Troubleshooting Generator Issues In EasyStart Systems

Inverter generators have just about taken over the entire generator industry. These light weight, compact and quiet units can supply remarkably large loads with power. Though these units are not without their limits. EasyStart can help start an air conditioner on a generator but the generator must be able to keep it running.

EasyStart customers sometimes report the generator will run their unit for a short time then shut off. Common causes include unrecognized loads, generator failures and atmospheric conditions. Use this guide along with the Micro-Air generator load test equipment kit (GTLK-001-X00) to help diagnose these problems with your generator.

Checking the load

All generators have a fixed limit of power they can produce. Many times, these ratings can be exceeded by electric water heaters, battery chargers, inverters, and even refrigerators operating at the same time as the air conditioning unit. Be sure all these items are turned off if your generator cannot support them along with the air conditioning unit.

Technical info: Most 120 volt air conditioners draw about 1 amp per 1000 BTU. A 13.5K unit will draw about 14 amps continuously. The best data is to consult your air conditioners data plate or owner's manual for the rating. Then be sure your generator exceeds this minimum requirement.

Measuring the output should always be the first step in diagnosing a problem. Voltage and current are the two parts of the output that can be tested. The Micro-Air generator load test equipment kit (GTLK-001-X00) includes a voltmeter, current clamp and test plugs that can help determine if your generator is up to the task of running an air conditioner.

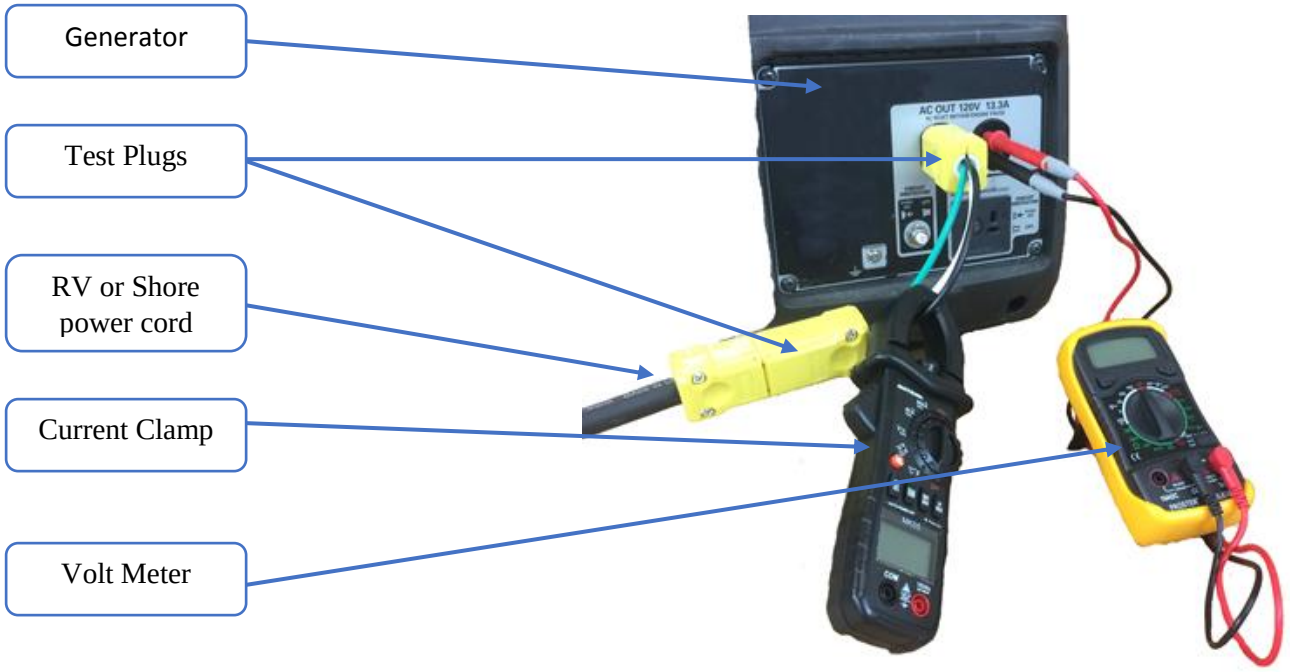
Setup

The best place to measure the generator performance is at the generator. Setup your test plug and meters as shown in picture 1. Connect the test plug between the generators output and the cord that feeds your RV or boat. Set the ammeter for the 60A position for compressors 16K and smaller or the 200A position for larger compressors. Place the ammeter clamp over just the black wire.

Change the multimeter switch to measure ACV in the AC~ 200 position. Carefully connect the voltmeter probes into the second socket of the generator. Probes will slide into the slotted connection of a standard 120V outlet.

Start the generator and allow it to operate for several minutes or as directed by your generator owner's manual.

