SERVICE MANUAL

DATSUN 280Z
MODEL S30 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

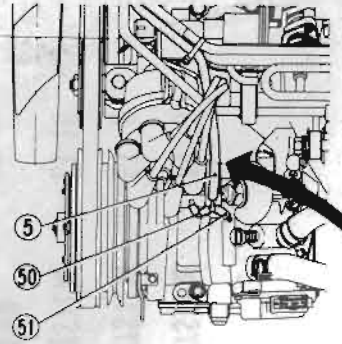
SECTION ET

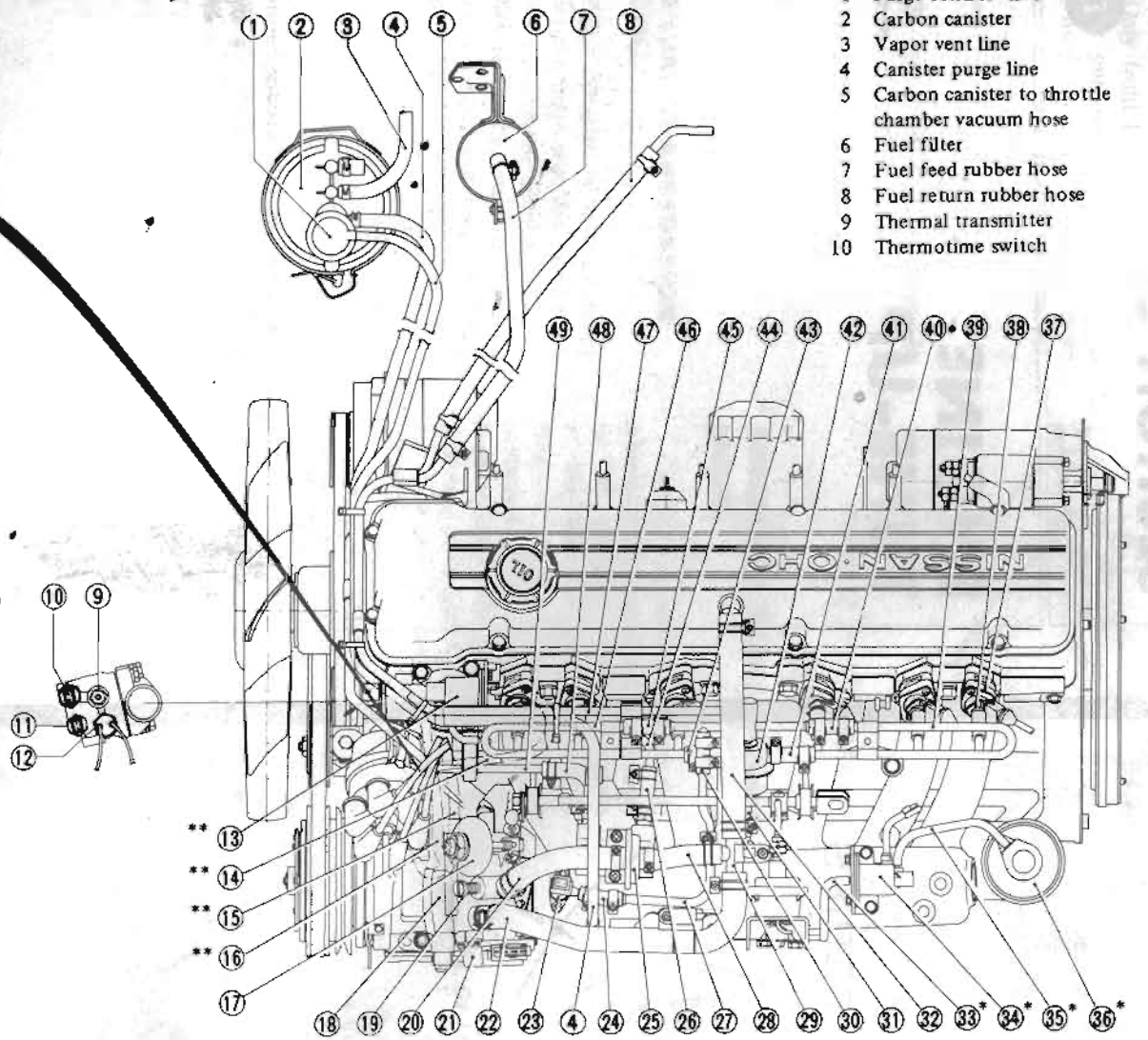
ET

ENGINE TUNE-UP

BASIC MECHANICAL SYSTEM ..... ET- 3
IGNITION AND FUEL SYSTEM ..... ET- 5
EMISSION CONTROL SYSTEM ET-10
TROUBLE DIAGNOSES AND CORRECTIONS ET-30

All except Non-California manual transmission models





1 Purge control valve
2 Carbon canister
3 Vapor vent line
4 Canister purge line
5 Carbon canister to throttle chamber 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 Water temperature switch
**13 Vacuum switching valve
**14 Vacuum switching valve to 3-way connector vacuum hose
**15 Vacuum switching valve to distributor vacuum hose
**16 3-way connector to throttle chamber vacuum hose
17 Anti-stall dash pot (Manual Transmission only)
18 Throttle chamber
19 Idle speed adjusting screw
20 Throttle chamber to air regulator rubber hose
21 Throttle valve switch
22 Throttle chamber to 3-way connector rubber hose
23 Cold start valve
24 Cold start valve to fuel pipe D rubber hose
25 Air regulator
26 Heater housing to water pipe rubber hose
27 Fuel pipe D
28 Air regulator to 3-way connector rubber hose
29 3-way connector
30 Fuel pipe D to fuel pipe A rubber hose
31 Pressure regulator to intake manifold vacuum hose
32 3-way connector to rocker cover rubber hose
*33 E.G.R. solenoid valve to throttle chamber vacuum hose
*34 E.G.R. solenoid valve
*35 E.G.R. control valve to E.G.R. solenoid valve vacuum hose
*36 E.G.R. control valve
37 Injector holder
38 Injector
39 Fuel pipe C
40 Fuel pipe A to fuel pipe C rubber hose
41 Pressure regulator to fuel pipe C rubber hose
42 Pressure regulator
43 Pressure regulator to fuel pipe B rubber hose
44 Rubber hose to water pipe
45 Fuel pipe A to fuel pipe B rubber hose
46 Fuel pipe B
47 Fuel pipe A
48 Heater housing to water pipe rubber hose
49 Rubber hose to cylinder head water pipe
50 3-way connector to distributor vacuum hose
51 3-way connector to throttle chamber vacuum hose

* California models only
**Non-California Manual Transmission models only

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Fig. ET-1 L28 engine system piping

BASIC MECHANICAL SYSTEM

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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.

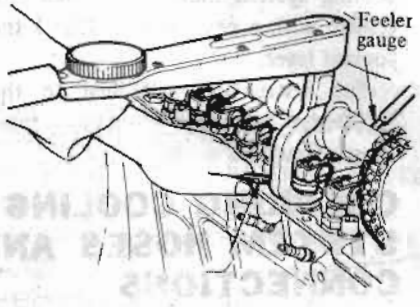
After adjustment, tighten pivot nut securely with special tool, and recheck the clearance.

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 (0.0079)
	Exhaust	0.25 (0.0098)
Warm	Intake	0.25 (0.0098)
	Exhaust	0.30 (0.0118)



ET235

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.

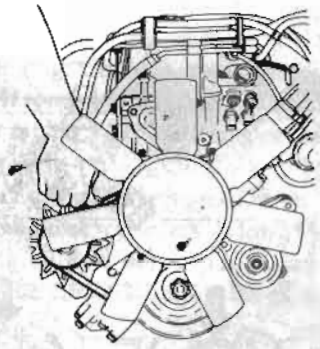


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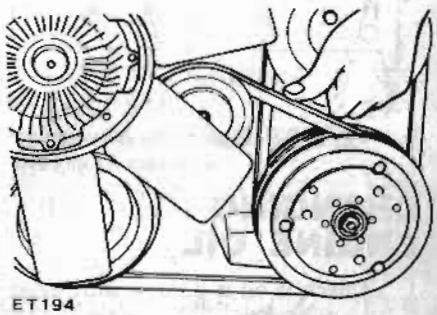
Fig. ET-3 Fan belt tension

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

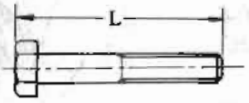
Fig. ET-4 Cooler compressor belt tensio

RETIGHTENING CYLINDER HEAD BOLTS, MANIFOLD NUTS AND CARBURETOR SECURING NUTS

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:
  - 6.5 to 8.5 kg-m
  - (47 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)

There are two types of 10M bolts as shown in Figure EM-111. When installing, do not confuse them.

