

PT22X-DNET TERMINAL

PT220/228-DNET-M (issue 2)



Lamonde Automation Ltd.,

Project House, Morris Road, South Nutfield, Surrey RH1 5SA

Tel 01737 824600

Fax 01737 821431

E-mail – Sales@Lamonde.com

Contents

<i>Contents</i>	1-2
1. INTRODUCTION	1-1
THE PT22X-DNET TERMINAL.....	1-1
HOW DOES IT WORK?	1-1
HOW DO I PROGRAM THE TERMINAL?.....	1-1
WHAT FEATURES DO THE MESSAGES HAVE?	1-2
WHAT VERSIONS ARE AVAILABLE?	1-2
HOW DO I LABEL THE KEYS?	1-2
2. INSTALLING THE TERMINAL	2-1
MOUNTING AND CUT-OUT PT220	2-1
MOUNTING AND CUT-OUT PT228	2-1
POWER AND CABLING REQUIREMENTS	2-2
PROGRAMMING CABLE	2-2
CONNECTING TO THE PLC.....	2-2
CONNECTING A POWER SUPPLY	2-2
WIRING THE DISCRETE INPUTS	2-2
ACTIVE HIGH INPUTS	2-3
ACTIVE LOW INPUTS.....	2-3
LABELLING THE PT-228 TERMINAL.....	2-4
3. THE PROGRAMMING SOFTWARE	3-1
INTRODUCTION.....	3-1
INSTALLING THE SOFTWARE.....	3-1
STARTING THE PROGRAM	3-1
THE MAIN SCREEN.....	3-2
THE MESSAGE LIST	3-2
THE MTR LOCATION	3-2
LEADING ZEROS.....	3-3
EDITING MESSAGES	3-4
VARIABLE DATA	3-5
INSERTING VARIABLE DATA.....	3-5
BIT DEPENDANT TEXT	3-6
SELECTING MESSAGES.....	3-7
EDIT MENU FUNCTIONS	3-7
TRANSFER MENU FUNCTIONS	3-7
PLC PROGRAM CONTROL.....	3-8
ALARM MESSAGES.....	3-8
PORT CONFIGURATION.....	3-9

1. Introduction

The PT22X-DNET Terminal

The PT22X-DNET terminal is an operator interface between the user and a Koyo DirectLOGIC PLC. The terminal provides a 2-line x 20-character display to provide information to the user and either 8 keys or 8 discrete 24vDC inputs to allow feedback from the user. The display uses variable data as well as bit dependant text to give the user a real time indication of the status of the machine.

How Does it Work?

The PT22X-DNET terminal connects to the PLC via the PLC programming port. The terminal uses six 'V' memory locations inside the PLC to pass and receive data. The first 'V'-memory is seen as the Message Trigger Register (MTR). To display a particular message, a value is written into this register. For instance, if the number 47 is loaded into the MTR, message 47 is displayed. The next four 'V' memory locations contain variable data. The terminal can display up to 4 different numbers on the display at any one time. The values in the four 'V'-memory locations after the MTR contain these values. To pass a number to the terminal, simply load it into the appropriate, 'V'-memory. The last 'V'-memory contains the key status. The terminal has either 8 keys (the PT228 range) or 8 discrete 24vDC inputs (the PT220 range). These inputs are mapped to the sixth 'V'-memory.

'V'-memory	Description
X	Message Trigger Register
X+1	Data Word 1
X+2	Data Word 2
X+3	Data Word 3
X+4	Data Word 4
X+5	Keyboard Download

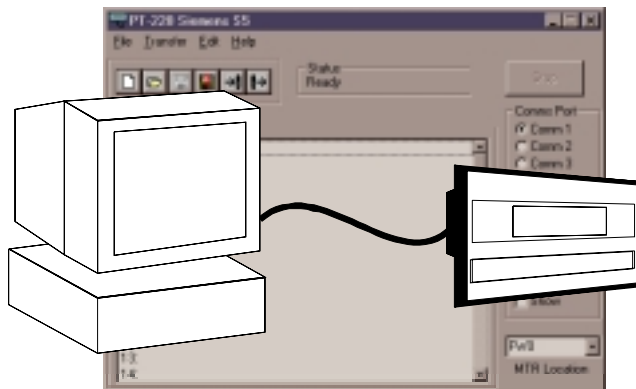
X in DL05/06/105/205/350/405 systems = V2000 – V2372.
X in DL305 systems = R400 – R550.

How Do I Program the terminal?

