AT&T

AT&T

Terminal User's Guide
5620 Dot Mapped
Display Terminal

Terminal User's Guide

5620 Dot Mapped

Display Terminal

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FCC WARNING STATEMENT

This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

If you are connecting a Firmware Version 8;7;5 Terminal to a Host CPU Running Version 1.1 or 1.2, 5620 Software, see "Operational Hints" in Section 5. You must create the file described in the second paragraph to run the "layers" windowing program on that terminal.

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1. Introduction

General

The 5620 Dot-Mapped Display (DMD) Terminal is a display based terminal designed to be an all purpose terminal for UNIX* System V based computer systems. The terminal can be used as an alphanumeric and graphic display terminal for desk top work.

The 5620 Terminal communicates asynchronously with its associated UNIX System on a point-to-point private line or switched network. The terminal requires the use of a data source and communicates with it through an EIA RS-232-C interface. The line speed for the interface is selectable for 300, 1200, 2400, 4800, 9600 or 19200 baud.

The 5620 Terminal consists of a display module with CPU based control electronics and power supply, a keyboard and a mouse. The display module is a high resolution, full graphics display with "windowing." The mouse is a special cursor control device external to the keyboard. It is used to point at and select displayed information in addition to the manipulation of graphics and text. The hand-held mouse sends its relative position and the selection of one of three software definable buttons to the display as it is moved over a desk top or any other flat surface.

The hardware devices for the terminal provide the input-output interface, display, and communication functions.
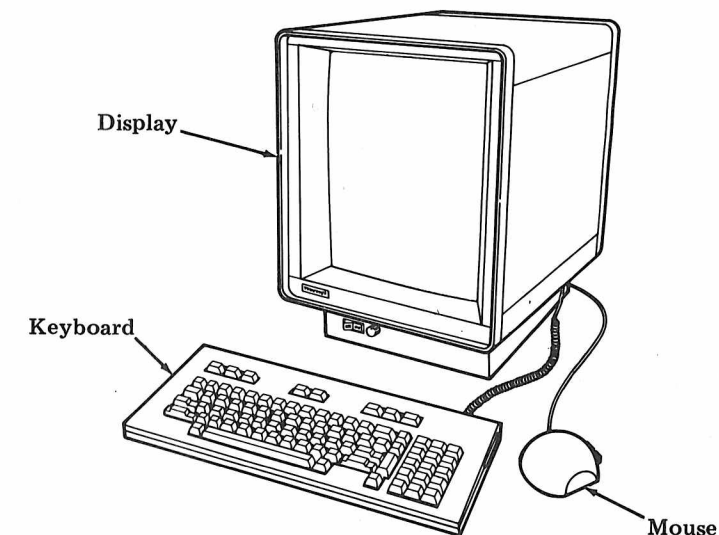
Figure 1-1. 5620 Dot Mapped Display Terminal

*Trademark of AT&T Bell Laboratories.

Summary of Features

Terminal Features

- Dot mapped display offers full graphics capability
- 800 dots per scan line (X axis)
- 1024 scan lines (Y axis)
- Display has 100 dot per inch resolution
- 15" diagonal CRT monitor with 8" by 10.24" visible screen area
- Detached low profile keyboard
- Keyboard audible alarm
- Dual port memory with transparent refresh
- 256K or 1M bytes RAM for screen image and programs
- Battery backed memory for storing options and other nonvolatile information
- Microprocessor based control electronics
- Operator accessible ac switch and brightness control
- Nonglare screen
- Green phosphor
- 115V 48 to 62 Hz power or 220V 48 to 62 Hz power (option)
- Power up into Interactive mode for logging on and requesting programs to be downloaded
- 300 to 19200 baud asynchronous EIA RS-232-C interface, keyboard selectable
- Auxiliary printer port with RS-232-C interface

Software Features

- All purpose intelligent terminal — can emulate other terminals
- Overlapping windows — each a different terminal
- Applications for the 5620 include:
  - software development
  - data inquiry/retrieval
  - engineering and scientific
  - systems monitoring and control
  - computer aided design
  - viewing typeset copy prior to hard copy output

Application Features

- Character matrix variable under program control, default is 7 by 9
- Character field variable under program control, default is 9 by 14
- Cursor functions variable under program control
- Edit functions variable under program control, compatible with UNIX *vi* editor in Default mode
- Display operations characterized by downloaded programs
- Downloaded programs interact with UNIX computer programs
- Display operates as single display (stand-alone), multiple virtual displays (Layers mode) or in the resident terminal mode (the mode when the terminal is first turned on.)

Technical Data

Display and Controller Combined Weight 59 lbs

AC Power Switch

Brightness Control

Keyboard Weight 3-1/4 lbs

13"

15"

18"

17"

16-1/2"

7"

30mm (1-1/2")
Low Profile

Height 1.8"
Width 2.9"
Depth 3.5"
Weight 9 oz.
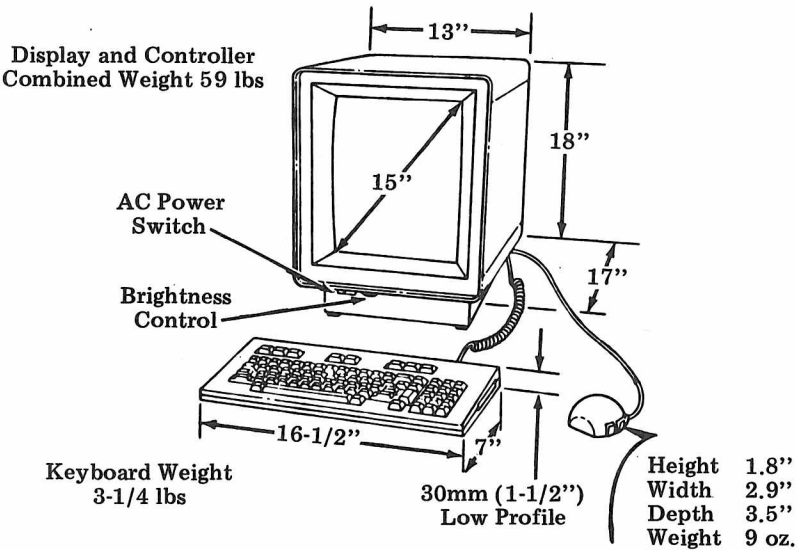
Figure 1-2. Dimensions and Weights

Environmental Requirements

Temperature
Storage -40° C to +65° C
Operating +4.5° C to 38° C

Relative Humidity
5% to 95% noncondensing between +4.5° C to 43° C

Altitude
Shipping   Sea Level to 50,000 feet
Storage   Sea Level to 10,000 feet
Operating   Sea Level to 10,000 feet

FCC Compliance

Complies with FCC regulation for Class A devices, Part 15, Subpart J.

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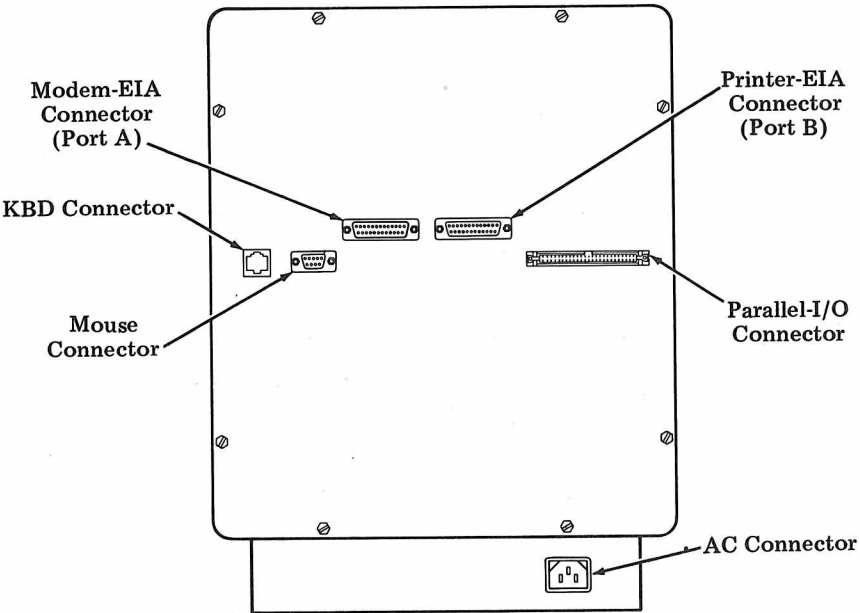
Figure 1-3. 5620 Display (Rear View)

UL and CSA Compliance

Complies with the Underwriters Laboratory Specification 478 and the Canadian Standards Association Specification C22.2 No. 154 (Option).

Electrical Requirements

Domestic

104 Vac to 127 Vac, 48 to 62 Hz at 1.5 Amperes
Power consumption 109 Watts
Initial ac surge — less than 40 amps over 1/2 cycle
AC Power Cord — 7 ft. 6 inches — furnished with set

One end has a standard 3-prong, grounded connector (NEMA 5-15T) for standard 115 Vac wall receptacle. Other end is a right-angle, 3-blade receptacle (mates with IEC 320-type connector) which attaches to the display.

International (Optional)

198 Vac to 242 Vac, 48 to 62 Hz at 0.8 Amperes
Power Consumption 133 Watts
Initial ac surge — less than 40 amps over 1/2 cycle
AC Power Cord — less connector

Check specific countries' rules and regulations for EMF standards.

VDE Compliance (Optional)

The display module complies with VDE 0805 (IEC 435), VDE 0806 (IEC 380) safety requirements and VDE 0871 Class B emission limits.

Interfaces

The 5620 Terminal has two EIA RS-232-C type serial data interface ports for connecting to a modem or other transmission medium, and for connecting to an optional auxiliary EIA device.

The RS-232-C I/O signals levels are:

Table 1-A. EIA Signal Levels

EIA (RS-232)	
State0(space)/On	+5 to +12 Vdc
State1(mark)/Off	-5 to -12 Vdc

Table 1-B. Modem Port Interface

Pin No.	5620	Modem	Description
1			Protective Ground
2			Send Data
3			Receive Data
5			Clear to Send
6			Data Set Ready
7			Signal Ground
8			Data Carrier Detect
9			+12 Vdc
10			-12 Vdc
14			+ 5 Vdc
20			Data Terminal Ready
4			Request to Send

Warning: Damage may result from improper connection to the MODEM connector. The signals on pins 9 (+12 volts), 10 (-12 volts), and 14 (+5 volts) do not meet the current limit requirements of Section 2.6 of EIA Standard RS-232-C. The signals on these pins should not be connected to any other device. This can be accomplished by using an interconnecting cable which does not connect these pins between the two ends. The following cables, available from AT&T, meet this requirement and are compatible with this terminal: 413600 (7 Ft), 413601 (12 Ft), 413602 (25 Ft) and 413603 (50 Ft).

Table 1-C. Printer EIA Interface

Pin No.	5620	Aux	Description
1	→		Protective Ground
3	→		Aux Send Data
6	→		Aux Data Set Ready
7	←		Signal Ground

Table 1-D. Mouse Interface

Pin No.	5620	Mouse	Description
1	→		+5 Vdc
2	←		Y2
3	←		Y1
4	←		X2
5	←		X1
6	→		Ground
7	←		Middle Switch
8	←		Right Switch
9	←		Left Switch

The mouse with cable is equipped with a male connector.

Parallel I/O Interface

The 5620 Terminal provides a 50 pin I/O port supporting an 8 bit bidirectional parallel data interface, a 5 bit parallel address interface and a number of control functions. Signal levels are 0.0 Vdc to 0.8 Vdc (ON) and 2.4 Vdc to 5.0 Vdc (OFF).

Table 1-E. Parallel I/O Interface

Pin No.	5620	Device	Designation	Description
2	→		STROBE0	WRITE STROBE
4	←		INT1	INTERRUPT
6	←		INT2	INTERRUPT
8	←		TIME	WAIT FOR DEVICE SYNC.
10	→		ADDR041	
12	→		ADDR031	5 BIT PARALLEL
14	→		ADDR021	ADDRESS
16	→		ADDR011	
18	→		ADDR001	
20	→		PIOWEN0	WRITE ENABLE
22	→		PIOEN0	PORT ENABLE
24	→		PIORST	RESET
26	←		PIOD0	
28	→		PIOD1	
30	←		PIOD2	
32	←		PIOD3	
34	→		PIOD4	8 BIT BIDIRECTIONAL
36	←		PIOD5	PARALLEL DATA
38	←		PIOD6	
40	←		PIOD7	
42	→		-12 Vdc	
44	→		+12 Vdc	
46	→		+12 Vdc	
48	→		+ 5 Vdc	
49	←		PORT ENABLE	DEVICE READY TO 5620
50	→		+ 5 Vdc	

Note: Odd numbered pins 1 through 47 at ground potential.

EIA Interface Connection

Modem EIA Connection:

    The connecting cables between the terminal and the modem must be furnished by the installer and should employ shielded cable. The following cables are available from AT&T:

Cable	Part Number	COMCODE	Price Element Code
7 foot length	413600	524-136-009	2724-08G
12 foot length	413601	524-136-017	2724-08L
25 foot length	413602	524-136-025	2724-08S
50 foot length	413603	524-136-033	2724-08V

    The connection to the modem and telephone (if present) should be made following the instructions for the particular modem involved.
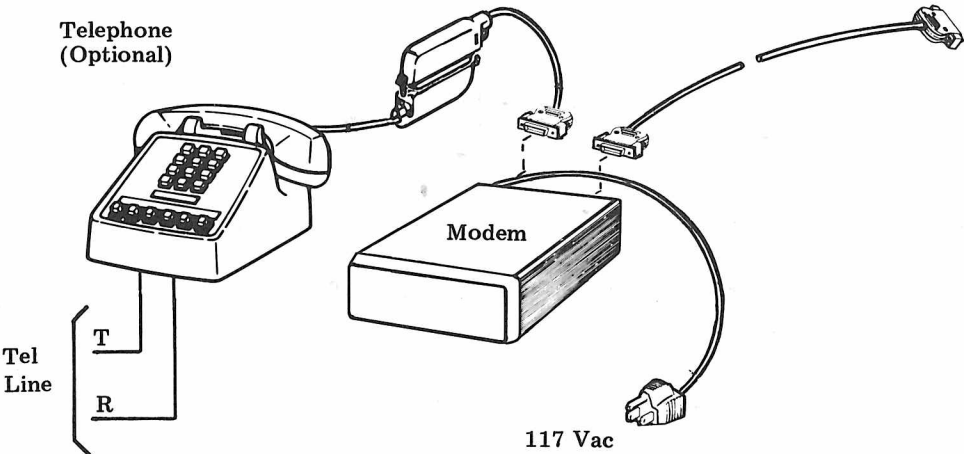
Figure 1-4. Modem Connection

Printer EIA Connection:

    The connecting cables between the terminal and the aux printer must be furnished by the installer and should employ shielded cable.

