WINPOWER

A Division of DTE Dyna Technology Inc

DIESEL GENERATOR SYSTEMS

INSTALLATION AND OPERATIONS MANUAL

DR12

SAVE THESE INSTRUCTION

This manual contains important instructions that should be followed during installation and maintenance of the generator and batteries.

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

USING THIS MANUAL

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

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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 WINPOWER 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
* Exhaust gases are dispersed safely
* 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 WINPOWER 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_____

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTION

This manual contains important instructions that should be followed during installation and maintenance of the generator and batteries.

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

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

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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.*

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WARNING:

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

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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.

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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.

    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-prong grounded receptacles and extension cords.
    f. Be sure the unit is properly grounded to an external ground rod driven into the earth.

2. **FIRE HAZARD -** Deisel fuel presents a hazard of possible explosion and/or fire.

    a. Do not smoke or use open flame near the generator set.
    b. Keep a fire extinguisher nearby and know its proper use. Fire extinguishers rated ABC by NFPA are appropriate.

3. **DEADLY EXHAUST GAS** - Exhaust fumes from any diesel 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.
    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 or floors).

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

    a. Use hearing protection equipment when working around this equipment for long periods of time.
    b. Keep your neighbors in mind when permanently installing 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 material that could create potential fire hazards.
    c. Carefully wipe up any fuel or oil spills before starting the unit.
    d. Never allow leaves or other flammable material to build up around the engine exhaust area.

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, cover, or receptacle panels while the engine is running.
    d. Use extreme caution when working on electrical components. High output voltages from this equipment can cause serious injury or death.
    e. Always avoid hot mufflers, exhaust manifolds, and engine parts. They all can cause severe burns instantly.
    f. 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.
    g. Always make sure unit is disabled before placing your hands anywhere near the fan, belts, alternator or water hoses.

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.

SPECIFICATIONS

MODEL	DR12K2-A	DR12K2-D	DR12K2-J	DR12K2-L
Generator				
Wattage	12000	12000	12000	12000
Volts	120/240	120/208	120/240	277/480
Phase	single	three	three	three
PF	1.0	.80	.80	.80
AMPs	50.0	41.7	36.1	18.0
Hertz	60	60	60	60

Engine	
Model	Kohler KDW1003
Fuel Capacity-	32 gallons
Starting System	12 Volt Auto Start
Muffler	Standard
Stop System	Auto/Emergency
Owner Must Provide	
Fuel	ASTM D-975 - 1D or 2D EN590 or equivalent See engine manual for additional fuel types & specification
Oil Type	5W-40 SJ/CF 4
See engine manual for additional oil information.	
Oil Capacity	2.5 Quarts
Cooling System	50/50 Mix

INTRODUCTION AND DESCRIPTION

PRODUCT DESCRIPTION:

This engine-generator set is designed for unattended remote start operation. It can be operated as part of a fully automatic standby power system or independently as a local start unit in a prime power system. The engine-generator set is fully tested at the factory prior to shipment to insure proper operation of each individual component as well as the total system's performance and reliability.

The engine generator set consists of a multi-cylinder, liquid cooled engine nominally operating at 3600 rpm. The generator frequency regulation is maintained by the engine governor to within +/- 1.5 hertz (cps), from no load to rated load for standard mechanical governors The generator is a single bearing, direct drive, rotating field brushless design. The generator is connected to the engine flywheel via flexible drive disks. The Generator Set is skid mounted with isolation mounts between the engine and base on all units.

Unit Orientation Note: All references used in this manual for unit familiarization, access and component locations on the Generator Set are oriented from a TOP (plan) VIEW with engine at the FRONT and generator to the REAR.

A customer supplied 12 Volt battery is required to complete the installation. The battery should be a BCI group 24 battery with at least 650 CCA

The engine is controlled and Generator Set operation is monitored for safe operation by a programmable microprocessor based Electronic Engine Control Module (ECM) with an LCD digital display. The Generator Set ECM control is mounted on a vertical pedestal on the right side of the generator. The ECM is programmed with a cycle cranking sequence - 3 cycles of 15 seconds on / 15 seconds off, and a 5 minute cool down delay. The cool down delay can be changed in the field from 0 to 30 minutes by your dealer. Other features, timing cycles, set points and signal output capabilities are possible. Consult factory for procedure and passwords.

ENGINE:

This manual covers specific operation of the combined engine generator set. Refer to engine operating and maintenance instructions for specific instruction on the care and maintenance of the engine. Oil and fuel requirements along with maintenance schedules and engine warranty information are provided by the individual engine manufactures.

**** CAUTION ****

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

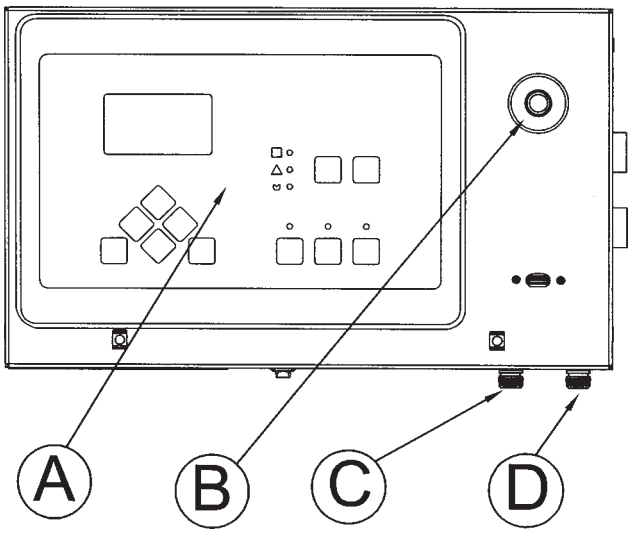
The engine manufacturer has established an excellent worldwide engine service organization; engine service is available from a nearby authorized dealer or distributor; check the Yellow Pages of the telephone directory under “engines,” or ask the dealer from whom you purchased the power plant.

