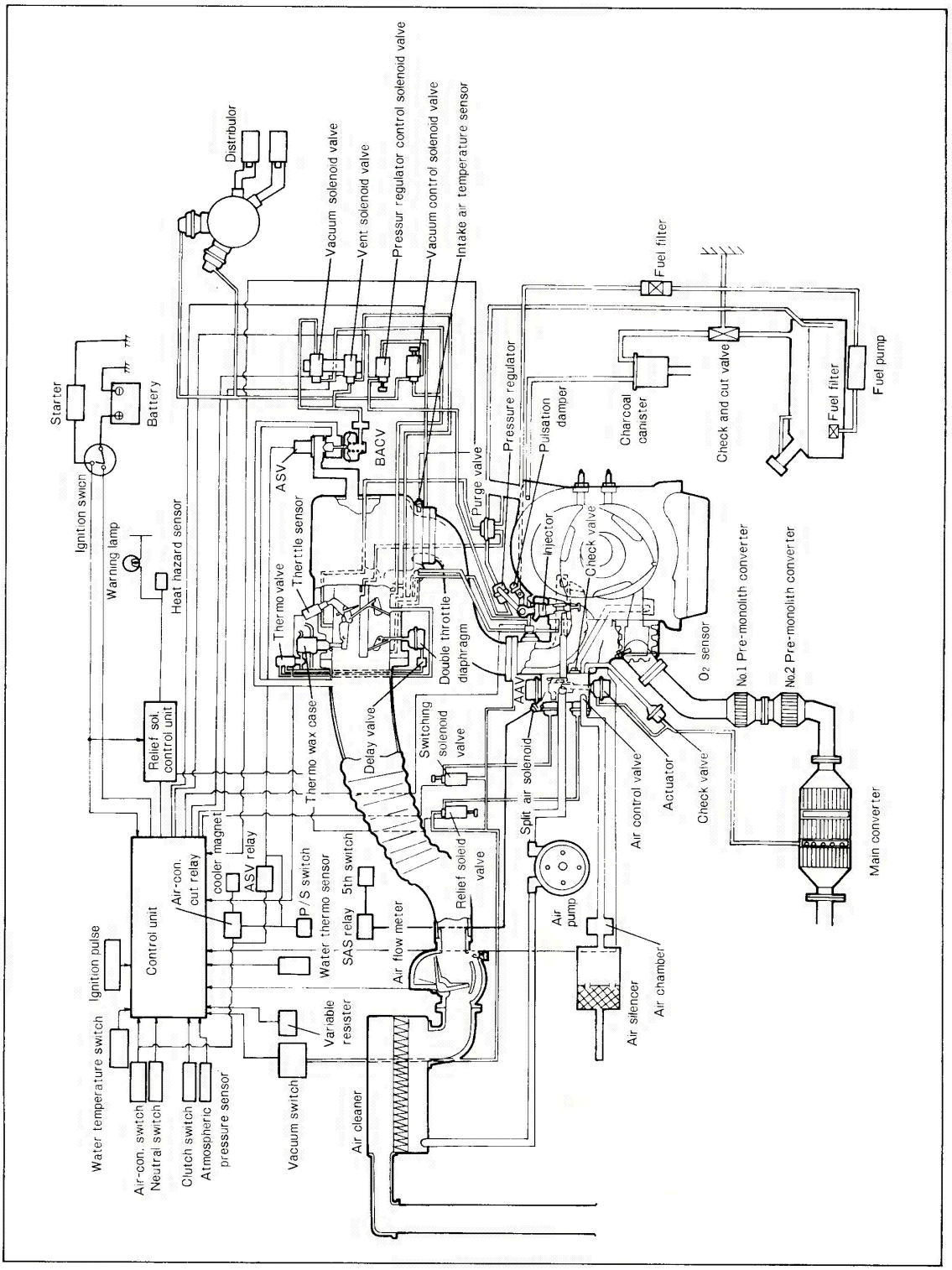
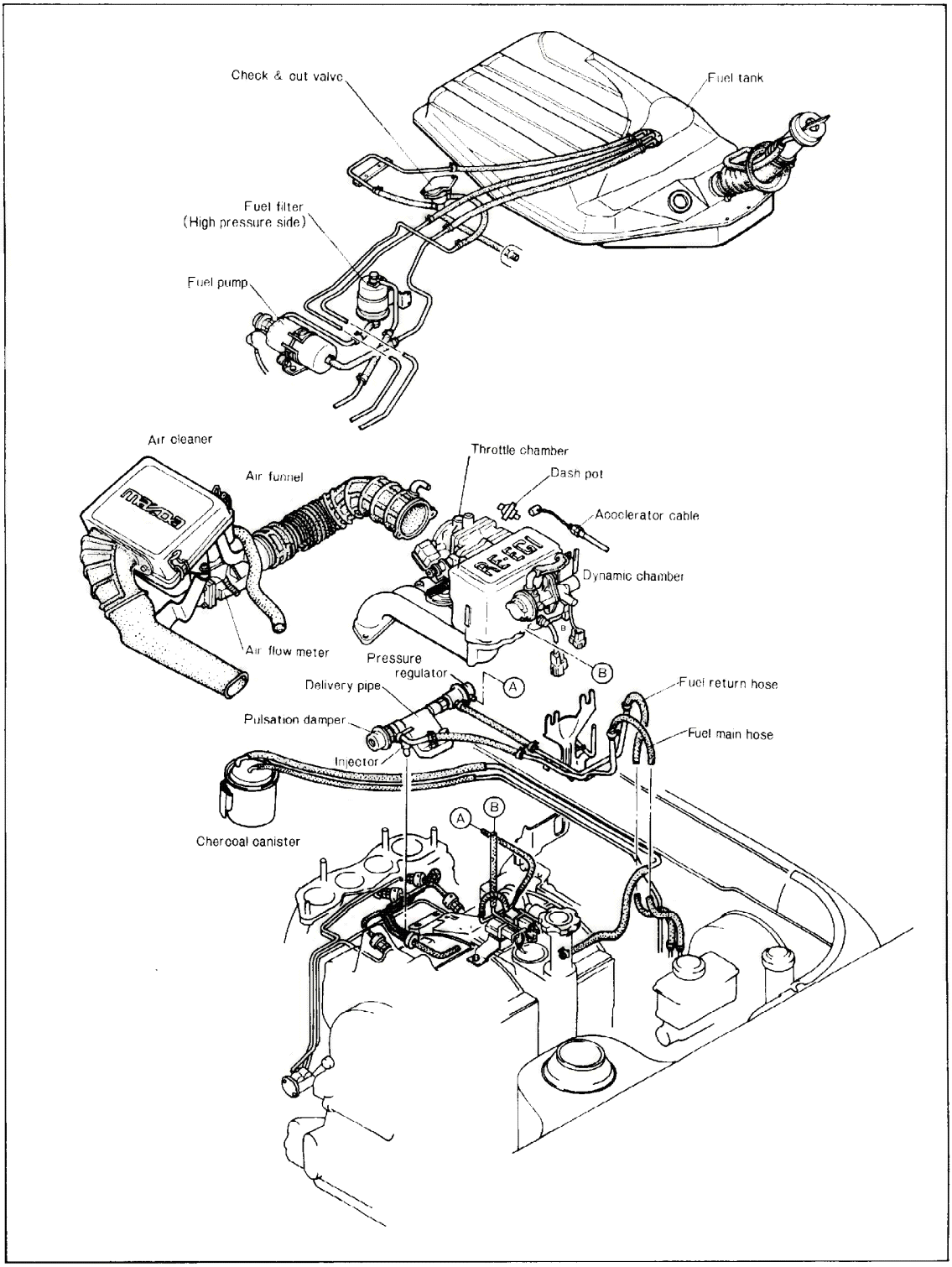
FUEL AND EMISSION CONTROL SYSTEM (13B ENGINE)

SYSTEM DIAGRAM

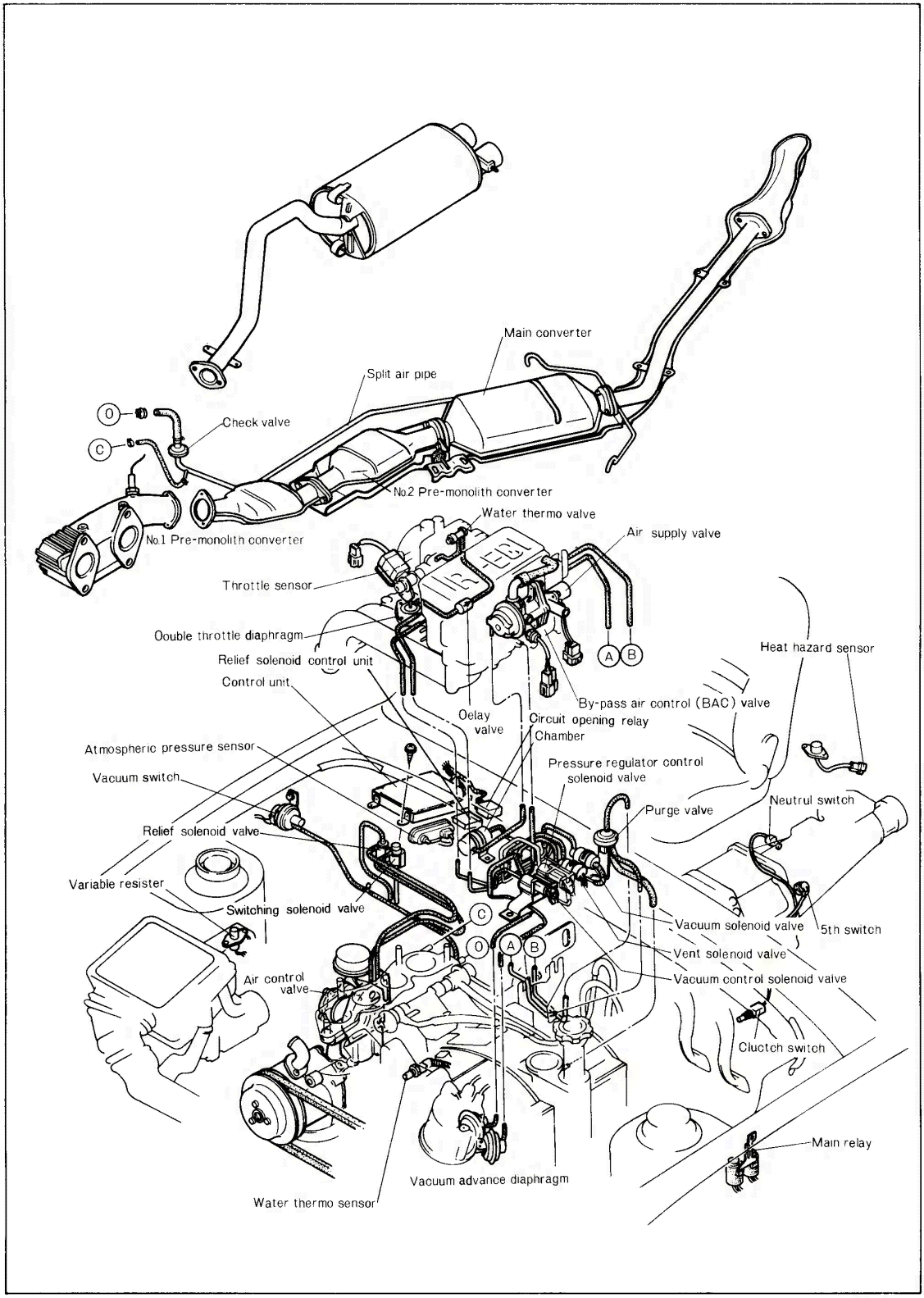


47U04B-502

EMISSION CONTROL SCHEMATIC DIAGRAM



47U04B-503


Main converter
Split air pipe
Check valve
No.2 Pre-monolith converter
No.1 Pre-monolith converter
Water thermo valve
Air supply valve
Throttle sensor
Oouble throttle diaphragm
Relief solenoid control unit
Control unit
Heat hazard sensor
By-pass air control (BAC) valve
Oelay valve
Circuit opening relay
Chamber
Atmospheric pressure sensor
Vacuum switch
Pressure regulator control solenoid valve
Purge valve
Neutrul switch
Relief solenoid valve
Variable resister
Switching solenoid valve
Vacuum solenoid valve
5th switch
Vent solenoid valve
Air control valve
Vacuum control solenoid valve
Cluctch switch
Main relay
Vacuum advance diaphragm
Water thermo sensor

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COMPONENT DESCRIPTIONS

Component	Function	Remarks
1. **Air Cleaner**	Filters air into throttle chamber	
2. **Air Control Valve (ACV)**	Directs air to one of three locations; exhaust port, 3-bed catalyst or back to the relief air silencer	Consists of 3 valves: Air Relief Valve Air Switching Valve Anti-afterburn Valve
3. **Air Flow Meter**	Detects amount of intake air; sends signal to control unit	
4. **Air Pump**	Supplies secondary air to ACV	
5. **Air Supply Valve**	Supplies by-pass air into dynamic chamber	During air-con. operation During P/S operation
6. **Anti-Afterburn Valve**	Supplies fresh air into rear port during deceleration	Included in ACV; vacuum operated
7. **Atmospheric Pressure Sensor**	Detects atmospheric pressure; sends to control unit	
8. **By-pass Air Control (BAC) Valve**	Controls amount of by-pass air to maintain idling speed, etc.	Controlled by vent solenoid valve and vacuum solenoid valve
9. **Canister**	Stores gas tank fumes when engine stops	Vented to atmosphere through charcoal and filter
10. **Check and Cut Valve**	Releases excessive pressure or vacuum in fuel tank to atmosphere Prevents fuel loss if vehicle overturns	

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Component	Function	Remarks
11. Clutch Switch and Neutral Switch	Detect in-gear condition; sends signal to control unit	Closes when clutch pedal is depressed; opens when clutch pedal is released Closes in neutral; opens in all other ranges
12. Control Unit	Detects the following: 1. Engine speed 2. Radiator coolant temperature 3. Engine coolant temperature 4. Throttle opening 5. Intake manifold vacuum 6. O_2 concentration 7. In-gear condition 8. Idle mixture 9. Floor temperature 10. Intake air temperature 11. Cranking signal 12. Atmospheric pressure 13. Air conditioner ON/OFF condition 14. Amount of intake air Controls operation of the following: 1. Vacuum control solenoid valve 2. Switching solenoid valve 3. Relief solenoid valve 4. BAC valve (vent solenoid valve and vacuum solenoid valve) 5. Pressure regulator control solenoid valve 6. Fuel injection system	1. Ignition coil – terminal 2. Water temperature switch 3. Water thermo sensor 4. Throttle sensor 5. Vacuum switch 6. O_2 sensor 7. Clutch switch and neutral switch 8. Variable resistor 9. Heat hazard sensor 10. Intake air temperature sensor 11. Starter switch 12. Atmospheric pressure sensor 13. Air con. switch 14. Air flow meter
13. Dash Pot	Gradually closes throttle during deceleration	Contacts at 2,350 ~ 2,650 rpm (in neutral)
14. Heat Hazard Sensor	Detects floor temperature; sends signal to relief solenoid valve control unit	Closes above 130°C (266°F) when heat hazard sensor is closed; relieves secondary air

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Component	Function	Remarks
15. **Intake Air Temperature Sensor**	Detects intake air temperature; controls pressure control valve and BAC valve through control unit	Thermistor
16. **No. 1 Pre-Monolith Converter**	Reduce HC, CO	Oxidizing catalyst
17. **No. 2 Pre-Monolith Converter**	Reduce HC, CO and NOx	3 way catalyst
18. **Over Drive Switch**	Controls ACV solenoid	5th gear: open Others: closed
19. **O_2 Sensor**	Detects exhaust manifold O_2 concentration; sends signal to control unit	
20. **Pressure Regulator Control Solenoid Valve**	Shuts vacuum passage between dynamic chamber and pressure regulator (to prevent engine stopping)	Operates when: Intake air temperature is above 50°C (122°F) During cranking After cranking
21. **Purge Valve**	Carries evaporative fumes from gas tank and canister to intake manifold	During open throttle
22. **Relief Solenoid Valve**	Relieves secondary air to air cleaner when unnecessary	Blue
23. **Split Air Solenoid Valve**	Controls amount of split air; increase split air when ACV solenoid operates	Operates when overdrive switch is open

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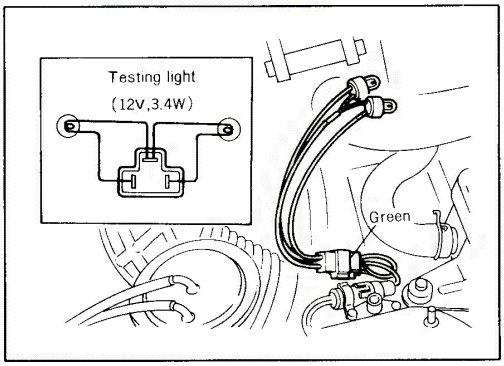
Component	Function	Remarks
24. Split Air Injection Pipe	Secondary air injected between center monolith and rear monolith (main converter) above 1,100 rpm with open throttle	
25. Switching Solenoid Valve	Switches secondary air to exhaust port or rear catalyst	Gray
26. Throttle Sensor	Detects throttle opening angle	
27. Vacuum Advance Diaphragm	Controlled by solenoid valve	
28. Vacuum Control Solenoid Valve	Cut vacuum to distributor during deceleration, etc.	Green
29. Vacuum Switch	Detects intake manifold vacuum; sends signal to control unit	Opens when intake manifold vacuum is 0 ~ 100 mmHg
30. Vent Solenoid Valve and Vacuum Solenoid Valve	Controls BAC valve	Controlled by control unit
31. Water Temperature Switch	Detects radiator coolant temperature; sends signal to control unit	Above 15°C (59°F): ON
32. Water Thermo Sensor	Detects engine coolant temperature; sends signal to control unit	Thermistor
33. 3-bed Monolith Converter	Further reduces HC, CO and NOx	3 way catalyst (Main converter)

47U04B-508

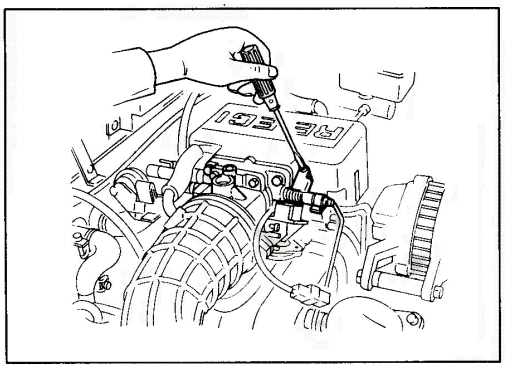


47U04B-001

EMISSION CHECKING PROCEDURE

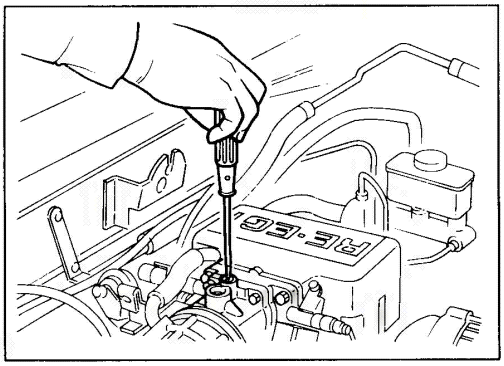
CHECKING THROTTLE SENSOR

1. Warm up the engine and stop it.
2. Connect the testing lights to the checking connector (Green).
3. Turn the ignition switch on and check whether one of the lights illuminates.



47U04B-002

4. If the both lights illuminate or neither does, turn the throttle sensor adjusting screw until one of the lights illuminates.
   a) If both lights illuminate, turn the adjusting screw counter-clockwise.
   b) If both lights do not illuminate, turn the adjusting screw clockwise.
5. After adjusting, attach the cap to the adjusting screw.

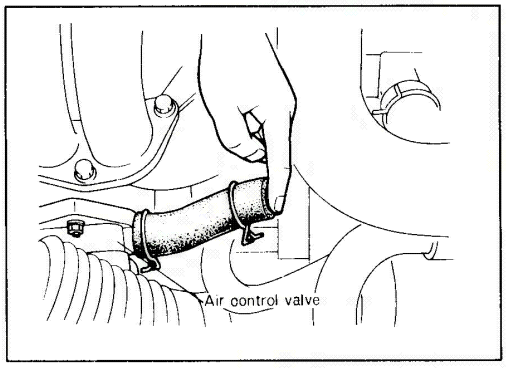


47U04B-003

CHECKING IDLE SPEED

6. Connect a tachometer to the engine.
7. Start the engine and adjust the idling speed. (Refer to page 4B–64.)

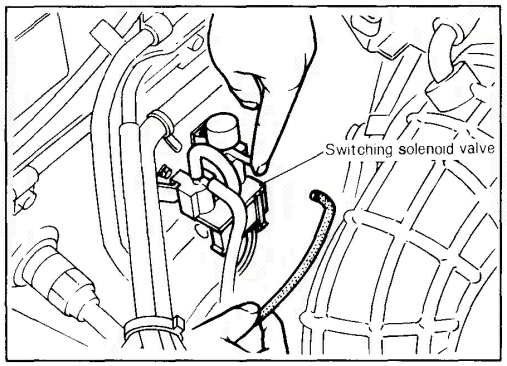
Idling speed: 800 rpm



47U04B-004

CHECKING ANTI-AFTERBURN VALVE

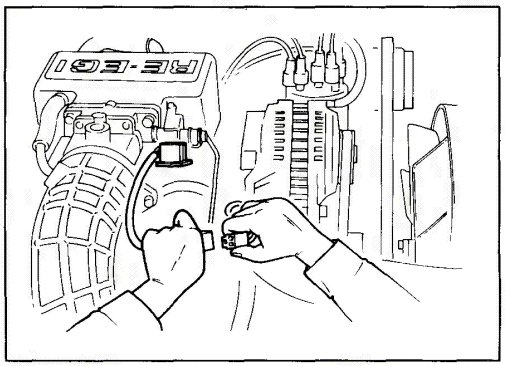
8. Disconnect the air hose (air pump ~ air control valve) at the air pump and place a finger over the air hose opening.
9. Increase the engine speed to 3,000 rpm, and then decrease the engine speed rapidly.
10. Make sure that air is sucked into the air hose for a few seconds while decelerating.
11. Reconnect the air hose to the air pump.



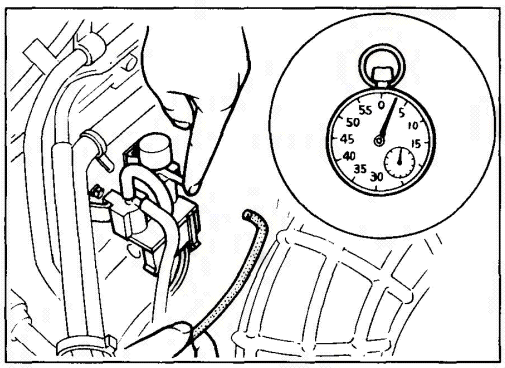
47U04B-005

CHECKING SWITCHING SOLENOID VALVE

12. Disconnect the vacuum sensing tube (switching solenoid valve ~ air control valve) at the switching solenoid valve.
13. Place a finger over the port opening of the valve.
14. Gradually increase the engine speed and make sure that air is sucked into the port at any engine speed.


47U04B-006

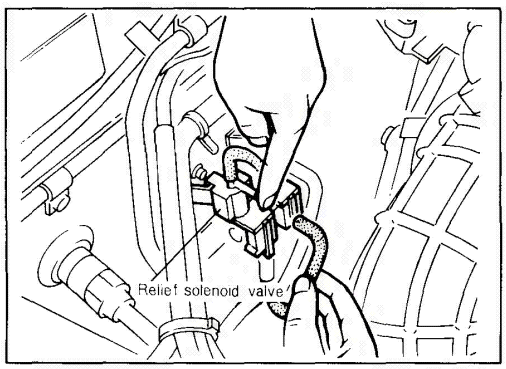
15. Disconnect the connector from the throttle sensor.
16. Gradually increase the engine speed and make sure that air is not sucked into the port when the engine speed is 1,000 ~ 1,200 rpm or higher.


47U04B-007

17. Decrease the engine speed to idling speed and make sure that air is sucked into the port again. At the same time, check the time that air is sucked into the port.

    Specified time: 8 seconds

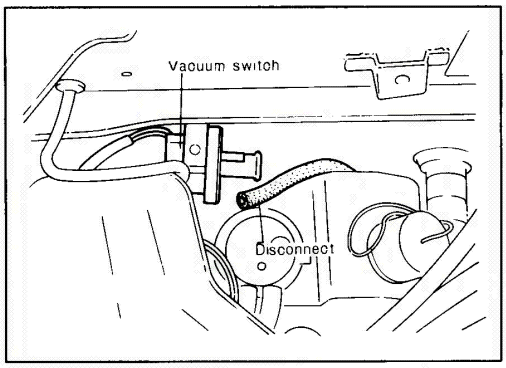
18. Connect the vacuum sensing tube to the switching solenoid valve.



47U04B-008

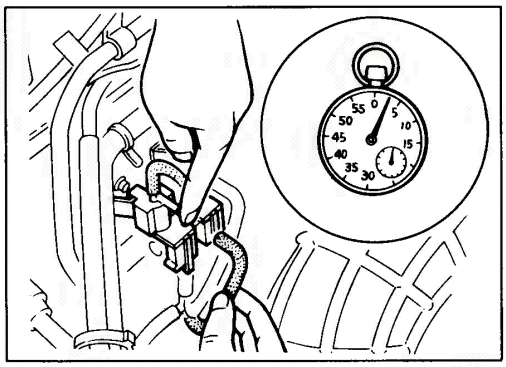
CHECKING RELIEF SOLENOID VALVE

19. Disconnect the vacuum sensing tube (relief solenoid valve ~ air control valve) at the relief solenoid valve.
20. Place a finger over the port opening and make sure that air is sucked into the port.
21. Increase the engine speed and make sure that air is not sucked into the port when the engine speed is 3,500 ~ 3,700 rpm or higher.



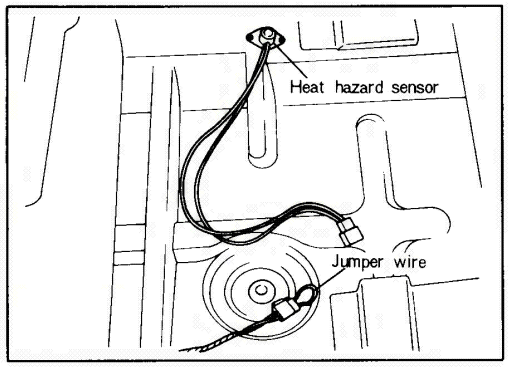
47U04B-009

22. Disconnect the vacuum sensing tube from the vacuum switch.
23. Make sure that air is not sucked into the relief solenoid valve port at any engine speed.
24. Reconnect the tube to the vacuum switch.



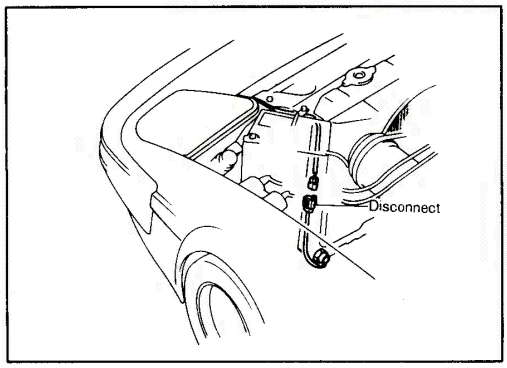
47U04B-010

25. Connect the throttle sensor connector, and then disconnect it.
26. Increase the engine speed from idling speed, and hold it the engine speed at 1,500 rpm. Make sure that the air is sucked into the port for about 120 seconds, and then that air is not sucked into the port.



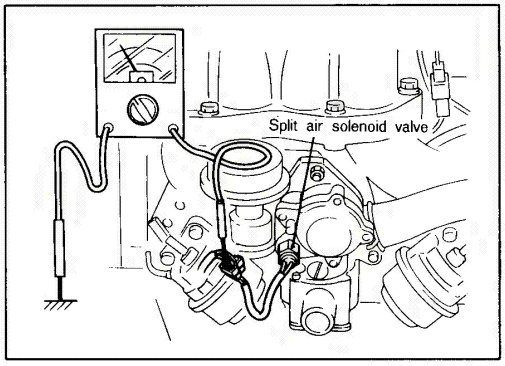
47U04B-011

27. Connect the throttle sensor connector.
28. Disconnect the connector from the heat hazard sensor and connect a jumper wire to both terminals of the connector.
29. Make sure that air is not sucked into the port at any engine speed.
30. Disconnect the jumper wire connected in step 28, and connect the connector to the heat hazard sensor.



47U04B-012

31. Stop the engine and disconnect the connector from the water temperature switch on the radiator.
32. Start the engine and gradually increase the engine speed; make sure that air is not sucked into the port when the engine speed is 1,000 ~ 1,200 rpm or higher.
33. Connect the vacuum sensing tube to the relief solenoid valve.

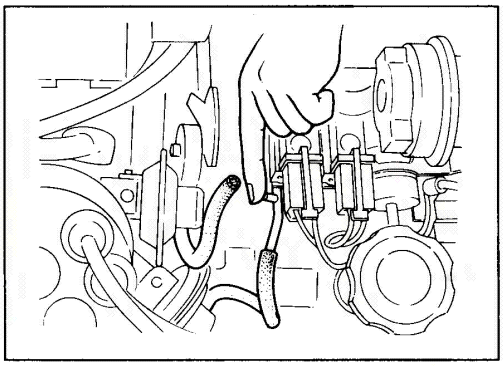


47U04B-013

CHECKING SPLIT AIR SOLENOID VALVE

34. Stop the engine and connect the connector of the water temperature switch disconnected in step 31.
35. Connect the voltmeter to the split air solenoid (LR) terminal and ground.
36. Shift into the 5th gear and observe the voltmeter reading.

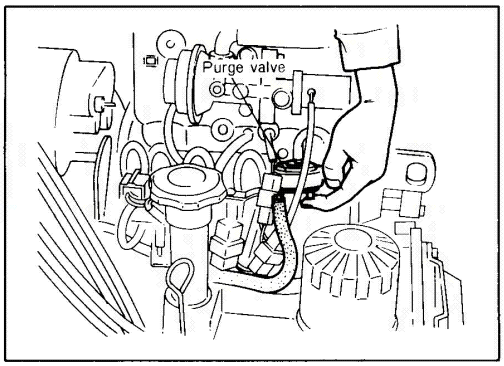
5th gear: 0V
Others: 12V



47U04B-014

CHECKING IGNITION CONTROL

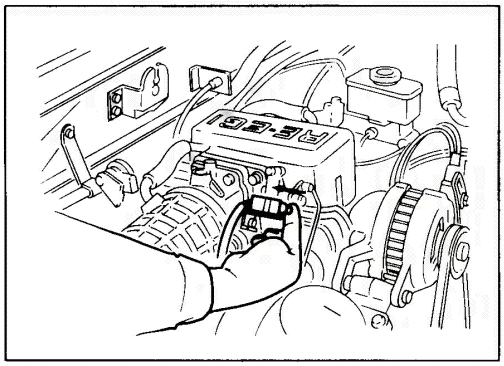
37. Start the engine and run it at idling speed.
38. Disconnect the vacuum sensing tube (vacuum advance diaphragm leading ~ pipe) at the pipe.
39. Place a finger over the pipe opening.
40. Gradually increase the engine speed and make sure that air is sucked into the pipe when the engine speed is 1,000 ~ 1,200 rpm or higher. Decrease the engine speed from 4,000 rpm and make sure that air is not sucked into the pipe while decelerating.
41. Reconnect the vacuum sensing tube.



47U04B-015

CHECKING PURGE VALVE

42. Disconnect the hose (purge valve ~ oil filler pipe) from the purge valve.
43. Place a finger over the port of the purge valve opening.
44. Increase the engine speed to 2,000 rpm and make sure that the air is sucked into the port.
45. Connect the hose to the purge valve.

