and run it idle.
5. Verify the fuel pressure.

Fuel line pressure
190–220 kPa {1.9–2.3 kgf/cm², 28–32 psi}

6. Short the ECU Terminal 4M and verify that fuel pressure.

Fuel line pressure
250–260 kPa {2.5–2.7 kgf/cm², 36–38 psi}

7. If not as specified, check the pressure regulator and solenoid valve.

DT-S1000

1. Remove the circuit opening relay.
2. Connect a fuel pressure gauge to the main hose.
3. Connect the circuit opening relay.
4. Connect the DT-S1000 to the diagnosis connector.
5. Start the engine and run it idle.
6. Select the simulation check and verify that the fuel line pressure increase when solenoid valve ON.
7. If fuel line pressure does not increase, check the operation sound of solenoid valve.

EXHAUST SYSTEM

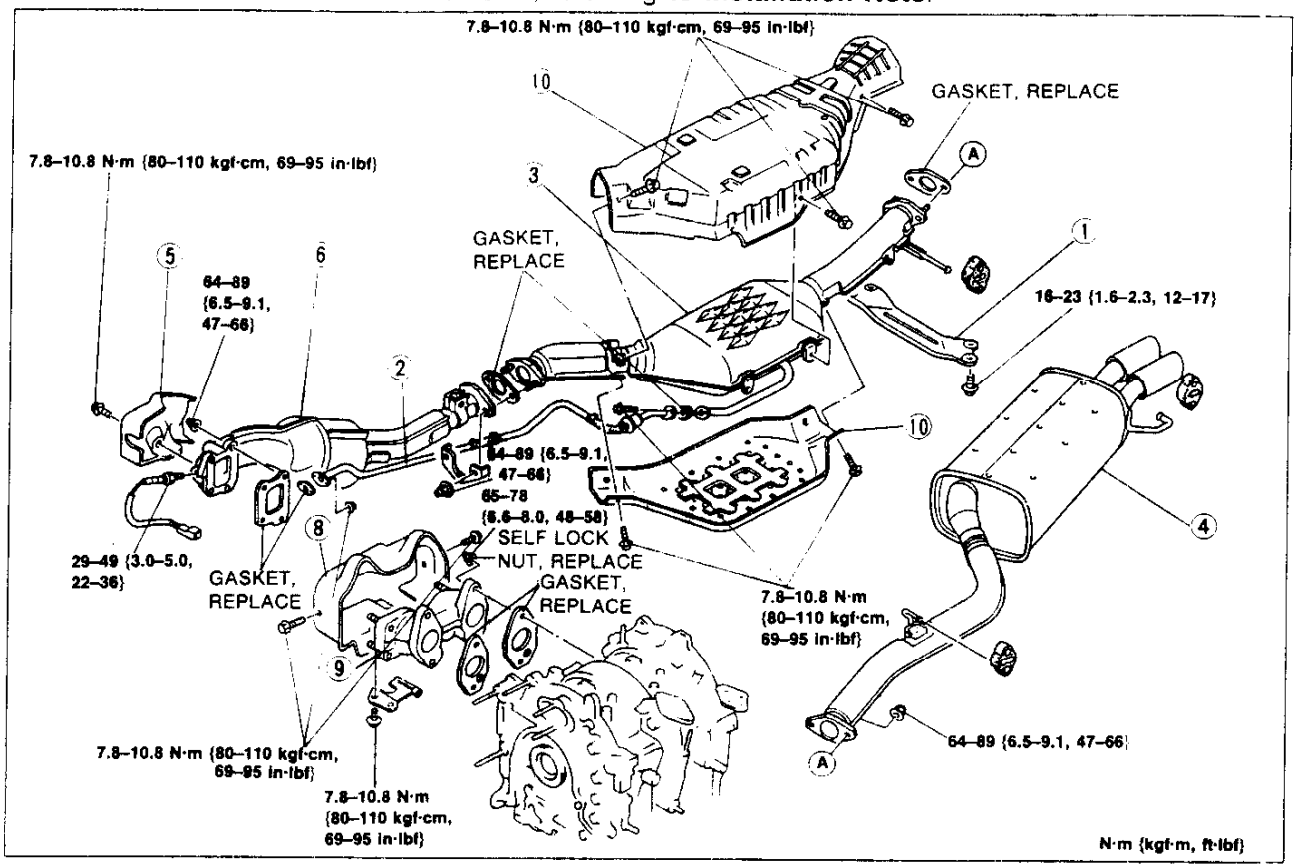
COMPONENT PARTS

Inspection (On-vehicle)

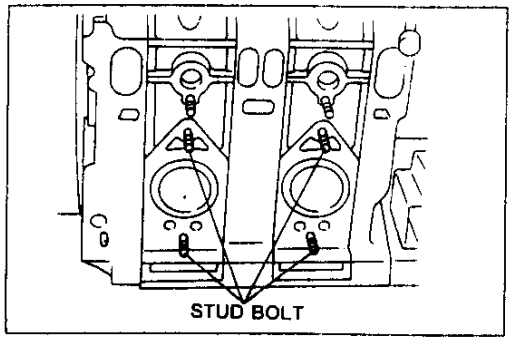
Start the engine and verify that there is no exhaust gas leakage from the exhaust system components.

Removal / Inspection / Installation

1. Remove in the order shown in the figure.
2. Check all parts and repair or replace if necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.



1. Braket
2. Secondary air pipe.
   Inspect for deterioration and restriction.
3. Main converter
   Inspect for deterioration and restriction.
4. Main silencer
   Inspect for deterioration and restriction.
5. Insulator
6. Front converter
   Inspect for deterioration and restriction
7. Turbocharger
   Removal ..... Refer to page F–89
8. Insulator
9. Exhaust manifold
   Inspect for deterioration and restriction
10. Insulatior



Installation Note

1. Check the stud bolt tighteing torque before installing exhaust manifold.

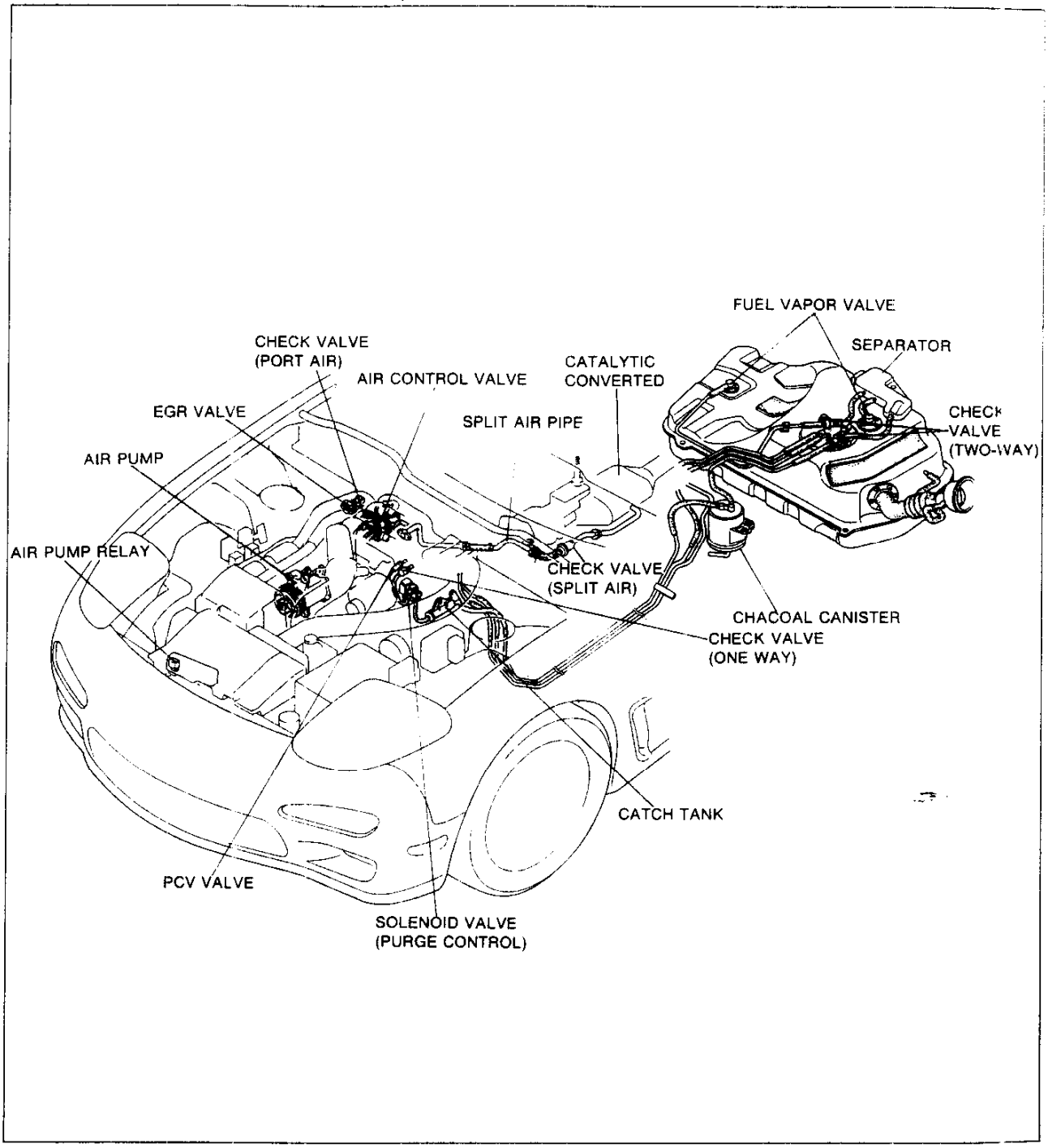
Tighting torque: 30–35 N·m {3.0–3.6 kgf·m, 22–26 ft·lbf}

OUTLINE OF EMISSION SYSTEM

STRUCTURAL VIEW

The following systems are employed to reduce CO, HC, and NOx emissions.

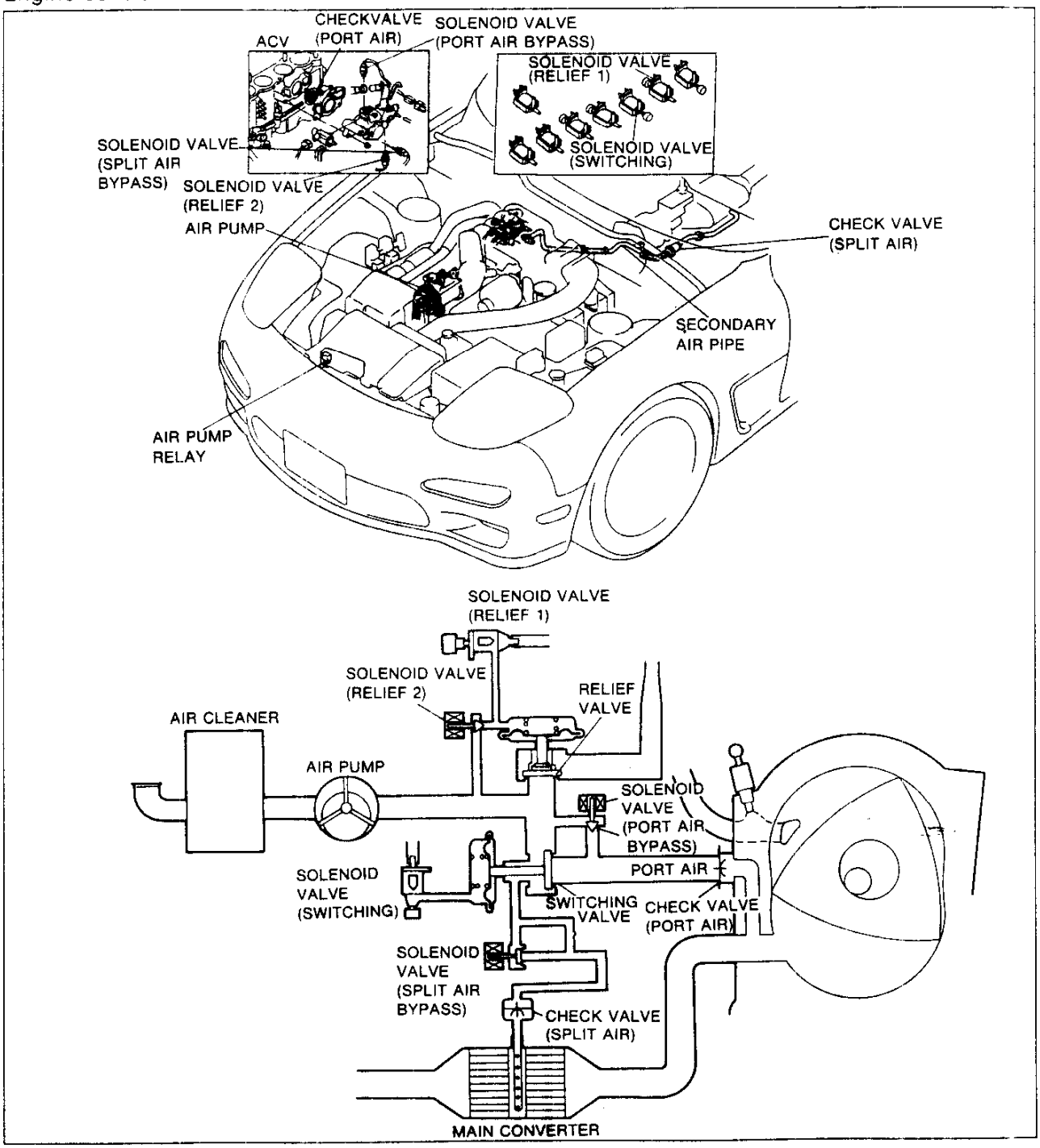
1. Secondary air injection system
2. Positive crankcase ventilation system
3. Evaporative emission control system
4. Catalytic converter
5. Deceleration control system
6. Exhaust gas recirculation control system



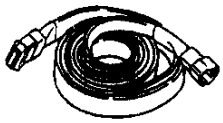
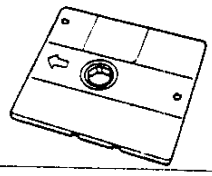
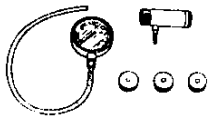
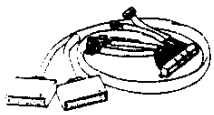
SECONDARY AIR INJECTION SYSTEM

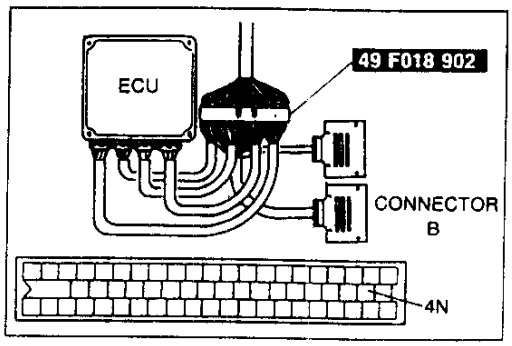
DESCRIPTION

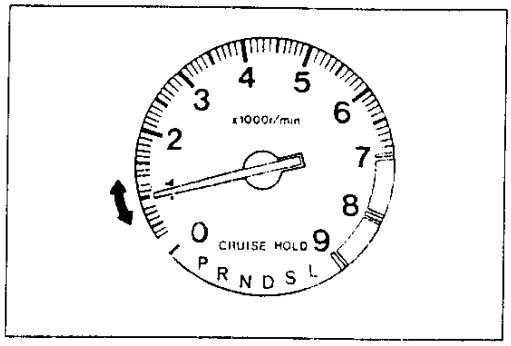
The secondary air injection system helps to clean the exhaust gas by introducing fresh air into the exhaust port or catalytic converter in relation to the during condition.
The ECU controls secondary air by actuating the solenoid valves (switching, relief 1, 2, port air bypass, split air bypass) and the air pump relay.
This system consist of an air control valve (ACV), three way solenoid valves, air pump relay and Engine control unit.

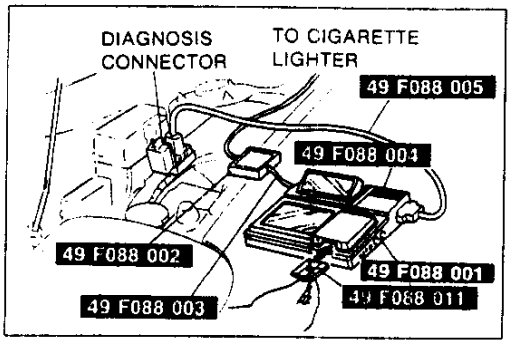


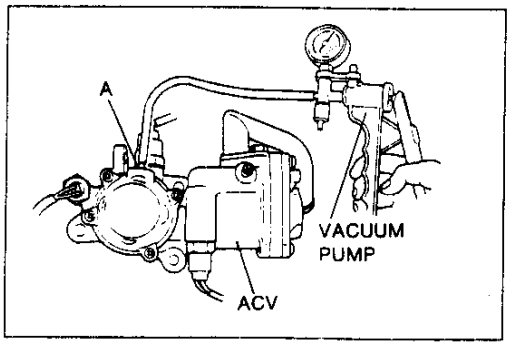
PREPARATION
SST

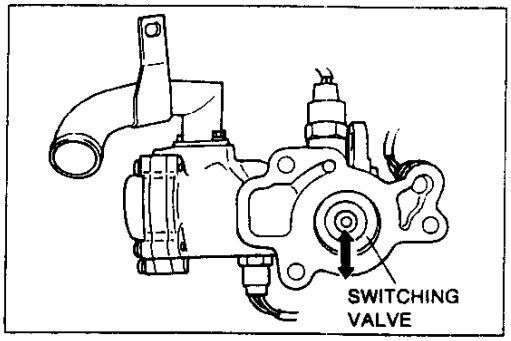
49 F088 001 DT-S1000 Base unit 	For inspection of solenoid valve and relay	49 F088 002 Power unit (DC12V) 	For inspection of solenoid valve
49 F088 003 Harness Power unit 	For inspection of solenoid valve	49 F088 004 Interface adapter Type–1 	For inspection of solenoid valve
49 F088 005 Harness Type–1 	For inspection of solenoid valve	49 F088 011 System disk Type–1 (Ver 1.00) 	For inspection of solenoid valve
49 2113 011B Air pump gauge set 	For inspection of air pump	49 F018 902 Adapter harness 	For inspection of solenoid valve











AIR CONTROL VALVE (ACV) SWITCHING VALVE

System operation

Engine Signal Monitor

1. Connect the **SSTs** (Engine Signal Monitor and Adapter Harness) to the ECU as shown.
2. Start the engine and run it idle.
3. Short the ECU terminal 4N and verify that the engine condition change (idle roughing)
4. If the engine condition does not change, check the following below.
   - Vacuum tube
     Inspect the vacuum line fitting, connections and components for leaks. (Refer to page F–10)
   - Solenoid valve (Switching)
     Inspection (Refer to page F–19)
   - Air relief valve
     Inspection (Refer to page F–117)
   - Air pump
     Inspection (Refer to page F–121)
   - Air pump relay
     Inspection (Refer to page F–123)

DT-S1000

1. Connect the **SSTs** (DT-S1000 and Harness) to the diagnosis connector as shown.
2. Start the engine and run it idle.
3. Select the simulation check and verify that the engine condition change at idle (idle roughing) when solenoid valve (Switching) to ON.
4. If the engine condition does not change, stop the engine and turn ignition switch ON.
5. Select the simulation check and verify that the solenoid valve (Switching) operation sound is heard.
6. If the solenoid valve operation sound is not heard check the condition above.

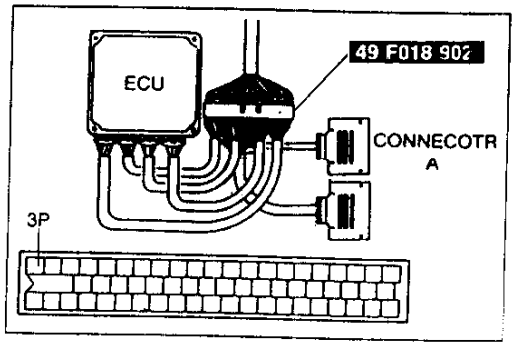
Inspection

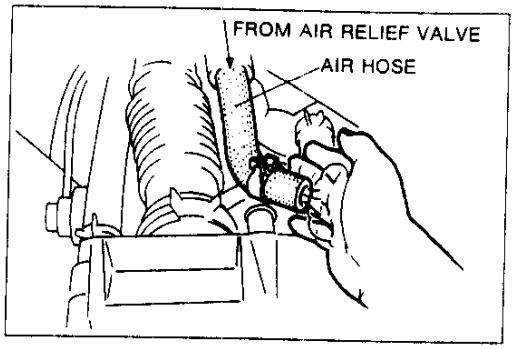
1. Remove the air control valve. (Refer to page F–119)
2. Connect a vacuum pump to port A.
3. Verify that the switching valve opens at a vacuum 14.7 kPa {110 mmHg, 4.3 inHg}

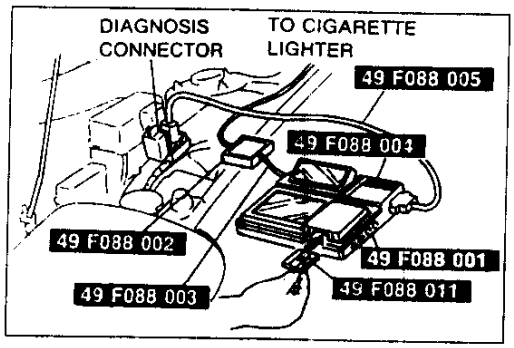
Caution

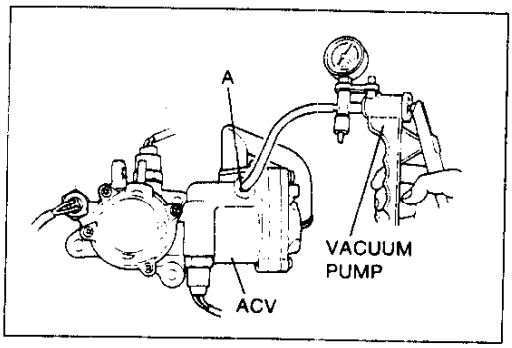
- **Do not apply vacuum more than 66.7 kPa {500 mmHg, 19.7 inHg}**

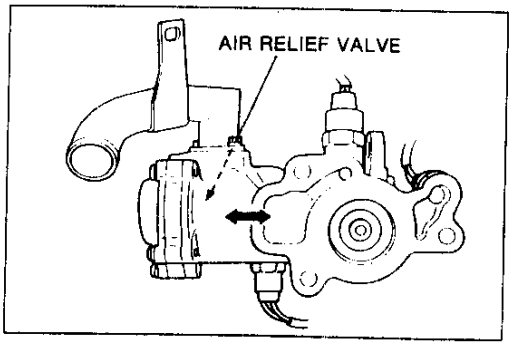
4. If not as specified, replace air control valve.
   (Refer to page F–119)











Air Relief Valve
System operation
Engine Signal Monitor

1. Connect the **SSTs** (Engine Signal Monitor and Adaptor Harness) to the ECU as shown.
2. Start the engine and run it idle.
3. Verify that air does not flows from air relief valve.
4. Short the ECU terminal 3P and verify that the air flows from air relief valve.
5. If the air does not flow, check the following condition below.
   - Vacuum tube
     Inspect the vacuum line fitting, connections and components for leaks. (Refer to page F–10)
   - Solenoid valve (Relief 1)
     Inspection (Refer to page F–190)
   - Air pump
     Inspection (Refer to page F–121)
   - Air pump relay.
     Inspection (Refer to page F–123)

DT-S1000

1. Connect the **SSTs** (DT-S1000 and Harness) to the diagnosis connector as shown.
2. Start the engine and run it idle.
3. Verify that air does not flows from air relief valve.
4. Select simulation check and verify that the air flows from air relief valve when solenoid valve (air relief) to ON.
5. If the air does not flows from air relief valve, stop the engine and turn ignition switch ON.
6. Select simulation check and verify that the solenoid valve (air relief) operational sound is heard.
7. If the solenoid valve operational sound is not heard check the condition above.

Inspection

1. Remove the air control valve (Refer to page F–119)
2. Connect a vacuum pump to port A
3. Verify that the air relief valve opens at a vacuum 19.3 kPa {145 mmHg, 5.7 inHg}

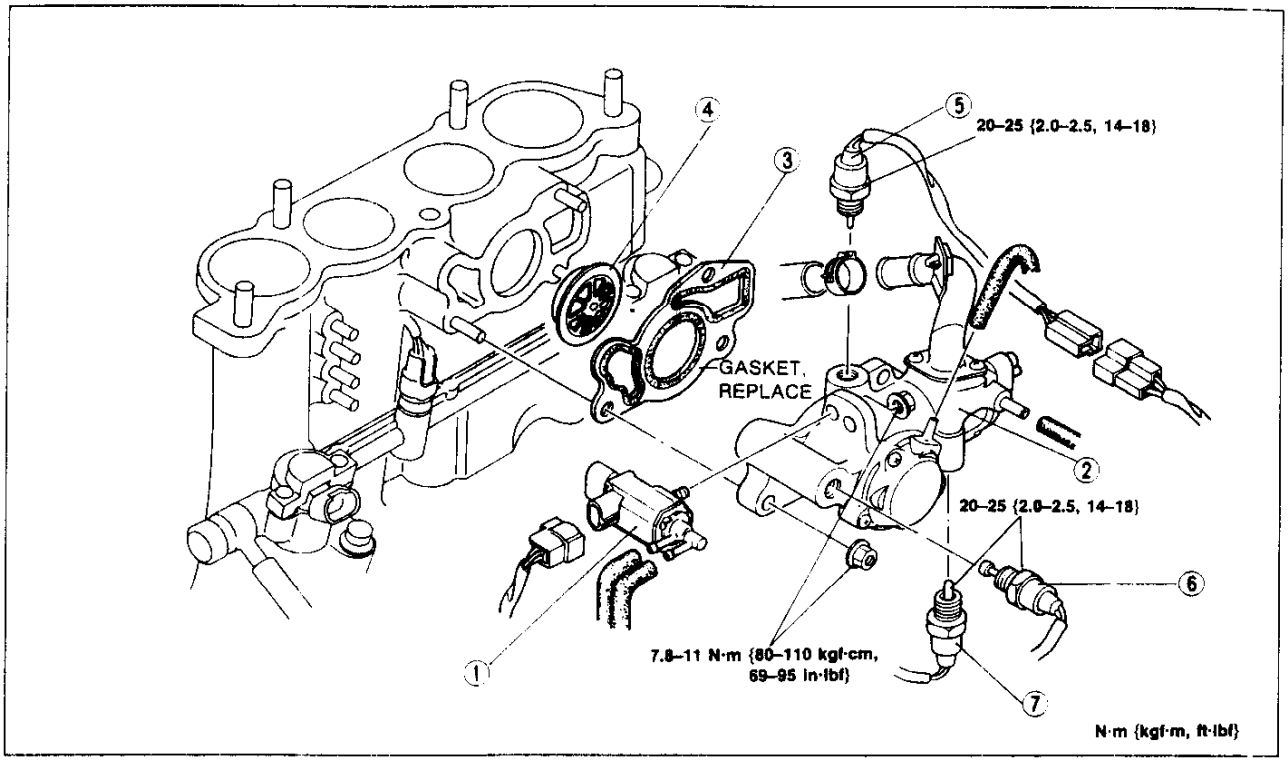
Caution

- **Do not apply vacuum More than 66.7 kPa {500 mmHg, 19.7 inHg}**

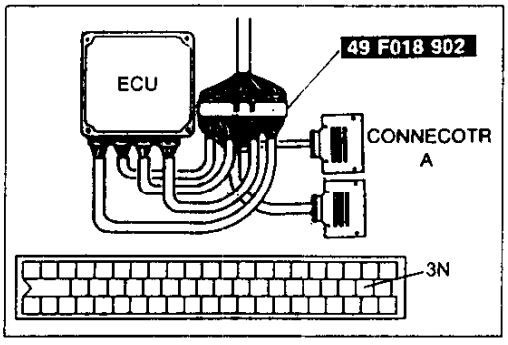
4. If not as specified, replace air control valve.

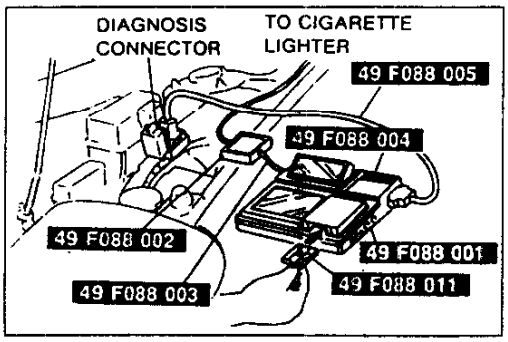
Removal / Installation

1. Remove the extension manifold. (Refer to page F–76)
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.



1. Solenoid valve (Turbo control)
   Inspection ..... page F–190
2. Air control valve
3. Gasket
4. Check valve (Port air)
   Inspection ..... page F–120
5. Solenoid valve (Port air bypass)
   Inspection ..... below
6. Solenoid valve (Split air bypass)
   Inspection ..... page F–120
7. Solenoid valve (Relief2)
   Inspection ..... page F–123





SOLENOID VALVE (PORT AIR BYPASS)

System Operation

Engine Signal Monitor

1. Connect the **SSTs** (Engine Signal Monitor Adaptor Harness) to the ECU.
2. Turn ignition switch ON.
3. Short the ECU terminal 3N and verify that the operational sound is heard.

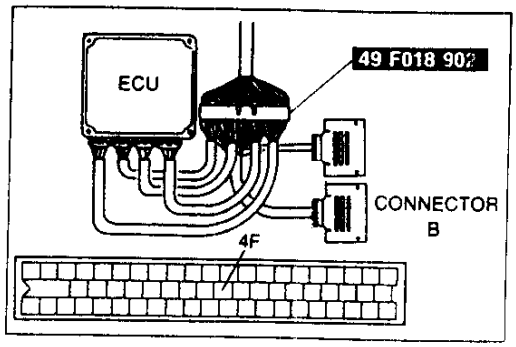
DT-S1000

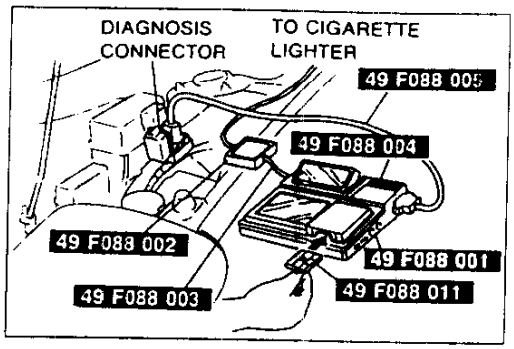
1. Connect the **SSTs** (DT-S1000 and Harness) to the diagnosis connector.
2. Turn ignition switch ON.
3. Select simulation check (port air bypass) and verify that the operational sound is heard.

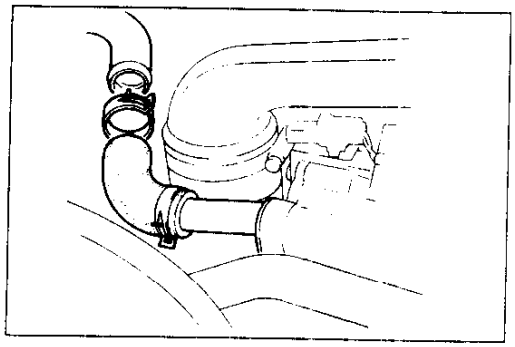
Inspection

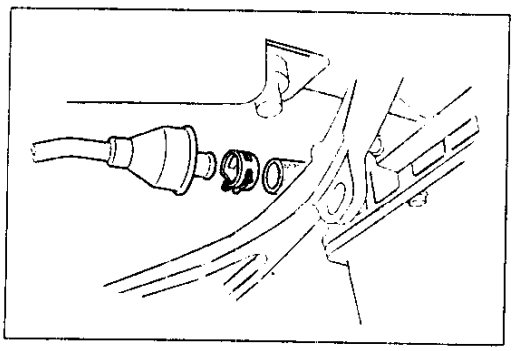
1. Disconnect the solenoid valve (Port air bypass) connector.
2. Measure the solenoid valve resistance with an ohmmeter.

   Resistance: 26.6–32.6 Ω (20°C [68°F])
3. If not as specified replace solenoid valve. (Refer to page F–190)









SOLENOID VALVE (SPLIT AIR BYPASS)

System Operation

1. Connect the **SSTs** (Engine Signal Monitor Adaptor Harness) to the ECU.
2. Turn ignition switch ON.
3. Short the ECU terminal 4F and verify that the operational sound is heard.

DT-S1000

1. Connect the **SSTs** (DT-S1000 and Harness) to the diagnosis connector.
2. Turn ignition switch ON.
3. Select simulation check and verify that the operational sound is heard.

Inspection

1. Disconnect the solenoid valve.
2. Measure the solenoid valve resistance with an ohmmeter.

Resistance: 27–32 Ω {20°C [68°F]}

3. If not as specified, replace solenoid valve.

CHECK VALVE (PORT AIR)

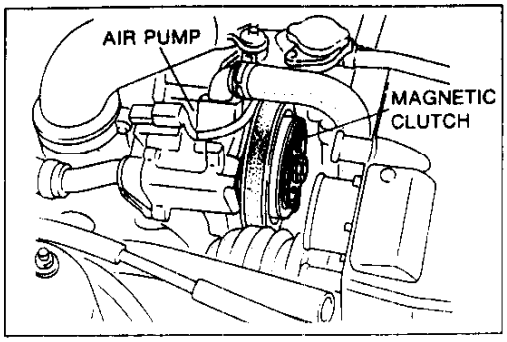
Inspection

1. Disconnect the air hose (From air pump to air control valve) at the air control valve.
2. Start the engine and run it idle.
3. Verify that the exhaust gas does not flow from air control valve.
4. If the exhaust gas flows from air control valve replace the check valve (port air)
   (Refer to page F–119)

CHECK VALVE (SPLIT AIR)

Inspection

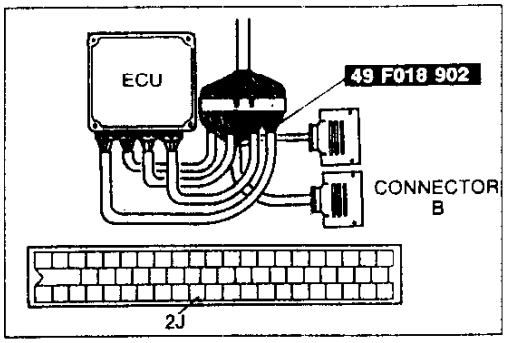
1. Disconnect the air hose (From air control valve to air pipe) at the air pipe.
2. Connect a tachometer to the engine.
3. Start the engine.
4. Increase the engine speed to 2,000 rpm and verify that the exhaust gas does not flow from split air pipe.
5. If not as specified, replace the check valve (Spilit air)



AIR PUMP

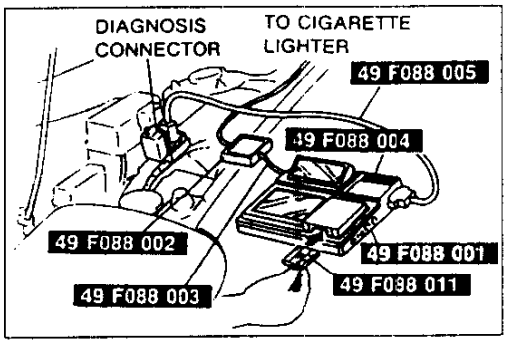
System Operation

1. Start the engine.
2. Increase the engine speed to above 3250 rpm and verify that the air pump magnetic clutch OFF.



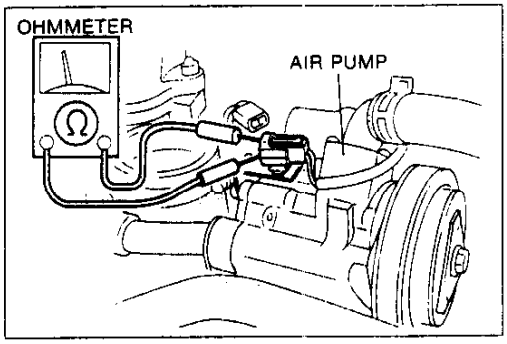
Inspection
Magnetic clutch
Engine signal monitor

1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the ECU.
2. Turn ignition switch ON.
3. Short the ECU terminal 2J and verify that the magnetic clutch OFF.
4. If the magnetic clutch does not OFF check the Air pump relay. (Refer to page F–123)
5. If the relay is OK, disconnect the air pump connector and check the continuity.
6. If not as specified, replace the air pump.



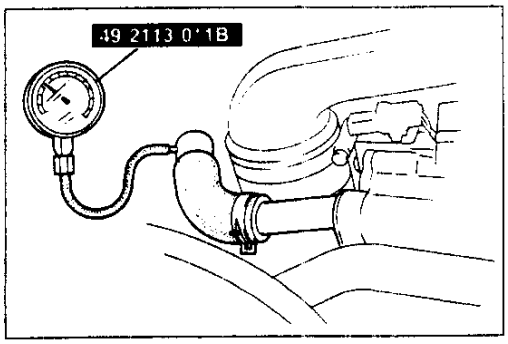
DT-S1000

1. Connect the **SST** (DT-S1000 and Harness) to the diagnosis connector.
2. Turn ignition switch ON.
3. Select a simulation check (air pump relay) and verify that the magnetic clutch ON and OFF.
4. If the magnetic clutch does not ON OFF check the air pump relay. (Refer to page F–123)
5. If the relay is OK, disconnect the air pump connector and check the continuity.
6. If not as specified, replace the air pump.



Continuity

1. Disconnect the air pump connector.
2. Check for continuity between terminals.
3. If no continuity, replace the air pump.



Pressure

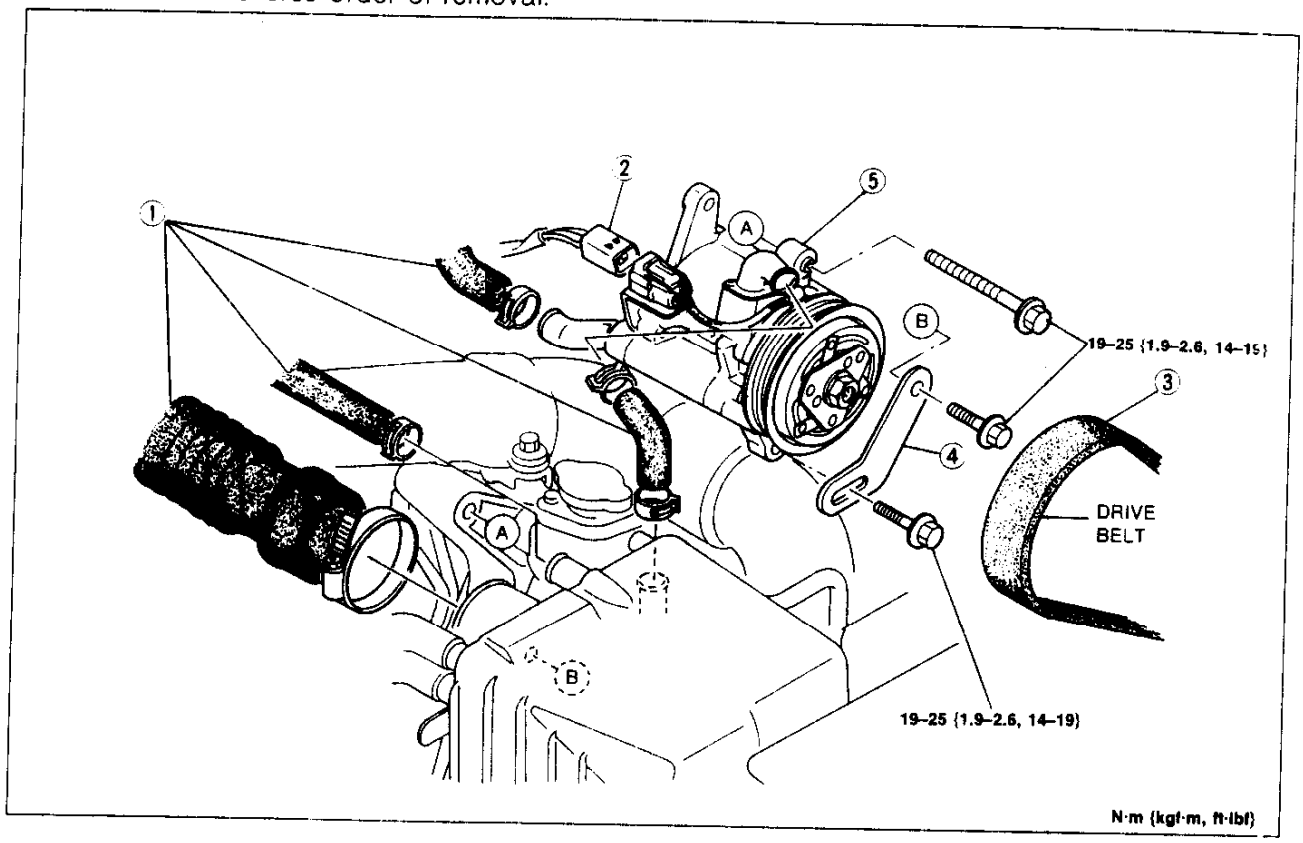
1. Disconnect air hose (from air control valve to air pump) at the air control valve.
2. Connect the **SST** to the air hose.
3. Start the engine and run it idle.
4. Measure the pressure.

Pressure
More than 4.9 kPa {0.05 kgf/cm², 0.7 psi}

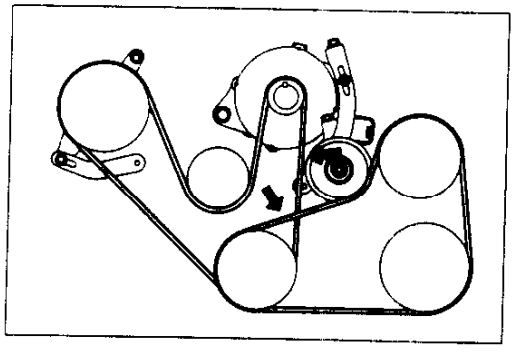
5. If not as specified, replace the air pump.

Removal / Installation

1. Remove in the order in the figure.
2. Install in the reverse order of removal.



1. Air hoses
2. Connector
3. Drive belt
   Inspection ..... below
4. Braket
5. Air pump
   Inspection ..... page F–121



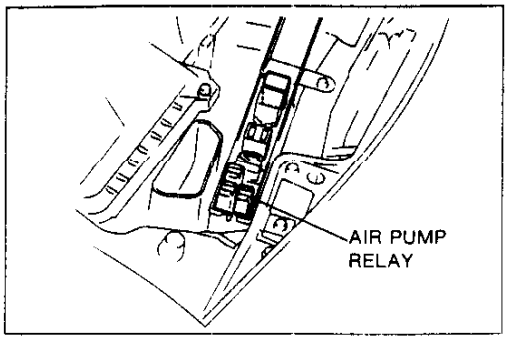
AIR PUMP DRIVE BELT

Inspection

1. Check the drive belt for cracks deterioration or oil contamination.
2. Replace if necessary.
3. If the belt is noisy, check for loose or misaligned pulleys.

Adjustment

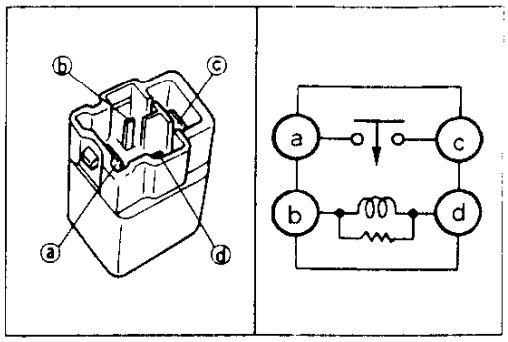
Refer to section C



AIR PUMP RELAY

Inspection (On-vehicle)

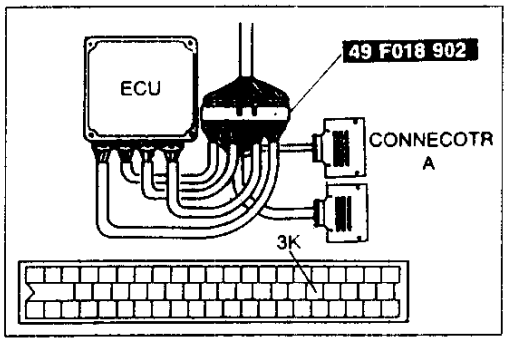
Check that a "clicking" sound is heard at the Air pump relay when turning the ignition switch ON and OFF.



Inspection

1. Disconnect the air pump relay.
2. Apply Battery voltage and ground to terminals B and D of the relay.
3. Check continuity of the relay.

Operation	A–C terminals
V_B Applied	Continuity
V_B Not applied	No continuity

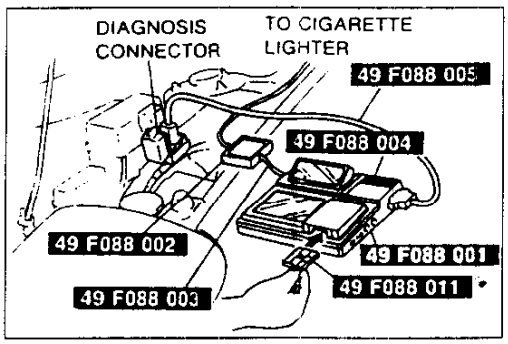


SOLENOID VALVE (RELIEF2)

System Operation

Engine Signal Monitor

1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the ECU.
2. Turn ignition switch ON.
3. Short the ECU terminal 3K and verify that the operation sound is heard.



DT-S1000

1. Connect the **SST** (DT-S1000 and Harness) to the diagnosis connector.
2. Turn ignition switch ON.
3. Select simulation check (RELIEF 2) and verify that the operation sound is heard.