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. Units should not be operated in ambient temperature greater than 125 degrees Fahrenheit.

GENERATOR:

This generator set uses a totally brushless, AVR (Auto-Voltage Regulator) controlled, 4 wire or 12 wire generator end. The generator converts rotational mechanical energy into electrical energy. This unit is equipped with a generator manufactured by Stamford. Each generator ‘end’ has its own data tag. The unique serial number is stamped on the data plate and into the upper section of the mounting adapter of the generator frame.

ENGINE CONTROL PANEL LAYOUT



A - DGC-2020 Digital Gen-Set Control. See Explanation below.

B - **Emergency Stop Switch** - When depressed this switch will disconnect all the 12 volt power to the DGC-2020 shutting the engine down. The lamp in the emergency stop switch will light up when the switch is depressed showing that the power to the panel has been disconnected.

C - DC Control Circuit Fuse. The 10 amp DC Circuit Fuse protects the 12 volt circuits and engine wiring harness against faults in wiring or control equipment. The fuse also prevents a discharge of the battery due to a circuit fault. (Replacement AGC-10A-250V)

D - DGC-2020 Fuse. This 3 amp DC fuse protects the DGC-2020 printed circuit board. (Replacement AGC-3A-250V)

ENGINE CONTROL MODULE (DGC-2020)

Note: A CD was shipped with this unit to support the DGC-2020. The CD contains the complete operators manual and the software to reprogram the DGC-2020 if the need should ever arise. Please store it in a safe place.

The DGC-2020 Digital Generator Set Controller provides integrated engine-generator set control, protection, and metering in a single package. Microprocessor based technology allows for exact measurement, set point adjustment, and timing functions. Front panel controls and indicators enable quick and simple DGC-2020 operation. Basler Electric communication software (BESTCOMSPlus) allows units to be easily customized for each application. A wide temperature-range liquid crystal display (LCD) with backlighting can be viewed under a variety of ambient light and temperature conditions.

FEATURES

DGC-2020 Digital Generator Set Controllers have the following features:

- Local and Remote Generator Control
- Engine and Generator Protection
- Programmable Analog Engine Senders
- Programmable Logic
- Automatic Transfer Switch Control (Mains Failure)
- Integrated RS485 interface
- Auto Synchronizing

DGC-2020 Digital Generator Set Controllers perform the following functions:

Generator Protection and Metering

Generator protection guards against over voltage, under voltage, under frequency, and over frequency. Over current and phase imbalance protection is available as an option at the time of manufacture. Each generator protection function has an adjustable pickup and time delay setting. Metered generator parameters include voltage, current, real power (watts), apparent power (VA), and power factor (PF).

Engine Protection and Metering

Engine protection features include oil pressure and coolant temperature monitoring, over crank protection, ECU specific protection elements, and diagnostic reporting.

Metered engine parameters include oil pressure, coolant temperature, battery voltage, speed, engine load, coolant level (from ECU), ECU specific parameters, and run-time statistics.

All metering functions are displayed on the liquid crystal display. The front panel display begins with the SUMMARY SCREEN. Pressing the *Right* arrow key will open the MAIN MENU screen. The MAIN MENU screen consists of METERING and SETTINGS

Summary Screen

Summary screen can be set to standard or scrolling. When set to standard, only the following are displayed:

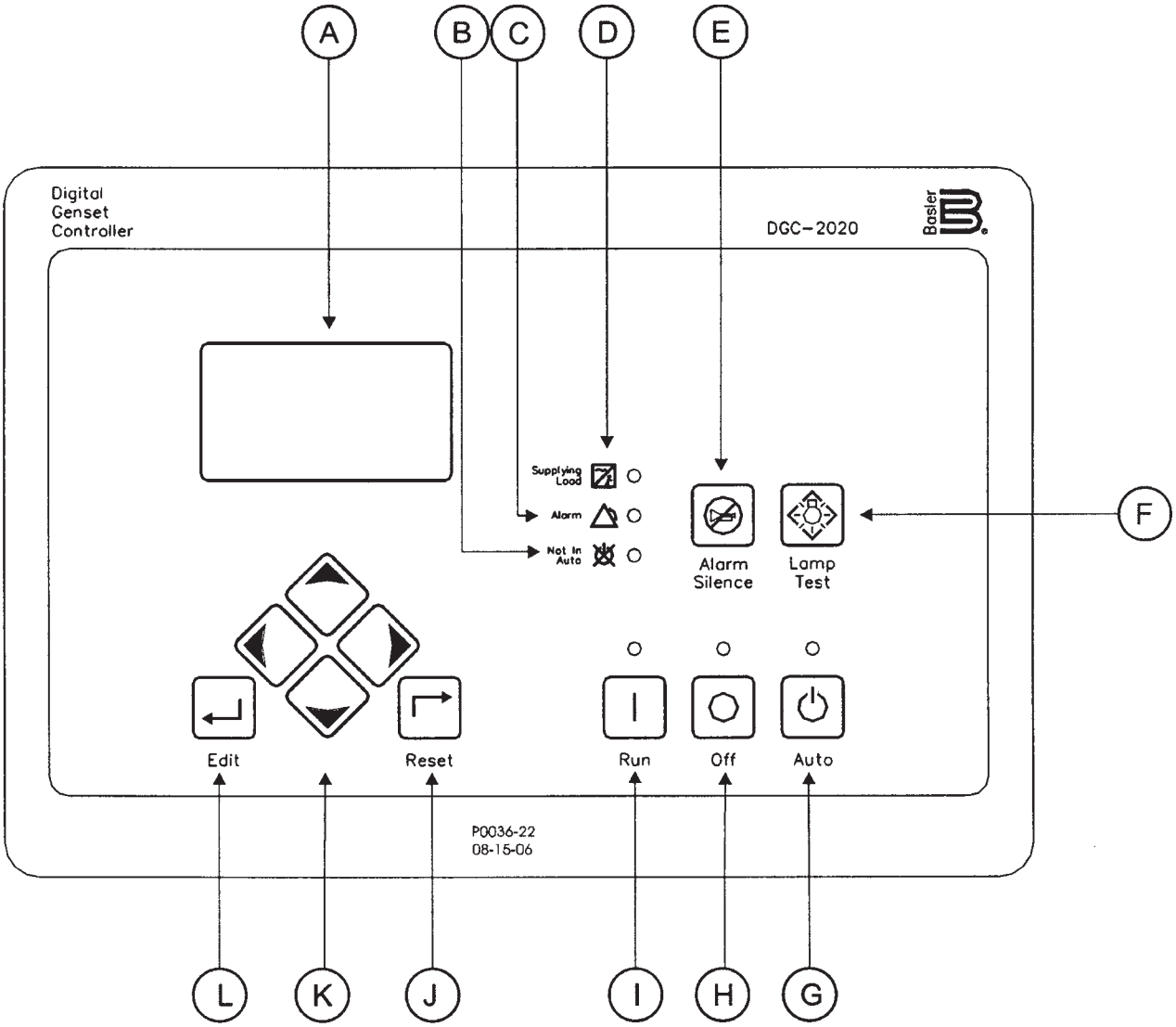
- Generator Voltage
- Generator Amperage
- Generator Phase
- Generator Frequency
- Engine Oil Pressure
- Engine Coolant Temperature
- Engine Battery Voltage

