OP--620

Operator Panel

Manual Number OP--620--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–620 Operator Panel User Manual
Manual Number: OP–620–M

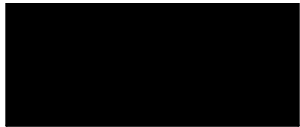| Issue	Date	Effective Pages	Description of Changes
Original	8/97	Cover/Copyright Contents	Original Issue
Rev A	6/98		Made minor revisions before reprinting

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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

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If you need technical assistance, please call the technical support group at **PLC***Direct (3505 Hutchinson Rd., Cumming, GA 30040, U.S.A.)* at 800-633-0405. They are available Monday through Friday from 9:00 A.M. to 6:00 P.M. Eastern Standard Time. Their Web Site address is   http://www.plcdirect.com

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-620. 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-620 panel. Also included are application examples to improve the learning process and working knowledge of the OptiMate units.

How to
Use the

OP-620

The OP-1500 and OP-1510 Operator panels may be reconfigured to exchange data with your programmable controller.
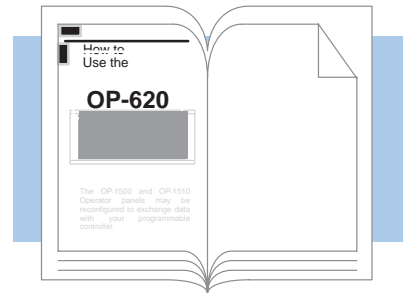
Supplemental Manuals

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).
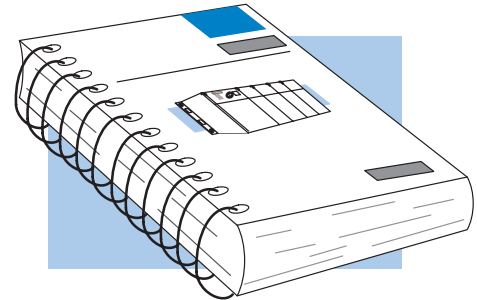
Technical Assistance

After completely reading this manual, including Appendix B, Troubleshooting the OP-620, if you are not successful with implementing the OP-620, 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.
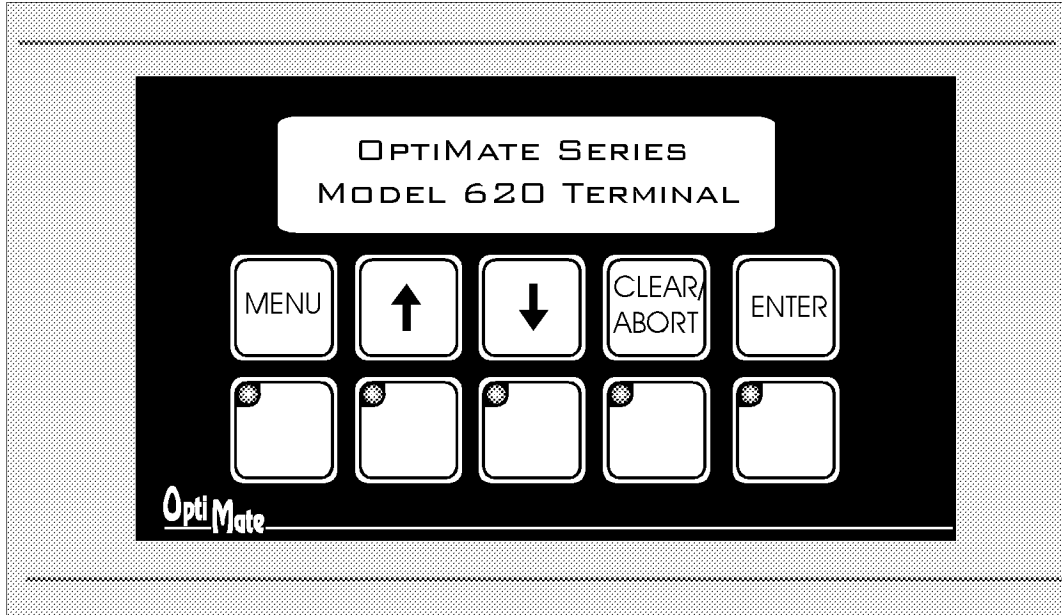
OP-620 Operator Panel

The OP-620 Operator Panel is a low cost/high performance man/machine interface with a broad range of operator input and display capabilities. The panel includes a 2 line by 20 character LCD display, arrow adjustment data entry, five function keys and menu tree capability.

OP-WINEDIT configuration software allows you to predefine up to 160 messages. These messages can be later selected for display by your PLC program to display status, variable data and allow numeric data input.

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

The OP-620 Operator Panel is part of Optimation's **OptiMate**® series. Each OptiMate panel is designed to connect to most PLCs 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. Terminal functions tie directly into your PLC ladder logic program. The OP-620 takes care of the rest.

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

Features
- 2 line x 20 character LCD
- Numeric arrow adjustment
- 5 User defined function keys
- Menu tree capability
- PLC compatible
- RS232/RS422 communications
- Stand alone operation capable
- Multipanel operation capable

Contents

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Configuration Options
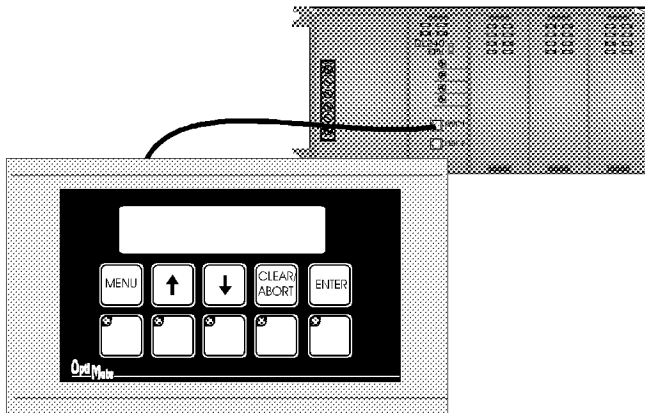
PLC Stand Alone

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

The OP-620 operator terminal uses a bank of PLC registers. Complete Operator interface is performed with 9 PLC registers for display message selection, data entry and function key interface. The OP-620 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.
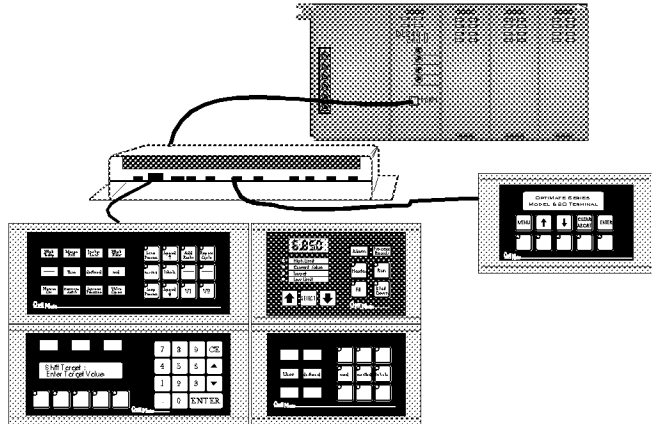
PLC Multi Panels

Larger systems involving operator panels and I/O 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 modules. 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 panels. The communication interface between modules requires only four wires.

System configuration is simple using OP-WINEDIT software 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

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 a specific OptiMate panel is mapped, this data can be moved, changed or monitored using ladder logic.

The term PLC register is used for describing 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 OP-620 Operator Panel uses a bank of 9 contiguous PLC registers. The register set definition is shown in the table below.

OP-620 Panel PLC Register Map

PLC Register	Register Function
M+0 (first register of bank)	Top line message selection
M+1	Bottom Line message selection
M+2	Top line data
M+3	Top line data 2 (for long BCD)
M+4	Bottom line data
M+5	Bottom line data 2 (for long BCD)
M+6	Function selection
M+7	Status register
M+8	Control register

Register Definition

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

- Register M - When a number from 1 - 160 is placed in this register, the predefined message associated with that number will be displayed on the top line of the LCD display.
- Register M+1 - When a number from 1-160 is placed in this register, the predefined message associated with that number will be displayed on the bottom line of the LCD display.
- Register M+2 - Numeric data associated with top line display (described in more detail in following paragraphs)
- Register M+3 - For long BCD or floating point data only. Numeric value is the four most significant BCD digits of data for the top line.
- Register M+4 - Numeric data associated with bottom line of display.
- Register M+5 - For long BCD or floating point data only. Value is the four most significant BCD digits of data for the bottom line.
- Register M+6 - The function number selected through the menu tree.
- Register M+7 - Status register

MSB   LSB

			⇕	⇕	ENT	MA	AB	FS	DA	F5	F4	F3	F2	F1
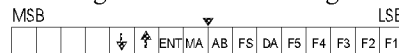
Status Register

> F1-F5 are status of the five function keys. Set to 1 when the button is active.
> DA - Data available. Associated with data entry. Set to 1 when new data has been entered.
> FS - Function Selected. Indicates that a function has been selected through use of the menu tree.

> ENT - ENTER button is active. (Not necessarily Data Entry - see DA bit).
> AB - Abort key active.
> MA - Menu operation is currently active.
> Up Arrow - Up arrow key is active.
> Down Arrow - Down arrow key is active.

- Register X+8 - Control bits

MSB   LSB

											BD	DAK	MR	ME
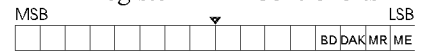
Control Register

> ME - Menu Enable. Must be set for menu operation to be enabled. (Normally, your control program would clear this bit when a function is in process).
> MR - Menu Return. Used at the end of a function. If set, will cause the menu to return to the same point in the menu tree as when the function started. If not set, function complete will not return directly into menu.
> DAK - Data acknowledge. This bit is used for repeat data entry into the same message. Setting to 1 acknowledges data entered from the keyboard as accepted by the PLC program. The 620 Terminal will "unlock" the data on the screen message, clear the DA bit and allow new data entry. This bit must be cleared after DA (status register) is cleared.
> BD - Buzzer disable. When this bit is set to 1, the buzzer that beeps every time a button is pressed will be disabled (i.e. not beep).

Operational Overview

Displaying Messages on the LCD Display

Through the OP-WINEDIT configuration software, up to 160 predefined messages can be entered and stored in the OP-620. These messages are 20 characters long and can include a field for the display and/or entry of numeric data.

Any predefined message can be displayed on either the top or bottom line. The messages entered via the configuration editor are numbered 1 through 160. To display a particular predefined message on the display, simply place that message's number in the message selection register.

For example, lets assume that we have defined message #16 as "Mary had a little .." and message #22 as "white fleeced lamb". If we wanted to put these two lines on the top and bottom lines of the display respectively, we would simply need to put the number 16 in register M and 22 in register M+1.

If any number other than 1 to 160 is placed in a message selection register, the associated line will not change.

Placing Numeric Data in the Display

Certain predefined messages may incorporate a numeric data field. One numeric field per line is allowed. This field may be either a display data field or a data entry field. Messages that contain data are entered through the configuration editor with a caret symbol "^" as a place holder for each numeric digit.

An example of the use of numeric data is the message "#widgets sold: ^^^^". Assume that this is message # 36 entered through the configuration editor. Also assume that a total of 465 widgets have been sold today. To display the current number of widgets sold on the bottom line of the display, you would place `36` in register M+1 and `465` in register M+4. The bottom line of the display would then read "# widgets sold: 465".

Displaying Data with a Decimal Point

The OP-620 panel allows you to display fixed point numbers. Fixed point numbers are numeric values that have a known decimal point placement and are simply handled as integer values within the PLC program. The only time you use an actual decimal point is for display to the operator. An example of a fixed point number is a program that uses temperature as a control variable. Within the program, all temperatures are scaled in tenths of a degree. The values are integer. A temperature of 73.5 degrees would be 735 in a data register. For the convenience of the operator, you would want the display to include the decimal.

Displaying Fixed Point Numbers

Fixed point numbers are handled by simply placing a decimal point or period in the message field during configuration. In other words, the message " Temperature : ^^^.^" would be entered during configuration (say message 47). If 47 were placed in register M and the value 735 in register M+2, the display would read "Temperature : 73.5" on the top line.

Displaying BCD and Binary Numbers

Normally, numeric values to be displayed are values contained in one 16 bit register. One 16 bit register will handle values between 0 and 65535 (in binary format), or 0 to 9999 (in BCD format). For these type numbers, register M+2 is used for numeric value for the top line and register M+4 is used for the bottom line.

Displaying "Double" Numbers

The OP-620 will handle larger numeric numbers. If you select the option "BCD double" when the display message is being defined, your display will handle numbers between 0 and 99,999,999. The OP-620 will use data in the register pair M+2 and M+3 for the top line. Likewise, M+4 and M+5 are used for the bottom line. The data must be in BCD format.

When placing a "BCD double" number in the display registers, the first register numerically in the sequence of two registers (M+2 or M+4) will contain the 4 least significant digits of the number. The second register in the sequence (M+3 or M+5) contains the data for the 4 most significant digits of the "BCD double" number.

If the data displayed on the top line of the panel is 92345678, the top line data registers will contain the following: (shown in BCD/Hex format)

BCD Double Data	PLC Register
M+2	5678
M+3	9234

Displaying Floating Point Numbers

The OP-620 has the capability to display Floating Point (or Real) numbers if you select the option "Floating Point" when the display message is being defined in the OP-WINEDIT software.

Floating point numbers can only be used with the PLC **Direct** DL250, DL350 and the DL450 CPUs since they are the only compatible CPUs that support the IEEE 32-bit floating point number format. The floating point numbers are stored in the IEEE 32-bit floating point format within the PLC. They always occupy 2 16-bit register locations regardless of the size of the number. Refer to the PLC manufacturer's programming documentation for more information on the IEEE 32-bit floating point number format.

An IEEE 32-bit floating point number has a range of $-3.402823E+38$ to $+3.402823E+38$. The OP-620 will be able to display any number within that range. The panel always uses the format $\pm X.XXE\pm XX$ to display the numbers.

The panel does not have the ability to display all the significant digits of a floating point number, it only displays the first 3 significant digits. The OP-620 does not "round" the numbers up or down, instead it truncates the remaining digits. The two examples in the table below show the data contained in the PLC registers and the value displayed on the panel in its format. Notice how the data is truncated, not rounded.

PLC Registers	OP-620 Display
12301.789	+1.23E+04
123.96783	+1.23E+02

The configuration of a floating point number message is similar to any other message. First you select the message number, then you type in the text using 9 caret symbols "^" as a place holder for each of the 9 floating point number symbols. Next, select the "Floating Point" option for the data format.

Suppose you wanted to configure message #58 to display a floating point number. In the OP-WINEDIT software you would select OP-620 as module type. Then to configure message #58 simply select it with the mouse and type in a message in the following manner: "Float Pt ^^^^^^^^^". Also, select floating point as the message format. To display a number, simply move it into either the top or bottom line data registers and load the

Temperature: 73.5
Float Pt# +6.32E+02

MENU ↑ ↓ CLEAR/ABORT ENTER

OptiMate
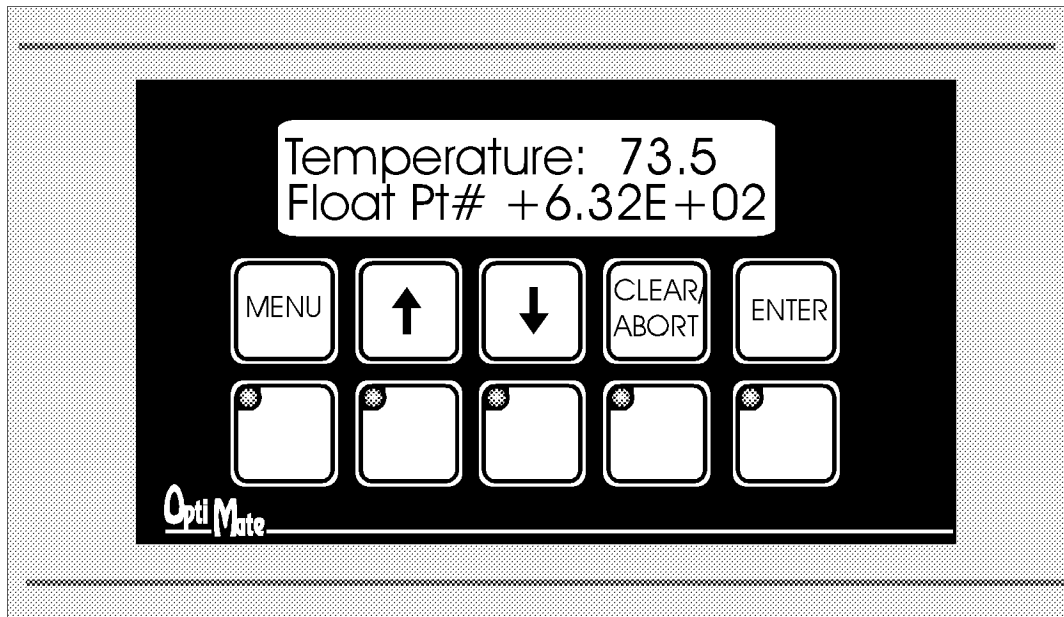
appropriate message number into the corresponding top or bottom line message selection register. If the number 632.15 is to be displayed in message #58, it will be displayed as the following:
"Float Pt # +6.32E+02".

Numeric Data Entry

Numeric data can be entered through the adjustment arrow keys. To do so, the message must be marked for data entry via the configuration editor.

Note : Only one data entry message may be active at a time. If data entry is selected simultaneously for both lines, unexpected operation may occur.

With the exception of floating point, all of the numeric features described for data display apply to numeric data entry. This includes the definition of the caret symbol "^" place holder within the message as well as "double" number types.

Data Entry/Adjustment with the Arrow Keys

A message can be set up for arrow adjustment through the OP-WINEDIT software. To do so, define the message with a numeric field. Select arrow adjustment. If there are limits, select and enter minimum and maximum values.

When the data screen is required in the program, place the number of the preconfigured message in the selection register and its current value in the associated data register. The digits marked by carets will initially display the current value.

As the operator presses the up or down arrow key, the numeric value will increment or decrement respectively. As it is adjusted, the value will be continuously updated in the PLC data register. When adjustment is complete, the operator will press the ENTER button. When this happens the data available (DA) status bit will be set. **The DA bit will remain set until a new message number is placed in the message selection register (M or M+1), or the DAK bit is set.**

Adjustment of data will be limited to within the limits defined through the configuration editor. Data also will be limited to the number of digits defined by carets in the message.

Example of Arrow Adjustment of Numeric Data

Suppose that your automatic banana peeler has a peel rate that can be adjusted between 1 and 50 bananas per second. With the configuration editor you define message 15 as "Set Peel Rate:^^.^". You would also select arrow adjustment and range limits of 10 to 500 (in tenths).

When this message is used, your PLC program would put 15 in register M (or M+1) and the current peel rate value in M+2 (or M+4). If the current peel rate was 5.7 bananas per second, the display would read "Set Peel Rate: 5.7". Pressing the arrow keys would adjust the value up or down while continuously writing the value to data register M+2 (or M+4). When the adjustment is complete, the operator would press ENTER. The OP-620 will then set DA. DA will remain set until a new message is selected via M (or M+1) or the DAK bit is set.

Function Buttons

The OP-620 contains five user definable pushbuttons. These pushbuttons can be custom labeled and used for any purpose.

The pushbuttons can be individually configured as either alternate action or momentary pushbuttons. Alternate action buttons alternate state each time they are pressed. Momentary buttons are active only while they are being pressed.

The status register holds the current state of each of the five pushbuttons. In a typical PLC application, these pushbuttons would be mapped to control contacts for easy ladder logic interface.

Menu Tree Operation

The OP-620 terminal is designed to allow you to create a menu tree for function selection. The menu tree allows for interactive selection of a required function operation from a "menu" or list of options.

The OP-620 allows up to four levels of menu. Each menu selection can be either a function or the next lower menu level. With this type of "tree" arrangement, you can construct an application menu that goes from general to specific. You can also place frequently used menu selections on the top layer and infrequent selections on lower layers.

The graphic below is an example of a typical menu tree.

Process Part type 1
Process Part type 2
Manual Control
    Turn Pump On
    Turn Pump Off
    Turn Heater On
    Turn Heater Off
    Turn Mixer On
    Turn Mixer Off
Setpoint Entry
    Tank Level Setpoints
        Set Minimum Level
        Set Maximum Level
        Set Low Alarm Level
        Set High Alarm Level
    Temperature Settings
        Temperature Setpoint
        Set Low Alarm Temp
        Set High Alarm Temp

Sample Menu Tree

The example shown has three menu layers. The top level has four selections. If the ENTER key is pressed while a function "Process Part Type 1" is displayed, the associated function number will be writen to X+6 and the FS flag will be set within the PLC.

