Standby Generator Systems

Residential Emergency Power

Tonight's Topics

- Overview
- The WA3UOO Installation
- System Detailed Views
- Load Distribution
- System Maintenance & Testing
- Purchase Considerations

Overview

What is a Standby Generator?

- A standby generator serves as a back up electrical system that supports the electrical load during a power outage
- During a utility outage, a standby system controller will automatically detect the outage, start and engine, transfer its power to the load via an automatic transfer switch and provide electricity to the residence
- Residential standby generators are typically fueled with natural or propane gas.

Fuel Options

- Many generators can be operate from natural gas (NG) or propane with NG being the norm
- Using propane usually requires a gas conversion kit
- But most OEM ratings are based on propane gas fuel by default
- NG is commonly used for residential installations due to wide availability in metro areas
  - Nameplate ratings are derated for NG
  - A nameplated 20Kw gen set using NG is actually a 18Kw unit
- NG provides fewer BTU's per unit than propane

WA3UOO Installation

Generator Unit

- Generac Standby Generator Unit
  - 1000cc air cooled, purpose-built V-twin natural gas engine (propane optional)
  - 20Kw generator unit – direct shaft drive derated for NG – 18Kw
  - Main output circuit breaker
  - Gas pressure regulator
  - Microprocessor transfer switch controller/monitor/alarm logging
  - 12 volt automotive-type cranking battery and AC based charging system
  - No alternator system for charging

System Transfer Switch & Load Shedding Relays

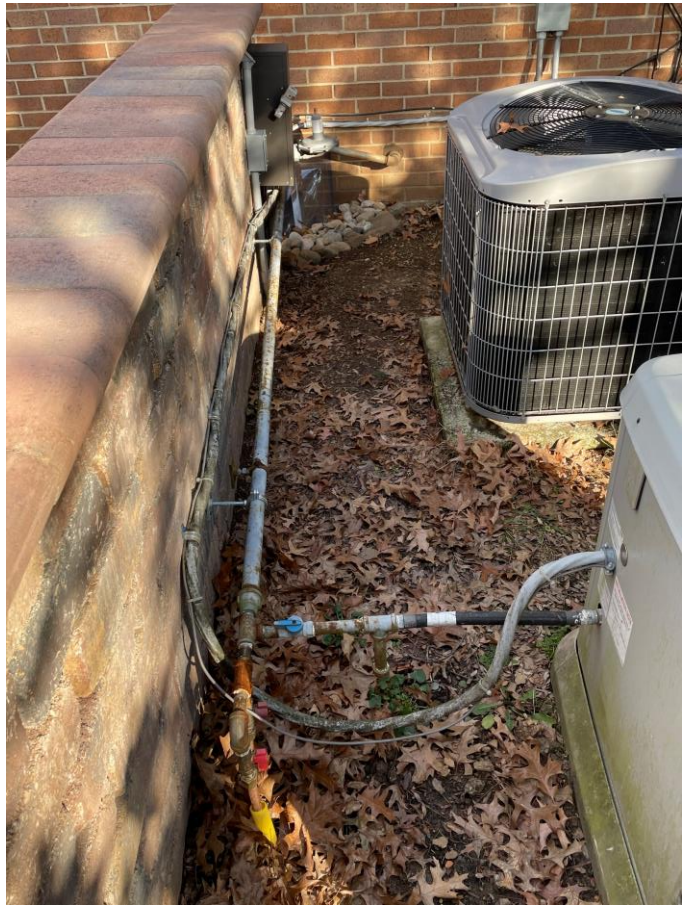
- Transfer Switch / Load Shed Controller
  - Automatically operates the switch from utility side of the line line to generator side based on system setup
    - Open transition on utility loss – 15-20 second delay
    - Closed transition on utility return – no delay
  - Switch is service rated for 200 amps, 240 VAC single phase, with neutral and ground (4 wire)
- Load Shedding Relays (4)
  - Rated 240 VAC, pole, 50 amps with 120 VAC control voltage
  - Controls specific distribution circuits
  - Controls non-essential loads as essential loads change

System Detailed Views

20 KW UNIT DERATED TO 18 KW FOR NG

WA3UOO

System Detailed Views



GAS LINE & GENERATOR
AC OUTPUT

OUTPUT CB, 110 V
UTILITY RECEPTACLE
STATUS LED's (lower-left)

