OP-613

Operator Panel

Manual Number OP-613-M

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Manual Revisions

If you contact us in reference to this manual, be sure and include the revision number.

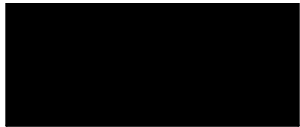**Title:** OP–613 Operator Panel User Manual
Manual Number: OP–613–M

Issue	Date	Effective Pages	Description of Changes
Original	8/97	Cover/Copyright Contents	Original Issue
Rev. A	6/98		Made minor corrections before reprinting

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EU Information

This product is manufactured in compliance with European Union (EU) Directives and carries the CE mark. The following information is provided to comply with EU documentation requirements.

NOTE: Products with CE marks perform their required functions safely and adhere to relevant standards as specified by EC directives provided they are used according to their intended purpose and that the instructions in this manual are adhered to. The protection provided by the equipment may be impaired if this equipment is used in a manner not specified in this manual. Only replacement parts supplied by **PLC***Direct* or its agents should be used. A listing of international affiliates is available at our Web site   http://www.plcdirect.com

Technical Support

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SELV Circuits

All electrical circuits connected to the communications port receptacle are rated as Safety Extra Low Voltage (SELV).

Environmental Specifications

Operating Temperature	0° to 50° C
Storage Temperature	–20° to 70° C
Operating Humidity	95% (non-condensing)
Air Composition	No corrosive gases permitted

Preventative Maintenance and Cleaning

No preventative maintenance is required. To clean the exterior of the panel disconnect the input power and carefully wipe the panel with a cloth moistened with plain water.

External Fuse Protection for Input Power

There are no internal fuses for the input power circuits, so external circuit protection is needed to ensure the safety of service personnel and the safe operation of the equipment itself. To comply with EU specifications, the input power must be fused. Use a fuse rated at **twice** the input current rating of the panel. For example, if the panel has an input current rating of 0.5 amperes, use a fuse rated for 1 ampere.

Introduction

The Purpose of this Manual

This User Manual provides user information on panel installation, panel configuration, and programming the OP-613. The purpose of this manual is to teach programming techniques which may be applied while implementing the OptiMate® panels. After reading the manual completely, load and run the example programs which are on the supplied diskette using the directions in Appendix A.

Contents of the Manual

Inside this manual you will learn about planning, implementing, and utilizing the OptiMate OP-613 panel. Also included are application examples to improve the learning process and working knowledge of the OptiMate units.
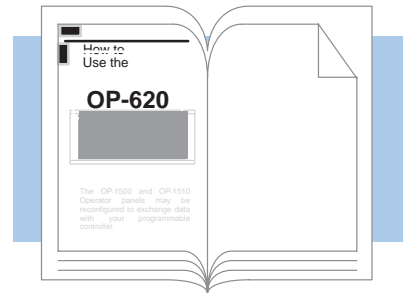
Supplemental Manuals

Reference the appropriate PLC/CPU User Manuals for the commands and address references required for your system. If you are using a *Direct*LOGIC PLC product, you will want to keep the *Direct*SOFT User Manual handy while programming your system. For *other* PLC brands you must reference their User manuals to properly program the ladder logic required to operate the OP-panels.

For Multi-Panel applications utilizing the OP-9001 Communications Master please refer to the OP-9001 User Manual (Part Number OP–9001–M).
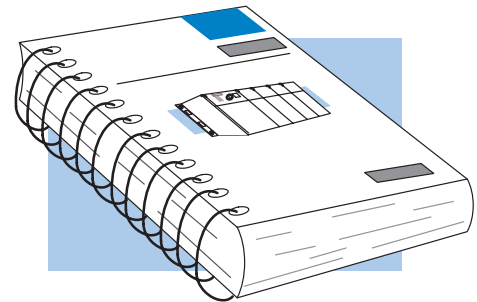
Technical Assistance

After completely reading this manual, including Appendix B, Troubleshooting the OP-613, if you are not successful with implementing the OP-613, you may call PLC*Direct* at (800) 633-0405, Monday through Friday from 9:00 A.M. to 6:00 P.M. Eastern Standard Time. Our technical support group will work with you in answering your application questions. If you have a comment or question about our products, services, or manuals which we provide, please fill out and return the suggestions card included with this manual.
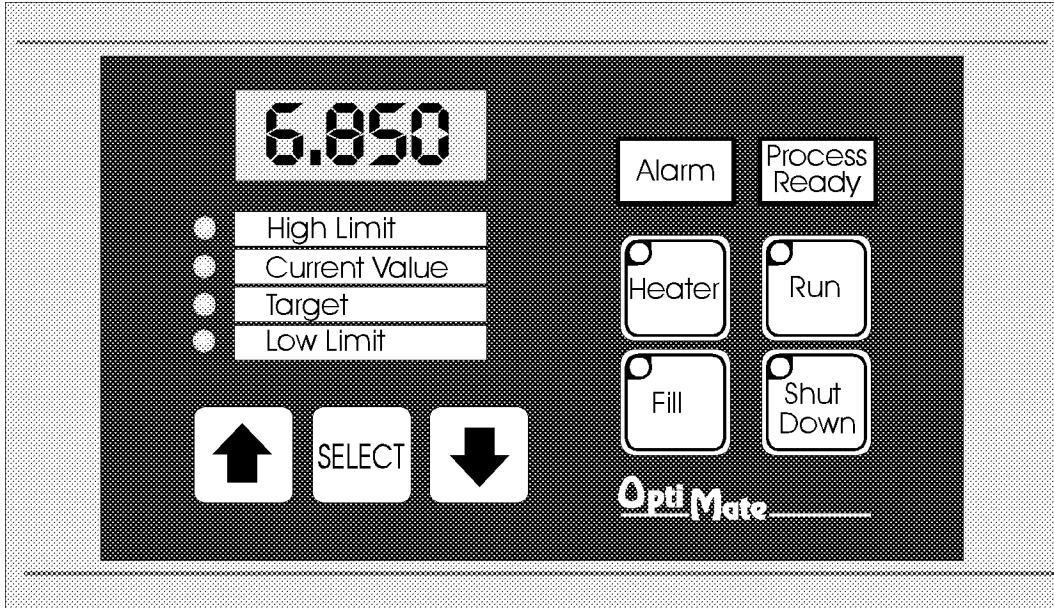
OP-613 Operator Panel

The OP-613 Operator Panel is a low cost/high performance man/machine interface with a broad range of operator input and display capabilities. The panel includes four field points which can be used for either setpoint entry or data display, four pushbuttons and two large indicator lamps.

The four digit numeric LED display is associated with four field points. The user can select which field point to project on the display by use of the SELECT button. The LEDs adjacent to the user defined field point labels highlight which field point is active. Once selected, the display will either show the related data or project the current setpoint value.

Setpoint adjusment can be performed by use of the arrow keys to move the value up or down. Once set, the value is saved into non-volatile memory. It is permanently stored, whether power remains on or not, until the next time it is changed by the operator.

Lamps and buttons can be custom labeled by the user with plastic inserts. The inserts can be custom legended with text and/or graphics, and slip into a protective pocket behind the faceplate.

The OP-613 Operator Terminal is part of Optimation's OptiMate® series. Each OptiMate module is designed to connect to a PLC with a single cable connection. OptiMate panels can be used individually, or together with any combination of other OptiMate panels.

When used with a PLC, operation is transparent to the user. Panel functions tie directly into your PLC ladder logic program. The OP-613 takes care of the rest.

Applications
- Machine control
- Process control
- Security systems
- HVAC
- Plant monitoring/control
- PLC applications
- Microprocessor applications

Features
- Setpoints or display points
- Four digit numeric display
- Two large LED light bars
- Four tactile snap membrane function buttons
- Buttons independently configurable for momentary or alternate action operation
- PLC compatible
- RS232/RS422 communications
- Stand alone operation capable
- Multipanel operation capable

Contents

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Configuration Options
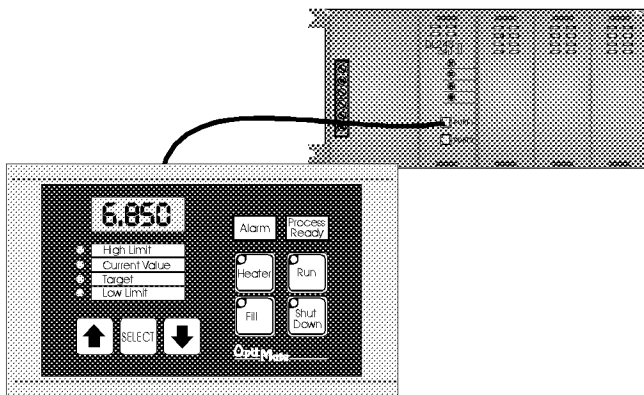
PLC Stand Alone

OptiMate panels plug directly into most PLCs. A cable connection allows you to interface and control the OptiMate panel via PLC data registers and ladder logic.

The OP-613 operator panel uses a bank of PLC registers. Complete operator interface is performed with 8 PLC registers for data entry and display, function key interface and indicator light control. The OP-613 continuously accesses these PLC registers and performs operations under ladder logic control on a real time basis.

PLCs are slave devices on their standard communications ports. This means that a panel attached to the standard port must control the transfer of information by reading and writing the PLC registers. OptiMate panels will perform this communications for most major PLC protocols. Configuration for particular PLC protocols and interconnect cabling is covered in the following pages.
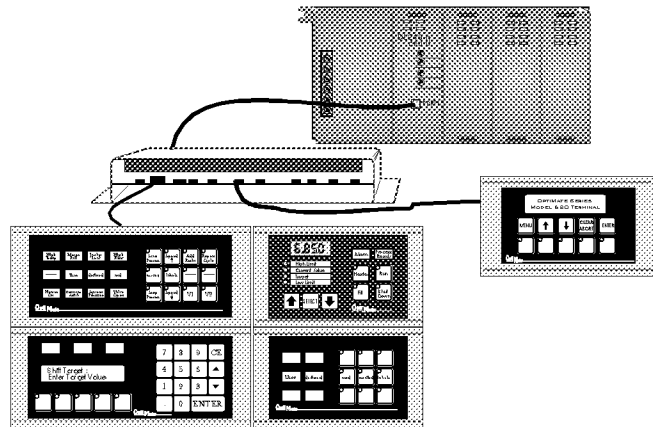
PLC Multi Panels

Larger systems involving operator panels can be successfully addressed using OptiMate panels. These applications utilize the OP-9001 Communications Master to transfer data between the PLC and the individual OptiMate panels. OptiMate panels can be located together to form custom panels or they can be distributed anywhere within 4000 feet.

The OP-9001 Communications Master provides a transparent interface between the PLC and a group of OptiMate modules. The communication interface between panels requires only four wires.

System configuration is simple via an interactive configuration program that runs on any IBM PC compatible computer.

This modular approach to custom applications provides a nearly limitless number of possibilities.

Use with a PLC

Register Bit Association table:

Register	MSB										LSB	
X	L2F L1F	B4F B3F B2F B1F	L2 L1	B4 B3 B2 B1	Indicator Light/LED On/Off/Flash
X+1				B4 B3 B2 B1	Button On/Off Status
X+2	Field Point 1 data cell				
X+3	Field Point 2 data cell				
X+4	Field Point 3 data cell				
X+5	Field Point 4 data cell				
X+6	Field Point force data cell				
X+7	FSP FP4 FP3 FP2 FP1	F1 F2 F3	B4 B3 B2 B1		Force Commands

Register Bit Association

Memory Mapping

Memory mapping is a technique that "maps" the memory of an OptiMate panel into the registers of the programmable controller. By knowing where the data of the specific OptiMate panel is mapped, this data can be moved, changed or monitored using ladder logic.

The term PLC register is used for the area of memory within the programmable controller used for data exchange with the OP-613. PLC registers are sometimes know as data registers or internal registers.

MSB															LSB
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

PLC Register

The OP-613 Terminal Panel uses a bank of 8 contiguous PLC registers. The register set definition is shown in the table below.

OP-613 Panel PLC Register Map	
PLC Register	**Register Function**
X (first register of bank)	Lamp and inset LED control
X+1	Function button status
X+2	Field point 1 data cell
X+3	Field point 2 data cell
X+4	Field point 3 data cell
X+5	Field point 4 data cell
X+6	Field point force data cell
X+7	Force control

Register Definition

The following describes the function of the registers shown in the table.

