

## NW-GC500 Generator Control User Manual



**including Yard Power (optional feature)  
Power Meters (optional feature) and  
HEP Feed (optional feature)**

**This manual applies to most versions of the NW-GC500  
equipped with a power selector switch with  
power selections located at diagonal positions.**

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# INTRODUCTION

Thank you for purchasing your new generator control package from Northwest Rail Electric. A few moments to study this user guide will help ensure safe, reliable operation of your new equipment for years to come.

The NW-GC500 is a generator control that will automatically or manually start and run a passenger car generator. The controls on the NW-GC500 allow for the selection of power source from lineside yard power (optional), the head-end power trainline (HEP), or an on-car generator. An optional control setting is also available that will feed the HEP trainline from the generator. Controls may also be set to automatically start-up and shut-down the generator while the car is being supplied from HEP power to compensate for HEP power fluctuations.

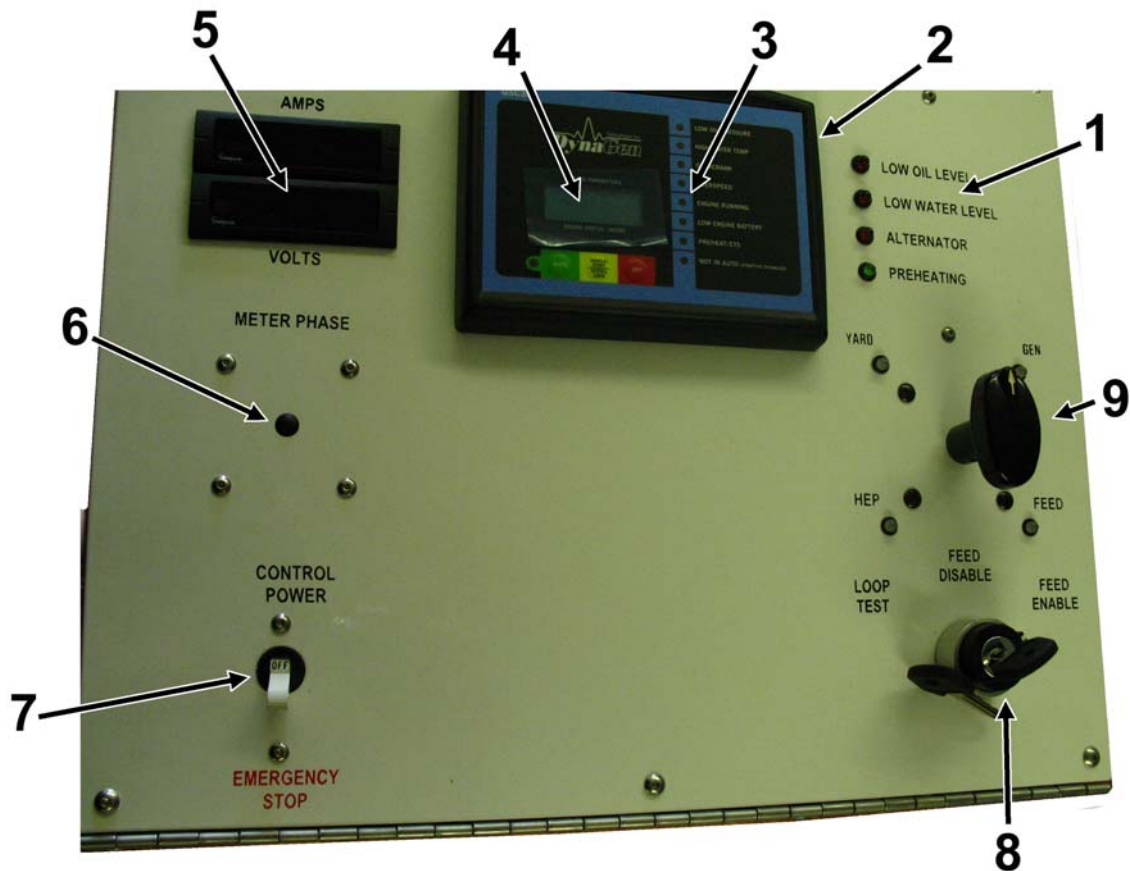
## SAFETY INFORMATION

The generator control panel contains Potentially-Lethal High Voltage(480V) AC (Alternating Current). Always verify that all power sources are disconnected before doing any work on the equipment. Only a qualified person, trained in the service of high voltage equipment, should perform any and all servicing of this equipment.

