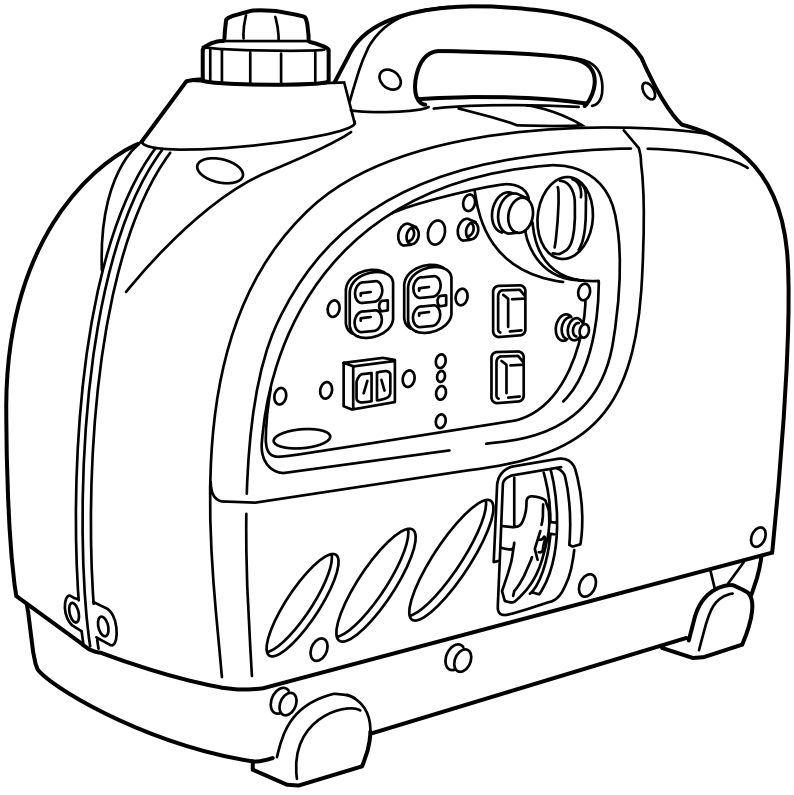
YAMAHA

YAMAHA GENERATOR

NEW MODEL GUIDE

EF1000iS



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YAMAHA MOTOR CO., LTD
O.P.E. OPERATIONS
SERVICE GROUP
September, 2002

Introduction

The EF1000iS Inverter Generator is the first Yamaha generator to use exclusive dual-stage multi-pole alternator and an inverter system (microcomputer-controlled sine wave inverter.)

With the adoption of an inverter system, it supplies high quality electricity equivalent to commercial power supply in a lightweight, compact, highly efficient package.

Benefits of an inverter portable generator

■ Lightweight and compact:

Through the use of a high efficiency multi-pole three phase alternator and inverter system, the EF1000iS weighs only 12.7 Kg, (13 Kg for Europe) which is approximately half the weight of EF1000S, a previous silent generator.

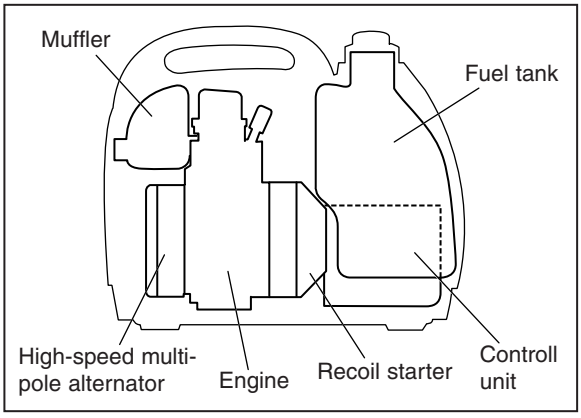
■ Sine Wave AC output:

Adapting an inverter system which generates genuine sine wave electricity, the quality of AC output from an inverter generator is equivalent to commercial power source in terms of frequency variation and wave form. In contrast, AC output of a conventional synchronous type generator is determined by its engine rpm whose fluctuation directly influences the AC output frequency and voltage.

■ Fuel Economy:

Because the engine's rpm is not linked to the frequency of the inverter generator output, wide range of engine rpm, from 3000 rpm to 6000 rpm, can be utilized.

The inverter generator is operated in accordance with the amount of electricity required, thus achieving better fuel efficiency and quiet operation.



■ Quiet Operation:

Exceptionally quiet running performance is achieved by the combined effects of the Economy Control function, which chooses the minimum engine speed necessary for the actual electrical load, the double coil system that makes possible a higher output even at the low engine speed setting on Economy Control mode, a new-design muffler structure, optimum distribution of sound-absorbing material and a low-noise cooling fan made of plastic. All this guarantees quiet running at just 47dBA at 1/4 load.

CONTENTS

Inverter system of EF1000iS

In the EF1000iS, the control unit and multi-pole alternator cooperate to produce AC output. The inverter, controlled by a 16-bit microcomputer, is a PWM sine wave inverter.

1. The alternator's output frequency remains unchanged even when the engine speed varies.
2. The output voltage is stable.
3. The output waveform is sine waves with small distortion (under 2.5%).

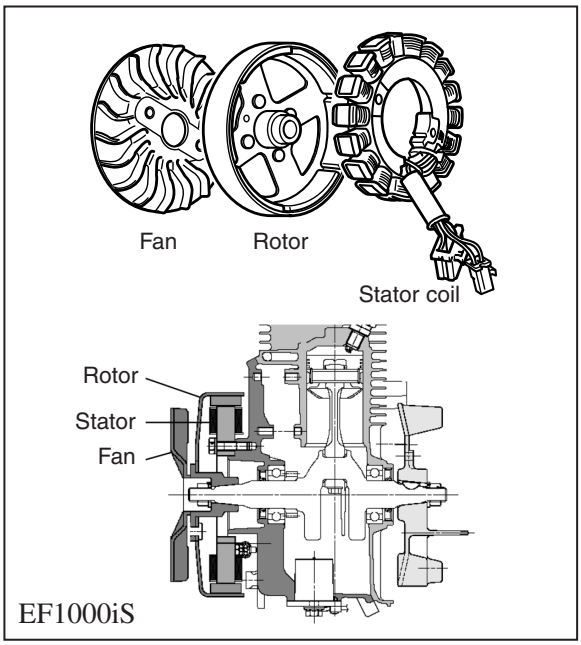
Multi-pole alternator features

The combination of ferrite magnets in the rotor and dual-stage multi-pole stator provides compact and high performance alternator.

High-frequency multi-pole alternator features:

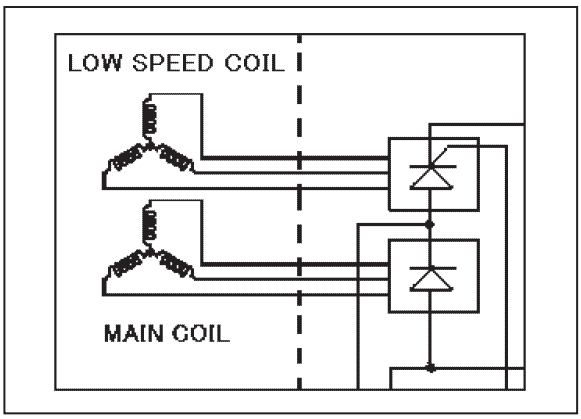
12-pole rotor
18-pole dual-stage stator coil
3-phase AC power generation

Reference information:
Ferrite magnets are magnetically stable and have a strong coercive force and so do not become demagnetized. While they have excellent corrosion resistance, they are also brittle due to the way they are produced. Great care must be taken when assembling them as jarring or shocks of force can adversely affect their efficiency.



Dual-stage stator Coil System

The double-coil system is a unique design that adds to the main coil a second coil specifically for running at lower rpm. Increasing the number of coils in this second low-speed coil enables it to generate optimum electricity when the engine is running at lower rpm. When the engine rpm increases, however, these extra coils become unwanted resistance that reduced generating efficiency. Thus, a system has been adopted that automatically selects the right coil in relation to the engine rpm; the low speed coil becomes the main generating coil at low rpm and the main coil from middle to high rpm. This is a Yamaha-exclusive technology that might be called a dual-stage system to accommodate low and middle range rpm. The result is a generating system that can provide optimum electricity supply that is stable even at low rpm and thus run with less noise and better fuel economy.

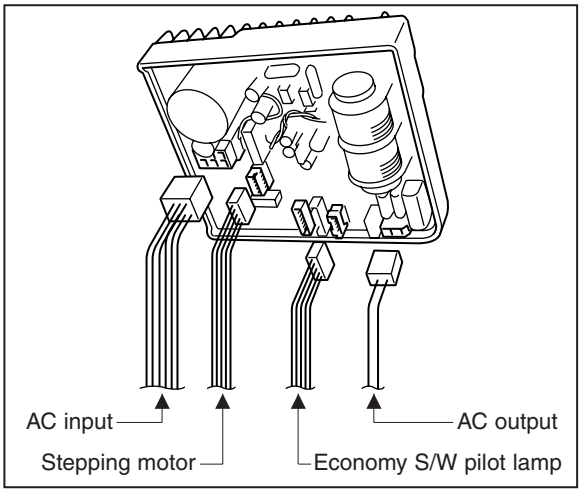


Control unit

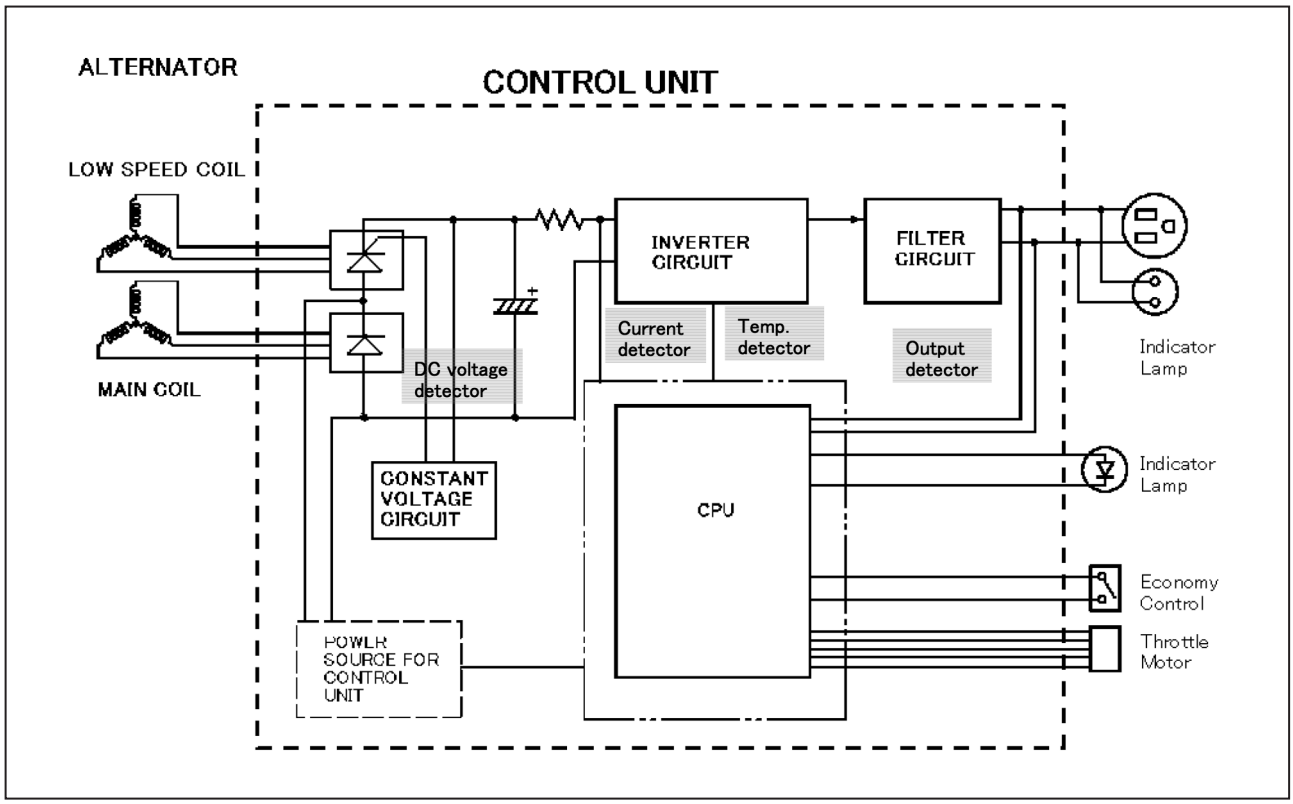
The control unit is a sealed unit.

