GE Fanuc Automation

Programmable Control Products

Operator Interface Terminal

User's Manual

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Warning

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution

Caution notices are used where equipment might be damaged if care is not taken.

Note

Notes merely call attention to information that is especially significant to understanding and operating the equipment.

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Preface

The Operator Interface Terminal (OIT) User's Manual explains how to install, startup, and program the OIT. Numerous examples are provided to make it easy to create screens for displaying data from the PLC or host.

Summary of the Manual

Chapter 1. Introduction: Provided a description of the features, general operation, and specifications of the OIT.

Chapter 2. Getting Started: Explains how to get the OIT started up and describes briefly menu operation and OptiSCREEN programming.

Chapter 3. Installation: Describes in detail power wiring, battery installation, power-up procedures, port connector definitions, and communications wiring.

Chapter 4. Operation: Describes in detail all the menus (Setup, Screen, BASIC, Tools, Config, Online, Local, Run), and options under each menu.

Chapter 5. OptiSCREEN Command Reference: Explains all the OptiSCREEN Commands. Escape sequences for each are included.

Chapter 6. Utility Programs for the IBM PC: Describes how to use the utility programs, provided on diskette, which aid in the development of application programs and screens.

Appendix A. Outline and Mounting Drawings

Appendix B. ASCII Codes and Special Character Sets

Appendix C. Screen Programming Template

Appendix D. ANSI Escape Sequences for PLCs

Appendix E. VT52 Escape Sequences

Appendix F. Function Key Operations

Related Publications

GFK-0361 - *Mini OIT User's Manual*

At GE Fanuc automation, we strive to produce quality technical documentation. After you have used this manual, please take a few moments to complete and return the Reader's Comment Card located on the next page.

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Chapter 1 Introduction

The Operator Interface Terminal (OIT) is a rugged, intelligent terminal specifically built for use in harsh environments. The sealed front panel of the OIT complies with NEMA 4 and NEMA 12 specifications and includes a shatterproof window. It is typically used as an operator control and monitoring station for industrial machines that are capable of communicating over a serial interface. These industrial machines may be host computers, CNC systems, programmable logic controllers, robots, and other computer-based data acquisition, monitoring, and control systems. In this manual, however, the intelligent machine described will usually be a Programmable Logic Controller (PLC) such as the Series 90™-70, Series 90-30, Series Five™, or Series Six™ PLC from GE Fanuc Automation.

The Operator Interface Terminal (OIT) is available in several models.

IC600KD542 Standard Color OIT
IC600KD515* Mini OIT
IC600KD516* Mini OIT with Touchscreen

* The Mini OIT is not described in this manual. For more information refer to the table in this chapter comparing OIT models. Also, refer to the Mini OIT User's Manual,
GFK-0361.

Note

There are options for OITs which are supplied by the original manufacturer, but not stocked or sold by GE Fanuc Automation. For additional information, contact GE Fanuc Automation Customer Service.

This chapter provides an overview of the OIT. The topics covered are:

- Features of the OIT
- Feature Comparison of GE Fanuc OIT Models
- General System Operation
- Keyboards for the OIT
- Specifications
- OIT Compatibility

Features of the OIT

The OIT is an intelligent terminal that stores screen files generated by the OptiSCREEN ™ utility. The OIT is built to NEMA 4 and NEMA 12 specifications making it ideal for factory floor applications. The OIT operates using either the ANSI X3.64, the VT-100, or the VT-52 escape sequences. This means the OIT can replace many terminals which also use these escape sequences such as the DEC VT-100 and VT-220. See the illustration of the OIT below.

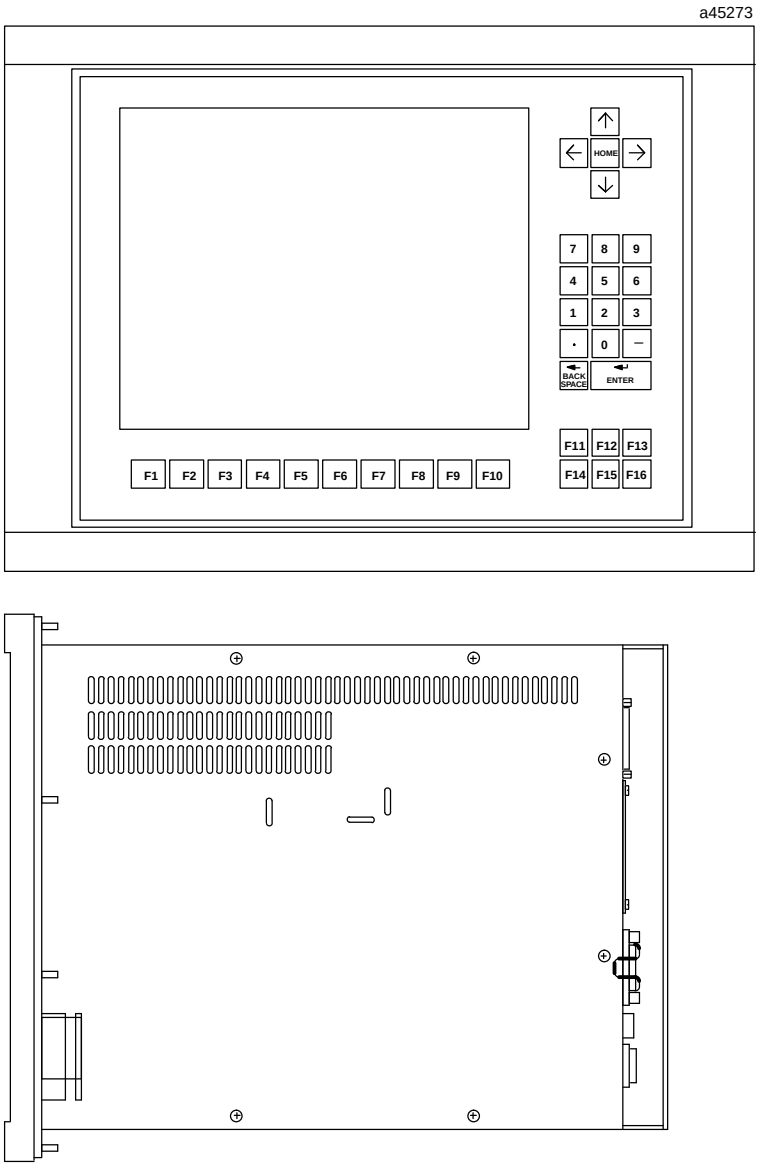


Figure 1-1. The OIT - Front and Side Views

™ **OptiSCREENis a trademark of NematronCorporation.**

Other important features of the OIT are described below.

- OptiSCREEN Editor: The OptiSCREEN Editor allows you to easily create and store screens which are used to display data from the PLC or host. English language commands are used instead of escape sequences.
- Serial Interfaces: The serial ports are typically used to connect to a host such as a PLC and to a printer. There are two serial ports on the OIT referred to as the Primary port and the Secondary port. Both ports have RS-232C, RS-422, and RS-485 capabilities and both are optically isolated.
- OIT Memory: The OIT is shipped with 128 Kbytes RAM (64 Kbytes for system use and 64 Kbytes for user screen files) and are expandable to 256 Kbytes RAM.
- Menu-Driven Software: The menu-driven software allows you to easily access the OIT functions: OptiSCREEN editor, system configuration, and file and screen transfers.
- Keyboards: During programming, an IBM-compatible, full-travel, QWERTY keyboard will be required. A round DIN keyboard connector is provided at the rear of the unit. Either an IBM XT- or AT-compatible keyboard may be used. GE Fanuc offers such a keyboard as part number IC642PKB250.
- Clock and Calendar Display: A battery-backed clock and calendar display the time and date at the bottom of the screen if desired. The clock and calendar can be reset from either the keyboard or through external commands. Moreover, the time and date can be used for time and date stamping of all OIT functions.

Feature Comparison of OIT Models

The table below explains the differences in features between the full-sized color OIT and the Mini OIT.

Table 1-1. Feature Comparison Between OIT Models

Feature	Full Size Color IC600KD542	Mini OIT IC600KD515, 516
OptiSCREEN Editing	Yes	Yes
Touch Screen CRT	No	Yes IC600KD516 only
Keyboards Available (Sealed Membrane type)	35-position built in	65-position full ASCII
Ports	2 serial	1 serial 1 parallel

Table 1-1. Feature Comparison Between OIT Models - Continued

Feature	Full Size Color IC600KD512, 514	Mini OIT IC600KD515, 516
User Memory	128 Kbytes shipped (64 Kbytes user) 256 Kbytes total	IC600KD515, IC600KD516 - 30 Kbytes shipped 62 Kbytes total
Character Sets	95 ASCII, 161 Graphic, 80 Quad Size letters, numbers,symbols	95 ASCII, 33 Graphic from Stand. char. set. No Alternate character set or Quad size process symbols
IBM Keyboard Connector Types	DIN type only for full-size IBM PC-XT or AT.	DIN type only for full size IBM PC-XT or AT
Color CRT	Yes	No
Screen Size	14" diag. 25 or 30 lines, 80 or 132 char. per line	5" x 9", 16 lines, 80 char. per line
Status Lines	0-7	None
Battery Backed Clock and Calendar	Yes	No

General Operation of the OIT

The OIT is designed to receive dynamic (changing) data from the host computer (PLC) and display it on the screen in a user-programmed screen format. This format is created using the OptiSCREEN Editor and typically does not change as often as the dynamic information from the PLC. The operator can enter data and initiate action to be taken by the PLC by pressing keys on the keyboard.

The information displayed on the OIT is of two types.

- Dynamic data such as counter or timer values from the PLC.
- Screen format programmed using the OptiSCREEN Editor which makes the dynamic information easy to read.

How the Dynamic Data is Produced

The origin of the dynamic data displayed on the OIT is the host or PLC. This data can be raw data, but often it needs to be processed in some way before it is displayed.

The Series 90-70 and Series 90-30 PCM modules can be used for processing raw data through the modules' resident BASIC. The ASCII/BASIC module provides the same capability for the Series Six PLC. These modules also retrieve operator-entered data and key presses to be acted upon by the PLC.

Creating the Screen Format

The OptiSCREEN Editor allows you to create screen formats easily, using English-language commands instead of the cumbersome escape sequences required on some terminals. The screen format usually consists of the screen title, explanations of the dynamic data, and any graphics such as lines and boxes used to clearly present the data.

The figure below illustrates a typical screen format.

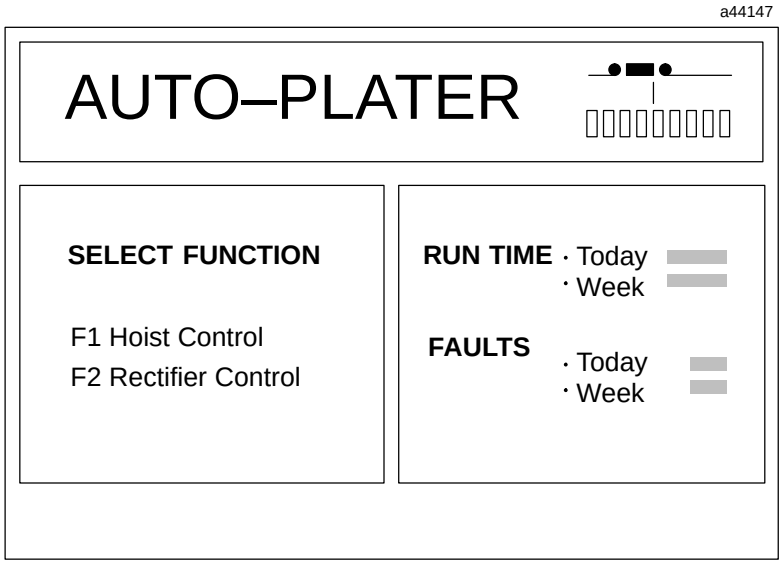


Figure 1-2. Typical Screen Format Created Using the OptiSCREEN Editor

Transferring Data Between the Host (PLC) and the OIT

The serial ports include an RS-232, an RS-422, or an RS-485 interface which can be connected to an intelligent module such as the Series 90-70 or Series 90-30 PCM module or a Series Five or Series Six ASCII / BASIC or CCM module.

The figures below show the connections for a serial configuration using the OIT.

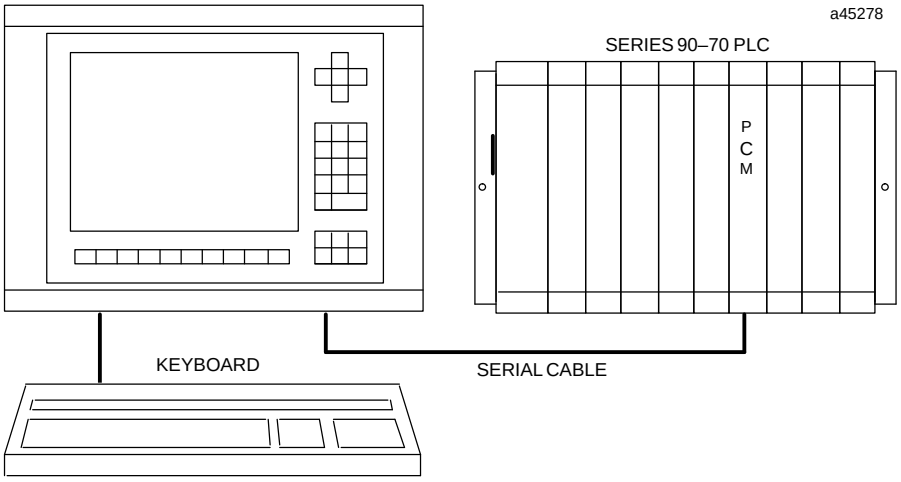


Figure 1-3. Connecting the OIT to a Series 90-70 or Series 90-30 PCM Module

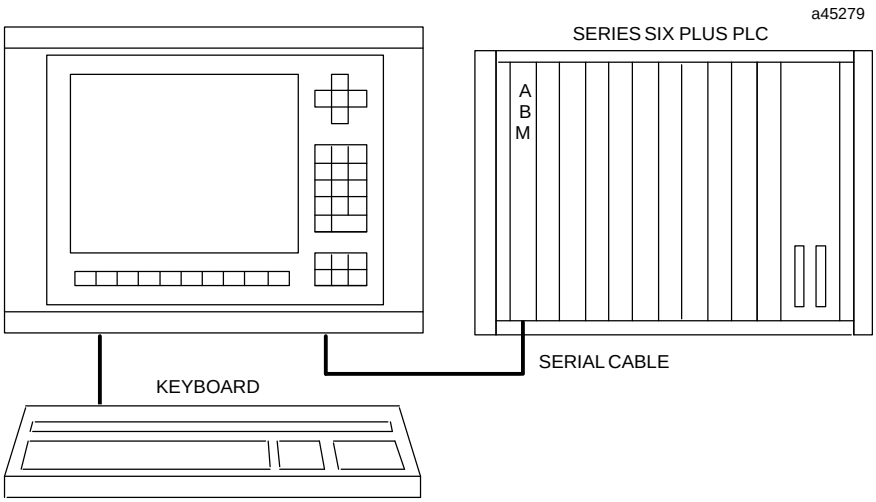


Figure 1-4. Connecting the OIT to a Series Six ASCII/BASIC Module

Keyboards for the OIT

The OIT comes with an integral 35-position sealed-membrane keyboard. This built-in keyboard is sufficient to perform most operator functions. However, for system configuration and screen development, you will need to use either a standard IBM PC-XT or AT keyboard.

35-Position Keyboard

The OIT's built-in keyboard features a numeric keypad, cursor control pad, and 16 function keys. The function key legends are also printed on slide-in inserts for easy user customization.

You can define the function keys to represent up to 16 ASCII characters (including escape sequences) for on-line operation.

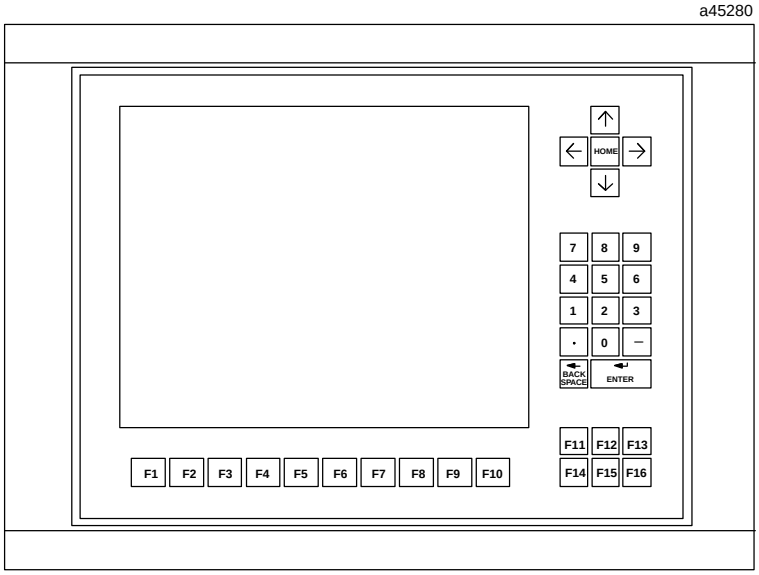


Figure 1-5. The 35-Position Integral Keyboard

IBM PC-Compatible Keyboards

During screen programming, and for certain permanent applications, an IBM PC-AT or PC-XT-compatible full-travel QWERTY keyboard may be desirable. The OIT supports keyboards designed for use with the IBM-PC-AT Personal Computer or compatible equivalents. A round DIN keyboard connector is provided at the rear of the unit.

An IBM-compatible keyboard may be connected and used simultaneously with the 35-position integral keyboard. Not all of the special keys on the IBM-compatible keyboard are appropriate for the OIT. The OIT supports IBM functions keys F1 through F10; you can use the [Shift]-[F1] through [Shift]-[F6] key combinations to produce F11 to F16; and the OIT supports the Print Screen key.

GE Fanuc Automation offers an IBM PC-AT-compatible full-travel keyboard; IC642PKB250.

User-Customized Keyboards

You can custom label the functions keys in the integral keyboard. Each function key has a clear window through which you can view the key legend. The standard legends are preprinted on inserts of .005" thick mylar film and installed in slots located immediately behind the front panel at each side of the enclosure.

To remove the standard legends locate the plastic tabs at the side of the enclosure. The legends are sandwiched between the plastic tab marked INSERT and the clear plastic tab. Remove only the legend (not the tab marked INSERT or the clear tab) by sliding it out.

You can label the keyboard inserts to meet your specific application needs. Inserts may be manufactured of any material and any color, but should be about 0.005" thick for proper insertion and keyboard operation. The standard inserts can be used as a guide for the proper size or you may refer to the figure below for the correct dimensions. Any keys that you do not use may be left blank or printed black to match the keyboard overlay foreground colors. All inserts should have a clear surface coating to protect the legends during use on the plant floor.

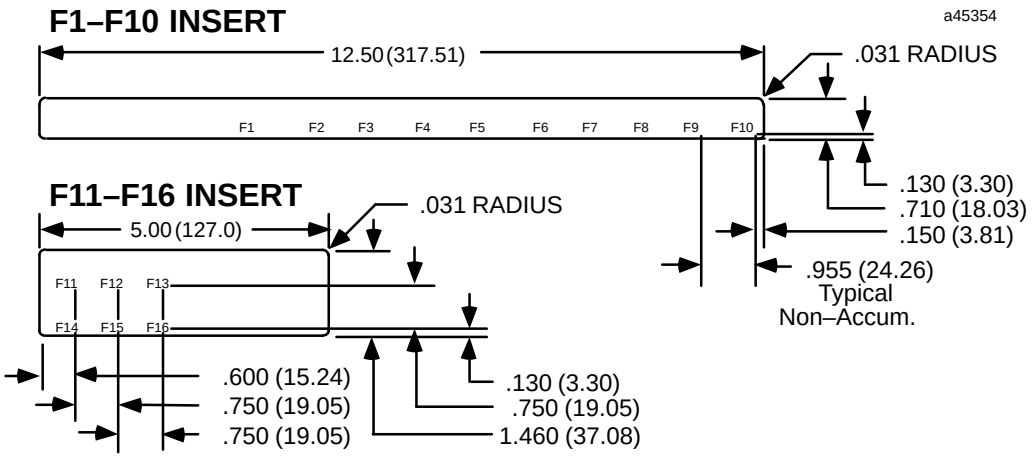


Figure 1-6. Dimensions for Function Key Legends

Specifications

Processor	Z180
User Memory	64 Kbytes to 192 Kbytes battery-backed CMOS RAM available.
Front panel finish	Black, textured Polane-T polyurethane paint standard.
Color	14" diagonal, high-resolution VGA
Window	Proprietary Foster-Grant glare shield made of ADC material.
Format	25 or 30 lines of 80 or 132 characters, 0 - 7 independent status lines
Weight	45 lb (20.4 Kg)
Characters	
Set	256 characters consisting of 95 ASCII and 161 graphic characters plus 80 quad size letters, numbers, symbols. ASCII characters can be displayed normal size, double-wide, or quad size.
Formation	5 x 7 dot matrix, except: 5 x 9 dot matrix for lowercase characters with descenders, 8 x 10 dot matrix for graphics
Video Attributes	
Size	14" diagonal: 7.5" high by 10.5" wide
Color	Eight foreground and eight background colors, plus blink
Cursor	None, and blinking or continuous in underline or block forms
Cursor addressing	Relative and direct
Scrolling	Full or split screen
Keyboards	
35-position (Sealed)	Keys in L-shaped configuration around display including 16 function keys, 0 to 9 numeric keys, Enter], Backspace], four cursor control keys, and Home].
Full Travel Keyboard, optional (Stand-alone as IC642PKB250)	IBM PC-AT type compatible with round DIN connector.
General information	The built-in snap action of the sealed-membrane keyboards generate tactile feedback for input. The surface of all of the keyboards is a matte, UV hardcoated polyester. The OIT accepts IBM PC-AT or -XT-compatible keyboards with a round DIN connector.
Operating Environment	
Sealed front panel	Meets NEMA 4 (indoor use only) and NEMA 12 specifications
Temperature	0 to 50 degrees Celsius (32 to 122 degrees Fahrenheit)
Humidity	5 to 95% RH, non-condensing
Shock and vibration	5 to 10 Hz, 0.20 inches peak-to-peak 10 to 200 Hz, 1G peak-to-peak
Electrical noise immunity	NEMA showering arc test ICS 2-230. Surge withstand capacity ANSI C37.90A
Certification UL and CSA	
Power Requirements	115 Vac to 230 Vac (wide ranging), 50 / 60 Hz, 110 W
Communications	
Primary port (DTE)	Serial RS-232, RS-422., and RS-485 Handshaking by hardware (RTS / CTS) or software (XON / XOFF). Uses DB-25P connector.
Secondary port (DTE)	Same as for Primary port.
Input buffers	256 characters per port
Optical isolation	Serial ports are protected by circuits which provide up to 1,000 volts of line isolation.
Menu-configurable	Independent control of both ports 300, 600, 1200, 2400, 4800, 9600, or 19200 baud rate. 7 or 8 bit characters. 1 or 2 stop bits. Odd, even or no parity. Command sets: ANSI X3.64, VT52, or subset of VT100.

OIT Compatibility

The OIT supports a wide variety of existing hardware and software configurations, therefore it can replace many other terminals. The OIT is completely compatible with the ANSI X3.64 and VT52 operating modes.

The OIT makes a number of non-ANSI commands available to allow its use in place of a DEC VT100 terminal. A number of differences, however, exist between the OIT and a VT100 terminal. The DEC VT220 series of terminals provide additional capabilities beyond the DEC VT100. The OIT, however, remains compatible with the VT220 terminal. The VT220 offers support for additional function keys, but since you can program the OITs function keys, you can configure an OIT to emulate the keys on a VT220.

The major differences between the OIT and the VT100 are outlined below:

- OIT and VT100 keyboards differ. This affects special commands that use the cursor keypad.
- The VT100 terminal supports an optional mode of 132 characters per line. The OIT does not support this mode.
- Some of the VT100 terminal's special graphic characters have been replaced by other characters on the OIT. Also the OIT does not support all commands that affect the character set on the VT100.
- Tab stops on the OIT are not programmable.
- The OIT does not support the smooth scrolling mode found on the VT100.
- The OIT addresses all 80 columns of the display in double width mode. The VT100 only addresses 40 columns in double width mode. For example, column 64 on the OIT corresponds to column 32 on the VT100 terminal when in double wide mode. This gives you more flexibility in creating screens than available with a VT100 terminal.

Chapter 2 Getting Started

When you receive your Operator Interface Terminal (OIT) package, you should receive the following items:

- The Operator Interface Terminal (OIT).
- Operator Interface Terminal (OIT) Documentation.

Keep the OIT shipping box and packing materials so that you can safely and efficiently ship the OIT if you need to.

You must supply several items not provided with the OIT:

- A medium-sized, flat-headed screwdriver and a Phillips screwdriver. You will use the screwdrivers for several jobs as you start to use your OIT.
- An IBM PC-AT or -XT-compatible keyboard.
- An AC power cord.

Warning

You must be familiar with standard electrical procedures before installing the Operator Interface Terminal. Observe normal safety procedures at all times.

Exercise extreme caution around energized equipment.

High voltages are present while power is connected, even if the OIT is turned off.

Ensure proper grounding of all equipment.

Do not apply power to the OIT yet.

Connecting AC Power

Using a screwdriver, attach the three wires from the AC power cord, which you supply, to the standard EIA plug shipped with the OIT. See the figure below.

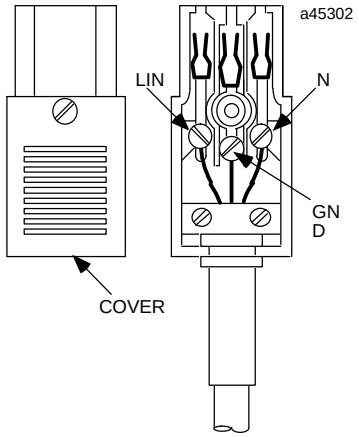


Figure 2-1. Wiring Diagram for AC Power

Installing the Battery

1. Locate the small rectangular battery cover plate on the back of the OIT. Remove the two Phillips screws from the plate, and separate the plate from the OIT. Notice how two clips hold the battery on the back of the plate.
2. Locate two sets of battery connections on the logic board just inside the OIT chassis. Plug the mating connector from the battery cable onto one of the connections on the logic board. Make sure that the notched side of the mating connector faces away from you as you plug it in.
3. Put the cover plate back on the OIT and replace the two screws.

Attaching the Keyboard

The OIT requires the use of an IBM PC-AT or -XT keyboard. By default, the OIT is configured to use an AT-compatible keyboard. To use an XT-compatible keyboard you will need to change a configuration switch located inside the unit on the logic board. Refer to the section, “Setting the Configuration Switches” found in Chapter 3.

Note

You can plug or unplug an AT-compatible keyboard while the power remains on for the OIT. You must , however, power the OIT off before plugging or unplugging an XT-compatible keyboard..

Powering-up the OIT

Plug in the OIT and turn on the AC power switch on the back of the OIT.

After you power-up the OIT, the following display, along with a moving video pattern, appears on your screen:

```
POWER-ON DIAGNOSTICS

INTERNAL BANK   00 : 32K RAM          EXTERNAL BANK A 00K OK
                01 : 32K RAM                        B 00K OK
                02 : 32K RAM                        C 00K OK
                03 : 00  EMPTY                      D 00K OK
                04 : 00  EMPTY                      E 00K OK
                05 : 00  EMPTY                      F 00K OK
                06 : 00  EMPTY                      G 00K OK

        SYSTEM RAM : OK
         VIDEO     : OK
CHARACTER RAM      : OK
EPROM CHECKSUM U61 : xxxx OK

           BATTERY : OK

             CLOCK : OK
```

These power-up diagnostics verify the user memory of the unit as well as other internal hardware components.

When the system completes this test, the Main Menu and Main Function Bar of the system appear, or only the Main Function Bar appears. The Main Menu and Main Function Bar appear below:

```
MAIN FUNCTIONS

F1 SETUP – Setup Workstation for      F6 TOOLS – Transfer files to/from
           power-up operation,                   cartridge or host,
           run demo program                      maintain int. files

F2 SCREEN– Create or edit             F7 CONFIG– Configure serial
           graphic screen files                  ports, execute
                                                 diagnostic tests

F3                                    F8 ONLINE– Enter Online
                                                 Terminal Mode

F4                                    F9 LOCAL – Enter Local
                                                 Terminal Mode

F5                                    F10 RUN  – Run Mode selected from
                                                 Setup

 F1      F2      F3     F4     F5      F6      F7      F8      F9     F10
SETUP  SCREEN                        TOOLS  CONFIG  ONLINE   LOCAL   RUN

 Power-up Status:  MAIN MENU                          01JUN93  09:00:00
```

Depending on the status of your system, only the Main Function Bar may appear at the bottom of the screen, as shown below:

```
 F1      F2      F3     F4     F5     F6      F7      F8      F9     F10
SETUP  SCREEN                       TOOLS  CONFIG  ONLINE   LOCAL   RUN

Power-up Status:  MAIN MENU                          1JAN08 00:00:00
```

If you do not see the diagnostic display and at least the Main Function Bar when you power-up the system, perform the following steps until it appears:

1. Using a flat–bladed screwdriver turn the Contrast Pot on the back of the OIT clockwise to increase the contrast on the monitor display. (See Figure 3-1 for location.)

Warning

Due to the dangerous voltages present within the OIT, adjustment of these controls should only be performed by qualified personnel.

2. Press the [Ctrl]-1 combination of keys. (Hold the [Ctrl] key down and press the *1* key that appears above the *Q* on the keyboard. You cannot use the numeric keypad for this operation. Release the keys at the same time.)

You can always turn the power to the OIT off from the Main Menu or Main Function Bar without losing any of the screens or files that you've created.

Using the Menu-Driven System

The menu-driven system allows you to enter the OptiSCREEN editor, specify parameters for serial communications, configure the system, and transfer screens and files to and from a host. The menu-driven system also gives directory listings of screens and files, and displays variables and their values.

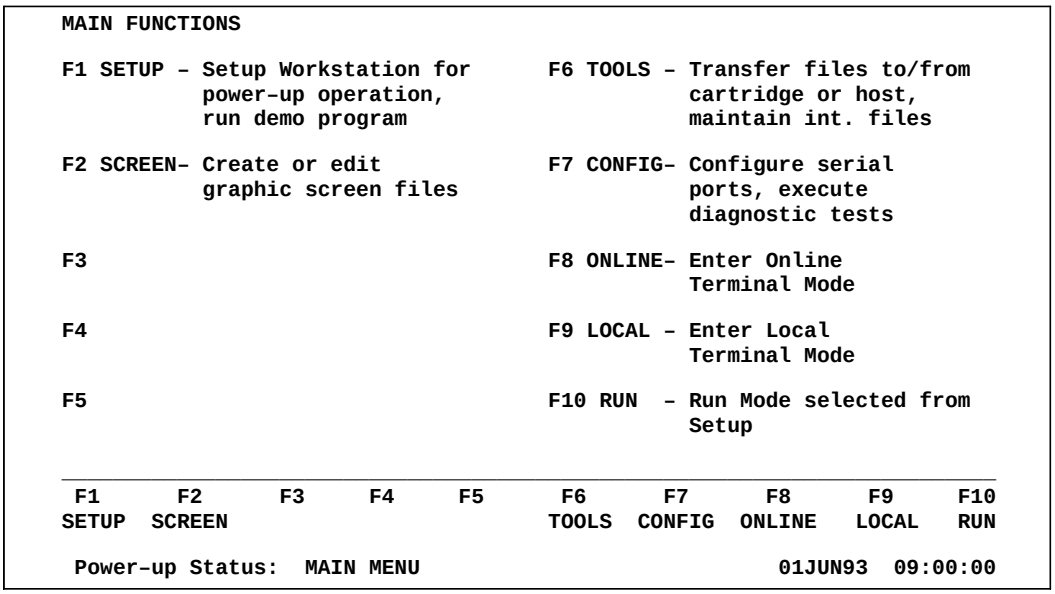
With the menus, you press one of the [F1] through [F10] function keys to make your selection. The system always displays valid function keys in the function bar at the bottom of the screen. After you press the key, the system displays another menu, offers a list of screens or files from which to choose, or executes an operation:

- When the system displays a menu, you press a function key to make another selection.
- When the system offers a list of files from which to choose, you use the cursor control keys (such as [Right] and [Down] on the keypad) to highlight a file and then press the appropriate function key to select the operation you want to perform.
- When the system executes an operation, it completes the process and then returns you to an appropriate menu or selection screen so that you can continue working.

To move between capabilities, you must return to the Main Function Bar. When you return to the Main Function Bar, the system outlines the menu items across the bottom of the screen:

- Usually you can press the [F1] MAIN function key to return to the Main Function Bar. After you press the [F1] MAIN function key, only the Main Function Bar appears across the bottom of the screen.
- The [Ctrl]-1 key combination often returns you to the Main Function Bar.

Within the menu-driven system, the Main Menu or the Main Function Bar appears first:



The following list describes the Main Menu or Function Bar choices and their capabilities:

[F1] SETUP: Specifies what operation the OIT performs on power-up or when you press the [F10] RUN key while using the system.

[F2] SCREEN: Enters the OptiSCREEN screen editor to create or edit a screen.

[F6] TOOLS: Enters the utility menu so that you can transfer screens, files, and data to and from the IBM-compatible host. This item also allows you to maintain internal files.

[F7] CONFIG: Specifies the serial communications parameters, ports, and diagnostic tests for the OIT.

[F8] ONLINE: Places your OIT in Online mode for communication with the host.

[F9] LOCAL: Places your OIT in Local mode for testing and limited operation.

[F10] RUN: Runs the mode named on the status line at the bottom of the screen. Specify the mode with the [F1] SETUP menu item from the Main Menu.

Using the Configuration Menu

Each of the Main Menu items leads you to another menu or set of selections. To start using your OIT, you need to use the Configuration Menu.

1. To enter the Configuration Menu, press the [F7] function key at the Main Function Bar. The Configuration Menu appears; for example:

```
CONFIGURATION
                    FIRMWARE RELEASE 4.2          01JUN93

MODES               ANSI              NO ECHO           SEND ANY CASE
DATE/TIME           03AUG92  DISPLAY                    14:51  DISPLAY
END LINE/COLOR      NO WRAP           NO AUTO LF        COLOR
CURSOR/CRT/UNDERLINE BLINKING BLOCK   SCREEN SAVER OFF  NO UNDERLINE
DISPLAY/CONTROLS    25 X 80 SCREEN    1 STATUS LINE     7 BIT CONTROLS
PRINT SCREEN        KEY OFF           GENERIC ASCII     PORT 1
KEYBOARD            35 PAD            15 FUNCTION KEYS  TERMINAL
TESTS/BATTERY/LEVEL DIAGNOSTIC        BATTERY           CURRENT (4.2)
PORTS/MOUSE         PRIMARY 1         SECONDARY 2       NO MOUSE
PORT 1              9600  NONE   7 BIT  1 STOP   HARD  RS232   PT TO PT
PORT 2              9600  NONE   7 BIT  1 STOP   HARD  RS232   PT TO PT

   -UP-      -DOWN-      -LEFT-       -RIGHT-      -SELECT-    -PERFORM-
  UP KEY    DOWN KEY    LEFT KEY     RIGHT KEY    BACK SPACE     ENTER


 F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
MAIN                            SAVE   RECALL                           RUN
FUNC
 Power-up Status:  MAIN MENU
```

The Configuration Menu specifies the serial communications parameters, ports, and diagnostic tests for the OIT. Use the cursor control keys to move through the items. Use the [Spacebar] to toggle through the available option settings for an item before saving the settings, as described below.

2. If the cursor does not already cover the first field on the screen (displaying the *ANSI* setting shown above), use the cursor control keys (such as [Up] and [Left] on the keypad) to move the cursor to that field.

3. Press the [Spacebar] several times to display the available settings: *ANSI, VT100,* and *VT52.* Leave the *MODE* item on the *ANSI* setting during the "Getting Started" chapter.

4. Use the [Down] key to move to the first field on the *KEYBOARD* line.

5. Press the [Spacebar] to move through the available settings. The proper setting for the OIT is 60 TOUCH & 35 PAD.

6. Check the date and time display on the second line of the Configuration Menu and, if necessary, correct them. By default, the date and time appear on the bottom line of the screen.

7. Check the rest of the settings on the Configuration Menu and, if any of them are different than the ones shown above, change them to match the above settings.

8. Press the [F5] SAVE function key to store the settings you just specified. The system highlights the *SAVE* function key as it saves the menu. The system uses the stored settings as the default whenever you power-up the system.

9. Press the [F1] MAIN function key to return to the Main Function Bar.

Now you are ready to set the default operating mode the OIT uses when you power-up the system.

Specifying the Default Setup

In this section, you specify the Main Menu as the default operating mode for your OIT. After you press the [F1] MAIN function key, the system displays the Main Function Menu Bar:

```
CONFIGURATION
                      FIRMWARE RELEASE 4.2          01JUN93

MODES                 ANSI               NO ECHO           SEND ANY CASE
DATE/TIME             03AUG92  DISPLAY                     14:51  DISPLAY
END LINE/COLOR        NO WRAP            NO AUTO LF        COLOR
CURSOR/CRT/UNDERLINE  BLINKING BLOCK     SCREEN SAVER OFF  NO UNDERLINE
DISPLAY/CONTROLS      25 X 80 SCREEN     1 STATUS LINE     7 BIT CONTROLS
PRINT SCREEN          KEY OFF            GENERIC ASCII     PORT 1
KEYBOARD              35 PAD             15 FUNCTION KEYS  TERMINAL
TESTS/BATTERY/LEVEL   DIAGNOSTIC         BATTERY           CURRENT (4.2)
PORTS/MOUSE           PRIMARY 1          SECONDARY 2       NO MOUSE
PORT 1                9600  NONE   7 BIT  1 STOP   HARD  RS232   PT TO PT
PORT 2                9600  NONE   7 BIT  1 STOP   HARD  RS232   PT TO PT


   -UP-      -DOWN-      -LEFT-       -RIGHT-      -SELECT-    -PERFORM-
  UP KEY    DOWN KEY    LEFT KEY     RIGHT KEY    BACK SPACE     ENTER


 F1      F2     F3     F4      F5      F6      F7     F8      F9      F10
MAIN                          SAVE   RECALL                          RUN
FUNC
 Power-up Status:  MAIN MENU
```

1. To enter the Setup Menu, press the [F1] SETUP function key from the Main Function Bar. The Setup Menu specifies the program or status that the system uses when you power-up the system or when you press the [F10] RUN key within the system. The Setup Menu appears below:

```
   SETUP

Workstation Power-up Status:

       MAIN MENU

 1 - Display Main Menu                          PRESS F10
                                                TO RUN NOW
 2 - Enter ONLINE Operation

 3 - Enter LOCAL Operation









 F1      F2      F3     F4      F5     F6      F7     F8      F9      F10
MAIN                                                                  RUN
FUNC
 Power-up Status:  MAIN MENU
```

2. If the Setup Menu does not already specify *Main Menu* at the top of the menu and in the *Power-up status* line at the bottom of the menu, press the *1 key* (in the numeric row above the letter Q or on the numeric keypad) to set this status.

3. To save and use the menu, press the [F1] MAIN function key or the [F10] RUN function key. When you press the [F1] MAIN function key, only the Main Function Bar appears at the bottom of the screen. When you press the [F10] RUN function key, the Main Function Bar appears on the bottom of the screen and the short descriptions for the various functions appear above the bar.

Now you are ready to enter the OptiSCREEN editor and create your first screen file.

Using the OptiSCREEN Editor

In this section of the "Getting Started" chapter, you create and display four screen files: a text screen file, a graphics screen file, a relative graphics screen file, and a screen file that calls the relative graphics screen file.

1. .Press the [F1] MAIN FUNC function key and the system displays the Main Menu and Function Bar.

```
 MAIN FUNCTIONS

F1 SETUP – Setup Workstation for      F6 TOOLS – Transfer files to/from
           power–up operation,                 cartridge or host,
           run demo program                    maintain int. files

F2 SCREEN– Create or edit             F7 CONFIG– Configure serial
           graphic screen files                ports, execute
                                               diagnostic tests

F3                                    F8 ONLINE– Enter Online
                                                 Terminal Mode

F4                                    F9 LOCAL – Enter Local
                                                 Terminal Mode

F5                                    F10 RUN  – Run Mode selected from
                                                 Setup

 F1      F2      F3     F4     F5      F6      F7      F8      F9      F10
SETUP  SCREEN                        TOOLS  CONFIG  ONLINE   LOCAL   RUN

 Power–up Status:  MAIN MENU                          01JUN93  09:00:00
```

2. To enter the OptiSCREEN editor for creating and editing OptiSCREEN screen files, press the [F2] SCREEN function key.

Creating a Text Screen File

After you press the [F2] SCREEN function key at the Main Function Bar, the Screen File Editor Directory appears. If a screen file appears (with the *Editing prompt* at the bottom of the function bar), press the [F10] DIR function key to obtain the directory, as shown below:

```
      Screen File Editor – Directory

TEST1




                SELECT FILE:  TEST 1

F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
MAIN   SYNTAX  EDIT    SHOW            RENAME  COPY    DELETE          RUN
FUNC                                    FILE    FILE    FILE
 Power–up Status:  MAIN MENU
```

1. Look in the directory for a file named *TEST1.* If the file does not exist, move to step 2. If the file exists, delete it:

   A. Use the cursor control keys ([Right] and [Down], for example) to move the cursor to cover the screen file named *TEST1* in the directory. The name also appears in the *Select file* prompt at the bottom of the screen.

   B. Press the [F8] DELETE FILE function key to delete the screen file.

   After deleting the file, the system returns you to the Screen File Editor Directory so that you can continue working.

2. If the directory is empty, use the keyboard to enter the name *TEST1* and then press the [F3] EDIT function key or press the [Enter] key. If another file name appears in the directory, use the [Backspace] key to delete the name, one character at a time, and then enter the name *TEST1* before pressing the [F3] EDIT function key or the [Enter] key.

3. The screen file editor places you in an empty screen:

```
–
END




F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
MAIN   STEP    HELP    SHOW    SAVE            UNDO    DELETE  INSER   DIR
FUNC                            FILE          CHNGES   LINE    LINE
```

Enter the following statements to generate the screen file. Feel free to enter the name of your company between quotes where *YOUR COMPANY* appears below:

```
'TEST1 – Text file
CLEAR SCREEN
MOVE TO 10, 10
QUAD SIZE
DISPLAY "TEST 1"
BLUE
/WHITE
MOVE TO 16, 10
DISPLAY "YOUR COMPANY"
EXIT QUAD


END



F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
MAIN   STEP    HELP    SHOW    SAVE            UNDO   DELETE  INSERT  DIR
FUNC                            FILE          CHNGES   LINE    LINE
 Editing:  TEST1
```

Information about the individual statements helps you understand the purpose of this file:

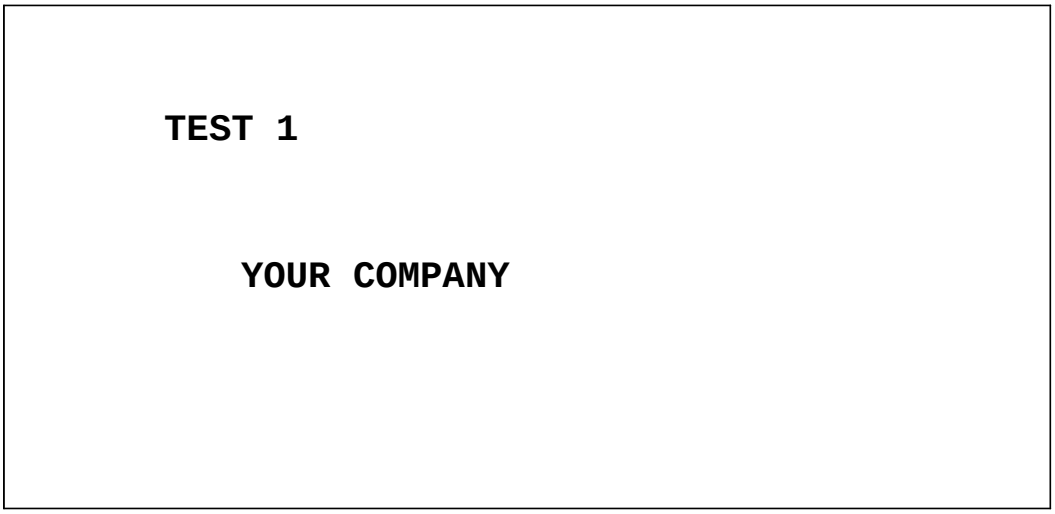
- The first line, *'Test1 - Text file*, demonstrates a comment line. Starting a line with an apostrophe (the character two keys to the right of the L key) makes any line a comment, or a remark, for the OptiSCREEN file. Comments help document the purpose of statements and statements in individual files. Also, when you make the first statement of a screen file a comment, the comment identifies the file when you generate a file directory.
- The *CLEAR SCREEN* statement clears the entire OIT screen and resets all attributes. You see this statement at the beginning of files and whenever you want to "start fresh" in a system.
- The *MOVE TO 10, 10* and the *MOVE TO 16, 10* statements cause the text or graphics that follow to appear in a specified location. The first MOVE statement starts the display of text at row 10 and column 10 on the screen. The second statement starts the display of text at row 16 and column 10. An OIT includes 25 or 30 rows, numbered from the top of the screen to the bottom. It includes 80 or 132 columns, numbered from the left side of the screen to the right.
- The *QUAD SIZE* and *EXIT QUAD* statement pair are "character attribute statements." They affect the appearance of all text and graphics that fall between the two statements. In general, a character fills a single cell so that it appears one row tall and one column wide. A quad size character appears four rows tall and four columns wide. Quad size characters appear in an uppercase (capitalized) form only.
- The *DISPLAY* statement specifies the text that appears on the screen. The first DISPLAY statement specifies the name of the file, "TEST1" and the second specifies the name of "YOUR COMPANY." As noted above, quad size characters appear in uppercase only, so you must enter capitalized text.
- Like QUAD SIZE the *BLUE* and */WHITE* statements are character attribute statements; they affect the appearance of all text and graphics that fall after the statements. In this case, *BLUE* specifies that the text and graphics appear in blue on the screen; */WHITE* specifies that the text and graphics appear on a white background . Other colors include RED, YELLOW, CYAN (light blue), GREEN, and MAGENTA (purple). By placing a slash (/) immediately before these colors or modes, you specify the background color or mode.

- The system automatically places the required *END* statement on the screen. When you display the screen file again, the system deletes the blank line before the *END* statement.

As you entered these statements, you may have noticed some interesting things:

- If you enter the first character or characters of a screen statement and then pause before completing the statement, the system displays a help screen that outlines the syntax for the statements that begin with the letter or letters you have entered. You must set the [F3] function key to the HELP setting, rather than NOHELP, for this feature.
- The system automatically capitalizes the statements for you when you press the [Enter] key to move to a new line. It does not, however, capitalize text that appears within quotes.
- When you press the [Enter] key, the system also correctly spells out statements that you abbreviated or misspelled as you entered them.
- You can use the cursor control keys to move through the screen file and make corrections to the text.
- You can press the [F9] INSERT LINE function key to insert a new, blank line into the middle of the file. (The [Ctrl]-[Ins] key combination also performs this function.)
- You can press the [F8] DELETE LINE function key to delete the line that the cursor currently covers in the file. (The [Ctrl]-[Del] key combination also performs this function.)
- You can press the [Ins] key to change from replacement, or overwrite, mode to insertion mode and add new text to the file. In insertion mode, existing text shifts to the right to make room for the new text.
- You can press the [Del] key to delete the character that the cursor currently covers.

4. To display the screen file at your OIT, press the [F4] SHOW function key:



This shows how the screen appears when you call it from an external device or call it from another program.