A PC running Windows programs the terminal. The software allows you to upload and download messages, set the MTR, load and save message files as well as edit the messages. The software comes on 2 floppy disks, which easily load onto a personal computer. A standard serial port is used with a special programming cable to talk to the terminal.

What Features Do the Messages Have?

Each message has various features associated with it. For example the message can be made to scroll from right to left or to chain to another message after a pre-programmed time out. Each message can have up to 4 different variable numbers displayed, plus bit dependant text (where the text displayed changes dependant upon a particular bit in one of the 4 data words).



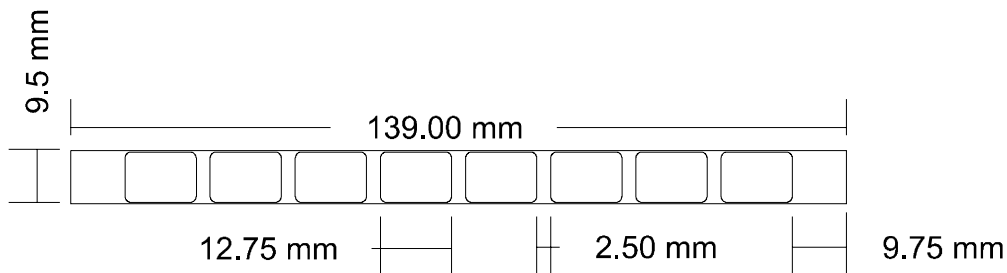
Parts of the message can also be made to flash. These features are all accessed via the programming software.

What Versions are available?

There are 4 standard versions of the PT22X terminals available, all of which utilise a 20 character, 2 line wide viewing angle STN LCD display, with high intensity yellow LED back light. The PT220 range uses a 48x144mm bezel and includes 8 discrete inputs, whereas the PT228 range uses a 72x144mm bezel and 8 function keys. Within each range there is a choice of either 32 or 256 messages. Vacuum Florescent displays can be factory fitted to order. Open frame OEM versions, for rear of panel mounting are supplied in packs of 5.

How Do I Label the Keys?

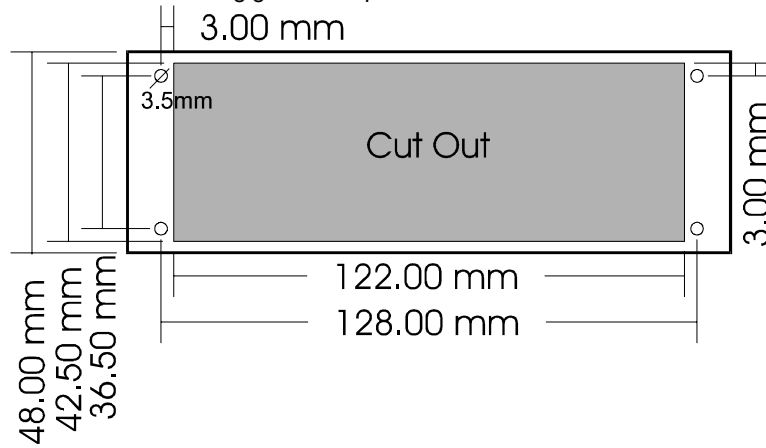
The PT228 series of terminals have 8 keys, which can be rear of panel labelled. The best way to label the keys is to prepare a printed-paper strip, which can be inserted behind the main label.



2. Installing the Terminal

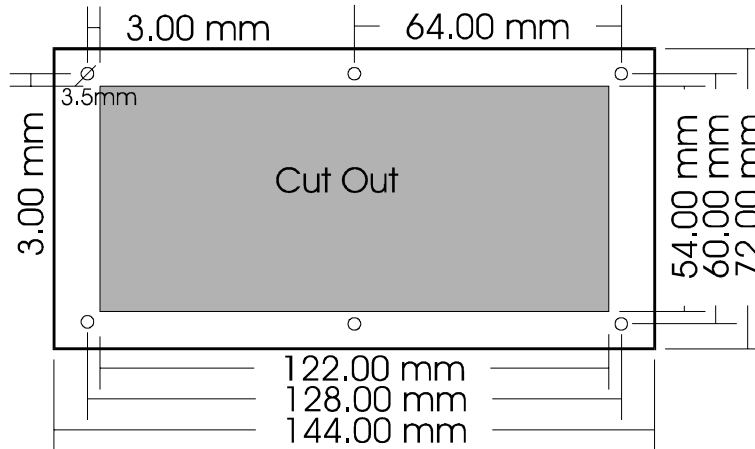
Mounting and cut-out
PT220

The PT220-DNET mounts using four M3 studs on the back of the bezel, plus a cut-out of 122 x 42.5mm. Self-locking nuts and a rubber-sealing gasket are provided.



