

B

Creating & Managing Communication Links

Certain object classes represent and such as PLCs, RTUs, and controllers. Lookout**Direct** uses the term *driver* to refer to these types of object classes. The functionality built into driver objects enables them to communicate with the physical devices that they represent. Lookout**Direct** communicates with the outside world primarily through driver objects.

The drivers are not separate applications. They work as any other object in the Lookout**Direct** event-driven environment, except that they communicate with external devices.

With traditional systems, a particular driver is assigned to a specific serial port. In these configurations, multiple drives cannot share a single serial port. Lookout**Direct** does not associate baud rate, data bits, parity, or stop bits with a particular serial port. In this configuration, drivers that implement different protocols and baud rates can use the same port and the same modem or radio frequency (RF).

This capability allows you to mix and match PLCs, RTUs, and other devices over a single RF without communications conflicts or special hardware. This is possible because of Lookout**Direct's** *communication service*. Objects use the communications service to gain access to serial ports in an orderly and timely fashion.

Note Some LookoutDirect driver objects communicate with physical devices through dedicated hardware. These driver objects do not use serial ports but instead rely on their own proprietary network cards for interfacing to the outside world. A few examples include Modbus Plus (SA85 card), Data Highway (KT card), and DeltaTau (PMAC card). You do not need to configure serial ports for these object classes. Refer to the appropriate object class documentation in Online Help or the Reference manual to verify if a particular object class uses a serial port.ion in Online Help.

Understanding the Communications Service

The Lookout*Direct* serial communication service allocates serial port usage between driver objects. At the frequency of the object Poll Rate, a driver object notifies the communications service that it needs to use a specific serial port to poll a device. If the requested serial port is not in use, Lookout*Direct* allocates the serial port to the driver object. When the driver object takes control of the serial port, it defines port communications parameters such as baud rate and protocol and polls its device. When polling is complete, the driver object releases the port so the communications service can allocated it to other driver objects.

You can uniquely configure each serial port for hardwired, radio, or dial-up communications through the Serial Port Settings dialog box.

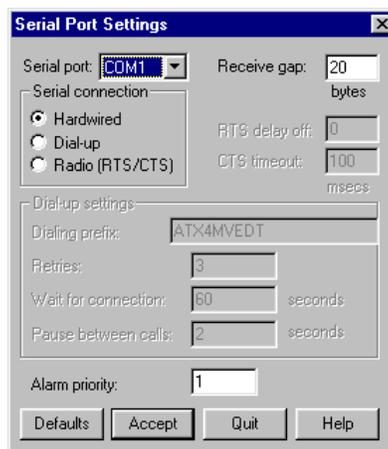


Note You must define serial port communication settings on both the Development/Runtime and Runtime only Lookout*Direct* products.

Defining Serial Port Connections

This section provides the necessary steps to configure serial port settings for hardwired, radio, and dial-up communications.

1. From the Lookout*Direct* menu bar, select **Options Serial Ports...**
The **Serial Port Settings** dialog box appears.



2. In the **Serial Port** data field, select the communication port you are defining. In this example we are using *COM 1*.
3. Define the serial port parameters for the appropriate communication port.
4. Click on **Accept** to save the parameter changes for the serial port.
5. Click on **Quit** to exit the dialog box.

Selecting the Serial Port

The **Serial Port** data field is a drop-down list box. Use it to select the communication port you are defining. Windows supports up to nine serial ports; however, most computers support only two serial ports without additional hardware.

Setting the Receive Gap

The **Receive gap** setting is available for all serial connection types. This number specifies the number of empty bytes (or amount of time) a driver receives from a controller before the driver recognizes the end of a message frame and asks for another message. Normally you should leave this at the default setting of 20. However, if you are experiencing garbled communication alarms, you might try increasing this number to allow more dead time before *LookoutDirect* decides it has received a complete message. For example, with a slow baud rate of 1200, you might have to increase the **Receive gap** setting to approximately 30.

Hardwired Settings

Hardwired serial connections require no hardware handshaking for line control. Use this setting for all serial communication types except dial-up telephone and remote radio transceivers. You should also use this setting when directly connecting to the Master Repeater on a radio system or through a leased-line modem. Because a Master Repeater is a full duplex device that does not require keying and unkeying of the frequency, it acts much like a physically hardwired network. Other hardwired connection types include RS-232, RS-422, RS-485, and leased telephone lines.

RTS/CTS Handshaking Settings

RTS/CTS is a local hardware handshaking mechanism between the local computer and the local communication device. Use the Radio (RTS/CTS) serial connection when connecting the serial port to a device that requires RTS/CTS hardware handshaking, such as a radio transceiver that must be keyed up during data transmission and unkeyed during data reception. Other half-duplex communication media such as RS-485 may require RTS/CTS hardware handshaking.

When you select RTS/CTS hardware handshaking, *LookoutDirect* controls the RTS, or request-to-send pin, and monitors the CTS, or clear-to-send pin, during data transmission (pins 4 and 5 on a 25-pin RS-232 connector). Therefore, you must have at least the RTS pin (pin 4) wired straight through on your RS-232 cable. The CTS pin (pin 5) is optional.

LookoutDirect initiates a serial transmission on an RTS/CTS port by first asserting RTS to key the radio. It then begins monitoring the state of the CTS pin. When the radio transmitter is fully keyed and ready to transmit, the radio asserts CTS and immediately begins data transmission. If the radio does not assert CTS within the CTS timeout setting (default is 100 msecs), *LookoutDirect* assumes the radio is ready to transmit and transmits anyway. The CTS timeout setting is the maximum amount of time that *LookoutDirect* waits after asserting RTS for CTS before transmitting. Most radios typically take between 10 and 80 milliseconds to key up. Consult your radio specifications and DIP switch settings to determine the key-up delay on your radio.

