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Power Quality Systems

Liebert HiSwitch2

Digital Static Transfer Switch

100 to 1000 A - 50/60 Hz

EN Installation and User Manual

EMERSON™
Network Power

Dear **Customer**,

thank you for choosing a Liebert product.

If this is your first purchase, we'd like to welcome you to the world of Liebert.

We're looking forward to working with you in the future and providing you with all the post-sales service you

need to get the most out of your Liebert HiSwitch2.

If you already own and use other Liebert products, we're happy that you continue to prefer Liebert.

We're constantly working with you to ensure the success of your business.

Our philosophy is summed up in our motto, **"Keeping Business in Business"**.

We'd welcome your advice on how we can improve our work on our mission.

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This manual describes installation and operating procedures for static transfer switches (HiSwitch2).

Read all sections of the manual carefully **<u>before</u>** beginning installation.

HiSwitch2 commissioning and technical assistance must be performed
by a technician trained and authorised by the manufacture (or distributor).

Failure to comply with this requirement poses a risk to the safety of personnel

and the functioning of the system and will render all guarantees invalid.

HiSwitch2 is designed exclusively for Commercial/Industrial applications,
and may not be used with vital support systems of any kind.

WARNING:

This is a product for <u>restricted sales distribution</u> to informed partners.
Installation restrictions or additional measures may be needed to prevent disturbance.
(See EN 50091-2)

If you encounter any problems with the procedures contained in this manual
you should seek immediate assistance from the Liebert Sales Office
from whom the equipment was purchased.
Alternatively, contact the Liebert's Customer Service & Support department
at the address shown below:

Liebert HIROSS Services (HQ)
Customer Service and Support Department

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35028 - Piove di Sacco (PD)
Italy

Help Desk Telephone +39 049 9719311
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Emerson Network Power Ltd - United Kingdom
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Please visit our web site: http://ups.liebert-hiross.com/

This manual describes the following equipment:

EQUIPMENT	ITEM CODE
100 A HiSwitch2	5230031B
250 A HiSwitch2	5230032C
400 A HiSwitch2	5230033D
600 A HiSwitch2	5230034E
800 A HiSwitch2	5230035F
1000 A HiSwitch2	5230036G
Led display panel with keylockout switch (for 100÷1000A)	22-806165-01
OPTIONS	
LCD touch screen display with keylockout switch (for 100÷1000A)	22-806139-00
Remote Source Selection Board	STSRSS
Network Interface Card (NIC)	STSNIC
Input Contact Isolator (ICI) Board	STSICI
Programmable Relay Board (PRB)	STSPRB
Comms Board w/SiteScan and Modem Interface	STSCOM

Safety instructions
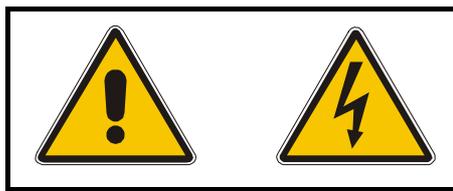
The warning triangle identifies instructions which are essential to ensuring the user's safety
Follow these instructions scrupulously to prevent serious injury

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Safety regulations

⚠ *CONFORMITY WITH STANDARDS*

The equipment complies with the requirements of the following standards:
 * EN 62040-1-1 (2002) — 'General and safety requirements for use in operator access area';
 * EN 50091-2 (1995) — 'Emissions requirements (EMC)';
 * EN 62040-3 (2001) — 'Performance requirements and test methods';
 * EN 60950 (2001) — 'Safety of information technology equipment'
 and published technical standards.
The equipment must be installed in accordance with these instructions and used only with accessories approved by the manufacturer to maintain conformity with the standards.

⚠ ⚡ *WARNING*

HIGH EARTH LEAKAGE CURRENT: EARTH CONNECTION IS ESSENTIAL BEFORE CONNECTING THE INPUT SUPPLY.
This equipment must be earthed in accordance with local electrical codes.

⚠ ⚡ *WARNING*

Follow these instructions scrupulously:

The HiSwitch2 is designed exclusively for indoor use. Protect the unit from excessive condensation and install it in a place free of flammable liquids, gases and corrosive substances.
The HiSwitch2 runs only on AC power supplies with a neutral line permanently and securely connected to the ground (TN systems).
Electrical installation must be performed by a qualified electrician.
Personnel working with the equipment described in this manual must be thoroughly familiar with the product.
Obtain appropriate protection against input overcurrents on the basis of the unit's nominal power.
Before making connections inside the unit, make sure that all incoming power sources are de-energised and insulated.
The unit is powered by more than one power mains. When one of the incoming power sources is active, the unit contains a dangerous level of voltage, even when it has "maintenance bypass" status.
To insulate the unit, turn it off and insulate all incoming power sources and auxiliary power sources.

⚠ ⚡ *Caution*

This equipment is fitted with RFI suppression filters.

Earth leakage current exceeds 3.5 mA and is less than 1000 mA.
When selecting a residual current device, take into account transitory currents dispersed to earth and in stationary operation which may occur when the equipment is started up.
Residual Current Circuit Breakers (RCCBs) must be selected sensitive to DC unidirectional pulses (class A) and insensitive to transient current pulses.

Note also that the earth leakage currents of the load will be carried by this RCCB or RCD.

⚠ ⚡ *Important*

Restrictions on installation or additional measures may be necessary to prevent interference.

⚠ ⚡ *General*

Like all high voltage equipment, the HiSwitch2 contains hazardous voltage. The risk of contact with this voltage is minimised as components under voltage are housed behind a hinged door which may be locked. Additional internal safety shields protect devices in accordance with IP20 standards.

There is no risk for personnel working on the equipment during regular operation in compliance with the recommended operating procedures.

All assistance and maintenance procedures requiring access to the inside of the equipment must be carried out exclusively by trained personnel.

⚠ ⚡ *WARNING*

HiSwitch2 DOES NOT INCORPORATE AUTOMATIC PROTECTION AGAINST VOLTAGE RETURNING TO THE INPUT; PRIMARY POWER KNIFE SWITCHES OUTSIDE THE SYSTEM MUST BE LABELLED TO WARN SERVICE PERSONNEL THAT THE CIRCUIT IS CONNECTED TO THE STATIC TRANSFER SWITCH SYSTEM (STS).

The wording must be similar to the following:

> **ISOLATE THE STATIC TRANSFER SWITCH (STS) BEFORE WORKING ON THIS CIRCUIT**

⚠ *Important*

Support Information:

If you require assistance for any reason, please have the following information available:

Model and size	
Part number	
Serial number	
Date installed	
Location	
Voltage & Frequency	

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Contents

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⚠ *Note*

Input Contact Isolator Settings Record

The Input Contact Isolator board (ICI) provides an HiSwitch2 module interface for up to eight external user alarm or message inputs to be routed through the static transfer switch's alarm network. See Chapter 3 - *Contact Isolator Board* for more information on the ICI.

If your HiSwitch2 has the ICI option installed, list the settings below for future reference. If control power is lost in the HiSwitch2, the settings are not saved.

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

⚠ *Note*

Programmable Relay Board Settings Record

The optional Programmable Relay Board (PRB) has eight channels to report events to an external device. Up to ten (10) events can be programmed to each channel. See Chapter 3 '*Programmable Relay Board*' for more information on the PRB.

If your HiSwitch2 has the PRB option installed, list the settings below for future reference. If control power is lost in the HiSwitch2, the settings are not saved.

Channel 1	
Channel 2	
Channel 3	
Channel 4	
Channel 5	
Channel 6	
Channel 7	
Channel 8	
Channel 9	
Channel 10	
PRB Notes	

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Part I — Installation Manual

1   Chapter 1 – Installation Procedure

1.1   Introduction

> ⚠️ ⚡ **WARNING**
>
> *Do not apply electrical power to the STS equipment before the arrival of the commissioning engineer.*

> ⚠️ ⚡ **WARNING**
>
> *The STS should be installed by a qualified engineer in accordance with the information contained in this chapter. All equipment not referred to this manual is shipped with details of its own mechanical and electrical installation.*

> ⚠️ **NOTE**
>
> *The HiSwitch2 may be connected with only one TN power supply system (see Note *).*

This section describes the HiSwitch2 system's environmental requirements and mechanical considerations that must be taken into account when planning the positioning and cabling of the static transfer switch.

Because every site has its requirements, it is not the aim of this chapter to provide step-by-step installation instructions, but to act as a guide as to the general procedures and practices that should be observed by the installing engineer.

Note (*): Failure to connect the neutral cable to the input of the equipment does not affect its operation. The system also includes a neutral pass bar (from the input to the output), which is useful to connect loads and allow the user to meet the most varied plant installation requirements. The manual provides all the information (drawings and electric diagrams) on the neutral cable. This information must be ignored if the input neutral cable is *not* connected.

1.2   Environmental considerations

1.2.1   Location of the HiSwitch2

The HiSwitch2 is suitable for indoor use only.

The unit should be located in a cool, dry, clean-air environment with adequate ventilation to keep the ambient temperature within the specified operating range (see Table 5-2).

All models in the HiSwitch2 range are cooled with the aid of internal fans and fitted with a system for monitoring correct operation.

Cooling air enters the STS unit through the ventilation grids located at various points on the cabinet and is released through the grids on the roof.

When the cabinet is located on a raised floor, bottom cable entry is used, additional cooling air also enters the HiSwitch2 via the floor void. If necessary, an air conditioning system should be installed, and a suitable air filtration system should be used if the HiSwitch2 is to operate in a dirty environment.

1.2.2   Heat Output

The unit produces minimal heat during normal operation.

Switch Size (A)	Heat Output (kW)
100	0.80
250	1.37
400	2.04
600	3.08
800	4.03
1000	5.09

1.2.3   Cooling

The HiSwitch2 100 ÷ 600A units utilize convection air cooling for the enclosure with forced air cooling of the heat sinks.

The 800÷1000A units are fan cooled using low-velocity fans to minimize audible noise. All fans are redundant so that a single fan failure cannot cause temperatures to increase beyond acceptable limits.

Air intake is through screened protective openings in the front of the unit. A standard furnace filter is installed behind the openings.

By opening the front door, the filter can be changed easily without exposing personnel to high voltage.

Open door to replace air filter, disposable type, size 2.54x 63.5x 63.5 (cm).

The air exhaust is through the top of the unit.

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1.3   Mechanical Considerations

1.3.1   System Components

All HiSwitch2 models provide two static transfer switches within one enclosure, with the ability to transfer between two input sources to a single output.

All HiSwitch2s can be configured either a LCD touch screen display or a LED display for monitoring and configuring the unit.

1.3.2   Frame and Enclosure

The complete HiSwitch2 is housed in a freestanding enclosure. The frame is constructed of galvanized steel and pops riveted to provide a strong substructure. The cabinet is a NEMA type 1 enclosure and meets IP20 requirements. The cabinet is structurally designed to handle lifting from the base.

The frame is designed to accommodate floor stands.

1.3.3   Moving the cabinets

The route to be travelled between the point of arrival and the unit's position must be planned to make sure that all passages are wide enough for the unit and that floors are capable of supporting its weight (for instance, check that doorways, lifts, ramps, etc. are adequate and that there are no impassable corners or changes in the level of corridors).

> ⚠️ **_WARNING_**
>
> Ensure that any lifting equipment that used in moving the HiSwitch2 cabinet has sufficient lifting capacity before use.
>
> **LOCATE THE CENTER OF GRAVITY SYMBOLS ⊕ AND DETERMINE THE UNIT'S WEIGHT BEFORE HANDLING THE CABINET.**

Ensure that the floor of the room in which the equipment is to be installed has an adequate carrying capacity in Kg/cm^2. Check weights precisely using the Tables of Mechanical Characteristics in Chapter 5.3.

The unit can be moved by forklift or pallet jack. When moving the unit by forklift, lift the unit from the rear so as to protect the front panel. Do not exceed a 15 degree tilt with the forklift.

Also, if you are moving the unit by forklift or pallet jack after it has been removed from the pallet, be aware of the location of the casters and leveling feet so as not to damage them.

Most HiSwitch2 models are contained in one cabinet. The 800–1000 amp units are contained in two cabinets that are connected together and shipped on one pallet.

Because the weight distribution in the cabinet is uneven, use extreme care during handling and transporting.

1.3.4   Clearances

The HiSwitch2 has no ventilation grills at either side or at the rear, and so does not require clearances. Rear access is not essential for maintenance work. Clearance around the front of the equipment should be sufficient to enable free passage of personnel with the doors fully opened. It is important to leave a distance of at least 475 mm between the top of the HiSwitch2 and the ceiling of the room in which it is installed to permit adequate circulation of air coming out of the unit.

1.3.5   Placing it in the operative position

The unit is furnished with integral castors that allow the unit to be rolled into place after it has reached its location and is removed from the pallet.

> ⚠️ **_WARNING_**
>
> Exercise extreme care when handling static switch cabinets to avoid equipment damage or injury to personnel. If moving the unit up a ramp on its castors or a pallet jack, ensure that the incline does not exceed fifteen (15) degrees.

After the unit has been inspected and no problems are found, the unit can be moved to its installation location.

When the equipment has been finally positioned ensure the adjustable feet are set so that the HiSwitch2 will remain stationary and stable (see Chapter 6).

1.3.6   Leveling and anchoring the unit to the floor

The frame includes heavy-duty swivel castors for ease of installation, plus permanent leveling feet for final installation.
The unit also can be fastened to the floor using optional seismic anchors to meet seismic Zone 4 requirements.
See 'Installation drawings' in Chapter 6 for instructions and details for installing seismic anchoring.

1.3.7   Cable entry

The unit is designed with top and bot tom cable terminations to allow maximum flexibility in its installation.
Cables can be installed through the top or bottom of the unit through removable conduits plates.
See 'Installation drawings' in Chapter 6.

> *Note*   *When selecting the power cables for side entry to a module located on a solid floor, consideration must be given to the minimum permissible bending radius of the proposed cables to ensure that they can be fashioned to reach the HiSwitch2 connection bus-bars*

1.3.8   Access

The HiSwitch2 is designed so all repairs and maintenance can be done from the front or top of the unit.
All components that may need repair or replacement during routine field maintenance are safely accessed with the units in bypass without removing power from the unit.

1.4   Preliminary Controls

Before you install the system hardware you should carry out the following preliminary checks:

1. Verify that the HiSwitch2 room satisfies the environmental conditions stipulated in the equipment specifications, paying particular attention to the ambient temperature and air exchange system.

2. Remove any packaging debris, then visually examine the HiSwitch2 for damage in transit, both internally and externally. Report any such damage to the shipper immediately.

3. Please make a note of the serial number and key type (engraved on both sides) of each power switch and keep it with the installation documents. This information will be essential for replacing the keys if you lose them; if you do not have the numbers, the locks will have to be replaced.

1.4.1   Identification

The HiSwitch2 has an identification tag on the back of the main door reporting the model and size. A metal disk fastened to the inside top of the cabinet is engraved with its serial number.

Record the model numbers and serial numbers in the front of this installation manual. A record of this information is necessary should servicing be required.

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2 Chapter 2 - Installation (Electrical)

The HiSwitch2 requires both «power» and «control» cabling once it has been mechanically installed. All «control» cables, whether screened or not, should be run separate from the power cables in metal conduits or metal ducts which are electrically bonded to the metalwork of the cabinets to which they are connected.

Note: *Auxiliary connections are needed to connect the coils of external circuit breakers and of AC power supply lines to the logical cards in order to permit external action permitting* <u>complete</u> *insulation of the static transfer switch.*

2.1 Power cabling

⚠️ ⚡ **_WARNING_**

BEFORE CABLING UP THE HiSwitch2*, ENSURE THAT YOU ARE AWARE OF THE LOCATION AND OPERATION OF THE EXTERNAL SWITCHES THAT CONNECT THE* HiSwitch2 *INPUT/BYPASS SUPPLY TO THE MAINS DISTRIBUTION PANEL.*
CHECK THAT THESE SUPPLIES ARE ELECTRICALLY ISOLATED, AND POST ANY NECESSARY WARNING SIGNS TO PREVENT THEIR INADVERTENT OPERATION.

The two input power feeds (sources) to the HiSwitch2 should be from two independent sources to avoid a common source failure.
To ensure proper operation of the HiSwitch2, the two input sources must be the same nominal voltage level and phase rotation.
For uninterrupted automatic transfer, the two input sources should be synchronized within 15 degrees.

⚠️ ⚡ **_CAUTION_**

THE INPUT SOURCES TO THE STATIC SWITCH MUST BE GROUNDED-WYE SOURCES. INPUT SOURCES OTHER THAN SOLIDLY GROUNDED-WYE SOURCES MAY CAUSE DAMAGE TO THE SWITCH.

The HiSwitch2 is designed for operation with 3 or 4-wire solidly grounded sources only.
For 4-wire operation, the common source neutral must be connected to the HiSwitch2.
4-Wire-Plus-Ground Systems — When 4-wire-plus-ground input feeds are utilized, the input power sources must be properly grounded. Because the neutral is not switched by the HiSwitch2, the neutrals of the two power sources are solidly interconnected.
Where possible, the two power sources should be located in close proximity and a single neutral-to-ground bond made.

For cable entry, refer to section 1.3.5.

2.1.1 Cable size

The principal factors influencing the choice of cables and cable sizes are voltage, current (taking over-current into account), ambient temperature and the conditions of installation.

The size of system power cables must be determined in accordance with the following descriptions:

Input /output cables
The size of input/output cables must be determined by identifying the maximum input current in Table 2-1, in accordance with size.
The size of input and output power cables depends on the device for protection from overcurrent upstream, in accordance with local codes and other pertinent regulations.

Note: Correct cable size must also take into account the system's overload capacity (see Chapter 5 – Technical Specifications: - Electrical Characteristics).

2.1.2 Table for determining cable size

Note: The table below gives nominal currents for determining the size of HiSwitch2 power cables. Other factors which must be taken into consideration include cable route length, coordination with protective devices, etc.

The power cables must be sized to suit the HiSwitch2 according to the table below:

Size	NOMINAL CURRENT: Amps	BUS-BAR CABLE CONNECTION		
	Input/Output	Input / Output cables		Torque (Nm)
		Bolt	Ø	
100	100	M12	13	48
250	250			
400	400			
600	600			
800	800			
1000	1000			

Table 2-1 Table for determining cable size.

All electrical power connections must be torqued to the required value and marked with a visual indicator.

2.1.3 General Notes

The following are guidelines only and are superseded by local regulations and codes of practice where applicable:

1. Take special care when determining the size of the neutral cable, as current circulating on the neutral cable may be greater than nominal current in the case of non-linear loads. Refer to the values given in the 'HiSwitch2 Electrical characteristics' table in Chapter 5.
2. The earth conductor should be sized according to the fault rating, cable lengths, type of protection, etc. The earth cable connecting the HiSwitch2 to the main ground system must follow the most direct route possible.
3. Use of paralleled smaller cables is recommended for heavy currents, as this can ease installation considerably.

2.1.4 Cable connections

The HiSwitch2 input and output power cables (all require lug type terminations) are connected to bus-bars situated side the power isolators – as shown in Chapter 6. The bus bars are accessible through the front of the HiSwitch2, and are designed to allow one-handed tightening.
Terminal block X1 is used for auxiliary connection of external devices or equipment with the HiSwitch2: the emergency stop pushbutton, the external circuit breakers and their release coils, the AC power supply lines to the logical boards, etc. through a screw terminal block assembled on a DIN guide – as described in section 2.3.

2.1.5 Safety earth

Equipment grounding — Grounding is primarily for equipment and personnel safety, although proper grounding also enhances equipment performance.
An insulated equipment ground conductor is recommended to run with each input and output power feed. The equipment ground conductors should be at least the minimum size conductor based on the upstream overcurrent protection device.
The earth bus-bar is located near the input and output power supply connections as shown in Chapter 6. The safety earth cable must be connected to the earth bus-bar and bonded to each cabinet in the system.
All cabinets and cable trunking should be earthed in accordance with local regulations.

Note: Proper grounding considerably reduces problems in systems caused by electromagnetic interference.

⚠ ⚡ ***WARNING***

FAILURE TO FOLLOW ADEQUATE EARTHING PROCEDURES CAN RESULT IN ELECTRIC SHOCK HAZARD TO PERSONNEL, OR THE RISK OF FIRE, SHOULD AN EARTH FAULT OCCUR.

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2.1.6   Protective devices

For safety reasons it is necessary to install circuit breaking protective devices in the input AC power supply and toward the load, external to the system. As every installation is unique, this chapter provides general information of use to qualified installation engineers who are familiar with operating practices, local regulations and the equipment to be installed.

Protection against excessive overcurrents and short circuits in the power supply lines:

Lines must be protected by installing suitable protective devices on the distribution panel of the incoming mains supply, considering that the protection must be selective with system overload capacity (see Chapter 5 – Technical Specifications: - Electrical Characteristics).

Input:

Power isolators inside the HiSwitch2 are typically not automatic and make use of devices located upstream for protection against overcurrents.
These protective devices must be of appropriate size for a capacity which is the same as or less than the switches incorporated in the HiSwitch2.
The AC lines powering the logical boards (LINE IN 1&2) must be fitted with appropriate protective devices and circuit breakers, upstream of the external circuit breakers. There are protective fuses in the HiSwitch2, in series with these inputs (F7÷10) (refer to figure 7-2).

Protection against earth faults (RCD devices):
In the event of a differential (RCD) device being installed upstream of the input supply, one must take into account the transient and steady state earth leakage currents that are produced during start-up of the HiSwitch2.
The presence of an RFI suppression filter inside the HiSwitch2, determines a residual earth current greater than 3.5 mA and less than 1000 mA.
Residual current circuit breakers (RCCB) must be sensitive to d.c. unidirectional pulse (class A) in the network and insensitive to transient current pulses.
They are identified by the symbols respectively:
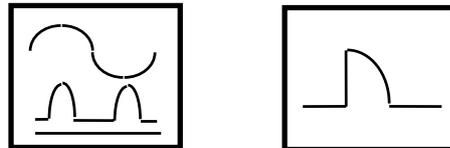
These isolators must have an average sensitivity, adjustable between 0.3 and 1A.

Output:

Load distribution line protection devices can also be used: before you use them, ensure that they discriminate with respect to the HiSwitch2 input protection devices.

⚠️ *Note*
All HiSwitch2 units are fuseless and are UL rated for use with upstream circuit breakers only.

2.1.7 Wiring procedure

⚠️ *Important*
The operations described in this section must be performed by authorised electricians or qualified technical personnel. If you have any difficulties do not hesitate to contact our Customer Service & Support department at the address given at the beginning of this manual.

⚠️ ⚡ *WARNING*
The HiSwitch2 will work only with an AC power source with a permanent neutral, safely earthed (TN systems). Failure to comply with these requirements will result in damage to the unit.

With the equipment bolted in its final position, connect up the power cables as described below.

Examine the reference drawing in Chapter 6.

1. Check that the HiSwitch2 is totally isolated from its external power source and that all the STS's power switches are open. Put up danger signs to prevent inadvertent operations.

2. Open the HiSwitch2 cabinet access door and remove the metal guard on the lower side to permit access to the connection bars. The metal guard on the HiSwitch2 cabinet must be removed after removing all power switch handles.

3. Connect the equipment's safety earth to the copper earthing wire installed in the bottom of the HiSwitch2 cabinet, underneath the power supply connections. Also connect the safety earthing cable to the earth of all other devices in the system.

    Note: Earthing connections and neutral connections must comply with the applicable local regulations and standards.

Mains 1 incoming power connections

4. Connect the **MAINS 1 AC power** cables to the bus-bars on **input 1** (terminals U1-V1-W1) of the HiSwitch2 and tighten the connections to the torque specified in Table 2-1 on the basis of size.
    The Neutral cable must be connected to the input bus-bar identified as terminal N (see Note *- page 1-1).

CHECK FOR CORRECT PHASE ROTATION.

Mains 2 incoming power connections

5. Connect the **MAINS 2 AC power supply** cables to the bus-bars on **input 2** (terminals U2-V2-W2) of the HiSwitch2 and tighten the connections to the torque specified in Table 2-1 on the basis of size.
    The Neutral cable must be connected to the input bus-bar identified as terminal N (see Note *- page 1-1).

CHECK FOR CORRECT PHASE ROTATION.

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Output connections

6.   Connect the **output cables** between the output bars (U3-V3-W3-N) of the HiSwitch2 and the **load distribution panel** and tighten connections to the torque specified in Table 2-1 on the basis of size.

<div align="center">

CHECK THAT PHASES ARE CONNECTED IN THE RIGHT ORDER

</div>

⚠️ ⚡ **WARNING**
If the load cannot be connected to the system, check that the power cables toward the load are insulated and made safe at the end of the connection segment.

Auxiliary connections

7.   Connect to terminal block X1 the auxiliary cables of devices or equipment external to the HiSwitch2, such as: external emergency stop, AC power lines supplying logical boards, external circuit breaker release coils, etc. (as shown in section 2.3).

8.   Connect the cables of any external devices for remote signalling (or external controls) to the corresponding output connections (or terminal blocks) on the optional boards (see Chapter 6).

9.   Reassemble all the lower metal guards removed previously.

2.2   Distance from floor to connection point on the equipment:

	HiSwitch2 100/250A Minimum distance (mm)	HiSwitch2 400/600A Minimum distance (mm)	HiSwitch2 800/1000A Minimum distance (mm)
Mains 1 incoming AC power supply	1020	1280	1670
Mains 2 incoming AC power supply			
Output	800	950	1100
Neutral	600		950
Auxiliary terminal block (X1)	1050		
Earth	350		1000

<div align="center">

Table 2-2 .

</div>

2.3   Auxiliary connections

2.3.1   Introduction

Auxiliary terminal block X1 is located at the base of the HiSwitch2 cabinet, behind a removable cover (identify the physical location on the basis of size in the drawings in Chapter 6). Use the table below to identify the terminals corresponding to the equipment (or device) to be connected up.

2.3.2   Auxiliary terminal block X1

X1 terminal reference		Name	Description
1-2	U	INPUT LINE IN 1	AC mains 1 inputs for powering logical boards. Use input 1 for phase 'U' and input 3 for phase 'V', after having removed the standard U-bolt.
3-4	V		If these inputs are not used, leave the standard U-bolts in place.
5-6	U	INPUT LINE IN 2	Mains 2 AC line inputs for powering logical boards. Use input 5 for phase 'U' and input 7 for phase 'V', first removing the standard U-bolt.
7-8	V		If these inputs are not used, leave the standard U-bolts in place.
9	Trip	SHUNT TRIP LINE 1	Inputs for the coil for releasing the external circuit breaker on Mains 1.
10	+		Use 48 VDC release coils. Refer to figure 2-1.
11	Trip	SHUNT TRIP LINE 2	Inputs for the coil for releasing the external circuit breaker on Mains 2.
12	+		Use 48 VDC release coils. Refer to figure 2-1.
13	COM	EXT. C.B. LINE 1	Indication of opening of an external input switch on Mains 1. The auxiliary contact on the external input switch should normally be open. If HiSwitch2 is operating in normal mode, the auxiliary contact of the external input switch must be closed. The opening of the external input switch (open auxiliary contact) is signaled on the display of the control panel only if the optional customer boards are installed and if the related alarm has been enabled. See in Chapter 3 'Input Contact Isolator Board'.
14	NO		
15	COM	EXT. C.B. LINE 2	Indication of opening of an external input switch on Mains 2. The auxiliary contact on the external input switch should normally be open. If HiSwitch2 is operating in normal mode, the auxiliary contact of the external input switch must be closed. The opening of the external input switch (open auxiliary contact) is signaled on the display of the control panel only if the optional customer boards are installed and if the related alarm has been enabled. See in Chapter 3 'Input Contact Isolator Board'.
16	NO		
17	COM	Emergency Power Off (EPO)	Remotely provides control for switching off the HiSwitch2 using a remote emergency button.
18	NO		
19	COM		The external contacts employed must be normally open. See note on the next page.
20	NO		

Table 2-3

Note: Auxiliary cables must be **shielded** and **double insulated**.
The recommended section for auxiliary cables is 0.5 to 1 mm^2. (max 2.5 mm^2)
Connect the cables using screw terminal blocks assembled on a DIN rail.
Maximum current of contacts on auxiliary terminals = 500 VAC @ 25 Amp.

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2.3.3   Emergency stop

The HiSwitch2 cabinet is prepared for installation of an external emergency stop button, as shown in the figure below. Terminal X1 is prepared for connection of release coils for external circuit breakers located in the optional cabinet external to the HiSwitch2.

Note: *the remote emergency pushbutton may be installed only if there are external circuit breakers with release coils.*

⚠️ ⚡ **IMPORTANT**

Assemble a circuit breaker with a release coil upstream of each incoming power supply, so that when the emergency button is pressed the HiSwitch2 *will be cut off from its power sources (there will no longer be power to the load).*

Pressing the external emergency button does not result in any alarm signal appearing on the operator panel display, though there will be alarms caused by the failure of the incoming power mains.

The external stop button must be located in a visible position which is easily accessible in the event of an emergency.