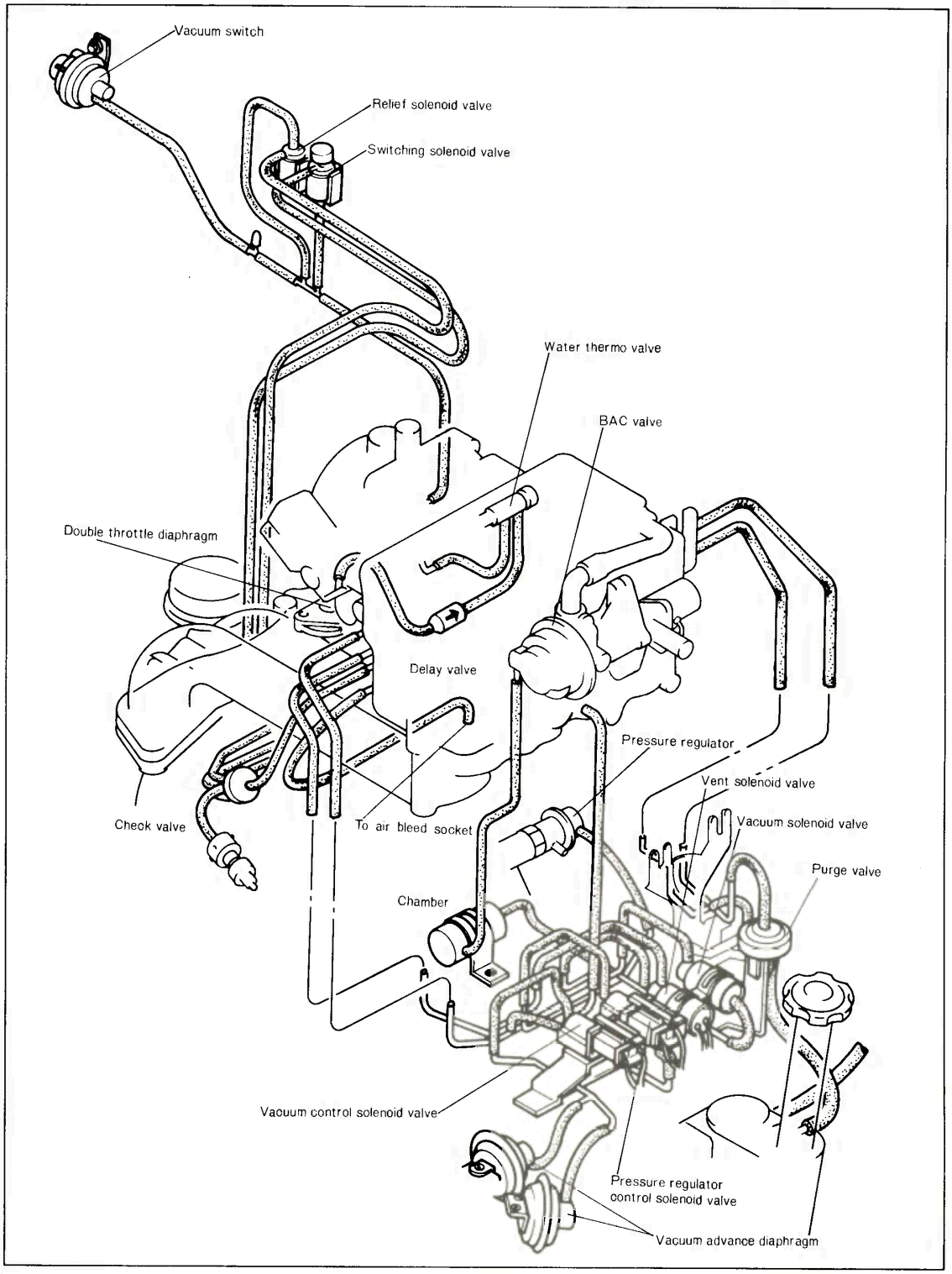


47U04B-016

CHECKING FUEL CUT OPERATION

46. Hold the engine speed at 2,000 rpm and make sure that the engine speed varies when the throttle sensor rod is pushed in with a finger.
47. Disconnect the tachometer from the engine.
48. Stop the engine.

VACUUM HOSE ROUTING DIAGRAM



47U04B-513

SPECIFICATIONS

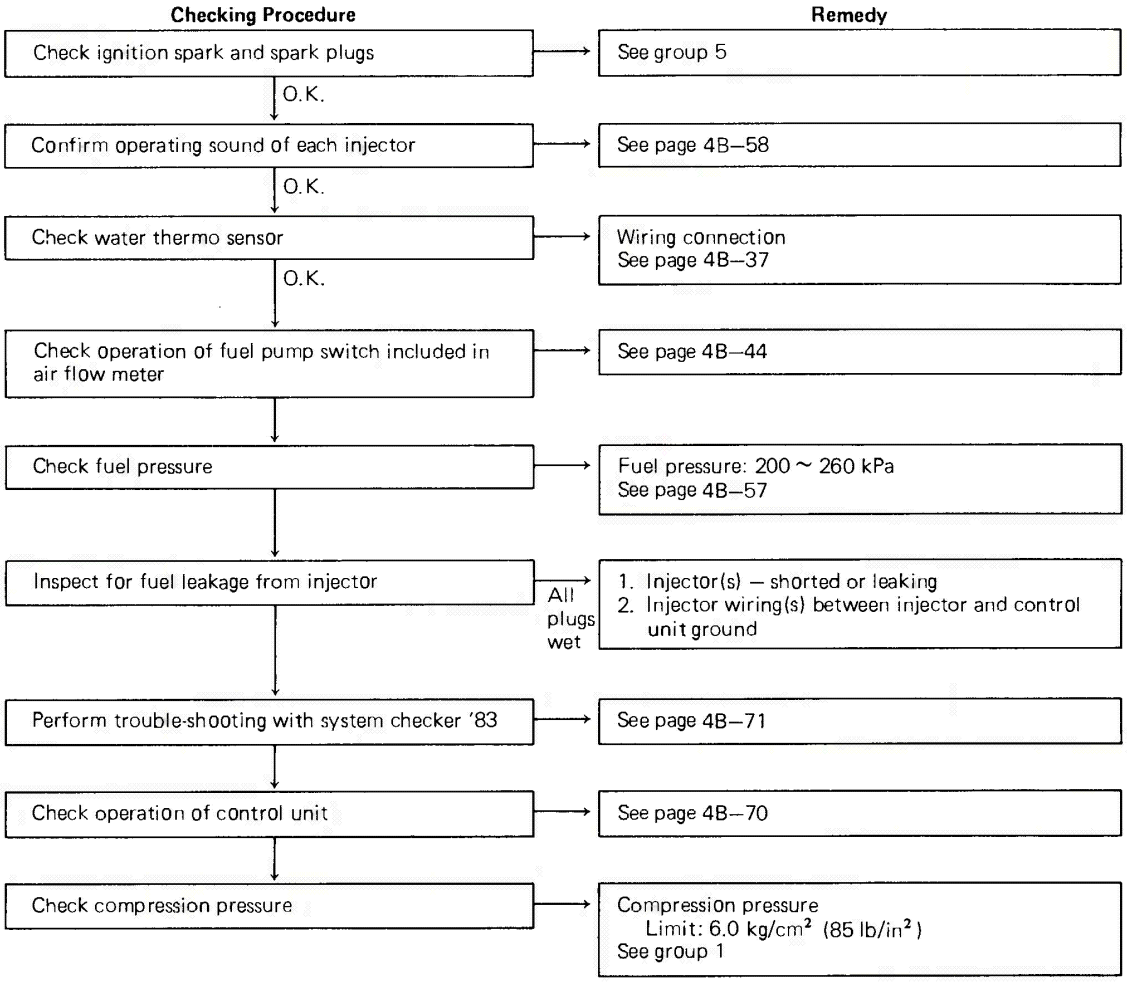
Fuel tank capacity			63ℓ (16.4 U.S. gallons) (13.9 Imp. gallons)
Fuel pump	Type		Motor
	Outlet pressure		350 ~ 500 kPa
	Feeding capacity		1,700 cc/min or more
Fuel filter	Element		Nylon 6 (150 mesh)
Pressure regulator	Type		Diaphragm type
	Fuel pressure (regulating pressure)		200 ~ 260 kPa
Throttle chamber	Type		Horizontal-draft (2 stage, 3 barrel)
	Throat diameter	Primary	40 mm (1.6 in)
		Secondary	36 mm (1.4 in) x 2
Dash pot	Adjustment speed		2,350 ~ 2,650 rpm
Idling speed			800 rpm
Air cleaner	Element		Long life dry
Vacuum switch	Operating pressure		-100 ± 10 mmHg
Heat hazard sensor	Operating temperature		130 ± 10°C (266 ± 18°F)
Water temperature switch	Operating temperature		15 ± 3°C (59 ± 7°F)
Actuator (For Auxilialy Port Valve)	Start to open		100 mmHg (3.94 inHg)
	Fully open		145 mmHg (5.7 inHg)

47U04B-525

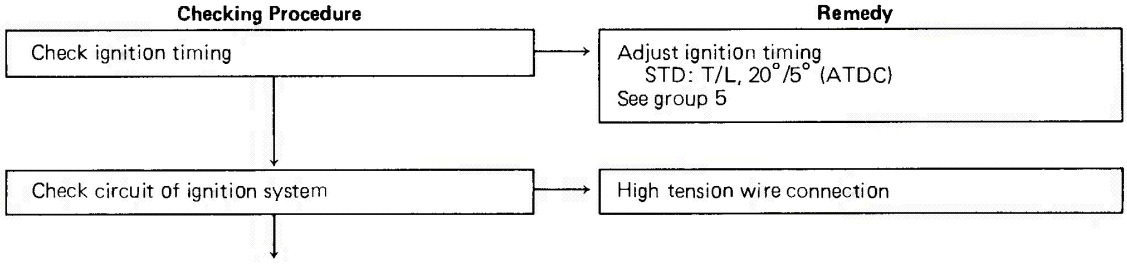
TROUBLESHOOTING GUIDE

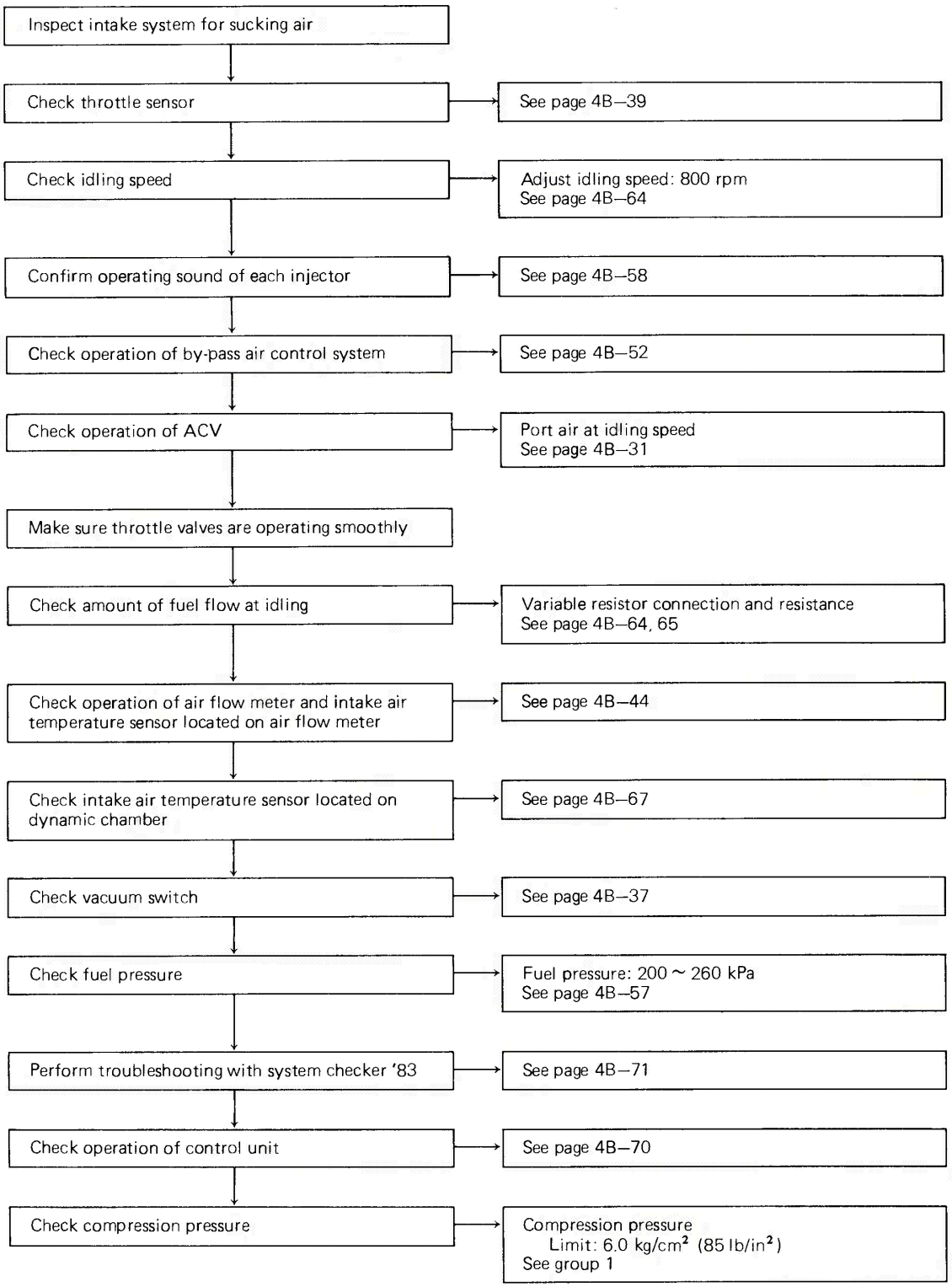
47U04B-514

1. HARD START OR NO START (CRANKS OK)



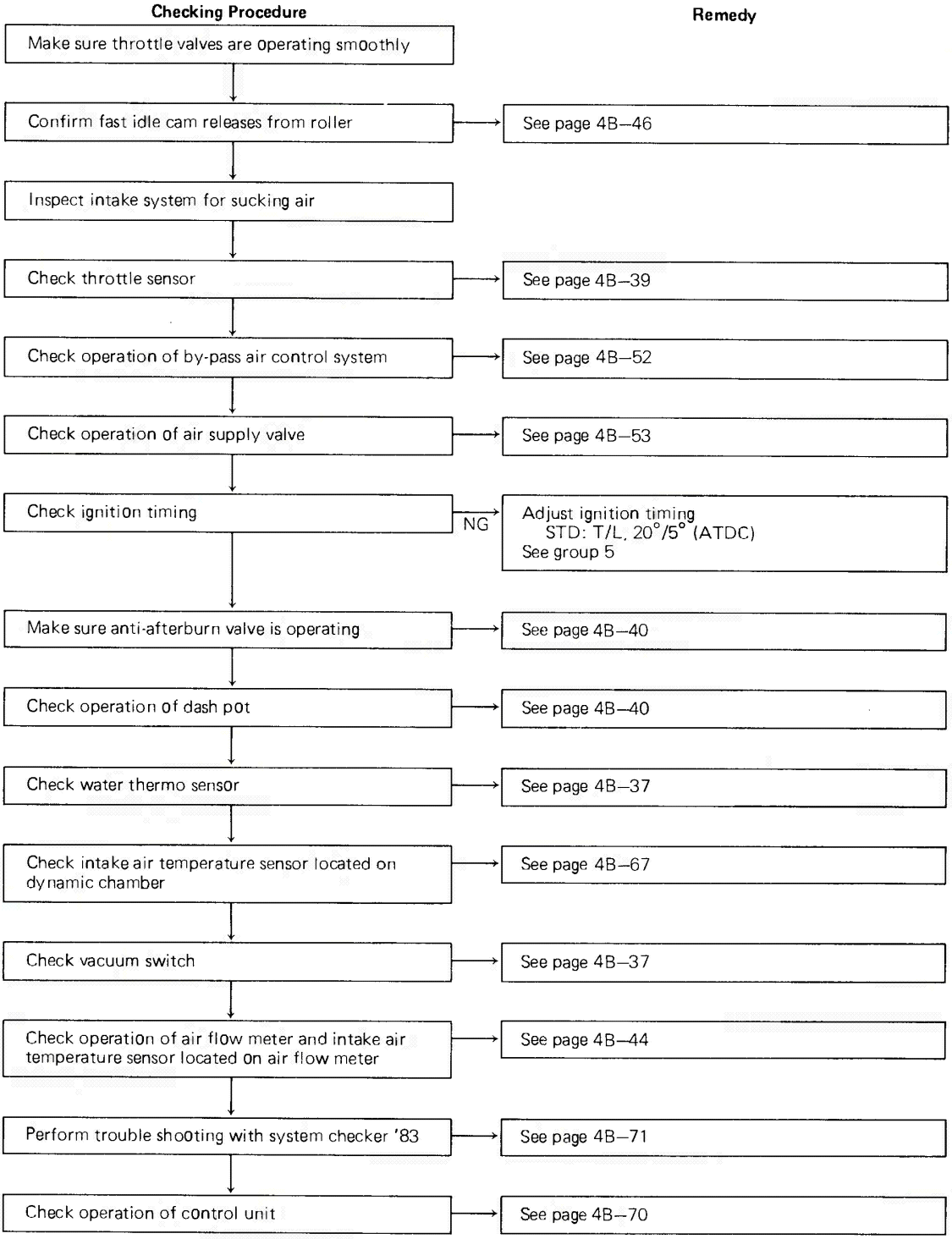
2. ROUGH IDLING




Inspect intake system for sucking air
Check throttle sensor
See page 4B–39
Check idling speed
Adjust idling speed: 800 rpm
See page 4B–64
Confirm operating sound of each injector
See page 4B–58
Check operation of by-pass air control system
See page 4B–52
Check operation of ACV
Port air at idling speed
See page 4B–31
Make sure throttle valves are operating smoothly
Check amount of fuel flow at idling
Variable resistor connection and resistance
See page 4B–64, 65
Check operation of air flow meter and intake air temperature sensor located on air flow meter
See page 4B–44
Check intake air temperature sensor located on dynamic chamber
See page 4B–67
Check vacuum switch
See page 4B–37
Check fuel pressure
Fuel pressure: 200 ~ 260 kPa
See page 4B–57
Perform troubleshooting with system checker '83
See page 4B–71
Check operation of control unit
See page 4B–70
Check compression pressure
Compression pressure
Limit: 6.0 kg/cm² (85 lb/in²)
See group 1

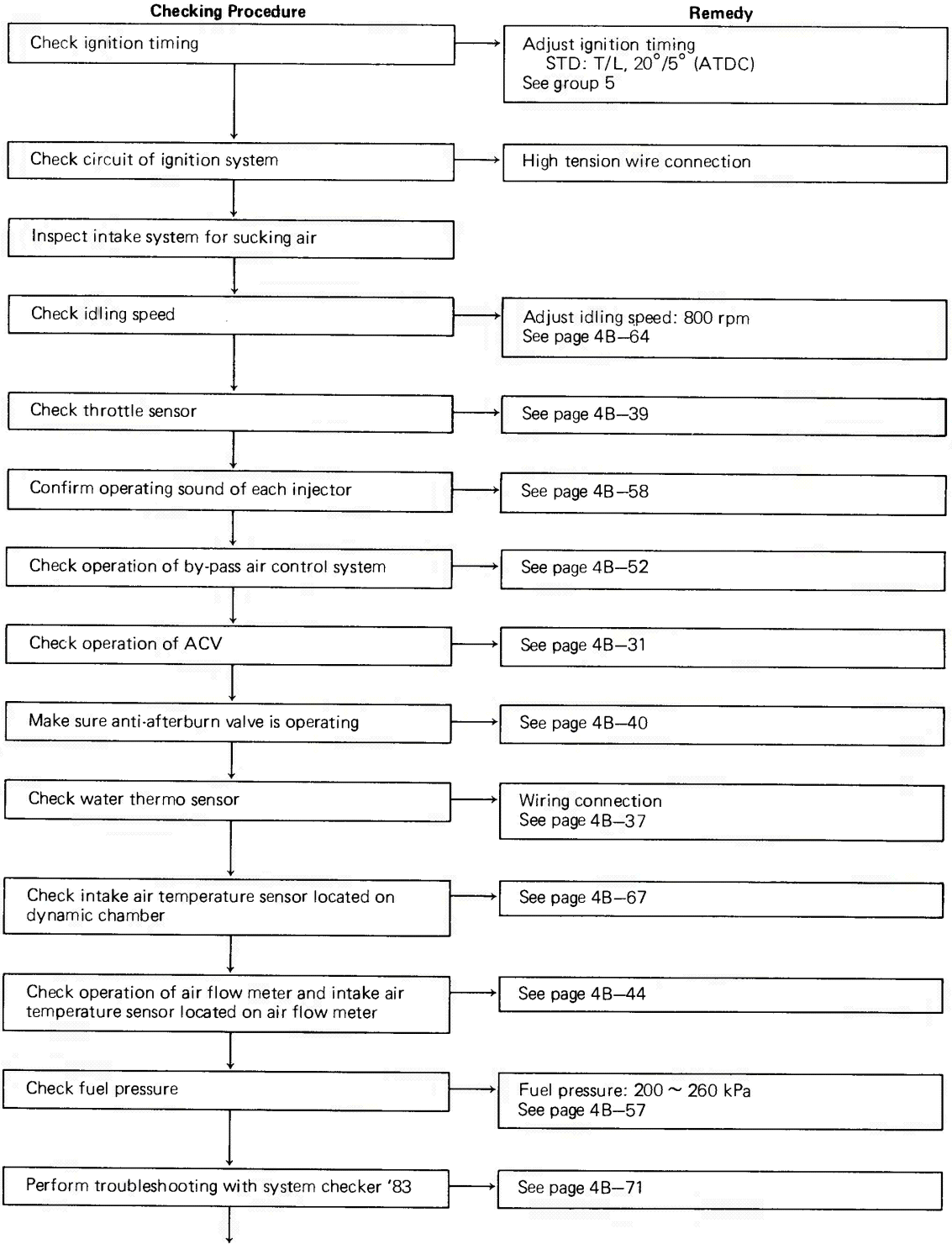
47U04B-515

3. NO RETURN TO IDLING OR HIGH IDLING SPEED IN NORMAL OPERATING TEMPERATURE



47U04B-516

4. ENGINE STALLS IN NORMAL OPERATING TEMPERATURE



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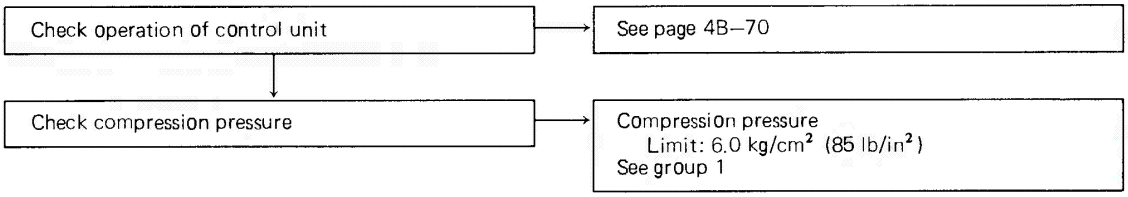
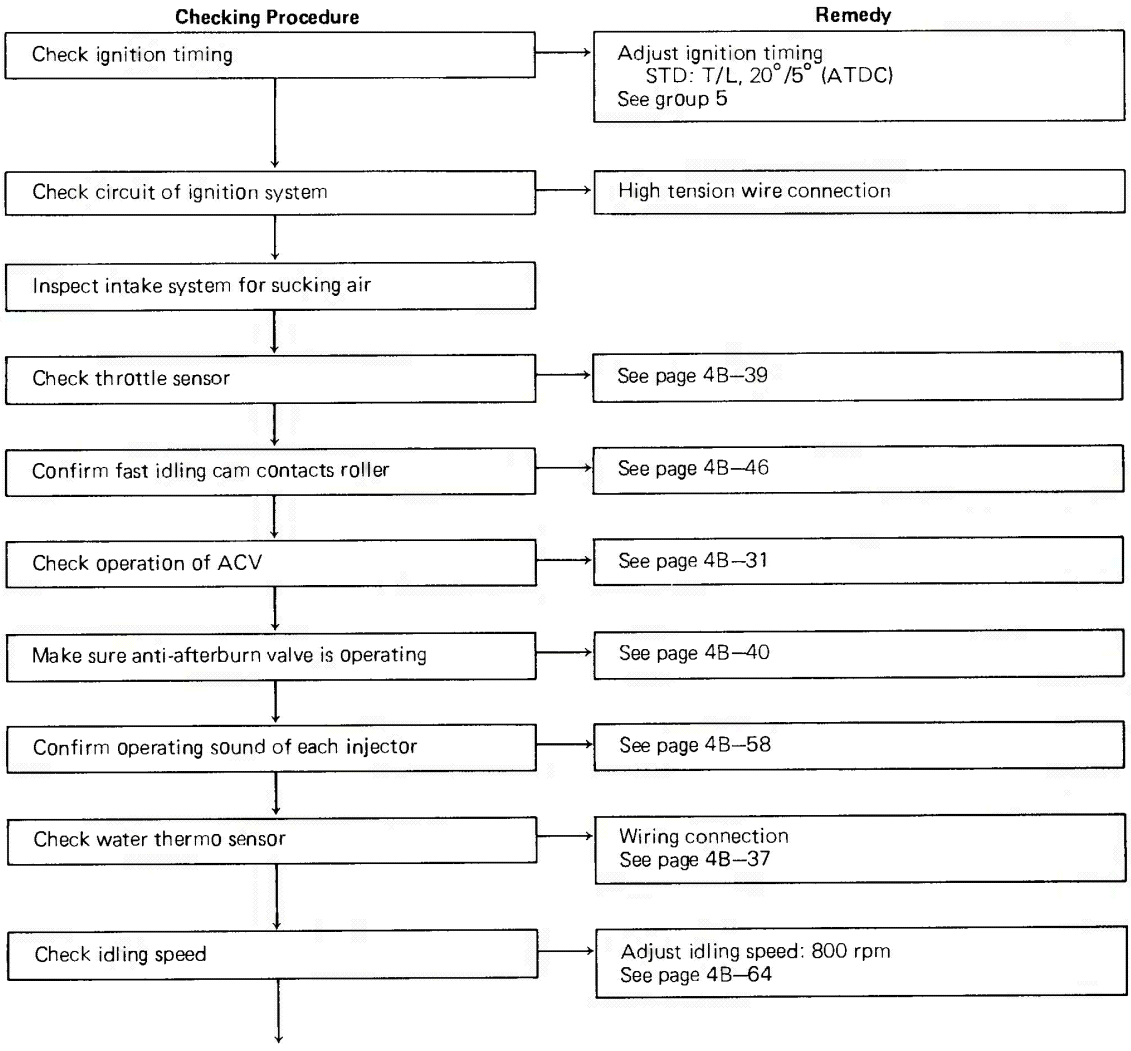
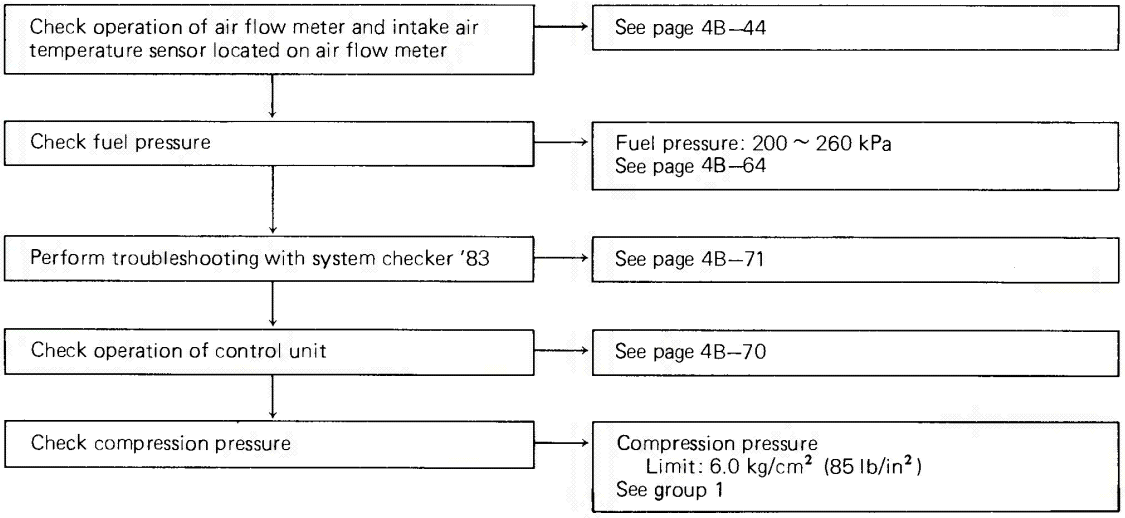


