

Duro
NEXT GENERATION

Max
POWER SYSTEMS

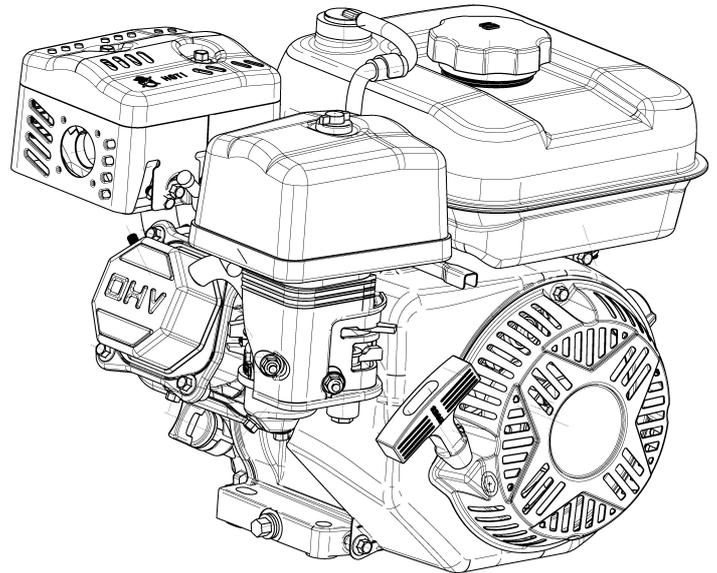
Gasoline Engine Owner's Manual

XP7HP

XP7HPE

XP16HP

XP16HPE



Max Tool Customer Service

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or call 1-800-629-3325 (option 3) Monday -Thursday 6am to 7pm, Friday 6am to 5:30pm. PST

Product Support (Product: information, application, service info & warranty questions)

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or call 1-800-629-3325 (option 3) Monday -Thursday 6am to 7pm, Friday 6am to 5:30pm. PST

This manual provides information regarding the operation and maintenance of these products. We have made every effort to ensure the accuracy of the information in this manual. We reserve the right to change this product at any time without prior notice. Please keep this manual available to all users during the entire life of the engine.

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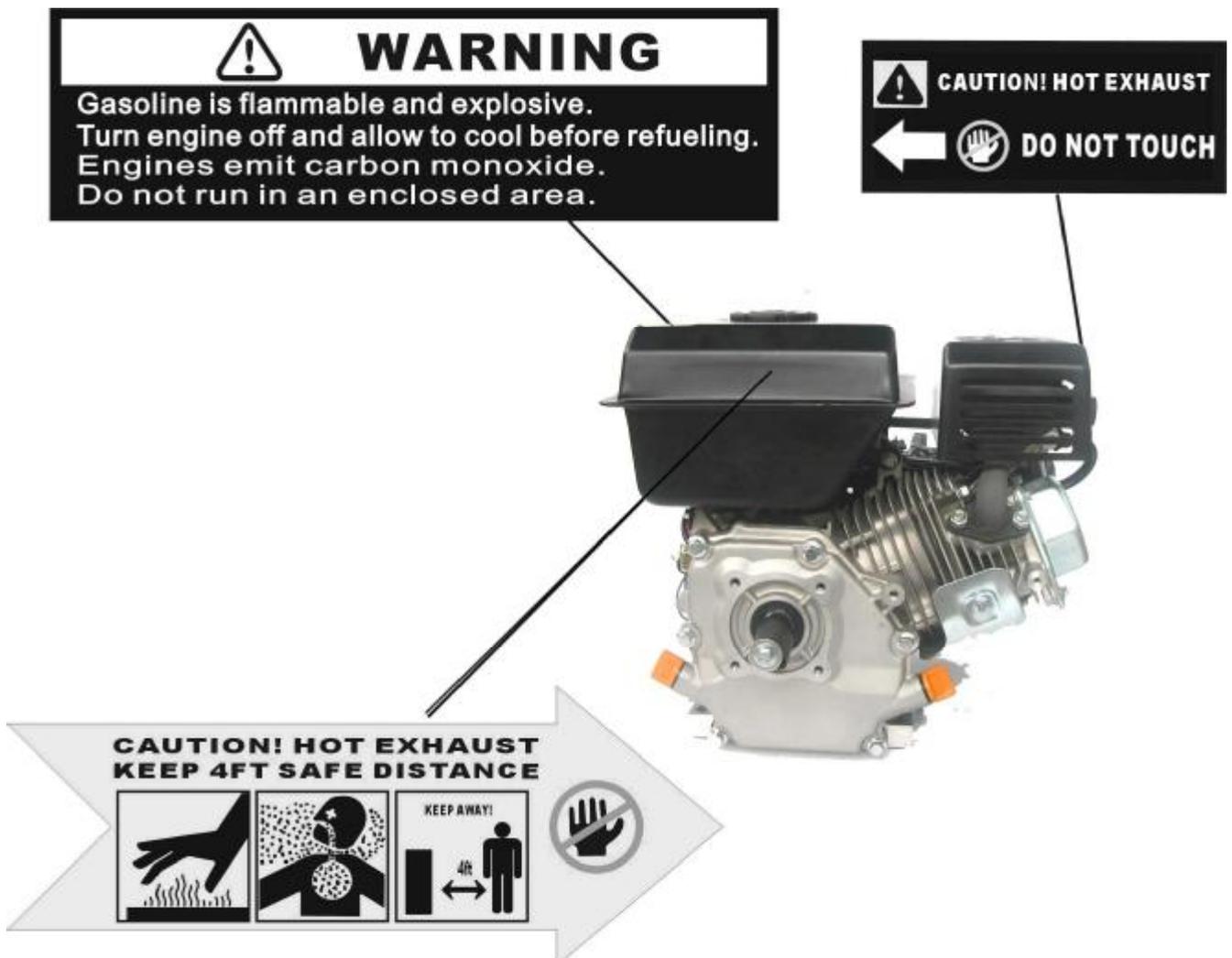
SAFETY PRECAUTIONS

WARNING:

Before operating the engine, be sure to read and familiar with the manual carefully, otherwise personal injury or equipment damage may produce.

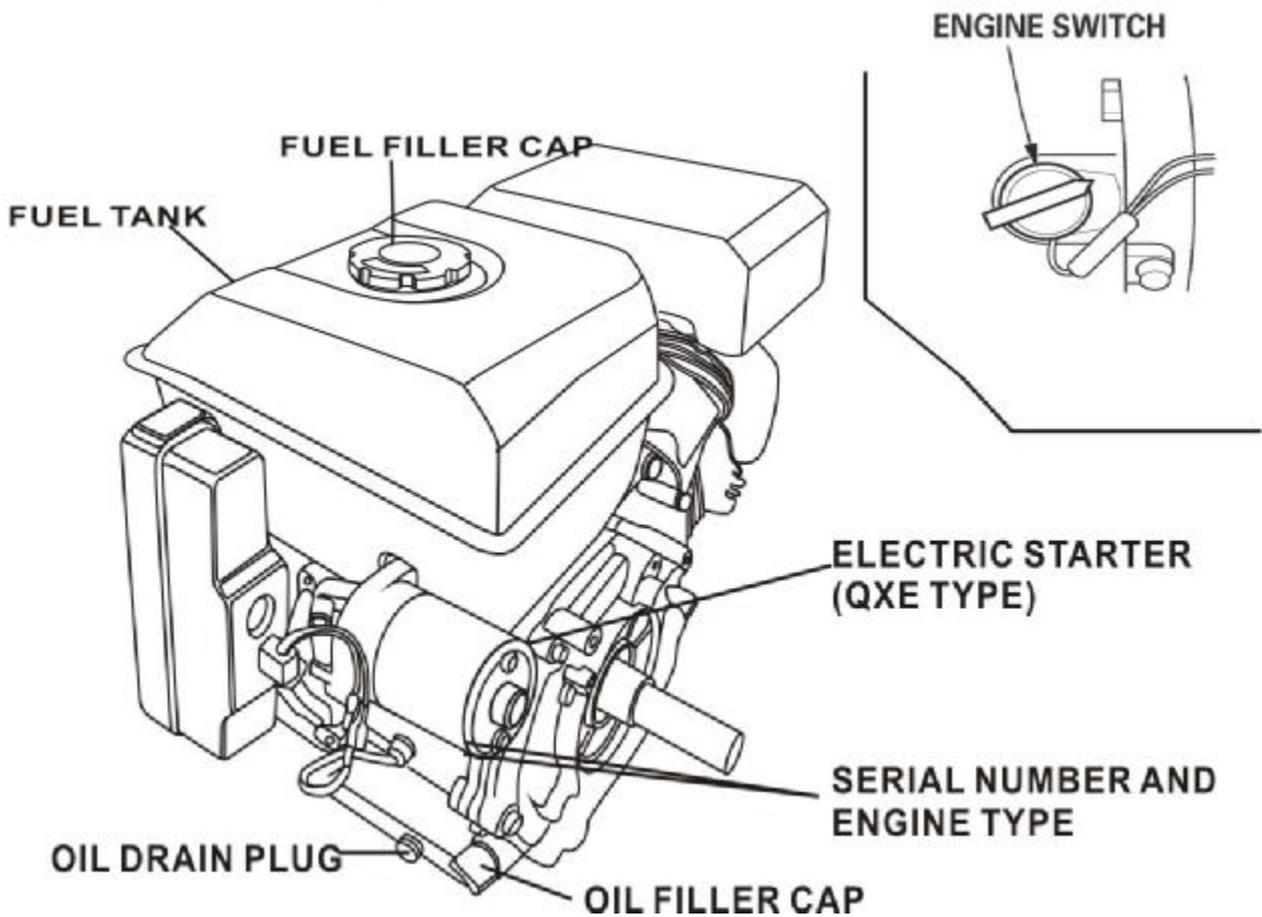
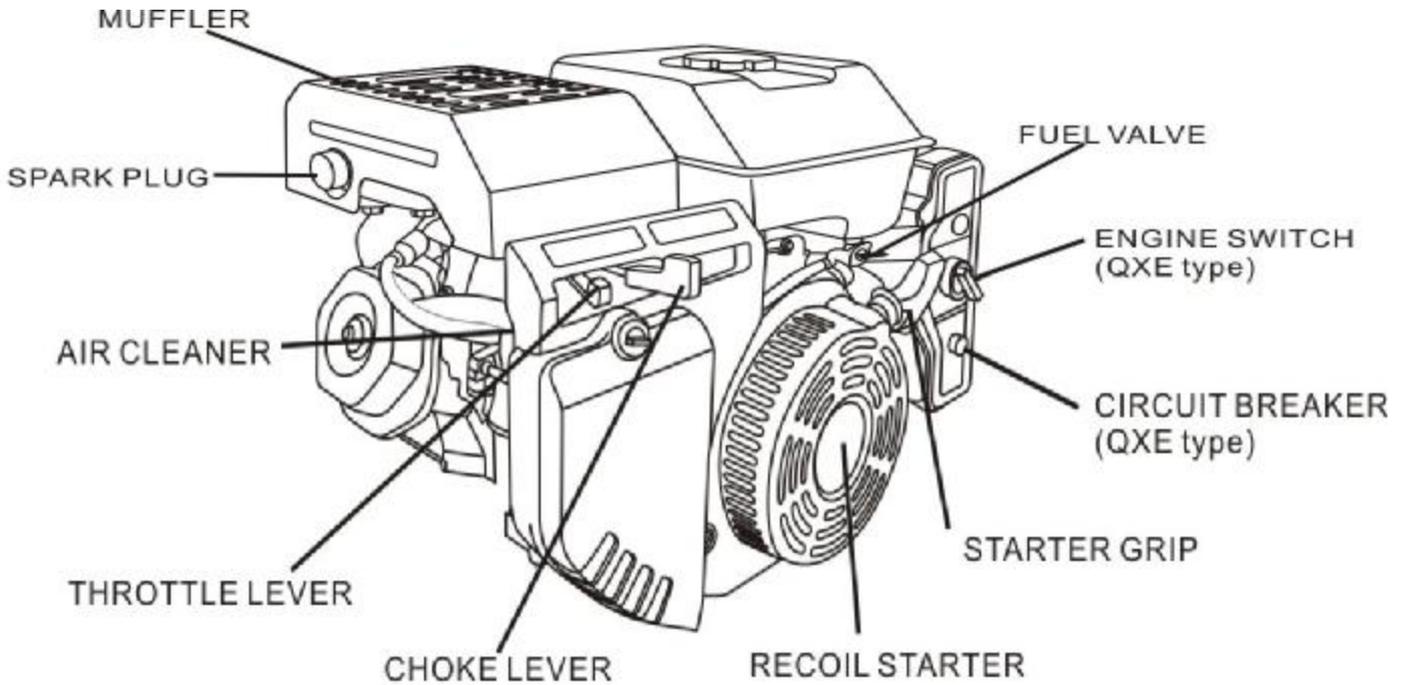
Please pay special attention to the following:

1. Running the engine in a well-ventilated place, keep it at least one meter away from building walls or other equipments, keep away from inflammables such as gasoline, matches and so on to avoid possibility of fire.
2. Keep the engine out of reach of children and pets to avoid accidents.
3. Operator of engine has been specially trained.
4. Refuel in a well-ventilated area with the engine stopped, and in places refueling or storing gasoline, no smoking and any flames or sparks.
5. Refuel the fuel tank not too full so as to avoid fuel's spilling out. If there is spilled fuel around, be sure to clean it thoroughly before starting.
6. Locate the engine on a level-working platform to avoid fuel's spilling out.
7. Make sure the fuel filler cap is tightened securely.
8. The exhaust muffler is very hot during running the engine even after the engine stops. Never touch it, or you may get burns. Transport or store the engine with it cooling down entirely.



PARTS DESCRIPTION

The main parts of engine are located as follows



BATTERY CONNECTION (electric-start type)

In the case that the specifications of the battery are **12V** and more than **18A.h** connect its positive lead to the electromagnetic coil while connect its negative lead to engine mount strew, base screw or any place capable of grounding with the engine well.

Make sure the battery leads are connected tightly and no corrosion is found. If any, eliminate it.

WARNING:

- The battery may give off explosive gas; keep sparks, flames and cigarettes away. Charge or use it in an area with good ventilation.

- The battery contains sylphlike acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.

If electrolyte gets in your skin, flush with water;

if gets in your eyes, flush with water for at least 15 minutes and call a physician at once.

- Electrolyte is poisonous. If swallowed, drink large quantities of water or milk, and follow with milk of magnesia or vegetable oil and oil a physician.

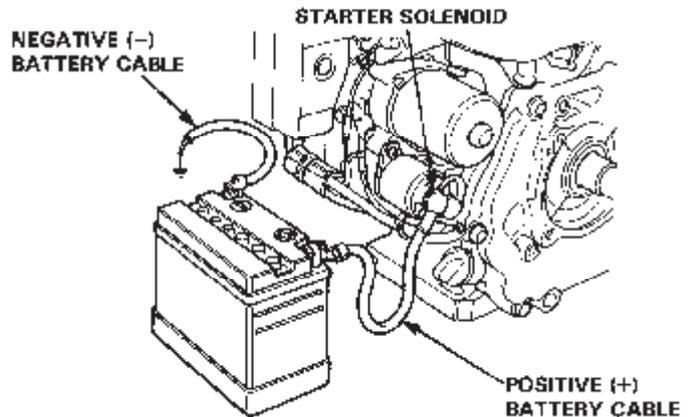
- Keep out of reach of children.

CAUTION:

- Do not add tap water to the battery instead of distilled water, or the battery life will be short-need.

- Do not add distilled water over electrolyte upper level mark, or electrolyte will spill out to corrupt the engine parts. If so, be sure to wash them away with water.

- Make sure not to connect the battery leads in reverse or-deer, or short-circuit or breaker's cutting may result.



PRE-OPERATE INSPECTION

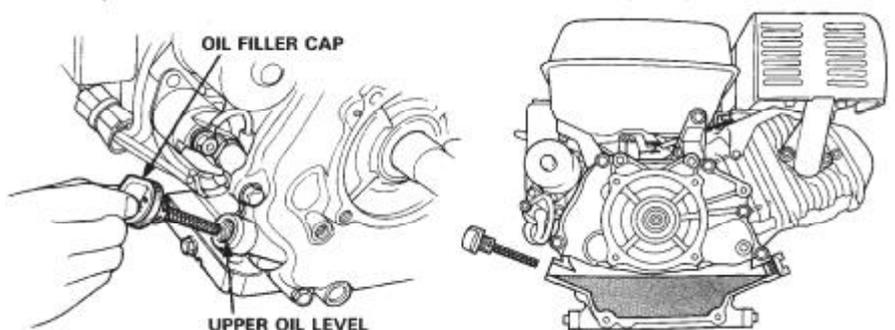
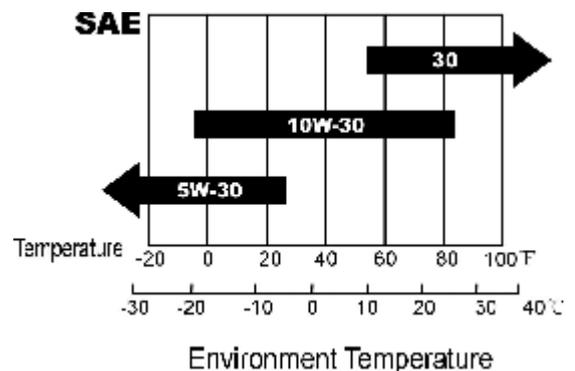
ENGINE OIL

CAUTION:

- Engine oil is key factor in deciding the engine's performance. Do not apply engine oil with additives or 2-stroke gasoline oil, as they haven't enough lubrication, which may shorten the en-gene's service life.

- Check the engine with it stopped on a level ground. Engine oil recommended: SAE10W-30

As viscosity varies with regions and temperatures, so the lubricant has to be



selected in accordance with our recommendation.

Check

1. Ensure that the engine is stopped on a level ground.
2. Remove the dipstick and clean it.
3. Reinsert the dipstick into the oil filler without screwing it, and check oil level.
4. If the oil level is too low, add the recommended engine oil up to the oil filler neck.
5. Reinstall the dipstick.

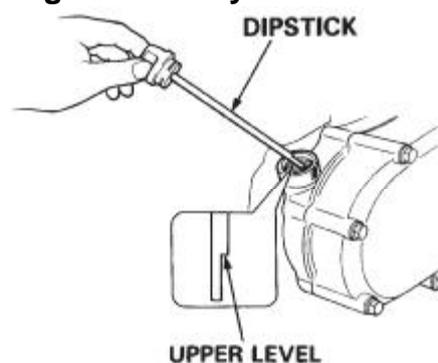
CAUTION: Run with insufficient engine oil may damage the engine severely.

OIL IN THE REDUCTION GEAR BOX (only for the model equipped with it) 1/2 Reduction gear with an auto-centrifugal clutch

Brand of the box oil is the same as that of engine oil.

Oil capacity: 0.5liters for 190N, 0.3liters for 170N. Check the oil level in the following order.

1. Remove the dipstick and clean it.
2. Reinsert the dipstick without screwing it in, and then check oil level
3. If the oil level is too low, add the recommended engine oil until it arrives the upper level mark.
4. Reinstall the dipstick.



AIR CLEANER

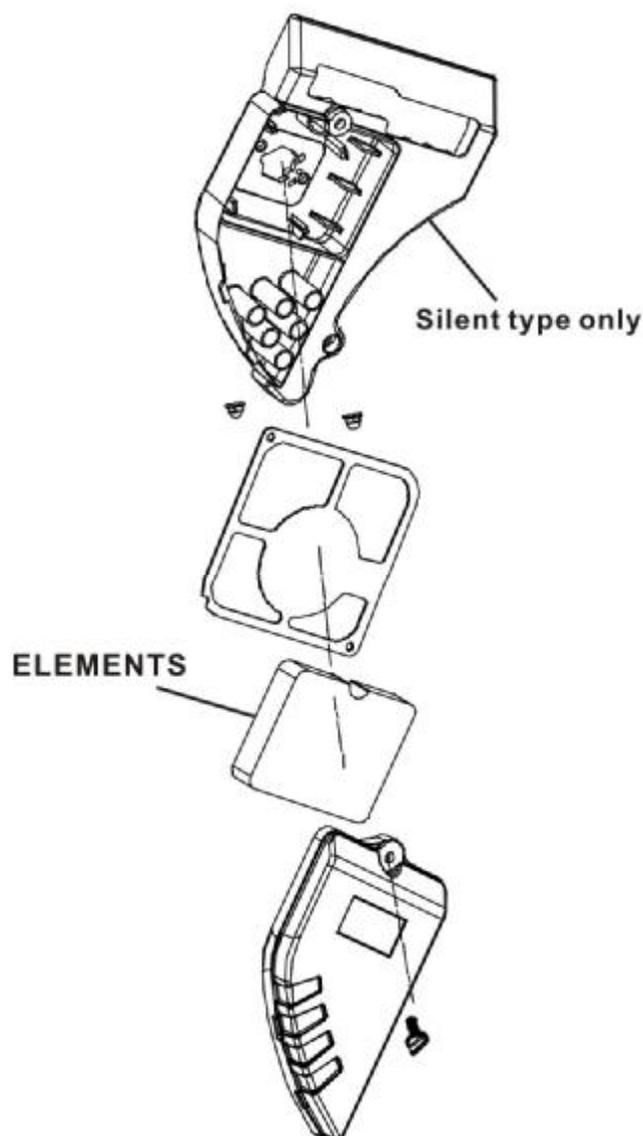
I. Double-core type

Dismantle the air cleaner housing and check its filter element, make sure it clean and intact, otherwise clean or replace it.

II. Dust-collecting type

1. Dismantle the dust-collecting hood and check the filter element of the air cleaner; make sure it is clean and intact, otherwise clean or replace.
2. Check whether there is any dust or dirt inside the dust-collecting hood, if any, clears away.

III. Single-core type



Dismantle the air cleaner housing and check its filter element, make sure it is clean and intact, otherwise clean or replace.

IV. Oil-bath type

1. Dismantle the air cleaner housing and check its core, make sure it is clean and intact, otherwise clean or replace.
2. Check oil level and oil quality. If the oil level is too low, add the recommended engine oil up to oil level mark.

CAUTION:

Never run the engine without an air cleaner, or severe wear of the engine may result.

FUEL AND FUEL TANK

Fuel

To ensure that the engine runs smoothly use only FRESH, UNLEADED GAS WITH AN OCTANE RATING OF 87 OR HIGHER. Using unleaded gasoline will decrease the possibility of producing carbon deposit and will prolong the engine's service life. Never apply used or polluted gasoline or a mixture of gasoline with engine oil. Make sure the fuel is free of dirt and water.

