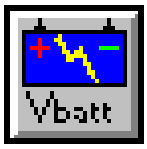
11... APPENDICES

NOTES:

APPENDIX A: MASTER ICON REFERENCE

SUPPLY VOLTAGE (VBATT) INPUT ICON



FUNCTION:

Used to take readings of the HyperLogger Supply Voltage. If internal batteries are installed in the HyperLogger and an external power supply is also connected, the output value will be the higher of the two.

INPUTS:

Hardware: No signal input shown on Net for Program Net connections.

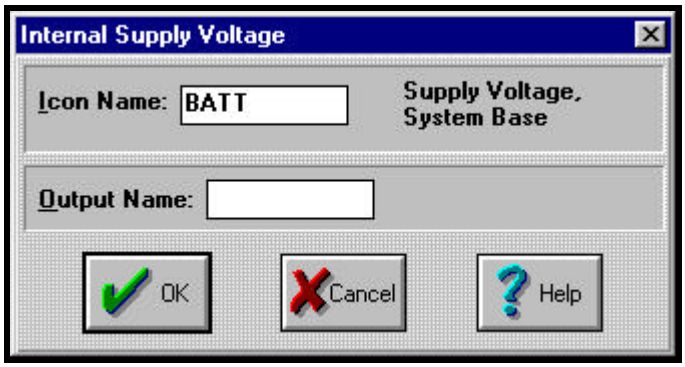
Update Clock: Output is updated with new reading upon each Update Clock pulse when Enable input is unconnected or HI.

Enable: Processing of icon is allowed when Enable pin is unconnected or connected and Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type signal. The Units of the output are Volts

ICON CONFIGURATION DIALOG BOX:

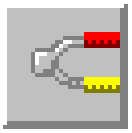


CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

THERMOCOUPLE INPUT ICON:



FUNCTION:

Performs the thermocouple channel selection, amplification, cold junction compensation and A-D conversion for a thermocouple hardware input from an HLIM-1 Interface Module. The CJC reading is taken from the integral thermistor on the TSA (terminal strip adapter).

INPUTS:

Hardware: No signal input shown on Net for Program Net connections.

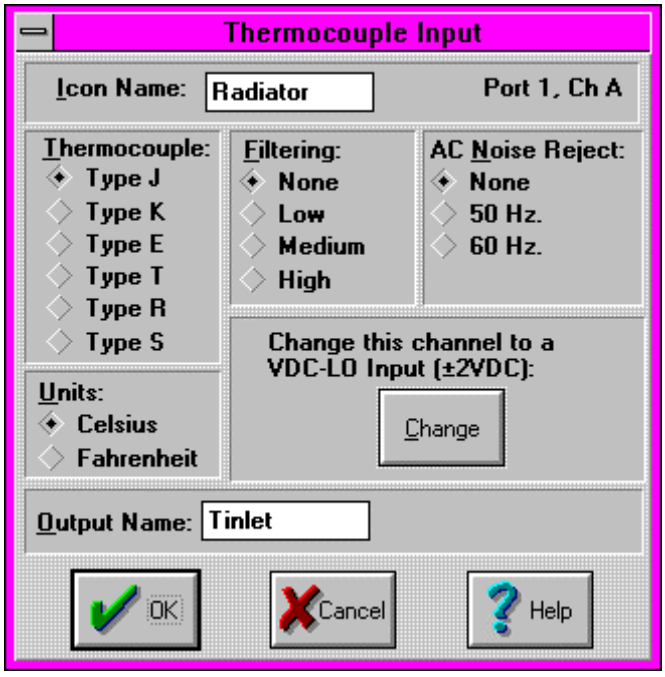
Update Clock: Output is updated with new reading upon each Update Clock pulse when Enable input is unconnected or Hi.

Enable: Processing of icon is allowed when Enable pin is unconnected or connected and Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type signal. The Units of the output are degrees C or F, selectable from the icon configuration dialog box.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to D) where the actual Interface Module channel is installed will be used for the name.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

Use This Channel for Voltage: Both the Thermocouple Icon and the VDC-2V Icon utilize the same Interface Module hardware Configuration Switch setting. Because of this capability, a Thermocouple Icon can be changed into a VDC-LO Icon by simply clicking on the CHANGE button.

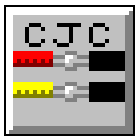
Thermocouple Type: Specify the type of thermocouple to be connected to this channel.

Units: Specifies the temperature scale units that will be output from this icon. Celcius and Fahrenheit are directly supported, however, conversion to other units can be performed within a Program Net by adding a Math Icon onto this icon's output.

AC Noise Reject: Enables software filtering of 50Hz or 60Hz noise on inputs. See Appendix for an explanation of the 50/60 Hz filtering technique.

Filtering: Three levels of first order noise filtering can be enabled during thermocouple channel reading. First order filtering reduces high frequency noise that may be picked up by sensor wiring with the cost that it slows down the rate at which a channel can be sampled. See Appendix for discussion on use of filtering.

CJC (COLD JUNCTION COMPENSATION) INPUT ICON:



FUNCTION:

Performs the Cold Junction Compensation (CJC) channel selection, amplification, and A-D conversion for a thermistor hardware input from a sensor mounted on the Terminal Strip Adapter TSA).

Alternatively, the CJC icon can be used to take a resistance reading or measure the temperature of an external thermistor (10Kohm at 25C, Fenwall curve 16 or equivalent). A wire jumper on the TSA can be removed and external wiring added if this optional use is desired. Due to the optimization of the CJC circuit for temperature sensing, the resistance measurement capability of this circuit does not provide consistent linearity over the full range. The normal resistance measuring range for a thermistor is 200 ohms to 70,000 ohms.

NOTE: If Thermocouple icons are used in the Program Net, the external sensing function described above must not be used as the temperature of the TSA is critical in the calculation of thermocouple temperatures.

INPUTS:

Hardware: No signal input shown on Net for Program Net connections.

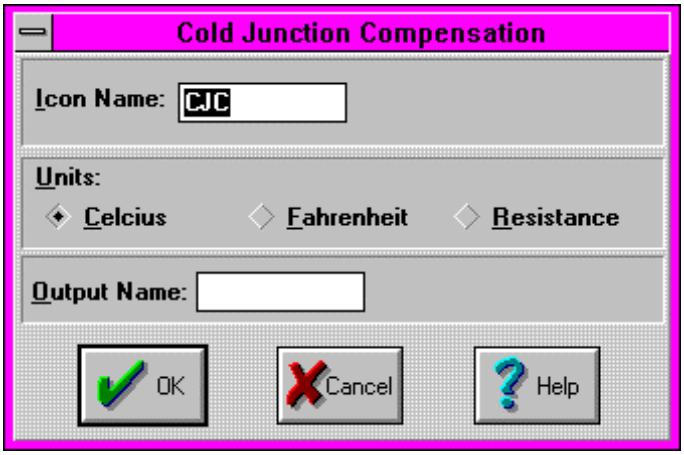
Update Clock: Output is updated with new reading upon each Update Clock pulse when Enable input is unconnected or Hi.

Enable: Processing of icon is allowed when Enable pin is unconnected or connected and Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type signal. The Units of the output are degrees C, degrees F, or Ohms. This is software selectable from the icon configuration dialog box.

ICON CONFIGURATION DIALOG BOX:

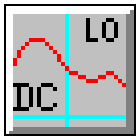


CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

Units: Specifies the temperature scale units that will be output from this icon. Celcius, Fahrenheit, and Ohms are directly supported.



DC-LO; +/- 2VDC FULL SCALE VOLTAGE INPUT ICON

FUNCTION:

Performs the analog channel selection, amplification, and A-D conversion for a DC voltage input within the range of +/-2V from an HLIM-1 Interface Module.

INPUTS:

Hardware: No signal input shown on Net for Program Net connections.

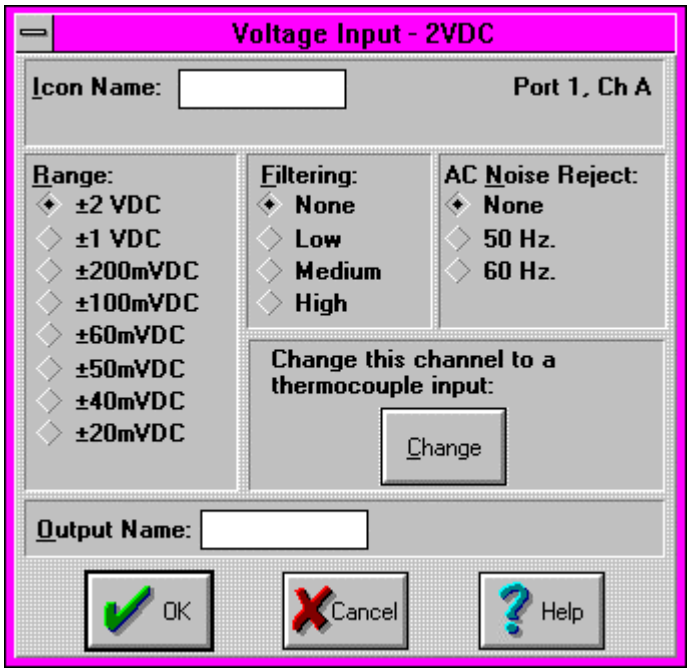
Update Clock: Output is updated with new reading upon each Update Clock pulse when Enable input is unconnected or Hi.

Enable: Processing of icon is allowed when Enable pin is unconnected or connected and Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type signal. The Units of the output are Volts

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to D) where the actual Interface Module channel is installed will be used for the name.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

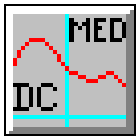
Change this channel to a thermocouple input: Both the Thermocouple Icon and the DC-LO Icon utilize the same Interface Module hardware Configuration Switch setting. Because of this capability, a DC-LO Icon can be changed into a Thermocouple Icon by simply clicking on the CHANGE button.

Range: Specify the input range to be used for this channel. Select the range so that anticipated input signal fluctuations will not exceed this Full Scale range. If the input exceeds the selected range, an over-range value will be logged.

AC Noise Reject: Enables software filtering of 50Hz or 60Hz noise on inputs. See Appendix for an explanation of the 50/60 Hz filtering technique.

Filtering: Three levels of first order noise filtering can be enabled during channel reading. First order filtering reduces high frequency noise that may be picked up by sensor wiring with the cost that it slows down the rate at which a channel can be sampled. See Appendix for discussion on use of filtering.

DC-MED; +/- 10 VDC FULL SCALE VOLTAGE INPUT ICON



FUNCTION:

Performs the analog channel selection, amplification, and A-D conversion for a DC voltage input within the range of +/-10VDC from an HLIM-1 Interface Module.

INPUTS:

Hardware: No signal input shown on Net for Program Net connections.

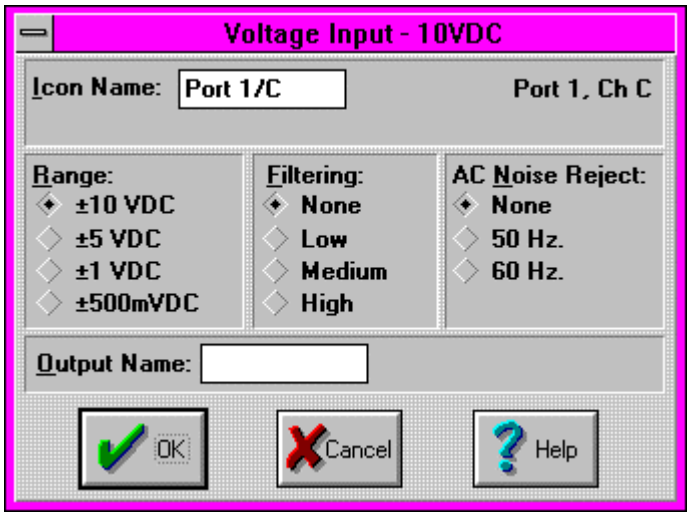
Update Clock: Output is updated with new reading upon each Update Clock pulse when Enable input is unconnected or Hi.

Enable: Processing of icon is allowed when Enable pin is unconnected or connected and Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type signal. The Units of the output are Volts

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to D) where the actual Interface Module channel is installed will be used for the name.

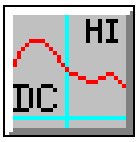
Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

Range: Specify the input range to be used for this channel. Select the range so that anticipated input signal fluctuations will not exceed this Full Scale range. If the input exceeds the selected range, an over-range value will be logged.

AC Noise Reject: Enables software filtering of 50Hz or 60Hz noise on inputs. See Appendix for an explanation of the 50/60 Hz filtering technique.

Filtering: Three levels of first order noise filtering can be enabled during channel reading. First order filtering reduces high frequency noise that may be picked up by sensor wiring with the cost that it slows down the rate at which a channel can be sampled. See Appendix for discussion on use of filtering.

DC-HI; +/- 30 VDC FULL SCALE VOLTAGE INPUT ICON



FUNCTION:

Performs the analog channel selection, amplification, and A-D conversion for a DC voltage input within the range of +/-30VDC from an HLIM-1 Interface Module.

INPUTS:

Hardware: No signal input shown on Net for Program Net connections.

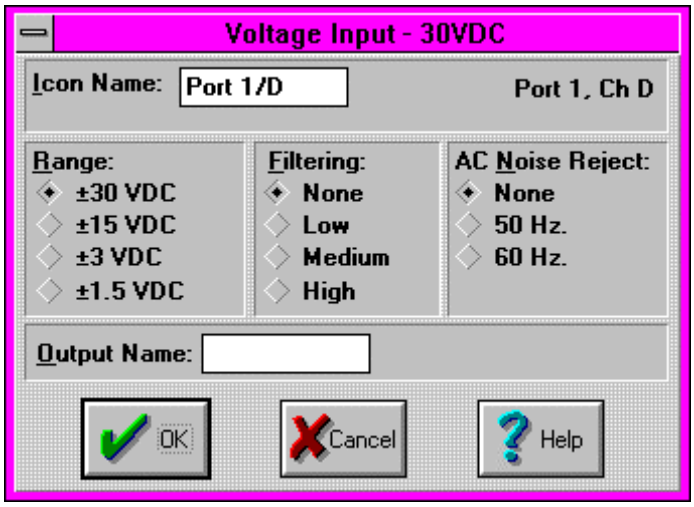
Update Clock: Output is updated with new reading upon each Update Clock pulse when Enable input is unconnected or Hi.

Enable: Processing of icon is allowed when Enable pin is unconnected or connected and Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type signal. The Units of the output are Volts.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to D) where the actual Interface Module channel is installed will be used for the name.

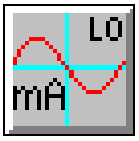
Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

Range: Specify the input range to be used for this channel. Select the range so that anticipated input signal fluctuations will not exceed this Full Scale range. If the input exceeds the selected range, an over-range value will be logged.

AC Noise Reject: Enables software filtering of 50Hz or 60Hz noise on inputs. See Appendix for an explanation of the 50/60 Hz filtering technique.

Filtering: Three levels of first order noise filtering can be enabled during channel reading. First order filtering reduces high frequency noise that may be picked up by sensor wiring with the cost that it slows down the rate at which a channel can be sampled. See Appendix for discussion on use of filtering.

MA-LO; +/- 20 MADC FULL SCALE CURRENT INPUT ICON



FUNCTION:

Performs the analog channel selection, amplification, and A-D conversion for a DC current input within the range of +/-20mADC from an HLIM-1 Interface Module.

INPUTS:

Hardware: No signal input shown on Net for Program Net connections.

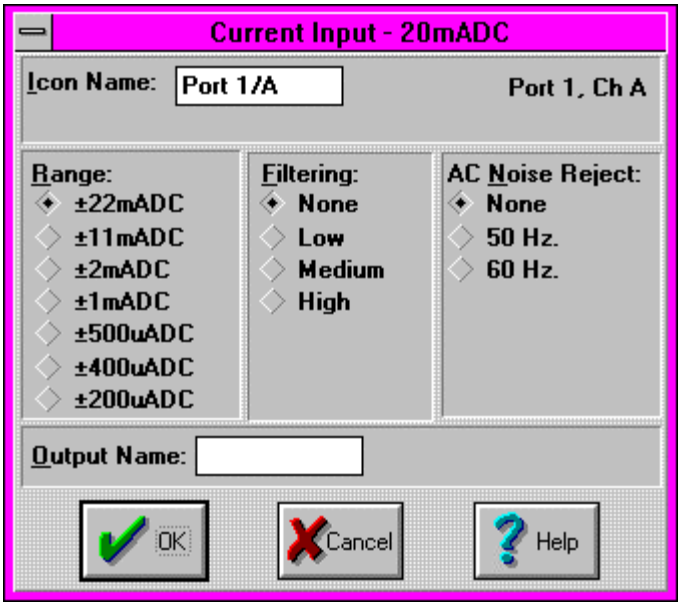
Update Clock: Output is updated with new reading upon each Update Clock pulse when Enable input is unconnected or Hi.

Enable: Processing of icon is allowed when Enable pin is unconnected or connected and Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type signal. The Units of the output are Milliamps.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to D) where the actual Interface Module channel is installed will be used for the name.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

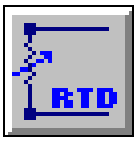
Range: Specify the input range to be used for this channel. Select the range so that anticipated input signal fluctuations will not exceed this Full Scale range. If the input exceeds the selected range, an over-range value will be logged.

AC Noise Reject: Enables software filtering of 50Hz or 60Hz noise on inputs. See Appendix for an explanation of the 50/60 Hz filtering technique.

Filtering: Three levels of first order noise filtering can be enabled during channel reading. First order filtering reduces high frequency noise that may be picked up by

sensor wiring with the cost that it slows down the rate at which a channel can be sampled. See Appendix for discussion on use of filtering.

RTD INPUT ICON (HLIM-4)



FUNCTION:

RTD, resistance, and thermistor signal inputs can all be handled with the HLIM-4. With the HLIM-4 installed in a HyperLogger, these respective function icons become available for use in Program Nets.

As an RTD input, the icon samples the resistance of the connected RTD, converts it to temperature and passes it along to the next icon. 2, 3, and 4-wire configurations are all supported.

This channel/icon can be changed to a thermistor or resistance input channel by selecting the **Change button.**

INPUTS:

Hardware: No signal input shown on icon for Program Net connections.

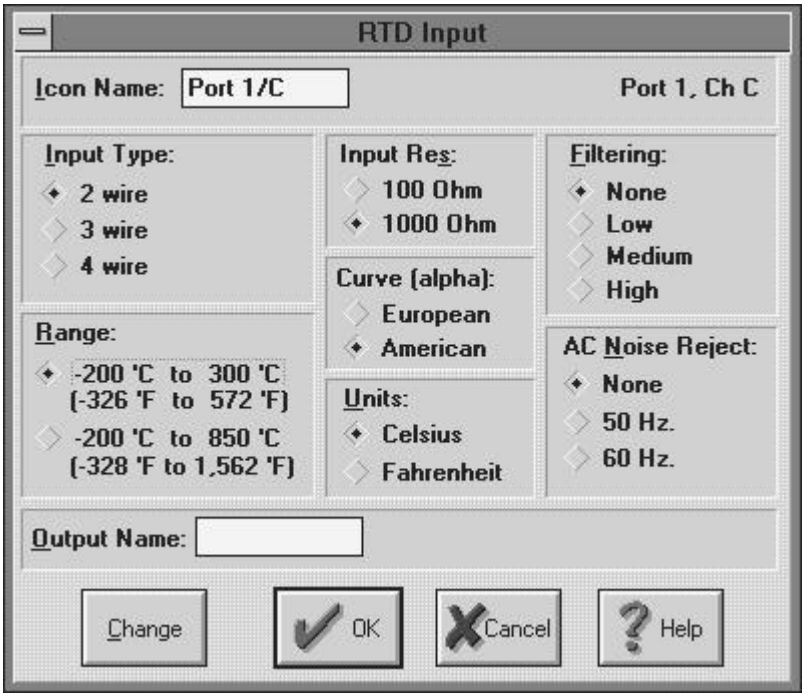
Update: The input is sampled every time an Update command is received on the Update input and the Enable terminal is True.

Enable: Processing of the icon is allowed when Enable pin is unconnected or connected *and* the Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type signal. The Units of the output are degrees C, degrees F, or Ohms. This is software selectable from the icon configuration dialog box.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to H) where the actual Interface Module channel is installed will be used for the name.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

Input Type: Specifies the wiring configuration to be used.
2-Wire is typically used for measurements of higher resistance values or with short lead wire runs where the resistance of the lead wires induces negligible error. With 2-wire configuration, all four input channels can be used.
3 and 4-Wire configurations are used where the lead wires to the element are longer and/or premium measurement accuracy is required. Both 3 and 4-wire configurations compensate for the lead wire resistance. 3-wire provides nearly the same performance as 4-wire using only 3 wires instead of 4.
If 3 or 4-wire configuration is selected, the input requires two input channels. From within the A and C channel icons, selecting 3 or 4-wire will result in a displayed message that a second channel will be deleted (B or D).

Range: Specify the input range to be used for this channel. For optimum resolution, choose the narrowest range that will meet the signal fluctuation without exceeding the Full Scale Range. If the input exceeds the selected range, an over-range value will be logged.

Input Res: Specify the RTD 0'C resistance value. Both 100 and 1000 ohm devices are supported.

Curve (alpha): Specify the alpha coefficient for your type of RTD. This coefficient is used in the conversion equation of resistance to temperature. If unknown, contact the RTD supplier for input. European (most common) = 0.00385 and American = 0.00392.

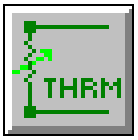
Units: Select Degrees C or F

Filtering: Three levels of first order noise filtering can be enabled during channel reading. First order filtering reduces high frequency noise that may be picked up by sensor wiring with the cost that it slows down the rate at which a channel can be sampled. See the HyperLogger User's Manual Appendix for discussion on use of filtering.

AC Noise Reject: Enables software filtering of 50Hz or 60Hz noise on inputs. See the HyperLogger User's Manual Appendix for an explanation of the 50/60 Hz filtering technique.

Change: Click on CHANGE to switch the icon / dialog box between thermistor, resistance, or RTD type input.

THERMISTOR INPUT ICON (HLIM-4)



FUNCTION:

RTD, resistance, and thermistor signal inputs can all be handled with the HLIM-4. With the HLIM-4 installed in a HyperLogger, these respective function icons become available for use in Program Nets.

As a thermistor input, the icon samples the resistance of the connected thermistor, converts it to temperature and passes it along to the next icon. As thermistors have high ohm/C ratios, lead wire error is negligible and only the 2-wire configuration is supported.

This channel/icon can be changed to an RTD or resistance input channel by selecting the **Change button.**

INPUTS:

Hardware: No signal input shown on icon for Program Net connections.

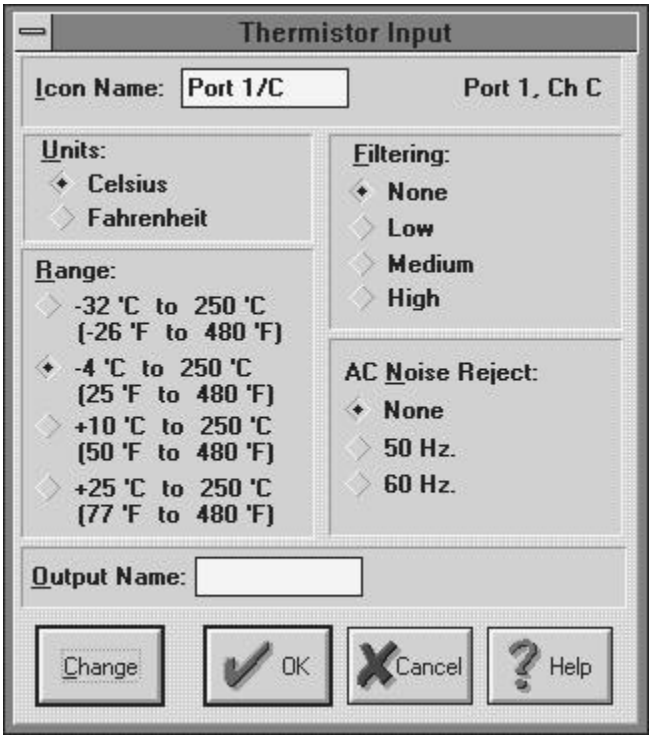
Update: The input is sampled every time an Update command is received on the Update input and the Enable terminal is True.

Enable: Processing of the icon is allowed when Enable pin is unconnected or connected *and* the Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type signal. The Units of the output are degrees C, degrees F, or Ohms. This is software selectable from the icon configuration dialog box.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to H) where the actual Interface Module channel is installed will be used for the name.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

Range: Specify the input range to be used for this channel. For optimum resolution, choose the narrowest range that will meet the signal fluctuation without exceeding the Full Scale Range. If the input exceeds the selected range, an over-range value will be logged.

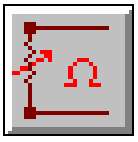
Units: Select Degrees C or F

Filtering: Three levels of first order noise filtering can be enabled during channel reading. First order filtering reduces high frequency noise that may be picked up by sensor wiring with the cost that it slows down the rate at which a channel can be sampled. See the HyperLogger User's Manual Appendix for discussion on use of filtering.

AC Noise Reject: Enables software filtering of 50Hz or 60Hz noise on inputs. See the HyperLogger User's Manual Appendix for an explanation of the 50/60 Hz filtering technique.

Change: Click on CHANGE to switch the icon / dialog box between thermistor, resistance, or RTD type input.

RESISTANCE INPUT ICON (HLIM-4)



FUNCTION:

RTD, resistance, and thermistor signal inputs can all be handled with the HLIM-4. With the HLIM-4 installed in a HyperLogger, these respective function icons become available for use in Program Nets.

As a Resistance input, the icon samples the resistance connected to its input, and passes it along to the next icon. 2, 3, and 4-wire configurations are all supported.

This channel/icon can be changed to a thermistor or RTD input channel by selecting the **Change button.**

INPUTS:

Hardware: No signal input shown on icon for Program Net connections.

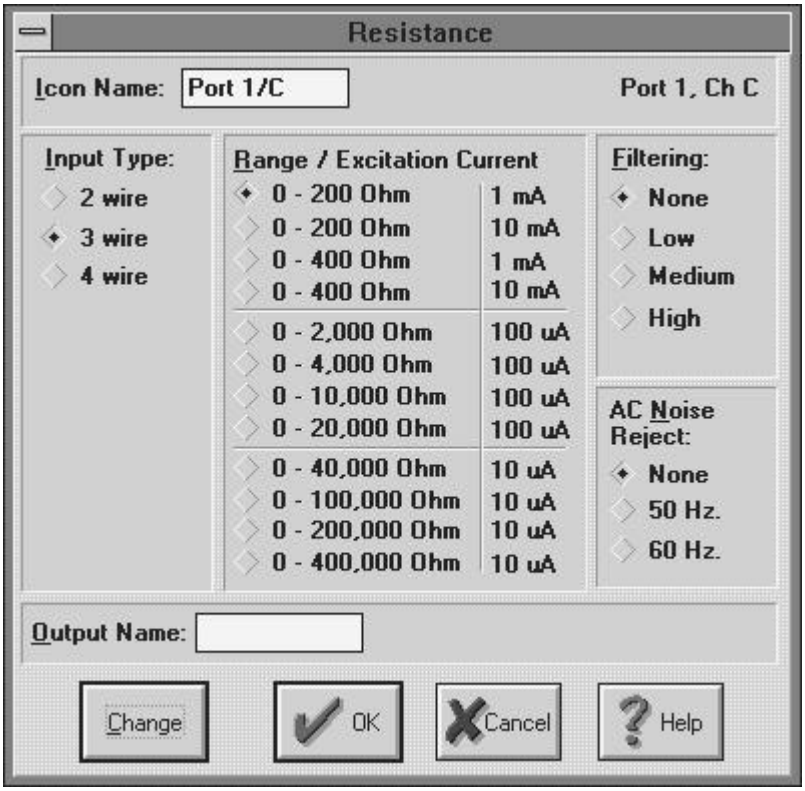
Update: The input is sampled every time an Update command is received on the Update input and the Enable terminal is True.

