SERVICE MANUAL

DATSUN 260Z
MODEL S30 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION EC

EMISSION CONTROL SYSTEM

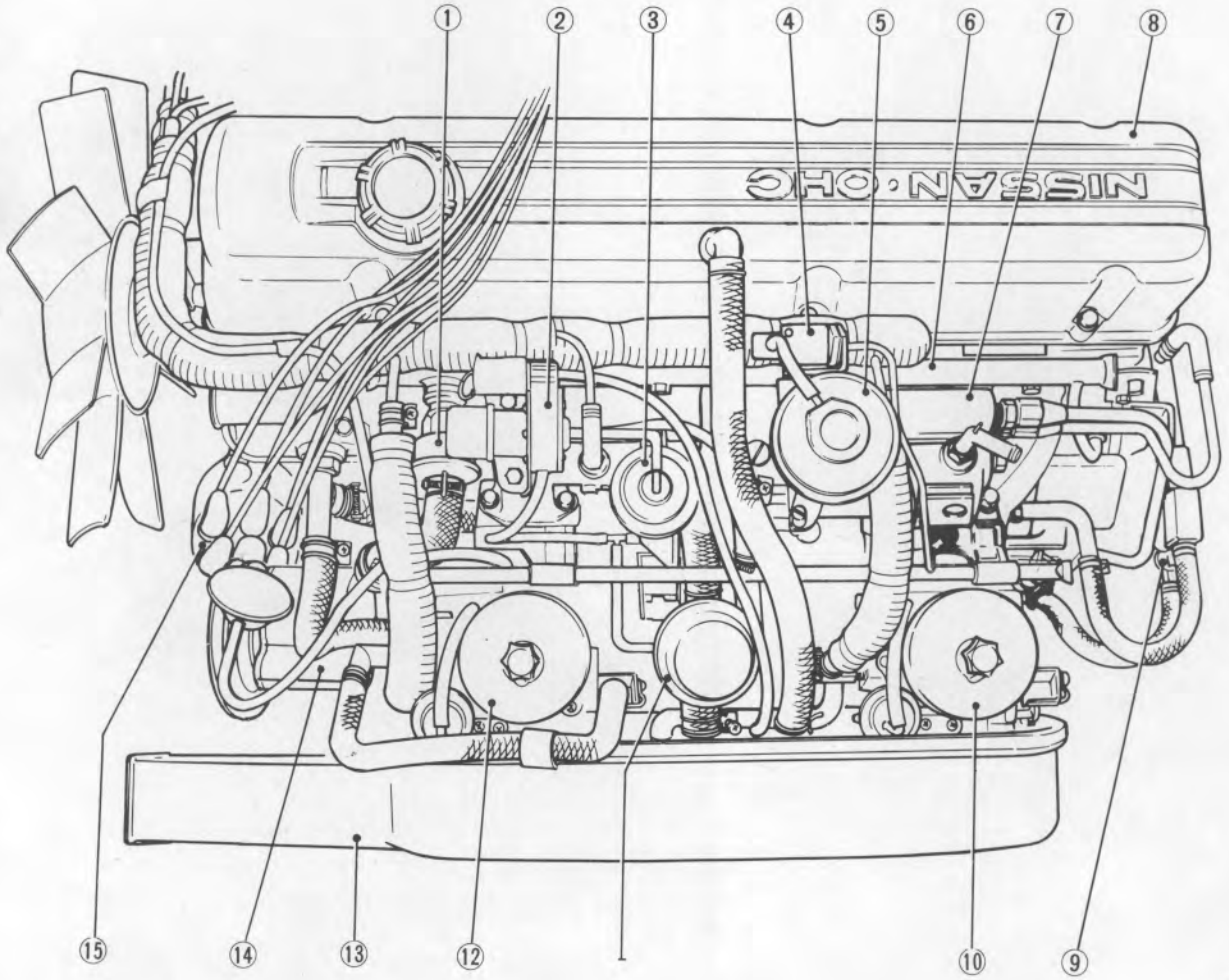
EC

GENERAL DESCRIPTION

There are three types of emissions to be controlled. The control systems are;

1. Closed type crankcase emission control system.
2. Exhaust emission control system.
   Air injection system (A.I.S.)
   Exhaust gas recirculation system (E.G.R.)
3. Evaporative emission control system.

Periodic inspection and required servicing of these systems should be carried out at the recommended intervals to reduce harmful exhaust gas emission to a minimum.



EC161

1	Check valve	6	Air gallery pipe	11	Anti-backfire valve
2	Opener control valve	7	Balance tube	12	Front carburetor
3	Servo diaphragm	8	Rocker cover	13	A.T.C. air cleaner
4	Solenoid valve	9	Water control valve	14	Air pump
5	E.G.R. control valve	10	Rear carburetor	15	Distributor

Fig. EC-1 Emission control system

AIR INJECTION SYSTEM

CONTENTS

DESCRIPTION

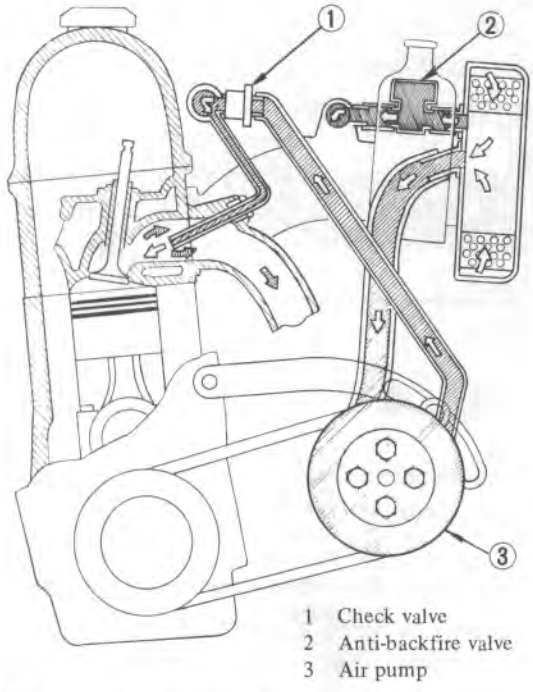


Fig. EC-2 Air injection system

The air injection pump receives clean air through a hose connected to a fitting attached to the carburetor air cleaner.

This rotary vane type pump has been designed to draw air in and compress it to produce maximum air flow with quiet operation. A fresh air line from the air injection pump is routed to a check valve, which prevents exhaust gas from entering the air pump in the event exhaust manifold pressure is greater than air injection pressure, or in the case of an inoperative pump. The compressed fresh air is injected through an injection nozzle to the exhaust ports.

An anti-backfire valve has been installed to eliminate "popping" in the exhaust system when the throttle is closed during high speed "coasting". Controls which have been incorporated to assure reliable system operation include an anti-backfire valve and a check valve.

Air pump

The air pump is a three-vane type. It is a positive displacement vane which requires no lubricating service.

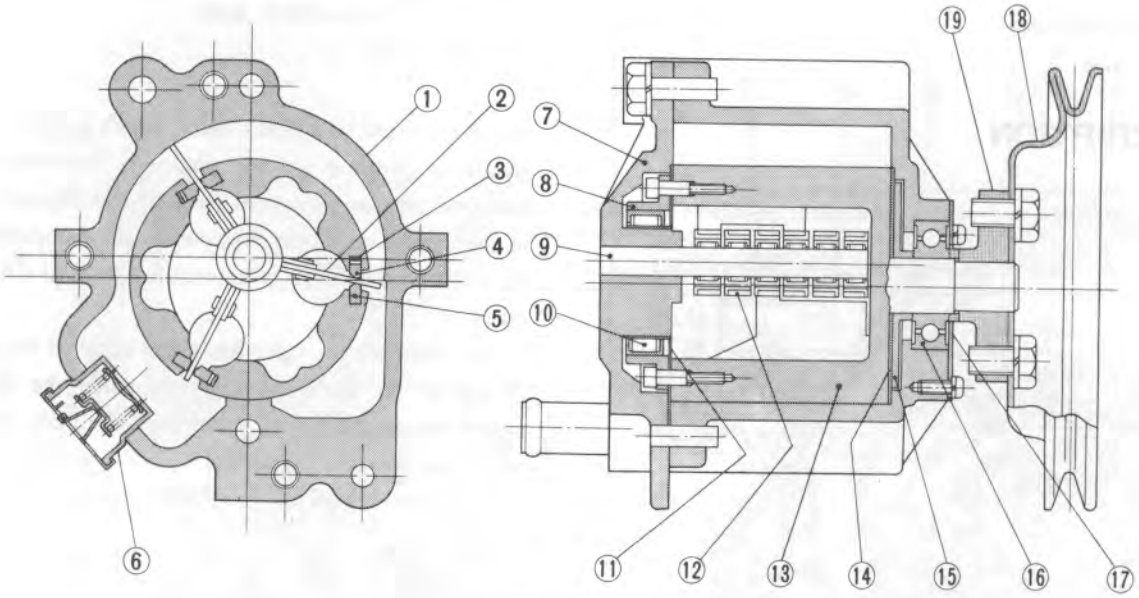
The die-cast aluminum air pump assembly attached to the front of the engine is driven by an air pump drive belt. A rotor shaft, drive hub, relief valve and inlet and outlet tubes are visible on the pump exterior. A rotor, vanes, carbon shoes, and shoe springs make up the rotating unit of the pump. The rotor located in the center of the pump is belt-driven. The vanes rotate freely around the off-center pivot pin, and follow the circular-shaped pump bore. In the three-vane type, the vanes form three chambers in the housing. Each vane completes a pumping cycle in every revolution of the rotor. Air is drawn into the inlet cavity through a tube connected to the air cleaner. Air is sealed between the vanes and moved into a smaller cavity (the compression area).

