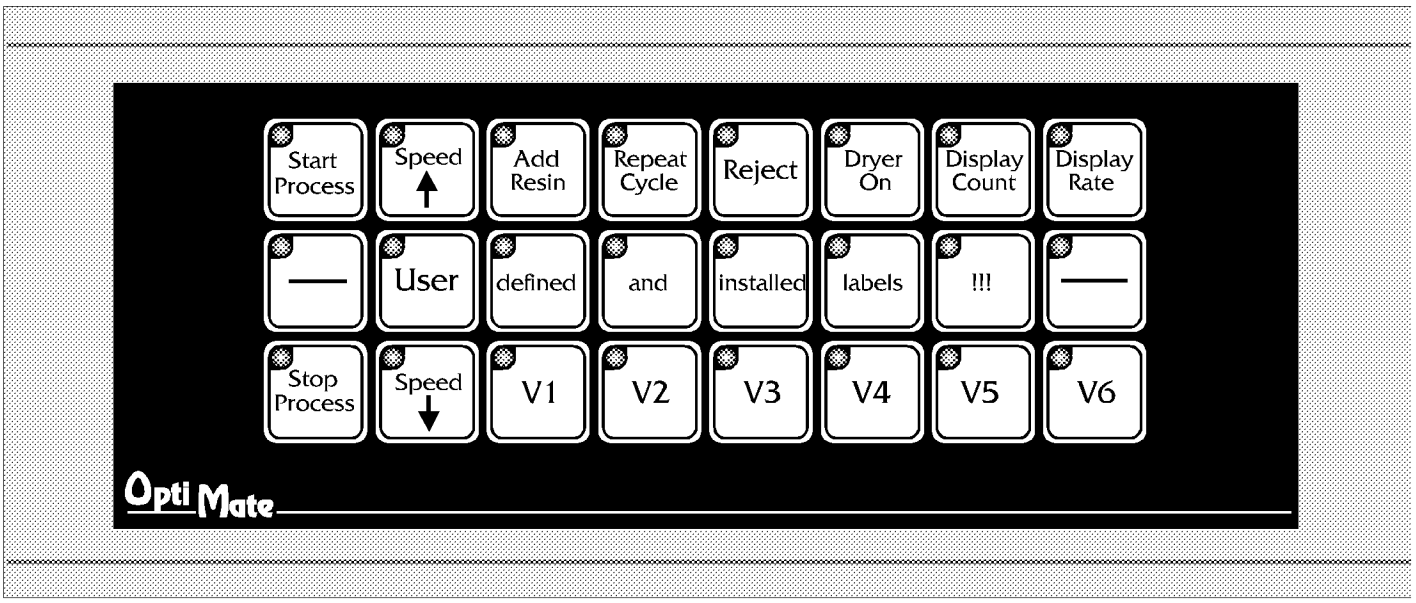

OM1224 Pushbutton Module

General Overview

The OM1224 Pushbutton Panel features 24 user-legendable pushbuttons arranged in three rows of eight buttons. Each of the buttons can be individually configured to operate as either a momentary or alternate-action pushbutton.

Buttons can be custom labeled by the user with a plastic insert. The insert can be custom legended with text and/or graphics, and slipped into a protective pocket behind the faceplate.

The OM1224 Pushbutton Panel is part of Optimation's **OptiMate®** series. Each OptiMate module is designed to connect to a microprocessor or most PLC's with a single cable connection. OptiMate modules can be used individually, or together with any combination of other OptiMate modules.

When used with a microprocessor system, simple communications over either an RS232 or RS422 communications cable allow the microprocessor to directly read the state of each button.

When used with a PLC, operation is transparent to the user. All the user must do to retrieve button status is to read PLC registers. The OM1224 takes care of the rest.

Applications

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

Features

- 24 tactile-snap membrane pushbuttons
- Independently configurable for momentary or alternate action
- User legendable
- PLC compatible
- RS232/RS422 communications
- Stand alone operation capable
- Multimodule operation capable

Contents

Configuration Options
- Stand Alone
- PLC Multi-Master
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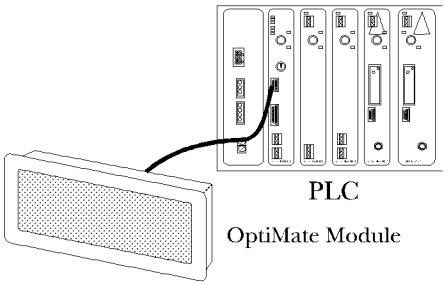
Use with a PLC
Microprocessor-Based Systems
- Hex Protocol