Enable: Processing of the icon is allowed when Enable pin is unconnected or connected *and* the Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type signal. The Units of the output are Ohms.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to H) where the actual Interface Module channel is installed will be used for the name.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

Input Type: Specifies the wiring configuration to be used.
2-Wire is typically used for measurements of higher resistance values or with short lead wire runs where the resistance of the lead wires induces negligible error. With 2-wire configuration, all four input channels can be used.
3 and 4-Wire configurations are used where the lead wires to the element are longer and/or premium measurement accuracy is required. Both 3 and 4-wire configurations compensate for the lead wire resistance. 3-wire provides nearly the same performance as 4-wire using only 3 wires instead of 4.
If 3 or 4-wire configuration is selected, the input requires two input channels. From within the A and C channel icons, selecting 3 or 4-wire will result in a displayed message that a second channel will be deleted (B or D).

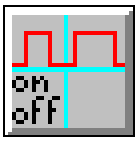
Range: Specify the input range to be used for this channel. For optimum resolution, choose the narrowest range that will meet the signal fluctuation without exceeding the Full Scale Range. If the input exceeds the selected range, an over-range value will be logged.
For reference, the excitation currents used on the various ranges are documented. In cases where two identical ranges are provided , use the range with the higher current... unless self-heating or other ancillary effects are of concern.

Filtering: Three levels of first order noise filtering can be enabled during channel reading. First order filtering reduces high frequency noise that may be picked up by sensor wiring with the cost that it slows down the rate at which a channel can be sampled. See the HyperLogger User's Manual Appendix for discussion on use of filtering.

AC Noise Reject: Enables software filtering of 50Hz or 60Hz noise on inputs. See the HyperLogger User's Manual Appendix for an explanation of the 50/60 Hz filtering technique.

Change: Click on CHANGE to switch the icon / dialog box between thermistor, resistance, or RTD type input.

EVENT INPUT ICON (GPDI)



FUNCTION:

The GPDI (General Purpose Digital Input) is a hardware digital input for Event and Counter applications. It is incorporated into every HyperLogger System Base.

As an EVENT input, it samples the input signal state (High or Low) per the sampling rate set on the Update input. It updates its output only when the input changes state.

INPUTS:

Hardware: No signal input shown on Net for Program Net connections.

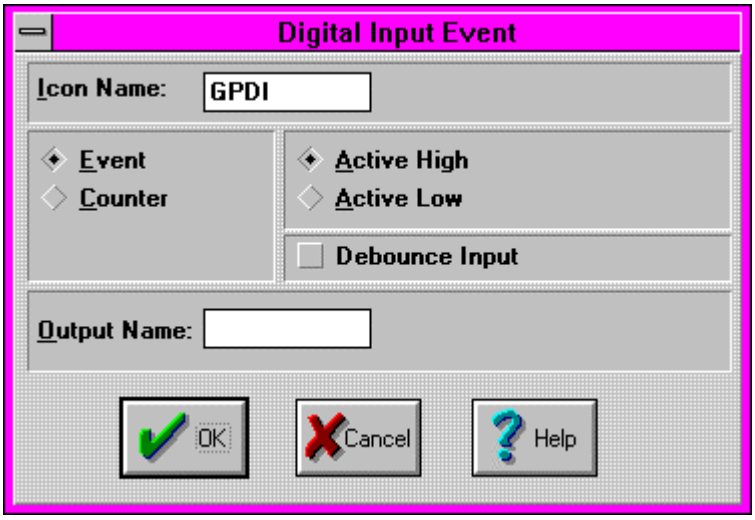
Update: The input is sampled every time an Update command is received on the Update input. If the input state has changed since the last Update command was received, the Output is updated with the new state. The absolute time resolution of the state change is determined by the frequency of the Update signal. For example, if an Update command is received every second, the state change will be recorded with one second resolution.

Enable: Processing of the icon is allowed when Enable pin is unconnected or connected *and* the Enable signal is TRUE.

OUTPUTS:

Output Signal: Logic type signal

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to D) where the actual Interface Module channel is installed will be used for the name.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

Event / Counter Select EVENT for the Event function.

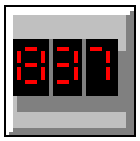
Debounce: Enables a hardware filter circuit that prevents short duration transitions from passing into the icon. Debounce can be used to filter out contact bounce from mechanical switches. The GPDI Debounce has a time

constant of approximately 50mS. Note that the use of Debounce will delay the actual input to output time by 50 to 200 mS.

> ***FYI:*** *Contact bounce is a phenomenon that occurs when a mechanical switch opens or closes. During switching, the physical electrical contacts inside the switch bounce against each other a number of times before they settle to their final state.*
>
> *Depending on the duty cycle of the contact bounce, the HyperLogger may count these bounces as events or transitions (count mode) resulting in technically accurate but undesired data. By enabling the debounce function, typical short duration contact bounce will be filtered out.*

Output True when input is LOW / HIGH: Specify what the state of the input signal is for the icon Output to be True. For example, if a switch is connected to the Event icon input, the User can then specify which state the switch should be in for a TRUE Output from the Event icon. *Output True when input is LOW* will result in an icon Output that is TRUE when the switch is closed. *Output True when input is TRUE* will result in an icon Output that is True when the switch is open.

COUNTER INPUT ICON (GPDI)



FUNCTION:

The GPDI (General Purpose Digital Input) is a hardware digital input for Event and Counter applications and is incorporated into every HyperLogger System Base.

As a COUNTER input, it accumulates counts from a User connected hardware signal input, then outputs the count when it receives an Update command. When the count is output, the counter is automatically set back to 0 and counting resumes.

The GPDI Counter (in contrast to the HLIM-2 Counter) is very fast and can count pulses received at input rates up to 10 KHZ. However, when using the GPDI Counter with high speed inputs, it is imperative that the Counter receive an Update command before it counts up to 65,535 or a counter roll-over condition will occur and count data will be lost.

INPUTS:

Hardware: No signal input shown on Net for Program Net connections.

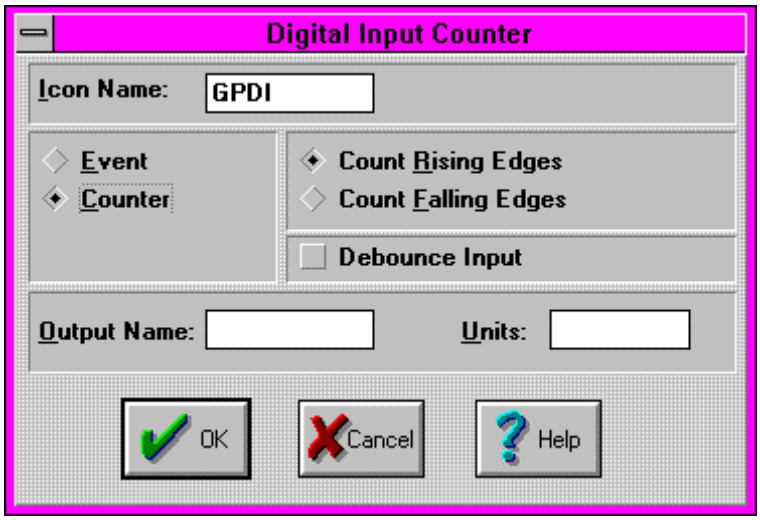
Update: The accumulated count is output every time an Update command is received on the Update input. To preclude the loss of data, this Update command should be received before the icon counts to 65,535 or the counter will roll-over to 0 and continue counting, resulting in lost counts.

Enable: Processing of the icon is allowed when Enable pin is unconnected or connected *and* the Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type signal (ie Count totals)

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to D) where the actual Interface Module channel is installed will be used for the name.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

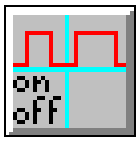
Event / Counter Select COUNTER for the Counter function.

Debounce: Enables a hardware filter circuit that prevents short duration transitions from passing into the icon. Debounce can be used to filter out contact bounce from mechanical switches. The GPDI Debounce has a time constant of approximately 50mS. Debounce should not be used when counting signals of frequency higher than 10Hz or signals with On or Off durations shorter than approximately 100mS.

> ***FYI:*** *Contact bounce is a phenomenon that occurs when a mechanical switch opens or closes. During switching, the physical electrical contacts inside the switch bounce against each other a number of times before they settle to their final state.*
>
> *Depending on the duty cycle of the contact bounce, the HyperLogger may count these bounces as events or transitions (count mode) resulting in technically accurate but undesired data. By enabling the debounce function, typical short duration contact bounce will be filtered out.*

Count Rising / Falling Edges: The GPDI increments its accumulated count when its input changes state from hi to lo or lo to hi. The User can specify which transition (edge) is to be counted Rising (lo to hi) or Falling (hi to lo). For example if a switch is connected to the input, the User can specify that the count increment when the switch closes (Falling Edge) or when it opens (Rising Edge).

EVENT INPUT ICON (DIGITAL I/O WITH HLIM-2)



FUNCTION:

An Event / Counter / Frequency input and Digital output functions are all provided with the HLIM-2. Four channels can be configured on an individual basis as Frequency, Event, or Counter type Inputs and four separate channels are available for Digital Output. With the HLIM-2 installed in a HyperLogger, these respective function icons become available for use in Program Nets.

As an EVENT input, the icon samples the state of the User connected hardware input signal (HI or LO) each time an Update command is received. The icon output state is updated when the input state changes.

The same dialog is used to configure the channel for Event, Frequency, and Counter functions.

INPUTS:

Hardware: No signal input shown on icon for Program Net connections.

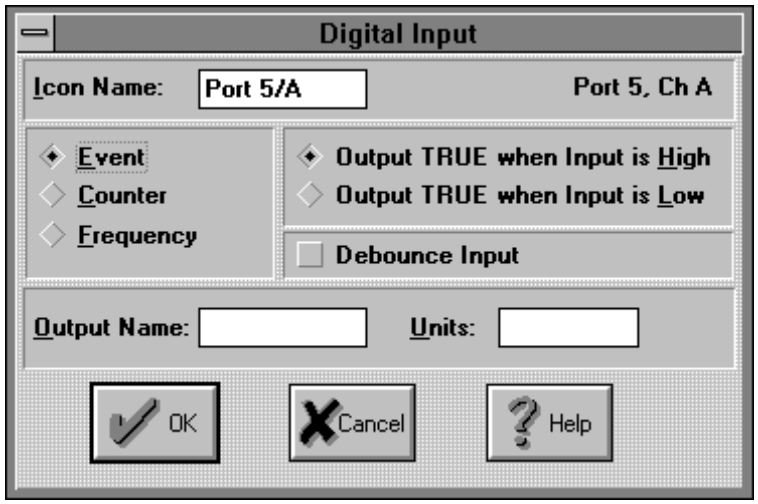
Update: The input is sampled every time an Update command is received on the Update input. If the input state has changed since the last Update command was received, the Output is updated with the new state. The absolute time resolution of the state change is determined by the frequency of the Update command. For example, if an Update command is received every second, the state change will be recorded with one second resolution.

Enable: Processing of the icon is allowed when Enable pin is unconnected or connected *and* the Enable signal is TRUE.

OUTPUTS:

Output Signal: Logic type signal

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to D) where the actual Interface Module channel is installed will be used for the name.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

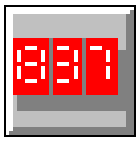
Units: Provides a text box for User entry of a units label that will be shown at the output from this icon. Conversion to other units can be performed within a Program Net by adding a Math Icon onto this icon's output.

Event / Counter / Frequency Select EVENT for the Event function.

Debounce: Enables a hardware filter circuit that prevents short duration transitions from passing into the icon. Debounce can be used to filter out contact bounce from mechanical switches. The HLIM-2 Debounce has a time constant of approximately 50mS. Note that the use of Debounce will delay the actual input to output transition time by 50 to 200 mS.

> ***FYI:*** *Contact bounce is a phenomenon that occurs when a mechanical switch opens or closes. During switching, the physical electrical contacts inside the switch bounce against each other a number of times before they settle to their final state.*
>
> *Depending on the duty cycle of the contact bounce, the HyperLogger may count these bounces as events or transitions (count mode) resulting in technically accurate but undesired data. By enabling the debounce function, typical short duration contact bounce will be filtered out.*

Output TRUE when Input is HIGH / LOW: Allows logical reversal of the Output with respect to the input state.



COUNTER INPUT ICON (DIGITAL I/O WITH HLIM-2)

FUNCTION:

Event / Counter / Frequency input and Digital output functions are all provided with the HLIM-2. With the HLIM-2 installed in a HyperLogger, these respective function icons become available for use in Program Nets.

The same dialog is used to configure the four input channels for Event, Frequency, and Counter functions.

As a COUNTER input, the HLIM-2 channel accumulates counts from a User connected hardware signal input, then outputs the count to the net when it receives an Update command. When the count is output, the counter is automatically set back to 0 and counting resumes.

The HLIM-2 Counter can count pulses received at input rates up to apx 20 Khz. However, at higher frequencies, the net must be configured to read the counter before it overflows or the counter will overflow and return to 0 and continue incrementing.

INPUTS:

Hardware: No signal input shown on Net for Program Net connections. The HLIM-2 Counter function increments its count on received rising or falling edges of the input signal.

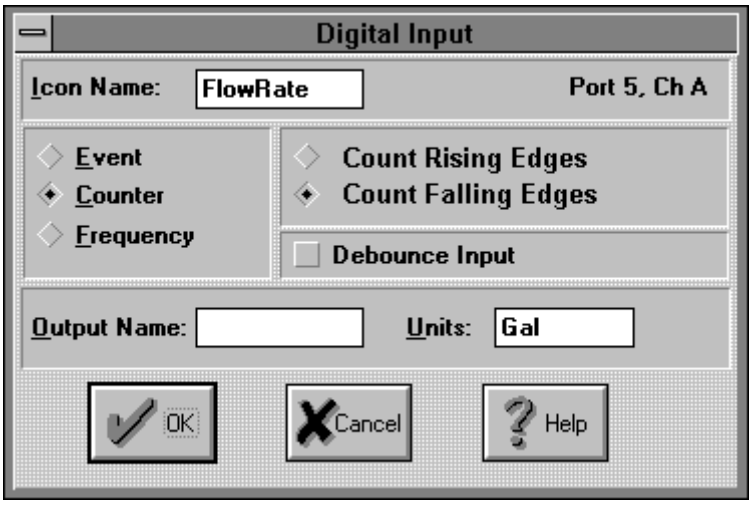
Update: The accumulated count is output every time an Update command is received on the Update input. To preclude the loss of data, this Update command (from a connected Sample Rate Clock) should be received before the icon counts to 16,777,216 or the counter will roll-over to 0 and continue counting, resulting in lost counts.

Enable: Processing of the icon is allowed when Enable pin is unconnected or connected *and* the Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type signal (ie Count totals)

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane

Port (1 to 6) and Channel (A to D) where the actual Interface Module channel is installed will be used for the name.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon. Conversion to other units can be performed within a Program Net by adding a Math Icon onto this icon's output.

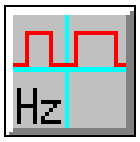
Event / Counter / Frequency Select COUNTER for the Counter function.

Debounce: Enables a hardware filter circuit that prevents short duration transitions from passing into the icon. Debounce can be used to filter out contact bounce from mechanical switches. The HLIM-2 Debounce has a time constant of approximately 50mS. Note that the use of Debounce will delay the actual input to output transition time by 50 to 200 mS.

> ***FYI:*** *Contact bounce is a phenomenon that occurs when a mechanical switch opens or closes. During switching, the physical electrical contacts inside the switch bounce against each other a number of times before they settle to their final state.*
>
> *Depending on the duty cycle of the contact bounce, the HyperLogger may count these bounces as events or transitions (count mode) resulting in technically accurate but undesired data. By enabling the debounce function, typical short duration contact bounce will be filtered out.*

Count Rising / Falling edges: Specify which edge of the input signal is to be used to increment the counter (eg when a device being monitored turns ON or OFF).

FREQUENCY INPUT ICON (DIGITAL I/O WITH HLIM-2)



FUNCTION:

Event / Counter / Frequency input and Digital output functions are all provided with the HLIM-2. With the HLIM-2 installed in a HyperLogger, these respective function icons become available for use in Program Nets.

The same dialog is used to configure the channel for Event, Frequency, and Counter functions.

As a FREQUENCY input, the HLIM-2 channel samples the incoming waveform and outputs the measured frequency to the net.

Calculation of the input signal frequency requires longer for lower frequencies. Due to this effect, the speed of execution of a Program Net may be reduced when reading low frequency inputs. (eg 10Hz inputs will require approximately 100mS to read, whereas a 100Hz input will require only 10mS)

NOTE: Due to the advanced signal processing utilized in the frequency mode, unbalanced duty-cycle inputs are measured with the same accuracy as balanced duty-cycle inputs.

INPUTS:

Hardware: No signal input shown on Net for Program Net connections.

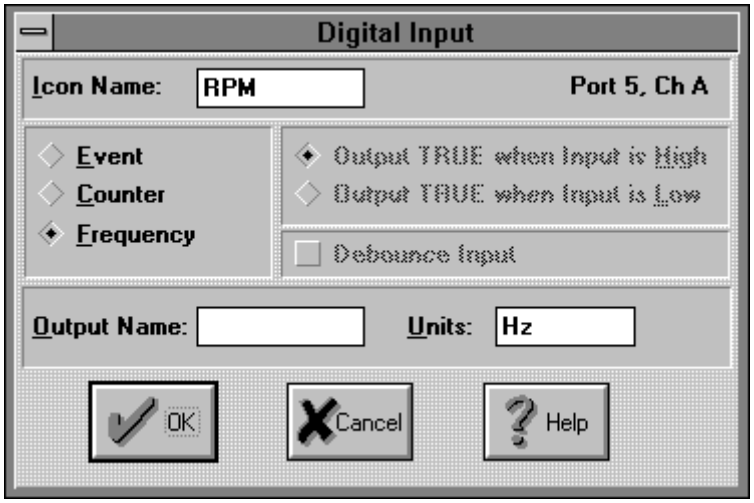
Update: The measured frequency is output every time an Update command is received on the Update input.

Enable: Processing of the icon is allowed when Enable pin is unconnected or connected *and* the Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type signal, Frequency in Hz.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

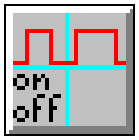
Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to D) where the actual Interface Module channel is installed will be used for the name.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon. Conversion to other units can be performed within a Program Net by adding a Math Icon onto this icon's output.

Event / Counter / Frequency Select FREQUENCY for the Frequency function.

EVENT INPUT ICON (DIGITAL I/O WITH HLIM-8)



FUNCTION:

Event input and Digital output functions are all provided with the HLIM-8. With the HLIM-8 installed in a HyperLogger, these respective function icons become available for use in Program Nets.

As an EVENT input, the icon samples the state of the User connected hardware input signal (HI or LO) each time an Update command is received. The icon output state is updated when the input state changes.

This channel/icon can be changed to a Digital Output channel by selecting the Change this channel to an Output button.

INPUTS:

Hardware: No signal input shown on icon for Program Net connections.

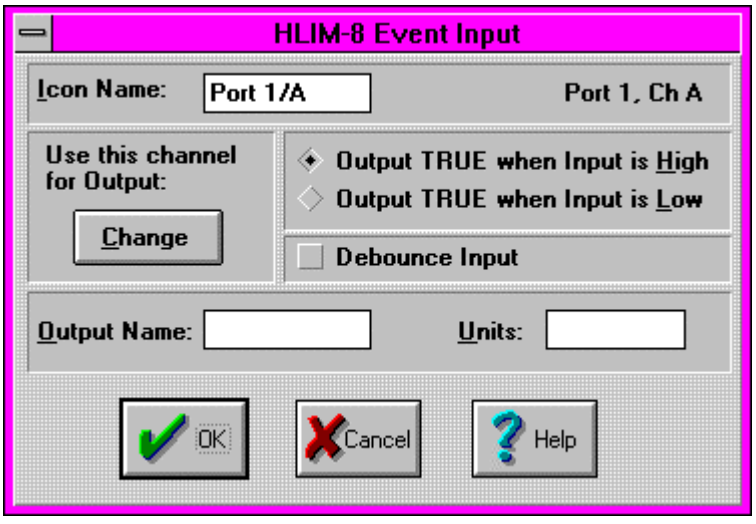
Update: The input is sampled every time an Update command is received on the Update input. If the input state has changed since the last Update command was received, the Output is updated with the new state. The absolute time resolution of the state change is determined by the frequency of the Update command. For example, if an Update command is received every second, the state change will be recorded with one second resolution.

Enable: Processing of the icon is allowed when Enable pin is unconnected or connected *and* the Enable signal is TRUE.

OUTPUTS:

Output Signal: Logic type signal

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to H) where the actual Interface Module channel is installed will be used for the name.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon. Conversion to other units can be performed within a Program Net by adding a Math Icon onto this icon's output.

Debounce: Enables a hardware filter circuit that prevents short duration transitions from passing into the icon. Debounce can be used to filter out contact bounce from mechanical switches. The HLIM-8 Debounce has a time constant of approximately 50mS. Note that the use of Debounce will delay the actual input to output transition time by 50 to 100 mS.

> ***FYI:*** *Contact bounce is a phenomenon that occurs when a mechanical switch opens or closes. During switching, the physical electrical contacts inside the switch bounce against each other a number of times before they settle to their final state.*
>
> *Depending on the duty cycle of the contact bounce, the HyperLogger may count these bounces as events resulting in technically accurate but undesired data. By enabling the debounce function, typical short duration contact bounce will be filtered out.*

Change This Channel to an Output: Not applicable when using this channel as an Event input. To change this channel to an Output, click on the Change button.

DIGITAL OUTPUT ICON (HLIM-8)

FUNCTION:

Eight channels of Digital output or Event input are all provided with the HLIM-8. With the HLIM-8 installed in a HyperLogger, these respective function icons become available for use in Program Nets. (Click on the CHANGE button within the Event dialog to switch the channel's icon function to a Digital Output).

The Digital Output icons provide software access to these digital outputs.

This channel/icon can be changed from a Digital Output to an Event Input channel by clicking on the CHANGE button.

INPUTS:

Data/Logic Signal: Logic type. True input turns hardware output ON. False input turns output OFF. Optionally, use the Latch icon in front of the Digital Output icon to latch the Output True upon receipt of a momentary True input.

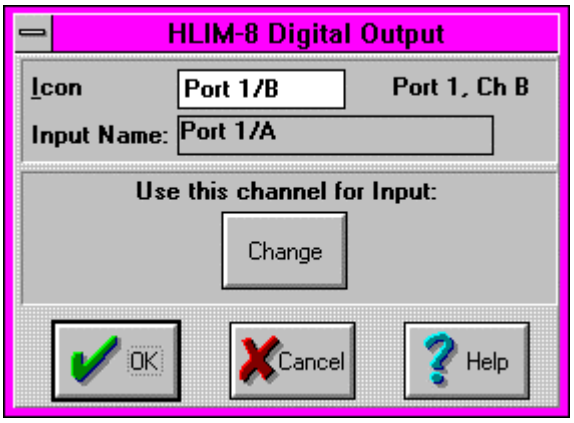
Update Clock: None

Enable: Processing of icon is allowed when Enable pin is unconnected or connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Hardware output only. No output terminal shown on icon for Program Net connections.

ICON CONFIGURATION DIALOG BOX:



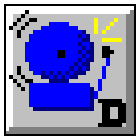
CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to D) where the actual Interface Module channel is installed will be used for the name.

Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's Input. The Output Name can be changed in the other icon's dialog.

Use this channel for Input: Select CHANGE to switch this icon into an Event type Input icon.

DIGITAL ALARM OUTPUT ICON



FUNCTION:

Three Digital Alarm outputs are provided as an integral part of the HyperLogger System Base. The Digital Alarm icons provide software access to these alarm outputs.

INPUTS:

Data/Logic Signal: Logic type. True input turns Alarm ON. LOW input turns Alarm OFF. Optionally, use the Latch icon in front of the icon to latch the Alarm ON with a momentary True input.

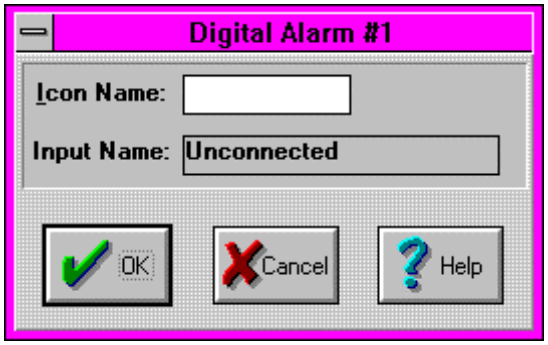
Update Clock: None

Enable: None

OUTPUTS:

Output Signal: Hardware output only. No output terminal shown on icon for Program Net connections.

ICON CONFIGURATION DIALOG BOX:

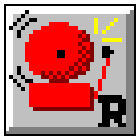


CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's Input. The Output Name can be changed in the other icon's dialog.

RELAY ALARM OUTPUT ICON



FUNCTION:

Two Relay Alarm outputs are provided as an integral part of the HyperLogger System Base. The Relay Alarm icons provide software access to these alarm outputs.

INPUTS:

Input Signal: Logic type. True input turns Alarm ON. False input turns Alarm OFF. Optionally, use the Latch icon in front of the icon to latch the Alarm ON with a momentary True input.

Update Clock: None

Enable: None

OUTPUTS:

Output Signal: Hardware output only. No output terminal shown on icon for Program Net connections.

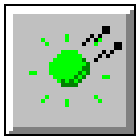
ICON CONFIGURATION DIALOG BOX:

CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's Input. The Output Name can be changed in the other icon's dialog.

GREEN LED STATUS OUTPUT ICON



FUNCTION:

A Green LED (light emitting diode) is provided as an integral part of the HyperLogger System Base and displays on the front panel of the HyperLogger. The Green LED icon provides software access to this Status output.

INPUTS:

Data/Logic Signal: Logic type. True input turns LED ON. False input turns LED OFF. Optionally, use the Latch icon in front of the icon to latch the LED ON with a momentary True input.

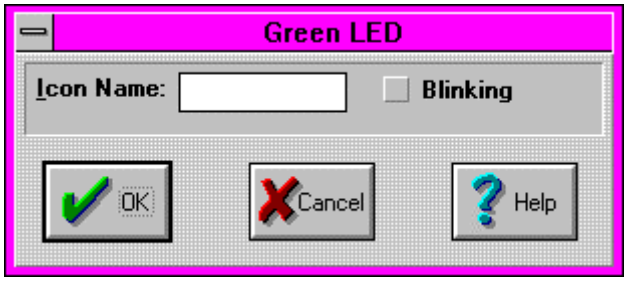
Update Clock: None

Enable: None

OUTPUTS:

Output Signal: Hardware output (LED) only. No output terminal shown on icon for Program Net connections.

ICON CONFIGURATION DIALOG BOX:

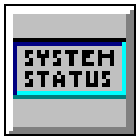


CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Blinking: If the Blinking check box is checked, the LED will blink at a rate of 1 second ON, 1 second OFF when the input is True. If not checked, the LED will be ON continuously when the input is True.

LCD MESSAGE OUTPUT ICON



FUNCTION:

User programmed messages can be displayed on the LCD (liquid crystal display) on the front panel of the HyperLogger System Base. The LCD Message icon provides for User entry of a two-line message for display when the icon input is TRUE.

INPUTS:

Data/Logic Signal: Logic type. True input turns message ON. False input turns message display OFF. Optionally, use the Latch icon in front of the LCD Message icon to latch the message ON upon receipt of a momentary True input.

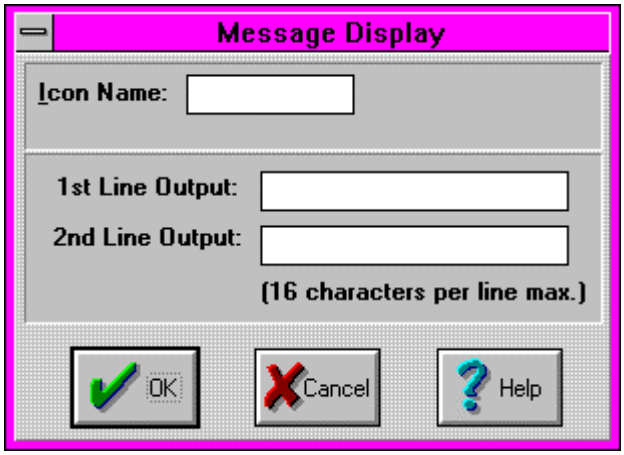
Update Clock: None

Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Hardware output (to LCD display) only. No output terminal shown on icon for Program Net connections.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

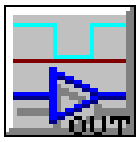
Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

First / Second Line Output: Two text boxes are provided for User entry of text to be displayed on the LCD when the Input is TRUE. Up to 16 characters can be entered on each line.

