3... INTERFACE MODULES

The HyperLogger System Base includes six ports for plug-in installation of any of the family of HyperLogger Interface Modules (see Figure 3... -1) . Interface Modules provide the interface between real world signals such as thermocouples, voltage, current, telephone lines, etc and the HyperLogger System Base.

This section covers the installation, wiring, hardware configuration, and application considerations of the basic HyperLogger family of Interface Modules. As additional modules are added, the instruction sheets should be added to this section for reference.

Utilization of the Interface Module channels within a HyperNet Program Net is covered within Chapter 7 and the reference Master Icon Listing contained in Appendix A.

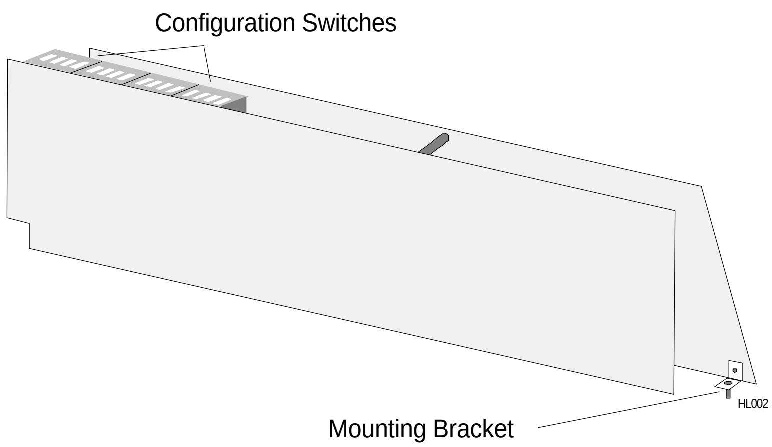


Figure 3... -1: Interface Module

-

HANDLING

As with all electronic systems, static electricity discharge can weaken or cause permanent damage to circuitry. Protective circuitry is integral to the HyperLogger system including the Interface Modules, however when the Interface Modules are not installed in the System Base, the protective circuitry is not effective. Therefore, when handling Interface Modules, it is recommended that reasonable static control procedures be followed.

- Before touching the Interface Module, discharge static electricity built up in your body be touching a grounded point such as a water faucet, cover plate screw on a receptacle, metal surface of a grounded appliance or other earth ground.
- Do not wrap or store the Interface Module in static generating materials such as untreated styrofoam packing `peanuts' or plastic bags. Anti-Static bags are available for storage of static sensitive components.

INSTALLATION

When shipped, Interface Modules are provided with a Quick Reference Card, Instruction sheet, and any necessary accessories. Optionally, if ordered with a System Base, the Interface Modules are typically factory installed in the System Base before shipment.

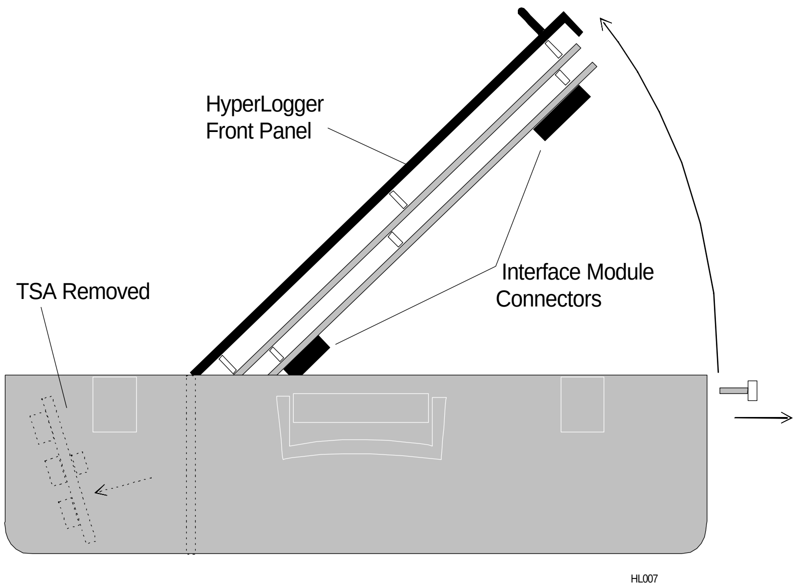


Figure 3... -2: Accessing the HyperLogger System Base backplane

The Interface Modules plug into a backplane that is located behind the front panel of the HyperLogger. Access is gained to this backplane as follows (Figure 3... -2):

1. Remove the TSA retaining thumbscrew and unplug the TSA.
2. Remove the two thumbscrews at the top of the HyperLogger enclosure.
3. Slowly, tug on the front panel handle (located near the top of the front panel) and the front panel will swing open on its hinge.

When the HyperLogger is open, inspection of the exposed circuit board backplane (Figure 3... -3) will reveal the connectors and threaded inserts used in installation of

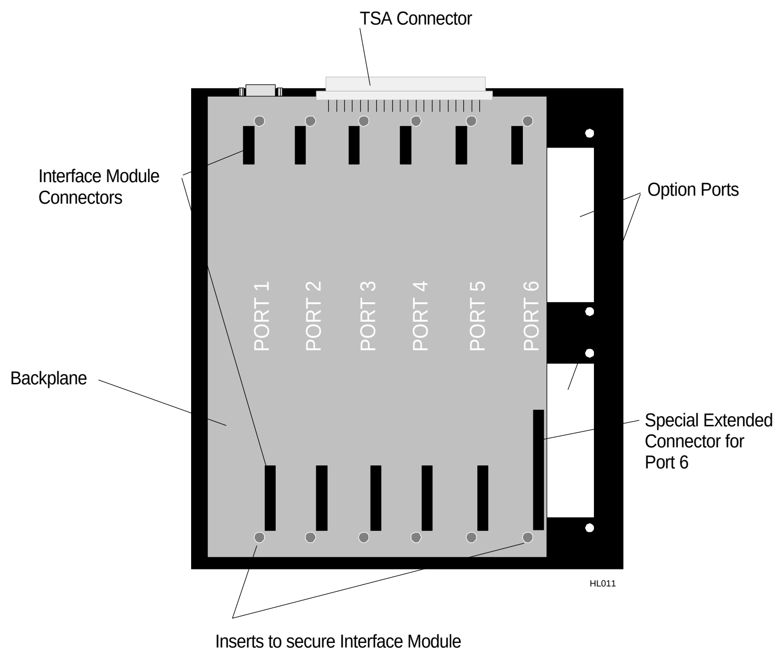


Figure 3... -3: Backplane and Interface Module connectors (view shown with HyperLogger front panel open)

a Interface Module. Note that Interface Module ports 1 through 5 are all identical, however Port 6 includes some additional connections (one of the Backplane socket connectors is longer) and also aligns with the Front Panel cutouts (labeled Option Port 1 and 2 on the Front Panel). Some Interface Modules such as the HLIM-5 must be installed in Port 6.

To install an Interface Module into the System Base Backplane *Ports 1 to 5*:

1. Review the Interface Module instructions and observe any special installation instructions.
2. Turn the HyperLogger System Power switch OFF.
3. Remove the TSA retaining thumbscrew and unplug the TSA.
4. Remove the two thumbscrews at the top of the HyperLogger enclosure.
5. Slowly, tug on the front panel handle (located near the top of the front panel) and the front panel will swing open on its hinge (Figure 3... -2).
6. Observe the gold connector pins on the long edge of the Interface Module. These pins will plug into a mating black socket mounted on the HyperLogger System Base Backplane. Also, two phillips head screws in angle brackets are at each end of the Interface Module. These screws will mate with threaded inserts in the Backplane (Figure 3... -3).
7. Orient the Interface Module with the diagonally cut end toward the top of the Backplane.

8. Tighten the retaining screws into their mating inserts while carefully observing the alignment of the mating connectors.

> *TIP: Start one screw into its mating insert, then align and start the other screw. Check that the connectors are aligned and then tighten both of the screws securing the Interface Module to the Backplane..*

To install an Interface Module into System Base Backplane *Port 6*:

1. Review the Interface Module instructions. If the Interface Module uses either Front Panel Option Port 1 or 2, remove the two phillips head screws holding the Option Port cover(s) in place.
2. Follow the steps specified for installation of an Interface Module into Ports 1 to 5 above.
3. Install any special bezels (provided with the Interface Module) using the two phillips head screws removed in step 1.

INTERFACE MODULE OPERATIONAL INSTRUCTIONS:

Each Interface Module has specific characteristics and instructions for set-up and use that are unique to that particular module. These instructions are provided with the Interface Module at the time of purchase. As Interface Modules are added to a User's HyperLogger, the instruction sheets provided should be added to this section of the manual.

The instructions for most Interface Modules include both hardware and software details. Software instructions will commonly be referenced from other sections of this manual such as in the chapter on HyperComm for the modem modules and the chapter on HyperNet programming for analog and digital Interface Modules.

Instruction sheets for the following Interface Modules are currently included in this section:

- HLIM-1; Analog Interface Module
- HLIM-2; Event, Frequency, Count Interface Module
- HLIM-4; RTD, Thermistor, and Resistance Module
- HLIM-8; Digital Interface Module (8 channel digital I/O)
- HLIM-5 PCMCIA Memory Card Interface Module
- MM-2400 2400 Baud Modem option (for HLIM-5)
- MM-14.4 14.4kbaud Modem option (for HLIM-5)

NOTES:

HLIM-1; FOUR CHANNEL ANALOG INTERFACE MODULE OVERVIEW

Overview:

The HLIM-1 is a four channel Interface Module for use in conjunction with the HyperLogger System Base. Each of the four channels can be individually programmed for any combination of the following signal types and input ranges with HyperWare software (via HyperNet) and hardware Configuration Switches (located on the Interface Module).

Thermocouple:

Type	Color (USA)	Range (F)	Range (C)
J	white/red	-60 to 1400F	-50 to 760C
K	yellow/red	32 to 2500F	0 to 1370C
E	purple/red	-150 to 1830F	-100 to 1000C
T	blue/red	-250 to 750F	-160 to 400C
R	black/red	32 to 1830F	0 to 1000C
S	black/red	32 to 3182F	0 to 1750C

Table 3... -1: Thermocouple input types and ranges

DC Voltage:

Full Scale (FS) ranges:

Icon	Full Scale Input Ranges				
VDC-LO	+/- 20mV	+/-40mV	+/-50mV	+/-60mV	+/-100mV
	+/-200mV	+/-1V	+/-2V		
VDC-MED	+/-5 V	+/- 10V			
VDC-HI	+/- 3V	+/-15V	+/-30V		

Table 3... -2: DC Voltage input ranges

Input Impedance for the 5V, 10V, and 30V ranges is >2.5Megohm. All other range's input impedance is > 10 Megohm.