The top level menu selection "Manual Control" is a sub-menu. If it is selected via the ENTER key, the second menu level will appear. In this case, each item on the second level is a function. If selected, each will place it's function number in X+6 and also set the FS flag.

The "Setpoint Entry" selection from the top level menu will bring up a second level menu of two items. Each second level item will in turn bring up another level. The items at the bottom level will perform actual function selections. In this branch, the items on the first and second levels are sub-menu items, the items on the third level are functions.

When a function is selected through the menu tree, the PLC program should start the function process. **Once a function is selected, the menu selection is locked. The OP-620 will be "locked up" until the PLC program decodes the function number and clears the ME flag.** Once the ME flag is cleared, the panel will return the LCD display to the control of your program.

Once you have completed your function, you may return to the same point in the menu by setting ME and MR. To require the user to start the menu selection process from the beginning, don't set MR, only set ME.

The menu enable is totally under PLC program control. If ME is set, the menu operation is enabled. If for any reason you need to take control of the display back from the menu, just clear the ME bit. The panel will leave the menu tree and display the message numbers in X and X+1.

Each menu tree message takes up one of the 160 available total messages.

Configuration

Configuration of the OP-620 Terminal or system of OptiMate modules is performed via an IBM PC compatible computer with the Windows operating system. Optimation supplies OP-WINEDIT software that will allow you to select module configuration, system configuration and PLC protocol definition.

If the OP-620 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, each panel must be configured under the multi-panel selection in OP-WINEDIT.

> Note : When configuring, always remember to set Run/Pgm to Pgm (towards the "ON"). Always wait for the module to reset(approximately 2 seconds) before configuring the module.

Run [ON] Pgm
             Term
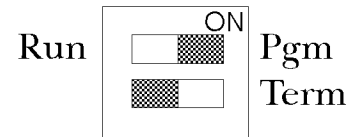
Specific configuration of the OP-620 begins with defining the block of PLC register data to be used. Next, each of the function buttons must be configured for either momentary or alternate action operation. Then each of the messages used by the PLC program must be defined.

Message definition is very straightforward and easily accomplished. All that is necessary is the following sequence.

- Select the message number to enter
- Type the message. Up to 20 characters are allowed. Any unused characters will be filled with blanks. One numeric field may be defined with caret '^' characters. One decimal point or colon may be placed within the field.
- If the message has a field for numeric arrow adjustment, select arrow adjustment. Select and enter minimum and maximum values if they apply.

Examples of Use with a PLCDirect PLC

Register Usage

The OptiMate OP-WINEDIT software allows you to configure a module to use a block of registers at a starting value that you define. For a PLCDirect DL105, DL205, DL350 or DL405 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 first seven PLC registers in the block used by the OP-620 panel are used for numeric information. As such they are ideally suited for the general purpose data registers (V2000 and V4000 area for the DL105/DL205/DL350/DL405 and R400 range for the 305). The last two 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 last two 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 assignment
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

Memory Mapping

The examples on the following pages use an OP-620 connected to a PLC Direct DL105/DL205/DL350/DL405 series PLC. The OP-620 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 (VC0) and copy from V40601 (VC20) to the control register. This is necessary because the OP-620 writes to the status register and reads from the control register.

With this rung placed in the PLC program, the status and 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		Status Register
V40601	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		Control Register

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

Status Register			Control Register	
bit	relay		bit	relay
F1	C0		ME	C20
F2	C1		MR	C21
F3	C2		DAK	C22
F4	C3		BD	C23
F5	C4			
DA	C5			
FS	C6			
AB	C7			
MA	C10			
ENTER	C11			
Up arrow	C12			
Down arrow	C13			

Using a Function Button

The five function buttons below the LCD display will appear as control relay coils in your program (assuming the memory mapping rung described previously is in your program). The following example turns on output Y1 when button F1 is active.
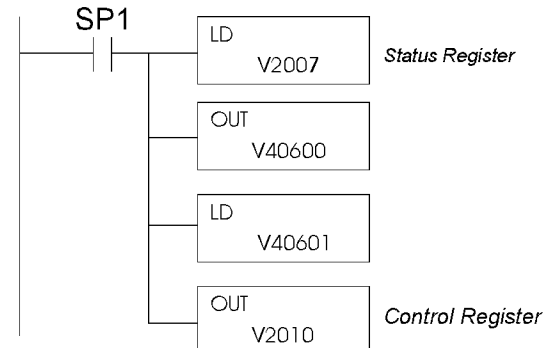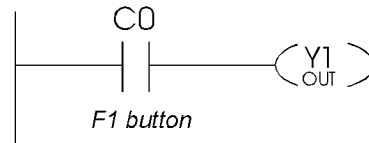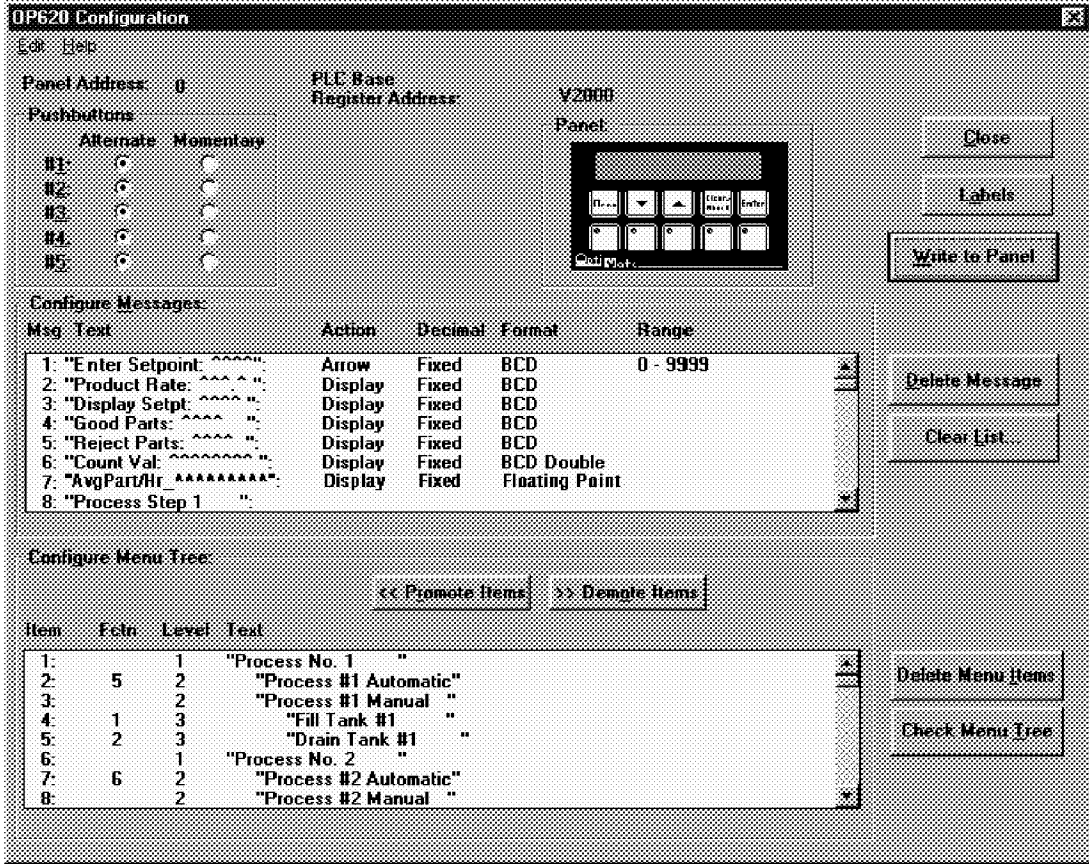
```
            C0
      |-----| |-----------------( Y1 )
      |                           OUT
      |  F1 button
      |
  SP1 |         ┌────────┐
  |---| |-------| LD     |
  |    |        |  V2007 |   Status Register
  |    |        └────────┘
  |    |        ┌────────┐
  |    |        | OUT    |
  |    |        |  V40600|
  |    |        └────────┘
  |    |        ┌────────┐
  |    |        | LD     |
  |    |        |  V40601|
  |    |        └────────┘
  |    |        ┌────────┐
  |    |        | OUT    |
  |    |        |  V2010 |   Control Register
  |    |        └────────┘
```

Displaying Messages on the LCD Display

Messages of various types can be configured via OP-WINEDIT and downloaded to the OP-620. The message definitions shown in the figure above will be used in all of the examples that follow.

The following example shows a couple of messages being displayed to the LCD display. The top line uses data display message 4. The data for the data field is coming from V3000. The bottom line is text message 8.

```
C100
 ┤├───┬── LD
      │      K4
      │
      ├── OUT        Select
      │      V2000   message 4
      │              to top line
      │
      ├── LD
      │      K8      Select
      │              message 8
      ├── OUT        to bottom
      │      V2001   line
      │
      ├── LD
      │      V3000   Put data
      │              from V3000
      └── OUT        into top line
             V2002   data field
```
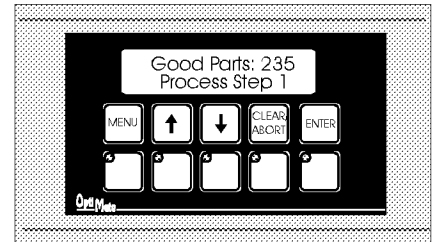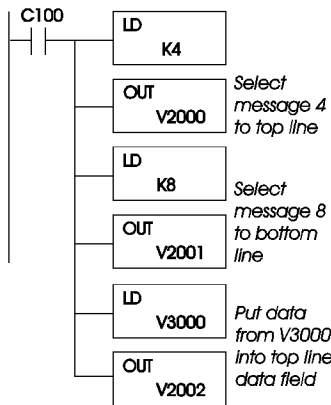

V2000	Top line message selection
V2001	Bottom line message selection
V2002	Top line data
V2003	Top line data 2 (for long BCD)
V2004	Bottom line data
V2005	Bottom line data 2 (for long BCD)
V2006	Function Selection
V2007	Status register
V2010	Control register

Displaying long BCD Numbers

The example shown on the right is similar to the last example. The primary difference is that it uses a BCD double number in the top line display. The top line uses data display message 6, which has been configured as a BCD double display. The data for the data field is coming from V3002 (&V3003). The bottom line is text message 8.

```
C101
─┤ ├─┬─┌──────────┐
     │ │ LD       │
     │ │      K6  │      Select
     │ └──────────┘      message 6
     │ ┌──────────┐      for top line
     ├─│ OUT      │
     │ │    V2000 │
     │ └──────────┘
     │ ┌──────────┐
     │ │ LD       │
     ├─│      K8  │      Select
     │ └──────────┘      message 8
     │ ┌──────────┐      for bottom
     ├─│ OUT      │      line
     │ │    V2001 │
     │ └──────────┘
     │ ┌──────────┐      Put
     ├─│ LDD      │      BCD double
     │ │    V3002 │      from V3002
     │ └──────────┘
     │ ┌──────────┐      into top line
     └─│ OUTD     │      data field
       │    V2002 │
       └──────────┘
```

```
Count Val: 75490213
Process Step 1

MENU  ↑  ↓  CLEAR/ABORT  ENTER

OptiMate
```
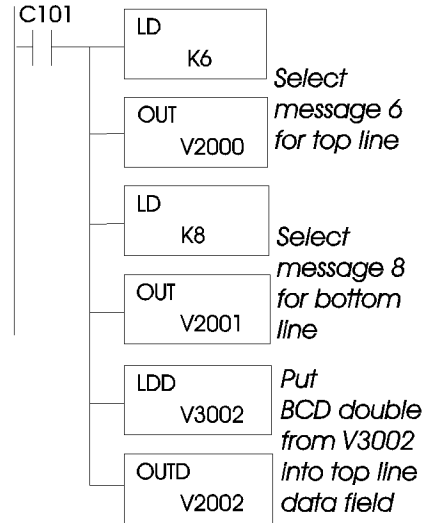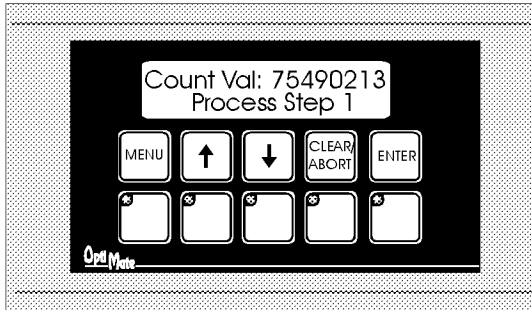
Displaying Floating Point Numbers

The example shown on the right is similar to the previous example. The primary difference is that it displays a floating point number The bottom line uses data display message 7, which has been configured as a floating point display message. Since the data is a floating point number, it uses two 16-bit registers. The two registers have to be looked at together, not individually, for you to be able to make any sense of the data. In this example, the data is loaded from V3010 and V3011 using the LDR (load real number) instruction to the bottom line display registers V2004 and V2005. The top line is text message 8.
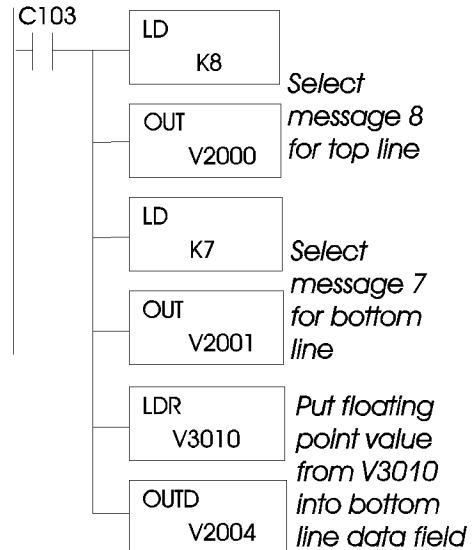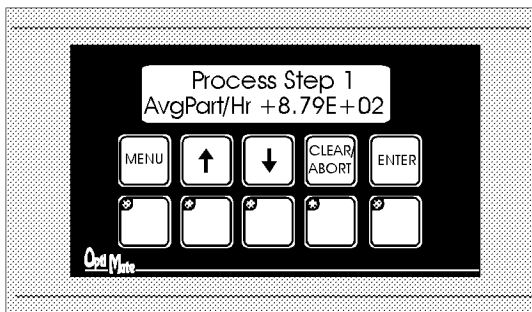
```
C103
─┤ ├─┬─┌──────────┐
     │ │ LD       │
     │ │      K8  │      Select
     │ └──────────┘      message 8
     │ ┌──────────┐      for top line
     ├─│ OUT      │
     │ │    V2000 │
     │ └──────────┘
     │ ┌──────────┐
     │ │ LD       │
     ├─│      K7  │      Select
     │ └──────────┘      message 7
     │ ┌──────────┐      for bottom
     ├─│ OUT      │      line
     │ │    V2001 │
     │ └──────────┘
     │ ┌──────────┐      Put floating
     ├─│ LDR      │      point value
     │ │    V3010 │      from V3010
     │ └──────────┘
     │ ┌──────────┐      into bottom
     └─│ OUTD     │      line data field
       │    V2004 │
       └──────────┘
```

```
Process Step 1
AvgPart/Hr +8.79E+02

MENU  ↑  ↓  CLEAR/ABORT  ENTER

OptiMate
```

Arrow Adjustment of Setpoint Data

The figure to the right illustrates arrow adjustment of setpoint data (and a whole lot more). The process is enabled when C74 is energized. The first program rung places the "Enter Setpoint" and "Display Setpt" messages in the top and bottom lines, initializes the setpoint value from the value in V3001 and enables the second rung.

The second rung continually copies the setpoint value to the display value so long as it is enabled. It latches itself until unlatched by the next rung while disabling the first rung.

The third rung waits until the data available flag is set (C5), then copies the setpoint back to V3001. It also unlatches the second rung and, by activating C77, enables the next block of logic (whatever that might be) in the program.
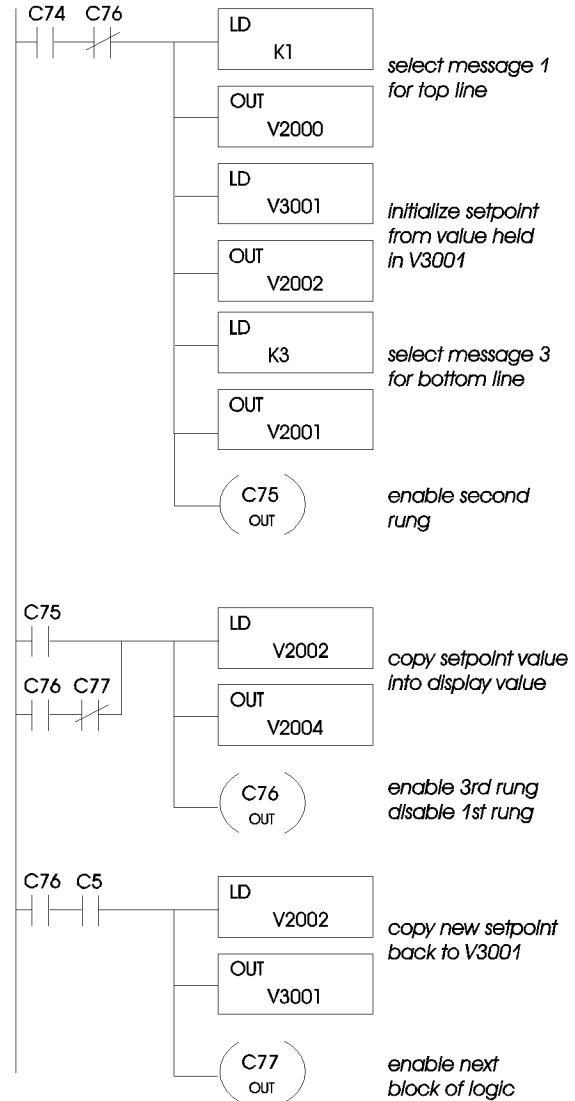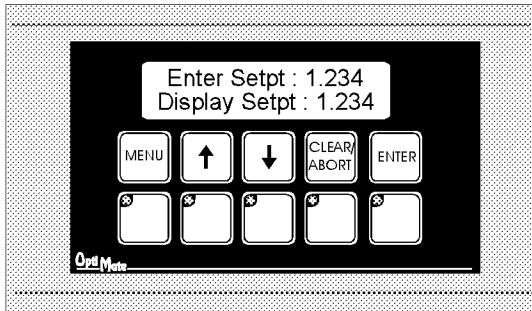
C74 C76

LD K1	select message 1 for top line
OUT V2000	
LD V3001	initialize setpoint from value held in V3001
OUT V2002	
LD K3	select message 3 for bottom line
OUT V2001	
C75 OUT	enable second rung

C75
C76 C77

LD V2002	copy setpoint value into display value
OUT V2004	
C76 OUT	enable 3rd rung disable 1st rung

C76 C5

LD V2002	copy new setpoint back to V3001
OUT V3001	
C77 OUT	enable next block of logic

Using a Menu Tree

The OP-620 allows you to predefine and use a layered menu tree for function selection. The operation of this menu tree is taken care of entirely by the OP-620 panel. The only requirement that the user has is to enable or disable the menu operation, and branch to the appropriate function logic when a function selection is made.

We will use the menu tree definition shown below for our example.

The OP-WINEDIT Editor screen shown below displays the menu structure,including function associations, on the lower section of the display. For example, if the operator selects

"Process #1 Automatic" from the menu tree, function number 5 would be placed in the function select register. If "Process No.2" is selected, no function number is selected; the terminal display will go to the next lower layer of the menu - "Process #2 Automatic".

Any menu item that has lower level menu items below it will, when selected, branch to the next level. If the "MENU" button is pressed, the terminal will back the menu tree up to the next higher level (towards the trunk) Arrow keys will step the panel through selection items on the same level of the same branch. The lowest level items on any branch will be function selections.

