

DATSUN 280Z
MODEL S30 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

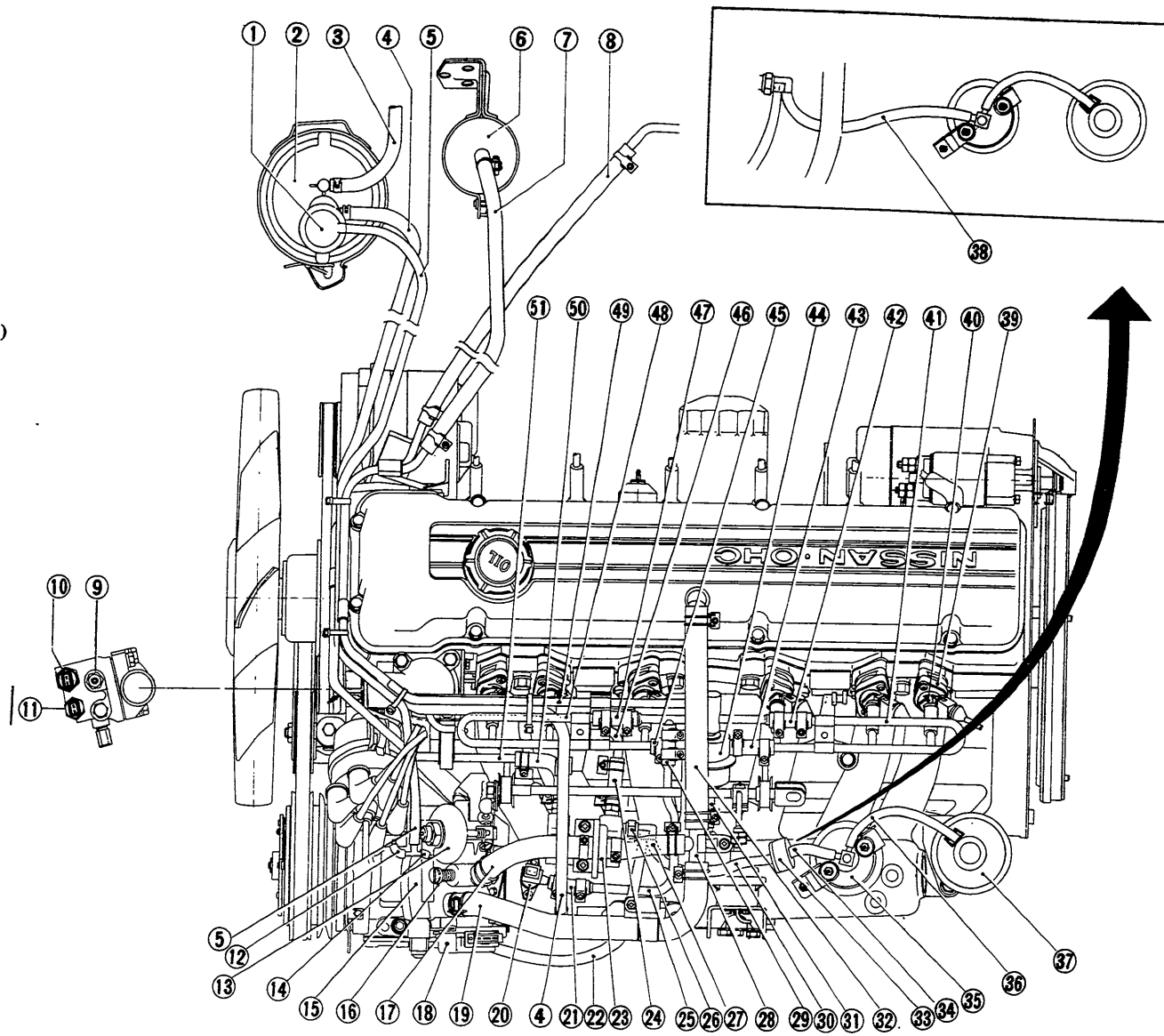
SECTION ET

ET

ENGINE TUNE-UP

BASIC MECHANICAL SYSTEM ..... ET- 3
IGNITION AND FUEL SYSTEM ..... ET- 5
EMISSION CONTROL SYSTEM ET-10
SERVICE DATA AND SPECIFICATIONS ET-13
TROUBLE DIAGNOSES AND CORRECTIONS ET-14

1 Purge control valve
2 Carbon canister
3 Vapor vent line
4 Canister purge line
5 Carbon canister to 3-way connector vacuum hose
6 Fuel filter
7 Fuel feed rubber hose
8 Fuel return rubber hose
9 Thermal transmitter
10 Thermotime switch
11 Water temperature sensor
12 3-way connector to distributor vacuum hose
13 Anti-stall dash pot (Manual Transmission only)
14 3-way connector throttle chamber vacuum hose
15 Throttle chamber
16 Idle speed adjusting screw
17 Throttle chamber to air regulator rubber hose
18 Throttle valve switch
19 Throttle chamber to 3-way connector rubber hose
20 Cold start valve
21 Cold start valve to fuel pipe D rubber hose
22 Throttle chamber to thermal vacuum valve vacuum hose
23 Air regulator
24 Heater housing to water pipe rubber hose
25 Fuel pipe D
26 Thermal vacuum valve
27 Air regulator to 3-way connector rubber hose
28 3-way connector
29 Fuel pipe D to fuel pipe A rubber hose
*30 Thermal vacuum valve to vacuum delay valve vacuum hose
31 Pressure regulator to intake manifold vacuum hose
32 3-way connector to rocker cover rubber hose
*33 Vacuum delay valve
*34 Vacuum delay valve to B.P.T. valve vacuum hose
35 B.P.T. valve
36 B.P.T. valve to E.G.R. control valve vacuum hose
37 E.G.R. control valve
**38 Thermal vacuum valve to B.P.T. valve
39 Injector holder
40 Injector



41 Fuel pipe C
42 Fuel pipe A to fuel pipe C rubber hose
43 Pressure regulator to fuel pipe C rubber hose
44 Pressure regulator
45 Pressure regulator to fuel pipe B rubber hose
46 Rubber hose to water pipe
47 Fuel pipe A to fuel pipe B rubber hose
48 Fuel pipe B
49 Fuel pipe A
50 Heater housing to water pipe rubber hose
51 Rubber hose to cylinder head water pipe

* California models only
**Non-California models only

ET361

Fig. ET-1 L28 engine system piping

BASIC MECHANICAL SYSTEM

CONTENTS

ADJUSTING INTAKE AND EXHAUST VALVE CLEARANCE ET-3
VALVE CLEARANCE ET-3
CHECKING AND ADJUSTING DRIVE BELTS ET-3
FAN BELT ET-3
COOLER COMPRESSOR BELT ET-3
RETIGHTENING CYLINDER HEAD BOLTS, MANIFOLD NUTS AND THROTTLE CHAMBER SECURING BOLTS ET-4
CHANGING ENGINE OIL ET-4
REPLACING OIL FILTER ET-4
CHANGING ENGINE COOLANT ET-4
PERMANENT ANTI-FREEZE COOLANT ET-4
CHECKING COOLING SYSTEM HOSES AND CONNECTIONS ET-4
INSPECTION OF RADIATOR CAP ET-5
COOLING SYSTEM PRESSURE TEST ET-5
CHECKING VACUUM FITTINGS, HOSES, AND CONNECTIONS ET-5
CHECKING ENGINE COMPRESSION ET-5
TESTING RESULT ET-5

ADJUSTING INTAKE AND EXHAUST VALVE CLEARANCE

Valve clearance adjustment cannot be made when the engine is in operation:

1. Loosen pivot locking nut and turn pivot screw until the specified clearance is obtained while engine is cold.

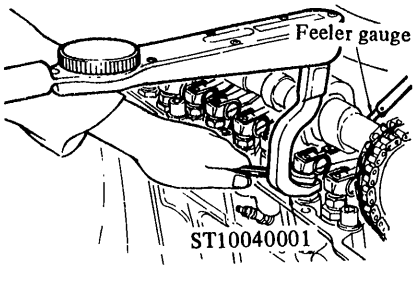
After adjustment, tighten pivot nut securely with special tool, and recheck the clearance.

2. Warm-up engine for at least several minutes and then stop. Measure valve clearance while engine is hot. If clearance is not within specifications, adjust.

