SERVICE MANUAL

MODEL
L20A, L24 SERIES
ENGINES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

# SECTION ET

# ENGINE TUNE-UP

ET

# ENGINE TUNE-UP

## CONTENTS



## Description

It may be needless to say, however, to maintain optimum engine performance always, periodical adjustment (engine tune-up) is necessary.

The foregoing chapter "Engine General" describes periodical inspection and maintenance period and items to be inspected. This Chapter describes actual operating procedures for the major items to be inspected.

This chapter does not describe periodical inspection and maintenance for emission control system.

For the details of emission control system, please refer to the section EC (Emission Control System).

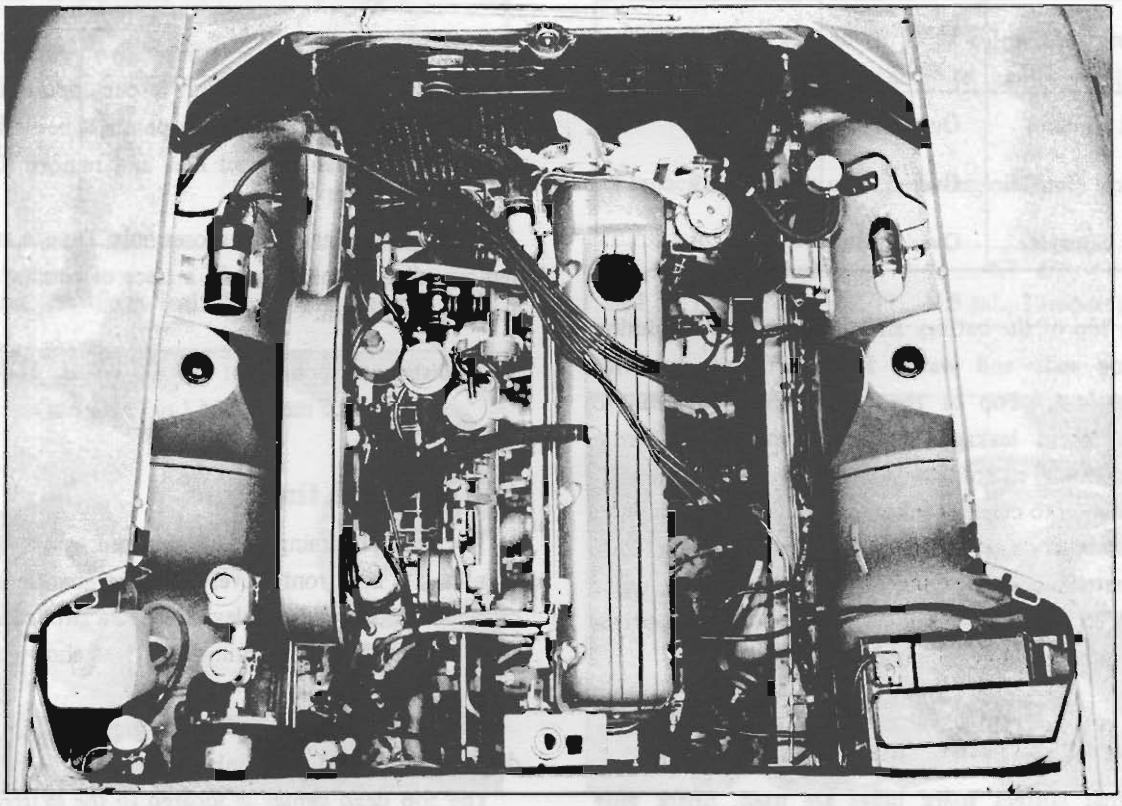

*Fig. ET-1 Engine compartment (model S30)*

## Battery inspection

1. Check the level of the electrolyte in battery cells.

Check the level line on the case with the battery electrolyte.

If necessary, add distilled water.

