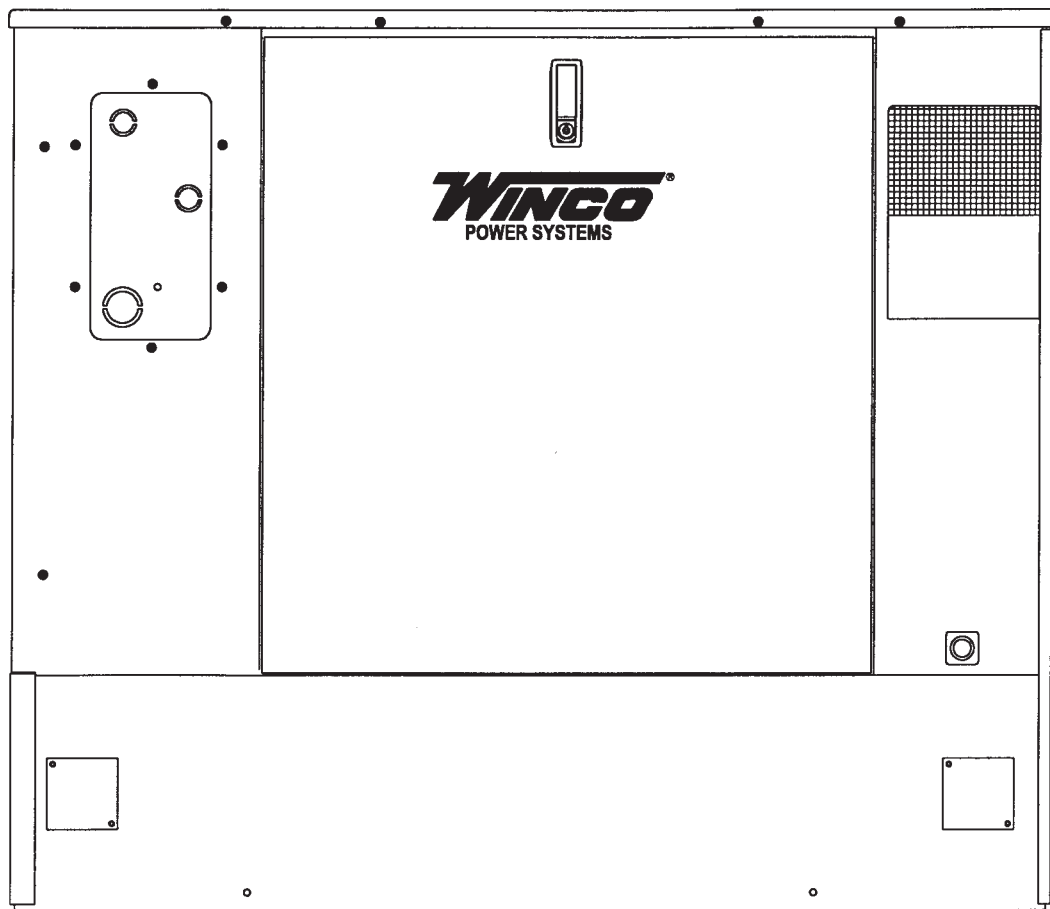

INSTALLATION AND OPERATORS MANUAL

PSS15B4W/A



Engine Generator Set

Read and understand all instructions in the manual before starting and operating the generator set.

USING THIS MANUAL

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

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

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

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PROPER USE AND INSTALLATION

You must be sure your new engine generator set is:

- * Properly serviced before starting
- * Operated in a well ventilated area
- * Properly exhausted and gases safely dispersed
- * Wired by a qualified electrician
- * Operated only for its designed purposes
- * Used only by operators who understand its operation
- * Properly maintained

COPY YOUR MODEL AND SERIAL NUMBER HERE

No other WINCO generator has the same serial number as yours. It is important that you record the number and other vital information here. 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 _____

DEALER PHONE # _____

SAFETY INFORMATION

This engine generator set has been designed and manufactured to allow safe, reliable performance. Poor maintenance, improper or careless use can result in potential 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.

ANSI SAFETY DEFINITIONS

DANGER:

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:

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

CAUTION:

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.

NOTE:

CAUTION is also used on the unit labels and in this manual to indicate a situation that could result in serious damage or destruction of the equipment and possible personal injury.

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

- Do not allow anyone to operate the generator without proper instruction.
- Guard against electric shock.
- Avoid contact with live terminals or receptacles.
- Use extreme care if operating this unit in rain or snow.
- Use only three-prong grounded receptacles and extension cords.
- Be sure the unit is properly grounded to an external ground rod driven into the earth.

2. FIRE HAZARD - Natural gas and L.P. present a hazard of possible explosion and/or fire.

- Do not refuel when the engine is running or hot. Allow the engine to cool at least two minutes

before refueling.

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

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

- Operate only in well ventilated areas.
- Never operate indoors.
- Never operate the unit in such a way as to allow exhaust gases to seep back into closed rooms (i.e. through windows, walls or floors).

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

- Use hearing protection equipment when working around this equipment for long periods of time.
- Keep your neighbors in mind when permanently installing this equipment.

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

- Remove all grease, ice, snow or materials that create slippery conditions around the unit.
- Remove any rags or other material that could create potential fire hazards.
- Carefully clean up any gas or oil spills before starting the unit.
- Never allow leaves or other flammable material to build up around the engine intake or exhaust area.

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

- Use only factory approved repair parts.
- Do not work on this equipment when fatigued.
- Never remove the protective guards, cover, or receptacle panels while the engine is running.
- Use extreme caution when working on electrical components. High output voltages from this equipment can cause serious injury or death.
- Always avoid hot mufflers, exhaust manifolds, and engine parts. They all can cause severe burns instantly.
- Installing a generator set is not a "do-it-yourself" project. Consult a qualified, licensed electrician or contractor. The installation must comply with all national, state, and local codes.

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 generators 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 the applicable engines.

INTRODUCTION AND DESCRIPTION

The package standby system includes all items necessary for a completely automatic standby power system as standard equipment.

DESCRIPTION

This packaged standby system is designed to automatically provide standby power to unattended loads during electrical outages. Upon an interruption of normal electrical service the packaged standby system electrical control circuits will automatically start the engine. The generator will produce electrical power and the Automatic Transfer Switch (A.T.S.) 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 retransfer 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.

These packaged standby systems consist of two major components:

1) AUTOMATIC TRANSFER SWITCH

A wall mounted ASCO 165 Automatic Transfer Switch (A.T.S.) designed for inside installation. The transfer switch is UL1008 approved. A fourteen day electronic exerciser circuit is installed in the A.T.S. as standard equipment. The A.T.S. also contains the power failure sensing circuitry necessary to start and stop the engine generator set. The transfer switch is also equipped standard with a 3 second start delay, and a 15 second transfer delay to allow the engine to warm up before transferring the load to the generator. When the line power is restored the ATS has a 5 minute retransfer delay to allow the incoming utility to stabilize before transferring back to line power and then an additional 1 minute engine cool down delay before the engine is shuts down. Read and understand the owners manual before installing, servicing or operating the transfer switch.

UL Automatic Transfer Switch Sizes

UNIT	LINE SIDE CONTACTOR	GENERATOR SIDE CONTACTOR
PSS15B4W	100 AMPS	100 AMPS
	200 AMPS	200 AMPS

Both the 100 amp and the 200 amp UL Switches are available in single phase only.