Mounting and cut-out
PT228

The PT228-DNET mounts using six M3 studs on the back of the bezel, plus a cut-out of 122 x 60mm. Self-locking nuts and a rubber-sealing gasket are provided.

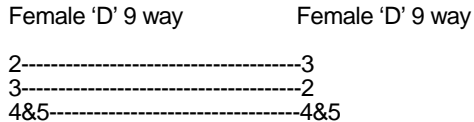


Power and Cabling Requirements

PT22x-DNET terminals use point-to-point communications, in that they connect one-to-one with the PLC or PC. A separate programming cable is required to connect the terminal to the PC.

Programming Cable

The programming cable FTCBL-PROG connects to a serial port on a PC. The standard cable has a 9 way 'D' female connector. To connect to a 25 way serial port, use a 9 to 25-way converter.



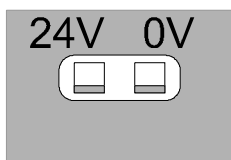
The screen should be connected to pin 5 at one end.

Connecting to the PLC

Koyo PLC's provide RS232 serial ports. PT220 and PT228 terminals are designed to utilise standard AutomationDirect cables D2-DSCBL, D3-DSCBL and D4-DSCBL for interface, or the shorter 2m cables FTCBL-K205, FTCBL-K340, FTCBL-K3405, FTCBL-K405. Special cable lengths are available to order.

Connecting a Power Supply

Power needs to be applied to the PT22X terminal. Two screw terminals are provided to allow this connection.

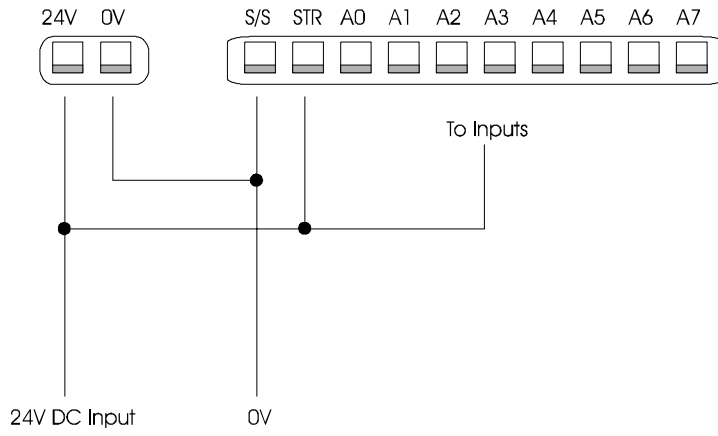


The +ve input will accept voltages from 8v to 40v. 40vDC is the absolute maximum input voltage this unit can accept. DO NOT EXCEED THIS VOLTAGE.

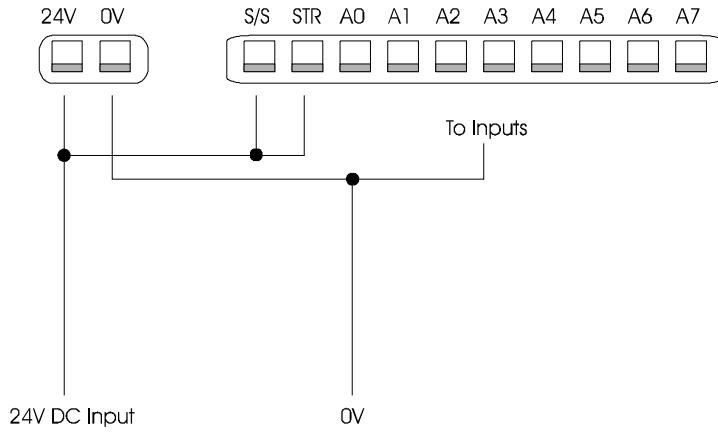
Wiring the Discrete Inputs

The PT220 range of terminals has 8 discrete 4-24vDC inputs. These inputs are mapped to the PLC in the same way as the keys on the PT228 range. The inputs can be sinking or sourcing, with pull up or pull down resistors. The S/S line should be connected to +ve to enable pull up resistors, or to 0V to enable pull down resistors. These inputs are active between 4-30VDC. A positive signal on a pin is always seen as ON in the PLC program. A strobe input is also provided to control the inputs. While the strobe is positive, the states of the inputs are read straight to the PLC. If the strobe is at 0V the states of the inputs are latched at the point the strobe went to 0V. In the usual operation of the terminal, the strobe input should be hard wired to +ve.