    The AT&T 5310 and 5320 used as an auxiliary printer requires a female-male cable. The following cables are available from AT&T for the 5310 and 5320:

Cable	Part Number	COMCODE	Price Element Code
7 foot length	413600	524-136-009	2724-08G
12 foot length	413601	524-136-017	2724-08L
25 foot length	413602	524-136-025	2724-08S
50 foot length	413603	524-136-033	2724-08V

    The AT&T 475 and the Hewlett Packard 2225 printers require a male-male cable. The following cables are available from AT&T for the 475 and HP 2225:

Cable	Part Number	COMCODE	Price Element Code
7 foot length	416174	524-161-742	2724-14G
12 foot length	416175	524-161-759	2724-14L
25 foot length	416176	524-161-767	2724-14S
50 foot length	416177	524-161-775	2724-14V

5620 Terminal Direct Connection to AT&T 3B2

    The 5620 Terminal is directly connected to the 3B2 host through use of the following cables and connector. These items do not have an AT&T Teletype Corporation part number.

Cable	COMCODE	Price Element Code
7 foot length	403-600-968	2725-16G
14 foot length	403-600-976	2725-16N
25 foot length	403-600-984	2725-16S
50 foot length	403-600-992	2725-16V

3B2 Connector	COMCODE	Price Element Code
Female Terminal/Printer	403-417-512	2750-C12

5620 Terminal Direct Connection to 3B5, 3B20, VAX 11/780 and VAX 11/750

The 5620 Terminal may be connected to the 3B5, 3B20s, VAX 11/750, and VAX 11/780 computers through the use of the following cables:

3B5/3B20 EIA Cables	Part Number	COMCODE	Price Element Code
7 foot length	456744	524-567-443	2724-88G
14 foot length	456745	524-567-450	2724-88L
25 foot length	456746	524-567-468	2724-88S
50 foot length	456747	524-567-476	2724-88V

2. Installation

Unpacking

Select an area to unpack the carton so that the display will not be damaged.

Note: Observe all caution notes printed on the carton.

Caution: To avoid condensation on the electrical components, the components should be allowed to assume room temperature before unpacking. This is especially important when the boxes are brought into a warm humid room from outside subzero temperature.

When unpacking, be sure to wear approved safety glasses.

1. Remove container that houses keyboard. Place keyboard container aside.

2. Remove manuals, cables and mouse container from top packing detail.

3. Remove large packing detail.

Warning: The display weighs 59 pounds; two people may be required to lift display out of the container.

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4.   Remove display from bottom detail.

   a.   Grasp side of display and lift display out of box.

   b.   Position display on floor in an upright position. **Do not** place display face down.

Early Design   Late Design
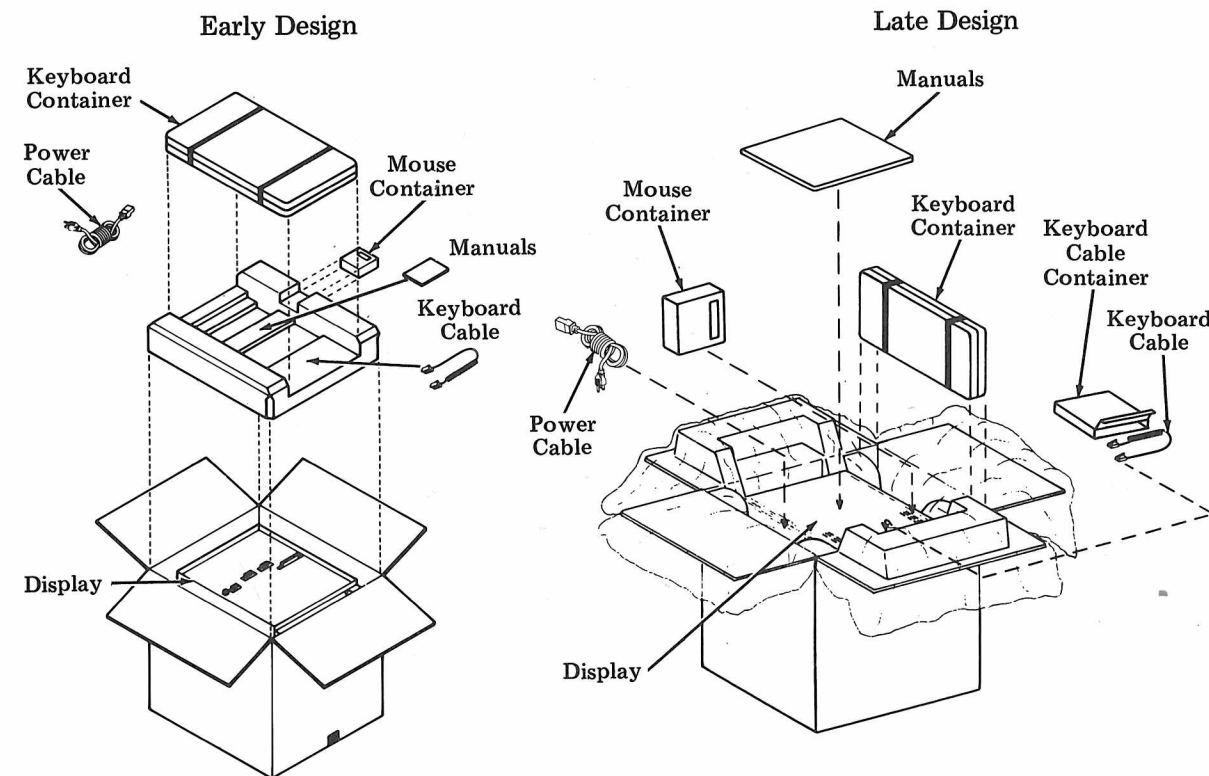
Figure 2-1. Packing Details

5.   Remove tape and unroll ac cord.
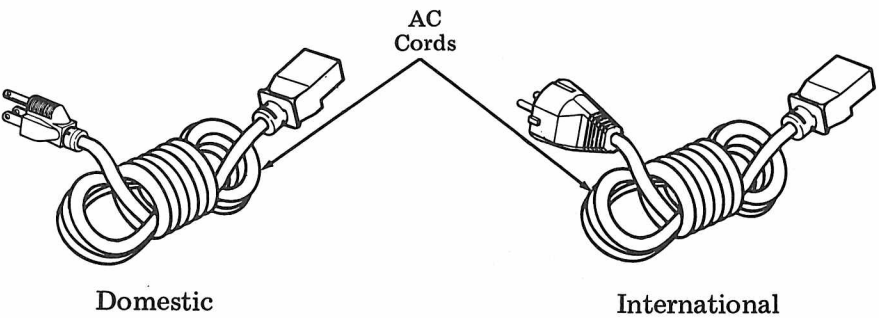
Figure 2-2. Power Cord

6.   Remove tape and string material from keyboard cable.

7.   Unpack the keyboard.

   a.   Open container by cutting or removing tape.

   b.   Separate styrofoam container and remove keyboard.

   c.   The keyboard is covered with a plastic bag (not shown in illustration); remove it.

   d.   It is advisable to save all packing materials.
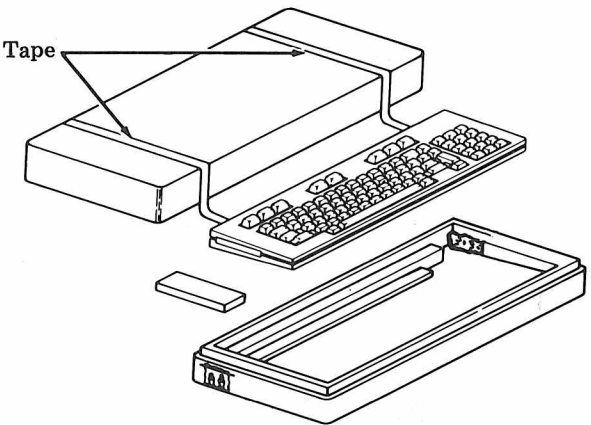
Figure 2-3. Keyboard Packing Details

8.   Unpack the mouse.

   • Open container and remove mouse with cable.

Early Design:

   • Remove packing detail.
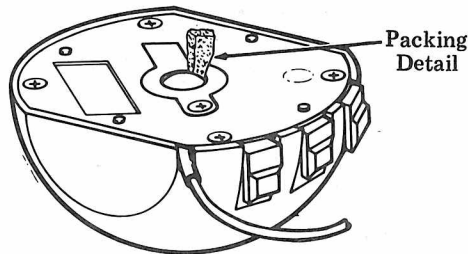
Figure 2-4. Mouse (Early Design)

Late Design:

   a.   Remove access door on bottom of mouse assembly.

   b.   Insert roller ball.

   c.   Assemble access door and secure with retaining screw. (Do
        not overtighten retaining screw.)
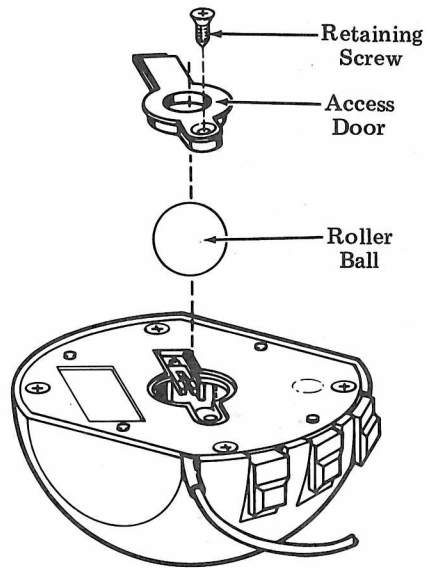
Figure 2-5. Mouse (Late Design)

Assembly

   1.   Position display on a table or desk.
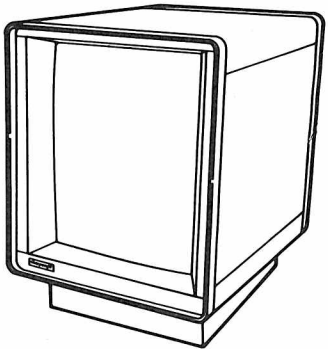
Figure 2-6. Display

   2.   Lay keyboard upside down near display.

   3.   Insert keyboard cable connector into receptacle in keyboard. Then,
        depress cable into cable keeper.
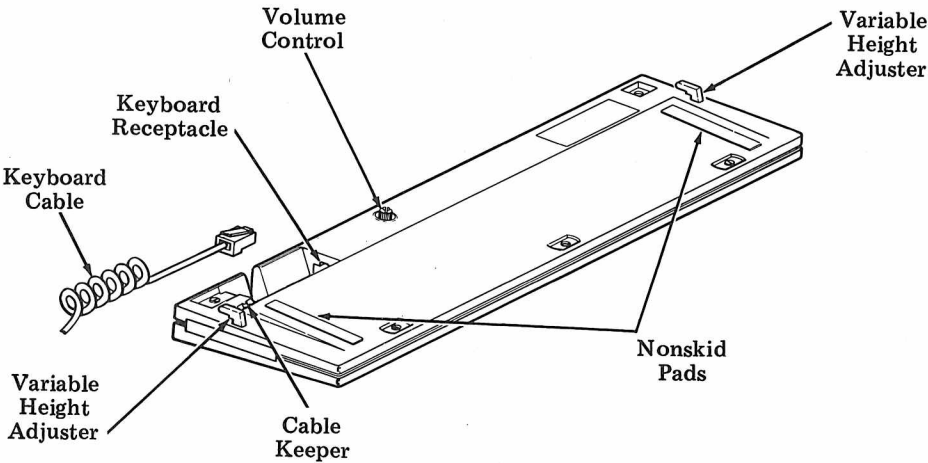
Figure 2-7. Keyboard Assembly

   4.   Turn keyboard over.

   5.   Adjust height of keyboard if desired.

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6. Connect other end of keyboard cable to keyboard connector at rear of display.

7. Connect mouse cable to mouse connector at rear of display. Secure cable with captive screws (if present).

8. Connect female end of power cord to ac connector at rear of display.
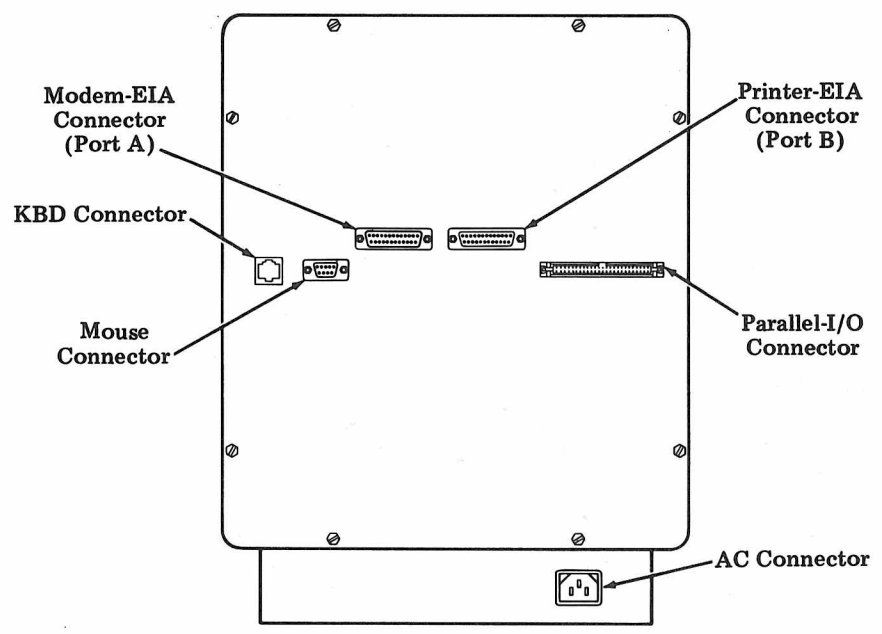
Figure 2-8. Display Connections (Rear View)

9. Connect female end of modem cable into modem connector on back of display. Secure cable with captive screws (if present).

10. Connect opposite end of cable to modem or other RS-232-C signal source. Secure cable with captive screws.
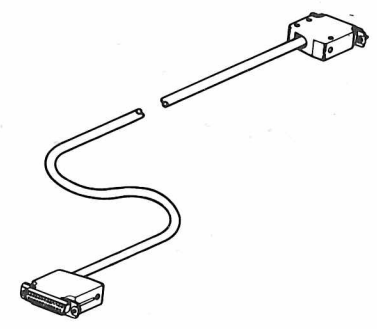
Figure 2-9. EIA Cable

11. Insert male end of cord into an ac outlet (or power source).
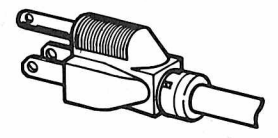
Figure 2-10. Power Cord Plug

Place all packing materials in display box. If needed, packing containers can be saved and used for reshipment.

Checkout Procedures

Operate power switch to ON.

The display brightness control is an adjustable knob located to the lower left of the display. Clockwise rotation of the knob increases brightness, counterclockwise rotation causes a decrease.