After compression, the vanes pass the outlet cavity. Subsequently they pass the stripper, a section of the housing that separates the outlet and inlet cavities. Continuing the cycle, the vanes again enter the inlet cavity to repeat the pumping cycle. The relief valve, located in the outlet cavity, consists of a preloaded spring, seat, and pressure-setting plug. Its function is to relieve the outlet air flow when the pressure exceeds a preset value.

Carbon shoes support the vanes from slots in the rotor. The shoes are designed to permit sliding of the vanes and to seal the rotor interior from the air cavities. Leaf springs which are behind the follower-side of the shoes compensate for shoe wear and vane operating sound. The rotor is further sealed by flexible side seals which are attached to each end.

The rotor is a steel ring bolted to the rotor end. This ring prevents the rotor from spreading at high speed, and also positions and holds the rear bearing and the carbon seal.

The front and rear bearings which support the rotor are of two types. The front bearing uses ball bearings and the rear bearing uses needle bearings. The vane uses needle bearings. All bearings have been greased.



1	Housing	7	End cover	14	Side seal B
2	Vane	8	Rotor ring	15	Side plate
3	Carbon shoe spring	9	Rotor shaft	16	Ball bearing
4	Carbon shoe B	10	Rotor bearing	17	Bearing plate
5	Carbon shoe A (thicker than B)	11	Side seal A	18	Pulley
6	Relief valve	12	Needle bearing	19	Pulley hub
		13	Rotor		

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Fig. EC-3 Sectional view of air pump (three valve type)

Air injection into each exhaust port

Fresh air from the air pump is injected into the individual exhaust ports of the cylinder head located near the exhaust valve.

Pressurized air is transmitted through hoses and air distribution manifold.

A schematic of the exhaust port is shown in Figure EC-4.

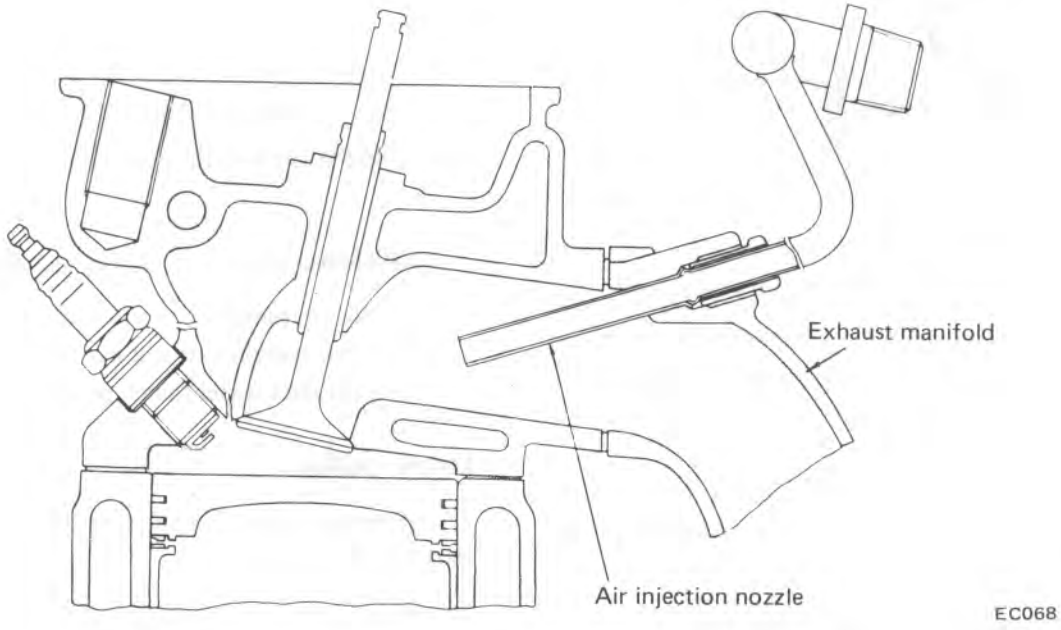


Fig. EC-4 Air injection into exhaust port

In addition to the air injection system, certain controls have been incorporated to assure reliable system operation.

Anti-backfire valve

This valve is controlled by intake manifold vacuum to prevent exhaust system backfire at the initial period of deceleration.

At that time, the mixture in the intake manifold is too rich to ignite and burn in the combustion chamber and burns easily in the exhaust system with injected air in the exhaust manifold.

The anti-backfire valve provides a supply of air to the intake manifold, thereby making the air-fuel mixture leaner, preventing backfire.

A schematic drawing of the anti-backfire valve is shown in Figure EC-5.

The inlet of the anti-backfire valve is connected to the air cleaner and the outlet to the balance tube.

The correct function of this valve reduces hydrocarbon emission during deceleration.

If the valve does not work properly, the extremely rich air-fuel mixture will go through the combustion chambers and meet high-temperature and injected air which ignites the mixture and results in back-firing.

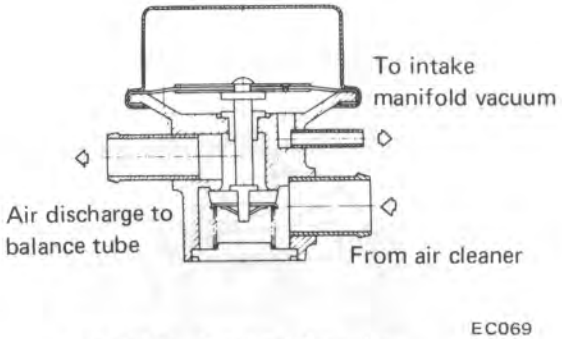
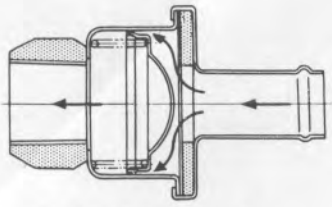


Fig. EC-5 Anti-backfire valve

Check valve

A check valve is located in the air pump discharge lines. The valve prevents the backflow of exhaust gas. Backflow of exhaust gas occurs in one of the following cases.

1. When the air pump drive belt fails.
2. When relief valve spring fails.



EC070

Fig EC-6 Check valve

Air pump relief valve

The air pump relief valve is mounted in the discharge cavity of the air pump and accomplishes the following functions without affecting effectiveness of the exhaust emission control system.

1. Minimizes exhaust gas temperature rise.

2. Minimizes horsepower losses resulting from air injection into the exhaust system.

3. Protects pump from excessive back pressure.

REMOVAL AND INSTALLATION

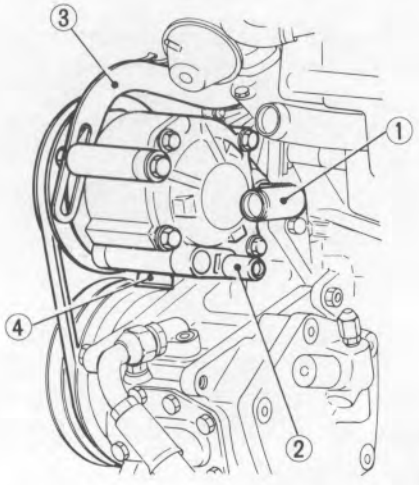
Do not remove the exhaust emission control system unless absolutely necessary.

When the removal is unavoidable, however, thoroughly inspect before removing.

