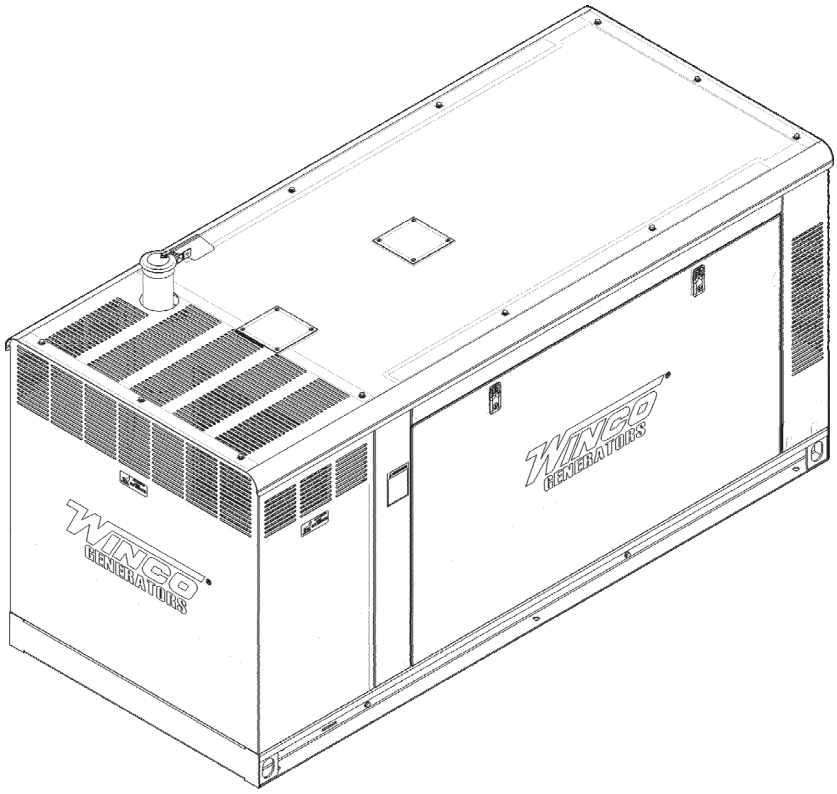
WINCO®
GENERATORS

PSS21F4/1
PSS30F4/1
GENERATOR

INSTALLATION AND OPERATORS MANUAL



COPY YOUR MODEL AND SERIAL NUMBER HERE
No other WINCO generator has the same serial number as yours. If you should ever need to contact us on this unit, it will help us to respond to your needs faster.

MODEL _____

SERIAL NUMBER _____

PURCHASE DATE _____

DEALER NAME _____

DEALER PHONE # _____

www.wincogen.com

TABLE OF CONTENTS

SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during installation and maintenance of the generator. Read and understand all instructions in the manual before starting and operating the generator.

USING THIS MANUAL
Congratulations on your choice of a WINCO generator. You have selected a high-quality, precision-engineered generator designed and tested to give you years of satisfactory service.

To get the best performance from your new generator, it is important that you carefully read and follow the operating instructions in this manual.

Should you experience a problem please follow the "Troubleshooting Tables" near the end of this manual. The warranty listed in the manual describes what you can expect from WINCO should you need service assistance in the future.

SAFETY INFORMATION

SAVE THESE INSTRUCTIONS

This engine generator set has been designed and manufactured to allow safe, reliable performance. Poor maintenance, improper or careless use can result in potentially deadly hazards; from electrical shock, exhaust gas asphyxiation, or fire. Please read all safety instructions carefully before installation or use. Keep these instructions handy for future reference. Take special note and follow all warnings on the unit labels and in the manuals.

CALIFORNIA PROPOSITION 65

WARNING: This product contains crude oil, gasoline, diesel fuel and other petroleum products, Antifreeze to which can expose you to chemicals including toluene and benzene, Ethylene glycol (ingested) which are known to the State of California to cause cancer, birth defects or other reproductive harm and developmental issues.
For more information go to www.P65Warning.ca.gov.

SAFETY DEFINITIONS

DANGER: indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

WARNING: indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

1. ELECTRICAL SHOCK -
The output voltage present in this equipment can cause fatal electric shock. This equipment must be operated by a responsible person.

A. Do not allow anyone to operate the generator without proper instruction.
B. Guard against electric shock.
C. Avoid contact with live terminals or receptacles.
D. Use extreme care if operating this unit in rain or snow.
E. Use only three-pronged grounded receptacles and extension cords.
F. Be sure the unit is properly grounded, installation must meet the national electrical code.

2. FIRE HAZARD -
Gasoline and other fuels present a hazard of possible explosion and/or fire.

A. Do not refuel when the engine is running or hot.
B. Keep fuel containers out of reach of children.
C. Do not smoke or use open flame near the generator set or fuel tank.
D. Keep a fire extinguisher nearby and know its proper use. Fire extinguishers rated ABC by NFPA are appropriate.
E. Store fuel only in an approved container, and only in a well ventilated area.
F. Follow local codes for closeness to combustible material.

3. DEADLY EXHAUST GAS -
Exhaust fumes from any internal combustion engine contain carbon monoxide, an invisible, odorless and deadly gas that must be mixed with fresh air.

A. Operate only in well ventilated areas.
B. Never operate indoors including attached garages
C. Never operate the unit in such a way as to allow exhaust gases to seep back into closed rooms (i.e. through windows, walls, and/or floors).

4. NOISE HAZARD -
Excessive noise is not only tiring, but continual exposure can lead to loss of hearing.

A. Use hearing protection when working around this equipment for long periods of time.
B. Keep your neighbors in mind when using this equipment.

5. CLEANLINESS -
Keep the generator and surrounding area clean.

A. Remove all grease, ice, snow or materials that create slippery conditions around the unit.
B. Remove any rags or other materials that could create a potential fire hazard.
C. Carefully clean up any gas or oil spills before starting the unit.
D. Do NOT use the generator area as a storage closet.

6. SERVICING EQUIPMENT -
All service, including the installation or replacement of service parts, should be performed only by a qualified technician.

A. Use only factory approved repair parts.
B. Do not work on this equipment when fatigued.
C. Never remove the protective guards, covers, or receptacle panels while the engine is running.
D. Use extreme caution when working on electrical components. High output voltage from this equipment can cause serious injury or death.
E. Always avoid hot mufflers, exhaust manifolds, and engine parts. They can cause severe burns instantly.
F. The use of the engine-generator set must comply with all national, state, and local codes.

SPECIFICATIONS

PSS21	LP				NG			
	PSS21F4-03	PSS21F4-04	PSS21F4-17	PSS21F4-18	PSS21F4-03	PSS21F4-04	PSS21F4-17	PSS21F4-18
STANDBY								
Watts	21,000	22,000	22,000	24,000	21,000	22,000	22,000	24,000
Volts	120/240	120/208	120/240	277/480	120/240	120/208	120/240	277/480
Phase	Single	Three	Three	Three	Single	Three	Three	Three
PF	1.0	0.8	0.8	0.8	1.0	0.8	0.8	0.8
Amps	88	76	66	36	88	76	66	36
Hertz	60	60	60	60	60	60	60	60
PSS30	**LP**				**NG**			
	PSS30F4-03	PSS30F4-04	PSS30F4-17	PSS30F4-18	PSS30F4-03	PSS30F4-04	PSS30F4-17	PSS30F4-18
STANDBY								
Watts	28,000	28,000	28,000	28,000	27,000	27,000	27,000	27,000
Volts	120/240	120/208	120/240	277/480	120/240	120/208	120/240	277/480
Phase	Single	Three	Three	Three	Single	Three	Three	Three
PF	1.0	0.8	0.8	0.8	1.0	0.8	0.8	0.8
Amps	116	97	84	42	112	93	81	40
Hertz	60	60	60	60	60	60	60	60

PSS21 GENERATOR RESISTANCE (all value at 22°C)	
Model	Stamford SOL2-M1
Winding Group	
Single Phase	706
Three Phase	711
Rotor	0.747 Ω
Stator	
706	0.097 Ω per phase series star connected
711	0.290 Ω per phase series star connected
Exciter Rotor	0.106 Ω per phase
Exciter Stator	15.42 Ω

PSS30 GENERATOR RESISTANCE (all value at 22°C)	
Model	
Single Phase	Stamford S1L2-H1
Three Phase	Stamford S1L2-K1
Winding Group	
Single Phase	706
Three Phase	711
Rotor	
706	0.891 Ω
711	0.965 Ω
Stator	
706	0.079 Ω per phase series connected
711	0.290 Ω per phase series connected
Exciter Rotor	
706	0.100 Ω per phase
711	0.112 Ω per phase
Exciter Stator	
706	16.55 Ω
711	15.50 Ω

ENGINE	
Model	FORD MSG-425
Starting System	12 Volt
Fuel Consumption	
LP	3.6 Gal/HR - 277,600 BTU/HR
NG	306.3 FT^3/HR - 321,576 BTU/HR
Oil Type	See Lubrication section in this manual
Oil Capacity	7 Quarts
Cooling System	50/50 mix

* See engine manual for additional fuel types and specifications

TESTING POLICY

Before any generator is shipped from the factory, it is fully checked for performance. The generator is loaded to its full capacity, and the voltage, current, and frequency are carefully checked.

Rated output of generator is based on engineering tests of typical units, and is subject to, and limited by the temperature, altitude, fuel, and other conditions specified by the manufacturer of applicable engines.

INTRODUCTION

PRODUCT DESCRIPTION

The Package Standby System is designed to automatically provide standby power to unattended loads during electrical outages. Upon interruption of normal electrical service, the Automatic Transfer Switch electrical control circuits will automatically start the engine. The generator will produce electrical power and the Automatic Transfer Switch (ATS) will automatically transfer the electrical loads to the engine-generator set. Upon restoration of normal electrical service the emergency transfer switch will sense return of the normal commercial power. The Automatic Transfer Switch will transfer the load back to the normal commercial power source. The engine control circuits will begin a cool-down cycle, after which the fuel supply will be shut off and the engine ignition system disabled.

NOTICE:
A Customer supplied 12 Volt battery is required to complete the installation. Battery requirements are listed later under the battery installation section.

The generator ships with an advanced DSE7310 digital controller. The DSE7310 will electronically display useful engine and generator performance information. The controller starts and stops the generator and monitors critical operating parameters and will shut the generator down to protect the engine from damage.

GENERATOR SET:
Every WINCO generator set has its own unique identity data plate. This data plate identifies the complete unit model number, the system serial number, and has links to the individual components that form the generator set in our factory records. Several of the major components also have their own individual data plates providing additional information to document build data for warranty and replacements parts. Be sure to have the main WINCO unit data plate information recorded inside the front cover of this manual for future reference and for identification whenever requesting field or factory assistance.
Primary fields needed for assistance are complete model number and serial number.

ENGINE:
This manual covers specific operation of the combined engine generator set. The basic engine information provided in this manual is not suitable for all operating conditions. Refer to the engine operators manual for more detailed operation and maintenance information.

CAUTION: EQUIPMENT DAMAGE:
Be sure to check the engine oil level frequently as specified in the engine manual.

Engine service is available from a nearby authorized dealer or distributor. Go to the WINCO website (wincogen.com) for a list of engine dealers or contact the WINCO Service Department.

The rated power of each engine-generator is limited by the temperature, altitude, and all other ambient conditions specified by the engine manufacturer.

Derates	
Above Sea Level Per 1,000 FT	4%
Temperature Every 42˚F above 77˚F	2%

Units should not be operated in ambient temperature greater than 120˚ Fahrenheit.

GENERATOR:

The nameplate includes a standby and prime/continuous rating. The standby rating is the maximum amount of power the generator set can produce. For prime power applications the load should be equal to or less than the prime power rating and the load is assumed to be variable. It is acceptable to occasionally reach the standby rating during prime operation to start motors or other temporary surges.

WINCO generator sets use a brushless, AVR (Auto-Voltage Regulator) controlled broad-range generator ends. The generator converts rotational mechanical energy into electrical energy. These WINCO units are equipped with generators manufactured by Cummins Generator Technologies. Each generator 'end' has its own data tag. A unique serial number is on the data plate and the data label is affixed to the main frame on the generator on the left side.

PREPARING THE UNIT

START-UP CHECK LIST

A Start-Up Completion & Warranty Validation Form was sent along with this manual. This must be completed and returned to WINCO Inc. within 180 days of the factory invoice date.
If this form is not returned, the Warranty may be voided.

UNPACKING

1. As you receive your unit, it is critical to check it for any damage. If any damage is noted, it is always easiest to refuse the shipment and let WINCO take care of the freight claim. If you sign for the unit, the transfer of the ownership requires that you file the freight claim

2. Before proceeding with the preparations of your new generator for operation, take a couple of minutes to ensure the unit you have received is the correct model and review the specification pages in this manual to ensure that this unit meets your job requirements.

CAUTION: EQUIPMENT DAMAGE:
These units are shipped with oil and a 50/50 mix of coolant. Be sure to check all fluid levels before operating. See engine manufacturer's instruction manual for recommended oil requirements before initial starting.