2) ENGINE/GENERATOR

The engine generator set consists of a Briggs & Stratton, twin cylinder, four cycle air cooled engine. The engine is factory equipped to run on L.P. or N.G. fuel. The engine operates at 3600 rpm and frequency regulation is maintained by the engine governor within 4 cycles variation (62.5 Hz - 58.5 Hz) from no load to rated load. The generator is a brushless, single bearing, direct drive, rotating field design. Voltage regulation is provided by an external voltage regulator mount on the generator, variation is +/- .5% steady state. The generator is connected to the engine's tapered (quill) crankshaft extension. The engine generator is mounted in a NEMA 3R enclosure for outside installation. Connection boxes are provided for all customer connections (both AC output and DC control). A customer supplied 500 CCA (BCI group 26) battery is required to complete the installation. Engine operation is controlled by the ASCO 165 Transfer Switch

COLD WEATHER OPERATION

Extreme cold weather operation requires special considerations. Higher CCA batteries are required for cold weather starting, 650 CCA or larger are recommended. In addition you should consider installing an oil heater kit and a battery warmer for reliable starting during cold weather.

** NOTICE **

This unit will automatically transfer if a power outage occurs while running in an exercise mode.

SPECIFICATIONS

GENERATOR

MODEL	WATTS*	VOLTS	AMPS*	HZ	PH	RPM
PSS15B4W	15,000	120/240	62.0	60	1	3600
*Derate 16% for Natural Gas operation. Derate 3.5% per 1000 feet elevation above sea level.						

FUEL CONSUMPTION

MODEL	NG		L.P. VAPOR		CF/HR	BTU/HR*
	CF/HR	BTU/HR	#/HR*	GAL/HR		
PSS15B4W	260	260,000	2.7	2.96	108	272,160
*Based on full load operation						

L.P. TANK SIZING

Required L.P. Tank size for L.P. Vapor withdrawal operating at various outside temperatures given in degrees Fahrenheit (Celsius)

TANK TEMPERATURE

MODEL 60 f(16 c) 32 f(0 c) 0 f(-18 c) -20 f(-29 c)
PSS15B4W 150 Gal. 250 Gal. 500 Gal. 1000 Gal.

ENGINE SPECIFICATIONS:

Refer to engine operating and maintenance instructions.

** NOTICE **

Regarding Engines - This manual covers the generator portion of these units. See the separate engine instruction manual for engine-related problems, detailed engine information and engine warranty.

** CAUTION **

Be sure to check the engine oil level frequently, as specified in the engine manual.

The engine manufacturer has established an excellent worldwide engine service organization; engine service is available from a nearby authorized dealer or distributor; check the yellow pages of the telephone directory under "engines," or ask the dealer from whom you purchased the power plant.

The rated power of each engine-generator is limited by the temperature, altitude and all other ambient conditions specified by the engine manufacturer. Engine power will decrease 3-1/2% for each 1000 ft. above sea level, and will decrease an additional 1% for each 10 degrees Fahrenheit above 60 degrees Fahrenheit.

UNPACKING INSTRUCTIONS

** NOTICE **

When unpacking the generator set, be sure to inspect it carefully for freight loss or damage. If loss or damage is noted at the time of delivery, require that the person making the delivery make note of the loss or damage on the freight bill, or affix his signature under the consignor's memo of the loss or damage. Contact the carrier for claim procedures.

When loss or damage is noted after delivery, segregate the damaged material, and contact the carrier for claim procedures. Be sure to retain the packaging material for carrier inspection.

"Concealed Damage" is understood to mean damage to the contents of a package which is not evident at the time of delivery by the carrier, but which is discovered later. The carrier or carriers are responsible for merchandise lost or damaged in transit. The title to goods rests with the consignee when generators are shipped F.O.B. factory, and only the consignee can legally file a claim. Please note, most carriers have a time limit for filing concealed damage claims.

**** CAUTION ****

These units are shipped without oil. Be sure to check oil levels before operating. See engine manufacturer's instruction manual for recommended oil requirements before initial starting.

UNPACKING:

1. Carefully remove the carton.
2. After inspecting the engine-generator and transfer switch for external physical damage, check for the following items packed inside the carton.
 - a. Owner's manual, wiring diagram and parts list.
 - b. Engine manufacturer's instruction manual.
3. Remove main frame hold down bolts, (4).
4. Unit can now be lifted from shipping pallet.

INSTALLATION

General Information

**** WARNING ****

Before proceeding with the installation, be sure the operation selector switch is in the stop position.

These engine/generator sets are designed to be mounted on a concrete pad outdoors only. The transfer switch is mounted next to your electrical entrance or distribution panel inside the building. Consult a qualified, licensed electrician or contractor to install and wire the transfer switch. The installation must comply with all national, state and local codes.

Before beginning the installation process recheck the rating of the generator set and its transfer switch rating. Be certain they can handle the intended load and are compatible with the entrance voltage, phase and current ratings. Plans for installation should be prepared with proper attention to mechanical and electrical engineering detail to assure a satisfactory system installation. The information in this manual is offered only as a guide to finalizing your installation plans.

ENGINE GENERATOR SET MOUNTING

The unit's main frame should be bolted solid to a four to six inch thick cement pad. The engine-generator is mounted on a sub-frame which is isolated with special shock mounts on the main frame. This allows the engine-generator to vibrate without affecting the control panel on the main frame.

Do not install any shock mounts between the base frame and the concrete pad. Engine vibration will be transmitted to the control panel causing erroneous start/stop cycles and premature control failure.

The unit should be mounted to allow for ample working room around it. A general rule to follow is three (3) feet clearance on all sides. NFPA 37 requires at least 3 feet clearance from any structures having combustible adjacent walls and 5 feet from openings in walls. Particular attention should be paid to the direction of the hot air discharge and exhaust discharge. Unit location should be such that these discharges are not allowed to be drawn back in through an open window or door.

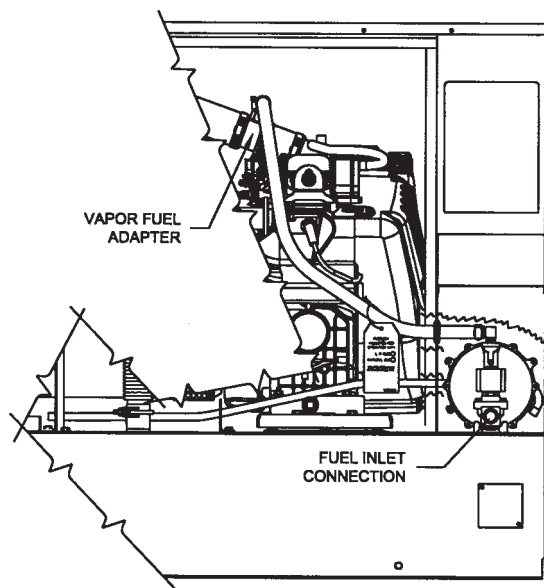
FUEL INSTALLATION

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 or information provided be interpreted to conflict with any local, state or national codes. If in doubt, always consult your local fire marshal or gas supplier.

**** **WARNING** ****

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

To connect the fuel line, locate the 3/4 inch NPT fuel inlet fitting on the side of the enclosure. This inlet is shipped with a plastic cap plug installed to insure the fuel system stays clean.