DGC2020 LAYOUT

A - Liquid Crystal Display. The backlit, 64 by 128 pixel LCD serves as the local information source for metering, alarms, pre-alarms and protective functions. Display operation is maintained at -20°C. An optional LCD heater would maintain display operation at -40°C.

B - Not in Auto Indicator. This red LED lights when the DGC-2020 is not operating in Auto mode.

C - Alarm Indicator. This red LED lights continuously during alarm conditions and flashes during pre-alarm conditions.



D - Supplying Load Indicator. This green LED lights when the generator current is greater than EPS threshold current.

E - Alarm Silence Push-button. Pressing this button opens the relay output programmed as the horn output.

F - Lamp Test Push-button. Pressing this button tests the DGC-2020 indicators by exercising all LCD pixels and lighting all LEDs.

G - Auto Push-button and Mode Indicator. Pressing the Auto button places the DGC-2020 in Auto mode. The green Auto mode LED lights when Auto mode is active.

H - Off Push-button and Mode Indicator. Pressing this button places the DGC-2020 in Off mode. The red Off mode LED lights when the DGC-2020 is in Off mode.

I - Run Push-button and Mode Indicator. Pressing this button places the DGC-2020 in Run mode. The green Run mode LED lights when Run mode is active.

J - Reset Push-button. This button is pressed to cancel a settings editing session and discard any settings changes. When pressed, this button also resets the Breaker Management Pre-Alarms

K - Arrow Push-buttons. These four buttons are used to navigate through the front panel display menus and modify settings. The left- and right-arrow buttons are used to navigate through the menu levels. The right arrow button is pressed to move downward through the menu levels and the left-arrow button is pressed to move upward. Within a level, the up-arrow and down-arrow buttons are used to move among items within the menu level. Pressing the down-arrow button moves to items lower in the list. Pressing the up-arrow button moves to items higher in the list. During a settings editing session, the up- and down-arrow buttons are used to raise and lower the value of the selected setting.

L - Edit Push-button. Pressing this button starts an editing session and enables changes to the DGC-2020 settings. At the conclusion of an editing session, the Edit push-button is pressed again to save the setting changes.

DISPLAY OPERATION

The front panel display is used to make settings changes and display metering values. Refer to call-outs J, K, and L in text and illustration for information on changing settings through the front panel and navigating through the Metering screens. When the unit is first powered up, the clock may need to be reset. Editing the clock provides familiarity with the edit process. All programming changes from the front panel are accessed through the edit key to begin and exit the internal microprocessor program.

Log-in and Permissions

To Log-in, navigate to the SETTINGS, ENTER PASSWORD screen and press the Edit key. Use the Up/Down arrow keys to scroll through the characters. Use the Left/Right arrow keys to enter more characters. The Owner operator password is OP. Once the password has been entered, press the Edit key to Log-in. See the key stroke sequence listed below to access the control and enter the edit mode. A LOGOUT selection now appears in the list of SETTINGS. To logout, navigate to SETTINGS, LOGOUT and press the Edit key. The LOGOUT selection is removed from the SETTINGS list.

Sequence for setting (or resetting) the system clock -
1) Press 'K' (right key) for initial set or 'K' (left to back up, up / down) to choose menu item and time/date element to be changed.
2) Press 'L' (Edit) to access change mode to enter Password - OP as follows:
2a -Press K (up) to select O
2b -Press K (right) to move cursor
2c -Press K (up) to select P
2d -Press L (Edit) to begin change mode
3) Press 'K' (up or down) to choose year
4) Press 'L' (Edit) to enter year
5) Press 'K' (down) to select month mode
6) Press 'L' (Edit) to access month change
7) Press 'K' (up or down) to choose month
8) Press 'L' (Edit) to enter month
9) Repeat sequence 5 through 8 for day, minute, second and DST (Daylight Saving Time).
To finish clock setting, process - Press 'K' (left).

