



# ENGINE WORKSHOP MANUAL

## PETROL ENGINE

BON-P-GE-3.0HP, BON-P-GE-3.5HP, BON-P-GE-4.0HP & BON-P-GE-5.0HP

## **PREFACE**

This workshop manual covers the construction, function and servicing Procedures of the BONHOEFFER MACHINES PVT. LTD

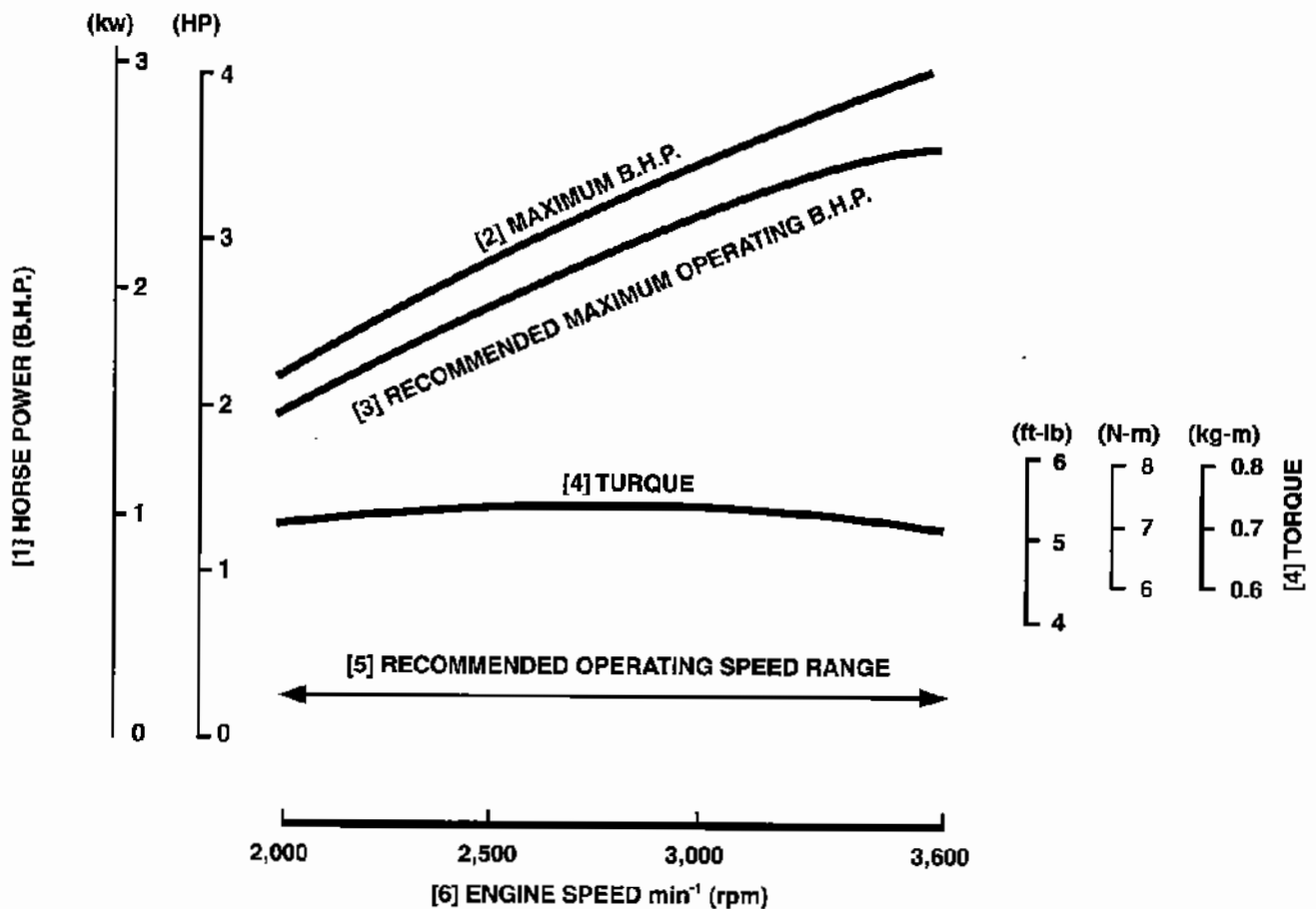
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**PERFORMANCE CURVES**

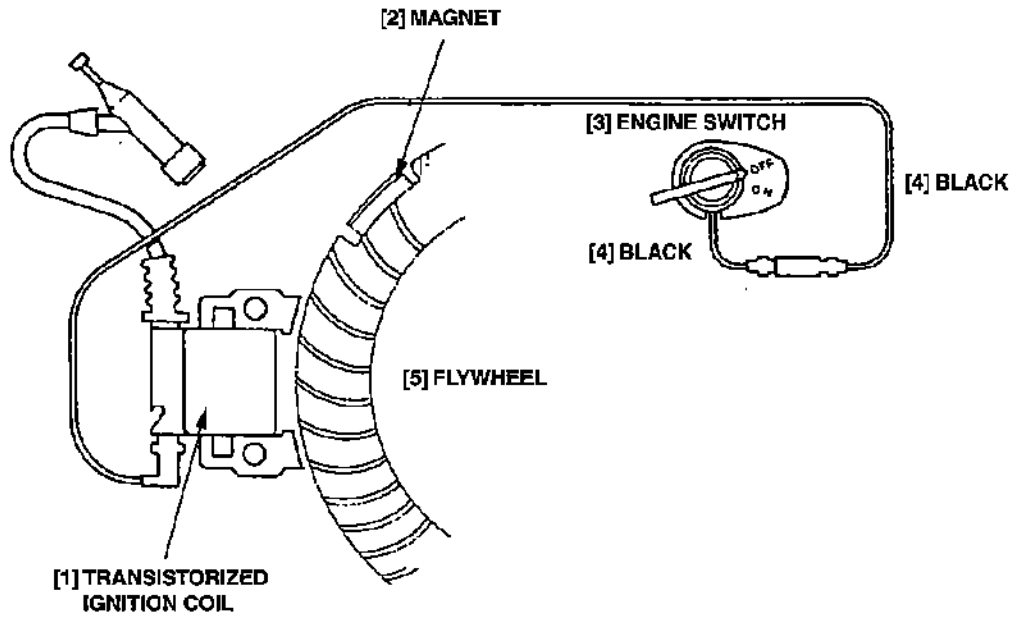
Tests were conducted according to SAE standard No. J607a. Power curves are for standard sea level atmospheric pressure of 29.92 in. (760 mm) Hg at a temperature of 60° F (15.6°C). Power curves are of a standard test engine equipped with standard air cleaner, muffler and other power consuming devices. Power output will decrease 3.5 % for each 1,000 ft. (305 m) of elevation above sea level and 1% for each 10°F (5.6°C) rise above the standard temperature of 60°F (15.6°C). As shipped, production engines will develop not less than 90% of the "Maximum B.H.P."