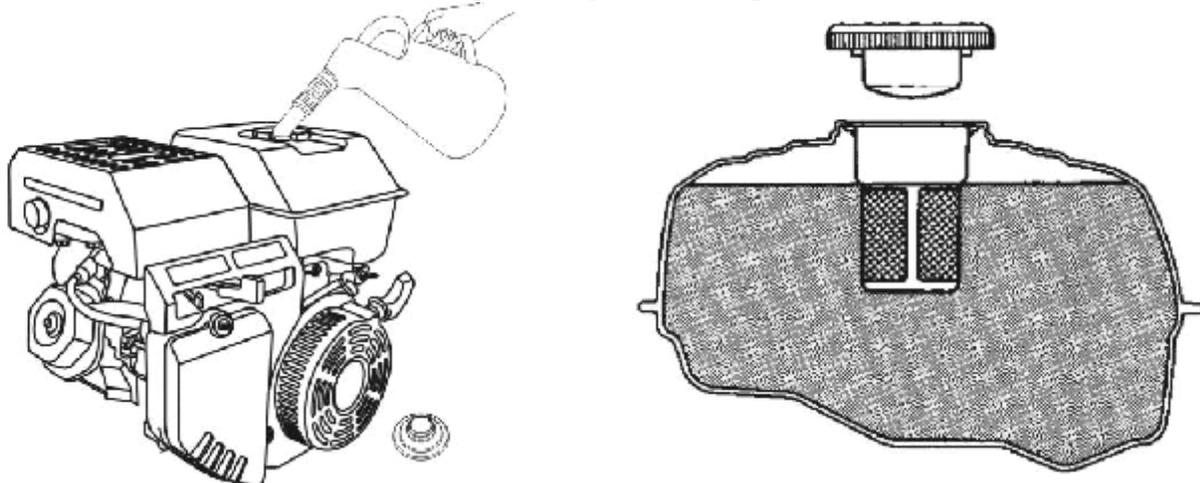
Gasoline Containing Alcohol

If you decide to use a gasoline containing alcohol (fuel blend), be sure its octane rating is at least as high as that recommended by the company. There are two types of "gasohol". One contains ethanol, and the other contains methanol. Neither gasoline containing more than 10% ethanol nor 5% methanol is allowed to be used. If methanol content in the fuel blend exceeds 5%, it may bring bad effect on the engine performance, besides, it may damage metals, rubber and plastic parts.

CAUTION: Handle fuel with care because it change plastic and painted surface.

It is normal when you hear occasionally light spark knock or pinking with the engine running under heavy load.

If "spark knock" or "pinking" occurs at a steady speed under normal load, change brand of gasoline; if Such phenomena still happen, consult your dealer for help, otherwise the engine may be damaged.



Fuel Tank

Fuel tank capacity: 3.6liters for 170N , 6.5liters for 190N.

Check

1. Remove the fuel filler cap and check fuel level.
2. If the fuel level is too low, refuel the tank. Remember adding fuel not over the fuel filler shoulder.

WARNING:

- Gasoline is extremely flammable and is explosive under certain conditions. Refueling in a well-ventilation area with the engine stopped. Do not smoke and smoke and allow flames or sparks in the area where gasoline is stored or where the fuel tank is refueled.
- Do not overfill the tank (there should be no fuel in the filler neck). After refueling, make sure the fuel filler cap is set back securely.
- Be careful not to spill fuel when refueling. Spilled fuel or fuel vapor may ignite. If any fuel is spilled, make sure the area is dry before starting the engine.
- Avoid repeated or prolonged contact with skin or breathing of fuel vapor. Keep out of reach of children.

STARTING THE ENGINE

1. Push the fuel cock to "ON".

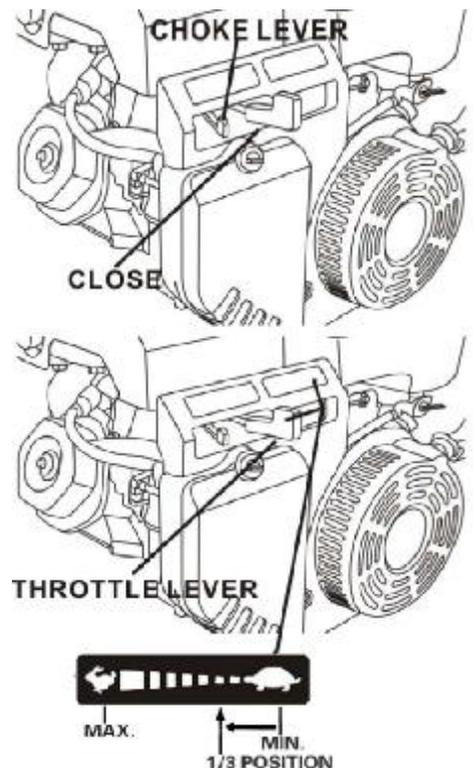
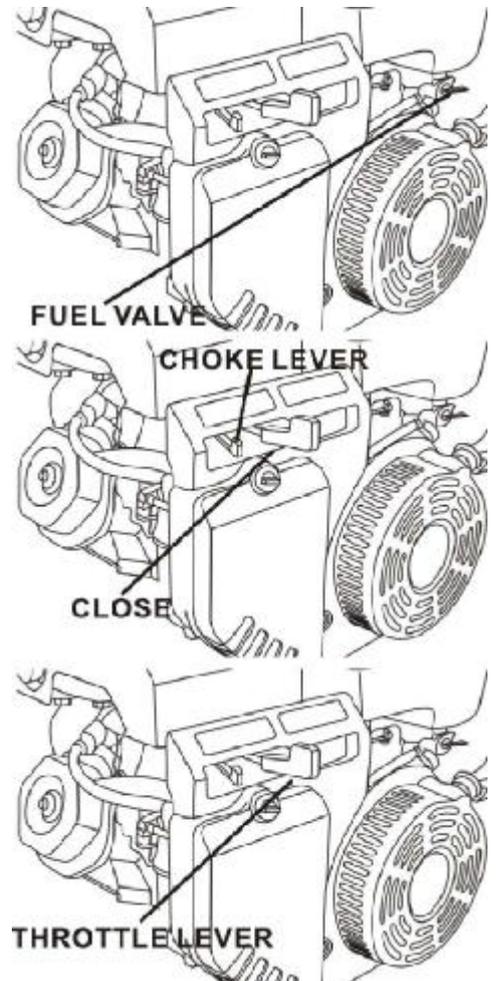
2. Push the choke lever to "CLOSE".

NOTE: if the engine is hot, closing the choke is unnecessary.

3. Move left the throttle lever a little.

4. Start the engine as follows:

a) Hand-operated kick-starter Push the engine switch to "ON". Pull slightly the starting rope handle



up until feeling anti-action, and then make a rapid pull.

CAUTION:

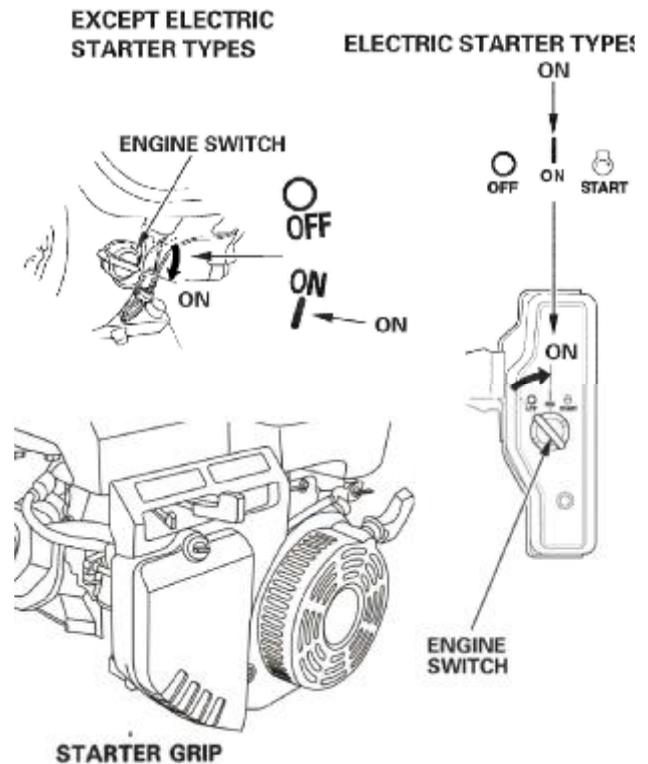
Releasing the handle suddenly may make it hitting the engine. Release the handle slowly conforming to its recoiling force.

b) Electric starter

Push the engine switch to "START" and remain there until the engine starts. Once the engine starts, reset the engine switch to "ON".

CAUTION:

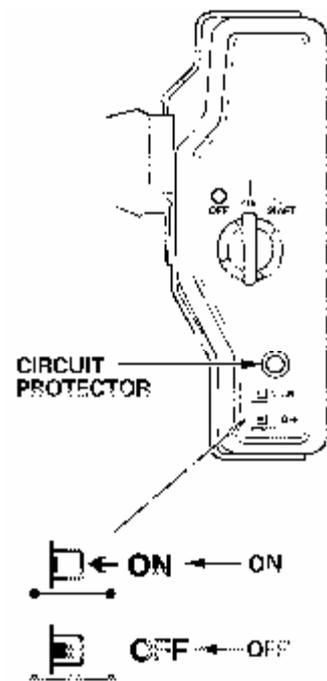
Use the engine switch not more than 5 minutes each time to avoid damage of the engine. Try once more 10 minutes later after last attempt failures.



RUNNING THE ENGINE

1. Preheat the engine and push back the choke lever to "OPEN".

2. Set the throttle lever in proper position to ensure the engine runs at required velocity.



ENGINE OIL ALARM

The engine oil alarm is designed to function when the engine oil in the crankcase is insufficient. Lack of engine oil may damage the engine. Oil may damage the engine. Once oil level in the

crankcase is too low, the engine oil alarm will stall the engine automatically to make it free of damage while the engine switch is still at "ON".

CAUTION:

If cannot restart the engine, check the engine oil level first before go to other check items.

BREAKER (Electric-start type)

The breaker will cut off automatically to protect the charging circuit of the battery in the case that short circuit or incorrect connection of the battery poles occurs.

The green indicator in the breaker will jump out with the circuit cutting off. After finding troubles and troubleshooting, depress the breaker button to tune the breaker on.

OPERATING ON HIGHLANDS

On highlands, the standard mixture ratio is relatively too big so the engine performance may be impaired while the fuel consumption may increase, besides, too big mixture ratio will pollute the spark plug to result in starting the engine difficultly. This problem can be solved by amending the carburetor technological status. If always using on highlands with a height above sea level of 1800 meters, ask your dealer for doing the job.

CAUTION:

Amended engine applicable to highlands may be damaged seriously in area below altitude of 1800 meters for overheating, because its mixture ratio is too small for operation in low altitude area. In the case, ask your dealer to recover the engine to its normal technical status.

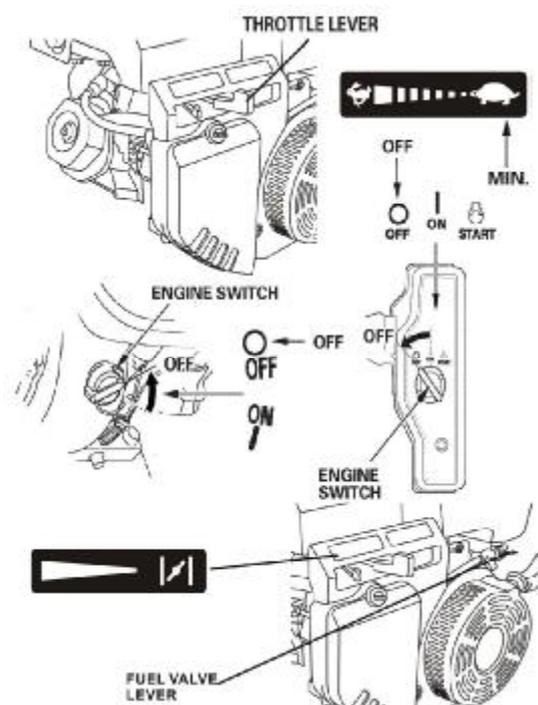
STOP

In emergency, push the engine switch to "OFF" to stall the engine; to stop it in normal, do as follows:

1. Push right the throttle lever to the bottom.
2. Push the engine switch to "OFF".
3. Set the fuel cock to "OFF".

CAUTION:

Sudden stopping at high speed under heavy load is forbidden, otherwise damage will result.