VALVE CLEARANCE

Unit: mm (in)

Cold	Intake	0.20 (0.008)
	Exhaust	0.25 (0.010)
Hot	Intake	0.25 (0.010)
	Exhaust	0.30 (0.012)



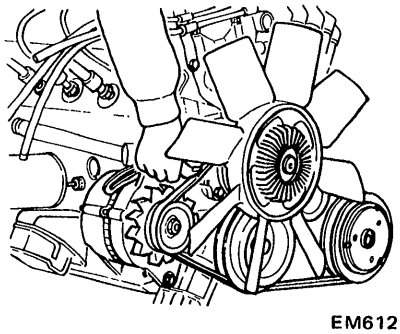
EM338

Fig. ET-2 Adjusting valve clearance

CHECKING AND ADJUSTING DRIVE BELTS

FAN BELT

1. Check for cracks or damage. Replace if necessary.
2. Adjust fan belt tension. It is correct if deflection is 8 to 12 mm (0.315 to 0.472 in) when thumb pressure [10 kg (22 lb)] is applied midway between fan pulley and alternator pulley.



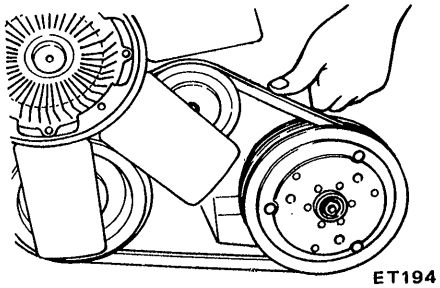
EM612

Fig. ET-3 Fan belt tension

COOLER COMPRESSOR BELT

1. Check cooler compressor belt for crack or damage. Replace if necessary.
2. Adjust cooler compressor belt tension by turning idler pulley bolt in or out.

It is correct if deflection is 8 to 12 mm (0.315 to 0.472 in) when thumb pressure [10 kg (22 lb)] is applied midway between crank pulley and cooler compressor pulley.



ET194

Fig. ET-4 Cooler compressor belt tension

RETIGHTENING CYLINDER HEAD BOLTS, MANIFOLD NUTS AND THROTTLE CHAMBER SECURING BOLTS

Tightening torque:
- Cylinder head bolts
  - 1st turn:
  - 4.0 kg-m (29 ft-lb)
  - 2nd turn:
  - 6.0 kg-m (43 ft-lb)
  - 3rd turn:
  - 7.0 to 8.5 kg-m
  - (51 to 61 ft-lb)
- Manifold nuts
  - 8 mm (0.315 in) dia. bolt
  - 1.4 to 1.8 kg-m
  - (10.1 to 13.0 ft-lb)
  - 10 mm (0.394 in) dia. bolt
  - 3.5 to 5.0 kg-m
  - (25 to 36 ft-lb)
- Throttle chamber securing bolts
  - 1.5 to 2.0 kg-m
  - (11 to 14 ft-lb)

Note: There are two types of 10M intake manifold securing bolts as shown in Figure ET-5. When installing, do not confuse them.

"L" dimensions; Long bolt (⇐): 40 mm (1.575 in)
Short bolt (⇐): 32 mm (1.260 in)

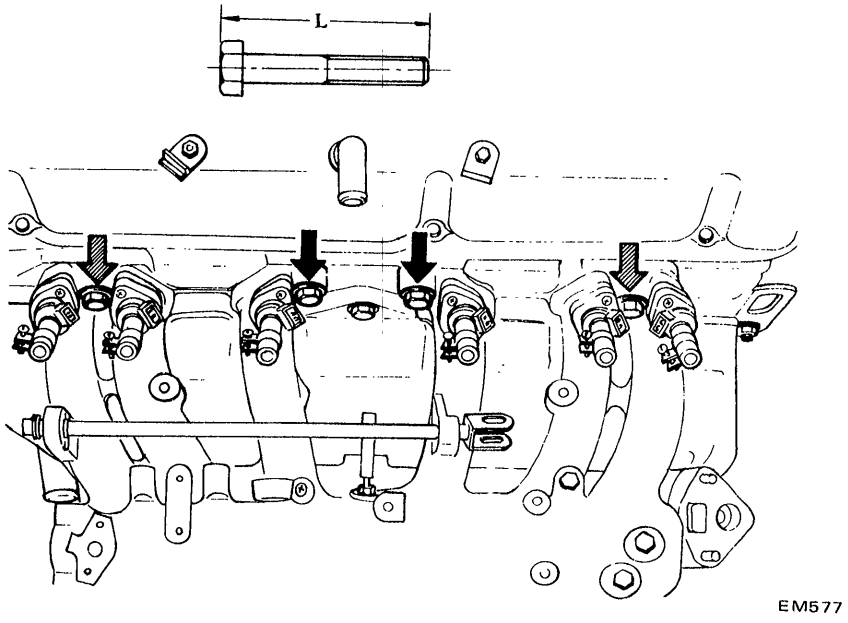


Fig. ET-5 Intake manifold securing bolt

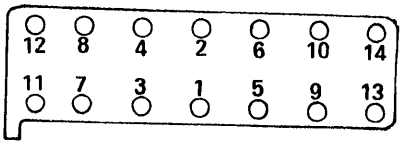


Fig. ET-6 Tightening sequence of cylinder head bolts

CHANGING ENGINE OIL

1. Check if oil is diluted with water or gasoline. Drain and refill oil if necessary.

Notes:

a. A milky oil indicates the presence of cooling water. Isolate the cause and take corrective measure.

b. An oil with extremely low viscosity indicates dilution with gasoline.

2. Check oil level. If below the specified level, raise it up to the H level.

Engine oil capacity
(including oil filter):
- Maximum (H level)
  - 4.7 ℓ (5 US qt, 4 1/8 Imp qt)
- Minimum (L level)
  - 3.7 ℓ (3 7/8 US qt, 3 1/4 Imp qt)

REPLACING OIL FILTER

Oil filter is of a cartridge type, and can be removed with Oil Filter Wrench ST19320000.

1. Check for oil leaks past gasketed flange. If any leakage is found, retighten just enough to stop leakage. If retightening is no longer effective, replace filter as an assembly.
2. When installing oil filter, tighten by hand.

Note: Do not overtighten oil filter, lest leakage should occur.

CHANGING ENGINE COOLANT

PERMANENT ANTI-FREEZE COOLANT

The permanent anti-freeze coolant is an ethylene glycol base product containing chemical inhibitors to protect the cooling system from rusting and corrosion. The anti-freeze does not contain any glycerine or ethyl alcohol. It will not evaporate or boil away and can be used with either high or low temperature thermostats. It flows freely, transfers heat efficiently, and will not clog the passages in the cooling system. The anti-freeze must not be mixed with other product. This coolant can be used throughout the seasons of the year.

Whenever coolant is changed, the cooling system must be flushed and refilled with a new coolant. Check the coolant level.

See instructions attached to the anti-freeze container for mixing ratio of anti-freeze to water.

CHECKING COOLING SYSTEM HOSES AND CONNECTIONS

Check hoses and fittings for loose connections or deterioration. Retighten or replace if necessary.

INSPECTION OF RADIATOR CAP

Apply reference pressure [0.9 kg/cm^2 (13 psi)] to radiator cap by means of a cap tester to see if it is

satisfactory. Replace cap assembly if necessary.

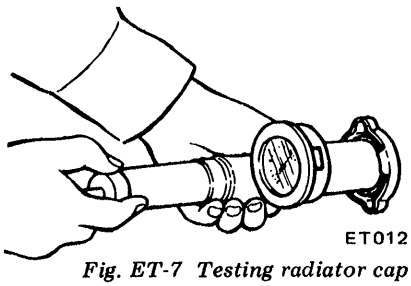


Fig. ET-7 Testing radiator cap

COOLING SYSTEM PRESSURE TEST

With radiator cap removed, apply reference pressure [1.6 kg/cm^2 (23 psi)] to the cooling system by means of a tester to detect any leakage.

Water capacity (including heater and reservoir tank):

Manual transmission model:
10.3 liter (10⅞ U.S. qt, 9⅛ Imp. qt)

Automatic transmission model:
10.1 liter (10⅝ U.S. qt, 8⅞ Imp. qt)

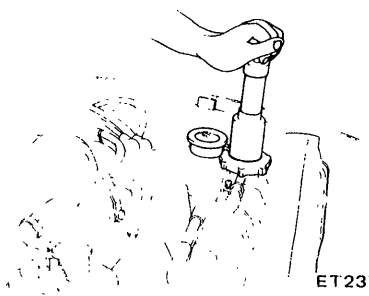


Fig. ET-8 Cooling system pressure test

CHECKING VACUUM FITTINGS, HOSES, AND CONNECTIONS

Check fittings and hoses for loose connections or damage. Retighten loose parts or replace parts that are not suitable for further use.