APPLICATION CONSIDERATIONS:

When the LCD icon is activated (ie its input is TRUE), the programmed message is displayed on the HyperLogger LCD. If a second (different) message is activated the second message will be displayed on the LCD and the first message will be maintained on a queue of active messages. This queue of messages can be reviewed via the HyperLogger front panel Next / Select buttons menu *Display Status Messages* or via a *Status Query* from within the HyperComm Window.

DIGITAL OUTPUT ICON (HLIM-2)



FUNCTION:

Four channels of Digital output are provided (along with 4 channels of Event / Counter/ and Frequency input) with the HLIM-2. With the HLIM-2 installed in a HyperLogger, these respective function icons become available for use in Program Nets.

The Digital Output icons provide software access to these digital outputs.

Refer to the Frequency, Counter and/or Event applications of the HLIM-2 for further information on those functions.

INPUTS:

Data/Logic Signal: Logic type. True input turns hardware output ON. False input turns output OFF. Optionally, use the Latch icon in front of the Digital Output icon to latch the Output True upon receipt of a momentary True input.

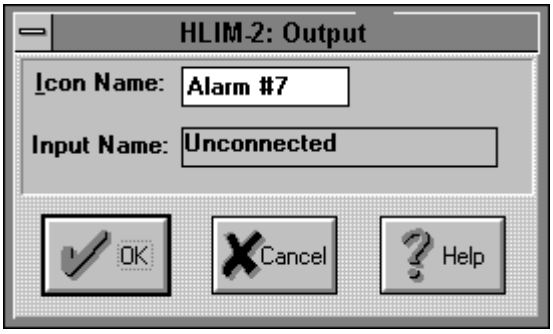
Update Clock: None

Enable: Processing of icon is allowed when Enable pin is unconnected or connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Hardware output only. No output terminal shown on icon for Program Net connections.

ICON CONFIGURATION DIALOG BOX:

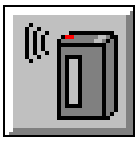


CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net. If no name is User provided, the Backplane Port (1 to 6) and Channel (A to D) where the actual Interface Module channel is installed will be used for the name.

Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's Input. The Output Name can be changed in the other icon's dialog.

PAGER CALL-OUT ICON



FUNCTION:

In HyperLoggers equipped with a telephone modem option, the Pager Call-Out icon can be used to dial a pager phone number, wait a User defined period of time (for the Paging service tone), then transmit a User assigned code number. This code number can be User assigned to represent a site and/or particular warning or status indication.

INPUTS:

Data/Logic Signal: Logic type. A FALSE to TRUE transition on the icon input initiates the Pager call. The Page will complete even if the input signal returns LOW.

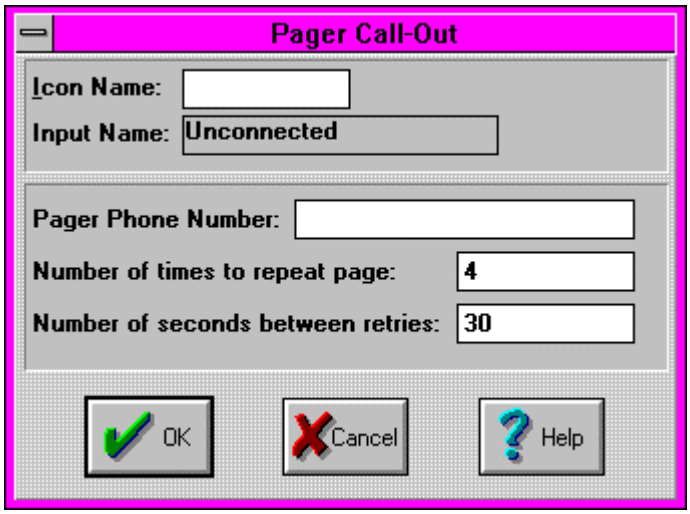
Update Clock: None

Enable: Processing of icon is allowed when Enable pin is unconnected or connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Hardware output to installed modem. No output terminal shown on icon for Program Net connections.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the name for the channel. This name will show directly under the icon within the Program Net.

Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's Input. The Output Name can be changed in the other icon's dialog.

Pager Phone Number: Enter the telephone number to dial to gain access to the pager; optionally followed by a number of commas (each which represents a 2 second delay) followed by the code number to be sent to the pager display.

For example: **(619) 555-1212,,,,,9999** entered in this text box will result in:

1. When the Pager icon is activated, the HyperLogger will dial the phone number (619)555-1212. Parenthesis and hyphens are ignored.
2. Wait for a 10 second delay (5 commas @ 2 seconds each)

3. The code number 9999 will be sent to the pager
4. The HyperLogger modem will disconnect.

The commas are entered to insert a delay between the dialing of the pager and the sending of the code. The delay time should be determined by the User to meet the subscribed pager system timing requirements. This delay can be determined empirically by calling the pager with a telephone and manually timing the delay between the last number dial and the tone indicating when a pager code should be entered. To allow for variations in this delay time, a few extra seconds (one or two commas) can be added to insure that the tone is received before the pager code is sent.

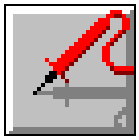
NOTE: The HyperLogger does not detect a busy line or pager tone, it merely executes the sequence of numbers and commas defined in this text box. The Pager call-out function and associated timing should be tested prior to field application.

Number of times to repeat page: If a number other than 0 is entered in this box, the Pager icon will will repeat the dialing sequence the specified number of times.

Number of seconds between retries: Enter the time to wait(in seconds) before a repeat call is placed.

APPLICATION CONSIDERATIONS:

Multiple Pager icons can be used in a Program Net, each connected to a different status or warning function. Different pager phone numbers and/or codes can then be assigned to indicate different status or warning conditons.



PROBE POINT OUTPUT ICON

FUNCTION:

Probe Point Icons mark and provide access to nodes within a Program Net for:

1. The HyperLogger front panel display while the Net is executing. Values at the nodes can be accessed through the **Display Probe Icon Values** LCD menu selection
2. Use during real-time HyperTrack sessions. Nodes marked with Probe Point icons are accessible via the serial link.

The units displayed by a Probe Point icon is inherited from the output to which it is connected. These units will appear on the LCD display as well as when the Probe Point is used in a HyperTrack Net.

INPUTS:

Data/Logic Signal: Data or Logic type. The terminal will accept either signal type.

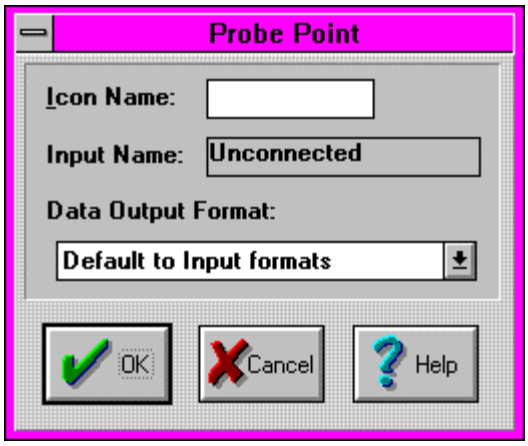
Update Clock: None

Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Hardware output (to LCD display and/or serial link) only. No output terminal shown on icon for Program Net connections.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's Input. The Output Name can be changed in the other icon's dialog.

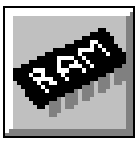
Data Output Format: The User can specify the data format that will be used in Output of the signal. In certain applications, additional processing speed may be realized through a judicious selection of the format.

Default to Input Formats - the default format. The data will be output using the same data format (Floating Point or Long Integer) as the Inputs use. This selection can be used consistently with good speed performance and no loss of precision.

Long Integer - The Input data will be converted to signed integer format, then output. Signed Integer format includes only the digits to the left of the decimal (XXXXX.)

The advantage of using Long Integer format is that this format will generally consist of a fewer number of bytes, hence serial transmission of the data for HyperTrack will be slightly faster. The number of bytes will dynamically size, from 1 to 4 bytes, according to the magnitude of the Output.

The disadvantage of Long Integer format is that numerical precision will be lost if incoming data is in floating point format. Precison will be lost in the conversion to integer format (eg 26.3 becomes 26). If large numbers are processed, this loss of precision may be negligible (eg 36785.2 becomes 36785).



MEMORY (HYPERLOGGER) ICON

FUNCTION:

The Memory icon represents data memory within the HyperLogger System Base (either internal or a PCMCIA memory card if installed).

The Units associated with the icon Output connected to the Memory icon Input will be stored with the recorded values.

INPUTS:

Data/Logic Signal: Data or Logic type. The terminal will accept either signal type.

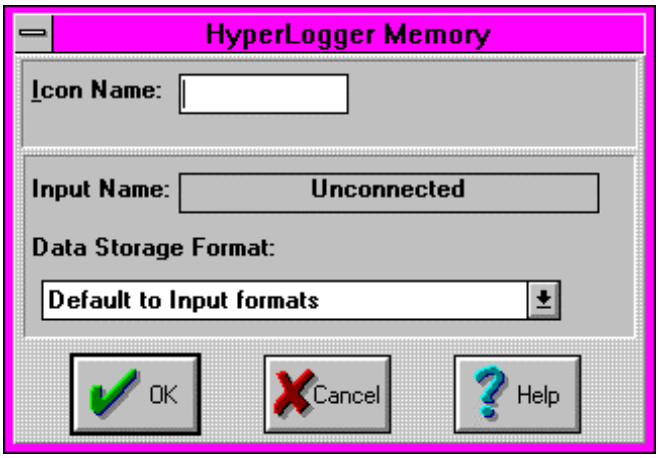
Update Clock: None

Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Hardware output to memory only. No output terminal shown on icon for Program Net connections.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's Input. The Output Name can be changed in the other icon's dialog.

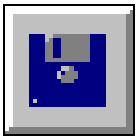
Data Storage Format: The User can specify the data format that will be used to store the data in memory. In certain applications, additional processing speed and/or less memory per stored sample can be realized through a judicious selection of the format.

Default to Input Formats - the default format. The data will be stored using the same data format (Floating Point or Long Integer) as the Inputs use. This selection can be used consistently with good speed performance and no loss of precision.

Long Integer - The Input data will be converted to integer format, then the data will be stored to memory in a signed Integer format. Signed Integer format includes only the digits to the left of the decimal (XXXXX.)

The advantage of using Long Integer format is that this format will generally utilize a fewer number of memory bytes for data storage. The number of bytes will dynamically size, from 1 to 4 bytes, according to the magnitude of the Output.

The disadvantage of Long Integer format is that numerical precision will be lost if incoming data is in floating point format. Precison will be lost in the conversion to integer format (eg 26.3 becomes 26). If large numbers are processed, this loss of precision may be negligible (eg 36785.2 becomes 36785).



DESTINATION FILE ICON

FUNCTION:

The Destination File icon represents a file on disk within the PC. This icon can be used as a destination file for data processed through a HyperTrack session and for file to file conversions from within the Post-Processing window.

The Units associated with the Output terminal of the icon which is connected to the Destination File icon Input will be stored with the recorded values.

INPUTS:

Data/Logic Signal: Data or Logic type. The terminal will accept either signal type.

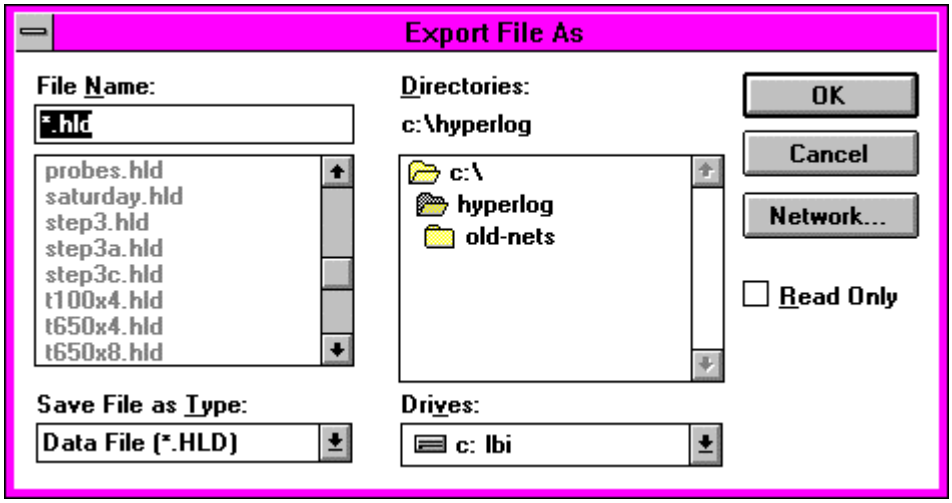
Update Clock: None

Enable: None

OUTPUTS:

Output Signal: Hardware output to file on disk only. No output terminal shown on icon for Program Net connections.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

The standard Windows File Save dialog box format is used during the configuration of the Destination File icon. Conventional Windows commands are used to specify the destination path and filename.

Save File as Type: Specify the file type (and extension) to be used. Three file types are supported as follows:

***.HLD** - This format is the standard HyperLogger Download file format. HyperPlot uses this file format.

***.TXT** - An ASCII file format that can be viewed with any text type editor or wordprocessor such as Notepad (for smaller files).

***.XLS** - The Excel spreadsheet file format.

REAL-TIME SCROLLING DISPLAY ICON

FUNCTION:

The Real-Time Scrolling Display icon represents the HyperTrack Scrolling Display Window in which real-time data values from a HyperLogger are displayed. The Real-Time Scrolling Display icon is used from within the HyperTrack Window during construction of a HyperTrack Net.

The Units associated with the Output terminal of the icon which is connected to the Data File icon Input will be stored with the recorded values.

Double clicking on the icon opens the HyperTrack Scrolling Display Window.

INPUTS:

Data/Logic Signal: Up to eight Data or Logic type. The terminal will accept either signal type. As connections are added to the icon, additional terminals appear, up to a total of 8 channels.

Update Clock: None

Enable: None

OUTPUTS:

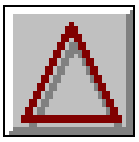
Output Signal: No output terminal shown on icon for Program Net connections.

ICON CONFIGURATION DIALOG BOX:

No Icon Configuration Dialog is available for this icon. Double clicking on the icon opens the HyperTrack Scrolling Display Window.

CONFIGURATION OPTIONS:

No Configuration Options are available.

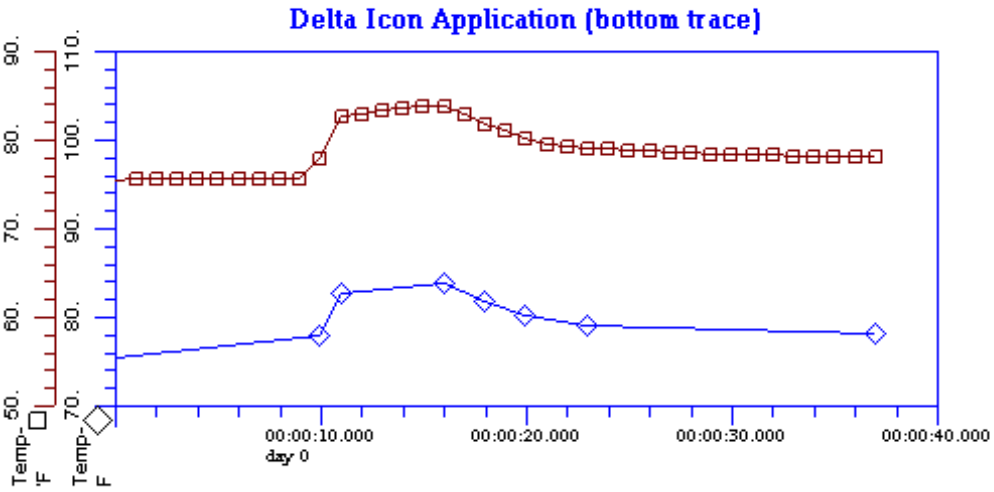


DELTA FUNCTION ICON

FUNCTION:

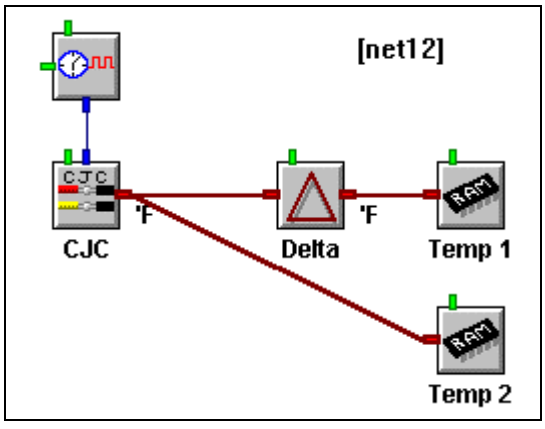
The Delta icon provides a special data processing function that can be used in a Program Net to drastically reduce the number of data samples required to profile an analog signal. The Delta icon only passes data from input to output when the input signal differs from the last passed sample by more than a User defined amount, ie the `delta' value.

When logging data that has periods of relatively stable values mixed with occassional dynamic fluctuations, the Delta icon can reduce the amount of data samples required to profile the curve with a minimum of accuracy compromise.



The data plotted above demonstrates the reduction of data points that is possible with the Delta icon. The Program Net shown below was developed with a Delta icon programmed with a Delta value of 1 degree F. Temperature data was then collected over a few seconds while the temperature sensor was warmed and then allowed to cool. As can be seen, the curve profiles do reflect slight differences (1 degree F maximum deviation), however the number of data samples used is radically reduced with the Delta icon data.

(Note that the curves are displayed with the same temperature scaling but are merely offset for viewing.)



INPUTS:

Data/Logic Signal: Data type.

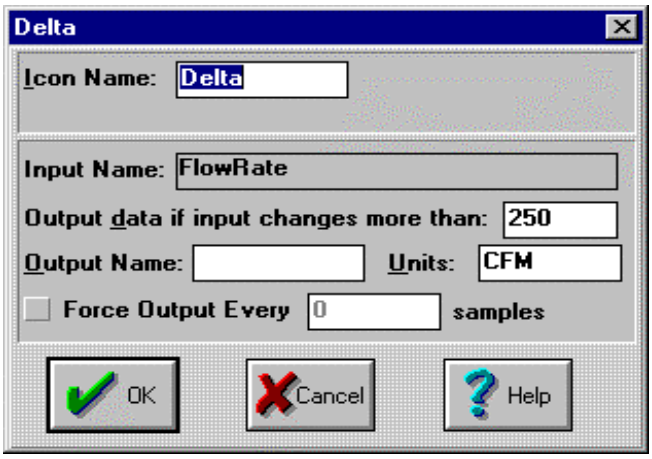
Update Clock: None

Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type. The Delta icon updates its output data when the updated input has changed in magnitude by a User defined `delta' amount in comparison to the last passed sample.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

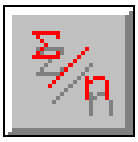
Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's Input. The Output Name can be changed in the other icon's dialog.

Output data if input changes by more than: Enter the `delta' value. For example if the data is to be passed if it changes by more than +/-2 degrees then enter the value of 2.

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon.

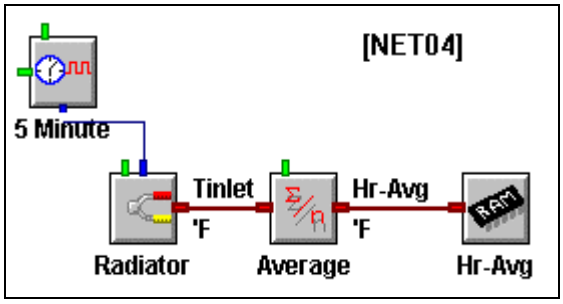
Force Output Every: If this box is checked, a value will output periodically regardless of whether or not the delta value has been exceeded.

AVERAGE FUNCTION ICON



FUNCTION:

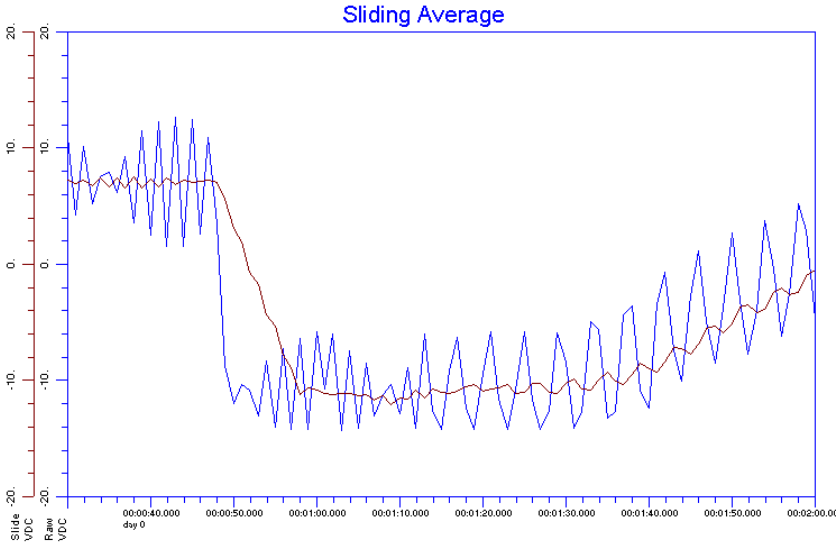
Averages data passing through the icon. The Average icon will accumulate a User specified number of input samples, then calculate and output the average. The Average icon can be used in either of two different modes: *Conventional*, or *Sliding*. These two



modes are described below.

Conventional: For example, if a User wants to take temperature readings every 5 minutes and calculate and store hourly averages, a Program Net as shown could be used. The Thermocouple icon is set to sample every 5 minutes per its attached Sample Rate Clock and the Average icon is configured to average 12 readings (ie 12 readings x 5 minutes = 1 hour) then output.

Sliding: The sliding average can be used to smooth noisy signals. When configured as a sliding average, every time the icon receives an updated input, a new average is calculated and output. The average will be calculated by dropping the oldest value, adding the new value then dividing by the Number of Samples Per Average. The following graph shows two plots of the same noisy input signal. The highly varying trace depicts the raw input which was logged straight to memory. The second, smoother trace was fed through a Sliding Average icon set for 10 samples. The smoothing effect is apparent.



INPUTS:

Data/Logic Signal: Data type.

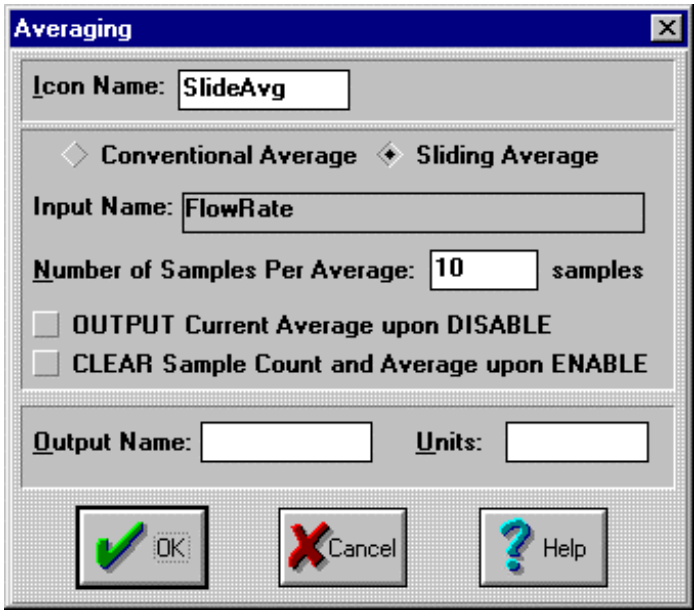
Update Clock: None

Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type. The Average icon updates its output after receiving and averaging the User specified number of readings.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's Input. The Output Name can be changed in the other icon's dialog.

Conventional/Sliding: Select type of Averaging function to perform.

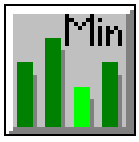
Number of Samples per Average: Specify the number of input readings to average before outputting.

Output current Average upon disable: Check this box to force an output of the in-process average calculation at any time that the icon is disabled. If this box is not checked, upon receipt of a disable signal, the Average calculation will be momentarily suspended until the icon is re-enabled and no in-process value will be output.
For example, if an average is to be calculated over 10 samples but only 7 have been averaged and the icon is disabled, the 7 sample average will be output and the Average calculation will be suspended until re-enabled. Upon re-enable, the calculation will continue and after 3 more samples are received, the 10 sample average will be output (unless the following check box is checked)

Clear Sample Count and Average upon Enable: Check this box to force a reset of the Average calculation as well as the Sample count used used for the calculation upon receipt of an Enable signal.
If this box is not checked, upon receipt of an Enable signal, the Average calculation will proceed from its suspended state (that it entered when it was disabled).

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon.

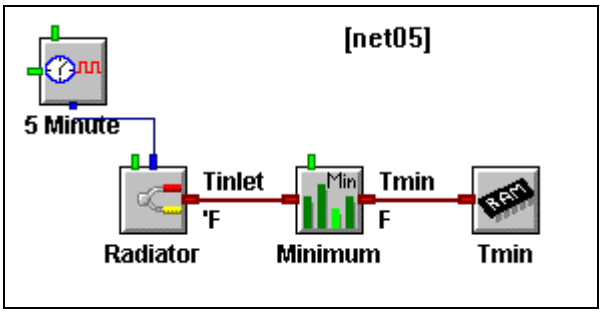
Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.



MINIMUM FUNCTION ICON

FUNCTION:

Detects the minimum data value passing through the icon. The Minimum icon will accumulate a User specified number of input samples, then calculate and output the minimum value received.



For example, if a User wants to take temperature readings every 5 minutes and calculate and store hourly minimums, a Program Net as shown could be used. The Thermocouple icon is set to sample every 5 minutes per its attached Sample Rate Clock and the Minimum icon is configured to analyze 12 readings (ie 12 readings x 5 minutes = 1 hour) then output the minimum.

INPUTS:

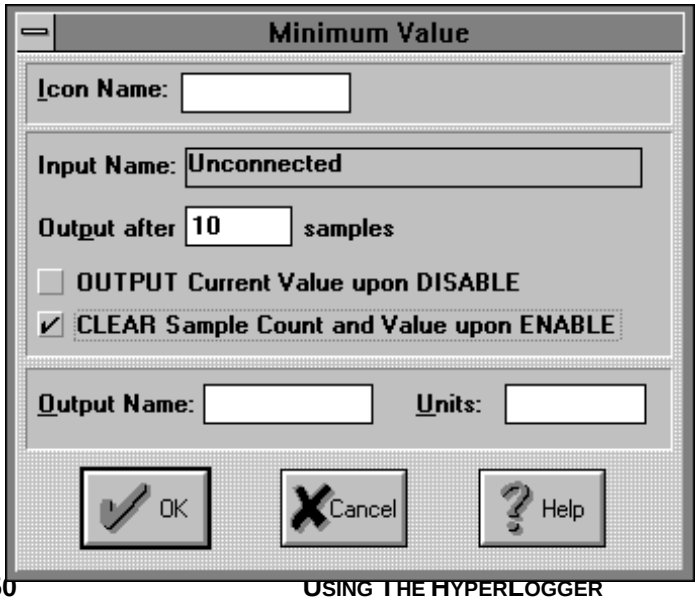
Data/Logic Signal: Data type.

Update Clock: None

Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type. The Minimum icon updates its output with the minimum value after receiving and analyzing the User specified number of readings.



ICON CONFIGURATION DIALOG BOX:

CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's Input. The Output Name can be changed in the other icon's dialog.

Output after __ Samples: Specify the number of input readings to analyze before outputting the minimum value in the group.

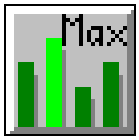
Output current Value upon disable: Check this box to force an output of the current Minimum Value at any time that the icon is disabled. If this box is not checked, upon receipt of a disable signal, the Minimum calculation will be momentarily suspended until the icon is re-enabled and no in-process value will be output.
For example, if a Minimum is to be calculated over 10 samples but only 7 have been analyzed and the icon is disabled, the 7 sample Minimum Value will be output and the Minimum Value detection will be suspended until re-enabled. Upon re-enable, the detection will continue and after 3 more samples are received, the 10 sample Minimum will be output (unless the following check box is checked)

Clear Sample Count and Value upon Enable: Check this box to force a reset of the Minimum Value as well as the Sample count used used for the calculation upon receipt of an Enable signal.
If this box is not checked, upon receipt of an Enable signal, the Minimum analysis will proceed from its suspended state (that it entered when it was disabled).

