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Blue Series

BLUE SERIES INSTALLATION AND OPERATION MANUAL

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Package the unit in its original packaging container or, if unavailable, any suitable rigid container. If a substitute container is used, surround the unit with shock absorbing material; damage in shipment is not covered by the warranty. Include a letter with the unit describing the difficulty and designating a contact person. Send to the following address: Maple Systems, Inc., 808 134th Street SW, Suite 120, Everett, WA 98204-7333.

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APPLICATIONS ASSISTANCE

This manual is designed to provide the necessary information for trouble-free installation and operation of your new Operator Interface Terminal (OIT). However, if you need assistance, please call Maple Systems at 425-745-3229 or visit our web site at www.maple-systems.com.

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Introduction - Welcome

Welcome to the Maple Systems' BLU300 Series of Operator Interface Terminals (OITs). The BLU300 is a low cost, easy-to-use graphical operator interface with membrane-style keypad. The BLU300 connects to programmable logic controllers (PLCs) to provide the human-machine interface in industrial applications. The BLU300 Series has several features not found in other low cost OITs. This manual explains the operation of the BLU300 Series OITs and how to implement the many available features using the BlueLeaf Configuration Software.

BlueLeaf Support

OIT Models Supported

The BlueLeaf configuration software supports the BLU300 operator interface terminal which is a 128x64 pixel backlit LCD display with five function keys and control keys. It is specifically designed for applications in which a small yet robust user interface is required.

PLCs Supported

For the latest list of PLCs and controllers supported by the BLU300Series OITs, please visit our website at http://www.maple-systems.com/index_productsbycontroller.htm.

About Your Documentation

Maple Systems provides many resources to allow you to get the most out of your BLU300 Series OIT.

- *BLU300 Series Operation Manual* (shipped with BlueLeaf software as a PDF file) - describes installation, general operation and features of the BLU300 Series and how to configure it using the BlueLeaf configuration software.
- *Controller Information Sheets* - important information specific to each supported protocol.
- *BlueLeaf On-line Help* - covers the operation of the BlueLeaf software. Always available by clicking **Contents** from the **Help** menu in BlueLeaf.

For more information about these and other training sources, visit the Maple Systems web site at:
http://www.maple-systems.com

Conventions

When using BlueLeaf software, there are usually several ways to perform a task. For example, if you want to copy a graphics object, you can:

- Click the Copy command on the Edit menu.
- Click the Copy button on the Standard toolbar.
- Press the CTRL + C keys on your computer.

In most cases, we will describe each method when the task is first discussed. The menu method is then used whenever the task is used in later procedures. Other conventions used in this book are listed in the following table.

Convention	Meaning
Bold	Characters that you must type exactly as they appear. For example, if you are directed to type **a:\setup**, you should type all the bold characters exactly as they are printed.
Italic	Placeholders for information you must provide. For example, if you are directed to type *filename*, you should type the actual name for a file instead of the word shown in italic type. Italics are also used to indicate a glossary term.
ALL CAPITALS	Directory names, file names, key names, and acronyms.
KEY1+KEY2	A plus sign (+) between key names means to press and hold down the first key while you press the second key.
click	Refers to clicking the primary mouse button (usually the left mouse button) once.
Double-click	Refers to quickly clicking the primary mouse button (usually the left mouse button) twice.
Right-click	Refers to clicking the secondary mouse button (usually the right mouse button) once. Right-clicking usually opens shortcut menus.

The following table identifies symbols and margin icons.

Icon	Meaning
	Identifies a procedure.
	Indicates a reference to additional information.
	Indicates an important note.

What You Need

The following items are needed to configure and operate your OIT.

Configuration Software	BlueLeaf
Configuration Cable	7431-0102
Personal Computer[1]	User provided
Power Cable	6030-0009
24VDC Power Supply	User Provided (for details refer to Appendix A: Specifications)
PLC	User Provided
Controller Information Sheet	Maple Systems provides Controller Information Sheets, which contain important information specific to each PLC. **Please locate the sheet that corresponds to your PLC on our website.**
Communication Cable (OIT to PLC)	Maple Systems manufactures custom cables of any length to connect the BLU300 to your PLC. Please visit our website for a complete list of available cables or build your own using the cable diagrams located there: www. maple-systems.com.

[1]Computer requirements include at least a Pentium 90Mhz PC, 16MB RAM, 10MB available hard disk space, VGA video controller, Microsoft Windows 95 or higher, and one available RS-232 serial port.

OIT Basics

Operator Interface Terminals (OITs) provide much more versatility than traditional mechanical control panels. An OIT allows a plant floor operator to monitor current conditions of a control system and, if necessary, to initiate a change in the operation of the system. OITs connect to programmable logic controllers (PLCs) typically through the PLC's serial communications port. The OIT can be programmed to monitor and/or change current values stored in the data memory of the PLC.

OITs can have either text-based or graphics-based displays. A text-based OIT can display printable text characters but no graphics. Some text-based OITs can display text characters in various sizes. A graphics-based OIT can display printable text characters of varying fonts and sizes and graphics shapes such as icons, bitmaps, or pictures. Using pictures instead of words or characters often greatly simplifies the operation of the OIT, making the OIT much more intuitive to use.

Some OITs use touch screen displays while others use a membrane-style keypad. Membrane-style keyboards are best used in applications in which the keypad is likely to become dirty.

The Maple Systems BLU300 Series OITs are graphics-based membrane-style keypad OITs. Before we get any further into the operation of these OITs, it is necessary to define some terms that will be used throughout this manual.

Projects

The OIT has two basic segments of internal memory. The *code memory* contains the information required by the OIT that controls how it operates such as the features supported and how it communicates to a PLC. The OIT programmer does not have the ability to change code memory. The *project memory* pertains to all of the screens created and any other features that the OIT programmer can create using the BlueLeaf configuration software. Therefore, the term *project* is used to designate the file that is sent to the OIT from the BlueLeaf software.

Objects

An *object* is any action that the OIT performs while it is communicating to the PLC. In order to get the operator interface terminal to 'do anything', you must program the OIT with objects. Objects perform actions such as display text or graphics, write a value to a PLC register, or display a message. Objects most often are graphics shapes that are to be displayed on the OIT screen. For example, a *Text Object* is used to display text on the OIT. But objects are also used to configure the OIT to perform some action. For example, a *Jump To Screen Object* tells the OIT to continuously monitor a PLC register that is used by the PLC to request a new screen. Some objects can display a graphics shape on the OIT screen and perform some action. For example, a *Function Key Object* creates a graphic object on the OIT that indicates the current state of a PLC register, when the tagged function key is pressed on the OIT.

Graphics Object

A *graphics object* is any text, icon, or picture that can be displayed on the OIT. Graphics objects are further defined by how they are composed or created. A *Text Object* is a graphics object that displays text on the OIT screen. A *Bitmap Object* is a graphics object that displays a bitmap on the OIT screen. Bitmaps are files stored in the OIT to display pictures. Bitmaps use a pixel-based file format.

Screens

A *screen* is a window of information that can be displayed on the OIT. Screens can appear on the OIT display by a request from the PLC or by a press from the OIT's keypad. Each screen can display graphics objects and there is no limit to the number of graphics objects that can be placed on each screen. The BLU300 Series is capable of storing up to 999 screens , but the actual limit is determined by the total amount of memory used for the application (maximum of 256Kbyte). A more in-depth discussion of screens is covered in later chapters.

What is a Blue Series OIT?

The Blue Series OITs by Maple Systems are graphics operator interfaces designed to connect to PLCs in an industrial environment. The 3.0" LCD displays are backlit and have a resolution of 128x64 pixels. The membrane-style keypad is composed of five function keys (ten with the SHIFT key) and control keys to facilitate entering data. The Blue Series has a built-in clock for displaying time/date and sending this data to the PLC.

BLU300M

Front View

Back View

LED Indicator	Purpose
ALARM LED (red)	indicates alarm conditions by the PLC

The Blue Series OIT has two serial ports that provide a connection to a PLC using RS-232 or two wire RS-485. The RS-232 serial port is also used to configure the BLU300.

The Blue Series is powered using +24VDC. Local setup menu allows adjustment of the LCD contrast, a back light saver, adjustment of the internal clock, and silencing the internal buzzer.

There is currently one model in the Blue Series.

Model	Display Size	Resolution	LCD Type	Keys	Clock
BLU300M	3.0"	128 x 64	STN LCD with green LED back light	5 function keys (10 with Shift)	Built-in with field-replaceable battery

Finally, the Blue Series is powered by a 25 MHz, 16-bit microprocessor with 256K Byte of flash memory and 32K Byte of RAM. The Blue Series is designed for industrial environments and carries a NEMA 4 rating as well as CE compliance for noise immunity and emissions. It is UL listed.

List of Features

The next chapter will guide you through the creation of your first project. Before you proceed, you may wish to read this brief list of some of the features offered in the Blue Series OIT.

Icon		
	Bit Lamp	Creates a graphics object to reflect the current status of a PLC bit.
	Word Lamp	Creates a graphics object to reflect the current state of a multi-state PLC data register.
	Multi-state Bit Lamp	Creates a multi-state bitmap object that changes state (picture) according to the value in a PLC data register. The PLC register can be a coil or 16/32 bit register. Up to 255 states available.
	Bar Graph	Creates a bar graph that represents a 16/32 bit PLC register.
	Analog Meter	Creates an analog meter that represents a 16 bit PLC register.
	Function Key	Creates a bitmap object, which changes state according to the press of a function key.
	Numeric ASCII display	Displays ASCII characters or numbers stored in a PLC register.
	Numeric Input	Displays a number stored in a PLC register. The number can be changed using the OIT's numeric entry screen.
	Dynamic Messages	Displays text messages according to a value in a PLC register.
	Clock Object	Displays the time and/or date using the built-in clock or data from six consecutive PLC registers.
	Text Object	Displays text or symbol characters using windows fonts.
	Bitmap Object	Displays a predefined or imported bitmap.
	Line	Draws a line.

	Rectangle	Draws a rectangle or square.
	Circle	Draws a circle or ellipse.
	Curve	Draws a curve.
	Chord	Draws a chord.
	Sector	Draws a sector.
	Polygon	Draws a polygon shape.
	Unit of Measure	Displays most common units of measure.
	Scale	Used to display scales (for bar graphs).

Chapter 1 - Installation of OITs

Before You Begin

Please read the following for proper handling of your new OIT.

Unpacking the Unit

Carefully unpack the OIT. Please read any instructions or cautions that appear on the shipping container. Check all material in the container against the enclosed packing list. Maple Systems, Inc. will not accept responsibility for shortages against the packing list unless notified within 30 days. The equipment and its accessories were inspected and tested by Maple Systems before shipment; all of the equipment should be in good working order. Examine the equipment carefully; if any shipping damage is evident, notify the carrier immediately. You are responsible for claim negotiations with the carrier. Save the shipping container and packing material in case the equipment needs to be stored, returned to Maple Systems, or transported for any reason.

Managing Electrostatic Discharge

It is best NOT to remove the rear enclosure of the OIT. When the rear part of the enclosure is removed, the circuitry inside is exposed to possible damage by electrostatic discharge during handling. Minimize the possibility of electrostatic discharge by:

- Discharging personal static by grounding yourself prior to handling the OIT
- Handling the OIT at a static-free grounded workstation
- Connecting the frame ground () connector of the OIT to a clean earth ground
- Placing the OIT in an anti-static bag during transport

CE Compliance

The Blue Series OITs have been tested to conform to European CE requirements per Council Directive 89/336/EEC. The European Union created these requirements to ensure conformity among products traded in those countries. Specifically, the Blue Series OITs meet or exceed the noise emissions and immunity requirements as set forth in the EN50081 (Emissions) and EN50082 (Immunity) standards. These products are designed to withstand electrical noise in harsh industrial environments. They also conform to requirements that limit electrical emissions. However, this does not guarantee that the products will be totally immune from possible malfunction in cases where severe electrical noise occurs. Therefore, we strongly recommend that you follow the guidelines outlined in this chapter for proper wire routing and grounding to insure the proper operation of the Blue Series OIT.

NEMA Rating

The Blue Series OITs are rated for NEMA 4/12 or IP65 installations. This means that when the OIT is properly mounted to a panel or other enclosure, the front enclosure of the OIT will provide protection to the inside of the panel from splashing water, wind blown dust, rain, or hose-directed water. The OIT must be installed according to the instructions in this chapter to be properly sealed.

Environmental Considerations

The Blue Series is designed to operate in temperatures from 0-50° C. It is intended primarily for indoor installations and may not be suitable for certain outdoor applications. Avoid installing the Blue Series in environments with severe mechanical vibration or shocks. Do not install the OIT in enclosures with rapid temperature variations or high humidity. Either may cause condensation of water inside the device and eventual damage to the OIT.

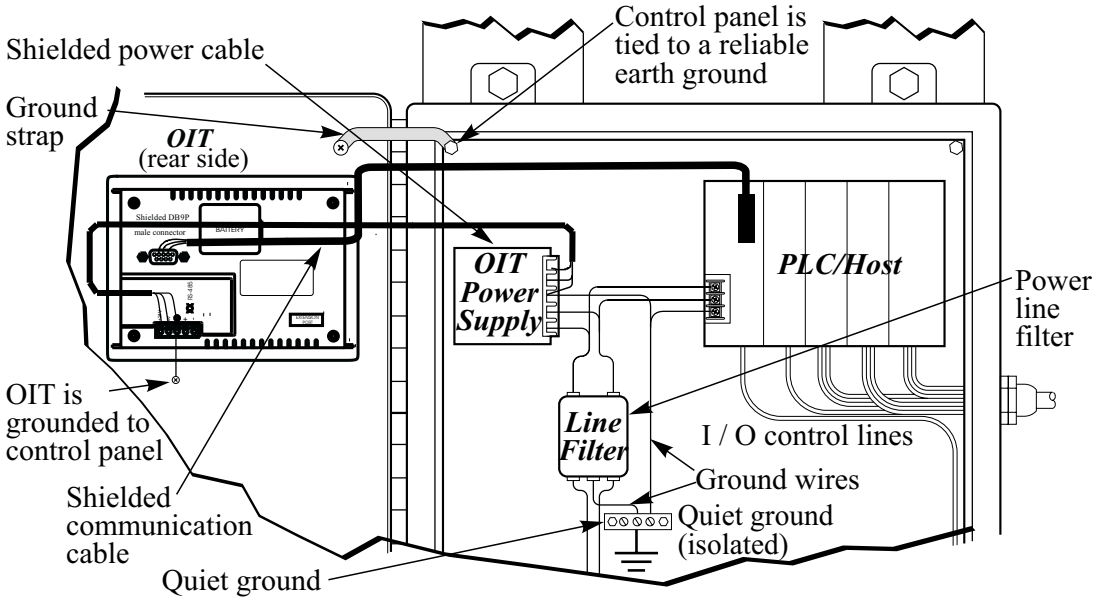
Safety Precautions

Please observe the following precautions when installing the Blue Series OIT. Failure to comply with these restrictions could result in loss of life, serious personal injury, or equipment damage.

	**Warning:** Do not operate the OIT in areas subject to explosion due to flammable gases, vapors, or dusts.
	**Warning:** Do not connect the OIT to an AC power source. You will cause permanent damage to the OIT.
	**Warning:** Do not attempt to use a DC power supply that does not meet OIT power requirements. You may cause malfunction or permanent damage to the OIT.
	**Warning:** Do not power the OIT with a DC power supply used for inductive loads or for input circuitry to the programmable logic controller. Severe voltage spikes caused by these devices may damage the OIT.

Control Panel Design Guidelines

Pay careful attention to the placement of system components and associated cable routing. These items can significantly enhance the performance and integrity of your control application.



Control Panel Example

Control Panel Grounding

The control panel should be connected to a good, high-integrity earth ground both for safety considerations and shielding purposes. Maple Systems cannot overemphasize the importance of good grounding. If you fail to use good grounding procedures during installation, sporadic malfunction of the OIT may occur:

- Connect the OIT's chassis ground terminal to a reliable earth ground with a low-resistance path.
- Route all earth ground wires that lead from the OIT, the PLC, the power supply, and the line filter to a central earth ground point such as a barrier strip. This will ensure that no ground current from one device influences the operation of the other devices.
- Connect the OIT chassis ground terminal to the control panel door using a heavy-gauge short braided cable or ground wire to minimize resistance.
- Connect the power cable's shield wire to the OIT's chassis ground terminal.
- Connect the control panel to earth ground using a copper grounding rod close to the OIT and control panel.

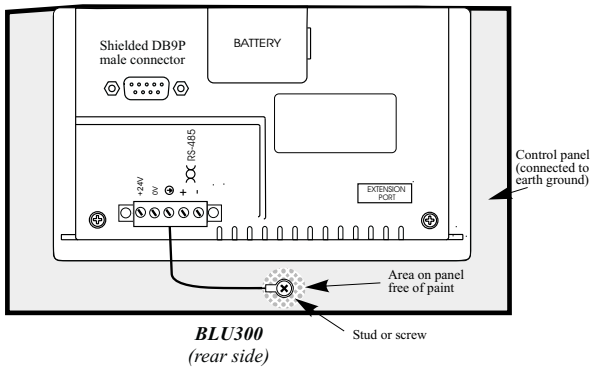
Hinged doors on control panels do not provide a long-term electrical connection to the rest of the enclosure. Corrosion develops over time and prevents good electrical contract. For this reason, a separate wire braid should be installed from the hinged control panel to the rest of the enclosure.

For a more in-depth overview of ground wiring techniques, refer to technical note #1027, *OIT Ground Wiring and Electrical Noise Reduction*, which you can find at www.maple-systems.com**.**

Connect OIT Chassis Ground to Control Panel

To reduce the possibility of electrical interference, connect the chassis ground terminal of the OIT to a clean earth ground. If the control panel is metal, make sure it is properly grounded. Then connect a *short* heavy-gauge wire (#18 AWG) from the chassis ground terminal of the OIT to a mounting bolt on the control panel door. The mounting bolt must have good electrical contact to the control panel; scrape away any paint that may be covering the panel to provide a good connection.

If the control panel is made of a non-conductive material, it is essential that you connect the chassis ground terminal of the OIT to a clean earth ground point located close to the panel.



OIT Chassis Ground Connection

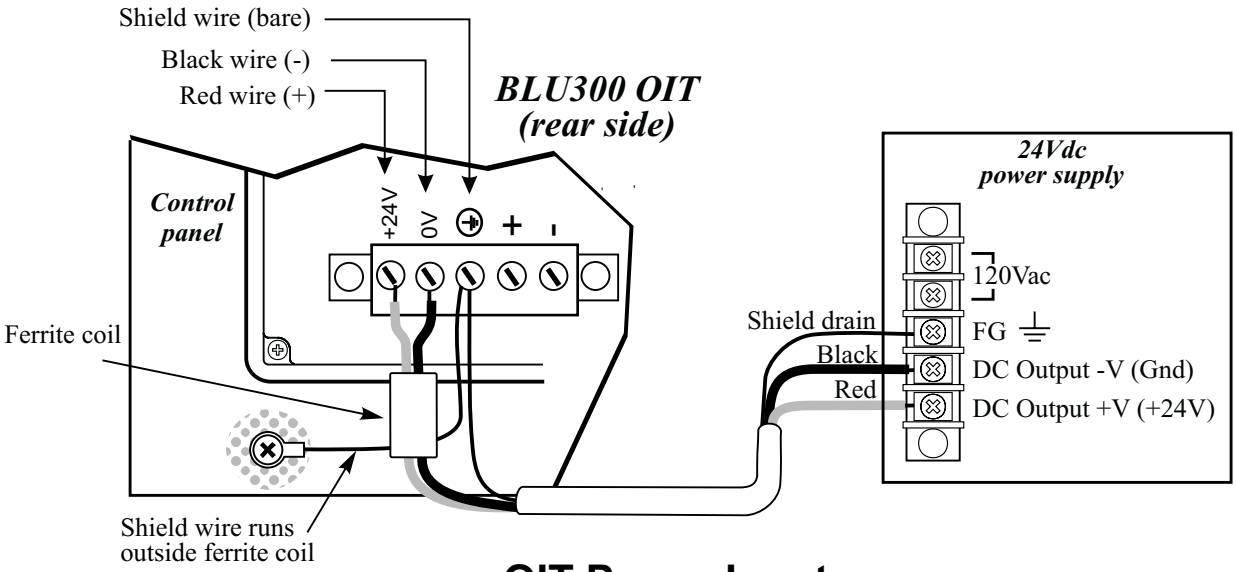
Power Supply Selection

The power supply used to power the OIT should provide an output of +24 VDC 5% measured at the OIT power terminal block. A 24VDC regulated power supply dedicated to the OIT is required (refer to *Appendix A: Specifications* for the input current requirements).

The power cable for the OIT should be 18AWG, 2-conductor wire with a shield drain wire and protective shield (foil or braid). The shield drain wire must be connected to earth ground at both ends of the cable. Please refer to the *Connect the OIT to Power* section for more information.

A power line filter installed at the AC input to the OIT power supply is highly recommended as a safeguard against conducted RF noise, which is often present on factory power lines. The wires connecting the output of the power line filter to the power supply should be kept as short as possible to minimize any additional noise pickup. The case of the power line filter should be connected to a quiet earth ground. The power line filter should have a current rating of at least 1 Amp with common mode and differential mode attenuation.

Do not use the power supply used to provide power to the OIT to power switching relays, solenoids, or other active devices.



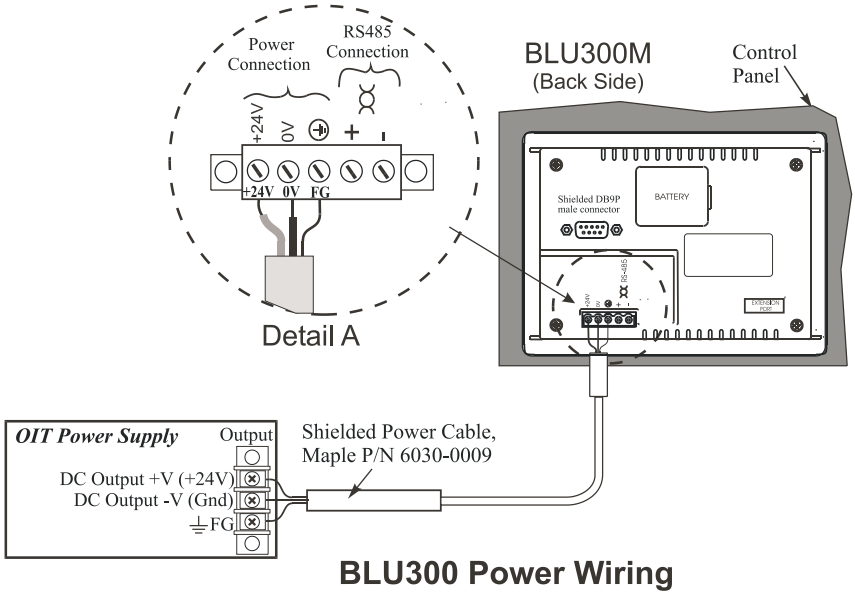
OIT Power Inputs

STEPS:

1. Connect the power cable to the OIT as follows:
   A. Strip the power cable shield to expose 2" of the black and red wires.
   B. Strip about ¼" of insulation from the black and red wires.
   C. Thread the black and red wires through the ferrite core. The shield wire must be outside.
   D. Connect the red wire to the DC positive (+) input of the OIT power terminal.
   E. Connect the black wire to the DC negative (-) input of the OIT power terminal.
   F. Connect the power cable shield wire to the OIT power terminal's chassis ground input.
2. Route the power cable to the OIT power supply. The power cable should not be any longer than necessary.
3. Install the power supply wires as follows (with colors shown for Maple Systems cable P/N 6030-0009):

Color	Power Supply	BLU300 Label
Red	+Output/+24 V dc	+24V
Black	-Output/+24V dc return	0V
Shield	Case ground	⏚ FG

The power connector on the BLU300 Series is a terminal block with wire clamps. Lugs are not required.



BLU300 Power Wiring

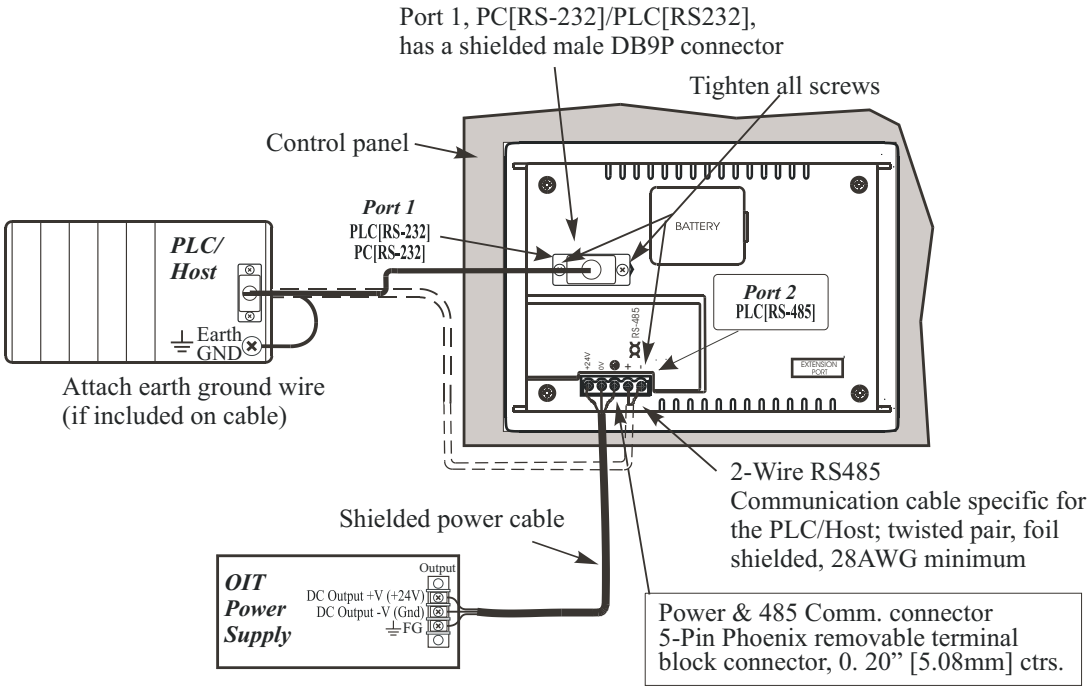
Connect the OIT to the PLC

Each PLC supported by Maple Systems has its own wiring requirements. Maple Systems offers OIT-to-PLC communication cables for most PLCs that are built to any length and tested for high reliability. Most cables are available for next-day shipment from Maple Systems. Components and instructions necessary to construct your own OIT-to-PLC communications cables are also available. Refer to Maple Systems' web site, http://www.maple-systems.com/Index_supportcenter.htm.

Port 1 RS-232	
Pin #	**Function**
1	(no connection)
2	RXD
3	TXD
4	(no connection)
5	GND
6	(no connection)
7	(no connection)
8	(no connection)
9	(no connection)

Port 2 RS-485	
Pin #	**Function**
+	RXD+/TXD+
-	RXD-/TXD-

Pinout for the OIT Ports



STEPS:

1. Connect the "HMI" end of the communication cable into either the RS-232 port or the RS-485 port as required for your application (HMI housing is marked).
2. Tighten the two cable screws at each end to ensure shield ground path.
3. Route the communication cable to the PLC. Refer to the "OIT Cable Routing" section for more information.
4. Connect the "PLC" end of the cable to the PLC and tighten the cable screws.
5. Connect the green shield wire from the cable to earth ground (⏚) on the PLC. If this wire is not present, make the ground connection inside the PLC connector.

Panel Preparation

A metal panel or mounting surface with a minimum thickness of 15 gauge (0.059 inch/3.3mm) if cold-rolled steel or hardened steel, or 10 gauge (0.101 inch/2.6mm) if aluminum alloy (6061-T6 preferred) is required. Thinner panels or surfaces may bow between the mounting clamps and not form a seal with the gasket.

The area of the panel or mounting surface where the gasket comes into contact must be flat and free of scratches, pits, and other features that prevent the gasket from sealing properly. If the panel or mounting surface is not uniform, thick, flat, stiff, or smooth enough, then a sealant such as silicone may be required.

✉ *Clean and deburr the panel cutout before the OIT is installed.*

WARNING

The OIT requires a stiff, flat, smooth mounting surface free of blemishes to seal properly to NEMA 4.

Mount the OIT to the Panel

Installing the Screws on the OIT

STEPS:

1. Prepare the four screw clamps for the BLU300 by inserting the clamps into the slots of the back enclosure as show in the illustration above.
2. Snap the OIT into the panel cutout using the plastic brackets of the back enclosure. Make sure that all metal clamps are properly in position.
3. Tighten the screw clamps until all are uniformly snug.

CAUTION: Do not over-tighten the screws beyond snugness, or you may damage the housing.

REINSTALLATION: Because the gasket will take a "set" to the panel, be sure to reinstall the OIT to the same panel cutout when a NEMA 4 seal is required. For best results, also replace the gasket itself.

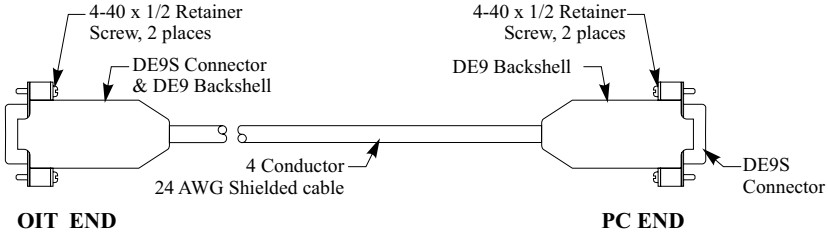
Configuration Wiring

The OIT must be configured for a particular protocol before use. The *BlueLeaf* software (used on a PC with Windows 95 or higher) is used for configuring the OIT. For detailed instructions on installing and using the software, please refer to the software documentation section of this manual.

Connect the OIT to the PC for Configuration

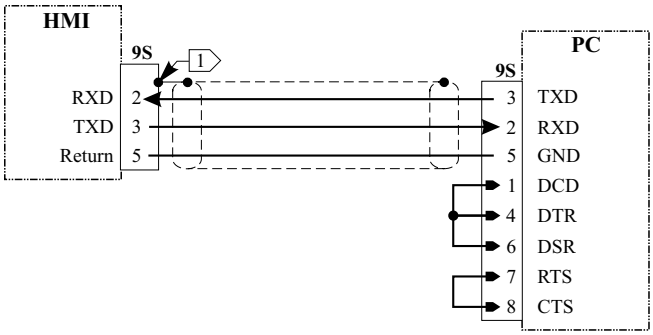
To configure the OIT using Maple System's configuration software, you will need the OIT Configuration Cable, Maple P/N 7431-0102. Connect the end marked "HMI" into the RS-232 port on the OIT and connect the end marked PC into the proper COM port on your PC. See the figure below for serial port pin assignments and the next two figures for connecting the BLU300 series to a PC.

BLU300 SERIES CONFIGURATION CABLE

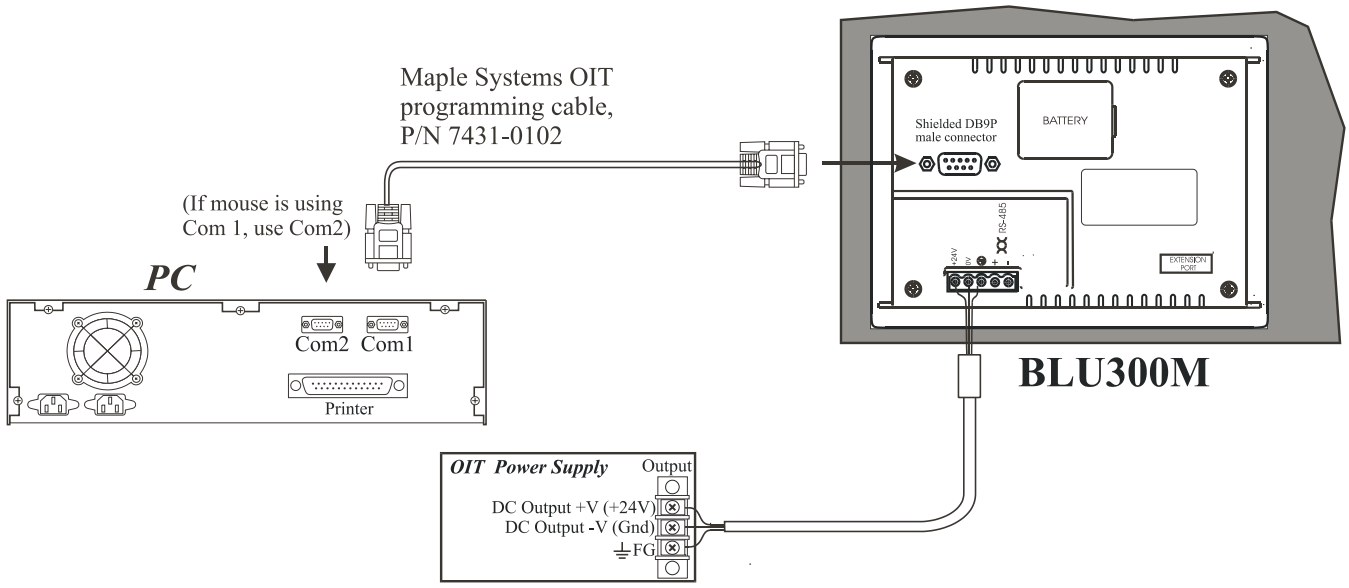


NOTES:

1. Solder shield wire to the DE9P connector metal shell. Install heatshrink tubing over the shield wire to avoid shorting.



OIT to PC Serial Port Pin Assignments



Connecting the BLU300M to a PC

Factory Configuration

Each OIT arrives from the factory without a project file in the OIT. To use the OIT, you must first create a project , then download the project to the BLU300. Please follow the directions enclosed in *Chapter 2, Creating Your First Project*, to configure your OIT for the PLC that you are using.

Each OIT has local setup menus that allow you to adjust some of the settings of the BLU300. Use the local setup menu to:

- Adjust the contrast setting of the LCD display
- Set a time interval for the back light saver
- Set the internal clock
- Enable the internal buzzer
- Assign a password to prevent unauthorized access of the local setup menus
- Assign the startup screen

The BLU300 comes with a CR2032 battery for the built-in clock. If the battery needs replacing, please follow the steps below:

To change the clock battery:

1. Use a small screwdriver to remove the battery cover on the back enclosure of the OIT.
2. Push the metal side lever to spring the battery loose.
3. Install a new lithium battery (CR2032) into the battery socket, ensuring the + side of the battery is facing up.
4. Snap the battery cover onto the back enclosure of the OIT.
5. Reset the time, day of week, and date of the clock by entering the local setup menus (see *Chapter 4: Basic Operation of the BLU300*).

Chapter 2 - Creating Your First Project

Often the best way to learn about new software is to just jump right in. This chapter will step you through the process of installing the BlueLeaf configuration software and then using the software to create a sample project that can be downloaded to your OIT. We won't go into much detail as to how each feature works. The purpose of this chapter is only to provide you with an overview of the process of creating a functional OIT that can communicate to a PLC. For our sample project, we will configure the OIT using the Modbus RTU protocol but you may feel free to select whichever protocol driver you intend to use.

By the end of this chapter, you should be able to:

Install and start the BlueLeaf configuration software.

- Create a sample project with two screens and several graphics objects.
- Save a project, compile a project, and download the project to the OIT.
- Verify that the OIT is functioning properly.

Before You Begin

Before you install BlueLeaf, make sure your computer meets the following minimum system requirements:

- Pentium-based 90MHz or higher processor
- 16 MB of RAM (more memory improves performance)
- 10 MB available hard disk space
- VGA or higher-resolution monitor set for 256 color 800x600 pixel mode
- Microsoft Mouse or compatible pointing device
- One available RS-232 port
- Microsoft Windows 95, 98, NT or higher

Connecting OIT to Computer

Before you start your first project, the OIT should be connected to the computer so that the project can be downloaded after creating it. You should also connect the PLC that you are using to the OIT so that you can test the operation of the OIT after you have finished creating this sample project.