When doing any metal work around either the control panel or the power distribution panel, make sure that both the high voltage and the low voltage power is disconnected from panels. Also make sure that no metal chips or tools land on or get into the electrical panels.

All service that is performed on the equipment must be performed with both the high and low voltage power disconnected. Failure to comply may result in Death, Dismemberment, Serious Injury, and/or equipment damage.

# GENERATOR CONTROL PANEL DIAGRAM



## Generator Control Panel Diagram Legend

1. Engine Status Lights.
  - a. Low Oil Pressure
  - b. High Water Temperature
  - c. Overcrank – the engine attempted to start, but a problem prevented the engine from starting and the starting process has stopped.
  - d. Overspeed – the engine ran too fast, and therefore there is likely a problem with the engine fuel system or governor, and it has been shut down.
  - e. Engine Running – the engine is operating normally.
2. DynaGen Engine Control Unit.
3. DynaGen Engine Status Lights

- f. Low Engine Battery – the battery voltage is low enough to be a problem.
- g. Preheat / ETS – the engine preheat system is operating before starting the engine.
- h. Not in Auto – Automatic startup has been disabled.

#### 4. Engine Control Unit LCD Display

This display shows the following information:

- a. Generator Frequency
- b. Engine Hours
- c. Battery System Voltage

- 5. Power Output Meters (Amperage and Voltage) – These meters are optional, and only the meter faceplates are installed on units without metering capability.
- 6. Meter Selection Switch – On units with metering installed, this switch selects the phase of power that is displayed on the meters. On units without metering, there are plugs to cover the holes.
- 7. Engine Control Breaker – This protects the battery power to generator control circuit from overcurrent, and turns on the battery power to the generator control system. This also functions as an emergency shutdown and resets the low oil and low water level warning light system if the generator has shut down due to one of these two faults.
- 8. HEP Feed Keyswitch – On units equipped with the option to feed HEP from the generator: Enables HEP feed in conjunction with the power selector switch. “LOOP TEST” position tests the HEP connector control loop. HEP feed is an optional feature, and units without HEP feed capability have a hole plug installed.
- 9. Power Selector Switch – Selects car power source and enables HEP feed (when this option is installed). There are several “Off” positions. These are located at the 12:00, 3:00, 6:00 and 9:00 positions. This switch starts the generator in the GEN or Feed setting, and sets the generator to automatically start on power failure when it is in the HEP or YARD (if system is equipped with a YARD option) position.

# OPERATING INSTRUCTIONS

Before operating the generator control system, make sure that the 3 phase 480 volt circuit breakers that are part of the switching equipment are turned on. If these circuit breakers are in the "tripped" position, they will need to be turned off and then turned on. If they are in the "tripped" position and the panel has been operating, an inspection should be made to determine why the circuit breaker tripped to begin with.

## Receiving Power from HEP

1. When power is on the HEP trainline, the HEP power indicator light will turn green, indicating that power is available from the HEP trainline. If the light is not lit the HEP Main circuit breaker may not be turned on.
2. Turn the power selector switch to the HEP position.
3. The indicator light will turn red, indicating that the contactor has closed and that the car is receiving power from the HEP system.