EXHAUST CONTROL SYSTEM

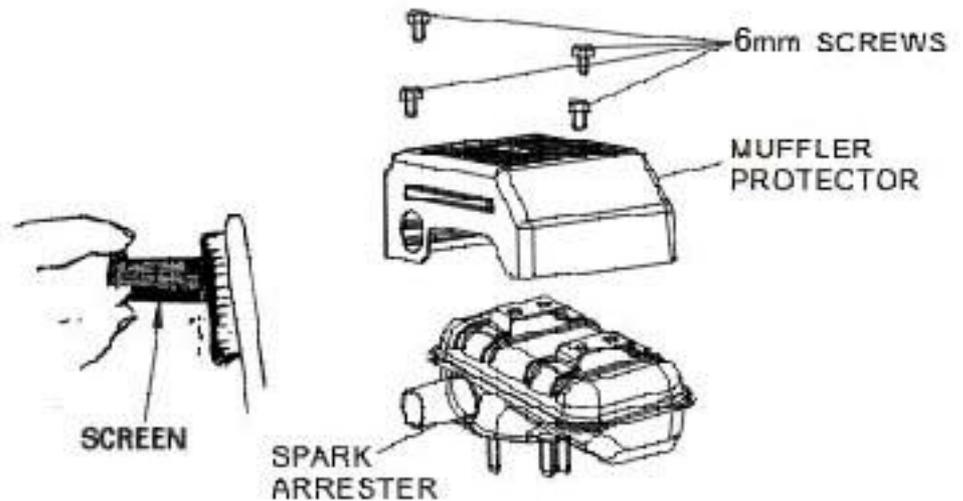
With the engine running, carbon monoxide, oxide of nitrogen and hydrocarbon will produce, and in certain conditions, oxide of nitrogen and hydrocarbon will react chemically each other to make

smoke while carbon monoxide is toxic, so exhaust control of them is very important. The company decreases the exhaust emissions by introducing poor-fuel carburetors and other devices into the engine to solve the problem.

To keep the exhaust of your engine with in the standard exhaust emission, pay attention to the following:

1. Maintenance

Maintain the engine periodically in accordance with the maintenance schedule in the manual. The maintenance schedule is made out on the base of normal use in normal conditions, if using under heavy load, dusty or wet circumstances or in high temperature, service of the engine should be done more often.



2. Replacement of Parts

We recommend that you should choose such parts which are manufactured by the company or equivalent to these in quality as replacement ones. Replacement without so high quality as the original may impair the exhaust the exhaust control system in effectiveness.

3. Modifying

Modifying the exhaust control system may make actual exhaust emissions exceeding statutory limit values. Illegal modification as such:

- a) Dismantle or modify any part of air intake or exhaust system.
- b) Modify or take off speed-adjusting connection device or speed adjustment device to result in the engine’s running beyond the set parameters.

4. Problems Affecting Exhaust Emissions

- a) Difficult starting or difficult stopping.
- b) Unstable idling.
- c) Give off black smoke or consume too much fuel.
- d) Poor ignition sparks or sparks returned.

Once you find any of above problems, contact your dealer for help.

MAINTENANCE

MAINTENANCE SCHEDULE

Frequency Item		Each time	First month or 20 hrs	Each season or 50 hrs	Every month 100 hrs	6 or	Each year or 300 hrs
Engine oil	Oil level check	√					
	Replace		√		√		
Reduction gear oil	Oil level check	√					
	Replace		√		√		

Air cleaner	Check	√				
	Clean			√①	√②*	
	Replace					√**
Deposit cup	Clean				√	
Spark plug	Clean, adjust				√	
	Replace					√
Spark eliminator	Clean				√	
Idling	Check-adjust					√②
Valve clearance	Check-adjust					√②
Fuel tank & fuel filter	Clean					√②
Fuel supply line	Check	Every two years (do a replacement if necessary)				

CAUTION:

Use only parts from the company or equivalents in quality; otherwise engine damage may result.

NOTE:

*: only for inside-ventilating double-core carburetors.

** : only for paper core air cleaners. Every two years or 600 hours' later for dust collecting air cleaners.

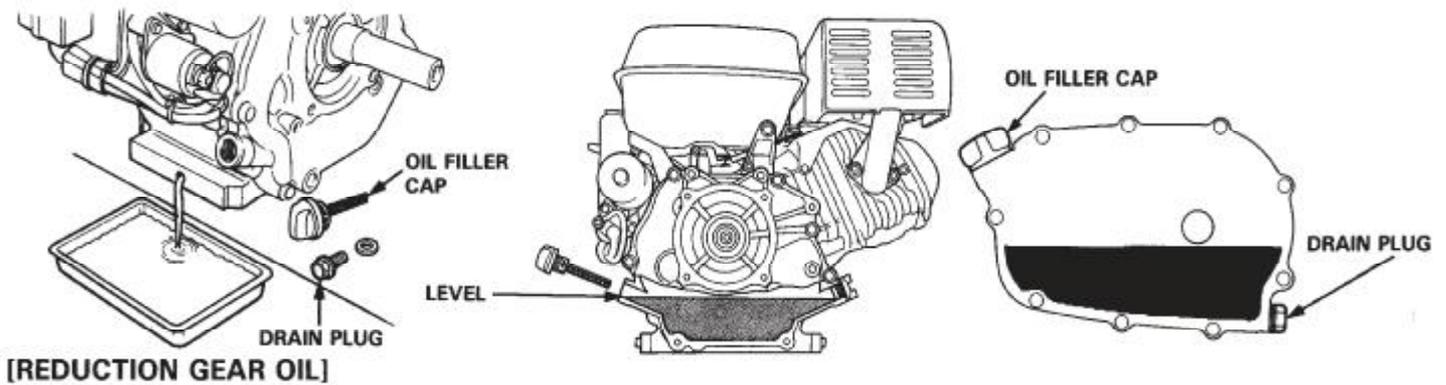
① More often than that in the schedule if in dusty circumstances.

② Should be done by your dealer unless you are specially trained and is well equipped with tools.

WARNING:

Stall the engine before service. If service is required with the engine running, be sure to keep good ventilation in the area. The exhaust emissions from the engine contain toxic carbon monoxide, inbreathing of it may result injury and even death.

REPLACEMENT OF ENGINE OIL



A still hot engine is helpful to drain out the engine oil in the crankcase rapidly and entirely.

1. Turn off the oil filler cap and drain plug to drain engine oil thoroughly. Reinstall the drain plug and screw in securely.
2. Fill the specified engine oil up to the upper level mark.
3. Reinstall the oil filler cap.

Engine oil capacity in the reduction gear box is 0.3 0.5 liters, engine oil capacity in the crankcase is 0.6(1.1) liters.

NOTE:

Do not dump oil containers or discarded engine oil into rubbish boxes or onto the ground. For the sake of environmental protection, we suggest you take in discarded engine oil with a closed container and bring to local recycling station.

SERVICE OF AIR CLEANER

A dirty air cleaner may block enough air’s flowing into the carburetor. To keep the carburetor in good working conditions, please service the air cleaner periodically. If operating the engine in extremely dusty area, the job should be done more often.

WARNING:

Never clean the air cleaner core in gasoline or low flash-point detergents, or explosion may happen.

CAUTION:

Never run the engine without an air cleaner, or air with dirt and dust may enter the engine so speed the engine’s wear.

Dual element type

Unscrew the wing nut, dismantle the air cleaner housing. Check if the two cores are damaged, if so, replace with new one.

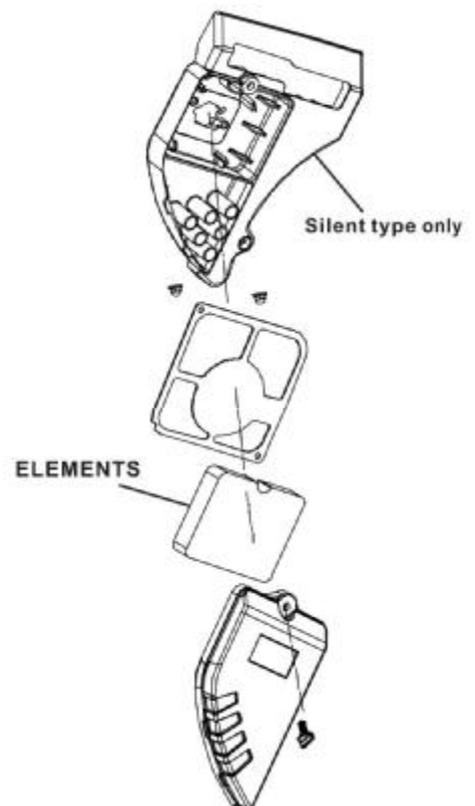
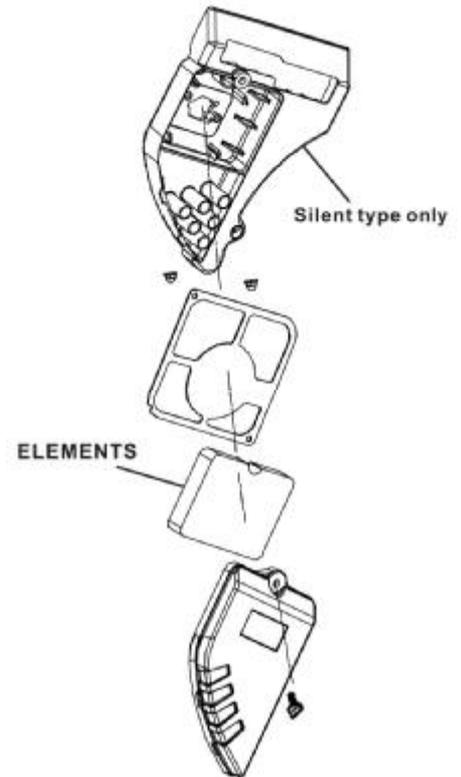
a) Foam filter element: clean with home detergents and warm water (or non-flammable or high flash-point cleansing solvents) and dry up, then soak in clean engine oil until saturated. Squeeze out excess oil, otherwise, the engine will discharge smoke in starting stage.

b) Paper filter element: knock the core against a solid plane to get rid of accumulated dust or blow out dust from inside to outside with high-pressure air flow (not more than 30psi). Never clean with a brush, as brushing may force the dust into the core fiber. If the core is extremely filthy, replace with a new one.

Dust-collecting type

1. Unscrew the wing nut, dismantle the air cleaner housing, check if the two cores are damaged, if so, replace with new one.

a) Foam filter element: clean with home detergents and warm water (or non-flammable or high flash-point cleansing solvents) and dry up, then soak in



clean engine oil until saturated. Squeeze out excess oil, otherwise, the engine will discharge smoke in starting stage.

b) Paper filter element: knock the core against a solid plane to get rid of accumulated dust or blow out dust from inside to outside with high-pressure air flow (not more than 30psi). Never clean with a brush, as brushing may force the dust into the core fiber. If the core is extremely filthy, replace with a new one.

2. Clean the dust-collecting hood: screw off the three special semi-round screws and remove the hood, wash parts with water and then dry up. Reinstall the hood.

CAUTION:

- When reinstalling the dust collecting core air cleaner, make sure to embed the fin on the pre-air cleaner hood in the dent in the dust-collecting hood.
- Install the air guide in correct order.

Single-core type

1. Remove the wing nut and air cleaner housing, and take out the filter element.
2. Clean with home detergents (or high flash-point cleansing solvents) and warm water, and dry up.
3. Soak in clean engine oil until saturated; squeeze excess oil, or the engine will exhaust smoke in starting stage.
4. Reinstall the filter element and air cleaner housing.