If your radio can assert CTS when it is ready to transmit, add about 50 milliseconds to the radio key-up delay specification and use this total value for the CTS timeout. If your radio does not assert CTS, you should begin by adding about 20 milliseconds to your radio key-up time. Then increase this value in 10 millisecond increments until the remote radio begins to correctly receive the first bytes of the message.

Some radios may assert CTS before they are actually ready to transmit. In this case, disconnect the CTS line (pin 5 on a 25-pin RS232 connector) and set the CTS timeout to a value high enough to let the radio fully key before transmission.

After it transmits the last byte of data, *LookoutDirect* continues to assert RTS, keeping the radio keyed until the RTS delay off time period expires. You should set this value to the default of zero milliseconds so that *LookoutDirect* un-keys the radio as soon as possible to prepare to receive the response.

When un-keyed, most radios generate an audible squelch tail that the remote device might decode as unexpected garbage bytes. Some remote devices reject the entire message instead of just decoding the valid data and ignoring the extra garbage bytes. In this case, keep the radio keyed for several milliseconds using the RTS delay off setting. This time period delays the squelch tail long enough for the remote device to recognize the last data frame as valid before receiving garbage bytes caused by the squelch tail.

If you set the RTS delay off setting too high, the remote device begins transmitting its response before the local radio is un-keyed, causing a communication alarm in Lookout**Direct**.

Dial-Up Modem Settings

Use the Dial-up serial connection when you use a modem in conjunction with a switched telephone line (not leased line). You can customize the dial-up settings for your particular modem and phone line.

The default Dialing prefix settings are based on the Hayes Corporation AT command set, which is an industry standard for data modems. The following table explains the Lookout**Direct** default settings. For additional commands, refer to your modem operation manual.

Table B-1 Default Dial-Up Modem Settings

| | |
|----|--|
| AT | Attention code that must precede all commands |
| D | Dial phone number with these modifiers: P for pulse; T for tone |
| En | Local echo mode: E for no echo |
| Mn | Speaker on or off: M for speaker always off |
| Vn | Verbal or numeric result codes: V for numeric result codes |
| Xn | Result code and dialing options: X4 waits for dial tone before dialing and recognizes busy signal. |

When you use an external dial-up modem with Lookout**Direct**, the DTR line in your cable between the modem and the computer must be wired straight through. This line is pin 20 on a 25-pin RS-232 connector and pin 4 on a 9-pin connector. Lookout**Direct** uses the DTR line to command the modem to disconnect (hang up) and return to the command mode.

Some factory modems are not configured to respond to the DTR line. After Lookout*Direct* first successfully dials out to a remote modem and finishes the polling cycle, it drops the DTR line but the modem remains connected. If the modem does not respond after several seconds of attempting to raise and drop the DTR line, Lookout*Direct* generates an alarm stating that the modem is not responding. If you receive this alarm message, your modem is not configured to monitor the DTR line.

The Hayes Corporation standard command for configuring the modem to hang up and enter command mode upon loss of DTR is &D2. You can use a terminal program to make this setting permanent on most modems by entering the modem command AT&D2&W to store the setting permanently in nonvolatile modem memory. Or you can just add &D2 into the Dialing prefix. The default Dialing prefix is ATX4MVEDT, so you might change it to AT&D2X4MVEDT.

Retries specifies the number of times Lookout*Direct* dials the specified phone number and attempts to connect to the modem at the other end of the line. If it fails to connect after the specified Retries, it generates an alarm and moves on to the next phone number in the polling queue (if a queue has formed).

Wait for connection specifies the length of time Lookout*Direct* waits to receive a connect signal back from the modem it is calling. The time period begins when Lookout*Direct* first sends the local modem the dialing prefix command. The time should be long enough for the local modem to receive a dial tone, dial the phone number, allow the remote modem to pick up the line, and send back a connect message. If the specified time is too short, your system could be operating correctly but never make a connection.

Pause between calls is the length of wait time after hanging up before it sends the local modem the next dialing prefix signal. If the specified time is too brief, your system may not hang up the existing call but instead attempt to call the next number.



Note Specific modems, radios, and local phone lines may operate faster or slower than the default settings. You may need to use a trial-and-error approach to find the best settings for your system.

DirectLogic Data Members

Protocol driver objects contain a great deal of data. V-memory registers, inputs, outputs, internal control relays are all included within this object. Therefore, as soon as you create a DirectLogic object you have immediate access to the entire data member set of the object. As with all LookoutDirect drivers, you can access I/O points and other data through data members. The following tables contain data members currently supported by the DirectLogic object class.

Data Modifiers

In order to have the DSData Server perform data conversions as it moves data in and out of the PLC, the data modifier presented in the following can be added to the end of a data item.

Table B-2

| Modifier | Description | Recognized by (DirectLogic PLC) |
|-------------|--|---------------------------------|
| No modifier | Decimal value (16 bits) | All |
| :D | Decimal value (32 bits) | All |
| :B | Convert to BCD (16 bits) | All |
| :DB | Convert to BCD (32 bits) | All |
| :nn | Read a specific bit in a Word (not available for writing bits) | All |
| :R | Convert to Real (32 bits) | DL250, DL350, and DL450 |
| :W | Word (16 bits) | DL330, DL330P, DL340, and DL305 |
| :WB | Word (16 bits), converts to BCD | DL330, DL330P, DL340, and DL305 |



Note The range of data members shown in the following tables may be beyond the capacity of the specific DirectLogic PLC or compatible CPU that you are using OR may not include some of the data members shown. Consult the appropriate PLC family user manual for the specific memory types and ranges available for your PLC CPU.