Air pump

Removal

1. Disconnect the hoses from the air pump housing cover.



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1 Inlet port
2 Outlet port
3 Belt adjusting bar
4 Relief valve

Fig. EC-7 Air pump

2. Remove bolt securing air pump to belt adjusting bar.

3. Remove bolt securing air pump to mounting bracket and remove air pump drive belt.

4. Dismount air pump assembly from car.

Installation

Reinstall air pump in reverse sequence of removal. Adjust belt tension so that it has 15 to 20 mm (0.59 to 0.79 in) of slack under thumb pressure [10 kg (22 lb)].

Drive pulley

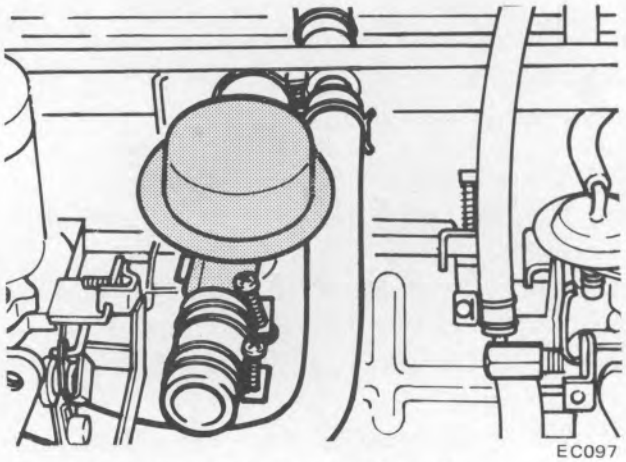
1. Loosen air supply pump adjusting bar nut and bolt to relieve belt tension.

2. Remove drive pulley attaching bolts.

Anti-backfire valve

When removing anti-backfire valve, disconnect hoses. and hose connections for leaks.

After installation, check the valve operation and inspect all hoses and hose connections for leaks.



EC097

Fig. EC-8 Anti-backfire valve

Check valve

1. Disconnect air supply hose.

2. Remove check valve from air gallery pipe holding flange of air gallery pipe with a wrench.

Notes: a. Be careful not to damage air gallery pipe.
b. No further disassembly should be done.

3. Reinstall check valve in reverse sequence of removal.

Note: Tightening torque is 9.0 to 10.5 kg-m (65 to 76 ft-lb).

4. After installation, check valve, hoses and hose connections for air leakage.

Air gallery pipe and injection nozzles

It is very difficult to remove the air gallery from the exhaust manifold without bending the pipe, which could result in fractures or leakage. Therefore, removal of the air gallery pipe and injection nozzles should be undertaken only when they are damaged.

1. Lubricate around the connecting portion of air injection nozzle and air gallery with engine oil.

2. Hold air injection nozzle hexagon head with a wrench and unfasten flare screw connecting air gallery to injection nozzle. Remove air gallery.

Notes: a. Apply engine oil to screws several times during above work.
b. Be careful not to damage other parts.

3. Unfasten air injection nozzle from cylinder head applying engine oil to screwed portion several times.

4. Check air allery and nozzle for fractures or leakage. Clean air injection nozzle with a wire brush.

5. At time of installation, hold air injection nozzle hexagon head with a wrench and tighten air gallery flange screw to a torque of 5.0 to 5.9 kg-m (36 to 43 ft-lb).

6. Check cylinder head, air injection nozzle and air gallery for leaks with engine running.

DISASSEMBLY AND ASSEMBLY

Disassembly of air pump

1. Remove four pulley drive bolts and remove pulley from hub.

2. Secure air pump drive hub in a vise, as shown in Figure EC-9 and remove four end cover bolts.

Note: Never clamp on the aluminum housing.

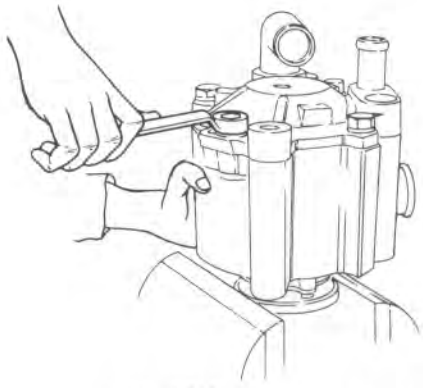


Fig. EC-9 Removing cover

3. Remove end cover by carefully tapping around dowel pin with a plastic mallet and lift up straight.

4. Put match marks "O" on rotor ring and side of rotor to ensure correct reassembly and remove six screws that retain rotor ring to rotor, using a Hexagonal Wrench ST19810000.

Note: Generally, match marks are indicated on both rotor ring and rotor by the manufacturer.

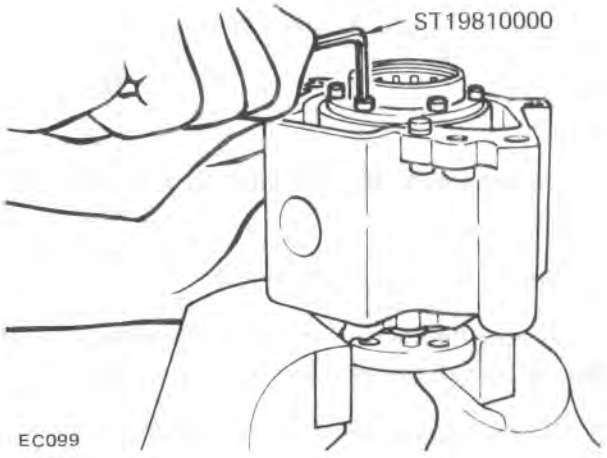


Fig. EC-10 Removing rotor ring

5. Remove vanes from rotor.

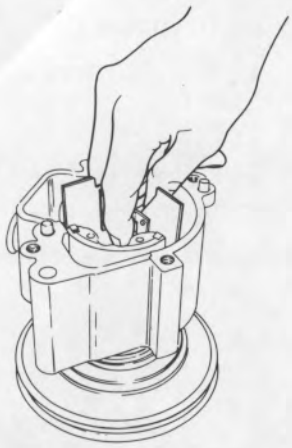


Fig. EC-11 Removing vanes

6. Remove six carbon shoes and three shoe springs from rotor using needle nose pliers or tweezers.

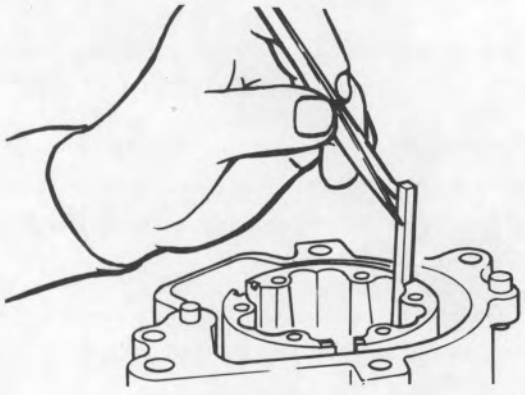


Fig. EC-12 Removing carbon shoe and shoe spring

If replacement of front bearing is necessary, proceed as follows:

7. Remove air pump drive hub with standard puller.

8. Remove three screws securing front bearing cover in place, and detach bearing cover.

9. Support the rear end face of air pump housing with Rotor Adapter ST19890000. Drive rotor out by pushing rotor shaft with Bearing Pressing Tool ST19940000.

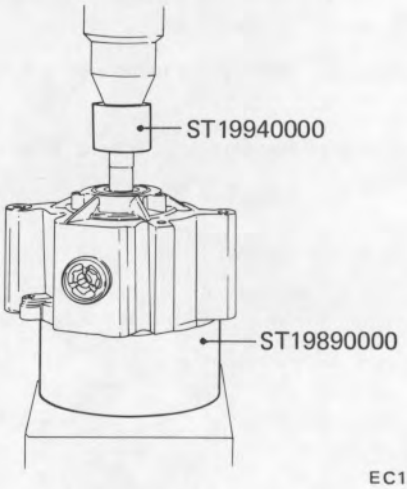


Fig. EC-13 Removing rotor shaft

10. Support the front end face of housing with Bearing Adapter ST19930000. Attach Bearing Driver ST19910000 to front bearing on the inside of air pump housing, and press out.

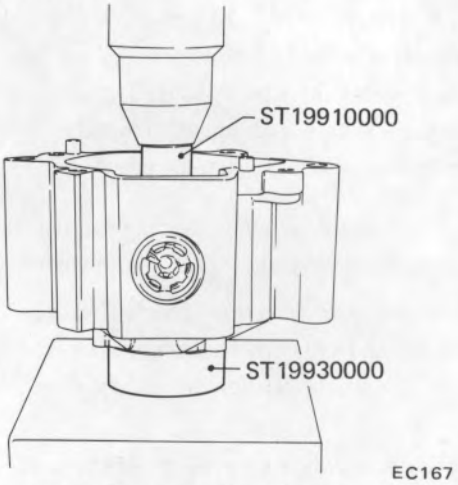


Fig. EC-14 Removing front bearing

11. To remove rear needle bearing, proceed as follows: Rear needle bearing is pressed out of rotor ring with a support for disassembling rotor ring and an attachment for pushing needle bearing out.