The external Emergency Stop has a series of 'normally open' contacts and must be connected to the terminals on the STS's Auxiliary Terminal Board (X1) as shown in the drawing below, with an armoured cable. Also connect the coils of the circuit breakers with terminal board X1.
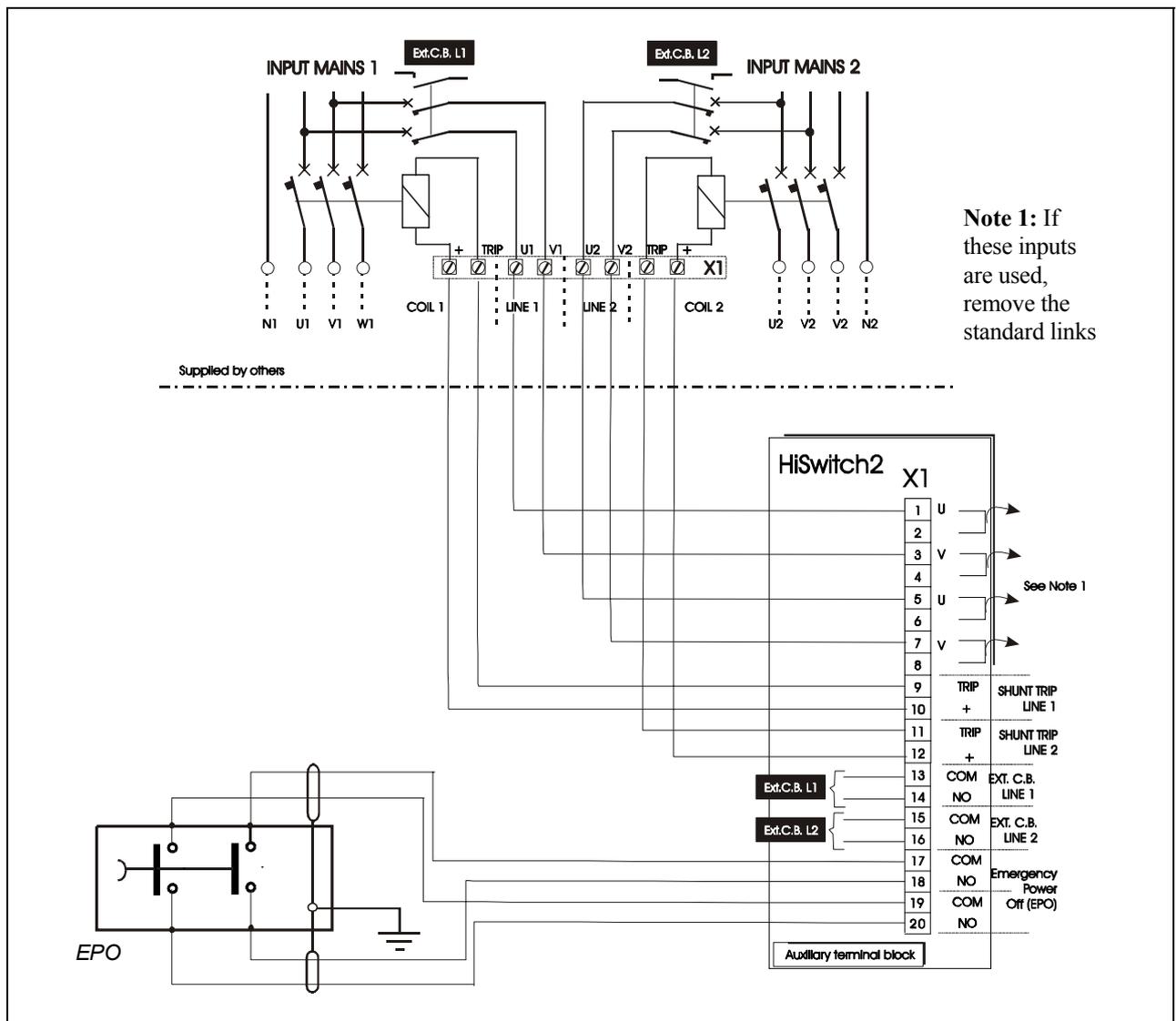
Figure 2-1 Typical external emergency button installation scheme

Note: The neutral connection (N1/N2) is optional. See Note *- page 1-1.

2.3.4   Power supply

The HiSwitch2 is supplied with redundant power supplies that are designed to operate from a voltage range of 200V to 415V. The unit is set at the factory to match the nameplate voltage. Field adjustments are **not** necessary. If the unit needs to operate at a voltage other than what is listed on the nameplate, contact Liebert Global Services or the local Liebert representative.

⚠️ ⚡ *Note*
Ensure that the wiring for the control transformers matches the input voltage for the unit.
Improper wiring could result in blown fuses.

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3   Chapter 3 – Optional equipment – Installation notes

3.1.1   Introduction

The configuration of a system incorporating the HiSwitch2 depends on the specific needs of the installation under consideration.

An installation consists of a number of items of equipment, devices and optional additional boards. The options may be prepared for installation either in the factory or directly by the customer.

HiSwitch2 is a member of a family of constant power control products, and is supported by an extensive customer service network.

Brief notes on installation of available options are provided below.

Installers must be thoroughly familiar with the product. More detailed information on installation procedures is provided in the Technical Assistance commissioning manual.

Options:

The following options are available for the HiSwitch2:
• Remote Source Selection board
• Key Lockout Switch
• Redundant Output Breaker
• Seismic Floor Anchors

Communications options:

• Programmable Relay Board (PRB)
• Input Contact Isolator (ICI) Board
• Comms Board w/SiteScan and Modem Interface
• Internal Modem
• Network Interface Card (NIC)

> ⚠️ ⚡ *WARNING*
>
> *All options must be installed by Liebert global services or Liebert factory-authorized service provided by a Liebert distributor. The option area and customer control cable area contain hazardous voltages if any of the input sources are on, even when the unit is in bypass. Turn all power sources off before installing customer control cables to any option*

3.1.2   Remote Source Selection

An optional Remote Source Selection board may be installed in your HiSwitch2. This board is installed in the same bay as the communications options.

The Remote Source Selection allows the preferred input source to be chosen from a remote location.

A user supplied normally open dry contact allows the user to remotely select a source to be the preferred source in the same process as the local source transfer selection.

The unit's preferred source selection and Remote Source Selection are active at the same time, with the HiSwitch2 following the last request for a preferred source change, regardless of whether it was from the local or Remote Source Selection controls.

See Chapter 9 - *Enabling Remote Source Selection* for instructions on enabling the Remote Source Selection.

See Figures in Chapter 6 for the location of the Remote Source Selection option.

Figure below shows the wiring details.
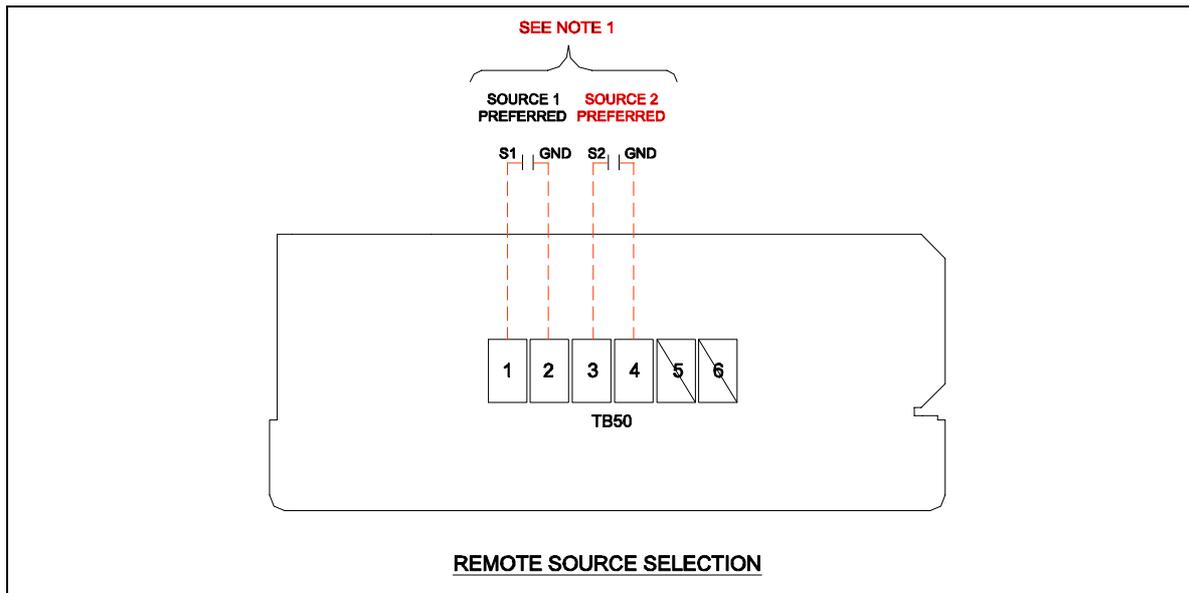
Figure 3-1

Notes:

1. Customer provided normally open dry contacts. Contact ratings: 10 mA @ 30Vdc.

2. Maximum cable length (152 meters) with 1.5 mm^2 flexible stranded cable. All control wiring (by others) must be run separate from power wiring. Control wiring runs should not be combined in the same conduit.

3. Refer to chapter 9 for configuring the '*Preferred Source Selection*'.

4. Refer to static transfer switch control connection diagram for location of *'Remote Source Selection option'*.

5. All wiring must be in accordance with national and local electrical codes.

3.1.2.1 Remote Source Selection Wiring

Terminal connections allow the customer to remotely select a source to be the preferred source in the same process as the local source transfer selection.

A six pin terminal block provides the Remote Source Selection connections. Two pairs of wires are used from the switch to trigger the source selection. You can select the type of switch used for this remote control. Connections are made to four of the connections, using Form A dry contacts. The contacts are numbered left to right:

Contact	Connection	Contact	Connection
1	Source 1	4	Isolated ground
2	Isolated ground	5	Do not use
3	Source 2	6	

Table 3-1 - Remote Source Selection Terminal

3.1.3 Key Lockout Switch

The key lockout switch activates a software lockout of the touch screen display to prevent manual transfers and configuration changes. When locked out, the touch screen becomes a read only display.

A key is needed to do manual transfers or change settings.

The alarm silence button is not disabled when in the lockout position.

The switch is located on the front of the unit next to the display; it is behind the front door but can be operated without opening the front door. See installation drawings in Chapter 6 for the key lockout location on each unit.

See Key Lockout Switch in Chapter 8 for instructions on using the key lockout switch.

3.1.4 Redundant Output Breaker

An optional output switch is provided which allows redundancy in the output power path. The breaker is connected in parallel with the output isolator Q3.

3.1.5 Seismic Floor Anchors

Seismic anchors are available for anchoring the unit to a concrete floor to meet seismic Zone 4 requirements. Installation details are provided in Chapter 6.

The seismic brackets are an option for the HiSwitch2 and are shipped separately from the unit when ordered.

3.1.6   Programmable Relay Board

The Programmable Relay Board (PRB) provides a means to trigger an external device when an event occurs in the HiSwitch2. Each PRB has 8 channels. Each channel has two sets of Form-C dry contacts, rated 1 Amp @ 30 VDC or 250 mAmp @ 125 VAC.

Any alarm/event can be programmed to any channel or channels. Up to ten (10) events can be programmed to a relay. If multiple events are grouped to one relay, group the events logically to simplify troubleshooting when an event is triggered. The same alarm/event can be programmed to more than one channel. Up to two Programmable Relay Boards can be installed in the HiSwitch2 for a total of 16 channels. Programming is performed through the touch screen display.

See *Configuring the Programmable Relay Board Settings* in Chapter 11 for default settings and instructions for reconfiguring the relays. See figures in Chapter 6 for the location of the PRB. Figure below shows the wiring details. Table 8 provides the PRB pinout.

PROGRAMMABLE RELAY BOARD
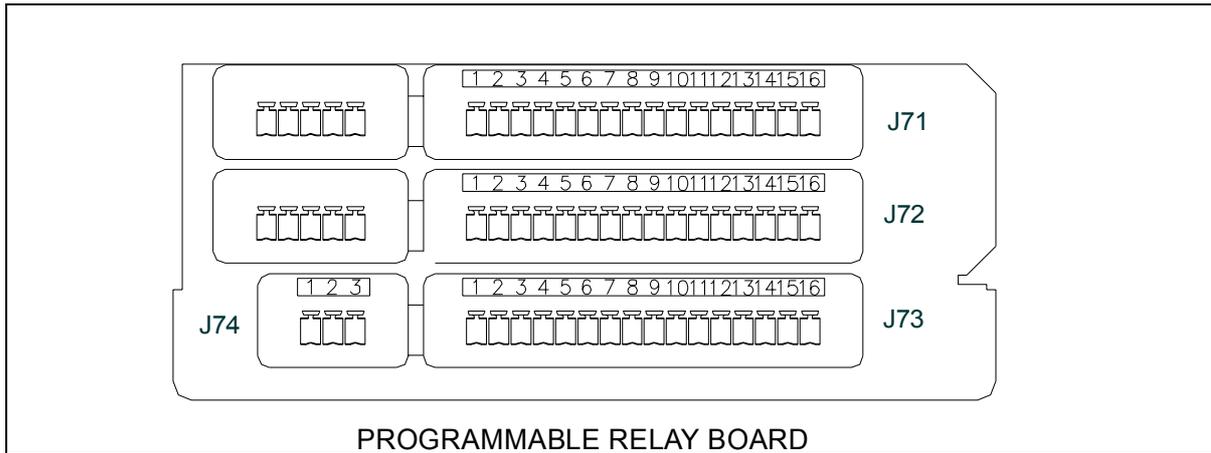
Figure 3-2

Notes:

1. Customer control wiring connection points are terminal blocks 1 through 15.

2. Programmable relay board option includes 8 signal channels with (2) form-c dry contacts per channel. See table below.

3. Refer to chapter 11 for configuring the programmable relay board option.

4. All control wiring (by others) must be run separate from power wiring. Control wiring runs should not be combined in the same conduit.

5. Refer to static transfer switch control connection diagram for location of program relay board option.

6. Contact ratings: 1 A @ 30Vdc, 200 mA @125Vac.

7. Maximum cable length (152 meters) with 1.5 mm^2 flexible stranded cable.

8. All wiring must be in accordance with national and local electrical codes.

	CHANNEL		PIN NO.	C	NC	NO
J71	CH1	A	1 - 3	1	2	3
		B	4 - 6	4	5	6
	CH2	A	7 - 9	7	8	9
		B	10 - 12	10	11	12
	CH3	A	13 - 15	13	14	15
J72		B	1 - 3	1	2	3
	CH4	A	4 - 6	4	5	6
		B	7 - 9	7	8	9
	CH5	A	10 - 12	10	11	12
		B	13 - 15	13	14	15
J73	CH6	A	1 - 3	1	2	3
		B	4 - 6	4	5	6
	CH7	A	7 - 9	7	8	9
		B	10 - 12	10	11	12
	CH8	A	13 - 15	13	14	15
J74		B	1 - 3	1	2	3

NOTE: PIN 16 NOT USED ON J71, J72, & J73

Key: N.O.= Normally open -
N.C.= Normally closed
C= Common

3.1.7   Input Contact Isolator Board

The Input Contact Isolator Board (ICI) provides an HiSwitch2 module interface for up to eight external user alarm or message inputs to be routed through the static transfer switch's alarm network. The eight contacts are normally open dry contacts. When a contact closes, an event is triggered.

The Input Contact Isolator options are configured through the Input Contact Isolator dialog box, which is accessed from the Comm Option dialog box on the touch screen display. You also can program the alarm messages through this dialog box. See Configuring the Input Contact Isolator Settings in Chapter 11 for instructions on configuring the connections.

See figures in Chapter 6 for the location of the ICI. Figure below shows the wiring details.

TABLE (J51)

INPUT CONTACT	PIN NO.
1	1
	2
2	3
	4
3	5
	6
4	7
	8
5	9
	10
6	11
	12
7	13
	14
8	15
	16

INPUT CONTACT ISOLATOR BOARD
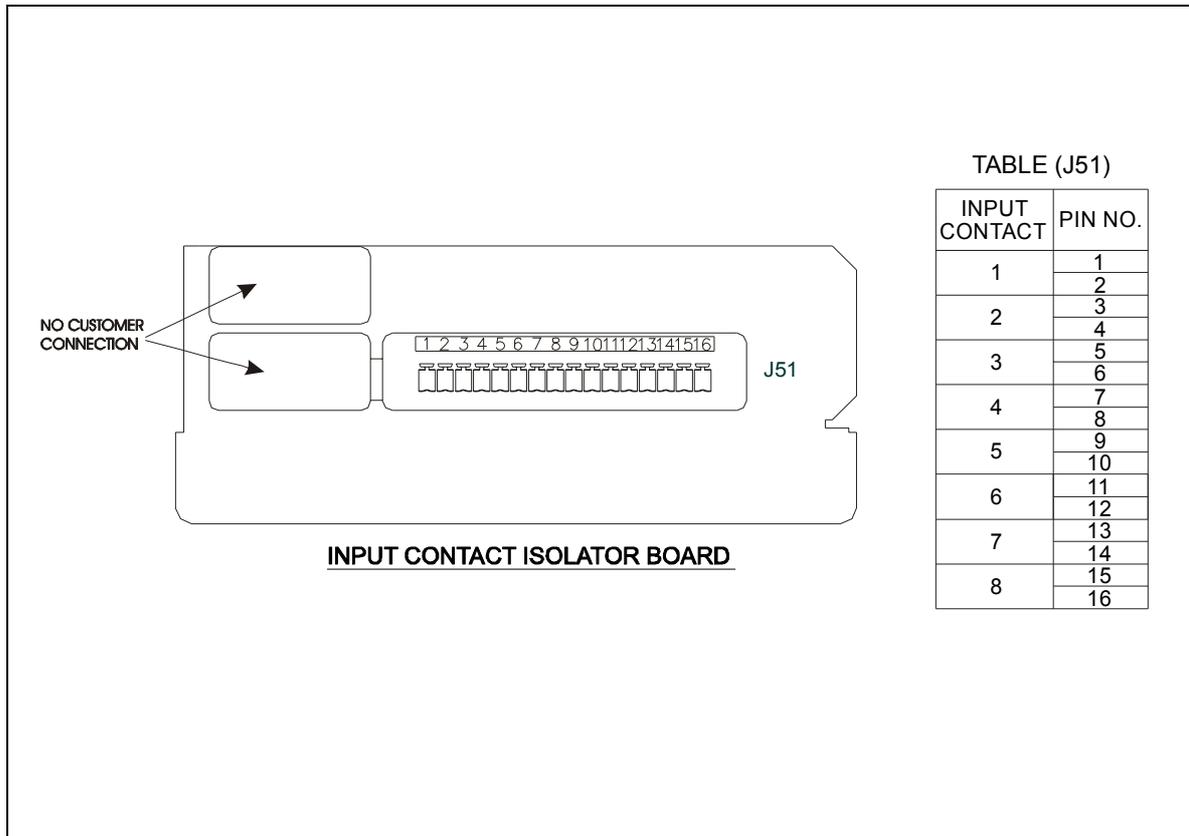
Figure 3-3

Notes:

1. Customer control wiring connection points are terminal blocks 1 through 16 (See table J51).

2. Customer provided normally open dry contacts for user alarm messages.

3. Refer to chapter 11 for configuring the '*input contact isolator board option*'.

4. All control wiring (by others) must be run separate from power wiring. control wiring runs should not be combined in the same conduit.

5. Refer to static transfer switch control connection diagram for location of '*input contact isolator board option*'.

6. Signal voltage: 100 mA @ 12Vdc.

7. Maximum cable length (152 meters) with # 1.5 mm^2 flexible stranded cable.

8. All wiring must be in accordance with national and local electrical codes.

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3.1.8   Comms Board

The Comms Board provides a communication interface to Liebert SiteScan, site monitoring product, and/or an external or internal modem. SiteLink-12 or SiteLink-4 is required for SiteScan to communicate with the HiSwitch2.
The Comms Board is equipped with an RS-422 communication port for communication to a Liebert SiteScan monitoring system using a 2-wire twisted pair for reliable communication up to 1000 meters. Information available from the RS-422 port includes the present switch status information, all monitoring parameters, and all active alarms.
The Comms Board is equipped with a modem interface for remote reporting of the present switch status information, alarm history information, and the history of status screens that are triggered upon a major alarm event. The monitoring system software also supports an auto-dial feature that allows the system to automatically dial programmed phone numbers by way of the modem to report designated alarm conditions.
Programming the Comms Board is performed through the touch screen display. See Comm Options in Chapter 11 for details.
See figures in Chapter 6 for the location of the Comms Board.
Figure below shows the wiring details.
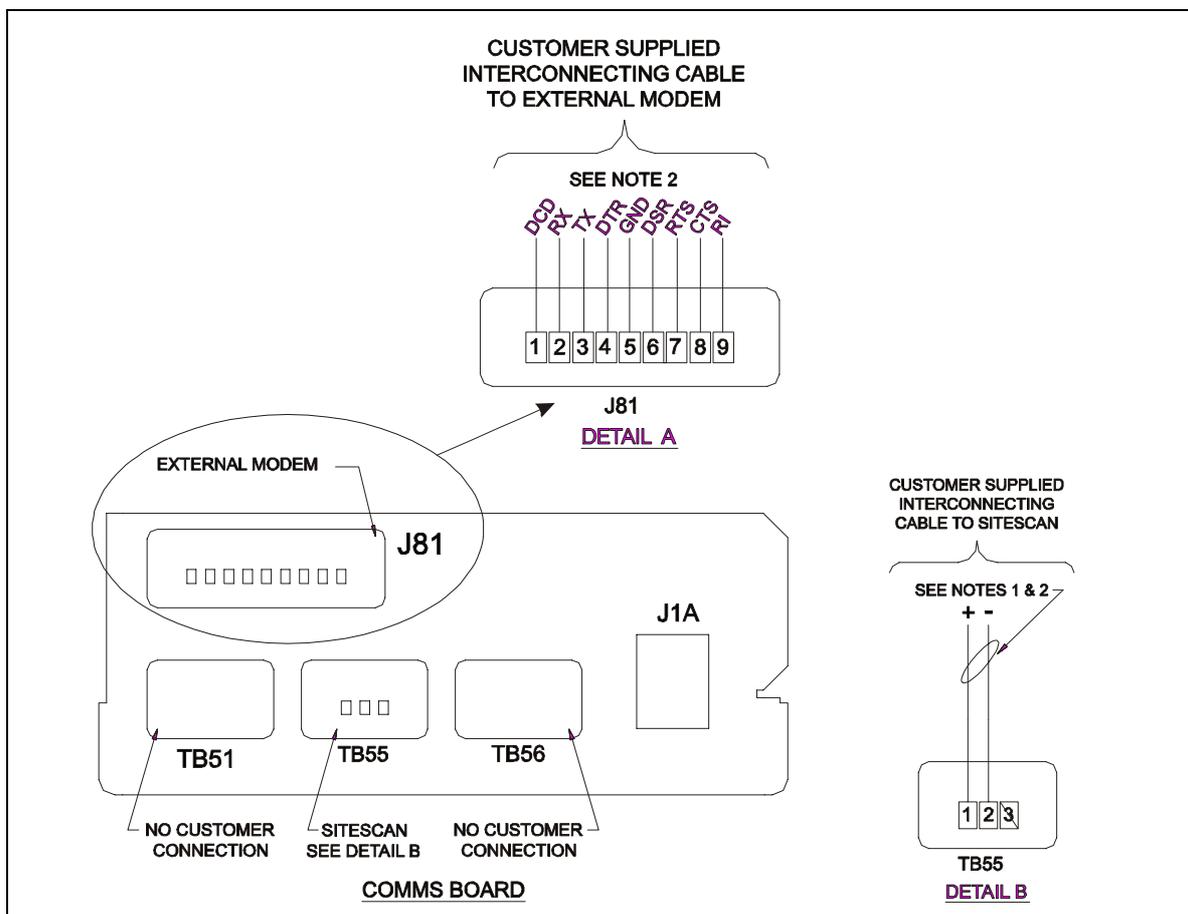
Figure 3-4

Notes:
1. Maximum cable length (300 meters) with twisted pair cable # 0,5 mm^2 300V minimum.
2. Signal voltage 5Vdc, current 10 mA.
3. Refer to chapter 11 for configuring the '*comms board*'.
4. All control wiring (by others) must be run separate from power wiring. Control wiring runs should not be combined in the same conduit.
5. Refer to control connection location diagram of static tranfer switch for location of *comms board*.
6. All wiring must be in accordance with national and local electrical codes.
7. External modem is supplied by others.

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4   Chapter 4 – Communication System

4.1   Introduction

HiSwitch2 enables to use the communication system to send all the most relevant information related to its operating condition (in real time), its alarm history and its event history, depending on the customer's specific requirements. If appropriate optional boards are installed, it is also possible to remotely display the most relevant alarms or user-defined ones.
Supervision can be carried out from a local or remote location.

The HiSwitch2 monitoring system offers several choices for communications. They are:
- RS-232 terminal port (std)

OPTIONS:
- Internal modem
- Network Interface Card (NIC)
- Input Contact Isolator (ICI) Board
- Programmable Relay Board (PRB)
- Comms Board

4.2   RS-232 Port

The unit is equipped with an RS-232 port for connecting a terminal or PC.

The HiSwitch2 communicates the information required by the customer through the two RS232 communication ports placed on the output of the Control board.

The RS-232 terminal port is standard on all units. The port is located inside the front door, to the left of the touch screen/LED front panel mounting as shown in Chapter 6. This port is primarily used as an alternate user interface to configure, control, and diagnose the system, especially for systems that do not include the LCD touch screen display. Commands for the RS-232 port are shown in Table below.

4.2.1   Terminal Port Connections

The system has an asynchronous serial port configured as Data Terminal Equipment for terminal access only (half duplex). The CPU services the terminal port with no handshaking. The serial port conforms to RS-232 levels with a data format of 9600 Baud, 1 start bit, 8 data bits, and no parity bits. The serial port is 1000 Volt DC isolated (non-SELV) and ESD protected to 15kV air discharge.

The connector is a 6 Pin MTA plug with connections shown below.

MTA Plug Pinout (Service Terminal port):

	Signal Name	Function / Comments
1	ISO_GND	Isolated service terminal ground
2	ISO_TXD	Isolated service terminal transmit output
3	ISO_RXD	Isolated service terminal receive input
4	NC	No Connection
5		
6		

Table 4-1

A DB9 male connector is added and connected parallel to the 6 position header. It is configured as DTE.

DB9 Pinout:

	Signal Name	Function / Comments
1	NC	No Connection
2	ISO_RXD	Isolated service terminal transmit output
3	ISO_TXD	Isolated service terminal receive input
4	NC	No Connection
5	ISO_GND	Isolated service terminal ground
6	NC	No Connection
7		
8		
9		

Table 4-2

Notes:
1. RS-232 Communication through DB9 connector.
2. Connector accessible with front door opened.
Connector must be removed prior to closing door.

DB9 CONNECTOR
DETAIL A

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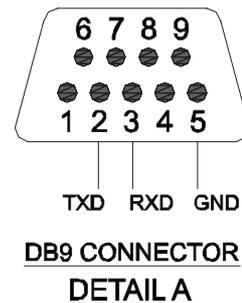
RS-232 Interface Parameters:

The service terminal interface parameters are the following settings and cannot be changed.

Parameter	Settings
Interface	RS-232 Using EIA Voltage Levels
Baud Rate	9600
Parity	None
Number of Data Bits	8
Number of Stop Bits	1
Hardware Flow Control	Off
Terminator	<CR> <LF>
Handshaking	Not supported
Structure	Full duplex
Local Echo	Off

Table 4-3

4.2.2   Connecting and Using a Terminal

An RS-232 connection can be used to connect the HiSwitch2 to either a terminal or a PC running terminal emulation software. If you are unsure of the cable pin out, see Terminal Port in previous section.

1. Connect the terminal to the HiSwitch2 by plugging the cable from the terminal into the RS-232 port.
This connection can be made at any time.

2. After making the connection, verify the communications link by pressing <ENTER> on the terminal keyboard.
The interface communications system responds as indicated below:

Repeating command -->
Illegal command!
<?> or <HELP?> displays the RS-232 command set
<?> <command> or <HELP?> <command> displays specific help for the command
SVTP-Control >

The **SVTP-Control** > prompt indicates that RS-232 communications are established.

• If you receive no response or prompt, verify that the connector is properly plugged into the port and the PC or terminal serial interface is working properly.

3. Enter the desired commands, as listed in Table below:
For additional help type *<?> <command>* or *<HELP?> <command>*

Refer to the corresponding menu options in the Chapter 11 for more details about the commands.
Some terminal commands require a password to function. Use the PWD command and a valid password to gain access.

Keys	Function
?	Displays this help menu or specific help with a command
AA?	Displays active alarms
AF?	Displays active faults
CEL	Clears the event log
CHL	Clears the history logs
DATE?	Displays current system date
DATE	Sets system date
EL?	Displays the entire event log
HELP?	Displays this help menu or specific help with a command
HLn?	Displays the history log #n, if frozen
LOGOUT	Logs user out of unprotected mode
PS?	Displays the preferred source
PS n	Sets the preferred source to #n
PWD	Allows users to access protected commands
QUIT	Modem only. Ends the session and hangs up the modem.
SH	Silences the horn
SPT?	Displays all current setpoints
Keys	**Function**
SPTx	Displays current setpoints for group x. See Configuring the HiSwitch2 via the Terminal for a description of groups.
SR?	Displays status reports
TIME?	Displays current system time
TIME	Sets system time
UPMDR?	Displays metering data
VER?	Displays firmware versions

Table 4-4 – Terminal/ Modem Commands

4.2.3   Configuring the HiSwitch2 via the Terminal

The SPT command is used to configure the systems setpoints. The SVT syntax for the setpoints consists for four parameters:

SPT [group] [item] [value]

where the parameters are:

• **SPT** — is the terminal command that is used to configure setpoints.
• *group* — the group under the setpoint command which contains the desired settings.
• *item* — the item number within the selected group.
• *value* — the desired value for this item.

Only the specific options words listed in this section use a hexadecimal value. Other settings, depending on what they are, use other input types. For example, System ID uses a text string, nominal voltages and currents use standard numeric integers, and modem baud rate uses an enumeration where 0 = 2400, 1 = 9600, & 2 = 19200 bps.

> ⚠️ *Note*
>
> *Spaces are placed between each parameter, but not between characters or numbers in a parameter. Using an underline here to represent a space, an example of a the syntax is: SPT_2_6_0081. 0081 is the value parameter.*

This section provides instructions for setting these parameters, with an example of building an SPT command for System and User settings.