Functions:

AC power generation
Electronic governor (throttle control)
Economy control program
Self-protective function



Principles of power generation with an inverter generator



Operation of control unit:

Stage 1. While converting three-phase AC into DC using a thyristor, rectifier circuit maintains stable DC voltage using a constant voltage circuit
Stage 2. The condenser stores the DC current.
Stage 3. The inverter circuit generates AC current with stable frequency.
Stage 4. The filter circuit further smoothens the sine wave of the AC current.

Protective functions:

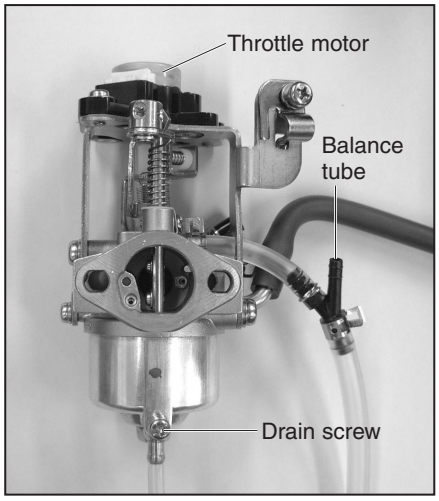
Overheat protection
Overload protection device
Over-voltage protection device

Other features:

electronic governor
economy control
electronic breaker
warning lamps

Electronic governor

An electronic governor takes the place of a conventional mechanical governor.
Throttle motor, a stepping motor, opens and closes the carburetor throttle valve electrically.



Components and functions:

■ Inverter control unit

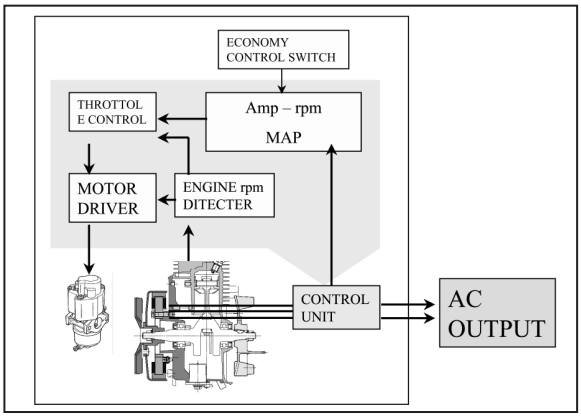
The control unit constantly monitors the AC output from the control unit, and operates the throttle motor to adjust the engine speed to the required speed.

■ Throttle motor (stepping motor)

The throttle motor receives pulses from the control unit and opens or closes the throttle shaft approximately 0.7 degrees per pulse.

Function of electronic governor

The inverter control unit is preprogrammed with the ideal engine speed settings in relation to electrical output current, and uses these settings as a cross-reference with the detected current to control the throttle motor (and consequently the throttle valve) to adjust engine speed to an optimum speed. Therefore, the engine speed will always be at the most adequate level according to the consumption of electricity on the system.



With an inverter generator, even if the engine speed changes it has no effect on the output frequency.

The electronic governor system is maintenance-free.

Throttle valve operation:

- The throttle is fully opened when the engine is not running.
- As soon as the engine is started with no load, the throttle valve is shut off.
  (When the economy switch is "ON", it will be in a position to maintain 3000 rpm.)
- The engine speed will be adjusted according to the requirements of the load on the system.
- The throttle valve stops at the fully opened position when the engine is turned off in order to prepare for the next engine starting.

Caution:
If the engine is difficult to start after the carburetor has been disassembled and reassembled onto the engine, fully open the throttle by hand and then start the engine.

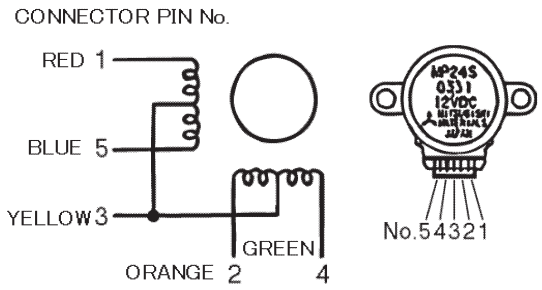
Automatic warming-up operation:
In temperatures of zero degrees or less, the engine will automatically operates at 5000 rpm for three minutes for self-warming-up purpose, even when the economy control switch is turned ON.

Throttle motor inspection

Caution during resistance measurement:
Do not allow the lead wire of the tester to touch the next terminal when measuring the resistance between terminals.

Caution during assembly:
To prevent damage to the throttle valve when reassembling the carburetor, re-install the carburetor with the throttle valve fully opened.

Caution:
If the engine is difficult to start after the carburetor has been installed onto the engine, fully open the throttle by hand and then start the engine.

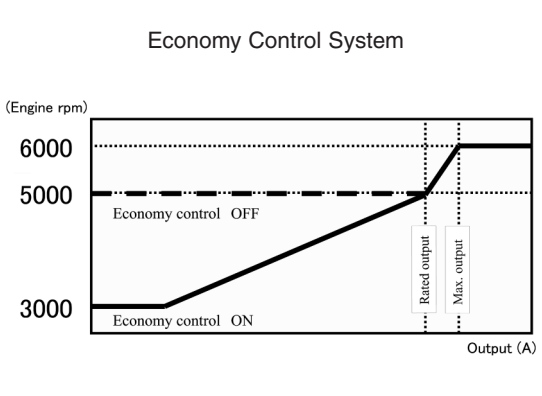


Resistance	250Ω	Terminal: 3-1, 3-5, 3-2, 3-4
	500Ω	Terminal: 1-5, 2-4
Throttle valve position:		
	During assembly:	Close
	During engine starting:	Open

Economy control operation and features

Because output frequency of an inverter generator is unrelated to the engine speed, it becomes possible to utilize a wide range of engine speed. Therefore, it also becomes possible to use low engine speed to meet a low electrical consumption.

With the EF1000iS, the engine runs at 3000 rpm when the electrical consumption is within approximately 1/4 of its rated output capacity. The engine speed gradually increases in accordance with the increase of electrical consumption.



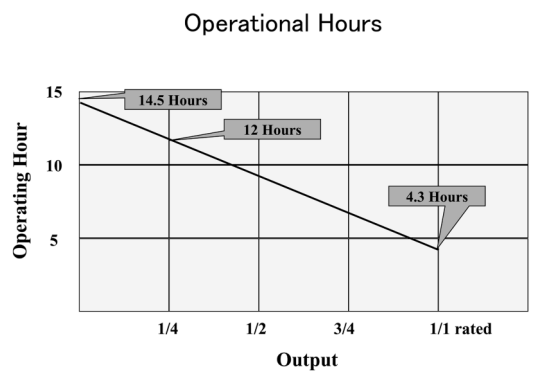
Economy switch ON: 3000 rpm (with no load)
Economy switch OFF: 5000 rpm

However, economy control switch is recommended to turn off in case of following occasions.

1. When operating induction motors, such as water pumps, which take large starting current.
2. When even the small changes in voltage cannot be accepted.
3. When charging batteries. The engine must be kept at 5000 rpm to maintain 12 V DC output.

Operational hour with economy switch on

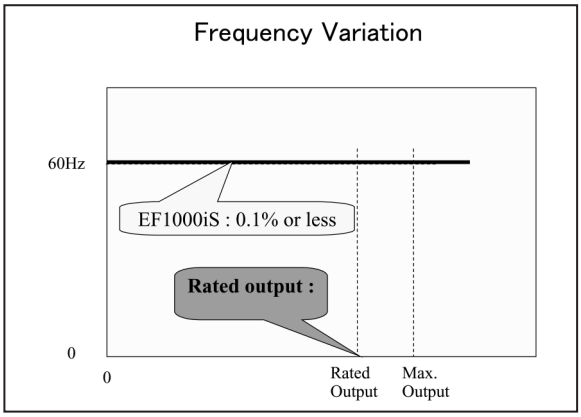
With rotated load	4.3 hours
With 1/4 of rated load	12.0 hours
With no load	14.5 hours



Frequency variation

In case of conventional synchronous generators, the engine speed with no load is set at approximately 6 % higher than rated engine speed (3600rpm) to maintain rated frequency when full rated load is applied. This is the reason why no-load frequency is slightly higher than the rated frequency.

However, adapting an inverter system, the frequency variation is not influenced by the engine speed. Therefore, an inverter generator provides constant AC output frequency even if the load changes.
Thus the output quality of EF1000iS is equivalent to the commercial power supplies.

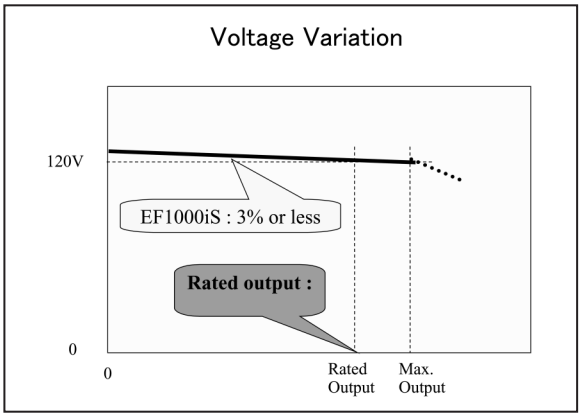


The frequency variation of EF1000iS is less than 0.1 %.

Voltage variation

The output voltage of conventional synchronous type generators with no load is set at approximately 10 % higher than the rated voltage to achieve the rated voltage when full rated load is connected. The voltage variation is inevitable on synchronous type generators due to the change in engine speed.

However, adapting an inverter system, the voltage variation can be maintained to minimum level, because the output voltage cannot be influenced directly by the engine speed.



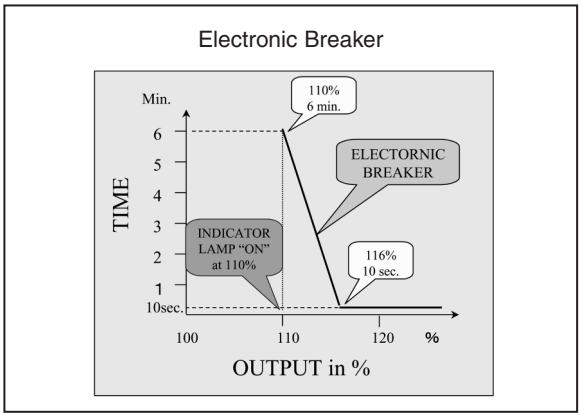
The voltage variation of EF1000iS is smaller than 3%.

The waveform distortion rate of EF1000iS is smaller than 2.5%.

Electronic beaker

As opposed to the NFB used in synchronous type generators, the EF1000iS uses an electronic breaker circuit housed in the control unit. When output from the control unit exceeds a specific limit, output is automatically interrupted to protect the generator from damage.

The control unit is designed to continuously monitor the output current for overloads, and if the current overload continues longer than a specified time, output is interrupted and "OVER LOAD" indicator turns on, while the engine continue to operate.



When using induction motors or similar devices (such as submerged water pumps) which require a large starting current with the generator, the current will not be interrupted for at least 10 seconds even if the starting current exceeds several times the generator's rated output. Only when the large over current continues longer than a specified time, the control unit will interrupt the AC output, and in this way it resembles a mechanical NFB.