Oil bath type

1. Remove the nut and air cleaner housing, and take out the filter element.
2. Clean with home detergents (or high flash-point cleansing solvents) and warm water, and dry up.
3. Soak in clean engine oil until saturated. Squeeze excess oil, or the engine will discharge smoke in starting stage.
4. Empty the air cleaner housing of oil. Clear away the dust inside with non-flammable or high flash-point cleansing solvents, and dry it up.
5. Fill the air cleaner housing with the specified engine oil up to the standard oil level mark.
6. Reinstall the air cleaner.

WASHING OF DEPOSIT CUP

Set the fuel cock at “OFF”, disconnect the deposit cup and O-ring. Wash in non-flammable or high flash-point cleansing solvents, and then try them up, at last, reinstall it. Set the fuel cock to “ON” and check for leaks.

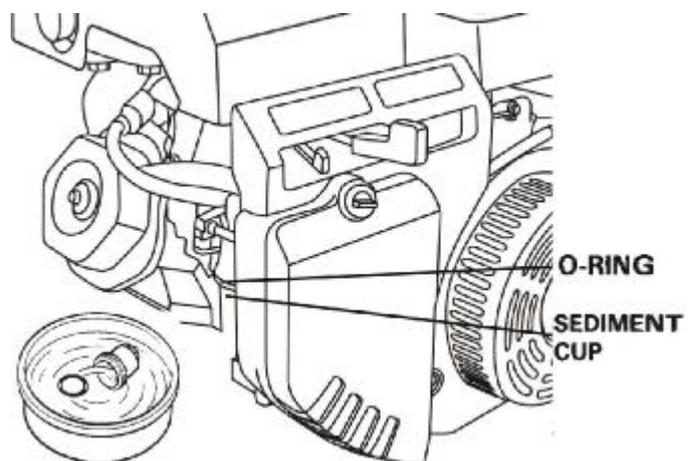
WARNING:

Gasoline is extremely flammable and explosive in certain condition. Keep cigarette, sparks and open flames away.

- After reinstalling the deposit cup, make sure the area around the engine is dry enough.

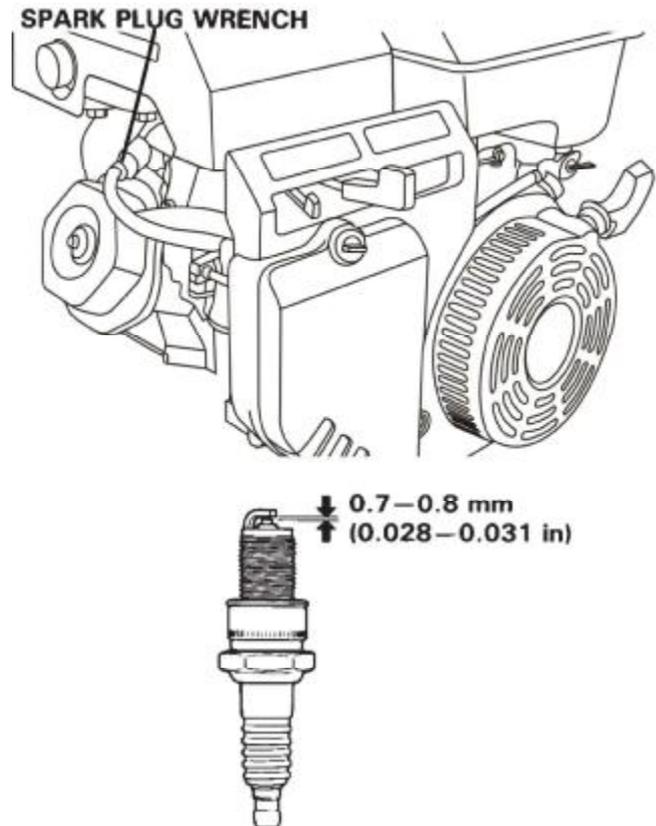
SPARK PLUG

Spark plug type: BPR6ES (NGK) or NHSP LD F6RTC



Proper spark plug clearance ensures the engine's normal running under no deposit around the spark plug.  Warning Be careful not to touch the muffler during or just after running the engine.

1. Remove the spark plug cap.
2. Clear away dirt around the spark plug base.
3. Dismantle the spark plug with a spark plug wrench.
4. Clean with a steel brush. If the insulator is damaged, replace the spark plug instead.
5. Measure the spark plug clearance with a feeler. The clearance should be 0.7~0.8mm. If adjustment is necessary, bend the side electrode carefully.
6. Check if the spark plug gasket is in good conditions, or replace with a new one. Screw on the spark plug to the bottom first by hand and then screw in by a spark plug wrench. If a new spark plug is used, twist 1/2 more turns after impacting the gasket, if reinstall the original one, just twist 1/8-1/4 more turns.



CAUTION:

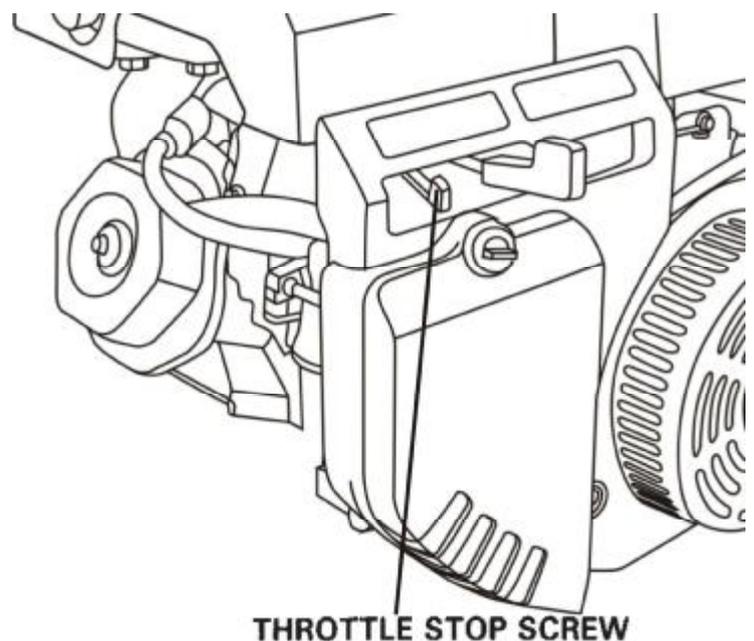
- The spark plug must be tightened securely, or it may become very hot to damage the engine.
- Only use recommended spark plug or the equivalent. Incorrect heat range of the spark plug may damage the engine.

CARBURETOR

IDLING

ADJUSTMENT

1. Start and preheat the engine until arriving at the normal working temperature.
2. Obtain standard idling by adjusting the throttle fixing screw under the engine's idling. Standard idling: 1700±150rpm.



TRANSPORT, STORAGE AND REMOVAL FROM STORAGE

TRANSPORT

Transport with the fuel cock turned off. Transport or store the engine when it is cool so as to avoid getting burns or fire.

CAUTION:

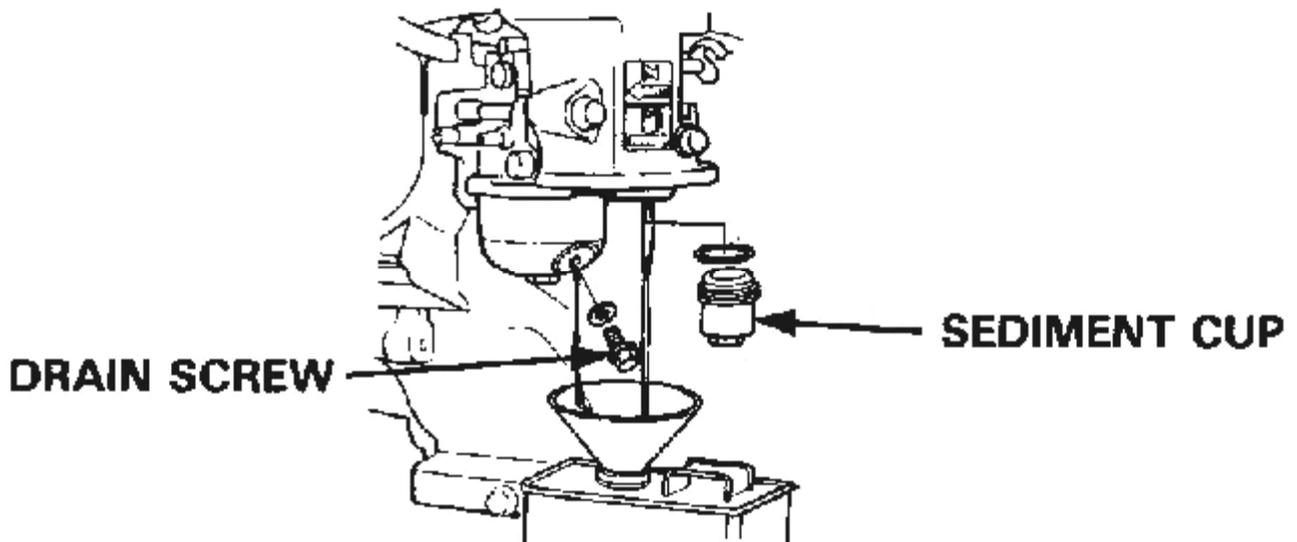
Do not incline the engine so as to avoid fuel's spill. Spilled fuel or fuel vapor may ignite to cause fire.

STORAGE

If the engine is not kept in use for a long time, be sure to store it properly. Make sure the storage area is dry and free of dust.

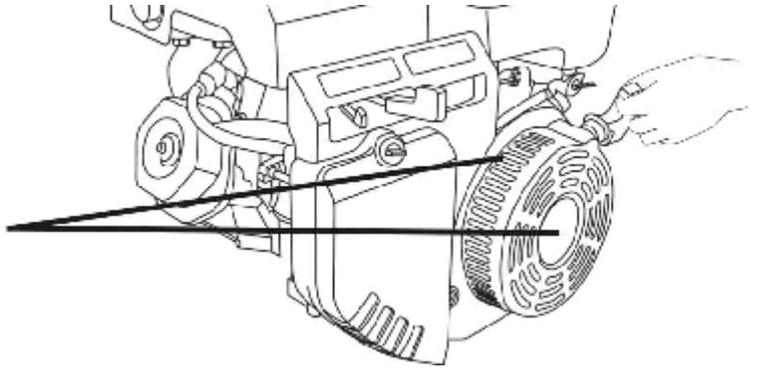
1. Drain the fuel ...
 - a. With the fuel valve in the OFF position, remove and empty the sediment cup.
 - b. Turn the fuel valve to the ON position and drain the gasoline from the fuel tank into a suitable container.
 - c. Replace the sediment cup and tighten securely.
 - d. Drain the carburetor by loosening the drain screw. Drain the gasoline into a suitable container.

WARNING: Gasoline is extremely flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks in the area.



2. Replace engine oil.
3. Disconnect the spark plug. Fill about a spoon of fresh engine oil from the spark plug mount hole into the cylinder. Crank the engine up to distribute engine oil evenly. Reinstall the spark plug.
4. Pull the starting rope slowly until feeling a slight anti-action, and then keep pulling it so as to align the arrow of the starting sleeve with the hole of the starter. At this time, both the inlet and outlet valves are closed so help prevent the engine inside from rusting.
5. Electric starter: disconnect the battery and store in dry and cool area. Charge once every month.
6. Cover the engine so keep dust away.

- Align the arrow on the starter pulley with the hole at the top of recoil starter.



REMOVAL FROM STORAGE

Before reusing, service the engine in accordance with the instruction of the table

STORAGE TIME	SERVICE ITEM
Within one month	Non
One ~ tow months	Drain out original fuel of the fuel tank and refuel
Two month ~ one year	Drain out original fuel of the fuel tank and refuel; Drain out fuel in the carburetor ^① ; Empty the deposit cup ^②
Above one year	Drain out original fuel of the fuel tank and refuel; Empty the fuel cup in the carburetor ^① ; Empty the deposit cup ^②

(1) Screw off the drain plug and drain out fuel in the carburetor.