Special tools

Support for disassembling rotor ring:
ST19820000

Attachment for pushing needle bearing:
ST19830000

Note: Support rotor ring carefully to avoid distortion.

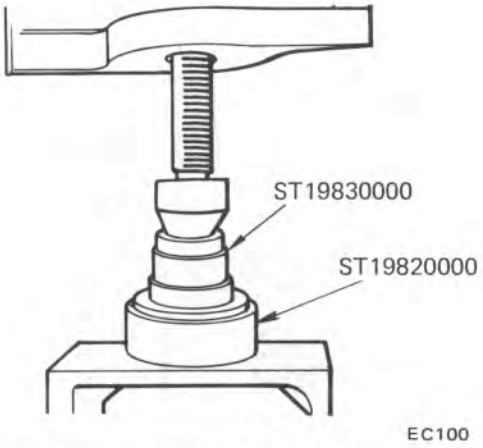


Fig. EC-15 Removing rear rotor bearing

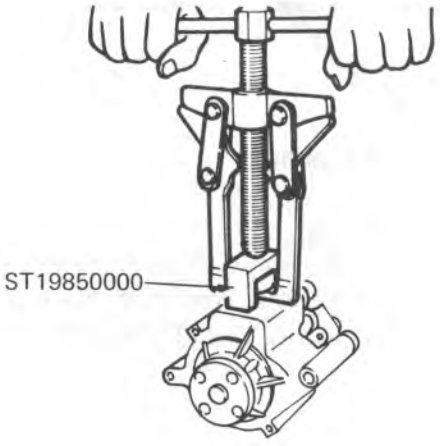
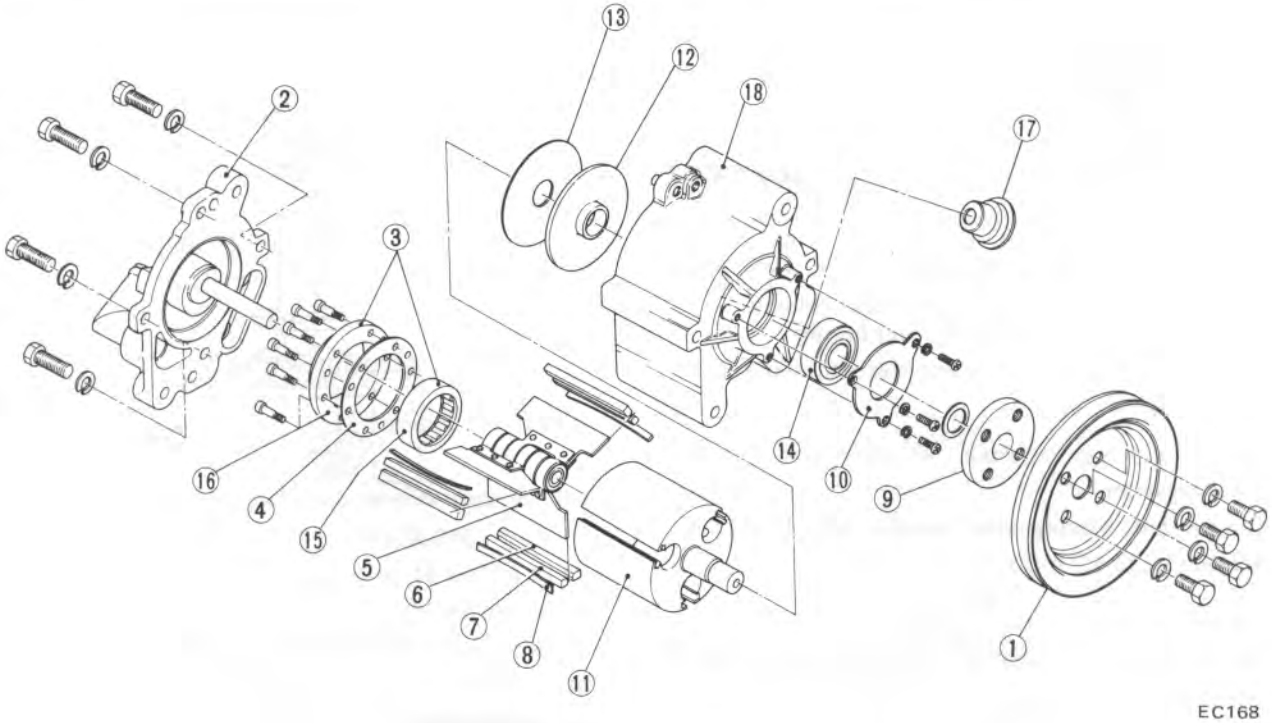


Fig. EC-16 Removing relief valve

12. When replacing relief valve, use bridge to pull relief valve out, (special tool ST19850000) and standard puller.

13. Keep disassembled parts in order.



1	Pulley	10	Bearing plate
2	End cover	11	Rotor
3	Rotor ring and rotor bearing	12	Side plate
4	Side seal A	13	Side seal B
5	Vane	14	Ball bearing
6	Carbon shoe A	15	Rotor bearing
7	Carbon shoe B	16	Rotor ring
8	Carbon shoe spring	17	Relief valve
9	Pulley hub	18	Housing

Fig. EC-17 Components of three-vane type air pump

Note: The numbers indicate disassembling sequence.

Assembly of air pump

1. Front bearing

Support the rear end face of air pump housing with Rotor Support ST19890000. Press front bearing into place with a press and Bearing Tool ST19940000.

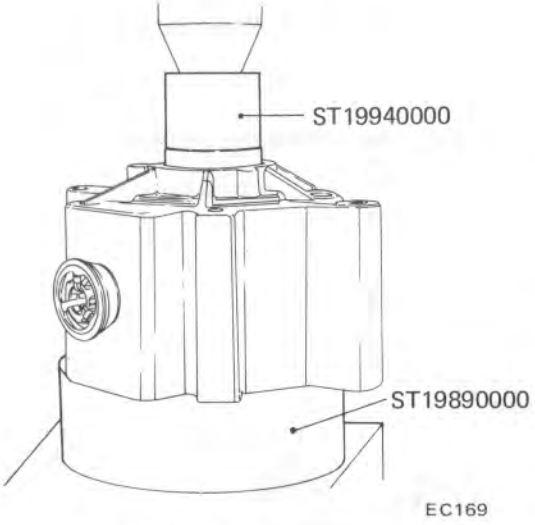


Fig. EC-18 Installing front bearing

2. Bearing cover

Torque three bearing cover securing bolts to 0.17 to 0.24 kg-m (1.2 to 1.7 ft-lb).

3. Rotor

Support the inward bottom of rotor with Rotor Stand ST19920000.

Press rotor into place with a press and Bearing Driver ST19910000 until side plate pressed into rotor shaft touches front bearing inner race.

Notes: a. Be sure to drive front bearing inner race in.

b. After rotor is installed in place, ensure that the rotor end is positioned below the end face of air pump housing.

Position of rotor end below air pump housing:

0.3 mm (0.012 in)

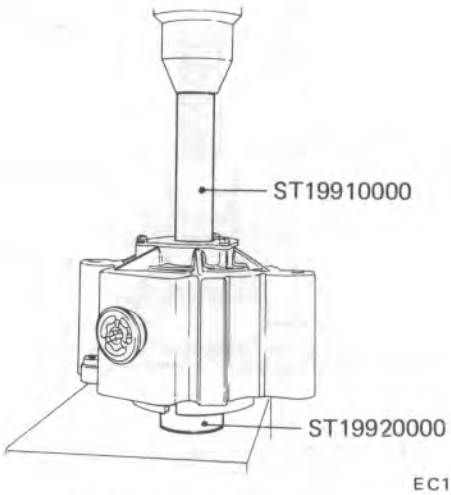


Fig. EC-19 Installing rotor

4. Air pump drive hub

Support the inward bottom of rotor with Rotor Stand ST19920000.

Press drive hub into place with a press and Bearing Driver ST19910000 until the end face of drive hub touches front bearing inner race.