- Register X - Control outputs for the 2 indicator lamps and, it LED separation is selected, the inset LEDs in the momentary pushbuttons.
- Register X+1 - Button status for the four function buttons.
- Register X+2 - Field point 1 data (either setpoint input or display output, as configured)
- Register X+3 - Field point 2 data.
- Register X+4 - Field point 3 data.
- Register X+5 - Field point 4 data
- Register X+6 - Force data. Value to force setpoint equal to when force operation is initiated by the PLC program.
- Register X+7 - Force control. This register controls the forcing of setpoints or button state. The most significant bits of this register control setpoint force. The least significant control pushbutton force.
  > FSP - When active, the Field point force data (X+6) will be forced into the field points set to be forced (FP1-FP4). Once the force operation takes place, the OP-613 will automatically clear FSP.

> FP1-FP4 - Used to identify which setpoints must be forced.

> F1 - When set, all alternate action buttons B1-B4 will be forced to the state (on or off) selected in the low 4 bits (B1-B4) of this register. Once the force operation takes place, the OP-613 will automatically clear F1.

> F2 - When set, all alternate action buttons matching the bits set in B1-B4 of this register will be forced on. Once the force operation takes place, the OP-613 will automatically clear F2.

> F3 - When set, all alternate action buttons matching the bits set in B1-B4 of this register will be forced off. Once the force operation takes place, the OP-613 will automatically clear F3.

Operational Overview

Reading a Setpoint

Setpoint data is continuously and transparently written to the associated PLC register. To access and use the setpoint data, simply reference the relavent PLC register (X+2 through X+5) in your PLC program.

Writing a Display Point

Writing a display value simply requires writing data into the associated PLC register. The OP-613 will automatically retrieve and display the data.

Forcing a Setpoint

There are times when it is necessary for the PLC program to initialize or override a setpoint. The capability to do so is provided as the Force Setpoint function.

To force a setpoint to a given value, the value should be placed in register X+6. Next the bit(s) corresponding to the setpoint(s) to be forced and the FSP bit must be set. When the OP-613 panel has forced the setpoint to the required value, it will clear register X+7.

Reading Pushbutton Status

Once the panel is configured and connected to the PLC, reading a button's status simply entails reading the appropriate register bit. In typical applications, a pushbutton appears in PLC ladder logic as a contact. The register bit association is shown in the table on the previous page. The OptiMate panel will automatically place status into this register. A 1 (or contact closed) indicates active or "on" condition.

Turning on a Lamp

When configured for PLC operation, turning on a lamp simply requires the writing of a 1 to the appropriate register bit. With most PLCs this is accomplished by activating a coil in the PLCs ladder logic. The OptiMate panel will automatically retrieve the register data and light any lamps whose bits are set.

A lamp must be turned on in order for the flash control bits to have any effect.

Flashing an Inset LED

As shown in the table, the second register will initiate lamp flash. To flash a lamp, the lamp must be on and lamp flash bit must be set.

Lamp flash is approximately .5 seconds on and .25 seconds off.

Turning on the Inset Indicator Light

In most cases, the LED inset in each button simply provides a visual indication of the status of the button. However, if a module is configured for LED separation mode, a momentary button's indicator light can be set directly from the PLC. In LED separation mode, turning on a lamp simply requires the writing of a 1 to the appropriate register bit. The register bit association is shown in the table on the previous page. The OptiMate panel will automatically retrieve the register data and light any lamps whose bits are set.

LED separation is available only for momentary pushbuttons.

Flashing an Inset LED

As shown in the table, the fourth register will initiate inset LED flash. To flash an LED, the LED must be on and LED flash bit must be set. In normal mode, LED "on" status simply reflects pushbutton status. In LED separation mode, LED "on" status is set directly via PLC register bits.

Lamp flash is approximately .5 seconds on and .25 seconds off.

Button Force Commands

If the OP-613 panel is configured for force capability, the PLC can directly control button status when desired. This may be desirable for initialization purposes.

The force capability also may prove useful for functions initiated from the panel pushbuttons. For example, consider a situation where an operator initiates a control process by pressing an alternate action panel button. The button status and indicator light would stay on and lighted to indicate that the function is still in process. At the end of the process, the PLC program could force the button status off.

There are three types of force functions available. These are described below.

Force function	Description
F1 (Force buttons status)	When the F1 bit is set, all buttons will be forced to the status set in the force register (X+7) bits B1-B4. Once these buttons are forced to the status set, the OP-613 will automatically clear register X+7.
F2 (Force buttons on)	When the F2 bit is set, all buttons matching the bits set in the force register (X+7) will be forced on. Once these buttons are forced on, the OP-613 will automatically clear register X+7.
F3 (Clear buttons)	When the F3 bit is set, all buttons matching the bits set in the force register (X+7) will be forced off. Once these buttons are forced off, the OP-613 will automatically clear register X+7.

Force obviously applies only to alternate action pushbuttons.

Examples of Use with a PLC*Direct* PLC

Register Usage

The OP-WINEDIT Configuration Editor allows you to configure a module to use a block of registers at a starting value that you define. For a PLC*Direct* 105, 205, 350 or 405 PLC the recommended memory to use is the general purpose data words starting at V2000 and V4000. For the 305 family, the recommended memory is the registers beginning at R400. Any block of registers within the data word range can be used.

The middle 5 PLC registers (X+2 thru X+6) in the block used by the OP-613 panel are used for numeric information. As such they are ideally suited for the general purpose data registers (V2000 and V4000 area for the 105/205/350/405 and R400 range for the 305). The first two and last registers use individual bits for control and status. These registers are better suited for the control relay register range of memory. The solution to this minor conflict is to define the base register address in general purpose data register memory and place a rung in your PLC program to copy the first and last registers to/from control relay registers.

The following table lists the control relay register addresses for the various PLC Direct PLCs.

PLC Direct CPU	Control Relay Register address range
DL130	V40600-V40617
DL230	V40600-V40617
DL240	V40600-V40617
DL250	V40600-V40617
DL330	R016-R037
DL330P	R016-R017 and R020-R027
DL340	R016-R037 and R100-R106
DL350	V40600-V40617
DL430	V40600-V40635
DL440	V40600-V40677
DL450	V40600-V40777

The examples on the following pages use an OP-613 connected to a PLC Direct 105/205/405 series PLC. The OP-613 is configured for a base address of V2000. **The program rung on the right should be placed in the program to copy the status register to V40600 and copy from V40601 to the control register**.

With the rung shown placed into the PLC program, the button status and lamp control bits will be control relays. The register association is shown in the figure below.

Register	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0 bit	
	MSB															LSB	
V40600	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Lamp Control
V40601	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Button Status

This will result in the following control relay association for the lamp control and button registers.

Lamp Control Register		Button Status Register	
bit	relay	bit	relay
B1	C0	B1	C20
B2	C1	B2	C21
B3	C2	B3	C22
B4	C3	B4	C23
L1	C5		
L2	C6		
B1F	C10		
B2F	C11		
B3F	C12		
B4F	C13		
L1F	C15		
L2F	C16		
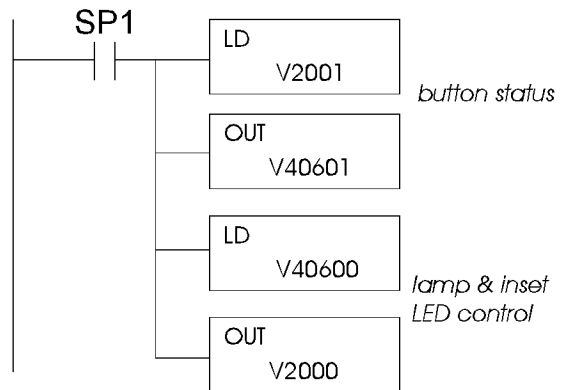
SP1

| LD |
| V2001 | button status

| OUT |
| V40601 |

| LD |
| V40600 | lamp & inset LED control

| OUT |
| V2000 |

Operations with Lights & Buttons

Turning on a Lamp

Turning on a lamp in the OP-613 simply requires activating its associated control relay coil. In the figure below, lamp 2 will be turned on whenever input X1 is active (energizing C6).
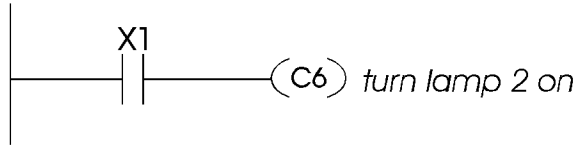
```
      X1
  ----| |-------------( C6 )  turn lamp 2 on
```

Flashing a Lamp

To flash a lamp, you simply need to both turn it on and set the associated flash bit. The example below shows a 105/205/350/405 program used to flash lamp 2 whenever X5 is energized.

```
      X5
  ----| |----------( C6 )  turn lamp 2 on
                |
                ---( C16 )  lamp 2 flash
```

Using a Function Button

The four function buttons will appear as control relay coils in your program (assuming the register copy rung described previously is in your program). The following example turns on output Y1 when button B2 is active.

```
         button 2
           C21
   ----------| |------------( Y1 )
                              OUT
```

Lighting an Inset LED

In LED separation mode, the LEDs in the corner of each momentary pushbutton may be directly controlled by the PLC program. The following example shows a segment of a 105/205/350/405 program that will light button 4's inset LED whenever input X7 is energized. *In order for this to work, the panel must be configured for LED separation and button 4 must be a momentary pushbutton.*

```
                    button 4
        X7          inset LED
   -----| |----------( C3 )
```

Flashing an Inset LED

To flash an inset LED, you simply need to both turn it on and set the associated flash bit. If the panel is not set up for LED separation, status is simply the button state. For momentary buttons with LED separation enabled, the on/off state is controlled by the PLC as shown in the previous example. For alternate action buttons, on/off state is always the button state.

The example below shows a 105/205/350/405 program used to set the LED inset in momentary button 3 to flash whenever X5 is energized.
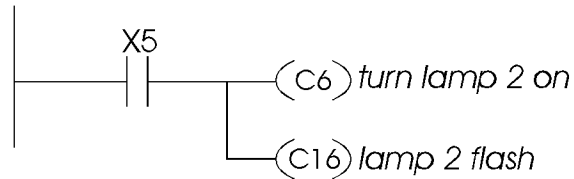
```
        X5
   -----| |--------------( C2 )  button 3 LED on
                      |
                      ---( C12 )  button 3 LED flash
```
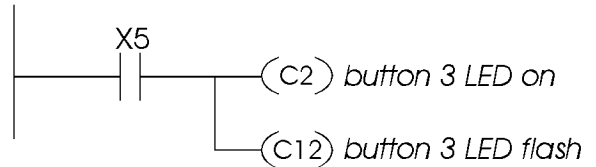
If the panel has been configured with button 3 being an alternate action button, the LED will operate as shown in the example and table below.

```
                       button 3
          X5           LED flash
   -------| |-------------( C12 )
```

Button State	X5 State	LED operation
Inactive	de-energized	Off
Inactive	energized	Off
Active	de-energized	On solid
Active	energized	Flashing

Setpoint & Display Operations

Displaying Numeric Data

Displaying numeric data in one of the 4 field points is a very simple process. During the initial configuration, make sure you define the point as a display point, not a setpoint. When this is done, the PLC program must simply put data to be displayed into the register associated with the display data field.