DC Current:

Full Scale (FS) ranges:

Icon	Full Scale Input Ranges			
mA-LO	+/-200uA	+/-400uA	+/-500uA	+/-1.0mA
	+/-2.0mA	+/-11 mA	+/-22mA	

Table 3... -3: DC Current input ranges

Input resistance for all current ranges is a 100 ohm precision shunt.

Module Installation:

Refer to page 3-2 for instruction on installation of the Interface Module into the HyperLogger Backplane. No special considerations are required for installation of this module into the System Base.

Upon completion of installation, visually insure that all of the connector pins are mated in their respective sockets.

Port Requirements / Limitations:

This module can be installed in any of the six Backplane ports.

Hardware Configuration Switches:

Four sets of Configuration Switches are provided for each of the four channels (Figure 3... -4). Through the use of these switches, various types of signals can be directly fed into the HyperLogger eliminating the need for User supplied external precision dividers, shunts and other circuitry.

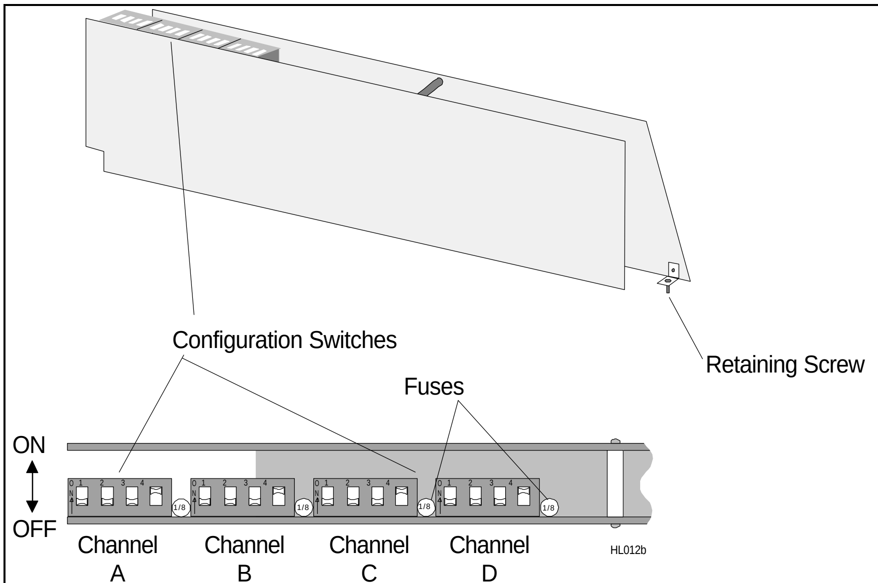


Figure 3... -4: Channel configuration switches within the HLIM-1 Interface Module

Although for most applications, an in-depth understanding of the function of these switches is not required, a simplified schematic of the input section of the HLIM-1 is provided in Figure 3... -5. As can be seen in this schematic, different combinations of the switches interject voltage dividers and shunts into the input stage of the

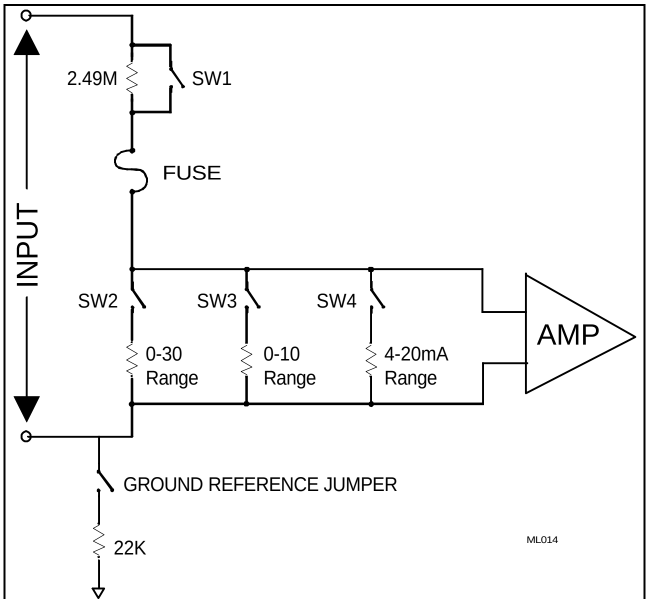


Figure 3... -5: Simplified schematic of input section of HLIM-1

Input Overcurrent Fuses:

Each channel is protected by a 125mA fuse as shown in Figure 3... -5 (circuit) and Figure 3-4 (physical location on module). This fuse will protect the module from overcurrent surges received from malfunctioning or improperly connected sensors and transmitters.

In the event that a channel on a module quits responding with proper values, it may be an indication that this protective fuse has blown. The fuse can be removed from the circuit and checked for continuity with an ohm-meter and/or replaced with a Littelfuse P/N: 273.125 fuse available from Logic Beach Incorporated or many electronic distributors.

The following reference chart provides the necessary information for configuration of the switches. The switch settings are read by the HyperLogger during a query of the hardware configuration (from within HyperNet) so the User is not burdened with keeping notes of the current HyperLogger configuration. Improper setting of the switches will result in a `Bad Configuration' message on the LCD upon power-up of the HyperLogger. In the event that this message displays, check the switch settings per Table 3... -4 and correct the conflict.

Input / Range	SW 1	SW2	SW3	SW4
Thermocouples VDC up through +/-2 VDC	OFF	OFF	OFF	**ON**
VDC up through +/-10 VDC	OFF	OFF	**ON**	OFF
VDC up through +/-30 VDC	OFF	**ON**	OFF	OFF
All Current (mADC) Ranges	**ON**	OFF	OFF	**ON**

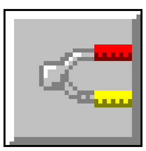
Table 3... -4: HLIM-1 configuration switch settings

HLIM-1 Channel Configuration via Software:

When a HLIM-1 channel is configured as a particular type of input via the module configuration switches, the configuration will be automatically detected during the development of a Program Net for the HyperLogger. Software configuration and utilization of the HLIM-1's channels in a Program Net is covered in Chapter 7 and within the Master Icon Listing in Appendix A.

HLIM-1; THERMOCOUPLE APPLICATION

Thermocouple Connection:



Thermo-couple Icon

To utilize an HLIM-1 channel as a thermocouple input, configure that channel's Interface Module Configuration Switch per Table 3... -4. Channels configured as thermocouple inputs utilize three terminal strip connections per input; Positive lead, Negative lead, and Shield.

Connect the thermocouple positive and negative (red in USA) leads to the correct pair of terminals on the TSA PORTx terminal strip. Refer to Chapter 7 for steps to generate a TSA Wiring printout for use in making field wiring connections.

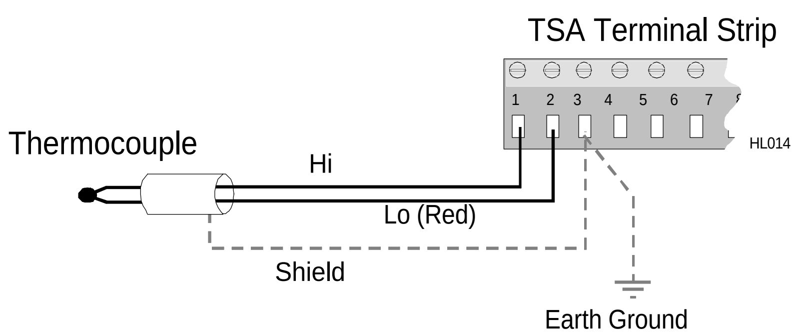


Figure 3... -6: Thermocouple (and optional Shield) terminal strip connection

Polarity is critical..

Shielded thermocouple wire is recommended in electrically noisy environments for optimum signal protection. If shielded wire is used, a ground wire should be run from one of the Shield terminals to an earth ground connection to conduct away noise picked up by the thermocouple shield (Figure 3... -6). Only one ground wire is required per 12 position terminal strip as terminals 3, 6, 9 and 12 are all interconnected within the TSA circuit board.

NOTE: Do not ground the shield wire at the sensor end away from the HyperLogger.

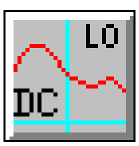
Thermocouple Application Notes:

Cold Junction Compensation (CJC): For thermocouple measurements, the temperature of the terminal strip connections is required in the voltage to temperature conversion equation used by the HyperLogger. This temperature is measured by the CJC sensor located on the back of the TSA. Any differential temperature from the metal terminal strip connections to the CJC sensor on the TSA circuit board will result in direct measurement errors.

The TSA is thermally designed to provide good CJC sensor vs terminal strip temperature tracking however, to minimize this potential error, avoid installations or effects that will induce extreme temperature differential. The most accurate readings will be achieved when the door to the HyperLogger is closed and temperatures within the enclosure have stabilized.

DIFFERENTIAL POTENTIAL: to minimize current loop induced errors, use isolated type thermocouples or insure that all thermocouple junctions are at ground potential. Insure that input voltages do not exceed 3.0V above or below circuit ground (maximum common mode voltage).

HLIM-1; DC VOLTAGE APPLICATION



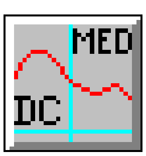
VDC- Lo Range Icon

The HLIM-1 can support three different major ranges (and a multitude of sub-ranges) of analog DC voltage input depending on the channel's hardware Configuration Switch setting (See Table 3... -4). To utilize an HLIM-1 channel as a DC Voltage input, set that channel's Configuration Switch per the Table for the desired input signal range.

As shown in Figure 3... -5, when DC-MED or DC-HI are selected with the hardware Configuration Switches, front-end divider circuitry is enabled. This circuitry attenuates the input signal to a range that can be handled by the HLIM-1 instrumentation amplifier section.

> ***TIP***: *For best accuracy and absolute resolution, utilize the lowest range possible that will cover the input signal's dynamic range without over-ranging.*

Signal Connection (all Ranges):



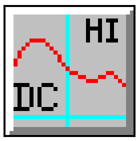
VDC- Medium Range Icon

Interface Module channels configured as VDC inputs provide three terminal strip connections per input; Positive lead, Negative lead, and Shield.