CHECKING ENGINE COMPRESSION

To check cylinder compression, it is essential to remove all spark plugs. The purpose of this test is to determine whether there is excessive leakage past piston rings, head gasket, etc. To test, engine should be heated to the operating temperature and throttle valve opened.

Cylinder compression in cylinders should not be less than 80% of the highest reading. Different compression in two or more cylinder usually indicates an improperly seated valve or broken piston ring.

Low compression in cylinders can result from worn piston rings. This trouble may usually be accompanied by excessive fuel consumption.

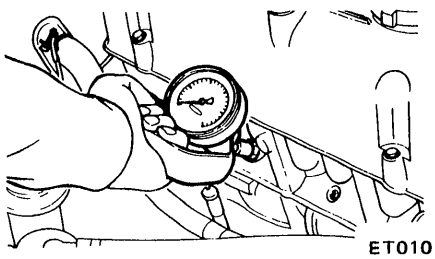


Fig. ET-9 Testing compression pressure

TESTING RESULT

If cylinder compression in one or more cylinders is low, pour a small quantity of engine oil into cylinders through the spark plug holes and retest compression.

1. If adding oil helps the compression pressure, the chances are that piston rings are worn or damaged.
2. If pressure stays low, the likelihood is that valve is sticking or seating improperly.
3. If cylinder compression in any two adjacent cylinders is low, and if adding oil does not help the compression, there is leakage past the gasketed surface.

Oil and water in combustion chambers can result from this trouble.

Compression pressure kg/cm^2 (psi)/at rpm:
11.5 to 12.5 (164 to 178)/ 300 to 400

IGNITION AND FUEL SYSTEM

CONTENTS

CHECKING BATTERY ET-6
CHECKING AND ADJUSTING IGNITION TIMING ET-6
CHECKING AND REPLACING SPARK PLUGS ET-6
CHECKING OPERATING PARTS OF DISTRIBUTOR AND IGNITION WIRING ET-7
AIR GAP ET-7
DISTRIBUTOR ET-7
HIGH TENSION CABLE ET-7
CHECKING DISTRIBUTOR CAP ROTOR ET-7
CHECKING ENGINE IDLE RPM AND MIXTURE RATIO ET-7
DASH POT ADJUSTMENT (Manual transmission models only) ET-9
CHECKING FUEL LINES (HOSES, PIPING CONNECTIONS, ETC.) ET-9
REPLACING FUEL FILTER ET-9
CHECKING AIR REGULATOR HOSES ET-9
REPLACING AIR CLEANER ELEMENT ET-9
CHECKING CABLE HARNESS AND CONNECTORS ET-9

CHECKING BATTERY

1. Remove six vent plugs and check electrolyte level in each battery cell. If necessary, pour distilled water.

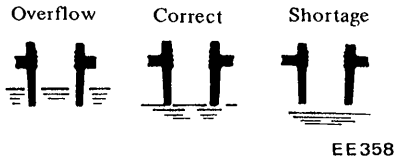


Fig. ET-10 Checking electrolyte level

2. Measure the specific gravity of battery electrolyte.

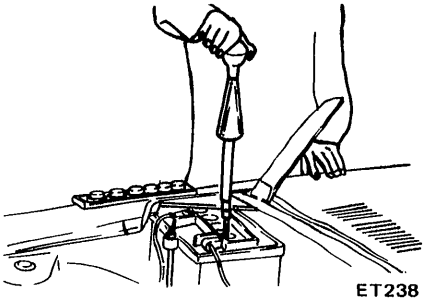


Fig. ET-11 Checking specific gravity of battery electrolyte

	Permissible value	Full charge value [at 20°C (68°F)]
Frigid climates	Over 1.22	1.28
Tropical climates	Over 1.18	1.23
Other climates	Over 1.20	1.26

Clean top of battery and terminals with a solution of baking soda and water. Rinse off and dry with compressed air. Top of battery must be clean to prevent current leakage between terminals and from positive terminal to hold-down clamp.

In addition to current leakage, prolonged accumulation of acid and dirt on top of battery may cause blistering of the material covering connector straps and corrosion of straps. After tightening terminals, coat them with petrolatum (vaseline) to protect them from corrosion.

Cautions:

a. If it becomes necessary to start the engine with a booster battery and jumper cables, the booster battery voltage must not exceed 12 volts, or the control unit of the fuel injection system and other electric components will be damaged.

b. If the battery cables are disconnected, they should be tightly clamped to the battery terminals to secure a good contact.

CHECKING AND ADJUSTING IGNITION TIMING

1. Check spark plugs for condition.
2. Thoroughly remove dirt and dust from crank pulley at timing mark location and front cover at timing indicator.
3. Warm up engine sufficiently.
4. Connect engine tachometer and timing light in their proper positions.
5. Adjust idling speed to 800 rpm by turning idle speed adjusting screw on manual transmission models.

   On automatic transmission models, adjust it to about 700 rpm with selector lever in "D" position.

Caution: When selector lever is shifted to "D" position, apply parking brake and block both front and rear wheels with chocks.

6. Check ignition timing with a timing light to ensure that it is adjusted to specifications indicated in the chart below.

	Ignition timing
Manual transmission	10° B.T.D.C./800 rpm
Automatic transmission (in "D" position)	10° B.T.D.C./700 rpm

If necessary, adjust it as follows.

(1) Loosen set screw until distributor can be moved by hand.

(2) Adjust ignition timing to specifications.

(3) Lock distributor set screw, and make sure that timing is correct.

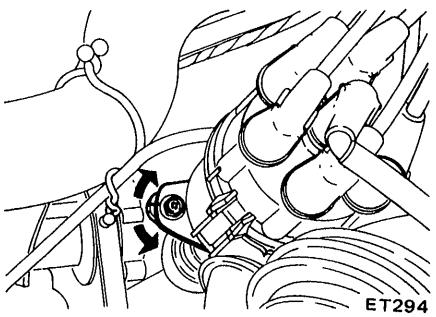


Fig. ET-12 Adjusting ignition timing

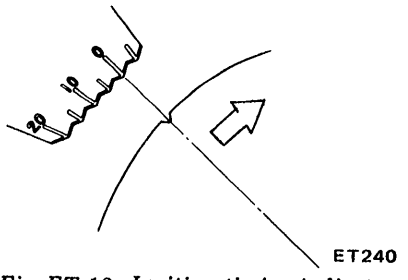


Fig. ET-13 Ignition timing indicator

CHECKING AND REPLACING SPARK PLUGS

1. Remove and clean plugs in a sand blast cleaner. Inspect each spark plug. Make sure that they are of the specified heat range.
2. Inspect insulator for cracks or chips. Check both center and ground electrodes.
3. If they are excessively worn, replace with new spark plugs.

4. Spark plug gap:

For U.S.A.
1.0 to 1.1 mm
(0.039 to 0.043 in)
For Canada
0.7 to 0.8 mm
(0.028 to 0.031 in)
Tightening torque:
1.5 to 2.0 kg-m
(11 to 14 ft-lb)

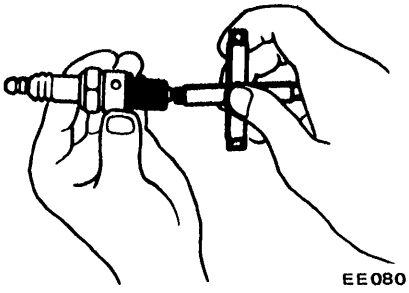


Fig. ET-14 Checking spark plug gap

CHECKING OPERATING PARTS OF DISTRIBUTOR AND IGNITION WIRING

AIR GAP

Standard air gap is 0.2 to 0.4 mm (0.008 to 0.016 in).

If the gap is off the standard, adjustment should be made by loosening pick-up coil screws. Gap gauge is required for adjustment.

