

# INSTRUCTIONS

## 1kW Propane Autonomous Power Unit Kit

***PLEASE READ THESE INSTRUCTIONS IN THEIR ENTIRETY BEFORE OPERATING YOUR 1KW PROPANE AUTONOMOUS POWER UNIT***

### Introduction

The generator provided by NRG Systems has been modified to operate on propane or natural gas and to allow for extended, continuous operation beyond the original manufacturer's specifications. All operations of the generator are covered in the manuals provided by Yamaha and US Carburetion except for the automatic oiler operation which is covered in this addendum.

### **WARNINGS:**

***WARNING: THE METERING OF OIL INTO THE CRANKCASE IS A SLOW PROCESS AND ONLY HAPPENS WHEN THE ENGINE IS RUNNING. DO NOT EMPTY THE CRANKCASE (CHANGE THE OIL) AND USE THE RESERVOIR TO FILL THE CRANKCASE.***

***WARNING: MAKE SURE THE OIL RESERVOIR IS FULL BEFORE EACH EXTENDED RUN OPERATION.***

***WARNING: NEVER POUR GASOLINE INTO THE OIL RESERVOIR – THE FUEL TANK IS USED ONLY AS AN OIL RESERVOIR AND IS NOT A FUEL TANK.***

***WARNING: OPERATING PROPANE GENERATORS CAN BE DANGEROUS. PLEASE FOLLOW LOCAL LAWS AND REGULATIONS WHEN OPERATING PROPANE EQUIPMENT.***

### Propane/Natural Gas Conversion

The generator has been converted, tuned and tested to run on propane or natural gas. This conversion is done by a Yamaha-approved dealer, US Carburetion. Please refer to the Master Guide provided by US Carburetion included with the generator for all information concerning the propane or natural gas operation and troubleshooting.

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## Engine Crankcase Auto Oiler System for Extended Runtime Operation

The stock Yamaha EF1000iS generator is designed with an oil capacity of 0.34 US quarts (0.32 liters). This works well for short duration usage but not for extended run time operation. The NRG retrofit allows the EF1000iS to operate for 40 continuous days autonomously. This is achieved by retrofitting the generator with an automatic oil feed system that provides the correct amount of oil into the generator at all times. In order to do this the generator fuel tank is converted to an oil reservoir. The oil is delivered to the crankcase by controlling a valve when the engine requires oil. The engine oil is gravity fed into the engine when it is required. An electronics module is added to the generator to monitor the oil reservoir level and control the correct crankcase oil level. The module also detects if the oil is no longer being metered into the crankcase and shuts the generator off if a low oil situation occurs.

## Oil Requirements and Quantity to Achieve Extended Runtime Duration

The required oil for extended operation is Mobil 1, 5W-30 Synthetic Oil. The oil reservoir should be filled before every extended operation deployment. The reservoir holds 2.64 US quarts (2.5 liters).

## Oil Reservoir Vent

The oil reservoir filler cap has a vent on it and it is important that this is opened before operation of the generator. Please keep this vent clear of any debris or other substances that may cause this vent to restrict the air flow into the reservoir.

## Propane Requirements to Achieve Extended Runtime Duration

The amount of propane required in order to achieve 40-day runtime duration will vary depending on the load presented to the generator during this time.

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**Table 1 Fuel Consumption**

Generator Electrical Load	Propane use (Gallons / Liters per Day)	40 Day Operation (Gallons / Liters)	# of 100 lb/ 45 kg Tanks
25%	1.40 gallons / 5.3 liters	56 gallons / 212 liters	2.40
100%	3.70 gallons / 14 liters	148 gallons / 560 liters	6.25

**Note:** 900 Watts = 100%

Table 1 gives an estimate of how much fuel will be needed for a 40 day duration based on a minimum and a maximum load.

## Maintenance Requirements

All of the following maintenance operations are covered in detail in the [Yamaha EF1000iS Generator Owner's Manual](#) provided with the generator (page numbers listed below). The generator comes with the appropriate oil in the crankcase when shipped.