**** **WARNING** ****

FIRE HAZARD - DO NOT OVERTIGHTEN THE FUEL LINE. THIS IS A TAPERED FITTING, OVERTIGHTENING WILL CAUSE THE FITTING TO CRACK AND LEAK FUEL.

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 fuel pressure can cause many problems ranging from a unit that will not start to causing damage to the fuel system.

INSTALLING THE FUEL LINE

** **NOTICE** **

The engine generator sets are properly adjusted before they leave the factory. A tag is attached to the unit that specifies the fuel, natural gas (NG) or propane vapor (LP) that the unit was set up and tested on.

Line Size

Unit location will determine the size of fuel line that is required to supply the engine with a constant fuel pressure and volume. Refer to the tables below for fuel line size, fuel consumption and recommended tank size. For distances of 50 feet and 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 lbs. A secondary regulator is installed to further reduce the fuel pressure to the required four (4) to six (6) oz operating pressure. This secondary 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 dual stage regulators, it should also be 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) stage regulator system is used, a fuel line size of 1/2 to 5/8 inch is generally adequate for distances up to 300 feet from the primary to the secondary regulator. (Consult your local fuel supplier for your exact requirements.) The appropriate line size from the table below is then installed from the secondary regulator to the generator set.

**** **WARNING** ****

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

NATURAL GAS or LP VAPOR

Size of pipe normally required for generators operating on **NATURAL GAS or LP VAPOR**

up to 25 feet* 25 - 100 feet* over 100 feet*
use a two regulator system

PSS15B4W 3/4" pipe 1" pipe regulator system
Allow an additional 3 feet for each standard elbow. Do not use 'street ells' (restrictive)

**** 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

L.P. & N.G. VAPOR FUEL

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 block diagram of a typical L.P. or N.G. vapor fuel installation.

Notice the following tables give two (2) 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.

Reference numbers 1 through 3 in the block diagrams above are system parts supplied by customer.

Reference number 4 is the engine generator set.

Below is a table of the fuel pressure reading at each reference in the system.

Fuel Pressure Table

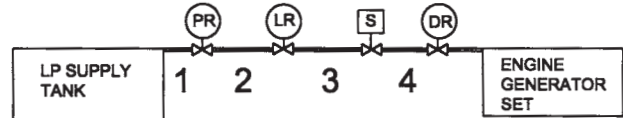
Single Regulator (L.P. Vapor only)

	1	3	4
UNIT OFF	TANK PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
STARTING	TANK PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
NO LOAD	TANK PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
FULL LOAD	TANK PSI	7-11 in 4-6 oz	7-11 in 4-6 oz

Two (2) Regulator System (L.P. Vapor only)

	1	2	3	4
UNIT OFF	TANK PSI	10-15 lbs	7-11 in 4-6 oz	7-11 in 4-6 oz
STARTING	TANK PSI	10-15 lbs	7-11 in 4-6 oz	7-11 in 4-6 oz
NO LOAD	TANK PSI	10-15 lbs	7-11 in 4-6 oz	7-11 in 4-6 oz
FULL LOAD	TANK PSI	10-15 lbs	7-11 in 4-6 oz	7-11 in 4-6 oz

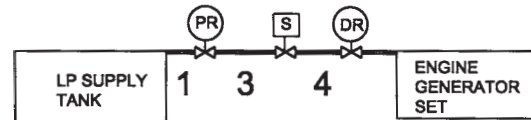
TWO REGULATOR FUEL SYSTEM



LEGEND

PR - PRIMARY REGULATOR
(REDUCES TANK PRESSURE TO 10-15 PSI)
LR - LOW PRESSURE REGULATOR
(REDUCES FUEL PRESSURE TO 4 TO 6 OZ)
S - FUEL SOLENOID VALVE
(POSITIVE FUEL SHUT-OFF SOLENOID)
DR - DEMAND REGULATOR
(REQUIRES ENGINE VACUUM TO OPEN)

DUAL STAGE SINGLE REGULATOR SYSTEM



LEGEND

PR - PRIMARY REGULATOR
(REDUCES TANK PRESSURE TO 4 TO 6 OZ)
S - FUEL SOLENOID VALVE
(POSITIVE FUEL SHUT-OFF SOLENOID)
DR - DEMAND REGULATOR
(REQUIRES ENGINE VACUUM TO OPEN)

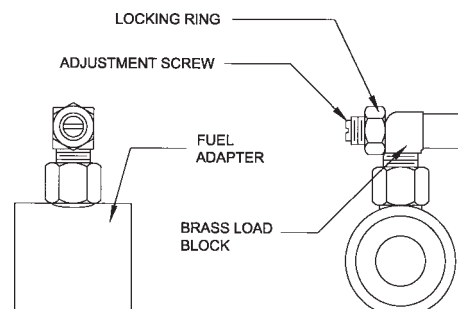
Natural Gas

	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

LP/NG FUEL CONVERSION

The PSS15B4W/A generator systems have been tested on **NATURAL GAS** prior to shipment. If you are going to use them on **LP vapor**, follow the procedures outlined below to change the fuel type.

1. Connect your LP supply to the unit, making sure that you have the correct fuel pressure.
2. Locate the vapor fuel adapter mounted between the air filter and the carburetor body.



3. Using an end wrench loosen the locking nut on the adjustment screw.
4. Start the unit up and lean out the fuel to air mixture by turning the adjustment screw in (clockwise). Keep adjusting until the engine is running smooth. If you lean it out too far the engine will start to slow down.
5. Check the unit to make sure it is still operating at the proper speed (61.5 to 62 Hz). If it is correct retighten the locking ring.
6. Test the unit under load to make sure it will work properly.

If it should become necessary to change back to NG from LP, just turn the adjustment out (counter clockwise) until the engine is running smooth.

LUBRICATION

Before starting the engine, fill the crankcase 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.

INSTALLING THE BATTERY

**** CAUTION ****

In the following battery installation procedure, check to be sure the right hand toggle switch is in the disabled position and the left hand toggle switch in the off position. This should be your last step before initial start-up.

A customer supplied twelve-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. *Gel batteries should not be used* with the battery tender installed in the generator enclosure.

<u>Model</u>	<u>BCI Group</u>	<u>MINIMUM CCA Rating</u>
PSS15B4W	26	500*

* 650 CCA Recommended for cold weather starting.

*****CAUTION*****

EQUIPMENT DAMAGE - *Always connect the positive cable first and the negative cable last, when disconnecting, it is negative cable first and positive last. Failure to connect and disconnect in the proper sequence can cause equipment damage.*

Observe polarities: connect the positive (+) battery terminal to the (+) cable from the control panel; the negative (-) battery terminal is connected to the negative cable (ground) from the engine generator assembly.

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

*****CAUTION*****

EQUIPMENT DAMAGE - NEVER JUMP START these units. *Doing so will destroy the engine control module rendering the unit non-operational. Remove and fully recharge the battery before attempting to start.*

CONNECTING THE BATTERY CHARGER

A two-stage battery tender is provided on all PSS series generators. This battery tender charges at a rate of 750 mA until the battery is fully charged and then automatically switches to a 13.2 VDC float charger. The charger has an indicator light on it, red indicates it is charging, and green indicates it is in the storage mode (float charge). This charger is mounted on the engine generator set in the same location as the other AC and DC connections.

This battery tender requires a circuit breaker protected AC circuit from your distribution panel be run out to the engine generator set. These AC wires can be run in the same conduit as the other AC leads from the generator. It is suggested that this circuit be fused for 15 amps.