Inspection

1. Disconnect the solenoid valve. (Refer to page F–119)
2. Measure the solenoid valve resistance with an ohmmeter.

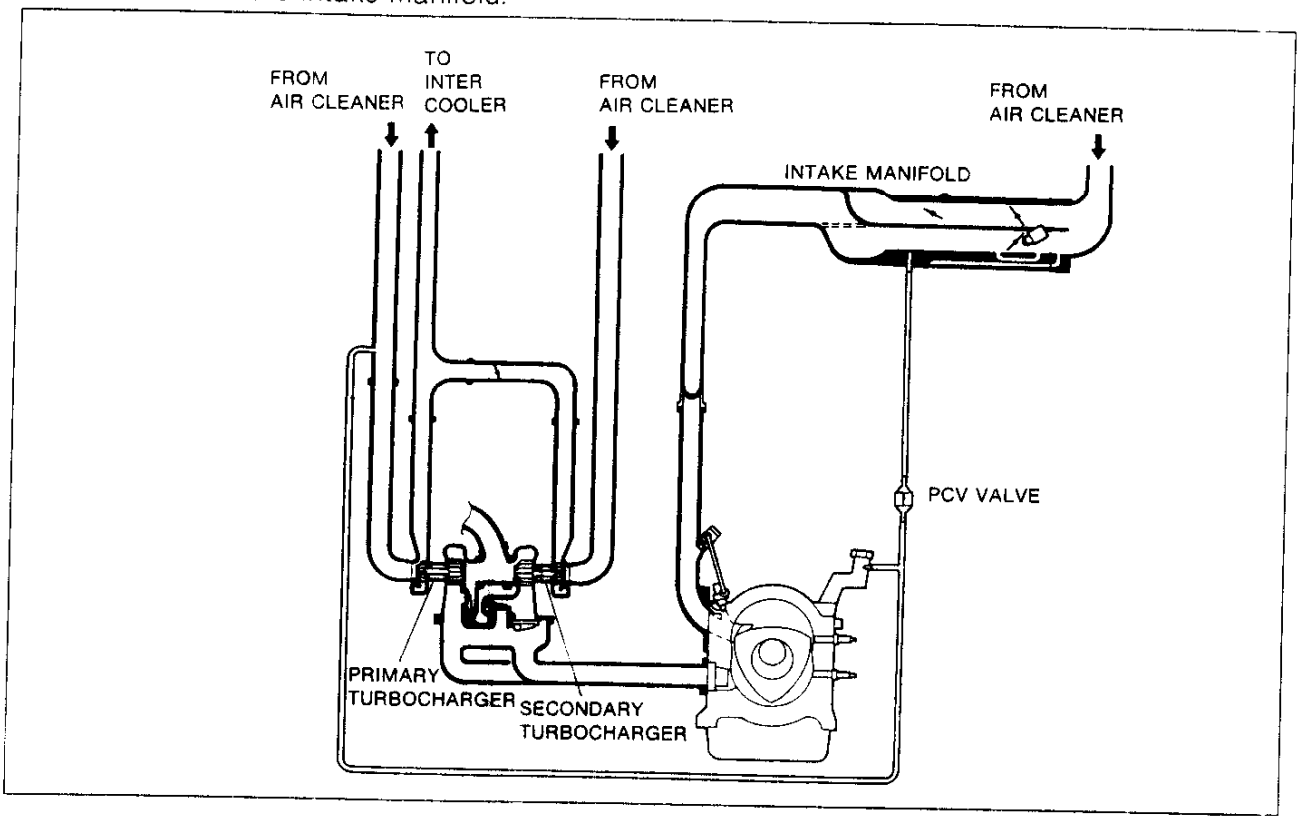
Resistance 27–32 Ω {20°C [68°F]}

3. If not as specified, replace solenoid valve. (Refer to page F–119)

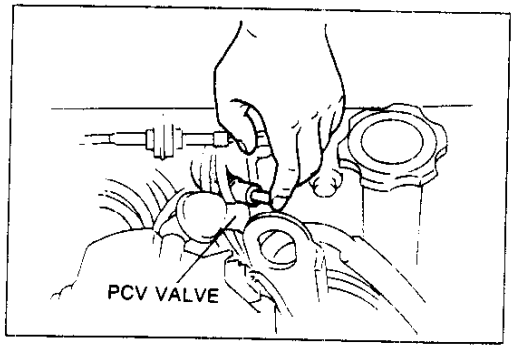
POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

DESCRIPTION

The PCV valve is operated by the intake manifold vacuum.
When the engine is running at idle, the PCV valve is opened slightly and a small amount of blow by gas is drawn into the dynamic chamber to be burned.
As the engine speed rises the PCV valve is opened further, allowing a larger amount of blow by gas to be drawn into the intake manifold.



29U0FX-231



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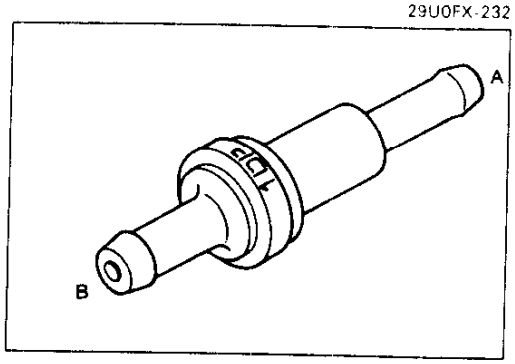


29U0FX-233

PCV VALVE

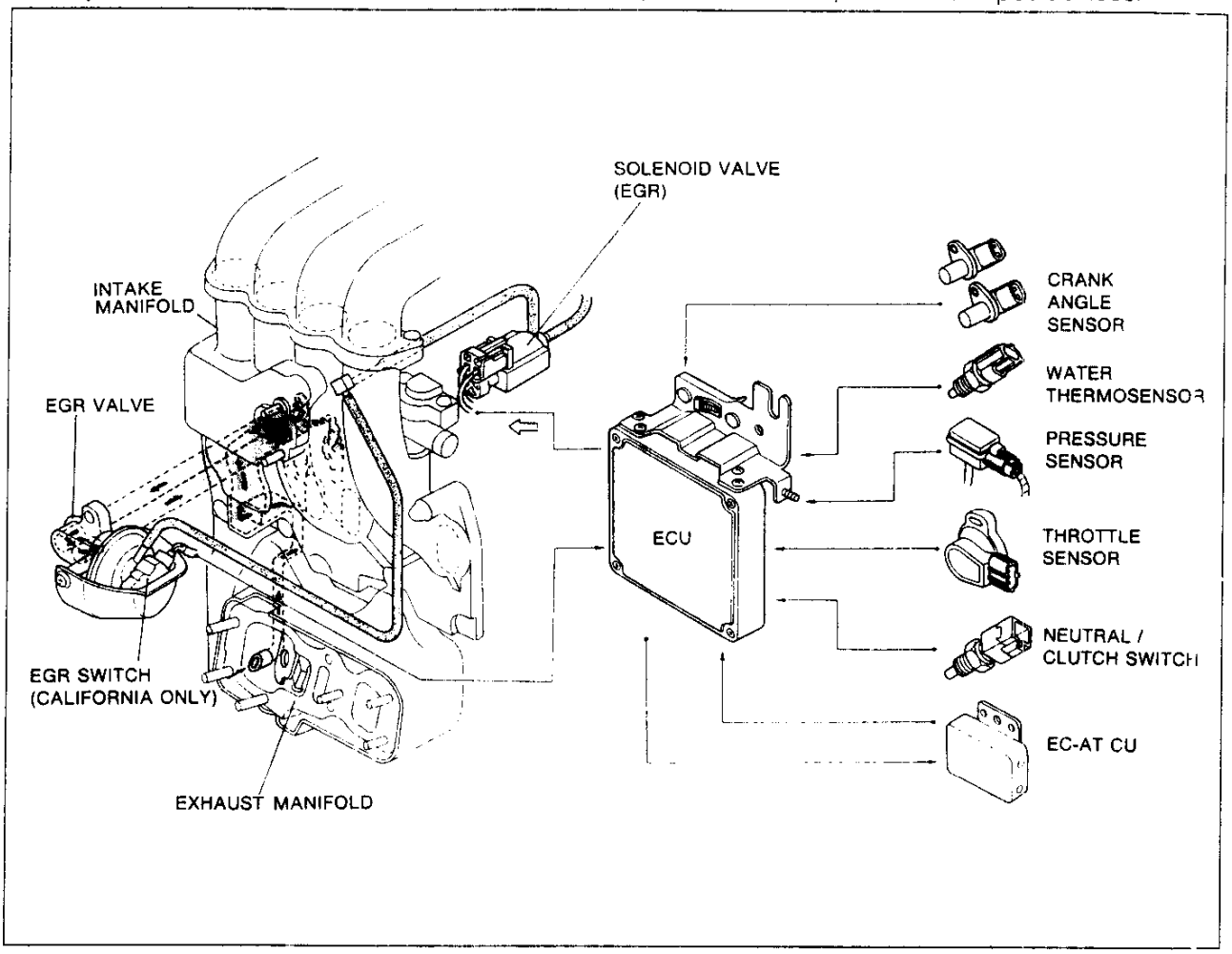
Inspection

1. Warm up the engine to the normal operating temperature and run it at idle.
2. Disconnect the PCV valve with the ventilation hose.
3. Block the PCV valve opening.
4. Verify that vacuum is felt.
5. Remove the PCV valve.
6. Blow through the valve from port A and verify that air comes out of port B.
7. Blow through the valve from port B and verify that no air comes out of port A.
8. Replace the PCV valve if necessary.

EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM

DESCRIPTION

This system recirculates a small amount of exhaust gas into the intake manifold to reduce the combustion temperature, and reduce NOx emissions.
This system consists of the EGR valve, EGR switch, solenoid valve, ECU and input devices.



Operation

Cold engine (Engine coolant temperature: below 70°C [158°F])

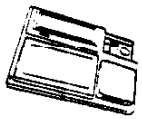
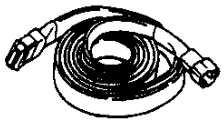
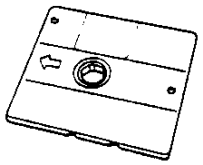
EGR operation is stopped to improve drivabilty when the engine is cold.

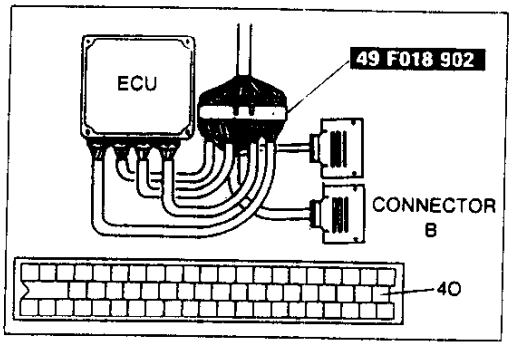
Warm engine

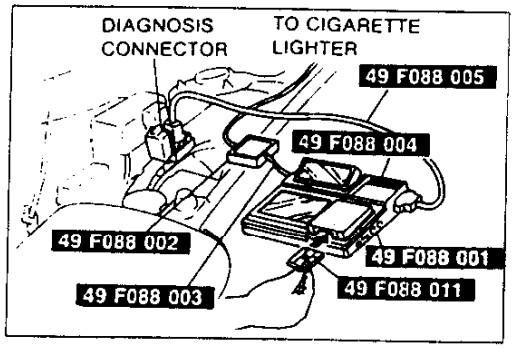
The ECU controls the solenoid valve to supply EGR gases as described below.

Operating condition	EGR operation	Remark
Idle	Stopped	–
Deceleration		
High engine speed		Above 3850 rpm
Heavy load		–
Others (Engine speed above 1050 rpm)	Supplied EGR gas	MT 5th gear, AT OD position Above 1700 rpm

PREPARATION
SST

49 F088 001 DT-S1000 Base unit 	For inspection of solenoid valve	49 F088 002 Power unit (DC12V) 	For inspection of solenoid valve
49 F088 003 Harness Power unit 	For inspection of solenoid valve	49 F088 004 Interface adaptor Type–1 	For inspection of solenoid valve
49 F088 005 Harness Type–1 	For inspection of solenoid valve	49 F088 011 System disk Type–1 (Ver 1.00) 	For inspection of solenoid valve





SYSTEM OPERATION
Engine Signal Monitor

1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the ECU as shown.
2. Start the engine.
3. Accelerates the engine and verify that ECU terminal 4O, voltage V_B while the engine is still cold.
4. Warm up the engine to normal operating temperature and run it at idle.
5. Short the ECU terminal 4O and verify that the engine runs roughly or stalls at idle.

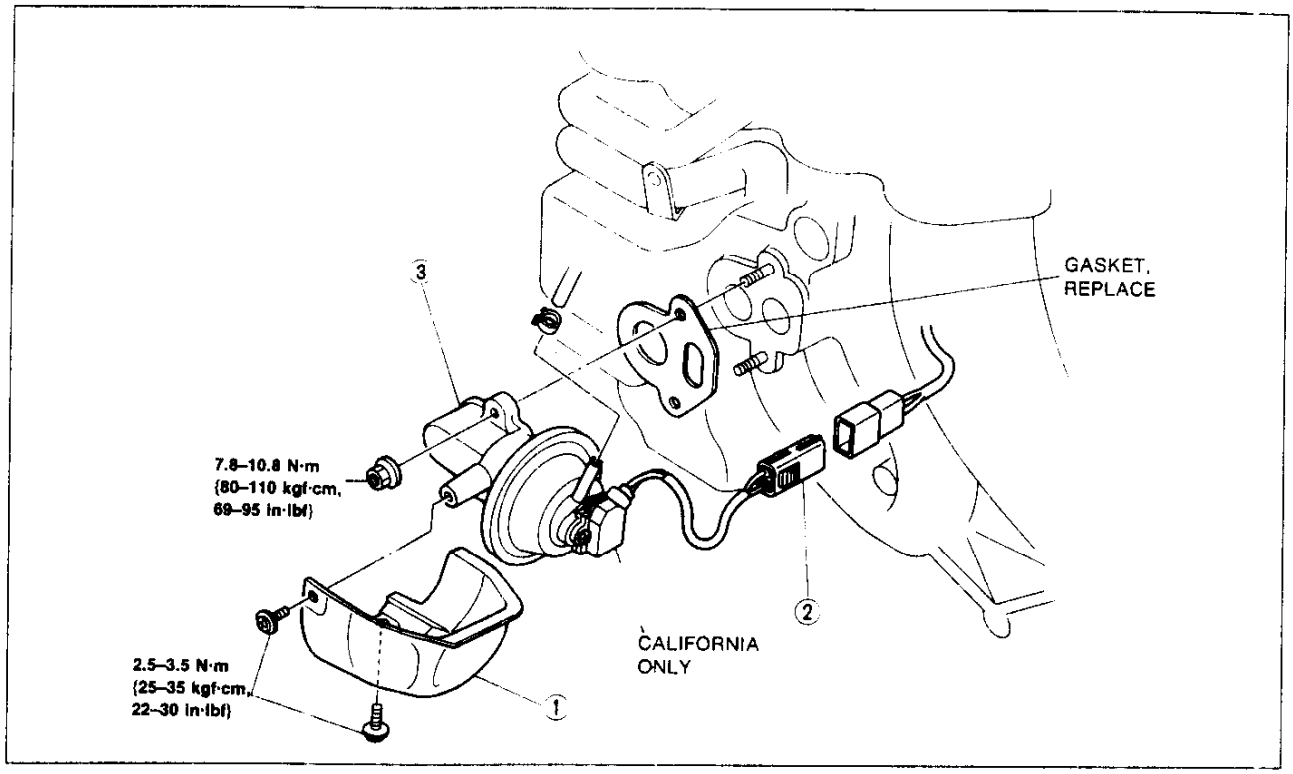
DT-S1000

1. Connect the **SSTs** (DT-S1000 and Harness) to the diagnosis connector as shown.
2. Start the engine.
3. Accelerate the engine and verify that the EGR solenoid valve OFF while engine is still cold.
4. Warm up the engine to normal operating temperature and run it at idle.
5. Select simulation check and verify that the engine runs roughly or stalls at idle when solenoid valve ON.

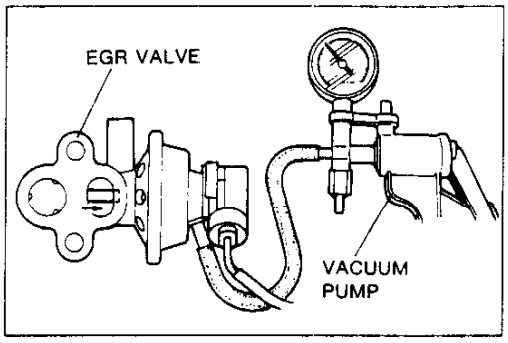
EGR VALVE

Removal / Installation

1. Remove the intake air system component parts. (Refer to page F–76)
2. Remove in the order shown in figure.
3. Install in the reverse order of removal.



1. Insulator
2. Connector
3. EGR valve
   Inspection ..... below

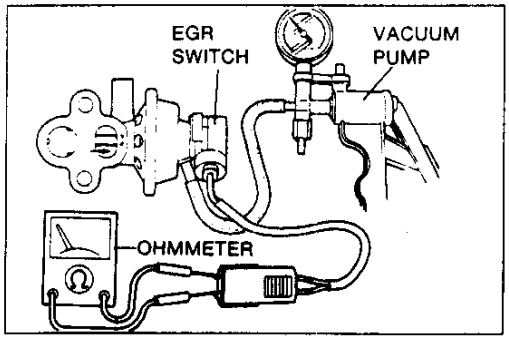


Inspection

1. Connect a vacuum pump as shown and apply vacuum.
2. Verify that the EGR valve moves at more than the specified vacuum.

Specification: 11–15.3 kPa {85–115 mmHg, 3.3–4.5 inHg}

3. If not as specified, replace EGR valve.



EGR SWITCH (CALIFORNIA ONLY)

Inspection

1. Remove the EGR valve (Refer to above)
2. Connect a vacuum pump as show and apply vacuum.
3. Verify that the EGR switch ON at more than the specified vacuum.

Specification: 11–15.3 kPa {85–115 mmHg, 3.3–4.5 inHg}

4. If not as specified, replace EGR valve.

SOLENOID VALVE (EGR)

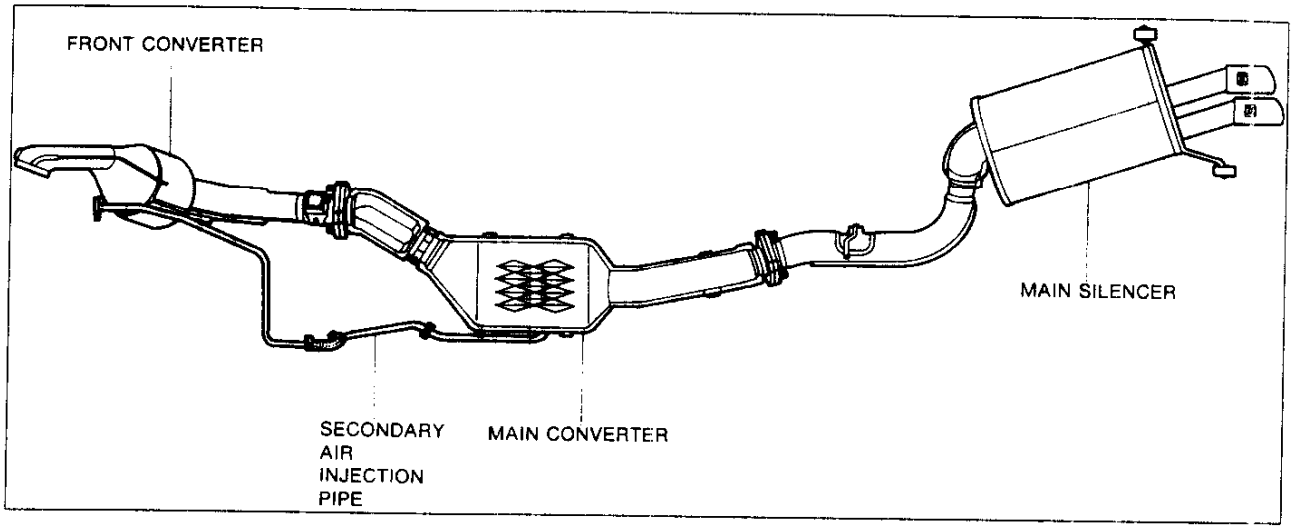
Inspection

(Refer to page F–190)

CATALYTIC CONVERTER SYSTEM

DESCRIPTION

Two bets three-way catalytic converters are used to reduce CO, HC, and NOx emissions.
For efficient operation. the front converter is placed close to the exhaust manifold so that it will heat up quickly and purify exhaust gas efficiently when engine runs at idle.
The front converter also protects the main converter from damaged by acting as a phosphorus and lead filter.



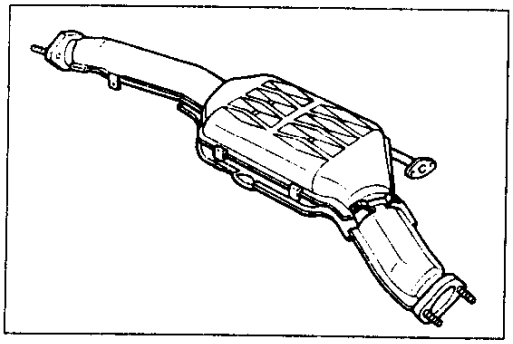
The catalytic converters reduce CO and HC, emissions through oxidization and NOx emissions by chemical reaction.

Catalytic converter	Type
Front converter	Metal
Main converter	Monotythic

Operation

(1) Before the engine is warmed up, when large amounts of CO and HC are ceated, the converter is supplied port air and uses both the first and second stages as the oxidization catalyst.
(2) In the normal driving range, the converter is supplied split air and uses the first stage as the ternary catalyst and second stage as the oxidization catalyst.
(3) During high-speed driving, an additional air to the converter is cut off, and the first and second stages are used the ternary catalyst.

	First stage	Second stage	Remark
Port air	Oxidation	Oxidation	Low-speed range, Deceleration range
Split air	Ternary	Oxidation	Cruising range
Air cut	Ternary	Ternary	High-speed range



CATALYTIC CONVERTER (FRONT CONVERTER AND MAIN CONVERTER)

Inspection

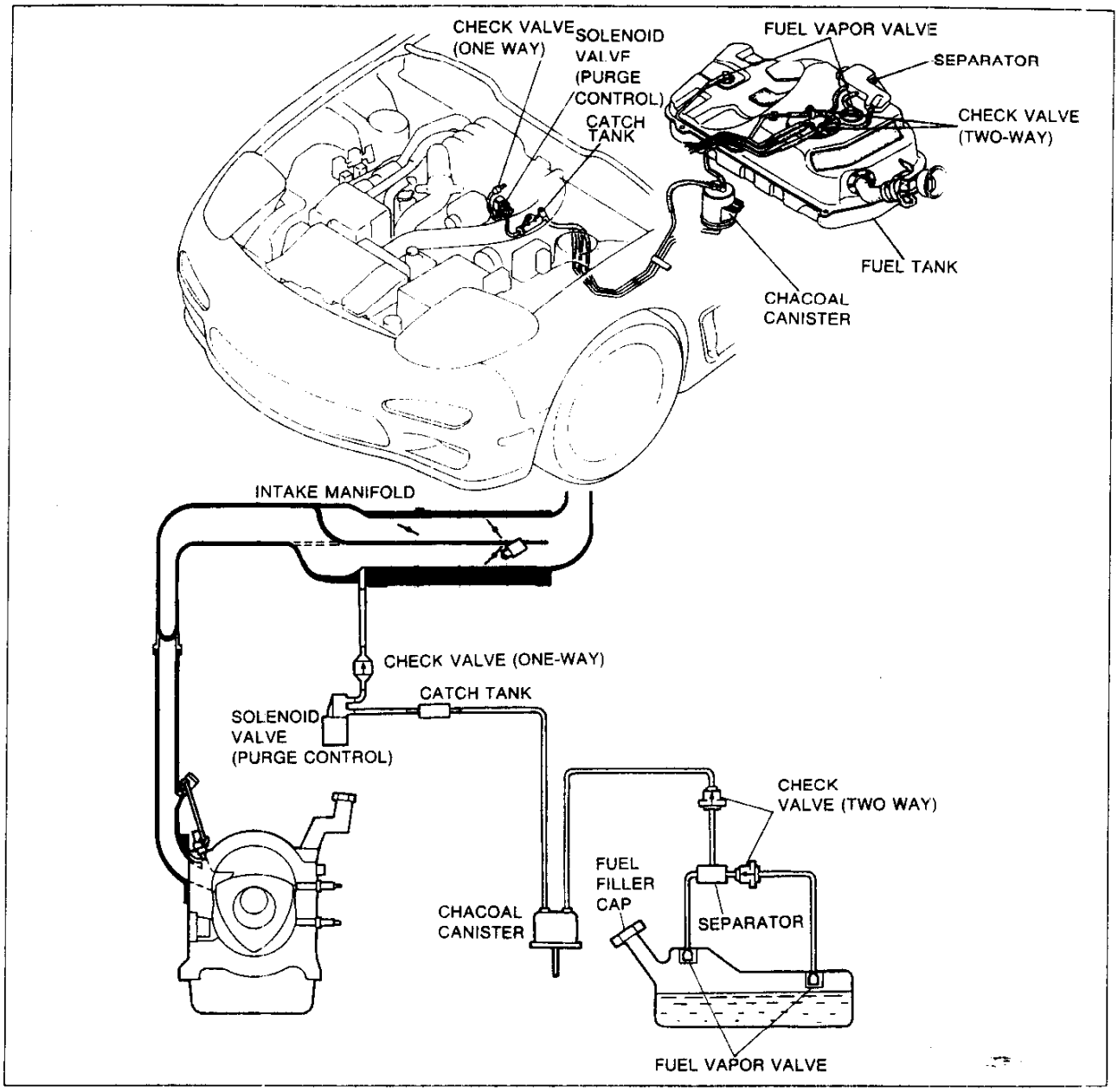
1. Check the catalytic converter for deterioration or clogging.
2. Check the insulation covers welded onto the catalytic converter for damage.

Note

- **If the insulation cover is touching the catalytic converter housing, excessive heat at the floor will occur.**

EVAPORATIVE EMISSION CONTROL SYSTEM

DESCRIPTION



The evaporative emission control system temporarily stores in the canister the evaporative fumes generated in the fuel tank. The stored gas is then passed into the air intake system for combustion when the engine is running. This operation prevents evaporative fumes from flowing out to the atmosphere.

Sending a large volume of evaporative fumes at one time into the air intake system deteriorates the airfuel ratio; thus, the ECU uses the solenoid valve (purge control) to regulate this volume.

Operation

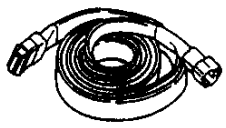
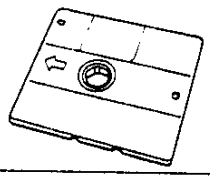
With engine stopped and no load applied

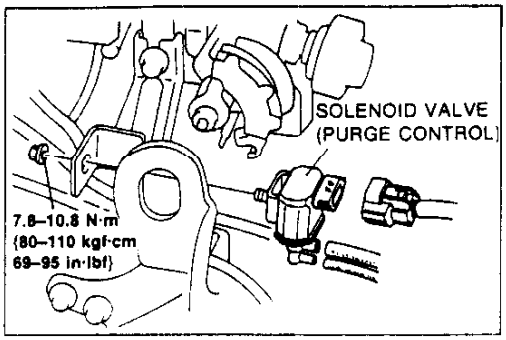
The evaporative fumes from the fuel tank are absorbed by the charcoal canister.

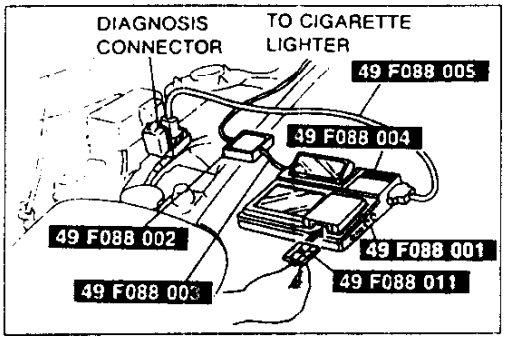
With engine running and load applied

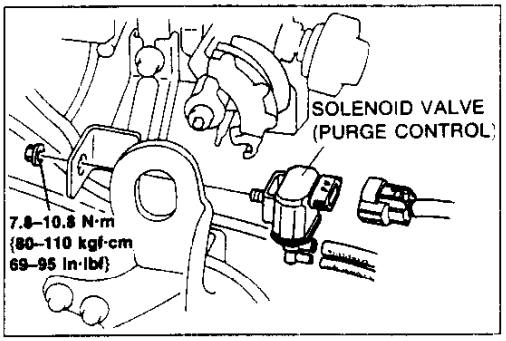
The evaporative fumes absorbed by the charcoal canister are drawn into the engine via the solenoid valve (purge control). The volume of fumes drawn depends on engine conditions.

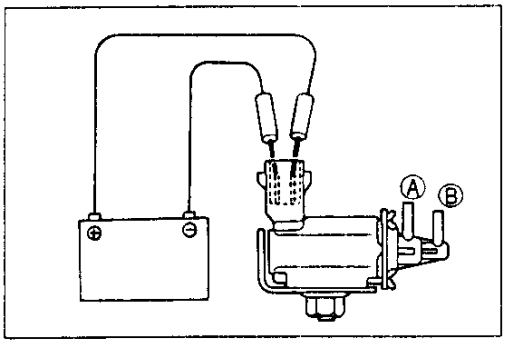
PREPARATION
SST

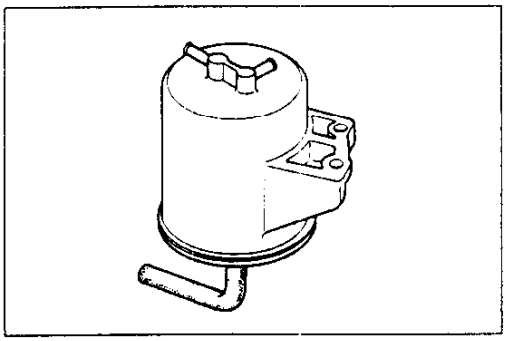
49 F088 001 DT-S1000 Base unit 	For inspection of solenoid valve and relay	49 F088 002 Power unit (DC12V) 	For inspection of solenoid valve
49 F088 003 Harness Power unit 	For inspection of solenoid valve	49 F088 004 Interface adaptor Type–1 	For inspection of solenoid valve
49 F088 005 Harness Type–1 	For inspection of solenoid valve	49 F088 011 System disk Type–1 (Ver 1.00) 	For inspection of solenoid valve











SYSTEM OPERATION

1. Warm up the engine to normal operating temperature and run it at idle.
2. Disconnect the vacuum hose from the solenoid valve (purge control) as shown in the figure, and verify that no vacuum is felt at the solenoid valve.
3. If not as specified, check the solenoid valve.

DT-S1000

1. Connect the **SST**s (DT-S1000 and Harness) to the diagnosis connector.
2. Warm up the engine to normal operating temperature and run it idle.
3. Select simulation check and verify that the solenoid valve operation sound is heard when solenoid valve ON.
4. If operation sound is not heard, check the following condition below.
   - Vacuum tube
     Inspect vacuum line fitting, connections and components for leaks. (Refer to page F–10)
   - Evaporative hose
     Inspect evaporative line fitting, connection and components for leaks.

SOLENOID VALVE (PURGE CONTROL)

Removal / Installation

1. Disconnect the vacuum hoses and connector from solenoid valve.
2. Remove the mounting nuts and solenoid valve.
3. Install in the reverse order of removal.

Inspection

1. Disconnect the vacuum hoses from the solenoid valve.
2. Blow into the valve and verify that no air flows through it.
3. Disconnect the solenoid valve connector and apply battery voltage as shown in the figure.
4. Blow into the valve and verify that air flows through it.
5. If not as specified, measure the solenoid valve resistance with an ohmmeter.

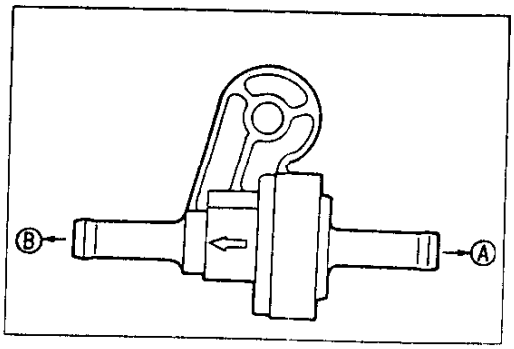
   Resistance: 30–34 Ω (20°C [68°F])

6. If not as specified, replace the solenoid valve.

CHARCOAL CANISTER

Inspection

Visually check for damage and replace the charcoal canister if necessary.

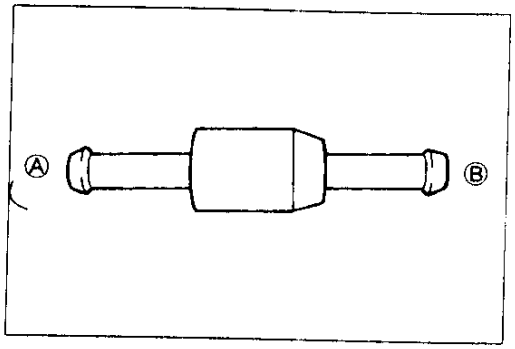


CHECK VALVE (TWO-WAY)

Inspection

1. Remove the check valve.
2. Check the operation of the check valve by using a vacuum pump.

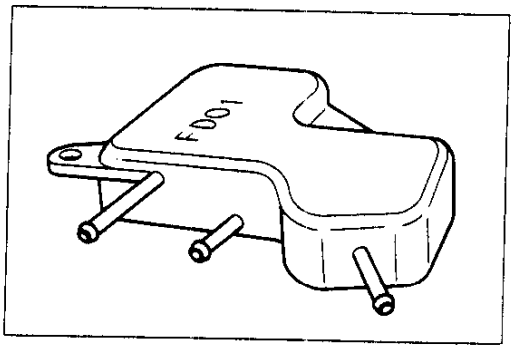
Apply approx. 5 kPa {37 mmHg, 1.46 inHg} vacuum at port A	Air flow
Apply approx. 6 kPa {44 mmHg, 1.73 inHg} vacuum at port B	Air flow



CHECK VALVE (ONE-WAY)

Inspection

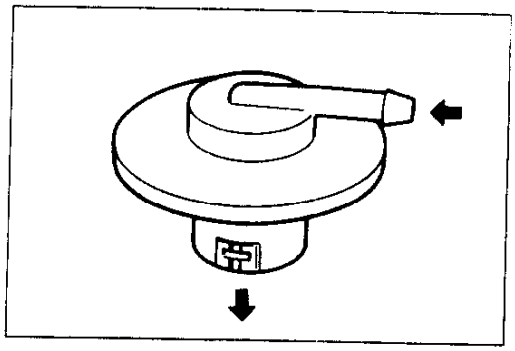
1. Remove the check valve.
2. Blow through the check valve from port A, and check that the air flows from port B
3. Blow through the check valve from port B, and check there is no flow.



SEPARATOR

Inspection

Visually check for damage and replace the separator if necessary.

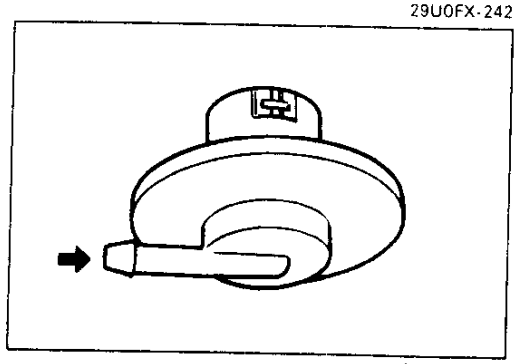


29U0FX-242

FUEL VAPOR VALVE

Inspection

1. Remove the valve.
2. Blow through the valve and verify that air flows in the direction shown.



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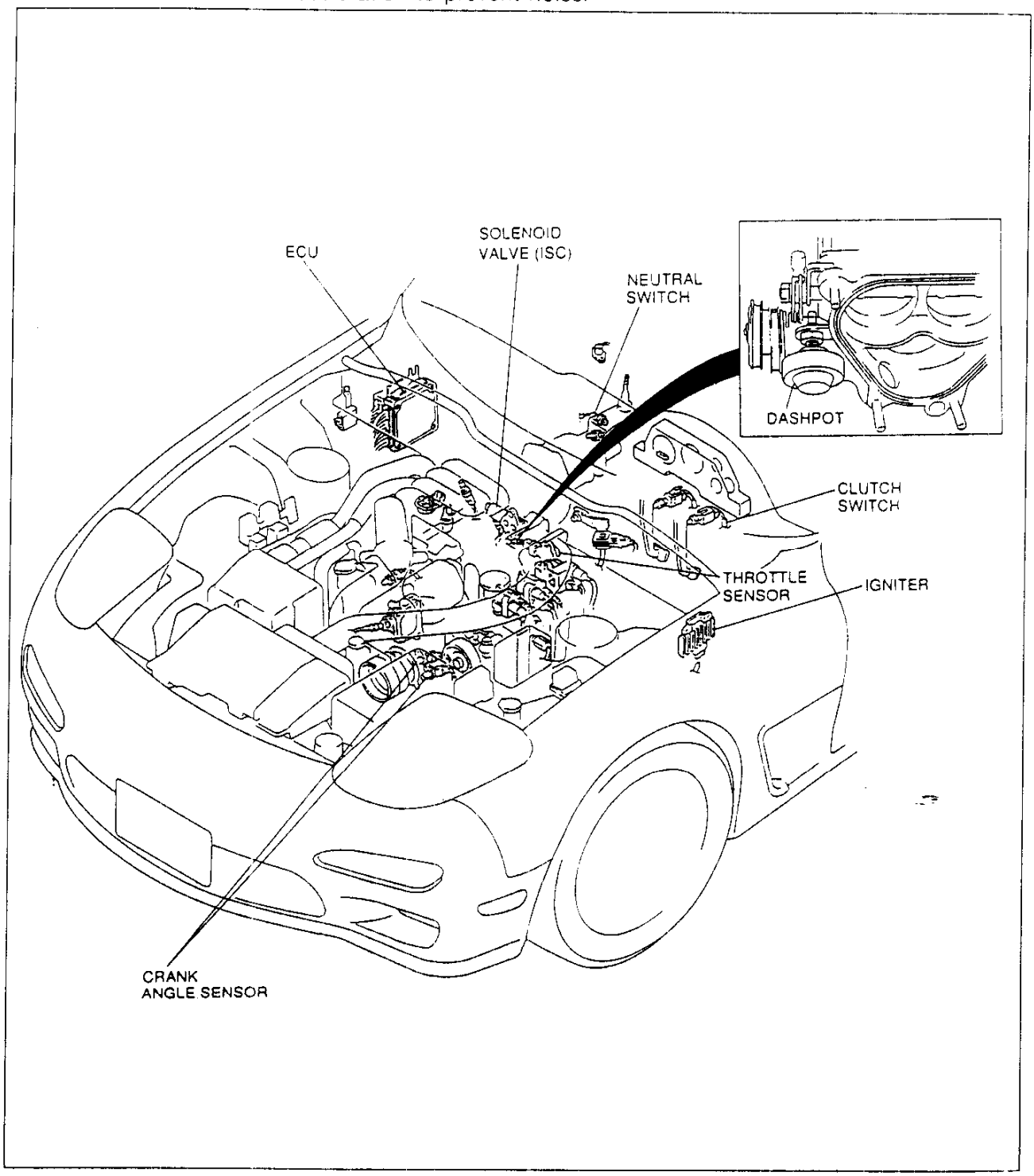
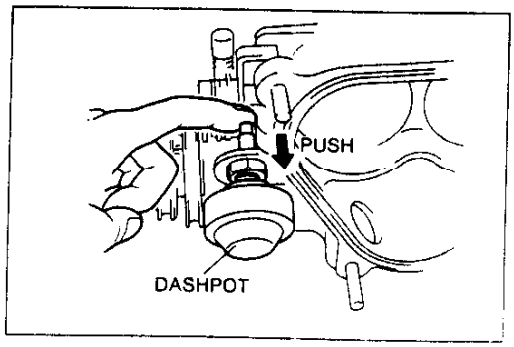
3. Turn the valve over and blow through the valve. Verify that no air flows.
4. Replace the valve if necessary.

DECELERATION CONTROL SYSTEM

DESCRIPTION

- Dash pot : To prevent the throttle valves from closing suddenly.
- Solenoid valve (ISC) : To prevent afterburn, air is supplied to intake manifold during deceleration.
- Fuel cut control : To improve the fuel economy and to prevent engine bucking during deceleration.
- Air bypass valve : Bypasses compressed air from after the turbocharger to air cleaner during deceleration to prevent noise.

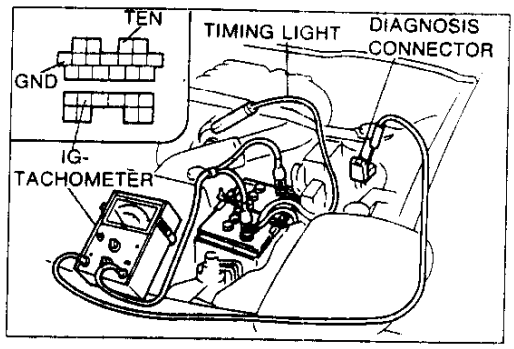




DASHPOT

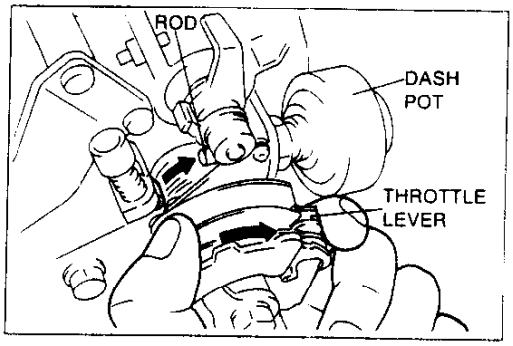
Inspection

1. Open the throttle valve fully, then push the dash pot rod with a finger and verify that the rod goes in slowly.
2. Release the rod and verify that it comes out quickly.
3. Replace it, if necessary.



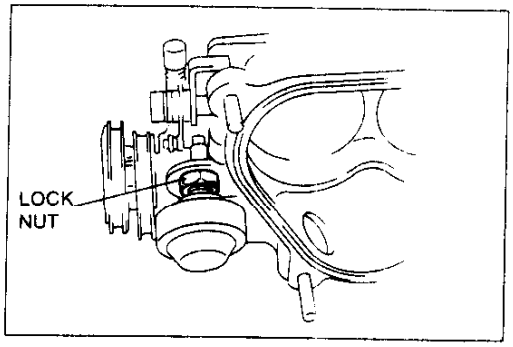
Adjustment

1. Warm up the engine to the normal operating temperature and run it idle.
2. Verify that the fast idle cam separates.
3. Turn all electrical loads OFF.
4. Connect a tachometer to the diagnosis connector terminal **IG-**.

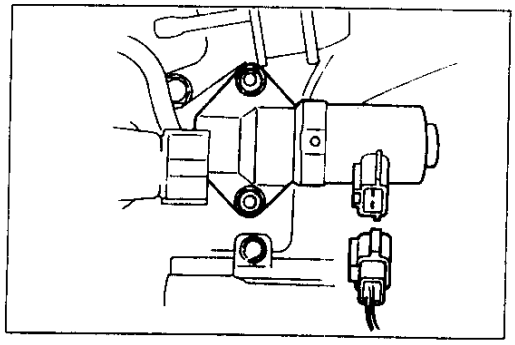


5. Open the throttle valve until the dash pot rod separates from the lever.
6. Check the engine speed when the dash pot rod touches to the lever.

Engine speed: 2600–3000 {2800 ±200} rpm



7. Loosen the lock nut and adjust by turning the dash pot, if necessary.



ANTI AFTERBURN CONTROL

System operation

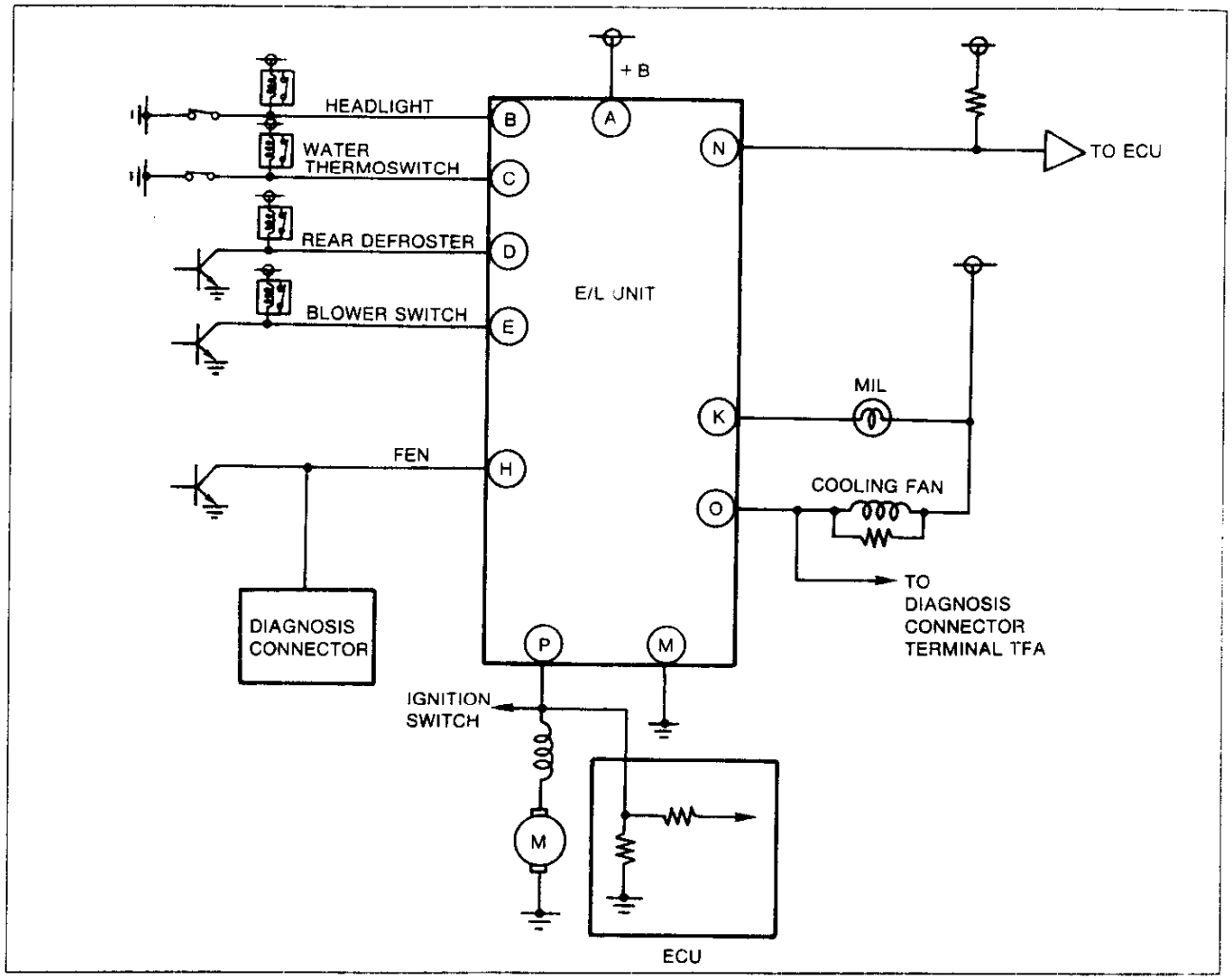
1. Start the engine and run it at idle.
2. Disconnect solenoid valve (ISC) connector.
3. Increase the engine speed to over 4,000 rpm then decrease the engine speed rapidly.
4. Verify that the engine speed decrease roughly at 1500–1000 rpm.

ELECTRICAL LOAD (E/L) CONTROL SYSTEM

DESCRIPTION

The engine speed increases when any of the following switches are ON.