Active High Inputs

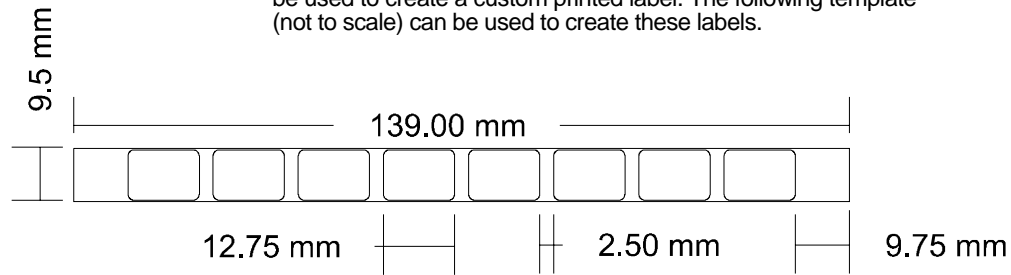


Active Low Inputs



Labelling the PT-228 Terminal

The PT228 terminal has 8 keys. These keys can be labelled using a strip of paper slid behind the label. A suitable label is supplied with each terminal. A computer program (such as CorelDraw) can be used to create a custom printed label. The following template (not to scale) can be used to create these labels.



Fitting the labels requires removing the front plate from the bezel of the terminal.

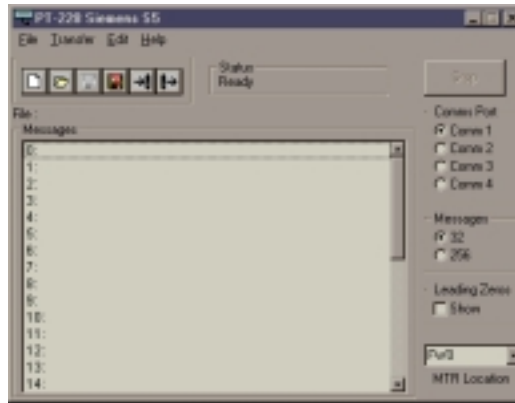
Remove all the screws from the protective cover on the back of the display.
 Remove the protective cover.
 Remove the protective nuts from the 6 mounting screws surrounding the keyboard.
 Press the 6 mounting screws firmly. The front plate should push forward until the side of the label is presented to you.
 Slide the custom labels behind the label.
 Press the front plate firmly back into position and do up the 6 mounting screws.
 Replace the protective cover and the screws that hold it in place.

Since the keys are discrete mechanical types custom overlay fronts can be produced fairly quickly, at low cost. For further information contact our sales representatives. For quickest production, at lowest cost, please produce images for our screen printers in CorelDraw 5 format. (CorelDraw 6 will allow output in CorelDraw 5 format).

3. The Programming Software

Introduction

The PT22x-DNET terminal is programmed on a PC running the windows operating system. The program allows you to load and save message files as well as edit all the messages, cut and paste messages, download all or selected messages and upload all or selected messages.



Installing the Software

The software will run under either Windows 95/98/2000/XP or Windows 3.1.

To install the software:

Load the operating system.
 Insert Disk 1 into the Disk Drive.
 Select 'RUN' from the START menu
 (in Windows 3.1 select 'FILE', 'RUN').
 Type a:\setup.exe and push return.
 The install program will now run.
 Insert Disk 2 when prompted to do so and click 'OK'
 You will be asked if you wish to change the destination directory. If
 you wish to, click on 'Change Directory'. Finally, click on the big
 ICON to install the software.
 The software will then be installed on your computer, and a
 program ICON created, you can use this ICON to start the
 program.