A 120 volt receptacle is mounted in the generator connection box. The receptacle is prewired with black, white and green leads attached to it, this is where you will connect your 120 volt fused power feed. This receptacle can also be used when installing the oil heater kit and the battery warmer.

** NOTICE **

The battery tender is not intended to recharge a battery which has become completely discharged. It is designed to produce enough current to recharge a slightly low battery, maintaining it fully charged.

MOUNTING THE AUTOMATIC TRANSFER SWITCH (A.T.S.)

 ***** WARNING *****

EQUIPMENT DAMAGE- *Protect the switch from construction grit and metal chips to prevent a malfunction or shortened life of the switch. Contactors returned for warranty consideration with foreign material inside of them will not be warranted.*

The Automatic Transfer Switch connects the load (lights, furnace, outlets, etc.) to the normal power line during standby. When normal power fails, the A.T.S. starts the engine generator set, disconnects the power line and then connects the load to the standby generator set. When normal power is restored, the automatic switch retransfers the electrical load to the normal service and stops the engine. The A.T.S. panel should be mounted as close to the distribution panel as possible.

****** WARNING ******

All wiring must be done by a licensed electrician, and must conform to the national electrical code and comply with all state and local codes and regulations. Check with your electrical inspectors before proceeding!

****** DANGER ******

Be certain the operation selector switch on the front of the A.T.S. Control is in the "stop" position and the main power switch "off". For your own protection, verify these important safety precautions yourself with reliable instruments before proceeding.

A.C. ELECTRICAL CONNECTIONS

****** WARNING ******

A FUSED DISCONNECT OR CIRCUIT BREAKER MUST BE INSTALLED BETWEEN THE GENERATOR AND THE A.T.S. PANEL TO PREVENT OVERLOADING AND BURNING OUT THE GENERATOR. FAILURE TO PROVIDE A FUSED DISCONNECT OR CIRCUIT BREAKER, RATED AT GENERATOR RATING WILL VOID YOUR WARRANTY IN CASE OF GENERATOR FAILURE.

Generator Connections

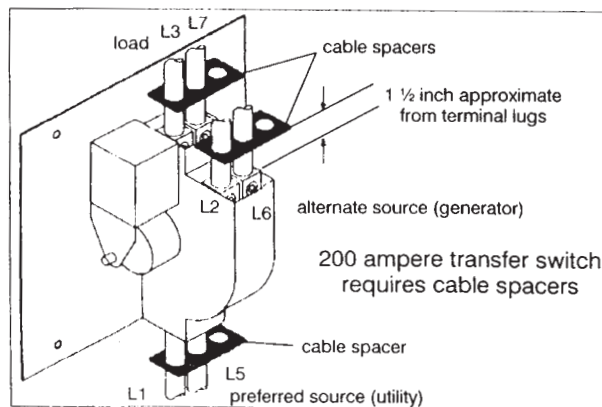
To gain access to the customer connections Remove the end panel opposite the hot air discharge end. All connections including AC & DC connections to the ATS, 120 Volt power connection for battery charger, and battery installation are made behind this panel. After removing the end panel you will need to remove the cover over the connection box in the upper right hand corner. Knockouts are provided on the outside of the enclosure for your convenience. See page 13 for unit layout.

Three AC power leads are required between the generator and the A.T.S. Two hot leads connected generator leads G1 and G3 and a neutral lead connected to generator leads N. A ground wire is also required, which is connected to the ground lug mounting bolt.

These units are shipped with no neutral to ground bond. You will need to run both the neutral and ground leads in addition to the two power leads all the way back to your distribution panel. Your distribution panel should contain your only neutral to ground bond.

All power leads from the generator to the A.T.S. must be sized to handle rated generator output amperage at a minimum, the type of wire you use will determine the gauge required. Consult your local wire supplier for proper gauge and type for your installation.

In addition to the power leads you will also need to run a three wire 120 volt, 15 amp GFCI protected circuit from your distribution panel to the generator. This circuit will be used to power the battery charger.



The last four wires you will need are the DC control leads for the start circuit in the A.T.S. These last four connections will be discussed later in more detail.

WINCO UL ATS (ASCO165)

The standby generator terminals in the A.T.S are marked "ALTERNATE L2 & L6". The "hot" leads G1 and G3 from the generator are connected to the terminals L2 & L6.

The normal line power terminals in the A.T.S. are marked "PREFERRED - L1 & L5". The "hot" line power leads are L1 and L3 from your normal power supply are connected to terminals L1 and L3.

The load terminals in the A.T.S. are marked "LOAD - L3 & L7". The leads to the load distribution panel are connect to terminals L3 & L7.

The neutral leads from all three locations are connected to the isolated terminal lugs on the sidewall of the cabinet. This terminal block is labeled "NEUTRAL" and the terminal lugs are mounted on red isolation standoffs.

The ground leads from all locations they are connected to the grounded terminal lugs also on the side wall. This set of terminals is labeled "GROUND".

INSTALLATION NOTES

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 main line 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)

Because of the many different types of service, feeder, and distribution equipment, no specific wiring instructions can be provided. It is, however, 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 A.T.S. control and safety systems will eliminate all paths for feedback. Check with your local electrical inspector on applicable local, state and federal codes.

WARNING

A service disconnect must be installed in front of the A.T.S. panel as the A.T.S is not service entrance rated. This will allow you to test the generator under load. Should you ever have to work on the switch, you will be able to disconnect the power and work on the switch cold without having the power company pull your meter.

To wire the automatic transfer switch into the existing wiring, first determine which circuits will be on the emergency load circuit. If the entire load is to be transferred, the transfer switch can be wired in directly after the watt-hour 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 reinstalled in 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.

D.C. ELECTRICAL INTERCONNECTION

*******CAUTION*******

Never run the AC and DC wiring in the same conduit.

ASCO 165 UL SWITCH

Your DC connection points in the ASCO 165 UL ATS are on the terminal block in the upper right hand corner of the ATS panel. The terminal block (TB7) is numbered 1 through 9. These terminal will accept #22 - #14 stranded wire. It is recommended that you use #16 for distances up to 200 feet.

You need to run four (4) wires from the engine generator set to the transfer switch, see table below.

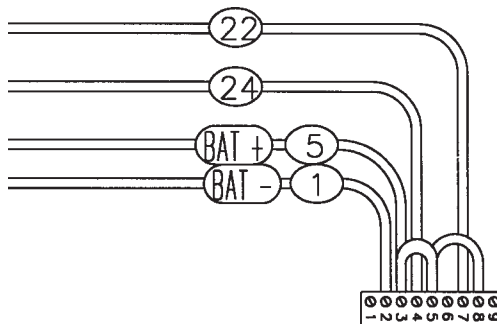
Wire #	Purpose	Recommended Color
#5	Battery positive	Black
#1	Battery Negative	White
#24	Fuel Solenoid	Red
#22	Start	Orange

You can use any color you want, these color codes are just a recommendation. The wires terminate on TB7 as follows:

Wire #	Color	TB7 Terminal
#5	Black	#3
#1	White	#2
#24	Red	#4
#22	Orange	#7

Jumpers will need to be installed as follows:

Wire #	Color	TB7 Terminals
#5	Black	#3 & #5
#5	Black	#5 & #8



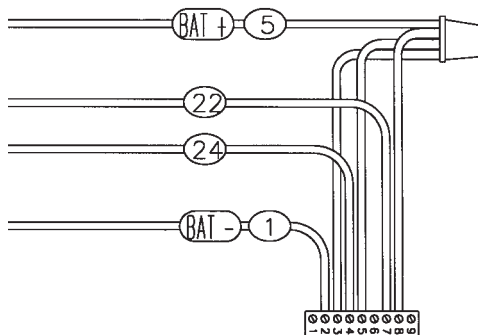
The following is an optional way to interconnect the Generator and the Transfer Switch. The wires terminate on TB7 as follows:

Wire #	Color	TB7 Terminal
#1	White	#2
#24	Red	#4
#22	Orange	#7

The following leads are wire nuted together:

Wire #	Color	From
#5	Black	Generator
#5	Black	TB7 #3
#5	Black	TB7 #5
#5	Black	TB7 #8

Optional Connections



INITIAL START UP

**** **WARNING** ****

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.

