

Q-LS ATS

Asynchronous Transfer Switch



Installation and Operation Manual

MNL128

Rev 3.1

Export Classification EAR99

**READ THIS MANUAL
CAREFULLY SAVE ALL
INSTRUCTIONS**

This manual contains important information needed to operate the Q-LS™ safely and efficiently. Please read all instructions carefully before installing or operating equipment.

Keep this manual handy for easy reference.

ELECTRICAL WARNING



Applying information contained in this manual to any other product, including customized Q-LS systems with nonstandard specifications, may cause injury.

Q-LS™ ATS system are registered trademarks of Power Innovations International, Inc. are trademarks of Power Innovations International, Inc.

This manual may accompany other instructional addendums about additional customizations to standard Q-LS™ systems. Please contact Power Innovations if additional manuals are needed and have not been received.

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1—Introduction

Congratulations on purchasing Power Innovations International, Inc.'s *Q-LS Series* uninterruptible power quality (UPQ) system. Power Innovations prides itself on the long life of its UPQ systems and hopes that this system will serve you well for a long time.

The Q-LS™ Asynchronous Transfer Switch (ATS) is designed to help ensure system uptime by switching to a secondary power source if the primary power source goes outside a specified safe range. The ATS uses advanced circuitry and a paired static switch to ensure switching happens without any interruption in output power.

This ATS cabinet features an easy-to-use LCD display, LED lights, and a status indicator showing the power flow. Depending on its capacity, the system comes in either a single-wide or double-wide cabinet. Using MODBUS, the ATS can be remotely monitored.



Manual Helps

For warranty and customer service information about this product, see the warranty information at the back of this manual.

1.1—Using this Manual

This manual will show how to safely receive, unpack, and install Power Innovations' ATS cabinet. Read and understand this manual to make installing and operating the system as easy as possible.

1.1.1 —Conventions Used in This Manual

To make this manual easier to read, several formatting conventions have been adopted.

1.1.1.1 —ADDITIONAL ADVICE

This manual will occasionally provide additional advice. When it is provided, this information will be enclosed by a set of lines to separate it from the rest of the text, like this:

This text does not belong with the rest.

Some of the information is very important, while other information may be good to know. To show the importance of each piece of information, the following symbols are used:



ELECTRICAL WARNINGS

Denotes advice that, if not followed, could cause severe bodily harm or death due to electrical shock.

WARNINGS



Denotes advice that, if not followed, could cause severe bodily harm or death due to other types of injury.

Cautions



Offers advice that, if not followed, may harm equipment or indirectly cause physical hazards.

Notes



Offers practical advice that may be helpful, but can be disregarded.

Additionally, the following symbols indicate information intended to clarify information listed in the manual.

For example...



Provides an example intended to illustrate information presented in the text.

Manual Helps



Provides references to other sections in this manual that could also be helpful.

Additional Manual



Provides references to other manuals that may also be provided with this system.

Usually these symbols will be listed in order of importance.

1.1.1.2 —BREAKER POSITIONS

Because some breakers on the front of the *Q-LS Series* share names with its subsystems or operation modes, breakers and their positions will be identified using all caps. Additionally, the words CLOSED and OPEN are always capitalized to stress which position is correct.

This convention exists to prevent the system components from becoming confused with names of breakers. Skimming the words that are capitalized can also serve as a quick-reference method for learning the functions of the breakers located on the front of the unit.

1.1.1.3 —KEY IDENTIFICATION

The first time a key located on the display is mentioned, both the name of the key and the symbol used on the key will be included. In the following references, only the symbol for the key will be used.

1.1.1.4 —TYPE CONVENTIONS

Menu options will be placed in uppercase letters and formatted as they appear onscreen.

1.1.1.1 —CABINET VS. SYSTEM

In this manual, the word *cabinet* refers to the actual *Q-LS* cabinet (or cabinets, for multi-cabinet systems). An external battery cabinet (or cabinets, for more than one string of batteries) will be referred to as a *battery cabinet* or *battery unit*.

The entire power quality system will be referred to as an uninterruptible power quality system (or UPQ), a *Q-LS* or a *Q-LS* system. These terms do not refer to one cabinet or set of cabinets.

They refer to the full system and everything that supplies power to it, including the battery cabinets, the *Q-LS* cabinet that controls the system, and any other cables or external controls.

1.1.1.2 —PHASE NAMES

This manual and the *Q-LS Series* system use both the global standard (R, S, T) *and* the North American standard (A, B, C) for the power phases and terminal connections.

On all labels, documentation, and components, they are used interchangeably: R=Phase Connection A; S=Phase Connection B; T=Phase Connection C.

1.2—Safety Warnings and Cautions

This section provides important information that you will need to remember in order to safely operate your system. Read it carefully.

This manual provides very little information about maintaining the unit. Such information is provided in a separate manual.

All maintenance must be performed by a service technician who has completed a training and certification course on the *Q-LS* system offered through Power Innovations. During that training course, a separate manual is provided to the service technician to use while maintaining the unit.

For ease in reading warnings and cautions, they have been divided into four sections, **Manual Use**, **Installation and Maintenance**, and **Safe Transport and Storage**.

1.2.1 —Manual Use



Read this manual carefully before operating or troubleshooting the ATS, and follow all operating instructions. Failure to do so may cause physical harm or death.



Obey all warnings within this manual. Failure to do so may void the system warranty.

1.2.2 —Installation and Maintenance

The ATS must be bonded to the facility electrical system.



This system contains high voltage power that is potentially dangerous if not handled properly. All repairs should be performed only by those who have completed Power Innovations' service training course. In order for the warranty to apply, wiring for the ATS and attached systems must be commissioned by personnel who have completed Power Innovations' *Q-LS* training and certification course.



This unit contains no interior parts that can be serviced without qualified personnel. If troubleshooting processes specified in this manual fail to solve a problem, qualified personnel must service the unit.

In order for ATS and attached Q-LS systems to operate properly, it should be periodically inspected and cleaned. This routine inspection and cleaning should be completed every 90–180 days.

1.2.3—Safe Transport and Storage



To avoid accidental worker injury, place this system in an area with limited access and ensure that all cables are placed carefully.



The Q-LS and ATS should be stored in a temperature-controlled indoor environment that is clean, dry, and free of flammable liquids and corrosive substances such as hazardous gases.



The ATS cabinet should be transported carefully so that the unit is not damaged. Avoid dropping the unit, tipping it upside down, or any other rough handling.

1.2.4—Operation



Retain the load within the Q-LS system rating guidelines to ensure that the ATS functions well. DO NOT insert any object into any of the ventilation holes or any other cabinet openings

1.2—ATS Topology

The ATS has two input sources, the primary (Input A) and the secondary (Input B) (Figure 1).

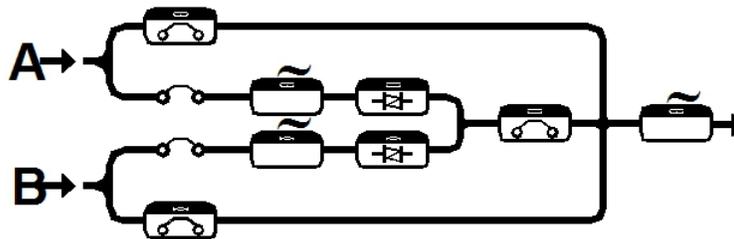


Figure 1: A/B Power Flow Topology

The ATS will provide output power from the primary source as long as the primary source is in the specified voltage and frequency range. If the primary source goes out of range, the ATS will automatically switch to the secondary input without interrupting output power.

When the primary source returns to within the specified range for at least three (3) seconds, the ATS will automatically switch back to the primary power source.

The Q-ATS static switch enables the system to automatically switch between primary and secondary input sources without interrupting output power. The static switch is composed of two pairs of Silicon Controlled Rectifiers (SCRs) with a shared output.

Detection circuitry allows immediate power switching and to confirm that switching has occurred.



See **Appendix B—System Topology** for a detailed diagram of the Q-ATS.

1.3.1—Modes of Operation

The ATS has four different operational modes:

1.1.1.1 —OUTPUT ON A

When operating normally, power enters the system through the primary (A) input and exits through the output.

Both the primary (A) and secondary (B) input breakers and the output breaker should be closed (ON). Both bypass breakers should be open (OFF).

1.1.1.2 —OUTPUT ON B

If the primary (A) input goes outside of the specified acceptable voltage and frequency range, the static switch will automatically switch. Power will then enter the system through the secondary (B) input and exit through the output.

Both the primary (A) and secondary (B) input breakers and the output breaker should be closed (ON). Both bypass breakers should be open (OFF).

