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CT 8500

VIDEO DISPLAY TERMINAL

OPERATORS

INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
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PREFACE

ABOUT THIS MANUAL

This manual contains information that tells how to operate the CT 8500 Video Display Terminal. The sections in this manual are organized as follows:

Section 1	The Learning Guide: introduces you to the general features of the CT 8500 terminal. This section tells how to unpack the terminal and contains a power-up procedure. Each of the terminal's keys is discussed. A Demonstration Run steps you through some of the CT 8500's most common functions.
Section 2	Contains some common operating procedures, with examples.
Section 3	Describes the interface between the CT 8500 and the host computer.

RELATED DOCUMENTS

The CT 8500 Video Display Terminal Service Manual contains servicing information. The service manual is an optional accessory that must be ordered separately.

NOTATIONAL CONVENTIONS

In this manual, all numbers are in hexadecimal notation unless otherwise noted.

Remote Commands

Many CT 8500 operations can be performed via remote commands from the host computer. In this manual, remote commands from the host are represented in the following format:

1B + xx

In this format, the Escape code (1B) begins the remote command. The second hexadecimal byte indicates the specific operation to be performed. Section 3 of this manual contains a table that lists the remote command sequences.

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OPERATORS SAFETY SUMMARY

This general safety information is for operating personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

TERMS

In This Manual

CAUTION statements identify conditions or practices that can result in damage to the equipment or other property.

WARNING statements identify conditions or practices that can result in personal injury or loss of life.

As Marked on Equipment

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property including the equipment itself.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

SYMBOLS

As Marked on Equipment

DANGER - high voltage.

Protective ground (earth) terminal.

ATTENTION - Refer to manual.

SAFETY PRECAUTIONS

Power Source

The CT 8500 Video Display Terminal is designed to operate from a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

Grounding the CT 8500

The CT 8500 is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the power input terminals. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

Use the Proper Power Cord

Use only the power cord and connector specified for your product.

Use only a power cord that is in good condition.

Refer cord and connector changes to qualified service personnel.

Use the Proper Fuse

To avoid fire hazard, use only the fuse specified in the parts list for your CT 8500. Be sure the fuse is identical in type, voltage rating, and current rating.

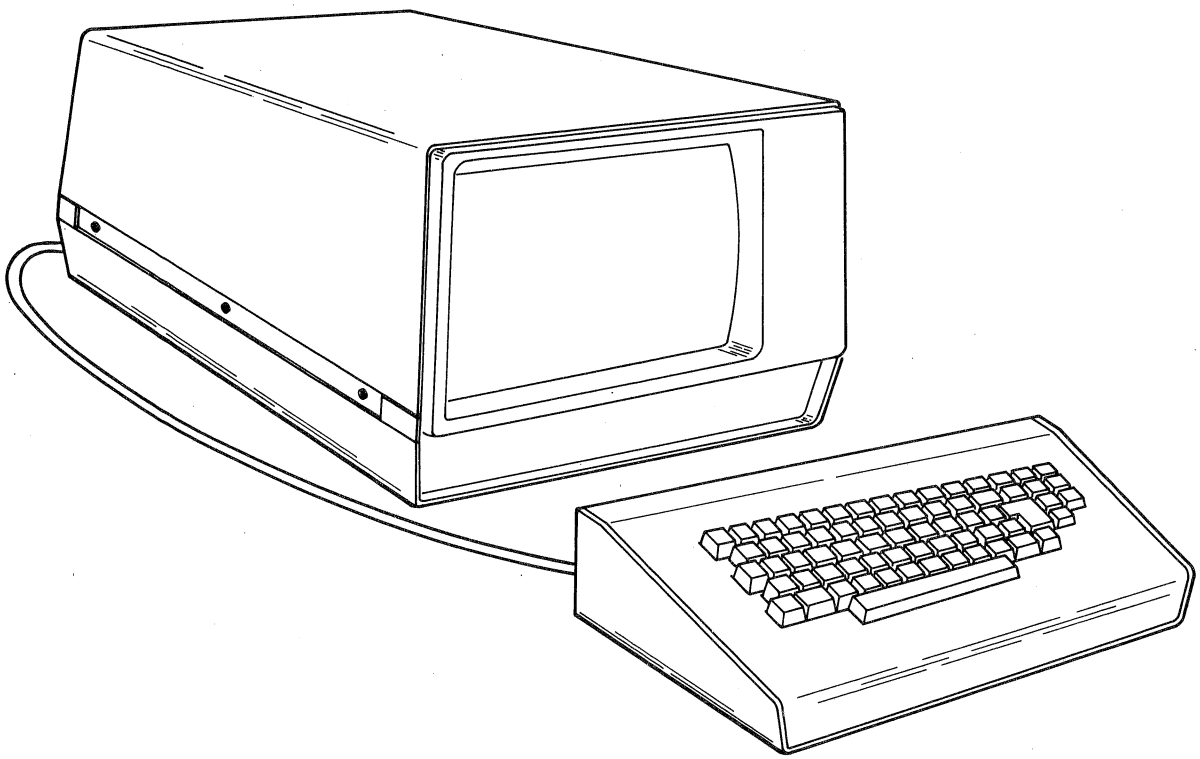
Refer fuse replacement to qualified service personnel.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate the CT 8500 in an atmosphere of explosive gases.

Do Not Remove Covers or Panels

To avoid personal injury, do not remove covers or panels from the CT 8500. Do not operate the CT 8500 without the covers and panels properly installed.



CT 8500 Video Display Terminal.

Section 1

LEARNING GUIDE

INTRODUCTION

This Learning Guide provides a general overview of the CT 8500 Video Display Terminal. This section is divided into the following topics:

- General Features. A discussion of the CT 8500's features, and of the operating modes.
- Specification. Electrical, environmental, and physical characteristics.
- Operator's Preparation for Use. Unpacking information, environmental considerations, space requirements, and a power-up procedure.
- Controls, Connectors, and Indicators. Rear panel controls, and the terminal keyboard.
- Demonstration Run. How to perform some of the CT 8500's basic operations.

GENERAL FEATURES

The CT 8500 is a general purpose microcomputer-based Video Display Terminal. It may be operated independently, but is primarily intended to be used in conjunction with a host computer system. The CT 8500 is particularly useful when used with TEKTRONIX screen-oriented editors, such as the DOS/50 Advanced CRT-Oriented Editor.

Physical Arrangement

The CT 8500 Video Display Terminal consists of a main Monitor Assembly with a detached Keyboard Assembly. The Keyboard Assembly is connected to the Monitor Assembly through a special interconnecting cable.

Display Features

The CT 8500 employs raster scan technology to present the display on a 12-inch (diagonal) cathode ray tube (CRT) screen. The display format is 80 characters per line, 25 lines per page, on each of two pages of display memory. A maximum of 2000 characters per page (4000 characters total) may be displayed.

Of the 128 ASCII characters, including both uppercase and lowercase, all but the unit separator (1F) may be displayed on the monitor screen. Characters are formed on a 6 x 8 dot matrix in an 8 x 10 dot field.

The display is green on black, with an adjustable brightness control. Additionally, five display attributes may be selected by the user:

- Blink
- Reduced intensity
- Inverse video
- Underline
- Blanking

These attributes may be selected individually, or in any of several combinations. Attributes are usually selected via software from the host computer, but may also be selected from the keyboard.

Split-screen operation may also be selected from the keyboard, or via software control from the host. This horizontal split-screen feature permits you to retain part of the display on the upper portion of the screen, while you independently perform editing functions or other operations on the lower portion of the display.

Display attributes and split-screen operation are described more fully in Section 2 of this manual, Operating Procedures.

The Terminal Keyboard

The CT 8500 keyboard includes the standard alphanumeric keys, and the following special keys:

- Eight function keys, programmable in the shifted state.
- TTY LOCK on or off (alternate action key).
- Five separate cursor movement keys.

- Paging and scrolling keys.
- TAB Forward/Backward and TAB Set/Clear keys.
- BACK SPACE and RUBOUT keys.
- Editing keys, including CHARacter and LINE Insert/Delete, ERASE To EOL (End of Line) or To EOP (End of Page), and CLEAR Screen/All.
- BREAK/SEND key, for line or page transmission to the host.

Any key function will automatically be repeated if the key is held down for 0.5 seconds or longer.

The keys on the CT 8500 keyboard are described individually later in this section.

Operating Modes

The CT 8500 normally operates in one of three operating modes: power-up mode, local mode, or host-control mode. The following paragraphs describe each of these operating modes.

(Section 2, Operating Procedures, explains how to change operating modes from the keyboard, or via software control from the host computer.)

Power-Up Mode. The CT 8500 is automatically placed in power-up mode when power is applied to the terminal. This is the most common mode for interacting with a host computer. (In power-up mode, the CT 8500 is assumed to be connected to a host.)

This mode provides full duplex character transmission of all 128 ASCII characters between the host and the terminal. Essentially all local functions are also enabled in power-up mode, although they are not transmitted to the host. The alphanumeric ASCII keys have no local function in this mode.

Local Mode. In local mode, the CT 8500 essentially functions as a self-contained unit. Characters entered at the keyboard are displayed on the CRT screen. Most terminal functions (editing, paging, scrolling, cursor movement, and others) can be performed from the keyboard when the terminal is in local mode. However, data can only be transmitted to the host system in "blocks" (either line or page).

Host-Control Mode. Host-control mode is used with special software packages, such as the TEKTRONIX Advanced CRT-Oriented Editor. This mode also provides full duplex character transmission, but all local operations are disabled. Keys do not perform local functions, but instead transmit a two-byte command sequence to the host: the Escape character (ASCII code 1B) followed by a function code. The host computer controls the terminal by issuing remote commands.

Section 3 of this manual contains a table of remote commands issued by the host computer.

Special Modes

Two additional modes, monitor mode and learn mode, are available to the CT 8500 user. Either of these modes may be entered when the terminal is in any of the three operating modes.

Monitor Mode. Monitor mode enables you to display all transmittable characters, including control characters, on the CRT screen. The special control characters are described in detail in Section 2 of this manual. Monitor mode may be entered either from the keyboard or from the host computer.

Learn Mode. Entering learn mode enables you to program function keys F1 through F8 (shifted) with any command or character string, up to a maximum of 64 characters. A Learn Status command causes the terminal to display all function keys and the string currently assigned to each key.

STANDARD ACCESSORIES

Two standard accessories are included with the CT 8500 Video Display Terminal: this operator's manual, and the appropriate power cord.

OPTIONAL ACCESSORIES

The CT 8500 Video Display Terminal Service Manual contains servicing information. The service manual is an optional accessory that must be ordered separately.

SPECIFICATIONS

Table 1-1
Electrical Characteristics: Primary Power

Characteristic	Performance Requirement	Supplemental Information
Supply Voltage	100 Vac (±10%) or 115 Vac (±10%) or 230 Vac (±10%)	Range selectable at rear panel.
Line Current (typical values)	0.6 A @ 100 Vac 0.5 A @ 115 Vac 0.25 A @ 230 Vac	
Power Dissipation	65 Watts (max)	
Fuse	1.0 A @ 100/115 Vac 0.5 A @ 230 Vac	Type 3AG, Fast-Blow Type 3AG, Fast-Blow

Table 1-2
Electrical Characteristics: DC Power Supplies

Characteristic	Performance Requirement	Supplemental Information
DC Voltages	+5.0 Vdc ±1%	Adjustable; 50 mV (p-p) max ripple
	-5.0 Vdc ±5%	50 mV (p-p) max ripple
	+12.0 Vdc ±5%	50 mV (p-p) max ripple
	-12.0 Vdc ±5%	80 mV (p-p) max ripple
	+15.0 Vdc ±5%	200 mV (p-p) max ripple
DC Currents (typical values)	1.0 A @ +5 Vdc (TBS) @ -5 Vdc 90 mA @ +12 Vdc 5 mA @ -12 Vdc	
	800 mA @ +15 Vdc	Supply for CRT Module.

Table 1-3
Environmental Characteristics

Characteristic	Description
Temperature Operating	10° C to 40° C (50° F to 104° F)
Storage	-55° C to +75° C (-67° F to +167° F)
Humidity	90% relative non-condensing (maximum)
Altitude Operating	4 500 m (15,000 ft) maximum
Storage	15 000 m (50,000 ft) maximum

Table 1-4
Physical Characteristics

Characteristic	Monitor Assembly	Keyboard Assembly
Height	31.8 cm (12.5 in)	7.6 cm (3.0 in)
Width	45.6 cm (18.0 in)	45.6 cm (18.0 in)
Depth	50.8 cm (20.0 in)	22.2 cm (8.7 in)
Weight	16.5 kg (36.5 lb)	2.7 kg (6.0 lb)

OPERATOR'S PREPARATION FOR USE

This part of the Learning Guide includes the following topics: unpacking information, environmental and desk mounting considerations, a power-up procedure, simple verification tests, and repackaging information.

UNPACKING INFORMATION

Before you unpack the terminal, examine the carton for signs of external damage. If you find any damage:

- Immediately notify the carrier who made delivery, and request inspection.
- Contact the nearest Tektronix Field Engineering Office or sales representative and report the damage.
- DO NOT THROW AWAY THE BOXES.
- DO NOT TRY TO REPAIR THE INSTRUMENT.

If no damage is found, unpack the instrument and check immediately for internal damage.

The CT 8500 is surrounded by protective material for safety in storage and shipping. When you remove the CT 8500 from the box, put the packing materials back inside the box for possible reshipment at a later date.

NOTE

If you observe any damage as you unpack and inspect the terminal, follow the procedure given above for reporting damage.

ENVIRONMENTAL CONSIDERATIONS

The CT 8500 should be operated within the range of environmental conditions specified in Table 1-3. Do not operate the CT 8500 in an explosive atmosphere.

DESK MOUNTING

The CT 8500 Video Display Terminal is designed for desk mounting. Space requirements are shown in Fig. 1-1. A 10-foot RS-232-C input/output (I/O) cable is provided with the terminal for connection to a host system or interface device.

CAUTION

To prevent overheating of electronic components in the CT 8500 Monitor Assembly, be sure to allow at least a 4-inch clearance at the rear of the cabinet. This clearance will permit unrestricted air flow through the ventilation openings at the bottom and rear of the equipment.

Make sure that you allow sufficient clearance at the rear of the cabinet to permit access to the rear panel controls.