5. Press any key to return to the screen file for further editing:

```
               'TEST1 – Text file
CLEAR SCREEN
MOVE TO 10, 10
QUAD SIZE
DISPLAY "TEST 1"
BLUE
/WHITE
MOVE TO 16, 10
DISPLAY "YOUR COMPANY"
EXIT QUAD


END



F1      F2      F3      F4      F5      F6      F7      F8      F9     F10
MAIN   STEP    HELP    SHOW    SAVE            UNDO   DELETE  INSERT  DIR
FUNC                            FILE          CHNGES   LINE    LINE
 Editing:  TEST1
```

At this point, you can add statements to the screen file or you can make changes to the existing statements in the screen file. Press the [F4] SHOW function key to display the screen again, and press any key to return to the screen file for further editing.

6. Press the [F5] SAVE function key to save the screen file you just created. The system highlights the *SAVE* function key as it saves the file.

7. Press the [F10] DIR function key to return to the Screen File Editor Directory. Notice that the TEST1 screen file now appears in the directory.

You are now ready to create another screen file or perform another function.

Creating a Graphic Screen

The first screen file that you created showed two lines of text. In this example you create a simple graphic display. To begin, examine the Screen File Editor Directory; for example:

```
      Screen File Editor – Directory

TEST1

                SELECT FILE:

F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
MAIN    SYNTAX  EDIT    SHOW            RENAME  COPY    DELETE          RUN
FUNC                                    FILE    FILE    FILE
 Power–up Status:  MAIN MENU
```

1. Look in the directory for a file named *TEST2*. If the file does not exist, move to step 2. If the file exists, highlight it with the cursor and press the [F8] DELETE function key to delete it.

2. If necessary, use the cursor control keys to highlight the *TEST1* file name. Use the [Backspace] key to delete the last character of the *TEST1* file name and enter the number 2, creating a screen file named *TEST2*. Press the [F3] EDIT function key or the [Enter] key.

3. The screen file editor places you in an empty screen. Enter the following statements to generate the screen file:

```
              'TEST2 – Text file
MOVE TO 10, 20
BOX 8 x 8
LEFT 4
QUAD SIZE
DISPLAY "e"
EXIT QUAD


END


F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
MAIN    STEP    HELP    SHOW    SAVE            UNDO    DELETE  INSERT  DIR
FUNC                            FILE            CHNGES  LINE    LINE
 Editing:  TEST2
```

Several new statements and different uses of old statements appear in this example:

- The *BOX* statement draws a box on the screen. In this case, the box is 8 rows tall and 8 columns wide. The system draws boxes from the lower left-hand corner of the box. That is, you use the MOVE TO statement to move to a specific location on the screen, and the BOX statement draws up a specified number of rows and to the right a specified number of columns. The cursor does not move after you issue the *BOX* statement; it remains in the lower left corner of the box.
- The *LEFT* statement moves the cursor left a specified number of columns. In this case, the cursor moves to the left of the box 4 columns, the width of one quad-sized character. OptiSCREEN also offers a RIGHT statement, an UP statement, and a DOWN statement.
- The lowercase *e* in the DISPLAY statement appears as a quad-sized graphic character rather than a text character. This occurs since uppercase quad size characters generate text and lowercase quad size characters generate graphics characters.

4. To display the screen file at your OIT, press the [F4] SHOW function key. The lowercase *e* generates the graphic symbol often used for a pump on a diagram. Note the location of the graphic and the box.
5. Press any key to return to the screen file for further editing. At this point, you can make changes to the existing statements in the screen file.
6. Press the [F5] SAVE function key to save the screen file you just created. The system highlights the *SAVE* function key as it saves the file.
7. Press the [F10] DIR function key to return to the Screen File Editor Directory.

You can now perform another function at the OIT.

Changing a Screen File from Absolute to Relative

In this part of "Getting Started," you change screen file *TEST2* to make it a relative screen file. (Descriptions of "absolute" and "relative" files appear below.) In the next part of this chapter, you use the changed relative screen file. To begin, move to the Screen Editor File Directory:

1. Highlight the file named *TEST2* with the cursor and press the [F3] EDIT function key or the [Enter] key. The screen editor places you in the TEST2 screen file.

2. Delete the second line in the file *(MOVE TO 10, 20)*. To do this, move the cursor to the second line and press the [F8] DELETE function key to delete it. After the deletion, the file looks like this:

```
                    'TEST2 – Text file
BOX 8 x 8
LEFT 4
QUAD SIZE
DISPLAY "e"
EXIT QUAD


END


F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
MAIN    STEP    HELP    SHOW    SAVE            UNDO    DELETE  INSERT  DIR
FUNC                            FILE            CHNGES  LINE    LINE
 Editing:  TEST2
```

This is now a relative graphic screen file. The statements in the file do not display the output from the file in an absolute position; the statements display the output in any location that you specify. Notice that the file does not contain the CLEAR SCREEN statement but contains both the QUAD and EXIT QUAD statements.

An example of how to display this relative file appears in the next section of this chapter.

3. Press the [F5] SAVE function key to save the *TEST2* screen file. The system highlights the *SAVE* function key as it saves the file.

4. Press the [F10] DIR function key to return to the Screen File Editor Directory.

You can now generate the screen file that calls the relative screen file.

Calling a Screen File from Another Screen File

In this section of the chapter, you call the relative screen file that you just created from another screen file. To begin, move to the Screen Editor File Directory:

1. Look in the directory for a file named *TEST3*. If the file does not exist, move to step 2. If the file exists, highlight it with the cursor and press the [F8] DELETE function key to delete it.

2. Use the [Backspace] key to delete the last character of the *TEST2* file name and enter the number 3, creating a screen file named *TEST3*. Press the [F3] EDIT function key or the [Enter] key.

3. The screen file editor places you in an empty screen. Enter the following statements to generate the screen file:

```
              'TEST3 – Calling another screen file
CLEAR SCREEN
RED
MOVE TO 10, 10
DISPLAY FILE TEST2
BLUE
MOVE TO 14, 20
DISPLAY FILE TEST2
YELLOW
MOVE TO 18, 30
DISPLAY FILE TEST2


END


F1      F2      F3      F4      F5      F6      F7      F8      F9     F10
MAIN   STEP    HELP    SHOW    SAVE            UNDO   DELETE  INSERT  DIR
FUNC                            FILE          CHNGES   LINE    LINE
 Editing:  TEST3
```

   The *DISPLAY FILE* statement in this screen file causes the system to display the contents of screen file *TEST2* in the locations, and in the colors or modes, that you specify.

4. To display the screen file at your OIT, press the [F4] SHOW function key. Note the location and color of the graphics and the box as they appear on the screen.

5. Press any key to return to the screen file for further editing. At this point, you can make changes to the statements in the screen file.

6. Press the [F5] SAVE function key to save the screen file. The system highlights the *SAVE* function key as it saves the file.

7. Press the [F10] DIR function key to return to the Screen File Editor Directory.

Creating a Sample Screen Format

A sample screen format is shown in the figure below. The sample format can be created by typing in the program which is listed after the figure. The format includes a variety of OptiSCREEN statements to help you become familiar with the overall characteristics of screen programming.

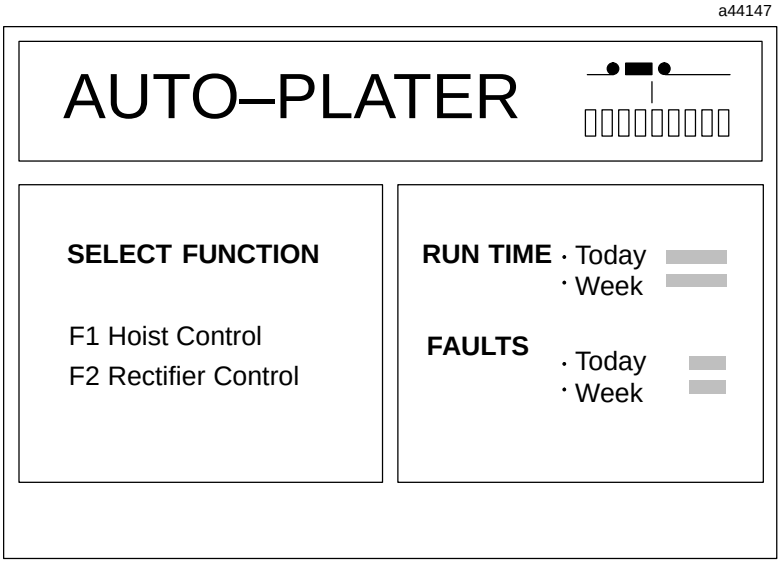


Figure 2-2. Sample Screen Format

The Sample Program

Comments explaining how the sample program works are included in the listing. Each of the statements used in the sample program are explained in full in Chapter 5, OptiSCREEN Statement Reference. The recommended method for entering the program is as follows.

1. Enter a single block of program lines at a time; the blocks are separated in the listing by a blank comment line.
2. After entering a block of lines, press the Show Key (F4) to display the part of the program entered.
3. Press any key to resume editing.

```
'Sample Screen File                    This is the Screen Title
'
RESET LINE ATTRIBUTES
CLEAR SCREEN
'
MOVE TO 7, 1                           These statements draw the box
BOX 7 X 80                             for the screen heading and dis-
MOVE TO 5, 5                           play the words AUTO-PLATER in
QUAD SIZE                              Quad size letters.  You must
DISPLAY "AUTO-PLATER                   use capital letters.
EXIT QUAD
'
MOVE TO 2, 59                          These statements draw the sym-
DISPLAY "_____________"                bol for the Auto-Plater using
MOVE TO 3, 64                          normal ASCII characters and
DISPLAY "|"                            characters in the Supple-
SUPPLEMENTAL                           mental character set.  Be sure
MOVE TO 2, 61                          to note that the Supplemeantal
DISPLAY "~PP~"                         character set letters are lower
MOVE TO 4, 59                          case.  See Appendix B for a
DISPLAY "lklklklklklklk"               graphic representation of the
MOVE TO 5, 59                          Supplemental characters.
DISPLAY "mjmjmjmjmjmjmj"
EXIT SUPPLEMENTAL
'
MOVE TO 20, 1                          These statements make up the
BOX 12 X 38                            Select Function area.  The
MOVE TO 11, 4                          DOUBLE WIDE, GREEN, and BLINK
DOUBLE WIDE                            statements are used to empha-
GREEN                                  size the action to be taken.
BLINK
DISPLAY "SELECT FUNCTION"
EXIT DOUBLE WIDE AND BLINK
RESET ATTRIBUTES
MOVE TO 14, 8
DISPLAY "F1 Hoist Control"
MOVE TO 16, 8
DISPLAY "F2 Rectifier Control"
```

```
'
MOVE TO 20, 43
BOX 12 X 38
MOVE TO 11, 45
DOUBLE WIDE
RED
DISPLAY "RUN TIME"
MOVE TO 15, 45
DISPLAY "FAULTS"
RESET ATTRIBUTES
SUPPLEMENTAL
MOVE TO 11, 65
DISPLAY "~"
MOVE TO 12, 65
DISPLAY "~"
MOVE TO 15, 65
DISPLAY "~"
MOVE TO 16, 65
DISPLAY "~"
EXIT SUPPLEMENTAL
MOVE TO 11, 67
DISPLAY "Today"
MOVE TO 12, 67
DISPLAY "Week"
MOVE TO 15, 67
DISPLAY "Today"
MOVE TO 16, 67
DISPLAY "Week"
```

These statements form the Display RUN TIME and FAULTS areas of the screen.

```
'
/BLUE
MOVE TO 11, 74
DISPLAY "{ENQ}{ENQ}{ENQ}{ENQ}{ENQ}"
MOVE TO 12, 74
DISPLAY "{ENQ}{ENQ}{ENQ}{ENQ}{ENQ}"
MOVE TO 15, 74
DISPLAY "{ENQ}{ENQ}{ENQ}"
MOVE TO 16, 74
DISPLAY "{ENQ}{ENQ}{ENQ}"
'
```

These statements are part of the Data Fill operations explained in Chapter 5. The Data Fill operations are used to make it easier for the host to place dynamic data in different locations on the screen. The /BLUE statement is only included here to show where data from the host will be displayed. Normally, the Data Fill statements would be a separate file from the rest of the screen.

```
'
LOAD FUNCTION KEY 1 WITH "B"
LOAD FUNCITON KEY 2 WITH "C"
```

These statements load function keys F1 and F2 with the characters "B" and "C" respectively.

Now That You've Started

This chapter outlined a number of the basic capabilities of the OIT. The rest of this guide and other documentation from GE Fanuc Automation expand on the information presented here:

- Chapter 3 of this guide, "Installation," describes the physical and electrical requirements of the OIT.
- Chapter 4, "Operation" describes menus and screens that the system provides, and outlines the steps you take to use the system.
- Chapter 5, "OptiSCREEN Statement Reference" completely describes the OptiSCREEN statements.
- The appendices found at the end of this guide contain information about the physical measurements of the OIT and the symbols available in the system.

Chapter 3 Installation

GE Fanuc Automation ships all Operator Interface Terminals (OITs) pre-tested and configured for the most popular modes of operation. To operate the OIT, you must mount the unit, supply AC power, and connect a serial communications cable. This section explains hardware installation of the OIT.

- How to physically mount the OIT.
- How to replace the battery and connect peripherals (such as a keyboard and communications cable) at the rear of the OIT..
- How to prepare the electrical connections for communication with the OIT.
- How you should set the switches and jumpers on the OIT logic board.

It also shows the locations for the adjustments of the CRT display.

In addition to requiring a compatible electrical interface between your OIT and the host or PLC system, you must also check the software configuration of the OIT for compatibility. More information about the software and its configuration appears in Chapter 4, "Operation."

Mounting the OIT

Install your OIT in a standard 19-inch industrial rack or in a special panel cutout for the unit. When properly mounted in a sealed enclosure, the OIT maintains its NEMA 4 and NEMA 12 ratings.

Refer to Appendix A for the required panel cutout and mounting holes for installing the OIT. The OIT uses 10-32 mounting studs. GE Fanuc supplies nuts with lock washers to accommodate panel mounting.

Caution

You must apply 35 inch/pounds (4 newton/meters) of torque to the mounting studs to maintain the NEMA 4 and NEMA 12 ratings for the OIT.

To avoid damaging the studs and the front panel, do not over-tighten the nuts on the mounting studs. This damage is not covered by the warranty.

You should keep the OIT box and packing materials so that you can use them if the unit ever needs to be shipped again.

Rear Panel Connections

The left rear of the OIT chassis contains all the connections you need during installation.

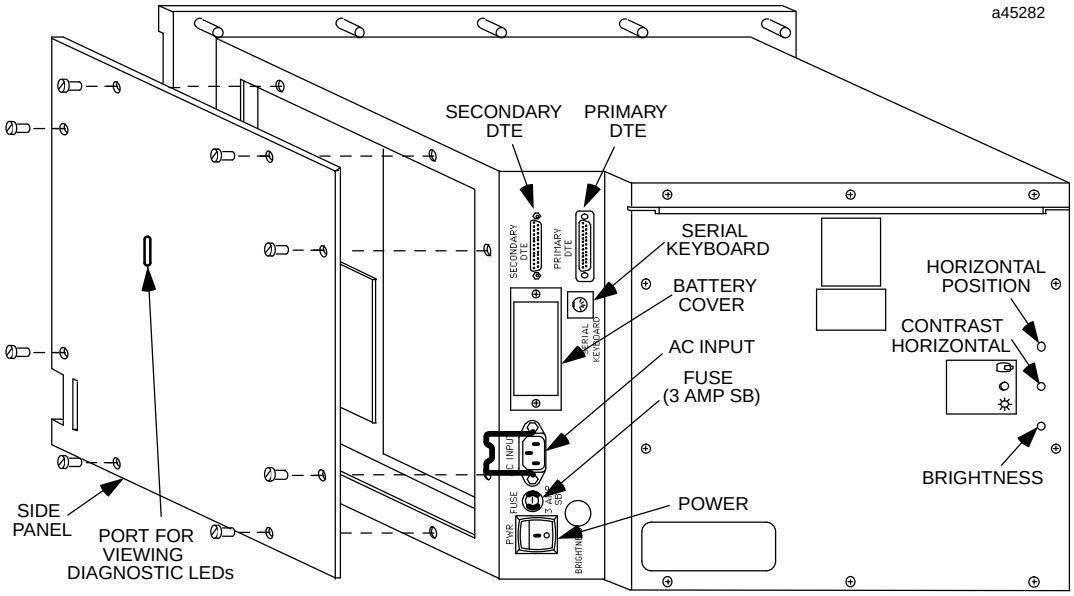


Figure 3-1. Rear View of the OIT

A description of each of the items shown here appears in this chapter.

AC Power

The OIT uses a 115 Vac to 230 Vac (50/60Hz) wide-ranging power supply; it consumes 110 watts. A standard EIA plug is provided with the OIT. You must supply the 3-wire AC power cord. The three terminals use the following designations.

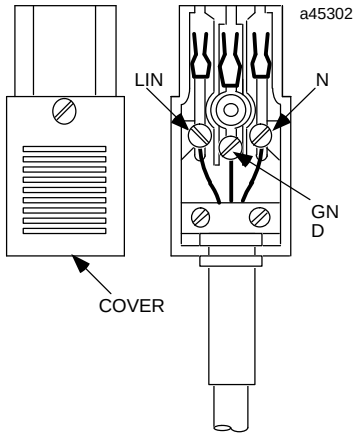


Figure 3-2. Wiring for AC Power

Battery Replacement

The OIT uses a lithium battery to power the built-in clock and calendar, and to maintain the user memory for screens and data files. The battery has a nominal shelf life of five years, and maintains the user memory for up to a year depending upon the amount of memory installed.

Warning

Lithium batteries cannot be recharged. Do not discard the lithium battery in fire. Do not short the battery. The battery may burn or release hazardous materials if damaged. Replace the battery with an identical lithium battery.

The battery assembly consists of a battery with a short cable and a mating connector.

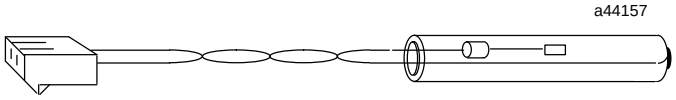


Figure 3-3. Battery Assembly

To replace a battery in the OIT, perform the following steps. You do not have to remove the OIT side panel to perform this operation:

1. Turn off the power to the OIT.
2. Remove the two screws which hold the battery coverplate on the back of the OIT.
3. Two clips hold the old battery to the back of the battery coverplate. Disconnect the old battery from the clips on the battery coverplate.
4. A pair of two-position connections exist inside the battery coverplate opening on the main logic board. The old battery is attached to one of the two-position connections.

   While the old battery remains attached, connect the new battery to the two unused battery connectors on the logic board. Be sure to use the notches on the battery connector to install the battery with the correct polarity. Assuming that the old battery retains some power, this "double battery" allows you to save any data in user memory.
5. Remove the old battery from the battery connector on the logic board.
6. Install the new battery in the clips on the battery coverplate.
7. Replace the battery coverplate on the back of the OIT.

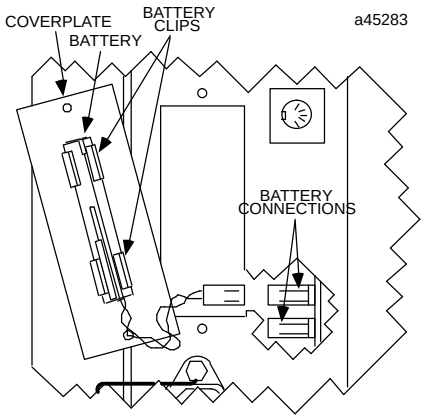


Figure 3-4. Connecting the Battery

Communication Interface

Your OIT communicates with your computer, programmable controller, or other host device through a serial interface at RS-232C, RS-422, or RS-485 signal levels. By default the OIT is configured for RS-232 communication. You can change this default by changing a jumper on the logic board as described later in this chapter in the section, "Setting the Configuration Switches".

The 25-pin, male, D-connectors on the rear of the unit conforms to RS-232C standards. These standards define an asynchronous serial interface, its impedances, and its physical connectors. RS-232C standards place all equipment into one of two general categories:

- DTE, or Data Terminal Equipment, includes most terminals, printers, and other peripherals. DTE devices are commonly called "data terminals."
- DCE, or Data Communications Equipment, includes many computers and modems. DCE devices are commonly called "data sets."

The differences between a data terminal and a data set emerge when referring to each device's input and output connectors, such as the signals labeled "transmitted data" and "received data."

A cable wired to a DTE at one end and to a DCE at the other end allows all necessary wires to match pin-for-pin at each end. When you connect a DTE device to another DTE device, or you connect a DCE to a DCE, you must cross one or more pairs of signals for proper operation:

The primary port and the secondary port are both configured as DTE ports with signals as shown below. Make sure that your host is either a DCE device or that the connecting cable makes the required signal pair crossovers.

With RS-232C operation, when you connect a DTE device to a DTE device, or a DCE device to a DCE device, the signals on pins 2 and 3 must be cross connected; for example, pin 2 at one device must be connected to pin 3 at the other. Any required handshaking signals must also be cross connected.

The RS-232 standard defines a number of signals in addition to transmitted and received data. Few devices require all signals to be used, and most require only a few signals. Refer to your host equipment manual for additional information about pins and required signals.

Port Connector Definitions

Definitions for the serial port connector appears below. An illustration of the 25-pin connector also appears for reference.

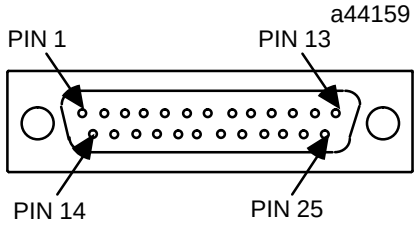


Figure 3-5. Primary and Secondary Port Using DB-25P Male Connector

Pin	Connection	Pin	Connection
1(a)	Protective(chassis)ground	14	TX (+), Data Out (+), SD(B), RS-422, also Data I/O (+) for RS-485
2	TXD, Data Out, RS-232C	15	TX (–), Data Out (–), SD(A), RS-422, also Data I/O (–) for RS-485
3	RXD, Data In, RS-232C	16	RX (+), Data In (+), RD(B), RS-422
4 (b)	RTS (Request To Send) output	17	RX (–), Data In (–), RD(A), RS-422
5 (c)	CTS (Clear To Send) input	18	no connection
6	no connection	19 (d)	Terminate RX, RS-422 and RS-485
7	Signal Ground	20 (e)	DTR (Data Terminal Ready) out
8	no connection	21 (d)	Terminate RX, RS-422 and RS-485
9	no connection	22	no connection
10	no connection	23	no connection
11	no connection	24	no connection
12	no connection	25	no connection
13	no connection		

Notes:

(a) Use the protective ground when a chassis ground is not available with the user equipment.

(b) Asserted when input buffer space available with hardware handshaking.

(c) Must be asserted to allow output if you use hardware handshaking.

CTS (pin 5) on the serial port is used for hardware handshaking during RS-232C operation. If the host equipment does not support the use of this signal and if software handshaking is not selected, then you must connect CTS (pin 5) to DTR (pin 20) at the OIT's connector.

(d) The Terminate RX signals (pins 19 and 21) must be connected to Data In signals (pins 16 and 17) for point-to-point operation or if this OIT is at the end of a multidrop line.

For RS-422 communication: connect pin 16 to pin 19
connect pin 17 to pin 21

For RS-485 communication: connect pin 14 to pin 19
connect pin 15 to pin 21

For RS-485 communication, the terminator depends on the configuration of the transmission line; refer to the RS-485 specification for proper cable termination. Also, a jumper on the logic board must be set for RS-422 or RS-485 communication.

(e) Asserted when OIT has power.

General Information about Handshaking

Communication devices, such as Terminals and BASIC PLC modules, use handshaking to coordinate the flow of two-way messages between two or more devices. Handshaking is necessary for two reasons:

- Handshaking prevents both devices from transmitting at the same time.
- Handshaking prevents one device from sending data faster than the other can receive it.

If you are using the OIT for display purposes only, then two-way communication never takes place and handshaking is less of an issue. But even with "display only" applications, many host computers can send data much faster than a Terminal can process it. Without handshaking, you can lose critical data because the host device keeps transmitting data, whether or not the Terminal can receive it.

The following definitions are necessary to understand handshaking.

Hardware handshaking	A method of handshaking that uses special dedicated signal lines to connect two devices.
Software handshaking	A method of handshaking that uses special transmitted characters to coordinate data transmissions. Software handshaking requires fewer signal lines for communication.
RTS - Request To Send	An output signal requesting permission to transmit data.
CTS - Clear To Send	An input signal giving permission to transmit data.
DTR - Data Terminal Ready	An output signal, usually a constant +5 V, sent as long as the equipment is energized.
DCD - Data Carrier Detect	An input signal. It is generally used in modem communication.
DSR - Data Set Ready	An input signal used to detect the presence of equipment at the other end of the line. It is generally used in modem communication.
TXD - Transmit Data	An output signal used for transmitted data. Typically, TXD is connected to RSD at the other end of an RS-232 cable.
RXD - Receive Data	An incoming signal used for received data. Typically, RSD is connected to TXD at the other end of an RS-232 cable.
RS-232C, RS-422, and RS-485 communications	Industry recommended standards for serial connections, serial communications, and signal characteristics. Since these are only recommended standards, many manufacturers do not follow all the standards, especially in regard to pin numbers.

Handshaking with RS-232C Signals

The OIT offers a 256-character input FIFO (first in, first out) buffer for receiving and holding characters until the OIT processes them. In some cases, the FIFO buffer is filled faster than the OIT processes the characters.

"Handshaking" allows the receiving device to direct the sending device to stop transmitting data so that the buffer does not overflow. Two modes of handshaking, software or hardware, can be selected through system configuration.

Software handshaking occurs as follows:

- When the FIFO buffer receives 192 characters, the OIT sends XOFF, or [Ctrl]-S, to the host computer as a message to stop transmitting. The system loses incoming characters only after the FIFO buffer receives 256 characters.
- When the OIT processes enough characters so that only 64 characters remain in the FIFO buffer, the OIT sends XON, or [Ctrl]-Q, to the host computer to indicate that it is ready to accept more characters.

You can enable or disable software handshaking with the Configuration menu. On initial power-up, the system defaults to hardware handshaking. After you select software handshaking, XON or XOFF codes from the host control the flow of data from the OIT.

The OIT handles hardware handshaking with the following signals:

- The OIT uses the RTS (Request To Send output) signal on pin 4 of the RS-232 interface to indicate when the FIFO buffer can accept additional characters.
- The host asserts the CTS (Clear To Send) signal on pin 5 before the OIT transmits any data.
- The OIT always asserts the DTR (Data Terminal Ready output) signal on pin 20 when power is on.

For either hardware or software handshaking, the host computer must be set up to handle the handshaking information. If the host computer does not support handshaking signals, set the OIT for hardware handshaking, and jumper the DTR output (pin 20) to the CTS input (pin 5) on the OIT. Then, the host ignores the RTS signal from the OIT. The OIT cannot control the flow of data from the host in this situation, so the application program must be written to ensure that the input buffer on the OIT does not overflow.

Handshaking with RS-422 Signals

The OIT does not support the hardware handshaking signals described above as equivalent RS-422 signals. With RS-422 signals, the OIT supports software handshaking when you select it. You should select hardware handshaking if the host supports no handshaking.

By default, jumpers E2 and E3 are configured for RS-232 communication. These two jumpers are described later in this chapter.

You can use RS-422 signals on one port, while you use RS-232 signals on the other port.

You must connect RS-422 receiver termination pins at the OIT when using it in a point-to-point configuration. In multidrop configurations, you must connect the termination pins at the OIT farthest from the host. You can use the OIT's internal termination resistors by connecting pin 16 to pin 19 and connecting pin 17 to pin 21.

Consult your host equipment supplier for additional information.

Cable and Connector Specifications

The following list provides the specifications for the construction of cables to connect the OIT to a host device:

- Cable connector to primary or secondary port: Female, D-subminiature type, Cannon DB-25S with DB110963-3 hood or equivalent (standard RS-232C connector).
- Maximum cable length: 50 feet (15 meters) for RS-232C; 4000 feet (1200 meters) for RS-422.
- Overall shield: Recommended. Tie the shield to the chassis ground at one end only. See the wiring diagrams below for more information.
- Minimum wire specification: 24 AWG.
- Cable recommendations: High quality, twisted pair cable (two twists per inch preferred) provides acceptable operation at data rates of up to 19.2K baud and distances of up to 4000 feet for RS-422 ports.

Refer to your application or device manual for additional information about connections to the host or peripherals.

When using the RS-422 port, you should match the twisted pairs so that both transmit signals make up one twisted pair and both receive signals make up the other twisted pair. If you ignore this crossover, cross talk affecting the performance of the communication system can result from the mismatching.

Caution

When routing communications cables outdoors, use transient suppression devices to reduce the possibility of damage due to lightning or static discharge.

Also, make sure that both the OIT and the host device to which the OIT is connected are grounded to a common point. Failure to provide a ground can result in serious damage to the equipment if the potential exceeds the isolation voltage rating of the equipment.

Typical Cable Wiring Configurations

This section contains cable wiring diagrams for the OIT.

- The diagrams do not cover all possible configurations; but by using the OIT port connector definitions and the manual for the DTE or DCE device connected to your OIT, you should be able to configure the cable for your application.
- All signals, with the exception of the protective ground, are optically isolated from the OIT internal logic. The primary and secondary ports are optically isolated from each other.

The diagrams appear below.

Primary Port to Series Six ASCII / BASIC Module Port 2)

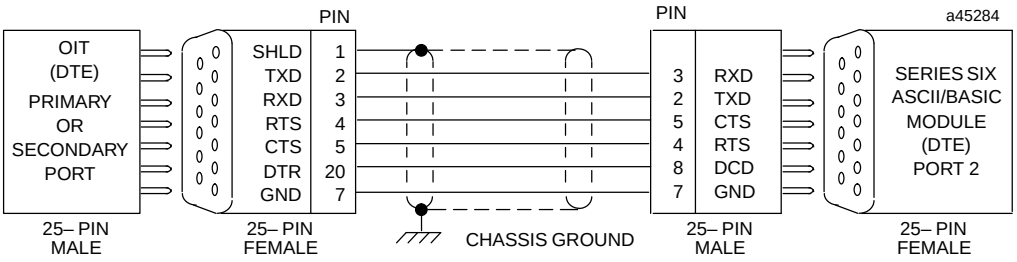
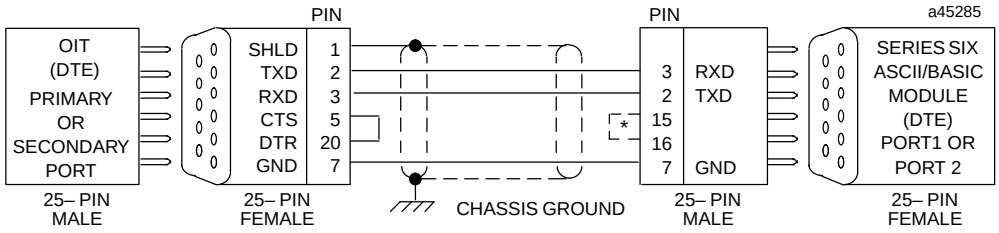


Figure 3-6. RS-232C Point-to-Point Communication with Handshaking (OIT Serial Port to Series Six ASCII/BASIC Module Port 1 or Port 2)



* IF PORT 1, MUST BE CONNECTED (SEE AS ASCII BASIC MANUAL)

Figure 3-7. RS-232C Point-to-Point Communication, No Handshaking (OIT Serial Port to Series Six ASCII/BASIC Module Port 1 or Port 2)

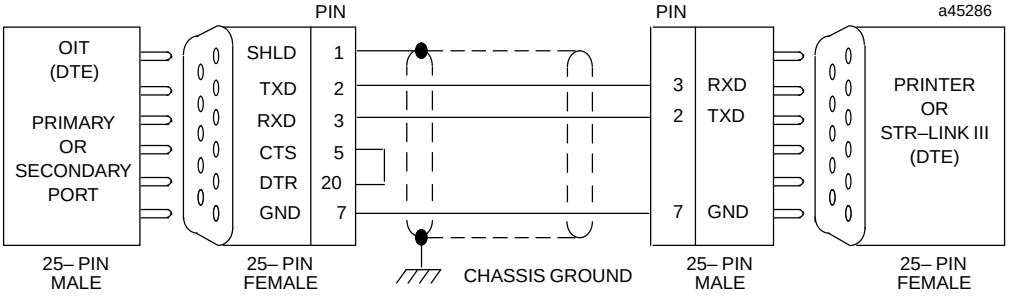


Figure 3-8. RS-232C Point-to-Point Communication (OIT Serial Port to Printer on STR-LINK III)

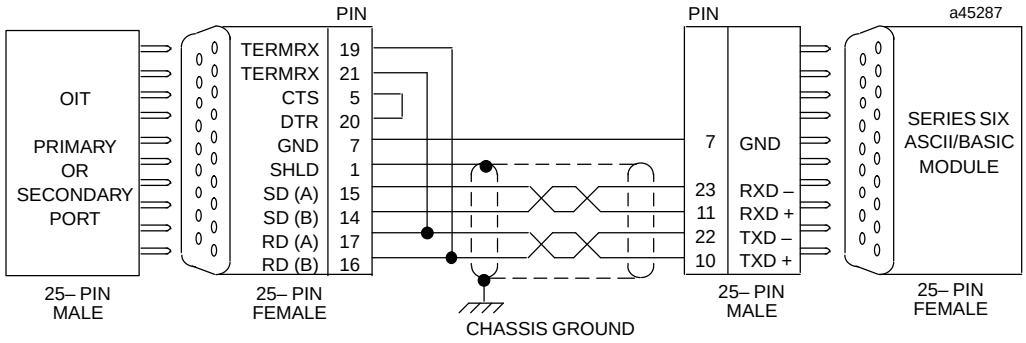


Figure 3-9. RS-422 Point-to-Point Communication (OIT Serial Port to Series Six ASCII/BASIC Module Port 1 or Port 2)

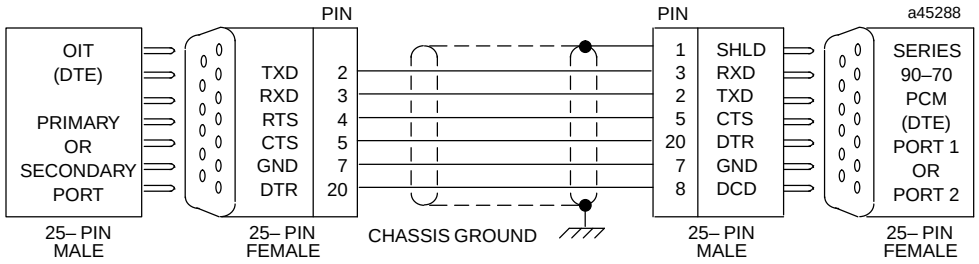


Figure 3-10. RS-232 Point-to-Point Communication with Handshaking (OIT Serial Port to Series 90-70 PCM Module Port 1 or Port 2)

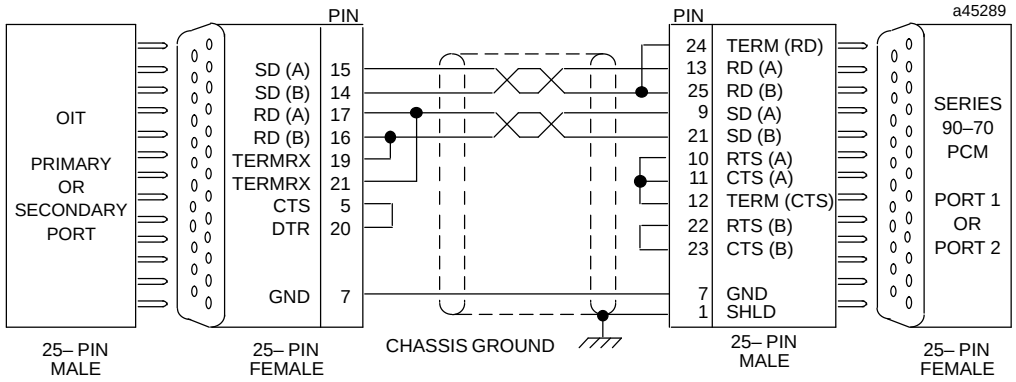


Figure 3-11. RS-422 Point-to-Point Communication with Handshaking (OIT Serial Port to Series 90-70 PCM Module Port 1 or Port 2)

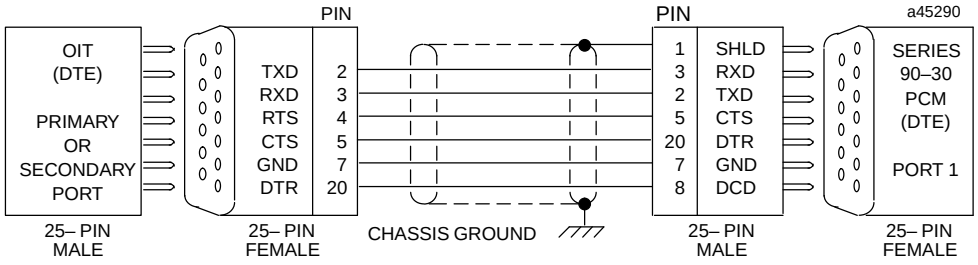


Figure 3-12. RS-232 Point-to-Point Communication with Handshaking (OIT Serial Port to Series 90-30 PCM Module Port 1)

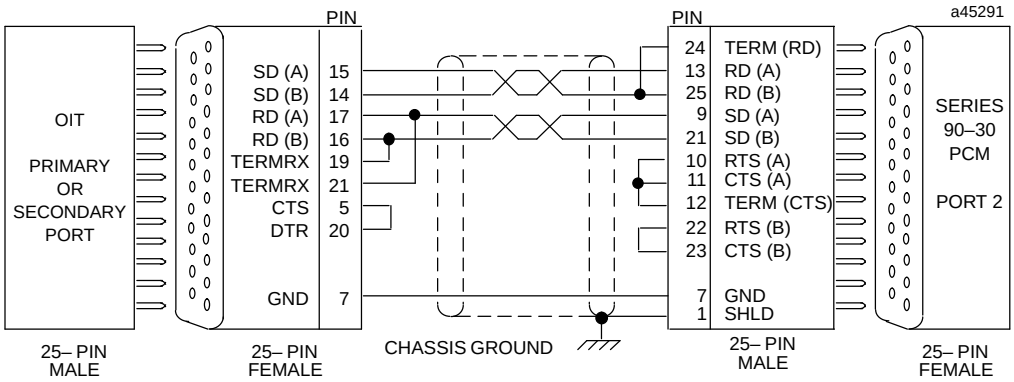


Figure 3-13. RS-422 Point-to-Point Communication (OIT Serial Port to Series 90-30 PCM Module Port 2)

Multidrop Operations

The OIT is designed with RS-422 interfaces so that a number of units can be linked on a multidrop line. Multidrop protocol messages are completely interrupt driven, reducing the delay between the end of the message and the time that the OIT places its transmitter in a high impedance state. This permits a host to poll a number of slaves with minimum delay between polls.

Configuring the OIT

Once you select *Multidrop* operation in the Configuration Menu, the system requires you to specify an address between 00 and 99. Although addresses may fall between 00 and 99, you are limited to a maximum of 16 slaves, depending on cable lengths, connection quality, and the communications baud rate. The 00 to 99 address identifies one of the 16 OITs for later operations. On power up, or when first selecting multidrop operation, the OIT automatically disables itself from receiving or transmitting data.

Software handshaking when selected from the Configuration menu uses the XON (or DC1) and XOFF (or DC3) codes to prevent transmission overruns. RS-422 multidrop operation requires this method since it does not offer RTS and CTS signals. Also, RS-422 multidrop operation does not allow the “message data” to use the DC1 or DC3 codes.

With *software* handshaking, *Echo* operation displays operator keystrokes on the screen immediately, even though the host has not yet received the data even though the host has not yet received the data. For special requirements, or when the polling of OITs takes place at high speeds, you can use *No Echo* operation. But the host must select *No Echo* mode by sending the OIT the appropriate escape sequence.

You also can select *hardware* handshaking. With the multidrop protocol, hardware handshaking operates the same as no handshaking, allowing you to use the protocol itself as a form of handshaking:

- When the system polls a slave, the slave transmitter is enabled from the time the system receives the address until the host receives the end of message code. If the host receives the end of message code while the slave is still transmitting, the system turns the slave transmitter off and the slave saves the remaining data in the output buffer. When the slave receives the next polling message, it continues the transmission.
- In a single poll, the slave can transmit the same approximate number of characters as the number of character frame times between the slave address and the end of message code. At a minimum, this time is the same as the number of characters transmitted as data from the host to the slave. The host may also designate a delay between sending the slave address and the end of message code.

After configuring the OIT with the communications specifications for your application, enter into *ONLINE* mode.

Wiring for RS-422 Communications

You should make sure that extra signals from the host equipment are not connected to RS-422 pins during RS-232C operation and, similarly, that extra signals from the host equipment are not connected to RS-232C pins during RS-422 operation.

When an OIT has not been selected during multidrop operation, its transmit signals are put in a high-impedance state. The host computer may require you to connect pull-up and pull-down resistors to its receive signals to avoid spurious data when no OIT has been selected for operation.

Support of RS-422 signals by a host device does not guarantee a multidrop configuration. The host must be able to drive the receiving circuitry of all connected devices. Moreover, to effectively support multiple OITs, the host software must be capable of polling and keeping track of communications with all the OITs in an orderly manner, and usually on a real-time basis. Consult the supplier of your host device for additional information.

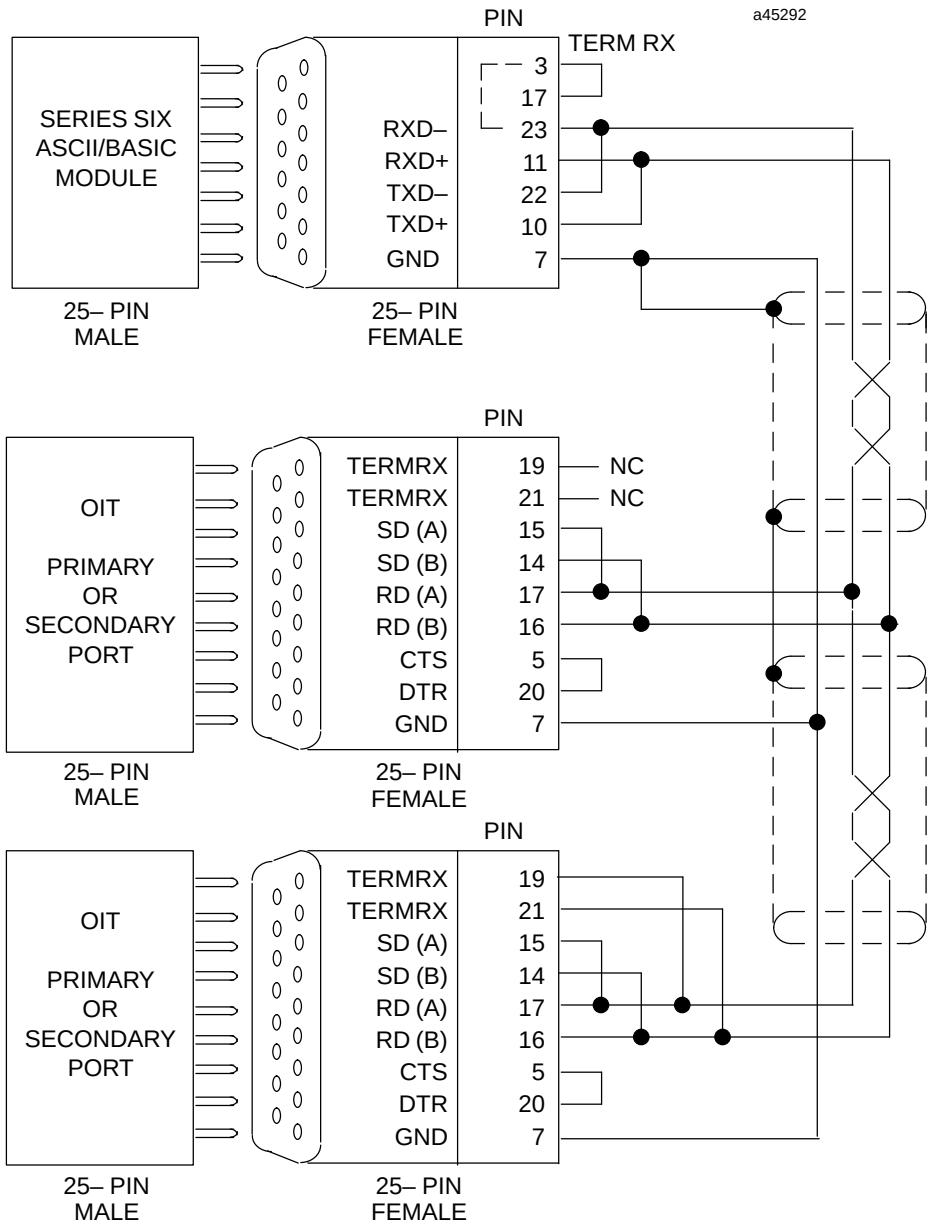


Figure 3-14. RS-422 Multidrop 2-Wire (OIT Serial Port to Series Six ASCII/BASIC Module)

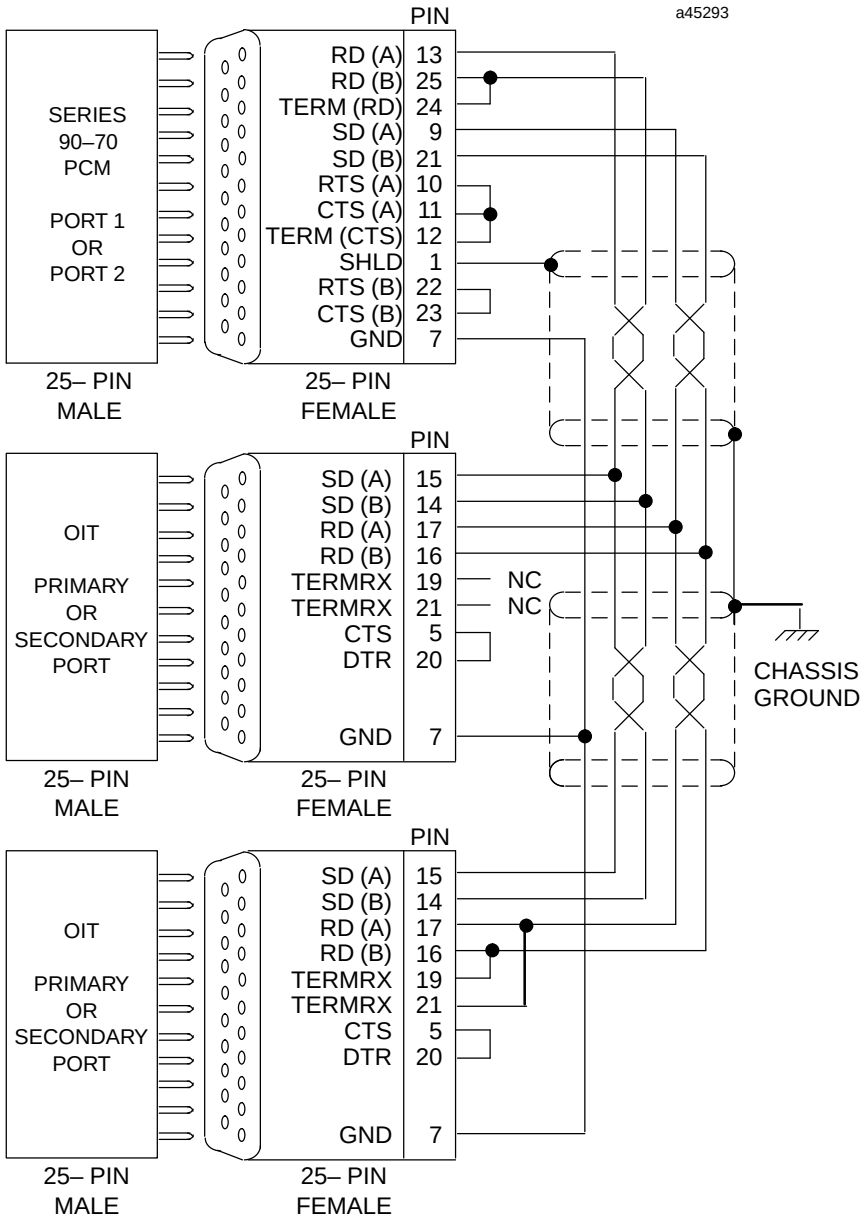


Figure 3-15. RS-422 Multidrop 4-Wire (OIT Serial Port to Series 90-70 PCM Module Port 1 or Port 2)

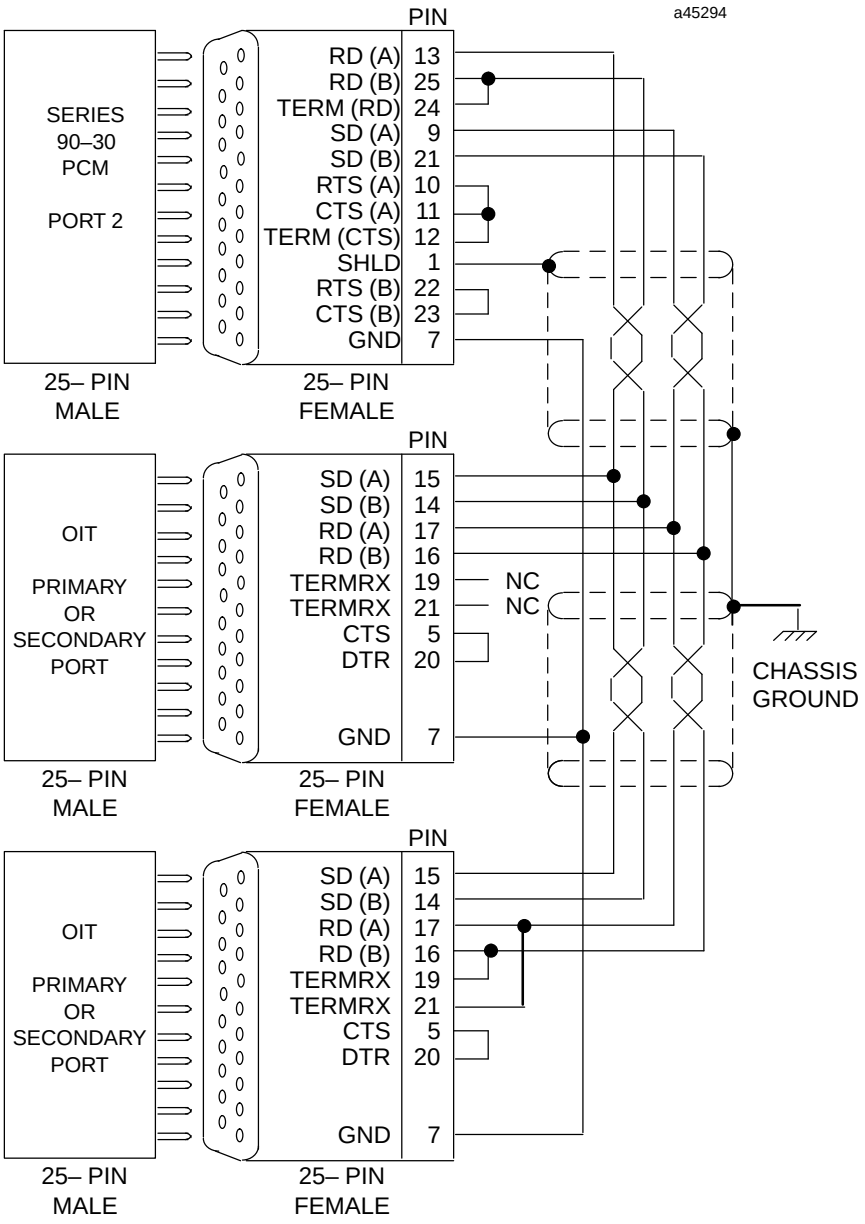


Figure 3-16. RS-422 Multidrop 4-Wire (OIT Serial Port or Secondary Port to Series 90-30 PCM Module Port 2)

RS-422 Communication with Pull-Up Resistors

Some terminal applications that connect an OIT to a host RS-422 device encounter junk characters displayed on the screen or misinterpreted escape codes. This problem occurs when the OIT receives spurious data during the interval when the host device releases the RS-422 transmit line. During this release interval, the receive input line is in a tri-state, or floating mode, that is highly susceptible to noise or cross-coupling signal pickup within the cable. Resolve this problem by adding two 10K resistors to the receive lines as shown below.