Once generator set is on-site:
1. Carefully remove the crate.
2. After inspecting the engine-generator for external, physical damage, locate and check the following items packed with the unit:
   a. Installation and Operator's Manual.
   b. Engine manufacturer's instruction manual.
   c. Start-up and warranty validation form.
   d. Battery hold-down brackets & hardware.
   e. Unit components or accessory items shipped loose for on-site installation.
   f. Optional accessories.
3. Remove main frame hold-down bolts.
4. Unit can now be lifted from shipping rails.

LIFTING THE GENERATOR SET

NOTICE: PERSONAL INJURY:
To prevent injury to persons or equipment, observe the following guidelines when lifting the generator:

Due to the different designs, configurations, options, weights, site conditions, and available material handling equipment, specific lifting instructions are not provided for each individual generator set model. General guidelines provided are applicable to the entire generator line. It is the responsibility of the installing party to follow the lifting equipment's operator's manual to prevent injury to personnel and damage to the generator.

Smaller generator sets may not require use of overhead lifting equipment and may be placed on the pad with basic material handling equipment, i.e. a forklift. Always use forklifts of a proper rating and with long enough forks to move the generator. As the distance from the forklift mast increases the lifting capacity for the forklift decreases. When lifting from the side the forks should extend the entire width of the unit to the opposite side frame rail.

CAUTION:
Do not attempt to lift the generator set by the means of the lifting eyes on the engine or generator end. These lifting points are only for the use during the manufacturing process and are designed for lifting of the individual generator set components and not the complete unit.

INSTALLATION

The max continuous coolant temperature for this unit is 250°F. This unit should be installed in a well ventilated area, ensuring the exhaust air cannot be recirculated back into the engine.

CAUTION:
This unit will get hot while it is running and for some time afterward.

WARNING: PERSONAL INJURY:
Before proceeding with the installation, be sure the engine control is in the "stop" position and the emergency stop depressed. Also, be sure the generator MLCB (main line circuit breaker) in is the "off" position and the unit starting battery is disconnected.

GENERAL INFORMATION

Before beginning the installation process, recheck the voltage, phase, and amperage rating of the generator set. Be certain it can handle the intended load and are compatible with the intended loads. Plans for installation should be prepared with proper attention to mechanical and electrical engineering detail to assure a satisfactory system installation. The installation must comply with all national, state, and local codes.

The information in this manual is offered only as a guide to finalizing your installation plans and does not substitute for sound engineering judgment for the specific application.

ENGINE GENERATOR SET MOUNTING

This engine-generator set is generally supplied as weather enclosed packages for quick installation on an outdoor concrete pad. They are also available as open skid mounted units for indoor installation in a building or protective enclosure, properly ventilated, supplied by the installer.

The factory weather enclosures are acoustical housing intended for outdoor installation only. Factory weather enclosed units are not intended to be used indoors and no support is available to assist in re-engineering finished packaged units. The unit should be mounted to allow ample working room around it. A general rule to follow is to allow 24 inches or more of clearance for maintenance. Follow local codes for clearance from combustible surfaces.

The unit's main frame must be bolted securely to a solid base. The engine-generator is mounted on channels which are attached with special shock mounts to the main frame. This allows the engine-generator free movement without affecting the base or surrounding equipment.

WARNING: EQUIPMENT DAMAGE:
Never mount these engine-generator sets to a wooden base/structure. Over time, the wood will deteriorate and the unit mountings will come loose. These units must be mounted to a steel or concrete base.

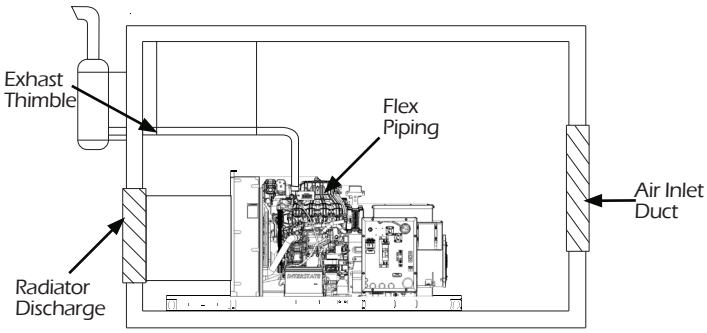
VENTILATION REQUIREMENTS

OPEN SKID

WARNING: EQUIPMENT DAMAGE:
It is the installer's responsibility to ensure that there is sufficient cooling air available to prevent the engine and generator from over heating. Damage caused by overheating is not covered by warranty.

Providing proper air movement during your installation planning is essential. You will need to provide a fresh air inlet as well as a hot air outlet (to the outside of protection housing) for proper engine performance. These engine-generator sets are equipped with unit mount radiators and the engine is equipped with a pusher type fan. The hot air from the face of the radiator must be ducted out of the enclosure to ensure proper cooling. Failing to do so will allow the hot air to recirculate around the radiator causing the engine to overheat, resulting in an engine shutdown and damage. If louvers are used in front of the hot air duct to protect the unit from outside weather, the louvers should be 1½ times as large as the area of the radiator face to prevent back pressure.

Foam or other seals can be used to form a tight lip forcing all of the air from the engine fan out of the enclosure. In addition to a hot air discharge, you must plan a fresh air intake opposite the radiator discharge. Their fresh air inlets should be 1½ to 2 times larger than the radiator face. The extra air inlet area is required to minimize restriction and to provide combustion air for the engine. Do not block fresh air intakes with other equipment as this will result in insufficient air flow to the engine for cooling. Installing them opposite the hot air discharge will allow a sweeping flow of cooling air across the engine, preventing hot spots.



The WINCO installation manual OPM-112 contains additional information on indoor, open skid installations and is available electronically through our website or by requesting a copy from the factory.

EXHAUST INSTALLATION

WARNING: PERSONAL INJURY
Improper exhaust installation will allow dangerous gases to seep into enclosed spaces causing a hazard to your health and/or death.

All exhaust must be piped out of the enclosure. When selecting a location to exhaust fumes make sure that the potential for contact with people is controlled. Exhaust can enter buildings through windows, ventilation systems and other openings if proper precautions are not followed.

The exhaust must be isolated from the vibration of the engine. If the exhaust is connected in a rigid system it will result in damage to the engine. The generator comes equipped with an engine mounted flex pipe to aid your installation. Ensure proper alignment with the generator. The flex can be eliminated if it is pushed to one side to make a connection.

The most direct path possible should be used to get to the outside of the enclosure. Each bend restricts the pipe and increases back pressure. It may be necessary to increase the exhaust pipe diameter in some applications.

The exhaust pipe is very hot. When passing through the structure it is critical that a thimble or other appropriate technique is used to dissipate the heat and prevent the structure from catching on fire.

It is preferable to exhaust out the side of the enclosures. Slope the pipe slightly downward away from the engine to cause any water in the exhaust to run away from the engine. Do not exhaust near intake. Once outside the enclosure a rain cap or other technique must be used to keep water out of the exhaust. In mobile applications make sure the rain flap faces to the rear of the vehicle so that it is not blown open during transportation.

The generator ships with a critical grade muffler that should be installed to decrease noise. It can be mounted either internally or externally to the enclosure. The muffler cannot increase back pressure to more than 0.725 psi.

FUEL INSTALLATION

The fuel supply should be as close as possible to the engine. This will reduce the installation cost of fuel runs. The information in this manual is offered to assist you in providing the proper fuel for your engine. However, this information is only provided to inform you of the engine's requirements and assist in making you aware of the decisions you must make. In no case should the instructions and information provided be interpreted to conflict with any local, state or national codes. If in doubt, always consult your local fire marshal, gas supplier or building inspector.

WARNING: FIRE HAZARD
All fuel runs should be installed by a licensed fuel supplier.

To connect the fuel line to the generator set you will connect your incoming fuel line to the .75 inch NPT fitting located on the left side of the engine-generator set. This fitting is shipped with a plastic plug installed to insure the fuel system stays clean. For all vapor fuel systems the delivery pressure of the fuel to the fuel solenoid on the unit must be four to six ounces psi (per square inch) or 7 to 11 inches W.C. (water column). These fuel pressures are critical; failure to provide the proper pressure can cause many problems including failure to start, inability to produce full power, or damage to the equipment.

These generators have been tested with both natural gas and LP at the factory. Before starting the engine you must verify it is configured for the proper fuel. See additional information in the NG/LP conversion section.

The information in this manual is offered to assist you in providing the proper fuel for your engine. However, this information is only provided to inform you of the engine's requirements and assist in making you aware of the decisions you must make. In no case should the instructions or information provided be interpreted to conflict with any local, state, or national codes. If in doubt, always consult your local fire marshal or fuel supplier.

INSTALLING THE FUEL LINE

NOTICE: The engine generator sets are properly adjusted before they leave the factory. The electronic control panel will indicate if the LP mode is active

NATURAL GAS or LP VAPOR PIPE SIZE
Size of pipe normally required for generators operating on natural gas or LP vapor. Unit location will determine the size of fuel line that is required to supply the engine with a constant fuel pressure and volume.

LIQUID PROPANE VAPOR (LP)

Refer to the tables on the following pages for fuel line size and recommended tank size. For distances of 25 feet or over, a two regulator fuel system is recommended. This is accomplished by installing a primary regulator at the tank which will reduce the tank pressure down to 10 to 15 psi. A low pressure regulator is installed to further reduce the fuel pressure to the required six (6) oz. operating pressure. This low pressure regulator must be at least 10 feet from the engine generator set; any closer installation will require a larger line be installed to provide a fuel reservoir. This is also true for the single low pressure regulator, it should also be a minimum of 10 feet from the unit. If this is not done, the demand regulator on the unit and the pressure regulator in the fuel line will interfere with each other. When the two (2) regulator system is used on LP, a fuel line size of 3/4 to 1 inch is generally adequate for distances up to 300 feet from the primary to the low pressure regulator. Consult your local fuel supplier for your exact requirements . The appropriate line size from the following table is then installed from the low pressure regulator to the generator set.

Feet*	Size of pipe
Up to 25 ft	1" pipe
Over 25 ft	Use a two regulator system

*Allow an additional 3 feet for each standard elbow.
DO NOT use 'street ells' (restrictive).

LP TANK SIZING

Tank Temperature	Tank Size
60° F (16° C)	160 Gallons
32° F (0° C)	300 Gallons
0° F (18° C)	1000 Gallons
-20° F (-29° C)	2000 Gallons

LIQUID WITHDRAWAL SYSTEMS

When installing a unit equipped with the LP liquid withdrawal, a primary regulator is not required on the supply tank. The supply line is connected to a liquid withdrawal valve on the supply tank and runs directly to the fuel system mounted on the engine generator set. Normally a 3/8 to 1/2 inch copper line is acceptable for this type of fuel installation. You must be sure that the valve you have connected to on the supply tank is in fact a liquid supply valve and has a drop tube inside the tank that is pulling fuel from the bottom of the supply tank. Before starting the unit, you must confirm that you have a good liquid supply at the unit. Engine generator sets equipped for liquid withdrawal will not run properly when supplied with vapor fuel.

NATURAL GAS (NG)

The primary regulator (fuel meter) on the building should deliver the correct volume and pressure to the generator set. This regulator must be sized to deliver the required BTU's to the generator set and all other appliances in the building. If the primary regulator (fuel meter) is a high pressure regulator, then a low pressure regulator must be installed to bring the pressure down to 4-6 oz. (7-11 inches water column) of pressure. This low pressure regulator must be at least 10 feet from the engine generator set; any closer installation will require a larger line be installed to provide a fuel reservoir. If this is not done, the demand regulator on the unit and the pressure regulator in the fuel line will interfere with each other. This regulator must be sized to accommodate the demand of the generator set and any other appliance connected to it. See the following table for the correct size of pipe to be installed.

Feet*	Size of pipe
Up to 25 ft	¾" pipe
25 - 100 ft	1" pipe
Over 100 ft	Use a two regulator system

*Allow an additional 3 feet for each standard elbow. DO NOT use 'street ells' (restrictive).

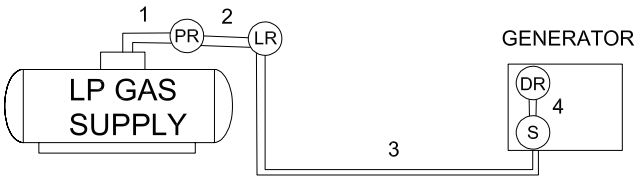
WARNING: PERSONAL DANGER
Do not use galvanized pipe in fuel line runs. The galvanized coating can become corroded and flake off, causing possible obstructions in the regulator or fuel valve. The results could range from inoperative engine to hazardous fuel leaks.

CAUTION:
Be careful when sealing gas joints. Excessive sealing compound can be drawn into the solenoid, regulator or carburetor causing an engine malfunction.

FUEL PRESSURE

Correct fuel pressure cannot be stressed enough. The most common cause for inoperative systems is an inadequate or incorrect fuel pressure. Performance of the engine is in direct relation to the correctness of the fuel system. Shown below is a diagram of a typical LP vapor fuel installation. Notice the following tables give two different units of measuring fuel pressure. The first and most accurate is the use of a simple water manometer. A manometer is calibrated in inches of water column . The second is with a pressure gauge calibrated in ounces per square inch.

