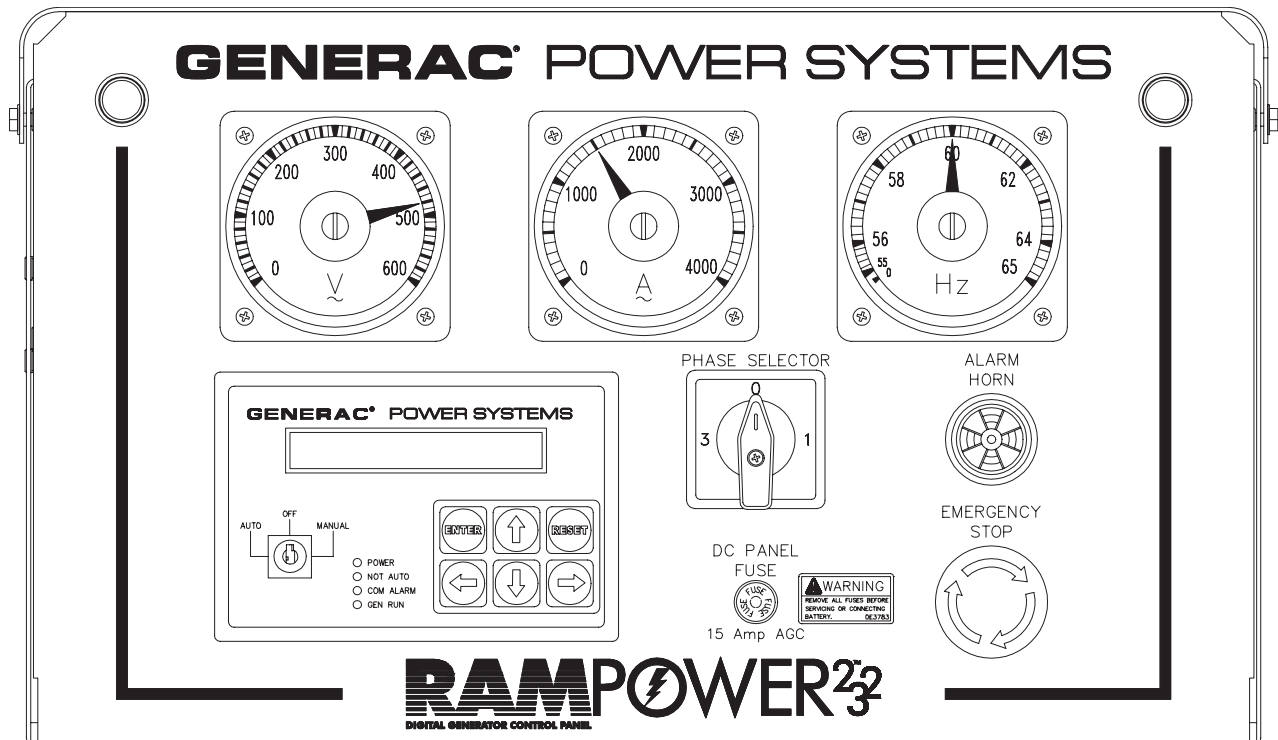


GENERAC®

POWER SYSTEMS, INC.

Operator's Manual

"E-Plus" Option Control Panel



This manual should remain with the unit.



SAVE THESE INSTRUCTIONS – *The manufacturer suggests that these rules for safe operation be copied and posted in potential hazard areas. Safety should be stressed to all operators and potential operators of this equipment.*

Study these SAFETY RULES carefully before installing, operating or servicing this equipment. Become familiar with this manual and all literature pertaining to your generator set and related equipment. This equipment can operate safely, efficiently and reliably only if it is properly installed, operated and maintained. Many accidents are caused by failing to follow simple and fundamental rules or precautions.

Generac cannot possibly anticipate every possible circumstance that might involve a hazard. The warnings in this manual, and on tags and decals affixed to your equipment are, therefore, not all-inclusive. If you use a procedure, work method or operating technique Generac does not specifically recommend, you must satisfy yourself that it is safe for you and others. You also must make sure the procedure, work method or operating technique that you choose does not render the equipment unsafe.

GENERAL HAZARDS

- For safety reasons, Generac recommends that this equipment be installed and serviced by a Generac Authorized Service Dealer or other competent, qualified electrician or installation technician who is familiar with applicable codes, standards and regulations. The operator also must comply with all such codes, standards and regulations.
- When working on this equipment, remain alert at all times. Never work on the equipment when physically or mentally fatigued.
- Inspect the equipment regularly, and promptly repair or replace all worn, damaged or defective parts using only factory-approved parts.
- Before performing any maintenance on the generator or any related equipment, disable the generator to prevent accidental start-up. Remove the control panel fuse and then disconnect the battery cables by removing the one indicated by a NEGATIVE, NEG or (–) first. To re-enable the generator, reconnect the battery cables connecting the one indicated by a NEGATIVE, NEG or (–) last, then re-install the control panel fuse.
- Do not handle any kind of electrical device while standing in water, while barefoot, or while hands or feet are wet. DANGEROUS ELECTRICAL SHOCK MAY RESULT.
- If people must stand on metal or concrete while installing, operating, servicing, adjusting or repairing this equipment, place insulative mats over a dry wooden platform. Work on the equipment only while standing on such insulative mats.
- Wire gauge sizes of electrical wiring, cables and cord sets must be adequate to handle the maximum electrical current (ampacity) to which they will be subjected.
- Before installing or servicing this equipment, make sure that all power voltage supplies are positively TURNED OFF at their source. Failure to do so will result in hazardous and possibly fatal electrical shock.
- When installed with an automatic transfer switch, the generator may crank and start anytime without warning. To prevent injuries caused by sudden start-up, disable the generator's automatic start circuit before working on or around the unit. Then, place a "Do Not Operate" tag on the generator control panel and on the transfer switch.
- In case of accident caused by electric shock, immediately shut down the source of electrical power. If this is not possible, attempt to free the victim from the live conductor. AVOID DIRECT CONTACT WITH THE VICTIM. Use a nonconducting implement, such as a rope or board, to free the victim from the live conductor. If the victim is unconscious, apply first aid and get immediate medical help.
- Never wear jewelry when working on this equipment. Jewelry can conduct electricity resulting in electric shock, or may get caught in moving components causing injury.

ELECTRICAL HAZARDS

- Generators produce dangerous electrical voltages and can cause fatal electrical shock. Avoid contact with bare wires, terminals, connections, etc., while the generator and related equipment are running. Ensure all appropriate covers, guards and barriers are in place before operating the equipment. If work must be done around an operating unit, stand on an insulated, dry surface to reduce shock hazard.

FIRE HAZARDS

- For fire safety, the generator and related equipment must be installed and maintained properly. Installation always must comply with applicable codes, standards, laws and regulations. Adhere strictly to local, state and national electrical and building codes. Comply with regulations the Occupational Safety and Health Administration (OSHA) has established. Also, ensure that the equipment is installed in accordance with the manufacturer's instructions and recommendations. Following proper installation, do nothing that might alter a safe installation and render the unit in noncompliance with the aforementioned codes, standards, laws and regulations.

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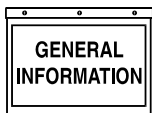
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AUTHORIZED SERVICE DEALER LOCATION

To locate the nearest GENERAC AUTHORIZED
SERVICE DEALER, please call this number:

1-800-333-1322

DEALER LOCATION INFORMATION
CAN BE OBTAINED AT THIS NUMBER.



OVERVIEW

The “E” option control panel is a programmable engine control and monitoring system. It allows the user to customize the generator starting and running sequence, monitor engine parameters and configure the alarms. This can be done either through its own control module, featuring liquid-crystal display (LCD) and keypad, or using a PC and RS232 serial communications. The module includes user programmable inputs and outputs that allow it to be tailored to a vast range of applications. All of the setup information is stored in nonvolatile (permanent) memory.

ENGINE CONTROL

The module has a three-position selector switch that selects between “Auto” mode, “Off” and “Manual” start mode. When the switch is in the OFF position, the generator will not start, and it will stop if it is running. When the switch is turned to MANUAL, the generator will start immediately and will continue to run until the switch is turned to the OFF position or a shutdown alarm is activated. With the switch in the AUTO position, the generator will wait for either the remote start contacts to close or for a start command to be sent from the serial link. The generator will run until the remote start contacts open, a stop command is sent down the serial link, a shutdown alarm is activated or the switch is turned to the OFF position. The remote start contacts always will have priority over the serial link commands so that the serial link cannot stop the generator if the remote start contacts are closed. When GenLink[®] software, which may be obtained from a Generac Authorized Service Dealer, is connected to the E-Plus panel via modem, the panel will monitor the connection to ensure that the line has not dropped. If the E-Plus panel detects that the line has been dropped, it will disconnect the modem so that it is ready for another incoming call. If the generator had been started via the modem connection, then it will be stopped immediately unless the remote start contacts are closed or the generator is in manual. However, if the GenLink[®] software disconnected cleanly (as a result of a user command) with the generator running, then the generator will continue to run for another three hours unless it receives a stop command.

When a start command is received, the engine preheat will be engaged, if it is selected. The user can program the preheat to engage for a programmable time before engaging the starter motor, to engage while the engine is attempting to start, or to do both. In order to protect the engine from trying to start while it is already running (if the rpm sensor is damaged), an alarm is generated if there is oil pressure when the start command is sent. An alarm also is generated if there is a voltage output from the generator but the rpm sensor detects zero engine speed.

The user can program the length of time that the starter motor is engaged during a start attempt. After the first attempt, the generator will pause for a programmable length of time before the next attempt. The number of attempts also is programmable, after which the failed to start alarm is activated.

The user can program a warm-up time that is active after the generator has started. This could be used in conjunction with a programmable relay output to inhibit the transfer switch from applying load until the generator is ready. The warm-up time can be set to zero if this function is not required. This timer is separate from the alarm hold off timer, which allows the generator to run for a time before certain alarms (such as low oil pressure) are active.

If the generator is in the AUTO mode and a stop command is received, a programmable cool-down timer can be used to keep the generator running with no load for a fixed time. This also can work in conjunction with a relay output to inhibit the transfer switch. If the timer is set to zero, this function is disabled. If the selector switch is turned to OFF, then the generator will stop immediately without waiting for the cool-down time.

Certain alarm functions are designated as shutdown alarms. These alarms will stop the generator and inhibit it from starting until the alarm condition has cleared and the alarm has been reset.

E-PLUS OPTION CONTROL MODULE

◆ OVERVIEW

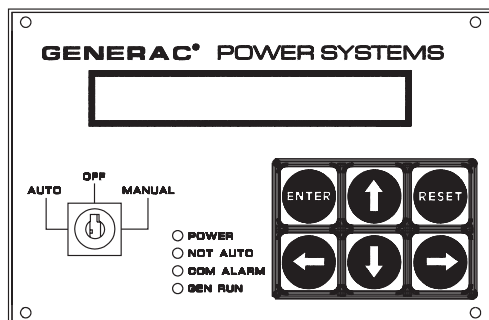
The LCD on the front of the module (Figure 1) features a 24-character by two-line display screen that will show one of seven pages. There is a keypad with six keys that are used for operating the display and selecting the various pages. A key activated switch allows the user to select whether the generator is in the “Auto” mode, “Off” mode or “Manual” run mode. Four LEDs indicate the following conditions:

- “Power” – Battery power is OK.
- “Not Auto” – The generator is not in the automatic mode.
- “Com Alarm” – A common alarm condition has occurred.
- “Gen Run” – The generator is running.

NOTE:

The “Power” LED will go out immediately if the battery voltage dips below the alarm limit, but the alarm will not be triggered unless the voltage is low for more than five minutes.

Figure 1 – Control Module Layout



◆ KEYPAD

The keypad consists of six keys labeled as follows: ↑ (up), ↓ (down), ← (left), → (right), Enter, and Reset. The left and right arrow keys are used to select the different pages on the display. The up and down arrow keys are used to scroll between options within a page. They also are used for selecting characters when the user is entering messages or parameters for the alarms. The left and right arrow keys move the cursor when the user is entering data. The enter key takes the user into a page on the display to change data (when applicable) and also accepts data that has been entered. It also is used to accept an alarm. The reset key ignores data that has been entered and returns the original value. It also is used to return from the parameter entry mode once the user has finished changing the data, and to reset any latched alarms that have cleared.

◆ DISPLAY

The display is organized into a series of pages, each page displays information about the status of the generator. For example, the “Alarm Status Message Page” displays the highest priority current alarm or status condition. The user will be able to scroll between the pages using the left and right arrow keys. Certain actions also cause the display to change pages, e.g., when an alarm becomes active, the display automatically will go to the alarm status page and display the alarm message.

The back light for the display is normally off. If the user presses any key, the back light will come on automatically and remain on for five minutes after the last key was pressed. It also will come on if any status message is current, which means the display will switch to the alarm status page. The back light will flash when an alarm or shutdown message is active, and the audible alarm will sound.

When the display is showing certain pages, the user is able to scroll between relevant items within the page using the up and down arrow keys. For example, if the display is showing the “Alarm Log Page,” the user can use the up and down arrow keys to scroll between the entries on the alarm log. A description of each page is given below.