SetUp and Interconnect
- Legending the Lamps
- Connection to the System

Configuration
- Configuration Selections
- Addressing

Specifications

Configuration Options

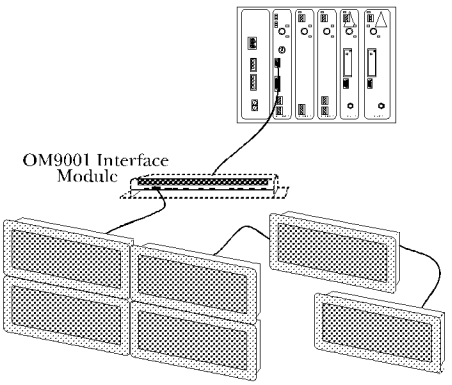


PLC Stand Alone

OptiMate modules plug directly into most PLCs. A simple cable connection allows you to interface and control the OptiMate module via PLC data registers.

The OM1224 Pushbutton module uses a bank of PLC registers. The exact number of registers used depends on the options selected. A fully implemented configuration uses a total of 8 PLC registers to hold pushbutton state, control lights and force pushbutton states. The OM1224 continuously communicates with the PLC registers and updates button status 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 modules will perform these communications for most major PLC protocols. Configuration for particular PLC protocols and interconnect cabling is covered in the following pages.



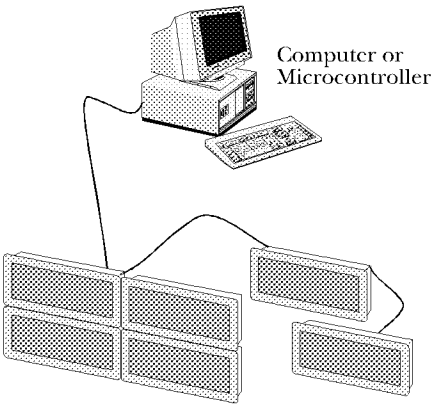
PLC Multi Modules

Larger systems involving operator panels can be successfully addressed using OptiMate modules. These applications utilize the OM9001 Communications Master to transfer data between the PLC and the individual OptiMate modules. OptiMate modules can be located together to form custom panels or they can be distributed anywhere within 4000 feet.

The OM9001 Communications Master provides a transparent interface between the PLC and a group of OptiMate modules. The communication interface between modules 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.



Microprocessor Based Systems

OptiMate modules can interface directly to most computers or microcontrollers. The modules communicate over either RS422 or RS232 serial communications. All that is required to interface OptiMate modules is a serial port. The OptiMate Hex communications protocol, detailed in this document, allows the user to directly access pushbutton status, as well as control OM1224 functions.

Since each module has its own unique address, up to 31 modules can be interfaced on one communications cable.

In a microprocessor-based system, the host microprocessor is the system master. The OptiMate modules are slave devices that respond to commands from the host. In the case of the OM1224, these commands are requests for pushbutton status and (possibly) messages that dictate inset lamps states.

Communications over RS422 allows placement of modules anywhere within a 4000 foot cable distance. Modules can be grouped together to form a panel. Modules can be grouped in several clusters all on the same communications cable.

Use with a PLC

Memory Mapping

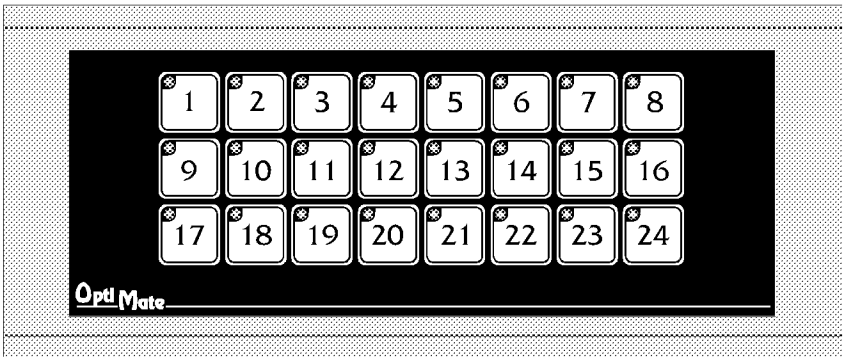
Memory mapping is a technique that "maps" the memory of an OptiMate module into the holding registers of the programmable controller. By knowing where the data of the specific OptiMate module is mapped, this data can be moved, changed or monitored using ladder logic.

The term PLC register is used by Optimation for the area of memory within the programmable controller that can be used for data storage. PLC registers are sometimes known 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 OM1224 Pushbutton Module uses a bank of 2 to 8 contiguous holding registers (depending on the configuration selected by the user). The register set definition is shown in the table below.