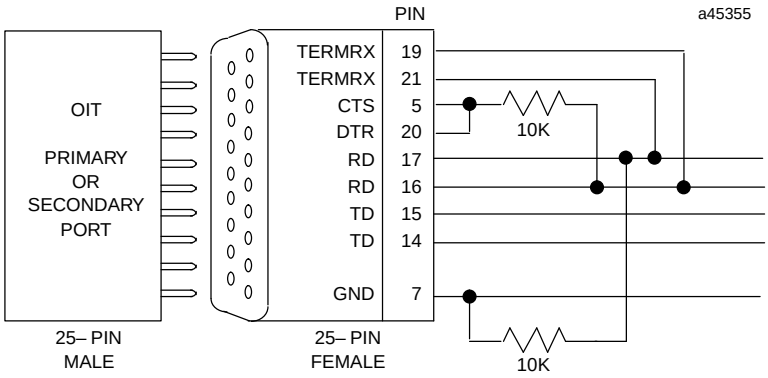


Figure 3-17. RS-422 Communication with Pull-Up Resistors

The resistors condition the receive input lines to an *off* state when the host is in a tri-state, or floating mode. The system uses the DTR signal for a positive voltage source for the pull-up resistor on the RD (+) line. Even with the 10 K resistors installed, it may be necessary to connect the terminating resistors at the "receive input" for long cables.

How Multidrop Operation Works

A typical sequence for a host device to poll a series of RS-422 slaves appears below:

1. To enable your OIT for both transmission and reception, the host sends [Ctrl]-P (Data Link Escape, or ASCII code 16) followed by the two digit address for the desired OIT. The address appears in standard ASCII format and uses two digits; for example, the system addresses OIT 5 as 05. For example, the host transmits the following ASCII codes:

   ```
   16 48 49
   ```

   ASCII code 16 is [Ctrl]-P. ASCII code 48 is 0. ASCII code 49 is 1. This sequence initiates communications with slave 1.

2. The system transmits the "message string" to the host. The system displays keyboard entries on the screen and stores them for subsequent transmission. The system stores a maximum of 256 characters before it loses data. Once you select an OIT, any keyboard entries being stored are automatically transmitted as the message string, and normal operation (as if point-to-point connection were in effect) takes place between the host and the OIT.

3. The host transmits a series of escape sequences to the slave.

4. The host can subsequently disable a OIT by sending [Ctrl]-W (End of Transmission Block, or ASCII code 23). For example, two-way communication continues until the hosts transmits the following ASCII code:

   ```
   23
   ```

   ASCII code 23 is [Ctrl]-W. This sequence ends communications with slave 1.

5. Continuing, the host transmits the following ASCII codes:

   ```
   16 48 50
   ```

ASCII code 16 is [Ctrl]-P. ASCII code 48 is 0. ASCII code 50 is 2. This sequence initiates communications with slave 2.

And so on, until all of the multidrop devices have been polled.

The system automatically enables an OIT with the address 00 to receive data addressed to any OIT, but the OIT is not enabled to transmit unless the host specifically transmits the 00 address. If the host transmits the address 00, all OITs are enabled to receive data, but only OIT 00 (if it exists) is enabled to transmit data.

Multiple OITs may use the same address, but only one OIT with the given address may be electrically connected to transmit data.

Similarly, more than one address may be enabled at the same time. Simply transmit the enabling code for an address (without an intervening [Ctrl]-W code), followed by the message string for the address; then transmit the enabling code for an address, followed by a message string, and so on. Again, however, only one OIT may be electrically connected for transmitting data.

The OIT uses the control codes for enabling and disabling ports in the same sequence as it does for all other commands and characters. Therefore, the system processes all commands and characters it receives before it executes a command to relinquish the multidrop link. Also, the host command to establish a new connection cannot be sent until the OIT relinquishes the previous connection. Therefore, you may be required to specify a delay between turning off one OIT and turning on another to prevent more than one OIT from operating simultaneously. The OIT holds up to 255 characters in its buffer and generally processes over 1000 characters per second; therefore, a 1/8th second delay (0.125 second) should be adequate unless you send a complex escape sequence, such as a screen display.

Setting the Configuration Switches

Eight configuration switches are accessed through a side panel on the back of the OIT. (See Figure 3-1 for location of the Side Panel.) Avoid unplugging the electrical harnesses from the power supply, the fan, or the video board. Note the location and orientation of any harnesses you do disconnect for reinstallation on the logic board.

Warning

High voltages are present in the OIT while power is connected, even after the OIT is turned off. Unplug the OIT before removing the side panel.

Caution

The electronic logic board is subject to damage by static electricity. Make sure that you are properly grounded before touching the logic board.

The default settings for the switches are shown below.

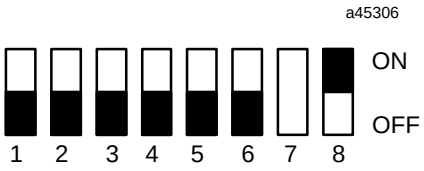


Figure 3-18. Default Switch Settings for the OIT

Switch 1 This switch sets the status for the manufacturing power-on diagnostics.

Setting	Description
On	Manufacturing diagnostics cycle enabled
Off	Manufacturing diagnostics cycle disabled (Default)

Switch 2 Vertical sync polarity.

Setting	Description
Off	Required

Switch 3 Horizontal sync polarity.

Setting	Description
Off	Required

Switch 4 This switch specifies the type of keyboard used with the OIT.

Setting	Description
On	IBM XT-compatible input
Off	IBM AT-compatible input (Default)

Switch 5 This switch specifies the action that the OIT takes after discovering an error during the diagnostic test cycling.

Setting	Description
On	Continues operation on test failure
Off	Halts operation on test failure and displays status code on diagnostic LEDs (Default)

Switch 6 This switch specifies whether or not a keystroke repeats when you hold down a key. The automatic keystroke repeat can be important for sealed-membrane and touch screen keyboard operation.

Setting	Description
On	Enables automatic keystroke repeating
Off	Disables automatic keystroke repeating (Default)

Switch 7 Not used.

Switch 8 Display type.

Setting	Description
On	Required

Interpreting the Diagnostic Status Codes

The eight diagnostic LEDs, located on the logic board (left of the switches SW2), provide information about the operation of your OIT. These LEDs may be viewed through a labeled slot in the side panel, without having to remove the side panel. The status codes are described below.

o indicates that the LED is illuminated.
– indicates that the LED is dark.

Seq. No	8 7 6 5 4 3 2 1	Description
0	o o o o o o o o	Power on, CPU not running; check U61, and CPU clock
1	o o o o o o o –	Trap, invalid code was executed
2	o o o o o o – o	CPU failed to initialize; check U35 and U61
3	o o o o o o – –	System RAM test failed; check SIMM U2 at 2000 to 3FFF
4	o o o o o – o o	Stack test failed; check U35, SIMM U2 at 2000 to 3FFF
5	o o o o o – o –	Access to code area A1 failed; check U61 at 4000
6	o o o o o – – o	Access to code area A2 failed; check U61 at 8000
7	o o o o o – – –	Access to code area A3 failed; check U61 at C000
8	o o o o – o o o	Access to code area A4 failed; check U61 at 10000
9	o o o o – o o –	Access to code area A5 failed; check U61 at 14000
10	o o o o – o – o	Access to code area A6 failed; check U61 at 18000
11	o o o o – o – –	Access to code area A7 failed; check U61 at 1C000
12	o o o o – – o o	Access to code area A8 failed; check U53 at 0000
13	o o o o – – o –	Access to code area A9 failed; check U53 at 4000
14	o o o o – – – o	Access to code area A10 failed; check U53 at 8000
15	o o o o – – – –	Access to code area A11 failed; check U53 at C000
16	o o o – o o o o	Access to code area A12 failed; check U53 at 10000
17	o o o – o o o –	Access to code area A13 failed; check U53 at 14000
18	o o o – o o – o	Access to code area A14 failed; check U53 at 18000
19	o o o – o o – –	Access to code area A15 failed; check U53 at 1C000
20	o o o – o – o o	Code check sum error; check U61
21	o o o – o – o –	Code check sum error; check U61
22	o o o – o – – o	Code check sum error; check U53
23	o o o – o – – –	Code check sum error; check U53
24	o o o – – o o o	Access to power–on diagnostic test failed
25	o o o – – o o –	RAM extension 1, all bits on; check SIMM U2 at 0000–1FFF
26	o o o – – o – o	RAM extension 1, address key; check SIMM U2 at 0000–1FFF
27	o o o – – o – –	RAM extension 1, all bits off; check SIMM U2 at 0000–1FFF
28	o o o – – – o o	RAM extension 1, all bits on; check SIMM U2 at 4000–7FFF
29	o o o – – – o –	RAM extension 1, address key; check SIMM U2 at 4000–7FFF
30	o o o – – – – o	RAM extension 2, all bits off; check SIMM U2 at 4000–7FFF
31	o o o – – – – –	ASCII 0 register tests; check CPU U35

40	o o – o – o o o	
41	o o – o – o o –	ASCII 1 register tests; check CPU U35
50	o o – – o o – o	
51	o o – – o o – –	CSIO register tests; check CPU U35
54	o o – – o – – o	
55	o o – – o – – –	Timer register tests; check CPU U35
64	o – o o o o o o	
65	o – o o o o o –	DMA register tests; check CPU U35
100	o – – o o – o o	
101	o – – o o – o –	Reserved for VDC register tests; check VDC U2
112	o – – – o o o o	
113	o – – – o o o –	Video memory, all bits on; check U17 and U27
114	o – – – o o – o	Video memory, address key; check U17 and U27
115	o – – – o o – –	Video memory, all bits off; check U17 and U27
116	o – – – o – o o	Character set memory, all bits on, check U32
117	o – – – o – o –	Character set memory, address key; check U32
118	o – – – o – – o	Character set memory, all bits off; check U32
119	o – – – o – – –	unused
128	o – – – – – – –	OIT running, all systems normal

Logic Board Jumpers

Jumpers on the OIT specify the appearance of the screen and RS-232, RS-422, and RS-485 communications for the two serial ports.

The jumpers are located on the logic board. Refer to the instructions on accessing the logic board in the section , “Setting the Configuration Switches,” earlier in this chapter.

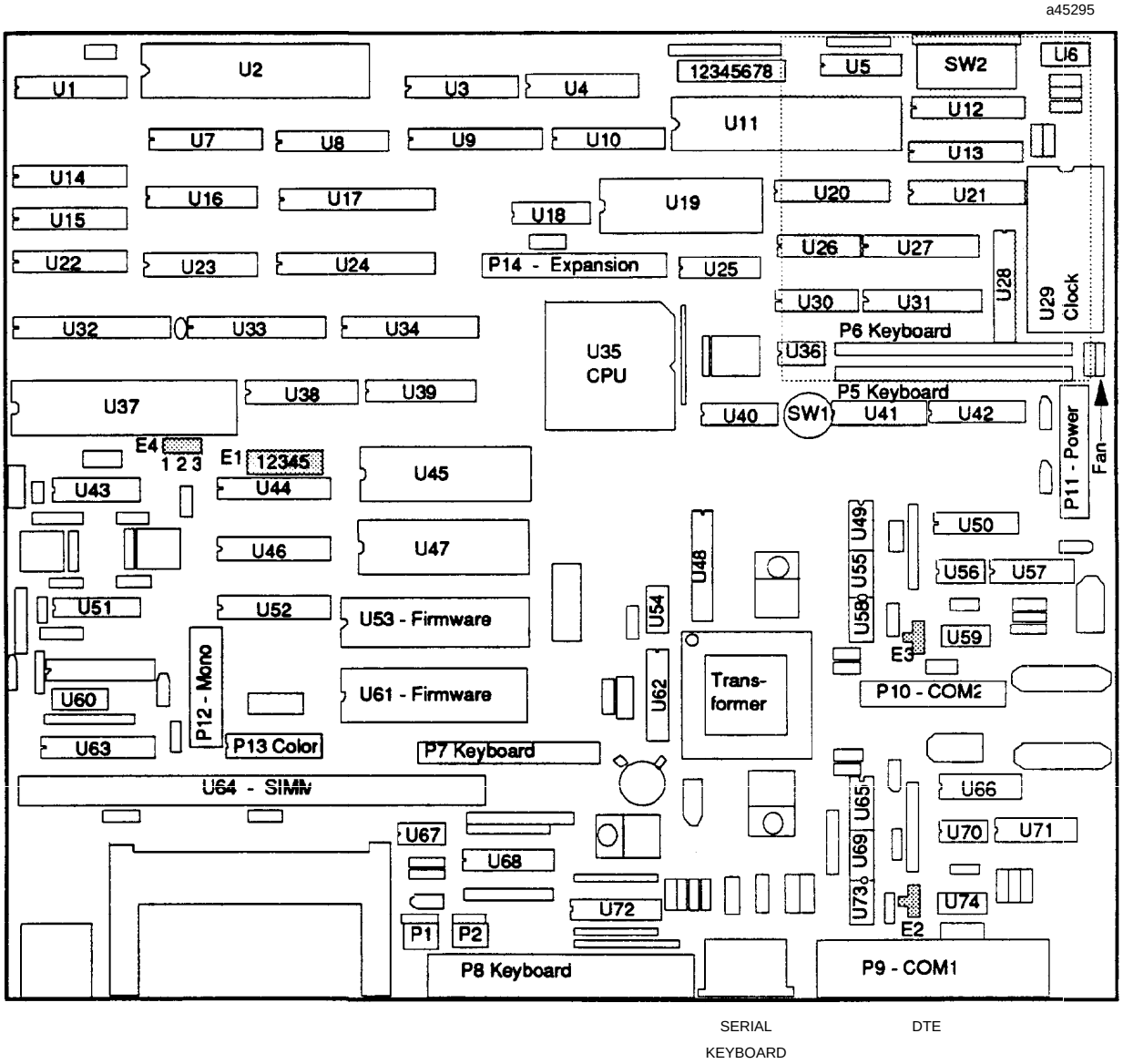


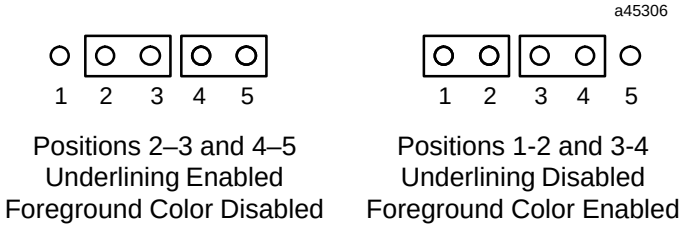
Figure 3-19. Logic Board-Memory Chip Location

All jumpers are configured for proper operation when shipped. You are responsible for verifying the jumper configuration when you change the configuration of the OIT, or when you install a new logic board.

The following table shows the jumper configuration and descriptions for the jumper locations on the logic board.

Jumper E1 Jumper E1 specifies underlining and enables or disables the foreground color. To display a concave or convex box, however, you must disable underlining.

Jumper	Description
2-3 and 4-5	Underlining enabled, foreground color disabled.
1-2 and 3-4	Underlining disabled, foreground color enabled (Default).

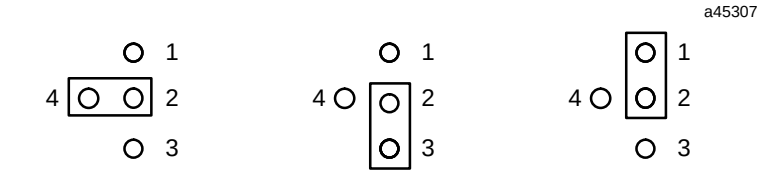


Positions 2–3 and 4–5
Underlining Enabled
Foreground Color Disabled

Positions 1-2 and 3-4
Underlining Disabled
Foreground Color Enabled

Jumper E2 Jumper E2 specifies the signal levels for communication channel #1.

Jumper	Description
2-4	RS-232 hardware enabled
2-3	RS-422 hardware enabled (Default)
1-2	RS-485 hardware enabled



Positions 2–4
RS–232 Operation

Positions 2–3
RS–422 Operatio

Positions 1–2
RS-485 Operation

Note

With jumper E2 in the 2-3 position to enable RS-422 operation, RS-232 can still be used on the primary port (port 1) by selecting it in the configuration menu. This jumper only needs to be modified to enable RS-485 operation. Placing the jumper in the 2-4 position to enable RS-232 operation disables both RS-422 and RS-485 operation.

JumperE3 Jumper E3 specifies the signal levels for communication channel #2.

Jumper	Description
2-4	RS-232 hardware enabled
2-3	RS-422 hardware enabled (Default)
1-2	RS-485 hardware enabled

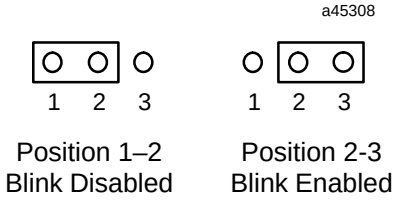
The E3 jumpers use the same positions as those shown under the "Jumper 2" heading.

Note

With jumper E3 in the 2-3 position to enable RS-422 operation, RS-232 can still be used on the secondary port (port 2) by selecting it in the configuration menu. This jumper only needs to be modified to enable RS-485 operation. Placing the jumper in the 2-4 position to enable RS-232 operation disables both RS-422 and RS-485 operation.

JumperE4 Jumper E4 specifies the software blink function.

Jumper	Description
1-2	Blink disabled, super characters enabled
2-3	Blink enabled, super characters disabled (Default)



The E4 jumper determines the BLINK or SUPER operation of the OIT with the OptiSCREEN system. Use the drawing of the logic board to locate the E4 jumper which appears near the E1 jumper and the U45 firmware slot.

If you enable the BLINK character set with the E4 jumper, you can specify "blinking" as the current character attribute with the OptiSCREEN BLINK statement. You cannot, however, specify "super" characters with the SUPER statement.

The BLINK and SUPER statements perform identical operations. The OIT uses the jumper setting to determine which operation is appropriate. With the BLINK function, the OIT loads the same character set into both the non-super and super character areas.

Information About the Logic Board

The switch labeled SW1 is the power reset switch. The switches labeled SW2 are the bottom-mounted configuration switches.

The clock chip is labeled U29.

The connectors on the logic board perform the functions listed below:

Label	Connection
P1	Battery
P2	Battery
P3	not used
P4	not used
P5	not used
P6	35-position integral keyboard
P7	not used
P8	Parallel keyboard
P9	COM1 (Primary DTE)
P10	COM2 (Secondary DTE)
P11	Power (Pin 1 is red on the logic board. Pin 1 is blue on the power supply.)
P12	not used
P13	Color interface connector (Note key plug)
P14	not used
P15	not used

CRT Adjustment

Adjustments for Horizontal Position, Contrast and Brightness are accessible through labeled access holes in the rear of the unit. (See Figure 3-1.) A knowledgeable user may use a flat-bladed screwdriver to reach inside the OIT to adjust these settings as required.

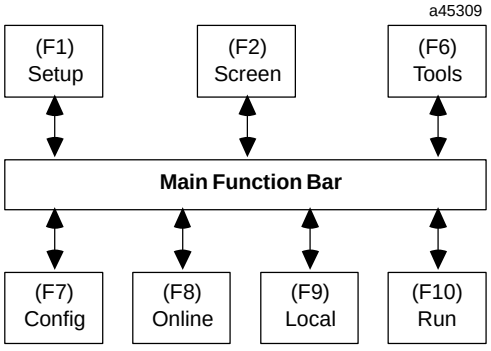
Warning

Due to the dangerous voltages present within the OIT, adjustment of these controls should only be performed by qualified personnel.

Chapter 4 Operation

This chapter outlines the system available for entering the OptiSCREEN editors, configuring the system, and transferring screens and files to and from a host with the menu–driven system. The menu–driven system also gives directory listings of screens and files, and displays variables and their values. With a full–travel keyboard attached to the OIT, these capabilities increase the ease–of–use and speed of development for applications by providing the following features:

- The system displays valid function keys in the function bar at the bottom of the screen. You press one of the [F1] through [F10] function keys to make your selection. After you press the key, the system displays another menu, offers a list of screens or files to choose from, or executes an operation:
  - When the system displays another menu, you press another function key to make another selection.
  - When the system offers a list of screens or files, you use the cursor control keys (the "arrow keys" labeled ↑, ↓, ←, and → on the keypad) to highlight a screen or file and then press the appropriate function key to select the operation you want to perform.
  - When the system executes an operation, it completes the process and then returns you to the appropriate menu or screen so that you can continue working.
- To move between the choices displayed on the main function bar, you must always return to the main function bar before selecting another choice. The following diagram shows the relationship of the various menu choices



- You can return to the main function bar from almost any point in the system by pressing the [Ctrl]– [1] combination of keys. Also, most menus allow you to "back out" of the menu by pressing one or more function keys. In many cases, you can simply press the [F1] function key to return to the main function bar.

- On color models function keys that appear in red in the function bar at the bottom of the screen represent the most powerful and important choices on the menu. Functions keys that appear in blue represent helpful and convenience–oriented choices on the menu. For example, the [F1] MAIN function key appears in red in the function bar at the bottom of the screen when you can press it to return to the main function bar.
- The menu–driven system makes it easy for you to move between different kinds of screens and files. The red [F1] MAIN menu item usually returns you to the main function bar. From that menu you can select a variety of operations. When you return to the menu item that you were working with before you entered the main menu, the screen or the file that you were working with automatically appears with the cursor exactly where you left it.
- In general, the system makes the entry of all screen and file names as simple as possible. If the name of the screen or file does not appear in a selection screen (for example, when you create a file with a new name), you must enter the name yourself. Uppercase and lowercase letters do not matter in this case. For editing convenience, you can use the [Backspace] key to erase the last letter or letters in the name of an existing file.
- In most cases the same item falls in the same place on different menus. For example, the MAIN menu item appears with the [F1] function key in most menus. The SAVE menu item (if it exists) appears with the [F5] function key. This helps you remember the operation of the various function keys and makes the firmware easier to use.
- If you do not make a valid menu item selection or make a valid entry for a prompt, the system does not make any changes by default.

This chapter describes the GE Fanuc Automation family of OITs. Some capabilities, such as the color CRT, may or may not be available on your OIT.

Turning the OIT On

The power on / off switch is located at the rear of the OIT. Whenever you turn the unit on, allow the CRT about 30 seconds to warm up. The OIT first performs self–diagnostics. Tests include verification that all system memory is working, that the various peripheral circuits function, and that the battery is working properly. If all tests pass, the OIT automatically enters the Main Menu or executes the application previously specified to run at power–up. If any test or tests fail, the system displays a message indicating the type of failure or failures.

If the battery voltage falls below a certain level, the “Battery Problem” message is displayed as a warning to replace the battery. The first time this happens, a limited amount of battery life may remain. To keep from losing the memory, do not remove the old battery assembly until you connect the new assembly.

If you have not installed the battery, the OIT fails the battery test, indicating a diagnotic error.

If all the tests pass, the OIT automatically enters the Main Menu or executes the application previously specified to run at power–up. If the above test fails, you may press any key to continue to the Main Menu or execute the application specified to run at power–up.

The Main Menu – The Main Function Bar

Within the menu system, the main function menu and main function bar appear first; for example:

```
 MAIN FUNCTIONS

F1 SETUP – Setup Workstation for      F6 TOOLS – Transfer files to/from
           power–up operation,                 cartridge or host,
           run demo program                    maintain int. files

F2 SCREEN– Create or edit             F7 CONFIG– Configure serial
           graphic screen files                ports, execute
                                               diagnostic tests

F3                                    F8 ONLINE– Enter Online
                                                 Terminal Mode

F4                                    F9 LOCAL – Enter Local
                                                 Terminal Mode

F5                                    F10 RUN  – Run Mode selected from
                                                 Setup

 F1     F2     F3     F4     F5      F6     F7      F8      F9   F10
SETUP  SCREEN                      TOOLS  CONFIG  ONLINE   LOCAL RUN

 Power–up Status:  MAIN MENU                      01JUN93  09:00:00
```

The menu choices, with a summary of what each does, appear below:

[F1] SETUP – Specifies the status of the OIT when you power–up the OIT or press the [F10] RUN key while using the system.

[F2] SCREEN – Enters the OptiSCREEN screen editor so that you can create or edit a screen.

[F6] TOOLS – Enters the utility menu so that you can transfer screens, files, and data to and from an IBM–compatible host. This item also performs housekeeping operations on internal files.

[F7] CONFIG – Specifies the serial communications parameters, ports, and diagnostic tests for the OIT.

[F8] ONLINE – Specifies that the system enters the Online mode for communication.

[F9] LOCAL – Specifies that the system enters the Local mode for testing and operation.

[F10] RUN – Executes the application named on the power–up status line at the bottom of the screen. Specify the application with the [F1] SETUP menu item from the main menu.

Each of these menu items leads you to another menu or set of selections. The menus and selections appear below.

The SETUP Menu – [F1] from the Main Function Bar

This menu specifies the application or status to be executed or displayed when you power–up the system or when you press the [F10] RUN key from within the system. This menu displays the current setting of the SETUP item at the top of the menu and in the power–up status line at the bottom of the screen; for example:

```
   SETUP

Workstation Power-up Status:

        MAIN MENU

 1 - Display Main Menu                          PRESS F10
                                                TO RUN NOW
 2 - Enter ONLINE Operation

 3 - Enter LOCAL Operation

 F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
MAIN                                                                    RUN
FUNC
 Power-up Status:  MAIN MENU
```

The menu choices, with a summary of what each does, appear below:

[F1] MAIN FUNC – Returns to the main function bar so that you can make another menu selection.

[F10] RUN – Executes the selected Power–Up status.

The Screen Menu – [F2] from the Main Function Bar

This menu enters the OptiSCREEN screen file editor so that you can create or edit a screen. The system displays a directory of OptiSCREEN files and prompts you to “Select file” from the list; for example:

```
   SCREEN FILE - DIRECTORY

FILE1          FILE2          QUARTZ         FILE4
FILE5          OPAL           FILE7          FLINT
FILE9          FILE10         GARNET         FILE12
FILE13         FILE14         FILE15         FILE16
FILE17


SELECT FILE:  QUARTZ

 F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
MAIN   SYNTAX   EDIT    SHOW          RENAME   COPY   DELETE           RUN
FUNC                                   FILE    FILE    FILE
 Power-up Status:  MAIN MENU
```

Use the cursor control keys to move through the OptiSCREEN names and highlight the screen you want to work with before you press one of the function keys described

below. The system displays the first line comment, or "description", of the file at the top of the screen above the directory of file names. To create a new file, use the [Backspace] key to delete one or more characters of the current screen name and enter the name of the new file in response to the "Select file" prompt. The file that you select or enter is called the "current file."

The menu choices, with a summary of what each does, are described below:

[F1] MAIN FUNC – Returns you to the main function bar so that you can make another menu selection. When you return to this SCREEN menu, the system recalls the screen on which you were working when you pressed the [F1] MAIN menu selection.

[F2] SYNTAX – Displays, in alphabetic order, the statement and parameter syntax for all of the OptiSCREEN statements. Use the [↑] and [↓] cursor control keys to move through the list of statements. Press one of the following function keys to exit the syntax list:

[F1] MAIN FUNC – Returns to the main function bar so that you can make another menu selection.

[F3] EDIT FILE – Returns to the current OptiSCREEN screen file for further editing of the file.

[F10] DIR – Returns to the OptiSCREEN screen file directory so that you can create or select another screen.

[F3] EDIT – Places you in the OptiSCREEN EDIT menu so that you can edit the current screen file; for example

```
'Text for "Blower ON"

MOVE TO 10, 10
DOUBLE WIDE
DISPLAY "Blower ON"
MOVE TO 11, 32
BOX 3 x 4



 F1      F2     F3     F4      F5      F6     F7      F8      F9      F10
MAIN    STEP   HELP   SHOW    SAVE           UNDO   DELETE  INSERT   DIR
FUNC                           FILE         CHNGES   LINE    LINE
 EDITING:  MYFILE2
```

The menu choices, with a summary of what each does, appear below. Each of the choices operates on the current screen file (named at the bottom of the screen) which you selected from the directory or entered in response to the "Select file" prompt:

[F1] MAIN FUNC – Saves the current screen file and returns the main function bar so that you can make another menu selection. When you return to the SCREEN menu, the system recalls the screen on which you were working when you pressed the [F1] MAIN FUNC menu selection.

[F2] STEP – Graphically displays statements in the current screen file from the top of the file to the line where your cursor currently rests. By pressing the [↓] cursor key, the system graphically executes the next line in the file. By repeatedly pressing the [↓] cursor key, you can work through the file line–by–line, statement–by–statement. After viewing the results of the screen file, press any function key to return to the screen file for further editing.

[F3] HELP– Toggles between *HELP* and *NOHELP* settings. The system starts with the *HELP* setting so that if you enter the first characters of a statement and then pause before completing it, the system displays a help screen that outlines the syntax for the statements that begin with the letters you've entered. If you press the [F3] to select the *NOHELP* setting, the system disables the help screen feature.

[F4] SHOW – Displays the entire graphic output of the current screen file. After viewing the results of the screen file, press any key to return to the screen file for further editing.

[F5] SAVE FILE – Saves the current screen file. After informing you that the file has been saved, the [F5] SAVE FILE function key allows you to continue editing the current screen file.

[F7] UNDO CHNGES – Exits the current version of the screen file without saving any changes that you made to it and returns you to the last saved version of the current screen file for further editing.

[F8] DELETE LINE – Deletes the current line. The [Ctrl]– [Del] key combination also deletes the current line.

[F9] INSERT LINE – Inserts a line at the current location. The [Ctrl]– [Ins] key combination also inserts a line at the current location.

[F10] DIR – Saves the current screen file and returns you to the OptiSCREEN screen file directory so that you can create or edit a screen.

[F4] SHOW – Displays the entire graphic output of the current screen file. Press any key to exit the display and return to the OptiSCREEN screen file directory to select or create a new screen file.

[F6] RENAME FILE – Prompts you to enter the new name for the current screen file.

[F7] COPY FILE – Prompts you to enter the name of the file to which you want to copy the current screen file. If it does not already exist, the system automatically creates the file that you name for the copy.

[F8] DELETE FILE – Deletes the current screen file. The system queries you to make sure that you have selected the appropriate file before deleting it.

[F10] RUN – Executes the mode displayed on the status line at the bottom of the screen. Specify the mode with the [F1] SETUP menu from the main menu.

The Tools Menu – [F6] from the Main Function Bar

The Tools Menu allows you to transfer screens, files, and data to and from an IBM–compatible host. After you make this selection, the system displays the following menu:

```
     TOOLS

    FILENAME                TYPE   SIZE   TITLE VALUE      LOCATION     S  P

  1 FASTDISPLAY             SCREEN  322   SCREEN ONE       INT 1:D5DB
  2 SLOWDISPLAY             SCREEN  310   SCREEN TWO       INT 1:C22F
  3 RETURNDISPLAY           SCREEN  215   SCREEN THREE     INT 2:BD33
  4 RETURNDISPLAY       BAK SCREEN  215   SCREEN THREE     INT 2:C260
  5 DEFAULTDISPLAY          SCREEN  280   SCREEN FOUR      INT 1:C300


 F1     F2      F3      F4      F5      F6      F7      F8      F9     F10
MAIN   FILE    FILE    USER    CART   SW SEC  DEFRAG          OPTI   RUN
FUNC   TYPES  SERVIC  ROMING   RIDGE  URITY    MENT           TALK
 Power-up Status:  DISPLAY MAIN MENU
```

The menu choices, with a summary of what each does, are described below:

[F1] MAIN FUNCTION – Returns to the Main Function Bar so that you can make another menu selection.

[F2] FILE TYPES – Places you in the Types Menu of the Tools Menu so that you can select OptiSCREEN screen files, system files, variables, or all types of files and variables; for example:

```
    TOOLS - Select File Type

  FILENAME              TYPE   SIZE   TITLE VALUE      LOCATION     S  P

1 CHIPCONVEYER1         SCREEN  322   SCREEN ONE       INT 1:D5DB
2 CHIPCONVEYER2         SCREEN  310   SCREEN TWO       INT 1:C22F
3 CHIPCONVEYER3         SCREEN  215   SCREEN THREE     INT 2:BD33
4 CHIPCONVEYER4         SCREEN  280   SCREEN FOUR      INT 1:C300


 F1      F2      F3      F4      F5      F6      F7     F8     F9     F10
MAIN   SCREEN          SYSTEM          VARS    ALL   ORG/BK  DFAULT EXIT
FUNC                                                                MENU
 Power-up Status:  DISPLAY MAIN MENU
```

The menu choices, with a summary of what each does, are described below:

[F1] MAIN FUNCTION – Returns to the Main Function Bar so that you can make another menu selection.

[F2] SCREEN – Displays a list of OptiSCREEN screen files available on the system. After you make this selection, the system highlights the [F2] SCREEN key in the function bar at the bottom of the screen.

[F4] SYSTEM – Displays a list of system files, such as configuration settings, available on the system. After you make this selection, the system highlights the [F4] SYSTEM key in the function bar at the bottom of the screen.

[F7] ALL – Displays a list of OptiSCREEN screen files, system files, and variables and their values. After you make this selection, the system highlights the [F7] ALL key in the function bar at the bottom of the screen.

[F8]ORIGINAL / BACKUP – Moves, or rotates, among original, backup, and both original and backup files for the currently selected *types* available on the system. After you make this selection, the system highlights *ORG* when displaying original files only, *BK* when displaying backup files only, or *ORG/BK* when displaying both the original and backup files. This menu selection works in conjunction with the [F2] SCREEN function through the [F7] ALL function.

[F9] DEFAULT – Defines all application files for selection. Application files include OptiSCREEN screen files, user–defined data files, and COM communication files; application files do not include system files. After you make this selection, the system highlights the [F9] DEFAULT key in the function bar at the bottom of the screen.

[F10] EXIT MENU – Returns you to the top level of the Tools Menu.

[F3] FILE SERVICE – Renames a file, copies a file, deletes one or more files, and defines where a file is created or where the file may be moved. The two paths for files include

internal memory (for on–board memory chips) and external memory (for a memory cartridge).

```
    Tools – File Service
FILENAME            TYPE   SIZE   TITLE VALUE        LOCATION      S  P
_____________________________________________________________________

1 QUARTZ            SCREEN   12   SCREEN ONE         INT 1:2026
2 GYPSUM            SCREEN  130   SCREEN TWO         INT 1:1036
3 SHALE             SCREEN  215   SCREEN THREE       INT 2:50D2    P  E
4 BAUXITE           SCREEN   28   SCREEN FOUR        INT 1:0300    P  I



_____________________________________________________________________
 F1      F2      F3      F4     F5      F6      F7      F8     F9    F10
MAIN   RENAME   MARK    MARK   COPY   DELETE   ANY     INT    EXT   EXIT
FUNC    FILE   A FILE   ALL    FILE   FILES    PATH    PATH   PATH  MENU
 Power–up Status:  DISPLAY MAIN MENU
```

The menu choices, with a summary of what each does, are described below:

[F1] MAIN FUNCTION – Returns you to the Main Function Bar so that you can make another menu selection.

[F2] RENAME A FILE – Prompts you to enter the new name for the currently selected file.

[F3] MARK A FILE – Marks, or flags, one or more files that you want to rename, copy, delete, or apply a path to.

[F4] MARK ALL – Marks, or flags, all of the files to delete or apply a path to.

[F5] COPY FILE – Prompts you to enter the name of the file to which you want to copy the currently selected file. If it does not already exist, the system automatically creates the file that you name for the copy.

[F6] DELETE FILE – Deletes one or more marked files. This menu selection prompts you to make sure that you have chosen the correct file or files to delete.

[F7] ANY PATH – Removes any memory location specification for all currently selected files. This function allows all selected files to be stored in either internal memory or external memory. After you press this function key, the system leaves the file in its current location and removes any *I* or *E* from the path column of the directory for the file.

[F8] INTERNAL PATH – Specifies the memory location for all currently selected files as internal memory only. This function ensures that all selected files are stored in on–board memory chips. After you press this function key, the system moves the file from external memory to internal memory, if necessary, and marks the path column of the directory with an *I* to show the path for the file.

[F9] EXTERNAL PATH – This function is not supported. Specifies the memory location for all currently selected files as external memory only. This function ensures that all selected files are stored in the removable memory cartridge. After you press this function key, the system moves the file from internal memory to external memory, if necessary, and marks the path column of the directory with an *E* to show the path for the file.

[F10] EXIT MENU – Returns you to the top level of the Tools Menu.

[F4] USER ROMMING – Stores an application in ROM in either 128K or 256K byte one–time programmable cartridges, or in 128K byte EPROM chips. Storing an

application in ROM produces a cartridge or chips which you install in an OIT to ensure that an application is permanent and secure against unexpected or deliberate changes.

```
   Tools – User Application ROMing
FILENAME            TYPE   SIZE   TITLE VALUE        LOCATION      S  P
_____________________________________________________________________

1 QUARTZ            SCREEN   12   SCREEN ONE         INT 1:2026
2 GYPSUM            SCREEN  130   SCREEN TWO         INT 1:1036
3 SHALE             SCREEN  215   SCREEN THREE       INT 2:50D2    P  E
4 BAUXITE           SCREEN   28   SCREEN FOUR        INT 1:0300    P  I




_____________________________________________________________________
 F1     F2      F3      F4      F5      F6      F7      F8      F9    F10
MAIN   BAUD    KIND    BANKS   SEND    SEND    DEFRAG          PORT  EXIT
FUNC   9600    OPTALK  0 TO 3  ROM 47  ROM 45  MENT             1    MENU
 Power–up Status:  DISPLAY MAIN MENU
```

The menu choices, with a summary of what each does, are described below:

[F1] MAIN FUNCTION – Returns you to the Main Function Bar so that you can make another menu selection.

[F2] BAUD – Moves, or rotates, through the list of baud rates that appears below the function key to specify the rate for your communication. Available rates include 300, 600, 1200, 2400, 4800, 9600, and 19200 baud.

[F3] KIND – Toggles between the *OptiTALK* and the *Hex* settings. To capture the files on a PC with OptiTALK, set KIND to the *OptiTALK* setting. To send raw data in the files to a PC or a programming device, set KIND to the *Hex* setting.

[F4] BANKS – Toggles between the *0 to 3* and the *A to D* settings. If the files you want to ROM reside in internal memory, set BANKS to *0 to 3*. If the files reside in the external memory cartridge, set BANKS to *A to D* (this function is not supported).

[F5] SEND ROM 47 – Sends the files stored in ROM chip 47. If the ROM image is empty, the system does not send it.

[F6] SEND ROM 45 – Sends the files stored in ROM chip 45. If the ROM image is empty, the system does not send it.

[F7] DEFRAGMENT – Re–arranges all internal memory to eliminate file fragments created with normal file editing. Defragmentation can increase performance in complex systems.

[F9] PORT – Moves, or rotates, through the list of ports that appears below the function key to specify the port for your communication.

[F10] EXIT MENU – Returns you to the top level of the Tools Menu.

[F5] CARTRIDGE – This function is not supported.

```
    TOOLS – Cartridge Utilities

  FILENAME              TYPE   SIZE   TITLE VALUE       LOCATION    S  P

1 CHIPCONVEYER1         SCREEN  322   SCREEN ONE        INT 1:D5DB
2 CHIPCONVEYER2         SCREEN  310   SCREEN TWO        INT 1:C22F
3 CHIPCONVEYER3         SCREEN  215   SCREEN THREE      INT 2:BD33
4 CHIPCONVEYER4         SCREEN  280   SCREEN FOUR       INT 1:C300


 F1     F2       F3      F4     F5     F6      F7       F8      F9     F10
MAIN   FILE     MARK    MARK    TO    FROM   BACKUP   RESTORE        EXIT
FUNC   TYPES   A FILE   ALL    CART   CART
 Power–up Status:  DISPLAY MAIN MENU
```

The menu choices, with a summary of what each does, are described below:

[F1] MAIN – Returns to the Main Function Bar so that you can make another menu selection.

[F2] FILE TYPES – Places you in the Types Menu of the Cartridge Menu so that you can transfer a single type of screens, files, or variables to a cartridge. The Types Menu of the Cartridge Menu works like the Types Menu of the Tools Menu described above.

[F3] MARK A FILE – Marks, or flags, one or more files that you want to move, back up, or restore to or from the memory cartridge. Use the cursor control keys to highlight a screen or file and then mark, or flag, it by pressing the [F3] MARK A FILE key. You can then move to another screen or file for marking; or you can rename, copy, or delete the marked screens or files. If you have previously selected one type of screen or file under the [F2] File Types Menu, then the [F3] MARK A FILE key only marks screens or files of the selected *type*. By selecting a screen or file with the [F3] MARK A FILE key a second time, you can unmark, or remove the flag, from a screen or file.

[F4] MARK ALL – Marks, or flags, all of the screens, files, and programs for moving to or from, backing up, or restoring from the cartridge. If you have previously selected one type of screen, file, or program under the [F2] Types Menu, then the [F4] MARK ALL key marks all of the selected *type*. By selecting a marked screen or file with the [F3] MARK A FILE function key, you can unmark, or remove the flag, for a single screen or file.

[F5] TO CARTRIDGE – Moves, or transfers, one or more marked files and the currently highlighted line from internal memory to the memory cartridge. If you do not have a memory cartridge installed, the system returns an error message.

[F6] FROM CARTRIDGE – Moves, or transfers, one or more marked files and the currently highlighted line to internal memory from the memory cartridge. If you do not have a memory cartridge installed, the system returns an error message.

[F7] BACKUP – Duplicates, or makes a back–up copy of, one or more marked files and the currently highlighted line to the memory cartridge or, if you do not have a memory cartridge installed or it is already filled, to another location in internal memory.

[F8] RESTORE – Restores, or makes a standard copy of, one or more marked files and the currently highlighted line to internal memory or to the memory cartridge if internal memory is full.

[F9] DEFRAG–MENT – Re–arranges all internal memory and, if write permitted, the external memory cartridge to eliminate file fragments created with normal file editing. Defragmentation can increase performance in complex systems.

[F10] EXIT – Returns you to the top level of the Tools Menu.

[F6] SOFTWARE SECURITY – Allows you to "protect" files so that operators cannot make changes to them or even "hide" files so that operators cannot find them to make changes. This security guards data and applications from unmonitored changes.

To enter the Software Security system, you must enter the user password at the prompt. To begin, the password is USERPWD although you can change this password, as described below.

```
                    SOFTWARE SECURITY

ENTER PASSWORD:  _____________________

ENTER YOUR USER PASSWORD T0 ACCESS THE SOFTWARE

SECURITY FEATURE TO HIDE OR PROTECT FILES.
  F1 OR F10 TO ABORT, CR TO TERMINATE INPUT.
```

As you enter the password, the system displays an *X* for each character you press so that a six–letter password appears as XXXXXX on the screen.