✧ Software Version Page

This page displays the software revision. Pressing the enter key in this page will perform a display and LED test.

✧ Generator Command Page

This page displays the command sent to the generator. The possible commands are as follows:

- Generator switched off
- Generator in manual mode
- Generator in auto mode – stop command
- Generator in auto mode – remote run command
- Generator in auto mode – serial link run command

✧ Generator Status Page

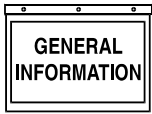
This page displays the current status of the generator. Options will be as follows:

- Stopped – ready to run
- Stopped – start inhibit active
- Pre-heating (with timer counting down)
- Attempting to start (with timer counting down and number of attempts)
- Pausing before start attempt (with timer counting down and number of attempts)
- Started – running up to speed
- Warming up
- Ready to accept load
- All alarms enabled
- Cooling down
- Stopping
- Stopped due to alarm

If the user has not pressed a key for some time, any change in status will cause this page to be displayed provided that there are no active alarms or status messages from other inputs. If an alarm condition occurs, the alarm status page will be displayed automatically.

✧ Alarm Status Message Page

This page displays alarm messages and programmable status messages. Messages are displayed according to priority, with the shutdown alarms having highest priority, and status messages having lowest priority.



If an alarm becomes active, the display will switch to this page and display the highest priority alarm message. The back light and alarm LED will flash, and the audible alarm will be activated. The user must press the enter key to accept the alarm, at which time the back light will be on continuously. If the alarm is non-latching, the alarm message will clear as soon as the condition is cleared. If the alarm is a latching alarm, then the user must press the reset key to clear the message. Once a message has cleared, the display will show the next priority alarm message.

After an alarm has been accepted, the user is able to scroll through other active alarm and message screens using the up and down arrow keys.

✦ **Alarm Log Page**

This page displays the last 50 alarm messages. When the user selects this page, it displays the latest alarm message. Pressing the up or down arrow keys will allow the user to scroll up and down the list of messages.

✦ **Instrumentation Page**

This page displays one of the analog signal values. Pressing the up or down arrow keys will scroll to other analog display screens.

✦ **Parameter Entry Page**

This page allows the user to modify the various set points and programmable options. See the “Programmable Parameters” section of this manual for more specific option information. The user must press the Enter key when this page is displayed and will then be prompted for a password. The password is a six-digit number and the default value is 000000. However, the user will be able to change the password. Digits will be selected using up and down arrow keys, and the cursor will be moved by the left and right arrow keys. When the user presses the Enter key, the password will be checked. If the password is correct, the display will show one of the data entry screens.

There are four parameter entry menus: “Engine Parameter,” “System Alarm,” “Digital I/O” and “Analog Input.” The user will be able to scroll through the various parameters in each menu using the up and down arrow keys. The left and right arrow keys are used to switch between the four menus. When a parameter that requires changing is displayed, the user presses the Enter key to enable data entry. A cursor will appear at the first character that can be altered. The user can then change the character using the up and down arrow keys. The user can move to the next character or previous character using the left and right arrow keys. Pressing the Enter key will accept the new setting. Pressing the Reset key will ignore the new setting.

If an alarm condition occurs when the user is entering data, the data will be ignored, and the display will show the alarm screen. If a status condition occurs when data is being entered, the display will not change.

Once the user has finished entering data by pressing the Enter key, pressing the Reset key will allow the user to select other pages using the left and right arrow keys.

ALARMS

All analog channels have alarms associated with them. There is also a coolant level alarm, an emergency stop alarm and eight user definable inputs that can be used to generate alarms. Alarms can be status messages, non-latching alarms, latching alarms or shutdown alarms. When a new alarm condition occurs, the alarm LED and the display back light will flash. Also, the alarm relay contacts will close (operating the audible alarm), and the display will show the alarm message. The user will be able to accept the alarm (turn off the audible alarm) from the keypad, and if the alarm condition has cleared, he or she also will be able to clear the alarm. Non-latching alarms will clear themselves if the alarm condition is no longer present. Latching alarms require the user to clear the alarm from the keypad even if the alarm condition is no longer present. Shutdown alarms are similar to latched alarms, but they also cause the generator to stop and will not allow it to start again until the key switch has been turned to the OFF position to reset the alarm. Status messages are similar to non-latching alarms except that they do not activate the alarm relay or the alarm LED and are not recorded on the alarm log.

Alarms can be always active, immediately active when the generator is commanded to run, or active after the hold off timer has expired. This timer delays the operation of certain alarms until a programmable time after the engine has started. Some alarms allow the user to define the type of alarm and when it is active.

The following chart is a summary of the alarms and the programmable options:

Alarm Message	Alarm Active Options	Alarm Type Options
Low Oil Pressure	Hold Off	Non-Latch
Oil Pressure Shutdown	Hold Off	Shutdown
High Coolant Temp	Hold Off	Non-Latch
Coolant Temp Shutdown	Hold Off	Shutdown
Low Coolant Temp	Always	Non-Latch
High Oil Temp	Immediate, Hold Off, Disabled	Non-Latch
Oil Temp Shutdown	Immediate, Hold Off, Disabled	Shutdown
Low Battery Voltage*	Always	Non-Latch
Overspeed Shutdown	Immediate	Shutdown
Underspeed	Hold Off	Status, Non-Latch, Latch, or Shutdown
Failed to Start	Immediate	Shutdown
Over Voltage	Hold Off	Status, Non-Latch, Latch, or Shutdown
Under Voltage	Hold Off	Status, Non-Latch, Latch, or Shutdown
Over Frequency	Hold Off	Status, Non-Latch, Latch, or Shutdown
Under Frequency	Hold Off	Status, Non-Latch, Latch, or Shutdown
High Fuel Level	Always, Disabled	Non-Latch
Low Fuel Level	Always, Disabled	Non-Latch
Low Fuel Shutdown	Always, Disabled	Shutdown
Analog Input Menu**	All Options Available	All Options Available
Low Coolant Level	Hold Off	Shutdown
Emergency Stop	Always	Shutdown
RPM Sensor Failure	Always	Shutdown
Start Inhibit : Oil Press.	Immediate	Shutdown
Oil Press Sense Fault	Always	Shutdown
Oil Temp Sense Fault	Always, Disabled	Shutdown
Coolant Temp Sense Fault	Always	Shutdown
Digital I/O Menu***	All Options Available	All Options Available
High Battery Voltage	Always	Non-Latch

* Battery voltage must be below alarm limit for 5 minutes to trigger alarm.

** Each user analog input channel has a high and low alarm.

*** Each user digital input can be programmed to trigger an alarm on high or low level.

ALARM PROCESSING

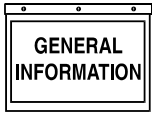
◆ INPUT ALARM FUNCTIONS

The E-Plus option panel will monitor the status of the analog and digital inputs, and generate alarm messages as required. Digital alarms and user-defined analog alarms are fully programmable. The user is able to select the type of alarm, the state of the input that will trigger the alarm, and the alarm message when it is active. The configurations are defined as follows:

◇ Alarm Active

The user is able to select when the alarm is active. The options will be as follows:

- **Disabled:** If this option is selected, the alarm is disabled and has no effect.
- **Always:** With this option selected, the alarm is active regardless of the state of the generator.
- **Immediate:** In this mode, the alarm is not active when the generator is stationary. It becomes active as soon as the generator starts to crank and remains active until the generator stops.
- **Hold Off:** This option waits until a preset time after the generator is running before becoming active. The hold off time can be set by the user. Note that the hold off time is common to all alarms.



◆ ALARM TYPE

◇ Status

This type of alarm will display a message on the screen. The message will not be logged. This is the lowest priority of alarm types.

◇ Warning – Non-Latched

This type of warning will activate the audible alarm, and flash the alarm LED and display back light. The associated message will be displayed on the screen. When the user accepts the warning (by pressing the Enter key), the back light will stop flashing, and the alarm LED will be on continuously. The message will be displayed on the alarm screen, but the user will be able to scroll through other screens. The LED and message will clear when the warning condition clears. This type of warning is logged.

◇ Alarm – Latched

This type of alarm will act similarly to the non-latched warning, except that the alarm does not clear when the alarm condition clears. When the alarm condition occurs, the audible alarm sounds, the LED and back light flash as before, and the user must accept the alarm to stop them. The alarm will continue to be displayed on the screen even after the alarm condition has cleared. The user must either press the Reset key or turn the key switch to the OFF position to clear the alarm after the alarm condition has cleared. This type of alarm is logged.

◇ Shutdown

This type of alarm will act similar to the latched alarm, but it also will stop the engine when the alarm condition occurs. It can be reset only by turning the key switch to the OFF position. All shutdown alarms are latching, and this type of alarm is logged.

◇ Alarm Status

This is the value at which the alarm is active. For analog alarms, it is a number corresponding to the alarm limit. Digital alarms are either “normally open” or “normally closed,” and an alarm is generated when the input is not in the normal state.

◇ Alarm Message

Each alarm will have a message associated with it. The analog alarm messages will be preset, and the digital alarm messages and user-defined analog messages will be entered via the keypad or the serial link.

◆ OTHER ALARMS

◇ Overcrank

This alarm is unlike other alarms as it is not associated with an analog or digital signal. The user is able to define the number of crank attempts, the length of each crank attempt and the rest time between cranks. After the last attempt has been made, an overcrank alarm will be generated. The user will then be unable to disable this alarm or alter the alarm message.

◇ Coolant Level

This alarm is generated by the coolant level detector. This device senses whether coolant is present or not. It has no user-definable level setting and is a shutdown alarm that is active after the hold off time. There are no user-definable parameters for this alarm.

PROGRAMMABLE PARAMETERS

The E-Plus option panel allows the user to configure various options to control the generator starting and stopping cycles, and the way that the alarms operate. Parameters are entered either from the control module or via the serial link. A description of the programmable parameters follows:

◆ PREHEAT ENABLED

This parameter determines how the preheat function works. The preheat can be fully disabled, enabled before starting only (for the duration of the preheat time), or before and during starting (for the duration of the preheat time and also while the starter is engaged). Note that if the user wishes to engage the preheat during starting, but not to have a preheat before starting, it is possible to set the preheat time to zero.

◆ PREHEAT TIME

When a start command is received, some engines require preheating before the generator attempts to start. When the preheat function is enabled, this parameter allows the user to determine the time that the preheat contact closes before activating the starter solenoid.

◆ START TIME

Once a start command has been received and the preheat time has expired (if enabled), the starter solenoid will be engaged. This parameter allows the user to determine how long the starter solenoid is engaged before the start attempt is regarded as having failed. If the generator does not start within this time, the generator will wait for a preset time before attempting to start again. The user also can program the number of start attempts the generator tries.

◆ PAUSE TIME

If the generator does not start within the programmed start time, it will pause before trying to start again. This parameter determines the length of that pause.

◆ START ATTEMPTS

This parameter determines the number of times that the generator tries to start. If the generator has not started after this number of attempts, an alarm is generated.

◆ STARTER DISENGAGE SPEED

While the starter is engaged, the engine speed is monitored. Once it reaches this value, the starter motor is disengaged, and the engine is regarded as having started.

◆ HOLD OFF TIME

Once the engine has started, some alarm functions (such as low oil pressure and under speed) are not activated immediately since the engine must be given time to reach a stable condition. This parameter determines the time that elapses before the hold off alarms are activated.

◆ COOL-DOWN TIME

It is sometimes desirable to run the generator for a given time with no load before stopping to allow the engine to cool down. This parameter determines the length of time that the generator continues to run after a stop command is sent in AUTO mode. Note that if the key switch is turned to the OFF position when the generator is running, it will stop immediately regardless of this setting. This value also should be set to zero if this function is controlled by the transfer switch.

◆ LOAD ACCEPT VOLTAGE AND FREQUENCY

Once the generator has started, the voltage and frequency will ramp up until they reach the values at which the generator can accept load. These parameters allow the user to set the values. The values should be set slightly lower than the nominal values to allow for a margin of error in the regulator and governor settings. Once the values have been reached, the warm-up timer is started.

◆ WARM-UP TIME

Some applications require that the generator is allowed to run for a given time before a load is applied. This parameter allows the user to set that time. Note that if this function is controlled elsewhere (e.g., within a transfer switch), this time should be set to zero. The generator is ready to accept load when this timer expires. This parameter can be assigned to an output relay.

◆ VOLTAGE SCALING FACTOR

The voltage scaling factor is used to scale the sensing voltage applied to CON4-4 and CON4-6.

On generators manufactured prior to the second quarter of 2000: Sensing voltage was measured from line-to-line, so the scaling factor was primarily set to 1.0. On generators manufactured starting the second quarter of 2000: Sensing voltage is measured from the frequency meter, in this case the scaling factor is used so the “E” panel displays line-to-line voltage. This scaling factor can also be used to “calibrate” the “E” panel display.

◆ FLYWHEEL TEETH

This parameter holds the number of flywheel teeth. This value is used to determine the engine speed from the magnetic pickup signal.