05/105/205/350/405 DirectLogic PLC Family Data Members

Table B-3. 05/105/205/350/405 DirectLogic PLC Data Members

| Data Member | Type | Read | Write | Description |
|---------------------|---------|------|-------|--|
| Activated | Logical | Yes | No | Object-generated signal when TRUE, this flag signifies an active5 communication connection between the process file and the PLC. |
| C0 – C3777 | Logical | Yes | Yes | Control Relays – addressed in octal and mapped to V40600 – V40777. |
| CT0 – CT377 | Logical | Yes | Yes | Counter status (done) bits – addressed in octal and mapped to V41140 – V41157 |
| CTA0:B – CTA377:B | Numeric | Yes | Yes | Counter current value words BCD – addressed in octal and mapped to V01000 – V01377 |
| CTA0:DB – CTA376:DB | Numeric | Yes | Yes | Counter current value double words (two adjacent addresses; 32-Bit) BCD – addressed in octal and mapped to V01000 – V01377 |
| Failed | Logical | Yes | No | Object-generated signal when TRUE, this flag signifies the process file is no longer communicating with the PLC. |
| GX0 – GX3777 | Logical | Yes | Yes | Remote I/O Inputs – addressed in octal and mapped to V40000 – V40177 |
| GY0– GY3777 | Logical | Yes | Yes | Remote I/O Outputs – addressed in octal and mapped to V40200 – V40277 |
| Paused | Logical | Yes | No | Object-generated signal when TRUE, this flag signifies that the communication connection has paused but is still active and will go FALSE when its paused condition is satisfied. Usually caused by modifying the Link while it is in use. |
| S0 – S1777 | Logical | Yes | Yes | Stage status (active) bits – addressed in octal and mapped to V41000 – V41077 |
| SP0 – SP777 | Logical | Yes | No | Special Relays (system status bits) – addressed in octal and mapped to V41200 – V41237 |

Table B-3. 05/105/205/350/405 DirectLogic PLC Data Members

| | | | | |
|-------------------|---------|-----|-----|--|
| T0 – T0377 | Logical | Yes | Yes | Timer status (done) bits – addressed in octal and mapped to V41100 – V41117 |
| TA0:B – TA377:B | Numeric | Yes | Yes | Timer current value words BCD – addressed in octal and mapped to V00000 – V00377 |
| TA0:DB – TA376:DB | Numeric | Yes | Yes | Timer current value double words (two adjacent addresses; 32-Bit) BCD – addressed in octal and mapped to V00000 – V00377 |
| V0 – V41237 | Numeric | Yes | Yes | Single (16-Bit) V-memory registers decimal |
| V0:D – V41237 | Numeric | Yes | Yes | Double (two adjacent registers; 32-Bit) V-memory registers decimal |
| V0:B – V41237:B | Numeric | Yes | Yes | Single (16-Bit) V-memory registers BCD 0- 9999 |
| V0:DB – V41236:DB | Numeric | Yes | Yes | Double (two adjacent registers; 32-Bit) V-memory registers BCD 0- 99999999 |
| V0:R - V41236:R | Numeric | Yes | Yes | Double word V-memory registers signed real (IEEE 32-Bit Floating Point) |
| V0:S - V41237:S | Numeric | Yes | Yes | Single (16-Bit) V-memory registers signed decimal ranging from -32768 to 32767 |
| VC0 – VC3760 | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers decimal Aliases for mapped Control Relays C0 – C3777 |
| VC0:B – VC3760:B | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers BCD Aliases for mapped Control Relays C0 – C3777 |
| VCT0 – VCT360 | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers decimal Aliases for mapped Counter Status (done) bits CT0 – CT377 |
| VCT0:B – VCT360:B | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers BCD Aliases for mapped Counter Status (done) bits CT0 – CT377 |

Table B-3. 05/105/205/350/405 DirectLogic PLC Data Members

| | | | | |
|--------------------|---------|-----|-----|--|
| VGX0 – VGX3760 | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers decimal Aliases for mapped Remote I/O Inputs GX0 – GX3777 |
| VGX0:B – VGX3760:B | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers BCD Aliases for mapped Remote I/O Inputs GX0 – GX3777 |
| VGY0 – VGY3760 | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers decimal Aliases for mapped Remote I/O Outputs GY0 – GY3777 |
| VGY0:B – VGY3760:B | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers BCD Aliases for mapped Remote I/O Outputs GY0 – GY3777 |
| VS0 – VS1760 | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers decimal Aliases for mapped Stage status (active) bits S0 – S1777 |
| VS0:B – VS1760:B | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers BCD Aliases for mapped Stage status (active) bits S0 – S1777 |
| VSP0 – VSP760 | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers decimal Aliases for mapped Special Relays (system status bits) SP0 – SP777 |
| VSP0:B – VSP760:B | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers BCD Aliases for mapped Special Relays (system status bits) SP0 – SP777 |
| VT0 – VT360 | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers decimal Aliases for mapped Timer Status (done) bits T0 – T377 |
| VCT0:B – VCT360:B | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers BCD Aliases for mapped Timer Status (done) bits T0 – T377 |
| VX0 – VX1760 | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers decimal Aliases for mapped Inputs X0 – X1777 |

Table B-3. 05/105/205/350/405 DirectLogic PLC Data Members

| | | | | |
|------------------|---------|-----|-----|--|
| VX0:B – VX1760:B | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers BCD Aliases for mapped Inputs X0 – X1777 |
| VY0 – VY1760 | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers decimal Aliases for mapped Outputs Y0 – Y1777 |
| VY0:B – VY1760:B | Numeric | Yes | Yes | Single (16-Bit) V-memory word registers BCD Aliases for mapped Outputs Y0 – Y1777 |
| X0 – X1777 | Logical | Yes | Yes | Inputs – addressed in octal and mapped to V40400 – V40477 |
| Y0 – Y1777 | Logical | Yes | Yes | Outputs – addressed in octal and mapped to V40500 – V40577 |