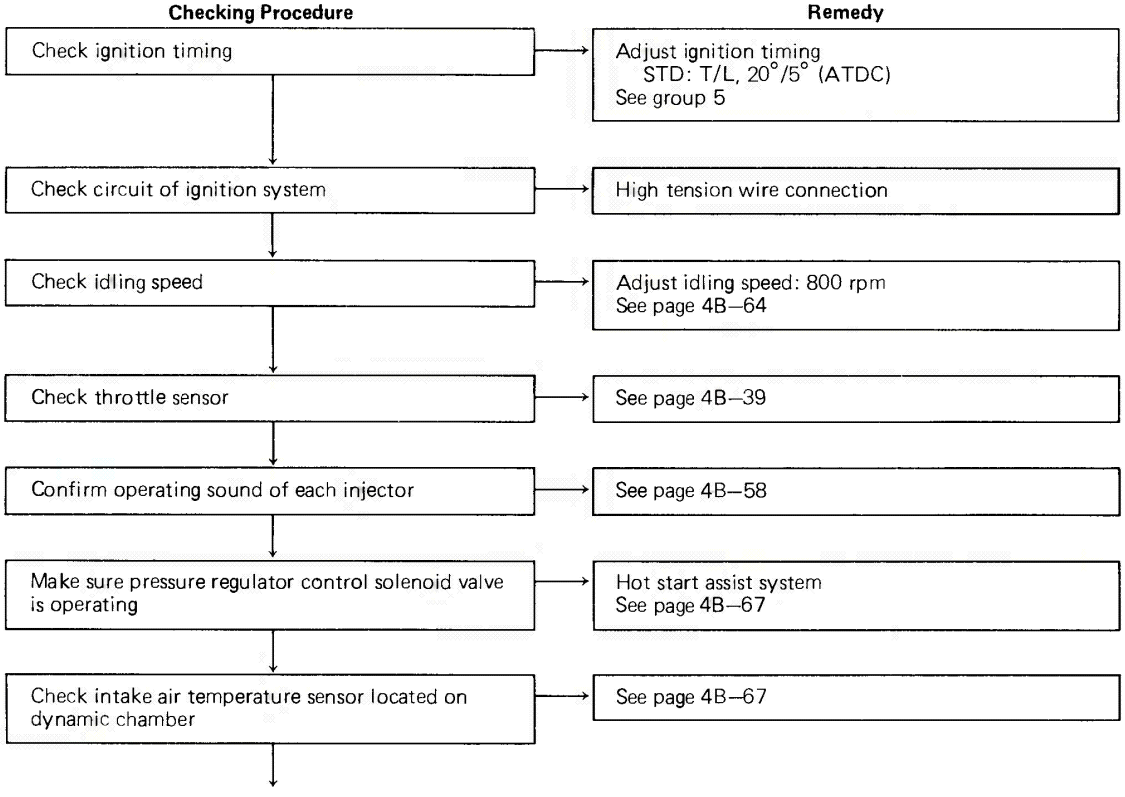
5. ENGINE STALLS IN COLD CONDITION



47U04B-518



6. ENGINE STALLS IN HIGH TEMPERATURE CONDITION



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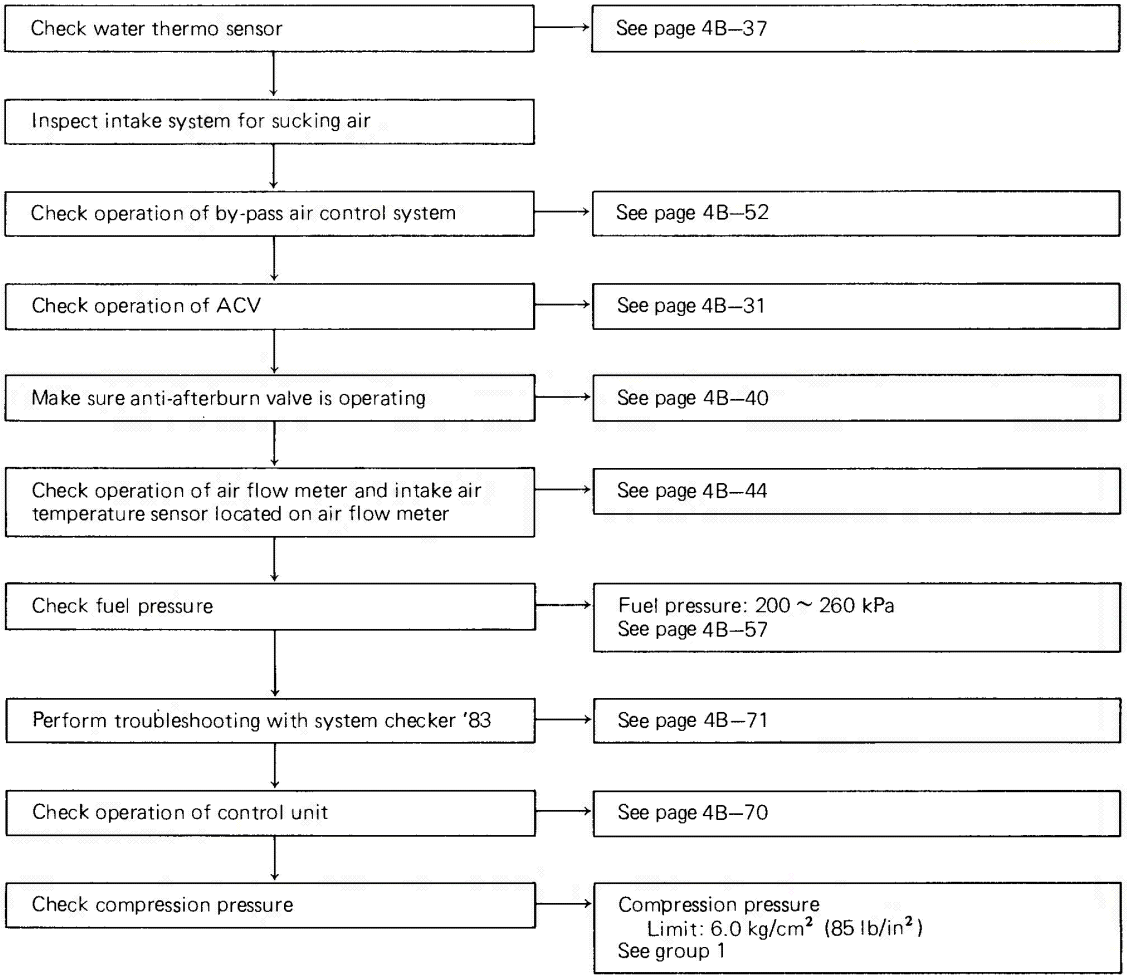
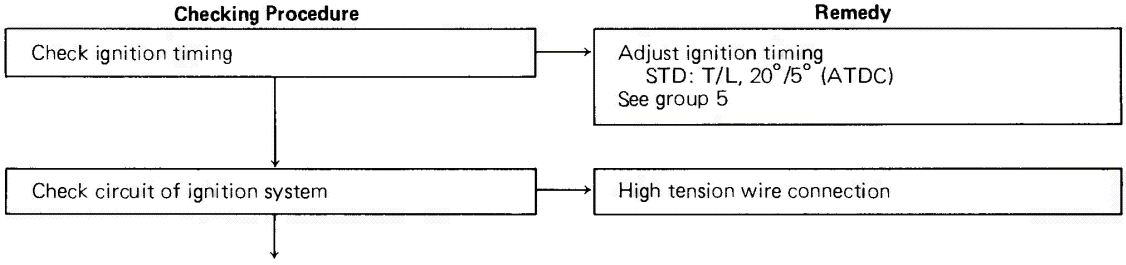
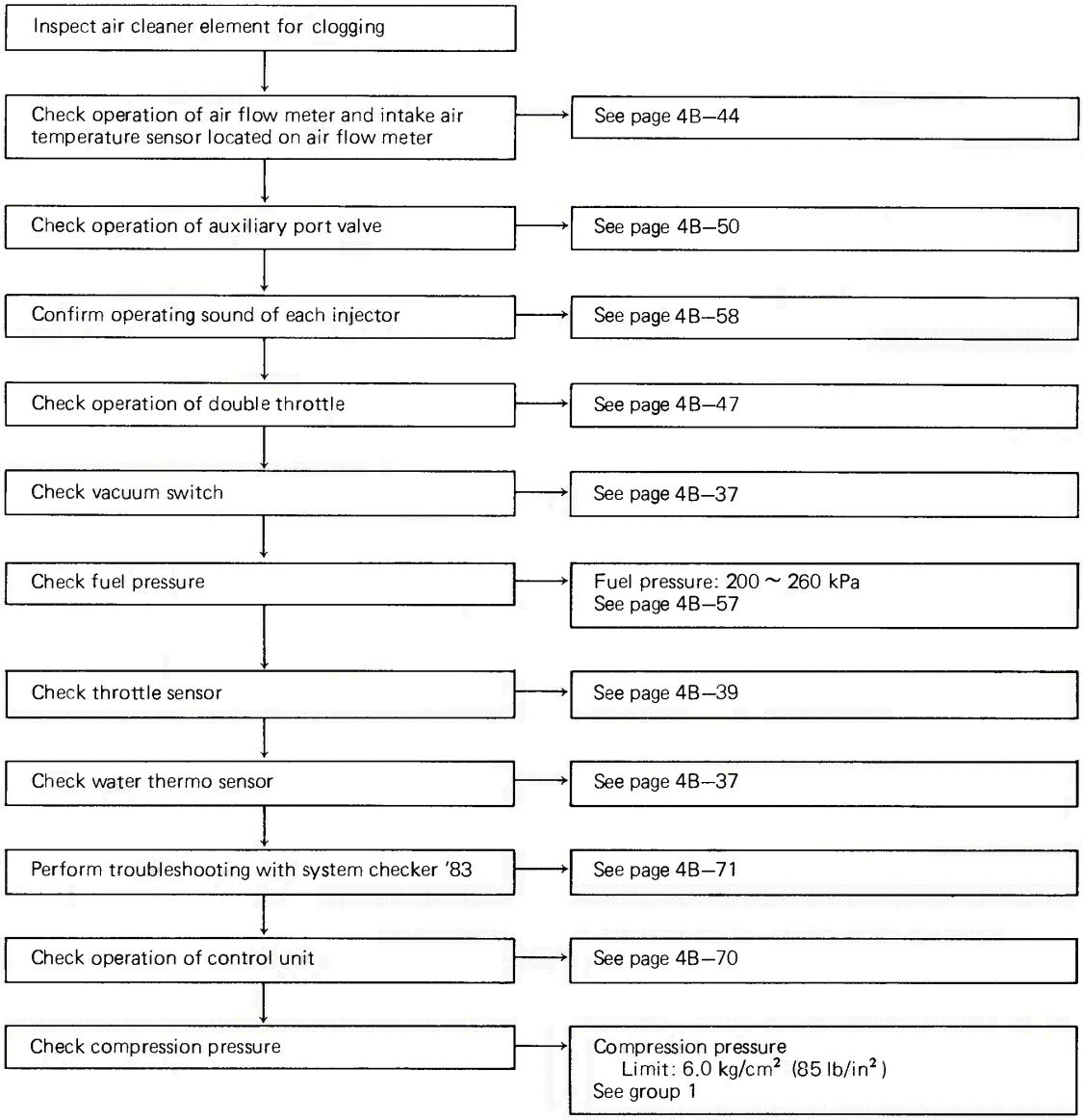


7. LACK OF POWER HESITATION RACING



47U04B-520

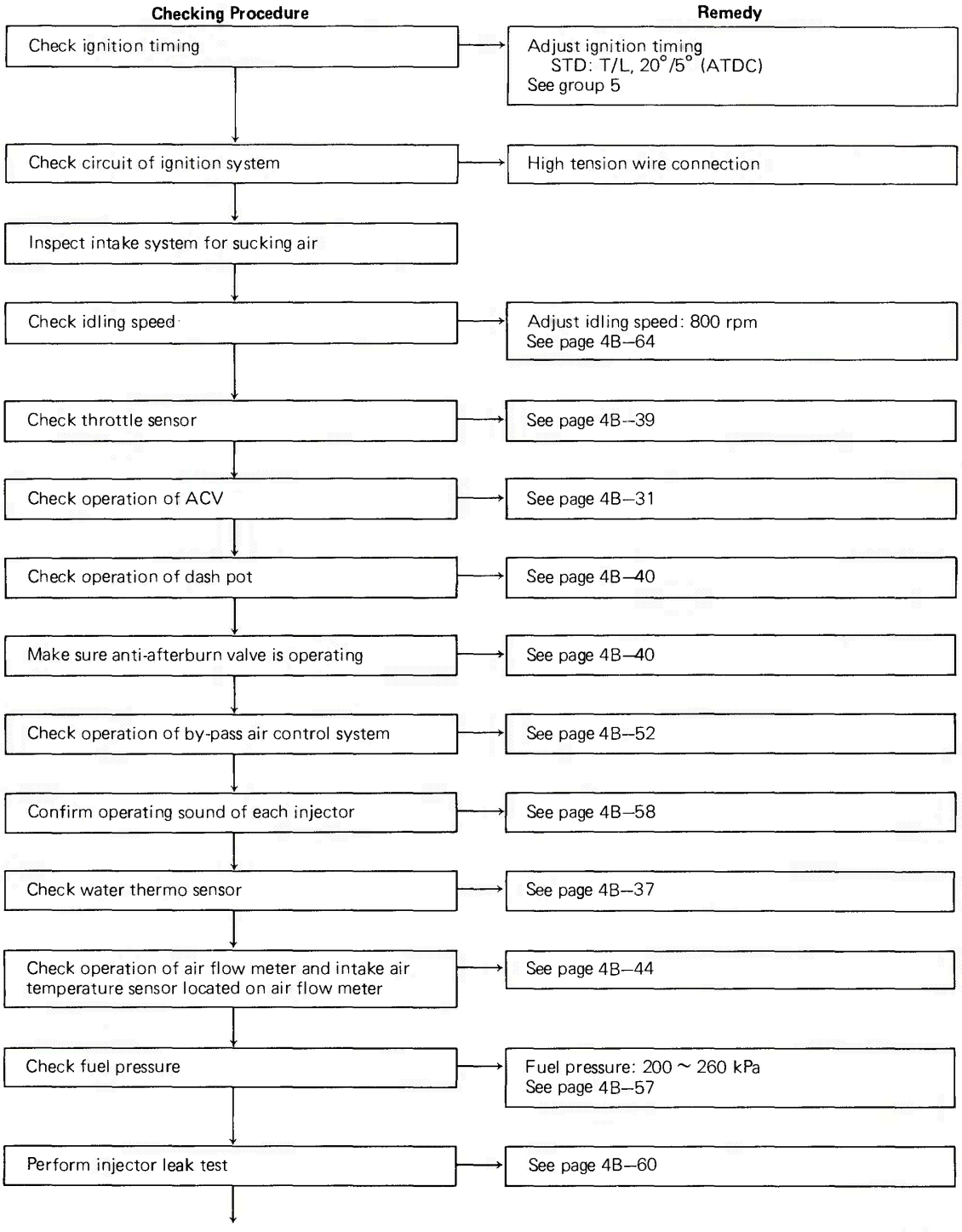


8. POOR ACCELERATION OR HESITATION

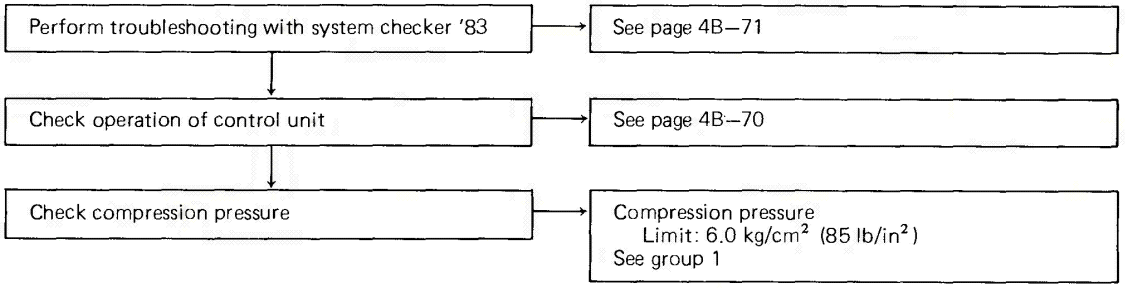
Refer to "LACK OF POWER HESITATION"

47U04B-521

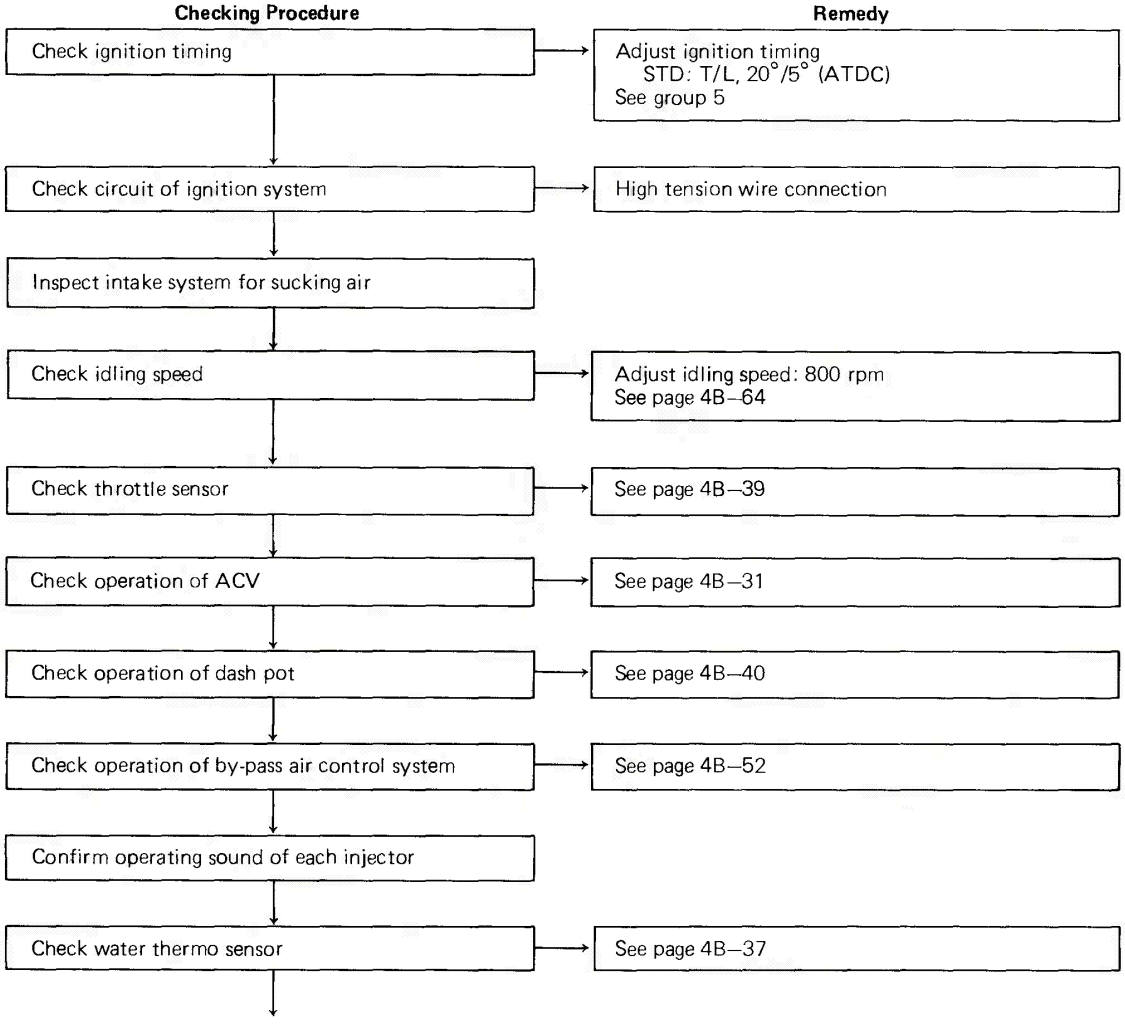
9. AFTERBURN



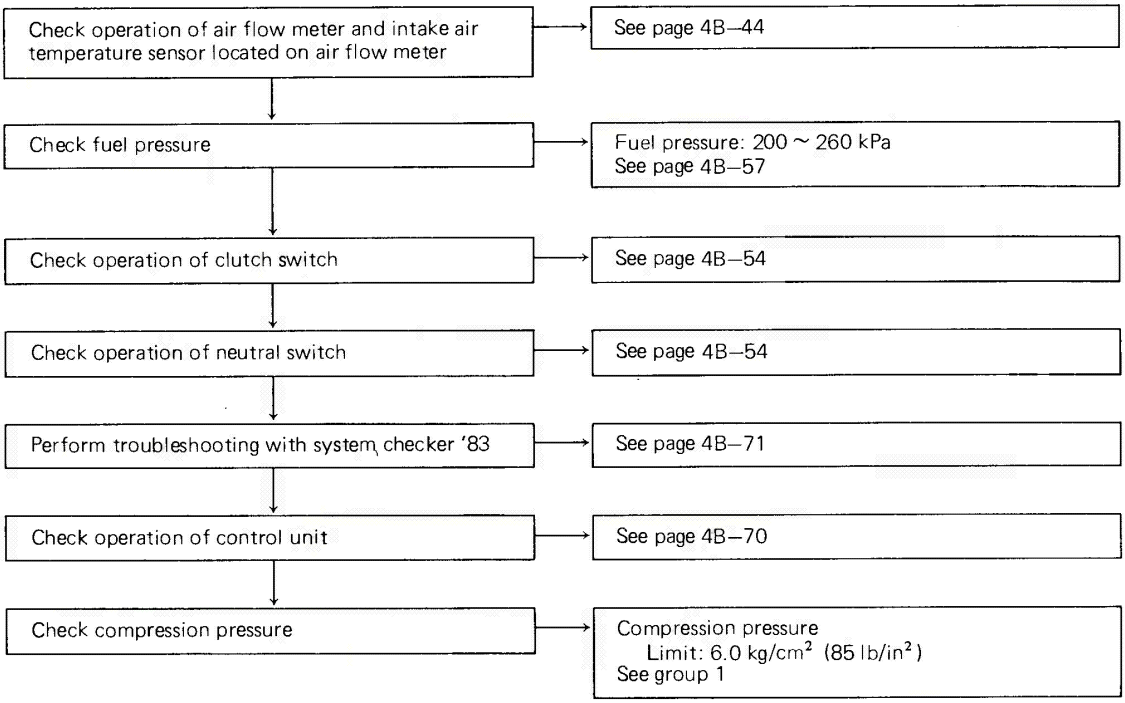
47U04B-522



10. RUNS ROUGH ON DECELERATION

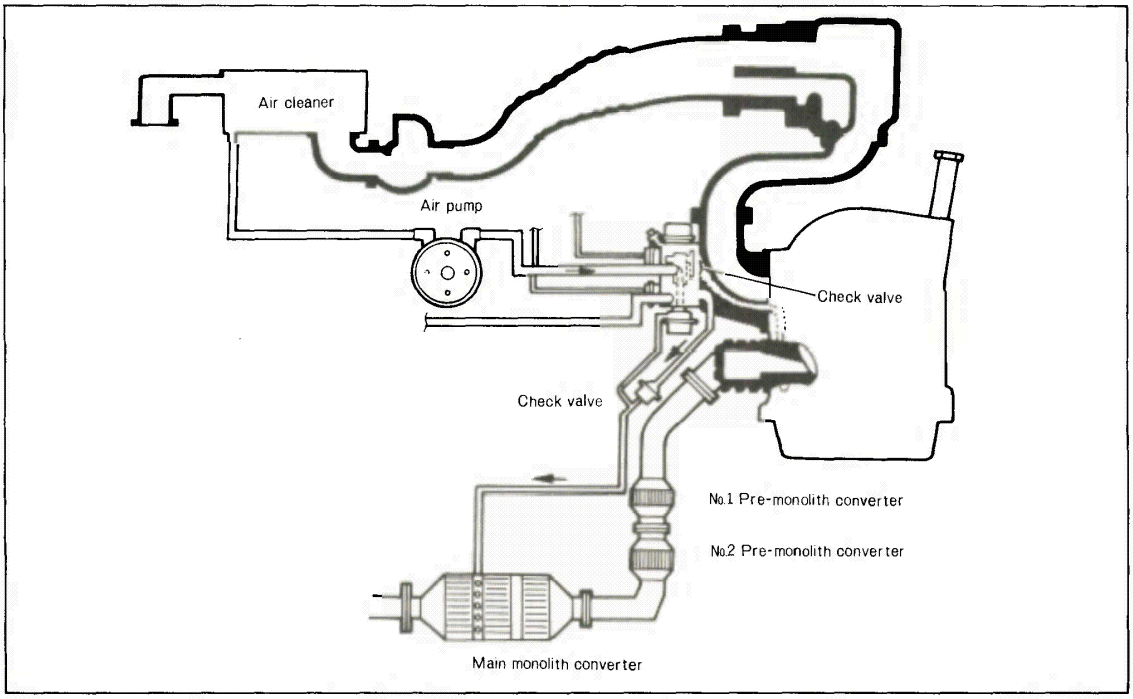


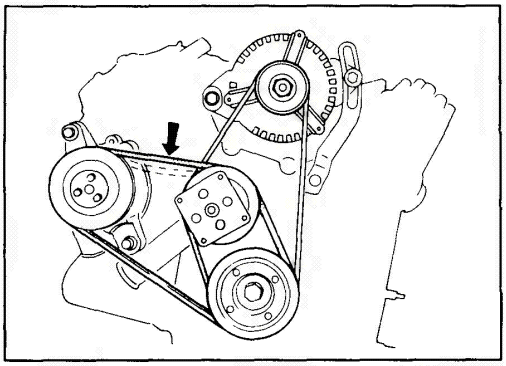
47U04B-523


Check operation of air flow meter and intake air temperature sensor located on air flow meter
See page 4B–44
Check fuel pressure
Fuel pressure: 200 ~ 260 kPa
See page 4B–57
Check operation of clutch switch
See page 4B–54
Check operation of neutral switch
See page 4B–54
Perform troubleshooting with system checker '83
See page 4B–71
Check operation of control unit
See page 4B–70
Check compression pressure
Compression pressure
Limit: 6.0 kg/cm² (85 lb/in²)
See group 1

47U04B-524

AIR INJECTION AND CATALYST



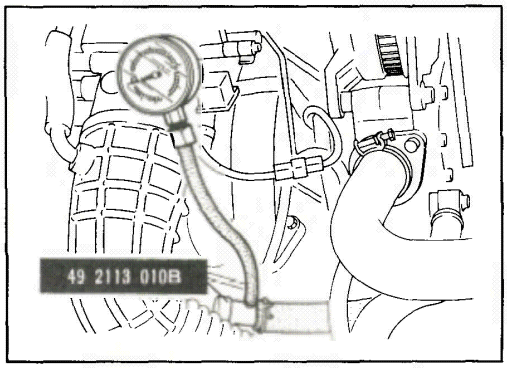


47U04B-017

AIR PUMP

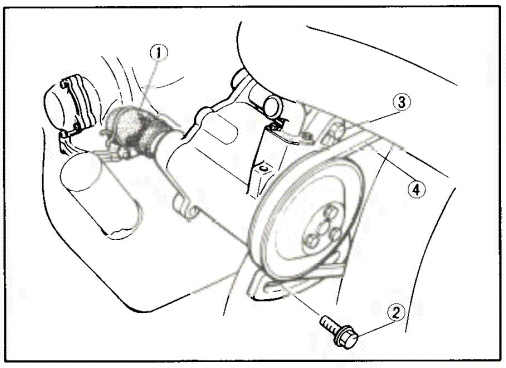
Checking Air Pump

1. Warm up the engine until it reaches normal operating temperature.
   Inspect hoses and connections for leaks.
2. Check the air pump for noise, if excessive, replace the air pump.
3. Check the air pump drive belt tension. Adjust to specification, if necessary.



47U04B-018

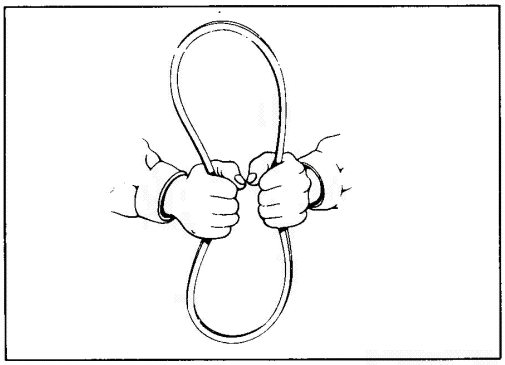
4. Disconnect the air hose (air pump ~ air control valve) at the air control valve.
5. Connect the **air pump gauge set** (49 2113 010B) to the air hose and clamp the hose securely to gauge.
6. Connect a tachometer to the engine.
7. Start the engine and run it at idling speed.
8. Observe the pressure reading on test gauge. The pressure reading should be **more than 11.5 kPa (1.64 lb/in^2) at 800 rpm.**
9. If the pump pressure does not meet minimum specifications, replace the air pump and repeat test.



47U04B-019

Replacing Air Pump

1. Disconnect the air inlet and outlet hoses.
2. Remove the air pump strap bolt.
3. Remove the air pump mounting bolt.
4. Disengage the air pump drive belt and remove the air pump.
5. Install the air pump in the reverse order of removing and adjust the drive belt tension.

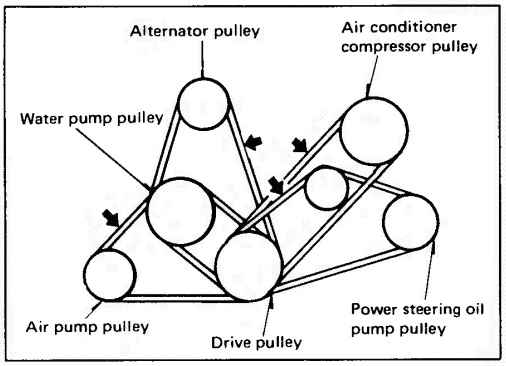


47U04B-020

AIR PUMP DRIVE BELT

Checking Air Pump Drive Belt

1. Check the drive belt cracks.
   Stretches or any type of deterioration also check that no oil or grease adheres to the belt.
   Replace if necessary.
2. If the belt noisy check for looseness or misaligned pulleys.



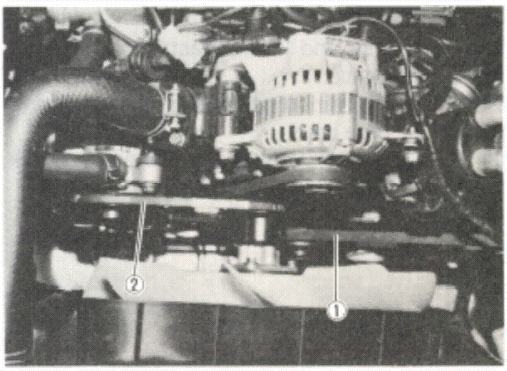
47U04B-021

Adjusting Air Pump Drive Belt

1. Loosen the air pump strap bolt and mounting bolt.
2. Move the air pump toward or away from the engine until the correct belt tension is obtained.

   Belt tension: 11 ~ 13 mm (0.43 ~ 0.51 in) when pressed at 10 kg (22 lb)

3. Tighten the pump mounting and strap bolts.

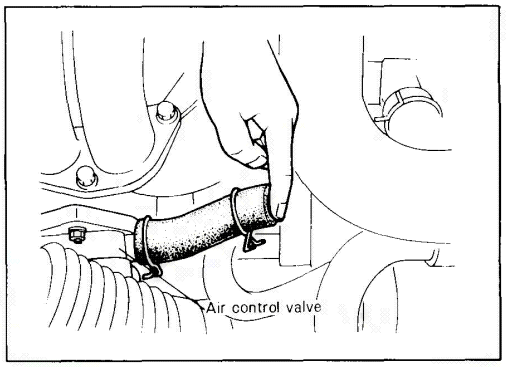


47U04B-022

Replacing Air Pump Drive Belt

1. Loosen the air-con. and power steering pulley drive belts until the air pump drive belt can be removed (if equipped).
2. Loosen the air pump strap and mounting bolts, then move the air pump until the drive belt can be removed.
3. Install a new belt and adjust the belt tension as explained above.
4. Install the air con. and power steering pulley drive belts and adjust the belt tension.

   Belt tension:
   10 ~ 12 mm (0.40 ~ 0.47 in)... Power steering
   when pressed at 10 kg (22 lb) and Air-con.

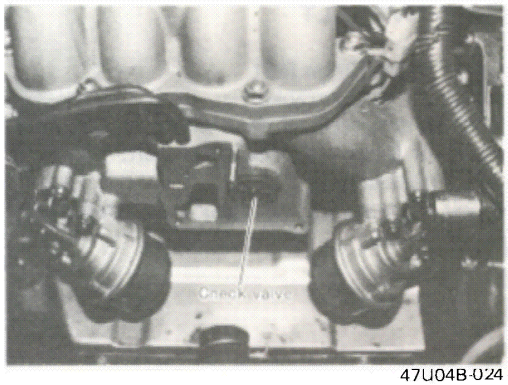


47U04B-023

CHECK VALVE (IN THE INTAKE MANIFOLD)

Checking Check Valve

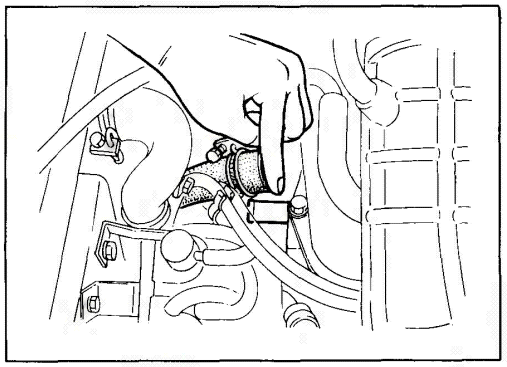
1. Disconnect the air hose (air pump ~ air control valve) at the air pump.
2. Connect a tachometer to the engine.
3. Start the engine and disconnect the connector from the switching solenoid valve.
4. Increase the engine speed to **1,500 rpm** and watch for exhaust gas leakage at the air inlet fitting on the air control valve.
   If there is exhaust gas leakage, replace the check valve.



47U04B-024

Replacing Check Valve

1. Remove the air control valve as described on page 4B–32.
2. Remove the gasket and check valve.
3. Install the check valve in the reverse order of removing.