Air gap:
0.2 to 0.4 mm
(0.008 to 0.016 in)

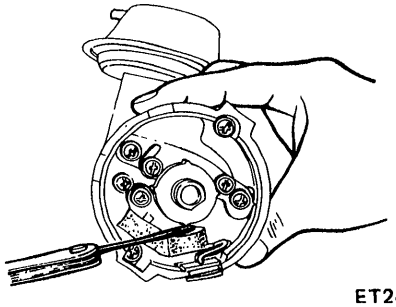


Fig. ET-15 Measuring air gap

Remove rubber cap from tip end of rotor shaft. Check grease and, if necessary, add. To remove pick-up coil, remove two pick-up coil assembly securing screws and core screws clamping primary lead wire. Install new pick-up coil assembly in reverse sequence of removal.

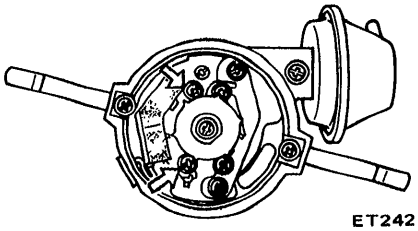


Fig. ET-16 Removing pick-up coil

DISTRIBUTOR

Check the centrifugal mechanical parts for loose connection, sticking of spring, or excessive or local wear.

If found to be in good condition, then check advance characteristics using a distributor tester. For test procedure and reference data, refer to Distributor in Section EE.

If vacuum advance unit fails to operate properly, check the following items and correct as necessary:

1. Check vacuum inlet for leakage at connection. If necessary, retighten or replace.
2. Check vacuum diaphragm for air leak.

If leak is found, replace diaphragm.

3. Inspect breaker plate for smooth operation.

If plate does not move smoothly, this may be caused by sticky steel balls or pivot. Apply grease to steel balls or, if necessary, replace breaker plate as an assembly. Refer to Section EE, Distributor, as regards vacuum advance characteristics.

HIGH TENSION CABLE

Use an ohmmeter to check resistance on high tension cables. Disconnect cables from spark plugs and remove distributor together with high tension cables. Do not remove cables from cap. Connect the ohmmeter between cable terminal on the spark plug side and the corresponding electrode inside cap.

If the resistance is more than 30,000 ohms, remove cable from cap and check the cable resistance only. If resistance is still more than 30,000 ohms, replace cable assembly.

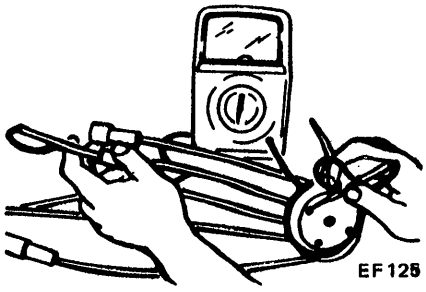


Fig. ET-17 Checking high tension cable

CHECKING DISTRIBUTOR CAP ROTOR

Note: This operation is to be performed while checking distributor points. Inspect distributor cap for cracks and flash over.

External surfaces of all parts of secondary system must be cleaned to reduce possibility of voltage loss. All wires should be removed from distributor cap and coil so that terminals can be inspected and cleaned. Burned or corroded terminals indicate that wires are not fully seated, which causes arcing between end of wire and terminal. When replacing wires at terminal, be sure they are fully seated before pushing rubber nipple down over tower. Check distributor rotor for damage, and distributor cap for cracks.

Apply grease through the top of distributor shaft.

CHECKING ENGINE IDLE RPM AND MIXTURE RATIO

Cautions:

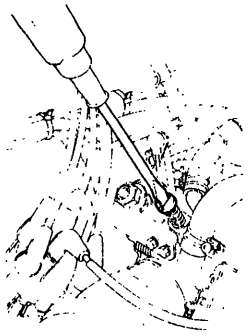
a. **On automatic transmission models, checks should be performed with the lever shifted to the "D" position. Be sure to engage parking brake and to lock both front and rear wheels with wheel chocks.**
b. **Depress brake pedal while accelerating the engine to prevent forward surge of car.**
c. **After idle adjustment has been made, shift the lever to the "N" or "P" position and remove wheel chocks.**

Idle mixture inspection requires the use of a CO-meter. Before attempting to check idle mixture ratio, it is essential to have the meter thoroughly warmed up and calibrated.

1. Warm-up engine until water temperature gauge registers operating temperature.
2. Race engine (1,500 to 2,000 rpm) two or three times under no load, then idle engine for one minute.
3. Check idle speed. If necessary, adjust it to specifications.

Engine speed:
Manual transmission:
800 rpm
Automatic transmission (in "D" position):
700 rpm

4. Check ignition timing. If necessary, adjust it to specifications.



ET295

Fig. ET-18 Adjusting idling speed

	Ignition timing
Manual transmission	10° B.T.D.C./800 rpm
Automatic transmission (in "D" position)	10° B.T.D.C./700 rpm

5. Check CO percentage with CO meter. Specified CO percentage is as follows:

Idle mixture ratio (CO percentage)
California models:
CO = 0.5% max.
Non-California models:
CO = 1.0% max.

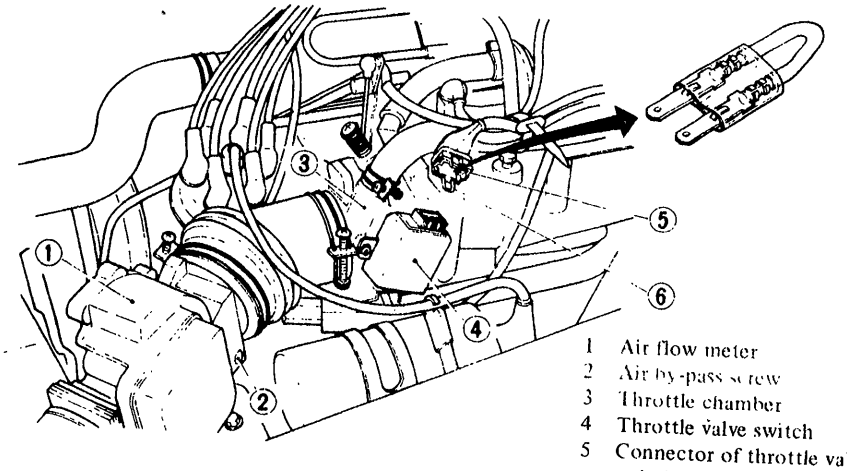
Note: When checking idle mixture ratio (CO percentage), make sure that the following parts are in good order.

- **Battery**
- **Ignition system**
- **Engine oil and coolant levels**
- **Fuses**
- **E.F.I. unit**
- **E.F.I. harness connectors**
- **Hoses**
- **Oil filler cap and oil level gauge**
- **Valve clearance, engine compression**

If specified idle CO percentage is not obtained, adjust as follows:

6. Idle Mixture Setting Procedure (Idle mixture ratio adjustment)

Note: The idle mixture ratio of electronic fuel injection car is set so lean that it is not appropriate to use CO% as an indicator of mixture ratio. Therefore, in order to adjust idle mixture ratio with conventional CO analyzer, a certain amount of enrichment must be temporarily given to idle mixture setting to make it richer.
To enrich the idle mixture, the full load enrichment is forced to function by making a short circuit in that enrichment circuit. The actual procedure to be followed is illustrated below.



1 Air flow meter
2 Air by-pass screw
3 Throttle chamber
4 Throttle valve switch
5 Connector of throttle valve switch harness
6 Leading wire

ET362

Fig. ET-19 Idle mixture ratio adjustment

(1) Remove connector of throttle valve switch harness.
(2) Insert a leading wire to the terminal of connectors ③ and ⑱

Note: When adjusting idle CO percentage at altitudes 750 m (2,500 ft) or more for California models, be sure to disconnect altitude switch connector. Refer to pages EF-15 and EF-64.

(3) Adjust idle CO to the altitude specifications by turning air by-pass screw.

Notes:
a. **Remove plastic blind plug from air by-pass screw of air flow meter.**
b. **Turn air by-pass screw clockwise to obtain rich mixture; turn it counterclockwise to obtain lean mixture.**

Idle CO specifications: (full enrichment)

Altitude	Idle CO % (full enrichment)
0 to 600 m (0 to 2,000 ft)	3.3%
600 to 1,200 m (2,000 to 4,000 ft)	4.7%
1,200 to 1,800 m (4,000 to 6,000 ft)	5.7%
Above 1,800 m (6,000 ft)	6.7%

(4) Remove the leading wire and connect the harness back to the throttle valve switch.

Note: After adjusting idle CO percentage for California models, replace altitude switch connector in its original position.

(5) Install a new rubber plug (furnished as a service part) on air flow meter.