## Receiving Power from YARD

The ability to receive power from a dedicated yard power receptacle on the side of the car is available as an option on most versions of the NW-GC500. If the Power Selector Switch does not have a "YARD" position the particular model you have does not have this as an option. **CAUTION:** Yard power systems come in several different voltages, including 480 volts, 240 volts, and 208 volts. **MAKE SURE THE YARD POWER SYSTEM YOU ARE ABOUT TO CONNECT TO IS COMPATIBLE WITH YOUR CAR!!** If the yard power system in question puts out 480 volts and your yard power receptacle is designed for 240 or 208 volts, it will be necessary to connect the yard power to the HEP receptacles rather than the yard power receptacle, but only if the car is equipped with 480 volt HEP (a few cars use a different HEP voltage).

1. When power is available from the YARD power system, the YARD power indicator light will turn green, indicating that power is available from the YARD system. If the light is not lit the YARD circuit breaker may not be turned on.
2. Turn the power selector switch to the YARD position.
3. The indicator light will turn red, indicating that the contactor has closed and that the car is receiving power from the YARD system.

## **Generator System**

Before operating the generator check the following items:

1. Check engine oil level.
2. Check engine coolant level.
3. Check fuel level.
4. Ensure that all personnel are clear of moving parts, and high voltage sources.

### **Receiving Power from the Generator**

1. If the outside temperature is less than 60 degrees F, the engine block heater should be energized for at least 4 hours prior to running the engine. (This step may be optional, but the generator could be hard to start if this step is skipped.)
2. Make sure the 480 volt 3 phase circuit breaker for receiving power from the generator is turned on.
3. Turn the Power Selector Switch to the "GEN" position. The green preheating indicator will turn on, and after a few seconds the generator should start. If the generator does not start preheating, check the following:
  - If the "NOT IN AUTO" light on the DynaGen engine control turns on, the generator starting process will not start. Press the green "AUTO" button at the bottom of the DynaGen engine control.
  - Check to make sure that the engine circuit breaker on the bottom left of the generator control is in the "ON" position.
4. Once the generator is running, there will be a brief delay. After this delay, the Generator Contactor will close automatically and the Generator Power Status Light will turn "Red" and the car will start receiving power from the generator.
5. Check indications on the DynaGen Engine LCD Display. There should be an oil pressure indication, a frequency reading, an engine hour reading, and other information relevant to the engine status. The display will automatically switch between the display of the various readings. The "Engine Running" indicator should be on and the Generator Power Status Light (near the "GEN" label on the Power

Selector Switch) should be green, showing that power is available from the generator.

### **Feeding Power to the HEP Trainline**

The ability to feed HEP from the on-car generator is available as an option. If the NW-GC500 you have does not have a HEP Feed Keyswitch, or there is no “FEED” position on the Power Selector Switch, the NW-GC500 does not have the option of feeding the HEP trainline with the generator.

1. Check the status of the trainline. Make sure that all of the HEP connectors between the cars are connected, and that there are no other power cars or locomotives on the train feeding power. If there are other power cars or locomotives that have the capacity to feed the HEP trainline, make sure that the power system on those cars is set to receive HEP. Verify that the “HEP” Power Status Indicator is not lit.
2. Check engine oil level.
3. Check engine coolant level.
4. Check fuel level.
5. Ensure that all personnel are clear of moving parts, and high voltage sources.
6. If the outside temperature is less than 60 degrees F, the engine block heater should be energized for at least 4 hours prior to running the engine. (This step may be optional, but the generator could be hard starting.)
7. Make sure the 480 volt 3 phase circuit breaker for receiving power from the generator is turned on.
8. Make sure the 480 volt 3 phase circuit breaker for receiving power from the HEP trainline is turned on. This circuit breaker is also used to feed HEP out of the car.
9. Turn the Power Selector Switch to the “FEED” position. The Preheating indicator should illuminate, and after a few seconds the generator should start. If the generator does not start preheating, check the following:
  - If the “NOT IN AUTO” light on the DynaGen engine control turns on, the generator starting process will not start. Press the green

“AUTO” button at the bottom of the DynaGen engine control.