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon.

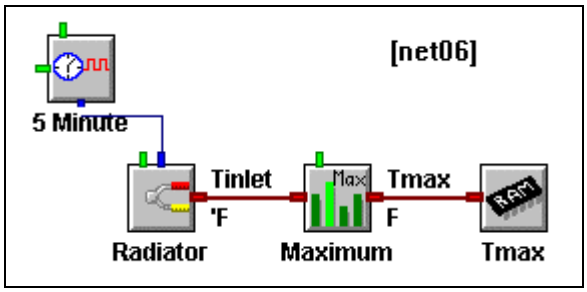
Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

MAXIMUM FUNCTION ICON



FUNCTION:

Detects the maximum data value passing through the icon. The Maximum icon will accumulate a User specified number of input samples, then calculate and output the maximum value of this set of received input values.



For example, if a User wants to take temperature readings every 5 minutes and calculate and store hourly maximums, a Program Net as shown could be used. The Thermocouple icon is set to sample every 5 minutes per its attached Sample Rate Clock and the Maximum icon is configured to analyze 12 readings (ie 12 readings x 5 minutes = 1 hour) then output the maximum value received in this set of 12 readings.

INPUTS:

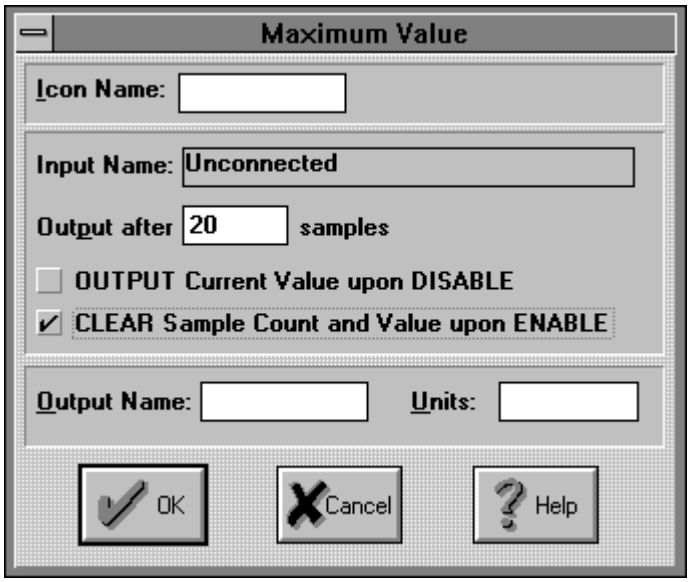
Data/Logic Signal: Data type.

Update Clock: None

Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type. The Maximum icon updates its output with the maximum value after receiving and analyzing the User specified number of readings.



ICON CONFIGURATION DIALOG BOX:

CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's Input. The Output Name can be changed in the other icon's dialog.

Output after __ Samples: Specify the number of input readings to analyze before outputting the maximum value in the group.

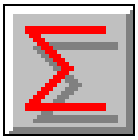
Output current Value upon disable: Check this box to force an output of the current Maximum Value at any time that the icon is disabled. If this box is not checked, upon receipt of a disable signal, the Maximum calculation will be momentarily suspended until the icon is re-enabled and no in-process value will be output.
For example, if a Maximum is to be calculated over 10 samples but only 7 have been analyzed and the icon is disabled, the 7 sample Maximum Value will be output and the Maximum Value detection will be suspended until re-enabled. Upon re-enable, the detection will continue and after 3 more samples are received, the 10 sample Maximum will be output (unless the following check box is checked)

Clear Sample Count and Value upon Enable: Check this box to force a reset of the Maximum Value as well as the Sample count used used for the calculation upon receipt of an Enable signal.
If this box is not checked, upon receipt of an Enable signal, the Maximum analysis will proceed from its suspended state (that it entered when it was disabled).

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon.

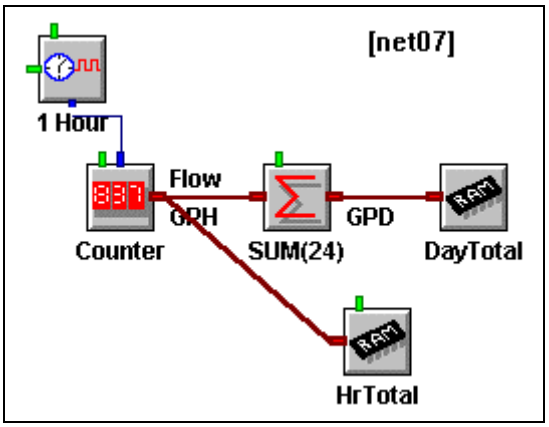
Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

SUM FUNCTION ICON



FUNCTION:

Sums the input values received for a User specified number of input updates.The Sum icon will accumulate a User specified number of input samples, then calculate and output the arithmetic sum of this set of received input values.



For example, if a User wants to record the daily and hourly flow totals from a pulse output flow meter, the above net could be used. Assuming each pulse from the flow meter equals 1 gallon, then the Counter can be set to accumulate pulses for an hour, then output these hourly totals. These hourly totals are stored in memory (Hr-Total) and also fed into the Summing icon. This Sum icon is configured to totalize (sum) 24 inputs, then output the daily sum to memory (the sum of 24, 1 hour totals equals one days total).

INPUTS:

Data/Logic Signal: Data type.

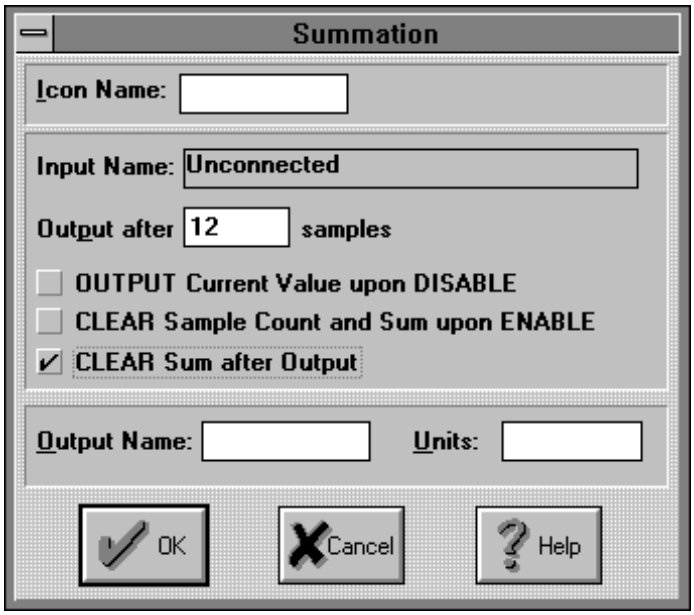
Update Clock: None

Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type. The Sum icon updates its output with the arithmetic sum of the User specified number of input readings.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's Input. The Output Name can be changed in the other icon's dialog.

Output after __ Samples: Specify the number of input readings to totalize before outputting the sum of the input readings.

Output current Value upon disable: Check this box to force an output of the current Sum Value at any time that the icon is disabled. If this box is not checked, upon receipt of a disable signal, the Summation calculation will be momentarily suspended until the icon is re-enabled and no in-process value will be output.
For example, if a Sum is to be calculated over 10 samples but only 7 have been analyzed and the icon is disabled, the 7 sample Summation Value will be output and the Summing calculation will be suspended until re-enabled. Upon re-enable, the summing will continue and after 3 more samples are received, the 10 sample Summation Value will be output (unless the following check box is checked)

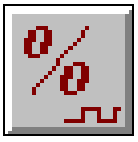
Clear Sample Count and Sum upon Enable: Check this box to force a reset of the Summation Value as well as the Sample count used used for the calculation upon receipt of an Enable signal.
If this box is not checked, upon receipt of an Enable signal, the Summation calculation will proceed from its suspended state (that it entered when it was disabled).

Clear Sum after Output: Check this box to force the Sum Value to be reset to 0 after Output. If this box is not checked, the icon will perform as a totalizer

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon.

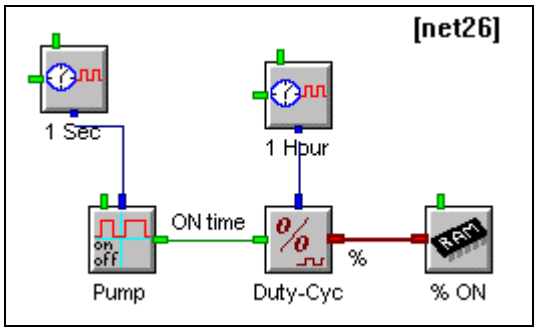
Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

DUTY-CYCLE FUNCTION ICON



FUNCTION:

Calculates the amount of time per a User defined time period, that the input signal is True (on) or False (off). Connected to the LOGIC output of an upstream icon (eg an Event icon) the Duty Cycle icon will determine the accumulated ON or OFF (True/False) time over a User defined time period and output that data value at the end of each period. It is to be used with Logic input signals.



NOTE: For integration of DATA type signals refer to the Integral icon.

For example, to determine the ON time (duty cycle) per hour of a pump in a water supply lift station. The pump power is sensed by an Event input channel which is sampling the pump status (on/off) every second. The Event icon output is connected to the Duty cycle icon input and an Update Clock is connected to the Duty cycle icon Update terminal. The Duty cycle icon Update Clock is set for 1 Hour. The Duty cycle icon then samples its input at a 1 second rate and calculates and outputs the ON (OFF) duty cycle of the input signal upon receipt of an Update Clock pulse (ie every hour).

INPUTS:

Data/Logic Signal: Logic type (true/false).

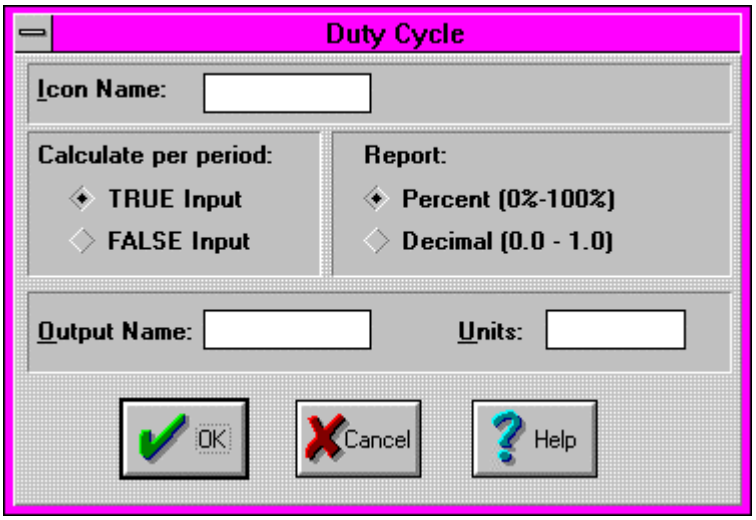
Update Clock: Yes, specifies the time period over which the duty-cycle is calculated

Enable: None

OUTPUTS:

Output Signal: Data type. The Duty-cycle icon updates its output after receiving an Update Command from the connected Update Clock. The Output will be in Percent (ie a number from 0 to 100) or a decimal format (ie a number from 0.0 to 1.0) depending on the User specified Report format within the Configuration Dialog.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

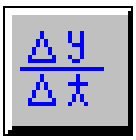
Calculate Per Period: Specify whether True (ON) or False (OFF) time per Period is to be accumulated.

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon.

Report: Specify if the output value is to be in Percent or in a Decimal format.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

RATE OF CHANGE FUNCTION ICON



FUNCTION:

The Rate of Change icon calculates and outputs the rate of change of a signal for a user specified number of samples. A "sliding" calculation is performed each time the input is updated. For example, if the user-entered number of samples is 5, after the 5th sample is taken, the 1st and 5th samples are used for the calculation. The next time sample is taken, the 2nd and 6th are used and so on.

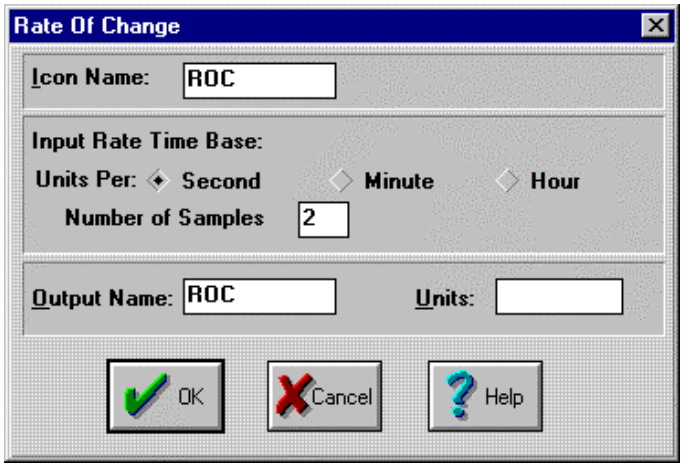
INPUTS:

Data/Logic Signal: Data type.

OUTPUTS:

Output Signal: Data type. The Rate of Change icon updates its output after receiving the user specified number of samples and calculation the Rate of Chnge.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

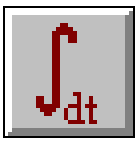
Input Rate Time Base: Specifies ttime base of the output. For example if Seconds is selected and the input is temperature, the output would be the rate of change of the input in degrees per second.

Number of Samples: Specifies the number of samples that defines the time interval used for the calculation.(dtm samples/intervals???).

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

Units: Provides a text box for user entry of a units label that will be shown at the output from this icon

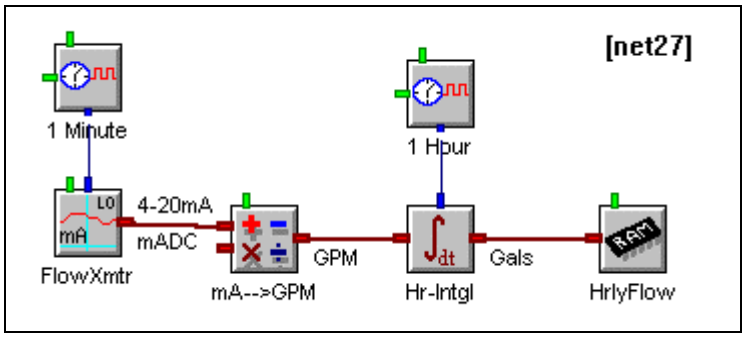
TIME INTEGRATION FUNCTION ICON



FUNCTION:

Calculates the time integral of data type input over a User defined integration period. The Time Integral icon can only be used with DATA type inputs.

NOTE: For LOGIC type input time integration, refer to the Duty-Cycle icon.



For example, the Integral icon can be used in a Net (see above) to determine the hourly flow total of oil through a pipe. The oil flow RATE is sampled every minute by a 4-20mA flow transmitter and the signal is converted to GPM via a Math icon. This flow rate is then connected to the Integral icon which calculates the hourly volume flow by integrating the flow rate over time. The Sample Rate Clock connected to the Integral icon Update terminal determines the integration period.

INPUTS:

Data/Logic Signal: Data

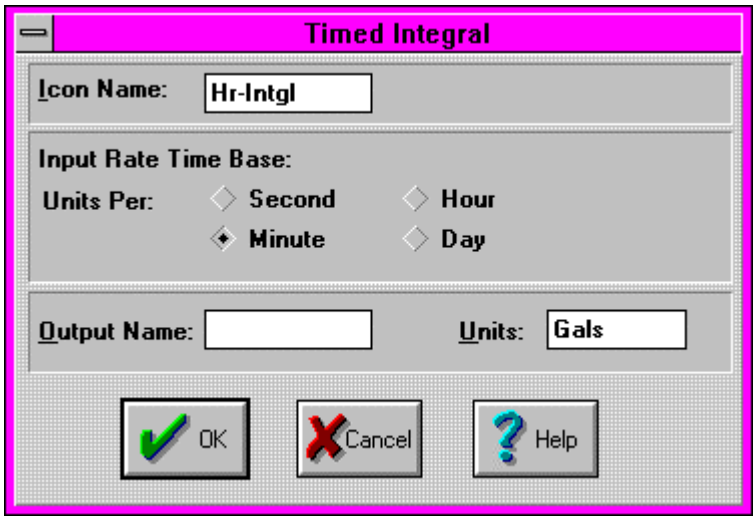
Update Clock: Yes, specifies the time period over which the input signal is integrated

Enable: None

OUTPUTS:

Output Signal: Data type. The Integral icon updates its output with the new integral value after receiving an Update Command from the connected Update Clock.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Input Rate Timebase: Units per...

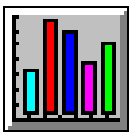
Specify the timebase (ie units per second, per minute, etc) for which the input signal rate is specified. By providing this information, the Net will automatically calculate the correct unit volume output based on the integration period. In the above example, the flow rate was in GPM. With a 1 hour integration period specified (by the User connected Rate Clock), the Net will automatically generate the correct volume output.

If a timebase other than seconds, minutes, hours, or days is used, the rate (Integral icon input) can be scaled by a math icon prior to connection to the Integral icon to bring the timebase within the possible timebase selections.

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon.

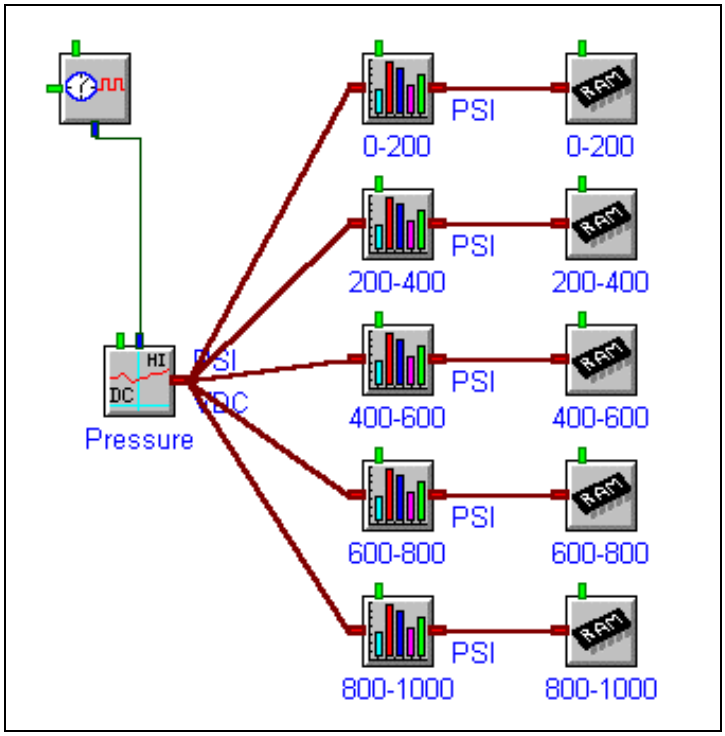
Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

HISTOGRAM FUNCTION ICON



FUNCTION:

The Histogram icon compares its input value with a user specified range. If the input value falls within the range, its internal counter is incremented. When a user specified number of inputs have been compared, the icon outputs its count.



For example, in the net shown above, five different Histogram icons are being used to monitor how often the pressure input falls within five different ranges. Each icon is set to compare the same number of samples before outputting its count.

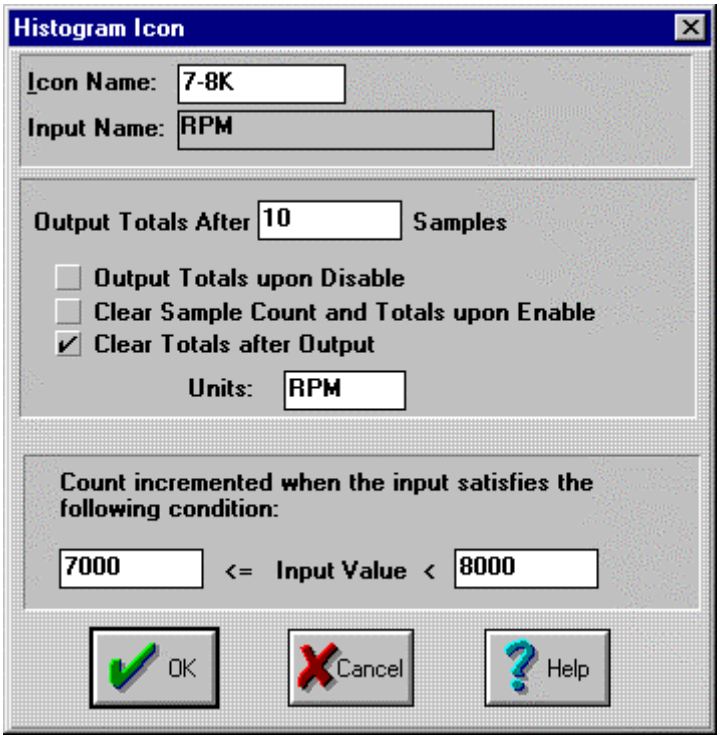
INPUTS:

Data/Logic Signal: Data type.

OUTPUTS:

Output Signal: Data type. The Histogram icon outputs it count after receiving the user specified number of samples.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's input. The Output Name can be changed in the other icon's dialog.

Output Totals After ___ Samples: When the number of samples specified have been received and compared, the icon will output the count of how many samples fell within the specified range.

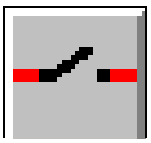
Clear Sample Count and Totals upon Enable: The icon keps track of how many samples it has compared, as well as how many fell into the specified range. Check this box to force a reset of both counts upon receipt of an enable signal.

Clear Totals After Output: Check this box to force the icon to clear the count after it is output.

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon.

Count incremented when the input satisfies the following conditions: Specifies the range that the input must fall within in order to increment the icon's counter.

REMOTE CONTROL FUNCTION ICON



FUNCTION:

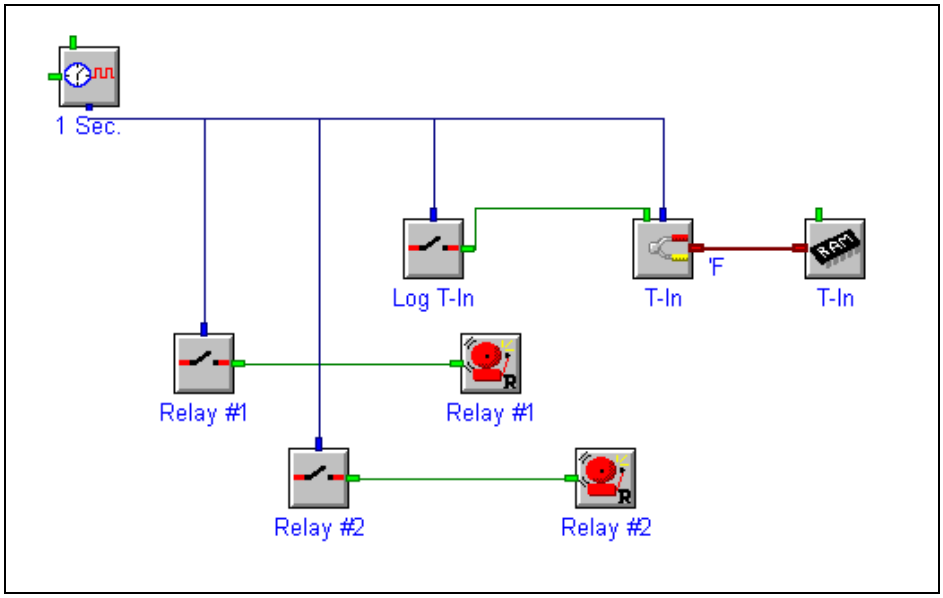
The Remote Control icon has a logic output that can be controlled real-time by the user. This output can be connected to the logic input of any other icon.

INPUTS:

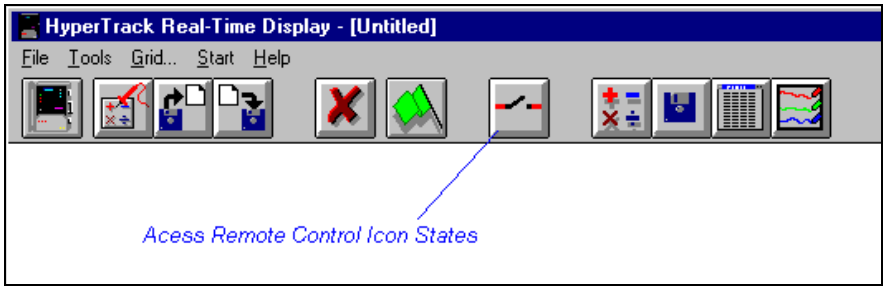
Update Clock: Output is updated to the last user selected state upon each Update clock pulse. For example, it the connected Update clock is set for 60 sec., and the output state is changed by the user via HyperWare(described below), the actual state of the output will not update until the icon receives an Update pulse which may be up to 60 seconds later.

OUTPUTS:

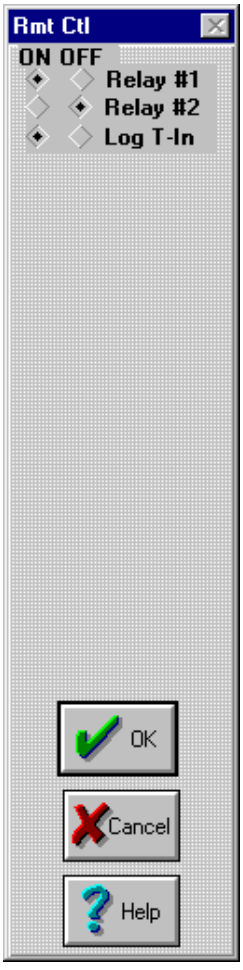
Output Signal: Logic type. The Remote Control icon updates its output after receiving a user generated command to do so from HyperWare.



For example, the portion of a net program depicted above shows posible uses for the Remote Control icon.The Remote Control icons labeled “Relay #1” and “Relay #2” are connected to the logger’s relay output icons. This would enable the user to control the state of the logger’s hardware relay outputs real-time. The Remote Control icon labled “Log T-In” is connected to the Enable input on a Thermocouple icon which is set to log data to memory. Whenever the Thermocouple’s enable input is ON, the channel will sample. Conversely, if its Enable input is OFF, it will not sample. This setup allows the user to turn on different portions of a net program at will

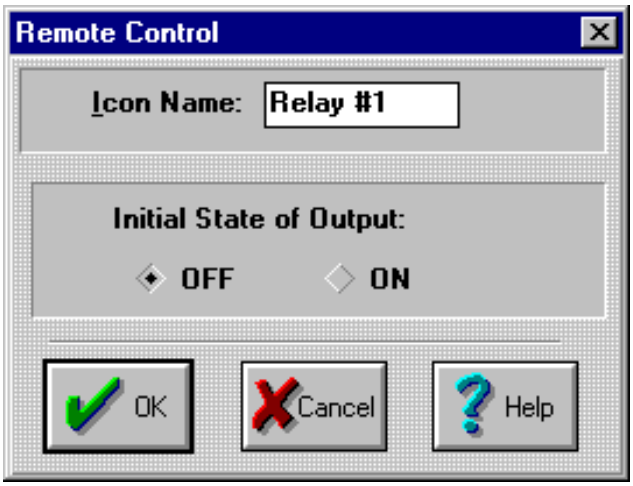


Remote Control icons can be accessed from the HyperTrack Real Time Display window. The button used to monitor/change the states of Remote Control icons is shown above. Clicking this button will cause HyperWare to query the logger for the names and corresponding states of its Remote Control icons. HyperWare will then display the following dialog box.



The states of each icon can then be selected. Clicking “OK” will cause HyperWare to sent the appropriate commands to the logger, telling it to update the Remote Control Ions accordingly.

ICON CONFIGURATION DIALOG BOX:

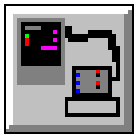


CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Initial State: This is the state of the icon's output uon enabling

HAP FUNCTION ICON



FUNCTION:

The HAP icon is used in conjunction with the Logic Beach HyperWare Automation Program (HAP) application. Hap is a stand-alone application separate from HyperWare, that automates most of HyperWare's communication functions. .. When the HAP icon's input goes TRUE, the icon will initiate communication with a PC that is running the HAP application.The icon will tell HAP which functions to perform. based on the information entered in the configuration dialog. HAP will then proceed to perform those functions.