Connect the VDC signal positive and negative leads to the correct pair of terminals on the TSA PORTx terminal strip (Figure 3... -7). Refer to Chapter 7 for steps to generate a TSA Wiring printout for use in making field wiring connections.

Observe polarity or the output signal will be reversed.

To minimize noise pickup on sensor wiring between the HyperLogger and the end sensor or signal source, 18 to 22 AWG shielded, twisted pair wire is recommended.



VDC-High Range Icon

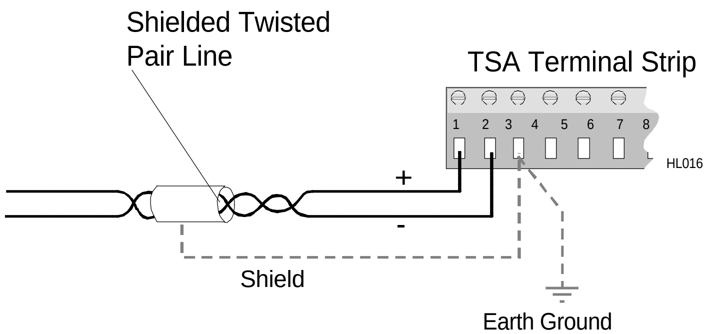


Figure 3... -7: VDC signal (and optional shield) terminal strip connection

> ***FYI:*** *Shielded wire minimizes the amount of noise picked up by the internal conductors carrying the signals by providing an `electrical shell' or Faraday cage around the internal conductors.*
>
> *Twisted pair wiring exposes both conductors equally to the ambient electrical noise. This common-mode type noise is easier to reject by the Interface Modules input signal conditioning circuitry than un-balanced (or differential) noise.*

Shielding and/or twisted pair wire is especially recommended in electrically noisy environments for optimum signal protection. If shielded wire is used, a ground wire should be run from one of the Shield terminals to an earth ground connection to conduct away noise picked up by the shield conductor. Only one ground wire is required per 12 position terminal strip as terminals 3, 6, 9 and 12 are all interconnected within the TSA circuit board. Multiple terminal strips on the TSA (multiple ports) can be daisy-chained to a common earth ground wire (Figure 3... -8).

NOTE: Do not ground the signal wiring shield conductor at the sensor end (the end away from the HyperLogger) as this can induce additional noise into

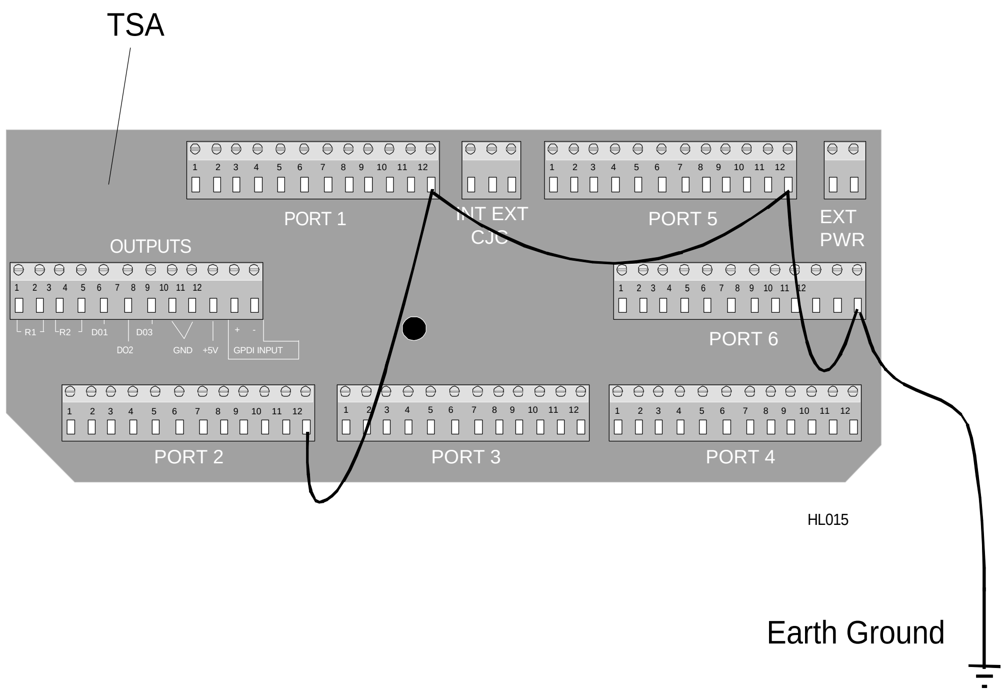


Figure 3... -8: Daisy-chained shield connections on TSA

the sensor wiring..

APPLICATION NOTES; DC Voltage Channels

Channel Isolation:

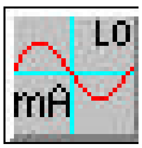
The negative terminal of HLIM-1 channels configured as DC Voltage inputs are isolated from the HyperLogger circuit ground by a 22Kohm resistor (see Figure 3... -5).

Common Mode Input Range Considerations:

To prevent saturation of the input amplifier stages and erroneous readings, no voltages should be applied to any input terminals that are greater than 4.0V above or below circuit ground. If the signal being measured is not connected to the HyperLogger circuit ground (ie `isolated' supplies are used), common mode input voltages up to 32 V can be accepted. Voltages above this level can be lethal and should not be applied to the HyperLogger. Supply isolation can be achieved by allowing the HyperLogger to run from its internal batteries (rather than an external source).

Multiple Measurement Nodes on a Circuit:

When measuring different voltage points from a common circuit with multiple channels (of one or more Interface Modules), measurement errors from induced ground currents can exist. Single ended measurements may be required. Consult the factory for application assistance.



mA-Lo Icon

HLIM-1; DC CURRENT (MA-LO) APPLICATION

The HLIM-1 can accept DC Current within the ranges specified in Table 3... -3. To utilize an HLIM-1 channel as a DC Current input, set that channel's Configuration Switch per Table 3... -4 as a **mA-LO** Channel.

As shown in Figure 3... -5, when mA-DC is selected with the hardware Configuration Switches, a precision 100 ohm burden resistor is enabled. The input signal is measured as a voltage across the shunt resistor.

> ***TIP**: For best accuracy and absolute resolution, utilize the lowest range possible that will cover the input signal's dynamic range without over-ranging.*

Signal Connection (all Current Ranges):

Interface Module channels configured as mA-LO inputs provide three terminal strip connections per input; Positive lead, Negative lead, and Shield.

Connect the mADC signal positive and negative leads to the correct pair of terminals on the TSA PORTx terminal strip (Figure 3... -8). Refer to Chapter 7; HyperNet Programming for steps to generate a TSA Wiring

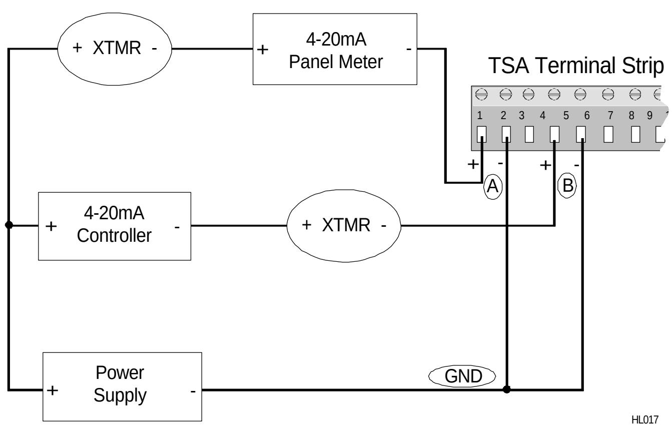


Figure 3... -8: Terminal strip connections for multiple 4-20mA inputs

printout for use in making field wiring connections.

Observe polarity or the output signal will be reversed.

To minimize noise pickup on sensor wiring between the HyperLogger and the end sensor or signal source, 18 to 22 AWG shielded, twisted pair wire is recommended. At the low current levels interfacing to the HLIM-1, voltage drop in signal wiring is not a concern, however for extremely long runs, a voltage drop analysis should be performed for the entire loop and if necessary larger gauge wire should be used.

> ***FYI:*** *Typically, with current signals (in contrast to low level voltage signals), noise pickup will be less due to the low impedances involved in the circuit. However, in real-world applications, one should attempt to minimize noise on signal wires whenever possible.*
>
> *Shielded wire minimizes the amount of noise picked up by the internal conductors carrying the signals by providing an `electrical shell' or Faraday cage around the internal conductors.*
>
> *Twisted pair wiring exposes both conductors equally to the ambient electrical noise. This common-mode type noise is easier to reject by the Interface Modules input signal conditioning circuitry than un-balanced (or differential) noise.*

Shielding and/or twisted pair wire is especially recommended in electrically noisy environments for optimum signal protection. If shielded wire is used, a ground wire should be run from one of the Shield terminals to an earth ground connection to conduct away noise picked up by the signal wire shield. Only one ground wire is required per 12 position terminal strip as terminals 3, 6, 9 and 12 are all interconnected within the TSA circuit board. Multiple terminal strips on the TSA (multiple ports) can be daisy-chained to a common earth ground wire (Figure 3... -8).

NOTE: Do not ground the signal wiring shield conductor at the sensor end (the end away from the HyperLogger) as this can induce additional noise into the sensor wiring..

APPLICATION NOTES; DC Current Channels

Channel Isolation:

The negative terminal of HLIM-1 channels configured as DC Current inputs are isolated from the HyperLogger circuit ground by a 22Kohm resistor (see Figure 3... -5).

Common Mode Input Range Considerations:

To prevent saturation of the input amplifier stages and erroneous readings, no voltages should be applied to any input terminals that are greater than 4.0V above or below HyperLogger circuit ground.

In wiring multiple 4-20mA transmitters to the HyperLogger through an HLIM-1 channel, this 4.0V common mode level must not be exceeded. Figure 3... -8 shows an acceptable method to connect multiple transmitters running from a common power supply to several channels on an HLIM-1 Interface Module channel without exceeding this spec.