To connect your OIT to the computer

1. Connect a +24VDC power supply to the OIT.
2. Connect the programming cable (Maple P/N 7431-0102) to the computer and OIT.
   - Connect the end marked **HMI** to the OIT port labeled **RS-232**.
   - Connect the end marked **PC** to the COM port of the computer.
3. Apply power to the OIT.

Setting the PC COM Port used by BlueLeaf

BlueLeaf is initially configured to use Com Port 1:

1. In Windows, click the **Start** button.
2. Select **Programs.**
3. Select **Maple Systems.**
4. Select **BlueLeaf**. The BlueLeaf application software should activate.
5. Open an existing project, or create a new one.
6. Click the OPTIONS menu, then click **PC-HMI Settings**.
7. Select the *HMI Comm Addr* of 1-255 (Default setting is 1 on the BLU300)
8. Select a *COM Port: 1-8*
9. Select baud rate (use 115200 unless you have problems downloading to the OIT)
10. Click **Enter**.

To connect your PLC to the OIT

1. Download your project to the Blue Series OIT.

   Maple Systems produces PLC communications cables that will connect the OIT to most of the PLCs available. The cables can be manufactured to any length you require. A listing of all the PLC cables Maple Systems offers, along with cable drawings, can be found on our website at www.maple-systems.com.
2. Connect the PLC communications cable from the serial port on your PLC to the appropriate serial port on your OIT.
   - If you are using RS-232 communications, then connect the OIT end of the cable to the OIT port labeled **RS-232**.
   - If you are using RS-485 communications, then connect the OIT end of the cable to the OIT port labeled **RS-485**.
3. Apply power to the PLC. Apply power to the OIT. The OIT will display the startup screen.

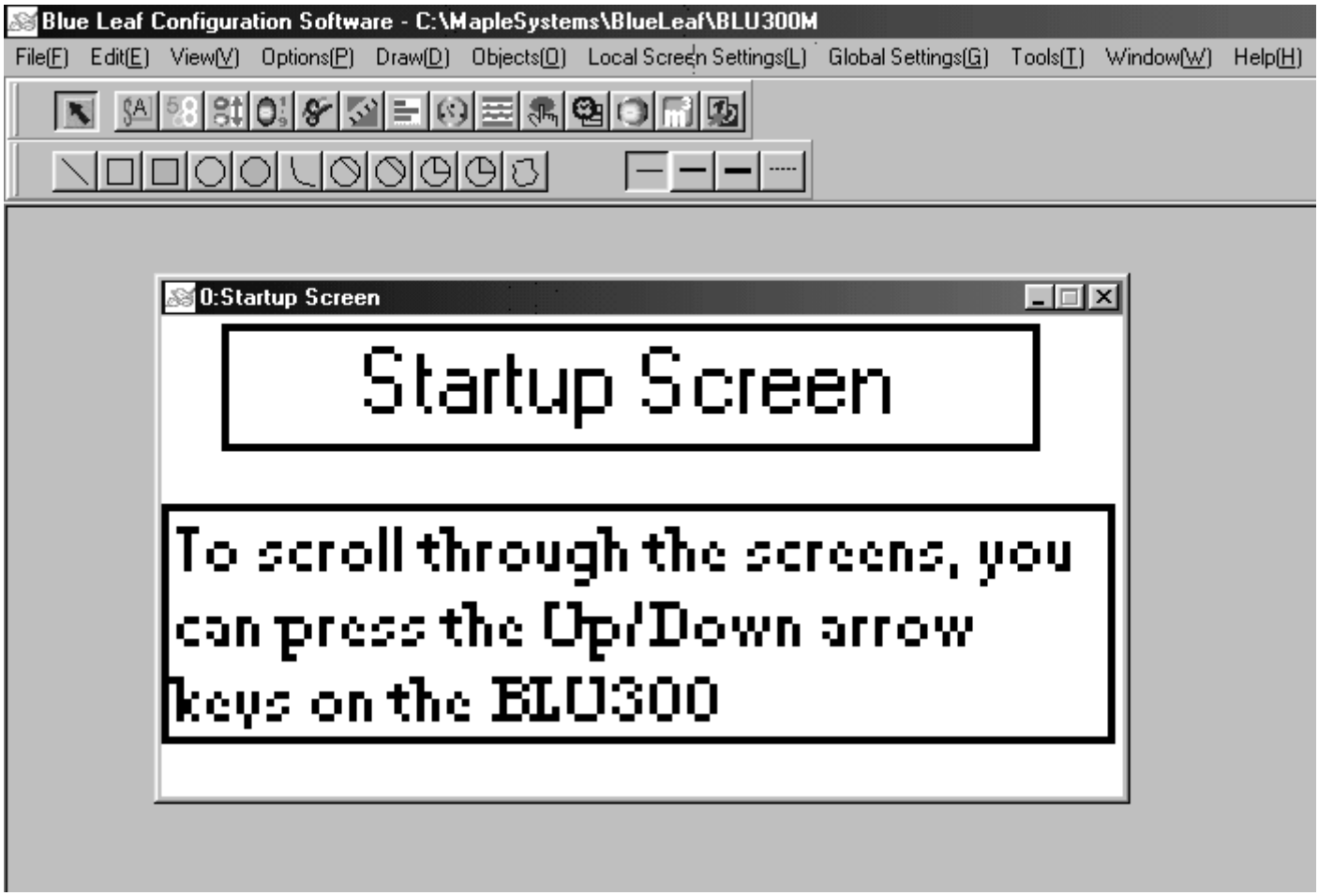
Starting BlueLeaf

Before you can create a sample project, you must start the configuration software. The BlueLeaf software is very easy to operate:

To start the BlueLeaf software

1. From the Windows Task Bar, click the **Start** button, point to **Programs**, and then click the BLUELEAF folder.
2. Click **BlueLeaf** to start the application.
3. Select **File Open** or **File New** to begin a project.
4. The main screen of BlueLeaf is displayed with Screen 0.

The following illustration shows the various sections of BlueLeaf.



Creating a Sample Project

This section walks you through the creation of a BlueLeaf project named Sample.mpl. Once downloaded to the OIT, this basic configuration allows the OIT to connect to the PLC, display a startup screen, and display a screen containing one PLC register monitor when a switch on the startup screen is pressed.

Although we strongly recommend that you perform the following steps to create this sample project, the project is already included in your BlueLeaf software with the following filename:

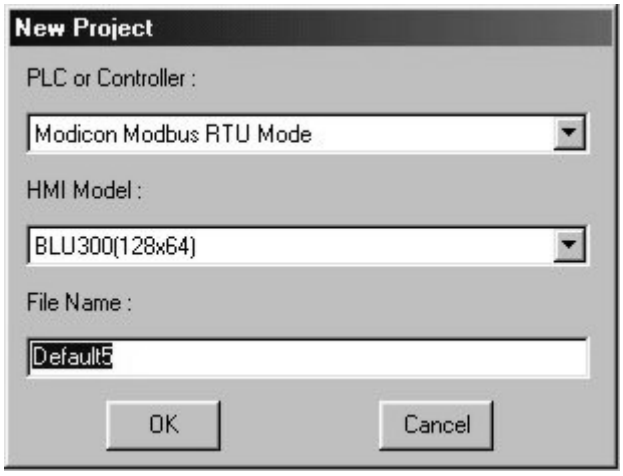
SAMPLE.MPL-sample project for the BLU300M

Selecting the PLC

Whenever you begin a new project, you need to select which PLC you intend to use and the name of the project:

▶ **To select a PLC and start a new project**:

1. Click the FILE menu, then click **New**.



2. Select the *PLC* or *controller* that you are using from the **PLC or Controller** pull-down box.
3. Select the *HMI Model* (at this time, the only model selectable is BLU300).
4. Enter the *name* you have chosen for your project in the **File Name** box (in this example, enter SAMPLE). Note: the default extension is MPL.
5. Click **OK** to return to the BlueLeaf main screen.

✉ *The communications parameters for the RS-232 port or RS-485 port of the OIT are configured from the **Tools…HMI-PLC Comm Settings** dialog box. Select the communications port you intend to use in **Tools…Set HMI-PLC Port**.*

Creating Two Screens

Screen #0, by default, is created when you start a new project. The OIT can store up to 999 predefined screens (actual number of screens dependent upon memory used) but you have to create them. To create Screen #1, you must perform the following:

▶ **To create Screen#1**:

1. From the EDIT menu, click **Add New Screen**.
2. Screen #1 is created and displayed as the active screen in BlueLeaf.
3. For now, click on Screen #0 to make it the active screen.

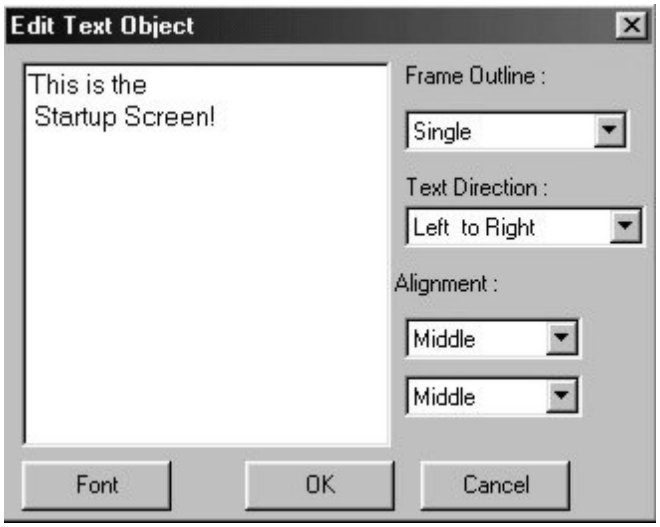
Creating a Startup Screen

We will configure Screen #0 as the startup screen. This section will show how to place text in the screen and how to create a function key that will display Screen #1.

▶ **To place text on Screen#0**:

1. From the DRAW menu, click **Text**.
2. Move the mouse cursor over the work area. The cursor changes from an arrow to a crosshair pointer.
3. Click once on Screen #0 to place a text object.
4. Double-click on the text object to display the EDIT TEXT OBJECT dialog box.
5. Click the **Font** button. Select **MS San Serif Regular 10** in the FONT dialog box. Then click **OK**.
6. Click **Single** in the FRAME OUTLINE pull-down box.

7. Click **Left to Right** in the TEXT DIRECTION box.
8. Select **Middle** for both ALIGNMENT boxes.
9. Click in the content box and type **This is the Startup Screen!**. Split the sentence into two lines as shown:

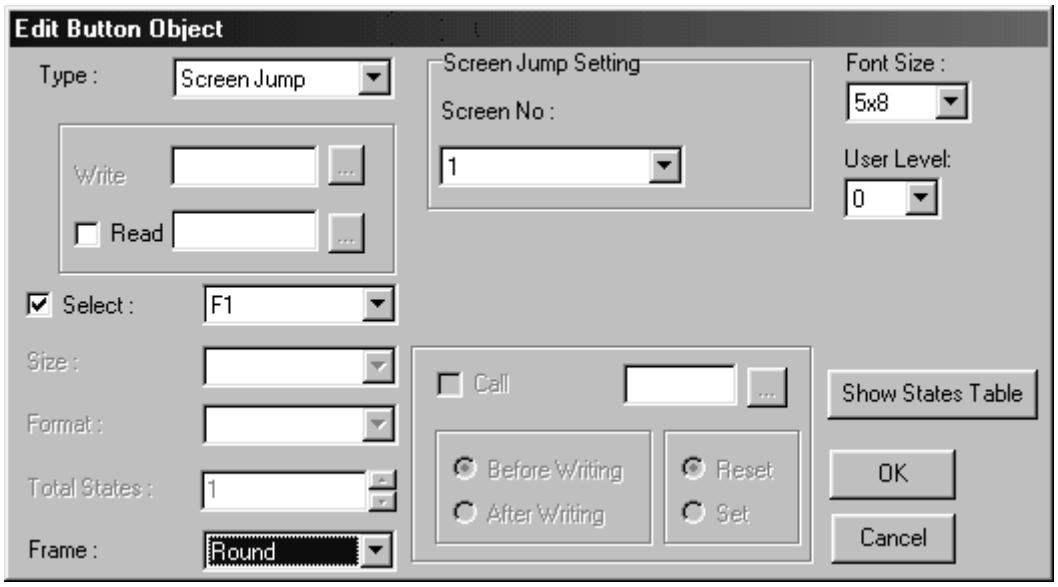


10. Click **OK**.
11. On the main screen of BlueLeaf, you will see the text object with small white boxes around the perimeter. Move your mouse cursor over these boxes and click/drag to resize the text object.
12. Move the mouse cursor over the text box and click/drag to move on Screen 0 as shown:

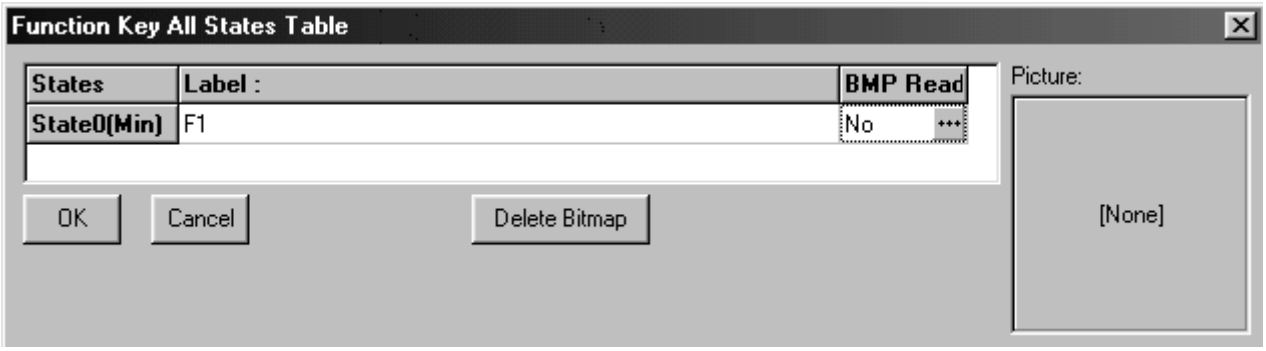
To create a visible function key on Screen#0:

1. From the OBJECTS menu, click **Function Key**.
2. Move the mouse cursor over the work area. The cursor changes from an arrow to a crosshair pointer.
3. Click once on Screen #0 to place a function key object.

4. Double-click on the function key object to display the EDIT BUTTON OBJECT dialog box:

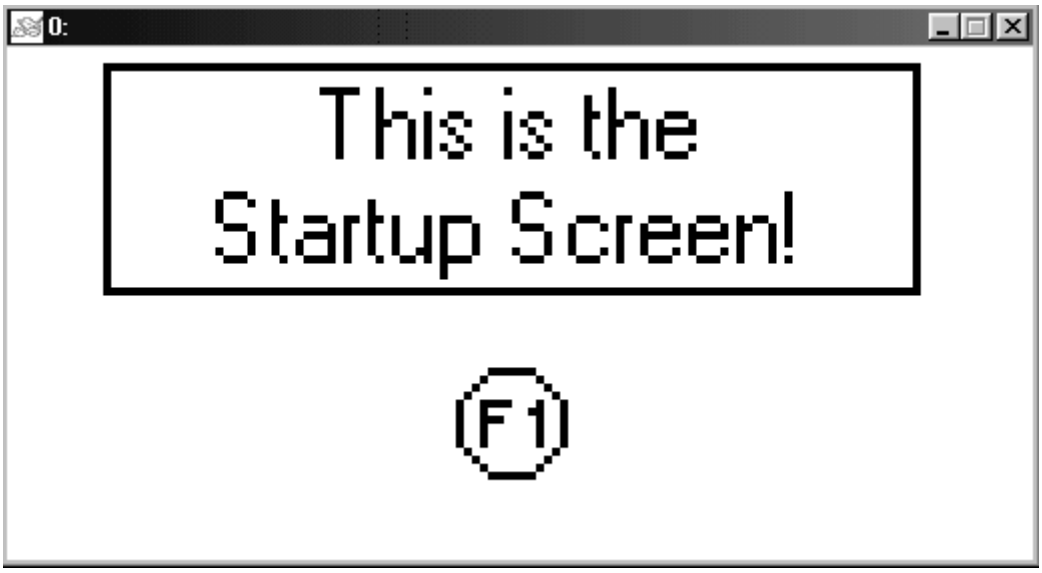


5. Click the Type pull-down box and select **Screen Jump**.
6. In the Screen Jump Setting frame box, select **1** from the Screen No. pull-down box.
7. Check the **Select** checkbox, then select **F1** from the pull-down box.
8. In the Frame box, select **Round**.
9. Click the **Show States Table** button:



10. Click on the Label entry and type **F1**.
11. Click the **OK** button to go back to the Edit Button Object dialog box.
12. Click **OK** to go back to Screen 0.
13. On the main screen of BlueLeaf, you will see the function key object with small white boxes around the perimeter. Move your mouse cursor over these boxes and click/drag to resize the function key object.

14. Move the mouse cursor over the function key box and click/drag to move on Screen 0 as shown:

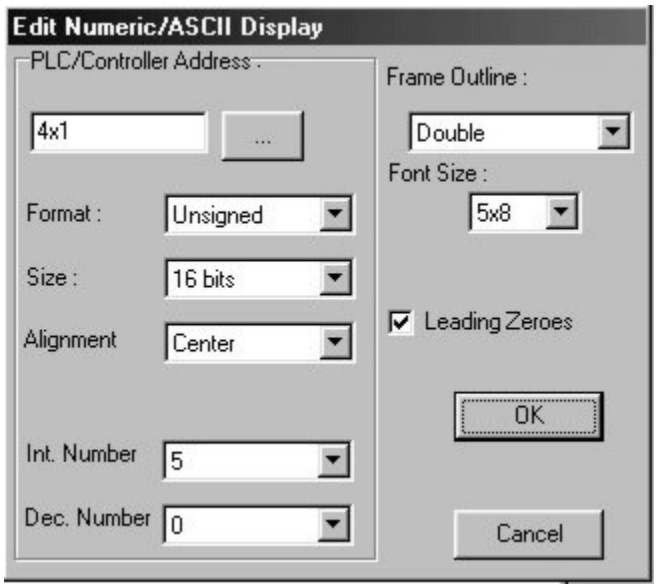


Creating a Second Screen

We will configure Screen #1 to display a PLC register. You will also create an increment and decrement key to change the value in the PLC Register.

To create a numeric register on Screen#1

1. From the OBJECTS menu, click **Numeric/ASCII Display**.
2. The mouse cursor changes to a crosshair. Select the location on the screen to place the Numeric/ASCII Display and left click the mouse to place a Numeric/ASCII Display object on the screen. Move the mouse cursor over the Numeric/ASCII Display object and double-click the Numeric/ASCII Display object. The Edit Numeric/ASCII Display Object dialog box appears.

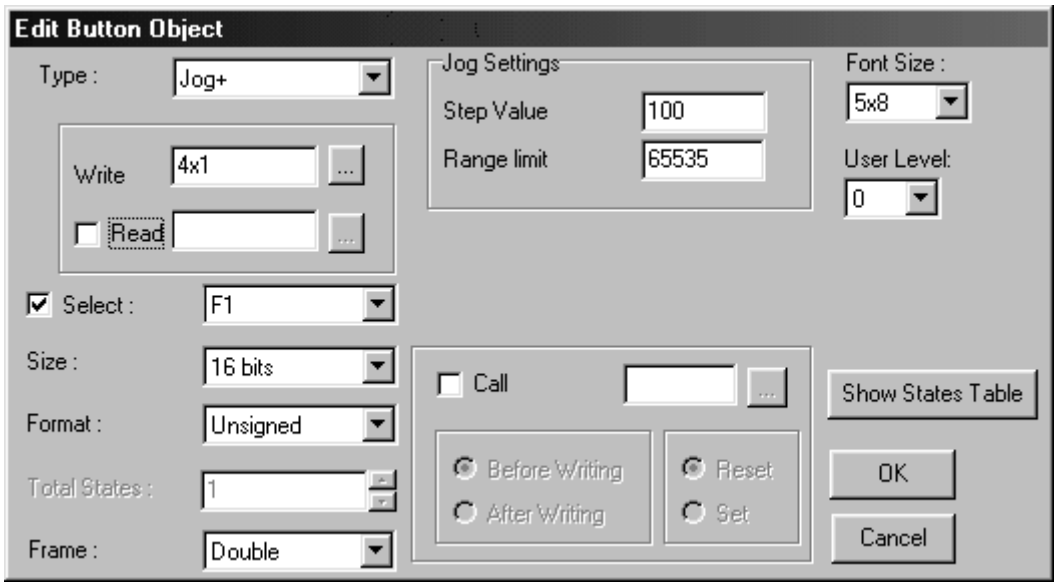


3. Enter the data as shown above (for more details on using the Numeric/ASCII Display object, consult *Chapter 8: Entering and Displaying Numeric and ASCII Characters*.)
4. Click **OK**. The Numeric/ASCII Display Object is displayed on the main screen of BlueLeaf as a numeric value of 0. If necessary, use the mouse to drag the object to the location on the window that you want it. You can also highlight the object to display the small white perimeter boxes and adjust

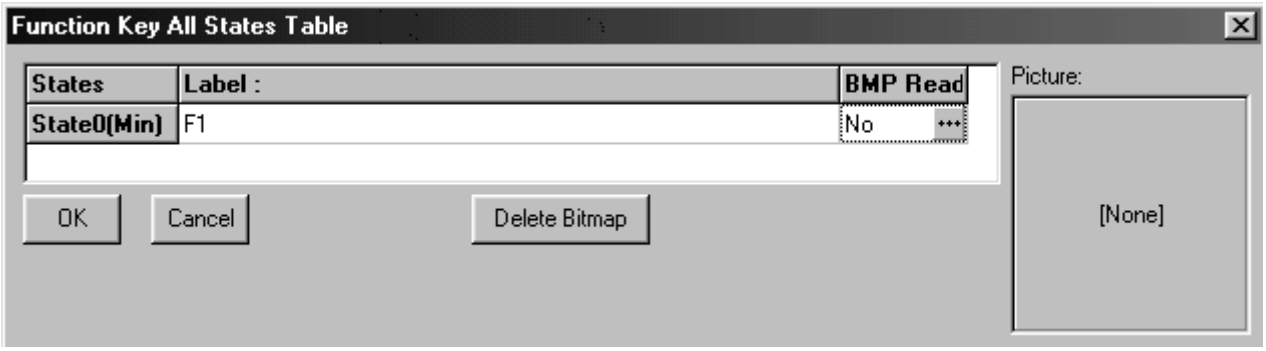
the size. Simply move the mouse cursor over the appropriate white box until the mouse cursor changes to a double-arrow symbol, then click and drag to change the size.

To create an increment key on Screen#1

1. From the OBJECTS menu, click **Function Key**.
2. Move the mouse cursor over the work area. The cursor changes from an arrow to a crosshair pointer.
3. Click once on Screen #1 to place a function key object.
4. Double-click on the function key object to display the Edit Button Object dialog box:



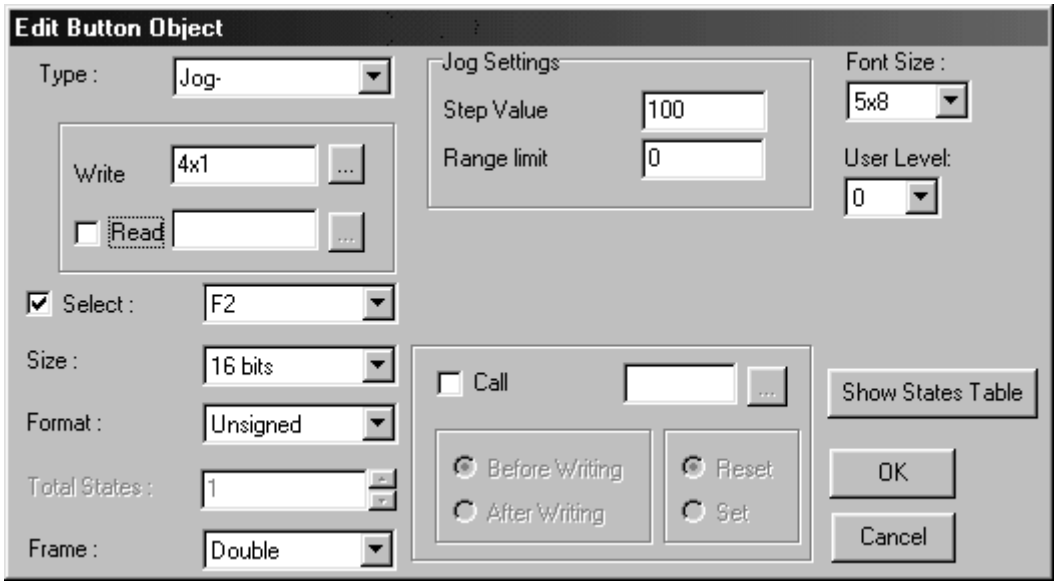
5. Enter the data as shown above (for more details on using the Function Key object, consult *Chapter 9: Using the Function Keys*.)
6. Click the **Show States Table** button:



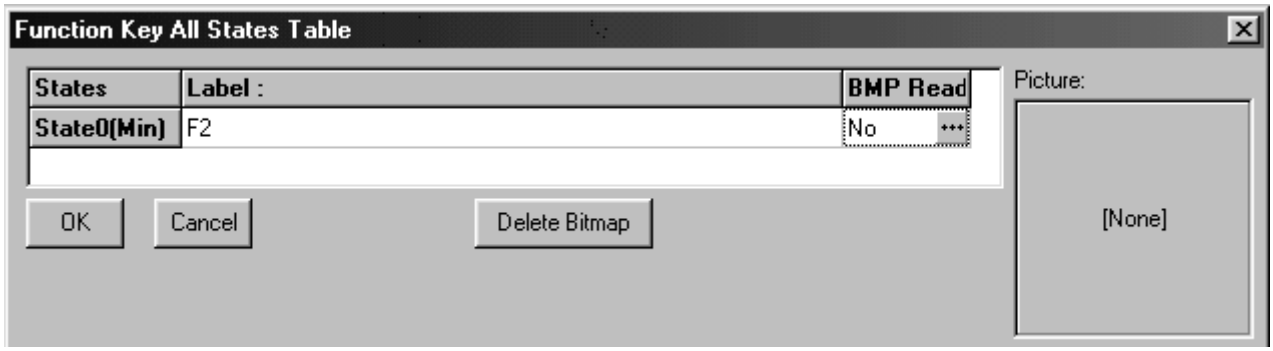
7. Click on the Label entry and type **F1**.
8. Click the **OK** button to go back to the Edit Button Object dialog box.
9. Click **OK** to go back to Screen 1.
10. On the main screen of BlueLeaf, you will see the function key object with small white boxes around the perimeter. Move your mouse cursor over these boxes and click/drag to resize the function key object.
11. Move the mouse cursor over the function key box and click/drag to move on Screen 1.

To create a decrement key on Screen#1

1. Click on the **F1** key you just created to highlight it.
2. From the EDIT menu, click **Copy**.
3. From the EDIT menu, click **Paste**. A copy of the increment key appears directly on top of the initial F1 key.
4. Use the mouse cursor to click and drag the second F1 key to the right of the first F1 key.
5. Double-click on the second increment key. The Edit Button Object dialog box appears:

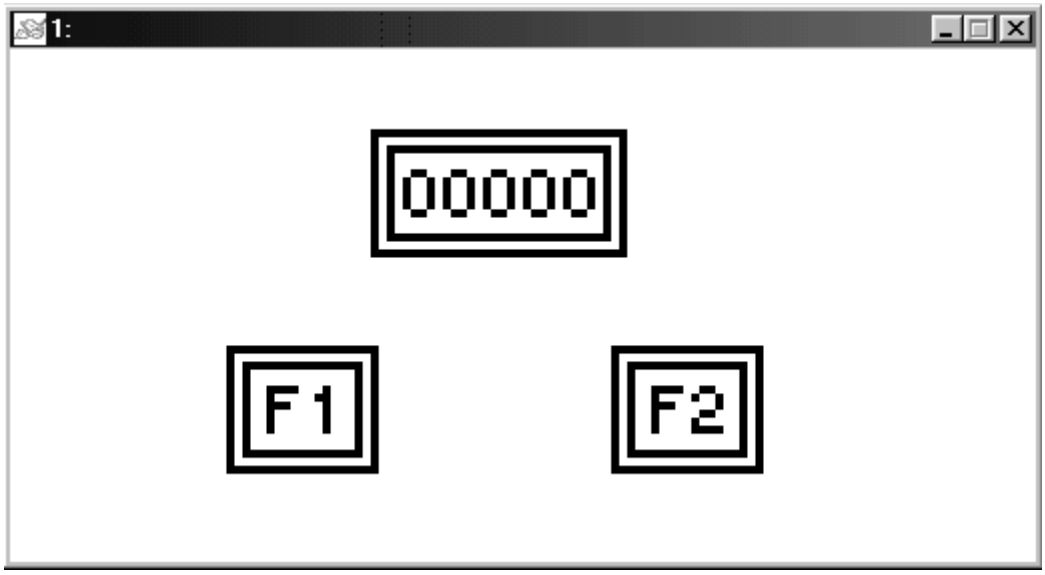


6. Enter the data as shown above (for more details on using the Function Key object, consult *Chapter 9: Using the Function Keys*)
7. Click the **Show States Table** button:



8. Click on the Label entry and type **F2**.
9. Click the **OK** button to go back to the Edit Button Object dialog box.
10. Click **OK** to go back to Screen 1.

The following illustration shows how Screen #1 looks:



You have now done your part in creating this sample project. It is now time for BlueLeaf to do its part.

Finishing Up

There are still a few steps, which must be completed before you can test your first project. In this section, you will:

- save the project onto your computer hard drive
- compile the project into a format that can be understood by the OIT
- download the project to the OIT
- verify that the OIT operates as expected
- exit the BlueLeaf software

> *If you haven't already done so, now would be a good time to connect the OIT to the computer. For more information, consult the first part of this chapter or see "Installation of OITs" later on in this manual.*

Saving your first project

1. From the FILE menu, click **Save**.
2. Click **OK**. The file is saved onto your computer hard drive.

Compiling your first project

1. From the TOOLS menu, click **Compile**. BlueLeaf will compile your project and display error results.
2. Click **OK**.

Downloading your first project

1. Apply power to your OIT, while holding down the **ESC** key.
2. Continue holding down the **ESC** key until the Local Setup menus appear on the OIT screen.
3. On the OIT, press the **F1** key to select `1.Read from PC`.
4. From the TOOLS menu of BlueLeaf, click **Write Project to BLU300**. The Confirm Download dialog box appears.
5. On the OIT, press the **ENTER** key to receive a download file.

6. Click **Yes** on the BlueLeaf dialog box to begin download.
7. When the download is complete, click **OK**.

Displaying your project on the OIT

1. Press the **ESC** key on the OIT to exit the download screen.
2. Disconnect the OIT from the computer, and connect to your PLC.
3. Press the **F5** function key to move the blinking cursor to `5.EXIT&RUN`.
4. Press the **ENTER** key.
5. The OIT should display the following screen.

6. Press the **F1** function key to display Screen #1:

7. Press the **F1** key to increment the value in the Numeric Display object. Press the **F2** key to decrement the value in the Numeric Display object.

CONGRATULATIONS! You have completed your first BlueLeaf project.

Chapter 3 - Using BlueLeaf Software

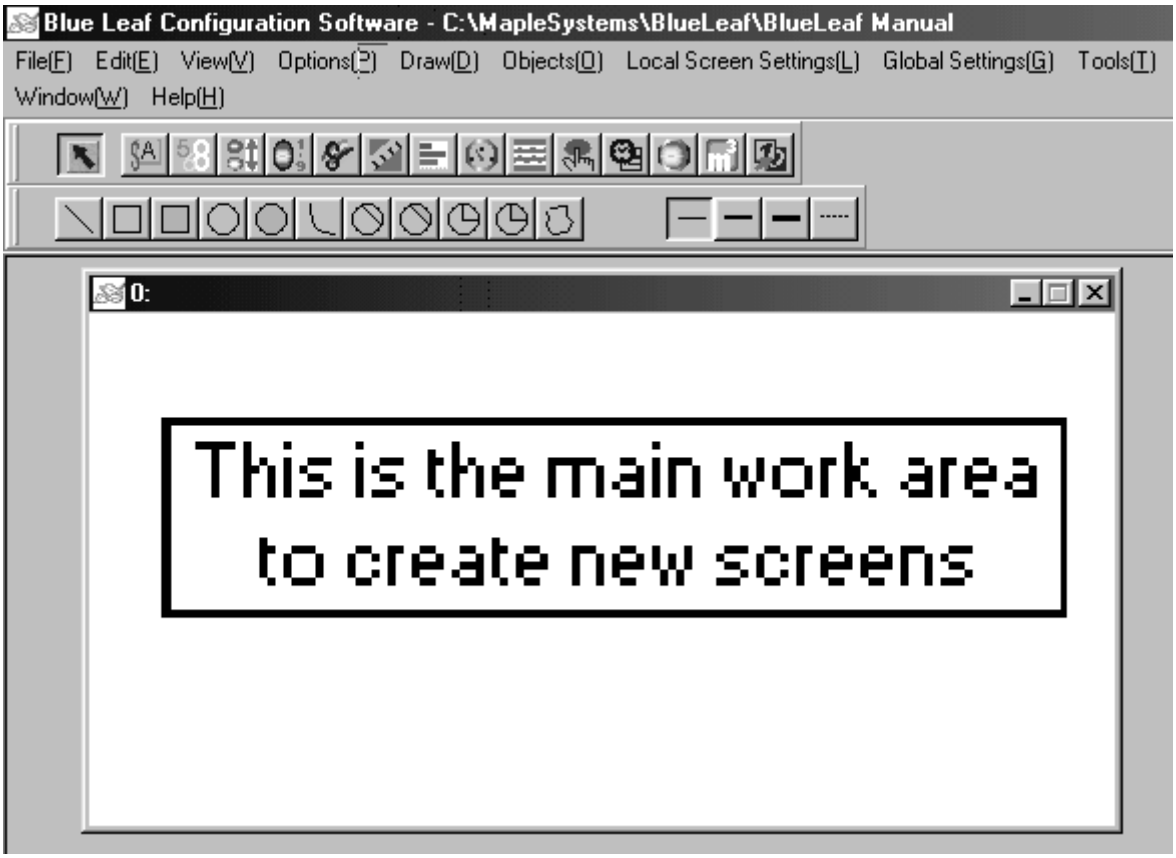
Overview

The BlueLeaf-300 software is used to create a project file that can be downloaded into the BLU300 operator interface terminal. This chapter shows you how to maneuver around BlueLeaf easily. This will pave the way for actually creating graphics objects in later chapters.

The BlueLeaf Application

This section guides you in how to operate the BlueLeaf application; however, it does not show you how to program your OIT or how to create graphics objects. These topics are reserved for later chapters. This section shows the fundamental operation of BlueLeaf -- from saving files, printing projects, and selecting the target PLC to showing how graphics objects can be easily manipulated in the BlueLeaf work area. When you have completed this chapter, you will be better able to use the features that are explained in later chapters.

The following illustration is used for reference to the following sections:



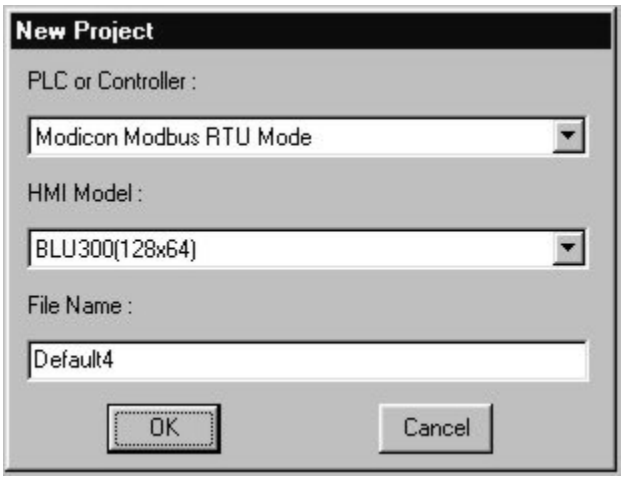
Managing Projects

Like most Windows® application software, BlueLeaf will open, save, close, and print files using the standard windows format.