After being run-in, they will develop not less than 95% of the "Maximum B.H.P." For practical operations, the B.H.P. load and engine speed should not exceed the limit defined by the "Recommended Maximum Operating B.H.P." curve. Continuous operation should not exceed 85% of the Maximum B.H.P.

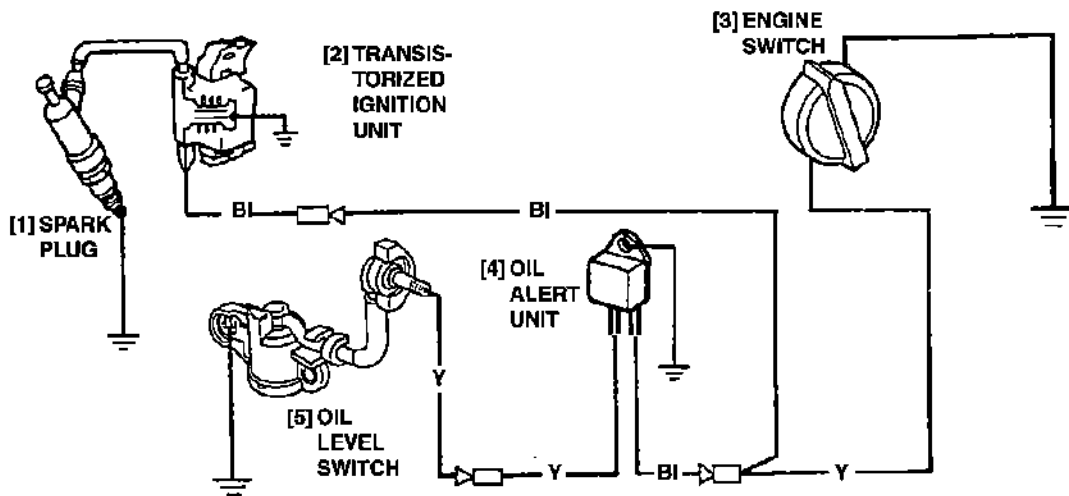


**WIRING DIAGRAMS**

<Without electric starter and oil alert>



<Without electric starter/With oil alert>



## GENERAL SAFETY

Pay attention to these symbols and their meanings:

- ⚠ WARNING** Indicates a strong possibility of severe personal injury or death if instructions are not followed.  
**CAUTION:** Indicates a possibility of personal injury or equipment damage if instructions are not followed.

### ⚠ WARNING

- Stop the engine, and remove the spark plug cap and ignition key before servicing.
- If the motor must be running to do some work, make sure the area is well ventilated. Never run the engine in a closed area; the exhaust contains poisonous carbon monoxide gas.
- Gasoline is extremely flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.

### CAUTION

- Keep away from rotating or hot parts and high voltage wires when the engine is running.

## SERVICE RULES

1. Use genuine Bonhoeffer or Bonhoeffer-recommended parts and lubricants or their equivalents. Parts that do not meet Bonhoeffer's design specifications may damage the engine.
2. Use the special tools designed for the engine.
3. Install new gaskets, O-rings, etc. when reassembling.
4. When torquing bolts or nuts, beginning with larger-diameter or inner bolts first and tighten to the specified torque diagonally, unless a particular sequence is specified.
5. Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before reassembly.
6. After reassembly, check all parts for proper installation and operation.
7. Many screws used in this machine are self-tapping. Be aware that cross-threading or overtightening these screws will strip the female threads and ruin the hole.
8. Use only metric tools when servicing this engine. Metric bolts, nuts and screws are not interchangeable with nonmetric fasteners. The use of incorrect tools and fasteners will damage the engine.
9. Follow the instructions represented by these symbols when they are used:



: Apply oil



: Use special tool

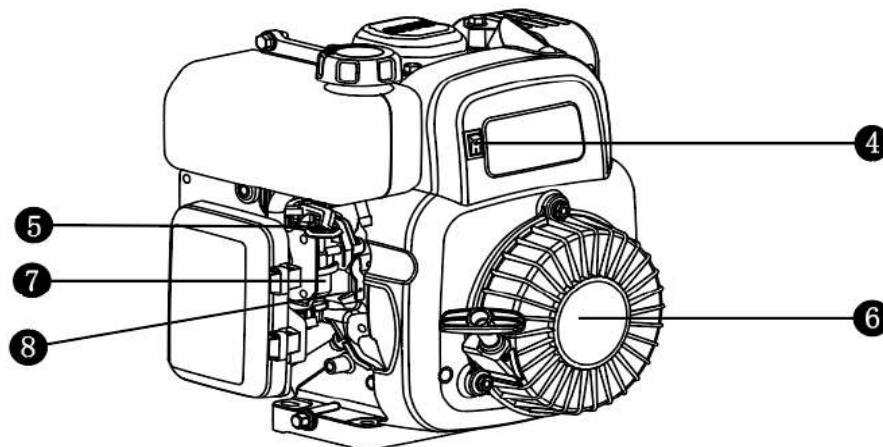


: Apply grease

O x O (O) : Indicates the type, length, and number of the flange bolt used.