The figure below illustrates a numeric display application with a PLC Direct 105,205,350 or 405 series PLC. In this application, the OP-613 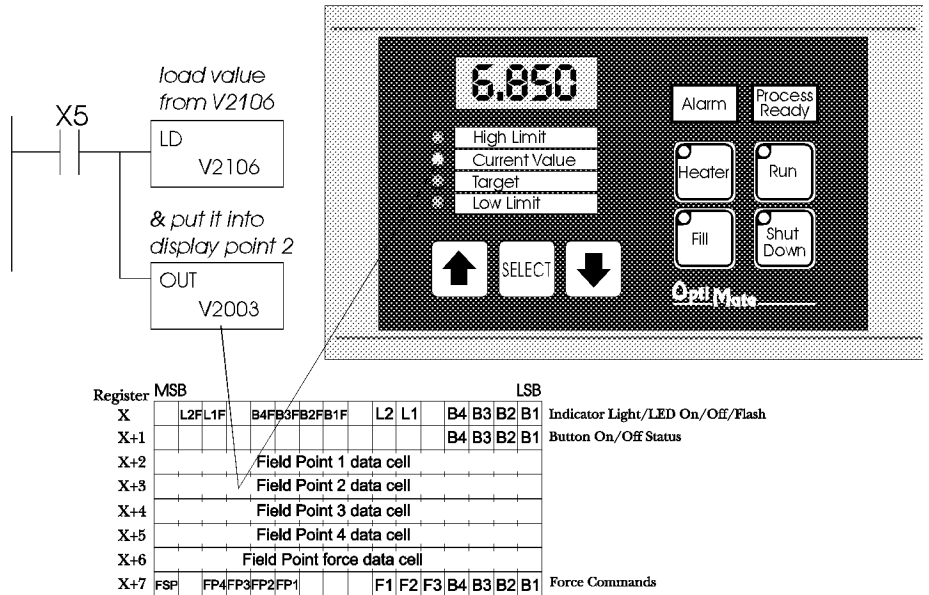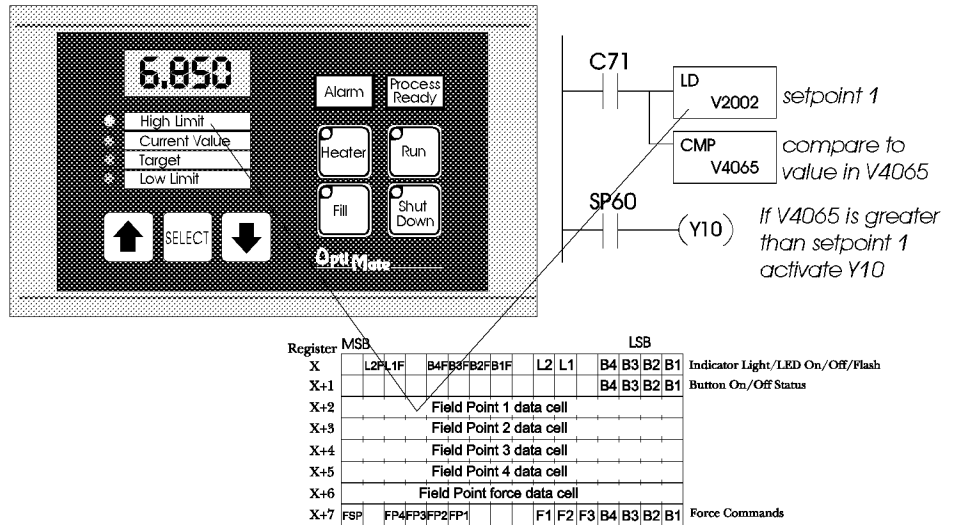is configured for a base address of 2000 and field point 2 for display. A value, held in V2106 must be displayed in field point 2 as long as X5 is active. The example shows the value transferred from V2106 to V2003. It will be displayed as field point 2.

load value from V2106

X5 — LD V2106

& put it into display point 2

OUT V2003

Register	MSB									LSB				
X	L2F	L1F	B4F	B3F	B2F	B1F	L2	L1		B4	B3	B2	B1	Indicator Light/LED On/Off/Flash
X+1										B4	B3	B2	B1	Button On/Off Status
X+2	Field Point 1 data cell													
X+3	Field Point 2 data cell													
X+4	Field Point 3 data cell													
X+5	Field Point 4 data cell													
X+6	Field Point force data cell													
X+7	FSP		FP4	FP3	FP2	FP1				F1	F2	F3	B4	B3 B2 B1 Force Commands

Reading a Setpoint

The following example uses an OP-613 at base address 2000. Field point 1 has been configured as a setpoint. In the example program, field point 1 is a High Limit setpoint. The program shown checks a value, held in V4065 against the setpoint whenever C71 is active. If the value exceeds the setpoint, Y10 will be turned on.

C71 — LD V2002 *setpoint 1*

CMP V4065 *compare to value in V4065*

SP60 — (Y10) *If V4065 is greater than setpoint 1 activate Y10*

Register	MSB									LSB				
X	L2F	L1F	B4F	B3F	B2F	B1F	L2	L1		B4	B3	B2	B1	Indicator Light/LED On/Off/Flash
X+1										B4	B3	B2	B1	Button On/Off Status
X+2	Field Point 1 data cell													
X+3	Field Point 2 data cell													
X+4	Field Point 3 data cell													
X+5	Field Point 4 data cell													
X+6	Field Point force data cell													
X+7	FSP		FP4	FP3	FP2	FP1				F1	F2	F3	B4	B3 B2 B1 Force Commands

Using Force Functions

The OP-613 gives you the ability to force alternate buttons to a given state and force setpoints to a given value. This capability may or may not be used on a given application. There are applications when it is desirable to have the PLC program automatically set or clear a button based on operational state. There are also cases when forcing a setpoint to a predetermined value is useful. Obviously, this capability should be used carefully.

The last two registers in the register bank are associated with force operations. Their use is detailed below.

Forcing Button Status

One of the more advanced capabilities of the OP-613 panel is the ability to force button state from the PLC program. This may be desirable, for example, if an alternate action is used to start a function process. When it is pushed and while the function is active, the button will remain on. You may want the PLC program to clear the button at the end of the function process.

Another example is one of a system that has individual enable or on/off (alternate action) buttons for several different device. You may also have other buttons (probably momentary) that enable a group of these same devices. You may want your program to force on the device enable buttons when the group enable button is pressed.

There are many other cases where button force capability can be useful in a system.

There are three types of force functions available for the OP-613 panel - force status, force on and force off. All three functions require moving appropriate data into the PLC registers defined as Force Data & Commands (see the table described in "Use with a PLC").

Note : Force only applies to Alternate Action pushbuttons

Force Button Status

This function is used to set the state (on or off) of every alternate action pushbutton in the panel. To use the "Force Button Status" function, simply set the F1 bit to 1 and all buttons that you want to be on to 1, while leaving all other bits off. The example on the right shows buttons 1 and 4 being forced on and the other two buttons forced off when C62 is active.

Notice that C62 is used as a set/reset type relay. The force should be written to the force register once. The OP-613 will automatically clear this register when the force is complete. This will normally happen very quickly (less than a second). The fact that the OP-613 clears the force control register when the operation is done can be used by the PLC program to verify operation. However, this is generally not necessary.

set F1,B1 & B3 in force command register

clear C62 so rung only executes once
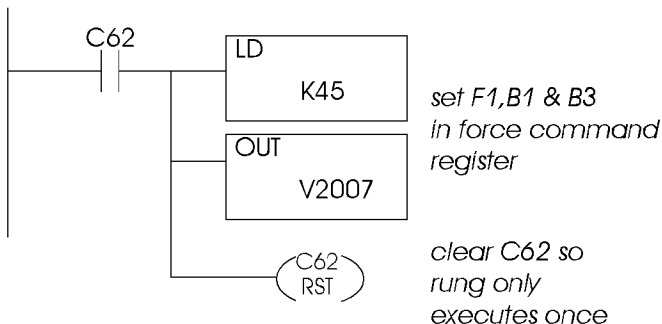
Force Button(s) On

This function is used to turn individual button(s) on without affecting the state of any other buttons. To use the "Force Buttons On" function, set the F2 bit to 1 and all buttons that you want to turn on to 1. Any buttons associated with bits that are left at '0' will not be affected. The following example shows buttons 1 and 2 being forced on when C62 is active.
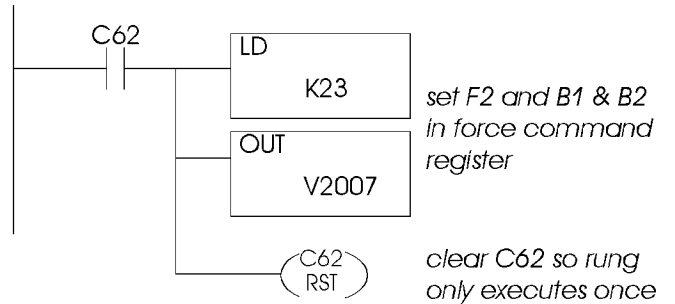
set F2 and B1 & B2 in force command register

clear C62 so rung only executes once

Clear Button(s)

This function is used to selectively turn individual button(s) off without affecting the state of any other buttons. To use the "Clear Buttons" function, set the F3 bit to 1 and all buttons that you want to turn off to 1. Any buttons associated with bits that are left as '0' will not be affected. The example on the right shows button 4 being cleared when C62 is active.
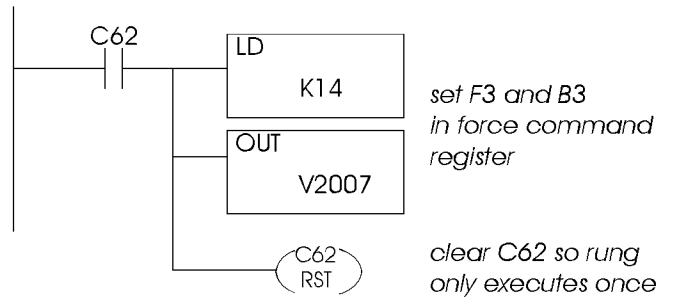
set F3 and B3 in force command register

clear C62 so rung only executes once

Forcing Setpoints

The OP-613 gives you the capability to force a setpoint to a value from the PLC.

To force a setpoint to a value, the value should be placed in register X+6. Next the force setpoint bit FSP and the bit(s) corresponding to the setpoint(s) to force to this value must be set in the force control register (X+7). When the OP-613 completes the force operation, it will clear the force control register.

The following example shows setpoint 4 being forced to 4321 when C75 is active.

Notice that C75 is used as a set/reset type relay. The force command should be written to the force register once. The OP-613 will automatically clear this register when the force is complete. This will normally happen very quickly (less than a second). The fact that the OP-613 clears the force control register when the operation is done can be used by the PLC program to verify operation. However, this is generally not necessary.


LD K4321 / OUT V2006	*put value 4321 into force data cell (V2006)*
LD KA000 / OUT V2007	*set FSP and FP4 to set field point 4 to the force value*
C75 RST	*clear C75 so rung only executes once*
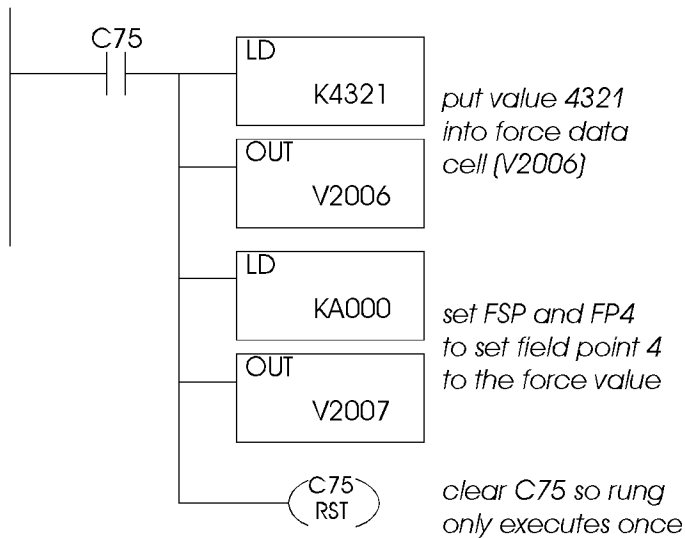
Examples of Use with an Allen Bradley PLC

Interfacing to A/B Memory

OptiMate modules interface to Allen Bradley SLC 5/03, SLC 5/04 and Micrologix PLCs via integer file type N. The 5/03 and 5/04 have file type N7 as standard. Other "N" type files can be created. The Micrologix has a fixed file type N7. Please refer to Allen Bradley documentaion for information on setting up and using "N" type files.

All of the examples that follow assume that the OP-613 module has been configured, through the OptiMate Configuration Editor, for a file number 7 and base register address 0. With this configuration, the lamp control and button status registers will be at N7:0 and N7:1 respectively. The following is a table relating lamp control and button status register bits to their N7 locations.