1.1.1.3 —BYPASS A

Automatic switching is disabled using the primary (A) BYPASS breaker. When the A BYPASS circuit breaker is closed (ON), automatic switching is disabled and power is routed only from the selected input to the output.

After putting the system in Bypass mode, both the **A** and **B INPUT** breakers should be OFF. Bypass mode can be used to perform maintenance, such as replacing fans or Rapid-Replace Modules, without interrupting power output.

1.1.1.4 —BYPASS B

Automatic switching is disabled using the secondary (B) BYPASS breaker. When the B BYPASS circuit breaker is closed (ON), automatic switching is disabled and power is routed only from the selected input to the output.

After putting the system in Bypass mode, both the **A** and **B INPUT** breakers should be OFF. Bypass mode can be used to perform maintenance, such as replacing fans or Rapid-Replace Modules, without interrupting power output.

ELECTRICAL WARNING



Never close both bypass breakers at the same time. Closing both bypass breakers will short both sources together.

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2—Installation

The ATS cabinet must be properly installed in a suitable location. The ATS should be in close proximity to the system(s) that it will control.

ELECTRICAL WARNING



Failure to properly install the cabinet could result in damage to the system, as well as injury to personnel servicing the system.

2.1—Selecting an Appropriate Location

For optimal ATS operation, the location in which the cabinet will operate should be chosen carefully.

2.1.1 —Ventilation Space

The cabinet should be installed in a location with:

- Adequate front access (1 m) to open the front door.
- At least 1 m above the system for proper ventilation.
- At least 1 m to cabinet's side or rear for maintenance access.
- Ample airflow to draw heat away from the operating system.

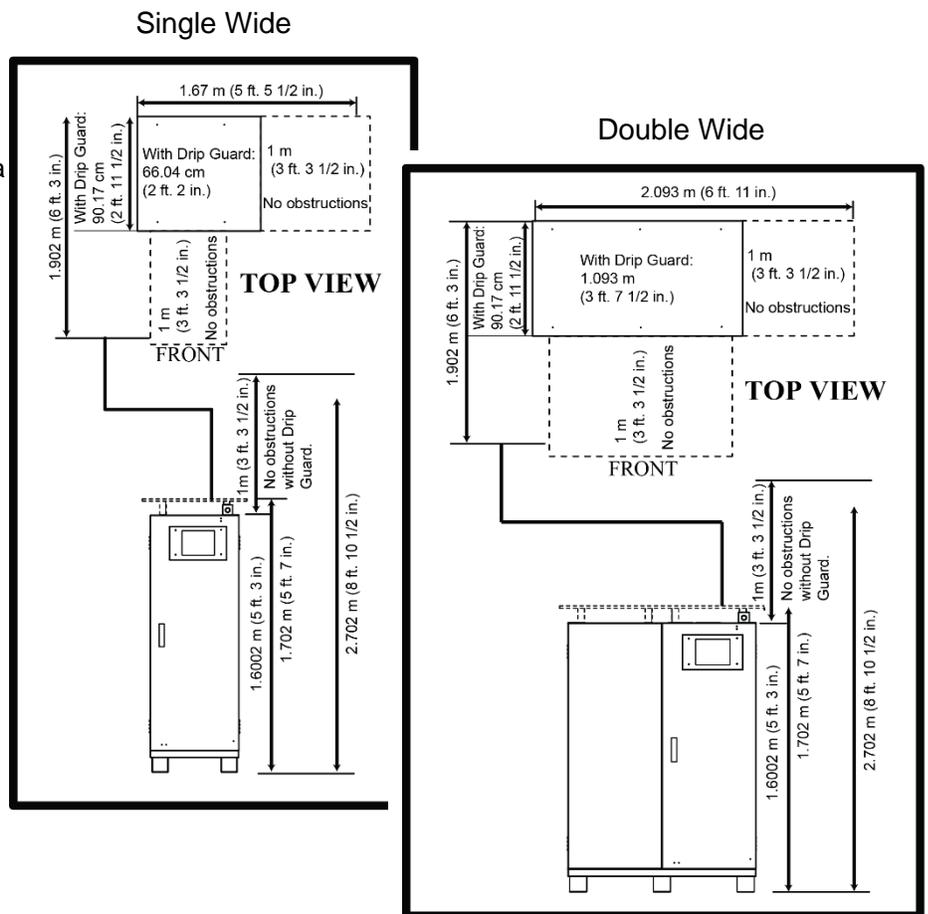


Figure 4: ATS Clearances

2.1.2—Environmental Protection

The installation site should be free of combustible materials, including combustible:

- Walls
- Ceiling
- Floors
- Nearby items (whether mobile or mounted)

Table 1 presents other important considerations for environmental and personnel protection.

Table 1: External Installation Conditions

Condition	Optimal	May Work	Avoid
Temperature	32 °F – 77 °F 0 °C – 25 °C	77 °F – 104 °F 0 °C – 40 °C	<32 °F (0 °C) >104 °F (40 °C)
Surface	Reinforced; noncombustible; even; system mounted.	Leveling brackets added. System mounted. Floor reinforced. Noncombustible surface.	Uneven surfaces; unmounted systems; weak flooring; combustible flooring.
Humidity	Less than 80% noncondensing.	-- -	More than 80% noncondensing.
Room location	Away from all heat and moisture. Close to easily accessible fire extinguisher.	-- -	Beneath the shower of fire sprinklers; near heat sources; distant fire extinguishers.
Exposure to Elements	Indoors; completely protected from dust, debris, moisture.	Shielded by lean-to or overhang.	Direct (wind, rain, sunlight, snow, sand, dust).**

*For more information about mounting refer to **6.1—Placing and Mounting** in the *Q-LS Series Installation and Operation Manual*.

**For complete protection against the elements, Power Innovations offers the option of installing the ATS inside a weather-safe container.



ELECTRICAL WARNING

Improper site selection could cause injury or void the system warranty.



Caution

Not installing the ATS in a protected environment may result in poor system operation.

2.2—Cable Installation

The ATS is connected to the output load(s) and Power Supplies from the Q-LS A and Q-LS B systems by cables connected to terminal blocks inside the base of the ATS. The connections between the ATS output and the load(s) should be made before the ATS is connected to input supplies A and B.

ELECTRICAL WARNING



Confirm that input power to the ATS is turned OFF and locked out before beginning the installation.

2.2.1 —Grounding

The ATS must be grounded to the facility electrical system.

When replacing panels removed for service or installation, always make sure that the individual panel grounding connectors are connected.

ELECTRICAL WARNING



Not checking ground connections could cause death by electrocution.

2.2.2 —Connecting Cables

The cabinet should be connected by a certified electrician, using appropriately sized cables.

Cables should be installed using fixed conduit or other applicable methods as allowed by local electrical codes.

Caution



Cables of incorrect length, construction, or size could cause damage or impair the system.

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3—Operation

3.1—Switching ON the ATS

To turn the ATS ON:

- 1** Switch ON the INPUT A breaker.
- 2** Switch ON the INPUT B breaker.
- 3** Switch ON the OUTPUT breaker.

3.2—Switching OFF the ATS

To turn the ATS OFF:

- 1** Switch OFF the OUTPUT breaker.
- 2** Switch OFF the INPUT B breaker.
- 3** Switch OFF the INPUT A breaker.

3.3—Entering Bypass Mode

ELECTRICAL WARNING



Only one **BYPASS** breaker should ever be turned ON at any given time. Turning on both **BYPASS** breakers will short both sources.

A mechanical interlock is installed on the breaker section dead-front to prevent electrical arcing. If this dead-front panel is removed, no other interlocking method is present.

To put the ATS in bypass mode:

- 1** Turn ON the BYPASS breaker corresponding to the currently selected input source (for example, if the output is powered by source A, turn ON BYPASS A).

ELECTRICAL WARNING



Never turn ON a BYPASS breaker not corresponding to the currently selected input source. Turning ON the wrong BYPASS breaker may cause an electrical short.

- 2** Turn OFF the OUTPUT breaker.
- 3** Turn OFF both INPUT breakers.
- 4** Open all fuses located behind the main control panel.

3.4—Exiting Bypass Mode

To return from bypass mode to normal operation:

- 1** Close all fuses located behind the Control Panel.



Caution

Failure to open the fuses will not allow the Static Switch to activate.

- 2** Turn ON the INPUT breaker for the line that is currently being used for Bypass.

For example...



For example, if Bypass A is active, close INPUT breaker A.

- 3** Make sure the Static Switch LED for the currently active line is illuminated proceeding to the next step.



Caution

Failure to wait for this light to illuminate will cause the load to be dropped.

- 4** Turn ON the OUTPUT breaker.

- 5** Turn OFF the BYPASS breaker.

The system is now back to normal operation.