◆ USER-DEFINED OUTPUT FUNCTIONS

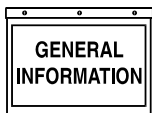
There are three user-defined outputs, and the preheat output also can be used as a user-defined output if the preheat function is disabled. Each output can be programmed to signal that an alarm is active, to indicate one specific alarm or input condition, to indicate the status of the key switch, or to indicate the current status of the generator. These relay contacts can be used to switch up to 30 volts AC or DC at 1 amp.

NOTE:

See the “Output Function Table” on Page 15 and the E-Plus panel Display Map on pages 18-19 for more detail.

Example: Program User output #2 to be active on any generator alarm shutdown.

1. Press the left or right arrow key until the display reads “Parameter Entry” and press ENTER.
2. Enter the password and press ENTER.
3. Use the left and right arrow keys to find the “Digital I/O Menu”.
4. Use the up and down arrow keys to locate “Output 2 Function”. The bottom line of the display will read the current setting.
5. Press ENTER. Use the up and down arrows to scroll through the list until “Generator Alarm Shutdown” is displayed in the bottom line.
6. Press the ENTER KEY. User Output #2 is now programmed to become active (relay energized) on any generator shutdown alarm.
7. Press RESET. This exits the programming mode and returns back to the parameter entry screen.



◆ ANALOG INPUT SCALING FACTORS

The two user-defined analog inputs can be scaled so that the display uses meaningful values rather than the voltage level at the input. The user enters the value to be displayed when the input voltage is zero and when it is at the maximum value. (An analog input to the E-Plus panel is a voltage sourced input with a zero to 10-volt range.) All alarm settings are based on this scaling, and the instrumentation display shows the input value based on this scaling too.

◆ ANALOG INPUT MESSAGES

This is a message up to 24 characters long that is displayed on the instrumentation display when the corresponding value is being shown.

◆ ANALOG INPUT ALARM MESSAGES

There is a user-definable message for each alarm condition on each analog input. This message is shown on the alarm display when the alarm condition is active and is stored in the alarm log.

◆ ANALOG INPUT ALARM SETTINGS

Each analog input has two alarms associated with it. One is activated when the input value is higher than the high set point, and the other is active when the input is lower than the low set point. The user also can define when the alarm is active (or disable it) and the severity of the alarm (from simply displaying a status message to shutting down the generator – see “Alarm Processing” on Page 5).

◆ DIGITAL INPUT ALARM SETTINGS

Each digital input also can generate an alarm. The user can program the alarm message, the input state that generates the alarm, when the alarm is active, and the alarm type. A digital input to the E-Plus panel is NOT a voltage sourced input, but a dry contact closure to ground. Voltage never should be sourced to a digital input. The signal options to a digital input are as follows:

- **Open:** This signal is an open circuit.
- **Closed:** This signal is a contact closure to ground.

***NOTE:**

For oil pressure, oil temperature and coolant temperature, the E-Plus panel will check to see if these inputs are either open circuit or short circuit which would indicate a faulty sender or faulty wiring to the sender.

If this type of fault condition exists the E-Plus panel will activate the alarm output and display one of the following message:

- **Oil Pressure Sense Fault**
- **Oil Temp Sense Fault**
- **Coolant Temp Sense Fault**

◆ OIL PRESSURE ALARMS (*SEE NOTE)

The oil pressure input has two associated alarm functions. The pre-low oil pressure warning is a non-latched, hold off alarm with a user-definable set point. The low oil pressure shutdown is a shutdown, hold off alarm with a user-definable set point. The shutdown alarm set point should be the lowest of the two settings so that the user will have some warning of a low oil condition before the generator is shut down.

◆ OIL TEMPERATURE ALARMS (*SEE NOTE)

The oil temperature has a non-latched warning and a shutdown alarm associated with it. The set points are programmable, and the alarms can be immediate, hold off or disabled.

◆ COOLANT TEMPERATURE ALARMS (*SEE NOTE)

The coolant temperature input has three associated alarms. The pre-high coolant temperature alarm is a non-latched, hold-off alarm. The high coolant temperature alarm is a shutdown, hold-off alarm. The low coolant temperature warning is a non-latched, always active alarm. set points for each alarm are programmable.

◆ BATTERY VOLTAGE ALARMS

The low battery voltage warning set point is programmable. The warning will be activated if the battery voltage is below this value for more than five minutes. This is a non-latched, always active alarm. Note that the “Power” LED on the front panel is extinguished immediately if the battery voltage is less than this value. The high battery voltage alarm set point is also programmable. The warning is active immediately when the battery voltage is higher than this value.

◆ ENGINE SPEED ALARMS

The user can program the overspeed and the underspeed alarm. The overspeed alarm is an immediate shutdown alarm. Underspeed is a hold off alarm that can either be non-latched, latched or shutdown.

◆ GENERATOR VOLTAGE ALARMS

An alarm can be generated for high voltage and low voltage. The set points are user-definable, and the alarms can be either non-latching, latching or shutdown.

◆ GENERATOR FREQUENCY ALARMS

An alarm can be generated for high frequency and low frequency. The set points are user-definable, and the alarms can be either non-latching, latching or shutdown.

◆ FUEL LEVEL ALARMS

Alarms can be generated by an optional fuel level sensor. The high fuel level warning is non-latching. There is also a low fuel level warning that is non-latching and a low fuel shutdown alarm. Each of these alarms has a set point and can be always active or disabled.

E-PLUS PANEL MODEM SETUP PROCEDURE

NOTE:

Generac only supports the US Robotics 56k V90 Sportster modem for connection of the “E” Panel to the phone line. Other modems may work in this application, but have not been tested by Generac.

1. Set modem Dip switches as shown in Figure 2. Power cycle the modem (turn modem off, then on).
2. Connect the cable between the “E” panel and the modem (see Figure 4).
3. Set the “E” panel for “modem connection and setup”. Power cycle the “E” panel (remove and relace front panel fuse).
4. In GenLink, select the proper setup string for the modem at the PC end (not the “E” panel).

Figure 2 — US Robotics 56k V90 Sportster Dip Switch Settings

1	2	3	4	5	6	7	8
■				■	■	■	
	■	■	■				■

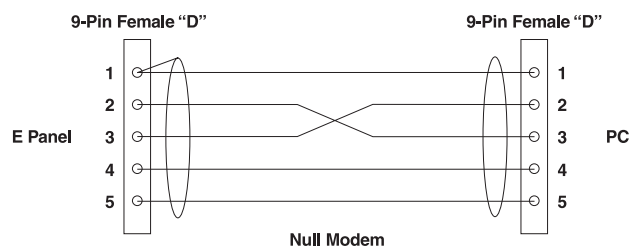
E-PLUS PANEL RS232 CABLES

The “E” panel can communicate via its RS232 port to a remote PC. The connection is made either directly to the serial port on a PC, or via a modem and telephone line.

The “E” panel has a 9-pin male “D” type connector, and is configured as DTE (Data Terminal Equipment). The serial ports on most PCs also have a DTE configuration, and are usually 9-pin “D” type male connectors. Most modems have a DCE configuration (Data Communication Equipment) and a 25-pin female connector.

Connecting an “E” panel directly to a PC requires a “Null Modem” connection. This can be achieved with either a null modem cable, or a standard serial cable with a null modem adapter. Figure 3 shows the required pin connections between the two cables for a 9-pin serial connector on the PC.

Figure 3 — “E” Panel to PC Cable Configuration

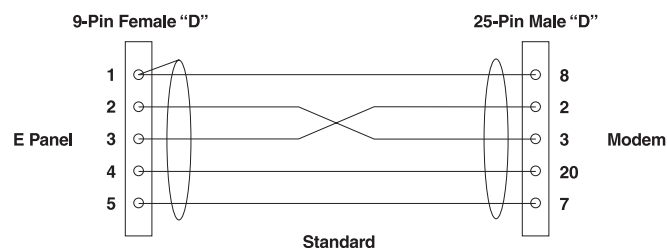


NOTE:

For Figures 3 and 4, use shielded cable 100 feet maximum in length. Connect the shield drain wire to Pin 1 on the E-Plus panel end ONLY.

Connecting the “E” panel to a modem requires a standard modem cable. The cable supplied with the modem should work. If a longer cable is required, the connectors should be wired as shown in Figure 4.

Figure 4 — “E” Panel to Modem Cable Configuration



NOTE:

The modem is not intended to be mounted inside the control panel. It should be mounted inside the enclosure (no vibration) or inside a nearby building or shelter if the generator does not have an enclosure.

NOTE:

For Figures 3 and 4, use shielded cable 100 feet maximum in length. Connect the shield drain wire to Pin 1 on the E-Plus panel end ONLY.

◆ SERIAL COMMUNICATIONS

◇ Serial Communication Via Modem

(Refer to the Genlink Manual)

The control panel has the ability to communicate to a PC via an RS232 serial port. The PC software will be able to interrogate the module, and the user also will be able to program the parameters on the PC and download them to the module. The user will be able to start and stop the generator if it is in AUTO mode.

The module does not have a built-in modem. However, software will include the ability to interface with an external modem. The user can initialize the modem from the panel. Generac offers a remote annunciator which allows the E-Plus panel to communicate with both a modem and a remote annunciator. See the Remote Annunciator Panel manual for a complete description of these panels.

◇ Remote Annunciator Panel

(Refer to the Remote Annunciator and Remote Relay manuals.)

The serial connections can be configured to allow the control panel to connect to a remote annunciator/remote relay panel, which is configured as RS485, to meet NFPA 110. Only one communication port is available for either a modem or remote annunciator.

◆ USER PASSWORD

The user can set the password. This is a six-digit number and is initially set to 000000.

ADDITIONAL PANEL COMPONENTS

In addition to the control module, the E-Plus option panel contains the following components (see Figure 6):

◆ AC VOLTMETER

This meter indicates the generator AC output voltage. To determine the nominal rated AC voltage of the unit, refer to the unit's data plate.

NOTE:

Some generators are reconnectable to a variety of voltages. Some units may be equipped with a rotary "Voltage Selector Switch." Be sure to read the "Generator AC Lead Connections" section in the Owner's Manual.

◆ AC AMMETER

This meter indicates the current draw of connected electrical loads, in amps. Also see "Line-phase Selector Switch." For continuous operation, never exceed the rated maximum continuous current capacity of the generator.

10 Generac® Power Systems, Inc.

◆ FREQUENCY METER

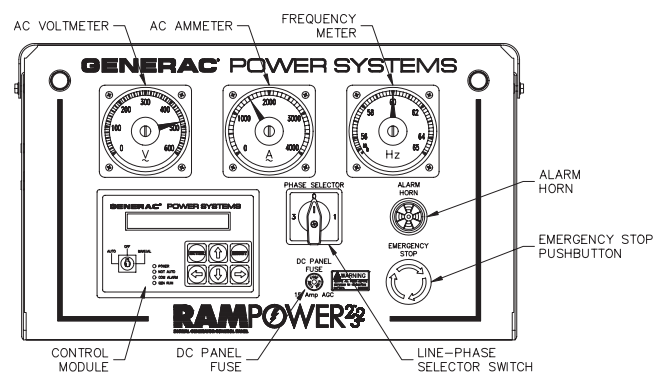
This meter indicates the generator's AC output frequency in "Hertz" (cycles per second).

◆ LINE-PHASE SELECTOR SWITCH

This four-position switch permits selection of either line-to-line or line-to-neutral readings on the panel voltmeter and ammeter. Switch positions are as follows:

Switch	Single-phase Units	Three-phase units
1	Line E1 to Neutral	Line E1 to E2
2	Line E3 to Neutral	Line E2 to E3
3	Line E1 to E3	Line E3 to E1
OFF	No Reading	No Reading

Figure 6 – E-Plus Option Panel Components



◆ ALARM HORN

This horn sounds an audible warning when an alarm condition exists. See the "Alarms" section for further information.

◆ DC PANEL FUSE

This 15 amp AGC fuse protects the panel components. This fuse is not to be confused with the control module internal fuse discussed in "Checking/Replacing the E-Plus panel Control Module Internal Fuse."

◆ EMERGENCY STOP SWITCH

When pressed, this switch will automatically shut down the entire generator set. The operator must twist the switch to pop out to its original position to reset it and allow for generator operation.

CHECKING/REPLACING THE E-PLUS PANEL CONTROL MODULE INTERNAL FUSE

Typically, the main indication of fuse failure is the absence of any illuminated front panel LEDs (even with the key in the OFF position, the “Power” LED will be illuminated) and no text visible on the module display. It should be noted however, that these conditions can exist if either:

- The generator start battery is dead (less than five-volts) or disconnected.
- The main panel fuse (15 amp AGC) is blown.
- The battery supply wires (#220 and #0) to the panel control module are open circuit (disconnected).
- The “Power” connector (CON4) is disconnected from the rear of the control module.
- The generator start battery connections have been reversed. Reversal of the battery connections **WILL** blow the internal fuse and is the most likely reason for its failure.

Before removing or disconnecting the E-Plus panel control module, check that none of the above conditions (“a” through “e”) exist.