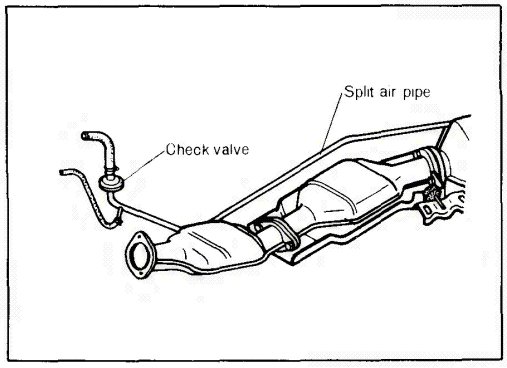


47U04B-025

CHECK VALVE (INTAKE MANIFOLD ~ CATALYTIC CONVERTER)

Checking Check Valve

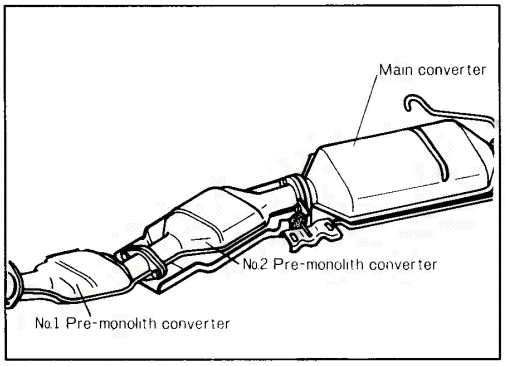
1. Disconnect the air hose (intake manifold ~ catalytic converter) at the rear side of the intake manifold.
2. Connect a tachometer to the engine.
3. Start the engine.
4. Increase the engine speed to **1,500 rpm** with throttle. Place a finger and watch for exhaust gas leakage at the air pipe opening.
   If there is exhaust gas leakage, replace the check valve.



47U04B-026

Replacing Check Valve

1. Unfasten the clip and disconnect the air hoses from the check valve.
2. Loosen the split air pipe attaching bolts and remove the air pipe ass'y.
3. Install the new check valve and pipe ass'y in the reverse order of removing.

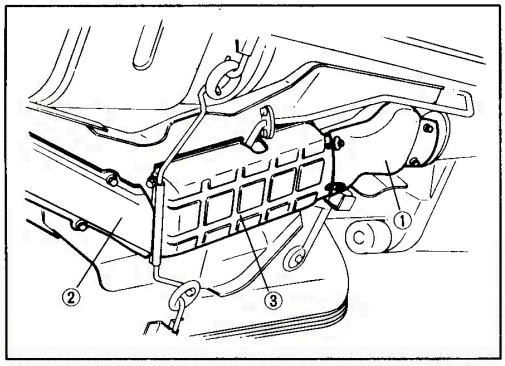


47U04B-027

PRE-MONOLITH AND MAIN MONOLITH CONVERTERS

Checking Converter

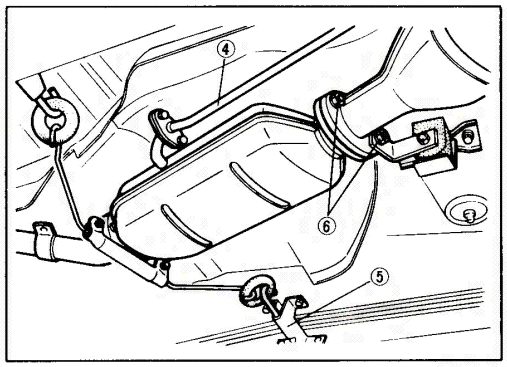
1. Visually inspect the pre-monolith and main monolith converter for crack or any damage.
2. Inspect the proper tightness of pre-monolith and main monolith converter connections.
3. Start the engine and run it at idling speed.
4. Check the exhaust gas leakage from the pre-monolith and main monolith converter connections.



47U04B-028

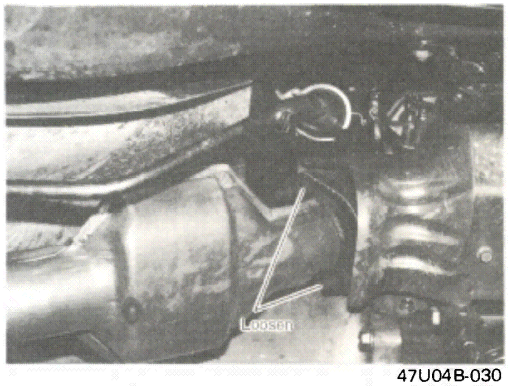
Replacing Converters

1. Remove the lower cover from the pre-monolith converter.
2. Remove the lower cover from the rear side of the exhaust pipe.
3. Remove the lower cover from the main converter.



47U04B-029

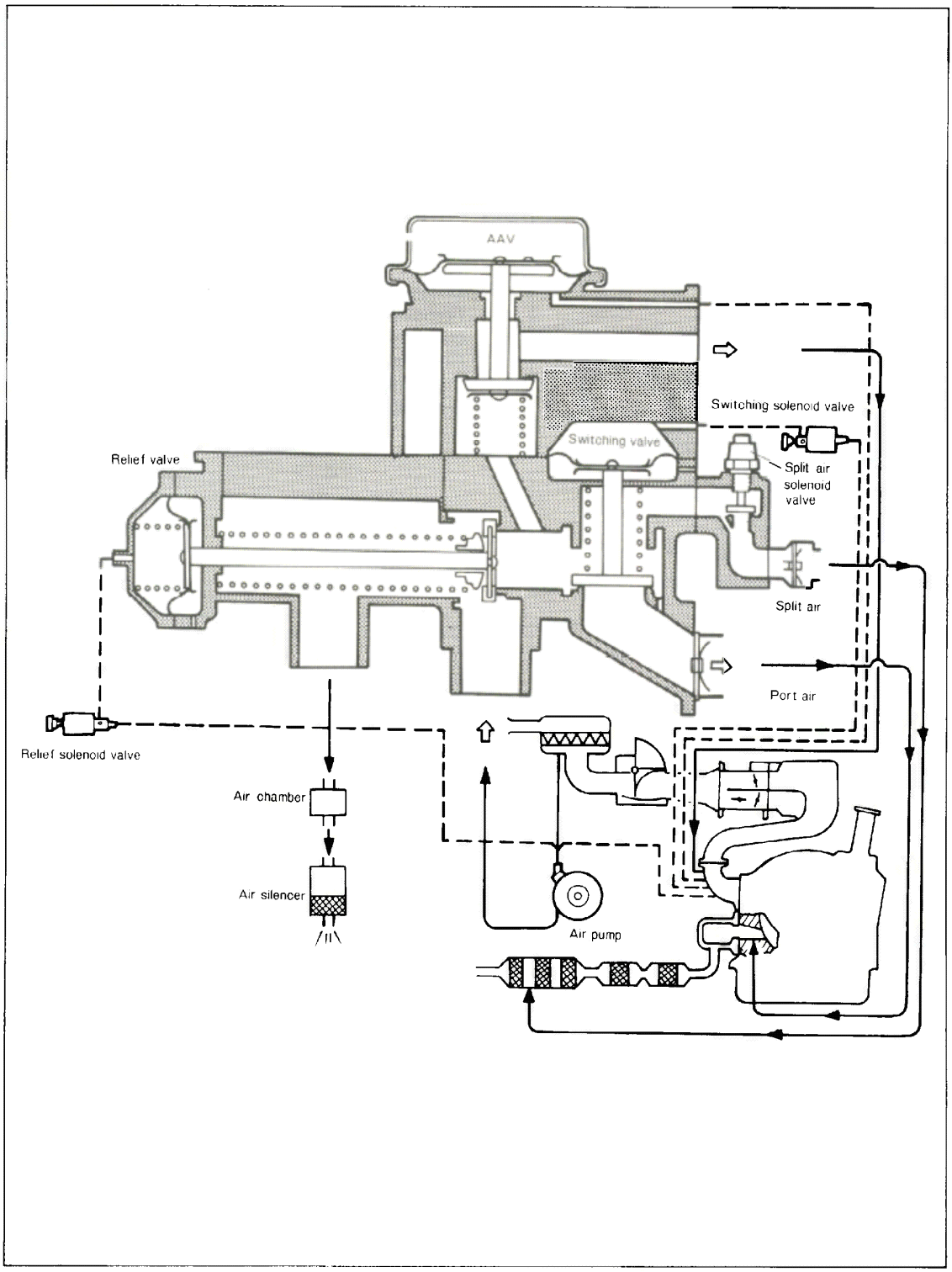
4. Disconnect the split air pipe from the main converter.
5. Remove the converter brackets.
6. Loosen the nuts attaching the main converter front flange to No. 2 pre-monolith converter.



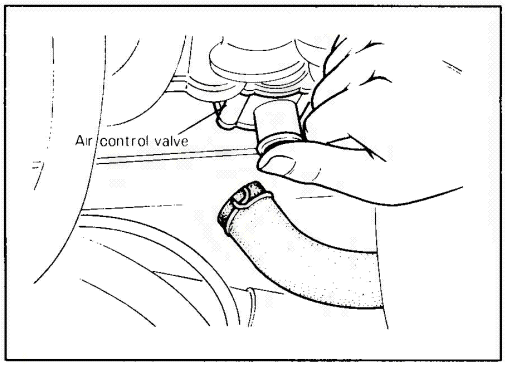
47U04B-030

7. Support the converters securely to prevent them from dropping.
8. Loosen the nuts attaching the exhaust pipe rear to silencer.
9. Carefully lower the exhaust pipe and main converter assembly from the vehicle.
10. Remove the pre-monolith converter by removing the attaching nuts.
11. Install the converters in the reverse order of removing.

SECONDARY AIR CONTROL SYSTEM



47U04B

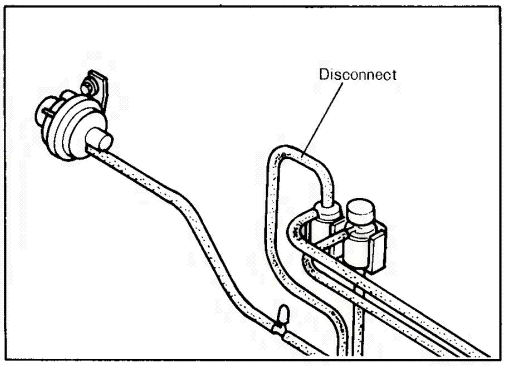


57U04B-031

AIR CONTROL VALVE

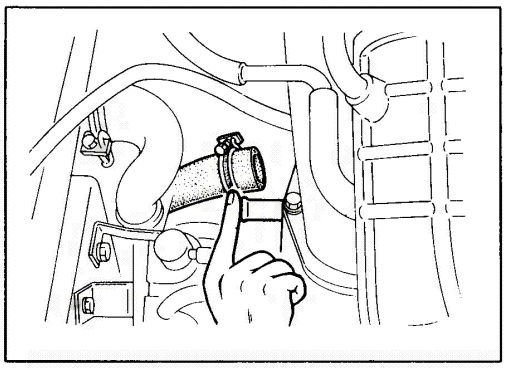
Checking Air Control Valve

1. Warm up the engine to the normal operating temperature.
2. Connect a tachometer to the engine.
3. Disconnect the air hose (air silencer ~ air control valve) at the air control valve.
   Place a finger over the air control valve outlet.
4. Increase the engine speed and make sure that air flows out when engine speed is 1,500 ~ 2,500 rpm or over.



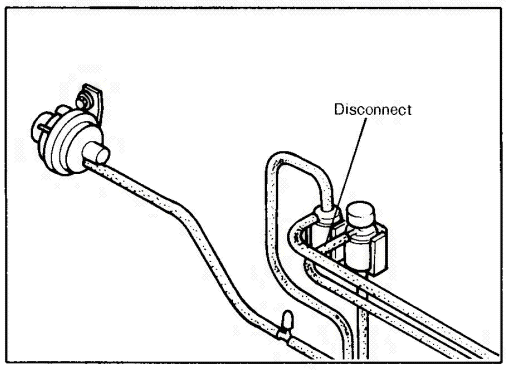
47U04B-032

5. Run the engine at idling speed.
6. Disconnect the vacuum sensing tube (relief solenoid valve ~ air control valve) at the relief solenoid valve.
7. Make sure that air flows out.
8. Reconnect the vacuum sensing tube and the air hose.



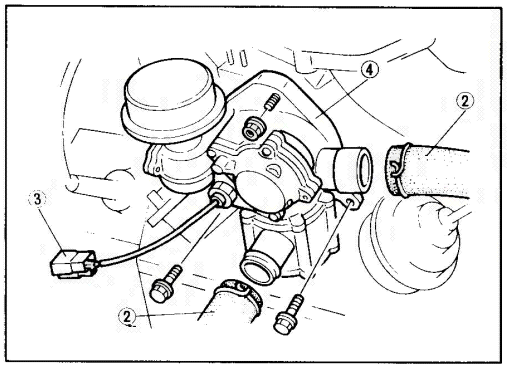
47U04B-033

9. Disconnect the split air hose (check valve ~ intake manifold) at the intake manifold. Place a finger over the port opening.



47U04B-034

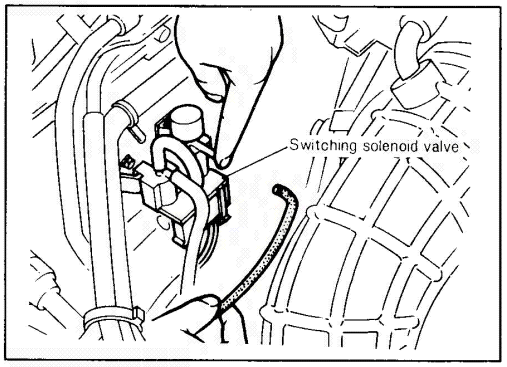
10. Disconnect the vacuum sensing tube (switching solenoid valve ~ air control valve) at the switching solenoid valve.
11. Make sure that air flows out from the port.
12. Reconnect the vacuum sensing tube and split air hose.
    Replace air control valve if necessary.



47U04B-035

Replacing Air Control Valve

1. Remove the air funnel from the throttle chamber.
2. Disconnect the air hoses.
3. Disconnect the connector for air control valve solenoid.
4. Remove the air control valve.
5. Install the air control valve in the reverse order of removing.

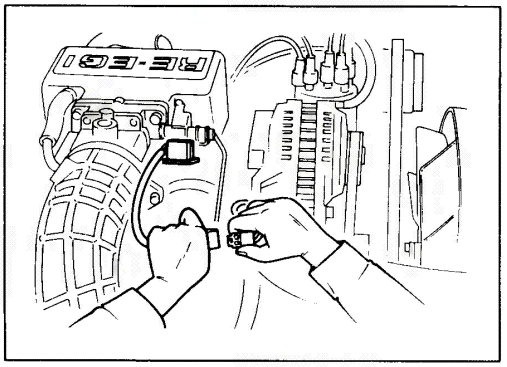


47U04B-036

SWITCHING SOLENOID VALVE

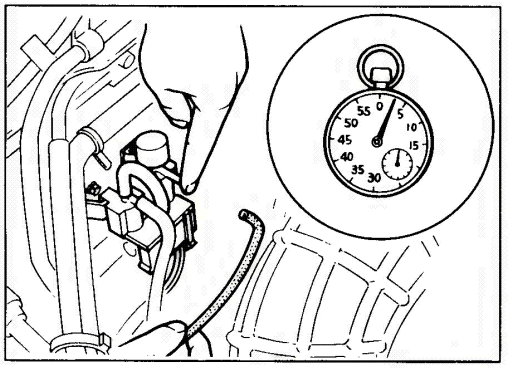
Checking Signal for Switching Solenoid Valve

1. Warm up the engine and run it at idling speed.
2. Connect a tachometer to the engine.
3. Disconnect the vacuum sensing tube (switching solenoid valve ~ air control valve) at the switching solenoid valve.
4. Place a finger over the port opening.
5. Gradually increase the engine speed and make sure that air is sucked into the port at any engine speed.



47U04B-037

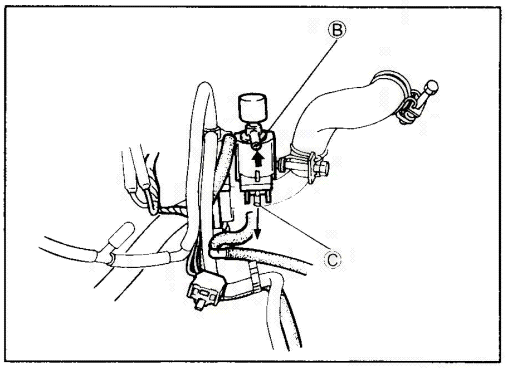
6. Disconnect the connector from the throttle sensor.
7. Gradually increase the engine speed and make sure that air is not sucked into the tube when the engine speed is 1,000 ~ 1,200 rpm or higher.



57U04B-038

8. Decrease the engine speed to idling speed and make sure that air is sucked into the port again. At the same time, check the time that air is sucked into the port.

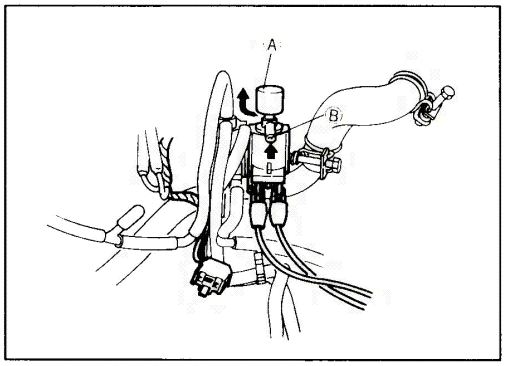
Specified time: 8 sec.



47U04B-039

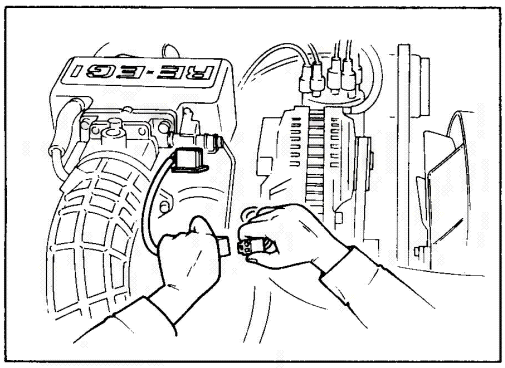
Checking Switching Solenoid Valve

1. Disconnect the vacuum sensing tubes from the solenoid.
2. Blow through the solenoid valve from the port B . Make sure the air passes through the valve and comes out of the port C .



47U04B-040

3. Disconnect the connector from the switching solenoid valve and connect the battery power to terminals on the valve.
4. Blow through the valve from the port B . Make sure the air passes through the valve and comes out from the air filter A of the valve.

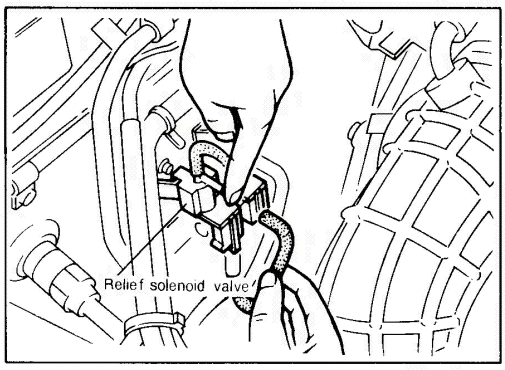


47U04B-041

RELIEF SOLENOID VALVE

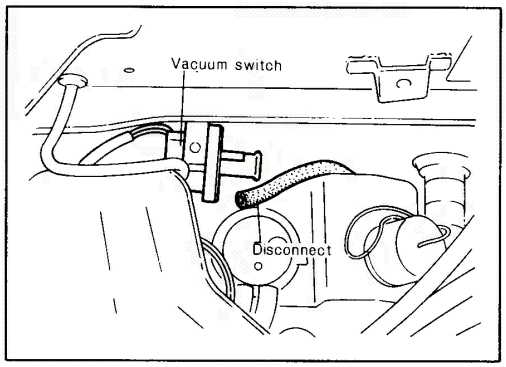
Checking Signal for Relief Solenoid Valve

1. Warm up the engine and run it at idling speed.
2. Connect a tachometer to the engine.
3. Disconnect the connector from the throttle sensor.



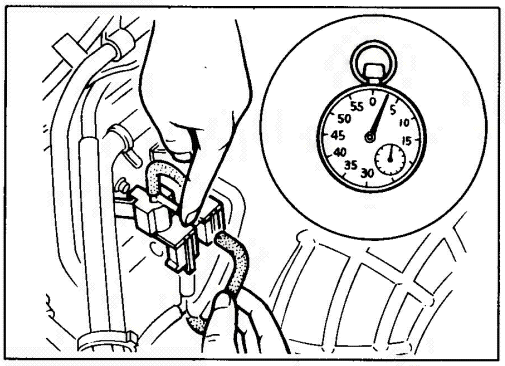
47U04B-042

4. Disconnect the vacuum sensing tube (relief solenoid valve ~ air control valve) at the relief solenoid valve.
5. Place a finger over the port opening and make sure that air is sucked into the tube.
6. Increase the engine speed and make sure that air is not sucked into the tube when the engine speed is 3,500 ~ 3,700 rpm or higher.



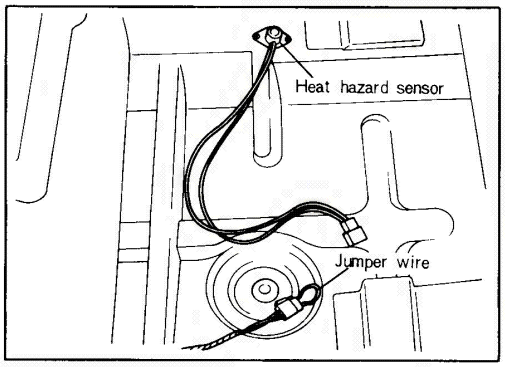
47U04B-043

7. Disconnect the vacuum sensing tube from the vacuum switch.
8. Make sure that air is not sucked into the relief solenoid valve port at any engine speed.
9. Reconnect the tube to the vacuum switch.



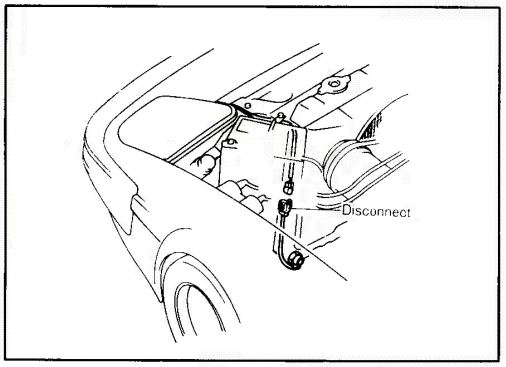
47U04B-044

10. Connect the throttle sensor connector, and then disconnect it.
11. Increase the engine speed from idling speed and hold it at 1,500 rpm.
    Make sure that air is sucked into the port for about **120 seconds,** and then that air is not sucked into the port.



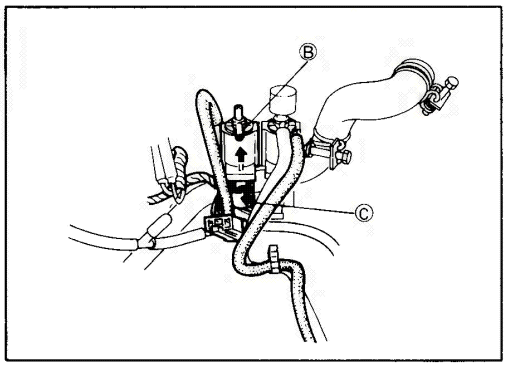
47U04B-045

12. Connect the throttle sensor connector.
13. Disconnect the connector from the heat hazard sensor and connect a jumper wire to both terminals in the connector.
14. Make sure that air is not sucked into the tube at any engine speed.
15. Disconnect the jumper wire connected in step 13 and connect the connector to the heat hazard sensor.



47U04B-046

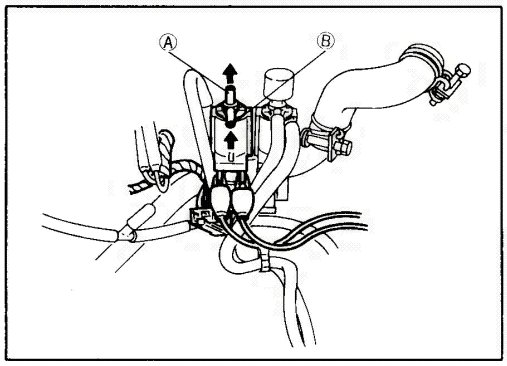
16. Stop the engine and disconnect the connector from the water temperature switch on the radiator.
17. Start the engine and gradually increase the engine speed and make sure that air is not sucked into the tube when the engine speed is 1,000 ~ 1,200 rpm or higher.



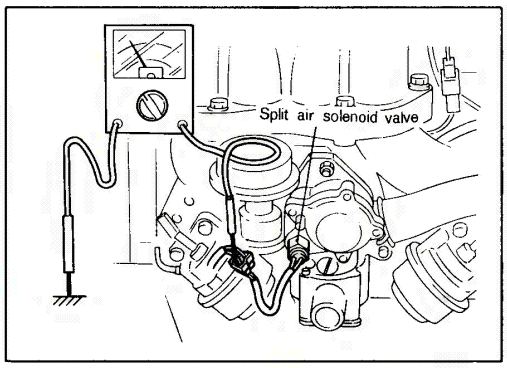
47U04B-048

Checking Relief Solenoid Valve

1. Disconnect the vacuum sensing tubes from the solenoid valve.
2. Blow through the solenoid valve from the port B . Make sure the air passes through the valve and comes out from the air filter C .



3. Disconnect the connector from the relief solenoid valve and connect the battery power to terminals on the valve.
4. Blow through the valve from the port B . Make sure the air passes through the valve and comes out from the port A of the valve.



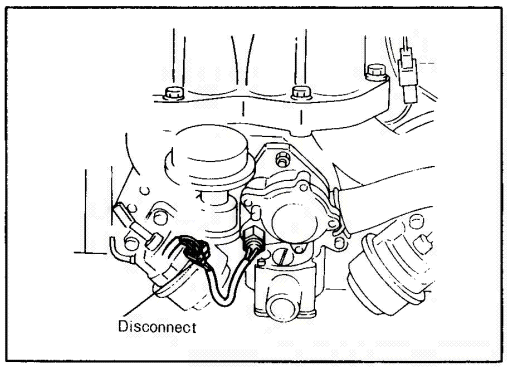
47U04B-049

SPLIT AIR SOLENOID VALVE

Checking Split Air Solenoid Valve

1. Connect the voltmeter to the split air solenoid (LR) terminal and ground.
2. Turn the ignition switch on.
3. Shift into the 5th gear and observe the voltmeter reading.

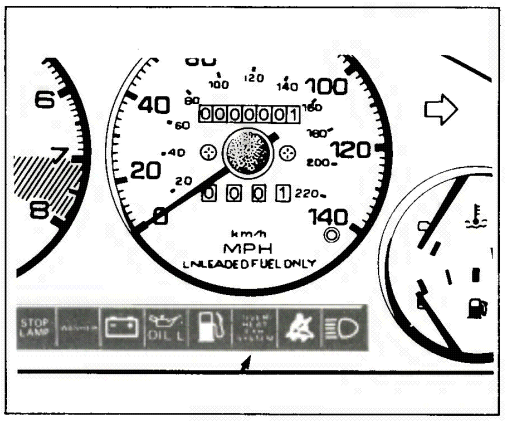
5th gear: 0V
Others: 12V



47U04B-050

Replacing Split Air Solenoid Valve

1. Disconnect the connector for the split air solenoid valve.
2. Remove the split air solenoid valve.
3. Install the split air solenoid valve in the reverse order of removing.

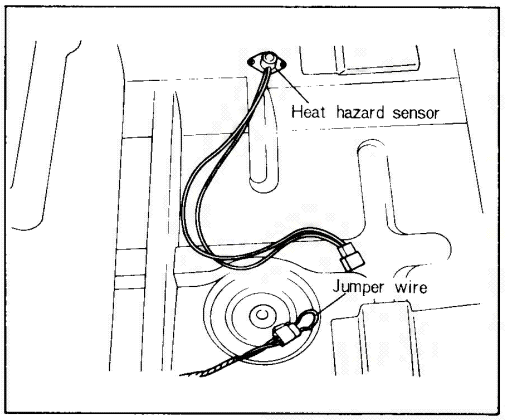


47U04B-051

HEAT HAZARD SENSOR

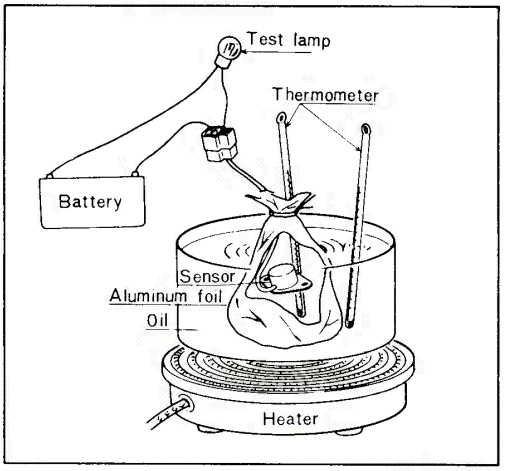
Checking Heat Hazard Protective and Warning System

1. Turn the ignition switch on. The heat hazard warning light comes on.
2. Start the engine and the warning light should go off.



47U04B-052

3. Disconnect the heat hazard sensor connector. Make sure the heat hazard warning light comes on when a jumper wire is connected to both terminals in the connector.

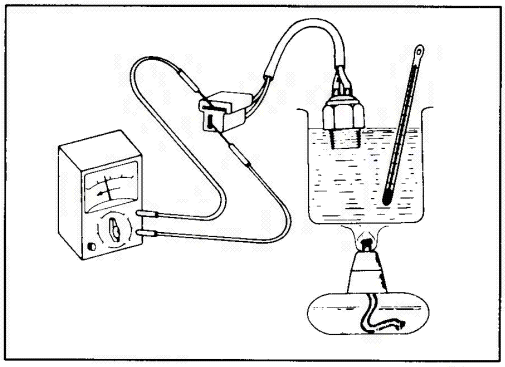


47U04B-053

Checking Heat Hazard Sensor

1. Remove the sensor.
2. Wrap the sensor and thermometer with aluminum foil to prevent oil penetration and place it in oil.
3. Connect the test lamp and battery to the sensor terminals in the connector as shown in Figure.
4. Gradually heat up the oil.
   The test lamp should turn on when the temperature of the aluminum foil reaches to **130 ± 10°C (266 ± 18°F).**
   If the sensor does not operate within the specification, replace the sensor.

Note
Do not heat up the oil more than 150°C (302°F).



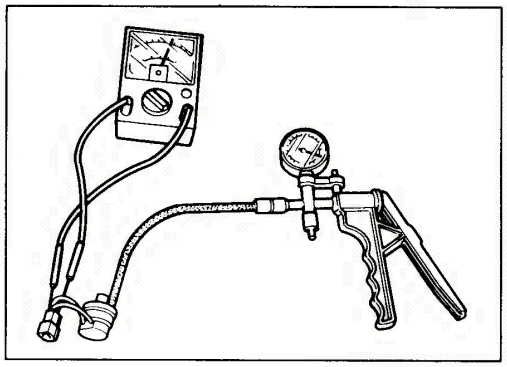
47U04B-054

WATER TEMPERATURE SWITCH

To check the water temperature switch, proceed as follows:

1. Remove the water temperature switch from the radiator.
2. Place the water temperature switch in water with thermometer and heat the water gradually.
3. Check the temperature at which continuity exists between the both terminals in the connector.

Specified temperature: 15 ± 3°C (59 ± 7°F)



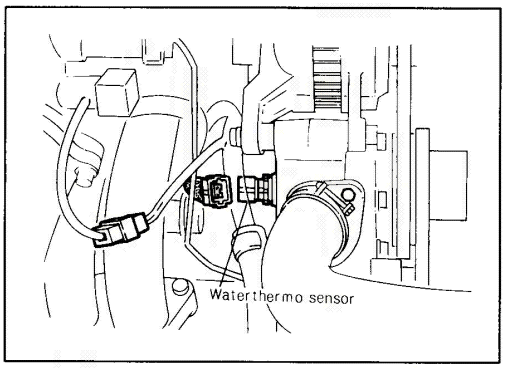
57U04B-055

VACUUM SWITCH

Checking Vacuum Switch

1. Remove the vacuum switch.
2. Connect a vacuum pump to the vacuum switch.
3. Connect an ohmmeter to the vacuum switch and then check the continuity between the switch terminals.