Configuration

Configuration of the OM1224 or system of OptiMate modules is performed via an IBM PC compatible computer. Optimation supplies configuration software that will allow you to select module configuration, system configuration and PLC protocol definition.

Every OM1224 module uses at least two registers for pushbutton status. Additional registers may be selected for flash control (.5 seconds on .25 seconds off). If LED separation is selected, two more registers are used. If force capability is configured, 8 total registers will be used. Regardless of the number of registers selected they will always be contiguous as shown in the tables.

If the module is to be operated in stand alone mode, with a PLC, the configuration selections must be made to select the proper PLC protocol information. If the module is part of a multi-module system, the configuration editor will automatically configure for the following:

- Hex Protocol (serial slave, 19200 baud, 8 bits, 2 stop bits, no parity)

The OM9001 Communications Master will talk to the the module over this protocol and to the PLC over the PLC protocol you select.

When configuring, always remember to set the module address to address 31 (switches 1-5 on) before applying power. ***Once configured, change the address setting***. If the module operates stand alone, change the address to anything other than 31. If the module is part of a multi-module system, change the address to whatever you have configured the module for.

Further configuration details are covered in the OptiMate Configuration Editor manual.

OM1224 Pushbutton Module PLC Register Map

Holding Register	Register Function
X (first register of bank)	Pushbutton 1-16 on/off status
X+1	Pushbutton 17-24 on/off status
X+2	Lamps 1-16 flash
X+3	Lamps 17-24 flash
X+4	Lamp 1-16 on/off (if in LED separation mode)
X+5	Lamp 17-24 on/off (if in LED separation mode)
X+6	Force pushbutton data (button1 1-16)
X+7	Force pushbutton data (buttons 17-24) Command bits

Register	MSB															LSB	
X	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Pushbutton On/Off Status
X+1									24	23	22	21	20	19	18	17	
X+2	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Flash Control
X+3									24	23	22	21	20	19	18	17	
X+4	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	LED On/Off Control
X+5									24	23	22	21	20	19	18	17	
X+6	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Force Data
X+7	F1	F2	F3						24	23	22	21	20	19	18	17	Force Data & Commands

Register Bit/Pushbutton Association

Reading Pushbutton Status

Once the module 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 module will automatically place status into this register. A "1" indicates active or "on" condition.

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, the 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 module will automatically retrieve the register data and light any lamps whose bits are set.

LED separation is available only for momentary pushbuttons.

Turning on Lamp Flash

As shown in the table, the second pair of registers will initiate lamp flash. To flash a lamp, the lamp must be on and lamp flash bit must be set. In normal mode, lamp "on" status simply reflects pushbutton status. In LED separation mode, lamp "on" status is set directly via PLC register bits.

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

Force Commands

If the OM1224 module 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 Pushbutton panel. 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 data registers (X+6 and X+7). Once these buttons are forced to the status set, the OM1224 will automatically clear F1.
F2 (Force buttons on)	When the F2 bit is set, all buttons matching the bits set in the force data registers (X+6 and X+7) will be forced on. Once these buttons are forced on, the OM1224 will automatically clear F2.
F3 (Clear buttons)	When the F3 bit is set, all buttons matching the bits set in the force data registers (X+6 and X+7) will be forced off. Once these buttons are forced off, the OM1224 will automatically clear F3.

Note: Force obviously applies only to alternate-action pushbuttons.

Examples of Use with a PLC Direct PLC

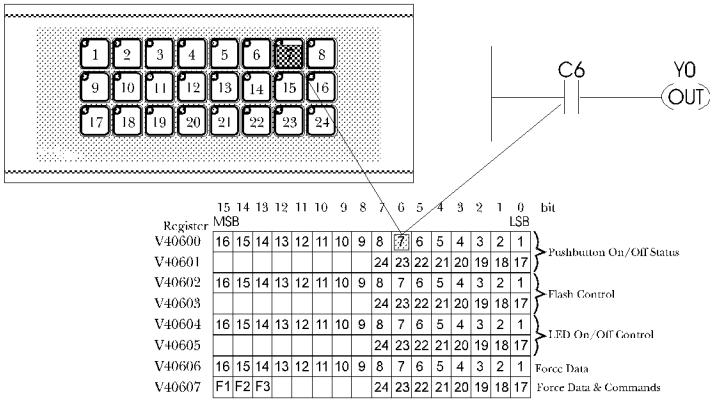
Defining the Base Register Address

The simplest method of interfacing a PLC Direct PLC program to an OM1224 module is to configure the module base address in the PLC's control relay memory. This allows your program to treat pushbuttons as contacts and LEDs as coils. The following table lists these address for various PLC Direct PLCs.