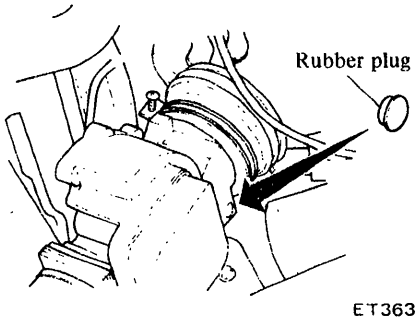


Fig. ET-20 Rubber plug

(6) Check CO percentage if it is within specifications.

Idle mixture ratio (CO percentage):
California models:
CO = 0.5% max.
Non-California models:
CO = 1.0% max.

DASHPOT ADJUSTMENT (Manual transmission models only)

Make sure that the clearance between idle setscrew (preset at the factory) and throttle lever is 1.9 mm (0.0748 in). Use shim(s) or suitable gauge to measure the clearance. A clearance of 1.9 mm (0.0748 in) between these two points corresponds to 2,000 engine rpm under no load.

Check that the dashpot rod end closely touches throttle lever when dashpot rod is fully extended (or when no back pressure is present at diaphragm). If necessary, loosen nut (shown by an arrow) and turn dashpot assembly until correct adjustment is made.

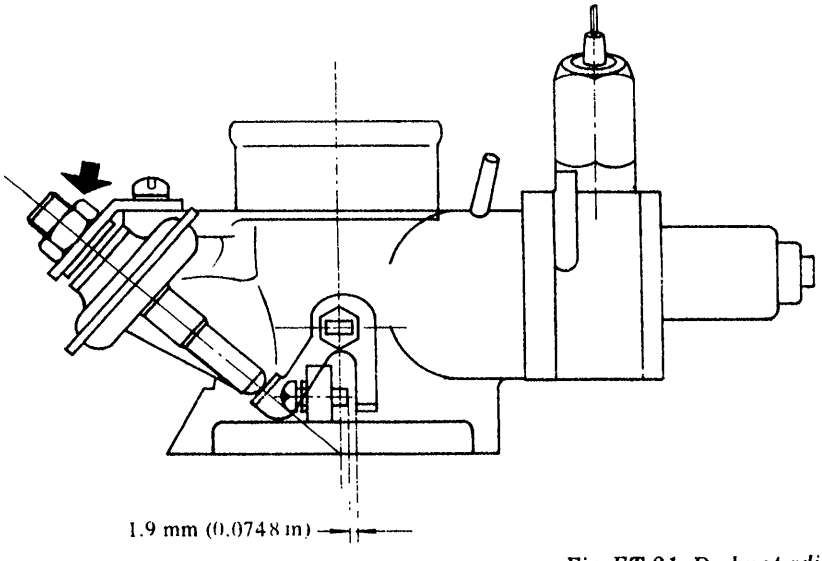


Fig. ET-21 Dashpot adjustment

CHECKING FUEL LINES (HOSES, PIPING CONNECTIONS, ETC.)

Check fuel hoses for leakage, loose connections, cracks or deterioration.

Retighten loose connections and replace any damaged or deformed parts. Replace any rubber fuel hose whose inner surface is deformed, scratched or chafed.

REPLACING FUEL FILTER

The fuel filter is designed especially for use with the electronic fuel injection system. It should be replaced as an assembly every 40,000 km (25,000 miles).

For removal and installation procedures, refer to section "Engine Fuel".

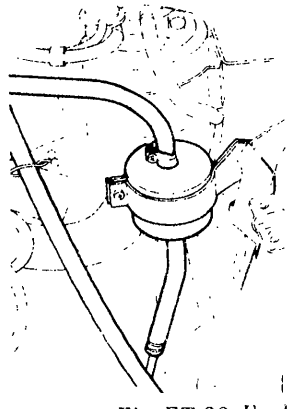


Fig. ET-22 Fuel filter

CHECKING AIR REGULATOR HOSES

Check air regulator hoses for leakage, cracks and deterioration.

Retighten loose connections and replace any parts if they are damaged or deformed.

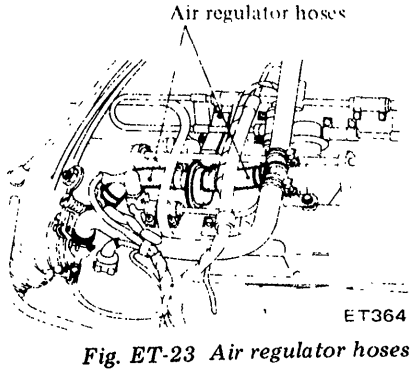


Fig. ET-23 Air regulator hoses

REPLACING AIR CLEANER ELEMENT

The viscous paper type air cleaner element does not require any cleaning operation between renewals.

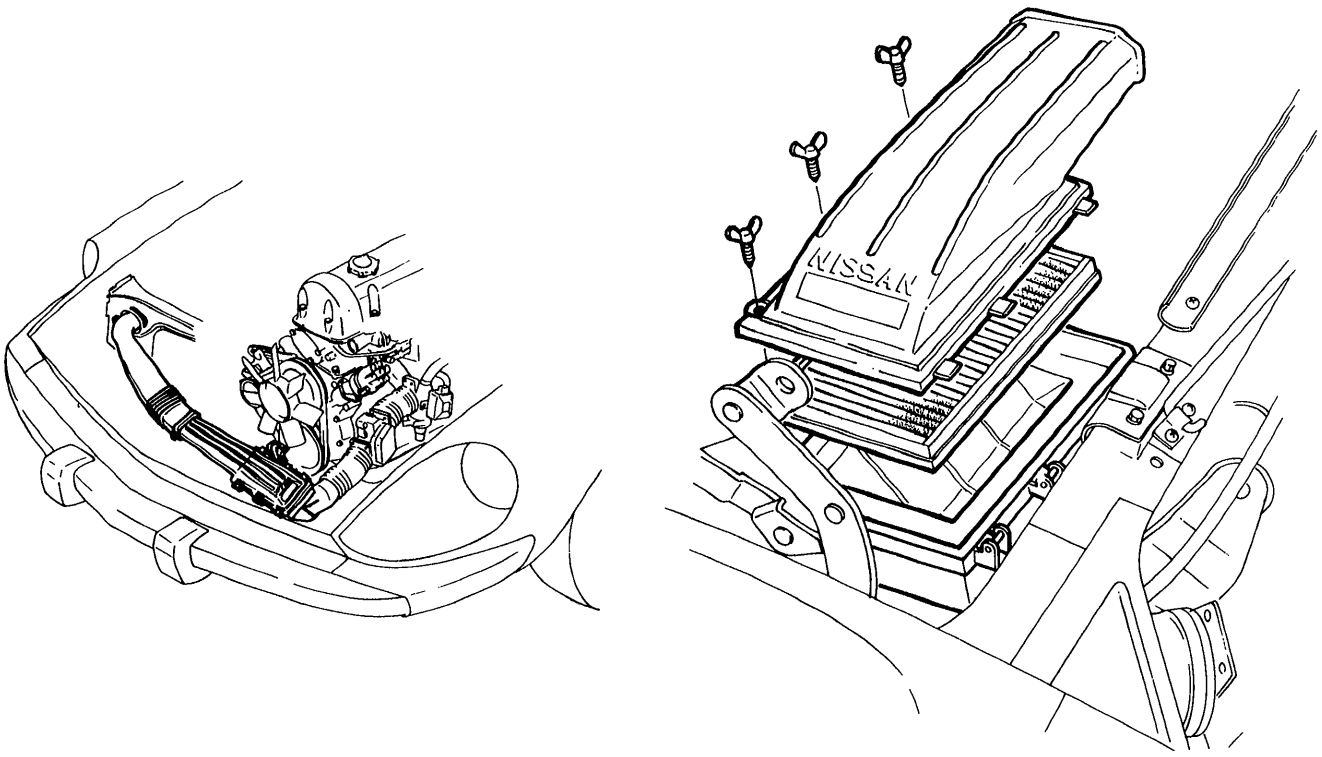
Brushing or blasting operation can cause a clogged element. This in turn reduces air intake efficiency, resulting in poor engine performance.

For replacement intervals of air cleaner element, refer to "Maintenance Schedule".

CHECKING CABLE HARNESS AND CONNECTORS

Check harness connectors for correct insertion and harness connector terminals for deformation or rust.

Replace faulty parts.