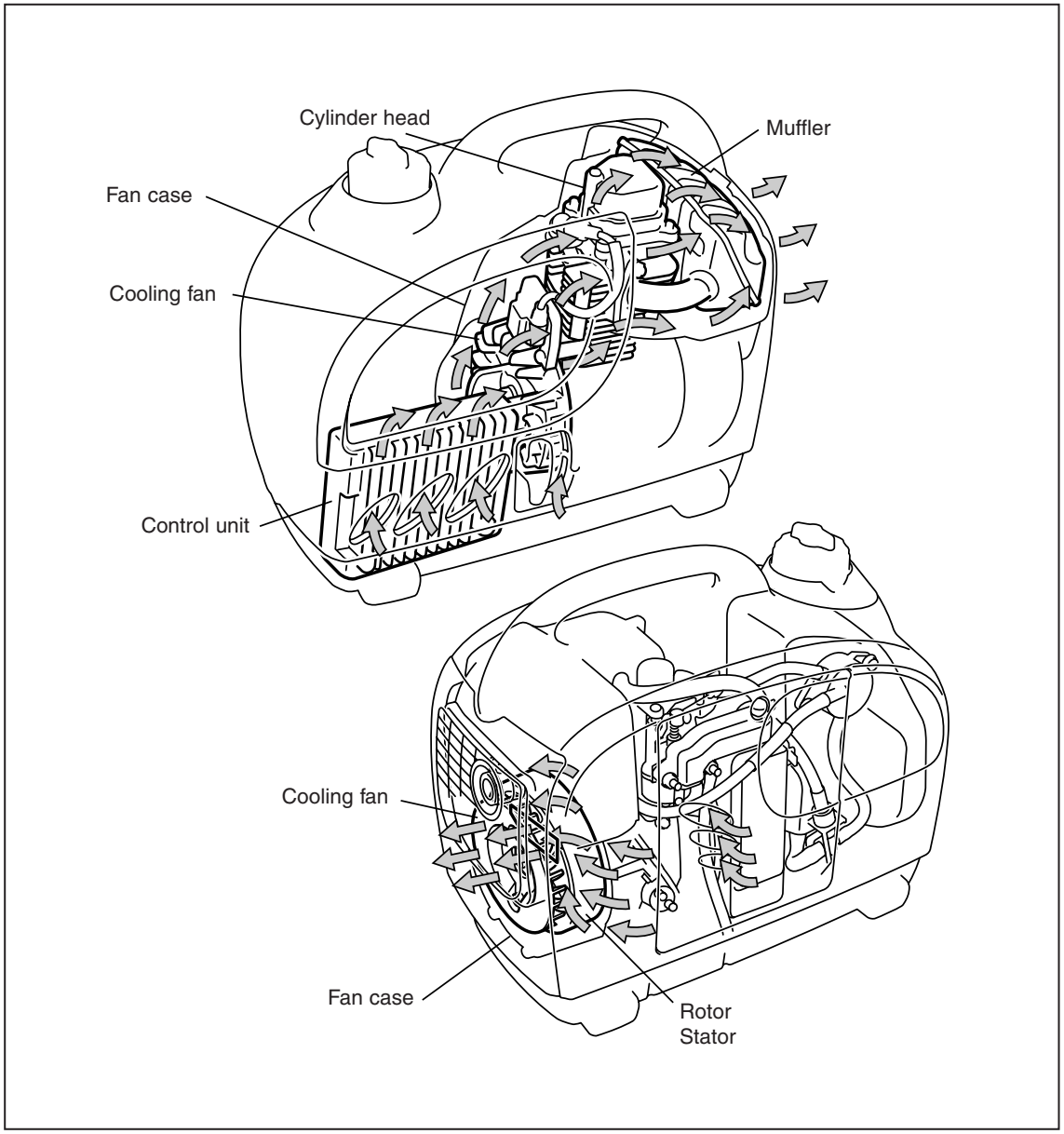
The electronic breaker will also interrupt AC output under following situation.

1) When the temperature of the control unit becomes too high.
2) When the current flow back into control unit from outer power source and the voltage becomes too high.

The engine must be stopped and power to the control unit must be interrupted in order for the system to reset after the electronic breaker has activated.

Cooling air flow

The centrifugal fans equipped on both side of the engine perform forced air-cooling of the system over the path as shown below.
Each part of the system is therefore continuously kept at a stable operating temperature.



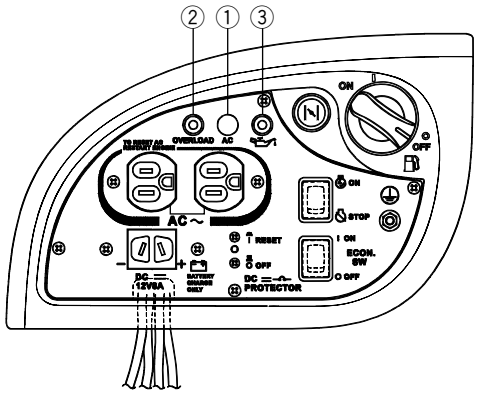
Indicators

1. Output indicator

When the generator is running normally and generating power, this indicator is lit green.

2. Overload warning lamp

During power generation, if the AC output exceeds 110% or more of the rated current, the electronic breaker will be activated and the red overload indicator turns on.
The AC output will be interrupted when the output current exceeds 116% or more of the rated current.



① Output indicator
② Overload warning lamp
③ Oil warning lamp

➢ When the electronic breaker operates:
The engine continues to run, but the control unit stops supplying AC output and:

The output indicator (green) turns **off**.
The overload indicator (red) turns **on**.

How to reset electronic breaker

➢ Stop the engine
Verify the required load of the connected device, and reduce to the rated load of the generator if necessary.
Verify whether or not there is a problem with a connected device. (A possible cause of excessive current leak.)
Check for foreign matter in the cooling air inlet and areas around the control unit which could block incoming air.

➢ To return the generator to normal operation:
Temporarily stopping the engine and re-starting automatically resets the system to its original state. (The system cannot be reset unless power to the control unit is interrupted by stopping the engine.)

When using an induction motor which requires a large starting current, the overload warning light (red) may temporarily light. This operation is normal.

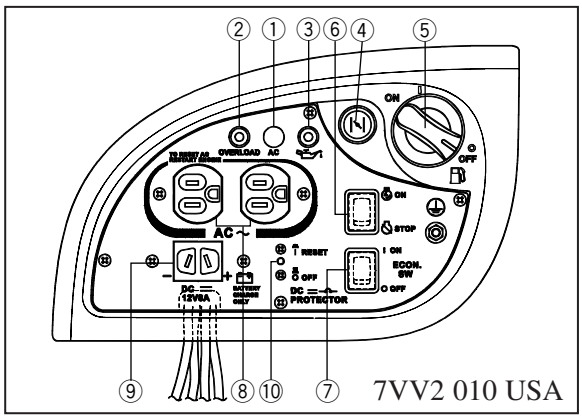
After the induction motor has started up, the overload warning light (red) will turn off, while the output indicator (green) will continue to be lit.

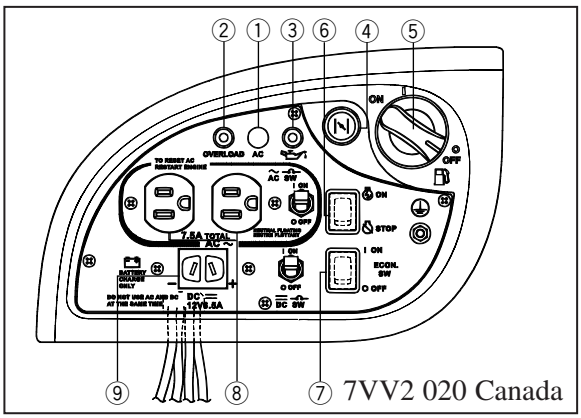
3. Oil warning lamp

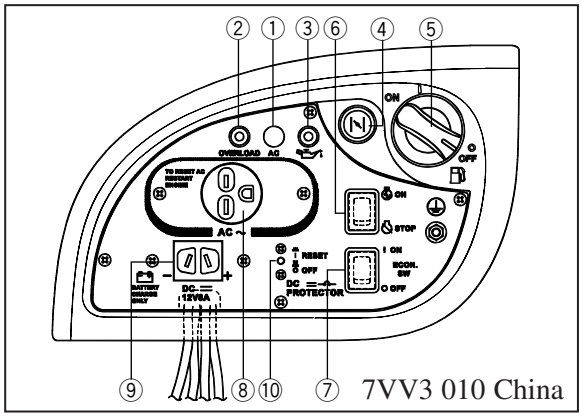
As in previous Yamaha generators, the engine will shut off automatically when the oil level decreases to a specified level.

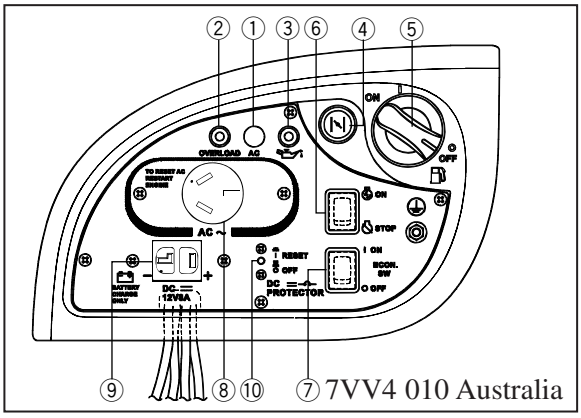
When this happens and the recoil starter is pulled, the engine will not start and the oil warning light will turn on.