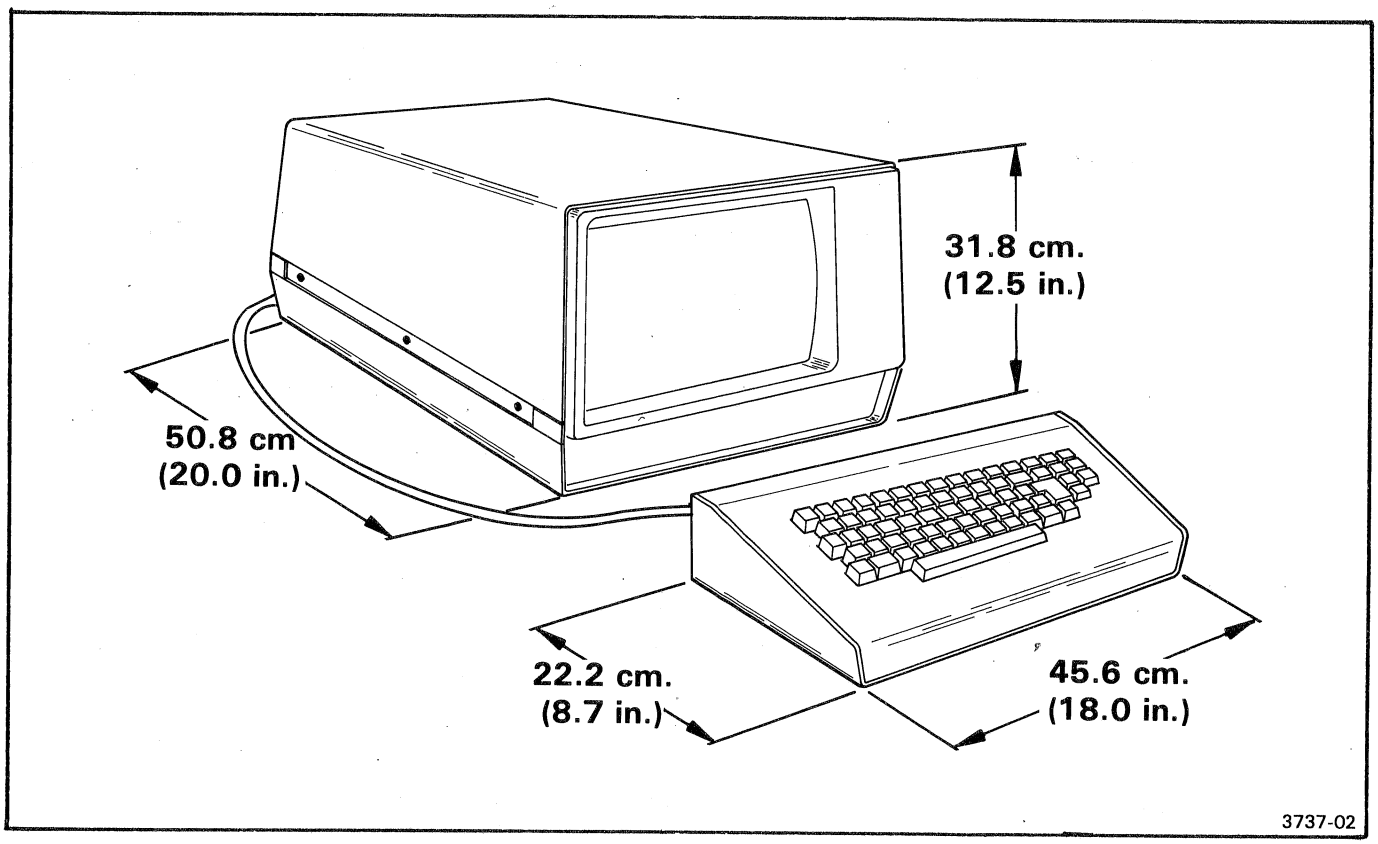


Fig. 1-1. CT 8500 space requirements.

POWER-UP PROCEDURE

Initial Setup

After the CT 8500 has been unpacked and placed in a suitable location, perform the following procedure to prepare the terminal for operation:

1. Ensure that the POWER switch, located on the CT 8500 rear panel, is in the OFF position. Figure 1-2 shows the location of the POWER switch and all other rear panel controls. Refer to Fig. 1-2 throughout the rest of this set-up procedure.

2. Two switch packs, S1 and S2, are located on the CT 8500 rear panel. Each switch pack contains eight switches. Switch S1-4 selects the screen refresh rate: 50 or 60 Hz. Set switch S1-4 to match the frequency of the power source.

3. Ensure that the power range selector switch on the rear panel is set to the correct line voltage and frequency.

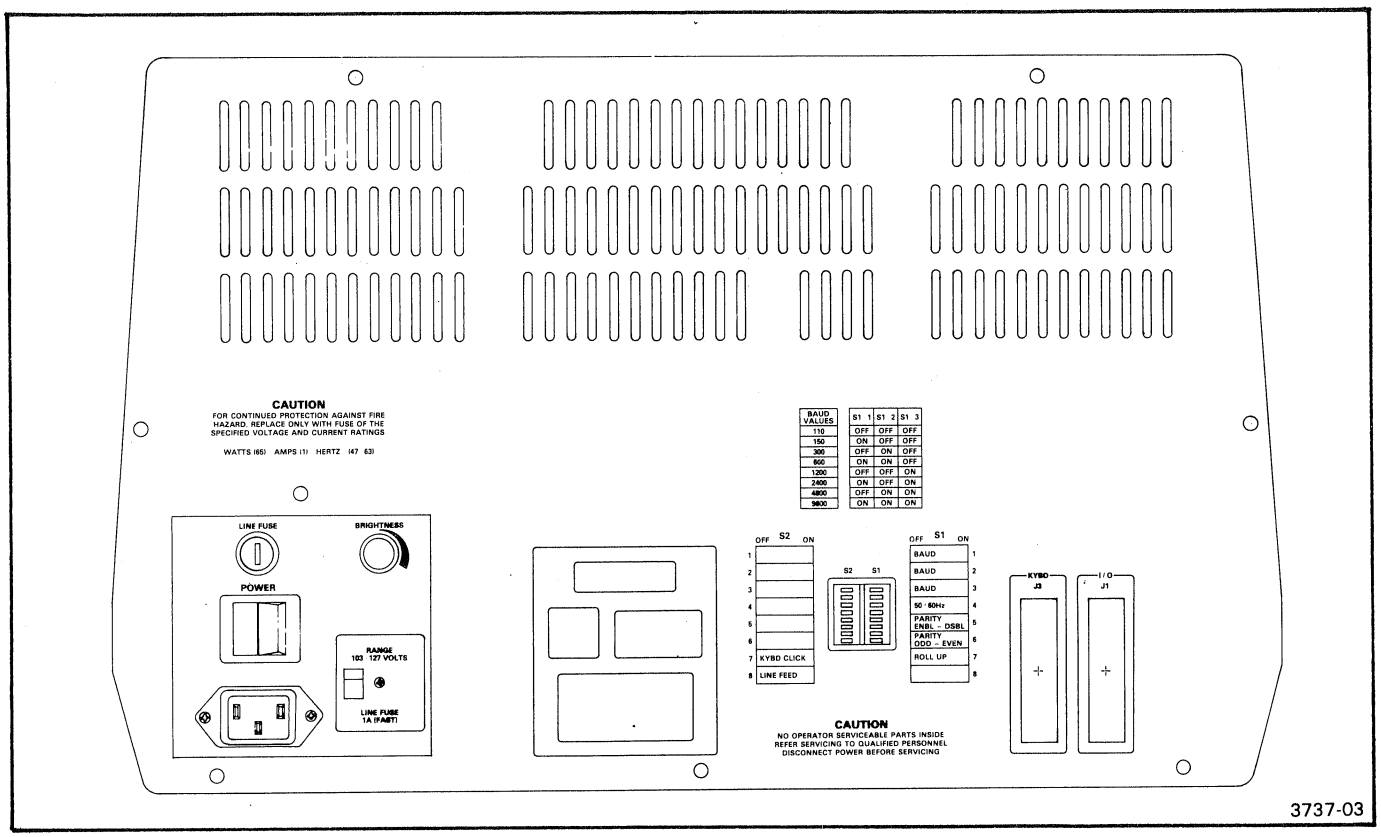


Fig. 1-2. CT 8500 rear panel.

4. Verify that the fuse rating is correct for the selected input power range:

   - o For 90-128V, 50/60 Hz: use 1.0A/250V fast-blow fuse.
   - o For 207-250V, 50/60 Hz: use 0.5A/250V fast-blow fuse.

5. The correct power cord for the specified line voltage is provided with the equipment.

CAUTION

Turn the POWER switch OFF before connecting or disconnecting any cables, or operating any of the baud rate or function switches.

Connect the power cord to the proper power source, then to the ac power input receptacle on the CT 8500 rear panel.

6. Set the baud rate selector switches (S1-1, -2, and -3) to match the required interface baud rate. Table 1-5 defines the baud rate switch settings.

Table 1-5
Baud Rate Switch Settings

Baud	S1-1	S1-2	S1-3
110	OFF	OFF	OFF
150	ON	OFF	OFF
300	OFF	ON	OFF
600	ON	ON	OFF
1200	OFF	OFF	ON
2400	ON	OFF	ON
4800	OFF	ON	ON
9600	ON	ON	ON

7. Set the parity switch (S1-5) to OFF if parity is to be enabled, or to ON if parity is not to be used. (For operation with the TEKTRONIX 8550 Microcomputer Development Lab, set the parity switch ON.)

If parity is enabled, set the parity select switch (S1-6) to odd (OFF) or even (ON), as appropriate. Table 1-6 defines the parity switch settings.

Table 1-6
Parity Switch Settings

Parity	S1-5	S1-6
Odd	OFF	OFF
Even	OFF	ON
None	ON	X

8. Connect the RS-232-C interface cable to the host or I/O equipment, then to connector J1 on the CT 8500 rear panel.

9. Connect the keyboard interconnecting cable to J3 on the CT 8500 rear panel.

10. Move the POWER switch to the ON position. The backlit REMOTE keyboard indicator indicates that the terminal is in the power-up mode.

11. After a one-minute warmup period, adjust the Brightness control (located on the CT 8500 rear panel) clockwise until the green raster background just appears, then counterclockwise until the raster just disappears. The cursor should be clearly visible.

NOTE

If the display is unstable or otherwise unsatisfactory, internal adjustment may be required. Internal adjustments should be performed only by qualified service technicians. Contact your local Tektronix, Inc. Field Service Office for assistance. The CT 8500 Video Display Terminal Service Manual contains adjustment procedures.

12. Press the LOCAL key on the keyboard. The REMOTE indicator will go off and the LOCAL indicator will illuminate. Now, the terminal is in local mode: you can perform all of the CT 8500's local operations directly from the keyboard.

The CT 8500 Video Display Terminal is now ready for operation. The following simple tests will help you verify that the terminal is working properly.

Screen Alignment Test

The Screen Alignment Test fills the entire display screen with a character selected from the keyboard. In this test, we'll fill the screen with asterisks.

1. To set up the Screen Alignment Test, press the CNTRL, SHIFT, and F8 keys simultaneously, then type an asterisk (remotely, 1B + 3F + 2A).

2. To execute the test, press the CLEAR key (1B + 04). The display should now be filled with asterisks.

3. To erase the asterisk pattern from the screen, press the CNTRL, SHIFT, and F8 keys simultaneously, then press the space bar. Then, press the CLEAR key again. This blanks the screen (fills it with the space character, 20H).

Self Test

This test displays a changing pattern on the CRT. As the test executes, every printable ASCII character is displayed on every line, in every character position.

1. To enter the Self Test routine from the keyboard, place the terminal in local mode, then press the CNTRL, SHIFT, and SEND keys simultaneously. The REMOTE indicator illuminates, but will go off when you terminate the test. The test runs continuously until terminated. (This test cannot be entered remotely.)

2. To terminate the test, press any key on the keyboard.

This concludes the power-up procedure.

The rear panel controls and the terminal keyboard are discussed later in the "Controls, Connectors, and Indicators" part of this section.

The Demonstration Run later in this section introduces you to most of the terminal's functions that can be accomplished in local mode.

The Operating Procedures section of this manual is a handy guide to often-used procedures.

REPACKAGING INFORMATION

Whenever the CT 8500 is to be shipped, it's best to repack it as it was originally shipped from the factory. For this reason, be sure to save the carton and packing material in which your terminal was shipped.

If the original packaging is unfit for use, or is not available, repackage the equipment according to the following procedure:

1. Obtain a carton of corrugated cardboard with a 350 psi test strength, having inside dimensions at least six inches greater than the terminal's dimensions. The larger dimensions allow for cushioning.

2. Surround the terminal with anti-static polyethylene sheeting for protection.

3. Cushion the terminal on all sides by tightly packing dunnage or urethane foam between the terminal and the sides of the container.

4. Seal the carton with shipping tape or an industrial stapler.

If you're shipping the terminal to a Tektronix Service Center for service or repair, be sure to attach a tag to the equipment showing the following information:

- The name and address of the owner.
- The name of an individual at your firm who can be contacted.
- Complete equipment type and serial number.
- A complete description of the service required or problems encountered.

Mark your return address, and the address of the Tektronix Service Center, on the carton in one or more prominent places.

Storage Considerations

Observe the following considerations whenever you store the CT 8500 Video Display Terminal:

- Don't exceed temperature or humidity limits, as outlined in Table 1-2.
- Store the carton upright. Don't compress or stack container cartons.

CONTROLS, CONNECTORS, AND INDICATORS

REAR PANEL CONTROLS

The CT 8500 rear panel is shown in Fig. 1-2. Controls, connectors, and switches on the rear panel are described in the following paragraphs.

CAUTION

Make sure that power to the CT 8500 is OFF before you change any switch settings.

1. Line fuse.

   For 90--128V, 50/60 Hz, use 1.0A/250V fast-blow fuse.

   For 207--250V, 50/60 Hz, use 0.5A/250V fast-blow fuse.

2. Brightness control.

   Rotate this switch clockwise for a brighter display.

3. POWER

   This ON-OFF rocker switch controls primary power for the CT 8500 Video Display Terminal.