OP620 Configuration

Edit Help

Panel Address: 0

PLC Base
Register Address: V2000

Pushbuttons

	Alternate	Momentary
#1	⦿	○
#2	⦿	○
#3	⦿	○
#4	⦿	○
#5	⦿	○

Panel

[Close]
[Labels]
[Write to Panel]

Configure Messages:

Msg Text	Action	Decimal	Format	Range
1: "Enter Setpoint: ^^^^":	Arrow	Fixed	BCD	0 - 9999
2: "Product Rate: ^^ ^ ":	Display	Fixed	BCD	
3: "Display Setpt: ^^^^ ":	Display	Fixed	BCD	
4: "Good Parts: ^^^^ ":	Display	Fixed	BCD	
5: "Reject Parts: ^^^^ ":	Display	Fixed	BCD	
6: "Count Val: ^^^^^^^^ ":	Display	Fixed	BCD Double	
7: "AvgPart/Hr ^^^^^^^^^":	Display	Fixed	Floating Point	
8: "Process Step 1 ":				

[Delete Message]
[Clear List]

Configure Menu Tree:

[<< Promote Items] [>> Demote Items]

Item	Fctn	Level	Text
1:		1	"Process No. 1 "
2:	5	2	"Process #1 Automatic"
3:		2	"Process #1 Manual "
4:	1	3	"Fill Tank #1 "
5:	2	3	"Drain Tank #1 "
6:		1	"Process No. 2 "
7:	6	2	"Process #2 Automatic"
8:		2	"Process #2 Manual "

[Delete Menu Items]
[Check Menu Tree]
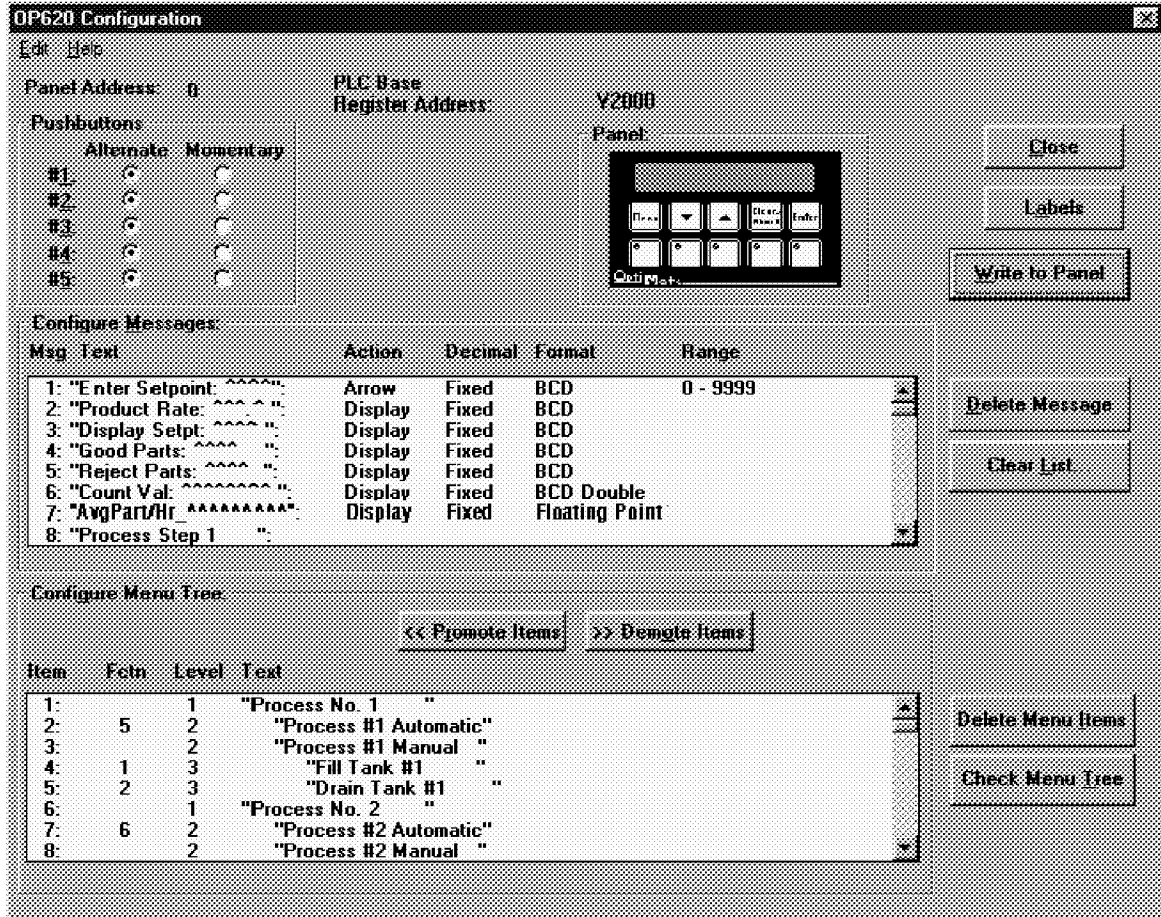
A Menu Tree Example

The following pages show examples using a Menu Tree. They show how to determine when a function has been selected and how to decode a function number. The examples also show how to implement a function with text display messages and how to implement a function containing arrow adjustment of a setpoint. The base register address for the following examples is V2000. The examples use the messages and the menu tree shown in the figure below.

PLC**Direct**™
by Koyo   OP-620   page-12
                          home page: optimate.com

Decoding a Function Number

The program shown below illustrates menu tree function selection using the menu tree shown on the previous page. The first rung enables the menu tree when C60 is active.

> Note : Enabling the menu tree does not automatically put the terminal into the menu. Once enabled, the terminal will bring up the menu tree when the operator presses "MENU". Until then, the display is under PLC program control.

The second rung sets the appropriate function enable bit when a selection is selected from the OP-620. Function selection will activate the FS flag (which, based on our register copy shown earlier, will be C6). The value held in the function register V2006 (M+6) is compared to a constant value. When one of the comparisons becomes true, that rung will set the appropriate enable relay (C70,C71, etc.). The last rung shown will disable the Menu Enable (ME) bit by setting C61. Until the ME bit is reset, the Menu may appear to "lock up" when a function is selected. Note that the logic shown interlocks the function number comparison (setting C70, C71, etc.) with the function select and menu enable flags to ensure that only one function is enabled each time a function is selected.
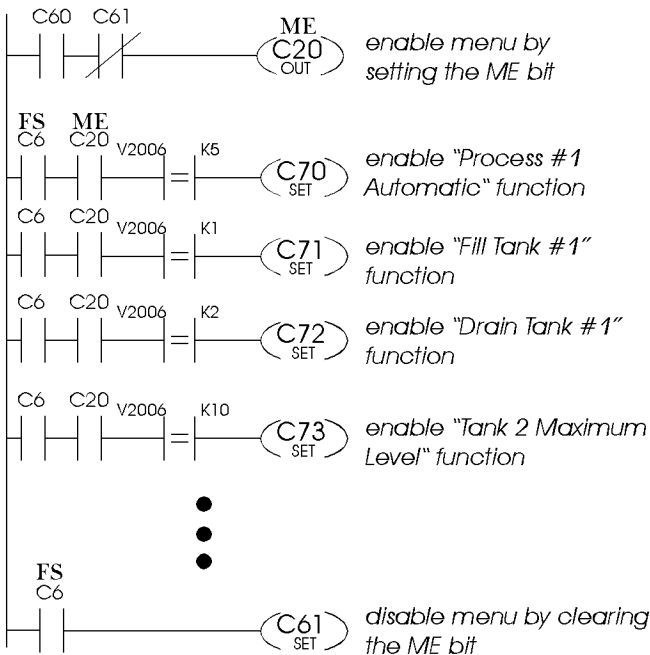
Implementing a Menu Function

The program logic shown below illustrates how a typical function might be implemented. Suppose the selection was made by the operator to "Drain Tank #1". According to the logic just shown, this would result in control relay C72 being set. The first rung of the "Drain Tank #1" function, shown below, will put messages into the top and bottom lines of the display. The second rung energizes output Y4 to open the drain until level sensor input X3 senses that it is empty. The third rung re-enables the menu and sets it to return back to the "Drain Tank #1" selection, via the MR (menu return) bit, when the tank is empty. The third rung also disables the function. By putting the function select relay (C6) in series, we force the program to wait until the function select has been cleared before re-enabling the menu.
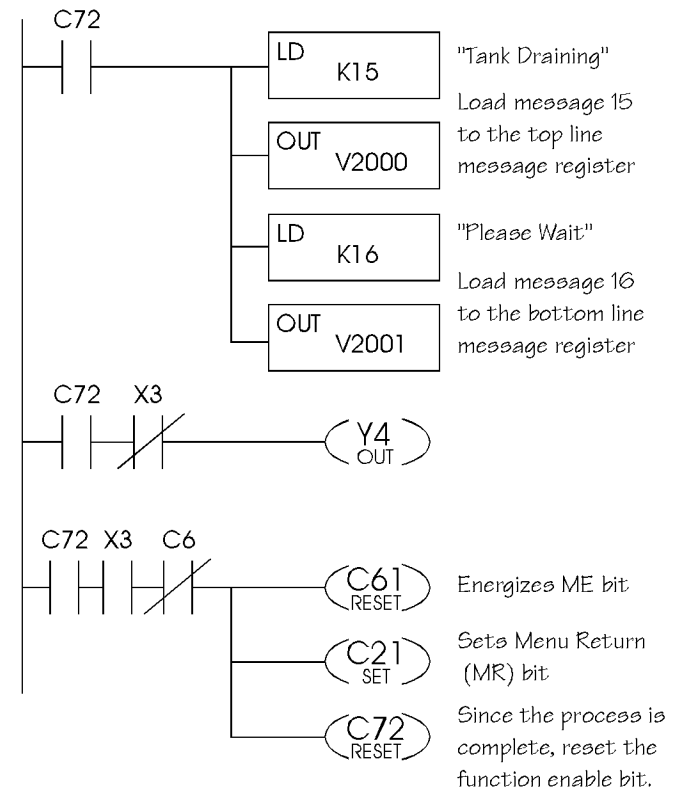
Implementing Data Entry using a Menu Function

The logic shown below is another typical example of how a setpoint function might be implemented. Suppose the selection for "Tank 2 Maximum Level" was made from the menu tree. From the logic on the previous page, this will result in C73 being set. Accordingly, the first rung shown below selects the appropriate setpoint message for the top line and a prompt message for the bottom line. It also initializes the setpoint value for arrow adjustment. The first rung disables itself and enables the second rung. When the setpoint data is entered (after the FS flag is cleared) the DA bit will be set. Then the second rung will copy the setpoint value back to its working location, set the DAK bit, and pass control to the third rung. The third rung waits until DA bit has been cleared by the OP-620, then clears the DAK and re-enable the menu. If the menu return flag is also set, the OP-620 will return to the same point in the menu.

Ladder	Instruction	Description
C73 C120 C121	LD K17	"T2 Max Level : ^^^^" Load message 17 to the top line message register.
	OUT V2000	
	LD V2120	Initial value for arrow adjust message. Copied from T2 Max Level holding register to top line data register.
	OUT V2002	
	LD K19	"Adjust then ENTER" Load message 19 to the bottom line message register.
	OUT V2001	
	C120 SET	Disable current rung and enable next rung.
C120 C5 C6 DA FS	LD V2002	When data entry complete (DA bit set), copy new value from top line data register to holding register for T2 Max Level.
	OUT V2120	
	C22 SET	Set DAK (Data Acknowledge) bit so panel will clear DA bit.
	C121 SET	Enable next rung which will wait for the panel to clear the DA bit.
	C120 RESET	Disable current rung
C121 C5	C121 RESET	Since the DA bit has been cleared, disable current rung.
	C61 RESET	Energizes the ME bit to Re-Enable the Menu
	C73 RESET	Since the function is complete, clear the bit that enabled the function.
	C22 RESET	Clear the DAK bit.

Example Program using an OP-620

The example program shown in the following 4 pages describes how to implement a program using an OP-620. The program uses the menu tree, an arrow adjust message, a data display message and text messages.

It is a complete program which will run on a DL105, DL205, DL350 or DL405 PLC. The program uses a two level deep menu tree with two menu functions. The first menu level contains only a single sub-menu message. The second menu level contains two messages, both of which are functions.

The OP-620 configuration for this example is shown in the figure below. The base register address is V2000. The first pushbutton (F1) is configured for momentary action and the rest for alternate. The first pushbutton is the only one used for this example.

The program implements the following tasks:

- Initializing the display
- Mapping the status and control registers to/from control relay registers
- Setting and Resetting the Menu Enable bit (ME)
- Decoding a function number
- Implementing a function containing an arrow adjust message
- Implementing a function containing a data display message
- Displaying text messages
- Using a function key (pushbutton)
- Using the CLEAR/ABORT button to escape from a menu or function
- Resetting the Data Available (DA) bit using the Data Acknowledge (DAK) bit

OP620 Configuration

Edit Help

Pushbuttons

	Alternate	Momentary
#1:	○	◉
#2:	◉	○
#3:	◉	○
#4:	◉	○
#5:	◉	○

Panel Address: 0

PLC Base Register Address: V2000

Panel

[Close]   [Labels]   [Write to Panel]

Configure Messages:

Msg	Text	Action	Decimal	Format	Range
1:	"Press Menu ":				
2:	"Desired Level: ^^^ ":	Arrow	Fixed	BCD	0 - 100
3:	"Adjust, then ENTER ":				
4:	"Actual Level: ^^^ ":	Display	Fixed	BCD	
5:	"Entry Done-Push Menu":				
6:	"Push F1 when Done ":				
7:					

[Delete Msg] [Clear List...]

Configure Menu Tree:

[Delete Items] [Check Tree] [<< Promote Items] [>> Demote Items]

Item	Fctn	Level	Text
1:		1	"Tank #1 "
2:	1	2	"Set Fluid Level "
3:	2	2	"Display Fluid Level "
4:			
5:			
6:			
7:			

Example Program
Rung 1

This rung only happens on the first program scan. It places the initial messages onto the OP-620's LCD display. It loads message 1 "Press Menu" to the top line of the display. Message 7, which is blank, is loaded to blank the bottom line of the display. The control relay C60 is set to energize the menu enable (ME) bit via rung 3.

Rung 2

This rung is the Memory Mapping rung. It should be active every scan. Since it is easier to treat individual bits (pushbuttons, DA, ME, DAK, etc.) as coils and contacts within the program, a memory mapping scheme is needed to mimic the status and control registers. This allows the individual bits of the status and control registers to be treated as coils and contacts.

The OP-620 writes data to the status register (V2007) so it's data can be copied to a control relay register such as VC0 (V40600). Therefore, the program can look at the corresponding bits within register VC0 to determine if a button has been pressed, DA is set, etc.

The OP-620 reads from the control register (V2010). Therefore, a control relay register such as VC20 (V40601) can be designated to mimic the panel's control register. The corresponding bits in VC20 are updated in the PLC program, then that register is mapped (copied) to the panel's control register. The panel will read the updated control register and act accordingly.

Rung 3

This rung sets the menu enable (ME) bit . This bit allows the user to enter the menu tree when the MENU button is pressed.

Rungs 4 and 5

Rungs 4 and 5 are used to determine which function was selected by the OP-620's user. Notice that both the function select (FS) and the menu enable (ME) bits are placed in the rung to ensure that a function has been selected before it determines which function the user selected. After it determines that the FS and ME bits are set, the function number is decoded to determine which function the user seleted. To decode the function number, selection register (V2006) is compared with a constant number. The constant number (K1, K2, etc.) represents the desired function. Once the function number has been determined, a coil is set. This coil is used only for this particular function.

Rung 4 represents function 1 and rung 5 represents function 2. These rungs can be duplicated for all the function numbers within the program. Later in the program, a rung needs to be added for each bit that starts a function process (C70, C71, etc.). When that particular bit has been set, the program knows which function was entered and then the program can implement that function using whatever logic is necessary. Two examples are described within this program.
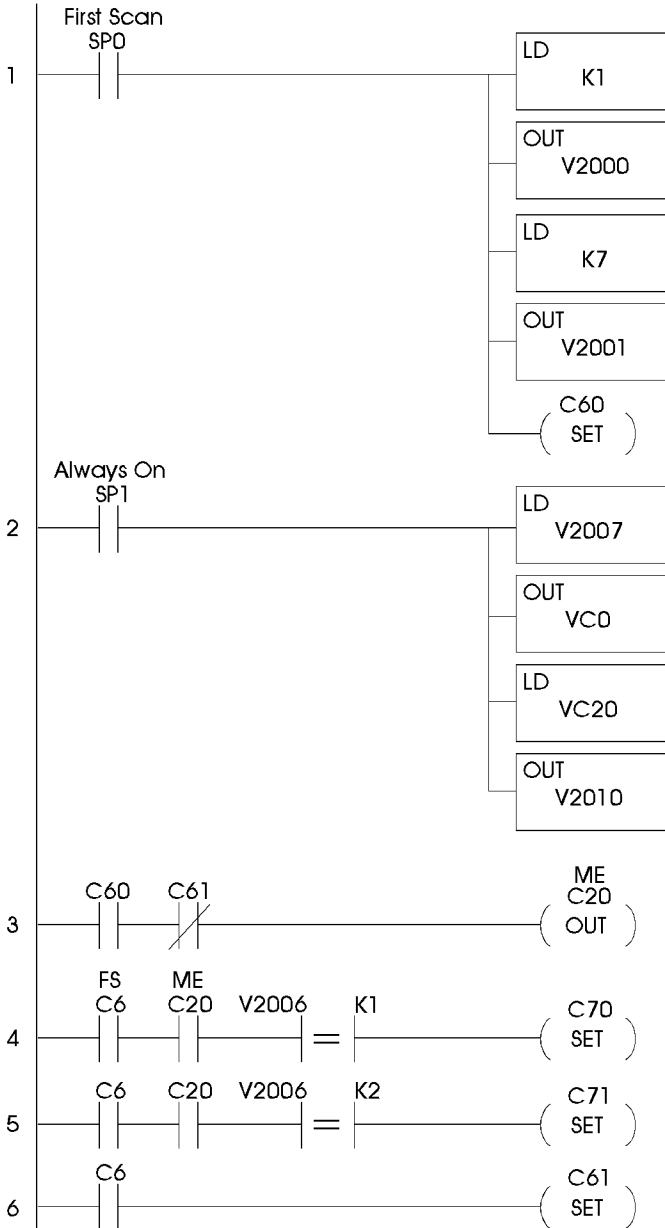
Rung 6

This rung disables the menu enable (ME) bit via C61. It checks for the function select (FS) bit. When the FS bit is set, the program knows that a function has been selected. If the function number has been decoded correctly as shown in the previous two rungs, then the panel needs to exit the menu so the program can implement the function.

The only way to leave the menu is to disable the ME bit. If the ME bit is not disabled after a function is selected, the OP-620's display will "lock up." When the ME bit is reset, the panel will leave the menu mode and the display will return to PLC program control.

Example Program
(Continued from previous page)

Rung 7

This rung is the first rung in the logic for function 1, defined in the menu tree as "Set Fluid Level". When C70 is enabled and C100 is not, the function begins. The second predefined message, "Desired Level: ^^^" is loaded into the top line (V2000) of the display.   Since message 2 is an arrow adjust message, the initial starting point for the adjustment has to be loaded into the top line data register, V2002. In this case, the data which is stored in V2210, is copied from V2210 to V2002.

Next, message 3 ,"Adjust, then ENTER", is loaded into the bottom line (V2001) of the display. Then, C100 is set which enables the next rung. A rung of this type which loads arrow adjustment messages should only execute one time within the function, therefore, C70 is reset to disable the current rung.

Rung 8

When the user is finished entering the data, the user will press the ENTER key as prompted by the bottom line message. The OP-620 will set the data available (DA) bit, C5. When the DA bit is set, rung 8 will copy the newly entered data from the top line data register, V2002, to the data's storage register,V2210. Next, the program sets C101 to enable the next rung and resets C100 to disable the current rung.

Notice that the function select (FS) bit, C6, is in series with C100 and the DA bit. This ensures that the panel has cleared the function select flag before allowing the program to accept the new data.

Rung 9

Rung 9 completes function 1. It waits until the OP-620 clears the data available (DA) bit, C5, before prompting the user for the next step.

When the panel clears the DA bit, two new messages are loaded to the display. Message 5, "Entry Done-Push Menu" is loaded to the top line of the display. Message 7, a blank message, is loaded to the bottom line of the display. Next, C61 is reset to re-enable the menu enable (ME) bit via rung 3. Finally, C101 is reset to disable the current rung.

After this rung is completed, the OP-620 will display the "Entry Done-Push Menu" message until the menu button is pressed.