If it is believed that the problem lies with the control module:

- Disconnect the generator start battery.
- Unplug all four wire harnesses from the back of the control module.
- Loosen, then detach, the two retaining clips securing the control module and remove the module.
- Using a multimeter (e.g., Fluke 87) set to the diode range, measure between pins 1 (BAT+) and 2 (BAT-) of connector CON4 on the module.
 - With the **positive** meter lead connected to **pin 2** and the **negative** lead to **pin 1**, the meter should read between 0.4 and 0.6 volts, which indicates that the internal fuse is OK.
 - Reversing the meter leads would give a slowly increasing voltage reading on the meter, which also indicates a good fuse.
 - An open circuit fuse will give an open circuit meter reading (.OL on Fluke 87).

If the meter reads open circuit:

- Remove the four phillips head screws retaining the rear cover of the control module.
- Open the back of the control module.
- Locate the internal printed-circuit board mounted fuse, which is behind and to the left of CON4.
- Remove the white plastic cover from the fuse holder and remove the fuse.
- If the fuse has blown, replace the fuse (use a 5A 5x20mm Slo-Blo fuse, part number 0A5705), reassemble the control module, and reinstall the control module and its connections.

- Reconnect the generator start battery and check if the control module now functions.

If the fuse blows again, or was not blown when the module was opened, or the module still does not function, the E-Plus panel control module must be replaced.

USER PROGRAMMABLE INPUTS

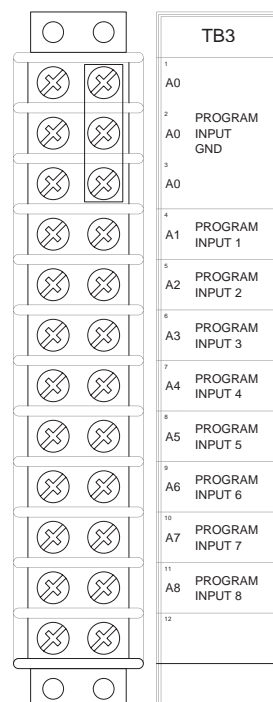
The E-Plus panel has eight (8) user programmable inputs. These inputs can be used for annunciation, pre-alarm, or shutdown alarms. Four of the inputs, Battery Charge Fail, Gen Power, Line Power, and Programmable Input 4 are set up to annunciate on the control panel display and at the optional 20 Light Remote Annunciator (Programmable Input 4 will light the unlabeled “spare” LED). These four inputs can be used for other connections if a remote annunciator is not used. The other four inputs, if utilized, will annunciate at the control panel only.

The user programmable input connection points are located inside the E-Plus option control panel on a 12-position strip labeled TB3 (refer to Figure 7 on page 12.). The first three terminals are labeled “prog input ground”. These are the common ground connection points for the user supplied switch devices to be used for the programmable annunciation.

NOTE:

These ground terminals are for user programmable input use only. The are not to be used for grounding any other circuits.

Figure 7 — TB3 Units Over 400 kW



The remaining eight terminals on TB3 are for the “positive” side of each user programmable input switch circuit. These eight terminals have a five VDC potential available in an open circuit condition (whether the control panel key switch is in the off, manual, or auto position). The inputs can be programmed to annunciate upon either an open circuit condition (five VDC potential at the terminal) or a grounded condition (zero VDC potential at the terminal). This voltage state is determined by the user supplied switch either opening or closing to cause an annunciation.

Program set-up for the user programmable inputs is carried out in the Digital I/O Menu of the E module (please refer to the Display Map on pages 18-19). Each of the eight inputs has four parameters in which specific options must be selected to make the annunciation function properly. These four parameters are labeled Input Channel Message, Input Channel Setting, Input Channel Alarm Enable, and Input Channel Alarm Type. Following is a brief description of each:

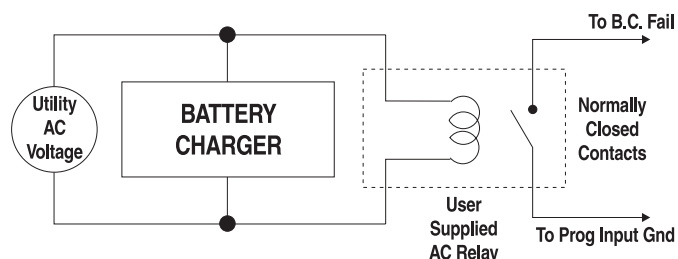
- Input Channel Message — for selecting letters and numbers to spell out what the display will read upon activation of that specific input.
- Input Channel Setting — for selecting whether annunciation should activate upon that specific circuit opening or closing to ground.
- Input Channel Alarm Enable — for enabling or disabling annunciation function of that specific input. Also, if enabled, for selecting when annunciation will be active. The choices are: Disabled, Always, Immediate and Hold-off. See E Control Panel Definitions on page 14.
- Input Channel Alarm Type — for selecting the type of alarm annunciation and the effect it has on the generators control system. The four choices are: Status, Non-latched, Latched and Shutdown. See E Control Panel Definitions on page 14.

WIRING EXAMPLES

◆ USER PROGRAMMABLE INPUT NUMBER 1

On units rated below 400 kW, input number 1 is programmed for “Battery Charge Fail” annunciation at the control panel display, and the LED on the 20 Light Remote Annunciator (if used). A user supplied AC relay is wired in to be powered up by AC voltage that supplies the unit Battery Charger (see Figure 9).

Figure 9 — Battery Charge Fail Wiring



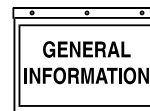
Upon loss of this AC supply voltage, the relay will de-energize. The normally closed contacts on the relay are to be connected to TB3 in the control panel. One wire connects to any of the four “Prog Input Gnd” terminals, the other wire connects to A1 (Input 1). With the relay de-energized, A1 (Input 1) will be grounded, signaling the E module to activate on Programmable Input 1.

◆ USER PROGRAMMABLE INPUTS NUMBERS 2 AND 3

On units rated below 400 kW, input numbers 2 and 3 are programmed for “Gen Power” and “Line Power” respectively, indicating the transfer switch position (Standby or Utility). Annunciation will occur at the control panel display and at the Remote Annunciator (if used). These signals will come from a set of spare auxiliary contacts located on the main contactor assembly in the transfer switch. The auxiliary contact switch is a set of dry contacts with three terminals: Common, Normally Open, and Normally Closed. Wires must be connected to these three terminals and routed to the generator control panel. These three wires must not be run in the same conduit as the generator’s main output conductors. The wire connected to the Common terminal on the auxiliary contacts will connect to any of the Prog Input Gnd terminals on TB3. The wire connected to the Normally Open terminal on the auxiliary contacts will connect to A2 (Input 2) on TB3. The wire connected to the Normally Closed terminal on the auxiliary contacts will connect to A3 (Input 3) on TB3.

◆ ALL USER PROGRAMMABLE INPUTS

On units rated below 400 kW, input numbers 4 through 8, and units rated over 400 kW, input numbers 1 through 8 can be used for virtually any kind of annunciation the user wishes to set up, within the parameters previously described, via an opened or closed switch device. Proper wiring consists of two wires from the user supplied switch: one wire connects to one of the “Prg Inpt Gnd” terminals (A0 on TB3), the other wire connects to a Programmable Input terminal on TB3.



PROGRAMMING EXAMPLES

◆ USER PROGRAMMABLE INPUT NUMBER 1

To be used for Battery Charge Fail annunciation. After properly wiring the circuit as described in Wiring Examples, program as follows:

1. Power up the E-Plus panel by connecting unit battery (ies) and inserting control panel fuse. The module will run through a self-test mode. Once it has completed its self-test, it will display the generator status (Stopped, ready to run).
2. Use the LEFT or RIGHT arrow keys to scroll over to the PARAMETER ENTRY column.
3. Once at the PARAMETER ENTRY column, press ENTER. Enter the password (if different from the factory set password 000000) and press ENTER. From the ENGINE PARAMETER MENU, press the RIGHT arrow to get to the DIGITAL I/O MENU.
4. Using the UP or DOWN arrows (the column is a continuous loop), scroll to INPUT CHANNEL 1 MESSAGE and press ENTER. Up to 24 letters, numbers and other characters can be entered to spell out what will be displayed upon this input becoming active. In this case, enter Battery Charge Fail. After entering the message, press ENTER.
5. Press the UP arrow to display INPUT CHANNEL 1 SETTING. Press ENTER, the display will read Input Function, OPEN=ALARM. The Battery Charge Fail annunciation should occur upon the user supplied relay de-energizing and its normally-closed contact closing, therefore, select CLOSED=ALARM by pressing the UP or DOWN arrow. Press ENTER, the display will read Input Channel 1 Setting, CLOSED=ALARM.

6. Press the UP arrow, the display will read Input 1 Alarm Enable, DISABLED, press ENTER. The choices are DISABLED, ALWAYS, IMMEDIATE, and HOLD OFF. This alarm should always be active, therefore, scroll up or down and select ALWAYS, and press ENTER.
7. Press the UP arrow, the display will read Input Channel 1 Alarm Type, STATUS MESSAGE, press ENTER. The choices are STATUS MESSAGE, NON LATCHING ALARM, LATCHING ALARM and SHUTDOWN ALARM. This annunciation for Battery Charge Fail should be a STATUS message, therefore, scroll up or down and select STATUS MESSAGE by pressing ENTER.

Programming for User Input Channel 1, Battery Charge Fail is now complete. The E module has been programmed for a STATUS alarm message that is ALWAYS active. Upon loss of AC supply voltage to the generators battery charger, the user supplied relay will de-energize, its normally closed contacts will close, grounding TB3 A1 to Prg Input Gnd. The E module will display BATTERY CHARGE FAIL. Because it was programmed as a STATUS alarm and not a LATCHING or SHUTDOWN alarm, the status message will clear when AC power is restored to the battery charger.

NOTE:

The Battery Charger Fail LED on the 20 Light Remote Annunciator (if connected) will also turn on when Input Channel 1 is activated.



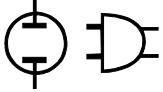
E CONTROL PANEL DEFINITIONS

Please refer to the following list for an explanation of terms used in various charts throughout the manual:

- **ALWAYS:** With this option selected, the alarm is active regardless of the state of the generator.
- **ANALOG INPUT:** An analog input to the E control panel is a voltage sourced input with a zero volt to 10-volt range.
- **DIGITAL INPUT:** A digital input to the E control panel is NOT a voltage sourced input, but a dry contact closure to ground. Voltage should never be sourced to a digital input.
- **DISABLED:** If this option is selected, the alarm is disabled and has no effect.
- **HIGH:** A high signal to a digital input is open circuit.
- **HOLD OFF:** This option waits until a preset time after the generator is running before becoming active. The hold off time can be set by the user. Note that the hold off time is common to all alarms.
- **IMMEDIATE:** In this mode, the alarm is not active when the generator is stationary. It becomes active as soon as the generator starts to crank and remains active until the generator stops.
- **LATCHED:** When the alarm condition occurs, the audible alarm sounds, the LED and back light flash as before, and the user must accept the alarm to stop them. The alarm will continue to be displayed on the screen even after the alarm condition has cleared. The user must either press the Reset key or turn the key switch to the OFF position to clear the alarm after the alarm condition has cleared. This type of alarm is logged.
- **LOW:** A low signal to a digital input is a contact closure to ground.
- **NON-LATCHED:** This type of warning will activate the audible alarm, and flash the alarm LED and display back light. The associated message will be displayed on the screen. When the user accepts the warning (by pressing the Enter key), the back light will stop flashing, and the alarm LED will be on continuously. The message will be displayed on the alarm screen, but the user will be able to scroll through other screens. The LED and message will clear when the warning condition clears. This type of warning is logged.
- **SHUTDOWN:** This type of alarm will act similar to the latched alarm, but it also will stop the engine when the alarm condition occurs. It can be reset only by turning the key switch to the OFF position. All shutdown alarms are latching, and this type of alarm is logged.
- **STATUS:** This type of alarm will display a message on the screen. The message will not be logged. This is the lowest priority of alarm types.
- **USER INPUT:** Any of the eight digital or two analog inputs reserved for customer options.