4. Power range selector switch.

   The position of this switch selects the line voltage to the CT 8500. Two positions are available: 115V or 230V. The position of this switch should be changed only by a qualified service technician.

5. Primary power input receptacle.

   The power cord is connected to this receptacle.

6. Switch packs S2 and S1.

These switches select various CT 8500 operating features. Figure 1-3 shows how to set the switches for operation with a TEKTRONIX 8550 Microcomputer Development Lab (at 60 Hz).

You must turn the POWER switch OFF before changing any switch settings.

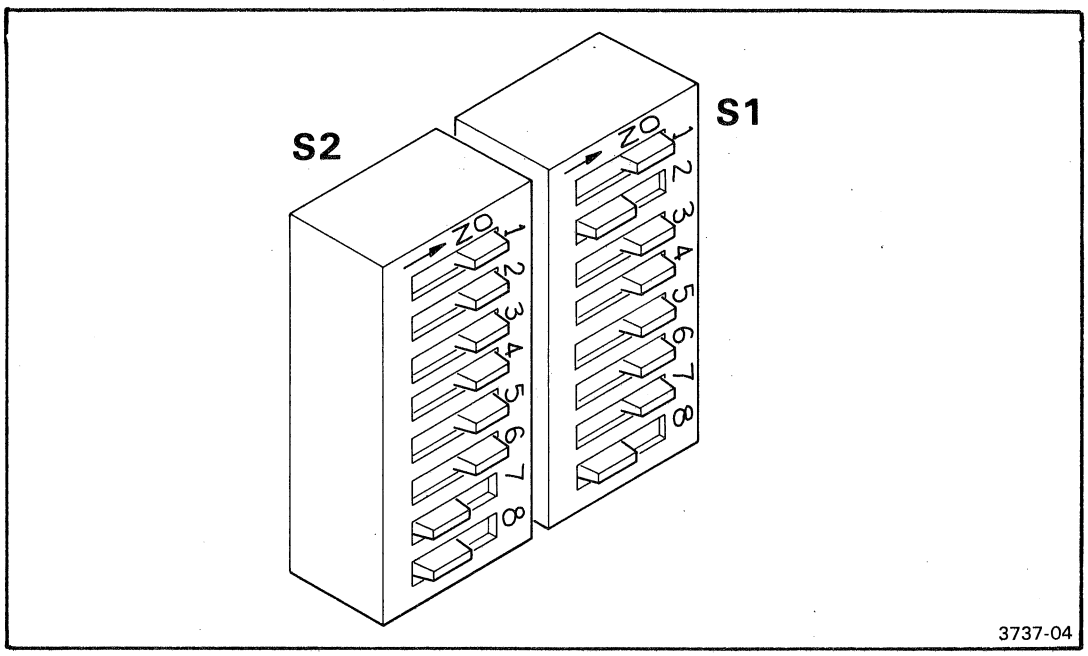


Fig. 1-3. Rear panel switches.

This figure shows the CT 8500 rear panel switches set for operation with a TEKTRONIX 8550 Microcomputer Development Lab (at 60 Hz).

Switches S1-1, -2, and -3 select the baud at which the CT 8500 communicates. Refer back to Table 1-5 for baud switch settings.

Switch S1-4 selects the screen refresh rate: 50 Hz (OFF) or 60 Hz (ON). Set this switch to match the frequency of the power source.

Switches S1-5 and -6 select parity. Set S1-5 OFF if parity is to be enabled, or ON if parity is not used. If parity is enabled, set S1-6 to odd (OFF) or even (ON), as appropriate. Refer back to Table 1-6 for parity switch settings.

Switch S1-7 controls the auto roll-up feature. When S1-7 is ON, and a character is entered in the bottom right character position of the screen, the entire display will roll up one line: the top line of memory disappears and the bottom line is filled with spaces. See Fig. 1-4. When S1-7 is OFF, data remains stationary on the screen, and the cursor returns to the top left corner of the screen (the "Home" position).

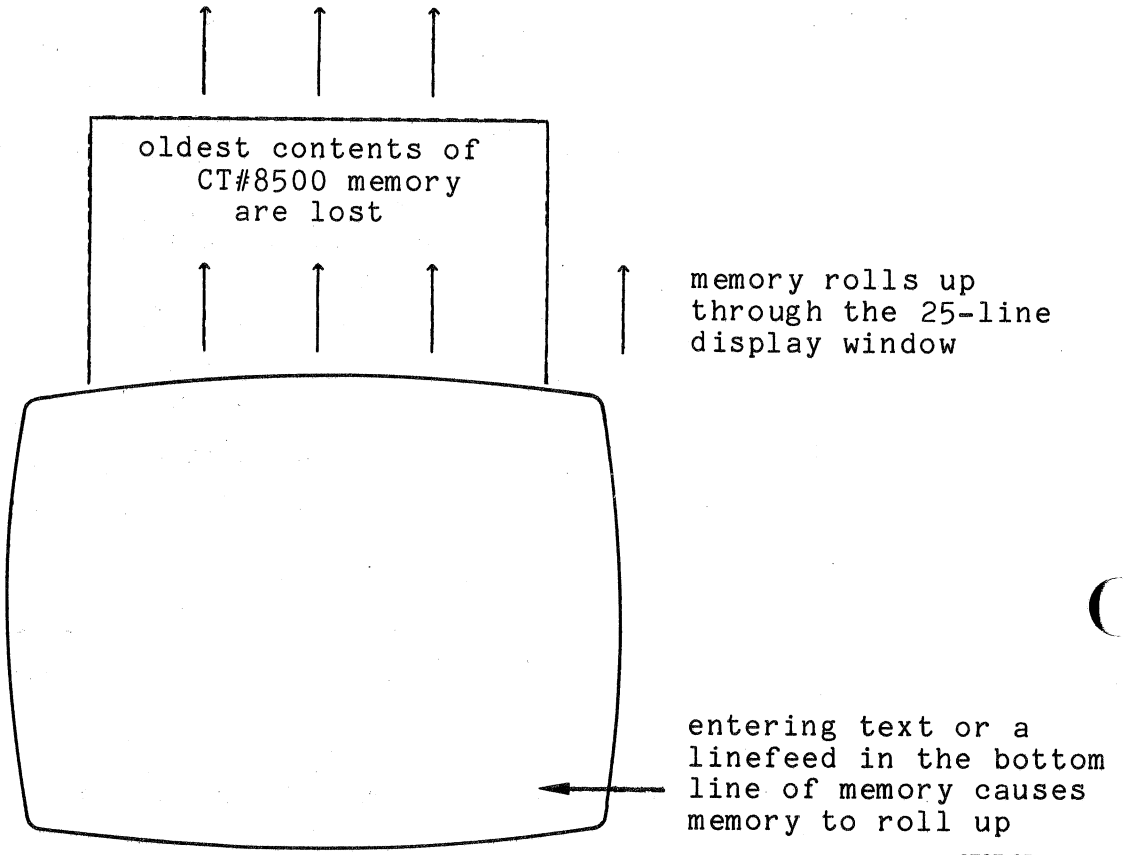


Fig. 1-4. Auto roll-up feature.

Switch S1-8 is not used.

Switches S2-1, -2, -3, -4, -5, and -6 are not used.

Switch S2-7 controls the keyboard click feature. When S2-7 is ON, each character typed from the keyboard results in an audible click, intended to simulate the sound of a typewriter. When S2-7 is OFF, this featured is disabled.

Switch S2-8 controls the auto line feed feature. When S2-8 is ON, each carriage return is accompanied by a line feed.

7. Keyboard connector J3.

   The interconnecting cable from the keyboard attaches to this connector.

8. I/O connector J1.

   The RS-232-C interface cable from the host or I/O equipment attaches to this connector.

THE TERMINAL KEYBOARD

The CT 8500 keyboard is divided into five groups of keys: alphanumeric keys, editing keys, cursor movement keys, function keys, and control keys. The following paragraphs discuss each of these groups of keys. Figure 1-5 shows the CT 8500 terminal keyboard.

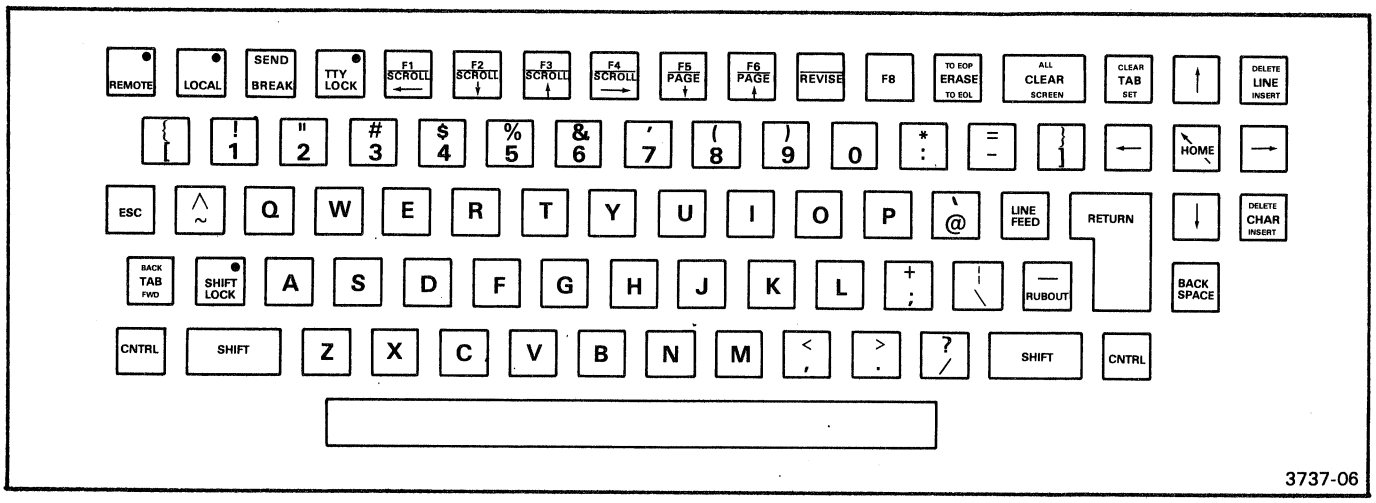
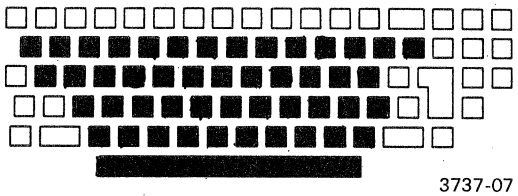


Fig. 1-5. CT 8500 terminal keyboard.

NOTE

Any key function is automatically repeated if the key is held down for 0.5 seconds or longer.

Alphanumeric Keys



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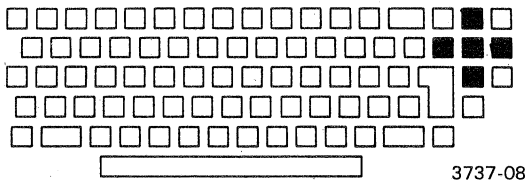
The alphanumeric keys occupy the main part of the CT 8500's keyboard. The keyboard layout resembles an ordinary typewriter keyboard, but with some important differences. Familiarize yourself with the CT 8500's alphanumeric key layout.

Cursor Movement Keys



3737-08

Cursor ↑. This key moves the cursor up one line. The cursor remains in the same column. When the cursor is already on the top line of the display, this key moves the cursor to the bottom line.

Cursor ↓. This key moves the cursor down one line. The cursor remains in the same column. When the cursor is already on the bottom line of the display, this key moves the cursor to the top line.

Cursor ←. This key moves the cursor one character position to the left, on the same line. When the cursor is already in the leftmost character position, this key moves the cursor to the rightmost position on the previous line. When the cursor is already in the "Home" position of the display (upper left), this key moves the cursor to the rightmost position on the bottom line of the display.

Cursor →. This key moves the cursor one character position to the right, on the same line. When the cursor is already in the rightmost character position, this key moves the cursor to the leftmost position on the following line. When the cursor is already in the rightmost character position of the bottom line, this key scrolls the display up one line.

HOME. This key moves the cursor to the leftmost position on the top line of the display.

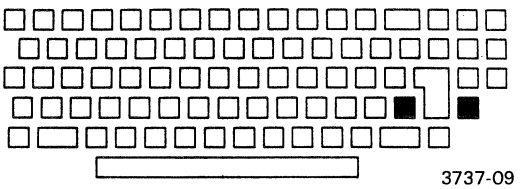
Pressing CNTRL and HOME simultaneously moves the cursor to the leftmost position on the top line of Page One. (See the discussion of Paging and Scrolling keys, later in this section.)

Pressing CNTRL, SHIFT, and HOME simultaneously moves the cursor to the leftmost position on the top line of Page Two.

Editing Keys

The editing keys are situated throughout the terminal keyboard. Many of these keys are similar to typewriter keys, and some of them have unique functions within the CT 8500. Note that most of these keys ignore line boundaries in local mode.

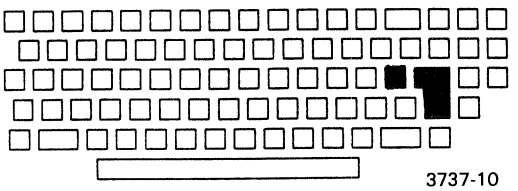
BACK SPACE and RUB OUT.



The BACK SPACE key moves the cursor one space to the left.

The RUB OUT key displays the Rubout character (7F) in local operation. When connected to a host computer in power-up or host-control mode, this key sends the RUBOUT character code (7F) to the host.

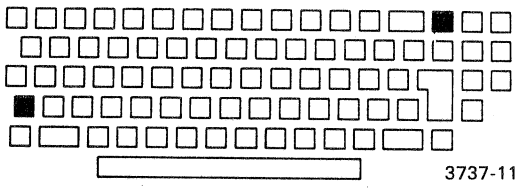
RETURN and LINE FEED.



The RETURN key moves the cursor to the start of the line. If the Auto Line Feed switch (S2-8) is ON, the cursor will return to the left margin and also move down one line.

The LINE FEED key moves the cursor down one line. If the cursor is on the bottom line of the CT 8500's memory, this key rolls the entire display up one line: the top line of memory is lost and the bottom line is filled with spaces. Figure 1-4 shows how this auto roll-up feature works.

TAB Keys.