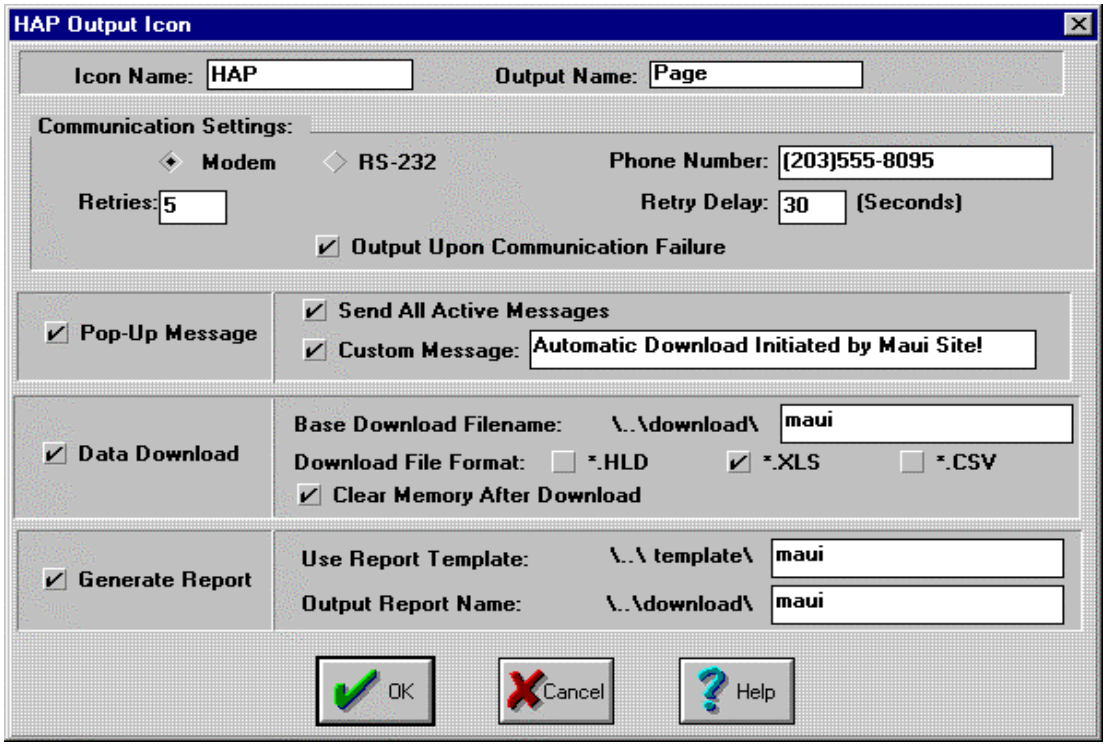
INPUTS:

Data/Logic Signal: Data type.

OUTPUTS:

Output Signal: Data type(Optional). The HAP icon turns on its output if it was unable to connect to HAP. The output will remain ON untill the next time the HAP icon fires off

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

Modem/RS-232: Specifies the type of communication

Phone Number: This is the phone number that will be called if telephone modem communication is selected.

Retries: If a call is unsuccessful, the dialing sequence will be repeated the specified number of times.

Retry Delay: If a call is unsuccessful, the logger will wait the specified time before attempting again.

Output Upon Communication Failure: Checking this box will cause an output to appear. This outup goes TRUE if a the logger fails to connect to the PC.

Pop-Up Message: Causes a pop-up message. to be displayed on the PC running HAP. This message will contain some basic header information as well as the following if selected.

Send All Active Messages: If this bo is cheked, the Pop-up message will contain all active system messages.

Custom Message: If this box is checked a custom message can be entered.

Data Download: Check this box to perform a download of logger memory.

Base Download Filename: Specifies the first few characters of the downloaded filename. HAP will append the base filename with "__last". If a file with that name already exists, hap will rename the older file to the base filename appended with __X where X is a number

Data Download File Format, *HLD/*XLS/*CSV: Specify the output file type.

Clear Memory After Download: Check this box to clear memory after the data is downloaded.

Generate Report: Check this box to generate an Excel report.

Use Report Template Name: Specify the report template to use. This template must be generated using HAP

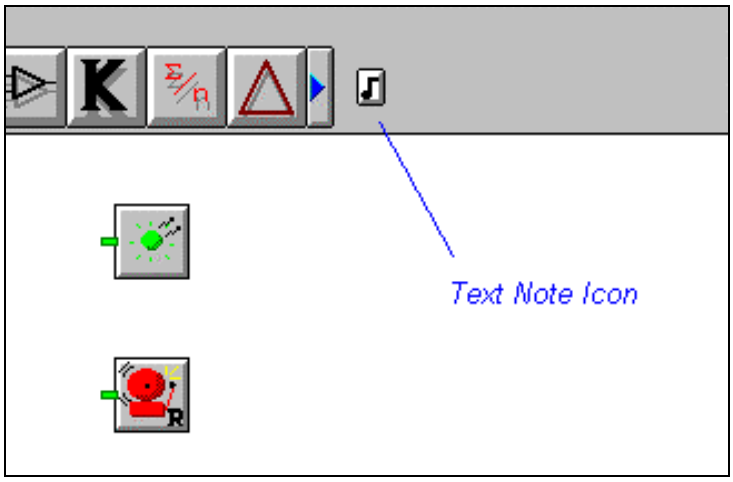
Output Report Name: Name of the report file

.

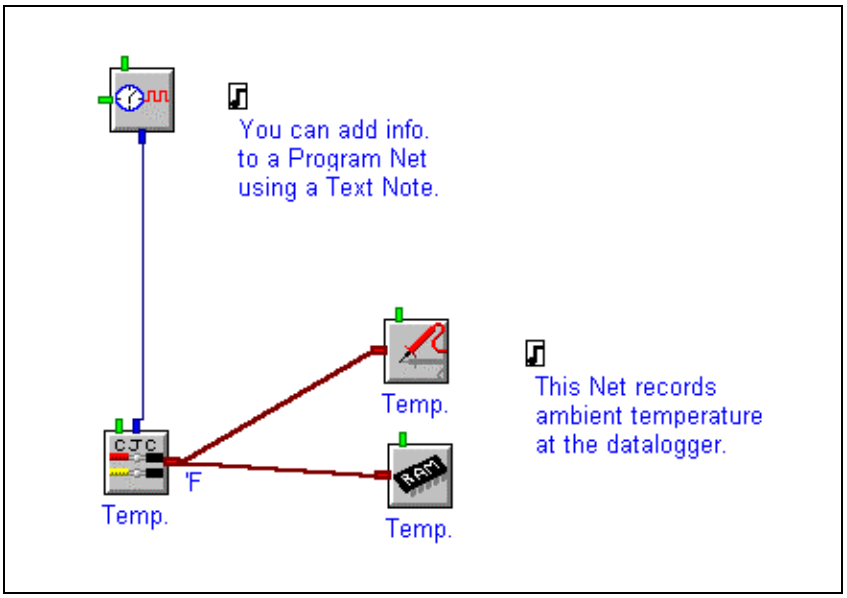
TEXT NOTE ICON

FUNCTION:

The Text Note icon provides a means to add user comments to a specific portion of a net program. The Text Note icon is located at the right-hand end of the sipnnable toolbar as depicted below.



The Text Note is not the same as other icons in that it doesn't actually process any data. It only displays text within the net program. Although the icon does not perform any function when the net program is run, it is an integral part of the net and remains intact when uploaded/downloaded to the logger. An example of a net that contains Text Note icons is shown below.



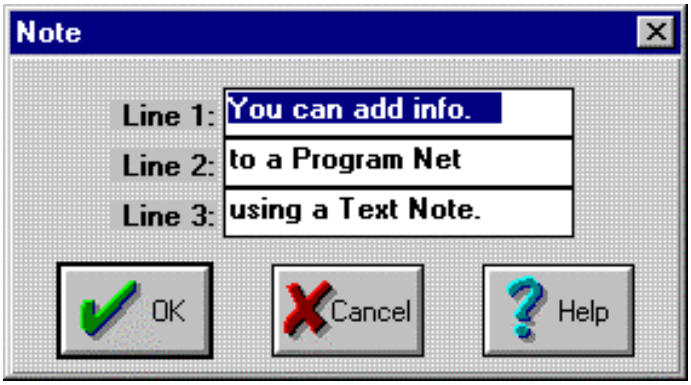
INPUTS:

None

OUTPUTS:

None.

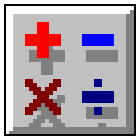
ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

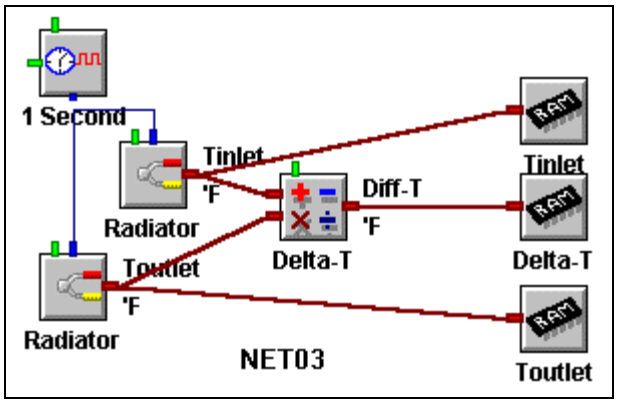
Lines 1,2 & 3: Simply enter the text that is to be displayed into the three boxes.

MATH FUNCTION ICON



FUNCTION:

The Math icon accepts one or two input signals, performs a User defined mathematical calculation, then outputs the result. Equations are entered by the User and optionally saved to a User-Defined math library. A Pre-Defined library of special equations is also provided.



For example, if a User wants to calculate the temperature differential across a heat exchanger radiator and store this `math channel' to memory, a Net as shown above might be used.

INPUTS:

Data/Logic Signal: One or Two Data type. If only one input is used, the other input should be left unconnected.

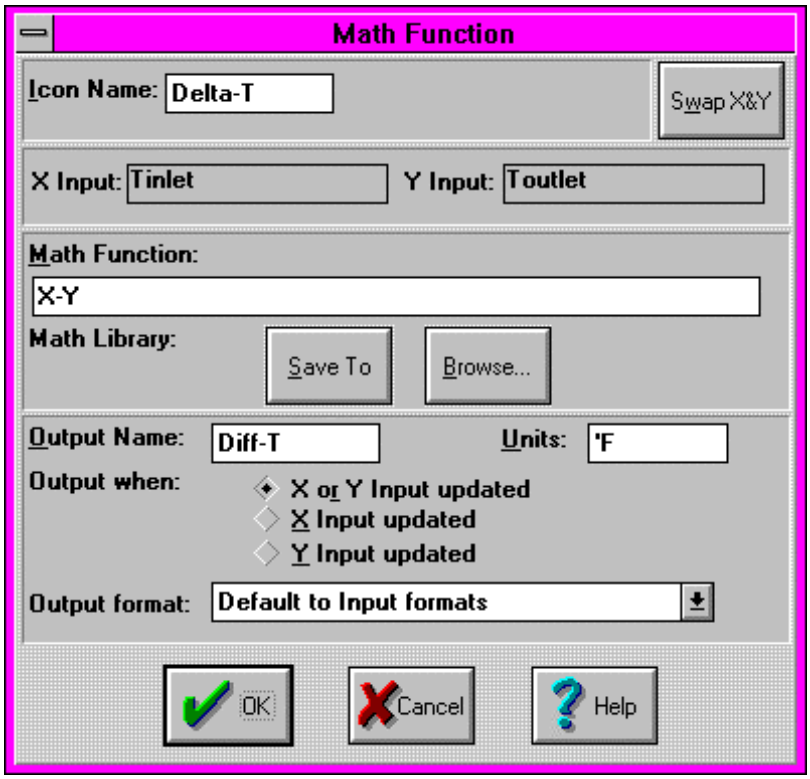
Update Clock: None

Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type. The Math calculation result.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

X and Y Input Name: In this box, HyperNet displays the Output Names of the icons connected to this icon's Inputs. The Output Names can be changed in the other icons' dialogs.

Swap X and Y: Clicking on the SWAP button swaps the X and Y input connections. The change is reflected in the X and Y Input Name boxes as well as in the actual Program Net where the connections are redrawn.

Math Function: A text box is provided for entry of the equation to be calculated. In the equation, use X and Y to represent the values at the X and Y inputs. Supported math functions, their Syntax, and Explanations are provided in the following table:

FUNCTION	SYNTAX	EXPLANATION
Addition	X+7	Adds 7 to Input X
Subtraction	X-20	Subtracts 20 from Input X
Multiplication	X*1.2	Multiplies X times 1.2
Division	X/2	Divides X by 2
Exponentiation	X^3	X cubed
Exponential	EXP(X)	e to Xth power
Parenthesis	2*(X-Y)	2 times the difference of the X Input minus the Y Input
Square	SQR(Y)	Y squared
Square Root	SQRT(X)	Square root of X

Absolute Value	ABS(Y)	Absolute value of Y
Zeroize	ZERO(X)	Zero if X is negative, X otherwise
Natural Log	LOG(Y)	Natural log of Y
Log Base 10	LOG10(X)	Base 10 log of X
Sine	SIN(Y)	Sine of Y
Cosine	COS(X)	Cosine of X
Tangent	TAN(Y)	Tangent of Y
ArcCosine	ACOS(X)	ArcCosine of X
ArcSine	ASIN(X)	ArcSine of X
ArcTangent	ATAN(X)	ArcTangent of X
ArcTangent2	ATAN2(Y)	ArcTangent2 is accurate for values of X very close to and equal to 0
TC converter[1]	TC_J(X,Y)	Temperature calculation using type J thermocouple input in mV (X) and CJC input in ohms(Y)
TC converter	TC_K(X,Y)	Same as above for type K
TC converter	TC_E(X,Y)	Same as above for type E
TC converter	TC_T(X,Y)	Same as above for type T
TC converter	TC_R(X,Y)	Same as above for type R
TC converter	TC_S(X,Y)	Same as above for type S

Math Library: A math function library is provided for storing User defined equations that may be used frequently.

To save a function, enter the equation in the Math Function text box, then select *Save To*. A dialog will open allowing for User entry of a short comment about the function to be saved. After entry of the comment, selecting OK saves the function to the User Function Library for future recall.

To retrieve a function for use, select *Browse* and a dialog will open allowing access to the Pre-Defined Library equations (provided with HyperWare and not editable by the User) as well as the User-Defined Library where User added equations are retained. Highlight the equation and click on *Use* and the function will be loaded into the Math Function text box.

Functions can be deleted by highlighting, then clicking on the *Remove* button.

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

Output When: Defines when the Output is updated. If inputs to the icon are updated at different times/rates (asynchronously), the User can specify when the Output should be updated.

X or Y Updated - The Output is updated if either the X or the Y inputs are Updated.

[1] See Example Nets in Appendix xxx for application ideas on use of the TC Converter functions.

X input Updated - The Output is updated only when the X input is Updated. If a calculation is performed that uses the Y input, the last Y input value will be used in the calculation and the Output will be updated.

Y input Updated - The Output is updated only when the Y input is Updated. If a calculation is performed that uses the X input, the last X input value will be used in the calculation and the Output will be updated.

Output Format: The User can specify the data format for the Output from the icon. In certain applications, additional processing speed and/or less memory per stored sample can be realized.

Default to Input Formats - the default format. The data will be passed using the same data format as the Inputs use. Note that if inputs are received as integers, operations resulting in a decimal component (eg division) will be output as integers with corresponding loss of precision (trunction of decimal). If this is of concern, utilize the Floating Point format.

Floating Point - The Output data will be of Floating point format. Floating Point format includes both the integer and decimal components (XXX.XXX) of the calculation result.

Advantages of Floating Point mode:

1. This format will result in outputs that have no loss in precision.

Disadvantages of Floating Point mode:

1. Calculations will perform slower than Long Integer mode. The calculation speed may be 10x slower per operation than using Long Integer mode.
2. If the Output is connected to a Memory icon, Floating Point mode will always use 4 bytes for data storage.

Long Integer - The Input data will be converted to integer format, then the calculation will be performed and output in signed Integer format. Signed Integer format includes only the digits to the left of the decimal (XXXXX.)

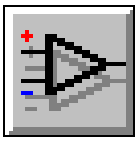
Advantages of Long Integer mode:

1. Calculations will perform faster. Processing throughput rates may be up to 10 times faster (per operation) than the equivalent calculation using floating point math.
2. If the Output is connected to a Memory icon, Long Integer mode will generally utilize a fewer number of bytes for data storage. The number of bytes will dynamically size, from 1 to 4 bytes, according to the magnitude of the Output.

Disadvantages of Long Integer mode:

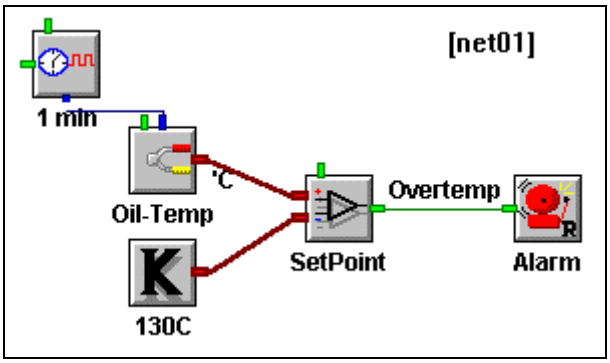
1. Input numerical precision will be lost if incoming data is in floating point format. Precison will be lost in the conversion to integer format (eg 26.3 becomes 26). If large numbers are processed, this loss of precision may be negligible (eg 36785.2 becomes 36785).
2. Calculation results will be truncated to integers, hence any decimal components will be lost (eg 10/3=3.33333 but will be output as the integer 3). If large numbers are processed and/or operations are performed that will not have decimal results (addition,subtraction, multiplication, etc), this loss may be negligible.

COMPARATOR (SETPOINT) FUNCTION ICON



FUNCTION:

The Comparator icon performs a comparison between its X and Y inputs and Outputs a Logic (True/False) signal depending on the result of the comparison. If the X input is greater than the Y input, the Output is True. If the X input is less then the Y input, the Output is False.



In the above net, when the temperature of the engine oil exceeds 130C, the relay output will be energized. The Comparator has been configured with hysteresis of 10 degrees. When the temperature drops to below 120C (130-10), the alarm will be turned off.

NOTE: Optionally utilize the Latch icon between the Comparator and the Alarm to latch the Alarm ON once it turns on.

INPUTS:

Data/Logic Signal: Two Data type inputs are required for operation.

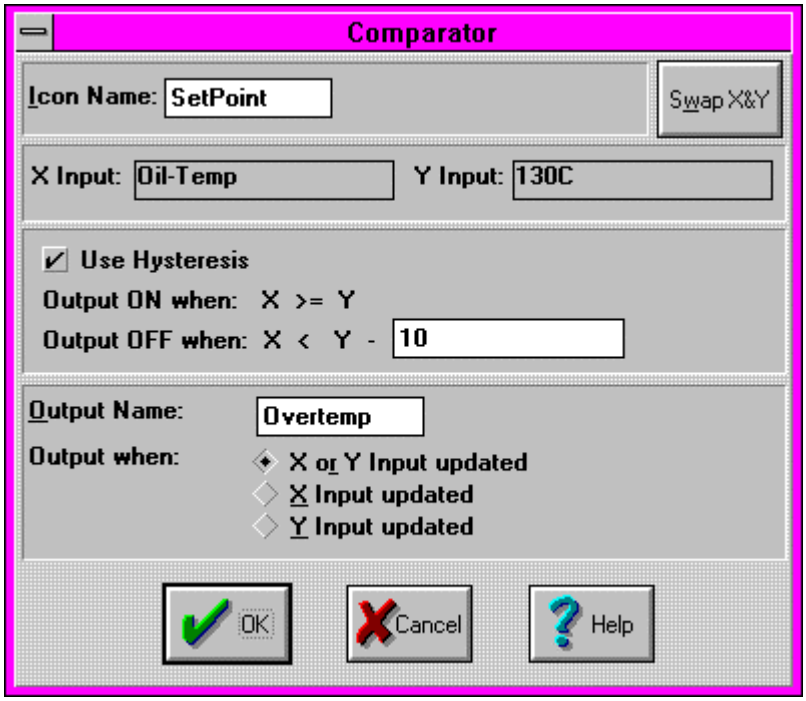
Update Clock: None

Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Logic type.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

X and Y Input Name: In this box, HyperNet displays the Output Names of the icons connected to this icon's Inputs. The Output Names can be changed in the other icons' dialogs.

Swap X and Y: Clicking on the SWAP button swaps the X and Y input connections. The change is reflected in the X and Y Input Name boxes as well as in the actual Program Net where the connections are redrawn.

Comparator Function: When the configuration dialog appears, the comparator is configured to perform a simple comparison between X and Y, if X is greater than or equal to Y, the Output is ON.

If the Hysteresis box is checked, an additional line is displayed with a text box for entry of hysteresis (ie deadband) which is then included in the comparison function. As shown, a Hysteresis of 10 degrees has been specified. In this case, when the oil temperature rises to equal or greater than 130C, the Output will turn ON. When the temperature of the oil drops to less than 120C, the output will turn OFF.

Hysteresis is commonly used to prevent short cycling due to quick dynamic system response and/or signal fluctuations and noise/jitter.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

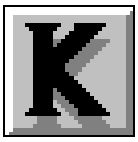
Output When: Defines when the Output is updated. If inputs to the icon are updated at different times/rates (asynchronously), the User can specify when the Output should be updated.

X or Y Updated - The Output is updated if either the X or the Y inputs are Updated.

X input Updated - The Output is updated only when the X input is Updated. If a calculation is performed that uses the Y input, the last Y input value will be used in the calculation and the Output will be updated.

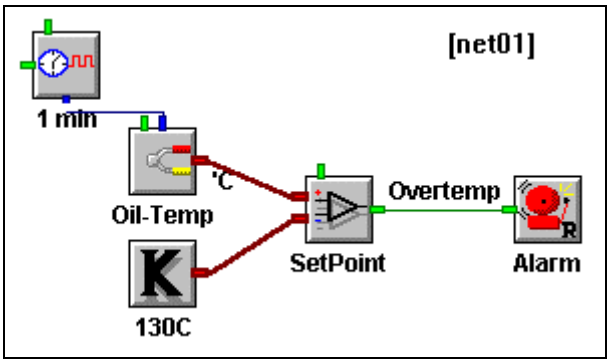
Y input Updated - The Output is updated only when the Y input is Updated. If a calculation is performed that uses the X input, the last X input value will be used in the calculation and the Output will be updated.

CONSTANT FUNCTION ICON



FUNCTION:

The Constant icon represents a fixed User defined value. A typical application for the Constant is as a threshold for use with the Comparator icon as shown below.



In the above net, when the temperature of the engine oil exceeds 130C, the relay output will be energized.

INPUTS:

Data/Logic Signal: None.

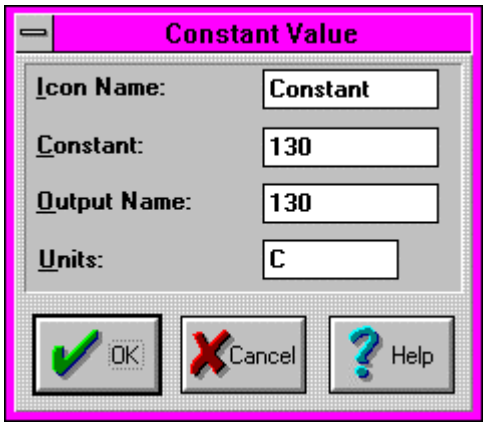
Update Clock: None

Enable: None

OUTPUTS:

Output Signal: Data type, fixed value of User definition.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

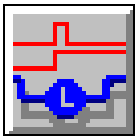
Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Constant: Enter the constant value in this text box.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

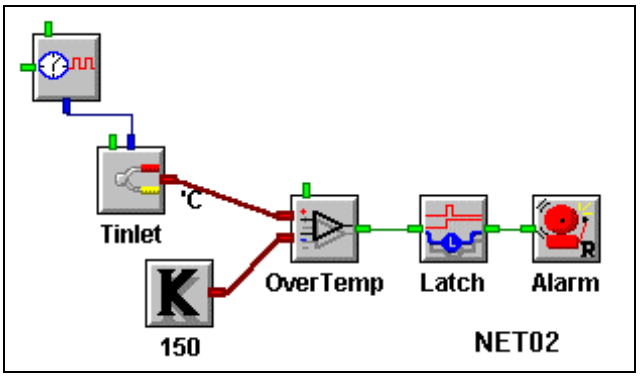
Units: Provides a text box for User entry of a units label that will be shown at the output from this icon.

LATCH FUNCTION ICON



FUNCTION:

The Output turns ON and stays ON when the Input transitions from OFF to ON. The Latch icon is commonly used in front of an Alarm output icon to force the Alarm to stay ON once it is turned ON (see following Net).



INPUTS:

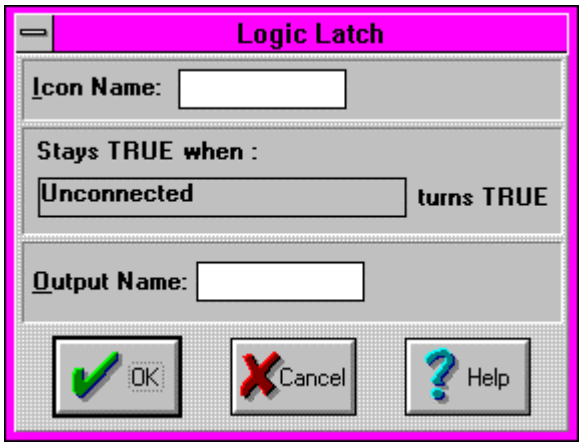
Data/Logic Signal: Logic (True/False) type.

Update Clock: None

OUTPUTS:

Output Signal: Logic type.

ICON CONFIGURATION DIALOG BOX:



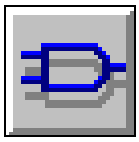
CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Stays TRUE when _____ turns TRUE: The Ouput name of the icon connected to the Latch icon input is displayed in this function statement.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

AND LOGIC FUNCTION ICON



FUNCTION:

The Output turns TRUE *ONLY* when both of the Inputs are TRUE. If either or both of the Inputs are FALSE, the Output is FALSE.

INPUTS:

Data/Logic Signal: Two Logic (TRUE/FALSE) type.

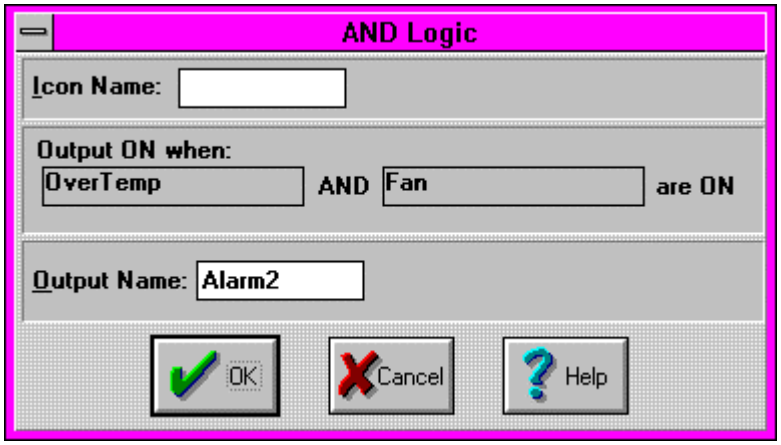
Update Clock: None

Enable: None

OUTPUTS:

Output Signal: Logic type.

ICON CONFIGURATION DIALOG BOX:



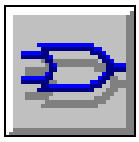
CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Output TRUEwhen: _____ AND _____ are TRUE: HyperNet completes this functional statement using the names of the Outputs from the icons that are connected to this AND icon's Inputs.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

OR LOGIC FUNCTION ICON



FUNCTION:

The Output turns TRUE when either of the Inputs are TRUE. If both of the Inputs are OFF, the Output is OFF.

INPUTS:

Data/Logic Signal: Two Logic (True/False) type.

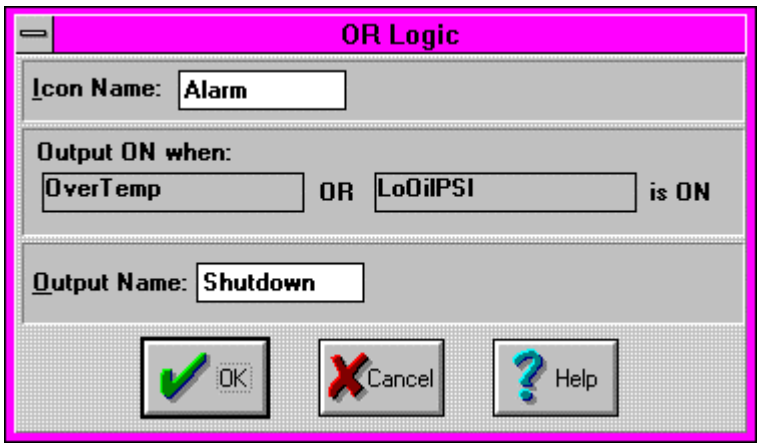
Update Clock: None

Enable: None

OUTPUTS:

Output Signal: Logic type.