2. Measure the specific gravity of the battery electrolyte.

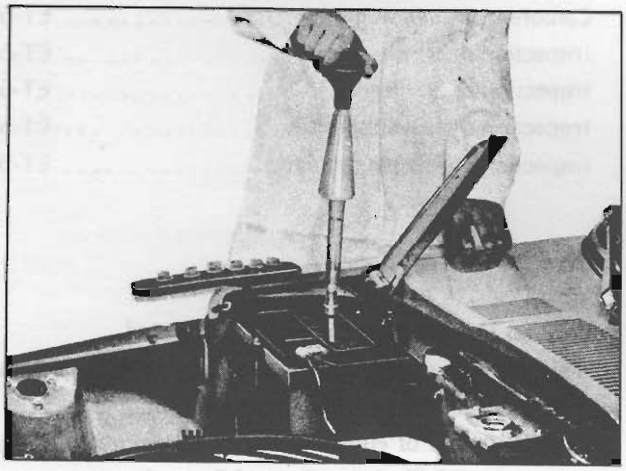

*Fig. ET-2 Battery inspection*

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

Clean top of the battery and terminals with a solution of baking soda and water. Rinse off and dry with compressed air. Top of the 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 the battery may cause blistering of the material covering connector straps and corrosion of straps. After tightening terminals, coat them with petrolatum to protect them from corrosion.

## Spark plugs-remove and recondition

See that correct spark plugs are used. Spark plug insulators should be thoroughly cleaned to prevent possible flash-over.

Thoroughly clean lower insulator and cavity by sand blasting. File both electrodes flat (rounded surfaces increase voltage required to fire plugs) and set gap to 0.8 to 0.9 mm (0.031 to 0.035 in). When plugs are reinstalled, use new gaskets and tighten plugs to 1.5 to 2.0 kg-m (11.0 to 15.0 ft-lb) torque.

## Clean and adjust distributor points

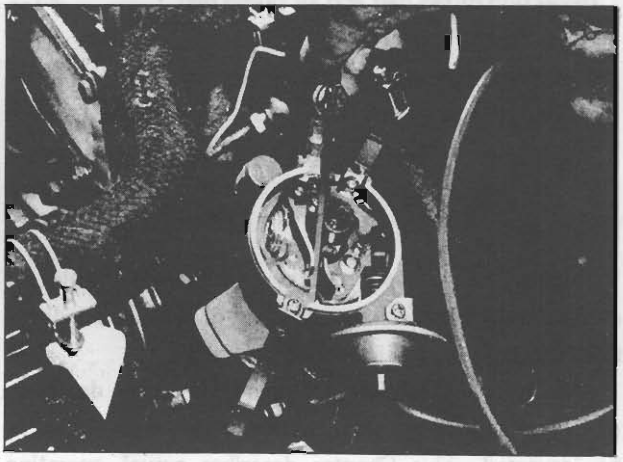

*Fig. ET-3 Distributor point gap check*

Remove distributor cap and inspect points for excessive burning or pitting. Replace points if necessary. Use a point file to clean contact area and remove scale from points.

Filing is for cleaning purposes only. Do not attempt to remove all roughness. Apply a trace of bearing lubricant to the breaker cam.

**Distributor point gap:**

0.4 to 0.5 mm (0.0157 to 0.0197 in)

## Set ignition timing

The ignition timing can be observed by the stationary pointer at the front cover and the markings on the crankshaft pulley with a device called a stroboscopic light (also referred to as a timing light) as shown in Figure ET-4.

Note that the pulley groove is graduated 5° per scale division in terms of the crank angle.

The top dead center is located to the extreme left as viewed from the inspector's side.