Opening, Editing Projects

To create a new project 

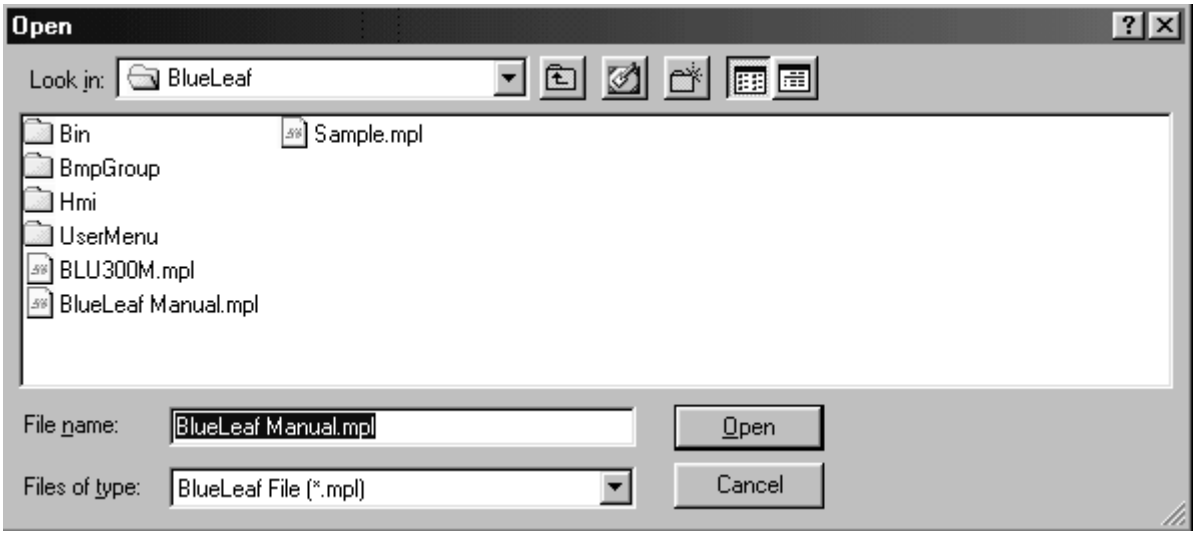
1. On the FILE menu, click **New** or click the **New** icon in the Standard toolbar. The New Project dialog box appears:



2. Select the *HMI model* you intend to use with your project (the BLU300 is the only model available in this version).
3. Select the *PLC* or *controller*.
4. Enter the *name* for your project under File Name.
5. Click **OK**. The main screen of BlueLeaf appears with a blank work area.

To open an existing project 

1. On the FILE Menu, click **Open** or click the **Open** icon in the Standard toolbar. The Open dialog box appears:



2. Click on the *project file* you intend to open.
3. Click **Open**. The main screen of BlueLeaf appears with the initial screen of the project displayed.

To close a project

On the FILE menu, click **Close**. If changes have been made to the project file, BlueLeaf will ask you if you would like to save the project. Then the main screen of BlueLeaf will remain but with no work area displayed. You must now use the Open or New commands to edit a project.

To save an existing project 

1. On the FILE Menu, click **Save** or click the **Save** icon in the Standard toolbar.
2. The project will automatically be saved using the file name you assign when you first created the project file.
3. To save the file under a new file name, click **Save As** on the File menu, and then enter a file name. Click **Save**.
4. The main screen of BlueLeaf reappears.

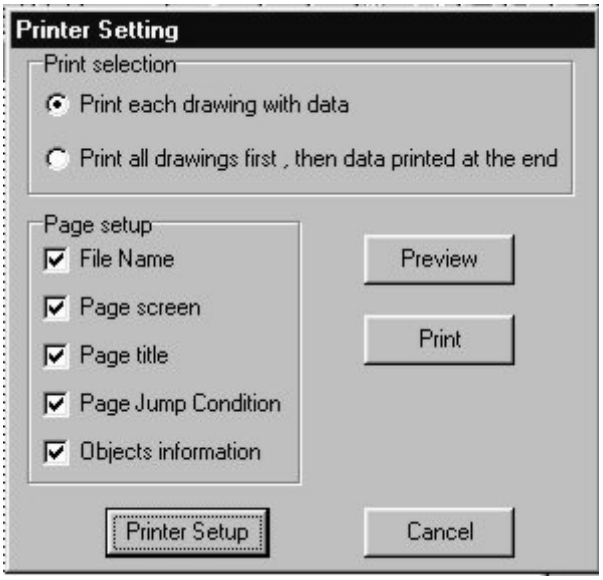
To exit BlueLeaf software

1. On the FILE menu, click **Exit** or click on the standard windows **Close** icon in the upper right corner.
2. If any changes have been made prior to your last save, a dialog box appears asking if you would like to save the changes.

Printing Projects

To print an existing project

1. On the FILE menu, click **Print** or click the **Print** icon in the Standard toolbar.
2. The Printer Setting dialog box appears:



3. Select the format that you want to print the project, and then click **Print**. For an onscreen preview of data that is to be printed, click the **Preview** button.

Editing and Creating Screen Objects

This section shows how to manipulate graphics objects that are placed onto the work area of BlueLeaf. We will use examples from a sample project that is included with the BlueLeaf software: SAMPLE.MPL Please load this project file and have BlueLeaf ready before you begin this section.

We will refer to Screen_1 of the project. To display Screen_1 on BlueLeaf, perform the following steps.

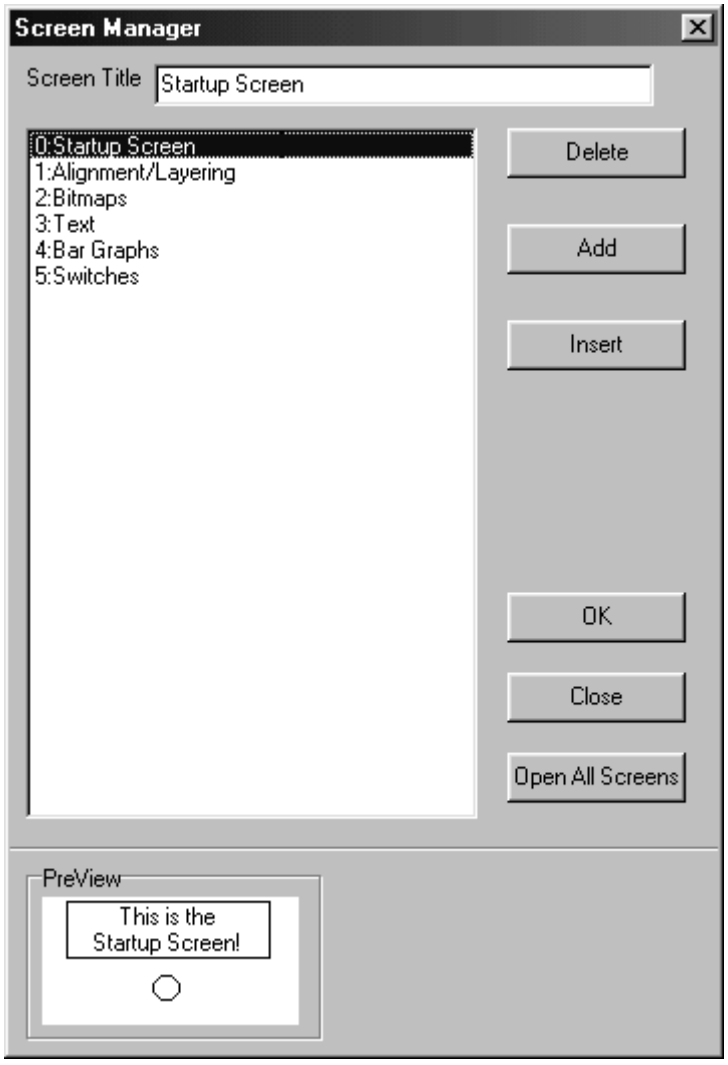
Display Options

Before we begin describing some of the commands that can be used to edit graphics objects, there are a few commands that apply to the general work area of BlueLeaf.

BlueLeaf provides a **Screen Manager** that can be used to easily maneuver between screens of a project.

To display the Screen Manager 

1. On the TOOLS menu, click **Screen Manager** or click the **Screen Manager** icon on the Standard toolbar. The Screen Manager appears:



2. The Screen Manager allows quick screen selection for editing. You can also create a new screen, delete an existing one, or insert a new screen between pre-existing screens. To view all of the screens of the project, click the **Open All Screens** button. The Preview area provides a quick preview of the screen being selected.

To create a new screen 

1. On the EDIT menu, click **Add New Screen** or click the **Add New Screen** icon on the Standard toolbar. A new screen appears in the work area of BlueLeaf.
2. To assign a screen title to the new screen, you must open the screen manager, highlight the new screen, and then enter the *title* in the **Screen Title**: area. Click the **OK** button.

Using the grid function

One available option allows the work area to be covered with grid lines, which can be helpful when trying to align objects that are created on the work area.

On the OPTIONS menu, click **Grid**, and then check the **Enabled** box to display grid line. To display screens without grid lines, check the Disabled box.

The grid function is a global setting and cannot be set for individual screens.

Using the zoom feature

Another available option is the zoom feature, which allows the magnification of each screen for easier viewing while editing. There are three levels of magnification: 100%, 200%, and 400%.

On the OPTIONS menu, click **Zoom**, and then click **All Screens** (to select the magnification level for all screens) or **This Screen** (to select the magnification level of an individual screen).

To zoom in on the selected screen 

Highlight the screen you wish to zoom in by clicking on the screen, and then click the **Zoom In** icon located on the standard toolbar.

To zoom out on the selected screen 

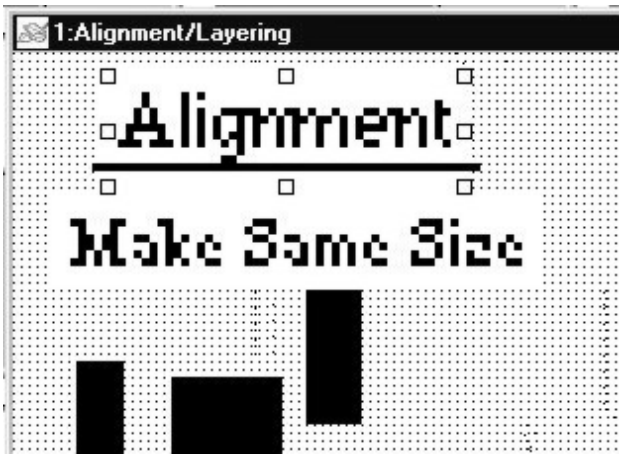
Highlight the screen you wish to zoom out by clicking on the screen, and then click the **Zoom Out** icon located on the standard toolbar.

Basic Editing Commands

To select a graphic object 

1. Click the mouse cursor icon in the OBJECTS toolbar.
2. Click on the graphic object. For example, using Screen_1, click on **Alignment**. This causes the text box to be selected, with small white square blocks around the edges indicating the boundaries of the object. Deselect the object by clicking elsewhere in the work area.

3. When a graphic object is selected, it can then be modified, copied, deleted, or moved to a new location.

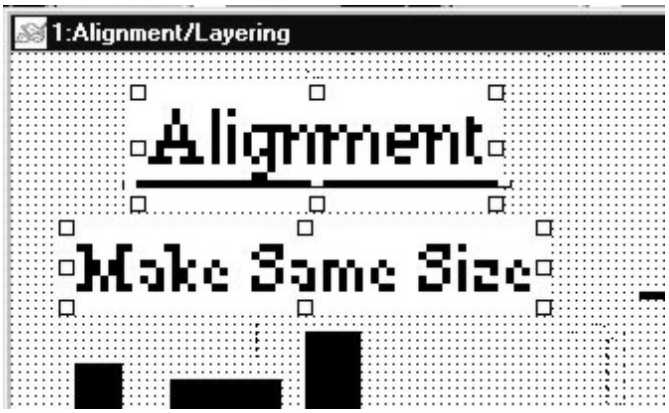


To select multiple graphics objects

1. Click the mouse cursor icon in the OBJECTS toolbar.
2. Click and hold down the left mouse button at the upper left corner of the graphics objects you wish to highlight. For example, using Screen_1, click to the left and above of **Alignment**
3. Move the mouse cursor to the lower right corner of the highlighted objects. Notice that a rectangle is formed as you do this. In this example, move the mouse to the right and below **Make Same Size**.
4. Release the mouse button. The rectangle outline changes to small white square blocks around the perimeter of the objects selected.

✉ *The rectangle outline will enclose any graphics objects that are partially selected.*

5. When several graphic objects are selected, they can easily be moved, deleted or copied together.



To select all objects

1. On the EDIT menu, click **Select All** or right click the mouse anywhere on the work area to display a popup window, and then click **Select All**.
2. Small white square blocks appear around the perimeter of all the objects on the screen.

3. You can now easily cut or copy the entire contents of the screen to a new screen.

Using the Undo  and Redo  commands

1. The Undo command is used to cancel the last command or action that you made. For example, select the **Alignment** text box in Screen_1.
2. Press the DELETE key on your keyboard to delete the text box.
3. From the EDIT menu, click **Undo** or click the Undo icon from the Standard toolbar. You can also press CTRL+Z. The deleted text box reappears.
4. The Redo command is used to cancel the Undo command. For example, if you decided that you really did want the **Alignment** text box deleted, you may click the **Redo** command to recover it.

Using the Cut  , Copy  , and Paste  commands

1. These commands are all selected from the EDIT menu or by clicking the appropriate icon in the Standard toolbar.
2. Select the graphic object or objects you wish to cut or copy.
3. Click **Cut** to copy and remove the graphic object(s) from the work area or click **Copy** to copy the graphic object(s). Using Screen_4, select the scale meter and then press CTRL+X to cut the object from the work area.
4. Objects cut or copied from one window can be pasted into other windows. Once the object has been selected and cut or copied, open another window and paste the object into it.
5. In this example, paste the scale meter back into Screen_4 by pressing CTRL+V. The pasted object reappears in the work area.

To delete a graphic object(s) 

1. Select the object or objects you wish to delete.
2. Press the **Delete** key or from the EDIT menu, or click the Delete icon on the STANDARD toolbar.

To resize a graphic object

Objects such as Bit Lamps, Word Lamps, and bitmaps cannot be resized.

1. Move the mouse cursor over one of the small white squares. The cursor changes to a double-arrow icon to indicate that it is in resizing mode.
2. Click and drag the mouse to resize the object.

To change attributes of a graphics object

1. Double-click the object.
2. The object's attribute dialog box is displayed. Object Attributes defines what the object is or how it behaves, (i.e. PLC address, bitmap, etc.). Click **OK** to accept any changes made or **Cancel** to cancel any changes.

Nudging Objects

Nudging is used to fine-tune the movement of objects in the work area of BlueLeaf. Using the nudge feature on a selected object will move that object in the specified direction either by one pixel or by the grid setting amount.

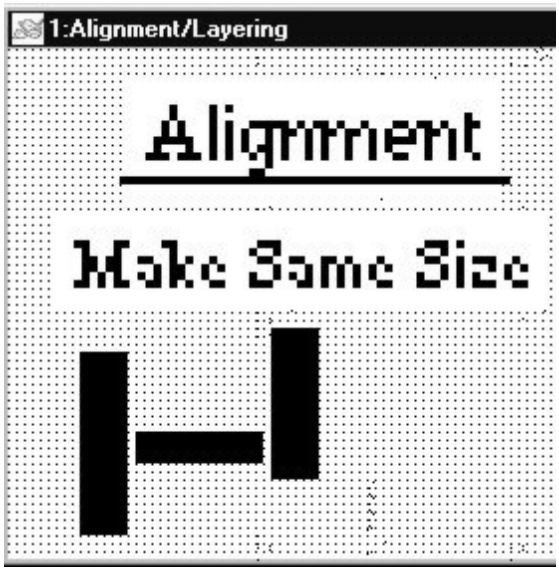
Using the nudge top , bottom , left , and right commands

1. Select one object or a group of objects in the work area of BlueLeaf.
2. Click the appropriate icon from the Alignment toolbar. The object(s) will move in that direction by one pixel. Continue clicking the icon to move the object(s) by one pixel at a time.

Nudging can also be done by using the arrow keys on your computer keyboard.

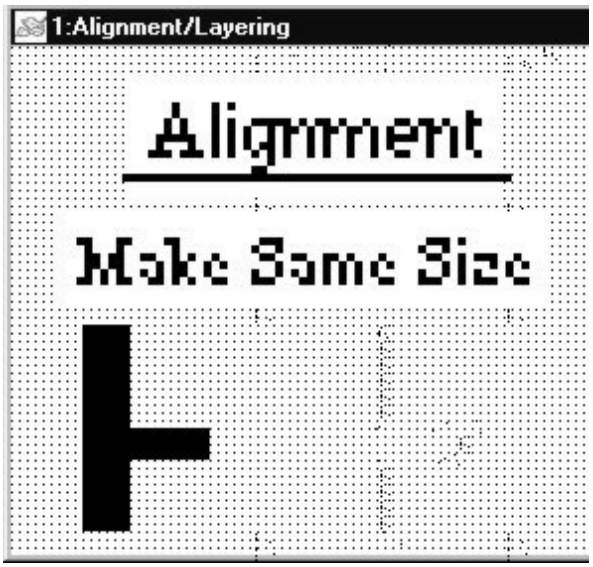
Aligning Objects

Alignment can be used to quickly align two or more objects. To better illustrate, refer to the left side of Screen_1 of the sample project:



Using the align left command 

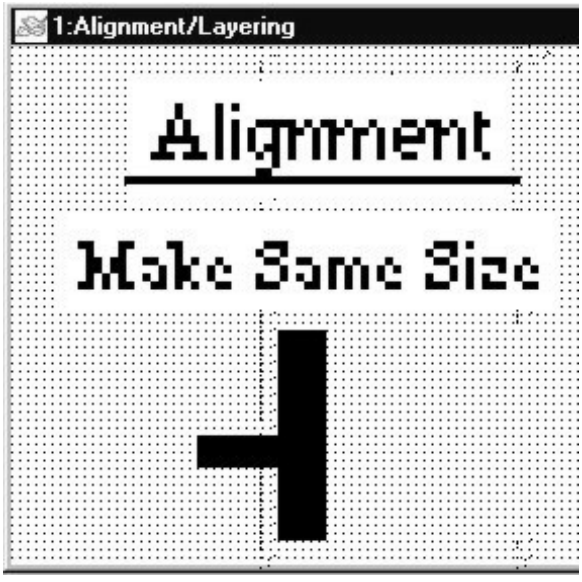
1. Select the objects you wish to align. For this example, select the three rectangle objects of Screen_1.
2. Click the appropriate icon from the Alignment toolbar.



3. From the EDIT menu, click **Undo** to put the objects back in their original position.

Using the align right command 

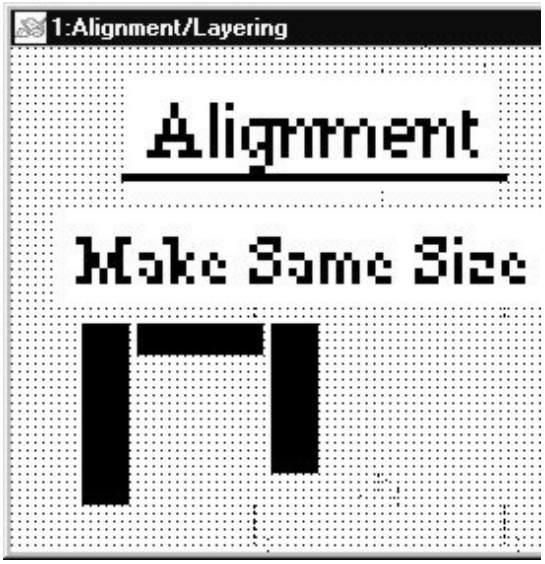
1. Select the objects you wish to align. For this example, select the three rectangle objects of Screen_1.
2. Click the appropriate icon from the Alignment toolbar.



3. From the EDIT menu, click **Undo** to put the objects back in their original position.

Using the align up command 

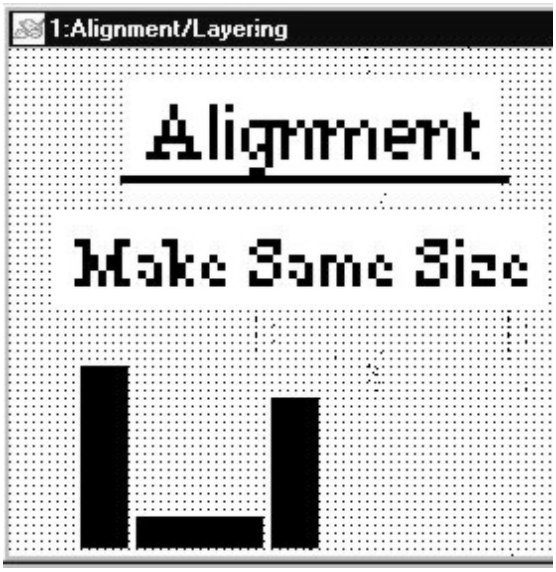
1. Select the objects you wish to align. For this example, select the three rectangle objects of Screen_1.
2. Click the appropriate icon from the Alignment toolbar.



3. From the EDIT menu, click **Undo** to put the objects back in their original position.

Using the align bottom command 

1. Select the objects you wish to align. For this example, select the three rectangle objects of Screen_1.
2. Click the appropriate icon from the Alignment toolbar.



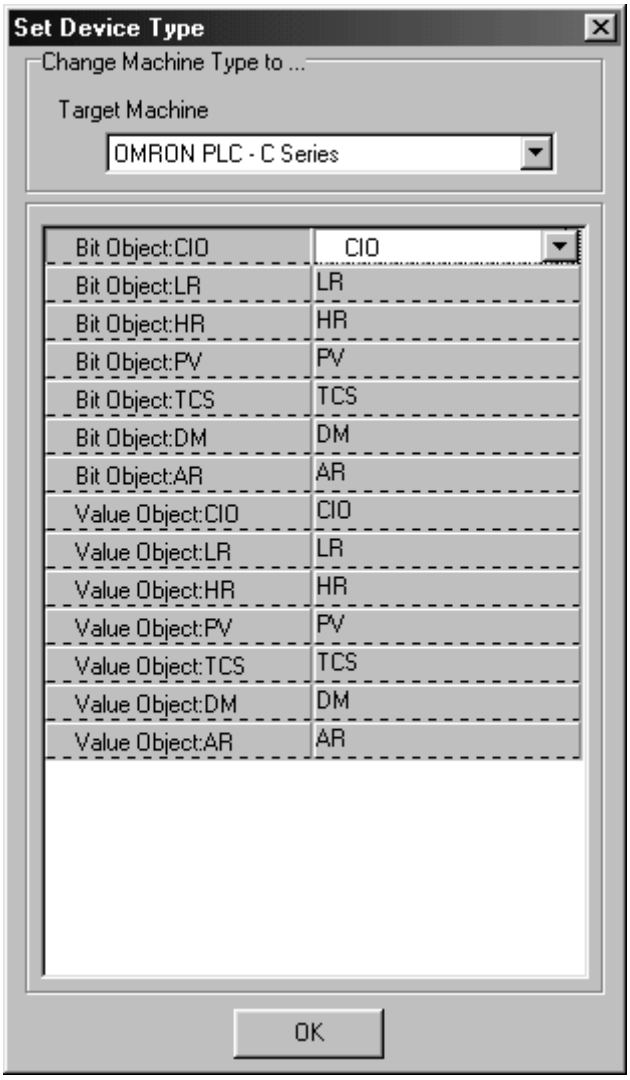
3. From the EDIT menu, click **Undo** to put the objects back in their original position.

Changing PLC Type

BlueLeaf Software supports the ability to change the PLC Type to an existing project.

To Change PLC Type

1. From the TOOLS menu, select **Set Device Type.** The Set Device Type dialog box appears.



2. Use the Target Machine dialog box to select which PLC you want to use. The window will show a list of supported registers for the PLC chosen.
3. Click **OK** for the changes to take effect, and close the window.

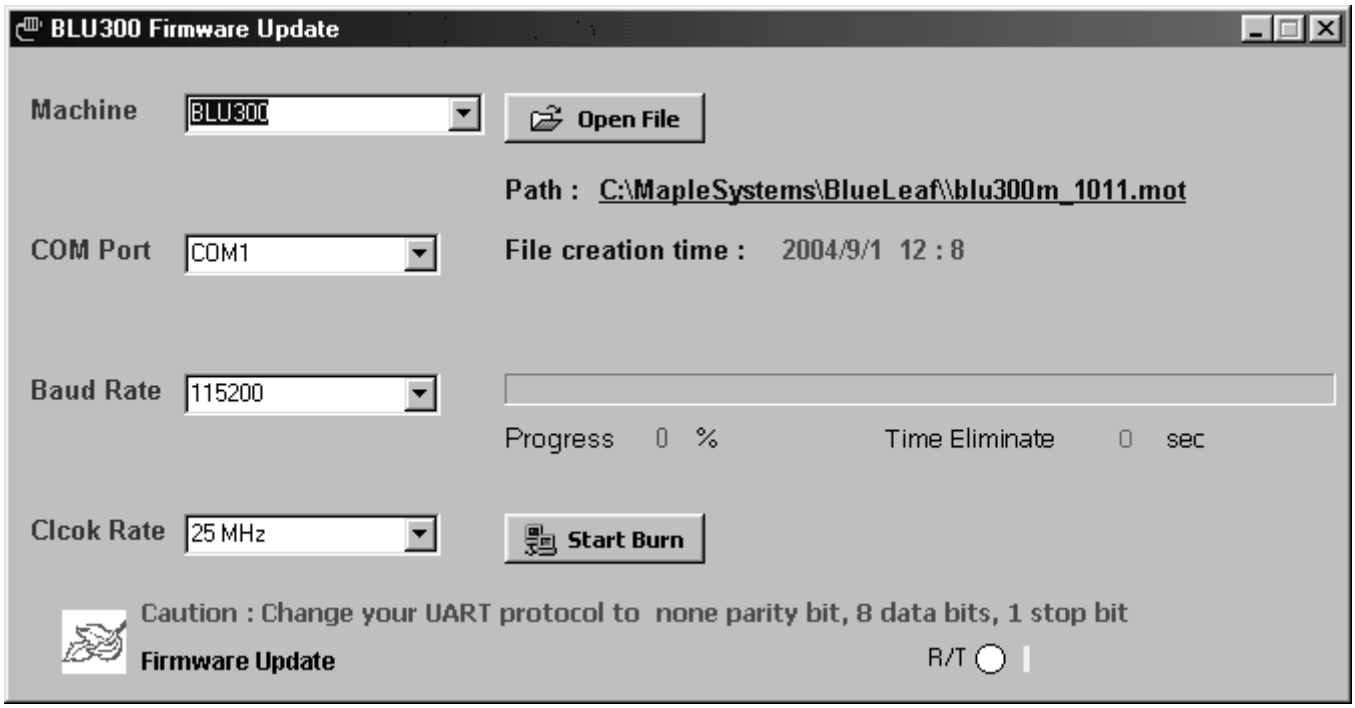
> *When changing PLC Type, be aware that all the objects will lose their current PLC/Controller address. All the objects will have to be revised and assigned new registers for the new PLC type.*

BLU300 Firmware Update

The BLU300 also allows for firmware updates. This is done using a specialty cable, which is connected on the back of the BLU300. Contact Maple Systems for further details.

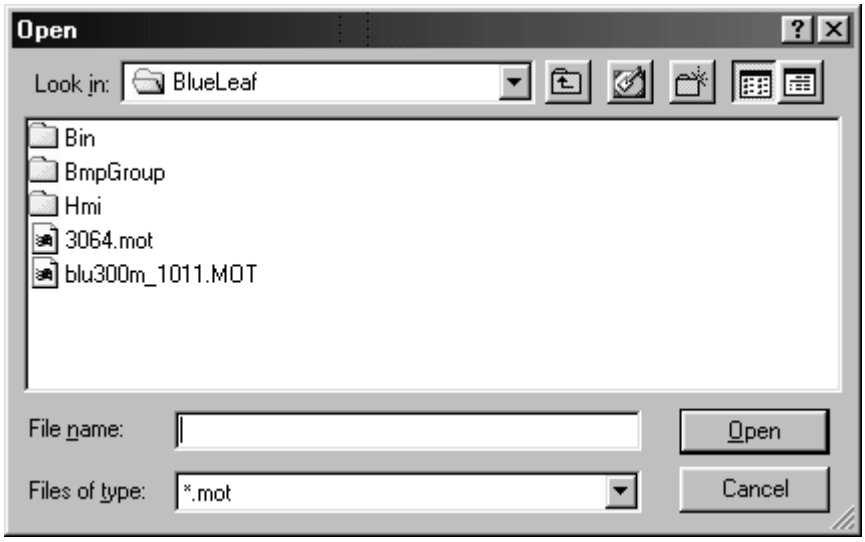
To Update Firmware

1. Remove power from the BLU300.
2. Connect one end of the specialty cable into the Extension Port on the back of the BLU300. The other end should be connected to the OIT configuration cable.
3. Apply power to the BLU300. The OIT screen will be blank.
4. Open the BlueLeaf configuration software. From the TOOLS menu, select **Flash BLU300.** The BLU300 Firmware Update dialog box appears.



5. Select *Machine* (at this time, the only model selectable is BLU300).
6. Select *COM Port*. This will be the same port used for communication between PC and BLU300.
7. Select *Baud Rate* and *Clock Rate*.

8. Open the file that contains the firmware update. Click **Open File**. The Open File dialog box appears. Select the *file* and click **Open**.



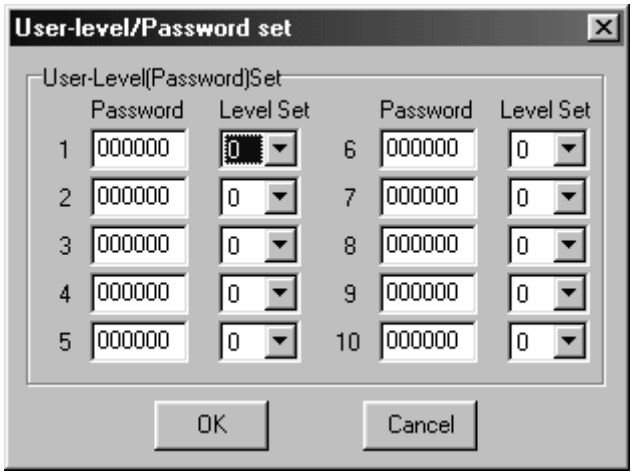
9. The file date and time of creation should appear after selecting the file.
10. Start Firmware Update. Click **Start Burn**.
11. The progress bar will show file progress. Time Eliminate shows the elapsed tie and the R/T (Receive/Transit) light will be blinking throughout the burn.
12. When the update is complete, disconnect power from the OIT and disconnect the cable from the extension port. Reconnect the OIT configuration cable.

BLU300 Security

BlueLeaf Software supports the ability to deny or grant access to different objects on screens. Security is achieved by assigning user levels to each object that needs to be protected.

To Configure User Levels/Passwords

1. From the TOOLS menu, select **User-level/Password set**. The User-level/Password set dialog box appears:

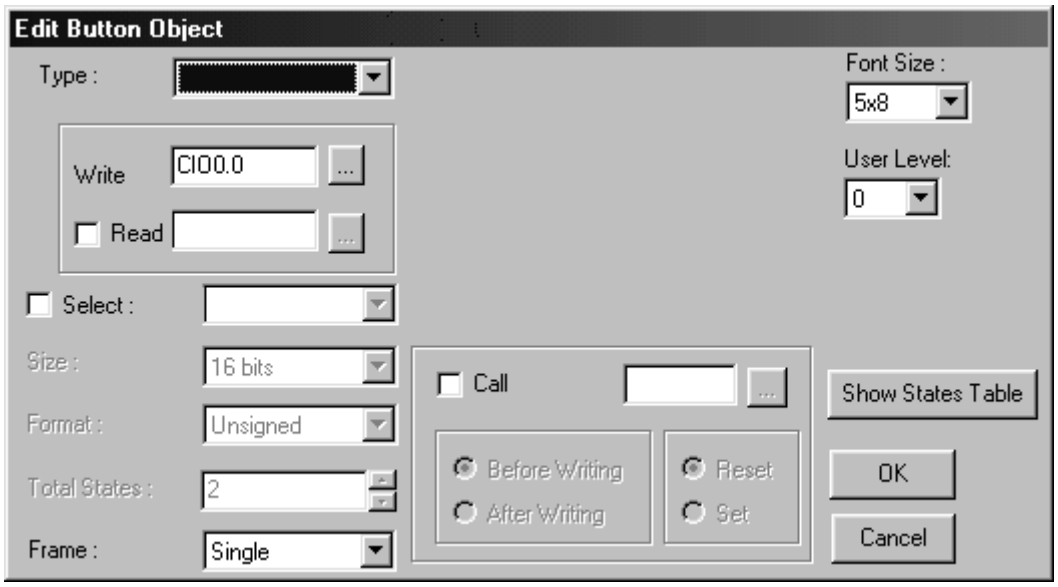


2. Click on the **Level Set** drop down menu to select a *level* and assign a *password* for that level.
3. Click **OK** when you are finished configuring all the levels you need.

To Assign User/Security Levels

User Levels can be assigned to objects that require operator interface, such as function keys.

1. Start by placing a function key on a screen. From the OBJECTS menu, select **Function Key**. Select a place on the screen to place the key (left click mouse to place object.) The Edit Button Object dialog box appears:



2. For more details on using the Function Key Object, consult *Chapter 9: Using the Function Keys.*
3. Click on the **User Level** drop down menu and select a level. Click **OK**.

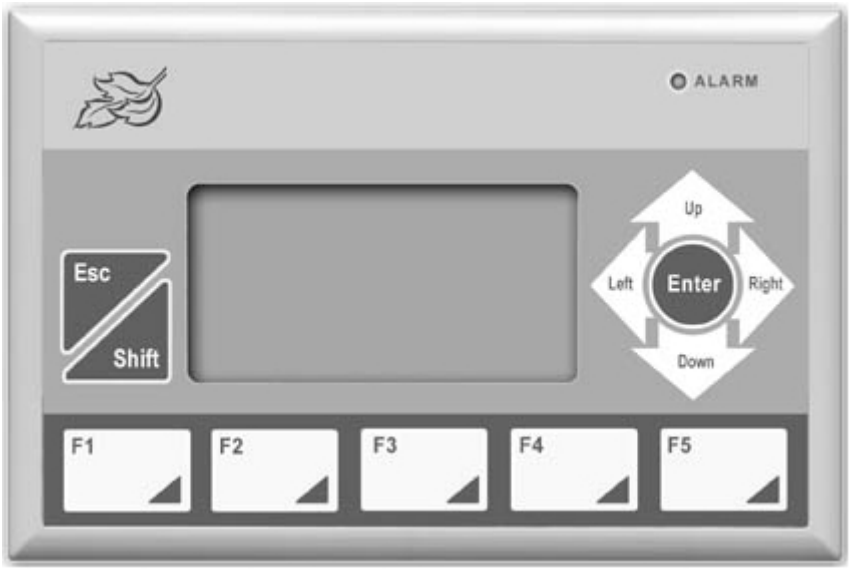
When a security level is assigned, the function key will display a password screen that requires the operator to enter a password before the predefined action is performed.