Note: The brightness control can be turned down so low that the terminal will appear to be turned off.
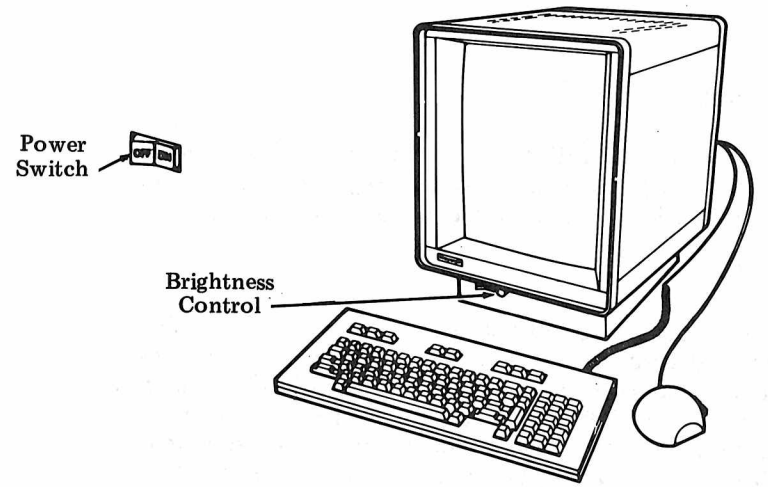
Figure 2-11. Power Switch and Brightness Control
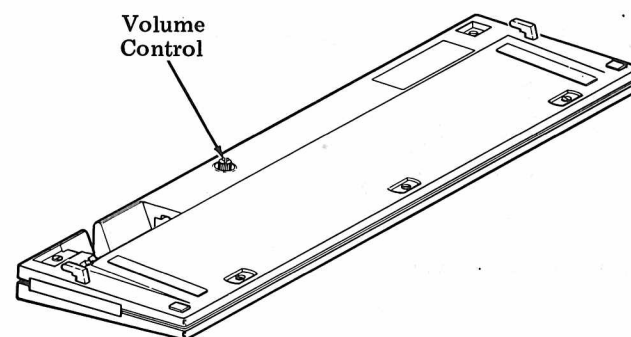
Figure 2-12. Volume Control

Adjust volume control knob on keyboard to desired keytone sound.

Firmware Versions — 8;7;3 vs. 8;7;5

There are different versions of firmware for the 5620 Terminal, and the diagnostic tests for each version vary slightly. From resident mode, by simultaneously pressing the SHIFT and SETUP keys, the 5620 will go through self-test and display the firmware version.

The following sections describe the self-test for the 8;7;3 and 8;7;5 versions of the firmware.

Diagnostic Tests (Version 8;7;3)

There are two firmware resident diagnostic tests for the 5620 Dot Mapped Display Terminal: automatic self-test and keyboard requested self-test. The following discussion applies to version 8;7;3 terminals.

- Automatic Self-Test

  Upon power-up, automatic self-test is performed to check the basic sanity of the hardware. A successful automatic self-test causes the following tests to be performed and their corresponding messages to be displayed in the upper left corner of the monitor: "ROM TEST" while verifying the correct ROM checksum (2 to 3 seconds), "RAM TEST" while testing each dynamic RAM location (2 to 8 seconds), "NONVOLATILE MEMORY TEST" while testing each CMOS RAM location (1 second), "I/O TEST" while testing the internal I/O hardware (6 seconds), "WAITING FOR KEYBOARD STATUS" while checking for the presence of a keyboard (2 to 3 seconds). Note that the self-test will fail and the terminal will not initialize if a keyboard is not attached to the display.

  If a "hard" error is detected in any part of the self-test, the program continues to execute the test that detected the error, and it is necessary to power off the terminal to reset. If the terminal passes automatic self-test, it will be initialized to normal operating mode and the cursor will appear in the home position, indicating a successful self-test.

Automatic self-test requires approximately 10-15 seconds for completion.

- Keyboard Requested Self-Test

  The user may invoke keyboard requested self-test by simultaneously depressing SHIFT and SETUP.

  Keyboard requested self-test operates similar to automatic self-test. In addition to the tests listed above the following tests are performed: "MOUSE TEST," an interactive test of the mouse (terminated when the user presses the RETURN key), and "KEYBOARD TEST," an interactive typing test (terminated when the user presses the RETURN key again). During MOUSE TEST, a "+" is displayed at the current mouse location and tracks the mouse as it is moved, and depressed mouse buttons are indicated by the words LEFT, MIDDLE, and RIGHT. During Keyboard Test all characters typed are displayed, and extended characters are underlined. Carriage Return exits the Keyboard Test.

  During keyboard requested self-test, the following message is displayed in the middle of the screen:

  KEYBOARD REQUESTED SELF-TEST

  COPYRIGHT 1983 TELETYPE CORPORATION
  TERMINAL VERSION NUMBER: 8;7;3
  1ST AVAILABLE MEMORY ADDRESS: 0x724104

 Errors are treated as described above for automatic self-test. If the terminal passes keyboard requested self-test, it will be initialized to Resident Terminal mode and the cursor will appear in the home position, indicating a successful self-test.

Diagnostic Tests (Version 8;7;5)

There are two firmware resident diagnostic tests for the 5620 Dot Mapped Display Terminal: automatic self-test and keyboard requested self-test. The following discussion applies to version 8;7;5 terminals.

- Automatic Self-Test

  Upon power-up, automatic self-test is performed to check the basic sanity of the hardware. A successful automatic self-test causes the following tests to be performed and their corresponding messages to be displayed in the upper left corner of the monitor: "ROM TEST" while verifying the correct ROM checksum (2 to 5 seconds), "SHORT RAM TEST" while testing the dynamic RAM leads (1 to 2 seconds), "WAITING FOR KEYBOARD STATUS" while checking for the presence of a keyboard (2 to 3 seconds). Note that the self-test will fail and the terminal will not initialize if a keyboard is not attached to the display.

If a "hard" error is detected in any part of the self-test, the program continues to execute the test that detected the error, and it is necessary to power off the terminal to reset. If the terminal passes automatic self-test, it will be initialized to Resident Terminal mode and the cursor will appear in the home position, indicating a successful self-test.

Automatic self-test requires approximately 5 seconds for completion.

• Keyboard Requested Self-Test

The user may invoke keyboard requested self-test by simultaneously depressing SHIFT and SETUP while in Resident Terminal mode.

Keyboard requested self-test operates similar to automatic self-test. After "ROM TEST" and "SHORT RAM TEST" the following tests are performed: "RAM TEST," a test of each dynamic RAM location (2 to 8 seconds), "NONVOLATILE MEMORY TEST" a test of each CMOS RAM location (1 second), "I/O TEST" a test of the internal I/O hardware (6 seconds), "MOUSE TEST," an interactive test of the mouse (terminated when the user presses the RETURN key), and "KEYBOARD TEST," an interactive typing test (terminated when the user presses the RETURN key again). During MOUSE TEST, a "+" is displayed at the current mouse location and tracks the mouse as it is moved, and depressed mouse buttons are indicated by the words LEFT, MIDDLE, and RIGHT. During Keyboard Test all characters typed are displayed, and extended characters are underlined. Carriage Return exits the Keyboard Test.

During keyboard requested self-test, the following message is displayed in the middle of the screen:

KEYBOARD REQUESTED SELF-TEST

COPYRIGHT 1983 TELETYPE CORPORATION
TERMINAL VERSION NUMBER: 8;7;5
VERSION DATE: DEC. 17, 1984
1ST AVAILABLE MEMORY ADDRESS: 0x71EE80
MEMORY SIZE: 256K*

* or 1M if the terminal is equipped with one megabyte of RAM.

Errors are treated as described above for automatic self-test. If the terminal passes keyboard requested self-test, it will be initialized to Resident Terminal mode and the cursor will appear in the home position, indicating a successful self-test.

3. How to Operate

Display Operation

• Operate power switch to ON.

• Adjust brightness control to a comfortable level.

• Upon power up, automatic self-test will be performed.

Keyboard Operation

The keys are arranged as on a regular typewriter. An external fifteen key numeric pad is positioned to the right of the keyboard. Eight Programmable Function (PF) keys are aligned across the top of the keyboard.
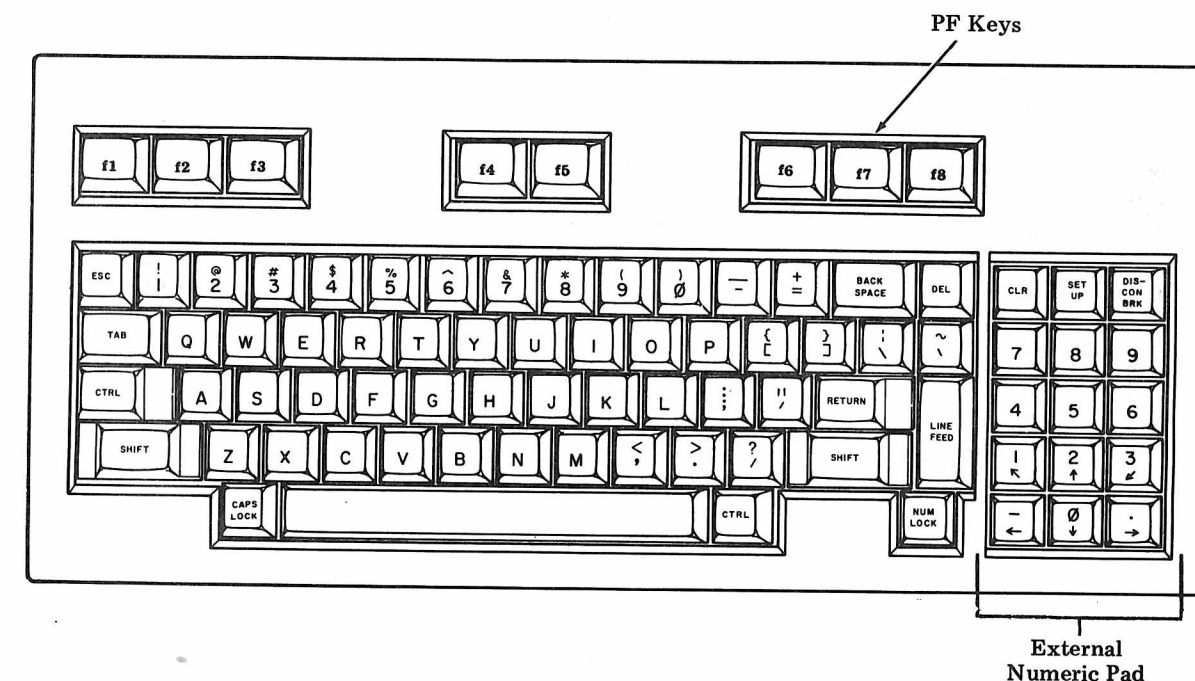
Figure 3-1. Keyboard Layout

Many actions not on the keys themselves can be obtained by dual depression of keys. This guide explains key action and dual depression actions available to the operator.

Repeat

Each key in the general keyboard and the external pad may be made to repeat by depressing that key for one or more seconds. Limitations on the use of a repeatable key appear in the description of that key.

Figure 3-2. Repeatable Keys

The exceptions to repeat are those keys shown below; none of these keys will repeat.
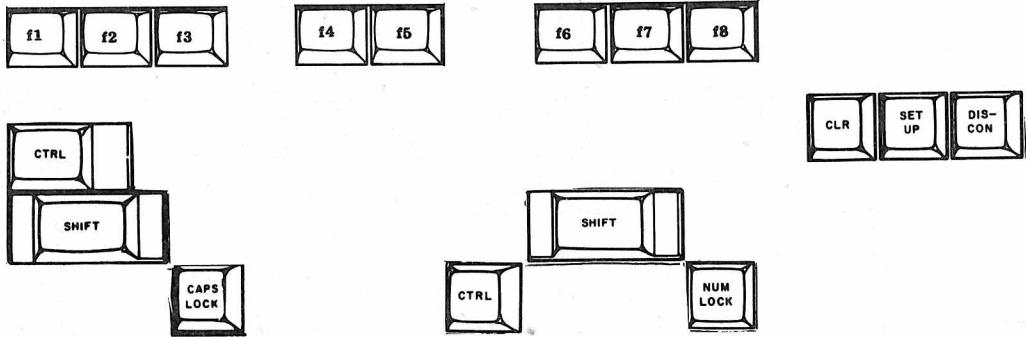
Figure 3-3. Nonrepeatable Keys

CAPS LOCK and NUM LOCK Off

When neither "CAPS LOCK" (or "CAPS") or "NUM LOCK" (or "NUM") is displayed, the keyboard is enabled for lowercase character entry as shown below. The external pad is set for cursor controls. The keys shown without a symbol above the key illustration are described later in this document as "Action Keys."
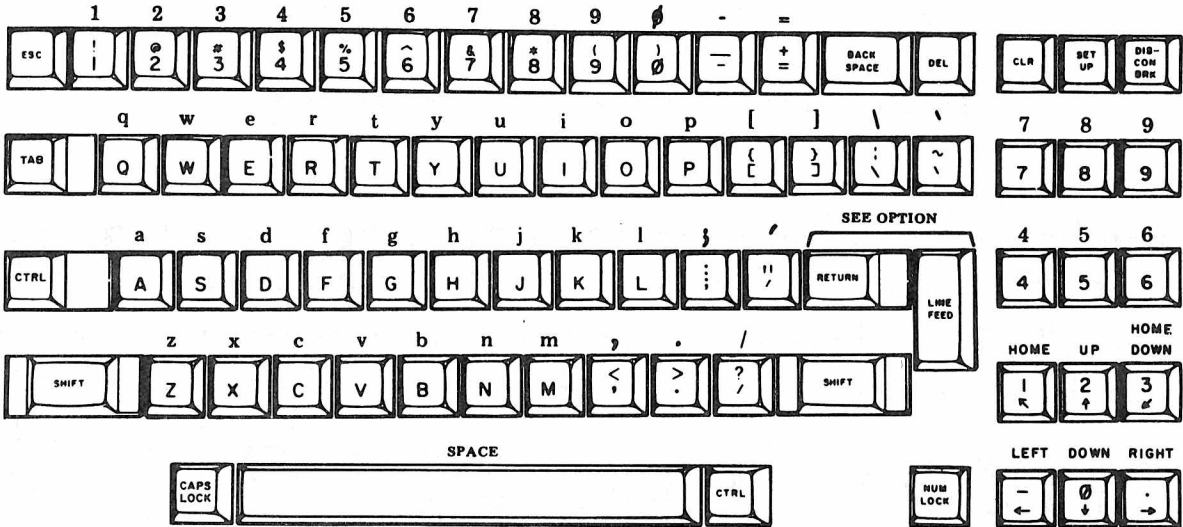
Figure 3-4. Characters Generated With CAPS LOCK and NUM LOCK Off

Depression of CAPS LOCK, NUM LOCK, SHIFT and CTRL changes the characters generated by each key. The changes caused by these keys are shown in the next few pages.

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CAPS LOCK On

The keyboard can be made to generate uppercase alpha (capital letters) by depressing the CAPS LOCK key. The abbreviation "CAPS LOCK" (or "CAPS") will appear on the bottom of the display. The "CAPS LOCK" is just a reminder of the keyboard status. It indicates that a capital letter will be transmitted after each key depression. This indication only appears in resident mode or while in Setup under Layers mode. A second depression of the CAPS LOCK key removes the reminder abbreviation "CAPS LOCK" (or "CAPS") from the display and turns CAPS LOCK off. The CAPS LOCK key does not send a character.