These keys have essentially the same functions as on a typewriter keyboard:

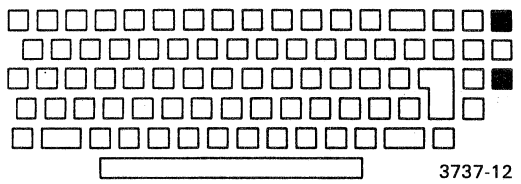
TAB FWD (unshifted) moves the cursor to the next tab setting. (Line boundaries are ignored.) The CT 8500 has default tab settings in the following character positions: 1, 9, 17, 25, 33, 41, 49, 57, 65, and 73. If all tabs have been cleared, this key moves the cursor to the bottom right character position in Page Two (the end of memory).

TAB BACK (shifted) moves the cursor left to the previous tab setting. (Line boundaries are ignored.) If no tabs are set, this key moves the cursor to the "Home" position in Page One.

TAB SET (unshifted) sets a column tab stop at the current cursor position.

TAB CLEAR (shifted) clears the column tab stop at the current cursor position.

LINE and CHAR Keys.



INSERT LINE (unshifted) inserts a blank line above the current cursor line.

DELETE LINE (shifted) deletes the line containing the cursor. All lines below the cursor move up one line.

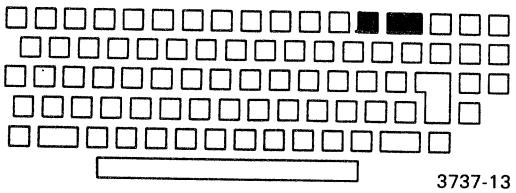
INSERT CHAR (unshifted) causes the character at the cursor position, and all characters to the right of the cursor (on the same line), to move one space to the right. A space is inserted at the cursor position.

NOTE

If the original line contained the full 80 characters, the last character in the line will be lost when the line is shifted to the right.

DELETE CHAR (shifted) deletes the character at the cursor position. All characters to the right of the cursor move one space to the left.

ERASE and CLEAR Keys.



ERASE TO EOL (unshifted) deletes all characters from the cursor to the end of the line.

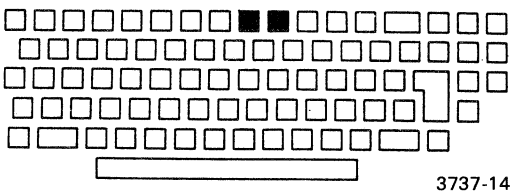
ERASE TO EOP (shifted) deletes all characters from the cursor to the end of the display.

CLEAR SCREEN (unshifted) deletes all characters on the display.

CLEAR ALL (shifted) deletes all characters on both pages of memory.

Paging and Scrolling Keys

PAGE ↓ and PAGE ↑.



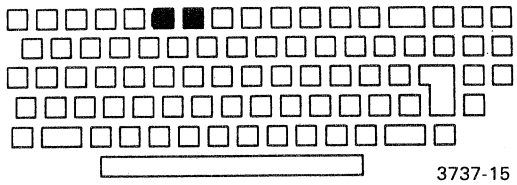
These keys have the following functions in local and power-up operation:

The PAGE ↓ (F5) key displays Page One (lines 0--24) of memory. The cursor returns to the "Home" position. See Fig. 1-6A.

The PAGE ↑ (F6) key displays Page Two (lines 25--49) of memory. See Fig. 1-6B. The top line of the display is line 25 in memory, and the cursor is positioned in the "Home" position on the screen.

When shifted, these keys are programmable. For information on how to program these keys, see the Function Keys discussion later in this subsection.

SCROLL ↓ and SCROLL ↑.



These keys have the following functions in local and power-up operation:

The SCROLL ↓ (F2) key scrolls memory, one line at a time, down through the 25-line display window. Scrolling stops when the top line of memory (line 0) appears at the top of the screen. See Fig. 1-6A.

The SCROLL ↑ (F3) key scrolls memory, one line at a time, up through the 25-line display window. Scrolling stops when the bottom line of memory (line 49) appears at the bottom of the screen. See Fig. 1-6B.

When shifted, these keys are programmable. For information on how to program these keys, see the Function Keys discussion later in this subsection.

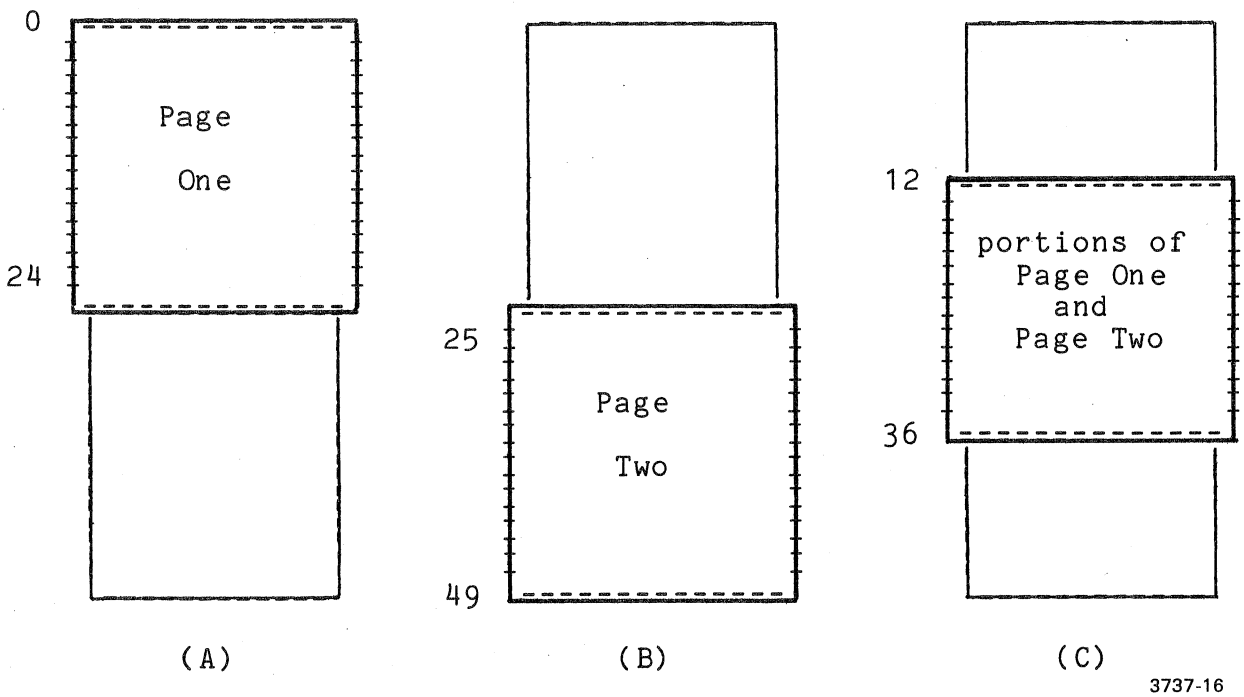
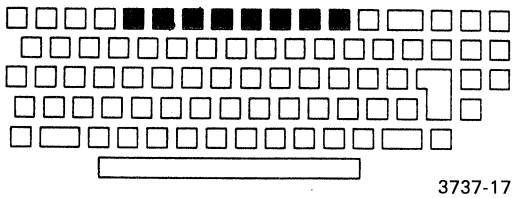


Fig. 1-6. Paging and scrolling.

This figure shows how the paging and scrolling keys move memory through the display window. In Fig. 1-6A, Page One (lines 0--24) of memory is displayed. In Fig. 1-6B, Page Two (lines 25--49) is displayed. In Fig. 1-6C, the display includes portions of both pages of memory. Either the PAGE or SCROLL keys could be used to restore the display to the setting shown in Fig. 1-6A or Fig. 1-6B.

Function Keys



The eight function keys are dual-function keys.

Unshifted, in power-up and local operation, the keys have the following functions assigned:

F2 Scroll data down.

F3 Scroll data upward.

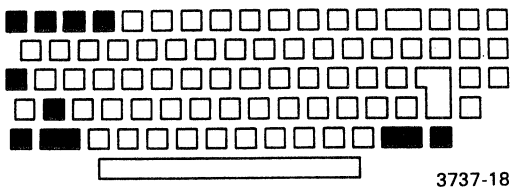
F5 Page data downward.

F6 Page data upward.

These four keys are discussed with the editing keys. In addition, F1, F4, and F7 are assigned functions with some TEKTRONIX screen-oriented editors. (F8 has no function assigned.)

Shifted, all keys are programmable, either locally (via the keyboard) or remotely (via software from a host computer). For more information about programming the function keys, see the Learn Mode discussion in Section 2 of this manual, Operating Procedures.

Control Keys



SHIFT and SHIFT LOCK.

When the SHIFT key and a second key are depressed simultaneously, the code for a shifted character is generated.

Pressing SHIFT LOCK illuminates the SHIFT LOCK key, and generates the shifted code for any subsequent character typed. Pressing either SHIFT key extinguishes the SHIFT LOCK indicator, and removes the SHIFT LOCK condition.

CNTRL.

When the CNTRL key and another key are depressed simultaneously, the code for a control character is generated. These control codes are not normally displayed. (For information on how to display control characters, refer to the Monitor Mode discussion in Section 2 of this manual, Operating Procedures.)

ESCAPE.

Ordinarily, this key has no effect in local operation. However, the ESCAPE key may be used in programming function keys. For more information, see the Learn Mode procedures in Section 2 of this manual.

TTY LOCK.

This alternate-action switch forces the terminal into (or out of) uppercase "teletypewriter" mode. When the terminal is in a TTY LOCK condition, the TTY LOCK indicator is lit, and only uppercase alpha characters are generated. When the terminal is in both a TTY LOCK and SHIFT LOCK condition, the keys K, L, M, N, and P generate special teletypewriter characters.

REMOTE and LOCAL.

These keys are used to change the CT 8500's operating mode. Each key has an indicator visible from the keyboard. When the LOCAL indicator is lit, the terminal is in local mode. When the REMOTE indicator is lit, the terminal is in power-up or host-control mode. For more information, refer to the procedure, "Changing Operating Modes", in Section 2 of this manual.

BREAK/SEND.

The BREAK key (unshifted) causes the communications line to go to the spacing level for 100 ms, when the terminal is in power-up or host-control mode.

The SEND key (shifted) is used to send a block of text (line or page) from the terminal to the host computer. For more information, refer to the procedure, "Sending a Block of Text", in Section 2 of this manual.

DEMONSTRATION RUN

This demonstration run presents some of the CT 8500's basic features: controlling the cursor, using the editing keys, paging and scrolling text, and using and setting tabs.

In ordinary operation, the CT 8500 is connected to a host computer, in either power-up or host-control operating mode. For simplicity, all functions in this demonstration run are performed in local mode.

Fill the Screen. First, press the CNTRL, SHIFT, and SEND keys simultaneously. This fills the screen with a display pattern. In this Demonstration Run, we'll use this display pattern to illustrate some of the CT 8500's functions.

When the screen is full, stop the fill operation by pressing any key. (The REMOTE indicator will go out when you stop the fill operation.)

Cursor Control. The five cursor control keys are located at the right side of the keyboard. Press the ↓ key and watch the cursor move down. Similarly, experiment with the ↑ key, the → key, and the ← key. Use these keys to move the cursor to the lower right portion of the display. Now press the HOME key. This key returns the cursor to the upper left corner of the display area on the CRT screen (Home position).

Erase and Clear Text. From the Home position, the ↑ key wraps the cursor around to the bottom of the display. Use the ↑ key to move the cursor to a position several lines above the bottom of the display.

1. Press the ERASE key. This deletes all display characters to the right of the cursor.
2. Now press the SHIFT and ERASE keys simultaneously. This deletes all text from the cursor to the end of the page.
3. Press the CLEAR key. This deletes all text on the displayed page.
4. Operate the appropriate PAGE key (F5 or F6) to verify that text remains on the other page.
5. Press CLEAR again. This key clears all text on the currently displayed page.
6. Enter some identifiable fill text on both pages.
7. Now press the SHIFT and CLEAR keys simultaneously.
8. Operate the PAGE keys (F5 and F6) to verify that both pages have been cleared.

Use the PAGE and SCROLL Keys.

1. Press the CNTRL and HOME keys simultaneously. This positions the cursor at the Home position on Page One.

2. Fill the screen with some text. Make sure that you enter enough text so that the top lines scroll off the top of the display.

3. Press the PAGE ↓ (F5) key. This key brings the top 25 lines of memory down into the display. The display returns to the Page One pattern shown in Fig. 1-6A.

4. Now press the PAGE ↑ (F6) key. This key brings lines 25--49 (the bottom 25 lines of memory) up into the display. See Fig. 1-6B.

5. Now use the SCROLL ↓ key to scroll memory back down through the display, line by line. Scrolling stops when you reach the top of memory. Enter some easily identifiable text on the first few lines of the display.

6. Press PAGE ↑ (F6), move the cursor to the bottom of the display, and enter ten linefeeds. Return to Page One and notice that the top lines of memory were lost when you entered the linefeeds. The CT 8500 stores the most recent 50 lines (4000 characters) entered into memory. All previous contents are lost.

Insert and Delete Lines.

1. Press PAGE ↓ (F5). Then position the cursor several lines down from the top of the display.

2. Press the LINE key. The line containing the cursor, and all lines below the cursor, move down one line. A blank line is inserted, and the cursor is positioned at the beginning of that line.

3. Type some identifiable text on the inserted line.

4. Press the SHIFT and LINE keys simultaneously. This deletes the line that you just entered. All text below the inserted line moves up one line to its original position.

Insert and Delete Characters.

1. Position the cursor in the center of any full line of text.

2. Press the CHAR key. The character at the cursor position, and all characters to the right of the cursor (on the same line), move one space to the right. A space is inserted at the cursor position.

3. Type an identifiable character in the inserted space.

4. Return the cursor one space to the left, to the inserted character.

5. Press the SHIFT and CHAR keys simultaneously. The inserted character is deleted, and all characters to the right of the cursor move one space to the left to their original position.

NOTE

If the original line contained the full 80 characters, the last character in the line will be lost when the line is shifted to the right.

Line Feed and Carriage Return.

1. Press the LINE FEED key, and watch the cursor move down.

2. Position the cursor near the center of the display.

3. Press the RETURN key, and watch the cursor return to the left margin of the display.

NOTE

If the Auto Line Feed feature is selected (switch S2-8 ON), the cursor will return to the left margin and also move down one line.