Lamp Control Register			Control Register	
bit	location		bit	location
B1	N7:0/0		B1	N7:1/0
B2	N7:0/1		B2	N7:1/1
B3	N7:0/2		B3	N7:1/2
B4	N7:0/3		B4	N7:1/3
L1	N7:0/5			
L2	N7:0/6			
B1F	N7:0/8			
B2F	N7:0/9			
B3F	N7:0/10			
B4F	N7:0/11			
L1F	N7:0/13			
L2F	N7:0/14			

Operations with Lights & Buttons

Turning on a Lamp

Turning on a lamp in the OP-613 simply requires activating its associated control relay coil. In the figure below, lamp 2 will be turned on whenever input I:0.0/4 is active (energizing N7:0/6).
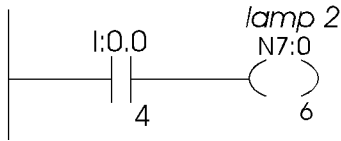
```
        I:0.0           lamp 2
                        N7:0
    ——| |——————————————(   )——
          4                 6
```
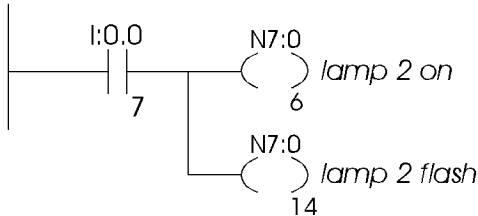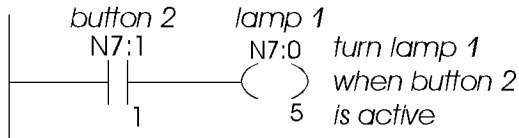
Flashing a Lamp

To flash a lamp, you simply need to both turn it on and set the associated flash bit. The example below shows a SLC program used to flash lamp 2 whenever I:0.0/7 is energized.

```
        I:0.0          N7:0
    ——| |————————┬————(   )—— lamp 2 on
          7       │        6
                  │    N7:0
                  └————(   )—— lamp 2 flash
                          14
```

Using a Function Button

The four function buttons will appear as control relay coils in your program. The following example Turns on output Lamp 1 when button B2 is active.

```
    button 2      lamp 1
    N7:1          N7:0     turn lamp 1
  ——| |—————————(   )——    when button 2
        1            5      is active
```
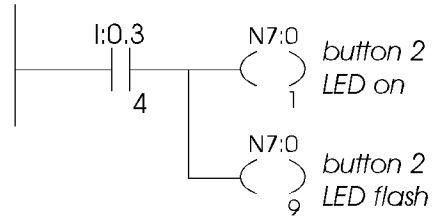
Lighting an Inset LED

In LED separation mode, the LEDs in the corner of each momentary pushbutton may be directly controlled by the PLC program. The following example shows a segment of a 205/405 program that will light button 2's inset LED whenever input I:0.3/1 is energized. *In order for this to work, the panel must be configured for LED separation and button 2 must be a momentary pushbutton.*
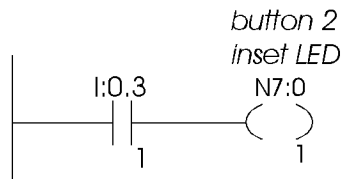
```
                    button 2
                    inset LED
        I:0.3       N7:0
    ——| |——————————(   )——
          1            1
```

Flashing an Inset LED

To flash an inset LED, you simply need to both turn it on and set the associated flash bit. If the panel is not set up for LED separation, status is simply the button state. For momentary buttons with LED separation enabled, the on/off state is controlled by the PLC as shown in the previous example. For alternate action buttons, on/off state is always the button state.

The example below shows an A/B program used to set the LED inset in momentary button 2 to flash whenever input I:0.3/4 is energized.

```
        I:0.3        N7:0       button 2
    ——| |—————┬—————(   )——     LED on
          4    │         1
               │   N7:0         button 2
               └—————(   )——    LED flash
                         9
```

If the panel has been configured with button 2 being an alternate action button, the LED will operate as shown in the example and table below.

```
                   button 2
                   LED flash
        I:0.3      N7:0
    ——| |—————————(   )——
          4            9
```
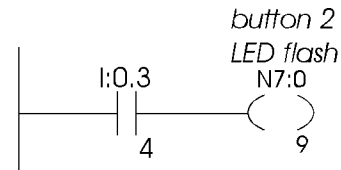
Button State	I:0.3/4 State	LED operation
Inactive	de-energized	Off
Inactive	energized	Off
Active	de-energized	On solid
Active	energized	Flashing

Setpoint & Display Operations
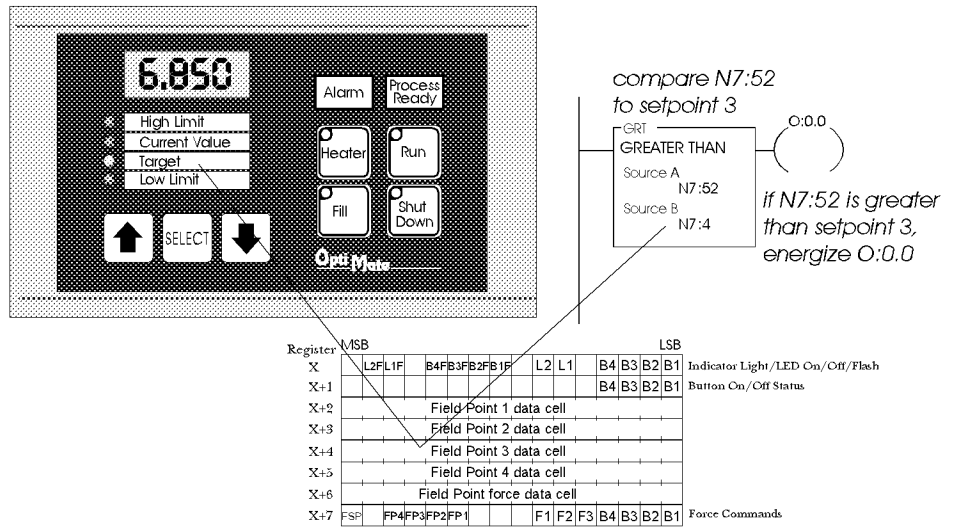
Displaying Numeric Data

Displaying numeric data in one of the 4 field points is a very simple process. During the initial configuration, make sure you define the point as a display point, not a setpoint. When this is done, the PLC program must simply put data to be displayed into the register associated with the display data field.

The figure on the right illustrates a numeric display application with an Allen-Bradley PLC. In this application, the OP-613 is configured for a base address of N7:0 and field point 2 for display. A value, held in N7:45 must be displayed in field point 2 as long as B3:22/3 is active. The example shows the value transferred from N7:45 to N7:3. It will be displayed as field point 2.

put value from N7:45 into field point 2

Register	MSB									LSB		
X	L2F	L1F	B4F	B3F	B2F	B1F	L2	L1	B4	B3	B2	B1	Indicator Light/LED On/Off/Flash
X+1								B4	B3	B2	B1	Button On/Off Status
X+2	Field Point 1 data cell										
X+3	Field Point 2 data cell										
X+4	Field Point 3 data cell										
X+5	Field Point 4 data cell										
X+6	Field Point force data cell										
X+7	FSP	FP4	FP3	FP2	FP1		F1	F2	F3	B4	B3	B2	B1	Force Commands
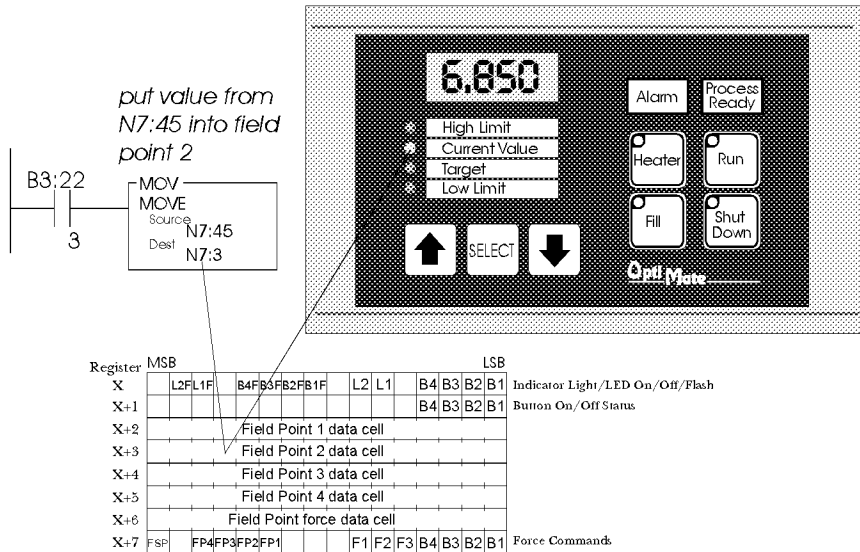
Reading a Setpoint

The following example uses an OP-613 at base address N7:0. Field point 3 has been configured as a setpoint. In the example program, field point 3 is a Target value setpoint. The program shown on the right checks a value, held in N7:52 against the setpoint. If the value exceeds the setpoint, O:0.0 will be turned on.

compare N7:52 to setpoint 3

if N7:52 is greater than setpoint 3, energize O:0.0

Register	MSB									LSB		
X	L2F	L1F	B4F	B3F	B2F	B1F	L2	L1	B4	B3	B2	B1	Indicator Light/LED On/Off/Flash
X+1								B4	B3	B2	B1	Button On/Off Status
X+2	Field Point 1 data cell										
X+3	Field Point 2 data cell										
X+4	Field Point 3 data cell										
X+5	Field Point 4 data cell										
X+6	Field Point force data cell										
X+7	FSP	FP4	FP3	FP2	FP1		F1	F2	F3	B4	B3	B2	B1	Force Commands

Using Force Functions

The OP-613 gives you the ability to force alternate buttons to a given state and force setpoints to a given value. This capability may or may not be used on a given application. There are applications when it is desirable to have the PLC program automatically set or clear a button based on operational state. There are also cases when forcing a setpoint to a predetermined value is useful. Obviously, this capability should be used carefully.

The last two registers in the register bank are associated with force operations. Their use is detailed below.

Forcing Button Status

One of the more advanced capabilities of the OP-613 panel is the ability to force button state from the PLC program. This may be desirable, for example, if an alternate action is used to start a function process. When it is pushed and while the function is active, the button will remain on. You may want the PLC program to clear the button at the end of the function process.

Another example is one of a system that has individual enable or on/off (alternate action) buttons for several different device. You may also have other buttons (probably momentary) that enable a group of these same devices. You may want your program to force on the device enable buttons when the group enable button is pressed.

There are many other cases where button force capability can be useful in a system.
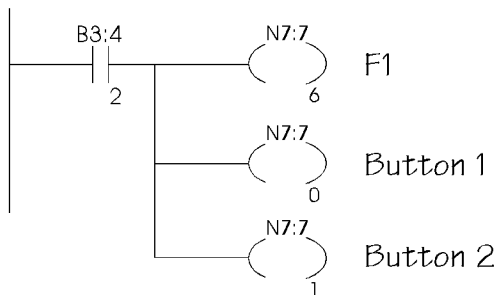
There are three types of force functions available for the OP-613 panel - force status, force on and force off. All three functions require moving appropriate data into the PLC registers defined as Force Data & Commands (see the table described in "Use with a PLC").

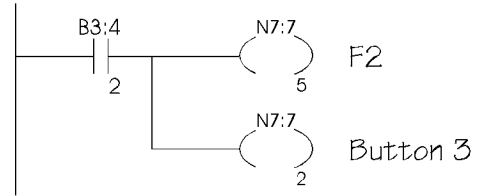**Note : Force only applies to Alternate Action pushbuttons**

Force Button Status

This function is used to set the state (on or off) of every alternate action pushbutton in the panel. To use the "Force Button Status" function, simply set the F1 bit to 1 and all buttons that you want to be on to 1, while leaving all other bits off. The example on the right shows buttons 1 and 2 being forced on and the other two buttons forced off when B3:4/2 is active.

The OP-613 will automatically clear register X+7 when the force is complete. This will normally happen very quickly (less than a second). The fact that the OP-613 clears the force control register when the operation is done can be used by the PLC program to verify operation. However, this is generally not necessary.

```
   B3:4              N7:7
  ---| |---+--------( )      F1
     2     |          6
           |        N7:7
           +--------( )      Button 1
           |          0
           |        N7:7
           +--------( )      Button 2
                      1
```
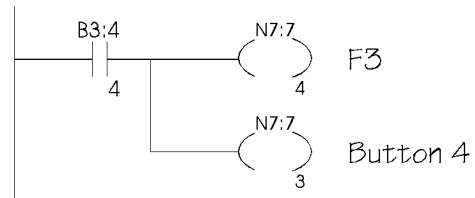
Force Button(s) On

This function is used to turn individual button(s) on without affecting the state of any other buttons. To use the "Force Buttons On" function, set the F2 bit to 1 and all buttons that you want to turn on to 1. Any buttons associated with bits that are left at '0' will not be affected. The following example shows button 3 being forced on when B3:4/2 is active.

```
   B3:4              N7:7
  ---| |---+--------( )      F2
     2     |          5
           |        N7:7
           +--------( )      Button 3
                      2
```

Clear Button(s)

This function is used to selectively turn individual button(s) off without affecting the state of any other buttons. To use the "Clear Buttons" function, set the F3 bit to 1 and all buttons that you want to turn off to 1. Any buttons associated with bits that are left as '0' will not be affected. The example on the right shows button 4 being cleared when B3:4/4 is active.

```
   B3:4              N7:7
  ---| |---+--------( )      F3
     4     |          4
           |        N7:7
           +--------( )      Button 4
                      3
```

Forcing Setpoints

The OP-613 gives you the capability to force a setpoint to a value from the PLC.

To force a setpoint to a value, the value should be placed in register X+6. Next the force setpoint bit FSP and the bit(s) corresponding to the setpoint(s) to force to this value must be set in the force control register (X+7). When the OP-613 completes the force operation, it will clear the force control register.

The following example shows setpoint 4 being forced to 4321 when B3:4/2 is active.