NUM LOCK On

When the NUM LOCK key is depressed, the abbreviation "NUM LOCK" or "NUM" appears in the reminder area. With "NUM LOCK" displayed, all the numeric keys in the external pad are active. A second depression of "NUM LOCK" removes "NUM LOCK" from the display and the external pad may be used for cursor control. This indication only appears in resident mode or while in Setup under Layers mode. The NUM LOCK key does not send a character.

Figure 3-5. Characters Generated With CAPS LOCK On
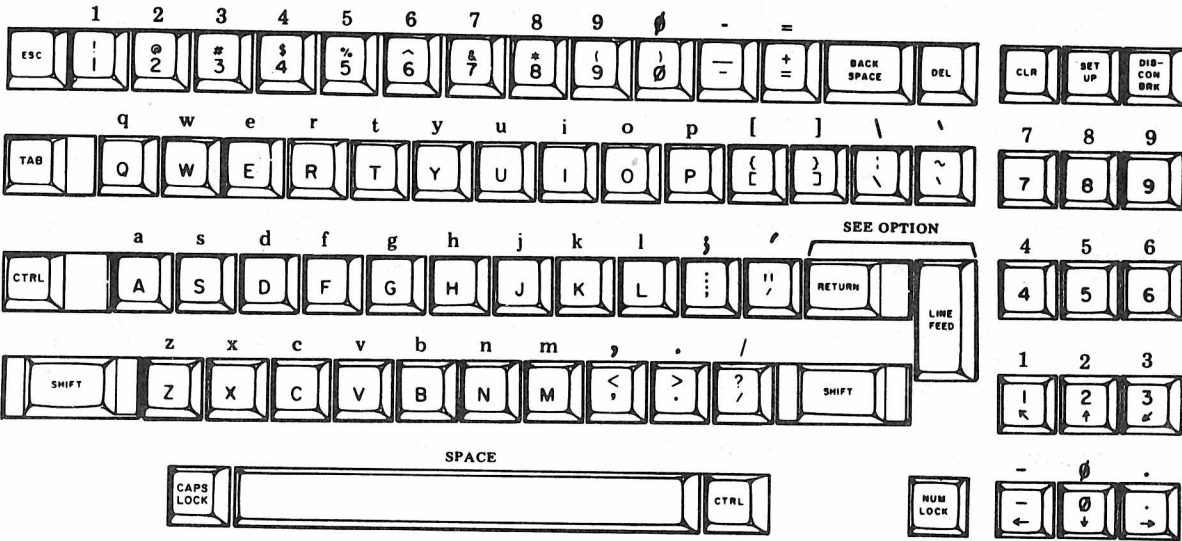
Figure 3-6. Characters Generated With NUM LOCK On

CAPS LOCK and NUM LOCK On

With both "CAPS LOCK" and "NUM LOCK" depressed the keys are active as shown.
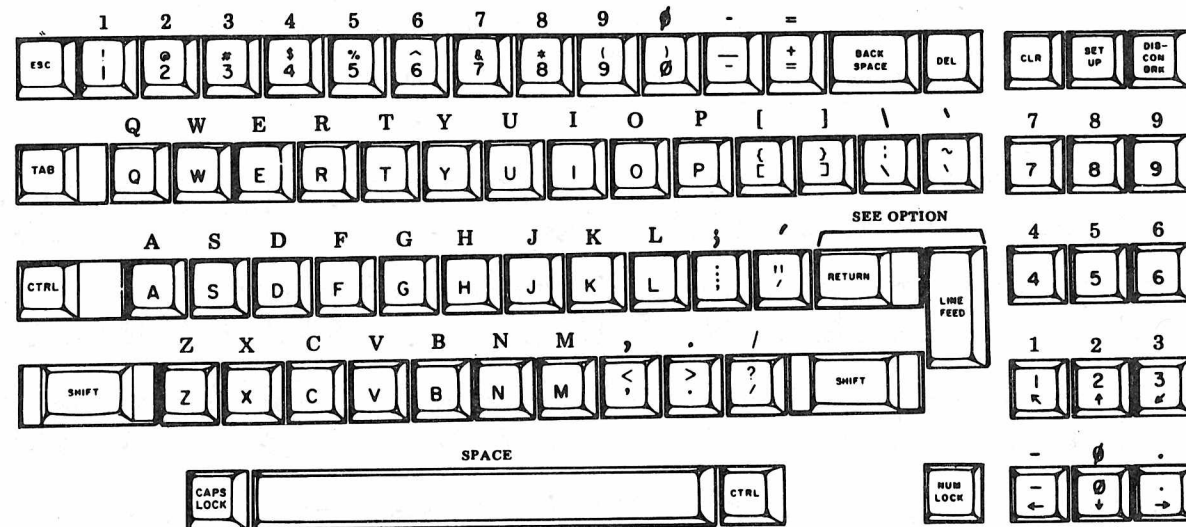
Figure 3-7. Characters Generated With CAPS LOCK and NUM LOCK On

SHIFT

When either of the SHIFT keys are held depressed, any alpha key will generate an uppercase character. The symbols on the top portion of many keys are also accessed by use of the SHIFT key. The SHIFT key does not send a character to the host, and it overrides "NUM LOCK."
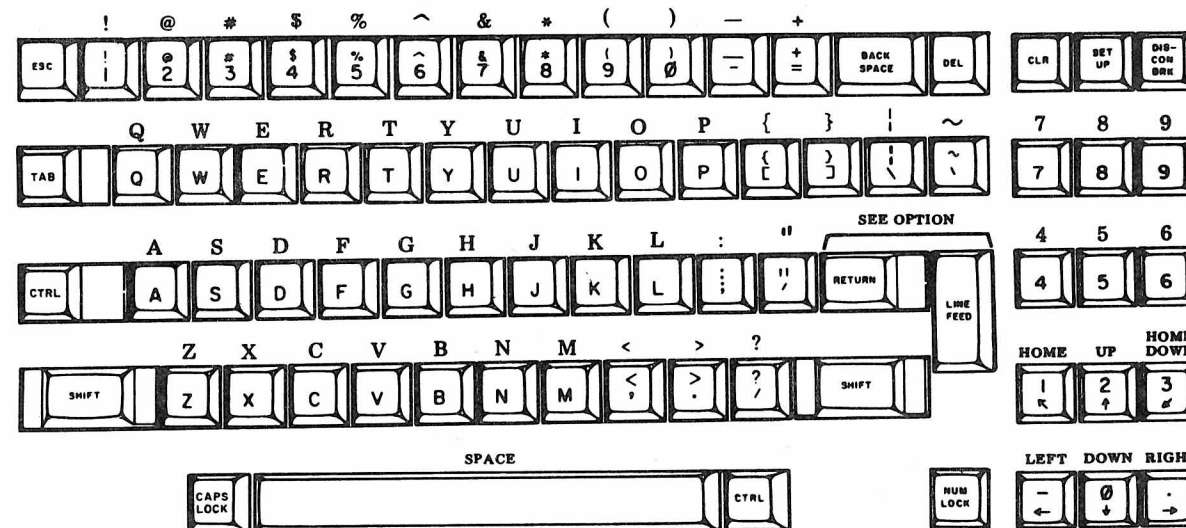
Figure 3-8. Characters Generated With SHIFT Depressed

CTRL Keys

When either of the two CTRL (control) keys is held depressed, depression of any of the keys indicated below will send an ASCII control character. The character generated is shown above the keytop in the following illustration. Depressng a CTRL key alone does not send a character to the host. The keys are not marked with any ASCII control character symbols.
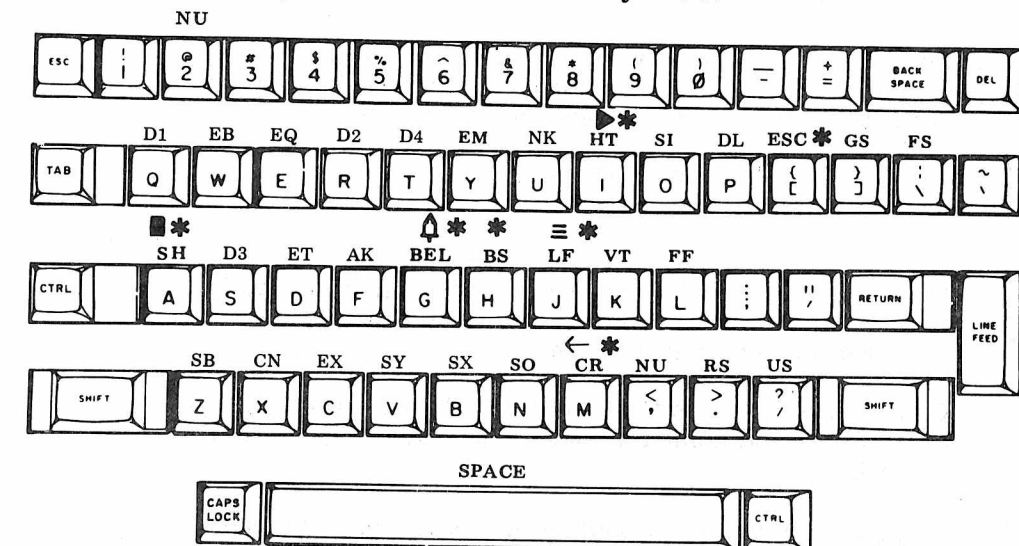
Figure 3-9. Characters Generated With CTRL Depressed

*These functions are performed rather than the control code abbreviation. See Table 3-C for an explanation of the control characters.

The CTRL key has the ability to override the NUM LOCK mode. Depressing CTRL and a cursor control key moves the cursor. Each key sends an escape sequence to the host.
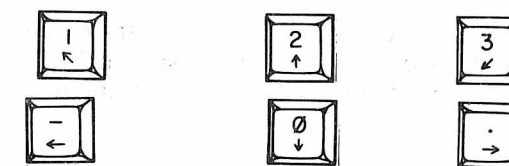
Figure 3-10. Cursor Movement With CTRL Depressed

Programmable Function (PF) Keys

Eight programmable function keys, f1 through f8, are arranged across the top of the keyboard. Each function key is capable of sending a sequence of up to fifty characters. The sequences may be loaded either manually, as described in "PF Key String Entry" under "Options" (in this section), or by means of a download from the host.
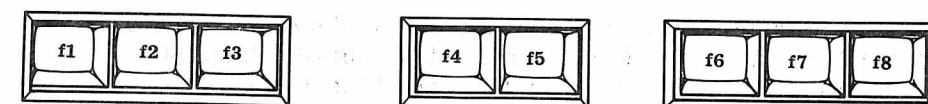
Figure 3-11. Function Keys

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Action Keys

Depression of any of the following keys causes varied terminal responses. Read each description carefully.

ESC — Sends an Escape (ESC) character to the line.

BACK SPACE — Cursor moves one column to the left, unless the cursor is in column one. No data is erased from the display. Sends a BS character to the line. BACKSPACE is a repeatable key.

DEL — DEL (Delete) character is sent to the line.

CLR — Clears all data from the display area and all character attributes from memory. Cursor stays in place. Depression of CLR key sends a character sequence to the line.

Codepression of either the SHIFT or CTRL key and CLR will clear all data and home the cursor without sending a sequence to the line.

DIS-CON BRK — DISCON — This unique method of line disconnect is available to the operator. Depressing either SHIFT or CTRL and DISCON simultaneously causes the terminal to disconnect from the line by turning off the DTR (Data Terminal Ready) signal at the modem port for a half-second.

DIS-CON BRK — BRK — Depressing the BRK key causes a timed line break of approximately 400 milliseconds to be sent.

TAB — Depression of TAB moves the cursor to the next preset tab stop. Codepression of CTRL and I causes the same effect. The character HT is sent to the line.

CTRL **I**

COLUMN 1
| 9 | 17 | 25 | 33 | 41 | 49 | 57 | 65 | 73 | 81 |
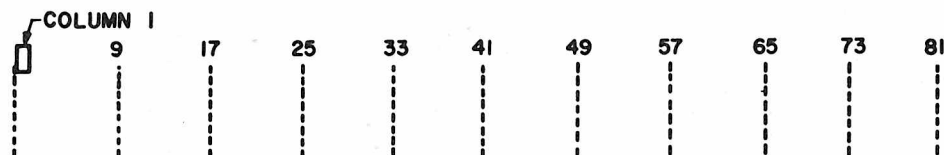
Horizontal tabs are preset at eight column intervals. Receipt of a TAB character when the cursor is to the right of column 80, causes it to wraparound to column one of the next line.

RETURN — Action of this key is controlled by the RETURN KEY option. Three values are allowed; CR, CR/LF or LF. The value selects the sequence sent over the line in response to a return keystroke.

The received character when optioned for CR causes the cursor to move to the beginning of the current line. When optioned for CR/LF, the cursor moves to the beginning of the next line. When optioned for LF, the cursor moves down in the same column to the next line.

7	8	9
4	5	6
1	2	3

NUM LOCK

| − | Ø | . |
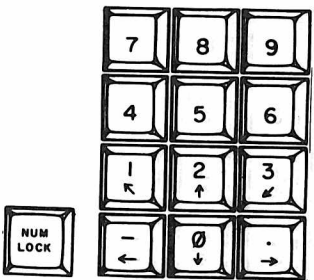
Enabling NUM LOCK cancels the cursor controls and enables external pad keys as numerics. The same characters may be sent to the line, using the numeric keys in the main keyboard. Depression of NUM LOCK a second time reinstates the keypad cursor controls.

When the LINE FEED key is depressed a line feed character is sent to the line.

The received character, when optioned for NL, causes the cursor to move to the beginning of the next line. When optioned for INDEX the cursor moves down in the same column to the next line.

Cursor Movement
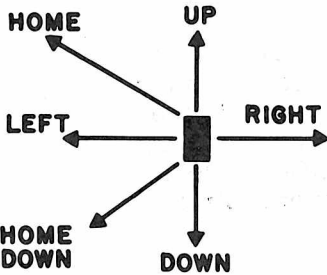
For rapid cursor movements, the cursor control keys are to be used. Cursor movement should be closely watched for possible perimeter overrun.

Perimeter overrun can be avoided by remembering that the cursor positioning keys are repeat keys. Continued depression for one second will start the repeat action. Any of the following six keys will send repeated sequences to the line, even with the cursor stopped at the display perimeter.
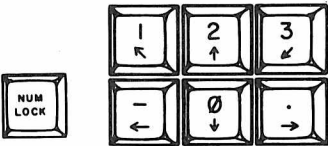
If NUM LOCK is off, any one of these six keys is capable of moving the cursor. If NUM LOCK is on, depression of SHIFT or CTRL and a cursor control key will move the cursor, overriding NUM LOCK.

Cursor home — causes movement to upper left character position and sends a character sequence to the line. Continued depression will not move the cursor.

Cursor up — each depression moves cursor upward one line, staying in the same column, and sends a character sequence to the line. Continued depression after the cursor reaches line one will not move the cursor.

Cursor home down — causes movement to line 70, column 1, and sends a character sequence to the line. Continued depression after the cursor reaches line 70, column 1 will not move the cursor.

Cursor left — each depression moves cursor one column left on the same line, until it reaches column one, sending a character sequence to the line. Continued depression after the cursor reaches column one will not move the cursor.