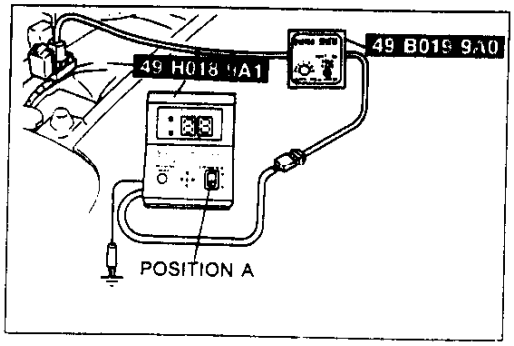
- Rear defroster switch
- Headlight switch
- Blower motor switch 3rd or 4th position.
- Water thermo switch for fan motor.



PREPARATION

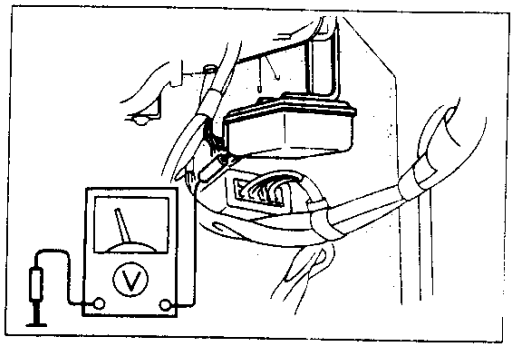
SST

49 B019 9A0 System Selector	For diagnosis	49 H018 9A1 Self-Diagnosis Checker	For diagnosis



SYSTEM OPERATION

1. Connect the **SST** (System selector) to the diagnosis connector.
2. Set switch A to position 1 and TEST SW to SELF-TEST.
3. Connect the **SST** (Self-Diagnosis Checker) to the System Selector and a ground.
4. Set the select switch to position A.
5. Turn ignition switch ON.
6. Check if the monitor lamp illuminates when each switch is made to function. (Refer to page F-67)



Inspection

1. Remove the E/L unit. (Refer to page F-150)
2. Connect the E/L unit connector.
3. Measure the voltage at each terminal by using a voltmeter.
4. If any E/L unit terminal voltage is incorrect, check the input or output device and related wiring harness. If they are normal, replace the E/L unit.

Terminal voltage

V_B: Battery voltage

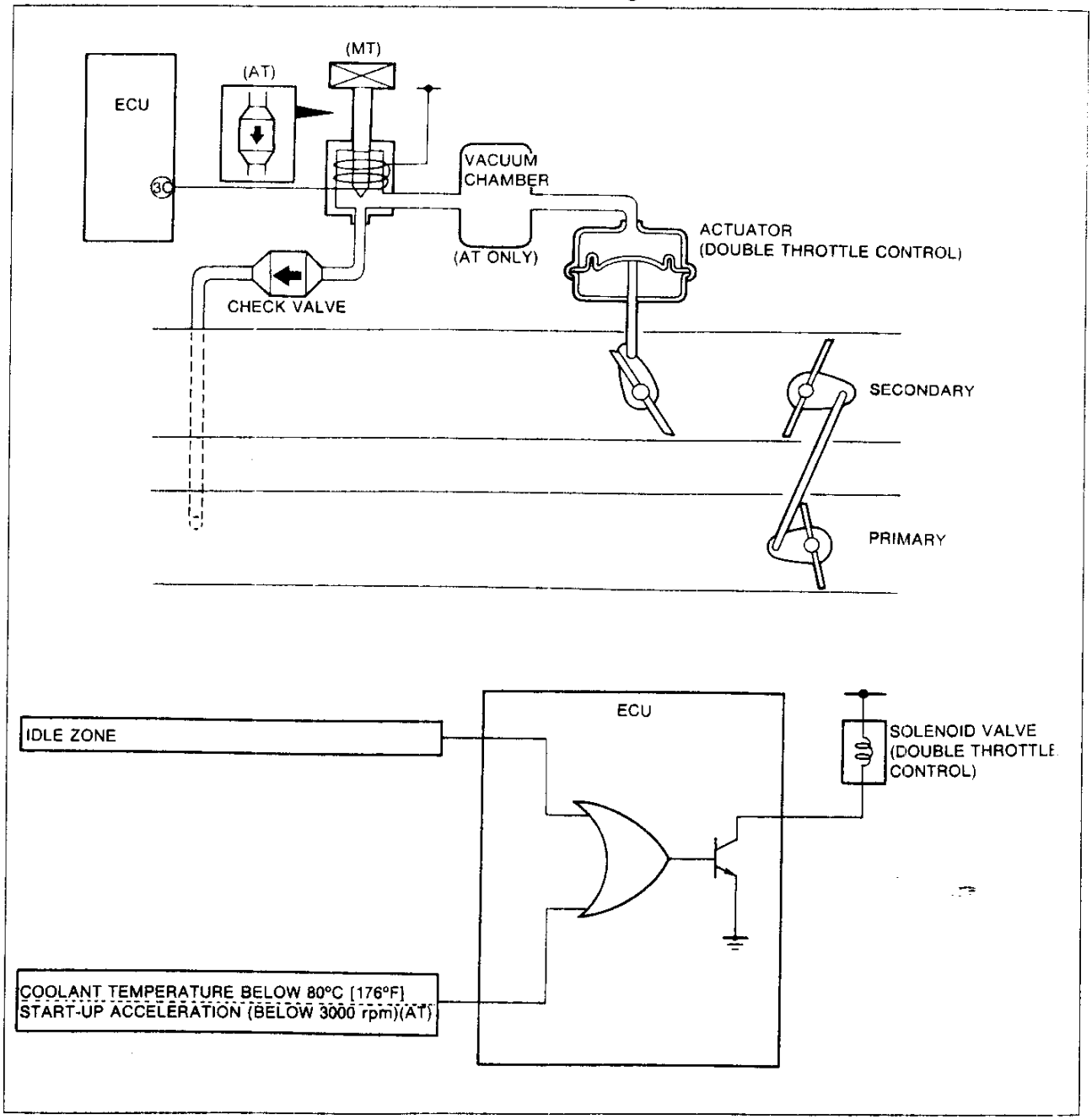
Terminal	Input	Output	Connected to	Test condition	Correct voltage	Remark
A	–	–	Main relay	Ignition switch ON	V_B	–
B	○		TNS relay	Position light ON	V_B	–
				Position light OFF	0V	
C	○		Water thermoswitch	Engine coolant temperature below 108°C	V_B	Ignition switch ON
				Engine coolant temperature above 108°C {221°F}	0V	
D	○		Rear window defroster ready	Rear window defroster OFF	V_B	Ignition switch ON
				Rear window defroster ON	Below 1.0V	
E	○		Blower moter relay	Blower switch 3rd or 4th position	Below 1.0V	Ignition switch ON
				Blower switch 1st or 2nd position	V_B	
F	–	–	–	–	–	–
G	–	–	–	–	–	–
H		○	Self-Diagnosis checker Diagnosis connector (FEN)	Buzzer sounded for 3 sec. after ignition switch OFF → ON	Below 2.5V	• With Self-Diagnosis checker and system Selector • With System Selector test switch at SELF TEST
				Buzzer not sounded for after 3 sec.	V_B	
				Buzzer sounded	Below 2.5V	
				Buzzer not sounded	V_B	
I	–	–	–	–	–	–
J	–	–	–	–	–	–
K		○	Malfunction indicator lamp (MIL)	Lamp illuminated for 3 sec. after ignition switch ON	Below 2.5V	With system selector test switch at SELF TEST
				Lamp not illuminated after 3 sec.	V_B	
				Lamp illuminated	Below 2.5V	
				Lamp not illuminated	V_B	
L	–	–	–	–	–	–
M	–	–	Ground	Constant	0V	–
N		○	ECU	Electrical load ON	Below 2.5V	Ignition switch ON
				Electrical load OFF	V_B	
O		○	Cooling fan relay	Engine coolant temperature below 108°C	Below 2.5V	Ignition switch ON
				Engine coolant temperature above 108°C	V_B	
P	○		Ignition switch	While cranking	–	–
				Ignition switch ON	Below 1.0V	

DOUBLE THROTTLE CONTROL SYSTEM

DESCRIPTION

The response delay of the pressure sensor followed mounted by rapid acceleration temporarily causes a lean fuel mixture. The double throttle control system prevents hesitation caused by this lean fuel mixture by slightly delaying the opening of the double throttle valve after the secondary throttle valve.

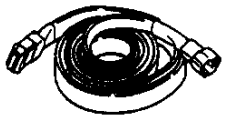
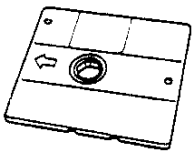
The double throttle valve is controlled by the ECU through the solenoid valve.

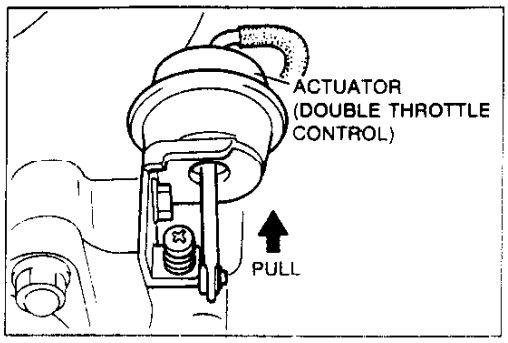


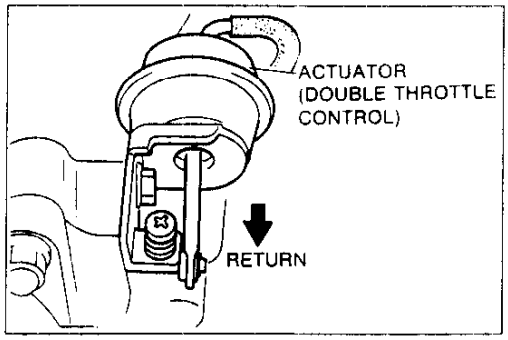
OPERATION

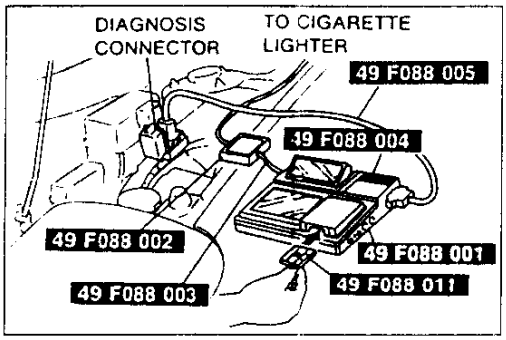
When one or more of the above conditions are met, the ECU turns the solenoid valve ON, applies vacuum to the actuator (double throttle control), and closes the double throttle valve.

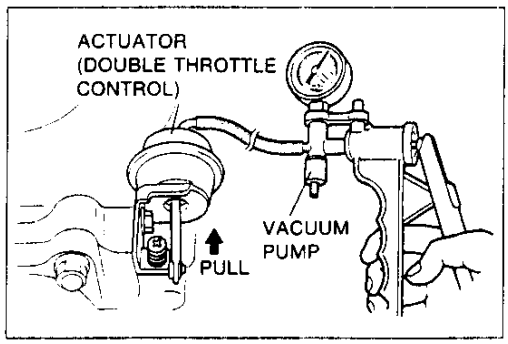
PREPARATION
SST

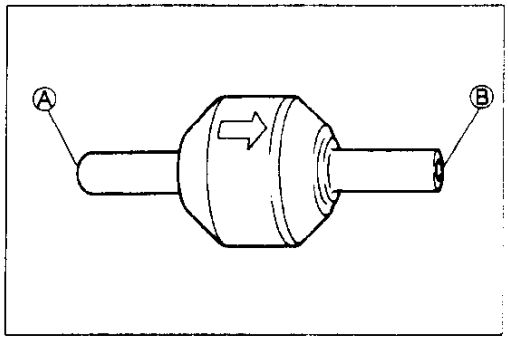
49 F088 001 DT-S1000 Base unit 	For inspection of solenoid valve and relay	49 F088 002 Power unit (DC 12V) 	For inspection of solenoid valve
49 F088 003 Harness Power unit 	For inspection of solenoid valve	49 F088 004 Interface adapter Type–1 	For inspection of solenoid valve
49 F088 005 Harness Type–1 	For inspection of solenoic valve	49 F088 011 System disk Type–1 (Ver.1.00) 	For inspection of solenoid valve











SYSTEM OPERATION

1. Start the engine and verify that the actuator (Double throttle control) rod is pulled into actuator while engine is cold.
2. If the actuator rod is not pulled, check the following condition below.
   - Vacuum tube
     Inspect vacuum line fitting, connections and components for leaks. (Refer to page F–10.)
   - Vacuum chamber
     Visually check for dogging damage or crack.
   - Actuator
     Inspection. (Refer to below.)
   - Solenoid valve (Double throttle control)
     Inspection. (Refer to page F–190.)
   - Water thermosensor
     Inspection. (Refer to page F–183.)
3. Verify that the actuator rod is returned, when warm up the engine to normal operating temperature.
4. If the actuator rod is not return, check the folbing condition below.
   - Solenoid valve (Double throttle control)
     Inspection. (Refer to page F–190.)
   - Water thermosensor
     Inspection (Refer to page F–183.)

DT-S1000

1. Connect the **SST**s (DT-S1000 and Harness)
2. Start the engine and run it idle.
3. Select the simulation check (Double throttle control) and verify that the actuator rod is moved when solenoid valve on and OFF
4. If actuator rod is not moved check the condition above.

ACTUATOR (DOUBLE THROTTLE CONTROL)

Inspection

1. Disconnect vacuum hose
2. Connect a vacuum pump and verify that actuator rod is pulled into actuator when apply the vacuum more than 22.0–28.7 kPa {165–215 mmHg, 6.5–8.5 inHg}
3. If not as specified, replace the actuator

Removal / Installation

(Refer to page F–78)

CHECK VALVE

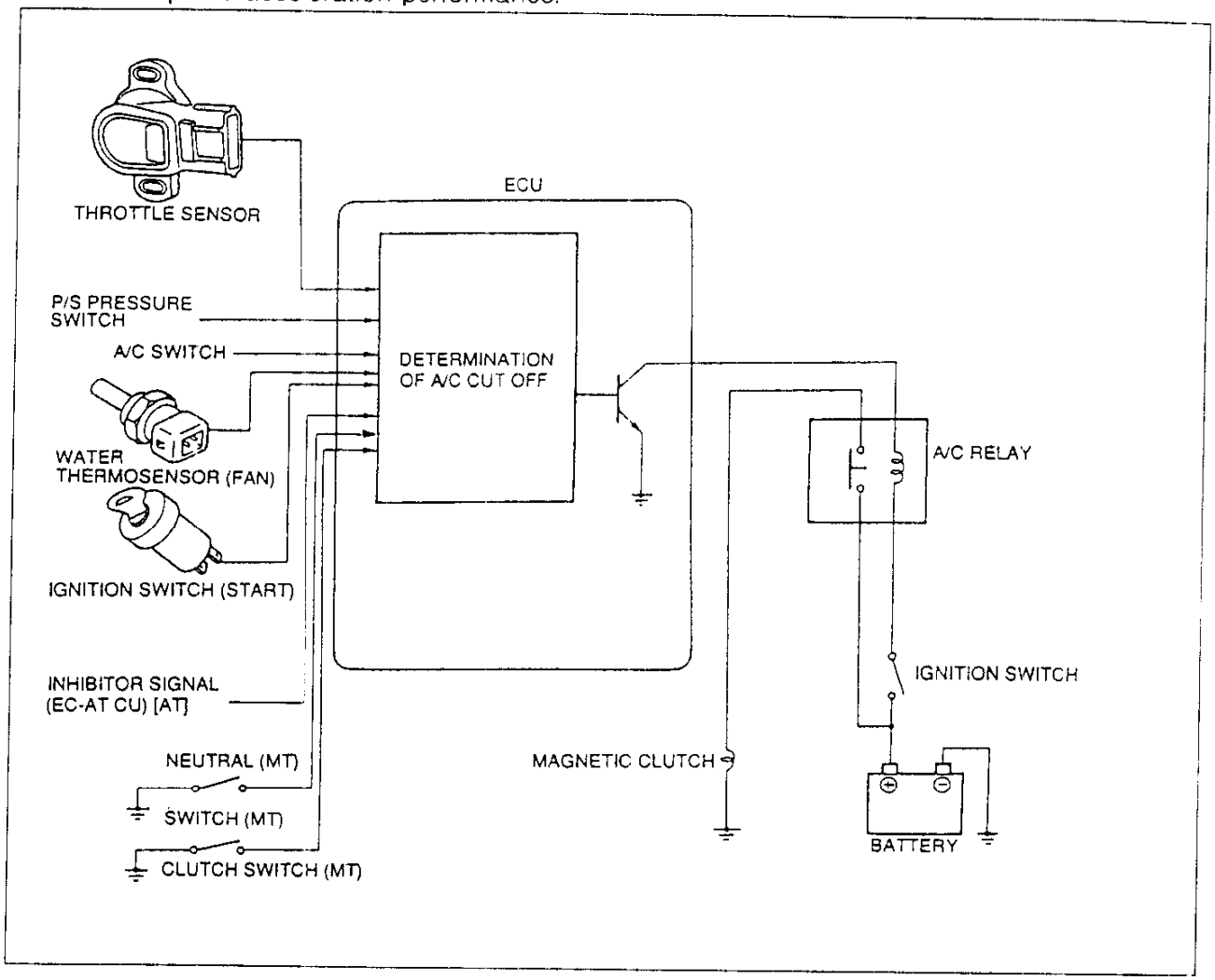
Inspection

1. Remove the check valve.
2. Blow through A and check that air flows from B.
3. Blow through B and check that air does not flow from A.

A/C CUT-OFF SYSTEM

DESCRIPTION

An A/C cut off system in used to improve idle smoothness immediately after starting the engine and to improve acceleration performance.

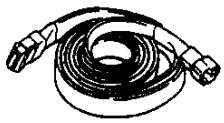
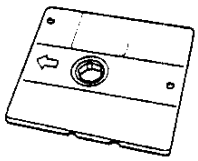


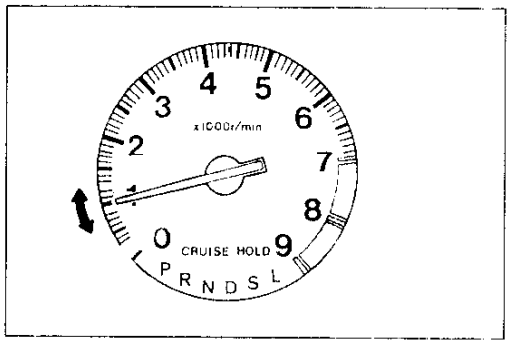
16EOF2-19

Operation

Engine condition	Purpose	Cut off period
After engine started	Improved idle	Approx. 8 sec.
Throttle valve fully open	Improved drivability	Approx. 7 sec.
Water temperature over 117°C {243°F}	Prevent engine from over heating	Water temperature under 115°C {239°F}

PREPARATION
SST

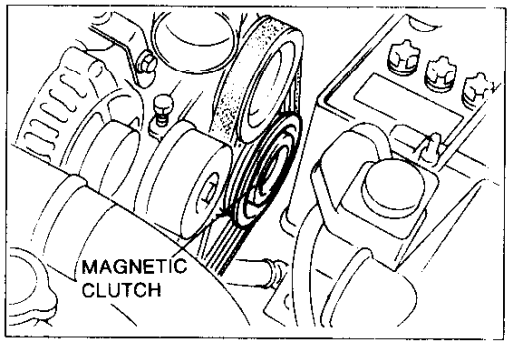
49 F088 001 DT-S1000 Base unit 	For inspection of solenoid valve and relay	49 F088 002 Power unit (DC 12V) 	For inspection of solenoid valve
49 F088 003 Harness Power unit 	For inspection of solenoid valve	49 F088 004 Interface adapter Type–1 	For inspection of solenoid valve
49 F088 005 Harness Type–1 	For inspection of solenoid valve	49 F088 011 System disk Type–1 (Ver.1 00) 	For inspection of solenoid valve



SYSTEM OPERATION

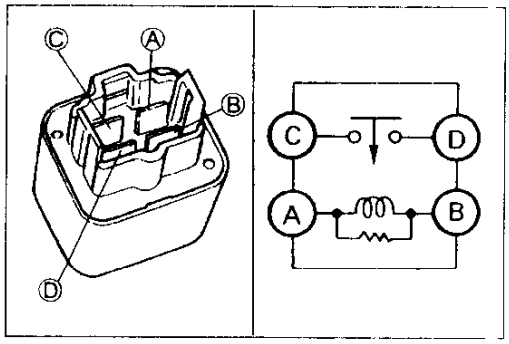
1. Start the engine and it idle.
2. Turn the A/C and blower switches ON, and verify that no engine speed decrease.
3. Turn the blowen switch OFF and verity that no engine speed increase.
4. If not as specified, check for cause.

- Solenoid valve (ISC)
  Inspection (Refer to page F–82)
- A/C signal (ECU terminal 1E)
  Inspection (Refer to page F–152)



Inspection
Acceleration cut-off

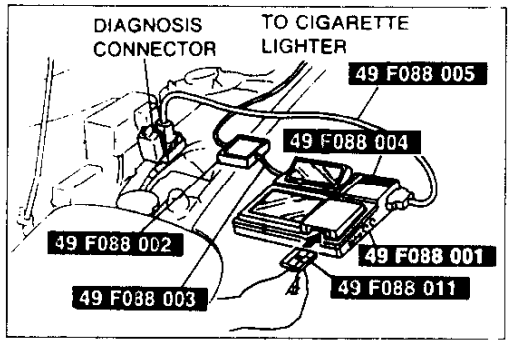
1. Turn ignition switch ON.
2. Shift transmission into gear (MT) on shift into D range (AT)
3. Turn the A/C and blower switches ON
4. Open the throttle valve fully and verify that the magnetic clutch disengage (click is heard) then renganges after **approx 5 seconds.**



A/C relay
Continuity inspection

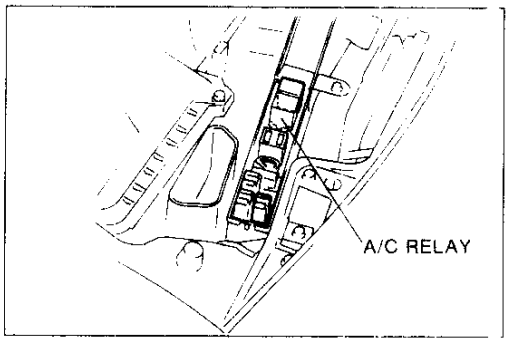
Check continuity between the terminals with ohmmeter

Terminal A–B	Terminal C–D
Apply V_B	Yes
Not Apply V_B	No



DT-S1000

1. Connect the DT-S1000 to the diagnosis connector.
2. Select simulation check.
3. Turn ignition switch ON.

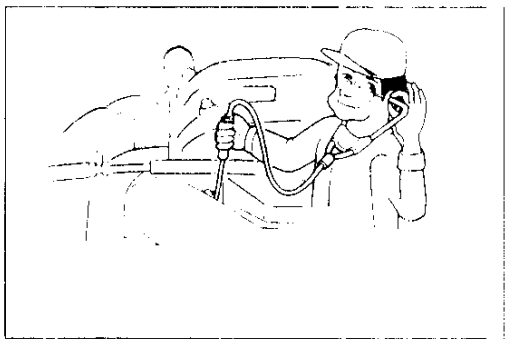


4. Verify that the A/C relay operation sound is heard.
5. If no sound is heard check the continuity of A/C Relay.

DECHOKE CONTROL SYSTEM

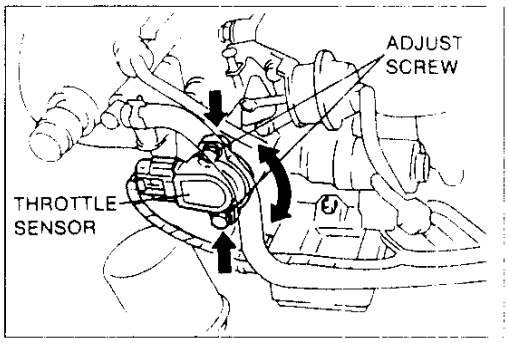
DESCRIPTION

To facilitate starting the engine if the spark plugs become fouled, such as when the engine is flooded, fuel injection is cut if the throttle valve is held wide open while cranking the engine. This allows the spark plugs to dry and purges excess fuel from the cylinders.



SYSTEM OPERATION

1. Verify that the engine will not start and no operational sound of primary injector with a serewdriver or a soundscope when cranked at normal speed with the throttle fully open.

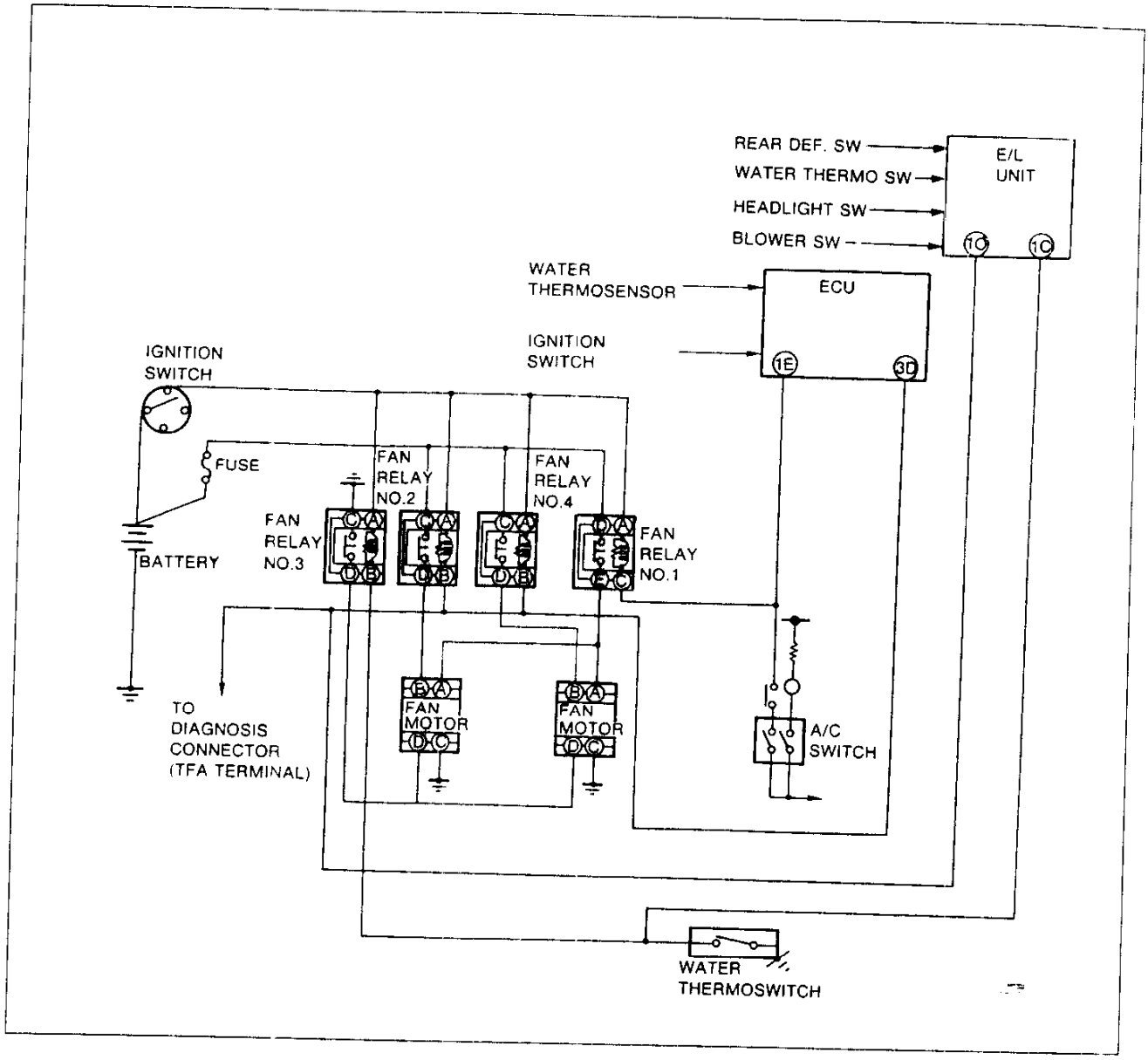


2. If the engine starts, and operational sound of primary injector is heard, inspect the throttle sensor. (Refer to page F–182) and the ECU terminal 1C voltage. (Refer to page F–152.)

ELECTRICAL COOLING FAN CONTROL SYSTEM

DESCRIPTION

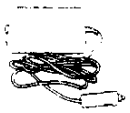
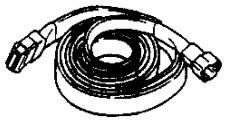
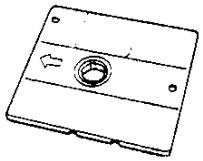
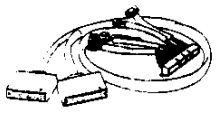
To improve idle smoothness and engine reliability, the Electrical cooling fan control system controls the electrical fan speed by ECU. This system consist of the cooling fan, fan relays, ECU, and input devices.



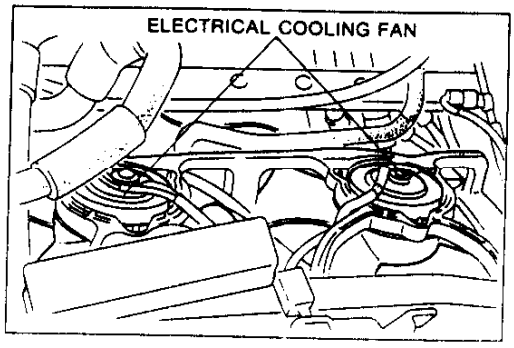
Operation

Engine condition (No electrical load)	A/C operation	Fan relay No.1	Fan relay No.2	Fan relay No.3	Fan relay No.4	Cooling fan operation
Coolant temperature below 105°C {221°F}	OFF	OFF	OFF	OFF	OFF	OFF
	ON	ON	ON	OFF	ON	LOW
Coolant temperature {221–226°F} 105–108°C	OFF	OFF	ON	OFF	ON	LOW
	ON	ON	ON	OFF	ON	MIDDLE
Coolant temperature above 108°C {226°F} (Water thermo switch ON)	OFF	OFF	ON	ON	ON	MIDDLE
	ON	ON	ON	ON	ON	HIGH
Water thermosensor malfunction	–	OFF	ON	OFF	ON	LOW
TFA terminal ground	–	OFF	ON	OFF	ON	LOW

PREPARATION
SST

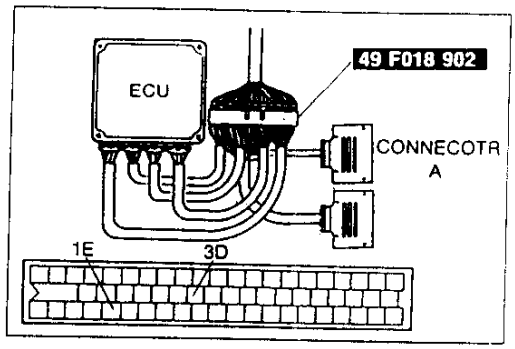
49 F088 001 DT-S1000 Base unit 	For inspection of solenoid valve and relay	49 F088 002 Power unit (DC 12V) 	For inspection of solenoid valve
49 F088 003 Harness Power unit 	For inspection of solenoid valve	49 F088 004 Interface adapter Type-1 	For inspection of solenoid valve
49 F088 005 Harness Type-1 	For inspection of solenoid valve	49 F088 011 System disk Type-1 (Ver. 1.00) 	For inspection of solenoid valve
49 F018 902 Adaptor harness 	For inspection of solenoid valve		

ELECTRICAL COOLING FAN CONTROL SYSTEM



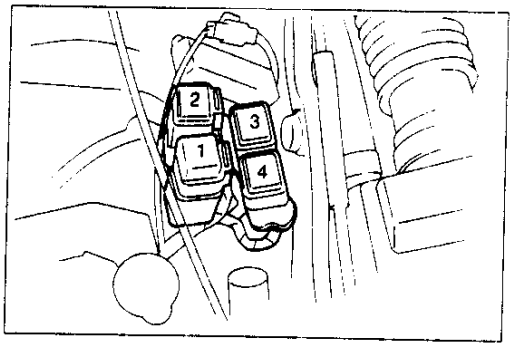
SYSTEM OPERATION

1. Connect the diagnosis connector terminals TFA and GND with a jumper wire.
2. Turn ignition switch ON.
3. Verify that electrical cooling fans operate.



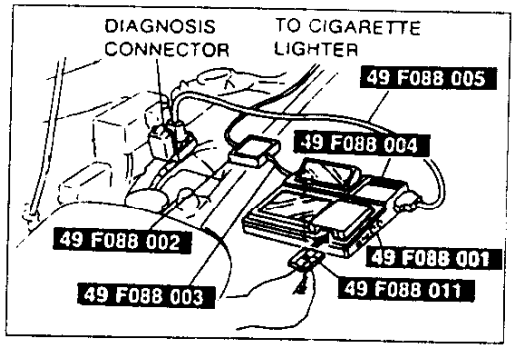
Inspection

1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the ECU
2. Turn ignition switch ON.
3. Short the ECU terminals and verify that the cooling fan operate as following condition below.



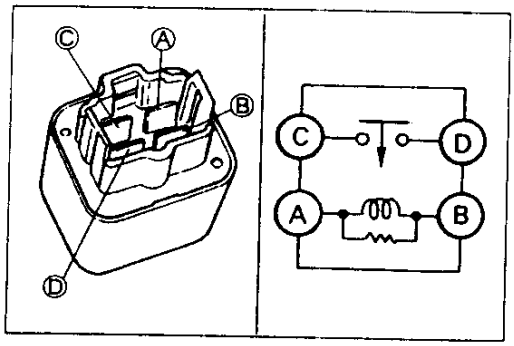
Terminal	Fan relay
3D	2.4
1E	1

4. If not as specified, check the harness and relays.



DT-S1000

1. Connect the **SST**s (DT-S1000 and Harness) to the diagnosis connector.
2. Turn ignition switch ON.
3. Select the simulation check (fan relay) and verify that the cooling fan operate.



FAN RELAY

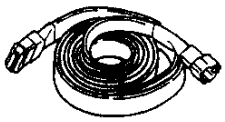
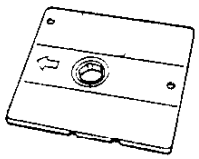
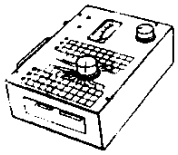
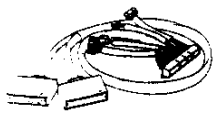
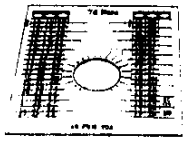
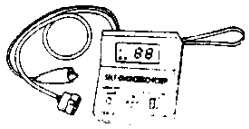
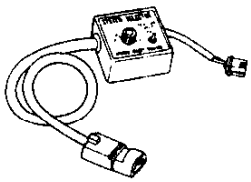
Inspection

1. Disconnect cooling fan relay
2. Apply battery voltage and ground to terminal A and B of cooling fan relay.
3. Check continuity of the relay

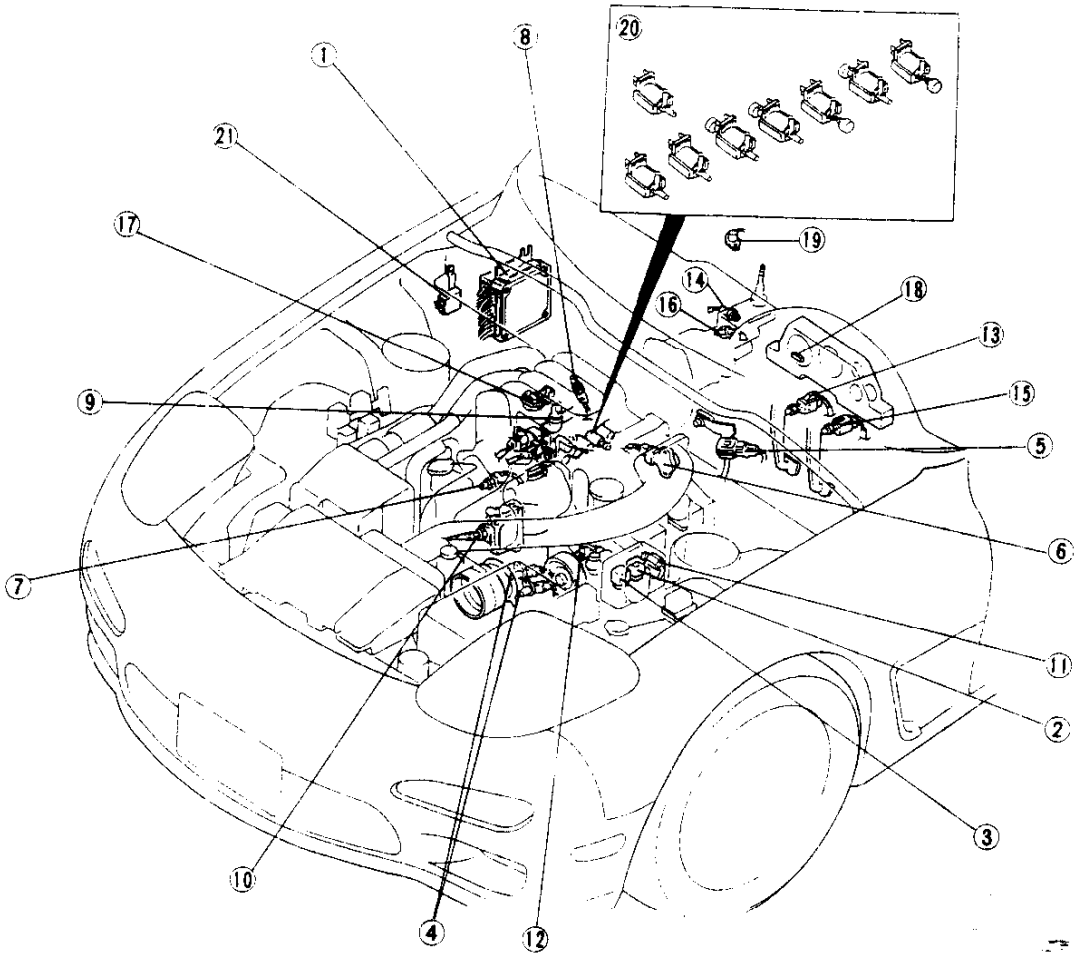
Operation	C–D terminal
V_B applied	Continuity
V_B Not applied	No continuity

CONTROL SYSTEM

PREPARATION
SST

49 F088 001 DT-S1000 Base unit 	For inspection of ECU terminal voltage and input / output devices	49 F088 002 Power unit (DC 12V) 	For inspection of ECU terminal voltage and input / output devices
49 F088 003 Harness Power unit 	For inspection of ECU terminal voltage and input / output devices	49 F088 004 Interface adaptor Type–1 	For inspection of ECU terminal voltage and input / output devices
49 F088 005 Harness Type–1 	For inspection of ECU terminal voltage and input / output devices	49 F088 011 System disk Type–1 (Ver. 1.00) 	For inspection of ECU terminal voltage and input / output devices
49 9200 162 Engine Signal monitor 	For inspection of ECU terminal voltage.	49 F018 902 Adaptor harness 	For inspection of ECU terminal voltage.
49 F018 903 Sheet 	For inspection of ECU terminal voltage	49 H018 9A1 Self-Diagnosis Checker 	For inspection of oxygen sensor and knock sensor
49 B019 9A0 System Selector 	For inspection of oxygen sensor and knock sensor		

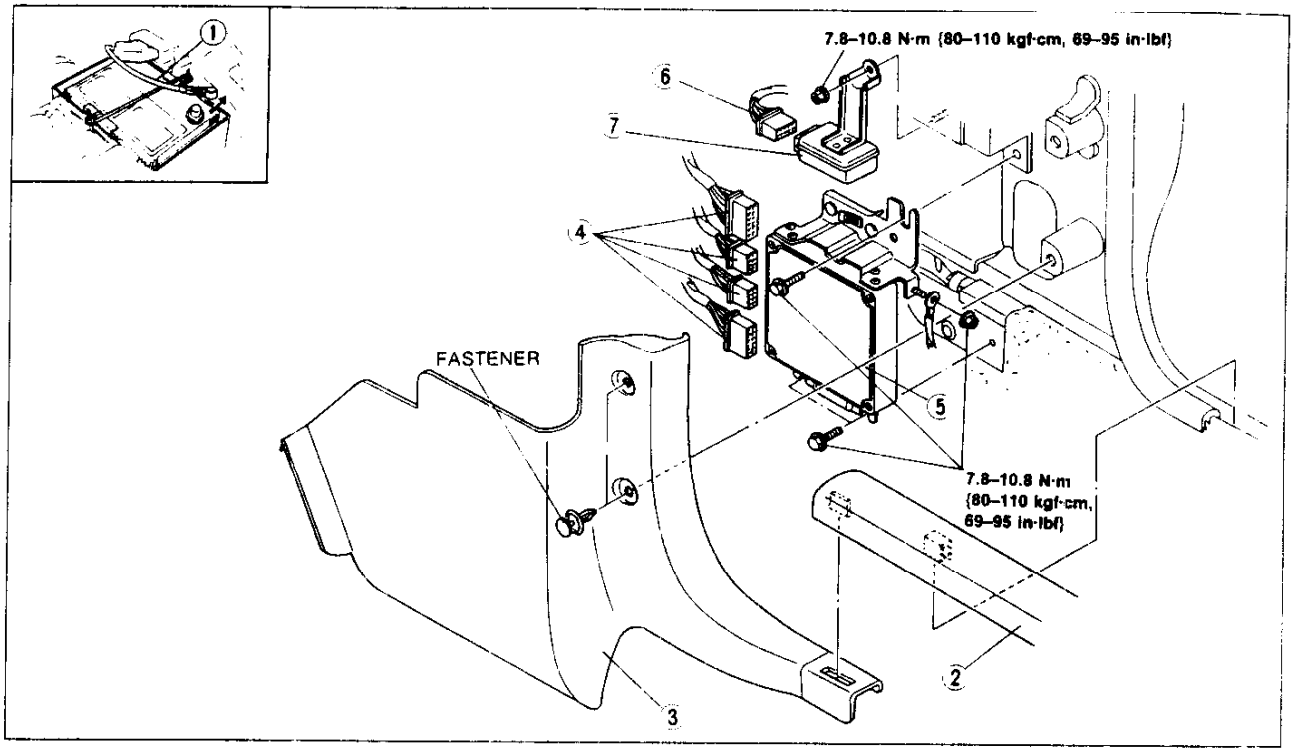
STRUCTUAL VIEW



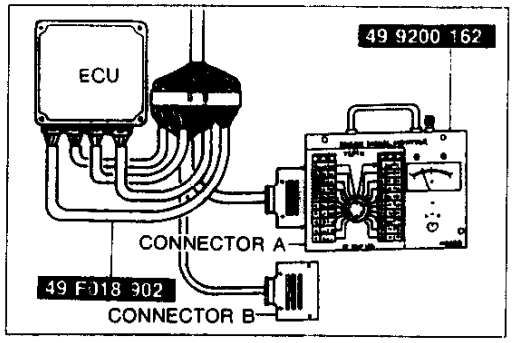
ENGINE CONTROL UNIT (ECU)

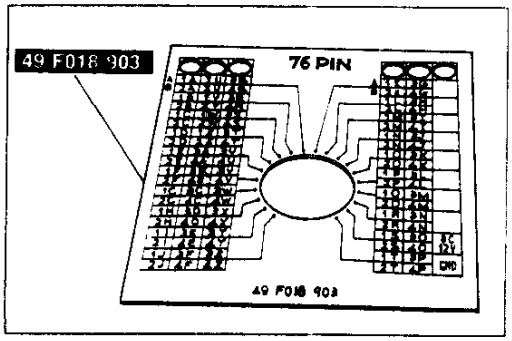
Removal / Installation

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.



1. Battery cable
2. Scuff plate
3. Front side trim
4. Connectors
5. ECU
   Inspection (Engine Signal Monitor) ... below
   Inspection (DT-S1000) ..... page F–151
6. Connector
7. E/L unit
   Inspection ..... page F–136





Inspection

Engine signal Monitor

1. Connect the **SST** (Engine Signal Monitor) between the ECU and the wiring harness by using the **SST**. (Adaptor)

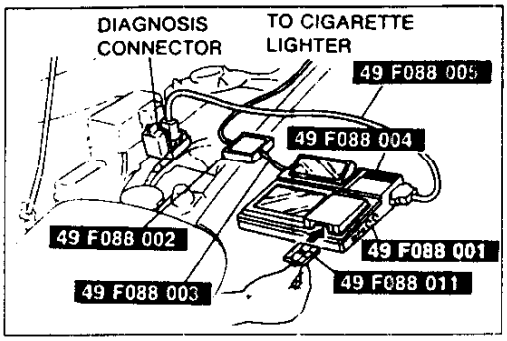
Note

- **Use connector A of the adaptor to measure voltage at terminals 1A through 1V and 3A though 3P, and use connector B to measure voltage at terminals 2A through 2L, and 4A through 4Z.**

2. Place the **SST** (Sheet: 76-pin type) on the **SST** (Engine Signal Monitor).
3. Measure the voltage at each terminal.
4. If any ECU terminal voltage is incorrect, check the input or output device and related wiring. If they are normal, replace the ECU.

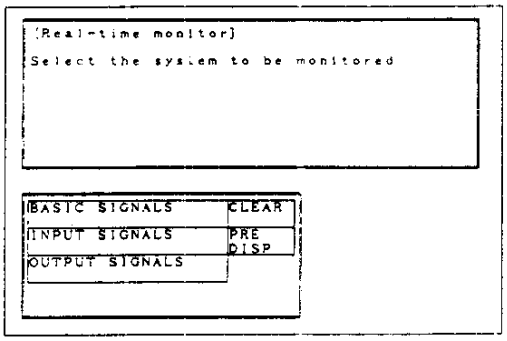
Caution

- **Never apply voltage to SST terminals A and B.**



DT-S1000

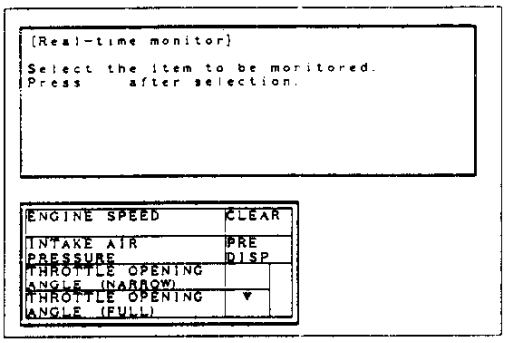
1. Connect the **DT-S1000** to the diagnosis connector as shown in figure.