The force command should be written to the force register once. The OP-613 will automatically clear this register when the force is complete. This will normally happen very quickly (less than a second). The fact that the OP-613 clears the force control register when the operation is done can be used by the PLC program to verify operation. However, this is generally not necessary.
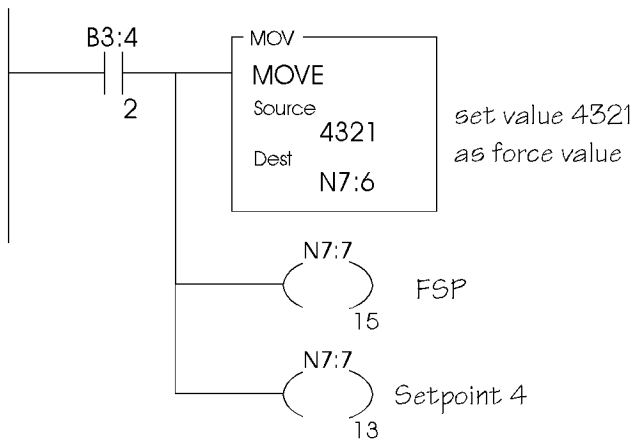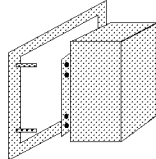
Set Up and Interconnect

Legending the Field Points, Lamps and Function Keys

Legending the OP-613 module is a relatively simple process that basically involves sliding legend transparencies into pockets in the panel overlay. Use the following procedure.
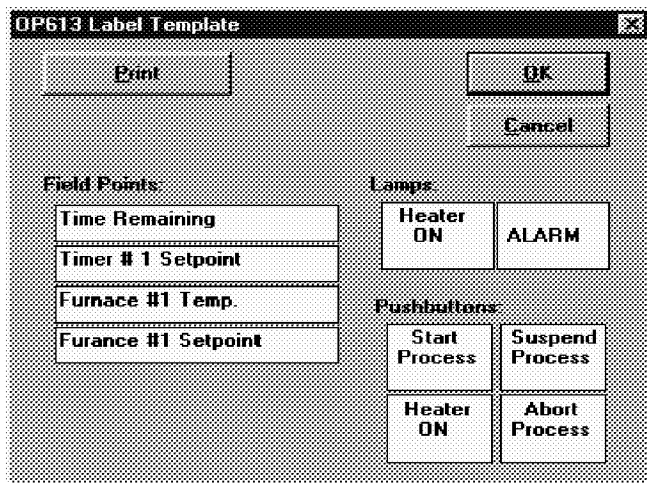
- Remove the bezel from the module. The bezel snaps to the module box along the top and bottom edges. Pull the bezel out and over the snaps to remove.
- Create legend transparencies. There are a number of available options for doing so. Patterns are provided on the next to last sheet of this document.
    - > Use the built in label making capability of the OP-WINEDIT software to create labels. Either print on the transparency directly or print on paper and photocopy onto the transparency. The figure below is a screen from OP-WINEDIT which illustrates the process.

Label Inserts

Label Insert

OP613 Label Template

Print   OK

          Cancel

Field Points:

| Time Remaining |
| Timer # 1 Setpoint |
| Furnace #1 Temp. |
| Furance #1 Setpoint |

Lamps:

| Heater ON | ALARM |

Pushbuttons:

| Start Process | Suspend Process |
| Heater ON | Abort Process |

- > Use a computer graphics program and a laser printer to create the transparency directly. Alternately print on paper and photocopy to a transparency.
- > Use press on letters onto a transparency sheet.
- > Use a typewriter or lettering machine to letter onto paper, then photocopy

- Cut along outline. Slide into overlay pocket. Pushbutton legends slide in from the bottom.
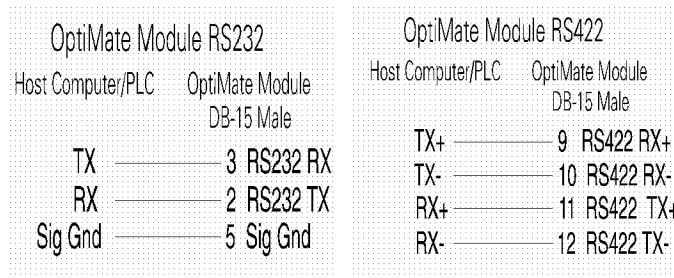- Re-attach bezel. Push bezel onto box until it snaps together.
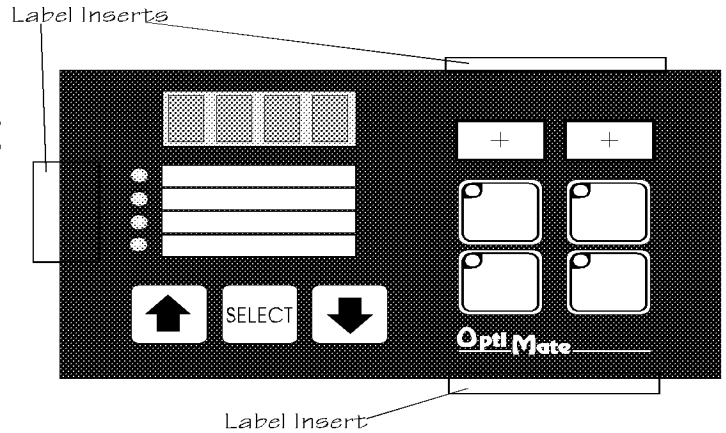
Connection to the System

OptiMate modules are designed for communications connection to system devices. The module can be connected to a computer, PLC or communication master over the serial port (RS232 or RS422).

Connection to a Computer or PLC

Connection of an OptiMate module to a computer or PLC can be accomplished over either an RS232 or RS422 link. RS232 is limited to one OptiMate module to one computer serial port. RS422 allows up to 31 modules to be connected to one computer port. Since PLCs are slave devices, the RS422 link for a PLC is limited to one OptiMate module.

Refer to manufacturer's documentation for PLC or computer serial link connector pinouts.

OptiMate Module RS232	
Host Computer/PLC	OptiMate Module DB-15 Male
TX ————————	3 RS232 RX
RX ————————	2 RS232 TX
Sig Gnd ———————	5 Sig Gnd

OptiMate Module RS422	
Host Computer/PLC	OptiMate Module DB-15 Male
TX+ ————————	9 RS422 RX+
TX- ————————	10 RS422 RX-
RX+ ————————	11 RS422 TX+
RX- ————————	12 RS422 TX-

Standard cables are available for connection to several different PLCs as well as to IBM PCAT compatible ports.

Serial Connection to Communications Master

Connection to an Optimation Communications Master over a serial link is via RS422. The Communication master port connections are reversed from the module ports to enable direct pin to pin connection. For distances under 50 feet (in a low electrical noise environment), a ribbon cable connection works quite well. For longer distances or in noisy environments, a two pair shielded RS422 cable is recommended.

Termination

The termination DIP switch on the back of the panel switches in a terminating resistor. This terminating resistor does not apply to an RS232 connection (and should be in the OFF position for RS232). In an RS422 connected system, such as with the OP-9001 Communication Master, the termination should be on in the last, and only the last, panel on the cable.

Run | ON Pgm / Term
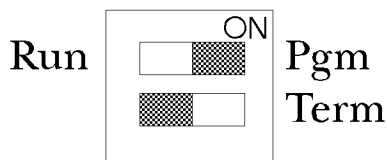
Power

The OP-613 panel will operate on any DC voltage between 8 and 30VDC. Steady state current is listed on the specification page.

There is a very brief (0.5 - 2 millisecond) power on surge up to 1.5 amps. This is typical of nearly any type of electronic equipment and is due to the initial charging of power capacitors. This surge is not normally a problem for a commercial power supply.

Configuration

Configuration of the OP-613 operator panel or system of OptiMate panels is performed via an IBM PC compatible computer. The OP-WINEDIT configuration software that allows you to select panel type, panel application, system configuration and PLC protocol definition.

If the OP-613 is to be operated stand alone with a PLC, the configuration selection must be made to select the proper PLC protocol information. If it is part of a multi-panel system, the OP-WINEDIT software will automatically set up communications between the OP-9001 and the panel via OptiMate Hex.

Note : When configuring, always remember to set the Run/Pgm DIP switch on the back of the panel to Pgm (towards the "ON") before applying power to the module. When you are finished downloading the

Run [ON switch] Pgm / Term
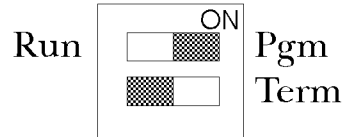
configuration, power down the panel and switch to the "Run" position before connecting to the PLC.

Specific configuration of the OP-613 begins with defining the block of PLC register data to be used. Next, each of the function buttons must be configured for either momentary or alternate action operation. Then each of the field points must be configured for setpoint or display. Additional options exist for setpoint range limits, LED separation (or not), and force enable/disable.

OP613 Configuration

Panel Address: 0
PLC Base Register Address: V2000

Write to Panel   **Close**   **Labels**

Panel

Pushbuttons
	A	M
#1:	●	○
#2:	●	○
#3:	○	●
#4:	○	●

[A = Alternate]
[M = Momentary]

Options
Force Option   ☐
LED Separation ☐

Configure Field Points:

To modify a field point, type the point number in the box below or select the point from the list, then press the 'Modify' button.

Configure Field Point#: 2   **Modify**

Point	Type	Format	Digits	Range
1:	Setpoint	BCD	0	0-9999
2:	Display	BCD	0	
3:	Setpoint	BCD	0	0-9999
4:	Setpoint	BCD	0	0-9999

Configuration Selections

OptiMate modules can be configured for the specific application by using the OptiMate Configuration Editor. The Configuration Editor runs on any IBM PC compatible computer. It allows the user to select the exact functionality to meet application requirements.

For the OP-613 module, the following are important configuration parameters.

## Single Panel PLC Based Systems

Decision	Selection
Single/ Multi Module	Choose single module configuration
Configuration starting point	First time configuration start with defaults for module. Subsequent configurations can utilize disk files you create
PLC Type	Select appropriate PLC type
Protocol	Select appropriate baud rate, # data bits, # stop bits & parity. Note that if 8 data bits and even or odd parity selected, only 1 stop bit is available
Buttons	Select momentary or alternate action as required for your application
Field Points	Define as setpoints or display points as required. Define number format in PLC (binary or BCD) For setpoints, define limits.
LED separation	If the LEDs inset in the momentary pushbuttons are to be controlled by the PLC program, rather than reflect button state, enable. Otherwise, disable.
Force option	If you intend to force button states or setpoint values, enable the force option.

## Multi Panel PLC Applications (Uses Communications Master)

Decision	Selection
Single/Multi Module	Chose Multi panel
PLC Type	This applies to the Communications master. Choose appropriate type
Address	Each panel must have a unique address.
Protocol	This applies to the Communications master. Choose appropriate baud rate, # bits, # stop bits & parity. Note that if 8 data bits and even or odd parity are selected, only 1 stop bit is available.
Module Protocol	Choose OptiMate Hex
Buttons	Select momentary or alternate action as required for your application
Field Points	Define as setpoints or display points as required. Define number format in PLC (binary or BCD) For setpoints, define limits.
LED separation	If the LEDs inset in the momentary pushbuttons are to be controlled by the PLC program, rather than reflect button state, enable. Otherwise, disable.
Force option	If you intend to force button states of setpoint values, enable the force option.