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



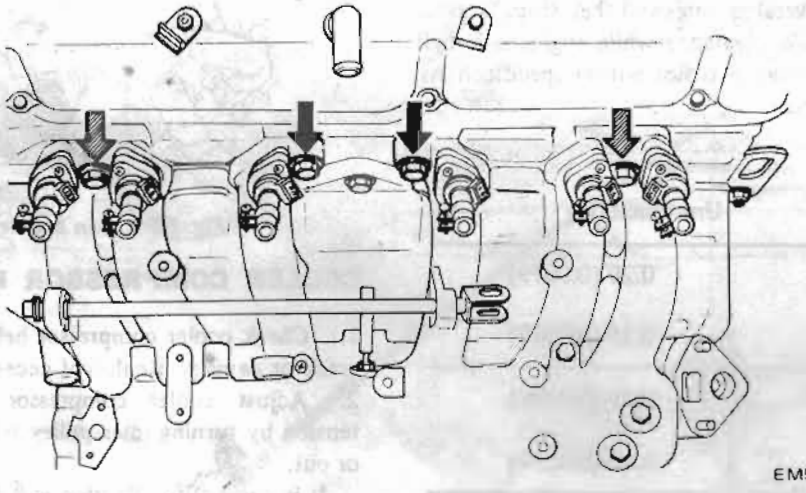


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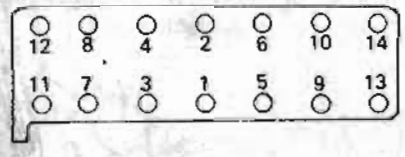
Fig. ET-5



EM269

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, 4⅛ Imp qt)
- Minimum (L level)
  - 3.7 ℓ (3⅞ US qt, 3¼ 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.

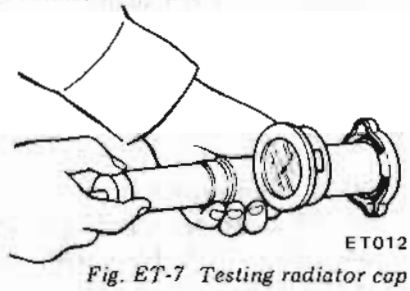


Fig. ET-7 Testing radiator cap

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):
10.4 ℓ (11 U.S. qt., 9⅛ Imp. qt.)

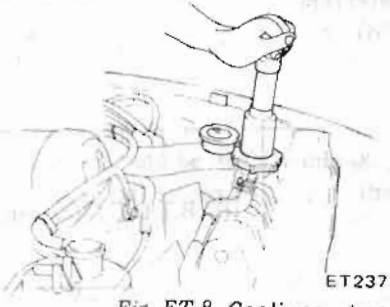


Fig. ET-8 Cooling system pressure test

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 and choke valves 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.

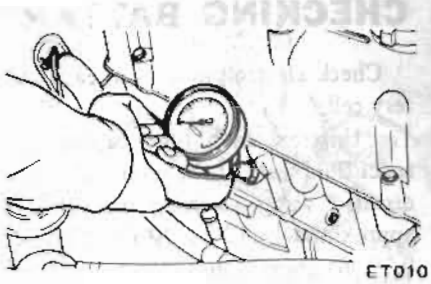


Fig. ET-9 Testing compression pressure

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)

IGNITION AND FUEL SYSTEM

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CHECKING BATTERY

Check electrolyte level in each battery cell.

1. Unscrew each filler cap and inspect fluid level. If the level is low, add distilled water to bring the level up approximately 10 to 20 mm (0.39 to 0.79 in) above plates. Do not overfill.
2. Measure the specific gravity of battery electrolyte.

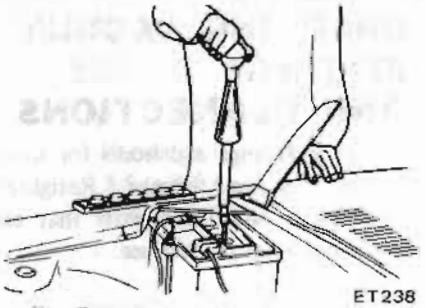

Fig. ET-10 Checking specific gravity of battery electrolyte

	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 and distributor breaker points 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" range.

Caution: When selector lever is shifted to "D" range, 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	
	Non-California model	California model
Manual transmission	7° B.T.D.C./800 rpm (Retarded) 13° B.T.D.C./800 rpm (Advanced) *	10° B.T.D.C./800 rpm
Automatic transmission (in "D" range)	7° B.T.D.C./700 rpm (Retarded) 13° B.T.D.C./700 rpm (Advanced)	10° B.T.D.C./700 rpm

*: After engine warming up, ignition timing is retarded. Advanced ignition timing adjustment is necessary only when adjusting phase difference.

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.

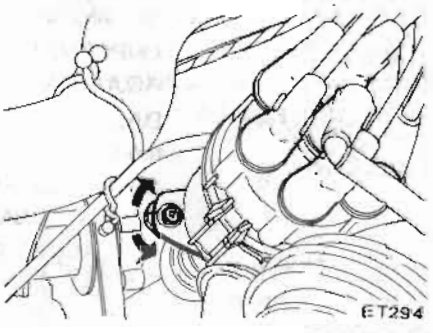

Fig. ET-11 Adjusting ignition timing

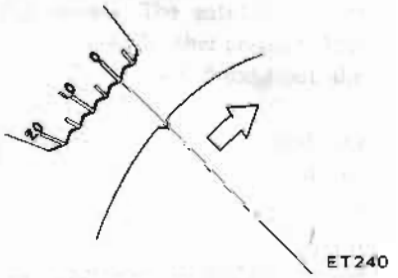

Fig. ET-12 Ignition timing indicator

CHECKING AND REPLACING SPARK PLUGS

Remove and clean plugs in a sand blast cleaner. Inspect each spark plug. Make sure that they are of the specified heat range. Inspect insulator for cracks or chips. Check both center and ground electrodes. If they are exces-

sively worn, replace with new spark plugs. File center electrode flat. Set the gap to 0.8 to 0.9 mm (0.031 to 0.035 in) using the proper adjusting tool. Tighten plugs to 1.5 to 2.0 kg-m (11 to 14 ft-lb) torque.

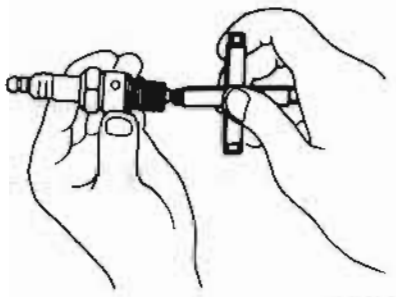

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Fig. ET-13 Checking spark plug gap

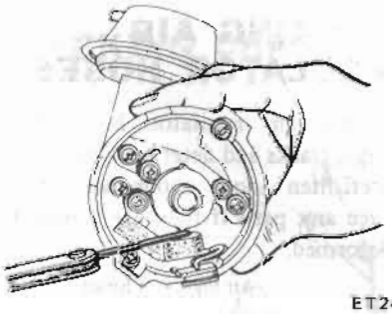
CHECKING OPERATING PARTS OF DISTRIBUTOR AND IGNITION WIRING

AIR GAP

Standard air gap is 0.2 to 0.4 mm (0.008 to 0.016 in) (both single gap and dual gap distributors).

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

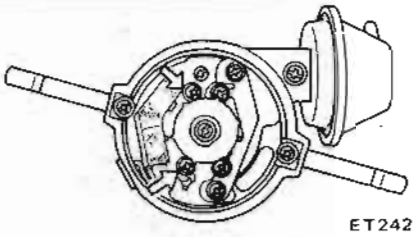
Air gap:
0.2 to 0.4 mm
(0.008 to 0.016 in)



ET241

Fig. ET-14 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.



ET242

Fig. ET-15 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.

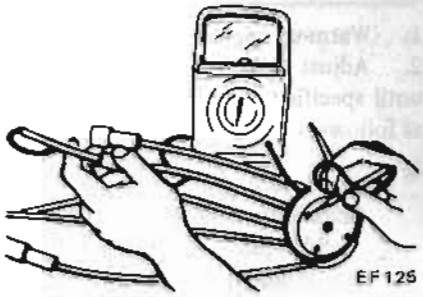
3. Inspect breaker plate for smooth operation.