The microprocessor is still in the General Settings Edit mode. Pressing 'K' (left) a second time exits the Edit mode and allows full access to the View Only mode for all control settings and current status. Any items to be changed are accessed by pressing 'K' (up/down/right or left) to select, 'L' (Edit) to change and 'K' (left) to exit.

Communication

Standard DGC-2020 communication features include a **standard USB port and SAE J1939 interface**. **Optional communication features** include a dial-out modem and RS-485 communication port. The **USB communication** port can be used with BESTCOMSPlus software to quickly configure a DGC-2020 with the desired settings or retrieve metering values and event log records. The CANBus interface provides high-speed communication between the DGC-2020 and the engine control unit (ECU) on an electronically controlled engine. This interface provides access to oil pressure, coolant temperature, and engine speed data by reading these parameters directly from the ECU. When available, engine diagnostic data can also be accessed. The CANBus interface supports the following protocols:

• **SAE J1939 Protocol** - Oil pressure, coolant temperature, and engine speed data are received from the ECU. In addition, DTCs (Diagnostic Trouble Codes) help diagnose any engine or related failures. The engine DTCs are displayed on the front panel of the DGC-2020 and may be obtained using BESTCOMSPlus software.

• **MTU/MDEC Protocol** - A DGC-2020 connected to a generator Set equipped with an MTU MDEC receives Oil pressure, coolant temperature, and engine speed data from the engine controller, along with various alarms and pre-alarms that are MDEC specific. In addition, the DGC-2020 tracks and displays the active fault codes issued by the MDEC ECU.

Optional - Dial-Out Modem One of two optional, dial-out modems (a US version or international version) enables remote control, monitoring, and setting of the DGC-2020. When an alarm or pre-alarm condition occurs, the DGC-2020 can dial up to four telephone numbers, in sequence, until an answer is received and the condition is annunciated.

Optional - RS-485 Port The RS-485 communication port uses the Modbus communication protocol and enables remote control and monitoring of the DGC-2020 over a polled network

.RECEIVING THE GENERATOR

The generator set will generally be shipped by a commercial 'common freight carrier'. WINCO recommends units that are shipped by common carrier be delivered to a commercial dock to allow the generator set to be unloaded in a safe, efficient manner and to minimize handling damage to the unit.

Locate the packing slip on the side of the crate or request it from the truck driver. When receiving the unit take special care in examining the unit for damage during shipment. Avoid signing for the equipment until a full visual assessment and inventory have been made. Verify that you have received the right equipment and the proper amount by matching up the equipment to the packing list.

The keys for doors of the enclosed generators sets are typically attached to lifting eye on the base of the machine. These keys are matched to all the doors on the generator set housing.

UNPACKING INSTRUCTIONS:

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 consignee'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.

"Concealed Damage" is understood to mean damage to the con-

tents of a package which is not in evidence 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 fob factory, and only the consignee can legally file a claim.

****** 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.

UNPACKING:

(Not recommended until the unit 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. Owner's operators manual.
   b. Engine manufacturer's instruction manual.
   c. Battery hold-down brackets & hardware.
   d. Unit components or accessory items shipped loose for on-site installation.
   e. Optional accessories (i.e. remote annunciator)

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 standby generator line. It is the responsibility of the installing party to follow the lifting equipment's operators 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.

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 use during the manufacturing process and are designed for lifting of the individual Generator Set component.

WINPOWER has designed this generators set to be lifted at the corners with an appropriate lifting rig. The lifting points are located on the side rails of the generator base.

The generator set can be lifted with properly rated chains or cables along with the use of spreader bars. The spreader bars should be long enough so that the lift cables or chains do not come into contact with the generator housing. Use of commercially available lifting fixtures may also be used. Always be sure that the equipment is properly rated for the weight of the generator. Failure to do so can cause damage to the generator, injury to personnel or even death.

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******* WARNING *******
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NEVER - attempt to lift the fuel tank while filled with fuel. Sloshing of the fuel can cause a shift in the balance of the fuel tank, making for a DANGEROUS, unbalanced lifting load. If the generator was shipped on the fuel tank, use the lifting points located on the fuel tank to move the entire Generator Set into place. DO NOT place fuel in the tank prior to lifting.

INSTALLATION

****
******* WARNING *******
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PERSONAL INJURY - Before proceeding with the installation, be sure the DGC-2020 is in the "stop" position. Before proceeding with the installation, be sure the Generator MLCB (Main Line Circuit Breaker) is in the 'OFF' position and the unit starting battery is disconnected.

GENERAL INFORMATION

These engine/generator sets are 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 supplied by the installer. The factory weather enclosures are available as standard or 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.**

All versions must be bolted to a solid base for proper operation. A properly designed concrete pad is necessary for stationary operation. A substantial DOT certified trailer is required for mobile applications. Consult a qualified, licensed electrician or contractor to install and wire this Generator Set. **The installation must comply with all national, state, and local codes.**

Before beginning the installation process, recheck the voltage, phase and amperage rating of the Generator Set and ATS (Automatic Transfer Switch). 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 must be bolted solidly to a 4 to 6 inch thick cement pad. The engine-generator is mounted on a sub-frame which is attached with special shock mounts to the main frame. This allows the engine-generator free movement without affecting the control panel which is mounted on the main frame.

Do not shock mount the main frame. 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 five (5) feet of clearance on all sides. (Code NFPA 37)

FUEL INSTALLATION

Diesel Fuel - Always use a good commercial-grade diesel fuel. Diesel fuels that satisfy the specifications are suitable for use in this engine: ASTM D-975 -1D or 2D, EN590 or equivalent.

For cold weather operation you may use a specially blended fuel, see engine operator manual for details Always insure that the fuel is clean and free of all impurities.