305/305S Direct Logic PLC Family Data Members

Table B-4. 305/305S DirectLogic Data Members

| Data Member | Type | Read | Write | Description |
|---|---------|------|-------|--|
| Activated | Logical | Yes | No | Object-generated signal when TRUE, this flag signifies an active communication connection between the process file and the PLC. |
| C160 – C373 C1000 – C1067 | Logical | Yes | No | Control Relays – addressed in octal |
| C374 – C377 C770 – C777 C1070 – C1077 | Logical | Yes | No | Special Relays – addressed in octal |
| Failed | Logical | Yes | No | Object-generated signal when TRUE, this flag signifies the process file is no longer communicating with the PLC. |
| IO0 – IO157 IO700 – IO767 | Logical | Yes | No | Inputs and Outputs – addressed in octal |
| Paused | Logical | Yes | No | Object-generated signal when TRUE, this flag signifies that the communication connection has paused but is still active and will go FALSE when its paused condition is satisfied. Usually caused by modifying the Link while it is in use. |
| R0 – R777 | Numeric | Yes | Yes | Single (8-Bit) byte registers decimal |
| R0:W – R776:W | Numeric | Yes | Yes | Single (16-Bit) word registers decimal |
| R0:WB – R776:WB | Numeric | Yes | Yes | Single (16-Bit) word registers BCD |
| RC160 – RC370 RC760RC1000 – RC1070 | Numeric | Yes | Yes | Single (8-Bit) byte Control Relay and Special Relay registers decimal Aliases. |

Table B-4. 305/305S DirectLogic Data Members

| Data Member | Type | Read | Write | Description |
|--|---------|------|-------|--|
| RC160:W – RC360:W RC760:W RC1000:W – RC1060:W | Numeric | Yes | Yes | Single (16-Bit) word Control Relay and Special Relay registers decimal Aliases. |
| RC160:WB – RC360:WB RC760:WB RC1000:WB – RC1060:WB | Numeric | Yes | Yes | Single (16-Bit) word Control Relay and Special Relay registers BCD Aliases. |
| RIO0 – RIO150 RIO700 – RIO760 | Numeric | Yes | Yes | Single (8-Bit) byte registers decimal Aliases for mapped Inputs and Outputs IO0 – IO157 and IO700 – IO767 |
| RIO0:W – RIO140:W RIO700:W – RIO750:W | Numeric | Yes | Yes | Single (16-Bit) word registers decimal Aliases for mapped Inputs and Outputs IO0 – IO157 and IO700 – IO767 |
| RIO0:WB – RIO140:WB RIO700:WB – RIO750:WB | Numeric | Yes | Yes | Single (16-Bit) word registers BCD Aliases for mapped Inputs and Outputs IO0 – IO157 and IO700 – IO767 |
| RS400 – RS570 | Numeric | Yes | Yes | Single (8-Bit) byte Shift Registers decimal |
| RS400:W – RS560:W | Numeric | Yes | Yes | Single (16-Bit) word Shift Registers decimal |
| RS400:WB – RS560:WB | Numeric | Yes | Yes | Single (16-Bit) word Shift Registers BCD |
| SR400 – SR577 | Logical | Yes | No | Shift Register Status Bits – addressed in octal |
| T600 – T677 | Logical | Yes | No | Timer/Counter status (done) bits – addressed in octal |
| TCA600:WB – TCA677W:WB | Numeric | Yes | Yes | Timer/Counter current value words BCD – addressed in octal and mapped to R600 – R677 |

Establishing DirectLogic PLC Links

Lookout*Direct* will use “Links” to easily build and store the communication settings for the DirectLogic PLC connection(s). This will also remove the guess work from communication settings. There are three different types of Links you can create.

- a standard serial link that uses COM1 through COM4 directly to the PLC port
- a serial link that will connect through a pair of modems to the PLC port
- a link that will connect through a network card to an Hx-ECOM module

The majority of communications links can be quickly established using the LinkWizard. The LinkWizard automatically searches for established communications links.



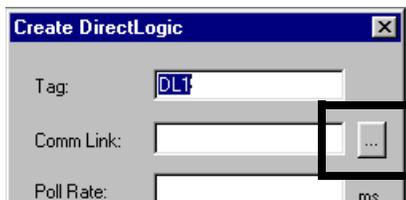
Note If you have a network of PLCs, you must build a communications link for each different PLC. For example, it is possible that all PLCs on a network have the same communications settings (protocol, baud rate, etc.). However, each one would have a unique station address, therefore you must build a separate link for each one.

Establishing a Communications Link Using the LinkWizard

1. Select **Object »Create Drivers**, choose **DirectLogic** as the object class, and then click OK.

The **Create DirectLogic** dialog box appears with no **Comm Link** selected.

2. Click the link button (...).



The **Select Link** dialog appears. Existing communications links that are links found by the *Link Wizard* are displayed in the **Links** gallery.



Note If no links appear in the **Links** gallery, refer to [Using the Link Wizard to Add a Serial Communications Link](#) below.

3. Double-click the desired link.

The links name appears on the **Create DirectLogic** dialog box in the **Comm Link** text box.

4. Click **OK** to establish the link.

Using the Link Wizard to Add a Serial Communications Link

The wizard will guide you through the creation of a communications link between *LookoutDirect* and your PLC.

1. In the **Select Link** dialog, click **Add**.

The **Link Wizard** opens.

2. Select the correct communications port, and then click **Next**.
3. Select the PLC family. Click *Not Sure* if you do not know what family your PLC belongs to. Click **Next** after making your family selection.

If you are using a AutomationDirect compatible PLC, the *Link Wizard* will attempt to detect the family automatically.