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4—LCD Panel

The LCD panel is located at the top-center inside the front door of the ATS cabinet. The panel consists of three main sections:

- 1 A flowchart display located in the center of the LCD panel.
- 2 Status notifications via a bank of *Status/Warning LED lights* and a *buzzer indicator*.
- 3 Menu navigation and ATS control via *navigation keys* and the *LCD Display*.

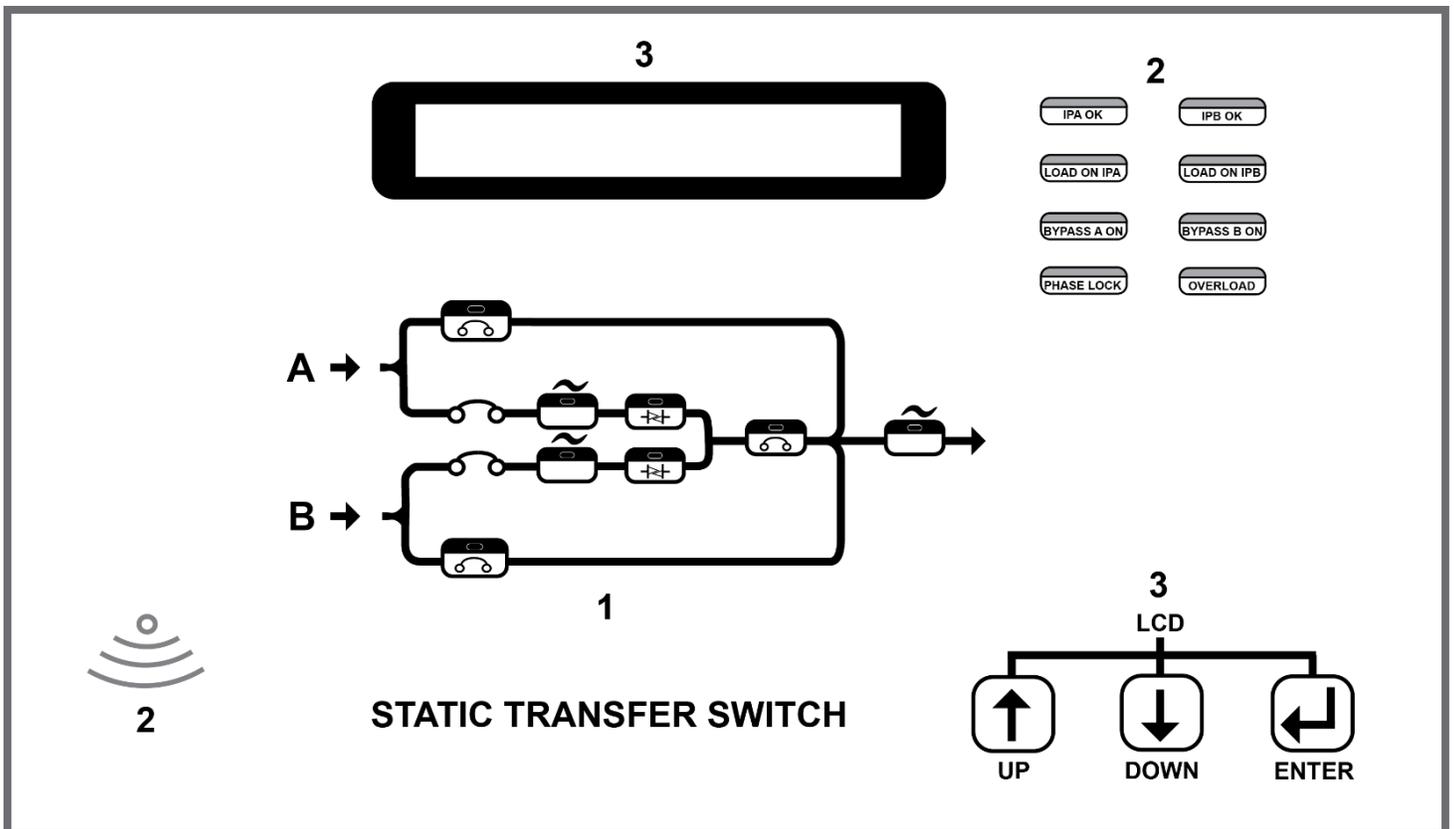


Figure 7: ATS LCD Display

4.1—Flowchart Display

The flowchart display is a power flow topology equipped with a bank of eight (8) LED lights (**Figure 4**). These lights provide an easy-to-read status update for the system.

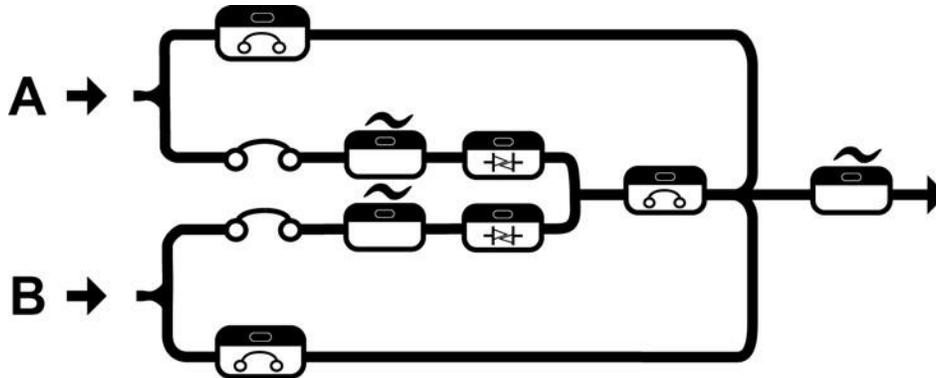


Figure 10: ATS Flowchart Display

4.1.1 —Input LED Indicators

- 1 Bypass Input A**—Illuminates when the **INPUT A BYPASS** breaker is closed (ON).
Output current is provided by Input A.
Automatic switching is disabled when the system is in Bypass mode.
- 2 Bypass Input B**—Illuminates when the **INPUT B BYPASS** breaker is closed (ON).
Output current is provided by **Input B**.
Automatic switching is disabled when the system is in Bypass mode.

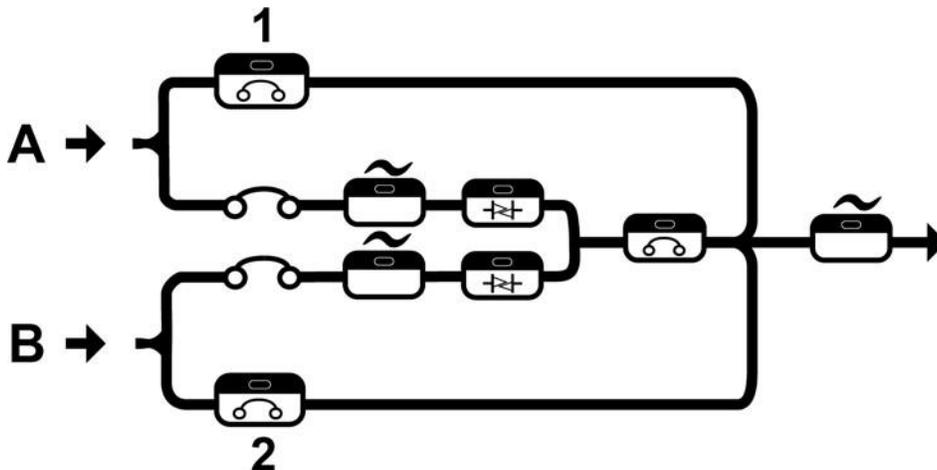


Figure 13: Flowchart Input LEDs

- 3 Input A Available**—Illuminates when power is available through **Input A** and the **INPUT A** breaker is closed (ON).

In Normal Operation mode, output current will be provided from **Input A**.

- 4 Input B Available**—Illuminates when power is available through **Input B** and the **INPUT B** breaker is closed (ON).

If power from **Input A** is outside the specified limits or if **Input B** is manually selected, output power will be provided from **Input B**.