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.



EF125

Fig. ET-16 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.

ADJUSTING ENGINE IDLE RPM

As the electronic fuel injection system is used in the engine, air-fuel mixture ratio adjustment cannot be made. Consequently, measurement of CO percentage is not necessary when making idle adjustment.

Cautions:

a. **On automatic transmission models, checks should be performed with the lever shifted to the "D" range. 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" range and remove wheel chocks.**

1. Warm-up engine sufficiently.
2. Adjust idle speed adjusting screw until specified engine speed is reached as follows:

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

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

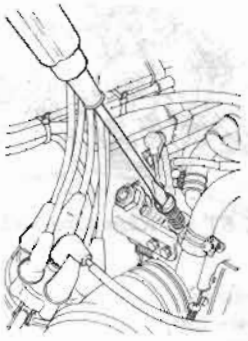


Fig. ET-17 Adjusting idling speed

	Ignition timing	
	Non-California model	California model
Manual transmission	7° B.T.D.C./800 rpm (Retarded) 13° B.T.D.C./800 rpm (Advanced) *	10° B.T.D.C./800 rpm
Automatic transmission (in "D" range)	7° B.T.D.C./700 rpm (Retarded) 13° B.T.D.C./700 rpm (Advanced) *	10° B.T.D.C./700 rpm

*: After engine warming up, ignition timing is retarded. Advanced ignition timing adjustment is necessary only when adjusting phase difference.

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.

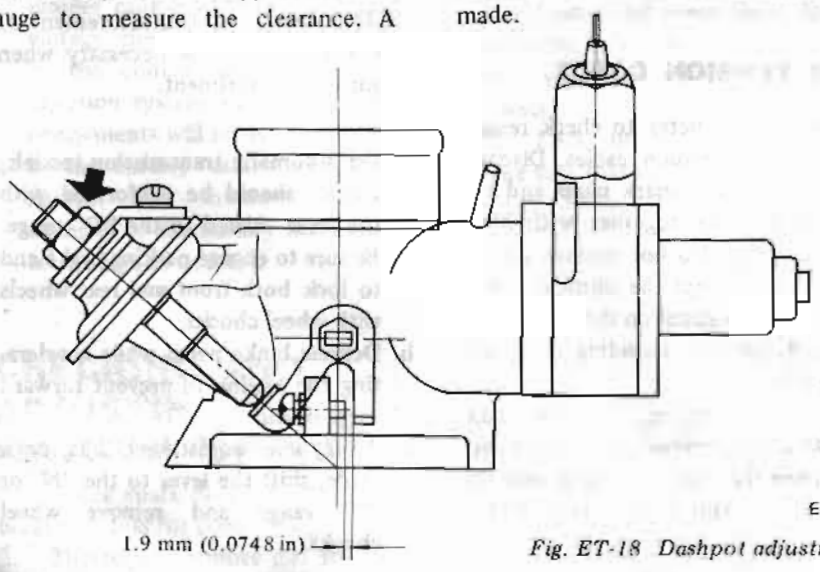


Fig. ET-18 Dashpot adjustment

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".

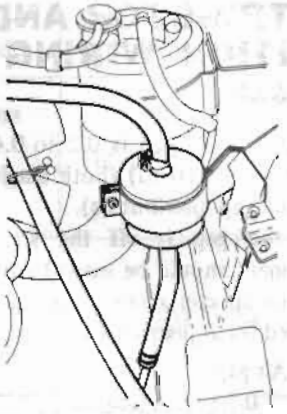


Fig. ET-19 Fuel filter

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.

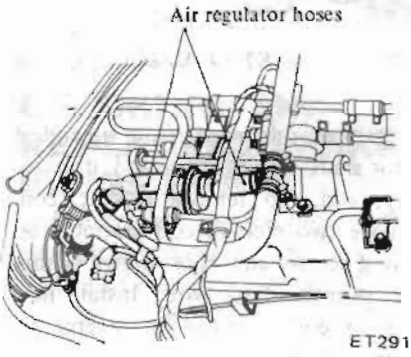


Fig. ET-20 Air regulator hoses

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"

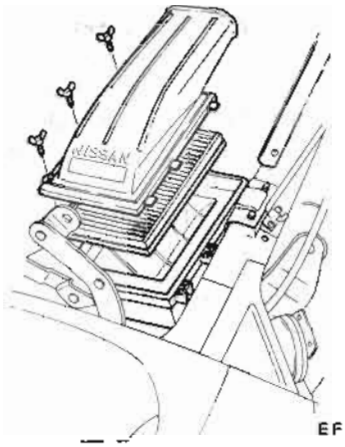


Fig. ET-21 Air cleaner element

EMISSION CONTROL SYSTEM

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CHECKING CRANKCASE EMISSION CONTROL SYSTEM

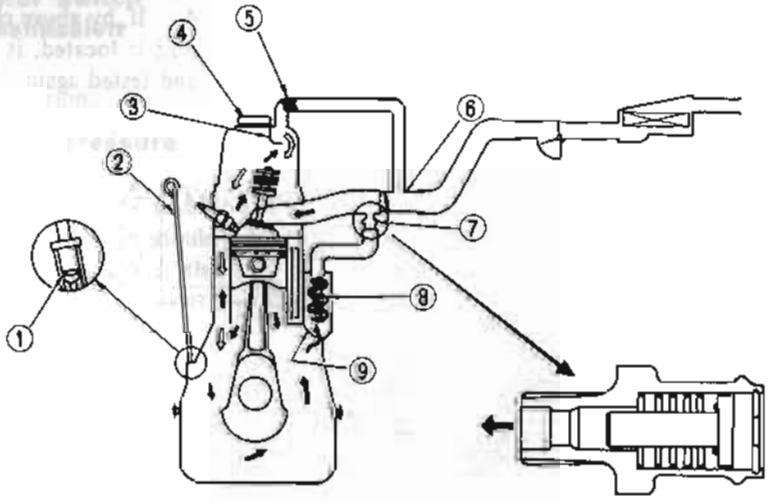


Fig. ET-22 Crankcase emission control system

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.

ADJUSTING OPERATING PRESSURE OF BOOST CONTROLLED DECELERATION DEVICE (B.C.D.D.)

CHECKING B.C.D.D. CIRCUIT WITH FUNCTION TEST CONNECTOR

Caution: Do not attach test leads of a circuit tester to those other than designated.

Manual transmission models

1. Check for continuity between A and B when car is brought to a complete stop. Refer to Figure ET-23.

B.C.D.D. circuit is functioning properly if continuity exists and voltmeter reading is 0 volts (d-c) in step 2 below.

If continuity does not exist, check for disconnected connector and/or faulty amplifier, speed detecting switch or B.C.D.D. solenoid valve.

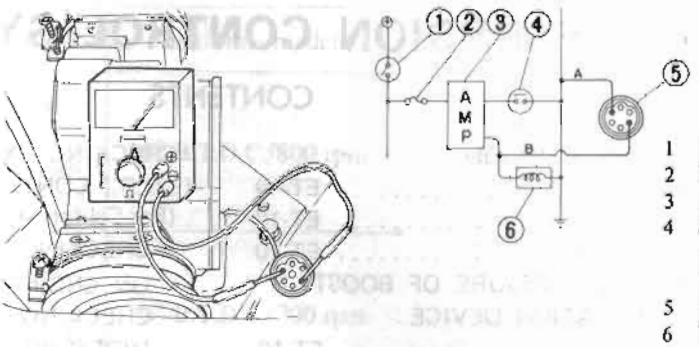
2. Check for presence of voltage across A and B [at a speed of more than 16 km/h* (10 MPH)]. Refer to Figure ET-23.

* Conduct this test by one of the following two methods.

1) Raising up rear axle housing with stand.
2) Chassis dynamometer test

- If voltmeter reading is 0 volt at a speed of more than 16 km/h (10 MPH), circuit is functioning properly.
- If voltmeter reading is not 0 volt, check for disconnected connector, burned fuse, faulty amplifier, B.C.D.D. solenoid valve or speed detecting switch.