ICON CONFIGURATION DIALOG BOX:



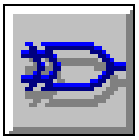
CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Output TRUEwhen: _____ OR _____ is TRUE: HyperNet completes this functional statement using the names of the Outputs from the icons that are connected to this OR icon's Inputs.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

XOR (EXCLUSIVE OR) LOGIC FUNCTION ICON



FUNCTION:

The Output turns TRUE when the state of the two Inputs are different, ie *ONLY ONE* of the Inputs is TRUE. If neither or both of the Inputs are TRUE, the Output is FALSE.

INPUTS:

Data/Logic Signal: Two Logic (True/False) type.

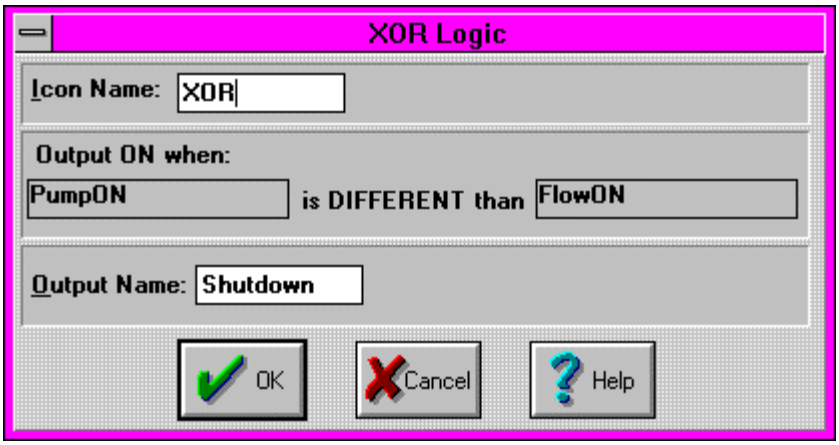
Update Clock: None

Enable: None

OUTPUTS:

Output Signal: Logic type.

ICON CONFIGURATION DIALOG BOX:



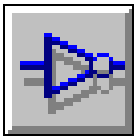
CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Output TRUE when: _____ is DIFFERENT than _____: HyperNet completes this functional statement using the names of the Outputs from the icons that are connected to this XOR icon's Inputs.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

NOT (INVERTER) LOGIC FUNCTION ICON



The NOT icon inverts the signal as it passes through. When the Input isTrue the Output is False. When the Input is False, the Output is True.

INPUTS:

Data/Logic Signal: Logic (True/False) type.

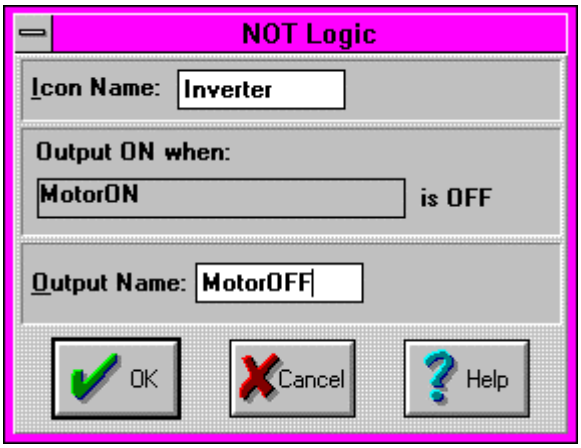
Update Clock: None

Enable: None

OUTPUTS:

Output Signal: Logic type.

ICON CONFIGURATION DIALOG BOX:



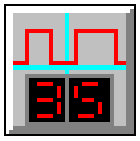
CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Output True when _____ is False: HyperNet completes this functional statement using the name of the Output from the icon that is connected to this NOT (inverting) icon's Inputs.

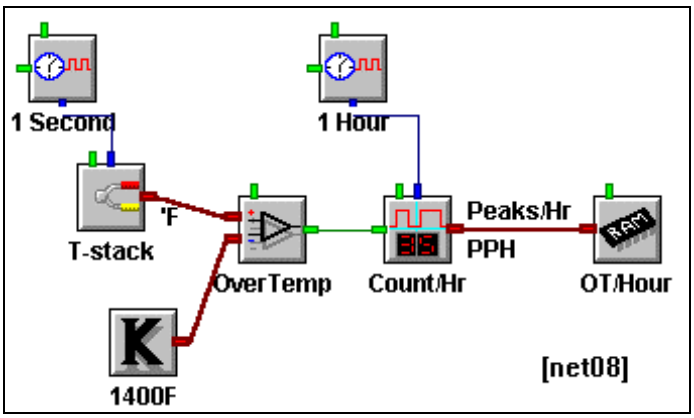
Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

TIMED COUNTER FUNCTION ICON



The Timed Counter is a software counter that can be used within a Net for accumulating transitions over a fixed period of time(for example: counting pulses received per hour). In concept, this icon performs a similar function as a hardware counter input such as the GPDI in the Counter mode. However, the difference is that the Timed Counter is a software version that can be used to count transitions received from other software icons such as the Comparator.

The icon is has an Update Clock input that specifies the time period over which it is to accumulate the transitions received on its Input. The Net shown below counts the number of times per hour a temperature exceeds the 1400F threshold and stores this *OverTemps per hour* value in memory.



INPUTS:

Data/Logic Signal: Logic (True/False) type.

Update Clock: Specifies the period of time over which the count is accumulated. When an Update command is received, the current count is output and counting resumes (optionally it can be reset to 0 before counting resumes)

Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type. The accumulated count is output.

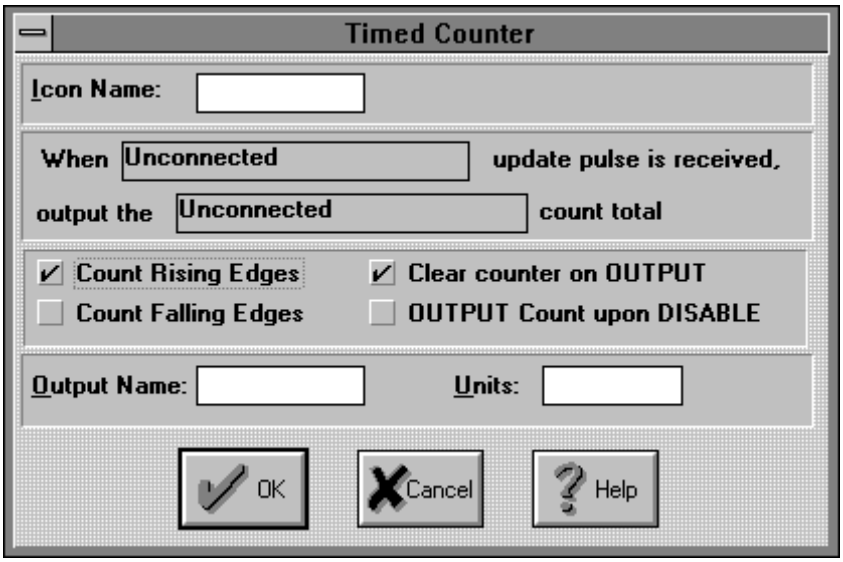
ICON CONFIGURATION DIALOG BOX:

CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

When _____ Update pulse is received, output the _____ count total: HyperNet completes this functional statement using the names of the Outputs from the icons that are connected to this Counter icon's Enable and Signal Inputs.

Clear Counter on Output: If this check box is checked, after the accumulated count total is passed to the Output, the total will be cleared and counting will restart from 0. If the box is not checked, counting will be cumulative, adding on to the current total.



Count Rising / Falling Edges: The Up Counter increments its accumulated count when its input changes state. The User can use this option to specify whether Rising (False to True) or Falling (True to False) transitions (edges)are to be counted.

Output Count upon disable: Check this box to force an output of the accumulated Count at any time that the icon is disabled. If this box is not checked, upon receipt of a disable signal, the Counting function will be momentarily suspended until the icon is re-enabled and no in-process value will be output.

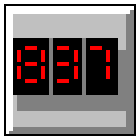
For example, if a Count is to be output when a one hour Update Pulse has been received but only 20 minutes have gone by and the icon is disabled, the 20 minute sample Count total will be output and the counting function will be suspended until re-enabled. Upon re-enable,counting will continue and after 40 more minutes, the hourly Count Total will be output (unless the following check box is checked)

Count Rising / Falling Edges: The Timed Counter increments its accumulated count when its input changes state. The User can use this option to specify whether Rising (False to True) or Falling (True to False) transitions (edges)are to be counted.

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon. Conversion to other units can be performed within a Program Net by adding a Math Icon onto this icon's output.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

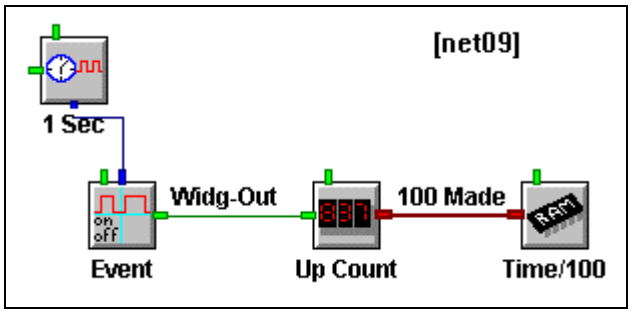
UP COUNTER FUNCTION ICON



The Up Counter is a software counter that can be used within a Net to count up to a User defined count value, then output the count. After outputting the count, the Up Counter clears the counter and starts counting up again.

An example application follows:

An input signal (logic) is generated every time a widget is produced on a production line. The User wants to log the time to produce 100 widgets. With the Up Counter programmed to 100, every time 100 event inputs are accumulated, the icon will output the value 100 to memory.



INPUTS:

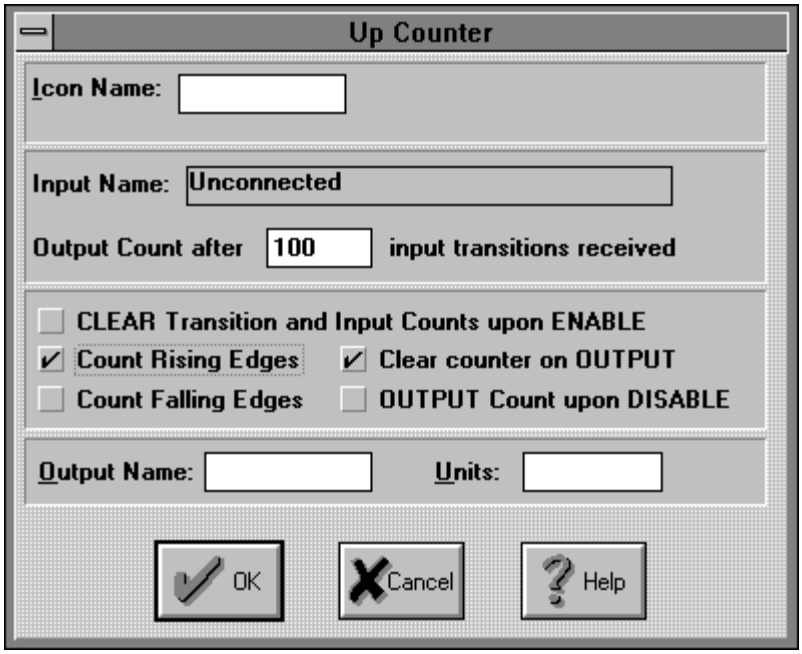
Data/Logic Signal: Logic (True/False) type.

Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Data type. The accumulated count is output.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Input Name: In this box, HyperNet displays the Output Name of the icon connected to this icon's Input. The Output Name can be changed in the other icon's dialog.

Output Count after ____ input transitions received: When the number of transitions received on the Up Counter's Input equals this User supplied value, the value is passed to the Output and the count resumes again at 0.

Count Rising / Falling Edges: The Up Counter increments its accumulated count when its input changes state. The User can use this option to specify whether Rising (False to True) or Falling (True to False) transitions (edges)are to be counted.

Output Count upon disable: Check this box to force an output of the accumulated Count at any time that the icon is disabled. If this box is not checked, upon receipt of a disable signal, the Counting function will be momentarily suspended until the icon is re-enabled and no in-process value will be output.
For example, if a Count is to be output after 100 samples have been received but only 60 have been received and the icon is disabled, the 60 sample Count total will be output and the counting function will be suspended until re-enabled. Upon re-enable,counting will continue and after 40 more samples are received, the 100 sample Count Total will be output (unless the following check box is checked)

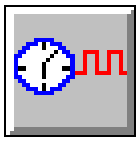
Clear Transition and Input Counts upon Enable: Check this box to force a reset of the accumulated Count Total as well as the Sample count used used for the calculation upon receipt of an Enable signal.
If this box is not checked, upon receipt of an Enable signal, counting calculation will proceed from its suspended state (that it entered when it was disabled).

Clear Counter on Output: Check this box to force the Count Value to be reset to 0 after Output. If this box is not checked, the icon will perform as a counting totalizer

Units: Provides a text box for User entry of a units label that will be shown at the output from this icon. Conversion to other units can be performed within a Program Net by adding a Math Icon onto this icon's output.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

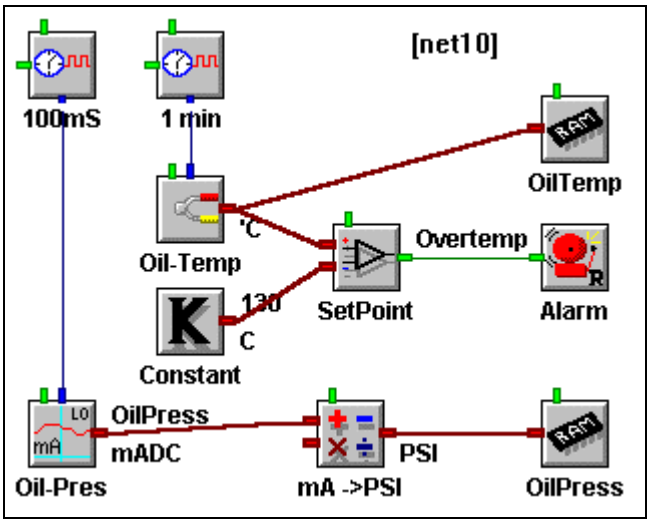
SAMPLE RATE CLOCK FUNCTION ICON



The Sample Rate Clock icon generates the Update signal/command used throughout Nets to set Sampling Rates of the different input type icons. (The icon derives its clock rate from a HyperLogger internal clock.)

When the Sample Rate Clock generates an Update command, it causes the connected icons to read their inputs, process the signal accordingly, then Update their Outputs. Sample Rate Clocks within a Net set the pace at which the various branches of the Program Net sequence.

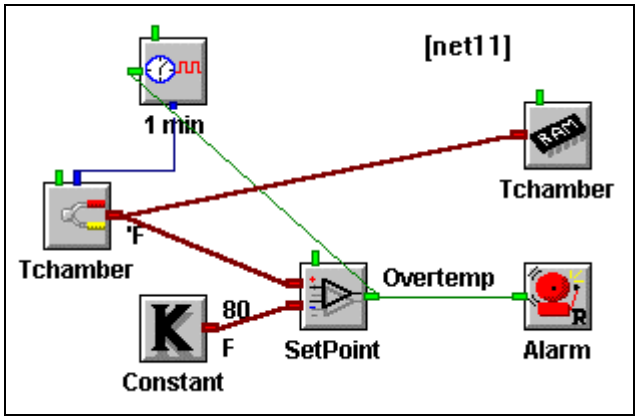
Multiple Sample Rate Clocks can be used within a single Program Net to provide different sampling rates.



INPUTS:

Alternate Rate Input: Logic type input. The Sample Rate Clock has a Logic Input terminal that is used to control which of two clock rates will be output (see Sample Rate Clock Configuration Dialog below) .

If the Alternate Rate Input is left unconnected, Update pulses will be output at the standard rate. If connected to a Logic type (True/False) Output from another icon (as shown in the Net below), the state of this signal will determine which of two rates will be used. When the Input is LOW, the Standard Update rate will be output. When the Input is TRUE (in the Net below, when an overtemp condition occurs) , the Alternate faster Clock Update rate will be output.



NOTE: The link (connection to the Alternate Rate Input on the Sample Rate Clock is unique in that it feeds back from an Output terminal to an Input terminal that is to the left on the screen. This is the only link that can be connected this way. *To make the connection, drag the link from the Sample Rate Clock Input terminal to the Output terminal (left to right).*

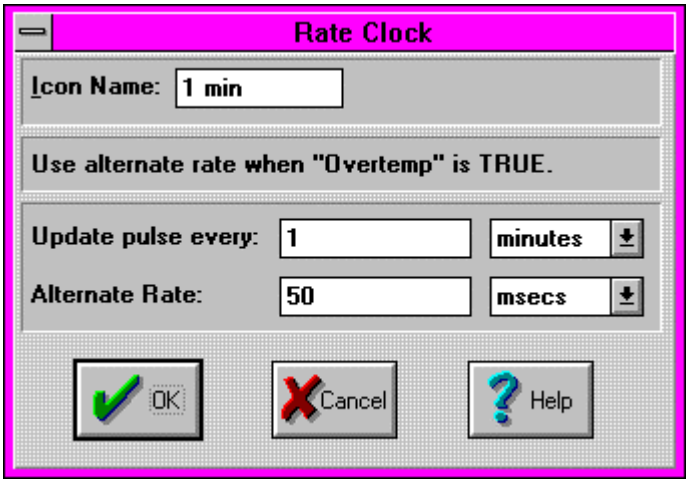
Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

The Enable terminal can be left unconnected, connected to a Start/Stop Clock icon, or connected to any other logic signal. This could control the generation of Update signals as a condition of some other parameter.

OUTPUTS:

Output Signal: Update type. The Sample Rate Clock icon is the only icon that can generate an Update command/signal. (The Warm-up icon does not actually generate an Update signal, it just passes it through).

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Never use Alternate Rate / Use Alternate Rate when _____ is True: If the Alternate Rate Input is left unconnected, **Never use Alternate Rate** will be displayed.

When a link is made to the Alternate Rate Input, **Use Alternate Rate when `_____' is True** is displayed. In quotes, HyperNet displays the Output Name of the icon connected to the Alternate Rate Input terminal. The displayed Output Name can be changed in the other icon's dialog.

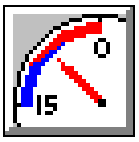
Update pulse every: A text box is provided for User entry of a number. The units (seconds, minutes, hours, days) can be specified via the list box.

NOTE: To specify Update signal rates faster than 1 second, set the **Sample Rate Clock Resolution** to **milliseconds** from within the Global icon Configuration dialog. Use of the millisecond setting will result in higher power consumption as the HyperLogger microprocessor is continually running during this mode. In the **Seconds** mode, the microprocessor is put to a low power `sleep' mode during times of inactivity.

NOTE: In MILLISECOND Mode, logging sessions must be limited to a maximum length of 2 weeks. This limitation

holds for both Rotary and Log to Full Memory modes. This 2 week limit is due to a maximum time count that the HyperLogger can internally store at the faster clock rate. For sessions longer than 2 weeks, utilize the SECOND mode. Refer to Global icon listing for additional information.

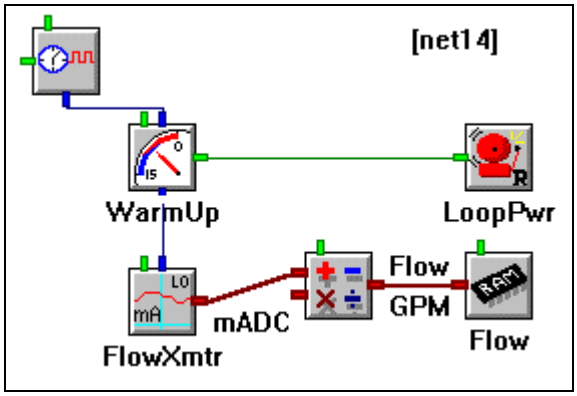
Alternate Rate: If a Logic link is connected to the Alternate Rate Input terminal, the Alternate Rate setting is enabled. Enter the Update pulse rate to be used when the Alternate Rate Input connection is True.



WARM-UP FUNCTION ICON

The Warm-up icon is is a special two Output terminal icon. It immediately outputs a logic signal on one terminal upon receipt of an Update signal, then after a User programmed delay, passes the Update signal to its second Output.

The typical application for the Warm-Up icon is to provide control of a power supply for excitation of a sensor or transmitter and a short delay until the sensor/transmitter is read. The following example Net illustrates that application. Upon receipt of the Update command from the Sample Rate Clock, the Warm-up icon immediately cycles its Logic Output terminalTrue which turns on the connected Relay Alarm icon to power up a 24VDC power supply for the 4-20mA loop excitation. The icon then waits for a User defined period of time, then passes the Update command to the connected mA-Lo (4-20ma) Input icon which then takes a sample. The next time the Net is executed, the power supply is turned OFF.



INPUTS:

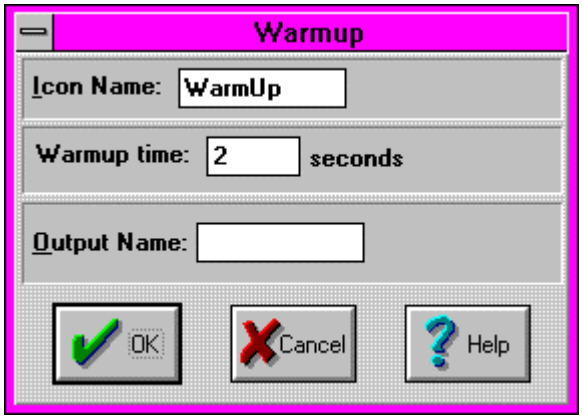
Update: The icon immediately turns its Logic Output True when an Update command is received. The Output staysTrue until the User provided time expires.

Enable: Processing of the icon is allowed when the Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal 1: Logic type. The Logic Output turnsTrue and staysTrue immediately after receipt of an Update command.

Output Signal 2: Update type. The Update command is passed through the icon after a User defined delay (warm-up time).



ICON CONFIGURATION DIALOG BOX:

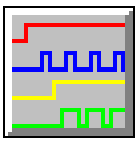
CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

WarmUp Time A text box is provided for User specification of the desired warmup time delay between the Logic Output turnTrue and the pass through of the Update command. The time is in seconds.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

PERIODIC OUTPUT FUNCTION ICON

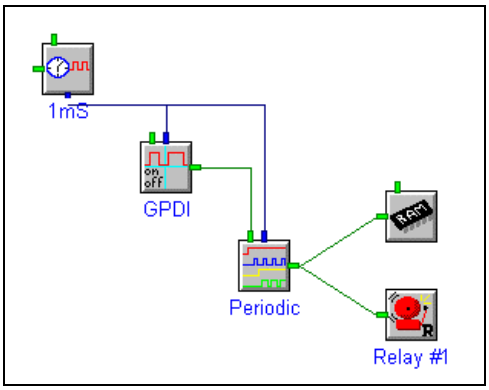


FUNCTION:

The Periodic Output Icon generates a Square Wave/Pulse output based upon time values entered by the user in the configuration dialog box. When the icon's Enable pin goes HI, the output remains LOW for a specified period. The output then goes HI for a user defined period before going back to a LOW state. This cycle is then repeated a specified number of times or continuously. There are two modes of operation that define the icon's behavior when its Enable pin returns LOW, Reset Upon Disable, and Suspend While Disabled.

Reset Upon Enable: In this mode, whenever the Enable input goes from HI to LOW, the operation is reset. The next time the Enable pin goes HI, the cycle starts from the beginning.

Suspend While Disabled: In this mode, whenever the Enable input goes from HI to LOW, the operation is suspended. All timers are put on hold while the Enable is LOW. The next time the Enable goes HI, operation continues where it left off.



The above net displays a typical application. The Periodic Output Icon is used to cycle a HyperLogger Relay Output On and Off at regular intervals, whenever the GPDI input is ON.

Another possible application is to insert a time delay into an Event (Logic Type) signal branch.

NOTE: At least one Sample Rate Clock icon is required in every net program. This icon must always be enabled (Enable pin disconnected or ON).

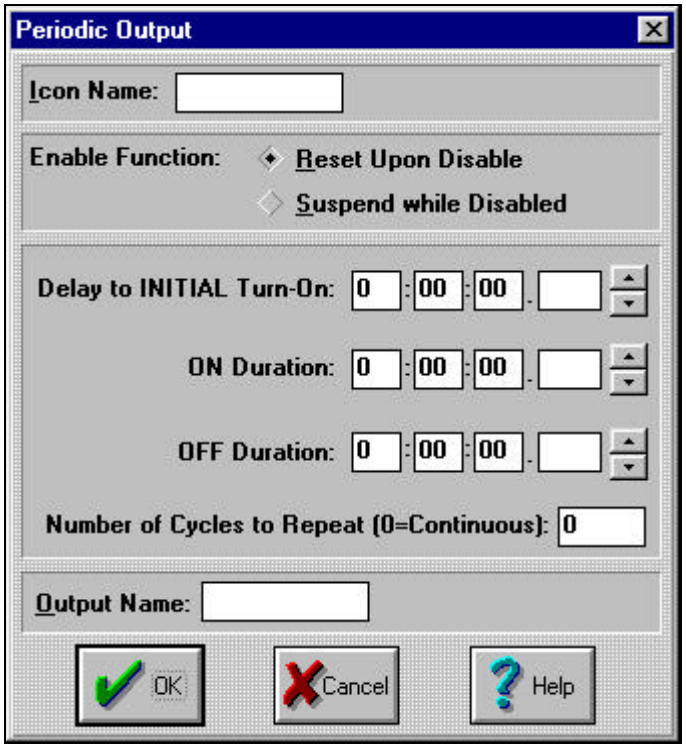
INPUTS:

Enable: Processing of icon is allowed when Enable pin is connected or when connected and Enable signal is TRUE.

OUTPUTS:

Output Signal: Logic Type. The output is TRUE during user defined time windows.

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Reset Upon Enable/Suspend While Enabled: Specifies the mode of operation..

Delay to Initial Turn-On: Amount of time after the Enable input goes HI, that the output remains LOW. If the Enable pin is not connected, it is HI. In this case, the Delay is the time delay after enabling the HyperLogger itself.

On Duration:. Amount of time the output remains HI.

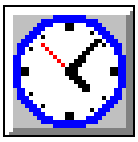
Off Duration:..Amount of time the output remains LOW.

Number of Cycles to Repeat: Number of times that the specified cycle will repeat. Entering zero will cause the cycle to repeat continuously.

NOTE: The Delay to Initial Turn-On time is not repeated.

Output Name: Specify the label for the Output. This name will show directly under the Output terminal within the Program Net.

NOTE: The millisecond entry box is disabled if the mS mode is not selected in the Global icon.



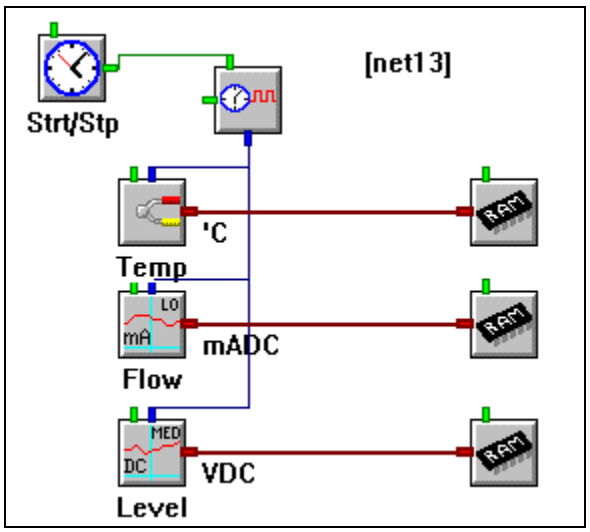
START/STOP CLOCK FUNCTION ICON

The Start/Stop Clock icon generates a Logic output that is a function of a User defined time. Two different modes of operation are available, Absolute Start/Stop and Delayed Start/Stop.

Absolute Start/Stop Mode: In this mode, the icon output is True for a User defined window of time. The User can specify the Start and Stop dates and times.