4.2.3.1   Groups Parameter

The setpoints are grouped for ease of configuration. For example, Event Masks are group 4 and System Settings are group 2. The numbers shown below are entered for the group parameter. For example, start of a System Settings command is *SPT 2*.

The group parameters are:

1 = System Ratings
2 = System Settings
3 = User Settings
4 = Event Mask Settings

For example, the start of a System Settings command is SPT 2, where SPT is the system setpoints command and 2 is the group parameter for System Settings.

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See '*Setting Event Masks with the Terminal*' in next section for instructions on configuring Event Mask parameters.

4.2.3.2   Item Parameter

Each setting within the group is indexed by an item number as shown below in Table 4-6. These item numbers are also displayed on the terminal when you list the configuration setting for a particular group.

Continuing with the example, to configure an Options_1 setting under System Settings, the command would begin with *SPT 2 6* where 6 is the value Options_1. Note the space between each parameter.

4.2.3.3   Value Parameter

Item settings, depending on what they are, use various value types.

Table 4-5 provides a list of the possible value types and their description.

Type	Definition
Numeric	An integer numeric value in the units indicated by the item name. For example, a System Voltage Rating of *480* would indicate *480 volts*.
Scaled	Similar to the Numeric, this value type is an integer that has been scaled, usually to remove decimal points that would normally appear within the value. In this case, a value of 2.5 may actually be input as simply 25. For all Scaled types, the scaling appears in Table 4-6.
String	Certain settings are represented by alphanumeric character strings, such as setting the System Model Number to HiSwitch2.
Enumeration	This type uses an indexed list to represent possible choices. One example is the Modem Baud Rate, which uses a value of *0* to select 2400 bps, *1* for 9600 bps, and *2* for 19200 bps.
Bit-packed	This type of value uses a *hexadecimal binary word*, where each of the sixteen *bits* in the word has the value of 1 (*True*) or 0 (*False*). Although somewhat difficult to use, it packs a large amount of data within a single entry. A detailed description of this type appears in next section 'Setting Bitpacked Setting Bitpacked Options with the Terminal'.
Event Masks	This type is a specially formatted and is used to customize the behavior of each fault and alarm in the system. See 'Setting Event Masks with the Terminal' in next section for instructions on configuring Event Mask parameters.

Table 4-5 – Value Types

Table below shows the various groups, the settings contained within, and the type of value it requires.

Group	Item:	Description	Value Type	Value Notes
Group 1: System Ratings	1	Input Volts (PDU)	Integer	Set per system spec.
	2	Volts		
	3	Current		
	4	Frequency	Scaled	Desired freq. x 10 (*600* = 60 Hz)
Group 2: System Settings	1	Language	Enumeration	[Not supported at this time]
	2	System Model Number	String	14 Character max.
	3	System ID Number		8 Character max.
	4	System Tag Number		
	5	System Order Number		
	6	Options_1	Bitpacked	14 Character max.
	7	Autodial Primary Line	String	20 Character max.
	8	Autodial Secondary Line		
	9	Autodial Pager Number		
	10	Autodial Pager PIN		10 Character max.
Group 2: (cont.)	11	Modem Init String	String	20 Character max.
	12	Modem Baud Rate	Enumeration	0 = 2400, 1 = 9600, & 2 = 19200 bps
	13	Modem LGS Check - Day	Bitpacked	
	14	Modem LGS Check - Time		
	15	Comms Options 1		See section 'Setting Bitpacked Options with the Terminal'
	16	Comms Options 2		
Group 3: User Settings	1	SRC1 Fast Undervoltage Setpoint	Integer	Integer In % of nominal below nominal
	2	SRC1 Slow Undervoltage Setpoint		
	3	SRC1 Slow Undervoltage Detect Delay		In number of lines cycles
	4	SRC1 Overvoltage Setpoint		In % of nominal above nominal
	5	SRC1 Overvoltage Detect Delay		In 1/4 lines cycles
	6	SRC1 I peak Transfer Setpoint		x 10
	7	SRC2 Fast Undervoltage Setpoint		In % of nominal below nominal
	8	SRC2 Slow Undervoltage Setpoint		
	9	SRC2 Slow Undervoltage Detect Delay		In number of lines cycles
	10	SRC2 Overvoltage Setpoint		In % of nominal above nominal
	11	SRC2 Overvoltage Detect Delay		In 1/4 lines cycles
	12	SRC2 I peak Transfer Setpoint		x 10
	13	Max. Transfer Phase Angle		In degrees
	14	Output Frequency Deviation		Freq. in Hz x 10
	15	ReTransfer Delay Time		In seconds
	16	Horn Volume		Range: 1-10
	17	Critical Option Enabling	Bitpacked	See next section 'Setting Bitpacked Options with the Terminal'
	18	Non-Critical Option Enabling		
Group 4: Event Mask Settings	1 to 63	Event Mask settings for faults	Event Mask	See section 'Setting Event Masks with the Terminal'
	64 to 143	Event Mask settings for alarms		

Table 4-6 – Group Settings and Values

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4.2.3.4   Setting Bitpacked Options with the Terminal

Five sets of *options* and *features* settings are available through the terminal to control the system operation.

Under System Settings for the SPT command, these items denote which options are INSTALLED:

- **6** — Options_1
- **14** — Comms Options 1
- **15** — Comms Options 2

Under User Settings, for the SPT command, these items denote which features are ENABLED:

- **17** — Critical Option Enabling
- **18** — Non-Critical Option Enabling

The value parameter settings are in the form of a bit-packed word (in hexidecimal notation). In other words, each bit indicates a particular setting for the option or feature. The bit assignments for the options and features are as follows:

Options_1			
bit0	HasDualOutputBreaker	bit5	HasExternalPrecisionTimeSource
bit1	HasPDU	bit6	HasSFA
bit2	Has4PoleTransferSwitch	bit7	HasRemoteSourceSelect
bit3	HasShuntTrip	bit8 through bit15	not used (set to 0)
bit4	asWyeOutputXfmr		

Comms Options 1			
bit0	HasIntModem	bit9	HasOpenCommsDigitalOutputBrd_2
bit1	HasExtModem	bit10	HasRemoteStatusPanelBrd_1
bit2	HasNIC	bit11	not used (set to 0)
bit3	not used (set to 0)	bit12	
bit4	HasSiteScan	bit13	
bit5	not used (set to 0)	bit14	EnableDialIn
bit6			
bit7	HasOpenCommsDigitalInputBrd	bit15	EnableDialOut
bit8	HasOpenCommsDigitalOutputBrd_1		

Comms Options 2	
bit0	EnablePager
bit1	EnableOCDINormallyClosed
bit2-3	OCDO1Assignment (0=User Defined, 1=Standard Set or 2=AS400)
Bit4-5	OCDO2Assignment (0=User Defined, 1=Standard Set or 2=AS400)
Bit6 throug h bit15	not used (set to 0)

Critical Option Enabling	
bit0	EnableManual_IPeakReset
bit1	EnableAutoRestart
Bit2 throug h bit15	not used (set to 0)

Non-Critical Option Enab	
bit0	EnableAutoReXfer
Bit1 throug h bit15	not used (set to 0)

The bits are set in reverse order, from bit 15 on the left to bit 0 (zero) on the right. The bits are grouped in four sets of four bits each, as such:

0000 0000 0000 0000

|................................|

bit 15........................bit 0

Since each bit represents a setting, a bit can be enabled or disabled:

• **1** = installed option or enabled feature

– *or –*

• **0** = option not installed or feature not enabled

Enabling or disabling the bits in each group creates a binary value for that group. For example, if the fourth bit in a group is set to 1, the group group's binary value is 0001.

Each group is translated into a hexidecimal equivalent. The group with the value of 0001 has a hex equivalent of 1. You can use this table to help with the conversion:

Binary value	Hex Equivalent
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9

Binary value	Hex Equivalent
A	1010
B	1011
C	1100
D	1101
E	1110
F	1111

Table 4-7 – Binary-Hexidecimal Conversions

The hex value for each group is entered in the command as four digits.

To summarize the procedure:

1. Set each bit position.

2. Convert the binary value each group into its hex equivalent.

3. Enter the hex values for each group, in order, into the command for the value parameter.

The following example explains how the conversion is completed.

4.2.3.5   Putting the Terminal Command Together

For example, a unit only has the Remote Source Selection and Dual-Output Breaker options installed.

Checking the bits list under **Options_1** on table above, bits 7 and 0 each must be set to 1 to indicate that these options are installed.

The bit setting is as follows, starting with bit 15 on the left and going down to bit 0:

0000 0000 1000 0001

With the bits combined in groups of four, the binary settings can be translated into hexidecimal values.

The first two groups in the sample equal zero (0). In the third group, 1000 in binary translates to 8 in hex. In the fourth group, 0001 in binary translates to 1 in hex.

In hex this equates to (digits in the value parameter cannot have spaces between them):

0081

So your command to indicate that the Remote Source Selection and the Dual-Output Breaker are installed would be:

SPT 2 6 0081

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4.2.4 Setting Event Masks with the Terminal

The event masks can be customized via a terminal. The command SPT4?<ENTER> displays all faults and alarms, along with their associated event masks. A plus sign (+) means that particular event mask is enabled, while a minus sign (-) means that mask is disabled.

Refer to 'Event Mask' in Chapter 11 for more information on event masks and their associated flags.

Unlike the System and User Settings, mask values are set by designated letters, not hex values.

However, as with other RS-232 interface settings, four parameters are passed. See 'Configuring the HiSwitch2 via the Terminal' in this section for more details about the parameters.

The syntax for configuring event masks is:

SPT 4 ID ±D±L±S±E±A

• **SPT** — is the terminal command used to configure setpoints.

• **4** — setting (group parameter) for event masks, under System Settings.

• **ID** — event ID. The ID is the item parameter for this command. The ID numbers for each event are listed with the events in Table 10-1 in Chapter 10.

• **D,L,S,E,A** — the event masks: Dial, Latch, Summary, Event log, and Audible. The masks are the value parameter for the command.

Each mask type **must** be preceded by a plus sign (+) to enable it, or a minus sign (-) to disable it.

⚠️ *Note*

NO spaces are placed between each mask listed above.

Only the mask that is passed (enabled) is applied when the event occurs.

Note that the Summary and Event Log event masks are only configurable for the LED units.

To set the event masks for a particular event:

1. Enter the command. Examples and descriptions are provided below.

2. Press ENTER.

After the new settings are entered, the new results for that event ID are displayed.

4.2.4.1 Examples of Event Mask Settings

• To latch event #001, S1 SCR SHORT, use SPT 4 1 +L.

• To disable event #128, CONFIG MODIFIED, from sounding the horn, use SPT 4 100 -A.

• To enable event #012, OUT VOLT SENSE FAIL, to Dial and go into the Event Log, use SPT 4 12 +D+E.

• To disable all masks for event #120, INPUT CONTACT #1, use SPT 4 120 -D-L-S-E-A.

To breakdown this syntax for the last example:

• **SPT** — SVT command

• **4** — group parameter, identifying System Setting group under which the Event Mask settings reside.

• **120** — item parameter. In this command, that is the event ID.

• **-D-L-S-E-A** — value parameter. In this case, the minus sign (-) disables all masks for the INPUT CONTACT #1 event.

4.3   Communications options

> ⚠️ ⚡   **WARNING**
>
> *Where optional accessories are to be installed or there is to be wiring inside the HiSwitch2, comply with the procedures set forth for equipment maintenance and the safety requirements of this manual.*

Several other communications options are also available. Those options are located a Communications compartment to the right of the touch screen/LED front panel and are accessible when the front panel door is open. See figures in Chapter 6 for the location of the communications options.

Connections to the communication ports are made by wiring to terminal boards located in the Communications compartment. The communications options listed below reference the control wiring drawing for each option.

The instructions for configuring the communications options are provided in Chapter 11.

4.3.1   Internal modem

The connection to this modem is through a standard RJ-11 port.

This port automatically dials the programmed telephone number when a designated alarm occurs. Automatic dial attempts are made to the first phone number at periodic intervals for 30 minutes. After that time, auto dial attempts are made to the second phone number at periodic intervals for the next 30 minutes. The process is repeated until a successful connection is made.

Upon successful connection, the system transmits the status information and then hangs up.

System status and history information can be requested and date and time can be changed through the modem. The modem commands are shown in Chapter 4 - Table 4-4.

The instructions for configuring the internal modem are provided in Chapter 11.
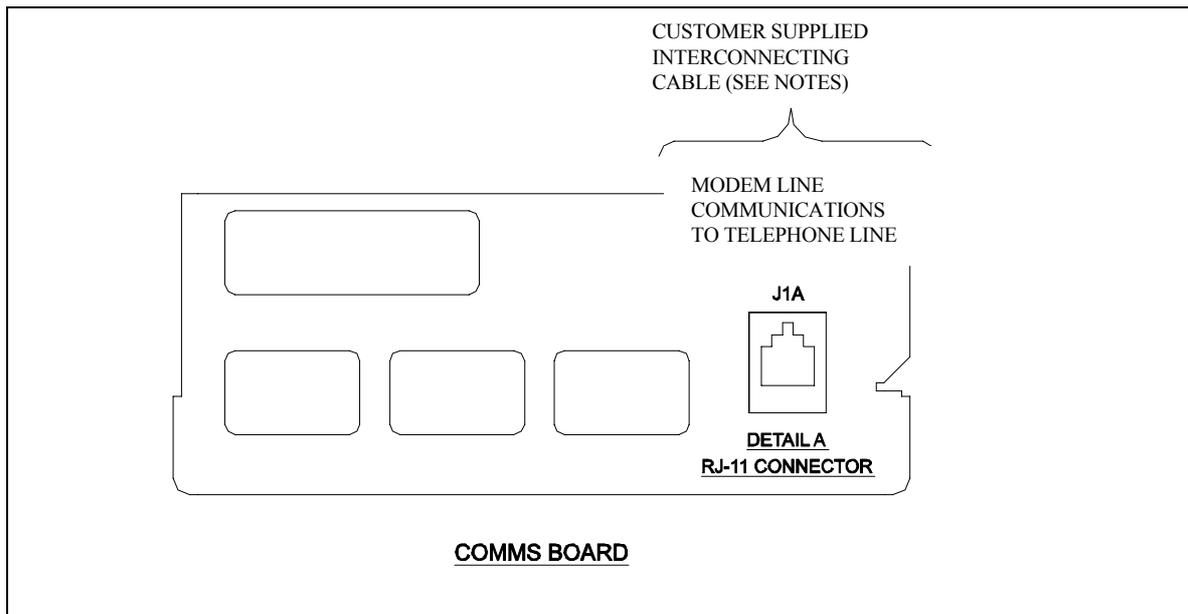
Figure 4-1

Notes:
1. Internal modem option must be ordered separately.
2. Wire size and type: telephone cable with RJ-11 plug Connector. The length is limited by internet standards.
3. Refer to chapter 11 for configuring the '*internal modem option*'.
4. All control wiring (by others) must be run separate from power wiring. Control wiring runs should not be combined in the same conduit.
5. Refer to control connection location diagram of static tranfer switch for location of *comms board*.
6. All wiring must be in accordance with national and local electrical codes.

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4.3.2   Network Interface Card (NIC)

The NIC provides connectivity to any TCP/IP-based Ethernet network to allow the device to communicate with network management systems (NMS) via SNMP. Events can be transmitted to the NMS to provide remote status monitoring, plus fault and alarm detection. The NIC includes an RJ-45 port for an Ethernet connection, via Category 5 cable.

The NIC can also integrate the system with an existing Building Management System (BMS) or out-of-band monitoring, using Mobus, a standard multi-drop protocol. The NIC has redundant communication paths that make it possible to connect to a BMS using Modbus while simultaneously communicate to a NMS through SNMP See figure in Chapter 6 for more information on the NIC. If you have questions about the NIC, refer to the OpenComms Network Interface Card Installation and Users Guide. The instructions for configuring the NIC are provided in Chapter 11.
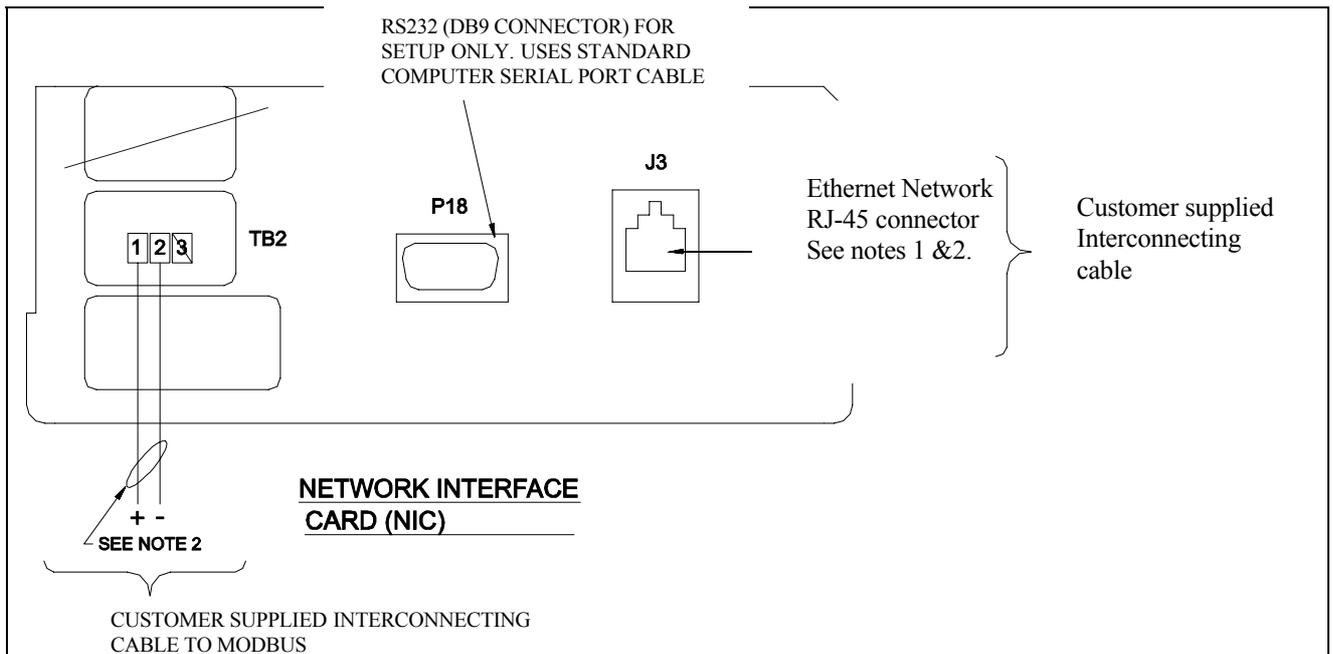
Figure 4-2

Notes:
1. . Wire size and type: 10/100 Base-T Ethernet cable with RJ-45 plug Connector. The length is limited by internet standards.
2. Maximum cable length (300 meters) with twisted pair cable # 0,5 mm^2 minimum. Signal voltage 5Vdc, current 10 mA.
3. Refer to chapter 11 for configuring the '*Network Interface Card*'.
4. All control wiring (by others) must be run separate from power wiring. Control wiring runs should not be combined in the same conduit.
5. Refer to control connection location diagram of static tranfer switch for location of '*Network Interface Card Option*'.
6. All wiring must be in accordance with national and local electrical codes.

4.3.3   Input Contact Isolator (ICI) Board

Provides an interface for up to eight user inputs. External messages and alarms can be routed to the unit, via the ICI. See Configuring the Input Contact Isolator Settings in Chapter 11 for instructions on configuring the connections. See Figure in Chapter 3 for wiring details.

4.3.4   Programmable Relay Board (PRB)

Up to two PRBs can be installed in the HiSwitch2 to route HiSwitch2 events to external devices. See Configuring the Programmable Relay Board Settings in Chapter 11 for default settings and instructions for reconfiguring the relays. See Figure in Chapter 3 for wiring details.

4.3.5   Comms Board

Includes a terminal block to provide a DTE connection to an external modem. This board also provides a direct connection to a SiteScan terminal, via an RS-422.
SiteLink-12 or SiteLink-4 is required for SiteScan to communicate with the HiSwitch2. See Figure in Chapter 3 for wiring details.
Data link requirements are Full Duplex Asynchronous RS-232 format.

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5   Chapter 5 – Technical Specifications

The tables below describe the typical features of static transfer switches (HiSwitch2).

5.1   Conformity and Standards

The static transfer switch is designed in accordance with the following standards:

Description	Year	Reference standards
General and safety requirements for UPS used in operator access areas	2002	EN 62040-1-1 IEC 62040-1-1
Emissions requirements	1995	EN 50091-2
Method of specifying the performance and test requirements	2001	EN 62040-3 identical to IEC 62040-3 (1999)
Safety of information technology equipment	2001	EN 60950
ISO 9001 Quality Certification — **CE marked**		

5.2   Environmental Conditions

STSes are designed to resist the following environmental conditions without failures or compromised operation:

ENVIRONMENTAL CHARACTERISTICS	UNIT	
Nominal current	**A**	**100-1000**
Operating temperature	°C	0 to 40
Relative humidity	—	≤ 95% not condensing
Installation altitude		≤1200m asl
Storage and transport temperature	°C	-40 ÷ +80
Operating Altitude above sea level without derating	m	Up to 1200 (Above 1200 m output current is derated by 18% per 1000 m)
Audible noise	dBA	≤ 55 dBA at 1.5 m with audible alarm off

5.3 Mechanical characteristics

MECHANICAL CHARACTERISTICS	UNIT of MEAS.	HiSwitch2					
	A	100	250	400	600	800	1000
Height	mm	1956					
Width		762		965		2134	
Depth		815					
Weight (^{1})	kg	354		544		1134	
Ventilation	-	By internal intake fans					
Cable entry	-	top or bottom					
Degree of protection (EN 60529)	-	IP20					
Colour	-	RAL 7035 (Light grey)					

(^{1}) The distributed floor weight for HiSwitch2 is less than 660kg/m².
Dimensions and weight do not include the pallet and packing material. Actual weights will vary depending on installed options.

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5.4   Electrical Characteristics (Inputs)

INPUTS		
	UNIT of MEAS.	
Nominal current	**A**	**100÷1000**
Nominal mains voltage ❶	Vac	200, 208, 220, 240, 380, **400** or 415 (L-L) **50** Hz from 200 to 415 (L-L) 60 Hz
Power supply		Three phase a.c. (3 or 4 wire-plus-ground). The HiSwitch2 is designed to accept an input neutral from each source.
Mains voltage variation tolerance	%	The voltage shall be within ± 10 % of the nominal voltage.
Frequency	Hz	**50** or 60 (factory setting)
Frequency tolerance	Hz	default ± 0.5 From 0.1 to 3.0 selectable every 0.1 Hz

5.5   Electrical Characteristics (Output)

OUTPUT DATA							
	UNIT of MEAS.						
Nominal current	**A**	**100÷1000**					
Nominal voltage ❶	V AC	200, 208, 220, 240, 380, **400** or 415 (L-L) **50** Hz from 200 to 415 (L-L) 60 Hz					
Power supply		Three phase a.c. (3 or 4 wire-plus-ground). Nominal output voltage shall be same as input voltage.					
Frequency	Hz	**50** or 60 (factory setting)					
Frequency tolerance	Hz	default ± 0.5 From 0.1 to 3.0 selectable every 0.1 Hz					
System Current Ratings ❷	A	100	250	400	600	800	1000
Overload Capability	A	125 % for 30 minutes 100A÷400A 125 % for 10 minutes 600A÷1000A 150 % for 2 minutes 500 % for 0.25 sec.					
Yield at nominal current		> 99 %					
Transfer mode		Non short-circuiting switching (Break before Make)					

Notes:

❶ = Factory set for **400** Vac — The HiSwitch2 is supplied with redundant power supplies that are designed to operate from a voltage range of 200V to 415V.

❷ = These ratings are based upon continuous switch current rating. These ratings are for all voltages and frequencies. All units are 100% continuous current rated.

5.6   General characteristics

<table>
<tr><td colspan="5" align="center">100÷1000 A</td></tr>
<tr><td>Switching:</td><td colspan="4">Manual and automatic
Preferential mains may be selected
Retransfer may be set to Automatic/manual
Inhibition of transfer may be set for overload in output
Transfer time: ¼ cycle (5 ms)</td></tr>
<tr><td></td><td colspan="4">3 pole configurations</td></tr>
<tr><td></td><td colspan="4">Size of neutral: 2 In (if used)</td></tr>
<tr><td></td><td colspan="4">SCR failure detection: open or short circuit (standard alarm only)</td></tr>
<tr><td></td><td colspan="4">Accessible from front for maintenance work</td></tr>
<tr><td></td><td colspan="4">Ventilation control device
Redundant fans</td></tr>
<tr><td>Operator display</td><td colspan="4">Led display panel or option LCD touch screen display panel</td></tr>
<tr><td>Parameters monitored</td><td colspan="4">Voltage and current (input/output);
frequency for both power sources
apparent and active power in output,
phase difference in input,
number of transfers</td></tr>
<tr><td>Load Power Factor Range</td><td colspan="4">0.75 to 1.0, leading or lagging</td></tr>
<tr><td>Load Crest Factor</td><td colspan="4">Up to 3.5</td></tr>
<tr><td>Source Voltage Distortion</td><td colspan="4">Up to 10% THD with notches and ringing transients</td></tr>
<tr><td rowspan="6">Unit Short Circuit Withstand Capability</td><td>Unit Voltage</td><td colspan="2">Unit Amps</td><td>Withstand Capability</td></tr>
<tr><td>208-240V</td><td colspan="2">100÷1000A</td><td>100kA</td></tr>
<tr><td></td><td colspan="2"></td><td></td></tr>
<tr><td rowspan="3">380-415V</td><td colspan="2">100-250A</td><td>65kA</td></tr>
<tr><td colspan="2">400-600A</td><td>100kA</td></tr>
<tr><td colspan="2">800-1000A</td><td>65kA</td></tr>
</table>

Input Surge Suppression
The HiSwitch2 is equipped with transient voltage surge suppression on each input for maximum surge suppression. The surge suppression is capable of protecting the HiSwitch2 from operating outside of tolerances due to surges as defined by IEC 1000-4-5 (1.2/50uS surge, 2kV CM and 1kV DM) as required under EN 50091-2.

Response Time
A dual level fast/slow transfer threshold is used for under voltage detection to allow the HiSwitch2 to be compatible with UPSs and generators. The voltage thresholds and the slow transfer delay time is user-adjustable. The fast transfer delay time is less than 4 ms.
The over voltage detection uses a single threshold, with programmable level and delay time.
See Chapter 11 'User Settings' for instructions on configuring these settings.

Environmental Requirements
See 'Location Considerations' in Chapter 1 for details concerning environmental requirements for the HiSwitch2.

6 Chapter 6 – Installation drawings

6.1 Introduction

The drawings below illustrate the principal mechanical and electrical characteristics of the HiSwitch2 and of its various optional cabinets.

In these drawings you will find all information of use for positioning the equipment, determining cable entry, making electrical power and auxiliary connections, determining the position of isolators, determining the physical location of various optional equipment, etc.

6.1.1 HiSwitch2 100 &250 A – general view

NOTES:
1) Air intake area. Do not block air filter.
2) Air exhaust
- 457 mm min. clearance above unit required for air exhaust.
3) Control cable entry
4) Power cable entry
5) Center gravity
- Keep cabinet within 15 deg. of vertical while handling.
6) Detail A
Threaded mounting holes used for seismic anchoring or floor-stand. Note, if floorstand is used the weight of the unit must be supported under all casters. Each mounting location is supported by (2) 10 ga. (.135") galvanized steel. The threaded 12mm insert is approx. 19mm deep.
Mounting bolts must be threaded into unit mounting holes from underneath unit base.
All dimensions are in millimeters

KEY LOCKOUT SWITCH

762

FRONT VIEW

815

1956

488

SIDE VIEW

594
213
280
FRONT
116
272
546
376
265
619
736
548
∅ 12MM

BOTTOM VIEW

620
238
343
326
130
756
MAX. DOOR SWING 180°
TOP VIEW
FRONT

12MM DIA THREADED MOUNTING HOLE (4) TYP (SEE NOTE 6)

69.8 (TYP)

LEVELER

FRONT OF UNIT SHOWN WITHOUT SIDE PANEL

DETAIL A

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6.1.2   HiSwitch2 100 &250 A – View of cable connections and mechanical details of their terminal bars

GROUND BUS
FRONT VIEW

INPUT/OUTPUT BUS
RIGHT SIDE VIEW

NEUTRAL BUS
RIGHT SIDE VIEW

NOTES:
1) Q1 Input isolator 1.

2) Q2 Input isolator 2.

3) Q3 Output isolator. - Q3A Redundant output isolator (Optional)

4) Q4 Manual maintenance bypass isolator.

5) Q5 Manual maintenance bypass isolator.

6) Earth

7) Neutral

8) Top and bottom cable entry available through removable access plates. Remove, punch to suit conduit size, and replace.

9) Control and power wiring must be run in separate conduit. Output cables should be run in a separate conduit from input cables.

10) Aluminum and copper clad aluminum cables are not recommended.

11) All wiring is to be in accordance with national and local electrical codes.

12) The torque requirement for M12 bolt is 48 Nm.