Picture 1



Testing your RV or boat

Plug in your power cord and measure the current the generator is producing WITHOUT the air conditioner running. If all the loads are off, you should read 1 amp or less on the clamp on meter. If you are seeing more than a 1 amp reading on the clamp on meter, locate and turn off any additional loads.

Start the air conditioner and check the current load while running. The current should rise to approximately the air conditioner manufacturer's rated value after 5 to 10 minutes of operation. If the generator overloads, or the air conditioner compressor shuts off unexpectedly, continue to the next section on "Testing the generator".

Testing the generator

Apply resistive loads to the generator like an electric heater, hair drier, heat lamp or other small appliance. A total load equal to the load expected on your generator is required.

Technical info: 15-16A is a good value to use for most RV and marine 120V 13.5K to 16K compressors. What you are trying to do is create a resistive load equivalent to the motor load on the generator. Use an appropriate load for compressors rated current draw for this test. Since these are resistive loads and not a more variable motor load, there should be no reason for a generator to degrade its output unless the engine is struggling to keep up.

Monitor the AC VOLTS while letting it run for a while and verify the generator can sustain and maintain this load without fault or overloading. If the voltage drops below 108V (a 10% deviation), that's an indication of there being an engine related problem with your generator. You will likely be surprised to observe that when you load the generator with the electric heater and the hair dryer, or other small appliance that the output voltage has dropped very low.

Technical info: Compressors are AC induction motors and are therefore an inductive load and they will stall when the applied AC voltage drops below a certain threshold (typically 95 VAC). Furthermore, even before reaching 95VAC, as the applied voltage drops, a heavily loaded AC induction motor will draw MORE CURRENT, which is OPPOSITE from what other loads will do. This exacerbates the problem for the generator, thus resulting in a quick "diversion" or "snowball" effect that results in a rapid collapse of the output voltage and subsequent stalling of the compressor motor.

Problems with air and fuel

Air and fuel issues are the most common type of motor problem. Proper maintenance and environmental understanding is helpful to resolving generator issues.

Fuels

There are many references on the internet on how long gasoline is good when stored. The most aggressive recommendations are to not use fuel over three months old and then only if it has been stored in a sealed container. Because there are so many things that can go wrong storing gas, it is best to stick to strict guidelines and be sure the fuel is as fresh as possible. Use of some fuel stabilizers has proven to not work reliably through winter storage. You must follow the precise directions to make sure the stabilizer has been allowed to pass through the entire fuel system and carburetor for enough time to ensure there are no minute ports that could suffer gum and varnish buildup during a storage period.

Generators have fuel filters and air filters that should be serviced regularly. If your generator is more than a year old or has sat for several months, consider servicing the generator and replacing any recommended components.

Propane has less unit energy than gasoline so most propane generators produce less than their gas counterparts. Propane converted generators have a higher loss than those designed specifically to run propane. Be sure to check with the generator manufacturer to see if they offer a rating when running on propane. It may be considerably less than the generators gasoline rating and possibly not enough to run an air conditioner under all conditions.

Technical info: Propane-converted generator engines have an estimated 10% lower horsepower as compared to gasoline. Use of propane as a fuel will therefore cause the point where the engine power output can no longer keep up with the inverter's power demand to occur at lower altitudes, lower temperatures, or sooner in the engine's routine maintenance period. This is important since air conditioning systems will use nearly all of a small generators maximum continuous capacity.

Air

Most generators are carbureted and calibrated at sea level. The higher in elevation a generator is operated the thinner the air gets. Often this requires the operator re-jet the carburetor for better performance. Most generator companies offer re-jet kits that are labeled based on the elevation you expect to operate in.

Technical info: Engines lose 3% of their power per 1000 feet of elevation due to decreased oxygen content. In addition since the carburetor is a metering device that does not compensate for elevation, the higher you go the richer the mixture gets. A rich mixture produces less power than an ideal mixture, so even more power is lost than the 3%/1000' estimate. Carburetor re-jet kits change the air fuel ratio back closer to the ideal ratio which regains some of the excess lost power, bringing it back to 3%/1000'. Jets must also be changed back when operating at lower elevations or there is an increased risk of engine damage due to high temperatures created by lean running conditions.

The density of oxygen in the air changes with elevation, temperature and barometric pressure. The technical term for this effect is called density altitude. Pilots and racers know this is what makes engine performance poor on some days and great on others. A generator on a very hot day at 3000 feet may seem like it is operating at almost 8000 feet. If you are going to operate your air conditioner near the limit of the generator output at increased temperature or elevation, you may want to consider the next larger size generator to ensure reliable operation.

Other problems with generators

If your generator is putting out less than it is rated for and it is fully maintained, you may need to take it to a service location. Although we do not service generators, we have had reports from customers who have found a myriad of problems including (in order of likelihood):

- Gummed up carburetor
- Stale fuel
- Clogged fuel filter
- Fouled spark plug
- Worn spark pug
- Bad ignition coil
- Low compression
- Bad valves
- Bad stator
- Broken piston ring
- Warped cylinder due to overheating