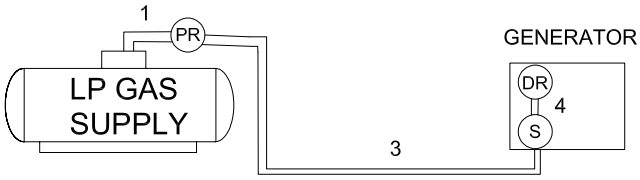
TWO REGULATOR FUEL SYSTEM



LEGEND:
PR - PRIMARY REGULATOR (Reduces tank pressure to 10 - 15 PSI (pounds per square inch)
LR - LOW PRESSURE REGULATOR (Reduces fuel pressure to 4 to 6 oz. (ounces per square inch)
S - FUEL SOLENOID VALVE (Positive shut-off solenoid)
DR - DEMAND REGULATOR (Requires engine vacuum to open)

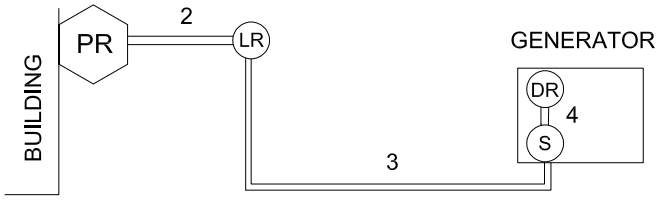
Reference numbers 1 through 3 in the diagram above are system parts supplied by the customer. Reference number 4 is on the generator.

DUAL STAGE SINGLE REGULATOR SYSTEM



LEGEND:
PR - PRIMARY REGULATOR (Reduces tank pressure to 4 to 6 oz.)
S - FUEL SOLENOID VALVE (Positive shut-off solenoid)
DR - DEMAND REGULATOR (Requires engine vacuum to open)

The following diagram is of a natural gas (NG) installation.



LEGEND:

PR - PRIMARY REGULATOR (Fuel Meter)
LR - LOW PRESSURE REGULATOR (Reduces fuel pressure to 4 to 6 oz. (ounces per square inch) IF REQUIRED
S - FUEL SOLENOID VALVE (Positive shut-off solenoid)
DR - DEMAND REGULATOR (Requires engine vacuum to open)

Reference numbers 2 through 4 in the previous diagram are system parts supplied by the customer. Reference number 4 is on the generator.

FUEL PRESSURE TABLES

The following tables are the fuel pressure readings at each reference in the system.

SINGLE LOW PRESSURE REGULATOR (LP vapor only)

Ref#	1	3	4
Unit off	Line PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
Starting	Line PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
No load	Line PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
Full load	Line PSI	7-11 in 4-6 oz	7-11 in 4-6 oz

TWO REGULATOR SYSTEM (LP vapor only)

Ref#	1	2	3	4
Unit off	Line PSI	10-15 lbs	7-11 in 4-6 oz	7-11 in 4-6 oz
Starting	Line PSI	10-15 lbs	7-11 in 4-6 oz	7-11 in 4-6 oz
No load	Line PSI	10-15 lbs	7-11 in 4-6 oz	7-11 in 4-6 oz
Full load	Line PSI	10-15 lbs	7-11 in 4-6 oz	7-11 in 4-6 oz

NATURAL GAS

Ref#	2	3	4
Unit off	2 PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
Starting	2 PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
No load	2 PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
Full load	2 PSI	7-11 in 4-6 oz	7-11 in 4-6 oz

NG/LP FUEL CONVERSION

This generator set was tested on both LP and NG at the factory. Ensure proper fuel configuration before operating.

CAUTION: EQUIPMENT DAMAGE
Do not make any fuel adjustments or governor adjustments until all pressure readings are in compliance with specification.

These engine/generator sets are easy to convert between LP or NG. As the engine timing is controlled by the ECU on the engine you only need to tell it what fuel you want to operate on. A small rocker switch has been provide on the underside of the engine control cabinet for this purpose.

Opening the rocker switch will tell the ECU mounted on the engine that you are operating on NG Fuel. Closing the rocker switch will tell the ECU that the fuel being supplied is LP. The Advance Power Controller has an indicator light for LP. When this light is on, the engine is set-up for LP, when the LP light is out the engine is set up for NG. The ECU will then reprogram the engine to operate on the proper fuel.

LUBRICATION & COOLANT

Before starting the engine, check the oil level in the crankcase. If it is low, refill to the full mark with the proper weight/grade of oil as recommended by the engine manufacturer's maintenance instructions. The necessity of using the correct oil and keeping the crankcase full cannot be over emphasized. Failure to do so will cause excessive engine wear and shorten its useful life.

Before starting the engine, Check the coolant level in the radiator. If it is low, refill as specified in the engine manufacturer's maintenance instructions. The radiator should be filled to about 1 inch below the filler neck.

ELECTRICAL CONNECTIONS

NOTICE: CLASS 1 WIRING METHODS ARE TO BE USED FOR ALL FIELD WIRING CONNECTIONS TO TERMINALS OF A CLASS 2 CIRCUIT

NOTE: The symbol ⏚ always indicates ground where shown. All wiring must be completed in accordance with the National Electric Code as well as any state and local codes.

You must pay particular attention to wire size requirement for the amperage of service you are dealing with. The table below provides you guidance on wire sizing based on both wire type and amperage. Wire amperages have been derated for 40° C ambient temperatures operation.

GROUNDING

Proper grounding of your generator is application dependent. Carefully evaluate your planned use of your generator to understand which grounding you require. If you are not sure what to do, contact a competent professional to assist you. The NFPA 70 250:34-35 are good technical references.

NEUTRAL CONFIGURATION

This Winco generator ships with either a bonded or floating neutral depending upon the configuration. The distribution panel will be labeled indicating the configuration. A competent electrician or other professional should be consulted on the proper neutral configuration for the specific application. Generally a floating neutral is used when the generator is connected to a buildings electrical system as a back up. Mobile or remote applications often require a bonded neutral. If the neutral configuration is changed in the field be sure to relabel the panel to its current condition.

TRANSFER SWITCH

NOTICE:
For full service switching of the entire load, the ATS must be 'SE' (Service Entrance) rated or must have a properly rated fusible disconnect installed before the ATS to protect the contacts.

WARNING: FIRE HAZARD:
All wiring must be done by a licensed electrician, and must conform to the National Electrical Code and comply with all the local codes and regulations. Check with the local authorities before proceeding.

INSTALLATION NOTES:
Because of many different types of service, feeder and distribution equipment, no specific wiring instructions can be provided. It is recommended that only copper wire be used. In all cases it is essential that while the load is connected to the generator, there can be absolutely no feedback from the generator to the power line or the power line to the generator. When properly installed, the normal ATS Control and safety system will eliminate all paths and feedback.

To wire the automatic transfer switch into existing wiring, first determine which circuits will be on the emergency load circuit. If the entire load is transferred, the transfer switch can be wired directly after the meter and the service entrance, providing the service entrance ampere rating is within the transfer switch's rated capability.

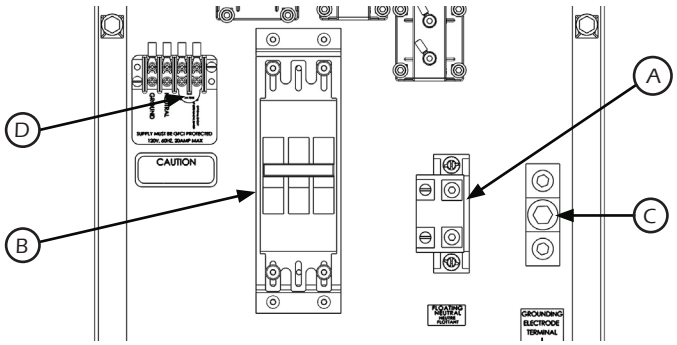
If only specific circuits are to be powered under emergency power failure conditions, an additional distribution panel designated "emergency distribution panel" must be installed.

All selected emergency circuits are removed from main distribution panels and installed in the emergency distribution panel. The ATS is then installed between the main panel and the emergency distribution panel. Suggested circuits: freezer, refrigerator, furnace, emergency lights, sump pump, emergency outlet circuits, etc. Total running load must not exceed generator rating.

AC ELECTRICAL CONNECTIONS

NOTICE:
CLASS 1 WIRING METHODS ARE TO BE USED FOR ALL FIELD WIRING CONNECTIONS TO TERMINAL OF A CLASS 2 CIRCUIT.

WARNING:
A mainline circuit breaker has been provided inside the generator housing. During all wiring installation, make sure the breaker is in the off position and the generator is disabled.



A - Neutral Lugs, These neutral lugs are isolated from ground and provided for you to connect your neutral wire from the transfer switch. The lugs will accommodate #12 AWG to 2/0 AWG and should be torqued to 50 in lbs.

B - Generator Circuit Breaker, This circuit breaker provides overload protection for the generator. Your power feeds from the transfer switch will connect to the bottom lugs on the circuit breaker. The generator power feeds have already been wired into the upper lugs.

The table below gives you the circuit breaker size, lug wire sizes and torque specification. (see the actual breaker for additional information and restrictions)

Volts	PH	Amp	Wire Capability	Lug Torque
120/240	1	125	#12 AWG-2/0 AWG	50 in lbs
120/208	3	100	#12 AWG-2/0 AWG	50 in lbs
120/240	3	100	#12 AWG-2/0 AWG	50 in lbs
277/480	3	45	#14-#10AWG	80 in lbs

The previous table shows the minimum conductor sizes between the generator and the ATS, based on wire type and temperature rating. Wire has been derated 40° C ambient temperatures.

			Wire Temperature Rating			
			Cu Conductor		Al Conductor	
Volts	PH	Amp	75°C	90°C	75°C	90°C
120/240	1	125	1/0 AWG	#1 AWG	3/0 AWG	2/0 AWG
120/208	3	100	#2 AWG	#3 AWG	1/0 AWG	#1 AWG
120/240	3	100	#2 AWG	#3 AWG	1/0 AWG	#2 AWG
277/480	3	45	#6 AWG	#8 AWG	#4 AWG	#6 AWG

For additional information on wire sizing refer to table 310-16 of the National Electrical Code ANSI/NFPA 70.

C - Ground Lug, These ground lugs are bonded to ground and are provided for you to connect your ground wire from the transfer switch to. The lugs will accommodate #6 AWG to 250 MCM and should be torqued to 50 in. lbs.

D. 120 Volt Terminal Block. These terminals are for shore power. For a power line with one lead, plug into either terminals, ensuring the jumper is still connected. To isolate two leads for use of two separate circuit breakers, the jumper must be removed.

WARNING: EQUIPMENT DAMAGE
When installing a three-phase 240 Volt system, be sure you know which lead is the high voltage "wild" leg (208 Volt to neutral). The generator normally carriers the high voltage on the G2 lead.

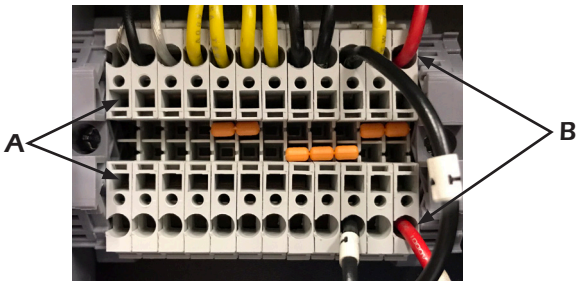
The load current carrying wires (L) and (T) must be sized to handle the maximum load current without excessive voltage drop. By code, the wire must be heavy enough to handle the full current rating of the mainline circuit breaker (or fuse) in the entrance (or sub-panel) protecting the contactor switch.

All wires should be installed in rigid or flexible conduit. (knockouts are provided in the control box).

DC WIRING

All communication and DC wiring should be run in separate conduit from AC wiring.

To install the wires, reference the following picture. Use a small flat head screwdriver to push the release spring inside the square hole (A). While the release is being pushed, insert the wire into the larger circular hole (B). Remove the screwdriver to secure the wire into place.

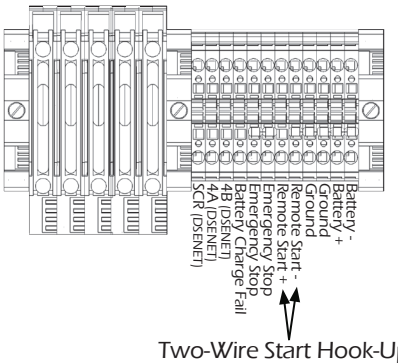


REMOTE START

The DSE7310 is able to start the generator when it receives a remote signal from any dry contact. This makes the system compatible with a wide range of control mechanisms including two-wire start automatic transfer switches. When the contact closes the controller will automatically start. When the contact is opened the generator will go through a cool-down cycle and turn off. Connect the remote start leads to the Remote Start + and Remote Start - terminal blocks in the door behind the DSE 7310 controller.

Depending on the distance, 14 to 16 gauge stranded wire should be used. It is suggested that these wires be labeled S1 and S23.

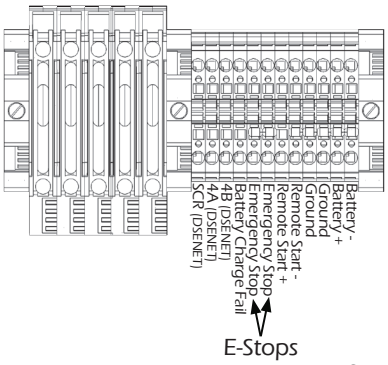
Note: Any relay closure can be used to start and stop this generator. As long as the contact stays closed the engine generator set will continue to run. Once the relay is opened the unit will shut down and remain in the standby mode until the remote start relay is closed again.