4. Select the correct protocol. The correct protocol will already be highlighted if a PLC family was selected in the previous step. Click **Next** after making your protocol selection.

LookoutDirect attempts to establish communications with the PLC using the node address and protocol you selected. The first attempt at communicating with the PLC will be made using 9600 baud and odd parity. If the first attempt is unsuccessful, a second attempt will be made using an autobauding sequence. If both attempts at establishing communication with the PLC are unsuccessful, use the **Link Editor** to manually adjust the port configuration until communications are established.



Note The choice of protocol is determined by two factors.

- Whether or not the PLC supports the protocol on the port where you are connecting. Refer to your PLC user manual for a list of protocols available for ports on *PLCDirect* and compatible CPUs.
- If you need to perform write operations to individual Discrete I/O points or control relays. In this case you must select the K-sequence protocol. *DirectNET* protocol cannot write to individual bit locations.

5. Enter a unique name for the link that is no more than 16 characters in length and a description of that is no more than 32 characters in length, and then click **Finish**.

The name of the new link appears in the **Link** gallery of the **Select Link** dialog box.

6. Click **Select**.

The abbreviated name for the communications link you selected appears in the **Comm Link** text box in the **Create DirectLogic** dialog box.



Note The **Poll Rate** and **Poll=** text boxes are used to for Modem/RF communications links or to compensate for noisy networks. Under normal circumstances, it is unnecessary to complete these text boxes. Refer to the online help for further information.

Using the Link Wizard to Add an Ethernet Link

The following provides the procedure for configuring a communications link between a standard network interface card and an Ethernet communications module.



Note Refer to Windows online help for information on configuring your network and installing network protocols.

1. In the **Select Link** dialog, click **Add**.
The **Link Wizard** opens.
2. Select *Ethernet*, and then click **Next**.
3. Select the correct transport and protocol, and then click **Next**.
Lookout*Direct* scans the network for ethernet modules.



Note The following restriction apply to the transport layer:

- If the Operating System is Windows NT 4.0, the only Transport option available to you is Winsock. Windows 95/98 allow you to choose either IPX interrupt or Winsock.
 - If you select UDP/IP as the Transport Protocol, you must change the IP address of the module from its default value of 255.255.255.255 before you can connect to it.
4. Select the device and addressing mode. If you selected the UDP/IP protocol in the last step, enter correct the IP address of the network card. Refer to *Making Changes to the Device and Addressing Mode* below for further information.
 5. Click **Next**.

Lookout*Direct* attempts to communicate with the ethernet module.

6. Enter a unique name for the link that is no more than 16 characters in length and a description of that is no more than 32 characters in length, and then click **Finish**.

The name of the new link appears in the **Link** gallery of the **Select Link** dialog box.

7. Click **Select**.

The abbreviated name for the communications link you selected appears in the **Comm Link** text box in the **Create DirectLogic** dialog box.

Making Changes to the Device and Addressing Mode

Module List Group

Each ethernet module is assigned a unique 12 digit address at the factory, called the Ethernet address. A sticker located either on the back of the PC board in the module or on the side of the module itself, will have the Ethernet address printed on it. The Module List will display any ethernet modules it finds on the network, sorted by their Ethernet address. If you select any device in the Module List, the current configuration for that device is displayed in the fields in the Address Mode section.

- The **Query** button executes a rescan of the network for Ethernet modules using the same Transport and Transport Protocol specified in the previous dialog.
- The **Setup...** button displays a dialog box that allows you to assign a Name, Description and IP address to the selected module.
- The **Link Editor** button displays a dialog box that will let you manually configure the Link parameters for a specific Ethernet module.

Address Mode Group

Each ethernet module must have some way of uniquely identifying itself on a network. The Ethernet address, which is assigned at the factory, is most always unique, but it is not always the most convenient identifier to remember.

Fortunately there are three user-configurable identifiers available: the Module ID, the Name, and the IP Address (the Ethernet address is not user configurable). The Address Mode selection determines which of these identifiers Lookout*Direct* will use to locate the ethernet modules on your network. The important thing to remember is that whichever identifier you choose for the Address Mode, it must be unique on the network.

If you want to change the module's configuration, click the **Setup** button and make any adjustments needed for your network.

Setup Button

Selecting a module in the Devices section will display the current configuration for that module in the Configuration section. Before you change any of the values, look at each of the options in more detail.

- The Module ID is a unique numerical identifier given to each module on the network. This number can be either the module's dipswitch setting, or a user configured address (if the dipswitches are set to address 0). Refer to the Ethernet module's user manual, part number H24-ECOM-M, for detailed information on assigning an address.
- The Name field can contain a 32 character alphanumeric string. The value assigned at the factory is "Name". If you intend to use the Name field as the identification method, you must change the default value from "Name" in order to make it unique on the network.
- The Description field can contain a 32 character alphanumeric string.
- The IP Address field must contain a valid IP address that is unique on your network. You must be careful not to duplicate IP addresses on a network (you will not be able to complete the link configuration if the IP address is not unique). Your Network Administrator should be able to tell you what addresses are available to use. If you intend to use IP Address, you must change the value from its default value.



Note You must be careful not to duplicate information in these user-configurable fields in any module on the network. You will not be able to complete the Link creation process if you choose an identifier that has been duplicated on another module.

If you enter new values for a field, click the **Update Module** button to write these new values to the EEPROM in the Ethernet module. The **Query Network** button will initiate a rescan of the network using the Transport and Transport Protocol previously specified.