The DA bit can be cleared two different ways. One is to replace the data entry message with another message, the other is to set the data acknowledge (DAK) bit, C22. In this example, the latter was chosen. Rung 14 explains that process in more detail.
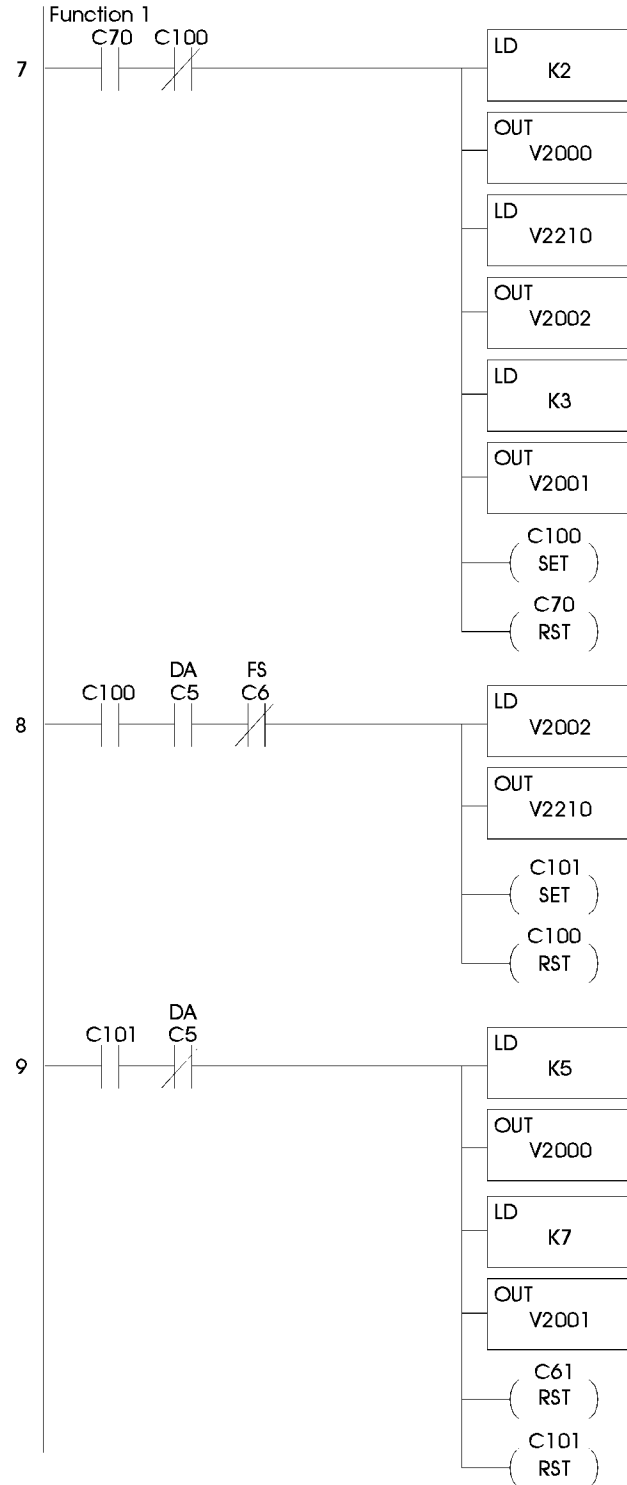
The program is continued on the next page.

Function 1

Rung 7: C70 (NO) C100 (NC) — LD K2, OUT V2000, LD V2210, OUT V2002, LD K3, OUT V2001, C100 (SET), C70 (RST)

Rung 8: C100 (NO) DA C5 (NO) FS C6 (NC) — LD V2002, OUT V2210, C101 (SET), C100 (RST)

Rung 9: C101 (NO) DA C5 (NC) — LD K5, OUT V2000, LD K7, OUT V2001, C61 (RST), C101 (RST)

Example Program
(Continued from previous page)

Rung 10

This rung is the first rung in the logic for function 2, defined in the menu tree as "Display Fluid Level". When C71 is enabled and C102 is not, the function begins. The fourth predefined message, "Actual Level: ^^^", is loaded into the top line (V2000) of the display. Since message 2 is a data display message, the initial display value has to be loaded into the top line data register, V2002. In this case, the initial value, which is stored in V2211, is copied from V2211 to V2002.

Next, message 6 ,"Push F1 when Done", is loaded into the bottom line (V2001) of the display. Then, C102 is set to enable the next rung. Last, C71 is reset to disable the current rung.

Rung 11

Rung 11 updates the data field of the display message on the top line. The OP-620's user can view the data as it changes within V2211. As long as this rung is active, the top line data register, V2002, will be updated with the current data, stored in V2211.

Rung 12

Message 6 on the bottom line prompts the user to "Push F1 when Done". When the OP-620's user wishes to stop viewing the data, they should press the first pushbutton, F1. This will complete function 2.

When F1, a momentary action button, is pressed, a new set of messages are loaded into the display registers . Message 1, "Press Menu", is loaded into the top line and message 7, a blank message, is loaded into the bottom line of the display. Next, C61 is reset to re-enable the menu enable (ME) bit via rung 3. Finally, C102 is reset to disable the current and previous rungs.

After this rung is completed, the OP-620 will display the "Press Menu" message until the menu button is pressed.

The program is continued on the next page.

Function 2

Rung 10: C71, C102 (not) —
- LD K4
- OUT V2000
- LD V2211
- OUT V2002
- LD K6
- OUT V2001
- C102 (SET)
- C71 (RST)

Rung 11: C102 —
- LD V2211
- OUT V2002

Rung 12: C102, F1 C0 —
- LD K1
- OUT V2000
- LD K7
- OUT V2001
- C61 (RST)
- C102 (RST)
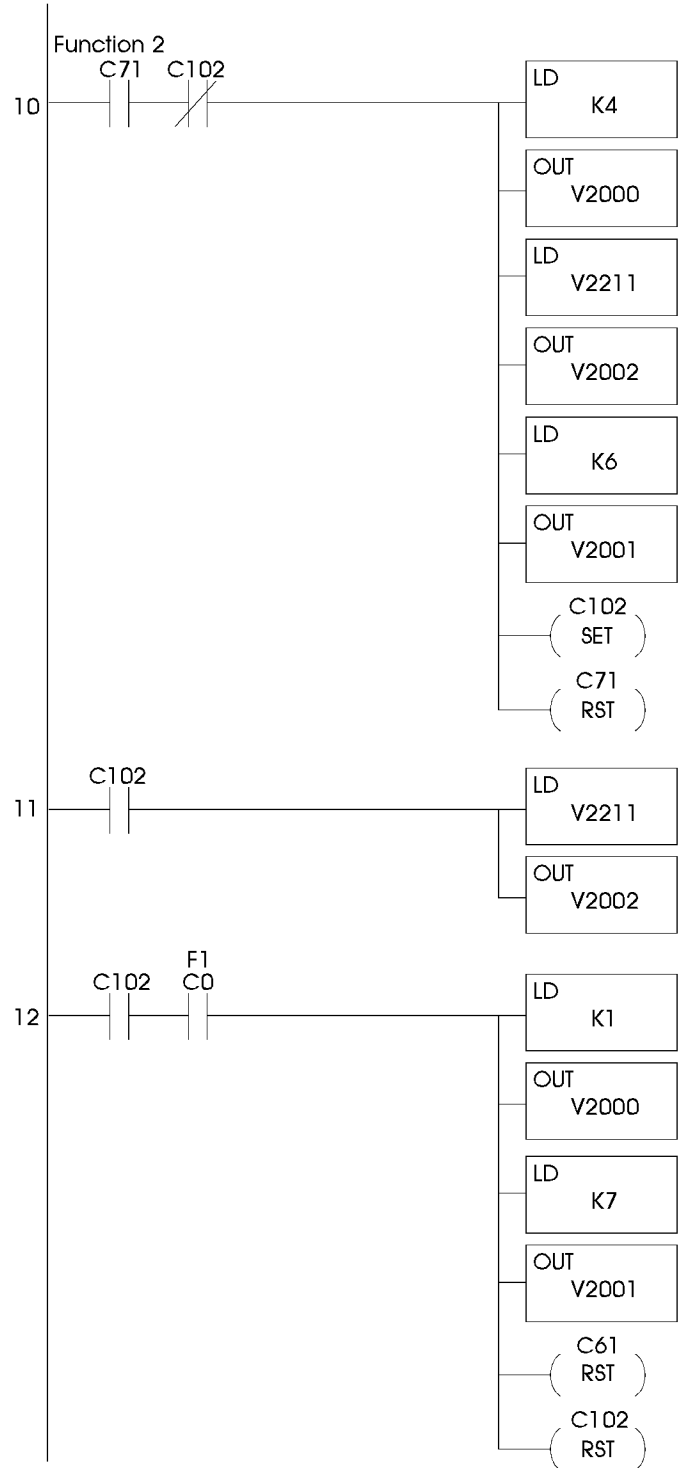
Example Program
(Continued from previous page)

Rung 13

This rung is an abort rung. If the OP-620's user is in the menu or in the middle of a function and they realize that they need to exit without making any changes, then they can use the CLEAR/ABORT button for that purpose. If the panel is in the menu tree when the CLEAR/ABORT button is pressed, the panel will exit the menu and default back to the messages that are in the top and bottom line message registers. If the user is in a function, this rung can be used to reset different bits within the program that pertain to any given function which could be active at the time, C70, C71, C100, etc.

This rung can also be OR'd with other conditions, such as machine jams, emergency conditions, etc. that might warrant exiting the menu (by clearing the menu enable bit) or disabling a function. Messages can also be loaded to the display to describe the problem to the user if so desired.

Rung 14

This rung sets the data acknowledge (DAK) bit whenever the data available (DA) bit is set by the OP-620. It will stay active until the panel sees that the DAK has been set. At that time, the panel will reset the DA bit which will deactivate the rung. If you choose to reset the DA bit in this manner, this rung should be placed at the end of the program where it can be checked every scan.

Rung 15

This rung marks the end of the program.

```
         AB
         C7                                              C61
13  ┤├──────────────────────────────────────────────┬──( RST )
                                                     │   C70
                                                     ├──( RST )
                                                     │   C71
                                                     ├──( RST )
                                                     │   C100
                                                     ├──( RST )
                                                     │   C101
                                                     ├──( RST )
                                                     │   C102
                                                     └──( RST )

         DA                                              DAK
         C5                                              C22
14  ┤├──────────────────────────────────────────────────( OUT )

15  ──────────────────────────────────────────────────( END )
```
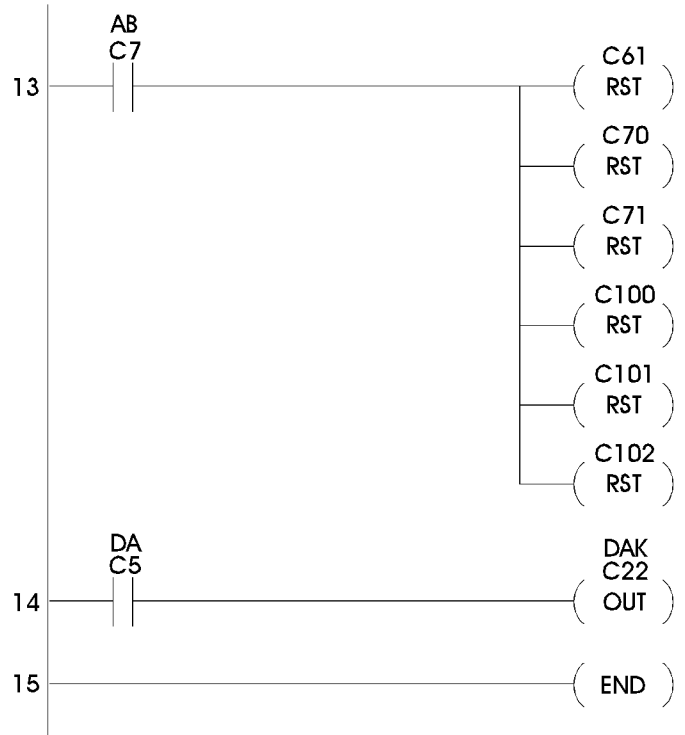
Examples of Use with an Allen-Bradley PLC

Interfacing to A-B Memory

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

> **Note: When using an OP-620 with an A-B PLC, always ensure that at least 9 words of memory are allocated to ensure proper communications.**

All of the examples that follow assume that the OP-620 module has been configured, through the OP-WINEDIT Editor, for a file type 7 and base register address 0. With this configuration, the status and control registers will be at N7:7 and N7:8 respectively. The following is a table relating status and control register bits to their N7 locations.

Status Register		Control Register	
bit	location	bit	location
F1	N7:7/0	ME	N7:8/0
F2	N7:7/1	MR	N7:8/1
F3	N7:7/2	DAK	N7:8/2
F4	N7:7/3	BD	N7:8/3
F5	N7:7/4		
DA	N7:7/5		
FS	N7:7/6		
AB	N7:7/7		
MA	N7:7/8		
ENTER	N7:7/9		
Up arrow	N7:7/10		
Down arrow	N7:7/11		

Using a Function Button

The five function buttons below the LCD display will appear as control relay coils in your program. The following example turns on output O:0/5 when button F2 is active.
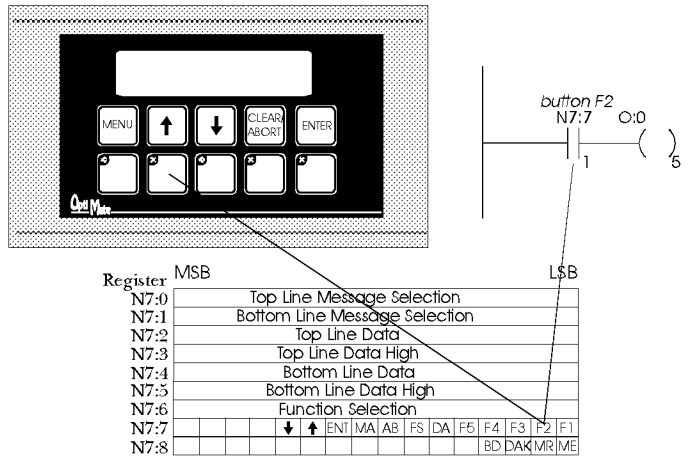
Displaying Floating Point Numbers

Floating point numbers can be displayed by the OP-620. This number format is a standard capability for PLC Direct DL250, DL350 and DL450 PLCs. However, the A-B SLC PLCs do not have a means of handling floating point numbers. Due to the limitations of the SLC, this capability will not be commonly implemented with A-B PLCs.

OP620 Configuration

Edit Help

Panel Address: 0   PLC Base
                                       Register Address: N7:0
Pushbuttons:
          Alternate Momentary   Panel:
    #1:   ●   ○
    #2:   ●   ○
    #3:   ●   ○
    #4:   ●   ○
    #5:   ●   ○

Configure Messages:

Msg: Text	Action	Decimal	Format	Range
1: "Enter Setpoint: ^^^^"	Arrow	Fixed	BCD	0 - 9999
2: "Product Rate: ^^^ ^"	Display	Fixed	BCD	
3: "Display Setpt: ^^^^ "	Display	Fixed	BCD	
4: "Good Parts: ^^^^ "	Display	Fixed	BCD	
5: "Reject Parts: ^^^ ^ "	Display	Fixed	BCD	
6: "Count Val: ^^^^^^^^ "	Display	Fixed	BCD Double	
7: "AvgPart/Hr_^^^^^^^^^"	Display	Fixed	Floating Point	
8: "Process Step 1 "				

Configure Menu Tree:

<< Promote Items   >> Demote Items

Item	Fctn	Level	Text
1:		1	"Process No. 1 "
2:	5	2	"Process #1 Automatic"
3:		2	"Process #1 Manual "
4:	1	3	"Fill Tank #1 "
5:	2	3	"Drain Tank #1 "
6:		1	"Process No. 2 "
7:	6	2	"Process #2 Automatic"
8:		2	"Process #2 Manual "

Close
Labels
Write to Panel
Delete Message
Clear List
Delete Menu Items
Check Menu Tree

Displaying Messages on the LCD Display

Messages of various types can be configured via OP-WINEDIT and downloaded to the OP-620. The message definitions shown in the figure above will be used in all of the examples that follow.

The example on the right shows a couple of messages being displayed to the LCD display. The top line uses data display message 4. The data for the data field is coming from N7:54. The bottom line is text message 8.

I:2
12

MOV
MOVE
Source 4
Dest N7:0
select message 4 to top line

MOV
MOVE
Source 8
Dest N7:1
select message 8 to bottom line

MOV
MOVE
Source N7:54
Dest N7:2
put data from N7:54 into top line data field

Good Parts : 235
Process Step 1

MENU ↑ ↓ CLEAR ABORT ENTER

Register MSB   LSB

Register															
N7:0	Top Line Message Selection														
N7:1	Bottom Line Message Selection														
N7:2	Top Line Data														
N7:3	Top Line Data High														
N7:4	Bottom Line Data														
N7:5	Bottom Line Data High														
N7:6	Function Selection														
N7:7				↓	↑	ENT	MA	AB	FS	DA	F5	F4	F3	F2	F1
N7:8											BD	DAK	MR	ME

Displaying long BCD Numbers

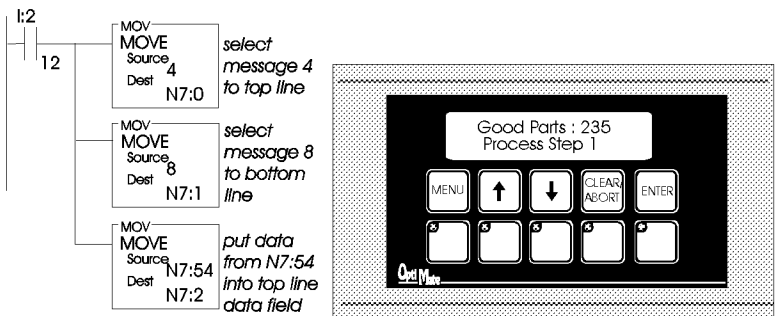Long (up to 8 digit) BCD numbers can be displayed by the OP-620. This number format is a standard capability for PLC Direct PLCs. However, the A-B SLC PLCs do not have an easy means of handling long BCD numbers. Due to the limitations of the SLC, this capability will not be commonly implemented.

The example in the next column illustrates the method for displaying large numbers. Registers N7:54 and N7:55 contain an 8 digit BCD number, with the most significant 4 digits in N7:55.
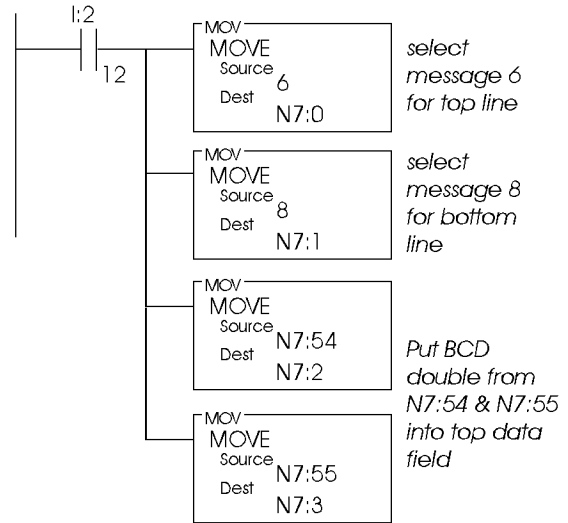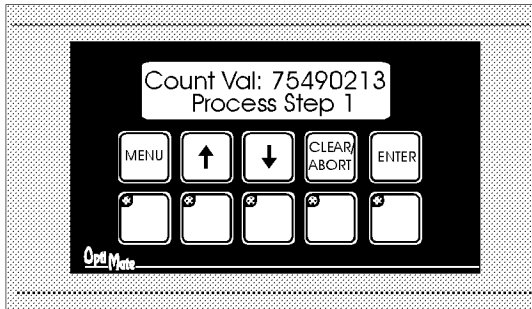
Arrow Adjustment of Setpoint Data

The figure to the right illustrates arrow adjustment of setpoint data (and a whole lot more). The process is enabled when B3/0 is energized. The first program rung places the "Enter Setpoint" and "Display Setpt" messages in the top and bottom lines, initializes the setpoint value from the value in N7:37 and enables the second rung.

The second rung continually copies the setpoint value to the display value so long as it is enabled. It latches itself until unlatched by the next rung while disabling the first rung.