> ✉ *Security Level applies only to objects on a screen, and not the screen itself. The screen where the protected objects are displayed is still accessible. To prevent access to a particular screen, use the Block Key Arrow Paging. Consult Chapter 5 for more details.*

Chapter 4 - Basic Operation of the BLU300

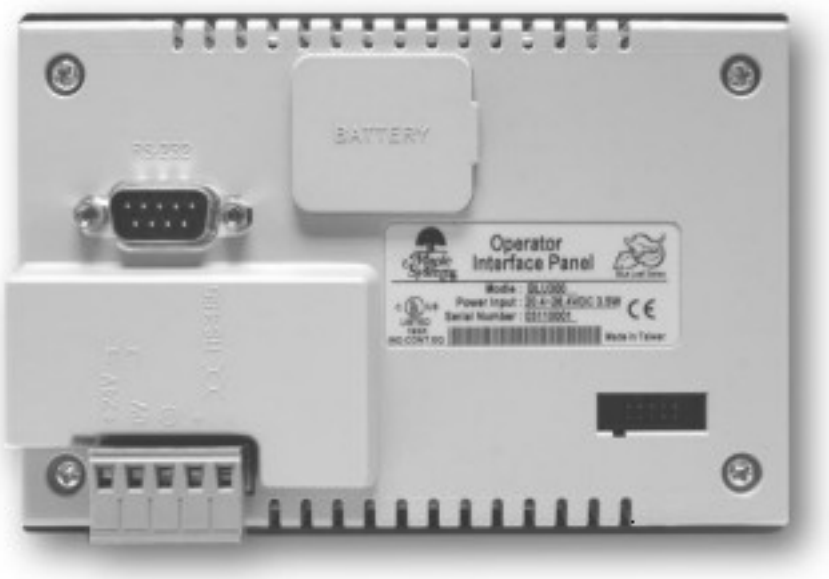
Overview

The BLU300 operator interface terminal is a graphics-based display with a membrane-style keypad. Below is an outline of the features of the BLU300:



Front outline of BLU300

Hardware Component	Description
Alarm Indicator	1. Flashes if communications to PLC is lost. 2. Can be tagged to PLC register to indicate alarm conditions in control system
ESC (Escape) key	Used to cancel any incorrect input. Also used to exit setup menus or cancel numeric entry input.
SHIFT key	Used to select secondary keys (F6-F10)
F1-F5	Primary keys used to display screens, input numeric values to PLC registers, or change the state of PLC coils
Arrow (Up, Down, Right, Left) keys	Up/Down keys: 1. Move through local setup menus 2. Scroll up/down screens 3. Increase/decrease digit values when using the Numeric Entry screen. Left/Right keys: 1. Change local setup settings 2. Move to next digit when using the Numeric Entry screen.
ENTER key	1. Accept setup menu selection 2. Accept value entered using the Numeric Entry screen.



Back Outline of the BLU300

Hardware Component	Description
RS-232	1. Port used for programming the BLU300 2. Port used to communicate to PLC using RS232
Power Input (+24V, 0V, gnd)	Used to connect +24VDC to BLU300
RS-485	1. Port used to communicate to PLC using RS485 2. Port used to connect OIT to OIT when transferring projects
Battery	Location of CR2032 lithium battery used for internal clock
Label	Model identification label
Extension Port	1. Used for bootcode upgrades 2. Used for uploading/downloading projects with memory stick (PCC)

Local Setup Menus

The Blue Series has local setup menus that are used to configure the OIT and to allow upload/download of project files. The table below provides a brief list of the setup menus and their function:

1. Read from PC		Download project from computer
2. Send to PC		Upload project to a computer
3. Copy HMI to HMI		Copy a project from one BLU300 to another
4. HMI Setup		Modify hardware settings of HMI
	1. Com port	Change active com port
	2. Contrast	Set contrast of LCD display
	3. Back light	Enable a back light saver
	4. Date/Time	Program the internal clock
	5. Buzzer	Enable/disable the internal buzzer
	6. Password	Create and enable setup password
	7. Start-up display	Select user startup screen or predefined screen.
5. Exit & Run		Exit setup menus and attempt to communicate to PLC

Accessing the Local Setup Menus

To access the local setup menus, perform one of the following:

- Power up the BLU300 while holding down the ESC key for approximately ten seconds.
- If the BLU300 is communicating to a PLC, hold down the ESC key for about four seconds.
- If the BLU300 is attempting to communicate to a PLC but a Timeout error message is displayed, hold down the ESC key for approximately ten seconds.

Once the local setup menu is accessed, the following should be displayed on the BLU300:

Downloading a Project to the BLU300

To download a project to the BLU300, follow these steps:

1. Access the LOCAL SETUP MENU as shown above.
2. Connect the BLU300 RS-232 port to your computer using the configuration cable (Maple P/N 7431-0102)
3. In BlueLeaf, click **Options…PC-HMI Comm Settings** to select the PC's com port and parameters.
4. Compile the project - click **Tools…Write Project to BLU300**.
5. On the BLU300, press the **F1** key or use the up/down arrow keys to move the blinking cursor to **`1.Read from PC`**. Then press the **ENTER** key:

5. In BlueLeaf, click the **Yes** button, to confirm the download. After the file has downloaded, click the **OK** button.
6. Press the **ESC** key on the BLU300 to exit the download menu.
7. Disconnect the OIT from the PC and connect the PLC cable to the OIT.
8. Press the **F5** key or use the up/down arrow keys to move the blinking cursor to **`5.EXIT & RUN`**, then press the **ENTER** key.

The OIT will attempt to communicate to the PLC.

Uploading a Project from the BLU300

To upload a project from the BLU300, follow these steps:

1. Access the LOCAL SETUP MENU per instructions given in the beginning of this chapter.
2. Connect the BLU300 RS-232 port to your computer using the configuration cable (Maple P/N 7431-0102)
3. In BlueLeaf, click **File…Close** to close any project that is currently opened.

> ✉ *If you upload a project from the OIT while an existing project is open, it will overwrite that project.*

4. Click **Options…PC-HMI Comm Settings** to select the PC's com port and parameters.
5. On the BLU300, press the **F2** key, or use the up/down arrow keys to move the blinking cursor to **`2.Send to PC.`** Press the **ENTER** key.
6. In the BlueLeaf software, click **Tools…Read Project from BLU300**.
7. In BlueLeaf, click the **Yes** button, to confirm the upload. After the file has been uploaded, click the **OK** button.
8. Press the **ESC** key on the BLU300 to exit the upload menu.

9. Disconnect the OIT from the PC and connect the PLC cable to the OIT.
10. Press the **F5** key or use the up/down arrow keys to move the blinking cursor to **`5.EXIT & RUN`**, then press the **ENTER** key.
11. The OIT will attempt to communicate to the PLC.

Transferring a Project Between Two BLU300s

To transfer a project from one BLU300 to another, follow these steps:

1. Access the local setup menu per instructions given in the beginning of this chapter.
2. Connect the BLU300 RS-485 port of one OIT to the RS-485 port of the other OIT using two-conductor twisted pair wire. Connect as shown:

Sending BLU300 (RS-485 Port)	Receiving BLU300 (RS-485 Port)
+ ← ----------	----------→ +
- ← ----------	----------→ -

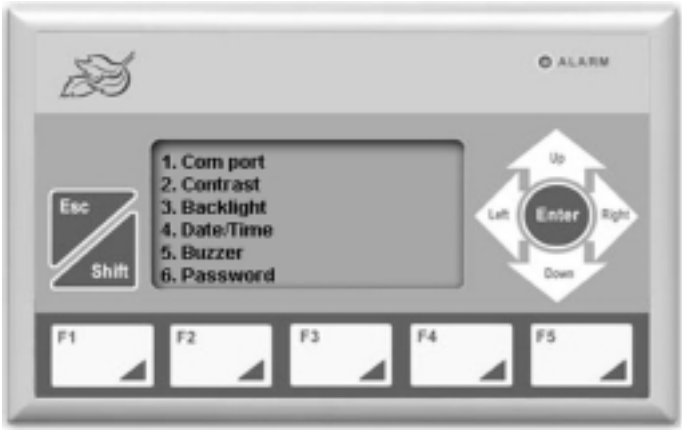
3. On the BLU300s, press the **F4** key, or use the up/down arrow keys to move the blinking cursor to **`4.HMI Setup.`** Press the **ENTER** key.
4. On **`1.Com port`**, press the **ENTER** key.
5. On **`1.HMI protocol`**, press the **ENTER** key. Ensure that the **HMI id** matches both units. If not, press the **ENTER** key on one of the BLU300s to edit the HMI id number. Use the right/left arrow keys to move to each digit, then use the up/down arrow keys to change each digit value. When done, press the **ENTER** key to save the changes.

> ✉ *HMI id numbers must match exactly or project transfer will not take place. The RS-485 port parameters do not have to match, the BLU300 units use predefined communications settings which are not affected by settings in the RS485 menus. Therefore, baud rate, data bits, parity, and stop bits do not have to match between OITs.*

6. Press the **ESC** key to go back to the HMI SETUP menu. Press **ESC** key again to go back to the main menu.
7. On the BLU300s, press the **F3** key, or use the up/down arrow keys to move the blinking cursor to **`3.Copy HMI to HMI.`** Press the **ENTER** key:
8. On the BLU300 that is to receive the project, use the up/down arrow keys to select **`2.Read from HMI`**. Then press the **ENTER** key.
9. On the BLU300 that is to send the project, use the up/down arrow keys to select **`1.Send to HMI`**. Then press the **ENTER** key.
10. The BLU300 that is receiving the file should display a message `Receiving Project File`. The BLU300 that is sending the file should display a message `Sending Project File`. When the downloading sequence has finished, both OITs should display `Finished`. Press the **ESC** key to clear the message.
11. Press the **ESC** key again on both units to exit the transfer menu.
12. Transfer is now complete.

HMI Setup Menu for the BLU300

The HMI SETUP menu allows you to change many of the hardware settings of the BLU300 OIT:



HMI Setup Menu

Changing the Com Port Settings

The Com port setting on the OIT allows you to change the OIT's communications parameters for the RS-232 and RS-485 ports without having to download a new project file from the BlueLeaf configuration software.

It is not necessary to adjust these settings in the local setup menu, since these settings are automatically changed whenever you download a project from the BlueLeaf software into the OIT. Adjusting these settings from the local setup menu is only provided as a convenient method of changing the parameters without downloading a new project file.

To change these settings, perform the following:

1. Access the LOCAL SETUP MENU per instructions given in the beginning of this chapter.
2. Press the **F4** key, or use the up/down arrow keys to move the blinking cursor to **`4.HMI Setup.`** Press the **ENTER** key.
3. Use the up/down arrow keys to move the blinking cursor to **`1.Com port.`** Press the **ENTER** key.
4. There are three menu items:

   - **HMI protocol**- used to change the OIT's id #. This id # must match the **HMI Comm. Addr** setting found in the BlueLeaf configuration software **Options…PC-HMI Comm Settings** menu before any upload/download of a project file can take place. When transferring a project from one OIT to another, the id #'s must match also.
   - **RS232**- used to change the communications parameters for the RS-232 port (see table below).
   - **RS485**- used to change the communications parameters for the RS-485 port (see table below).

Parameter	Options
Baud Rate	4800, 9600, 19200, 38400, 57600, 115200
Data Bits	8 Bit, 7 Bit
Parity	Even, Odd, None
Stop Bit	1 Bit, 2 Bit

5. From the Com port menu, use the up/down arrow keys to move the blinking cursor to the target selection: HMI protocol, RS-232, RS-485. Press the **ENTER** key.
6. To change a parameter (such a Baud Rate), use the up/down arrow keys to move the blinking cursor to the parameter, and then press the **ENTER** key. At any time, you can cancel changing the parameter by pressing the **ESC** key.
7. The blinking cursor will highlight the options for the particular parameter you have selected. Use the right/left arrow keys to select one of the options. Press the **ENTER** key to select the new option. A brief message `Setup complete` will appear, indicating that the new option has been saved.
8. When you have finished modifying parameters, press the **ESC** key to go back to the COM PORT menu.
9. Press the **ESC** key again to go back to the HMI SETUP menu.

Changing the Contrast Setting

The contrast setting allows the OIT operator to optimize the contrast for the particular environment the OIT is installed in.

To change the contrast, perform the following:

1. Access the LOCAL SETUP menu per instructions given in the beginning of this chapter.
2. Press the **F4** key, or use the up/down arrow keys to move the blinking cursor to **`4.HMI Setup`**. Press the **ENTER** key.
3. Use the up/down arrow keys to move the blinking cursor to **`2.Contrast`**. Then press the **ENTER** key.
4. From the CONTRAST menu, use the right/left arrow keys to vary the contrast setting of the LCD. The contrast will change as you make adjustments.
5. When you have finished modifying the contrast, press the **ENTER** key to go back to the HMI Setup menu. Press the **ESC** key to cancel any changes.

Changing the Back light Saver Setting

The back light saver setting allows the OIT operator to enable an LED back light saver that will automatically shut off the LED back light of the OIT display after a predefined time, thereby extending the lifespan of the display. The back light is reactivated whenever any key on the OIT is pressed.

To change the back light saver, perform the following:

1. Access the LOCAL SETUP MENU per instructions given in the beginning of this chapter.
2. Press the **F4** key, or use the up/down arrow keys to move the blinking cursor to **`4.HMI Setup`**. Press the **ENTER** key.
3. Use the up/down arrow keys to move the blinking cursor to **`3.Back light`**. Press the **ENTER** key.
4. From the BACK LIGHT menu, use the right/left arrow keys to switch between the two digits. Use the function keys to change each digit value (ex. F1 =1, F5 =5, Shift F1 =6, Shift F10 =0). Range is 0 to 99 minutes. Note: if 0 is selected, the back light saver feature is disabled and the back light always remains on.
5. When you have finished modifying the back light saver, press the **ENTER** key to go back to the HMI Setup menu. Press the **ESC** key to cancel any changes.

Setting the Internal Clock

The Date/Time setting allows the OIT's internal clock to be set.

To change the clock, perform the following:

1. Access the LOCAL SETUP MENU per instructions given in the beginning of this chapter.
2. Press the **F4** key, or use the up/down arrow keys to move the blinking cursor to **`4.HMI Setup`**. Press the **ENTER** key.
3. Use the up/down arrow keys to move the blinking cursor to **`4.Date/Time.`** Press the **ENTER** key.
4. From the Date/Time menu, use the up/down arrow keys to move the blinking cursor to the parameter you wish to change (ex. Date, Week, etc).

5. Press the **ENTER** key. The blinking cursor will now highlight the options for that parameter.
6. Use the right/left arrow keys to switch between the options or digits for that parameter. Use the function keys to change each digit value (ex. F1 =1, F5 =5, Shift F1 =6, Shift F10 =0).
7. When you have finished modifying the clock settings, press the **ENTER** key to go back to the HMI Setup menu. Press the **ESC** key to cancel any changes.

✉ *The Date/Time setting menu also displays a bar graph which represents the relative amount of energy left in the clock battery.*

Enabling/Disabling the Internal Buzzer

The Buzzer setting allows the OIT's internal buzzer to be disabled or enabled.

To change the Buzzer, perform the following:

1. Access the LOCAL SETUP MENU per instructions given in the beginning of this chapter.
2. Press the **F4,** key or use the up/down arrow keys to move the blinking cursor to **`4.HMI Setup`**. Then press the **ENTER** key.
3. Use the up/down arrow keys to move the blinking cursor to **`5.Buzzer`**. Press the **ENTER** key.
4. From the BUZZER menu, use the up/down arrow keys to move the blinking cursor to `1.Normal` or `2. Silent.`
5. Press the **ENTER** key to save the change and go back to the HMI Setup menu. Press the **ESC** key to cancel any changes .

Setting the Local Setup Password

The Password setting allows you to restrict access to the LOCAL SETUP menus.

To change the password, perform the following:

1. Access the LOCAL SETUP MENU per instructions given in the beginning of this chapter.
2. Press the **F4,** key or use the up/down arrow keys to move the blinking cursor to **`4.HMI Setup`**. Press the **ENTER** key.
3. Use the up/down arrow keys to move the blinking cursor to **`6.Password`**. Press **Enter**.
4. From the PASSWORD menu, use the up/down arrow keys to move the blinking cursor to the parameter you wish to change: `1. New password` or `2.Enable.`
5. Press the **ENTER** key on `1.New password`. The Password Entry screen appears, showing the current 4-digit password. The blinking cursor will now highlight the first digit of the password.
6. Use the right/left arrow keys to switch between the digits of the password, and then use the function keys to change each digit value. The password can be any set of four digits and/or characters. To enter digits or characters, each function key has assigned a set of password characters as follows:

   F1:
   1 6 A B C D E F

   F2:
   2 7 G H I J K

   F3:
   3 8 L M N O P

   F4:
   4 9 Q R S T U

   F5:
   5 0 V W X Y Z

   Scroll through each list of characters for each function key by continuously pressing that key.

7. When you have finished setting the new password, press the **ENTER** key to save the password. Press the **ESC** key to cancel any changes. A message will appear indicating that the new password has been saved. Press the **ESC** key to go back to the Password menu.
8. Use the up/down arrow keys to move to `2.Enable`. Press the **ENTER** key to alternate the setting from **No** to **Yes**.
9. When you have finished setting the new password, press the **ESC** key to go back to the HMI SETUP menu.

If you forget the password, you can still access the LOCAL SETUP menus by entering the backdoor password '8888'. However, once this backdoor password is entered, the BLU300 will clear the prior password and the project stored in the OIT. The OIT will be reset to factory settings and must be reprogrammed.

Selecting the Startup Display

The Startup Display setting allows you to enable or disable the herald screen as seen below:

When enabled, this screen briefly appears whenever the OIT is powered up. Then the first screen of your project is displayed.

To change the Startup Display, perform the following:

1. Access the LOCAL SETUP MENU per instructions given in the beginning of this chapter.
2. Press the **F4** key, or use the up/down arrow keys to move the blinking cursor to **`4.HMI Setup`**. Press the **ENTER** key.
3. Use the up/down arrow keys to move the blinking cursor to **`7.Start-up display.`** Press the **ENTER** key.
4. From the START-UP DISPLAY menu, use the up/down arrow keys to move the blinking cursor to `1.HMI Default` or `2. User Defined.`
5. Press the **ENTER** key to save the change and go back to the HMI SETUP menu. Press the **ESC** key to cancel any changes.

Chapter 5- Creating and Displaying Screens

This section shows how to create screens using BlueLeaf software. To better illustrate some of the examples, please open the sample project (BLU300M.MPL) included with the BlueLeaf configuration software.

Creating Screens

An operator interface terminal wouldn't be very useful if all of the information to be displayed could only be placed onto one screen. Therefore, most OITs have multiple screens that can be used to display information. The Maple Systems Blue Series is capable of storing up to 999 screens (actual limit is determined by memory requirements of each screen), giving you maximum flexibility in designing your operator interface.

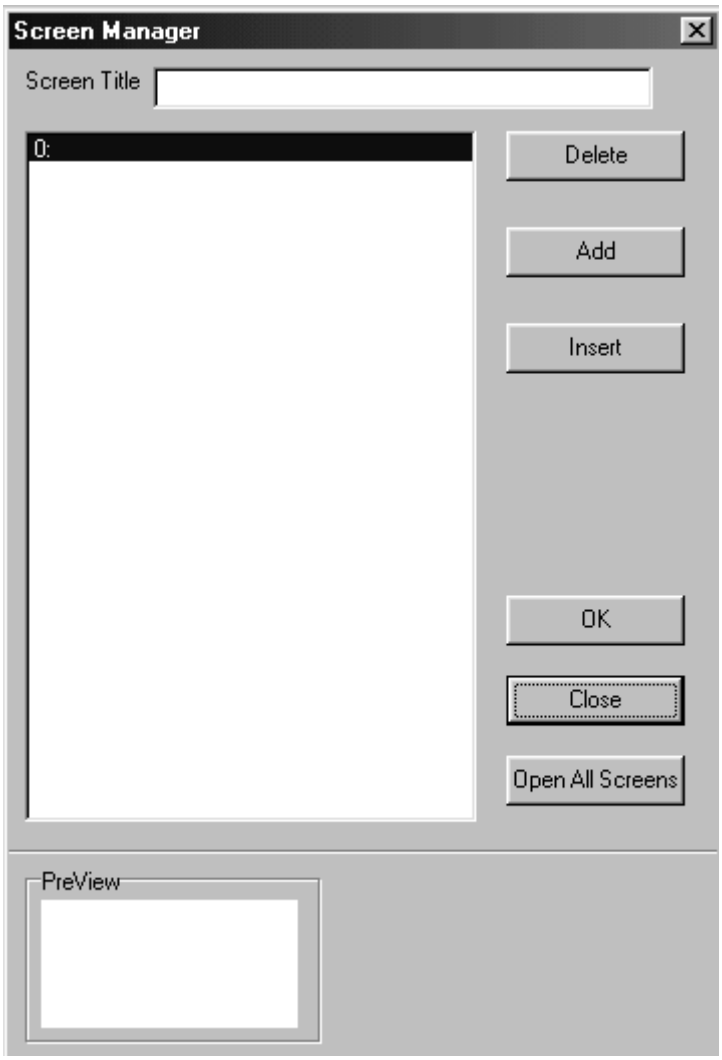
This chapter will demonstrate how to create new screens, use the Screen Manager, and how to display screens using the OIT or the PLC to call up screens.

Opening a Screen

To view the contents of a screen in BlueLeaf, it must first be opened. When you create or open an existing project file only the initial screen (Screen 0) is opened. To view any other screens that have already been created, you must first open the screen. This can be done using the Screen Manager:

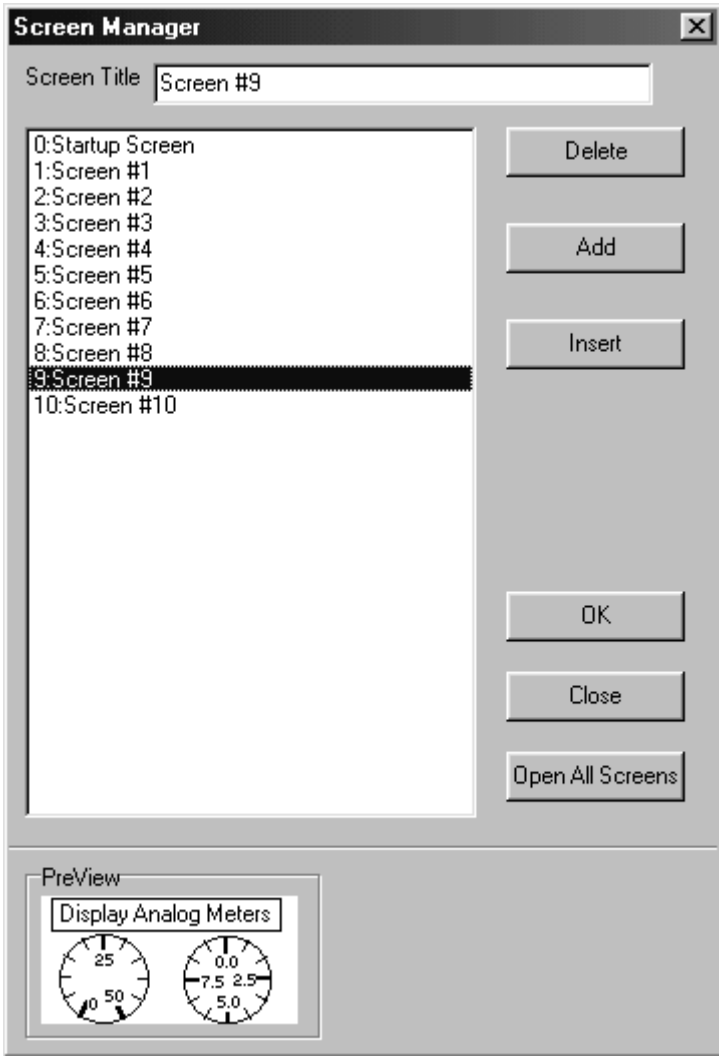
To open a screen 

1. From the TOOLS menu, select **Screen Manager**. Or click the Screen Manager icon from the Standard Toolbar. The Screen Manager dialog box appears:



2. Click on the screen you wish to open, and then click **OK**. You can also open the screen by double-clicking it.
3. The Screen Manager dialog box closes and the opened screen is displayed in the BlueLeaf work area.

Let's look at the Screen Manager again, using the sample project.



The Screen Manager lists all of the screens currently created for the project. You will notice that in the sample project, ten screens have been created. Each screen is listed with a screen number and title. The screen title is the name that you assign to the screen in the Screen Manager. Finally, you will notice that the Screen Manager can also be used to create a new screen, open all screens at once, or delete a screen.

> *When you delete a screen, the Screen Manager will automatically renumber all of the screens above that screen, to fill in the missing screen. For example, if Screen #8 is deleted, Screen #9 will be renamed as Screen #8. In some cases, this may present a problem with your application. If so, simply Insert a new blank screen to replace the deleted screen.*

Press the **Close** command button to return to the main BlueLeaf screen.

By default, when a screen is opened it will become active in the work area of BlueLeaf. Other open screens will be moved to the background. To switch between open screens, open the **Screen Manager** and select from the list of screens currently open. You can also *cascade* or *tile* the open screens to see the screens at the same time. Finally, you can use the previous page or next page buttons on the Standard Toolbar to scroll through the open screens.

BlueLeaf requires more resources from your computer every time you open another screen. When many screens are open, the performance of the computer may be affected; therefore, you may wish to close some of the screens until you are ready to edit them.

To close a screen

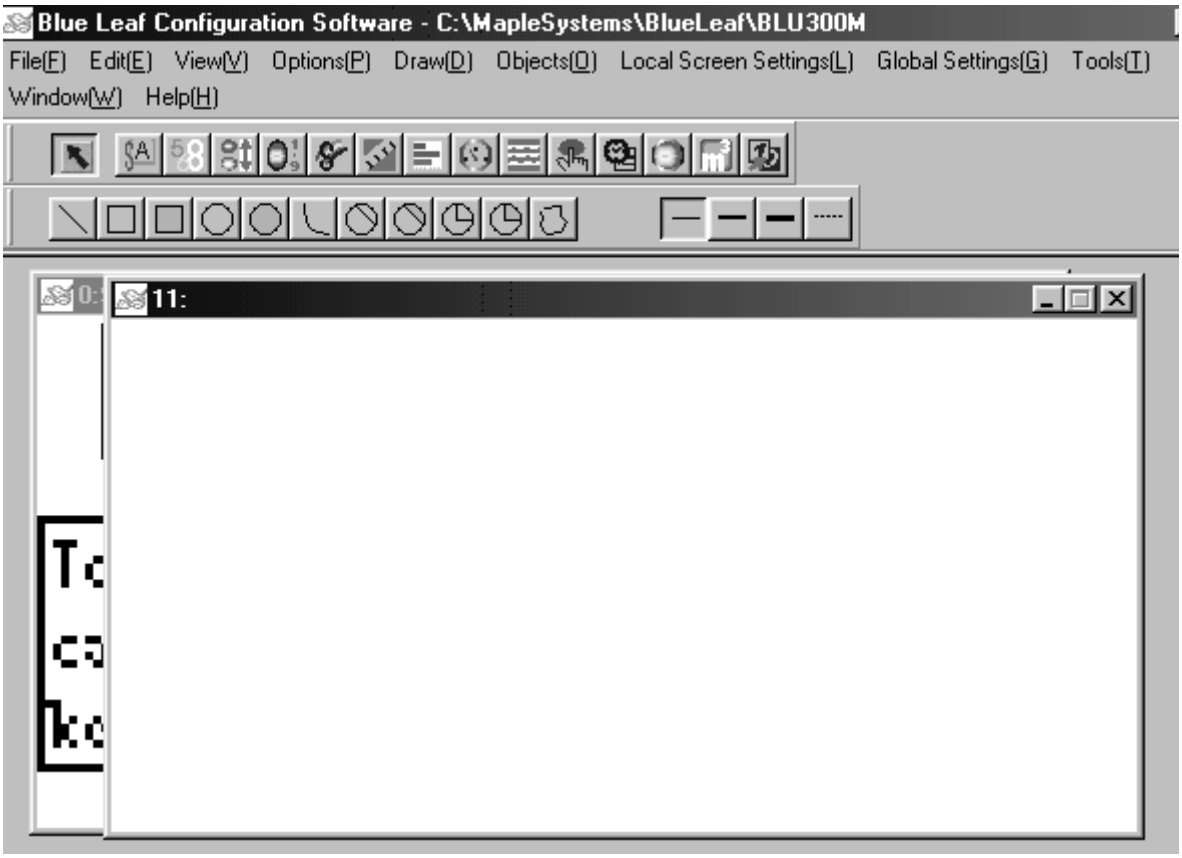
You will notice three small icons located in the upper right hand corner of each screen: the minimize icon , the maximize icon , and the close icon . To close a screen, click the close icon associated with that screen.

Creating a New Screen

Whenever you create a new project file, only the initial screen (Screen 0) is automatically created. To create any other screens, you must complete the following steps.

To create a new screen

From the EDIT menu, select **Add New Screen** or click on the **New Screen** icon in the Standard toolbar. The BlueLeaf software will create a new screen and display it in the work area:



If you wish to assign a screen title to the screen you just created, click on the Screen Manager, click on the new screen and enter a new title under Screen Title.

Deleting a Screen

To delete a screen

1. From the TOOLS menu, select **Screen Manager**. Or click the Screen Manager icon from the Standard Toolbar. The Screen Manager dialog box appears.
2. Highlight the screen that you wish to delete.
3. Click the **Delete** command. A dialog box appears asking if you want to delete this screen.
4. Click **Yes**. The dialog box disappears and the selected screen is deleted.
5. Click **Close** in the Screen Manager to go back to the BlueLeaf main screen.

How to Display Screens

Screens are displayed on the BLU300 using the following methods:

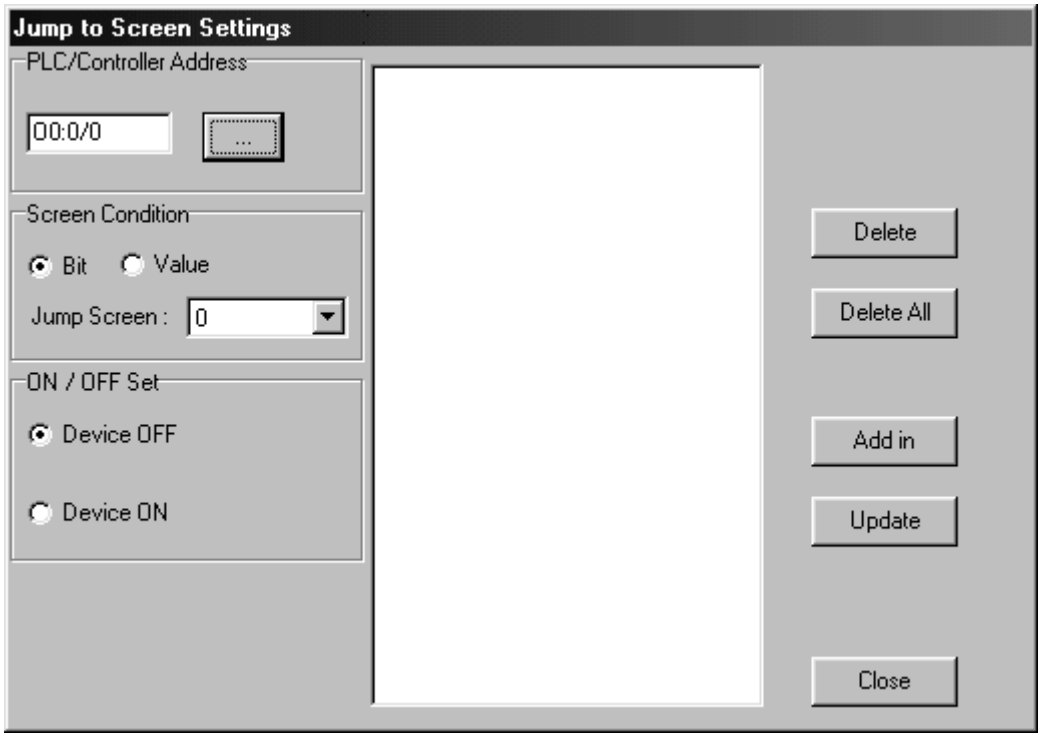
- Configuring the OIT to continuously monitor a PLC register or coil using the 'Jump To Screen' feature
- Configuring a function key to display a new screen
- Use the up/down arrow keys to scroll through the screens

Jump to Screen Feature

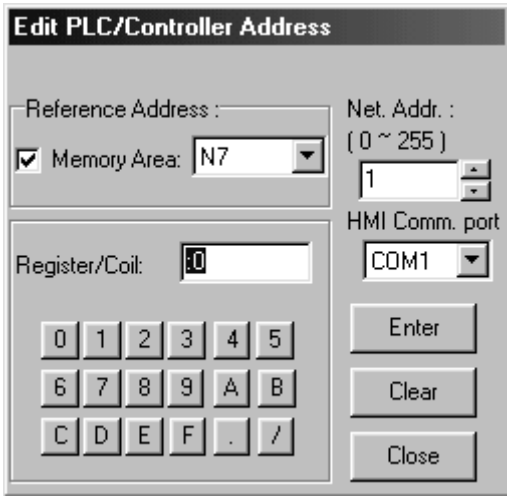
The 'Jump To Screen' feature is used to configure a PLC coil or register that the OIT will continuously monitor for a condition. If that condition is met, then the OIT will display the assigned screen. There are two 'Jump To Screen' editors: the Local and Global editors. The Global Jump To Screen feature is used to configure a PLC coil/register that will be monitored by the OIT regardless of which screen is currently being displayed. The Local Jump To Screen feature is used to configure a PLC coil/register that will only be monitored by the OIT when that screen is displayed.

To create a 'Jump To Screen' object

1. To use the global object, from the GLOBAL SETTINGS menu, select **Jump To Screen**. To use the local object, click the LOCAL SCREEN SETTINGS menu, then **Jump To Screen**. The Jump To Screen Settings dialog box appears:



2. Click on the type of PLC memory you wish to use under **Screen Condition**: **Bit** or **Value** (16 or 32 Bits).
3. In the **PLC/Controller Address** frame, enter the *PLC coil* or *register address*. Or click the PLC/Controller Address button to display the Edit PLC/Controller Address dialog box:



4. Check the Memory Area box. Click the pull-down box to select the *target PLC memory area*. Use the numeric keypad to enter the specific *PLC memory address*. Select the *PLC Network Address* (if applicable) and *HMI communications port*. Click **Enter** to go back to prior dialog box.

5. Use the Jump Screen pull-down box to select the screen you want to display if the trigger condition is met.
6. **For Bit Only-** Select **Device OFF** if the screen must appear when the PLC coil is off. Select **Device ON** if the screen appears when the PLC coil is on.
7. **For Value Only-** In the **Size:** box, use the pull-down box to select *16 bit* or *32 bit* register.
8. **For Value Only-** Use the **Format**: pull-down box to select the *format* that determines how the OIT reads the value in the PLC register. Select from:

Format	Range	Size (Bits)	Description
Unsigned	0 to 65535	16	unsigned 16 bit format
	0 to 4294967295	32	unsigned 32 bit format
Signed	-32768 to +32767	16	signed 16 bit format
	-2147483648 to +2147483647	32	signed 32 bit format
Hexadecimal	0000 to FFFF	16	hexadecimal 16 bit format
	00000000 to FFFFFFFF	32	hexadecimal 32 bit format
BCD	0000 to 9999	16	BCD 16 bit format
	00000000 to 99999999	32	BCD 32 bit format

9. **For Value Only-** In the **Trigger Condition** box, enter the **Device Value** that will be used to compare with the value actually in the PLC register.
10. **For Value Only-** In the **Trigger Condition** box, use the pull-down box to select the *mathematical expression* that will be used to compare the entered constant value with the value read from the PLC register: For example, suppose the PLC register is 4x1 and the Device Value used is 5.

Trigger Condition	Description	Example
=	Equal condition	4x1 = 5: if value in register 4x1 is equal to 5, activate screen.
>	Greater than condition	4x1 > 5: if value in register 4x1 is greater than 5, activate screen.
<	Less than condition	4x1 < 5: if value in register 4x1 is smaller than 5, activate screen.
>=	Greater than or equal to	4x1 >= 5: if value in register 4x1 is greater than or equal to 5, activate screen
<=	Less than or equal to	4x1 <= 5: if value in register 4x1 is less than or equal to 5, activate screen
!=	Not equal	4x1 != 5: if value in register 4x1 is not 5, activate screen.