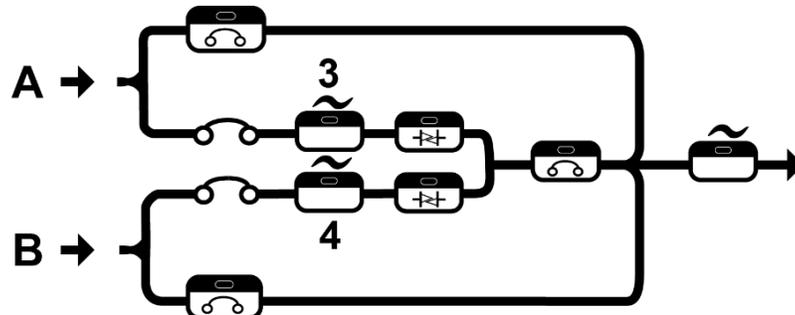


Figure 15: More Flowchart Input LEDs

4.1.2 —Output LED Indicators

- 5 Input A Selected**—Illuminates when **Input A** Static Switch is ON and output power is being provided through **Input A** (Normal Operation).
- 6 Input B Selected**—Illuminates when **Input B** Static Switch is ON and output power is being provided through **Input B** (Backup Operation Mode).
- 7 Available Output**—Illuminates when the output breaker is closed (ON) and that output power is available.
- 8 Power to Load**—Illuminates to indicate that power is available at the output terminals.

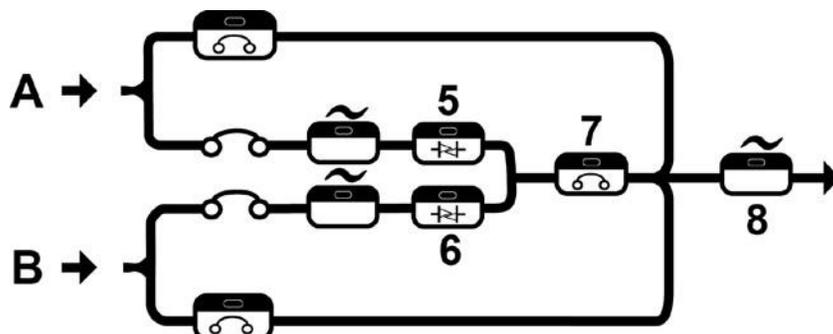


Figure 18: Flowchart Output LEDs

4.2—Status Notification

The status notification section consists of a notification/alarm buzzer and a Status/Warning bank of LED lights.

4.2.1—Status/Warning LEDs

The eight (8) Status/Warning LEDs are located on the top-right side of the control panel (**Figure 21**).

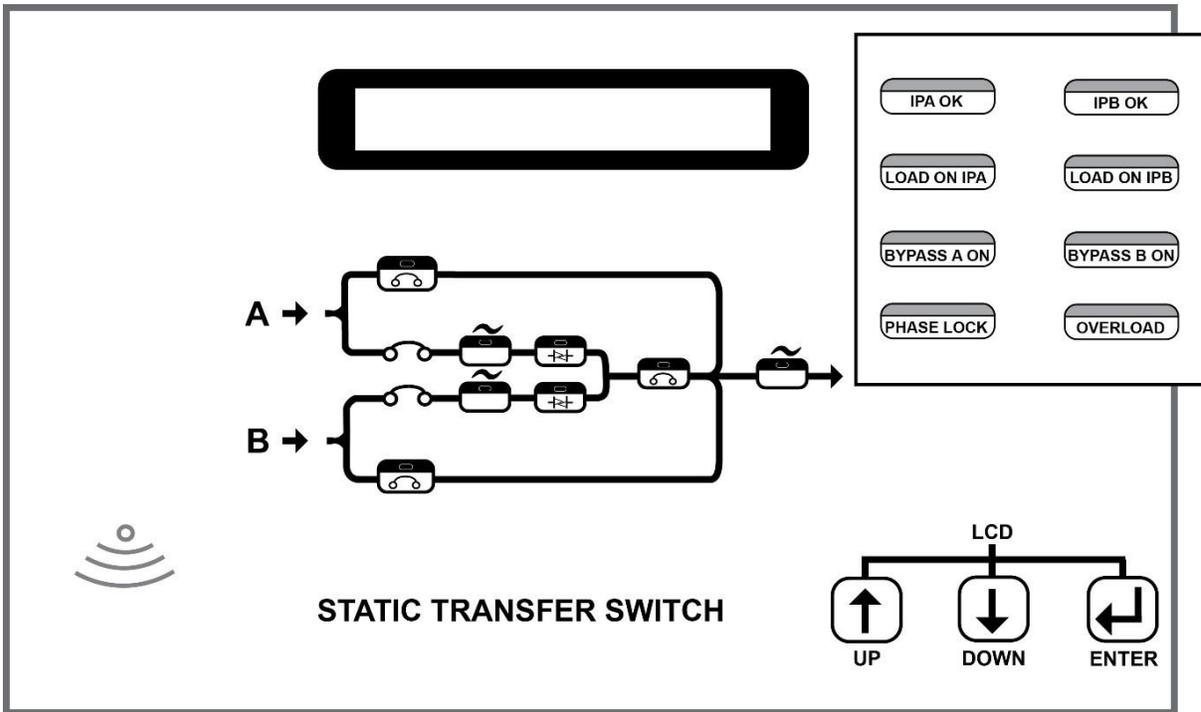


Figure 21: Location of Status/Warning LEDs

4.2.1.1 —LED INDICATOR OVERVIEW

- 1 IPA OK:** Input A available.
- 2 LOAD ON IPA:** Input A carries load.
- 3 BYPASS A ON:** BYPASS A breaker turned ON.
- 4 PHASE LOCK:** Phase offset between sources is within maximum tolerance. Manual switching is enabled.

- 5 IPB OK:** Input B available.
- 6 LOAD ON IPB:** Input B carries load.
- 7 BYPASS B ON:** BYPASS B breaker turned ON.
- 8 OVERLOAD:** Output power draw is above 110%.

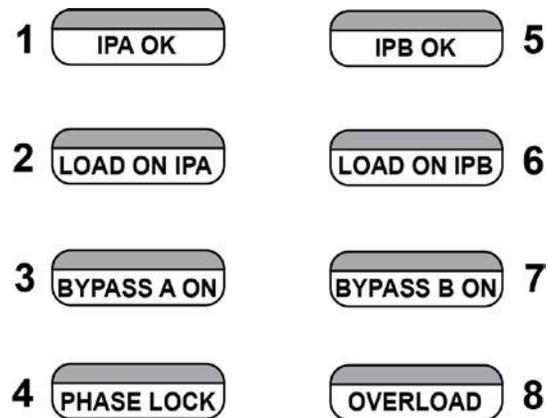


Figure 24: LED Indicators

4.2.2 —Notification/Alarm Buzzer

The buzzer icon is located on the lower-left side of the control panel (Figure 8). The buzzer itself will sound when important warnings or alerts require attention.

Table 2: Notification Alarms by Frequency and Urgency

Sound	Meaning	Level of Urgency
Solid tone	Critical Fault	Immediate
Frequent short beeps	Urgent Warning	Very Important
Less frequent beeps	Warning	Important
Silence	Normal Operation	None

Any time the buzzer beeps, see the alert LEDs on the control panel or the *Status/Warn/Fault* screen on the LCD Display to determine the nature of the alert.

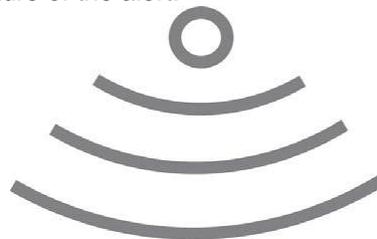


Figure 27: Notification/Alarm Buzzer

4.3—Menu Navigation Section

The menu navigation section of the control panel consists of two parts:

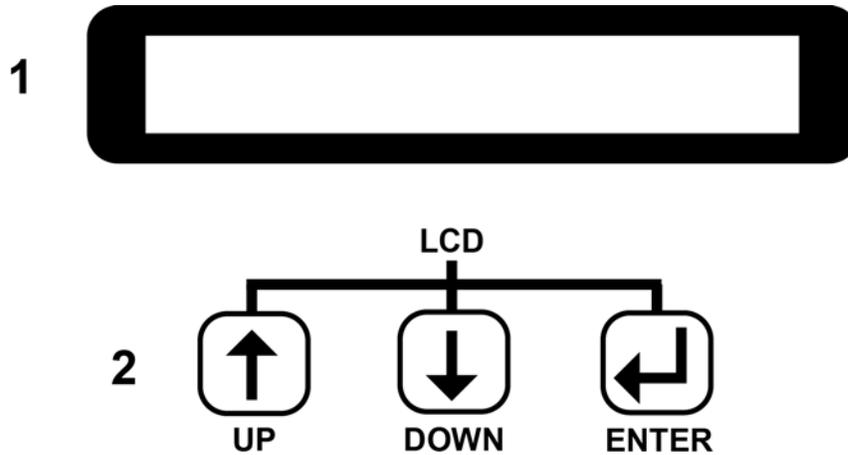


Figure 30: Navigation Keys and Display

- 1** A LCD screen located on the top-center of the control panel.
- 2** A set of three (3) keys located on the lower-left side of the control panel.
The three (3) keys are used to navigate the menu options shown on the LCD display.