The third rung waits until the data available flag is set (N7:7/5), then copies the setpoint back to N7:37. It also unlatches the second rung and, by activating B3/3, enables the next block of logic (whatever that might be) in the program.
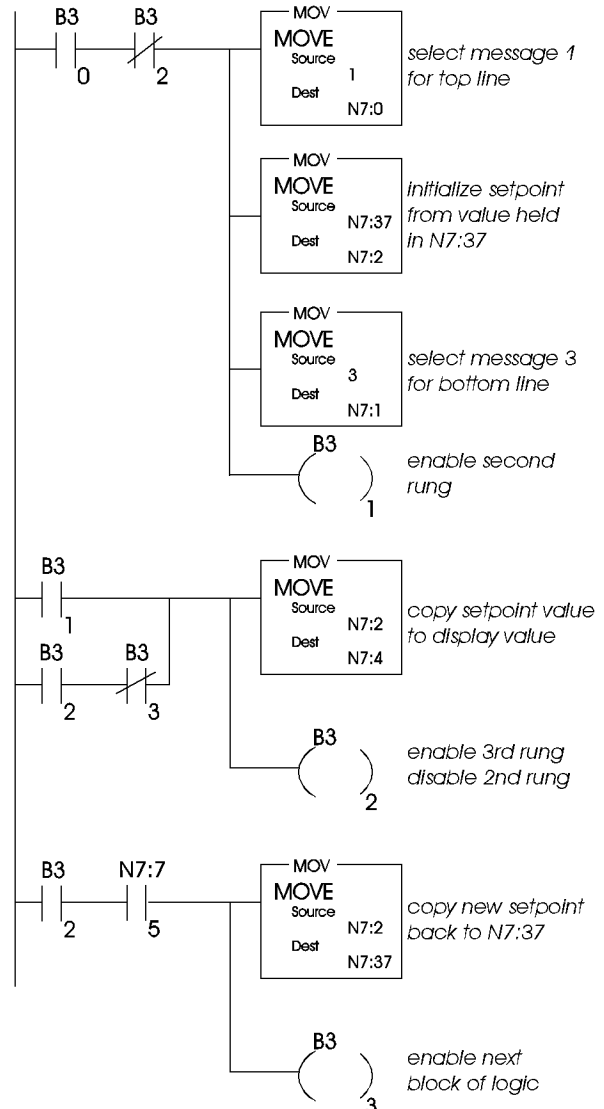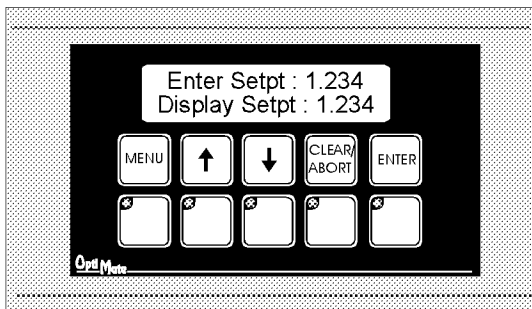
Using a Menu Tree

The OP-620 allows you to predefine and use a layered menu tree for function selection. The operation of this menu tree is taken care of entirely by the OP-620 terminal. The only requirement that the user has is to enable or disable the menu operation, and branch to the appropriate function logic when a function selection is made.

We will use the menu tree definition shown below for our example.

The OP-WINEDIT Configuration Editor screen shown below displays the menu structure, including function associations, in the lower section of the display. For example, if the operator selects "Process #1 Automatic" from the menu tree, function number 5 would be placed in the function select register. If "Manual" is selected, no function number is selected; the terminal display will go to the next lower layer of the menu - "Fill Tank #1".

Any menu item that has lower level menu items below it will, when selected, branch to the next level. If the "MENU" button is pressed, the terminal will back the menu tree up to the next higher level (towards the trunk) Arrow keys will step the panel through selection items on the same level of the same branch. The lowest level items on any branch will be function selections.


```
OP620 Configuration                                                    [X]
Edit  Help

Panel Address:   0          PLC Base
                            Register Address:    N7:0
Pushbuttons
       Alternate  Momentary              Panel:
  #1      (•)        ( )                                        Close
  #2      (•)        ( )
  #3      (•)        ( )                                        Labels
  #4      (•)        ( )
  #5      (•)        ( )                                        Write to Panel
                                         OptiMate

Configure Messages:
Msg Text                    Action    Decimal  Format        Range
  1: "Enter Setpoint: ^^^^":  Arrow    Fixed    BCD           0 - 9999
  2: "Product Rate: ^^^.^":   Display  Fixed    BCD                       Delete Message
  3: "Display Setpt: ^^^^":   Display  Fixed    BCD
  4: "Good Parts: ^^^^":      Display  Fixed    BCD
  5: "Reject Parts: ^^^^":    Display  Fixed    BCD                       Clear List
  6: "Count Val: ^^^^^^^^":   Display  Fixed    BCD Double
  7: "AvgPart/Hr ^^^^^^^^":   Display  Fixed    Floating Point
  8: "Process Step 1    ":

Configure Menu Tree:

              << Promote Items    >> Demote Items

Item  Fctn  Level  Text
  1:           1    "Process No. 1    "
  2:     5     2       "Process #1 Automatic"                             Delete Menu Items
  3:           2       "Process #1 Manual  "
  4:     1     3          "Fill Tank #1      "
  5:     2     3          "Drain Tank #1     "                            Check Menu Tree
  6:           1    "Process No. 2    "
  7:     6     2       "Process #2 Automatic"
  8:           2       "Process #2 Manual  "
```
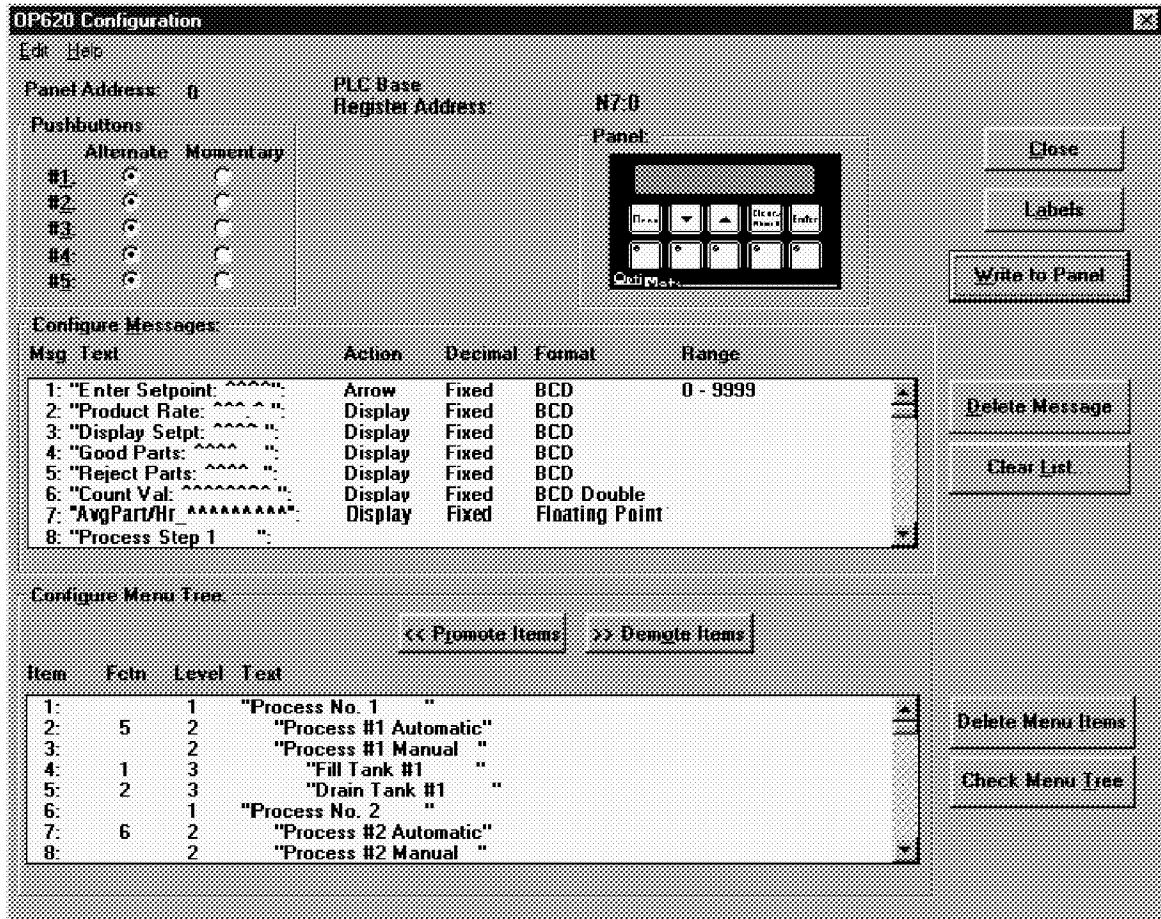
A Menu Tree Example

The following pages show examples using a Menu Tree. They show how to determine when a function has been selected and how to decode a function number. The examples also show how to implement a function with text display messages and how to implement a function containing arrow adjustment of a setpoint. The base register address for the following examples is N7:0. The examples use the messages and the menu tree shown in the figure below.

Decoding a Function Number

The program below illustrates menu tree function selection using the menu tree shown on the previous page. The first rung enables the menu tree when B3/3 is active.

　　Note : Enabling the menu tree does not automatically put the terminal into the menu. Once enabled, the terminal will bring up the menu tree when the operator presses "MENU". Until then, the display is under PLC program control.

The second rung sets the appropriate function enable bit when a selection is selected from the OP-620. Function selection will activate the FS flag (N7:7/6). The value comparison to the value held in the function register will latch the appropriate enable relay (B4/0, B4/1, etc.). The last rung shown will also disable the Menu Enable (ME) bit by latching B3/4. Note that the logic shown interlocks the function selects (setting B4/0, B4/1, etc.) with the function select and menu enable flags to ensure that only one function is enabled each time a function is selected.
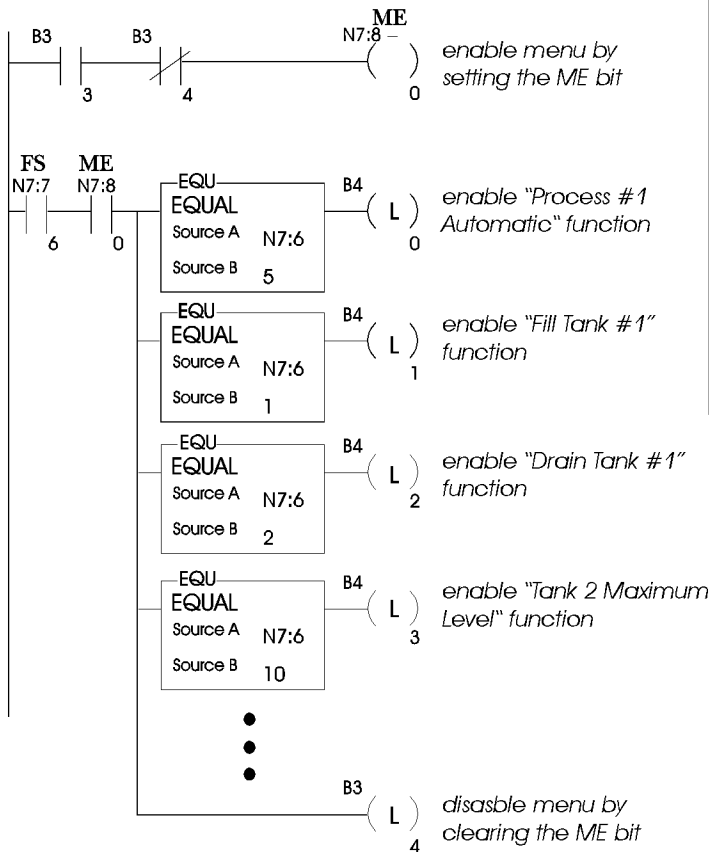
Implementing a Menu Function

The program logic shown below illustrates how a typical function might be implemented. Suppose the selection was made by the operator to "Drain Tank #1". According to the logic just shown, this would result in control relay B4/2 being latched. The first rung of the "Drain Tank #1" function, shown below, will put messages into the top and bottom lines of the display. The second rung energizes output O:0/4 to open the drain until level sensor input I:2/5 senses that it is empty. The third rung re-enables the menu and sets it to return back to the "Drain Tank #1" selection when the tank is empty. The third rung also disables the function. By putting the function select relay (N7:7/6) in series, we force the program to wait until the function select has been cleared before re-enabling the menu.
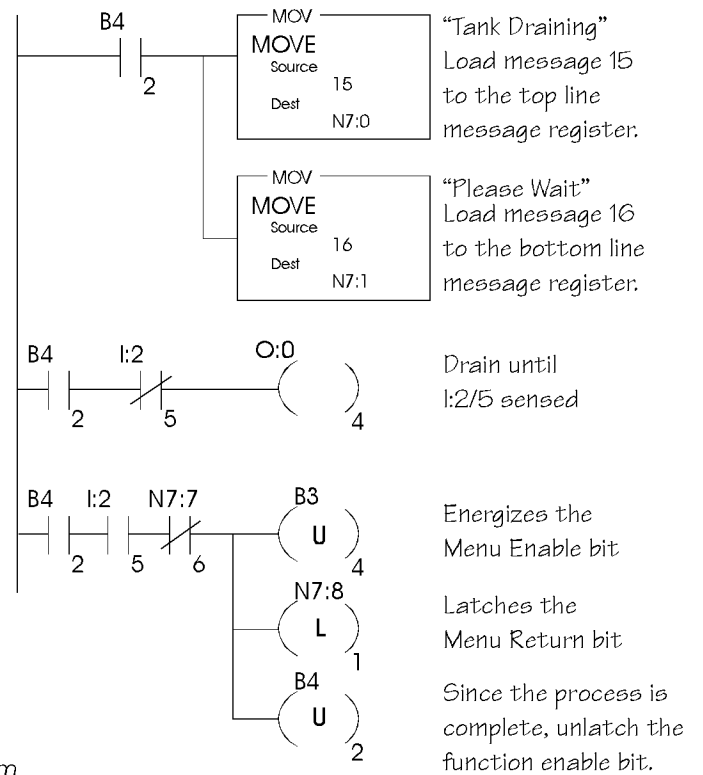
Implementng Data Entry using a Menu Function

The logic shown below is another typical example of how a setpoint function might be implemented. Suppose the selection for "Tank 2 Maximum Level" was made. From the logic on the previous page, this will result in B4:3 being latched. Accordingly, the first rung shown below selects the appropriate setpoint message for the top line and a prompt message for the bottom line. It also initializes the setpoint value for arrow adjustment. The first rung disables itself and enables the second rung. When the setpoint data is entered (after the FS flag is cleared), the second rung will copy the setpoint value back, unlatch B3:1 to disable the function and unlatch B3:4 to re-enable the menu. If the menu return flag is also latched, the OP-620 will return to the same point in the menu.

Ladder logic	Description
B4 || 3 **B3** |/| 1 — MOV — MOVE, Source 17, Dest N7:0	"T2 Max Level : ^^^^" Load message 15 to the top line message register.
— MOV — MOVE, Source N7:37, Dest N7:2	Initial value for arrow adjust message. Copied from T2 Max Level holding register to top line data register.
— MOV — MOVE, Source 19, Dest N7:1	"Adjust then ENTER" Load message 16 to the bottom line message register.
B3 (L) 1	Disable current rung and enable next rung.
B3 || 1 **DA** **N7:7** || 5 **FS** **N7:7** |/| 6 — MOV — MOVE, Source N7:2, Dest N7:37	When data entry complete (DA bit set), copy new value from top line data register to holding register for T2 Max Level.
B3 (U) 1	Disable current rung
B3 (U) 4	Energize the ME bit to Re-Enable the Menu
B4 (U) 3	Since function is complete, clear the bit that enabled the function.
DA **N7:7** || 5 **DAK** **N7:8** ( ) 2	Set Data Acknowledge (DAK)

Example Program using an OP-620

The example program shown in the following 4 pages describes how to implement a program using an OP-620. The program uses the menu tree, an arrow adjust message, a data display message and text messages.

It is a complete program which will run on an Allen-Bradley SLC 5/03, SLC 5/04 or Micrologix PLC. The program uses a two level deep menu tree with two menu functions. The first menu level contains only a single sub-menu message. The second menu level contains two messages, both of which are functions.

The OP-620 configuration for this example is shown in the figure below. The base register address is N7:0. The first pushbutton (F1) is configured for momentary action and the rest for alternate. The first pushbutton is the only one used for this example.

The program implements the following tasks:

- Initializing the display
- Mapping the status and control registers to/from control relay registers
- Setting and Resetting the Menu Enable bit (ME)
- Decoding a function number
- Implementing a function containing an arrow adjust message
- Implementing a function containing a data display message
- Displaying text messages
- Using a function key (pushbutton)
- Using the CLEAR/ABORT button to escape from a menu or function
- Resetting the Data Available (DA) bit using the Data Acknowledge (DAK) bit

Example Program
Rung 1

This rung only happens on the first program scan. It places the initial messages onto the OP-620's LCD display. It loads message 1 "Press Menu" to the top line of the display. Message 7, which is blank, is loaded to blank the bottom line of the display. The bit B3/3 is latched to disable the current rung and to energize the menu enable (ME) bit via rung 3.

Rung 2

This rung sets the menu enable (ME) bit as long as B3/3 is latched and B3/4 is not. The ME bit allows the user to enter the menu tree when the MENU button is pressed.

Rungs 3 and 4

Rungs 3 and 4 are used to determine which function was selected by the OP-620's user. Notice that both the function select (FS) and the menu enable (ME) bits are placed in the rung to ensure that a function has been selected before it determines which function the user selected. After it determines that the FS and ME bits are set, the function number is decoded to determine which function the user selected. To decode the function number, selection register (N7:6) is compared with a constant number. The constant number (1, 2, etc.) represents the desired function. Once the function number has been determined, a coil is latched. This coil is used only for this particular function.

Rung 3 represents function 1 and rung 4 represents function 2. These rungs should be duplicated for all the function numbers within the program. Later in the program, a rung needs to be added for each bit that starts a function process (B4/0, B4/1, etc.). When that particular bit has been latched, the program knows which function was entered and then the program can implement that function using whatever logic is necessary. Two examples are described within this program.

Rung 5

This rung disables the menu enable (ME) bit via B3/4. It checks for the function select (FS) bit. When the FS bit is set, the program knows that a function has been selected. If the function number has been decoded correctly as shown in the previous two rungs, then the panel should exit the menu so the program can implement the function.

The only way to leave the menu is to disable the ME bit. If the ME bit is not disabled after a function is selected, the OP-620's display will "lock up." When the ME bit is reset, the panel will leave the menu mode and the display will return to PLC program control.
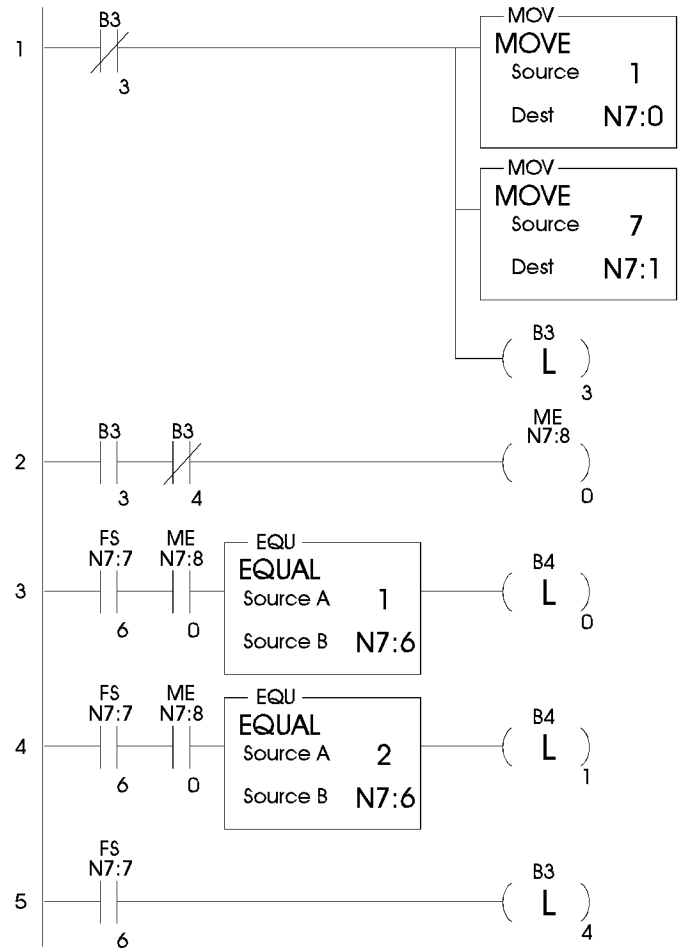
The program is continued on the next page.

Example Program
(Continued from previous page)

Rung 6

This rung is the first rung in the logic for function 1, defined in the menu tree as "Set Fluid Level". When B4/0 is enabled and B4/3 is not, the function begins. The second predefined message, "Desired Level: ^^^" is loaded into the top line (N7:0) of the display. Since message 2 is an arrow adjust message, the initial starting point for the adjustment has to be loaded into the top line data register, N7:2. In this case, the data which is stored in N7:20, is copied from N7:20 to N7:2.