Use the following check list to verify correct installation before starting the engine:

- Engine oil.* Check level & fill as required with proper grade/qty.
- Unit mounting base properly bolted down.
- Clearance for service and maintenance on all sides.
- Proper fuel line material, and size.
- All fuel line connections tight.
- Fuel line protected and a moisture trap installed (may be required for N.G.).
- LP/NG pressure O.K. 4-6 Oz. (7-11" WC).
- Battery connections clean and tight.
- Battery fully charged.
- All A.C. and D.C. wiring installed and properly protected.

* Refer to engine owners manual for proper levels and type.

After completing the above checklist, the engine-generator set is ready for the initial start-up test.

PROCEDURE

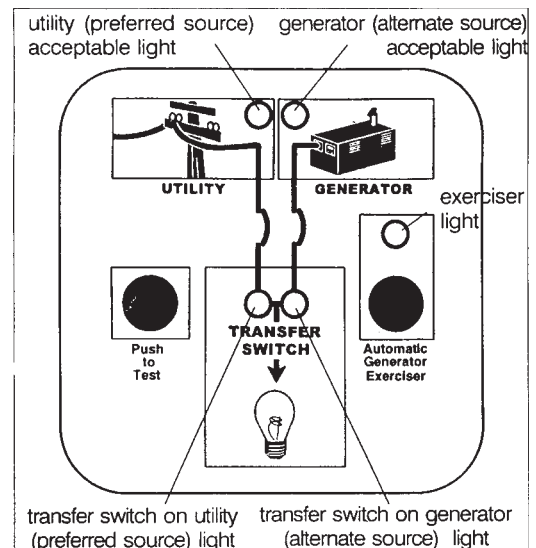
Engine Generator Set only

Move the right hand toggle switch from stop to the normal position the alarm light should go out. Next move the left hand toggle switch from the off to the run position. You should hear the fuel solenoid engage at this time. Next lift the toggle switch to the start position and hold. The starter should engage and the engine will start. As soon as the engine starts release the toggle switch and it will return to the run position. If the engine does not start after 15 seconds release the switch and let the starter rest for 15 seconds and reattempt to start. If the unit still will not start, consult the troubleshooting guide in the back of this manual.

With the engine running smoothly, check the no load voltage and frequency at wire G1 and G3 (L2 and L6 in the ASCO ATS) on the generator terminal block in the A.T.S. The voltage should be 240 volts plus or minus nominal. The frequency should be between 61.5 to 62 hertz (Hz). The voltage should also be checked between the hot terminals (L2 and L6) and the neutral to be certain of a balanced voltage output and a solid neutral connection. The voltage should be about one half of the line to line voltage.

** Notice **

If for any reason during the check out procedure the voltage and frequency are not correct, move the toggle switch to the "STOP" position and correct the trouble before proceeding.



After verifying the voltage and frequency are correct, move the left hand toggle switch to the off position. The unit should shut off with no time delay. Move the right hand toggle switch to the stop position, the alarm light should now light up.

Transfer Switch & Engine Generator

**** **WARNING** ****

FIRE DANGER - The left hand toggle switch (Stop-Run-Start) must be in the stop position unless you are starting the generator with this switch. Any time this switch is in the run position the fuel solenoid is open and can leak fuel if the engine is not running. This switch is for test running at the unit only and is not used for automatic operation.

This procedure checks the electrical operation of automatic transfer switch. If the actual operation does not follow this procedure, consult the troubleshooting section in the transfer switch manual.

1. Move the right hand toggle switch from the stop position to the normal position, the alarm light should go out. The unit is now ready to be operated from the Automatic Transfer Switch. Leave the left hand switch in the off/stop position.

**** **WARNING** ****

PERSONAL INJURY HAZARD - Install front cover in transfer switch before operation. An electrical system fault could cause a flash and severe personal injury

2. Turn on the preferred source (utility) circuit breaker. The utility source acceptable light should now come on as well as the transfer switch on utility light. If these lights fail to come on recheck your incoming power to insure you 240 volts nominal. If not troubleshoot you utility source before continuing.

3. Turn on the alternate source (generator) circuit breaker.
4. Press and hold the **Push to Test** button until the generator (alternate source) acceptable light comes on and stays on. Then release the button. This will start your generator set up.

This light indicates that the generator is running and the output voltage and frequency are within acceptable limits. Under normal conditions this light should come on in 5 to 10 seconds. If the light does not come on and stay on a malfunction has occurred. Either the unit didn't start or the voltage or frequency is incorrect. Correct the problem before continuing.

5. About 15 seconds after the generator (alternate source) acceptable light comes on, the automatic transfer switch should transfer the load from the utility to the generator. At that time the **Transfer Switch** on generator light should come on.

6. The generator will stay connected to the load for about 5 minutes at which time the transfer switch will transfer the load back to the utility. At the time it transfers back to utility the Transfer Switch on Utility light should come on and the Transfer Switch on generator light should go out. To bypass this five minute time delay you can press and release the Push to Test button again at any time.

7. After the load retransfers to the utility the generator will continue to run for about 1 minute (without a load) and then shut down. The Generator acceptable light will go off indicating the generator set has shut down.

This completes the functional test of the transfer switch and the generator set. If you want to leave the generator in the Automatic Start mode you can leave the right hand toggle switch on the generator in the normal position. If you have additional work to do or don't want to leave the engine generator set in the automatic start mode move the toggle switch to the stop position. In the stop position the alarm light will come on and the engine generator set will not start or run.

GENERATOR EXERCISER CIRCUIT

The automatic generator exerciser is configured to automatically exercise to generator for 20 minutes once every fourteen days.

In order to set and test the exercise circuit the right hand toggle switch on the generator control panel must be in the normal position.

SETTING THE EXERCISER CIRCUIT

Press and release the **Automatic Generator Exerciser** button. After about 8 seconds the exerciser light flashes 14 times to indicate that the exerciser circuit has been set. The number of flashes indicates the number of days until the next exercise period. This 20 minute period will occur at approximately the same time of the day the button was pressed.

DISABLING THE EXERCISER CIRCUIT

Press and hold the **Automatic Generator Exerciser** button until the light above the button goes off, the light flashes and then goes off.

ENABLING THE EXERCISER CIRCUIT

Press and hold the **Automatic Generator Exerciser** button until the light goes off, the light flashes then goes off. After about 8 seconds the exerciser light flashes fourteen times to indicate that the exerciser circuit has been re-enabled.

 **** **WARNING** ****

WITH A TOTAL POWER FAILURE (UTILITY POWER FAILS AND THE GENERATOR FAILS TO START AND RUN) THE EXERCISER MUST BE RESET AFTER THE POWER IS RESTORED.

