

---

## CPP-4794 Rear Panel & Internal Switch Settings

### General

The rear panel of the CPP-4794 contains a series of slots where additional PC boards can be installed. A few slots are dedicated to a particular PC board, and the remainder can accommodate various types of boards. A picture of the rear panel is presented near the end of this tech note. To install or replace PC boards reference the section at the end of this tech note. Presented below, in order, is a list of the headings in this tech note.

Power Supply  
Controller Board  
Controller Board Back Panel 10 Position Dip Switch  
Compact Flash memory/Printer Output  
Expanded Comm Ports  
Remainder of Slots  
Analog to Digital Converter (ADC)  
Digital Input Board  
Digital Output Board  
Isolated Current or Voltage Outputs  
Direct Met Interface  
Thermistor  
Direct Met Board Selection  
Wind Speed Counters  
Internal Amplifier  
Internal Modem/Ethernet Interface  
Removing/Installing PC Boards  
Rear Panel Drawing  
Installing Rack Mounting Brackets  
CPP-4794 Standard PC Card Placement

### Power Supply

Viewed from the rear, the leftmost slot is for the power supply PC board. This board contains the following;

- +5v,  $\pm$ 12v supplies
- Power output connector
- Activity LED
- Battery backup
- Comm port #4 DB9 and RJ11 front panel connectors
- LED indicating comm. port #4 Rx/Tx lines proper
- Front/rear panel on/off switches
- Fuse
- Line power entry and filter

#### Power Output Connector

| Pin | Definition    |
|-----|---------------|
| 1   | Ground        |
| 2   | +5v           |
| 3   | Ground        |
| 4   | +12v          |
| 5   | Ground        |
| 6   | -12v          |
| 7   | Ground        |
| 8   | Counter Input |

### Controller Board

The next slot is for the controller PC board. This board contains the following

- Digital signal processor
- Real time clock
- ROM/RAM memory
- EEPROM for configuration storage
- Four serial ports
- Rear panel LED indicating proper Tx/Rx serial connections
- Dip switch for comm ports # 1 and 4 Baud rate, and battery in/out

The serial ports on this board are designated as comm port #1, comm port #2, comm port #3-0, and comm port #4. Comm port #1 is the port used to communicate with a central processing system. Comm port #2 can be used for a variety of purposes. The most common usage is as a Modbus port or a met broadcast port. Special protocols are provided over this comm. port. Comm port # 3-0 is used to interface to instruments serially. Comm port # 4 is considered the on site operator interface.

### Controller Back panel 10 position Dip switch

Switch positions 1, 2, and 3 control the Baud rate of comm port #4, and switch positions 4, 5, and 6 control the Baud rate of comm port #1, as defined below.

| SW2  | 1   | 2   | 3   | 4   | 5   | 6   | Baud Rate  |
|------|-----|-----|-----|-----|-----|-----|------------|
| CP#4 | Off | Off | Off | -   | -   | -   | 300 Baud   |
| CP#4 | On  | Off | Off | -   | -   | -   | 1200 Baud  |
| CP#4 | Off | On  | OFF | -   | -   | -   | 2400 Baud  |
| CP#4 | On  | On  | Off | -   | -   | -   | 4800 Baud  |
| CP#4 | Off | Off | On  | -   | -   | -   | 9600 Baud  |
| CP#4 | On  | Off | On  | -   | -   | -   | 19.2K Baud |
| CP#4 | Off | On  | On  | -   | -   | -   | 38.4K Baud |
| CP#4 | On  | On  | On  | -   | -   | -   | 38.4K Baud |
| CP#1 | -   | -   | -   | Off | Off | Off | 300 Baud   |
| CP#1 | -   | -   | -   | On  | Off | Off | 1200 Baud  |
| CP#1 | -   | -   | -   | Off | On  | Off | 2400 Baud  |
| CP#1 | -   | -   | -   | On  | On  | Off | 4800 Baud  |
| CP#1 | -   | -   | -   | Off | Off | On  | 9600 Baud  |
| CP#1 | -   | -   | -   | On  | Off | On  | 19.2K Baud |
| CP#1 | -   | -   | -   | Off | On  | On  | 38.4K Baud |
| CP#1 | -   | -   | -   | On  | On  | On  | 38.4K Baud |

Rear panel switch positions 7, 8, and 9 are not used. Switch position number 10 switches the internal battery on and off to the internal memory and the real time clock.