Next, message 3 ,"Adjust, then ENTER", is loaded into the bottom line (N7:1) of the display. Then, B4/3 is latched which enables the next rung. A rung of this type which loads arrow adjustment messages should only execute one time within the function, therefore, B4/0 is unlatched to disable the current rung.

Rung 7

When the user is finished entering the data, the user will press the ENTER key as prompted by the bottom line message. The OP-620 will set the data available (DA) bit, N7:7/5. When the DA bit is set, rung 7 will copy the newly entered data from the top line data register, N7:2, to the data's storage register, N7:20. Next, the program latches B4/4 to enable the next rung and unlatches B4/3 to disable the current rung.

Notice that the function select (FS) bit, N7:7/6, is in series with B4/3 and the DA bit. This ensures that the panel has cleared the function select flag before allowing the program to accept the new data.

Rung 8

Rung 8 completes function 1. It waits until the OP-620 clears the data available (DA) bit, N7:7/5, before prompting the user for the next step.

When the panel clears the DA bit, two new messages are loaded to the display. Message 5, "Entry Done-Push Menu" is loaded to the top line of the display. Message 7, a blank message, is loaded to the bottom line of the display. Next, B3/4 is unlatched to re-enable the menu enable (ME) bit via rung 2. Finally, B4/4 is unlatched to disable the current rung.

After this rung is completed, the OP-620 will display the "Entry Done-Push Menu" message until the menu button is pressed.

The DA bit can be cleared two different ways. One is to replace the data entry message with another message, the other is to energize the data acknowledge (DAK) bit, N7:8/2. In this example, the latter was chosen. Rung 13 explains that process in more detail.
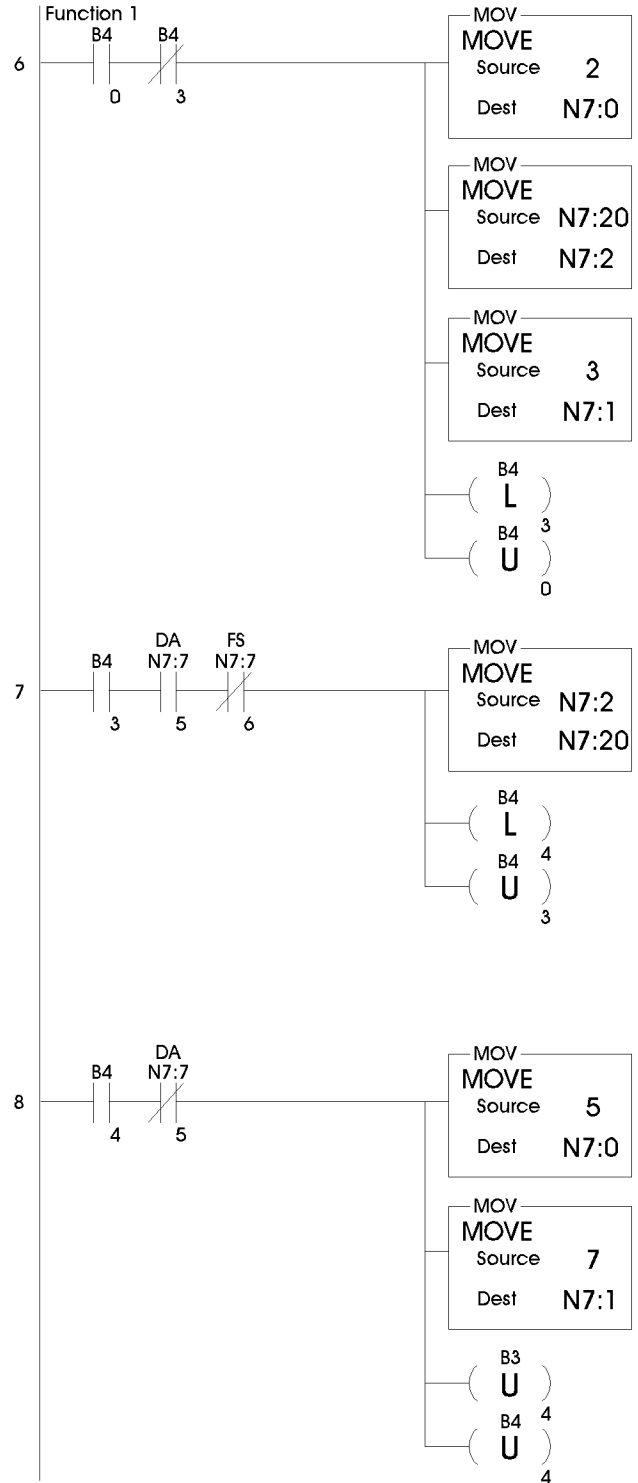
The program is continued on the next page.

Example Program
(Continued from previous page)

Rung 9

This rung is the first rung in the logic for function 2, defined in the menu tree as "Display Fluid Level". When B4/1 is enabled and B4/5 is not, the function begins. The fourth predefined message, "Actual Level: ^^^", is loaded into the top line (N7:0) of the display. Since message 2 is a data display message, the initial display value has to be loaded into the top line data register, N7:2. In this case, the initial value, which is stored in N7:21, is copied from N7:21 to N7:2.

Next, message 6 ,"Push F1 when Done", is loaded into the bottom line (N7:1) of the display. Then, B4/5 is latched to enable the next rung. Last, B4/1 is unlatched to disable the current rung.

Rung 10

Rung 10 updates the data field of the display message on the top line. The OP-620's user can view the data as it changes within N7:21. As long as this rung is active, the top line data register, N7:2, will be updated with the current data, stored in N7:21.

Rung 11

Message 6 on the bottom line prompts the user to "Push F1 when Done". When the OP-620's user wishes to stop viewing the data, they should press the first pushbutton, F1. This will complete function 2.

When F1, a momentary action button, is pressed, a new set of messages are loaded into the display registers . Message 1, "Press Menu", is loaded into the top line and message 7, a blank message, is loaded into the bottom line of the display. Next, B3/4 is unlatched to re-enable the menu enable (ME) bit via rung 2. Finally, B4/5 is unlatched to disable the current and previous rungs.

After this rung is completed, the OP-620 will display the "Press Menu" message until the menu button is pressed.

The program is continued on the next page.
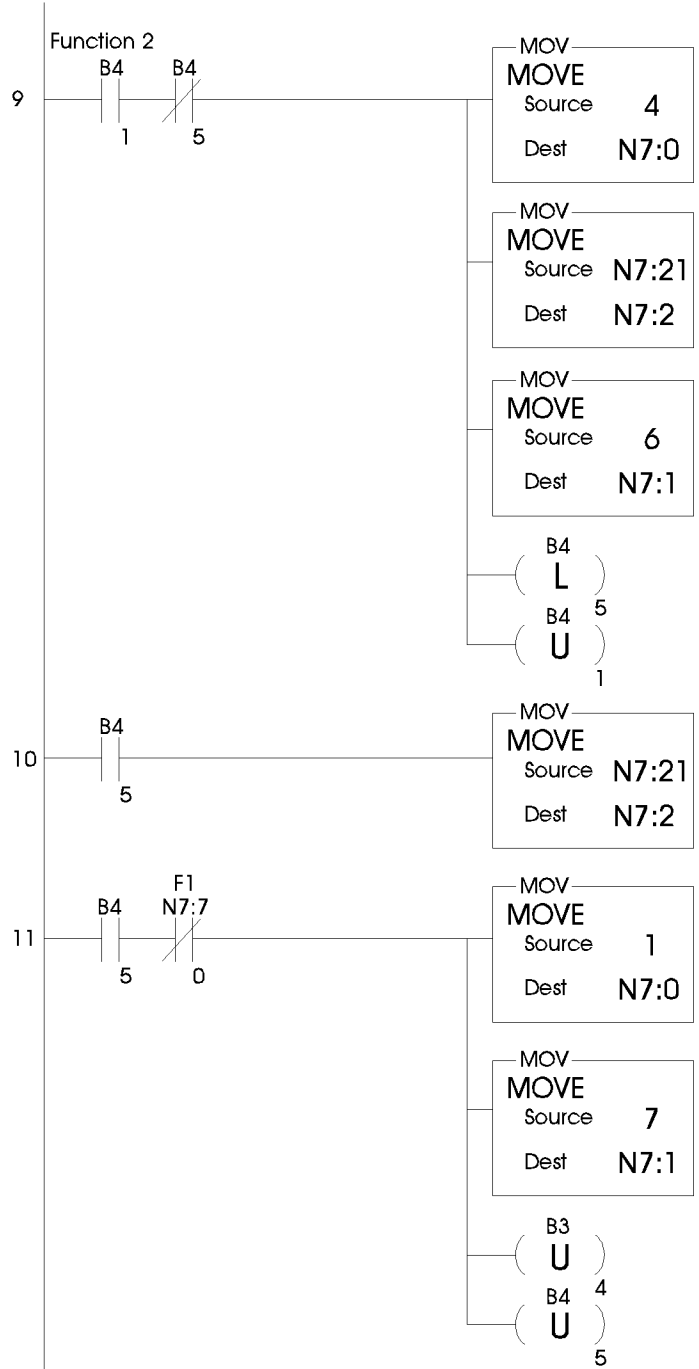
Example Program
(Continued from previous page)

Rung 12

This rung is an abort rung. If the OP-620's user is in the menu or in the middle of a function and they realize that they need to exit without making any changes, then they can use the CLEAR/ABORT button for that purpose. If the panel is in the menu tree when the CLEAR/ABORT button is pressed, the panel will exit the menu and default back to the messages that are in the top and bottom line message registers. If the user is in a function, this rung can be used to unlatch different bits within the program that pertain to any given function which could be active at the time, B4/0, B4/1, B4/3, etc.

This rung can also be OR'd with other conditions, such as machine jams, emergency conditions, etc. that might warrant exiting the menu (by clearing the menu enable bit) or disabling a function. Messages can also be loaded to the display to describe the problem to the user if so desired.

Rung 13

This rung energizes the data acknowledge (DAK) bit whenever the data available (DA) bit is latched by the OP-620. It will stay active until the panel sees that the DAK has been set. At that time, the panel will unlatch the DA bit which will deactivate the rung. If you choose to unlatch the DA bit in this manner, this rung should be placed at the end of the program where it can be checked every scan.

Rung 14

This rung marks the end of the program.

```
                AB
                N7:7                                         B3
         12  ───┤ ├──────────────────────────────────────┬──( U )
                  7                                        │      4
                                                           │    B4
                                                           ├──( U )
                                                           │      0
                                                           │    B4
                                                           ├──( U )
                                                           │      1
                                                           │    B4
                                                           ├──( U )
                                                           │      3
                                                           │    B4
                                                           ├──( U )
                                                           │      4
                                                           │    B4
                                                           └──( U )
                                                                  5

                DA                                         DAK
                N7:7                                       N7:8
         13  ───┤ ├──────────────────────────────────────────( )
                  5                                                2

         14  ──────────────────────────────────────────────( END )
```
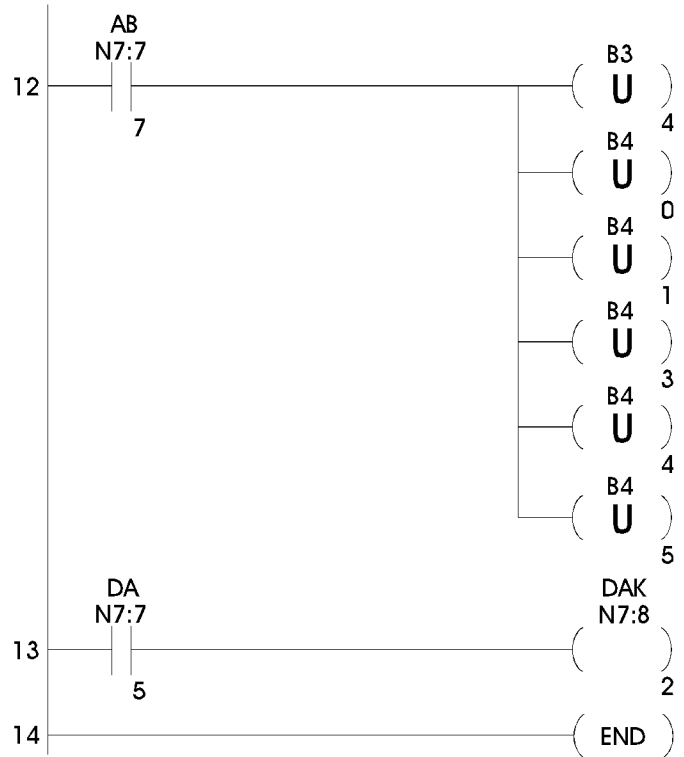
Set Up and Interconnect

Legending the Function Keys

Legending the OP-620 panel is a relatively simple process that basically involves sliding a label transparency into a pocket in the panel overlay. Use the following procedure.

- Remove the bezel from the panel. The bezel snaps to the panel 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.
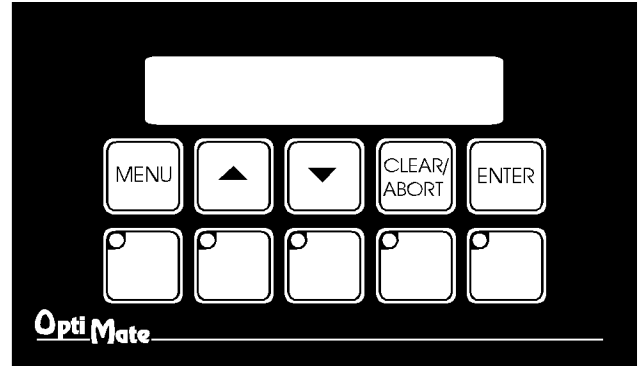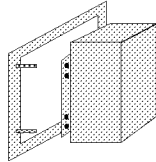
Function Key Legend tranparency

OP620 Label Template

Print

OK

Cancel

Pushbuttons:

| Start Process | Stop Process | Dryer ON | Previous Loop | Next Loop |
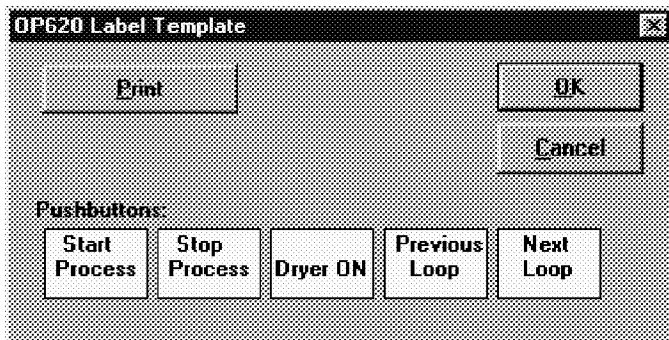
Other options include the following
- > Uses a computer graphics program and a laser printer to create the transparency directly. Alternately print on paper and photocopy to a transparency
- > Use press on letters onto a transparency sheet.
- > Use a typewriter, lettering machine or press on letters 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 panels are designed for communication connection to system devices. The panel 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 panel to a computer or PLC can be accomplished over either an RS 232 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 Panel RS232		OptiMate Panel RS422	
Host Computer/PLC	OptiMate Panel DB-15 Male	Host Computer/PLC	OptiMate Panel DB-15 Male
TX ————	3 RS232 RX	TX+ ————	9 RS422 RX+
RX ————	2 RS232 TX	TX- ————	10 RS422 RX-
Sig Gnd ————	5 Sig Gnd	RX+ ————	11 RS422 TX+
		RX- ————	12 RS422 TX-

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

Serial Connection to OP-9001 Communications Master

Connection to an OP-9001 Communications Master over a serial link is via RS422. The Communication Master port connections are reversed from the panel 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. We recommend Belden 9729 or equivalent cable.

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 switch should be on in the last, and only the last, panel on the cable.

Run | ON | Pgm
Term
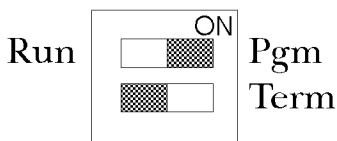
Power

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.

There is a brief (0.5 to 2 millisecond) power on surge 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.

For multi-panel systems using multiple power supplies, we recommend tying the DC commons (grounds) together for each separate power supply. This will ensure that the voltage differential of each power supply DC ground will be at the same level.

Configuration

Configuration Selections

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

For the OP-620 module, the following are important configuration parameters.

Single Module PLC Based Systems

Decision	Selection
Single/ Multi Module	Choose single panel configuration
Configuration starting point	First time configuration start with defaults for the panel. 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
Messages	Define messages as required for application

Multi Module PLC Applications (Uses Communications Master)

Decision	Selection
Single/Multi Module	Chose Multi module
PLC Type	This applies to the Communications master. Choose appropriate type
Protocol	This applies to the OP-9001 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.
Address	Each panel must have a unique address
Panel Protocol	The OP-WINEDIT software will automatically select the OptiMate Hex protocol for communications between the OP-9001 and the panel. (This is all transparent to the user)
Buttons	Select momentary or alternate action as required for your application
Messages	Define messages as required for your application.

Configuration must be downloaded from the IBM PC compatible to each panel. This is done over the serial link. Panel must be selected for "Pgm" (DIP switch in back of the module) for module to accept configuration data. After the download to the panel is complete, wait a few seconds before switching the DIP switch from "Pgm" to "Run." The DIP switch must be in the "Run" position for the module to operate with the selected host. The "Term" switch must be in the OFF position unless the panel is at the end of a cable in an RS422 system.

Run | ON | Pgm
Term
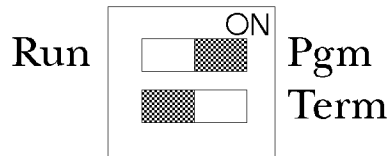
Creating Messages

The figure on right the illustrates the process of creating messages for your program to use. The first step involves simply using a message template to define, on paper, each of the messages. We suggest copying the template page and using it to define all of your messages.

The next step is to use the OP-WINEDIT editor to enter the messages as defined. Remember to use carets wherever variable data is to be used. The OP-WINEDIT editor will guide you through other definable parameters, including data type, message type, etcetera, as shown below.

Message #	Text (20Characters Max.)																			
1	E	n	t	e	r		S	e	t	p	o	i	n	t	:		^	^	^	^
2	P	r	o	d	u	c	t		R	a	t	e	:	^	^	^	.	^		
3	S	h	i	f	t		T	a	r	g	e	t	:	^	^	^	.	^		

Example Message Definitions

Message Configuration

Edit Help

Message Number: 1

Old

New Text: Display Setpt: ^^^^

(count: 19)

Message Value:

Operator Control: Display Only

Format:
○ Binary ● BCD ○ BCD Double ○ Float

Decimal Point Position:
○ Variable Point
● Fixed

OK
Cancel
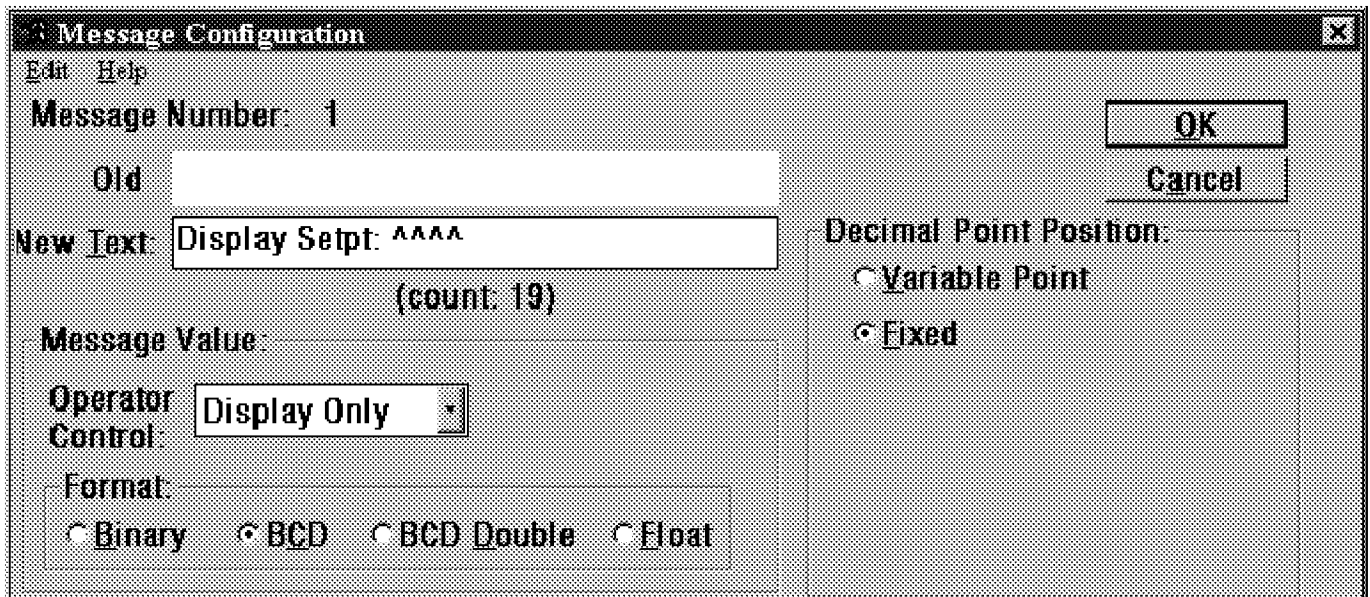
Label and Message Definition Templates

Message #	Text (20Characters Max.)