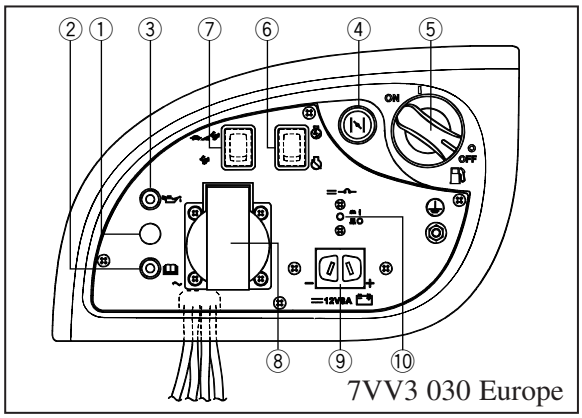
Control panel







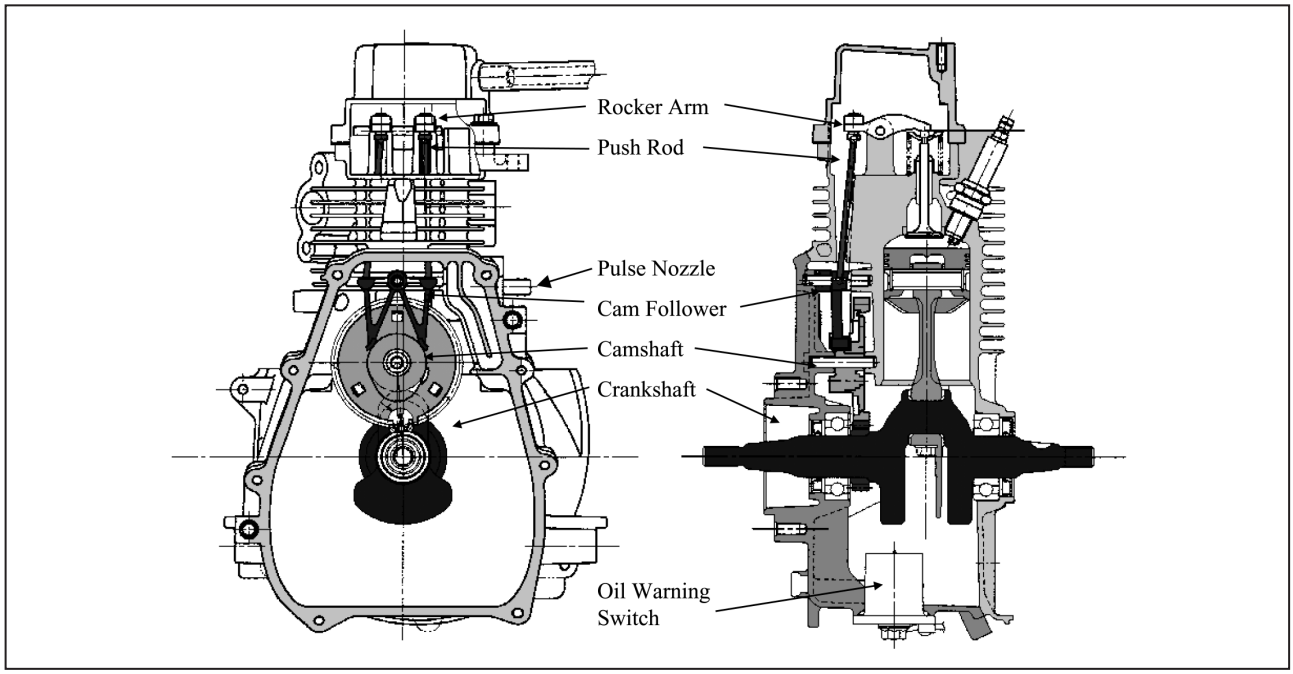


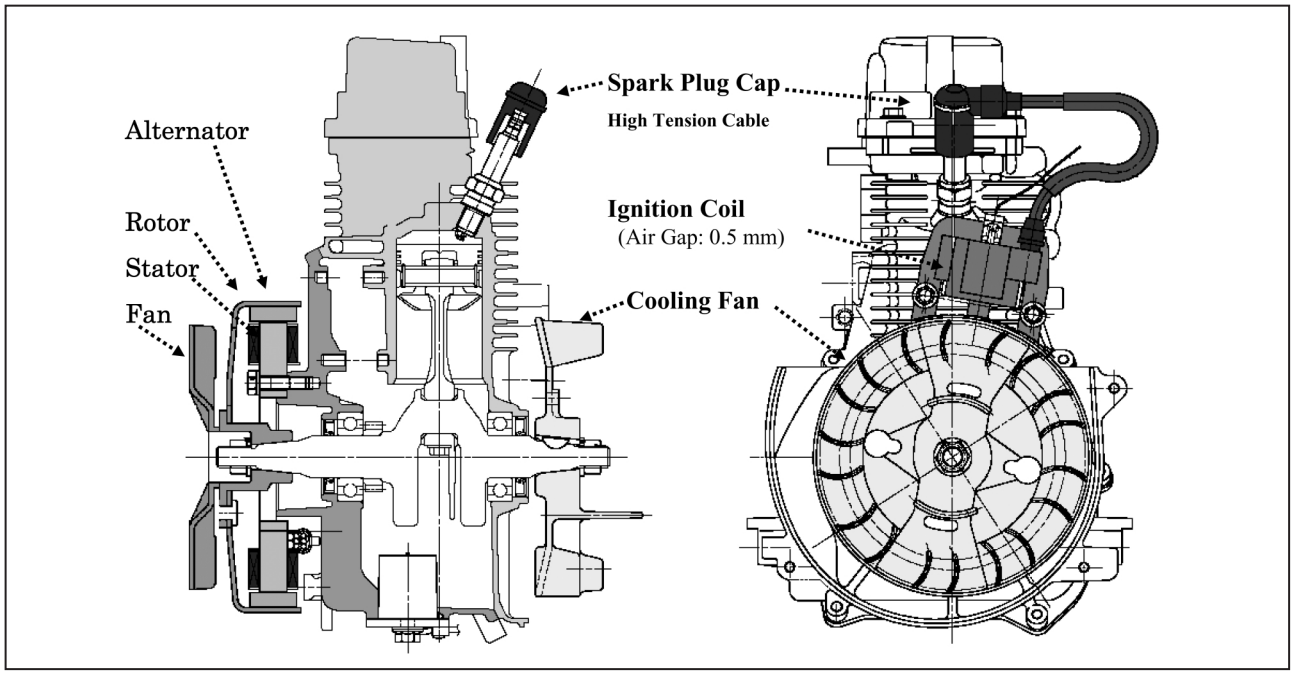


① Output indicator
② Over load warning lamp
③ Oil warning lamp
④ Choke
⑤ Fuel petcock
⑥ Engine stop switch
⑦ Economy control switch
⑧ AC receptacle
⑨ DC receptacle
⑩ NFB for DC output

Characteristics of the new OHV engine

1. The crankcase, cylinder and cylinder head are integrated, resulting in a compact engine.
2. The exhaust valve of stelite has raised durability against wear.3. The oil seal of the exhaust valve system reduces oil consumption.
4. Combustion efficiency is high thanks to the newly designed intake/combustion system.
5. The new breather system reduces oil consumption.
6. The TCI ignition system is maintenance-free.
7. The oil warning system employed in the Yamaha alternator is used.
8. The cam shaft made of resin is compact and lightweight.
9. The large muffler employed reduces exhaust noises.
10. The fuel pump is a negative pressure pump.





Crankcase, Cylinder, Cyliner Head

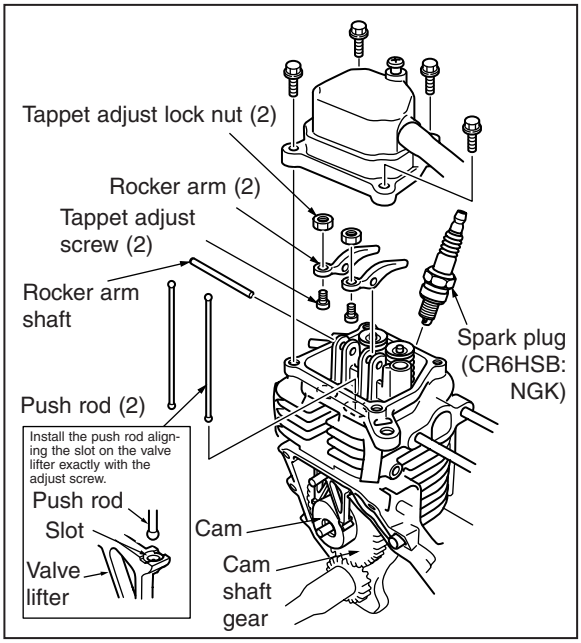
Exhaust Valve : Stellite valve face
Intake Valve : with valve stem seal

Piston Ring

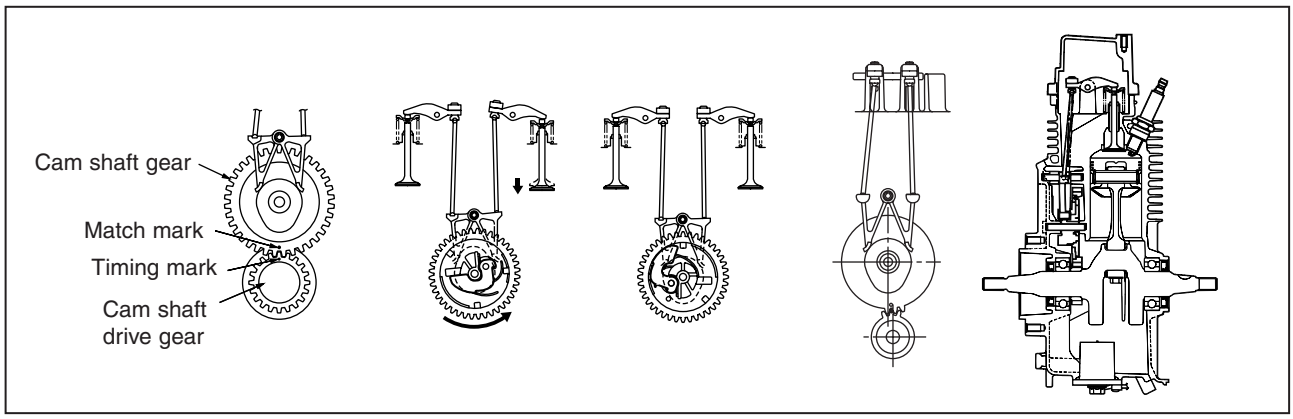
1st

2nd

Oil Ring

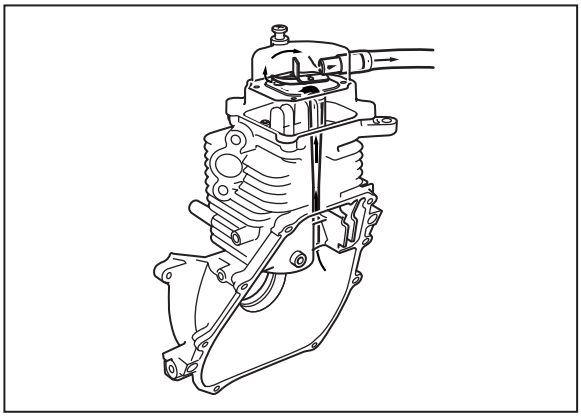


Auto decompressor system



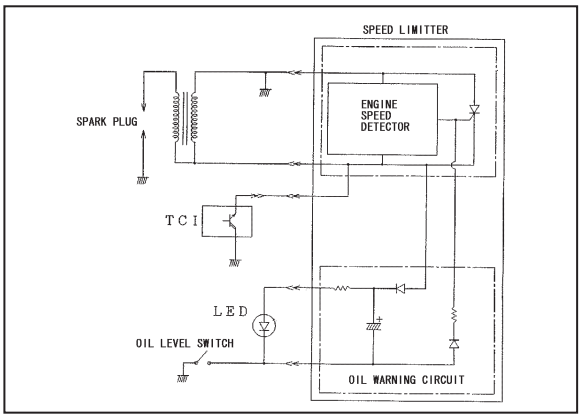
Breather system

In the breather system, the lead valve separates the air from the oil.
The air comes to the air clearner via the breather hose.
The oil comes to the crankcase, reducing oil consumption.



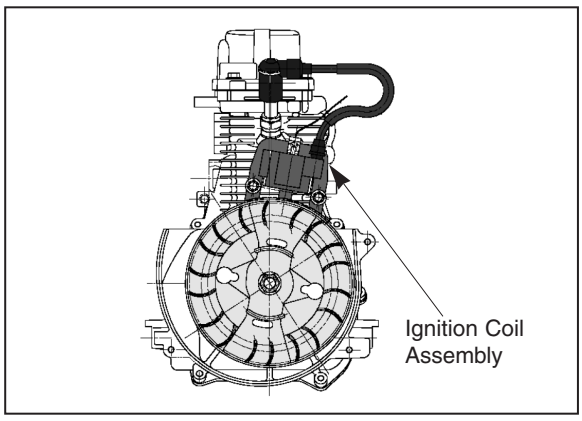
Ignition system

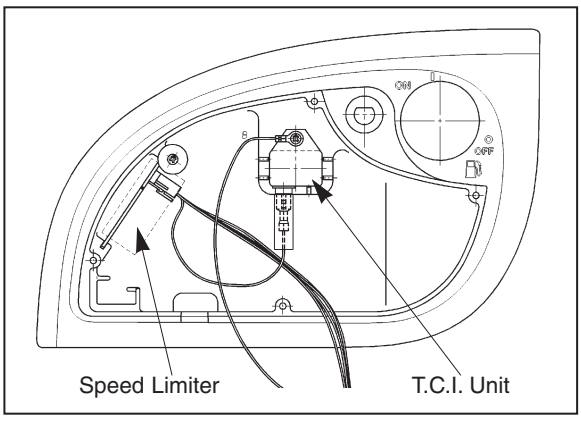
The TCI system shows a good performance in starting and igniting.
The TCI system makes maintenance easy because of the absence of mechanical points. It produces good sparks and shows a reliable performance in igniting.



Characteristics:
The ignition system, provided with an overrun limiter, protects the engine from overrevolution.
When the overrun limiter operates, the number of sparks will be limited to put the engine in stalling condition and prevent overrevolution. The ignition system of the EF1000iS consists, separately from the ignition coil and TCI unit, of an integral unit which performs the function of the overrun limiter in the oil warning unit.