An internal dip switch, SW3, is used when converting comm ports number 1, 2, and 3-0 from RS-232 to RS-422/485, as defined below.

| SW3   | Definition  |
|-------|---|
| 1,2,3 | On for CP#1 as RS-232 – Off for RS-422/485 operation. Install U36.  |
| 4,5,6 | On for CP#2 as RS-232 – Off for RS-422/485 operation. Install U45   |
| 7,8,9 | On for CP#3-0 as RS-232 – Off for RS-422/485 operation. Install U37 |
| 10    | Used internally at H2NS, should always be off.                      |

Dip switch number SW1 is also used for comm ports number 1 and 3-0. When comm port 1 is set up for RS-422/485 operation, switch position 4 allows the output to be tri-stated. With position 3 off, the RS-422/485 output is always driven. With position 3 on, the output of the RS-422/485 driver is on only when the transmitter is active.

SW1, position 3, allows a similar control of comm port 3-0 when configured as RS-422/485.

### **Compact Flash Memory/Printer**

The third slot from the left is for the Compact Flash Memory (CFM) interface and the printer output. Compact flash memories do not have a write protect option. Switch position #4 on SW1 provides this feature. Turning this switch on, write protects the CFM. The other switch positions are not used.

The CFM is formatted with the FORMATcx command where x is 1 through 8. If the x is omitted the CFM formats as an 8 meg CFM.

### **Expanded Comm Ports**

The fourth and fifth slots are for the expanded comm PC boards. Each board accommodates four serial ports. The comm ports are designated comm ports 3-1, 3-2, 3-3, and 3-4 on the first board, and 3-5, 3-6, 3-7, and 3-8 on the second board installed. Comm ports number 3-2 and 3-3 on board number one, and comm ports 3-6 and 3-7 on the second board, can be changed to be RS-422/485 protocols. These outputs of these comm ports are connected to the RJ11 connectors and the eight pin pluggable connectors as well. An on board 10 position Dip switch is used to change these ports from RS-232 to RS-422, as defined below. The switch settings are the same for both boards.

SW1 position 1 selects either board 1, CP# 3-1 through 3-4, or board 2, CP# 3-5 through 3-8. Position 1 off selects board 1, and on selects board 2.

Position 3 allows the transmit output of 3-3 (3-7 on second board) to be controlled with the comm ports RTS signal. On allows the RTS signal to control the output, off enables the output at all times.

Position 10 of SW1 allows the transmit output of 3-2 (3-6 on second board) to be controlled with the comm ports RTS signal. On allows the RTS signal to control the output, off enables the output at all times.

For RS-232 operation of comm port 3-3 (3-7) positions 4, 5, and 6 should be on. For RS-422/485 operation they should be open.

For RS-232 operation of comm port 3-2 (3-6) positions 7, 8, and 9 should be on. For RS-422/485 operation they should be open.

For RS-422/485 operation for comm port 3-2 (3-6) U29 should be installed. For RS422/485 operation for comm port 3-3 (3-7) U30 should be installed.

The eight-position connector that can be used for RS-422/485 connections is defined below.

| <u>Eight Pin Connector</u> | <u>Function</u> |
|----------------------------|-----------------|
| 1                          | Tx2+            |
| 2                          | Tx2-            |
| 3                          | Rx2+            |
| 4                          | Rx2-            |
| 5                          | Tx3+            |
| 6                          | Tx3-            |
| 7                          | Rx3+            |
| 8                          | Rx3-            |

### Remainder of Slots

The remainder of the slots can be filled with analog and digital I/O PC cards. Since the rear panel labels are generic, the connector definition of each type on board is presented below. Presented at the end of this tech note is a standard slot usage.

### Analog to Digital Converter (ADC)

The ADC has 16 analog inputs. The ADC supports  $\pm 100\text{mv}$ ,  $\pm 1.0\text{v}$ , 0-5v, 0-10v and 4-20mA inputs. Since the ADC switches both signal and ground, the standard ADC input can handle 4-20mA signals; however, for true 4-20mA isolation an isolated front end should be used. The analog front ends of the ADC are contained on a piggyback PC board the plugs into the ADC main board. A n on board DIP switch is used to set a board as A/D channels 1-16 or 17-32, and to select 50 or 60 Hertz operation. The switch settings are presented below.

|       | A/D Ch 1-16 | A/D Ch 17-32 |
|-------|-------------|--------------|
| SW1 1 | On          | Off          |
| SW1 2 | On          | Off          |
| SW1 3 | Off         | On           |
| SW1 4 | Off         | On           |

Switch position number 5 is On when only one ADC board is installed in the CPP, and Off when two ADC boards are installed.

|       |                                |
|-------|--------------------------------|
| SW1 5 | On for 1 ADC, Off for 2 ADC's. |
| SW1 6 | Not used                       |

Switch positions number 7 and 8 are used to select 50 or 60 hertz operation.

|       |                       |
|-------|-----------------------|
| SW1 7 | On for 60Hz operation |
| SW1 8 | On for 50Hz operation |

Dip switch SW4 is used for in house testing. For normal operation positions 1 and 2 should be on and positions 3 and 4 off.