Two-Wire Start Hook-Ups

E STOPS

In some applications additional emergency stops may be desired or necessary. The controller has terminals designed allowing the addition of multiple remote emergency stops. E-stops must be normally closed to work properly in this system. The e-stop circuit supplies power to the fuel solenoid and the starter circuit. Opening any switch in the series prevents the engine from cranking or from receiving fuel to run.



E-Stops

To wire additional emergency stop switches first remove the orange jumper between the two Emergency Stop terminal blocks. Failure to remove the jumper will prevent the remote switches from working properly. Add wires between the terminal block to the new switch(s). The switches must be wired in series for proper function. Test each e-stop after wiring to ensure they function properly.

SERIAL COMMUNICATION

DSE provides a series of remote accessories that can help provide useful information to operators. These accessories communicate over the DSE Net. Terminal blocks are wired to the distribution panel to aid in installation. Follow the instructions included with each accessory.

The generator controller can communicate with a variety of controls and monitoring systems, including RS232 and RS485. The ports are wired onto the back of the DSE7310. In order to finalize communication the program will need to be adjusted using the free DSE configuration software to enable the commutation. Contact Winco service for a list of register values.

INSTALLING THE BATTERY

CAUTION:
In the following battery installation procedure, check to be sure the engine control is in the "stop" position. This should be your last step before initial start-up.

A customer supplied 12 Volt battery is required to complete the installation. Installation of the highest CCA rated battery, within the correct BCI group, will increase cold weather starting performance.

BATTERY REQUIREMENTS

Voltage	BCI Group	Min. CCA Rating
12	24	650

WARNING: EQUIPMENT DAMAGE:
This unit is12 Volt and is negative ground. Permanent damage will occur if they are connected to a 24 Volt system or a positive ground system. If you are using the truck batteries to start these units, you may have to disable the charging system to keep it from interfering with the vehicle charging system.

Installation and servicing of batteries must only be preformed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.

When installing or replacing batteries, use the proper group/size starting battery. The battery should be a maintenance-free lead acid design. Deep cycle batteries will not work for this application.

CAUTION: PERSONAL DANGER:
NEVER dispose a battery in a fire. The battery is capable of exploding.

DO NOT open or mutilate the battery. Released electrolyte is known to be harmful to the skin and eyes and to be very toxic.

These engine-generator sets are all NEGATIVE ground. Be very careful not to connect the battery in reverse polarity, as this may short circuit the battery charging system on the engine.

CAUTION:
A battery presents a risk of electrical shock and high short circuit current. The following precautions must be observed when working with batteries:

1. *Remove watches, rings, and other metal objects.*
2. *Use tools with insulated handles.*
3. *Check both the battery cable ends and the battery posts to be sure they are free of corrosion.*
4. *Always connect the battery positive cable first and then connect the battery negative cable. When removing the battery cables from the battery, reverse the procedure, disconnect the negative first and then the positive cable.*
5. *Be sure all connections are tight and coat the terminals and cable ends with dialectic grease.*

WARNING:
The electrolyte is diluted sulfuric acid that is harmful to the skin and eyes. It is electrically conductive and corrosive. The following precautions must always be taken.

1. *Always wear full eye protection and protective clothing.*
2. *Where electrolyte contacts skin, wash off immediately with water.*
3. *If electrolyte contacts the eyes, flush thoroughly and immediately with water and seek immediate medical attention*
4. *Spilled electrolyte is to be washed down with an acid neutralizing agent. A common practice is to use a solution of one pound of bicarbonate of soda (baking soda) to one gallon of water. The bicarbonate of soda solution is to be added until the evidence of reaction (foaming) has ceased. The resulting liquid is to be flushed with water and the area dried.*

DANGER: EXPLOSIVE FIRE RISK:

1. *Never smoke when near batteries.*
2. *Do not cause a flame or spark in the battery area.*
3. *Always discharge static electricity from your body before touching batteries by first touching a ground metal surface.*

SERVICING BATTERIES

Batteries used on these units may, over time, lose water. This is especially true if you are using a trickle charger to maintain your battery. When refilling the battery with water, use only distilled water. Tap water will shorten the service life of the battery.

Never fill the battery above the fill line. Over filling above the upper level line may cause the electrolyte to overflow, resulting in corrosion to the engine or nearby parts. Immediately wash off any spilled electrolyte following the procedure above.

NOTE: Always make sure that a new battery is fully charged before installing it on a generator set. Failure to do so can cause damage to the engine control module in the generator set.

All connections must be clean and tight. Check the electrolyte in the battery periodically to be sure it is above the plates. Never allow the battery to remain in a discharged condition.

BATTERY CHARGER & BLOCK HEATER

BATTERY CHARGER

A three-stage, on-board marine battery charger is provided standard on this unit. The charger is a 5 amp dual use maintainer and charger designed to keep your batteries fully charged by maintaining them automatically.

Make sure all DC battery connections are tight and clean. Follow battery manufacturer's recommendations.

This charger is mounted under the customer connection on the control side of the generator. The charger will need to be plugged to a customer's power source, using a customer supplied heavy duty, UL approved extension cord. The receptacle is to be powered by a GFCI circuit and installed in accordance to the US National Electric Code. It is suggested that this circuit be fused to 20 Amps.

Low/Charge Mode:
The illuminated blue power LED and red low/charging LED. This indicates the Low/Charge mode is in process. When completed the RED Low/Charge LED will turn off.

Auto Maintain Mode:
The illuminated Green auto maintain LED. This indicates your 12 volt battery is fully charged. During short or long term storage periods, Auto Maintain (Energy Saver) mode will monitor and auto maintain a battery only when needed to maintain a full state of charge. This feature significantly reduces AC Power consumption, lowers operating costs and maximizes reserve power performance.

BLOCK HEATER

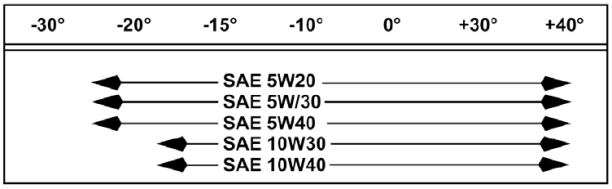
The block heater on this unit is a 1000 watt heater and can use the same 20 Amp GFCI fused circuit. The circuit will terminate on the 120 Volt terminal block mount in the customer connection cabinet. The engine block heater installed on this unit should also be plugged into this receptacle. The block heater is thermostatically controlled when plugged in will maintain the engine coolant temperature between 100 and 120 degrees F.

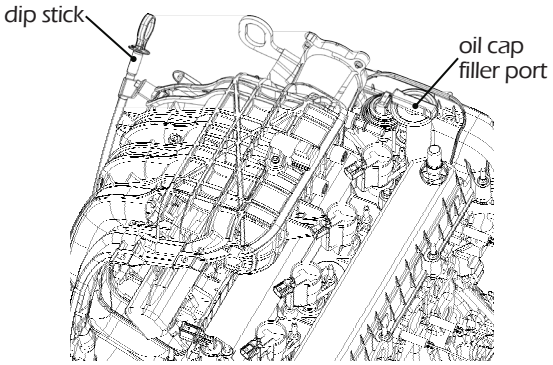
STARTING PROCEDURE

CAUTION:
For the first 10 seconds of operation all of the oil, coolant, and electrical shutdowns are disabled. This is enough time to cause catastrophic damage to the equipment if the pre-start checklist is not properly completed and proper maintenance isn't consistently followed.

LUBRICATION

Before starting the engine, check the oil level in the crankcase. If it is low, refill to the full mark with the proper weight/grade of oil as recommended by the engine manufacturer's maintenance instructions. The necessity of using the correct oil, and keeping the crankcase full, cannot be over emphasized. Failure to use the proper oil and keep the crankcase properly filled will cause excessive engine wear and shorten its useful life.





CAUTION: PERSONAL INJURY
Only check oil when the engine is not running and is at a low temperature in order to avoid the risk of burns.

1. Remove the dipstick and ensure the oil level is between the Min and Max limits.

2. If it is difficult to assess the level of the oil, clean the dipstick using a clean cloth and then put it back into its seat. Remove the dipstick again and check the level.

3. If level is low, unscrew the oil cap and refill with suitable oil using the previous table.

COOLANT

Before starting the engine, check the coolant level in the radiator. If it is low, refer to Refilling Coolant in the Maintenance section of this manual. The radiator should be filled to about 1 inch below the filler neck. For additional information on engine coolant requirements, see engine manufacturer's maintenance instructions.

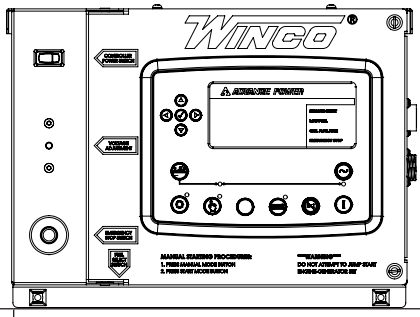
PRE-START CHECK LIST

There is a Pre-Start & Warranty Form that must be filled out by an Authorized WINCO Service Center. After completing the checklist, the engine-generator set is ready for initial start-up.

WARNING: EQUIPMENT DAMAGE:
Before attempting to start this unit, complete your pre-start checklist and ensure the generator mainline circuit breaker (if installed) is in the proper position prior to starting. Starting this unit without it properly connected can cause serious personal injury or equipment damage.

DO NOT jump start these engine-generator sets. Starting these units on a low battery or jump starting them will cause damage to the engine control module.

CONTROL LAYOUT



	STOP/RESET - This button places the module into its Stop/Reset mode. This will clear any alarm conditions for which the triggering criteria have been removed. The fuel supply de-energizes and the engine comes to a standstill. Should a remote start signal be present while operating in this mode, a remote start WILL NOT occur.
	MANUAL MODE - This button places the module into its Manual Mode. Once in Manual Mode, the model responds to the Start button to start the generator and run it off load.
	START - Pressing this button from STOP/RESET will start the engine and run the load.
AUTO	AUTO MODE - This button places the module into its Auto Mode. This mode allows the module to control the function of the generator automatically.
	ALARM/LAMP TEST - This button silences the audible alarm in the controller, deactivates the Audible Alarm output (if configured) and illuminates all of the LEDs on the module's face as a lamp test function.
	MENU NAVIGATION - Used for navigating the instrumentation, event log, and configuration screens.

PROTECTIONS

When an alarm is present, the common alarm LED, if configured, will illuminate. The LCD display will show an icon to indicate the failure.

WARNINGS

Warnings are non-critical alarm conditions. They do not affect the operation of the generator system, they serve to draw the operator's attention to an undesirable condition. Warning alarms are self-resetting when the fault condition is removed. The icon will appear steady in the display.

SHUTDOWN

Shutdowns are critical alarm conditions that stop the engine and draw the operator's attention to an undesirable condition. Shutdown alarms are latching. The fault must be removed and the STOP/RESET button pressed to reset the module. The icon will be flashing in the display.

MANUAL MODE

1. Press and release the MANUAL MODE button. The small LED light next to it should come on.

Note: There is no start delay in this mode of operation.

2. Press and release the green START ENGINE button. The DSE 7310 will send two signals to the engine. The first signal wire #21 will engage the fuel solenoid, the second wire, #22, will engage the starter on the engine. At this point the DSE 7310 will start the cranking cycle (10 seconds on and 10 seconds off).

   If the engine fails to start during this cranking period, the starter motor is disengaged and goes into a rest mode after which a second attempt is made to start the engine. Should this sequence continue through 3 cranking cycles the start sequence will be stopped and the display will show 'FAILED TO START'.

3. During manual operation, the load will not normally be applied to the generator. But caution must be used, if the line power should fail or be turned off the transfer switch during manual operation the load may be applied to the generator.

   With the engine running smoothly check the no load voltage and frequency on the digital display. The voltage should match the nameplate and a frequency of 59.5 to 60.5 hertz (Hz).

   If you have the proper voltage at the generator the next step is to check the voltage at the generator terminals in the Automatic Transfer Switch. The voltage between the G1 and the G3 terminals should be the same as it was on the generator front panel. The voltage should also be checked between the hot terminals (G1 and G3) and the G-N to be certain of a balanced voltage output and a solid neutral connection. The voltage between G1 and G-N should be about 120 volts AC (277 on 480 units). The same approximate voltage should be found between terminals G3 and G-N (120 volts AC).

   On three phase panels the G2 voltage level should also be checked. ON 240 VOLT (DELTA) SYSTEMS BE SURE YOU KNOW WHERE THE HIGH VOLTAGE "WILD" LEG IS. IT MUST BE IN THE SAME LOCATION ON THE LINE SIDE AS IT IS ON THE GENERATOR SIDE. (i.e. if it's on L-3 on the line side it must be on G-3 on the generator side. Also on three phase systems make sure that the rotation is the same on the generator as it is on your line power. Failure to insure proper rotation will cause three phase motors to spin backwards possibly damaging them.

NOTICE:
If for any reason during the check out procedure the voltage and frequency are not correct, depress the STOP/RESET button and correct the trouble before proceeding.

4. Stopping - There are two ways to stop the unit when it is in the manual mode. Pressing the STOP/RESET button will stop the unit immediately. Pressing the AUTO mode button will stop the unit but only after the cool down timers have timed out and there is no remote start signal being sent to the unit.