Speed limiter operation speed 6200 ± 200 rpm

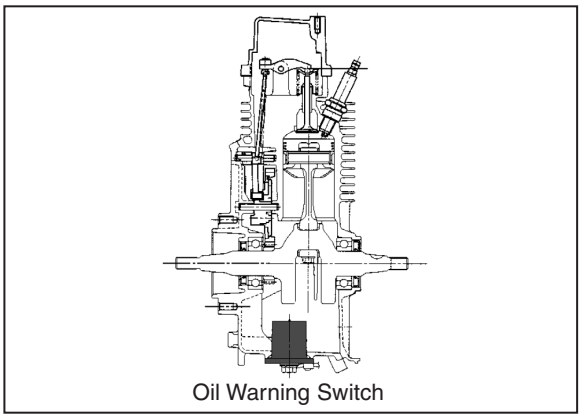




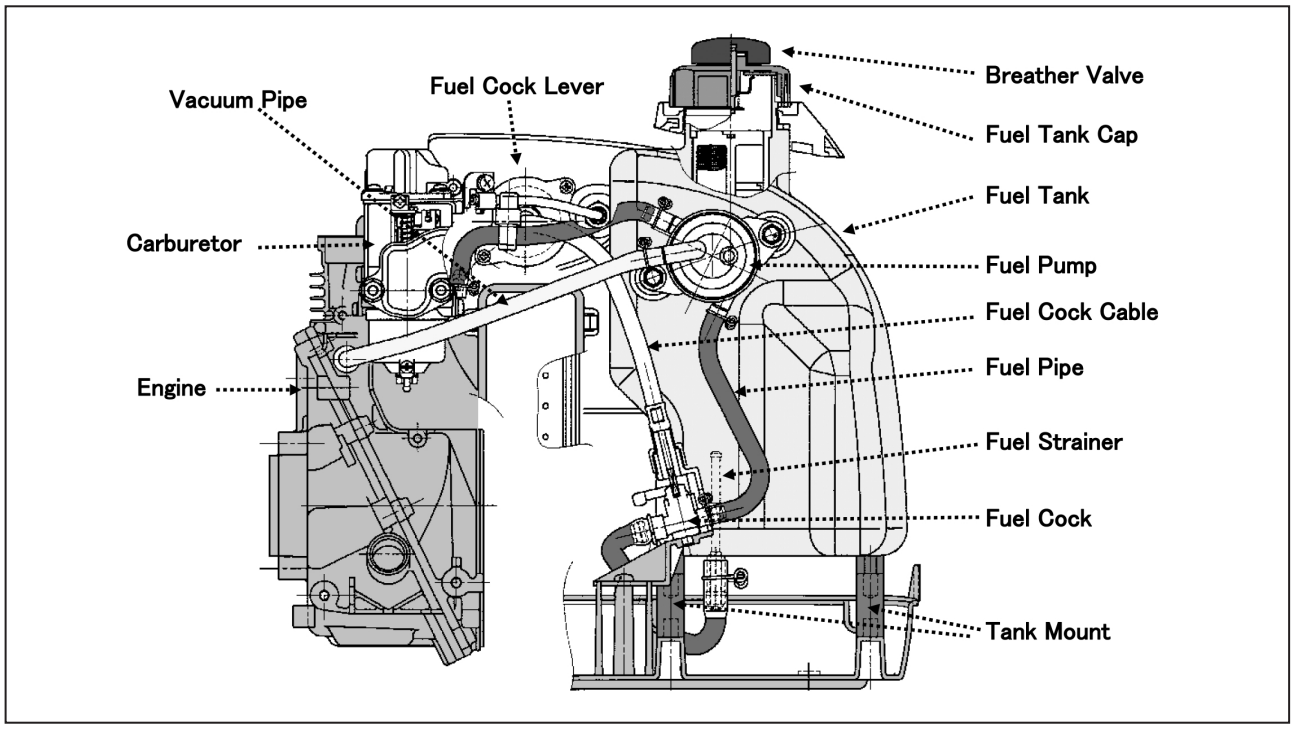
Oil warning system

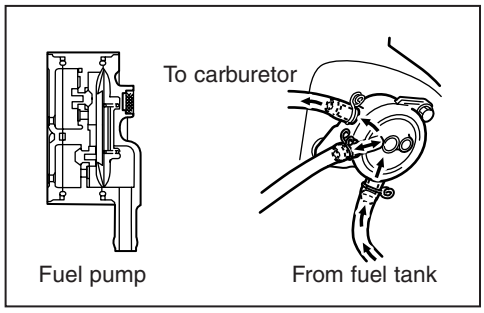
The oil-warning unit is built in the speed limiter unit.
The oil-warning switch is installed in the crankcase.

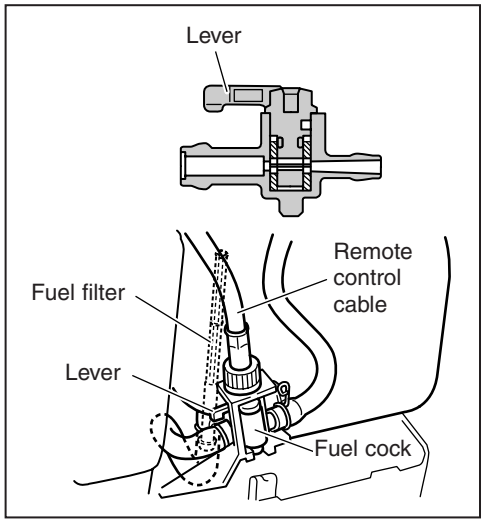
When the engine oil level drops below the specified level, the ignition system is killed and the engine will be automatically stopped. This function prevents the engine from serious damage.
The oil-warning lamp turns on by attempting to start the engine so as to warn the operator that the engine oil should be replaced or refilled.

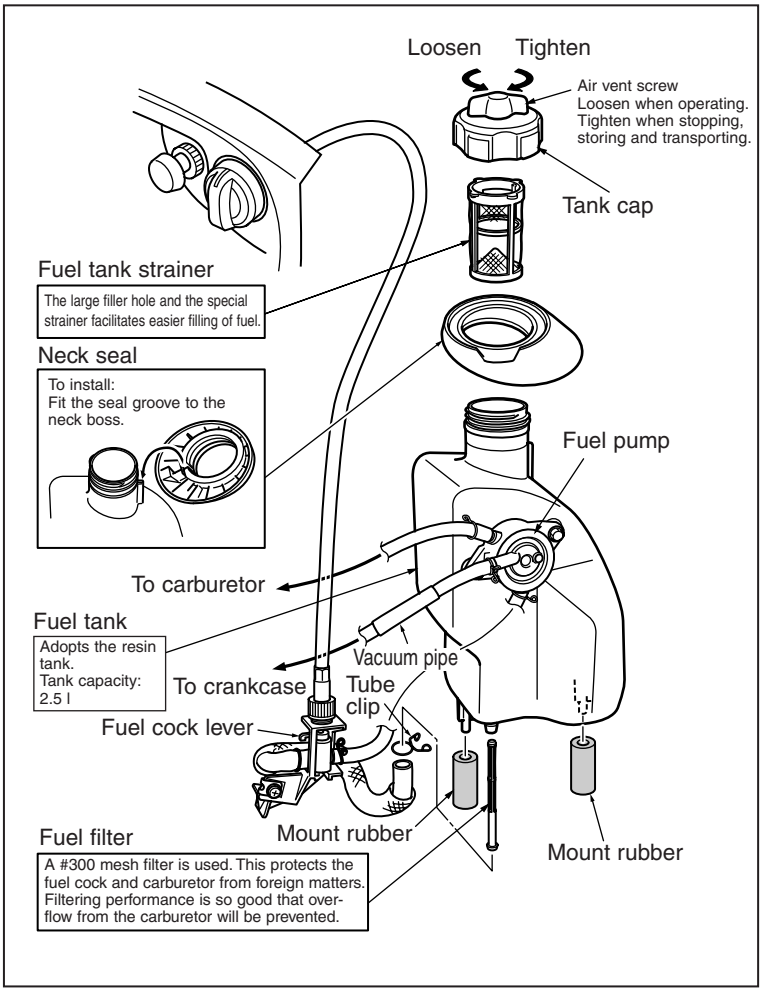


Fuel system

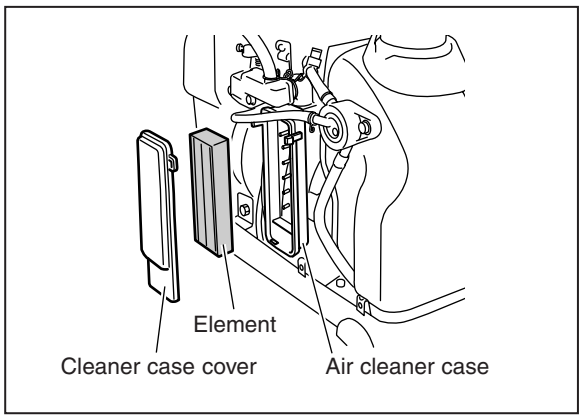

Vacuum Pipe
Fuel Cock Lever
Breather Valve
Fuel Tank Cap
Fuel Tank
Carburetor
Fuel Pump
Fuel Cock Cable
Engine
Fuel Pipe
Fuel Strainer
Fuel Cock
Tank Mount

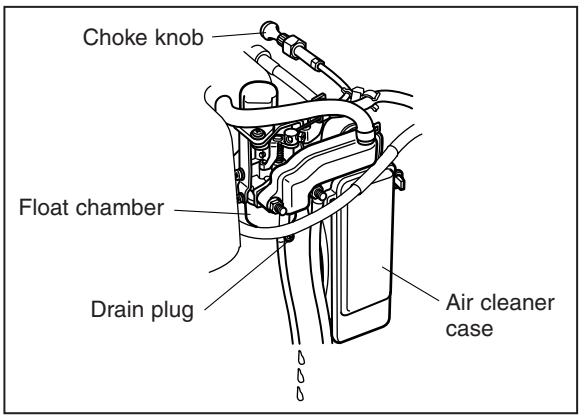

To carburetor
Fuel pump
From fuel tank


Lever
Remote control cable
Fuel filter
Lever
Fuel cock

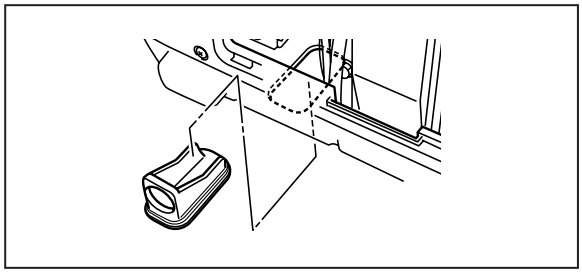

Loosen
Tighten
Air vent screw
Loosen when operating.
Tighten when stopping, storing and transporting.
Tank cap
Fuel tank strainer
The large filler hole and the special strainer facilitates easier filling of fuel.
Neck seal
To install:
Fit the seal groove to the neck boss.
Fuel pump
To carburetor
Fuel tank
Adopts the resin tank.
Tank capacity: 2.5 l
Vacuum pipe
To crankcase
Tube clip
Fuel cock lever
Mount rubber
Fuel filter
A #300 mesh filter is used. This protects the fuel cock and carburetor from foreign matters. Filtering performance is so good that overflow from the carburetor will be prevented.
Mount rubber