The next chapter will cover menu options.

4.3.1 —Basic Key Operation



UP

Use to scroll upward through LCD navigation



DOWN

menus. Use to scroll downward through LCD

navigation menus.



ENTER

Use to confirm all menu selections and to progress to submenus.

The next chapter will present more information about using these three (3) keys to select menu options

5—Navigating Menus

The LCD Display is used to view or manage information and settings for the ATS. The main menu is called the select menu, and the order of menus is shown in **Figure 33** below.

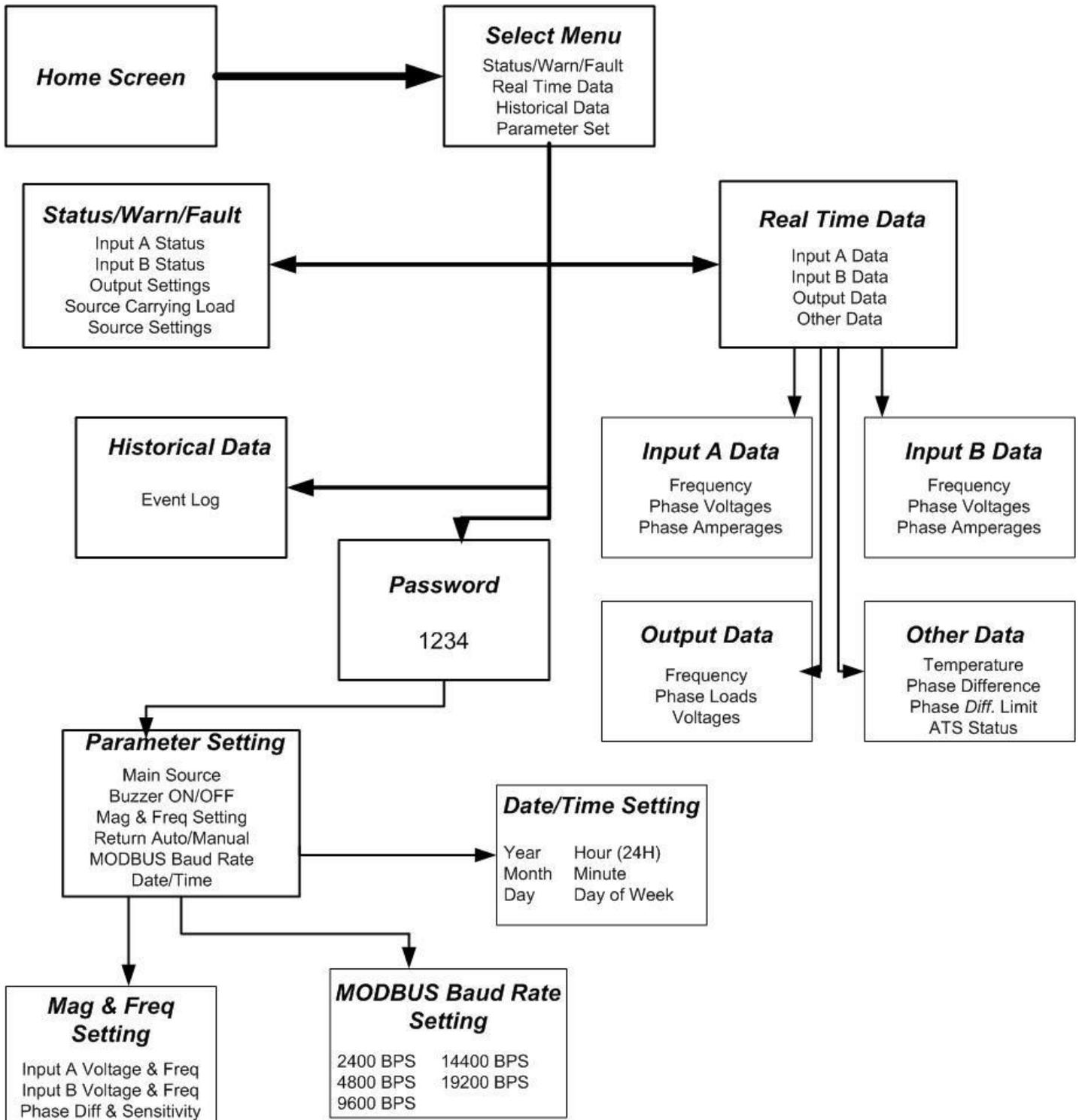


Figure 33: Menu Tree, LCD Display

5.1—Main Screen

The main screen displays general information about the system. When the menu keys are inactive, the ATS will show the main screen.

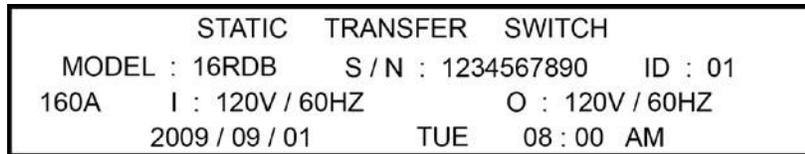


Figure 36: Menu Main Screen

From this screen, press any button ([Up], [Down], or [Enter]) to view the *Select Menu*.

5.2—Select Menu

The *Select Menu* allows the user to access specific functions or information. To use the *Select Menu*:

- 1 Press or to move the arrow cursor between menu options.

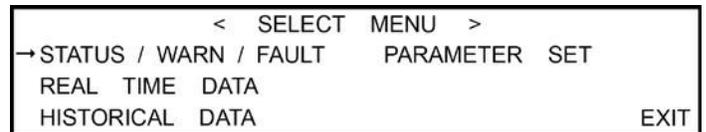


Figure 39: Select Menu

- 2 Press to confirm the indicated menu choice.

Notes



From the *Select Menu*, Select **EXIT** to return to the *Main Menu*. Unlike other menu options, the word **EXIT** will blink when it is selected.

5.2.1 —Status/Warn/Fault Screen

The *Status/Warn/Fault* screen is accessed through the *Select Menu*.

Figure 42 shows the system in Normal Operation mode (no faults/warnings).

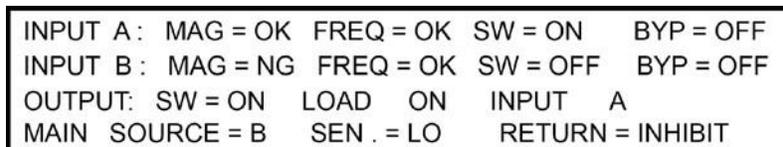


Figure 42: Status/Warn/Fault Screen

The first two lines of this screen show the magnitude, frequency and static switch selections for Inputs A and B.

The third line shows output information and the selected primary source, along with the source currently being used. SEN, located on the fourth line, shows the voltage sensitivity switch window. RETURN shows whether or not the system will return to the primary source after the ATS automatically switches to the secondary source. If the reading is INHIBIT, the source will not return automatically to the primary source after a switch.

Note



No settings can be changed using this screen. From the *Status/Warn/Fault* screen, press to return to the *Select Menu*.

5.2.2 —Real-Time Data Menu

The *Real-Time Data Menu* is accessed through the *Select Menu*. It allows the user to view specific real-time data, including input data for Input A and B, Output Data, and other data.

To use the *Real-Time Data Menu*:

1

Press  or  to move the cursor arrow between menu options.

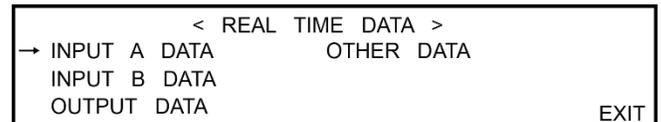


Figure 45: Real Time Data Menu

2

Press  to confirm the selected menu option.

Note



Select **EXIT** to return to the *Select Menu*.

Unlike other menu options, the word **EXIT** will blink when it is selected.

5.2.2.1 —INPUT A DATA SCREEN

The *Input A Data* screen is accessed through the *Real Time Data Menu*. It displays real-time data about the power from **Input A**.

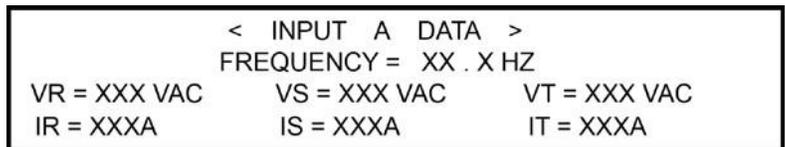


Figure 47: Input A Data Screen

Note



From the *Input A Data* screen, press  to return to the *Real Time Data Menu*.

5.2.2.2 —INPUT B DATA SCREEN

The *Input B Data* screen is accessed through the *Real-Time Data Menu*. It displays real-time data about the power from **Input B**.