Delayed Start/Stop Mode: The icon output goes True at a User specified elapsed time after the HyperLogger is Enabled, then stays True for a User specified length of time before returning False.

NOTE: In both modes, after the Start/Stop clock `stops', the HyperLogger will continue to be Enabled. However, any icons in the Net that are controlled by the Start/Stop icon will not update. Alarms will remain in the state they are in when the Stop occurs.



A typical application of this icon is to enable an unattended HyperLogger at some particular future time, then disable after a period of time. The following Net illustrates that application:

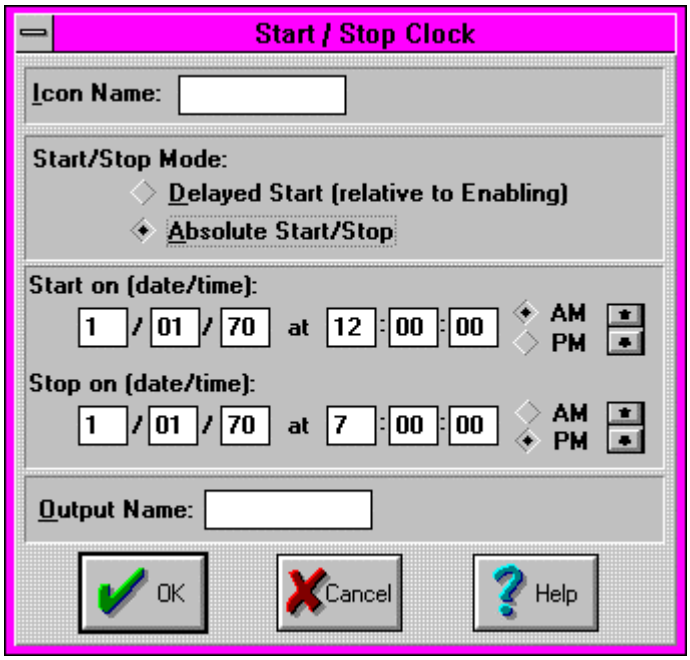
INPUTS:

Enable: Processing of icon is allowed when Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Logic type. The Output is True during User defined time windows.

ICON CONFIGURATION DIALOG BOX (ABSOLUTE START/STOP MODE):



CONFIGURATION OPTIONS (ABSOLUTE START/STOP MODE):

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

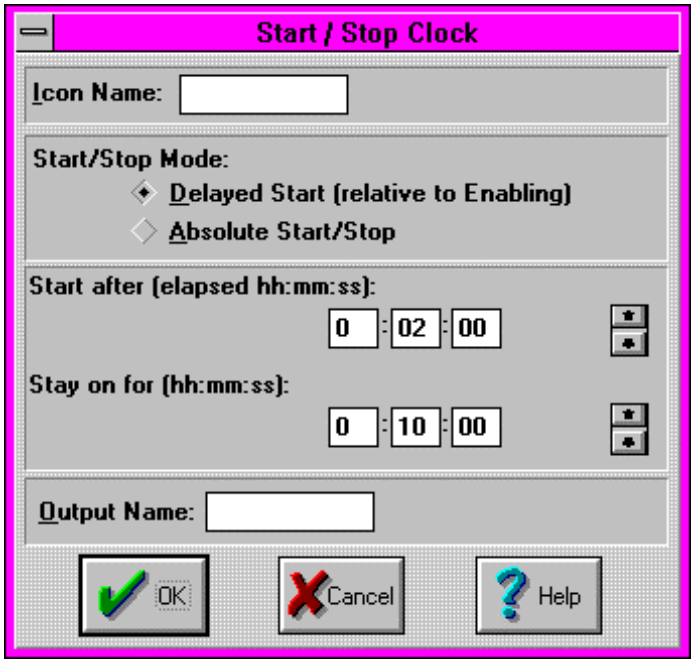
Absolute Start / Stop or Delayed Start Mode: Specifies the mode of operation. The time setting boxes will change accordingly.

Start On: A text box is provided for User entry of the date and time to turn the OutputTrue.

Stop On: A text box is provided for User entry of the date and time to turn the Output OFF.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

ICON CONFIGURATION DIALOG BOX (DELAYED START/STOP MODE):



CONFIGURATION OPTIONS (ABSOLUTE START/STOP MODE):

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Absolute Start / Stop or Delayed Start Mode: Specifies the mode of operation. The time setting boxes will change accordingly.

Start After (elapsed HH:MM:SS): A text box is provided for User entry of the time to delay before starting (turning the Output True).

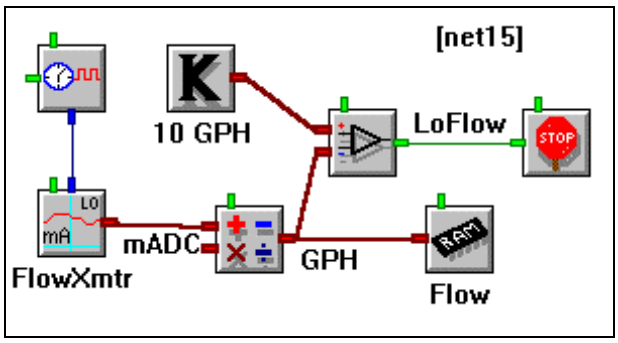
Stay ON for: A text box is provided for User entry of the time to leave the Output True.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.

STOP LOGGING FUNCTION ICON

When the Stop Logging icon receives a Logic True input, it stops the HyperLogger execution of the Program Net. The function is the same as if the front panel STOP button were pressed.

In the following example Net, if the flow ever drops to less than 10GPH, the HyperLogger will stop logging. In this Net, logging will not restart, even if the flow increases to over 10GPH again.



INPUTS:

Data/Logic Signal: Logic type (True/False). A True signal on this input Stops execution of the HyperLogger Program Net..

Enable: Processing of the icon is allowed when the Enable pin is unconnected or when connected *and* Enable signal is TRUE.

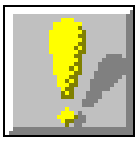
OUTPUTS:

Output Signal: Internal system control output only. No output terminal shown on icon for Program Net connections.

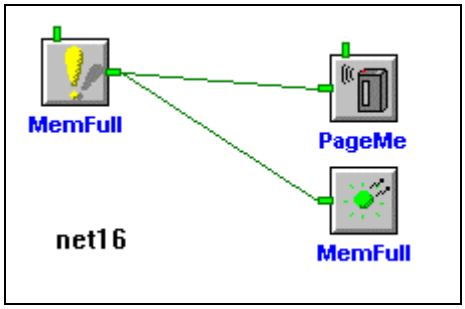
ICON CONFIGURATION DIALOG BOX:

No Configuration Dialog is provided.

WARNING FUNCTION ICON



The Warning icon outputs a True Logic signal while any of five User selected system conditions are true. Multiple Warning icons can be used in a Program Net to initiate alarming or other action upon different conditions. The following example illustrates activation of a Page (and front panel LED) if the HyperLogger memory fills to 90%.



INPUTS:

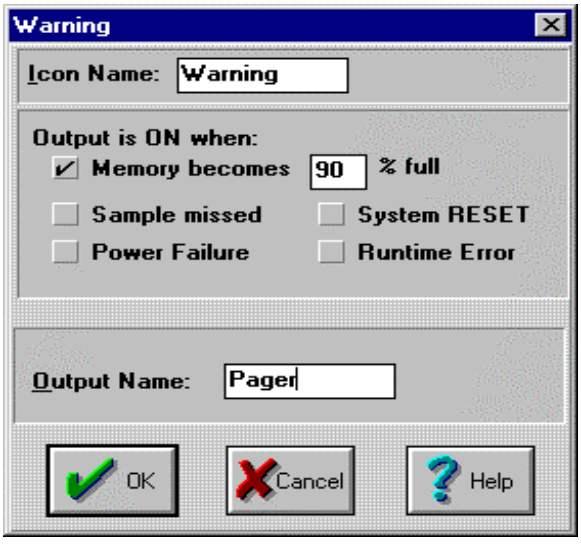
Data/Logic Signal: None, internal system status only. No terminals shown for icon connections in Net.

Enable: Processing of the icon is allowed when the Enable pin is unconnected or when connected *and* Enable signal is TRUE.

OUTPUTS:

Output Signal: Logic (True/False). Output is TRUE only while any of the five conditions are true. A Latch icon can be connected to the Output of this icon if a latching function is desired.

ICON CONFIGURATION DIALOG BOX:



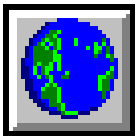
CONFIGURATION OPTIONS:

Icon Name: Specify the label for the icon. This name will show directly under the icon within the Program Net.

Output is True when: Check boxes are provided for User selection of up to five conditions, *any of which* will cause the icon Output to go True. Note that the Output will only stay TRUE while the condition is true. The five conditions are:

1. **Memory Becomes __%Full** - Output latches TRUE if HyperLogger memory is filled to the specified percentage. Output goes LOW when Memory is cleared (unless some other conditon is true, forcing the Warning icon Output TRUE).
2. **Sample Missed** - Output latches TRUE if a sample is missed (ie not taken at the Sample Rate Clock commanded time) during execution of a Program Net. This can occur if a Net requires more time to process than the User has specified via Sample Rate Clock Update rates. Note that missing a sample does not cause the Program Net to stop. The Output is reset LOW when the Program Net is Stopped.
3. **Power Failure** - a Power Failure occurs when the HyperLogger power supply voltage falls below a useable level. If this occurs, the HyperLogger stops execution of the Program Net, preserves data memory, and sets a memory marker (flag) that indicates that a Power Failure has occurred. When the power to the HyperLogger returns, the Warning icon Output latches TRUE indicating that a Power Failure has occurred, and the HyperLogger will automatically resume execution of the Program Net however the icon Output will remain TRUE. The Output is set LOW when the Program Net is stopped. This condition is mainly used to indicate to a User that a Power Failure occurred at some time. For warning of impending power failure, use the Power Low condition (above).
4. **System RESET** - if a System RESET occurs, the Output latches TRUE. The Watch-Dog Timer or a front panel RESET can cause a System RESET to occur. The Output is set LOW when the Program Net is stopped.
5. **Runtime Error** - if a Runtime Error occurs, the Output latches TRUE. Runtime errors should normally not occur, but could be caused by a corrupted Program Net in the HyperLogger's memory. A Runtime error could also be caused by incompatible HyperLogger and HyperWare versions. The Output is set LOW when the Program Net is stopped.

Output Name: Specify a name for the Output signal from this icon. This Output Name will be referenced by other icons downstream in the Program Net.



GLOBAL FUNCTION ICON

The Global icon provides for User specification of various HyperLogger system settings that may be used during the execution of a Program Net. No Input or Output terminals are available on the icon.

INPUTS:

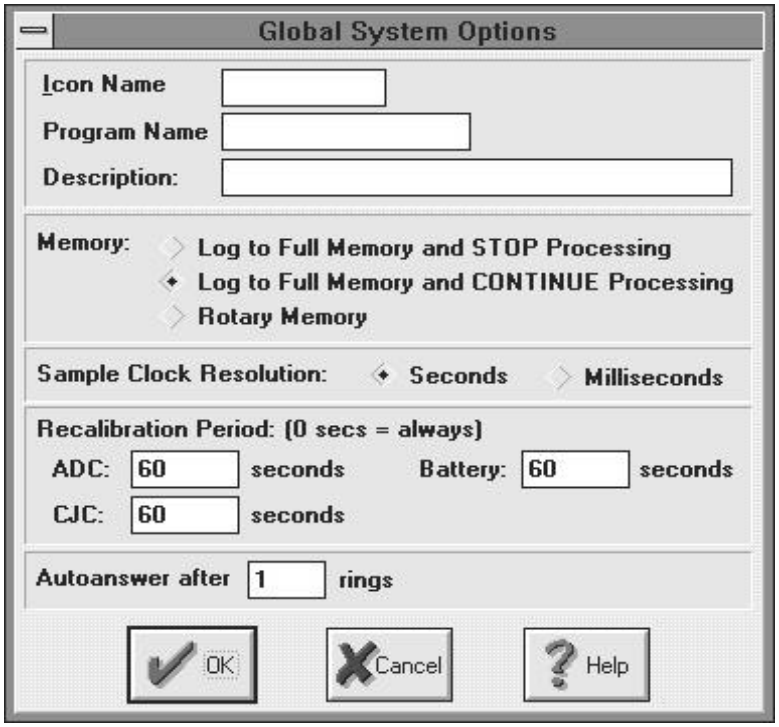
Data/Logic Signal: None.

Enable: None. Icon is always enabled.

OUTPUTS:

Output Signal: None

ICON CONFIGURATION DIALOG BOX:



CONFIGURATION OPTIONS:

Icon Name: Specify a label for the icon. This label will appear directly below the icon. A suggested use for this name is to enter the filename for the Program Net... allowing for quick future reference.

Program Name: A short (16 characters maximum) Program Net name can be entered via this text box. This name can be accessed on the HyperLogger front panel LCD as well as through a Status Query serial communication command.

Program Description: A short (32 characters maximum) Program Net description can be entered via this text box. This name can be accessed on the HyperLogger front panel LCD as well as through a Status Query serial communication command.

Memory: Three selections are available for utilization of the HyperLogger memory:

Log to Full Memory and STOP Processing - if selected, the HyperLogger will log data until memory is filled, then stop execution of the Program Net and go into a low power sleep mode.

NOTE: If MILLISECOND Sample Clock Resolution is selected (see below) logging sessions must be limited to a maximum length of 40 days.

Log to Full Memory and CONTINUE Processing - if selected, the HyperLogger will log data until memory is filled, then continue the execution of the Program Net excluding the storage of data to memory. This mode allows all of the non-Memory icons in the Program Net to continue operation providing continued Alarm, Probe Point, etc access.

NOTE: If MILLISECOND Sample Clock Resolution is selected (see below) memory must be filled before a maximum of 40 days after Enabling the HyperLogger . Processing will continue after the 40 day limitation.

Rotary Memory - if selected, the HyperLogger will log data until the memory is filled, then begin overwriting the oldest sample in memory. Processing of the complete Program Net will continue as normal.

NOTE: If MILLISECOND Sample Clock Resolution is selected (see below) logging sessions must be limited to a maximum length of 40 days.

Sample Clock Resolution: Two options are available for selecting the time resolution of the HyperLogger.

SECONDS - This mode should be used for all Program Nets that have Sample Rate Clocks set at 1 second or slower. In this mode, the HyperLogger `sleeps' in a low-power mode during times of inactivity, providing extended battery life. Sample Rate Clocks can be set as fast as 1 second.

MILLISECONDS - This mode must be used if any Sample Rate Clocks will be set at faster than 1 second rates. In this mode, the HyperLogger can resolve time increments as small as 1/1000 of a second. **NOTE:** Use of the millisecond mode will result in higher power consumption as the HyperLogger microprocessor is continually operating. Depending on the Program Net, the energy consumption in this mode may be approximately 10 to 15 times higher than in the SECOND mode.

> **NOTE:** In MILLISECOND Mode, logging sessions must be limited to a maximum length of 40 days. This limitation holds for both Rotary and Log to Full Memory modes. This 40 day limit is due to a maximum time count that the HyperLogger can internally store at the faster clock rate. For sessions longer than 40 days, utilize the SECOND mode.

Recalibration Period: The HyperLogger performs various self-calibrations during execution of a Program Net. The User can specify the frequency of these calibrations. If a 0 is entered for the period, a recalibration will be performed at the start of each Program Net execution. If speed is not of concern, entering 0 for each of the recalibration periods will result in optimum performance.

ADC - the analog to digital converter used within the HyperLogger and much of the analog circuitry incorporated into Interface Modules can drift over time and temperature fluctuations. By performing a recalibration, most of this drift can be nulled. Specify the period in seconds between recalibrations.

CJC - a Cold Junction Compensation sensor is mounted on the TSA. The temperature it measures on the TSA is used during thermocouple millivolt to temperature conversions (HLIM-1). This CJC Recalibration Period specifies how frequently the CJC temperature is checked and updated in the thermocouple calculation equation. Any temperature error in the measurement of the TSA will result in a nearly equal error in the thermocouple reading.

> TIP: If a short duration test is being performed where maximum speed of thermocouple readings is required, sufficient accuracy may be achieved by setting the Recalibration Period fairly long. In this way, a CJC recalibration will be done before the first pass through the Program Net, then the high speed readings will be taken, then another CJC recalbration. During the test, the TSA thermal mass will keep the CJC temperature fairly constant.

Battery - the internal power supply voltage is checked periodically based on the User specified Recalibration Period. This Battery voltage is used by the Warning icon for detection of a Power Low condition and for update of the HyperLogger front panel LCD *System Supply Voltage* display. For most applications of HyperLoggers this period can be set fairly long (eg 3600 seconds) as battery voltage droops slowly. If additional loads are being powered such as modems, outputs, etc shorten this value accordingly.

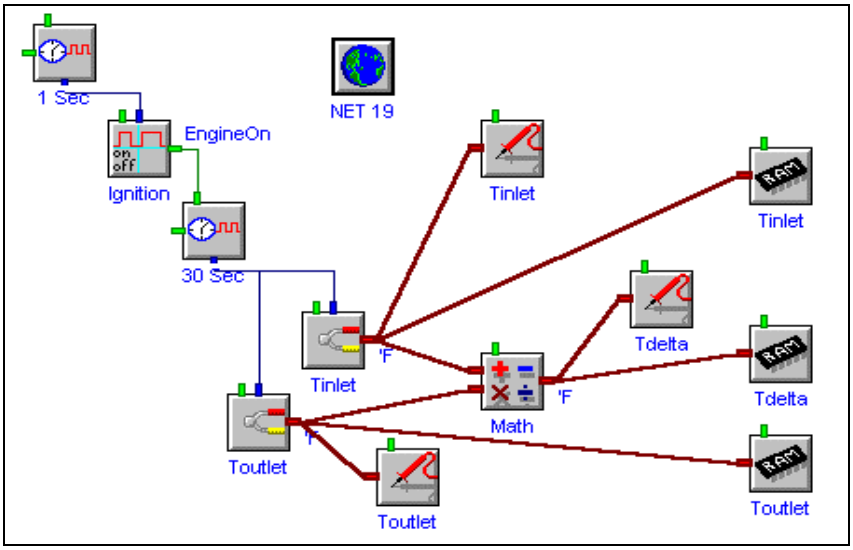
If the Warning icon is not being used and battery voltage will not be checked via the LCD or through a serial communication Status Query, this Recalibration Period can be set very long.

Auto-answer after __ ring: If a HyperLogger is equipped with a modem, the number of rings to wait before answering the call can be User defined. Enter the number in the provided text box.

APPENDIX B: EXAMPLE PROGRAM NETS

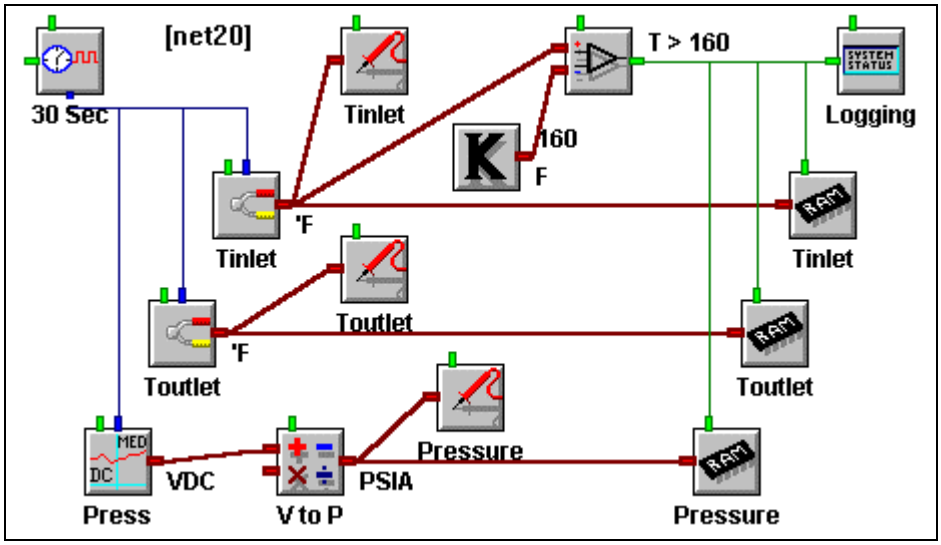
Following are some example Program Nets with descriptions of their operation.

Engine Oil Cooler Performance Test:



Two thermocouples are configured to sample inlet and outlet oil temperatures every 30 seconds on a heat exchanger. Logging of data only occurs when the engine ignition is ON. A delta-T calculation is performed and the inlet, outlet, and differential temperature is stored to memory. Probe icons are available for display of all three temperatures from the LCD and/or via a serial link.

Hydraulic Pump Performance Test



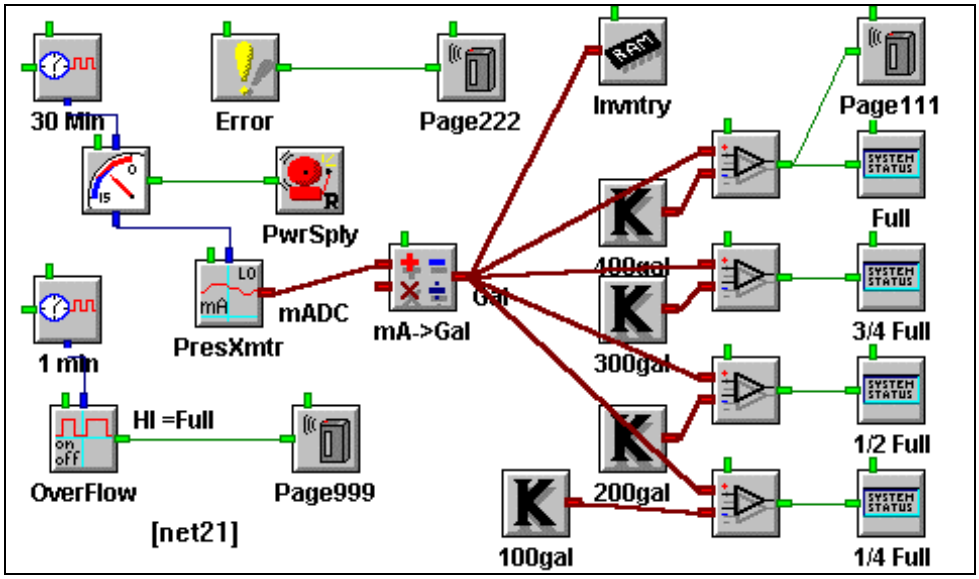
The above Net is designed for collecting data from a hydraulic pump on a vehicle during periods of high fluid temperature operation only. Two thermocouple channels and a continually powered pressure transducer are sources of input signals.

After Enabling the Net, the inputs are sampled every 30 seconds. When the Tinlet temperature exceeds 160F (Comparator and Constant icons), data storage to memory is Enabled for all three parameters and the HyperLogger front panel LCD displays a message stating that the temperature currently exceeds 160F and data is being logged to memory.

The DC voltage from the pressure transducer is converted to PSI via the Math icon.

Instantaneous values for the two temperatures and pressure are accessible on the HyperLogger LCD and/or through a serial connection via the Probe icons.

Tank Level / Inventory Profiling Data Collection with Alarming:



A remote site liquid tank has a constantly varying inventory as liquid is added and removed over time. Profiling of the inventory over time, onsite display of the inventory amount, and overflow telephone pager alarming are all desired.

Using a single 4-20mA pressure transmitter input and a Math icon, the inventory can be calculated in gallons. The pressure transmitter is powered from a battery which is cycled ON 10 seconds prior to reading, then OFF with the Relay icon and the Warmup icon.

Every 30 minutes, the inventory is logged to memory as well as compared (Comparator icon) to four different thresholds, 100, 200, 300, and 400 thousand gallons. The current level is displayed on the HyperLogger front panel LCD.

In the event that the top threshold (full) is met, a Page is sent with a code of `111'.

Additionally, every minute, a float type level switch is read via the GPDI icon in the Event mode. When the tank gets too close to overflowing, the switch closes. This signal is then sent to the Pager icon and a Page of `999' is sent.

A separate Program Net branch is added to initiate a Page of `222' if the HyperLogger memory fills or a Run-time error occurs.

High Speed Thermocouple Application:

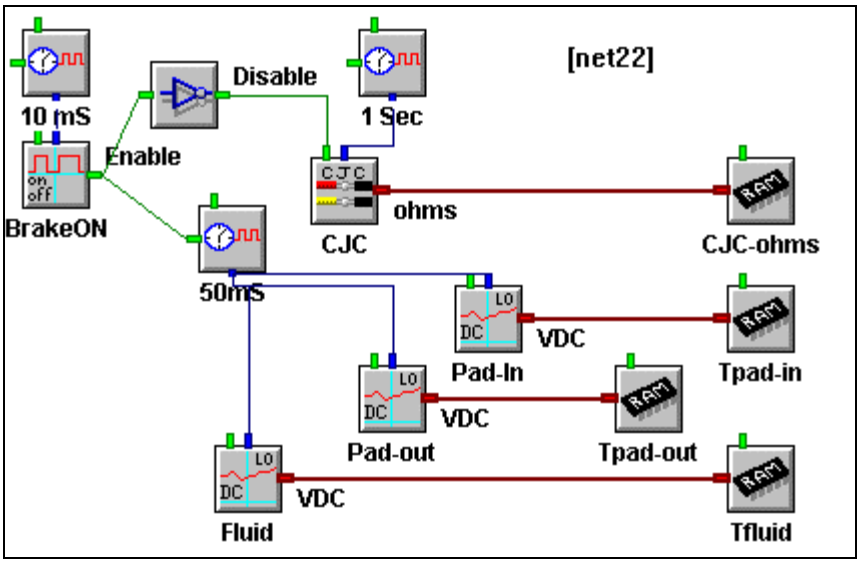
In some applications, maximum speed of thermocouple measurement is desired. The Thermocouple icon is one of the slowest to process in a Program Net due to the intensive math associated with each sample. A Cold Junction Compensation reading is required as well as the thermocouple reading, then the two are combined through curve approximating polynomials... heavy math for the HyperLogger.

A method to improve on the throughput rate of thermocouple inputs exists. If the thermocouple inputs are read as mV signals (which are processsed very quickly) and the CJC is read as a resistance (which is lots faster than temperature), the net will process many times faster. The mV readings from the Thermocouple icon and the resistance reading from the CJC icon are then merged in a Post-Processing Net and the results (in degrees) are put into a destination *.HLD file for plotting.

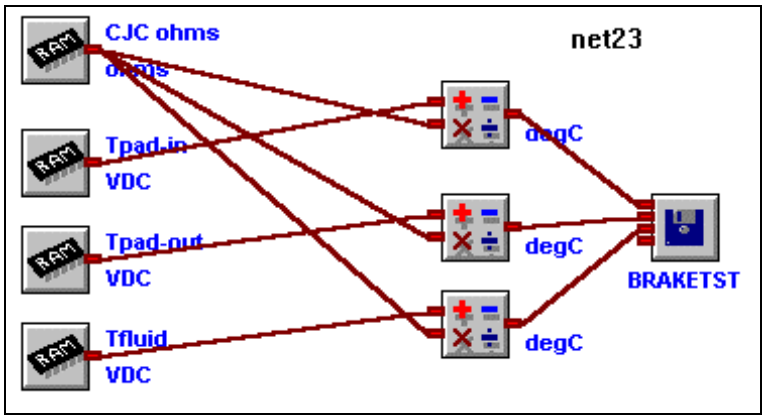
The following Program Net represents an application of this method of high speed thermocouple temperature data collection. Temperature rise data on components within an automobile brake is desired. Thermocouples are installed and connected to HyperLogger input channels configured as mV inputs. The TSA CJC input is sent to memory in units of OHMS.

A unique triggering scheme is implemented with the Event icon and three Sample Rate Clocks. One Sample Rate Clock causes the Event icon to sample the status of a switch connected to the brake pedal every 10mS. When the switch is open (ie brakes NOT activated) the CJC icon is enabled and the Sample Rate Clock sends a reading to memory every second. Additionally,. the 50mS Sample Rate Clock is sampling at its primary rate which is set to 1 second.

When the brake pedal is depressed, the CJC icon is disabled and the 50mS Sample Rate Clock driving the three Voltage icons (thermocouple inputs) switches to its Alternate rate, storing readings to memory every 50mS.



After the data has been collected and downloaded to the PC, a Post-Processing Net is constructed as shown in the following diagram.