Use and Set Tabs.

1. Position the cursor at the left margin on any line of the display.

2. Press the TAB FWD/BACK key momentarily. This moves the cursor to the next default tab setting (column 9).

3. Press the TAB key several more times, and watch the cursor move to default tab positions (every 8 spaces) across the screen.

4. Now hold the SHIFT key down and press the TAB FWD/BACK key several times to move the cursor backward across the screen to the default tab settings.

5. Starting at the left margin, tab to the first default tab position, then press the SHIFT and TAB SET/CLEAR keys simultaneously. This clears the default tab setting. Repeat this procedure to clear several of the remaining default tab settings.

6. Press the RETURN key, then move the cursor to the right about 10 or 12 spaces.

7. Now press the TAB SET/CLEAR key to set a tab stop at this cursor position. Go ahead and set several more tab stops across the page.

8. Return the cursor to the left margin, then operate the TAB FWD/BACK key to verify that the cursor moves correctly to the new tab settings.

SUMMARY

This completes the demonstration run for the CT 8500 terminal. In this demonstration run, you performed the following operations:

- Used the cursor control keys to position the cursor within the display.
- Used the ERASE and CLEAR keys to delete text from the display and from the CT 8500's memory.
- Used the PAGE and SCROLL keys to become familiar with the CT 8500's entire 50-line (4000-character) memory space.
- Used the LINE and CHAR keys to insert and delete text.
- Became familiar with how to enter linefeeds and carriage returns, and how to use and set tabs.

FOR CONTINUED LEARNING

Section 2	Contains some common operating procedures, with examples: changing operating modes; using monitor and learn modes; using the display attributes; dividing the screen horizontally; sending a block of text; and sending remote commands from the host to the CT 8500.
Section 3	Describes the interface between the CT 8500 and the host computer.

Section 2

OPERATING PROCEDURES

PROCEDURE INDEX

INTRODUCTION

Section 1, the Learning Guide, gave you a general overview of the CT 8500 Video Display Terminal, and presented a simple demonstration run. This section presents some common procedures for using the CT 8500 Video Display Terminal.

Most of the procedures in this section may be performed under local control, via the keyboard, or remotely, via software control from a host computer. The examples in this section generally illustrate local control.

For more information about controlling the CT 8500 via software from the host computer, refer to Section 3, Host Communications.

Each procedure in this section is presented in the following format:

Description: A summary of the action(s) performed by the procedure.

Procedure: Locally, the sequence of keystrokes that you enter on the terminal keyboard. Square brackets ([ ]) are used to enclose a series of one or more keys that must be pressed simultaneously.

Remotely, the software sequence from the host, a series of hexadecimal bytes. In this manual, the plus sign (+) is used to delimit bytes, but is not actually sent by the host.

Parameters: A description of the values that you supply.

Comments: The operating limits and options for the procedure.

Examples: One or more demonstrations of correct entry format.

See also: Cross-references to related procedures.

OPERATING MODES

Changing Operating Modes

Description: This procedure demonstrates how to change from one CT 8500 operating mode to another.

Procedure:

Locally: modekeys

Remote: 1B + code

Parameters: modekeys -- The key(s) that you press to change operating modes locally, via the keyboard. See Fig. 2-1.

code -- The function code that is used to change operating modes remotely, via software control from the host computer. See Fig. 2-2.

Comments: Figure 2-1 shows the key sequence used to change operating modes locally, from the keyboard. Figure 2-2 shows the commands used to change operating modes remotely, via software control from the host computer.

Examples:

From local mode, press the REMOTE key. This places the CT 8500 in power-up mode, allowing the host computer to control the terminal. To change to host-control mode, the host computer must now issue the following remote command:

1B + 3D

(Locally, you could press [CNTRL-SHIFT-F6].)

Now, the terminal is in host-control mode, and can be used with a special software package, such as a screen-oriented editor.

To verify that the terminal is in host-control mode, experiment with the cursor control keys. These keys operate locally in power-up mode, but have no function in host-control mode.

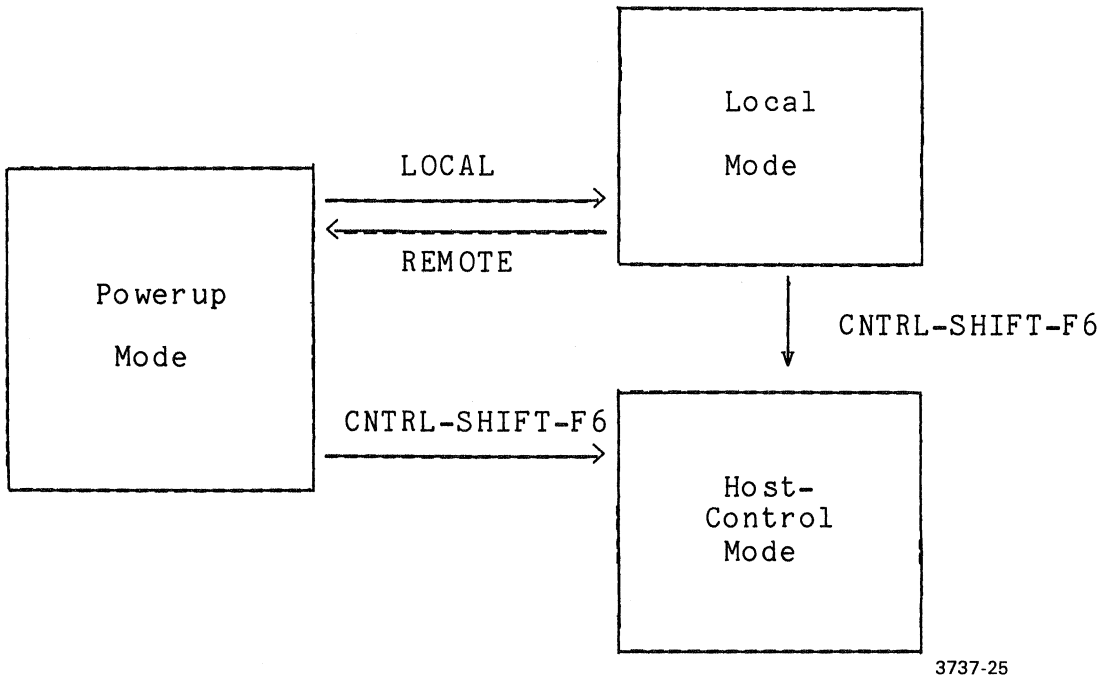


Fig. 2-1. Changing operating modes from the keyboard.

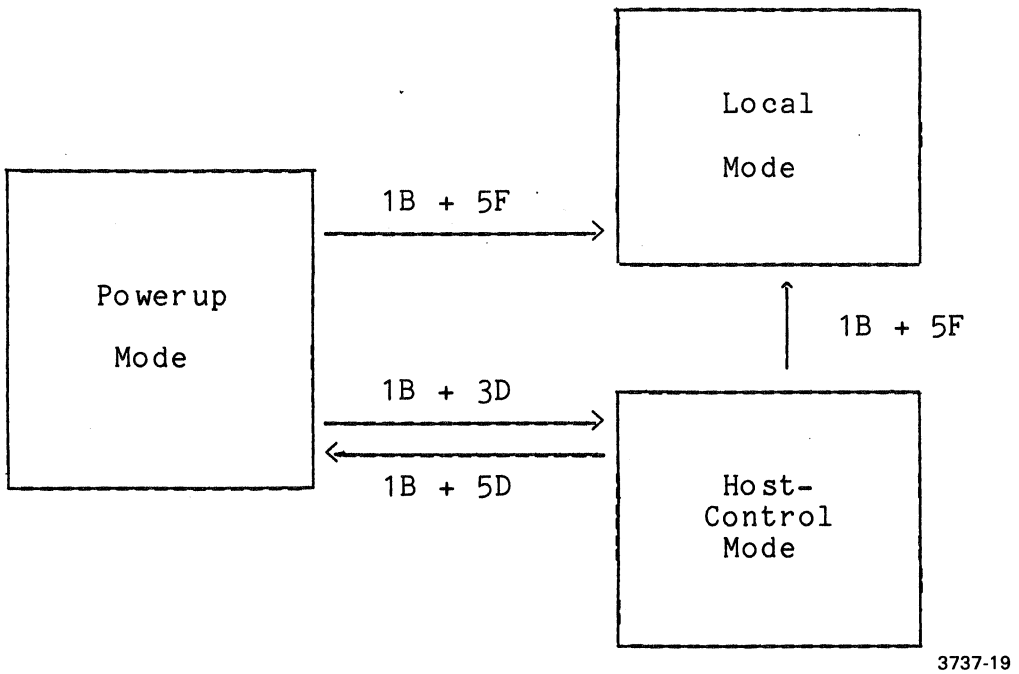


Fig. 2-2. Changing operating modes remotely.

See also:

- Displaying Control Characters
- Programming Function Keys

MONITOR MODE

Monitor mode permits you to view non-printable control characters on the CRT screen. Of the 128 ASCII characters, all but one may be displayed. (The unit separator, 1F, is used to exit monitor mode remotely and thus cannot be displayed.)

Displaying Control Characters

Description: This procedure illustrates the use of monitor mode. In monitor mode, all ASCII characters (excluding the unit separator, 1F) are displayed -- including control characters. Non-printing characters are represented on the display by symbols. Monitor mode allows you to view your file, to make sure that control characters or ESC sequences are actually included in the file.

Procedure:

Locally: [CNTRL-SHIFT-F4] activity [CNTRL-SHIFT-F5]

Remote: 1B + 3B + activity + 1F

Parameters: activity -- The activity that you want to monitor. Any control characters will appear in the special display format.

Comments: You press the [CNTRL-SHIFT-F4] keys to enter monitor mode (remotely, 1B + 3B). Then, perform any activity that you want to monitor. Remember, control characters lose their special significance to the terminal in monitor mode. To exit monitor mode, press [CNTRL-SHIFT-F5]. (Remotely, the unit separator, 1F, is used to exit monitor mode.)

Figure 2-3 illustrates how to enter and exit monitor mode from the keyboard or remotely.

Most of the control characters are keyed to the lower three rows of the keyboard. Table 2-1 lists the monitor mode representation for each control character.

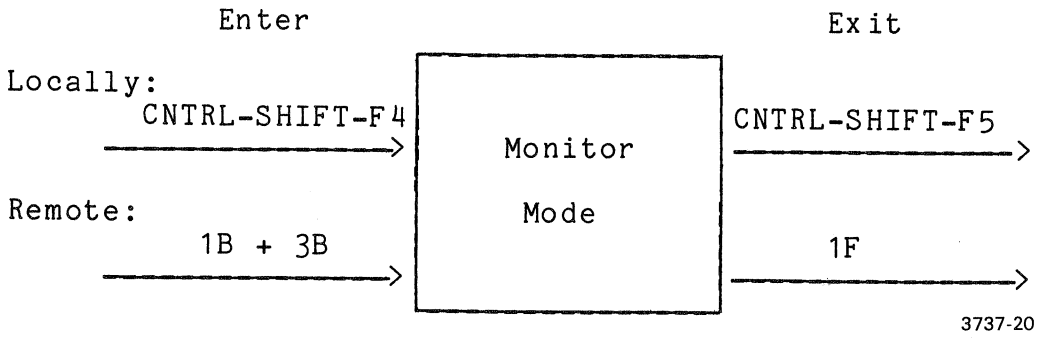


Fig. 2-3. Entering and exiting monitor mode.

Examples:

NOTE

This example assumes that the terminal is connected to a host computer, such as the TEKTRONIX 8550 Microcomputer Development Lab, and is in power-up mode.

[CNTRL-SHIFT-F4]

> COPY BIGFILE CONO

The operating system COPY command displays the file BIGFILE on the terminal. All control characters in BIGFILE are displayed in monitor mode. To exit monitor mode, press [CNTRL-SHIFT-F5].

See also:

- Displaying Function Key Status
- Programming Function Keys
- Switching Operating Modes

Table 2-1
Monitor Mode Display Characters

CNTRL + Character Key	Control Function		
	Display Symbol	ASCII Abbreviation	Definition
@		NUL	Null
A		SOH	Start of Heading
B		STX	Start Text
C		ETX	End Text
D		EOT	End of Transmission
E		ENQ	Enquiry
F		ACK	Acknowledge
G		BEL	Bell
H		BS	Back Space
I		HT	Horizontal Tab
J		LF	Line Feed
K		VT	Vertical Tab
L		FF	Form Feed
M		CR	Carriage Return
N		SO	Shift Out
O		SI	Shift In
P		DLE	Data Link Escape
Q		DC1	Direct Control 1
R		DC2	Direct Control 2
S		DC3	Direct Control 3
T		DC4	Direct Control 4
U		NAK	Negative Acknowledge
V		SYN	Synchronous Idle
W		ETB	End Transmission Block
X		CAN	Cancel
Y		EM	End of Medium
Z		SUB	Substitute
[		ESC	Escape
\		FS	Form Separator
]		GS	Group Separator
^		RS	Record Separator
LINE FEED		LF	Line Feed
ESCAPE		ESC	Escape
BACK SPACE		BS	Back Space

LEARN MODE

Learn mode allows you to program function keys F1 -- F8 (shifted) with a string of up to 64 characters of desired text or data. In learn mode, you may also obtain the status (current assignments) of the eight function keys.

Displaying Function Key Status

Description: This procedure displays the status of the eight programmable function keys.

Procedure:

Locally: [CNTRL-SHIFT-F1]

Remote: 1B + 38

Comments: This procedure may be performed locally, from the keyboard, in local or power-up mode. This procedure may be performed remotely, via software from a host computer, in power-up or host-control mode.

The display consists of a list of the eight programmable function keys, along with the function string currently assigned to each key.

Control characters are displayed as in monitor mode. Table 2-1 shows the monitor mode representation for each control character.

Examples:

[CNTRL-SHIFT-F1]

```
F1=@H
F2=@I
F3=@J
F4=@K
F5=@L
F6=@M
F7=@N
F8=@O
```

Causes the eight function keys to be displayed, along with their powerup default function strings.