Jumper J2 is used write enable or write disable the EEPROM used for storing calibration constants. This jumper should always be in the disabled position except when the ADC is being calibrated. All other jumpers on the board are used by H2NS in testing routines, and should not have any jumpers installed.

The rear panel connector for the ADC is defined below.

| Rear Panel |            |       |            |
|------------|------------|-------|------------|
| Pin #      | Definition | Pin # | Definition |
| 1          | Ch1+       | 2     | Ch1-       |
| 3          | Ch2+       | 4     | Ch2-       |
| 5          | Ch3+       | 6     | Ch3-       |
| 7          | Ch4+       | 8     | Ch4-       |
| 8          | Ch5+       | 10    | Ch5-       |
| 11         | Ch6+       | 12    | Ch6-       |
| 13         | Ch7+       | 14    | Ch7-       |
| 15         | Ch8+       | 16    | Ch8-       |
| 17         | Ch9+       | 18    | Ch9-       |
| 19         | Ch10+      | 20    | Ch20-      |
| 21         | Ch11+      | 22    | Ch11-      |
| 23         | Ch12+      | 24    | Ch12-      |
| 25         | Ch13+      | 26    | Ch13-      |
| 27         | Ch14+      | 28    | Ch14-      |
| 29         | Ch15+      | 20    | Ch15-      |
| 31         | Ch16+      | 32    | Ch16-      |

### Digital Input Board

The digital input board accommodates 16 digital inputs. The inputs are optically isolated from the CPP, and have input voltage protection and pull up resistors to +5v. A contact closure is sensed as a one, or true by the CPP. The rear panel connector of the digital input board is defined below.

*{Lo equates to an isolated ground and Hi equates to a isolated input.}*

| Rear Panel |             |      |             |
|------------|-------------|------|-------------|
| Pin#       | Definition  | Pin# | Definition  |
| 1          | Input 01 Hi | 2    | Input 01 Lo |
| 3          | Input 02 Hi | 4    | Input 02 Lo |
| 5          | Input 03 Hi | 6    | Input 03 Lo |
| 7          | Input 04 Hi | 8    | Input 04 Lo |
| 9          | Input 05 Hi | 10   | Input 05 Lo |
| 11         | Input 06 Hi | 12   | Input 06 Lo |
| 13         | Input 07 Hi | 14   | Input 07 Lo |
| 15         | Input 08 Hi | 16   | Input 08 Lo |
| 17         | Input 09 Hi | 18   | Input 09 Lo |

|    |             |    |             |
|----|-------------|----|-------------|
| 19 | Input 10 Hi | 20 | Input 10 Lo |
| 21 | Input 11 Hi | 22 | Input 11 Lo |
| 23 | Input 12 Hi | 24 | Input 12 Lo |
| 25 | Input 13 Hi | 26 | Input 13 Lo |
| 27 | Input 14 Hi | 28 | Input 14 Lo |
| 29 | Input 15 Hi | 30 | Input 15 Lo |
| 31 | Input 16 Hi | 32 | Input 16 Lo |

The CPP will support 3 digital input boards providing 48 digital inputs. The board selection is made by dip switch SW1, as defined below.

| SW1  | Input Selection                       |
|------|---------------------------------------|
| 1 On | Inputs 1-16                           |
| 2 On | Inputs 17-32                          |
| 3 On | Inputs 33-48                          |
| 4 On | Inputs 49-64 (Not Standard, Optional) |

A switch position must be On to enable the board, but only one position can be set on any board. If more than one position is On, there will be interference among the boards.

### Digital Output Board

The digital output board has 16 relays, and provides a contact closure when a one or true. The rear panel connector of the digital output board is defined below. Although there is not a positive or negative signal associated with the relay outputs, for clarity, it is shown this way below.