2. Select the real time monitor from the **DT-S1000** display.
3. Turn ignition switch ON.

Caution

- **Do not turn the ignition switch OFF until real time monitor is completed.**

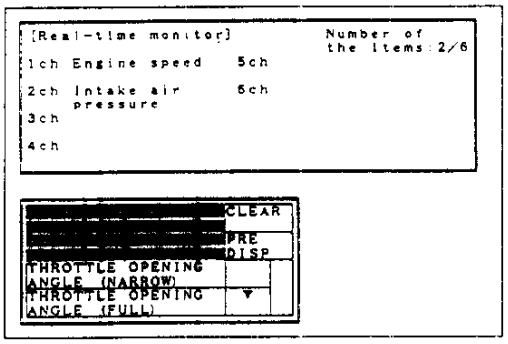


4. Select the inspection items.

Note

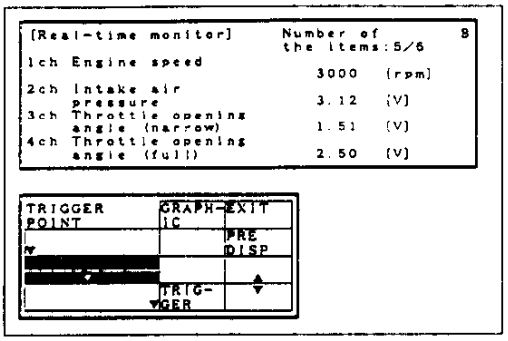
- **The maximum selection items are 8.**
- **Basic input signal need two-channel, therefore if all selection items basic input signal. The maximum selection item is 4.**

5. Verify indication of respective data item in each condition, referring to ECU terminal condition chart. (Refer to page F–166)



<Example>
When checking the throttle sensor operation pattern at engine speed and intake air pressure, the following steps are available.
Step 1.

Select the engine speed and intake air pressure from Basic signal then select the solenoid valves.



Step 2.

Drive the vehicle and verify that the engine speed (rpm), intake air pressure (kPa), solenoid valves ON/OFF and duty signal (%) valve on the display.

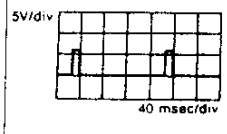
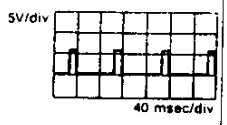
Note

- **Referring to the DT-S1000 instruction manual.**

Terminal voltage

1. Using the engine signal monitor

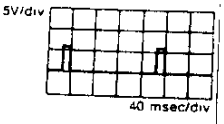
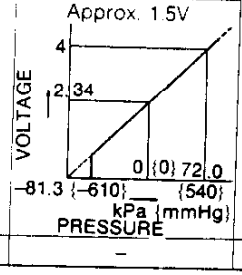
V_B: Battery vo tage

Terminal	Input	Output	Connected to	Test condition		Correct voltage	Remark
1A	–	–	Battery	Constant		V_B	For backup
1B	○		Main relay (FUEL INJ relay)	Ignition switch	OFF	0V	–
					ON	V_B	
1C	○		Ignition switch (START)	While cranking		V_B	–
				Ignition switch ON		Below 1.0V	
1D		○	Self-Diagnosis checker (monitor lamp)	Test switch at SELF TEST Lamp illuminated for 3 sec. after ignition switch OFF → ON		4.5–5.5V	With Self-Diagnosis checker and System Selector
				Lamp not illuminated after 3 sec.		V_B	
				Test switch at O_2 MONITOR Lamp illuminated		4.5–5.5V	
				Test switch at O_2 MONITOR Lamp not illuminated		V_B	
1E	○		A/C switch	A/C switch ON		Below 3.0V	• With Blower SW ON • Ignition switch ON
				A/C switch OFF		V_B	
1F		○	Self-Diagnosis checker (code number)	Buzzer sounded for 3 sec. after ignition switch OFF → ON		Below 2.5V	• With Self-Diagnosis checker and System Selecto • With System Selector test switch at SELF TEST
				Buzzer not sounded for after 3 sec.		V_B	
				Buzzer sounded		Below 2.5V	
				Buzzer not sounded		V_B	
1G		○	Igniter (Trailing) Front rotor	Ignition switch ON		0V	–
				Idle		0.2–0.5V (Reference)	
				Oscilloscope			
				Engine speed: above 2,500 rpm		0.5–0.8V (Reference)	Initial acceleration
1H		○	Igniter (Leading)	Ignition switch ON		0V	–
				Idle		0.2–0.5V (Reference)	
				Oscilloscope			
				Engine speed: above 2,500 rpm		0.8–1.2V (Reference)	Initial acceleration

V_B: Battery voltage

Incorrect voltage		Possible cause
Always 0V		• ROOM 10A fuse burnt • Open circuit in wiring from ROOM 10A fuse to ECU terminal 1A
Always 0V		• Main relay malfunction (Refer to page F–188) • Open or short circuit in wiring from main relay to ECU terminal 1B
Always 0V (starter turns)		• Open or short circuit in wiring from ignition switch to ECU terminal 1C • Ignition switch malfunction (Refer to Section T)
Always 0V		• Main relay (FUEL INJ relay) malfunction (Refer to page F–188) • Open circuit in wiring from ignition switch to diagnosis connector terminal +B • Open or short circuit in wiring from diagnosis connector terminal MEN to ECU terminal 1D
Always V_B		• Poor connection at ECU connector • ECU malfunction
Always approx. 5V		ECU malfunction
Always below 1.0V		• Short circuit in wiring from A/C switch to ECU terminal 1E • A/C switch malfunction (Refer to Section T)
Always V_B		• Open circuit in wiring from A/C switch to ECU terminal 1E • A/C switch malfunction (Refer to Section T)
Always below 2.5V	No display on Self-Diagnosis Checker	• Main relay (FUEL INJ relay) malfunction (Refer to page F–188) • Open circuit in wiring from ignition switch to diagnosis connector terminal +B
	"88" displayed and buzzer sounds continuously	Open or short circuit in wiring from diagnosis connector terminal FEN to ECU terminal 1F
Always V_B		• Poor connection at ECU connector • ECU malfunction
Always 0V		Refer to page F–16 (Ignition timing adjustment)
Always 0V		Refer to page F–16 (Ignition timing adjustment)

V_B: Battery voltage

Terminal	Input	Output	Connected to	Test condition		Correct condition	Remark
1I	○		Diagnosis connector (TEN terminal)	System Selector test switch at O_2 MONITOR		V_B	• With System Selector • Ignition switch ON
				System Selector test switch at SELF TEST		0V	
1J		○	Igniter (Trailing) Rear rotor	Ignition switch ON		0V	
				Idle		0.2–0.5V (Reference)	
					Oscilloscope		–
				Engine speed: above 2500 rpm		0.5–0.8V (Reference)	Initial acceleration
1K		○	Fuel pump relay	Ignition switch ON		Below 1.0V	
				While cranking		Below 1.0V	
				Idle	Solenoid valve (PRC) does not operate	V_B	
					Solenoid valve (PRC) operates	Below 1.0V	
1L		○	A/C relay	While cranking		V_B	A/C switch, Blower switch ON
				Idle		Below 1.0V	
				During acceleration (Running)		V_B	
1M	○		Speecometer sensor	Ignition switch ON		4.0–5.0V	
				Driving		2.0–2.5V	–
1N	○		P/S pressure switch	P/S OFF at idle		V_B	
				P/S ON at idle		Below 1.0V	–
			Mileage switch	Under 20,000 miles {34,000 km}		Below 1.5V	Ignition switch ON after 2 seconds
				Over 20,000 miles {34,000 km}		V_B	
1O	○		Pressure sensor	Ignition switch ON		Approx. 2.6V	
				Idle		Approx. 1.5V	–
							
1P	–	–	–	–		–	–

V_B: Battery voltage

Incorrect condition	Possible cause
Always below 1.0V	Short circuit in wiring from diagnosis connector terminal TEN to ECU terminal 1I
Always V_B	• Open circuit in wiring from diagnosis connector terminal TEN to ECU terminal 1I • Open circuit in wiring from diagnosis connector terminal GND to ground
Always 0V	Refer to page F-16 (Ignition timing adjustment)
Always below 1.0V	Refer to code No.51 Troubleshooting (Refer to page F-60)
Always V_B	• Poor connection at ECU connector • Fuel pump relay malfunction (Refer to page F-110) • ECU malfunction
Always V_B	• A/C relay malfunction (Refer to page F-143) • Open circuit in wiring from ignition switch to A/C relay • Open circuit in wiring from A/C relay to ECU terminal 1L
Always below 1.0V	• Short circuit in wiring from A/C relay to ECU terminal 1L • A/C relay malfunction (Refer to page F-143)
Always 0V	• Open or short circuit in wiring from speedometer sensor to ECU terminal 1M • Speedometer sensor malfunction (Refer to Section T)
Always below 1.0V	• P/S pressure switch malfunction (Refer to page F-186) • Short circuit in wiring from P/S pressure switch to ECU terminal 1N • ECU malfunction
Always V_B	• P/S pressure switch malfunction (Refer to page F-186) • Open circuit in wiring from P/S pressure switch to ECU terminal 1N • Open circuit in wiring from P/S pressure switch to ground
Always V_B under 20,000 miles	• Mileage switch malfunction (Refer to page F-189) • ECU malfunction
Always below 1.5V over 20,000 miles	• Mileage switch malfunction (Refer to page F-189) • ECU malfunction
Always 0V or 5V	Refer to Code No.13 Trouble shooting (Refer to page F-33)
–	–

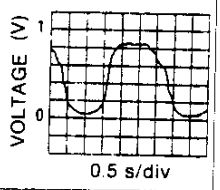
V_B: Battery voltage

Terminal	Input	Output	Connected to	Test condition	Correct voltage	Remark
1Q	○		Clutch switch (MT)	Clutch pedal: released	V_B	Ignition switch ON
				Clutch pedal: depressed	Below 1.0V	
			EC-AT control unit (AT)	Idle	V_B	Reduce torque signal
				When shifting from 1st to 2nd or from 2nd to 3rd with the throttle opening above 1.5/8	Below 1.0V	
				Idle	V_B	Slip lock up signal
				When slip lockup with the throttle opening below 0.5/8	Below 1.0V	
1R	○		Neutral switch (MT)	Neutral	Below 1.0V	Ignition switch ON
				In gear	V_B	
			EC-AT control unit (AT)	Por N range	Below 1.0V	• Inhibitor signal • Ignition switch ON
				Other	V_B	
1S	○		Stoplight switch	Brake pedal released	Below 1.0V	Ignition switch ON
				Brake pedal depressed	V_B	
1T		○	Circuit opening relay	Ignition switch ON	V_B	–
				Idle	Below 1.0V	
1U	○		Fuel thermosensor	Idle (after warm up)	1.5–3.0V	
1V	–	–	–	–	–	–
2A	–	–	–	–	–	–
2B		○	Diagnosis connector (IG-terminal)	Ignition switch ON	0V	–
				Idle	0.3–0.8 (Reference)	
				Engine speed: 3,000 rpm	1.8–2.2V (Reference)	Initial acceleration
2C		○	EC-AT (AT) control unit	Idle	V_B	Slip lock up OFF signal
				Engine speed: hold 3,000 rpm (after 5 seconds)	Below 1.0V	Initial acceleration
2D		○	EC-AT control unit (AT)	Ignition switch ON	2–4.5V	Atmospheric pressure signal
2E		○	EC-AT control unit (AT)	Idle	Below 1.0V	Idle signal
				Other	Approx 5V	
2F		○	Open (ex. Canada)	Constant	1–2.5V	–
			Ground (Canada)	Constant	0V	
2G		○	EC-AT control unit (AT)	Idle	V_B	Torque reduced signal
				Throttle opening above 1/8 (Engine coolant temp. below 40°C (104°F))	Below 1.0V	
2H	–	–	–	–	–	–
2I	○		Heat Hazard Sensor	Ignition switch ON	Below 2.0V	
				Idle (Temp.: Below 100°C (212°F))	V_B	
				Idle (Temp: Above 100°C (212°F))	Below 1.0V	
2J		○	A/P relay	Engine speed Idle–Below 3,250 rpm	Below 1.0V	
				Engine speed above 3,250 rpm	V_B	

V_B: Battery voltage

Incorrect voltage	Possible cause
Always V_B	• Clutch switch malfunction (Refer to page F–187) • Open circuit in wiring from clutch switch to ECU terminal 1Q
Always below 1.0V	• Clutch switch malfunction (Refer to page F–187) • Short circuit in wiring from clutch switch to ECU terminal 1Q
Always V_B	• Open circuit in wiring from ECU terminal 1Q to EC-AT C.U terminal 2P
Always below 1.0V	• Short circuit in wiring from ECU terminal 1Q to EC-AT C.U terminal 2P
Always below 1.0V	• Neutral switch malfunction (Refer to page F–186) • Short circuit in wiring from neutral switch to ECU termina 1R
Always V_B	• Neutral switch malfunction (Refer to page F–186) • Open circuit in wiring from neutral switch to ECU termina 1R
Always below 1.0V	• Inhibitor switch malfunction (Refer to Section K) • Short circuit in wiring from EC-AT control unit terminal 1C to ECU terminal R
Always V_B	• Inhibitor switch malfunction (Refer to Section K) • Open circuit in wiring from EC-AT control unit terminal 1C to ECU terminal R
Always below 1.0V (Stoplight OK)	Open circuit in wiring from stoplight switch to ECU terminal 1S
Always below 1.0V or V_B	• Open or short circuit in wiring from circuit opening relay to ECU terminal 1T • Circuit opening relay malfunction (Refer to page F–188)
Always Approx. 0V or approx 5V	Refer to Code No.23 Troubleshooting (Refer to page F–40)
–	–
–	–
Always 0V	• Open circuit in wiring from diagnosis connector IG-terminal to ECU terminal 2B • Crank angle sensor malfunction (Refer to page F–180) • ECU malfunction
Always V_B	Open circuit in wiring from EC-AT C.U terminal 2G to ECU terminal 2C
Always below 1.0V	Short circuit in wiring from EC-AT C.U terminal 2G to ECU terminal 2C
Always 0V or 4V	• Refer to code No 14 Troubleshooting (Refer to page F–34) • Open or short circuit in wiring from EC-AT C.U terminal 2C to ECU terminal 2D
Always below 1.0V	Short circuit in wiring from EC-AT C.U terminal 2M to ECU terminal 2E
Always V_B	Open circuit in wiring from EC-AT C.U terminal 2M to ECU terminal 2E
Always 0V	Short circuit in wiring ECU terminal 2F to ground.
Always approx. 5V	Open circuit in wiring ECU terminal 2F to ground.
Always below 1.0V	Short circuit in wiring from EC-AT C.U terminal 2P to ECU terminal 2G
Always V_B	Open circuit in wiring from EC-AT C.U terminal 2P to ECU terminal 2G
–	–
Always below 1.0V	• Short circuit in wiring from heat hazard sensor to ECU terminal 2I • Heat hazard sensor malfunction (Refer to page F–189)
Always V_B	• Open circuit in wiring from heat hazard sensor to ECU terminal 2I • Heat hazard sensor malfunction (Refer to page F–189)
Always below 1.0V or V_B	Refer to Code No 54 Troubleshooting (Refer to page F–61)

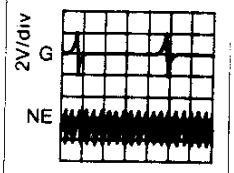
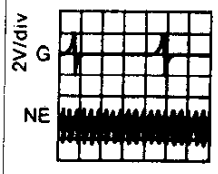
V_B: Battery voltage

Terminal	Input	Output	Connected to	Test condition		Correct voltage	Remark
2K	○		1–2 switch (MT)	1st position		V_B	Ignition switch ON
				Other		Below 1.0V	
			EC–AT CU (AT)	2nd or 3rd position		Below 1.0V	While running
				Other		V_B	
2L	○		1–2 switch (MT)	2nd position		Below 1.0V	Ignition switch ON
				Other		V_B	
			EC–AT CU (AT)	3rd or O/D position		Below 1.0V	While running
				Other		V_B	
3A	○		Metering oil pump position sensor	Ignition switch ON		1.0–4.2V	Voltage increase when accelerating
				Idle		Approx. 1.1V	
				Accelerator pedal depressed		1.1–4.2V	
3B	○		E/L unit	Headlight switch position I, II, Blower motor position III, IV, Rear defroster switch ON		Below 4.0V	
				Headlight switch, Blower motor, rear defroster switch are OFF		5V	
3C	○		Oxygen sensor	Idle	Cold engine	Approx 0V	
					After warm up	0.0–1.0V	
					Oscilloscope		
				Acceleration (after warm up)		0.5–1.0V	
				Deceleration (after warm up)		0.0–0.4V	
3D		○	Cooling fan relay	Idle	During electrical cooling fan operating	V_B	
					Electrical cooling fan does not oprate	Below 1.0V	
				TFA terminal of diagnosis connector is grounded		Below 1.0V	Ignition switch ON
3E	○		Water thermosensor	Engine coolant temperature 20°C (68°F)		Approx. 2.5V	Ignition switch ON
				After warm up		Below 0.5V	
3F	○		Throttle sensor (Narrow range)	Accelerator pedal released		0.75–1.25	• Ignition switch ON • After warm-up
				Accelerator pedal fully depressed		4.8–5.0	
3G	○		Throttle sensor (Full range)	Accelerator pedal released		0.1–0.7	• Ignition switch ON • After warm-up
				Accelerator pedal fully depressed		4.2–4.6	
3H		○	Solenoid valve (purge control)	Ignition switch ON		V_B	
				Idle			
				Engine speed: 1,500–3,300 rpm		4–10V	While running

V_B: Battery voltage

Incorrect voltage	Possible cause
Always below 1.0V	• Short circuit in wiring from 1–2 switch to ECU terminal 2K • 1–2 switch malfunction (Refer to page F–187)
Always V_B	• Open circuit in wiring from 1–2 switch to ECU terminal 2K • 1–2 switch malfunction (Refer to page F–187)
Always below 1.0V	Short circuit in wiring from EC-AT CU terminal 1D to ECU terminal 2K
Always V_B	Open circuit in wiring from EC-AT CU terminal 1D to ECU terminal 2K
Always below 1.0V	• Short circuit in wiring from 1–2 switch to ECU terminal 2L • 1–2 switch malfunction (Refer to page F–187)
Allways V_B	• Open circuit in wiring from 1–2 switch to ECU terminal 2L • 1–2 switch malfunction (Refer to page F–187)
Always below 1.0V	• Short circuit in wiring from EC-AT CU terminal 1B to ECU terminal 2L
Always V_B	• Open circuit in wiring from EC-AT CU tarminal 1B to ECU terminal 2L
Always approx 0V or approx 5V	Refer to Code No.27 Troubleshooting (Refer to page F–43)
Always below 1.0V	• Short circuit in wiring from switches ~ E/L unit ~ ECU terminal 3B • Switches malfunction (Refer to Section T)
Always V_B	• Open circuit in wiring from switches ~ E/L unit ~ ECU terminal 3B • Switches malfunction (Refer to Section T)
0V after warm-up	Refer to Code No.15 Troubleshooting (Refer to page F–34)
Always approx. 1V after warm-up	Refer to Code No.17 Troubleshooting (Refer to page F–36)
Always below 1.0V or Always V_B	• Open or short circuit in wiring from cooling fan relay to ECU terminals 3D • Fan relay malfunction (Refer to page F–147) • ECU malfunction
Always approx. 0V or approx. 5V	Refer to Code No.09 Troubleshooting (Refer to page F–30)
Always approx. 0V	Refer to Code No.12 Troubleshooting (Refer to page F–32)
Always approx. 5V	
Always approx. 0V	Refer to Code No.18 Troubleshooting (Refer to page F–38)
Always approx. 5V	
Always 0V or V_B	Refer to Code No.40 Troubleshooting (Refer to page F–53)

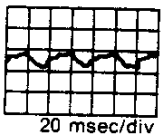
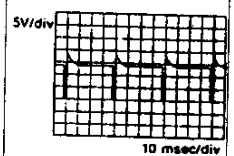
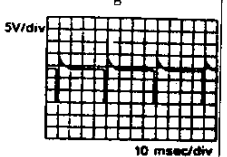
V_B: Battery voltage

Terminal	Input	Output	Connected to	Test condition		Correct voltage	Remark
3I	○		Throttle sensor	Constant		Approx. 5.0V	Ignition switch ON
3J	○		EGR switch	EGR valve operates		V_B	Califolnia only
				EGR valve does not operate		Below 1.0V	
	○		DRL relay	Idle	Pull the parking brake (Turnlight OFF)	0V	Canada only
					Release the parking brake (Turnlight ON)	V_B	
3K		○	Solenoid valve (Relief2)	Ignition switch ON		V_B	
				Idle	Before warm up approx. 40°C (104°F)	Below 1.0V	
					After warm up	V_B	
3L	○		Intake air thermosensor	Ambient air temperature 20°C (68°F)		Approx. 2.5V	Ignition switch ON
				After warm up		Approx. 0.6V	
3M	○		Knock sensor	Ignition switch ON		Approx. 2.5V	
				Knocking occur (Tap the engine hanger with hanmer)		2.6–2.8V (Reference)	Ignition switch ON
3N		○	Solenoid valve (Port air by-pass)	Ignition switch ON		V_B	
				After warm up Engine speed: 1,500–3,000 rpm		Below 1.0V	While running
3O		○	Solenoid valve (Double throttle control)	Engine coolant temperature below 80°C (176°F)		Below 1.0V	Ignition switch ON
				After warm up		V_B	
3P		○	Solenoid valve (Relief1)	Idle		V_B	• After warm up
				Engine speed: 2,700–3,200 rpm		Below 1.0V	• While running
4A	–	–	Ground (Output)	Constant		0V	–
4B	–	–	Ground (Output)	Constant		0V	–
4C	–	–	Ground (CPU)	Constant		0V	–
4D	–	–	Ground (Input)	Constant		0V	–
4E	○		Crank angle sensor [NE – signal]	Ignition switch ON		Below 1.0V	Engine signal monitor: Red lamp flash
				Idle	Oscilloscope		
					Voltmeter	0.1–0.4V (Reference)	
4F		○	Solenoid valve (Split air by-pass)	Idle		V_B	
				5th position (MT) / OD (AT)		Below 1.0V	• After warm up • While running
4G	○		Crank angle sensor [G signal]	Ignition switch ON		Below 1.0V	
				Idle	Oscilloscope		
					Voltmeter	0.1–0.4V (Reference)	

V_B: Battery voltage

Incorrect voltage	Possible cause
Always 0V	• Short circuit in wiring from main relay to ECU terminal 3I • Main relay malfunction (Refer to page F–188)
Always 0V or V_B	• EGR switch malfunction (Refer to page F–127) • Open or short circuit in wiring from EGR switch to ECU terminal 3J
	• DRL relay malfunction (Refer to section T) • Open or short circuit in wiring from DRL relay to ECU terminal 3J
Always below 1.0V or V_B	Refer to Code No.39 Troubleshooting (Refer to page F–52)
Always 0V or approx. 5V	Refer to Code No.11 Troubleshooting (Refer to page F–31)
Always 0V	Refer to Code No.05 Troubleshooting (Refer to page F–28)
Always below 1.0V or V_B	Refer to Code No.33 Troubleshooting (Refer to page F–48)
Always below 1.0V or V_B	Refer to Code No.50 Troubleshooting (Refer to page F–59)
Always below 1.0V or V_B	Refer to Code No.31 Troubleshooting (Refer to page F–46)
Above 0V	• Poor connection at ground terminal • Open circuit in wiring from ECU
Always approx. 0V or approx. 5V	Refer to Code No.03 Troubleshooting (Refer to page F–27)
Always below 1.0V or V_B	Refer to Code No.30 Troubleshooting (Refer to page F–45)
Always approx. 0V or approx. 5V	Refer to Code No.02 Troubleshooting (Refer to page F–26)

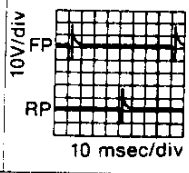
V_B: Battery voltage

Terminal	Input	Output	Connected to	Test condition	Correct voltage	Remark
4H	○		Crank angle sensor	Constant	Below 1.0V	–
4I		○	Stepping motor (Metering oil pump)	Ignition switch ON	V_B	
4J				Idle	3 terminals / 4 terminals V_B Other terminal 5–9V	
4K						
4L						
4M		○	Solenoid valve (Pressure regulator control)	Idle	V_B	
				Idle after hot start	Below 1.0V	approx. 1 minute
4N		○	Solenoid valve (Switching)	Ignition switch ON/Idle	V_B	
				Engine speed: above 3,200 rpm (After warm up)	Below 1.0V	Initial acceleration
4O		○	Solenoid valve (EGR)	Idle	V_B	
				5th position (MT)/OD (AT)	Below 1.0V	While running
4P		○	Solenoid valve (AWS)	Before warm up approx. 40°C (104°F)	Below 1.0V	Idle
				After warm up	V_B	
4Q		○	Solenoid valve (ISC)	Ignition switch ON	8.0–11.0V	Reference valve ● Cranking 99 % ● Idle 32–65 % ● Initial set 38 %
				Idle Oscilloscope	5.0–11.0 (Reference) 5V/div  20 msec/div	
4R		○	Solenoid valve (Turbo control)	Idle	V_B	
				Engine speed: above 5,500 rpm (MT) Engine speed: above 5,250 rpm (AT)	Below 1.0V	Initial acceleration
4S		○	Solenoid valve (Charge relief)	Idle	V_B	
				Engine speed: 4,000–5,500 rpm (MT) for 8 sec. 3,500–5,000 (AT) for 4 sec.	Below 1.0V	Initial acceleration
				Engine speed: above 5,500 rpm (MT) above 5,250 rpm (AT)		
4T		○	Solenoid valve (Charge control)	Idle	Below 1.0V	
				Engine speed: above 5,500 rpm (MT) Engine speed: above 5,250 rpm (AT)	V_B	Initial acceleration
4U		○	Solenoid valve (Wastegate control)	Ignition switch ON	V_B	Reference valve ● Idle 5% ● Solenoid valve (Turbo control) before operates 95%
				Idle Oscilloscope	V_B 5V/div  10 msec/div	
				Initial acceleration	5.0–11.0 V	
4V		○	Solenoid valve (Turbo precontrol)	Ignition switch ON	V_B	Reference valve ● Idle 5% ● Solenoid valve (Turbo control) after operates 5%
				Idle Oscilloscope	V_B 5V/div  10 msec/div	
				Engine speed: above 3,000 rpm	4.0–10.0V (Reference)	Initial acceleration

V_B: Battery voltage

Incorrect voltage	Possible cause
Always above 1.0V	Refer to Code No.02 Troubleshooting (Refer to page F–26)
Always 0v or V_B	Refer to Code No.26 Troubleshooting (Refer to page F–42)
Always below 1.0V or V_B	Refer to Code No.25 Troubleshooting (Refer to page F–41)
Always below 1.0V or V_B	Refer to Code No.32 Troubleshooting (Refer to page F–47)
Always below 1.0V or V_B	Refer to Code No.28 Troubleshooting (Refer to page F–44)
Always below 1.0V or V_B	Refer to Code No.38 Troubleshooting (Refer to page F–51)
Always below 1.0V or V_B	Refer to Code No.34 Troubleshooting (Refer to page F–49)
Always below 1.0V or V_B	Refer to Code No.44 Troubleshooting (Refer to page F–56)
Always below 1.0V or V_B	Refer to Code No.46 Troubleshooting (Refer to page F–58)
Always below 1.0V or V_B	Refer to Code No.45 Troubleshooting (Refer to page F–57)
Always below 1.0V or V_B	Refer to Code No.43 Troubleshooting (Refer to page F–55)
Always below 1.0V or V_B	Refer to Code No.42 Troubleshooting (Refer to page F–54)

V_B: Battery voltage

Terminal	Input	Output	Connected to	Test condition	Correct voltage	Remark
4W		○	Injector (Front primary)	Ignition switch ON	V_B	• Secondary injector not working at no load condition * Engine Signal Monitor: Green lamp flash
4X		○	Injector (Front secondary)	idle*	12–14V	
4Y		○	Injector (Rear primary)	Oscilloscope		
4Z		○	Injector (Rear secondary)			

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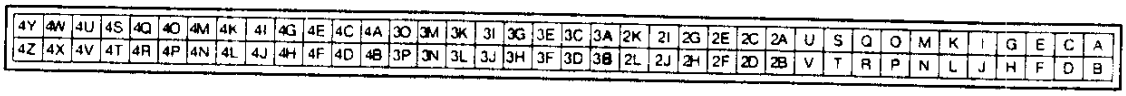
Control Unit Connector (Control Unit Side)



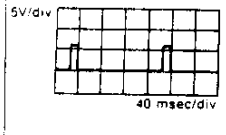
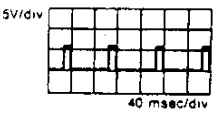
V_B: Battery voltage

Incorrect voltage	Possible cause
Always 0V	• Open or short circuit in wiring from injector to ECU terminal 4W, 4X, 4Y, or 4Z • Main relay malfunction (Refer to page F–188) • Refer to troubleshooting

Using the DT-S1000

DT mark terminal can use the DT-S1000, if no mark use the circuit tester or oscilloscope.

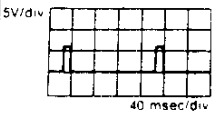
V_B: Battery voltage

Terminal	Input	Output	Connected to	Test condition	Correct condition	Remark
1A	–	–	Battery	Constant	V_B	For backup
1B DT S 1.0B	○		Main relay (FUEL INJ relay)	Ignition switch OFF	11–13V	–
				Ignition switch ON	12–14V	
1C DT S 1.0C	○		Ignition switch (START)	While cranking	OFF	–
				Ignition switch ON	ON	
1D		○	Self-Diagnosis Checker (monitor lamp)	Test switch at SELF TEST Lamp illuminated for 3 sec. after ignition switch OFF → ON	4.5–5.5V	With Self-Diagnosis Checker and System Selector
				Lamp not illuminated after 3 sec.	V_B	
				Test switch at O_2 MONITOR Lamp illuminated	4.5–5.5V	
				Test switch at O_2 MONITOR Lamp not illuminated	V_B	
1E DT S 1.0D	○		A/C switch	A/C switch ON	ON	• With Blower SW ON • Ignition switch ON
				A/C switch OFF	OFF	
1F		○	Self-Diagnosis Checker (code number)	Buzzer sounded for 3 sec. after ignition switch OFF → ON	Below 2.5V	• With Self-Diagnosis Checker and System Selector • With System Selector test switch at SELF TEST
				Buzzer not sounded after 3 sec	V_B	
				Buzzer sounded	Below 2.5V	
				Buzzer not sounded	V_B	
1G DT S 1.0G		○	Igniter (Trailing) Front rotor	Idle	BTDC –20°CA	
				Oscilloscope		
				Engine speed: 2,500 rpm	BTDC 15–35°CA	Initial acceleration
1H DT S 1.0H		○	Igniter (Leading)	Idle	BTDC –5°CA	
				Oscilloscope		
				Engine speed: above 2,500 rpm	BTDC 15–35°CA	Initial acceleration

V_B: Battery voltage

Incorrect condition		Possible cause
Always 0V		• ROOM 10A fuse burnt • Open circuit in wiring from ROOM 10A fuse to ECU terminal 1A
Always 0V		• Main relay malfunction (Refer to page F-188) • Open or short circuit in wiring from main relay to ECU terminal 1B
Always OFF (starter turns)		• Open or short circuit in wiring from ignition switch to ECU terminal 1C • Ignition switch malfunction (Refer to Section T)
Always 0V		• Main relay (FUEL INJ relay) malfunction (Refer to page F-188) • Open circuit in wiring from ignition switch to diagnosis connector terminal +B • Open or short circuit in wiring from diagnosis connector terminal MEN to ECU terminal 1D
Always V_B		• Poor connection at ECU connector • ECU malfunction
Always approx. 5V		ECU malfunction
Always ON		• Short circuit in wiring from A/C switch to ECU terminal 1E • A/C switch malfunction (Refer to Section T)
Always OFF		• Open circuit in wiring from A/C switch to ECU terminal 1E • A/C switch malfunction (Refer to Section T)
Always below 2.5V	No display on Self-Diagnosis Checker	• Main relay (FUEL INJ relay) malfunction (Refer to page F-188) • Open circuit in wiring from ignition switch to diagnosis connector terminal +B
	"88" displayed and buzzer sounds continuously	Open or short circuit in wiring from diagnosis connector terminal FEN to ECU terminal 1F
Always V_B		• Poor connection at ECU connector • ECU malfunction
Different ignition timing		Refer to page F-16 (Ignition timing adjustment)
Different ignition timing		Refer to page F-16 (Ignition timing adjustment)

V_B: Battery voltage

Terminal	Input	Output	Connected to	Test condition	Correct condition	Remark
1I	○		Diagnosis connector (TEN terminal)	System Selector test switch at O_2 MONITOR	V_B	● With System Selector ● Ignition switch ON
				System Selector test switch at SELF TEST	0V	
1J		○	Igniter (Trailing) Rear rotor	Ignition switch ON	0V	
				Idle	0.2–0.5V (Reference)	
				Oscilloscope		
				Engine speed: above 2,500 rpm	0.5–0.8V (Reference)	Initial acceleration
1K DTS		○	Fuel pump relay	Ignition switch ON	ON	
				While cranking	ON	
				Idle — Solenoid valve (PRC) does not operate	OFF	
				Idle — Solenoid valve (PRC) operates	ON	
1L DTS		○	A/C relay	While cranking	OFF	
				Idle	ON	A/C switch, Blower switch ON
				During acceleration (Running)	OFF	
1M DTS	○		Speedometer sensor	Ignition switch ON	0 km/h	–
				Driving (20km/h)	18–22 km/h	
1N DTS	○		P/S pressure switch	P/S OFF at idle	OFF	–
				P/S ON at idle	ON	
			Mileage switch	Under 20,000 miles {34,000 km}	Below 1.5V	Ignition switch ON after 2 seconds
				Over 20,000 miles {34,000 km}	V_B	
1O DTS	○		Pressure sensor	Idle	−64–−66.7 kPa	● After warm-up ● Initial acceleration
				Engine speed: 1,000 rpm	−46.7–−60 kPa	
				Engine speed: 2,000 rpm	−26.7–−46.7 kPa	
1P	–	–	–	–	–	–

V_B: Battery voltage

Incorrect condition	Possible cause
Always below 1.0V	Short circuit in wiring from diagnosis connector terminal TEN to ECU terminal 1I
Always V_B	• Open circuit in wiring from diagnosis connector terminal TEN to ECU terminal 1I • Open circuit in wiring from diagnosis connector terminal GND to ground
Always 0V	Refer to page F-16 (Ignition timing adjustment)
Always OFF	Refer to code No.51 Troubleshooting (Refer to page F-60)
Always OFF	• A/C relay malfunction (Refer to page F-143) • Open circuit in wiring from ignition switch to A/C relay • Open circuit in wiring from A/C relay to ECU terminal 1L
Always ON	• Short circuit in wiring from A/C relay to ECU terminal 1L • A/C nelay malfunction (Refer to page F-143)
Always 0 km/h	• Open or short circuit in wiring from speedometer sensor to ECU terminal 1M • Speedometer sensor malfunction (Refer to Section T)
Always ON	• P/S pressure switch malfunction (Refer to page F-186) • Short circuit in wiring from P/S pressure switch to ECU terminal 1N • ECU malfunction
Always OFF	• P/S pressure switch malfunction (Refer to page F-186) • Open circuit in wiring from P/S pressure switch to ECU terminal 1N • Open circuit in wiring from P/S pressure switch to ground
Always V_B under 20,000 miles	• Mileage switch malfunction (Refer to page F-189) • ECU malfunction
Always below 1.5V over 20,000 miles	• Mileage switch malfunction (Refer to page F-189) • ECU malfunction
Different pressure	Refer to Code No.13 Troubleshooting (Refer to page F-33)
–	–

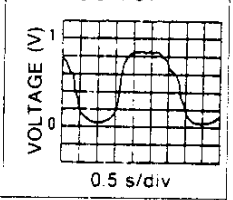
V_B: Battery voltage

Terminal	Input	Output	Connected to	Test condition	Correct condition	Remark
1Q DT-S 1000	○		Clutch switch (MT)	Clutch pedal: released	OFF	Ignition switch ON
				Clutch pedal: depressed	ON	
			EC-AT control unit (AT)	Idle	OFF	Reduce torque signal
				When shifting from 1st to 2nd or from 2nd to 3rd with the throttle opening above 1 5/8	ON	
				Idle	OFF	Slip lock up signal
				When slip lockup with the throttle opening below 0.5/8	ON	
1R DT-S 1000	○		Neutral switch (MT)	Neutral	ON	Ignition switch ON
				In gear	OFF	
			EC-AT control unit (AT	P or N range	ON	• Inhibitor signa • Ignition switch ON
				Other	OFF	
1S DT-S 1000	○		Stoplight switch	Brake pedal released	OFF	Ignition switch ON
				Brake pedal depressed	ON	
1T DT-S 1000		○	Circuit opening relay	Ignition switch ON	OFF	–
				Idle	ON	
1U DT-S 1000	○		Fuel thermosensor	Fuel temperature 20°C	20°C	
				Fuel temperature 40°C	40°C	
				Fuel temperature 60°C	60°C	
1V	–	–	–	–	–	–
2A	–	–	–	–	–	–
2B		○	Diagnosis Connector (IG-terminal)	Idle	700–750 rpm	• After warm-up • No electrical load
2C		○	EC-AT (AT) control unit	Idle	OFF	Slip lock up OFF signal
				Engine speed: hold 3,000 rpm (after 5 seconds)	ON	Initial acceleration
2D		○	EC-AT control unit (AT)	Ignition switch ON	2–4.5V	Atmospheric pressure signal
2E		○	EC-AT control unit (AT)	Idle	ON	Idle signal
				Other	OFF	
2F		○	Open (ex. Canada)	Constant	OFF	
			Ground (Canada)	Constant	ON	
2G		○	EC-AT control unit (AT)	Idle	OFF	Torque reduced signal
				Throttle opening above 1/8 (Engine coolant temp. below 40°C (104°F))	ON	
2H	–	–	–	–	–	–
2I	○		Heat Hazard Sensor	Ignition switch ON	ON	
				Idle (Temp. Below 100°C (212°F))	OFF	
				Idle (Temp. Above 100°C (212°F))	ON	
2J DT-S 1000		○	A/P relay	Engine speed Idle-below 3,750 rpm	ON	
				Engine speed above 3,750 rpm	OFF	

V_B: Battery voltage

Incorrect condition	Possible cause
Always OFF	• Clutch switch malfunction (Refer to page F–187) • Open circuit in wiring from clutch switch to ECU terminal 1Q
Always ON	• Clutch switch malfunction (Refer to page F–187) • Short circuit in wiring from clutch switch to ECU terminal 1Q
Always OFF	Open circuit in wiring from ECU terminal 1Q to EC-AT C.U terminal 2P
Always ON	Short circuit in wiring from ECU terminal 1Q to EC-AT C.U terminal 2P
Always ON	• Neutral switch malfunction (Refer to page F–186) • Short circuit in wiring from neutral switch to ECU terminal 1R
Always OFF	• Neutral switch malfunction (Refer to page F–186) • Open circuit in wiring from neutral switch to ECU terminal 1R
Always ON	• Inhibitor switch malfunction (Refer to section K) • Short circuit in wiring from EC-AT C.U terminal 1C ECU terminal 1R
Always OFF	• Inhibitor switch malfunction (Refer to section K) • Open circuit in wiring from EC-AT C.U terminal 1C ECU terminal 1R
Always OFF (Stoplight OK)	Open circuit in wiring from stoplight switch to ECU terminal 1S
Always ON or OFF	• Open or short circuit in wiring from circuit opening relay to ECU terminal 1T • Circuit opening relay malfunction (Refer to page F–188)
Different temperature	Refer to Code No.23 Troubleshooting (Refer to page F–40)
–	–
–	–
Always 229 rpm	• Open circuit in wiring from diagnosis connoctor IG-terminal to ECU terminal 2B • Crank argle sensor malfunction (Refer to page F–180) • ECU malfunction
Always OFF	Open circuit in wiring from EC-AT C.U terminal 2G to ECU terminal 2C
Always ON	Short circuit in wiring from EC-AT C.U terminal 2G to ECU terminal 2C
Always 0V or 4V	• Refer to code No.14 Troubleshooting (Refer to page F–34) • Open or short circuit in wiring from EC-AT C.U terminal 2C to ECU termianl 2D
Always ON	Short circuit in wiring from EC-AT C.U terminal 2M to ECU terminal 2E
Always OFF	Open circuit in wiring from EC-AT C.U terminal 2M to ECU terminal 2E
Always ON	Short circuit in wiring ECU terminal 2F to ground.
Always OFF	Open circuit in wiring ECU terminal 2F to ground.
Always ON	Short circuit in wiring from EC-AT C.U terminal 2P to ECU terminal 2G
Always OFF	Open circuit in wiring from EC-AT C.U terminal 2P to ECU terminal 2G
–	–
Always ON	• Short circuit in wiring from heat hazard sensor to ECU terminal 2I • Heat hazard sensor malfunction (Refer to page F–189)
Always OFF	• Open circuit in wiring from heat hazard sensor to ECU terminal 2I • Heat hazard sensor malfunction (Refer to page F–189)
Always ON or OFF	Refer to Code No.54 Troubleshooting (Refer to page F–61)

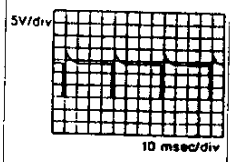
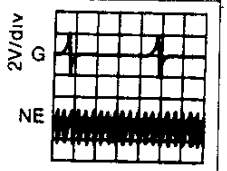
V_B: Battery voltage

Terminal	Input	Output	Connected to	Test condition		Correct condition	Remark
2K	○		1-2 switch (MT)	1st position		ON	Ignition switch ON
				Other		OFF	
			EC-AT CU (AT)	2nd or 3rd position		OFF	While running
				Other		ON	
2L	○		1-2 switch (MT)	2nd position		ON	Ignition switch ON
				Other		OFF	
			EC-AT CU (AT)	3rd or O/D position		OFF	While running
				Other		ON	
3A	○		Metering Oil pump position sensor	Ignition switch ON		1.0–4.2V	Voltage increase while accelerating
				Idle		Approx. 1.1V	
				Accelerator pedal depressed		1.1–4.2V	
3B	○		E/L unit	Headlight switch position I, II,		ON	
				Blower motor position III, IV,		ON	
				Rear defrostor switch ON		ON	
				Headlight switch, Blower motor, rear defroster switch are OFF		OFF	
3C	○		Oxygen sensor	Idle	Cold engine	Approx. 0V	
					After warm up	0.0–1.0V	
					Oscilloscope		
				Acceleration (After warm up)		0.5–1.0V	
				Deceleration (After warm up)		0.0–0.4V	
3D		○	Cooling fan relay	Idle	During electrical cooling fan operating	OFF	–
					Electrical cooling fan does not operate	ON	
3E	○		Water thermosensor	Engine coolant temperature 20°C		20°C	Ignition switch ON
				Engine coolant temperqture 60°C		60°C	
3F	○		Throttle sensor (Narrow range)	Accelerator pedal released		0.75–1.25V	• Ignition switch ON • After warm-up
				Accelerator pedal fully depressed		4.8–5.0V	
3G	○		Throttle sensor (full range)	Accelerator pedal released		0.1–0.7V	• Ignition switch ON • After warm-up
				Accelerator pedal fully depressed		4.2–4.6V	
3H		○	Solenoid valve (purge control)	Idle		0 %	
				Engine speed 1,500–3,300 rpm		5–70 % (Reference)	While running

V_B: Battery voltage

Incorrect condition	Possible cause
Always OFF	• Open circuit in wiring from 1–2 switch to ECU terminal 2K • 1–2 switch malfunction (Refer to page F–187)
Always ON	• Short circuit in wiring from 1–2 switch to ECU terminal 2K • 1–2 switch malfunction (Refer to page F–187)
Always ON	Short circuit in wiring from EC-AT CU terminal 1D to ECU terminal 2K
Always OFF	Open circuit in wiring from EC-AT CU terminal 1D to ECU terminal 2K
Always ON	• Short circuit in wiring from 1–2 switch to ECU terminal 2L • 1–2 switch malfunction (Refer to page F–187)
Allways OFF	• Open circuit in airing from 1–2 switch to ECU terminal 2L • 1–2 switch malfunction (Refer to page F–187)
Always ON	Short circuit in wiring from EC-AT CU terminal 1B to ECU terminal 2L
Always OFF	Open circuit in wiring from EC-AT CU tarminal 1B to ECU terminal 2L
Always approx. 0V or approx 5V	Refer to Code No.27 Troubleshooting (Refer to page F–43)
Always ON	• Short circuit in wiring from switches ~ E/L unit ECU terminal 3B • Switch malfunction (Refer to Section T)
Always OFF	• Open circuit in wiring from switches ~ E/L unit ~ ECU terminal 3B • Switch malfunction (Refer to Section T)
0V after warm up	Refer to Code No.15 Troubleshooting (Refer to page F–34)
Always approx. 1V after warm up	Refer to Code No.17 Troubleshooting (Refer to page F–36)
Always ON or OFF	• Oper or short circuit in wiring from cooling fan relay to ECU terminals 3D • Fan relay malfunction (Refer to page F–147) • ECU malfunction
Different temperature	Refer to Code No.09 Troubleshooting (Refer to page F–30)
Always approx. 0V	Refer to Code No.12 Troubleshooting (Refer to page F–32)
Always approx. 5V	
Always approx. 0V	Refer to Code No.18 Troubleshooting (Refer to page F–38)
Always approx. 5V	
Always duty valve not change	Refer to Code No.40 Troubleshooting (Refer to page F–53)

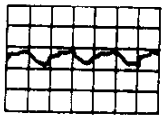
V_B: Battery voltage

Terminal	Input	Output	Connected to	Test condition		Correct condition	Remark
3I	○		Throttle sensor	Constant		Approx. 5.0V	Ignition switch ON
3J DT S 10-1	○		EGR switch	EGR valve operates		ON	California only
				EGR valve does not operate		OFF	
	○		DRL relay	Idle	Pull the parking brake (Turnlight OFF)	OFF	Canada only
					Release the parking brake (Turnlight ON)	ON	
3K DT S 10-3		○	Solenoid valve (Relief2)	Ignition switch ON		OFF	
				Idle	Befor warm up approx. 40°C {104°F}	ON	
					After warm up	OFF	
3L DT S 10-3	○		Intake air thermosensor	Ambient air temperature 20°C {68°F}		20°C	Ignition switch ON
3M	○		Knock sensor	Ignition switch ON		Approx. 2.5V	Ignition switch ON
				Knocking occur (Tap the engine hunger with hammer)		2.6–2.8V (Reference)	
3N DT S 6-3		○	Solenoid valve (Port air by-pass)	Ignition switch ON		OFF	
				After warm up Engine speed: 1,500–3,000 rpm		ON	While running
3O DT S 2-3		○	Solenoid valve (Doulbe throttle control)	Engine coolant temperature below 80°C {176°F}		ON	Ignition switch ON
				After warm up		OFF	
3P DT S 5-3		○	Solenoid valve (Relief1)	Idle		OFF	
				Engine speed: 2,700–3,200 rpm		ON	• After warm-up • While running
4A	–	–	Ground (Output)	Constant		0V	–
4B	–	–	Ground (Output)	Constant		0V	–
4C	–	–	Ground (CPU)	Constant		0V	–
4D	–	–	Ground (Input)	Constant		0V	–
4E DT S 10-3	○		Crank angle sensor [NE + signal]	Idle		700–750 rpm	
				Oscilloscope			–
4F DT S 10-3		○	Solenoid valve (Split air by-pass)	Idle		OFF	
				5th position (MT), OD (AT)		ON	• After warm up • While running
4G	○		Crank angle sensor [G signal]	Ignition switch ON		Below 1.0V	
				Idle	Oscilloscope		
					Voltmeter	0.1–0.4V (Reference)	