After the system accepts the password, it places you in the Software Security menu.

```
   Tools – Software Security
FILENAME            TYPE   SIZE   TITLE VALUE        LOCATION      S  P
_____________________________________________________________________

1 QUARTZ            SCREEN   12   SCREEN ONE         INT 1:2026
2 GYPSUM            SCREEN  130   SCREEN TWO         INT 1:1036
3 SHALE             SCREEN  215   SCREEN THREE       INT 2:50D2    P  E
4 BAUXITE           SCREEN   28   SCREEN FOUR        INT 1:0300    P  I




_____________________________________________________________________
 F1     F2      F3      F4      F5      F6     F7      F8      F9     F10
MAIN   UNDO    MARK    MARK    PRO    HIDE          RESTOR  CHANGE  EXIT
FUNC  SCURTY  A FILE   ALL     TECT                 SCURTY  PASSWD  MENU
 Power–up Status:  DISPLAY MAIN MENU
```

The system lists all files without an identifier in the Security column for Unprotected files, with a letter *P* for Protected files, or with a letter *H* for Hidden files to indicate their level of file protection. You can use the function keys at this level to mark files as Protected or Hidden, to unprotect or make files visible, and to change the password, as described below.

[F1] MAIN FUNCTION – Returns you to the Main Function Bar without saving the current settings of the security modes for files.

[F2] UNDO SECURITY – Changes one or more marked files from Protected or Hidden files to Unprotected files.

[F3] MARK A FILE – Marks, or flags, one or more files to change their security mode. Use the cursor control keys to highlight a file and then mark, or flag, it by pressing the [F3] MARK A FILE function key. By selecting a file with the [F3] MARK A FILE key a second time, you can unmark, or remove the flag, from a file.

[F4] MARK ALL – Marks, or flags, all of the files to change their security mode. By selecting a marked file with the [F3] MARK A FILE function key, you can unmark, or remove the flag, from a single highlighted file.

[F5] PROTECT – Changes one or more files from Unprotected to Protected. Protected files appear in Tools directory listings but not in other listings which allow you to select a file to edit, delete, copy, rename, or change their path.

[F6] HIDE – Changes one or more files from Unprotected to Hidden. Hidden files do not appear in any directory listings.

[F8] RESTORE SECURITY – Saves the current setting of the security modes for all files and returns to the Main Function Bar so that you can make another selection. To exit the menu without saving your changes, press the [F1] MAIN or [F10] EXIT function key.

[F9] CHANGE PASSWORD – Prompts you to enter the old password and, after accepting it, then prompts you to enter the new password. As with the password prompt to gain access to the software security function, the system displays XXXXXX as you enter the characters.

[F10] EXIT MENU – Returns you to the top level of the Tools menu without saving the current settings of the security modes for files.

OITs without a battery in the clock / calendar chip cannot use the software security capabilities on an OIT.

By default, the system enters the "full security" mode every time the OIT starts–up. You exit the full security mode entering the Tools software security menu. You return to the full security mode by pressing the [F8] RESTORE SECURITY function key or by powering the OIT up again.

If you try to create a file with a name that conflicts with an already existing Protected or Hidden file, the system displays the *RESERVED FILE NAME* error message.

[F7] DEFRAGMENT – Re– arranges all internal memory to eliminate file fragments created with normal file editing. The system displays the message *Defragmenting: 0123456ABCD* as it defragments the memory.

[F9] OPTITALK – Allows you to communicate with an attached PC–compatible computer to backup and restore one or more files.

```
   TOOLS – OptiTALK Communication

   File Name       Type      Size     Title/Value       Location     S  P
 1                 RUN TEMP  5004                       INT 0:C893
 2 APPLICATIONS    SYSTEM    4x17                       INT 1:FF20
 3 CITY            STRING    17       Huntsville        INT 0:DC4D
 4 F1              SYSTEM    3                          INT 1:FF0E
 5 JUNKLIST        FILE      10x63                      INT 1:EE9F
 6 MYTEST2         SCREEN    128      File MyTest2      INT 1:8926


 F1     F2      F3      F4      F5      F6      F7      F8      F9      F10
SEND   BAUD   MARK    MARK   ASCII   ASCII   BINARY  BINARY  PORT    EXIT
DIR    9600  A FILE   ALL    SEND    RECV     SEND     RECV    1      MENU
Power-up Status:
```

The menu choices, with a summary of what each does, are described below:

[F1] SEND DIRECTORY – Sends the current directory of files to the host, another OIT, or a serial printer. The [F1] SEND DIR function uses the settings specified with the [F2] BAUD and [F9] PORT functions.

[F2] BAUD – Moves, or rotates, through the list of baud rates that appears below the function key to specify the rate for your communication. Available rates include 300, 600, 1200, 2400, 4800, 9600, and 19200 baud. You can specify different baud rates for the two ports by using the [F9] PORT function key.

[F3] MARK A FILE – Marks, or flags, one or more screens or files for transfer, backup, or restoration from the host. Use the cursor control keys to highlight a file, and then mark, or flag, it by pressing the [F3] MARK A FILE key. You can then move to another screen or file to be flagged; or you can transfer the flagged screens or files. By selecting a screen or file with the [F3] MARK A FILE function key a second time, you can unmark, or remove the flag, from a screen or file.

[F4] MARK ALL – Marks, or flags, all screens and files for transfer from the host. If you have previously selected one type of screen or file with the [F2] Types Menu, then the [F4] MARK ALL key marks all of the selected *type*. By selecting a marked screen or file with the [F3] MARK A FILE function key, you can unmark, or remove the flag, from a single screen or file.

[F5] ASCII SEND – Sends one or more marked files and the currently highlighted line in ASCII format to the host or another OIT. Use this function to transfer OptiSCREEN files (not data files) to a computer running the OptiTALKutility. You can also connect a serial printer to the OIT and use the [F5] ASCII SEND function to print files directly.

[F6] ASCII RECEIVE – Receives one or more marked files and the currently highlighted line from the host in ASCII format. Use this function to transfer OptiSCREEN files (not data files) from a computer running the OptiTALKutility.

[F7] BINARY SEND – Sends to the host in binary format (with error checking and retry capabilities) one or more marked files and the currently highlighted line. Use this function for OptiSCREEN, configuration, and data files.

[F8] BINARY RECEIVE – Receives from the host in binary format (with error checking and retry capabilities) one or more marked files and the currently highlighted line. Use this function for OptiSCREEN, configuration, and data files.

[F9] PORT – Moves, or rotates, through the list of ports that appears below the function key to specify the port for your communication. Use the [F2] BAUD function key to specify different baud rates for the two ports.

[F10] EXIT MENU – Returns you to the top level of the Tools Menu.

[F10] RUN – Runs the program named on the status line at the bottom of the screen. Specify the program with the [F1] Setup Menu function key from the Main Menu.

The CONFIG Menu – [F7] from the Main Function Bar

The Configuration Menu specifies the serial communications parameters, ports, and diagnostic tests for the OIT. You configure your OIT to match the data communication format of the host and equipment that you use. Consult your equipment manual for details on the formats that your equipment requires.

The default Configuration Menu, which is set at the factory before shipping the OIT, appears below:

```
CONFIGURATION
                      FIRMWARE RELEASE 4.2          01JUN93

MODES                 ANSI               NO ECHO           SEND ANY CASE
DATE/TIME             03AUG92  DISPLAY                     14:51  DISPLAY
END LINE/COLOR        NO WRAP            NO AUTO LF        COLOR
CURSOR/CRT/UNDERLINE  BLINKING BLOCK     SCREEN SAVER OFF  NO UNDERLINE
DISPLAY/CONTROLS      25 X 80 SCREEN     1 STATUS LINE     7 BIT CONTROLS
PRINT SCREEN          KEY OFF            GENERIC ASCII     PORT 1
KEYBOARD              35 PAD             15 FUNCTION KEYS  TERMINAL
TESTS/BATTERY/LEVEL   DIAGNOSTIC         BATTERY           CURRENT (4.2)
PORTS/MOUSE           PRIMARY 1          SECONDARY 2       NO MOUSE
PORT 1                9600  NONE   7 BIT  1 STOP   HARD  RS232   PT TO PT
PORT 2                9600  NONE   7 BIT  1 STOP   HARD  RS232   PT TO PT


   -UP-      -DOWN-      -LEFT-       -RIGHT-      -SELECT-    -PERFORM-
  UP KEY    DOWN KEY    LEFT KEY     RIGHT KEY    BACK SPACE     ENTER


 F1      F2     F3     F4      F5      F6      F7     F8      F9      F10
MAIN                          SAVE   RECALL                          RUN
FUNC
 Power-up Status:  MAIN MENU
```

It is easy to specify formats with the Configuration Menu. You use the cursor control keys to advance through the menu items. You use the [Spacebar] to advance, or toggle, through the available option settings for a menu item.

The Configuration Menu choices, with a summary of what each does, appear below with the steps for setting the items:

[F1] MAIN FUNC – Returns you to the main function bar so that you can make another menu selection.

[F5] SAVE – Saves the current settings of the Configuration Menu in the file named USER_CONFIG. Any previously saved configuration is lost when you press the [F5] SAVE function key.

[F6] RECALL – Recalls the last configuration that you stored in the file named USER_CONFIG with the [F5] SAVE function key.

[F10] RUN – Runs the mode named on the power–up status line at the bottom of the screen. Specify the mode with the [F1] SETUP menu from the main menu.

Configuration Procedure

Each OIT uses a Configuration Menu that reflects the operating functions specific to the OIT and the equipment to which you attach the OIT. However, the menu format remains the same for all cases.

- At the top of the Configuration Menu, a box that describes the revision level and the release date for the firmware appears.
- On the left side of the menu, a list of available OIT modes appears. On the right side of the menu, a status message for each of the modes appears.
- At the bottom of the menu, the four available Configuration Menu functions keys appear.

When you view the Configuration Menu, it displays the current configuration status for the various modes. To change the configuration, follow these steps:

- Use the [←], [→], [↑], and [↓] cursor control keys to move the cursor to cover the status option that you want to change.
- Once the cursor covers the status option, press the [Spacebar] to advance through the available options and display the values. Some modes only offer two status options; you toggle through these options. Other modes offer many options; by pressing the [Spacebar] repeatedly, you can rotate through all of the available status options. You can view and change status options any number of times.
- When the system displays the desired status for a mode, you select the status setting by using the cursor control keys to move the cursor to another status option.

To store all of the status options, press the [F5] SAVE function key. After saving the configuration, press the [F1] MAIN FUNC or [F10] RUN function key to resume work at the OIT.

After you store the configuration with the [F5] SAVE function key, the OIT automatically enters the saved configuration on power–up, regardless of the configuration it utilized when power was shut down.

Configuration Options

By following the procedure described above, the Configuration Menu allows you to select all of the following configuration options. Again, consult your equipment manual for details on the formats that your equipment requires.

Modes

The Mode line controls the type of terminal, the echoing, and the case sensitivity for the OIT.

Type of Terminal

The Configuration Menu selects the escape sequence type as *ANSI, VT100,* or *VT52.* The OIT is an intelligent terminal. In addition to transmitting and receiving data, it responds to a wide variety of screen statements, or escape sequences. The screen statements consist of the ASCII character ESCAPE (27 in decimal) followed by additional characters, which specify parameters.

The American National Standards Institute (ANSI) publishes a set of standards so that equipment designed by all vendors can follow the same set of escape sequence statements. This ANSI standard, X3.64–1979, recommends formats for statements in general and defines commonly used statements.

Few if any terminals (including the OIT) use all of the statements defined by ANSI X3.64, and many terminals (including the OIT) define private statements that expand on the ANSI set. For ANSI compatibility, a device must be able to recognize properly formatted ANSI statements and safely ignore those standardized statements which it does not use. You are responsible for determining that any private ANSI–compatible statements generated by the software are either supported or ignored by the OIT.

The OIT supports numerous statements in the ANSI format, as well as many statements defined by Digital Equipment Corporation for the VT52 and the VT100 display terminals. Specifying both an ANSI terminal mode and 8–bit controls (described below) emulates the DEC VT 220 display terminal.

Echoing

The Configuration Menu selects either an *Echo* or *No Echo* mode. *Echo* supports half–duple x mode, and *No Echo* supports full–duplex mode.

When you select *Echo* mode, the system transmits all keystrokes to the host and the OIT takes simultaneous action as if the key codes were returned by the host. When you select *No Echo* mode, the system transmits all keystrokes to the host but the OIT takes no action until the host returns the same key codes.

Case Sensitivity

The Configuration Menu selects case sensitivity as *Send Any Case* or *Send CAPS Only.* If you select *Send Any Case,* the system transmits lowercase characters as lowercase characters and uppercase characters as uppercase characters. If you select *Send CAPS Only,* the system automatically transmits lowercase characters as uppercase letters.

Date/Time

The Configuration Menu sets the date and the time for the OIT, and specifies whether or not the system displays the date or time, or both, in the bottom right corner of the screen.

To set the date, perform the following steps:

- Move the cursor to cover the date status message.
- Press the [Spacebar] to highlight the day of the month.
- Press the [Spacebar] to advance the day of the month or use the numbers on the keyboard or numeric keypad to enter the correct day.

- Press the [→] cursor control key to highlight the month.
- Press the [Spacebar] to move through the months until the correct month appears.
- Press the [→] cursor control key to highlight the year.
- Press the [Spacebar] to advance the year or use the numbers on the keyboard or numeric keypad to enter the correct year.
- Press the [→] cursor control key twice, once to select the given date and once to move to the date display mode.

To display the date at the bottom right corner of the screen, set the date display mode to *Display*; to turn the date display off, set the mode to *No Display*.

To set the time, perform the following steps:

- Move the cursor to cover the time status message.
- Press the [Spacebar] to highlight the hour of the day.
- Press the [Spacebar] to advance the hour or use the numbers on the keyboard or numeric keypad to enter the correct hour. The system uses a 24 hour clock.
- Press the [→] cursor control key to highlight the minutes.
- Press the [Spacebar] to advance the minutes or use the numbers on the keyboard or numeric keypad to enter the correct minutes.
- Press the [→] cursor control key twice, once to select the given time and once to move to the time display mode.

To display the time at the bottom right corner of the screen, set the date display mode to *Display*; to turn the date display off, set the mode to *No Display*.

End Line/Color

Wrap

The Configuration Menu selects the end of line control as either *Wrap* or *No Wrap*. The *Wrap* status setting causes an automatic carriage return and line feed to occur when you specify a character in the 80th column. The *No Wrap* status setting causes a character displayed in the 80th column (or 132nd column, depending on your configuration) to replace the character currently displayed there.

Auto LF

The system also selects *No Auto LF* or *Auto LF* for line feeds. If you select *No Auto LF*, the OIT does not generate a line feed when it processes a carriage return. If you select *Auto LF*, the OIT automatically performs a line–feed when it processes a carriage return. If double line feeds appear on the screen, you should change *Auto LF* to *No Auto LF* since the host is already sending a line feed with each carriage return.

Color

The Configuration Menu specifies your OIT as a *Monochrome* or *Color* CRT display. You must set the color mode correctly so that your OIT displays colors and intensities in their proper formats.

Cusor/CRT/Underline

Cursor Type

The Configuration Menu selects the cursor type as *No Cursor, Blinking Underline, Blinking Block, Steady Underline,* or *Steady Block*. This mode has no effect on the transfer or processing of data.

Screen Control

The Configuration Menu selects the screen control as *Screen Saver On* or *Screen Saver Off*.

If you select *Screen Saver On* and make no changes to the screen display for a period of 4 to 8 minutes, the system "blanks the screen," or makes the current display invisible, to prevent damage to the phosphor layer on the inside of the tube. By depressing any key, you return the display to the screen. You can press the [Shift] key to restore the display without actually sending any key codes.

If you select *SCREEN Saver Off,* the screen display remains visible until you turn the power off.

Underline

The *Underline* or *No Underline* field enables or disables a monochrome character attribute listing for the OptiSCREEN editor. If you specify *Underline* on an OIT in monochrome mode, the following character attributes appear in the file syntax list:

DARK UNDERLINE	**DIM UNDERLINE**
NORMAL UNDERLINE	**BRIGHT UNDERLINE**

If you specify *No Underline* on an OIT in monochrome mode, the character attributes do not appear in the file syntax list although they are still available to you. The underline character attributes are not available on OITs in color mode; therefore, you should select *No Underline* on OITs in color mode.

For underlining to appear, you must set Jumper E1 as described in Chapter 3, "Installation." The color jumper positions, which disable underlining, are not normally used with OITs in monochrome mode. To display a concave or convex box, however, you must disable underlining, even on an OIT in monochrome mode.

Display/Controls

The Display and Control elements control the number of columns and lines displayed in the main part of the the display and the number of status lines shown at the bottom of the OIT display.

Number of Columns and Lines

The Configuration Menu selects the CRT display as *25 x 80, 25 x 132, 30 x 80, or 30 x 132.*

The menus in the menu–driven system always appear with 25 rows and 80 columns, regardless of the configuration switches and Configuration Menu settings.

Number of Status Lines

The Configuration Menu selects 0–7 status lines. The status lines act as one line message displays that do not scroll. The top of the display scrolls when the cursor reaches the last line prior to the status line region.

7 or 8 Bit Control

The Configuration Menu selects *7 Bit Control* or *8 Bit Control* for ANSI standard codes. If you select the *7 Bit Control* setting, you can choose from 128 total codes. If you select the *8 Bit Control* setting, you can choose from the 128 codes available with the *7 Bit Control* setting or from the additional 128 codes made available by the extra bit. Some communications devices, such as the DEC VT220 terminal, use the extended *8 Bit Control* codes. Consult your equipment manual for details on the formats that your equipment can use.

Print Screen

The Configuration Menu specifies whether or not the [Print Screen] key, or automatic screen printing capability, operates. The [Print Screen] key formats the video screen image and sends it to one of the serial ports for printing or storage. If you specify that the [Print Screen] key operates, you must also specify the format and the port for the output.

The [Print Screen] key code is 0AAH (170). The standard full– travel keyboard already offers this key, or you can program a key on any of the membrane keyboards to use this code.

The system performs the [Print Screen] statement as a background process. Normal operations continue while the system prints the image. The only condition under which the OIT waits is when you issue a [Print Screen] statement before a previous [Print Screen] statement is completed.

The [Print Screen] printer task processing and the normal OIT processing occur concurrently. This concurrent operation allows video images to be captured in hardcopy form while the OIT actively monitors a real time process:

- When you initiate [Print Screen], the system makes a copy of the current video image and stores it in reserved system memory.
- The system activates an interrupt–driven background printer task. The background printer task scans the copy of the video image, converts the character codes into printer graphic data, and transmits the data to the printer.
- The system then returns to the process that initiated the [Print Screen].

The printer task terminates itself after the printer completes the image.

Key Enable

If you specify *Key On*, you can press the [Print Screen] key to send the contents of the current screen to a printer. If you specify *Key Off*, the system does not accept the statement so that output does not reach the printer.

Printer Type

If you specify *Key On*, you must also specify the format and the port for the output. The system accepts any one of the following graphic drivers for your printer:

Generic ASCII (Dependent on your printer, prints text only.)
C. Itoh printer, portrait mode
C. Itoh printer, landscape mode
Proprinter printer, portrait mode

Proprinter printer, landscape mode
Hewlett–P ackard PCL printer, portrait mode
Hewlett–P ackard PCL printer, landscape mode

Printer Port

If you specify *Key On*, you must specify the serial port as *port 1* or *port 2*.

Keyboard

The Configuration Menu describes the type of keyboard your OIT uses during normal operation.

The defaults of 35 PAD, 40 MODEL 3040, and TERMINAL are the only options currently supported.

Tests

If configuration switch 1of the OIT is set to *Off* (which is the default) and you press the [Enter] key after highlighting the *Diagnostic* Menu selection, the system offers the following Diagnostic Menu from which you can select tests:

```
DIAGNOSTIC TEST       STATUS         MESSAGES
_____________________________________________________________________

F1   Battery
F2   Clock
F3   EPROM
F4   RAM
F5   Video
F6   Keyboard
F7   Serial ports

F9   All Tests

F10  Iteration type  Single
     Number of iterations
F11  Quit tests, Exit

Press highlighted key to run test.
```

Press the specified function key or the first letter of the test name (such as [F1] or *B* for the battery test, [F2] or *C* for the clock test, and so on) to begin the testing process. The individual tests are described below:

- Battery. This test displays a message when the battery is dead or not installed.
- Clock. This test displays a message when the clock battery is dead, when the clock is not installed, or when the hundredths of a second register does not change after a period of time.
- EPROM. This test displays a message when the checksum values stored in the chip itself do not match the summed bytes.
- RAM. This test determines the existence and type of each internal and external bank. The system displays a message when a bank fails its individual test.
- Video. This test displays the Scan Alignment Screen and the Attribute Screen, which allow you to check and adjust the screen.
- Keyboard. This test has not been installed.

- Serial ports. This test performs a loopback test for Ports 1 and 2. Make a loopback connector with one of the following configurations on the female DB–25S connector to make sure that the serial port is receiving data.

  RS–232 **2 (TXD) to 3 (RXD)**
  4 (RTS) to 5 (CTS)

  RS–422 **14 (SD(B)) to 16 (RD(B))**
  15 (SD(A)) to 17 (RD(A))
  4 (RTS) to 5 (CTS)

Press the [F9] function key or *A* key to select *All tests* so that the system runs each of the tests, one after the other.

Press the [F10] function key or *I* key to toggle between a single execution or continuous execution of the tests.

Press the [F11] function key (or the [Shift]–[F1] combination of keys) or the *Q* key to stop a continuous test; press the key or the combination of keys again to return to the Configuration Menu after the test.

If you set OIT configuration switch 1 to *On* and then press the [Enter] key after selecting the Diagnostic Menu, the system executes the manufacturing power–on diagnostics tests (Battery, Clock, EPROM, RAM, and Serial ports) continuously.

Battery

The Configuration Menu allows you to specify BATTERY and NO BATTERY operation:

- When set for BATTERY operation, the Workstation evaluates the battery with the start–up diagnostic tests.
- When set for NO BATTERY operation, the OIT indicates that the battery is OK, even if it is not installed or is not functional.

The system saves the BATTERY or NO BATTERY option setting in the SAVED_CONFIG configuration file. The SAVED_CONFIG file must be stored in ROM or in a non–volatile cartridge for OIT operation without a battery.

OIT applications which are installed completely in ROM or completely on cartridge do not usually require battery–back ed data storage. Also, some installations and locations do not allow you to install a battery. In these cases, you can specify NO BATTERY operation to override the battery tests executed at start–up and operate without a battery.

In installations and locations that do not permit a battery, you must remove three batteries within the OIT:

- The battery on the back cover plate which powers internal memory.
- The battery in the RAM cartridge (if it is installed).
- The battery in the clock / calendar chip of the Workstation (at location U29).

OITs without a battery in the clock / calendar chip cannot use the software security capabilities on an OIT.

Level

The Level option allows you to specify the software operating level as *Current (Release 4.2)* or *Former (Release 2.3)*. The Level menu item resets the key values for integral and external keyboards. By returning Release 2.3 key codes to the keyboards, you do not have to change your LOAD KEY statements in the OptiSCREEN system when running a Release 2.3 application under Release 4.2.

Ports

The Configuration Menu allows you to specify the Primary Port as Port 1 or Port 2 and also specify the Secondary Port as Port 1 or Port 2. This specification becomes important with commands such as TRANSMIT FILE VIA PRIMARY PORT and TRANSMIT FILE VIA SECONDARY PORT. In On–line mode, an OIT only accepts ANSI escape sequences from a host at the Primary Port.

Mouse

A Microsoft, Logitech, or Manager mouse (with two or three buttons) connected to one of the serial ports on the back of an OIT offers you a convenient method for positioning the cursor with any of the standard editing operations. Since a mouse is not an industrial input device, this method of positioning the cursor is usually only appropriate during the development of a system.

On the Configuration Menu, you can select one of the following settings to operate (or disable) a serial mouse:

Setting	Meaning
No mouse	Any attached serial mouse is disabled
MS Mouse 1	Enables a Microsoft serial mouse attached to serial port 1
MS Mouse 2	Enables a Microsoft serial mouse attached to serial port 2
LM Mouse 1	Enables a Logitech or Manager serial mouse attached to serial port 1
LM Mouse 2	Enables a Logitech or Manager serial mouse attached to serial port 2

To use a mouse, you must set the OIT baud rate to 1200 baud and configure the serial port for 8 data bits, 1 or 2 stop bits, no parity bit, and hardware (none) handshaking.

Port 1 and Port 2

The Configuration Menu selects the baud rate, the parity, the word length, the number of stop bits, the type of handshaking, and the type of communications (point–to–point or multidrop) for the OIT. All status settings can be set separately for Port 1 and Port 2:

- Baud Rate: Select the baud rate as *300* baud, *600* baud, *1200* baud, *2400* baud, *4800* baud, *9600* baud, or *19.2K* baud.
- Parity: Select the parity as *None, Odd,* or *Even*.
- Word Length: Select the word length as either *7 bits* long or *8 bits* long depending on the needs of your equipment.
- Stop Bits: Select the number of stop bits as either *1 Stop* bit or *2 Stop* bits. Your host or equipment may require a specific setting for the number of stop bits.
- Handshaking: Select handshaking as either *Hard* or *Soft* for hardware or software handshaking.

  If your equipment does not support either hardware or software handshaking, configure the OIT for hardware handshaking and wire the port as shown in Chapter

3. When you use this configuration, you must take care to avoid overflowing the input buffer. Chapter 3, “Installation,” contains more information on handshaking.

- Communication Operation: Select *RS–232* , *RS–422* , or *RS–485* communications for your OIT. In addition to specifying the operation on the configuration menu, you must change the E2 and E3 jumper as described in Chapter 3 for RS–422 or RS–485 operation.
- Communication Type: Select the online communication type as *Point–to–P oint* or *Multidrop* communications:
  - The *Point–to–P oint* communication mode uses either software or hardware handshaking. The *Point–to–P oint* communication mode accepts either RS–232 or RS–422 signals.
  - The *Multidrop* communication allows a host to communicate with up to 16 terminal addresses, all on the same RS–422 multidrop line. The 16 terminal addresses are labeled 1 to 99 (0 indicates broadcast mode).

  When you select the *Multidrop* mode and your host does not support software handshaking, you should select hardware handshaking although it may not be used. In this case, jumper pin 5 to pin 20 on the OIT primary or secondary port. See Chapter 3, “Installation,” for more information on multidrop wiring and handshaking.

To set the communication type, perform the following steps:

1. Move the cursor to cover the communication type status message.
2. Press the [Spacebar] to change the communication type from *Point–to–P oint* to *Multidrop*, or to change from *Multidrop* to *Point–to–P oint*.

   To move between these two types, you use the cursor control keys (such as [←] and [→]) to move off the communication type and back onto the communication type; you cannot use the [Spacebar] to toggle between the two types.

   After selecting *Point–to–P oint* communication, press the [→] cursor control key to move to the next port configuration mode.
3. To change the terminal number with *Multidrop* communications, press the [Spacebar] to advance the first digit of the terminal or use the numbers on the keyboard or numeric keypad to enter the correct first digit.
4. Press the [→] cursor control key to highlight the second digit of the terminal.
5. To change the second digit, press the [Spacebar] to advance the number or use the numbers on the keyboard or numeric keypad to enter the correct second digit.
6. To select the terminal number for *Multidrop* communication, press the [→] cursor control key twice, once to select the given communication type and once to move to the next port configuration mode.

ONLINE Mode – [F8] from the Main Function Bar

Specifies that the system enters the Online mode for communication.

LOCAL Mode – [F9] from the Main Function Bar

Specifies that the system enters the Local mode for testing and operation. Press the [Ctrl]–1 key to exit the Local Mode.

RUN – [F10] from the Main Function Bar

This menu item executes the mode named on the power–up status line at the bottom of the screen.

Placing a User Application in ROM

You can now store your own applications in ROM in 128 Kbyte EPROM chips. Storing an application in ROM produces chips which you install in an OIT to ensure that an application is permanent and secure against unexpected or deliberate changes.

Storing an Application in EPROM Chips

To create your own EPROM chip for an application in ROM, you must have the following equipment:

- 128K EPROM chip set (which consists of two 150ns 27C512 chips).
- PC–based EPROM programmer for 27C512 EPROMs including parallel interface and software.
- PC–compatible computer.

The steps necessary to store your application in an EPROM chip are described below.

1. Place the files that you want to store in ROM in internal RAM memory. These files may include OptiSCREEN files, font files, function key files, programmable key files, configuration files, and application files.

   After you specify a power–up application with the SETUP function and save it with the SAVE CONFIGURATION function, the application becomes permanent within the OIT.

2. Use the [F7] DEFRAGMENT function in the Tools menu to remove unused space between the files you intend to save in ROM. After defragmenting the space, if the files require more than four banks for storage, you cannot store the files in ROM. If the files only require one or two banks, you only need to supply one EPROM chip for the ROM.

3. Use the Tools menu [F4] USER ROM function key to enter the ROM storage utility. Specify the baud rate by pressing the [F2] BAUD function key and specify the port by pressing the [F9] PORT function key.

```
   Tools – User ROM
FILENAME            TYPE   SIZE   TITLE VALUE        LOCATION      S  P
_____________________________________________________________________

1 QUARTZ            SCREEN   12   SCREEN ONE         INT 1:2026
2 GYPSUM            SCREEN  130   SCREEN TWO         INT 1:1036
3 SHALE             SCREEN  215   SCREEN THREE       INT 2:50D2    P  E
4 BAUXITE           SCREEN   28   SCREEN FOUR        INT 1:0300    P  I



 F1     F2      F3      F4      F5      F6     F7      F8      F9    F10
MAIN   BAUD    KIND    BANKS   SEND    SEND   DEFRAG          PORT  EXIT
FUNC   9600    HEX     1 TO 4  ROM 47  ROM 45 MENT              1   MENU
 Power–up Status:  DISPLAY MAIN MENU
```

4. Press the [F4] BANKS function key to select internal memory Bank 1 to Bank 4.

5. To send the files to the EPROM programmer that accepts this format, press the [F3] KIND function key to select HEX files.

   To capture the files on a PC, press the [F3] KIND function key to select OptiTALK files. On the PC–compatible computer, enter the OptiTALK system and enter the RECEIVE ASCII file mode.

6. Press the [F5] SEND ROM 47 and [F6] SEND ROM 45 to transmit the files. If a ROM image (either ROM 45 or ROM 47) is empty, the system does not send it.

7. Follow the instructions supplied with the EPROM programmer to load the application into the chip or chips.

8. Install the EPROM chip or chips in the OIT and test them. If both ROM images (ROM 45 and ROM 47) contain files, you must install both EPROM chips. If the application needs to be changed, you must always re–program both EPROM chips.

Supplying File Protection and Security

The new software security menu item under the Tools menu allows you to protect and hide OptiSCREEN files, data files, and communication files. By default, the system enters the "full security" mode every time you start the OIT. The full security system offers three levels of protection and visibility: Unprotected files, Protected files, and Hidden files:

- In Unprotected mode, a file is listed in the Tools directory without an indicator in the security column. (The security column is labeled with an *S* at the top of the column). When you create a file, it is an Unprotected file by default. You can perform all standard file operations on an unprotected file. Only Unprotected files appear in the OptiSCREEN file editor. Only Unprotected files appear in the Tools editor with the [F3] FILE SERVICE menu item with the [F2] RENAME FILE, [F5] COPY FILE, and [F6] DELETE FILES function key operations.
- In Protected mode, a file is listed in the Tools directory with a *P* in the security column. The only operation you can perform on a Protected file is binary backup. This prevents you from accidentally erasing or editing a file but allows you to backup and restore a protected file.
- In Hidden mode, a file does not appear in any directory listing and users who enter the system in full security mode are unaware of its existence. You cannot perform any file operations on a hidden file. A hidden file is automatically protected.

OITs without a battery in the clock / calendar chip cannot use the software security capabilities on an OIT.

The system allows you to perform the following operations on files in the three protection modes under full security:

	Unprotected	**Protected**	**Hidden**
Directory listing	Yes	Yes	No
Source listing	Yes	No	No
Editing	Yes	No	No
Binary backup	Yes	Yes	No
ASCII backup	Yes	No	No
Rename	Yes	No	No
Copy	Yes	No	No
Change path	Yes	No	No
Delete	Yes	No	No

To gain access to the file protection and software security operation, first move to the Main Menu. From the Main Menu, press the [F6] TOOLS function key to gain access to the Tools menu. From the Tools menu, press the [F6] SOFTWARE SECURITY function key.

To enter the Software Security system, you must enter the user password at the prompt. To begin, the password is USERPWD although you can change this password, as described above.

```
                    SOFTWARE SECURITY

ENTER PASSWORD:  _____________________

ENTER YOUR USER PASSWORD T0 ACCESS THE SOFTWARE

SECURITY FEATURE TO HIDE OR PROTECT FILES.
  F1 OR F10 TO ABORT, CR TO TERMINATE INPUT.
```

As you enter the password, the system displays an *X* for each character you press so that a six–letter password appears as XXXXXX on the screen. After the system accepts the password, it places you in the Software Security menu.

```
   Tools – Software Security
FILENAME            TYPE   SIZE   TITLE VALUE        LOCATION      S  P
_____________________________________________________________________

1 QUARTZ            SCREEN   12   SCREEN ONE         INT 1:2026
2 GYPSUM            SCREEN  130   SCREEN TWO         INT 1:1036
3 SHALE             SCREEN  215   SCREEN THREE       INT 2:50D2    P  E
4 BAUXITE           SCREEN   28   SCREEN FOUR        INT 1:0300    P  I



_____________________________________________________________________
 F1     F2      F3      F4      F5      F6     F7      F8      F9     F10
MAIN   UNDO    MARK    MARK    PRO    HIDE          RESTOR  CHANGE  EXIT
FUNC  SCURTY  A FILE   ALL     TECT                 SCURTY  PASSWD  MENU
 Power–up Status:  DISPLAY MAIN MENU
```

The operation of the function keys to apply software security is described above.

Keyboard Operation

The keyboard sends data to your OIT or the screen. A single character occupies a character position at any given time and remains there until the system replaces or erases it.

You can connect and simultaneously use an IBM–compatible keyboard with the sealed keyboard. Not all of the special keys on the IBM–compatible keyboard are appropriate for the OIT. The OIT supports functions keys [F1] through [F12]; you can use the [Shift]–[F1] through [Shift]–[F6] key combinations to produce [F11] to [F16]; and the OIT supports the [PrintScreen] key.

Alphabetic Keys

An IBM PC or PC–XT–compatible keyboard sends either uppercase or lowercase letters depending on the state of the [Shift] and [Caps Lock] key. If you configure the OIT for *Upper Case Only* in the Configuration Menu, the OIT sends only uppercase letters.

Nonalphabetic Keys

Nonalphabetic keys are those with double markings. These include the numbers 0 through 9, punctuation marks, and special characters. The system generates the lower marking when you do not depress the [Shift] key; it generates the upper marking when you depress the [Shift] key.

Cursor Keys

The cursor control keys (or "arrow keys" labeled [↑], [↓], [←], and [→] on the keypad) and the [Home] key transmit an escape sequence corresponding to their particular function when they are pressed. The actual escape sequence follows either the ANSI standard or VT52 or VT100 emulation standard, depending upon the mode you specified for the OIT.

As with all other keys, the OIT does not perform the function associated with the keys unless the host device echoes the data back, or you configured the OIT for *Echo* operation.

Function Keys

Depending upon the keyboard, up to 16 separate function keys may be available. On some keyboards, fewer function keys are shown, but in conjunction with the [Shift] key, a total of 16 function keys are accessible:

Key	Unshifted	[Shift]
F1	[F1]	[F11]
F2	[F2]	[F12]
F3	[F3]	[F13]
F4	[F4]	[F14]
F5	[F5]	[F15]
F6	[F6]	[F16]
F7	[F7]	
F8	[F8]	
F9	[F9]	
F10	[F10]	

The function keys generate a sequence of key strokes that either the OIT or a remote host can use to perform unique operations that could not otherwise be performed by a single ASCII code.

In the Online mode, the function keys transmit or generate a user–programmed sequence of one to sixteen characters.

The OITs [F1] through [F4] function keys correspond to the DEC VT100 terminal's PF1 through PF4 keys.

Miscellaneous Keys

The following key characteristics apply only to the OITs internal handling of the listed functions. In *No Echo* operation, functions such as [Return], [Line Feed], [Spacebar], [Backspace], [Del], and so on, are transmitted to the host and are acted on by the OIT only if the host retransmits the same functions back:

[Return] – moves the cursor to the first character position of the line on which it currently rests. If the cursor already rests at the first character position, it remains there. [Return] generates a line feed if you specified *Auto LF*.

[Line feed] – moves the cursor down one line. If the cursor rests on the bottom line, a line feed causes it to remain there but all of the data on the screen moves up one line. The screen loses data on the top line as it scrolls up and off the screen. [Line feed] generates a [Return] if you specified *Auto CR*.

[Spacebar] – causes the cursor to move one character position to the right. If the cursor was positioned on a displayed character, the system replaces it with a space. When a [Spacebar] occurs at the end of the line, the cursor remains there unless you select *Auto Wrap*.

[Backspace] – moves the cursor one space to the left. If the cursor rests at the left end of the line, the cursor does not move. Many forms of software use this key to delete the last input character.

[Del] – transmits the ASCII code 7F (Hex) as a nondisplayable character. The host computer software may use this to generate its own functions.

[Alt] – generates an alternate escape sequence.

[Esc] – is a nondisplayable character that transmits the ASCII code 1B in hex (or 27 in decimal). Use this key in combination with other keys to enter OIT statements. These statements change screen attributes, move the cursor, store and recall screens, and perform many other operations described throughout this guide.

[Break] – generates a [Ctrl]–C, or ETX, escape sequence.

[Print Screen], or [Prt Scr] – performs a "print screen" operation to the primary or secondary port. The [Print Screen] key must be enabled for this to happen. A complete description of this operation appears above under the "Print Screen Control" heading of the Configuration Menu.

Control Keys

You can hold down the [Ctrl] key in combination with other keys to send the 32 ASCII control codes (0–31). Refer to the "ASCII Codes and Special Character Sets" chart in Appendix B of this guide for a listing of the control keys. All of these [Ctrl] key combinations are non–displayable characters. The OIT responds to only eight of the control characters:

Backspace (BS or [Ctrl]–H) – duplicates the [Backspace] key.

Tab (HT or [Ctrl]–I) – uses software control to move the cursor to the next tab stop to the right. The tab stops are fixed eight character spaces apart at columns 9, 17, 25, 33, 41,

49, 57, 65, and 73. If the cursor rests in columns 73 through 79, each time you press Tab, the cursor only moves one character position to the right. If the cursor rests at column 80, it does not move.

Line feed (LF or [Ctrl]–J) – duplicates the [Linefeed] key.

Carriage return (CR or [Ctrl]–M) – duplicates the [Return] key.

Shift out ([Ctrl]– N) – enters the supplemental graphics mode for the current character set.

Shift in ([Ctrl]–O) – exits the supplemental graphics mode for the current character set.

Cancel ([Ctrl]–X) – stops executing the current Escape sequence.

Escape (ESC or [Ctrl]–[) – duplicates the [Esc] key. In addition to these standard [Ctrl] key combinations, OIT accepts the [Ctrl]–1 combination to cause the OIT to return to the Main Menu.

Chapter 5 OptiSCREEN Statement Reference

By using the OptiSCREEN editor and statements, the OIT functions as an independent device which can handle screen update and communications to a PLC.

You use the OptiSCREEN editor to create and modify OptiSCREEN files. Each OptiSCREEN file contains OptiSCREEN statements which you specify to generate screen displays for your application. A description of the OptiSCREEN editor appears in Chapter 2, "Getting Started", and also in Chapter 4, "Operation".

An individual OptiSCREEN file cannot exceed 31 Kbytes in size. You can use the Tools menu utility to list your OptiSCREEN files and display their sizes. You can break each OptiSCREEN file into smaller files which call each other to avoid exceeding the 31 Kbyte size limitation.

In some applications, the host sends ASCII character codes which instruct the OIT to display the OptiSCREEN files. The ASCII character codes which instruct the OIT to display the OptiSCREEN files. The ASCII character codes and escape sequences for these applications appear in Appendix D, "ANSI Escape Sequences".

OptiSCREEN Statement Types

The twelve major types of OptiSCREEN statements are briefly described below.

Comment and End of File — The comment sets off text as documentation for the screen file. Any comment found on the first line of an OptiSCREEN file also appears when you display the directory. Comments also identify the purpose of statements and sections of files for yourself and other users. The OptiSCREEN editor automatically inserts the END statement at the end of each OptiSCREEN file.

Configuration — These change the way the OIT communicates and processes text. Each configuration statement offers a corresponding statement on the configuration menu. Examples of configuration statements include AUTO WRAP AT END OF LINE and NO AUTO WRAP.

Cursor — These statements control the appearance and location of the cursor on the screen. During operation, the location of the cursor determines the starting position for text and graphics on the screen. Examples of cursor statements include NO CURSOR and the MOVE TO statement.

Character Attribute — These change the video attributes of all characters displayed after the statement. Examples of character attribute statements include BLINK, SUPPLEMENTAL, QUAD, BLUE, and / WHITE.

Line Attribute — These set the video attributes for a single line of text on the screen. Examples of line attribute statements include DOUBLE SIZE LINE and DOUBLE WIDE LINE.

Clock and Date These specify whether or not the date and time appear at the bottom of the screen in the OptiSCREEN status line. Examples of clock and date statements include DISABLE DATE and ENABLE DATE.

Display The DISPLAY statement is one of the most commonly used statements in the OptiSCREEN editor. You can generate text and graphics for your application with the DISPLAY statement.

File Display The file display statements display other screen files, allowing you to "call" other OptiSCREEN files, file memory, or a directory of files. Examples of the file display statements include DISPLAY FILE and DISPLAY FILE MEMORY.

Erasing and Editing The erasing and editing statements allow you to perform a number of operations that edit text and graphics which already appear on the screen: clear the screen or a portion of the screen, insert new text, or specify a scrolling region for text or graphics. Examples of erasing and editing statements include CLEAR SCREEN, CLEAR STATUS LINES, DELETE LINE, and SCROLL UP.

Graphics The graphics statements draw boxes, change the video attributes for boxed regions of the screen, and draw bar graphs. Examples of graphic statements include BOX, EMPTY BOX, BOX ATTRIBUTES, and HORIZONTAL BAR GRAPH.

Programmable Keyboard and Function Key These statements allow you to set and use the programmable keyboard and function key capabilities of an OIT. Examples of these statements include CLEAR KEY TABLE, DISPLAY KEY TABLE, and LOAD KEY. The LOAD FUNCTION KEY statement loads the available function keys for a OIT.

Data Transmissions and Port Control These statements control data transmissions and output from the serial ports. Examples of these statements include PRINT SCREEN and BAUD.

Data Fill Operations You may create an OptiSCREEN file with numerous blanks left for the host to fill with data. The file creation and appending procedures allow you to create the screen file using the [Ctrl]-E (ENQ, enquiry) control character for the locations on the screen where the system displays data.

Conventions for the OptiSCREEN Statements

This summary lists and describes all of the statements used in the OptiSCREEN editor. All OptiSCREEN statement listings follow the format shown below:

STATEMENT FORM {ESC}xxx

A short description of the statement follows the headline statement form. Elements that appear in UPPERCASE LETTERS of the statement form are required elements of the statement. Elements that appear in lowercase letters are parameters that you supply. A summary of acceptable parameters appears in the description.

Example: A short explanation appears before the example of the statement.

```
OPTISCREEN STATEMENT 1
OPTISCREEN STATEMENT 2
...
OPTISCREEN STATEMENT n
```

Each of the OptiSCREEN statements appear under the heading in which the statement is summarized above. An alphabetic summary of the individual statements appears at the end of the chapter.

The escape sequence in the form {ESC}xxx is provided for each OptiSCREEN statement. Escape sequences can be sent by a Host to produce the same result as the OptiSCREEN statement.

The Comment and End of File Statements

The comment statement and the end of file statement are two important statements for the OptiSCREEN system.

'comment

OptiSCREEN treats all text following an apostrophe (') as a comment.

comment specifies that the rest of the line is a comment. You can only place the comment at the beginning of the line.

When you make the first line of an OptiSCREEN file a comment, the first 25 characters of the comment line also appear when you generate a directory of OptiSCREEN files from the Tools menu .

Example: Give a comment that you might want to place as the first line of an OptiSCREEN file. When you generate a directory of OptiSCREEN files, the system labels this file as Fluid Level, Tanks 1,2,3:

```
'Fluid Level, Tanks 1,2,3
```

END {EOT}

The END statement indicates the end of the OptiSCREEN screen file. The OptiSCREEN editor automatically adds the END statement to each file that you create.

Configuration Statements

The configuration statements change the way the OIT communicates and processes text. Each configuration statement offers a corresponding statement which you can set in the Configuration Menu as the default.

AUTO LINE FEED ON RETURN {ESC}[>8h
NO AUTO LINE FEED {ESC}[>8l

The AUTO LINE FEED ON RETURN statement forces an automatic line feed to occur with a carriage return. It is rarely used since most host devices already generate a line feed with a carriage return.

The NO AUTO LINE FEED statement disables the automatic line feed that usually occurs with a carriage return; it is the opposite of the AUTO LINE FEED ON RETURN statement.

AUTO RETURN ON LINE FEED {ESC}[9h
NO AUTO RETURN {ESC}[9l

The AUTO RETURN ON LINE FEED statement forces an automatic carriage return that occurs with a line feed. It is rarely used since most host devices already generate a carriage return with a line feed.

The NO AUTO RETURN statement disables the automatic carriage return that occurs with a line feed; it is the opposite of the AUTO RETURN ON LINE FEED statement.

AUTO WRAP AT END OF LINE {ESC}[?7h
NO AUTO WRAP {ESC}[?7l

The AUTO WRAP AT END OF LINE statement forces automatic line wrapping to occur at the end of a filled line. The screen scrolls up to wrap, if necessary. This statement is useful when you use a host device sending a series of ASCII characters without line feeds or carriage returns.

The NO AUTO WRAP statement disables the automatic line wrapping facility at the end of lines. After the 80th character in a line (or 132nd character depending on your configuration) , characters overprint so that only the last character received in column 80 (or 132) appears. This statement is the opposite of the AUTO WRAP AT END OF LINE statement.

BAUD nnn {ESC}[nnn W
BAUD port, nnn {ESC}[port;nnn W

This statement sets the serial communications baud rate for the current operation. The OIT allows you to specify different baud rates for the two ports.

port - specifies the port as 1 or 2. If you do not specify "port", the statement sets both port 1 and port 2 to the specified baud rate.

nnn - specifies the baud rate. You must specify nnn as one of the following rates: 300, 600, 1200, 2400, 4800, 9600, or 19200.

You should pause communications for a minimum of one second after you issue the BAUD statement to allow time for the serial ports to begin use of the selected baud rate. Your OIT may require additional pause time if you sent statements or data to it immediately prior to the BAUD statement. This is necessary since your OIT buffers statements and data at the same time that the host sends the BAUD statement.

Example: Change the baud rate to 1200 baud for a printer connected to port 2.

```
BAUD  2, 1200
```

Cursor Statements

The cursor statements control the appearance of the cursor and specify the location for the cursor on the screen. During operation, the location of the cursor determines the starting position for text and graphics on the screen.

Controlling the Appearance of the Cursor

The following statements determine whether or not the cursor appears on the screen, the appearance of the cursor, and the blinking or non?blinking characteristics of the cursor.

CURSOR or ENABLE CURSOR {ESC}[>5l
NO CURSOR or DISABLE CURSOR {ESC}[>5h

The CURSOR and ENABLE CURSOR statements make the cursor visible so that it appears on the screen. The two statements are identical.

The NO CURSOR and DISABLE CURSOR statements disable the cursor so that it does not appear on the screen. The two statements are identical. They are the complements of the CURSOR and ENABLE CURSOR statements.

BLOCK CURSOR {ESC}[>4h
UNDERLINE CURSOR {ESC}[>4l

The BLOCK CURSOR statement makes the cursor appear as a solid block on the screen.

The UNDERLINE CURSOR statement makes the cursor appear as an underline character on the screen.

BLINKING CURSOR {ESC}[>11l
STEADY CURSOR {ESC}[>11h

The BLINKING CURSOR statement makes a block or underline cursor flash off and on as it appears on the screen. To make a block of text blink, use the FLASH statement.