3. If, by above checks, faulty part or unit is located, it should be removed and tested again. If necessary, replace.



1 Ignition key
2 Fuse
3 Amplifier
4 Speed detecting switch
Above 10 mph: OFF
Below 10 mph: ON
5 Function test connector
6 Vacuum control solenoid valve

Fig. ET-23 Checking B.C.D.D. circuit with function test connector (for manual transmission)

Automatic transmission models

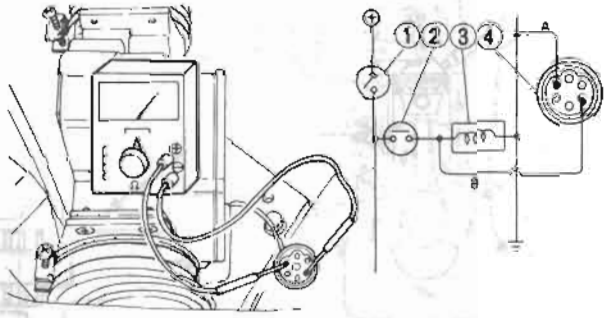
1. Turn ignition key to "ON" position.
2. With inhibitor switch "ON" ("N" or "P" range), check for presence of voltage across A and B. Refer to Figure ET-24.

- If voltmeter reading is 12 volts (d-c), B.C.D.D. circuit is functioning properly.
- If voltmeter reading is zero, check for disconnected connector, faulty solenoid valve or inhibitor switch.

3. With inhibitor switch "OFF" ("1", "2", "D", or "R" range), check for resistance between A and B. Refer to Figure ET-24.

- If ohmmeter reading is 15 to 28 ohms, circuit is functioning properly.
- If ohmmeter reading is not above, check for poor connection of connector, faulty B.C.D.D. solenoid valve or inhibitor switch.

4. If, by above checks, faulty part or unit is located, it should be removed and tested again. If necessary, replace.



1 Ignition key
2 Inhibitor switch
N-P, range: ON
1, 2, D, R, range: OFF
3 Vacuum control solenoid valve
4 Function test connector

Fig. ET-24 Checking B.C.D.D. circuit with function test connector

Checking vacuum control solenoid valve

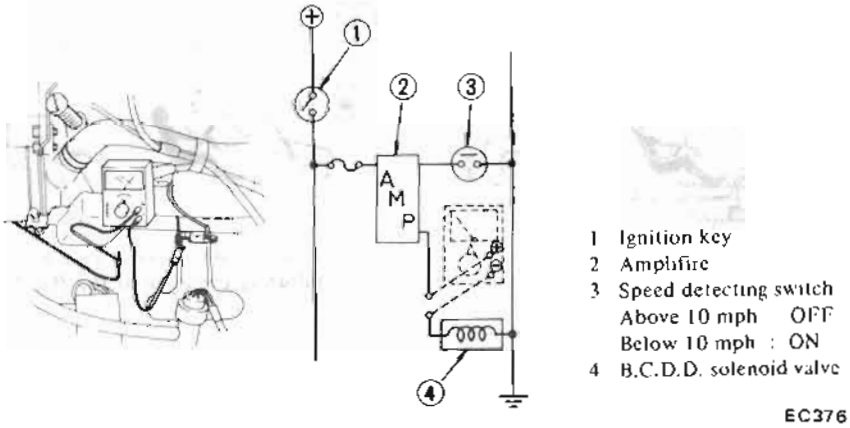
1. Turn on engine key. (Do not start engine.)
2. Ensure that solenoid valve clicks when intermittently electrified as shown in Figure ET-24.
3. If a click is heard, solenoid valve is normal.
4. If a click is not heard at all, check for continuity with a circuit tester. If discontinuity is detected, replace solenoid valve.

Checking amplifier (Manual transmission models)

The amplifier is installed at the rear of the speedometer. To check, proceed as follows.

1. Set circuit tester in d-c ampere range (1A min, full scale), connect test probes of tester as shown in Figure ET-25.

   Do not confuse positive line with negative line.
2. Turn ignition key to "ON" position.
3. Ensure that tester pointer deflects when ignition key is turned on.
4. If tester pointer does not deflect when solenoid valve and speed detecting switch circuits are functioning properly, amplifier is faulty.



1 Ignition key
2 Amplifire
3 Speed detecting switch
  Above 10 mph : OFF
  Below 10 mph : ON
4 B.C.D.D. solenoid valve

EC376

Fig. ET-25 Checking amplifier

Checking inhibitor switch (Automatic transmission models)

Refer to the TM section.

Adjustment of set pressure of B.C.D.D.

Generally, it is unnecessary to adjust the B.C.D.D., however, if it should become necessary to adjust it, the procedure is as follows:

Prepare the following tools

1. Tachometer to measure the engine speed while idling, and a screwdriver.
2. A vacuum gauge and connecting pipe.

Note: A quick-response type boost gauge such as Bourdon's type is recommended; a mercury-type manometer should not be used.

To properly set the B.C.D.D. set pressure, proceed as follows:

1. Remove the harness of solenoid valve.

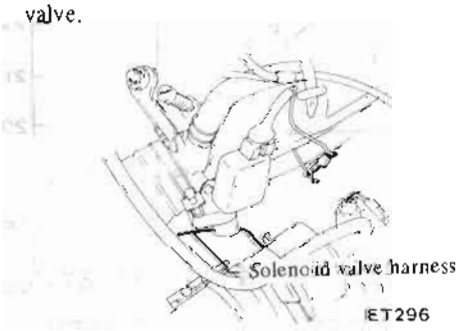
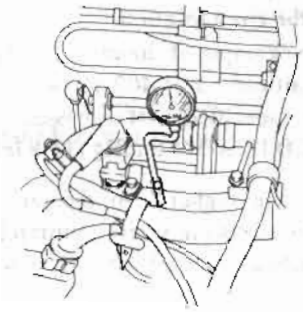


Fig. ET-26 Removing harness of solenoid valve

2. Connect rubber hose between vacuum gauge and intake manifold as shown in Figure ET-27.



EC378

Fig. ET-27 Connecting vacuum gauge

3. Warm up the engine until it is heated to operating temperature.

   Then adjust the engine at normal idling setting. (Refer to the item "Idling Adjustment" in page ET-7.)

   Idling engine speed
   Manual transmission
   800 rpm
   Automatic transmission
   (in "D" position)
   700 rpm
4. Run the engine under no load. Increase engine speed to 3,000 to 3,500 rpm, then quickly close throttle valve.
5. At that time, the manifold vacuum pressure increases abruptly to −600 mmHg (−23.62 inHg) or above and then gradually decreases to the level set at idling.
6. Check that the B.C.D.D. set pressure is within the specified pressure.

   Specified pressure (0 m, sea level and 760 mmHg (30 inHg) atmospheric pressure)

   Manual transmission:
   −460 to −480 mmHg
   (−18.1 to −18.9 inHg)
   Automatic transmission:
   −460 to −480 mmHg
   (−18.1 to −18.9 inHg)

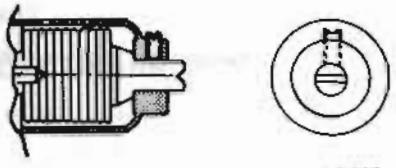
Notes:

a. When atmospheric pressure is known, operating pressure will be found by tracing the arrow line "A". See Figure ET-30. When altitude is known, operating pressure will be found by tracing the arrow line "B". See Figure ET-30.

b. **When checking the set pressure of B.C.D.D., find the specified set pressure in Figure ET-32 from the atmospheric pressure and altitude of the given location.**

For example, if the car is located at an altitude of 1,400 m (4,600 ft), the specified set pressure for B.C.D.D. is 375 mmHg (14.8 inHg).

7. If it is higher than the set level, turn the adjusting screw counterclockwise until correct adjustment is made.



EC409

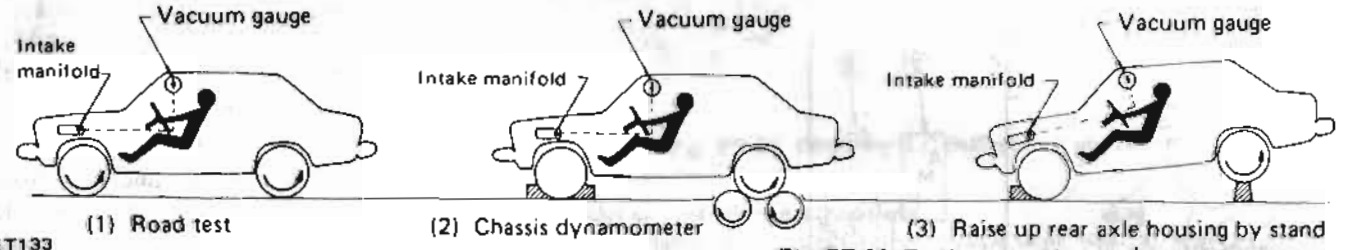
Fig. ET-28 Adjusting set pressure

8. Race the engine and check for adjustment.
9. If it is lower than the set level, turn the adjusting screw clockwise until correct adjustment is made.
10. Race the engine and check for adjustment.