- Check to make sure that the engine circuit breaker on the bottom left of the generator control is in the “ON” position.
10. Once the generator is running the Generator Contactor will close automatically.
  11. Check indications on the DynaGen Engine LCD Display. There should be an oil pressure indication, a frequency reading, an engine hour reading, and other information relevant to the engine status. The display will automatically switch between the display of the various readings. The “Engine Running” indicator should be illuminated and the Generator Power Status Light (near the “GEN” label on the Power Selector Switch) should be green, showing that power is available from the generator.
  12. Turn the HEP Feed Keyswitch to the “LOOP TEST” position. If the “FEED” indicator turns green, the trainline control loop is complete, and it is safe to feed the HEP trainline.



At the point this photograph was taken, the generator has been started in the “FEED” position, and it is feeding power to the car. However, it is not feeding power to the rest of the train yet. In preparation for feeding, the key switch is in the “LOOP TEST” position, and the “FEED” indicator light is green, indicating that there are no problems with the trainline.

The specific layout of the switch may be different than illustrated here, due to differences in optional features ordered with the specific NW-GC500.

13. Turn the HEP Feed Keyswitch to the “LOOP TEST” position. If the “FEED” indicator turns green, the trainline control loop is complete, and

it is safe to feed the HEP trainline.

14. Turn the HEP Feed Keyswitch to the “FEED ENABLE” position. Turn the Power Selector Switch to the “FEED” position. The “GEN” and the “HEP” Power Status Indicators will turn red when the generator is feeding the HEP trainline. The “FEED” indicator will also turn red, which indicates the unit is running with a completed HEP trainline.

NOTE: It is possible to switch power selection from “GEN” to the “FEED” position. However, all equipment on the car will experience a brief power interruption during the time that the power selection switch is in the off position that exists between the “GEN” and “FEED” positions. This brief power interruption may cause trouble for certain equipment on the car, and if it is already known that the car is going to be used to provide HEP power, this power interruption can be avoided by starting the generator in the “FEED” position in the first place.

### **Automatic Generator Start on Power Failure**

1. Make sure both 480 volt 3 phase circuit breakers for the HEP and Generator are turned on.
2. Turn the Power Selector Switch to the “HEP” or “YARD” position.
3. Ensure the HEP Feed Keyswitch is in the “Feed Disable” position.
4. Turn the “CONTROL BREAKER” to the on (up) position.
5. If the power supply (HEP or YARD) fails, the generator will start and provide power to the car.
6. If the HEP or YARD power returns for more than five seconds, the power source will switch back to HEP and the generator will shut down automatically after a few minutes of cool down operation.

### **To Shut off the Automatic Generator Start on Power Failure Feature**

1. If the generator is not running, simply turn off the “CONTROL BREAKER” in the lower left of the control panel. This shuts off the engine control circuit and it will not start if this is turned off. This means the car will function just like any other HEP powered car: when power is available, the car will receive power. When HEP power fails, the car will not have power, and it will not start the generator.
2. If the engine is running due to a loss of HEP or YARD power, the shut down procedure is a little more complicated due to a need to have the

engine go through the cooldown process. Turn the Power Selector Switch to one of the off positions (12:00, 3:00, 6:00 or 9:00) on the switch. **After the generator has finished cool down**, shut off the “CONTROL BREAKER” by moving it to the down position.