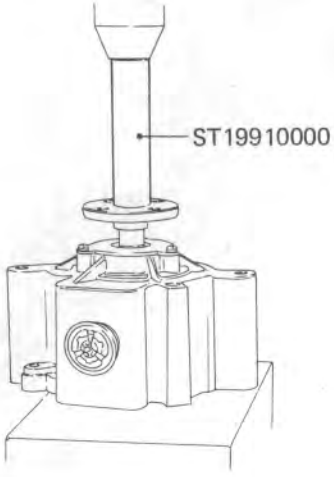


Fig. EC-20 Installing pulley hub

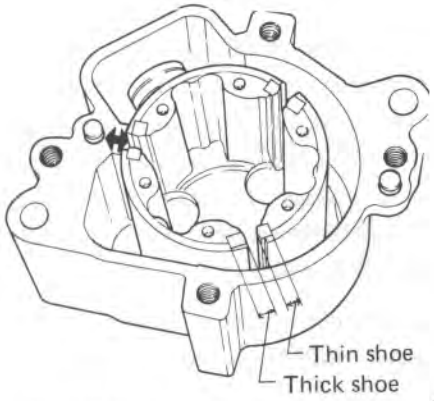
5. Installation of carbon shoe

(1) Place air pump drive hub in a vise.

(2) Clean carbon, dust, etc. from shoe grooves in rotor shoe.

(3) Position rotor and housing properly (as shown by arrow in Figure EC-21).

(4) Large and small carbon shoes are used. Install large carbon shoe on the left and small one on the right, as viewed from center of rotor.



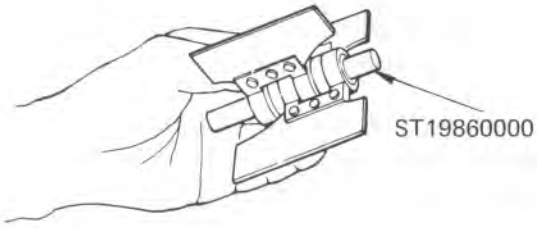
EC172

Fig. EC-21 Installing carbon shoe

Note: If carbon shoes are exposed beyond the rotor end face, remove carbon shoes and clean shoe grooves. Reassemble carbon shoes.

6. Vane

(1) Assemble vanes correctly on dummy shaft of 9.5 mm (0.374 in) diameter. (use special tool ST19860000)



EC074

Fig. EC-22 Vane assembly

(2) Place vanes into rotor. Do not remove the dummy shaft at this time.

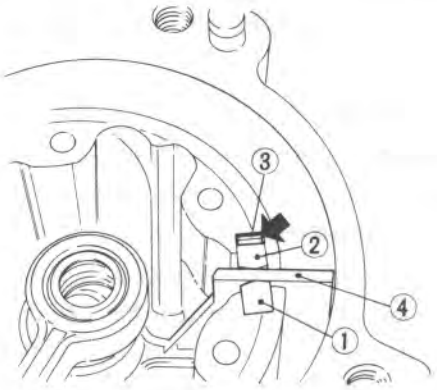
Notes: a. Pack the vane hub bearing with high melting point grease such as ESSO ANDOK 260.

b. The vanes may require 6 to 16 km (4 to 10 miles) wear-in running time. In the event a slight squeaking still persists, drive the car about 64 to 80 km/h (40 to 50 MPH). In most cases 6 to 16 km (4 to 10 miles) will be sufficient for wear-in.

(3) Install vanes in place on rotor, using dummy shaft as a guide.

7. Shoe spring

Insert shoe spring into place on the side of carbon shoe (or on the left side as viewed from center of rotor).



EC173

1	Thick shoe	3	Shoe spring
2	Thin shoe	4	Vane

Fig. EC-23 Installing shoe spring

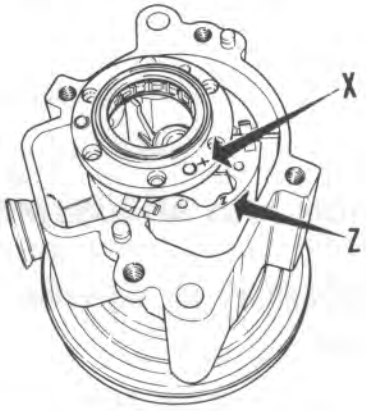
Note: When installing a shoe spring, make sure that the outward bending side faces in shoe and that both ends of spring face in the wall of shoe groove. Be sure to push spring in so that spring end face is flush with rotor.

8. In the three-vane type, if rear bearing was removed, a new bearing may be pressed into rotor ring using attachment for pressing in needle bearing (special tool ST19840000). The bearing should be about 0.8 mm (0.031 in) below rotor ring surface.

Note: Press only on lettered end of bearing surface and support rotor ring to prevent distortion.

9. Position new side seal on rotor ring so that holes line up.

10. Properly align "X" mark in rotor ring with "Z" mark in rotor.



EC179

Fig. EC-24 Match mark in rotor ring

11. Apply thread locking material to rotor ring retaining screws and tighten to 0.3 to 0.5 kg-m (2.2 to 3.6 ft-lb).

12. Carefully withdraw dummy shaft from vane.

13. Insert vane shaft with end cover into vane bearing. Do not force cover on since it will damage vane bearings and change vane bearing alignment.

14. Position end cover in place. Snugly tighten bolt close to dowel. Then tighten four bolts to the specified torque.
Tightening torque: 1.4 to 2.0 kg-m (10 to 14 ft-lb)

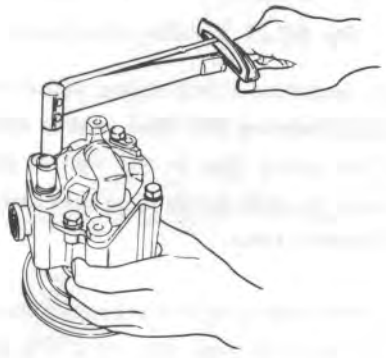


Fig. EC-25 Tighten end cover securing bolts

15. Tighten four pulley securing bolts to the specified torque.
Tightening torque: 1.4 to 2.0 kg-m (10 to 14 ft-lb)

INSPECTION AND ADJUSTMENT

Checking secondary air injection system hoses

Check air system hoses and fittings for loose connections, cracks or deterioration. Retighten or replace if necessary.

Checking air system manifold

Check air gallery pipe and injection nozzles for loose connections and cracks. Retighten or replace if necessary.

It is very difficult to remove air gallery from exhaust manifold without bending the pipe, which could result in fractures or leakage. Therefore, removal of air gallery pipe and injection nozzles should be undertaken only when they are damaged.

1. Lubricate connecting portion of air injection nozzle and air gallery with engine oil.

2. Hold air injection nozzle hexagon head with a wrench and unfasten flare screw connecting air gallery to injection nozzle. Remove air gallery.

Note: a. Apply engine oil to screws several times during above work.
b. Be careful not to damage other parts.

3. Unfasten air injection nozzle from cylinder head applying engine oil to screwed portion several times.

4. Check air gallery and nozzle for fractures or leakage. Clean air injection nozzle with a wire brush.

5. At time of installation, assemble nozzle seat on injection nozzle and tighten air gallery flange screw to a torque of 5 to 5.9 kg-m (36 to 43 ft-lb).

6. Check cylinder head, air injection nozzle and air gallery for leaks with engine running.

Checking control valves and air pump

The following procedures are recommended for checking and/or ascertaining that the various components of the exhaust emission control system are operating properly.

The engine and all components must be at normal operating temperatures when the tests are performed. Prior to performing any extensive diagnosis of the exhaust control system, it must be determined that the engine as a unit is functioning properly.

Testing check valve

This test can be performed at the same time as the air pump test.

1. Operate engine until it reaches normal operating temperature.

2. Inspect all hoses and hose connectors for obvious leaks, and correct, if necessary, before checking valve operation.

3. Visually inspect position of valve plate inside valve body. It should be lightly positioned against valve seat away from air distributor manifold.

4. Insert a probe into the valve connection on check valve and depress valve plate. It should freely return to the original position, against valve seat, when released.

5. Leave hose disconnected and start engine. Slowly increase engine speed to 1,500 rpm and watch for exhaust gas leakage at check valve. There should be no exhaust leakage. The valve may flutter or vibrate at idle speed, but this is normal due to exhaust pulsations in manifold.