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

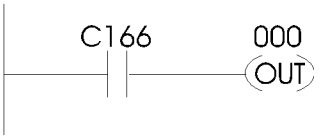
Using a Pushbutton

The following example illustrates the use of an OM1224 with a DL205 or DL405 PLC. In this example, the module has been configured with a PLC base register address of 40600. When button 7 is activated, C6 will become active and turn on output Y0.



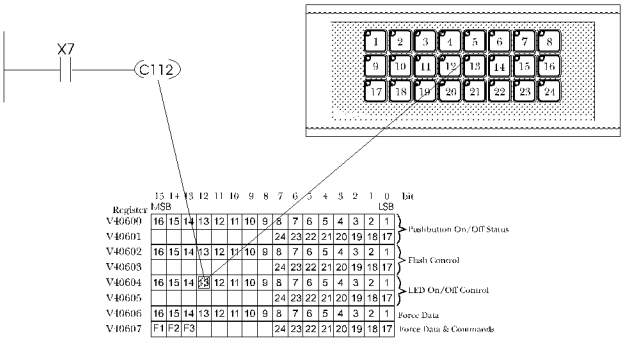
Register Bit/Pushbutton Association

The illustration on the right is the same example for a DL305 PLC with base address 16.



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 13's inset LED whenever input X7 is energized.



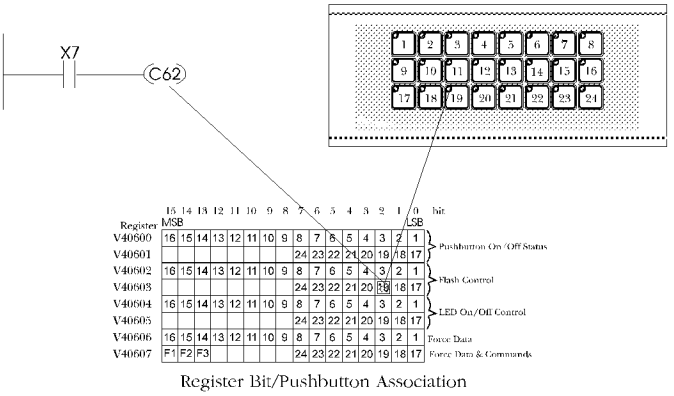
Register Bit/Pushbutton Association

In order for this to work, the panel must be configured for LED separation and button 13 must be a momentary pushbutton.

Flashing an Inset LED

To flash an inset LED, you need to turn it on and also 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 205/405 program used to set the LED inset in button 19 to flash whenever X7 is energized. If the panel has been configured with button 19 being an alternate action button, the LED will operate as shown in the table below.



Register Bit/Pushbutton Association

Button State	X7 State	LED operation
Inactive	de-energized	Off
Inactive	energized	Off
Active	de-energized	On solid
Active	energized	Flashing

Forcing Button Status

One of the more advanced capabilities of the OM1224 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 devices. 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.

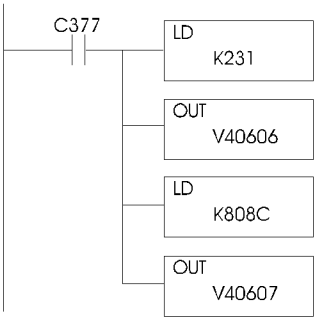
There are many other cases where button force capability can be useful in a system.

There are three types of force functions available for the OM1224 panel - force status, force on and force off. All three functions require moving appropriate data into the PLC registers defined as Force Data and Force Data & commands (see the table described in "Use with a PLC").

Note: Force only applies to Alternate-Action pushbuttons

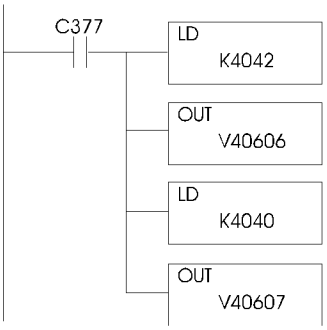
Force Button Status

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 below shows buttons 1,5,6,10, 19, 20 and 24 being forced on and all other buttons forced off when C377 is active.



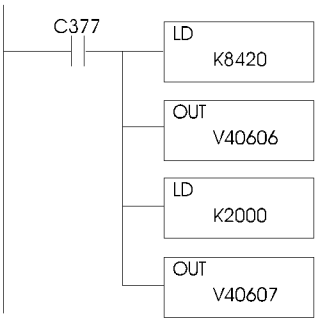
Force Button(s) On

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 2, 7,15 and 23 being forced on when C377 is active.