Vacuum	Switch
0 ~ 100 mmHg (3.9 inHg)	Open
more than 100 mmHg (3.9 inHg)	Closed

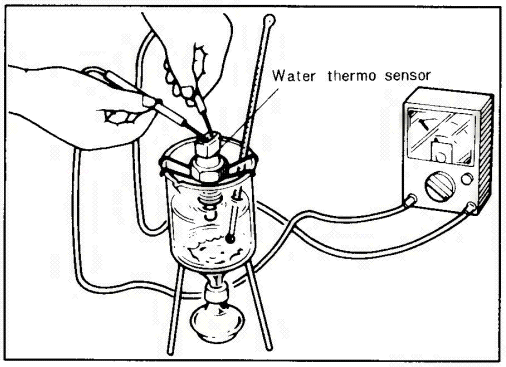


47U04B-056

WATER THERMO SENSOR

Checking Water Thermo Sensor

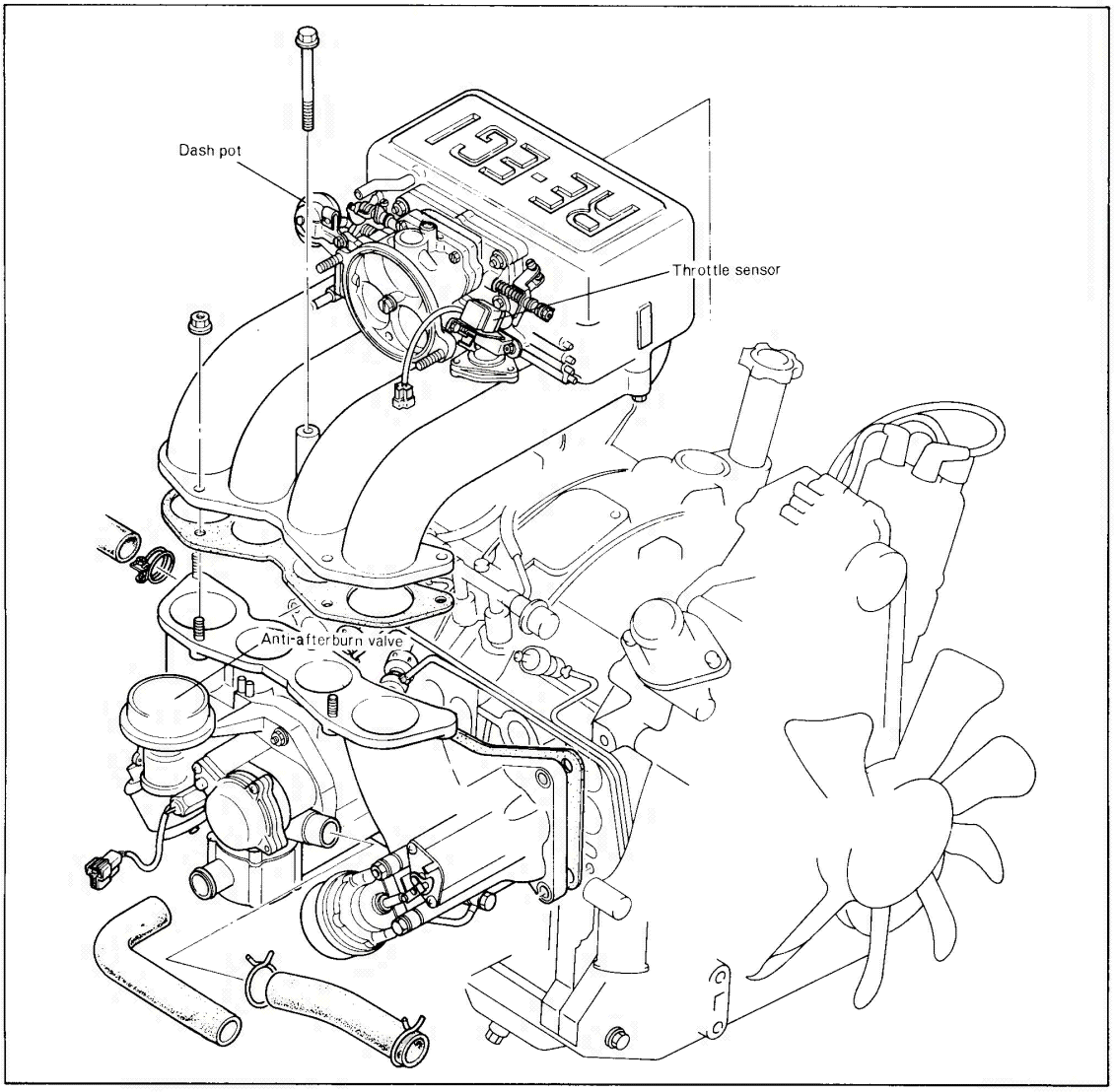
1. Remove the water thermo sensor from the water pump.

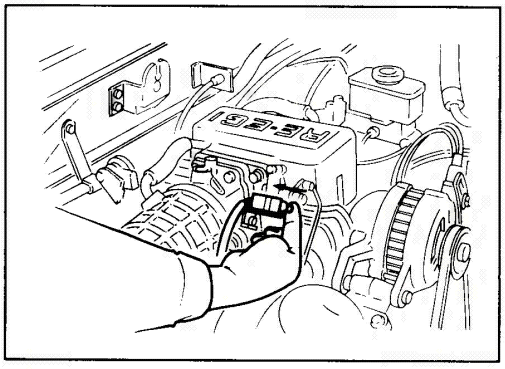


2. Place the water thermo sensor in water with thermometer and heat up the water gradually.
3. Check the calibration of the sensor.

Water temperature	Resistance
-20°C (-4°F)	16.2 ± 1.62 kΩ
20°C (68°F)	2.45 ± 0.24 kΩ
80°C (176°F)	0.32 ± 0.032 kΩ

DECELERATION CONTROL SYSTEM





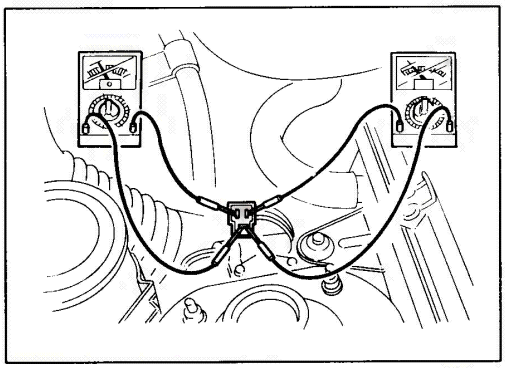
FUEL CUT

During deceleration above a certain engine speed, fuel is not injected from the injectors.

Engine speed:
above 1,500 ~ 1,600 rpm . . . in neutral
above 1,200 ~ 1,300 rpm . . . in gear

Checking Fuel Cut Operation

1. Hold the engine speed at 2,000 rpm.
2. Make sure that the engine speed varies when the throttle sensor is pushed in with a finger.

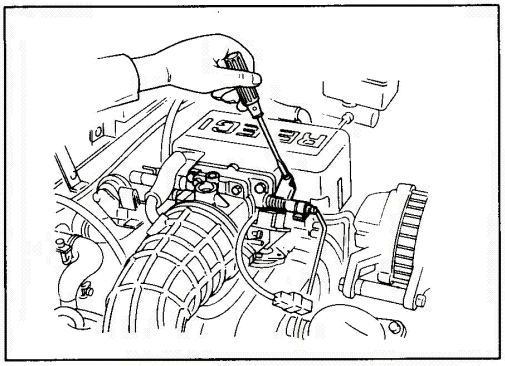


47U04B-057

THROTTLE SENSOR

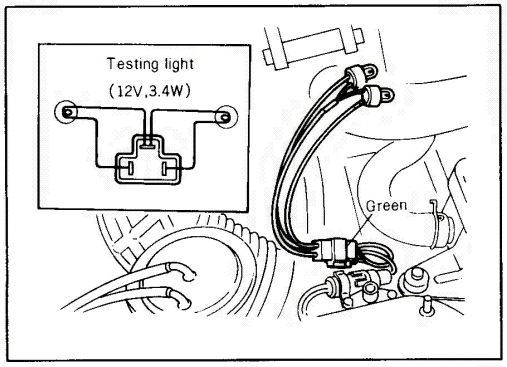
To check and adjust the throttle sensor, proceed as follows:

1. Warm up the engine and stop it.
2. Connect the voltmeters to the to the checking connector (Green) as shown.
3. Turn the ignition switch on and check whether the current flows to one of the voltmeters.



47U04B-058

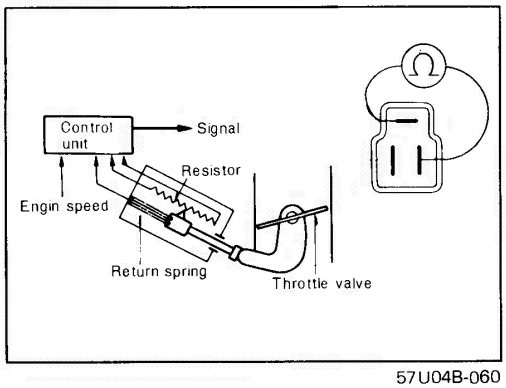
4. If the current flows to both voltmeters or does not flow at all, turn the throttle sensor adjusting screw untill the current flows to one of the voltmeters.
   a) If current flows to both voltmeters, turn the adjusting screw counter-clockwise.
   b) If current does not flow at all, turn the adjusting screw clockwise.
5. After adjusting, install the cap onto the adjusting screw.



47U04B-059

Reference

The testing light as shown in the figure can be prepared and used in place of the steps 3 and 4. In this case, the testing light turns on when current flows.

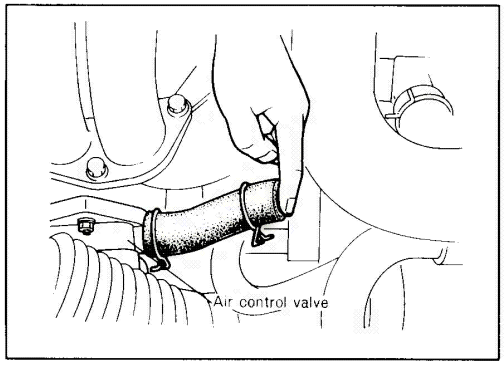


57U04B-060

Checking throttle sensor

1. Disconnect the connector for the throttle sensor.
2. Connect an ohmmeter to the throttle sensor as shown.
3. Open the throttle valve and observe the ohmmeter reading.

Throttle opening
At idle: about 1 kΩ
Full open: about 5 kΩ

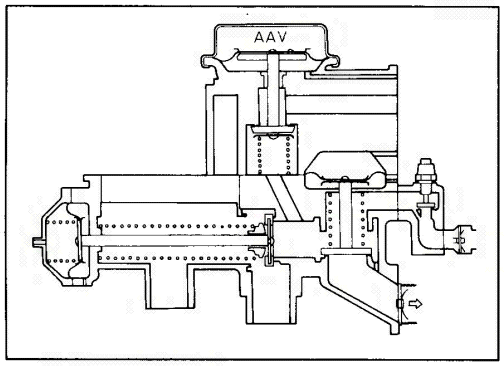


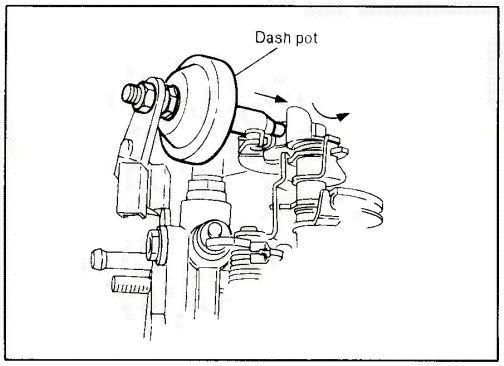
47U04B-061

ANTI-AFTERBURN VALVE

Checking Anti-afterburn Valve

1. Warm up the engine and run it at idling speed.
2. Disconnect the air hose (air control valve ~ air pump) at the air pump.
3. Place a finger over the air hose opening and make sure that the air is not sucked into the air hose at idling speed.
4. Increase the engine speed more than 3,000 rpm then decrease the engine speed **rapidly.**
5. Make sure that the air is sucked into the air hose for a few seconds while decelerating.
   Replace air control valve, if necessary.



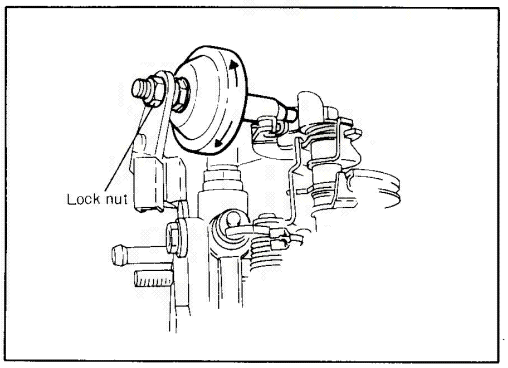


47U04B-062

DASH POT

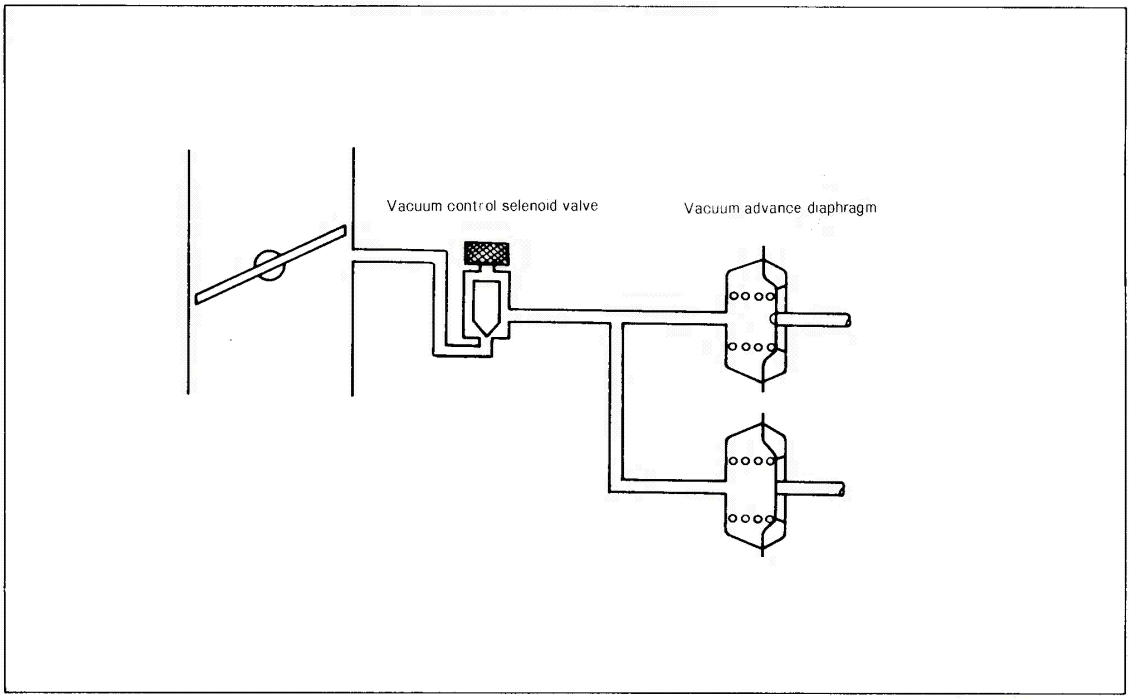
To check and adjust the dash pot, proceed as follows:

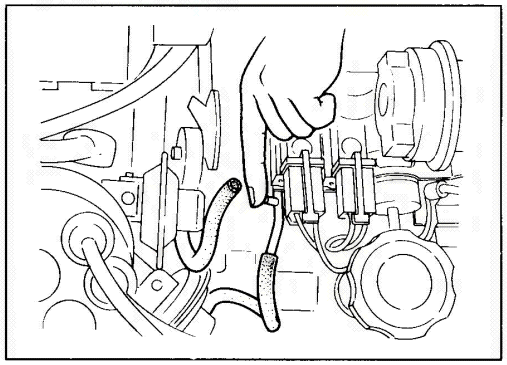
1. Check that the dash pot rod does not keep the throttle lever from returning to the idle stop.
2. Quickly operate the throttle lever fully and make sure the dash pot rod extends quickly.
   Release the throttle lever and make sure that the throttle lever returns slowly to idle position after it has touched the dash pot rod.
3. Connect a tachometer to the engine.
4. Start the engine and warm up the engine to the normal operating temperature.
   Make sure the engine operates at the specified idle speed.
   Operate the throttle lever until it is away from the dash pot rod.
5. Slowly decrease the engine speed and check the engine speed at which the throttle lever just touches the dash pot rod.
   The engine speed should be **2,350 ~ 2,650 rpm.**
   If the engine speed is not within the specification, loosen the lock nut and adjust the engine speed by turning the dash pot diaphragm.



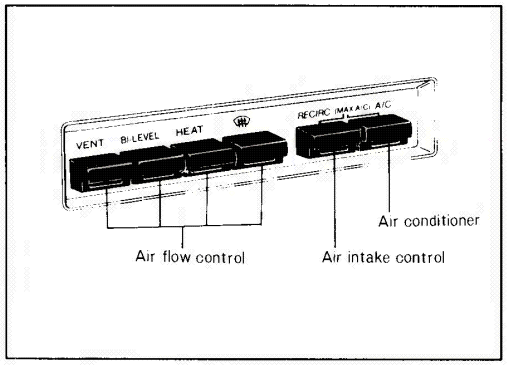
47U04B-063

IGNITION CONTROL SYSTEM





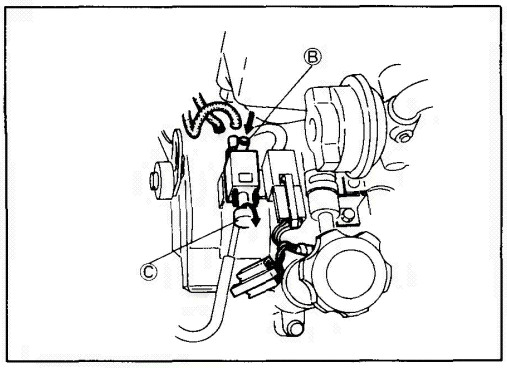
47U04B-063



VACUUM CONTROL SOLENOID VALVE

Checking Signal for Vacuum Control Solenoid Valve

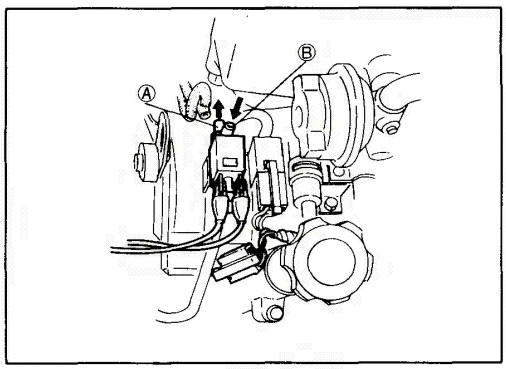
1. Warm up the engine to the normal operating temperature.
2. Connect a tachometer to the engine.
3. Disconnect the vacuum sensing tube (vacuum advance diaphragm leading ~ pipe) at the pipe.
4. Place a finger over the pipe opening and make sure that the air is not sucked into the pipe.
5. Gradually increase the engine speed and make sure that the air is sucked into the pipe when the engine speed is 1,000 ~ 1,200 rpm or over.
6. Decrease the engine speed from 4,000 rpm rapidly and make sure that the air is not sucked into the pipe while decelerating.
7. Turn the air-con. switch on and make sure that the air is sucked into the pipe at idling speed.



47U04B-064

Checking Vacuum Control Solenoid Valve

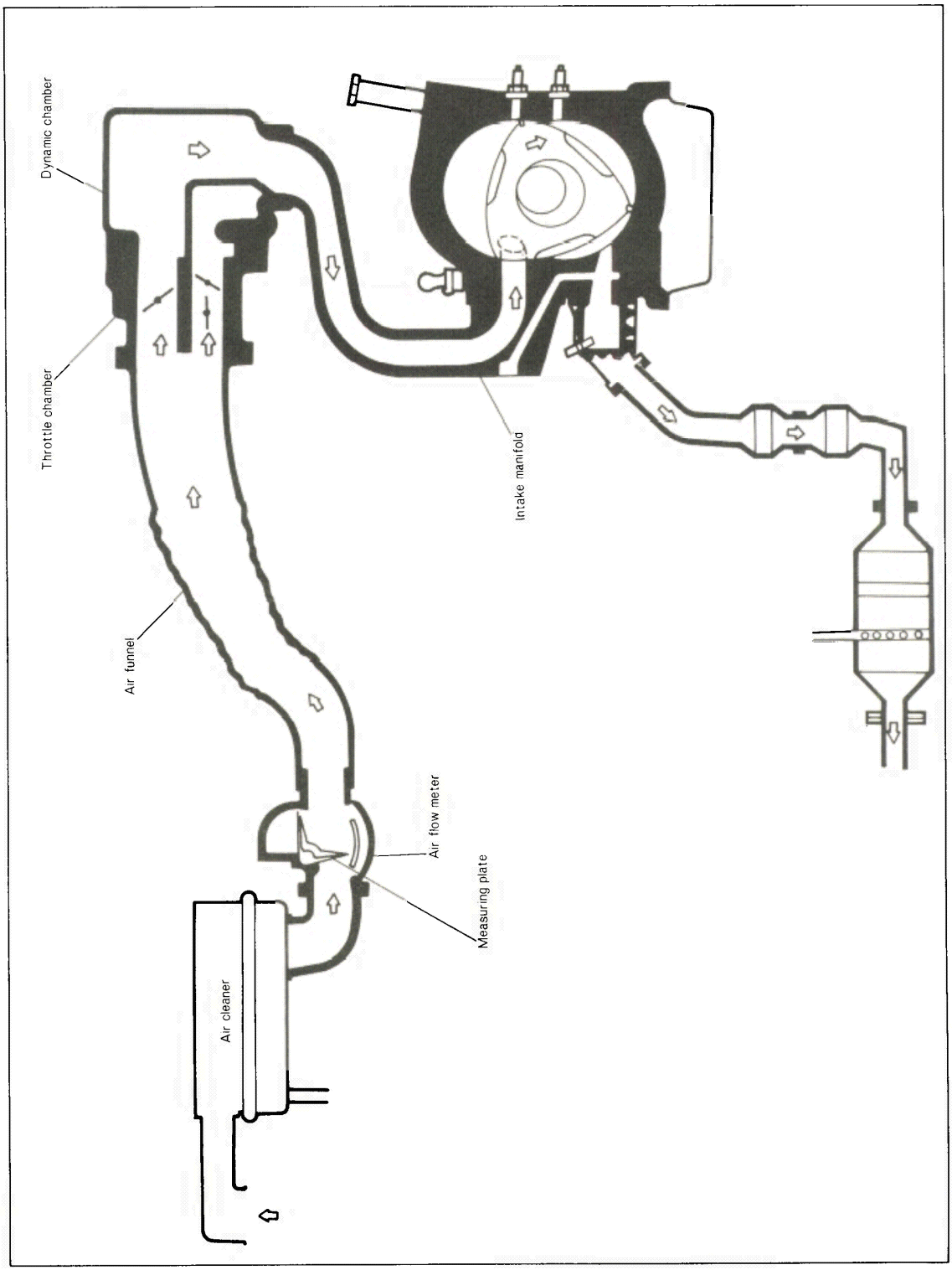
1. Disconnect the vacuum sensing tubes from the solenoid valve and vacuum pipe.
2. Blow through the solenoid valve from the port B.
   Make sure the air passes through the valve and comes out from the air filter C.

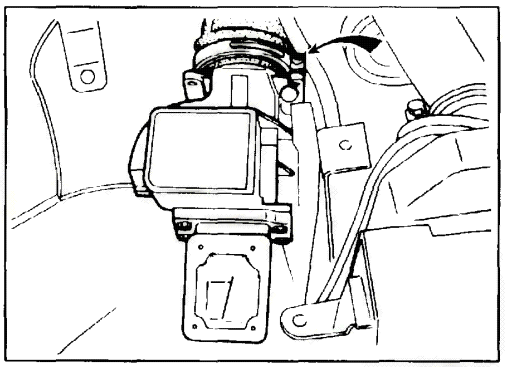


47U04B-065

3. Disconnect the connector from the vacuum control solenoid valve and connect the battery power to terminals on the valve.
4. Blow through the valve from the port B.
   Make sure the air passes through the valve and comes out from the port A of the valve.

AIR INDUCTION SYSTEM





47U04B-066

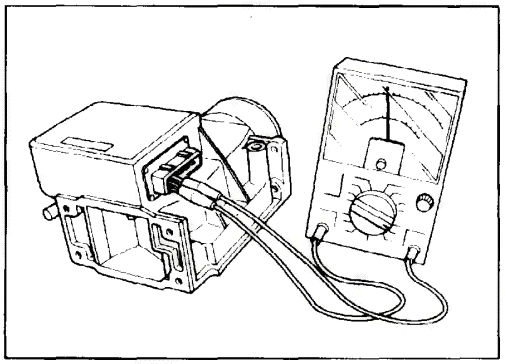
AIR FLOW METER

Removing Air Flow Meter

1. Remove the air cleaner element.
2. Loosen the air flow meter attaching bolts and remove the air cleaner.
3. Loosen the air funnel band and remove the air flow meter.

Installing Air Flow Meter

Install the air flow meter in the reverse order of removing.

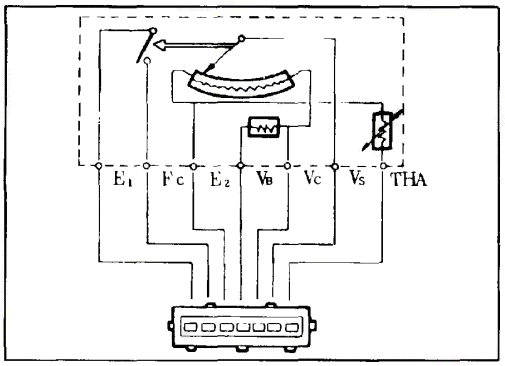


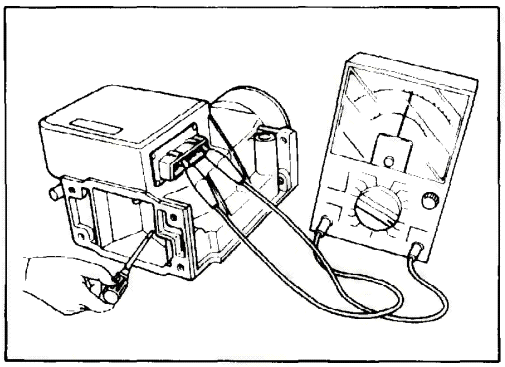
47U04B-067

Checking Air Flow Meter

1. Check the air flow meter body for cracks.
2. Check the resistance of each terminals by using an ohmmeter.

Terminal	Resistance (Ω)
$E_2 \leftrightarrow Vs$	20 ~ 400
$E_2 \leftrightarrow Vc$	100 ~ 300
$E_2 \leftrightarrow V_B$	200 ~ 400
$E_2 \leftrightarrow$ THA (Intake air temperature sensor)	-20°C (-4°F) 10,000 ~ 20,000 0°C (32°F) 4,000 ~ 7,000 20°C (68°F) 2,000 ~ 3,000 40°C (104°F) 900 ~ 1,300 60°C (140°F) 400 ~ 700
$E_1 \leftrightarrow Fc$	∞



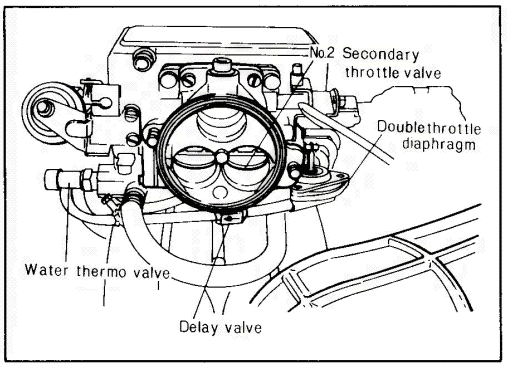


57U04B-068

CHECKING OPERATION

Pressing down the measuring plate with a driver or the like, measure the resistance between E_2 and Fc (fuel pump switch) and between E_2 and Vs.

Conditions / Terminals	Measuring plate	
	Fully closed	Fully open
$E_1 \leftrightarrow Fc$	∞	0
$E_2 \leftrightarrow Vs$	20 to 400Ω	20 to 1,000Ω



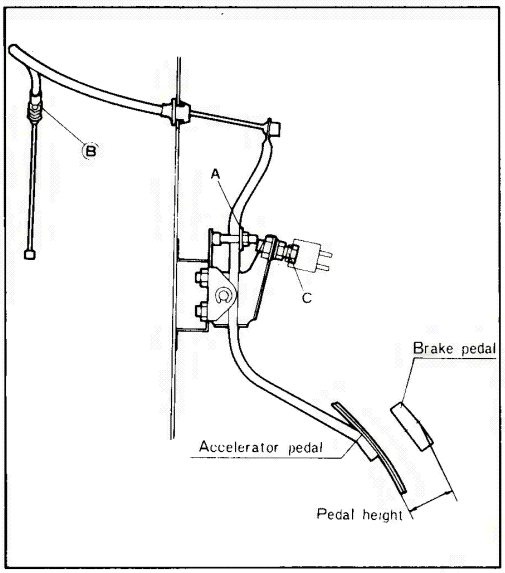
47U04B-064

ACCELERATOR LINKAGE

Checking Accelerator Linkage

Remove the air funnel and, with the accelerator pedal fully depressed, observe the position of the throttle valves. They should be horizontal (wide open position).

Check that the accelerator linkage returns fully and does not bind.



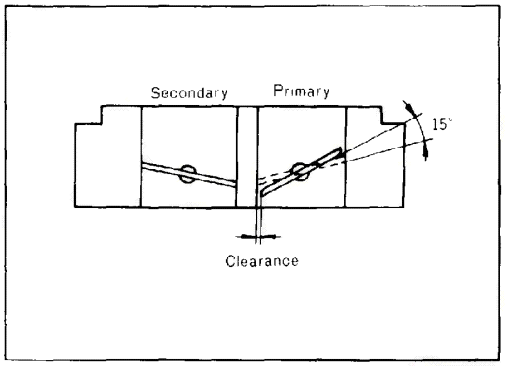
47U04B-070

Adjusting Accelerator Cable

1. Check the accelerator pedal position.
   The accelerator pedal height should be **42 ± 5 mm (1.7 ± 0.2 in)** lower than the brake pedal height. If necessary, adjust the nut A to obtain the correct position.
2. Check the free play of the cable at the throttle chamber. It should be **1 ~ 3 mm.** If the free play is not within the specifications, adjust it with the nut B.

   Caution
   Before checking the free play, move away the fast-idle cam from the roller.

3. Depress the accelerator pedal all the way down to the floor and check to see that the throttle valves are wide open. If necessary, adjust the stopper bolt C.