If engine speed cannot be decreased to idling when checking B.C.D.D. set pressure, proceed as follows:

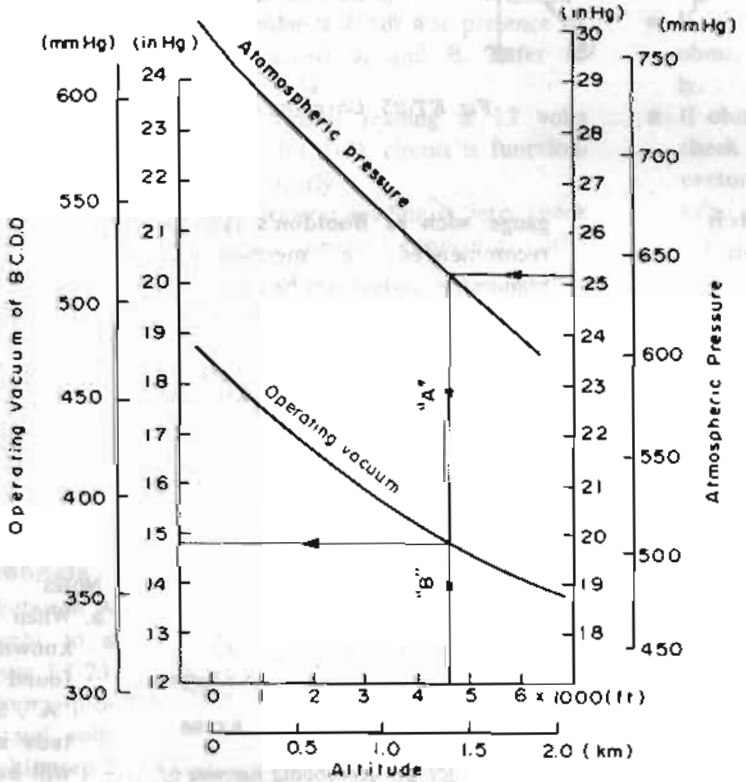
When the engine speed does not fall to idling speed, it is necessary to reduce the negative idling pressure of the manifold to lower than the set pressure of the B.C.D.D. (The engine speed will not drop to idling speed when the negative idling pressure is higher than the set pressure of the B.C.D.D.).

In this case, the engine must be labored by (1) road test or (2) chassis dynamometer or (3) by raising up rear suspension member on a stand, accelerating the car to 64 to 80 km/h (40 to 50 MPH) in top gear (manual transmission) or in "D" position (automatic transmission), and then releasing the accelerator pedal and letting the car decelerate. After doing this, check whether the B.C.D.D. set pressure is at the predetermined value or not.



ET133

Fig. ET-29 Testing operating pressure of the B.C.D.D.



EC379

Fig. ET-30 Changes in operating pressure versus changes in atmospheric pressure altitude

CHECKING SPARK TIMING CONTROL SYSTEM (Except California)

DESCRIPTION

The transistor ignition unit is used in the ignition system on all models. On the Non-California models, a dual pick-up type distributor is used to control spark timing.

This unit helps keep efficient operation of the engine by advancing spark timing with the dual pick-up type distributor before engine warming-up. When the coolant temperature of the engine is low, the water temperature switch energizes a relay, which activates the "advance" pick-up of the distributor. The system operation is shown below.

The distributor consists of a water temperature switch, relay and dual pick-up coil and transistor ignitor unit.

Engine coolant temperature		Water temperature switch	Relay	Spark timing
57 to 63°C * (135 to 145°F)	Below	ON	OFF	Advanced
	Above	OFF	ON	Retarded

Note * : The water temperature switch is designed to operate at a coolant temperature somewhere between 57°C (135°F) and 63°C (145°F).
Operating points vary slightly with individual characteristics.

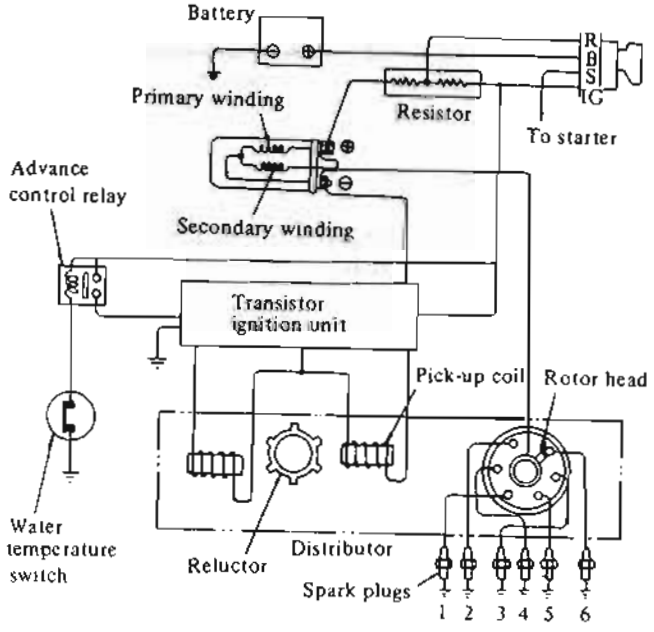


Fig. ET-31 Spark timing control system circuit diagram

INSPECTION AND ADJUSTMENT

PHASE DIFFERENCE

1. Disconnect engine harness red wire connector from water temperature switch.
2. Ground engine harness red wire terminal to engine with a suitable lead wire.

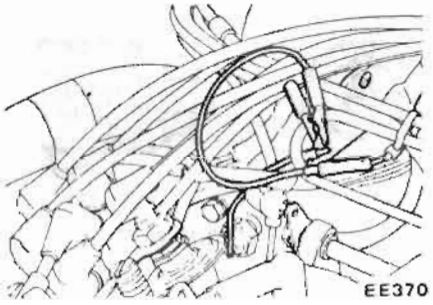


Fig. ET-32 Short-circuit of advance control relay

3. With engine idling, adjust ignition timing by rotating distributor to specifications.
4. With engine harness red wire connector disconnected from water temperature switch, idle engine. Check to determine that phase delay is 6 degrees in terms of crankshaft angular displacement.

To correct proceed as follows:

(1) Referring to Figure ET-33, turn out adjuster plate screws 1/2 to 2 turns. The screws are located at pick-up coil assembly on retarded side.
(2) Turn adjuster plate until correct phase difference is obtained.

Ignition timing is retarded when plate is turned counterclockwise.

Note: Refer to graduations on breaker plate to make adjustment easier. One graduation corresponds to a crankshaft angular displacement of 4 degrees.

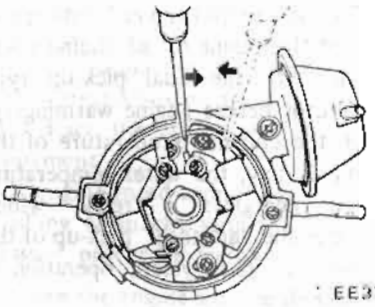


Fig. ET-33 Adjusting phase difference

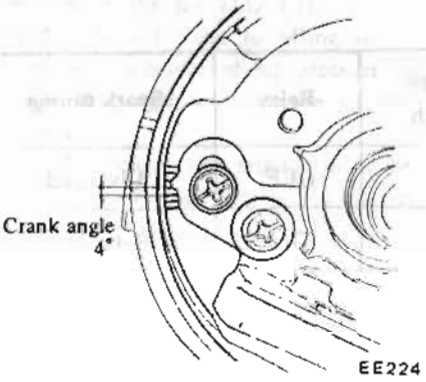


Fig. ET-34 Phase difference adjusting scale

(3) Make sure that the ignition timing of advance side meets specifications.
(4) After adjustment, connect water temperature switch harness.

WATER TEMPERATURE SWITCH

Water temperature switch is located at the thermostat housing of engine.

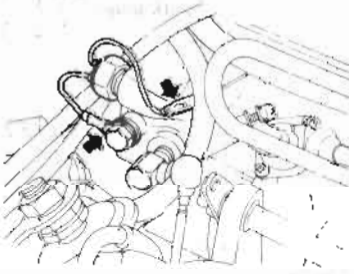


Fig. ET-35 Water temperature switch

1. A thermometer and ohmmeter are needed to check water temperature switch.
2. Checking "ON" of water temperature switch. Starting water temperature from 50°C (122°F) and below, check continuity of water temperature switch to ensure that reading remains zero until a water temperature rises to 57°C (135°F).
3. Checking "OFF" of water temperature switch.