A simple method to comply with this spec is to insure that all negative inputs (-) on channels configured as mA-LO inputs are directly connected to the GROUND (-) terminal of the power supply used for excitation of the 4 to 20 mA loop (eg the Logic Beach RPS-1, Rechargeable Power Supply). This will insure that the voltage developed across the 100 ohm resistor internal to the HLIM-1 mA-LO input channel will never exceed 2 VDC (ie 20mA X 100 ohms = 2 VDC) relative to any channel's (-) negative terminal. In Figure 3... -8, the voltage developed between node [A] to [GND] and node [B] to [GND] will never exceed 2VDC (in normal operation).

Multiple Measurement Nodes on a Circuit:

When measuring different voltage points from a common circuit with multiple channels (of one or more Interface Modules), measurement errors from induced ground currents can exist. Single ended measurements may be required. Consult the factory for application assistance.

NOTES:

HLIM-2; DIGITAL INTERFACE MODULE OVERVIEW

Overview:

The HLIM-2 Interface Module provides four input channels and four output channels on a single module. Each of the four input channels can be individually programmed for any combination of Event input, Count input, or Frequency input. The four output channels provide current limited nominal 5VDC output. Configuration of the module is done from within HyperNet in HyperWare.

Module Installation:

Refer to Chapter 3 for instruction on installation of the Interface Module into the HyperLogger Backplane. No special considerations are required for installation of this module into the System Base. Upon completion of installation, visually insure that all of the connector pins are mated in their respective sockets.

Port Requirements / Limitations:

This module can be installed in any of the six Backplane ports.

Hardware Configuration Switches:

No hardware configuration switches are provided on the HLIM-2. All configuration is done via the HyperNet software.

Software Configuration of the HLIM-2:

The HLIM-2 module is completely configured on a channel by channel basis from within the HyperNet software. This software configuration and utilization of the various HLIM-2 channels in a Program Net is covered in Chapter 7 and within the Master Icon Listing in Appendix A.

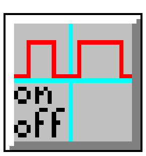


Figure 3... -9: Event icon (HLIM-2)

HLIM-2; EVENT INPUT APPLICATION

The Event function of the HLIM-2 allows for the recording of the state of an ON/OFF type input. Configured as an Event input, a channel will accept a powered input signal (ranging from 0 to a maximum of 15VDC) or a contact closure (dry contact) input.

- For powered input signals, the HLIM-2 Event function defines signals less than 1VDC as a Low level and greater than 4VDC (15VDC max) as a High level.
- For contact closure type inputs, power is automatically supplied from the HLIM-2 channel circuitry via a 100Kohm pull-up resistor (R1 in Figure 3... -13).

Channel input impedance is greater than 30K ohm.

A 40mS debounce circuit can be enabled via software which can be used to filter out `contact bounce' (Refer to the Master Icon Listing in Appendix A for details).

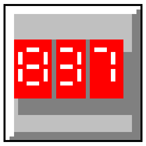


Figure 3... -10: Counter icon (HLIM-2)

HLIM-2; COUNTER INPUT APPLICATION

The Counter function of the HLIM-2 provides an accumulating total of signal transitions received at its input.

Configured as a Counter type input, a channel will accept a powered input signal ranging from 0 to a maximum of 15VDC or a contact closure (dry contact) input.

- For powered input signals, the HLIM-2 Counter function defines signals less than 1VDC as a Low level and greater than 4VDC (15VDC max) as a High level.
- For contact closure type inputs, power is automatically supplied from the HLIM-2 channel circuitry.

In Counter mode, 16,777,216 transitions can be received before the counter will roll-over to 0 and begin counting up again. This may be a consideration during the implementation of a Counter channel within a Program Net and is covered in the Master Icon Listing, Appendix A.

Channel input impedance is greater than 30K ohm.

A 40mS debounce circuit can be enabled via software which can be used to filter out `contact bounce' (see below).

Event / Counter Input Signal Connections:

To utilize an HLIM-2 channel as an Event or Counter input, connect the input signal positive lead to an *Input* terminal (Chan A, B, C, or D) and the negative lead to one of the four *Common* terminals on the TSA PORTx terminal strip (Figure 3... -11). Note that all of the four Common terminals are interconnected and connect directly to the HyperLogger circuit ground. Refer to Chapter 7 for steps to generate a TSA Wiring printout for use in making field wiring connections.

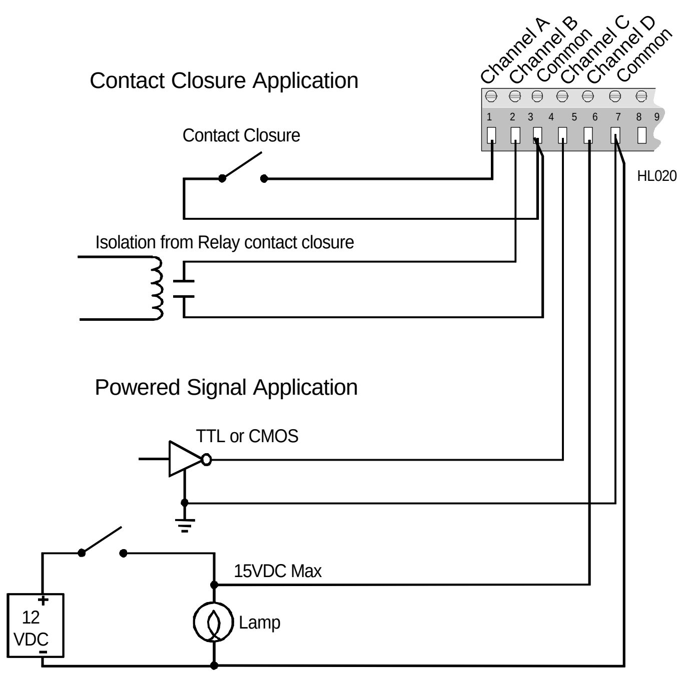


Figure 3... -11: Contact closure and Powered type Event or Counter signal input connections

> ***CAUTION:*** *Note that a direct connection exists between the common (-) terminal on all four channels of the HLIM-2 (Figure 3... -13). When connecting to multiple event or counter signal sources sharing a common ground or reference, insure that the source's ground or reference is connected to the terminal strip `common' terminal to prevent shorting out of the source signal and possible damage to the HLIM-2 or TSA.*

For most counter and event applications, shielding is not necessary due to the relatively low input impedance of the channel and the high noise immunity of the HLIM-2 channel input.

-

HLIM-2; FREQUENCY INPUT APPLICATION

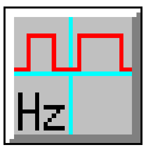


Figure 3... -12: Frequency icon (HLIM-2)

An HLIM-2 channel configured as a Frequency type input can measure input frequencies ranging from approximately 5Hz to 20KHz. The channel will accurately measure frequencies of sine, square, or sine approximating input waveforms with peak to peak amplitudes of 300mVDC to 15VDC. Channel input impedance is greater than 30K ohm within the specified input range.

The HLIM-2 incorporates an AC coupled front-end amplifier for use with low amplitude signals (see AMP in Figure 3... -13).

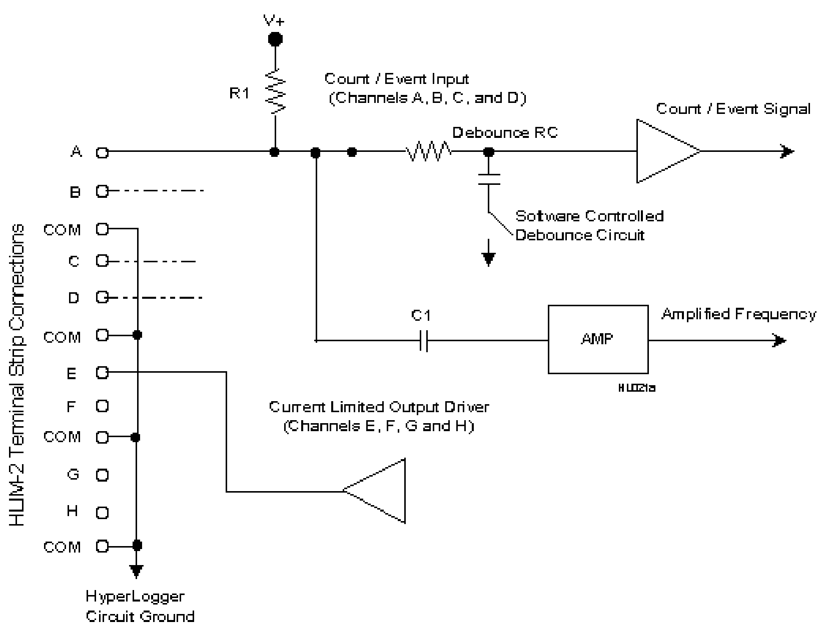


Figure 3... -13: Simplified schematic of HLIM-2 input channel (single channel shown)

`

Frequency Signal Connection:

To utilize an HLIM-2 channel as a Frequency input, connect the input signal positive lead to one of the four *Input* terminals (Chan A, B, C, or D) and the negative lead to one of the four *Common* terminals on the TSA PORTx terminal strip (Figure 3... -14). Note that all of the four Common terminals are interconnected and connect directly to the HyperLogger circuit ground.. Refer to Chapter 7 for steps to generate a TSA Wiring printout for use in making field wiring connections.

CAUTION: *Note that a direct connection exists between the common (-) terminal on all four channels of the HLIM-2 (Figure 3... -13). When connecting to multiple frequency sources sharing a common ground or reference, insure that the source's ground or reference is connected to the terminal strip `common' terminal to prevent shorting out of the frequency signal and possible damage to the HLIM-2 or TSA.*

For Frequency recording applications with small signal amplitude, high frequencies, long lead length and/or in noisy environments, twisted pair wire will provide extra noise immunity. In extremely noisy applications, shielded wire may be required. If shielded wire is used, the shield at the HyperLogger end should be connected to an external earth ground (Figure 3... -14) or if available, a grounded Shield connection provided on another type installed interface module (such as the HLIM-1).

NOTE: Do not ground the shield wire at the end away from the HyperLogger.