V_B: Battery voltage

Incorrect condition	Possible cause
Always 0V	• Short circuit in wiring from main relay to ECU terminal 3I • Main relay malfunction (Refer to page F–188)
Always ON or OFF	• EGR switch malfunction (Refer to page F–127) • Open or short circuit in wiring from EGR switch to ECU terminal 3J
	• DRL relay malfunction (Refer to section T) • Open or short circuit in wiring from DRL relay to ECU terminal 3J
Always ON or OFF	Refer to Code No.39 Troubleshooting (Refer to page F–52)
Different temperature	Refer to Code No.11 Troubleshooting (Refer to page F–31)
Always 0V	Refer to Code No.05 Troubleshooting (Refer to page F–28)
Always ON or OFF	Refer to Code No.33 Troubleshooting (Refer to page F–48)
Always ON or OFF	Refer to Code No.50 Troubleshooting (Refer to page F–59)
Always ON or OFF	Refer to Code No.31 Troubleshooting (Refer to page F–46)
Above 0V	• Poor connection at ground terminal • Open circuit in wiring from ECU
Always 229 rpm	Refer to Code No.03 Troubleshooting (Refer to page F–27)
Always ON or OFF	Refer to Code No.30 Troubleshooting (Refer to page F–45)
Always approx. 0V or approx. 5V	Refer to Code No.02 Troubleshooting (Refer to page F–26)

V_B: Battery voltage

Terminal	Input	Output	Connected to	Test condition	Correct condition	Remark
4H	○		Crank angle sensor	Constant	below 1.0V	
4I 4J 4K 4L		○	Stepping motor (Metering oil pump)	Ignition switch ON	V_B	
				Idle	3 terminals / 4 terminals V_B Other terminal 5–9V	
4M DT S 1900		○	Solenoid valve (Pressure regulator control)	Idle	OFF	
				Idle after hot start	ON	approx. 1 minute
4N DT S 1900		○	Solenoid valve (Switching)	Ignition switch ON/Idle	OFF	
				Engine speed: above 3,200 rpm (After warm up)	ON	Initial acceleration
4O DT S 1900		○	Solenoid valve (EGR)	Idle	OFF	
				5th position (MT)/OD (AT)	ON	While running
4P DT S 1900		○	Solenoid valve (AWS)	Before warm up approx. 40°C (104°F)	ON	Idle
				After warm up	OFF	
4Q DT S 1900		○	Solenoid valve (ISC)	While cranking	99 %	
				Idle after warm up	32–65 %	No electrical load
				Oscilloscope	5V/div  20 msec/div	Reference valve ● Initial set 38 %
4R DT S 1900		○	Solenoid valve (Turbo control)	Idle	OFF	
				Engine speed: above 5,500 rpm (MT)	ON	Initial acceleration
				Engine speed: above 5,250 rpm (AT)		
4S DT S 1900		○	Solenoid valve (charge relief)	Idle	OFF	
				Engine speed: 4,000–5,500 rpm (MT) for 8 sec. 3,500–5,000 (AT) for 4 sec.	ON	Initial acceleration
				Engine speed: above 5,500 rpm (MT) above 5,250 rpm (AT)		
4T DT S 1900		○	Solenoid valve (Charge control)	Idle	ON	
				Engine speed: above 5,500 rpm (MT)	OFF	Initial acceleration
				Engine speed: above 5,250 rpm (AT)		
4U DT S 1900		○	Solenoid valve (Wastegate control)	Idle	5 %	Reference valve ● Solenoid valve (Turbo control) before operates 95 %
				Initial acceleration	40–95 %	
				Oscilloscope		
4V DT S 1900		○	Solenoid valve (turbo pre-control)	Idle	5 %	Reference valve ● Solenoid valve (Turbo control) after operates 5 %
				Engine speed: above 3,000 rpm (Initial acceleration)	20–60 %	
				Oscilloscope		

V_B: Battery voltage

Incorrect condition	Possible cause
Always above 1.0V	Refer to Code No.02 Troubleshooting (Refer to page F–26)
Always 0V or V_B	Refer to Code No.26 Troubleshooting (Refer to page F–42)
Always ON or OFF	Refer to Code No.25 Troubleshooting (Refer to page F–41)
Always ON or OFF	Refer to Code No.32 Troubleshooting (Refer to page F–47)
Always ON or OFF	Refer to Code No.28 Troubleshooting (Refer to page F–44)
Always ON or OFF	Refer to Code No.38 Troubleshooting (Refer to page F–51)
Always duty value not change	Refer to Code No.34 Troubleshooting (Refer to page F–49)
Always ON or OFF	Refer to Code No.44 Troubleshooting (Refer to page F–56)
Always ON or OFF	Refer to Code No.46 Troubleshooting (Refer to page F–58)
Always ON or OFF	Refer to Code No.45 Troubleshooting (Refer to page F–57)
Always duty value not change	Refer to Code No.43 Troubleshooting (Refer to page F–55)
Always duty value not change	Refer to Code No.42 Troubleshooting (Refer to page F–54)

V_B: Battery voltage

Terminal	Input	Output	Connected to	Test condition	Correct condition	Remark
4W		○	Injector (Front primary)	Idle*	2.0–3.0 msec	• Secondary injection not working at no load condition * Engine Signal Monitor: Green lamp flash
4X		○	Injector (Front secondary)	Oscilloscope	10V/div FP RP 10 msec/div	
4Y		○	Injector (Rear primary)			
4Z		○	Injector (Rear secondary)			

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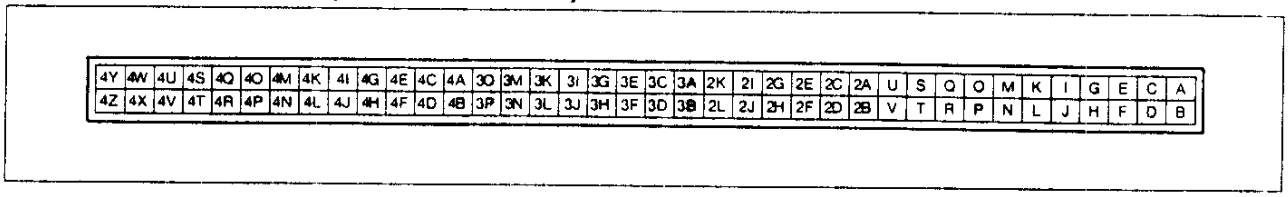
Control Unit Connector (Control Unit Side)



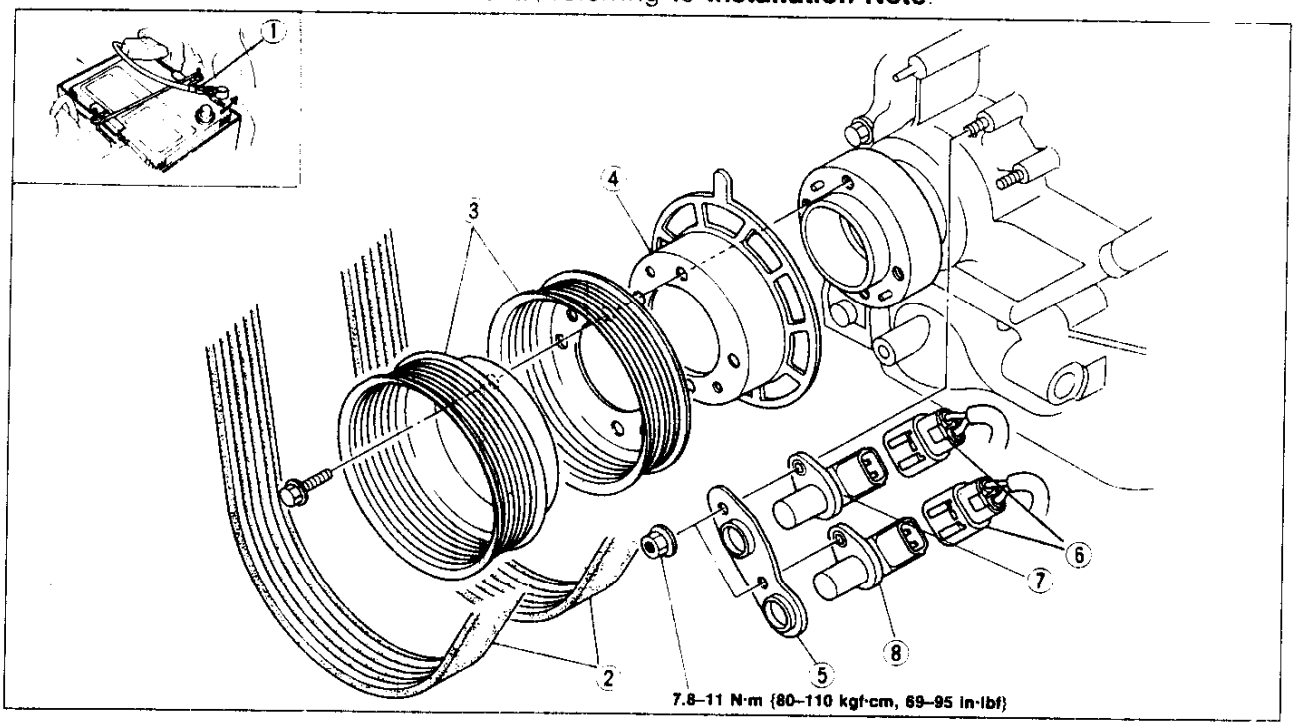
V_B: Battery voltage

Incorrect condition	Possible cause
Different fuel injection amount	• Open or short circuit in wiring from injector to ECU terminal 4W, 4X, 4Y, or 4Z • Main relay malfunction (Refer to page F–188) • Refer to troubleshooting

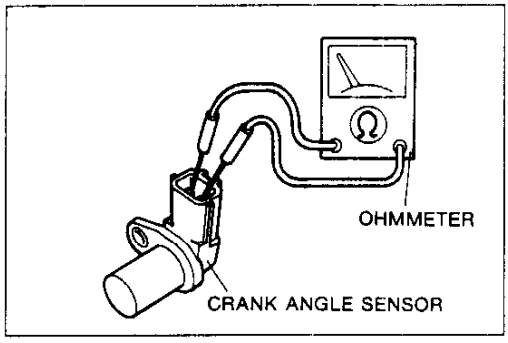
CRANK ANGLE SENSOR

Removal / Installation

1. Remove in the order shown in figure.
2. Install in the reverse order of removal, referring to **Installation Note**.



1. Battery cable
2. Drive belt
3. Eccentric shaft pulley
4. Crank angle sensor plate
5. Bracket
6. Connectors
7. Crank angle sensor (NE-signal)
   Inspection ..... below
8. Crank angle sensor (G-signal)
   Inspection ..... below

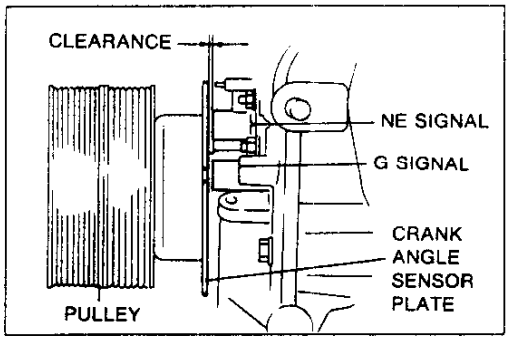


Inspection

1. Remove the crank angle sensor
2. Measure the resistance of the sensor

Resistance: 0.95–1.25 kΩ (20°C [68°F])

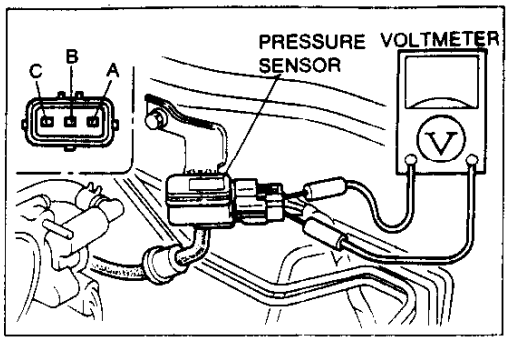
3. If not as specified, replace the crank angle sensor.

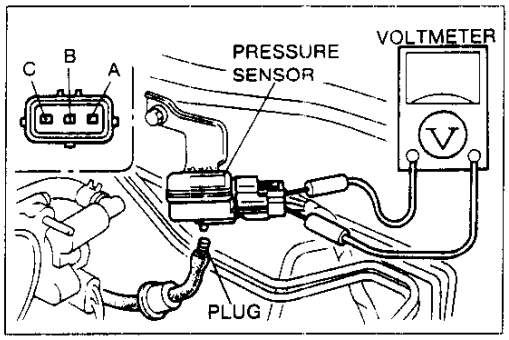


Installation Note

Measure the crank angle sensor to crank angle sensor plate clearance by using feeler gauge.

Clearance: 1.0–2.0 mm {0.039–0.078 in}





PRESSURE SENSOR

Inspection

1. Warm up the engine to normal operating temperature and run it at idle.
2. Turn all electrical load off.
3. Connect a voltmeter between the pressure sensor terminal A and B and verify the voltage is within specification.

Voltage: 1.3–1.6V

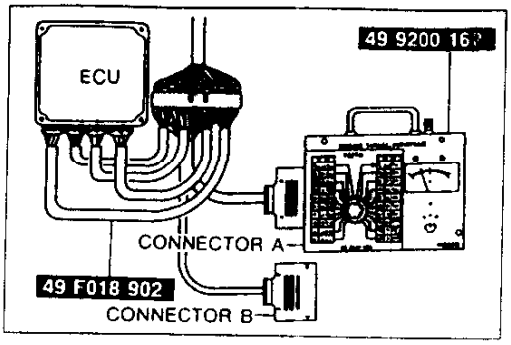
4. Disconnect vacuum tube and plug the vacuum tube and verify the voltage is within specification.

Voltage: 2.38–2.78V

5. Connect a vacuum pump to the pressure sensor.
6. Apply vacuum and measure the voltage of the pressure sensor

Vacuum	Voltage
– 66 kPa {– 500 mmHg, –19.7 inHg}	1.25–1.55V
0 kPa {0 mmHg, 0 inHg}	2.38–2.78V
98.7 kPa {740 mmHg, 29.1 inHg}	4.35–4.65V

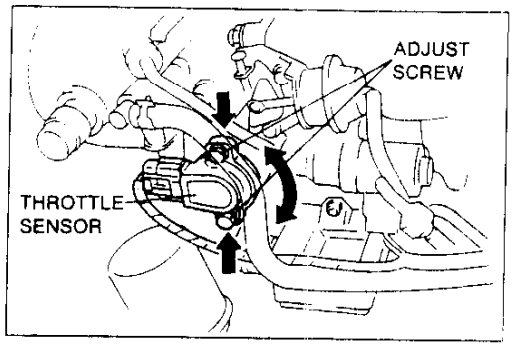
7. If not as specified, replace the pressure sensor.
8. Cancel the memory of malfunctions by disconnecting the negative battery cable for at least 20 seconds and depress brake pedal.
9. Reconnect the negative battery cable.



THROTTLE SENSOR

Inspection

1. Warm up the engine to normal operating temperature and run it at idle.
2. Verify the first idle cam separates.
3. Stop the engine.
4. Connect the **SST**s (Engine Signal Monitor and Adaptor Harness) to ECU or connect the **SST**s (DT-S1000 and Harness) to diagnosis connector as shown.
5. Turn the ignition switch to ON.

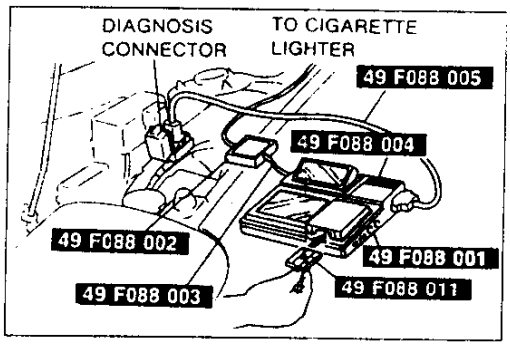


6. Rotate the throttle link by hand verify that the voltage is within specification.

Specification

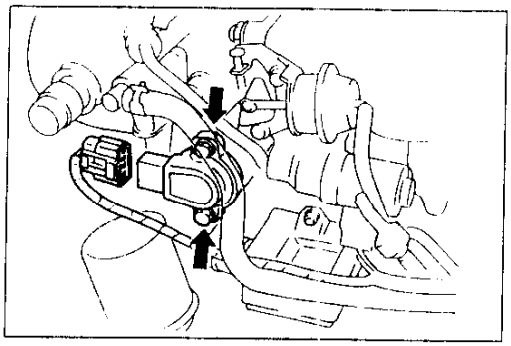
ECU Terminal	Throttle valve condition		
	Fully closed	closed to open	Fully open
3F (Narrow range)	0.75–1.25V	1.0–5.0V	4.8–5.0V
3G (Full range)	0.1–0.7V	0.4–4.3V	4.2–4.6V

7. If not as specified, adjust or replace the throttle sensor.



Adjustment

1. Warm up the engine to normal operating temperature and run it idle.
2. Verify that the first idle cam separates.
3. Stop the engine.
4. Connect the **SST**s (Engine Signal Monitor and Adaptor Harness) to ECU or connect the **SST**s (DT-S1000 and Harness) to diagnosis connector as shown.
5. Turn the ignition switch to ON.



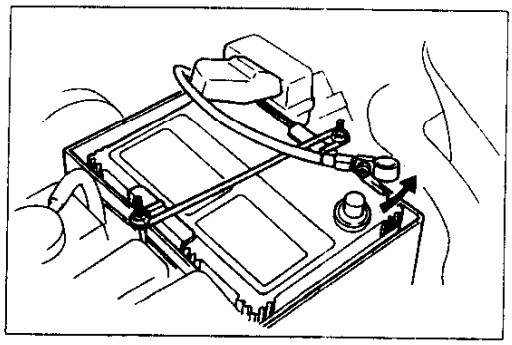
6. Loosen the screws and rotate the throttle sensor to set the correct closed position voltage.
   (Refer to "Specification" above)
7. Check the correct open position voltage and close to open voltage.
   (Refer to "Specification" above)
9. Tighten the screws.

Note

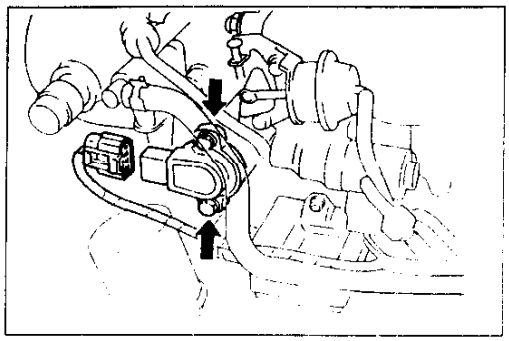
- **When installing the sensor, Tighten to the specified torque.**

Tightening Torque

1.6–2.4 N·m {16–24 kgf·cm, 140–210 in·lbf}



10. Cancel the memory of malfunctions by disconnecting the negative battery cable for at least 20 seconds and depress the brake pedal.
11. Reconnect the negative battery cable.



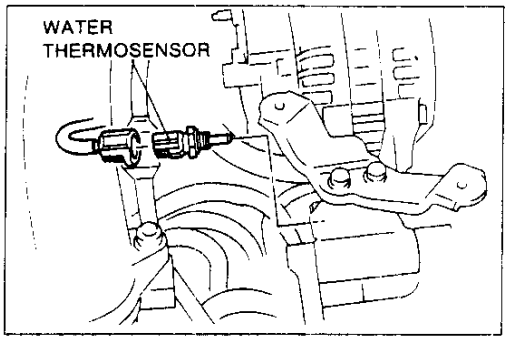
Removal / Installation

1. Turn ignition switch to OFF.
2. Disconnect the throttle sensor connector.
3. Remove the throttle sensor.

Caution

- **Do not drop the throttle sensor.**

4. Adjust the throttle sensor (Refer to page F–182)



WATER THERMOSENSOR

Removal / Installation

Warning

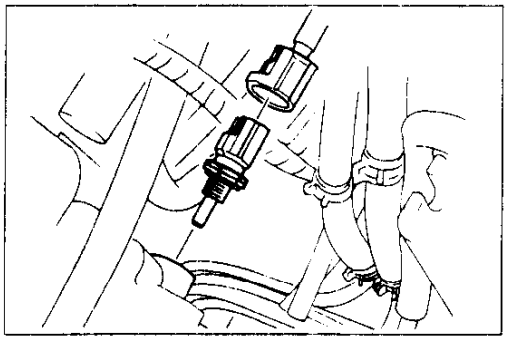
- **Never remove water thermosensor while the engine is hot.**

1. Remove the extension manifold. (Refer to page F–76)
2. Disconnect water thermosensor connector.
3. Remove the water thermosensor.
4. Install a new gasket and Install in the reverse order of removal.

Note

- **When istalling the sensor, tighten to the specified torque.**

Tightening torque:
19.6–24.5 N·m {200–250 kgf·cm, 174–217 in·lbf}

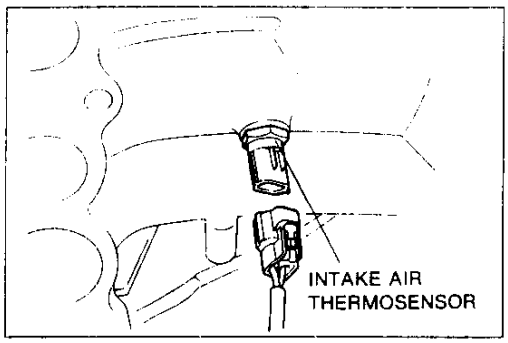


Inspection

1. Place the water thermosensor in water with a thermometer and heat the water gradually.
2. Measure the resistance of the sensor with an ohmmeter.

Water temperature	Resistance
20°C {68°F}	2.2–2.7 kΩ
80°C {176°F}	0.29–0.35 kΩ

3. Replace the sensor, if necessary.



INTAKE AIR THERMOSENSOR

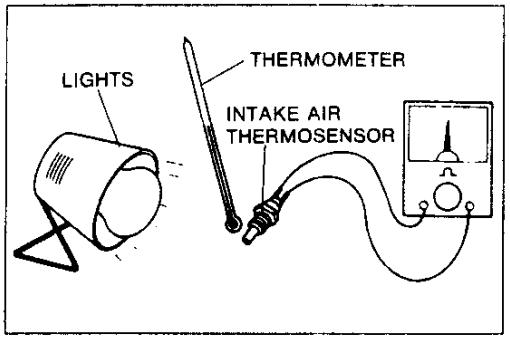
Removal / Installation

1. Remove the extension manifold (Refer to page F–76)
2. Remove the intake air thermosensor from extension manifold.

Note

- **When installing the sensor, tighten to the specified torque.**

Tightening torque:
7.8–12 N·m {0.8–1.2 kgf·m, 5.8–8.7 ft·lbf}

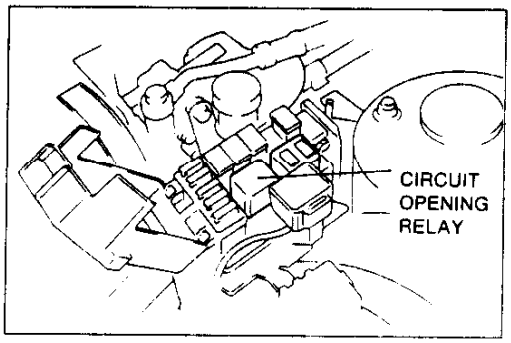


Inspection

1. Remove the intake air thermosensor and heat the sensor as shown in figure.
2. Measure the resistance of the sensor with an ohmmeter.

Temperature	Resistance
20°C {68°F}	2.2–2.7 kΩ
80°C {176°F}	0.29–0.35 kΩ

3. Replace the sensor, if necessary.



FUEL THERMOSENSOR

Removal / Installation

Warning

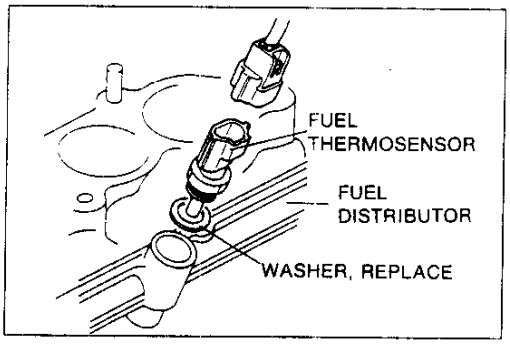
- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility injury or fire (Refer to page F–95).**

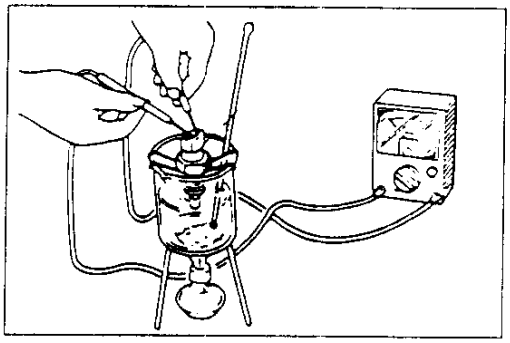
1. Remove the intake air system component parts. (Refer to page F–76)
2. Disconnect the fuel thermosensor connector.
3. Remove the fuel thermosensor.
4. Install in the reverse order of removal.

Note

- **When installing the sensor, tighten to the specified torque.**

Tightening torque:
19.6–24.5 N·m {200–250 kgf·cm, 174–217 in·lbf}



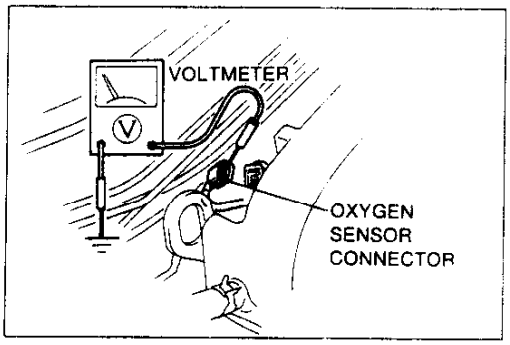


Inspection

1. Place the fuel thermosensor in water with a thermometer and heat the water gradually.
2. Measure the resistance of the sensor with an ohm meter.

Water temperature	Resistance
20°C {68°F}	2.2–2.7 kΩ
80°C {176°F}	0.29–0.35 kΩ

3. Replace the sensor, if necessary.



OXYGEN SENSOR

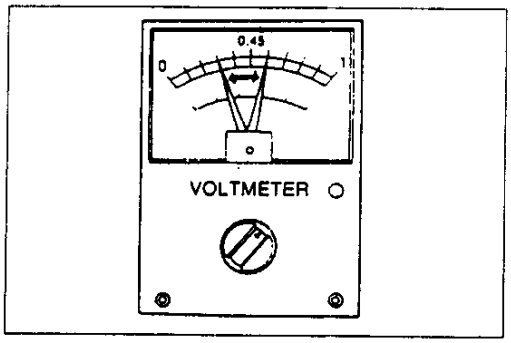
Inspection of Terminal Voltage.

1. Warm up the engine to normal operating temperature and run it at idle.
2. Disconnect the oxygen sensor connector.
3. Connect a voltmeter between the oxygen sensor terminal.

Caution

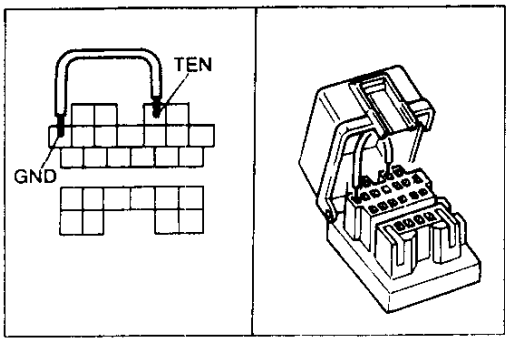
- **When measuring the terminal voltage of oxygen sensor, use a high internal resistance type (More than 40 kΩ) voltmeter.**

4. Measure the voltage while increasing and decreasing the engine speed suddenly several times.



Specification

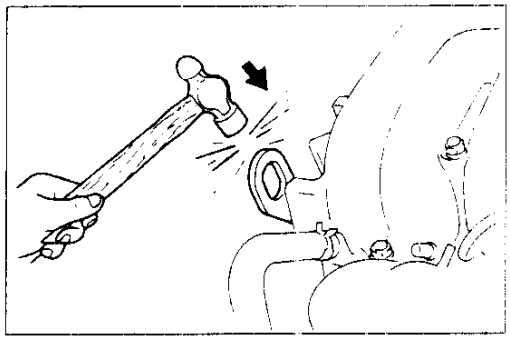
Engine condition	Voltage
While decelerating	0.0–0.4V
While accelerating	0.5–1.0V



KNOCK SENSOR

Inspection (On vehicle)

1. Turn the ignition switch to ON.
2. Connect a voltmeter to the MEN terminal of the diagnosis connector
3. Connect the diagnosis connector terminals TEN and GND by using a jumper wire.
4. Turn ignition switch ON

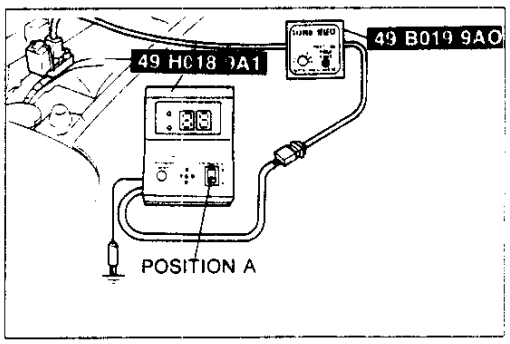


5. Lightly tap the engine hanger with a hammer.
6. Verify that the voltmeter indicator move.

Note

- **When inspect again, turn ignition switch OFF.**

Self Diagnosis Checker

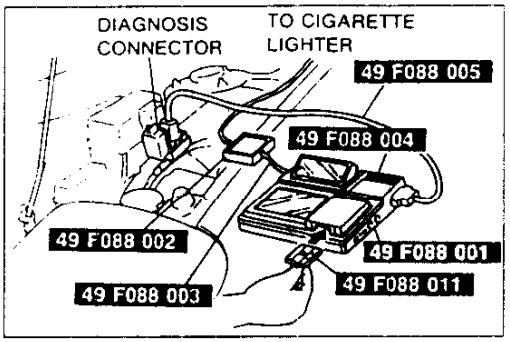


1. Connect the **SST**s (System selector and Self-Diagnosis Checker) to diagnosis connector.
2. Set switch A to position of Self-Diagnosis Checker
3. Set SYSTEM SELECT position 1 and TEST SW to SELF-TEST of System selector.
4. Turn ignition switch ON
5. Lightly tap the engine hanger with a hammer.
6. Verify that the monitor lamp illuminates for approx. 0.5 seconds.

Note

- **When inspect again, turn ignition switch OFF.**

DT-S1000

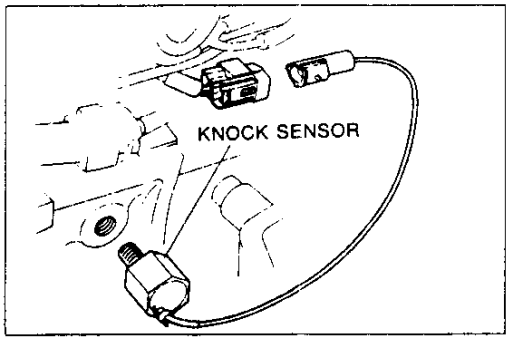


1. Connect the **SST**s (DT-S1000 and Harness) to diagnosis connector.
2. Select Switch Monitor function.
3. Turn ignition switch ON.
4. Lightly tap the engine hanger with a hammer.
5. Verify that the indicator, turn white to black for approx 0.5 seconds.

Note

- **When ispect again, turn ignition switch OFF.**

Removal / Installation

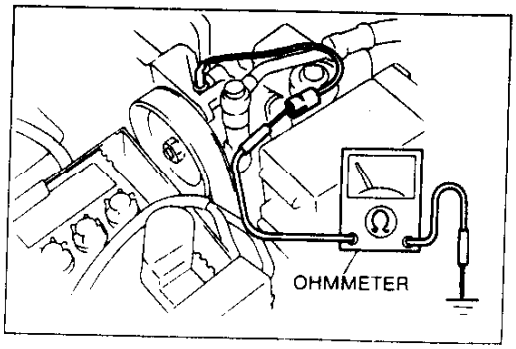


1. Disconnect knock sensor connector.
2. Remove the knock sensor.
3. Install in the reverse order of removal.

Tightning Torque:
20–34 N·m {2.0–3.5 kgf·m, 14–25 ft·lbf}

Caution

- **Do not use a impact wrench.**
- **Do not drop the knock sensor.**

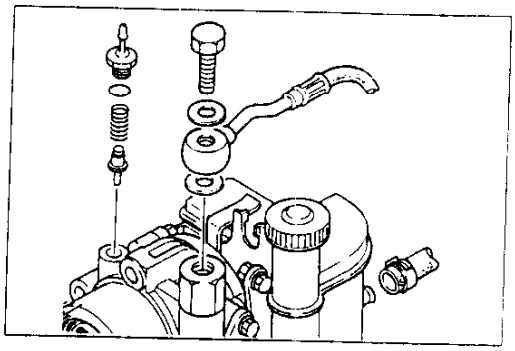


POWER STEERING PRESSURE SWITCH

Inspection (On the vehicle)

1. Disconnect the P/S pressure switch connector.
2. Start the engine, and check continuity of the switch.

Steering wheel	Continuity
Turned	Yes
Straight ahead	No

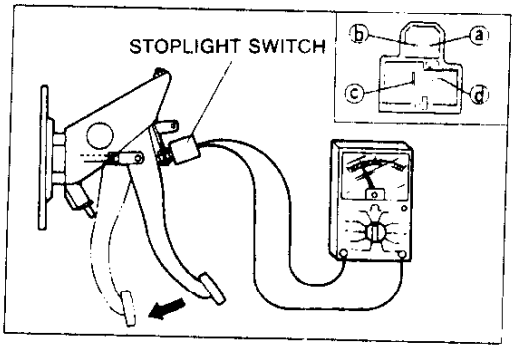


3. Replace the P/S pressure switch if not as specified

Note

- **When installing the switch, tighten to the specified torque.**

Tightning torque:
29–39 N·m {3.0–4.0 kgf·m, 22–29 ft·lbf}

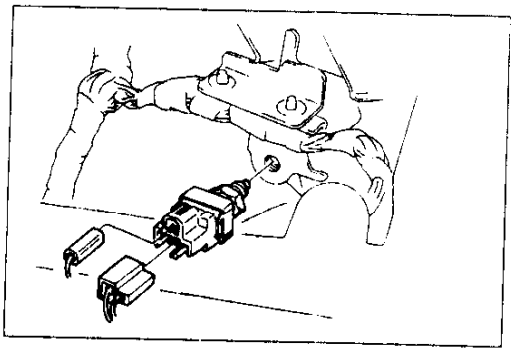


STOPLIGHT SWITCH

Inspection

1. Disconnect the stop light switch connector.
2. Connect a circuit tester between the stop light switch terminal C and D.
3. Check the continuity of the switch.

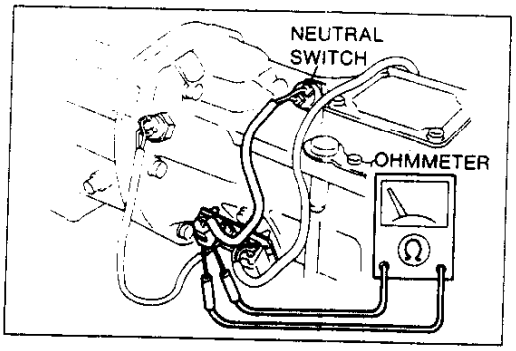
Pedal	Continuity
Depressed	Yes
Released	No



Removal / Installation

1. Disconnect the stoplight switch connector.
2. Remove the stoplight switch.
3. Install the stoplight switch.
4. Connect a circuit tester between the stoplight switch terminal C and D, and verify that the continuity when the brake pedal depressed and no continuity when the brake pedal released.
5. Tighten the adjust nut.

Tightening Torque:
14–18 N·m {1.4–1.8 kgf·m, 10–13 ft·lbf}

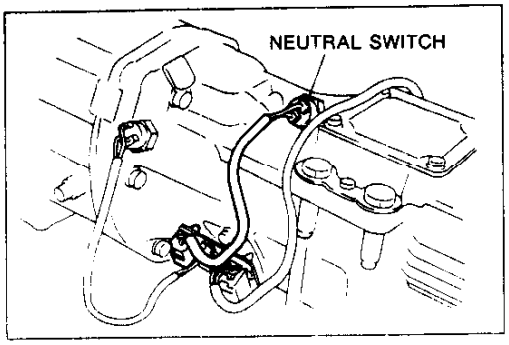


NEUTRAL SWITCH (MT)

Inspection

1. Disconnect the neutral switch connector.
2. Connect a circuit tester to the switch.
3. Check the continuity.

Transmission	Continuity
In neutral	Yes
In other ranges	No



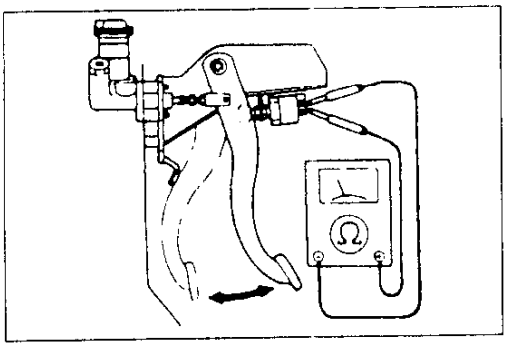
Removal / Installation

1. Remove the extension housing (Refer to Section J).
2. Disconnect the neutral switch connector.
3. Remove the neutral switch.
4. Install in the reverse order of removal.

Note

- **When installing the switch tighten to the specified torque.**

Tightening Torque:
25–34 N·m {2.5–3.5 kgf·m, 18–25 ft·lbf}

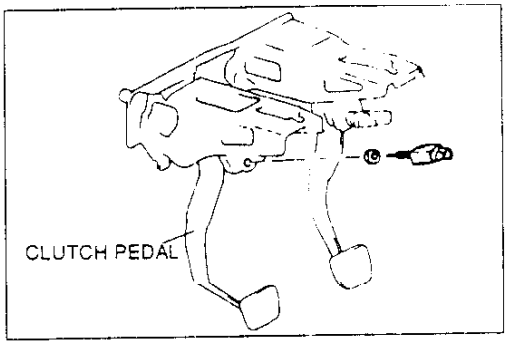


CLUTCH SWITCH (MT)

Inspection

1. Disconnect the clutch switch connector.
2. Connect a circuit tester to the switch.
3. Check the continuity.

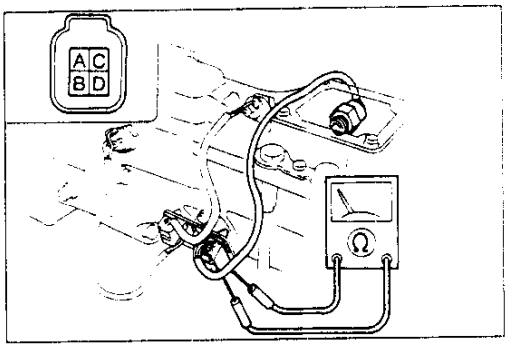
Pedal	Continuity
Depressed	Yes
Released	No



Removal / Installation

1. Remove the extension housing (Refer to Section J).
2. Remove the clutch switch.
3. Install the clutch switch.
4. Connect a circuit tester to the switch and verify that there is continuity when the clutch pedal depressed and no continuity when the clutch pedal released.
5. Tighten the adjust nut.

Tightening torque:
14–18 N·m {1.4–1.8 kgf·m 10–13 ft·lbf}

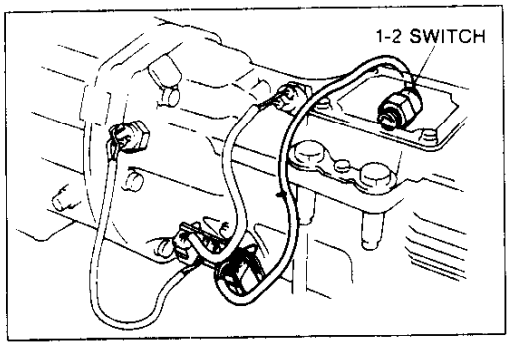


1-2 SWITCH (MT)

Inspection

1. Disconnect 1-2 switch.
2. Connect a circuit tester to the switch.
3. Check the continuity.

Terminal	Transmission	Continuity
A–B	In 1st range	No
	In other range	Yes
C–D	In 2nd	Yes
	In other range	No



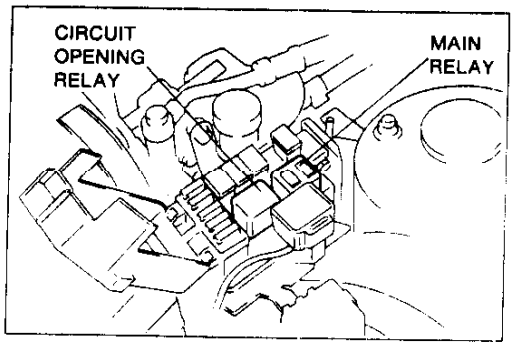
Removal / Installation

1. Remove the extension housing (Refer to Section J).
2. Remove the 1-2 switch.
3. Install in the reverse order of removal.

Note

- **When installing the switch tighten to the specified torque.**

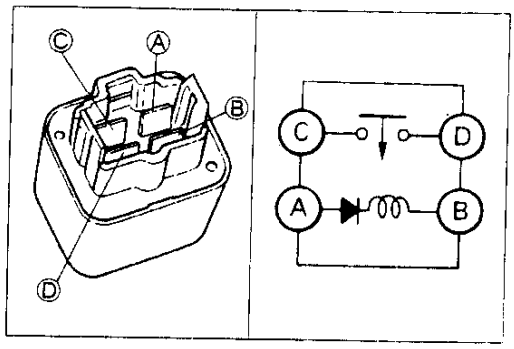
Tightening torque:
25–34 N·m {2.5–3.5 kgf·m, 18–25 ft·lbf}



MAIN RELAY (EGI RELAY)

Inspection (On vehicle)

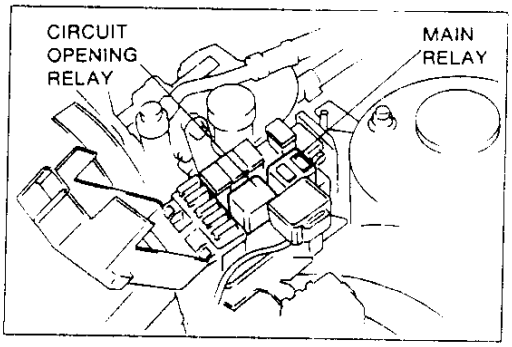
Check that a "clicking" sound is heard at the EGI main relay when turning the ignition switch OFF and ON



Inspection

1. Disconnect the main relay
2. Apply Battery voltage and ground to terminals A anc B of the EGI main relay.
3. Check continuity of the relay.

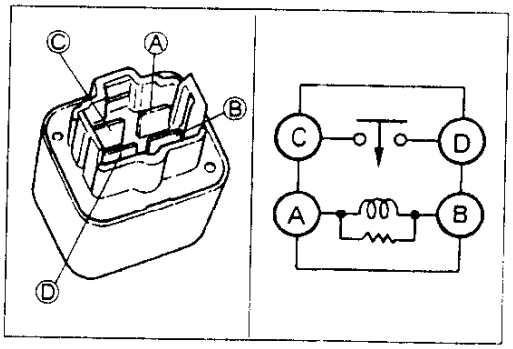
Operation	C-D terminals
V_B Applied	Continuity
V_B Not applied	No continuity



CIRCUIT OPENING RELAY

Inspection (On vehicle)

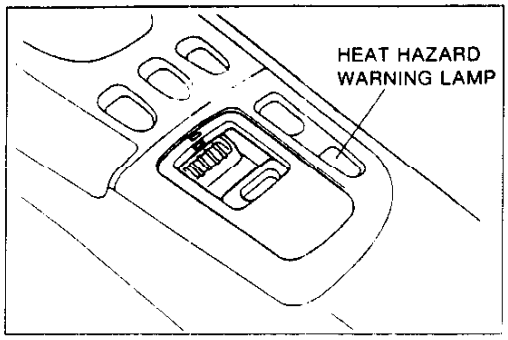
Check that a "clicking" sound is heard at the circuit opening relay, when turning the ignition switch OFF and ON.



Inspection

1. Disconnect the circuit opening relay.
2. Apply battery voltage and ground to terminal A and B of the circuit opening relay.
3. Check continuity of the relay.

Operation	C-D terminals
V_B applied	Continuity
V_B Not applied	No continuity



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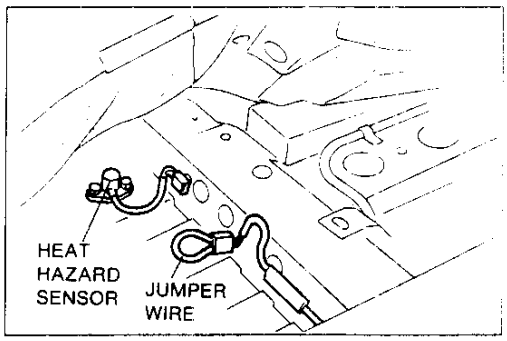

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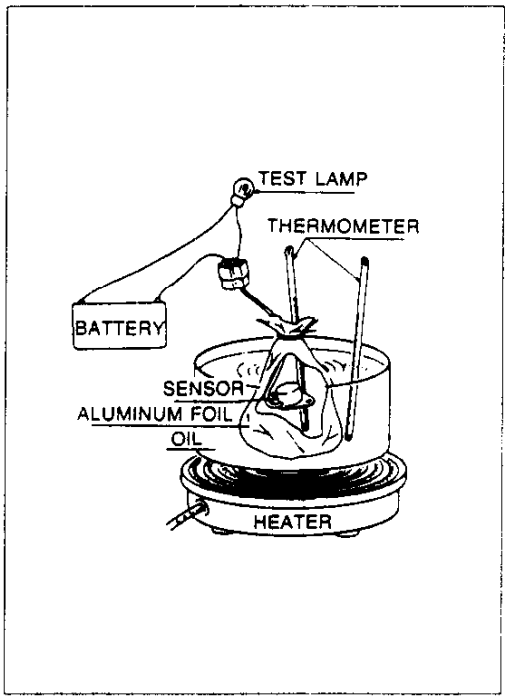
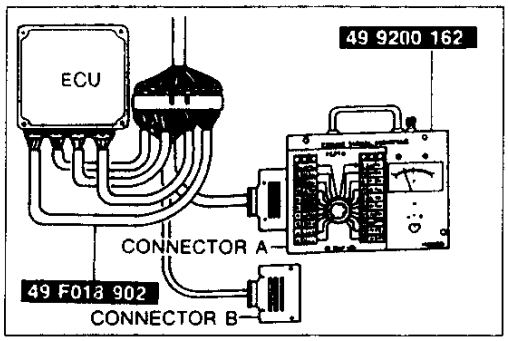




HEAT HAZARD SENSOR

Inspection (Warning system)

1. Turn the ignition switch ON Verify that the heat hazard warning lamp illuminates.
2. Start the engine and verify that the warning lamp goes out.
3. Disconnect the heat hazard sensor connector.
4. Check that the heat hazard warning lamp illuminates on when a jumper wire is connected to the terminals of the sensor connector (harness side).