Message Definition Template

Pushbutton Label Strip Pattern

Specifications

Physical

- Recessed Mount Housing 6.6"Lx4.0"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 dark gray letters. White with user supplied label.
- LCD Display : 2 line x 20 character STN with LED backlight character size : 5.5mm high x 3.2mm wide
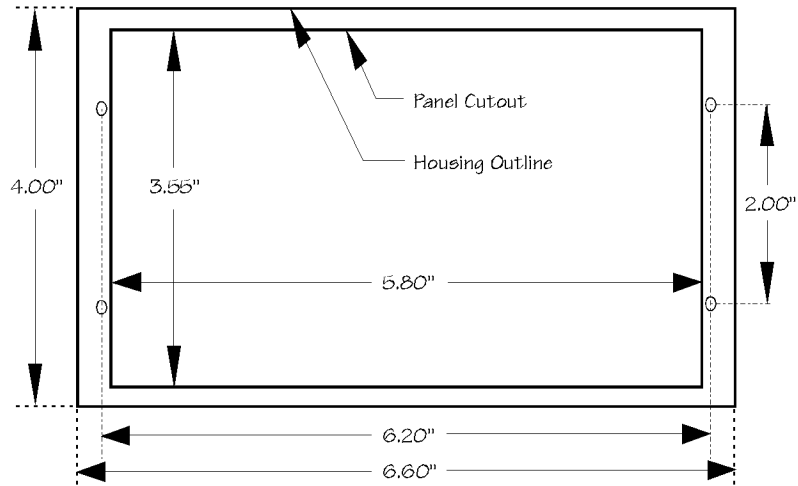
Electrical

- Power : 8 - 30VDC @ 1.8Watts
  150mA @ 12VDC
  75mA @ 24VDC
- Power on surge (see figure below)
  1.5A for 2 milliseconds maximum

Power on Surge
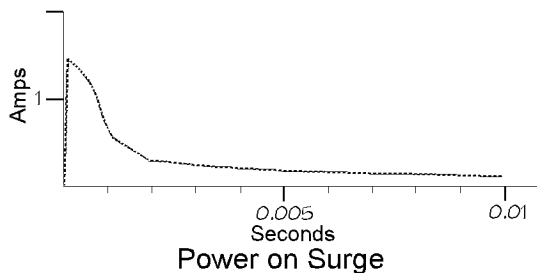
- Power connector : Pluggable terminal block, 2 position

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 LEDs inset in the corner of the 5 buttons will all simultaneously flash at a rapid rate.

Panel Cutout
Housing Outline

4.00" 3.55" 2.00"

5.80"

6.20"

6.60"

Panel Mounting Dimensions

Environmental

- Enclosure   - NEMA 4
                   (when properly installed)
- Temperature   - 0 to 50 C
- Humidity   - 95% non-condensing

Message Types (160 user defined messages available)

- General Text message
- Data display message (one data value per line)
- Arrow adjustment data message (integer or fixed point)

Numeric Types & Values

- Integer
- Fixed Point
- BCD (Values between 0 & 9999; with appropriate decimal placement)
- BCD Double (values between 0 & 99999999 with appropriate decimal placement)
- Binary (Values between 0 & 65535 with appropriate decimal placement)
- Floating Point (Values between -3.402823E+38 to +3.402823E+38 in the format of ±X.XXE±XX)

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. A Cement Kiln System is used to demonstrate the ladder logic required to support the various OP-panel features. The program provides ladder logic which demonstrates controlling pushbuttons, lamps, messages and menu 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.

Raw Meal

Hopper Selected ☐ (1–3)

Kiln Speed ☐ (0–100%)

Hopper 1 Hopper 2 Hopper 3

Flow

Cement Kiln

Zone 1 Temperature   Zone 2 Temperature   Zone 3 Temperature

Conveyor Flow
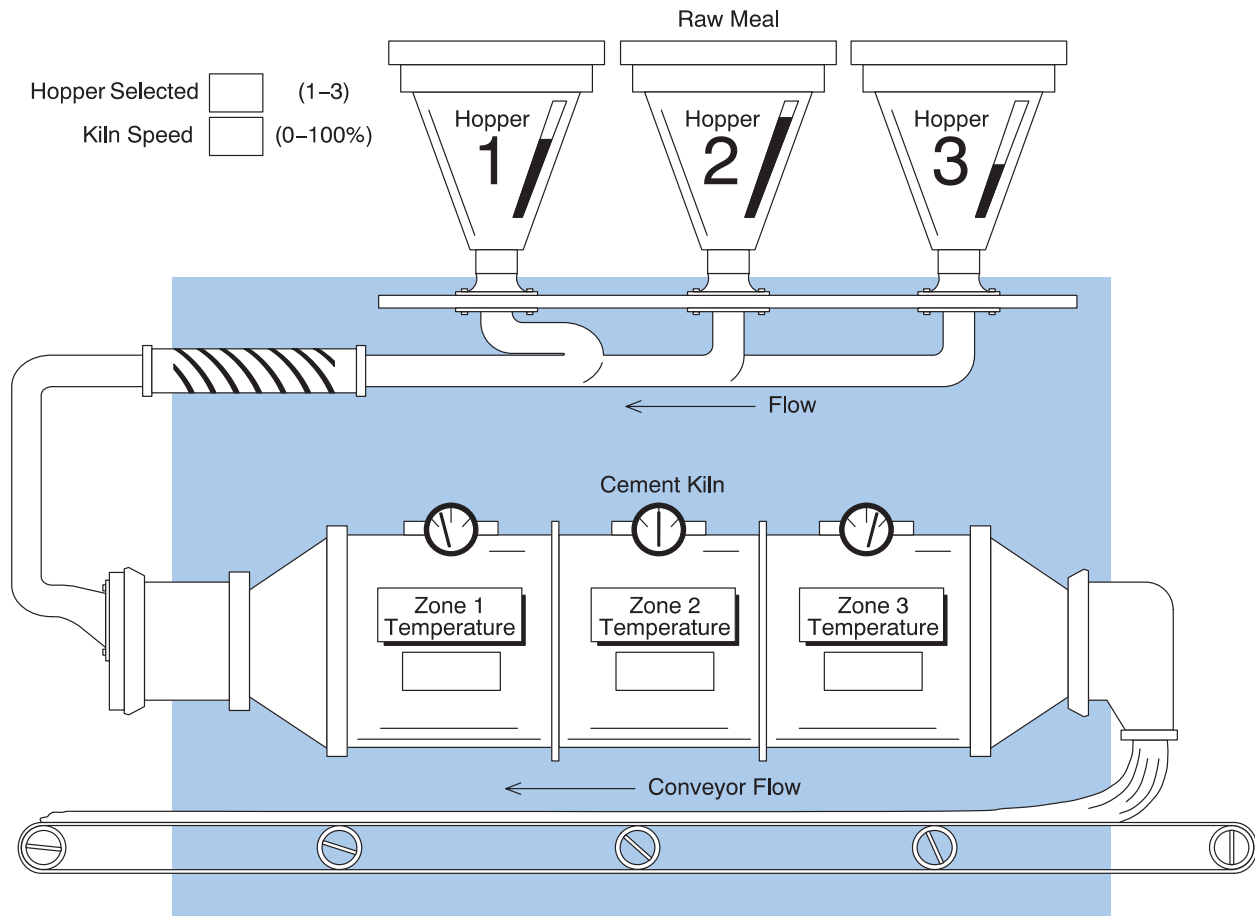
Software Requirements

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

Pushbuttons...

OP-WINEDIT

SOFT

Memory Requirements...

Process Data.....

Fault messages....

2 Line x 20 character

MENU   ▲   ▼   CLEAR/ABORT   ENTER

Opti Mate

Example Programs
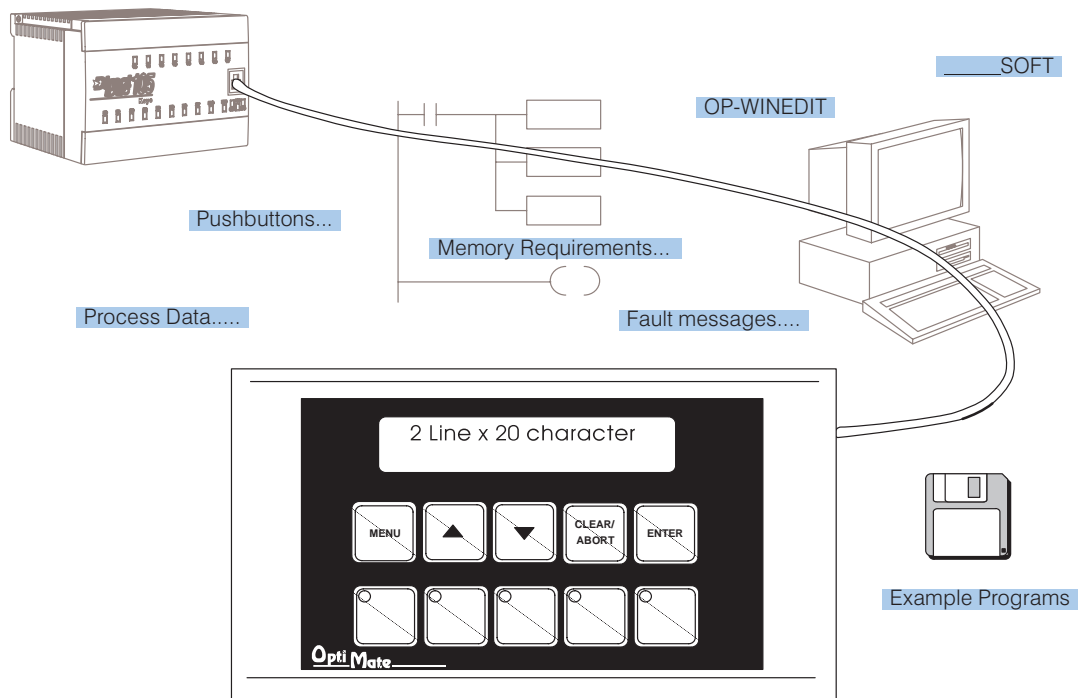
Step 1: Power Supply Connections

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.

Terminal 2

Terminal 1

Ground
+24VDC
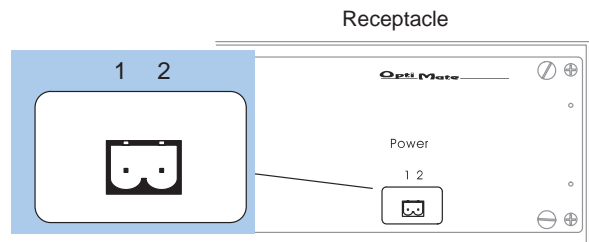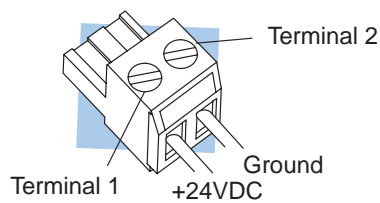
Plug the terminal block connector into Power receptacle located on the back side of the panel.

Receptacle

1   2

Opti Mate

Power

1 2

**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.
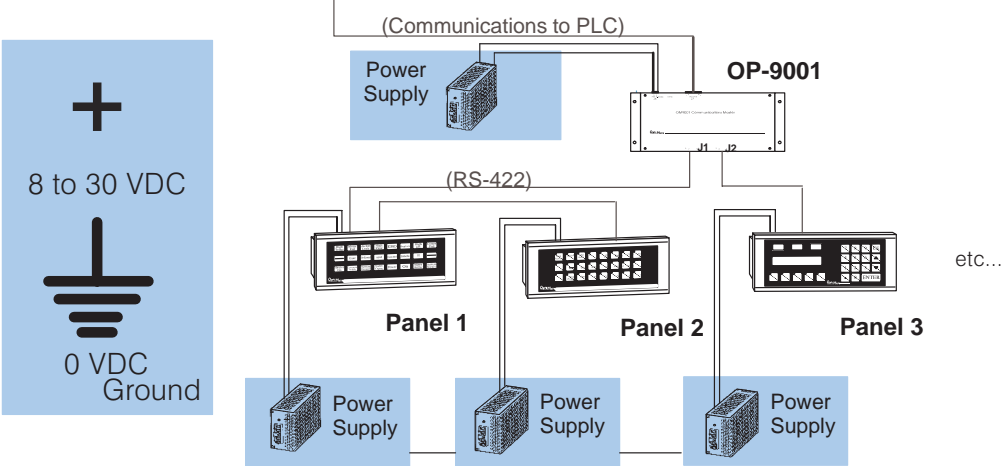
Step 2: Setting the OP-Panel PGM/RUN DIP Switch to PGM

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.

RUN | ON | PGM ——— Set to PGM
1 □ ■ | TERM
2 ■ □
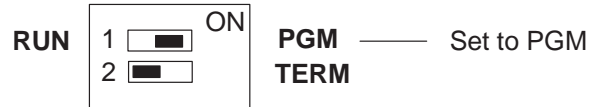
For multi-panel configurations, see the section titled OP-9001 Multi-Panel Configurations towards the end of this chapter.

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.

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

** — also DC versions

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

Connecting Cable Details

Connecting Cable   The OP–620 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.

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

PLC

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

RJ12

1 2 3 4 5 6

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

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

RJ11

1 2 3 4

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

8= YOM
7= CTS
6= not used
5= not used
4= On-line
3= Din
2= Dout
1= YOP

15
15= tied (0V)
14= tied (0V)
13= tied (0V)
12= not used
11= not used
10= not used
9= not used

1

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

13= not used
12= not used
11= not used
10= not used
9= not used
8= not used
7= 0V
6= not used
5= CTS
4= RTS
3= Din
2= Dout
1= not used

25
25= not used
24= not used
23= not used
22= not used
21= not used
20= not used
19= not used
18= not used
17= not used
16= not used
15= not used
14= not used

1

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

6 7 8
3 4 5
1 2

3= Din
2= Dout
5 =0V

OP-2CBL

RJ12
(6P6C)   DB15

OP-3CBL

RJ11
(4P4C)   DB15

OP-4CBL-1

DB15   DB15

OP-4CBL-2

DB25   DB15

OP-ACBL-2

Mini–DIN   DB15

Panel

1

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

15

RS-422 Pinout

PLC	Panel
Din + ———	11 = Dout+
Din – ———	12 = Dout –
Dout + ———	9 = Din +
Dout – ———	10 = Din–
0V ———	5 =0V
RTS+	
CTS+	
RTS–	
CTS–	
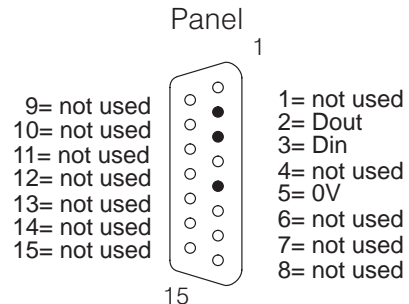
Step 4: Connecting Configuration Cable OP–ACBL–1

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 con-nections are the same for other OP-panels)

Panel

Computer

```
5= 0V            9
4= not used    ○ ○    9=not used
3= Dout        ● ●    8= CTS
2= Din         ● ●    7= RTS
1= not used    ○ ●    6=not used
               ○ ○
               1
Cable Connector
```

```
Female         Male
DB9            DB15
3 ──────────── 3
2 ──────────── 2
5 ──────────── 5
7 ─┐
8 ─┘
```

```
                                        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
Cable Connector       8= not used
```
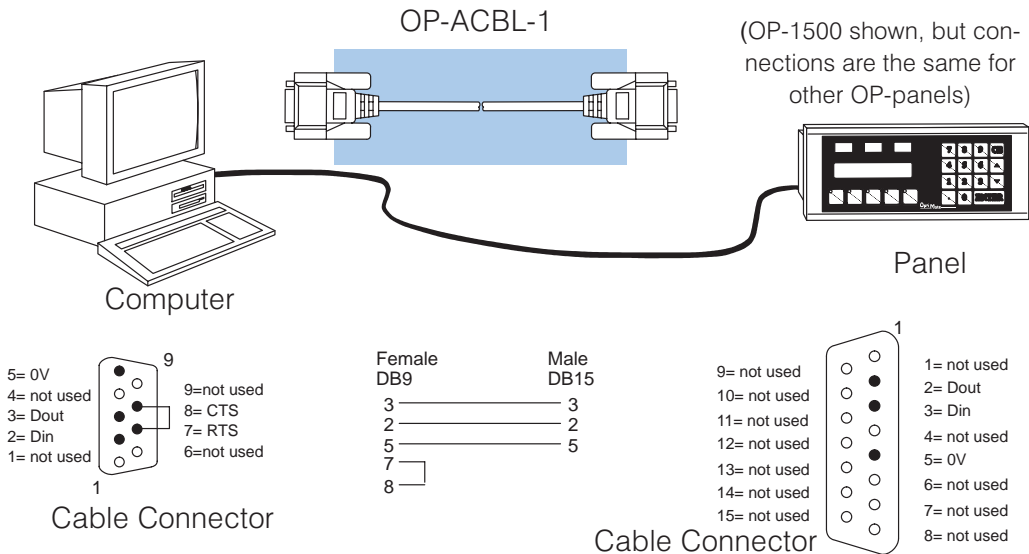
Step 5: Installing the Example Programs on Your Personal Computer Hard Drive

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
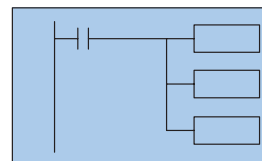
To install the example programs if **using Windows 3.1**, follow these steps:

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-620 panel, type:

   MD C:\OP–620

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–620*.*

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-620 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-620" 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–620" directory. Open the "OP–620" 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-620"). 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-620 panel with a DL205 PLC, select and open the file titled "620_205.ocf".

5. A screen appears having all the configuration parameters for running the example program using an OP-620 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 *Direct*SOFT 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-620"). 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-620 panel with a DL205 PLC, select and open the file titled "620_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 program. Read through the following section, Running The OP-620 Example Program, while at the same time doing the setup and 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. In addition, see the Kiln Demo Worksheets at the end of this chapter to help understand the program. There are also blank worksheets to use for your own applications.

**Running the
OP-620 Example
Program**

In this example program a Cement Kiln System is used to demonstrate the ladder logic required to support the various OP-panel features. The program provides ladder logic which demonstrates controlling pushbuttons, lamps, messages and menu operations.