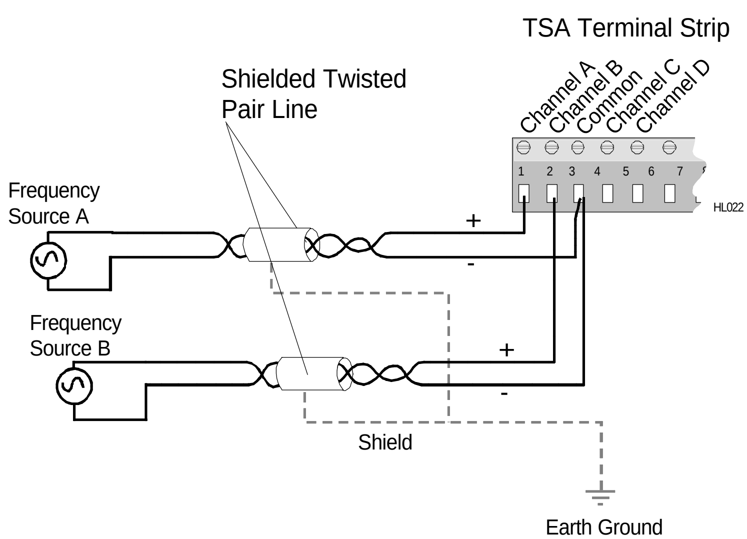
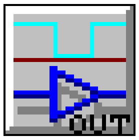


Figure 3... -14: Frequency input terminal strip connections (two inputs shown)

-

HLIM-2; DIGITAL OUTPUT APPLICATION



Digital Output icon (HLIM-2)

The HLIM-2 provides four channels dedicated as outputs. These channels can be configured for functions such as alarming. The output is a current limited voltage signal with the voltage/current characteristics shown in Figure 3... -15. As shown, with a light load, the output voltage maintains approximately 4+ VDC but as the

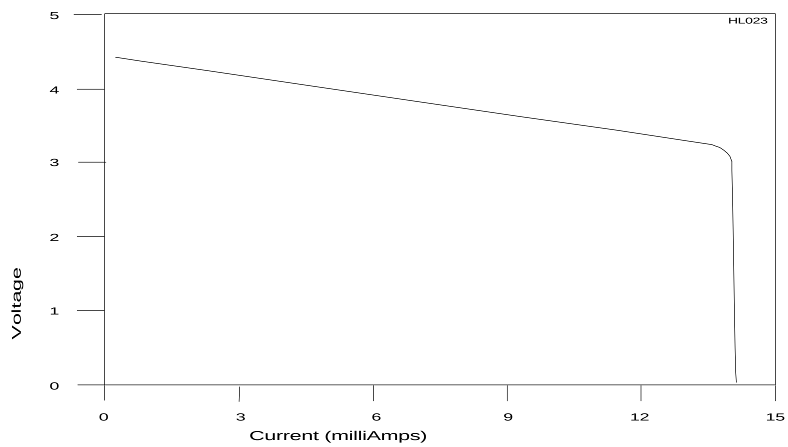


Figure 3... -15: HLIM-2 Digital output drive characteristics

current draw increases, current limiting occurs and the output voltage droops. The output can be short circuited continuously without damage to the output drive circuitry, but the HyperLogger battery life will be drastically reduced.

Note that the when the Output is OFF, it is merely floating, ie it is not driven to a ground (or shorted to ground) potential. This may be a consideration when driving TTL or other type inputs. A pull-down resistor (eg 10K) can be added on the terminal strip connections from the output to the common to provide a low resistance OFF state if necessary. Keep in mind that this resistor will consume power when the Output is ON.

Digital Output Signal Connections:

To utilize an HLIM-2 Output channel, connect the load positive lead to an *Output* terminal (Chan E, F, G, or H) and the load negative lead to one of

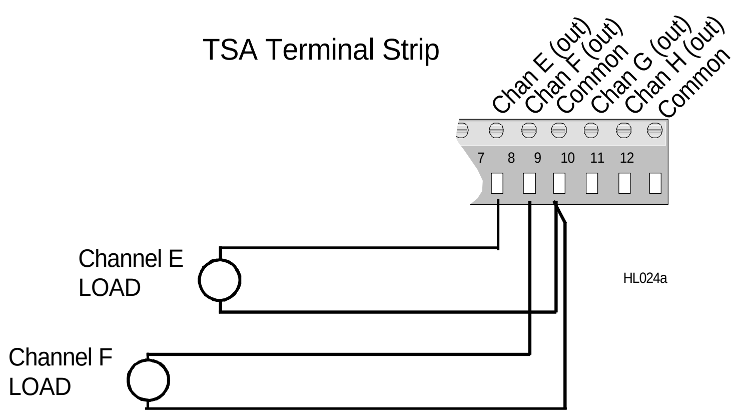


Figure 3... -16: HLIM-2 Digital output terminal strip

the four *Common* terminals on the TSA PORTx terminal strip (Figure 3... - 16). Note that all of the four Common terminals are interconnected and connect directly to the HyperLogger circuit ground. Refer to Chapter 7 for steps to generate a TSA Wiring printout for use in making field wiring connections.

HLIM-4; RTD / RESISTANCE INTERFACE MODULE OVERVIEW

Overview

The HLIM-4 is a four channel Interface Module for use in the HyperLogger System Base. Each of the four channels can be individually programmed for any combination of RTD (100 ohm or 1000 ohm), Resistance or Thermistor input via the HyperWare software (HyperNet).

Additionally, for RTD and resistance measurements, 2, 3, and 4-Wire configurations can be selected. With 3 and 4-wire configurations, the resistance due to the extension wires is minimized. With 3 or 4-wire configuration, two input channels are required.

Module Installation:

Refer to the HyperLogger User's Manual Section 3 for instruction on installation of the Interface Module into the HyperLogger Backplane. No special considerations are required for installation of this module into the System Base. Upon completion of installation, visually insure that all of the connector pins are mated in their respective sockets.

Port Requirements / Limitations:

This module can be installed in any of the six Backplane ports.

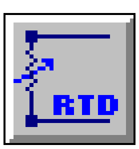
Hardware Configuration Switches:

No hardware configuration switches are provided on the HLIM-4. All configuration is done via the HyperNet software.

Software Configuration of the HLIM-4

The HLIM-4 module is completely configured on a channel by channel basis from within the HyperNet software. This software configuration and utilization of the various HLIM-4 channels in a Program Net is covered in overview in Chapter 6, within the Master Icon Listing in Appendix A, and with specific detail in this document.

When the HLIM-4 module is detected in a HyperLogger after clicking on the New Program button from within HyperNet, four icons representing the HLIM-4 input channels will display on the screen. The icons will display as 2-wire RTD inputs as the default. These icons can be switched to Resistance or Thermistor inputs by double-clicking on the icon then on the Change button.



RTD Input

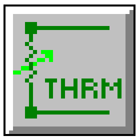
HLIM-4; RTD INPUT APPLICATION

The RTD function of the HLIM-4 allows for the input of Platinum RTD's with any of the following characteristics:

- 100 or 1000 ohm @ 0' C
- European (0.0385) or American (0.0392) alpha coefficient curve
- 2, 3, or 4-wire configuration

The actual temperature is calculated from the resistance and can be output in either degrees C or F. Two input temperature ranges are provided for maximizing span and ultimate resolution of the readings. The RTD element resistance is measured using a constant current ratiometric technique which provides excellent stability over time and temperature.

Refer to the Excitation Current Table for current levels utilized in the excitation of the RTD elements.



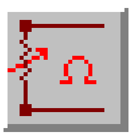
Thermistor Input

HLIM-4; THERMISTOR INPUT APPLICATION

The Thermistor function of the HLIM-4 allows for the input of 10,000 ohm @ 25C NTC thermistors conforming to the Fenwall Curve 16 or equivalent RT curve.

The actual temperature is calculated from the resistance and can be output in either degrees C or F. Four input temperature ranges are provided for maximizing span and ultimate resolution of the readings. The Thermistor element resistance is measured using a constant current ratiometric technique which provides excellent stability over time and temperature. Due to the high resistance vs temperature ratio, only 2-wire configuration is provided (and required).

Refer to the Excitation Current Table for current levels utilized in the excitation of the Thermistor element under test.



Resistance Input

HLIM-4; RESISTANCE INPUT APPLICATION

The Resistance function of the HLIM-4 can measure resistances ranging from 200 ohm to 400,000 ohm full scale. 2, 3, or 4-wire configurations can be used depending on absolute accuracy requirements.

Twelve input resistance ranges are provided for maximizing span and ultimate resolution of the readings. The resistance is measured using a constant current ratiometric technique which provides excellent stability over time and temperature.

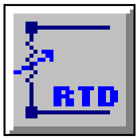
Refer to the Excitation Current Table for current levels utilized in the excitation of the resistance elements being measured.

HLIM-4; INPUT SIGNAL CONNECTION METHODS:

For all three signal types, RTD, thermistor, and resistance, a ratiometric resistance measurement technique is used. In the case of the RTD and thermistor measurements, a software conversion is then used to convert this resistance into temperature.

In measuring the resistance of a distant element with a conventional 2-wire connection configuration, the resistance of the lead wires running from the HyperLogger TSA terminal to the actual sensing element itself will add resistance and corresponding error. The magnitude of these errors depends on the resistance of the lead wires which is a function of wire gauge, temperature, and any connection resistance. If the resistance is small relative to the resistance being measured, this additive lead wire resistance can be ignored (eg in thermistor or Kohm resistance measurements). However, in applications of RTDs or lower resistance ranges this lead wire resistance can add up to substantial measurement errors... especially if long runs or lighter gauge lead wire is used. For example, in a 100 ohm RTD, 0.4 ohms of lead wire resistance would translates to a reading error of 1 Deg C.

To minimize these lead wire induced errors, the HLIM-4 supports 3-wire and 4-wire connection methods. Connection diagrams and descriptions for each of the wiring methods follow.



2-Wire
Config

2-Wire Configuration

The 2-wire configuration is easiest to use and allows for utilization of all four input channels of the HLIM-4 as individual channels. All three input types, RTD, thermistor, and resistance can be measured with the 2-wire technique. For short runs, heavier gauge lead wires and/or higher resistance measurements, the 2-wire technique will provide excellent performance with minimal error.

Calculating Lead Wire Effects

To calculate resistance errors induced by lead wires in a 2-wire configuration:

1. Estimate the total length of the lead wire to be used.
2. Multiply this length by the resistance per foot of the wire to be used. Complete wire tables are available from wire manufacturers and in many electronic reference books. For general reference, an abbreviated table is included below.
   Note that wire resistances are typically given per 1000 foot.
3. Assess the effects of this resistance on the required accuracy. For RTD applications, tables are available from the manufacturer that correlate RTD element resistance to degrees over the usable range. As a general guideline, a 100 ohm RTD will have a 1 Degree C change for every 0.36 ohms, a 1000 ohm RTD will have a 1 degree C change for every 3.6 ohms (hence the increasing popularity of the 1000 ohm RTD).