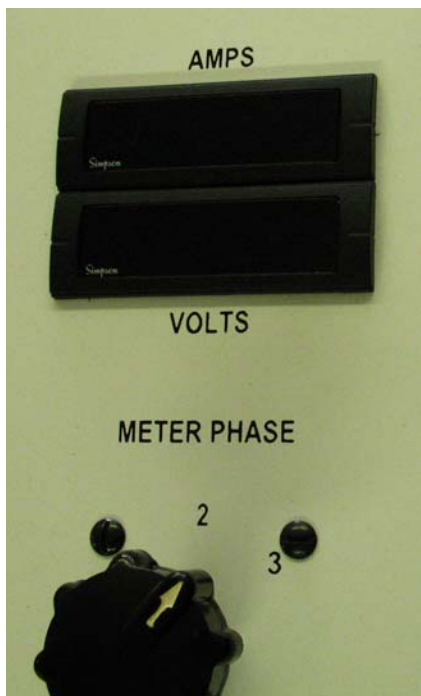
### Generator Shut-Down Procedure

1. Switch the Power Selector Switch to HEP, YARD, or to one of the unmarked off positions at 12:00, 3:00, 6:00 or 9:00.
2. Turn the HEP Feed Keyswitch to the “HEP FEED DISABLE” position.
3. The generator will shut-down in a few minutes.

### Generator Emergency Shutdown

1. Switch the Engine Breaker to the down position. The engine will shut down immediately. **\*\*\*Warning\*\*\*** Shutting down the generator under load and/or without allowing it to cool down may cause engine or generator damage.

### Using the Meter System



Power meters are an optional feature and the specific system being metered depends on what the customer requested. Most of the time, the meters measure total generator output current and voltage received at the 480 volt circuit breaker panel. On some systems (usually those without HEP feed), the current reading is of total car amperage, no matter if the car is running on HEP or generator power. Consult the power system drawing for your system to determine what the meters actually measure.

Move the METER PHASE switch from the “OFF” position to phase 1, phase 2 or phase 3 to measure voltage and current on any of the three phases.

While most systems will not show a current indication when running on HEP or YARD power, the voltage indication will still work and this may be helpful in diagnosing problems with the HEP system, as dropped phases or phases with low voltage will show on the car meters.

# WHAT THE INDICATOR LIGHTS MEAN

## Engine Indicator Lights in the Top Right of the Panel

1. **Low Oil Level:** Engine oil level is below the detector. The engine will automatically shut off if there is a low oil level problem, but only after a time delay. This time delay is to prevent unwanted shutdown of the engine in the event the car is on uneven track or a super-elevated curve. If this light is occasionally turning on, it means that the oil level is low enough for track irregularities to show an oil level problem, but not low enough to cause the problem for a long enough time for the generator to shut off. If this is happening, the generator oil level should be checked and oil added at the next available opportunity.
2. **Low Water Level:** Engine coolant level is below the detector. The engine will automatically shut off if there is a low coolant level problem, but only after a time delay. This time delay is to prevent unwanted shutdown of the engine in the event the car is on uneven track or a super-elevated curve. If this light is occasionally turning on, it means that the coolant level is low enough for track irregularities to show a coolant level problem, but not low enough to cause the problem for a long enough time for the generator to shut off. If this is happening, the generator coolant level should be checked and coolant added at the next available opportunity.
3. **Alternator:** Engine alternator has a fault and is not properly charging the battery or otherwise providing power to the system. It is possible for the generator to run off the battery power for a time, but the fuel pump and other electrically powered items will ultimately cause the battery to drain to the point where the generator will stop operating.
4. **Preheating:** This light turns on when the preheat system is operating.

## Engine Indicator Lights on DynaGen Engine Control

1. **Low Oil Pressure:** This indicator actually has a number of different meanings. If it is flashing and the “LOW OIL LEVEL” indicator is lit, it means that the oil level is too low, and the engine has shut down. If it is flashing and the “LOW WATER LEVEL” indicator is lit, it means that the coolant level is too low and the engine has shut down. If it is flashing and none of the other indicators are lit, it can mean two things: the low oil pressure switch has shut the engine off, or the high coolant temperature switch has shut the engine off. Of these last two, it is most likely that the meaning is low oil pressure, as if the coolant temperature detection system is operating correctly, it will have shut

the engine off instead.

2. High Water Temp: Engine coolant temperature, as read by the indicator from the engine, has become too hot.
3. Overcrank: This indicator has two meanings, depending on the situation:

If an attempt to start the engine was made, it means the engine has attempted to start, but failed to do so in the specified amount of time. If this happened, the engine should be checked for problems, such as a plugged fuel filter. It may also be too cold to start the engine – the engine jacket should be turned on at least four hours before starting the engine if it is below 60 deg. F.