Configuration must be downloaded from the IBM PC compatible to each module. This is done over the serial link. Module address must be selected for PGM (DIP switch on back of module) prior to application of power for module to accept configuration data. The module must be powered down and the DIP switch changed to "Run" before re-applying power for the module to operate with the selected host. Communication cable is available from Optimation.
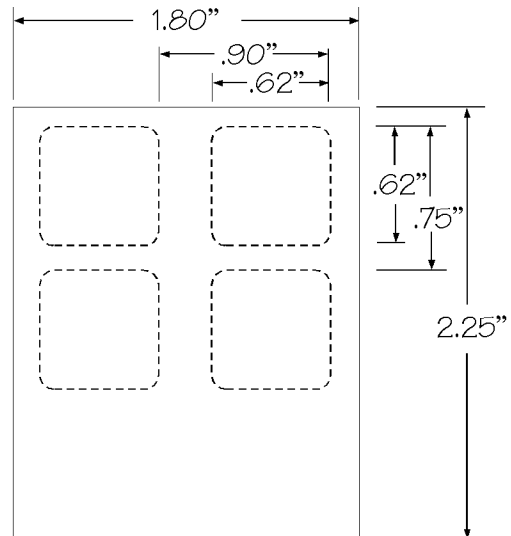
Label Templates
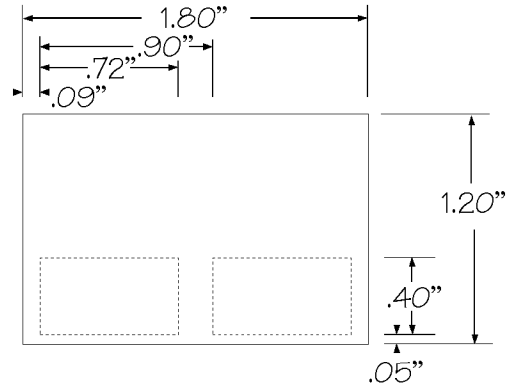
Lamp Label Insert Template
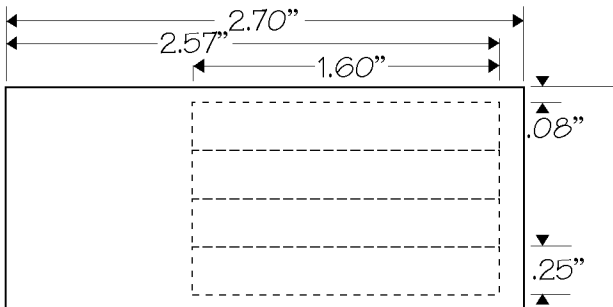
Field Point Label Insert Template

Pushbutton Label Insert Template

Specifications

Physical
- Recessed Mount Housing 6.6"L x 4.0"H x 1.25"D
- Cutout size for above 3.55"Hx5.80"L
- Panel Fasteners : Four, 6x32 threaded studs, shown above (on ends, symmetrical about center line)
- Weight : 10 ounces
- Colors : Dark gray housing with dark gray panel. Keypad keys; white with gray letters. Function keys ; White with user supplied label.
- Numeric LED height : 0.35 inch
- Pushbutton life : 1,000,000 switch cycles
- Lamp Colors : Red, Green
- Lamp window size : 0.7" x 0.4"

Panel Cutout

Housing Outline

4.00"   3.55"   2.00"

5.80"

6.20"

6.60"
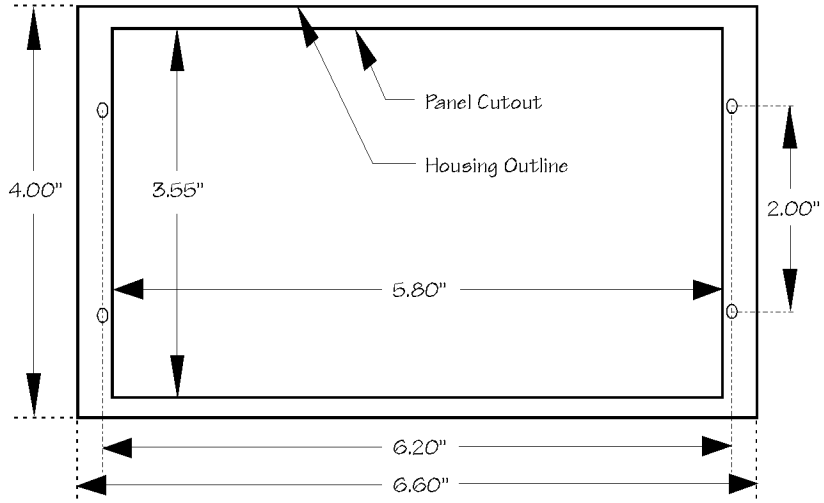
Panel Mounting Dimensions

Electrical
- Power (all lamps on) :   8 - 30VDC @ 2.2Watts
       180 mA @ 12VDC   90 mA @ 24VDC
- Power On Surge (see figure below)
       1.5A for 2 milliseconds max

0.005
Seconds
Power on Surge
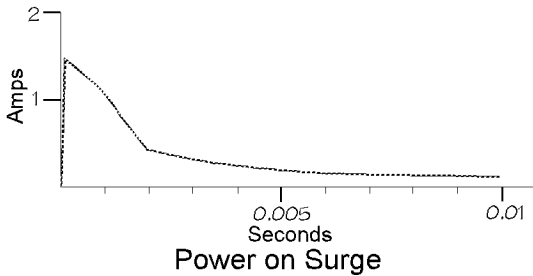
Environmental
- Enclosure   -   NEMA 4 (when properly installed)
- Temperature   - 0 to 50 C
- Humidity   - 95% Non-condensing

- Power connector :
       Pluggable terminal block, 2 position

Communications
- RS232 and RS422
- 4800 to 19200 baud
- Compatible with major PLC protocols
- 15 pin female 'D' shell connector
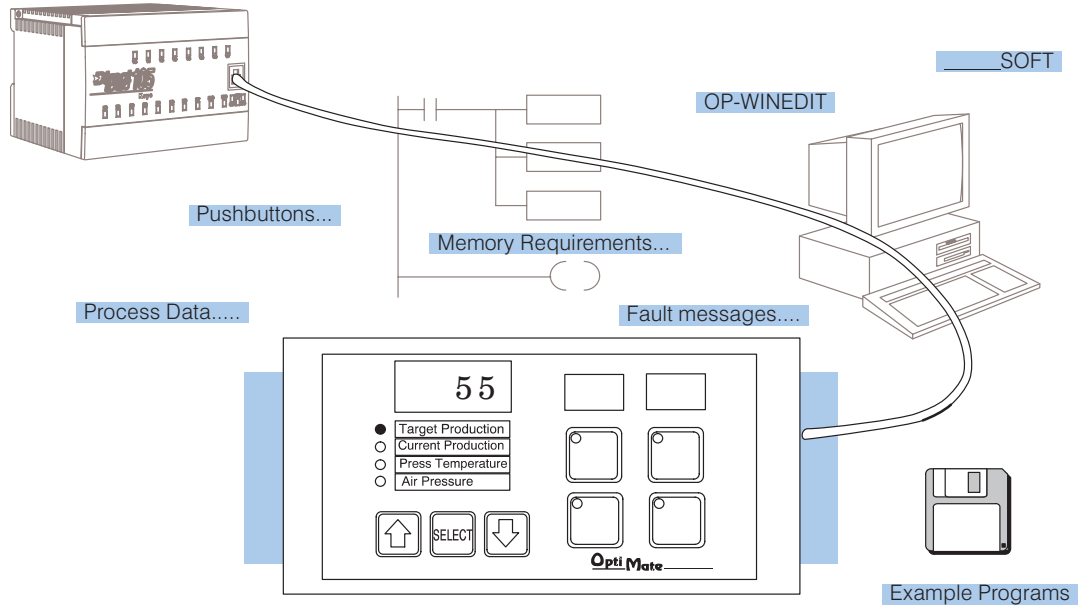
Communications Failure Operation
Should the module (when not selected for configuration) ever fail to communicate successfully for a period of 12 seconds, the light bars and LEDs will flash rapidly.

Appendix A
Example Programs

A

In This Chapter. . . .
— Installing Example Programs
— Selecting and Connecting Cables
— Running Example Programs
— Program Worksheets

Understanding the Example Programs

One of the best ways to learn how to use the OP-panel is to load the example programs which are on the supplied diskette, and run the program for your PLC. The example program provides ladder logic which demonstrates controlling pushbuttons, LEDs, lamps, and force operations. Use an understanding of this example program to help develop programs for your own applications.

Follow the instructions in this chapter for installing and running the example programs.

Software Requirements

The example programs require that you have two software packages loaded on your personal computer:

- *Direct*SOFT programming software, and
- OP-WINEDIT (OptiMate Editor) configuration software.

If you do not have these software packages, obtain and install them on your personal computer using the instructions in their user manuals.

Once you have both programs installed on your personal computer you are ready to use the following step-by-step instructions for installing and using the example programs.

9 Steps to Using the Example Programs

Step 1: Power Supply Connections

An external power supply should be used to power the Optimation unit. The power supply must supply a voltage of 8 to 30 VDC. Connect the power supply using the supplied terminal block connector. The connector is keyed to prevent reversing the polarity. Pin 1 is the positive connection (8 to 30VDC), while pin 2 is the common (0VDC) or ground connection.

Use 18–24 AWG conductor wire and connect the power supply to the supplied connector block as follows: Connect the positive (+8 to 30 VDC) lead to terminal 1, and connect the common ground (0V) lead to terminal 2.
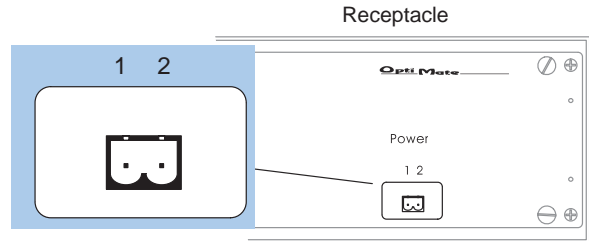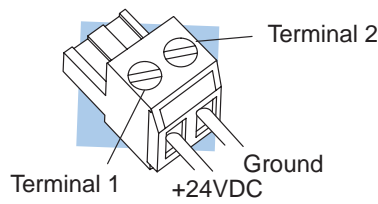
Plug the terminal block connector into Power receptacle located on the back side of the panel.

**Step 1A: Multi-Panel Power Supply Connections (Optional)**

In multi-panel applications, if using separate power supplies, make sure the electrical ground commons do not have a great potential difference. When using a *single* power supply in a *multi-panel* application, the power supply must maintain the specified voltage and current consumption for each of the individual units under all conditions (including power-up). See individual panel power requirements.
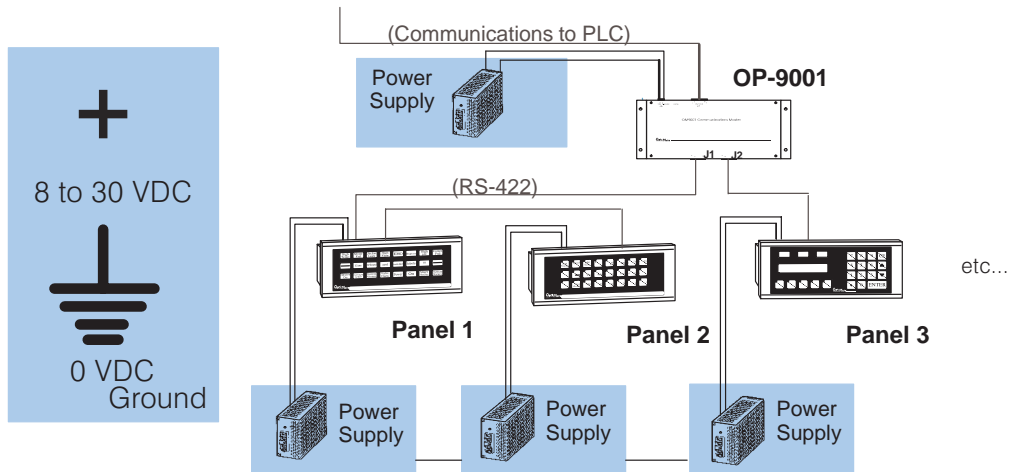
Step 2: Setting the OP-Panel PGM/RUN DIP Switch to PGM

You may generate your OP-panel configuration off-line. To download your configuration, the PGM/RUN DIP switch located on the back of the OP-panel must be set to PGM (ON). The TERM switch should remain off.

NOTE: You must cycle power to the panel (turn power off, set DIP switch, and turn power back on) to activate the new switch settings.
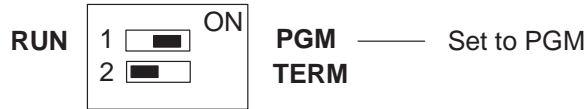
For multi-panel configurations, see the section titled OP-9001 Multi-Panel Configurations towards the end of this chapter.

Step 3: Selecting Cables

Depending on which PLC you are using, you may require as many as three cables to use the example programs:

- An OP–ACBL–1 configuration cable to connect your personal computer to the OP-panel to load the configuration program into the panel. *All panels* use the OP–ACBL–1 for the configuration cable. This cable is also used to connect an OP-panel to an Allen-Bradley SLC 500 CPU.

- A cable to connect your personal computer to the PLC to load the *Direct*SOFT example ladder programs into your PLC. See the *Direct*SOFT user manual for help in selecting the proper cable to use with your PLC.

- A cable to connect the OP-panel to the PLC. Use the information on the next two pages to select the proper cable to use with your PLC.

Choosing Your Connecting Cables

Depending on which PLC you are using, you may require as many as two cables. Here are the requirements:

- **OP-ACBL-1:** *all* units require this cable for configuration. This is a 9-pin female to 15-pin male cable that connects your personal computer to the OP-panel. This cable is also used to connect an OP-panel to the Allen-Bradley SLC 500 CPUs listed.

- **CPU Cables:** You will also need the appropriate cable to connect your CPU to the OP-panel. Use the chart shown to the right to choose the correct communications cable.

OP-9001 Cable Connectors

If you're planning to use multiple panels and an OP-9001, then you will need to build your own custom cables. Since the proper cable choice really depends on your application, we offer the following connectors.

- **OP-CMCON–1** — pack of 4 ribbon cable connectors.

- **OP-CMCON–2** — pack of 4 solder-type connectors.