[CNTRL-SHIFT-F1]

```
F1=STATUS←
F2=DATE←
F3=ɜJ
F4=LDIR←
F5=ɜL
F6=HELP:L←
F7=USER /VOL/SYSVOL←
F8=ɜO
```

Causes the eight function keys to be displayed, along with the currently assigned function strings. In this example, keys F1, F2, F4, F6, and F7 are programmed for commonly used TEKTRONIX DOS/50 operating system commands. (The RETURN character, displayed as ←, is included.)

See also:

- Programming Function Keys
- Displaying Control Characters
- Switching Operating Modes

Programming Function Keys

Description: This procedure assigns a function string to one of the eight programmable function keys.

Procedure:

Locally: [CNTRL-SHIFT-F2] f-key
charstring [CNTRL-SHIFT-F3]

Remote: 1B + 39 + f-keycode + hexstring + 1F

Parameters: f-key -- The shifted function key that you want to program.

charstring -- The ASCII character string that you want to assign to the specified function key.

f-keycode -- The two-byte sequence that corresponds to the function key that you want to program. Table 2-2 lists the two-byte sequence for each programmable function key.

Table 2-2
Function Key Codes

Function Key	Code Sequence
F1	1B + 48
F2	1B + 49
F3	1B + 4A
F4	1B + 4B
F5	1B + 4C
F6	1B + 4D
F7	1B + 4E
F8	1B + 4F

hexstring -- The hexadecimal equivalent of the ASCII character string that you want to assign to the function key. Section 3 of this manual contains an ASCII-to-hexadecimal conversion table.

Comments: Press the [CNTRL-SHIFT-F2] keys to enter learn mode (remotely, 1B + 39). Then, press the shifted function key that you want to program, and enter the string that you want to assign (up to 64 characters). When you have finished entering the string, press [CNTRL-SHIFT-F3] to exit learn mode. (Remotely, the unit separator, 1F, is used to exit learn mode.)

Figure 2-4 illustrates how to enter and exit learn mode from the keyboard or remotely.

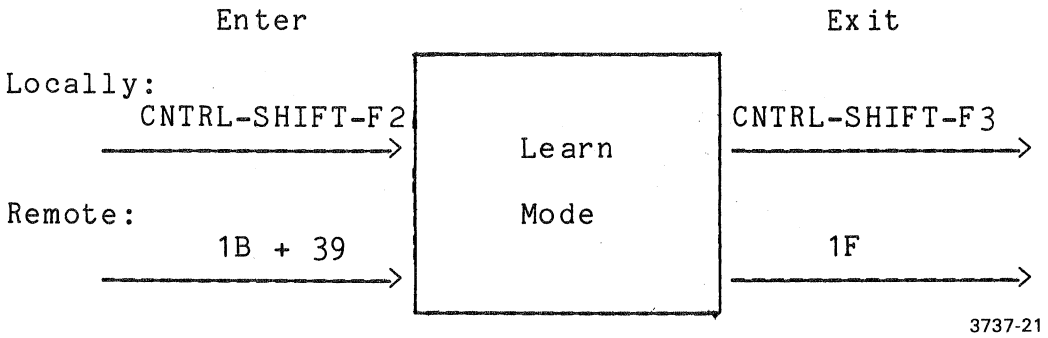


Fig. 2-4. Entering and exiting learn mode.

Up to 64 characters can be assigned to a shifted function key. If more than 64 characters are entered, the bell tone will sound, indicating an error; and the prompt will reappear on the next line.

You may use the RUBOUT key in learn mode to correct typing errors.

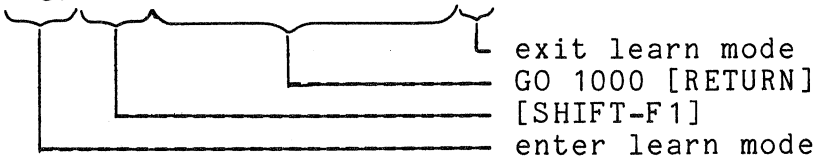
The RUBOUT character may not be included in the string that you assign to a function key. Also, you may not include the CTRL-RUBOUT character (the unit separator, 1F, which exits learn mode). All other ASCII characters (including ESC) may be entered in learn mode.

Control characters are displayed as in monitor mode. See Table 2-1.

Examples:

Locally: [CNTRL-SHIFT-F2] [SHIFT-F1]
GO 1000 [RETURN] [CNTRL-SHIFT-F3]

Remote: 1B391B48474F20313030300D1F

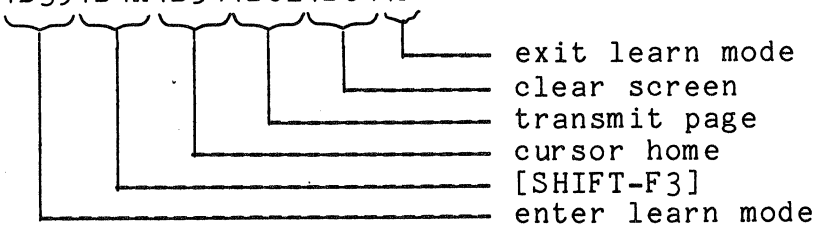


This example programs shifted function key F1 to "GO 1000←". Each time that shifted key F1 is pressed, "GO 1000" (followed by a carriage return) will be inserted following the cursor.

To verify that you have programmed shifted key F1 correctly, press [CNTRL-SHIFT-F1] to obtain the learn mode status.

Locally: [CNTRL-SHIFT-F2] [SHIFT-F3] [ESC] [T]
[ESC] [CNTRL-B] [ESC] [CNTRL-D]
[CNTRL-SHIFT-F3]

Remote: 1B391B4A1B541B021B041F



This example illustrates how to use the ESC key in programming function keys. Shifted function key F3 is programmed to move the cursor to the Home position of the screen, transmit the entire display to the host computer, and clear the screen. Instead of having to press [HOME] [CNTRL-SEND] [CLEAR] to perform this operation, you would simply press [SHIFT-F3]. once the key had been programmed.

See also:

- Displaying Function Key Status
- Displaying Control Characters
- Switching Operating Modes
- Using the Display Attributes

DISPLAY FEATURES

Using the Display Attributes

Description: This procedure illustrates how to use the CT 8500's display attributes: blinking, inverse video, underline, reduced intensity, and blanking.

Procedure:

Locally: [CNTRL-SHIFT-F2] f-key [ESC] char sometext [ESC] [space] f-key

Remote: 1B + code + textcode + 1B + 20

Parameters:

code -- The hexadecimal code that represents one of the CT 8500 display attributes. Table 2-3 lists the available display attributes, along with the sequence used to obtain each attribute remotely (via software from a host computer) or locally (from the keyboard).

textcode -- The hexadecimal equivalent of the ASCII text that you want to display using the CT 8500's display attributes. Section 3 of this manual contains an ASCII-to-hexadecimal conversion table.

f-key -- The shifted function key that you want to program with text using one of the CT 8500's display attributes. Any of the eight shifted function keys may be specified.

char -- The ASCII equivalent of the hexadecimal code. See Table 2-3.

sometext -- Text that you want to display using the display attributes. Section 3 of this manual contains an ASCII-to-hexadecimal conversion table.

space -- The space character cancels previous display attributes, and causes all following characters (until the next attribute marker) to appear "normally".

Comments: You can use any of 12 attributes to display text on the CT 8500 screen. Ordinarily, display attributes are selected remotely, via software control from the host computer. You can also select attributes locally, by programming a shifted function key with the desired attribute.

Table 2-3
Display Attributes

Display Attribute	Code Sequence	Character Sequence
Stop Attribute	1B + 20	[ESC][space]
Begin Underline Attribute	1B + 21	[ESC][!]
Begin Blink Attribute	1B + 22	[ESC]["]
Begin Blink and Underline	1B + 23	[ESC][#]
Begin Inverse Attribute	1B + 24	[ESC][$]
Begin Blank Attribute	1B + 25	[ESC][%]
Begin Blink and Inverse	1B + 26	[ESC][&]
Begin Reduce Attribute	1B + 28	[ESC][(]
Begin Reduce and Underline	1B + 29	[ESC][)]
Begin Blink and Reduce	1B + 2A	[ESC][*]
Begin Blink, Reduce, and Underline Attribute	1B + 2B	[ESC][+]
Begin Inverse and Reduce	1B + 2C	[ESC][,]
Begin Blink, Reduce, and Inverse Attribute	1B + 2E	[ESC][.]

The underline attribute causes a solid underline to appear until the next attribute marker.

The blink attribute causes all subsequent characters, until the next attribute marker, to blink approximately twice a second.

The reduce attribute causes all subsequent characters, until the next attribute marker, to appear at a reduced intensity, with respect to the rest of the display.

The inverse attribute causes all subsequent characters, until the next attribute marker, to appear black on a green background. (Normal display is green on black.)

The blank attribute suppresses display of all subsequent characters, until the next attribute marker, although they exist in the CT 8500 memory.

Each attribute marker (the [ESC][char] sequence) occupies one character location in the CT 8500's memory and on the screen. When you overwrite a location that contains an attribute marker, the attribute is erased from the screen.

Examples:

This example illustrates how to create and view the various display attributes on your CT 8500 terminal.

NOTE

If you are performing this example locally (from the keyboard), switch S2-8 must be ON (for Auto Line Feed).

[CNTRL-SHIFT-F2] [SHIFT-F6] [ESC] [$] ENTER YOUR NAME: [ESC] [space] [CR] [CNTRL-SHIFT-F3]

This key sequence programs shifted key F6 to display the message "ENTER YOUR NAME:" in inverse video (black on green), and then issue a carriage return. Then, when you press [SHIFT-F6], that message will be displayed on the terminal screen.

[CNTRL-SHIFT-F2] [SHIFT-F5] [ESC] [.] ENTER YOUR ADDRESS: [ESC] [space] [CR] [CNTRL-SHIFT-F3]

This time, shifted key F5 is programmed with the message "ENTER YOUR ADDRESS:" in blinking inverse video, with reduced display intensity. (See Table 2-3.) When you press [SHIFT-F5], that message will be displayed on the terminal screen.

See also:

- Displaying Function Key Status
- Programming Function Keys

Dividing the Screen Horizontally

Description: This procedure divides the CT 8500 screen horizontally.

Procedure:

Locally: [CNTRL-SHIFT-F7] char

Remote: 1B + 3D + code

Parameters: char -- The ASCII character representing the number of the line where you want to divide the screen horizontally. The character must correspond to a line within the range 0--49, as shown in Table 2-4.

code -- The hexadecimal equivalent of the ASCII character char.

Comments: The screen is divided horizontally at the line represented by char. This procedure is useful for establishing a header at the top of the screen. When you enter text in the lower portion of the screen, any text in the upper portion is not affected by upward scrolling. See Fig. 2-5.

To divide the screen in Page Two, make sure that char corresponds to a number between 25 and 49. When you divide the screen in Page Two, all 25 lines of Page One are automatically protected against rollup. (See Fig. 2-5B.)

To cancel the horizontal split screen, enter [CNTRL-SHIFT-F7] [space]. (Remotely, 1B + 3D + 20.) The space character corresponds to line 0, as shown in Table 2-4.

Table 2-4
Line and Column Addressing Codes

Line or Column	ASCII Symbol and Hex Code
0	space (20)
1	! (21)
2	" (22)
3	# (23)
4	$ (24)
5	% (25)
6	& (26)
7	' (27)
8	((28)
9	) (29)
10	* (2A)
11	+ (2B)
12	, (2C)
13	- (2D)
14	. (2E)
15	/ (2F)
16	0 (30)
17	1 (31)
18	2 (32)
19	3 (33)
20	4 (34)
21	5 (35)
22	6 (36)
23	7 (37)
24	8 (38)
25	9 (39)
26	: (3A)
27	; (3B)
28	< (3C)
29	= (3D)
30	> (3E)
31	? (3F)
32	@ (40)
33	A (41)
34	B (42)
35	C (43)
36	D (44)
37	E (45)
38	F (46)
39	G (47)
40	H (48)
41	I (49)
42	J (4A)
43	K (4B)

Line or Column	ASCII Symbol and Hex Code
44	L (4C)
45	M (4D)
46	N (4E)
47	O (4F)
48	P (50)
49	Q (51)

Column	ASCII Symbol and Hex Code
50	R (52)
51	S (53)
52	T (54)
53	U (55)
54	V (56)
55	W (57)
56	X (58)
57	Y (59)
58	Z (5A)
59	[(5B)
60	\ (5C)
61	] (5D)
62	^ (5E)
63	_ (5F)
64	` (60)
65	a (61)
66	b (62)
67	c (63)
68	d (64)
69	e (65)
70	f (66)
71	g (67)
72	h (68)
73	i (69)
74	j (6A)
75	k (6B)
76	l (6C)
77	m (6D)
78	n (6E)
79	o (6F)

In Table 2-4, only lines 0--49 may be specified for the split-screen feature. However, these codes also are used in remote commands issued by the host computer. Refer to the "Remote Commands" procedures, later in this section.

Examples:

[F5] [CNTRL-SHIFT-SEND]

(When the cursor appears at the bottom of the screen, enter:)

[CNTRL-SHIFT-F7] [*]

Pressing [CNTRL-SHIFT-SEND] initiates the Self Test routine (described in Section 1 of this manual). Pressing [CNTRL-SHIFT-F7], followed by the '*' character, divides the screen horizontally at line 10 of the screen. (The ASCII character '*' corresponds to line 10. See Table 2-4.)

Press [F5] to return to Page One. Move the cursor to the bottom of the display, and enter ten successive linefeeds. Watch as the text in the bottom of the screen scrolls upward. The top nine lines are not affected by the upward scrolling, and remain on the screen. See Fig. 2-5A.

Now, enter the following key sequence:

[CNTRL-SHIFT-F7] [#]

Position the cursor at the bottom of the screen, and enter ten more linefeeds. Notice that only the top three lines remain unchanged on the screen; the screen is now divided at line 3. ('#' corresponds to line 3. See Table 2-4.)

Let's try another one. Enter the following key sequence:

[CNTRL-SHIFT-SEND]

Wait 30 seconds as the screen is filled with the test pattern. Then enter:

[CNTRL-SHIFT-F7] [C] [F6]

The uppercase 'C' divides the screen at line 35 (in Page Two). This protects the top 35 lines of the CT 8500's 50-line memory. The cursor is now at the top of Page Two. Move the cursor to the bottom of the screen, and enter ten successive linefeeds. Press the PAGE ↓ (F5) key to verify that Page One text has not been changed.