Cursor down — each depression moves cursor one line down in the same column, sending a character sequence to the line. Continued depression after the cursor reaches line 70 will not move the cursor.

Cursor right — each depression moves one column right on the same line, until it reaches the last column of the display (88), sending a character sequence to the line. Continued depression after the cursor reaches the rightmost column will not move the cursor.

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Options

Setup

This key is used to view or change the options menu. See "Option Selection" in this section for instructions on how to change terminal options. A DC3 is sent when this key is depressed (Prior to Version 8;7;5 Firmware).

While in the Setup mode, terminal operation is suspended but no data is lost by the terminal.

A depression of the SETUP key while the Setup menu is on display removes the menu from display, stores the options, and returns the display to the Interactive mode, and sends a DC1 to the line (Prior to Version 8;7;5 Firmware).

The user may enter Setup mode at any time by depressing the SETUP key. This will result in the bottom two lines being cleared, and the setup display being drawn in these two lines. The setup display will look like one of the two figures below. A discussion of these options follows:
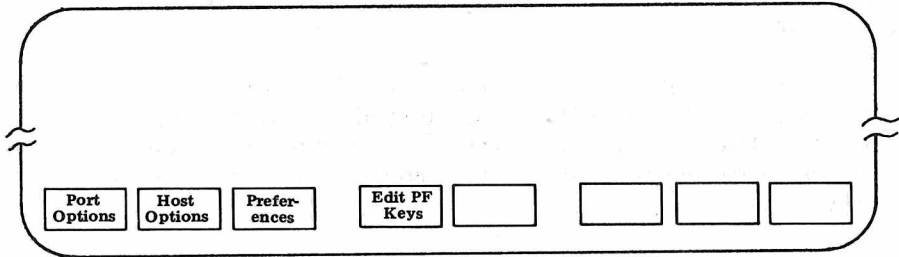
Figure 3-12. Options Menu — Version 8;7;5
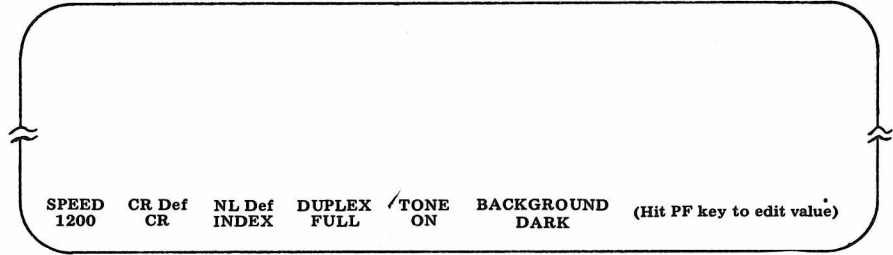
Figure 3-13. Options Menu — Versions Prior to 8;7;5

Note: Changing some options (such as speed) while in the Layers mode may result in a lockup of the terminal.

Firmware Type

Depending on which firmware is installed in the 5620 Terminal, one of the two menus described above will be displayed when the SETUP key is depressed. Use either the "8;7;5 Firmware" or "Prior to 8;7;5 Firmware" procedures for changing options.

Option Selection (Prior to Version 8;7;5 Firmware)

Depression of the SETUP key clears the bottom two lines from the display. The option menu then appears (as shown in Figure 3-13).
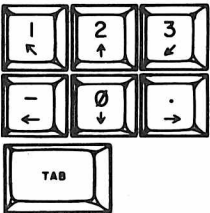
The user may now change any of these options. Each option on the menu controls an on-line or a display action. In order to change any option (except function keys), the user selects options by positioning the cursor to the current value of that option. The cursor may be moved to the right by typing either TAB or CTRL-I. The cursor is moved to the left by typing either "backspace" or CTRL-H.

A depression of the spacebar causes a change in the displayed selectable option. Continued depressions of the spacebar cycles the available option selections. Stop when the desired option is displayed.
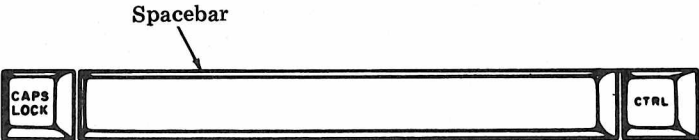
Spacebar

For example, if the spacebar were depressed once with the cursor at the baud rate, it would change from 1200 to 2400. The display updates to the selected value immediately.

The Setup mode must be exited before any of the changed options will take effect.

A second depression of the SETUP key causes the bottom two lines on the display to clear. The displayed options are then stored.

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SPEED   The selection of speed (bps) must match that of
                 the modem or the system.

                     300
                     1200
                     2400
                     4800
                     9600
                     19200

CR DEF   Choices for RETURN key action:

                 LF
                 CR
                 CR/LF

NL DEF   Cursor positioning after receiving a line feed or
                 new line character is governed by one of two
                 choices:
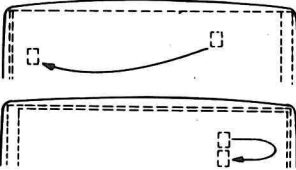
                 NL — When selected, a received NL character
                 causes the cursor to move to the beginning of the
                 next line.

                 INDEX — If selected, the cursor will move down
                 one line in the same column, after a received
                 NL character.

DUPLEX   Choice of FULL or HALF is governed by the
                 system requirements.
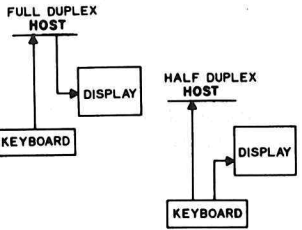
                 FULL — When optioned for full duplex, the
                 keyboard sends directly to the host. The host
                 or modem must be made to echoplex or loop-
                 back the sent signal to the display. Echoplexing
                 by the host is a guarantee of the host's reception
                 of the sent character.

                 HALF — With this selection, a keyboarded char-
                 acter is sent to the line and the display.

                 Any echoplex or loopback in half-duplex will
                 display double characters.

KEY TONE   Allows control of the keyboard sounder.
                 OFF — Gives the operator quiet data entry from
                 the keyboard.
                 ON — Gives the operator a keyclick sound for each
                 depression. Exceptions to keyclick sounding are
                 CTRL, SHIFT, and CAPS LOCK.

SCREEN   Dark (green characters appear on a black back-
BACKGROUND   ground).

                 Light (black characters appear on a green back-
                 ground).

PF Key String Entry

     There is a character sequence associated with each programmable
function key. This sequence may be up to fifty characters in length. When
the function key is depressed, the associated character sequence is sent to
the host processor.

     Any function key may be either examined or edited by depressing that
function key while in Setup mode. This puts the user in Function Key
Edit mode. The lower two lines of the screen will change to the following,
though exact spacing may vary:

     To change or enter a string, depress SETUP. Depress the desired func-
tion key.

     The example below shows what would be displayed for editing func-
tion key 3 if it contained the string "WHATEVER".

f3: WHATEVER

INS CHAR	DEL CHAR	EXIT		←	→		NEXT		
f1	f2	f3		f4	f5		f6	f7	f8

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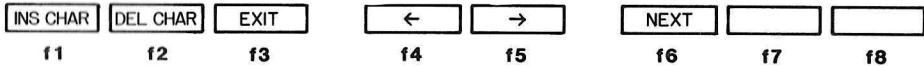
The cursor appears on the first character of the function key string.

To move to the next function key depress the f6 key. Depressing the f6 (next) key sequentially steps to the next function key (i.e., f5 →, f6 →, f7 →, f8 → f1 . . . .).

To change to another function key, depress the f3 key. Depressing the f3 (exit) key exits the function key edit mode. The options menu appears on the last two lines of the screen. Depressing another PF key enters the Function Key Edit mode (i.e., "f2" key).

SPEED	CR Def	NL Def	DUPLEX	TONE	BACKGROUND	(Hit PF key to
1200	CR	INDEX	FULL	ON	DARK	edit value)

To move the cursor, depress either the f4 or f5 keys or cursor (← or →). Depressing either the f4 (←) or f5 (→) or cursor control function key moves the cursor to the left or right for each depression.

To insert or delete characters from a character sequence associated with a function key, depress the f1 or f2 keys. Use the f4 and f5 cursor control function keys to position the cursor. To insert characters depress the f1 key. Depressing the f1 (INS CHAR) key causes the following:

- Cursor does not move.

- All characters under and to the right of the cursor are shifted right one column.

- Characters shifted beyond the 50 character length are lost.

To delete characters depress the f2 key. Depressing the f2 (DEL CHAR) key causes the following:

- Cursor does not move unless it is at the end of the PF string.

- The character covered by the cursor is removed from the display.

- All characters to the right of the cursor are shifted left one column.

The function key definition display makes an attempt to show most control characters. The only control character that is not shown or entered is null. The initial value of every function key is null.

Pressing SHIFT with DISCON or BRK will exit SETUP and perform a "software reset." This is similar to a power down/power up cycle, with two main differences: DTR is not dropped at all and no self-test is performed. This type of software reset is available only in terminal versions prior to 8;7;5.

Default Options (Prior to Version 8;7;5 Firmware)

Following is a list of option selections with factory defaults indicated.

Table 3-A. Options (Prior to Version 8;7;5)

Name	Values (* Indicates factory default)
Baud Rate	300 1200* 2400 4800 9600 19200
Return Key Definition	LF CR* CR/LF
Received Newline Definition	NL Index*
Line Mode	Full Duplex* Half-Duplex
Key Tone	ON* OFF
Screen Background	Dark* Light
PF Key Definitions	Up to 50 characters each; initially empty;

Option Selection (Version 8;7;5)

SETUP is used to customize the 5620 Terminal to individual tastes and operating environments. Enter SETUP by pressing the SETUP key. The bottom two screen lines are changed as shown below. (The contents of the last two lines prior to the SETUP menu being displayed are saved and will be restored when SETUP is existed.)

| Port Options | Host Options | Prefer- ences | | Edit PF Keys | | | | |
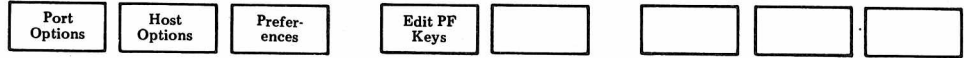
Figure 3-14. Main SETUP Menu Labels

This is called the "Main Menu" for SETUP. From here a category of options is selected to view and possibly change.

Notice that the layout of the highlighted boxes corresponds to the layout of the functions keys along the top of the keyboard (labeled f1, f2 . . . f8). These are the keys used in SETUP to select and change option values. Keys with blank labels (e.g., f5 through f8 in the Main Menu) are reserved for future use; pressing these will sound the terminal alarm signal, but will cause no other action.

There are two types of displays used in SETUP. The first is a menu of option categories, for example, the Main Menu. Pressing a function key in a SETUP menu brings up a category of options. The second type is a menu of option values. Pressing a function key in an option values menu steps through the possible values for the option. The possible values are presented one at a time in a circular fashion; after the last value in the list is presented, the first is presented.

For example, by pressing 'f3' in the Main Menu, "Preferences" is selected (see Figure 3-15) and the bottom two screen lines will change to show the selected values for certain user convenience options. Here, pressing 'f1' causes a return to the Main Menu without changing any option value. Pressing f2 through f7 changes the option values. Pressing f8 ("more") displays the next portion of the Preference menu.

The mouse may also be used in terminal setup. Notice that when SETUP is entered the mouse cursor will appear as a small arrow (if it is not already visible.) As the mouse cursor is moved over the highlighted boxes, the box the mouse is positioned over changes screen color. This indicates that the box is "selected." Pressing button 1 while a box is selected is equivalent to pressing the function key corresponding to the selected box. Button 2 is used to return to the main menu at any point and button 3 is used to exit SETUP at any point.

"Preferences" Portion of Preference Menu

| Main Menu | Screen Dark | Controls Visible | Key Tone On | Cursor No Blink | Repeat 15 | Mouse Right | More |

"More" Portion of Preference Menu

| Main Menu | Newline Index | Return CR | | | | | More |
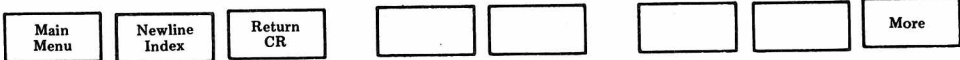
Figure 3-15. Preference Menu

When the display shows the desired option values, leave the menu by:

- Pressing 'f1' (or using mouse button 2) to return to the main menu;

- Pressing SETUP (or using mouse button 3) to exit the Setup mode.

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Shown below are the branching of the root keys and the labels that appear in each block on the screen at factory default value. Also shown are two samples of how option values may be changed. Although the examples describe use of keys f1 to f8 the mouse may also be used to change options as described under "Option Selections (Version 8;7;5)" in this section.

Depress the SETUP key and the following appears:

Branch 1.

| Port Options | Host Options | Prefer- ences | | Edit PF Keys | | | | |
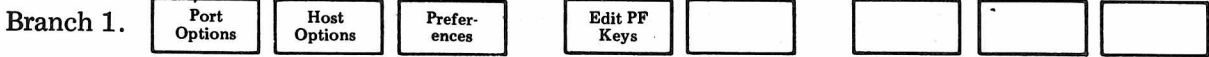
In branch 1. above, depressing f1 key (Port Options), causes the following to appear:

Branch 2.

| Main Menu | Port A Options | Port B Options | | | | | | |
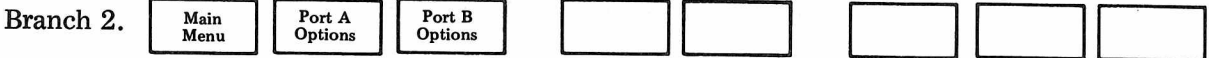
In branch 2. above, depressing f2 key (Port A Options), causes the following to appear:

Branch 3.

| Main Menu | Speed 1200 | Parity None | | Bits/Char 8 | Type RS-232 | | Rcv Flow Off | | |
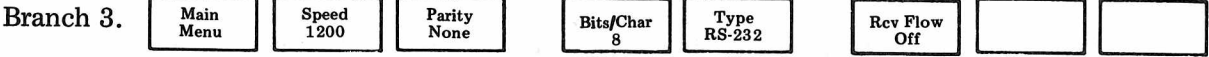
In branch 2. above, depressing f3 key (Port B Options), causes the following to appear:

Branch 4.

| Main Menu | Speed 1200 | Parity Even | | Bits/Char 8 | Type RS-232 | | | | |
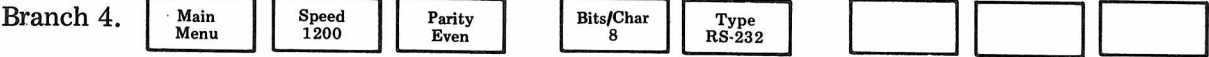
Option Change

To change speed depress f2 key. The speed changes to 2400 baud.

| Main Menu | Speed 2400 | Parity Even | | Bits/Char 8 | Type RS-232 | | | | |

In branch 1. above, depressing f2 key (Host Options), causes the following to appear:

Branch 5.