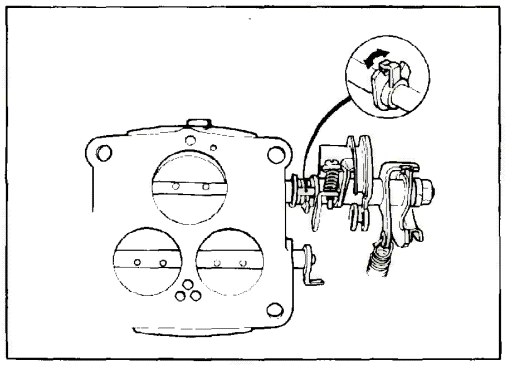


57U04B-071

THROTTLE CHAMBER

Checking No. 1 Secondary Throttle Valve

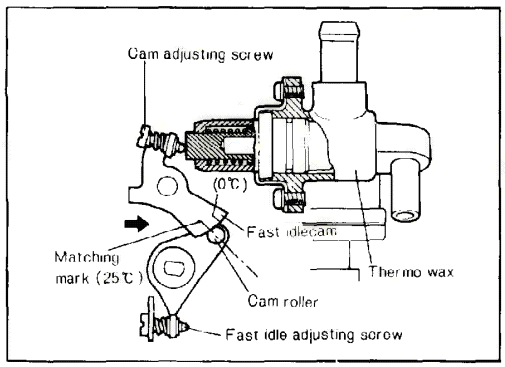
1. The No. 1 secondary throttle valve starts to open when the primary throttle valve opens 15 degrees and completely opens at the same time when the primary throttle valve fully opens.
2. Check the clearance between the primary throttle valve and the wall of the throttle bore when the No. 1 secondary throttle valve starts to open.



47U04B-072

3. If the clearance is not within the specification, bend the tab until the proper clearance is obtained.

Standard clearance:
1.1 ~ 1.7 mm (0.043 ~ 0.067 in)



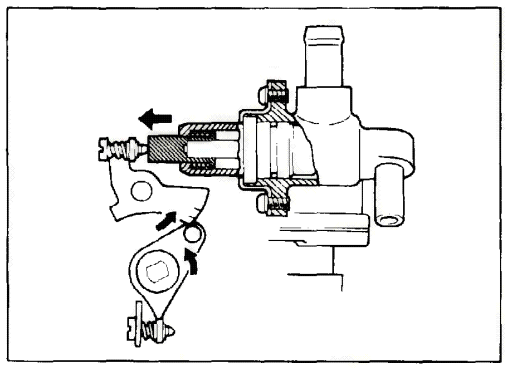
47U04B-073

Checking Fast Idle Operation

For this operation to be checked the vehicle and throttle chamber must be at **25°C (77° F).**

1. For proper fast idle operation the matching mark on the fast idle cam must be aligned with the center of the cam roller.
2. If the matching mark and the center of the cam roller do not align, turn the cam adjusting screw until proper alignment is obtained.

Note
Fast idle adjustment is unnecessary unless it has been tampered with.



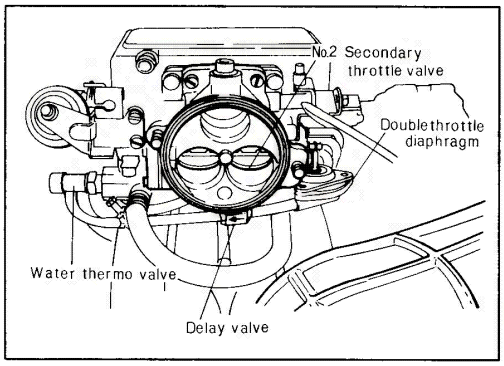
47U04B-074

3. Once the connect matching mark aligns with the center of the cam roller check the clearance (throttle chamber ~ primary throttle valve), turn the fast idle adjusting screw to specifications, if necessary.

Standard clearance:
0.4 ~ 0.5 mm (0.016 ~ 0.02 in)

On Vehicle

1. Warm up engine to operating temperature.
2. Make sure thermo wax rod extends outward fully and idle cam separates from roller.

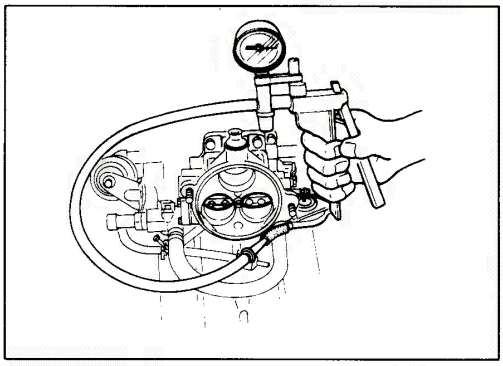


47U04B-075

Checking No. 2 Secondary Throttle Valve

Visual check

1. Remove the air funnel from the throttle chamber.
2. Make sure that the No. 2 secondary throttle valve is fully opened.

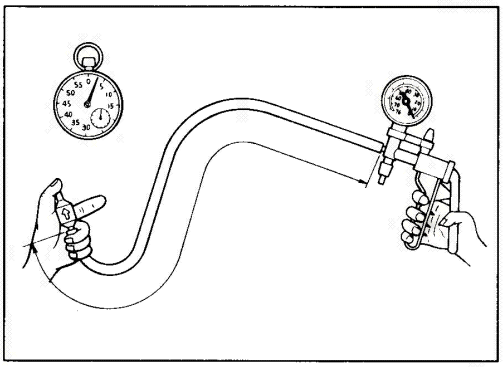


47U04B-076

Checking Double Throttle Diaphragm

1. Disconnect the vacuum sensing tube from the double throttle diaphragm.
2. Apply vacuum of more than 200 mmHg (7.87 inHg) to the double throttle diaphragm.
3. Make sure that the No. 2 secondary throttle valve is fully closed to its movable range.
4. Check the calibration of the double throttle diaphragm.

No. 2 secondary throttle valve	Vacuum
Start to open	120 mmHg (4.7 inHg)
Fully opened	0 ~ 45 mmHg (0 ~ 1.8 inHg)



47U04B-077

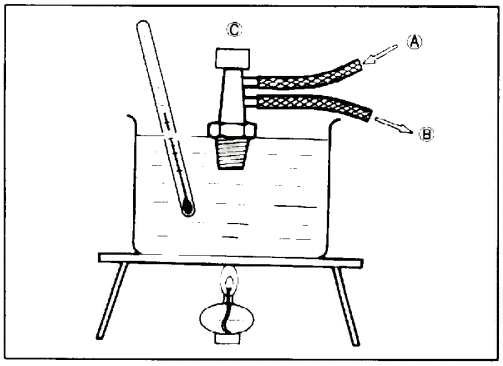
Checking Delay Valve

1. Disconnect the vacuum delay valve.
2. Connect the **1.0 m (3.28 ft)** vacuum tube to the vacuum pump tester.
3. Connect the vacuum delay valve to the tube.

Note
Make sure that the direction of the vacuum delay valve is as shown.

4. Completely shut the other side of the vacuum delay valve with your thumb.
5. Apply a vacuum of over **500 mmHg (19.7 inHg)** by using the vacuum pump tester.
6. Release your thumb from the vacuum delay valve and check the time required for the vacuum reading to decrease to **100 mmHg (3.9 inHg)** from **400 mmHg (15.7 inHg).**

Specified time: 12 ± 3 sec.

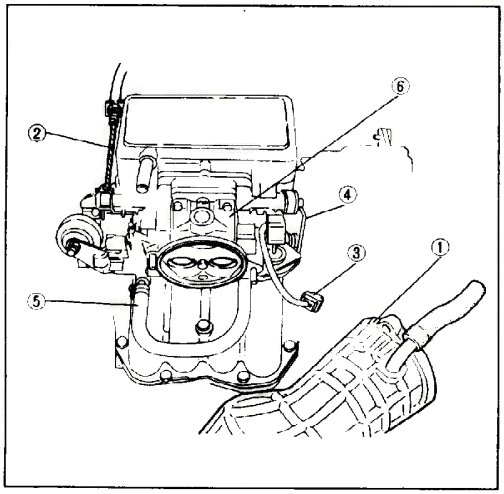


47U04B-078

Checking Water Thermo Valve

1. Remove the water thermo valve.
2. Immerse the water thermo valve in a container.
3. Heat up the water gradually and observe the temperature.
4. Blow the port A and check the thermo valve operation.

Water temperature	Air passes
Below 60°C (140°F)	From A to B
Above 60°C (140°F)	From A to C



47U04B-079

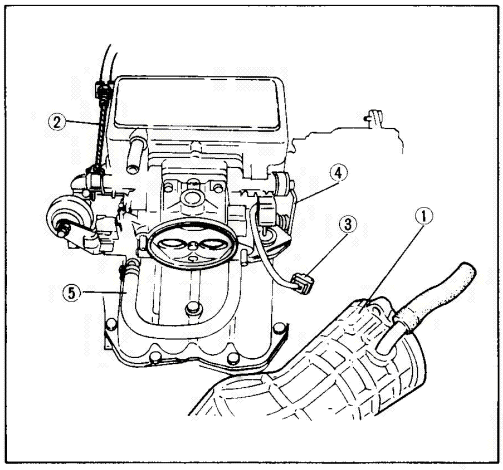
Removing Throttle Chamber

Remove and disconnect the following parts.

1. Air funnel
2. Accelerator cable
3. Throttle sensor connector
4. Metering oil pump connecting rod
5. Water hoses
6. Throttle chamber

Installing Throttle Chamber

Install the throttle chamber in the reverse order of removing.



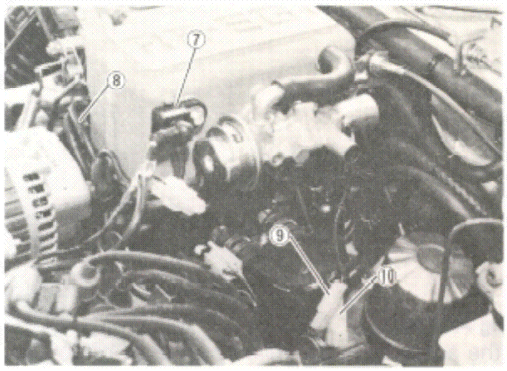
47U04B-081

DYNAMIC CHAMBER

Removing Dynamic Chamber

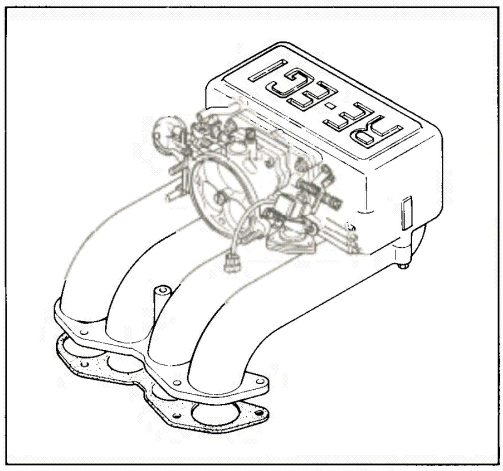
Remove and disconnect the following parts.

1. Air funnel
2. Accelerator cable
3. Throttle sensor connector
4. Metering oil pump connecting rod
5. Water hoses



47U04B-082

6. Battery negative cable
7. Terminal cover
8. Vacuum sensing tubes
9. Air supply valve connector
10. Intake air temperature sensor connector



47U04B-083

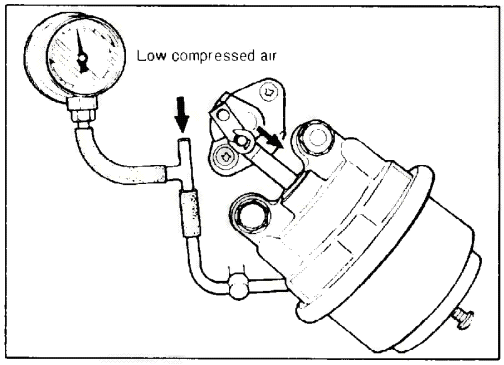
11. Dynamic chamber

Caution

After removing the dynamic chamber cover the intake manifold port with a clean cloth to prevent dust or dirt from entering.

Installing Dynamic Chamber

Install the dynamic chamber in the reverse order of removing.



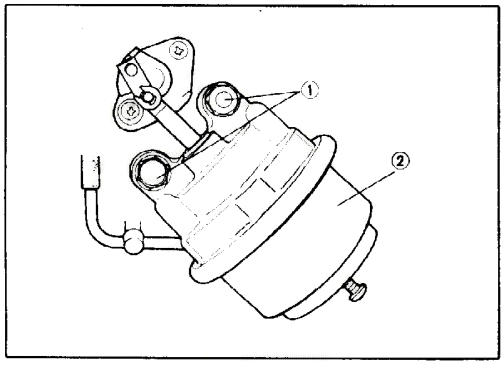
47U04B-084

ACTUATOR AND AUXILIARY PORT VALVE

Checking Actuator and Auxiliary Port Valve

1. Remove the air hose and connect the pressure gauge as shown.
2. Apply low compressed air to the actuator and check operation.

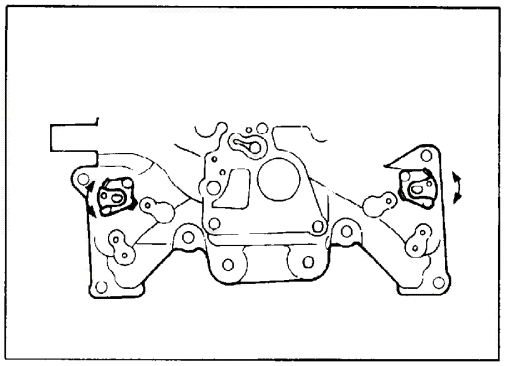
At start to move: 13 kPa (1.8 psi)
At finish: 19 kPa (2.7 psi)



47U04B-085

Removing Actuator

1. Loosen the actuator attaching nuts.
2. Remove the actuator.



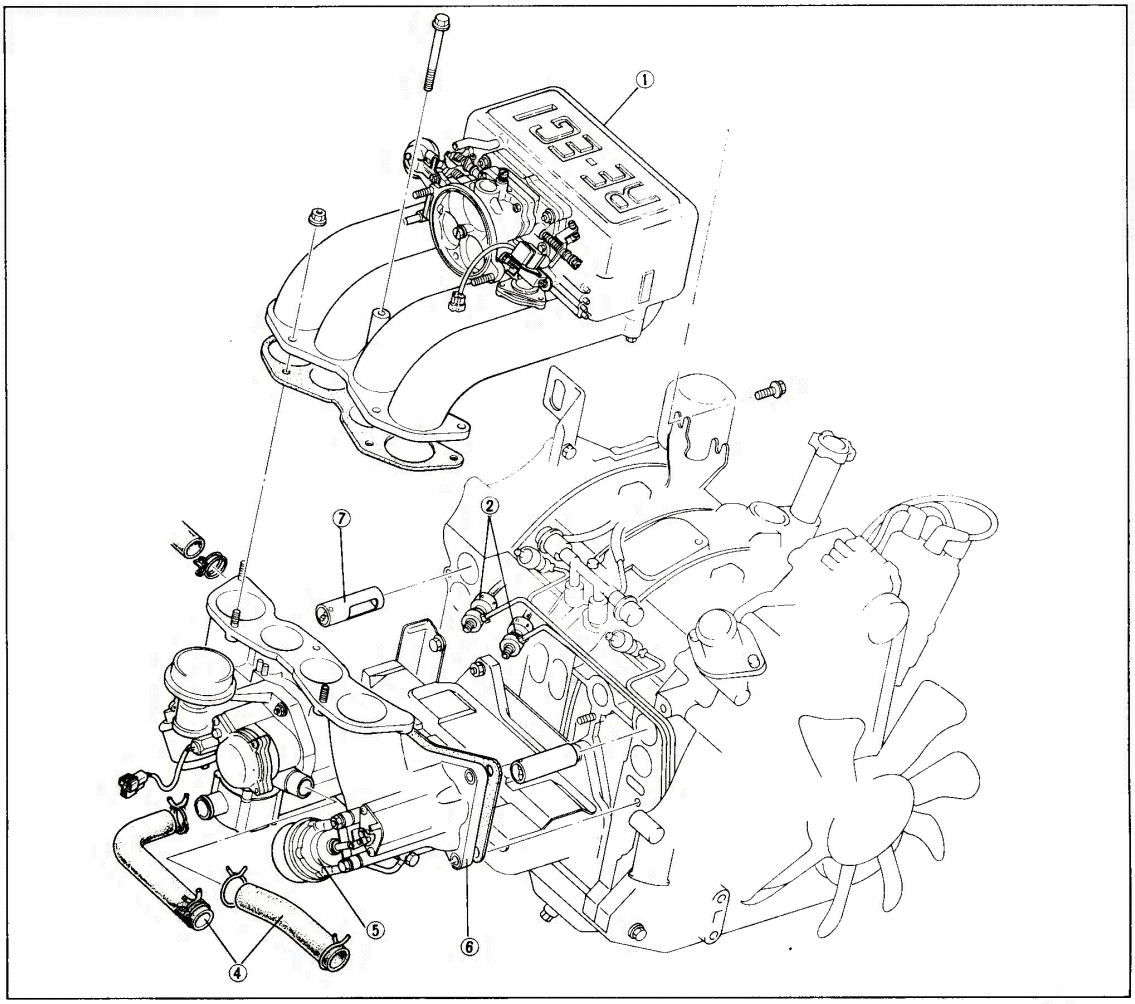
47U04B 086

Installing Actuator

Install the actuator in the reverse order of removing.

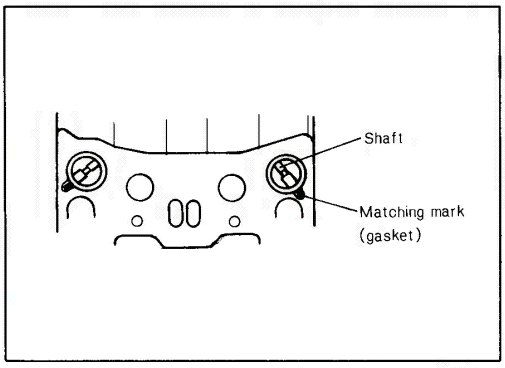
Caution
Before installing the actuator, rotate the lever and make sure that it moves smoothly.

Removing Auxiliary port Valve
Remove the auxiliary port valve in the numbered order shown in the figure.



47U04B-087

1. Dynamic chamber (see page 4B–49)
2. Check valve assembly
3. Vacuum hoses
4. Air hoses
5. Actuator
6. Intake manifold
7. Auxiliary port Valve



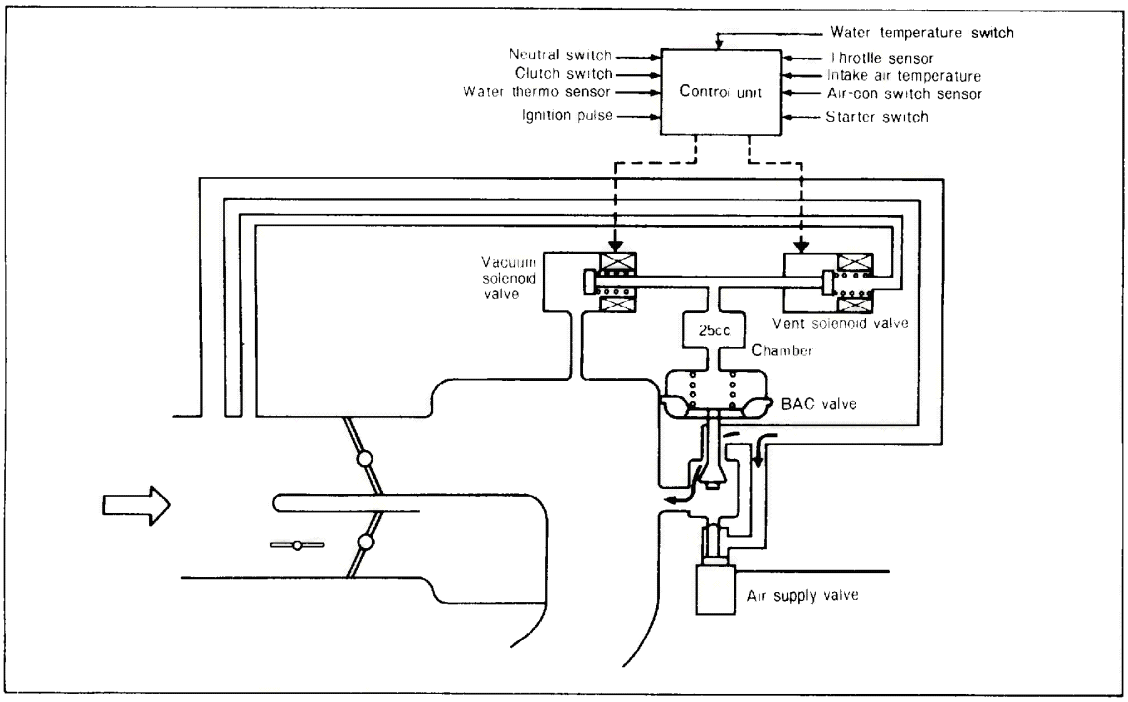
47U04B-088

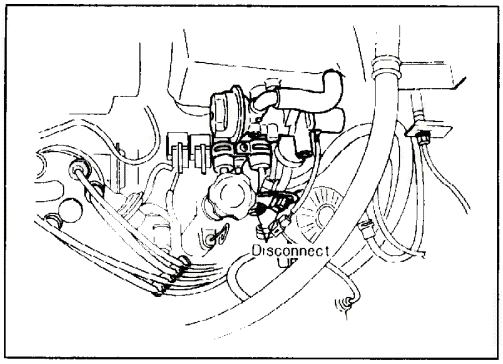
Checking Auxiliary Port Valve
Check the auxiliary port valve for cracks and breakage.

Installing Auxiliary Port Valve
Install the auxiliary port valve in the reverse order of removing.

Caution
Installation should be made so that the bigger side of the auxiliary port valve shafts align the matching mark on the gasket as shown in the figure.

BY-PASS AIR CONTROL (BAC) SYSTEM



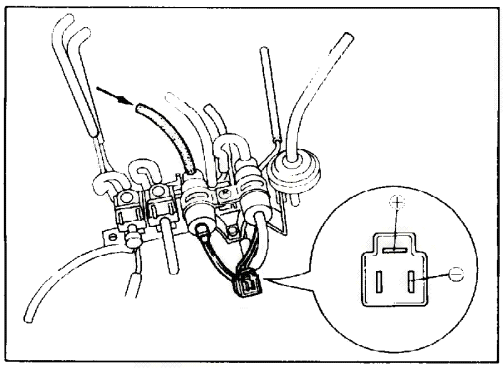


47U04B-089

BAC SYSTEM

Checking BAC System

1. Warm up the engine and run it at idling speed.
2. Turn the headlight switch on and disconnect the vent and vacuum solenoid valve connector. Make sure that the engine speed decreases.
3. Connect the vent and vacuum solenoid valve connector and make sure that the engine speed increases to 800 rpm.

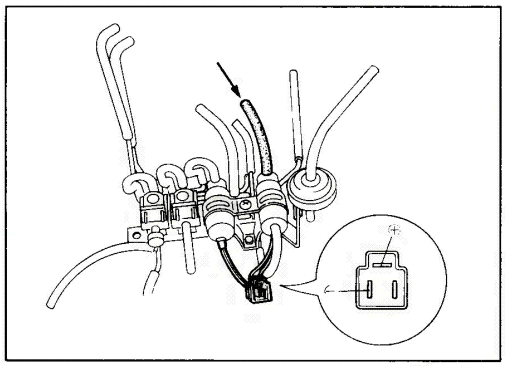


47U04B-090

VENT SOLENOID VALVE

Checking Vent Solenoid Valve

1. Disconnect the tube from the pipe.
2. Disconnect the connector.
3. Blow through the vent solenoid valve from the tube and make sure that the air does not pass.
4. Apply battery power to the terminals as shown.
5. Blow through the vent solenoid valve from the tube and make sure that the air passes.

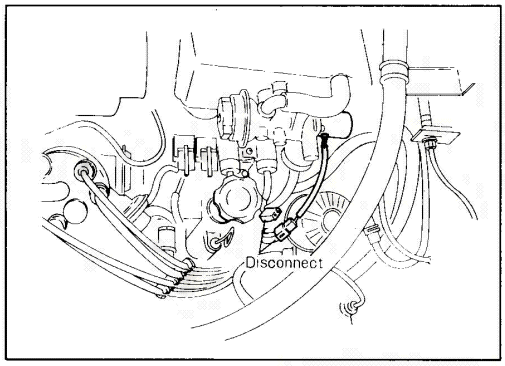


47U04B-091

VACUUM SOLENOID VALVE

Checking Vacuum Solenoid Valve

1. Disconnect the tube from the pipe.
2. Disconnect the connector.
3. Blow through the vacuum solenoid valve from the tube and make sure that the air passes.
4. Apply battery power to the terminals as shown.
5. Blow through the vent solenoid valve from the tube and make sure that the air does not pass.

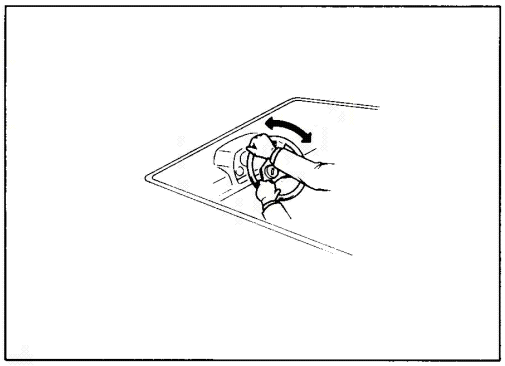


47U04B-092

AIR SUPPLY VALVE

Checking Air Supply Valve

1. Start the engine and run it at idling speed.
2. Turn the air con. switch ON and make sure that the engine speed does not decrease.
3. Disconnect the air supply valve connector and make sure that the engine speed decreases,
4. Reconnect the air supply valve connector and make sure that the engine speed increases to idling speed (800 rpm).

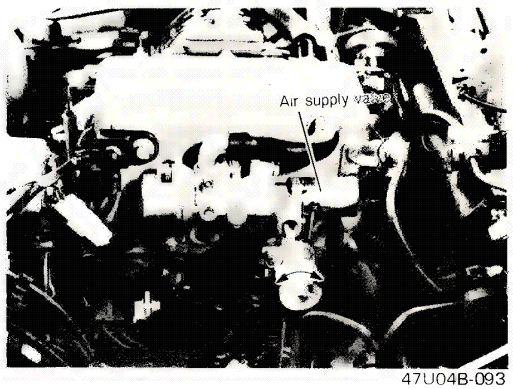


5. Turn the steering wheel either the right or left, and make sure that the magnet clutch of compressure turns off.

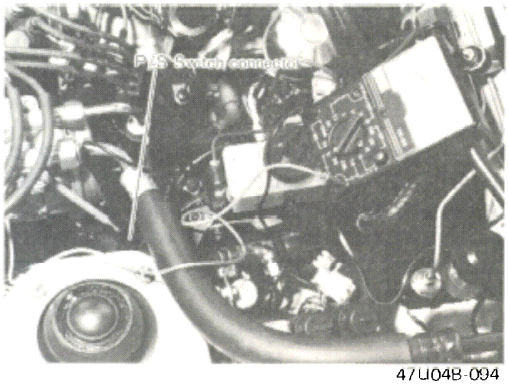
Adjusting Air Supply Valve

Adjust the air supply valve, if necessary.

1. Warm up the engine and run it at idling speed.
2. Connect a tachometer to the engine.
3. Disconnect the vent and vacuum solenoid valve connector.
4. Check the idling speed and adjust it, if necessary.
5. Disconnect the air supply valve connector and apply the battery power to the air supply valve.
6. Make sure the engine speed is within 1,000 ~ 1,070 rpm.
7. If the engine speed is not within the specified, remove the blind cap and adjust the engine speed by turning the adjusting screw.
8. After adjusting, install the blind cap.



47U04B-093



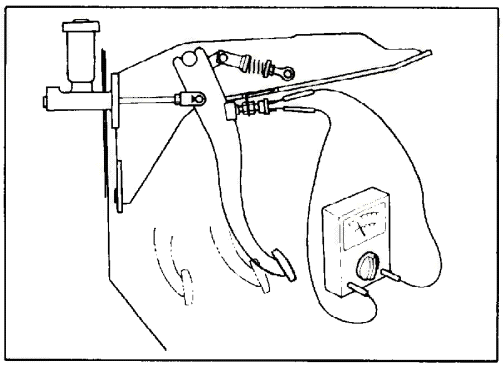
47U04B-094

POWER STEERING SWITCH

Checking Power Steering Switch

1. Start the engine and run it at idling speed.
2. Disconnect the power steering switch connector.
3. Connect an ohmmeter to the power steering switch.
4. Turn the steering wheel either the right or left, and make sure there is continuity between the switch terminals.

When the oil pressure is above 3,000 kPa (427 psi): CLOSED
When the oil pressure is below 3,000 kPa (427 psi): OPEN

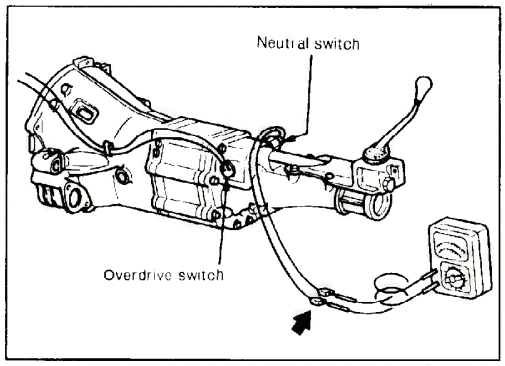

47U04B-095

CLUTCH SWITCH

Checking Clutch Switch

1. Disconnect the clutch switch connector.
2. Connect an ohmmeter to the clutch switch, and then check the continuity between the switch terminals.

When the pedal is depressed	Closed
When the pedal is released	Open



47U04B-096

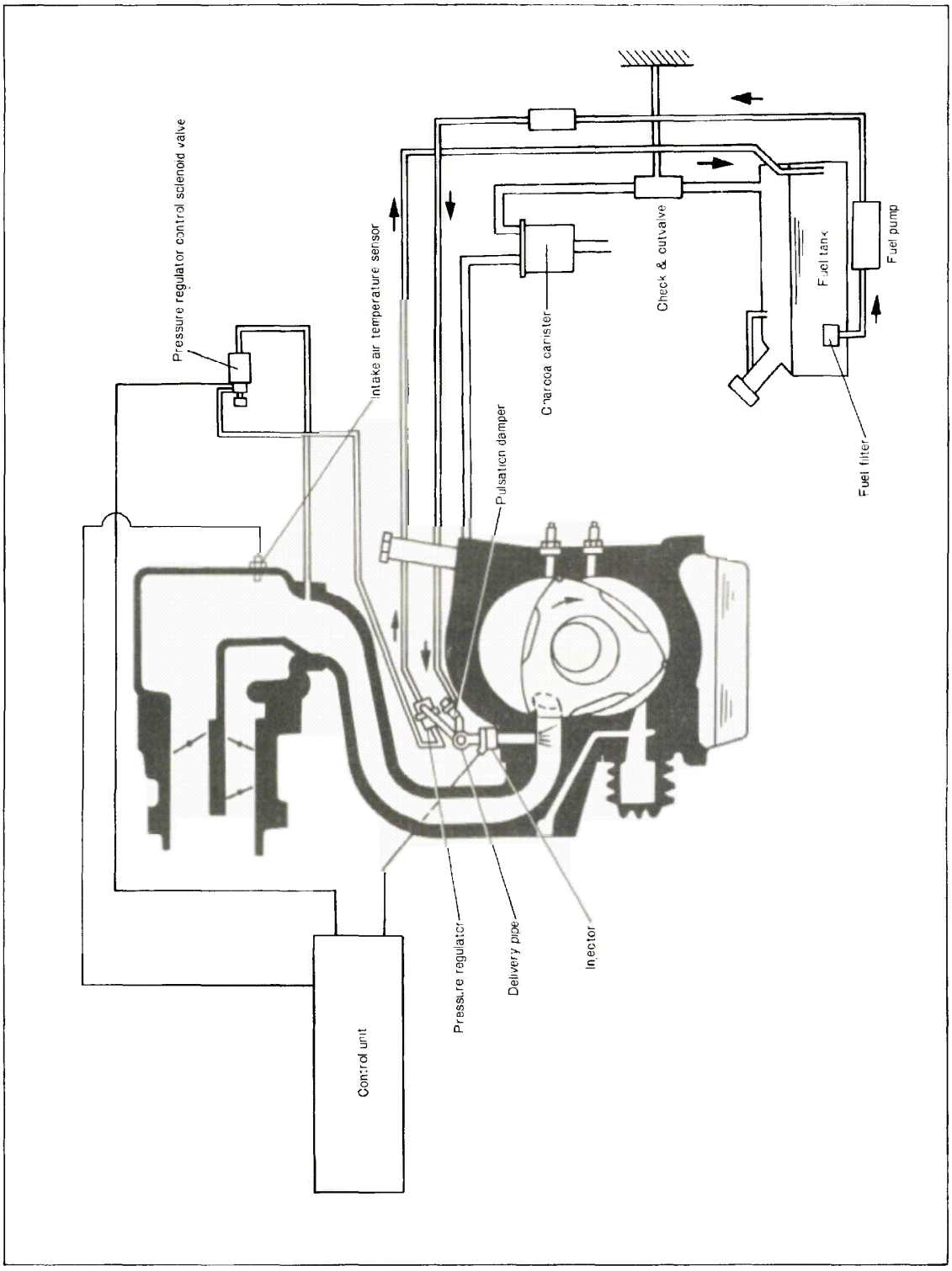
NEUTRAL SWITCH

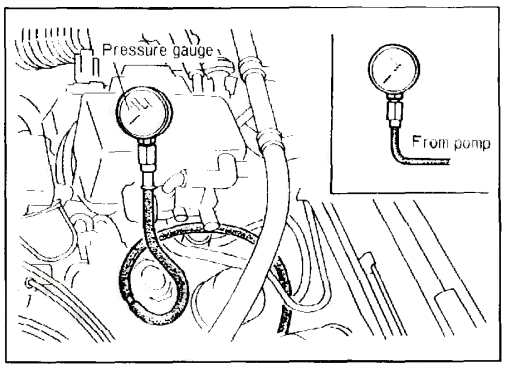
Check Neutral Switch

1. Disconnect the neutral switch connector.
2. Connect an ohmmeter to the neutral switch, and then check the continuity between the switch terminals.