Wire Gauge	ohms per 1000 ft @ 25C (77F)	ohms per 1000 ft @ 65C (149F)
26	41.6	48
24	26.2	30.2
22	16.5	19.0
20	10.4	11.9
18	6.5	7.5
16	4.1	4.7

Table 5: Typical Copper Wire resistance

2-Wire TSA Connections:

For each Interface Module Port, a 12 position terminal strip is provided on the TSA. Each HLIM-4 input channel utilizes 3 of the 12 terminals (1-2-3, 4-5-6, 7-8-9, 10-11-12). Connect the input signal to the first two of the three input terminals (1-2, 4-5, 7-8, 10-11) on the TSA. A wire jumper must then be installed from the second to the third terminal (2-3, 5-6, 8-9, 11-12).

Refer to Chapter 6 for steps to generate a TSA Wiring printout after construction of a Program Net for use in making field wiring connections.

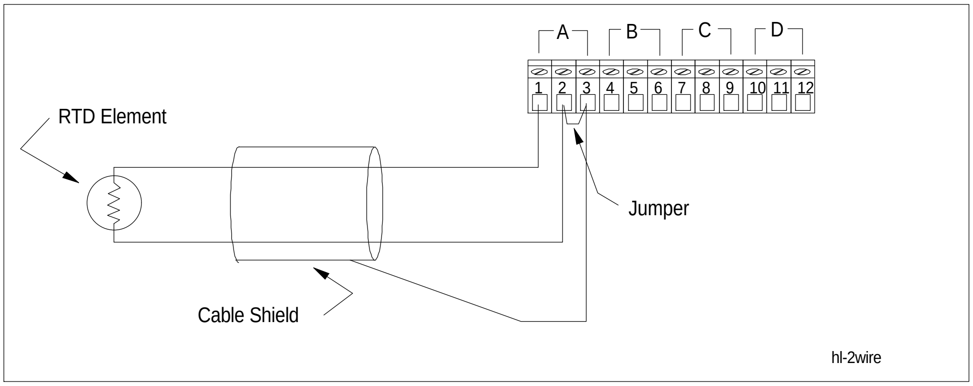
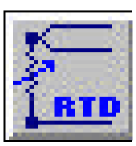


Figure 3... -17; 2-Wire Configuration

For long lead wire runs and in applications in electrically noisy environments, it is recommended that twisted pair and/or shielded wire be used. The extension wire shield can be connected to the 3rd terminal (ground) along with the jumper. If shielded wire is used, a ground wire should be run from one of the shield/ground (3rd) terminals on the TSA to an earth ground connection to conduct away noise picked up by the shield conductor. Terminals 3, 6, 9, and 12 are all internally connected so a single grounding wire will suffice. Refer to Figure 3-8 in the HyperLogger Users Manual.



3-Wire Config

3-Wire Configuration

The 3-wire configuration is used in applications where the lead wire effects calculated as above will have a significant error inducing effect on the resistance measurement. The 3-wire configuration requires two input channels (A and B or C and D) to implement. From within the HyperNet Window, double-clicking Channel A or C icons displays a dialog and allows for selection of 2, 3, or 4-wire connection. When 3 -wire is selected, a second corresponding icon (Channel B or D) is removed as this second channel is required for the 3 -wire measurement.

3-Wire Compensation Theory:

With a 3-wire configuration, the resistance of one of the lead wires is measured, doubled and then subtracted out of the measured total element plus lead wire circuit resistance. The 3-wire configuration, as the name implies, requires the use of three discrete wires from the TSA to the element. Two of the leads connect to one common end of the element and the other lead connects to the other end of the element. The 3-wire configuration provides nearly the same level of error compensation as the 4-wire configuration with one less wire.

Due to the fact that only one of the lead wires resistance is actually measured and the other lead wire is assumed to match, in using the 3-wire configuration, it is important that both lead wires used for the excitation current (connected to terminals 1 & 2, or 7 & 8 and opposite ends of the element) are of the same approximate length, same gauge, and operating at the same temperature. The third lead (connected to terminal 4 or 10) can be of lighter gauge if desired as a very low current flows through it.

3-Wire TSA Connections:

As can be seen in the 3-Wire Wiring Diagram, each channel requires 6 of the 12 terminals. Channel A uses terminals 1 through 6, and Channel C uses terminals 7 through 12.

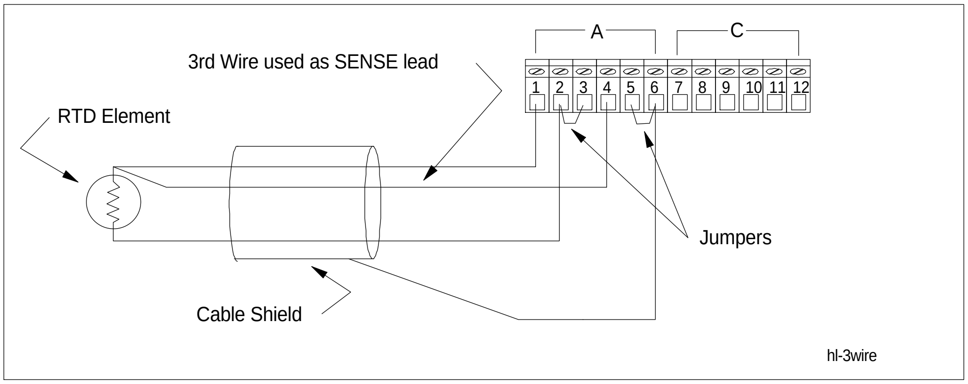


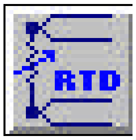
Figure 3... -18: 3-Wire Configuration

Two matching gauge Excitation wires should connect from opposite ends of the element and to terminals 1-2 or 7-8 on the TSA. A third Sense wire then connects from the element (sharing the connection with a lead from terminal 1 or 7 on the TSA) to terminal location 4 or 10. Two wire jumpers must then be installed connecting terminals 2-3 and 5-6 for Channel A and 8-9 and 11-12 for Channel C.

Refer to Chapter 6 for steps to generate a TSA Wiring printout after construction of a Program Net for use in making field wiring connections.

For long lead wire runs and in applications in electrically noisy environments, it is recommended that twisted pair and/or shielded wire be used. The extension wire shield can be connected to terminal 6 or 12 (ground). If shielded wire is used, a ground wire should be run from one of the ground terminals on the TSA to an earth ground connection to conduct away noise picked up by the shield conductor. Terminals 3, 6, 9, and 12 are all internally connected so a single grounding wire will suffice. Refer to Figure 3-8 in the HyperLogger Users Manual.

4-Wire Configuration



4-Wire Config

The 4-wire configuration is used in applications where the lead wire effects calculated as above will have a significant error inducing effect on the resistance measurement. The 4-wire configuration provides the best compensation for lead wire resistance at the expense of running a 4th lead. The 4-wire configuration requires two input channels (A and B or C and D) to implement. From within the HyperNet Window, double-clicking Channel A or C icons displays a dialog and allows for selection of 2, 3, or 4-wire connection. When 4-wire is selected, a second corresponding icon (Channel B or D) is removed as this second channel is required for the 4-wire measurement.

4-Wire Compensation Theory:

With a 4-wire configuration, the excitation current flows to and from the element through one pair of leads. The actual voltage developed across the element is then measured using a second pair of Sense leads that conduct a very small amount of current (hence adding negligible I * R voltage measurement error) .

The 4-wire configuration, as the name implies, requires the use of four discrete wires from the TSA to the element. Two of the leads connect to one end of the element and the other two to the other end of the element.

Due to the fact that the excitation current flows through a separate pair of leads, wire gauge, temperature effects, and connection resistance has no effect on the accuracy of the readings. The Sense leads (connected to terminals 4-5 or 10-11) can be of lighter gauge if desired as a very low current flows through them.

4-Wire TSA Connections:

As can be seen in the 4-Wire Wiring Diagram, each channel requires 6 of the 12 terminals. Channel A uses terminals 1 through 6, and Channel C uses terminals 7 through 12.

The Excitation wires connect from opposite ends of the element and to terminals 1-2 or 7-8 on the TSA. A second pair of Sense wires then connects from opposite ends of the element to terminals 4-5 or 10-11. A wire jumper must then be installed connecting terminals 2-3 for Channel A and 8-9 for Channel C.

Refer to Chapter 6 for steps to generate a TSA Wiring printout after construction of a Program Net for use in making field wiring connections.

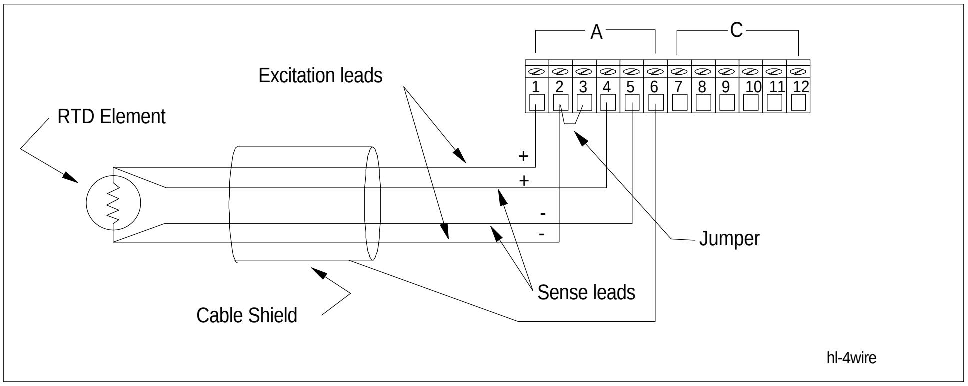


Figure 3... -19: 4-Wire Configuration

For long lead wire runs and in applications in electrically noisy environments, it is recommended that twisted pair and/or shielded wire be used. The extension wire shield can be connected to terminal 6 or 12 (ground). If shielded wire is used, a ground wire should be run from one of the ground terminals on the TSA to an earth ground connection to conduct away noise picked up by the shield conductor. Terminals 3, 6, 9, and 12 are all internally connected so a single grounding wire will suffice. Refer to Figure 3-8 in the HyperLogger Users Manual.