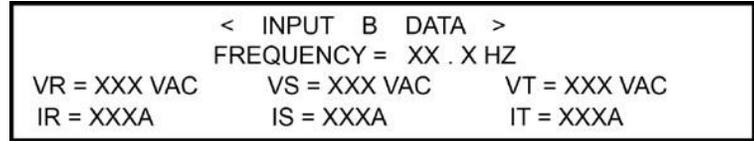


Figure 50: Input B Data Screen



Note

From the *Input B Data* screen, press  to return to the *Real Time Data Menu*.

5.2.2.3 —OUTPUT DATA SCREEN

The *Output Data* screen is accessed through the *Real Time Data Menu*. It displays real-time data about the power output.

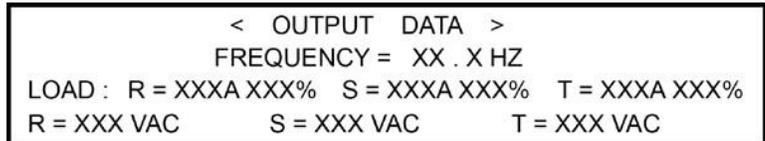


Figure 53: Output Data Screen



Note

From the *Output Data* screen, press  to return to the *Real Time Data Menu*.

5.2.2.4 —OTHER DATA

The *Other Data* screen is accessed through the *Real-Time Data Menu*. It displays real-time data about ATS status.

The displayed data will include system temperature and phase information.

Using **PHASE DIFF LIMIT on the lower-left side of the screen**, set the phase difference threshold for switching between **Inputs A** and **B**. This feature offers complete control of input sources.

The lower-right side of the screen will display whether the ATS is operating in an emergency state.

Three statuses exist: Normal, Warning, and Alarm. Alarm is most urgent. It means the system requires immediate attention.

< OTHER DATA >			
TEMPERATURE = XX ° C			
PHASE DIFFERENCE = XXX °			
PHASE DIFF. LIMIT = XX °	STATUS = NORMAL		

Figure 56: Other Data screen



Note

From the *Other Data* screen, press  to return to the *Real-Time Data Menu*.

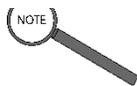
5.2.3 —Historical Data Screen

The *Historical Data* screen is accessed through the *Select Menu*. It displays the three most recent events in the system history log.

< DATE / TIME / EVENTS >			RECORD NO. = 157
23	2009\03\29	09:32	SHORT CIRCUIT!
24	2009\05\01	22:25	INPUT A FAIL
25	2009\05\01	22:54	INPUT A RECOVERED

Figure 59: Date/Time Events screen

The log will store information about the 157 most recent abnormal events (startup, shutdown, warnings, and faults). The top-right side of the screen displays the total number of stored events.



Note

Press  to move one record up (select an older entry) in the log.

Press  to move one record down (select a newer entry) in the log.

Press  to return to the *Settings* menu.

5.2.4 —Parameter Setting Menu

The Parameter Setting menu allows the user to modify settings used by the ATS.

5.2.4.1 —ACCESSING THE MENU

Enter the default password (1234) to access the *Parameter Setting Menu*:

- 1 Use  or  to change the first number to the correct value. The selected number will blink until it is confirmed.

- 2 Press  to confirm the selection.

- 3 Repeat **Steps 1** and **2** for the second through fourth values.

If the correct password has been entered, the selected screen will appear (**Figure 65**). If the password is wrong, the user will be returned to the previous screen.



Figure 62: Password screen

5.2.4.2 —MAKING SELECTIONS

Once on the *Parameter Setting Menu*:

- 1 Press  or  to move the cursor arrow between menu options.

- 2 Press  to confirm the selected menu option.

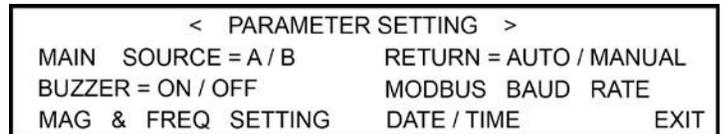


Figure 65: Parameter Setting Menu

5.2.4.3 —SELECTING MAIN SOURCE

MAIN SOURCE is used to manually switch the Static Switch from one source to the other. This manual switching of sources can only be performed if input phase lock tolerance is within the currently designated threshold.

- 1 With *MAIN SOURCE* selected, press  or  to switch to the desired power source.

- 2 Press  to save the setting and return to the *Parameter Setting* menu.

5.2.4.4 —SELECTING BUZZER

BUZZER is used to switch the audible buzzer ON or OFF. To switch the buzzer ON

1 or OFF: Press  or  to turn the buzzer ON or OFF.

2 Press  to save the setting and return to the *Parameter Setting* menu.

5.2.4.5 —MAG & FREQ SETTING SCREEN

The *Mag & Freq Setting* screen is accessed through the *Parameter Setting* menu. It is used to set the acceptable range used by the ATS.

```

    < MAG & FREQ SETTING >
    → INPUT A : VOLTAGE = +XX% -XX% FREQ = X . X HZ
    INPUT B : VOLTAGE = +XX% -XX% FREQ = X . X HZ
    PHASE DIFF = XXDEG SENSITIVITY = LO EXIT
```

Figure 68: Mag & Freq Setting screen

If the Voltage or Frequency on the input for UPQ1 (source 1) goes outside the allowed setting, the ATS will automatically switch to UPQ2 (source 2).

Phase Diff and Sensitivity dictate what the conditions are between two sources before a non-emergency switch.

For example...



After switching because the primary input failed, upon its return an automatic return to the primary input will only occur if the phase diff and voltage sensitivity are within limits set here.

1 Press  or  to move the cursor arrow between menu options. Each menu option will blink as it is selected.

2 Press  to confirm the selected menu option.

Notes



Select **EXIT** to return to the *Select Menu*. Unlike other menu options, the word **EXIT** will blink when it is selected.

5.2.4.5 A—Selecting *Input A* and *B* Voltages

The **Input A** and **Input B** options configure the acceptable voltage range and target frequency:

- 1 Press  or  to increase or decrease the selected range or frequency option. Each option will blink as it is selected.
- 2 Press  to accept the value and continue to the next option.
- 3 Press  after the range or frequency has been set to return the cursor to the main *Mag and Freq Setting* screen.

5.2.4.5 B—Phase Diff and Sensitivity

The *Phase Diff* and *Sensitivity* options configure the allowed variation in phase offset:

- 1 Press  or  to increase or decrease the selected option. When an option is selected, it will blink.
- 2 Press  to accept the value and continue to the next option.
- 3 Press  after the sensitivity range has been selected to return the cursor to the main *MAG and FREQ Setting* screen.



Notes

Select EXIT to return to the *Parameter Setting* Menu. The word EXIT will blink when it is selected.

5.2.4.6 —SELECTING RETURN

RETURN is used to select whether the system will automatically revert to the primary input source when it returns to an acceptable range.

In *Auto* mode, the system will revert to primary input if it returns to and remains in the acceptable range for at least three (3) seconds.

In *Manual* mode, use the **MAIN SOURCE** setting to switch back to the primary input. User intervention is required in order to return to the primary source after an input failure (**Figure 65**).

1 Press  or  to switch which option is selected. When an option is selected, it will blink.

2 Press  to save the setting and return to the *Parameter Setting* menu.



Notes

Select EXIT to return to the *Select Menu*. The word EXIT will blink when it is selected.

5.2.5 —MODBUS Baud Rate Setting Menu

With the *MODBUS Baud Rate Setting Menu*, configure all Baud Rate settings.

1 Access this menu by selecting *MODBUS BAUD RATE* from the *Parameter Settings Menu*.

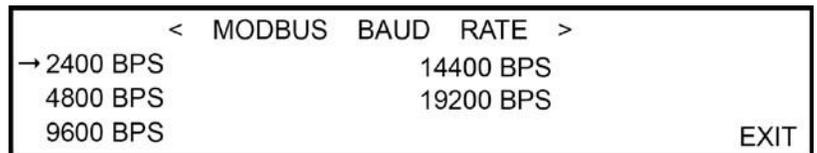


Figure 71: MODBUS Baud Rate Setting Menu

2 Select the communication baud rate used by the device(s) connected to the MODBUS terminal. The MODBUS terminal is located inside the control panel.

Manual Helps



More information about MODBUS communication from the ATS is located in **Appendix C—MODBUS Information**.

5.2.6—Date/Time Setting Screen

The Date/Time Setting Screen is accessed through the *Parameter Setting Menu*. It is used to set the current time/day/date used by the ATS.

- 1 Press  or  to move the cursor arrow between menu options.