All dimensions are in millimeters

FRONT VIEW
(WITH FRONT PANELS REMOVED)

SECTION A-A
SIDE VIEW

6.1.3   HiSwitch2 400 &600 A – general view

NOTES:
1) Air intake area. Do not block air filter.
2) Air exhaust
- 457 mm min. clearance above unit required for air exhaust.
3) Control cable entry
4) Power cable entry
5) Center gravity
- Keep cabinet within 15 deg. of vertical while handling.
6) Detail A
Threaded mounting holes used for seismic anchoring or floor-stand. Note, if floorstand is used the weight of the unit must be supported under all casters. Each mounting location is supported by (2) 10 ga. (.135") galvanized steel. The threaded 12mm insert is approx. 19mm deep.
Mounting bolts must be threaded into unit mounting holes from underneath unit base.
All dimensions are in millimeters

6.1.4   HiSwitch2 400 &600 A – View of cable connections and mechanical details of their terminal bars

GROUND BUS
FRONT VIEW

INPUT/OUTPUT BUS
RIGHT SIDE VIEW

NEUTRAL BUS
RIGHT SIDE VIEW

SOURCE 1 INPUT

SOURCE 2 INPUT

SYSTEM OUTPUT

FRONT VIEW
(WITH FRONT PANELS REMOVED)

SECTION A-A
SIDE VIEW

NOTES:
1) Q1 Input isolator 1.

2) Q2 Input isolator 2.

3) Q3 Output isolator. - Q3A Redundant output isolator (Optional)

4) Q4 Manual maintenance bypass isolator.

5) Q5 Manual maintenance bypass isolator.

6) Earth

7) Neutral

8) Top and bottom cable entry available through removable access plates. Remove, punch to suit conduit size, and replace.
9) Control and power wiring must be run in separate conduit. Output cables should be run in a separate conduit from input cables.
10) Aluminum and copper clad aluminum cables are not recommended.
11) All wiring is to be in accordance with national and local electrical codes.
12) The torque requirement for M12 bolt is 48 Nm.
All dimensions are in millimeters

6.1.5   HiSwitch2 800 &1000 A – general view

NOTES:
1) Air intake area. Do not block air filter.
2) Air exhaust
- 457 mm min. clearance above unit required for air exhaust.
3) Control cable entry
4) Power cable entry
5) Center gravity
- Keep cabinet within 15 deg. of vertical while handling.
6) Detail A
Threaded mounting holes used for seismic anchoring or floor-stand. Note, if floorstand is used the weight of the unit must be supported under all casters. Each mounting location is supported by (2) 10 ga. (.135") galvanized steel. The threaded 12mm insert is approx. 19mm deep.
Mounting bolts must be threaded into unit mounting holes from underneath unit base.
All dimensions are in millimeters

KEY LOCKOUT SWITCH

BREAKER CABINET

FRONT VIEW

SIDE VIEW

BOTTOM VIEW

TOP VIEW

MAX. DOOR SWING 180° (TYP)

12MM DIA THREADED MOUNTING HOLE (8) TYP (SEE NOTES 6)

69.8 (TYP)

LEVELER

DETAIL A
FRONT OF UNIT SHOWN WITHOUT SIDE PANEL

Ø 12MM

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6.1.6   HiSwitch2 800 &1000 A – View of cable connections and mechanical details of their terminal bars

NOTES:

1) Q1 Input isolator 1.

2) Q2 Input isolator 2.

3) Q3 Output isolator. - Q3A Redundant output isolator (Optional)

4) Q4 Manual maintenance bypass isolator.

5) Q5 Manual maintenance bypass isolator.

6) Earth

7) Neutral

8) Auxiliary terminal blocks (X1)

9) Top and bottom cable entry available through removable access plates. Remove, punch to suit conduit size, and replace.

10) Control and power wiring must be run in separate conduit. Output cables should be run in a separate conduit from input cables.

11) Aluminum and copper clad aluminum cables are not recommended.

12) All wiring is to be in accordance with national and local electrical codes.

13) The torque requirement for M12 bolt is 48 Nm.

All dimensions are in millimeters

6.1.7   HiSwitch2 100 ÷ 1000 A – Auxiliary terminal blocks (X1) details for all units

FRONT VIEW
(WITH FRONT PANELS REMOVED)

NOTE:
Remove standard links * (#21&22 and #23&24) when external circuit breakers are connected to the input lines.
For 800/1000A auxiliary terminal blocks are fitted within left cabinet rear a metal guard.

6.1.8   Typical options location

HiSwitch2 100/600

CONTROL WIRING
FRONT VIEW WITH FRONT DOOR REMOVED

HiSwitch2 800/1000

CONTROL WIRING
FRONT VIEW WITH FRONT DOOR REMOVED

NOTES:
Typical options are shown.
1) Remote Source select (Optional)

2&3) Programmable Relay Board (Optional)

Maximum of two (2) programmable relay boards can be used.

4) Input Contact Isolator board (Optional) or programmable relay board (option)

5) Network Interface Card (NIC) (Optional)

6) Comms board for Sitescan, external and internal modem interface (Optional)

7) LED display or touch screen display (Optional) with a standard RS232 port (8)

OPTION LOCATION DETAIL

❶ ❷ ❸ ❹ ❺ ❻

6 7 8 9
1 2 3 4 5

TXD   RXD   GND

DB9 CONNECTOR

❽

❼

LED PANEL (std)
LCD DISPLAY (opt)

FRONT VIEW
UPPER HALF OF UNIT
WITH DOOR OPENED

6.1.9   Electrical connections in the HiSwitch2

Note 1: (*) Remove standard links (*) when external circuit breakers are connected to the input lines.
Note 2: The neutral connection (N1/N2) is optional. See Note *- page 1-1.

6.1.10   Location of keys in HiSwitch2 power switch locks

ⓘ   Keys supplied
       inserted in locks
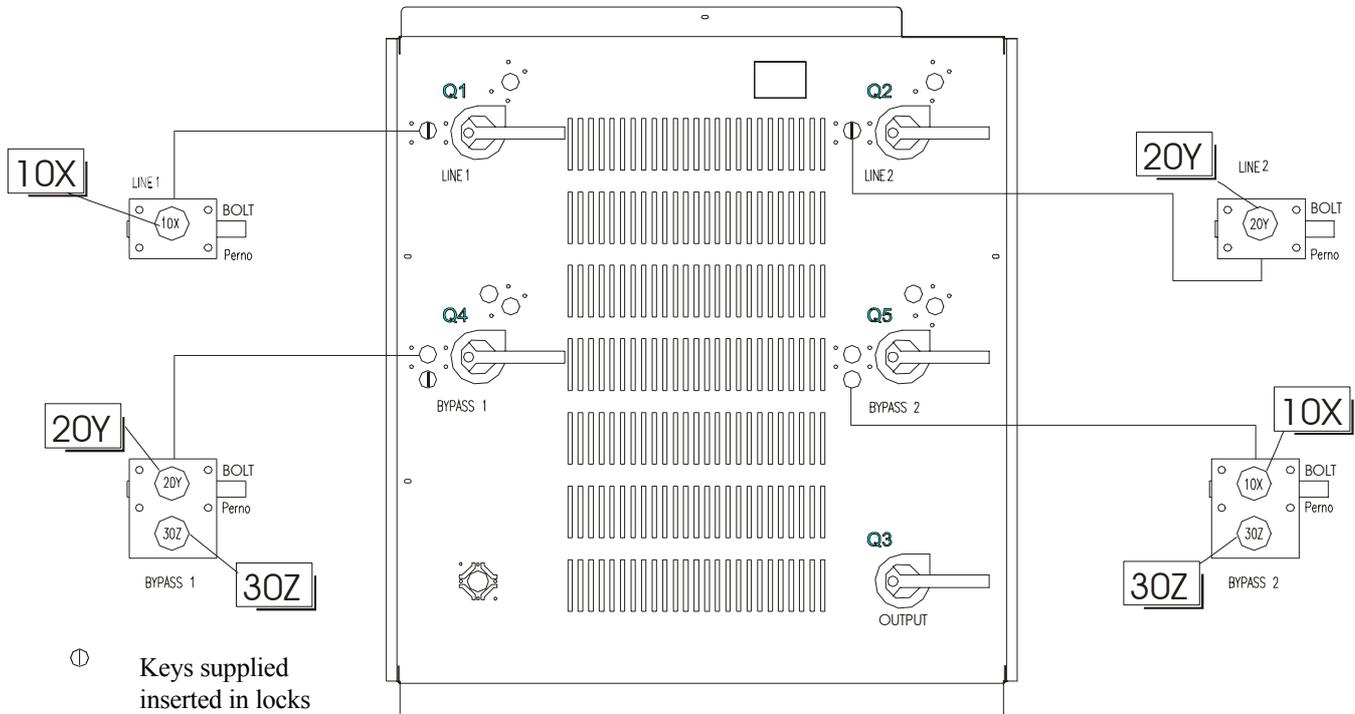
Type	Description of function
Single lock 10(X) and 20(Y)	• To turn switch, turn key clockwise. • To remove key, set switch in the OFF position and turn key anti-clockwise. • You can release the lock when the key has been removed from the lock (along with common key 30Z) of the Bypass Switch requiring maintenance work.
Double lock	• To turn on the Bypass Switch requiring maintenance, insert both keys (30Z and either 10X or 20Y) and turn them clockwise. • To remove a key, set the switch to the OFF position and turn the key to be removed anti-clockwise.

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Part II — User's Manual

7 Chapter 7 – General Description

7.1 Introduction

The HiSwitch2 contains all the equipment necessary to prevent an interruption in power flow to the AC load, should your primary source fail.

7.1.1 System Description

A HiSwitch2 provides an automatic, seamless transfer between input power sources to an output load. The HiSwitch2 monitors the input sources, to ensure each source is operating within set parameters, as well as ensure that each source is within acceptable tolerances for a transfer between sources to be completed.
The HiSwitch2 contains two static transfer switches in one enclosure to allow the unit to transfer its load between the two input sources without disruption to the output for longer than 1/4 cycle.
If a problem is detected with a primary (Preferred) input source and defined trigger points are reached, the HiSwitch2 automatically switches the input to the other (Alternate) input source. The HiSwitch2 continues to monitor both sources and can automatically transfer the load back to the preferred source, if so configured, when that source returns to acceptable operating parameters.
The system control logic automatically monitors the input sources and power output to ensure that they are operating within acceptable tolerances. The system logic manages the transfer between sources.

All control and logic components are mounted separate from the power components. The HiSwitch2 is designed to minimize the exposure of hazardous voltages to allow safe servicing of the unit while the load is energized.

The HiSwitch2 front panel can be equipped with either a LED display or a Color Graphical Display on LCD touch screen (Option).
On LED Display units, the RS-232 interface is used for configuration and status and event log monitoring.
In units not equipped with the touch screen, LEDs provide the user with the ability to monitor the HiSwitch2 and quickly assess problems.
The Color Graphical Display provides a menu-driven operator interface, and a display of system information, status information, a one-line diagram (Mimic) of the HiSwitch2, active alarms, and alarm history information.
The menu selections provide control of the preferred source, manual transfer initiation. Buttons provide for audible alarm silence and reset.
Through the touch screen, specific voltage, current and environmental parameters can be configured to trigger events that can sound an alarm, write to a history log and either transfer sources or inhibit a transfer.
Preferred input source selection, alarm reset and alarm silencing are done through buttons on the touch screen, or push buttons with the LED display.
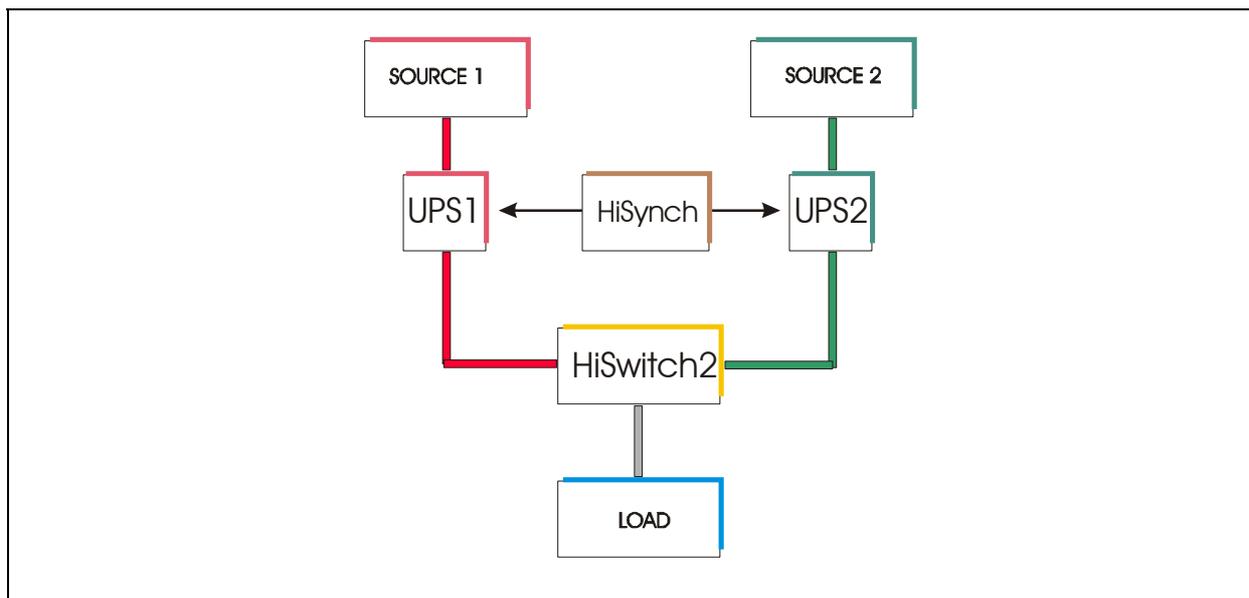
Figure 7-1 'HiSwitch2' block diagram

The simplest way of creating a dual bar system is represented by the Load Bus Sync (HiSynch) option, which permits synchronisation of two or more UPS systems even when running on the battery or powered by electricity generating units which are not synchronised. Each UPS supplies its own distribution unit connected up to it downstream, so that each element in the load may be connected to either. With the HiSwitch2, any connected load may be switched between supplies, so that one UPS (and its distribution system) may be taken out of service for maintenance work.

7.1.2   HiSwitch2 Static Transfer Switch

The HiSwitch2 is a 3 pole, double-throw, solid state automatic transfer switch that is fed from two sources. The Preferred source is the input source that normally carries the load when both sources are available. The preferred source is selectable by the user from the LCD panel or an optional Remote Source Selection. The unselected source is referred to as the Alternate source and carries the load if the preferred source should fail or if a manual transfer is initiated. The unit uses Silicon Controlled Rectifiers (SCRs) connected in paralleled, opposing pairs to function as an AC switch configuration. Three pairs of SCRs connect the AC load to the selected preferred input source as long as the preferred source is available. A second set of SCRs stands ready to transfer the AC load to the alternate input source should the preferred source fail. The switching action is a very fast, break-before-make with less than a 1/4 cycle break in the AC waveform.

During static switch transfers and retransfers, the conduction state of the SCRs is carefully monitored and controlled to prevent a current path from one source to the other. This technique prevents a faulted source from feeding into the other good source.

7.1.3   Source Transfer

The HiSwitch2 allows manually initiated transfers between the two sources, providing the alternate source is within acceptable voltage limits and phase tolerances with the preferred source. You begin a manual transfer by selecting the inactive source as the preferred source. On a manual transfer, the HiSwitch2 transfers between the two sources with less than one (1) millisecond interruption of power to the load. The transfer can only be completed when both sources are available and synchronized within the user-adjustable phase synchronization window. For sources where the two frequencies are not exactly in phase, manually-initiated transfers are delayed by the HiSwitch2 until the two sources are within the defined phase synchronization window.

Source selection can also be done remotely using the Remote Source Selection option, if installed.

7.1.4   Automatic Transfer/Retransfer

If the preferred source is out of voltage and/or frequency limits, the load is automatically transferred to the alternate source.

If the unit is so configured, the load is retransferred automatically to the preferred source after the preferred source returns to within the acceptable voltage and frequency limits for at least the defined retransfer time delay, and is in phase with the alternate source. You can enable and disable automatic retransfer to the preferred source through a user configuration setting.

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7.1.4.1 Automatic Retransfer Inhibited

If the system makes five transfers from the preferred source to the alternate source in a five minute period, automatic retransfers back to the preferred source is disabled.

To clear this alarm condition, you must assign the alternate source as the preferred source.

Also, the UV detection thresholds may need adjustment. See Chapter 11 '*Source Set Points*' for instructions on setting the UV detection.

This alarm also is cleared if the unit transfers to the preferred source due to an alternate source AC volt failure (i.e., an emergency transfer.).

7.1.5 Emergency Transfer

To ensure that power remains connected to the load, the HiSwitch2 automatically performs an emergency transfer from one input source to the other when an outage occurs on the existing source.

The automatic transfer takes place if the other source's voltage is within acceptable limits, and regardless of the phase difference between the two sources.

Emergency transfers occur with a loss of power on the output of less than 4 ms.

Emergency transfers from the alternate source to the preferred source are not affected by the Auto Retransfer Enabled/Disabled or Retransfer Delay user settings.

7.1.6 Load Current Transfer Inhibit

The HiSwitch2 senses the load current. If the load current exceeds the preset level deemed to represent a load inrush or fault condition, the unit's logic disables manual and automatic transfers, even if the selected source's input voltage is outside the acceptable limits. This event triggers an I-Peak alarm. If so configured, the Load Current Transfer Inhibit is automatically reset after the current and voltage return to within normal parameters. This reset provides continued protection against a source failure. The Load Current Transfer Inhibit also can be programmed to require a manual reset. See Chapter 11 '*Source Set Points*' for details.

7.1.7 SCR Failure

The HiSwitch2 continuously monitors the status of the SCR switching devices for proper operation. In the event of a shorted SCR on the input source powering the load, the HiSwitch2 automatically triggers an alarm and trips open the coil of the external input switch. Because the power breakers inside the HiSwitch2 are not automatic, customer must install external circuit breakers with release coils for isolating the input lines. Refer to figure 2-1.

In the event of an open SCR, the switch automatically triggers an alarm and transfers the load to the other source. All open and shorted SCR alarm conditions are latched and require the system to be repaired and reset to restore normal operation.

7.1.8 On/Off Sequence

The HiSwitch2 contains no master On/Off push button control. When connected to the input sources, the unit's logic power comes on automatically. The touch screen display (if so equipped) is active as long as at least one input source is energized and the Control Power Disconnect (located inside the static switch) is on.

7.1.9 Redundancy

Redundancy within the HiSwitch2 prevents one component from being a single point of failure, should a problem occur. Redundant circuits and components are used to eliminate single points of failure.

Since the HiSwitch2 has two input sources, no single component failure can cause a loss of power to the load.

Redundant power supplies are provided which feed a DC dual-bus used throughout the unit to prevent any single-point power supply failure modes.

Three separate redundant control logic modules are built into the system. Each contains the logic necessary to run the HiSwitch2, and control all transfers.

Redundant fans are provided if a primary fan fails. The redundant fans turn on to prevent overheating inside of the unit. Should the front panel interface fail, either touch screen or LEDs, the control logic continues to operate and the unit would transfer should a problem be detected on the preferred source. Information on the monitoring parameters would be available through the remote communication options, if available, or the DB9 (RS-232) connector located next to the LCD display behind the front door.

7.1.10 Emergency stop button

The HiSwitch2 cabinet has no internal emergency stop button.

The 'normally open' contacts on the Emergency Stop button outside the HiSwitch2 cabinet must be included in a specific electric circuit in order to start an external action (such as tripping of an external circuit breaker located on each of the power sources) to permit complete isolation of the static transfer switch under certain emergency conditions.

7.2   Modes of Operation of the STS

Normal operation (Preferred Source)
Under normal operating conditions, the HiSwitch2 routes power from the preferred input source to the output load. The unit monitors the voltage current and phase of each source to ensure that both are operating within set tolerances, and that the alternate source is available, should a transfer be required.

Transfer

Should the preferred source fail or be outside acceptable voltage limits, the HiSwitch2 transfers the input to the alternate source until the problem is rectified in the preferred source. The unit can be set to automatically transfer the input back to the preferred source, or only allow the transfer to be done manually.

Transfer Inhibit

For a transfer to be completed between input sources, the sources must meet certain parameters, or the transfer cannot take place. Uninterrupted transfer between sources is inhibited due to input source failure, sources out of sync, switch failure, or the unit is in bypass mode.

Maintenance Bypass

The static transfer switch can be manually bypassed to allow the power from a source to directly flow to the output load. This bypass allows the unit's electronics to be serviced without dangerous voltages being present.
The HiSwitch2 includes key-interlocked maintenance bypass isolators that allow either input source's electronics to be bypassed for maintenance without interruption of power to the load.

STS turned off

If a circuit breaker with a release coil has been installed upstream of each incoming power supply (optional cabinet), when the emergency pushbutton is pressed the STS will be deprived of both power sources and the load will no longer be supplied. If the external switches on the AC power supply lines powering the logical cards are kept closed, the operator control panel display will display alarm signals.

⚠ ⚡	***WARNING***
Note that hazardous voltage is present on the bus-bars, at the terminals of isolators affected by the bypass condition, and on AC power supply lines to logical boards and fuses (F 1÷4).	

7.2.1   Configuration of HiSwitch2 power isolators
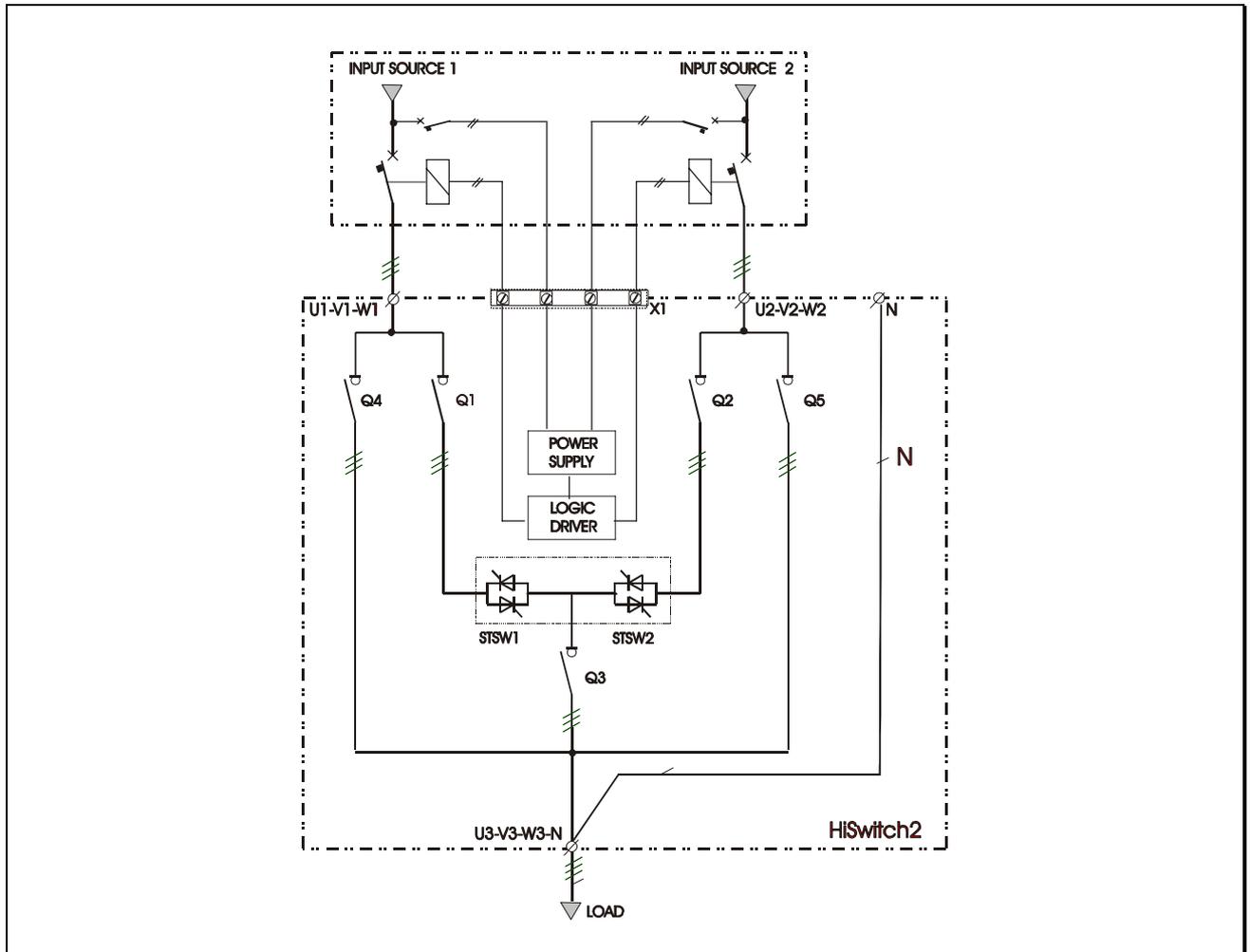
Figure 7-2 Typical diagram of 'HiSwitch2' static transfer switch

Figure 7-2 illustrates a typical HiSwitch2 configuration. The static switch input section is connected through its knife isolator (Q1) to an input mains (U1/V1/W1) which also supplies the manual maintenance bypass. The same circuit is repeated for the other input mains. The common output of the static switch is connected to the output isolator (Q3).

With the exception of the manual maintenance bypass isolators (Q4 and Q5), all the other isolators illustrated must be closed during regular HiSwitch2 operation.

7.2.2   Typical HiSwitch2 configuration in a dual-bus power supply system

The example in figure 7-3 illustrates 'dual bus' wiring. The load with a single input is supplied by a static transfer switch, which takes the power required from the output of a UPS system. The two UPS systems are synchronised with the 'HiSynch' option.
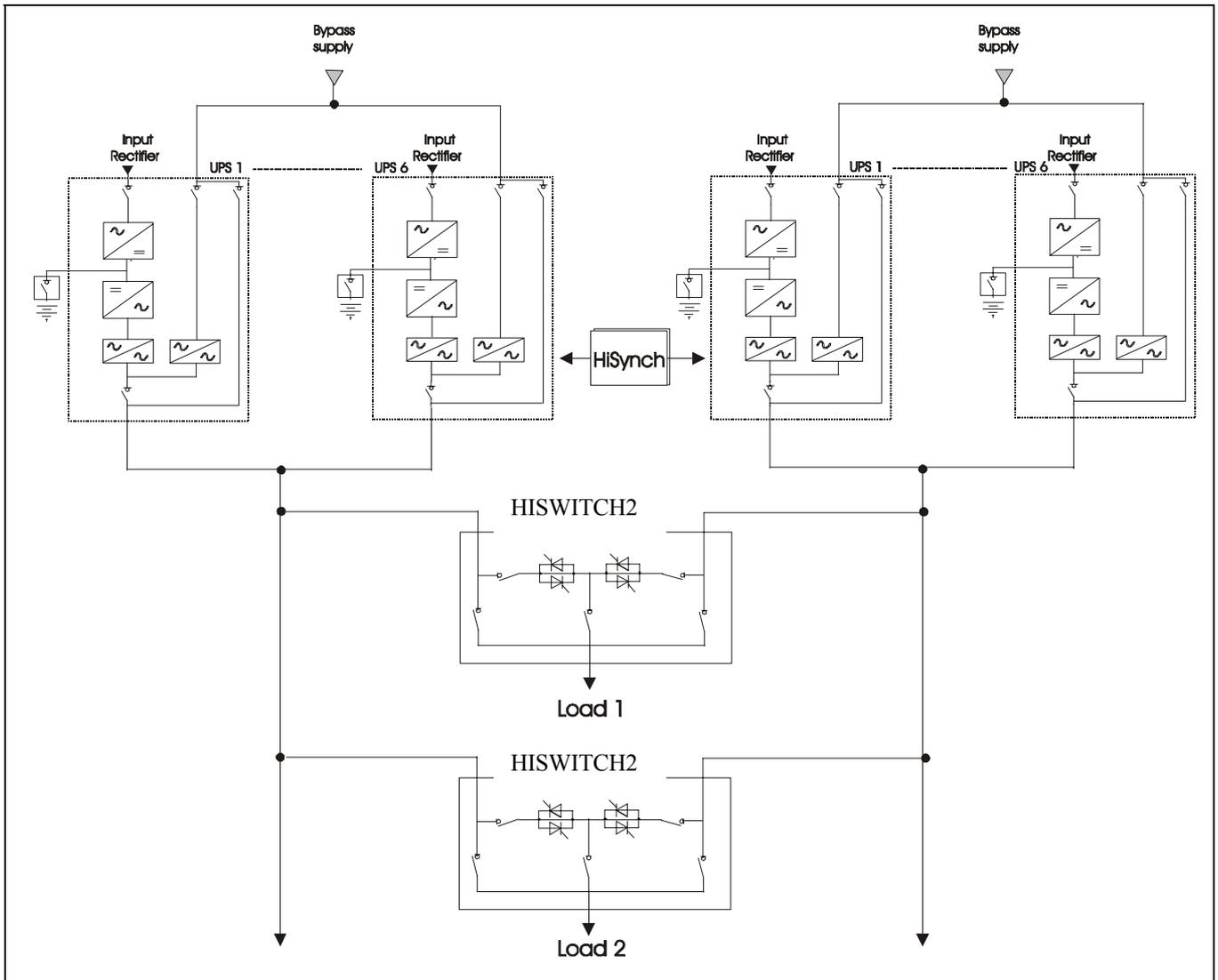
Figure 7-3 Typical HiSwitch2 configuration in a dual-bus power supply system

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8   Chapter 8 – Operating the Led front panel

8.1   Introduction

The HiSwitch2 front panel can be equipped with either a LED display or a Color Graphical Display on LCD touch screen (Option).
The LED front panel allows you to monitor the unit and alert you when a problem occurs.
The Color Graphical Display unit is designed to provide all of the information required or to configure and monitor the unit's operation.
Both units can be accessed from a terminal, or a PC running terminal emulation software, that is attached to the unit.
Through the RS-232 access, you can monitor and configure the unit, plus remotely select a preferred source. See Chapter 4 - Using the RS-232 Port for instructions on using the RS-232 interface.
The LED front panel can be replaced with the Color Graphical Display, if desired. Instructions for using the LCD are in Chapter 11.