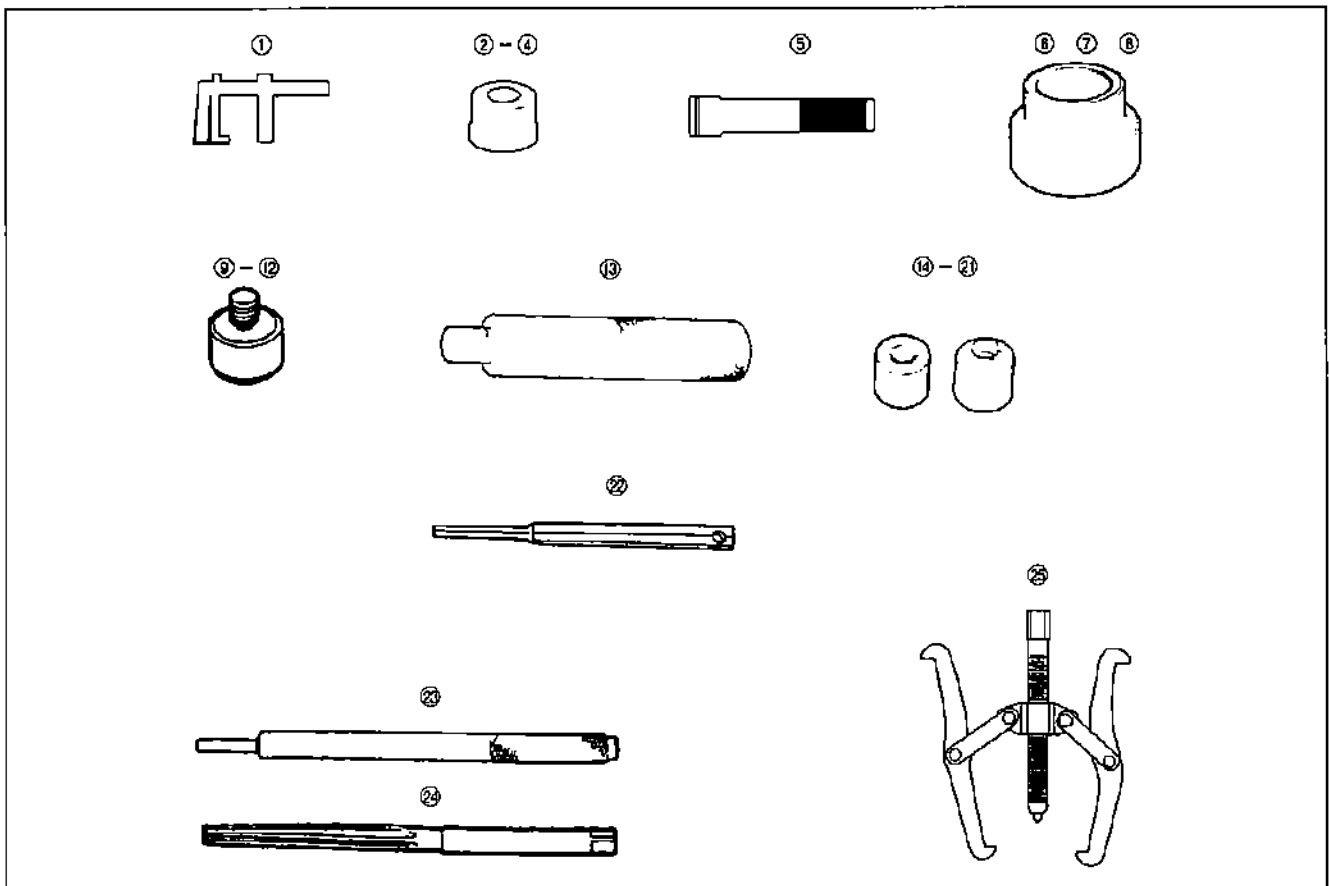
## SERIAL NUMBER LOCATION

The engine serial number, the type and the variation are stamped on the crankcase. Refer to these when ordering parts or making technical inquiries