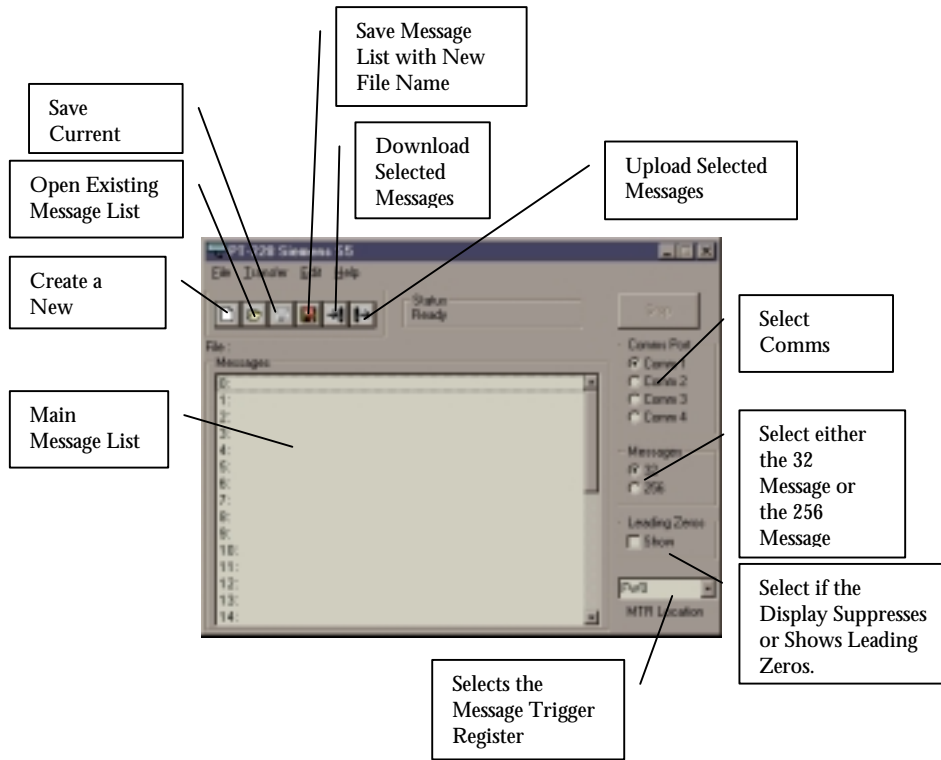
Starting the Program

To start the program once it has been installed:

Click on the 'Start' menu, followed by 'Programs' then 'PT228net',
 and finally the 'PT228net' ICON.
 In Windows 3.1, click on the 'PT228net' ICON.

The Main Screen

The screen that appears when you open the program is the main screen from which you perform most of the operations.



The Message List

The messages that currently exist appear in the message list. Here they can be uploaded from and downloaded to the terminal, copied and pasted to other messages, and selected for editing. You can select between message lists of either 32 or 256 messages. The number of messages should correspond to the number of messages in your terminal. You can switch between these lengths of message lists at any time, however, when you go from 32 to 256 messages; the extra messages are added to the existing 32 messages. When you go from 256 messages to 32 messages, messages 32-255 are lost. Confirmation is required when you do this to prevent the accidental loss of your messages.

The MTR Location

The Message Trigger Register is the memory location inside the PLC that contains the current selected message number. To make the PLC display a message, or start a message chain, simply load the required constant to this register. The terminal will display the message in the MTR immediately, if no chain is active, or when the current chain is finished. To exit a chain immediately, place 255 in the MTR. This is the emergency override message.

Message 255 is usually left blank, so when you exit from a chain a blank message is displayed until you tell the terminal to display the next message.

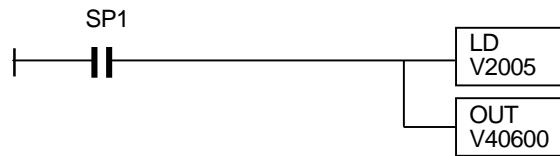
IMPORTANT: Message zero (0) is reserved and will always display a blank screen. This can be useful if you wish to flash a complete message under PLC control, as you need to simply alternate between message 0 and the displayed message number.

The MTR is located in the PLC data memory and can be V2000 - V2372 for DL05/05/105/205/350/405 systems, and R400 - R550 for DL305 systems.

The MTR defines the start address of a block of six registers, which must be reserved in the PLC:

MTR + 1 : Variable Data Word 1
 MTR + 2 : Variable Data Word 2
 MTR + 3 : Variable Data Word 3
 MTR + 4 : Variable Data Word 4
 MTR + 5 : Keyboard download.

The 8 keys are downloaded to the lower byte of the data register MTR + 5, which can be mapped to 'C' locations using LD and OUT box instructions in a DL205/405. For example:



This program line transfers the key status in V2005 to C0 - C7.

Leading Zeros

When a variable number is displayed in a message it can be set to show the leading zeros or to suppress them. When a number is set to suppress leading zeros it prints spaces instead of a zero, maintaining the shape of the message.