8.2   LEDs and Buttons and Key Lockout Switch

The LED Display unit is monitored and controlled through a series of LEDs and buttons and a standard key lockout switch. This section includes illustrations of the LEDs, buttons and key lockout switch, plus tables providing definitions of these components.

8.2.1   Front Panel Controls

The front panel contains the LEDs to monitor the HiSwitch2, plus selection buttons to chose the preferred source. Table 8-1 defines the LEDs and Table 8-2 defines the push-buttons on the unit. Figure below provides a breakdown of the front panel.

8.2.2   Event Controls

When an alarm is triggered, a red LED is lit in the control panel. A pair of buttons allows you to turn off the horn and reset the alarm.
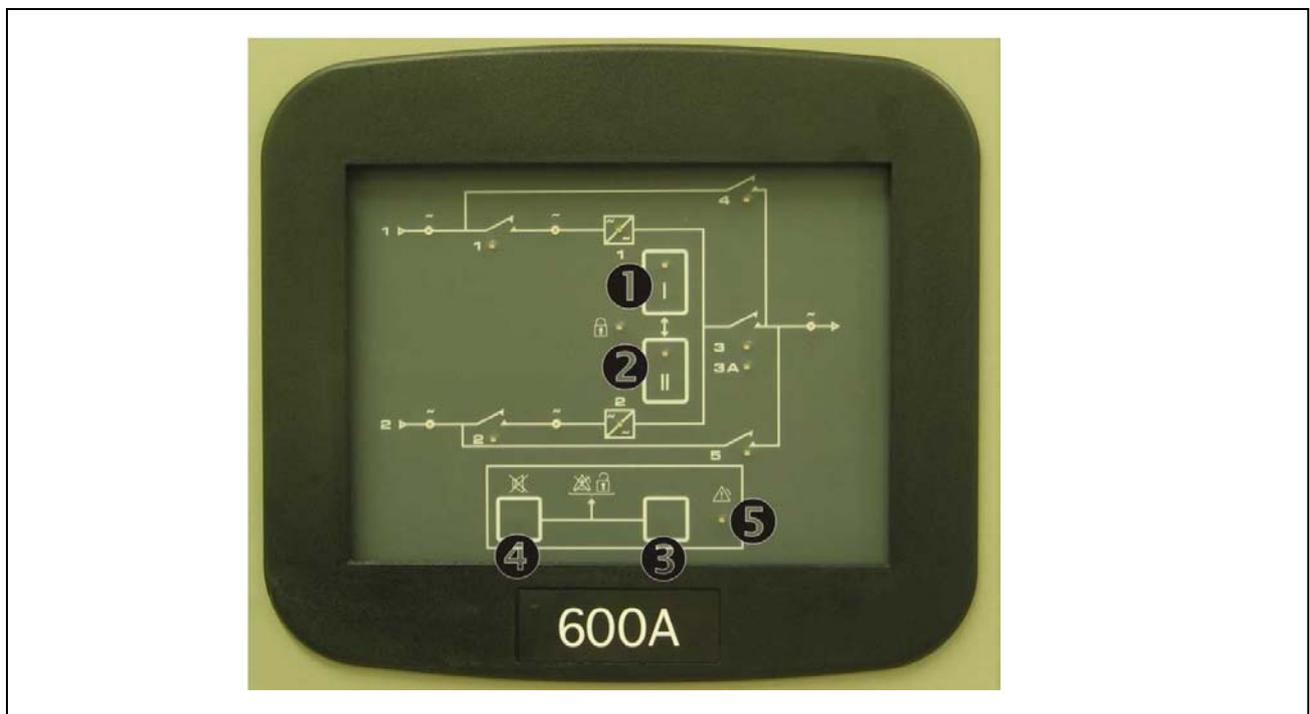
Figure 8-1 LED front panel

1	SW_PREF1
2	SW_PREF2
3	ALRMRST
4	NOAUD
5	ALRM

8.2.3   LED Definitions

The following table defines what item that these LEDs monitor:

|	LED	Item Monitored	Action
1	**IN1A**	Source 1 input present	A green LED is lit if the Source 1 input power is present. This LED only indicates that power is present to the power supply; it does not indicate if the power is within the programmed tolerances of the unit.
2	**IN2A**	Source 2 input present	A green LED is lit if the Source 2 input power is present. This LED only indicates that power is present to the power supply; it does not indicate if the power is within the programmed tolerances of the unit.
3	**CB1 (Q1)**	Isolator 1	A green LED is lit if Q1 (Input isolator 1) is closed, indicating power is flowing to the static transfer switch from Source 1.
4	**CB2 (Q2)**	Isolator 2	A green LED is lit if Q2 (Input isolator 2) is closed, indicating power is flowing to the static transfer switch from Source 2.
5	**IN1B**	Source 1 parameters	A green LED is lit if Source 1 power is within the programmed tolerance for all phases.
6	**IN2B**	Source 2 parameters	A green LED is lit if Source 2 power is within the programmed tolerance for all phases.
7	**STS1**	Source 1 SCRs	A green LED is lit when the SCRs for Source 1 are closed.
8	**STS2**	Source 2 SCRs	A green LED is lit when the SCRs for Source 2 are closed.
9	**LED_PREF1**	Source 1 as the preferred source	A green LED is lit if the button has been pushed to set Source 1 as the preferred source.
10	**LED_PREF2**	Source 2 as the preferred source	A green LED is lit if the button has been pushed to set Source 2 as the preferred source.
11	**NOXF**	Transfer inhibited	A yellow (amber) LED is lit when source transfers are inhibited (locked out) by a hardware condition. Connect a PC terminal to the HiSwitch2 to locate the exact cause. See Chapter 4 for PC terminal commands.
12	**CB3 (Q3)**	Isolator 3	A green LED is lit if the output switch is closed.
13	**CB3A (Q3A)**	Isolator 3A	A green LED is lit if the output switch is closed. Q3A is installed on units with dual output isolators.
14	**CB4 (Q4)**	Isolator 4	A yellow LED is lit if the Source 1 bypass switch is closed.
15	**CB5 (Q5)**	Isolator 5	A yellow LED is lit if the Source 2 bypass switch is closed.
16	**OUT**	Power present to output load	A green LED is lit to indicate that power is present on the output load.
17	**ALRM**	Alarms	A red LED is lit when an alarm condition is present in the HiSwitch2. Connect a PC terminal to the HiSwitch2 to locate the exact cause. See Chapter 4 for PC terminal commands.

Table 8-1 Table for LEDs definitions.

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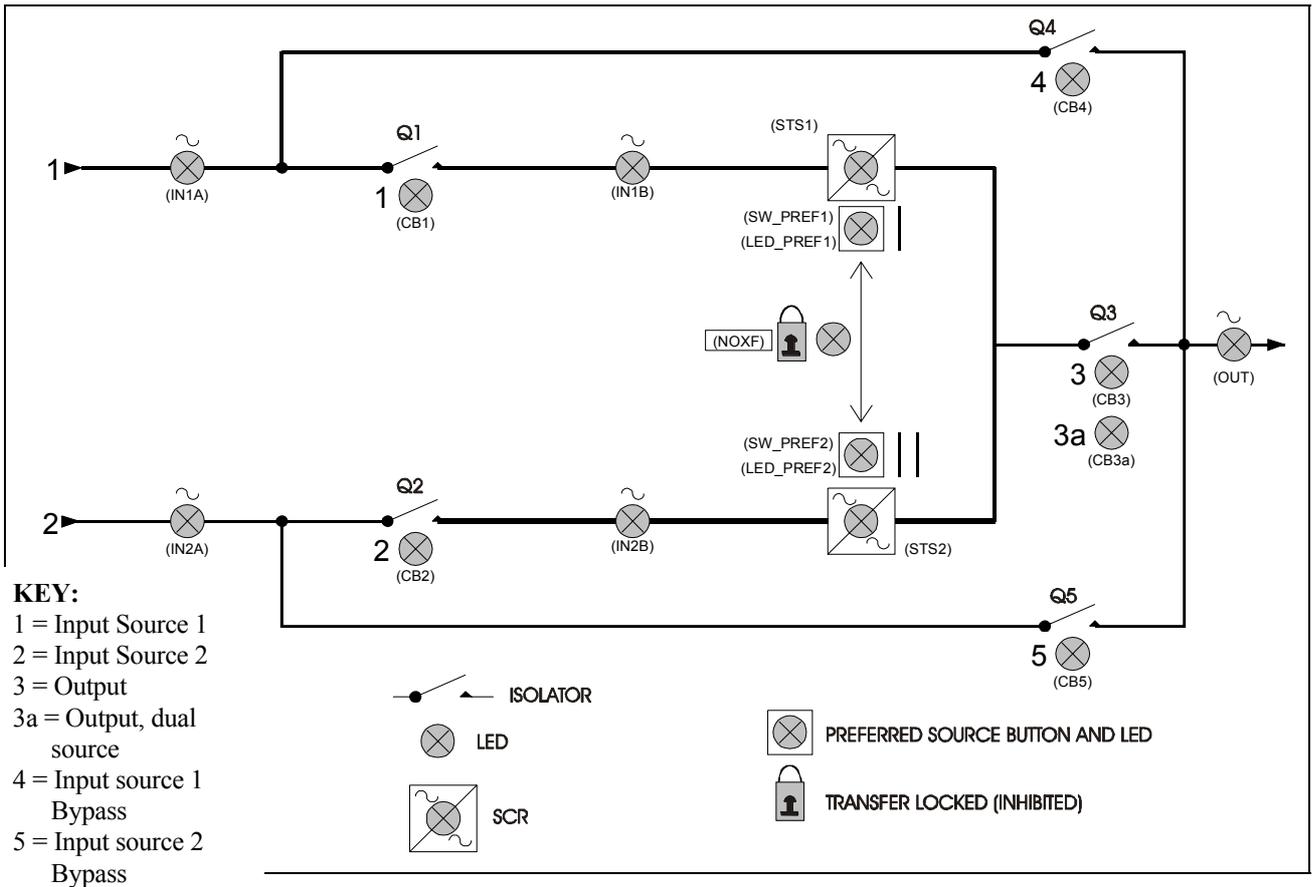
Figure 8-2 Front panel LEDs and buttons

8.2.4   Button Definitions

	Button	Definition	Action
	SW_PREF1	Source 1 Preferred	Push this button to select Source 1 as the preferred source.
	SW_PREF2	Source 2 Preferred	Push this button to select Source 2 as the preferred source.
	ALRMRST	Alarm reset	Push this button simultaneously with the NOAUD button to reset an alarm condition. An alarm can only be reset if the hardware condition permits a reset.
	NOAUD	Silence	Push this button to turn off the horn that is sounded for an alarm. This button does not reset an alarm condition, unless pushed simultaneously with the ALRMRST button.
Note: A standard key lockout switch is already installed.			

Table 8-2 Table for Button definitions.
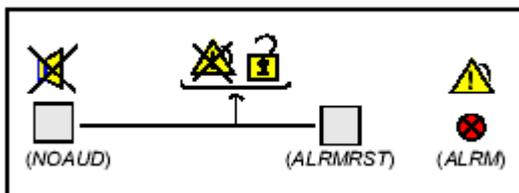
8.2.5   Key Lockout Switch

A standard key lockout switch for the HiSwitch2 enables or disables all push button inputs, except for the alarm silence button. The key lockout switch is mounted on the front of the unit. See Chapter 6 for the key lockout switch location on each unit.
• To disable the buttons, turn the key to the top of the switch, toward the closed padlock icon.
• To enable all of the buttons, except the alarm silence, turn the key to the horizontal position, toward the open padlock icon.

Key Lockout Switch.

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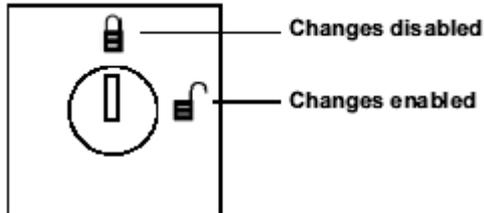
9   Chapter 9 – Operating Procedures

9.1   Introduction

The HiSwitch2 may be operated under the following conditions:

- **Regular operation** – The three power isolators, input (Q1/Q2) and output (Q3), are closed, and the load is supplied by the preferred mains. The bypass isolators (Q4/Q5) are open.
- **Switching** – The preferred mains does not meet the requirements, so the load is switched onto the alternative mains on 'stand-by'. Switching may be automatic or manual.
- **Manual Maintenance Bypass**– the STS's static switches are off but the load is connected to the mains power supply through one of the two bypasses.
- **Overload** – The load exceeds the nominal values indicated in the electrical characteristics in Chapter 5.
- **Stop** – All internal power supply isolators and external circuit breakers are open (also open the isolating devices on the incoming AC lines (see table 2.3) of the two power sources) – the load is not supplied with power.

9.1.1   General notes

Note 1:   All the commands mentioned in these procedures are described in Chapter 8.

Note 2:   The acoustic alarm may be triggered at various times during these procedures. It may be turned off at any time by pressing the 'Silence' button.

9.1.2   Power isolators

The HiSwitch2 has power isolators assembled inside the cabinet, which are accessible after opening the front door, which has a key. To identify the power isolators, refer to the figure in Chapter 6 for the appropriate size.

The HiSwitch2 isolators are identified as follows:

Q1 – Input isolator 1: connects the HiSwitch2 static transfer switch to mains 1.
Q2 – Input isolator 2: connects the HiSwitch2 static transfer switch to mains 2.
Q3 – Output isolator: connects the system output to the load.
Q3A – Redundant Output isolator (Optional)
Q4 – Manual maintenance bypass isolator: permits the load to be connected directly to mains 1 during maintenance work.
Q5 – Manual maintenance bypass isolator: permits the load to be connected directly to mains 2 during maintenance work.

Note: The input and bypass isolators have a key lock, which by activating mechanical interlocks, prevents unintentional operations when the HiSwitch2 is being transferred to 'maintenance bypass' condition.

All isolators are equipped with N.O. and N.C. auxiliary contacts for monitoring of the isolator positions.

The external input circuit breakers must be equipped with 48 VDC shunt trips to allow for control by the HiSwitch2 logic. See Table 2-3.

9.2 Operating instructions

9.2.1 Introduction

The following 'start-up procedures' display regular HiSwitch2 start-up procedures after the completion of commissioning. These instructions must be reconsidered on the basis of:
special or custom modifications made to the equipment, considerations involving the load, special conditions involving the installation environment or corporate policy requiring modifications to standard equipment start-up procedures.

This section discusses the system turn-on, shut-down and bypass procedures for LED-based HiSwitch2.

Note: These instructions (𝕃ℂ𝔻) only refer to the LCD touch screen display (Option).

9.2.2 Normal System Turn-On

This section provides instructions to turn on your HiSwitch2. The LEDs provide the basic information required to ensure proper operation. To monitor metering data, use a PC terminal.

⚠ ⚡	*WARNING*

Ensure that the following notice is followed before proceeding with point 1 of the Start-Up procedures:
Close the incoming isolating devices of the input line 1 and 2 that supply the logic boards (refer to table 2-3 of Chapter 2).

1. Ensure that all the isolators of HiSwitch2 are open. Close the incoming external switches connected to the two inputs of HiSwitch2. Apply power to both HiSwitch2 inputs. The LED display panel is on and working correctly only when at least one of the two inputs is present.
2. Check that the green LEDs for each source are lit (IN 1A and IN 2A).
(𝕃ℂ𝔻) The touch screen control panel should become active and operate properly when at least one of the inputs is energized is closed.
3. Verify that nominal input voltages are applied to both inputs (Source 1 and Source 2).
Check that the green LEDs (IN 1B and IN 2B) monitoring the sources are lit indicating the sources are within acceptable tolerances.
(𝕃ℂ𝔻) The input voltages, selected preferred source, breaker and switch status, and alarms are indicated on the Mimic screen.

   Note: Operations involving the input isolators are permitted only after turning the corresponding key

4. Close Q1.
The green LED (CB1) monitoring Q1 turns on.
(𝕃ℂ𝔻) Verify that Source 1 voltages are nominal and Q1 breaker status is correctly indicated on the Monitor/Mimic screen.
5. Close Q2.
The green LED (CB2) for Q2 turns on.
(𝕃ℂ𝔻) Verify that Source 2 voltages are nominal and Q2 isolator status is correctly indicated on the Monitor/Mimic screen.
6. Verify that the preferred source LED (green) (LED_PREFx) is lit for the source that you want the switch to be using.
7. Verify that the green LED for the corresponding SCR (STS1 or HiSwitch2) is lit, indicating that the SCR is closed.
(𝕃ℂ𝔻) Verify that boxes for the preferred source and corresponding static transfer switch are highlighted on the Mimic screen, indicating which side of the Static Transfer Switch is on.
8. Close Output Isolator Q3 (and Q3A in a redundant output configuration).
9. Verify the Q3 (CB3) LED is lit, indicating that Q3 is closed and the output and load are energized.

• In a redundant output configuration, verify the Q3A (CB3A) LED is lit, indicating that Q3A is closed and the output and load are energized.
(𝕃ℂ𝔻) Verify Q3, the Output box, and the Load box are highlighted, indicating that Q3 is closed and the Output and Load are energized.

10. Press the Alarm Reset (ALRMRST) and Silence (NOAUD) buttons simultaneously to reset any previous alarms.
(𝕃ℂ𝔻) Press the RESET button on the touch screen to reset any previous alarms.
11. Verify that no red or yellow (amber) LEDs are lit indicating an active alarm, transfer is inhibited or a bypass circuit isolator is closed.
(𝕃ℂ𝔻) Verify in the Event Display and the Mimic that there are no active alarms.

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If the alarm LED remains lit, check the PC terminal to identify the alarm. Refer to Alarm and Faults on Chapter 10 for a description of the alarms and possible causes. All active alarm conditions should be corrected before proceeding.

12. Turn on the load equipment following the load equipment manufacturer's recommendations.

NOTE 1: For redundant output switch units, Q3 descriptions apply to Q3 and Q3A.
NOTE 2: If your HiSwitch2 is connected to a PDU with a Wye configuration, enable the Wye Output Transformer before starting the system. This configuration can be done from a PC terminal. Refer to 'Using the RS-232 Port' on Chapter 4 for instructions.

9.2.3   Manual Transfer / Preferred Source Selection (for LED Display panel)

The preferred source buttons allow you to change the preferred source. Transfers are only permitted when the voltage and current are within their proper operating range and the sources are synchronized. Transfer is inhibited if the deviation exceeds the parameter set in the Source Set Points.

⚠ *NOTE*
If one source will be de-energized for an extended period (hours or days), set the unit to bypass mode for the remaining source. Without using bypass, if a failure occurs in the switch components for remaining source, the HiSwitch2 does not have a second source to switch to and the load would not receive power. See 'Maintenance Bypass' for bypass instructions.

To manually select the preferred source:

1. Ensure that the Transfer Inhibit (NOXF) LED is not lit.

If the Transfer Inhibit LED is lit:
• Check to see if the red alarm LED (ALRM) is lit.
• If the alarm LED is lit, check the alarm messages on a PC terminal.
• Correct alarm conditions before attempting a source transfer.

NOTE 2: When the remote source selection option (Remote Control) is activated, a change of state (Remote Preferred Source Selection) may initiate a transfer if the appropriate contacts are closed. See Figure 3-1.

2. Verify that the LEDs are lit for both sources, indicating power is present and within acceptable tolerances.
3. Verify that the LEDs for the SCRs (STS1 and HiSwitch2) are lit.
4. Verify that the input isolators Q1 and Q2 are closed.
• Verify that their respective LEDs are lit.

5. Push the Preferred Source button for the desired source. See Figure 8-2.
The Preferred Source (LED_PREFx) LED turns on for that source.
When conditions are correct, the switch transfers the load to the alternate source by selecting the alternate source as the preferred source.
This source is now monitored as the preferred source throughout the various configurations set up through the PC terminal.
6. Check the LEDs to verify that the correct source is designated as the preferred source and that the input source changes to the desired source and the output (OUT) LED remains lit.

If your system contains the LCD touch screen display (option) instead of the LED front panel, refer to following section.

9.2.4 Manual Transfer / Preferred Source Selection for LCD touch screen display (Option)

The Source Transfer option (Source Xfers) in the touch screen menu allows you to select a preferred source. Transfers are only permitted when the voltage and current are within their proper operating range and the sources are synchronized. The Source Transfer screen indicates the synchronization between the two sources, while the voltage and frequency are displayed on the Mimic.

See Figure below. Transfer is inhibited if the deviation exceeds the parameter set in the Source Set Points. See User Settings in Chapter 11.

WARNING: Check the Note in previous section.
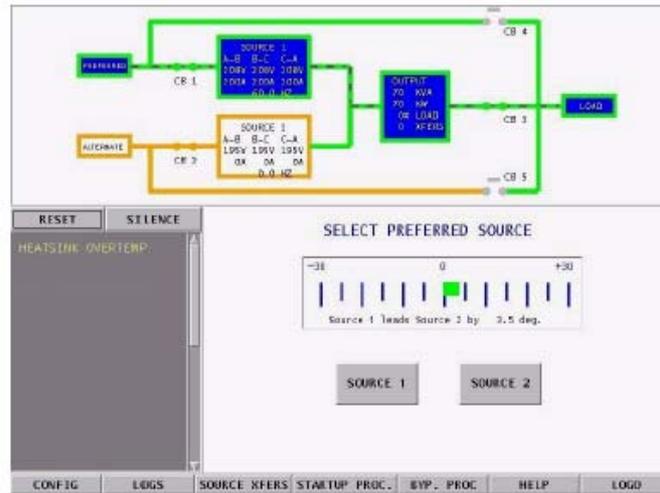
Figure 9-1 Source Transfer Screen

To manually select the preferred source:

1. Verify that the input isolators Q1 and Q2 are closed.

2. Select SOURCE XFERS from the menu bar.

The Select Preferred Source screen is displayed in the Event Display.

3. Check the Mimic to verify that Source 1 and Source 2 input voltages are correct.

4. Select SOURCE 1 or SOURCE 2 as your preferred source.

When conditions are correct, the switch transfers the load to the alternate source by selecting the alternate source as the preferred source.

This source is now monitored as the preferred source throughout the various configurations set up through the touch screen.

5. Verify that the correct source is designated as the preferred source and that the input source changes to the desired source.

The Mimic is updated to indicate the new preferred source. The source is now highlighted with blue and that source is labeled as the preferred source.

If the Transfer Inhibit message is displayed, check for alarm messages on the Active Status window.

Correct alarm conditions before attempting a source transfer.

⚠	*NOTE*

The preferred source may also be changed via the optional Remote Source Selection option, thereby initiating a transfer remotely.

9.2.4.1 Enabling Remote Source Selection

If your system is equipped with the optional Remote Source Selection option, it must be enabled.

If you system includes the LCD touch screen display (Option):

1. Select CONFIG from the menu bar.

2. Select SYSTEM SETTINGS from the Configuration menu.

3. Select SYSTEM OPTIONS from the System Settings menu.

4. Select YES for the REMOTE SOURCE SELECT choice.

If your system contains the LED display or you are configuring the system from the RS-232 port, see Chapter 4 - Using the RS-232 Port for instructions on using that interface.

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9.2.5   Maintenance Bypass procedure

The HiSwitch2 is equipped with two key-interlocked, bypass isolators, Q4 and Q5, to allow manual bypass of the switch electronics for either input source in the event of switch failure or for maintenance of the switch. Refer to the static transfer switch one-line diagram (see Figure 7-2 of Chapter 7).

While operating on maintenance bypass, all voltages are removed from the HiSwitch2 electronics to facilitate safe repair, without de-energizing the load using a make-before-break switching sequence. (If the LCD touch screen display is available you can see the highlighted static transfer switch box on the Mimic screen.)

However, the unit can be bypassed using a make-before-break switching sequence only to the same source to which that the switch is connected.

> ⚠️ **NOTE**
>
> *If the HiSwitch2 is not connected to the mains on which you wish to perform a maintenance bypass operation, follow the 'TRANSFER OR SELECTION OF THE PREFERRED SOURCE' procedure to modify the desired input mains. In the event of a fault in the mains or a HiSwitch2 failure, the maintenance bypass must be exclusively on the current input source.*

Mechanical interlocks are provided on the breakers to prevent improper maintenance bypassing of the solid-state switch. A bypass breaker cannot be closed unless the solid-state switch is connected to the same input source and only one bypass breaker can be closed at a time. All breakers are equipped with N.O. and N.C. auxiliary switches for monitoring of the breaker positions.

> ⚠️ **IMPORTANT**
>
> *Transferring the HiSwitch2 to 'maintenance bypass' condition is possible only when the bypass isolator involved receives the key for the switches (both input and bypass) on the supply mains which will **not** be supplying power to the load. You must move the key to prevent unintentional start-up of the mains not in 'maintenance bypass' condition.*

Check that there are no current alarms. If there are current alarms, refer to the detailed description in Chapter 10. All current alarm conditions must be examined and corrected.

> ⚠️ ⚡ **WARNING**
>
> *The unit is insulated from hazardous voltage for safe maintenance work.*
>
> *Note that there is hazardous voltage on the bus-bars, on the terminals of the isolators in bypass condition, and on the AC power supply lines to the logical boards and fuses (F1÷4).*

For convenience, instructions for the bypass procedure can be displayed on the touch screen by selecting the BYP. PROC option from the menu bar.

The Mimic is used to verify the status of the unit during the bypass procedures. In the unlikely event that the Color Graphical Display is not available, open the front door and look through the slots in the control door. If you can see green LEDs on the gate driver board through that slot, then the unit is connected to the source referenced on the label below that slot. See Figure below.
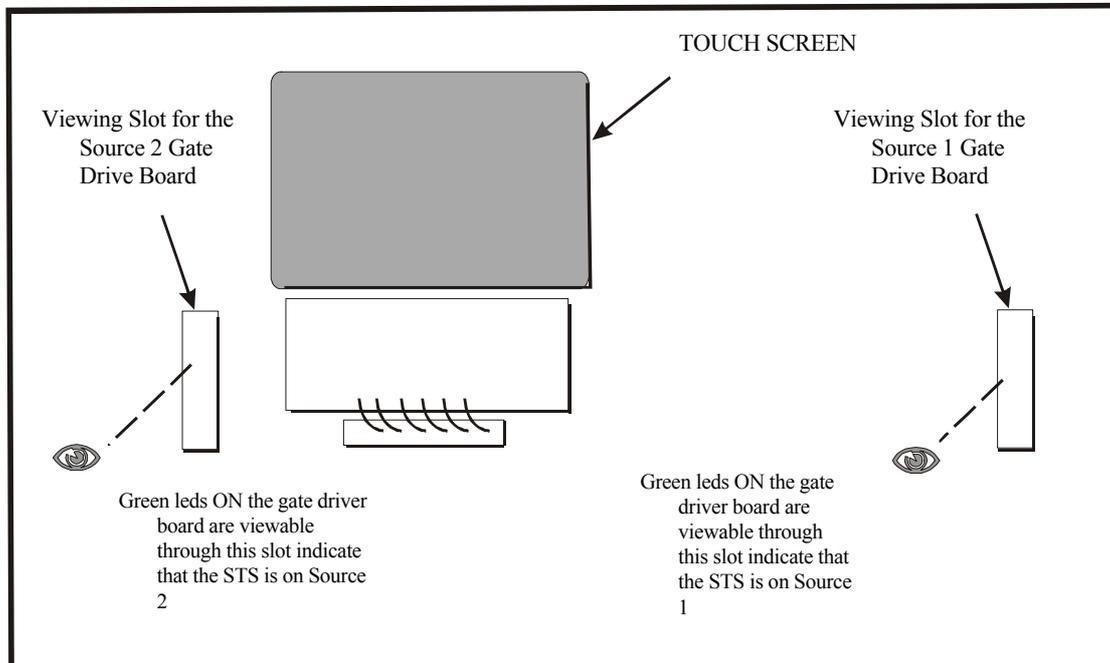
Figure 9-2 Gate board viewing slot locations

If the LCD display is not available, you can still use the following bypass procedures, ignore the steps to check the display, and check the LEDs .

Note: These instructions (𝕃ℂ𝔻) only refer to the LCD touch screen display (Option).

Bypass Procedures for Source 1

Note: If you wish to bypass the Source 1 static transfer switch but Source 2 is presently active, you must first transfer to Source 1. See Manual Transfer / Preferred Source Selection in previous section.

If transfer to Source 2 is not desired:
1. Follow the instructions to transfer the load to Source 1, if it is not the currently used source.

(𝕃ℂ𝔻) Verify Source 1 is supplying power via the Mimic.
• If the LCD Display is not available, check the gate driver board LEDs through the slots in the control panel. See Figure 9-2.
2. Remove the interlock key from Q5 and place it in Q4 interlock.
3. Open the alternate source input isolator Q2.
    The Q2 LED is turned off.
4. Rotate and remove the interlock key.
5. Insert the key into the Q4 bypass isolator interlock.
6. Rotate interlock keys in the Q4 bypass isolator interlock to retract the interlock.
7. Close bypass isolator Q4.
    The LED for Q4 turns on.
    (𝕃ℂ𝔻) Verify the breaker status on the Mimic screen.
8. Open source input isolator Q1.
9. Rotate the interlock key and remove it to lockout the isolator.
    The LED for Q1 turns off.
    (𝕃ℂ𝔻) Secure the key, per your site's lockout/tagout procedure.

10. Open the output isolators Q3 and Q3A (if supplied) to remove power from static switch.

The LEDs for Q3 and Q3A (if supplied) turn off.

11. Verify that the output (OUT) LED is lit.

Power is now flowing directly from the source to the load, without passing through the static transfer switch.