EF647

Fig. ET-24 Air cleaner element

EMISSION CONTROL SYSTEM

CONTENTS

CHECKING CRANKCASE EMISSION CONTROL SYSTEM. ET-11
P.C.V. VALVE. ET-11
VENTILATION HOSE. ET-11
CHECKING EVAPORATIVE EMISSION CONTROL SYSTEM. ET-11
FUEL TANK, VAPOR LIQUID SEPARATOR AND VAPOR VENT LINE. . . . ET-11
CARBON CANISTER PURGE CONTROL VALVE ET-12
CARBON CANISTER FILTER. ET-12
FUEL TANK VACUUM RELIEF VALVE . . . ET-12

CHECKING CRANKCASE EMISSION CONTROL SYSTEM

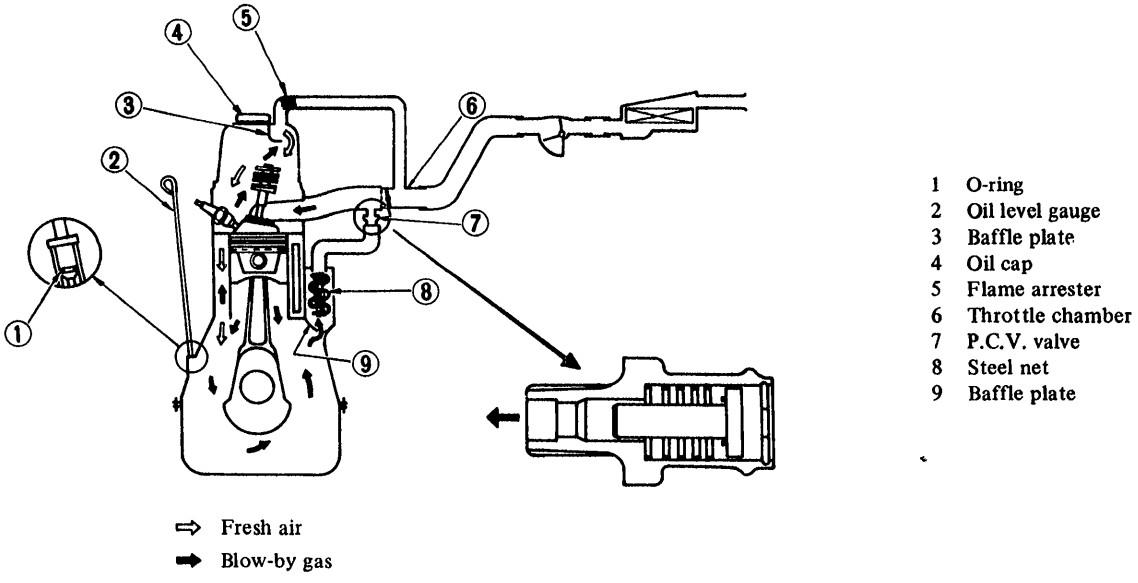


Fig. ET-25 Crankcase emission control system

P.C.V. VALVE

Check P.C.V. valve in accordance with the following method.

With engine running at idle, remove the ventilator hose from P.C.V. valve. If the valve is working, a hissing noise will be heard as air passes through the valve and a strong vacuum should be felt immediately when a finger is placed over valve inlet.

Replace P.C.V. valve in accordance with the maintenance schedule.

VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air.

If any hose cannot be free of obstructions, replace.

Ensure that flame arrester is surely inserted in hose between throttle chamber and rocker cover.

CHECKING EVAPORATIVE EMISSION CONTROL SYSTEM

FUEL TANK, VAPOR LIQUID SEPARATOR AND VAPOR VENT LINE

1. Check all hoses and fuel tank filler cap.
2. Disconnect the vapor vent line connecting carbon canister to vapor-liquid separator.
3. Connect a 3-way connector, a manometer and a cock (or an equivalent 3-way charge cock) to the end of the vent line.
4. Supply fresh air into the vapor vent line through the cock little by little until pressure becomes 368 mmH2O (14.5 inH2O).
5. Shut the cock completely and leave it unattended.
6. After 2.5 minutes, measure the height of the liquid in the manometer.
7. Variation of height should remain with 25 mmH2O (0.98 inH2O).
8. When filler cap does not close completely, the height should drop to zero in a short time.
9. If the height does not drop to zero in a short time when filler cap is removed, it is the cause of a stuffy hose.

Note: In case the vent line is stuffy, the breathing in fuel tank is not thoroughly made, thus causing insufficient delivery of fuel to engine or vapor lock. It must, therefore, be repaired or replaced.

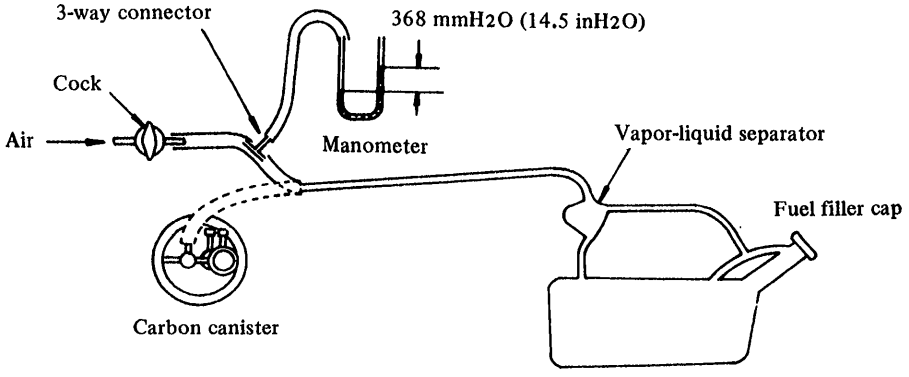


Fig. ET-26 Checking evaporative emission control system

CARBON CANISTER PURGE CONTROL VALVE

Check for fuel vapor leakage in the distributor vacuum line, at diaphragm of carbon canister purge control valve.

To check for leakage, proceed as follows:

1. Disconnect rubber hose, in the line, between T-connector and carbon canister at T-connector.
2. Inhale air into the opening of rubber hose running to vacuum hole in carbon canister and ensure that there is no leak.

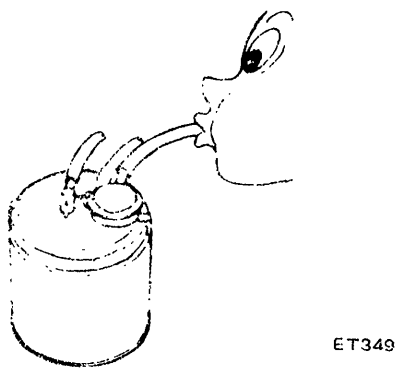
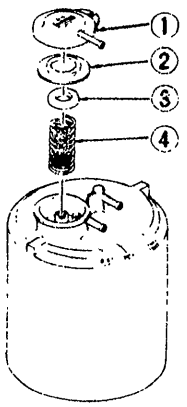


Fig. ET-27 Checking carbon canister purge control valve

3. If there is a leak, remove top cover from purge control valve and check for dislocated or cracked diaphragm. If necessary, replace diaphragm kit (which is made up of a retainer, diaphragm and spring).



1 Cover
2 Diaphragm
3 Retainer
4 Diaphragm spring

ET350

Fig. ET-28 Carbon canister purge control valve

CARBON CANISTER FILTER

Check for a contaminated element. Element can be removed at the bottom of canister installed on car body.

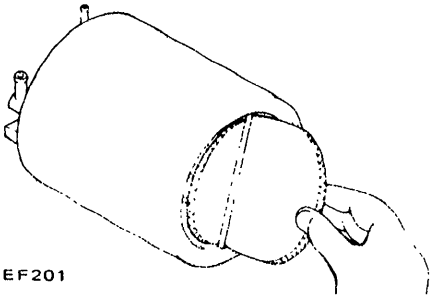


Fig. ET-29 Replacing carbon canister filter

FUEL TANK VACUUM RELIEF VALVE

Remove fuel filler cap and see that it functions properly.

1. Wipe valve housing clean and place it in your mouth.
2. Inhale air. A slight resistance accompanied by valve indicates that valve is in good mechanical condition. Note also that, by further inhaling air the resistance should disappear with valve clicks.
3. If valve is clogged, or if no resistance is felt, replace cap as an assembly.