The STEADY CURSOR statement makes a block or underline cursor non-flashing as it appears on the screen.

Controlling the Location of the Cursor

The following statements determine the location of the cursor on the screen.

COLUMN nn {ESC}[ccc F

This statement moves the cursor to the right.

nn - is the number of columns, or character cells, you are moving on the current row. If you do not specify the number of columns, it moves the cursor one column to the right.

A screen contains 80 or 132 columns, depending on your configuration. If the cursor is in the right most column, it remains there.

Example: Move the cursor to column 6 on the current row.

```
COLUMN 6
```

HOME {ESC}[H or {ESC}[f

The HOME cursor statement moves the cursor to the home position at row 1 and column 1.

Example: The underlined number 1 appears in the home position below.

```
1234567891111111111222222222233333333334444444444555555555566666666667777777778
2        012345678901234567890123456789012345678901234567890123456789012345678901234567890
3
4                    < < < Columns 1 through 80 > > >
5
6
7
8
9
10                                      _ MOVE TO 10, 40
11 ^
12 ^
13 ^                                                    _ UP 2
14 Rows
15 1                                    _ DOWN 5        _ RIGHT 15
16 through
17 25
18 ^
19 ^
20 ^
21
22
23
24
25
```

MOVE TO rr, {ESC}[rr f
MOVE TO rr, ccc {ESC}[rr;ccc f or {ESC}[rr;ccc H

This statement positions the cursor on the screen at a specified row and column position.

rr - specifies row 1 to 25 (or 30 depending on your configuration), inclusive. If you specify a row that does not exist, the cursor remains in the current row.

ccc - specifies column 1 to 80 (or 132 depending on your configuration), inclusive. If you specify column 0, the cursor moves to row rr and column 1. If you specify a column that does not exist, the cursor moves to the last column.

Example 1: Move the cursor to row 10 and column 40.

```
MOVE TO 10, 40
```

Example 2: Both of the following statements move the cursor to row 20 and column 1.

```
MOVE TO 20,
MOVE TO 20, 1
```

DOWN {ESC}[B
DOWN nn {ESC}[nn B

This statement moves the cursor down the screen.

nn - specifies the number of rows to move. If you do not specify the number of rows, this statement moves the cursor down one row.

A screen contains 25 or 30 rows depending on your configuration. If the cursor appears in the row before the status line(s), it remains in that row.

Example: Move the cursor down 5 lines.

```
DOWN 5
```

UP {ESC}[A
UP nn {ESC}[nn A

This statement moves the cursor up the screen.

nn - specifies the number of rows to move. If you do not specify the number of rows, this statement moves the cursor up one row.

A screen always contains 25 or 30 rows depending on your configuration. If the cursor is in row 1, it remains there.

Example: Move the cursor up four rows.

```
UP 4
```

LEFT {ESC}[D
LEFT nnn {ESC}[nnn D

This statement moves the cursor to the left.

nnn - specifies the number of columns, or character cells, to move. If you do not specify the number of columns, this statement moves the cursor left one column.

A screen contains 80 or 132 columns depending on your configuration. If the cursor is in column 1, it remains there.

Example: Move the cursor left seven spaces.

```
LEFT 7
```

RIGHT {ESC}[C
RIGHT nnn {ESC}[nnn C

This statement moves the cursor to the right.

nnn - specifies the number of columns, or character cells, to move. If you do not specify the number of columns, it moves the cursor one column to the right.

A screen contains 80 or 132 columns depending on your configuration. If the cursor is in the right most column, it remains there.

Example: Move the cursor right six spaces.

```
RIGHT 6
```

INDEX {ESC}D

This statement invokes a line feed to move the cursor down one row. If the cursor rests on the bottom row in the active portion of the screen, it remains there and the display scrolls up one row. If the cursor rests in the status portion of the screen, it only scrolls the status region and does not affect the active portion of the screen.

REVERSE INDEX {ESC}M

This statement reverses the line feed to move the cursor up one row. If the cursor is on the top row, it remains there and scrolls text on the screen down one line.

NEW LINE {ESC}[E

This statement moves the cursor down one row and automatically moves to the beginning of the new line.

LINE rr {ESC}[rr f or {ESC}[rr H

This statement moves the cursor to the beginning of specified line 1 to 25 (or 30, depending on your configuration), inclusive.

rr - specifies the line, or row, number.

A screen has 25 or 30 rows, depending on your configuration.

Example: Move the cursor to row 4, column 1.

```
LINE 4
```

ROW nn {ESC}[nn E

This statement moves the cursor to the beginning of specified line 1 to 25 (or 30, depending on your configuration).

nn - specifies the line, or row, number.

A screen has 25 or 30 rows, depending on your configuration.

Example: Move the cursor to row 4, column 1.

```
ROW 4
```

SAVE POSITION {ESC}7 or {ESC}[s
RESTORE POSITION {ESC}8 or {ESC}[u

The SAVE POSITION statement stores the current location of the cursor so that you can return to that location. The RESTORE POSITION statement returns the cursor to the stored location.

Example: Display an OptiSCREEN file. After the system displays the file, store the position of the cursor, display two other files, and then return to the stored position that you specified earlier.

```
DISPLAY FILE 10
SAVE POSITION
DISPLAY FILE 21
DISPLAY FILE 22
RESTORE POSITION
```

Character Attribute Statements

Character attribute statements change the video attributes of all characters displayed after the statement. The first set of character attribute statements described below

35define the common attributes for the OIT in color and monochrome modes. The second set of statements define attributes for the OIT in color mode only. The third set define attributes for the OIT in monochrome mode only. Finally, the ATTRIBUTE statement defines character attributes that affect the OIT in both color and monochrome modes by changing the character appearance and color or intensity.

The color / monochrome mode is set using Jumper E1 as described in Chapter 3.

Attributes for Both Color and Monochrome OITs

These statements define the character attributes for the OIT common to both color and monochrome modes.

BLINK {ESC}[5m
EXIT DOUBLE WIDE AND BLINK {ESC}[22m

The BLINK statement establishes blinking as the current character attribute mode. After you issue the BLINK statement, all subsequent text and graphics slowly flash off and on. (To make the cursor blink, use the BLINKING CURSOR statement.)

The EXIT DOUBLE WIDE AND BLINK character attribute statement resets the double wide and blink character attributes to normal. This statement does not change the foreground or background intensity. The RESET ATTRIBUTES statement resets the blink condition as well as all character attributes to the default: normal size, normal color or intensity, no underlining, and no reversed colors or intensities.

To display text and graphics as blinking, the OIT must have the jumpers at location E4 set to pins 2 and 3. Otherwise, the OIT displays characters as part of the Super character set. This jumper is described in Chapter 3.

Example: Create a single line text message with only the word Warning blinking.

```
MOVE TO 10, 15
BLINK
DISPLAY “WARNING ”
EXIT DOUBLE WIDE AND BLINK
DISPLAY “OVEN TEMPERATURE HIGH!”
```

REVERSED {ESC}[7m

The REVERSED statement establishes reverse video as the current character attribute mode; normally the characters appear as a light character on a dark background. In monochrome mode, the background intensity level (bright, dim, or normal) appears the same as the previously specified foreground. In color mode, the foreground and background colors are “reversed;” for example, a black foreground on a red background reverses to red on black.

The RESET ATTRIBUTES statement resets the reversed attribute as well as all character attributes to the default: normal size, normal color or intensity, no blink, and no underlining.

Example: Display a two line message. Make the second line use reversed characters to highlight it.

```
MOVE TO 10, 28
DISPLAY “Crusher not moving”
REVERSED
```

```
MOVE TO 12, 20
DISPLAY "Check with operator for information"
RESET ATTRIBUTES
```

SUPER {ESC}[24m
EXIT SUPER {ESC}[25m

Not supported.

SUPPLEMENTAL {ESC}[11m or {SO}
EXIT SUPPLEMENTAL {ESC}[10m or {SI}

The SUPPLEMENTAL statement establishes the supplemental character set as the current character attribute mode. The supplemental character set consists of the numbers from 0 to 9, the uppercase letters from A to Z, most punctuation marks, and 33 supplemental graphics characters. You specify the supplemental graphics with lowercase letters from a to z and special symbols. A summary and comparison of the standard, supplemental, alternate, and quad characters appears at the end of the discussion of these characters.

The EXIT SUPPLEMENTAL statement exits the supplemental character set. This statement does not change any other character or line attribute settings.

Example: Display a small box generated with supplemental characters.

```
MOVE TO 10, 20
SUPPLEMENTAL
DISPLAY "lk"
MOVE TO 11, 20
DISPLAY "mj"
EXIT SUPPLEMENTAL
```

QUAD SIZE {ESC}[16m
EXIT QUAD {ESC}[17m

The QUAD SIZE statement establishes quad size characters as the current character attribute mode. All characters and symbols cover the positions from the cursor to the right four character cells and up four lines. You must clear the area of the screen before printing quad size characters since unused character cells do not erase previous data on the screen and connecting lines used in graphic displays remain visible after a quad size symbol appears.

The quad size character set includes the capital letters A through Z, the numerals 0 through 9, and the comma (,), the period (.), the asterisk (*), the plus sign (+), the minus sign (–), the equals sign (=), the slash (/), and the question mark (?). A number of quad size symbols can be generated by using lowercase letters a through l, and special symbols. A summary and comparison of the standard, supplemental, alternate, quad, and double wide characters appears at the end of the discussion of these characters.

Quad size characters in column 78, 79, and 80 (or 130, 131, and 132, depending on your configuration) wrap to the next available row (four rows below the current row) and scroll, if necessary, after you specify WRAP AT END OF LINE. This allows you to use the OIT as a quad size message display. After you specify quad size characters, text information sent to the OIT in online mode is correctly displayed and scrolled even when the message exceeds a line or the screen size.

See also the section below, “Comparison of Various Character Attribute Modes”.

The combination of QUAD SIZE and DOUBLE WIDE attributes create characters which appear eight columns wide and four rows tall. Quad size and double wide characters wrap to the next available row and scroll, if necessary, after you specify WRAP AT END OF LINE.

The EXIT QUAD statement exits the quad size character set. This statement does not change any other character or line attribute settings.

Example: Display a message in quad-sized letters and then exit the QUAD character attribute mode.

```
QUAD SIZE
DISPLAY “IN PROGRESS”
EXIT QUAD
```

ALTERNATE {ESC}[12m
EXIT ALTERNATE {ESC}[13m

The ALTERNATE statement establishes the alternate character set as the current character attribute mode. The alternate character set consists of 128 graphics characters. You specify the alternate character set with the numbers from 0 to 9, the uppercase letters from A to Z, the lower case letters from a to z, and the special symbols.

The supplemental alternate character set gives you a number of additional special graphic symbols. A summary and comparison of the standard, supplemental, alternate, and quad character sets appears at the end of the discussion of these characters.

The EXIT ALTERNATE statement exits the alternate character set.

Example: Display two characters from the standard character set and then display a graphic symbol (an ascending diagonal line) from the alternate character set.

```
LINE 10
DISPLAY “lm”
ALTERNATE
DISPLAY “lm”
UP
DISPLAY “lm”
EXIT ALTERNATE
```

DOUBLE WIDE {ESC}[15m
EXIT DOUBLE WIDE AND BLINK {ESC}[22m

The DOUBLE WIDE statement establishes double wide characters as the current character attribute mode. The cursor automatically increments two positions for both characters and spaces, but only decrements one position for the backspace character. Cursor movements are still performed one position at a time although the position after the double wide character does not appear. Double wide characters in column 80 (or 132, depending on your configuration) wrap to the next row and scroll, if necessary, after you specify WRAP AT END OF LINE. A summary and comparison of the standard, supplemental, alternate, quad, and double wide character set appears at the end of the discussion of these characters.

The combination of DOUBLE WIDE and QUAD SIZE attributes create characters which appear eight columns wide and four rows tall. Double wide and quad size characters wrap to the next row and scroll, if necessary, after you specify WRAP AT END OF LINE.

The EXIT DOUBLE WIDE AND BLINK statement resets the double wide and blink character attributes to normal. The RESET ATTRIBUTES statement does NOT reset the DOUBLE WIDE statement to normal.

Example: Display double wide text and then return to the normal character attribute mode.

```
DOUBLE WIDE
MOVE TO 5, 10
DISPLAY "New Instructions"
MOVE TO 7, 20
EXIT DOUBLE WIDE AND BLINK
DISPLAY "For Loading"
```

Comparison of Various Character Attribute Modes

The following chart shows the similarities and the differences between the ASCII codes and the standard, supplemental, quad size, alternate, and supplemental alternate character modes. (Drawings of the graphics characters appear in Appendix B.) To use the chart, determine the ASCII code for the character that you want to print, find the column that holds the number, and look down the column to see the various outputs available for the character in the different modes.

For example, the letter A is ASCII number 65. In standard, supplemental, and quad size character mode, it produces the uppercase letter A. In alternate and supplemental alternate character mode, it produces a graphics character for the upper part of a circle.

The letter a is ASCII number 97. In standard character mode, it produces the lower letter a. In supplemental character mode, it produces a "checker board" pattern. In quad size mode, it produces the graphics character for a transformer. In alternate character mode, it produces a graphics character for the lower part of a half circle. In supplemental alternate character mode, it produces an angular shape.

The caret (^) is ASCII number 94. In standard character mode, it produces a caret. In supplemental character mode, it produces a a vertical bar. In alternate character mode, it produces a graphics character for the upper part of a half circle. In supplemental alternate character mode, it is blank. In quad size mode, it produces a quad size "up arrow" graphics character.

Character	ASCII codes 48-57	ASCII codes 65-90	ASCII codes 97-122	ASCII codes 32-47	ASCII codes 58-64	ASCII codes 91-96	ASCII Codes 123-126
Standard	0 to 9	A to Z	a to z	space ! " # $ % & ' ( ) * + , – . /	: ; <=> ? @	[\ ] ^ _ ‘	{ | } ~
Supple–mental Standard	0 to 9	A to Z	graphics	space ! " # $ % & ' ( ) * + , – . /	: ; <=> ? @	[\ ] and graphics	graphics
Quad Size	0 to 9	A to Z	graphics and blank	space ! * + , – . / and graphics	= ? and graphics	graphics	blank
Alternate	graphics	graphics	graphics	graphics	graphics	graphics	blank
Supple–mental Alternate	same graphics as Alternate	same graphics as Alternate	different graphics than Alternate	same graphics as Alternate	same graphics as Alternate	different graphics than Alternate	blank

This chart expresses ASCII codes as decimal values. Drawings of the graphics characters appear in Appendix B.

ENABLE ATTRIBUTES {ESC}[_
DISABLE ATTRIBUTES {ESC}[^

The DISABLE ATTRIBUTES statement inhibits, or suppresses, the writing of character attributes to the screen. In this mode, the character attributes already specified in a location remain unchanged and the system writes only character data to the screen. The DISABLE ATTRIBUTES statement is helpful in several situations:

- It is easier to update random fields on the screen. You do not have to change the current character attribute when you move from field to field.
- It takes less time to display information. Without using DISABLE ATTRIBUTES, half of the display information specifies the character attribute and the other half specifies the character data. With DISABLE ATTRIBUTES, the system only uses the character data.

The ENABLE ATTRIBUTES statement resets the ability to write character attributes to the screen; this is the default mode.

RESET ATTRIBUTES {ESC}[m or {ESC}[0m

The RESET ATTRIBUTES statement resets all character attributes to the default: normal size, normal color or intensity, no blink, no underlining, and no reversed colors or intensities. The RESET ATTRIBUTES statement does not change the character set from alternate, supplemental, or quad; nor does it affect line attributes.

You can specify a new default with the SET DEFAULT ATTRIBUTE statement.

SET DEFAULT ATTRIBUTE {ESC}[X

This statement defines the currently set character attributes, including color or intensity attributes, as the new default attributes. Use this statement with the RESET ATTRIBUTES statement to control the default attributes and restore them to the most commonly used format in your application.

Example: Display text to show the default color settings for your OIT before you set a new default. Set a new default. Change the color setting again and then return to your new default setting.

```
CLEAR SCREEN
MOVE TO 8, 10
DISPLAY “Default settings”
YELLOW
MOVE TO 10, 10
DISPLAY “Yellow foreground”
SET DEFAULT ATTRIBUTE
RED
/BLUE
MOVE TO 12, 10
DISPLAY “Red on blue”
RESET ATTRIBUTES
MOVE TO 14, 10
DISPLAY “New default”
```

Attributes for OITs in Color Mode Only

All of the following statements are valid only on units with the COLOR option saved on the configuration menu. Also, jumper E1 must be set to enable foreground color. (See Chapter 3.) With all of the following colors, you use the foreground color (such as BLACK or RED) to specify the color for the text or graphics. You use the background color (such as /BLUE or /GREEN) to specify the color for a region.

The RESET ATTRIBUTES statement resets all character attributes to the default colors.

BLACK {ESC}[30m
/BLACK {ESC}[40m

The BLACK statement sets the foreground color to black. /BLACK sets the background color to black.

Example: Display black text on a red background.

```
BLACK
/RED
DISPLAY “Black foreground with red background”
```

BLUE {ESC}[34m
/BLUE {ESC}[44m

The BLUE statement sets the foreground color to blue. /BLUE sets the background color to blue.

Example: Display blue text on a yellow background.

```
BLUE
/YELLOW
DISPLAY
“Blue text, yellow background.”
```

CYAN {ESC}[36m
/CYAN {ESC}[46m

The CYAN statement sets the foreground color to cyan, or light blue. /CYAN sets the background color to cyan, or light blue.

Example: Display black text on a cyan background.

```
BLACK
/CYAN
DISPLAY “Black on cyan”
```

GREEN {ESC}[32m
/GREEN {ESC}[42m

The GREEN statement sets the foreground color to green. /GREEN sets the background color to green.

Example: Display green text on a white background.

```
GREEN
/WHITE
DISPLAY "Green on white"
```

MAGENTA, PURPLE, or PINK {ESC}[35m
/MAGENTA, /PURPLE, or /PINK {ESC}[45m

The MAGENTA, PURPLE, and PINK statements set the foreground color to magenta. /MAGENTA, /PURPLE, and /PINK set the background color to magenta. The MAGENTA, PURPLE, and PINK statements, as well as the /MAGENTA, /PURPLE, and /PINK statements, are identical.

RED {ESC}[31m
/RED {ESC}[41m

The RED statement sets the foreground color to red. /RED sets the background color to red.

WHITE {ESC}[37m
/WHITE {ESC}[47m

The WHITE statement sets the foreground color to white. /WHITE sets the background color to white.

YELLOW {ESC}[33m
/YELLOW {ESC}[43m

The YELLOW statement sets the foreground color to yellow. /YELLOW sets the background color to yellow.

Attributes for OITs in Monochrome Mode Only

All of the following statements are valid on OITs with jumper E1 set to 2-3 and 4-5 and the MONOCHROME option saved on the configuration menu. With all of the following intensities, you use the foreground setting (such as BRIGHT or DARK) to specify the intensity for the text or graphics.

You use the background setting (such as /DIM or /NORMAL) to specify the intensity for a region.

The RESET ATTRIBUTES statement resets all character attributes to the default intensities and no underlining.

BRIGHT {ESC}[33m
/BRIGHT {ESC}[43m

The BRIGHT statement sets the foreground intensity level to higher than normal. /BRIGHT sets the background intensity level to higher than normal.

Example: Display information with normal text and the warning in bright text.

```
NORMAL
MOVE TO 10, 1
DISPLAY “Bin 1 OK”
BRIGHT
MOVE TO 12, 1
DISPLAY “CHECK BIN 2”
NORMAL
MOVE TO 14, 1
DISPLAY “Bin 3 OK”
```

DIM {ESC}[31m
/DIM {ESC}[41m

The DIM statement sets the foreground intensity level lower than normal. /DIM sets the background intensity level to lower than normal.

Example: Display dim text over a dark background and bright text over a dim background.

```
MOVE TO 10, 10
DIM
/DARK
DISPLAY “Staging area ”
BRIGHT
/DIM
DISPLAY “Overloaded”
RESET ATTRIBUTES
```

DARK {ESC}[30m
/DARK {ESC}[40m

The DARK statement sets the foreground intensity level to dark. /DARK sets the background intensity level to dark.

DARK UNDERLINE {ESC}[34m

The DARK UNDERLINE statement sets the foreground intensity level to be lower than DIM UNDERLINE and underlines the text. The OptiSCREEN system also offers DIM UNDERLINE, UNDERLINE, NORMAL UNDERLINE, and BRIGHT UNDERLINE modes. Jumper E1 must be positioned properly to enable text underlining. Also the UNDERLINE / NO UNDERLINE Configuration Screen Switch must be set to UNDERLINE.

The RESET ATTRIBUTES statement resets all underlining attributes as well as all character attributes to the default: Normal size, normal intensity, and no reversed intensities.

NORMAL {ESC}[32m
/NORMAL {ESC}[42m

The NORMAL statement sets the foreground intensity level to normal. /NORMAL sets the background intensity level to normal.

Example: Display normal text, bright text, and return to normal again.

```
NORMAL
MOVE TO 10, 20
DISPLAY “Step 1 Complete”
BRIGHT
MOVE TO 12, 20
DISPLAY “Step 2 In Process”
NORMAL
MOVE TO 14, 20
DISPLAY “Step 3 Scheduled, Not Done”
```

NORMAL UNDERLINE {ESC}[36m

The NORMAL UNDERLINE statements sets the foreground to the default, or normal, intensity and underlines the text. The OptiSCREEN system also offers DARK UNDERLINE, DIM UNDERLINE, UNDERLINE, and BRIGHT UNDERLINE modes. Jumper E1 must be positioned properly to enable text underlining. Also the UNDERLINE / NO UNDERLINE Configuration Screen Switch must be set to UNDERLINE.

The RESET ATTRIBUTES statement resets all underlining attributes as well as all character attributes to the default: Normal size, normal intensity, and no reversed intensities.

UNDERLINE {ESC}[4m
BRIGHT UNDERLINE {ESC}[37m
DIM UNDERLINE {ESC}[35m

The UNDERLINE statement sets the foreground intensity level to normal and underlines the text. The BRIGHT UNDERLINE statement sets the foreground intensity level higher than normal and underlines the text. The DIM UNDERLINE statement sets the foreground intensity level lower than normal and underlines the text. Jumper E1 described in Chapter 3, must be positioned properly to enable text underlining.

The RESET ATTRIBUTES statement resets all underlining modes as well as all character attributes to the default: normal size, normal color or intensity, no blink, and no reversed colors or intensities.

Example 1: Display a line of underlined text.

```
UNDERLINE
DISPLAY “Bin Full”
RESET ATTRIBUTES
```

Example 2: Display a message with one word underlined with a bright underline.

```
BRIGHT
DISPLAY “System 1 loading ”
BRIGHT UNDERLINE
DISPLAY “NOW”
RESET ATTRIBUTES
```

LIGHT BRIGHT {ESC}[37m
/LIGHT BRIGHT {ESC}[47m

The LIGHT BRIGHT statement sets the foreground intensity level to higher than bright. /LIGHT BRIGHT sets the background intensity level to higher than bright. The OptiSCREEN system also offers BRIGHT, LIGHT DARK, LIGHT DIM, and LIGHT NORMAL modes.

Example: Display information with normal text and the warning in higher than bright text.

```
NORMAL
MOVE TO 10, 1
DISPLAY “Bin 1 OK”
LIGHT BRIGHT
MOVE TO 12, 1
DISPLAY “CHECK BIN 2”
NORMAL
MOVE TO 14, 1
DISPLAY “Bin 3 OK”
```

LIGHT DARK {ESC}[34m
/LIGHT DARK {ESC}[44m

The LIGHT DARK statement sets the foreground intensity level to darker than normal. /LIGHTDARK sets the background intensity level to darker than normal. The OptiSCREEN system also offers BRIGHT, LIGHT BRIGHT, LIGHT DIM, and LIGHT NORMAL modes.

Example: Display information with normal text and the warning in dark text.

```
NORMAL
MOVE TO 10, 1
DISPLAY “Bin 1 OK”
LIGHT DARK
MOVE TO 12, 1
DISPLAY “CHECK BIN 2”
NORMAL
MOVE TO 14, 1
DISPLAY “Bin 3 OK”
```

LIGHT DIM {ESC}[35m
/LIGHT DIM {ESC}[45m

The LIGHT DIM statement sets the foreground intensity level to dimmer than normal. /LIGHT DIM sets the background intensity level to dimmer than normal. The OptiSCREEN system also offers BRIGHT, LIGHT BRIGHT, LIGHT DARK, and LIGHT NORMAL modes.

Example: Display information with normal text and the warning in dim text.

```
NORMAL
MOVE TO 10, 1
DISPLAY “Bin 1 OK”
LIGHT DIM
MOVE TO 12, 1
DISPLAY “CHECK BIN 2”
NORMAL
MOVE TO 14, 1
DISPLAY “Bin 3 OK”
```

LIGHT NORMAL {ESC}[36m
/LIGHT NORMAL {ESC}[46m

The LIGHT NORMAL statement returns the foreground intensity level to normal. /LIGHTNORMALreturns the background intensity to normal.

Example: Display information with normal text and the warning in normal text.

The ATTRIBUTE Statement

The ATTRIBUTE statement allows you to specify character attribute settings that operate on both color and monochrome settings.

```
NORMAL
MOVE TO 10, 1
DISPLAY “Bin 1 OK”
LIGHT NORMAL
MOVE TO 12, 1
DISPLAY “CHECK BIN 2”
NORMAL
MOVE TO 14, 1
DISPLAY “Bin 3 OK”
```

ATTRIBUTE: nn {ESC}[nn m
ATTRIBUTES: nn, nn {ESC}[nn; nn m
ATTRIBUTES: nn, nn, nn {ESC}[nn; nn; nn m

The ATTRIBUTE statement establishes one, two, or three character attributes as the current character attribute mode or modes.

nn - specifies a character attribute mode number from the table given below.

Each OptiSCREEN character attribute statement offers an identical ATTRIBUTE statement; for example, the ATTRIBUTE: 12 statement and the ALTERNATE statement are identical. The ATTRIBUTE mode numbers and their paired character attribute statements are listed below:

Mode	Character Attribute Statement
0	RESET ATTRIBUTES
1	BRIGHT
2	DIM
4	UNDERLINE
5	BLINK
7	REVERSE
10	EXIT SUPPLEMENTAL
11	SUPPLEMENTAL
12	ALTERNATE
13	EXIT ALTERNATE
14	BRIGHT and / DIM
15	DOUBLE WIDE
16	QUAD SIZE
17	EXIT QUAD SIZE
22	EXIT DOUBLE WIDE AND BLINK
30	BLACK or DARK
31	RED or DIM
32	GREEN or NORMAL
33	YELLOW or BRIGHT
34	BLUE or LIGHT DARK (or UNDERLINE *)
35	MAGENTA or LIGHT DIM (or DIM UNDERLINE *)
36	CYAN or LIGHT NORMAL (or UNDERLINE *)
37	WHITE or LIGHT BRIGHT (or BRIGHT UNDERLINE *)
40	/ BLACK or / DARK
41	/ RED or / DIM
42	/ GREEN or / NORMAL
43	/ YELLOW or / BRIGHT
44	/ BLUE or / LIGHT DARK
45	/ MAGENTA or / LIGHT DIM
46	/ CYAN or / LIGHT NORMAL
47	/ WHITE or / LIGHT BRIGHT

* Attribute if jumper E1 is set for underlining. See Chapter 3.

Example 1: Display white characters on a blue background.

```
ATTRIBUTES: 37, 44
DISPLAY "This is white foreground on blue background"
```

Example 2: Display blue blinking characters on a white background.

```
ATTRIBUTES: 5, 34, 47
DISPLAY "Now the text is blue and blinking"
```

Line Attribute Statements

Line attribute statements set the video attributes for a single line of text on the screen.

DOUBLE SIZE {ESC}#7
DOUBLE SIZE "text" {ESC}#9text{ETX}

The DOUBLE SIZE line attribute statement establishes double size as the current line attribute mode. Double size characters extend from the current cursor position up one

line so that each double size character appears two character cells tall and one character cell wide. Since DOUBLE SIZE is a line attribute, only double size characters appear on a double size line. The DOUBLE SIZE statement only affects a single line.

The RESET LINE ATTRIBUTES statement resets the DOUBLE SIZE attribute as well as all line attributes to single height and single width characters.

Note

DOUBLE SIZE TOP / BOTTOM statements are still supported but you should now be using just the DOUBLE SIZE statement.

text - specifies a line of text generated with double size characters. When you specify text, the system leaves the cursor at the end of the line.

Example 1: Display a single line of double-sized text.

```
MOVE TO 10, 35
DOUBLE SIZE
DISPLAY "ALPHA CORP."
MOVE TO 12, 36
DISPLAY "Distribution System"
```

Example 2: Display a single line of double-sized text.

```
MOVE TO 10, 20
DOUBLE SIZE "XYZ INC."
MOVE TO 12, 20
DISPLAY "Loader No.  1"
```

DOUBLE WIDE LINE {ESC}#6

This statement establishes double-wide characters for an entire line of characters on the screen. The RESET LINE ATTRIBUTES statement resets the DOUBLE WIDE LINE attribute as well as all line attributes to single-height and single-width characters.

Example: Display a single line of double-wide text and a line of normal text.

```
MOVE TO 10, 20
DOUBLE WIDE LINE
DISPLAY "Sprayer Operating"
MOVE TO 15, 26
DISPLAY "Do not change setting"
```

SINGLE SIZE LINE {ESC}#5

This statement establishes an entire line of single-sized characters on the screen. An example of this statement appears below under the RESET LINE ATTRIBUTES statement.

RESET LINE ATTRIBUTES {ESC}#0

This statement resets all line attributes to the default operating mode with single height and single width characters.

Example: Display the words "INPUT" and "OUTPUT" with double wide characters. After each of the words, display "location 1" and "location 2" with normal characters. Use the SINGLE SIZE LINE statement to reset the first occurrence of double wide characters; use the RESET LINE ATTRIBUTES statement to reset the second occurrence.

```
MOVE TO 5, 5
DOUBLE WIDE LINE
```

```
DISPLAY "INPUT "
SINGLE SIZE LINE
DISPLAY "location 1"
DOUBLE WIDE LINE
DISPLAY " OUTPUT "
RESET LINE ATTRIBUTES
DISPLAY "location 2"
```

Clock and Date Statements

The clock and date statements specify whether or not the date and time appear at the bottom of the screen in the OptiSCREEN status line.

DISABLE TIME {ESC}[?15l
ENABLE TIME {ESC}[?15h

After you give the DISABLE TIME statement, the system does not display the time at the bottom of the screen. To force the time to appear again, enter the ENABLE TIME statement.

DISABLE DATE {ESC}[?14l
ENABLE DATE {ESC}[?14h

After you give the DISABLE DATE statement, the system does not display the date at the bottom of the screen. To force the date to appear again, enter the ENABLE DATE statement.

Example: Disable the date and time display from the bottom of the screen, display three screens in the body of the screen, and then force only the date to appear again at the bottom of the screen.

```
DISABLE DATE
DISABLE TIME
DISPLAY FILE 25
DISPLAY FILE 26
DISPLAY FILE 27
ENABLE DATE
```

DISPLAY DATE HERE {ESC}[j
DISPLAY TIME HERE {ESC}[k

These statements allow you to move the date display and the time display from the bottom right corner of the screen. The statements change the display position, not the character attributes or line attributes.

Example: Display the time and date in a new location on the screen.

```
MOVE TO 1, 1
DISPLAY "Time: "
DISPLAY TIME HERE
MOVE TO 1, 15
DISPLAY DATE HERE
END
```

Display Statements

The display and file display statements are two of the most commonly used statements in the OptiSCREEN editor. With the DISPLAY statement, you can generate text and

graphics for your application. With the DISPLAY FILE statement, you can "call" (or display) other OptiSCREEN files, file memory, or a directory of files.

"text" text
DISPLAY "text" text

These statements display a string of text that you specify.

text - represents the string that you want to display.

Text strings surrounded by quotes operate the same as the DISPLAY "text" statement.

Example 1: Display a three word message.

```
"Message for Viewing"
```

Example 2: Display a five word message.

```
DISPLAY "This is a text message"
```

CLEAR FLASH {ESC}[Z

The CLEAR FLASH statement stops all flashing text strings and flashing box regions. The statement causes all flashing text strings and box regions to appear with normal intensities.

The STOP FLASH statement stops a single flashing text string or flashing box region at the current cursor location.

The STOP FLASH and CLEAR FLASH statements do not erase or rewrite any text or graphics; they only change the flashing mode for the text or graphics.

FLASH "text" {ESC} [\text {ETX}
FLASH ccc {ESC} [ccc]
FLASH rr X ccc {ESC} [rr; ccc]

The FLASH statement displays a flashing, or blinking, string of text or box region for text and graphics. The FLASH statement switches between the specified screen attributes and the reversed foreground and background screen attributes at one-half second intervals. With the flashing mode, the *text* is constantly visible, either with its specified attributes or its reversed attributes. (This is a change from the BLINK character attribute which turned the display off and on, making the text visible only half the time.) You may specify as many as 64 simultaneous flashing line items; for example, a box 5 lines tall uses 5 of the 64 line items.

The STOP FLASH statement resets the flashing mode at the current cursor position to normal. The CLEAR FLASH statement resets all flashing modes to normal.

text - represents the flashing string that you want to display. The cursor moves to the right of the last character.

ccc - specifies the number of columns to the right from the cursor that the boxed region extends. The cursor location does not change.

rr - specifies the number of rows up from the cursor that the boxed region extends.

Flashing box regions specified with *cc* and *rr* are determined from the lower left corner of the box. Legal cursor positions fall between rows 1 to 16 (or 25) and between columns

1 to 80 (or 132, depending on your configuration). If a flashing box region exceeds a legal cursor position, the box wraps around to the opposite side or opposite end of the screen. Both the row specification *rr* and the column specification *cc* must be greater than or equal to 2.

This statement does not erase or rewrite any text and graphics that already exist in the flashing box region; it only flashes the character attributes for the text or graphics in the region. This statement is useful for defining and changing the intensities for text on a screen without rewriting the text after the change.

Example 1: Display a warning message in a flashing mode.

```
MOVE TO 10, 10
FLASH "High Temperature:  210"
```

Example 2: Display three warning messages in a flashing boxed area.

```
MOVE TO 16, 15
FLASH 10 X 20
MOVE TO 11, 16
DISPLAY "BIN 1 FULL"
MOVE TO 13, 16
DISPLAY "BIN 2 FULL"
MOVE TO 15, 16
DISPLAY "BIN 3 NOT READY"
```

STOP FLASH {ESC}[[

The STOP FLASH statement stops a single flashing text string or flashing box region at the current cursor location. The statement causes one flashing text string or flashing box region to appear with its normal intensities.

The CLEAR FLASH statement stops all flashing text strings and flashing box regions.

The STOP FLASH and CLEAR FLASH statements do not erase or rewrite any text or graphics; they only change the flashing mode for the text or graphics.

File Display Statement

DISPLAY FILE nn {ESC}[>nn w

This statement displays another screen file.

nn - specifies the name or number of the file that you want to display.

Example 1: Display the results of the statement sequence stored in file 30.

```
DISPLAY FILE 30
```

Example 2: Display the results of the statement sequence stored in file CHAMBER2.

```
DISPLAY FILE CHAMBER2
```

Erasing and Editing Statements

The erasing and editing statements allow you to perform a number of operations that edit text and graphics which already appear on the screen: clear the screen or a portion of the screen, insert new text, or specify a scrolling region for text or graphics.

Clearing the Screen

With the following statements, you can clear the whole screen or a portion of the screen, clear a line or a part of a line, or clear individual characters.

CLEAR SCREEN {ESC}[2J

This statement moves the cursor to the home position at row 1 and column 1, clears the entire screen, and resets all attributes to normal. Examples of this statement appear throughout this summary.

CLEAR SCREEN FROM CURSOR {ESC}[0J

This statement clears the screen from the current cursor position to the end of the screen.

Example: Generate two lines of text, move to the middle of the first line, and delete the screen below and to the right of the cursor. The result is a line that reads Part only.

```
MOVE TO 10, 20
DISPLAY “Part one”
MOVE TO 11, 20
DISPLAY “Second section”
MOVE TO 10, 24
CLEAR SCREEN FROM CURSOR
```

CLEAR SCREEN TO CURSOR {ESC}[1J

This statement clears the screen from the home position (at row 1 and column 1) to the current cursor position.

Example: Generate two lines of text, move to the middle of the second line, and delete the screen above and to the left of the cursor. The result is a line that reads two only.

```
MOVE TO 10, 20
DISPLAY “First part”
MOVE TO 11, 20
DISPLAY “Part two”
MOVE TO 11, 24
CLEAR SCREEN TO CURSOR
```

CLEAR LINE {ESC}[2K

This statement clears the contents of the entire line on which the cursor rests. This statement erases the character on which the cursor rests although the cursor does not move.

Example: Generate a line of text, move to the middle of the line, and delete the entire line.

```
MOVE TO 10, 20
DISPLAY “First line”
MOVE TO 10, 25
CLEAR LINE
```

CLEAR LINE FROM CURSOR {ESC}[0K

This statement clears the contents of the line from the current cursor position, including the character on which the cursor rests, to the end of the line. The cursor does not move.

Example: Generate a line of text, move to the middle of the line, and delete the line to the right of the cursor. The result is a line that reads Second only.

```
MOVE TO 10, 20
DISPLAY "Second line"
MOVE TO 10, 26
CLEAR LINE FROM CURSOR
```

CLEAR LINE TO CURSOR {ESC}[1K

This statement clears the line from the beginning of the line to the current position of the cursor including the character on which the cursor rests. The cursor does not move.

Example: Generate a line of text, move to the middle of the line, and delete the line to the left of the cursor. The result is a line that reads test only.

```
MOVE TO 10, 20
DISPLAY "Third test"
MOVE TO 10, 25
CLEAR LINE TO CURSOR
```

CLEAR STATUS LINES {ESC}[3J

This statement clears the status line or lines in the status region at the bottom of the screen. You may have from 0 to 7 status lines, depending on your configuration.

DELETE LINE {ESC}[M
DELETE nn LINES {ESC}[nn M

This statement deletes one or more lines.

nn - specifies the number of lines for deletion. If you do not specify the number of lines, the statement deletes the entire line on which the cursor rests. This statement deletes the entire line on which the cursor rests and the following line or lines to delete a total of nn lines.

The cursor moves to the line following the deleted line or lines. The DELETE LINE statement scrolls the existing text below the deleted line or lines up the screen and adds blank lines at the bottom of the screen above the status line.

Example: Generate five lines of text, then remove the first line of text and the last two lines of text leaving lines two and three displayed.

```
MOVE TO 10, 1
DISPLAY "Line One"
NEW LINE
DISPLAY "Line Two"
NEW LINE
DISPLAY "Line Three"
NEW LINE
DISPLAY "Line Four"
NEW LINE
DISPLAY "Line Five"
MOVE TO 10, 5
DELETE LINE
DOWN 2
DELETE 2 LINES
```

ERASE BAR DOWN column x pixel {ESC}[= column; pixel m
ERASE BAR DOWN pixel {ESC}[= pixel m

ERASE BAR LEFT line x pixel {ESC}[= line; pixel n
ERASE BAR LEFT pixel {ESC}[= pixel n

ERASE BAR RIGHT line x pixel {ESC}[= line; pixel l
ERASE BAR RIGHT pixel {ESC}[= pixel l

ERASE BAR UP column x pixel {ESC}[= column; pixel k
ERASE BAR UP pixel {ESC}[= pixel k

These statements erase a bar (as created for a bar graph) in the direction that you specify. The ERASE BAR statements are related to the DRAW BAR statements, and operate in a similar manner.

pixel - specifies the number of pixels to erase for the bar.

The erased pixels begin on the location where the cursor rests and flow above, below, to the right, or the the left of the cursor.

If you specify ERASE BAR UP or ERASE BAR DOWN, a single character cell 10 pixels "tall" is erased. The ERASE BAR UP and ERASE BAR DOWN statements round the number of pixels up to the nearest whole character cell to erase the whole cell.

If you specify ERASE BAR RIGHT or ERASE BAR LEFT, a single character cell 8 pixels "wide" is erased. The ERASE BAR RIGHT and ERASE BAR LEFT statements round the number of pixels up to the nearest whole character cell to erase the whole cell.

column or row - specifies the number of whole columns or rows to be erased for the bar.

If you specify ERASE BAR UP or ERASE BAR DOWN, cc represents the number of whole columns to the right of the cursor erased for the bar.

If you specify ERASE BAR RIGHT or ERASE BAR LEFT, cc represents the number of whole rows above the cursor erased for the bar.

If you do not specify the number of columns or rows with cc, the ERASE BAR statement uses the single column or row on which the cursor rests and erases a bar pp pixels tall or wide. Otherwise, the system erases a bar cc columns tall or wide and pp pixels wide or tall.

The ERASE BAR statement requires you to enter a space before and after the required "x" parameter.

Example 1: Generate a block of Xs and then use the ERASE BAR DOWN statement to erase a single cell within the block.

```
MOVE TO 4, 2
DISPLAY "XXXXXX"
MOVE TO 5, 2
DISPLAY "XXXXXX"
MOVE TO 6, 2
DISPLAY "XXXXXX"
MOVE TO 7, 2
DISPLAY "XXXXXX"
MOVE TO 5, 3
ERASE BAR DOWN 3
```

After this ERASE statement, the block of Xs looks like this:

```
XXXXXX
X XXXX
XXXXXX
XXXXXX
```

Example 2: Continuing with the example started above, erase from the block a set of cells that are two cells wide and two cells tall.

```
MOVE TO 5, 5
ERASE BAR DOWN 2 X 11
```

After this ERASE statement, the block of Xs looks like this:

```
XXXXXX
X X  X
XXX  X
XXXXXX
```

Example 3: Generate a block of Xs and then erase an area three cells tall and one cell wide.

```
MOVE TO 5, 5
DISPLAY "XXXX"
MOVE TO 6, 5
DISPLAY "XXXX"
MOVE TO 7, 5
DISPLAY "XXXX"
MOVE TO 8, 5
DISPLAY "XXXX"
MOVE TO 9, 5
DISPLAY "XXXX"
MOVE TO 8, 6
ERASE BAR UP 30
```

After this ERASE statement, the block of Xs looks like this:

```
XXXX
X XX
X XX
X XX
XXXX
```

Example 4: Generate a block of Xs and then erase an area two cells wide and one cell tall within the block.

```
MOVE TO 5, 1
DISPLAY "XXXXX"
MOVE TO 6, 1
DISPLAY "XXXXX"
MOVE TO 7, 1
DISPLAY "XXXXX"
MOVE TO 6, 2
ERASE BAR RIGHT 16
```

After this ERASE statement, the block of Xs looks like this:

```
XXXXX
X  XX
XXXXX
```

DELETE CHARACTER {ESC}[P
DELETE nn CHARACTERS {ESC}[nn P

This statement deletes one or more characters.

nn - specifies the number of characters for deletion. If you do not specify the number of characters, the system deletes the character that the cursor covers. This statement

deletes the character that the cursor covers and the character or characters to the right of the cursor to delete a total of nn characters.

Any characters to the right of the deleted character or characters shift left and the cursor covers the character after the last deleted character.

Example 1: Enter a line of text, move to the middle of the line, and delete a single character and the space following the character. The result is a line that reads "Test character".

```
MOVE TO 10, 20
DISPLAY "Test 1 character"
MOVE TO 10, 25
DELETE CHARACTER
DELETE CHARACTER
```

Example 2: Continuing with the line that reads "Test character", delete the nine characters in the word "character".

```
MOVE 10, 25
DELETE 9 CHARACTERS
```

Inserting Text

The following statements allow you to insert text or graphics into already existing text or graphics.

INSERT LINE {ESC}[L
INSERT nn LINES {ESC}[nn L

This statement inserts one or more lines into a screen.

nn - specifies the number of lines for insertion. If you do not specify the number of lines, the statement inserts a single line at the line on which the cursor rests. Otherwise, this statement inserts nn lines at the line on which the cursor rests and below the cursor.

After the insertion, the cursor rests on the single inserted line or the first inserted line of the inserted line or lines. The INSERT statement scrolls the existing text toward the bottom of the screen.

Example 1: Insert a single line and add text into the middle of several other lines of text.

```
MOVE TO 5, 1
DISPLAY "Line one"
NEW LINE
DISPLAY "Line two"
NEW LINE
DISPLAY "Line three"
NEW LINE
DISPLAY "Line four"
NEW LINE
DISPLAY "Line five"
MOVE TO 7, 1
INSERT LINE
DISPLAY "First insertion"
```

Example 2: Continuing with the example started above, insert two lines above the last line of existing text, and fill both inserted lines with text.

```
MOVE TO 10, 1
INSERT 2 LINES
DISPLAY "Second insertion"
NEW LINE
DISPLAY "Third insertion"
```

After the two sets of insertions, the results look like this:

```
Line one
Line two
First insertion
Line three
Line four
Second insertion
Third insertion
Line five
```

START INSERT {ESC}[4h
STOP INSERT {ESC}[4l

The START INSERT statement begins the insertion mode so that you can insert characters into text that already appears on the screen. As you send characters, text to the right of the cursor shifts right; characters in column 80 (or 132, depending on your configuration) shift off the screen and do not wrap.

The STOP INSERT statement ends the insertion mode.

Example: Display three lines of text and then insert the text from another file "in front" of the three lines.

```
MOVE TO 10, 1
DISPLAY "First Line"
MOVE TO 11, 1
DISPLAY "Second Line"
MOVE TO 12, 1
DISPLAY "Third Line"
MOVE TO 11, 1
START INSERT
DISPLAY FILE 100
STOP INSERT
```

Assume that file 100 contains the following statements.

```
DISPLAY "Insertion 1 "
NEW LINE
DISPLAY "Insertion 2 "
INDEX
DISPLAY "Insertion 3 "
NEW LINE
DISPLAY "Insertion 4 "
```

The resulting file appears as shown below.

```
First Line
Insertion 1 Second Line
Insertion 2 Third Line
Insertion 3
Insertion 4
```

Scrolling

The scrolling statements allow you to specify a region for scrolling through text or graphics.

SCROLL LINES nn TO pp {ESC}[nn; pp r

The SCROLL LINES statement causes a specified area of the screen to scroll up.

nn - specifies the top line of the scrolling area.

pp - specifies the bottom line of the scrolling area.

After you specify text or graphics to appear on the scrolling lines, the text or graphics shift up one row at a time. Screen data outside of the scrolling lines does not move or change, nor does the cursor position change as the text or graphics scroll through the lines.

Before you issue the SCROLL LINES statement, you must specify AUTO LINE FEED ON through the Configuration menu, with the AUTO LINE FEED ON RETURN statement in OptiSCREEN, or with the appropriate escape sequence.

Example: Define a scrolling area and delimit it with a line of text both before and after. Display a file directory in the scrolling area and the word Done after you've completed the display.

```
MOVE TO 10, 1
DISPLAY "--- Top ---"
SCROLL LINES 11 TO 13
MOVE TO 14, 1
DISPLAY "--- Bottom --"
MOVE TO 11, 1
DISPLAY DIRECTORY
MOVE TO 15, 1
DISPLAY "- Done -"
```

SCROLL DOWN line x column {ESC}[= line; column r
SCROLLLEFT line x column {ESC}[= line; column p
SCROLL RIGHT line x column {ESC}[= line; column o
SCROLL UP line x column {ESC}[= line; column q

These scrolling statements specify the area and the direction for scrolling text and graphics.

direction - specifies the direction for scrolling text and graphics as either UP, DOWN, RIGHT, or LEFT.

line - represents the number of rows for the height of the scrolling region. Specify line as greater than or equal to 2 and less than or equal to the screen height.

column - represents the number of columns for the width of the scrolling region. Specify column as greater than or equal to 2 and less than or equal to the screen width.