To return to the normal mode:

1. Verify that the LEDs for Source 1 are on, indicating that the source is supplying power and is operating within acceptable tolerances.
2. Remove the key from Q5 and insert it in the Q1 isolator interlock.
3. Rotate key to retract interlock.
4. Close source input isolator Q1.
     The LED for Q1 turns on.
     (LCD) Verify the Source 1 and Q1 isolator status on the Mimic screen.
5. Close the output isolators Q3 and Q3A (if supplied).
     The LEDs for Q3 and Q3A are lit.
     (LCD) Verify Q3 and Q3A isolator status and STS SOURCE 1 and OUTPUT boxes are highlighted on the Mimic screen.
6. Open bypass isolator Q4. Rotate keys in Q4 interlock to extend interlock.
     The LED for Q4 is turned off.
7. Remove the proper key from Q4 interlock and insert it into Q2 isolator interlock.
8. Rotate the key to retract Q2 isolator interlock.
9. Close source input isolator Q2.
     The LED for Q2 is turned on.
     (LCD) Verify the STS SOURCE 2 box and Q2 isolator status on the Mimic screen.
     • If the LCD display is not available, check the gate driver board LEDs through the slots in the control panel. See Figure 9-2.
10. Verify that the output LED is lit.

Bypass Procedures for Source 2

Note: If you wish to bypass the Source 2 static transfer switch but Source 1 is presently active, you must first transfer to Source 2. See Manual Transfer / Preferred Source Selection in previous section.

If transfer to Source 1 is not desired:
1. Follow the instructions to transfer the load to Source 2, if it is not the currently used source.

(LCD) Verify Source 2 is supplying power via the Mimic.
• If the LCD Display is not available, check the gate driver board LEDs through the slots in the control panel. See Figure 9-2.
2. Remove the interlock key from Q4 and place it in Q5 interlock.
     The LED for Q1 is turned off.
3. Open the alternate source input isolator Q1.
4. Rotate and remove the interlock key.
5. Insert the key into the Q5 bypass isolator interlock and rotate the interlock keys in Q5 bypass isolator interlock to retract the interlock.
6. Close bypass isolator Q5.
     The LED for Q5 is turned on.
     (LCD) Verify the isolator status on the Mimic screen.
7. Open source input isolator Q2.
     The LED for Q2 is turned off.
8. Rotate the interlock key and remove it to lockout the isolator.
     (LCD) Secure the key, per your site's lockout/tagout procedure.
9. Open output isolators Q3 and Q3A (if supplied) to remove power from static switch.
     The LEDs for Q3 and Q3A (if supplied) turn off.
10. Verify that the output LED is lit.

Power is now flowing directly from the source to the load, without passing through the static transfer switch.

To return to the normal mode:

1. Verify that the LEDs for Source 2 are on, indicating that the source is supplying power and is operating within acceptable tolerances.
2. Insert key in the Q2 isolator interlock.
3. Rotate key to retract interlock.
4. Close source input isolator Q2.
   The LED for Q2 is turned on.
   (LCD) Verify Source 2 and Q2 isolator status is supplying power via the Mimic.
5. Close output isolators Q3 and Q3A (if supplied).
   The LEDs for Q3 and Q3A (if supplied) turn on.
   (LCD) Verify Q3 and Q3A isolator status and STS SOURCE 2 and OUTPUT boxes are highlighted on the Mimic screen.
6. Open bypass isolator Q5.
   The LED for Q5 is turned off.
7. Rotate keys in Q5 interlock to extend interlock.
8. Remove the proper key from Q5 interlock and insert it in Q1 isolator interlock.
9. Rotate key to retract Q1 isolator interlock.
10. Close source input isolator Q1.
    The LED for Q1 is turned on.
    (LCD) Verify the STS SOURCE 1 box and Q1 isolator status on the Mimic screen.
    • If the LCD display is not available, check the gate driver board LEDs through the slots in the control panel. See Figure 9-2.
11. Verify that the output LED is lit.

9.2.6   Normal System Shutdown

The HiSwitch2 can be shut down from either the static switch mode or the bypass mode.

Shutdown in Static Transfer Switch Mode

When the Static Transfer Switch is operating on static transfer switch mode (not maintenance bypass mode):
1. Turn off the load equipment per manufacturer's recommendations.
2. Open Q3 to turn off the static switch output.
   • Open Q3A if the static transfer switch is a redundant output configuration.
   The LEDs for Q3 and Q3A (if supplied) and the output (OUT) are turned off.
3. Open the input isolators Q1 and Q2.
   The LEDs for Q1 and Q2 are turned off.
4. To completely de-energize the unit, turn OFF the power to both inputs to the HiSwitch2.

Shutdown in Maintenance Bypass Mode

When the Static Transfer Switch is operating on bypass:
1. Turn off the load equipment per manufacturer's recommendations.
2. Open the bypass isolators (Q4 or Q5) to turn off the static transfer switch output.
   The LED for the bypass isolators is turned off.
   The output (OUT) LED is turned off.
3. To completely de-energize the unit, turn OFF the power to both inputs to the HiSwitch2.

⚠️ ⚡ ***WARNING***

To fully isolate the unit, open all external power switches on HiSwitch2 input sources; if this is not done, hazardous voltage will persist inside the unit (also open knife switches on AC power supply lines powering the logical boards (LINE IN 1-2)).

Post danger signs to prevent inadvertent operations.

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10 Chapter 10 – Alarm and faults

10.1 Messages on the display panel

Alarms and faults are events that are triggered when the operation of the static transfer switch falls outside of the defined parameters. These events can also be triggered by: user actions, such as changing configurations, clearing logs, etc.; failed components such as a fan failure, an SCR that is open or closed, etc.; and system status, such as open circuit breakers, load on alternate source, etc.

These events can provide a warning or trigger the system to make a change, such as switch sources or the recording of a history log.

The HiSwitch2 monitoring system detects and annunciates a comprehensive set of fault and alarm conditions.

Faults and alarm messages are can be viewed on the LCD touch screen or via the RS-232 port.

On the LCD touch screen, the events are shown in the Status Display panel in the lower left corner of the touch screen and written to the Event log. You can touch a message to view a definition of an event and a tip for troubleshooting. See Touch Screen Display in Chapter 11 for more information on the touch screen.

If you are monitoring the system through the RS-232 port, see *Terminal Commands* in Chapter 4 for the commands to view event logs, and alarm and fault lists.

Event actions can be triggered by the settings configured from the Event Masks. See Chapter 11 *Event Mask* for more information.

Faults — A fault indicates that a component of the HiSwitch2 has failed or has been damaged. In the Event Display, faults are indicated in red.

Alarms — An alarm is an event caused by a significant abnormal system condition. In the Event Display, alarms are indicated in yellow. The setpoints for many of the alarms are configurable through the User Settings. Many alarms clear themselves when the condition is resolved. If an alarm event mask is set to latch, the alarm messages remain active until the alarm condition has been corrected and the RESET button is pushed. See *Event Mask* for more information on latching.

When the system is furnished with an optional internal or external modem and a telephone line is connected to the modem, the system can be programmed to automatically dial out upon occurrence of any of certain designated alarms. The auto-dial feature can be configured for alarms using the Event Mask option in the touch screen. See *Configuring the Modem* in Chapter 11 for instructions on for setting up your modem.

No alarm signal appears on the operator display panel when the external emergency button is pressed.

10.2 Event mask

The HiSwitch2 gathers, processes and reports faults and alarms, collectively referred to below as *events*.

The Event Mask dialog box allows you to set the system's response for specific alarms and faults that are generated.

The following mask types are available for each event:

• *Latch* — If a latch is enabled for the selected event, that event remains active even if the originating event condition clears. A latched event may only be cleared by pushing the RESET button (ALRMRST on the LED units).

• *Dial Out* — If the selected event is triggered, the system automatically calls the specified telephone numbers through the modem. For example, a page could be sent or an event could be sent to an external terminal, via the modem. See Chapter 3 for more information on configuring communications options.

• *Event Log* — The selected event is date/time stamped and recorded to the Event Log when the event is triggered.

• *Audible* — If the selected event is triggered, an audible beeper or horn is sounded by the HiSwitch2.

The beeper continues while this event is active or latched, or until the SILENCE button (NOAUD on the LED units) is pushed. This button must be pushed with the ALRMRST button on the LED units.

See Event Masks in Chapter 11 for instructions on setting the mask type via the touch screen display.

See the Setting Event Masks with the Terminal in Chapter 4 for instructions on configuration using the RS-232 port.

10.3   Event and History Logs

The system tracks events through the Events Log and tracks significant events through the History Logs. These logs allow you to quickly spot trends or diagnose problems that the unit may have had. Both logs are written in nonvolatile memory.

The logs can be accessed from the touch screen menu or the RS-232 port. See Logs in Chapter 11 for more instructions on viewing the logs from the touch screen. See Terminal Commands in Chapter 4 for the RS-232 interface commands used to access the logs.

10.3.1   Event Log

The events are tracked in sequence of occurrence. The sequence of occurrence is identified by date, time and frame number. The last 512 events are stored in a nonvolatile memory and can be viewed from the Event Log.

Event logs wrap, meaning when the log is full, the oldest event is deleted when a new event is written to the log. The Event Log tracks:

• # — the sequence number in which the event occurred since the log was last cleared.
• *Message* — the event that occurred, such as Ambient Over temp., Source 1 Fail, etc.
• *Type* — either a Fault or Alarm. See *Alarm and Faults* in this chapter for further details on these events.
• *ID* — the event identifier.
• *Date and Time* — when the event occurred.
• *Faults* — the number of fault events logged.
• *Alarms* — the number of alarm events logged.
• *User Alarms* — the number of alarm events logged that were triggered by user-created alarms, such as those alarms created with the Input Contact Isolator settings.
• *Total* — the sum of all the events currently logged.

10.3.2   History Log

When a designated major alarm occurs, the History Status buffer is frozen, capturing 64 sequential frames before and after the alarm condition. When the History Status buffer is frozen, a History Log is created.

Two History Logs are available to track major alarms. This log includes the triggering event plus the surrounding events, and the system voltages, currents, frequency, power, source selection and breaker positions at the time of the event. The History Log displays the 64 sequential frames, in 4-millisecond intervals, of the Present Status screens surrounding the event.

If you are viewing the log from the touch screen, the Mimic and the Event Display show the data that was present as the alarm was triggered. The data is displayed as frames are played.

The History Log allows you to replay the events leading up to the alarm and the events right after the alarm to see the status of the switch at that time and diagnose the cause of the alarm. The History Log is triggered when certain events are tripped that have the Freeze option enabled.

You can run through the frames sequentially. The sequence of the events is identified by date, time, and frame number. The History Log frames are stored in a nonvolatile memory buffer that is continuously overwritten until a designated fault condition occurs. When the fault occurs to trigger a freeze, the History Log stores the next 23 frames, then freezes until it is reset. The History Log then keeps 40 frames before the fault, the frame where the fault occurred, plus the next 23 frames.

The History Log should not be reset until the fault condition that caused the buffer to freeze is reviewed and investigated by a qualified service technician. After the alarm condition has been corrected, the History Log can be cleared.

The History Log has the following fields:
• *Replay Rate* — indicates how long it takes for the replay to play. Use the UP and DOWN buttons to set the time.
• *Status* — the status of the HiSwitch2 at the point of the current frame in the replay. The History log has three statuses: Frozen, Not Frozen and Retrieving Data, please stand by.
• *Critical Event* — The event which triggered this log to be written. The event is indicated in red on the bar graph.
• *Frame Number* — the current frame in the replay. A negative number indicates the replay is at a point before the triggering event occurred.

10.4   Alarm Notes

The I-PK on Source 1 and I-PK on Source 2 alarms inhibit automatic transfer due to an overload or load fault. These alarms can be set for either auto or manual alarm reset.

In the auto reset mode, the alarm is reset as soon as the load current and source voltage return to normal, and transfers are no longer inhibited. In manual mode, the alarm remains active and transfers are inhibited until the conditions return to normal and the user manually presses the RESET button (ALRMRST button on LED units). In either case, the cause of the Source 1 or Source 2 Ipeak overload should be investigated and resolved (such as by reducing the overload condition or clearing the output fault) before returning the switch to normal operation.

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These events indicate a device failure. The device must be replaced and the system must be restarted for the fault to clear. When an open or short-circuited SCR alarm occurs, a release signal is automatically sent to one of the two coils (X1 terminal board) on the external input circuit breakers (Qext#) to prevent transfer of the load in an anomalous situation. The SCR failure must be investigated and repaired before returning the switch to normal operation. Both source input switches must be opened (such as when the unit is placed in maintenance bypass for servicing) before a shorted or open SCR alarm can be reset.

10.5 List of Messages

Table 10-1 lists available event messages, a definition of the event, and the functions that are activated with the event by default. The functions are indicated as follows:

D — The indicated event initiates the Auto-Dial sequence through the optional modem.

A — The indicated event activates the Audible alarm.

F — The indicated event triggers a Freeze of the History Log.

L — The indicated event Latches. A latched alarm remains displayed until the alarm condition has cleared and the RESET (ALRMRST) button has been pressed.

E — By default, all faults and alarms are written to the Event Log. Changing this setting is only available for the LED units and is set through the RS-232 port. See Setting Event Masks with the Terminal in Chapter 4.

All of these functions, except Freeze, can be reconfigured to trigger for each event, using the Event Mask option. See Event Mask in this chapter. The Freeze function is hard-coded and cannot be changed for an event.

If the front panel of your HiSwitch2 contains LEDs and push buttons instead of the touch screen interface, you can view these messages via the RS-232 port. See Connecting and Using a Terminal in Chapter 4 for the commands to view the event messages on a PC terminal.

An LED is used to indicate the presence of any active fault or alarm. Refer to Operating the LED Display HiSwitch2 in Chapter 8 for more information about the LEDs.

ID	ALARM MESSAGE	DESCRIPTION/CAUSE	Action
001	S1 SCR SHORT	One or more of the SCRs for Source 1 have shorted and failed.	D, F, A, E
002	S2 SCR SHORT	One or more of the SCRs for Source 2 have shorted and failed.	D, F, A, E
003	S1 SCR OPEN	One or more of the SCRs for Source 1 is open.	D, F, A, E
004	S2 SCR OPEN	One or more of the SCRs for Source 2 is open.	D, F, A, E
005	PRIMARY FAN FAIL	A primary cooling fan has failed and the unit is now being cooled by a secondary fan, which is not monitored.	D, A, E
006	CONTROL MODULE FAIL	Control logic module has failed.	D, A, E
007	PWR SPLY DC A FAIL	Power supply DC bus A has failed.	D, A, E
008	PWR SPLY DC B FAIL	Power supply DC bus B has failed.	D, A, E
009	PWR SPLY S1 AC FAIL	Power supply Source 1 AC has failed.	D, A, E
010	PWR SPLY S2 AC FAIL	Power supply Source 2 AC has failed.	D, A, E
011	PWR SPLY LOGIC FAIL	A power supply module has failed.	D, A, E
012	OUT VOLT SENSE FAIL	The output volt sense module failed	D, A, E
013	S1 VOLT SENSE FAIL	The Source 1 volt sense module failed.	D, A, E
014	S2 VOLT SENSE FAIL	The Source 2 volt sense module failed.	D, A, E
015	S1 SCR SENSE FAIL	The Source 1 SCR sense module failed.	D, A, E
016	S2 SCR SENSE FAIL	The Source 2 SCR sense module failed.	D, A, E
017	S1 CURR SENSE FAIL	The Source 1 SCR current module failed.	D, A, E
018	S2 CURR SENSE FAIL	The Source 2 SCR current module failed.	D, A, E
019	S1 GATE DRIVE FAIL	The Source 1 gate drive module failed.	D, A, E
020	S2 GATE DRIVE FAIL	The Source 2 gate drive module failed.	D, A, E
021	INTERNAL COMM FAIL	Internal CAN communications failed	D, A, E
022	EXTERNAL COMM FAIL	Options CAN communications failed.	A, E

ID	ALARM MESSAGE	DESCRIPTION/CAUSE	Action
023	CB1 SHUNT TRIP FAIL	Q1 shunt trip failed.	A, E
024	CB2 SHUNT TRIP FAIL	Q2 shunt trip failed.	D, A, E
064	HEATSINK OVERTEMP	Heatsink has exceeded the recommended temperature.	A, E
067	S1 UV	Source 1 under voltage, fast detection.	A, E
068	S1 UV (RMS)	Source 1 under voltage, slow detection.	L, A, E
069	S1 OV	Source 1 over voltage	A, E
070	S1 OF/UV	Source 1 over frequency/under frequency	A, E
071	S1 FAIL	Source 1 failure	A, E
072	S2 UV	Source 2 under voltage, fast detection.	A, E
073	S2 UV (RMS)	Source 2 under voltage, slow detection.	A, E
074	S2 OV	Source 2 over voltage	A, E
075	S2 OF/UV	Source 2 over frequency/under frequency	A, E
076	S2 FAIL	Source 2 failure	A, E
077	S1 OVERCURRENT	Source 1 over current	A, E
078	S2 OVERCURRENT	Source 2 over current	A, E
079	S1 I-PEAK	I-PK on Source 1	A, F, E
080	S2 I-PEAK	I-PK on Source 2	A, F, E
081	SOURCES OUT OF SYNC	Source 1 and Source 2 are out of synchronization.	A, E
082	LOAD ON ALT SOURCE	The output load is running on the alternate source.	A, E
083	AUTO REXFER INHIBIT	Automatic retransfer is inhibited.	A, E
084	CB1 (S1) OPEN	Source 1, Isolator 1 (Q1) is open.	A, E
085	CB2 (S2) OPEN	Source 2, Isolator 2 (Q2) is open.	A, E
086	CB4 (S1 BYP) CLOSED	Source 1 on bypass, Isolator 4 (Q4) is closed.	A, E
087	CB5 (S2 BYP) CLOSED	Source 2 on bypass, Isolator 5 (Q5) is closed.	A, E
088	CB3 (OUTPUT) OPEN	Output Isolator (Q3) is open.	A, E
089	CB3A (OUTPUT) OPEN	Output Isolator (Q3A) is open.	A, E
090	S1 PHASE ROT ERROR	Source 1 phase rotation error.	A, E
091	S2 PHASE ROT ERROR	Source 2 phase rotation error.	A, E
092	TRANSFER INHIBITED	Transfer inhibited.	A, E
093	OUTPUT UV	Output is under voltage.	D, F, A, E
120 121 122 123 124 125 126 127	INPUT CONTACT #1 INPUT CONTACT #2 INPUT CONTACT #3 INPUT CONTACT #4 INPUT CONTACT #5 INPUT CONTACT #6 INPUT CONTACT #7 INPUT CONTACT #8	Input Contact # x is an optional alarm input. The alarm name can be programmed with an alarm name from the Input Contactor Isolator settings option under the Comm Options. See **Configuring the Input Contact Isolator Settings** in Chapter 11. The alarm is sent to Monitor DSP. The LCD logs the alarm with the programmed name. Monitor DSP logs it with the generic name, which is how it is reported to the SVT query.	A, E
128	CONFIG MODIFIED	A set point configuration has changed.	A, E
129	PASSWORD CHANGED	The password for touch screen access has been modified and saved.	A, E
130	TIME REPROGRAMMED	The system's time has been reset and saved	A, E
131	DATE	The system's date has been reset and saved.	A, E

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ID	ALARM MESSAGE	DESCRIPTION/CAUSE	Action
	REPROGRAMMED		
132	EVENT LOG CLEARED	The event log has been erased.	A, E
133	HIST LOGS CLEARED	Both History Logs have been erased	A, E
134	HIST LOGS FULL	Both History Logs have been written and no more history logs can be written without clearing one of the logs.	A, E

Table 10-1

Note: *No alarm signal appears on the operator panel display when the external emergency button is pressed, though there will be alarms caused by the failure of the input mains.*

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11 Chapter 11 – Touch Screen Interface (Option)

The HiSwitch2 can be configured with an optional Color Graphical LCD touch screen display that allows you to quickly check the status of the unit and identify problems.

LCD touch screen display, through the front of the HiSwitch2, provides a graphical (Mimic) display of the switch's operation, plus system information including system parameters, alarms and faults.

The LCD provides a color, back-lit touch screen as a user interface. In addition to the Mimic and the system parameters, the screen provides a series of menus to allow you to configure the HiSwitch2, including the control of the preferred source, auto/manual retransfer selection, alarm notification, and other system setpoints. The touch screen also provides buttons to reset alarms and turn off audible alarms, such as a horn. A password and a standard keylock are provided for security.

Figure 11-1 Touch Screen Display panel

11.1 Display Overview

The HiSwitch2 Color Graphical Display provides three areas of information, plus buttons and a series of menu choices. The Color Graphical Display contains the following features:

• Mimic — a graphical diagram of the status of the unit.
• Event controls — allow you to reset alarms and turn off audible alarms.
• Event Display — displays any active alarm or fault condition, in real-time.
• Menus — provide choices and configuration settings in dialog boxes or information in the display panel.
• Display panel — provides additional information, depending on the menu choice that was last selected. This information includes event help text, and startup and bypass procedures.
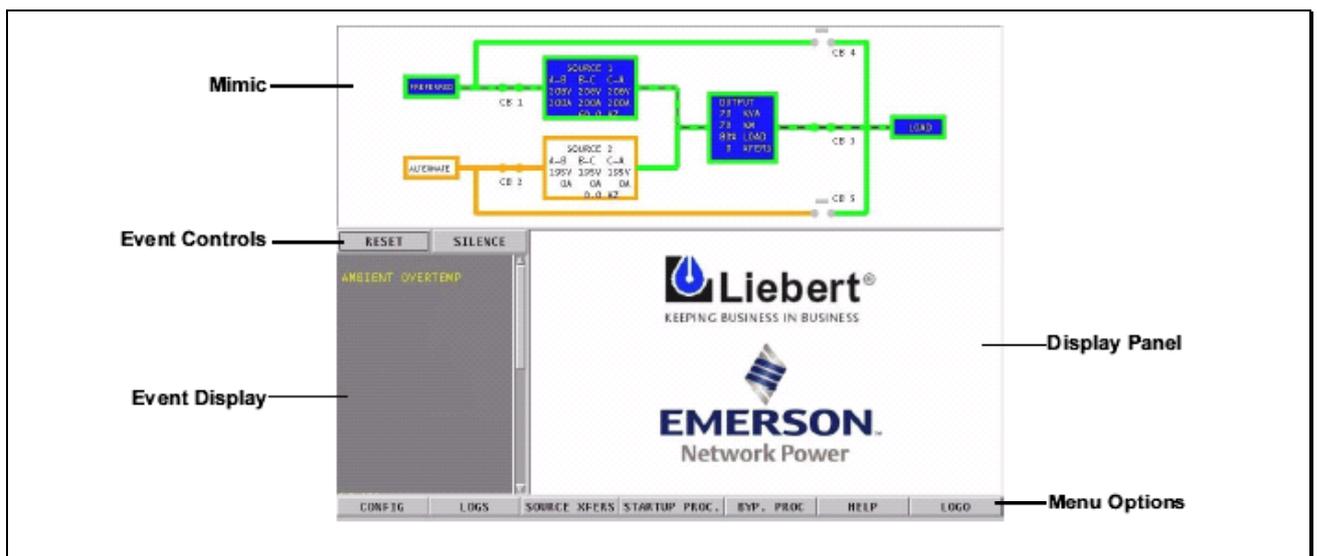
Figure 11-2 Touch Screen Display

11.2 Menu Overview

The touch screen menu provides access to configuration settings and more device information.
The CONFIG (Configuration) and LOGS menus provide multiple choices through pop-up menus.
The SOURCE XFER menu selection allows you to select the preferred source. The other menu choices provide information in the display panel. The menu choices are discussed later in this manual.
All programmable functions are preset at the factory to default settings. These settings enable the unit to be brought up without the need to enter all selectable parameters. The menus allow the settings to be customized.
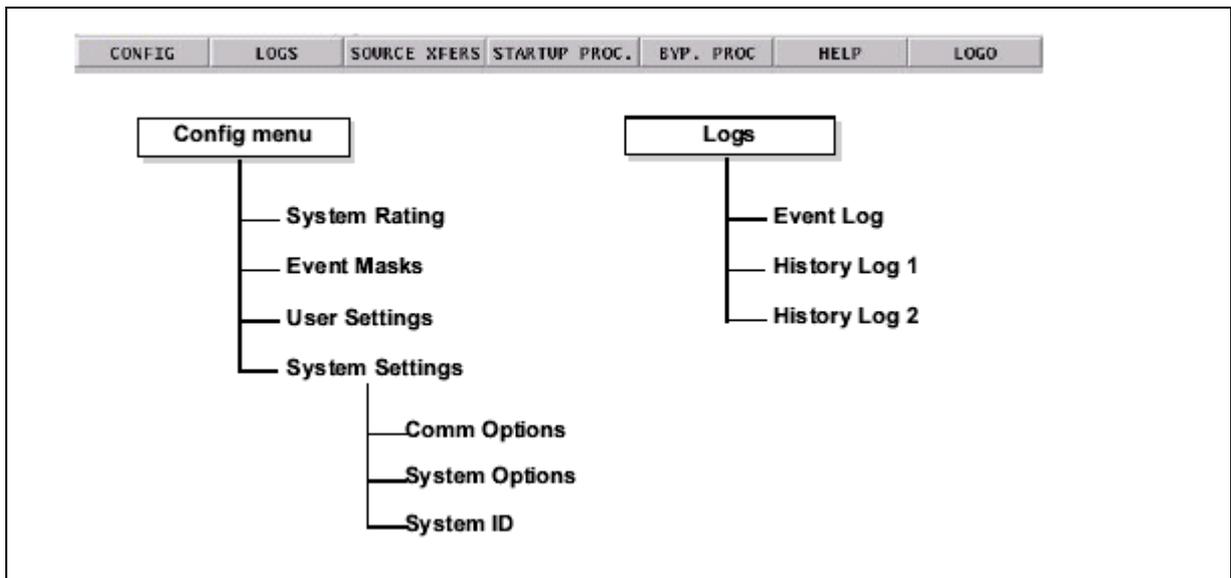
Figure 11-3 Menus

> ⚠ ***NOTE***
>
> *Some menu choices display a keyboard or keypad on the touch screen. Enter data on the touch screen. Click OK to save the data that you have entered.*
>
> *Use the back arrow button (<-) to delete unwanted characters. This button functions like a backspace key on a keyboard.*
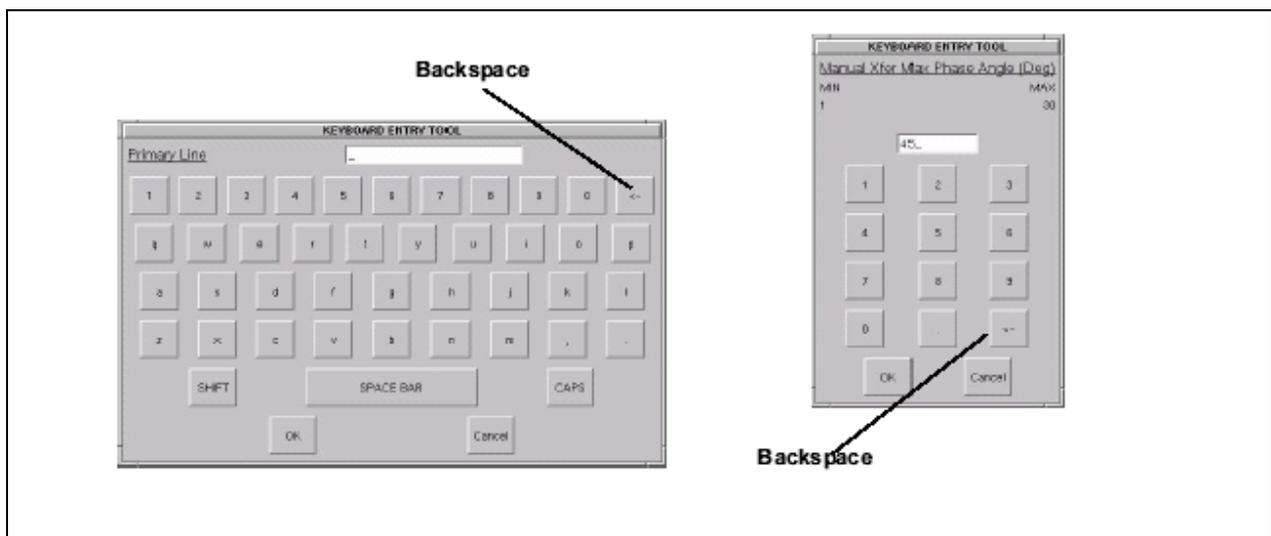
Figure 11-4 Keyboard and Keypad displays

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11.3 Security

Because the HiSwitch2 Color Graphical Display provides access to various configuration and monitoring choices, a password or key lockout switch may be used to protect access to certain changes, including:
• Change configuration settings.
• Clear logs.
• Make a source transfer.
• Reset an alarm.
Without entering the password or enabling changes with the key lockout switch, you still can:
• View the display, including the mimic, status and event help.
• View logs.
• View the startup and bypass procedures.
• Use the SILENCE button to turn off the audible alarm.