11. Click the **Add In** button to add the condition to the list. You can have multiple trigger conditions assigned.
12. If you need to make a change to a trigger condition on the list, simply click on the trigger condition to highlight, and then make the necessary modifications in the edit fields. Click the **Update** button.
13. If you decide to delete one of the trigger conditions, highlight the trigger condition on the list and click the **Delete** button.
14. When you have finished editing the trigger conditions for the 'Jump To Screen' object, click the **Close** button.

15. The **Jump To Screen Settings** dialog box closes and the active screen is displayed in the BlueLeaf work area.

Displaying screens using function keys

Function keys are also used to display a screen. As with the 'Jump To Screen' feature, there are two Function Key editors: the Local and Global editors. The Global Function Key Editor is used to configure a function key that, when pressed, will display a screen on the OIT regardless of which screen is currently being displayed. The Local Function Key Editor is used to configure a function key that, when pressed, will only switch to the target screen if the screen that the local function key was created on is displayed. For more information on configuring a local or global function key to display a screen, consult *Chapter 9- Using The Function Keys*.

Displaying screens using the up/down arrow keys

The Up and Down Arrow keys of the BLU300 are used to scroll through the screens. Pressing the Down Arrow key causes the OIT to 'page down' to the next screen. For example, if Screen #5 is currently displayed on the OIT, pressing the Down Arrow key causes Screen #6 to appear.

The Up Arrow key is used to 'page up' to the prior screen. If Screen #5 is currently displayed on the OIT, then pressing the Up Arrow key causes Screen #4 to appear.

There may be some situations in which you do not want a screen to be accessible using the up/down arrow keys:

- A screen is configured that should only be displayed by a request from the PLC (i.e. an alarm)
- A screen needs to be protected against unauthorized access, so you configure a function key to display a screen with password-protection
- You want some screens to be 'chained' together but not all screens

If you have a screen that you do not want accessible using the up/down arrow keys, do the following:

Block Key Arrow Paging

1. Open the screen that you wish to isolate from the paging feature of the up/down arrow keys.
2. From the LOCAL SCREEN SETTINGS menu, select **Block Key Arrow Paging**. A checkmark is placed next to the Block Key Arrow Paging to indicate that it is enabled. To disable this feature, click again.
3. When the up/down arrow keys are used to page through screens, this screen will be skipped.

Chapter 6 - Creating Graphics Objects

Drawing Objects

To display any graphic objects on the OIT screen, you must either create them using the drawing tools included with BlueLeaf software, import them as bitmaps from another applications program, or select from the many choices available in the graphic libraries included with BlueLeaf software.

This chapter shows you how to create, use, and save graphics objects in BlueLeaf software. You have learned from previous chapters how graphics objects are placed onto windows. In this chapter, we concentrate on how to create graphics objects.

Using the Drawing Tools

Several drawing tools are provided in BlueLeaf software that make it easy to create graphic objects. With these tools, you can create simple geometric shapes such as straight lines, circles, rectangles, and polygonal shapes. You can also combine various geometric shapes to form complex shapes.

The Line Tool

Use the Line tool to create straight lines on a window screen. Each line that you create has two parameters associated with it: length and thickness.

To create a line 

1. From the DRAW menu, click **Line** or click the **Line** icon in the Draw toolbar.
2. Move the mouse cursor over to the work area of BlueLeaf software onto the screen that you are currently editing. The mouse cursor changes to a crosshair cursor. Click and drag on the screen to mark the beginning of the line.
3. While holding the left button on the mouse, drag the black outline box to the point where you wish to mark the end of the line. Release the left button of the mouse to display the new line. A series of small white square blocks will appear around the boundaries of the line.
4. Click and drag on the small white boxes (the mouse cursor will change to a double arrow) to change direction or size of the line.
5. Click and drag anywhere within the border of the new line to move it to a new location.
6. Modify the line thickness by highlighting the line (clicking on it) and then selecting one of the four options in the Draw toolbar.
7. To continue creating more lines, move the crosshair cursor to a new location and repeat. To discontinue creating new lines, click on the mouse cursor icon in the Objects toolbar or click on any object on the screen.

The Rectangle Tools

The rectangle tools are used to create rectangles or squares. The Rectangle (outline) tool creates a rectangle. The Rectangle (solid) tool creates a solid rectangle.

To create a rectangle  **or** 

1. From the DRAW menu, click **Rectangle (outline or solid)** or click the **Rectangle** icon in the Draw toolbar.
2. Move the mouse cursor over to the work area of BlueLeaf software onto the screen that you are currently editing. The mouse cursor changes to a crosshair cursor. Click and drag on the screen to mark the beginning of the rectangle.

3. While holding the left button on the mouse, drag the black outline box to the point where you wish to mark the opposite end of the rectangle. Release the left button of the mouse to display the new rectangle. A series of small white square blocks will appear around the boundaries of the rectangle.
4. Click and drag on the small white boxes (the mouse cursor will change to a double arrow) to change the width or height of the rectangle.
5. Click and drag anywhere within the border of the new rectangle to move it to a new location.
6. Modify the rectangle (outline) thickness by highlighting the rectangle (clicking on it) and then selecting one of the four options in the Draw toolbar.
7. To continue creating more rectangles, move the crosshair cursor to a new location and repeat. To discontinue creating new rectangles, click on the mouse cursor icon in the Objects toolbar or click on any object on the screen.

The Circle Tools

The circle tools are used to create ellipses or circles. The Circle (outline) tool creates a circle. The Circle (solid) tool creates a solid circle.

To create a circle  **or** 

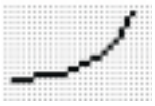
1. From the DRAW menu, click **Circle (outline or solid)** or click the **Circle** icon in the Draw toolbar.
2. Move the mouse cursor over to the work area of BlueLeaf software onto the screen that you are currently editing. The mouse cursor changes to a crosshair cursor. Click and drag on the screen to mark the beginning of the circle.
3. While holding the left button on the mouse, drag the black outline box to the point where you wish to mark the opposite end of the circle. Release the left button of the mouse to display the new circle. A series of small white square blocks will appear around the boundaries of the circle.
4. Click and drag on the small white boxes (the mouse cursor will change to a double arrow) to change the width or height of the circle.
5. Click and drag anywhere within the border of the new circle to move it to a new location.
6. Modify the circle (outline) thickness by highlighting the circle (clicking on it) and then selecting one of the four options in the Draw toolbar.
7. To continue creating more circles, move the crosshair cursor to a new location and repeat. To discontinue creating new circles, click on the mouse cursor icon in the Objects toolbar or click on any object on the screen.

The Curve Tool

The curve tool is used to create curves. Each curve created has three parameters associated with it: size, thickness, and orientation.

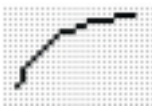
To create a curve 

1. From the DRAW menu, click **Curve** or click the **Curve** icon in the Draw toolbar.
2. Move the mouse cursor over to the work area of BlueLeaf software onto the screen that you are currently editing. The mouse cursor changes to a crosshair cursor. Click and drag on the screen to mark the beginning of the curve.
3. While holding the left button on the mouse, drag the black outline box to the point where you wish to mark the opposite end of the curve. Release the left button of the mouse to display the new curve. A series of small white square blocks will appear around the boundaries of the curve.
4. Note: Once the curve has been placed onto the screen, it is not possible to change the orientation (how the curve bends- right, left, upward or downward) of the curve. Therefore, in order to place the curve onto the screen with a correct orientation, you must select the proper corner when initially placing the curve onto the screen:

For  start at the upper left corner

For  start at the lower left corner

For  start at the upper right corner

For  start at the lower right corner

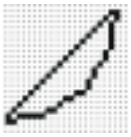
5. Click and drag on the small white boxes (the mouse cursor will change to a double arrow) to change the width or height of the curve.
6. Click and drag anywhere within the border of the new curve to move it to a new location.
7. Modify the curve (outline) thickness by highlighting the curve (clicking on it) and then selecting one of the four options in the Draw toolbar.
8. To continue creating more curves, move the crosshair cursor to a new location and repeat. To discontinue creating new curves, click on the mouse cursor icon in the Objects toolbar or click on any object on the screen.

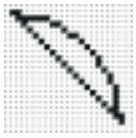
The Chord Tools

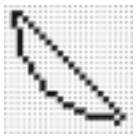
The chord tools are used to create chords. The Chord (outline) tool creates a chord. The Chord (solid) tool creates a solid chord.

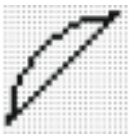
To create a chord  **or** 

1. From the DRAW menu, click **Chord (outline or solid)** or click the **Chord** icon in the Draw toolbar.
2. Move the mouse cursor over to the work area of BlueLeaf software onto the screen that you are currently editing. The mouse cursor changes to a crosshair cursor. Click and drag on the screen to mark the beginning of the chord.
3. While holding the left button on the mouse, drag the black outline box to the point where you wish to mark the opposite end of the chord. Release the left button of the mouse to display the new chord. A series of small white square blocks will appear around the boundaries of the chord.
4. Note: Once the chord has been placed onto the screen, it is not possible to change the orientation (how the chord bends- right, left, upward or downward) of the curve. Therefore, in order to place the chord onto the screen with a correct orientation, you must select the proper corner when initially placing the chord onto the screen:

For  start at the upper left corner

For  start at the lower left corner

For  start at the upper right corner

For  start at the lower right corner

5. Click and drag on the small white boxes (the mouse cursor will change to a double arrow) to change the width or height of the chord.
6. Click and drag anywhere within the border of the new chord to move it to a new location.
7. Modify the chord (outline) thickness by highlighting the chord (clicking on it) and then selecting one of the four options in the Draw toolbar.
8. To continue creating more chords, move the crosshair cursor to a new location and repeat. To discontinue creating new chords, click on the mouse cursor icon in the Objects toolbar or click on any object on the screen.

The Sector Tools

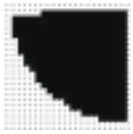
The sector tools are used to create sectors of circles. The Sector (outline) tool creates a sector. The Sector (solid) tool creates a solid sector.

To create a sector  **or** 

1. From the DRAW menu, click **Sector (outline or solid)** or click the **Sector** icon in the Draw toolbar.
2. Move the mouse cursor over to the work area of BlueLeaf software onto the screen that you are currently editing. The mouse cursor changes to a crosshair cursor. Click and drag on the screen to mark the beginning of the sector.
3. While holding the left button on the mouse, drag the black outline box to the point where you wish to mark the opposite end of the sector. Release the left button of the mouse to display the new sector. A series of small white square blocks will appear around the boundaries of the sector.
4. Note: Once the sector has been placed onto the screen, it is not possible to change the orientation (how the sector points- right, left, upward or downward) of the sector. Therefore, in order to place the sector onto the screen with a correct orientation, you must select the proper corner when initially placing the sector onto the screen:

For  start from the upper left corner

For  start from the lower left corner

For  start at the upper right corner

For  start at the lower right corner

The Polygon Tool

The polygon tool is used to create irregular shapes with many sides.

To create a polygon 

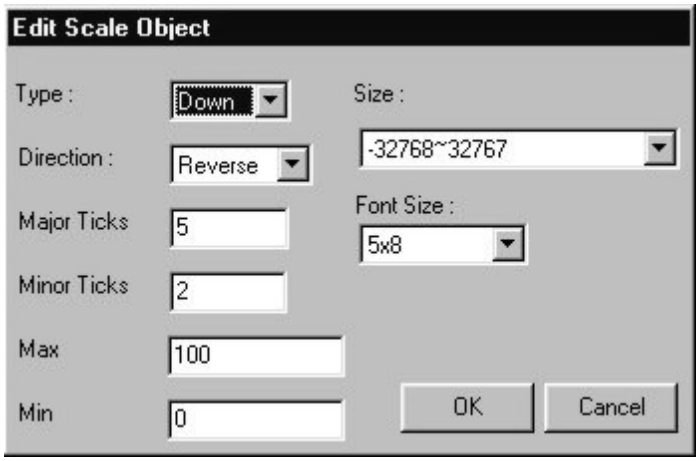
1. From the DRAW menu, click **Polygon** or click the **Polygon** icon in the Draw toolbar.
2. Move the mouse cursor over to the work area of BlueLeaf software onto the screen that you are currently editing. The mouse cursor changes to a crosshair cursor. Click on the screen to mark the beginning of the polygon.
3. Move the cursor to a new location and click. A line is created. Move the cursor to another location and click. Another side is created.
4. Continue moving the cursor to each vertex of the polygon you want to create until finished.
5. Double-click the final side to complete the polygon.
   A series of small white square blocks will appear around the boundaries of the polygon.
6. Click and drag on the small white boxes (the mouse cursor will change to a double arrow) to change the width or height of the polygon.
7. Click and drag anywhere within the border of the new polygon to move it to a new location.
8. Modify the polygon thickness by highlighting the polygon (clicking on it) and then selecting one of the four options in the Draw toolbar.
9. To continue creating more polygons, move the crosshair cursor to a new location and repeat. To discontinue creating new polygons, click on the mouse cursor icon in the Objects toolbar or click on any object on the screen.

The Scale Tool

The Scale tool is used to create scales. Each scale created has four parameters associated with it: size, direction, major/minor ticks, and labels. Scales are most often used when creating bar graphs or linear scale meters.

To create a scale 

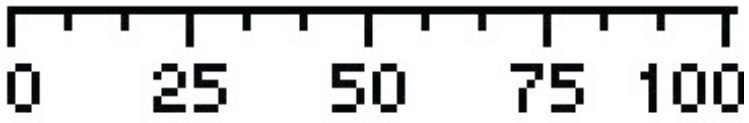
1. From the DRAW menu, click **Scale**. Or click the **Scale** icon in the Draw toolbar.
2. Move the mouse cursor over to the work area of BlueLeaf software onto the screen that you are currently editing. The mouse cursor changes to a crosshair cursor. Click and drag on the screen to mark the beginning of the scale.
3. While holding the left button on the mouse, drag the black outline box to the point where you wish to mark the opposite end of the scale. Release the left button of the mouse to display the new scale. A series of small white square blocks will appear around the boundaries of the scale.
4. Click and drag on the small white boxes (the mouse cursor will change to a double arrow) to change the width or height of the scale.
5. Click and drag anywhere within the border of the new scale to move it to a new location.
6. Double-click on the scale to display the **Edit Scale Object** dialog box:



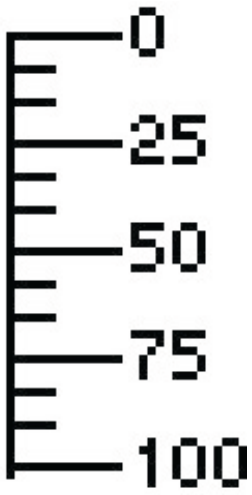
7. Select the direction you want the scale to go, from the **Type**: pull-down box:

Up

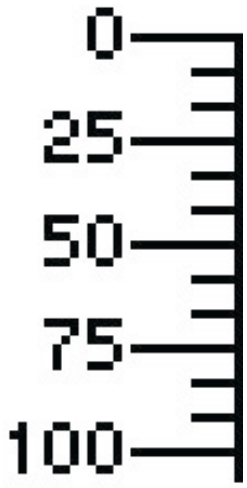
Down



Right

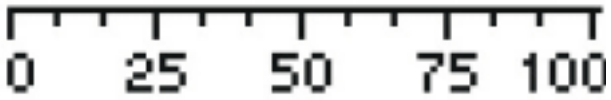


Left

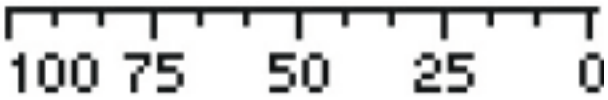


8. Select **Direction**: to change the orientation of the numbers:

Normal



Reverse



9. The **Major Ticks:** box and **Minor Ticks:** box are used to configure the number of tick marks you need.
10. The **Max:** and **Min:** determine the number range that is displayed.
11. The **Size:** box allows you to select the maximum/minimum range that you can select in the **Max:** and **Min:** boxes.
12. Click on the **Font Size:** box to change the size of the numbers: 5x8, 8x8, 8x12, 8x16.
13. To continue creating more scales, move the crosshair cursor to a new location and repeat. To discontinue creating new scales, click on the mouse cursor icon in the Objects toolbar or click on any object on the screen.

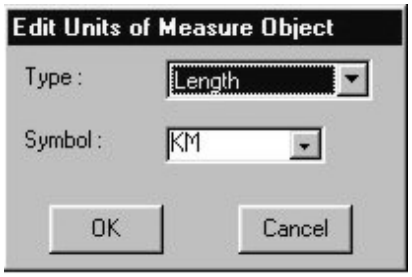
The Units of Measure Tool

The Units of Measure tool is used to quickly create a unit of measure that can be displayed next to a numeric value to add meaning to the number.

▶ To create a unit of measure 

1. From the DRAW menu, click **Unit of Measure**. Or click the **Unit of Measure** icon in the Draw toolbar.

2. Move the mouse cursor over to the work area of BlueLeaf software onto the screen that you are currently editing. The mouse cursor changes to a crosshair cursor. Click on the location that you wish to place the unit of measure.
3. To change the measure used, double-click the object:



Type:	Length	Area	Volume	Weight	Velocity	Temperature
Symbol:	KM	KM^2		kg	$^{KM}/_{SEC}$	C
	M	M^2	M^3	g	$^{M}/_{SEC}$	F
	CM	CM^2	CM^3			
	MM			mg		
	MILE	$MILE^2$			$^{MILE}/_{SEC}$	
	FT	FT^2	FT^2	lb	$^{FT}/_{SEC}$	
	INCH	$INCH^2$	$INCH^3$			

4. The size of the Unit of Measure cannot be varied. The Font of the Unit of Measure cannot be varied and is always Sans Serif 8.
5. To continue creating more units of measure, move the crosshair cursor to a new location and repeat. To discontinue creating new units of measure, click on the mouse cursor icon in the Objects toolbar or click on any object on the screen.

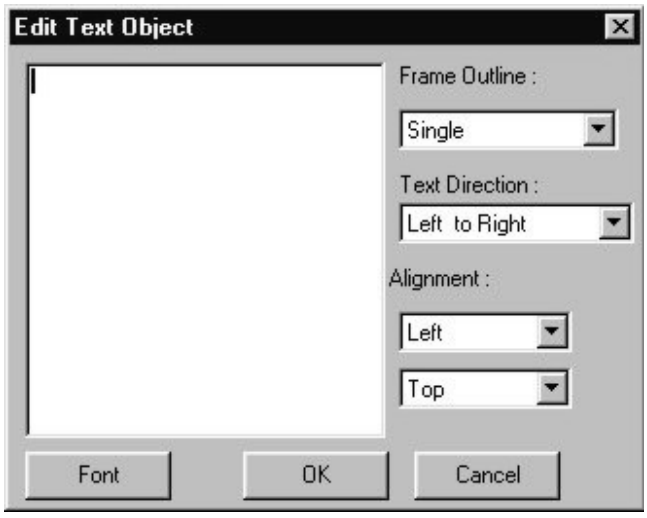
Using Text

BlueLeaf software allows you to create text boxes using Windows® TrueType® fonts. The text can be displayed with or without a frame and can be displayed horizontally or vertically. The text can be left, center, or right justified in the text box.

▶ To create a text box

1. From the DRAW menu, click **Text**. Or click the **Text** icon in the Draw toolbar.
2. Move the mouse cursor over to the work area of BlueLeaf software onto the screen that you are currently editing. The mouse cursor changes to a crosshair cursor. Click on the location that you wish to place the text box.

3. To add text, double-click the object. The Edit Text Object dialog box appears:



4. Select the font size and type by clicking the **Font** button.
5. Enter the *text* in the content box:

   Press the **ENTER** key to begin new lines.
6. Select the *type of frame* you want surrounding the text using the **Frame Outline** pull-down box.
7. Select the *Text Direction*.
8. Select the type of *justification* in **Alignment:** box for both horizontal and vertical alignment.
9. Click **OK**. The main screen of BlueLeaf software reappears with the outline of the text box on the screen and the text. If the size of the text box is too small, only a portion of the text you created will be seen. To see all of the text, you must click and drag on the small white boxes that outline the perimeter of the text object to resize the object.
10. Click and drag anywhere within the border of the new text box to move it to a new location.

To quickly edit the text box

1. You can edit the text of a text box by clicking on the text object and then making changes in the Text Input box located on the Text/Graphic Toolbar.

2. You can also change the font by clicking on the font button  in the Text/Graphic Toolbar.

Predefined Bitmaps

In addition to using the drawing tools to create your own graphics, BlueLeaf software provides several libraries of predefined bitmaps of various sizes and shapes. These bitmaps are stored in libraries that come with BlueLeaf software, (more on libraries in the next section). Bitmaps are to display a predefined complex graphics object on the OIT screen. Bitmaps are pixel-based graphics which are stored in files that contain information about each pixel to compose a bitmap graphic. The pixel is the smallest possible detail that you can change on a screen. Bitmaps can be created with any graphics-design software and saved into one of the predefined libraries.

Bitmaps are used in both passive and active graphics objects. Each bitmap can be placed anywhere on the screen but cannot be resized. The following examples show how to place a pre-defined bitmap on the OIT screen as a passive object. Using bitmaps with active graphics objects is covered in *Chapter 6 - Representing Data with Graphics Objects*. Information on how to create new bitmaps and store them into libraries will be covered in a later section of this chapter.

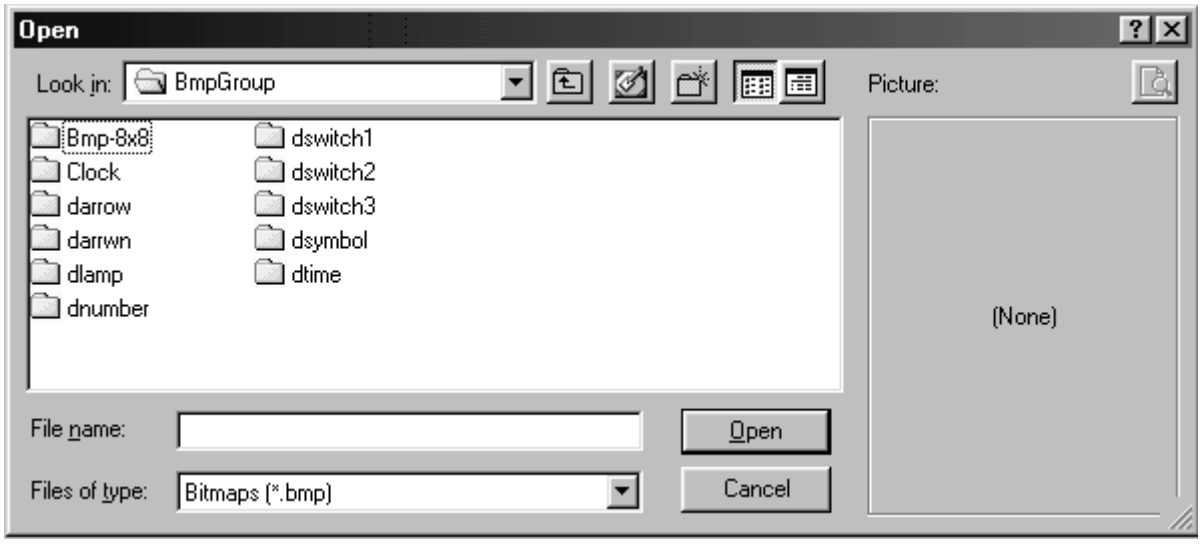
Using a Predefined Bitmap

You can select from many bitmaps that are included in the BlueLeaf software configuration software. Bitmaps can be used for active or passive objects. The following procedure describes using a passive bitmap object.

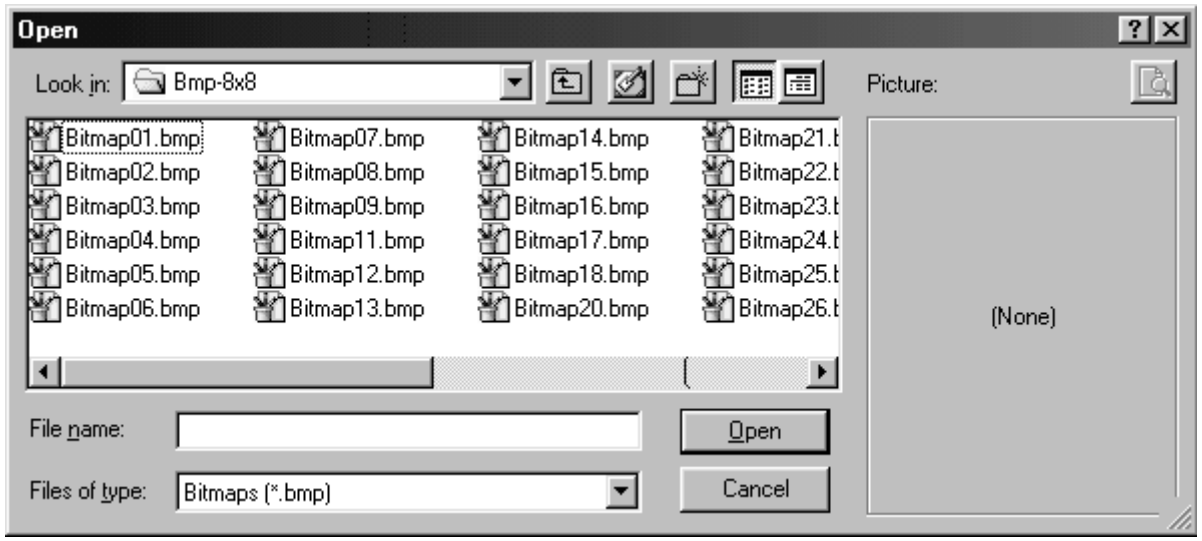
To use a bitmap 

1. From the DRAW menu, click **Bitmap**. Or click the **Bitmap** icon in the Draw toolbar. As you move the mouse cursor over the screen area, it changes to a crosshair cursor.
2. Click anywhere on the screen edit area to place a bitmap. A 16-by-16 pixel box with small white boxes around the perimeter appears.

3. Double-click on the bitmap to display the Open Bitmap dialog box:



4. Double-click on any of the libraries to open that folder and display the bitmaps within that library:



5. Click on any of the bitmap files and use the Preview Box to view the bitmap. To select the bitmap, click **Open**.
6. The bitmap should now appear on the main screen of BlueLeaf software, highlighted with small white boxes around the perimeter.
7. Move the bitmap to the location desired by clicking and dragging the object.
8. The bitmap cannot be resized. To change the size of the bitmap, you must vary the size using some other graphics design software.

Chapter 7 - Using Dynamic Objects

BlueLeaf software includes several active graphics objects or 'parts' that are used to represent data that is stored in the PLC or controller. The data represented can be single bit coils, 16-bit, or 32-bit registers. The data can be represented as numbers, ASCII characters, or as graphic shapes or bitmaps. This chapter focuses on only parts that perform relatively simple functions. More complex parts used for alarms, trending, etc. will be reserved for later chapters.

Representing PLC Coil Registers

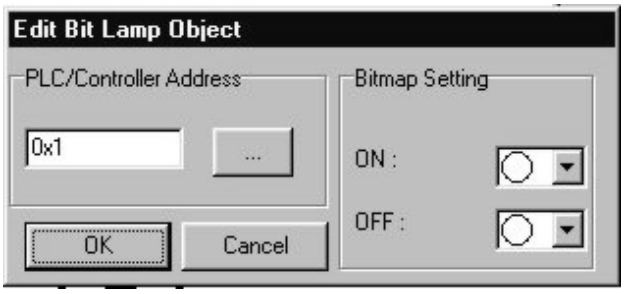
PLC coils (or binary registers) and internal coils of the OIT are represented using three parts: the Bit Lamp Object, the Word Lamp Object, and the Multi-state Bitmap Object. Each has a particular function that makes them unique but they are all constructed and used in essentially the same manner.

The Bit Lamp Object

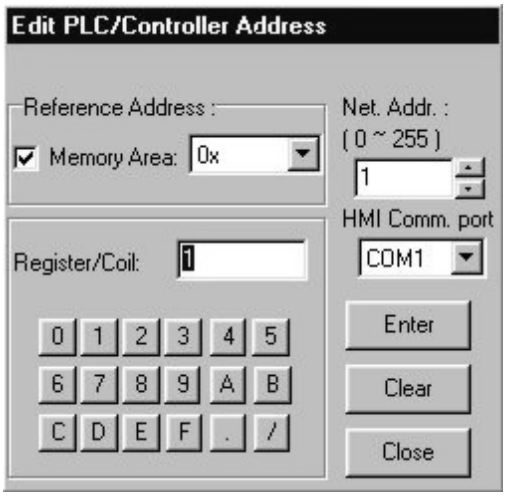
The Bit Lamp Object is a simple way to represent the value of a PLC coil using predefined bitmaps that represent the On and Off state of the PLC coil. The object continuously reads the PLC coil and displays the corresponding bitmap that is tagged to the On or Off state of the coil.

To create a Bit Lamp Object

1. From the OBJECTS menu, click **Bit Lamp**. Or click the **Bit Lamp** icon in the Objects toolbar. The mouse cursor changes to a crosshair. Select the location on the screen to place the Bit Lamp and left click the mouse to place a Bit Lamp object on the screen. Move the mouse cursor over the Bit Lamp object and double-click the Bit Lamp object. The Edit Bit Lamp Object dialog box appears.



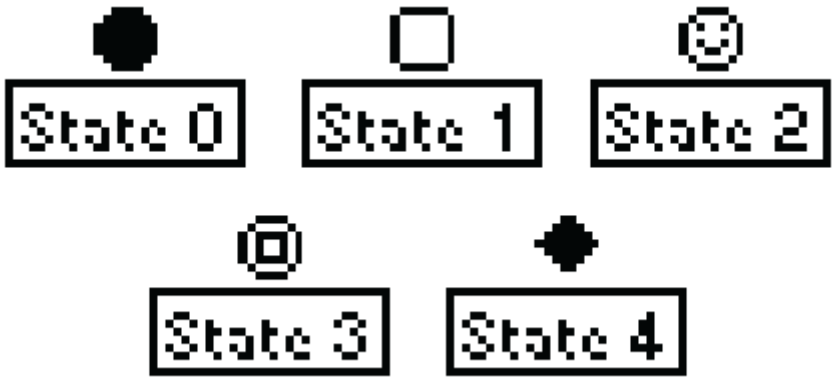
2. In the **PLC/Controller Address** frame, enter the *PLC coil* or c*ontroller address*. Or click the PLC/Controller Address button ... to display the Edit PLC/Controller Address dialog box:



3. Check the **Memory Area** box. Click the pull-down box to select the *target PLC memory area*. Use the numeric keypad to enter the specific *PLC memory address*. Select the *PLC Network Address* (if applicable) and *HMI communications port*. Click **Enter** to go back to prior dialog box.
4. In the **Bitmap Setting** frame, select which *Bit Lamp object* to display for the ON state and the OFF state. There are eighteen predefined bitmaps from which to select from (to use a custom bitmap or text labels, you must use the Multi-State Bitmap w/Label object).
5. Click **OK**. The Bit Lamp Object is displayed on the main screen of BlueLeaf with the appropriate bitmap displayed. If necessary, use the mouse to drag the part to the location on the window that you want it. Note: the Bit Lamp object is always preset to 16x16 pixels in size and cannot be changed.

The Word Lamp Object

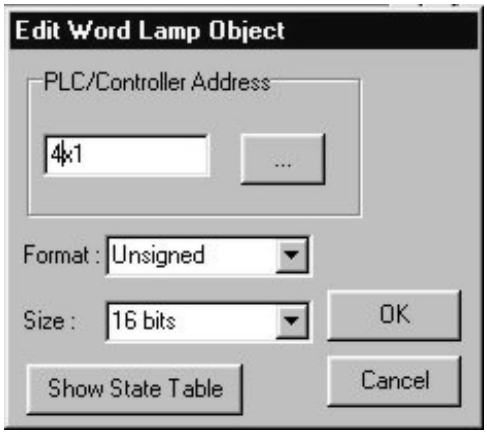
The Word Lamp Object is used to represent the value of a PLC data register. The object continuously reads the PLC register and displays the corresponding bitmap that is tagged to each state of the register. A maximum of five states can be created, as shown in the example below:



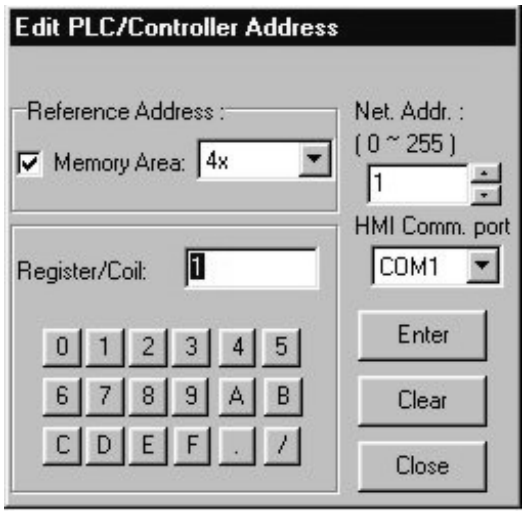
To create a Word Lamp Object 

1. From the OBJECTS menu, click **Word Lamp**. Or click the **Word Lamp** icon in the Objects toolbar. The mouse cursor changes to a crosshair. Select the location on the screen to place the Word Lamp and left click the mouse to place a Word Lamp object on the screen. Move the mouse cursor over the

Word Lamp object and double-click the Word Lamp object. The Edit Word Lamp Object dialog box appears.



2. In the **PLC/Controller Address** frame, enter the *PLC coil* or *controller address*. Or click the PLC/Controller Address button ... to display the Edit PLC/Controller Address dialog box:

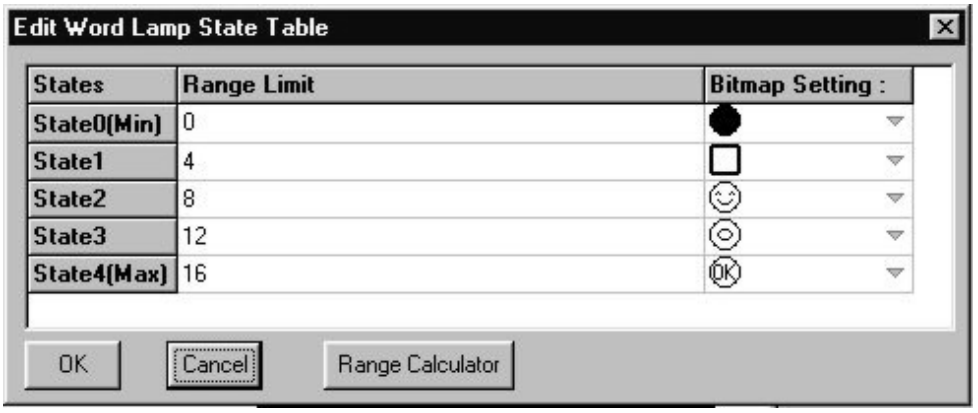


3. Check the Memory Area box. Click the pull-down box to select the *target PLC memory area*. Use the numeric keypad to enter the specific *PLC memory address*. Select the *PLC Network Address* (if applicable) and *HMI communications port*. Click **Enter** to go back to prior dialog box.