If the engine was previously running and abruptly stopped running, it means that the engine speed signal from the engine to the engine controller was lost. As the current version of the NW-GC500 determines the engine speed based on the actual generator output, the most likely cause is a wire problem between the NW-GC500 and the switchgear. Check for a loose wire or terminal or other electrical problem between the switchgear and the control panel.

4. Overspeed: the engine has run faster than the limit specified for the engine. This may be a stuck fuel rack or other fuel control problem with the engine.
5. Engine Running: the engine is running without any problems.
6. Low Engine Battery: the engine battery has lower than expected voltage. The exact voltage is one of the items that is shown in the text on the LCD display on a regular cycle of various engine parameters.
7. Preheat/ETS: This indicator turns on when the engine control is sending a preheat signal.
8. Not In Auto: If an attempt was made to adjust engine parameters on the engine control, it will have been taken out of the automatic starting operation. To solve this problem, press the “AUTO” button in the lower left corner of the engine control.

# **TROUBLESHOOTING**

## **If the panel appears to be “dead”**

1. If the system is being used to control a Stadco Railgen generator:  
Verify that the Local/Remote switch on the Stadco generator’s panel is set to “Remote”.
2. Make sure the Engine Breaker is in the “ON” Position.
3. Verify that the generator’s battery(s) are properly charged.
4. Call for support.

## **If the engine cranks but does not start**

1. Verify that there is the proper amount of fuel in the tank(s).
2. Verify that there is the proper level of oil and water in the engine.
3. Verify that the fuel system is primed.
4. Check the fuel filters.
5. Call for support.

## **If the engine starts but shuts down in a few minutes**

1. Check the engine status indicators to see if any red lights or other trouble indicators are lit.
2. Switch the Engine Breaker to the “OFF” position.
3. Correct any problems indicated by the engine status indicators.
4. Switch the Engine Breaker to the “ON” position.
5. Turn the Generator Control Switch to the “ON” position to see if the problem is corrected.
6. If the problem is not corrected, verify proper fuel level and flow to the engine.
7. Call for support.

## **If the generator control will not feed the HEP trainline**

1. Verify that the trainline loop is complete and that there are no other power sources feeding the HEP trainline.
2. Verify that no other cars or locomotives on the train that have the ability to feed HEP have their trainline loop systems incorrectly set. The cars need to be set to feed HEP through the car, or otherwise have the HEP control loop system set so that it is possible for those cars to receive HEP power from the trainline.
3. Verify that the power selector switch is in the “FEED” position.
4. Verify that the HEP Feed Keyswitch is in the “HEP FEED” position.
5. Verify that the FEED indicator light is green when the key switch is in the “LOOP TEST” position. If it does not turn green, then there is probably a problem with the HEP power cables that run between the cars. These cables must make a complete loop for the generator control system to allow the generator to feed the HEP system.
6. Check the fuses to make sure that none of the 480 volt or 120 volt fuses are blown.
7. Call for support.

## **If the car will not receive HEP power**

1. Make sure that the HEP Feed Keyswitch is in the “HEP FEED DISABLE” position.
2. Make sure that the HEP main 3 phase 480 volt circuit breaker is turned on. Another symptom of this problem is that the indicator light that shows HEP power being available will not light.
3. Make sure that HEP connectors between each car and at the end of the train are connected properly. Another symptom of this problem is that the power car will not indicate that there is a complete loop in the HEP trainline.
4. Check the fuses to make sure that none of the 480 volt or 120 volt fuses are blown.
5. Call for support.

## **Power Available Lights will not light**

1. Check to make sure that the 480 volt three phase circuit breakers that receive power from HEP and the generator are turned on.
2. Check the fuses to make sure that none of the 480 volt or 120 volt fuses are blown.
3. Call for support.