OUTPUT FUNCTION TABLE

Output Function ID	Function Name	Description
00	Output Disabled	Output not in use
01	Common Alarm	Active for all latched, non-latched and shutdown alarms
02	Low Oil Pressure Warning	Active after hold off time
03	Oil Pressure Shutdown	Active after hold off time, low oil pressure
04	High Coolant Temp Warning	Active after hold off time
05	Coolant Temp Shutdown	Active after hold off time, high coolant temperature
06	Low Coolant Temp Alarm	
07	High Oil Temp Warning	
08	Oil Temp Shutdown	High oil temperature
09	Low Battery Voltage	Must be below set value for five minutes
10	High Battery Voltage	
11	Overspeed Shutdown	
12	Underspeed Alarm	Active after hold off time
13	Over Voltage Alarm	Active after hold off time
14	Under Voltage Alarm	Active after hold off time
15	Over Frequency Alarm	Active after hold off time
16	Under Frequency Alarm	Active after hold off time
17	High Fuel Alarm	Above the warning set point
18	Low Fuel Alarm	Below the warning set point
19	Low Fuel & Shutdown	Below the shutdown set point
20	Failed to Start Alarm	Overcrank
21	Coolant Level Alarm	Low coolant level
22	RPM Sensor Failed Alarm	Magnetic pickup failure
23	Start Inhibit Alarm	Oil pressure was present at start request
24	Emergency Stop Alarm	Emergency stop active
25	Oil Press Sense Fault	Sensor is either open or short circuit
26	Oil Temp Sense Fault	Sensor is either open or short circuit
27	Coolant Temp Sense Fault	Sensor is either open or short circuit
28	Analog Channel 1 High	Input at user analog channel 1 is above programmed high set point
29	Analog Channel 1 Low	Input at user analog channel 1 is below programmed low set point
30	Analog Channel 2 High	Input at user analog channel 2 is above programmed high set point
31	Analog Channel 2 Low	Input at user analog channel 2 is below programmed low set point
32	Digital Channel 1 Active	User programmable digital input 1 is active
33	Digital Channel 2 Active	User programmable digital input 2 is active
34	Digital Channel 3 Active	User programmable digital input 3 is active
35	Digital Channel 4 Active	User programmable digital input 4 is active
36	Digital Channel 5 Active	User programmable digital input 5 is active
37	Digital Channel 6 Active	User programmable digital input 6 is active
38	Digital Channel 7 Active	User programmable digital input 7 is active
39	Digital Channel 8 Active	User programmable digital input 8 is active
40	Generator in Auto	Key switch in auto position
41	Generator in Manual	Key switch in manual position
42	Generator Off	Key switch in off position
43	Stopped	Generator stopped
44	Shutdown Due to Alarm	Generator shutdown
45	Stopped Ready to Run	Generator ready to start
46	Running	Generator running
47	Ready to Accept Load	Generator has reached load accept voltage and frequency set points, and the warm-up timer has expired
48	All Alarms Active	Generator running



E-PLUS PANEL MASTER CONTROL BOX CONFIGURATION SETTINGS

ENGINE PARAMETER MENU

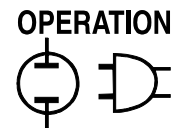
Parameter	Value	Units
RS232 Port or RS485 Port	Connection Mode (C1)	
Restore All Values to Default Settings	Direct Connection Only	
Voltage Scaling Factor	Master Password Required (Factory Only)	
Flywheel Teeth	.05 to 300	Number
Panel I.D.	30 to 200	
User Password	000000 to 999999	
Preheat Option	000000 to 999999	
Load Accept Frequency	(P1)	
Load Accept Voltage	0 to 90	Hz
Starter Disengage Speed	0 to 20000	V
Number of Start Attempts	0 to 4000	RPM
Generator Cool Down Time	0 to 10	Number
Generator Warm Up Time	0 to 600	min.
Alarm Hold Off Time	0 to 600	sec.
Start Attempt Pause Time	0 to 15	sec.
Start Timer	5 to 600	sec.
Preheat Timer	3 to 15	sec.
	0 to 30	sec.

Available Options: P1 = No Preheat, Before Start, Before and During Start
 C1 = Direct Connection, Modem Connection, Modem Connection & Setup

SYSTEM ALARM MENU

Parameter	Value	Units	Active	Type
Low Fuel Shutdown Alarm	0 to 100	%	(A2)	Shutdown Alarm
Fuel Level Low Warning	0 to 100	%	(A2)	Non-latching Alarm
Fuel Level High Warning	0 to 100	%	(A2)	Non-latching Alarm
Under Freq	0 to 100	Hz	Hold Off	(T1)
Over Freq	0 to 100	Hz	Hold Off	(T1)
Under Voltage	0 to 20000	V	Hold Off	(T1)
Over Voltage	0 to 20000	V	Hold Off	(T1)
Engine Overspeed Alarm	1000 to 4500	RPM	Immediate	Shutdown Alarm
Engine Underspeed Alarm	0 to 4500	RPM	Hold Off	(T1)
Battery Volts High Warning	4 to 30	V	Always	Non-latching Alarm
Battery Volts Low Warning	4 to 30	V	Always	Non-latching Alarm
Coolant Temp Low Warning	0 to 245	Deg. F	Always	Non-latching Alarm
Coolant Temp Shutdown Alarm	-5 to 275	Deg. F	Hold Off	Shutdown Alarm
Coolant Temp High Warning	-5 to 275	Deg. F	Hold Off	Non-latching Alarm
Oil Temp Shutdown Alarm	-5 to 275	Deg. F	(A1)	Shutdown Alarm
Oil Temp Warning	-5 to 275	Deg. F	(A1)	Non-latching Alarm
Oil Press Shutdown Alarm	0 to 100	PSI	Hold Off	Shutdown Alarm
Oil Press Warning	0 to 100	PSI	Hold Off	Non-latching Alarm

Available Options: A1 = Disable, Holdoff, Immediate
 A2 = Disable, Always
 T1 = Shutdown Alarm, Latching Alarm, Non-latching Alarm, Status Message



DIGITAL I/O MENU					
Channel		Message	Setting	Alarm Enable	Alarm Type
Output 1			(F1)		
Output 2			(F1)		
Output 3			(F1)		
Preheat Output Function			(F1)		
User Input 1	*1	Battery Charge Fail	(S1)	(A1)	(T1)
User Input 2	*1	Generator Power	(S1)	(A1)	(T1)
User Input 3	*1	Line Power	(S1)	(A1)	(T1)
User Input 4	*2	Backup Low Oil Pressure	(S1)	(A1)	(T1)
User Input 5	*2	Backup High Engine Temp.	(S1)	(A1)	(T1)
User Input 6	*2	Oil Filter Blocked	(S1)	(A1)	(T1)
User Input 7	*2	MLCB	(S1)	(A1)	(T1)
User Input 8	*2	Ruptured Tank	(S1)	(A1)	(T1)

Messages can be a maximum of 24 characters including spaces.

Available Options: A1 = Disabled, Hold Off, Immediate, Always
 F1 = See output function table for available options.
 S1 = Closed (Low Signal/Contact Closure to Ground), Open (High signal/Open Circuit)
 T1 = Shutdown Alarm, Latching Alarm, Non-latching alarm, Status Message

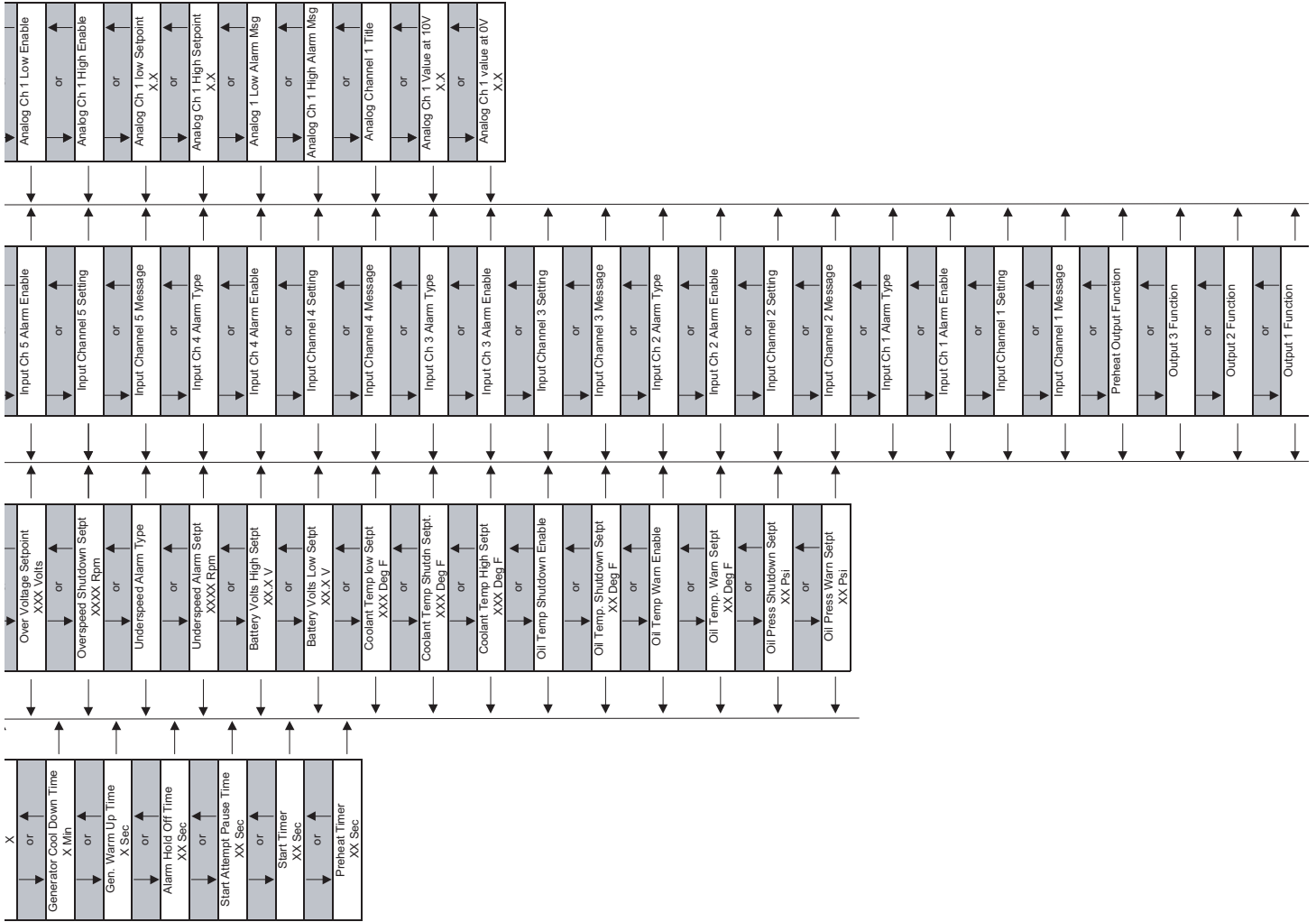
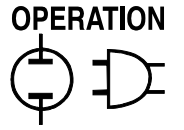
*1 Assigned if used with 20 light Remote Annunciator or Remote Relay Panel Otherwise available for any customer options.
 *2 Factory wired if unit is equipped with these options. Otherwise these inputs are available for any customer requirements.

ANALOG INPUT MENU											
	Value at 0V	Value at 10V	(Display) Title	Alarm Msg. Message		Setpoint		(Alarm) Enable		(Alarm) Type	
				High	Low	High	Low	High	Low	High	Low
Analog Channel 1								(A1)	(A1)	(T1)	(T1)
Analog Channel 1								(A1)	(A1)	(T1)	(T1)

Messages can be a maximum of 24 characters including spaces.

Available Options: A1 = Disabled, Hold Off, Immediate, Always
 T1 = Shutdown Alarm, Latching Alarm, Non-latching alarm, Status Message

Section 3 – Operation
E-Plus Option Control Panel





Section 4 – Troubleshooting

E-Plus Option Control Panel

TABLE A

Dip Switch	Setting
1	Up
2	Down
3	Down
4	Down
5	Up
6	Up
7	Up
8	Down

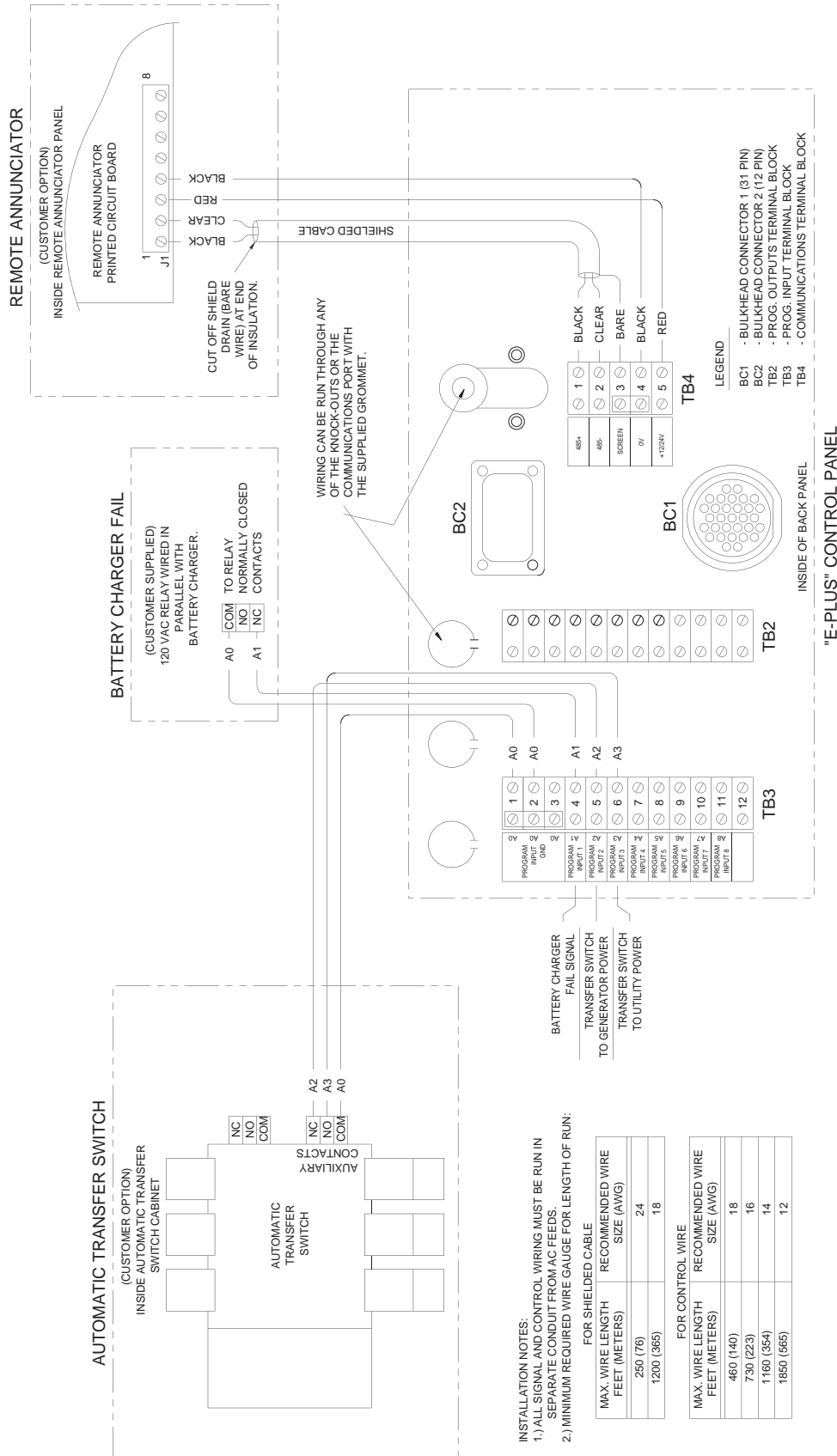
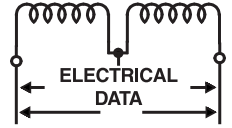