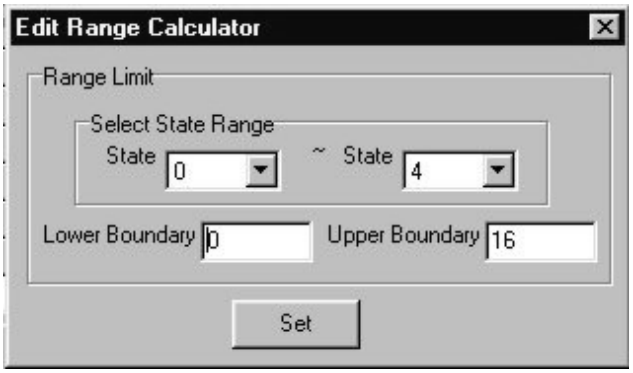
4. In the **Format:** box, use the pull-down box to select the *format* that determines how the OIT interprets the value in the PLC register. Select from:

Format	Range	Size (Bits)	Description
Unsigned	0 to 65535	16	unsigned 16 bit format
	0 to 4294967295	32	unsigned 32 bit format
Signed	-32768 to +32767	16	signed 16 bit format
	-2147483648 to +2147483647	32	signed 32 bit format
Hexadecimal	0000 to FFFF	16	hexadecimal 16 bit format
	00000000 to FFFFFFFF	32	hexadecimal 32 bit format
BCD	0000 to 9999	16	BCD 16 bit format
	00000000 to 99999999	32	BCD 32 bit format

5. In the **Size:** box, use the pull-down box to select *16 bit* or *32 bit* register.
6. Click the **Show State Table** button to display the Edit Word Lamp State Table dialog box:



7. For each State, enter the *Range Limit* that determines if that state's bitmap is to be displayed. The range limit number entered must be larger than the prior state and smaller than each successive state, as shown in the example above. You can also click the **Range Calculator** button to display the Range Calculator:



8. The Range Calculator is a tool to help you easily determine the ranges. By setting the minimum value to be represented (lower boundary) and maximum value to be represented (upper boundary), the calculator will evenly divide the range for each state. Click the **Set** button to go back to the prior dialog box.
9. In the **Bitmap Setting:** box select a *bitmap* for each state. There are eighteen predefined bitmaps from which to select from (to use a custom bitmap or text labels, you must use the Multi-State Bitmap

w/Label object). Click **OK** to accept the settings and go back to the Edit Word Lamp Object dialog box.

10. Click **OK**. The Word Lamp Object is displayed on the main screen of BlueLeaf with the appropriate bitmap displayed. If necessary, use the mouse to drag the part to the location on the window that you want it. Note: the Word Lamp object is always preset to 16x16 pixels in size and cannot be changed.

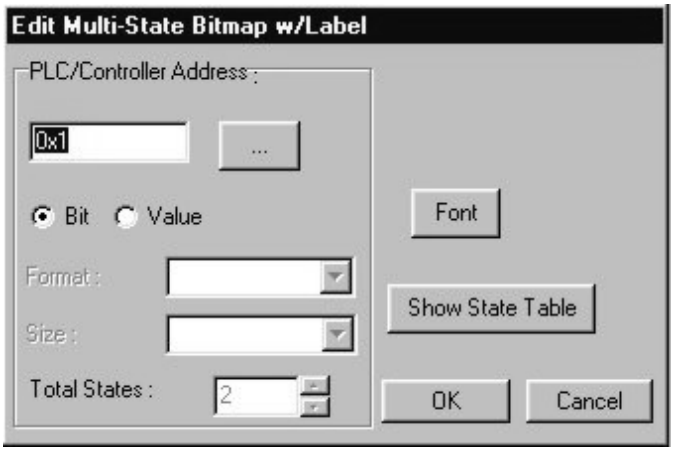
The Multi-State Bitmap w/Label Object

The Multi-State Bitmap w/Label Object is very similar to the Bit Lamp and the Word Lamp objects. It is also used to read values from a PLC coil or register but there are three additional features:

- option to use text labels instead of bitmaps
- assign bitmaps selected from any of the predefined bitmap libraries or use your own
- create more than five state word lamps- up to 255 states

▶ To create a Multi-State Bitmap w/Label Object 

1. From the OBJECTS menu, click **Multi-State Bitmap w/Label**. Or click the **Multi-State Bitmap** icon in the Objects toolbar. The mouse cursor changes to a crosshair. Select the location on the screen to place the Multi-State Bitmap and left click the mouse to place a Multi-State Bitmap object on the screen. Move the mouse cursor over the Multi-State Bitmap object and double-click the Multi-State Bitmap object. The **Edit Multi-State Bitmap w/Label** dialog box appears.

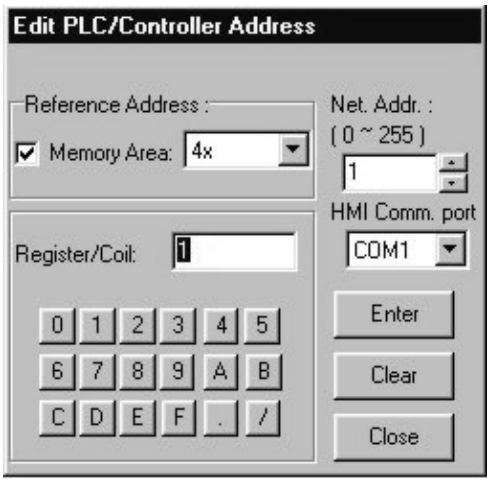


2. First select either **Bit** or **Value** to determine if the Multi-State Bitmap object will read from a PLC coil or a PLC register (16 or 32 bit).

3. **For Value Only-** If reading from a PLC/controller register, use the **Format**: pull-down box to select the format that determines how the OIT reads the value in the PLC register. Select from:

Format	Range	Size (Bits)	Description
Unsigned	0 to 65535	16	unsigned 16 bit format
	0 to 4294967295	32	unsigned 32 bit format
Signed	-32768 to +32767	16	signed 16 bit format
	-2147483648 to +2147483647	32	signed 32 bit format
Hexadecimal	0000 to FFFF	16	hexadecimal 16 bit format
	00000000 to FFFFFFFF	32	hexadecimal 32 bit format
BCD	0000 to 9999	16	BCD 16 bit format
	00000000 to 99999999	32	BCD 32 bit format

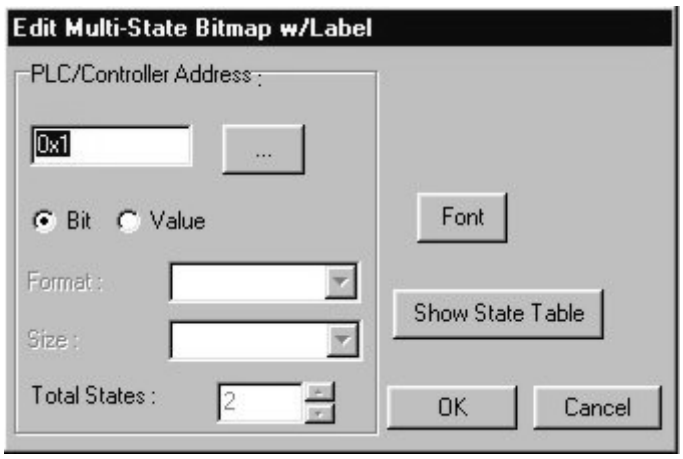
4. **For Value Only-** In the **Size:** box, use the pull-down box to select *16 bit* or *32 bit* register.
5. **For Value Only-** Use the **Total States:** box to enter the *total number of states* to be represented. Use the up/down scroll keys to change the value. Range is 1 to 255.
6. In the **PLC/Controller Address** frame, enter the PLC coil or register address. Or click the PLC/Controller Address button ... to display the Edit PLC/Controller Address dialog box:



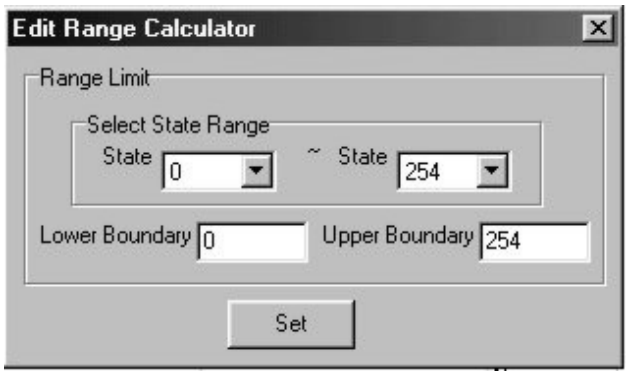
Check the **Memory Area** box. Click the pull-down box to select the *target PLC memory area*. Use the numeric keypad to enter the specific *PLC memory address*. Select the *PLC Network Address* (if applicable) and *HMI communications port*. Click **Enter** to go back to prior dialog box.

7. Click the **Font** button to select the *font* that will be used for any text labels created for each state in the **Show State Table**.

8 Click the **Show State Table** button to display the Edit Multi-State Bitmap State Table dialog box:



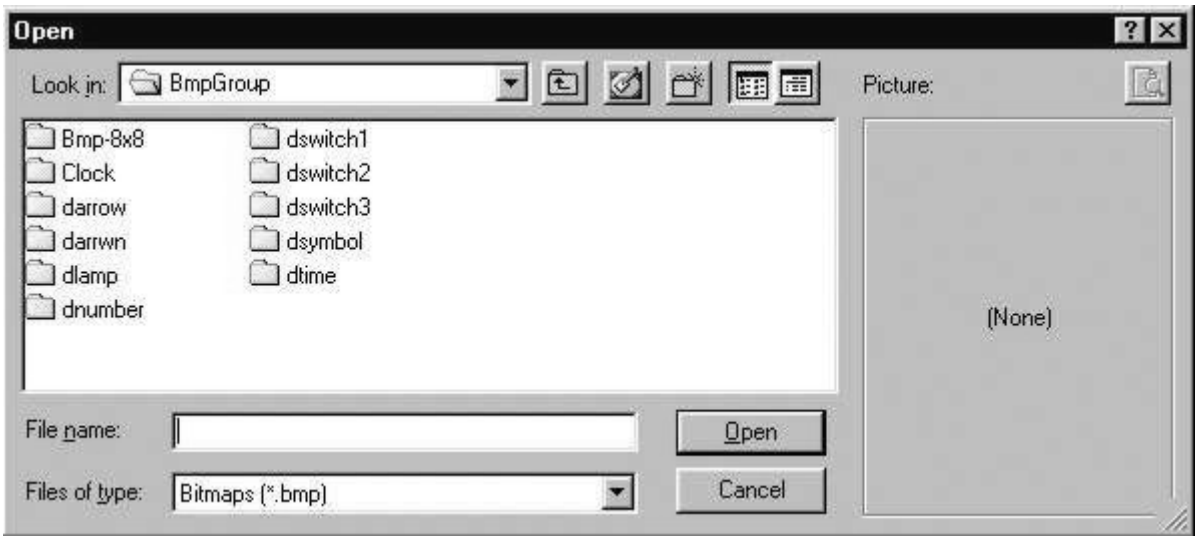
9. For each State, enter the *Range Limit* which determines if that state's bitmap or text label is to be displayed. The range limit number entered must be larger than the prior state and smaller than each successive state, as shown in the example above. You can also click the **Range Calculator** button to display the Range Calculator:



The Range Calculator is a tool to help you easily determine the ranges. By setting the minimum value to be represented (lower boundary) and maximum value to be represented (upper boundary), the calculator will evenly divide the range for each state. Click the **Set** button to go back to the prior dialog box.

10. In the **Label:** box, you can enter *text* that is displayed when the state is valid. The length of the text string is limited to the size and type of font you have selected and the width of the OIT screen. For example, for font MS Serif 6, a maximum of 32 characters can be used.
11. In the **BMP Read** box select a *bitmap* for each state. This is done by clicking on the directory

button +++ to display the BmpGroup library directory:



12. Click on any of the listed subdirectories. Select the bitmap you wish to use, then click **Open**. Click **OK** to accept the settings and go back to the **Edit Multi-State Bitmap State Table** dialog box.
13. Click **OK**. The Multi-State Bitmap Object is displayed on the main screen of BlueLeaf with the appropriate bitmap displayed. If necessary, use the mouse to drag the part to the location on the window that you want it. Note: the Multi-State Bitmap object can be resized once placed on the screen to fit the largest bitmap in the series. Simply click the up/down arrows of the State: box while the Multi-State Object is highlighted to scroll through each state. When the largest bitmap is displayed, click on the small white boxes located around the perimeter of the selected object to resize the object.

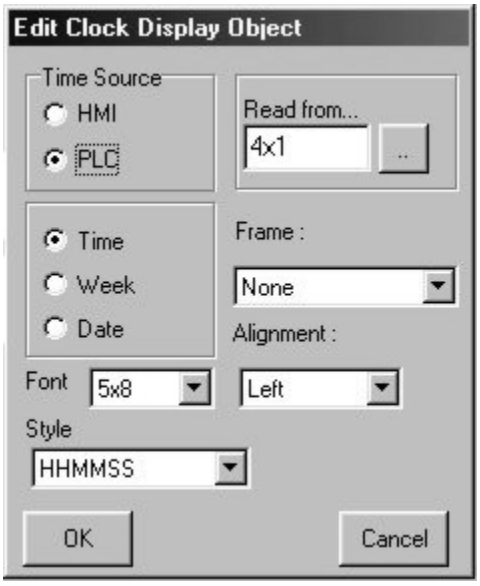
The Clock Display Object

The Clock Display Object is used to display the time and/or date using the OIT's built-in clock or by reading a PLC register.

To create a Clock Display Object

1. From the OBJECTS menu, click **Clock Display**. Or click the **Clock Display** icon in the Objects toolbar. The mouse cursor changes to a crosshair. Select the location on the screen to place the Clock Display and left click the mouse to place a Clock Display object on the screen. Move the mouse cursor over

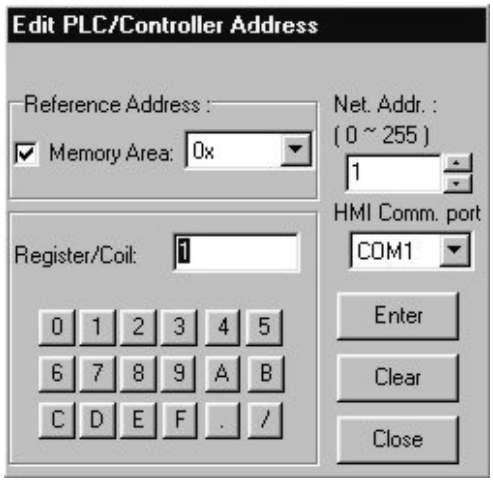
the Clock Display object and double-click the Clock Display object. The Edit Clock Display Object dialog box appears.



2. In the **Time Source** frame, select *HMI* or *PLC* as the source of the clock information. If HMI is selected, the frame to the right will change to Write to… This field is used to select a PLC address that will be used to write the current time and date. If PLC is selected, the frame to the right will change to Read from… This field is used to select a PLC address that the HMI uses to read the current time and date. Whether reading from or writing to a PLC register, the HMI requires seven consecutive 16-bit registers for the clock data. Using the PLC address in the example above, the registers would be as follows:

PLC Register	Clock Data	Range (binary format)	Example
4x1	Year	00-99	2004 = 04
4x2	Day of Week	1-7	Monday =1, Sunday =7
4x3	Month	1-12	January =1, December =12
4x4	Date (Day of Month)	1-31	
4x5	Hour (24hr format)	0-23	1= 1am, 12= noon, 18=6pm
4x6	Minute	0-59	
4x7	Second	0-59	

3. Click the PLC/Controller Address button ... to display the Edit PLC/Controller Address dialog box:



4. Check the **Memory Area** box. Click the pull-down box to select the *target PLC memory area*. Use the numeric keypad to enter the specific *PLC memory address*. Select the *PLC Network Address* (if applicable) and *HMI communications port*. Click **Enter** to go back to prior dialog box.

✉ *If you are using the OIT's internal clock and don't wish to write to any PLC address, leave the **Memory Area** checkbox unchecked.*

5. Select *Time*, *Week*, or *Date* to determine the type of clock data to be displayed.
6. In the **Frame:** box, use the pull-down box to select the *type of frame* that surrounds the clock data.
7. In the **Font:** box, use the pull-down box to select the *font size* of the clock display.
8. In the **Alignment:** box, select *Right*, *Left*, or *Middle* alignment.
9. Use the **Style** box to select the *format* you want to use when displaying the time or the date.

Type	Style	Description
Time	HHMMSS	24hr format (hr, min, sec)
	HHMM	24hr format (hr,min)
	HHMMSSa	12hr format (hr, min, sec, a/p)
	HHMMa	12hr format (hr, min, a/p)
Week	MON - SUN	day of week
Date	YYYY/MM/DD	year, mon, day
	MM/DD/YYYY	mon, day, year
	DD/MM/YYYY	day, mon, year
	MM/DD/YY	mon, day, yr
	DD/MM/YY	day, mon, yr

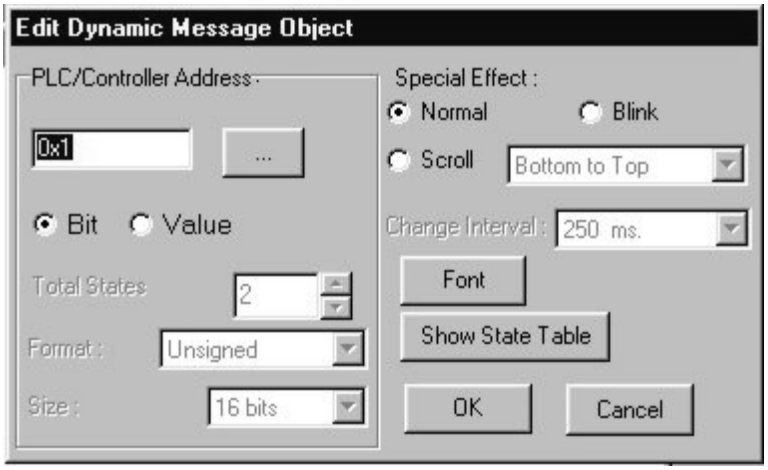
10. Click **OK**. The Clock Display Object is displayed on the main screen of BlueLeaf with the appropriate format displayed. If necessary, use the mouse to drag the part to the location on the window that you want it. You can also resize the clock display object by moving the mouse cursor over any of the small white boxes around the perimeter of the object. The mouse cursor will change to a double-arrow. Then click on the box and drag the box to change size.

The Dynamic Messages Object

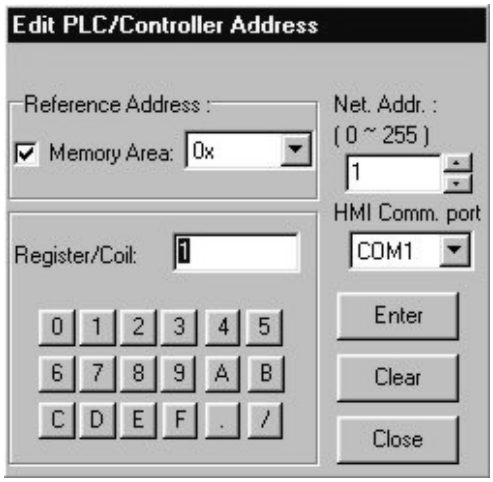
The Dynamic Messages Object is used to display predefined text messages depending upon the value read from a PLC register or coil. This feature can be used to display alarm messages or other information to the plant floor operator.

▶ To create a Dynamic Messages Object 

1. From the OBJECTS menu, click **Dynamic Messages**. Or click the **Dynamic Messages** icon in the Objects toolbar. The mouse cursor changes to a crosshair. Select the location on the screen to place the Dynamic Message and left click the mouse to place a Dynamic Message object on the screen. Move the mouse cursor over the Dynamic Message object and double-click the Dynamic Message object. The Edit Dynamic Message Object dialog box appears.



2. Check **Bit** to select a PLC coil. Check **Value** to select a PLC register.
3. In the **PLC/Controller Address** frame, enter the PLC coil or register address. Or click the PLC/Controller Address button  to display the Edit PLC/Controller Address dialog box:

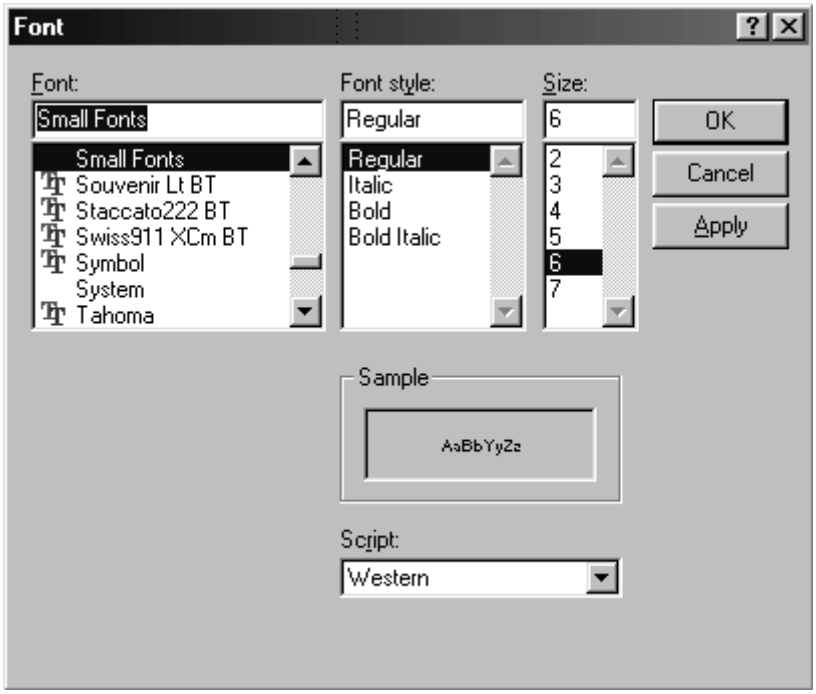


4. Check the **Memory Area** box. Click the pull-down box to select the *target PLC memory area.* Use the numeric keypad to enter the specific *PLC memory address*. Select the *PLC Network Address* (if applicable) and *HMI communications port*. Click **Enter** to go back to prior dialog box.
5. If **Value** is selected, enter the *Total States* by using the scroll buttons. The **Total States** parameter determines the number of messages that can be created and displayed. Up to 255 states can be displayed.

6. **For Value Only-** In the **Format** box, select the type of *PLC register* to be read from: Unsigned, Signed, Hexadecimal, and BCD.
7. **For Value Only-** The **Size** box determines if a 16 or 32 bit register is to be read.
8. Select the type of *special effects* used to display the dynamic message in the **Special Effect:** frame:

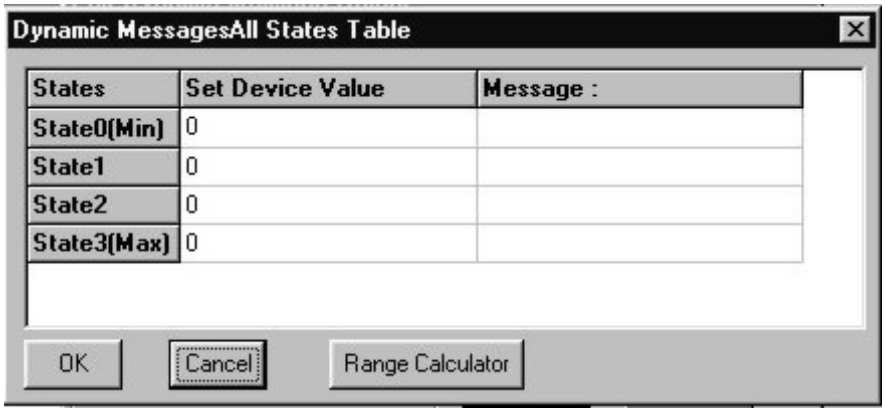
Special Effect	Description
Normal	the message is displayed with no special effects.
Blink	the entire message blinks on and off (regardless of state every 2 sec)
Scroll	the entire message will scroll across the area set aside for the dynamic message according to four settings: Bottom to top, Top to bottom, Right to left, and Left to right. The **Change Interval** setting determines the scroll rate.

9. Click the **Font** button to display the Font dialog box:

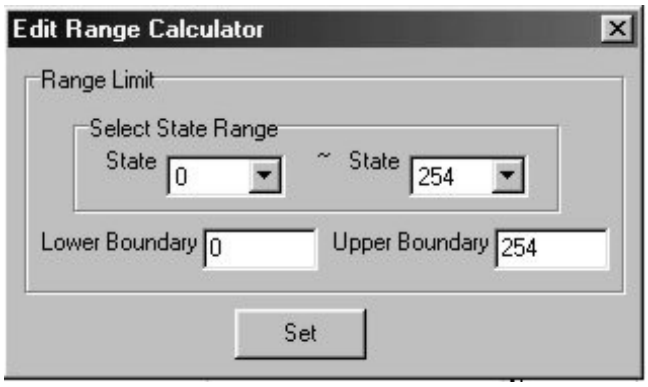


10. Select the *font*, *style* and *font size*. Click **OK** to go back to the prior dialog box.

11. Click the **Show State Table** button to display the Dynamic Messages States Table dialog box:



12. For each State, enter the *Range Limit* that determines if that state's text message is to be displayed. The range limit number entered must be larger than the prior state and smaller than each successive state, as shown in the example above. You can also click the **Range Calculator** button to display the Range Calculator:



13. The Range Calculator is a tool to help you easily determine the ranges. By setting the *minimum value* to be represented (lower boundary) and *maximum value* to be represented (upper boundary), the calculator will evenly divide the range for each state. Click the **Set** button to go back to the prior dialog box.
14. In the **Message:** box, you can enter the *text* that is displayed when the state is valid. The length of the text string is limited to the size and type of font you have selected and the width of the OIT screen. For example, for font MS Serif 6, a maximum of 32 characters can be used.
15. Click **OK** to go back to the Edit Dynamic Message Object dialog box.
16. Click **OK**. The Dynamic Message Object is displayed on the main screen of BlueLeaf with the appropriate format displayed. If necessary, use the mouse to drag the part to the location on the window that you want it. You can also resize the dynamic message by moving the mouse cursor over any of the small white boxes around the perimeter of the object. The mouse cursor will change to a double-arrow. Then click on the box and drag the box to change size.

Chapter 8 - Entering/Displaying Numeric and ASCII Characters

The BlueLeaf software includes two objects that are used to represent numeric or ASCII character data that is stored in the PLC. The data represented can be single bit coils, 16-bit or 32-bit registers. The data can be displayed as numbers or ASCII characters. This chapter focuses on the Numeric/ASCII Display object and the Numeric Input object.

Representing PLC Data Registers

PLC registers are represented using two objects:

- Numeric/ASCII Display object
- Numeric Input object

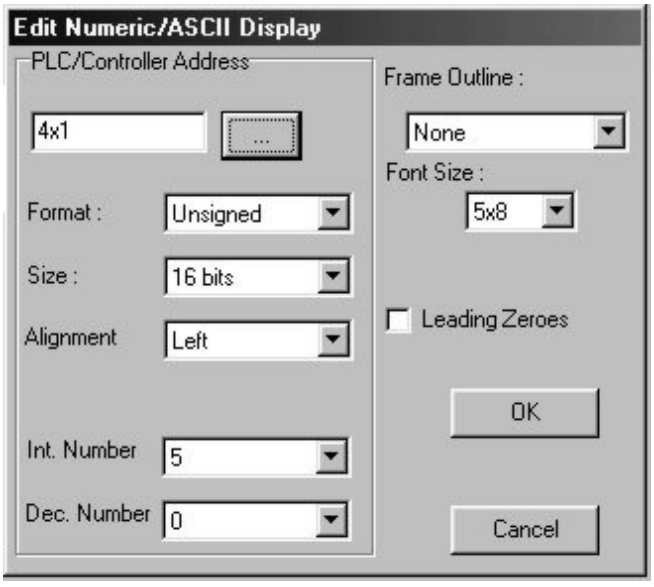
They are constructed in much the same manner as objects described in the previous section. With these objects, however, you can represent data from 16-bit or 32-bit PLC registers.

The Numeric/ASCII Display Object

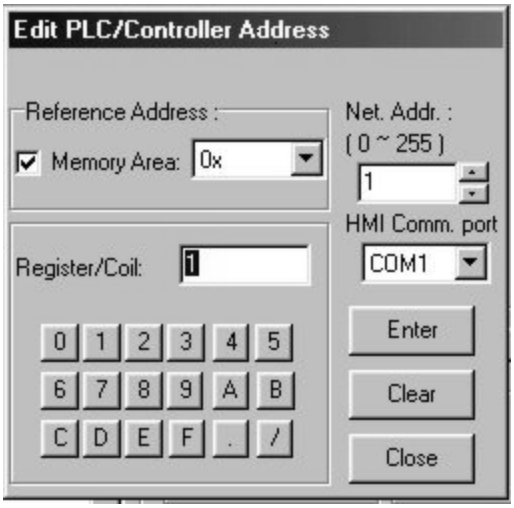
The Numeric/ASCII Display Object is used to display the numeric value of a PLC register, or to represent each 16-bit register in the PLC, as two printable ASCII characters. The object continuously reads the PLC register and displays the corresponding numeric data in the format specified. The PLC register can be a 16-bit or 32-bit word.

To create a Numeric/ASCII Display object 

1. From the OBJECTS menu, click **Numeric/ASCII Display,** or click the **Numeric/ASCII Display** icon in the Objects toolbar. The mouse cursor changes to a crosshair. Select the location on the screen to place the Numeric/ASCII Display and left click the mouse to place a Numeric/ASCII Display object on the screen. Move the mouse cursor over the Numeric/ASCII Display object and double-click the Numeric/ASCII Display object. The Edit Numeric/ASCII Display Object dialog box appears.



2. In the **PLC/Controller Address** frame, enter the *PLC coil* or *controller address*. Or click the PLC/Controller Address button to display the Edit PLC/Controller Address dialog box:



3. Check the **Memory Area** box. Click the pull-down box to select the *target PLC memory area*. Use the numeric keypad to enter the specific *PLC memory address*. Select the *PLC Network Address* (if applicable) and *HMI communications port*. Click **Enter** to go back to prior dialog box.
4. In the **Format** attribute box, select the *format type* you wish to use. The options are:

Format	Range	Size (Bits)	Description
Unsigned	0 to 65535	16	unsigned 16 bit format
	0 to 4294967295	32	unsigned 32 bit format
Signed	-32768 to +32767	16	signed 16 bit format
	-2147483648 to +2147483647	32	signed 32 bit format
Hexadecimal	0000 to FFFF	16	hexadecimal 16 bit format
	00000000 to FFFFFFFF	32	hexadecimal 32 bit format
BCD	0000 to 9999	16	BCD 16 bit format
	00000000 to 99999999	32	BCD 32 bit format
ASCII	Printable characters	16	2 ASCII characters
	Printable characters	32	4 ASCII characters
Binary	00... to 11... (16 bits)	16 only	binary 16 bit format

5. In the **Size** attribute box, select either *16 bits* or *32 bits*.
6. In the **Alignment** attribute box, select how you wish to *align* the data that is displayed: left justification, right justification, or centered.
7. The **Int. Number** and **Dec. Number** attribute boxes are used to specify the number of digits you want displayed before/after a decimal point. For example, if you are monitoring a 16-bit PLC register (+220) using signed format and have Int.Number =2 and Dec.Number =1, then the BLU300 displays this number as +22.0.

If the value in the PLC register requires more digits than you have allocated with the Int. Number and Dec. Number, the HMI will only display the specified digits. For example, if the value in the PLC register is +17,220 and Int.Number = 2 and Dec. Number = 1, then the HMI will display +22.0 giving no indication that the actual value in the PLC register is larger. Therefore, it is the responsibility of the HMI programmer to ensure the HMI settings are correct for the PLC range to be used.

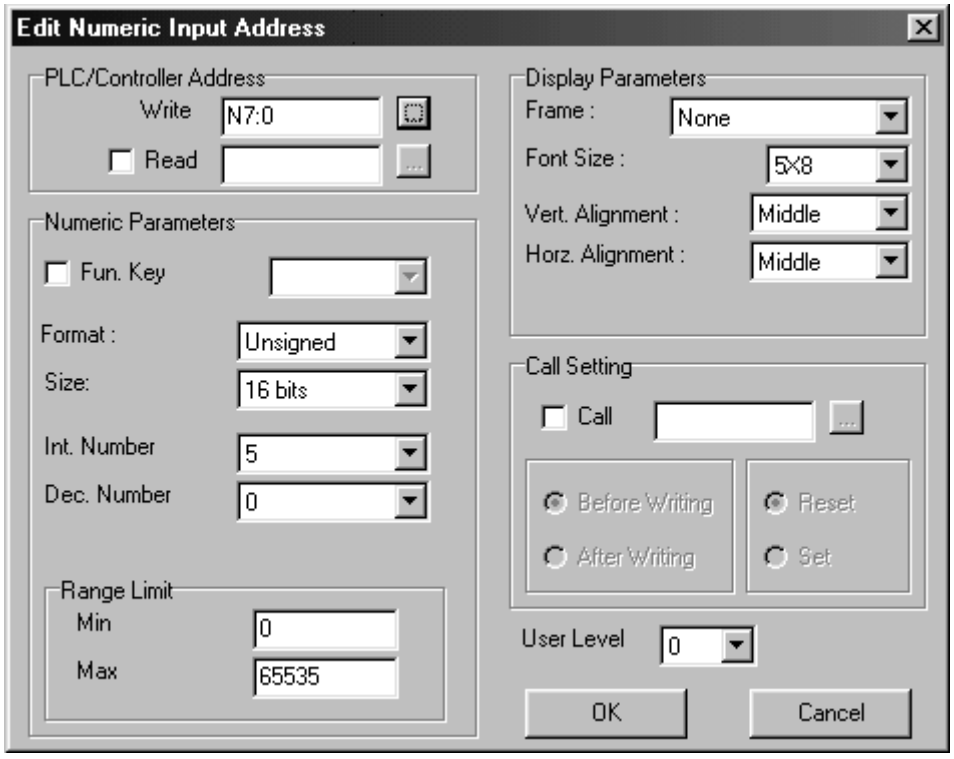
8. The **Frame Outline** attribute box allows you to enclose the data in a box. Select from- None, Single, Double, Thick, Dot, or Dotted Line.
9. The **Font Size** can be 5x8 (width/height), 8x8, 8x12, or 8x16 pixels for each character.
10. Check **Leading Zeroes** to display the number with 'padded' zeroes to the left of the number in cases where the number displayed is smaller than the number of digits allocated.
11. Click **OK**. The Numeric/ASCII Display Object is displayed on the main screen of BlueLeaf as a numeric value of 0. Multiple 0's will be displayed if the Leading Zeroes option is checked. If the Type selected is Signed, than a $ symbol is displayed to indicate the '+/-' sign. If necessary, use the mouse to drag the object to the location on the window that you want it. You can also highlight the object to display the small white perimeter boxes and adjust the size. Move the mouse cursor over the appropriate white box until the mouse cursor changes to a double-arrow symbol, then click and drag to change the size.

The Numeric Input Object

The Numeric Input Object is used to read and write numeric values to a PLC register. The object continuously reads the PLC register and displays the corresponding value in the specified format . The PLC register can be a 16-bit or 32-bit word. By assigning a function key that displays an entry screen, the OIT operator can enter a new value using the arrow keys and/or the function keys as a numeric entry keypad. The minimum/maximum values can be set and a password can be assigned to restrict access. You can also use the Call Setting feature to set or clear a PLC coil before or after a new value is written to the PLC register.

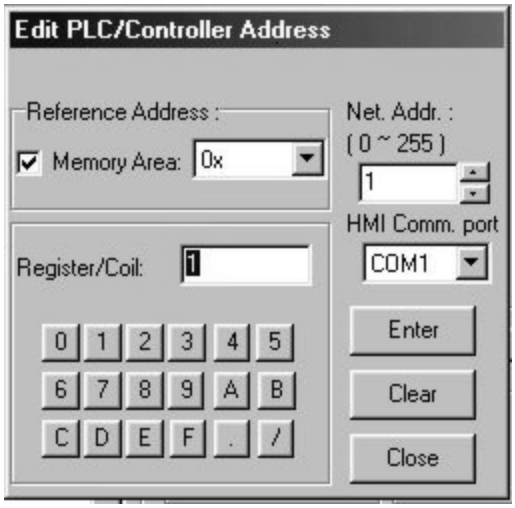
To create a Numeric Input Object 

1. From the OBJECTS menu, click **Numeric Input,** or click the **Numeric Input** icon in the Objects toolbar. The mouse cursor changes to a crosshair. Select the location on the screen to place the Numeric Input and left click the mouse to place a Numeric Input object on the screen. Move the mouse cursor over the Numeric Input object and double-click the Numeric Input object. The Edit Numeric Input Address dialog box appears.