In neutral	Closed
In other ranges	Open

FUEL SYSTEM


Pressure regulator control solenoid valve
Intake air temperature sensor
Charcoal canister
Check & cutvalve
Fuel tank
Fuel pump
Fuel filter
Pulsation damper
Pressure regulator
Delivery pipe
Injector
Control unit



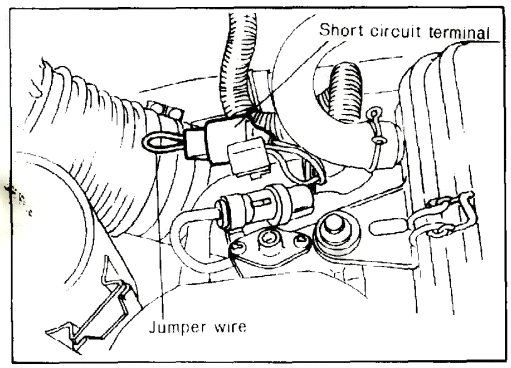
47U04B-097

FUEL PUMP

Checking Outlet Pressure

1. Disconnect the negative battery terminal.
2. Disconnect the fuel main hose from the fuel pipe. And connect a pressure gauge.

Warning
Cover the hose with waste cloth since fuel is splashed out when disconnecting the hose.



47U04B-098

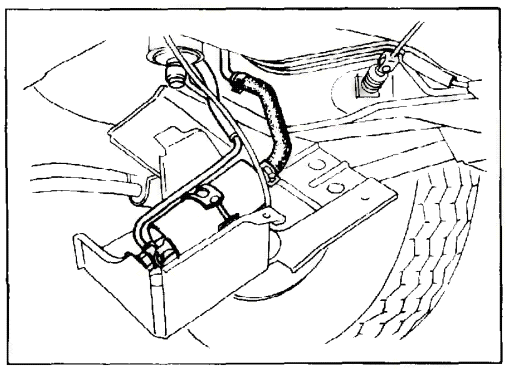
3. Connect the terminal (-) of the battery.
4. Turning on the ignition switch, shortcircuit the fuel pump shortcircuit terminal and start the pump.
5. Measure the fuel pressure.

Outlet pressure:
350 ~ 500 kPa (49.8 ~ 71.1 lb/in^2)

47U04B-099

Replacing Fuel Pump

1. Remove the storage compartment located behind the driver's seat.
2. Disconnect the fuel pump connector.
3. Jack up a vehicle and support it with safety stands.

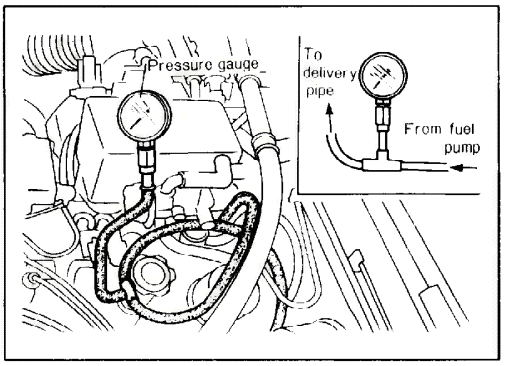


47U04B-100

4. Remove the pump bracket clamp bolt.
5. Disconnect the inlet hose and the outlet hose.

Warnings
a) Cover the hose with waste cloth since fuel is splashed out when disconnect the hose.
b) Provide the hose with a plug.

6. Remove the pump from the pump bracket.
7. Install the pump in the reverse order of removing.



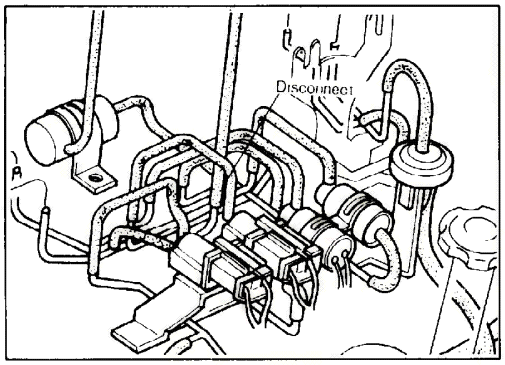
47U04B-101

PRESSURE REGULATOR

Checking Fuel Pressure

1. Disconnect the negative battery terminal.
2. Disconnect the fuel main hose from the fuel pipe.
3. Connect the pressure gauge between the fuel main hose and pipe by using the three way joint.

Warning
Cover the hose with waste cloth since fuel is splashed out when disconnecting the hose.



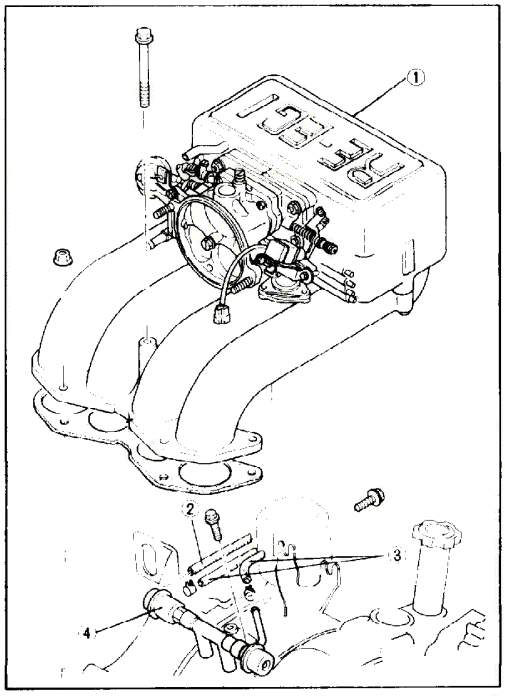
47U04B-102

3. Connect the negative battery terminal, and start the engine.
4. Disconnect the vacuum hose connected to the pressure regulator at the pressure regulator control valve.
5. Measure the fuel pressure at idle.

Standard value: About 260 kPa (36.97 psi)

6. Connect the vacuum hose as it was, and measure the fuel pressure.

Standard value: About 200 kPa (28.44 psi)



47U04B-103

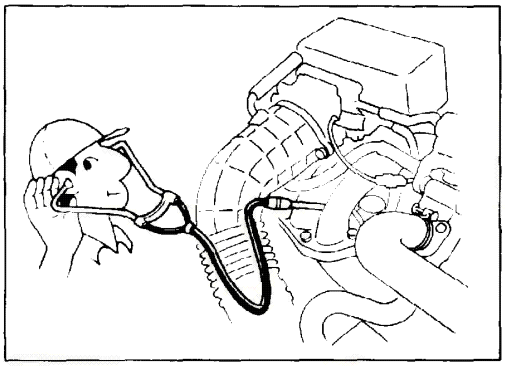
Replacing Pressure Regulator

1. Remove the dynamic chamber. (Refer to page 4B–49.)
2. Disconnect the vacuum hose.
3. Disconnect the fuel return hose.

Warning
Cover the starting motor with waste cloth so that fuel may not be splashed on it.

4. Remove the pressure regulator mounting nut.
5. Install the pressure regulator in the reverse order of removing.

Caution
Before installing the dynamic chamber, check for no fuel leaks with the fuel pressure applied as described on page 4B–56.

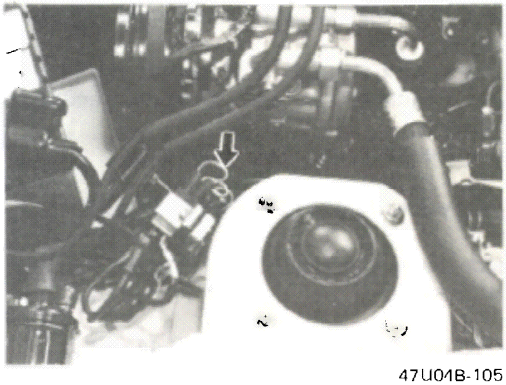


47U04B-104

INJECTOR

Checking Operation Noise

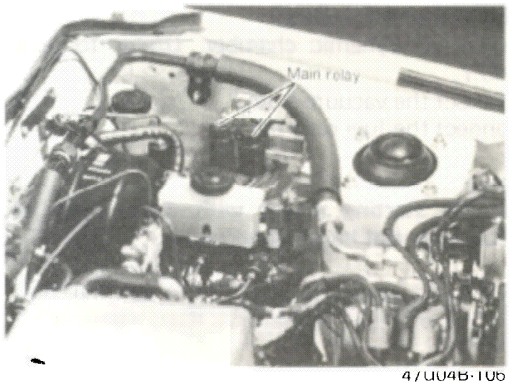
Check the operating noise of the injector, using a sound scope as shown in the figure. Check that regular operating noises are produced from every injector at idle and at acceleration.



47U04B-105

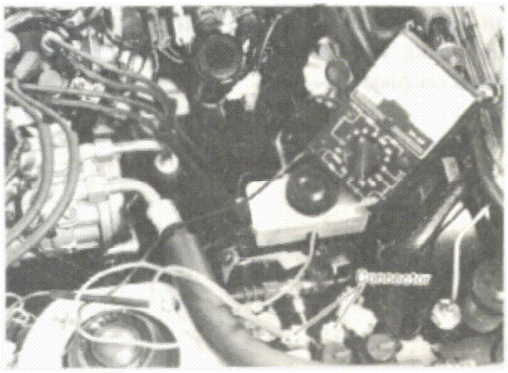
In case the two injectors do not operate, check the followings.

1. Check that continuity is present in wire from trailing coil – terminal to U terminal in control unit connector.
2. Check EGI main fusible link.



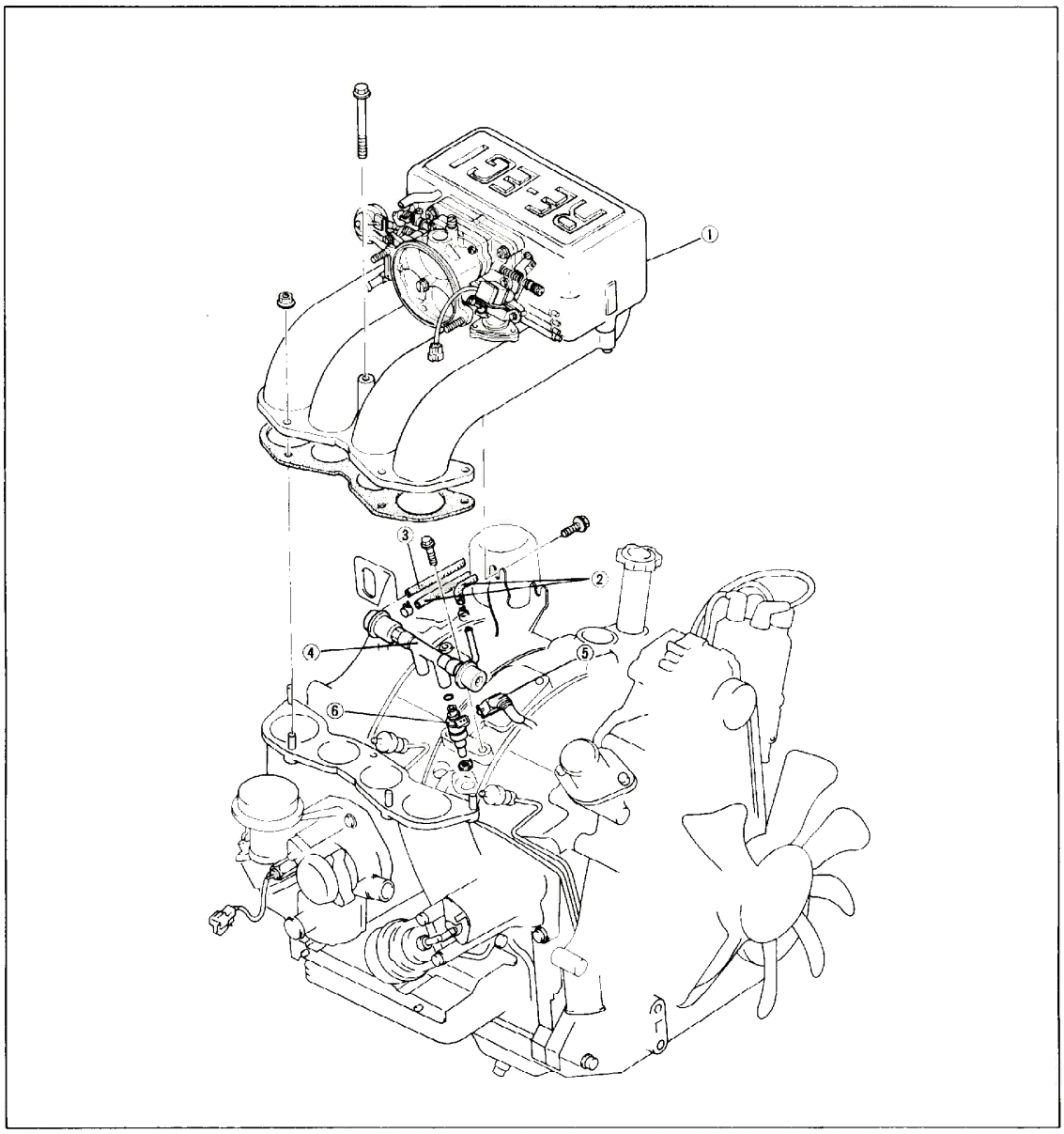
47U04B-106

3. Turn ignition switch "ON", verify that main relay "CLICKS".



If clicking is not observed at main relay when ignition switch is turned "ON", check that 12V exists at main relay connector No. 2 terminal (BW) wire.

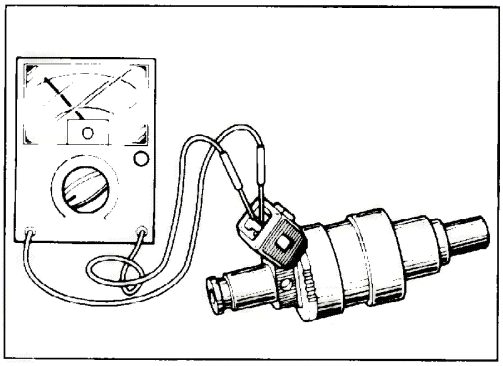
Removing Injector
Remove the injector in the numbered order shown in the figure.



47U04B-559

1. Dynamic chamber (described on page 4B–49)
2. Fuel hose
3. Vacuum sensing tube
4. Injector connector
5. Delivery pipe
6. Injector

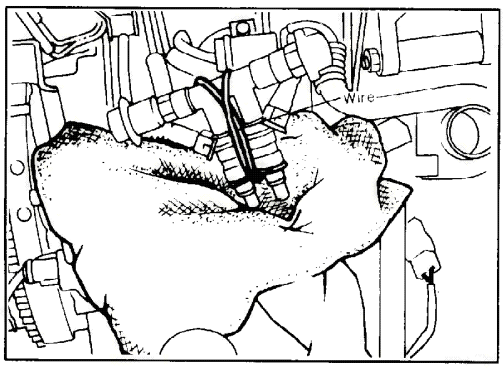
Warning
Cover the hose with waste cloth since fuel is splashed out when disconnecting the fuel hose.



47U04B-107

Checking Injector
Measure the resistance of injector by using an ohmmeter.

Resistance: 1.5 ~ 3Ω



47U04B-108

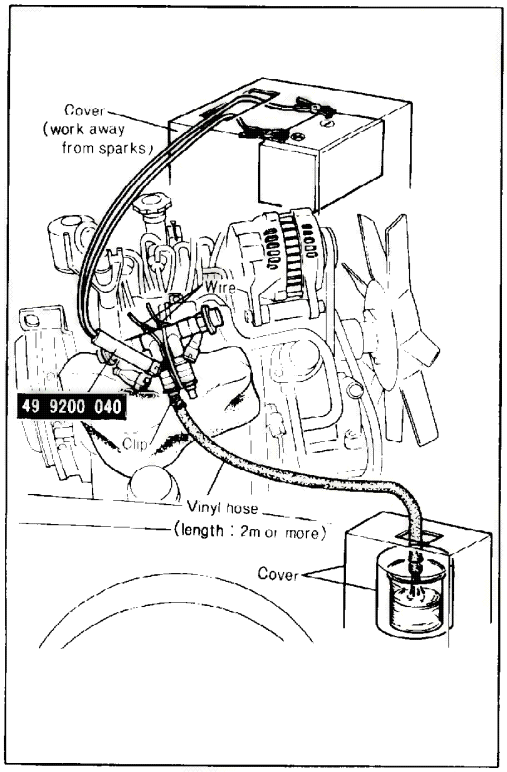
Injector fuel leak test
1. Remove the dynamic chamber. (See page 4B–49.)
2. Loosen the delivery pipe attaching bolts.
3. Fix the injectors to the delivery pipe with wire.

Caution
Affix the injectors firmly to the delivery pipe so no movement of the injectors is possible.

Warning
Be extremely careful when working with fuel; always work away from sparks or open flames.

4. Turn the ignition switch on then shortcircuit the fuel pump shortcircuit terminal. (See page 4B–56.)
   Make sure the fuel does not leak from the injector nozzles.

Note
After 5 minutes a very slight amount of fuel leakage from the injector is acceptable.

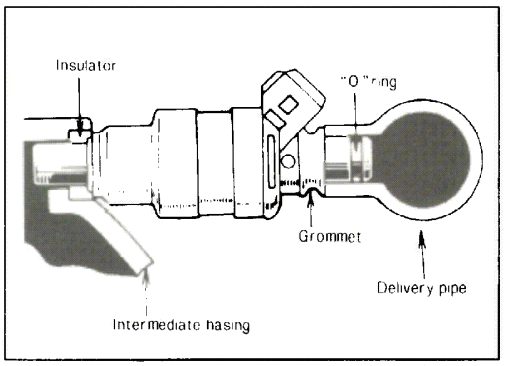


57U04B-110

Injection volume test
Fix the injectors to the delivery pipe with wire as above.
1. Connect suitable vinyl hose to the injector.
2. Connect the **injector checker** (49 9200 040) to the injector.
3. Turn the ignition switch on then shortcircuit the fuel pump shortcircuit terminal. (See page 4B–56.)
4. Apply battery power to the **injector checker** and measure the injection volume with a graduated cylinder.

Volume: 173 ± 24 cc/15 sec.

Warning
Be extremely careful when working with fuel; always work away from sparks or open flames.



47U04B-111

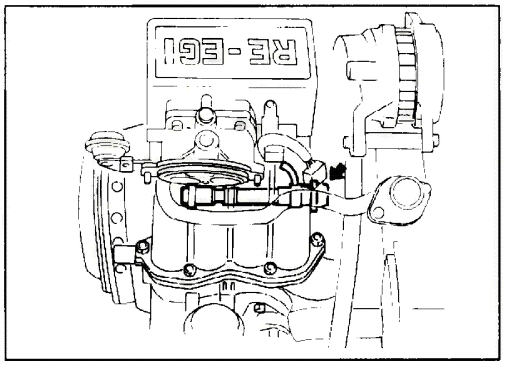
Installing Injector

Installation is the reverse order of removal.

Cautions

a) Replace "O" ring for new one when installing. When it is difficult to fit "O" ring, use gasoline as lubricant and be careful so that it may not be damaged.

b) Before installing the dynamic chamber, check for no leaks with the fuel pressure applied as described on page 4B–56.

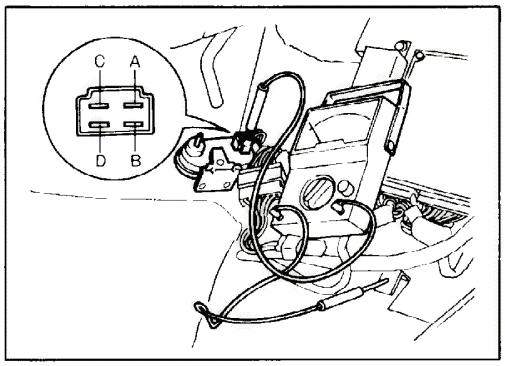


47U04B-112

PULSATION DAMPER

Checking Pulsation Damper

1. Start the engine and run it at idling speed.
2. Place a finger over the pulsation damper and make sure that the damper pulsates.
3. Replace it, if necessary.



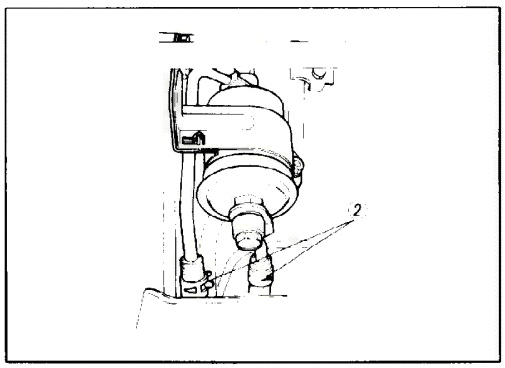
47U04B-113

ATMOSPHERIC PRESSURE SENSOR

Checking Atmospheric Pressure Sensor

1. Connect the voltmeter to the atmospheric pressure sensor (D) terminal.
2. Turn the ignition switch on and take a voltage reading.

Voltage: 4 ± 0.5V at sea level
3 ± 0.5V at high altitude
[2,000m (6,500 ft)]



47U04B-114

FUEL FILTER

The fuel filter should be replaced at intervals, following the maintenance schedule.

To replace the fuel filter, proceed as follows:

1. Raise the rear end of the vehicle and support it with stands.
2. Loosen the clips at both ends of the filter and disconnect the fuel hoses.
3. Remove the fuel filter with the bracket.
4. Install a new filter and connect the fuel hoses.

Note

When installing the filter, fully push in the fuel hoses to the fuel filter and secure the hoses with clips.

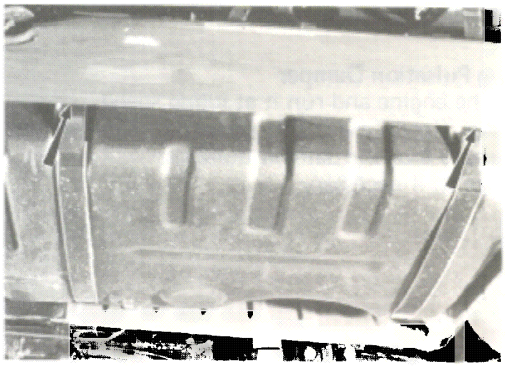
47U04B-115

FUEL TANK

Removing Fuel Tank

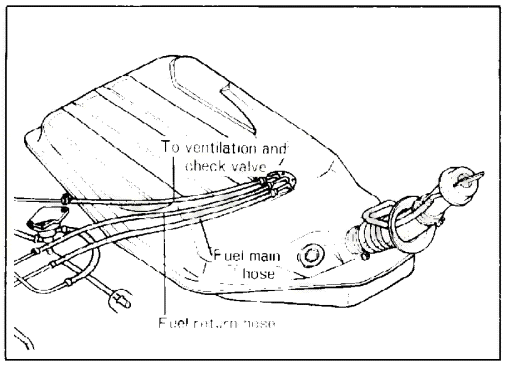
1. Drain the fuel in the tank.
2. Raise the rear end of the vehicle and support it with stands.
3. Remove the tank protectors.

Note
When removing the fuel tank, keep sparks, cigarettes and open flames away from the fuel tank.



47U04B-116

4. Disconnect the fuel main hose, fuel return hose and evaporation hoses from the fuel tank.
5. Remove the fixing band attaching bolts and lower the fuel tank.

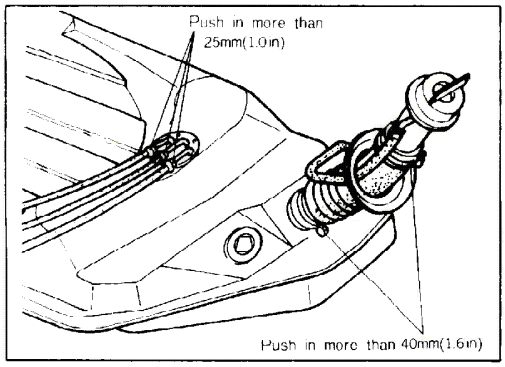


47U04B-117

Checking Fuel Tank

Check the fuel tank for cracks and corrosion. If any defect it present, repair or replace as necessary.

Note
Before repairing, clean the fuel tank thoroughly with steam and sufficiently remove all explosive gas.

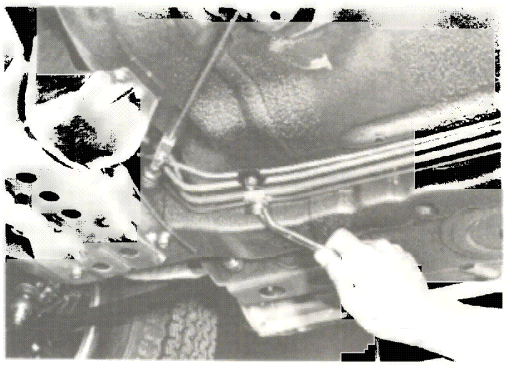


47U04B-118

Installing Fuel Tank

Install the fuel tank in the reverse order of removal, **noting** the following points.

1. Push the hose ends of the fuel main hose, fuel return hose and evaporation hoses in to the fuel tank fittings until the fittings are inserted to **more than 25 mm (1.0 in).**
2. Push the fuel filler hose ends in to the fuel tank pipe and filler pipe to **more than 40 mm (1.6 in).**



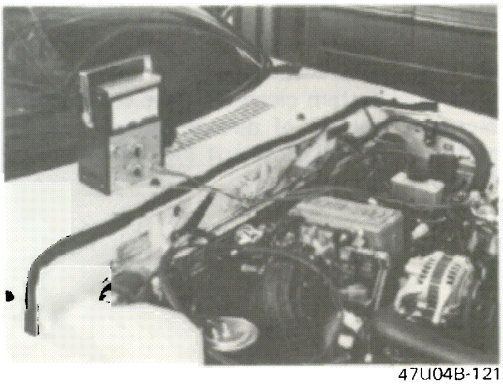
47U04B-119

FUEL LINE

Inspect the fuel lines for leaks and tighten the fuel line connections to prevent leakage. It is important to keep the fuel system clean and free from water. If an excessive amount of dirt or water is found, drain the fuel tank and blow out the fuel lines with compressed air.

47U04B-120

When replacing the fuel hose, push in the fuel hose end to fuel pipe until the fuel pipe is inserted to **30 ~ 35 mm (1.2 ~ 1.4 in).**



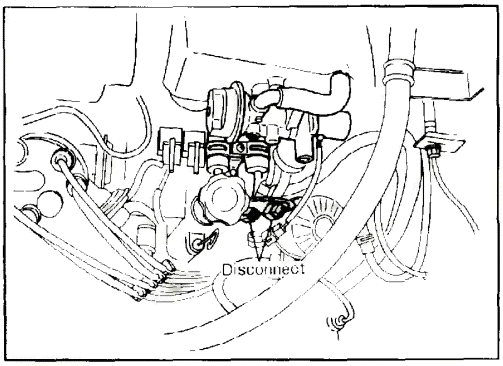
47U04B-121

IDLE SPEED AND IDLE MIXTURE

ADJUSTING IDLE SPEED

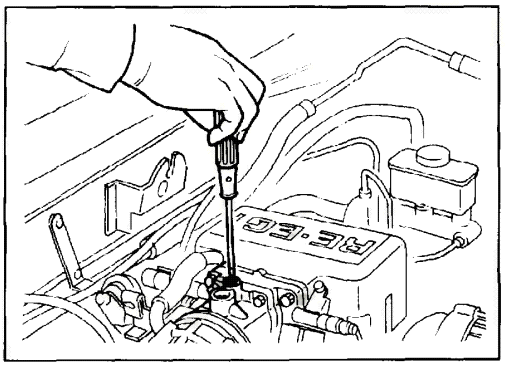
Before checking or adjusting the idle speed, follow these directions.

a. Switch off all accessories.
b. Remove the fuel filler cap.
c. Connect a tachometer to the engine.



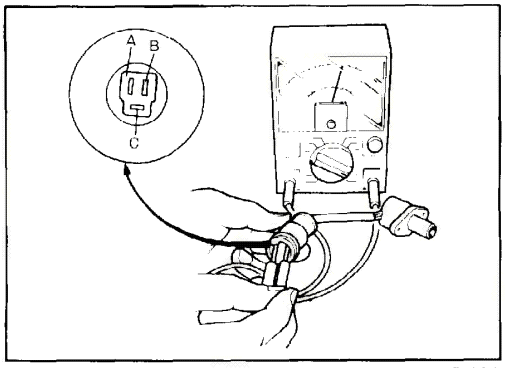
47U04B-122

1. Warm up the engine until it reaches normal operating temperature.
2. Check and adjust the throttle sensor as instructed on page 4B–39.
3. Disconnect the vent and vacuum solenoid valve connector.



57U04B-123

4. Adjust the idling speed to **800 rpm** by the turning AAS (air adjust screw).



47U04B-124

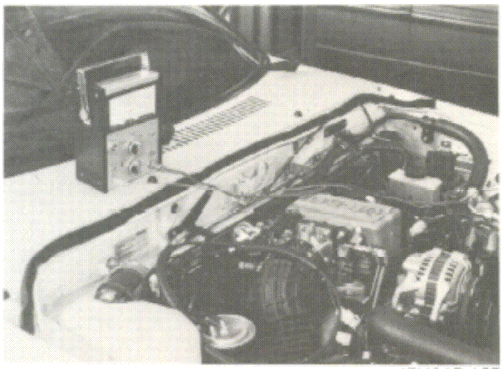
ADJUSTING IDLE MIXTURE

Usually idle mixture adjustment is unnecessary. Idle mixture adjustment should be adjusted when the variable resistor is replaced.

Disconnect the variable resistor connector and connect an ohmmeter to the variable resistor. If the continuity (resistance) does not exist, replace the variable resistor and adjust the idle mixture.

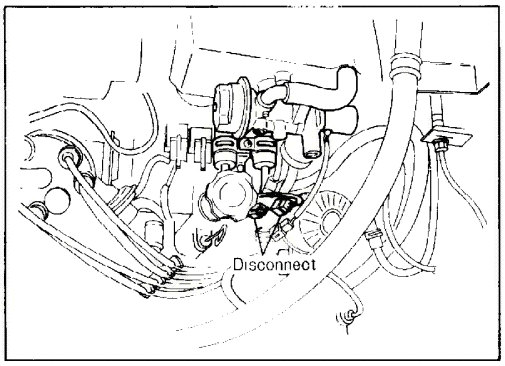
Reference resistance
A – C: 0.5 ~ 4.5 kΩ
B – C: 0.5 ~ 4.5 kΩ

Note
When replacing the engine, replace the variable resistor and then adjust the idle mixture.