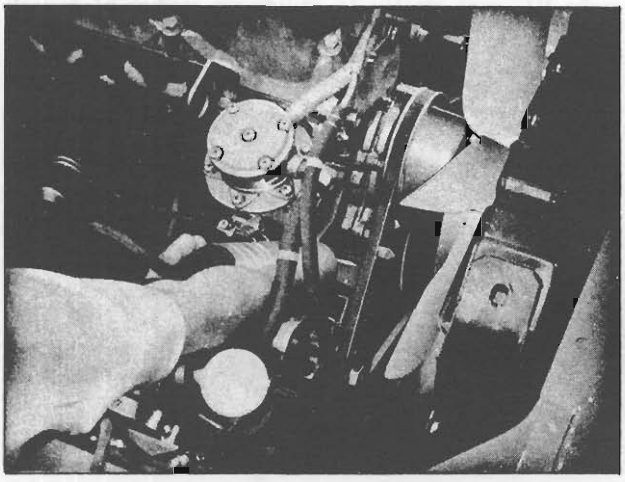

*Fig. ET-4 Ignition timing set*

**Ignition timing**

| | | Manual transmission | Automatic transmission | |
|---|---|---|---|---|
| L20A | | 10°/ 550 rpm | 10°/ 650 rpm | N Range |
| L24 | Single carb. | 17°/ 550 rpm | 17°/ 650 rpm | N Range |
| | SU twin | 17°/ 650 rpm | 17°/ 700 rpm | N Range |
| L24 SU twin Emission control | | 5°/ 750 rpm | 0°/ 600 rpm | D Range |
| | | | 0°/ 780 rpm | N Range Reference |

## Inspection of fan belt and air pump belt

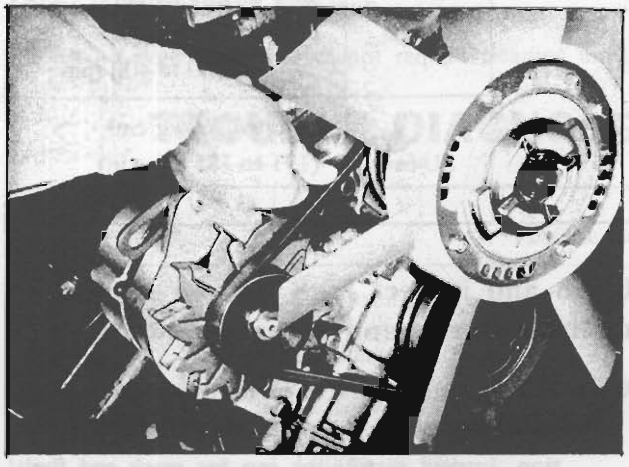

*Fig. ET-5 Fan belt tension*

1. Check for a cracked or damaged V-belt. Replace if defective.

2. Adjust the belt tension, if necessary.

**Slackness of belt when it is depressed by a force of 10 kg (22.0 lb)**

| | |
|---|---|
| Fan belt | 8 to 12 mm (0.3150 to 0.4724 in) |
| Air pump | 15 to 20 mm (0.591 to 0.787 in) |

## Inspection of engine oil

1. Check if the engine oil has been deteriorated by intruded cooling water or gasoline. Drain and refill the oil, if necessary.

**Note: a. A milky oil indicates the presence of cooling water.**
**Detect the cause for necessary treatment.**
**b. Suggest that oil with extremely low viscosity be diluted with gasoline.**

2. Check oil level, and if it is below the rated level, replenish oil of the same grade up to the "H" level.

**Oil capacity of engine oil (including oil filter)**

| | | |
|---|---|---|
| L20A, L24 | Maximum (H level) | 4.7 ℓ (1¼ U.S.gal., 1 Imper. gal.) |

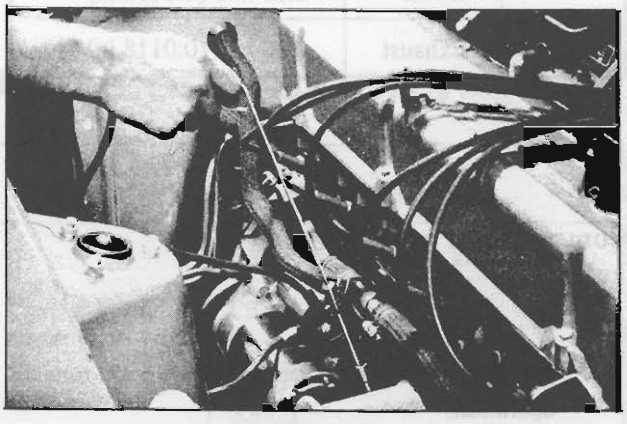

*Fig. ET-6 Oil level check*

## Carburetor overhaul and adjustment

For the details, refer to the Section "EF" (Engine Fuel System).