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 following example shows buttons 6, 11 and 16 being cleared when C377 is active.



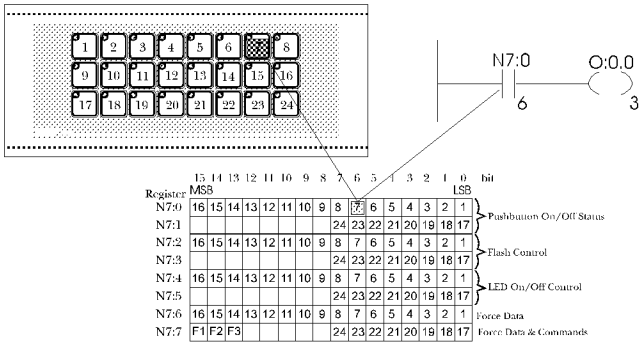
Examples of Use with an Allen Bradley PLC

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 programming documentation for information on setting up and using "N" type files.

Using a Pushbutton

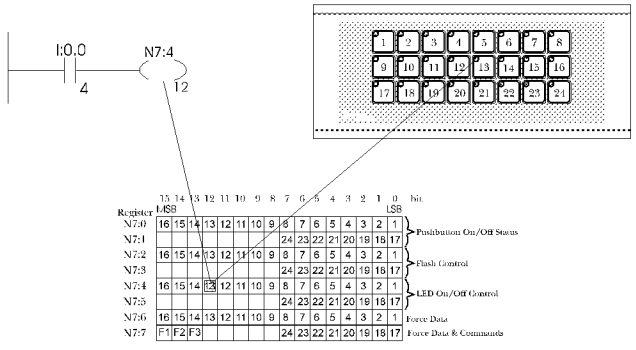
The following example illustrates the use of an OM1224 with a SLC or Mircologix PLC. In this example, the module has been configured with a PLC file number of 7 and a base register address of 0. When button 7 is pushed, N7:0/6 will become active and turn on output O:0.0/3.



Register Bit/Pushbutton Association

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 SLC or Micrologix program that will light button 13's inset LED whenever input I:0.0/4 is energized. *In order for this to work, the panel must be configured for LED separation and button 13 must be a momentary pushbutton.*

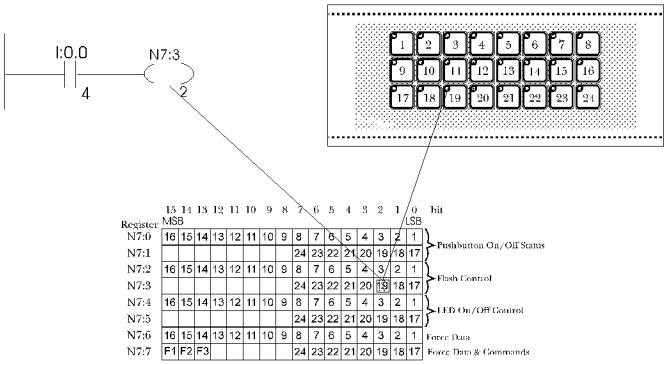


Register Bit/Pushbutton Association

Flashing an Inset LED

To flash an inset LED, turn it on and also 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 SLC or Micrologix program used to set the LED inset in button 19 to flash whenever I:0.0/4 is energized. If the panel has been configured with button 19 being an alternate-action button, the LED will operate as shown in the table below.



Register Bit/Pushbutton Association

Button State	I:0.0/4 State	LED operation
Inactive	de-energized	Off
Inactive	energized	Off
Active	de-energized	On solid
Active	energized	Flashing

Forcing Button Status

One of the more advanced capabilities of the OM1224 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 devices. 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.

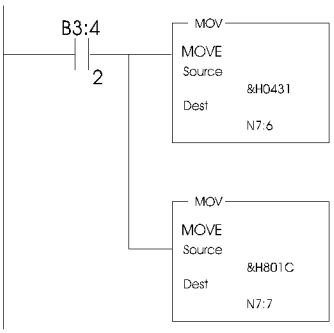
There are many other cases where button force capability can be useful in a system.

There are three types of force functions available for the OM1224 panel - force status, force on and force off. All three functions require moving appropriate data into the PLC registers defined as Force Data and Force Data &Commands (see the table described in "Use with a PLC").

Note: Force only applies to Alternate-Action pushbuttons.