(2) Turn off the engine switch first, disconnect the deposit cup and empty it.

Note: for the sake of environmental protection, we recommend to fill the discarded fuel into a closed container and bring to local recycling station. Never pour freely.

WARNING:

Fuel is extremely flammable and explosive under certain conditions. Keep cigarette, open flames and sparks away from operating site.

SPECIFCAIONS

MAIN SPECIFICATIONS

Model Items	XP7HP	XP7HPE	XP16HP		XP16HPE	
Engine type	4-strok, OHV,25°,single-cylinder, force air-cooled					
bore×stroke(mm)	70×54		90×66		90×66	
Rated power(kW/rpm)	4.2/3600		8.5/3600		8.5/3600	
Max. torque(N·m/rpm)	13.2/2500		28.5/2500		28.5/2500	
Displacement(ml)	208		420		420	
Starting type	recoil	Electric start	recoil	Electric start	recoil	Electric start
Ignition type	Induction ignition					
Lubricating type	splashing					
Fuel consumption (g/kW-h)	≤395		≤375			
Dry weight	33lbs.	35.3lbs.	73 lbs.	77 lbs.	73 lbs.	77 lbs.
Dimension(L×W×H)(in.)	14.25×12.3×13.2		17.7×16×17.4			

TORQUE OF IMPORTANT BOLTS

S/N	Item	Specifications	Torque Value(N . m)
1	Cylinder head bolt	M8×1.25	24±2
2	Crankcase cover bolt	M8×1.25	24±2
3	Tie-rod bolt	M7×1	12±2
4	Flywheel bolt		70~80
5			8~10

TROUBLESHOOTING

I. START ENGINE DIFFICULTLY

1. By using kick-starter

TROUBLE	CAUSE	REMEDY
1. Normal cylinder compression. 2. Normal spark plug spark. 3. Something wrong with the fuel system. 4. Fuel supply is not smooth or no fuel	There is no enough fuel in fuel tank of fuel cock is closed.	Fill fuel, open fuel cock.
	Air vent in the fuel filler cap is clogged.	Dredge air vent.
	Fuel cock is clogged.	Clean first and then dredge.
	Improper or clogged main oil flow hole.	Readjust or clean, blow to get through.

supply.	Needle valve is not closed properly or start hole is clogged.	Dismantle needle valve and repair, clean, blow to get through.
	Float is damaged or sticking.	Repair float
1. Normal cylinder compression.	Fuel is too filthy or deteriorated	Replace
2. Normal spark plug spark.	There is water in fuel	Replace
3. Something wrong with the fuel system.	Too much fuel in engine	Drain extra fuel, dry up spark plug electrodes
	Wrong fuel brand	Select proper fuel brand corresponding with the requirements
4. Smooth fuel flow.		
1. Normal cylinder compression.	Too much carbon deposit and dirt around electrodes.	Clear away
2. Normal fuel supply.	Electrodes are burn damaged seriously or insulators damaged	Replace spark plug
3. Normal high-pressure coil spark.	Improper electrodes gap	Adjust to proper value
4. Spark plug is in bad conditions.		
1. Normal cylinder compression.	High-pressure coil is damaged	Replace
2. Normal fuel supply.	Ignition coil is damaged	Replace
	Magneto loses magnetism	Replace
3. No high-pressure coil spark.		
4. Normal spark plug.		
1. Poor cylinder compression.	Piston ring is worn to or even over its wear limit	Replace
2. Normal fuel supply system.	Piston ring is broken	Replace
	Piston ring is sticking	Clear up carbon fouling
3. Normal ignition system.	Spark plug is not installed tighten or without a gasket	Tighter with a gasket in
	Air leakage between cylinder block and cylinder head	Check cylinder gasket, and the flatness of the surface by which cylinder block contacting with cylinder head, tighten cylinder head bolts in stipulated order to stipulated torque.
	Air leakage in valves	Check valve, clearance and tightness, repair if necessary

WARNING:

- When testing the spark plug, never hold the high-voltage wire of the spark plug with wet hand.

- Make sure there is no spilled fuel outside the engine and that the spark plug isn't dipped with fuel.
- To prevent fire, keep sparks far away from the spark plug mount hole.

2. By using starting motor

ITEM	CAUSE	REMEDY
Check battery connection	Incorrect connection	Correct
Check battery	No charge or under charge, corrosion	Check the breaker, charge up the battery or replace it
Starting motor functions normally	Be the same as kick-starter	Conduct it in the same way of kick-starter

Having fulfilled all the check items above, the engine still fails to work, contact your dealer for help.

II. LOW GASOLINE ENGINE POWER OUTPUT

TROUBLE	CAUSE		REMEDY
When turning throttle greater, speed in crease responds slow or speed is decreased even engine stops running	Ignition system	Incorrect ignition time	Readjust ignition advance angle
	Fuel supply system	Air in fuel line or fuel line clogged	Exhaust air or dredge fuel line
		Main oil flow hole is not adjusted properly	Readjust
		In carburetor, needle valve hole and main oil flow hole clogged	Clean and blow to get through
		Fuel cock is clogged up	Clean, replace damaged part
		Too much carbon deposit in combusting chamber	Clear away
		Too much carbon fouling in muffler and exhaust pipe	Clear away
		Air cleaner is clogged up	Clean air cleaner filter elemi
	Poor compression	Intake pipe is leaking	Repair or replace
		Piston or cylinder or piston ring is worn	Replace the worn
		Air leakage from the surface by which cylinder block contacting with cylinder head	Replace cylinder gasket
		Too big or too small valve clearance	Readjust it
		Valve tightness is poor	repair

III. GASOLINE ENGINE CANNOT RUN SMOOTHLY

TROUBLE	CAUSE	REMEDY
Engine is pinging	Piston, cylinder or piston ring is worn excessively	Replace the worn
	Piston pin and piston pin hole are worn excessively	Replace piston or piston pin
	Tie rod small head is worn excessively	Replace tie rod

	Roller bearing for crankshaft main shaft is worn	Replace roller bearing
Abnormal combustion	Engine is too hot	Shoot trouble
	Too much carbon deposit in combustion chamber	Clear away
	Improper gasoline brand or low gasoline quality	Replace with qualified gasoline
Engine cannot start because of spark lacking	There is water in float chamber	Clean
	Improper spark plug electrodes clearance	Adjust
	Incorrect ignition time	Readjust
	Something wrong with induced coil, and so on	Check and replace damaged parts

IV. STOP SUDDENLY WHEN RUNNING

TROUBLE	CAUSE		REMEDY
Stop suddenly when running	Fuel supply system	Fuel is used up	Refill fuel
		Carburetor is clogged	Check fuel line and dredge
		Float is leaking	Repair
		Needle valve sticks	Dismantle float chamber and crimate it
	Ignition system	Spark plug is struck through, or short-circuited by carbon deposit	Replace spark plug
		Side electrode of spark plug is dropped out	Replace spark plug
		High-pressure wire is dropped out	Weld on
		Ignition coil is struck through to be short-circuited	Replace ignition coil
		Parking wire is located on engine body	Find out meeting and insulate
	The other	Cylinder is pulled damage, valve is dropped out	Repair or replace damaged parts

V. GASOLINE ENGINE IS EXCESSIVELY HOT

TROUBLE	CAUSE	REMEDY
Gasoline engine is excessively hot	Improper ignition time	Adjust ignition advance angle properly
	Insufficient fuel supply	Refill engine oil
	Exhaust pipe is blocked up	Dredge exhaust pipe
	Flow guard is leaking	Repair damaged part

	Dirt or something like this fill up among air cooling fins	Clear away dirt or something like this
	Cooling fan is loosen, losing function	Reinstall well
	The rod deformation makes piston and cylinder bushing side wear	Replace tie rod
	Cylinder or piston or piston ring is worn, resulting in air flow between cylinder and crankcase	Replace the worn
	Improper adjustment of engine speed produces excessive rotational speed	Readjust engine speed to proper value by speed regulator
	Crankshaft main bearing is burnt out	Replace main bearing

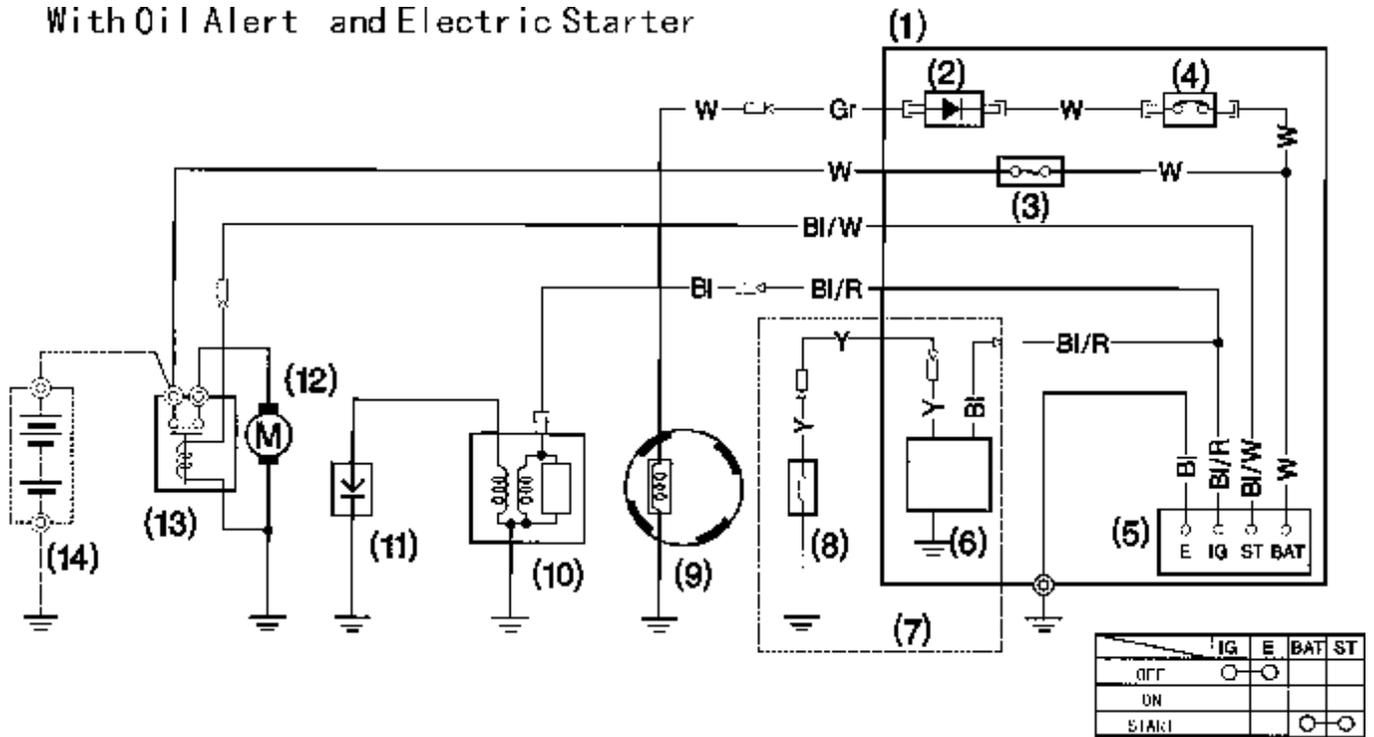
NOTE: the gasoline should run under certain temperature. Generally, permitting temperature at the flow guard outlet is between 80-110°C, while the temperature of the crankcase is about 60°C under the magneto. If temperatures surpass the limits, it is an indication that the gasoline engine is excessively hot.