*{the + position refers to the wiper of the relay and the – position refers to the common}*

| Rear Panel |            |      |            |
|------------|------------|------|------------|
| Pin#       | Definition | Pin# | Definition |
| 1          | Relay 01+  | 2    | Relay 01-  |
| 3          | Relay 02+  | 4    | Relay 02-  |
| 5          | Relay 03+  | 6    | Relay 03-  |
| 7          | Relay 04+  | 8    | Relay 04-  |
| 9          | Relay 05+  | 10   | Relay 05-  |
| 11         | Relay 06+  | 12   | Relay 06-  |
| 13         | Relay 07+  | 14   | Relay 07-  |
| 15         | Relay 08+  | 16   | Relay 08-  |
| 17         | Relay 09+  | 18   | Relay 09-  |
| 19         | Relay 10+  | 20   | Relay 10-  |
| 21         | Relay 11+  | 22   | Relay 11-  |
| 23         | Relay 12+  | 24   | Relay 12-  |
| 25         | Relay 13+  | 26   | Relay 13-  |
| 27         | Relay 14+  | 28   | Relay 14-  |
| 29         | Relay 15+  | 30   | Relay 15-  |
| 31         | Relay 16+  | 32   | Relay 16-  |

The CPP will support up to 3 digital output boards providing 48 relay outputs. The board selection is made by dip switch SW1, as defined below.

| SW1  | Input Selection                        |
|------|--|
| 1 On | Outputs 1-16                           |
| 2 On | Outputs 17-32                          |
| 3 On | Outputs 33-48                          |
| 4 On | Outputs 49-64 (Not Standard, Optional) |

A switch position must be On to enable the board, but only one position can be set on any board. If more than one position is On, there will be interference among the boards.

Relays 15 and 16 can be jumpered for normally closed operation. Jumpers J7 and J10 are used to make this selection.

Jumper J10 controls relay 15. With J10 jumpered pins 1-2, the relay output is a normally open contact. Setting to a true activates the relay and makes the contact closure. With J10 pins 2-3 jumpered, the relay output is a normally closed contact. Setting to a true activates the relay and opens the contact closure output.

Jumper J7 controls relay 16. With J7 jumpered pins 1-2, the relay output is a normally open contact. Setting to a true activates the relay and makes the contact closure. With J7 pins 2-3 jumpered, the relay output is a normally closed contact. Setting to a true activates the relay and opens the contact closure output.

### Isolated Current or Voltage Outputs

The CPP supports up to 16 isolated current or voltage outputs. An analog output motherboard is required for each group of 8 output signals. Four daughter cards, each containing two isolated output signals, can be plugged into each motherboard. So each motherboard can support eight isolated output signals. A jumper on the board, J11, determines the address of each motherboard, either output channels 1-8, or 9-16. Jumpering pins 1 and 2, which are the two pins closest to the rear panel connectors, sets this board up to output channels 1-8. The output pin assignments of the motherboards are presented below.

| Rear Panel | Signal            |
|------------|-------------------|
| 1          | Earth Ground (EG) |
| 2          | Signal01+         |
| 3          | Signal01-         |
| 4          | EG                |
| 5          | EG                |
| 6          | Signal02+         |
| 7          | Signal02-         |
| 8          | EG                |
| 9          | EG                |
| 10         | Signal03+         |
| 11         | Signal03-         |
| 12         | EG                |
| 13         | EG                |
| 14         | Signal04+         |
| 15         | Signal04-         |

|    |           |
|----|-----------|
| 16 | EG        |
| 17 | EG        |
| 18 | Signal05+ |
| 19 | Signal05- |
| 20 | EG        |
| 21 | EG        |
| 22 | Signal06+ |
| 23 | Signal06- |
| 24 | EG        |
| 25 | EG        |
| 26 | Signal07+ |
| 27 | Signal07- |
| 28 | EG        |
| 29 | EG        |
| 30 | Signal08+ |
| 31 | Signal08- |
| 32 | EG        |

### Direct Met Interface

The direct met interface provides;

- Four 1-volt reference outputs
- Three wind speed counters (One standard)
- Battery backed rainfall counter
- Provisions for various thermistor connections