This completes your installation and unit testing. ALWAYS leave the system in automatic mode unless servicing the unit. For automatic operation, the right hand toggle switch on the generator control panel must be left in the **"NORMAL"** position.

TROUBLESHOOTING TABLES

 **** **WARNING** ****

NEVER JUMP START THESE UNITS. JUMP STARTING THESE UNITS WITH LOW OR BAD BATTERIES WILL CAUSE PERMANENT DAMAGE TO THE ENGINE CONTROL MODULE.

UNIT WILL NOT CRANK WHEN THE POWER FAILS.

1. Generator control switch not in "ON" position.
2. Low or dead battery, must hold 12 volts during cranking.
3. Incorrect wiring between transfer switch and generator.
4. Circuit breaker tripped on engine control.
5. Loose or dirty battery terminals.
6. Defective "ON/DISABLE" switch.
7. Defective starter.
8. Defective start solenoid.
9. Defective start/stop control in the transfer switch.
10. ATS panel in fault from previous run cycle.
11. Blown 3/4 amp fuse on generator control panel.

ENGINE WILL NOT CRANK WITH GENERATOR SELECTOR SWITCH IN THE START POSITION.

1. Low or dead battery, must hold 12 volts during cranking.
2. DC circuit breaker on control module tripped.
3. Blown 3/4 amp fuse on generator control panel.
4. Loose or dirty battery terminals.
5. Defective "OFF/RUN/START" switch.
6. Defective starter.
7. Defective start solenoid.
8. Locked up engine generator set.

ENGINE CRANKS BUT WILL NOT START.

1. Improper fuel pressure being delivered to unit.
2. Fuel supply shut off.
3. Fuel tank empty.
4. Defective spark plug.
5. Defective engine ignition module.
6. Dirty air cleaner filter.
7. Defective fuel solenoid valve.
8. Low voltage from battery to fuel solenoid, must hold 12 volts during cranking.
9. Oil in the bottom of air cleaner from crankcase breather.

ENGINE STARTS AND THEN STOPS.

1. Engine is low on oil.
2. Faulty oil pressure switch on engine.

ENGINE WILL NOT COME UP TO SPEED AFTER IT STARTS.

1. Insufficient fuel volume getting to the unit.
 - a. Fuel line too small.
 - b. Low fuel pressure.
2. AC short circuit.
3. Wiring to the A.T.S. panel crossed or shorted.
4. Unit is overloaded, check load amperage.

ATS PANEL WILL NOT TRANSFER TO EMERGENCY SUPPLY (GENERATOR).

1. No AC generator output from generator.
2. Wiring error between generator set and transfer switch.
3. See ASCO manual for ATS troubleshooting.

ATS PANEL WILL NOT PULL IN ON NORMAL POWER.

1. Proper normal line power not available at line terminals in ATS panel.
2. See ASCO manual for ATS troubleshooting.

NO AC OUTPUT FROM GENERATOR.

1. Diodes on rotor blown.
2. Defective capacitor(s).
3. Defective rotor.
4. Defective stator.
5. AC short in the output leads.
6. Unit has lost its residual voltage.
7. Rotor loose on engine crankshaft.
8. Low engine speed, must be 3600 RPM.
9. AC short on output leads.

PREVENTIVE MAINTENANCE

Reasonable care in preventive maintenance will insure high reliability and a long life for the engine generator set and the Automatic Transfer Switch.

**** WARNING ****

When performing any type of maintenance on this equipment make sure the selector switch on the engine generator is in the off position. If you are working in the Automatic Transfer Switch, confirm with a reliable meter that all power has been disconnected.

AUTOMATIC TRANSFER SWITCH

Clean and inspect the switch once a year. De-energize all power sources, both line and engine generator set, then brush and vacuum away any excessive dust and dirty accumulation. You can at this time with the contactor de-energized remove the contactor covers and check the contacts. Make sure the contacts are clean and not burned or pitted.

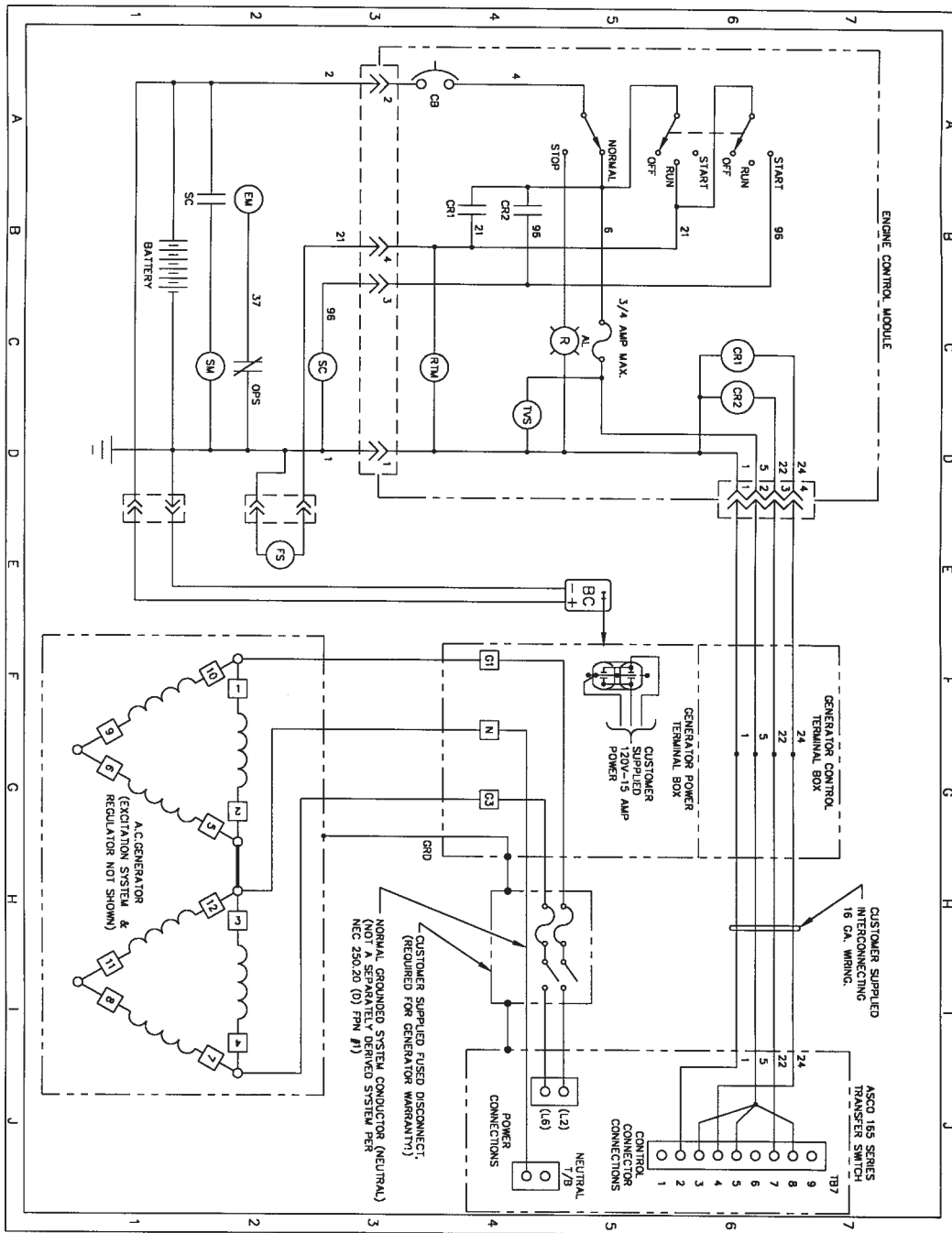
ENGINE GENERATOR SET

Service the engine in accordance with the engine manufacturers manual provided with your new equipment. Routinely remove debris and dirt from around and inside generator enclosure. Insure that the air intakes are free from leaves and other debris at all times.