6. If check valve does not meet the recommended conditions, replace it.

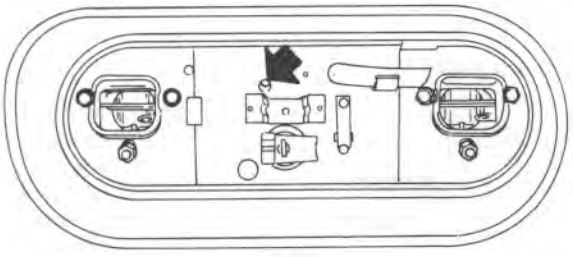
Testing anti-backfire valve

1. Operate engine until it reaches manual operating temperature.

2. Inspect inlet and outlet hoses of valve and hose connections for obvious leaks, and correct if necessary.

3. Remove air cleaner cover.

4. Place a finger on inlet hole of valve. Do not shut inlet hole off.



EC191

Fig. EC-26 Air inlet hole of anti-backfire valve

5. Raise engine speed to 3,000 to 3,500 rpm from idle speed gradually by the manual operation of throttle valve linkage.

6. Release linkage suddenly. If air flow through valve inlet is felt at this time, valve is correct for operation.

7. If air flow through valve inlet is not felt, or constant gulping air is observed, replace valve with a new one.

Notes: a. Anti-backfire valve cannot be disassembled.
b. Anti-backfire valve must be installed with its diaphragm chamber upward.

Testing air pump

1. Operate engine until it reaches normal operating temperature.

2. Inspect all hoses, hose connections and air gallery for leaks, and correct, if necessary, before checking the injection pump.

3. Check air injection pump belt tension and adjust to specifications if necessary.

4. Disconnect air supply hose at check valve.

5. Insert open pipe end of Air Pump Test Gauge Adapter ST19870000 in air supply hose. Clamp hose securely to adapter to prevent it from blowing out. Position adapter and test gauge so that air blast emitted through drilled pipe plug will be harmlessly dissipated.

6. Install a tachometer on engine. With engine speed at 1,500 rpm, observe pressure produced at gauge.
Air pressure should be 16 mmHg (0.63 inHg) or more.

7. If air pressure does not meet above pressure, proceed as follows:

(1) Repeat 2 and 3 above.

(2) Check air cleaner filter.

(3) With engine speed at 1,500 rpm close hole of test gauge by finger. If a leaking sound is heard or leaking air is felt by finger at relief valve, relief valve is malfunctioning. Relief valve should be replaced or repaired.

(4) If air injection pump does not meet minimum requirement of the pressure test, it should be replaced.

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Excessive belt noise	Loose belt.	Tighten.
	Seized pump.	Replace.
Excessive pump noise	Leak in hose.	Check and correct.
	Loose hose.	Reassemble and replace or tighten hose clamp.
	Pump mounting fasteners loose.	Retorque all mounting screws.
	Worn ball bearing.	Replace.
	Worn end cover (with needle bearing)	Replace end cover assembly.
	Worn vane bearing.	Replace vane assembly.
	Broken shoe spring.	Replace.
	Broken relief valve.	Replace.
	Pump failure.	Replace pump.
No air supply	Loose belt.	Tighten.
	Leak in hose.	Check and correct.
	Leak at hose fitting.	Reassemble and replace or tighten hose clamps.
	Broken relief valve.	Replace.
	Check valve failure.	Replace valve.
	Pump failure.	Replace pump.

EXHAUST GAS RECIRCULATION SYSTEM

CONTENTS

DESCRIPTION

The Exhaust Gas Recirculation System has exhaust gases recirculate into the combustion chamber and reduces the combustion temperature so as to reduce NOx produced in combustion process.

This system is composed of a balance tube, control valve, solenoid valve, thermo switch, E.G.R. tube, vacuum hose and water hose. Refer to Figure EC-19.

The exhaust gases are sent out from the exhaust manifold through the E.G.R. tube into the rear end of the balance tube and to the E.G.R. control valve.

The exhaust gases which have passed through the E.G.R. control valve go through the center of the balance tube to be distributed to the front and rear intake manifolds.

The exhaust gases passing through the balance tube are cooled by the engine coolant. Refer to Figure EC-27.

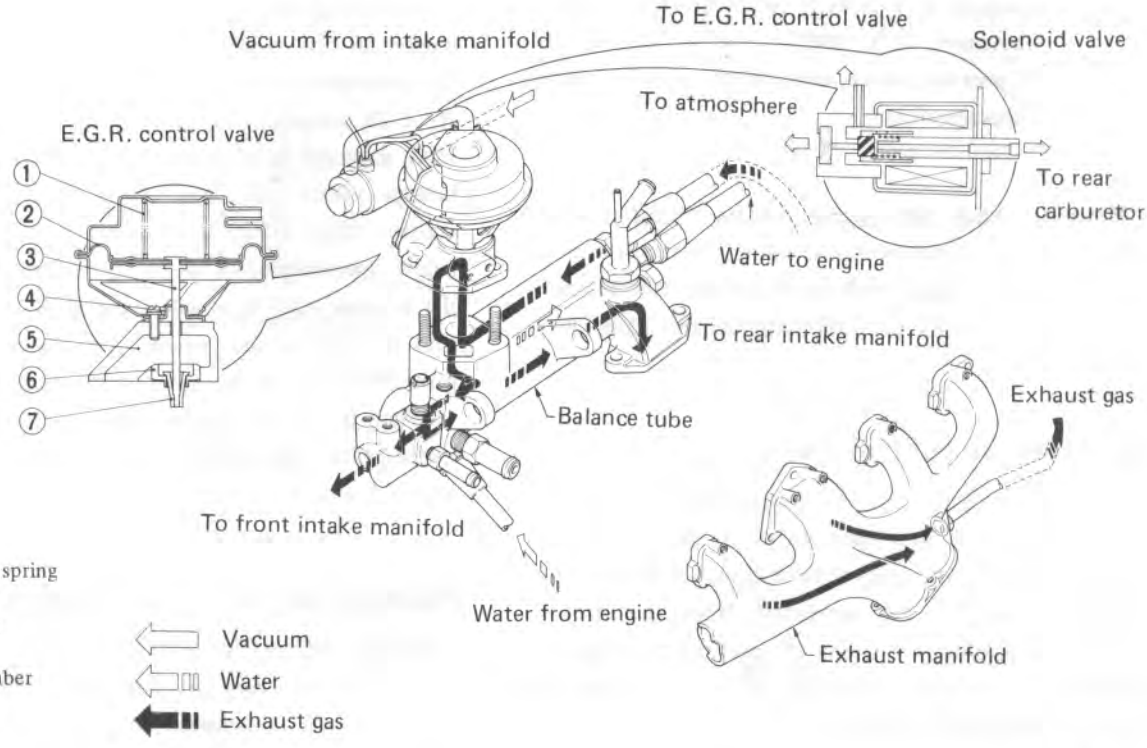
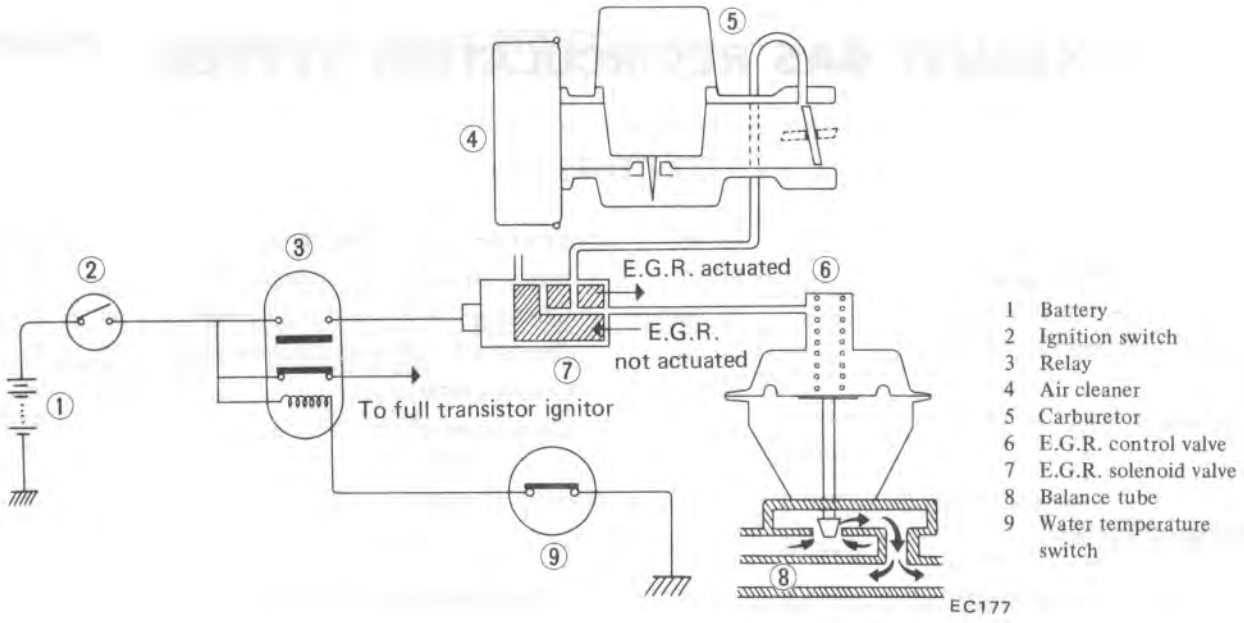


Fig. EC-27 Exhaust gas recirculation system



1 Battery
2 Ignition switch
3 Relay
4 Air cleaner
5 Carburetor
6 E.G.R. control valve
7 E.G.R. solenoid valve
8 Balance tube
9 Water temperature switch

E.G.R.	Switch operating temperature		Water temp. SW.	Relay	E.G.R. solenoid valve	E.G.R. control valve
Not actuated	* 31 to 41°C (88 to 106°F)	Below	OFF	ON	ON	CLOSE
Actuated		Above	ON	OFF	OFF	OPEN

Fig. EC-28 Schematic drawing of E.G.R. control system

Note (*): The water temperature switch is designed to operate at a coolant temperature somewhere between 31°C (88°F) and 41°C (106°F). Operating points vary slightly with individual characteristics.