| Main Menu | Duplex Full | Encoding Off | | Gen Flow On | Pass Flow No | | | | |
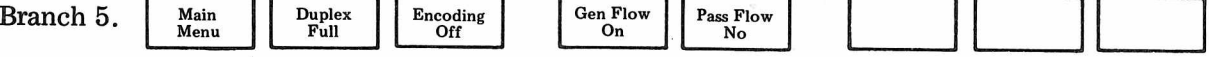
In branch 1. above, depressing f3 key (Preferences), causes the following to appear:

Branch 6.

| Main Menu | Screen Dark | Controls Visible | | Key Tone On | Cursor No Blink | | Repeat 15 | Mouse Right | More |
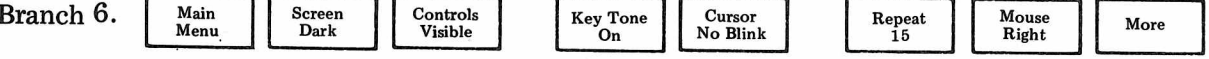
Option Change

To change screen depress f2 key. The screen will change to light background.

| Main Menu | Screen Light | Controls Visible | | Key Tone On | Cursor No Blink | | Repeat 15 | Mouse Right | More |

In branch 6. above, depressing f8 key (More), causes the following to appear:

Branch 7.

| Main Menu | Newline Index | Return CR | | | | | | | More |
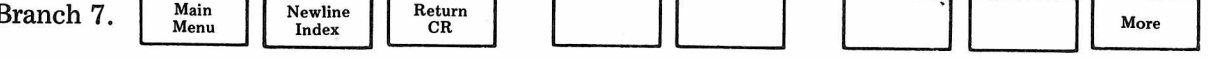
In branch 1. above, depressing f4 key (Edit PF Keys), causes the following to appear:

Branch 8.

| Edit f1 | Edit f2 | Edit f3 | | Edit f4 | Edit f5 | | Edit f6 | Edit f7 | Edit f8 |
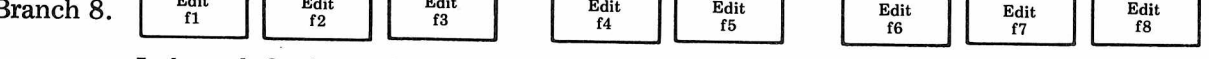
In branch 8. above, depressing f4 key (as an example), causes the following to appear:

Branch 9.

f4:

| Main Menu | Next Key | Previous | | ← | → | | Insert | Delete | Erase |
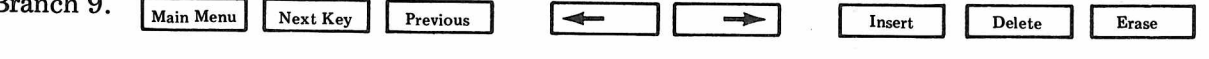
Figure 3-16. Root Key Labels

Caps and Num Indication — If either CAPS LOCK or NUM LOCK are active, the corresponding indicator will appear in the options display beside the fourth and fifth screen labels, as shown below.
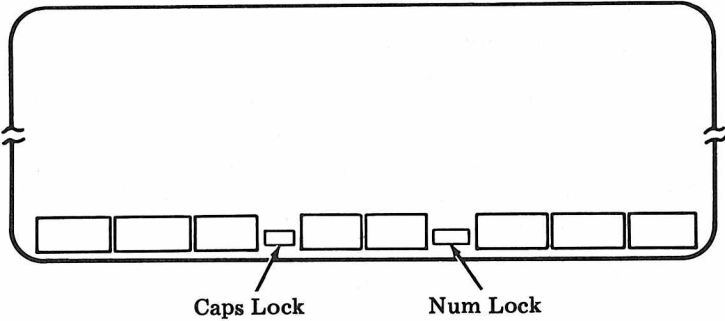
Caps Lock   Num Lock

Figure 3-17. CAPS LOCK and NUM LOCK Indicators

Exiting Options Selection — To exit the options selection mode, press the SETUP key or push button 3 on the mouse. The values last displayed are the new options values. The new values are saved in the nonvolatile memory. The screen area overlaid by the options display is restored to its previous contents.

Description of Options

Port Options — These options apply to the physical I/O ports. The 5620 Terminal has two physical ports: Port A, marked "MODEM-EIA", is a full duplex RS-232 port with a male 25-pin connector used for host connection. Port B, marked "PRINTER-EIA", is a send-only RS-232 port with a female 25-pin connector used for attachment of a local printer.

The port options described below apply to both ports, with exceptions noted.

Speed — Selects the speed at which the port operates. It should be matched with the speed of the attached modem/host.

Parity — Determines the state of the eighth or ninth bit (depending on the setting of the Bits/Char option). If "None" is selected, only the number of bits selected by the Bits/Char option are transmitted; no additional parity bit is transmitted. On receipt, no parity bit is expected. If set to "Odd" or "Even", an additional bit is transmitted (and expected for characters received) that indicates the parity of the data.

Bits/Char — Selects the size of the data portion of each character (i.e., does not include parity and start/stop bits). This is the same value reported as "-cs" in response to "stty -a" on the UNIX System host.

Type — Always set to RS-232. Not changeable.

Rcv Flow — Selects whether DC3 (ASCII 0x13) and DC1 (ASCII 0x11) are to be treated as flow control characters on receipt. If this option is on, receipt of DC3 will cause the terminal to halt transmission of characters until a DC1 is received. If off, DC1/DC3 are not treated specially. Outside of resident terminal mode, this option is ignored unless the Encoding option is also enabled.

Caution: The Rcv Flow option should not be enabled unless the terminal is attached to a local area network or host which generates DC1/DC3 flow control. (UNIX systems will do this if the "stty ixoff" command is issued.) A spurious DC3 character received when this option is enabled will cause the terminal to send no more data until it is reset (by power-off, self-test, or soft reset).

Host Options — These options apply to the host port (Port A).

Duplex — Selects whether keystrokes are displayed locally ("Half") or not ("Full"). Most UNIX System hosts require full duplex. In the Layers mode, this option is ignored and the host line is always run in Full Duplex mode.

Encoding — This option selects whether the data communications path will reliably transmit all 8-bit ASCII characters. Certain local-area networks use ASCII control characters for internal signaling, and will not reliably transmit these characters. Since the protocol used in the Layers mode (and by some stand-alone DMD programs) can embed these ASCII control characters within messages, the communications system must be prevented from interpreting these characters. If the Encoding option is on, data transmitted by the terminal in the Layers and Stand-Alone program modes only (i.e., **not** in resident terminal mode) is encoded to prevent any ASCII control characters (ASCII code < 0x20) from occurring. Data arriving from the host when Encoding is on is assumed to be similarly encoded and is automatically decoded by the low-level terminal I/O system.

To determine whether you require Encoding to be on, answer the following two questions:

- Does the communications system always transmit all eight-bit ASCII characters?

- Does the communications system use ASCII DC1/DC3 or ASCII ENQ/ACK for internal flow control?

If the answer to either of these questions is "yes", set the "Encoding" option on. Otherwise, it should be set to off.

Gen Flow — This option selects whether the terminal should generate ASCII DC1/DC3 characters to halt transmission by the host or communications controller. If this option is on, the terminal will automatically generate an ASCII DC3 character when the internal buffer nears capacity. An ASCII DC1 character is automatically transmitted when the buffer is nearly empty. The corresponding UNIX host setting is "ixon". Note that if this option is disabled or if the host does not recognize the DC1/DC3 characters, the host is more like to overrun the terminal's input buffer, causing the alarm to sound (in resident terminal mode) as characters are discarded.

Pass Flow — This option selects whether DC1/DC3 characters typed at the keyboard will be passed to the host. The default, no, indicates that DC1/DC3 characters will be handled internally by the terminal on a per-layer basis and will not be sent to the host. Pass flow is only effective in Layers mode. If a user types DC3 in a layer and then changes the pass flow option, it will be necessary for him to reset pass flow before a DC1 will unblock the layer.

Preferences — This category contains options for user convenience and personal preferences.

Screen — Selects screen background color. "Dark" chooses black background; "Light" chooses a green background.

Controls — Selects display of control characters. ASCII control characters received are displayed if this option is "Visible". If the option is "Invisible", the characters are not displayed and do not occupy any screen space; "Spaces" causes control characters to be substituted with a space. The control characters excepted from this are: space, tab (which is expanded), carriage return, line feed, and escape (which is the beginning of an ANSI 3.64 control sequence).

Key Tone — If on, the keyboard will generate an audible tone when a key is depressed.

Cursor — If "No Blink", the text cursor will appear as a solid block, if "Blink", the cursor appears as a blinking block.

Repeat — This option selects the rate at which keystrokes repeat, in characters per second. Keys repeat after being held down for a half second. There is a possibility of transmitting incomplete editing sequences at low line speeds when the repeat rate is set high.

Mouse — This option changes the mouse button meanings for left- and right-handed operators. If "Right", the mouse buttons are numbered 1, 2, 3 from left to right; if "Left", the buttons are numbered 3, 2, 1 from left to right. A correct setting results in the index finger always holding button 1 for both left- and right-handed operators.

Newline — This option selects the action caused by a received new line (ASCII 0x0a). "NL" causes an advance to the beginning of the next line; "Index" causes an advance to the same position on the next line.

Return — This option selects the sequence sent by the "Return" key on the keyboard. "CR" sends a CR (ASCII 0x0d); "CR/LF" sends a CR followed by an LF (ASCII 0x0a); "LF" sends a LF. These correspond to the UNIX System stty flags of "-igncr icrnl", "ignr icrnl" and "-inlcr", respectively.

Editing Function Keys — A PF key depression is translated into a user-defined sequence of up to fifty characters. The sequence to be sent for each PF key can be edited by selecting "Edit PF Keys" from the main menu and then selecting the PF key to edit. For example, press "Edit PF Keys" and "f1" to edit PF key 1. The bottom two lines of the display will change to look like the example below:

```
f1:cd $HOME ; layers -f .5620-profile
```

| Main Menu | Next Key | Previous | ← | → | Insert | Delete | Erase |

This shows the current contents of "f1" (there would be spaces displayed if f1 was empty) and a set of new labels for the function keys. The function keys correspond to these commands during PF key editing:

- "Main Menu" returns to the main SETUP menu.

- "Previous" edits the logically previous PF key (f8 is previous for f1).

- "Next" edits the logically next PF key (f1 is next for f8).

- "←" and "→" move the cursor left and right, respectively, since the normal cursor keys are used to insert the ANSI 3.64 escape sequences corresponding to the arrows.

- "Insert" turns Insert mode on and off. Typing in Insert mode pushes characters to the right as new characters are typed; the text cursor changes to a narrow bar to indicate Insert mode. A normal box cursor indicates Overtype mode.

- "Delete" removes one character and closes up the space.

- "Erase" depressed once changes to "Confirm"; depressed again, it erases the PF key contents. Depress any other key to abort the erase.

The mouse is used differently in PF key edit than in the rest of setup. When pointing at the labels ("Main Menu", "Previous", etc.) a button 1 push is equivalent to depressing the corresponding PF key, just as elsewhere in SETUP. When pointing on the line containing the text of the PF key, button 1 pushes are used to move the text cursor as close as possible to the mouse. For example, pointing at the far right of the screen on the top line of the setup display with the mouse moves the text cursor to the right edge of the PF key definition. Pointing within the text of the PF key moves the text cursor to the character pointed to by the mouse.

Default Options (Version 8;7;5)

Following is a list of option selections with factory defaults indicated.

Table 3-B. Options (Version 8;7;5)

Group Name	Option Name	Notes	Option Values
Port A Options (Modem)	Speed	1	300, 1200*, 2400, 4800, 9600, 19200
	Parity	1	None*, Odd, Even
	Bits/Char	1, 2	7, 8*
	Type	1	RS-232*
	Rcv Flow		On, Off*
Port B Options (Printer)	Speed		300, 1200*, 2400, 4800, 9600, 19200
	Parity	3	Even*
	Bits/Char	3	8*
	Type	3	RS-232*
Host Options	Duplex	4	Full*, Half
	Encoding	1	On, Off*
	Gen Flow		On*, Off
	Pass Flow		No*, Yes
Preferences	Screen		Dark*, Light
	Controls		Visible*, Invisible, Spaces
	Key Tone		On*, Off
	Cursor		No Blink*, Blink
	Repeat		15*, 20, 30, 60 cps
	Mouse		Right*, Left
	Newline		NL, Index*
	Return		CR*, LF, CR/LF

*Indicates factory default value.

Note 1: This option applies to both send and receive.

Note 2: Character size does not include the parity bit; this is the same value reported with "stty -a" on the UNIX System host.

Note 3: Port B is a send-only port for connecting an auxiliary printer. The only selectable option is the baud rate.

Note 4: Full duplex is always used in the layers environment, regardless of the value of this setting.

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Transmitted ASCII Codes

Depicted in the following table are the ASCII codes that will be generated by the 5620 Terminal when an associated key is operated unshifted and when operated in conjunction with the SHIFT or CTRL key. The hexadecimal (HEX), decimal (DECI) and octal equivalents are listed for reference.

The numeric pad keys are not included in the table. Numerics generate the same codes as shown for unshifted numerics of this table.

The inset on this page defines the ASCII control codes.

The chart layout matches the keyboard. It starts at the ESC key and progresses right to DEL. This pattern is repeated on succeeding rows and ends with the spacebar.