Range	Excitation Current	Range	Excitation Current
Res 200 ohm	1 mA	Res 200,000 ohm	10 uA
Res 200 ohm	10 mA	Res 400,000 ohm	10 uA
Res 400 ohm	1 mA	RTD-100 ohm 300C	1 mA
Res 400 ohm	10 mA	RTD-100 ohm 850C	1 mA
Res 2000ohm	100 uA	RTD-1000 ohm 300C	100 uA
Res 4000 ohm	100 uA	RTD-1000 ohm 850C	100 uA
Res 10,000 ohm	100 uA	Therm -32 to 250C	10 uA
Res 20,000 ohm	100 uA	Therm -4 to 250C	10 uA
Res 40,000 ohm	10 uA	Therm +10 to 250C	10 uA
Res 100,000 ohm	10 uA	Therm +25 to 250C	100 uA

Excitation Currents used for HLIM-4 Ranges

NOTES:

HLIM-8; DIGITAL I/O INTERFACE MODULE OVERVIEW

Overview:

The HLIM-8 is an eight channel Interface Module for use in the HyperLogger System Base. Each of the eight channels can be individually programmed for any combination of Event input or Digital output via the HyperWare software (HyperNet).

Module Installation:

Refer to Chapter 3 for instruction on installation of the Interface Module into the HyperLogger Backplane. No special considerations are required for installation of this module into the System Base. Upon completion of installation, visually insure that all of the connector pins are mated in their respective sockets.

Port Requirements / Limitations:

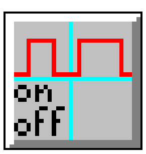
This module can be installed in any of the six Backplane ports.

Hardware Configuration Switches:

No hardware configuration switches are provided on the HLIM-8. All configuration is done via the HyperNet software.

Software Configuration of the HLIM-8:

The HLIM-8 module is completely configured on a channel by channel basis from within the HyperNet software. This software configuration and utilization of the various HLIM-8 channels in a Program Net is covered in Chapter 7, within the Master Icon Listing in Appendix A, and within this document.



Event icon (HLIM-8)

HLIM-8; EVENT INPUT APPLICATION

The Event function of the HLIM-8 allows for the recording of the state of an ON/OFF type input. Configured as an Event input, a channel will accept a powered input signal (ranging from 0 to a maximum of 26VDC) or a contact closure (dry contact) input.

- For powered input signals, the HLIM-8 Event function defines signals less than 1VDC as a Low level and greater than 4VDC (26VDC max) as a High level.
- For contact closure type inputs, power is automatically supplied from the HLIM-8 channel circuitry via a 100Kohm pull-up resistor (R1 in Figure 3... -20).

Channel input impedance is greater than 30K ohm.

A 40mS debounce circuit can be enabled via software which can be used to filter out `contact bounce' (Refer to the Master Icon Listing in Appendix A for details).

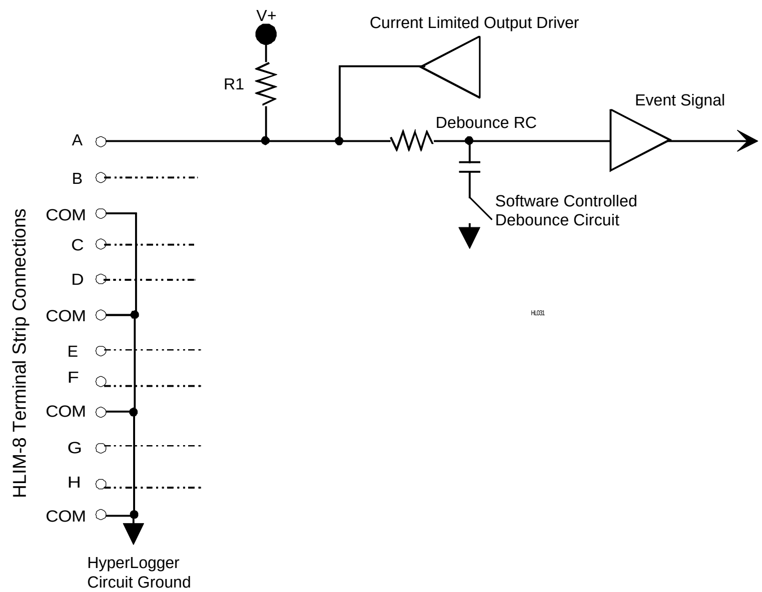


Figure 3... -20: Simplified schematic of HLIM-8 input/output channel (single channel shown)

Event Input Signal Connections:

To utilize an HLIM-8 channel as an Event input, connect the input signal positive lead to an *Input* terminal (Chan A, B, C, D, E, F, G, or H) and the negative lead to one of the four *Common* terminals on the TSA PORTx terminal strip (Figure 3... -21). Note that all of the four Common terminals on the terminal strip (3, 6, 9, 12) are interconnected and connect directly to the HyperLogger circuit ground. Refer to Chapter 7 for steps to generate a TSA Wiring printout for use in making field wiring connections.

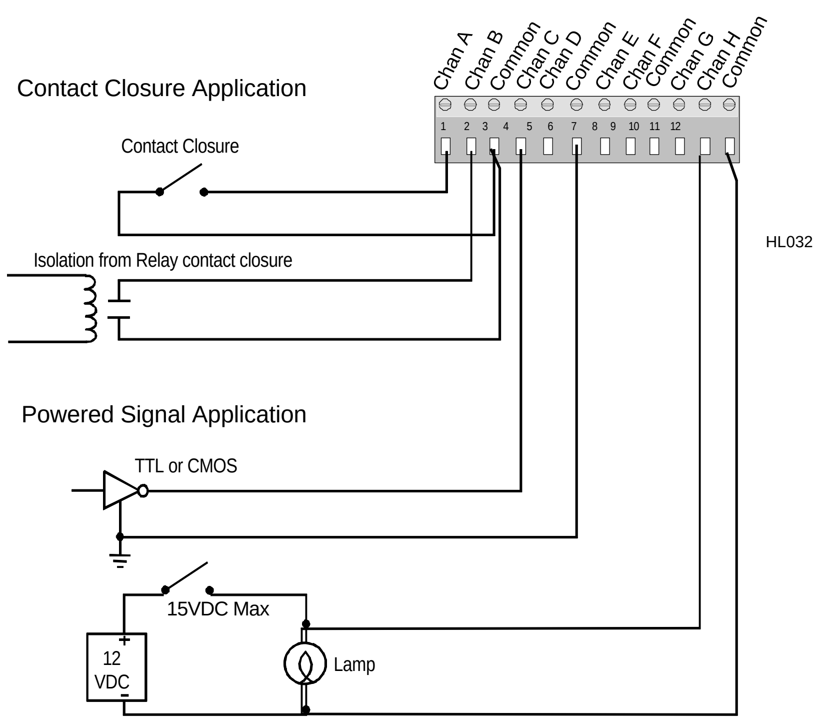


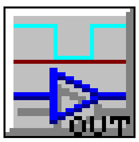
Figure 3... -21: Contact closure and Powered type Event signal input

> ***CAUTION:*** *Note that a direct connection exists between the common (-) terminal on all eight channels of the HLIM-8. When connecting to multiple event signal sources sharing a common ground or reference, insure that the source's ground or reference is connected to the terminal strip `common' terminal to prevent shorting out of the source signal and possible damage to the HLIM-8 or TSA.*

For most event applications, shielding is not necessary due to the relatively low input impedance of the channel and the high noise immunity of the HLIM-8 channel input.

-

HLIM-8; DIGITAL OUTPUT APPLICATION



Digital Output icon (HLIM-8)

An HLIM-8 channel configured as a Digital Output can provide an ON/OFF voltage signal for alarming applications. The output is a current limited voltage signal with the approximate voltage/current characteristics shown in Figure 3... -22. As shown, with a light load, the output voltage maintains approximately 4+ VDC but as the

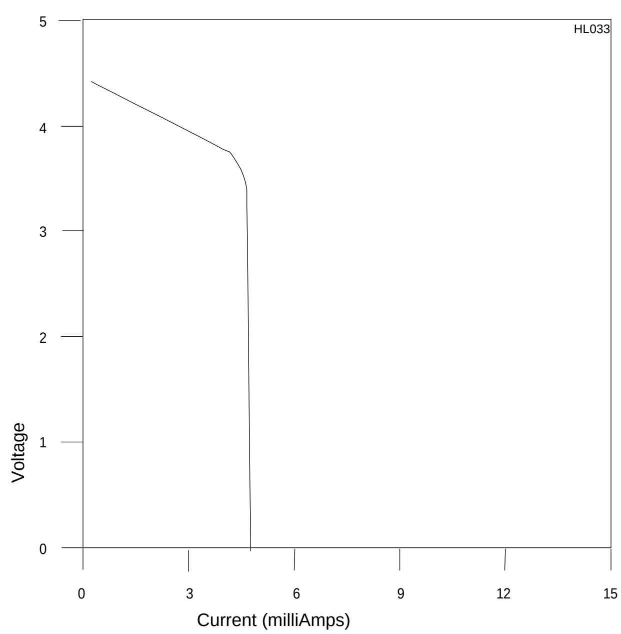


Figure 3... -22: HLIM-8 Digital output drive characteristics

current draw increases, current limiting occurs and the output voltage droops. The output can be short circuited continuously without damage to the output drive circuitry, but the HyperLogger battery life will be correspondingly reduced.

Digital Output Signal Connections:

To utilize an HLIM-8 channel as a Digital Output, connect the load positive lead to an *Output* terminal (Chan A, B, C, D. E, F, G, or H) and the load negative lead to one of the four *Common* terminals on the TSA PORTx terminal strip (Figure 3... -23). Note that all of the four Common terminals are interconnected and connect directly to the HyperLogger circuit ground (see Figure 3... -20). Refer to Chapter 7 for steps to generate a TSA Wiring printout for use in making field wiring connections.