Examples:

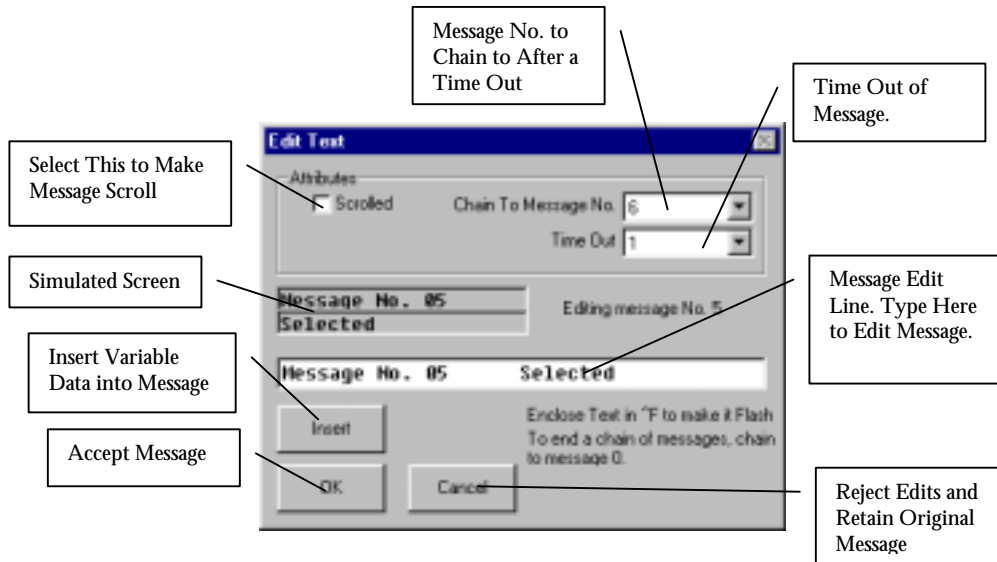
With Leading Zeros: The Volume is 003.45 Litres
 Without Leading Zeros: The Volume is 3.45 Litres

To set leading zeros to be shown, tick box.

To set leading zeros to be suppressed, clear the tick box.

Editing Messages

To edit a message either double click on the message or select it using the arrow keys and press return.
The edit a message screen is now shown.



To edit message text directly overwrite the text in the Message Edit Line. The simulated screen shows positioning of the text on the display. Characters represent variable data, bit dependant text, or instructions to flash part of a message:

- Ø - Represents variable data
- ¢ - Represents Bit Dependant Text

The instructions to flash part of a message are not shown on the display, to ensure correct placing of text on the simulated screen.

To make a message scroll put a tick in the Scroll tick box. The message will scroll from the right of the screen to the left.

A message can be made to jump to another message, creating a chain of messages. A message will chain to another if a time out is programmed and there is a number in the chain-to box other than zero. The message will be displayed for the length of time in the time-out box (these numbers correspond to ¼ of a second, for example a value of 8 would display the message for 2 seconds). If there is a zero in the chain-to box the message in the MTR is displayed. If there is another message number in the chain-to box this message is displayed. To end a chain of messages either chain to message zero (give control back to the MTR), or put 255 in the MTR (emergency override).

The Insert button allows variable data or Bit Dependant Text to be added to a message.

When the message is complete either click OK or hit return to accept the message. Click CANCEL or hit ESC to reject the edits and return to the main screen.

Variable Data

Up to 4 different variable numbers can be displayed in a message at the same time. These numbers correspond to the 4 words of data after the MTR. These data words can be displayed in 3 different formats:

Hex mode
Unsigned integer mode
Signed integer mode

In Hex mode, a 4 digit hex number is displayed – e.g. 73AB. This mode will also show a BCD number correctly such as a timer or counter current value.

An unsigned integer will display a 1-5 digit number 0 - 65535.

A signed integer will display a 1-5 digit number 0 - 32726, plus the sign of the number. The sign is taken as being the state of the 16th (most significant) bit. If this bit is ON the number is shown as a negative number, and if it is OFF the number is shown as a positive number.

Each word of data can display up to 5 digits and can have up to 5 decimal places. If the number of decimal places exceeds the number of digits then no decimal places are displayed.

Examples:

3 digits, 1 decimal place - 62.9
5 digits, 5 decimal places - .65432
2 digits, 0 decimal places - 34

Inserting Variable Data

To display a variable number you insert a code into the message, which tells the display to display a variable number.