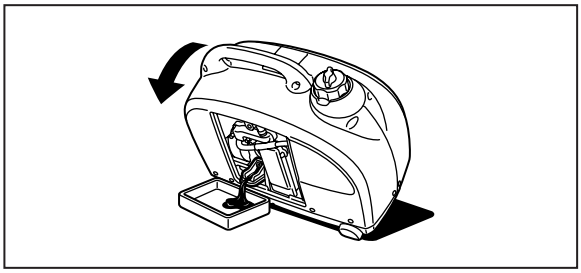
Air Cleaner & carburetor

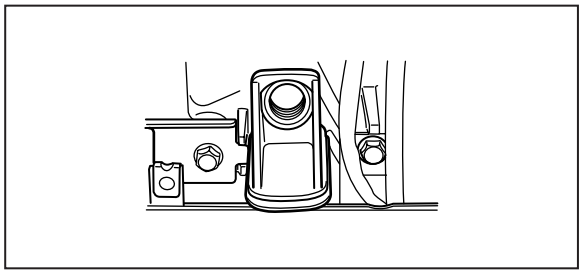


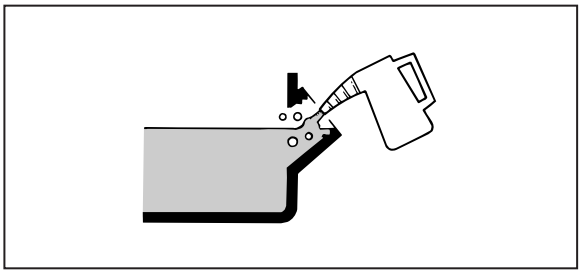


Engine oil replacement

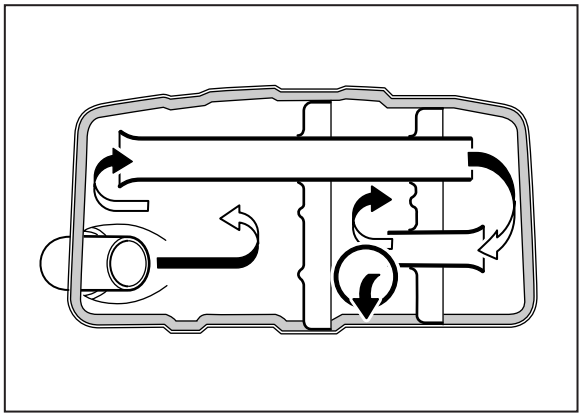






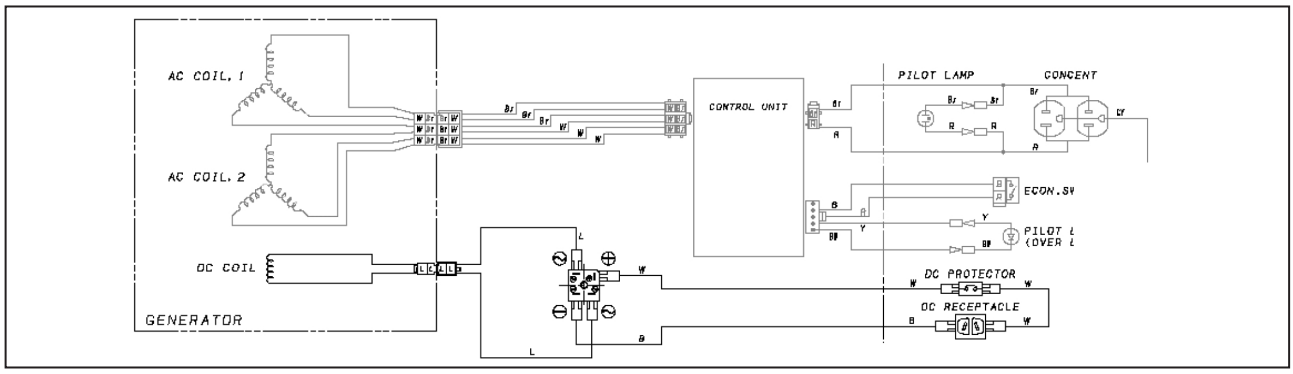


Muffler

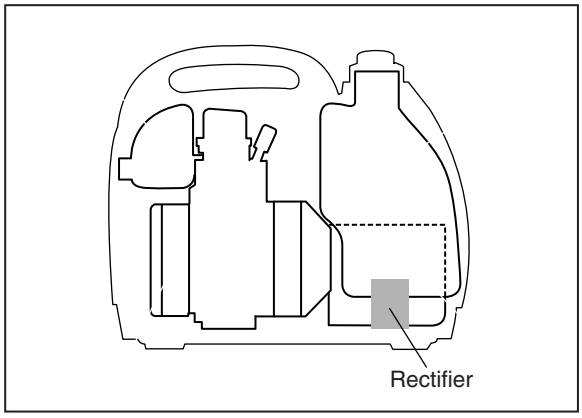


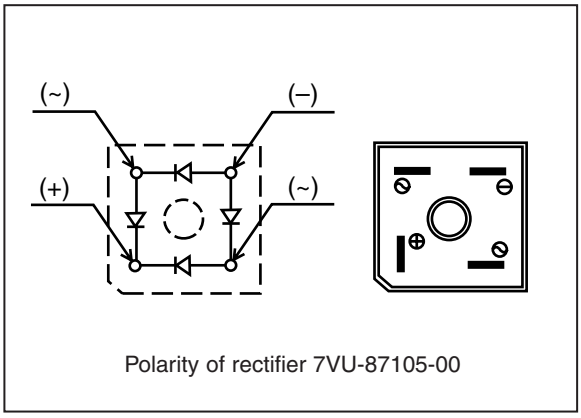
DC output

DC output is provided on EF1000iS exclusively for battery charging.
Rated output: DC 12V - 8A



DC 12V circuit is entirely separated from AC circuit. Economy control switch must be truned off while charging a battery, as the rated engine speed, which is 5000 rpm, is required to generate rated DC-output.
The total electric consumption of both the AC and the DC output should not exceed the total rated output of the generator, which is 900 VA, when both output are used together.





Polarity of rectifier 7VU-87105-00

Battery charging

■ Conditions of use of the DC power supply (exclusively for charging 12V battery)
The DC power supply is designed to charge a battery of 40AH which is half discharged.
12V battery
The time taken to charge a battery depends on how the battery is discharged. Charging is complete when the specific gravity of the battery is 1.26-1.28. Check the specific gravity in every hour or so.
A 40AH battery of a compact car which is half discharged will be charged almost fully in about 3 hours. Be sure to check the level of the electrolyte.
Do not take energy from the battery nor run the starter when the battery is being charged. This could cause a large current to flow through the generator coil, burning it.

■ Precautions for charging the battery
The battery will produce a flammable gas. The wrong handling might result in explosion or serious injuries. Be sure to observe the following when charging a battery.
1) Keep fire and electric sparks away. Explosion might happen.
2) Secure a good ventilation where the battery is charged. Otherwise explosion might happen.
3) Be very careful to handle the electrolyte (diluted sulfuric acid). It will burn anything, so keep it away from your eyes, skin and clothes.
   First-aid procedures: If your skin or clothes catch the electrolyte, wash them with a great amount of water immediately. If it enters your eyes, wash with a great amount of water and consult the doctor immediately.

■ Charging a 12V battery

Do not use for other than charging a 12V battery.

⚠ **WARNING:**

- **When handling a battery, keep good ventilation and keep electric sparks, like from short-circuit, away. Also keep fire away. Explosion might happen because a flammable gas occurs from the battery.**
- **The battery electrolyte is diluted sulfuric acid. Remember that, if it comes to your eyes or skin, the affected part will be burnt. If it should happen, wash the part with much water for at least 15 minutes and consult the doctor immediately.**
- **Before charging a battery, remove all cords connected to the battery, doing it first from the negative side. When reconnecting, do the positive side first. If you do the wrong way, short-circuit could result.**

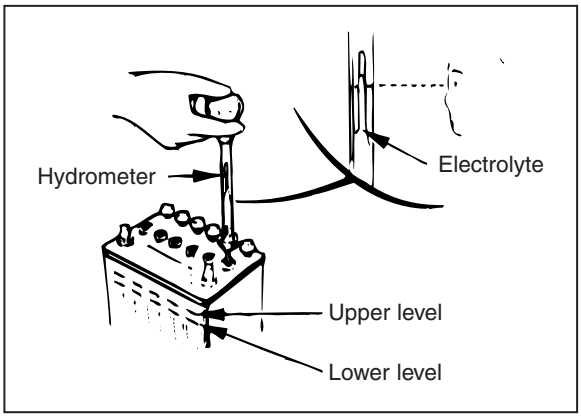
■ Handling precautions

If you continue to charge the battery for many hours, the temperature of the electrolyte will rise and battery performance may deteriorate.

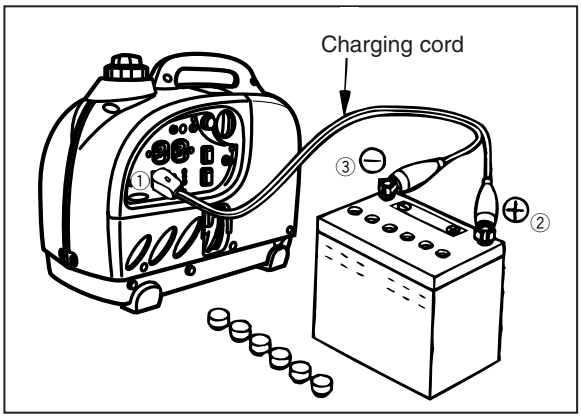
Handling procedures vary with the type of battery.

1. Remove the cords and tubes from the battery and then remove the battery.

2. Measure the specific gravity of the battery.
   - Remove the plugs from the battery and check the electrolyte level. If it is near the lower limit (LOWER), supply distilled water until the level reaches the higher limit (UPPER).
   - Be sure to supply distilled water. Use of the tap water would result in a reduced service life of the battery.
   - Measure the specific gravity of the electrolyte with a hydrometer.
   - Measure the specific gravity in about every hour. Make sure the reset is not turned off. (The battery is considered to be fully charged when the specific gravity is 1.26-1.28.)
   - Measure the specific gravity for each cell.



3. Connect the charging cord across the battery and DC outlet. Start the engine to charge the battery.
   When charging, set the economy control switch at OFF.
   To connect the cord, do in the order of the numbers shown in the illustration. To remove the cord, reverse the connecting order.



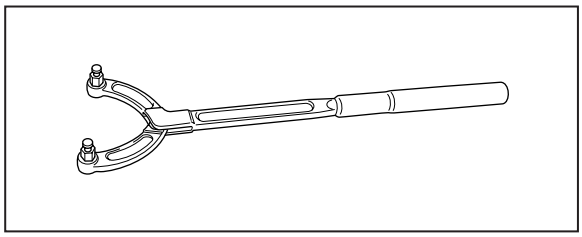
⚠ **WARNING:**

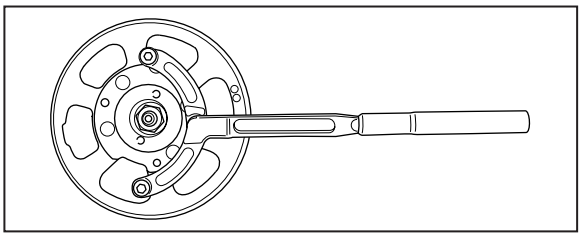
Make sure of the polarity, ⊕ and ⊖, of the charging cord. If you connect it in the wrong polarity, short-circuit could result. A flammable gas occurring from the battery may explode. The alternator and/or battery may also fail.