This Post-Processing Net combines the voltage data from the thermocouple input channels and the CJC readings (in ohms) to calculate the actual temperature of each of the three thermocouple channels and store the data in a new destination file called BRAKETST.HLD. This special calculation is done using the function TC_J(X,Y) in each of the three Math icons.

NOTES:

APPENDIX C: HYPERWARE FILE LISTING

During the installation of the HyperWare package, the following files and directories are created on the PC hard disk. The file listing uses the default sub-directory names offered during the installation process. If different names were chosen by the User during installation, the files will be installed in those respective directories.

To uninstall the HyperWare software, locate and delete all of the listed files from the hard drive. Note that no modifications are done to the Windows system or configuration files during the installation process.

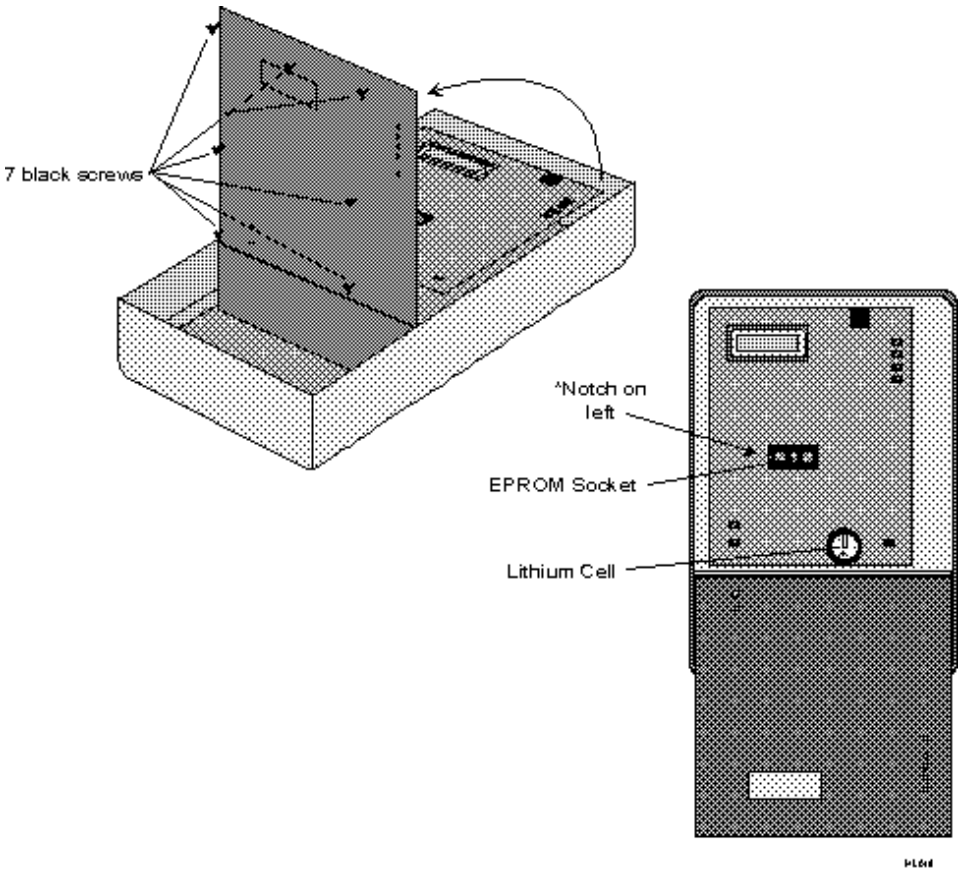
HyperWare installation generated files:

Path and File	Description
\HYPERWAR\HYPERLOG.EXE	Main HyperWare program
\HYPERWAR\WAVE.EXE	HyperPlot graphing program
\HYPERWAR\BC402RTL.DLL	program library
\HYPERWAR\BIDS402.DLL	program library
\HYPERWAR\OWL202.DLL	program library
\HYPERWAR\DBWIN.DLL	program library
\HYPERWAR\DIBAPI.DLL	program library
\HYPERWAR\CLIB.DLL	program library
\HYPERWAR\HYPERWAR.HLP	Help file
\HYPERWAR\NOTES.TXT	TSA I/O Listing comments
\HYPERWAR\DATAx.HLD	Example download files
\HYPERWAR\DEMO_X.NET	Example Program Net files
\HYPERWAR\TEST.PST	Example Post-Processing Net
\HYPERWAR\TEST.PRB	Example HyperTrack Net
\HYPERWAR\TEST.NET	Example HyperLogger Program Net
\HYPERWAR\TEST.HLD	Example HyperLogger Download file
\HYPERWAR\README.TXT	Late breaking notes and comments
\WINDOWS\MATH.LIB	Math function library
\WINDOWS\HYPERLOG.INI	Program configuration file

NOTE: During the HyperWare installation process, a file called BWCC.DLL is installed into the Windows directory (if it does not already exist in that directory). This file is common to many different software applications and should not be removed as it may be required by these other applications.

NOTES:

APPENDIX D: CHANGING THE CLOCK / MEMORY BACKUP BATTERY



The HyperLogger internal memory and real-time clock are powered from a Panasonic BR2325 (or equivalent) lithium cell when the HyperLogger Main Power switch is OFF. The cell is mounted in a socket located on the main microprocessor circuit board which is located directly under the HyperLogger front panel.

To change the lithium cell:

1. Download any valuable data retained in HyperLogger memory.
2. Turn off the HyperLogger power
3. Remove the retaining screw holding the TSA in place, then unplug the TSA.
4. Remove the 7 black machine screws located on the HyperLogger front panel. These screws hold the HyperLogger circuit board assembly to the front panel.
5. Remove the two thumbscrews at the top of the HyperLogger enclosure and carefully swing the HyperLogger front panel open.
6. The lithium cell is located in the socket at the lower right corner of the exposed circuit board.
7. Gently pry the cell to be replaced out of its holder with a small, blunt, non-metallic tool being careful not to puncture the cell or

damage any surrounding circuitry. Insulated tweezers may assist in pulling the cell out of the holder. Use care during this step so that the spring loaded contact is not bent up excessively.

8. Slide a new cell (Panasonic BR2323 or equivalent) into the holder with the positive terminal UP. A properly installed cell will seat approximately flush with the top of the socket.
9. Slowly swing the HyperLogger front panel back in place over the circuit board assembly while aligning and guiding the switches, buttons, and RS-232 jack through the front panel holes.
10. Install the 7 black screws and tighten slowly while insuring that all of the switches, buttons and other components project through their respective openings.
11. Reinstall the TSA and power up the HyperLogger. Clear the unit memory and upon loading of a new Program Net, the unit is ready to deploy.

CAUTION

Use care in handling lithium cells. Currently manufactured cells such as the BR2325 are very stable and safe parts, however, DO NOT TEMPT FATE! Do not puncture, short, or dispose of in fire as explosions could occur.

NOTES:

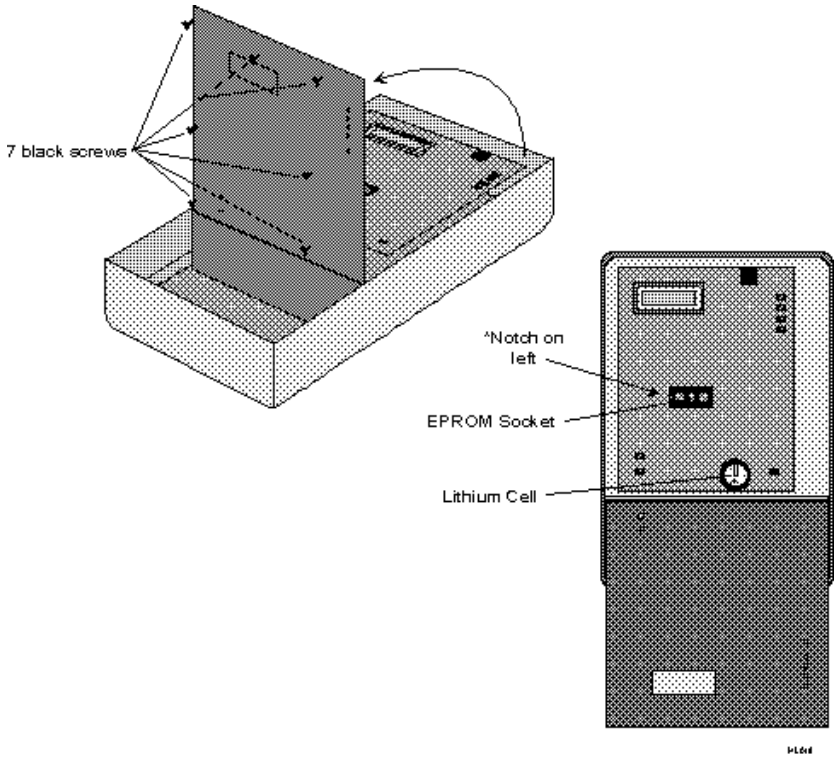
APPENDIX E: CHANGING THE HYPERLOGGER EPROM

The EPROM (Eraseable /Programmable Read Only Memory) contains the software code which controls the function of the HyperLogger. Updates to add features and/or improve performance are sometimes performed on the HyperLogger by changing the EPROM to a later version. If desired, contact Logic Beach, Inc Service/Repair Dept. about performing the upgrade.When a replacement EPROM is received, use the following procedure to remove and replace the EPROMs.

CAUTION

The EPROM chip is especially sensitive to damage from static discharge. Discharge body static before working with the HyperLogger and EPROM by touching a grounded surface. Call with any questions!

To change the EPROM chip:



1. Download any valuable data retained in HyperLogger memory.
2. Turn off the HyperLogger power
3. Remove the retaining screw holding the TSA in place, then unplug the TSA.

4. Remove the 7 black machine screws located on the HyperLogger front panel. These screws hold the HyperLogger circuit board assembly to the front panel.
5. Remove the two thumbscrews at the top of the HyperLogger enclosure and carefully swing the HyperLogger front panel open.
6. The EPROM is located in a socket near the center of the exposed circuit board.
7. Gently pry the EPROM to be replaced out of its socket with a small screwdriver or other instrument. Pry at one end then the other until the EPROM is free from its socket. Be careful so that surrounding circuitry is not damaged.
8. Align the new EPROM in its socket with the small notch located to the left while making sure that each of the EPROM's legs are aligned with the mating holes in the socket.
9. Press slowly to seat the EPROM in its socket. Visually examine the installation to insure that all of the EPROM legs are inserted in their holes.
10. Slowly swing the HyperLogger front panel back in place over the circuit board assembly while aligning and guiding the switches, buttons, and RS-232 jack through the front panel holes.
11. Install the 7 black screws and tighten slowly while insuring that all of the switches, buttons and other components project through their respective openings.
12. Reinstall the TSA and power up the logger. The LCD should display some verbage (which indicates that the EPROM is correctly installed). **Perform a 3-button initialization at this time with the following procedure:**

    A. Depress and hold the NEXT button down on the front panel.
    B. Momentarily, depress the STOP and RESET buttons.
    C. After a second or so, release the NEXT button.

    This sequence will result in a complete initialization of the unit. After a short sequence of display messages on the LCD, a *SYSTEM INITIALIZED* message should display momentarily indicating that the logger was properly initialized. If this message does not display, repeat the procedure.
13. After initialization, reprogram the logger with a new Net Program and the unit is ready to deploy

.

NOTES:

APPENDIX F: FILTERING OPTIONS

Many of the Interface Modules can be configured with filtering options for reducing the noise picked up on sensor or input signal wiring. A short discussion of two of the filtering methods that are available to the User through icon configuration dialog boxes follow:

ADC Input Filtering

Three levels of first order noise filtering (None, Low, Medium, High) can be enabled during many of the analog input icon configuration dialog boxes. First order filtering reduces High frequency noise that may be picked up by sensor wiring. *However*, filtering slows down the rate at which a channel can be sampled as it adds additional settling time to the total time required for a reading.

Additional settling time required for each of the three levels is specified in the table below.

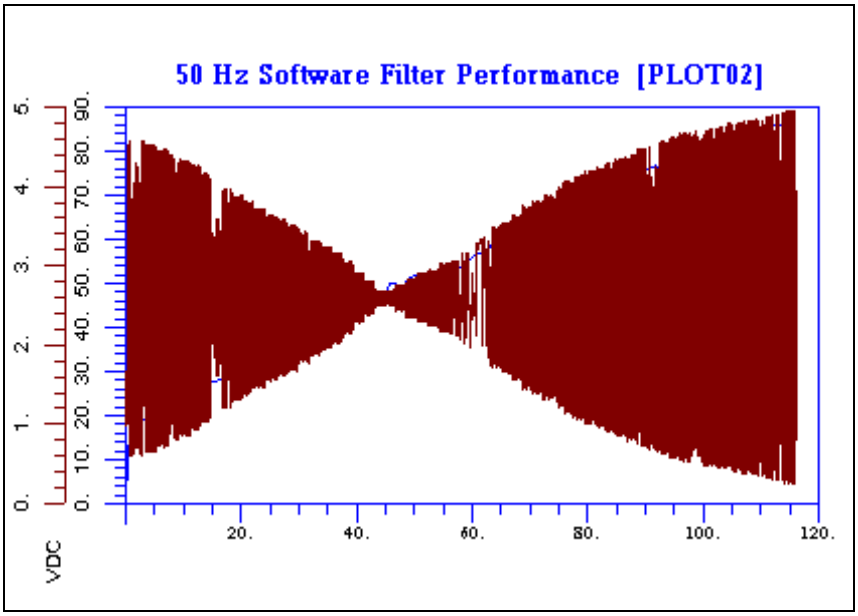
If speed of execution of the Program Net is not of concern, utilize the High level of filtering for best noise rejection.

Filter Level	Additional Settling Time
None	0
Low	3 ms
Med	4.5 mS
High	12 mS

50Hz / 60Hz Sofware Filtering

Noise radiated from utility power lines (including house and building wiring, appliances and extension cords) and picked up by sensors and associated wiring is one of the most common sources of data acquisition error.

The HyperLogger has additional software based filtering capability designed to remove 50 Hz or 60Hz power line sourced noise from incoming signals. This filtering capability is especially helpful in applications with sensors and/or wiring which is in close proximity to utility wiring.



The above plot demonstrates the performance of the 50Hz software filtering. The plot is from actual data collected by a HyperLogger during the development and testing of the software filtering feature. A 5Vp-p AC swept frequency was super-imposed on a 2.5VDC and input into a HyperLogger equpped with an HLIM-1 The input channel was configured with the 50 Hz filtering enabled. As can be seen from the plot, at 50 Hz, the amplitude of the noise is radically reduced.

As with all filtering, a compromise is involved. Line Rejection filtering adds approximately 8.5 mS for 60 Hz rejection (10mS for 50Hz) to the measurement and processing time required for a reading.

If the desired sampling rate allows, enable Line Reject filtering by selecting 50 or 60 Hz depending on the power line frequency used in the installation locale. In the USA, 60 Hz should be selected.

APPENDIX G: HYPERNET THEORY OF OPERATION

A Program Net is a graphical representation of a sequence of commands. In the process of transferring the Program Net to the HyperLogger, the Program Net is converted over to a sequence of commands. When Enabled, the HyperLogger microprocessor follows this sequence of commands to perform the desired functions.

During execution, the microprocessor steps through each of the commands, completing the command if possible, then moving on to the next command. This stepping through of commands can be visualized fairly accurately as propogating through connections between icons in a Program Net.

In execution of a Program Net by the HyperLogger microprocessor, an order of operations is followed. The Program Net executes in approximately this order:

1. When a Sample Rate Clocks internal counter counts up to the User specified sampling period (ie the Update pulse set within the icon configuration dialog) the Sample Rate Clocks send out their Update command to any connected icons.
2. Icons connected to the Sample Rate Clock(s) then update their Outputs (eg taking a thermocouple temperature reading and presenting the value on the Output)
3. Icons connected to these Outputs then receive the new signal and process the signal and present it on their Ouput. This processing then progresses through the remaining icons in the Program Net from left to right.
4. When the processing has progressed completely through the Program Net the HyperLogger then waits (if any time remains), waiting for the next Sample Rate Clock to generate an Update command. If the Program Net specifies Seconds resolution mode (Global Icon), the HyperLogger goes into a low power sleep mode to extend battery life.
5. When the Sample Rate Clock generates the Update command, processing begins sequencing through the Program Net again.

During the execution of the Program Net, some parts of the Net may be skipped for a number of reasons. Execution will then jump to the next part of the Net and continue sequencing. Reasons that this might occur include:

- The sequence may run into an icon that is not Enabled.
- An icon may be encountered that has two inputs, where only one input was recently processed, and the User has specified that the Output is to be updated only upon Update of both inputs.

This explains why Program Nets will execute at different speeds if they contain conditional statements. For example, a Program Net may be developed that monitors a contact closure input (which can be done 100's of times per second). When the contact closes, 10 more channels may be enabled, storing data to memory. The Program Net will slow accordingly. Also, different branches of a Program Net may execute at different times if they are driven by Sample Rate Clocks that have asynchronous (ie not synchronized) Update pulse rates specified by the User.

NOTES:

APPENDIX H: ACCESSORIES

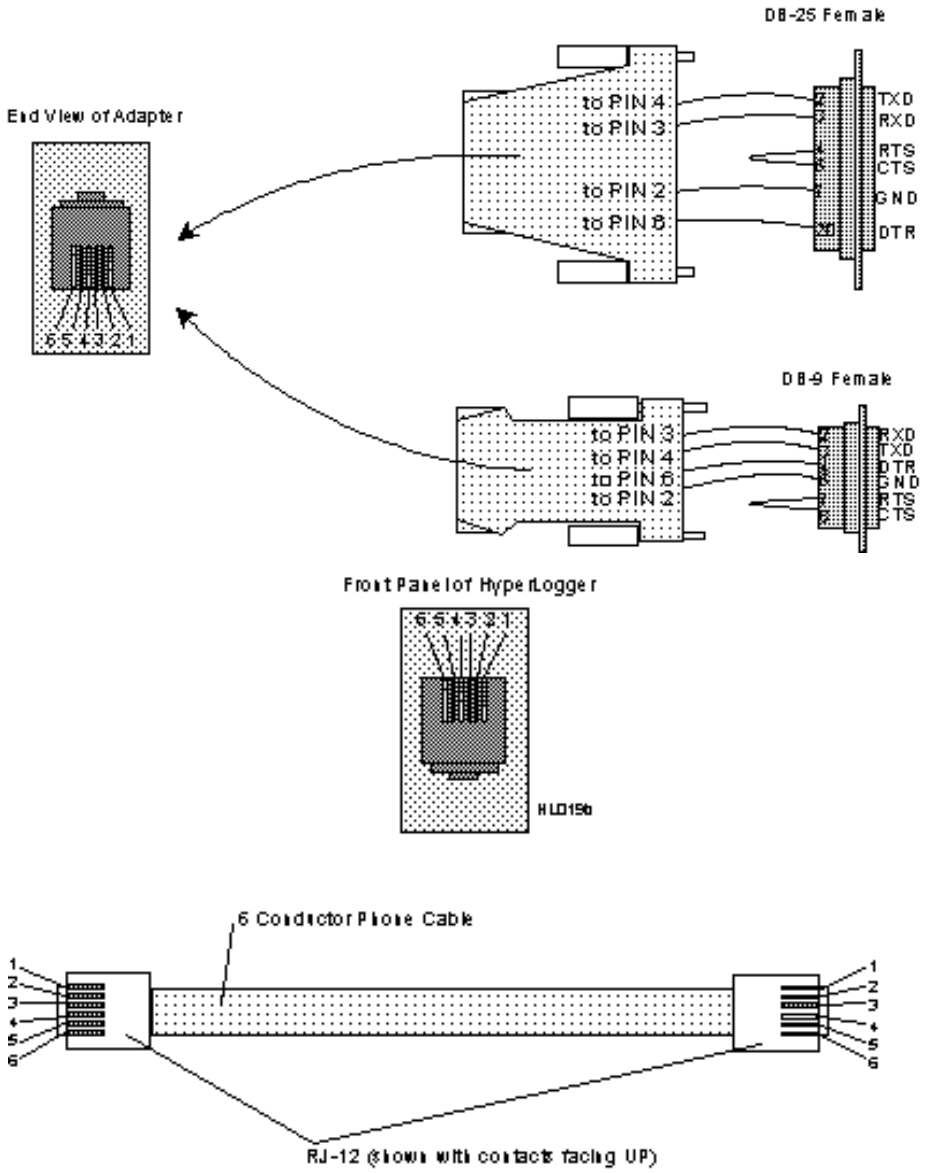
Accessory items for the Hyperlogger portable data logging system include:

- **Interface Modules** - the HyperLogger family of products is continuing to expand with powerful plug-moodules and accessories
- **HL-200 -** an integrated data logging system that includes an RPS-1 rechargeable power supply and the HyperLogger all ruggedly packaged in a NEMA 4X rated enclosure. With this system, higher current sensor excitation (eg 4-20mA transmitters) is simply configured. Under control of the HyperLogger Program Net, the power to various sensor loops can be cycled for optimization of battery life.
  The internal batteries can be recharged from photovoltaics or other low-voltage AC or DC source.
- **Photovoltaic Power Generation Systems** - for long term unattended data logging
- **RPS-1 Rechargeable Power Supply** - for higher current sensor excitation or output drive (alarm) applications
- **OEM Systems** - contact Logic Beach about low cost “no frills” systems for integration into your manufactured equipment

Contact Logic Beach Inc or your local Sales Representative for additional information and pricing on these accessories.

NOTES:

APPENDIX I:RS-232 CABLE, PORT AND ADAPTER



PIN	Description
1	+5VDC (current limited source from HyperLogger)
2	Ground
3	Transmit (HyperLogger output)
4	Receive (HyperLogger input)
5	Not Used
6	DTR (HyperLogger input; computer asserts HI to wake up the HyperLogger serial port)

NOTES:

APPENDIX J: TROUBLESHOOTING TIPS

Refer to any README.TXT files that may be provided in the HyperWare software directory after installation for additional comments and troubleshooting tips.

TROUBLESHOOTING PROGRAM NETS:

Probe Point Diagnostics:

If operation of a Program Net is not what was expected, the judicial insertion of Probe Point icons can be a valuable troubleshooting method. This insertion of Probe Point icons at various points throughout the net allows for the real-time display of the values and/or states of various nodes in the net.

To implement this method of troubleshooting, drag additional Probe Point icons onto the screen and connect them to various outputs in the net. Transfer the net to the HyperLogger and Enable the unit. Via the front panel LCD or through HyperTrack, the status of each of the Probe Point icons can be observed. These values will commonly lead you to the crux of the problem.

Incompatible Net Warning dialog:

This message normally displays during an attempted download and enable of a Program Net that does not match the current HyperLogger configuration. For example if a Program Net uses channels on an Interface Module that is not currently installed in the HyperLogger, or if configuration switches on a module are not set correctly, the HyperLogger will catch this incompatibility.

In HyperLoggers running at higher speeds, this message may display if a Program Net upload is attempted while the HyperLogger is Enabled. If this occurs, stop the HyperLogger and retry the upload.

Bad Program Net warning dialog:

If the HyperLogger currently does not have a valid Program Net in memory, this message will display upon enabling.

Correct by uploading a new Program Net.

SYSTEM ERRORS:

No Display on the HyperLogger LCD:

Upon power-up of the HyperLogger, numerous internal checks are performed. In the event that the LCD never displays the standard "HyperLogger" message, a number of problems could exist.

The main batteries may be discharged: a volt meter can be used to check the voltage across the batteries (remove cover and probe where the wires are soldered to the battery holders.) If no critical loads are connected to the Output Relay(s), a load can be put onto the batteries by holding one of the Relay switches in the TEST position while observing the voltage. New batteries will read approximately 9 VDC and batteries below apx 7 volts are essentially dead.

OR... apply an external supply to the EXT power terminals on the TSA.

The HyperLogger may have a corrupted Program Net: A special total system initialization can be performed by simultaneously holding the front panel NEXT and STOP buttons down while momentarily tapping the

RESET button. After initialization, the LCD will display *System Initialized*. Press any front panel button to enter into normal mode.

NOTE: This 3 button reset will erase all internal data as well as the currently loaded Program Net. **Use with caution**.

SERIAL COMMUNICATION PROBLEMS:

Cannot establish an RS-232 link:

Insure that **only Logic Beach HyperLogger adapters and cables** are used. Also, insure that no gender or pinout adapters (eg 9 pin to 25 pin) are used. Pinout is critical and must be correct for communication to work. Pinout details are provided in Appendix I.

Check the Port number and that the port is actually working with another serial package and device (eg a modem).

Refer to addtional considerations in the HyperComm Serial Communications chapter.

Modem Communication Problems:

Refer to Appendix K for modem configuration details.

Refer to the HyperComm Serial Communications chapter.

HYPERPLOT :

No Data Displays upon loading of File:

Data may actually be loaded but compressed. Select the Calculations\Zoom All menu choice to view.

ANALOG READINGS:

Incorrect readings on HLIM-1 Channels:

Ensure that the fuse for the particular channel is not blown.

APPENDIX K: MODEM CONFIGURATION SUPPLEMENT

As modem initialization is never as easy as it should be, this appendix was written to provide additional assistance in the configuration of modems for communication between the PC (equipped with the **LOCAL** modem) and the HyperLogger (equipped with the **REMOTE** modem). Four different configurations with 2400 baud and 14.4 Kbaud modems are provided for general reference (also see modem material covered in Chapter 5).

Obviously, other combinations will exist, however, it is hoped that some understanding of the setups can be gleaned from the following examples and explanations to make life easier. Intelligent experimentation is commonly the best method for modem configuration... however, after experimentation, if a reliable connection can't be implemented, please call our technical support group for additional assistance.

Modem commands beyond the basics are not standardized and have evolved over the years as different manufacturers have implemented more advanced features. Hence, standard commands can't be supplied for the plethora of modems available on the market today. The following short list of commands is fairly consistent between modems:

AT	Attention command
&F0	Use factory defaults settings 0 (common usage)
&F1	Use factory defaults settings 1 (also common)
E0	Turn off local Echo of commands
Q0	Enable Result Codes
V1	Use Verbal Result Codes

Local 2400 to Remote 2400 (MDM-2400 Modem Option)

Within the HyperWare Modem Communication Dialog Box, set:

Baud Rate: 2400
Initialization String: AT&F0E0Q0V1 or AT&F1E0Q0V1.
This sets the local modem to its factory defaults (F0 or F1) and then turns Echo Off and enables Verbal Result Codes. (No error correction or compression is used in 2400 Baud modems so no additional settings are required to configure those features in the **Initialization String** box).

Local 2400 to Remote 14.4 (MDM-14.4 Modem Option)

Within the HyperWare Modem Communication Dialog Box, set:

Baud Rate: 2400
Initialization String: AT&F0E0Q0V1 or AT&F1E0Q0V1.
This sets the local modem to its factory defaults (F0 or F1) and then turns Echo Off and enables Verbal Result Codes (usually two commands, one to Enable Result Codes and one to select Verbal rather than numeric). (No error correction or compression is used in

2400 Baud modems so no additional settings are required to configure those features in the **Initialization String** box).

Local 14.4 to Remote 2400

Within the HyperWare Modem Communication Dialog Box, set:

Baud Rate: 2400
Initialization String: Set to disable Error Correction, disable Data Compression, Echo Off and enable Verbal Result Codes (usually two commands, one to Enable Result Codes and one to select Verbal rather than numeric). The commands to disable the Correction and Compression functions will vary with manufacturer, so a bit of research may be required in the Modem Manual supplied with the local 14.4 modem.

Examples of functional strings for two different modems follow:

US Robotics 14.4:	AT&F1E0X4&M0
Pract Periphs 14.4:	AT&F1Q0E0V1&M0

Local 14.4 to Remote 14.4 (MDM-14.4 Modem Option)

Within the HyperWare Modem Communication Dialog Box, set:

Baud Rate: 19,200
Initialization String: Set the local modem to its factory defaults (F0 or F1) and then turn Echo Off and enable Verbal Result Codes (usually two commands, one to Enable Result Codes and one to select Verbal rather than numeric). Error correction can be enabled and will automatically be negotiated between the modems upon connection. Data Compression may be enabled on the local modem, but it will be ignored by the remote modem.

Examples of functional strings for two different modems follow:

US Robotics 14.4:	AT&F1E0X4
Pract Periphs 14.4:	AT&F1Q0E0V1