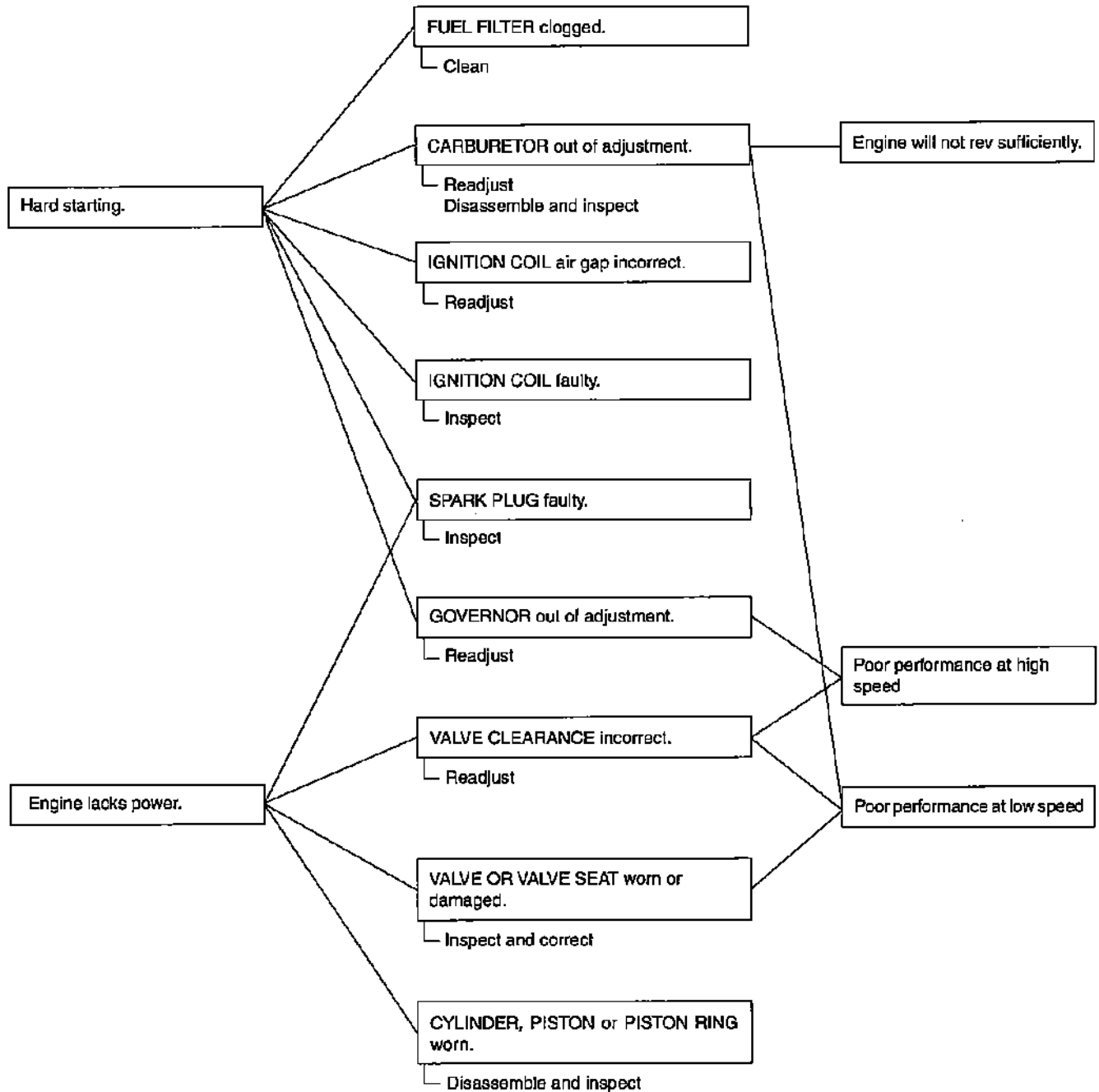
**SPECIAL TOOLS**

REF. NO	DESCRIPTION	APPLICATION
①	Float level gauge	Carburetor float level inspection
②	Attachment, 42 x 47 mm	6204 bearing installation
③	Attachment, 52 x 55 mm	6205, 62/22 bearing installation
④	Attachment, 62 x 68 mm	6206, 6305 bearing installation
⑤	Driver, 40 mm I.D.	Driver for tools 6, 7 and 8
⑥	Attachment, 25 mm I.D.	Timing gear installation (3HP to 5 HP)
⑦	Attachment, 30 mm I.D.	Governor drive gear timing gear (3HP to 5HP) installation
⑧	Attachment, 35 mm I.D.	Governor drive gear installation (3HP to 5HP)
⑨	Pilot, 22 mm	62/22 bearing installation
⑩	Pilot, 20 mm	6204 bearing installation
⑪	Pilot, 25 mm	6205, 6305 bearing installation
⑫	Pilot, 30 mm	6206 bearing installation
⑬	Driver	Driver for tools 2, 3 and 4
⑭	Valve seat cutter 45° ø24.5	Exhaust valve seat reconditioning (3HP to 5HP)
⑮	Valve seat cutter 45° ø27.5	Intake valve seat reconditioning (3HP to 5HP)
⑯	Valve seat cutter 45° ø22	Exhaust, intake valve seat reconditioning (3HP to 5HP)
⑰	Valve seat cutter 32° ø25	Exhaust valve seat reconditioning (3HP to 5HP)
⑱	Valve seat cutter 32° ø28	Intake valve seat reconditioning (3HP to 5HP)
⑲	Valve seat cutter 32° ø22	Exhaust, intake valve seat reconditioning (3HP to 5HP)
⑳	Valve seat cutter 60° ø30	Exhaust, intake valve seat reconditioning (3HP to 5HP)
㉑	Valve seat cutter 60° ø22	Exhaust, intake valve seat reconditioning (3HP to 5HP)
㉒	Valve seat cutter holder, 5.5 mm	Valve seat reconditioning
㉓	Valve guide driver	Valve guide removal/installation
㉔	Valve guide reamer	Valve guide I.D. reaming
㉕	Flywheel puller	Flywheel removal