Items listed in the figure below, such as Hopper Selection, Kiln Speed, Start/Stop/Run controls, and Kiln Zone Temperatures are monitored and controlled by the OP-panel example program.
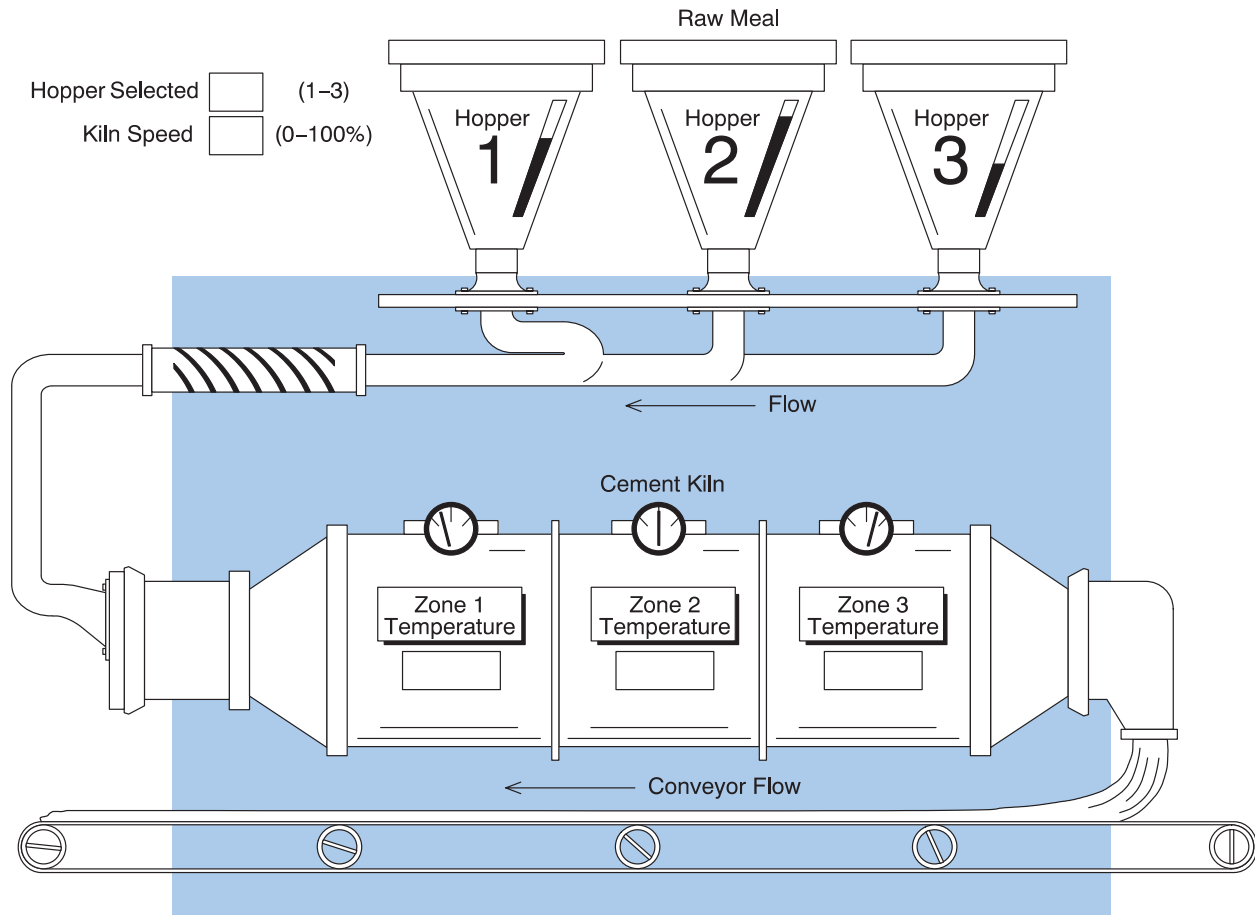
There are two parts to the program: 1. Using the "MENU" function to enter the setup parameters, and 2. Starting and stopping the program. We will discuss setup first.

Use your imagination to picture the operation of the kiln system shown. The first thing we must do is the program setup. There are two main categories of setup parameters, "Raw Meal Control" and "Temperature Control". We will discuss "Raw Meal Control" first.

There are two parameters which must be setup for "Raw Meal Control":

- "Hopper Selection": This parameter selects which hopper is going to provide the material for the kiln system. The choices are Hopper 1, Hopper 2 or Hopper 3.

- "Kiln Speed": This parameter selects the speed that the material will travel through the kiln system. The speed is specified as a percentage of the maximum possible speed and can be set for any speed between 1% (lowest speed) and 100% (highest speed).

Indicator Light   F1   F2   F3   F4   F5
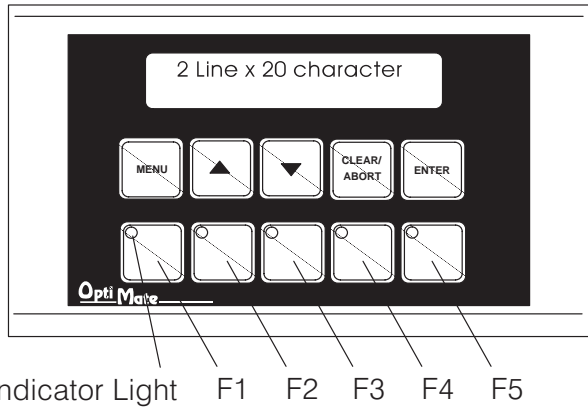
There are three parameters which must be setup for "Temperature Control":

- "Setpoint Zone1 Temp.": This parameter selects the temperature that the material will be exposed to while traveling through Temperature Zone 1. The temperature can be set to any setting from 1 to 2,000, with 1 being the lowest temperature setting and 2,000 being the highest.
- "Setpoint Zone2 Temp.": This parameter selects the temperature that the material will be exposed to while traveling through Temperature Zone 2 and can be set from 1 to 2,000.
- "Setpoint Zone3 Temp.": This parameter selects the temperature that the material will be exposed to while traveling through Temperature Zone 3 and can be set from 1 to 2,000.

Once all five parameters are setup, we are ready to run the program. This is done by pressing the F1 pushbutton. To stop the program, press F2.

This is a simple program, but it shows how a program can be developed for a practical application for the OP-panel. Follow these step-by-step directions to setup the parameters and run the example program:

1. After starting the *Direct*Soft example program, the initial OP-panel display is:

> OP-620 KILN DEMO
>
> MENU: Setup   F1: Start
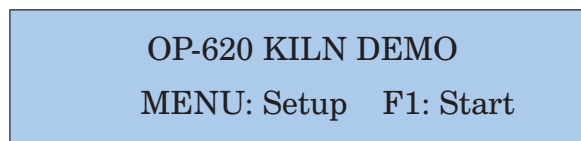
The first thing we want to do is setup the parameters, so press the **Menu** pushbutton to get the following screen:

> Raw Meal Control
>
> Enter/Arrow/Clear

Press either of the up/down arrow pushbuttons (▲or▼) to get the following screen:

> Temperature Control
>
> Enter/Arrow/Clear

Notice that pressing either ▲▼ pushbutton toggles the display between these two screens. These are the two main categories of setup parameters. In the second line of each screen are three choices of pushbutton selections we can make at this point:

- **Enter:** Press this to setup the parameter currently shown.
- **Arrow:** Press either ▲▼ pushbutton to toggle between the two screens.
- **Clear/Abort:** Press this pushbutton to return to the initial screen.

2. Let's setup the Raw Meal Control first, so press either ▲▼ pushbutton to get to that screen, and press **Enter**. The following screen appears:

> Hopper Selection
>
> Enter/Arrow/Clear

Press **Enter.** The following screen appears:

> Meal Hopper (1-3): 2
>
> Arrow UP/DOWN = 1

Select Hopper 1, 2 or 3 by using the ▲▼ pushbuttons, and pressing **Enter.** For example, the "2" on the top line indicates that Hopper 2 is currently selected. If we wish to change our selection to Hopper 1, press ▲▼ pushbuttons until a "1" is displayed on the bottom line, and press **Enter**. A "1" replaces the "2" on the top line and the display returns to the previous "Hopper Selection" screen.

Pressing **Clear/Abort** cancels any changes made and returns the display to the initial screen.

3. Next we need to set the kiln speed. With the "Hopper Selection" screen displayed, press ▲▼ pushbuttons to get the following screen:

> Kiln Speed Control
>
> Enter/Arrow/Clear

4. Press **Enter.** The following screen appears:

> Kiln Speed (%) :   25
>
> New Kiln Speed =   50

Select kiln speed by using the ▲▼ pushbuttons, and pressing **Enter.** For example, the "25" on the top line indicates that a speed of 25% of maximum speed is currently selected. If we wish to change our selection to 50% of maximum speed, press the ▲ pushbutton until a "50" is displayed on the bottom line, and press **Enter**. A "50" replaces the "25" on the top line and the display returns to the previous "Kiln Speed Control" screen.

Both Raw Meal Control parameters are now set. Next we need to set the three Temperature Control parameters.

5. Press **Menu** and use the ▲▼ pushbuttons to select the following Temperature Control screen:

> Temperature Control
>
> Enter/Arrow/Clear

Press **Enter** to get the following screen:

> Setpoint Zone1 Temp.
>
> Enter/Arrow/Clear

First we will set the Zone 1 temperature. Press **Enter** to get the following screen:

> Zone1 Temp. SP: 100
>
> Enter New Temp=   200

Select Zone1 temperature by using the ▲▼ pushbuttons, and pressing **Enter.** For example, the "100" on the top line indicates the current Zone1 temperature setting. If we wish to change our selection to "200", press the ▲   pushbutton until a "200" is displayed on the bottom line, and press **Enter**. A "200" replaces the "100" on the top line. The Zone1 temperature is now set and the display returns to the following screen:

> Setpoint Zone1 Temp.
>
> Enter/Arrow/Clear

6. We now need to set the Zone 2 and Zone 3 temperatures in the same manner. To set the Zone 2 temperature, press the ▲▼ pushbuttons until the "Zone1" portion of the display changes to "Zone2" as follows:

> Setpoint Zone2 Temp.
>
> Enter/Arrow/Clear

Press **Enter**, and set the Zone 2 temperature the same way that you set the Zone 1 temperature. Repeat the same procedure for the Zone 3 temperature.

All setup parameters are now set, and you are ready to run the program.

7. After the last setup parameter is entered, press **Clear/Abort** to return to the following initial screen:

> OP-620 KILN DEMO
>
> MENU: Setup F1: Start

To start the program, press the **F1** pushbutton. Notice that the **F1** indicator light momentarily lights and the screen quickly changes to the following:

> KILN STARTING
>
> Press F2 to Stop

The above screen only appears momentarily before changing to the following:

> SYSTEM RUNNING
>
> Press F2 to Stop

The program is now running using the parameters we preset. If you wish to stop the program, press **F2**. The program stops, the **F2** indicator light goes on, and following screen appears:

> KILN SYSTEM STOPPED
>
> Press F2 to Continue

Press **F2** to resume running the program. You have now run through the entire example program.

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.

KILN DEMO EXAMPLE WORKSHEET

PAGE:_____

DESCRIPTION :   OP-620 Kiln Demo

System Type   _____

Panel Type   OP-620

PLC Base Register Addr   _____

PLC CONFIGURATION :

PLC Family   _____
CPU Model   _____
Protocol   _____
PLC Address   _____
PLC Timout   _____
Baud Rate   _____
Parity   _____
Data/Stop Bits   _____

PUSHBUTTONS / LAMPS :

A   M   (Alternate/Momentary)

F1   ☐ ☒   Start

F2   ☒ ☐   Stop

F3   ☐ ☐ _____

F4   ☐ ☐ _____

F5   ☐ ☐ _____

Green **Lamp1**	System Running
Yellow **Lamp2**	System Starting
Red **Lamp3**	System Stopped

MESSAGE:

No. 1   Text

| O | P | – | 6 | 2 | 0 | | | K | I | L | N | | D | E | M | O | | | |

Action: N/A   Data Type/Format: N/A   Range: N/A
Text Message

No. 2

| M | E | N | U | : | S | E | T | U | P | | F | 1 | : | S | T | A | R | T | |

Action: N/A   Data Type/Format: N/A   Range: N/A
Text Message

No. 3

| K | I | L | N | | S | T | A | R | T | I | N | G | | | | | | | |

Action: N/A   Data Type/Format: N/A   Range: N/A
Text Message

No. 4

| P | R | E | S | S | | F | 2 | | T | O | | S | T | O | P | | | | |

Action: N/A   Data Type/Format: N/A   Range: N/A
Text Message

No. 5

| S | Y | S | T | E | M | | R | U | N | N | I | N | G | | | | | | |

Action: N/A   Data Type/Format: N/A   Range: N/A
Text Message

No. 6

| P | R | E | S | S | | F | 2 | | T | O | | S | T | O | P | | | | |

Action: N/A   Data Type/Format: N/A   Range: N/A
Text Message

No. 7

| K | I | L | N | | S | Y | S | T | E | M | | S | T | O | P | P | E | D | |

Action: N/A   Data Type/Format: N/A   Range: N/A
Text Message

No. 8

| P | R | E | S | S | | F | 2 | | T | O | | C | O | N | T | I | N | U | E |

Action: N/A   Data Type/Format: N/A   Range: N/A
Text Message

No. 9

| M | E | A | L | | H | O | P | P | E | R | | (| 1 | – | 3 |) | : | | ^ |

Action: N/A   Data Type/Format: INTEGER/BCD   Range:
Text Message

No. 10

| A | R | R | O | W | | U | P | / | D | O | W | N | | = | ^ | ^ | ^ | | |

Action: Arrow   Data Type/Format: BCD   Range: 1–3

EXAMPLE MESSAGE WORKSHEET   PAGE:———————

MESSAGE:

Text   Text Message

No. 11	K	I	L	N		S	P	E	E	D		(	%	)	:	^	^	^	^	

Action: N/A   Data Type/Format: BCD   Range: N/A

Text Message

No. 12	N	E	W		K	I	L	N		S	P	E	E	D		=				

Action: Keypad   Data Type/Format: BCD   Range: N/A

No.13	Z	O	N	E	1		T	E	M	P		S	P	:	^	^	^	^	

Action: N/A   Data Type/Format: BCD   Range: N/A

No.14	E	N	T	E	R		N	E	W		T	E	M	P	.	=	^	^	^	^

Action: Keypad   Data Type/Format: BCD   Range: N/A

No.15	Z	O	N	E	2		T	E	M	P		S	P	:	^	^	^	^	

Action: N/A   Data Type/Format: BCD   Range: N/A

No.16	E	N	T	E	R		N	E	W		T	E	M	P	.	=	^	^	^	^

Action: Keypad   Data Type/Format: BCD   Range: N/A

No.17	Z	O	N	E	3		T	E	M	P		S	P	:	^	^	^	^	

Action: N/A   Data Type/Format: BCD   Range: N/A

No. 18	E	N	T	E	R		N	E	W		T	E	M	P	.	=	^	^	^	^

Action: Keypad   Data Type/Format: BCD   Range: N/A

No.

Action: Data Type/Format: Range:

No.

Action: Data Type/Format: Range:

No.

Action: Data Type/Format: Range:

No.

Action: Data Type/Format: Range:

No.

Action: Data Type/Format: Range:

No.

Action: Data Type/Format: Range:

No.

Action: Data Type/Format: Range:

No.

Action: Data Type/Format: Range:

No.

Action: Data Type/Format: Range:

EXAMPLE MENU WORKSHEET

PAGE:_____

MENU:

Text

| No. 1 | R | A | W | | M | E | A | L | | C | O | N | T | R | O | L | | | | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | _ |

| No. 2 | H | O | P | P | E | R | | S | E | L | E | C | T | I | O | N | | | | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | **1** |

| No. 3 | K | I | L | N | | S | P | E | E | D | | C | O | N | T | R | O | L | | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | **2** |

| No. 4 | T | E | M | P | E | R | A | T | U | R | E | | C | O | N | T | R | O | L | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | |

| No. 5 | S | E | T | P | O | I | N | T | | Z | O | N | E | 1 | | T | E | M | P | . |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | **3** |

| No. 6 | S | E | T | P | O | I | N | T | | Z | O | N | E | 2 | | T | E | M | P | . |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | **4** |

| No. 7 | S | E | T | P | O | I | N | T | | Z | O | N | E | 3 | | T | E | M | P | . |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | **5** |

| No. | | | | | | | | | | | | | | | | | | | | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | |

| No. | | | | | | | | | | | | | | | | | | | | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | |

| No. | | | | | | | | | | | | | | | | | | | | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | |

| No. | | | | | | | | | | | | | | | | | | | | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | |

| No. | | | | | | | | | | | | | | | | | | | | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | |

| No. | | | | | | | | | | | | | | | | | | | | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | |

| No. | | | | | | | | | | | | | | | | | | | | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | |

| No. | | | | | | | | | | | | | | | | | | | | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | |

| No. | | | | | | | | | | | | | | | | | | | | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | |

| No. | | | | | | | | | | | | | | | | | | | | |

| Menu Level | **1** | **2** | **3** | **4** | Function No. | |

OP-620 APPLICATION WORKSHEET   PAGE:_____

DESCRIPTION : _____

System Type _____

Panel Type _____

PLC Base Register Addr _____

PLC CONFIGURATION :

PLC Family _____

CPU Model _____

Protocol _____

PLC Address _____

PLC Timout _____

Baud Rate _____

Parity _____

Data/Stop Bits _____

PUSHBUTTONS / LAMPS :

A M (Alternate/Momentary)

F1 ☐ ☐ _____

F2 ☐ ☐ _____

F3 ☐ ☐ _____

F4 ☐ ☐ _____

F5 ☐ ☐ _____

Green **Lamp1** _____

Yellow **Lamp2** _____

Red **Lamp3** _____

MESSAGE:

Text Message

No. |
Action: Data Type/Format: Range:

No. |
Action: Data Type/Format: Range:

No. |
Action: Data Type/Format: Range:

No. |
Action: Data Type/Format: Range:

No. |
Action: Data Type/Format: Range:

No. |
Action: Data Type/Format: Range:

No. |
Action: Data Type/Format: Range:

No. |
Action: Data Type/Format: Range:

No. |
Action: Data Type/Format: Range:

No. |
Action: Data Type/Format: Range:

OP-620 MESSAGE WORKSHEET   PAGE:_____

MESSAGE:

Text Message

No. [ ]
Action: Data Type/Format: Range:

No. [ ]
Action: Data Type/Format: Range:

No. [ ]
Action: Data Type/Format: Range:

No. [ ]
Action: Data Type/Format: Range:

No. [ ]
Action: Data Type/Format: Range:

No. [ ]
Action: Data Type/Format: Range:

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No. [ ]
Action: Data Type/Format: Range:

No. [ ]
Action: Data Type/Format: Range:

No. [ ]
Action: Data Type/Format: Range:

OP-620 MENU WORKSHEET   PAGE:—————

MENU:

Text Message

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

No.																					

Menu Level | **1** | **2** | **3** | **4** | Function No.

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-620

A

In This Chapter. . . .
— Troubleshooting
— Panel Configuration Problems
— Panel to PLC Communications
— A-B Panel to PLC Communications

Troubleshooting the OP–620 Panel

Troubleshooting

In this section, we explain how to isolate potential problems which may occur while using the OP-620. 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
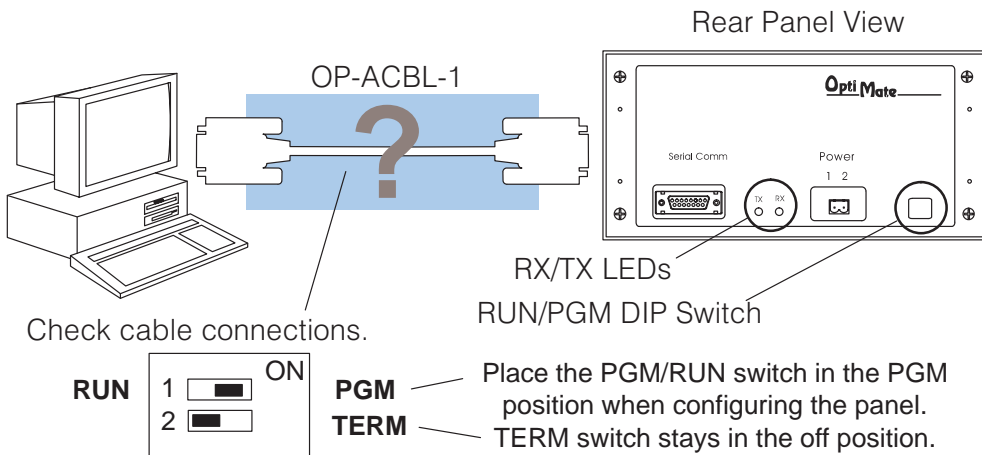- Panel and PLC communications failures

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.

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.

RUN 1 ON   PGM — Place the PGM/RUN switch in the PGM
     2   TERM   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 LEDs in the corners of the five pushbuttons 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

ON

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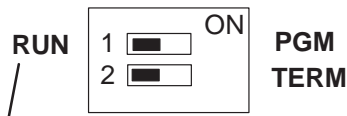
Place the PGM/RUN switch in the RUN position when running the program.
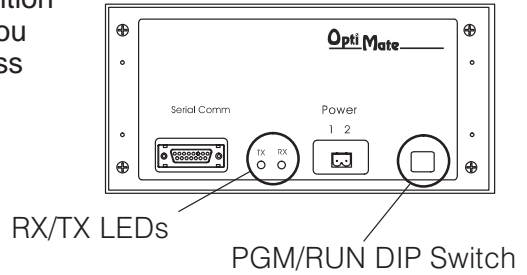
3. Examine the communications information for the proper PLC type, protocol type, baud rate, parity, stop bit, address number. Use the user manual for the PLC product you are using to determine the proper settings.

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.