4. On completion of charging, stop the engine and remove the charging cord in the reverse order of installing it.

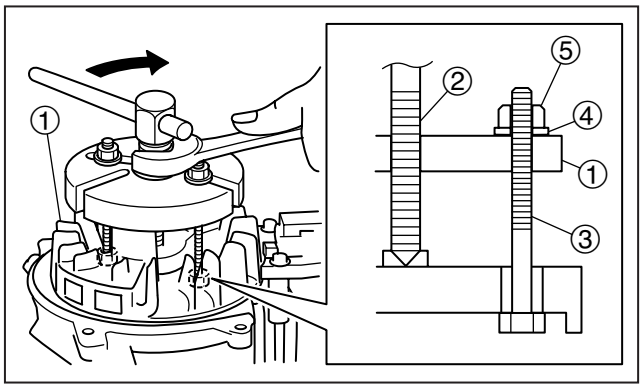
Special tools

1. Rotor assy holder
   A tool available in markets will serve.
   HOZAN C-349 (drum remover) overall length: 360 mm



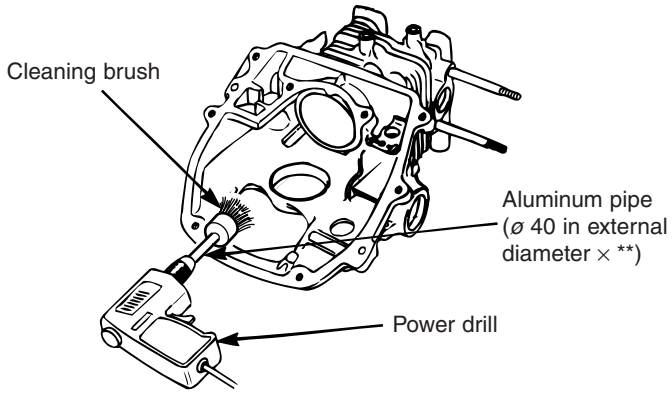


2. Flywheel rotor puller
   ① 90890-01361 (body) (1)
   ② 90890=01357 (center bolt) (1)
   ③ 95817-06100 (bolts) (2)
   ④ 90201-06380 (washers) (2)
   ⑤ 90170-06254 (nuts) (2)



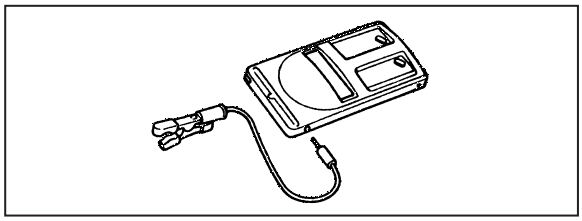
3. Cleaning of the combustion chamber
   1) Insert an aluminum pipe (ø 40 in external diameter × ** mm long) in the cylinder along its inner wall.
   2) Fit a brush attachment to a power drill (see below) and clean the combustion chamber.

Caution:
To protect the inner wall of the cylinder, be sure to install the aluminum or plastic pipe.

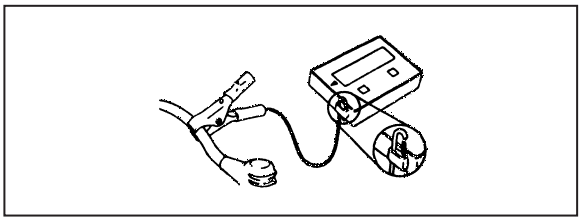


For cylinder head cleaning:
Wire Brush, Solid End, 3/4" Brush
Diameter, 1/4" Shank/Arbor
Snap-On : AC16C

4. Engine tachometer
   Use of the PET-1000 or PET-2000DX engine tachometer made by Oihama Kogyo Co., Ltd. is recommended.
   Note that the reading may not be right if the position of the engine tachometer is wrong. Keep it away from the engine.

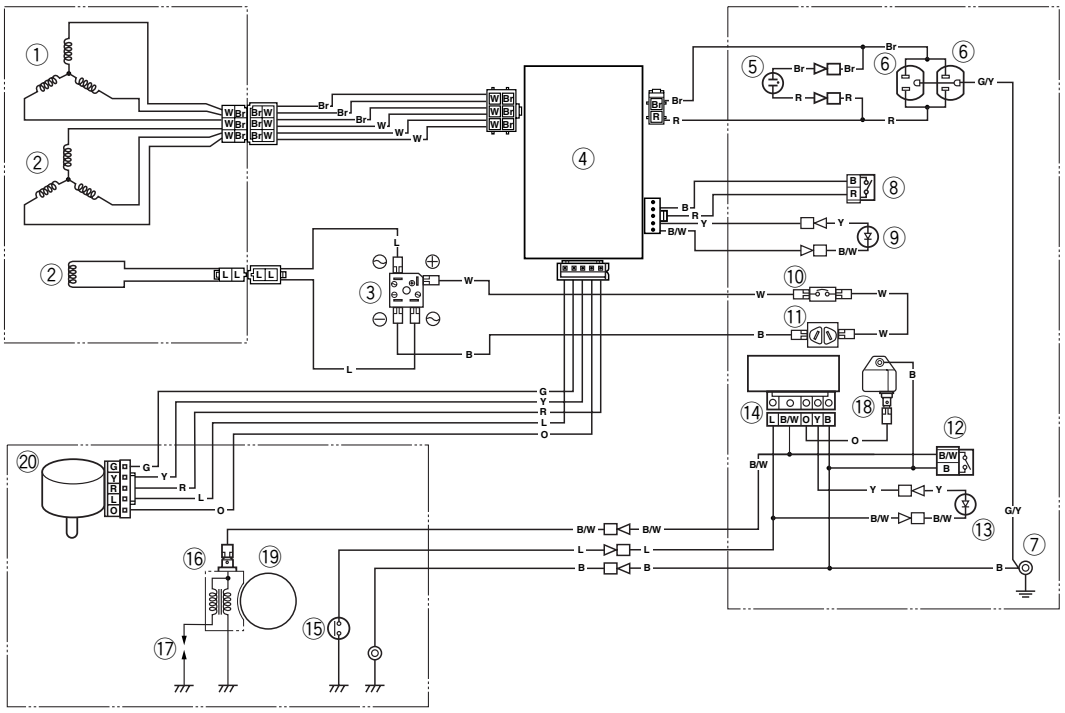


90793-80009 Engine tachometer (PET-1000)



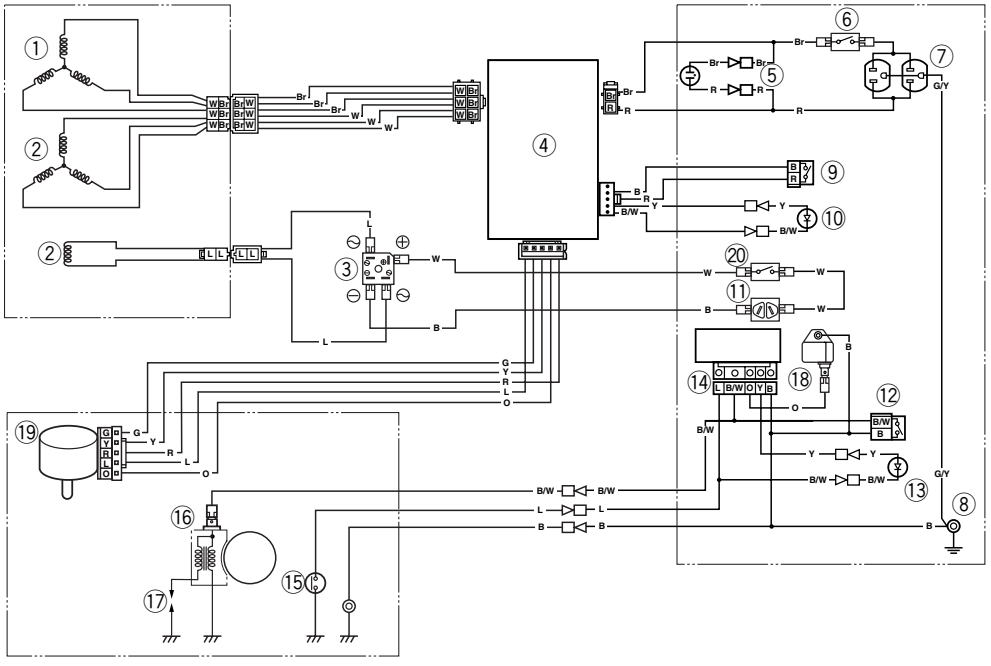
90793-80032 Engine tachometer (PET-2000DX)

Wiring diagram



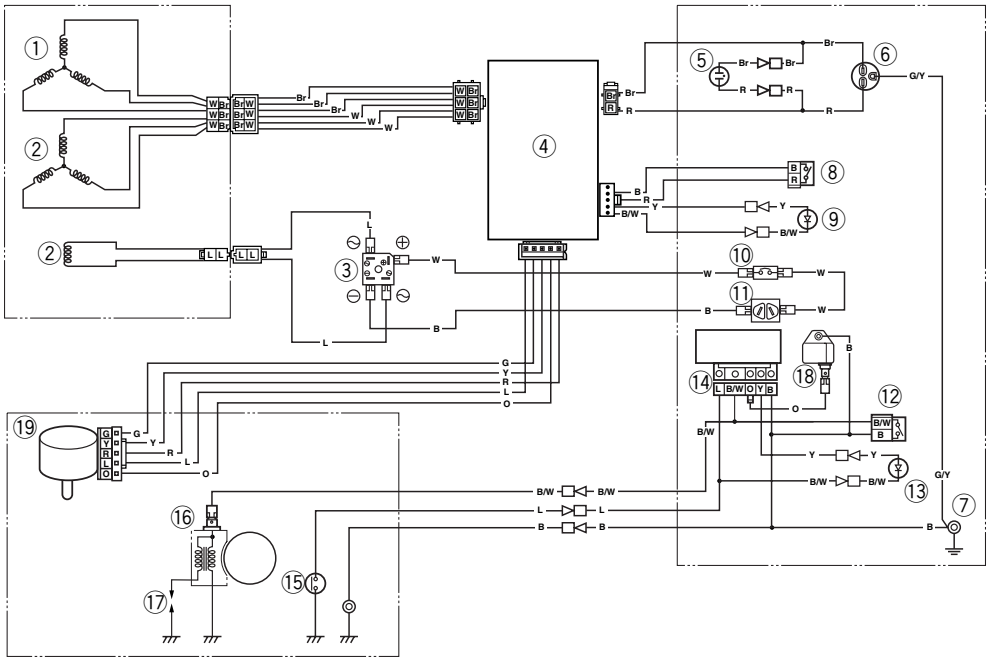
① Main coil
② Sub coil
③ DC rectifier
④ Control unit
⑤ AC pilot light
⑥ AC receptacle
⑦ Ground (Earth) terminal
⑧ Economy control switch
⑨ Overload indicator light
⑩ DC protector (breaker)
⑪ DC receptacle
⑫ Engine switch
⑬ Oil warning light
⑭ Speed limiter
⑮ Oil level gauge
⑯ Ignition coil
⑰ Spark plug
⑱ TCI unit
⑲ TCI magneto
⑳ Stepping motor

120V, 60Hz (US)



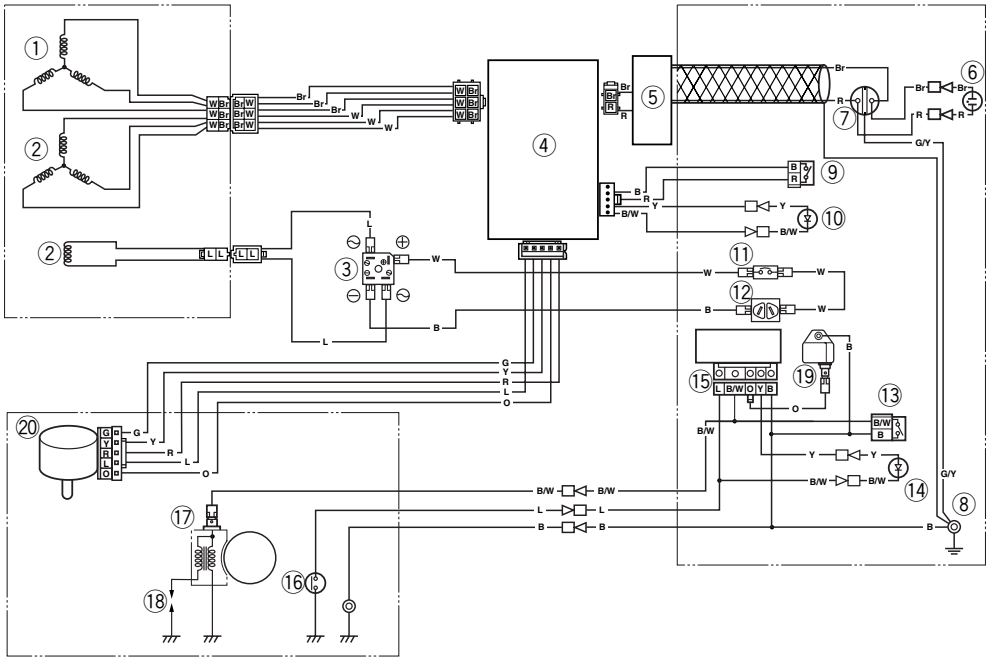
① Main coil
② Sub coil
③ DC rectifier
④ Control unit
⑤ AC pilot light
⑥ AC receptacle
⑦ N.F.B. (AC)
⑧ Ground (Earth) terminal
⑨ Economy control switch
⑩ Overload indicator light
⑪ DC receptacle
⑫ Engine switch
⑬ Oil warning light
⑭ Speed limiter
⑮ Oil level gauge
⑯ Ignition coil
⑰ Spark plug
⑱ TCI unit
⑲ Stepping motor
⑳ DC protector (breaker)