TABLE B

"E" Panel Pin	Modem Pin
1	8
2	3
3	2
4	20
5	7

Section 5 – Interconnection Diagram

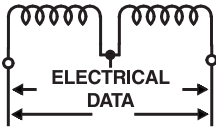
Communication Interconnection Diagram – Drawing No. 0E2283



INSTALLATION NOTES:
 1.) ALL SIGNAL AND CONTROL WIRING MUST BE RUN IN SEPARATE CONDUIT FROM AC FEEDS.
 2.) MINIMUM REQUIRED WIRE GAUGE FOR LENGTH OF RUN:

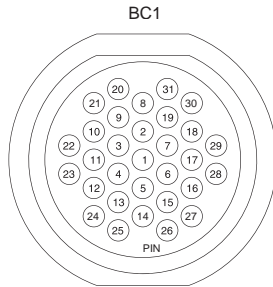
FOR SHIELDED CABLE	
MAX. WIRE LENGTH FEET (METERS)	RECOMMENDED WIRE SIZE (AWG)
250 (76)	24
1200 (365)	18

FOR CONTROL WIRE	
MAX. WIRE LENGTH FEET (METERS)	RECOMMENDED WIRE SIZE (AWG)
460 (140)	18
730 (223)	16
1160 (354)	14
1650 (505)	12



Section 6 – Electrical Data

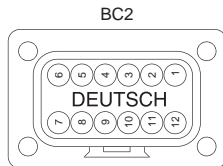
Wiring Diagram – Drawing No. 0D8507B-B



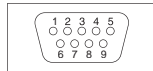
SHIELDED CABLE 1 WITH WIRES 79, 0, & SHLD GO TO PINS 16, 17, & 28 IN THAT ORDER.

SHIELDED CABLE 2 WITH WIRES 79A, 0A, & SHLDA GO TO PINS 22, 10, & 23 IN THAT ORDER.

RESERVED PINS WILL BE POPULATED ONLY WHEN THE INTERNAL GOVERNOR AND SMOKE LIMITING RELAY KITS ARE NEEDED.



SERIAL PORT

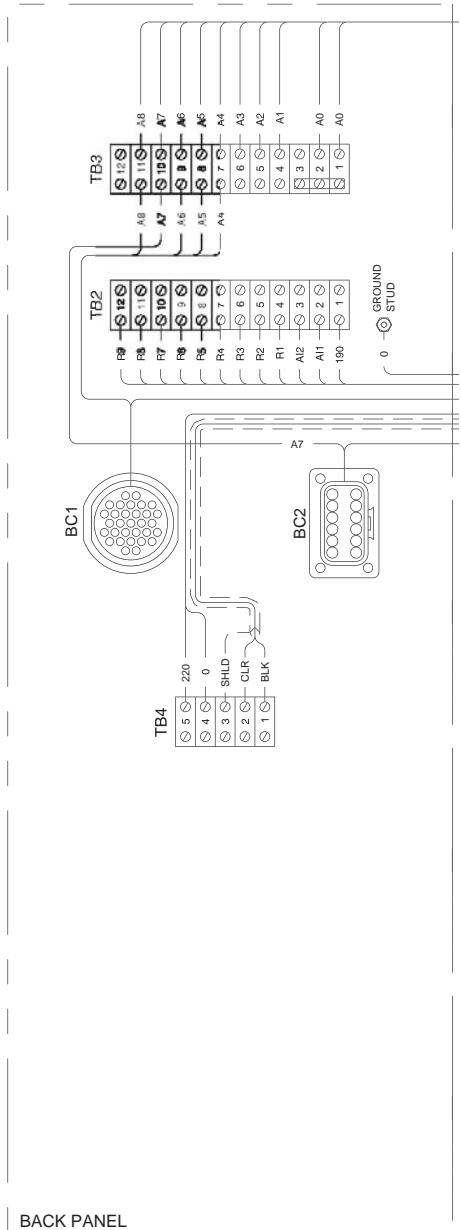


CUT SHIELD DRAIN WIRE EVEN WITH CABLE JACKET AT THIS END.

WIRE TERMINATION				
PIN	WIRE	GAUGE	TO	STATUS
1	0	18	TB1-17	USED
2				OPEN
3	353	14		RESERVED
4	220	18	TB1-3	USED
5	A5	18	TB2-8	USED
6	575	18	CON2-2	USED
7	219	14	TB1-7	USED
8	219	18	TB1-5	USED
9	219	14	TB1-6	USED
10	0A	20	TB1-12	USED
11	A8	18	TB2-11	USED
12	0	18	TB1-17	USED
13	A6	18	TB2-9	USED
14	69	18	CON2-5	USED
15	A4	18	TB2-7	USED
16	79	20	TB1-13	USED
17	0	20	TB1-14	USED
18	168	14		RESERVED
19	56	18	ESS-12	USED
20	0	14	TB1-16	USED
21	0	14	TB1-15	USED
22	79A	20	TB1-11	USED
23	SHLDA	-	TB1-12	USED
24	573	18	CON2-7	USED
25				OPEN
26	68	18	CON2-6	USED
27	523	18	CON2-4	USED
28	SHLD	-	TB1-14	USED
29	169	14		RESERVED
30	218	14	TB1-10	USED
31	218	14	TB1-9	USED

WIRE TERMINATION				
PIN	WIRE	GAUGE	TO	STATUS
1	S1	18	SW1-14	USED
2	S2	18	SW1-16	USED
3	S3	18	SW1-18	USED
4	A7	18	TB2-10	USED
5	S15	18	HZ+	USED
6	S16	18	HZ-	USED
7	57	18	SW1-3	USED
8	58	18	SW1-7	USED
9	59	18	SW1-11	USED
10	0	18	TB1-19	USED
11	178	18	TB1-19	USED
12	183	18	CON2-10	USED

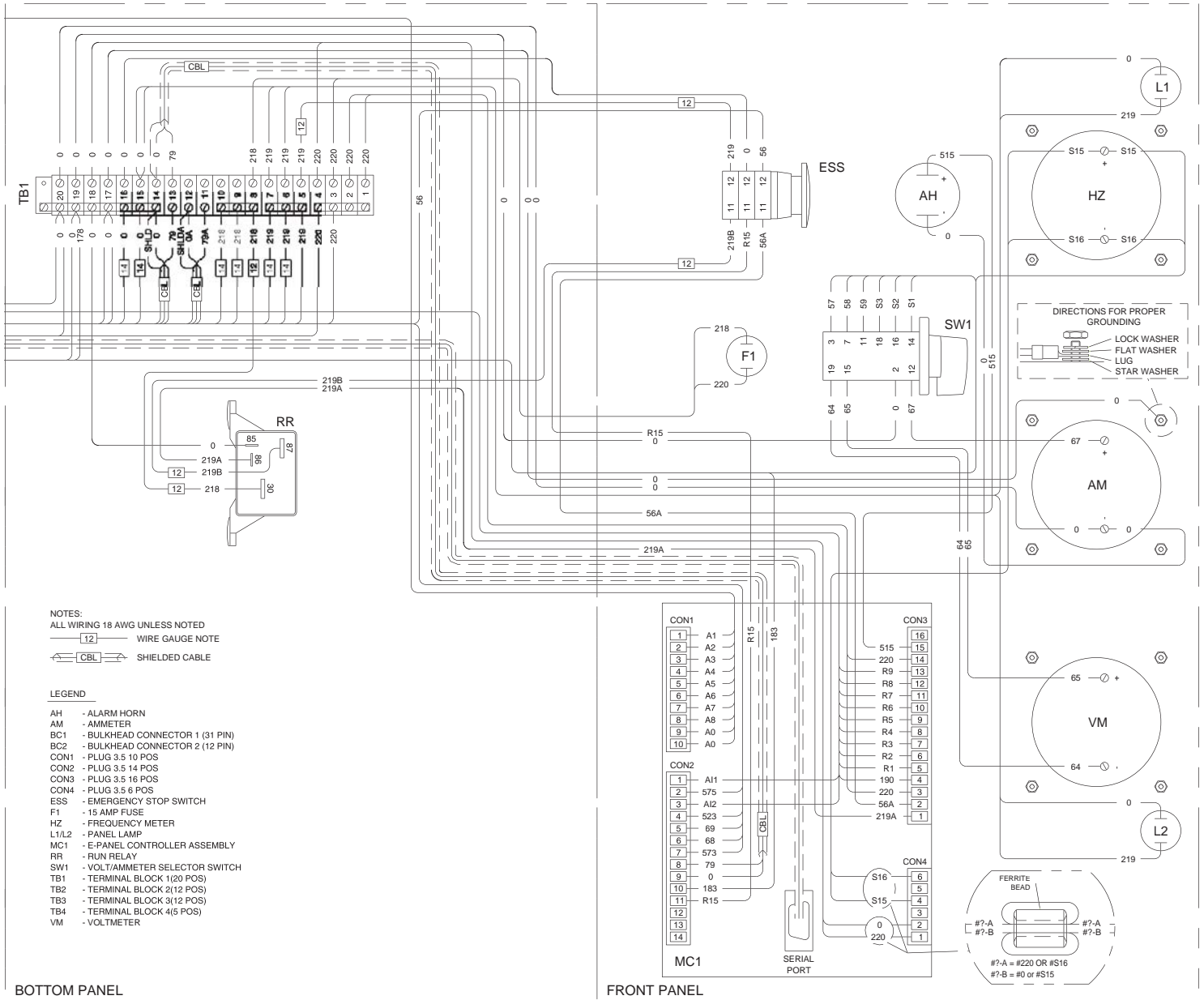
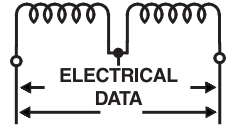
WIRE TERMINATION				
PIN	WIRE	GAUGE	TO	STATUS
1				OPEN
2	BLK	20	TB4-1	USED
3	CLR	20	TB4-2	USED
4				OPEN
5				OPEN
6				OPEN
7				OPEN
8				OPEN
9				OPEN



BACK PANEL

Section 6 – Electrical Data

Wiring Diagram – Drawing No. 0D8507B-B

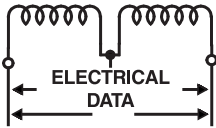


NOTES:
 ALL WIRING 18 AWG UNLESS NOTED
 WIRE GAUGE NOTE
 SHIELDED CABLE

- LEGEND**
- AH - ALARM HORN
 - AM - AMMETER
 - BC1 - BULKHEAD CONNECTOR 1 (31 PIN)
 - BC2 - BULKHEAD CONNECTOR 2 (12 PIN)
 - CON1 - PLUG 3.5 10 POS
 - CON2 - PLUG 3.5 14 POS
 - CON3 - PLUG 3.5 16 POS
 - CON4 - PLUG 3.5 6 POS
 - ESS - EMERGENCY STOP SWITCH
 - F1 - 15 AMP FUSE
 - HZ - FREQUENCY METER
 - L1/L2 - PANEL LAMP
 - MC1 - E-PANEL CONTROLLER ASSEMBLY
 - RR - RUN RELAY
 - SW1 - VOLT/AMMETER SELECTOR SWITCH
 - TB1 - TERMINAL BLOCK 1(20 POS)
 - TB2 - TERMINAL BLOCK 2(12 POS)
 - TB3 - TERMINAL BLOCK 3(12 POS)
 - TB4 - TERMINAL BLOCK 4(5 POS)
 - VM - VOLTMETER