However, when the engine coolant temperature is above operating temperature, at idling the throttle valve does not open enough to admit intake manifold vacuum to carburetor vacuum port and thus exhaust gases does not recirculate.

Operation of control valve

This valve is operated by vacuum pressure produced in the rear carburetor, and opens or closes the exhaust gas passage. At idling, the control valve does not operate and the exhaust gases do not recirculate. When the throttle valve of the carburetor opens to increase the negative pressure in the intake manifold this valve starts to operate and the exhaust gases recirculate.

However, when the throttle valve is fully opened and the negative pressure is decreased below −50 mmHg (−2.0 in Hg), this valve will close again.

Operation of E.G.R. solenoid valve

This improves the starting ability and durability of the engine in the cold condition. The water temperature switch detects the cooling water temperature and operates the EGR solenoid valve fitted to the intake manifold. The EGR solenoid valve intermittently shuts off the vacuum passage which leads from the carburetor to the EGR control valve. When the cooling water temperature is below operating temperature, the current flows through the solenoid and so actuates the EGR solenoid valve to shut off the vacuum passage. This prevents the exhaust gases from recirculating.

When the cooling water temperature is above operating temperature, the current does not flow through the solenoid, and accordingly the vacuum passage is left open.

REMOVAL AND INSTALLATION

E.G.R. Control valve is installed on upper side of Balance tube for easy servicing. Removing and installation can be done in a few steps.

However, this E.G.R. system requires a regular maintenance, especially cleaning.

Remove and install E.G.R. System as follows:

Removal

STEP 1. Removal of control valve

1. Disconnect vacuum hose connecting from E.G.R. solenoid valve to carburetor at solenoid valve side.

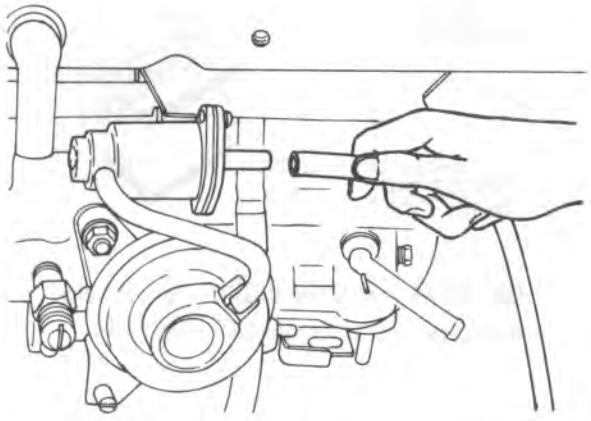


Fig. EC-29 Disconnecting vacuum tube

2. Remove solenoid valve harness.

3. Remove E.G.R. Control valve by unscrewing two bolts. Be careful not to damage gasket.

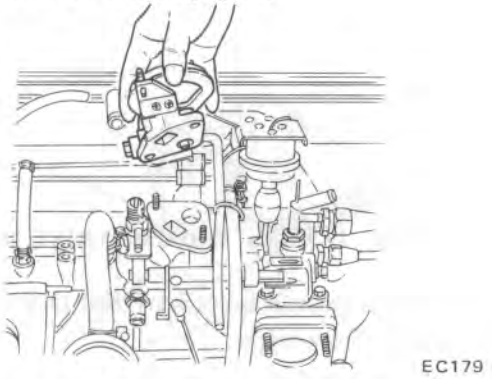


Fig. EC-30 Removing E.G.R. control valve

STEP 2. Removal of balance tube

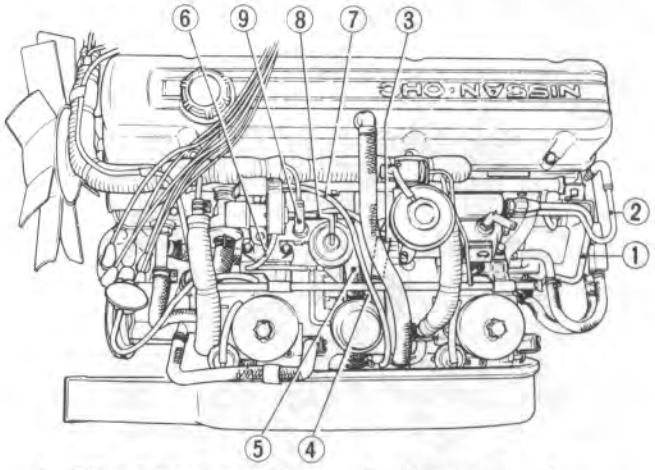
1. Remove the following hoses from balance tube.
- Anti-back fire valve hose
- Water inlet hose
- Canister purge hose
- Crankcase ventillation hose

2. Remove ISS hose from idle speed adjusting screw block attached to balance tube.

3. Remove piping from throttle opener.
- throttle opener to intake manifold
- throttle opener to air cleaner
- throttle opener to servo diaphragm

4. Remove throttle opener control valve and servo diaphragm.

5. Lossen acorn nut, and remove water outlet tube and exhaust gas return tube from rear end of balance tube.



1 Exhaust gas return tube
2 Water outlet tube
3 ISS hose
4 Crankcase ventilation hose
5 Anti-backfire valve hose
6 Throttle opener vacuum signal hose
7 Throttle opener hose (throttle opener to air cleaner)
8 Throttle opener hose (throttle opener to servo diaphragm)
9 Canister purge hose

Fig. EC-31 Disconnecting related piping

6. On the cooler equipped model, remove F.I.C.D. and bracket as an assembly. To facilitate removal of dashpot, remove rocker cover.

7. Remove balance tube by taking off four bolts.

STEP 3. Removal of E.G.R. solenoid valve

EGR solenoid valve is mounted with two screws on E.G.R. control valve bracket.

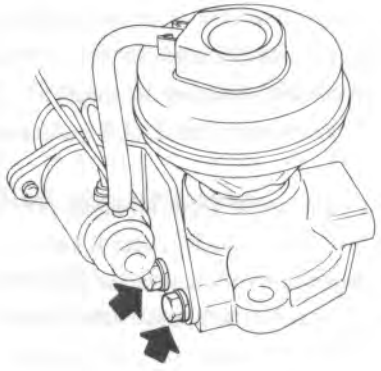
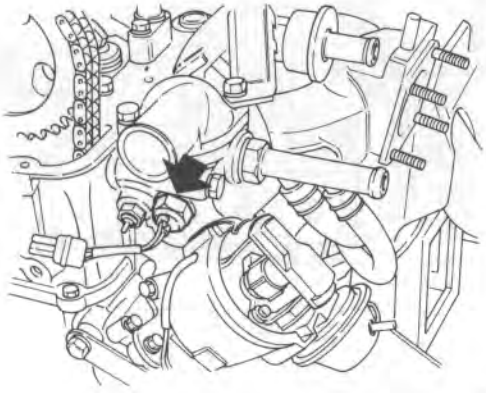


Fig. EC-32 Removing E.G.R. solenoid valve

STEP 4. Removal of water temperature switch

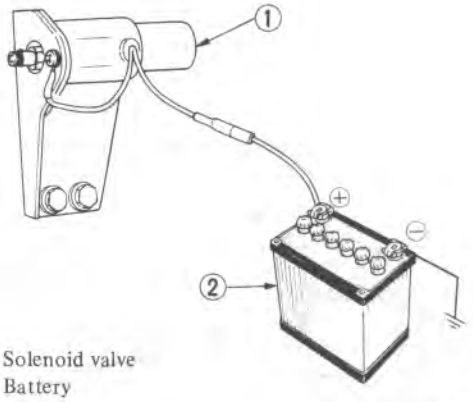
This switch is located in the front part of cylinder head.