- **OP-CMCON–3** — pack of 2 D–shell connectors with screw terminals for use with OP-9001 & multiple OP-panels.

- **OP-PSCON** — pack of 4 power supply block connectors.

For electrically noisy environments, we recommend an individually paired and shielded cable, such as Belden 9729 or equivalent. This type of cable requires the solder-type or D-shell with screw terminal connectors. For distance of 30 feet or less, you can use ribbon cable. For ribbon cable, we recommend Belden 9L28015 or 3M 3365/15.
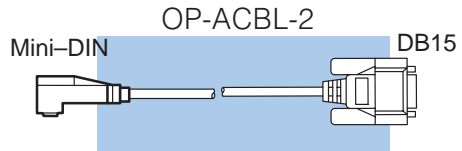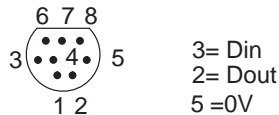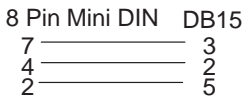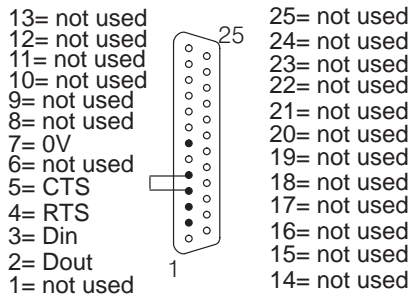
OptiMate Cables			
Family	**CPU (or other device)**	**Port**	**Cable**
*Direct*LOGIC™ DL105	DL130	Only port	OP–2CBL
*Direct*LOGIC™ DL205	DL230	Only port	OP–2CBL
	DL240	Top port	OP–2CBL
		Bottom port	OP–2CBL
	DL250	Top port	OP–2CBL
		Bottom port	OP–2CBL–1
	D2–DCM (module)	Only port	OP–4CBL–2
*Direct*LOGIC™ DL305	DL330	Requires DCU*	OP–4CBL–2
	DL330P	Requires DCU*	OP–4CBL–2
	DL340	Top port	OP–3CBL
		Bottom port	OP–3CBL
	DL350	Top port	OP–2CBL
		Bottom port	OP–4CBL-2
*Direct*LOGIC™ DL405	DL430	Top port (15-pin)	OP–4CBL–1
		Bottom port (25-pin)	OP–4CBL–2
	DL440**	Top port	OP–4CBL–1
		Bottom port	OP–4CBL–2
	DL450	Phone Jack	OP–2CBL
		Top port (15-pin)	OP–4CBL–1
		Bottom port (25-pin)	OP–4CBL–2
	D4–DCM (module)	Only port	OP–4CBL–2
	Slice I/O panels	Only port	OP–4CBL–1
GE® Series 1	IC610CPU105/106	Requires DCU*	OP–4CBL–2
GE® Series™ 90/30	All Models (311–351)	RS232, RS422 Serial Port	OP–GCBL–1
GE® Fanuc™ Series 90 Micro	All Models	RS232, RS422 Serial Port	OP–GCBL–1
MODICON	ModBus	RJ45 port	OP–MCBL–1
TI305™ / SIMATIC® TI305™	325–07, PPX:325–07	Requires DCU*	OP–4CBL–2
	330–37, PPX:330–37	Requires DCU*	OP–4CBL–2
	325S–07 (or 325 w/ Stage Kt)	Requires DCU*	OP–4CBL–2
	330S–37, PPX:330S–37	Requires DCU*	OP–4CBL–2
	335–37, PPX:335–37	Phone Jacks	OP–3CBL
		If DCU is used*	OP–4CBL–2
TI405™ / SIMATIC® TI405™	425–CPU, PPX:425–CPU **	Only port	OP–4CBL–1
	PPX:430–CPU	Top port (15-pin)	OP–4CBL–1
		Bottom port (25-pin)	OP–4CBL–2
	435–CPU, PPX:435–CPU **	Top port (15-pin)	OP–4CBL–1
		Bottom port (25-pin)	OP–4CBL–2
	Smart Slice™ I/O panels	Only port	OP–4CBL–1
A–B SLC 500	5/03, 5/04	Bottom port	OP–ACBL–1
A-B	MicroLogix	Only port	OP–ACBL–2

* — requires RS232 Data Communications Unit (D3–232–DCU)

**— also DC versions

Connecting Cable Details

Connecting Cable The OP–613 connecting cable may vary depending on which CPU you use. Refer to the previous page to select the proper cable for connecting to your PLC.

PLC

RJ12 (PLC)   DB15
4 ————————— 3
3 ————————— 2
1 ————————— 5

1= 0V   RJ12
2= not used
3= Din
4= Dout
5= not used
6= not used
1 2 3 4 5 6

OP-2CBL
RJ12   DB15
(6P6C)

RJ11 (PLC)   DB15
2 ————————— 3
1 ————————— 2
4 ————————— 5

1= Din   RJ11
2= Dout
3= not used
4= 0V
1 2 3 4

OP-3CBL
RJ11   DB15
(4P4C)

DB15 (PLC)   DB15
2 ————————— 3
3 ————————— 2
4 ————————— 5
13
14
15
1
7
8

8= YOM   15   15= tied (0V)
7= CTS   14= tied (0V)
6= not used   13= tied (0V)
5= not used   12= not used
4= On-line   11= not used
3= Din   10= not used
2= Dout   9= not used
1= YOP   1

OP-4CBL-1
DB15   DB15

DB25 (PLC)   DB15
2 ————————— 3
3 ————————— 2
7 ————————— 5
4
5

13= not used   25   25= not used
12= not used   24= not used
11= not used   23= not used
10= not used   22= not used
9= not used   21= not used
8= not used   20= not used
7= 0V   19= not used
6= not used   18= not used
5= CTS   17= not used
4= RTS   16= not used
3= Din   15= not used
2= Dout   1   14= not used
1= not used

OP-4CBL-2
DB25   DB15

8 Pin Mini DIN   DB15
7 ————————— 3
4 ————————— 2
2 ————————— 5

6 7 8
3 (4) 5   3= Din
1 2   2= Dout
                5 =0V

OP-ACBL-2
Mini–DIN   DB15

RS-422 Pinout

PLC   Panel
Din + ———— 11 = Dout+
Din – ———— 12 = Dout –
Dout + ———— 9 = Din +
Dout – ———— 10 = Din–
0V ———— 5 =0V

RTS+
CTS+
RTS–
CTS–

Panel
1

9= not used   1= not used
10= not used   2= Dout
11= not used   3= Din
12= not used   4= not used
13= not used   5= 0V
14= not used   6= not used
15= not used   7= not used
                   8= not used
15
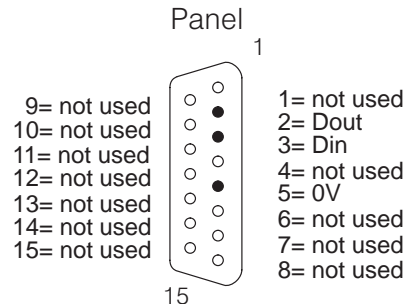
Step 4: Connecting Configuration Cable OP–ACBL–1

Once the example programs are loaded in your personal computer, the first step will be to load the configuration program from the computer into the OP-panel, so make this cable connection first. Connect the configuration cable between the serial port of the OP-panel and the serial port of the personal computer when configuring panels using the OP-WINEDIT software. The OP-WINEDIT software requires you to select the serial port number (com1, com2) being used for configuration. The figure below shows programming cable connectors and wiring specifications. Wiring diagrams refer to the cable connectors, *not* the communication ports.

OP-ACBL-1

(OP-1500 shown, but connections are the same for other OP-panels)

Computer

Panel

Cable Connector

5= 0V
4= not used
3= Dout
2= Din
1= not used

9=not used
8= CTS
7= RTS
6=not used

Female DB9	Male DB15
3	3
2	2
5	5
7	
8	

9= not used
10= not used
11= not used
12= not used
13= not used
14= not used
15= not used

1= not used
2= Dout
3= Din
4= not used
5= 0V
6= not used
7= not used
8= not used

Cable Connector
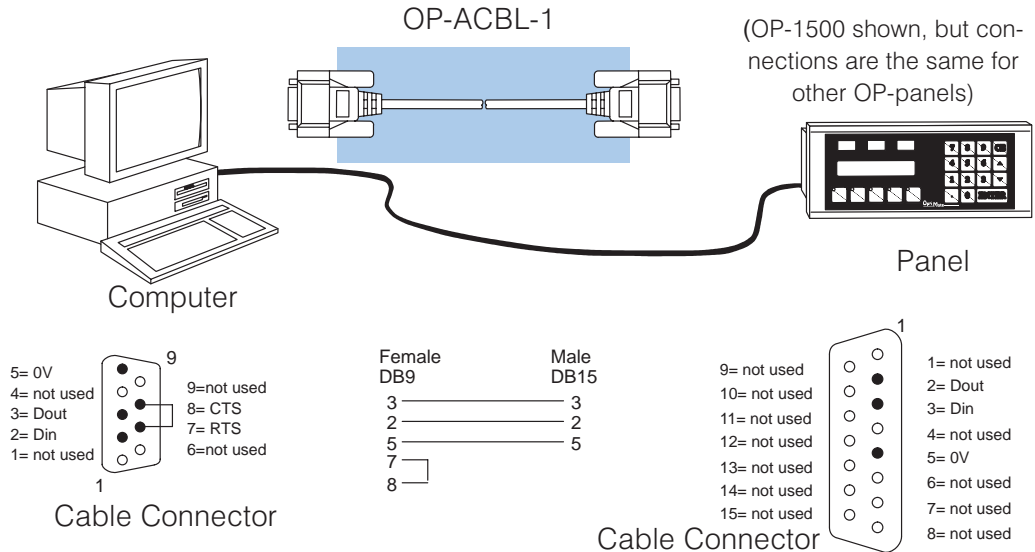
Step 5: Installing the Example Programs on Your Personal Computer Hard Drive

It is possible to load the examples from the diskette; however, we recommend copying them to the hard drive in your computer and keeping the original diskette in a safe place.

a:\filename.prj
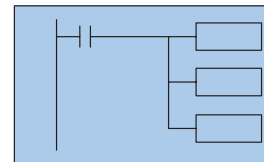
To install the example programs if **using Windows 3.1**, follow these steps:

1. Call up the DOS Prompt. Make a new directory on the hard drive in your computer. For example,
    if the hard drive is drive C and you are using an OP-613 panel, type:

    MD C:\OP–613

2. Copy all the files from the example program disk to the new directory. For example, if the diskette is in drive A: and the hard drive is drive C:, type:

    COPY A:*.* C:\OP–613*.*

To install the example programs if **using WIN 95**, follow these steps:

1. Select the **Explorer** icon and open. If the hard drive is drive C, select the **(C:)** icon.

2. Make a new directory in the hard drive of your computer. For example, if you are using an OP-613 panel, Select the **File** menu, then select **New** and then **Folder**. Notice the **New Folder** icon that appears. Select the folder and name it "OP-613" by selecting the **File** menu and selecting **Rename**. Type in the new name.

3. Copy all the contents of the example program disk. Insert the diskette in drive A, and select and open the **3 1/2 Floppy (A)** icon. Notice the disk has numerous files of example programs. Select all the programs by opening the **Edit** menu and selecting **Select All**. Open the **Edit** menu again and select **Copy**.

4. Paste the program disk contents into the new C drive "OP–613" directory. Open the "OP–613" directory, open the **Edit** menu and select **Paste**.

The example programs are now loaded onto the hard drive of your computer. Remove the diskette from drive A.

Step 6: Loading the OP–WINEDIT Example Program into the OP–Panel

The next step is to load the configuration program into the OP-panel as follows:

1. Open the OP-WINEDIT (also called OPEditor) software.

2. When the initial screen appears, select **Existing System**.

3. A **File Open** window appears. Open the example program file that you just loaded on your hard drive ("OP-613"). A list of files appears, all having ".ocf" after the file name. These are all configuration programs.

4. Select the configuration program for the OP-panel and PLC you are using. For example, if you are using an OP-613 panel with a DL205 PLC, select and open the file titled "613_205.ocf".

5. A screen appears having all the configuration parameters for running the example program using an OP-613 with a DL205 PLC. Make sure your OP–ACBL–1 cable is connected between your personal computer and the OP-panel, that the DIP switch slides are set to ON, and that the OP-panel power supply is on. Select **Configure Panel.**

6. When the next window appears, select **Write to Panel**. This loads the program into the OP-panel.

7. After the program is loaded, close the open windows and select **Exit Software**. This closes out the OP-WINEDIT software.

The OP-panel is now configured, and the OP-ACBL-1 cable can be disconnected.