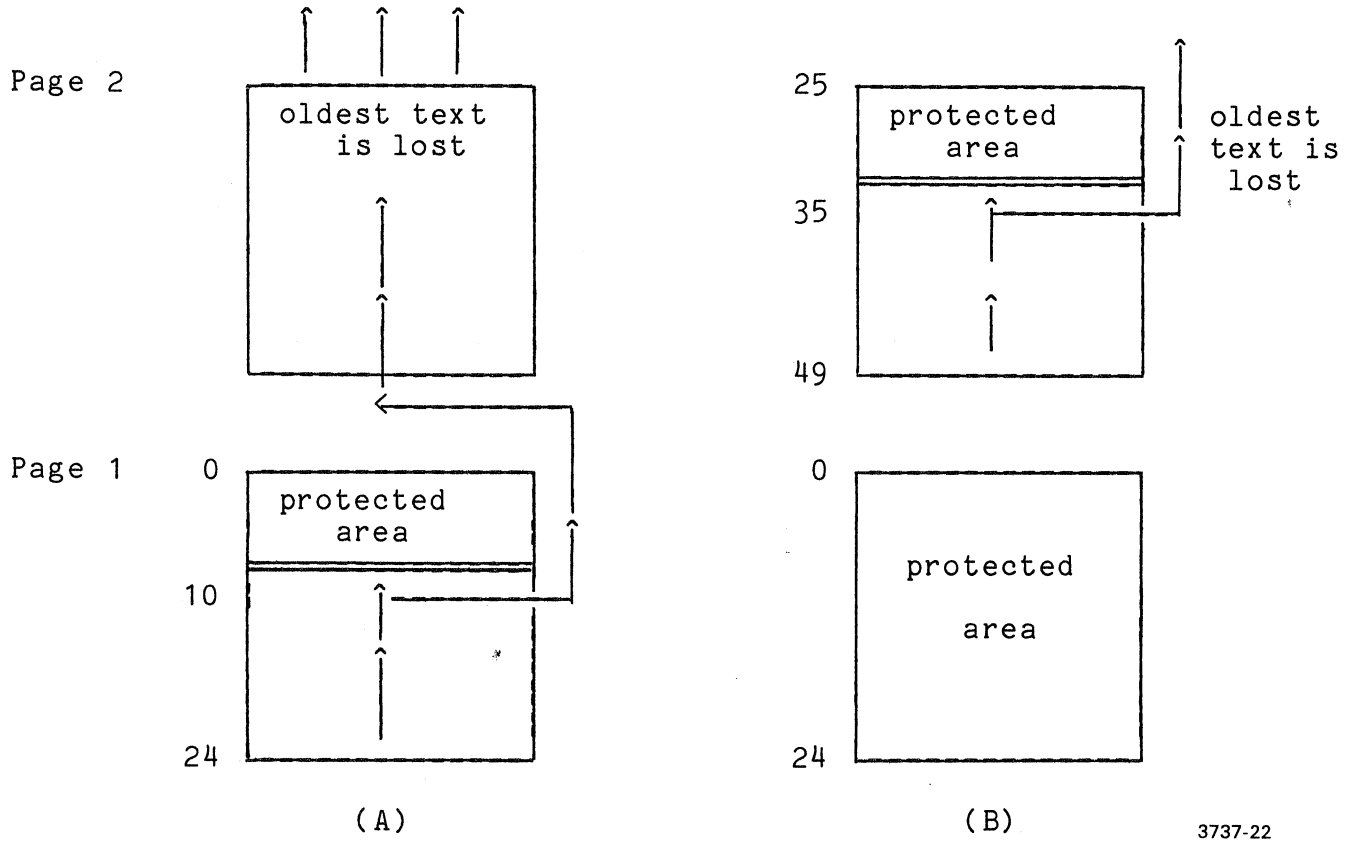


Fig. 2-5. Splitting the screen horizontally.

In Fig. 2-5A, the screen is split at line 10, in Page One. As more text is entered from the keyboard, the old text rolls upward, past the "protected" area at the top of Page One, and into Page Two. In Fig. 2-5B, the screen is split at line 35, in Page Two. As more text is entered in Page Two, the old text rolls up and out of memory. (The contents of Page One are automatically protected in Fig. 2-5B.)

See also:

- Using the Display Attributes
- Sending a Block of Text

SENDING TEXT TO THE HOST

Sending a Block of Text

Description: This procedure shows how to send a block of text from the terminal to the host computer.

Procedure:

Locally: sendkeys

Remote: 1B + code

Parameters: sendkeys -- The keys that you press to indicate the type of transmission. For line transmission, [SHIFT-SEND]. For page transmission, [CNTRL-SEND].

code -- The hexadecimal code indicating the type of transmission: line (01) or page (02).

Comments: You can send either a line or an entire page of text from the terminal to the host computer. In line transmission, the current line is sent, up to the first ETX (CNTRL-c) encountered. In page transmission, the contents of the displayed screen are sent, from the cursor position to the bottom of the display (or to the first ETX encountered).

To insert an ETX (CNTRL-c) character into your text, enter monitor mode:
[CNTRL-SHIFT-F4] [CNTRL-c] [CNTRL-SHIFT-F5]

The CT 8500 must be attached to a host. Otherwise, this procedure will lock up the terminal, and you will have to turn the POWER switch OFF and then restart the terminal.

Examples:

[SHIFT-SEND]

Pressing these keys sends the line containing the cursor (up to the first ETX) to the host computer. You must press the LOCAL key to return to local mode.

[CNTRL-SEND]

Pressing these keys sends the contents of the displayed screen, from the cursor position to the bottom of the display (or to the first ETX) to the host computer. You must press the LOCAL key to return to local mode.

See also:

- Dividing the Screen Horizontally
- Programming Function Keys
- Switching Operating Modes

REMOTE COMMANDS

Loading the Cursor Address

Description: This procedure is used to change the cursor address remotely, via software control from the host computer.

Procedure:

Remote: 1B + 7C + lineaddr + columnaddr

Comments: The cursor may be moved to any of the 2000 character positions currently displayed. Each character position can be uniquely addressed by a line and column number, via software from the host computer. The software sequence moves the cursor from its current position to the character position specified by the line and column address. Table 2-4 lists the hexadecimal codes that are used to specify line and column addresses.

Parameters: lineaddr -- The hexadecimal representation for the specified line address. Only lines 0--24 may be specified. See Table 2-4.

NOTE

The line address is relative to the 25-line display, and not to the entire 50-line CT 8500 memory.

columnaddr -- The hexadecimal representation for the specified column address. Any column in the range 0--79 may be specified. See Table 2-4.

Examples:

1B + 7C + 2A + 36

This example moves the cursor to line 10, column 22. ('2A' corresponds to line 10, and '36' corresponds to column 22, as shown in Table 2-4.)

See also:

- Reading the Cursor Address
- Reading the Top Line Address
- Locking the Keyboard
- Turning the Cursor Off

Reading the Cursor Address

Description: This procedure is used to read the cursor address remotely, via software control from the host computer.

Procedure:

Remote: 1B + 7D

Comments: Each character position within the display can be individually addressed by a unique line and column number. This procedure reads the line and column address to the host computer. Table 2-4 lists the hexadecimal codes that are used to specify line and column addresses.

Examples:

With the cursor at line 10, column 22, the host computer issues the following remote command:

1B + 7D

The terminal issues the following response to the host:

2A + 36

The terminal's response indicates that the cursor is at line 10, column 22, as shown in Table 2-4.

See also:

- Loading the Cursor Address
- Reading the Top Line Address
- Locking the Keyboard
- Turning the Cursor Off

Reading the Top Line Address

Description: This procedure is used to read the address of the top line of the display, via software control from the host computer.

Procedure:

Remote: 1B + 69

Comments: When the host issues this software sequence, the terminal responds with code that corresponds to the line address (0--49) of the line at the top of the display. Table 2-4 lists the code representation for each line within the terminal's two pages (50 lines) of memory. Figure 2-6 illustrates the relationship between the display and the terminal's two-page memory.

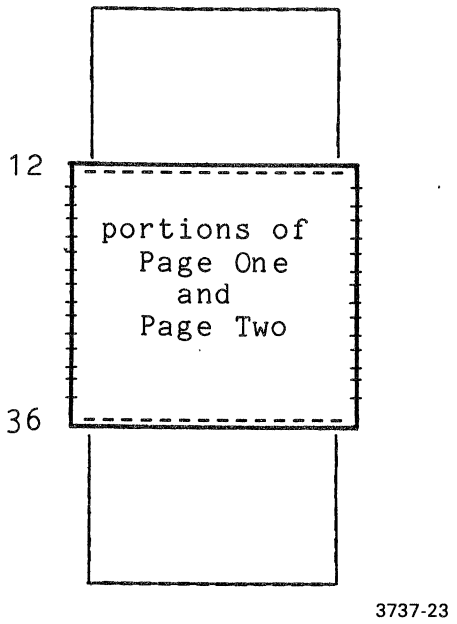


Fig. 2-6. Reading the top line address.

The current display includes lines 12--36 of the CT 8500's 50-line memory.

Examples:

With line 12 of memory at the top of the display, as shown in Fig. 2-6, the host computer issues the following remote command:

1B + 69

The terminal issues the following response to the host:

2C

The terminal's response indicates that the top line of the display is line 12 of the CT 8500's 50-line memory. Refer back to Table 2-4.

See also:

- Loading the Cursor Address
- Reading the Cursor Address
- Locking the Keyboard
- Turning the Cursor Off

Locking the Keyboard

Description: This procedure is used to lock the keyboard against operator input, via software control from the host computer.

Procedure:

Remote: 1B + 6A (locks the keyboard)

1B + 6B (unlocks the keyboard)

Comments: The terminal's keyboard lock feature prevents any operator input from the keyboard while the host computer is performing an operation. First, the host issues the remote command to lock the keyboard. When the operation is completed, the host issues the remote command to unlock the keyboard, again permitting operator input from the keyboard.

Examples:

1B + 6A

This remote command locks the keyboard. When the host computer has completed its operation, it issues the command 1B + 6B to again allow operator input.

See also:

- Loading the Cursor Address
- Reading the Cursor Address
- Reading the Top Line Address
- Turning the Cursor Off

Turning the Cursor Off

Description: This procedure is used to turn the cursor off, via software control from the host computer.

Procedure:

Remote: 1B + 5B (turns the cursor off)

1B + 5A (turns the cursor back on)

Comments: It may be desirable to turn the cursor off while the host computer is performing some operation on the display, such as moving the cursor. The first remote command (1B + 5B) turns the cursor off. When the computer has completed its operation, the second remote command (1B + 5A) can be issued to restore the visible cursor.

Examples:

1B + 5B

This remote command turns the cursor off. Now, the host computer can move the cursor to a new address (line 22, position 79):

1B + 7C + 36 + 6F

After the cursor has been moved to its new position, the host computer can restore the visible cursor with the following command:

1B + 5A

See also:

- Loading the Cursor Address
- Reading the Cursor Address
- Reading the Top Line Address
- Locking the Keyboard

Section 3

HOST COMMUNICATIONS

RS-232-C INTERFACE

The CT 8500 Video Display Terminal is interfaced with the host computer through an EIA standard RS-232-C communications interface. Table 3-1 defines the function of each RS-232-C line, and lists the connector pin numbers.

The communications interface (a cable or modem to the host computer) is connected to the 25-pin RS-232-C connector J1, on the CT 8500 rear panel. Figure 3-1 shows the pin arrangement of connector J1.

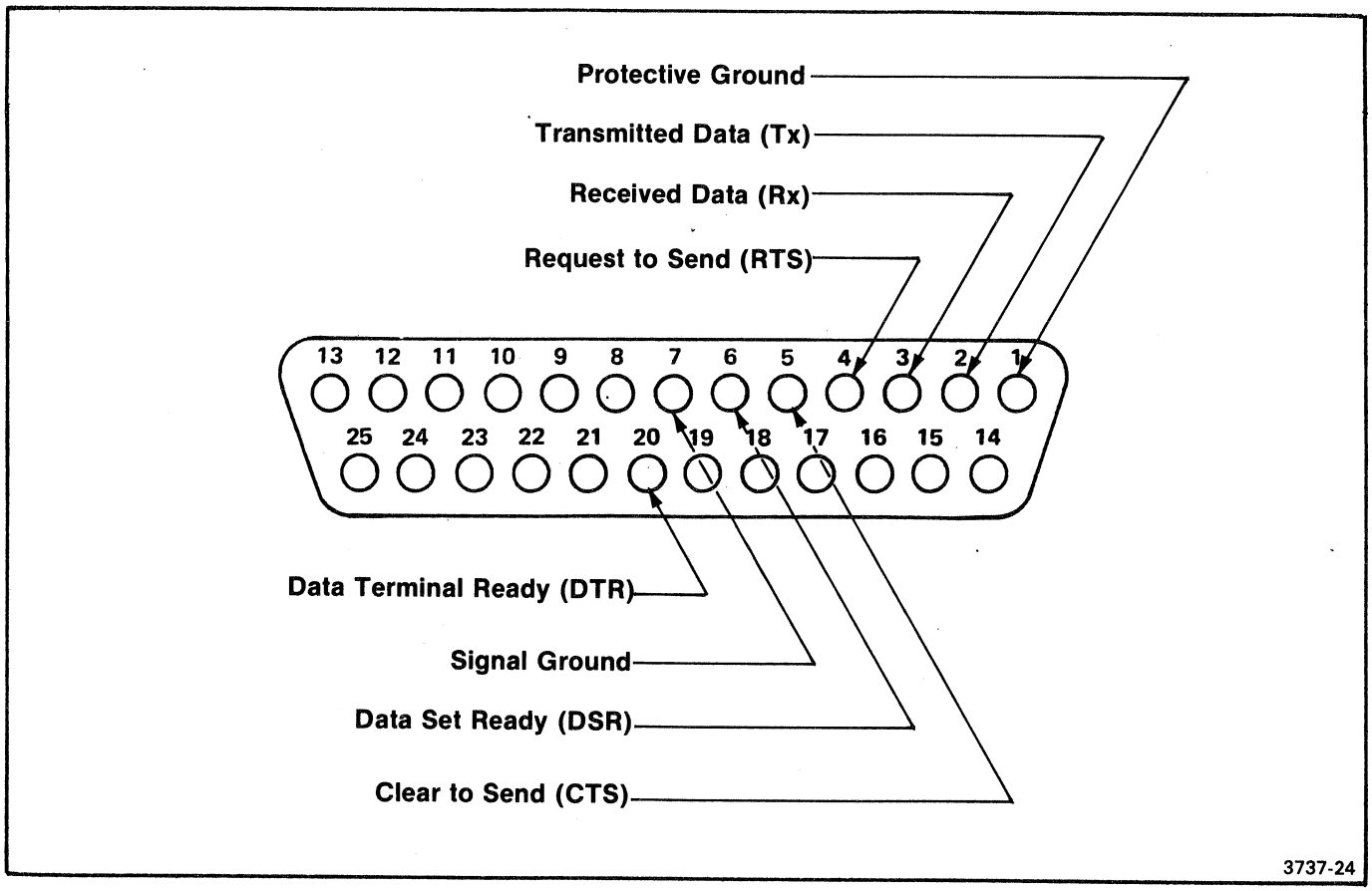


Fig. 3-1. RS-232-C interface connector pin arrangement.