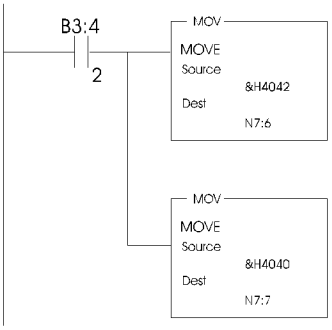
Force Button Status

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 below shows buttons 1,5,6,11, 19, 20 and 21 being forced on and all other buttons forced off when B3:4/2 is active.



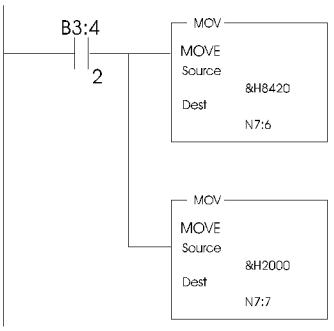
Force Button(s) On

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 2, 7,15 and 23 being forced on when B3:4/2 is active.



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 following example shows buttons 6, 11 and 16 being cleared when B3:4/2 is active.



Use in a Microprocessor-Based System

OptiMate modules can interface a microprocessor-based controller over a serial link. This link can be either RS232 (for point to point) or RS422 (for multidrop or point to point). In either case the microprocessor acts as the master. It can write data to the module or read data from the module.

Communication with a computer-based system (anything with a serial port that can be used as a master), is by use of the Optimate Hex protocol. This protocol, shown below is very straightforward and easy to use.

Module Address

Switches 1-5 of a six position DIP switch on the back of each OptiMate module provides a method for setting the address. By use of this DIP switch you can set the module address to any number between 0 and 31. See the addressing description in the "Configuration" section of this manual.

Configuration

Each of the 24 pushbuttons can be independently configured for either momentary or alternate-action operation. A momentary button is on or active only while it is being pressed. An alternate-action button changes state each time it is pressed.

A second configuration option in a microprocessor-based system is whether the inset LEDs are directly linked to pushbutton state or are separated. In LED separation mode, the on/off state of LEDs inset into momentary pushbuttons can be controlled via messages from the host computer. Normally LED separation is not used.

Flash capability is always available in computer-based systems. Remember that in order to flash, the LED must be on. This means for normal (non-LED separation) operation, that the button must be active to flash. For LED separation mode, flashing an LED entails turning it on and setting the flash bit.

Further configuration details are covered in Optimation's Configuration Editor Manual.

Communications Protocols

To use an OptiMate module as a slave device in a microprocessor-based system, the module must be configured for Hex protocol. The other options that must be set are baud rate, parity and number of stop bits (note; if parity is set to even or odd, only one stop bit is allowed). Once selected, it must be downloaded to the module.

OptiMate Hex Protocol

General Format

STX Module function text checksum
address

where Module address = 0 to 30
Function = 0xA0 ; Write LED states
= 0xA1 ; Read pushbutton states
= 0xA2 ; Force buttons
checksum = 8 bit sum of all characters after address until checksum

For function type A0 : Write LED states

STX Module ftn row1 row2 row3 row1 row2 row3 checksum
address |—— on ——| |—— flash ——|

where Module address = 0 to 30
ftn = 0xA0 ; Write LED states
rowx = Corresponds to LEDs. LSB of data character corresponds to Leftmost LED. Bits are in sequence.
Rownumbers are 1 to 3 - top to bottom.
on = LED on/off state. Applies only if configured for LED separation. If flash and reverse flash not set, on will cause on solid. If not on (0), LED will be Off regardless of flash & reverse flash bits.
flash = Flash .5 sec on, .25 sec off (must be on for flash)

Response

ACK **if message received and processed OK**
or
NAK if any errors in message

For function type A1 : Read Pushbutton states

STX Module ftn checksum
address

where Module address = 0 to 30
ftn = 0xA1 ; Read pushbutton states

Response

STX row1 row2 row3 checksum if message received and processed ***OK***
or
NAK **if any errors in message**
where rowx = Corresponds to buttons. LSB of data character corresponds to Leftmost button. Bits are in sequence. Row numbers are 1 to 3 -top to bottom
1 = Button active
0 = Button not active

For function type A2 : Force Buttons

STX Module ftn flags row1 row2 row3 checksum
address

where Module address = 0 to 30
ftn = 0xA2 ; Force buttons
flags = bit 7 - Force all buttons to the following status
bit 6 - Or all buttons with the following status
bit 5 - Clear all buttons selected in the following
rowx = Corresponds to buttons. LSB of datacharacter corresponds to Leftmost lamp. Bits are in sequence.
Row numbers are 1 to 3 - top to bottom.