Increasing water temperature from about 50°C (122°F), make continuity check of water temperature switch. Operation is normal if an ohmmeter reading is infinite, at water temperature somewhere between 57 to 63°C (135 to 145°F) and remains infinite at above 63°C (145°F).

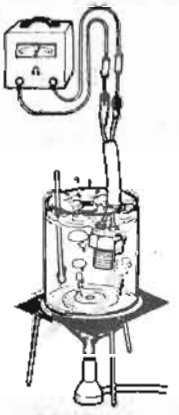


Fig. ET-36 Checking water temperature switch

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

RELAY

The relay which controls the operation of dual pick-up coil is installed on the right side of the engine compartment, on the relay bracket at the wheel housing.

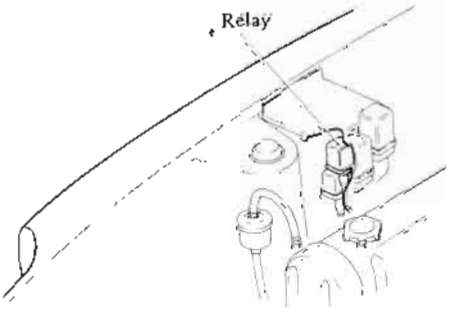


Fig. ET-37 Relay

CHECKING TRANSMISSION CONTROLLED VACUUM ADVANCE SYSTEM (Manual transmission models only except California)

1. Ensure that wiring connectors are tight in place.
2. Ensure that vacuum hoses are properly connected to their positions. See Figure ET-1.
3. Ensure that distributor vacuum controller properly functions.
4. Set timing light.
5. Run engine and keep it at 3,200 to 3,500 rpm. Read spark timing.
6. Shift gears in top (4th) position, and read spark timing.

The system is properly functioning if spark timing in top (4th) position is approximately 5° greater than that in neutral position.

Note: To protect against accidental forward surge, engage parking brake firmly while above check is being made.

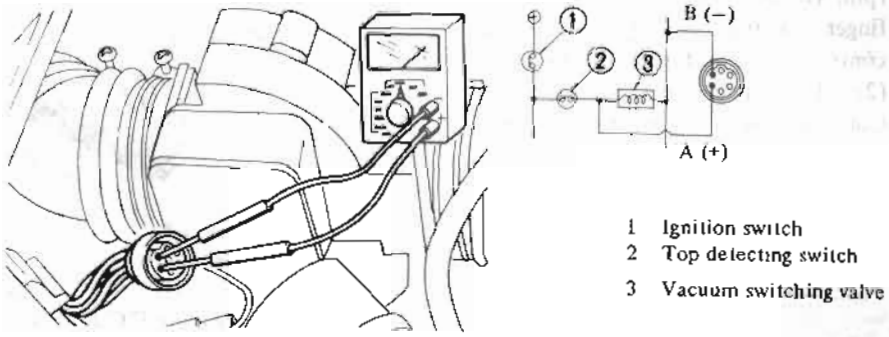
7. If spark timing does not vary at all in steps 5 and 6 above, proceed as follows:

(1) Disconnect vacuum switching valve white wire connector.
(2) Set timing light.
(3) Run engine and keep it at 3,200 to 3,500 rpm. Read spark timing.
(4) Connect vacuum switching valve white wire connector directly to battery positive (+) terminal and read spark timing.

Vacuum switching valve is normal if spark timing advances by 5° when connector is disconnected from battery positive (+) terminal. If not, top detecting switch is faulty and should be replaced. If spark timing does not vary at all in step 7 above, replace vacuum switching valve.

8. Check for continuity in electrical wiring with a function test connector.

Turn ignition switch on, but do not run engine. Check for voltage across terminals A and B as shown in Figure ET-38.



1 Ignition switch
2 Top detecting switch
3 Vacuum switching valve

EC408

Fig. ET-38 Checking for continuity in electrical wiring with function test connector

Electrical wiring circuit is normal if voltmeter readings are as shown in the chart below.

Transmission	Voltmeter indication
Top (4th) gear position	0V
Other gear position	12V

If readings are not shown, check for loose harness and burned fuse.

CHECKING EXHAUST GAS RECIRCULATION (E. G. R.) CONTROL SYSTEM (For California)

CHECKING E. G. R. CONTROL SYSTEM ON ENGINE

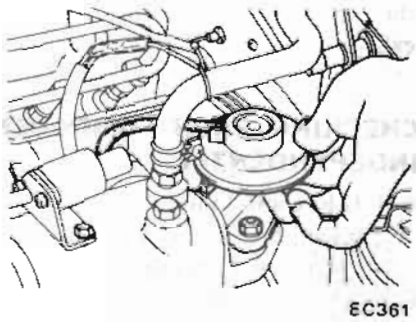
1. Visually check E.G.R. control system.

If necessary, wipe away oil to facilitate inspection. If any hoses are cracked or broken, replace.

2. With engine running, check E.G.R. control system for proper function.

- When engine coolant temperature is low:

(1) Make sure that E.G.R. control valve does not operate when engine speed is increased from idling to 3,000 – 3,500 rpm. To check the valve operation, place a finger on the diaphragm of E.G.R. control valve as shown in the figure below.

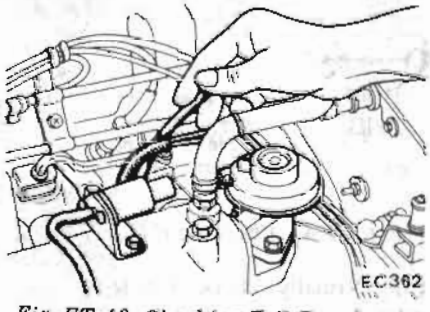


EC361

Fig. ET-39 Checking E.G.R. control valve

(2) Disconnect one end (E.G.R. control valve side) of the vacuum hose connecting E.G.R. solenoid valve to E.G.R. control valve. Then increase engine speed from idling to 3,000 – 3,500 rpm.

Make sure that E.G.R. solenoid valve is closed, and that throttle chamber vacuum is not present at the end (E.G.R. control valve side) of the vacuum hose. If vacuum is present, check E.G.R. solenoid valve and water temperature switch independently as described later.



EC362

Fig. ET-40 Checking E.G.R. solenoid valve

- When engine coolant temperature is high:

(1) Make sure that E.G.R. control valve operates when engine speed is increased from idling to 3,000 - 3,500

rpm. To check valve operation, place a finger on the diaphragm of E.G.R. control valve. See Figure ET-39.

(2) Disconnect one end (E.G.R. control valve side) of the vacuum hose connecting E.G.R. solenoid valve to E.G.R. control valve. Then, increase engine speed from idling to 3,000 - 3,500 rpm.

Make sure that E.G.R. solenoid valve opens, and that throttle chamber vacuum is present at the end of the vacuum hose. See Figure ET-40.

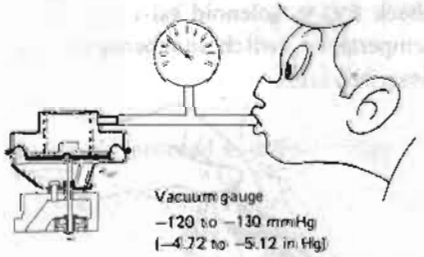
(3) With the engine idling, push the diaphragm of E.G.R. control valve up with your fingertips. Ascertain that the engine operates irregularly due to exhaust gases.

CHECKING EACH COMPONENT INDEPENDENTLY

- E.G.R. control valve
  Remove E.G.R. control valve and vacuum hose from engine.

(1) Visually check vacuum hose for deterioration or deformation. If the hose is damaged, vacuum leak may occur, resulting in improper operation of E.G.R. control valve. Damaged hose should be replaced.

(2) Apply a vacuum of 120 to 130 mmHg (4.72 to 5.12 inHg) to the E.G.R. control valve as shown in the figure below. The valve should move to the full position, and remain open for more than 30 seconds after the vacuum has cut off.