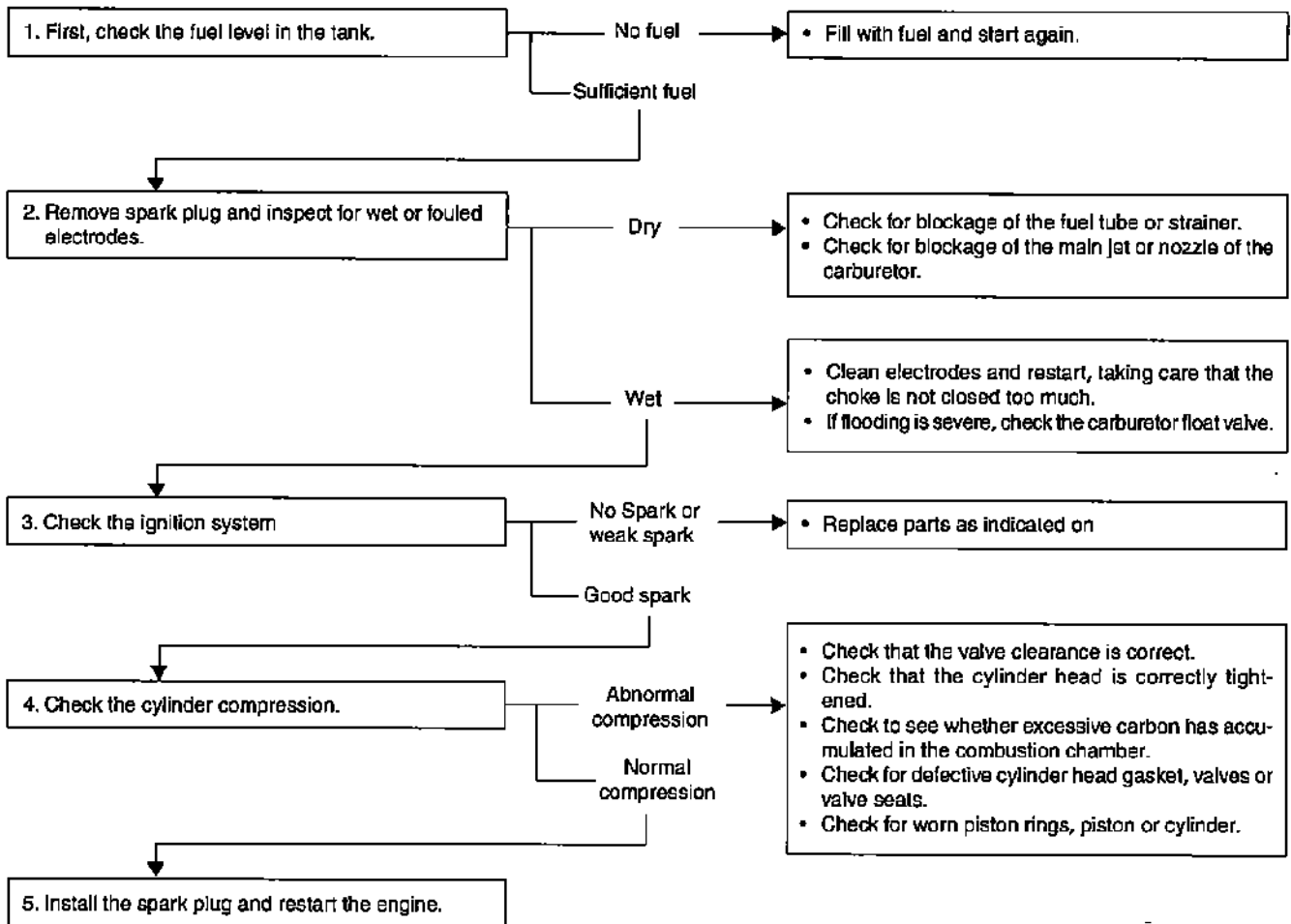


## TROUBLESHOOTING

### a. GENERAL SYMPTOM AND POSSIBLE CAUSES



## b. HARD STARTING

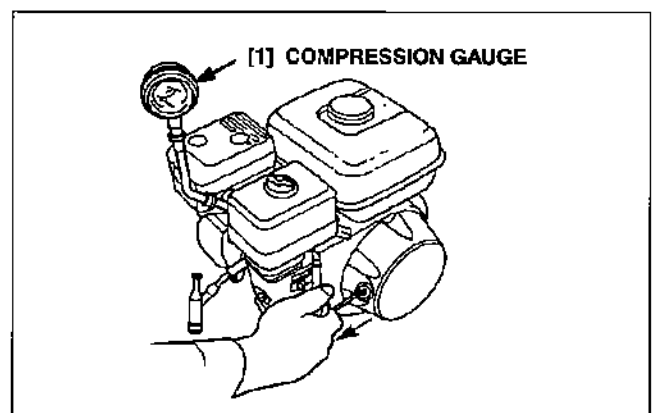


### CYLINDER COMPRESSION CHECK

(Mechanical decompressor engaged)

- 1) Remove the spark plug and install a compression gauge in the spark plug hole.
- 2) Crank the engine several times with the recoil starter and measure the compression.

Compression	6.0 – 8.5 kg/cm <sup>2</sup> (85 – 121 psi) at 600 min <sup>-1</sup> (rpm)
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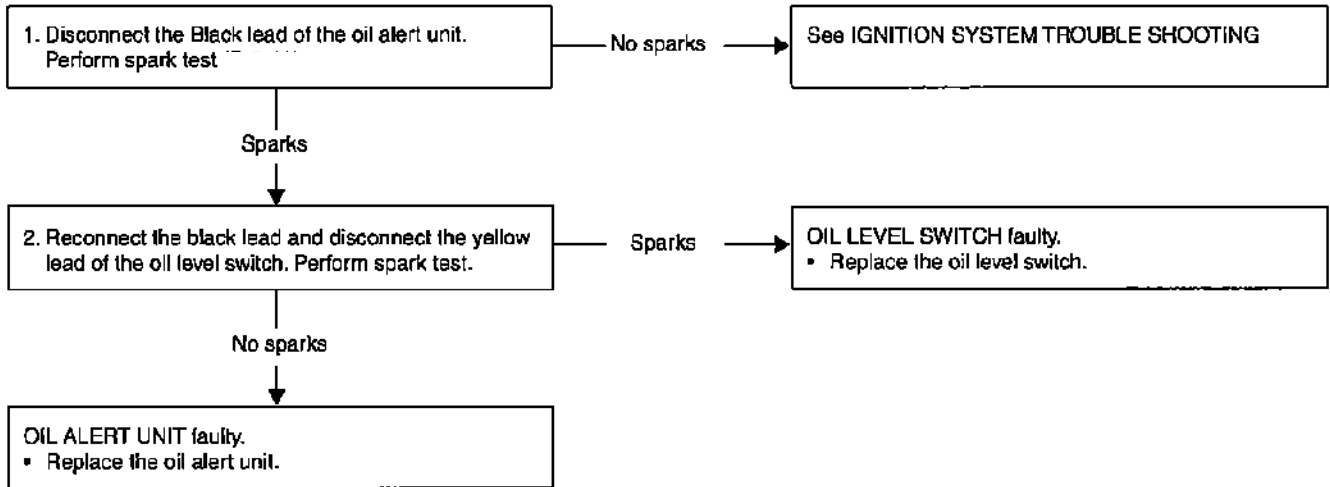