The following maintenance tasks should be performed:

No	Item	Remarks	Pre-operational check	720 hrs	1500 hrs
1	Spark Plug	Check condition. Adjust gap and clean. Replace if necessary.		•	•
2	Valve Clearance	Check and adjust when engine is cold.			•
3	Crankcase breather system	Check breather hose for cracks or damage. Replace if necessary			•
4	Idle speed	Check and adjust engine idle speed. Use the <b>load block adjustment</b> instructions.	•		
5	Exhaust System	Check for leakage. Retighten or replace gasket if necessary.	•		
		Check muffler screen and spark arrester. Clean/replace if necessary.	•		

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6	Engine oil	Check oil level.	•		
		Replace.		•	•
7	Air filter	Clean. Replace if necessary.			•
8	Fuel line	Check fuel hose for crack or damage. Replace if necessary.	•		
9	Cooling system	Check for fan damage.			•
10	Starting system	Check recoil starter operation.	•		

## Retrofit Summary:

- Fuel tank is used only as an oil reservoir and is not a fuel tank
- Fuel petcock is no longer functional
- Carburetor choke is no longer necessary and is disconnected
- Ignore all references related to gasoline operation of the generator in the included manuals
- Best (lowest) fuel consumption is in economy mode

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## Installation Recommendations:



- Keep the generator **under cover** to avoid rain and snow buildup
- Orient shelter to block prevailing winds.
- Be sure to allow for adequate air flow for intake and exhaust.
- Regulators should be mounted with vents pointed toward the ground to limit moisture.
- In cold weather (<math><-15^{\circ}\text{C}</math>), consider insulating the tanks for better fuel flow.
- Shelter tanks from rain/snow.

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## Assembly & Starting Instructions:

### Tools Required:

- 7/8" or adjustable open end wrench
- 9/16" or adjustable open end wrench

1. Add 2 quarts (1.90 liters) of Mobil 1, 5W-30 Synthetic Oil to fuel tank:



**NOTE: NEVER** add gasoline to the fuel tank.

2. Remove blue caps from regulators and attach to propane tanks (6 regulator/tank capacity):



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## Notes:

- a) Each pair of tank fittings is connected by a Tee-Check valve. This allows the fuel to flow from the tank which has higher fuel pressure.
- b) It is possible to only connect one tank in this configuration. If only one tank is connected, be sure to cap the other to prevent contamination and/or water intrusion.
- c) 7/8" or adjustable wrench may be required to tighten regulator to tank fittings.

3. Remove caps and attach manifold to generator using quick-connect fittings:



4. Open cover by removing the thumbscrew:



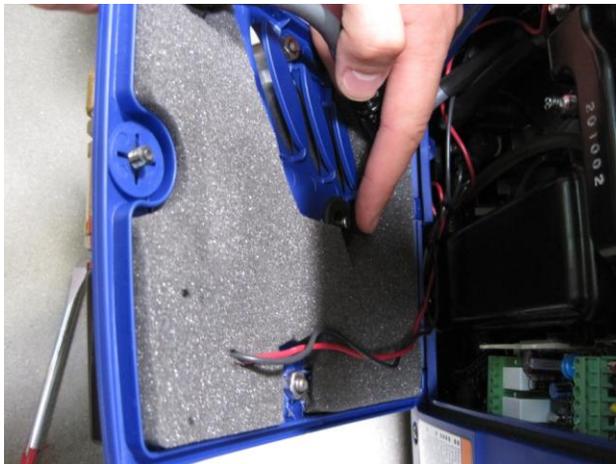
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5. Flip the economy control switch to off (O) position and open propane tank valves:



**NOTE:** Economy control switch will need to be turned to on (I) position after starting the engine. The engine switch (red) must be switched to on position to start generator - this switch acts as a kill switch for the generator.