Table 3-1
Communications Interface Signals

Pin	Function	Description
1	Protective Ground	Electrically connected to the equipment frame, which is, in turn, connected to the power system ground through the power cord grounding conductor.
2	Transmitted Data (Tx)	Presents output data to be transmitted to the host. This line is only operative when CTS is high.
3	Received Data (Rx)	Carries input data received from the host. The Rx line is held low when no data is being sent by the host.
4	Request To Send (RTS)	The RTS line is maintained high in all operating modes.
5	Clear To Send (CTS)	This line is held high when data is being transmitted to the host. If not externally connected, CTS should be connected to RTS. If connected to a modem, the modem will assert CTS when connection to the remote device has been verified.
6	Data Set Ready (DSR)	DSR must be high in order for the terminal to transmit data. If not externally connected, DSR should be maintained low. If connected to a modem, the modem will assert DSR when connection to the communication line line is established, and the modem has power and is in data mode.
7	Signal Ground	The common reference (ground potential) for all EIA interchange circuits except protective ground (RS-232-C connector pins 2, 3, 4, 5, 6, and 20).
20	Data Terminal Ready (DTR)	The DTR line is maintained high in all operating modes.

Table 3-2
ASCII-to-Hexadecimal Conversion Chart

B7 B6 B5 / B4 B3 B2 B1	ø ø ø	ø ø 1	ø 1 ø	ø 1 1	1 ø ø	1 ø 1	1 1 ø	1 1 1
	CONTROL		SYMBOLS		UPPERCASE		LOWERCASE	
ø ø ø ø	0 ø NUL	10 16 DLE	20 32 SP	30 48 ø	40 64 @	50 80 P	60 96 `	70 112 p
ø ø ø 1	1 1 SOH	11 17 DC1	21 33 !	31 49 1	41 65 A	51 81 Q	61 97 a	71 113 q
ø ø 1 ø	2 2 STX	12 18 DC2	22 34 "	32 50 2	42 66 B	52 82 R	62 98 b	72 114 r
ø ø 1 1	3 3 ETX	13 19 DC3	23 35 #	33 51 3	43 67 C	53 83 S	63 99 c	73 115 s
ø 1 ø ø	4 4 EOT	14 20 DC4	24 36 $	34 52 4	44 68 D	54 84 T	64 100 d	74 116 t
ø 1 ø 1	5 5 ENQ	15 21 NAK	25 37 %	35 53 5	45 69 E	55 85 U	65 101 e	75 117 u
ø 1 1 ø	6 6 ACK	16 22 SYN	26 38 &	36 54 6	46 70 F	56 86 V	66 102 f	67 118 v
ø 1 1 1	7 7 BEL BELL	17 23 ETB	27 39 '	37 55 7	47 71 G	57 87 W	67 103 g	77 119 w
1 ø ø ø	8 8 BS BACK SPACE	18 24 CAN	28 40 (	38 56 8	48 72 H	58 88 X	68 104 h	78 120 x
1 ø ø 1	9 9 HT	19 25 EM	29 41)	39 57 9	49 73 I	59 89 Y	69 105 i	79 121 y
1 ø 1 ø	A 10 LF	1A 26 SUB	2A 42 *	3A 58 :	4A 74 J	5A 90 Z	6A 106 j	7A 122 z
1 ø 1 1	B 11 VT	1B 27 ESC	2B 43 +	3B 59 ;	4B 75 K	5B 91 [	6B 107 k	7B 123 {
1 1 ø ø	C 12 FF	1C 28 FS	2C 44 ,	3C 60 <	4C 76 L	5C 92 \	6C 108 l	7C 124 ¦
1 1 ø 1	D 13 CR RETURN	1D 29 GS	2D 45 -	3D 61 =	4D 77 M	5D 93]	6D 109 m	7D 125 }
1 1 1 ø	E 14 SO	1E 30 RS	2E 46 .	3E 62 >	4E 78 N	5E 94 ^	6E 110 n	7E 126 ~
1 1 1 1	F 15 SI	1F 31 US	2F 47 /	3F 63 ?	4F 79 O	5F 95 _	6F 111 o	7F 127 DEL RUBOUT

Table 3-3
Numeric Conversion Chart

Decimal	Hexadecimal	Binary 8-bit Code	Decimal	Hexadecimal	Binary 8-bit Code	Decimal	Hexadecimal	Binary 8-bit Code	Decimal	Hexadecimal	Binary 8-bit Code
0	00	0000 0000	64	40	0100 0000	128	80	1000 0000	192	C0	1100 0000
1	01	0000 0001	65	41	0100 0001	129	81	1000 0001	193	C1	1100 0001
2	02	0000 0010	66	42	0100 0010	130	82	1000 0010	194	C2	1100 0010
3	03	0000 0011	67	43	0100 0011	131	83	1000 0011	195	C3	1100 0011
4	04	0000 0100	68	44	0100 0100	132	84	1000 0100	196	C4	1100 0100
5	05	0000 0101	69	45	0100 0101	133	85	1000 0101	197	C5	1100 0101
6	06	0000 0110	70	46	0100 0110	134	86	1000 0110	198	C6	1100 0110
7	07	0000 0111	71	47	0100 0111	135	87	1000 0111	199	C7	1100 0111
8	08	0000 1000	72	48	0100 1000	136	88	1000 1000	200	C8	1100 1000
9	09	0000 1001	73	49	0100 1001	137	89	1000 1001	201	C9	1100 1001
10	0A	0000 1010	74	4A	0100 1010	138	8A	1000 1010	202	CA	1100 1010
11	0B	0000 1011	75	4B	0100 1011	139	8B	1000 1011	203	CB	1100 1011
12	0C	0000 1100	76	4C	0100 1100	140	8C	1000 1100	204	CC	1100 1100
13	0D	0000 1101	77	4D	0100 1101	141	8D	1000 1101	205	CD	1100 1101
14	0E	0000 1110	78	4E	0100 1110	142	8E	1000 1110	206	CE	1100 1110
15	0F	0000 1111	79	4F	0100 1111	143	8F	1000 1111	207	CF	1100 1111
16	10	0001 0000	80	50	0101 0000	144	90	1001 0000	208	D0	1101 0000
17	11	0001 0001	81	51	0101 0001	145	91	1001 0001	209	D1	1101 0001
18	12	0001 0010	82	52	0101 0010	146	92	1001 0010	210	D2	1101 0010
19	13	0001 0011	83	53	0101 0011	147	93	1001 0011	211	D3	1101 0011
20	14	0001 0100	84	54	0101 0100	148	94	1001 0100	212	D4	1101 0100
21	15	0001 0101	85	55	0101 0101	149	95	1001 0101	213	D5	1101 0101
22	16	0001 0110	86	56	0101 0110	150	96	1001 0110	214	D6	1101 0110
23	17	0001 0111	87	57	0101 0111	151	97	1001 0111	215	D7	1101 0111
24	18	0001 1000	88	58	0101 1000	152	98	1001 1000	216	D8	1101 1000
25	19	0001 1001	89	59	0101 1001	153	99	1001 1001	217	D9	1101 1001
26	1A	0001 1010	90	5A	0101 1010	154	9A	1001 1010	218	DA	1101 1010
27	1B	0001 1011	91	5B	0101 1011	155	9B	1001 1011	219	DB	1101 1011
28	1C	0001 1100	92	5C	0101 1100	156	9C	1001 1100	220	DC	1101 1100
29	1D	0001 1101	93	5D	0101 1101	157	9D	1001 1101	221	DD	1101 1101
30	1E	0001 1110	94	5E	0101 1110	158	9E	1001 1110	222	DE	1101 1110
31	1F	0001 1111	95	5F	0101 1111	159	9F	1001 1111	223	DF	1101 1111
32	20	0010 0000	96	60	0110 0000	160	A0	1010 0000	224	E0	1110 0000
33	21	0010 0001	97	61	0110 0001	161	A1	1010 0001	225	E1	1110 0001
34	22	0010 0010	98	62	0110 0010	162	A2	1010 0010	226	E2	1110 0010
35	23	0010 0011	99	63	0110 0011	163	A3	1010 0011	227	E3	1110 0011
36	24	0010 0100	100	64	0110 0100	164	A4	1010 0100	228	E4	1110 0100
37	25	0010 0101	101	65	0110 0101	165	A5	1010 0101	229	E5	1110 0101
38	26	0010 0110	102	66	0110 0110	166	A6	1010 0110	230	E6	1110 0110
39	27	0010 0111	103	67	0110 0111	167	A7	1010 0111	231	E7	1110 0111
40	28	0010 1000	104	68	0110 1000	168	A8	1010 1000	232	E8	1110 1000
41	29	0010 1001	105	69	0110 1001	169	A9	1010 1001	233	E9	1110 1001
42	2A	0010 1010	106	6A	0110 1010	170	AA	1010 1010	234	EA	1110 1010
43	2B	0010 1011	107	6B	0110 1011	171	AB	1010 1011	235	EB	1110 1011
44	2C	0010 1100	108	6C	0110 1100	172	AC	1010 1100	236	EC	1110 1100
45	2D	0010 1101	109	6D	0110 1101	173	AD	1010 1101	237	ED	1110 1101
46	2E	0010 1110	110	6E	0110 1110	174	AE	1010 1110	238	EE	1110 1110
47	2F	0010 1111	111	6F	0110 1111	175	AF	1010 1111	239	EF	1110 1111
48	30	0011 0000	112	70	0111 0000	176	B0	1011 0000	240	F0	1111 0000
49	31	0011 0001	113	71	0111 0001	177	B1	1011 0001	241	F1	1111 0001
50	32	0011 0010	114	72	0111 0010	178	B2	1011 0010	242	F2	1111 0010
51	33	0011 0011	115	73	0111 0011	179	B3	1011 0011	243	F3	1111 0011
52	34	0011 0100	116	74	0111 0100	180	B4	1011 0100	244	F4	1111 0100
53	35	0011 0101	117	75	0111 0101	181	B5	1011 0101	245	F5	1111 0101
54	36	0011 0110	118	76	0111 0110	182	B6	1011 0110	246	F6	1111 0110
55	37	0011 0111	119	77	0111 0111	183	B7	1011 0111	247	F7	1111 0111
56	38	0011 1000	120	78	0111 1000	184	B8	1011 1000	248	F8	1111 1000
57	39	0011 1001	121	79	0111 1001	185	B9	1011 1001	249	F9	1111 1001
58	3A	0011 1010	122	7A	0111 1010	186	BA	1011 1010	250	FA	1111 1010
59	3B	0011 1011	123	7B	0111 1011	187	BB	1011 1011	251	FB	1111 1011
60	3C	0011 1100	124	7C	0111 1100	188	BC	1011 1100	252	FC	1111 1100
61	3D	0011 1101	125	7D	0111 1101	189	BD	1011 1101	253	FD	1111 1101
62	3E	0011 1110	126	7E	0111 1110	190	BE	1011 1110	254	FE	1111 1110
63	3F	0011 1111	127	7F	0111 1111	191	BF	1011 1111	255	FF	1111 1111

Table 3-4
Remote Commands

Function	Code Sequence	Function	Code Sequence
Transmit Line	1B + 01	Enter Monitor Mode	1B + 3B
Transmit Page	1B + 02	Exit Monitor Mode	1B + 3C
Clear Screen	1B + 04	Enter Host Control Mode	1B + 3D
Clear All	1B + 05	Enter Power-Up Mode	1B + 5D
Tab Forward	09	Enter Local Mode	1B + 5F
Tab Back	1B + 09	Learn Mode Status	1B + 38
Set Column Tab	1B + 61	Enter Learn Mode	1B + 39
Clear Column Tab	1B + 62	Exit Learn Mode	1B + 3A
Insert Line	1B + 0C	Split Screen	1B + 3E
Delete Line	1B + 0D	Screen Alignment Test	1B + 3F
Erase to End of Line	1B + 14	Scroll Down	1B + 41
Erase to End of Page	1B + 15	Scroll Up	1B + 42
Insert Character	1B + 1C	Page Down	1B + 44
Delete Character	1B + 1D	Page Up	1B + 45
Stop Attribute	1B + 20	Page One	1B + 59
Begin Underline Attribute	1B + 21	Page Two	1B + 79
Begin Blink Attribute	1B + 22	Cursor Left	1B + 50
Begin Blink and Underline	1B + 23	Cursor Down	1B + 51
Begin Inverse Attribute	1B + 24	Cursor Up	1B + 52
Begin Blank Attribute	1B + 25	Cursor Right	1B + 53
Begin Blink and Inverse	1B + 26	Cursor Home	1B + 54
Begin Reduce Attribute	1B + 28	Cursor On	1B + 5A
Begin Reduce and Underline	1B + 29	Cursor Off	1B + 5B
Begin Blink and Reduce	1B + 2A	Load Cursor Address	1B + 7C
Begin Blink, Reduce, and Underline Attribute	1B + 2B	Read Cursor Address	1B + 7D
Begin Inverse and Reduce	1B + 2C	Read Top Line Address	1B + 69
Begin Blink, Reduce, and Inverse Attribute	1B + 2E	Keyboard Lock	1B + 6A
		Keyboard Unlock	1B + 6B

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Date: 3-23-81 Change Reference: C10/381

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