## Valve clearance adjustment

This adjustment can not be made when the engine is in operation. Follow the procedure described below:

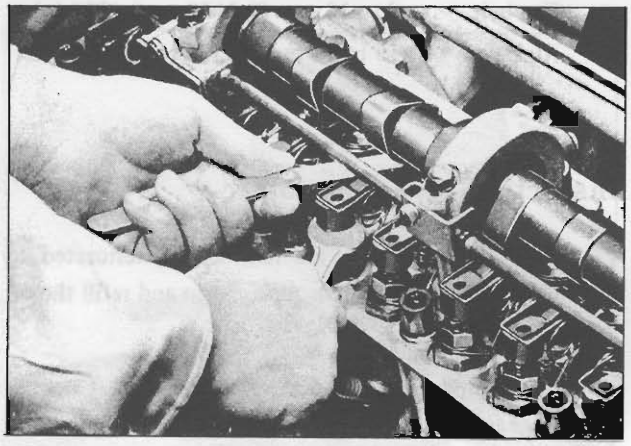

*Fig. ET-7 Valve clearance adjustment*

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

Tighten the pivot locking nut securely after adjustment, and recheck the clearance.

2. Warm up the engine, and stop it. Then, measure the hot engine valve clearance in the same manner as above. If it deviates from the given hot-engine valve setting value, make necessary adjustment.

| | | |
|---|---|---|
| Hot | Intake | 0.25 mm (0.0098 in) |
| | Exhaust | 0.30 mm (0.0118 in) |

## Compression pressure-test each cylinder

**Note: If this test is required, it should be done when plugs are removed for service during basic tune-up operation.**

Unless checking for wron rings or for the cause of low speed miss, compression check should not be made.

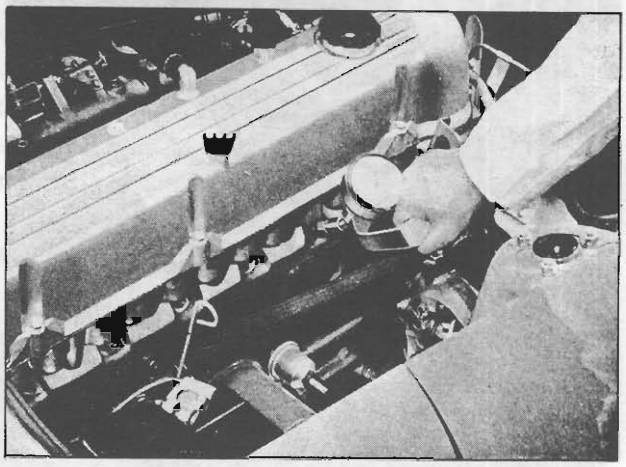

*Fig. ET-8 Compression pressure test*

Test compression with engine warm, all spark plugs removed and throttle and choke open. No cylinder should be less than 80% of the highest cylinder. Excessive variation between cylinders, accompanied by low speed missing of the cylinder or cylinders which are low, usually indicates a valve not properly seating or a broken piston ring. Low pressures, even though uniform, may indicate worn rings. This may be accompanied by excessive oil consumption.

**Compression pressure**

| | | |
|---|---|---|
| L20A | | 11.5 to 12.5 kg/cm² (163 to 178 lb/sq in) at 300 to 400 rpm |
| L24 | Single | 11.5 to 12.5 kg/cm² (163 to 178 lb/sq in) at 300 to 400 rpm |
| | SU-carb. | 12.0 to 13.0 kg/cm² (171 to 185 lb/sq in) at 300 to 400 rpm |

## Clean and inspect high tension wires, distributor cap and rotor

**Note: This operation should be performed while checking distributor points during the basic tune-up operation. Inspect distributor cap for crack and flash over.**

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

### Distibutor lubricate

Slightly apply special cam and ball bearing lubricant on cam lobes when servicing.

### Tighten intake manifold and Carburetor installation nuts

Intake manifold installation bolts and nuts on engines should be tightened to proper torque.

Carburetor installation nuts should be tightened securely. Leak at these area may cause rough idle, surging, deceleration popping or deceleration whistle.

### Inspection of oil filter

1. Check for oil leak at the packing flange. If any leakage is found, tighten it slightly, or replace the oil filter assembly. Do not tighten excessively.