VI. THERE EXISTS ABNORMAL NOISE WHEN ENGINE RUNNING

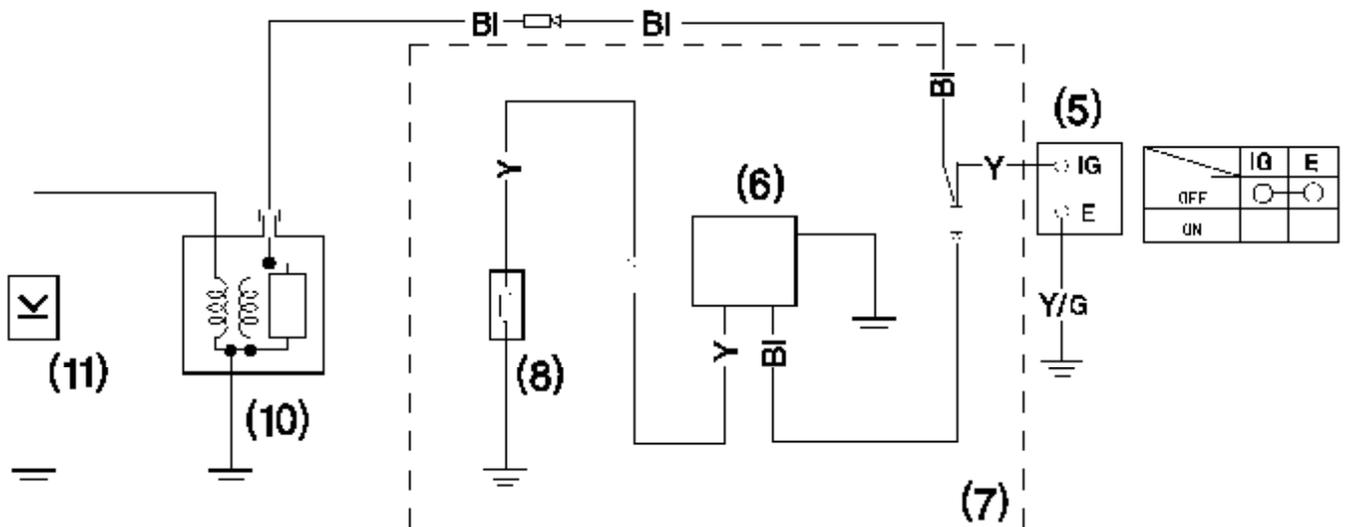
TROUBLE	CAUSE	REMEDY
Abnormal noise	Piston, piston ring or cylinder is worn	Replace the worn
	Tie rod or piston pin and piston pin hole is worn	Replace the worn
	Crankshaft main bearing is worn	Replace
	Piston ring is broken	Replace
There is an abnormal noise during combustion	Too much carbon deposit in combusting chamber	Clear away carbon deposit
	Too small electrode clearance of spark plug	Adjust electrode clearance properly
	Engine is flooded with fuel	Check relative parts such as carburetor
	Improper fuel brand	Replace fuel
	Engine is excessively hot	Find a cause and eliminate it
The other	Improper valve clearance	Readjust calve clearance properly
	Fly wheel is not connected with crankshaft tightly	Connect tightly

WIRING DIAGRAM

With Oil Alert and Electric Starter



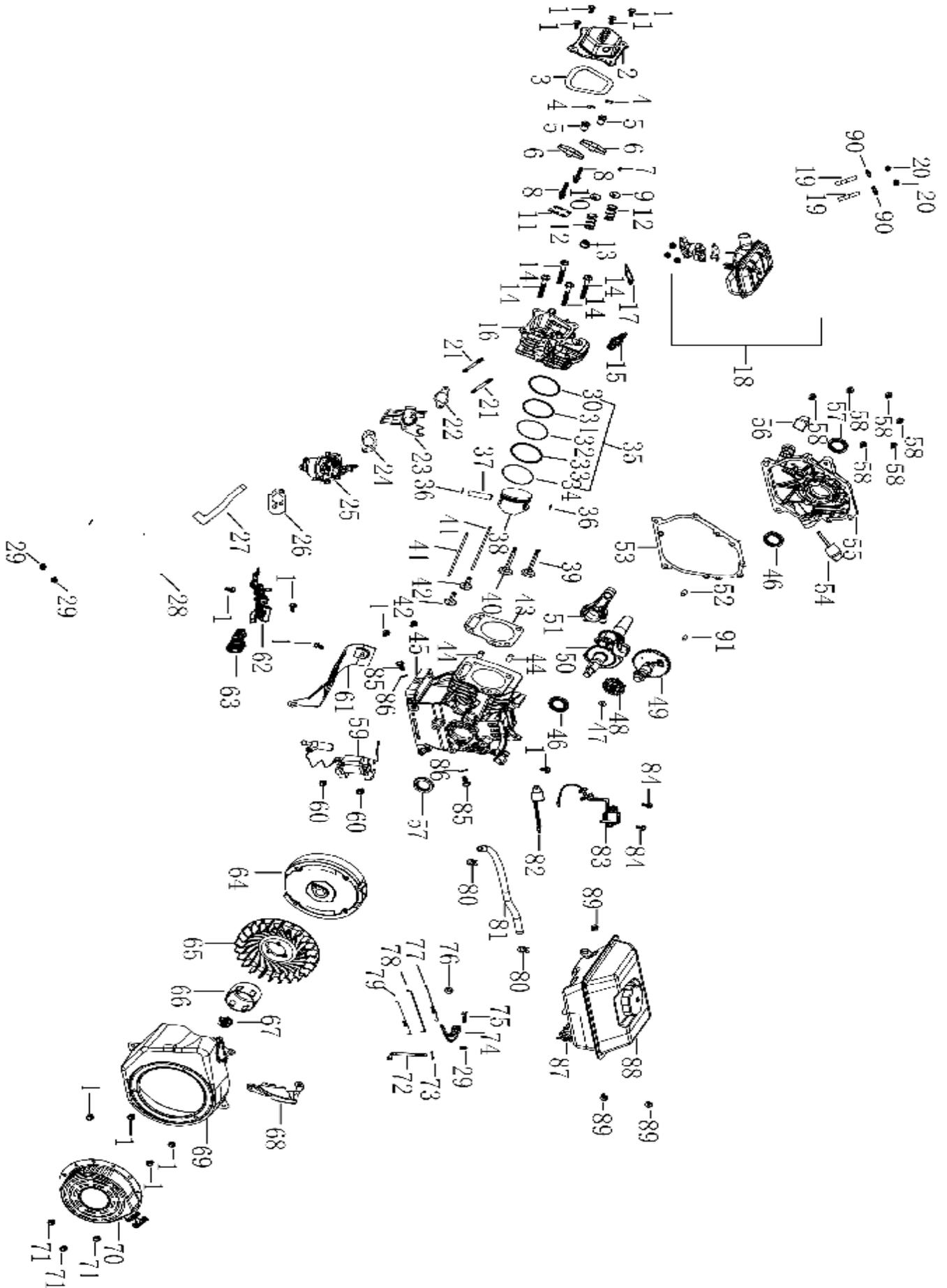
With Oil Alert and Without Electric Starter



- | | | | |
|------------------------------|-----------------------|----------|----------------|
| (1) CONTROL BOX | (8) OIL LEVEL SWITCH | BI Black | Br Brown |
| (2) RECTIFIER | (9) CHARGING COIL | Y Yellow | O Orange |
| (3) FUSE | (10) IGNITION COIL | Bu Blue | Lb Light blue |
| (4) CIRCUIT BREAKER | (11) SPARK PLUG | G Green | Lg Light green |
| (5) ENGINE SWITCH | (12) STARTER MOTOR | R Red | P Pink |
| (6) OIL ALERT UNIT | (13) STARTER SOLENOID | W White | Gr Gray |
| (7) TYPE WITH OIL ALERT UNIT | (14) BATTERY (12 V) | | |

Note: The diagram for other types may be different with the exception of electric-start type.

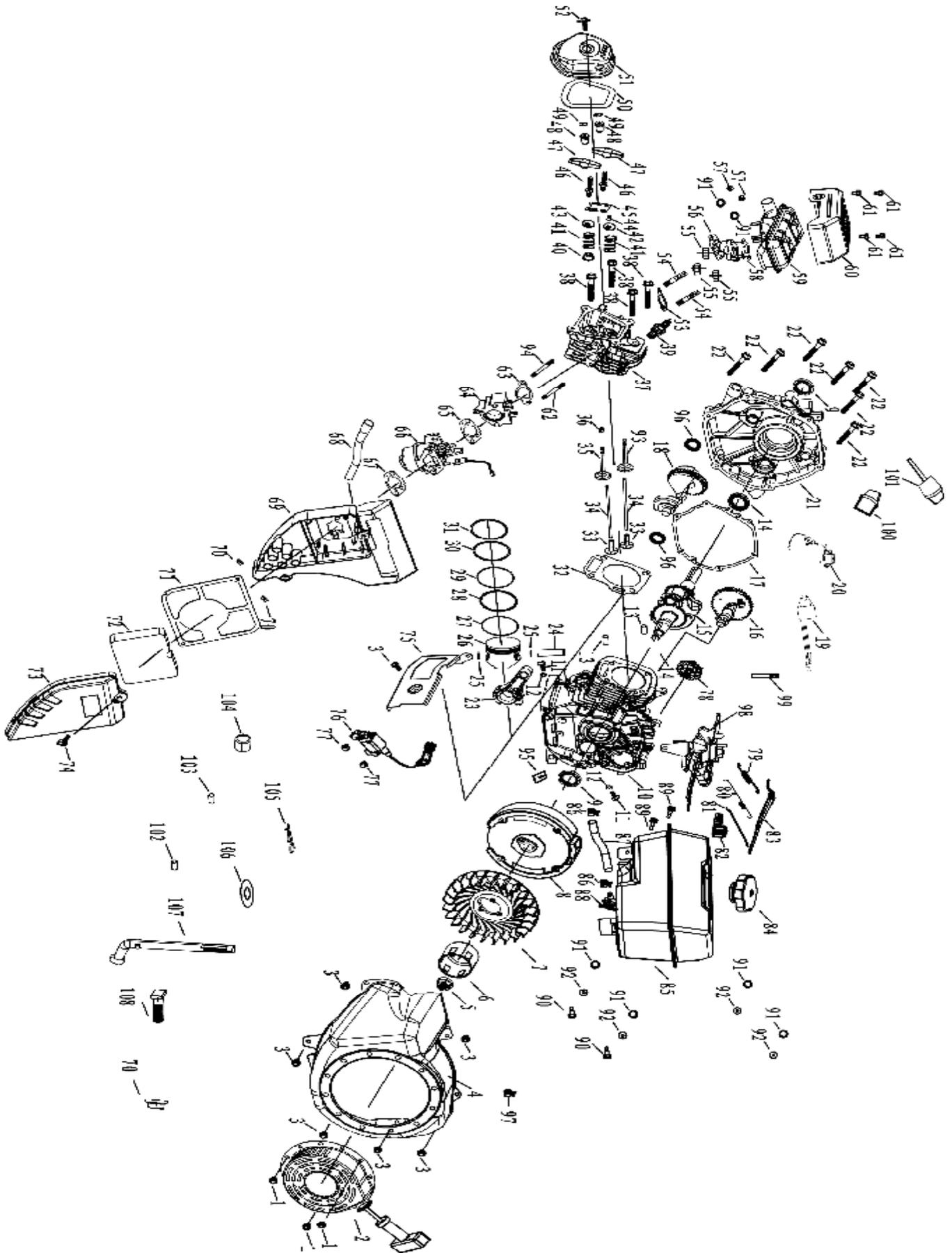
EXPLODED VIEW AND PARTS LIST(7HP)