System Detailed Views

ENGINE-GENERATOR
COMPARTMENT

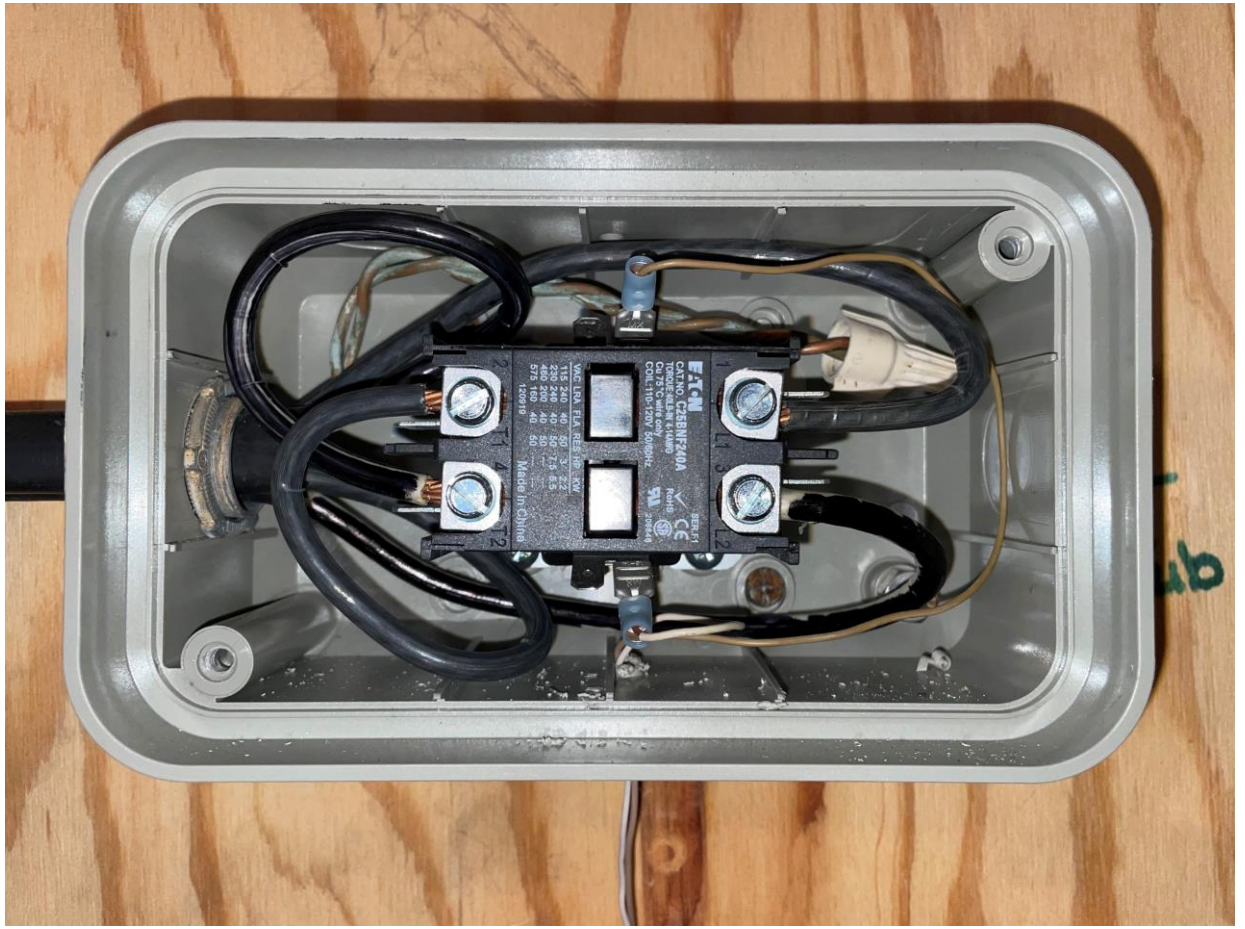
MICRO-CONTROLLER
AND PANEL CONTROLS

System Detailed Views

AUTO-TRANSFER SWITCH

2 OF 4 LOAD SHEDDING RELAYS

System Detailed Views



50 AMP TWO-POLE LOAD SHEDDING RELAY
120 VAC COIL

Load Distribution Considerations

Essential vs. Non-Essential Loads

- Final decision for *my* installation. Yours will likely be different
- Essential Loads
  - Central air
  - Furnace
  - All lighting and receptacle circuits throughout the home
- Non-Essential Loads – load shedding relays
  - Hot tub
  - Oven & microwave (gas cooktop is plan B when needed)
  - Washer/dryer

True Whole-House vs. Partial House

- This system is 18 Kw with a load shedding system
- Based on National Electrical Code (NEC) calculations, a true whole-house generator system without load shedding requires a **35Kw** generator system

18 Kw

35 Kw

System Maintenance & Testing

General Maintenance Recommendations - Generac

- Every Two Years – generally performed by service company
  - Oil change
  - Air filter change
  - Spark plugs
  - Gas control and regulator checks
  - Check control system operation
  - Review alarm log
  - Battery check – suggest replacement every 4 years regardless of condition
- Weekly
  - 12 minute automatic start-up, exercise and shutdown under no-load conditions
  - This engine operation does not cause problems for these fueled engines

What Engines Have Operational Problems from Unloaded Exercise?

- *Unloaded* means 30% or less load on the generator
- Diesel engines suffer from a condition known as wet stacking
- This is due to unloaded/lightly loaded conditions during weekly exercise operation
- Click the image below to learn about wet stacking and diesel engines

Maintenance Costs

- Generally, about $250 per year for previously mentioned services
- Look at service plans and reputation of prospective service providers
  - Single year
  - Multi-year
  - Parts inclusive
  - Pre-paid
  - Rapid response needs?
    - Same day, 4 hours, etc.
- These will break eventually. Know where to get service before you need it.

Purchase Considerations

Before You Buy

- Research brands, reviews, reliability, serviceability and local service capabilities
- Buy from known, reputable dealers. Preferably get your service from the same company that sells the prospective unit you want
- Make sure the gas supply you have will support the generator under full load conditions – consult with the processionals
- NG is good because you may already have it but remember the deration factor for NG is about 10%.
- Rural areas probably won't have NG, so propane will be required
- Point of reference – this 20 Kw system was just under $10K

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Thanks for checking in to the CORC TechNet this evening!
73 until next time!