2. Replace the filter every 10,000 km (6,000 miles) running.

### Inspection of air cleaner

Viscous type element does not require cleaning until the engine is used for two years, or the vehicle is driven 40,000 km (24,000 miles) (under normal conditions).

### Inspection of fuel strainer

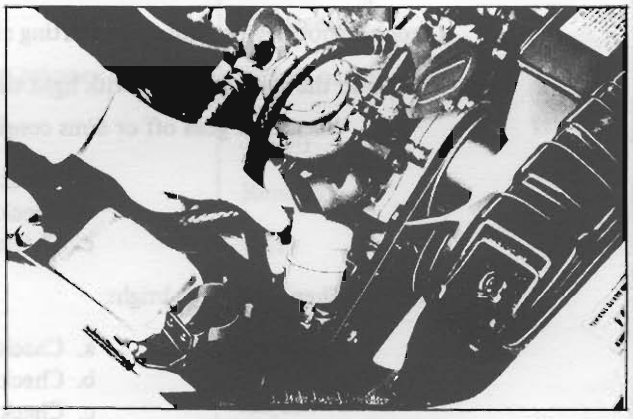

*Fig. ET-9 Fuel strainer*

A cartridge type fuel strainer is used. When it is defective, replace as an assembly.

### Inspection of cooling system

#### Inspection of radiator cap

Apply reference pressure [0.9 kg/cm² (13 lb/sq in)] to the radiator cap (in case of L13 and L16) and the reservoir tank cap (in case of L20) by means of a cap tester to insure that it is satisfactory. Replace the cap assembly if necessary.

#### Cooling system pressure test

With radiator cap removed, apply reference pressure [1.9 kg/cm² (27 lb/sq in)] to the cooling system by means of a tester to check for leaks at system components.

## TROUBLE DIAGNOSES AND CORRECTIONS

| Troubles | Possible causes | Corrective action |
|---|---|---|
| **CANNOT CRANK ENGINE OR SLOW CRANKING** | Improper grade oil. | Replace with proper grade oil. |
| | Discharged battery. | Charge battery. |
| | Defective battery. | Replace. |
| | Loosen fan belt. | Adjust. |
| | Trouble in charge system. | Inspect charge system. |

| | | |
|---|---|---|
| | Wiring connection trouble in starting circuit. | Correct. |
| | Defective starter switch. | Repair or replace. |
| | Defective starter motor. | Repair or replace. |

(Trouble shooting procedure on starting circuit)

Switch on the starting motor with light turned on

When light goes off or dims considerably

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

When light stays bright

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

**ENGINE WILL CRANK NORMALLY BUT WILL NOT START**

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

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

First, check spark plug in accordance with the following procedure:

Disconnect high tension cable from one spark plug and hold it about 10 mm (0.4 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 cylinder compression.

No spark occurs. — Check the current flow in primary circuit.

Very high current — Inspect primary circuit for short circuiting. Check breaker point operation.

Low or no current — Check for loose terminal or disconnection in primary circuit. Check for burned points.

| | | |
|---|---|---|
| **Ignition system in trouble** | Burned distributor point | Repair or replace. |
| | Improper point gap | Adjust. |
| | Defective condenser | Replace. |
| | Rotor cap and rotor leak | Replace. |

| | | |
|---|---|---|
| | Defective spark plug | Clean, adjust plug gap or replace. |
| | Improper ignition timing | Adjust. |
| | Defective ignition coil | Replace. |
| | Disconnected of high tension cable | Replace. |
| | Loose connection or disconnection in primary circuit | Repair or replace. |
| **Fuel system in trouble** | Lack of fuel | Supply. |
| | Dirty fuel strainer | Replace. |
| | Dirty or clogged fuel pipe. | Clean. |
| | Fuel pump will not work properly. | Repair or replace. |
| | Improperly adjusted float level. | Correct. |
| | Improper idling | Adjust. |
| | Dirty or clogged carburetor | Disassemble and clean. |
| | Clogged breather pipe | Clean. |
| **Low compression** | Incorrect spark plug tightening, defective gasket. | Tighten to normal torque, replace gasket. |
| | Improper engine oil grade or viscosity dropping | Replace with proper grade oil. |
| | Incorrect valve clearance | Adjust. |
| | Compression leak from valve seat | Remove cylinder head and lap the valves. |
| | Sticky valve stem | Correct or replace valve. |
| | Weak or defective valve springs | Replace valve springs. |
| | Compression leak at cylinder head gasket | Replace gasket. |
| | Sticking or defective piston ring | Replace piston rings. |
| | Worn piston ring or cylinder | Overhaul engine. |