The fuel supply should be as close to the engine as possible. This will reduce the installation cost of fuel runs and minimize line losses. The diesel fuel supply should be no more than 3 feet below the fuel inlet on the pump. If your fuel supply is lower than three feet you may have to install an additional lift pump to bring the fuel up to the mechanical fuel pump on the engine.

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.

INSTALLING THE FUEL LINE

Engine generator sets are properly adjusted before they leave the factory. Connecting a fuel supply with adequate supply volume is critical to reliable operation. Diesel units with optional base mounted fuel tanks are pre-plumbed to the mechanical fuel pump on the engine.

Open skid mounted Diesel units are often supplied with capped inlet and return lines. The use of a suitable customer supplied flexible fuel line is essential between the engine and fuel supply to provide a vibration break between your fuel supply and the engine.

The picture above shows the fuel inlet location.

The picture above shows the fuel return line connection location.

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***** WARNING *****
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FIRE DANGER - Connecting rigid fuel line (i.e. steel or copper line) directly to the inlet fuel filter or fuel pump may cause the fuel line to crack during operation creating a serious fire hazard.

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.

COOLANT

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. For additional information on engine coolant requirements see engine manufacturer's maintenance instructions.

INSTALLING THE BATTERY

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

In the following battery installation procedure, check to be sure the DGC-2020 is in the "stop" 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.

Installation and servicing of batteries must be performed or supervised only 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

CAUTION - NEVER dispose of a battery in a fire. The battery is capable of exploding.

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

* Always wear full eye protection and protective clothing
* Where electrolyte contacts the skin, wash off immediately with water
* If electrolyte contacts the eyes, flush thoroughly and immedi ately with water and seek immediate medical attention
* Spilled electrolyte is to be washed down with an acid neutral izing 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

* Never smoke when near batteries
* Do not cause a flame or spark in the battery area
* Always discharge static electricity from your body before touching batteries by first touching a grounded 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 (fluid) in the battery periodically to be sure it is above the plates. Never allow the battery to remain in a discharged condition.

CONNECTING THE BATTERY CHARGER

A two-stage battery tender is provided on this unit. The 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).

**** NOTICE ****

The trickle charger is not intended to recharge a battery which has become completely discharged. It is designed to produce just enough current to maintain a fully charged battery.

The battery tender receptacle is to be powered by a GFCI circuit and installed in accordance with the United States National Electric Code. It is suggested that this circuit be fused for 15 amps. A 120 volt duplex receptacle is mounted on the generator along the side engine control, and the battery charger has been plugged in to the receptacle.

A.C. ELECTRICAL

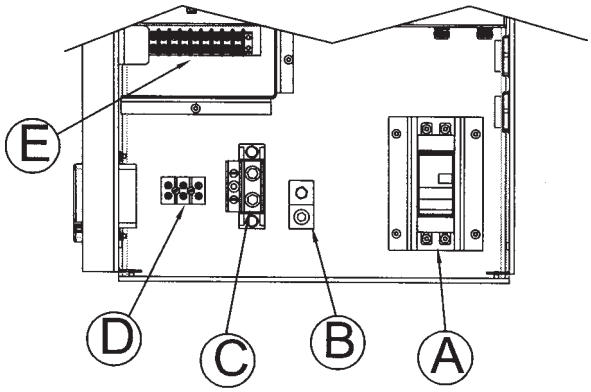
CONNECTIONS

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

Note: This symbol ⏚ always indicates ground where shown.

All wiring must be completed in accordance with the Nation Electric Code as well as any state or local codes.

A - Generator Circuit Breaker, The circuit breaker provides



overload protection for the generator. Your power feeds from the transfer switch will connect to the open lugs on the circuit breaker. The generator power feeds have already been wired into the other 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)

kW	Voltage	PH	Amp	Wire Capability	Lug Torque
12	120/240	1	50	#12 AWG -2/0 AWG	50 in lbs
12	120/208	3	40	#12 AWG -2/0 AWG	50 in lbs
12	120/240	3	35	#12 AWG -2/0 AWG	50 in lbs
12	277/480	3	20	#14 - #1/0 AWG	80 in lbs

Minimum Conductor Sizes between the Generator and the ATS. Based on wire type and temperature rating. Wire has been derated for 40° C ambient temperatures.

				Cu Conductor		Al Conductor	
			C/B	Wire Temperature Rating			
kW	Voltage	PH	Amp	75°C	90°C	75°C	90°C
12	120/240	1	50	#6 AWG	#8 AWG	#4 AWG	#6 AWG
12	120/208	3	40	#8 AWG	#8 AWG	#6 AWG	#8 AWG
12	120/240	3	35	#8 AWG	#8 AWG	#8 AWG	#8 AWG
12	277/480	3	20	#12AWG	#12AWG	#10AWG	#10AWG

For additional information on wire sizing refer to table 310-16 of the National Electrical Code ANSI/NFPA 70.Please refer to the circuit breaker installed on your unit for breaker lug capacities and proper torque specifications. Minimum wire size for CU or AL conductors is 6 AWG rated at 75 or 90 Degree C. **Wire amperages have been derated for 40° C ambient temperatures operation.**

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

B - 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 handle wire sizes #14 AWG to #2 AWG and should be torqued to 50 in. lbs.

C - Neutral Lugs, These neutral lugs are isolated from ground and provided for you to connect your neutral wire from the transfer switch to. The lugs will accommodate #12 AWG to 1/0 AWG and should be torqued to 75 in. lbs.

NOTE: THIS UNIT HAS BEEN SHIPPED WITH NO BOND BETWEEN GROUND AND POWER. NEC DOES REQUIRE THAT ONE BE ESTABLISHED SOME WHERE IN YOUR POWER DISTRIBUTION SYSTEM.