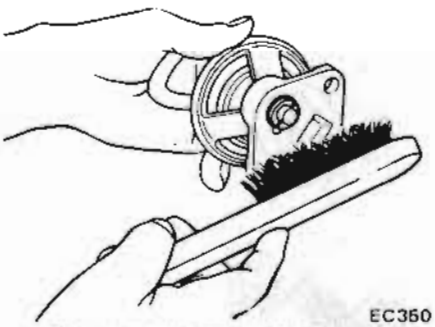


ET151

Fig. ET-41 Checking E.G.R. control

(3) Visually check E.G.R. control valve for damage, wrinkle or deformation.

(4) Clean the seating surface of E.G.R. control valve with a brush and compressed air, and remove foreign matter from around the valve and port.

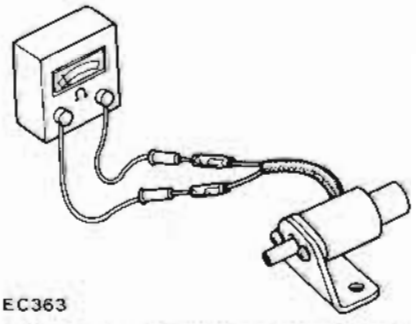


EC350

Fig. ET-42 Cleaning E.G.R. control valve

- E.G.R. solenoid valve
  Check E.G.R. soelnoid valve with ohmmeter and battery, as follows:

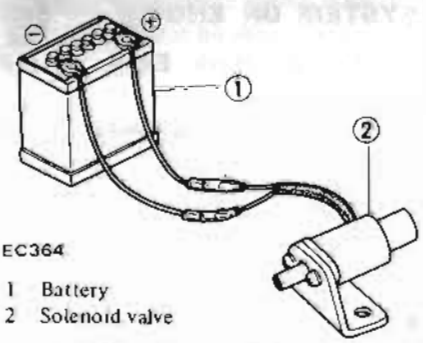
(1) Connect ohmmeter to solenoid lead wire and check continuity of the solenoid. If continuity does not exist, replace E.G.R. solenoid valve as a unit.



EC363

Fig. ET-43 Checking E.G.R. solenoid valve

(2) If continuity exists in step (1) above, apply electric current to the solenoid intermittently. Make sure that E.G.R. solenoid valve clicks. If clicks are heard, E.G.R. solenoid valve is functioning properly. If clicks are not heard, replace E.G.R. solenoid valve unit.



EC364

1 Battery
2 Solenoid valve

Fig. ET-44 Checking E.G.R. solenoid valve

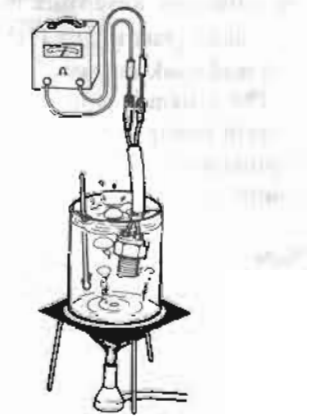
- Water temperature switch
  Remove water temperature switch from engine.
  Check water temperature switch with thermometer and ohmmeter.

(1) Checking "ON" of water temperature switch

Starting from water temperature at 50°C (122°F) and below, check continuity of water temperature switch and ensure that a reading is almost zero, that is, switch is ON.

(2) Checking "OFF" of water temperature switch

Increasing water temperature from about 50°C (122°F), make continuity check of a water temperature switch. Operation is normal if an ohmmeter reading increases to infinite on condition that water temperature is somewhere between 57 to 63°C (134 to 145°F) and remains infinite at about 63°C (145°F) and above.



EC365

Fig. ET-45 Checking water temperature

(3) If it is satisfied both in steps (1) and (2) above, switch is good.

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 mmAq (14.5 inAq).
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 mmAq (0.98 in Aq.).
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.

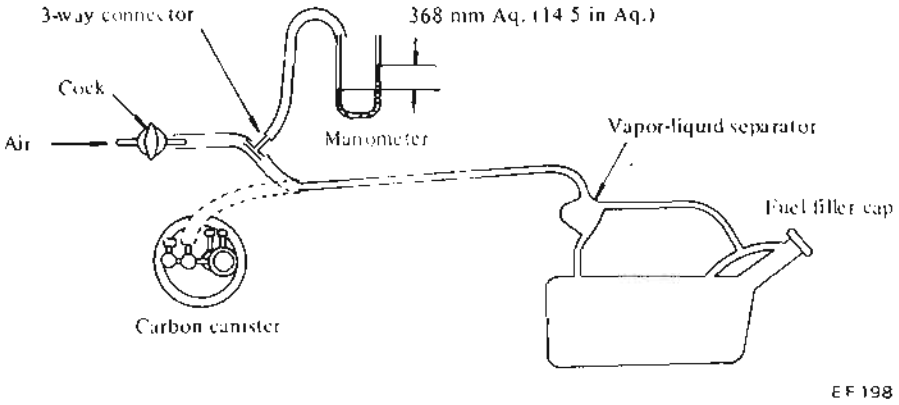


Fig. ET-46 Checking evaporative emission control system

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.

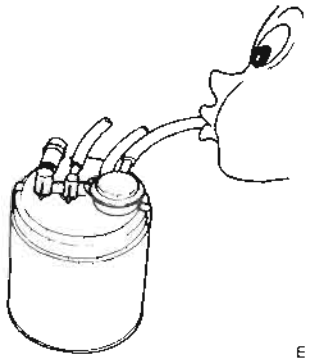


Fig. ET-47 Checking carbon canister purge control valve

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).

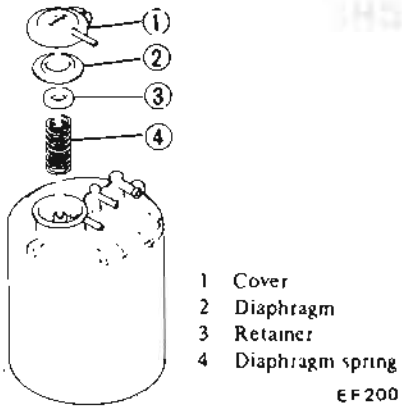


Fig. ET-48 Carbon canister purge control valve

CARBON CANISTER FILTER

Check for a contaminated element.

Element can be removed at the bottom of canister installed on car body.

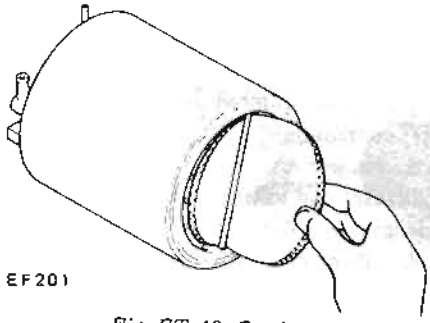


Fig. ET-49 Replacing carbon canister filter

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.

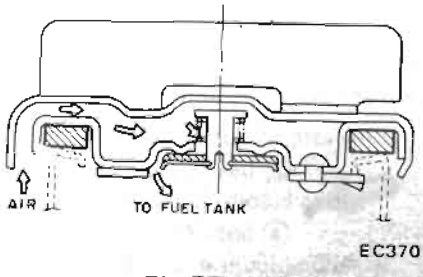


Fig. ET-50 Fuel filler cap

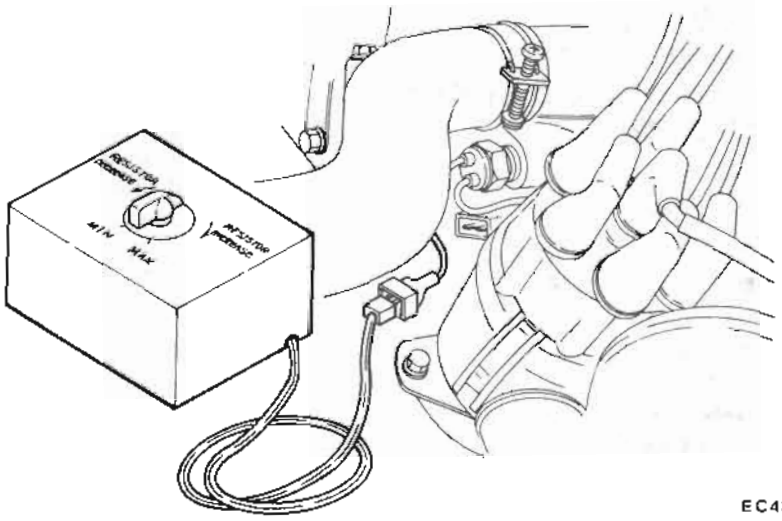
CHECKING CATALYTIC CONVERTER (For California)

Checking catalytic converter with an emission adjuster:

1. Apply parking brake with gear set in neutral.
2. Place wheel lock under each tire.
3. Warm up engine thoroughly. [About 80°C (176°F)]
4. After engine has warmed up, run engine at 2,000 rpm for a few minutes under no load until catalytic converter reaches operating temperature.
5. Turn off the ignition switch.
6. Remove connector of water temperature sensor.
7. Connect emission adjuster to harness connector of water temperature sensor. See Figure ET-51.