For example: ^ABCD

Where:

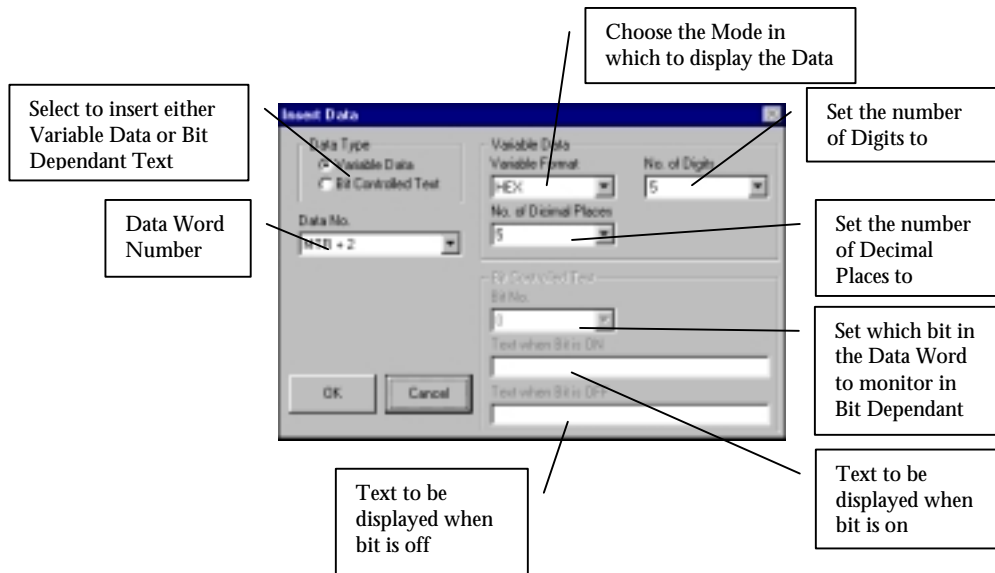
A = 1-4 (data number to be read from PLC)

B = 0-2 (data type: 0 – Hex mode
1 – Unsigned Integer
2 – Signed Integer)

C = 1-5 (number of digits)

D = 0-5 (number of decimal places)

To aid in entering these codes click on the Insert button. This brings up the Insert Text window.



To insert a variable number:

- Select Variable Data in the Data Type box.
- Select the Data Word Number to be displayed.
- Select the Mode in which to display the data.
- Select the total number of digits to be displayed.
- Select the number of decimal places to be displayed.
- Click OK or hit return.

Bit Dependant Text

Bit Dependant Text (BDT) is text that changes depending upon the state of a bit in the data words. To enter Bit Dependant Text you enter a code to tell the display what to display:

For example: ^5ABxxx:yyy:
 Where:
 5 = code for bit dependant text
 A = Data Word Number (1-4)
 B = Bit Number (0-F)
 xxx = Text when bit is on
 yyy = Text when bit is off

To aid in inserting BDT click on the insert button to bring up the Insert Data window. To insert BDT:

- Select Bit Controlled Text in the Data Type Box.
- Select the Data Word number to be used.
- Select the Bit to be used in the Bit No. box.
- Enter the text for when the bit is on.
- Enter the text for when the bit is off.
- Click OK or hit return.

If the text for ON is a different length to that for OFF the difference is automatically made-up in the display with spaces to maintain the layout of the message.

N.B.

BDT can take up a large number of characters in the message. Each Message can be a maximum of 61 characters long. To display BDT you have to store the text twice, so an instance of an 8 character BDT will occupy 14 characters more than is displayed. Multiple instances of BDT in a single message can use up all the available message space. The software will not let you enter more than 61 characters.

Selecting Messages

Multiple messages can be selected at the same time. This allows banks of messages to be moved, replaced, downloaded or uploaded. To select a message with the mouse simply click on it. To select a block of messages, click and hold the mouse button while dragging across a selection of messages. Alternatively, you can select a block of messages by selecting the first, holding down the shift key, and clicking on the last one. Individual messages can be added to a selection by holding down the control key and clicking on them. In this way a selection can be made of non-sequentially messages. Using the keyboard, the cursor keys move the highlight bar up and down. To select a block of messages hold the shift key down and move the highlight bar up and down.

Edit Menu Functions

The following actions occur:

Copy: Copies selected messages to copy buffer.
 Cut: Copies selected messages to copy buffer and blanks messages.
 Paste: Copies copy buffer to messages starting at the first selected message.
 Replace: Copies copy buffer to selected messages.
 Delete: Blanks selected messages.
 Clear All: Blanks the entire message list.

Transfer Menu Functions

When complete, or after editing, messages and set-up data can be downloaded to the terminal, using programming cable FTCBL-PROG.