**c. OIL ALERT SYSTEM**

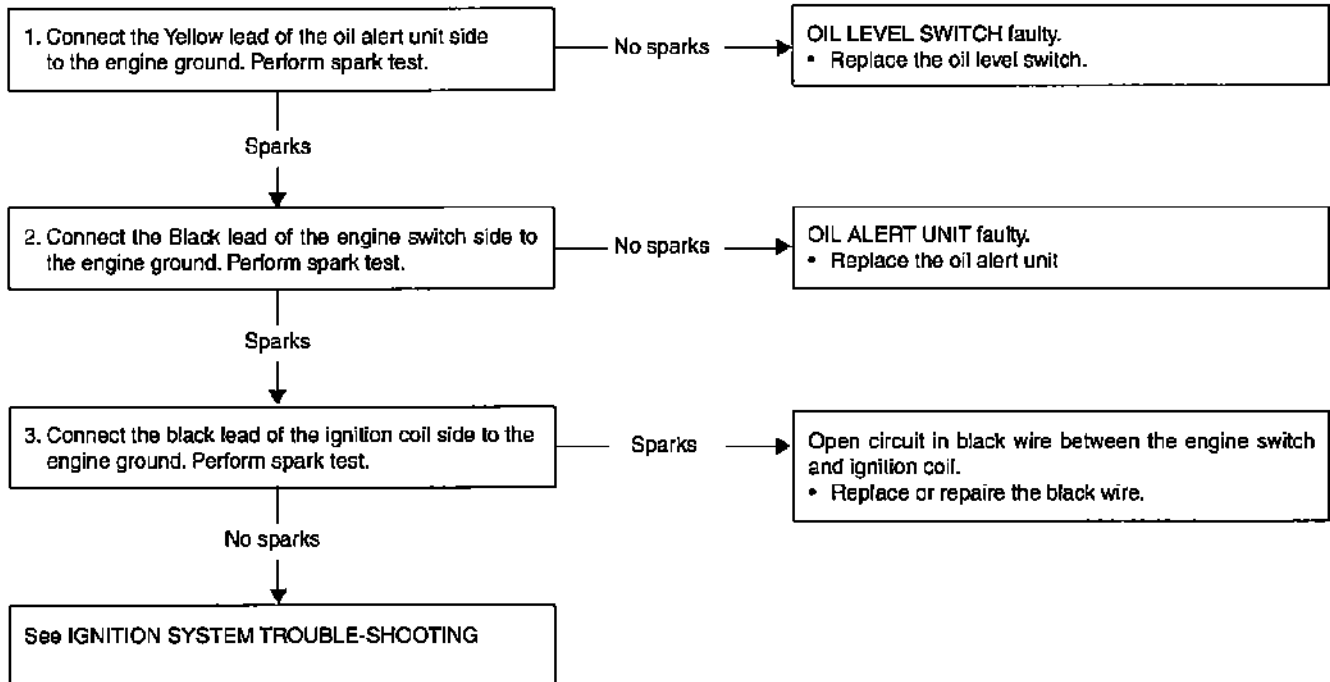
**CAUTION**

- Never start the engine when the oil has been drained.

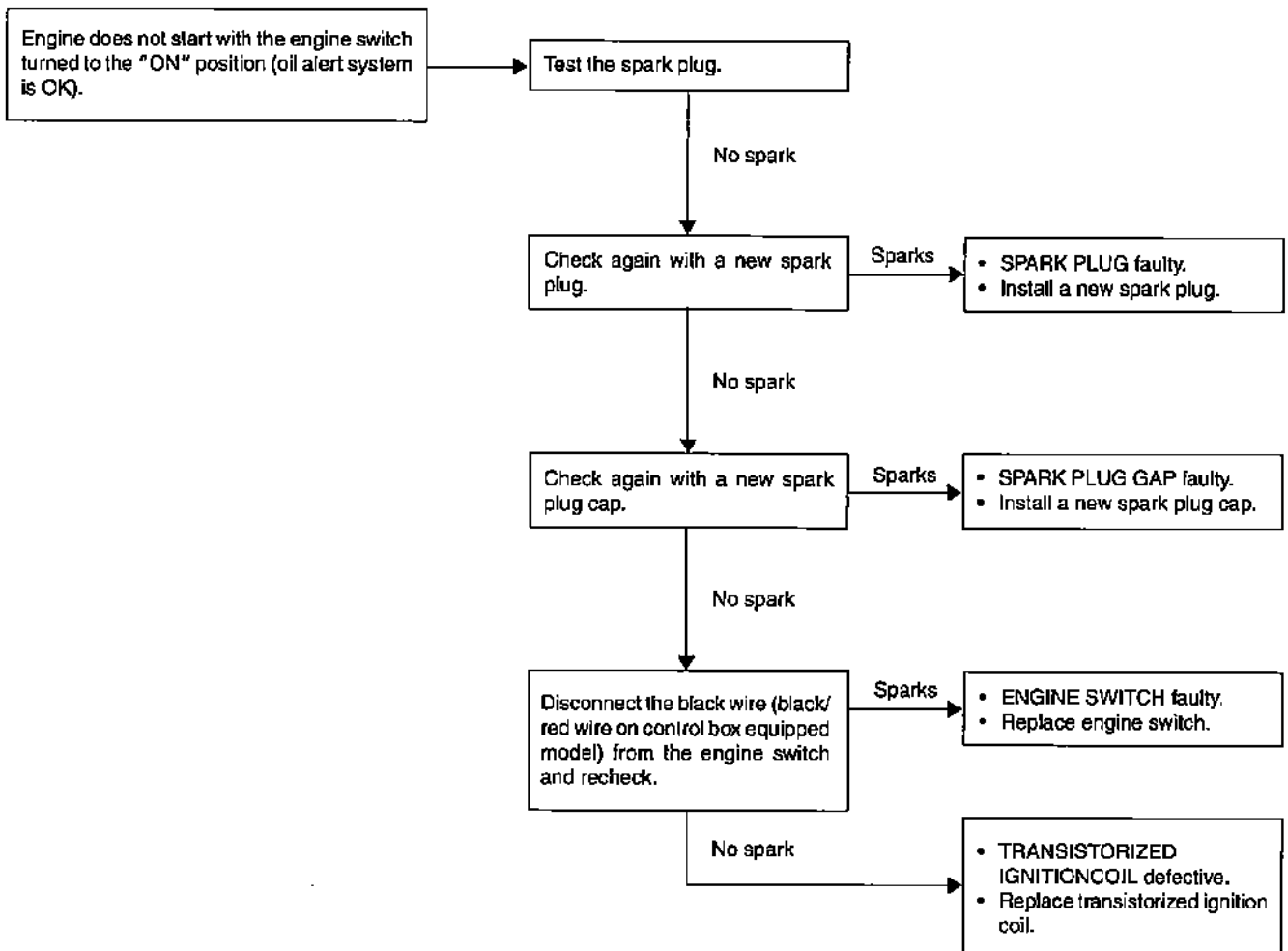
- Engine Does not Start with Engine Switch ON.
- Check oil level before proceeding. Add the recommended engine oil if necessary.