The system uses the current cursor position to determine the location of the scrolling region on the screen. After you specify text or graphics to appear in the scrolling region, the text or graphics shift one character or one row at a time in the indicated direction (up, down, left, or right).

Screen data outside of the scrolling region does not move or change, nor does the cursor position change as the text or graphics scroll through the region.

When you specify SCROLL LEFT, the system positions the cursor in the lower right corner of the scrolling region. When you specify SCROLL RIGHT, the system positions the cursor in the lower left corner of the scrolling region. The SCROLL LEFT and SCROLL RIGHT statements are helpful for presenting trend graphs.

When you specify SCROLL UP, the system positions the cursor in the lower left corner of the scrolling region. When you specify SCROLL DOWN, the system positions the cursor in the upper left corner of the scrolling region. The SCROLL UP and SCROLL DOWN statements are helpful for presenting text messages.

Graphics Statements

The graphics statements draw boxes, change the video attributes for boxed regions of the screen, and draw bar graphs:

- The BOX statement draws a box around text or graphics.
- The EMPTY BOX statement draws a box and erases any text or graphics that appear inside.
- The FILL BOX statement draws a box and fills it with a single character.
- The BOX ATTRIBUTES statement defines the character attributes (such as color) for a boxed region; this is helpful for defining a color for a region.

Each of these "box" statements is described before the bar graph statements are described.

Generating Boxes and Boxed Regions

The following statements draw boxes from the lower left-hand corner of the box or define a boxed region.

BOX rr X ccc {ESC}[= rr, ccc d

This statement creates an outlined box.

rr - specifies the number of rows up from the cursor that the box extends.

ccc - specifies the number of columns to the right from the cursor that the box extends.

The system draws boxes from the lower left-hand corner of the box. Legal cursor positions fall between rows 1 to 25 (or 30, depending on your configuration) and between columns 1 to 80 (or 132, depending on your configuration). If a box exceeds a legal cursor position, the box wraps around to the opposite side or opposite end of the screen. The lines used for the box outline are two character dots wide and two scan lines high. Both the row specification rr and the column specification cc must be greater than or equal to 2. The BOX statement does not change the existing text, existing colors, or intensity within a box.

Example 1: Draw two boxes surrounding text in the center of the screen. The first box outlines the text as closely as possible. The second box borders the entire screen.

```
MOVE TO 11, 36
DISPLAY "GE Fanuc"
MOVE TO 12, 35
BOX 3 x 10
BLUE
MOVE TO 24, 1
BOX 24 x 80
```

Example 2: Character attributes affect both text and boxes. For example, if you create a box after a DOUBLE WIDE statement, the box covers twice as many characters cells as the statement states since the system doubles the box width. The following statements draw two double wide text messages surrounded by boxes. The first box appears as a double wide box and the second box appears with normal character attributes.

```
DOUBLE WIDE
MOVE TO 10, 20
DISPLAY “BOX 1”
MOVE TO 11, 18
BOX 3 x 7
MOVE TO 20, 20
DISPLAY “BOX 2”
EXIT DOUBLE WIDE AND BLINK
MOVE TO 21, 19
BOX 3 x 11
```

BOX OUTLINE rr X ccc {ESC}[rr; ccc c

This statement creates an outlined box or rectangle and operates like the BOX rr X cc statement.

rr - specifies the number of rows up from the cursor that the box extends.

ccc - specifies the number of columns to the right from the cursor that the box extends.

Boxes are drawn from the lower left corner of the box. Legal cursor positions fall between rows 1 to 25 (or 30) and between columns 1 to 80 (or 132, depending on your configuration). If a box exceeds a legal cursor position, the box wraps around to the opposite side or opposite end of the screen. The lines which form the box outline are two pixels thick. Both the row specification *rr* and the column specification *ccc* must be greater than or equal to 2. The BOX OUTLINE statement does not change the existing color or intensity within a box.

Example 1: Draw two boxes surrounding text in the center of the screen. The first box outlines the text as closely as possible. The second box borders the entire screen.

```
MOVE TO 11, 36
DISPLAY “GE FANUC”
MOVE TO 12, 35
BOX OUTLINE 3 x 10
MOVE TO 24, 1
BOX OUTLINE 24 x 80
```

(See illustration for BOX rr X ccc statement.)

Example 2: Character attributes affect both text and boxes. For example, if you create a box after a DOUBLE WIDE statement, the box covers twice as many characters cells as the statement states since the system doubles the box width. The following statements draw two double wide text messages surrounded by boxes. The first box appears as a double wide box and the second box appears with normal character attributes.

```
DOUBLE WIDE
MOVE TO 10, 20
DISPLAY “BOX 1”
MOVE TO 11, 18
BOX OUTLINE 3 x 7
MOBR TO 20, 20
DISPLAY “BOX 2”
EXIT DOUBLE WIDE AND BLINK
MOVE TO 21, 19
BOX OUTLINE 3 X 11
```

CONCAVEBOX rr X ccc {ESC}[=rr; ccc u

This statement creates a concave, or indented, box with a beveled edge and the appearance of a light source shining above the upper right corner of the box.

Jumper E1 must be set to disable underlining, see Chapter 3.

rr - specifies the number of rows up from the cursor that the box extends.

ccc - specifies the number of columns to the right from the cursor that the box extends.

The interior of the box is cleared of text or graphics and becomes the current background color. If the current character attribute specifies double wide characters, the interior of the box is double wide but the left and right edges of the box remain a single character wide.

Like the BOX statement, concave boxes are drawn from the lower left corner of the box. If a box exceeds a legal cursor position, the box wraps around to the opposite side or opposite end of the screen. Both the row specification *rr* and the column specification *ccc* must be greater than or equal to 2.

CONVEXBOX rr X ccc {ESC}[=rr; ccc s

This statement creates a convex, or raised, box with a beveled edge and the appearance of a light source shining above the upper right corner of the box.

Jumper E1 must be set to disable underlining, see Chapter 3.

rr - specifies the number of rows up from the cursor that the box extends.

ccc - specifies the number of columns to the right from the cursor that the box extends.

The interior of the box is cleared of text or graphics and becomes the current background color. If the current character attribute specifies double wide characters, the interior of the box is double wide but the left and right edges of the box remain a single character wide.

Like the BOX statement convex boxes are drawn from the lower left corner of the box. If a box exceeds a legal cursor position, the box wraps around to the opposite side or opposite end of the screen. Both the row specification *rr* and the column specification *ccc* must be greater than or equal to 2.

EMPTY BOX rr X ccc {ESC}[= rr; ccc e

This statement creates an empty box. This statement erases any text or graphics that previously appeared in the boxed region.

rr - specifies the number of rows up from the cursor that the box extends.

ccc - specifies the number of columns to the right from the cursor that the box extends.

The system draws boxes from the lower left-hand corner of the box. Legal cursor positions fall between rows 1 to 25 (or 30, depending on your configuration) and between columns 1 to 80 (or 132, depending on your configuration). If a box exceeds a legal cursor position, the box wraps around to the opposite side or opposite end of the screen. The lines used for the box outline are two character dots wide and two scan lines high. Both the row specification rr and the column specification cc must be greater than or equal to 2.

Example: Create an empty box 12 rows tall by 40 columns wide.

```
MOVE TO 20, 20
EMPTY BOX 12 X 40
```

FILL BOX rr X ccc WITH “char” {ESC}[= rr; ccc b char

This statement creates a box and fills it with a single character.

rr - specifies the number of rows up from the cursor that the box extends.

ccc - specifies the number of columns to the right from the cursor that the box extends.

a - specifies the single “fill character” value that fills the boxed area. The fill character uses the current foreground and background character attribute settings. If you specify the fill character as a space (a non-printing character), this statement fills the region with the color or setting currently specified by the background attribute.

The system draws boxes from the lower left-hand corner of the box. Legal cursor positions fall between rows 1 to 25 (or 30, depending on your configuration) and between columns 1 to 80 (or 132, depending on your configuration). If a box exceeds a legal cursor position, the box wraps around to the opposite side or opposite end of the screen. The lines used for the box outline are two character dots wide and two scan lines high. Both the row specification rr and the column specification cc must be greater than or equal to 2.

Example: Fill a box 12 rows by 40 columns with the letter X.

```
MOVE TO 15, 5
FILL BOX 12 X 40 WITH “X”
```

BOX ATTRIBUTES rr X ccc {ESC}[= rr; ccc a

This statement applies the currently defined character attributes to a boxed region.

rr - specifies the number of rows up from the cursor that the box extends.

ccc - specifies the number of columns to the right from the cursor that the box extends.

The system determines box attribute regions from the lower left-hand corner of the box. Legal cursor positions fall between rows 1 to 25 (or 30, depending on your configuration) and between columns 1 to 80 (or 132, depending on your configuration). If a box exceeds a legal cursor position, the box wraps around to the opposite side or opposite end of the screen. The lines used for the box outline are two character dots wide and two scan lines high. Both the row specification rr and the column specification cc must be greater than or equal to 2.

This statement does not erase or rewrite any text or graphics that already exist in the box attribute region; it only changes the character attributes for the text or graphics in the region. This statement is useful for defining and changing the colors or intensities for text on a screen without rewriting the text after the change.

Example: Define a line of text to read “Blower off ON”. Then define two sets of box attribute regions. The first box attribute region displays the word off with the default color and the word “ON” in black so that it is hidden. The second box attribute region displays the word “off” in black so that it is hidden and the word “ON” in red on a yellow background so that it is highlighted. The second box region includes a colored box around the word “ON” to highlight it even more.

Use the STEP editor function to move through the file and see how the two boxed attribute regions work.

```
'Blower off/on text
MOVE TO 10, 10
DOUBLE WIDE
DISPLAY "Blower off ON"
MOVE TO 11, 32
BOX 3 x 4
'
'Box attributes:  Blower off normal
MOVE TO 10, 24
GREEN
BOX ATTRIBUTES 1 x 3
MOVE TO 11, 32
BLACK
/BLACK
BOX ATTRIBUTES 3 x 4
'
'Box attributes:  Blower ON highlighted
MOVE TO 10, 24
BLACK
BOX ATTRIBUTES 1 X 3
MOVE TO 11, 32
RED
/YELLOW
BOX ATTRIBUTES 3 x 4
```

Drawing Bar Graphs

The following statements draw horizontal or vertical bar graphs. However, we recommend that new applications use the GRAPH or DRAW BAR statement.

HORIZONTAL BAR GRAPH nn, ff, mm {ESC}[= nn; ff; mm h

This statement makes a horizontal bar graph that flows toward the right-hand edge of the screen.

nn - represents the number of whole cells for the graphed item in the bar; nn must be expressed as an integer to represent whole character cells.

ff - represents the percentage of a single cell for the bar; ff must be expressed as an integer from 0 to 99.

mm - represents the maximum number of cells for the bar.

When you invoke this statement, it generates a bar of whole and fractional cells specified by nn and ff. The statement erases any previous bar. The bars use the current foreground and background character attributes.

A single character cell appears 8 pixels "wide." Assuming a full 80 columns for a bar, this results in as many as 640 pixel-formed bars (8 * 80) for a bar graph.

Example 1: Temperatures fall between 0 and 100 degrees. Generate a horizontal bar graph that uses a maximum of 10 cells. Show a temperature of 43.5 degrees.

1. Determine the range of the variable to be graphed.

```
Range = Maximum - Minimum
Range = 100 - 0
Range = 100
```

2. Determine the maximum number of character cells for the graph.

```
mm = 10
```

3. Decide the scaled actual value for the graph.

```
Scaled value = Graph amount * (mm / Range)
Scaled value = 43.5 * (10 / 100)
Scaled value = 4.35
```

4. Determine the number of whole character cells for the graph.

```
nn = INT (Scaled value)
nn = INT (4.35)
nn = 4
```

5. .Determine the percentage of the remaining character to be graphed.

```
ff = (Scaled value - nn) * 100
ff = (4.35 - 4) * 100
ff = 35
```

The resulting bar graph statement:

```
HORIZONTAL BAR GRAPH 4, 35, 10
```

Example 2: The count of an inventory item falls between –5 and 50. Generate a horizontal bar graph that uses a maximum of 12 cells. Show a level of 32 items.

1. Determine the range of the variable to be graphed.

```
Range - Maximum – Minimum = 50 - (–5) = 55
```

2. Determine the maximum number of character cells for the graph.

```
mm = 12
```

3. Decide the scaled actual value for the graph.

```
Scaled value = Graph amount * (mm / Range) = 32 * (12 / 55) = 6.98
```

4. Determine the number of whole character cells for the graph.

```
nn = INT (Scaled value) = INT (6.98) = 6
```

5. Determine the percentage of the remaining character to be graphed.

```
ff = (Scaled value - nn) * 100 = (6.98 - 6) * 100 = 98
```

The resulting bar graph statement:

```
HORIZONTAL BAR GRAPH 6, 98, 12
```

VERTICALBAR GRAPH nn, ff, mm {ESC}[= nn; ff; mm v

This statement makes a vertical bar graph that reaches up toward the top of the screen.

nn - represents the number of whole cells for the graphed item in the bar; nn must be expressed as an integer to represent whole character cells.

ff - represents the percentage of a single cell for the bar; ff must be expressed as an integer from 0 to 99.

mm - represents the maximum number of cells for the bar.

When you invoke this statement, it generates a bar of whole and fractional cells specified by nn and ff. The statement erases any previous bar. The bars use the current foreground and background character attributes.

A single character cell appears 10 pixels "tall." Assuming a full 24 rows for a bar, this results in as many as 240 pixel-formed bars (10 * 24) for a bar graph.

Example 1: A machine can process from 0 to 1000 objects per hour. Generate a vertical bar graph that uses a maximum of 10 cells. Show 884 objects on the graph.

1. Determine the range of the variable to be graphed.

```
Range = Maximum - Minimum
Range = 1000 - 0
Range = 1000
```

2. Determine the maximum number of character cells for the graph.

```
mm = 10
```

3. Decide the scaled actual value for the graph.

```
Scaled value = Graph amount * (mm / Range)
Scaled value = 884 * (10 / 1000)
Scaled value = 8.84
```

4. Determine the number of whole character cells for the graph.

```
nn = INT (Scaled value)
nn = INT (8.84)
nn = 8
```

5. Determine the percentage of the remaining character to be graphed.

```
ff = (Scaled value - nn) * 100
ff = (8.84 - 8) * 100
ff = 84
```

The resulting bar graph statement:

```
VERTICAL BAR GRAPH 8, 84, 10
```

Example 2: Fluid levels must be maintained between 10 and 50 gallons. Generate a vertical bar graph that uses a maximum of 8 cells. Show a level of 18.5 gallons.

1. Determine the range of the variable to be graphed.

```
Range = Maximum - Minimum = 50 – 10 = 40
```

2. Determine the maximum number of character cells for the graph.

```
mm = 8
```

3. Decide the scaled actual value for the graph.

```
Scaled value = Graph amount * (mm / Range) = 18.5 * (8 / 40) = 3.7
```

4. Determine the number of whole character cells for the graph.

```
nn = INT (Scaled value) = INT (3.7) = 3
```

5. Determine the percentage of the remaining character to be graphed.

```
ff = (Scaled value - nn) * 100 = (3.7 – 3) * 100 = 70
```

The resulting bar graph statement:

```
VERTICAL BAR GRAPH 3, 70, 8
```

DRAW BAR DOWN column x pixel {ESC}[= column; pixel i
DRAW BAR DOWN pixel {ESC}[= pixel i

DRAW BAR LEFT line x pixel {ESC}[= line; pixel j
DRAW BAR LEFT pixel {ESC}[= pixel j

DRAW BAR RIGHT line x pixel {ESC}[= line; pixel g
DRAW BAR RIGHT pixel {ESC}[= pixel g

DRAW BAR UP column x pixel {ESC}[= column; pixel f
DRAW BAR UP pixel {ESC}[= pixel f

These statements draw a bar graph with the bar extending in the direction that you specify.

pixel - specifies the number of pixels on which the cursor rests and above, below, to the right or to the left of the cursor used to draw the bar.

If you specify DRAW BAR UP or DRAW BAR DOWN, a single character cell 10 pixels "tall" is drawn. The DRAW BAR UP and DRAW BAR DOWN statements use the actual number of pixels that you specify for the bar graph.

If you specify DRAW BAR RIGHT or DRAW BAR LEFT, a single character cell 8 pixels "wide" is drawn. The DRAW BAR RIGHT and DRAW BAR LEFT statements use the actual number of pixels that you specify for the bar graph.

columns or lines - specifies the number of whole columns or lines on which the cursor rests and to the right or above the cursor used for the bar.

If you specify DRAW BAR UP or DRAW BAR DOWN, cc represents the number of columns to the right of the cursor for the bar.

If you specify DRAW BAR RIGHT or DRAW BAR LEFT, cc represents the number of rows above the cursor for the bar.

If you do not specify the number of columns or rows with cc, the DRAW BAR statement uses the column or row on which the cursor rests and makes the bar pp pixels tall or wide. Otherwise, the bar appears cc columns tall or wide and pp pixels wide or tall.

Example 1: Draw a bar 71 row pixels tall and 1 column wide that extends down toward the bottom of the screen.

```
MOVE TO 5, 10
DRAW BAR DOWN 71
```

Example 2: Draw a bar 63 column pixels wide and 1 row tall that extends left across the screen.

```
MOVE TO 12, 40
DRAW BAR LEFT 63
```

Example 3: Draw a bar 17 column pixels wide and 1 row tall that extends toward the right edge of the screen.

```
MOVE TO 6, 5
DRAW BAR RIGHT 17
```

Example 4: Draw a bar 22 column pixels wide and 4 rows tall that extends toward the right edge of the screen.

```
MOVE TO 11, 5
DRAW BAR RIGHT 4 X 22
```

Example 5: Draw a bar 21 row pixels tall and 1 column wide that extends up toward the top of the screen.

```
MOVE TO 20, 30
DRAW BAR UP 21
```

Example 6: Draw a bar 27 row pixels tall and 4 columns wide that extends up toward the top of the screen.

```
MOVE TO 20, 34
DRAW BAR UP 4 X 27
```

Programmable Keyboard and Function Key Statements

These statements allow you to set and use the programmable keyboard capabilities of an OIT. The LOAD FUNCTION KEY statement sets and uses the function key capabilities for a OIT.

Selecting the Programmable Keyboard

To program the keyboard, you must specify "5 PROGRAMMABLE" at the KEY CODES line of the Configuration Menu. To specify the programmable keyboard, perform the following steps:

1. Return to the Main Menu. (You can gain access to the Main Menu by pressing the MAIN [F1] function key from the OptiSCREEN editor).
2. From the main menu, enter the Configuration Menu by pressing the [F7 CONFIG function key.
3. In the Configuration Menu, use the [Up Arrow] and [Down Arrow] cursor control keys to move to the KEYBOARD line of the menu.
4. On the KEYBOARD line, press the [Spacebar] repeatedly until the option 5 PROGRAMMABLE appears.
5. To save this configuration, press the SAVE [F5] function key.

After performing these steps you can set and use the programmable keyboard capabilities on your OIT.

Programmable Keyboard Programming

The 35-position built-in keyboard is programmable. The keys can be loaded individually through the LOAD KEY statement

Any of the 94 key positions can be programmed as a function key using the LOAD FUNCTION KEY statement. Each function key can be programmed to generate a sequence of up to 16 ASCII characters. Not more than 16 keys can become function keys.

On a cold start, the key table is initialized at the same time that the default configuration is loaded. The default and user-defined key values are retained in non-volatile memory.

The programmable keyboard and Function Key statements are described below.

CLEARKEY TABLE {ESC}[>251r

This programmable keyboard statement eliminates any previous key table specifications and makes all key values null.

DEFAULT KEYBOARD {ESC}[>254r

(Not Supported.) The DEFAULT KEYBOARD statement forces the system to use the second setting on the Configuration Screen's Keyboard option line to determine which detached membrane the system is using. This membrane keyboard would be plugged into the parallel keyboard port, not the 5-pin DIN connector. This statement is only valid on units with an integral keyboard or an attached sealed-membrane keyboard.

DEFAULT KEYPAD {ESC}[>253r

This statement forces the system to use the first setting on the Configuration Screen's Keyboard option line to determine the Membrane Keypad the system is using. This statement is only valid on units with an integral keyboard or an attached sealed-membrane keyboard.

DEFAULT KEYS {ESC}[>255r

(Not Supported.) The DEFAULT KEYS statement forces the system to use the third setting on the Configuration Screen's Keyboard option line to determine which keyboard inserts are being used in a 65-position detached membrane keyboard connected to a workstation's parallel keyboard port. DEFAULT TOUCH KEYS, DEFAULT KEYPAD, DEFAULT KEYBOARD, and DEFAULT KEYS perform the same basic function as the (Firmware 2.3) command DEFAULT KEY TABLE. This command was used to return the key table to its original setting. (DEFAULT TOUCH KEYS, DEFAULT KEYPAD, DEFAULT KEYBOARD, and DEFAULT KEYS are rarely required, but allow the user to force the workstation to check the configuration file for the current keyboard setting before processing keyboard commands.), This statement is only valid on units with an integral keyboard or an attached sealed-membrane keyboard.

DEFAULT TOUCH KEYS {ESC} [255r

(Not Supported.) This statement forces the system to use the first setting on the Configuration Screen's Keyboard option line to determine the Touch Screen the system is using. This statement is only valid on units with an integral keyboard or an attached sealed-membrane keyboard.

LOAD KEY nn WITH vvv {ESC} [>nn; vvv r

This programmable keyboard statement loads a specific key with a value that you specify. To use the statement, specify the key position nn as determined in the figure below:

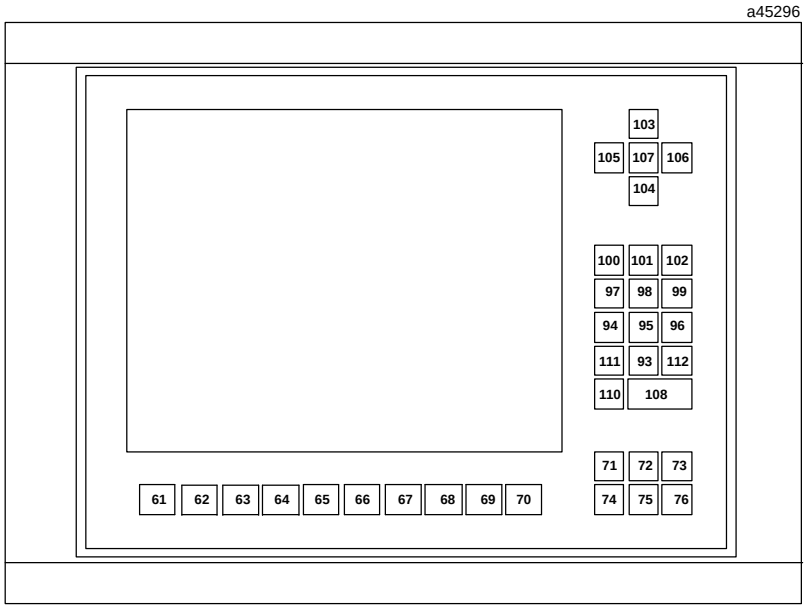


Figure 5-1. Key Location Numbers for the 35-Position Built-In Keyboard

Specify the value of the key to be programmed as a single ASCII character vvv. The capital letters A through Z are indicated by the ASCII numbers 65 through 90, and the lower case letters a through z are indicated by the ASCII numbers 97 through 122.

Key Value:	Output When Activated:
0 to 31	Standard ASCII non-displayable codes*
32 to 127	Standard ASCII displayable codes*
128 to 143	Function key codes F1 to F16
144 to 153	Control-1 to Control-9
154 to 169	Not used
170 to 171	IBM special key codes
172 to 175	Not used
176 to 177	IBM special key codes (Ins, End)
178	Cursor Down
179	IBM special key code (Page Down)
180	Cursor Left
181	Not used
182 to 184	Cursor Right, Home, Up key codes
185	IBM special key code (Page Up)
186 to 191	Not used
192 to 204	IBM special key codes
205 to 254	Not used
255	No keystroke code

* Refer to Appendix B for ASCII Codes.

The key tables contain unshifted, non-control values for 94 available key positions. If used with the 65-position and / or 34-position membrane keyboards, all keys except the Reset, Break, Control, Repeat, and Shift keys become user-definable. The Shift and Control keys are inactive. This enables you to define the ASCII code generated by any of the 94 available key positions.

Example: Clear the programmable keyboard specification and load key number 1, with the letter A.

```
CLEAR KEY TABLE
LOAD KEY 61 WITH 65
```

LOAD FUNCTION KEY nn WITH “text” {ESC}[>nn t text {ETX}

This function key statement loads function key nn with a value (text). Specify nn as a function key number between 1 and 16, inclusive.

text - specifies the text string to be assigned to the function key. Non-displayable characters (such as carriage return and line feed) appear between the quotation marks surrounded by braces; for example, {CR} and {LF}. You can specify as many as 248 characters for *text*, which can include one or more escape sequences.

Example: Load function key [F12] with the text string “RUN” statement.

```
LOAD FUNCTION KEY 12 WITH “RUN”
```

Data Transmissions and Port Control Statements

These statements control data transmissions and output from the serial port or ports associated with the OIT.

PRINT SCREEN TO PORT n {ESC}[nS
PRINT SCREEN TO PORT n, GRAPHIC TYPE g {ESC}[n; g S

These statements send the current screen to a printer.

n - specifies the number of the port to which you attached a printer. Specify *n* as 1 for the primary port, or 2 for the secondary port.

g - Specifies the type of printer you attached to the OIT. Specify *g* as a number between 0 and 7.

Specify g as a number between 0 and 7, as described below:

g	Printer	Approximate size of image
0	Specified in Configuration*	Depends on printer
1	Generic ASCII**	Depends on printer
2	C. Itoh-3500	Portrait mode
3	C. Itoh-3500	Landscape mode
4	Proprinter	Portrait mode
5	Proprinter	Landscape mode
6	Hewlett-Packard PCL	Portrait mode
7	Hewlett-Packard PCL	Landscape mode

* Uses the driver specified on the Configuration menu.

** Prints text only; does not print graphics.

If you do not specify GRAPHIC TYPE g, the system generates a generic ASCII file.

Example: Send the current screen to port 1 (primary port) for printing on a Citoh-3500 printer 7I tall by 11I wide.

```
PRINT SCREEN TO PORT 1, GRAPHIC TYPE 2
```

TRANSMIT FILE fname VIA PRIMARY PORT {ESC}[>“fname” x
TRANSMIT FILE fname VIA SECONDARY PORT {ESC}[>“fname” y

TRANSMIT FILE n VIA PRIMARY PORT {ESC}[>n x
TRANSMIT FILE n VIA SECONDARY PORT {ESC}[>n y

This statement transmits a single file to the output device at either the primary or secondary port. Specify fname or a file number as the file for display. Specify the port position as either PRIMARY or SECONDARY, depending on where you want the directory sent.

Example:

```
TRANSMIT FILE NEW_DATA VIA SECONDARY PORT
```

Data Fill Operations

In many situations, you will want to create a screen file that includes numerous blanks for the host to later fill in with data. In order to fill in these blanks, the host must perform some form of cursor positioning before sending the data for the blank field. To simplify the cursor positioning the Screen Display and Data Fill escape sequence (Esc [> n f) has been developed.

To perform this operation you will normally create two screen files, using the OptiSCREEN Editor. Screen file 1 will contain the text portion of the screen only. Screen file 2 will contain special place holders in the form of [Ctrl]-E {ENQ} characters where data from the host is to be sent.

First, the host will display file 1, the text portion of the screen, using the Screen Display escape sequence (Esc [> n w). Next, when the host is ready to send data, it will use the Screen Display and Data Fill escape sequence (Esc [>n f) to display the screen file 2 containing the blank space place holders. Then the host sends the data. When the host is ready to send data again it uses the Screen Display and Data Fill escape sequence to display the blanks only before sending data.

When the Screen Display and Data Fill escape sequence is executed, the screen will be processed only up to the first [Ctrl-E] encountered. At this point, data received from the host in On-Line mode, or from the keyboard in Local mode, will be placed on the screen instead of spaces. As each additional character is received, it will be used to fill the blanks in the file where [Ctrl]-E was placed. As the screen file is being processed, when a character other than[Ctrl]-E is again encountered, normal file display will resume.

If a non-displayable character is received in the data to be filled in on the screen (e.g., a carriage return, line feed), spaces will automatically be put on the screen for each [Ctrl]-E in the same data field. A field is considered to end when a character other than [Ctrl]-E is found in the display file. In this manner a field of 6 [Ctrl]-Es for a particular data value may use fewer than 6 characters and be left justified in the blanks reserved for the data.

The host or application program can terminate a Data Fill sequence prior to sending all of the characters required to fill the fields on the screen by sending a [Ctrl]-C (End of

Text). In this manner, only the highest priority fields on the screen can be updated if desired.

The format for the Display File and Data Fill escape sequence (normally sent from the host) is:

```
Esc [ > n f data data data ... data ETX
```

The file number is n; the ETX is optional and only required if fewer data characters are sent than the blank fields in the file. An example of this operation is shown below.

Example Data Fill Operation

The display below is created using two separate screen files. Lower-case e's are used to show where the fill character ([Ctrl]-E) has been placed.

```
CURRENT SETPOINT:  eeeee
CURRENT HIGH ALARM:  eeeee
CURRENT LOW ALARM:  eeeee

CURRENT TEMPERATURE:  eeeee
HIGHEST TEMPERATURE THIS BATCH:  eeeee
LOWEST TEMPERATURE THIS BATCH:  eeeee
```

The text of the screen was created by the OptiSCREEN Editor as shown below:

```
CLEAR SCREEN
HOME
DISPLAY "CURRENT SET POINT:"
MOVE 1, 2
DISPLAY "CURRENT HIGH ALARM:"
MOVE 1, 3
.
.
.
END
```

A second file was then created to include the blank space place holders.

```
MOVE TO 1, 20
DISPLAY "{ENQ}{ENQ}{ENQ}{ENQ}{ENQ}" The {ENQ} character is the
MOVE T0 2, 22 blank space created by
DISPLAY "{ENQ}{ENQ}{ENQ}{ENQ}{ENQ}" pressing Ctrl-E.
MOVE TO 3, 19
.
.
.
END
```

In the example above, the operations in the first file could have been included in the second file. But, using a separate file for the data fill operation allows the host to repeat displaying of data without redisplaying the text portion of the screen.

The following Series Five ASCII/BASIC program running in the host could be used to display the file and then fill in the blanks. Note that the syntax used in this example may vary depending upon the type of BASIC being used.

```
10 PRINT CHR(27),"[>1w"  : REM print screen one
20 PRINT CHR(27),"[>2f"  : REM print screen two fill statement
30 . . .
40 . . .
50 PRINT A               : REM first data field
60 PRINT B               : REM second data field
.
.
.
```

In the above example, it was assumed that the variables A and B would be 5 characters or less. Each of the BASIC Print statements will send a Carriage Return and Line Feed

after each variable. If a variable was less than 5 characters, then spaces would automatically be used to pad out the fields. Therefore, each field is automatically left-justified and trailing spaces are added as needed to erase old data that may have been in the field.

Statement Summary

The following statement summary gives the format, a short description for each statement, and the page number where the statement is fully documented. In the following summary, brackets appear around optional arguments.

'comment (Comment) Specifies that the rest of the line is a comment.

[Ctrl]-E {ENQ} (Data Fill) Holds space on display for character sent from host.

ALTERNATE (Character attribute) Establishes the alternate character set as the current mode.

ATTRIBUTES: [nn,] nn, nn (Character attribute) Establishes two or more character attributes as the current mode.

AUTO LINE FEED ON RETURN (Configuration) Forces an automatic line feed to occur with a carriage return.

AUTO RETURN ON LINE FEED (Configuration) Forces an automatic carriage return to occur with a line feed.

AUTO WRAP AT END OF LINE (Configuration) Forces automatic line wrapping to occur at the end of a filled line.

BAUD nnn (Configuration) Sets the programmable communications baud rate.

BLACK and /BLACK (Character attribute) Sets the foreground and background colors to black.

BLINK (Character attribute) Establishes the blinking character attribute mode.

BLINKING CURSOR (Cursor) Makes the cursor blink on the screen.

BLOCK CURSOR (Cursor) Makes the cursor appear as a solid block.

BLUE and /BLUE (Character attribute) Sets the foreground and background colors to blue.

BOX ATTRIBUTES rr X ccc (Graphics) Applies the currently defined character attributes to a boxed region rr rows tall and cc columns to the right.

BOX OUTLINE rr X ccc (Graphics) Creates an outlined box or rectangle.

BOX rr X ccc (Graphics) Creates an outlined box rr rows tall and cc columns to the right.

BRIGHT and /BRIGHT (Character attribute) Sets the monochrome foreground and background intensity to higher than normal.

BRIGHT UNDERLINE (Character attribute) Sets the monochrome foreground intensity level to BRIGHT and underlines the text.

CLEAR FLASH (Display) Stops all flashing text strings and flashing box regions.

CLEAR KEY TABLE (Programmable Keyboard) Makes all programmable key values null.

CLEAR LINE (Erasing and editing) Clears the contents of the current line.

CLEAR LINE FROM CURSOR (Erasing and editing) Clears the contents of the current line from the cursor to the end of the line.

CLEAR LINE T0 CURSOR (Erasing and editing) Clears the contents of the current line from the beginning of the line to the cursor.

CLEAR SCREEN (Erasing and editing) Moves the cursor to the home position, clears the screen, and resets all attributes to normal.

CLEAR SCREEN FROM CURSOR (Erasing and editing) Clears the screen from the cursor to the end of the screen.

CLEAR SCREEN TO CURSOR (Erasing and editing) Clears the screen from the home position to the cursor.

CLEAR STATUS LINE (Erasing and editing) Clears the status line or lines at the bottom of the screen.

COLUMN ccc (Cursor) Moves the cursor to the right..

CONCAVE BOX rr X ccc (Graphics) Creates a concave, or indented, box with a beveled edge and the appearance of a light source shining above the upper right corner of the box.

CONVEX BOX rr X ccc (Graphics) Creates a convex, or raised, box with a beveled edge and the appearance of a light source shining above the upper corner of the box.

CURSOR (Cursor) Makes the cursor visible.

CYAN and /CYAN (Character attribute) Sets the foreground and background colors to light blue.

DARK and /DARK (Character attribute) Sets the monochrome foreground and background intensity to dark.

DARK UNDERLINE (Character attribute) Sets the foreground intensity level to be lower than DIM UNDERLINE and underlines the text.

DEFAULT KEYBOARD (Programmable keyboard) Forces the system to use the second setting on the Configuration Screen's Keyboard option line. (Not Supported.)

DEFAULT KEYPAD (Programmable keyboard) Forces the system to use the first setting on the Configuration Screen's Keyboard option line.

DEFAULT KEYS (Programmable keyboard) Forces the system to use the third setting on the Configuration Screen's Keyboard option line. (Not Supported.)

DEFAULT TOUCH KEYS (Programmable keyboard) Forces the system to use the first setting on the Configuration Screen's Keyboard option line. (Not Supported.)

DELETE [nn] CHARACTERS (Erasing and editing) Erases one or nn characters to the right.

DELETE [nn] LINES (Erasing and editing) Deletes one or nn lines.

DIM and /DIM (Character attribute) Sets the monochrome foreground and background intensity to lower than normal.

DIM UNDERLINE (Character attribute) Sets the monochrome foreground intensity level to DIM and underlines the text.

DISABLE DATE (Clock and date) Disables the date at the bottom of the screen.

DISABLE ATTRIBUTES (Character attribute) Inhibits, or suppresses, the writing of character attributes to the screen.

DISABLE CURSOR (Cursor) Disables the cursor on the screen. (Same as NO CURSOR.)

DISABLE TIME (Clock and date) Disables the time at the bottom of the screen.

DISPLAY "text" (Display) Displays the string text.

DISPLAY DATE HERE (Clock and date) Move the date display from the bottom of the screen.

DISPLAY FILE (File display) Displays OptiSCREEN file nn.

DISPLAY TIME HERE (Clock and date) Move the time display from the bottom of the screen.

DOUBLE SIZE ["text"] (Line attribute) Establishes double size as the current line attribute mode or displays text double size.

DOUBLE WIDE (Character attribute) Establishes the double wide character set as the current mode.

DOUBLE WIDE LINE (Line attribute) Establishes double wide as the current line attribute mode.

DOWN [nn] (Cursor) Moves the cursor down one or nn rows.

DRAW BAR DOWN column X pixel
DRAW BAR DOWN pixel
DRAW BAR LEFT line X pixel
DRAW BAR LEFT pixel
DRAW BAR RIGHT line X pixel
DRAW BAR RIGHT pixel
DRAW BAR UP column X pixel
DRAW BAR UP pixel
(Graphics) These statements draw a bar in the specified direction (UP, DOWN, LEFT, or RIGHT) of the specified lines, columns, or pixels).

EMPTY BOX rr X cc (Graphics) Creates an empty box rr rows tall and cc columns to the right.

ENABLE ATTRIBUTES (Character attribute) After you specify DISABLE ATTRIBUTES, this statement resets the ability to write character attributes to the screen.

ENABLE CURSOR (Cursor) Makes the cursor visible. (Same as CURSOR.)

ENABLE DATE (Clock and date) Enables the date at the bottom of the screen.

ENABLE TIME (Clock and date) Enables the time at the bottom of the screen.

END (End of File) Indicates the end of the OptiSCREEN file.

ERASE BAR DOWN column X pixel, ERASE BAR DOWN pixel
ERASE BAR LEFT line X pixel, ERASE BAR LEFT pixel

ERASE BAR RIGHT line X pixel, ERASE BAR RIGHT pixel
ERASE BAR UP column X pixel, ERASE BAR UP pixel
(Erasing and Editing) These statements erase a bar in the specified direction (UP, DOWN, LEFT, or RIGHT) of the specified lines, columns or pixels.

EXIT ALTERNATE (Character attribute) Exits the alternate character set.

EXIT DOUBLE WIDE AND BLINK (Character attribute) Resets the double wide and blinking character attributes to normal.

EXIT QUAD (Character attribute) Exits the quad character set.

EXIT SUPER (Character attribute) Exits the Super character set. (Not supported.)

EXIT SUPPLEMENTAL (Character attribute) Exits the supplemental character set.

FILL BOX rr X cc WITH "a" (Graphics) Creates a box rr rows tall and cc columns to the right filled with character a.

FLASH "text"
FLASH cc
FLASH rr X ccc
(Display) Displays a flashing, or blinking, string of text or box region for text and graphics.

GREEN and /GREEN (Character attribute) Sets the foreground and background colors to green.

HOME (Cursor) Moves the cursor to row 1 and column 1.

HORIZONTAL BAR GRAPH nn, ff, mm (Graphics) Generates a horizontal bar graph nn whole cells to the right, ff (0 to 99) fractional cells to the right, and mm maximum cells to the right.

INDEX (Cursor) Moves the cursor down one row.

INSERT [nn] LINES (Erasing and editing) Inserts one or nn lines below the cursor.

LEFT [nnn] (Cursor) Moves the cursor left one or nnn columns.

LIGHT BRIGHT and /LIGHT BRIGHT (Character attribute) Sets the foreground / background intensity level to higher than BRIGHT.

LIGHT DARK and /LIGHT DARK (Character attribute) Sets the foreground / background intensity level to darker than NORMAL.

LIGHT DIM and /LIGHT DIM (Character attribute) Sets the foreground / background intensity level to dimmer than NORMAL.

LIGHT NORMAL and /LIGHT NORMAL (Character attribute) Returns the foreground / background intensity level to NORMAL.

LINE rr (Cursor) Moves the cursor to the beginning of line rr.

LOAD FUNCTION KEY nn WITH "text" (Function key) Loads function key nn with ASCII values text.

LOAD KEY nn WITH vvv (Programmable keyboard) Loads key nn with character vvv.

MAGENTA and /MAGENTA (Character attribute) Sets the foreground and background colors to purple.

MOVE TO rr[, cc] (Cursor) Moves the cursor to row rr and column cc.

NEW LINE (Cursor) Moves the cursor down to the beginning of the new line.

NO AUTO LINE FEED (Configuration) Disables the automatic line feed that occurs with a carriage return.

NO AUTO RETURN (Configuration) Disables the automatic carriage return that occurs with a line feed.

NO AUTO WRAP (Configuration) Disables the automatic line wrapping facility at the end of lines.

NO CURSOR (Cursor) Disables the cursor on the screen.

NORMAL and /NORMAL (Character attribute) Sets the monochrome foreground and background intensity to normal.

NORMAL UNDERLINE (Character attribute) Sets the foreground to the default, or normal, intensity and underlines the text.

PINK and /PINK (Character attribute) Sets the foreground and background colors to purple. (Same as MAGENTA.)

PRINT SCREEN TO PORT n[, GRAPHIC TYPE g] (Data transmission) Specifies port 1, 2, or 3 as the output location for a copy of the current screen.

PURPLE and /PURPLE (Character attribute) Sets the foreground and background colors to purple. (Same as MAGENTA.)

QUAD SIZE (Character attribute) Establishes the quad character set as the current mode.

RED and /RED (Character attribute) Sets the foreground and background colors to red.

RESET ATTRIBUTES (Character attribute) Resets all character attributes to the default.

RESET LINE ATTRIBUTES (Line attribute) Resets all line attributes to the default operating mode.

RESTORE POSITION (Cursor) Returns the cursor to the location stored with SAVE POSITION.

REVERSE INDEX (Cursor) Moves the cursor up one row.

REVERSED (Character attribute) Establishes the reverse video character attribute mode.

RIGHT [nnn] (Cursor) Moves the cursor right one or nnn columns.

ROW rr (Cursor) Moves the cursor to the beginning of the specified line.

SAVE POSITION (Cursor) Stores the current location of the cursor for recall with RESTORE POSITION.

SCROLL DOWN line x column
SCROLL LEFT line x column
SCROLL RIGHT line x column
SCROLL UP line x column
(Erasing and editing) These statement specify the direction and boundaries for scrolling text and graphics.

SCROLL LINES nn TO pp (Erasing and editing) Specifies the top line of the scrolling region as nn and the bottom line as pp.

SET DEFAULT ATTRIBUTE (Character attribute) Defines the currently set character attributes as the new default.

SINGLE SIZE LINE (Line attribute) Establishes single size as the current line attribute mode.

START INSERT (Erasing and editing) Begins the insertion mode to insert characters into text.

STEADY CURSOR (Cursor) Makes the cursor non-blinking on the screen.

STOP FLASH (Display) Stops a single flashing text string or flashing text string or flashing box region at the current cursor location.

STOP INSERT (Erasing and editing) Ends the insertion mode.

SUPER (Character attribute) Establishes the Super character set as the current mode. (Not supported.)

SUPPLEMENTAL (Character attribute) Establishes the supplemental character set as the current mode.

TRANSMIT FILE fname VIA position PORT (Data transmissions) Transmits the single file "fname" or file number "n" to the PRIMARY or SECONDARY port.

UNDERLINE (Character attribute) Sets the monochrome foreground intensity level to normal and underlines the text.

UNDERLINE CURSOR (Cursor) Makes the cursor appear as an underline character.

UP [nn] (Cursor) Moves the cursor up one or nn rows.

VERTICAL BAR GRAPH nn, ff, mm (Graphics) Generates a vertical bar graph nn whole cells up, ff (0 to 99) fractional cells up, and mm maximum cells up.

WHITE and /WHITE (Character attribute) Sets the foreground and background colors to white.

YELLOW and /YELLOW (Character attribute) Sets the foreground and background colors to yellow.

Chapter 6 Utility Programs for the IBM PC

The "OptiTALK Utility Programs Release 1.32" diskette contains programs to:

- Upload, or receive, OIT files to an IBM PC-compatible computer.
- Download, or send, files from an IBM PC-compatible computer to an OIT.

The OptiTALK utility is labeled Release 1.32 and is stored on the IWSREL.312 subdirectory.

OptiTALK runs on an IBM XT-compatible or AT-compatible computer. It sends and receives files from the OIT TOOLS menu.

Installing the OptiTALK Utility

The following DOS commands offer one method for installing OptiTALK on the hard disk of your IBM PC-compatible computer. These commands make a new subdirectory named OPTITALK, move to the new subdirectory, and copy the files from the floppy disk to the hard disk:

```
MD OPTITALK

CD OPTITALK

COPY A:IWSREL.312\*.*
```

The OptiTALK utility allows you to save all files received at the PC-compatible computer on any disk drive and in any subdirectory. By adding the OptiTALK subdirectory (as created above) to your path directory, you can also call OptiTALK from any location; for example:

```
PATH=C:\;C:\DOS;C:\DOS\MOUSE;C:\WIN;C:\OPTITALK
```

You can also copy the OptiTALK programs to another floppy disk and execute the utilities from the disk. The floppy disk sent with the OIT does not contain sufficient space to store received files and should be used as an archive, or backup, disk.

Using the OptiTALK Utility

OptiTALK is a file transfer program designed for use with OITs containing firmware release 3.1 or later. OptiTALK communicates with the OITs TOOLS HOST facility to receive and send files developed on the OIT. The OIT always uses software handshaking with the OptiTALK utility.

Cabling

OptiTALK transfers files using either port on the OIT and the COM1 or COM2 port on the IBM PC-compatible computer. The following diagrams show the cables required for communication.

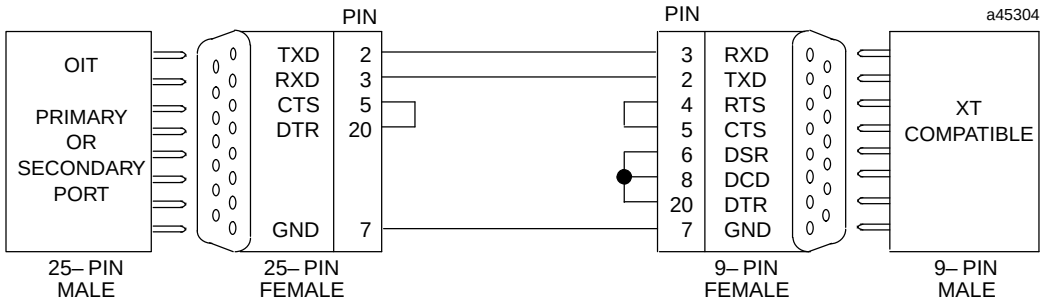


Figure 6-1. OIT Serial Port to IBM XT-Compatible Computer

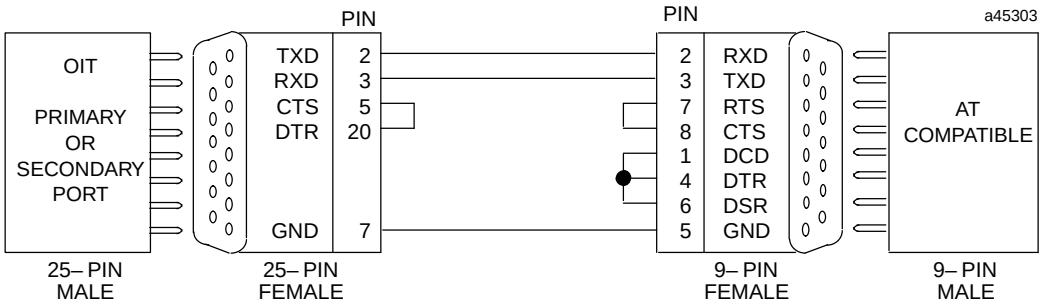


Figure 6-2. OIT Serial Port to IBM AT-Compatible Computer

- On an OIT with a Logic I or a Logic II board (a GE Fauc IC600KD51x or IC600KD53x) the cables only connect to the primary port.
- On an OIT with a Logic III board (a GE Fanuc IC600KD54) the cables connect to either the primary or secondary port.

Binary and ASCII Files

OptiTALK offers the [F2] Send and the [F3] Receive functions to transfer ASCII files between the OIT and the PC computer. OptiTALK also offers the [F4] BSend and the [F5] BReceive functions to transfer binary files. You must transfer OptiSCREEN files in their ASCII formats.