11.3.1   Using the standard Key Lockout Switch

A standard key lockout switch for the HiSwitch2 enables or disables the ability to make changes on the HiSwitch2. The key lockout switch is located on the front of the unit next to the display; it is behind the front door but can be operated without opening the front door. See figures in Chapter 6 for location of the key lockout switch.
• To disable the changes, turn the key to the top of the switch, toward the closed padlock.
• To enable changes turn the key to the horizontal position, toward the open padlock.
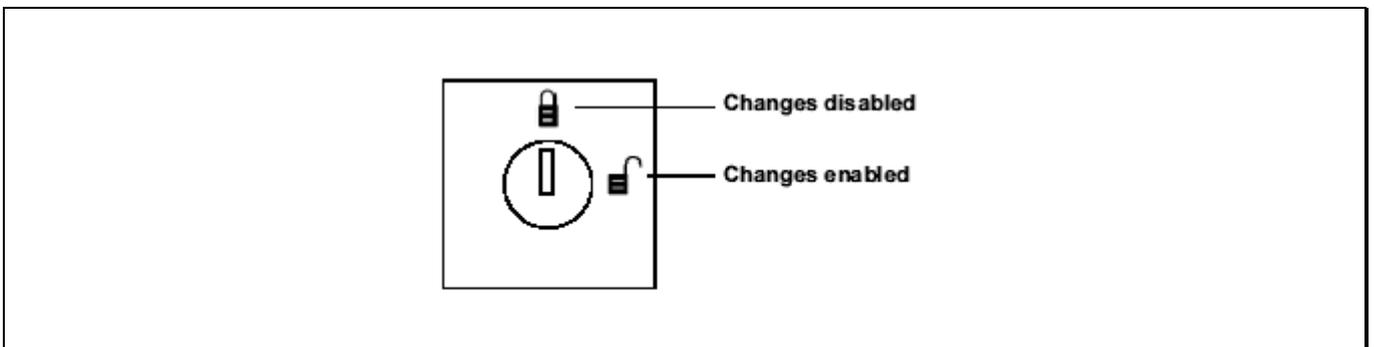
Figure 11-5 Key Lockout Switch

11.3.2   Using the Password

If the unit is not equipped with a keylock, a password is required when you attempt to:
• Save changes in the CONFIG menu choices.
• Transfer sources.
• Reset active alarms.
• Clear logs.
When a password is requested, a keyboard is displayed on the touch screen. After you enter the password, select OK. The password is case-sensitive. Password access times out after ten (10) minutes, and must be reentered to save changes. The time-out period cannot be changed.
To set or reset the password:
1. Select SYSTEM SETTINGS from the CONFIG menu.
2. Select SYSTEM ID from the SYSTEM SETTINGS menu.
3. Click PASSWORD.
A keyboard is displayed.
4. Enter a password.
The password must be four (4) alpha-numeric characters and is case sensitive.
5. Click OK.

11.4 Mimic Display

The Mimic display provides a color diagram of the operation of the HiSwitch2. This display imitates the power flow through the static transfer switch and indicates source status, breaker status, switch status, source voltage and current readings, output power measurements, and active alarm messages. See Figure 11-2.

11.5 Event Controls

The HiSwitch2 detects events when certain thresholds are passed or certain problems occur. The alarm controls allow you to acknowledge the existence of these events.

• RESET — All latched events whose conditions have cleared are removed from the Event Display.

Faults and alarms that remain active, or are not recoverable, are not affected when this button is selected. This button is also used to perform manual I-Peak resets and manual retransfers.

• SILENCE — turns off the audible alarm (horn or beeper) without resetting the triggering event. This setting does not permanently turn off the horn. The alarm sounds again when the next event with an audible alarm setting is triggered.

Active events are shown in the Event Display, whereas cleared events can be reviewed via the Event Log.

11.6 Event Display

The Event Display lists the condition of the HiSwitch2 in real-time. Both nominal system parameters and alarm messages are displayed in the Event Display. You can touch any message in the Event Display to display more information in the Display Panel to the left. The selected status is displayed in bold type.

11.7 Menu bar

As previously mentioned, the menu bar provides both configuration choices and information. The choices under the Config and Log menus access additional dialog boxes, while the other menu choices only show information in the display panel.

11.8 Configuration Menu

When you select the CONFIG (Configuration) menu choice, a pop-up menu is displayed with four choices.

• *System Ratings* — used to configure frequency, voltage and currents settings for the HiSwitch2.

• *Event Mask* — allows you to configure system's response for events.

• *User Settings* — allows you to configure operations for the HiSwitch2.

• *System Settings* — accesses another pop-up menu to configure communication and system choices and the system ID.

Each of these choices accesses a separate dialog box.

11.9 System Ratings

The System Ratings menu is used to set the nominal line frequency, nominal voltage and nominal current at which the system operates when it is installed. These settings are configured when the system is initialized at the factory or under maintenance and should not be changed by the user.

11.10 Event Masks

The HiSwitch2 gathers, processes and reports faults and alarms, collectively referred to below as events.

The Event Mask dialog box allows you to set the system's response for specific alarms and faults that are generated. See Chapter 10 - Alarm and Faults for more information on events and Event Mask for the definitions of the Event Mask types.

To set the event masks:

1. Access the Event Mask dialog box:

a. Select CONFIG.

b. Select EVENT MASK from the pop-up menu.

The Event Mask dialog box is displayed. See Figure below.

2. Select the mask settings for each fault and alarm.

a. Select YES to enable the setting,

– or –

b. Select NO to disable the setting.

3. Select SAVE to keep the settings.
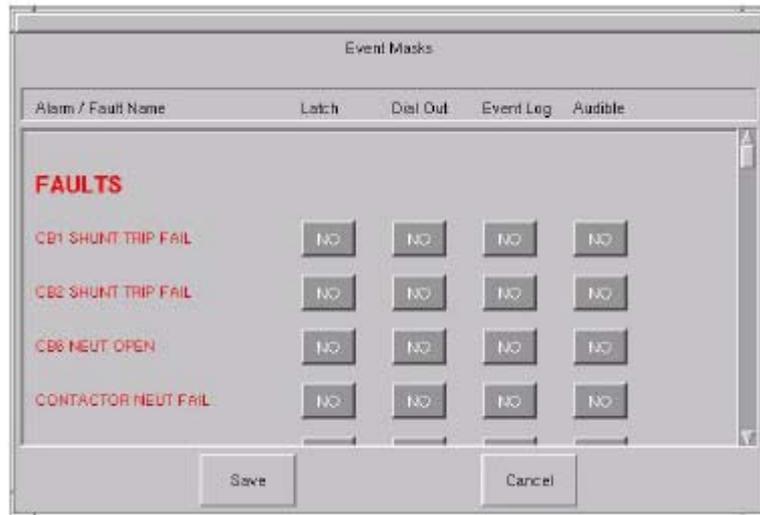
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Figure 11-6 Event Mask Dialog Box

11.10.1 User Settings

The User Settings choice allows you to adjust the user-accessible switch settings. Access is limited to qualified personnel via system security.

To access the User Settings dialog box:

1. Select CONFIG.

2. Select USER SETTINGS from the pop-up menu.

The User Settings dialog box is displayed. See Figure below. The top six buttons access a series of secondary dialog boxes to configure the various settings.
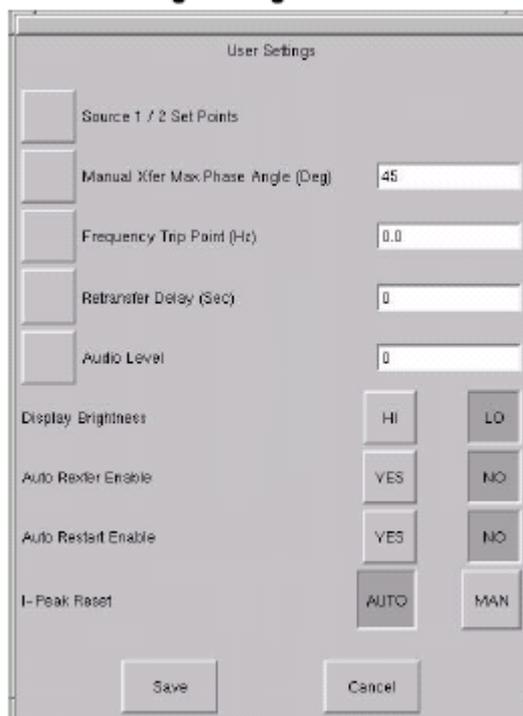

Figure 11-7 User Settings Dialog Box

11.10.2 Source Set Points

The Source 1/2 Set Points allows you to configure trigger points for each input source (1 or 2) for the HiSwitch2 via a keypad dialog or HI/LO dialog box. The source numbers do not designate the source as the preferred or alternate source. The numbers simply identify the input source. See Manual Transfer / Preferred Source Selection in Chapter 9 to set the preferred source.

The Set Points are based on values in relation to the nominal voltage required for the HiSwitch2. UV refers to under voltage, meaning the amount of voltage below the nominal voltage. OV refers to over voltage, or the amount of voltage over the nominal voltage.

• **Fast UV Setting (%)** — if the voltage drops below this set percentage of the nominal voltage, the HiSwitch2 transfers from the current source to the opposite source.

• **Slow UV Setting (%)** — if the voltage remains this set percentage below the nominal voltage for the period of the slow detection delay, the HiSwitch2 transfers from the current source to the opposite source.

• **Slow UV detection delay** — the number of cycles that the source must remain below the Slow UV Setting before the HiSwitch2 transfers.

• **OV Setting (%)** — if the voltage exceeds this set percentage of the nominal voltage for the period of the OV detection delay, the HiSwitch2 transfers from the current source to the opposite source.

• **OV Detection Delay** — the number of cycles that the source must remain above the OV Setting before the HiSwitch2 transfers sources.

• **I-PK Xfer Lockout** — if current from the source exceeds this threshold, the HiSwitch2 disables source transfers, and has to be reset either manually or automatically. The type of reset is configured under the User Settings.

To configure the set points for each source:

1. Select SOURCE 1/2 SET POINTS from the User Settings dialog box.

The Source 1/2 Set Points dialog is displayed.

Figure 11-8 Source Set Points

2. Select **1** to configure the settings for Source 1.

3. Configure the settings using the keypad or dialog box that is displayed when you touch a button.

Button	Range	Default	Comments
Fast UV Setting (%)	-10 to –30% of Nominal voltage rating	–20%	Set in increments of 1%.
Slow UV Setting (%)	-5 to –20%	–10%	Set in increments of 1%.
Slow UV detection delay	1-60 cycles	5 cycles	Units: Line Cycle
OV Setting (%)	+5% to +20%	+10%	Set in increments of 1%.
OV detection Delay	1-255 cycles	3 cycles	Units: 1/4 Line Cycle
I-PK Xfer Lockout	0 – 3.0 multiplied by the unit current rating.	2.5* Unit Current Rating	I-peak xfer lockout detection point. Units: Amps RMS. Select the HI or LO buttons to configure your setting.

Table 11-1

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4. Select **2** for Source 2.

5. Configure the settings, as described in step **3**.

6. Select SAVE to keep the settings for both sources.

The Set Points dialog is closed and the User Settings dialog is displayed.

7. Select MANUAL MAX XFER PHASE ANGLE.

A keypad is displayed.

This setting configures the maximum allowed phase difference between the sources and applies to all manual transfers as well as any auto retransfer.

    a. Configure this setting with a range of +/- 1-30 degrees.

    The default setting is +/-15 degrees and the resolution is 1 deg.

    b. Select OK to save the setting.

    The setting is now displayed in the adjacent field in the User Settings dialog box.

8. Select FREQUENCY TRIP POINT.

A keypad is displayed.

This choice verifies that the source is running at the proper frequency. This choice sets the frequency deviation in the frequency that triggers the frequency trip point alarm. The frequency deviation setting is the allowable frequency variation from nominal (50.0 or 60.0 Hz) before activating the frequency deviation alarm. The frequency setting applies to both input sources.

    a. Configure this setting with a range of 0.1 – 3.0 Hz

    The default setting is 0.5 and the resolution is 0.1.

    b. Select OK to save the setting.

9. Select RETRANSFER DELAY.

A keypad is displayed.

With the secondary source being used, this setting sets the length of time the switch waits until attempting to transfer back to the preferred source.

    a. Configure this setting with a range of 1 to 60 seconds.

    The default setting is three (3) seconds and the resolution is 1 second.

    b. Select OK to save the setting.

    The setting is now displayed in the adjacent field in the User Settings dialog box.

10. Select AUDIO LEVEL.

A dialog box is displayed with HI and LO settings.

This choice sets the loudness of the horn or beeper that is sounded for audible alarms.

    a. Configure this setting with a range of 1–10 (ten).

    The default setting is 5. The settings have an increment of 1 (one).

    b. Select OK to save the setting.

The setting is now displayed in the adjacent field in the User Settings dialog box.

You can select TEST to briefly sound the alarm to judge its volume.

11. Select DISPLAY BRIGHTNESS.

A dialog box is displayed with HI and LO settings.

This choice sets the brightness for the touch screen.

    a. Configure the Contrast and Brightness settings with a range of 1 – 10 (ten).

    b. Select OK to save the settings.

12. Set the AUTO REXFER ENABLE choice.

The auto retransfer enable setting determines whether the switch automatically returns the preferred source after that source is restored.

    • Select YES to enable the automatic transfer.

    • Select NO to disable the automatic transfer. The setting requires transfers be done manually.

13. Set the AUTO RESTART ENABLE choice.

This setting determines whether the HiSwitch2 can be started automatically when power is restored after it has been lost.

    • Select YES to enable the automatic restart.

    • Select NO to disable the automatic restart. This setting requires a manual restart of the HiSwitch2.

14. Select a setting for the I-PEAK RESET.

    • Select AUTO to configure the static transfer switch to automatically reset when a fault clears and the voltage and current are normal.

    • Select MAN to require a manual reset of the static transfer switch when fault clears and the voltage and current are normal.

<table>
<tr><td>⚠ ⚡ CAUTION</td></tr>
</table>

RISK OF EQUIPMENT DAMAGE AND PERSONNEL INJURY.
USE OF AUTO RESTART IS SITE SPECIFIC. DO NOT ENABLE AUTO RESTART UNLESS THE INFRASTRUCTURE IS
DESIGNED FOR UNATTENDED OPERATION AND THERE IS NO CHANCE OF EQUIPMENT OR PERSONNEL
HARM BY AUTOMATIC RE-ENERGIZING OF THE SYSTEM.
CONSULT WITH YOUR LIEBERT'S CUSTOMER SERVICE DEPARTMENT AS TO WHETHER AUTO RESTART
SHOULD BE ENABLED.

11.10.3 System Settings

The System Settings choice under the Config menu displays another pop-up menu with three choices:
- *Comm Options*
- *System Options*
- *System ID*

To access the System Settings menu:
1. Select CONFIG from the menu bar.
2. Select SYSTEM SETTINGS from the Config menu.

11.10.4 Comm Options

The Comm Options dialog box allows you to configure the communications settings for the HiSwitch2.
- Select COMM OPTIONS from the System Settings Menu.

The Comm Options dialog box is displayed. See Figure below.
- An option can be enabled by selecting YES.
- An option can be disabled by selecting NO.
- An option can be configured by selecting the adjacent option button to display a separate configuration dialog box.

The instructions for configuring the communications options are provided in this section.
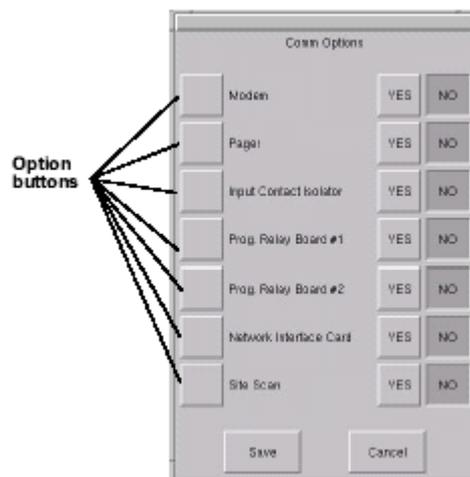
Figure 11-9 Comm Options Dialog Box

11.10.5 Configuring the Modem

The Modem dialog box allows you to configure the optional, internal modem or an external modem that is connected to the static transfer switch. Only one modem can be utilized by the HiSwitch2.

The dialog box contains a series of choices that access either a keypad or a secondary dialog to configure settings. Auto dial can also be configured for the modem to be triggered by events, as set up in the Event Mask choices.

Designated major alarms activate the auto dial modem sequence. Automatic dial attempts are made to the first number three times, at 30 seconds between attempts. If connection is not established in that time period, the system automatically rolls over to the second number. Auto dial attempts are made again three more times at 30 seconds between attempts. The process is repeated until a successful connection is made. Upon successful connection, the

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system transmits a present status data, including all active alarm messages. After transmission, the modem automatically hangs up and returns to the auto-answer mode.

To configure the modem:
1. Select MODEM from the Comm Options menu.
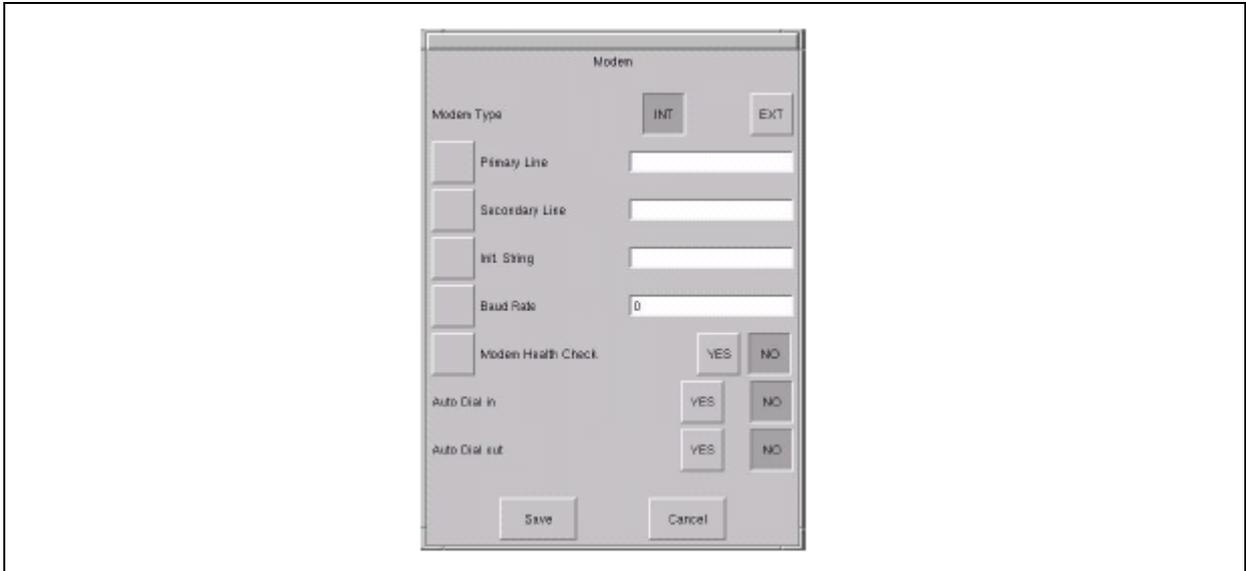The Modem dialog box is displayed.

Figure 11-10 Modem Dialog Box

2. Select the type of modem that the HiSwitch2 will be using:
 • Select INT if the HiSwitch2 will be communicating via an internal modem.
 • Select EXT if the HiSwitch2 will be communicating via an external modem.
3. Select the PRIMARY LINE choice to enter the primary telephone number for the modem to dial when an alarm is triggered.
4. Enter the number in the keypad dialog box.
5. Select OK to save the telephone number. The number is displayed in the field adjacent to the Primary Line choice.
6. Select the SECONDARY LINE choice to enter the secondary telephone number for the modem to dial when an alarm is triggered.
7. Enter the number in the keypad dialog box.
8. Select OK to save the telephone number. The number is displayed in the field adjacent to the Secondary Line choice.
9. Select INIT. STRING to configure the initialization string.
This string configures the parameters of the modem.
 • This setting only needs to be configured if an external modem is used. Check your modem's documentation for this setting.
 • The string for the internal modem set by the manufacturer and does not need to be changed.
10. Select BAUD RATE to display a dialog with the baud rate choices:
 • For an external modem, select from 2400 bps, 9600 bps or 19200 bps.
 • An internal modem only supports 2400 bps.
11. Configure the MODEM HEALTH CHECK.
The Health Check verifies that the modem is working properly. This setting allows you to enable the check and set when it is run.
 a. Select the button to display the Modem Health Check dialog box, from which you can access further dialogs to set the time and days that the check is run.
 b. Select SAVE to keep the settings.
 The Health Check dialog box is closed and the Modem dialog box is again active.
 c. Select YES in the Modem dialog box to activate the Modem Health Check.
If you select NO, the Modem Health Check is not run.
12. Configure AUTO DIAL IN.
Auto Dial In allows a user to dial into the HiSwitch2 through the modem to check status and access the system via a hyperterminal connection.
 a. Select YES to activate the dial in feature.
 b. Select NO to deactivate the dial in feature.
13. Configure AUTO DIAL OUT.

Auto Dial Out allows the HiSwitch2 to automatically dial out to a system to notify a user of an event or status.

    a. Select YES to activate the dial out feature.

    b. Select NO to deactivate the dial out feature.

14. Select SAVE to keep the modem configuration settings.

15. Select YES in the Comm Options dialog box to activate the settings.

You are returned to the Comm Options dialog box.

11.10.6 Configuring Pager Support

Pager support will be implemented in an upcoming update of the system. This support will trigger the system to call a pager when specified events occur. This menu choice will allow you to enter the telephone number and PIN for the pager that you want the system to call.

11.10.7 Configuring the Input Contact Isolator (ICI) settings

The Input Contact Isolator (ICI) is an optional, eight-channel input board for up to eight external user alarm or message inputs to be routed to the static transfer switch's alarm network.

The contact is set to either be normally open or normally closed. When a contact closes or opens, an event is triggered. See Chapter 3 - Input Contact Isolator Board for more information on the ICI.

The Input Contact Isolator options are configured through the Input Contact Isolator dialog box, which is accessed from the Comm Options dialog box. The Input Contact Isolator dialog box contains eight choices to match the eight channel input board. You can label each button to identify the event associated with the contact. When the dialog box is accessed, each button flashes to display the Input Contact Isolator number and the user entered label. This label also appears in the Display Panel when an event related to an Input Isolator Connector is triggered.

The Input Contact Isolator dialog box allows you to:

    • Label the input contact assignments for your setup.

    • Set the delay for an external event triggering an alarm.

    • Review the isolator contact assignments, once the labels are entered.

The delay allows you to set the number of seconds which a condition needs to persist to trigger an alarm.

These input alarms can also be configured to activate a programmable relay output, which is discussed in Configuring the Programmable Relay Board Settings in Chapter 3.

To configure the Input Contact Isolator relays:

1. Select INPUT CONTACT ISOLATOR from the Comm Options menu.
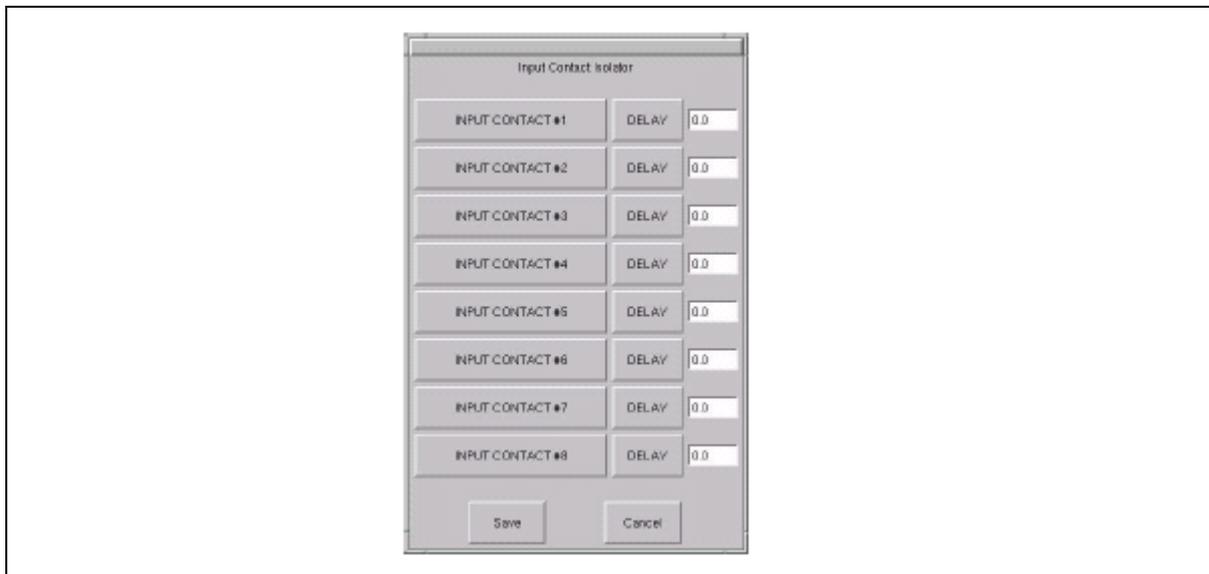
The Input Contact Isolator dialog box is displayed.

Figure 11-11 Input contact isolator dialog box

2. Select INPUT CONTACT 1.

A keyboard is displayed to allow you to enter the name of the alarm.

3. Enter the name of the alarm set for that input. For example, a fan problem could be indicated by naming the button FAN.

4. Select OK on the keyboard to keep your label.

5. Select DELAY.

A keypad is displayed prompting you for a delay time, in seconds, for a condition to exist before the alarm is triggered.

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6. Enter the delay value. The range for the values are from 0 (zero) to 99.9 seconds.

7. Select OK on the keypad to keep your setting.

The value you entered is displayed in the field adjacent to the corresponding input contact.

8. Repeat steps 2 to 7 for each input contact.

9. Select SAVE after you have configured all input contacts.

Be sure to select Save even if you have accessed this dialog only to change a setting.

10. Enter the settings in Input Contact Isolator Settings Record at the biginning of this manual.

⚠️ ***NOTE***
This information is not saved if control power is removed.

11. Select OK in the Comm Options dialog box to activate the settings.

11.10.8 Configuring the Programmable Relay Board Settings

The HiSwitch2 can contain up to two Programmable Relay Boards (PRB) that can trigger an external device when an event occurs in the static transfer switch. For example, if Source 1 fails, an external light flashes.

See Chapter 3 - Programmable Relay Board for more information on the PRBs.

The Programmable Relay Board dialog box with two options: STANDARD SET and USER DEFINED SET. The STANDARD SET are the factory-configured settings.

The STANDARD SET for the Programmable Relay Board settings are:

Relay	Setting	Definition
1	SOURCE 1 FAIL	Source 1 failure
2	SOURCE 2 FAIL	Source 2 failure
3	BYPASS CB4 CLOSED	Switch (Q4) is closed, Source 1 is bypassed.
4	BYPASS CB5 CLOSED	Switch (Q5) is closed, Source 2 is bypassed.
5	TRANSFER INHIBIT	A transfer between Source 1 and Source 2 is being restrained.
6	OUT OF SYNC	The phase difference between sources 1 and 2 exceeds the allowable threshold for transfer
7	EQUIP OVER TEMP	The ambient temperature of the HiSwitch2 exceeds the recommended threshold for operation.
8	blank	No setting.

Table 11-2 *Standard Settings for Programmable Relays*

The USER DEFINED SET allows you to assign faults and alarms to each contact on the relay boards.

Utilizing the USER DEFINED SET, you can also select Input Contact Isolators to associate with a programmable relay. In addition individual events, three other assignment choices are available:

- SELECT ALL sends a summary event to the selected relay whenever any event occurs. If this setting is selected for a relay, no other event needs to be assigned for that relay.
- ON SOURCE 1 or ON SOURCE 2 can be assigned to a relay to send a notification when that source is being used by the load.

Once configured, the static transfer switch continuously checks the status of the items defined for each contact and updates the state of the relay.

To configure your programmable relay boards for user defined settings:

1. Select PROG. RELAY BOARD # x from the Comm Options dialog box, where x is the corresponding board number.
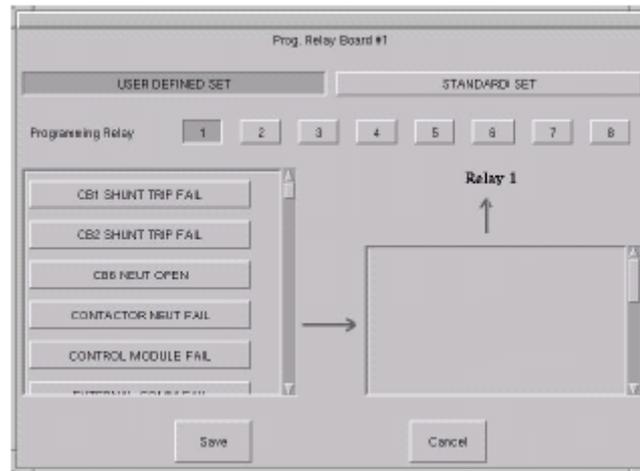
The Prog. Relay Board dialog box is displayed.

Figure 11-12 Programmable Relay board dialog box

2. Select your configuration settings.
  • Select STANDARD SET to use the settings configured at the factory. See Go to step 4.
  • Select USER DEFINED SET to configure your own settings. Go to step 3.

> ⚠️ ***NOTE***
>
> *If you enter a user defined settings, this information is not saved if control power is removed.*

Record the settings in Programmable Relay Board Settings Record at the biginning of this manual.
3. To define your relay board settings:
  a. Select a Programming Relay.
  b. Select an event you want associated with the relay. That fault is placed in the Relay column.
You can associate up to ten (10) events with one relay. If you do so, you should group the events logically to simplify troubleshooting when an event is triggered.
4. Select SAVE to keep the settings.
5. Select OK for the applicable Programmable Options Board option in the Comm Options dialog box to activate the settings.

11.10.9   Configuring the Network Interface Card

An optional Liebert OpenComms Network Interface Card (NIC) can be installed in the HiSwitch2 to provide Ethernet connectivity via an RJ-45 port.
Ethernet cabling is the responsibility of the customer. Category 5 cabling is required.
See Chapter 3 - Network Interface Card (NIC) for more information on the NIC.
See the OpenComms Network Interface Card Installation and Users Guide for configuration instructions for the card.
If the optional OpenComm NIC is installed in the HiSwitch2:
  • Select YES for the Network Interface Card option in the Comm Options dialog box to activate the card.

11.10.10   SiteScan Configuration

An optional RS-422 port, contained in the Comms Board, can be installed in the static transfer switch to provide communications with Liebert's SiteScan. SiteScan is Liebert's system monitoring software that allows you to utilize a PC to monitor the static transfer switch's status and check alarms. See Chapter 3 - Comms Board for more information on this board.
If the HiSwitch2 will be connected to SiteScan:
  • Select YES for the SiteScan choice in the Comm Options dialog box to activate the card.