WARNING: EQUIPMENT DAMAGE
Always make sure the generator runs under no load for five minutes before stopping to allow the engine and components to cool down. Don't use the E-Stop as the standard.

AUTO MODE

To activate the automatic start mode you will just need to depress the AUTO button, the LED indicator beside the button confirms that the unit is in automatic mode.

To test the Automatic Transfer Switch, follow the instruction on the operator's manual that came with the transfer switch. If you get a fault during the initial start up or prior to start up, it is most likely a false warning light. Simply reset the ATS to start over.

Once you have completed testing of the ATS, be sure you ALWAYS leave the system in the standby mode,unless servicing the unit. For standby operation, press the AUTO button on the front of the control. The green light should light up next to the AUTO button.

NOTE: For setting the exerciser circuit, for all ATS, see the operator's manual shipped with the ATS.

CONTROL POWER

The DSE7310 controller consumes small amounts of battery power when it is in use. The controller comes with a power switch that disconnects battery power when it is not in use. The switch is designed with a safety relay that prevents it from removing power to the controller while the generator is operating. If the switch is turned off while the engine is running it will continue operating until the engine shuts down and then the controller will power down.

This switch should be used when the generator is not going to be used over the course of several days and the generator is not connected to a battery charger.

A solar charger kit is the easiest way to always maintain the battery during storage in mobile applications. The supplied battery charger can be plugged in to an extension cord on mobile applications.

OPERATING CONDITIONS

NORMAL OPERATION

This generator-engine set needs load and should not idle for long periods of time.

If the generator application is for emergency standby the generator should be exercised at least monthly ideally under load. Load banking the generator at least annually will help keep the engine in good condition.

HARSH ENVIRONMENTS OPERATIONS

Some applications require the generator to operate in harsh environments. One of the most common hazards are extremely dusty conditions. In harsh conditions it is often necessary to take additional steps to keep the equipment clean and operating at its peak. Maintenance intervals on lubricant and filter changes may need to be shortened. An oil quality testing program can also provide early warnings or oil degradation. Efforts may need to be made to reduce the amount of dust and debris entering the housing and generator components.

COLD WEATHER OPERATIONS

The minimum starting temperature with block heater is -13°F.

The degree of fluidity of the engine oil may be reduced at low temperatures due to the separation of the paraffin. This results in the filters becoming clogged.

Oil companies must respect these standards, which provide for the distribution of fuels adapted to the climatic and geographical conditions in various countries.

This generator-engine set needs load and should not idle for long periods of time.

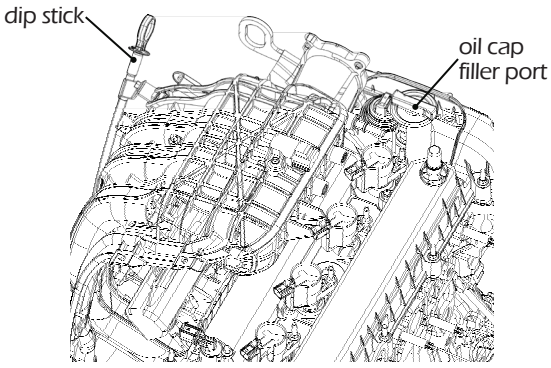
If the generator set will be run in extremely cold environments it may be beneficial to provide means to reduce air circulation to increase the temperature of the enclosure.

Inspect the hoses regularly during cold operation looking for signs of freezing. If the line freezes it will cause pressure to build in the crankcase and may cause an engine seal failure. If the engine operates below optimal temperatures for long periods of time damage may occur.

MAINTENANCE

WARNING: PERSONAL INJURY/EQUIPMENT DAMAGE
Place controller in manual mode, e-stop applied first. If an auto start signal comes on during maintenance, it may result in injury, death and equipment damage.

CHANGING THE OIL



WINCO pipes the oil change to the outside for convenient maintenance.

CAUTION: PERSONAL INJURY
Only change oil when the engine is not running and is at a low temperature in order to avoid the risk of burns.

1. Remove the oil cap to vent the engine crankcase and allow the oil to drain more easily.

2. Place a drip pan or suitable container for catching the oil . WINCO has supplied a valve on the skid frame to hook a customer supplied 5/8" hose to conveniently run the oil to the drip pan.

3. Drain the oil.

4. Once the oil has fully drained, close the valve.

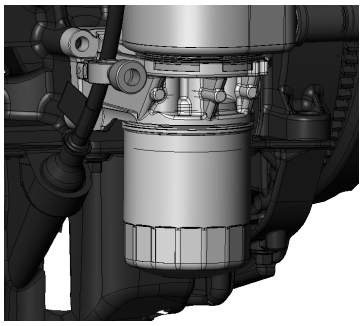
5. Top-off through the filler port using lubricant oil with the suitable oil table in the LUBRICATION section of this manual.

6. Use the dip stick to ensure the level of oil does not exceed the "MAX" limit.

7. Insert the dipstick and close the lubricant oil cap.

8. Dispose of oil in accordance to local codes. DO NOT dispose or allow oil to seep into the ground or sewer systems, doing so will cause environmental damage.

CHANGING OIL FILTER



The filter must be replaced when the lubricant oil is changed.

Only use filters with a filtering degree equal to the original filter.

CAUTION: PERSONAL INJURY
Only change oil when the engine is not running and is at a low temperature in order to avoid the risk of burns.

1. Use an oil filter wrench to unscrew and remove the oil filter.

2. Lightly coat the gasket on the new oil filter with engine oil.

3. Install the new engine oil filter manually by screwing on new oil filter canister until sealing ring abuts the filter head and tighten a further 1/2 turn. Do NOT use a strap wrench or similar tool to tighten the filter canister.

4. Warm up the engine by running it for 5 minutes and check for any oil leaks.

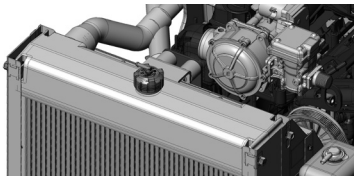
5. Recheck the oil level using the dipstick.

6. Add engine oil to engine oil filler port as needed until the level is between the maximum and minimum lines shown on the dipstick.

FILLING COOLANT

CAUTION: PERSONAL INJURY
Only fill coolant when the engine is not running and is at a low temperature in order to avoid the risk of burns.

CAUTION: EQUIPMENT DAMAGE
Never use a cold coolant mixture to top-up the radiator of a hot engine if the coolant level is very low; this could cause serious engine damage.

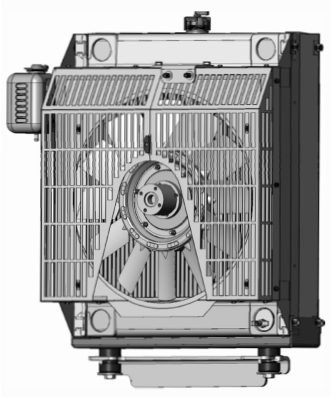


1. Ensure the radiator plug located at the bottom of the radiator and the plug on the engine block are secure.

2. Remove the cap (1) and slowly pour the coolant into the radiator until it is even with the lip of the filler port. Ensure no air bubbles develop.

3. Reinstall radiator cap.

CHANGING COOLANT



Engine coolant contaminated with rust or water scale reduces the cooling effect. Even when extended life engine coolant is properly mixed, the engine coolant gets contaminated as its ingredients deteriorate. Drain, flush and refill the cooling system with new coolant every 1000 hours or once a year, whichever comes first.

CAUTION: PERSONAL INJURY
Only proceed when the engine is not running and is at a low temperature in order to avoid the risk of burns.

1. Loosen the cap on the radiator. Once all of the pressure is released, fully remove the cap.

2. Remove the drain plug at the bottom of the radiator and drain the coolant into an approved container. Reinstall plug.

3. Remove the coolant drain plug from the engine block.

4. After draining the engine coolant, flush the radiator and engine block with water to remove any rust, scale and contaminants. Then reinstall and tighten the drain plug. Reinstall and tighten the engine block drain plug.

5. Fill radiator and engine with engine coolant up to the maximum mark on the tank. Reinstall the radiator cap.

6. Run the engine to check for leaks.

CAUTION: EQUIPMENT DAMAGE
Never use a cold coolant mixture to top-up the radiator of a hot engine if the coolant level is very low; this could cause serious engine damage.

CLEANING RADIATOR

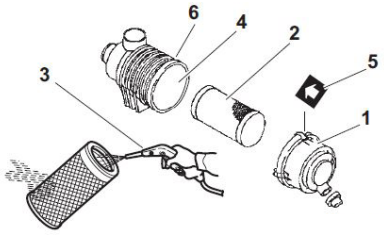
The surfaces of the radiator come into contact with the outside air and can be subject to deposits and impurities. Clean in accordance to the maintenance schedule with compressed air or steam.

1. Remove dirt or foreign material with a soft brush or cloth.

CHANGING AIR FILTER

The engine performance is adversely affected when the air cleaner element is clogged with dust.

WARNING: EQUIPMENT DAMAGE
Never operate the engine with the air cleaner element removed. This may allow foreign material to enter the engine and damage it. Do NOT remove filter while engine is running.



1. Unlatch and remove the air cleaner cover (1).

2. Remove the element (2).

3. Blow air (Figure 13, (3)) through the element from the inside out using 42 - 71 PSI compressed air to remove the particulates. Use the lowest possible air pressure to remove the dust without damaging the element.

4. Replace the element with a new one if the element is damaged, excessively dirty or oily.

5. Clean inside of the air cleaner cover.

6. Reinstall the element into the air cleaner case (4).

Note: If there is a red line (2) in the outer element, reinsert the element until the overlap position of red line and end face of the air cleaner case.

8. Reinstall the air cleaner cover making sure you match the arrow (5) on the cover with the arrow on the case (6).

9. Latch the air cleaner cover to the case.

ADJUSTING THE GOVERNOR

Never attempt to adjust the low or high idle speed limit screw. This may impair the safety and performance of the machine and shorten its life. If adjustment is ever required, contact your Ford Distributor.

1. Check that the governor lever (1) makes firm contact with the high idle stop (2) and the low idle speed limit screw (3) when the engine speed control is in the full speed or low idle speed positions.

2. If the governor lever does not make proper contact with the high idle stop or the low idle speed limit screw, adjust the throttle cable or linkage as necessary.

WARNING: EQUIPMENT DAMAGE
Do not force the throttle cable or linkage to move. This may damage the the governor lever, the throttle cable or linkage and cause irregular operation of the engine speed control.

STORAGE

PREPARING THE ENGINE FOR A LONG PERIOD OF INACTIVITY

In the case of a planned period of inactivity that lasts longer than one month, to prevent the interior parts of the engine and some components of the injection system from oxidizing, prepare the engine as follows:

One Month

1. While the engine is running, treat upper cylinders by spraying engine fogging agent into the air intake for about two minutes. Open throttle for short bursts of speed, shut off engine and allow it to come to a stop while continuing to spray into air intake.

2. Leave spark plugs in holes or seal spark plug holes with suitable threaded metal plugs and cover all openings into engine with dust-proof caps or shields.

3. If engine is less transmission, spray flywheel and ring gear with mixture of one part recommended engine oil, and one part Stoddard Solvent or equivalent.

4. Check coolant protection. Store indoors in dry area.

Infinite period

1. Perform the next Preventive Maintenance procedure. For example, if there are 10 hours remaining before the 250 hour maintenance, you should do the maintenance before you place the engine in storage.

2. Drain crankcase completely and refill with recommended engine oil.

3. Run engine until completely out of fuel.

4. Check coolant protection

5. Disconnect and remove the battery.

6. Clean exterior surface of the engine.

7. Leave spark plugs in holes or seal spark plug holes with suitable threaded metal plugs.

8. Seal all openings in engine and accessories with non-hygroscopic material. Mask off all area to be used for electrical contacts.

9. Make sure all surfaces are dry, and then spray all taped openings, all engine accessories including ignition wiring, and all exterior surfaces of engine with Insulation Compound.

RETURNING ENGINE TO SERVICE

1. Perform the Daily Checks.

2. The engine should be pre-oiled before startup. Crank the engine, leaving the fuel system shut off so the engine will not start, for 15 seconds. Then pause for 30 seconds. Repeat the procedure until you have cranked the engine for a total of one minute. This will circulate the oil in the engine's lubrication system.

3. Start the engine. Allow the engine to idle for approximately 15 minutes while you check for:
   - Proper oil pressure
   - Fuel, engine oil, or coolant leaks
   - Proper operation of the indicators and/or gauges.

4. Avoid prolonged operation at minimum or maximum engine speeds and loads for the remainder of the first hour of operation.