Table 3-C. Transmitted ASCII Codes

Keytop	Unshifted ASCII	HEX	DECI	OCTAL	With Shift Key ASCII	HEX	DECI	OCTAL	With Control Key ASCII	HEX	DECI	OCTAL
ESC	ESC	1B	27	033	ESC	1B	27	033	ESC	1B	27	033
! / 1	!	31	49	061	!	21	33	041				
@ / 2	2	32	50	062	@	40	64	100				
# / 3	3	33	51	063	#	23	35	043				
$ / 4	4	34	52	064	$	24	36	044				
% / 5	5	35	53	065	%	25	37	045				
^ / 6	6	36	54	066	^	5E	94	136				
& / 7	7	37	55	067	&	26	38	046				
* / 8	8	38	56	070	*	2A	42	052				
(/ 9	9	39	57	071	(	2B	40	050				
) / 0	0	30	48	060	)	29	41	051				
- / _	-	2D	45	055	_	5F	95	137				
+ / =	=	3D	61	075	+	2B	43	053				
BACK SPACE	BS	08	08	010	BS	08	08	010	BS	08	08	010
DEL	▨	7F	127	177	▨	7F	127	177	▨	7F	127	127
TAB	HT	09	09	011	HT	09	09	011	HT	09	09	011

Controls:

NU	— Null
SH	— Start of Heading
SX	— Start of Text
EX	— End of Text
ET	— End of Transmission
EQ	— Enquiry
AK	— Acknowledge
BEL	— Bell
BS	— Back Space
HT	— Horizontal Tabulation
NL	— New Line
VT	— Vertical Tabulation
FF	— Form Feed
CR	— Carriage Return
SO	— Shift-Out
SI	— Shift-In
DL	— Data Link Escape
D1	— Device Control 1
D2	— Device Control 2
D3	— Device Control 3
D4	— Device Control 4
NK	— Negative Acknowledge
SY	— Synchronous Idle
EB	— End of Transmission Block
CN	— Cancel
EM	— End of Medium
SB	— Substitute
ESC	— Escape
FS	— File Separator
GS	— Group Separator
RS	— Record Separator
US	— Unit Separator

Table 3-C. Transmitted ASCII Codes (Continuation)

Keytop	Unshifted ASCII	HEX	DECI	OCTAL	With Shift Key ASCII	HEX	DECI	OCTAL	With Control Key ASCII	HEX	DECI	OCTAL
Q	q	71	113	161	Q	51	81	121	D1	11	17	021
W	w	77	119	167	W	57	87	127	EB	17	23	027
E	e	65	101	145	E	45	69	105	EQ	05	05	005
R	r	72	114	162	R	52	82	122	D2	12	18	022
T	t	74	116	164	T	54	84	124	D4	14	20	024
Y	y	79	121	171	Y	59	89	131	EM	19	25	031
U	u	75	117	165	U	55	85	125	NK	15	21	025
I	i	69	105	151	I	49	73	111	HT	09	09	011
O	o	6F	111	157	O	4F	79	117	SI	OF	15	017
P	p	70	112	160	P	50	80	120	DL	10	16	020
[	[	5B	91	133	{	7B	123	173	ESC	1B	27	033
]	]	5D	93	135	}	7D	125	175	GS	1D	29	035
\	\	5C	92	134	|	7C	124	174	FS	1C	28	034
~	`	60	96	140	~	7E	126	176	—	—	—	—
A	a	61	97	141	A	41	65	101	SH	01	01	001
S	s	73	115	163	S	53	83	123	D3	13	19	023
D	d	64	100	144	D	44	68	104	ET	04	04	004
F	f	66	102	146	F	46	70	106	AK	06	06	006
G	g	67	103	147	G	47	71	107	BEL	07	07	007
H	h	68	104	150	H	48	72	110	BS	08	08	010
J	j	6A	106	152	J	4A	74	112	NL	0A	10	012
K	k	6B	107	153	K	4B	75	113	VT	0B	11	013

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Table 3-C. Transmitted ASCII Codes (Continuation)

Keytop	Unshifted				With Shift Key				With Control Key			
	ASCII	HEX	DECI	OCTAL	ASCII	HEX	DECI	OCTAL	ASCII	HEX	DECI	OCTAL
L	l	6C	108	154	L	4C	76	114	FF	0C	12	014
;	;	3B	59	073	:	3A	58	072	—	—	—	—
" '	'	27	39	047	"	22	34	042	—	—	—	—
RETURN	CR &/or NL	0D &/or 0A	13 &/or 10	015 &/or 012	CR &/or NL	0D &/or 0A	13 &/or 10	015 &/or 012	CR &/or NL	0D &/or 0A	13 &/or 10	015 &/or 012
LINE FEED	NL	0A	10	012	NL	0A	10	012	NL	0A	10	012
Z	z	7A	122	172	Z	5A	90	132	SB	1A	26	032
X	x	78	120	170	X	58	88	130	CN	18	24	030
C	c	63	99	143	C	43	67	103	EX	03	03	003
V	v	76	118	166	V	56	86	126	SY	16	22	026
B	b	62	98	142	B	42	66	102	SX	02	02	002
N	n	6E	110	156	N	4E	78	116	SO	0E	14	016
M	m	6D	109	155	M	4D	77	115	CR	0D	13	015
< ,	,	2C	44	054	<	3C	60	074	NU	00	00	000
> .	.	2E	46	056	>	3E	62	076	RS	1E	30	036
? /	/	2F	47	057	?	3F	63	077	US	1F	31	037
SPACE	Space	20	32	040	Space	20	32	040	Space	20	32	040

Received ASCII Codes

The table below depicts the effect of received ASCII codes upon the 5620 Terminal. The hexadecimal (HEX), decimal (DEC) and octal codes listed represent nonparity equivalents of the binary code used for ASCII transmission and reception.

Note: The 5620 Terminal has fixed horizontal tab stops at columns 8, 16, 24, 32, 40, 48, 56, 64, 72, 80 of each line of the default characters font. The screen does not display any tabulation indicators.

Table 3-D. Received ASCII Codes

HEX	DEC	OCTAL	Display	Action	HEX	DEC	OCTAL	Display	Action	HEX	DEC	OCTAL	Display	Action
00	00	000	NU	Space	29	41	051	)	None	56	86	126	V	None
01	01	001	■	None	2A	42	052	*	None	57	87	127	W	None
02	02	002	SX	None	2B	43	053	+	None	58	88	130	X	None
03	03	003	EX	None	2C	44	054	,	None	59	89	131	Y	None
04	04	004	ET	None	2D	45	055	-	None	5A	90	132	Z	None
05	05	005	EQ	None	2E	46	056	.	None	5B	91	133	[	None
06	06	006	AK	None	2F	47	057	/	None	5C	92	134	\	None
07	07	007		Sound bell tone	30	48	060	0	None	5D	93	135	]	None
08	08	010		Move cursor left one position	31	49	061	1	None	5E	94	136	^	None
09	09	011		Cursor to next TAB position	32	50	062	2	None	5F	95	137	_	None
0A	10	012		NL or Index (optionable)	33	51	063	3	None	60	96	140	`	None
0B	11	013	VT	None	34	52	064	4	None	61	97	141	a	None
0C	12	014	FF	None	35	53	065	5	None	62	98	142	b	None
0D	13	015		Move cursor to 1st column	36	54	066	6	None	63	99	143	c	None
0E	14	016	SO	None	37	55	067	7	None	64	100	144	d	None
0F	15	017	SI	None	38	56	070	8	None	65	101	145	e	None
10	16	020	DL	None	39	57	071	9	None	66	102	146	f	None
11	17	021	D1*	None*	3A	58	072	:	None	67	103	147	g	None
12	18	022	D2	None	3B	59	073	;	None	68	104	150	h	None
13	19	023	D3*	None*	3C	60	074	<	None	69	105	151	i	None
14	20	024	D4	None	3D	61	075	=	None	6A	106	152	j	None
15	21	025	NK	None	3E	62	076	>	None	6B	107	153	k	None
16	22	026	SY	None	3F	63	077	?	None	6C	108	154	l	None
17	23	027	EB	None	40	64	100	@	None	6D	109	155	m	None
18	24	030	CN	None	41	65	101	A	None	6E	110	156	n	None
19	25	031	EM	None	42	66	102	B	None	6F	111	157	o	None
1A	26	032	SB	None	43	67	103	C	None	70	112	160	p	None
1B	27	033		Interpret following string as command (ESC sequence)	44	68	104	D	None	71	113	161	q	None
					45	69	105	E	None	72	114	162	r	None
					46	70	106	F	None	73	115	163	s	None
1C	28	034	FS	None	47	71	107	G	None	74	116	164	t	None
1D	29	035	GS	None	48	72	110	H	None	75	117	165	u	None
1E	30	036	RS	None	49	73	111	I	None	76	118	166	v	None
1F	31	037	US	None	4A	74	112	J	None	77	119	167	w	None
20	32	040	Space	None	4B	75	113	K	None	78	120	170	x	None
21	33	041	!	None	4C	76	114	L	None	79	121	171	y	None
22	34	042	"	None	4D	77	115	M	None	7A	122	172	z	None
23	35	043	#	None	4E	78	116	N	None	7B	123	173	{	None
24	36	044	$	None	4F	79	117	O	None	7C	124	174	|	None
25	37	045	%	None	50	80	120	P	None	7D	125	175	}	None
26	38	046	&	None	51	81	121	Q	None	7E	126	176	~	None
27	39	047	'	None	52	82	122	R	None	7F	127	177	//	None
28	40	050	(	None	53	83	123	S	None					
					54	84	124	T	None					
					55	85	125	U	None					

*For firmware version 8;7;5 only, action dependent on setting of the RCV Flow option.

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Received Data

Control Characters

Table 3-E. 5620 Terminal Control Characters

Control Characters for 5620 DMD		
Function	**Keyboard Key**	**CTRL With Key**
NUL	—	, (or 2 in 8;7;5)
BEL	—	G
BS	BACKSPACE	H
HT	TAB	I
LF	LINEFEED	J
CR	RETURN*	M
DC1	—	Q
DC3	—	S
ESC	ESCAPE	[
RS	—	.
US	—	/

*The sequence sent by RETURN is a terminal option.

Table 3-E shows control characters with special meaning to the resident terminal program. These are described in more detail below.

NUL (00 hex) — The null character is displayed on receipt. If received from the keyboard, it is transmitted to the host.

BEL (07 hex) — The bell character causes the audible alarm to sound when received from the host. When received from the keyboard, it is transmitted.

BS (08 hex) — The BS (Backspace) character causes the cursor to move one position left when received from the host. It has no effect if the cursor is positioned at the left edge of the screen. It is transmitted when received from the keyboard.

HT (09 hex) — The HT (Horizontal Tab) character causes the cursor to move to the next tab stop when received from the host. Tab stops occur every eight spaces. It will wrap the cursor to the next line if the cursor is at the right edge of the screen. A wrapped line is considered an extension of the logical line, not a new line. The leftmost character position of the wrapped line is treated as column (n*88) of the logical line, where "n" is the number of line wraps performed on this logical line. HT is transmitted when received from the keyboard.

LF (0A hex) — The action of the LF (Line Feed) character when received from the host is determined by the setting of the "Received Newline Definition" terminal option. When set to "NL", the cursor will move to the beginning of the next screen line. When set to "INDEX", the cursor will move to the current column on the next line. Scrolling is performed in both cases if necessary.

CR (0D hex) — The CR (Carriage Return) character causes the cursor to move to the beginning of the current line when received from the host. It is governed by the value of the "Return Key Definition" option when received from the keyboard.

DC1 (11 hex) and DC3 (13 hex) — DC1 and DC3 are used by both the resident terminal program and the user to control transmission on the communications line. Some coordination is enforced to avoid locking up the line.

The DC1 (Resume Transmission) character is sent automatically by the resident terminal software (to the host) to resume suspended data transmission. In terminal version 8;7;5, this action can be suppressed by turning the "GEN FLOW" option off. If entered on the keyboard, DC1 is sent unless the resident terminal program has blocked transmission. In this case, the line will automatically be unblocked when the resident terminal program has enough buffer space available. If received from the host, DC1 is displayed. In terminal version 8;7;5, a DC1 character entered on the keyboard is always sent and a received DC1 character is always displayed.

The DC3 (Suspend Transmission) character is sent automatically by the resident terminal software to the host to suspend transmission of data if needed to avoid data loss. In terminal version 8;7;5, this action can be suppressed by turning the "GEN FLOW" option off. It is the responsibility of the host software to suspend data transmission within 100 characters. Host transmission should not resume until a DC1 is sent by the terminal. If entered on the keyboard, DC3 is transmitted to the host unless the resident terminal program has already blocked transmission. If received from the host, it is displayed. In terminal version 8;7;5, a DC3 character entered on the keyboard is always sent. If received from the host DC3 is displayed unless the "RCV FLOW" option is on.

ESC (1B hex) — The ESC (Escape) character indicates the beginning of a multicharacter control sequence. These are described below. When received from the keyboard, ESC is transmitted to the host. When received from the line, it is not displayed, but subsequent characters are interpreted as indicated below.

RS (1E hex) — The RS (Record Separator) character is only included because of the nonstandard position in the keyboard.

US (1F hex) — The US (Unit Separator) character is only included because of the nonstandard position in the keyboard.

Other Control Characters — Control characters not listed are transmitted when received from the keyboard. When received from the host, these control characters are displayed. No other special action is taken.

Escape Sequences — The 5620 Terminal uses the ANSI 3.64 escape sequence encoding. However, not all functions described by ANSI 3.64 are supported by the terminal.

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Escape Sequences

Table 3-F is the subset of ANSI 3.64 supported by the 5620 Terminal. Exceptions are noted. In cases where keyboard keys are indicated, depression of the named key transmits the given escape sequence to the host. These are described in more detail later.

Escape sequences other than those listed below will be ignored if received by the terminal. A portion of an unrecognized escape sequence may be displayed, since it will appear as data to the terminal.

Table 3-F. Escape Sequences for 5620 Terminal

Function	Sequence	Keyboard Key	Notes
Cursor Home	ESC [H	Upper Left Arrow	
Cursor Up	ESC [A	Up Arrow	
Cursor Down	ESC [B	Down Arrow	
Cursor Left	ESC [D	Left Arrow	
Cursor Right	ESC [C	Right Arrow	
Cursor Home Down	ESC [70;1 H	Lower Left Arrow	
Clear Screen	ESC [2 J	CLR	
Clear to End of Screen	ESC [J	—	
Clear to End of Line	ESC [K	—	
Scroll Up	ESC [n S	—	1
Scroll Down	ESC [n T	—	1
Cursor Positioning	ESC [$line;column$ H	—	2
or	ESC [$line;column$ f	—	2
Save Cursor Position	ESC 7	—	11
Restore Cursor Position	ESC 8	—	
Set PF Key	ESC [$k;n$ q string	—	3
Insert Lines	ESC [n L	—	1
Delete Lines	ESC [n M	—	1
Insert Characters	ESC [n @	—	4
Delete Characters	ESC [n P	—	4
Send Terminal ID	ESC [c	—	
Reset Terminal	ESC c	—	10
Download	ESC [$m;n$ v	—	5
Encoding inquire	ESC [F	—	6, 9
Set character attributes	ESC [$j;k$ m	—	6, 7, 13
Request memory size	ESC [g	—	6, 9
Set RAM split	ESC [n h	—	6, 8, 9, 12

Note 1: "n" is the number of lines (default 1).

Note 2: Both forms of cursor positioning have identical effects. The different forms are included for compatibility only. If the specified line or column is beyond the range of 70 lines or 88 columns, the cursor is moved as far as possible.

Note 3: "k" is PF key number; "n" is length of string.

Note 4: "n" is number of characters (default 1).

Note 5: "m;n" is the series of codes describing the type of download.

The stand-alone download sequence is ESC [n;m v, where:

n = 2 for loading layersys from ROM with no download (not available prior to 8;7;5)
1 for downloading layersys with a download patch
0 for downloading programs other than layersys
m = 2 for hex (encoded) download with subsequent encoding (see chart for availability)
1 for hex (encoded) download without subsequent encoding
0 for unencoded, binary download

Note 6: Available only in terminal version 8;7;5.

Note 7: "j;k" is the series of codes of the attributes to be set.

Set Character Attributes — This sequence determines which of the available character attributes will be enabled. The values of the desired attributes are separated by semicolons and placed on the command line. Available attributes are reverse video (7), underline (4), and normal (0), which is nonunderlined, nonreverse video. The attributes act in order of their specification, so "ESC [0;4" (which enables underline) is not the same as "ESC [4;0" (which resets to nonunderlined, nonreversed).

Note 8: "n", (1-9), is multiplied by ten to give the value of the desired percentage of memory available for downloaded programs.

Note 9: Not ANSI compatible.

Note 10: Attributes not reset.

Note 11: Attributes not saved.

Note 12: Only the default setting of 50% is supported fully.

Note 13: Null parameter list ignored.

Cursor Home — Moves the cursor to the upper left corner of the screen. Home on the 5620 DMD has line and column position (1, 1).