Appendix B

Glossary

| Prefix | Meanings | Value |
|--------|----------|------------------|
| μ- | micro- | 10 ⁻⁶ |
| m- | milli- | 10 ⁻³ |
| k- | kilo- | 10 ³ |
| M- | mega- | 10 ⁶ |

A

| | |
|--------------------------------|--|
| absolute date absolute time | <p>Numeric system <i>LookoutDirect</i> uses for keeping track of dates and times, in which midnight (0 hours), January 1, 1900 is represented by 1, midnight of January 2, 1900 is represented by 2, and so on. The absolute date/time number 36234.47222250 represents 11:20 AM, March 15, 1999.</p> <p>The numeric value for 1 second in <i>LookoutDirect</i> is .000011574, the numeric value for 1 minute is .000694444, and the numeric value for 1 hour is .041666667.</p> |
| ACK | Acknowledge (an alarm or event). |
| active notification | A feature of event-driven software systems in which the application is alerted of value changes when they occur instead of through continuous, loop-driven queries. |
| address space | An OPC term for the area you browse to find what items are available on an OPC server. Part of the standard OPC interface, this space may arrange items hierarchically. |
| alarm | Software notification of a condition in a process. This alarm may call attention of a value that has exceeded or fallen below certain levels, set in the object database or in an Alarm object. |
| alias | Name given to a data member using the Edit Database dialog box. This name can be descriptive or mnemonic, and may be associated with other data member configurations such as scaling, logging, and alarming. A data member can have more than one alias, each with different associated configurations. |

B

- baud rate Measurement of data transmission speed, formally defined as the number of electronic state changes per second. Because most modems transmit four bits of data per change of state, is sometimes misused or misunderstood—a 300 baud modem is moving 1200 bits per second. *See* [BPS](#).
- .bmp files Graphic files in bitmap format. If you are using a .bmp file in *LookoutDirect*, you cannot resize it on screen. *See* [Windows metafile](#).
- BPS Bits per second—measure of the rate of transfer of data.

C

- CBL compiler *LookoutDirect* uses the CBL (Control Block Language) compiler to compile a *LookoutDirect* source file (.lks) into a binary file (.l4p).
- .cbx file A *LookoutDirect* file containing a *LookoutDirect* object class. A .cbx (Control Block Extension) file may have one or more object classes in it.
- checksum A method of verifying that the number of bits received is the same as the number of bits transmitted. Used by TCP/IP and serial protocols.
- Citadel The *LookoutDirect* historical database that stores your data for access later.
- classes *See* [object classes](#).
- client A *LookoutDirect* process that monitors a *LookoutDirect* server process. *LookoutDirect* clients should be computer independent so that they can be run from any computer on your network. *LookoutDirect* server processes run on computers actually connected to your control hardware.
- comm port Term sometimes used for a serial port.
- connection Input to a *LookoutDirect* object's writable data members. For more information, refer to Chapter 4, *Using LookoutDirect*.
- control objects *LookoutDirect* objects you use to control a process, change a data value, adjust a register, and so on.
- controllable objects *LookoutDirect* objects you can control with a *LookoutDirect* control object.

| | |
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| .csv files | Comma Separated Value file, a format widely accepted by spreadsheet and other data handling programs. |
| CTS | Clear to Send. Part of a handshaking protocol for certain devices that connect the serial port of a computer. See the <i>RTS/CTS Handshaking Settings</i> section of Chapter 3, <i>Serial Port Communications</i> , in the <i>LookoutDirect Developer's Manual</i> for detailed information. |
| cursor (data table) | The <i>LookoutDirect</i> data table can activate one row of data at a time using the data table cursor. See the data table reference in the <i>LookoutDirect</i> online help or the <i>LookoutDirect Object Reference Manual</i> . |

D

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| DAQ | Short for Data Acquisition. |
| data member | Data source or sink associated with a <i>LookoutDirect</i> object. A readable data member, or source, may be used in expressions or as inputs to other objects. A writable data member, or sink, may have at most one connection into it, created using the Object»Edit Connections dialog box. A data member may be both readable and writable. See also native data member and alias . |
| data type | Kind of value (numeric, logical, or text) that a parameter or data member can hold. |
| database | Collection of data stored for later retrieval, display, or analysis. |
| datagram | Message sent between objects in <i>LookoutDirect</i> . A datagram contains a route and a value. |
| DCOM/COM | Distributed Component Object Model, a Microsoft standard in which client program objects request services from server program objects. The Component Object Model (COM) is a set of interfaces, clients, and servers used to communicate within the same computer (running Windows 98/95 or Windows NT). |
| DDE | Dynamic Data Exchange, currently used in <i>LookoutDirect</i> to exchange data with other programs (such as Microsoft Excel) running on your network. |

Glossary

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| deadband | A value that must be exceeded for an alarm to sound or a change in state to be recorded. For instance, if you have a low-level alarm set at 5 with a deadband of 2, the alarm will not trigger until the value being monitored drops to 5. The alarm will then stay active until the value being monitored moves above 7. A deadband keeps small oscillations of value from triggering an alarm and then canceling it too rapidly. |
| deviation | Set a deviation to filter out small changes in value when logging data. Before being logged to a database, a value must change by at least the deviation amount of the last logged value. |
| dialing prefix | Part of the Hayes AT command set for use with modems. See the Dial-Up Modem Settings section of Chapter 3, <i>Serial Port Communications</i> , in the <i>LookoutDirect Developer's Manual</i> for detailed information. |
| displayable objects | A <i>LookoutDirect</i> object class that has a displayable component, such as a Pot, a Switch, or a Pushbutton. |
| DLL | A Dynamic Link Library, which is a collection of small, special purpose programs which can be called by a larger program running on the computer. Sometimes called Dynamically Linked Library. |
| driver objects | <i>Lookout Direct</i> objects used to communicate with PLCs, RTUs, and other I/O devices. |