The rear panel connections are as follows;

| Pin# | Signal                      |
|------|-----------------------------|
| 1    | Rainfall Input              |
| 2    | Ground                      |
| 3    | Wind Speed Input #1         |
| 4    | Ground                      |
| 5    | Wind Speed Input #2         |
| 6    | Ground                      |
| 7    | Wind Speed Input #3         |
| 8    | Ground                      |
| 9    | Thermistor #1 T1            |
| 10   | Thermistor #1 T2            |
| 11   | Thermistor #1 T3            |
| 12   | Ground                      |
| 13   | Thermistor #2 T1            |
| 14   | Thermistor #2 T2            |
| 15   | Thermistor #2 T3            |
| 16   | Ground                      |
| 17   | Voltage Reference #1 Output |
| 18   | Ground                      |
| 19   | Voltage Reference #2 Output |
| 20   | Ground                      |



|    |                             |
|----|-----------------------------|
| 21 | Voltage Reference #3 Output |
| 22 | Ground                      |
| 23 | Voltage Reference Output #4 |
| 24 | Ground                      |
| 25 | +5 volts                    |
| 26 | Ground                      |
| 27 | Unused                      |
| 28 | +12 volts                   |
| 29 | -12 volts                   |
| 30 | Ground                      |
| 31 | Earth Ground                |
| 32 | Earth Ground                |

### Thermistor Input

Some thermistors can be connected to the CPP with a single external resistor. Some require a series of precision resistors. On the direct met interface board are two DIP sockets for installing headers with the resistors installed on the headers. Please feel free to contact H2NS regarding thermistor connection.

### Direct Met Board Selection

A four position dip switch is installed on the direct met interface board. Switch position number one sets the board for board number 1. Switch position number 2 sets the board for board number 2. Two direct met interface boards is an option. For one direct met interface board, switch position number one is on and switch position number 2 is off.

### Wind Speed Counters

The operation of the wind speed counters can be tested using an internal switch setting. Ten position dip switch number SW1 is used for the test feature. Switch positions 1-6 are used to select various frequencies. Switch positions 7, 8, and 9 are used to direct the selected frequency into a counter input. Switch position 10 is used to turn on/off the battery power to the rainfall counter. Switch SW1 is defined below.

| <u>Switch SW1</u> |                            |
|-------------------|----------------------------|
| Position          | Function                   |
| 1                 | Frequency $\approx$ 4.9 Hz |
| 2                 | Frequency $\approx$ 9.8 Hz |
| 3                 | Frequency $\approx$ 19 Hz  |
| 4                 | Frequency $\approx$ 38 Hz  |
| 5                 | Frequency $\approx$ 76 Hz  |
| 6                 | Frequency $\approx$ 152 Hz |
| 7                 | Wind Speed Input #1        |
| 8                 | Wind Speed Input #2        |
| 9                 | Wind Speed Input #3        |
| 10                | Rainfall Battery On/Off    |

### **Internal Amplifier**

The direct met interface board contains an amplifier with a gain of approximately six. For signal amplification, and external amplifier is recommended, however the internal amplifier may prove useful in some applications. To direct the input and output of the internal amplifier, two jumpers are required. Jumper J17 directs rear panel connection Thermistor #2 T1 (Pin #13) to the input of the amplifier. Jumper J18 directs the output of the amplifier to rear panel connection Thermistor #2 T2, (pin #14).

### **Internal Modem/Ethernet Interface**

To be added.

### **Removing/Installing PC Boards**

The CPP-4794 has been designed so that PC boards are plugged into a motherboard and attached to the rear panel with a screw. This approach makes maintenance easier and facilitates field expansions. Power should always be shut off prior to removing or installing a PC board. Although not absolutely necessary, board removal and installation are much easier if the rear panel is loosened so that it can lean backwards, and is recommended. This is not as difficult or laborious as it may first sound.

The power supply board is the most difficult to change as it is connected to both the front and rear panels. Anytime the power supply is being removed, the AC power cord should be removed.