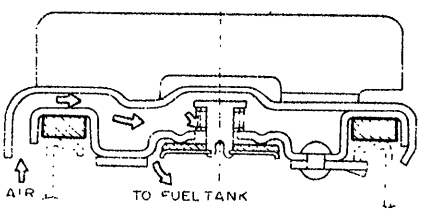


Fig. ET-30 Fuel filler cap

SERVICE DATA AND SPECIFICATIONS

Ignition timing and idling speed			
Manual transmission		degree/rpm	10° B.T.D.C./800
Automatic transmission (in "D" position)		degree/rpm	10° B.T.D.C./700
Valve clearance			
Cold	Intake	mm (in)	0.20 (0.008)
	Exhaust	mm (in)	0.25 (0.010)
Hot	Intake	mm (in)	0.25 (0.010)
	Exhaust	mm (in)	0.30 (0.012)
Belt tension			
Fan and alternator		mm (in)	8 to 12 (0.315 to 0.472)
Air con compressor		mm (in)	8 to 12 (0.315 to 0.472)
Pressure		kg (lb)	10 (22) is applied
Compression pressure at 300 to 400 rpm			
Standard		kg/cm^2 (psi)	12.5 (178)
Minimum		kg/cm^2 (psi)	11.5 (164)
Radiator cap relief pressure		kg/cm^2 (psi)	0.9 (13)
Cooling system			
Leakage testing pressure		kg/cm^2 (psi)	1.6 (23)
Battery specific gravity at 20°C (68°F)			1.26
Distributor			
Air gap		mm (in)	0.2 to 0.4 (0.008 to 0.016)
Spark plug			
Gap		mm (in)	For U.S.A. 1.0 to 1.1 (0.039 to 0.043) For Canada 0.7 to 0.8 (0.028 to 0.031)
Checking "CO" percentage at idling speed			
California models		%	0.5 max.
Non-California models		%	1.0 max.
Dash pot			
Setting engine speed		rpm	2,000
Tightening torque			
Cylinder head bolts			
1st turn		kg-m (ft-lb)	4.0 (29)
2nd turn		kg-m (ft-lb)	6.0 (43)
3rd turn		kg-m (ft-lb)	7.0 to 8.5 (51 to 61)
Manifold nuts		kg-m (ft-lb)	8 mm (0.315 in) dia. bolt; 1.4 to 1.8 (10.1 to 13.0) 10 mm (0.394 in) dia. bolt; 3.5 to 5.0 (25 to 36)
Throttle chamber securing bolts		kg-m (ft-lb)	1.5 to 2.0 (11 to 14)
Spark plugs		kg-m (ft-lb)	1.5 to 2.0 (11 to 14)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
CANNOT CRANK ENGINE OR SLOW CRANKING	Improper grade oil.	Replace with proper grade oil.
	Partially discharged battery.	Charge battery.
	Malfunctioning battery.	Replace.
	Loose fan belt.	Adjust.
	Trouble in charge system.	Inspect.
	Wiring connection trouble in starting circuit.	Correct.
	Malfunctioning ignition switch.	Repair or replace.
	Malfunctioning starter motor.	Repair or replace.

(Trouble-shooting procedure on starting circuit)
Switch on the starting motor with head lights "ON".

When head lights go off or dim considerably,

a. Check battery.
b. Check connection and cable.
c. Check starter motor.

When head lights stay bright,

a. Check wiring connection between battery and starter motor.
b Check ignition switch.
c. Check starter motor.

ENGINE WILL CRANK NORMALLY BUT WILL NOT START

In this case, the following trouble causes may exist, but in many cases ignition system or fuel system is in trouble.

Ignition system in trouble
Fuel system in trouble
Valve mechanism does not work properly
Low compression

(Trouble-shooting procedure)
Check spark plug firstly by following procedure.
Disconnect high tension cable from one spark plug and hold it about 10 mm (0.39 in) from the engine metal part and crank the engine.

Good spark occurs.

a. Check spark plug.
b. Check ignition timing.
c. Check fuel system.
d. Check revolution trigger signal.
e. Check cylinder compression.

No spark occurs. Very high current. Check the current flow in primary circuit.
Inspect primary circuit for short.
Check distributor pick-up coil operation.
Check transistor ignition system.

Condition	Probable cause	Corrective action
	Low or no current.	Check for loose terminal or disconnection in primary circuit. Check for burned points.
Ignition system in trouble	Malfunctioning distributor pick-up coil.	
	Improper air gap.	Adjust.
	Leak at rotor cap and rotor.	Clean or replace.
	Malfunctioning spark plug.	Clean, adjust plug gap or replace.
	Improper ignition timing.	Adjust.
	Malfunctioning ignition coil.	Replace.
	Disconnection of high tension cable.	Replace.
	Loose connection or disconnection in primary circuit.	Repair or replace.
	Irregular revolution trigger pulse.	Replace transistor ignition control unit.
	Malfunctioning full transistor ignition unit.	Replace.
ENGINE CRANKS NORMALLY BUT WILL NOT START		
Fuel system malfunction	Lack of fuel.	Supply.
	Damaged electronic fuel injection harness or relay.	Replace.
	Malfunctioning fuel pump (Listen to operating sound).	Replace.
	Damaged control unit.	Replace.
	Seized injector (Listen to operating sound).	Replace.
	Seized cold start valve.	Replace.
	Malfunctioning air flow meter.	Replace.
	Damaged water temp. sensor.	Replace.
		For inspection procedures for electronic fuel injection system components, refer to engine fuel section.
	Malfunctioning pressure regulator.	Replace.
	Dirty fuel strainer.	Replace.
	Dirty or clogged fuel pipe.	Clean.
	Clogged fuel tank breather pipe.	Repair and clean.
Low compression	Incorrect spark plug tightening or damaged gasket.	Tighten to normal torque or replace gasket.
	Improper grade engine oil or low viscosity.	Replace with proper grade oil.
	Incorrect valve clearance.	Adjust.
	Compression leak from valve seat.	Remove cylinder head and lap valves.
	Sticky valve stem.	Correct or replace valve and valve guide.
	Weak or damaged valve springs.	Replace valve springs.
	Compression leak at cylinder head gasket.	Replace gasket.

Condition	Probable cause	Corrective action
Low compression	Sticking or defective piston ring.	Replace piston rings.
	Worn piston ring or cylinder.	Overhaul engine.
	(Trouble shooting procedure) Pour the engine oil from plug hole, and then measure cylinder compression.	
	Compression increases.	Trouble in cylinder or piston ring.
	Compression does not change.	Compression leaks from valve, cylinder head or head gasket.
UNSTABLE ENGINE IDLING		
Ignition system	Incorrect idle adjustment	Adjust.
	Malfunctioning ignition system (spark plug, high tension cable, air gap, full transistor ignition unit, ignition coil, etc.)	Replace.
	Incorrect basic ignition timing.	Adjust.
Engine mechanical system in trouble	Loose manifold and cylinder head bolts.	Retighten bolts.
	Incorrect valve clearance.	Adjust.
Fuel system malfunction	Clogged air cleaner filter.	Replace element.
	Damaged manifold gaskets.	Replace gasket.
	Intake air leakage at following points: Dipstick Oil filler cap Blow-by hoses Intake air duct–air flow meter to throttle chamber.	Repair or replace.
	Damaged electronic fuel injection harness.	Replace.
	Seized injector (Listen to operating sound).	Replace.
	Malfunctioning air regulator (During warm-up driving only)	Replace.
	Damaged control unit.	Replace.
	Damaged water and air temp. sensor.	Replace.
	Malfunctioning throttle valve switch.	Repair or replace.
	Damaged altitude switch.	Replace.
	Irregular fuel pressure.	Replace pressure regulator.
		For inspection procedures for electronic fuel injection system components, refer to Engine Fuel Section.
Others	Malfunctioning E.G.R. control valve.	Clean or replace.
HIGH ENGINE IDLE SPEED	Dragged accelerator linkage.	Check and correct accelerator linkage.
	Malfunctioning B.C.D.D. system.	If engine idling speed rises above 1,800 to 2,000 rpm, the cause may be a malfunctioning B.C.D.D. system. Check B.C.D.D. system. Repair or replace if necessary.
	Malfunctioning air regulator.	Replace. For inspection procedures for air regulator, refer to engine fuel section.