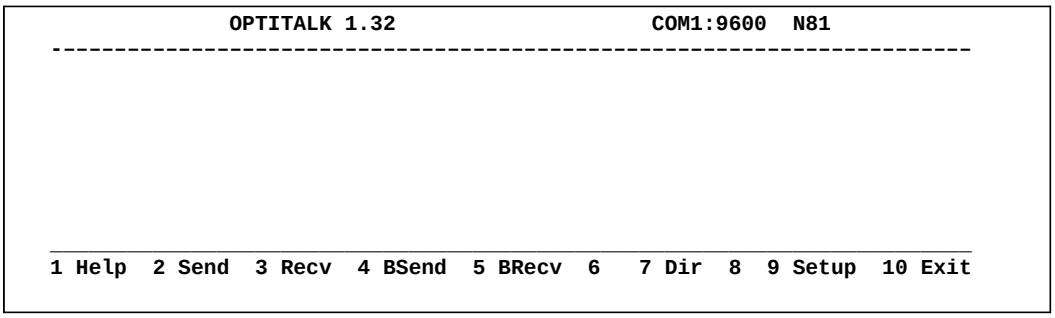
Transferring Files

To execute OptiTALK, type the following command at the DOS level:

`OptiTALK`

If running OptiTALK from the backed-up floppy disk, move to the *A:* directory before typing *OPTITALK* or simply type *A:OPTITALK* to gain access to the utility programs.

After the system displays the introduction screen, you can press any key to display the Main Menu. The program displays valid function keys at the bottom of the screen:



After you select a function key from this menu, the system displays a new screen and the valid function keys. The keys are summarized below and then described in detail.

[F1] Help Displays a help screen.

[F2] Send Sends ASCII files from the PC to the OIT.

[F3] Recv Receives ASCII files at the PC from the OIT.

[F4] BSend Sends binary files from the PC to the OIT.

[F5] BRecv Receives binary files at the PC from the OIT.

[F7] Dir Changes the directory on the PC.

[F9] Setup Changes communications configurations.

[F10] Exit Exits to DOS.

A complete description of each of these functions appears below.

[F1] Help - Press the [F1] Help key from the Main Menu to display the Main Menu help screen. This screen describes the operation of the Main Menu function keys. Press any key to leave the help screen.

[F2] Send - Press the [F2] Send key from the Main Menu to send OptiSCREEN files in an ASCII format from the IBM PC-compatible computer to the OIT. After you press the [F2] Send key, the OptiTALK Send screen appears; for example:

```
              OPTITALK 1.32                      COM1:9600  N81     SEND
-------------------------------------------------------------------------
Directory:  C:\OPTITALK
Total files: 5     Files Selected: 0
-----------------------------------------------
                   DIRECTORY
No  Name      Ext      Date      Time      Size
-----------------------------------------------
1   BTEST2   .SCR    09/27/90    09:34     7160
2   VALVE2   .SCR    09/27/90    10:21     3215
3   TEMPF1   .SCR    10/29/90    15:33     9325
4   COMPDIT  .SCR    10/29/90    15:44     6213
5   RELEASE  .SCR    10/29/90    16:04     7740




_____________________________________________________________________________
1 Help  2 Send  3 Mark  4   5 MkSCR  6   7 MkALL  8 UnMk  9  10 Exit
```

Before sending ASCII files to the OIT, you must select the proper port and baud rate from the TOOLS menu on the OIT and press the [F6] RECEIV function key. The OIT displays *ASCII RECEIVE READY* above the function bar.

You must also use the Main Menu [F9] Setup key to select the proper configuration information for the IBM PC-compatible computer before sending files. Use the [F7] Dir key to select the directory for the files.

You can individually "mark" files in the directory using the [F3] Mark or [Enter] key or by file extension using the [F5] MkSCR function keys. You then send marked files to the OIT by pressing the [F2] Send function key again. During file transmission, the system displays the file name, the number of files sent, and the number of characters sent.

[F1] Help - Displays the help screen which describes the operation of the [F2] Send function keys. Press any key to leave the help screen.

[F2] Send - Sends the marked ASCII files to an OIT running the TOOLS menu.

[F3] Mark - Flags one or more files that you want to send. Use the [↑] and [↓] cursor control keys to highlight a file and then mark, or flag, it by pressing the [F3] Mark key. You can then move to another file for marking, or you can send the file. By selecting a file with the [F3] Mark key a second time, you can unmark, or remove the flag, from a file.

[F5] MkSCR - Marks, or flags, all of the OptiSCREEN files with the .SCR extension to be sent to the OIT. By selecting a marked OptiSCREEN file with the [F3] Mark key, you can unmark, or remove the flag, from a single OptiSCREEN file.

[F7] MkALL - Marks, or flags, all of the files to be sent to the OIT. By selecting a marked file with the [F3] Mark key, you can unmark, or remove the flag, from a single screen or file.

[F8] UnMk - Unmarks, or unflags, all of the currently marked files.

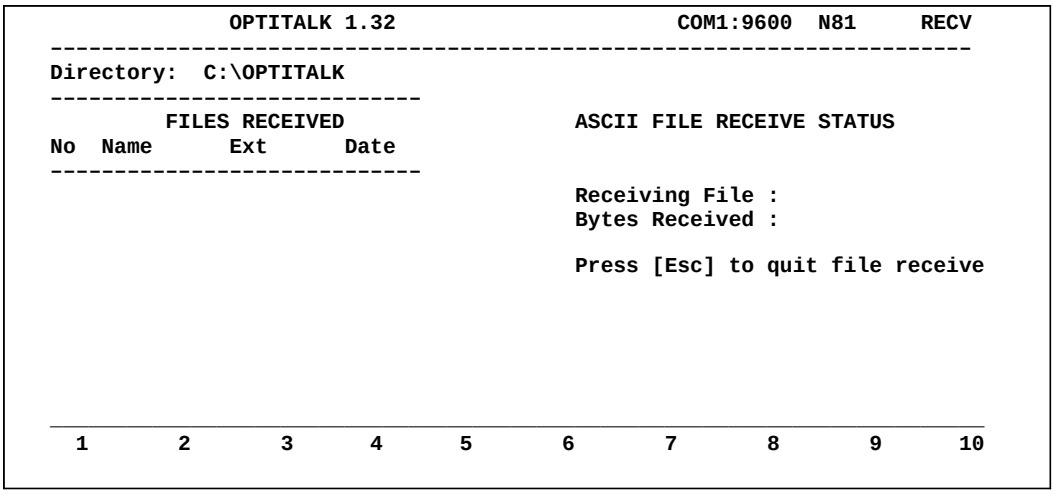
[F10] Exit - Exits to the Main Menu so that you can select another OptiTALK operation.

[Esc] Abort - Aborts the ASCII file send operation.

Do not compare the file size displayed on the OptiTALK directory with the file size displayed on the OITs TOOLS directory as a check for a good file transfer. The files are

stored in different formats on the different machines, and the total number of bytes is not the same.

[F3] Recv - Use the [F3] Recv operation from the Main Menu to receive OptiSCREEN files in an ASCII format for backup or transfer. After you press the [F3] Recv key from the Main Menu to send ASCII files from the OIT to the IBM PC-compatible computer, the program displays the ASCII File Receive screen:



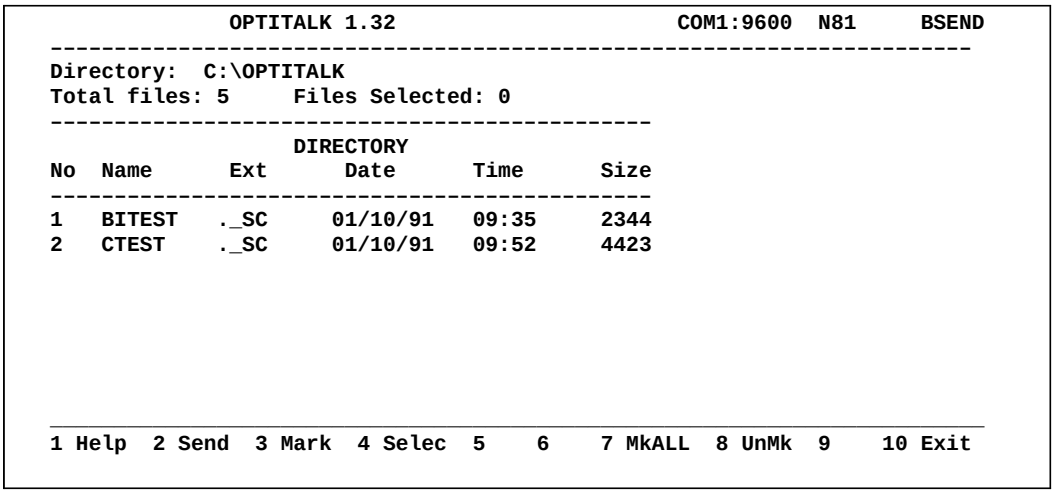
Before receiving files from the OIT, select the proper port and baud rate from the TOOLS menu on the OIT, mark the files to be sent, and press the [F5] SEND function key. The OIT displays the *SENDING: file name* message above the function bar.

You must also use the Main Menu [F9] Setup key to select the proper configuration information for the IBM PC-compatible computer before receiving files. Use the [F7] Dir key to select the directory for the files.

The only active key on the IBM PC-compatible computer at this time is the [Esc] key, which exits the file receive mode. During file transmission, the system displays the file name and the number of bytes received.

If the IBM PC-compatible computer running OptiTALK does not start receiving an ASCII file within a short period of time, it displays the "Time out occurred" error message. In this case, you must press the [Esc] key to return to the Main Menu before pressing the [F3] Recv key again.

[F4] BSend - Press the [F4] BSend key from the Main Menu to send data files in a binary format from the IBM PC-compatible computer to the OIT. After you press the [F4] BSend key, the OptiTALK Binary File Screen appears; for example:



Before sending binary files to the OIT, you must select the proper port and baud rate from the TOOLS menu on the OIT and press the [F8] BRECV function key. The OIT displays *BINARY RECEIVE READY* above the function bar.

You must also use the Main Menu [F9] Setup key to select the proper configuration information for the IBM PC-compatible computer before sending files. Use the [F7] Dir key to select the directory for the files.

You can individually "mark" files in the directory using the [F3] Mark or [Enter] key or by file extension using the [F4] Selec function key. You then send marked files to the OIT by pressing the [F2] Send function key again. During file transmission, the system displays the file name, the number of files sent, and the number of characters sent.

[F1] Help - Displays the help screen which describes the operation of the [F4] BSend function keys. Press any key to leave the help screen.

[F2] Send - Sends the marked binary files to an OIT running the TOOLS utility. You cannot send SYSTEM files or unnamed files with the BSend operation.

[F3] Mark - Flags one or more files that you want to send. Use the [↑] and [↓] cursor control keys to highlight a file and then mark, or flag, it by pressing the [F3] Mark key. You can then move to another file for marking; or you can send the file. By selecting a file with the [F3] Mark key a second time, you can unmark, or remove the flag, from a file.

[F4] Select - Prompts you to identify the binary file extension that you want to mark. OptiTALK uses the following OIT types and file extensions:

Extension	**OIT Type**
_FK	Function key
_SC	OptiSCREEN
_XX	Any other file type

The system then marks, or flags, all of the binary files with the named extension to be sent to the OIT.

[F7] MkALL - Marks, or flags, all of the files to be sent to the OIT. By selecting a marked file with the [F3] Mark key, you can unmark, or remove the flag, from a single screen or file.

[F8] UnMk - Unmarks, or unflags, all of the currently marked files.

[F10] Exit - Exits to the Main Menu so that you can select another OptiTALK operation.

[Esc] Abort - Aborts the binary file send operation.

Only binary files are available to mark in the BSEND mode. You can store OptiSCREEN files in an ASCII or binary format.

Do not compare the file size displayed on the OptiTALK directory with the file size displayed on the OITs TOOLS directory as a check for a good file transfer. The files are stored in different formats on the different machines, and the total number of bytes is not the same.

[F5] BRecv - Use the [F5] BRecv operation from the Main Menu to receive data files in a binary format for backup or transfer. After you press the [F5] BRecv key from the Main Menu to send binary files from the OIT to the IBM PC-compatible computer, the program displays the Binary File Receive screen:

```
              OPTITALK 1.32                        COM1:9600  N81    BRECV
------------------------------------------------------------------------------
Directory:  C:\OPTITALK
-----------------------------
         FILES RECEIVED                 BINARY FILE RECEIVE STATUS
No  Name      Ext      Date
-----------------------------
                                    Receiving Binary File :
                                    Bytes Received        :
                                    ECC Count:            :

                                    Press [Esc] to quit receive

_____________________________________________________________________________
  1       2       3       4       5       6       7       8       9       10
```

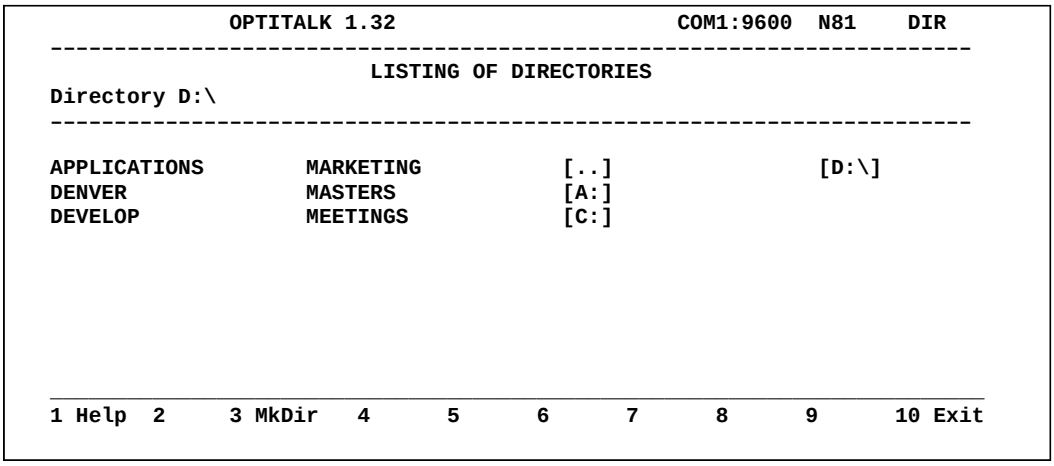
Before receiving files from the OIT, select the proper port and baud rate from the TOOLS menu on the OIT, mark the files to be sent, and press the [F7] BSEND function key. The OIT displays the *BINARY SENDING: file name* message above the function bar.

You must also use the Main Menu [F9] Setup key to select the proper configuration information for the IBM PC-compatible computer before receiving files. Use the [F7] Dir key to select the directory for the files.

The only active key on the IBM PC-compatible computer at this time is the [Esc] key, which exits the binary file receive mode. During file transmission, the system displays the file name and the number of bytes received.

There is no “time out” for the [F8] BRecv operation. You cannot receive SYSTEM files with the [F8] BRecv menu item.

[F7] Dir - Use the [F7] Dir operation from the Main Menu to change the directory from which you want to send or receive files. When you exit OptiTALK, the system places you in the original directory at which you entered it. After you press the [F7] Dir key, the program displays the current directory:



This menu item allows you to move through the directories from which you can send or receive files. Press the [Enter] key to select a drive or directory and then, if available, select another subdirectory before exiting the screen.

[F1] Help - Displays the help screen which describes the operation of the [F7] Dir function keys. Press any key to leave the help screen.

[F3] MkDir - Creates a subdirectory under the currently selected directory. When the system prompts you to "Enter directory name", you must specify the new valid name. The system does not place you in that subdirectory.

[F10] Exit - Exits to the Main Menu so that you can send or receive files in the directory you selected.

Moving Through the Directories

Use the cursor control keys to move through the available directories on your IBM PC-compatible computer and press the [Enter] key to move to the highlighted directory:

[Enter] - Selects the currently highlighted drive, directory, or subdirectory as the location where you want to send or receive files.

[←], [→], [↑], and [↓] - Moves through the drives, directories, and subdirectories currently listed on the screen.

[Home] and [End] - Moves to the first or last drive, directory, or subdirectory listed on the screen.

You can use the cursor control keys and the [Enter] key repeatedly to move up and down through the available drives, directories, or subdirectories. When you exit OptiTALK, the system places you in the original directory at which you entered it.

Speed Searching for Directories

The speed search capability is helpful when you must move through a long list of directories. To use the speed search, press the first letter of the directory name you want to move to. The cursor highlights the first directory name that begins with that letter. If you press the same letter again, the cursor highlights the next directory name which begins with that letter.

For example, in the above screen, if you press the [M] key, the cursor highlights the MARKETING directory. If you press the [D] key, the cursor highlights the DENVER directory. If you press the [D] key again, the cursor highlights the DEVELOPMENT directory. If you press the [Enter] key, the system enters the DEVELOPMENT directory and displays the available subdirectories.

[F9] Setup - When you select [F9] SETUP from the Main Menu, the program displays the Serial Port Communication menu for the IBM PC-compatible computer. You can select the communication port, baud rate, parity, word length, and stop bits from this menu. (Use the [F7] Dir key to select the directory for the files.) The following Serial Port Configuration screen shows the factory defaults for the system:

```
              OPTITALK 1.32                      COM1:9600  N81    SETUP
-------------------------------------------------------------------------

  SERIAL PORT CONFIGURATION

     Comm Port     COM1
     Baud Rate     9600
     Parity        None
     Word Length   Eight
     Stop Bits     One




_____________________________________________________________________________
Help    Save   Restor                                                  Exit
 F1      F2     F3     F4     F5      F6      F7      F8      F9      F10
```

Before sending files to an OIT or receiving files from an OIT, configure the OITs port parameters to match the IBM PC-compatible computer's configuration. The OIT always uses software handshaking and point-to-point communication with OptiTALK.

[F1] Help - Displays the help screen which describes the operation of the [F9] Setup function keys. Press any key to leave the help screen.

[F2] Save - Stores the currently set IBM PC-compatible computer configuration parameters to the disk. After you save the configuration, the system returns to these parameters when you start OptiTALK.

[F3] Restor - Restores the factory-set IBM PC-compatible computer configuration parameters shown above.

[F10] Exit - Exits to the Main Menu so that you can select another OptiTALK operation.

[←] and [→] - Increases and decreases the settings for the various configuration items.

[↑] and [↓] - Moves to the next configuration item and moves to the previous configuration item.

The [F9] Setup Serial Port Configuration screen offers the following settings for the IBM PC-compatible computer:

Comm Port - COM1 or COM2.

Baud Rate - 110 baud, 150 baud, 300 baud, 600 baud, 1200 baud, 2400 baud, 4800 baud, or 9600 baud.

Parity - None parity, Odd parity, or Even parity.

Word Length - Eight bits or Seven bits.

Stop Bits - One stop bit or two stop bits.

The configuration settings for the OIT and the IBM PC-compatible computer running OptiTALK must match before you attempt to send or receive files.

[F10] Exit - Press the [F10] Exit key to return to the DOS level. The system prompts you "Do you want to enter DOS (Y / N)?" before placing you in DOS.

File Names and Extensions

OptiTALK naming conventions, file extensions, and older file names are described below.

Naming Conventions

With OptiTALK, files received at the IBM PC-compatible computer are stored under the file name they were given on the OIT. Although the OIT allows file names up to sixteen characters long, names longer than eight characters are truncated when received at the IBM PC-compatible computer; this is due to a DOS limitation.

Therefore, you should limit file names to eight characters if you intend to back-up the files on an IBM PC-compatible computer. To use a longer file name, you must rename the long file name with the [F6] RENAME function on the OIT before receiving the file and then change the name back after sending it.

Extensions

The OptiTALK system uses the following extensions for file names:

Extension	OIT Type
SCR	ASCII OptiSCREEN
_FK	Binary function key
_SC	Binary OptiSCREEN
_XX	Any other binary file type

Hardware/Software Compatibility With GE Fanuc IC600KD510/512/530/532

The following hardware changes may affect an application which is being transferred from an older unit:

- The auxiliary port (Port 3) is no longer supported.
- The signal pins for RS-422 have changed.
- The secondary port (Port 2) connector is now a male type
- The baud rates 110, 134.5, 200, 1050, 2000 and 38400 are no longer supported.

The following OptiSCREEN statement changes may affect an application which is being transferred from an older unit:

- The CLEAR KEY TABLE escape sequence has been changed from {ESC}[>98r to {ESC}[>251r .
- DOUBLE SIZE and QUAD SIZE line attribute statements operate somewhat differently. In particular, LEFT, RIGHT, UP and DOWN cursor control statements on double sized and quad sized lines may not operate as before. The suggested modification is to use MOVE TO statements to an absolute screen location.

Transferring Files to This OIT

OITs running this firmware release can also run OptiSCREEN applications written for previous firmware releases. To transfer the files, you must upload the files to a PC-compatible computer and then download the files to this OIT. Each older firmware release level requires slightly different steps.

To transfer your application, check the firmware release level on the Configuration Menu of your old OIT. Then choose the appropriate transfer programs listed below to transfer your files to this OIT. A summary of the available transfer programs and cables for transferring data appears next, before step-by-step instructions for each firmware release.

Release 2.3 and Before	Program	Description
	IWSLINK	(File: IWSLINK.BAS) IWSLINK offers binary transfer of Release 2.3 (and before) OptiSCREEN and system files to and from a PC computer. It backs-up the entire memory of an OIT in a file with the IWS extension. It is only used to restore files to another OIT running Release 1.x or 2.x. You must use your own cable to transfer files with IWSLINK.
	IWSFILE	(File: IWSFILE.BAS) IWSFILE offers ASCII transfer of Release 2.3 (and before) OptiSCREEN files to and from a PC computer. It backs-up OptiSCREEN files one screen at a time and stores them in a file, one screen per file, with the FIL extension.
	IWSEDIT	(File: IWSEDIT.BAS) IWSEDIT offers binary transfer of Release 2.3 (and before) OptiSCREEN files to and from a PC computer. It backs-up individual files with the SCR extension.

	IWSAUTO	(File: IWSAUTO.BAS) IWSAUTO offers binary transfer of Release 2.3 (and before) OptiSCREEN files and restores them all at once. It backs-up individual files with the SCR extension. Files transferred with IWSAUTO may require some minor adjustments after transfer to an OIT running this firmware release.
Release 3.1 to 4.0	OPTITALK Version 1.21	(File: OPTITALK.EXE) This version of OptiTALK uploads Release 3.1 and 4.0 files to a PC computer and downloads files to an OIT. You can transfer OptiSCREEN files in an ASCII format although you can also transfer them in a binary format. You must transfer system files in a binary format.
	40_TO_41	(File: 40_TO_41.EXE) The 40_TO_41 utility converts binary files generated in Release 3.1 or 4.0 to Release 4.1 or later. You do not need to transfer OptiSCREEN files in a binary format although you can transfer them in a binary format and then convert them with the 40_TO_41 program. You must transfer system files in a binary format and then convert them with this program before you download them into an OIT running Release 4.1 or later.
Release 4.1 and Later	OPTITALK Version 1.32	(File: OPTITALK.EXE) This version of OptiTALK uploads Release 4.1 or later files to a PC computer and downloads files to an OIT. You can transfer OptiSCREEN files in an ASCII format. You must transfer system files as binary files. You do not need to use the 40_TO_41 program to convert binary files transferred with OptiTALK Version 1.32.

Transferring Files from a Firmware Release Before Release 2.2

If necessary, use the IWSLINK, IWSFILE, and IWSEDIT programs to restore files to your OIT running any release before Release 2.2. Then use these instructions to transfer files for a firmware release before Release 2.2:

1. Connect the OIT running a firmware release before Release 2.2 to a PC computer.
2. Use the program named IWSAUTO to upload all OptiSCREEN files to your PC computer. To use the program, type IWS on the PC, select IWSAUTO from the menu, and follow the instructions on the screen. IWSAUTO stores individual OptiSCREEN files on the PC with the SCR extension.
3. After the PC has completed uploading the files, connect this OIT to the PC computer.
4. Use IWSAUTO to download files from the PC computer to the OIT. Files transferred with IWSAUTO may require some minor adjustments after transfer to an OIT running this firmware release. Review your screen files carefully for any corruption which might have occurred during the transfer.

You can't transfer system files from OITs using a firmware release before Release 2.2.

Transferring Files from Firmware Release 2.2 through Release 2.4

If necessary, use IWSLINK to restore files to your OIT running Release 2.2 through Release 2.4. Then use these instructions to transfer files for Firmware Release 2.2 through Release 2.4:

1. Connect the OIT running Release 2.2 through Release 2.4 to a PC computer.
2. Use the program named IWSFILE to upload OptiSCREEN files to a PC computer. To use the program, type IWS on the PC, select IWSFILE from the menu, and follow the instructions on the screen. The program individually transfers each OptiSCREEN file and stores it in an ASCII file with the FIL extension. Use the DOS system RENAME command to change the FIL extension to SCR on each file; for example, REN 1.FIL TO 1.SCR.

Caution

You will need to access screen files from all used RAM banks. It is possible that different screen files, each with the same number, may be located in different RAM banks. You must ensure that each screen file is assigned a unique number/name before downloading to the new OIT. This will probably require some programming changes to reference the file with the changed name.

3. After the PC has completed transferring the files, connect the new OIT to the PC computer.

4. Use OptiTALK Version 1.32 to download the renamed files with the SCR extension to the new OIT. To use the program, type OPTITALK on the PC and follow the instructions on the screen. The OptiTALK utility is described earlier in this chapter.

   - If you used IWSAUTO to upload the OptiSCREEN files to a PC computer, use IWSAUTO to download the files from the PC computer to the OIT. Files transferred with IWSAUTO may require some minor adjustments after transfer to a new OIT.

You can't transfer system files from OITs using Firmware Release 2.2 through Release 2.4.

Transferring Files from Firmware Release 3.1 through Release 4.0

Use these instructions to transfer files for Firmware Release 3.1 through Release 4.0:

1. Connect the OIT running Release 3.1 through Release 4.0 a PC-compatible computer.
2. Use OptiTALK Version 1.21 to upload OptiSCREEN and system files to a PC computer. To use the program, type **OPTITALK** on the PC and follow the instructions on the screen. The OptiTALK utility is described in the user's guide. Upload OptiSCREEN files as ASCII files. Upload system files as binary files.
3. Use the 40_TO_41 program to convert binary files for use with the new OIT. To use the program, type **40_TO_41** and follow the instructions on the screen.
4. After the PC has completed transferring the files, connect the new OIT to the PC computer.
5. Use OptiTALK Version 1.32 to transfer OptiSCREEN files as ASCII files. Transfer system files as binary files after you use the 40_TO_41 program to convert the binary files for use with the new OIT.

Transferring Files from Firmware Release 4.1

Use these instructions to transfer files for Firmware Release 4.1 or later:

1. Connect the OIT running Release 4.1 to a PC-compatible computer.
2. Use OptiTALK Version 1.32 to upload OptiSCREEN and system files to a PC computer. To use the program, type **OPTITALK** on the PC and follow the instructions on the screen. The OptiTALK utility is described in the user's guide. Upload OptiSCREEN files as ASCII files. Upload system files as binary files.
3. After the PC has completed transferring the files, connect the new OIT to the PC computer.
4. Use OptiTALK Version 1.32 to download files to the new OIT. Transfer OptiSCREEN files as ASCII files. Transfer system files as binary files.

Appendix A Outline and Mounting Drawings

The following drawings and dimensions are subject to change without notice. Please confirm all dimensions with the actual product or the factory prior to fabrication of mounting equipment.

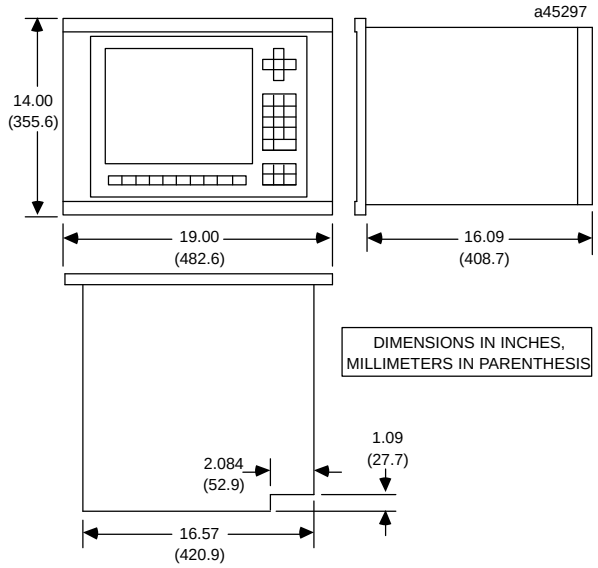


Figure A-1. Outline Drawing for OIT Models IC600KD542

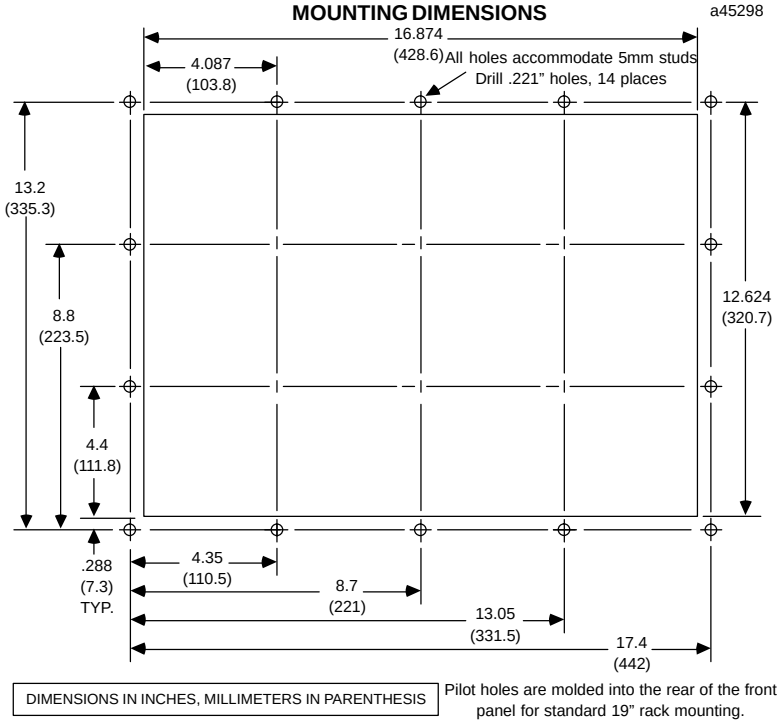


Figure A-2. Cutout Drawing for OIT Models IC600KD542

Appendix B ASCII Codes and Special Character Sets

The OIT uses standard ASCII codes for display and communication. Additionally, the OIT offers special Supplemental Standard, Alternate, Supplemental Alternate, and Quad Size character and graphics sets.

ASCII Codes and Characters

The decimal values, hexadecimal values, characters, and descriptions for the standard ASCII characters appear below. Characters marked with an asterisk (*) are not processed.

Decimal	Hex	Character	Description
0	00	[Ctrl]–@	NUL, null or tape feed*
1	01	[Ctrl]–A	SOH, start of header
2	02	[Ctrl]–B	STX, start of text
3	03	[Ctrl]–C	ETX, end of text
4	04	[Ctrl]–D	EOT, end of transmission
5	05	[Ctrl]–E	ENQ, enquiry
6	06	[Ctrl]–F	ACK, acknowledge*
7	07	[Ctrl]–G	BEL, external bell output
8	08	[Ctrl]–H	BS, backspace
9	09	[Ctrl]–I	HT, horizontal tab
10	0A	[Ctrl]–J	LF, line feed
11	0B	[Ctrl]–K	VT, vertical tab*
12	0C	[Ctrl]–L	FF, form feed
13	0D	[Ctrl]–M	CR, carriage return
14	0E	[Ctrl]–N	SO, shift out
15	0F	[Ctrl]–O	SI, shift in
16	10	[Ctrl]–P	DLE, data link escape
17	11	[Ctrl]–Q	DC1, device control 1, XON
18	12	[Ctrl]–R	DC2, device control 2*
19	13	[Ctrl]–S	DC3, device control 3, XOFF
20	14	[Ctrl]–T	DC4, device control 4*
21	15	[Ctrl]–U	NAK, negative acknowledge*
22	16	[Ctrl]–V	SYN, synchronous idle*
23	17	[Ctrl]–W	ETB, end of transmission block
24	18	[Ctrl]–X	CAN, cancel escape sequence
25	19	[Ctrl]–Y	EM, end of medium*

Decimal	Hex	Character	Description
26	1A	[Ctrl]–Z	SUB, substitute*
27	1B	[Ctrl]–[	(left square bracket) ESC, esc
28	1C	[Ctrl]–\	(backslash) FS, file separator*
29	1D	[Ctrl]–]	(right square bracket) GS, group separator
30	1E	[Ctrl]–^	(caret) RS, record separator
31	1F	[Ctrl]–_	(underscore) US, unit separator*
32	20	[Space]	
33	21	!	(exclamation point)
34	22	‘‘	(double quotation mark)
35	23	#	(hatch, number sign, or pound)
36	24	$	(dollar sign)
37	25	%	(percent sign)
38	26	&	(ampersand)
39	27	’	(apostrophe or single right quote)
40	28	(	(left or open parenthesis)
41	29	)	(right or close parenthesis)
42	2A	*	(asterisk or star)
43	2B	+	(plus sign)
44	2C	,	(comma)
45	2D	–	(minus sign, hyphen, or dash)
46	2E	.	(period or dot)
47	2F	/	(slash or forward slash)
48	30	0	(zero)
49	31	1	
50	32	2	
51	33	3	
52	34	4	
53	35	5	
54	36	6	
55	37	7	
56	38	8	
57	39	9	
58	3A	:	(colon)
59	3B	;	(semicolon)
60	3C	<	(less than)
61	3D	=	(equals)
62	3E	>	(greater than)
63	3F	?	(question mark)
64	40	@	(at sign)
65	41	A	(begin uppercase letters)
66	42	B	
67	43	C	
68	44	D	
69	45	E	

Decimal	Hex	Character	Description
70	46	F	
71	47	G	
72	48	H	
73	49	I	
74	4A	J	
75	4B	K	
76	4C	L	
77	4D	M	
78	4E	N	
79	4F	O	
80	50	P	
81	51	Q	
82	52	R	
83	53	S	
84	54	T	
85	55	U	
86	56	V	
87	57	W	
88	58	X	
89	59	Y	
90	5A	Z	(end uppercase letters)
91	5B	[	(left or open bracket
92	5C	\	(backslash or reverse slash)
93	5D	]	(right or close square bracket)
94	5E	^	(up arrow sign or caret)
95	5F	__	(underscore)
96	60	’	(grave accent or single left quote)
97	61	a	(begin lowercase letters)
98	62	b	
99	63	c	
100	64	d	
101	65	e	
102	66	f	
103	67	g	
104	68	h	
105	69	i	
106	6A	j	
107	6B	k	
108	6C	l	
109	6D	m	
110	6E	n	
111	6F	o	
112	70	p	

Decimal	Hex	Character	Description
113	71	q	
114	72	r	
115	73	s	
116	74	t	
117	75	u	
118	76	v	
119	77	w	
120	78	x	
121	79	y	
122	7A	z	(end lowercase letters)
123	7B	{	(left or open squiggly brace)
124	7C	|	(vertical line)
125	7D	}	(right or open squiggly brace)
126	7E	~	(tilde)
127	7F	DEL	(delete or rubout)
128	80	[F1]	(begin function keys)
129	81	[F2]	
130	82	[F3]	
131	83	[F4]	
132	84	[F5]	
133	85	[F6]	
134	86	[F7]	
135	87	[F8]	
136	88	[F9]	
137	89	[F10]	
138	8A	[F11]	
139	8B	[F12]	
140	8C	[F13]	
141	8D	[F14]	
142	8E	[F15]	
143	8F	[F16]	(end function keys)
144	90	[Ctrl]–0	(begin control keys
145	91	[Ctrl]–1	
146	92	[Ctrl]–2	
147	93	[Ctrl]–3	
148	94	[Ctrl]–4	
149	95	[Ctrl]–5	
150	96	[Ctrl]–6	
151	97	[Ctrl]–7	
152	98	[Ctrl]–8	
153	99	[Ctrl]–9	(end control keys)
154–	9A–		not used
169	A9		

Decimal	Hex	Character	Description
170–	AA–		IBM special key codes
171	AB		
172–	AC–		not used
175	AF		
176– 177	B0– B1		IBM special key codes
178	B2		Cursor down
179	B3		IBM special key code (page down)
180	B4		Cursor left
181	B5		not used
182	B6		Cursor right
183	B7		Home
184	B8		Up
185	B9		IBM special key code (page up)
186– 191	BA– BF		not used
192– 204	C0– CC		IBM special key codes
205– 254	CD– FE		not used
255	FF		no keystroke

Supplemental Standard Graphics Set

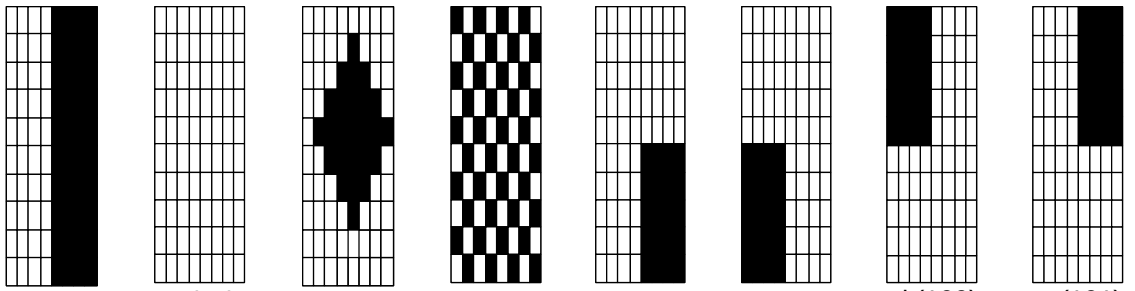
From the Standard Character Set, you can enter the Supplemental Standard Graphics Set with the OptiSCREEN SUPPLEMENTAL command. Return to the Standard Character Set with the EXIT SUPPLEMENTAL command.

The Supplemental Standard Set includes the following:

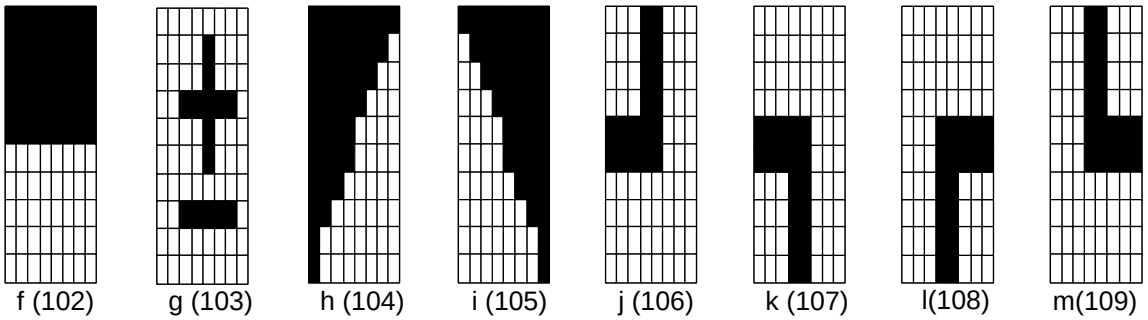
numbers 0 to 9	(	:
uppercase A to Z	)	;
space	*	<
!	+	=
″	,	>
#	–	?
$	.	@
%	/	[
&	]	\
’		

The Supplemental Standard Graphics Set appears below.

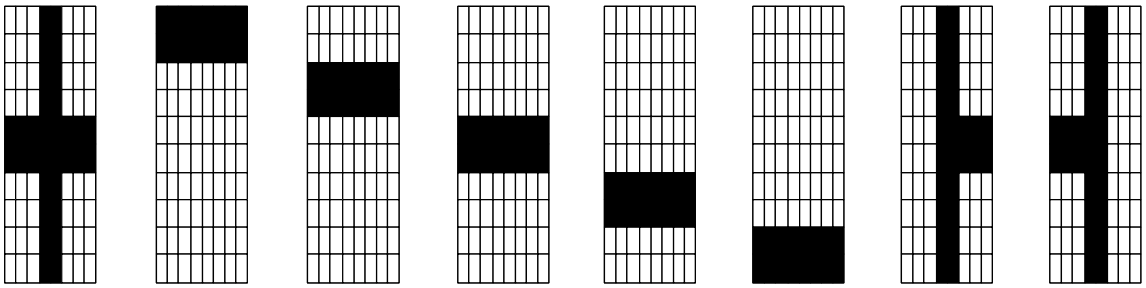
a44106



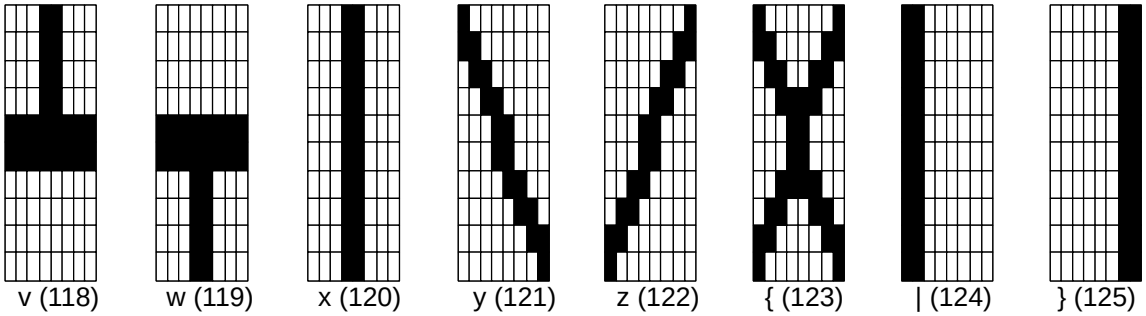
a44107



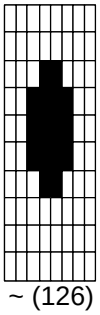
a44108



a44109



a44110

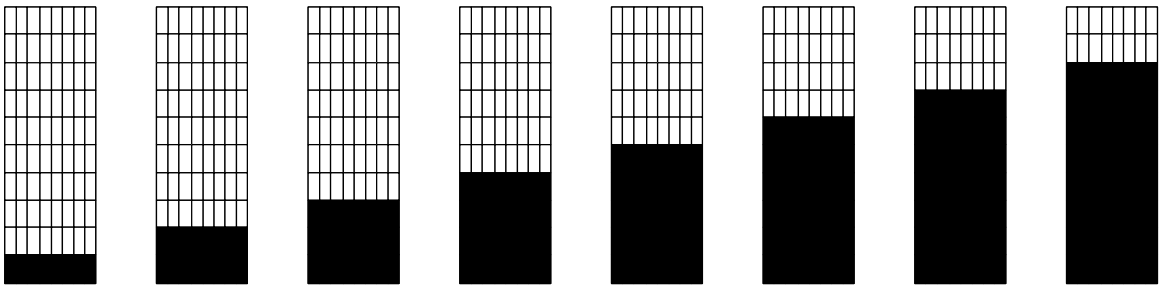


Alternate Graphics Set

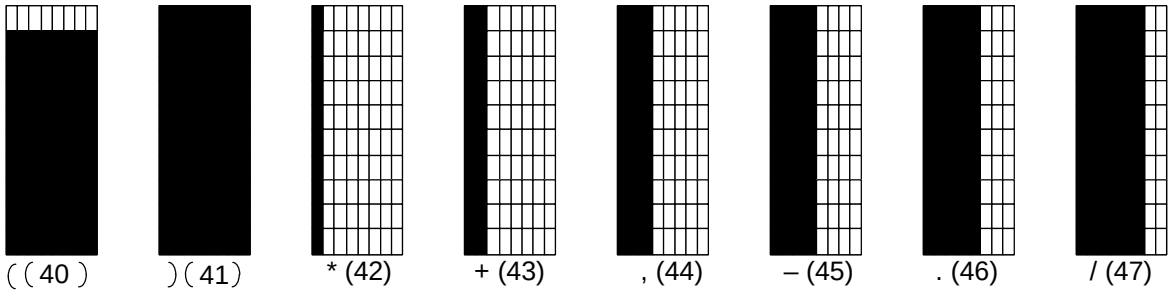
From the Standard Character Set, you can enter the Alternate Graphics Set with the OptiSCREEN ALTERNATE command. Return to the Alternate Graphics Set with the EXIT ALTERNATE command.

The Alternate Graphics Set appears below.