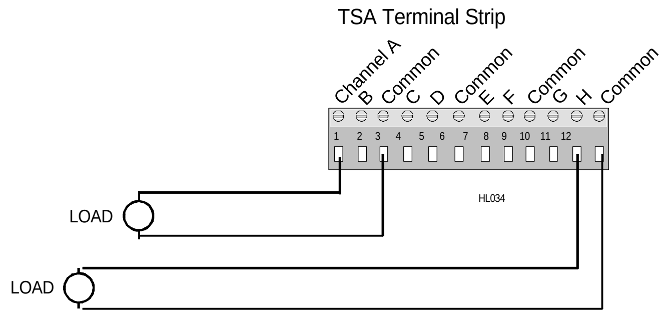


Figure 3... -23: HLIM-8 Digital output terminal strip connections

HLIM-5; PCMCIA MEMORY CARD MODULE

Overview:

The HLIM-5 is a special function Interface Module for use in the HyperLogger System Base. The HLIM-5 provides capability to record data to a removable SRAM based memory card (Logic Beach Part Numbers; MC-50, MC-100, MC-200) rather than to internal HyperLogger memory. This memory card can then be read through a PD-1, PCMCIA Drive, installed (connected to) on a PC.

In addition to this function, the HLIM-5 provides support circuitry for the MM-14.4 and MM-2400 modems. These optional internal modems provide phone line based control and interrogation of the HyperLogger as well as a Pager Alarm function. The modems plug directly into the HLIM-5 and can be field installed.

Module Installation:

Installation of the HLIM-5 into the HyperLogger System Base is unique in that it has a memory card socket that projects through the front panel of the HyperLogger (Figure 3... -24). For this reason, the HLIM-5 can only be installed into Backplane Port 6.

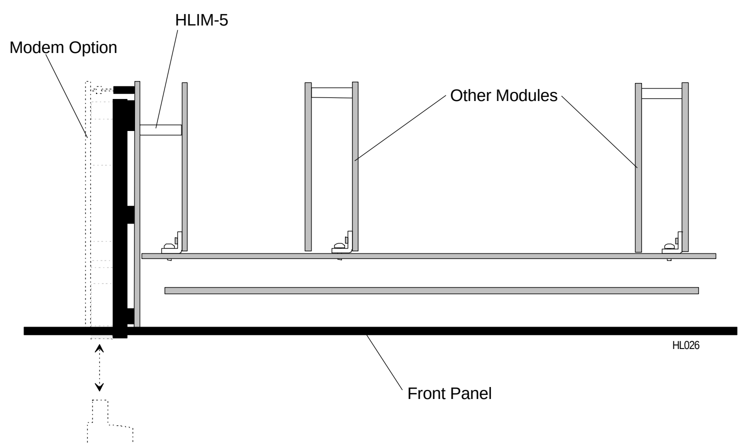


Figure 3... -24: HLIM-5 installation in Port 6

To install the HLIM-5 follow these steps:

1. Relocate any Interface Module already installed in Port 6. Refer to the Interface Module Installation, page 3-2 for general Interface Module installation and removal instructions.
2. On the HyperLogger front panel, remove the two retaining screws and the cover over Option Port 2. Save the screws and cover.
3. Follow the instructions specified in the Interface Module Installation, page 3-2 to install the HLIM-5 into the HyperLogger Backplane. Note that one circuit board of the HLIM-5 actually fits along the edge of the backplane and nearly touches the metal front panel of the HyperLogger (Figure 3... -24). Upon completion of

installation, visually insure that all of the connector pins are mated in their respective sockets.

4. Carefully align and fasten in place the special HLIM-5 memory card socket bezel plate provided with the HLIM-5 module. Use the two machine screws removed in step 1.

Configuration of the HLIM-5:

The presence of a HLIM-5 is detected automatically by the HyperLogger upon power-up. No additional software or hardware configuration of the module is necessary.

Operation of the HLIM-5 and PCMCIA Memory Card:

For full details on the configuration and use of the PCMCIA card, refer to Chapter 6.

NOTE

Numerous types of PCMCIA cards are currently available on the market utilizing various technologies. To insure compatibility with the HLIM-5, utilize only Logic Beach supplied memory cards or verify alternate parts compatibility with Logic Beach Technical Support <u>prior to plugging into the HyperLogger</u>.

MM-2400; 2400 BAUD INTERNAL MODEM MODULE

Overview:

The MM-2400 is a 1200/2400 Baud telephone modem module designed for installation internally in the HyperLogger System Base. The MM-2400 provides direct connection between the HyperLogger and a standard voice quality telephone line. This will allow the full complement of serial communications and control of the HyperLogger from a remotely located PC equipped with a modem.

The MM-2400 is a low power modem, drawing approximately 50mA during operation (off-hook) and 0 mA while quiescent (on-hook). It installs on the HLIM-5 Interface Module.

Modem Module Installation:

The MM-2400 plugs into a HLIM-5 PCMCIA Interface Module, then into the HyperLogger System Base backplane. The MM-2400 telephone line connectors project through the front panel of the HyperLogger via Option Port 1. In installation, the MM-2400 is plugged into the HLIM-5 and fastened in place, then the entire assembly is installed into the HyperLogger System Base. The HLIM-5 / MM-2400 assembly can only be installed into Backplane Port 6, as it utilizes the front panel Option Ports.

To install the MM-2400, follow these steps:

1. If an HLIM-5 (without the MM-2400 is currently installed in Port 6, remove it. If another Interface Module is installed in Port 6, relocate it to another Port. Refer to the Interface Module Installation section, page 3-2 for general Interface Module installation and removal instructions.
1. On the HyperLogger front panel, remove the four

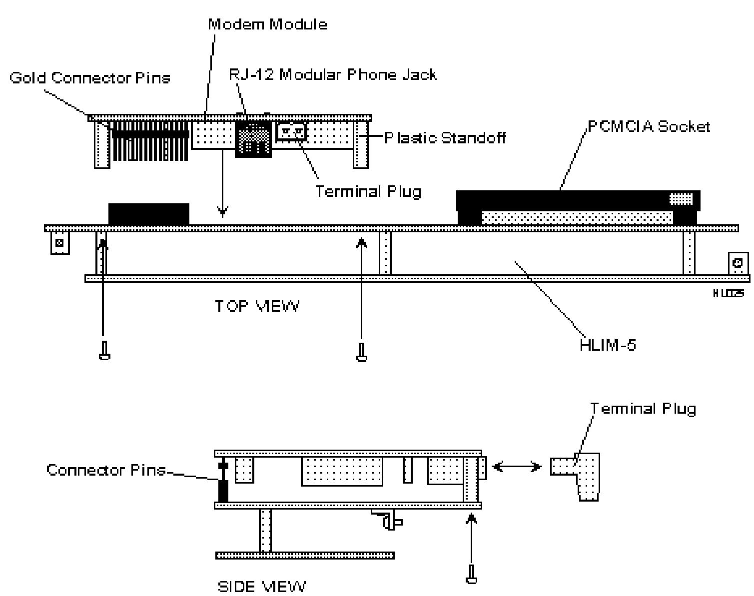


Figure 3... -25: Modem module installation onto HLIM-5

retaining screws and the covers over Option Ports 1 and 2. Save the screws and cover.

2. After discharging any static electricity in your body (see Interface Module Handling precautions at the start of this chapter), remove the MM-2400 from its static proof bag. Unplug the terminal strip plug and set aside. Orient the MM-2400 module as shown in Figure 3... -25, and plug the gold pins on the modem module into the mating black connector on the HLIM-5. Visually check that the pins are all in the connector.
3. Install the two machine screws provided with the MM-2400 through the HLIM-5 circuit board and into the two plastic standoffs on the MM-2400. Tighten the screws snugly.
4. Unplug the two position terminal plug from the MM-2400 module.
5. Follow the instructions specified in the Interface Module Installation Section, page 3-2 to install the HLIM-5 / MM-2400 assembly into the HyperLogger Backplane. Upon completion of installation, visually insure that all of the connector pins are mated in their respective sockets.
6. Carefully align and fasten in place the special HLIM-5 memory card socket bezel plate provided with the HLIM-5 module over Option Port 2 and the special bezel provided with the MM-2400 over Option Port 1. Use the machine screws removed in step 1.
7. Plug in the terminal strip plug removed in step 3.

Telephone Line Connection:

A standard voice grade telephone line can be used with the MM-2400. The two phone conductors (tip and ring) can be connected to the MM-2400 via the provided plug-in terminal plug or a modular phone plug. Polarity is not critical for either connection method.

Terminal Plug method: Route the phone line through one of the strain reliefs at the bottom of the HyperLogger enclosure. Strip back the phone lead insulation and connect the conductors to the terminal plug (polarity is not critical). The plug can then be plugged into the mating connector on the MM-2400 accessible through the HyperLogger front panel Option Port 1.

Modular Phone Plug method: Plug a telephone cord equipped with a 6/2 modular phone plug (RJ-12 type) into the modular phone socket accessible through the HyperLogger front panel Option Port 1. Insure that the phone conductors are installed into the center two locations of the plug (polarity is not critical).

Various length phone extension cords with the RJ-12 type modular phone plugs on each end are readily available from most phone supply stores. Insure that the `telephone base' type cord is used... not the `handset' cord as the handset plug is smaller and will not effect a good connection.

Plug the other end of the phone cord into the telephone wall jack.

Hardware Configuration Switches:

No hardware configuration switches are provided on the HLIM-5 or the MM-2400. All configuration is done via the HyperWare software.

Operation of the MM-2400:

The presence of the installed HLIM-5 and MM-2400 is detected automatically by the HyperLogger upon power-up. The MM-2400 is self-configuring with the exception of one parameter... the number of rings before the HyperLogger answers an incoming call. This parameter is set from within HyperNet (the Global icon) and is thoroughly explained within the Master Icon Listing in Appendix A under the Global icon section.

Additional information on the setup and configuration of the modem located at the PC is provided in Appendix K.

MM-14.4; 14.4KBAUD INTERNAL MODEM MODULE

Overview:

The MM-14.4 is a 1200, 2400, 4800, 9600, 14,400 Baud telephone modem module designed for internal installation in the HyperLogger System Base. The MM-14.4 provides direct connection between the HyperLogger and a standard voice quality telephone line. It allows the full complement of serial communications and control of the HyperLogger from a remotely located modem equipped PC.

The MM-14.4 is a low power modem, drawing approximately 125mA during operation (off-hook) and 0 mA while quiescent (on-hook). It installs on the HLIM-5 Interface Module.

Installation / Operation:

The MM-14.4 is installed and configured identically to the MM-2400. Refer to the MM-2400 installation and configuration instructions in the previous section for details.

Additional information on the setup and configuration of the modem located at the PC is provided in Appendix K.