Item	Part	Qty	Description	Item	Part	Qty	Description
1	GBT5789-86	13	Flange bolt M6×12	45	DJ170F-11100-C	1	Crank case assy.
2	DJ168F-11300-B	1	Cover assembly	46	GB276-89-6205	2	Radial ball bearing (6025)
3	DJ168F-11011-A	1	cover assembly	47	DJ168F-15100-A	1	Speed Regulating Gear
4	DJ168F-13204-A	1	Lock Nut	48	DJ168F-15100-A	1	centrifugal assy.
5	DJ168F-13203-A	1	Adjusting Nut	49	DJ168F-13100-B	1	Camshaft assy.
6	DJ168F-13201-A	1	Arm, valve rocker	50	DJ168F-12100-QT	1	Crankshaft Assembly
7	DJ168F-13006-A	1	Rotator, valve	51	DJ170F-12200-B	1	Tie-rod Assembly
8	DJ168F-13202-A	2	Fastening Bolt	52	DJ168F-11002-D	1	Pin, dowel, 7×12
9	DJ168F-13005-A	1	Retainer, EX. Valve spring	53	DJ170F-11003-B	1	Crankcase Gasket
10	DJ168F-13004-A	1	Retainer, IN. Valve spring	54	DJ168F-11007-A	1	Oil Filler Assembly
11	DJ168F-13300-A	1	Plate, push rod guide	55	DJ168F-11001-C	1	Crankcase cover
12	DJ168F-13003-A	2	Spring, valve	56	DJ168F-11600-A	1	Dipstick cover
13	DJ168F-13010-A	1	Returner, Exhaust Valve	57	DJ168F-11014-A	2	Oil seal, 25.14×35×7
14	GBT5787-B8-60	4	Flange bolt M8×60	58	GBT5787-B8-35	6	bolt M8×35
15	DJ168F-18500-B	1	Spark Plug F7TC	59	DJ168F-18100-C	1	Ignition Coil
16	DJ170F-11200-B	1	Head comp, cylinder	60	GBT5787-B6-25	2	bolt M6×25
17	DJ168F-14006-C	1	Outlet Gasket	61	DJ168F-11012-A	1	Air-leading Cover
18	DJ170N-14400-A	1	Muffler Assembly	62	DJ170N-15200-A	1	speed adjuster
19	DJ168F-14002-A	2	Bolt head, M8×35	63	DJ170N-15201-A	1	Speed Regulating Bar
20	GBT6177-N-8	2	Flange nut M8	64	DJ168F-16200-C	1	Flywheel
21	DJ168F-14001-A	2	Bolt Stud, 6×90	65	DJ168F-16002-A	1	Flywheel Fan
22	DJ168F-14003-B	1	Inlet Gasket	66	DJ168F-16000-A	1	Starting Cup
23	DJ168F-14004-A	1	Connecting Block, Carbretor	67	GBT6177-N-14	1	Flange nut M14
24	DJ168F-14005-A	1	Carbretor Gasket	68	DJ168F-11400-A	1	Wind Shiel Assembly
25	DJ170N-14100-A	1	Carburetor Assembly	69	DJ170N-16121-A	1	Recoil Sarer
26	DJ168F-14027-A	1	Air Cleaner Gasket	70	DJ170N-16122-A	1	recoil starter
27	DJ170N-11013-A	1	Tube, Breather	71	GBT5787-B6-8	3	Bolt Flange M6×8
28	DJ170N-11420-A	1	AirCleaner Assembly	72	DJ168F-15001-A	1	Shaft, governor assy.
29	GBT6177-N-8	2	Flange nut M8	73	DJ168F-15003-A	1	Pin Lock
30	DJ170F-12301-A	4	Piston Ring A	74	DJ168F-15004-A	1	Speed Regulating Arm

31	DJ170F-12302-A	1	Piston Ring B	75	DJ168F-15005-A	1	Lock Bolt
32	DJ170F-12304-A	1	Side Ring	76	GBT6177-N-6	3	Flange nut M6
33	DJ170F-12303-A	1	Wave Ring	77	DJ170F-15007-B	1	Back Spring B
34	DJ170F-12304-A	1	Side Ring	78	DJ168F-15006-A	1	Pulling Rod
35	DJ170F-12300-A	1	Scraper Ring Set, Piston	79	DJ170F-15008-A	1	Fine Regulating Spring C
36	DJ168F-12003-A	2	Clip, piston pin	80	DJ1P65F-14008-A	2	Tube clip
37	DJ170F-12002-A	1	Pin, piston	81	DJ170N-14007-A	1	Outlet pipe $\phi 6 \times \phi 10 \times 295$
38	DJ170F-12001-B	1	Piston	82	DJ168F-18300-A	1	Amplifier
39	DJ168F-13002-A	1	Intake Valve	83	DJ168F-18200-A	1	Oil Sensor Assembly
40	DJ168F-13001-A	1	Exhaust Valve	84	GBT5787-B6-16	2	bolt M6×16
41	DJ170F-13008-A	2	Rod, push	85	DJ168F-11004-A	2	Drain Plug Washer
42	DJ170F-13009-A	2	Tappet Litter Valve	86	DJ168F-11005-A	2	Washer, drain lug
43	DJ170F-11010-C	1	Casket, cylinder head	87	DJ170N-14302-A	1	Fuel cock
44	DJ168F-11009-A	2	Set Pin, 10×14	88	DJ170N-14300-A	1	Fuel tank
89	GBT5787-B6-16	3	bolt M6×16	90	GBT93-LW-8	2	spring washer

EXPLODED VIEW AND PARTS LIST (16HP)



Ite m	Part	Q t y	Description	Ite m	Part	Q t y	Description
1	GBT5787-B6-8	3	Bolt Flange M6×8	44	DJ188F-13006-A	1	Rotator, valve
2	DJ190N-16122-A	1	recoil starter	45	DJ188F-13300-A	1	Plate, push rod guide
3	GBT5787-B6-12	9	Bolt Flange M6×12	46	DJ188F-13202-A	2	Bolt, pivot
4	DJ190N-16121-A	1	Starter comp, recoil	47	DJ188F-13201-A	2	Arm, valve rocker
5	GBT6177-N-14	1	Flange nut M14	48	DJ168F-13203-A	2	Nut, Arm, valve rocker
6	DJ188F-16001-A	1	Pulley, starter	49	DJ168F-13204-A	2	Nut, pivot adjusting
7	DJ188F-16002-A	1	Fan, cooling	50	DJ188F-11011-A	1	Exhaust piper
8	DJ188F-16200-C	1	Flywheel comp	51	DJ188F-11300-B	1	Cover comp, head
9	DJ188F-11014-A	2	Oil seal, 35×52×8	52	DJ188F-11015-A	1	Bolt, head cover
10	DJ190F-11100-C	1	Crank case assy.	53	DJ188F-14006-A	1	Casket (B) EX. Pipe
11	DJ188F-11004-A	2	Bolt, drain lug	54	DJ188F-14002-A	2	Bolt head, M8×48
12	DJ188F-11005-A	2	Washer, drain lug	55	GBT6170-N-8	3	Nut M8
13	DJ188F-11009-A	2	Pin, dowel, 12×20	56	DJ190N-14009-A	1	Pipe comp EX.
14	GB276-89-6207	1	Radial ball bearing (6207)	57	GBT6175-N-8	2	Nut M8
15	DJ190F-12100-QS	1	Crankshaft comp	58	DJ190N-14009-C	1	Pipe comp EX.
16	DJ190F-13100-C	1	Camshaft assy.	59	DJ190N-14400-A	1	Muffer Assembly
17	DJ190F-11003-B	1	Packing, case cover	60	DJ190N-14401-A	1	muffler protector
18	DJ188F-12004-A	1	Balancing Shaft	61	GBT5787-B6-8	4	Bolt Flange M6×8
19	DJ188F-18300-A	1	Amplifier	62	DJ177F-14001-A	1	Bolt head, 8×105
20	DJ188F-18200-A	1	Oil Sensor	63	DJ190N-14003-B	1	Packing, carburetor
21	DJ188F-11001-D	1	Crankcase cover	64	DJ190N-14004-A	1	Insulator, carburetor
22	GBT5787-B8-35	7	Bolt Flange M8×35	65	DJ188F-14005-B	1	Packing, insulator
23	DJ190F-12200-B	1	Connecting rod assy.	66	DJ190N-14100-A	1	Carburetor assy.
24	DJ190F-12002-A	1	Pin, piston	67	DJ188F-14027-A	1	Gasket,Air Cleaner
25	DJ188F-12003-A	2	Clip, piston pin	68	DJ190N-11013-A	1	Tube, breather
26	DJ190F-12001-B	1	Piston	69	DJ190N-14203-A	1	Case comp, air cleaner
27	DJ190F-12304-A	1	Side Ring	70	GBT6177-N-6	3	Flange nut M6
28	DJ190F-12303-A	1	Wave Ring	71	DJ190N-14202-A	1	Retainer Filter Element
29	DJ190F-12304-A	1	Side Ring	72	DJ190N-14201-A	1	Element, air cleaner
30	DJ190F-12302-A	1	Piston Ring B	73	DJ190N-14204-A	1	Cover comp, air cleaner
31	DJ190F-12301-A	1	Piston Ring A	74	DJ190N-14207-A	1	Clip, air cleaner ware
32	DJ190F-11010-C	1	Casket, cylinder head	75	DJ188F-11012-A	1	Shroud comp
33	DJ190F-13009-A	2	Lifter, valve	76	DJ188F-18100-C	1	Coil assy. ignition
34	DJ190F-13008-A	2	Rod, push	77	GBT5787-B6-25	2	Flange bolt M6×25
35	DJ188F-13001-A	1	Valve, IN.	78	DJ188F-15100-A	1	Governor kit
36	DJ188F-13011-A	1	oil seal,Valve	79	DJ188F-15007-C	1	Spring, governor
37	DJ188F-11200-B	1	Head comp, cylinder	80	DJ188F-15008-A	1	Spring, throttle return
38	GBT5787-B10-80	4	Flange bolt M10×80	81	DJ188F-15006-A	1	Rod, governor
39	DJ168F-18500-B	1	Plug, spark	82	DJ170N-15201-A	1	handle
40	DJ188F-13010-A	1	Returner intake valve,lower	83	DJ188F-15004-A	1	Arm, governor
41	DJ188F-13003-A	2	Spring, valve	84	DJ190N-14301-A	1	fule filler Cap

42	DJ188F-13005-A	1	Retainer, EX. Valve spring	85	DJ190N-14300-A	1	fule filler
43	DJ188F-13004-A	1	Retainer, IN. Valve spring	86	DJ1P65F-11038-A	1	Tube Cock
87	DJ190N-1400-A	1	Outlet pipe $\phi 6 \times \phi 10 \times 320$	88	DJ170N-18400-A	1	Choke Switch
89	GBT5787-B8-20	2	Flange bolt M8 \times 20	90	GBT5787-B8-35	2	Flange bolt M8 \times 35
91	GBT93-LW-8	4	spring washer	92	GBT-W-8	4	flat washer
93	DJ188F-13002-A	1	EX. Valve	94	DJ190N-14001-B	1	Bolt head, 8 \times 120
95	DJ188F-11017-A	1	Clip, wire	96	GB276-89-6202	2	Radial ball bearing (6202)
97	DJ188F-11039-C		O-Ring	98	DJ190N-15200-A	1	speed adjuster
99	DF2500H-34118-A	1	Clip, wire	100	DJ188F-11006-A	1	Dipstick cover
101	DJ188F-11007-A		Dipstick	102	DJ168F-11002-D	1	Pin $\Phi 7 \times 14$
103	DJ168F-11002-F	1	Pin $\Phi 9 \times 14$	104	DJ188F-15009-A	1	Oil Seal Moving Staff
105	DJ188F-15003-A	1	Pin Lock	106	DJ188F-15002-A	1	Plain Washer
107	DJ188F-15001-A	1	Moving Staff	108	DJ168F-15005-A	1	Lock Bolt