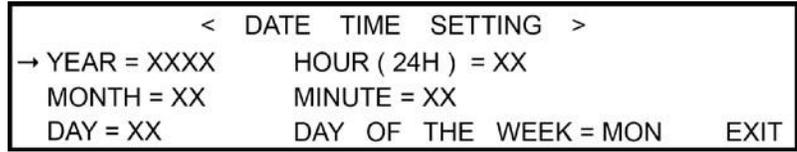


Figure 74: Date Time Setting

- 2 Press  to select the indicated menu option.

When an option has been selected, it will begin blinking.

- 3 Press  or  to increase or decrease the blinking option.

- 4 Press  to accept the value and continue to the next value.

- 5 Press  after the last value to save the setting and return the cursor to the main *Date/Time Setting* menu.

Notes



Select **EXIT** to return to the *Parameter Setting* Menu. The word **EXIT** will blink when it is selected.

6—Dry Contacts

The ATS contains several dry contacts located inside the control panel on TR PCB. These contacts can be used for remote monitoring of the system.

Each contact consists of terminals for connecting a normally open circuit. When the designated event occurs, the contact will close and complete a circuit.

Notification will be sent using computer interface options.

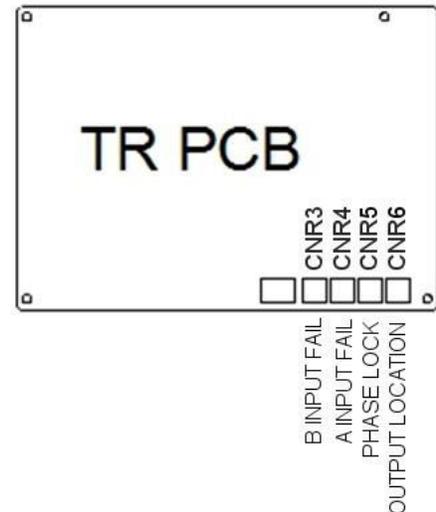


Figure 77: TR PCB (located inside control panel)

6.1—Notification Meanings

CNR3—B Input Fail: Power is not available at the **B**

Input. CNR4— A Input Fail: Power is not available

at the **A Input**.

CNR5—Phase Lock: Phases are locked. The user-specified phase lock window has been achieved.

CNR6: Output Location: The contact position indicates which source has been selected for the output.

Open contact: Indicates the Static Switch has selected Input A.

Closed contact: Indicates the Static Switch has selected Input B.

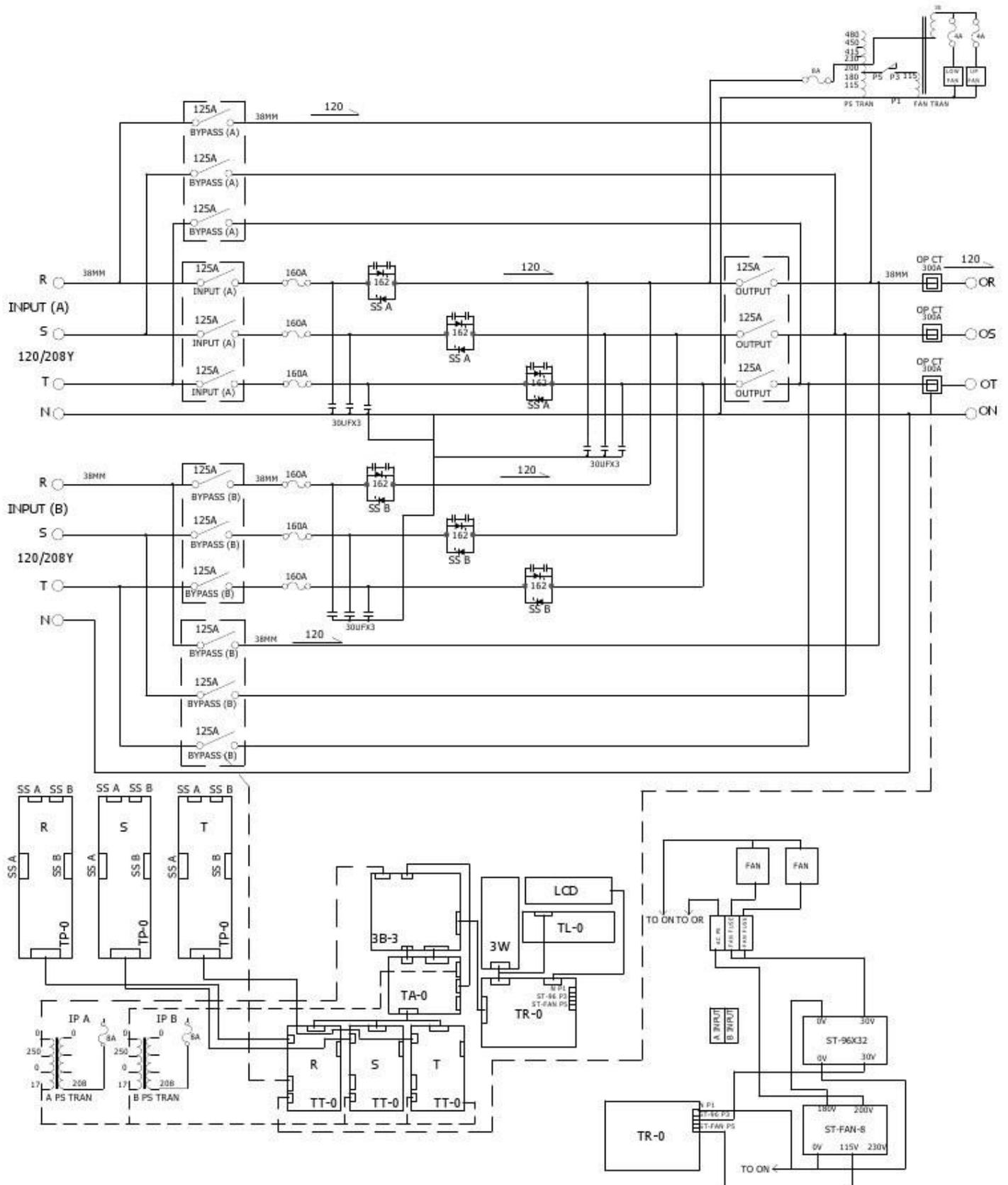
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7—Product Specifications

Model	ATS -50	ATS -100	ATS -120	ATS -150	ATS -200	ATS -300	ATS -400	ATS -500	ATS -800	ATS- 1000	ATS- 1500	ATS- 2000	
Nominal Current (A)	50	100	120	150	200	300	400	500	800	1000	1500	2000	
Input													
Normal Voltage	208-380-400-415-440-480-600 VAC 3-Phase WYE												
Input Voltage Tolerance	+/- 20% (selectable)												
Switched Input Phases	WYE (3+N) or Delta (3)												
Nominal Frequency	50/60 Hz												
Input Frequency Tolerance	+/- 2.5 Hz												
Distribution Compatibility													
Operating Topology	Break Before Make (No source overlap)												
Available Transfer Modes	Automatic/Manual/Remote												
Transfer Time for Source Failure	<4mS (S1/S2 synchronized) 10 mS (S1/S2 unsynchronized)												
Environmental													
Efficiency at full load	>99												
Noise Level 1m from front (dBA)	52					55				58			
Storage Temperature Range (°C)	-10 to +50												
Ambient Temperature (°C)	0 to +40												
Relative Humidity	90% non-condensing												
Altitude Rating	100% up to 1000M (-1% for every 100M above 1000M), max 4000M												
Dimensions													
Height (in./cm)	63/160					63/160				63/160			
Width (in./cm)	22/55					44/110				65/165			
Depth (in./cm)	32/80					32/80				32/80			
Weight (lbs./kg)	396/ 180	419/ 190	441/ 200	507/ 230	551/ 250	706/ 320	750/ 340	794/ 360	926/ 420	992/ 450	1058/ 480	1124/ 510	

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Appendix A—System Topology



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Appendix B—MODBUS Information

B.1—MODBUS Slave ID

The MODBUS slave ID for the ATS system can be designated by accessing the PARAMETER SETTINGS menu and entering the password 7777. Do not change any information within this menu aside from the ID parameter.

B.2—MODBUS Data Definition

01: COIL STATUS:

DATA LENGTH: 48(ALWAYS).

MASTER: ADDRESS, FUNCTION, STATUS ADDRESS H/L, NO. OF STATUS H/L, CHKSUM H/L = 8 BYTE. SLAVE: VALID: ADDRESS, FUNCTION, BYTE COUNT, DATA1, ...,DATAn, CHKSUM H/L.

n=6

(ALWAYS).