2. In the **PLC/Controller Address** frame, enter the *PLC* or *controller address* you wish to access in the

Write attribute box, or click the PLC/Controller Address button ... to display the Edit PLC/Controller Address dialog box:



3. Check the **Memory Area** box. Click the pull-down box to select the *target PLC memory area*. Use the numeric keypad to enter the specific *PLC memory address*. Select the *PLC Network Address* (if applicable) and *HMI communications port*. Click **Enter** to go back to prior dialog box.
4. If you wish to read the contents of a different PLC register address, then check the **Read** checkbox and enter the PLC address you wish to display. Or click on the PLC/Controller Address button ... to display the Edit PLC/Controller Address dialog box. The BLU300 will then read and display the contents of this register, but will still allow you to use a function key to display an entry screen that allows you to write to the address listed in the **Write** attribute box.

✉ *If you wish to read the same PLC register as that to which you are writing, then leave the **Read** checkbox unchecked. It is not necessary to select the same address for the **Read** attribute, the BLU300 will automatically assume that you wish to read the PLC register that is entered into the **Write** attribute box.*

5. To initiate the process of writing a new value, you must assign a function key to the Numeric Input object. Check the **Fun. Key** attribute box, then select a *function key* from the drop-down list box.

✉ *If you attempt to select a function key that has already been assigned to another Numeric Input object on the same screen or a function key that has been assigned using the Local Function Key Editor, an error message will be displayed notifying you that the key is currently being used.*

6. In the **Format** attribute box, select the *format type* you wish to use. The options are:

Format	Range	Size (Bits)	Description
Unsigned	0 to 65535	16	unsigned 16 bit format
	0 to 4294967295	32	unsigned 32 bit format
Signed	-32768 to +32767	16	signed 16 bit format
	-2147483648 to +2147483647	32	signed 32 bit format
Hexadecimal	0000 to FFFF	16	hexadecimal 16 bit format
	00000000 to FFFFFFFF	32	hexadecimal 32 bit format
BCD	0000 to 9999	16	BCD 16 bit format
	00000000 to 99999999	32	BCD 32 bit format

7. In the **Size** attribute box, select either *16 bits* or *32 bits*.
8. The **Int. Number** and **Dec. Number** attribute boxes are used to specify the number of digits you want displayed before/after a decimal point. For example, if you are writing to a 16-bit PLC register using unsigned format and have Int.Number =3 and Dec.Number =2, then the BLU300 will allow you to write a five digit number with the three leftmost digits placed to the left of a decimal point and the two rightmost digits placed to the right of the decimal point.

✉ *If the value read in the PLC register requires more digits than you have allocated with the Int. Number and Dec. Number, the HMI will display only the specified digits. For example, if the value in the PLC register is +17,220 and Int.Number = 2 and Dec. Number = 1, then the HMI will display +22.0 giving no indication that the actual value in the PLC register is larger. Therefore, it is the responsibility of the HMI programmer to ensure the HMI settings are correct for the PLC range to be used.*

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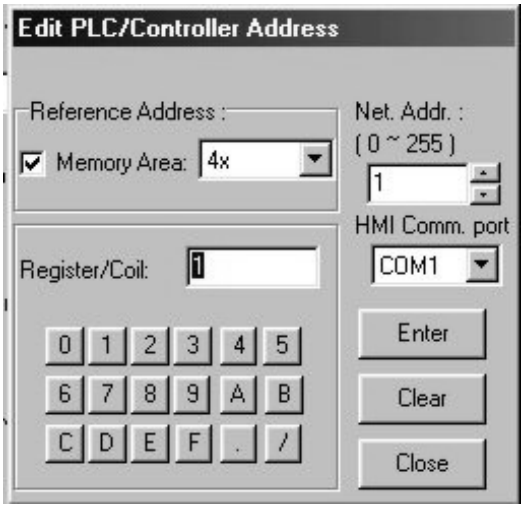
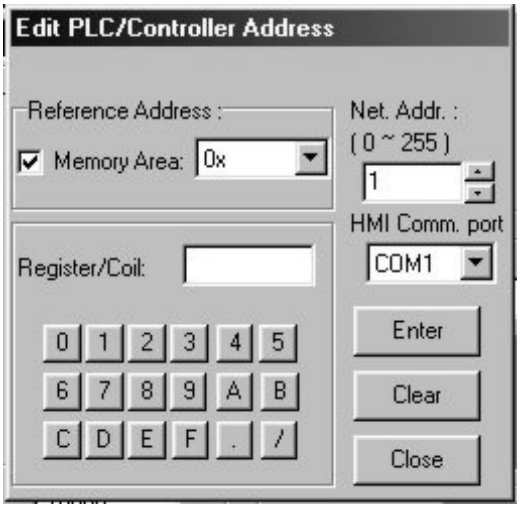
9. **Range Limit**: the **Min** attribute box allows you to set the minimum value that can be entered by OIT operator. The **Max** attribute specifies the maximum value.
10. The **Frame** attribute box allows you to enclose the data in a box. Select from- None, Single, Double, Thick, Dot, or Dotted Line.
11. The **Font Size** can be 5x8 (width/height), 8x8, 8x12, or 8x16 pixels for each character.
12. In the **Vert**. **Alignment** attribute box, select how you wish to vertically align the data that is displayed: top justification, bottom justification, or centered.
13. In the **Horz**. **Alignment** attribute box, select how you wish to horizontally align the data that is displayed: left justification, right justification, or centered.
14. **Call Setting Feature:** this feature is used to set or clear a PLC coil either before writing the new value to the PLC register or immediately after writing the new value. It provides an easy means of notifying the PLC that a change has been made to the value in the PLC register. To use this feature, check the **Call** checkbox. Enter the *PLC coil address* by clicking the **PLC/Controller Address** button to display the Edit PLC/Controller Address dialog box:



15. Check the **Memory Area** box. Click the pull-down box to select the *target PLC memory area*. Use the

numeric keypad to enter the specific *PLC memory address*. Select the *PLC Network Address* (if applicable) and *HMI communications port*. Click **Enter** to go back to prior dialog box.



16. Select either **Before Writing** or **After Writing**. This determines whether the coil is written to before the new value is written to the PLC register or immediately after when the Enter key is pressed. Select either **Reset**(0) or **Set**(1) to determine which value is written to the PLC coil.
17. Select the *User Level* you wish to assign to the Numeric Input object. If User Level 0 is selected (the default setting), the numeric entry screen will be immediately displayed on the HMI when the assigned function key is pressed. If User Level 1-4 is selected, the OIT displays a password entry screen that requires the OIT operator to enter a six digit password before access to the numeric entry screen is granted.
18. Click **OK**. The Numeric Input Object is displayed on the main screen of BlueLeaf as a series of pound '#' signs to represent the numeric value. If the Type selected is Signed, then a $ symbol is displayed to indicate the '+/-' sign. If necessary, use the mouse to drag the object to the location on the window that you want it. You can also highlight the object to display the small white perimeter boxes and adjust the size. Simply move the mouse cursor over the appropriate white box until the mouse cursor changes to a double-arrow symbol, then click and drag to change the size.

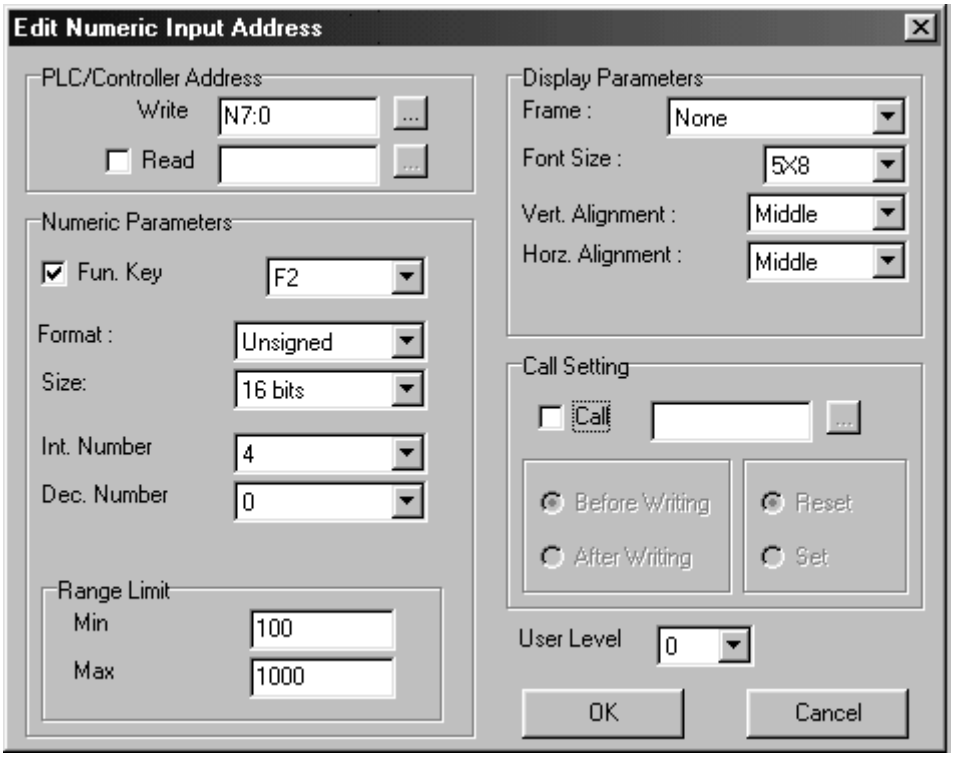
Displaying and Using the Numeric Entry Screen

Now that you know how to create a Numeric Input object, let's go through an example that shows how the OIT operator can enter a new value into a PLC register using the BLU300. For this example, you will create a simple startup screen for the BLU300 that has a text object and a Numeric Input object. You will assign Function Key F2 to the Numeric Input object so that when F2 is pressed, the Numeric Entry screen is displayed. You will also configure a minimum and maximum range value to show this feature.

The screen you create should look like the following when finished:

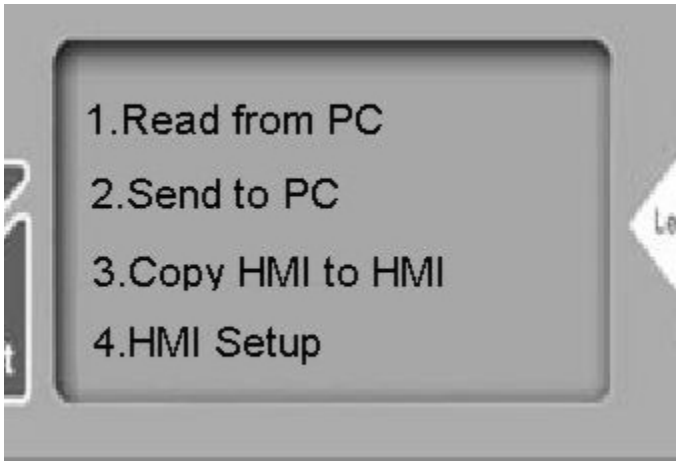
To create a sample numeric entry screen

1. Start a new project file, with the PLC driver of your choice. The initial screen (Screen 0) is displayed in the work area of BlueLeaf.
2. Click **Object…Numeric Input**. Move the mouse cursor to a location similar to what is shown above and left click- a Numeric Input object appears. Double-click on the Numeric Input object and enter values as shown below:

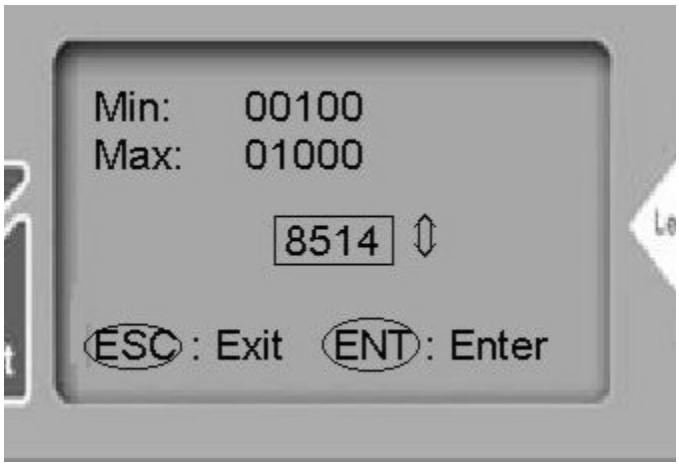


3. Click **OK**. Click **Draw…Text**. Move the mouse cursor to the left of the Numeric Input object and left click- a text object appears. Double-click on the text object and enter **Speed:** into the text box. Click **OK.**
4. Click on the small white boxes around the perimeter of the text object to resize as necessary.
5. Click **Tools…HMI-PLC Comm.Settings** to set the communications parameters to match your PLC. Click Set HMI-PLC Port to select RS-232 or RS-485 connection.
6. Click **File…Save**. Click **OK** when save is finished. Click **Tool…Compile**. Click **OK** when compiling is finished.
7. Click **Tools…Write Project to BLU300**.

8. On the BLU300, power up the OIT and hold down the ESC key during power-up. The BLU300 will eventually beep and display the following setup screen:



9. Press the **F1** key to move the block cursor to `1. Read from PC`, and then press the ENTER key on the BLU300. The BLU300 will display a screen indicating that it is waiting for communications to be established with the BlueLeaf software.
10. Click **Yes** on the Confirm dialog box in BlueLeaf to commence the download process. After the project transmission is complete, a new dialog box is displayed. Click **OK** to complete the download. On the BLU300 OIT, you should see a new screen that indicates the download process is finished. Press the ESC key to exit the download screen and display the Setup screen again.
11. Press the **F5** key to move the block cursor on the BLU300 OIT to `5.EXIT & RUN`, then press the ENTER key after you have connected your PLC to the BLU300. The startup screen listed above should appear.
12. Press the **F2** key to initiate the Numeric Entry process. The Numeric Entry screen should appear on the BLU300:



13. The Numeric Entry screen displays the minimum and maximum allowed values at the top of the screen (in this example- Min:100 Max:1000). In the center of the screen, the current value of the PLC register is displayed (note: if you checked the Read checkbox during configuration of the Numeric Input object, then the HMI will show the latest value of the Read register).
14. To enter a new number into the Numeric Entry screen, you must highlight each digit of the number using the blinking block cursor. Once selected, each digit can be changed one of two ways: 1) by pressing the UP/DOWN keys of the BLU300 or 2) by pressing one of the function keys (F1-F5). After you have changed the digit to the appropriate number, press the RIGHT/LEFT keys of the BLU300 to advance to the next digit.

The function keys F1-F5 have two numbers associated with each key:

Key	No Shift Key	Shift Key
F1	1	6
F2	2	7
F3	3	8
F4	4	9
F5	5	0

15. Press the function key associated with the number you wish to use. For Shift Key numbers (6-0), simply press the SHIFT key until the inverse video character ‘S’ appears on the BLU300 screen, then press the function key.
16. When you have finished, press the ENTER key. If the number entered is Out Of Range, an error message is briefly displayed on the OIT. If the number is within range, it is immediately written to the PLC register, the Numeric Entry screen closes, and the prior screen is displayed. To cancel this operation, press the ESC key.

Chapter 9 - Using The Function Keys

The Blue Series has membrane-style keypads that can be configured to act as momentary switches, push-on/off keys, display screens or used to enter numeric data or ASCII characters into PLC registers. This chapter shows how to configure the Function Keys. There are three objects in BlueLeaf software that can configure the function keys: the Button Object, the Local Function Key Editor, and the Global Function Key Editor.

The Button Object

The Button Object is used to place an object on the screen that can be controlled by a function key. Use the button object when you wish to have visual feedback that the function key has been 'activated' when pressed.

Using the Button Object

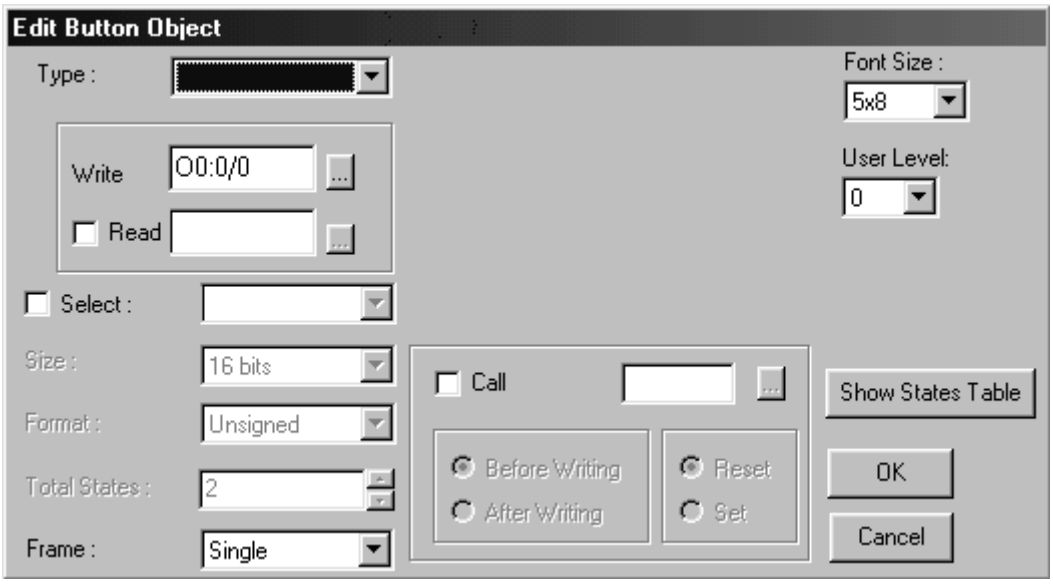
The Button Object configures a function key to do the following:

- Force On or Force Off a bit in the PLC
- Reset On or Off a bit in the PLC
- Configure a Function key to behave as a momentary switch
- Configure a Function key to behave as a push on/off switch
- Configure a multi-state function key
- Create the ability to edit a numeric register or place a constant value into a PLC register
- Act as an increment or decrement (Jog) key
- Display a new screen
- Enter a password

To create a Button Object 

1. From the OBJECTS menu, click **Function Key,** or click the **Function Key** icon in the Objects toolbar. Move the mouse cursor over the screen work area. The mouse cursor should appear as a cross-hair. Click once to place a button object onto the screen.

2. Move the mouse cursor over the button object. The cross-hair cursor changes to a single arrow. Double-click on the button object to display the Edit Button Object dialog box.



3. In the **Type:** frame, select how you want the Button object to operate:

Function	Option	Description
Force On		Sets the target PLC coil when pressed.
Force Off		Clears the target PLC coil when pressed.
Pulse On		Sets the target PLC coil when pressed. For most PLC communications drivers, the Pulse On performs the same function as the Force On (see the PLC driver's Controller Information Sheet for variances).
Pulse Off		Clears the target PLC coil when pressed. Same as Force Off except for some PLC drivers.
Momentary		Sets the target PLC coil when key is pressed. Clears the PLC coil when the key is released.
Push On/Off		Alternates setting and clearing the PLC coil when pressed.
Multi-State	Bit	Same as Push On/Off except that you can assign a password level.
	Value	In this configuration, the function key will set values in a PLC register according to the number of times pressed, (ie. pressed once clears the register, twice will set the value in the register to 1, pressed three times= 2, etc.) Note: the function key must be pressed in rapid succession
	LSB	Similar to the Multi-State Value setting described above, the function key will set *bits* in a PLC register according to the number of times pressed, (ie. pressed once sets the least significant bit- bit 0, twice will set the second least significant bit- bit 1, pressed three times- bit 2, etc.) Note: the function key must be pressed in rapid succession. All other bits will be cleared. Options: Change To Next State, Previous State (not used at this time) Total States: range is 1 to 16
Input Value		When pressed, the keypad editor is displayed on the BLU300 screen, allowing the operator to change a value in the targeted PLC register.
Set Constant		Set a constant value in the targeted PLC register when the function key is pressed.
Jog + (Increase)		Increases the value in the targeted PLC register by the Step Value, whenever pressed.
Jog – (Decrease)		Decreases the value in the targeted PLC register by the Step Value, whenever pressed.
Screen Jump		Changes to the specified screen, whenever function key is pressed. Note: function keys are screen-dependent.
Password		Displays the password setting table, allowing the ability to change the ten passwords.

4. In the **Write** address frame, select the *PLC coil* or *register address* that will be written to whenever the function key is pressed.

5. In the **Read** address frame, select the *PLC coil* or *register address* that the HMI reads to determine which state is displayed. Note: if this feature is not checked, then the object will display the state depending upon the value of the PLC coil or register used in the Write address frame; however, this does not mean that the object will continuously read the value of this address to determine the current state. If you wish to do this, you must check the Read address frame and select the same PLC coil or register as is used in the Write address frame.
6. Click the **Select**: checkbox, then select which *function key* (F1 thru F10) will be assigned to the button object. Note: only one button object can be created per function key assignment. If you use the Local Function Key Editor to configure a function key, then a button object cannot be created for that key.
7. Configure each parameter for the particular type you are using (for more details consult the *Function Key Type* section later in this chapter).
8. Click the **Frame:** pulldown box to select the type of *frame* that should appear around the object.
9. Click the **Font Size:** pulldown box to select the *size* of the text that will appear if you configure labels (see the Show States Table button) for each state.
10. Click the **User Level:** to assign a *security level* for the object. If any security level is assigned other than the default setting of 0, then the function key will display a password screen that requires the operator to enter a (see Tools…User Level/Password Set menu) six-digit password before the predefined action is performed.
11. Each function key can be configured to perform a secondary action known as the **Call Function**. The **Call** function allows the function key to set or reset a PLC coil, *in addition to the primary function that was assigned to it*. For example, you can configure Function Key #1 to enter a value into a PLC register whenever it is pressed by setting the **Type**: parameter to **Input Value**. By using the **Call** function, you can also have the key set or clear a PLC coil *before or after* a new value is entered into the PLC register.

The Function Key Editors

There are two Function Key Editors, the Local and Global editors. The Function Key Editor configures each function key without placing an object on the screen as is done with the Button Object. Use the button object (see above) when you wish to have visual feedback that the function key has been 'activated' when pressed. The Global Function Key Editor is used to configure how each function key behaves for every screen in which the Local Function Key Editor or Button Object have not been used for that particular function key.

Using the Global Function Key Editor

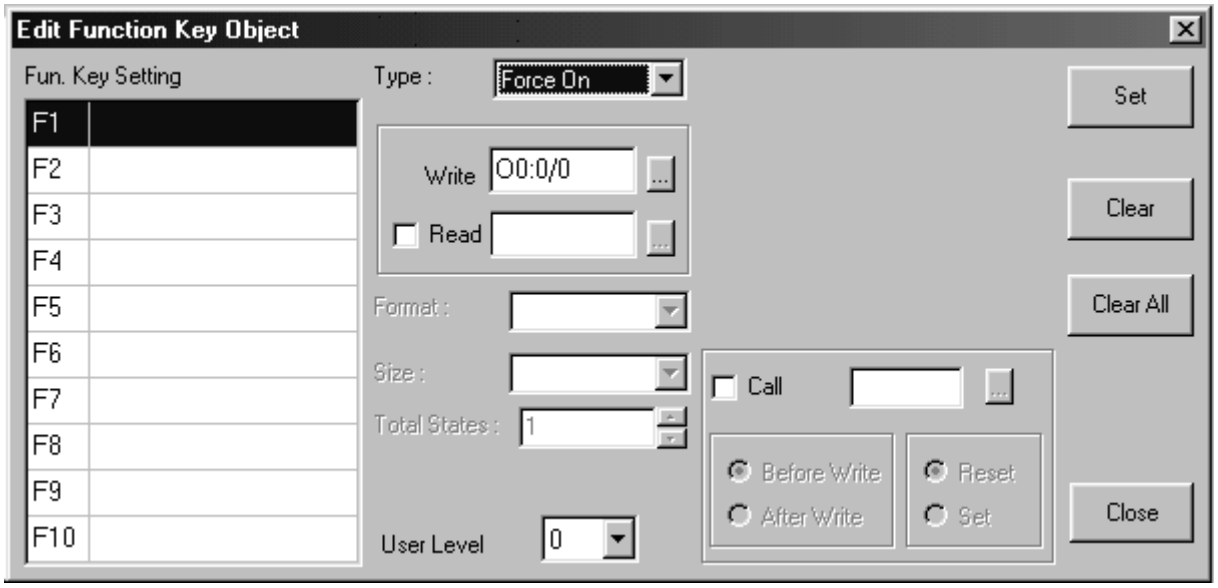
The Global Function Key Editor configures a function key to do the following:

- Force On or Force Off a bit in the PLC
- Reset On or Off a bit in the PLC
- Configure a Function key to behave as a momentary switch
- Configure a Function key to behave as a push on/off switch
- Configure a multi-state function key
- Create the ability to edit a numeric register or place a constant value into a PLC register
- Act as an increment or decrement (Jog) key
- Display a new screen
- Enter a password

The Global Function Key Editor is used to configure how each function key will behave, regardless of which screen is displayed; however, if a Button Object or a Local Function Key is configured for a particular screen, this setting will take precedence over the setting in the Global Function Key.

To create a Global Function Key

1. From the GLOBAL SETTINGS menu, click **Function Key Editor**. The Global Function Key Editor dialog box appears:



2. Click on the *function key* (F1 thru F10) that you wish to configure. Note: F6-F10 correspond to shift F1-F5 keys. Configure the parameters for the function key per type used. When finished, click the **Set** button, then define the next function key or click the **Close** button. Use the **Clear** button to clear a particular function key or the **Clear All** button to erase settings for all function keys.

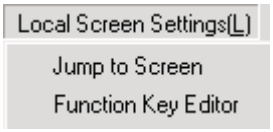
Using the Local Function Key Editor

As with the Global Function Key Editor, the Local Function Key Editor configures a function key to do the following:

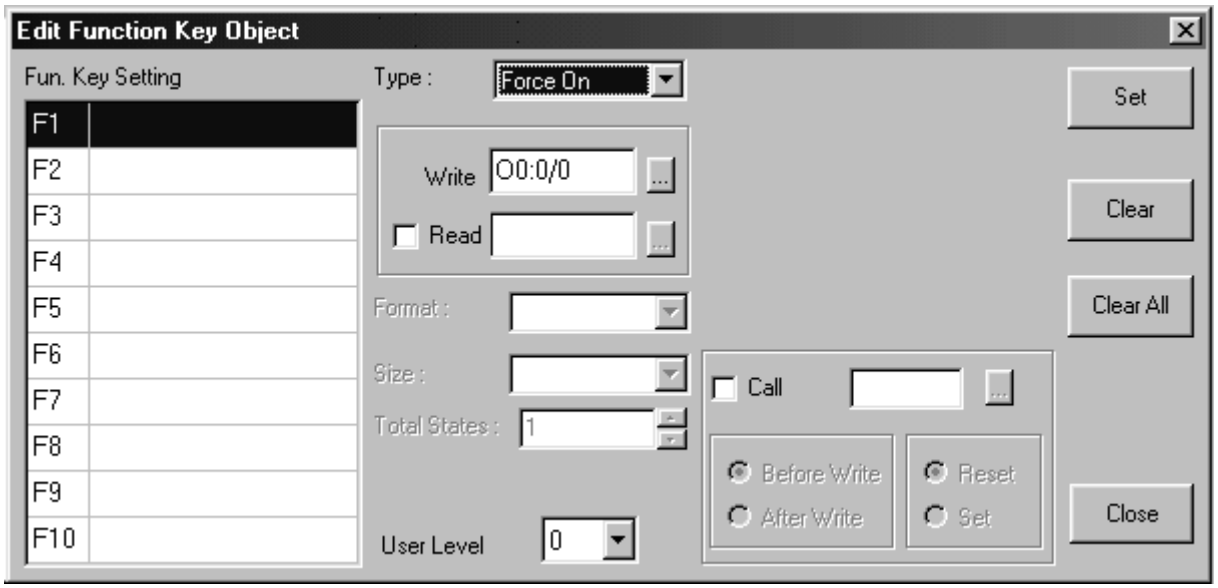
- Force On or Force Off a bit in the PLC
- Reset On or Off a bit in the PLC
- Configure a Function key to behave as a momentary switch
- Configure a Function key to behave as a push on/off switch
- Configure a multi-state function key
- Create the ability to edit a numeric register or place a constant value into a PLC register
- Act as an increment or decrement (Jog) key
- Display a new screen
- Enter a password

The Local Function Key Editor is used to configure how each function key will behave on a particular screen; however, if a Button Object or a Local Function Key is configured for a particular screen, this setting will take precedence over the setting in the Global Function Key. Note: You cannot configure a Button Object and a Local Function Key for the same key.

To create a Local Function Key



1. From the LOCAL SCREEN SETTINGS menu, click **Function Key Editor**. The Local Function Key Editor dialog box appears:

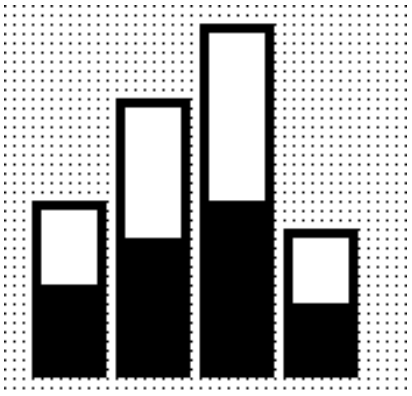


2. Click on the *Function Key* (F1 thru F10) that you wish to configure. Note: F6-F10 correspond to shift F1-F5 keys. Configure the parameters for the function key per type used. When finished, click the **Set** button, and then define the next function key or click the **Close** button. Use the **Clear** button to clear a particular function key or the **Clear All** button to erase settings for all function keys.

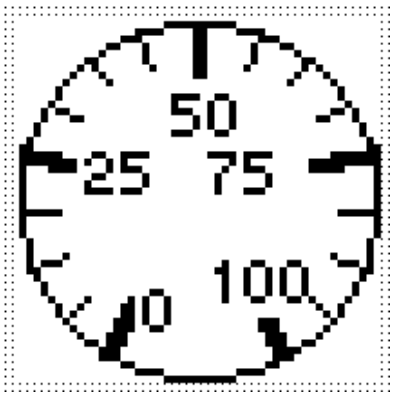
Chapter 10 - Bar Graphs and Meters

This chapter focuses on two special graphic objects that can be used to display PLC data registers. You read in Chapter 7 how to use text and bitmaps to represent the data in PLC registers as states. You also read in Chapter 8 how to use alphanumeric data fields to display the contents of PLC registers as either numbers or ASCII characters. We now introduce two more options to display the data in PLC registers:

Bar Graph Objects



Meter Display Objects



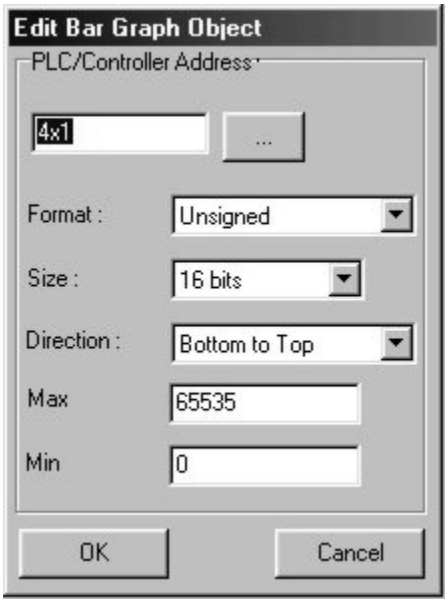
Creating Bar Graphs

The Bar Graph Object is used to represent the data in a 16-bit or 32-bit PLC register as a bar graph. Data in the PLC register can be interpreted as unsigned, signed, BCD, or hexadecimal. You can configure the bar graph to move up, down, right, or left. The bar graph can be configured with any base number that represents 0 level and any span range.

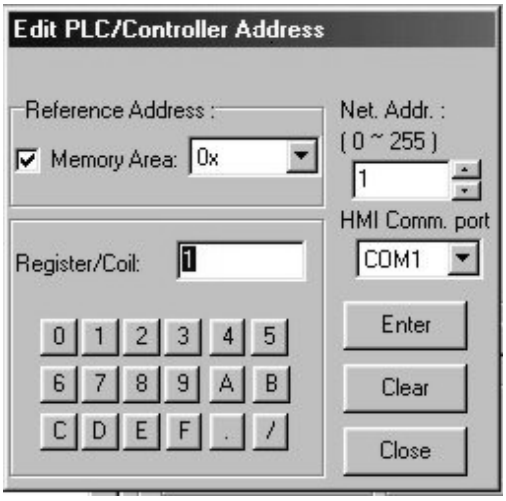
To create a Bar Graph Object 

1. From the OBJECTS menu, click **Bar Graph**, or click the **Bar Graph** icon in the Objects toolbar. The mouse cursor changes to a crosshair. Select the location on the screen to place the Bar

Graph and left click the mouse to place a Bar Graph object on the screen. Move the mouse cursor over the Bar Graph object and double-click the Bar Graph. The Edit Bar Graph Object dialog box appears:



2. In the **PLC/Controller Address** frame, enter the *PLC coil* or *controller address*. Or click the PLC/Controller Address button to display the Edit PLC/Controller Address dialog box:



3. Check the **Memory Area** box. Click the pull-down box to select the *target PLC memory area*. Use the numeric keypad to enter the specific *PLC memory address*. Select the *PLC Network Address* (if applicable) and *HMI communications port*. Click **Enter** to go back to prior dialog box.

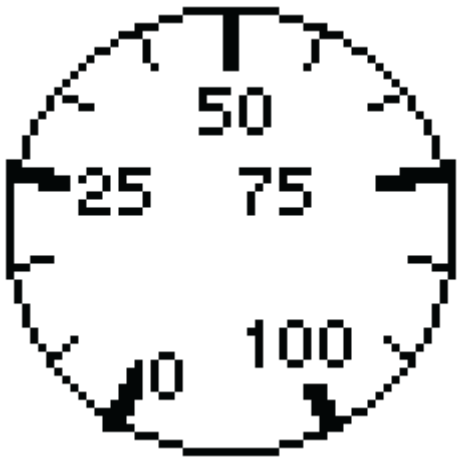
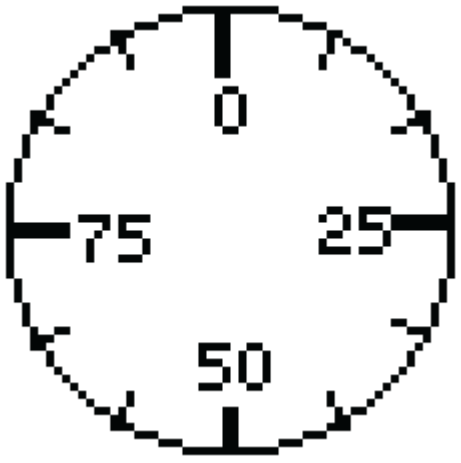
4. In the **Format** attribute box, select the format type you wish to use. The options are:

Format	Range	Size (Bits)	Description
Unsigned	0 to 65535	16	unsigned 16 bit format
	0 to 4294967295	32	unsigned 32 bit format
Signed	-32768 to +32767	16	signed 16 bit format
	-2147483648 to +2147483647	32	signed 32 bit format
Hexadecimal	0000 to FFFF	16	hexadecimal 16 bit format
	00000000 to FFFFFFFF	32	hexadecimal 32 bit format
BCD	0000 to 9999	16	BCD 16 bit format
	00000000 to 99999999	32	BCD 32 bit format

5. In the **Size** attribute box, select either *16* bits or *32* bits.
6. In the **Direction** attribute box, select how you wish to align the data that is displayed- Bottom to Top, Top to Bottom, Right to Left, and Left to Right.
7. The **Max** attribute specifies the *maximum value*, which causes the bar graph to be completely filled. The **Min** attribute box allows you to set the *minimum value,* which equates to an empty bar graph.
8. Click **OK**. The Bar Graph is displayed on the main screen of BlueLeaf. If necessary, use the mouse to drag the object to the location on the screen that you want it. You can also highlight the object to display the small white perimeter boxes and adjust the size. Simply move the mouse cursor over the appropriate white box until the mouse cursor changes to a double-arrow symbol, then click and drag to change the size.