Removal

1. Remove right front seat.
2. Lift up the floor mat.
3. Disconnect the heat hazard sensor connector and remove the sensor.

Installation

Install in the reverse order of removal.

Inspection

1. Wrap the sensor and a thermometer in aluminum foil and place them in a container of oil.
2. Connect a test lamp and 12V to the terminals of the sensor connector.
3. Gradually heat the oil.
   Verify that the test lamp comes on when the temperature in the aluminum foil reaches 105–115°C {221–239°F}.

Caution

- **Do not heat the oil to more than 150°C {302°F}.**

4. Replace the sensor, if necessary.

MILEAGE SWITCH

Inspection

1. Connect the **SST** (Engine Signal Monitor) to the ECU.
2. Turn ignition switch ON.
3. Check the ECU terminal 1N as show.

Under 20,000 miles	Below 1.5V
Over 20,000 miles	V_B

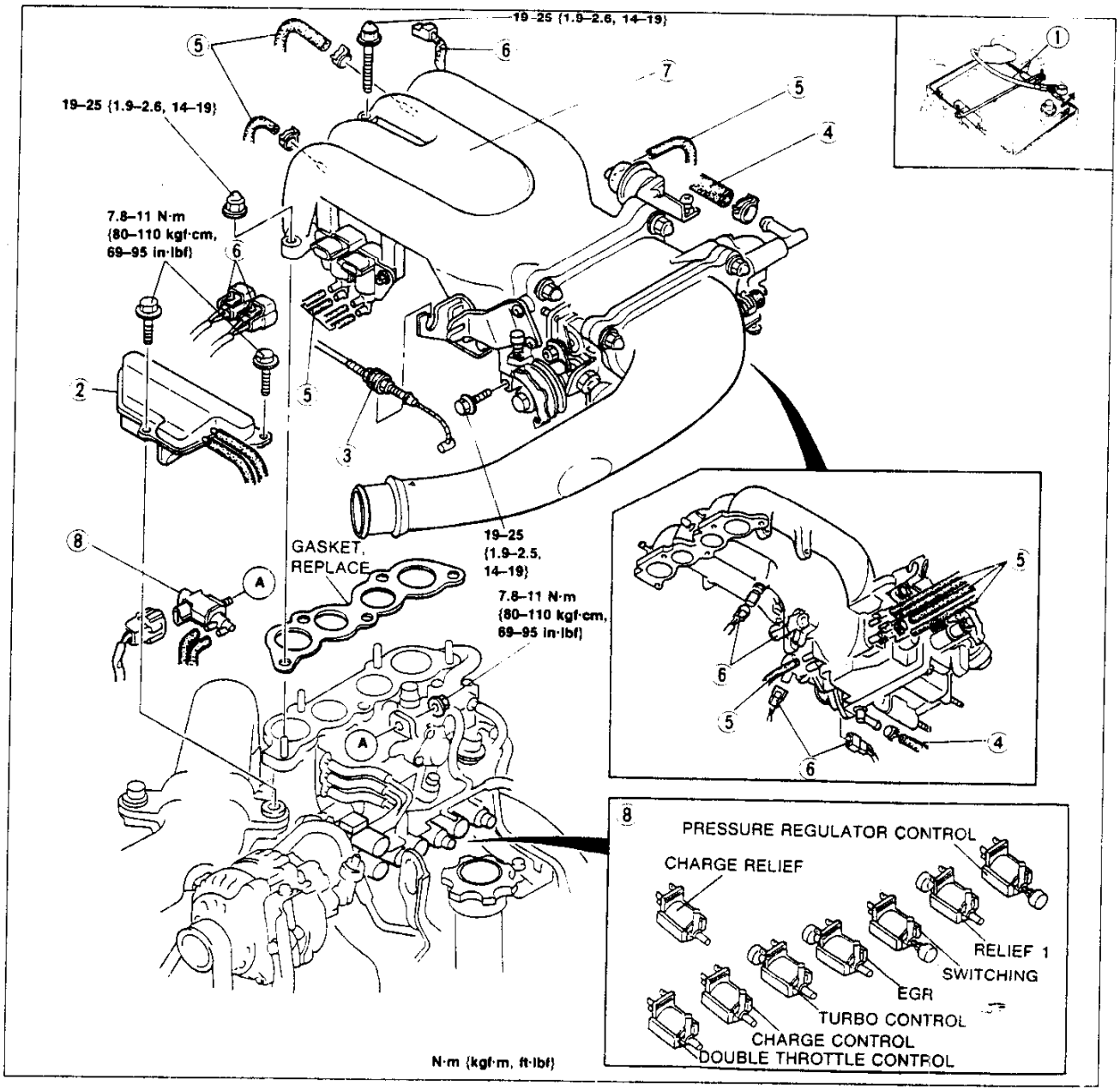
Note

- **When checking the terminal voltage, mesure the during two second after ignition switch ON.**

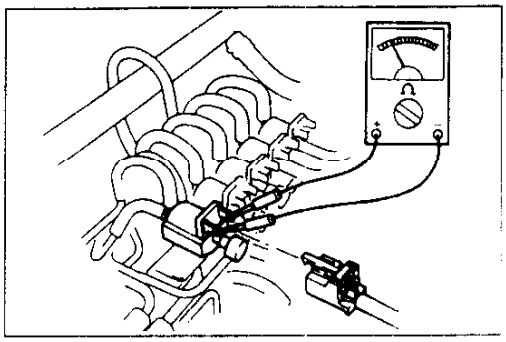
SOLENOID VALVES

Removal / Installation

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.

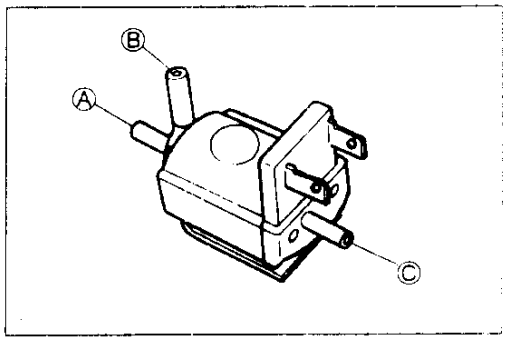


1. Battery cable
2. Pressure chamber
3. Accelerator cable
   removal / installation ..... page F–80
   Inspection / adjustment ..... page F–80
4. Water hose
5. Vacuum hoses
6. Connector
7. Extension manifold
8. Solenoid valves
   Inspection ..... page F–12



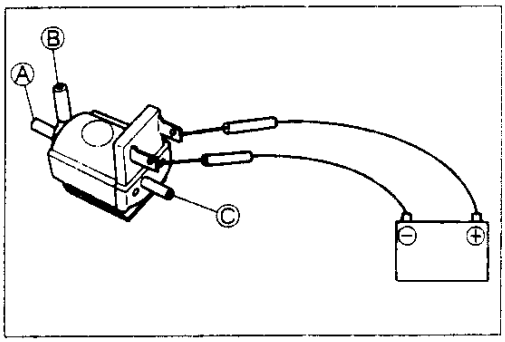
Inspection

1. Disconnect the connector.
2. Connect a circuit tester to the solenoid valve.
3. Check the continuity at the terminals.



4. Verify that air flows between each ports as below.

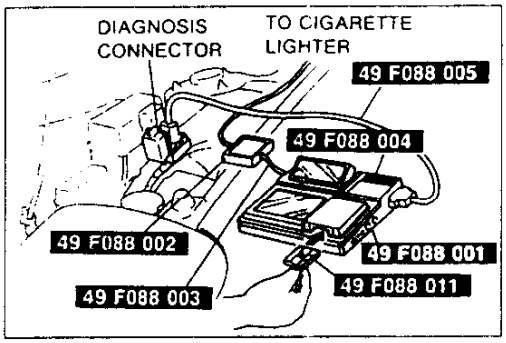
Port	Air flow
A–B	No
A–C	No
B–C	Yes



5. Connect V_B and a ground to the terminals of the solenoid valve.
6. Verify that air flows between each ports as below.

Port	Air flow
A–B	Yes
A–C	No
B–C	No

7. Replace the solenoid valve, if necessary.



DT-S1000

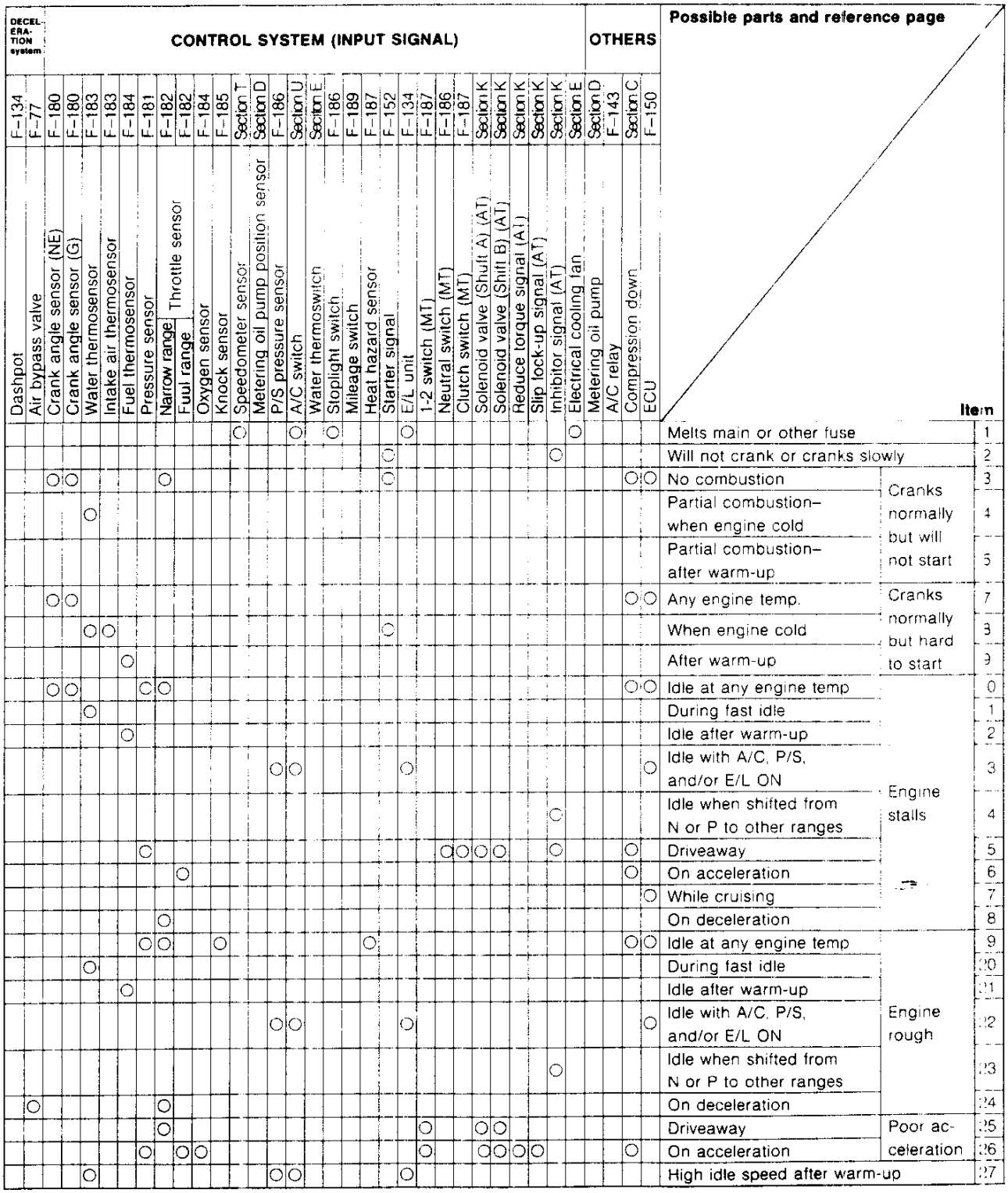
1. Connect the **SST** (DT-1000) between the diagnosis connector and the wiring harness by using the **SST** (Harness).
2. Turn the ignition switch to ON.
3. Select the simulation function.
4. Listen for operational sounds of each solenoid valve.
5. If no sound is heard, check the wiring to the solenoid valves and measure the voltage of the ECU terminals. (Refer to page F–152).

TROUBLESHOOTING GUIDE

QUICK DIAGNOSIS CHART

This Quick Diagnosis Chart shows the relationship between troubleshooting items and inspection points.

Item		Possible parts and reference page	Intake air system					Fuel system								Ignition system			Turbo charger system				Secondary air injection system						Emission system			
			F-16	F-83	F-83	F-137	F-79	F-76	F-105	F-105	F-103	F-100	F-110	F-109	F-110	F-104	F-112	Section G	Section G	Section G	F-16	F-93	F-93	F-93	F-93	F-123	F-119	F-119	F-123	F-121	F-123	F-128	F-131	F-131	F-127
			Air cleaner element	Solenoid valve (ISC)	Solenoid valve (AWS)	Solenoid valve (Double throttle)	Fast idle cam	Intake air leakage	Injector (Primary)	Injector (Secondary)	Fuel filter	Fuel pump	Fuel pump relay	Fuel pump resistor	Circuit opening relay	Pressure regulator	Solenoid valve (PRC)	Igniter	Ignition coil	Spark plug	Ignition timing	Turbo precontrol	Wastegate control	Turbo control	Charge control	Charge relief	Relief 1	Switching	Split air bypass	Port air bypass	Relief 2	Air pump	Air pump relay	Catalytic converter	Charcoal canister	Solenoid valve (Purge control)	Solenoid valve (EGR)
																						Solenoid valve					Solenoid valve								
1	Melts main or other fuse			○		○			○	○		○			○		○																		
2	Will not crank or cranks slowly																																		
3	Cranks normally but will not start	No combustion										○			○		○	○	○	○																
4		Partial combustion– when engine cold						○	○			○								○																
5		Partial combustion– after warm-up														○																		○	○		
7	Cranks normally but hard to start	Any engine temp.	○	○				○	○		○	○			○		○			○																
8		When engine cold					○												○																	
9		After warm-up														○																		○	○		
10	Engine stalls	Idle at any engine temp		○				○		○	○				○		○	○	○	○														○	○		
11		During fast idle		○		○																														
12		Idle after warm-up														○																		○	○		
13		Idle with A/C, P/S, and/or E/L ON		○																																
14		Idle when shifted from N or P to other ranges		○																																
15		Driveaway						○																												
16		On acceleration													○																					
17		While cruising						○			○			○			○	○																		
18		On deceleration																																		
19	Engine rough	Idle at any engine temp	○	○				○		○	○				○		○	○	○	○					○	○				○	○					
20		During fast idle		○		○																														
21		Idle after warm-up														○																		○	○		
22		Idle with A/C, P/S, and/or E/L ON		○																																
23		Idle when shifted from N or P to other ranges		○																																
24		On deceleration																																		
25	Poor acceleration	Driveaway			○					○										○	○						○									
26		On acceleration	○		○				○	○		○				○	○			○	○	○	○	○						○						
27	High idle speed after warm-up			○	○		○	○	○						○	○																			



DECELERATION system	CONTROL SYSTEM (INPUT SIGNAL)																												OTHERS			Possible parts and reference page		Item
	Dashpot	Air bypass valve	Crank angle sensor (NE)	Crank angle sensor (G)	Water thermosensor	Intake air thermosensor	Fuel thermosensor	Pressure sensor	Narrow range / Throttle sensor / Fuul range	Oxygen sensor	Knock sensor	Speedometer sensor	Metering oil pump position sensor	P/S pressure sensor	A/C switch	Water thermoswitch	Stoplight switch	Mileage switch	Heat hazard sensor	Starter signal	E/L unit	1-2 switch (MT)	Neutral switch (MT)	Clutch switch (MT)	Solenoid valve (Shuft A) (AT)	Solenoid valve (Shift B) (AT)	Reduce torque signal (AT)	Slip lock-up signal (AT)	Inhibitor signal (AT)	Electrical cooling fan	Metering oil pump	A/C relay	Compression down	ECU			
	F–134	F–77	F–180	F–180	F–183	F–183	F–184	F–181	F–182	F–182	F–184	F–185	Section T	Section D	F–186	Section U	Section E	F–186	F–189	F–187	F–152	F–134	F–187	F–186	F–187	Section K	Section K	Section K	Section K	Section K	Section E	Section D	F–143	Section C	F–150			
												○			○		○													○					Melts main or other fuse		1
																				○								○					Will not crank or cranks slowly		2
			○	○					○											○											○	○	No combustion	Cranks normally but will not start	3
					○																													Partial combustion–when engine cold		4
																																		Partial combustion–after warm-up		5
			○	○																												○	○	Any engine temp.	Cranks normally but hard to start	7
					○	○														○														When engine cold		8
							○																											After warm-up		9
			○	○					○																							○	○	Idle at any engine temp	Engine stalls	0
					○																													During fast idle		1
							○																											Idle after warm-up		2
														○	○						○												○	Idle with A/C, P/S, and/or E/L ON		3
																													○					Idle when shifted from N or P to other ranges		4
								○															○	○	○	○						○		Driveaway		5
									○																							○		On acceleration		6
																																	○	While cruising		7
																																		On deceleration		8
								○	○			○							○													○	○	Idle at any engine temp	Engine rough	9
					○																													During fast idle		20
							○																											Idle after warm-up		21
														○	○						○												○	Idle with A/C, P/S, and/or E/L ON		22
																													○					Idle when shifted from N or P to other ranges		23
	○								○																									On deceleration		24
									○													○			○	○								Driveaway	Poor acceleration	25
							○			○												○			○	○	○	○					○	On acceleration		26
					○									○	○						○													High idle speed after warm-up		27

TROUBLESHOOTING GUIDE

Item	Possible parts and reference page	Intake air system					Fuel system									Ignition system			Turbo charger system				Secondary air injection system						Emission system			
		Air cleaner element F-16	Solenoid valve (ISC) F-83	Solenoid valve (AWS) F-83	Solenoid valve (Double throttle) F-137	Fast idle cam F-79	Intake air leakage F-76	Injector (Primary) F-105	Injector (Secondary) F-105	Fuel filter F-103	Fuel pump F-100	Fuel pump relay F-110	Fuel pump resistor F-109	Circuit opening relay F-110	Pressure regulator F-104	Solenoid valve (PRC) F-112	Igniter Section G	Ignition coil Section G	Spark plug Section G	Ignition timing F-16	Turbo precontrol F-93	Wastegate control F-93	Turbo control F-93	Charge control F-93	Charge relief F-93	Relief 1 F-123	Switching F-119	Split air bypass F-119	Port air bypass F-119	Relief 2 F-123	Air pump F-21	Air pump relay F-123	Catalytic converter F-128	Charcoal canister F-131	Solenoid valve (Purge control) F-131	Solenoid valve (EGR) F-127
																				Solenoid valve					Solenoid valve									
28	Idle fluctuates / idle hunts		○				○											○	○	○															
29	Hesitates / Stumbles on acceleration	○			○			○	○		○							○	○		○			○	○										
30	Surges while cruising						○	○	○		○				○			○	○		○			○	○										
31	Lack of power	○							○	○		○			○	○		○	○		○	○	○	○	○										
32	Poor fuel economy	○					○					○			○	○		○	○		○	○	○	○	○							○			
33	A/C does not work																															○			
34	Knocking / Pinging						○	○	○						○	○			○																
35	Fuel odor																																○		
36	Exhaust sulfur smell									○																						○	○		
37	High oil consumption																														○				
38	Self-Diagnosis Checker flashes 88																																		
39	Self-Diagnosis Checker will not work																																		

DECEL-ERA-TION system	CONTROL SYSTEM (INPUT SIGNAL)																																OTHERS			Possible parts and reference page / Item
	Dashpot	Air bypass valve	Crank angle sensor (NE)	Crank angle sensor (G)	Water thermosensor	Intake air thermosensor	Fuel thermosensor	Pressure sensor	Throttle sensor: Narrow range	Throttle sensor: Fuel range	Oxygen sensor	Knock sensor	Speedometer sensor	Metering oil pump position sensor	P/S pressure sensor	A/C switch	Water thermoswitch	Stoplight switch	Mileage switch	Heat hazard sensor	Starter signal	E/L unit	1-2 switch (MT)	Neutral switch (MT)	Clutch switch (MT)	Solenoid valve (Shift A) (AT)	Solenoid valve (Shift B) (AT)	Reduce torque signal (AT)	Slip lock-up signal (AT)	Inhibitor signal (AT)	Electrical cooling fan	Metering oil pump	A/C relay	Compression down	ECU	
	F-134	F-77	F-180	F-180	F-183	F-183	F-184	F-181	F-182	F-182	F-184	F-185	Section T	Section D	F-186	Section U	Section E	F-186	F-189	F-187	F-152	F-134	F-187	F-186	F-187	Section K	Section K	Section K	Section K	Section K	Section E	Section D	F-143	Section C	F-150	
								○	○																											Idle fluctuates / idle hunts 28
								○		○																		○							Hesitates / Stumbles on acceleration 29
											○	○																							Surges while cruising 30
								○		○															○	○	○	○					○	○	Lack of power 31
				○				○																	○	○		○					○	○	Poor fuel economy 32
																○															○				A/C does not work 33
				○																														○		Knocking / Pinging 34
																																		○		Fuel odor 35
																																				Exhaust sulfur smell 36
				○				○						○																	○			○		High oil consumption 37
																																		○		Self-Diagnosis Checker flashes 88 38
																																		○		Self-Diagnosis Checker will not work 39

RELATIONSHIP CHART

INPUT DEVICE \ OUTPUT DEVICE		INJECTOR					SOLENOID VALVE																				
		FUEL INJECTION AMOUNT	FUEL INJECTION TIMING	CIRCUIT OPENING RELAY	FUEL PUMP RELAY	IGNITER	IDLE SPEED CONTROL SYSTEM	ACCELEATED WARM-UP SYSTEM	DUBLE THROTTLE CONTROL SYSTEM	PRESSURE REGULATOR CONTROL	TURBO PRECONTROL	WASTEGATE CONTROL	TURBO CONTROL	CHARGE CONTROL	CHARGE RELIEF	RELIEF 1	SWITCHING	SPLIT AIR BYPASS	PORT AIR BYPASS	RELIEF 2	PURGE CONTROL	EGR	EC-AT CONTROL UNIT	METERING OIL PUMP	A/C RELAY	AIR PUMP RELAY	SERVICE CODE	MONITOR LAMP
CRANK ANGLE SENSOR	NE SIGNAL	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	G SIGNAL		○			○																					○	
THROTTLE SENSOR	NARROW RANGE	○				○	○		○	○						○	○	○	○	○	○	○	○	○		○	○	
	FULL RANGE	○	○			○	○				○	○	○	○	○							○			○	○	○	○
WATER THERMOSENSOR		○				○	○	○	○		○	○				○	○	○	○	○	○	○			○	○	○	
INTAKE AIR THERMOSENSOR		○				○	○																			○	
FUEL THERMOSENSOR		○			○	○	○			○											○					○	
PRESSURE SENSOR		○			○	○	○				○	○	○	○	○	○	○	○	○	○	○	○		○		○	○	
OXYGEN SENSOR		○														○		○	○		○							
KNOCK SENSOR						○																				○	○
SPEEDOMETER SENSOR							○																	○		○	
MOP POSITION SENSOR																							○			○	
E/L UNIT						○	○																				
A/C SWITCH		○				○	○																				
P/S PRESSURE SWITCH		○				○	○																				
IGNITION SWITCH (ST SIGNAL)		○			○	○	○	○		○			○			○								○	○		
STOPLIGHT SWITCH							○																				
NEUTRAL SWITCH (MT)		○				○	○	○		○	○	○	○	○	○	○	○	○	○	○	○	○			○	○		
CLUTCH SWITCH (MT)		○				○	○	○		○	○	○	○	○	○	○	○	○	○	○	○	○			○	○		
1-2 SWITCH (MT)											○	○	○	○	○												
EGR SWITCH (Calif)																						○				○	
MILEAGE SWITCH																○		○	○	○							
HEAT HAZARD SENSOR																									○		
SOLENOID VALVE SIGNAL (AT)	SHIFT A					○			○		○	○	○	○	○		○	○				○				○	
	SHIFT B					○			○		○	○	○	○	○		○	○				○				○	
REDUCE TORQUE SIGNAL (AT)					○																	○					
SLIP LOCK-UP SIGNAL (AT)					○																	○					
INHIBITOR SIGNAL (AT)		○			○	○	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○			○	○	○	
DIAGNOSIS CONNECTOR (TEN-TERMINAL)		○				○																				○	○
ATMOSPHERIC PRESSURE SENSOR (IN ECU)		○			○	○			○		○	○	○	○	○		○			○		○				○	

Output devices and Engine condition

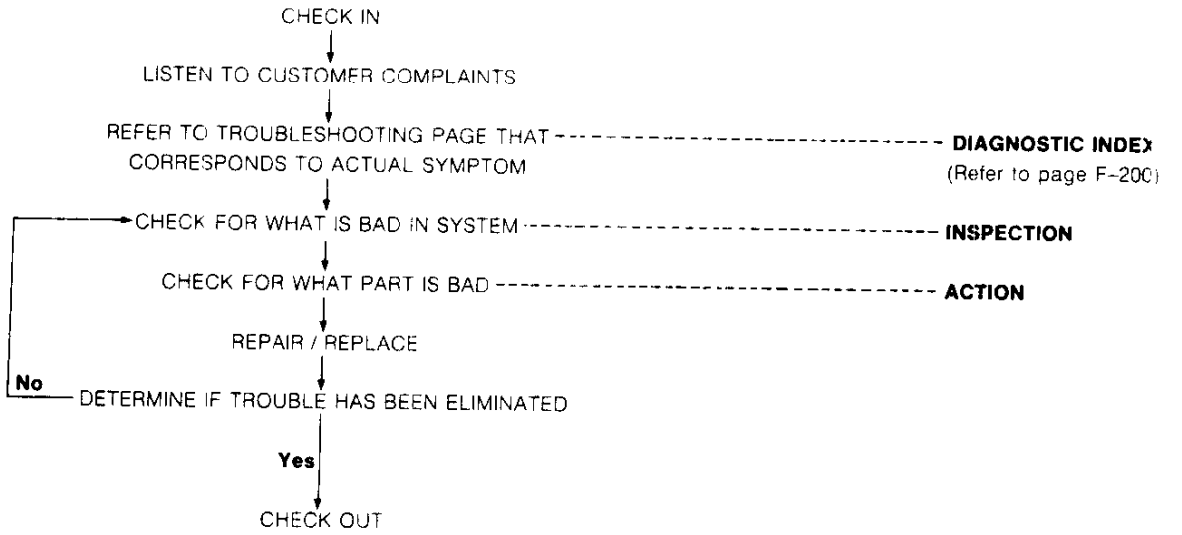
ENGINE CONDITION / OUTPUT DEVICE		CRANKING (COLD ENGINE)	WARMING UP (DURING IDLE)	MEDIUM LOAD		ACCELERATION	HEAVY LOAD	DECELERATION	IDLE	IG: ON (ENGINE NOT RUNNING)	REMARK
				COLD	WARM						
INJECTOR	FUEL INJECTION AMOUNT	Rich			Normal	Rich		FUEL CUT*	Rich	No injection	
	Primary	Operate						Not operate	Operate		
	Secondary	Not operate				Operate		Not operate			
CIRCUIT OPENING RELAY		ON								OFF	
FUEL PUMP RELAY		OFF (Low speed)				ON (High speed)		OFF (Low speed)			
IGNITER		Fixed at BTDC 5°	Advanced: depends on engine condition						Fixed at ATDC 5° (L) ATDC 20° (T)	-	
	ACCELERATED WARM-UP (AWS)	ON	OFF								
	IDLE SPEED CONTROL (ISC)	ON (Feedback duty)	ON (Fixed duty)						ON (Feedback duty)		
	DOUBLE THROTTLE CONTROL	ON (Closed)		OFF (Open)		ON (AT only)	OFF (Open)				
	TURBO PRE-CONTROL	OFF (Closed)	Depends on engine condition					OFF (Closed)			
	WASTEGATE CONTROL	OFF (Closed)				Depends on engine condition		OFF (Closed)			
	TURBO CONTROL	OFF (Closed)				ON (Open)		OFF (Closed)			
	CHARGE CONTROL	ON (Closed)				OFF (Open)		ON (Closed)			
	CHARGE RELIEF CONTROL	OFF (Open)				ON (closed)		OFF (Closed)			
	RELIEF 1	OFF (Closed)		ON (Open)		OFF (Closed)					
	SWITCHING	OFF (Port)		ON (Split)				OFF (Port)			
	SPLIT AIR BYPASS	OFF (Closed)		ON (Open)				OFF (Closed)			
	PORT AIR BYPASS	OFF (Closed)	ON (Open)			OFF (Closed)					
	RELIEF 2	ON (Open)	OFF (Closed)								
	PRESSURE REGULATOR CONTROL (PRC)	OFF (Vacuum to pressure regulator)							ON*	OFF	* During hot start only
	PURGE CONTROL (PURGE)	OFF		ON (Purge)		OFF					
	EXHAUST GAS RECIRULATION (EGR)	OFF (EGR Cut)		ON* (EGR)		OFF (EGR Cut)					Engine speed: 1,700–3,850 rpm
A/C RELAY		OFF (A/C cut)	ON			OFF (A/C cut)	ON				
COOLING FAN RELAY		OFF		Depends on engine coolant temperature							
METERING OIL PUMP (MOP)		OFF	ON							OFF	

USING THIS SECTION

Introduction

Most of the fuel and emission control systems are electronically controlled, often making it difficult to diagnose problems, especially intermittent problems. Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a drivability complaint. The customer is often a good source of information on such problems, especially the intermittent ones. Through a talk with the customer, you will usually find out what the symptoms are and under what conditions they occur.

Work flow



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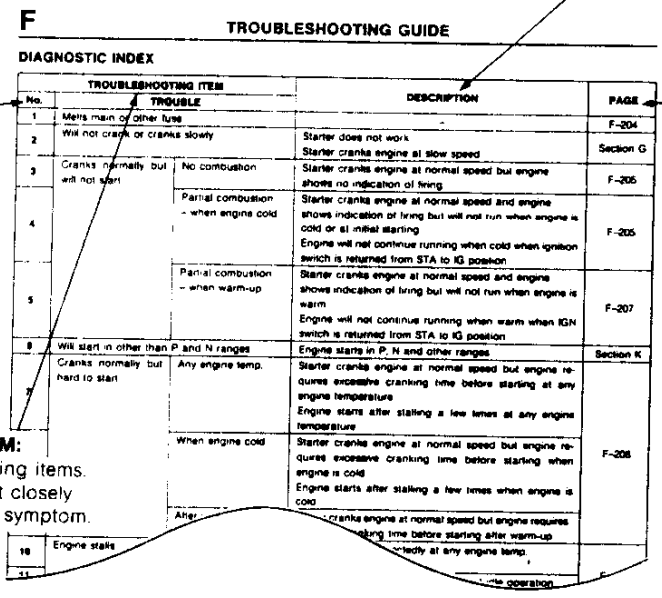
Diagnostic index

DESCRIPTION:
Describes each troubleshooting item



F TROUBLESHOOTING GUIDE

DIAGNOSTIC INDEX

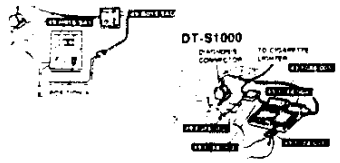
No.	TROUBLESHOOTING ITEM TROUBLE		DESCRIPTION	PAGE
1	Melts main or other fuse			F-204
2	Will not crank or cranks slowly		Starter does not work Starter cranks engine at slow speed	Section G
3	Cranks normally but will not start	No combustion	Starter cranks engine at normal speed but engine shows no indication of firing	F-205
4		Partial combustion – when engine cold	Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is cold or at initial starting Engine will not continue running when cold when ignition switch is returned from STA to IG position	F-205
5		Partial combustion – when warm-up	Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is warm Engine will not continue running when warm when IGN switch is returned from STA to IG position	F-207
6	Will start in other than P and N ranges		Engine starts in P, N and other ranges	Section K
7	Cranks normally but hard to start	Any engine temp.	Starter cranks engine at normal speed but engine requires excessive cranking time before starting at any engine temperature Engine starts after stalling a few times at any engine temperature	F-208
		When engine cold	Starter cranks engine at normal speed but engine requires excessive cranking time before starting when engine is cold Engine starts after stalling a few times when engine is cold	
		After	cranks engine at normal speed but engine requires king time before starting after warm-up	
10	Engine stalls		ediately at any engine temp.	
11			ile operation	

No.:
Each troubleshooting item is assigned a number.

TROUBLESHOOTING ITEM:
There are 58 troubleshooting items. Choose the item that most closely corresponds to the actual symptom.

PAGE:
Shows the reference page or section.

Troubleshooting chart

7, 8, 9	CRANKS NORMALLY BUT HARD TO START	• ANY ENGINE TEMPERATURE • WHEN ENGINE COLD • AFTER WARM-UP
DESCRIPTION	• Starter cranks engine at normal speed but engine requires excessive cranking time before starting • Engine starts after stalling a few times • Battery in normal condition • Engine runs normally at idle (If idle condition not OK, refer to "Engine rough" [Nos. 19, 20, 21, 22, or 23])	
[TROUBLESHOOTING HINTS] ① Injector • Fuel leakage from injector(s) ② Fuel pump • Poor connection of pump connector • Poor connection of circuit opening relay connector ③ Pressure regulator • Malfunction of pressure regulator ④ Fast idle cam • Malfunction of fast idle cam (when engine cold) ⑤ Spark plug • Dirty or worn spark plug(s)		⑥ Intake air system • Air leakage ⑦ Water thermosensor • Poor connection of water thrmosensor • Malfunction of water thermosensor ⑧ Solenoid valve (Purge control) • Air leakage ⑨ Metering oil pump • Malfunction of pump ⑩ Crank angle sensor • Ground circuit open
STEP	INSPECTION	ACTION
1	Is "00" or "No service codes" displayed on SST with ignition switch ON? SELF-DIAGNOSIS CHECKER ☞ page F-20 	Yes: "00" or "No service codes" displayed Go to next step No: Service Code No. displayed Check for cause (Refer to specified check sequence)
2	Is air leakage felt or heard at intake air system components at idle?	Yes: Repair or replace
3		

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DESCRIPTION:

Further describes the system. Confirm that the chart addresses the actual symptom before beginning troubleshooting.

TROUBLESHOOTING HINTS:

This describes the possible point of malfunction.

STEP:

This Shows the order of troubleshooting. Proceed with troubleshooting as indicated.

INSPECTION:

This describes an inspection to quickly determine the malfunction of parts. If a detailed procedure is necessary to perform the INSPECTION, refer to the page specified by the "☞" mark.

ACTION:

This recommends the appropriate action to take as a result (Yes/No) of the INSPECTION. How to perform the actions is described on the reference page specified by the "☞" mark.

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DIAGNOSTIC INDEX

TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
1	Melts main or other fuse		–	F-204
2	Will not crank or cranks slowly		Starter does not work Starter cranks engine at slow speed	Section G
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6	Will start in other than P and N ranges		Engine starts in P, N and other ranges	Section K
7	Cranks normally but hard to start	Any engine temperature	Starter cranks engine at normal speed but engine requires excessive cranking time before starting at any engine temperature Engine starts after stalling a few times at any engine temperature	F-208
8		When engine cold	Starter cranks engine at normal speed but engine requires excessive cranking time before starting when engine is cold Engine starts after stalling a few times when engine is cold	
9		After warm-up	Starter cranks engine at normal speed but engine requires excessive cranking time before starting after warm-up	
10	Engine stalls	Idle at any engine temperature	Engine stops unexpectedly at any engine temperature	F-210
11		During fast idle	Engine stops unexpectedly during fast-idle operation	
12		Idle after warm-up	Engine stops unexpectedly at idle after warm-up	
13		Idle with A/C, P/S, and/or E/L ON	Engine stops unexpectedly when A/C, P/S, and/or E/L is turned ON at idle	F-212 Section K
*14		Idle when shifted from N or P to other ranges	Engine stops unexpectedly when shifted from N or P to other ranges at idle	
15		Driveaway	Engine stops unexpectedly upon driveaway	F-213
16		On acceleration	Engine stops unexpectedly at beginning of acceleration or during acceleration	F-215
17		While cruising	Engine stops unexpectedly while cruising	
*18		On deceleration	Engine stops unexpectedly at beginning of deceleration or recovery from deceleration Exhaust afterburn	F-216 Section K
19	Engine rough	Idle at any engine temperature	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at any engine temperature Idle speed too slow and excessive engine shake at any engine temperature	F-217
20		During fast idle	Fast idle speed too slow and excessive engine shake during fast idle, but returns to normal after warm-up	
21		Idle after warm-up	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle after warm-up	

* Refer to Section F2 before referring to Section K.

TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
22	Engine rough	Idle with A/C, P/S, and/or E/L ON	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when A/C, P/S, and/or E/L ON	F-210
23		Idle when shifted from N or P to other range	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when shifted from P or N to other range	
24*		On deceleration	Engine shakes at beginning of deceleration, during deceleration, or recovery from deceleration Exhaust afterburn	F-220 Section K
25*	Poor acceleration	Driveaway	Engine speed increases normally but vehicle speed slowly, increases during driveaway	F-22 Section K
26*		On acceleration	Engine speed increases normally but vehicle speed slowly increases during acceleration	
27	High idle speed after warm-up		Idle speed continues at fast idle after warm-up Engine returns slowly to idle after accelerator is released	F-223
28	Idle fluctuates / Idle hunts		Engine speed hunts between specified idle speed and higher speed	F-225
29	Hesitates / Stumbles on acceleration		Momentary pause at beginning of acceleration or during acceleration	F-226
30*	Surges while cruising		Momentary minor irregularity in engine power at steady vehicle speed	F-228 Section K
31*	Lack of power		Performance poor under load (i.e., power down when climbing hills)	F-229 Section K
32*	Poor fuel economy		Fuel economy unsatisfactory	F-229 Section K
33	A/C does not work		A/C compressor magnetic clutch does not engage when A/C switch ON	F-229
34	Knocking / Pinging		Sound produced as air/fuel mixture is ignited by something other than spark plug (i.e., hot spot in combustion chamber)	F-230
35	Fuel odor		Gasoline fuel smell or visible leaks	F-230
36	Exhaust sulfur smell		Rotten egg (sulfur) smell from exhaust	F-230
37	High oil consumption		Oil consumption excessive	F-230
38	Self-Diagnosis Checker flashes 88 / DT-S1000 indicates "SYSTEM ERROR"		Checker flashes 88 with test connector grounded or DT-S1000 indicates "System error"	F-231
39	MIL never ON		Self-Diagnosis Checker or DT-S1000 indicates Service Code No. of input device but MIL never ON	F-231
40	Vehicle does not move in D, S, L and/or R ranges		No creep at all Vehicle does not move when accelerator pedal is depressed after shifted to D, S, L and/or R ranges	Section K
41	Vehicle moves in N range		Vehicle creeps in N ranges Vehicle moves with accelerator pedal not depressed	Section K
42	Vehicle moves in P range		Vehicle rolls in P range	Section K
43	Excessive creep		Vehicle moves quickly in D, S, L and R range (with accelerator pedal not depressed) **Note** **• Excessive N to R range and N to D range shift shock felt**	Section K

* Refer to Section F before referring to K Sections

TROUBLESHOOTING GUIDE

TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
44	No shift		Single range shift (1st → 2nd, 2nd → 3rd or 3rd → O/D) only Sometimes shifts correctly **Note** **• Gear position held in hold mode.**	Section K
45	Abnormal shift		Shifts incorrectly (incorrect shift pattern) (ex) Vehicle shifts 1st → O/D directly when accelerating with accelerator pedal depressed slightly	Section K
46	Frequent shifting		Downshift occurs when accelerated slightly in D, S and L ranges (except hold mode)	Section K
47	Shift point high or low		Shift points do not match shift diagram Shift delayed when accelerating Shift occur too fast when accelerating and engine speed does not increase	Section K
48	No lockup		No lockup when vehicle speed reaches lockup range	Section K
49	No kickdown		Does not downshift when accelerator pedal depressed more than 7/8 within kickdown range	Section K
50	Engine speed flares up	When accelerating	Engine speed flares up on acceleration	Section K
51		When upshifting and/or downshifting	Engine flares up when accelerator pedal depressed before upshifting Engine flares up suddenly when accelerator pedal depressed before downshifting	Section K
52	Excessive shift shock	P, N to R and/or N to D	Strong shift shock felt at idle when shifting from N to D or R range	Section K
53		When upshifting and/or downshifting	Excessive shift shock felt when accelerating at upshifting Excessive shift shock felt when accelerator pedal depressed at downshifting during cruising	Section K
54	No engine braking		Engine speed drops to idle but vehicle does not slow when accelerator pedal released during cruising at medium to high speed Engine speed drops to idle but vehicle does not slow when accelerator pedal released when in L range at low vehicle speed	Section K
55	No mode change		Mode does not change to/from normal mode in D range Hold mode not engaged or not cancelled	Section K
56	Transmission noise	All ranges	Transmission noisy in all ranges when vehicle is idling	Section K
57		D, S, L, R ranges	Abnormal noise from transmission in D, S, L, R	Section K
58	Transmission overheats		ATF smells burnt and/or is discolored	Section K

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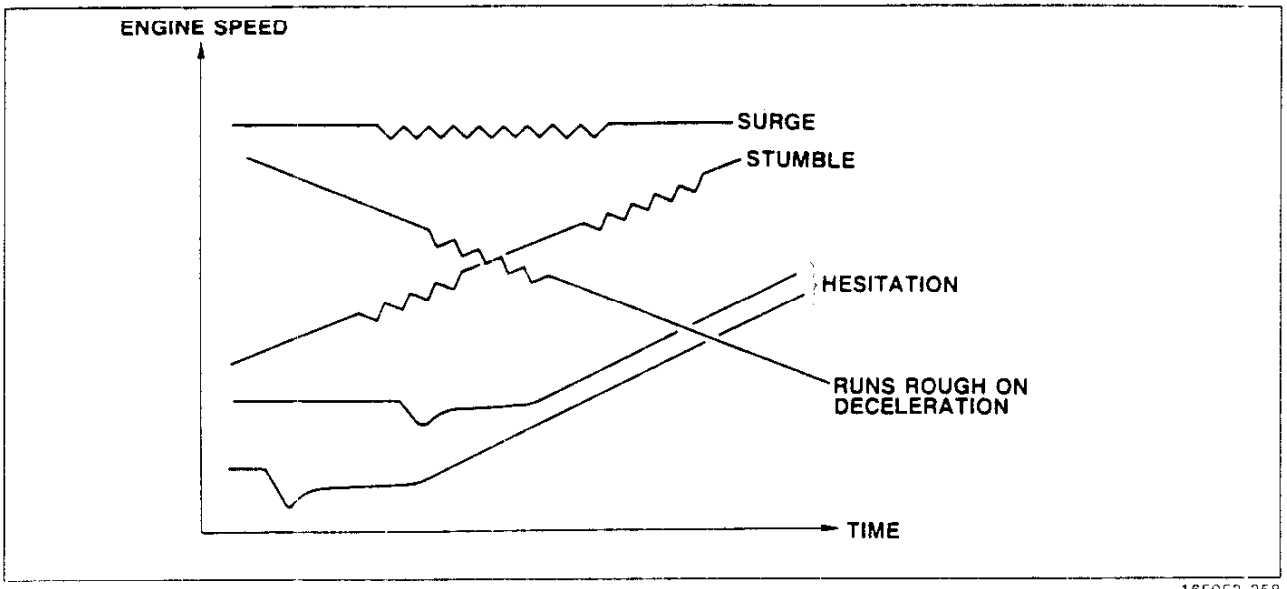
Description of Drivability Problems

STUMBLE : Mild jerking during acceleration.
HESITATION : Flat spot occurring just after the accelerator pedal is depressed.
SURGE : Continuous soft jerking while cruising.



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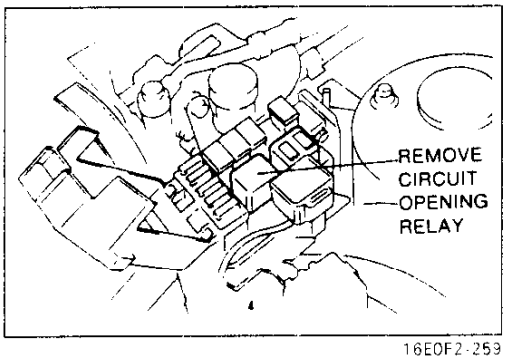

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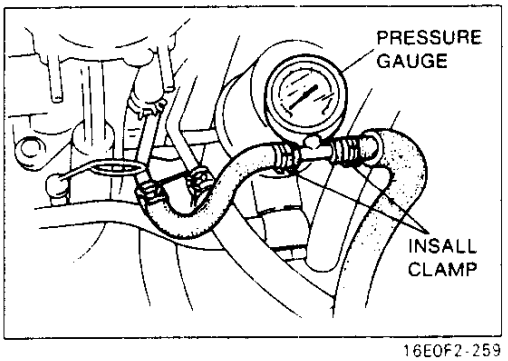

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PRECAUTION

Fuel Pressure Release and Servicing Fuel System

a) Fuel in the fuel system remains under high pressure when the engine is not running.
Before disconnecting any fuel line, release the fuel pressure from the fuel system as described to reduce the possibility of injury or fire.
1. Start the engine.
2. Remove the circuit opening relay.
3. After the engine stalls, turn OFF the ignition switch.
4. Install the circuit opening relay.

b) Use a rag as protection from fuel spray when disconnecting the hoses.
Plug the hoses after removal.

c) When inspecting the fuel system, use a suitable fuel pressure gauge.