DATA

DEFINITION:

BYTE NO	BIT	DATA DEFINITION	TYPE
1	0	INPUT A RΦ VOLTAGE FAIL	STATUS
1	1	INPUT A RΦ FREQUENCY FAIL	
1	2	INPUT B RΦ VOLTAGE FAIL	
1	3	INPUT B RΦ FREQUENCY FAIL	
1	4	INPUT A RΦ VOLTAGE>100V	
1	5	INPUT B RΦ VOLTAGE>100V	
1	6	PHASE DIFFERENCE	
1	7	*** RESERVED ***	
2	0	RΦ STATIC SWITCH A ON	
2	1	RΦ STATIC SWITCH B ON	
2	2	RΦ BYPASS A ON	
2	3	RΦ BYPASS B ON	
2	4	OUTPUT BREAKER ON	
2	5	*** RESERVED ***	
2	6	*** RESERVED ***	
2	7	*** RESERVED ***	
3	0	INPUT A SΦ VOLTAGE FAIL	
3	1	INPUT A SΦ FREQUENCY FAIL	
3	2	INPUT B SΦ VOLTAGE FAIL	
3	3	INPUT B SΦ FREQUENCY FAIL	

3	4	INPUT A SΦ VOLTAGE>100V
3	5	INPUT B SΦ VOLTAGE>100V

3	6	*** RESERVED ***
3	7	*** RESERVED ***
4	0	SΦ STATIC SWITCH A ON
4	1	SΦ STATIC SWITCH B ON
4	2	SΦ BYPASS A ON
4	3	SΦ BYPASS B ON
4	4	*** RESERVED ***
4	5	*** RESERVED ***
4	6	*** RESERVED ***
4	7	*** RESERVED ***
5	0	INPUT A TΦ VOLTAGE FAIL
5	1	INPUT A TΦ FREQUENCY FAIL
5	2	INPUT B TΦ VOLTAGE FAIL
5	3	INPUT B TΦ FREQUENCY FAIL
5	4	INPUT A TΦ VOLTAGE>100V
5	5	INPUT B TΦ VOLTAGE>100V
5	6	*** RESERVED ***
5	7	*** RESERVED ***
6	0	TΦ STATIC SWITCH A ON
6	1	TΦ STATIC SWITCH B ON
6	2	TΦ BYPASS A ON
6	3	TΦ BYPASS B ON
6	4	*** RESERVED ***
6	5	*** RESERVED ***
6	6	*** RESERVED ***
6	7	*** RESERVED ***

B.3—Holding Register

03: HOLDING REGISTER

DATA LENGTH: 28 MAX.

MASTER: ADDRESS, FUNCTION, DATA ADDRESS H/L, NO. OF DATA H/L, CHKSUM H/L = 8
 BYTE. SLAVE: VALID: ADDRESS, FUNCTION, BYTE COUNT, DATA1,,DATA_n, CHKSUM
 H/L

DATA_i = 2

BYTTE.

DATA

DEFINITION:

NO	USE	DATA DEFINITION	TYPE
1	YES	RΦSTATUS(SAME AS FUNCTION 1)	STATUS
2	YES	SΦSTATUS(SAME AS FUNCTION 1)	
3	YES	TΦSTATUS(SAME AS FUNCTION 1)	
4	YES	RΦ INPUT A VOLTAGE(1V/DIGIT)	DATA
5	YES	RΦ INPUT B VOLTAGE(1V/DIGIT)	
6	YES	SΦ INPUT A VOLTAGE(1V/DIGIT)	
7	YES	SΦ INPUT B VOLTAGE(1V/DIGIT)	
8	YES	TΦ INPUT A VOLTAGE(1V/DIGIT)	
9	YES	TΦ INPUT B VOLTAGE(1V/DIGIT)	
10	YES	INPUT A FREQUENCY(0.1HZ/DIGIT)	
11	YES	INPUT B FREQUENCY(0.1HZ/DIGIT)	
12	YES	PHASE DIFFERENCE	
13	YES	RΦ OUTPUT VOLTAGE(1V/DIGIT)	
14	YES	SΦ OUTPUT VOLTAGE(1V/DIGIT)	
15	YES	TΦ OUTPUT VOLTAGE(1V/DIGIT)	
16	YES	OUTPUT FREQUENCY(0.1HZ/DIGIT)	
17	YES	RΦ OUTPUT CURRENT(1A/DIGIT)	
18	YES	RΦ LOAD PERCENTAGE(1%/DIGIT)	
19	YES	SΦ OUTPUT CURRENT(1A/DIGIT)	
20	YES	SΦ LOAD PERCENTAGE(1%/DIGIT)	
21	YES	TΦ OUTPUT CURRENT(1A/DIGIT)	
22	YES	TΦ LOAD PERCENTAGE(1%/DIGIT)	
23	YES	TEMPERATURE(1DEG/DIGIT)	SETTING
24	YES	SETTING 1 & 2	
25	YES	SETTING 3 & 4	
26	YES	SETTING 5 & 6	
27	YES	SETTING 7 & 8	
28	YES	SETTING 9 & 10	

BIT	7	6	5	4	3	2	1	0
SET1	AUTO/MAN				ESCFM	ESTP	1=SLNT	0=A,1=B
SET2	IPA+-%:5,10,15,20				IPA-%:5,10,15,20			
SET3	IPB+-%:5,10,15,20				IPB-%:5,10,15,20			
SET4	IPAF:0.5,1,1.5,2,2.5Hz				IPBF:0.5,1,1.5,2,2.5Hz			
SET 5	PDIFF:5,10,15,20DEG,DON'T CARE				SENSITIVITY:LO,ME,HI			
SET 6	MODBUS BAUD RATE							
SET 7								
SET 8								
SET 9								
SET 10								

BAUD RATE	COMPUTER	ATS	RESULT
2400	2400	2400	OK
4800	4800	4810	OK
9600	9620	9620	OK
14400	14460	14470	OK
19200	19380	19200	OK

Warranty

Limited Warranty

Power Innovations International, Inc. (hereinafter "PI"), warrants this product to be free from defects in material and workmanship for a period of one year from the startup date, provided initial power-up is performed by a PI certified technician. The initial power-up must be performed within six (6) months of the PI shipping date, and the product must be stored in a suitable environment prior to power-up, with batteries being charged as recommend. The warranty includes twelve-month (12) coverage of parts only. Various service contracts that cover parts, labor, and travel are sold separately.

This Warranty does not cover any product that has been misused, not operated or handled according to the instructions contained in the User's Manual, and/or which has been installed or serviced by an unauthorized technician.

Repair or Replacement

If any part or portion on the PI product fails to conform to the Warranty within the Warranty period, PI, will repair or provide a refurbished or new replacement within a reasonable turnaround time. Replacement parts will meet specifications of the original part or unit.

Proof of Purchase

Proof of purchase will be required by Power Innovations to substantiate date of purchase and to verify the Warranty period. Such proof of purchase must be an original bill of sale or receipt containing name and address of seller, purchaser, and the serial number of the product.

Legal Rights and Restrictions

This Warranty gives you specific legal rights. You may also have other rights which vary from state to state. This warranty is limited to the original end user of the product and is not transferrable. This warranty covers only PI supplied components. Any damage or service required because of third-party components is not covered under this warranty.

Limitation of Remedies

PI's entire liability and the User's exclusive remedy will be repair or replacement of the unit if all conditions described under Limited Warranty have been met.

Warranty Claims

Claim Restrictions

The product must not have been altered, repaired, or serviced by anyone other than a certified technician. The serial number of the product must not have been altered or removed. To be covered by this warranty, the product will not have been subjected to accident, misuse or abuse, or operated contrary to the instructions in the User's Manual.

Making a Claim

For any Warranty Claims, customers shall contact PI at 801-785-4123 or <http://powerinnovations.com/support>. It is the obligation of the customer to have the product or part shipped freight prepaid, to PI. All parts or products returned to PI for service and repair MUST have prior approval, which can be obtained by contacting <http://powerinnovations.com/support>. All products must be returned using original packaging.

Replacement of Parts/Components

It is often unnecessary to return a failed piece of equipment/components since this equipment uses plug-in type assemblies throughout. Replacement assemblies for the system covered by this manual are custom made and will be provided as soon as possible.

Contacting Power Innovations

Customer Support

Questions concerning the operation, repair, or maintenance of this equipment should be directed to the Customer Support Department of PI. When making such an inquiry, please provide the model number, serial number, and detailed description of the issue. To service or repair any product, the customer must obtain Customer Support Ticket number from Customer Support.

Contacting Power Innovations

If there is any question or comment about this product, please feel free to contact us.

Power Innovations International, Inc.

Tel: (801) 785-4123

Fax: (801) 785-6999

Email: support@power-innovations.com

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