120V, 60Hz (CANADA)



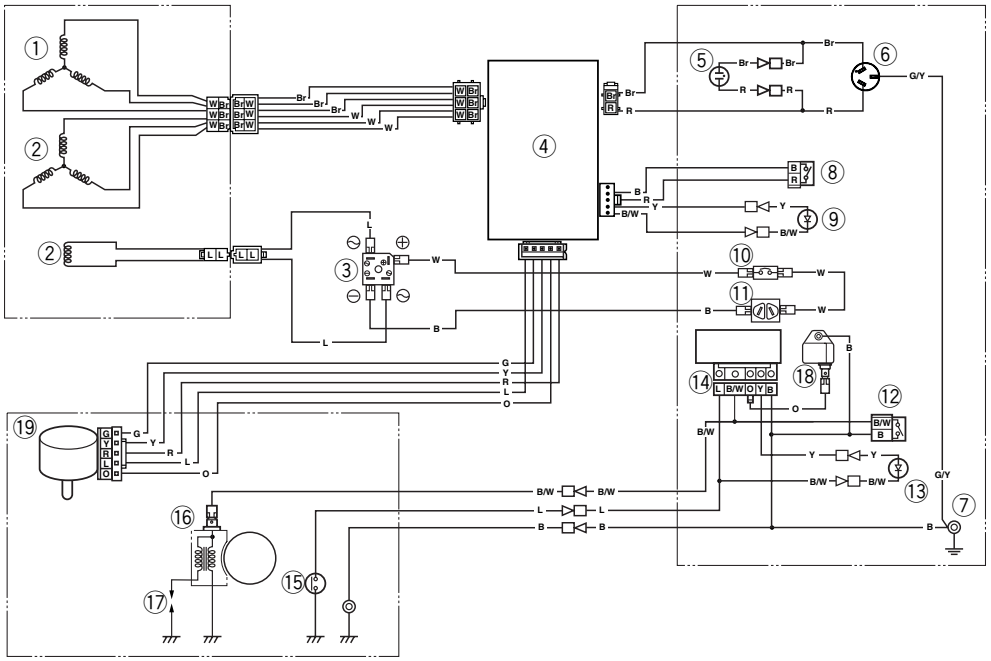
① Main coil
② Sub coil
③ DC rectifier
④ Control unit
⑤ AC pilot light
⑥ AC receptacle
⑦ Ground (Earth) terminal
⑧ Economy control switch
⑨ Overload indicator light
⑩ DC protector (breaker)
⑪ DC receptacle
⑫ Engine switch
⑬ Oil warning light
⑭ Speed limiter
⑮ Oil level gauge
⑯ Ignition coil
⑰ Spark plug
⑱ TCI unit
⑲ Stepping motor

220V, 50Hz (CHINA)



① Main coil
② Sub coil
③ DC rectifier
④ Control unit
⑤ Noise filter
⑥ AC pilot light
⑦ AC receptacle
⑧ Ground (Earth) terminal
⑨ Economy control switch
⑩ Overload indicator light
⑪ DC protector (breaker)
⑫ DC receptacle
⑬ Engine switch
⑭ Oil warning light
⑮ Speed limiter
⑯ Oil level gauge
⑰ Ignition coil
⑱ Spark plug
⑲ TCI unit
⑳ Stepping motor

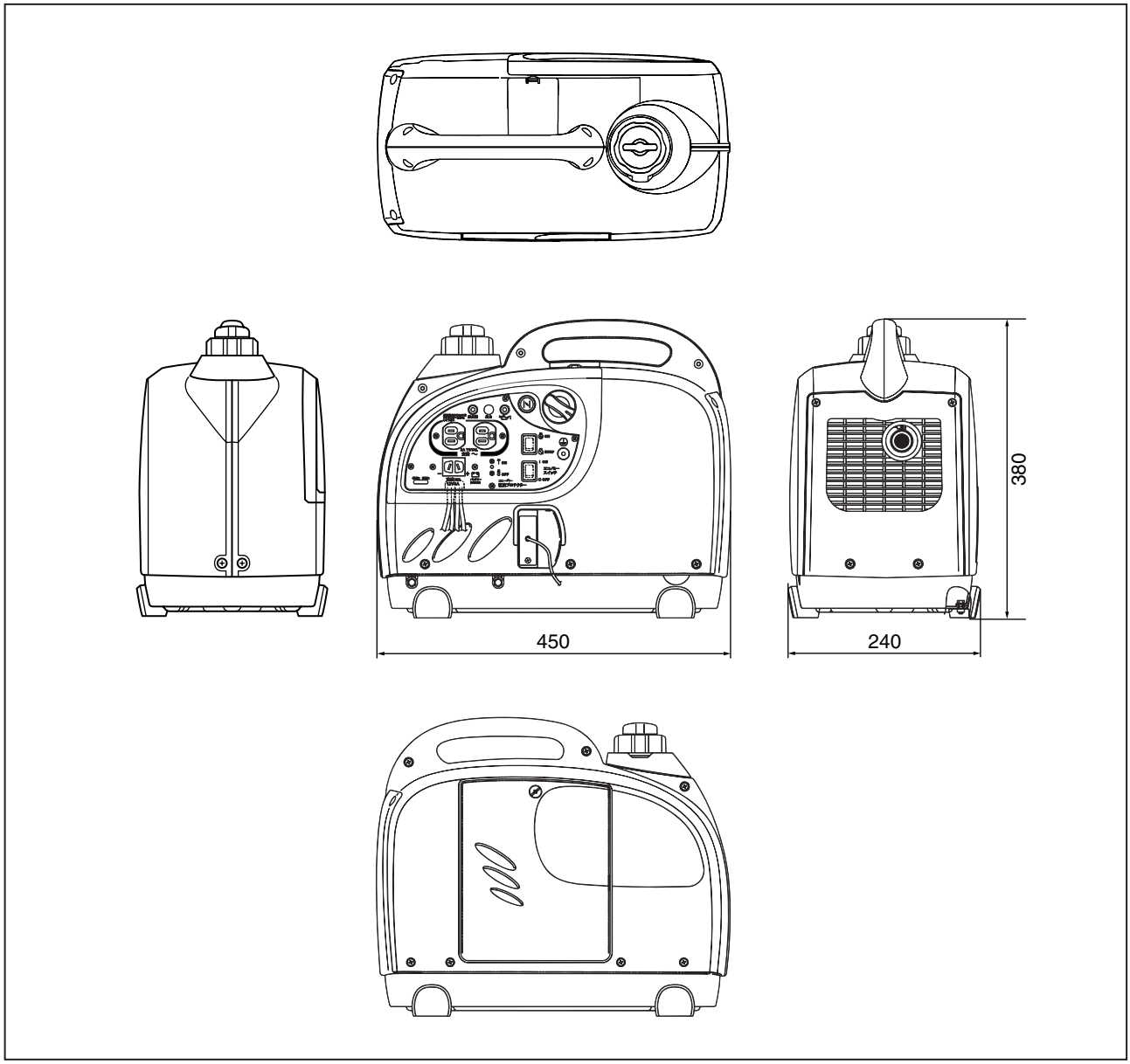
230V, 50Hz (EUROPE)



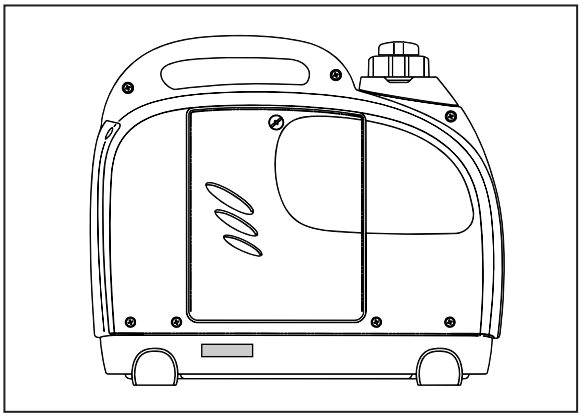
① Main coil
② Sub coil
③ DC rectifier
④ Control unit
⑤ AC pilot light
⑥ AC receptacle
⑦ Ground (Earth) terminal
⑧ Economy control switch
⑨ Overload indicator light
⑩ DC protector (breaker)
⑪ DC receptacle
⑫ Engine switch
⑬ Oil warning light
⑭ Speed limiter
⑮ Oil level gauge
⑯ Ignition coil
⑰ Spark plug
⑱ TCI unit
⑲ Stepping motor

240V, 50Hz (AUSTRALIA)

External views of the EF1000iS



Serial Number



SPECIFICATIONS

Specifications		EF1000iS	EF1000iS	EF1000iS	EF1000iS	EF1000iS	EF1000iS
Market		USA	CANADA	CHINA	UK	FRANCE	AUSTRALIA
Generator type		7VV2 010	7VV2 020	7VV3 010	7VV3 020	7VV3 030	7VV4 010
Engine specifications							
Engine type		MZ50					
Overall length*width*height (mm)		450 × 240 × 380					
Dry weight (kg)		12.7	12.7	12.7	13.0	13.0	12.7
Noise level	dB(A) at 7m	48 ~ 57 (with economy control turned “ON”)					
Engine type		OHV, Single, Forced air cooled, 4-stroke, Gasoline-engine					
Displacement	(liters)	0.05					
Max. power output	[kW(PS)/(rpm)]	1.58 (2.15) / 6500					
Max. torque	[Nm(Kgm)/(rpm)]	2.75 (0.28) / 4500					
Fuel		Unleaded gasoline					
Fuel tank capacity		2.5					
Continuous operation (Hrs)	Rated load	4.1 hours					
	1/4 load	11.9 hours					
	No load	14.3 hours					
Lubrication oil		4-stroke engine oil API Service Classification SE or SF					
Oil tank capacity (max./min.)	(liters)	0.32/0.13					
Lubrication method		Splash oil					
Cooling method		Forced air cool					
Air cleaner type		Semi-wet formed rubber					
Govenor type		Electric control					
Ignition system		TCI					
Carburetor		BV15-11					
Spark plug		CR6HSB (NGK)					
Starter type		Recoil type					
Engine cut off		Ignition cut-off					
Electrical specifications							
Generaor type		Inverter Type					
Rated frequency (Hz)		60	60	50	50	50	50
AC output	Rated voltage(V)	120	120	220	230	230	240
	Rated output(kVA)	0.9	0.9	0.9	0.9	0.9	0.9
	Max. output(kVA)	1.0	1.0	1.0	1.0	1.0	1.0
	Rated amperes(A)	7.5	7.5	4.1	3.9	3.9	3.8
DC output	Rated output(W)	96	78	96	96	96	96
	Rated voltage(V)	12	12	12	12	12	12
	Rated amperes(A)	8	6.5	8	8	8	8
Rated engine speed	rpm	5000					
Voltage fluctuation	Instantaneous	20% or less					
	Setting	3% or less					
	Setting time	2 seconds or less					
Voltage stability		±1%					
Frequency variation	Instantaneous	1% or less					
	Setting	0.1% or less					
	Setting time	1 second or less					
Frequency stability		±0.1Hz or less					
Governor		Electronic governor (Throttle motor)					
Wave distortion ratio		2.5% or less					
Rated power factor		1					
Number of phases		Single phase					
Alternator	Type	Multi-pole, outer rotor, three phase					
	Excitation method	Ferrite maggnet					
Indicator lamps	Output indicator	Green					
	Overload indicator	Red					
	Oil warning indicator	Red					
Overload protection device	AC	Electronic breaker					
	DC	NFB					

Specifications are subject to change without prior notice.