MAINTENANCE SCHEDULE

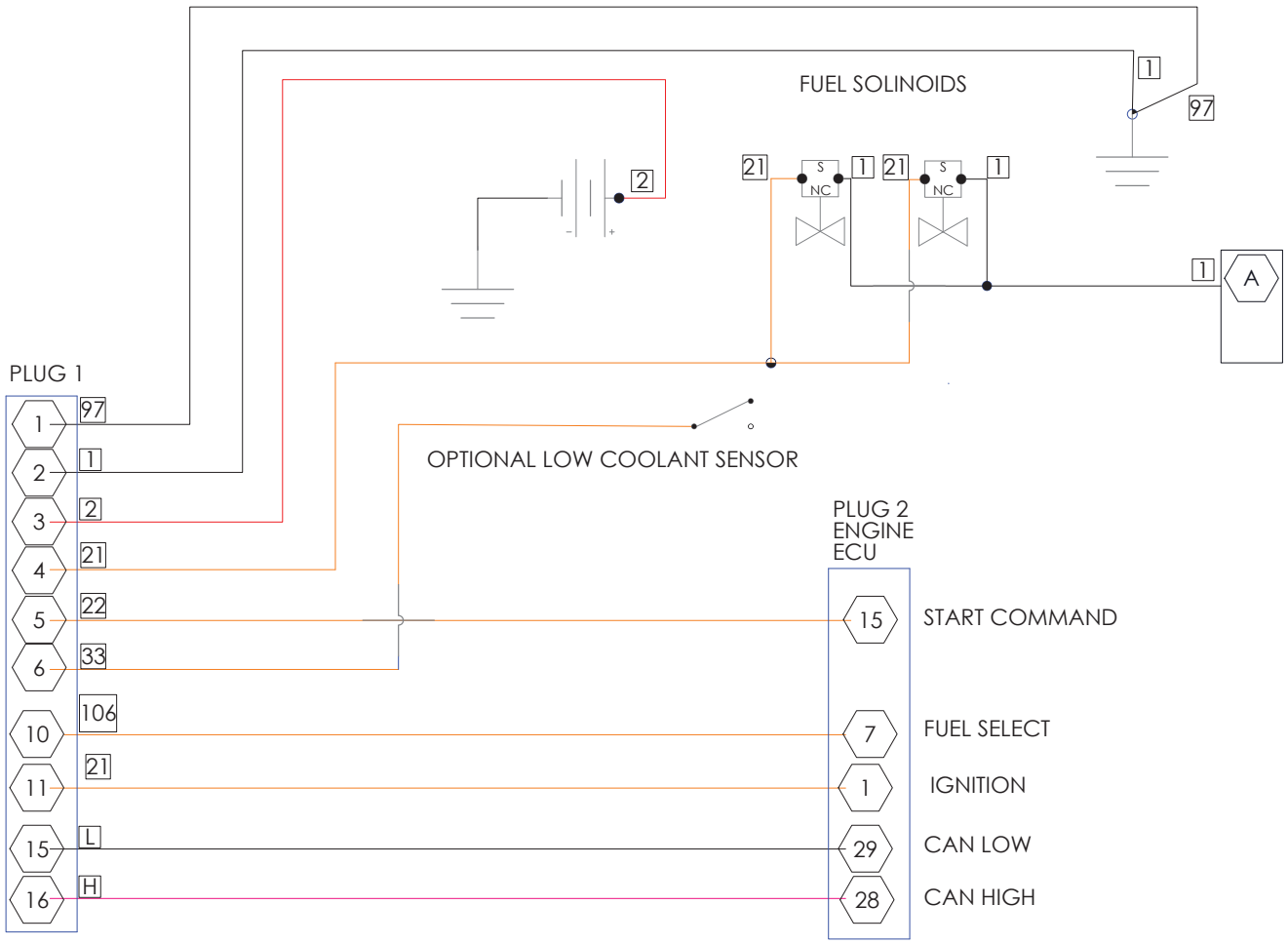
COOLING SYSTEM	FREQUENCY
Check and refill engine coolant	Daily
Check and clean radiator fans	Every 250 hours
Check and adjust cooling fan V-Belt	Every 250 hours
Change Coolant	Every 1000 hrs/1yr
ELECTRICAL EQUIPMENT	**FREQUENCY**
Check indicators	Daily
Check battery and recharge	Every 250 hours
ENGINE OIL	**FREQUENCY**
Check engine oil	Daily
Drain and fill engine	Every 400 hours
Replace engine oil	Every 400 hours
ENGINE SPEED CONTROL	**FREQUENCY**
Check and adjust governor lever	Daily/Every 250 hrs
FUEL	**FREQUENCY**
Check lines for fuel leaks	Every 100 hours
INTAKE & EXHAUST	**FREQUENCY**
Clean air cleaner element	Every 200 hours
Replace air cleaner element	Every 400 hours
COMPLETE ENGINE	**FREQUENCY**
Overall visual check	Daily

Note: Some operating conditions may require more frequent maintenance intervals.

TROUBLE SHOOTING TABLES

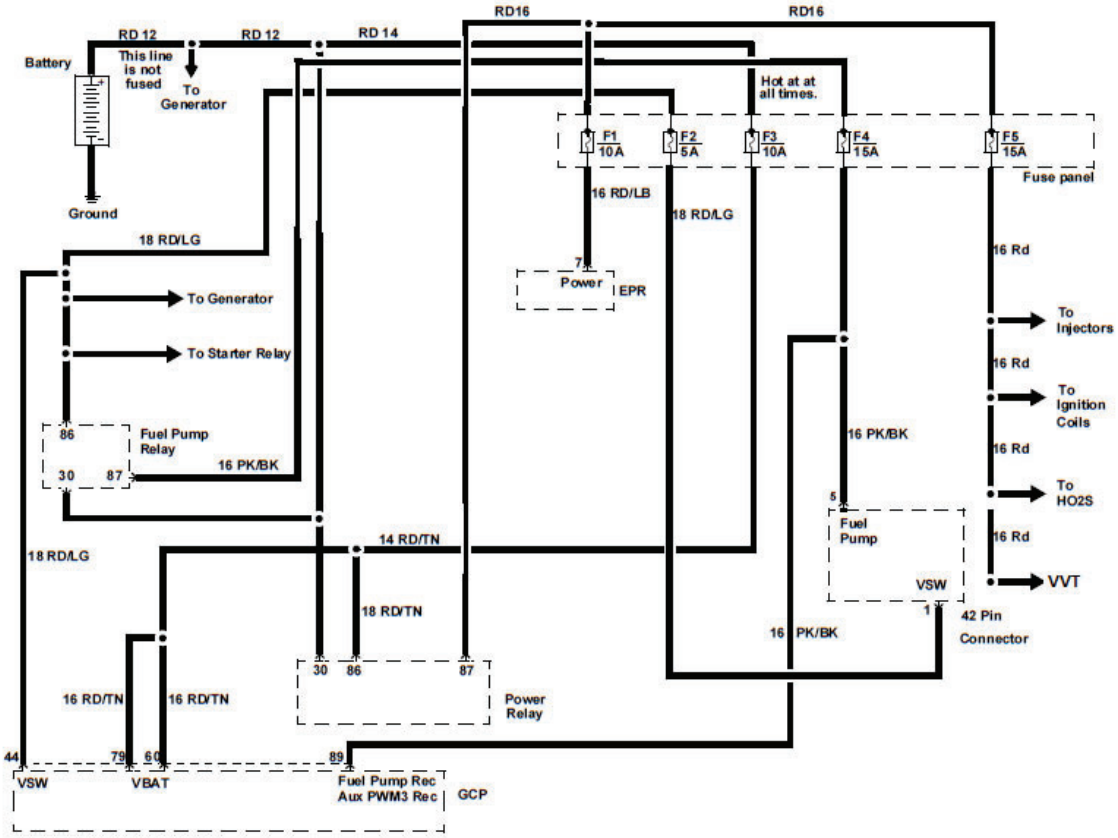
Problem	Possible Causes
Unit will not crank when power fails	Digital genset not in AUTO Transfer control switch not in AUTOMATIC position Incorrect wiring between ATS and genset Defective control relay in ATS Fuse(s) blown in the DSE 7310 Defective DSE 7310 Loose or dirty battery terminals Defective starter Defective start solenoid Low/dead battery
Engine won't crank	Low/dead battery Blown DC fuses Defective DSE 7310 Defective key switch Loose or dirty battery terminals Defective starter Defective start solenoid Locked up engine genset Defective engine harness Improper battery voltage to start solenoid, fuel pump, or fuel solenoid
Engine cranks but will not start	Faulty OEM drivers safety shut-off seat switch Coil power loss GCP ground loss GCP power loss severe Vacuum leak Air inlet restriction air inlet leak Fuel lock-off inoperative Wiring failure Low fuel pressure Ancillary components binding
Engine starts, then stops and alarm light comes on	Engine oil pressure is low Engine has high water temperature Engine has overspeed Engine has gone into overcrank No output from AC generator Loss of speed signal Loss of run signal Loss of spark Frozen fuel regulator (Dry Fuel) Low fuel pressure Air inlet restriction wiring failure GCP failure
Engine will not come up to speed after it starts	Insufficient fuel volume getting to the unit 1. Too small of fuel line 2. Fuel racks not open properly Governor is defective AC short in generator components
ATS will not transfer to Emergency Supply (generator)	No AC generator output Defective ATS control board. See ATS manual Circuit breaker open or defective
ATS will not re-transfer to normal power	Proper power line not available at line terminals in ATS panel Defective ATS control board. See ATS manual
No AC output from generator	Defective diode Defective voltage regulator Defective rotor Defective stator Defective exciter rotor Defective exciter stator AC short in the output leads Defective/open generator output breaker Wiring error