D - 120 Volt Terminal Block, This terminal block is provide for the 120 volt/ 15 amp feed from customers distrubution panel for the block heater and the trickle charger. Terminal will handle #12 AWG to #8 AWG and should be torqued to 50 in. lbs.

E - DC Interconnection - see DC installation section.

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

A main line circuit breaker has been provided inside the generator housing. During all wiring installations make sure the breaker is in the OFF position and the generator operation switch is in the OFF position.

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

GROUNDING

A grounding lug has been provided on the engine generator set and the generator set must be properly grounded to good earth ground. Generally a 8 foot copper rod driven into the earth will provide a proper earth ground.

D.C. ELECTRICAL

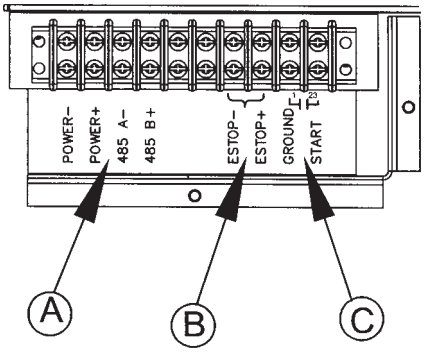
CONNECTIONS

All DC connections are completed in the small box located below the engine control. All DC connection **must be run in separate conduit.** You can not mix AC and DC leads in the same conduit.

CONNECTION BOX TERMINALS

Wire size requirements for each of the connections may vary but terminal lugs should be used for all connections. Torque spec for terminal lugs is 9 in. lbs.

A - 485 B+, 485 B-, POWER + and POWER - are the intercon-



nection leads for a Basler "RDP-110 REMOTE DISPLAY PANEL" (remote annunciator). Minimum wire size is 20 AWG, you can use two twisted pair up to 4000 feet. (*This feature meets the annunciation requirements in applications requiring NFPA110 level one protection.)*

B - ESTOP- & ESTOP+ - Remote Emergency Stop terminals. These two terminals are shipped with a jumper installed. If your application requires the installation of a Remote Emergency Stop switch, remove the jumper and wire your switch to these terminals. **This unit will not start and run without either the jumper installed or a remote N/C switch installed.**

C - GROUND & START This is a battery negative connection point and your remote start connection. A relay closure betweeen the **GROUND & START** terminals activates the auto start sequence in the DGC-2020 engine control. This closure must be a dry contact that **closes** when the generator is required to start and stays closed until you want the generator to shut off.

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

Be sure Engine Generator is in the "OFF" position before you make any DC interconnections.

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

INITIAL START UP

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

ENGINE DAMAGE - DO NOT OPERATE THIS ENGINE AT OVER 70% LOAD FOR THE FIRST 50 HOURS. *Doing so may cause excessive engine wear. See the engine operator manual for additional information.*

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

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.*

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

1. Engine oil. Fill as required with proper grade/qty.
2. Engine coolant. Fill as required with proper mixture.
3. Unit mounting base properly bolted down.
4. Clearance for service and maintenance on all sides.
5. Proper fuel line material and size.
6. All fuel line connections tight.
7. Battery connections clean and tight.
8. Battery fully charged.
9. All AC and DC wiring installed and properly protected.

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

PROCEDURE

Depress the "RUN" push-button on the front of the DGC. The engine-generator will crank and start automatically. If the engine fails to start, depress the "stop" push-button and correct the trouble before proceeding.

With the engine running smoothly check the no load voltage and frequency on the digital display. The voltage should be 230 volts line to line and a frequency should read 49.5 To 50.5 hertz (Hz).

If you have the proper voltage at the generator the next step is to check the voltage at the generator circuit breaker and you load distribution system to insure you are getting the same voltage at all locations. This should be done before any load is applied.

**** Notice ****
If for any reason during the check out procedure the voltage and frequency are not correct, depress the "OFF" push-button and correct the trouble before proceeding.

After verifying that the voltage and frequency are correct, depress the "OFF" push-button. The unit should shut off with no time delay. You are now ready to test the automatic start function.

To test the Automatic Start function you will need to complete a relay closure between Wire # 23 and Wire #1 in the customer

connection box. This can be done either with a simple switch closure or by using some sensing device that will provide a dry relay closure when the generator is required to run.

TROUBLESHOOTING TABLES

Note: Before doing any troubleshooting, check the digital display on the DGC-2020. Normally it will tell why the unit has failed. This will shorten your troubleshooting time and in many cases prevent the replacement of parts that may not be defective.

UNIT WILL NOT CRANK WHEN THE POWER FAILS.

1. Digital Genset Controller not in "AUTO".
2. Transfer control switch not in "AUTOMATIC" position.
3. Incorrect wiring between start relay and generator.
4. Defective remote start relay.
5. Fuse (s) blown in the Digital Genset Controller.
6. Defective Digital Genset Controller.
7. Loose or dirty battery terminals.
8. Defective starter.
9. Defective start solenoid.
10. Dead Battery.

ENGINE WILL NOT CRANK WITH GENERATOR RUN PUSH-BUTTON DEPRESSED.

1. Battery dead.
2. Blown DC fuses on the Digital Genset Controller tripped.
3. Defective Digital Genset Controller.
4. Loose or dirty battery terminals.
5. Defective starter.
6. Defective start solenoid.
7. Locked up engine genset.

ENGINE CRANKS BUT WILL NOT START

1. Improper fuel delivery to the unit.
2. Fuel supply shut off.
3. Fuel tank empty.
4. Air in the injection system.
5. Engine solenoid has not opened.

ENGINE STARTS AND THEN STOPS AND ALARM LIGHT COMES ON

1. Engine is low on oil.
2. Engine has high water temperature.
3. Engine has overspeed.
4. Engine has gone into overcrank.
5. No output from AC generator.
6. Loss of speed signal.
7. Loss of run signal.