Response

ACK **if message received and processed OK**
or
NAK **if any errors in message**

Broadcast message (sent to all modules)

Synchronize lamp flashing (between all system modules that have flashing lamps or LEDs)

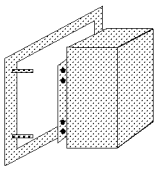
STX **Broadcast function checksum**
address
where broadcast address = 99
function = 0

Set Up and Interconnect

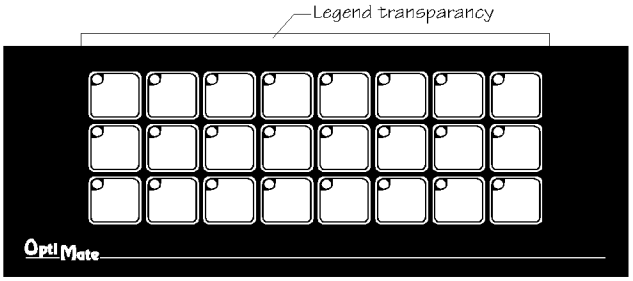
Legending the Buttons

Legending the OM1224 module is a relatively simple process that basically involves sliding a legend transparency into a pocket 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 a legend transparency. There are a number of available options for doing so. A pattern is provided on the specification sheet of this document.
  - > 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 between top layer and white background sheet
- Re-attach bezel. Push bezel onto box until it snap together.

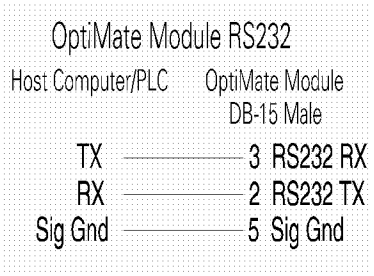
Connection to the System

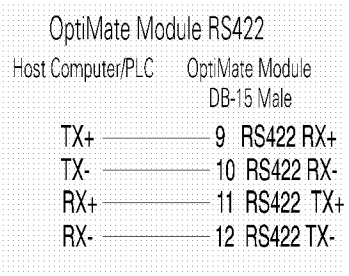
OptiMate modules are designed for communications connection to system devices. The module can be connected to a computer, PLC or communication master over the serial port (RS232 or RS422).

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.





Optimation sells interface cables 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.

Configuration

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 OM1224 module, the following are important configuration parameters. Further configuration details are covered in Optimation's OptiMate Configuration Editor manual.

Computer-Based Systems

Decision	Selection
Single/Multi Module	Choose Single module even if the system will contain several modules. The Multi module selection applies only to systems using a communications master. In computer-based systems, each module is configured independently. After configuration, multiple modules can be connected together to form a system.
Configuration starting point	First-time configuration, start with defaults for module. Subsequent configurations can utilize disk files you create.
PLC Type	Select OptiMate Hex
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. Hex protocol requires 8 data bits.
Alternate/ Momentary	Set as required for application
LED Separation	Enable LED separation only if all momentary buttons inset LEDs are to be controlled from the host computer
Force option	Force capability is always available for computer-based systems.
Flash option	Flash capability is always available for computer-based systems.

Single Module 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
Momentary/ Alternate	Set as required for application
LED Separation	Enable LED separation only if all momentary button inset LEDs are to be controlled from the host PLC
Force Option	Set as required for application
Flash option	Select as appropriate for the application. Uses 2 sixteen-bit registers

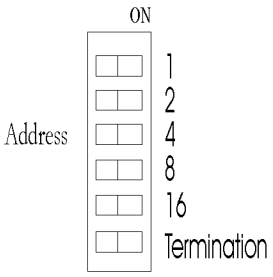
Multi-Module PLC Applications (Uses Communications Master)

Decision	Selection
Single/Multi Module	Choose Multi module
PLC Type	This applies to the Communications Master. Choose appropriate type
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	Will be Hex
Momentary/ Alternate	Set as required for application
LED Separation	Enable LED separation only if all momentary buttons are to be controlled from host PLC
Force option	Set as required for application
Flash option	Select as appropriate for the application. Uses 2 sixteen-bit data registers.

Configuration must be downloaded from the IBM PC compatible to each module. This is done over the serial link. Module address must be set to 31 prior to application of power for module to accept configuration data. Communication cable is available from Optimation.

Addressing

Setting the module address is a matter of turning the module over and pressing the appropriate dip switches. There are 6 DIP switches; 5 of which have a numeric value listed next to the switch. To select an address, push (with a pencil or small screwdriver) the appropriate combination of switches down to the right.