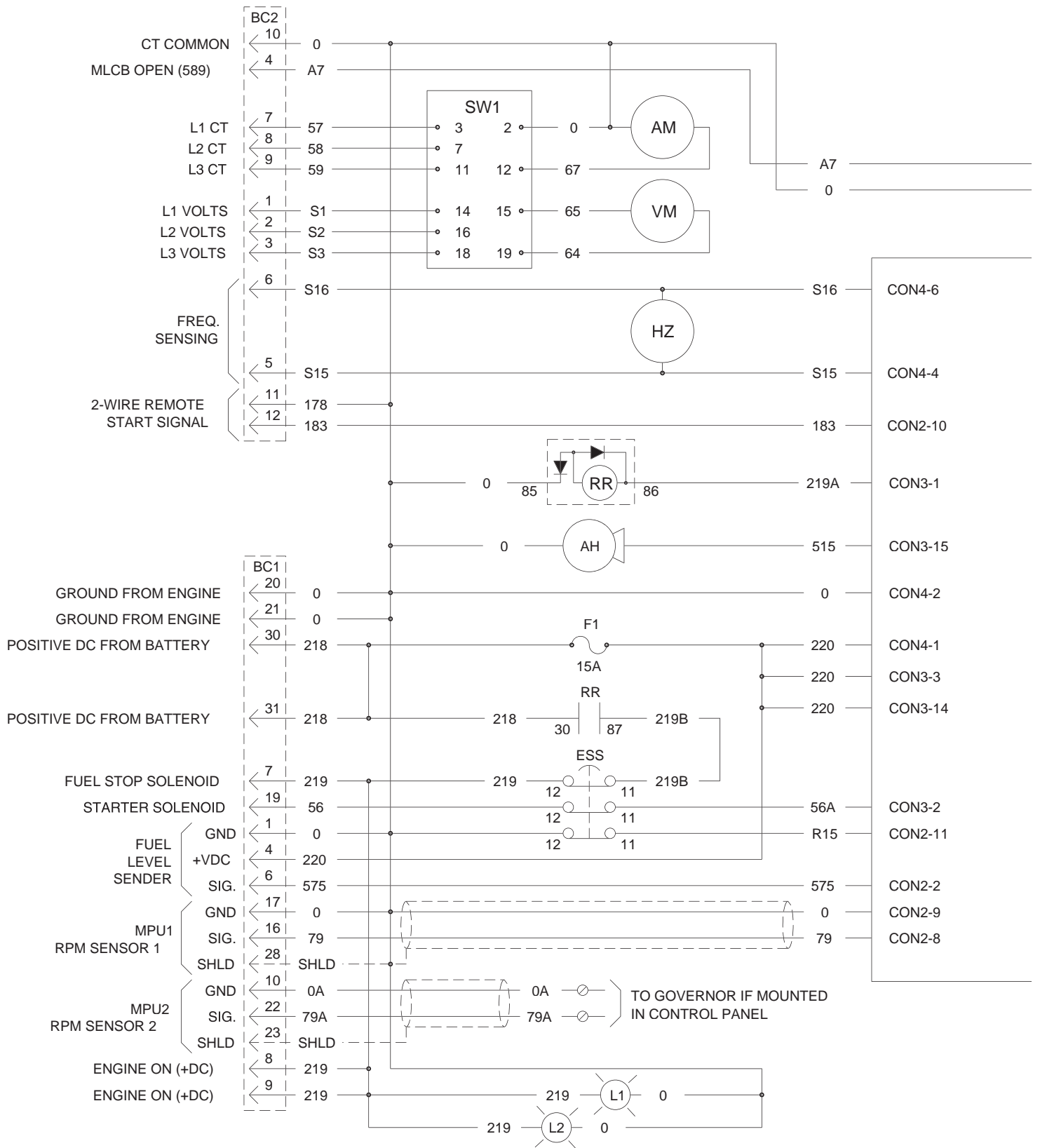
BOTTOM PANEL

FRONT PANEL

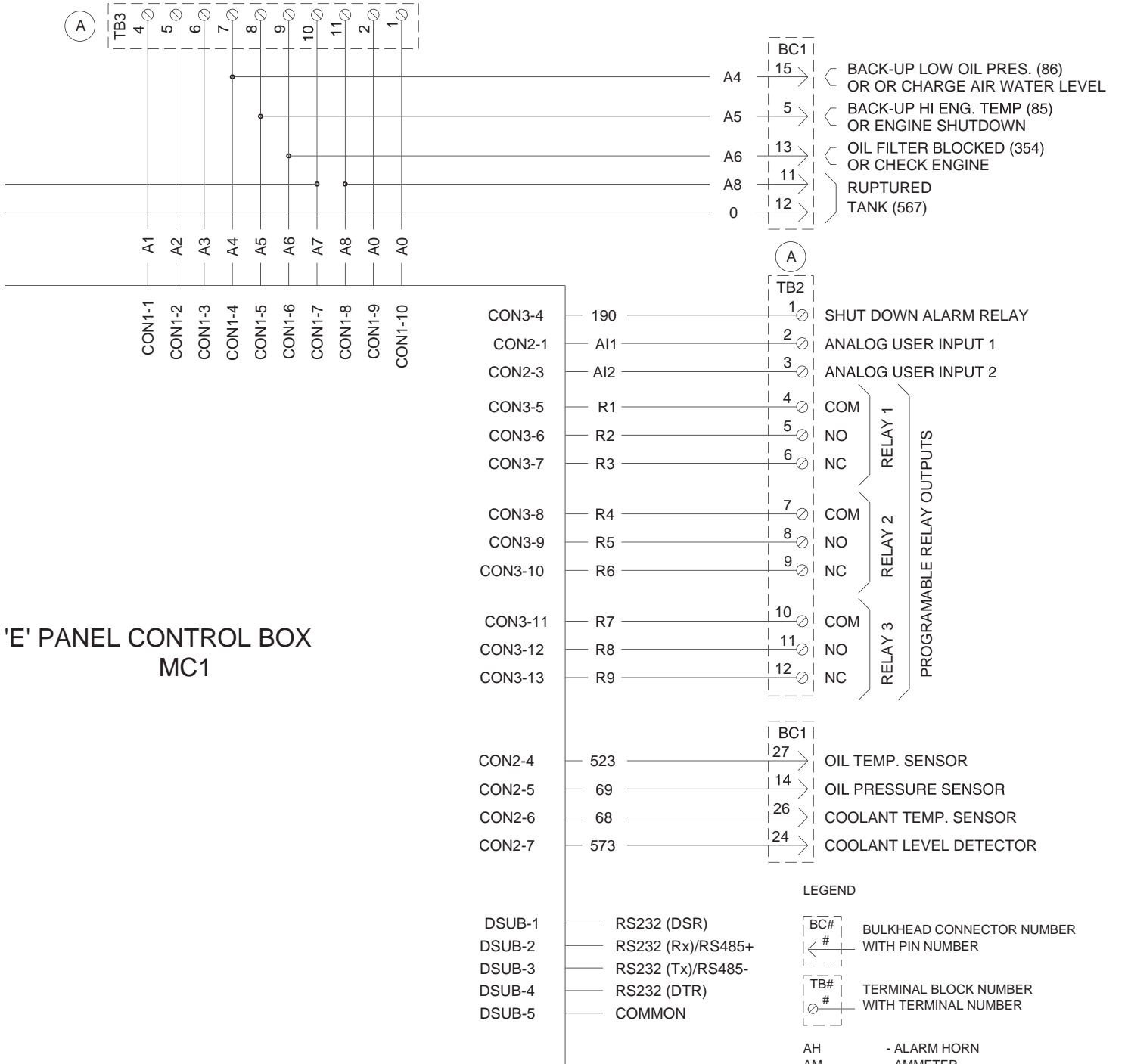
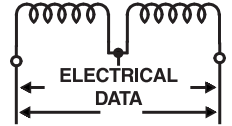


Section 6 – Electrical Data

Electrical Schematic – Drawing No. 0D8507A-B



Section 6 – Electrical Data
Electrical Schematic – Drawing No. 0D8507A-B



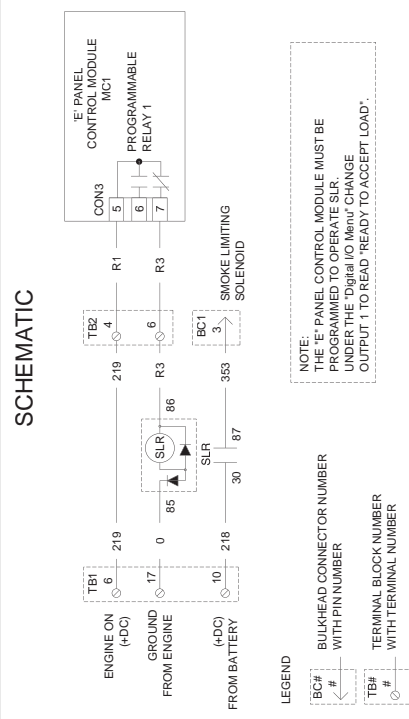
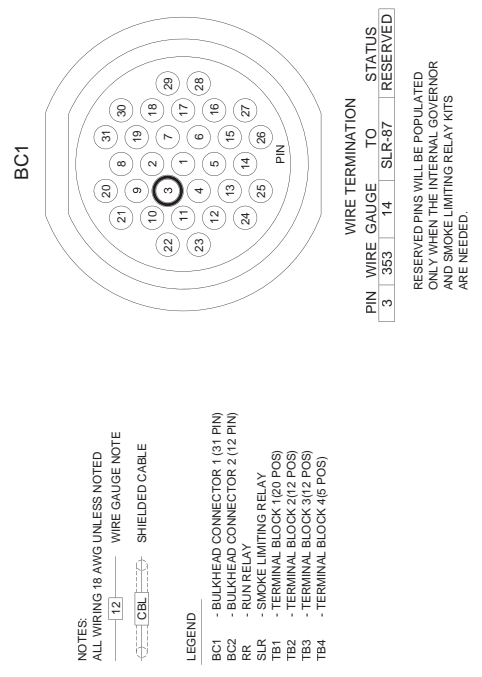
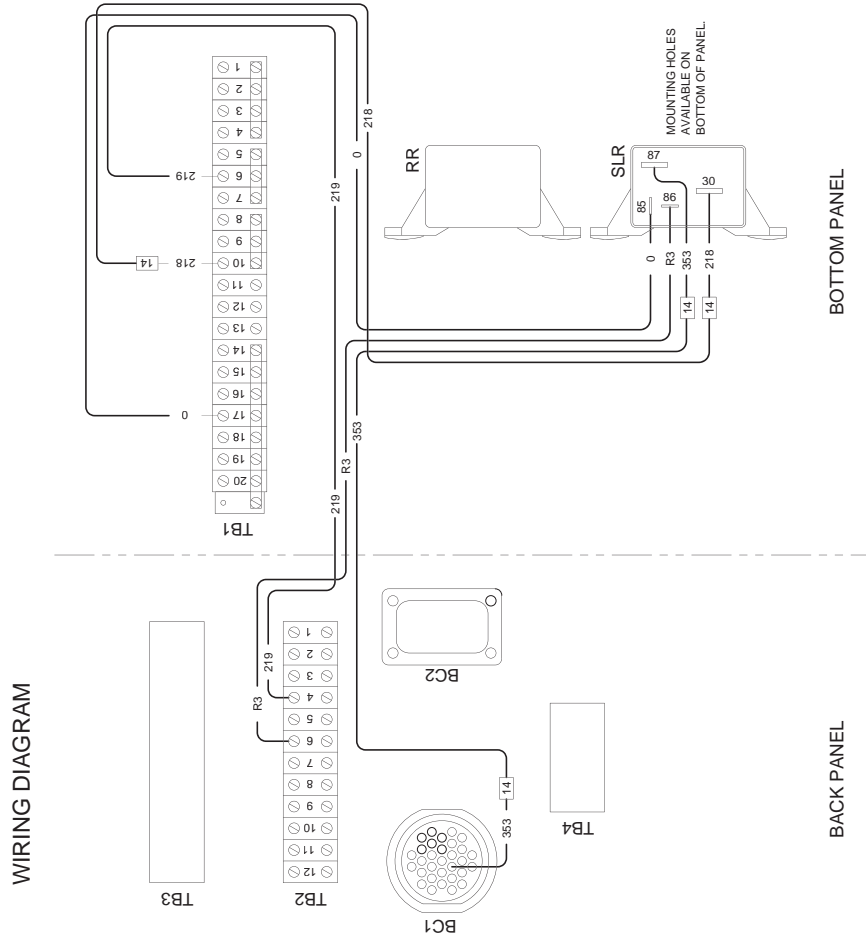
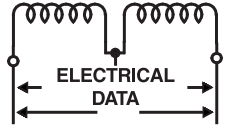
LEGEND