E

| | |
|----------------------|---|
| edit mode | <i>LookoutDirect</i> mode in which you can alter and create objects within a process. Switch in and out of edit mode by pressing <Ctrl-space> or by selecting Edit»Edit Mode . |
| engineering unit | In <i>LookoutDirect</i> , used to refer to scaled or converted data. Thermocouple data, for instance, arrives in volts as the raw unit, and must be converted to degrees, an engineering unit. |
| environment services | Tasks <i>LookoutDirect</i> performs as a part of making your SCADA/HMI work easier. <i>LookoutDirect</i> environment services include serial communications, database and logging, security, networking, alarming, and so on. |
| Ethernet | A widely used, standardized local area networking technology, specified in the IEEE 802.3 standard. |

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| event | Anything that happens can be an event. In <i>LookoutDirect</i> , events include such things as adjusting a control value, entering or exiting edit mode, opening or closing a control panel, and logging in or logging out of the system. |
| expression functions | Mathematical, logical, and other functions used by <i>LookoutDirect</i> expressions. |
| expressions | <i>LookoutDirect</i> expressions are often paths to a data member. They can also function like variables that, using a spreadsheet cell type formula, become capable of performing flexible, real-time math operations, condition testing, and other complex operations functions. See Chapter 1, <i>Expressions</i> , in the <i>LookoutDirect Developer's Manual</i> for more information on expressions. |
| F | |
| failover | A failover is the takeover of a process by a standby computer when the primary computer fails for any reason. |
| FieldBus | An all digital communication network used to connect process instrumentation and control systems. |
| FieldPoint | A National Instruments hardware product line for industrial automation, control, monitoring, and reporting. |
| frame | Sequence of bytes sent from a computer to a device or vice versa. The syntax of the frame depends on the protocol being used. A read frame contains enough information to specify a set of variables whose values the device should return. A write frame specifies a variable in the device and a new value to write into that variable. Some protocols support the writing of multiple variables in a single frame. A response frame is returned from the device to the computer, indicating whether the frame just sent to it was received successfully. If the frame just received was a read frame, the response frame contains a set of requested values. |
| functionality | The way an object works, operates, or performs a task. Functionality is a general concept that applies in the same way to all objects in a given object class. Parameters define the specific functionality of an individual object. |
| functions | <i>See</i> expression functions . |

G

gray proximity A term used in Lookout*Direct* color animation. This sets what percentage of gray will be replaced by a given color as conditions change in a monitored value or set of values.

H

Hi and HiHi Alarm settings. Both warn that a value has gone above some setpoint. Generally a Hi alarm is used to alert an operator of a need for intervention. A hihi alarm is usually used to alert an operator that the value has been exceeded by an even greater margin than a hi alarm indicates, and is usually used to indicate an urgent need for action.

historical logging The process of storing data in a database for use at another time, or from another location.

HOA Hand-Off-Auto control, used to set whether a value must be changed manually, is completely turned off, or functions automatically. You can use a Pot object and a complex expression to create this sort of control in Lookout*Direct*, or you can use a RadioButton object, depending on the particular requirements of the task you need to accomplish.

I

I/O point Every read-only, write-only, or read-write connection Lookout*Direct* makes to external hardware is counted as an I/O point. Lookout*Direct* is licensed for use with a set number of I/O points. If you exceed the number you are licensed to use with your copy of Lookout*Direct*, a warning message appears on your computer screen warning you to shut down one of your processes within a specified time before Lookout*Direct* cuts back on I/O usage.

(implicit) data member A Lookout*Direct* data member containing the fundamental data for certain object classes. When you make a connection to an (implicit) data member, you only use the name of the object, not the name of the object followed by the data member name.

L

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| .14p files | File extension for Lookout <i>Direct</i> process files. These are the compiled files Lookout <i>Direct</i> runs when it runs a process. |
| .14t files | File extension for a Lookout <i>Direct</i> state file, which stores the values for Lookout <i>Direct</i> controls and other objects with state information. |
| .1ka files | File extension for Lookout <i>Direct</i> security files. |
| .1kp files | File extension for Lookout <i>Direct</i> process files in versions of Lookout <i>Direct</i> earlier than Lookout <i>Direct</i> 4. |
| .1ks files | File extension for a Lookout <i>Direct</i> source file, which Lookout <i>Direct</i> compiles to make a Lookout <i>Direct</i> process file that Lookout <i>Direct</i> can run. This is the file you should make sure you keep backed up in case you need to recreate a corrupted process file, or in case some future version of Lookout <i>Direct</i> cannot run a process file compiled in an earlier version of Lookout <i>Direct</i> . |
| logging | The process of storing data in a computer database file. See Chapter 7, <i>Logging Data and Events</i> , in the <i>LookoutDirect Developer's Manual</i> for more information on logging data in Lookout <i>Direct</i> . |
| logical data member | A Lookout <i>Direct</i> data member of the logical data type. |
| .1st files | Extension for the Lookout <i>Direct</i> state file in versions of Lookout <i>Direct</i> earlier than Lookout <i>Direct</i> 4. |

M

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| multiplex | A method of working with more than one data stream using only one communications channel. There are a number of different methods of multiplexing, depending on the hardware and software being used. A number of Lookout <i>Direct</i> driver objects support multiplexing hardware. |
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N

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| native data member | Data members built into a <i>LookoutDirect</i> object class, as opposed to data members you create by using aliases. |
| NetDDE | A way of networking using DDE (dynamic data exchange), retained in <i>LookoutDirect</i> 4 and later for compatibility with earlier versions of <i>LookoutDirect</i> . |
| numeric data member | A <i>LookoutDirect</i> data member of the numeric data type. |