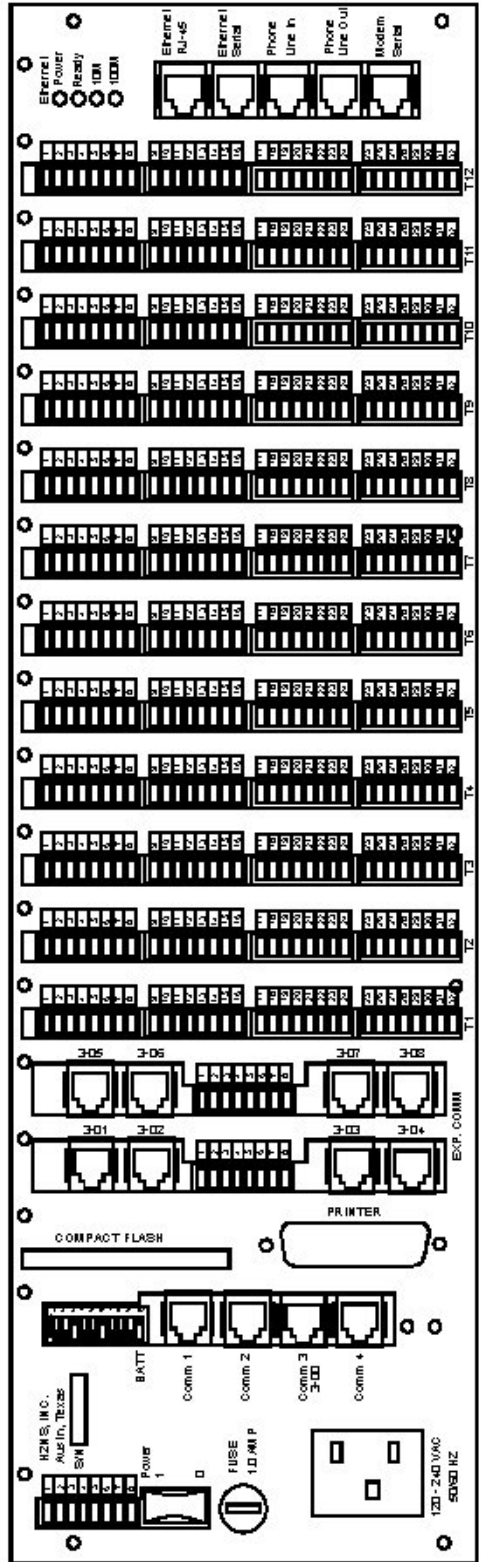
**The power supply board is connected to the incoming AC power. The AC lines are on etch on the board and run between the front and rear panel on/off switches, which allows dangerous voltages to be exposed when the board is removed. Any maintenance should be conducted only by a qualified technician familiar with high voltages.**

The power supply board can be removed and installed without losing the front panel; however, losing the front panel is straightforward and facilitates board exchange. The outputs of the power supply can be tested at the rear panel connector defined above.

To loosen the front panel remove the two top screws and loosen all other front panel screws. The two hex nuts on the front panel DB9 connector must also be removed. Because of the connectors on the power supply rear panel, the rear panel must also be loosened so that it can lean backwards. This requires that the screws holding each PC board be removed as well. The power supply board is removed by pulling up from the front edge and sliding the connectors out of the rear panel. Installation is the reverse, position the rear panel connectors and then plug the card into the motherboard and position the front panel over the front panel connectors/switches. Reinstall all screws.

Other boards are removed or installed by removing the rear panel screw and tilting the board rearwards to mate the connectors with the rear panel cutouts and the plugging the board into the motherboard.

CPP 4794 Rear Panel Drawing



### Installing Rack Mounting Brackets

The units are shipped from H2NS with 8x32, 5/16" screws for mounting the brackets to the CPP. The power supply PC board fits closely to the side panel. Although clearance holes have been drill in the power supply where the mounting bracket screws protrude, it is recommended that screws no longer than 5/16" be used.

**NOTE: Screws any longer than 3/8 inch may extend inside the chassis and contact with high voltages on the power supply board. If proper length screws are needed please contact H2NS.**

### CPP-4794 Standard PC Card placement

Several PC cards in the CPP have fixed locations or slots; many do not. Presented below are the standard locations used by H2NS.

Looking from the rear panel, the power supply is located in the leftmost slot. The next card adjacent to the power supply is the Processor PC board. The next slot is for the Compact Flash Interface board. The next two slots are for the expanded comm. boards. The remainder of the slot positions, labeled T1 – T12, can be used for any type PC board. The last slot, last on the right (End), is for the internal modem/Ethernet Interface. The standard usage is presented below.

|     |                         |
|-----|-------------------------|
| T1  | A/D 1-16                |
| T2  | A/D 17-32               |
| T3  | Digital Inputs 1-16     |
| T4  | Digital Inputs 17-32    |
| T5  | Digital Inputs 33-48    |
| T6  | Digital Outputs 1-16    |
| T7  | Digital Outputs 17-32   |
| T8  | Digital Outputs 33-48   |
| T9  | Analog Outputs 1-8      |
| T10 | Direct Met Interface #1 |
| T11 | Analog Outputs 9-16     |
| T12 | Direct Met Interface #2 |
| End | Internal Modem/Ethernet |