- BC# - BULKHEAD CONNECTOR NUMBER WITH PIN NUMBER
- TB# - TERMINAL BLOCK NUMBER WITH TERMINAL NUMBER

- AH - ALARM HORN
- AM - AMMETER
- CON1-4 - MC1 CONNECTOR
- CT - CURRENT TRANSFORMER
- DSUB - MC1 9 PIN DSUB CONNECTOR
- ESS - EMERGENCY STOP SWITCH
- F1 - 15 AMP FUSE
- HZ - FREQUENCY METER
- L1/2 - PANEL LIGHTS
- MC1 - E-PANEL CONTROLLER ASSEMBLY
- MLCB - MAIN LINE CIRCUIT BREAKER
- MPU1/2 - MAG. PICK-UP
- RR - RUN RELAY
- SW1 - VOLT/AMMETER SELECTOR SWITCH
- VM - VOLTMETER

Section 6 – Electrical Data

Wiring Diagram – Smoke Limiting Relay – Drawing No. 0E0063A

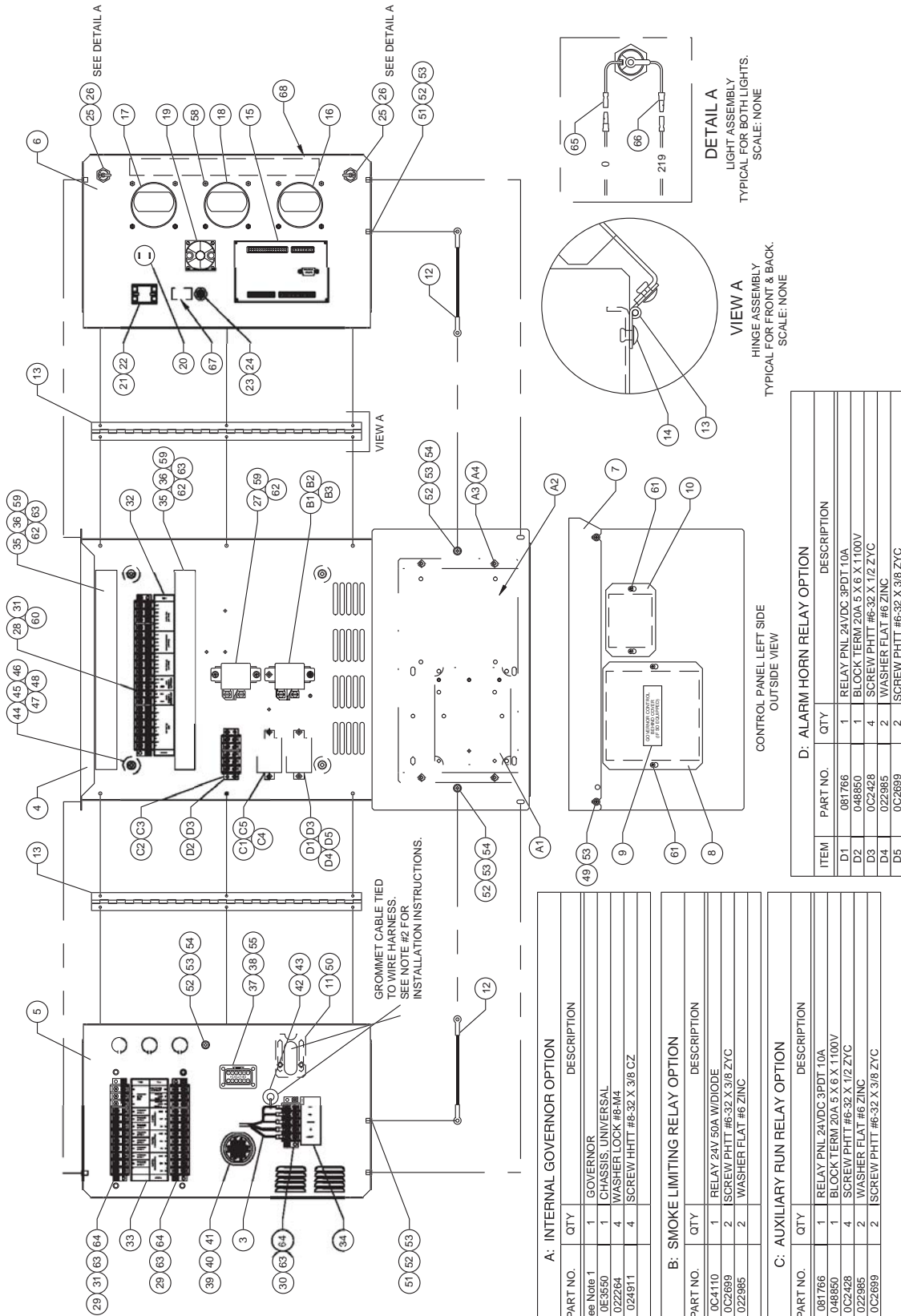


- NOTES:
 ALL WIRING 18 AWG UNLESS NOTED
 WIRE GAUGE NOTE
 SHIELDED CABLE
- LEGEND:
 BC1 - BULKHEAD CONNECTOR 1 (31 PIN)
 BC2 - BULKHEAD CONNECTOR 2 (12 PIN)
 RR - RUN RELAY
 SLR - SMOKE LIMITING RELAY
 TB1 - TERMINAL BLOCK 1 (20 POS)
 TB2 - TERMINAL BLOCK 2 (12 POS)
 TB3 - TERMINAL BLOCK 3 (12 POS)
 TB4 - TERMINAL BLOCK 4 (6 POS)



Section 7 – Exploded Views & Parts Lists

Control Panel – Drawing No. 0D8680-G



A: INTERNAL GOVERNOR OPTION

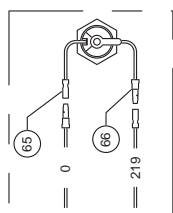
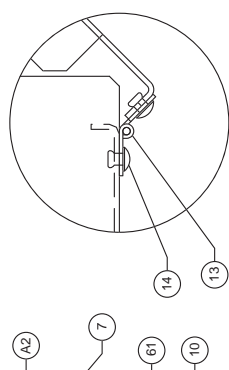
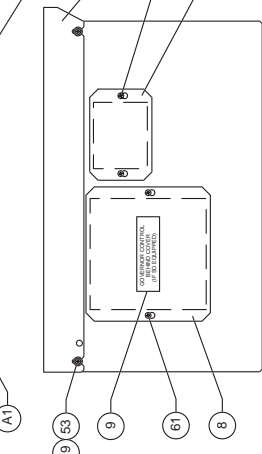
ITEM	PART NO.	QTY	DESCRIPTION
A1	See Note 1	1	GOVERNOR
A2	0E3550	1	CHASSIS, UNIVERSAL
A3	022264	4	WASHER LOCK #8-M4
A4	024911	4	SCREW PHTT #6-32 X 3/8 CZ

B: SMOKE LIMITING RELAY OPTION

ITEM	PART NO.	QTY	DESCRIPTION
B1	0C4110	1	RELAY 24V 50A W/DIODE
B2	0C2699	2	SCREW PHTT #6-32 X 3/8 ZYC
B3	022985	2	WASHER FLAT #6 ZINC

C: AUXILIARY RUN RELAY OPTION

ITEM	PART NO.	QTY	DESCRIPTION
C1	081766	1	RELAY PNL 24VDC 3PDT 10A
C2	048850	1	BLOCK TERM 20A 5 X 6 X 1100V
C3	0C2428	4	SCREW PHTT #6-32 X 1/2 ZYC
C4	022985	2	WASHER FLAT #6 ZINC
C5	0C2699	2	SCREW PHTT #6-32 X 3/8 ZYC

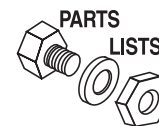


D: ALARM HORN RELAY OPTION

ITEM	PART NO.	QTY	DESCRIPTION
D1	081766	1	RELAY PNL 24VDC 3PDT 10A
D2	048850	1	BLOCK TERM 20A 5 X 6 X 1100V
D3	0C2428	4	SCREW PHTT #6-32 X 1/2 ZYC
D4	022985	2	WASHER FLAT #6 ZINC
D5	0C2699	2	SCREW PHTT #6-32 X 3/8 ZYC

Section 7 – Exploded Views & Parts Lists

Control Panel – Drawing No. 0D8680-G



ITEM	PART NO.	QTY.	DESCRIPTION	ITEM	PART NO.	QTY.	DESCRIPTION
1	0D8507A	0	SCHEMATIC, E+ CONTROL PANEL	39	0C8239	1	CONN DTCH HDP24-31PT
2	0D8507B	0	WIRING DIAGRAM E+ CONTROL PNL	40	0C8243	1	WASHER LOCK HDP DEUTSCH
3	0D8507C	1	WIRE HARNESS E PLUS CNTL PANEL	41	0C8244	1	NUT HDP DEUTSCH
4	0D6415	1	BOTTOM E PLUS CONTROL PANEL	42	030809	1	GROMMET 11/16 X 1/8 X 7/16
5	0D6416	1	BACK E PLUS CONTROL PANEL	43	028739A	1	TIE WRAP 3.9" X .10" BLK UL
6	0D8618	1	E PLUS FRONT PNL W/SILKSCREEN	44	040479	4	VIB MNT 1.0 X 1.0 X 1/4-20
7	0D6419	1	COVER E PLUS CONTROL PANEL	45	047246	4	FLAT WASHER SPECIAL
8	0D6526	1	COVER PLATE GOVERNOR	46	022287	4	SCREW HHC 1/4-20 X 3/4 G5
9	0A3394	1	DECAL ELEC GOVERNOR	47	022473	4	WASHER FLAT 1/4 ZINC
10	0D6527	1	COVER PLATE AVR	48	022097	4	WASHER LOCK M6-1/4
11	0D6528	1	COVER PLATE COMMUNICATIONS	49	0D8729	4	SCREW HHPM #10-32 X 1/2 ZINC
12	0A2275	2	DOOR-STOP RAM PANEL	50	036701	2	SCREW PPHM #10-32 X 1/2
13	0D6947	2	HINGE CONTINUOUS	51	033120	2	SCREW HHC #10-32 X 3/8
14	036261	12	RIVET POP .125 X .129-.133/#30	52	023897	4	WASHER FLAT #10 ZINC
15	0A4087	1	MSTR CTRL BOX E-PNL	53	022152	9	WASHER LOCK #10
16	SEE NOTE 1	1	VOLTMETER	54	022158	3	NUT HEX #10-32 STEEL
17	SEE NOTE 1	1	FREQUENCY METER	55	074908	4	SCREW HHTT M5-0.8 X 10 BP
18	SEE NOTE 1	1	AMMETER	58	023365	1	WASHER SHAKEPROOF INT #8
19	061945	1	SWITCH SELECTOR 6A AMP/V	59	0C2699	6	SCREW PHTT #6-32 X 3/8 ZYC
20	061286	1	SOUNALERT, BUZZER	60	0C2428	2	SCREW PHTT #6-32 X 1/2 ZYC
21	098426A	1	SWITCH EMERG PB HEAD	61	036901	4	SCREW PPHM #6-32 X 3/8
22	098426C	3	SWITCH EMERG PB N.C.	62	022985	6	WASHER FLAT #6 ZINC
23	032300	1	HOLDER FUSE	63	022155	6	WASHER LOCK #6
24	022676	1	FUSE 15A X AGC15	64	022188	6	NUT HEX #6-32 STEEL
25	0D8374	2	MINI LAMP BASE ASM. W/O BULB	65	074129	2	LUG DIS SN-RCPT I-T 22-18 BR
26	0D8809	2	BULB 24 VOLT	66	074130	2	LUG DIS SN-PLG I-T 22-18 CU
27	0C4110	1	RELAY 24V 50A W/DIODE	67	0E3783	1	DECAL WARNING REMOVE FUSE
28	057335	1	BLOCK TERM 20A 20 X 6 X 1100V	68	0E5455	*	DECAL GENERAC POWER SYSTEMS
29	055911	2	BLOCK TERM 20A 12 X 6 X 1100V				
30	048850	1	BLOCK TERM 20A 5 X 6 X 1100V				
31	046669	16	BLOCK TERM JUMPER				
32	0D8625	1	DECAL TB1 E PLUS CONTROL PANEL				
33	0D8626	1	DECAL TB2/3 E PLUS CONTROL PNL				
34	0C2688	1	DECAL TERM STRIP TB4				
35	091472	1	DUCT WIRING 1X1.5 6 FT (24"LG)				
36	091472A	1	COVER WIRE DUCT 1 IN (24"LG)				
37	0C5137	1	CONN DEUTSCH RECEPT BK/FLN				
38	0C5148	1	CONN DEUTSCH WEDGE LOCK 12-WAY				

*DECAL NOT USED ON PRIVATE LABELED UNITS.

NOTES: 1.) CONTACT GENERAC SERVICE FOR CORRECT PART NUMBER FOR YOUR UNIT.
 2.) USE GROMMET (ITEM #42) TO PROTECT CUSTOMER COMMUNICATIONS CABLE WHERE IT ENTERS THE CONTROL PANEL THROUGH THE BACK.

GENERAC® POWER SYSTEMS, INC.

P.O. BOX 8
WAUKESHA, WI 53187

Part No. OD9344

Revision C (07/18/03)

Printed in U.S.A.