ENGINE WILL NOT COME UP TO SPEED AFTER IT STARTS

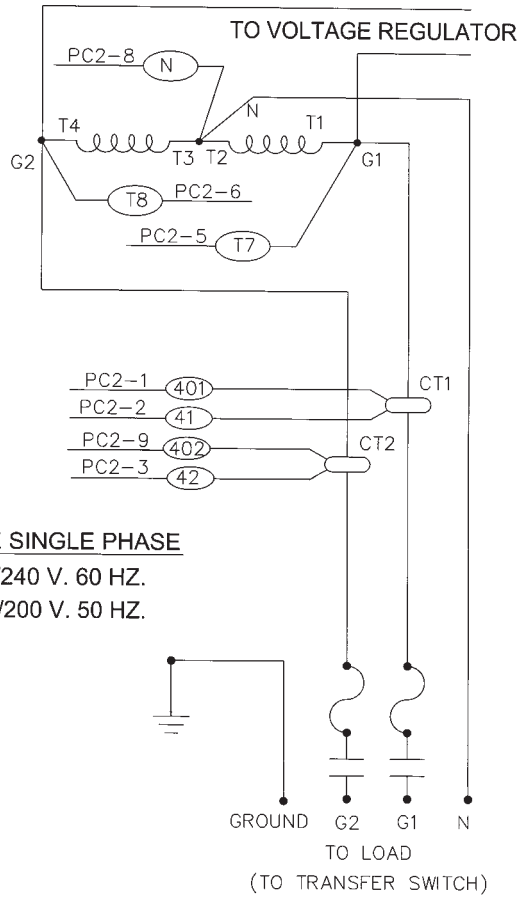
1. Insufficient fuel volume getting to the unit.
   a. Too small of fuel line.
   b. Fuel racks not opened properly.
2. Governor is defective.
3. AC short in generator components.

NO AC OUTPUT FROM GENERATOR

1. Defective diode.
2. Defective voltage regulator.
3. Defective rotor.
4. Defective stator.
5. Defective exciter rotor.
6. Defective exciter stator.
7. AC short in the output leads.
8. Defective field circuit breaker.
9. Wiring error.

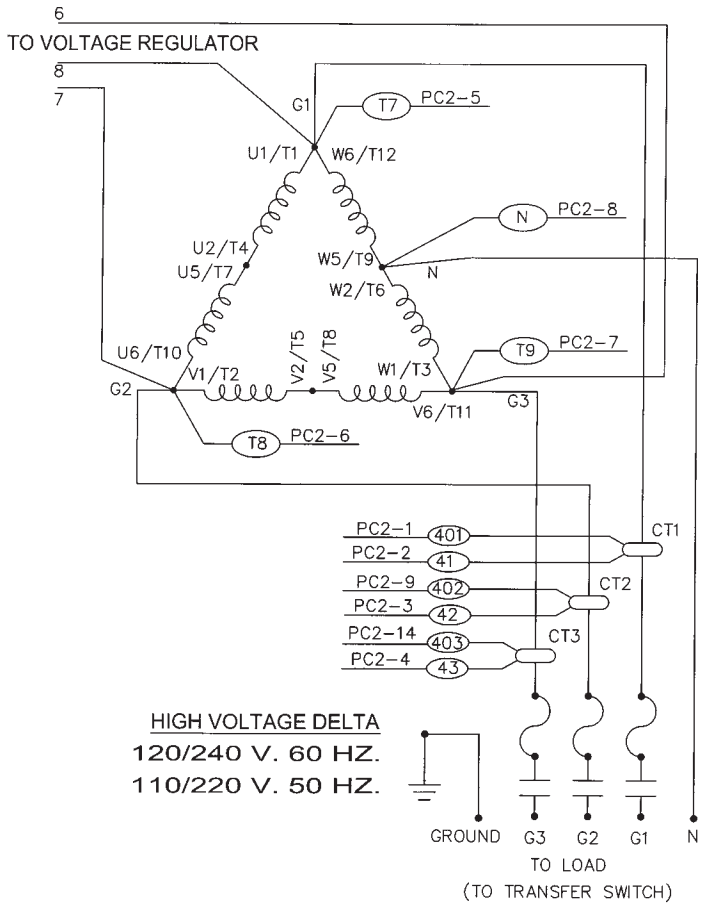
THREE PHASE AC WIRING - DELTA
SINGLE PHASE AC WIRING

SINGLE PHASE
120/240 VOLTS



HIGH VOLTAGE SINGLE PHASE
120/208-139/240 V. 60 HZ.
100/173- 115/200 V. 50 HZ.