(Trouble shooting procedure)

Pour engine oil from plug hole, and measure cylinder compression.

| | |
|---|---|
| Compression increases. | Trouble in cylinder or piston ring |
| Compression does not change. | Compression leaks from valve, cylinder head or head gasket. |

| | | |
|---|---|---|
| **IMPROPER ENGINE IDLING** | | |
| **Fuel system in trouble** | Clogged or damaged carburetor jets | Clean or replace. |
| | Incorrect idle adjustment | Adjust. |

| | | |
|---|---|---|
| | Clogged air cleaner | Replace element. |
| | Defective manifold gaskets or carburetor insulator. | Replace gasket. |
| | Improper float level adjustment | Adjust. |
| **Low compression** | | Previsouly mentioned |
| **Others** | Incorrect valve clearance | Adjust. |
| | Extremely low revolution | Adjust. |
| **ENGINE POWER NOT UP TO NORMAL** | | |
| **Low compression** | | Previously mentioned |
| **Ignition system in trouble** | Incorrect ignition timing | Adjust. |
| | Defective spark plugs | Clean, adjust or replace plugs. |
| | Defective distributor points | Dress, or replace points. Check condenser also. |
| | Incorrect octane selector setting | Adjust octane selector. |
| **Fuel system in trouble** | Malfunction of choke system | Adjust. |
| | Clogged fuel pipe | Clean. |
| | Dirty or clogged fuel strainer. | Replace. |
| | Fuel pump will not work properly. | Repair or replace. |
| | Clogged carburetor jets | Disassemble and clean. |
| **Air intake system in trouble** | Clogged air cleaner | Replace element. |
| | Air inhaling from manifold gasket or carburetor gasket | Replace gasket. |
| **Overheating** | Insufficient coolant | Replenish. |
| | Loosen fan belt | Adjust fan belt. |
| | Worn or defective fan belt | Replace. |
| | Defective thermostat | Replace. |
| | Defective water pump | Replace. |
| | Clogged or leaky radiator | Flush, repair or replace. |
| | Defective radiator filler cap | Replace. |
| | Air intrusion into cooling system | Retighten each part of cooling system. |
| | Improper engine oil grade | Replace with proper grade oil. |

| | | |
|---|---|---|
| | Incorrect ignition timing | Adjust. |
| | Defective carburetor (lean mixture). | Overhaul carburetor. |
| **Overcooling** | Defective thermostat | Replace. |
| **Others** | Low octane fuel | Replace with specified octane fuel. |
| | Improper tire pressure | Adjust to specified pressure. |
| | Dragging brake | Adjust. |
| | Clutch slipping | Adjust. |
| **NOISY ENGINE** | | |
| **Car knocking** | Overloading to 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 the 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 the worn or damaged bearings, or unevenly worn crankshaft. Renew the bearings and adjust or change the crankshaft.<br>Check the lubrication system. |
| Connecting rod bearing knocking. | This is a little higher-pitched noise than the crankshaft knocking, and also increases when the engine is accelerated. Cause a misfire on each cylinder and if the noise deminishes almost completely, this crankshaft bearing generates the noise. | Same as the case of crankshaft bearings. |
| Piston and cylinder noise | When you hear an overlapping metalic noise which increases its magnitude with the revolution of the engine and which decreases as the engine is warmed up, this noise is caused by the piston and cylinder. To locate the place, cause a misfire on each cylinder. | This may cause an abnormal wearing of the cylinder and lower compression which in turn will cause a lower out-put power and excessive consumption of oil.<br>Overhaul the engine. |
| Piston pin noise. | This noise is heard at each highest and lowest dead end of the piston. To locate the place, cause a misfire on each cylinder. | This may cause a wear on the piston pin, or piston pin hole.<br>Renew the piston and piston pin assembly. |