Clean and inspect battery terminals at least twice a year. Check the battery water level at least twice a year also.

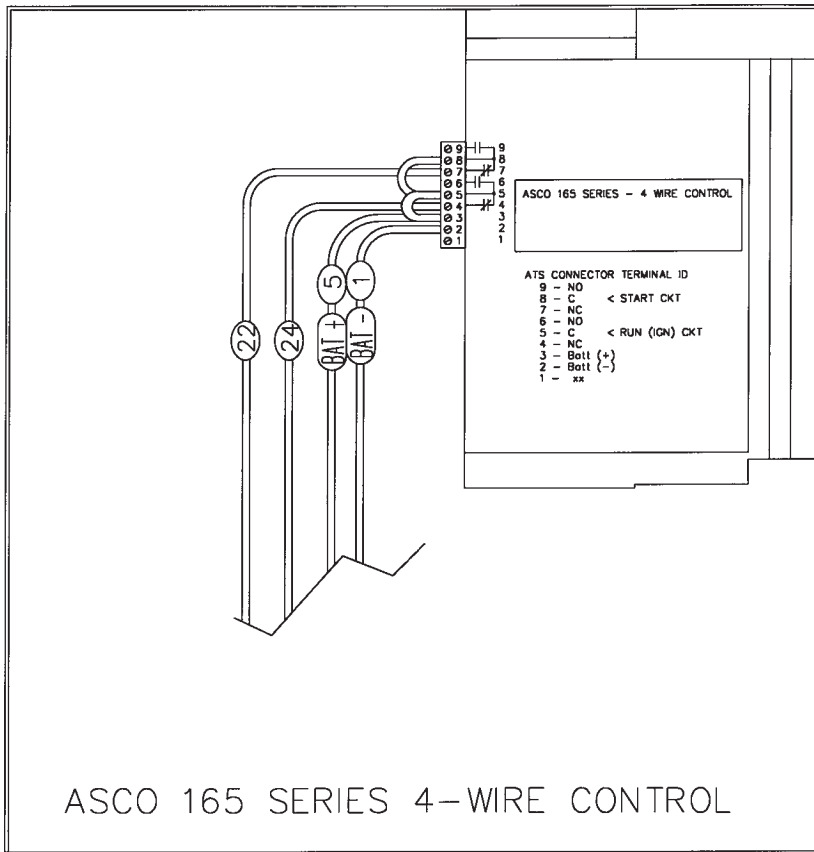
Other than keeping the generator clean and free of debris there is no other routine or preventive maintenance required, as long as the generator is run once a week to keep it dry and in good working order.