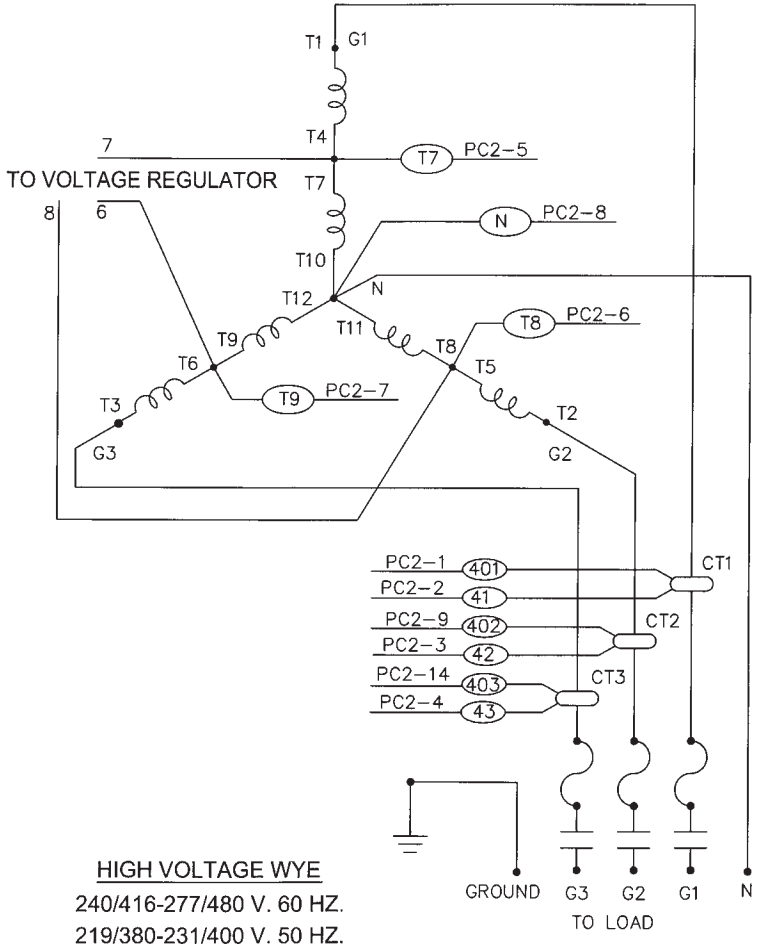
THREE PHASE -DELTA
120/240 VOLTS



HIGH VOLTAGE DELTA
120/240 V. 60 HZ.
110/220 V. 50 HZ.

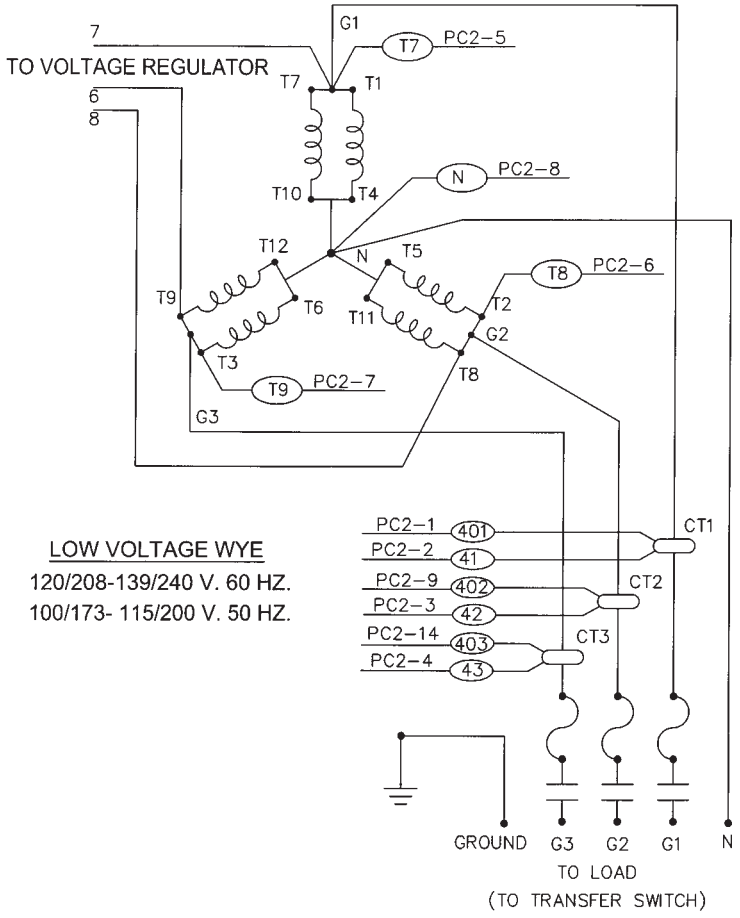
THREE PHASE AC WIRING
HIGH AND LOW WYE

THREE PHASE-HIGH WYE
277/480 VOLTS



HIGH VOLTAGE WYE
240/416-277/480 V. 60 HZ.
219/380-231/400 V. 50 HZ.

THREE PHASE-LOW WYE
120/208 VOLTS



LOW VOLTAGE WYE
120/208-139/240 V. 60 HZ.
100/173- 115/200 V. 50 HZ.

Limited Warranty

WINPOWER, Incorporated warrants to the original purchaser for 12 months or 1000 hours which ever occurs first, that goods manufactured or supplied by it will be free from defects in workmanship and material, provided such goods are installed, operated and maintained in accordance with WINPOWER written instructions.

WINPOWER's sole liability, and Purchaser's sole remedy for a failure under this warranty, shall be limited to the repair of the product. At WINPOWER's option, material found to be defective in material or workmanship under normal use and service will be repaired or replaced. For warranty service, return the product within 12 months or 1000 hours which ever occurs first from the date of purchase, transportation charges prepaid, to your nearest WINPOWER Authorized Service Center or to WINPOWER, Inc. at Le Center Minnesota.

THERE IS NO OTHER EXPRESS WARRANTY.

To the extent permitted by law, any and all warranties, including those of merchantability and fitness for a particular purpose, are limited to 12 months or 1000 hours which ever accurs first, from date of purchase. In no event is WINPOWER liable for incidental or consequential damages.

Note: Some states do not allow limitation on the duration of implied warranty and some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations may not apply in every instance. This warranty gives you specific legal rights which may vary from state to state.

WINPOWER reserves the right to change or improve its products without incurring any obligations to make such changes or improvement on products purchased previously.

EXCLUSIONS:

WINPOWER does not warrant Engines. Engines are covered exclusively by the warranties of their respective manufacturers, see enclosed warranties.

WINPOWER does not warrant Batteries, or Other Component Parts that are warranted by their respective manufacturers.

WINPOWER does not warrant modifications or alterations which were not made by WINPOWER, Inc.

WINPOWER does not warrant products which have been subjected to misuse and/or negligence or have been involved in an accident.

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