For example, to select address 14, the 2, 4 and 8 switches should be pressed down to the right and the 1 and 16 switches down to the left.

Remember that for configuration, address 31 (numeric switches 1-16 on) must be selected first, then apply power to the module.

The termination switch must always remain in the OFF position unless the module is the last, and only the last, module on the cable in an RS422 system.

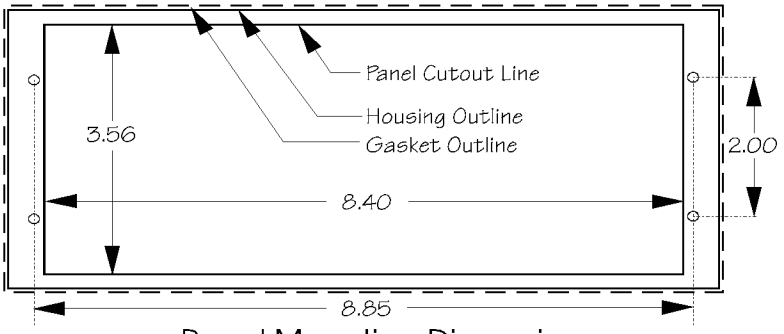
Power

OptiMate modules can operate on any voltage between 8 and 30 VDC. Power must be connected to the terminal plug located on the back of the module.

Specifications

Physical

- Recessed Mount Housing 9.5"L x 4.0"H x 1.75"D
- Cutout size for above
  3.5"Hx8.4"L



Panel Mounting Dimensions

- Panel Fasteners : Four, 6x32 threaded studs, shown above (on ends, symmetrical about center line)
- Weight : 19 ounces
- Colors : Dark gray housing with black panel
- Pushbutton dimensions : .65 inches square on .75 inch centers
- Pushbutton life : 1,000,000 switch cycles

Electrical

- Power (all lamps on) : 8 - 30VDC @ 4VA
  340 mA @ 12VDC
  170 mA @ 24VDC
- Power connector : Pluggable terminal block, 2 position

Communications

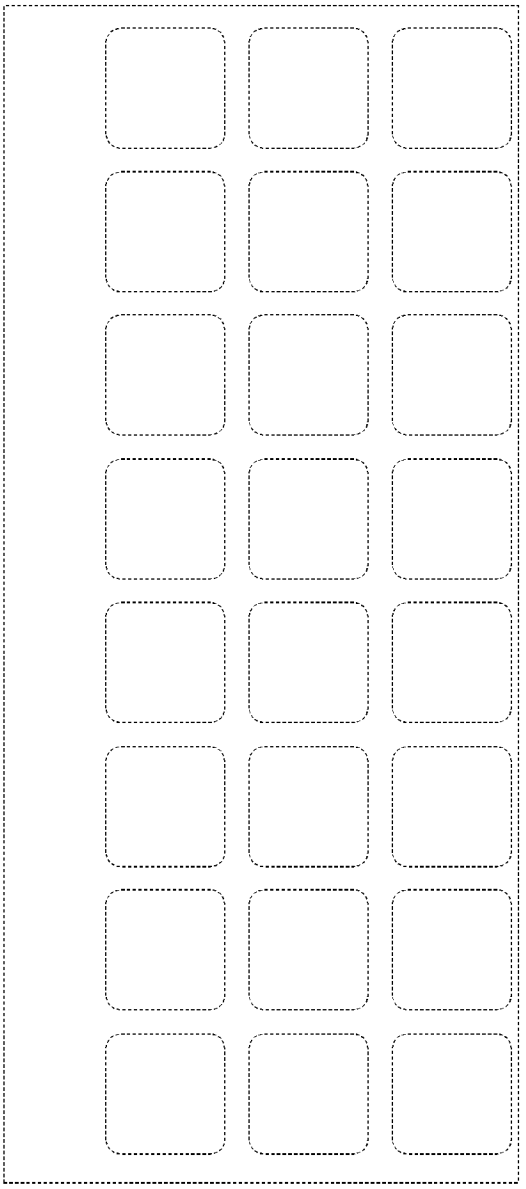
- RS232 and RS422
- 4800 to 19200 baud
- Compatible with most major PLC protocols
- Microprocessor compatible OptiMate Hex protocol
- 15 pin female 'D' shell connector (screw terminal adapter available)

Communications Failure Operation

Should the module (when set to any address other than 31) ever fail to communicate successfully for a period of 12 seconds, all inset LEDs will flash rapidly.

Environmental

- Enclosure - NEMA 4 recessed mount
- Temperature - 0 to 50 C
- Humidity - 95% Non-condensing



Label Strip Pattern