ENGINE HARNESS SCHEMATIC

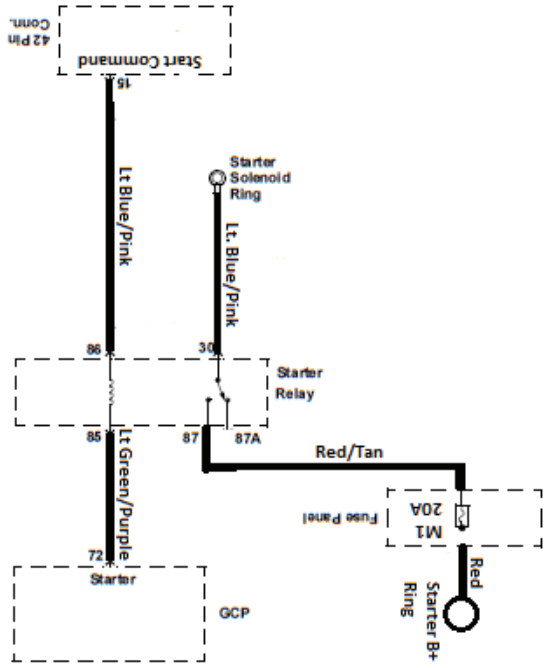


ENGINE CONTROLS

POWER DISTRIBUTION

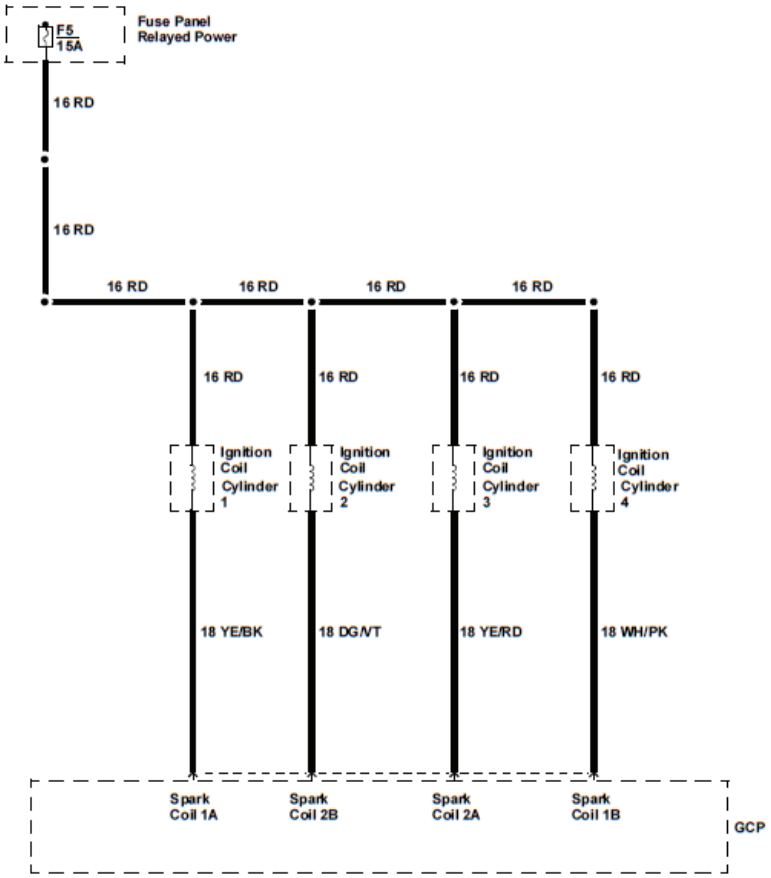


STARTING SYSTEM

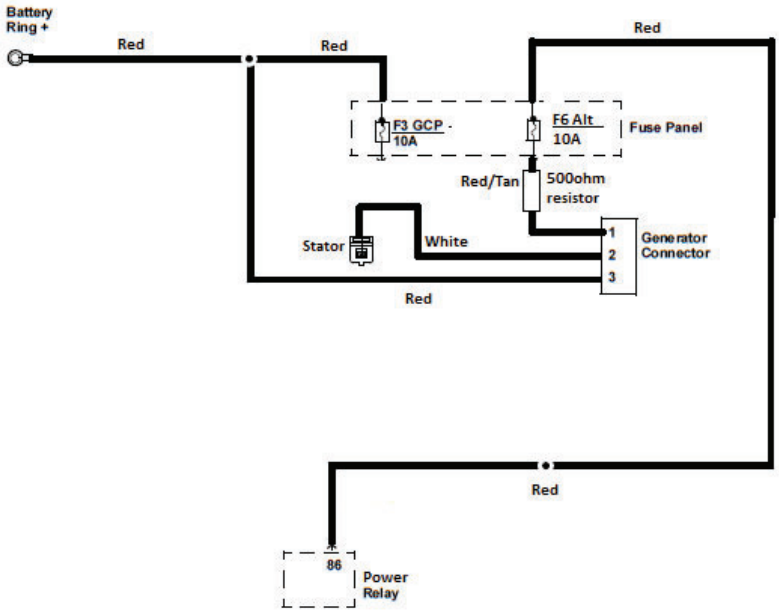


ENGINE CONTROLS

IGNITION SYSTEM

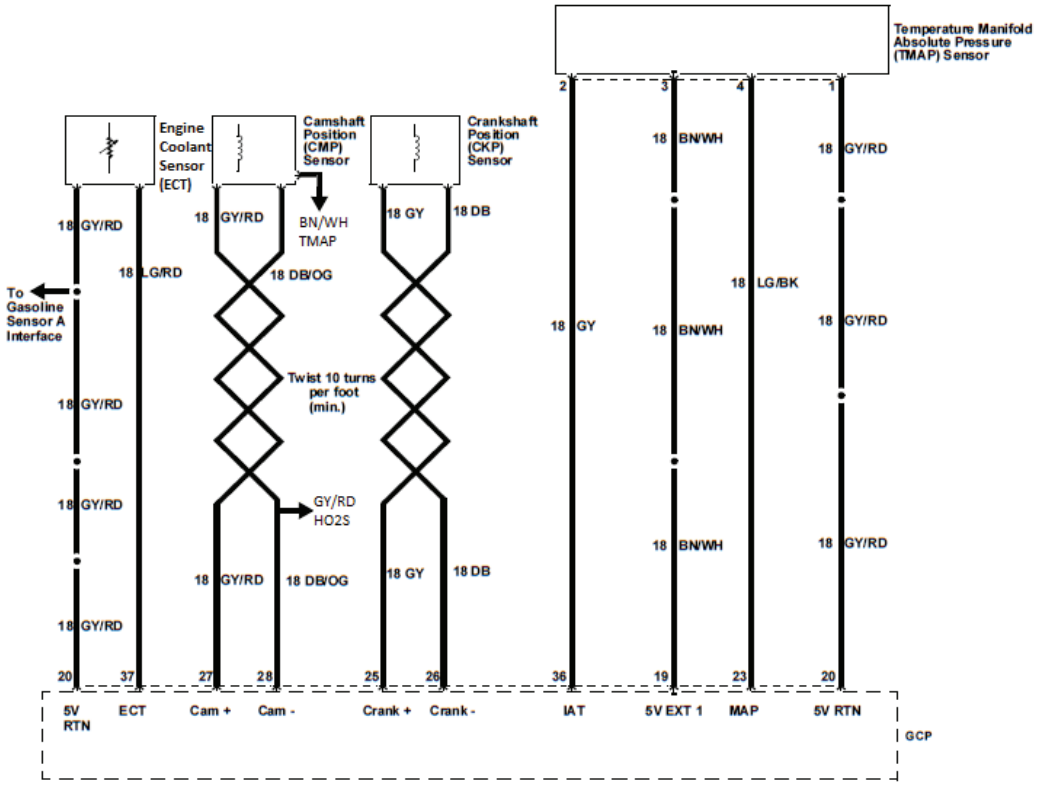


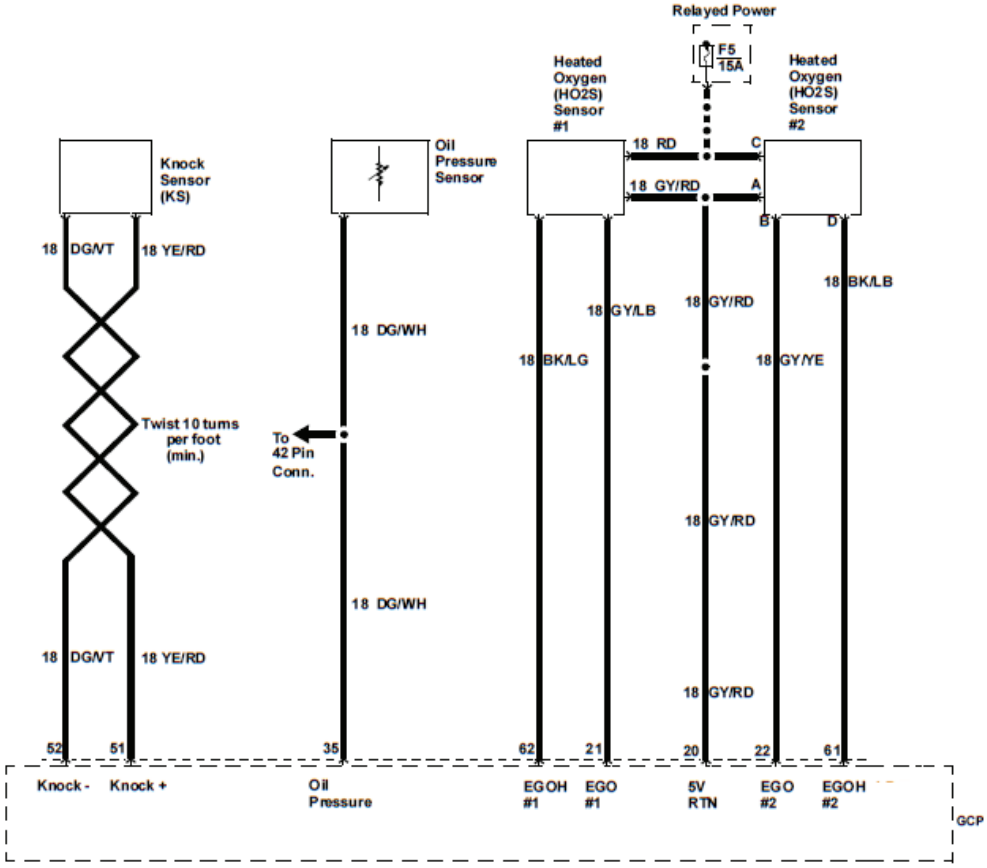
CHARGING SYSTEM



ENGINE CONTROLS

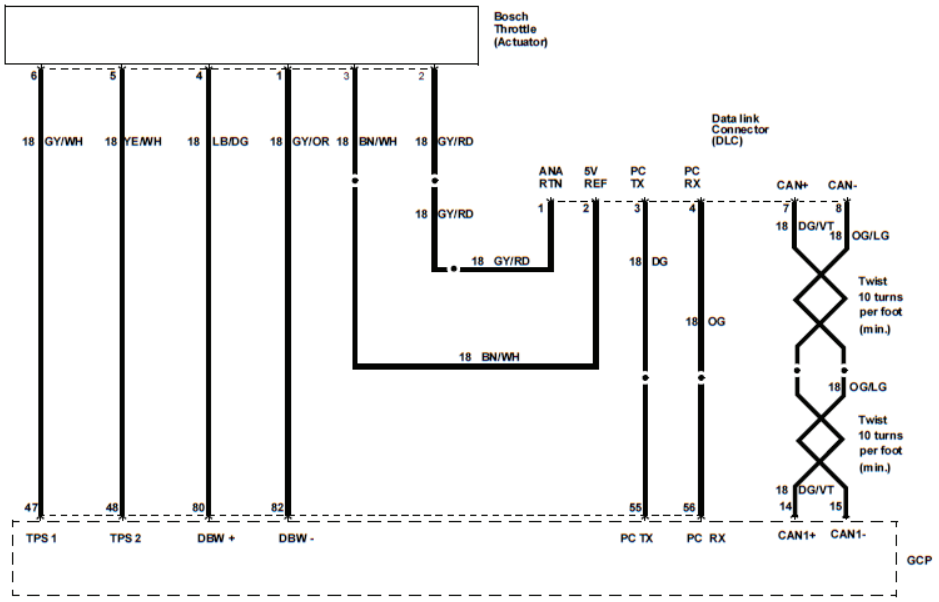
SENSORS



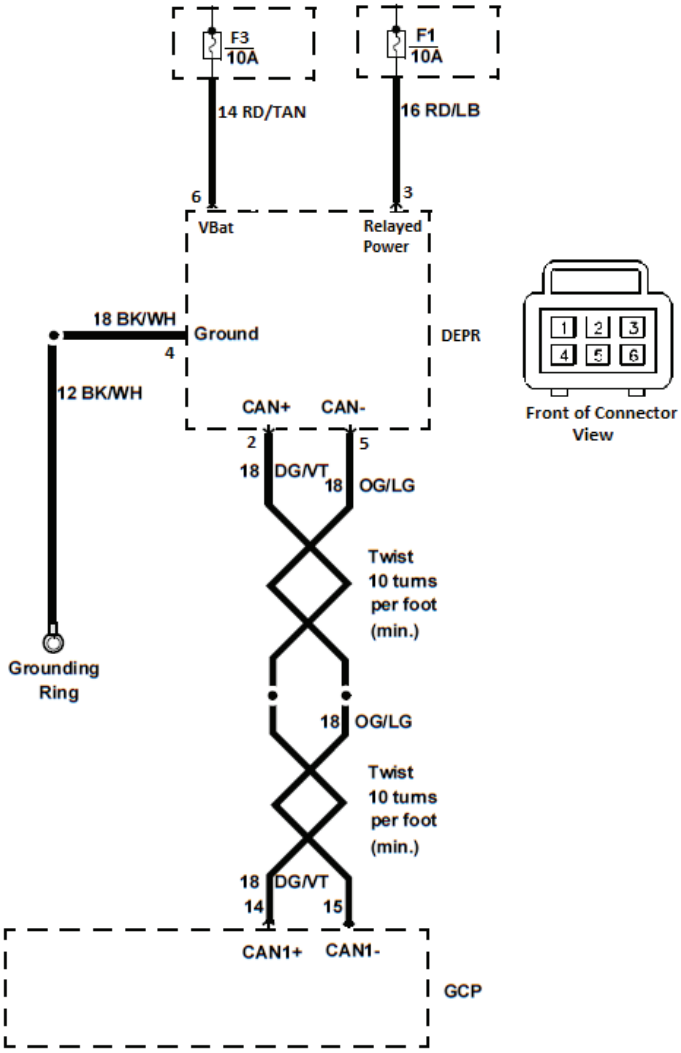


ENGINE CONTROLS

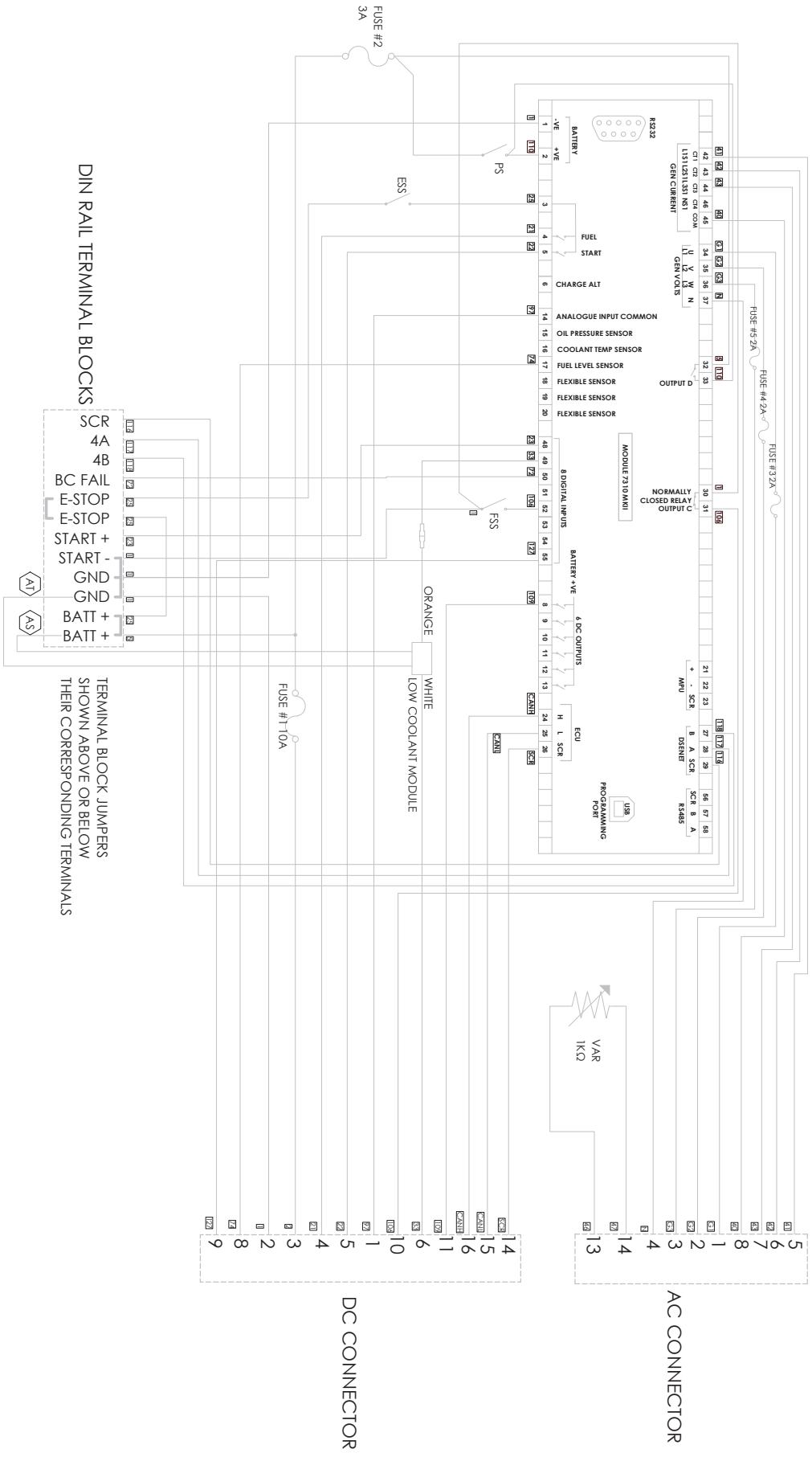
ACTUATOR/DATA LINK CONNECTOR



DRY FUEL DEPR

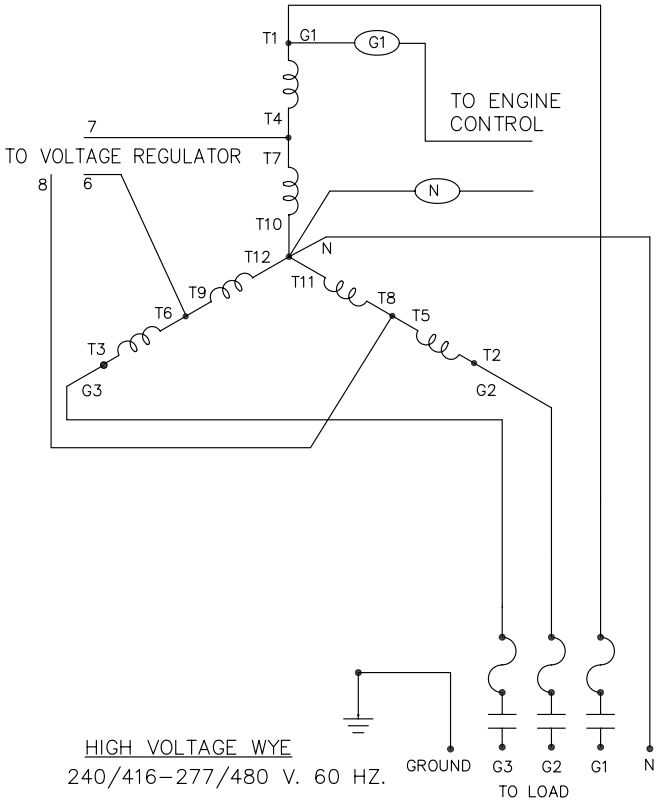


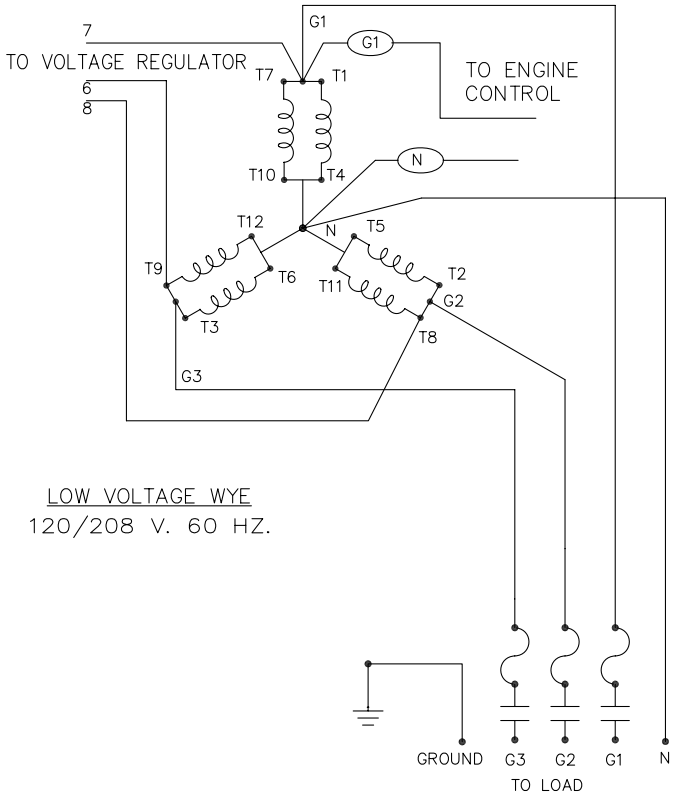
DSE7310 WIRING DIAGRAM



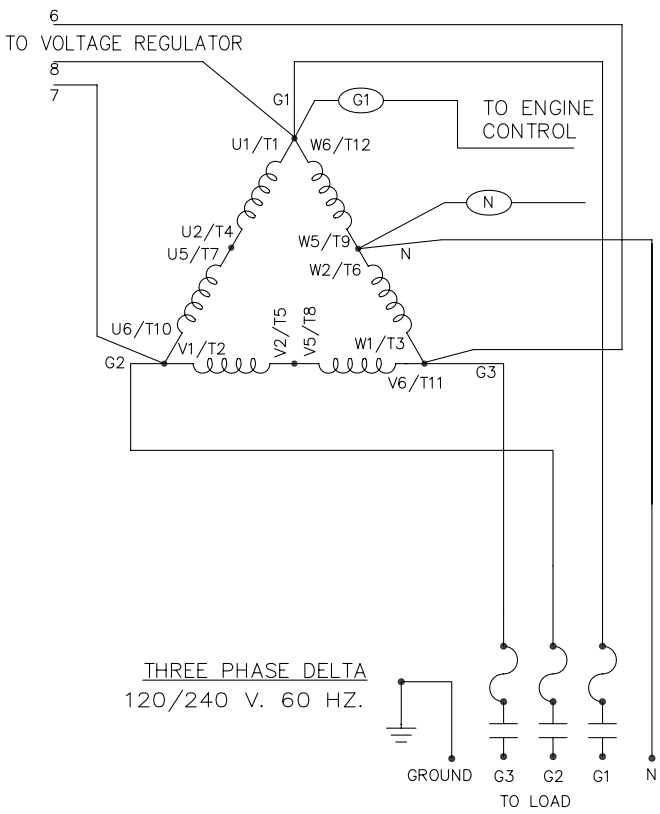
WIRING DIAGRAMS

THREE PHASE AC WIRE HIGH AND LOW WYE

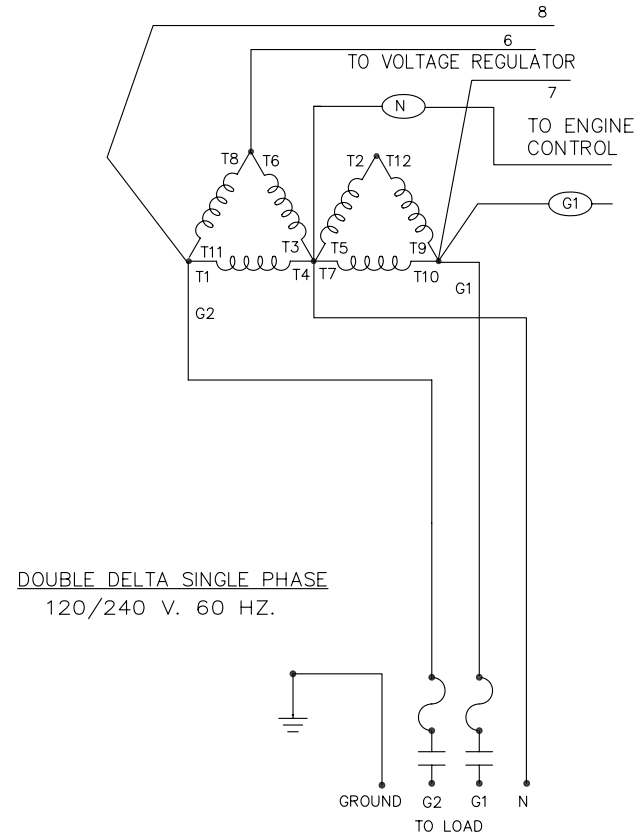




THREE PHASE AC WIRING- DELTA



SINGLE PHASE 311 WINDING



ENGINE GENERATOR SET LIMITED WARRANTY

WINCO Inc. has been engineering and manufacturing high quality generators since 1927. WINCO Inc. warrants to the original owner that the purchased product is free from defects in materials and/or workmanship for the period of time outlined below. If the product should prove defective within the time period outlined below, it will be repaired, adjusted or replaced at the option of WINCO Inc., provided that the product, upon inspection by an authorized WINCO Inc. service center, has been found to have been properly installed, maintained and operated in accordance with WINCO Inc.'s Installation and Operating Manuals, engine manufacturer installation and operation guidelines, and National and local code. This limited warranty is not valid or enforceable unless:

1. All supporting product maintenance records are kept on file and made available upon request from WINCO Inc.
2. A copy of the WINCO Inc. Start-up Completion and Warranty Validation Checklist is properly and completely filled out and returned to WINCO Inc. within 30 days of start-up.
3. The product is routinely exercised in accordance with operating instructions. This warranty does not apply to malfunctions caused by physical damage, misuse, improper installation, repair or service by unauthorized persons; or normal wear and tear. The warranty is not assignable.

Prime WINCO Inc. Product Warranty Period:

- Engine generator set: Parts and Labor for one (1) year from the date of factory invoice or 2,000 hours (whichever occurs first).
- Accessories (installed on the product or shipped loose): Parts and Labor for one (1) year from the date of factory invoice or 2,000 hours (whichever occurs first).

Standby WINCO Inc. Product Warranty Period:

- Engine generator set: Parts and Labor for one (2) year from the date of factory invoice or 2,000 hours (whichever occurs first).
- Accessories (installed on the product or shipped loose): Parts and Labor for one (1) year from the date of factory invoice or 2,000 hours (whichever occurs first).

The start of the warranty period can be adjusted to the date of unit start-up (limited up to 180 days from invoice date) provided that the following information is provided to WINCO Inc. at the time of start-up:

1. A copy of the WINCO Inc. Start-up Completion and Warranty Validation Checklist is properly and completely filled out and returned to WINCO Inc. within 30 days of start-up.
2. Some engines may require revalidation after long-term storage. The engine revalidation process if included in the manual must be followed.

To obtain warranty service:

Contact your nearest authorized WINCO Inc. service center. For assistance in locating your nearest authorized service center, contact WINCO Inc.'s Service Department.

Warranty service may be performed by an authorized WINCO Inc. service center only. Service work performed by unauthorized persons will void all warranties.

WINCO Inc. shall not be liable for any claim in an amount greater than the purchase price of the product. In no event shall WINCO Inc. be held liable for any special, indirect, consequential or liquidated damages.

WINCO Inc. shall not be liable for any claim that requires replacement of engine, part, or component of the product that is no longer manufactured or available. Additionally, WINCO Inc. will not be liable for any engine replacement that may require an emissions tier-level change.

THERE ARE NO EXPRESS WARRANTIES OTHER THAN THOSE DESCRIBED HEREIN. THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, OR OTHERWISE CREATED UNDER THE UNIFORM COMMERCIAL CODE, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY, OR WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE.

The following items and/or circumstances are excluded from this limited warranty:

- Engine starting batteries: The battery manufacturers' warranty applies. Consult your local battery supplier for warranty service.
- Fuel system and/or governing system adjustments performed during or after start-up.
- Normal maintenance items: Consumable items such as belts, filters and hoses.
- Damage caused by over-loading the generator and failure to adequately provide over-load protection.
- LP/NG fuel adjustments or conversion from one fuel to another.
- Any repeat or shop come-back repairs resulting from poor service work or improper diagnosis and testing. Replacement of parts as a trail-and-error method of diagnosis will not be considered for warranty.
- Adjustments and tune–ups performed during start-up or thereafter.
- Loose connections (electrical and mechanical) not found during start-up.
- All fluid level related items including low coolant not found during start-up or checked during regular maintenance intervals.
- Equipment modifications made without the written consent of WINCO Inc. will void all warranties.
- Shipping damage of any type. All equipment is shipped F.O.B. factory and risk of loss transfers to the carrier once loaded for shipment. It is the responsibility of the receiving party to sign for the receipt of, and note any shipping damage to the equipment. Freight damage claim filing is the responsibility of the receiving party. In the rare event that damage occurs during shipment, WINCO Inc. will not warrant any damage to the unit resulting from packaging material.
- Any special access fees, requirements or after hours scheduling to gain access to the equipment for warranty service purposes.
- Rental generators used while warranty work is being performed.
- Damages caused by acts of nature, such as lightning, wind, flood, wild fires, or earthquake.
- Any damage due to situations beyond the control of the manufacturing and/or workmanship of the product.
- Use of non-protected steel enclosure within 25 miles of the coast.
- Damage caused by improper installation or failure to provide adequate ventilation.
- Misapplication of the equipment such as usage outside the original design parameters as stated on the nameplate of the equipment.
- Equipment purchased at the standby rating that is being used in a prime power application(s).
- Diesel engine "Wet Stacking" due to lightly loaded diesel engines.
- Travel time or service calls unless given written authorization by WINCO Inc.