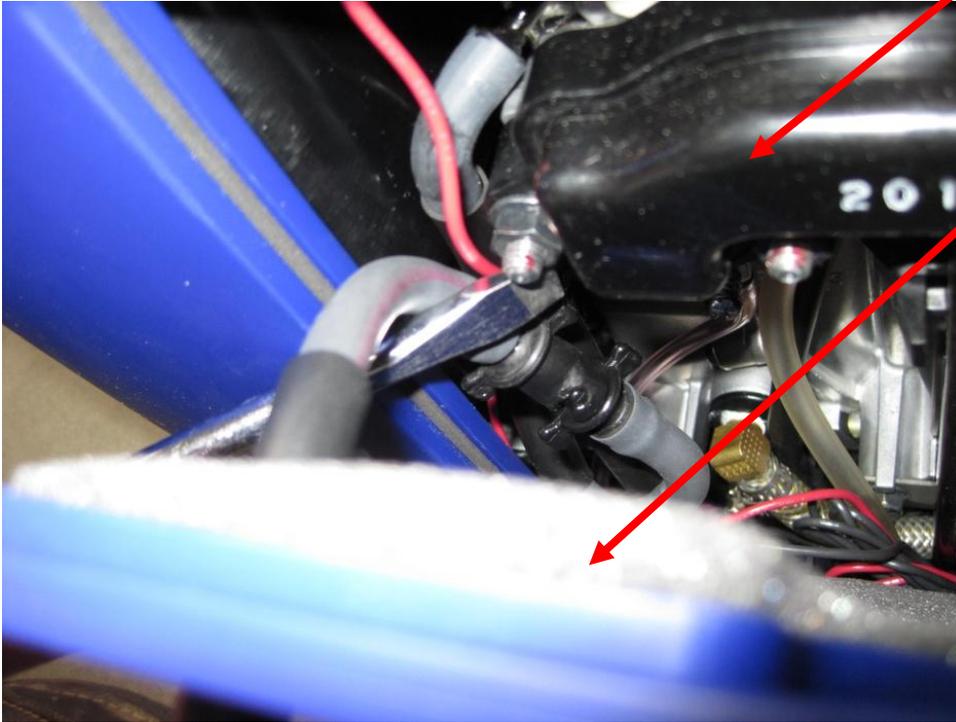
6. Press priming pin (located on inside of cover) for one second & release. **Immediately** pull cord to start engine:



**NOTE:** Repeat step as necessary to start engine.

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7. Replace cover, making sure fuel line is not pinched between air filter cover and cover:



**NOTE:** Engine will sputter and may stall if fuel line is pinched.

To stop engine, close the propane tank valve to ensure that all fuel in the generator and fuel hose has been consumed

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## 8. Load block adjustment:

After running the generator for 5 to 10 minutes under load, adjust the load block as follows:

- a. Loosen the lock nut with a 9/16" wrench
- b. While watching the tachometer, slowly turn the load block adjustment screw until maximum RPMs are reached
- c. Turn the adjustment screw 1/8 of a turn clockwise to "lean it out"
- d. Tighten the lock nut, taking care not to disturb the position of the adjustment screw



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## 9. Checking oil level and changing oil

The propane generator will automatically control the volume of oil in the crankcase. However, if there is any doubt about the oil level, or an oil change is desired, a Tee fitting is in place to allow for access to the oil pan.

To check:

- a. With the engine off, remove tee-plug with 5/16" wrench;
- b. Insert dipstick (clean tie-wrap or similar).



To change:

- c. Remove reservoir hose;
- d. Remove tee-fitting from engine block;
- e. Attach oil chute (rubber piece fitted in bottom of generator);
- f. Tip generator to drain oil into approved container;
- g. Fill crankcase with 320 mL of fully synthetic 5w-30 oil.

***Dispose of used oil per local regulations.***

**\*\* WARRANTY PERIOD: 1500 hours of operation \*\***