| | | |
|---|---|---|
| Water pump noise. | This noise may be caused by the worn or damaged bearings, or by the uneven surface of sliding parts. | Replace the water pump with a new one. |
| Others. | An improper adjustment of the valve clearance | Adjust. |
| | Noise of the timing chain. | Adjust the tension of the chain. |
| | An excessive end-play on the crankshaft<br>Remarks: Disengage the clutch slightly and this noise will stop. | Disassemble the engine and renew the main bearing bush. |
| | Wear on the clutch pilot bushing<br>Remarks: This noise will be heard when the clutch is disengaged. | Renew the bushing and adjust the drive shaft. |
| **ABNORMAL COMBUSTION** (back fire, after fire, run-on etc.) | | |
| **Improper ignition timing** | Improper ignition timing | Adjust the ignition timing. |
| | Improper heat range of the spark plugs | Use specified spark plugs. |
| **Fuel system in trouble** | Damaged carburetor or manifold gasket. (back fire, after fire) | Replace them with new parts. |
| | Defective carburetor jet | Dismantle the carburetor and check it. |
| | Improper function of the float | Adjust the level, and check the needle valve. |
| | Uneven idling | Adjust. |
| **Defective cylinder head, etc.** | Improperly adjusted valve clearance | Adjust it. |
| | Excess carbon in the combustion chamber | Remove the cylinder head and get rid of the carbon. |
| | Damaged valve spring (back fire, after fire) | Replace it with a new one. |
| **EXCESSIVE OIL CONSUMPTION** | | |
| **Oil leakage** | Loose oil drain plug | Tighten it. |
| | Loose or damaged oil pan gasket. | Renew the gasket or tighten it. |
| | Loose or damaged chain cover gasket | Renew the gasket or tighten it. |
| | Defective oil seal in front and rear of the crankshaft | Renew the oil seal. |
| | Loose or damaged locker cover gasket | Renew the gasket or tighten it (but not too much). |

| | | |
|---|---|---|
| | Improper tightening of oil filter | Renew the gasket and tighten it with the proper torque. |
| | Loose or damaged oil pressure switch | Renew the oil pressure switch or tighten it. |
| **Excessive oil consumption** | Worn cylinder and piston | Overhaul the cylinder and renew the piston. |
| | Improper location of the piston ring gap or reversely assembled piston ring. | Remount the piston rings. |
| | Damaged or seized piston rings | Renew the rings.<br>Repair or renew the piston and cylinder. |
| | Worn piston ring groove and rings | Renew the piston and piston ring. |
| | Fatigue of valve oil seal lip | Replace the seal lip with a new one. |
| | Worn valve stem | Renew the valve or the guide. |
| **Others** | Inadequate quality of engine oil. | Use the designated oil. |
| | Engine overheat | Previously mentioned |
| **EXCESSIVE FUEL CONSUMPTION** | | |
| **See the explanation of the power decrease** | | |
| **Others** | Exceeding idling revolution | Adjust it to the designated rpm |
| | Defective acceleration recovery. | Adjust it. |
| | Fuel leakage | Repair or tighten the connection of fuel pipes. |
| **TROUBLE IN OTHER FUNCTIONS** | | |
| **Decreased oil pressure** | Inadequate oil quality | Use the designated oil. |
| | Overheat | Previously mentioned |
| | Defective function of oil pump regulator valve | Disassemble the 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. |
| | Increased clearance in various sliding parts | Disassemble and replace the worn parts with new ones. |

| | | |
|---|---|---|
| | Blocked oil strainer | Clean it. lean it. |
| | Troubles in the oil gauge pressure switch | Replace it with a new one. |
| **Excessive wear on the sliding parts** | Oil pressure decreases | Previously mentioned |
| | Defective quality or contamination of oil | Exchange the oil with proper one and change the element. |
| | Defective air cleaner | Change the element. |
| | Overheat or overcool | Previously mentioned. |
| | Improper fuel mixture | Check the fuel system. |
| **Seizure 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. |

## SERVICE JOURNAL OR BULLETIN REFERENCE

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