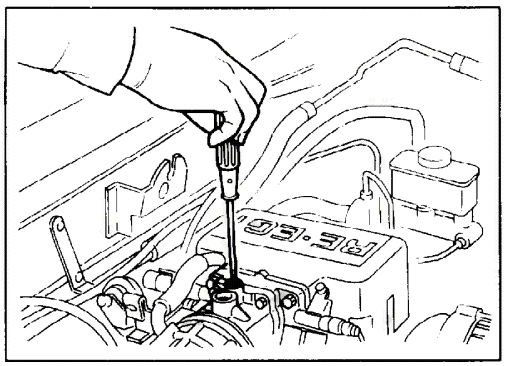
47U04B-125

Before adjusting the idle mixture, follow these directions.
a. Switch off all accessaries.
b. Remove the fuel fill or cap.
c. Connect a tachometer to the engine.



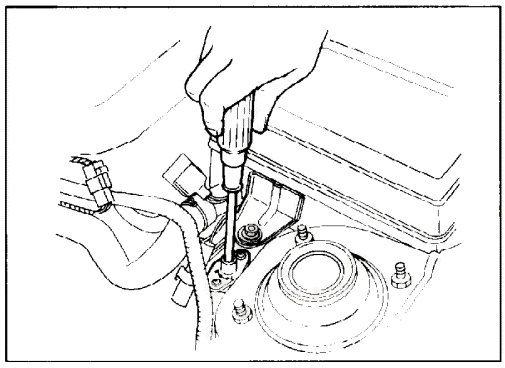
47U04B-126

1. Warm up the engine until it reaches normal operating temperature.
2. Check and adjust the throttle sensor as instructed on page 4B–39.
3. Disconnect the vent and vacuum solenoid valve connector.



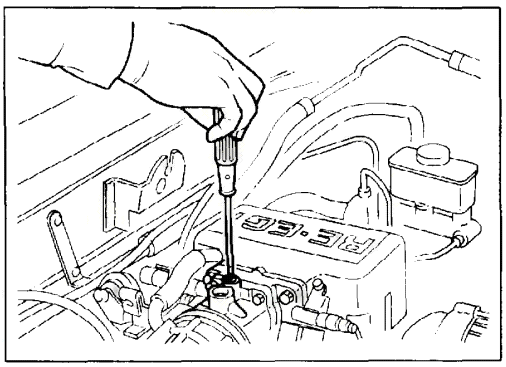
57U04B-127

4. Adjust the idling speed to **800 rpm** by turning AAS.



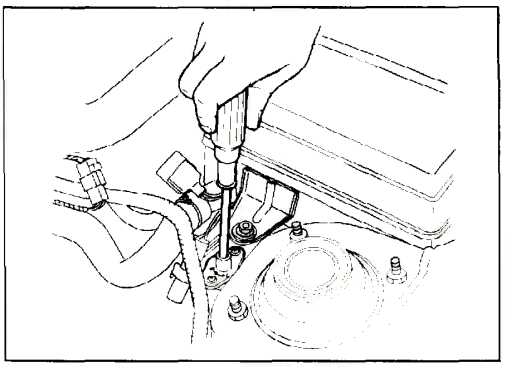
47U04B-128

5. Set the idle speed at the highest by turning the variable resistor.



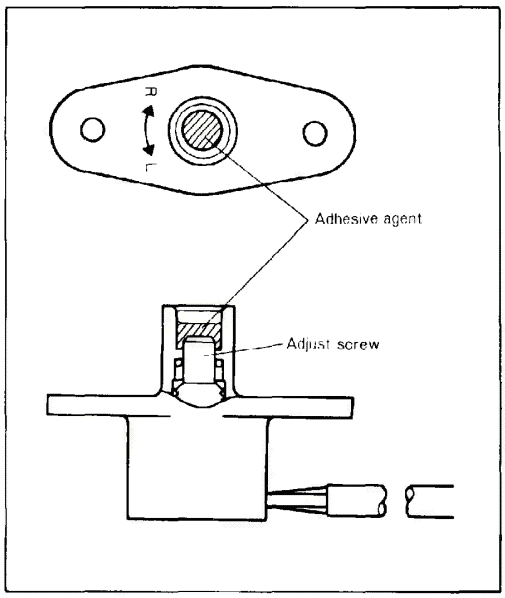
47U04B-129

6. Set the idle speed to **800 rpm** by turning AAS.



47U04B-130

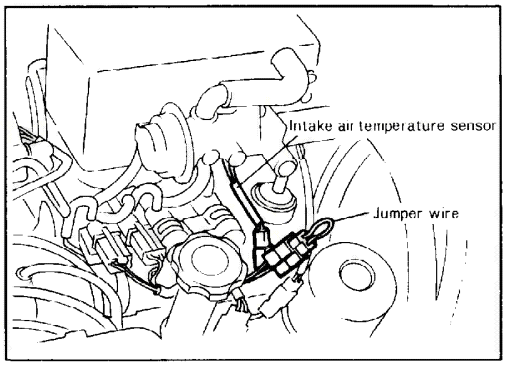
7. Turn the variable resistor counter-clockwise until the engine speed becomes **780 rpm** then turn it clockwise until the engine speed becomes **800 rpm.**



57U04B-131

8. Connect the vent and vacuum solenoid connector.
9. Fill up the head of the adjust screw with the adhesive agent (Part No. N304 23 795).

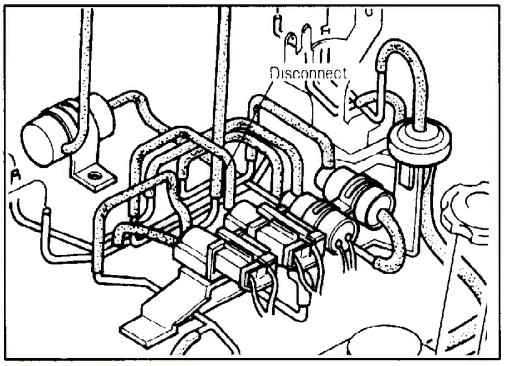
HOT START ASSIST SYSTEM



47U04B-133

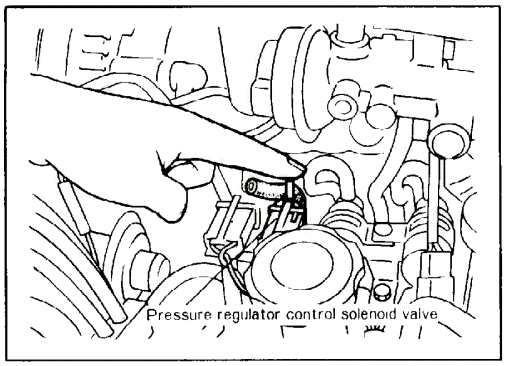
CHECKING HOT START ASSIST SYSTEM

1. Disconnect the intake air temperature sensor connector and connect a jumper wire as shown.



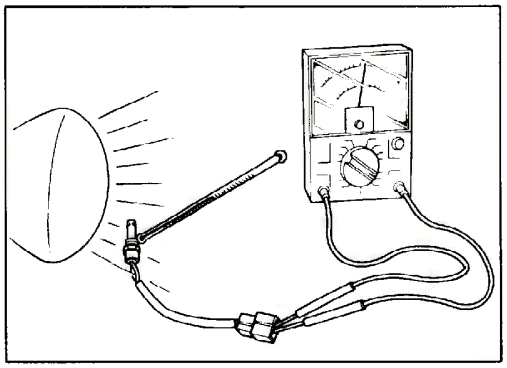
47U04B-134

2. Disconnect the vacuum sensing tube from the pressure regulator control solenoid valve.



47U04B-135

3. Connect a tachometer to the engine.
4. Start the engine and check the followings.
   1) After starting, engine speed should be about **850 rpm for 60 seconds.**
      After 60 seconds be sure engine speed becomes **800 rpm.**
   2) **For 60 seconds** after engine is started be sure air is not sucked at pressure regulator control solenoid valve.
      After 60 seconds be sure air is sucked at pressure regulator control solenoid valve.

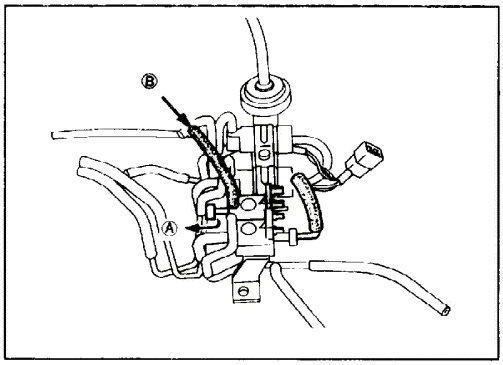


47U04B-136

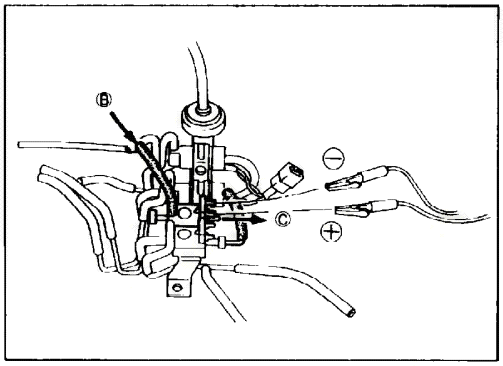
CHECKING INTAKE AIR TEMPERATURE SENSOR

1. Remove the intake air temperature sensor from the dynamic chamber.
2. Connect an ohmmeter to the sensor terminals.
3. Check the calibration of the sensor.

Temperature	Resistance
20°C (68°F)	41.5 ± 4.15 kΩ
50°C (122°F)	11.85 ± 1.19 kΩ
85°C (185°F)	3.5 ± 0.35 kΩ



47U04B-137

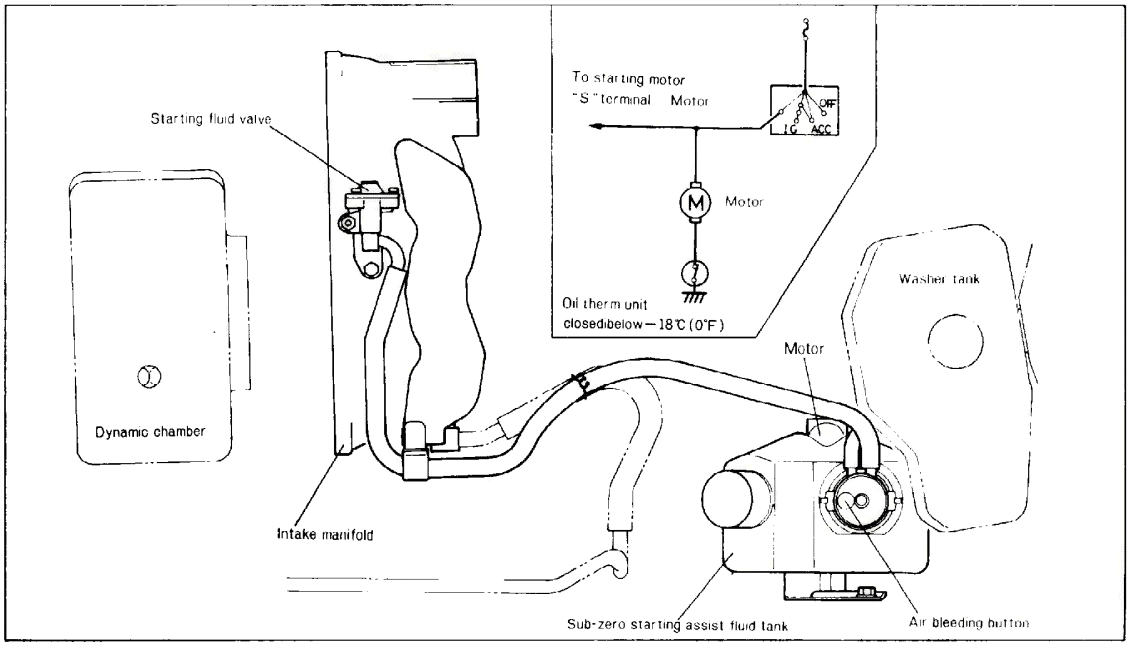


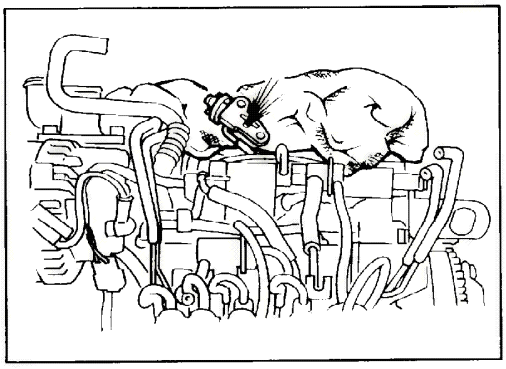
47U04B-138

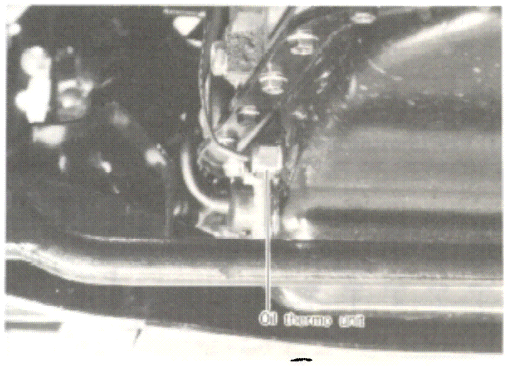
CHECKING PRESSURE REGULATOR CONTROL SOLENOID VALVE

1. Disconnect the vacuum sensing tubes from the solenoid valve and vacuum pipe.
2. Blow through the solenoid valve from the vacuum sensing tube B .
   Make sure the air passes through the valve and comes out from the air filter A .
3. Disconnect the connector from the solenoid valve and connect the battery power to the terminals on the valve.
4. Blow through the valve from the vacuum sensing tube B .
   Make sure the air passes through the valve and comes out from the port C .

SUB-ZERO STARTING ASSIST DEVICE (EXCEPT FOR CALIFORNIA)







47U04B-139

CHECKING SUB-ZERO STARTING ASSIST DEVICE

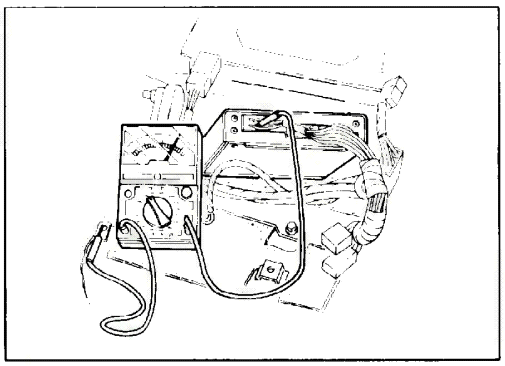
1. Make sure that there is sufficient starting assist fluid in the tank. Replenish if necessary.
2. Disconnect the connector of "S" terminal from the starting motor magnetic switch.
3. Remove the dynamic chamber. (Refer to page 4B–49.)
4. Remove the starting fluid valve from the intake manifold as shown.
5. Turn the ignition key to the "START" position and make sure that the starting assist fluid does not spout from the valve.
   [Ambient temperature should be above 18°C (0°F)]
6. Disconnect the connector from the oil thermo unit on the oil pan and earth the disconnected connector to the body.
7. Turn the ignition key to the "START" position with the air bleeding button of the tank kept pushed and make sure that the starting assist fluid spouts out from the valve.

SUB-ZERO STARTING ASSIST FLUID

The mixture proportion of starting assist fluid should be 90% of high quality ethylene glycole anti-freeze solution plus 10% of water.

CHECKING OIL THERMO UNIT

The oil thermo unit is in normal condition if it is energized below −18°C (0°F) and is not above it.



47U04B-140

CONTROL UNIT

CHECKING CONTROL UNIT

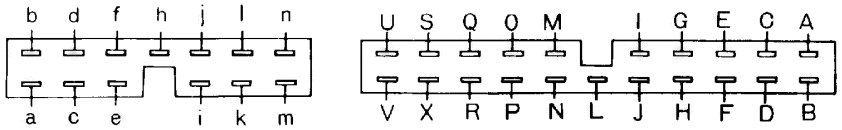
1. Connect a voltmeter to the control unit as shown in the figure.
2. Turn the ignition switch ON, and then measure the voltage of each terminal.

Cautions

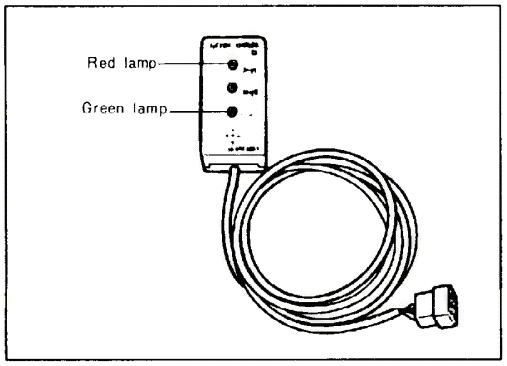
a. Before checking control unit, warm up the engine to the normal operating temperature.
b. Do not start the engine.
c. If the proper voltage is not indicated on the voltmeter check all wiring, connections and finally, check that component.

Terminal	Connection to	Voltage with ignition ON (when functioning properly)
A	Main relay	approx. 12V
B	Ground	0V
C	Water thermo sensor	1 ~ 2V (warm engine)
D	Ground	0V
E	Air flow meter	4 ~ 6V . . . at 20°C 1.5 ~ 3.5V . . . at 50°C
F	Injector (#20)	approx. 12V
G	Throttle sensor & Atmospheric pressure sensor	4.5 ~ 5.5V
H	Injector (#10)	approx. 12V
I	Throttle sensor	approx. 1V
J	Vacuum switch	approx. 12V
L	Variable resistor (V/R)	0 ~ 12V (Varies according to the V/R adjustment)
M	Ignition switch "START" terminal	below 1.5V
N	O_2 sensor	0V
O	Air flow meter	approx. 12V
P	Atmospheric pressure sensor	approx. 4V
Q	Air flow meter	approx. 2V
R	Air flow meter	approx. 7.5V
S	Ground	0V
T	Ground	0V
U	Ignition coil (T) - terminal	approx. 12V
V	Main relay	approx. 12V
a	Switching solenoid valve	approx. 12V
b	Relief solenoid valve control unit	approx. 12V
c	Checking connector	0V
d	Vacuum control solenoid valve (T/L)	approx. 12V
e	Pressure regulator control valve	below 1.5V
f	Checking connector	0V
h	Vent solenoid valve	below 1.5V (throttle sensor is adjusted properly)
i	Clutch switch	below 1.5V . . . pedal released approx. 12V . . . pedal depressed
j	Neutral switch	below 1.5V . . . in neutral approx. 12V . . . in gear
k	Water temperature switch	below 1.5V . . . above 15°C
l	Intake air temperature sensor	8.5 ~ 10.5V . . . at 20°C 5 ~ 7V . . . at 50°C
m	Air-con. switch	below 1.5V . . . air-con. switch OFF
n	Vacuum control valve	approx. 12V (throttle sensor is adjusted properly)

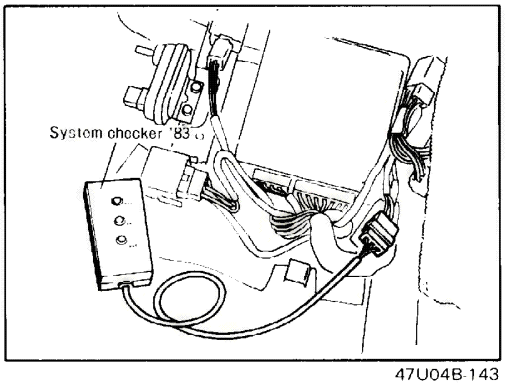
Control unit connector



47U04B-141



47U04B-142



47U04B-143

TROUBLESHOOTING WITH SYSTEM CHECKER 83

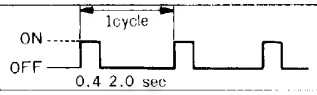
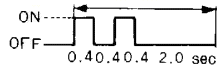
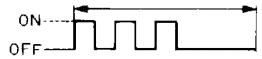
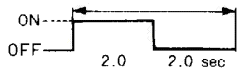
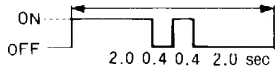
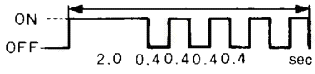
System checker 83 (49 G040 920) can be used to detect (via the control unit check terminal) problems in each sensor and damaged wiring or poor contact or short circuit between each of the sensor-control units.
Trouble is indicated by a red lamp and a buzzer. The indication for problems of each sensor are shown in the table below.

INSPECTION PROCEDURE

1. Warm up the engine to the normal operating temperature.
2. Connect **system checker 83** (49 G030 920) to the check connector as shown.
3. Check whether the trouble-indication lamp illuminates.
4. If the lamp illuminates, check for cause of problem.

Note
To check the system checker 83 indication, the lamp should illuminate for about 3 seconds after the ignition switch turns on.

1. RED LAMP AND BUZZER

Code No.	Location of problem	Indication	Checking procedure
1	Engine speed		Disconnect the trailing coil – terminal crank engine at least 1.5 seconds, with IG "ON" code should be heard.
2	Air flow meter		Disconnect air flow meter connector, turn IG "ON" code should be heard.
3	Water thermo sensor		Disconnect the water thermo sensor connector, turn IG "ON" code should be heard.
4	Oxygen (O_2) sensor		Refer to page 4B–72.
5	Throttle sensor		Disconnect throttle sensor connector, turn IG "ON" code should be heard.
6	Atmospheric pressure sensor		Disconnect the atmospheric pressure sensor, turn IG "ON" code should be heard.

Note
1) If there is trouble in 2 or more places, the indication will be for the smaller code number first.
2) Even if the problem is corrected during indication, 1 cycle will be indicated.

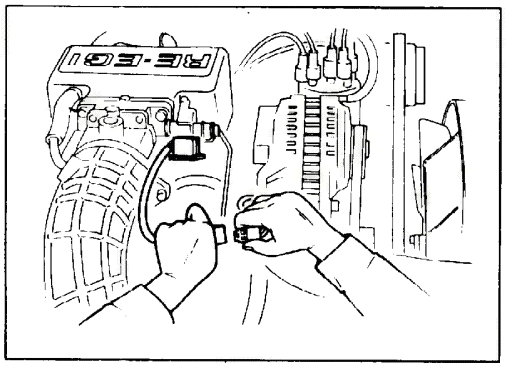
47U04B 144

2. GREEN LAMP (O_2 SENSOR SIGNAL)
THIS LAMP FLASHES ACCORDING TO THE O_2 SENSOR SIGNAL.

Green Lamp	Air-Fuel Ratio
Turns ON	Richer than the stoichiometric air/fuel ratio.
Turns ON and OFF	O_2 sensor signal is fed back to the control unit.
Turns OFF	Leaner than the stoichiometric one.

This procedure allows the technician to judge whether the O_2 sensor signal is fed back to the control unit correctly or not.

47U04B-145



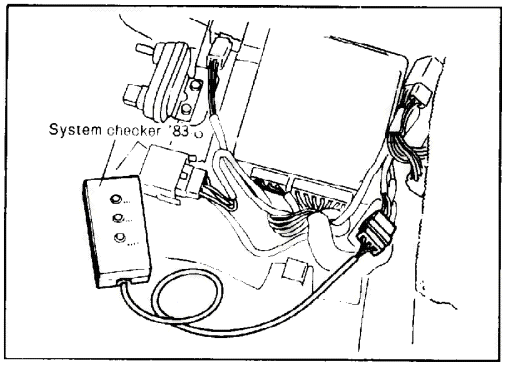
47U04B-146

HOW TO CHECK THE O_2 SENSOR WITH SYSTEM CHECKER '83

1. Start the engine and run it at idling speed.
2. Disconnect the throttle sensor connector.

Red lamp and buzzer:

Green lamp: Turns ON

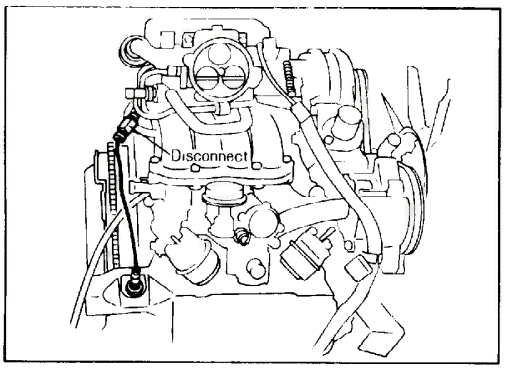


47U04B-147

3. Make sure that the green lamp starts to turn on and off within 10 seconds after increasing the engine speed to 2,000 rpm.

Red lamp and buzzer:

Green lamp: Turns ON and OFF

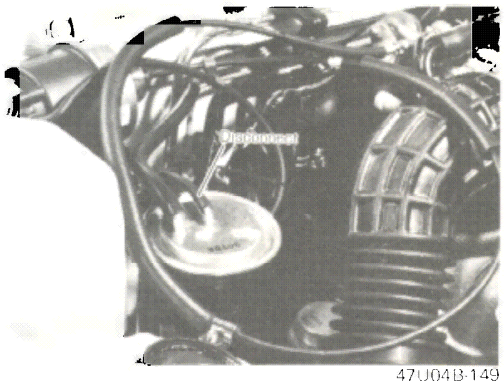


47U04B-148

4. Hold the engine speed at 2,000 rpm and disconnect the O_2 sensor connector.
   Make sure that the red lamp and buzzer, green lamp change as follows.

Red lamp and buzzer:

Green lamp: Turns ON



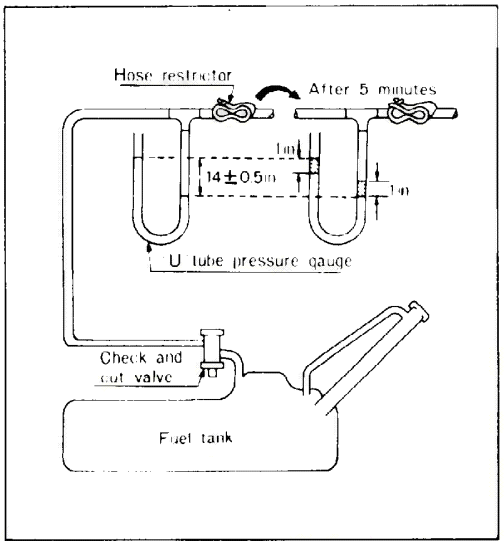
47U04B-149

CRANKCASE AND EVAPORATIVE EMISSION CONTROL SYSTEM

EVAPORATIVE LINE

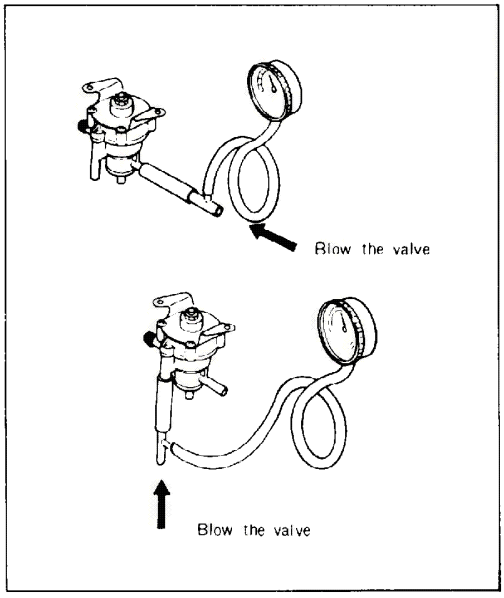
To check the evaporative line, proceed as follows:

1. Disconnect the ventilation hose from the canister.
2. Connect the "U" tube pressure gauge to disconnected ventilation hose.



47U04B-150

3. Gradually apply the low compressed air into the "U" tube so that the difference of water level should be **356 ± 12 mm (14 ± 0.5 in).**
4. Then, blind the inlet of the "U" tube and leave the "U" tube with inlet blind for five minutes. If the water level drops within the hatched lines shown in the figure, evaporative line is in good condition.
   If not, inspect the following points and repair or replace as required.
   a) Leaky or loose evaporative line
   b) Leaky fuel tank
   c) Leaky or loose fuel line
   d) Leaky filler cap



47U04B-151

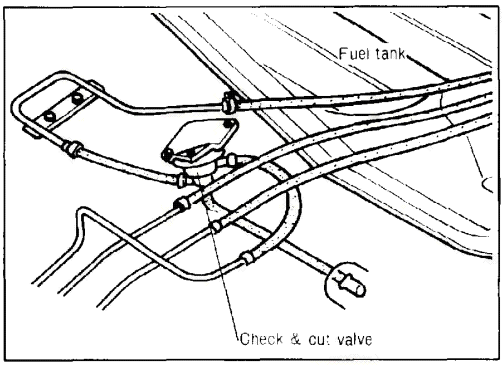
CHECK AND CUT VALVE

Checking check and cut valve

1. Remove the check and cut valve.
2. Connect a pressure gauge to the passage to the fuel tank.
3. Blow through the valve. The valve should open with the pressure of **5.5 ~ 7 kPa (0.78 ~ 1.0 lb/in²).**
4. Remove the pressure gauge and connect it to the passage to atmosphere.
5. Blow through the valve and if the valve opens with the pressure of **1 ~ 5 kPa (0.14 ~ 0.71 lb/in²)**, the valve is normal.

Note

The test should be performed with the valve located horizontally. Otherwise the weight of the valve will cause it to move out of position and crose the passage.



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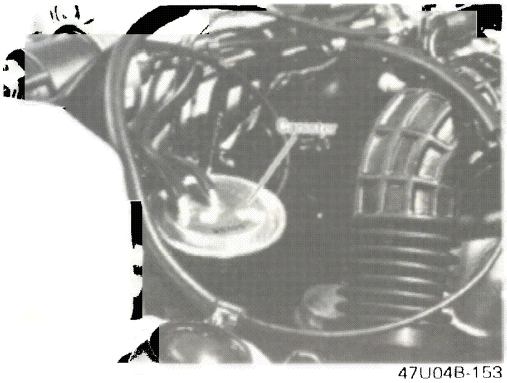

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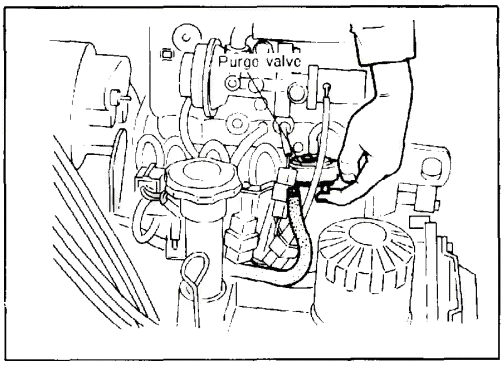

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Replacing Check and Cut Valve

1. Raise the rear end of the vehicle and support it with stands.
2. Unfasten the hose bands and disconnect the evaporative hoses from the check and cut valve.
3. Remove the check and cut valve.
4. Install the check and cut valve in the reverse order of removing noting the hose position.

Cautions

a) When installing the check and cut valve, fully push in the evaporative hoses to the valve and secure the hoses with bands.

b) When connecting the fuel hoses to the valve, note the direction of the valve fittings.

CHARCOAL CANISTER

Visually check the canister for any leakage of the active carbon. Tap the canister with a finger no abnormal sound should be audible.

PURGE VALVE

To check the purge valve, proceed as follows:

1. Disconnect the hose (purge valve ~ oil filler pipe) from the purge valve.
2. Start the engine and run it at idle.
3. Place a finger to port opening and check that the air is not drawn into the port.
4. Increase the engine speed to **2,000 rpm,** the air should be drawn into the port.