Note: Be sure to drain cooling water prior to removing switch.



EC182

Fig. EC-33 Water temperature switch



1 Solenoid valve
2 Battery

ET062

Fig. EC-34 Inspecting E.G.R. solenoid valve

(5) With engine running at idling speed, push up E.G.R. control valve diaphragm by manually pressing bottom dish.

It is normal if engine loses stability.

Installation

Install E.G.R. system component parts in the reverse order of removal.

CHECKING AND INSPECTION

Engine equipped with control valve

(1) Visually inspect entire E.G.R. control system. Clean it for ease of inspection if it is contaminated with oil. Replace tube and the like if found cracked or broken.

(2) When it becomes necessary to inspect E.G.R. control valve, check to be sure that E.G.R. solenoid valve is properly wired.

(3) Increase engine speed from idling to 3000 to 3500 r.p.m., noting if plate of E.G.R. control valve diaphragm and valve shaft move upwards as speed is increased.

(4) Disconnect E.G.R. solenoid valve harness, and connect it directly to battery to apply battery voltage (12V) to E.G.R. solenoid valve. Race engine again without disturbing above setup.

E.G.R. control valve should be kept stationary.

Checking E.G.R. control valve parts

To inspect parts, it is necessary first to remove E.G.R. control valve from engine.

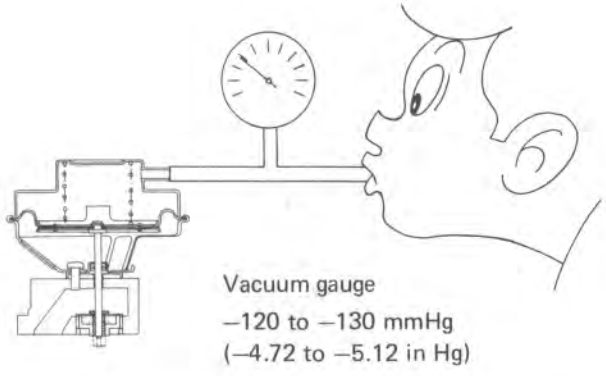
(1) Remove E.G.R. vacuum hose and check to be certain that vacuum-hose is not deformed excessively. If it is, the probability is that E.G.R. control valve is not operating properly due to leakage of vacuum signals. To remedy this malfunction, replace vacuum hose with a new one.

(2) Remove E.G.R. control valve from balance tube.

(3) Apply a vacuum of −120 to −130 mmHg (−4.72 to −5.12 inHg) to E.G.R. control valve. Vacuum application can easily be made by the method illustrated in Fig. EC-35.

It is correct if valve moves into full-up position.

E.G.R. control valve should stay uplifted for more than 30 seconds after vacuum is stopped.



ET151

Fig. EC-35 Checking E.G.R. control valve

(4) Visually inspect E.G.R. control valve for sign of damage, wrinkle or deformation.

(5) Clean E.G.R. control valve seat with brush and compressed air as shown in Figure EC-36 to eliminate clogging of E.G.R. control valve.

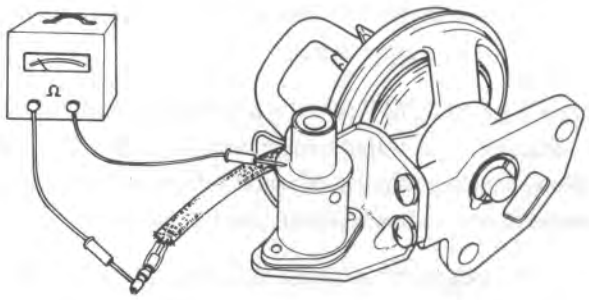
ET153

Fig. EC-36 Cleaning E.G.R. control valve seat

Checking EGR solenoid valve parts

Check E.G.R. solenoid valve parts as instructed below. An ohmmeter and battery are required in this checking.

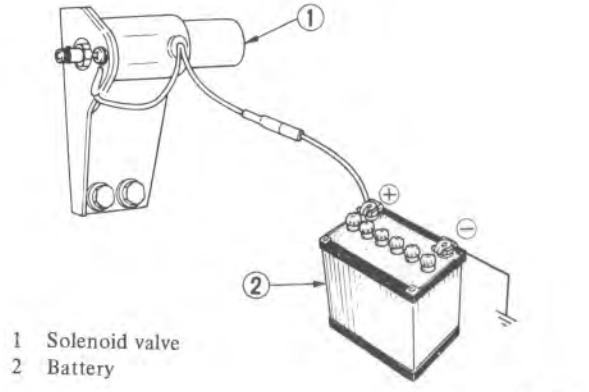
1. Check solenoid for proper conduction as shown in Figure EC-37.
If ohmmeter pointer does not deflect, it is considered as broken and needs to be replaced.



ET154

Fig. EC-37 Checking E.G.R. solenoid valve

2. If ohmmeter pointer deflects in step 1 above, check E.G.R. solenoid valve to ensure that it clicks when intermittently electrified is shown in Figure EC-38. If a click is heard, E.G.R. solenoid valve is normal.



1 Solenoid valve
2 Battery

ET062

Fig. EC-38 Inspecting E.G.R. solenoid valve

3. Solenoid valve is considered as sticking and must be replaced when it does not click in Item 2 above.

Checking balance tube

When E.G.R. control valve is removed, visually inspect E.G.R. valve mounting flange and E.G.R. passage of balance tube.

If it is found heavily fouled with carbon deposit or extremely clogged, remove balance tube from intake manifold and clean it.

Checking water temperature switch

1. A thermometer and ohmmeter are needed for checking water temperature switch.

2. Checking "OFF" of water temperature switch.
Starting from water temperature at 25°C (77°F) and below, check continuity of water temperature switch and ensure that a reading is infinite, that is, switch is open.

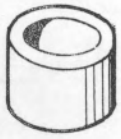
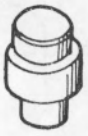
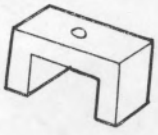
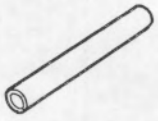
3. Checking "ON" of water temperature switch
Increasing water temperature from about 25°C (77°F), make continuity check of water temperature switch. Operation is normal if an ohmmeter reading drops to zero, at water temperature somewhere between 31 to 41°C (88 to 106°F) and remains zero at above 41°C (106°F).

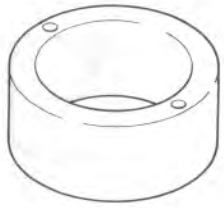
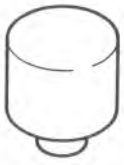
Fig. EC-39 Checking water temperature switch operation

4. If it is satisfied both in steps 2 and 3 above, switch is good.

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
1.	*ST19810000 Hexagon wrench	For removing and installing the rotor ring assembly  SE279	L26 L20B	Fig. EC-10

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
2.	ST19820000 Support for disassembling rotor ring	For supporting the rotor ring in case of needle bearing removal and installation  SE280	L26	Page. EC-8 Fig. EC-15
3.	ST19830000 Attachment for pushing out needle bearing	For removing the needle bearing  SE281	L26	Page. EC-8 Fig. EC-15
4.	ST19840000 Attachment for pressing in needle bearing	For installing the needle bearing  SE282	L26	Page. EC-11
5.	ST19850000 Bridge for pulling out relief valve	Use as a bridge for removing the relief valve by the puller  SE283	L26	Fig. EC-16
6.	ST19860000 Dummy shaft	For assembling the vanes  SE284	L26	Fig. EC-22

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
7.	ST19890000 Rotor adapter	Used as a mount when rotor is removed and when bearing is installed.  SE347	L26 L20B	Fig. EC-13 Fig. EC-18
8.	ST19940000 Bearing Pressing tool	Used when rotor is removed and when front bearing is installed.  SE348	L26 L20B	Fig. EC-13 Fig. EC-18
9.	ST19930000 Bearing adapter	Used as a mount when front bearing is removed.  SE349	L26 L20B	Fig. EC-14
10.	ST19910000 Bearing driver	Used as a drift when front bearing is installed. Also used as a support when rotor is installed.  SE350	L26 L20B	Fig. EC-14 Fig. EC-19 Fig. EC-20
11.	ST19920000 Rotor stand	Used as a drift when rotor is installed.  SE351	L26 L20B	Fig. EC-19

These service tools are designed for use in disassembly and assembly of the air pump.