Caution: Always keep emission adjuster lead wires away from high tension cable so as not to damage control unit.

8. Insert CO meter probe through diffuser end until a minimum insertion length of 500 mm (19.7 in) is reached.
9. Run engine at 2,000 rpm and adjust CO percent to 3 percent with emission adjuster.
10. Remove injector connector from number six cylinder.
11. Keep engine running at 2,000 rpm with no load.
12. If CO percent is less than 1 percent, catalytic converter is functioning properly. (If CO percent is more than 1 percent, catalytic converter must be replaced.)
13. Turn off ignition switch.
14. Locate water temperature sensor connector, and injector connector in place.



EC435

Fig. ET-51 Connecting emission adjuster.

CHECKING FLOOR TEMPERATURE WARNING SYSTEM

Floor temperature warning system

Apply parking brake.

Shift gears into Neutral (for manual transmission) and Neutral or Park (for automatic transmission).

1. Ensure that floor temperature warning lamp lights when ignition switch is turned to the "S" position. If lamp does not light, check burned bulb. Replace burned out bulb. If bulb is not burned, trace wire(s) back to ignition switch.
2. Be sure that floor temperature sensor is cool [below 80°C (176°F)] before carrying out the following:
   (1) Remove rear seat.
   (2) Turn ignition switch to the "IG" position.
   (3) Ensure that floor temperature warning lamp goes out.
   (4) Heat areas around floor sensor with a proper heater to ensure that floor temperature warning lamp comes on when floor is heated to specifications in the table below.

Note: Avoid heating floor sensor directly.

Floor sensor	Floor temperature warning lamp	Floor temperature
Contacts close	OFF	Below 115°C (239°F)
Contacts open	ON	Above 115°C (239°F)

If lamp does not come on, check floor sensor connector for continuity with a circuit tester.

If continuity exists after heating areas around floor sensor, replace floor sensor.

If continuity does not exist, trace the wiring back to relay or proceed to step 3. Repair or replace wire(s) if necessary.

3. Turn ignition switch to the "IG" position, and disconnect floor sensor connector. The lamp should remain on. If not, check floor sensor relay for continuity with a circuit tester.

Conduct checks under the heading "following floor sensor relay", and if relay is found normal, trace wire(s) back to ignition switch. Repair faulty wiring if necessary.

Note: Do not heat floor sensor directly.

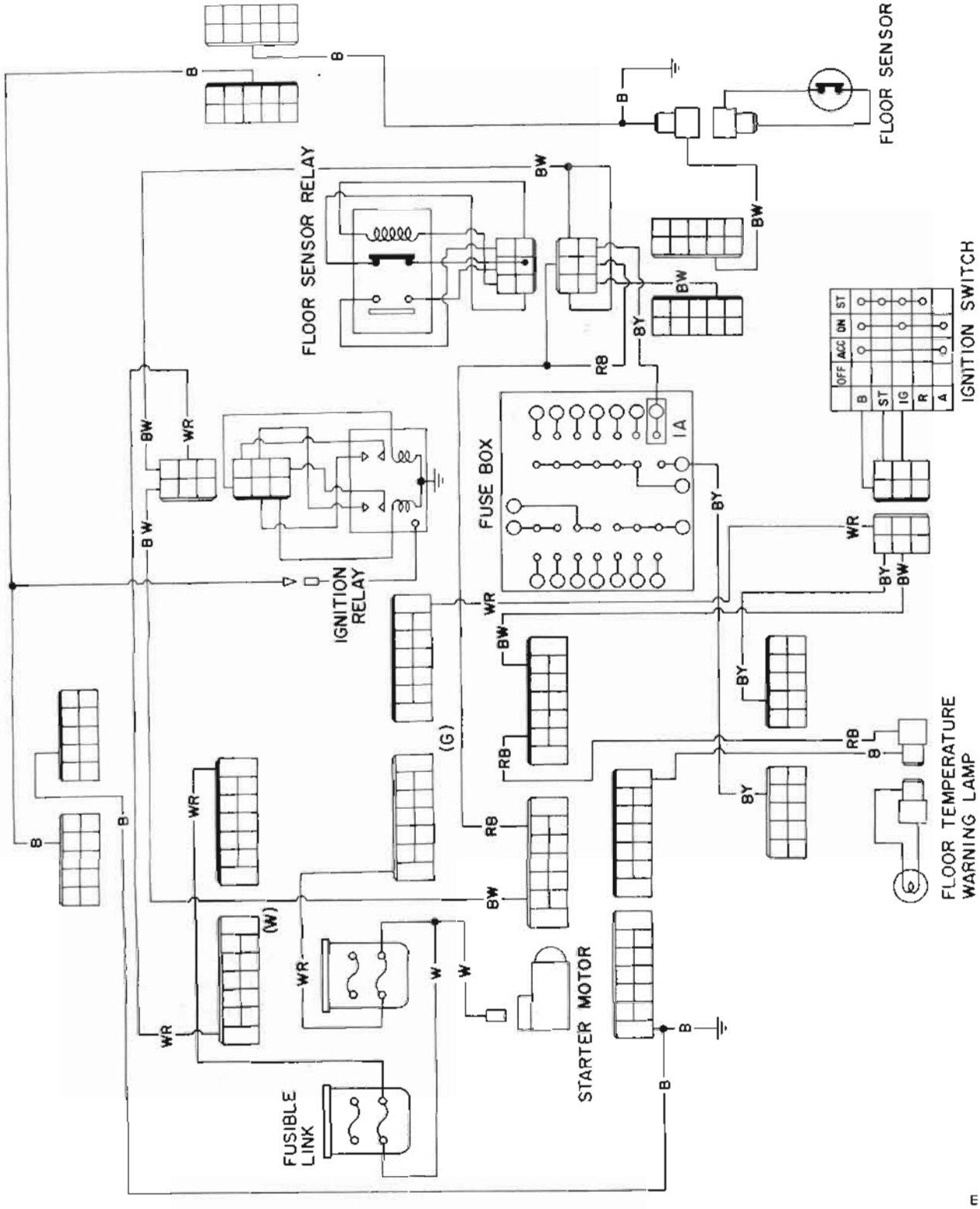


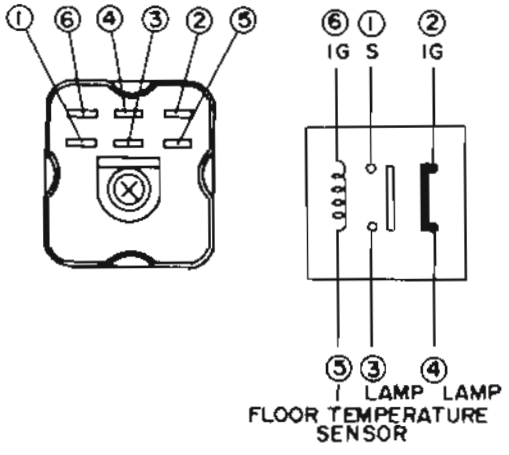
Fig. ET-52 Wiring diagram of floor warning system

Floor sensor relay (See Figure ET-53)

When checking floor sensor relay unit, remove it, and conduct continuity and voltage tests as follows:

1. Terminals ⑤ and ⑥
   Continuity should exist.
   Terminals ② and ④
   Continuity should exist.
   Terminals ① and ③
   Continuity should not exist.
2. Terminals ⑤ and ⑥
   12 volt should be present.
   Terminals ① and ③
   Continuity should exist.
   Terminals ② and ④
   Continuity should not exist.

If test results are not as indicated above, replace faulty parts.



EC404

Fig. ET-53 Checking floor sensor relay

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.
	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.
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. Repair or renew piston and cylinder.
	Worn piston ring groove and ring.	Renew piston and piston ring.
	Fatigue of valve oil seal lip.	Replace seal lip with a new one.
	Worn valve stem.	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. } For inspection procedures for electronic fuel injection system components, refer to Engine Fuel Section.
	Damaged control unit.	Replace.
	Malfunctioning air flow meter.	Replace.
	Damaged air temperature sensor.	Replace.
	Malfunctioning throttle valve switch.	Replace.
	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.
	Troubles in 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.