11.10.11   Saving Your Communications Configurations

To save you communications configuration settings:
1. When you have completed the Comm Options configurations, ensure you have selected YES for all the settings that you want activated.
2. Select SAVE to keep the settings.
Whenever you make modifications to the any of the Comm Options, select SAVE to keep the changes.

11.10.12 System Options

Most System Options are configured at the factory. However, you may need to set two of the choices after the unit is installed: Wye Output Transformer and Remote Source Selection.
    • Select SYSTEM OPTIONS from the System Settings Menu.
The System Options dialog box is displayed.
        • An option is enabled by selecting YES.
        • An option is disabled by selecting NO.

Figure 11-13 System options

Dual Output Breaker
This selection is set at the factory. The choice is set to YES to enable both output isolators (Q3 and Q3A) when two are installed in the unit. If only one output isolator (Q3) is installed, the setting is set to NO.
PDU
This selection is set at the factory. This setting allows the LCD to draw the Mimic accordingly and display PDU specific metering and alarm information.
4 Pole Transfer Switch
This selection is set at the factory to indicate whether the system is a 3 or 4 pole unit.
Shunt
This selection is set at the factory.
Wye Output Transformer
The Wye Output Transformer controls the firing of the SCRs on startup, which minimizes the inrush into PDU transformers. Output isolators and PDU input isolators have to be closed when you start up the system. Based on whether the input side of the PDU transformer is configured as a Wye or Delta changes the firing sequence of the SCRs.
If the HiSwitch2 is connected to a PDU configured as a Wye:
    • Select YES for the Wye Output Transformer choice in the System Options dialog box.
Remote Source Selection
If your system is configured with the optional Remote Source Selection, it must be enabled from the System Options menu. See Chapter 3 - Remote Source Selection Wiring for more information.
If the system is utilizing Remote Source Selection:
    • Select YES for the Remote Source Selection choice in the System Options dialog box to activate the option.
System ID
Most of the settings for System ID are set by Liebert either at the factory or when the unit is installed.
Order No., System Tag No., System ID No. and Model No. are the numbers used to identify and track the system.
Language, Time and Date are synchronized with the location of the unit.
The only configurable field is the Password. See *Using the Password* in this Chapter for more information on configuring and using the password.

11.10.13   Logs

Two types of logs are kept by the HiSwitch2: Event Log and History Log.

Event Log

The Event Log tracks the alarms and faults of the HiSwitch2.

See Chapter 10 - *Alarm and Faults* for more information on these events and Event Log for more information on the Event Log and definitions of the fields displayed in the Event Log screen.
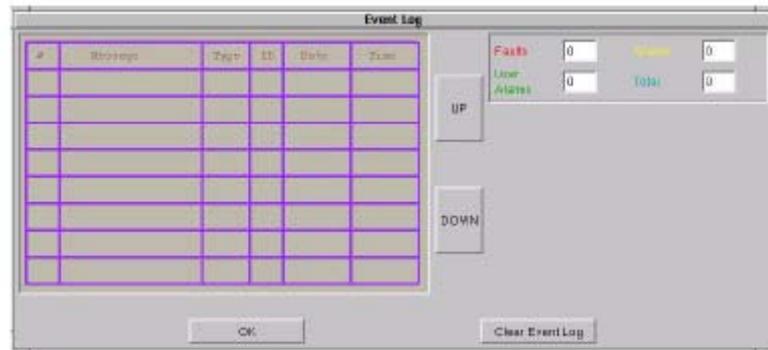

Figure 11-14 Event Log

To use the Event Log:

1. Select LOGS from the menu bar to open the Logs menu.

2. Select EVENT LOG from the menu.

3. Use the UP and DOWN buttons to scroll through the event list.

4. Select OK to close the Event Log. The data remains in the log.

History Log

Two History Logs are available to track major alarms. If so configured, an alarm freezes the history buffer. When the History Status buffer is frozen, a History Log is created that can be accessed from the HISTORY LOG x choices in the LOGS menu.

See Chapter 10 - *History Log* for more information on the History Logs and definitions of the fields displayed in the History Log screen.

Figure 11-15 History Log

To use the History Log:

1. Select LOGS from the menu bar to open the Logs menu.

2. Select either HISTORY LOG 1 or HISTORY LOG 2 from the menu.

3. Select the appropriate buttons to replay the log:

   • Select PREV to go to the previous frame in the sequence.

   • Select NEXT to go to the next frame in the sequence.

   • Move the green cursor to the location from which you would like to play the sequence of events.

   • Select REPLAY to play the frames automatically from the point of the cursor.

   • Select STOP to halt the replay.

   • Select RESET to return to the first frame in the log.

4. Select EXIT to close the History Log. The data remains in the log.

   • Use CLEAR HLOGS to remove the data from both history logs.

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⚠️ **NOTE**

Event and History Logs are protected by security. The password or a disabled key lockout is required on such equipped units to clear these logs.

11.10.14 Source Transfers

The Source Transfer choice (SOURCE XFERS) allows you to manually select a preferred source.
To switch the primary source, refer to the instructions in Manual Transfer / Preferred Source Selection in Chapter 9.

11.10.15 Startup Procedure

You can access instructions for starting the HiSwitch2 from the menu bar.
    • From the menu bar, select STARTUP PROC.
These instructions are also provided in Chapter 9 - *Normal System Turn-On* for Color Graphical display units and for LED Display units.

11.10.16 Bypass Procedure

You can access instructions for bypassing the static transfer switch from the menu bar.
    • From the menu bar, select BYP. PROC.
The instructions are provided in the display panel.
Bypass procedures are also discussed in Chapter 9 - *Maintenance Bypass* for Color Graphical display units and for LED Display units.

11.10.17 Help

You can select an event in the Event Display to display more information about that event in the Display Panel. This same help is also available in next section - *Event Message Help Text*.

11.10.18 Logo

The Logo menu choice shows the Liebert and Emerson logo in the Display panel.

11.11 Cleaning the LCD Touch Screen

If the touch screen requires cleaning, use a pre-moistened towelette designed for cleaning CRTs, or dampen a soft, non-abrasive cloth with a very mild cleaning solution.
Do not spray the cleaner directly onto the touch screen, as drips may run down into the screen and damage the equipment.
Close all menus and dialog boxes before cleaning the touch screen.

11.12 Operating instructions for the Touch Screen Interface

After the initial equipment start-up, the following operating guidelines can be used for equipment operation.
All programmable functions are preset at the factory to enable the unit to be brought up without the need to enter all selectable parameters.

11.13   EVENT MESSAGE HELP TEXT

Event Message Help Text provides the help text for the various system event messages. This help is also available through the touch screen interface.

> *Key:*
>
> ALL CAPS = event message displayed in the Event Display panel in the lower left corner of the LCD display.
>
> Indented text = help text shown in the Display Panel in the lower right corner of LCD display.
>
> **BOLD** = commands that are sent through the RS-232 port.

S1 SCR SHORT
    Source 1 SCR Short.

    One or more of the SCRs for Source 1 has shorted. Transferring between sources has been inhibited.

    Contact authorised technical support address shown at the beginning of the manual.

    Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

    This event and the system status surrounding it have been written to a History Log if the History Logs were not already full. This event was also written to the Event Log, if so configured.

    The alarm has triggered a message to be sent to the modem, if so configured.

S2 SCR SHORT
    Source 2 SCR Short.

    One or more of the SCRs for Source 2 has shorted. Transferring between sources has been inhibited.

    Contact authorised technical support address shown at the beginning of the manual.

    Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

    This event and the system status surrounding it have been written to a History Log if the History Logs were not already full. This event was also written to the Event Log, if so configured.

    The alarm has triggered a message to be sent to the modem, if so configured.

S1 SCR OPEN
    Source 1 SCR Open.
    One or more SCRs on Source 1 is open. Transferring between sources has been inhibited.

    Contact authorised technical support address shown at the beginning of the manual.

    HiSwitch2 output has been transferred to Source 2.
    Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

    This event and the system status surrounding it have been written to a History Log if the History Logs were not already full. This event was also written to the Event Log, if so configured.

    The alarm has triggered a message to be sent to the modem, if so configured.

S2 SCR OPEN
    Source 2 SCR Open.
    One or more SCRs on Source 2 is open. Transferring between sources has been inhibited.

    HiSwitch2 output has been transferred to Source 1.

    Contact authorised technical support address shown at the beginning of the manual.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event and the system status surrounding it have been written to a History Log if the History Logs were not already full. This event was also written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

PRIMARY FAN FAIL
    Primary Fan Failure
    One of the primary cooling fans for the HiSwitch2 has failed. The alternate fans are now running. The alternate fans are not monitored.

    Contact authorised technical support address shown at the beginning of the manual.

    Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
    This event was written to the Event Log, if so configured.
    The alarm has triggered a message to be sent to the modem, if so configured.

CONTROL MODULE FAIL
    Control logic module has failed.
    One of the control modules on the control board has failed.

    Contact authorised technical support address shown at the beginning of the manual.

    Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
    This event was written to the Event Log, if so configured.
    The alarm has triggered a message to be sent to the modem, if so configured.
    If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

PWR SPLY DC A FAIL
    Power Supply DC Bus A Failed
    The primary power supply is no longer providing DC power to the control board and the touch screen.

    Contact authorised technical support address shown at the beginning of the manual.

    Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
    This event was written to the Event Log, if so configured.
    The alarm has triggered a message to be sent to the modem, if so configured.
    If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

PWR SPLY DC B FAIL
    Power Supply DC Bus B Failed
    The secondary power supply is no longer providing DC power to the control board and CAN options.

    Contact authorised technical support address shown at the beginning of the manual.

    Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
    This event was written to the Event Log, if so configured.
    The alarm has triggered a message to be sent to the modem, if so configured.
    If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

PWR SPLY S1 AC FAIL
    Power Supply Source 1 AC Failed
    The AC input power to the power supplies from Source 1 has failed. The power supplies are now operating on AC power from Source 2. The AC input from Source 1 is still good.

    Contact authorised technical support address shown at the beginning of the manual.

    Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
    This event was written to the Event Log, if so configured.
    The alarm has triggered a message to be sent to the modem, if so configured.
    If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

PWR SPLY S2 AC FAIL
Power Supply Source 2 AC Failed
The AC input power to the power supplies from Source 2 has failed. The power supplies are now operating on AC power from Source 1. The AC input from Source 2 is still good.

Contact authorised technical support address shown at the beginning of the manual.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
This event was written to the Event Log, if so configured.
The alarm has triggered a message to be sent to the modem, if so configured.
If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

PWR SPLY LOGIC FAIL
Power Supply Module Failed
The power supply logic module contained in the primary power supply has failed.

Contact authorised technical support address shown at the beginning of the manual.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
This event was written to the Event Log, is so configured.
The alarm has triggered a message to be sent to the modem, if so configured.
If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

OUT VOLT SENSE FAIL
Output Voltage Sense Module Failed
The module contained on the snubber monitoring the output voltage has failed.
Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

Contact authorised technical support address shown at the beginning of the manual.

This event was written to the Event Log, if so configured.
The alarm has triggered a message to be sent to the modem, if so configured.
If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

S1 VOLT SENSE FAIL
Source 1 Voltage Sense Module Failed
The module contained on the snubber monitoring the input voltage from Source 1 has failed.
Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

Contact authorised technical support address shown at the beginning of the manual.

This event was written to the Event Log, if so configured.
The alarm has triggered a message to be sent to the modem, if so configured.
If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

S2 VOLT SENSE FAIL
Source 2 Voltage Sense Module Failed
The module contained on the snubber monitoring the input voltage from Source 2 has failed.
Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

Contact authorised technical support address shown at the beginning of the manual.

This event was written to the Event Log, if so configured.
The alarm has triggered a message to be sent to the modem, if so configured.
If configured to be a latching alarm, press RESET on the display. If you are accessing the HiSwitch2 system from a terminal, type **CA** and press RETURN on your keyboard.

S1 SCR SENSE FAIL
Source 1 SCR Sense Module Failed
The module contained on the snubber monitoring the SCRs for Source 1 has failed.
Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

Contact authorised technical support address shown at the beginning of the manual.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.
If configured to be a latching alarm, press RESET on the display. If you are accessing the HiSwitch2 system from a terminal, type **CA** and press RETURN on your keyboard.

S2 SCR SENSE FAIL
Source 2 SCR Sense Module Failed
The module contained on the snubber monitoring the SCRs for Source 2 has failed.
Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
Contact authorised technical support address shown at the beginning of the manual.
This event was written to the Event Log, if so configured.
The alarm has triggered a message to be sent to the modem, if so configured.
If configured to be a latching alarm, press RESET on the display. If you are accessing the HiSwitch2 system from a terminal, type **CA** and press RETURN on your keyboard.

S1 CURR SENSE FAIL
Source 1 Current Sense Failure
The module monitoring the current from Source 1 has failed. This module is contained on the left side gate driver board.
Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
This event was written to the Events Log, is so configured.
The alarm has triggered a message to be sent to the modem, if so configured.
If configured to be a latching alarm, press RESET on the display. If you are accessing the HiSwitch2 system from a terminal, type **CA** and press RETURN on your keyboard.

S2 CURR SENSE FAIL
Source 2 Current Sense Failure
The module monitoring the current from Source 2 has failed. This module is contained on the right side gate driver board.
Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
This event was written to the Events Log, is so configured.
The alarm has triggered a message to be sent to the modem, if so configured.
If configured to be a latching alarm, press RESET on the display. If you are accessing the HiSwitch2 system from a terminal, type **CA** and press RETURN on your keyboard.

S1 GATE DRIVE FAIL
Source 1 Gate Drive Failure
The gate drive module for an SCR for Source 1 has failed. This module is contained on the right side gate driver board.
Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
Contact authorised technical support address shown at the beginning of the manual.
This event was written to the Event Log, if so configured.
The alarm has triggered a message to be sent to the modem, if so configured.
If configured to be a latching alarm, press RESET on the display. If you are accessing the HiSwitch2 system from a terminal, type **CA** and press RETURN on your keyboard.

S2 GATE DRIVE FAIL
Source 1 Gate Drive Failure
The gate drive module for an SCR for Source 2 has failed. This module is contained on the left side gate driver board.
Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
Contact authorised technical support address shown at the beginning of the manual.
This event was written to the Event Log, if so configured.
The alarm has triggered a message to be sent to the modem, if so configured.
If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

INTERNAL COMM FAIL
Internal CAN Communications Failed
Communications have failed in the CAN bus between the control board and the touch screen control.
Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
Contact authorised technical support address shown at the beginning of the manual.
This event was written to the Event Log, if so configured.
The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

EXTERNAL COMM FAIL

External Communications Failed

Communications have failed between the control board and the CAN options.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the unit from a terminal, type **SH** and press RETURNRETURN on your keyboard to turn off the audible alarm.

Contact authorised technical support address shown at the beginning of the manual.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

CB1 SHUNT TRIP FAIL

Switch 1 Shunt Trip Failure

Switch 1 failed to trip open when the control issued a command for the Switch to trip.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

Contact authorised technical support address shown at the beginning of the manual.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

CB2 SHUNT TRIP FAIL

Switch 2 Shunt Trip Failure

Switch 2 failed to trip open when the control issued a command for the Switch to trip.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

Contact authorised technical support address shown at the beginning of the manual.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

HEAT SINK OVERTEMP

Heat Sink Over Temperature

The system heat sink temperature has exceeded the design limits.

Take immediate steps to cool the unit. Remove obstructions from the air inlet in the front of the unit. Remove and replace the air filter behind the front door. A standard furnace filter can be used.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

S1 UV

Source 1 Under Voltage (fast detection).

The input voltage from Source 1 dropped below a set percentage of the nominal voltage, as set in the Fast UV set point under the User Settings. An S1 Fail alarm was also issued and source transfer has been inhibited.

The load of the HiSwitch2 has been transferred to Source 2.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

S1 UV (RMS)

Source 1 Under Voltage (slow detection).

The input voltage from Source 1 remained below a set percentage of the nominal voltage for a designated period, as set in the Slow UV Setting and Slow UV Detection Delay set points configured under the User Settings. An S1 Fail alarm was also issued and source transfer has been inhibited.

The load of the HiSwitch2 has been transferred to Source 2.

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Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

The alarm is latched and must be reset after the voltage returns to the nominal voltage. If the Reset option is not configured for AUTO (automatic reset), then the reset action must be done manually. When the voltage is within acceptable parameters, touch the RESET button on the touch screen. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

S1 OV

Source 1 Over Voltage.

The input voltage from Source 1 exceeded a set percentage of the nominal voltage, as set in the OV Setting and OV Detection Delay set points configured under the User Settings. An S1 Fail alarm was also issued and source transfer has been inhibited. The load of the HiSwitch2 has been transferred to Source 2.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

S1 OF/UF

Source 1 Over Frequency/Under Frequency

The frequency for Source 1 is running outside the acceptable operating range, as set in the Frequency Trip Point under User Settings. An S1 Fail alarm was also issued and source transfer has been inhibited.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

S1 FAIL

Source 1 Failure

Source 1 has failed due to under voltage (UV), over voltage (OV), or running over or under frequency (OF/UF). This alarm is a companion to S1 UV, S1 UV (RMS), S1 OV and S1 OF/UF.

The load of the HiSwitch2 has been transferred to Source 2.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event has been written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

S2 UV

Source 2 Under Voltage (fast detection).

The input voltage from Source 2 dropped below a set percentage of the nominal voltage, as set in the Fast UV set point under the User Settings. An S2 Fail alarm was also issued and source transfer has been inhibited.

The load of the HiSwitch2 has been transferred to Source 1.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

S2 UV (RMS)

Source 2 Under Voltage (slow detection).

The input voltage from Source 2 remained below a set percentage of the nominal voltage for a designated period, as set in the Slow UV Setting and Slow UV Detection Delay set points configured under the User Settings. An S2 Fail alarm was also issued and source transfer has been inhibited.

The load of the HiSwitch2 has been transferred to Source 1.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

The alarm is latched and must be reset after the voltage returns to the nominal voltage. If the Reset option is not configured for AUTO (automatic reset), then the reset action must be done manually. When the voltage is within acceptable parameters, touch

the RESET button on the touch screen. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

This event was written to the Event Log, if so configured.

S2 OV

Source 2 Over Voltage.

The input voltage from Source 2 exceeded a set percentage of the nominal voltage, as set in the OV Setting and OV Detection Delay set points configured under the User Settings. An S2 Fail alarm was also issued and source transfer has been inhibited. The load of the HiSwitch2 has been transferred to Source 1.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

S2 UF/OF

Source 2 Under Frequency/Over Frequency

The frequency for Source 2 is running outside the acceptable operating range, as set in the Frequency Trip Point under User Settings. An S2 Fail alarm was also issued and source transfer has been inhibited.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

S2 FAIL

Source 2 Failure

Source 2 has failed due to under voltage (UV), over voltage (OV), or running with an over or under frequency (OF/UF). This alarm is a companion to S2 UV, S2 UV (RMS), S2 OV and S2 OF/UF.

The load of the HiSwitch2 has been transferred to Source 1.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type CA and press RETURN on your keyboard.

S1 OVERCURRENT

Source 1 Overcurrent

HiSwitch2 is running on Source 1 and an overload condition has occurred on one or more phases.

⚠️ **NOTE**

The overload setpoint is a single fixed number--101%. An overload condition is detected when the measured load current is equal to or greater than the setpoint.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

S2 OVERCURRENT

Source 1 Overcurrent

HiSwitch2 is running on Source 2 and an overload condition has occurred on one or more phases.

⚠️ **NOTE**

The overload setpoint is a single fixed number--101%. An overload condition is detected when the measured load current is equal to or greater than the setpoint.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

S1 I-PEAK
>
> Current Peak on Source 1
>
> The peak current from Source 1 has exceeded the set point as defined in the I-PK Xfer Lockout setting under User Settings. Transferring to Source 2 has been inhibited.
>
> Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
>
> This event and the system status surrounding it have been written to a History Log if the History Logs were not already full. This event was also written to the Event Log, if so configured.
>
> If this alarm is configured to automatically reset under the set points for User Settings, the alarm clears itself when the I-Peak condition clears.
>
> If this alarm is set for manual reset mode, the alarm continues to show as active after the current returns to nominal, still inhibiting transfers. You will need to manually reset the alarm. If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.
>
> The alarm has triggered a message to be sent to the modem, if so configured.

S2 I-PEAK
>
> Current Peak on Source 2
>
> The peak current from Source 2 has exceeded the set point as defined in the I-PK Xfer Lockout setting under User Settings. Transferring to Source 1 has been inhibited.
>
> Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
>
> This event and the system status surrounding it have been written to a History Log if the History Logs were not already full. This event was also written to the Event Log, if so configured.
>
> If this alarm is configured to automatically reset under the set points for User Settings, the alarm clears itself when the I-Peak condition clears.
>
> If this alarm is set for manual reset mode, the alarm continues to show as active after the current returns to nominal, still inhibiting transfers. You will need to manually reset the alarm. If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.
>
> The alarm has triggered a message to be sent to the modem, if so configured.

SOURCES OUT OF SYNC
>
> Sources out of synchronization.
>
> The phase difference between Source 1 and Source 2 has exceeded the deviation as set for MANUAL MAX XFER PHASE ANGLE under User Settings.
>
> A manual transfer cannot take place while the sources are not synchronized.
>
> Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
>
> The event was written to the Event Log, if so configured.
>
> The alarm has triggered a message to be sent to the modem, if so configured.
>
> If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

LOAD ON ALT SOURCE
>
> HiSwitch2 load on the alternate source.
>
> The static transfer switch is running on the alternate power source. Check the Event Log to determine the reason for the transfer from the preferred source.
>
> Another event has caused the system to transfer to the alternate source. The system returns the load to the preferred source either automatically or manually, depending on how the system is configured.
>
> In automatic reset mode, the HiSwitch2 automatically retransfers to the preferred source after the causal condition clears.
>
> In manual reset mode, the system remains on the alternate source after the causal event clears until you select RESET from the touchscreen, or enter **CA** (Clear Alarms) from a service terminal.
>
> **Pressing the RESET button to returns the unit to the preferred source. Ensure that the condition that triggered the switch has been rectified before returning to the preferred source.**
>
> Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
>
> This event was written to the Event Log, if so configured.
>
> The alarm has triggered a message to be sent to the modem, if so configured.

AUTO REXFER INHIBIT
   Automatic Retransfer Inhibited.
   The system made five transfers from the preferred source to the alternate source in the last five minutes. As a result, automatic retransfers back to the preferred source is now disabled.
   To clear this alarm condition, assign the alternate source as the preferred source.
   This alarm also is cleared if the unit transfers to the preferred source due to an alternate source AC volt failure (i.e., an emergency transfer.)
   Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
   The event was written to the Event Log, if so configured.
   The alarm has triggered a message to be sent to the modem, if so configured.
   If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

CB1 (S1) OPEN
   Isolator 1 (Q1) Open [for Source 1]
   Isolator 1 is not closed. Q1 is only assigned to Source 1.
   Check that the Q 1 Isolator is in the desired position.
   Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
   This event was written to the Event Log, if so configured.
   The alarm has triggered a message to be sent to the modem, if so configured.
   If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

CB2 (S2) OPEN
   Isolator 1 (Q2) Open [for Source 2]
   Isolator 2 is not closed. Q2 is only assigned to Source 2.
   Check that the Q2 Isolator is in the desired position.
   Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
   This event was written to the Event Log, if so configured.
   The alarm has triggered a message to be sent to the modem, if so configured.
   If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

CB4 (S1 BYP) CLOSED
   Q4 Bypass Isolator Closed [Source 1]
   Q4 Isolator is not open. The input from Source 1 is bypassing the static transfer switch.
   Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
   This event was written to the Event Log, if so configured.
   The alarm has triggered a message to be sent to the modem, if so configured.
   If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

CB5 (S1 BYP) CLOSED
   Q5 Bypass Isolator Closed [Source 2]
   Q5 Isolator is not open. The input from Source 2 is bypassing the static transfer switch.
   Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
   This event was written to the Event Log, if so configured.
   The alarm has triggered a message to be sent to the modem, if so configured.
   If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

CB3 (OUTPUT) OPEN
   Q3 Output Isolator Open
   Q3 is not closed. This Switch is assigned to the output load. The power flow to the load cannot flow through the static transfer switch.
   Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
   This event was written to the Event Log, if so configured.
   The alarm has triggered a message to be sent to the modem, if so configured.
   If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

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CB3A (OUTPUT) OPEN

Q3A Output Isolator (Optional) is Open

Q3A is not closed. This Switch is assigned to the output load. The power flow to the load cannot flow through the static transfer switch.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

S1 PHASE ROT ERROR

Source 1 Phase Rotation Error

A phase rotation error condition exists on Source 1. Check the phase sequence (U-V-W or ABC) of Source 1.

Transferring to Source 1 has been inhibited.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

S2 PHASE ROT ERROR

Source 2 Phase Rotation Error

A phase rotation error condition exists on Source 2. Check the phase sequence (U-V-W or ABC) of Source 2.

Transferring to Source 2 has been inhibited.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

TRANSFER INHIBITED

Transfer Inhibited

Uninterrupted transfer between sources is inhibited due to input source failure, sources out of sync, switch failure, or the unit is in bypass mode.

Check the Event Log for the event or events that may have caused the alarm.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

This event was written to the Event Log, if so configured.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

OUTPUT UV

Output Undervoltage

The voltage being supplied to the load has dropped below the acceptable nominal voltage. Check the input voltage from both sources.

This event and the system status surrounding it have been written to a History Log if the History Logs were not already full.

This event was also written to the Event Log, if so configured.

Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.

The alarm has triggered a message to be sent to the modem, if so configured.

If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

INPUT CONTACT #1
> Input Contact Isolator #1
> Occurrence of the indicated external event has been detected by Input Contact Isolator #1 of the Open Comms Digital Input option board.

INPUT CONTACT #2
> Input Contact Isolator #2
> Occurrence of the indicated external event has been detected by Input Contact Isolator #2 of the Open Comms Digital Input option board.

INPUT CONTACT #3
> Input Contact Isolator #3
> Occurrence of the indicated external event has been detected by Input Contact Isolator #3 of the Open Comms Digital Input option board.

INPUT CONTACT #4
> Input Contact Isolator #4
> Occurrence of the indicated external event has been detected by Input Contact Isolator #4 of the Open Comms Digital Input option board.

INPUT CONTACT #5
> Input Contact Isolator #5
> Occurrence of the indicated external event has been detected by Input Contact Isolator #5 of the Open Comms Digital Input option board.

INPUT CONTACT #6
> Input Contact Isolator #6
> Occurrence of the indicated external event has been detected by Input Contact Isolator #6 of the Open Comms Digital Input option board.

INPUT CONTACT #7
> Input Contact Isolator #7
> Occurrence of the indicated external event has been detected by Input Contact Isolator #7 of the Open Comms Digital Input option board.

INPUT CONTACT #8
> Input Contact Isolator #8
> Occurrence of the indicated external event has been detected by Input Contact Isolator #8 of the Open Comms Digital Input option board.

> Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
> The event, with its assigned name, was written to the Event Log, if so configured.
> The alarm has triggered a message to be sent to the modem, if so configured.
> If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

CONFIG MODIFIED
> Configuration Modified
> A set point has been updated and saved.
> Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
> The event was written to the Event Log, if so configured.
> The alarm has triggered a message to be sent to the modem, if so configured.
> If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

PASSWORD CHANGED
> Access Password Changed
> The password for accessing the HMI (touch screen) options has been updated and saved.
> Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
> The alarm has triggered a message to be sent to the modem, if so configured.
> The event was written to the Event Log, if so configured.
> If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

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TIME REPROGRAMMED
    System Time Reprogrammed
    The system's time setting has been updated and saved.
    Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
    The event was written to the Event Log, if so configured.
    The alarm has triggered a message to be sent to the modem, if so configured.
    If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

DATE REPROGRAMMED
    System Date Reprogrammed
    The system's date setting has been updated and saved.
    Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
    The event was written to the Event Log, if so configured.
    The alarm has triggered a message to be sent to the modem, if so configured.
    If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

EVENT LOG CLEARED
    Event Log Cleared
    All past alarms and faults are no longer recorded in the system's event log.
    Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
    This event was written to the Event Log, if so configured.
    The alarm has triggered a message to be sent to the modem, if so configured.
    If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

HIST LOGS CLEARED
    History Logs Cleared
    Both History Logs have been erased and the logs are now available to record future events.
    Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type SH and press RETURN on your keyboard to turn off the audible alarm.
    The event was written to the Event Log, if so configured.
    The alarm has triggered a message to be sent to the modem, if so configured.
    If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type CA and press RETURN on your keyboard.

HIST LOGS FULL
    History Logs Full
    The history buffer has reached its capacity for both history logs. No further history logs can be written until the logs are cleared. The History Logs were frozen by the occurrence of two designated faults or alarms.
    Both history logs have been frozen by significant events. These logs contain valuable diagnostic data regarding those events which may be useful if service is required. Once the logs have been analyzed and the causes for freezing them have been resolved, the history logs should be cleared to make them available for capturing future events.
    To clear the History Logs, select the CLEAR HLOG button under the LOGS > HISTORY LOG 1 or LOGS > HISTORY LOG 2 menus to clear the History Status buffer after the alarms have been resolved.
    If you are accessing the unit from a terminal, type **CHL** and press RETURN to clear the History Logs.
    Press SILENCE on the touch screen to turn off the audible alarm, if so configured. If you are accessing the HiSwitch2 system from a terminal, type **SH** and press RETURN on your keyboard to turn off the audible alarm.
    The event was written to the Event Log, if so configured.
    The alarm has triggered a message to be sent to the modem, if so configured.
    If configured to be a latching alarm, press RESET on the display. If you are accessing the unit from a terminal, type **CA** and press RETURN on your keyboard.

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