Caution

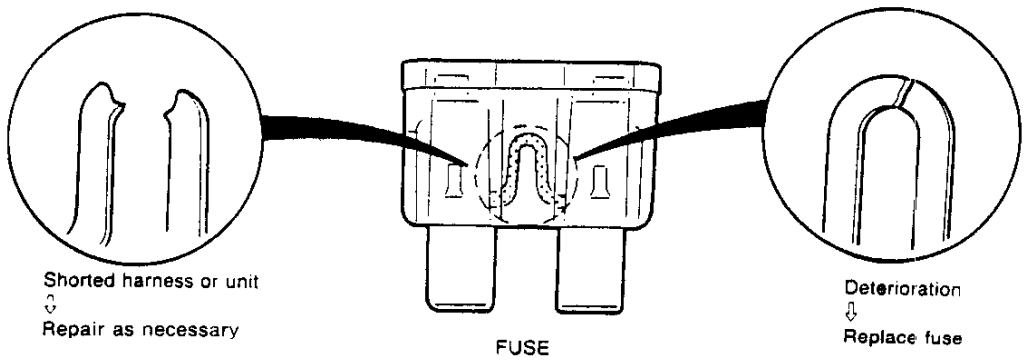
- **Install hose clamps to secure the fuel pressure gauge to prevent fuel leakage.**

SYMPTOM TROUBLESHOOTING

1	MELTS MAIN OR OTHER FUSE

[TROUBLESHOOTING HINTS]

Check the condition of the fuse



Damaged Fuse	Related Wiring Harness	
MAIN (120A)	Main fuse	Alternator (B)
BTN (60A)	BTN fuse	ROOM fuse (W/R)
ROOM (10A)	ROOM fuse	ECU terminal 1A (L/R)
EGI INJ (30A)	Main relay	Injectors (B/Y) ECU terminal 1B (B/W) Oxygen sensor (B/W) Solenoid valves (B/W) E/L unit (B/W) Air pump relay (B/W)
ENGINE (15A)	ENGINE fuse	Main relay (B/W)
METER (15A)	METER fuse	Diagnosis connector terminal + B (B/Y)
FUEL PUMP (20A)	FUEL PUMP fuse Circuit opening relay	Circuit opining relay (L) Fuel pump (W/R)

3	CRANK NORMALLY BUT WILL NOT START	• NO COMBUSTION
DESCRIPTION	• Starter cranks engine at normal speed but engine shows no indication of firing	

[TROUBLESHOOTING HINTS]

① Crank angle sensor
- Poor connection of connector

② Main relay
- Poor connection of connector
- Malfunction of relay

③ Fuel pump
- No fuel in tank
- Poor connection of fuel pump connector

④ ECU
- Poor connection of connector (Especially 1H, 1O, 1T, 3I, 4D, 4E, 4G, 4H)

⑤ Igniter
- Poor connection of connector

⑥ Injector
- Poor connection of connector

4	CRANKS NORMALLY BUT WILL NOT START	• PARTIAL COMBUSTION – WHEN ENGINE COLD
DESCRIPTION	• Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is cold at initial starting • Engine will not continue running when cold when ignition switch is returned from STA to IG position • Refer to "ENGINE STALLS" if this symptom initially appears after engine stalls • Fuel in tank • Battery in normal condition	

[TROUBLESHOOTING HINTS]

① Igniter
- Poor connection of connector

② Ignition coil
- Poor connection of connector

③ Spark plug
- Dirty or worn spark plug(s)

④ Injector (primary)
- Poor connection of connector
- Fuel leakage from injector(s)

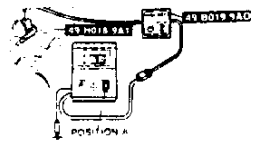
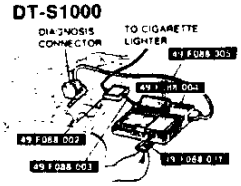
⑤ Intake air system
- Air leakage

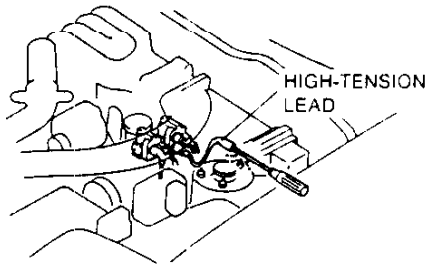
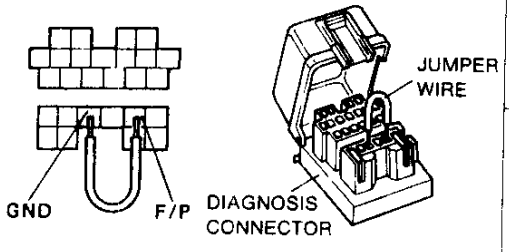
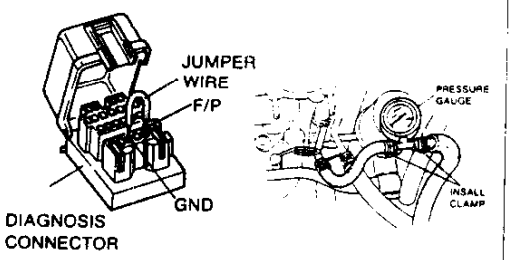
⑥ Water thermosensor
- Poor connection of connector

⑦ Engine compression

⑧ ECU
- Poor connection of connector
(Especially 1B, 1G, 1H, 1J, 1N, 1O, 1T, 3E, 4E, 4G, 4H)

⑨ Solenoid valve (Purge control)
- Short circuit (Solenoid valve fully opened)

STEP	INSPECTION		ACTION
1	Is "00" or "No service codes" displayed on **SST** with ignition switch ON? ☞ **page F–20** **SELF-DIAGNOSIS CHECKER**  **DT-S1000** 	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence)

STEP	INSPECTION		ACTION
2	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Go to next step
		No	Check ignition system ☞ **Section G**
3	Are spark plugs OK? ☞ **Section G**	Yes	Go to next step
		No	Clean or replace
4	Connect jumper wire between F/P and GND terminals of diagnosis connector; will engine start? 	Yes	Check as follows: • 1T terminal voltage at ECU ☞ **page F–156** • Continuity between 1T terminal and circuit opening relay connector terminal • Condition of ECU and circuit opening relay connector female terminals
		No	Check if fuel pump operating sound is heard • If yes, go to next step • If no, check fuel pump and wiring harness ☞ **page F–100**
5	Are ECU terminal voltages OK? ☞ **page F–152**	Yes	Go to next step
		No	Check for cause ☞ **page F–153**
6	Connect diagnosis connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F–98** **Fuel line pressure:** **250-260 kPa {2.5-2.7 kgf/cm², 36-38 psi}** 	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F–104** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F–101**

STEP	INSPECTION		ACTION
7	Are injectors OK? ☞ **page F-107** • Fuel leakage • Primary injector(s) clogged	Yes	Go to next step
		No	Replace injector(s) ☞ **page F-105**
8	Is engine compression OK? ☞ **Section C** **Compression** **690 kPa {7.0 kgf/cm², 100 psi} – 250 rpm** **Differential limit of chambers** **150 kPa {1.5 kgf/cm², 21psi} – 250 rpm**	Yes	Go to next step
		No	Check for cause ☞ **Section C**
9	Try known good ECU; does condition improve? ☞ **page F-150**		

5	CRANKS NORMALLY BUT WILL NOT START	• PARTIAL COMBUSTION – AFTER WARM UP
DESCRIPTION	• Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is warm • Engine will not continue running when ignition switch is returned from STA to IG position	

[TROUBLESHOOTING HINTS]

① Solenoid valve (PRC)
- Poor connection of solenoid valve connector or ECU 4M terminal

② Fuel
- High RVP (winter) fuel used in warm weather

③ Water thermosensor
- Malfunction of water thermosensor

④ Evaporative emission control
- Malfunction of check valve (two-way)

⑤ Fuel pump
- Malfunction of circuit opening relay

7, 8, 9	CRANKS NORMALLY BUT HARD TO START	• ANY ENGINE TEMPERATURE • WHEN ENGINE COLD • AFTER WARM-UP
DESCRIPTION	• Starter cranks engine at normal speed but engine requires excessive cranking time before starting • Engine starts after stalling a few times • Battery in normal condition • Engine runs normally at idle (if idle condition not OK, refer to "Engine rough" [Nos. 19, 20, 21, 22, or 23])	

[TROUBLESHOOTING HINTS]

① Injector
- Fuel leakage from injector(s)

② Fuel pump
- Poor connection of pump connector
- Poor connection of circuit opening relay connector

③ Pressure regulator
- Malfunction of pressure regulator

④ Fast idle cam
- Malfunction of fast idle cam (when engine cold)

⑤ Spark plug
- Dirty or worn spark plug(s)

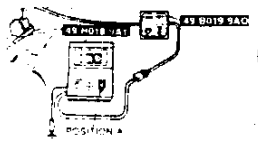
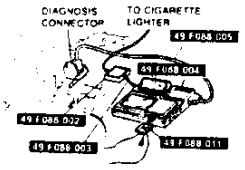
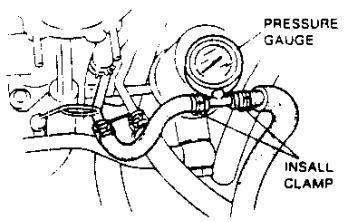
⑥ Intake air system
- Air leakage

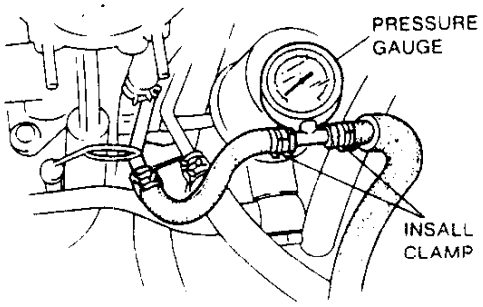
⑦ Water thermosensor
- Poor connection of water thrmosensor
- Malfunction of water thermosensor

⑧ Solenoid valve (Purge control)
- Air leakage

⑨ Metering oil pump
- Malfunction of pump

⑩ Crank angle sensor
- Ground circuit open

STEP	INSPECTION		ACTION
1.	Is "00" or "No service codes" displayed on **SST** with ignition switch ON? **SELF-DIAGNOSIS CHECKER** ☞ page F–20  	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence)
2	Is air leakage felt or heard at intake air system components at idle?	Yes	Repair or replace
		No	Go to next step
3	Is fast idle cam OK? ☞ page F–79	Yes	Go to next step
		No	Adjust ☞ page F–79
4	Connect diagnosis connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ page F–98 **Fuel line pressure:** **250–260 kPa {2.5–2.7 kgf/cm², 36–38 psi}** 	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ page F–104 • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ page F–101

STEP	INSPECTION		ACTION
5	Is fuel line pressure held after ignition switch is turned OFF? ☞ page F-97 **Fuel pressure:** **More than 150 kPa {1.5 kgf/cm², 21 psi}**  	Yes	Go to next step
		No	Plug outlet of pressure regulator, Is fuel line pressure held after ignition switch is turned OFF? ☞ page F-100 • If yes, replace pressure regulator ☞ page F-104 • If no, check fuel pump hold pressure ☞ page F-101 If fuel pump OK, check injectors for fuel leakage ☞ page F-106
6	Are spark plugs OK? ☞ Section G	Yes	Go to next step
		No	Repair or replace
7	Is EGR control system OK? ☞ page F-126	Yes	Go to next step
		No	Check as follows: • Solenoid valve (EGR) for sticking • Condition of solenoid valve connector female terminal(s)
8	Try known good ECU; does condition improve? ☞ page F-150		

16E0F2-266

10, 11, 12	ENGINE STALLS	• IDLE AT ANY ENGINE TEMP • DURING FAST IDLE • IDLE AFTER WARM-UP
DESCRIPTION	• Engine stops unexpectedly at idle and/or during fast idle operation	

[TROUBLESHOOTING HINTS]

① Injector
- Fuel leakage from injector(s)
- Injector(s) clogged

② Fuel pump
- Poor connection of connector

③ Circuit opening relay
- Poor connection of connector

④ Spark plug
- Dirty or worn spark plug(s)

⑤ Pressure sensor
- Poor connection of pressure sensor connector

⑥ EGR control valve
- EGR control valve stuck

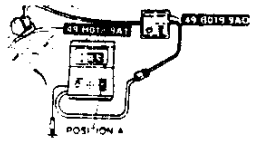
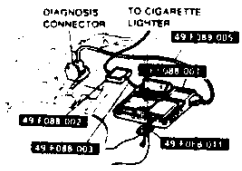
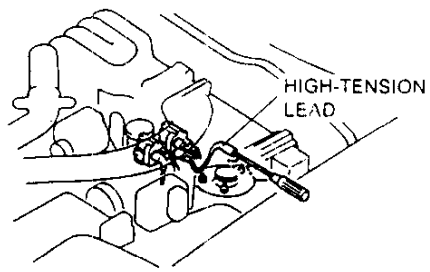
⑦ Solenoid valve (ISC)
- Poor connection of connector

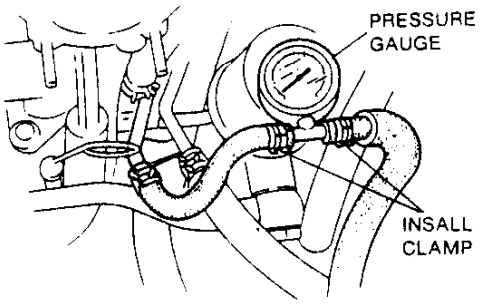
⑧ Crank angle sensor
- Poor connection of connector

⑨ ECU
- Poor connection of connector

⑩ Igniter
- Poor connection of connector

⑪ Metering oil pump
- Malfunction of oil pump

STEP	INSPECTION		ACTION
1	Is "00" or "No service codes" displayed on **SST** with ignition switch ON? ☞ **page F-20** **SELF-DIAGNOSIS CHECKER**  **DT-S1000** 	Yes	**"00" or "No service codes" displayed** • If symptom occurs at idle at any engine temp., go to next step • If symptom occurs during fast idle operation, go to next step • If symptom occurs at idle after warmup, go to Step 6
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence)
2	Is fast idle cam OK ? ☞ **page F-79**	Yes	Go to next step
		No	Adjust ☞ **page F-79**
3	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Go to next step
		No	Check ignition system ☞ **Section G**

STEP	INSPECTION		ACTION
4	Are following ECU terminal voltages OK? ☞ **page F-152** • 1B (ECU power) • 1G, 1H, 1J (Igniter) • 1O (Pressure sensor) • 1T (Circuit opening relay) • 3E (Water thermosensor) • 3F (Throttle sensor narrow range) • 4E, 4G, 4H (Crank angle sensor) • 4O (Solenoid valve (EGR)) • 4P (Solenoid valve (AWS)) • 4Q (Solenoid valve (ISC)) • 4W, 4Y (Primary fuel injector)	Yes	Go to next step
		No	Check for cause ☞ **page F-153**
5	Connect diagnosis connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F-98** **Fuel line pressure:** **250–260 kPa {2.5–2.7 kgf/cm², 36–38 psi}**  	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F-104** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F-101**
6	Is engine compression correct? ☞ **Section C** **Compression** **690 kPa {7.0 kgf/cm², 100 psi} – 250 rpm** **Differential limit of chambers** **150 kPa {1.5 kgf/cm², 21 psi} – 250 rpm**	Yes	Go to next step
		No	Check for cause
7	Are spark plugs OK? ☞ **Section G**	Yes	Go to next step
		No	Clean or replace
8	Try Known good ECU, does condition improves? ☞ **page F-150**		

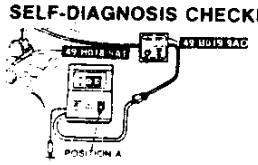
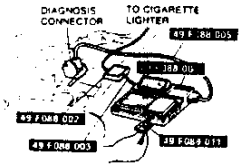
13, 14	ENGINE STALLS	• IDLE WITH A/C, P/S, and/or E/L ON • IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGES
DESCRIPTION	• Engine stops unexpectedly when A/C, P/S, and/or E/L turned ON at idle • Engine stops unexpectedly when shifted from N or P to other ranges at idle • Idle condition is normal when A/C, P/S, and E/L are OFF and in N and P	

[TROUBLESHOOTING HINTS]

① Monitor switch functions (SST)
- A/C switch
- Headlight switch
- Rear window defroster
- Blower switch

② Solenoid valve (ISC)
- Solenoid valve stuck

③ Air control valve
- Malfunction of air control valve

STEP	INSPECTION		ACTION
1	Are switches correct when checked by using **SST** monitor switch function while ignition switch ON? ☞ **page F–44** • Blower switch • Headlight switch • Rear window defroster switch • Electric cooling fan • Electrical load unit • A/C switch	Yes	Go to next step
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞ **page F–45**
2	Is "00" or "No service codes" displayed on **SST** with ignition switch ON? ☞ **page F–20** **SELF-DIAGNOSIS CHECKER**  **DT-S1000** 	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–22**
3	Is terminal voltage at ECU correct at idle? ☞ **page F–150** **4Q terminal: Approx. 5-11V (at Idle)**	Yes	Check solenoid valve (ISC) and replace it if necessary ☞ **page F–83** If OK, go to "ENGINE STALLS–IDLE WHEN SHIFTED FROM N or P TO OTHER RANGES" in Section K of this manual
		No	Try known good ECU and check if condition improves ☞ **page F–150**

15	ENGINE STALLS	• DRIVEAWAY
DESCRIPTION	• Engine stops unexpectedly upon driveaway • Idle condition normal	

[TROUBLESHOOTING HINTS]

① Injector
- Fuel leakage from injector(s)
- Injector(s) clogged

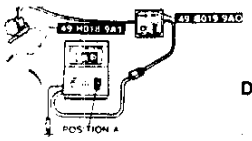
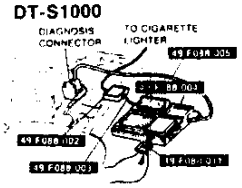
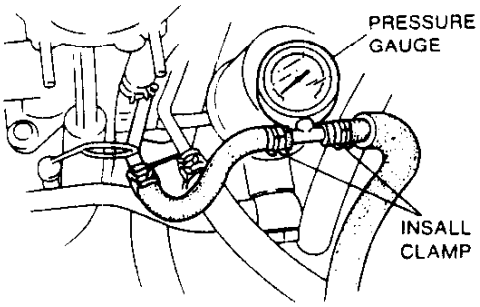
② Pressure regulator
- diaphragm damaged

③ Fuel filter
- Fuel filter clogged

④ Metering oil pump
- Poor connection of connector

⑤ Water thermosensor
- Poor connection of connector

⑥ Crank angle sensor
- Malfunction of sensor

STEP	INSPECTION		ACTION
1	Is "00 " or "No service codes" displayed on **SST** with ignition switch ON? ☞ **page F–20** **SELF-DIAGNOSIS CHECKER**  	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–22**
2	Using Engine Signal Monitor, do voltage reading and lamp operation change as follows upon driveaway? Terminal: 1O — Condition: Voltage gradually increase Terminal: 4D, 4E — Condition: Voltage not suddenly change Terminal: 4W, 4Y — Condition: Flashing of green and red lamps becomes quicker	Yes	Go to next step
		No	Check as follows: • Condition of female terminals in related connector • Continuity between injector connector and ECU 4W or 4Y terminal
3	Connect diagnosis connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F–98** **Fuel line pressure:** **250–260 kPa {2.5–2.7 kgf/cm², 36–38 psi}** 	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F–104** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F–101**
4	Are injectors OK? • No fuel leakage ☞ **page F–106** • Injectors not clogged (Perform volume test) ☞ **page F–67**	Yes	Go to next step
		No	Replace injector ☞ **page F–105**

STEP	INSPECTION		ACTION
5	Is engine compression OK? ☞ **Section G** **Compression** **690 kPa {7.0 kgf/cm², 100 psi} – 250 rpm** **Differential limit of chambers** **150 kPa {1.5 kgf/cm², 21 psi} – 250 rpm**	Yes	Go to next step
		No	Check for cause
6	Are spark plugs OK? ☞ **Section G**	Yes	Go to next step
		No	Clean or replace
7	Try known good ECU: does condition improve? ☞ **page F–150**		

16, 17	ENGINE STALLS	• ON ACCELERATION / WHILE CRUISING
DESCRIPTION	• Engine stops unexpectedly at beginning of acceleration or during acceleration • Engine stops unexpectedly while cruising	

[TROUBLESHOOTING HINTS]

① Fuel pump
- Poor connection

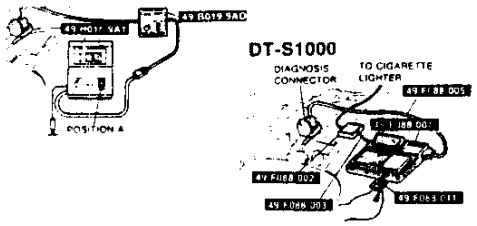
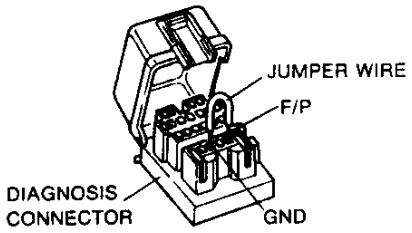
② Pressure regulator
- Diaphragm damaged

③ Crank angle sensor
- Poor connection of connector

④ Pressure sensor
- Poor connection of connector

⑤ Spark plug
- Misfire

⑥ Main relay
- Poor connection of connector

STEP	INSPECTION		ACTION
1	Is "00" or "No service codes" displayed on **SST** with ignition switch ON? ☞ **page F-20** **SELF-DIAGNOSIS CHECKER**  	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence)
2	Ground terminal F/P of diagnosis connector within ignition switch ON; does condition improve?  	Yes	Check as follows; • Poor connection of circuit opening relay • Poor connection of ECU 1T terminal
		No	Go to next step
3	Is pressure regulator OK? ☞ **page F-104**	Yes	Go to next step
		No	Replace
4	Try known good ECU; does condition improved? ☞ **page F-150**		

18	ENGINE STALLS	• ON DECELERATION
DESCRIPTION	• Engine stops unexpectedly at beginning of deceleration or recovery from deceleration • Exhaust afterburn	

[TROUBLESHOOTING HINTS]

① Fuel pump
- Poor connection of connector

② Idle speed
- Idle speed too low

③ Crank angle sensor
- Poor connection of connector

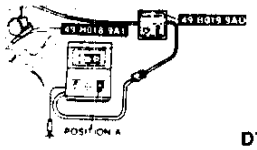
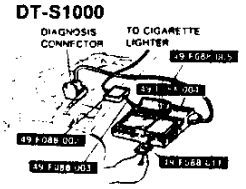
④ Pressure sensor
- Malfunction of pressure sensor

⑤ Solenoid valve (ISC)
- Solenoid valve stuck

⑥ EGR control valve
- Solenoid valve stuck open

⑦ ECU
- Poor connection of connector

⑧ Fuel cut control

STEP	INSPECTION		ACTION
1	Is "00" or "No service codes" displayed on **SST** with ignition switch ON ☞ **page F-20** **SELF-DIAGNOSIS CHECKER**  **DT-S1000** 	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence)
2	Are following ECU terminal voltage correct? **Note** **When checking voltages, tap, move, and wiggle harness and connector** • 1B (Main relay) • 1G, 1H, 1J (Igniter) • 1T (Circuit opening relay) • 4D (Ground) • 4W, 4Y (Primary injector)	Yes	**MT** Check neutral switch and clutch switch ☞ **page F-186** **AT** Go to "ENGINE STALLS ON DECELERATION" in Section K of this manual
		No	Check for cause

19, 20, 21	ENGINE ROUGH	• IDLE AT ANY ENGINE TEMP / DURING FAST IDLE / IDLE AFTER WARM-UP
DESCRIPTION	• Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at any engine temperature • Idle speed too low and excessive engine shake at any engine temperature • Fast idle speed too low and excessive engine shake during fast idle, but returns to normal after warm-up • Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle after warm-up	

[TROUBLESHOOTING HINTS]

① Injector
- Fuel leakage from injector(s)
- Injector(s) clogged

② Air pump
- Malfunction of air pump

③ Circuit opening relay
- Poor connection of connector

④ Spark plug
- Misfire

⑤ Engine
- Compression low

⑥ Fast idle cam
- Malfunction of fast idle cam

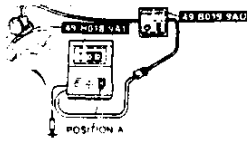
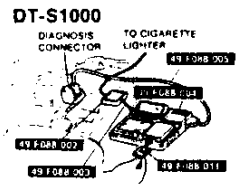
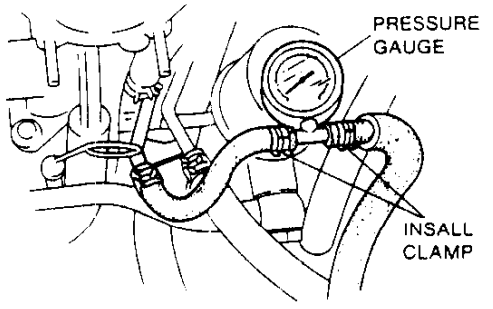
⑦ Pressure sensor
- Malfunction of pressure sensor

⑧ Water thermosensor
- Poor connection of connector

⑨ EGR control valve
- EGR control valve stuck

⑩ Solenoid valve (ISC)
- Poor connection of connector

⑪ Fuel thermosensor

STEP	INSPECTION		ACTION
1	Is "00" or "No service codes" displayed on **SST** with ignition switch ON ? ☞ **page F–20** **SELF-DIAGNOSIS CHECKER**  **DT-S1000** 	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–22**
2	Are spark plugs OK?	Yes	Go to next step
		No	Clean or replace
3	Is strong blue spark visible at each disconnected high-tension lead at idle?	Yes	Go to next step
		No	Check ignition system ☞ **Section G**
4	Connect diagnosis connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F–98** 	Yes	• If symptom occurs at idle at any engine temperature, go to next step • If symptom occurs during fast idle operation, go to Step 6 • If symptom occurs at idle after warm-up, go to Step 10
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F–104** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F–10**
5	Is air pump OK? ☞ **page F-121**	Yes	Go to next step
		No	Repair or replace

STEP	INSPECTION		ACTION
6	Is solenoid valve (ISC) OK? ☞ **page F–83**	Yes	Go to next step
		No	Repair or replace
7	Is fast idle cam OK? ☞ **page F–79**	Yes	Go to next step
		No	Adjust
8	Is accelerated warm-up system OK? ☞ **page F–83**	Yes	Go to next step
		No	Repair or replace
9	Is engine compression correct? ☞ **Section C** **Compression** **690 kPa {7.0 kgf/cm², 100 psi} – 250 rpm** **Differential limit of chambers** **150 kPa {1.5 kgf/cm², 21 psi} – 250 rpm**	Yes	Go to next step
		No	Check for cause ☞ **Section G**
10	Are following ECU terminal voltages correct? ☞ **page F–152** ● 1O (Pressure sensor) ● 3E (Water thermosensor) ● 3L (Intake air thermosensor) ● 4I, 4J, 4K, 4L (Metering oil pump) ● 4Y (Rear primary injector) ● 4W (Front primary injector)	Yes	Go to next step
		No	Check for cause
11	Is EGR control system OK? ☞ **page F–126**	Yes	Try known good ECU; does condition improve? ☞ **page F–150**
		No	Repair or replace

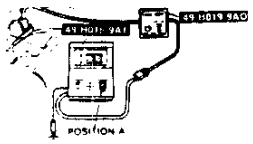
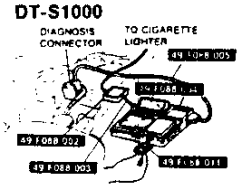
22, 23	ENGINE ROUGH	• IDLE WITH A/C, P/S AND/OR E/L ON • IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGES
DESCRIPTION	• Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when A/C, P/S and/or E/L ON • Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when shifted from P or N to other range	

[TROUBLESHOOTING HINTS]

① Idle speed
- Idle speed too low

② Monitor switch function (SST)
- A/C switch
- Headlight switch
- Rear window defroster switch
- Blower switch

③ Solenoid valve (ISC)
- Solenoid valve stuck

STEP	INSPECTION		ACTION
1	Is idle speed correct? ☞ page F-16	Yes	Go to next step
		No	Adjust ☞ page F-16
2	Is "00" or "No service codes" displayed on **SST** with ignition switch ON? ☞ page F-20 **SELF-DIAGNOSIS CHECKER**  **DT-S1000** 	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence) ☞ page F-22
3	Are following terminal voltage at ECU correct? ☞ page F-1 • 1E (A/C switch) • 1N (P/S pressure switch) • 1R (EC-AT control unit) [AT] • 3B (Electrical load unit) • 3D(Electrical cooling fan)	Yes	Go to next step
		No	Check for cause
5	Warm-up engine Does idle speed decrease when solenoid valve (ISC) connector disconnected?	Yes	• If symptom occurs at idle with A/C ON, check A/C system in Seciton U of this manual • If symptom occurs at idle with E/L ON, check E/L unit ☞ page F-13 • If symptom occurs at idle with P/S ON, check P/S pump in Section N of this manual • If symptom occurs at idle when shifted from N or P to other range, go to "ENGINE ROUGH-IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGE" in Section K of this manual (AT)
		No	Check fast idle cam ☞ page F-79

24	ENGINE ROUGH	• ON DECELERATION
DESCRIPTION	• Engine shakes at beginning of deceleration, or recovery from deceleration • Exhaust afterburn.	

[TROUBLESHOOTING HINTS]

① Fuel pump
- Poor connection of connector

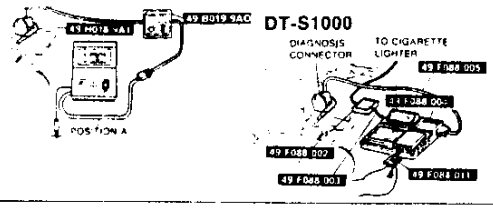
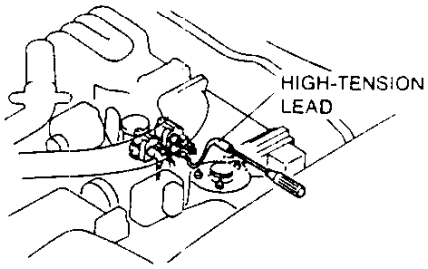
② Injector
- Fuel leakage from injector(s)

③ Dashpot
- Dashpot misadjusted

④ Throttle sensor
- Poor connection of connector

⑤ Secondary air injection system

⑥ Solenoid valve (ISC)
- Solenoid valve stuck

STEP	INSPECTION		ACTION
1	Is "00" or "No service codes" displayed on **SST** with ignition switch ON? **SELF-DIAGNOSIS CHECKER** ☞ page F-20  	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence) ☞ page F-22
2	Is strong blue spark visible at each disconnected high-tension lead?  	Yes	Check spark plugs If OK, go to next step If not OK, clean or replace spark plug
		No	Check ignition system ☞ Section G
3	Is dashpot OK? ☞ page F-134	Yes	Go to next step
		No	Adjust
4	Is intake manifold vacuum correct at idle? **Vacuum:** **More then 60.0 kPa {450 mmHg, 17.7 inHg}**	Yes	Go to next step
		No	Check as follows: • Intake air system components for proper installation • Vacuum hoses for disconnection and damage • Engine compression ☞ Section C
5	Are injectors OK? ☞ page F-106	Yes	Go to next step
		No	Replace
6	Is engine compression OK? ☞ Section C **Compression** **690 kPa {7.0 kgf/cm², 100 psi} – 250 rpm** **Differential limit of chambers** **150 kPa {1.5 kgf/cm², 21 psi} – 250 rpm**	Yes	Go to next step
		No	Check for cause ☞ Section C
7	Try known good ECU; does condition improve? ☞ page F-150		

25, 26	POOR ACCELERATION	• DRIVEAWAY • ON ACCELERATION
DESCRIPTION	• Engine speed increases normally but vehicle speed slowly increases during driveaway or acceleration	

[TROUBLESHOOTING HINTS]

① Injector
- Fuel leakage from injector(s)
- Injector nozzle clogged

② Pressure regulator
- Pressure regulator malfunction

③ Fuel filter
- Filter clogged

④ Spark plug
- Misfire

⑤ Igniter
- Poor connection of connector

⑥ Air leakage in intake air system

⑦ Pressure sensor
- Pressure sensor filter or hose clogged
- Poor connection of connector

⑧ Crank angle sensor
- Poor connection of connector

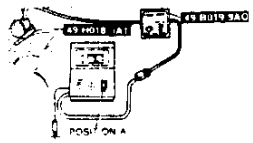
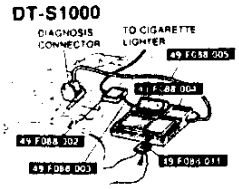
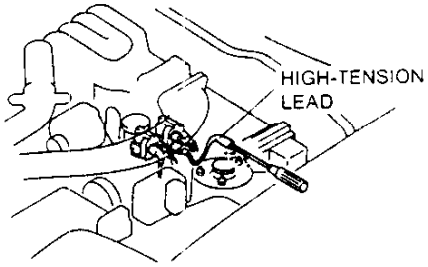
⑨ Metering oil pump
- Malfunction of oil pump
  (Fuel injection amount and ignition timing fixed)

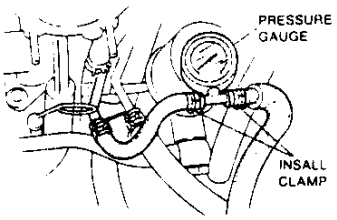
⑩ Solenoid valve (Turbo control, Charge control)
- Malfunction of solenoid valve
  (Fuel injection amount and ignition timing fixed)

⑪ EGR control system
- EGR control valve stuck (open)

⑫ Water thermosensor
- Malfunction of thermosensor

⑬ Double throttle control system

STEP	INSPECTION		ACTION
1	Is "00" or "No service codes" displayed on **SST** with ignition switch ON? ☞ **page F–20** **SELF-DIAGNOSIS CHECKER**  **DT-S1000** 	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–22**
2	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plugs If OK, go to next step If not OK, clean or replace spark plug
		No	Check ignition system ☞ **Section G**
3	Is intake manifold vacuum correct at idle? **Vacuum:** **More than 60.0 kPa {450 mmHg, 17.7 inHg}**	Yes	Go to next step
		No	Check as follows: • Intake air system components and installation • Vacuum hoses for disconnection and damage • Engine compression ☞ **Section C**
4	Is air leakage felt or heard at intake air system components?	Yes	Repair or replace
		No	Go to next step

STEP	INSPECTION		ACTION
5	Is fuel line pressure correct at idle? ☞ **page F-98** **Fuel line pressure:** **190–220 kPa {1.9–2.3 kgf/cm², 28–32 psi}**  	Yes	Go to next step
		No	**Low pressure** Check as follows: • Fuel filter for clogging • Operation of pressure regulator
6	Are injectors OK? ☞ **page F-106**	Yes	**MT** Go to next step **AT** Go to "POOR ACCELERATION – DRIVEAWAY / ON ACCELERATION" in Section K of this manual
		No	Replace
7	Try known good ECU; does condition improve? ☞ **page F-150**		

27	HIGH IDLE SPEED AFTER WARM-UP
DESCRIPTION	• Idle sped continues at fast idle after warm-up • Engine returns slowly to idle after accelerator is released

[TROUBLESHOOTING HINTS]

① Fast idle cam
- Malfunction of fast idle cam

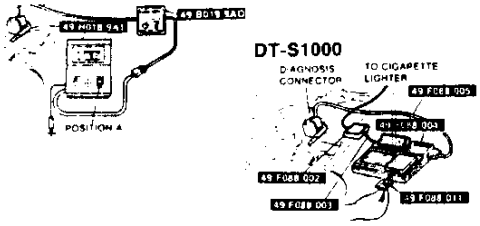
② Accelerated warm-up system
- Solenoid valve (AWS) open

③ Water thermosensor
- Malfunction of water thermosensor

④ Solenoid valve (ISC)
- Solenoid valve (ISC) stuck (open)
- A/C, P/S, or E/L signal always ON

⑤ Throttle valve
- Valve not fully closed

⑥ Dashpot

STEP	INSPECTION	ACTION	
1	Is "00" or "No service codes" displayed on **SST** with ignition switch ON? ☞ **page F–20** **SELF-DIAGNOSIS CHECKER**  	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–22**
2	Connect diagnosis connector terminals TEN and GND with a jumper wire; does idle speed decrease?	Yes	Check following terminal voltage at ECU ☞ **page F–152** • 1E (A/C switch) • 1N (P/S pressure switch) • 3B (Electrical load unit)
		No	Go to next step
3	Are following terminal voltage at ECU correct? ☞ **page F–152** • 1E (A/C switch) • 1O (Pressure sensor) • 3B (Electric load unit) • 3E (Water thermosensor) • 3F (Throttle sensor-Narrow range) • 3L (Intake air thermosensor) • 4P (Solenoid valve (AWS)) • 4Q (Solenoid valve (ISC))	Yes	Go to next step
		No	Check for cause ☞ **page F–153**
4	Is throttle valve fully closed?	Yes	Go to next step
		No	Check following devices • Accelerator cable linkage • Throttle lever • Accelerator pedal • Fast idle cam

STEP	INSPECTION		ACTION
5	Is solenoid valve (AWS) OK? ☞ page F–83	Yes	Go to next step
		No	Repair
6	Is water thermosensor OK? ☞ page F–183	Yes	Go to next step
		No	Replace
7	Try known good ECU: does condition improved? ☞ page F–150		

28	• IDLE FLUCTUATES • IDLE HUNTS
DESCRIPTION	• Engine speed changes back and forth between specified idle speed and higher speed

[TROUBLESHOOTING HINTS]

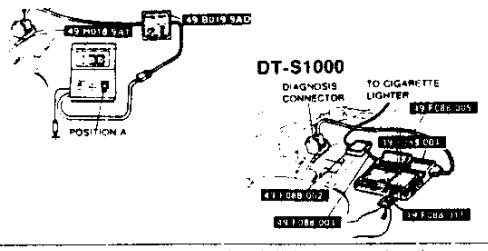
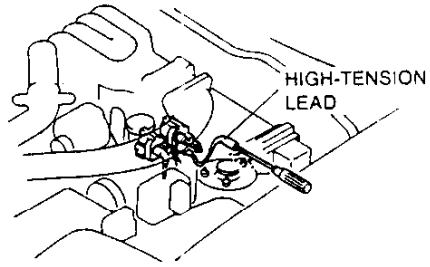
① PCV valve
- PCV valve stuck

② Spark plug
- Dirty or worn spark plug(s)

③ Throttle sensor
- Incorrect adjustment

④ Solenoid valve (ISC)
- Solenoid valve stuck

⑤ Intake air system
- Air leakage

STEP	INSPECTION	ACTION	
1	Is "00" or "No service codes" displayed on **SST** with ignition switch ON? ☞ **page F–20** **SELF-DIAGNOSIS CHECKER** 	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–22**
2	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plug(s) If OK, go to next step If not OK clean or, replace spark plug(s)
		No	Check as follows: • Ignition coils • Igniter • High tension leads • ECU 1G, 1H, 1J terminal voltage ☞ **Section G**
3	Is air leakage felt or heard at intake air system components?	Yes	Repair or replace
		No	Go to next step
4	Is PCV valve stuck? ☞ **page F–124**	Yes	Replace PCV valve
		No	Go to next step
5	Is solenoid valve (ISC) OK? ☞ **page F–83**	Yes	Go to next step
		No	Replace
6	Is fuel line pressure correct at idle? ☞ **page F–98** **Fuel line pressure:** **190–220 kPa {1.9–2.3 kgf/cm², 28–32 psi}**	Yes	Go to next step
		No	**Low pressure** Check as follows: • Fuel filter for clogging • Operation of pressure regulator
7	Try known good ECU; does condition improved? ☞ **page F–150**		

29	• **HESITATES** • **STUMBLES ON ACCELERATION**
DESCRIP-TION	• Momentary pause at beginning of acceleration or during acceleration

[TROUBLESHOOTING HINTS]

① Injector
- Fuel leakage from injector(s)

② Pressure regulator
- Pressure regulator stuck

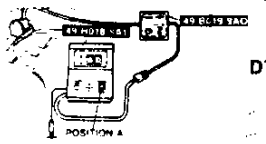
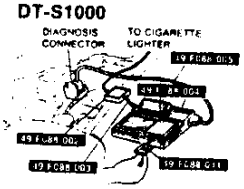
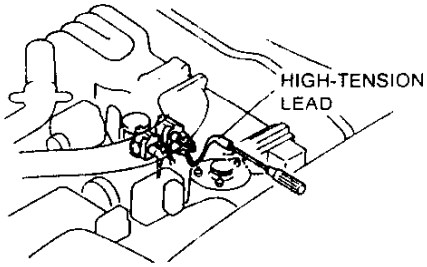
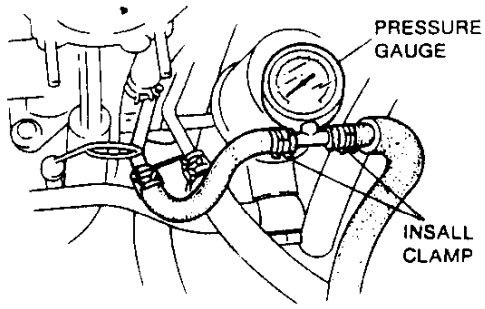
③ High-tension lead
- Lead damaged

④ Spark plug
- Dirty or worn spark plug(s)

⑤ Pressure sensor
- Malfunction of pressure sensor

⑥ EGR control valve
- EGR control valve stuck

⑦ Double throttle control
- Double throttle valve stuck

STEP	INSPECTION		ACTION
1	Is "00" or "No service codes" displayed on **SST** with ignition switch ON? ☞ **page F–20** **SELF-DIAGNOSIS CHECKER**  **DT-S1000** 	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–22**
2	Is strong blue spark visible at each disconnected high-tension lead at idle? 	Yes	Check spark plug(s) If OK, go to next step If not OK, clean or replace spark plug(s)
		No	Check ignition system ☞ **Section G**
3	Is fuel line pressure correct at idle? ☞ **page F–104** **Fuel line pressure** **190–220 kPa {1.9–2.3 kgf/cm², 28–32 psi}** 	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F–104** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F–101**

STEP	INSPECTION		ACTION
4	Does fuel pressure increase when throttle valve opened? (engine running)	Yes	Go to next step
		No	Check pressure regulator ☞ page F-104
5	Are following termina. voltage at ECU correct? ☞ page F-154 1O (Pressure sensor) 3F (Throttle sensor–Full range) 3G (Throttle sensor–Narrow range) 3K (Solenoid valve (Relief 2)) 30 (Solenoid valve (Double throttle)) 3P (Solenoid valve (Relief 1)) 4E (Crank angle sensor (NE)) 4I, 4J, 4K, 4L (Metering oil pump) 4O (Solenoid valve (EGR)) 4R (Solenoid valve (Turbo control)) 4S (Solenoid valve (Charge relief)) 4T (Solenoid valve (Charge control)) 4V (Solenoid valve (Turbo precontrol)) 4W, 4X, 4Y, 4Z (Fuel injector)	Yes	Go to next step
		No	Check for cause ☞ page F-155
6	Are injectors OK? ☞ page F-106	Yes	Go to next step
		No	Repair or replace
7	Is EGR control system OK? ☞ page F-126		
8	Try known good ECU. does condition improve? ☞ page F-150		

30	SURGES WHILE CRUISING
DESCRIPTION	• Momentary minor irregularity in engine power at steady vehicle speed.

[TROUBLESHOOTING HINTS]

① Injector
- Poor connection of connector

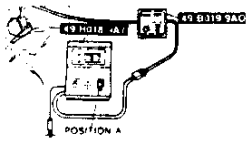
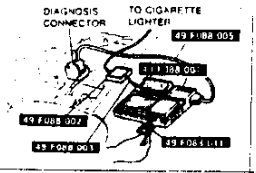
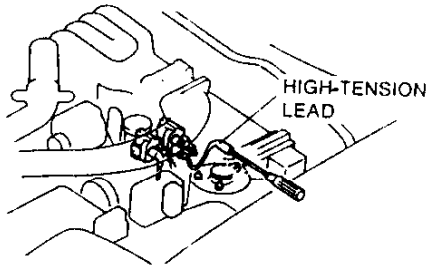
② Spark plug
- Dirty or worn spark plug(s)

③ Pressure sensor
- Poor connection of connector

④ Igniter
- Poor connection of connector

⑤ Ignition coil
- Malfunction of ignition coil

⑥ Throttle sensor

STEP	INSPECTION		ACTION
1	Is "00" or "No service codes" displayed on **SST** with ignition switch ON? ☞ **page F–20** **SELF-DIAGNOSIS CHECKER**  **DT-S1000** 	Yes	**"00" or "No service codes" displayed** Go to next step
		No	**Service Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–22**
2	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plug(s) for damage If OK, go to next step If not OK, replace spark plug(s)
		No	Check ignition system ☞ **Section G**
3	Does idle become rough when shaking connector of following devices? • Injector • Igniter • Ignition coil • Crank angle sensor	Yes	Check condition of connector
		No	Go to next step
4	Are following terminal voltage at ECU correct? ☞ **page F–158** • 1G, 1H, 1J (Igniter) • 3G (Throttle sensor–Full range) • 4O (Solenoid valve (EGR)) • 4R (Solenoid valve (Turbo control)) • 4S (Solenoid valve (Charge relief)) • 4V (Solenoid valve (Turbo precontrol)) • 4W, 4X, 4Y, 4Z (Injector)	Yes	Go to next step
		No	Check for cause ☞ **page F–159**
5	Try known good ECU; does condition improve? ☞ **page F–150**		

31	LACK OF POWER
DESCRIPTION	• Performance poor under load (i.e., power down when climbing hills)

[TROUBLESHOOTING HINTS]

① Pressure sensor
- Malfunction of pressure sensor

② Secondary injector
- Poor connection of connector
- Nozzle clogged

③ Air leakage
- Turbo boost leakage

④ Spark plug
- Dirty or worn spark plug(s)

⑤ Throttle sensor (Full range)
- Malfunction of throttle sensor

⑥ Fuel filter
- Filter clogged

⑦ Pressure regulator
- Malfunction of pressure regulator

⑧ Double throttle control system
- Double throttle valve not open

⑨ Sequential twin turbo control system
- Secondary port not open

⑩ EGR control system
- EGR control valve stuck (open)

⑪ Air cleaner
- Clogged element

⑫ Catalytic converter
- Clogged catalytic converter

⑬ Fuel
- Low octane fuel used

⑭ Metering oil pump
- Poor connection of connector

32	POOR FUEL ECONOMY
DESCRIPTION	• Fuel economy unsatisfactory

[TROUBLESHOOTING HINTS]

① Engine compression
- Compression low

② Spark plug(s)
- Dirty or worn spark plug(s)

③ Ignition coil
- Malfunction of ignition coil

④ Pressure regulator
- Malfunction of pressure regulator

⑤ Intake air leakage
- Air hose damaged or disconnected

33	A/C DOES NOT WORK
DESCRIPTION	• A/C compressor magnetic clutch does not engage when A/C switch ON

[TROUBLESHOOTING HINTS]

① A/C relay
- Poor connection of connector
- Relay malfunction

☞ Section U

② A/C switch
- Does not send signal to ECU terminal 1E

☞ page F-152

③ ECU
- ECU 1L terminal circuit open

☞ page F-154

16E0F2-232

34	• KNOCKING • PINGING
DESCRIPTION	• Sound produced when air/fuel mixture is ignited by something other than spark plug (i.e., hot spot in combustion chamber)
[TROUBLESHOOTING HINTS] Knock sensor • Open or short in harness (Code No.05 output)	☞ page F-185

16E0F2-283

35	FUEL ODOR
DESCRIPTION	• Gasoline smell or visible leaks
[TROUBLESHOOTING HINTS] ① Solenoid valve (purge control) • Open harness (Code No.26 output) ② Charcoal canister • Canister full of fuel and leaking	☞ page F-131

16E0F2-284

36	EXHAUST SULFUR SMELL
DESCRIPTION	• Rotten egg smell (sulfur) from exhaust
[TROUBLESHOOTING HINTS] High sulfer content fuel used	

16E0F2-285

37	HIGH OIL CONSUMPTION
DESCRIPTION	• Oil consumption excessive
[TROUBLESHOOTING HINTS] ① Metering oil pump • Malfunction of metering oil pump • Open or short in wiring harness ② PCV valve • PCV valve stuck open	☞ Section D ☞ page F-124

38	SELF-DIAGNOSIS CHECKER FLASHES 88 / DT-S1000 INDICATES "SYSTEM ERROR"
DESCRIP-TION	• Checker flashes 88 with test connector (TEN) grounded • DT-S1000 indicates "System error"
[TROUBLESHOOTING HINTS] ① Short circuit in wiring between diagnosis connector terminal FEN and ECU terminal 1F ② ECU malfunction	

16E0F2-287

39	MIL NEVER ON
DESCRIP-TION	• Self-Diagnosis Checker or DT-S1000 indicates Service Code No. of input device but MIL never ON
[TROUBLESHOOTING HINTS] ① Bulb burnt ② Electrical load unit 1K terminal circuit open ☞ page F-135	

16E0F2-288

SERVICE POINTS

OUTLINE

[Power and Ground]

ECU ground (Injector)

- An open circuit will not produce any symptom.
- If the ECU ground (Output devices) circuit also has an open, the engine will not start.