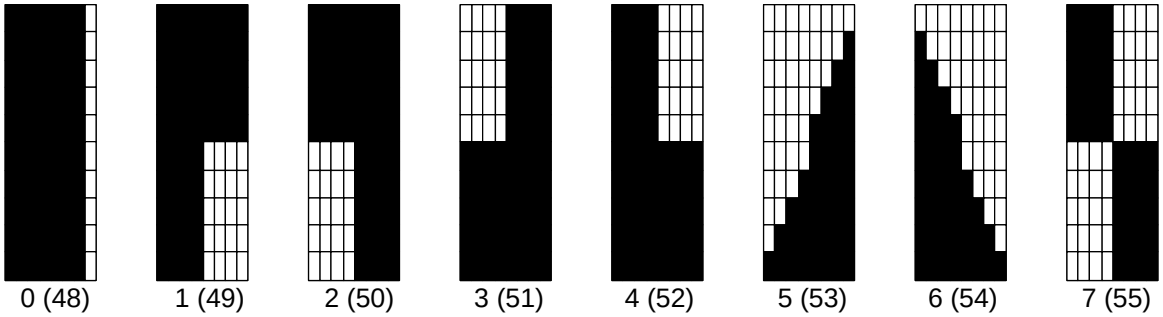
a44111



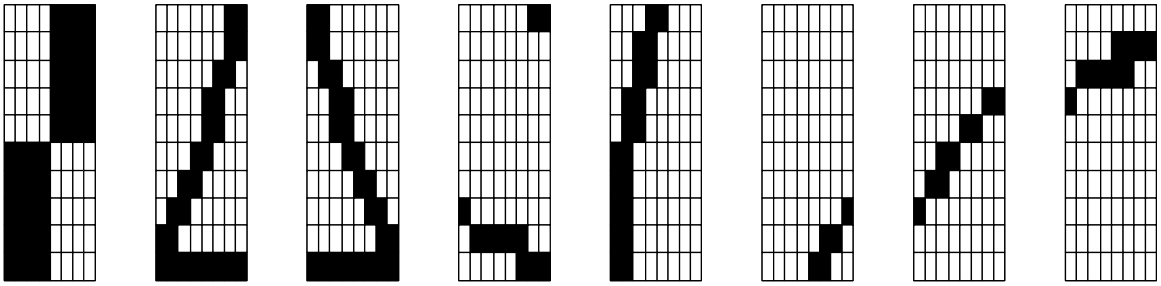
a44112



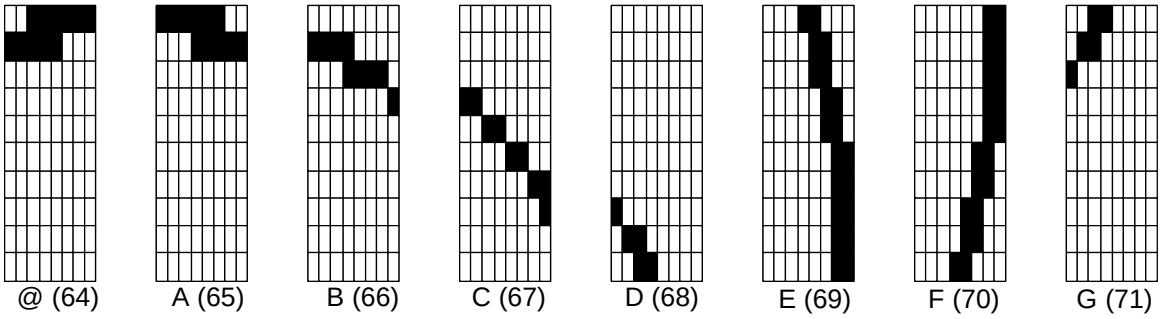
a44113



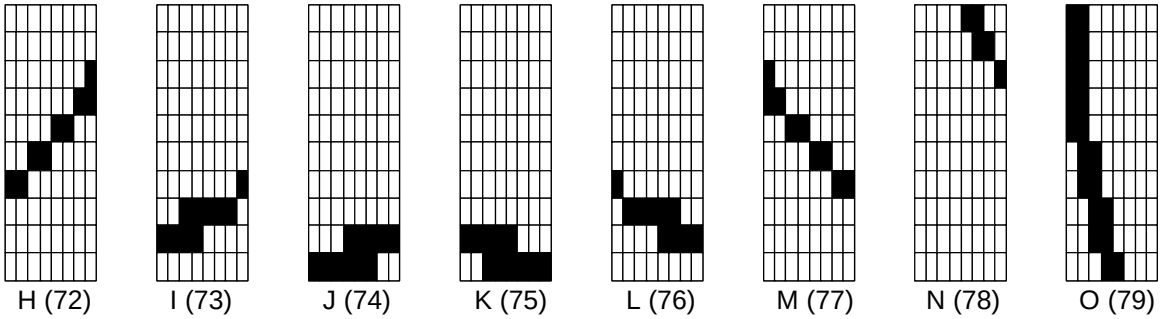
a44114



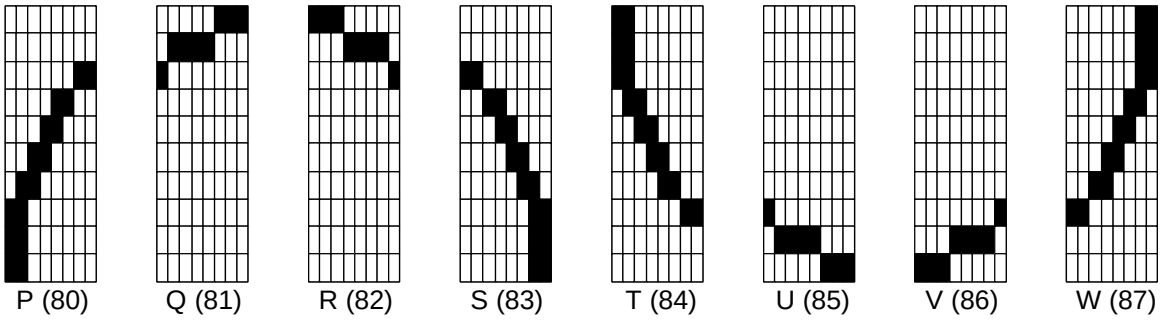
a44115



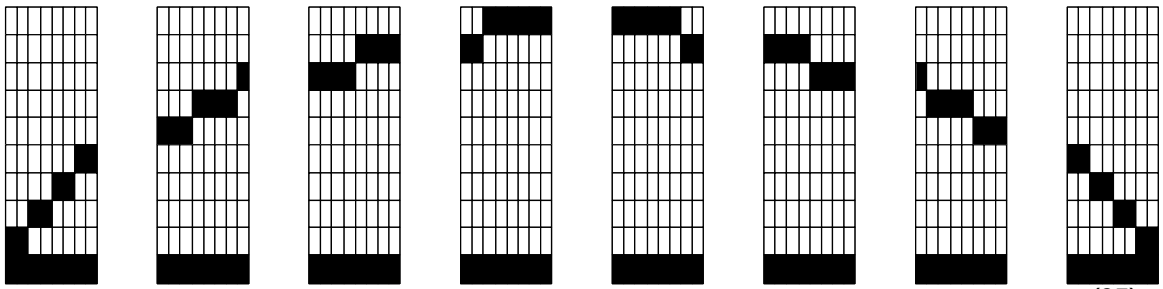
a44116



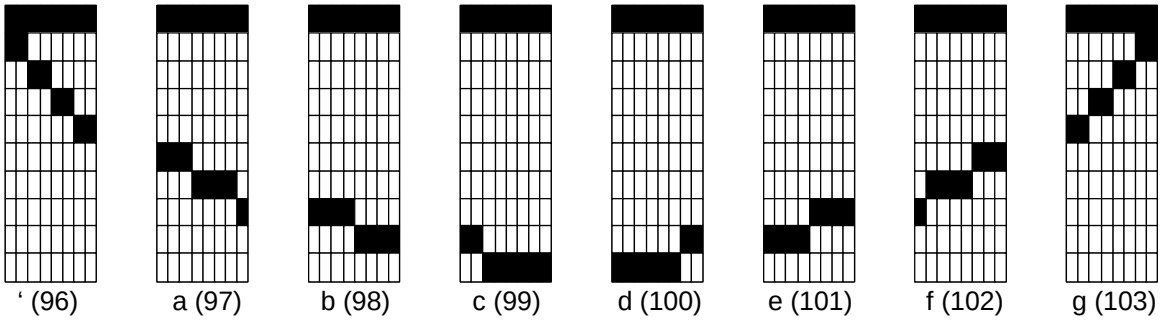
a44117



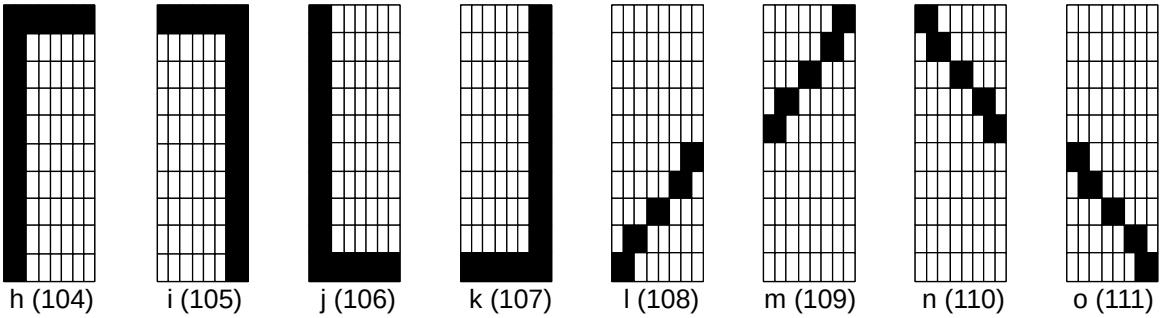
a44118



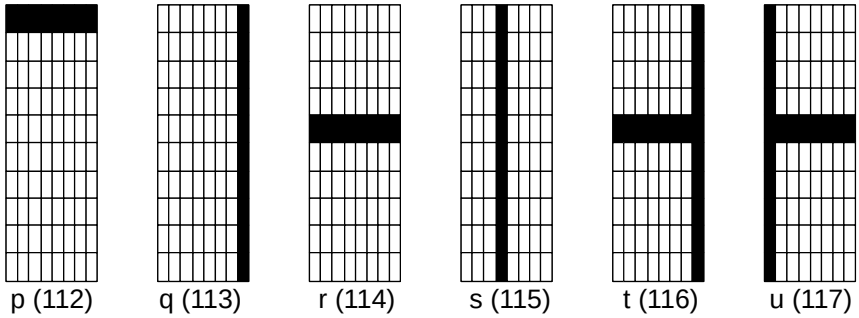
a44119



a44120



a44121

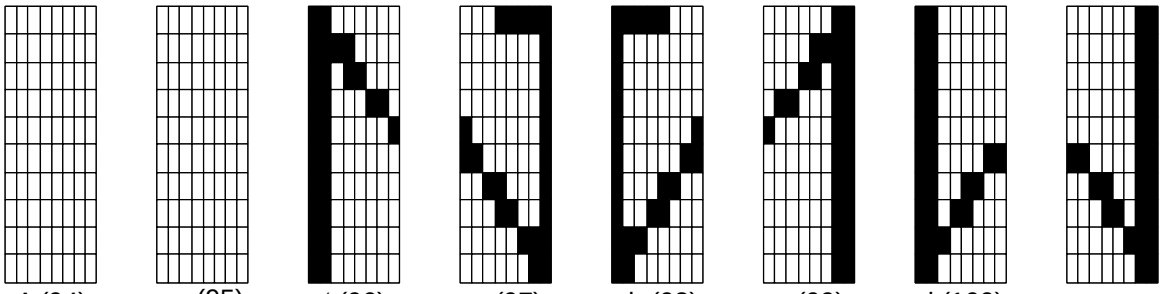


Supplemental Alternate Graphics Set

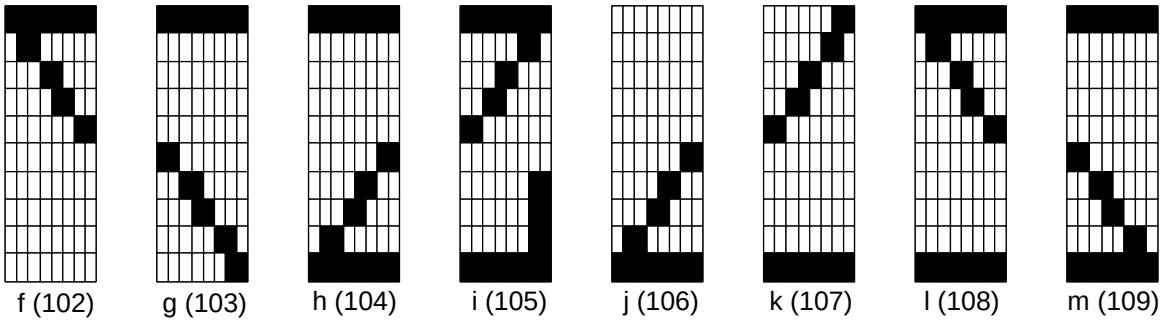
From the Alternate Graphics Set (described above), you can enter the Supplemental Alternate Graphics Set with the OptiSCREEN SUPPLEMENTAL command. Return to the Alternate Graphics Set with the EXIT SUPPLEMENTAL command.

The Standard Supplemental Graphics Set appears below.

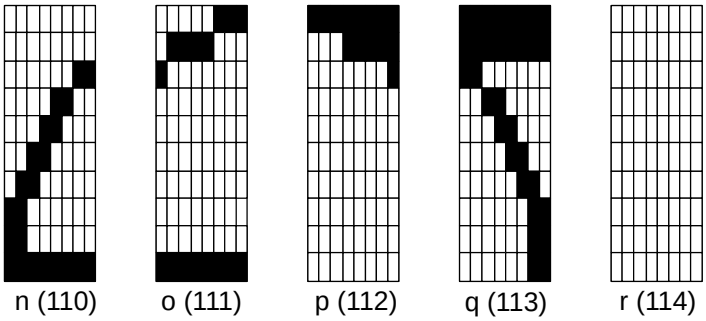
a44122



a44123



a44124



Quad Size Character Set

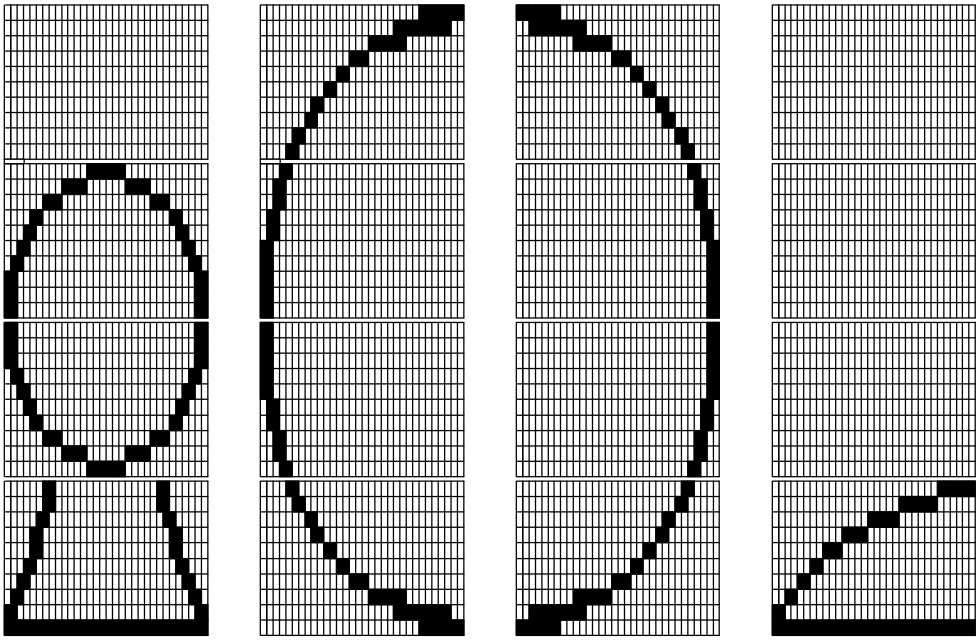
From the Standard Character Set, you can enter the Quad Size Character Set with the OptiSCREEN QUAD command. Return to the Standard Character Set with the EXIT QUAD command.

The Quad Size Character Set includes the following:

numbers 0 to 9	,
uppercase A to Z	–
space	.
!	=
*	?
+	

The Quad Size Graphics Set appears below.

a44182



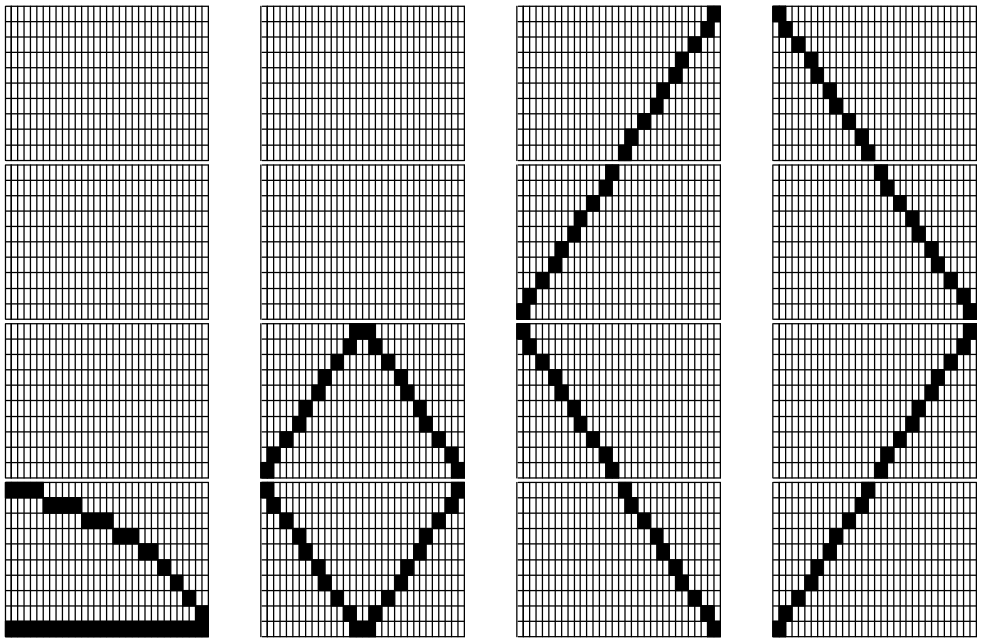
Motor
" (34)

4 x 8 Circle
Left
(35)

4 x 8 circle
Right
$ (36)

Tank Top
Left
% (37)

a44183



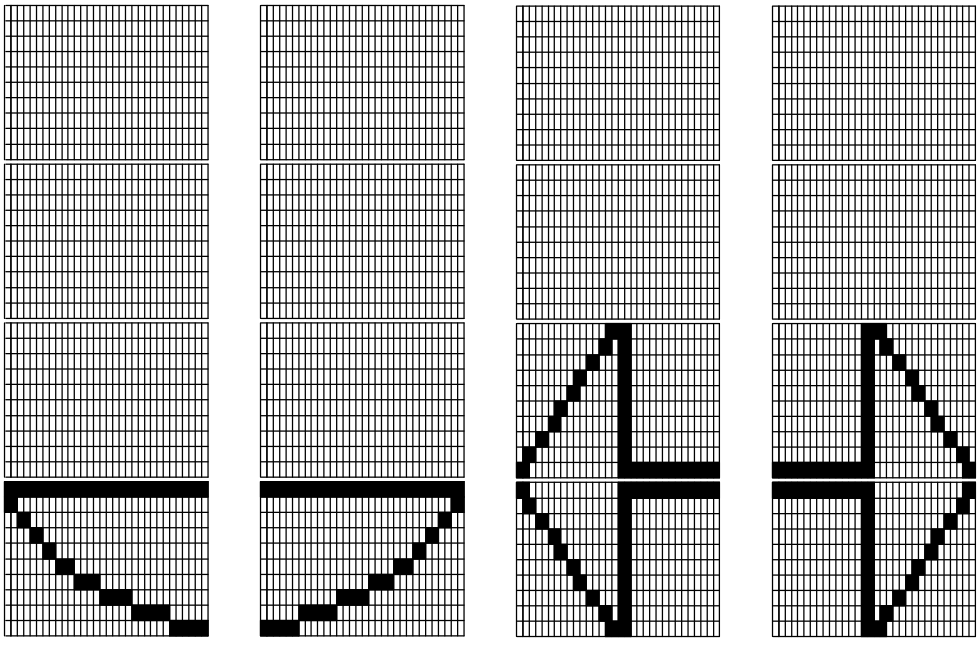
Tank Top Right & (38)

2 x 4 Diamond ’ (39)

4 x 8 Diamond Left (( )

4 x 8 Diamond Right)( )

a44184



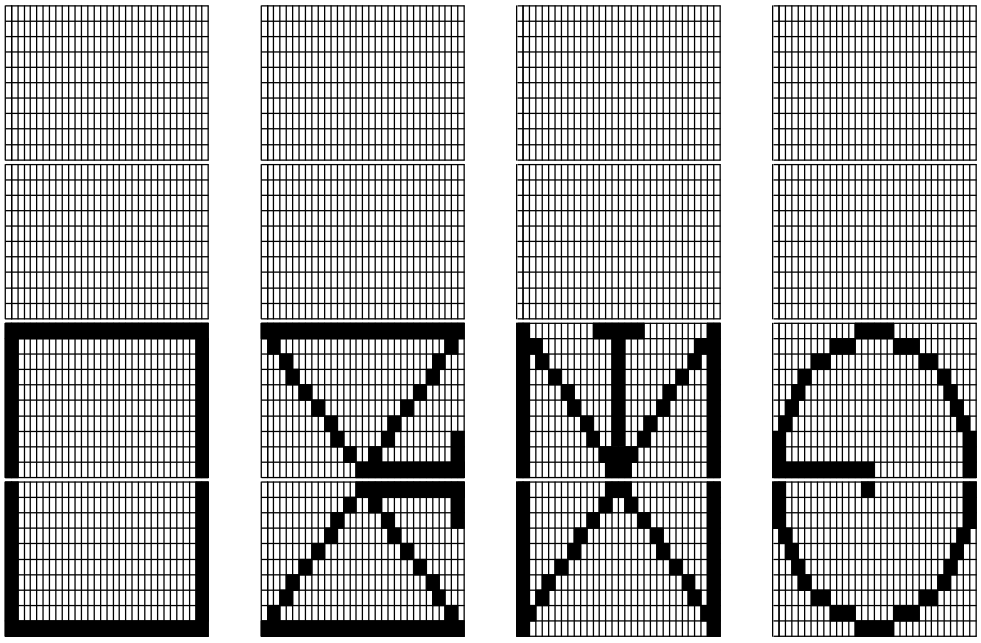
Tank Bottom Left : (58)

Tank Bottom Right ; (59)

Left Arrow < (60)

Right Arrow > (62)

a44185



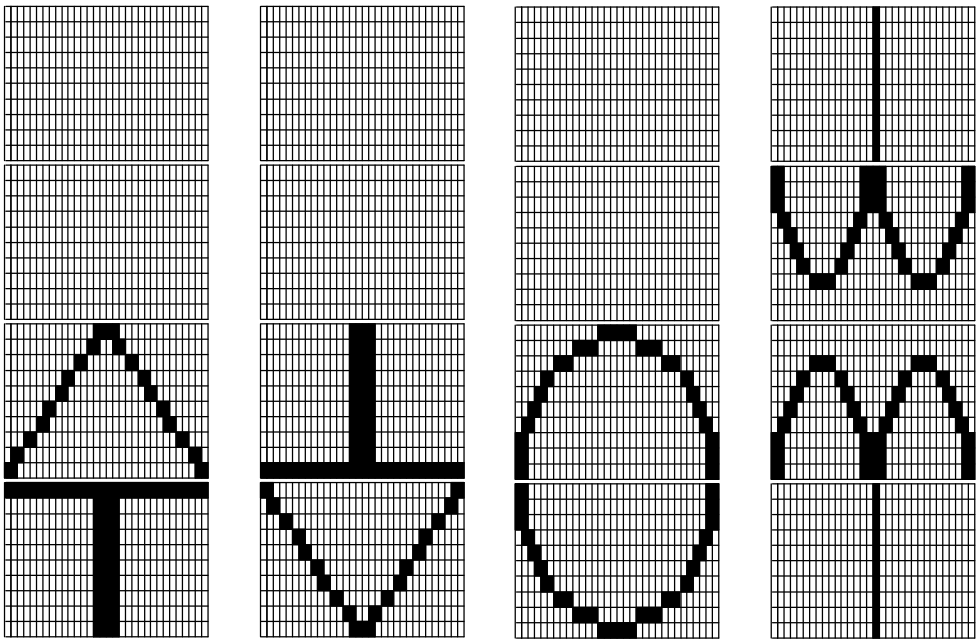
2 x 4 Box
@ (64)

Valve Right
[(91)

Valve Up
\(92)

Pump/
Compressor
] (93)

a44186



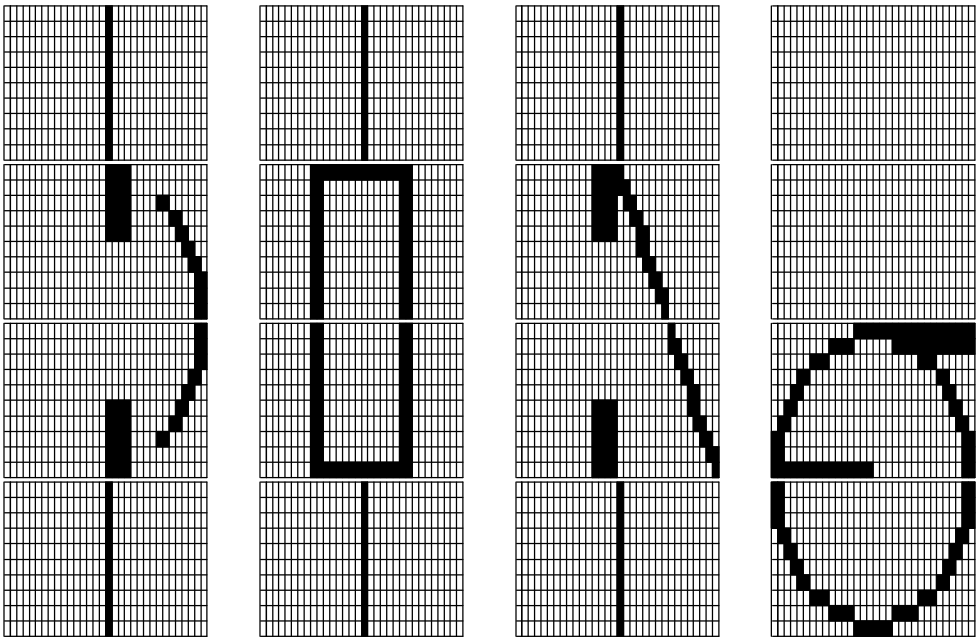
Up Arrow
^ (94)

Down Arrow
_ (95)

2 x 4 Circle
’ (96)

Transformer
a (97)

a44187



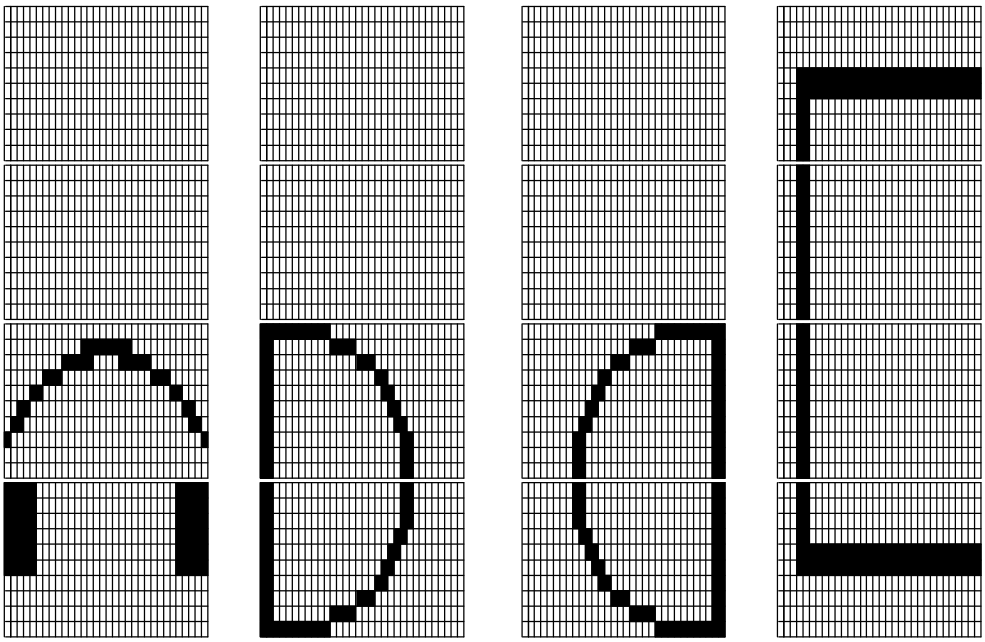
Circuit Breaker b (98)

Fuse c (99)

Disconnect d (100)

Pump/Blower e (101)

a44188



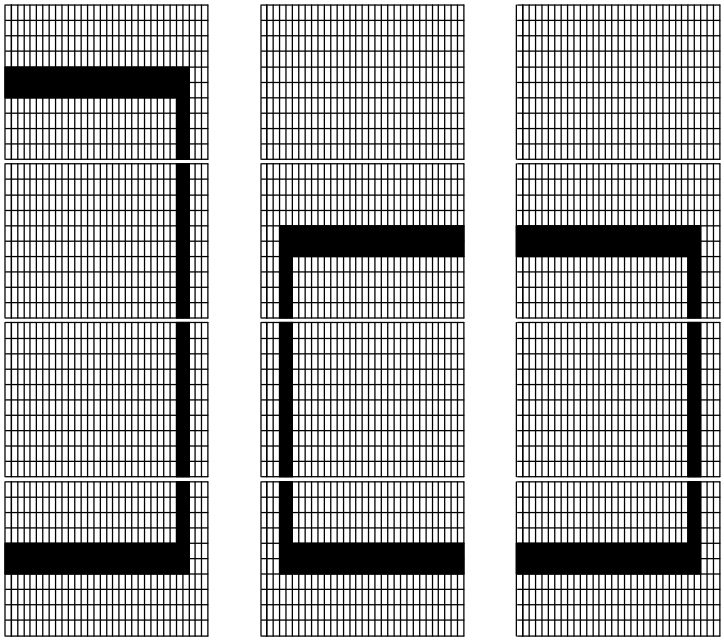
Circuit Breaker f (102)

Turbine g (103)

Turbine h (104)

4 x 8 Box Left i (105)

a44189



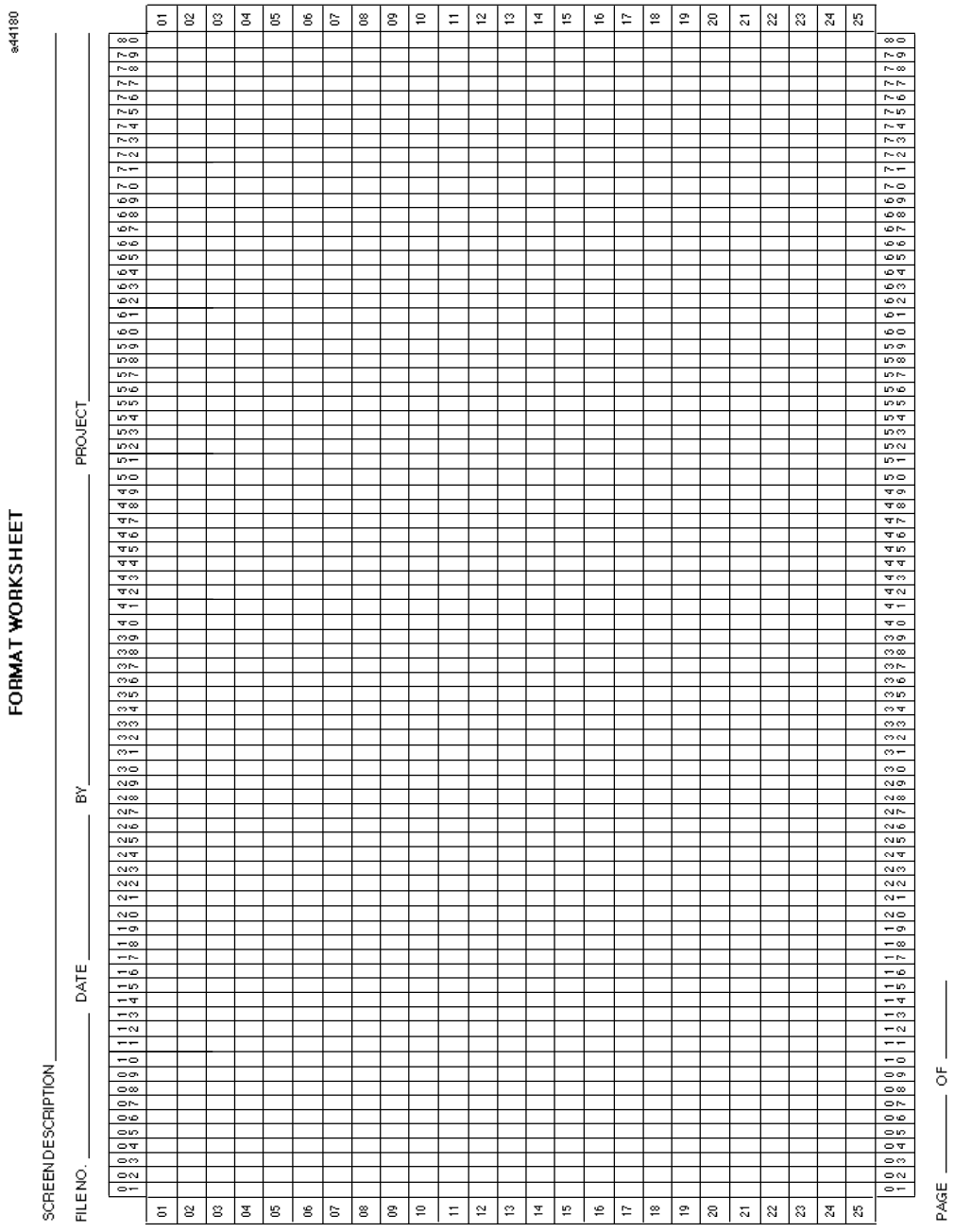
4 x 8 Box
Right
j (106)

3 x 8 Box
Left
k (107)

3 x 8 Box
Right
l (108)

Appendix C

Screen Programming Template



Appendix D

ANSI Escape Sequences for PLCs

You may create an OptiSCREEN file with numerous blanks left for the host to fill with data. The file creation and appending procedures allow you to create the screen file using the [Ctrl]-E (ENQ, enquiry) control character for the locations on the screen where the system displays data. When you develop a screen, enter a [Ctrl]-E for each character to be filled. A blank space appears on the screen which will be filled with data.

When you use the standard screen display escape sequence ({ESC}[> nnnw where nnn specifies the screen), the system continues to place a space wherever you entered a [Ctrl]-E.

However, when you use the data file escape sequence ({ESC}[>nnnf where nnn specifies the screen), the system only processes up to the first [Ctrl]-E you entered. At this point, data received from the host in Online mode, from the keyboard in Local mode, or from an OptiBASIC PRINT statement in BASIC mode, is placed on the screen instead of spaces.

As the system receives each additional character, it uses the character to fill the blanks in the file where you placed a [Ctrl]-E. As the screen file is being processed, when a character other than a [Ctrl]-E is encountered, normal file display resumes until the next [Ctrl]-E is encountered.

In the event that a non-displayable character (such as a line feed) is received in the data to be filled on the screen, the system automatically places a space on the screen for all the [Ctrl]-E characters in the same data field. A field is considered to end when a character other than a [Ctrl]-E is found in the display file. In this manner, a field of six [Ctrl]-E characters for a particular data value may use fewer than six characters and be left justified in the blanks reserved for the data.

The host or application program can terminate a data fill sequence prior to sending all of the characters required to fill the fields on the screen by sending a [Ctrl]-C (ETX, end of text) control character. In this manner, only the highest priority fields on the screen can be updated.

The format for the data fill escape sequence appears below:

{ESC} [>nnnf data1, data2, ..., datan {ETX}

The file number is nnn. The {ETX} character is optional only required if fewer data characters are sent than the blank fields in the file.

A complete list of escape codes for use with PLCs appears below. The first column contains the escape sequences. The second column contains the OptiSCREEN command descriptions. Refer to Chapter 5 for detailed descriptions of the OptiSCREEN commands.

Table D-1. Escape Sequence OptiSCREEN Command

{SOH}{STX}	'
{SOH} remark {STX}	' remark
{ESC}[12m	ALTERNATE
{ESC}[nn m	ATTRIBUTE: nn
{ESC}[nn ; nn m	ATTRIBUTES: nn , nn
{ESC}[nn ; nn ; nn m	ATTRIBUTES: nn , nn , nn
{ESC}[>8h	AUTO LINE FEED ON RETURN
{ESC}[9h	AUTO RETURN ON LINE FEED
{ESC}[?7h	AUTO WRAP AT END OF LINE
{ESC}[nnn W	BAUD nnn
{ESC}[30m	BLACK
{ESC}[40m	/ BLACK
{ESC}[5m	BLINK
{ESC}[>11l	BLINKING CURSOR
{ESC}[>4h	BLOCK CURSOR
{ESC}[34m	BLUE
{ESC}[44m	/ BLUE
{ESC}[= rr ; ccc a	BOX ATTRIBUTES rr X ccc
{ESC}[= rr ; ccc c	BOX OUTLINE rr X ccc
{ESC}[= rr ; ccc d	BOX rr X ccc
{ESC}[33m	BRIGHT
{ESC}[43m	/ BRIGHT
{ESC}[37m	BRIGHT UNDERLINE
{ESC}[Z	CLEAR FLASH
{ESC}[>251r	CLEAR KEY TABLE
{ESC}[2K	CLEAR LINE
{ESC}[0K	CLEAR LINE FROM CURSOR
{ESC}[1K	CLEAR LINE TO CURSOR
{ESC}[2J	CLEAR SCREEN
{ESC}[0J	CLEAR SCREEN FROM CURSOR
{ESC}[1J	CLEAR SCREEN TO CURSOR
{ESC}[3J	CLEAR STATUS LINES
{ESC}[ccc F	COLUMN ccc
{ESC}[= rr ; ccc u	CONCAVE BOX rr X ccc
{ESC}[= rr ; ccc s	CONVEX BOX rr X ccc
{ESC}[>5l	CURSOR
{ESC}[36m	CYAN
{ESC}[46m	/ CYAN
{ESC}[30m	DARK
{ESC}[40m	/ DARK
{ESC}[34m	DARK UNDERLINE
{ESC}[>253r	DEFAULT KEYPAD
{ESC}[P	DELETE CHARACTER
{ESC}[nn P	DELETE nn CHARACTERS
{ESC}[M	DELETE LINE
{ESC}[nn M	DELETE nn LINES
{ESC}[31m	DIM
{ESC}[41m	/ DIM
{ESC}[35m	DIM UNDERLINE

Table D-1. Escape Sequence OptiSCREEN Command - Continued

{ESC}[^	DISABLE ATTRIBUTES
{ESC}[>5h	DISABLE CURSOR
{ESC}[?14l	DISABLE DATE
{ESC}[?15l	DISABLE TIME
text	DISPLAY “text”
{ESC}[j	DISPLAY DATE HERE
{ESC}[> “fname” w	DISPLAY FILE fname
{ESC}[> nn w	DISPLAY FILE nn
{ESC}[k	DISPLAY TIME HERE
{ESC}#7	DOUBLE SIZE
{ESC}#9 text {ETX}	DOUBLE SIZE “text”
{ESC}#4	DOUBLE SIZE BOTTOM LINE
{ESC}#3	DOUBLE SIZE TOP LINE
{ESC}[15m	DOUBLE WIDE
{ESC}#6	DOUBLE WIDE LINE
{ESC}[nn B	DOWN line
{ESC}[= column ; pixel i	DRAW BAR DOWN column X pixel
{ESC}[= pixel i	DRAW BAR DOWN pixel
{ESC}[= line ; pixel J	DRAW BAR LEFT line X pixel
{ESC}[= pixel j	DRAW BAR LEFT pixel
{ESC}[= line ; pixel g	DRAW BAR RIGHT line X pixel
{ESC}[= pixel g	DRAW BAR RIGHT pixel
{ESC}[= column ; pixel f	DRAW BAR UP column X pixel
{ESC}[= pixel f	DRAW BAR UP pixel
{ESC}[= rr ; ccc e	EMPTY BOX rr X cc
{ESC}[_	ENABLE ATTRIBUTES
{ESC}[>5l	ENABLE CURSOR
{ESC}[?14h	ENABLE DATE
{ESC}[?15h	ENABLE TIME
{EOT}	END
{ESC}[= column ; pixel m	ERASE BAR DOWN column X pixel
{ESC}[= pixel m	ERASE BAR DOWN pixel
{ESC}[= line ; pixel n	ERASE BAR LEFT line X pixel
{ESC}[= pixel n	ERASE BAR LEFT pixel
{ESC}[= line ; pixel l	ERASE BAR RIGHT line X pixel
{ESC}[= pixel l	ERASE BAR RIGHT pixel
{ESC}[= column ; pixel k	ERASE BAR UP column X pixel
{ESC}[= pixel k	ERASE BAR UP pixel
{ESC}[13m	EXIT ALTERNATE
{ESC}[22m	EXIT DOUBLE WIDE AND BLINK
{ESC}[17m	EXIT QUAD
{ESC}[10m or {SI}	EXIT SUPPLEMENTAL
{ESC}[= rr ; ccc b char	FILL BOX rr X ccc WITH “char”
{ESC}[ccc]	FLASH ccc
{ESC}[rr ; ccc]	FLASH rr X ccc
{ESC}[\ text {ETX}	FLASH “text”
{ESC}[32m	GREEN
{ESC}[42m	/ GREEN
{ESC}[f or {ESC}[H	HOME
{ESC}[= nn ; ff ; mm h	HORIZONTAL BAR GRAPH nn, ff, mm
{ESC}D	INDEX

Table D-1. Escape Sequence OptiSCREEN Command - Continued

{ESC}[L	INSERT LINE
{ESC}[nn L	INSERT nn LINE
{ESC}[nnn D	LEFT nnn
{ESC}[37m	LIGHT BRIGHT
{ESC}[47m	/ LIGHT BRIGHT
{ESC}[34m	LIGHT DARK
{ESC}[44m	/ LIGHT DARK
{ESC}[35m	LIGHT DIM
{ESC}[45m	/ LIGHT DIM
{ESC}[36m	LIGHT NORMAL
{ESC}[46m	/ LIGHT NORMAL
{ESC}[rr f or {ESC}[rr H	LINE rr
{ESC}[> nn t text {ETX}	LOAD FUNCTION KEY nn WITH "text"
{ESC}[> nn ; vvv r	LOAD KEY nn WITH vvv
{ESC}[35m	MAGENTA
{ESC}[45m	/ MAGENTA
{ESC}[rr ; ccc f or {ESC}[rr ; ccc H	MOVE TO rr, ccc
{ESC}[E	NEW LINE
{ESC}[>8l	NO AUTO LINE FEED
{ESC}[9l	NO AUTO RETURN
{ESC}[?7l	NO AUTO WRAP
{ESC}[>5h	NO CURSOR
{ESC}[32m	NORMAL
{ESC}[42m	/ NORMAL
{ESC}[36m	NORMAL UNDERLINE
{ESC}[35m	PINK
{ESC][45m	/ PINK
{ESC}[S	PRINT SCREEN
{ESC}[n S	PRINT SCREEN TO PORT n
{ESC}[n ; g S	PRINT SCREEN TO PORT n, GRAPHIC TYPE g
{ESC}[35m	PURPLE
{ESC}[45m	/ PURPLE
{ESC}[16m	QUAD SIZE
{ESC}[31m	RED
{ESC}[41m	/ RED
{ESC}[m or {ESC}[0m	RESET ATTRIBUTES
{ESC}[#0	RESET LINE ATTRIBUTES
{ESC}[u or {ESC}8	RESTORE POSITION
{ESC}M	REVERSE INDEX
{ESC}[7m	REVERSED
{ESC}[nnn C	RIGHT nnn
{ESC}[rr E	ROW rr
{ESC}[s or {ESC}7	SAVE POSITION
{ESC}[= line ; column r	SCROLL DOWN line X column
{ESC}[= line ; column p	SCROLL LEFT line X column
{ESC}[nn ; pp r	SCROLL LINES nn TO pp
{ESC}[= line ; column o	SCROLL RIGHT line X column
{ESC}[= line ; column q	SCROLL UP line X column
{ESC}X	SET DEFAULT ATTRIBUTE
{ESC}#5	SINGLE SIZE LINE
{ESC}[4h	START INSERT

Table D-1. Escape Sequence OptiSCREEN Command - Continued

{ESC}[>11h	STEADY CURSOR
{ESC}[[	STOP FLASH
{ESC}[4l	STOP INSERT
{ESC}[11m or {SO}	SUPPLEMENTAL
{ESC}[> “fname”x	TRANSMIT FILE fname VIA PRIMARY PORT
{ESC}[> “fname”y	TRANSMIT FILE fname VIA SECONDARY PORT
{ESC}[> n x	TRANSMIT FILE n VIA PRIMARY PORT
{ESC}[> n y	TRANSMIT FILE n VIA SECONDARY PORT
{ESC}[4m	UNDERLINE
{ESC}[>4l	UNDERLINE CURSOR
{ESC}[nn A	UP nn
{ESC}[= nn ; ff ; mm v	VERTICAL BAR GRAPH nn, ff, mm
{ESC}[37m	WHITE
{ESC}[47m	/ WHITE
{ESC}[33m	YELLOW
{ESC}[43m	/ YELLOW

Appendix E

VT52 Escape Sequences

It is not recommended that VT52 escape sequences be used with new application software.

The first column in the following list contains the character or characters that follow the escape character, and the second contains the function of that sequence.

SEQUENCE	FUNCTION
#	Transmit Page.
/ Z	Response to ESC Z (VT100 identification code for VT52).
<	Enter ANSI mode.
@	Enter insert character mode.
A	Cursor up.
B	Cursor down.
C	Cursor right.
D	Cursor left.
E	Clear screen (except status lines).
F	Enter graphics mode.
G	Exit graphics mode.
H	Move cursor to home position.
I	Reverse index (reverse scroll).
J	Erase from cursor to end of screen.
K	Erase from cursor to end of line.
L	Insert a line at cursor position.
M	Delete line at cursor position.
N	Delete character at cursor.
O	Exit insert character mode.
P	Special function key “f1” (transmitted only).
Q	Special function key “f2” (transmitted only).
R	Special function key “f3” (transmitted only).
S	Special function key “f4” (transmitted only).
T	Special function key “f5” (transmitted only).
U	Special function key “f6” (transmitted only).
V	Special function key “f7” (transmitted only).
W	Special function key “f8” (transmitted only).
Y <line#><col#>	Cursor addressing. Line and column numbers are single ASCII characters where ASCII code 32 decimal is used to designate line or column one and increase from there.
Z	Identify as VT52. Response: ESC / K.

SEQUENCE	FUNCTION
^	Transmit status line(s).
	Transmit current (cursor) line.
(underscore)	Transmit character at cursor.
b	Erase from beginning of display to cursor.
c	Enable clock display.
d	Disable clock display.
e	Send time to host (Transmits HHMMSS<CR>).
j	Save current cursor position.
k	Restore current cursor position.
l	Erase entire line.
n	Cursor position report.
	Response: ESC Y <line #> <col #).
	See cursor positioning notes above.
o	Erase from beginning of line to cursor.
p	Enter reverse video mode.
q	Exit reverse video mode.
v	Enter wrap at end of line mode.
w	Exit wrap at end of line mode.
x<parameter>	VT52 set modes.
x4	Set block cursor.
x5	Disable cursor.
x8	Enable auto line feed on carriage return.
x9	Enable auto carriage return on line feed.
x;	Set non-blinking cursor.
x=	Set hardware handshaking.
x>	Enable ECHO (half duplex).
y<parameter>	VT52 reset modes.
y4	Set underline cursor.
y5	Enable cursor.
y8	Disable auto line feed on carriage return.
y9	Disable auto carriage return on line feed.
y;	Set blinking cursor.
y=	Set software handshaking.
y>	Disable half duplex.
z	Reset to power up configuration.
(	Enable keyboard.
)	Disable keyboard.

Appendix F

Function Key Operations

The 16 function keys are programmed to perform two independent functions. In Local mode, they are used as single key entries to select various character and line attributes allowing user screens to be programmed easily. In On-Line mode, they transmit the escape sequences shown for the VT52 mode or the currently programmed messages for the ANSI mode.

In the ANSI mode, the function keys transmit user-defined messages which may include other escape sequences. These messages may contain up to 16 ASCII characters. The default messages (escape sequences) for the ANSI mode or the standard VT52 messages (escape sequences) will be ignored upon receipt by the terminal.

To program new ANSI messages, the escape sequence ESC [> n t followed by the message and terminated with ETX (Control-C) is used. This escape sequence can be entered while in Local mode or On-Line mode. The terminal will truncate any programmed messages at 16 characters, and will fill any unused character locations up to 16 with NULLs. These escape sequences may be programmed as part of a screen file.

In On-Line mode, the function keys are not preprogrammed.

In Local mode, the function keys have been preprogrammed to perform specific tasks. These are as follows:

f1 = Reset to normal video display (resets attributes marked with *).
f2 = Select foreground intensity / color *.
f3 = Select background intensity / color *.
f4 = Terminate an f2 or f3 selection.
f5 = Enter blink video *.
f6 = Enter reverse video *.
f7 = Enter double wide character mode *.
f8 = Exit blink and / or double wide mode.
f9 = Enter quad size character mode.
f10 = Exit quad size character mode.
f11 = Set line to double high tops & double wide.
f12 = Set line to double high bottoms & double wide.
f13 = Set line to single high & single wide.
f14 = Enter alternate character set (96 graphics).
f15 = Exit alternate character set (96 graphics).
f16 = Clear all attributes -
Includes video attributes and line attributes.
Exits alternate character set.
Exits supplemental graphics.
Exits quad size characters.

The function keys f2 and f3 are used in a sequence such as f2 n f4 or f3 n f4. These keys allow any combination of foreground and background intensities to be combined. They are also designed to be upward compatible with color models of the terminal. The parameter n yields the effect shown in the following table.

n	MONOCHROME	COLOR	NOTES
0	Hidden(Black)	Black	Default background
1	Dim	Red	
2	Normal	Green	Default foreground
3	Highlight	Yellow	
4	——	Blue	
5	Underline & Dim	Pink	
6	Underline & Normal	Turquoise	
7	Underline & Highlight	White	

Note

Underline is a foreground attribute only.

The attribute “shade” described earlier is the combination of a dim background and highlight foreground. It can be achieved using the sequence: f2 3 f4 followed by f3 1 f4. Obviously many other versions of shade can be created using the above parameters. Reverse in monochrome automatically switches the foreground and background intensities. In the color mode, reverse will only switch parameters 0 to 3.

Symbols

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W

Y