- Engine Does not Stop When the Engine oil Is Insufficient.
- Before proceeding, drain the engine oil.



**d. IGNITION SYSTEM**

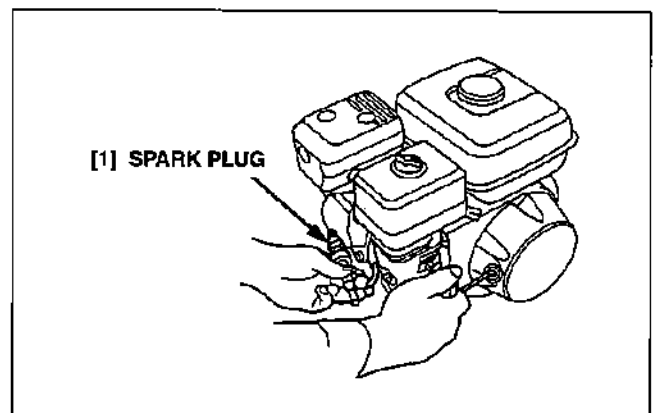


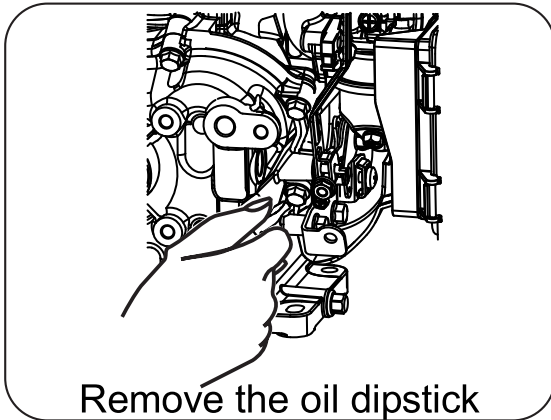
**SPARK TEST**

- 1) Remove the spark plug.
- 2) Install the spark plug to the spark plug cap and ground the side electrode against the cylinder head cover.
- 3) Turn the engine switch to the "ON" position, pull the recoil starter and check to see if sparks jump across the electrodes.

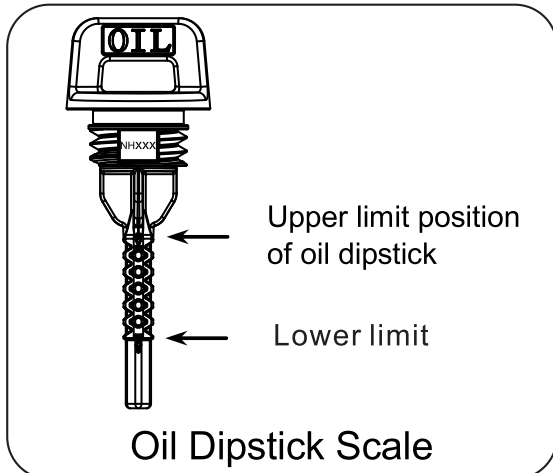
**⚠ WARNING**

- Never hold the spark plug lead with wet hands while performing this test.
- Make sure that no fuel has been spilled on the engine and the plug is not wet with fuel.
- To avoid fire hazards, do not allow sparks near the plug hole.





3. Fill the recommended engine oil, until the oil reaches the upper limit.



**⚠ CAUTION**

**Inspection of Filling Scale**

Insert the oil dipstick into the oil filler again, and stay at the filler neck. Do not screw the oil dipstick into the oil filler.

4. Tighten the oil dipstick completely.
5. Please use approved waste engine oil recovery equipment for used oil disposal.

**Replace the Engine Oil**

**⚠ CAUTION**

Replace the engine oil when the engine is under heating state.

1. Place the engine on flat ground.
2. Clean the area around oil dipstick and oil drain plug.
3. Remove the oil dipstick.
4. Remove the oil drain plug, and drain off engine oil.
5. Replace and tighten the oil drain plug securely.
6. Fill the recommended engine oil, until the oil reaches the upper limit (see the above-mentioned "Filling the Engine Oil").
7. Tighten the dipstick completely.
8. Please use approved waste engine oil recovery equipment for used oil disposal.