Step 7: Setting the OP-Panel PRG/RUN DIP Switch to RUN

To run the example programs, set the RUN/PRG DIP switch to RUN.

NOTE: You must cycle power to the panel (turn power off, set DIP switch, and turn power back on) to activate new switch settings.

Set to RUN ———— **RUN** | 1 ◼ ON | **PGM**
2 ◼ **TERM**

Step 8: Loading the *Direct*SOFT Example Program into the PLC

The next step is to load the *Direc*tSOFT example program into the PLC as follows:

1. Connect the communications cable from your personal computer communications port to your PLC's programming port on the CPU.
2. Start ***Direct*SOFT** on your personal computer.
3. Select **Open Document.**
4. A dialog box appears. Open the example program file that you just loaded on your hard drive ("OP-613"). A list of files appears, all having ".prj" after the file name. These are the example program files. Notice that the program files are named for the OP-panel and PLC being used and end with ".prj".
5. Select the example program for the OP-panel and PLC you are using. For example, if you are using an OP-613 panel with a DL205 PLC, select and open the file titled "613_205.prj". When the program opens, its ladder rungs will appear on the monitor screen.
6. Select the **PLC** menu, then **Connect**, then select the link to use. All the program examples are saved without PLC link information, so you have to re-connect to your particular CPU. If a message appears which asks you to select the source of program to view, select **Disk.**
7. Make sure the CPU is in Program mode. Then download the program to the CPU. One method is to select the **File** menu, **Write Program**..., then select **To PLC**.
8. When the program download is complete, put the CPU in Run Mode. Select the **PLC** menu, **PLC Modes**..., then select **Run**. The program is now running.

Step 9: Connecting the OP-Panel to the PLC and Running the Program

The next step is to connect the OP-panel to the PLC using the cable you selected earlier. Once the OP-panel is connected to the PLC you can run the example program. Read through the following section, Running The OP-613 Example Program, while at the same time actually running the program on your OP-panel. It would be helpful to print a hardcopy of the example program and study the ladder logic to see how the program operates.

Running the OP-613 Example Program

The example program demonstrates the main features of the OP-613 panel:
- Custom pushbutton configuration
- Custom pushbutton LED configuration
- Custom lamp configuration
- The four field points and the four-digit numeric LED display
- Force operations.
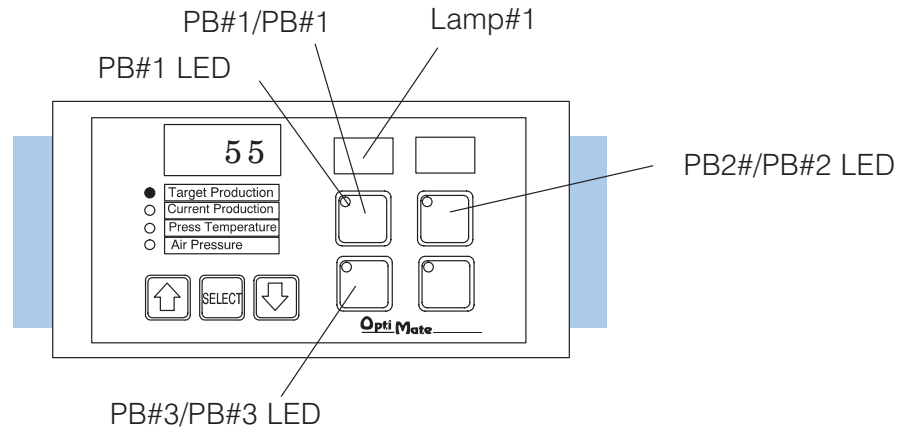
If you look at the pre-configured OP-WINEDIT program you loaded into the OP-panel earlier, notice that the four pushbuttons are set for momentary operation and that the Force Option and LED Separation features are both activated (see Configuration section for configuration details).

The example program operates as follows:

Notice that the pushbutton PB#1 LED is flashing. This LED is programmed to do this at CPU powerup.

Next, press pushbutton PB#1. Pushbutton PB#1 LED and Lamp#1 both start flashing for a short period of time, then Lamp#1 and pushbutton PB#3 LED both go on steady while PB#1 LED goes off.

Press pushbutton PB#1 again. Pushbutton PB#1 LED and Lamp#1 both start flashing for a short period of time, then Lamp#1 and pushbutton PB#3 LED both go on steady while PB#1 LED goes off.

Next, press pushbutton PB#3 and notice that Lamp#1 flashes for a very short period of time and then stays on steady. Pushbutton PB#3 LED stays on.

Press the **Select** pushbutton repeatedly to scroll through the four field point locations and view their contents on the four-digit numeric display. Select the top field point location and notice that the number "55" is entered. Use the up/down (▲▼) arrow keys to change the numeric value in this location, then press PB#2 and notice that "55" is forced into this location.

Print a hardcopy of the example program and study the ladder logic to see how the program operates. Hopefully this example will help you utilize the OP-panel for your own applications.

OP-9001 Multi-Panel Configurations

If you are connecting more than one OptiMate panel to a single CPU this is referred to as multi-panel configuration. Multi-panel configurations require the OP-9001 Communications Master, which the CPU communicates to for obtaining data from the connected OP-panels. The OP-9001 Communications Master looks for an address within the range of 0 to 30 for each panel connected. Each panel connected in a RS-422 link must have a unique address. A more detailed description of multiple panel configuration and installation is given in the OP–9001-M User Manual.

The Termination Resistor

The last panel must be terminated when using a RS-422 communications link by setting DIP switch 2 to the TERM (ON) position. Operator panels communicatiing more than 50 feet distance *must* use RS-422 and also be properly terminated.

NOTE: Only the *last* panel of each RS-422 link should have the termination DIP switch 2 set to the TERM position. All other panels should have the DIP switch set to the off (left) position. After changing the DIP switch settings, remember to cycle power on panel to activate the new switch settings.

Appendix B
Troubleshooting the
OP–613

In This Chapter. . . .

Troubleshooting the OP-613 Panel

Troubleshooting

In this section, we explain how to isolate potential problems which may occur while using the OP-613. If you are unable to troubleshoot and correct your problem using these procedures, please contact our technical product support team between the hours of 9:00 AM and 6:00 PM (EST) Monday through Friday. Call **1–800–633–0405** or fax **(770) 889–7876**.

We have organized the troubleshooting section into two categories:

- Panel configuration problems
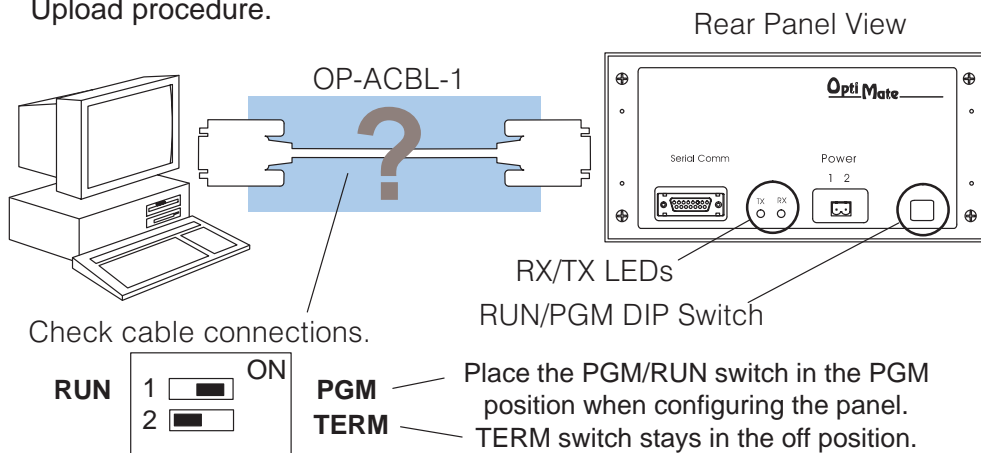- Panel and PLC communications failures

Panel Configuration Problems

We explained in previous sections that the OP–WINEDIT configuration software is used to create OP-panel applications and to download and upload your OP-panel programs. If you are online with the panel and communications fails, the following error message is displayed:

"Could not communicate with panel"   (OP–WINEDIT)

If this occurs, check the following in the order given:

1. Check the rear panel RX/TX LEDs while attempting the Upload or Download operation. Both LEDs should be giving slow alternating flash signals, indicating the PC and OP–panel are connected. If *only* the TX (transmitter) LED is flashing, or if the TX/RX LEDs are *not* alternating between flashes, check that the OP–panel is set to the configuration mode by setting the RUN/PGM DIP switch to the PGM position.

2. Check to make sure the configuration cable **(OP–ACBL–1)** is properly connected. For cable details, refer to the Appendix A, Connecting the Configuration Cable OP–ACBL–1 section.

3. Make sure the correct communications port is selected with the software, such as COM1, COM2, COM3, COM4. If *Direct*SOFT is open, close it down while you are configuring the panel.

4. Check the 24VDC power source and connections.

5. After checking the above items, repeat the online panel Download or Upload procedure.

Rear Panel View

OP-ACBL-1

RX/TX LEDs

RUN/PGM DIP Switch

Check cable connections.

Place the PGM/RUN switch in the PGM position when configuring the panel.
TERM switch stays in the off position.

Panel to PLC Communications Problems

If you experience communications difficulties between the OP-panel and PLC for a period of twelve seconds, the light bars and LEDs will flash rapidly.
In this case, you should check the following items:

1. Observe the TX and RX LEDs on the rear of the panel. Both LEDs should be a steady flash or glow (depending on baud rate). If not, check and make sure you are using the proper communications cable and that it is securely connected.

2. Examine the PGM/RUN DIP switch to make sure it is placed in the RUN position to load and run the ladder program. You must cycle OP-panel power for address switch changes to take effect.

Rear Panel View

RX/TX LEDs

PGM/RUN DIP Switch

RUN | 1 | ON | **PGM**
2 | | **TERM**
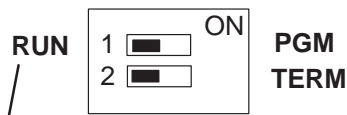
Place the PGM/RUN switch in the RUN position when running the program.
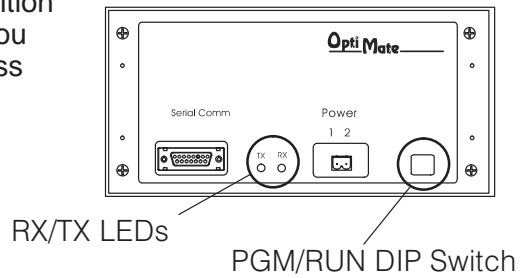
3. Examine the communications information for the proper PLC type, protocol type, baud rate, parity, stop bit, address number. Use the user manual for the PLC product you are using to determine the proper settings.

4. If you are using an OP cable, verify cable pinout. For RS422 connections use a Belden 9729 or equivalent cable.

5. Check 24VDC power source and connections.

Direct
LOGIC
PLC

*Direct*LOGIC **PLCs :** If you are using the secondary communications port such as *Direct*LOGIC PLC port 2, ensure the communications port address and protocol setting match.

PLC Model		Port/Baud Rates	Parity	Stop Bit
DL105/230/240	Top	9600	Odd	1
	Bottom	Bottom (DL240 only) 9600/19.2k	Odd/None	
DL250	Top	9600	Odd/None	1
	Bottom	9600/19.2K		
DL330	DCU only	4800/9600/19.2k	Odd/None	1
DL340	Bottom &Top	4800/9600/19.2k	Odd/None	1
DL350	Top	9600	Odd	1
	Bottom	4800/9600/19.2K		
DL430/440	Top	Top 9600	Odd	1
	Bottom	9600/19.2k	Odd/None	
DL450	DB15	9600	Odd	1
	DB25	9600/19.2k	Odd/None	
	RJ12	9600/19.2k	Odd/None	

Allen-Bradley Panel to PLC Communications Problems

For Allen-Bradley, you may connect to Channel 0 (bottom serial port), using DF1 in full duplex mode. Additionally, the Allen-Bradley software allows the bottom port to a unique PLC address. The Allen-Bradley software default is PLC address one. You must ensure the OP-panel configuration address matches the PLC address you have assigned. The Allen-Bradley port only communicates using either 4800 or 9600 baud. No other baud rates are supported between the OP-panel and Allen-Bradley PLC. For example, on Allen-Bradley PLC's the serial port baud rate defaults to 1200 baud and must be changed. The baud rate for channel 0 must be set to 4800 or 9600 baud to match the OP–WINEDIT configuration. Also the base memory area must be expanded to include the full range of registers such as N7:0 through N7:7.

OTHER

PLC

OTHER PLCs : Regardless of which PLC brand you are implementing, the communications parameters should be reviewed and properly configured. Please check the appropriate manual for your PLC product to ensure proper communications port and panel type settings.