Condition	Probable cause	Corrective action
HIGH ENGINE IDLE SPEED	Incorrect adjustment of idle speed adjusting screw.	Correct. For inspection procedures, refer to throttle chamber section.
ENGINE POWER NOT UP TO NORMAL		
Low compression		Previously mentioned.
Ignition system in trouble	Incorrect ignition timing.	Adjust.
	Malfunctioning spark plugs.	Clean, adjust or replace plugs.
	Malfunctioning distributor pick-up coil.	Dress, or replace points. Also check condenser.
ENGINE POWER BELOW NORMAL		
Fuel system malfunction	Throttle valve does not open fully.	Adjust. } For inspection procedures for electronic fuel injection system components, refer to Engine Fuel Section.
	Damaged electronic fuel injection harness.	Replace.
	Seized injector (Listen to operating sound).	Replace.
	Malfunctioning air flow meter.	Replace.
	Malfunctioning throttle valve switch.	Repair or replace.
	Irregular fuel pressure.	Replace pressure regulator if necessary.
	Clogged fuel pipe.	Replace if necessary.
	Dirty or clogged fuel strainer.	Replace.
	Fuel pump will not work properly.	Replace.
Air intake system malfunction	Clogged air cleaner.	Replace element.
	Air leaking from manifold gasket.	Replace gasket.
	Intake air leakage at following points: Dipstick Oil filler cap Blow-by hoses Intake air duct–air flow meter to throttle chamber etc.	Repair or replace.
Overheating	Insufficient coolant.	Replenish.
	Loose fan belt.	Adjust fan belt.
	Worn or damaged fan belt.	Replace.
	Malfunctioning thermostat.	Replace.
	Malfunctioning water pump.	Replace.
	Clogged or leaky radiator.	Flush, repair or replace.
	Malfunctioning radiator filler cap.	Replace.
	Air in cooling system.	Retighten each part of cooling system.
	Improper engine oil grade.	Replace with proper grade oil.
	Incorrect ignition timing.	Adjust.

Condition	Probable cause	Corrective action
Overcooling	Malfunctioning thermostat.	Replace.
Others	Improper octane fuel.	Replace with specified octane fuel.
	Improper tire pressure.	Inflate to specified pressure.
	Dragging brake.	Adjust.
	Clutch slipping.	Adjust.
NOISY ENGINE		
Car knocking	Overloaded engine.	Use right gear in driving.
	Carbon knocking.	Disassemble cylinder head and remove carbon.
	Timing knocking.	Adjust ignition timing.
	Fuel knocking.	Use specified octane fuel.
	Preignition (misusing of spark plug).	Use specified spark plug.
Mechanical knocking		
Crankshaft bearing knocking.	This strong dull noise increases when engine is accelerated. To locate the place, cause a misfire on each cylinder. If the noise stops by the misfire, this cylinder generates the noise.	This is caused by worn or damaged bearings, or unevenly worn crankshaft. Renew bearings and adjust or change crankshaft. Check lubrication system.
Connecting rod bearing knocking.	This is a little higher-pitched noise than the crankshaft knocking, and also increases when engine is accelerated. Cause a misfire on each cylinder and if the noise diminishes almost completely, this crankshaft bearing generates the noise.	Same as the case of crankshaft bearings.
Piston and cylinder noise.	When you hear an overlapping metallic noise which increases its magnitude with the revolution of engine and which decreases as engine is warmed up, this noise is caused by piston and cylinder. To locate the place, cause a misfire on each cylinder.	This may cause an abnormal wearing of cylinder and lower compression which in turn will cause a lower out-put power and excessive consumption of oil. Overhaul engine.
Piston pin noise.	This noise is heared at each highest and lowest dead end of piston. To locate the place, cause a misfire on each cylinder.	This may cause a wear on piston pin, or piston pin hole. Renew piston and piston pin assembly.
Water pump noise.	This noise may be caused by worn or damaged bearings, or by the uneven surface of sliding parts.	Replace water pump with a new one.
Others.	An improper adjustment of valve clearance.	Adjust.
	Noise of timing chain.	Adjust the tension of chain.
	An excessive end-play on crankshaft.	Disassemble engine and renew main bearing.

Condition	Probable cause	Corrective action
Others.	**Note; This noise will be heared when clutch is disengaged.**	
	Wear on clutch pilot bushing.	Renew bushing and adjust drive shaft.
	Note: This noise will be heared when clutch is disengaged.	
ABNORMAL COMBUSTION (backfire, after fire run-on etc.)		
Improper ignition timing	Improper ignition timing.	Adjust ignition timing.
	Improper heat range of spark plugs.	Use specified spark plugs.
Fuel stem malfunction	Intake air leakage at following points: Dipstick Oil filler cap Blow-by hoses Intake air duct–air flow meter to throttle chamber etc.	Repair or replace.
	Damaged electronic fuel injection harness.	Replace. } For inspection procedures for electronic fuel injection system components, refer to Engine Fuel Section.
	Damaged control unit.	Replace.
	Malfunctioning air flow meter.	Replace.
	Damaged water temp. sensor.	Replace.
	Damaged altitude switch.	Replace.
Defective cylinder head, etc.	Improperly adjusted valve clearance.	Adjust.
	Excess carbon in combustion chamber.	Remove head and get rid of carbon.
	Damaged valve spring (backfire, after fire).	Replace it with a new one.
Others		Check for loose vacuum hoses. Replace if necessary.
	Malfunctioning E.G.R. control valve.	Replace.
EXCESSIVE OIL CONSUMPTION		
Oil leakage	Loose oil drain plug.	Tighten it.
	Loose or damaged oil pan gasket.	Renew gasket or tighten it.
	Loose or damaged chain cover gasket.	Renew gasket or tighten it.
	Damaged oil seal in front and rear of crankshaft.	Renew oil seal.
	Loose or damaged locker cover gasket.	Renew gasket or tighten it (but not too much).
	Improper tightening of oil filter.	Renew gasket and tighten it with the proper torque.
	Loose or damaged oil pressure switch.	Renew oil pressure switch or tighten it.

Condition	Probable cause	Corrective action
Excessive oil consumption	Cylinder and piston wear.	Overhaul cylinder and renew piston.
	Improper location of piston ring or reversely assembled piston ring.	Remount piston rings.
	Damaged piston rings.	Renew rings.
	Worn piston ring groove and ring.	Repair or renew piston and cylinder.
	Fatigue of valve oil seal lip.	Renew piston and piston ring.
	Worn valve stem.	Replace seal lip with a new one.
		Renew valve or guide.
Others	Inadequate quality of engine oil.	Use the designated oil.
	Engine overheat.	Previously mentioned.
POOR FUEL ECONOMY		
Ignition system		
See the explanation of the power decrease		
Others	Exceeding idling revolution.	Adjust it to the designated rpm.
		Repair or tighten the connection of fuel pipes.
Emission control system	Malfunctioning E.G.R. system.	Replace.
Fuel system malfunction	Fuel leakage.	Repair or replace.
	Damaged electronic fuel injection harness.	Replace.
	Damaged control unit.	Replace.
	Malfunctioning air flow meter.	Replace.
	Damaged air temperature sensor.	Replace.
	Malfunctioning throttle valve switch.	Replace.
		For inspection procedures for electronic fuel injection system components, refer to Engine Fuel Section.
	Fuel leakage at injector or cold start valve.	Replace damaged part.
	Fuel leakage at rubber fuel hose.	Repair or replace.
	Irregular fuel pressure.	Replace pressure regulator if necessary.
TROUBLE IN OTHER FUNCTIONS		
Decreased oil pressure	Inadequate oil quality.	Use the designated oil.
	Overheat.	Previously mentioned.
	Malfunctioning oil pump regulator valve.	Disassemble oil pump and repair or renew it.
	Functional deterioration of oil pump.	Repair or replace it with a new one.
	Blocked oil filter.	Renew it.

Condition	Probable cause	Corrective action
Decreased oil pressure	Increased clearance in various sliding parts.	Disassemble and replace the worn parts with new ones.
	Blocked oil strainer.	Clean it.
	Malfunctioning oil gauge pressure switch.	Replace it with a new one.
Excessive wear on the sliding parts	Oil pressure decreases.	Previously mentioned.
	Damaged quality or contamination of oil.	Exchange the oil with proper one and change element.
	Air leakage from air intake duct.	Repair or replace.
	Damaged air cleaner.	Change element.
	Overheat or overcool.	Previously mentioned.
	Improper fuel mixture.	Check the fuel system.
Scuffing of sliding parts	Decrease of oil pressure.	Previously mentioned.
	Insufficient clearances.	Readjust to the designated clearances.
	Overheat.	Previously mentioned.
	Improper fuel mixture.	Check the fuel system.