O

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| object | A specific instance created from an object class. |
| object classes | Software modules you use to create individual objects to perform tasks in <i>LookoutDirect</i> . |
| object connections | Software links between objects used to transmit data and commands from one object to another. |
| ODBC | <p>Open DataBase Connectivity, a standard application programming interface (API) for accessing a database. You can use ODBC statements to access files in a number of different databases, including Access, dBase, DB2, and Excel.</p> <p>ODBC is compatible with the Structured Query Language (SQL) Call-Level Interface. ODBC handles SQL requests by converting them into requests an ODBC database can use.</p> |
| OPC | OLE for Process Control, an industry standard interface providing interoperability between disparate field devices, automation/control systems, and business systems. Based on ActiveX, OLE, Component Object Model (COM), and Distributed COM (DCOM) technologies. |

P

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| parameter | Input to an object, similar to a writable data member, whose value is specified in the object parameter list in a Lookout <i>Direct</i> source (.lks) file. Typically, parameter values are set in the object Object»Create or Object»Modify dialog box. |
| ping | A small utility program in Windows and DOS that checks to see if a computer can be reached across a network. Also used to indicate the running of that program. |
| pixel | Picture Element, the smallest bit of a picture. Has one color or shade of grey. The number of pixels per inch determine the resolution of an image. |
| PLC | Programmable Logic Controller. |
| poll | A software event in which a computer checks some value in a device or register. In Lookout <i>Direct</i> , a logical command that forces a device poll to check data member values. |
| poll rate | How often a device is polled. |
| pop-up panel | One variety of Lookout <i>Direct</i> control panel that can only be displayed at the size set by the process developer, and which cannot be maximized. When open, a popup panel remains on top of other panels until minimized. |
| process | In Lookout <i>Direct</i> , process refers to a Lookout <i>Direct</i> “program,” used for industrial automation, control, monitoring, or reporting. |
| process file | The Lookout <i>Direct</i> binary file Lookout <i>Direct</i> executes when running a process. Carries the .l4p extension. |

R

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| raw unit | Data as it arrives in your process, such as voltage or amperage. Thermocouple data, for instance, arrives in volts as the raw unit, and must be converted to degrees, an engineering unit. |
| receive gap | A serial communications setting that determines the number of empty bytes (or amount of time) a driver receives before recognizing the end of a message frame and requesting another message. See the <i>Setting Receive Gap</i> section of Chapter 3, <i>Serial Communications</i> , in the Lookout <i>Direct Developer's Manual</i> for more information about the receive gap. |

Glossary

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| redundancy | A system for making sure that a computer can come online and run a LookoutDirect process if the computer currently running that process fails for some reason. |
| remote | In the context of LookoutDirect, remote is a position source location for a control. See the <i>Remote Position Source Connections</i> section of Chapter 4, <i>Using LookoutDirect</i> , for detailed information on the LookoutDirect remote position source. |
| resolution | The smallest signal increment that can be detected by a measurement system. Also, the number of pixels per inch on a computer monitor screen or dots per inch in printer output. |
| RTS | Request to Send, part of a handshaking protocol for certain devices that connect the serial port of a computer. See the <i>RTS/CTS Handshaking Settings</i> section of Chapter 3, <i>Serial Communications</i> , in the <i>LookoutDirect Developer's Manual</i> for detailed information. |
| RTU | Remote Terminal Unit, a device similar to a PLC for use at a remote location, communicating with a host system through radio or telephonic connections. |
| run mode | LookoutDirect mode in which processes run but no editing changes can be made. Switch in and out of run mode by pressing <Ctrl-space> or selecting Edit>Edit Mode . |
| S | |
| SCXI | Signal Conditioning eXtensions for Instrumentation, a National Instruments product line for conditioning low-level signals. |
| security accounts | Also called user and group accounts, LookoutDirect uses security accounts to define what users or group of users have different operation privileges in LookoutDirect. See Chapter 6, <i>Security</i> , in the <i>LookoutDirect Developer's Manual</i> for detailed information on LookoutDirect security. |
| server | A process that provides data (services) to client processes. In LookoutDirect, server processes are intended to be run on one computer only, with direct connections to field hardware. Client processes interact with field hardware through server processes. |
| source file | LookoutDirect file that can be compiled to produce a binary LookoutDirect process file that runs a process. Uses a .1ks file extension. |

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| SQL | Structured Query Language, used to get information from and update information in a database. |
| standby | A computer standing by to take over running a process if the primary computer fails or falls offline. |
| startup file | A LookoutDirect process file (.14p) you designate in the System Options dialog box that LookoutDirect will open and run any time LookoutDirect is opened. |
| state file | The LookoutDirect file that stores the value of all LookoutDirect control parameters and object data members in use in a process. Uses the file extension .14t. |
| system objects | LookoutDirect objects used to control other objects or process and analyze data. |

T

| | |
|------------------|---|
| TCP TCP/IP | Transmission Control Protocol, a method (protocol) for sending data between computers. Used with IP, the Internet Protocol. TCP/IP sends data as packets, with IP handling the delivery of data and TCP keeping track of the individual packets. |
| text data member | LookoutDirect data member used for text data. |
| trace | A term for data from a single source over some period of time, stored in an ODBC-compliant database. |
| traces table | ODBC databases present data in the form of traces tables. A traces table contains a field or column of data for each data member being logged, along with a field you can use to query the database. |
| trend | Historical data showing the change in a value over time. Often used in connection with graphing the data for display. |

W

| | |
|------------|---|
| .wav files | File extension given to sound files. You can play a .wav file in LookoutDirect to add sounds or speech to alarms or events. |
|------------|---|

Glossary

Windows metafile A standard graphics file type for use in the Microsoft Windows operating environment. If you use a metafile graphic in *LookoutDirect*, you can enlarge or reduce it on the screen, use them as masks without specifying transparent pixels, and use the *LookoutDirect* Animator to animate the colors of the graphic.

.wmf file File extension given to Windows Metafile graphic files.

X

.xls file File extension given to Microsoft Excel files.