ECU ground (Output devices)

- An open circuit will not produce any symptom.
- If ECU ground (Injector) circuit also has an open, the engine will not start.

ECU ground (System)

- An open circuit will not produce any symptom.

ECU ground (Analogue)

- If the circuit has an open, engine hard starting and rough idle will be caused and Service Code Nos. 09, 11, 12, 13, 20 and 23 will be output.

Main relay (Battery power)

- If the circuit is shorted, the EGI INJ fuse (30A) will burn out.

Room fuse (ECU memory power)

- If the circuit is open, the ECU memory function will not operate, and service codes for intermittent malfunctions will not be indicated. Also, the learning control will be canceled, but will not produce any particular symptom.
- If the circuit is shorted, the ROOM fuse (15A) will burn out.

[Input Device]

A/C switch

- The switch monitor function can confirm the presence of an open or short circuit.
- If the circuit is open, the air conditioner (the magnetic clutch) will not operate.
- If the circuit is shorted, the air conditioner will constantly operate when the blower is ON.

Atmospheric pressure sensor

- The sensor is contained in the ECU.
- If the sensor has an open or short circuit, Service Code No. 14 is output, and the ECU will use a preprogrammed pressure of sea level.
- A malfunction in the sensor causes engine roughness at high elevation.

Clutch switch (MT)

☞ Refer to "Neutral / clutch switches"on page F–187.

Crank angle sensor (NE, G signal)

- If the NE signal circuit has an open or short, Service Code No. 02 is output.
- If the G signal circuit has an open or short, Service Code No. 03 is output.
- If the NE or G signal circuit has an open or short, the engine will not start (No fuel injection and no ignition).

Daytime running light unit (Canada)

- If the circuit has an open, the idle speed will be slightly slow.
- If the circuit is shorted, idle speed will be slightly fast.

E/L unit

- If the circuit has an open, the switch monitor function can confirm that the blower fan, headlight, rear window defroster, and electric cooling fan operating signals are not input to the ECU.
- If the circuit is short, the Idle speed will be increased slightly.

EGR Switch (Calif.)
- If the EGR switch or circuit has an open or short, Service Code No. 16 is output.
- In the above conditions, the EGR control valve will be fully closed.

Fuel thermosensor
- If the thermosensor circuit has an open or short, Service Code No. 23 is output.
- In the above conditions, the ECU will use a preprogrammed temperature value of 50°C {122°F} and no symptom will be noticed.

Heat hazard switch
- If the circuit has open, no sympotm will be noticed.
- If the switch or circuit has a short, the heat hazard warning light will illuminate and the air pump will not operate, causing rough idle.

Inhibitor signal (AT ; Refer to Section K)
- If the circuit is open or shorted, the idle speed will be slightly low in R, D, S, and L ranges.

Intake air thermosensor
- If the thermosensor or circuit has an open or short, Service code No. 11 is output.
- In the above conditions, no symptom will be noticed.

Knock sensor
- If the knock sensor or circuit has an open or short, Service Code No. 05 is output.
- In the above conditions, ignition timing is retarded.

Metering oil pump position sensor
- If the sensor or circuit has an open or short, Service Code 20 is output.
- In the above conditions, the fuel injection amount is fixed, causing poor acceleration and hesitation.

Mileage switch / Power steering pressure switch
- If the switch circuit has an open circuit, no particular symptom will be noticed.
- If the switch circuit has a short circuit, idle speed will be increased.

Neutral switches (MT)
- The switch monitor function of the Self-Diagnosis Checker can confirm the presence of an open or short circuit.
- If the circuit is open, the idle speed drops when the A/C, P/S, or electrical load is ON.

1–2 switch (MT)
- If the circuit has an open or short, no symptom will be noticed.

Oxygen sensor
- If the sensor output voltage continues below 0.55V for 100 sec. after the engine exceeds 1,500 rpm because of an open or short circuit, Service Code No. 15 is output.
- If the sensor output voltage continues unchanged 50 sec, after the engine exceeds 1,500 rpm, Service Code No. 17 is output.
- In the above conditions, no fuel injection feedback control will be present and no symptom will be noticed.

Pressure sensor
- If the sensor or circuit has an open or short, Service code No. 13 is output.
- In the above condition, the ECU uses a preprogrammed fuel injection amount, causing rough idle and poor acceleration with afterburn.

P/S pressure switch
- Refer to "Mileage switch"

Reduce torque signal (AT ; Refer to Section K)
- If a malfunction occurs in the reduce torque signal, the torque reduction control system is inhibited and line pressure will be high at shifting. Shift shock may be slightly increased.

Slip lock-up signal (AT ; Refer to Section K)
- If a malfunction occurs in the slip lock-up signal, line pressure will be high at shifting and shift shock may be slightly increased.

Solenoid valve (Shift A) (AT)
- Refer to Section K

Solenoid valve (Shift B) (AT)
- Refer to Section K

Speedometer sensor
- If the vehicle speed signal circuit has an open or short, Service Code No. 06 is output.
- If the circuit has open or short, hold mode will not operate.

Start signal
- A lack of engine cranking signal will cause hard starting when engine is cold.

Stoplight switch
- The switch monitor function can confirm the presence of an open or short circuit.
- An open or short circuit will produce no symptom.
- A short circuit will cause the STOP fuse (20A) burn out.

Throttle sensor (Narrow range)
- If the sensor or circuit has an open or short, Service Code No. 18 is output.
- In the above condition, rough idle, and engine stall on deceleration will be caused.

Throttle sensor (Full range)
- If the sensor or circuit has an open or short, Service Code No. 12 is output.
- In the above condition, poor acceleration will be caused.

TEN terminal (Diagnosis connector)
- If the circuit is open, the Self-Diagnosis Checker or DT-S1000 can not perform service code checks, switch monitoring checks, real time monitor check and simulation check.
- If the circuit is shorted, the opening amount of the solenoid valve (ISC) will not change, causing hard starting and rough idle. The Self-Diagnosis Checker or DT-S1000 cannot perform sensor monitoring chekcs.

Water thermosensor
- If the thermosensor or circuit has an open or short, Service Code No. 09 is output, and ECU uses a preprogrammed temperature value of 82°C {180°F}.
- A malfunction in the water thermosensor or its circuit will cause hard starting or engine stall when engine is cold.
- In the above condition, the electric cooling fan will constantly operate when the ignition switch is ON.

[Output Device]

A/C relay

- If the circuit is open, the air conditioner (Magnetic clutch) will not operate.
- If the circuit is shorted, the air conditioner will constantly operate when blower is ON, causing rough idle.

Air pump relay

- If the relay or circuit has an open or short, Service Code No. 54 is output.
- If the circuit is short, air pump will always operate, causing catalytic converter melted.
- If the circuit is open, the air pump will never operate, causing rough idle.

Circuit opening relay

- If the circuit is open, the engine will not start.
- If the circuit is shorted, the fuel pump will operate whenever the ignition switch is ON.

EC-AT control unit (AT)

- Refer to Section K

Electric cooling fan relay

- If the circuit is shorted, the cooling fan will always operate while the ignition switch ON.
- If the circuit is open, the cooling fan will not operate until the engine temperature exceeds 108°C {226°F}.

Fuel injector

- If a secondary injector or circuit has an open or short, Service Code No. 71 (Front) or 73 (Rear) is output, causing poor acceleration and lack of engine power.
- If a primary injector or circuit has an open, engine will stall and will not start.

Fuel pump relay

- If the relay or circuit has an open or short, Service Code No. 51 is output.
- If the circuit is open, engine will hesitate or engine power will lack.

FEN terminal (Diagnosis connector)

- If the circuit between the diagnosis connector and E/L unit is open, the Self-Diagnosis Checker buzzer will not sound during the service code check or the DT-S 1000 will indicate " System error" on the display.
- If the circuit between ECU 1F terminal and E/L unit is open, the Self-Diagnosis Checker buzzer will constantly sound during the service code check or the DT-S1000 will indicate "System error" on the display.
- If the circuit is shorted, code "88"will keep flashing and the buzzer will continue sounding (Self-Diagnosis Checker), or "service error" is indicated on DT-S1000 display, preventing a service code check.

Igniter

- If a trailing igniter or circuit has an open or short, idle speed will be slightly decreased and poor acceleration will be cased.
- If the leading igniter or circuit has an open or short, hard starting and rough idle will be caused.

Metering oil pump

- If the pump or circuit has an open or short, Service Code No. 26 and 27 are output.
- In the above conditions, ECU fixes ignition timing and fuel injection amount, causing engine poor acceleration.

MEN Terminal (Diagnosis Connector)
- If the circuit is open, the monitor lamp will not illuminate.
- If the circuit is shorted, the monitor lamp will stay on.

Solenoid valve (Accelerated warm-up system)
- If the solenoid valve or circuit has an open or short, Service Code No. 38 is output.
- If the circuit is open, the fast idle speed just after engine starting will not exceed 2,000 rpm.
- If the circuit is shorted, the idle speed will be increased and then hunted at the specified speed (approx. 1500 rpm after warm-up).

Solenoid valve (Charge control)
- If the solenoid valve or circuit has an open or short, Service Code No. 45 is output.
- In the above conditions, the ECU fixes the ignition timing and fuel injection amount, causing poor acceleration and lack of power.

Solenoid valve (Charge relief)
- If the solenoid valve or circuit has an open or short, Service Code No. 46 is output.
- If the circuit is open, the charge relief valve will always open, causing poor acceleration.
- If the circuit is shorted, the charge relief valve will always closed, causing momentarily intake air noise on acceleration.

Solenoid valve (Double throttle control)
- If the solenoid valve or circuit has an open or short, Service Code No. 50 is output.
- If the circuit is open, the double throttle valve will always closed, causing poor acceleration and lack of power.
- If the circuit is shorted, the double throttle valve will always open, causing hesitation when the engine is cold.

Solenoid valve (EGR)
- If the solenoid valve or circuit has an open or short, Service Code No. 28 is output.
- If the circuit is open, no symptom will be noticed.
- If the circuit is shorted, the EGR valve will always open, causing engine stalling and hard starting.

Solenoid valve (ISC)
- If the solenoid valve or circuit has an open or short, Service Code No. 34 is output.
- If the circuit is open, the valve will always fully closed, causing rough idle and hard starting.
- If the circuit is shorted, the valve will always fully open, causing high idle speed. (After warm-up, engine hunts at approx. 1500 rpm.)

Solenoid valve (Port air bypass)
- If the solenoid valve or circuit has an open or short, Service Code No. 33 is output.
- In the above conditions, no symptom will be noticed.

Solenoid valve (Pressure regulator control)
- If the solenoid valve or circuit has an open or short, Service Code No. 25 is output.
- If the circuit is open, hard starting may result when the engine is hot.
- If the circuit is shorted, fuel pressure will always be approx. 280 kPa {2.9 kgf/cm^2, 41 psi} and no symptom will be noticed.

Solenoid valve (Purge control)
- If the solenoid valve or circuit has an open or short, Service Code No. 40 is output.
- If the circuit is open, no symptom will be noticed.
- If the circuit is shorted, the engine stalls at low speed.

Solenoid valve (Relief 1)
- If the solenoid valve or circuit has an open or short, Service Code No. 31 is output.
- If the circuit is open, no symptom will be noticed.
- If the circuit is shorted, solenoid / valve will be always open and CO and HC will be increased.

Solenoid valve (Relief 2)
- If the solenoid valve or circuit has an open or short, Service Code No. 39 is output.
- If the circuit is open, no symptom will be noticed.
- If the circuit is shorted, secondary air noise will be heard while the air pump operates.

Solenoid valve (Split air bypass)
- If the solenoid valve or circuit has an open or short, Service Code No. 30 is output
- In the above conditions, no symptom will be produced.

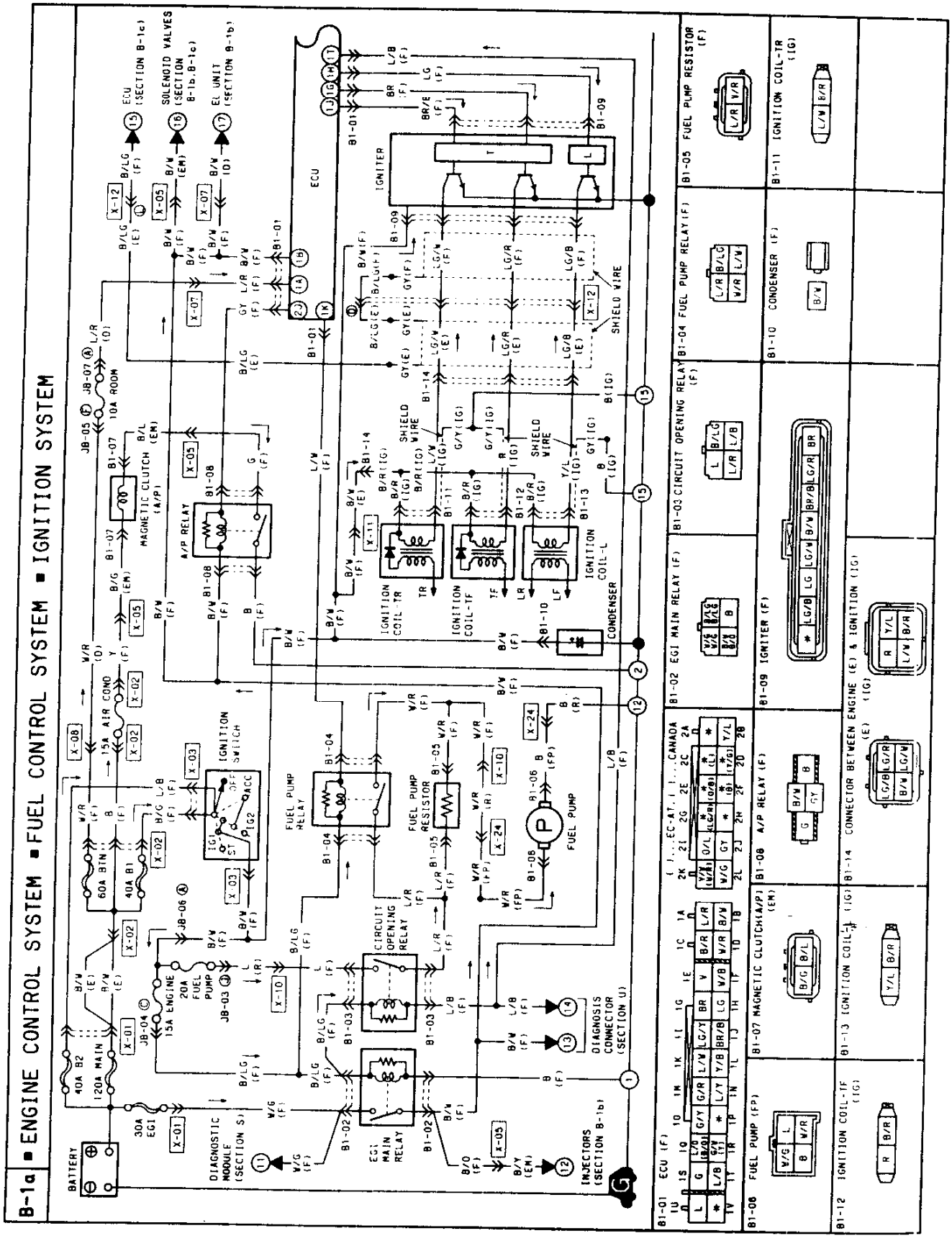
Solenoid valve (switching)
- If the solenoid valve or circuit has an open or short, Service Code No. 32 is output.
- If the circuit is open, no symptom will be noticed.
- If the circuit is shorted, rough idle will result.

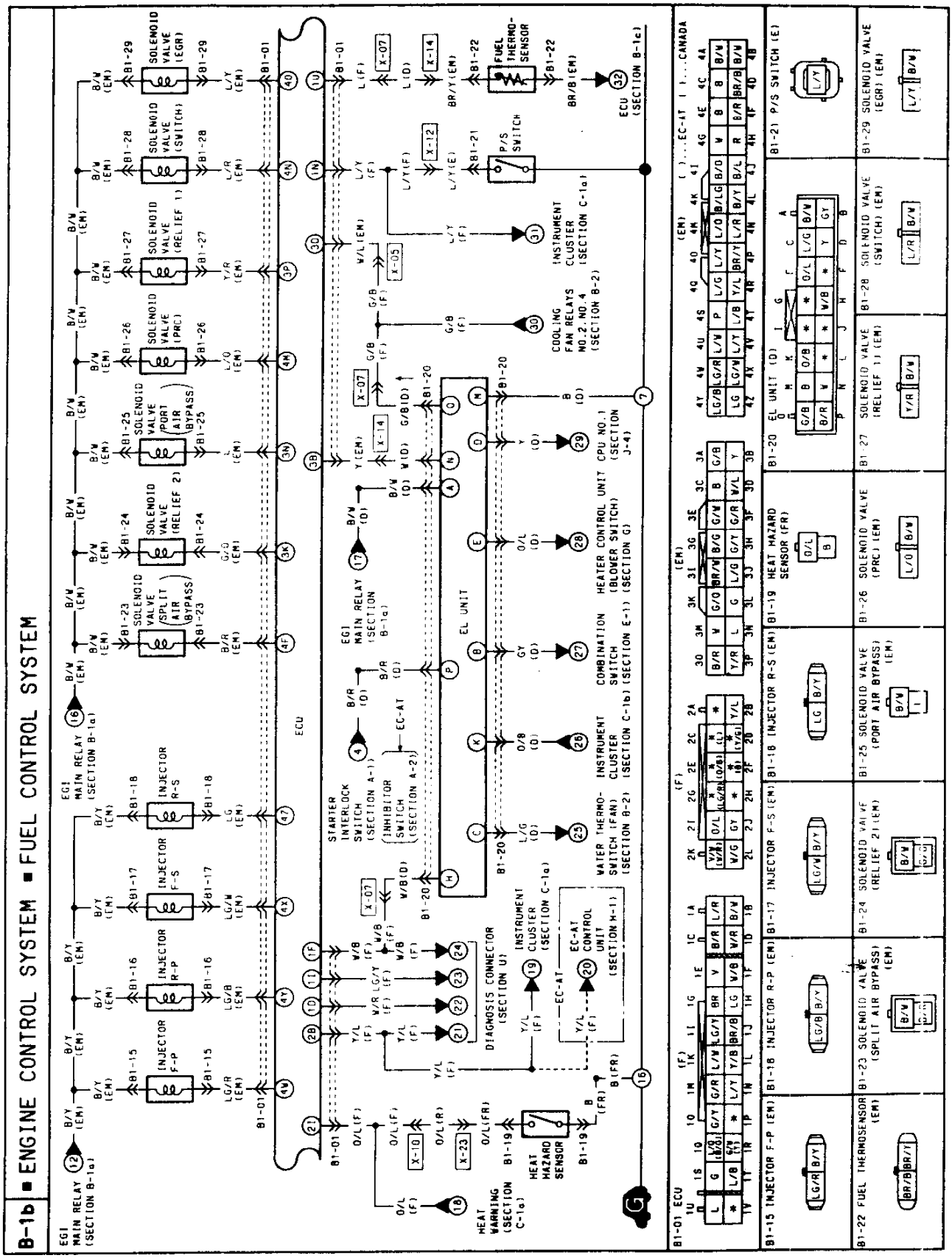
Solenoid valve (Turbo control 1, Turbo control 2)
- If the solenoid valve or circuit has an open or short, Service Code No. 44 is output.
- If the circuit is open, the turbo control valve will not open, causing poor acceleration and lack of power.
- If the circuit is shorted, turbo control valve will open earlier on acceleration, causing poor acceleration.

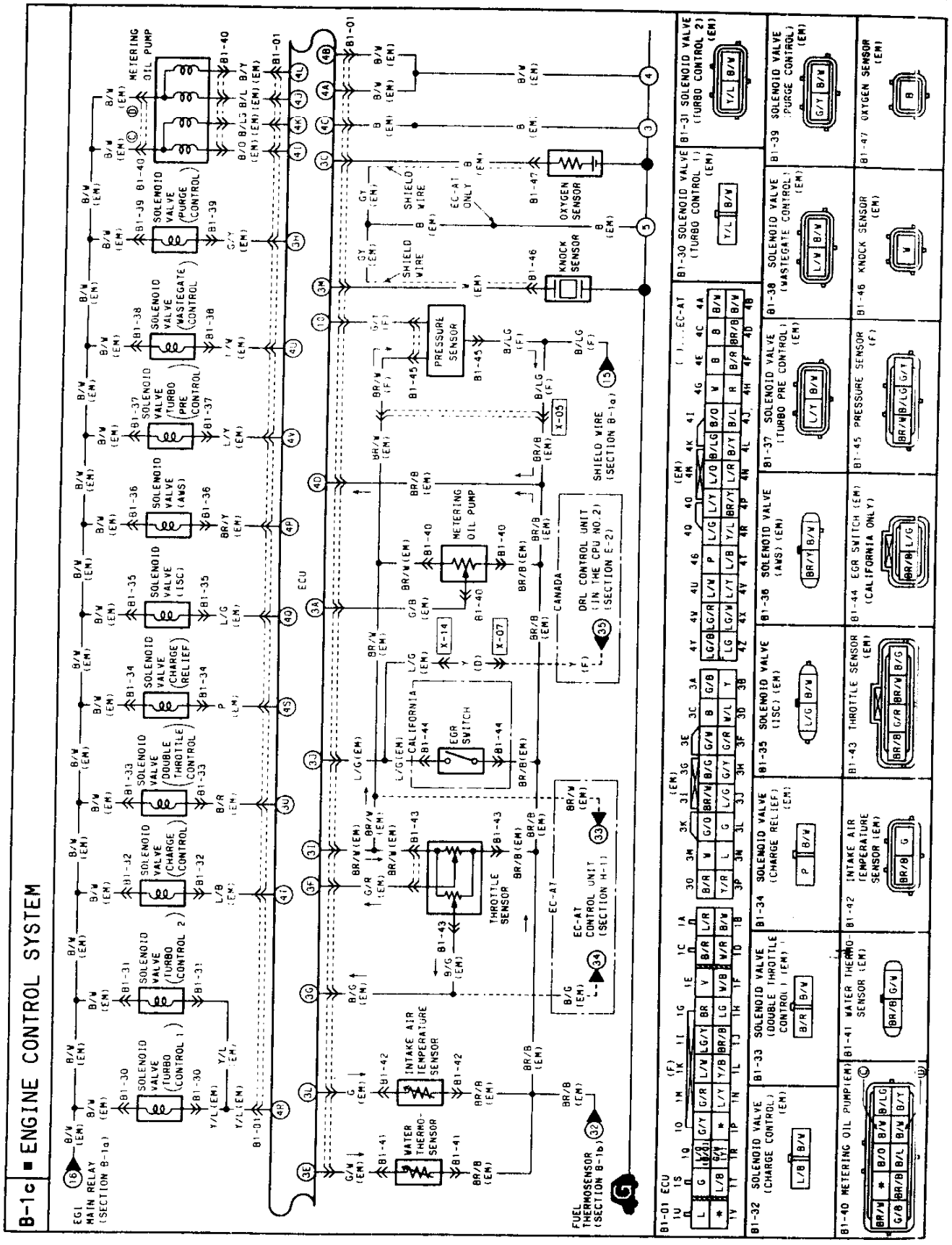
Solenoid valve (Turbo precontrol)
- If the solenoid valve or circuit has an open or short, Service Code No. 42 is output.
- If the circuit is open, the precontrol valve will open earlier, causing slightly hesitation and poor acceleration.
- If the circuit is short, precontrol valve will never open, causing hesitation and poor acceleration.

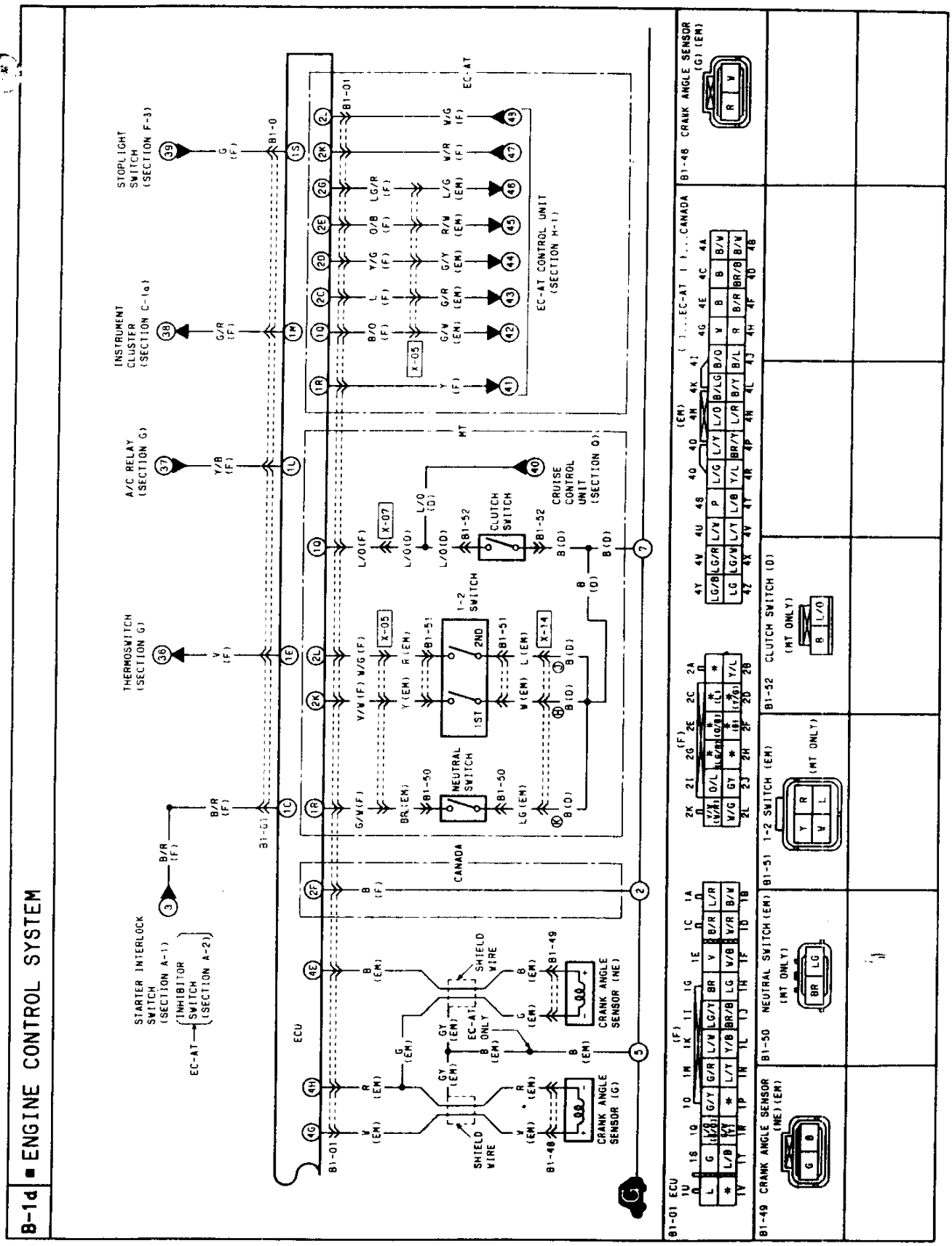
Solenoid valve (Wastegate control)
- If the solenoid valve or circuit has an open or short, Service Code No. 43 is output.
- If the circuit is open, wastegate valve will open earlier, causing poor acceleration and lack of power.
- If the circuit is shorted, wastegate valve will not open easily and no symptom will be noticed. (To prevent engine damage, the overboost fuel cut will be operated)

WIRING DIAGRAM




B-1b ■ ENGINE CONTROL SYSTEM ■ FUEL CONTROL SYSTEM
EGI MAIN RELAY (SECTION B-1a)
ECU
INJECTOR F-P
INJECTOR R-P
INJECTOR F-S
INJECTOR R-S
SOLENOID VALVE (SPLIT AIR BYPASS)
SOLENOID VALVE (PORT AIR BYPASS)
SOLENOID VALVE (RELIEF 2)
SOLENOID VALVE (RELIEF 1)
SOLENOID VALVE (PRC)
SOLENOID VALVE (SWITCH)
SOLENOID VALVE (EGR)
STARTER INTERLOCK SWITCH (SECTION A-1)
(INHIBITOR SWITCH (SECTION A-2))
EGI MAIN RELAY (SECTION B-1a)
EL UNIT
DIAGNOSIS CONNECTOR (SECTION U)
INSTRUMENT CLUSTER (SECTION C-1a)
EC-AT CONTROL UNIT (SECTION H-1)
WATER THERMO-SWITCH (FAN) (SECTION B-2)
INSTRUMENT CLUSTER (SECTION C-1b) (SECTION E-1) (SECTION G)
COMBINATION SWITCH (SECTION E-1)
HEATER CONTROL UNIT (BLOWER SWITCH) (SECTION G)
CPU NO.1 (SECTION J-4)
COOLING FAN RELAYS NO.2 NO.4 (SECTION B-2)
INSTRUMENT CLUSTER (SECTION C-1a)
P/S SWITCH
FUEL THERMO-SENSOR
ECU (SECTION B-1c)
HEAT WARNING (SECTION C-1a)
HEAT HAZARD SENSOR
B1-01 ECU
B1-15 INJECTOR F-P (EM)
B1-16 INJECTOR R-P (EM)
B1-17 INJECTOR F-S (EM)
B1-18 INJECTOR R-S (EM)
B1-19 HEAT HAZARD SENSOR (FR)
B1-20 EL UNIT (D)
B1-21 P/S SWITCH (E)
B1-22 FUEL THERMOSENSOR (EM)
B1-23 SOLENOID VALVE (SPLIT AIR BYPASS) (EM)
B1-24 SOLENOID VALVE (RELIEF 2) (EM)
B1-25 SOLENOID VALVE (PORT AIR BYPASS) (EM)
B1-26 SOLENOID VALVE (PRC) (EM)
B1-27 SOLENOID VALVE (RELIEF 1) (EM)
B1-28 SOLENOID VALVE (SWITCH) (EM)
B1-29 SOLENOID VALVE (EGR) (EM)


B-1c ■ ENGINE CONTROL SYSTEM
EGI MAIN RELAY (SECTION B-1a)
SOLENOID VALVE (TURBO CONTROL 1)
SOLENOID VALVE (TURBO CONTROL 2)
SOLENOID VALVE (CHARGE CONTROL)
SOLENOID VALVE (DOUBLE THROTTLE CONTROL)
SOLENOID VALVE (CHARGE (RELIEF))
SOLENOID VALVE (ISC)
SOLENOID VALVE (AWS)
SOLENOID VALVE (TURBO PRE CONTROL)
SOLENOID VALVE (WASTEGATE CONTROL)
SOLENOID VALVE (PURGE CONTROL)
METERING OIL PUMP
ECU
WATER THERMO-SENSOR
INTAKE AIR TEMPERATURE SENSOR
THROTTLE SENSOR
EGR SWITCH
CALIFORNIA
CANADA
EC-AT CONTROL UNIT (SECTION H-1)
ORL CONTROL UNIT (IN THE CPU NO.2) (SECTION E-2)
PRESSURE SENSOR
KNOCK SENSOR
OXYGEN SENSOR
SHIELD WIRE
EC-AT ONLY
FUEL THERMOSENSOR (SECTION B-1b)
SHIELD WIRE (SECTION B-1a)
B1-01 ECU
B1-30 SOLENOID VALVE (TURBO CONTROL 1) (EM)
B1-31 SOLENOID VALVE (TURBO CONTROL 2) (EM)
B1-32 SOLENOID VALVE (CHARGE CONTROL) (EM)
B1-33 SOLENOID VALVE (DOUBLE THROTTLE CONTROL) (EM)
B1-34 SOLENOID VALVE (CHARGE RELIEF) (EM)
B1-35 SOLENOID VALVE (ISC) (EM)
B1-36 SOLENOID VALVE (AWS) (EM)
B1-37 SOLENOID VALVE (TURBO PRE CONTROL) (EM)
B1-38 SOLENOID VALVE (WASTEGATE CONTROL) (EM)
B1-39 SOLENOID VALVE (PURGE CONTROL) (EM)
B1-40 METERING OIL PUMP (EM)
B1-41 WATER THERMO-SENSOR (EM)
B1-42 INTAKE AIR TEMPERATURE SENSOR (EM)
B1-43 THROTTLE SENSOR (EM)
B1-44 EGR SWITCH (EM) (CALIFORNIA ONLY)
B1-45 PRESSURE SENSOR (F)
B1-46 KNOCK SENSOR (EM)
B1-47 OXYGEN SENSOR (EM)


B-1d ■ ENGINE CONTROL SYSTEM
STARTER INTERLOCK SWITCH (SECTION A-1)
INHIBITOR SWITCH (SECTION A-2)
EC-AT
B/R (F)
THERMOSWITCH (SECTION G)
A/C RELAY (SECTION G)
INSTRUMENT CLUSTER (SECTION C-1a)
STOPLIGHT SWITCH (SECTION F-3)
EC-AT CONTROL UNIT (SECTION H-1)
ECU
NEUTRAL SWITCH
1-2 SWITCH
CLUTCH SWITCH
CRUISE CONTROL UNIT (SECTION G)
CANADA
MT
CRANK ANGLE SENSOR (NE)
CRANK ANGLE SENSOR (G)
SHIELD WIRE
EC-AT ONLY
B1-01 ECU
B1-48 CRANK ANGLE SENSOR (G) (EM)
B1-49 CRANK ANGLE SENSOR (NE) (EM)
B1-50 NEUTRAL SWITCH (EM)
B1-51 1-2 SWITCH (EM)
B1-52 CLUTCH SWITCH (D)
(MT ONLY)

ELECTRICAL DIAGNOSIS SUPPORT

[Power and Ground]

Main relay (Battery power)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1B)—Main relay	Engine hard starting	EGI INJ fuse (30A) burns out when ignition switch ON	NA

16E0F1-291

Room fuse (Memory power)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1A)—Room fuse	No symptom	ROOM fuse (15A) burns out	NA

16E0F1-292

ECU ground (Output device, Injector, System, Analogue)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4A)—Ground (Output device)	(One side open circuit) No symptom (Both sides open circuit) Engine will not start	NA	(One side poor ground) No symptom (Both sides poor ground) Engine will not start
ECU (4B)—Ground (Injector)			
ECU (4C)—Ground (System)	No symptom		No symptom
ECU (4D)—Ground (Analogue)	Code Nos. 09, 11, 12, 13, 20, and 23 Engine hard starting Rough idle		Code Nos. 09, 11, 12, 13, 20, and 23 Engine hard starting Rough idle

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[Input Device]

A/C switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1E)—A/C amplifier	Air conditioner (magnetic clutch) will not operate	Air conditioner will constantly operate with blower ON	NA

Clutch switch (MT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1Q)—Clutch switch	No symptom	No symptom	NA

Crank angle sensor (NE, G signal)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4E)—Crank angle sensor (NE)	Code No. 02 output Engine will not start	Code No. 02 output Engine will not start	NA
ECU (4G)—Crank angle sensor (G)	Code No. 03 output Engine will not start	Code No. 03 output Engine will not start	
ECU (4H)—Crank angle sensor (Ground)	Code Nos. 02 and 03 output Engine will not start	NA	Engine will not start Engine suddenly stalls

Daytime running light unit (Canada)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3J)—Daytime running light unit	Idle speed may be slightly low	Idle speed may be slightly high	NA

NA: Not applicable

E/L unit

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1F)—E/L unit (H)	MIL will never ON	MIL will always ON Self-Diagnosis Checker buzzer sounds constantly	NA
ECU (3B)—E/L unit (N)	Idle speed will be low when E/L ON*1	Idle speed will be high	
Main relay—E/L unit (A)	Idle speed will be low when E/L ON*1	EGI INJ fuse (30A) burns out when ignition switch ON	
Headlight switch—E/L unit (B)	Idle speed may be low when headlight switch ON	Parking lights will always ON	
Electric cooling fan relay—E/L unit (C)	Idle speed may be low when cooling fan operates	Cooling fan always operates when ignition switch ON	
Rear defroster switch—E/L unit (D)	Idle speed may be low when defroster switch ON	Rear window defroster always ON when ignition switch ON	
Heater control unit—E/L unit (E)	Idle speed may be low when blower fan operate high speed	High idle speed when blower fan not operate	
MIL—E/L unit (K)	MIL will never ON	MIL will always ON	
Ground—E/L unit (M)	Idle speed drops when E/L ON*1 MIL will never ON	NA	Idle speed hunts or drops when E/L ON*1 MIL will never ON
Electric cooling fan relay—E/L unit (O)	Idle speed may be low when cooling fan operates	Cooling fan always operates when ignition switch ON	NA
Inhibitor switch—E/L unit (P)	No symptom	No symptom	

*1 E/L ON: Headlight switch ON, electric cooling fan operating, rear window defroster switch ON, or blower fan control switch at 3rd or 4th position.

EGR switch (Calif.)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3J)—EGR switch	Code No. 16 output No symptom	Code No. 16 output No symptom	NA
ECU (4D)—EGR switch		No symptom	

Fuel thermosensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1U)—Fuel thermosensor	Code No. 23 output No symptom	Code No. 23 output No symptom	NA
ECU (4D)—Fuel thermosensor		No symptom	

Heat hazard switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (2I)—Heat hazard switch	No symptom	Heat hazard warning light illuminates Rough idle	NA
Ground—Heat hazard switch		No symptom	No symptom

NA: Not applicable

Inhibitor signal (AT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1R)—EC-AT control unit (1C)	Idle speed drops when shifted to L, S, D or R range		NA

Intake air thermosensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3L)—Thermosensor	Code No. 11 output No symptom	Code No. 11 output No symptom	NA
ECU (4D)—Thermosensor		No symptom	

Knock sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3M)—Knock sensor	Code No. 05 output Lack of power Knocking	Code No. 05 output Lack of power Knocking	NA

Metering oil pump position sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3A)—Metering oil pump (J)	Code No. 20 output Poor acceleration Hesitation	Code No. 20 output Poor acceleration Hesitation	NA
ECU (4D)—Metering oil pump (H)		No symptom	
ECU (3I)—Metering oil pump (I)		Code No. 20 output Poor acceleration Hesitation	

Mileage switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1N)—Mileage switch	No symptom	Idle speed slightly high	NA

Neutral switch (MT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1R)—Neutral switch	Idle speed slightly high	Idle speed drops when A/C, P/S, or E/L ON	NA

1-2 switch (MT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (2K)—1-2 switch	No symptom	No symptom	NA
ECU (2L)—1-2 switch			
Ground—1-2 switch			No symptom

NA: Not applicable

Oxygen sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3C)—Oxygen sensor	Code No. 15 output No symptom	Code No. 15 output No symptom	NA

Pressure sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1O)—Pressure sensor	Code No. 13 output Poor acceleration Rough idle	Code No. 13 output Poor acceleration Rough idle	NA
ECU (3I)—Pressure sensor			
ECU (4D)—Pressure sensor		No symptom	

P/S Pressure sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1N)—P/S Pressure switch	No symptom	Idle speed slightly high	NA

Reduced torque signal, slip lock-up signal (AT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1Q)—EC-AT control unit (2P)	Shift shock slightly increased		NA

Solenoid valve (Shift A) (AT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (2K)—EC-AT CU (1D)	Shift shock slightly increased		NA

Solenoid valve (Shift B) (AT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (2L)—EC-AT CU (1B)	Shift shock slightly increased		NA

Speedometer sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1M)—Speedometer sensor	Code No. 06 output Hold mode will not operate (AT)		NA

Stoplight signal (Stoplight switch)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1S)—Stoplight switch	No symptom	STOP fuse (20A) burns out	NA

NA: Not applicable

Throttle sensor (Narrow range, Full range)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3F)—Throttle sensor (Narrow range)	Code No.18 output Rough idle Strong shift shock (AT)	Code No.18 output Rough idle Strong shift shock (AT)	NA
ECU (3G)—Throttle sensor (Full range)	Code No.12 output Poor acceleration Strong shift shock (AT)	Code No.12 output Poor acceleration Strong shift shock (AT)	
ECU (3I)—Throttle sensor	Code Nos.12, 18 output Rough idle	Code Nos.12 and 18 output Rough idle	
ECU (4D)—Throttle sensor	Code No.12 output Rough idle	No sympton	

TEN terminal (Diagnosis connector)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1I)—Diagnosis connector	Cannot perform service code checks and switch monitor checks	Hard starting Rough idle	NA

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Water thermosensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3E)—Water thermosensor	Code No.09 output Rough idle and hard starting when engine cold	Code No.09 output Rough idle and hard starting when engine cold	NA
ECU (4D)—Water thermosensor		No symptom	

[Output Device]
A/C relay

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1L)—A/C relay	A/C will not operate	A/C constantly operate when blower ON Rough idle	NA

Air pump relay

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (2J)—Air pump relay	Code No.54 output Rough idle	Code No.54 output Catalytic converter melted	NA

Fuel injector

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4X, 4Z)—Secondary injector	Code No.71 or 73 output Lack of power	Code No.71 or 73 output Engine will not start	NA
ECU (4W, 4X)—Primary injector	Engine stall Engine will not start	Engine stalls Engine will not start	

Electric cooling fan relay

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3D)—fan relay	Cooling fan will not operate until coolant temperature exceeds 108°C {226°F}	Cooling fan always operate when ignition switch ON	NA

NA : Not applicable

Fuel pump relay

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1K)—Fuel pump relay	Code No.51 output Hesitation Lack of power	Code No.51 output No symptom	NA

FEN terminal (Diagnosis connector)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1F)—Diagnosis connector	Self-Diagnosis Checker buzzer will not sound during service code check or "system error" indicated on DT-S1000 display	Code "88" will keep flashing and buzzer will continue sounding during service code check or "system error" indicated on DT-S1000 display	NA

Igniter

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1G)—Igniter (Trailing Front) ECU (1J) —Igniter (Trailing Rear)	Poor acceleration Hard starting when engine cold		NA
ECU (1H)—Igniter (Leading)	Rough idle Poor acceleration Hard starting when engine cold		

Metering oil pump

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4I, 4J, 4K, 4L)—Metering oil pump	Code No.26 and 27 output Poor acceleration		NA

NA: Not applicable

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MEN terminal (Diagnosis connector)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (1D)—MEN terminal	Monitor lamp will not illuminate	Monitor lamp stays on	NA

Solenoid valve (Accelerated warm-up system)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4P)—Solenoid valve	Code No.38 output Fast idle speed just after engine starting will not exceed 2,000 rpm	Code No.38 output Idle speed stays stays or fluctuates at approx. 1,500 rpm after warm-up	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

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Solenoid valve (Charge control)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4T)—Solenoid valve	Code No.45 output Lack of power Poor acceleration	Code No.45 output Lack of power Poor acceleration	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

NA: Not applicable

Solenoid valve (Charge relief)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4S)—Solenoid valve	Code No.46 output Poor acceleration	Code No.46 output Momentarily Intake air noise on acceleration	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Double throttle control)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3O)—Solenoid valve	Code No.50 output Poor acceleration Lack of power	Code No.50 output Hesitation when engine cold	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (EGR) [Calif.]

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4O)—Solenoid valve	Code No.28 output No symptom	Code No.28 output Engine stall Hard starting	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (ISC)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4Q)—Solenoid valve	Code No.34 output Rough idle Hard start	Code No.34 output Idle speed stays or fluctuates at approx. 1,500 rpm after warm-up	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Port air bypass)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3N)—Solenoid valve	Code No.33 output No symptom	Code No.33 output No symptom	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

NA: Not applicable

Solenoid valve (Pressure regulator control)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4M)—Solenoid valve	Code No.25 output Hard starting when engine warm-up	Code No.25 output No symptom EGI INJ fuse (30A) burns out when ignition switch ON	NA
Solenoid valve—Main relay			

Solenoid valve (Purge control)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3H)—Solenoid valve	Code No.40 output No symptom	Code No.40 output Hard starting Engine stalls at low speed	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Relief 1)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3P)—Solenoid valve	Code No.31 output No symptom	Code No.31 output CO and HC increased	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Relief 2)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (3K)—Solenoid valve	Code No.39 output No symptom	Code No.39 output Secondary air noise heard while air pump operates	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Split air bypass)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4F)—Solenoid valve	Code No.30 output No symptom	Code No.30 output No symptom	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Switching)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4N)—Solenoid valve	Code No.32 output No symptom	Code No.32 output Rough idle	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

NA: Not applicable

Solenoid valve (Turbo control 1, Turbo control 2)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4R)—Solenoid valve (s)	Code No.44 output Poor acceleration	Code No.44 output Poor acceleration	NA
Solenoid valve (s)—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Turbo precontrol)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4V)—Solenoid valve	Code No.42 output Hesitation Poor acceleration	Code No.42 output Hesitation Poor acceleration	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Wastegate control)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ECU (4U)—Solenoid valve	Code No.43 output Lack of power Poor acceleration	Code No.43 output No symptom	NA
Solenoid valve—Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

NA: Not applicable