Creating Analog Meters

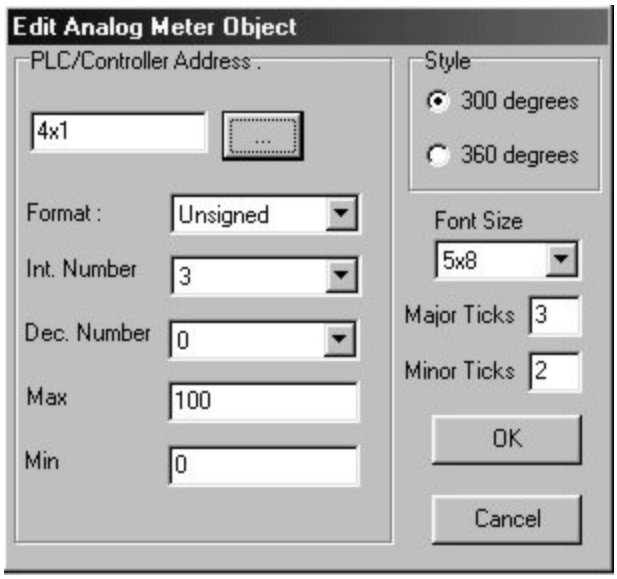
The Analog Meter Object is used to represent the data in a 16-bit PLC register as a scaled meter. You can configure the Display Meter in two styles:

300 degrees	360 degrees
	

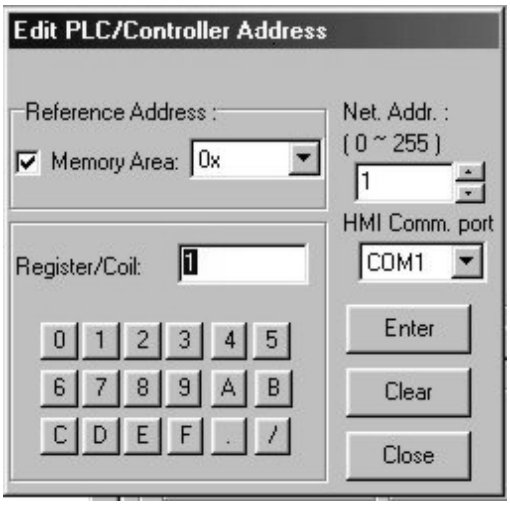
Data in the PLC register can be interpreted as unsigned, signed, BCD, or hexadecimal. You can select the minimum and maximum range displayed, then select the number of major delineations (tick marks) as well as minor delineations (minor tick marks).

To create an Analog Meter Object 

1. From the OBJECTS menu, click **Analog Meter**. Or click the **Analog Meter** icon in the Objects toolbar. The mouse cursor changes to a crosshair. Select the location on the screen to place the Analog Meter and left click the mouse to place an Analog Meter object on the screen. Move the mouse cursor over the Analog Meter object and double-click the Analog Meter. The Edit Analog Meter Object dialog box appears:



2. In the **PLC/Controller Address** frame, enter the *PLC coil* or *controller address*. Or click the PLC/Controller Address button ... to display the Edit PLC/Controller Address dialog box:



3. Check the **Memory Area** box. Click the pull-down box to select the *target PLC memory area*. Use the numeric keypad to enter the specific *PLC memory address*. Select the *PLC Network Address* (if applicable) and *HMI communications port*. Click **Enter t**o go back to prior dialog box.

4. In the **Format** attribute box, select the *format type* you wish to use. The options are:

Format	Range	Description
Unsigned	0 to 65535	unsigned 16 bit format
Signed	-32768 to +32767	signed 16 bit format
Hexadecimal	0000 to FFFF	hexadecimal 16 bit format
BCD	0000 to 9999	BCD 16 bit format

5. The **Int. Number** and **Dec. Number** attribute boxes are used to specify the number of digits you want displayed before/after a decimal point. For example, suppose you are monitoring a 16-bit PLC register using unsigned format with Min = 0 and Max =1000. The value in the PLC register is 500. If Int.Number =2 and Dec.Number =1, then the BLU300 displays this number as 50.0 (with the needle pointed halfway).
6. The **Max** attribute specifies the *maximum value* that causes the analog meter needle to point to at the maximum value. The **Min** attribute box allows you to set the *minimum value,* which causes the analog meter needle to point to the minimum value on the meter.
7. The **Style** determines whether the meter format if a *full circle* (360) or *semi-full circle* (330).
8. The **Font Size** for the scale numbers depicted on the meter can be 5x8 (width/height), 8x8, 8x12, or 8x16 pixels for each character.
9. The **Major Ticks** determines the major markers that show scaled numbers. The minimum required is 2.
10. The **Minor Ticks** determine the number of subdivisions between each major marker. The minimum number allowed is 0.
11. Click **OK**. The Analog Meter is displayed on the main screen of BlueLeaf. If necessary, use the mouse to drag the object to the location on the screen that you want it. You can also highlight the object to display the small white perimeter boxes and adjust the size. Simply move the mouse cursor over the appropriate white box until the mouse cursor changes to a double-arrow symbol, then click and drag to change the size.

Chapter 11 - Using Alarms

BlueLeaf includes two alarm features: the alarm LED and the alarm buzzer, which are used to indicate problems that may occur in the control system. Used in conjunction with the Dynamic Message object, the alarm feature can highlight alerts and display them on the OIT screen as warnings.

This chapter looks at how the BLU300 Series uses alarms.

Using Alarms

BlueLeaf has three parts that can be used to perform alarm functions: the Alarm LED editor, the Alarm Buzzer editor, and the Dynamic Message object. You can create an Alarm LED and Alarm Buzzer that will always be active (regardless of which screen is currently displayed on the OIT). You can also create local Alarm LEDs and Alarm Buzzers that will only activate if the screen that they are attached to is displayed. The Dynamic Message object can be used to display warning messages or provide instructions to the plant operator on how to respond to an alarm condition.

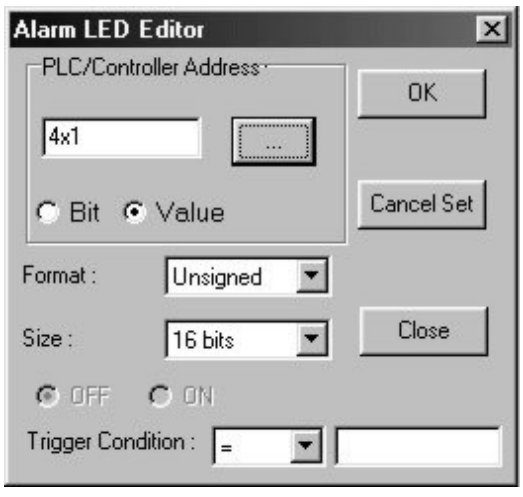
Monitoring Alarms with the Alarm LED Editor

The Alarm LED continuously monitors a defined PLC coil or PLC register to determine if an alarm condition has occurred. Once an alarm has occurred, the Alarm LED remains on until the condition no longer exists.

To use the Alarm LED Editor

1. There are two types of Alarm LED Editors: global and local. The Global Alarm LED Editor is used to configure an Alarm LED that will continuously monitor the assigned PLC coil or register regardless of which OIT screen is currently displayed. To use the global Alarm LED, select from the **Global Settings** menu, then click **Alarm LED Editor**.

   The Local Alarm LED Editor is used to configure an Alarm LED for a particular screen of the OIT. To use this feature, you must first edit the screen you wish to assign the alarm LED to, then select from the **Local Screen Settings** menu, then click **Alarm LED Editor**.
   When the Alarm LED Editor is selected, the Alarm LED Editor dialog box appears:



2. First select either **Bit** or **Value** to determine if the Alarm LED will read from a PLC coil or a PLC register (16 or 32 bit).

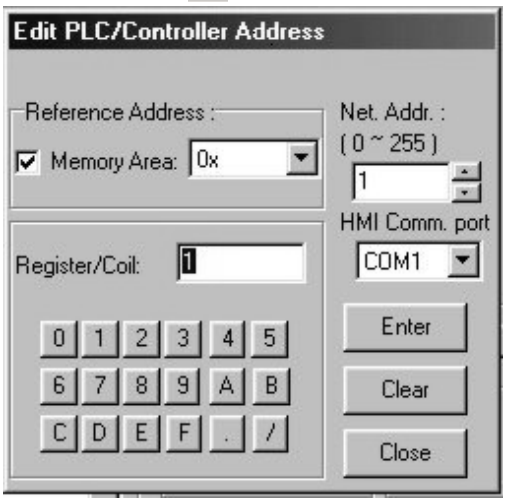
3. **For Value Only-** If reading from a PLC/controller register, use the **Format**: pull-down box to select the format that determines how the OIT reads the value in the PLC register. Select from:

Format	Range	Size (Bits)	Description
Unsigned	0 to 65535	16	unsigned 16 bit format
	0 to 4294967295	32	unsigned 32 bit format
Signed	-32768 to +32767	16	signed 16 bit format
	-2147483648 to +2147483647	32	signed 32 bit format
Hexadecimal	0000 to FFFF	16	hexadecimal 16 bit format
	00000000 to FFFFFFFF	32	hexadecimal 32 bit format
BCD	0000 to 9999	16	BCD 16 bit format
	00000000 to 99999999	32	BCD 32 bit format

4. **For Value Only-** In the **Size:** box, use the pull-down box to select *16 bit* or *32 bit* register.
5. **For Bit Only**- Select OFF if the Alarm LED is active when the PLC coil is off. Select ON if the Alarm LED is active when the PLC coil is on.
6. **For Value Only**- In the Trigger Condition box, use the pull-down box to select the mathematical expression that will be used to compare the entered constant value with the value read from the PLC register:

Trigger Condition	Description	Example
=	Equal condition	4x1 = 5: if value in register 4x1 is equal to 5, activate LED.
>	Greater than condition	4x1 > 5: if value in register 4x1 is greater than 5, activate LED.
<	Less than condition	4x1 < 5: if value in register 4x1 is smaller than 5, activate LED.
>=	Greater than or equal to	4x1 >= 5: if value in register 4x1 is greater than or equal to 5, activate LED
<=	Less than or equal to	4x1 <= 5: if value in register 4x1 is less than or equal to 5, activate LED
!=	Not equal	4x1 != 5: if value in register 4x1 is not 5, activate LED.

7. In the **PLC/Controller Address** frame, enter the PLC coil or register address. Or click the PLC/Controller Address button ... to display the Edit PLC/Controller Address dialog box:



8. Check the **Memory Area** box. Click the pull-down box to select the *target PLC memory area*. Use the numeric keypad to enter the specific *PLC memory address*. Select the *PLC Network Address* (if applicable) and *HMI communications port.* Click **Enter** to go back to prior dialog box.
9. Click **OK** to go back to the main screen of BlueLeaf. To delete an Alarm LED, click the **Cancel Set** button.

✉ *When using the Local Alarm LED and a Global Alarm LED, the Alarm LED will activate and remain active if either condition is true. If a Local Alarm LED is used, the Alarm LED will turn off if a new screen is displayed on the OIT, regardless of whether or not the Local Alarm condition is still true.*

Monitoring Alarms with the Alarm Buzzer Editor

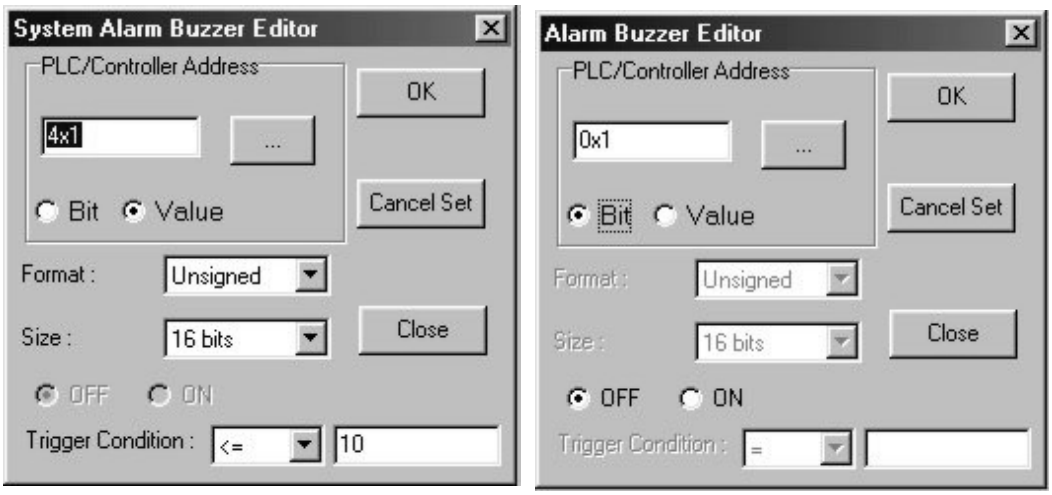
The Alarm Buzzer continuously monitors a defined PLC coil or PLC register to determine if an alarm condition has occurred. Once an alarm has occurred, the internal buzzer of the OIT remains on (pulsing on and off) until the condition no longer exists.

▶ To use the Alarm Buzzer Editor

1. There are two types of Alarm Buzzer Editors: global and local. The Global Alarm Buzzer Editor is used to configure an Alarm Buzzer that will continuously monitor the assigned PLC coil or register regardless of which OIT screen is currently displayed. To use the global Alarm Buzzer, select from the **Global Settings** menu, then click **Alarm Buzzer Editor**.

   The Local Alarm Buzzer Editor is used to configure an Alarm Buzzer for a particular screen of the OIT. To use this feature, you must first edit the screen you wish to assign the alarm Buzzer to, then select from the **Local Screen Settings** menu, then click **Alarm Buzzer Editor**.

   When the Alarm Buzzer Editor is selected, the Alarm Buzzer Editor dialog box appears:



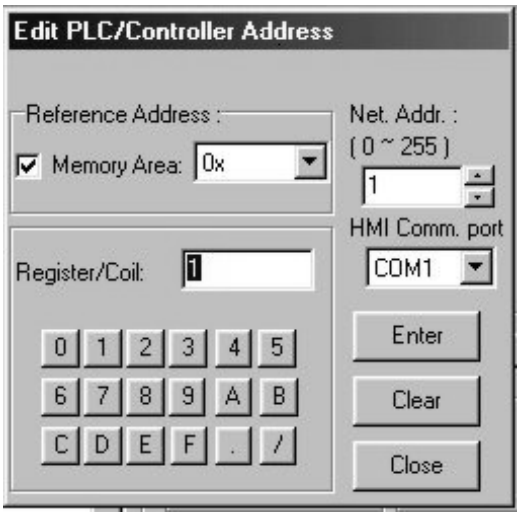
2. First select either **Bit** or **Value** to determine if the Alarm Buzzer will read from a PLC coil or a PLC register (16 or 32 bit).
3. **For Value Only-** If reading from a PLC/controller register, use the **Format**: pull-down box to select the format that determines how the OIT reads the value in the PLC register. Select from:

Format	Range	Size (Bits)	Description
Unsigned	0 to 65535	16	unsigned 16 bit format
	0 to 4294967295	32	unsigned 32 bit format
Signed	-32768 to +32767	16	signed 16 bit format
	-2147483648 to +2147483647	32	signed 32 bit format
Hexadecimal	0000 to FFFF	16	hexadecimal 16 bit format
	00000000 to FFFFFFFF	32	hexadecimal 32 bit format
BCD	0000 to 9999	16	BCD 16 bit format
	00000000 to 99999999	32	BCD 32 bit format

4. **For Value Only-** In the **Size:** box, use the pull-down box to select *16 bit* or *32 bit* register.
5. **For Bit Only**- Select *OFF* if the Alarm Buzzer is active when the PLC coil is off. Select *ON* if the Alarm Buzzer is active when the PLC coil is on.
6. **For Value Only**- In the Trigger Condition box, use the pull-down box to select the *mathematical expression* that will be used to compare the entered constant value with the value read from the PLC register:

Trigger Condition	Description	Example
=	Equal condition	4x1 = 5: if value in register 4x1 is equal to 5, activate LED.
>	Greater than condition	4x1 > 5: if value in register 4x1 is greater than 5, activate LED.
<	Less than condition	4x1 < 5: if value in register 4x1 is smaller than 5, activate LED.
>=	Greater than or equal to	4x1 >= 5: if value in register 4x1 is greater than or equal to 5, activate LED
<=	Less than or equal to	4x1 <= 5: if value in register 4x1 is less than or equal to 5, activate LED
!=	Not equal	4x1 != 5: if value in register 4x1 is not 5, activate LED.

7. In the **PLC/Controller Address** frame, enter the *PLC coil* or *register address*. Or click the PLC/Controller Address button to display the Edit PLC/Controller Address dialog box:



8. Check the **Memory Area** box. Click the pull-down box to select the *target PLC memory area.* Use the numeric keypad to enter the specific *PLC memory address*. Select the *PLC Network Address* (if applicable) and *HMI communications port*. Click **Enter** to go back to prior dialog box.
9. Click **OK** to go back to the main screen of BlueLeaf. To delete an Alarm Buzzer, click the **Cancel Set** button.

✉ *When using the Local Alarm Buzzer and a Global Alarm Buzzer, the Alarm Buzzer will activate and remain active if either condition is true. If a Local Alarm Buzzer is used, the Alarm Buzzer will turn off if a new screen is displayed on the OIT, regardless of whether or not the Local Alarm condition is still true.*

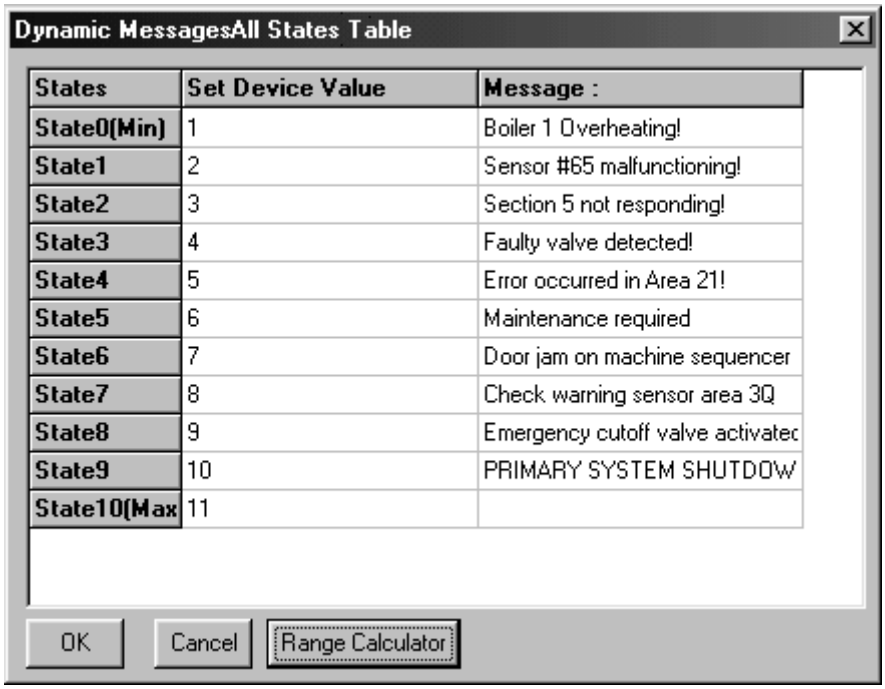
Displaying Alarms using the Dynamic Message Object

Though the Dynamic Message object can be used to display any messages, it is particularly useful for displaying warning messages and instructions that are tied to an alarm condition. Similar to the Alarm LED and Alarm Buzzer, you can construct a dynamic message object that changes messages according to a PLC coil or register value.

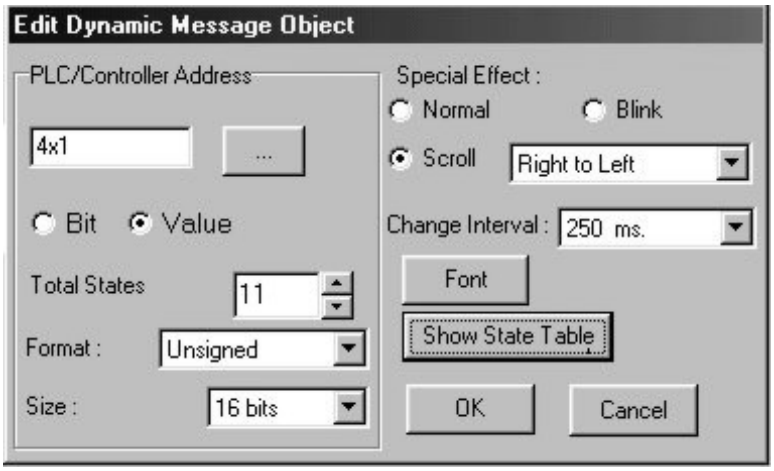
Using the Dynamic Message object to display Alarm messages

Let's go through an example to illustrate how to configure an Alarm LED, an Alarm Buzzer, and a Dynamic Message object to alert a plant floor operator of alarm conditions:

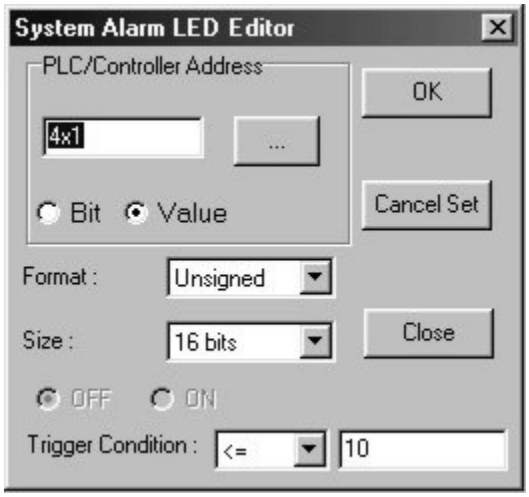
First, create a dynamic message (refer to *Chapter 7* for more information on how to create a dynamic message) for Screen 0, with the following state table:



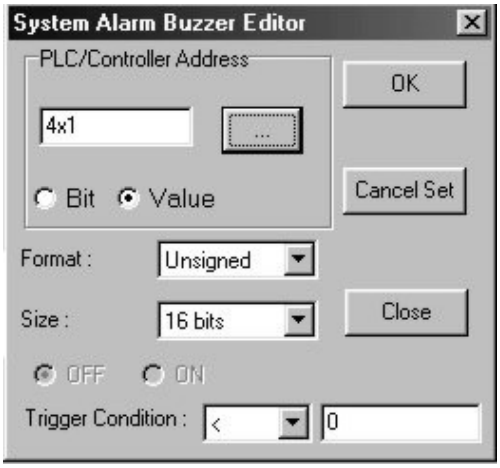
Use the following settings for the Dynamic Message:



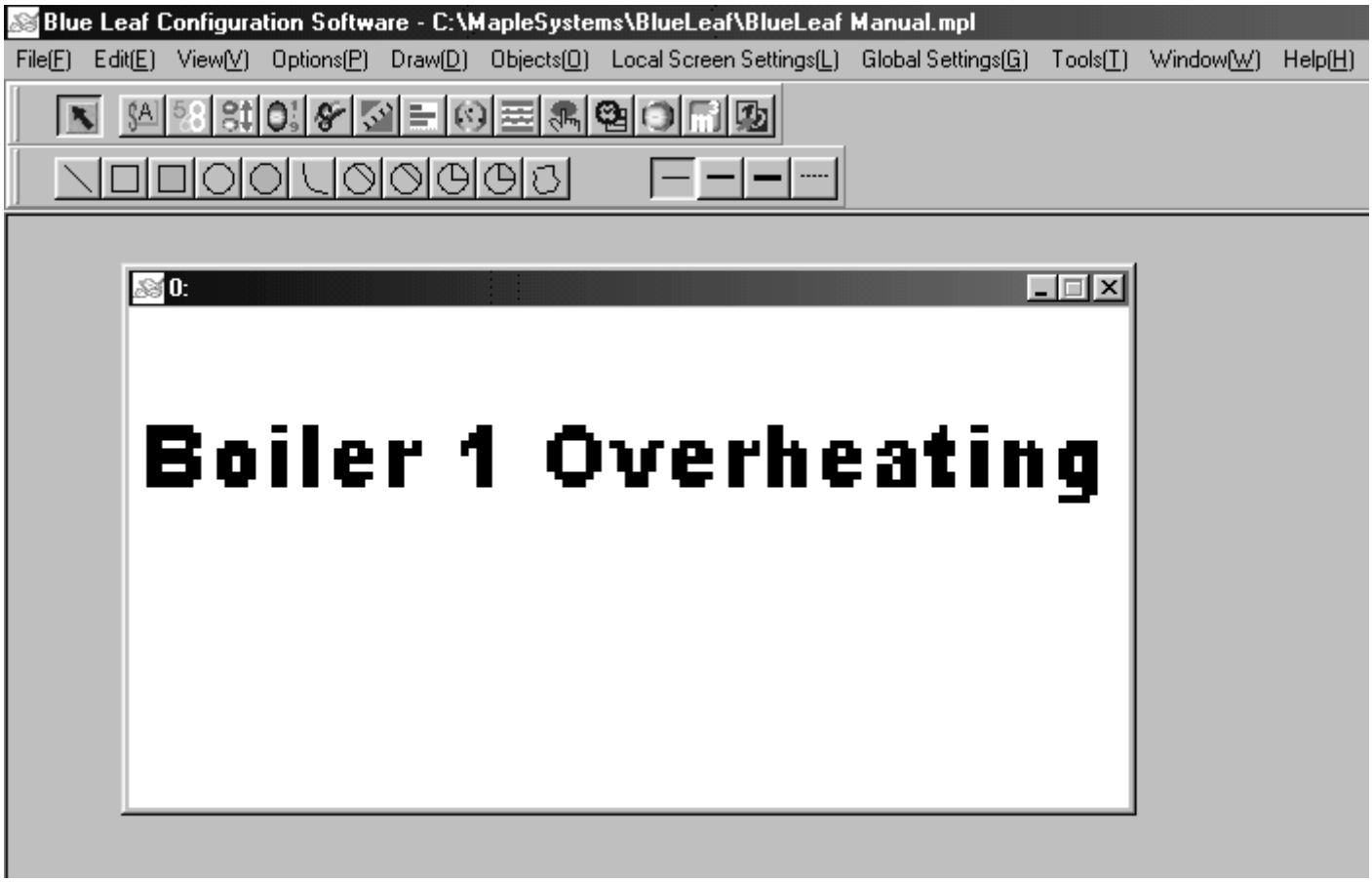
Next, use the Global Alarm LED Editor to assign the alarm LED to the same PLC register as is used for the dynamic message, with the following settings:



Finally, use the Global Alarm Buzzer Editor to configure the OIT buzzer as follows:



When you have finished, the startup screen should look like the following:



Now download your project to the BLU300 Series OIT. Enter the value 1 into the PLC register you are using for the alarm (in this example, 4x1). The following should be displayed on the OIT, with the Alarm LED on and the buzzer pulsing:

Now enter the value 10:

To remove the alarm, enter value 11. This will blank the OIT screen, turn off the buzzer and LED.

Chapter 12 - Using a Memory Stick

The BLU300 Series supports the ability to quickly download/upload a project using a memory stick called the Program Copy Card (PCC). The PCC (Maple P/N 7902-0001) is an optional accessory for the BLU300 which reduces the time required to download a project into the BLU300:

PCC (Maple P/N **7902-0001**)

Copying a project from the BLU300 to the PCC

1. Remove power from the BLU300.
2. Set the switch on the memory stick (PCC) to **BLU→PC**.
3. Insert the memory stick (PCC) into the extension slot in the back of the BLU300 with the slot guide face up.

4. Apply power to the BLU300. The OIT will display the following:

5. Press the ENTER key on the OIT. The OIT will download the project to the memory stick, then display the following:

6. Remove power from the BLU300 and remove the memory stick.
7. Power up the BLU300. The PCC will now have the project.

Copying a project from the PCC to the BLU300

1. Remove power from the BLU300.
2. Set the switch on the memory stick (PCC) to **PC→BLU**.
3. Insert the memory stick (PCC) into the extension slot in the back of the BLU300 with the slot guide face up.

4. Apply power to the BLU300. The OIT will display the following:

5. Press the ENTER key on the OIT. The OIT will download the project from the memory stick, then display the following:

6. Remove power from the BLU300 and remove the memory stick.
7. Power up the BLU300. The HMI will now have the project installed.

Appendix A - Specifications

BLU300M:

Display

Type – 3” STN Graphic LCD w/back light
Resolution – 128 x 64 pixels
Display Size (WxH) – 2.64” [67mm] x 1.26”[32mm]
Back light – LED back light with up to 50,000 hour life span
Ten step contrast adjustment

Hardware

Microprocessor –Hitachi H8/3064F 25 MHz
Flash Memory- 256KB
Real-Time Clock Chip- standard (battery field replaceable- CR2032)

Mechanical

Material – plastic ABS
Mounting- panel
Weight – 0.60 lb [0.27 kg]
Dimensions (WxHxD)- 5.79” [147mm] x 3.82” [97mm] x 1.61” [41.0mm]
Depth Behind Panel – 1.40” [35mm]

Environment

Operating Temp.- 32 to 122ºF; 0 to 50ºC
Storage Temp. - -4 to 140ºF; -20 to 60ºC
Relative Humidity – 20% to 90% (non-condensing)
Vibration Endurance – 10 to 55 Hz (x,y,z direction; 2G; 40 minutes)

Certifications

NEMA Rating- 4,12 IP65
UL508A listed
CE Certification:
EN61000-4-2/1995
EN61000-4-3/1995
EN61000-4-4/1995
CISPR22, Class A

Power Requirements

Input Voltage – 24 VDC
Power Usage – 3.5 watts max. (60mA typ.)

Communications

One RS-232 serial port (DE9P) used for OIT configuration and controller communications
One RS-485 two-wire serial port (Molex input) for controller communications
Baud rates from 4800 to 115200
Point-to-point serial communications for all protocols (network support for Modbus protocol)

Memory Stick Support

Optional memory stick for quickly downloading project into OIT

Keypad

Membrane with audible and tactile feedback
Up to 5 million operations
Five user-definable keys, ESC, SHIFT, ENTER, Arrow keys

Available Keys

Five user-definable keys that can be configured as up to ten function keys using the SHIFT key
User-definable keys can be configured as:
Latched button
Push On/Off switch
Momentary switch
Jog button
Screen jump button
Set Constant
Input a numeric value
Set a password
Numeric entry using data entry screen with arrow keys
Esc key to cancel operation
Enter key to accept the data entered by the operator and update the current register

Screens

Up to 999 user-definable screens (actual usage dependent upon memory)
User-definable startup screen
Can display text and graphics

Graphics Libraries

Includes more than 500 of the most common bitmap symbols
Store new bitmaps in libraries
Import preexisting bitmaps (8-bit)

Text

Text objects can display characters using Windows TrueType fonts.
Multiple font sizes and styles available
Text can be aligned within a frame
International characters

Bar Graphs

Define the direction- up, down, right, or left
Adjustable min/max range
Scale object for tick marks and numeric labels

Meters

Two formats- 300 degree or 360 degree
Scale with major/minor tick marks
Numeric labels with four font sizes
Adjustable min/max range

PLC Register Control

Decimal, Signed, Hex, and BCD representation
16 or 32 bit formats
Adjustable decimal location
Adjustable field width
High/low limits
Data can be aligned within a frame
Password Protection
Set/Clear a coil before or after writing value
Four font sizes

Alarms

Alarm LED and/or buzzer triggered by coil or value
Alarm LED and/or buzzer set per screen or global

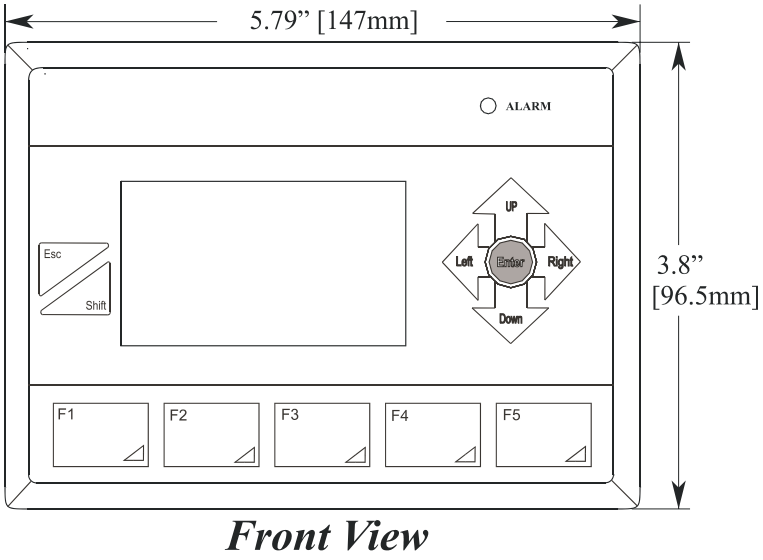
Additional Features

Back light screen saver
Easy-to-use, Windows-based configuration software
10 level user-password settings
Can connect to two PLCs

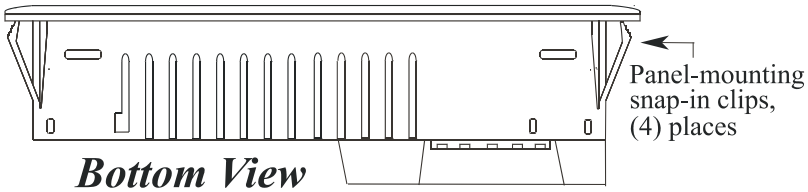
Appendix B - Dimensional Outlines & Panel Cutout

Maple Systems, Inc.
http//www.maple-systems.com
Last revised July 1, 2004

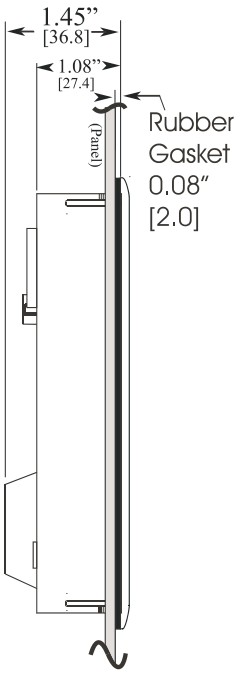
Dimensional Outline, BLU300



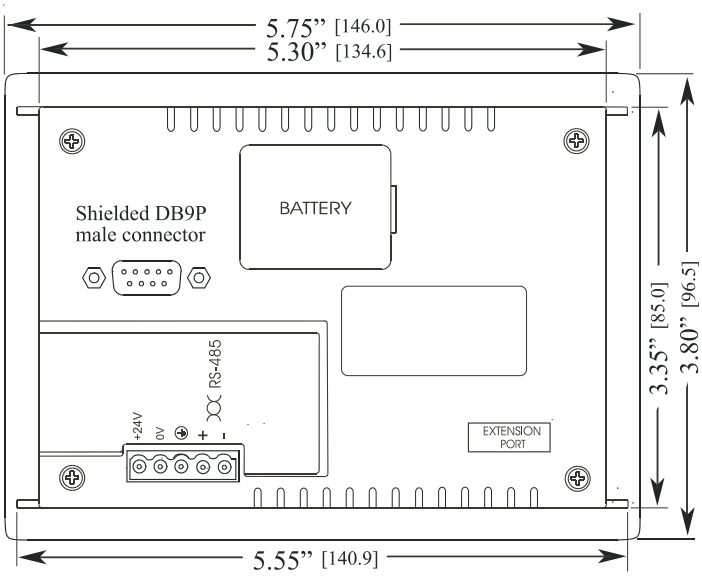
Front View



Bottom View

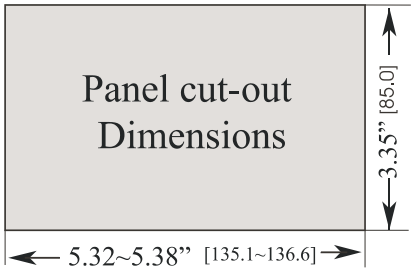


Side View



Rear View

**NOTE: 2.00” [50.8]
Minimum depth required
behind the panel opening
to allow for power connector.



Panel Thickness Range: 0.25~.180”
[0.6~4.6]

Dimensions are in inches [mm]

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