AC AND DC GENERATOR SCHEMATIC

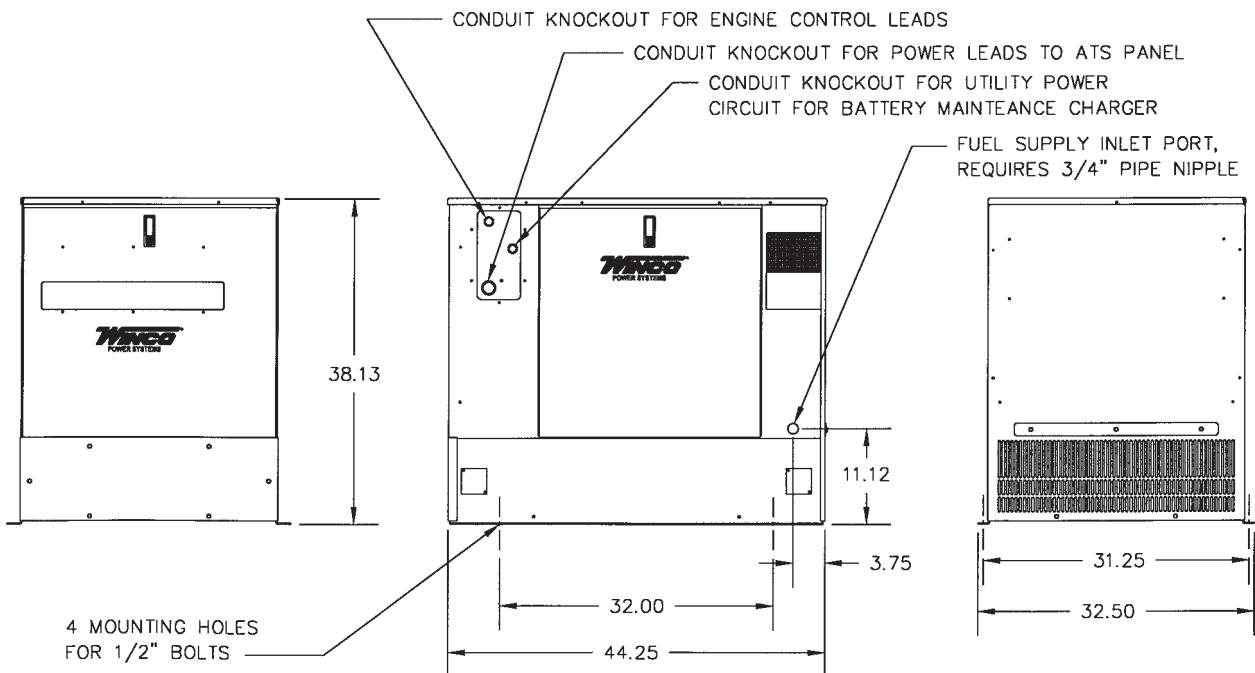


LEGEND

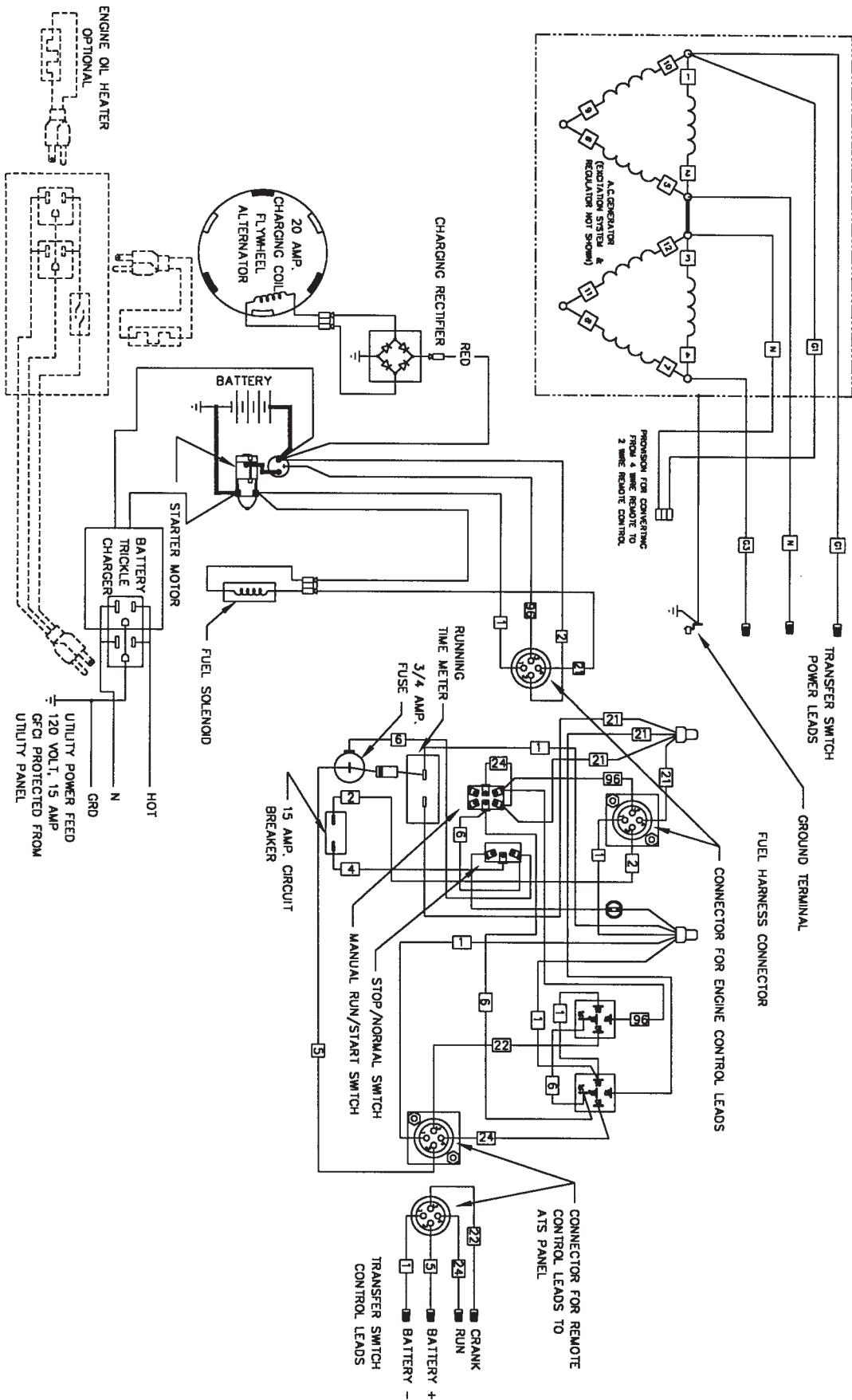
- | | |
|-----|------------------------------|
| AL | ALARM LAMP (SYSTEM OFF) |
| BC | BATTERY FLOAT CHARGER |
| CB | CIRCUIT BREAKER |
| CR1 | START CONTROL RELAY |
| CR2 | RUN CONTROL RELAY |
| EM | ENGINE MAGNETO |
| FS | FUEL SOLENOID |
| OPS | OIL PRESSURE SWITCH |
| RTM | RUNNING TIME METER |
| SC | START CONTACTOR |
| SM | STARTER MOTOR |
| TVS | TRANSIENT VOLTAGE SUPPRESSOR |



GENERATOR LAYOUT



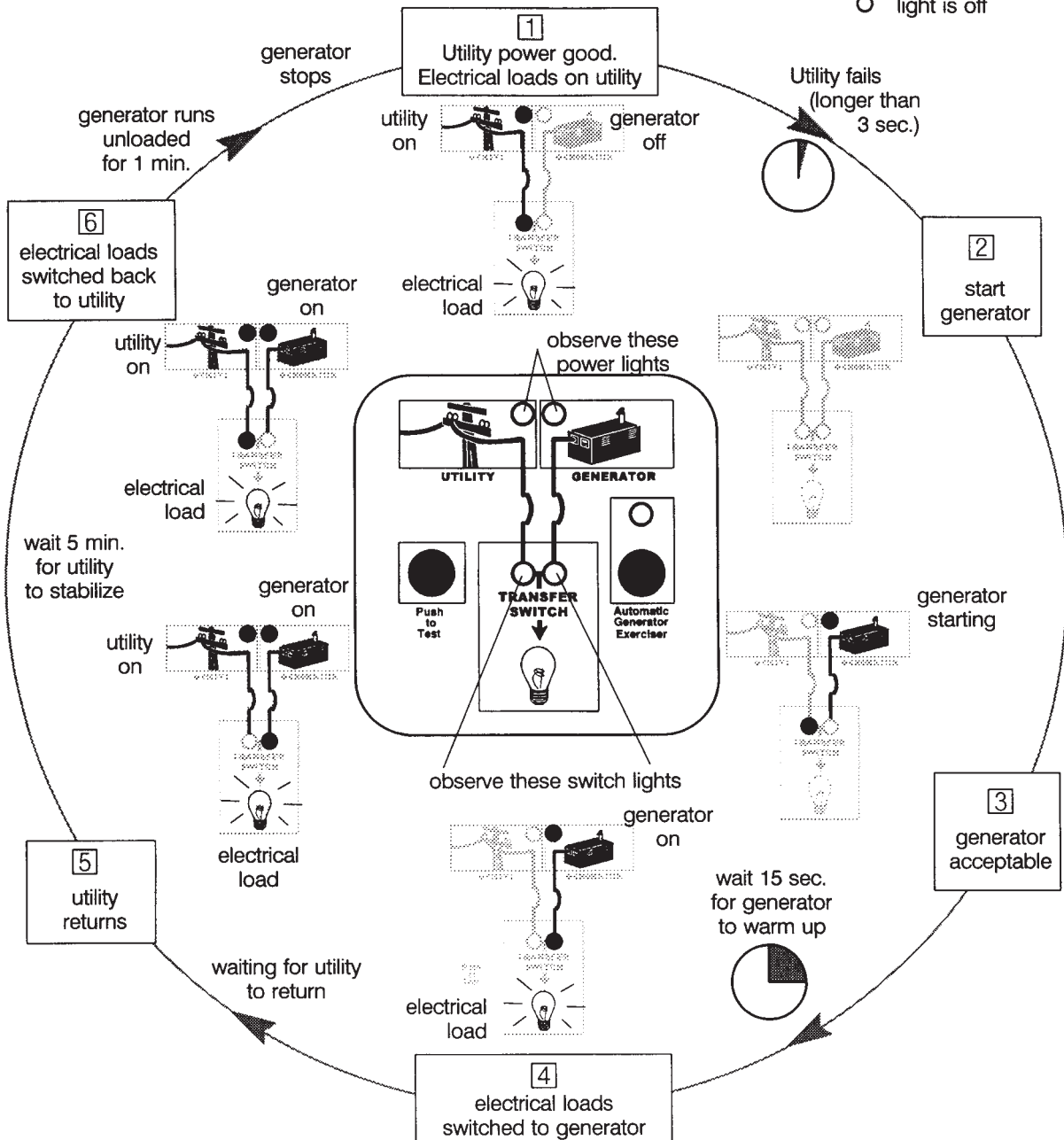
AC AND DC GENERATOR WIRING DIAGRAM



Sequence of Operation – Utility Failure for Series 165 Automatic Transfer Switch

Read and understand the **Owner's Manual** before installing, servicing, or operating.
Failure to do so could result in serious personal injuries or property damage.

- light is on
- light is off



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MAINTENANCE LOG

DATE	ITEM	WORK PERFORMED

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