**⚠ WARNING**

The engine is not filled with oil before delivery, Before filled with engine oil of recommended grade and quantity, any engine operation could result in damage to the engine and the warranty invalidation at same time.

## Air Filter

1. Screw off air filter cover.



2. Remove the foam/paper element.
3. Paper filter element: Remove the internal impurities of paper filter element (do not wash, soak or destroy its structure);

Foam filter element: Clean the foam filter element in liquid detergent and hot water, and then wrap it with a piece of clean cloth and extrude water, for the purpose of complete dryness. Dip it in clean engine oil. Finally, wrap it with a piece of clean absorbent cloth, and extrude excessive engine oil.

4. Reinstall the filter element into assembly.
5. Replace the air filter cover,

and then install the air filter.

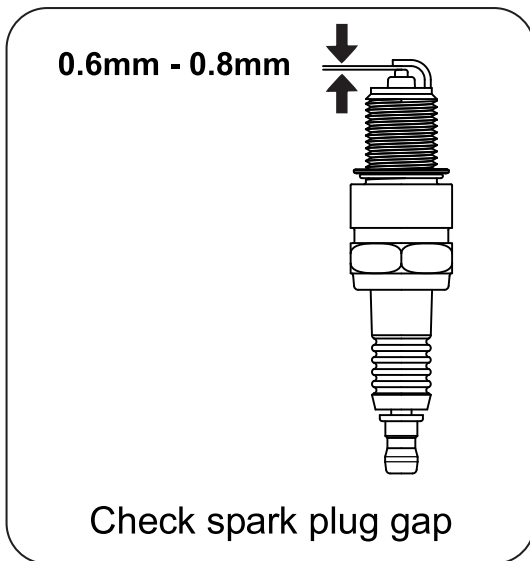
### **⚠ WARNING**

Do not operate the engine without air filter. Otherwise, it could result in damage to the engine.

## Spark Plug

1. Clean the spark plug cap, and remove the dirt at the bottom of spark plug.
2. Remove the spark plug cap.
3. Use spark plug socket to loose and remove the spark plug.
4. Observe the spark plug and spark plug gasket. If they are damaged or worn, please replace them with new ones. If it is required to reuse them, clean them with a steel wire brush.
5. Inspecting the spark plug gap. If necessary, please bend one of the electric shock ends carefully to adjust the gap.

**Spark plug gap:0.6mm - 0.8mm.**



6. Screw the spark plug into the engine carefully with hands.
7. After the spark plug is fixed, tighten it with special socket for spark plug.

**Spark plug tightening torque: 20-25 N.m**

8. Install the spark plug cap on the spark plug, so that spark plug cap is connected with spark plug.

**⚠ WARNING**

Use the recommended or equivalent spark plug. Do not use the spark plug having an improper heat value range.

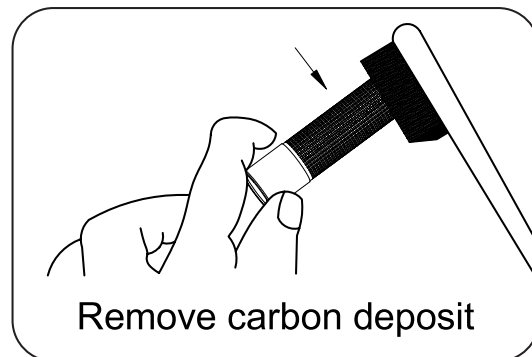
**Spark Extinguisher**

(If equipped)

1. Before spark extinguisher

check, cool down the engine completely.

2. Remove the two screws on the fixing cover plate, which is connected with the end of spark extinguisher, so that it is kept in the muffler.
3. Remove the spark extinguisher strainer.
4. Remove the carbon deposit on the spark extinguisher strainer with a steel wire brush carefully.



5. Replace the spark extinguisher if damaged.
6. Reinstall the spark extinguisher on the muffler, and fix it with two screws.

**3. Idling Speed**

Idling speed has been preset in the factory. Adjustment is only required in very rare situations. If adjustment is necessary, please contact a local authorized distributor.

**⚠ WARNING**

Before delivery, the engine is not filled with oil. Before it is filled with engine oil of recommended grade and quantity properly, any attempt to rotate crankshaft or start engine could result in permanent damage to the engine and product warranty invalidation.

2 minutes. Unscrew the fuel tank cap slowly to decrease the pressure in tank.

Use fresh and clean unleaded gasoline.

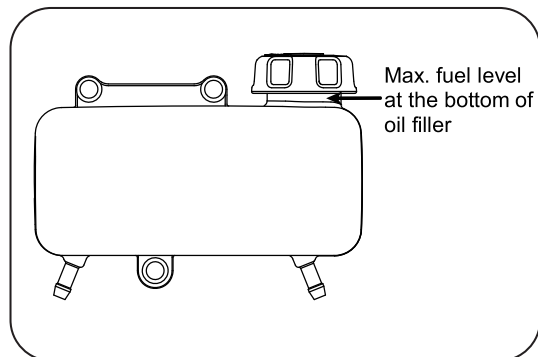
Do not mix engine oil with fuel.

Ensure the fuel level does not exceed the upper limit mark, so as to reserve volatilizing space for gasoline.

**Fuel quantity (rated):**  
see parameter.

**⚠ WARNING**

Engine oil is an important factor with influences on performance and service life. Please use four-stroke engine oil recommended in the chapter of Maintenance.



**4 Engine Fuel**

After the engine stops, check the fuel quantity. If necessary, please fill the fuel.

**⚠ CAUTION**

A certain pressure will come into being due to gasoline volatilization in fuel tank. Before fuel tank cap is removed, please cool down the engine for at least

**⚠ DANGER**

For the fuel filled into fuel tank, the fuel level shall not exceed the upper limit. Overfilling could result in unstable engine operation or even flameout, damage to carbon canister (if equipped), and invalidation of product warranty.





**BONHOEFFER**