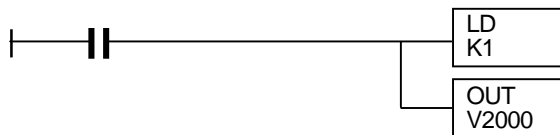
The Transfer menu provides the following actions:

Download Message:	Downloads selected messages to display.
Upload Message:	Uploads selected messages from display.
Download All:	Downloads all messages to display.
Upload All:	Uploads all messages from display.

For further information on menu functions use the help files provided with the programming software.

PLC program Control

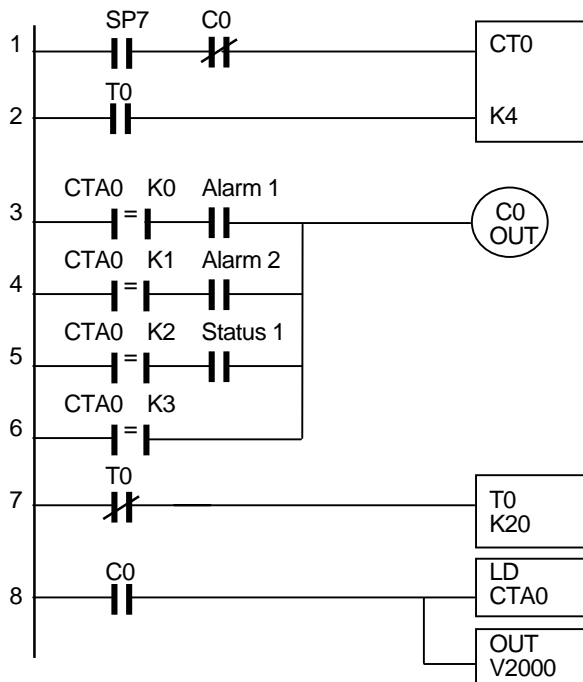
To call message 1 on a display simply action the following program in a DirectLOGIC PLC system, where V2000 is the MTR:



If RLL^{PLUS} (stage) programming is used this simple program line is all that is needed to call messages on the terminal.
 If several messages are called within a stage, or within an active ladder program, then the last active line will control the message displayed. The highest priority message, or first status message of a sequence should therefore be placed last in the ladder program.

Alarm messages

Multiple alarm messages are best handled by a simple routine based on a counter.



SP7 is an alternate scan oscillating contact.
 Alarm states, which can be complex ladder statements, are placed in series with each decoded state of the counter CT0.
 The highest priority alarm is placed on the top rung, and machine status contacts are placed under all alarm contacts.

Counter CT0 scans each alarm or plant status state quickly. When an active contact is detected the counter stops via C0, and the actual value of the counter is transferred to the MTR via the last line. Every 2 seconds timer T0 resets the counter, which then restarts the scan to find the highest value message. Messages are programmed into the terminal corresponding to the accumulating value in CT0. Alarm 1 calls flashing message 1, etc.

This program produces a priority alarm sequence, where the highest priority only is displayed, with rescan every 2 seconds. It is ideal for machinery where one alarm creates other alarms. As alarms are cleared, new alarms appear to steer an operator through the restart process:

E.g. Outlet blocked – clear discharge
 Inlet blocked – reopen gate
 Close guards
 Clear Emergency Stop

When no alarms exist then lower priority plant status messages can be displayed, with line 6 calling the initial default message.

Alterations can be made to this program to achieve different attributes.

Instead of OUT C0 use SET C0 and reset the messages with one of the terminal buttons used as an alarm ACCEPT key. Use another button to direct input to the counter in order to STEP through the display of further alarms and plant status.

Port Configuration

The PT22X-DNET terminal is designed to operate on the following communications settings.

9600	Baud
Hex	Protocol
None	Parity (305)
Odd	Parity
	All other DL PLCs
Secondary Address	1

Terminals with firmware release 8.0 or greater now have an automatic search routine for K-Sequence or DirectNET operation, which allows the terminals to be used on the full range of DirectLOGIC CPU's.

NOTE:

It will be necessary to configure the bottom secondary port of a PLC if the terminal uses this port, to the communications settings listed above, as the default protocol is ASCII.

When using DirectSOFT on-line via the top programming port, under menu selections "PLC", "Setup", select "Setup Secondary Communications port".

PLCs with RS422 or RS485 ports can be connected to the terminal over screened TP cables up to 1500m.

Connections are: 1=232/422 select, 2=232Rx, 3=232Tx, 4=Programming cable link, 5=Gnd, 6=Rx+, 7=Rx-, 8=Tx+, 9=Tx-
 Link Pins 1 and 5 to select RS422/485.