Cursor Up — Moves the cursor up one line within the same column. No effect at the top of the screen.

Cursor Down — Moves the cursor down one line within the same column. No effect at the bottom of the screen.

Cursor Left — Moves the cursor left one position on the same line. No effect at the left edge of the screen.

Cursor Right — Moves the cursor right one position on the same line. No effect at the right edge of the screen.

Cursor Home Down — Moves the cursor to the first character position on the bottom line of the screen (i.e., line 70).

Clear Screen — Clears the entire screen. This sequence does not affect cursor position.

Clear to End of Screen — Clears from the current cursor position to the end of the screen, inclusive. This sequence does not affect cursor position.

Clear to End of Line — Clears from the current cursor position to the end of the current cursor line, inclusive. This sequence does not affect cursor position.

Scroll Up — Scrolls the screen up the given number of lines (default 1), creating that many blank lines at the bottom of the screen.

Scroll Down — Scrolls the screen down the given number of lines (default 1), creating that many blank lines at the top of the screen.

Cursor Positioning — Moves the cursor to the given line and column position, relative to the upper left corner of the screen (1, 1). The bottom right corner of the screen is (70, 88).

Save Cursor Position — The current position of the cursor is saved in a terminal scratchpad. Any previous value in the scratchpad is lost.

Restore Cursor Position — Executes a Cursor Position to the value stored in the saved position scratchpad (by the Save Cursor Position function).

Set PF Key — Sets the contents of a Programmed Function key. "k" is the key number, 1-8; "n" is the length of the string which will become the new contents of the PF key. Setting "n" to zero will clear the contents of the PF key.

Insert Lines — This sequence will create "n" blank lines (default 1) at the cursor position. The cursor will remain stationary. The cursor line and all lines below it are pushed down. The "n" bottom screen lines are lost. This sequence cannot affect the bottom 2 status lines.

Delete Lines — This sequence will delete the cursor line and the n-1 lines (default 1) following it. The nth line following the cursor line will become the current cursor line. The cursor remains stationary. Blank lines will be created at bottom of the screen if necessary. This sequence cannot affect the bottom 2 status lines.

Insert Characters — This sequence will insert n characters (default 1) at the cursor position. The cursor remains stationary. Characters on the current line at the cursor or to its right are pushed right. Characters may be pushed off the edge of the screen.

Delete Characters — This sequence will delete n characters (default 1) starting at the cursor position. Characters to the right of the cursor will be adjusted left to fill the space. The cursor remains stationary.

Send Terminal ID — The terminal will respond with a stored character sequence identifying the features supported by the terminal. This sequence is "ESC[?8;7;nc", where n is the version number of the firmware release.

Reset Terminal — A software reset is performed. It will clear the screen and restore options to the values set in nonvolatile RAM. The cursor moves to the home position.

Download — Data following this sequence, up to a special termination sequence, is interpreted by the resident terminal downloader as data to be loaded into terminal RAM.

Encoding Inquire — This sequence will prompt the terminal for the value of the encoding setup option. The response is "ESC [1 F" if encoding is turned on and "ESC [0 F" if encoding is off.

Set Character Attributes — This sequence determines which of the available character attributes will be enabled. The values of the desired attributes are separated by semicolons and placed on the command line. Available attributes are reverse video (7), underline (4), and normal (0), which is nonunderlined, nonreverse video. The attributes act in order of their specification, so "ESC [0;4m" (which enables underline) is not the same as "ESC [4;0m" (which resets to nonunderlined, nonreversed).

Request Memory Size — This sequence will prompt the terminal for a value indicating the amount of installed memory. The response is "ESC [1 g" for IM of RAM and "ESC [0 g" for 256K of RAM.

Set RAM Split — This sequence determines how memory will be divided between user ("alloc") space and screen ("gcalloc") space in Layers mode. The parameter n (multiplied by 10) indicates the percentage of memory which will be allocated to downloaded programs. The remaining memory is used for screen operations. The default division is 50/50. This sequence is recognized only in resident terminal mode.

4. Routine Maintenance and Care

Display

Maintenance of the display screen consists of dusting with a dry, soft, clean cloth. Heavier contaminants may be removed with detergent and water or amonia-based window cleaner.

Care should be taken to prevent chemicals, cleaners or cosmetics from coming in contact with the painted surfaces.

Scouring pads, abrasive cleaners, acid and chlorinated solutions will damage the screen and should not be used. Care should also be taken to prevent tapes and adhesives from coming into contact with the display screen.

Do not allow fingerprints or other contaminants to remain on the coated surface for extended periods of time. This makes cleaning much more difficult.

Do not allow cleaning agents to dry on the coated surface. Always wipe the surface dry with a clean, soft cloth.

Antistatic or antifogging solutions should not be used. These agents leave a residue on the surface of the coating which may adversely affect its optical properties.

Display Tube Cleaners

Detergent and water.
Ammonia-based window cleaner.

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Keyboard

The keyboard should be cleaned only with a damp cloth. No spray cleaners should be used.

Mouse (Roller Ball Cleaning)

Removal of the access door on the bottom of the mouse permits removal of the roller ball for cleaning. The contact rollers and bias spring roller are also accessible for cleaning with a soft, dry cloth (no fluids inside mouse). Use of mineral spirits, solvents or abrasive cleaning agents is to be avoided. Care should be exercised in removing and replacing the access door retaining screw (tighten only until snug). The possibility of damage to circuitry due to electrostatic discharge is minimized by the following procedure. Before attempting to remove the access door, the operator should: disconnect the mouse from the terminal, dissipate any static charge on his/her person by touching any large metallic object such as the terminal cabinet, and discharge any tools to be used, such as a screwdriver, by the same method. The roller ball should also be discharged before replacing into the mouse.

Caution: Do not overtighten retaining screw after reassembling access door.
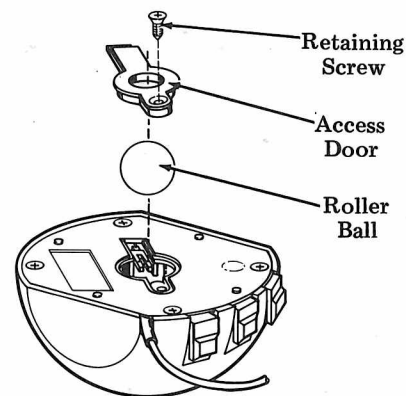
Figure 4-1. Roller Ball Access

5. Compatibility (Interaction of 5620 Terminal Firmware With 5620 Host Software)

Purpose

The 5620 Dot Mapped Display Terminal contains firmware that interacts with host resident software. With time, the product has evolved, and new versions of host software and terminal firmware have been released.

This section is intended to serve the individual who needs to know the details of how different software and firmware versions interact with each other.

Determining Version Numbers

Firmware Version Number

To determine your firmware version number, first log off (so that you have no programs running) then simultaneously depress the SHIFT and SETUP keys.

The message that appears will include the version number of your terminal. The string of digits separated by semicolons (for instance, 8;7;5) is your firmware version.

If no such message appears during the self-test, your firmware is either 8;7;1 or 8;7;2. Within this document, these versions are treated alike.

Host Software Version Number

In order to determine your host software version, contact your system administrator or consult the documentation that was supplied with the software installed on your host computer.

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Determining Compatibility

Currently released versions of firmware and software are listed in the table below. The next few pages explain the interaction details of particular firmware/ software combinations.

Table 5-A. Compatibility Chart

Firmware Version	5620 Host Software Version		
	1.0	1.1 or 1.2	2.0
8;7;1/8;7;2	Compatible	Incompatible (See Below)	Incompatible (See Below)
8;7;3	Incompatible (See Below)	Compatible	Compatible (See Below)
8;7;5	Incompatible (See Below)	Compatible (See Below)	Compatible

To obtain different firmware or software versions, contact an AT&T sales representative.

Firmware Versions 8;7;1 and 8;7;2

Versions 8;7;1 and 8;7;2 differ only in a modification made to comply with factory tests standards.

Versions 8;7;1 and 8;7;2 Compatibility with 5620 Host Software Version 1.1 or 1.2

— These versions are incompatible. Contact an AT&T sales representative to upgrade firmware to a version compatible with host software version 1.1.

Versions 8;7;1 and 8;7;2 Compatibility with 5620 Host Software Version 2.0

— These versions are incompatible. Contact an AT&T sales representative to upgrade firmware version to a version compatible with software version 2.0. An upgrade to version 8;7;5 is recommended.

Firmware Version 8;7;3

Firmware version 8;7;3 was released to provide a new linkage structure which minimizes firmware/software address dependencies.

Version 8;7;3 and 5620 Host Software Version 1.0

— These versions are incompatible. Contact an AT&T sales representative to upgrade software to a version compatible with firmware version 8;7;3.

Version 8;7;3 and 5620 Host Software Version 2.0

— A down-loadable software image of 8;7;5 firmware accompanies 2.0 software version to provide 8;7;5 functionality for customers who do not wish to upgrade from 8;7;3 firmware. The resulting configuration, however, is characterized by certain operating restrictions. See the Product Overview (Catalogue Number 999-801-122IS/Select Code Number 306-145) for details. The Product Overview document is shipped with the "core" software package for the 5620.

Firmware Version 8;7;5 (2.0)

Firmware version 8;7;5 was released to provide several new features, including LAN network encoding, printer support, enhanced setup, enhanced user interface, more ROM-resident software routines, and more user-accessible routines.

Version 8;7;5 and 5620 Host Software Version 1.0

— These versions are incompatible. Contact an AT&T sales representative to upgrade software to a version compatible with firmware version 8;7;5. An upgrade to software version 2.0 is recommended.

Version 8;7;5 and 5620 Host Software Version 1.1

— This configuration provides a high degree of functionality, although, to take full advantage of the increased terminal functionality, an upgrade to host software version 2.0 is recommended. Using version 1.1 software, situations may arise where minor adjustments must be made. If an error message is received directing the user to the compatibility chart or to the documentation supplied with the terminal, refer to "Operational Hints (Version 8;7;5 Firmware, Version 1.1 or 1.2 Host Software)" in this section.

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Operational Hints (Version 8;7;5 Firmware, Version 1.1 or 1.2 Host Software)

This section is for users with version 8;7;5 firmware configured with version 1.1 or 1.2 host software. These comments apply only to users having difficulty with flow control or running the layers or dmdebug application programs.

Difficulty With Flow Control

If problems are experienced with flow control, be sure the Pass Flow option is set to No.

Difficulty Running Layers

Before layers will run on this configuration, it is necessary to supply a file called lsys.8;7;5. This is done by changing to the directory $DMD/lib/layersys and typing: > "lsys.8;7;5". This creates a zero-length file with the name expected by version 8;7;5 layers. If write permission is not present, talk to the system administrator; layers can be used in the meantime by typing "layers" followed by the name of any zero-length file.

Difficulty Running dmdebug

The host application program dmdebug is an interactive debugging tool for C language programmers. If the user does not intend to author original C language programs that download into the terminal or modify existing applications, the remainder of this section can be ignored. The instructions that follow only need to be performed once on a particular host. The person making these changes should be an experienced C language programmer. If possible, obtain the results from another programmer who has already made the modifications on a host similar to the one you are using.

Version 1.1/1.2 of dmdebug used on version 8;7;5 terminals can be modified to provide full functionality. The first modification involves supplying the appropriate symbol table. Dmdebug running on version 8;7;5 terminals expects to find a copy of the corresponding symbol table under $DMD/lib/lsym.8;7;5. Copying the version 8;7;3 symbol table from lsym.8;7;3 to lsym.8;7;5 will enable dmdebug to run, but with limited features. Trace-back, for instance, will not work since the program's idea of the address of ROM resident routines is wrong. The real symbol table is required for complete operation and can be uploaded from ROM as discussed below.

Once dmdebug has the correct symbol table, trace-backs still will not work because versions 1.1 and 1.2 dmdebug limit to 64K the amount of ROM memory accessible to the program. (This is not true of version 1.2 software for the 3B2 and 3B5.) To correct this, dmdebug itself must be modified.

The programs and steps needed to modify version 1.1 and 1.2 dmdebug and to upload the correct symbol table are given below. Save the current version of dmdebug by copying it to another file before making any changes.

How to Modify Dmdebug Version 1.1 and 1.2 to Work on 8;7;5 Terminals:

A.   Get the appropriate symbol table out of the ROM:

1.   Type in the program to upload the symbol table (given below) and call it upload.c.

2.   Compile the program by typing "dmdcc upload.c".

3.   Download the program using jx by typing "jx dmda.out". After downloading, the program will appear to be download- ing again. This is the uploading of the symbol table. The program will exit when uploading is complete.

4.   The file lsym.8;7;5.z has now been created in the current directory. Type:

   unpack "lsym.8;7;5.z"

   to unpack the file. This also changes its name to lsym.8;7;5.

Note for 3B2 users: The unpack command is a part of the Directory and File Management Utilities Package. If this package is not installed, this step may be per- formed on a machine which does have the unpack command by uploading the packed file to the other machine, unpacking it, and then transfer- ring the resulting file back. If difficulty is encoun- tered, the recommended solution is to upgrade the 3B2 to release 2.0 of the 5620 host software. An AT&T sales representative can provide order- ing details.

5.   If the computer is a VAX, type:

   m32conv -t vax "lsym.8;7;5"
   mv   "lsym.8;7;5.v"   "lsym.8;7;5"

   to convert the file into the VAX's format.

6.   Move the file to $DMD/lib (retaining the file name lsym.8;7;5).

If 5620 source code is present on your host, perform step B and skip step C. If source code is not present, skip step B and do step C. To determine whether source code is present, look for directory $DMD/src/ddt. If this directory does not exist, it is possible that binary only is present; check with the system administrator before assuming that source code is not present.

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B. For users with source code:

1. Change directory to $DMD/src/ddt.

2. Edit the file protocol.h, changing

    #define HI_ROM   Oxffff

    to:

    #define HI_ROM   Ox3ffff.

3. Type "make" to recompile.

4. Copy host/joff to $DMD/bin/dmdebug.

5. Copy term/joff to $DMD/lib/dmdebug.m.

C. For users with binary only: Perform this step only if it is certain that source code is not present.

Versions 1.1 and 1.2 host software are functionally equivalent, but it is necessary to know which version is present before proceeding. In general the version of host software used corresponds to the release number of the UNIX operating system installed on the system (version 1.1 host software is used with System V Release 1 and Version 1.2 with System V Release 2). Check with the system administrator to be sure.

1. Type in the program to modify the host portion of dmdebug (given below) and call it "hdebug.c". Note that the values for the two "#defines" must be filled in from the table below.

Table 5-B. Values for "#defines"

	dmdebug 1.1		dmdebug 1.2	
	BYTE1	BYTE2	BYTE1	BYTE2
3B20	43470	66830	42918	65986
VAX	42220	65472	42432	65900
3B2	45589	70499		

2. Copy hdebug.c to $DMD/bin.

    Change directory to $DMD/bin.

    Copy dmdebug to dmdebug.save.

    Compile hdebug.c using cc by typing "cc hdebug.c -o hdebug".

    Execute it by typing "./hdebug".

3. Type in the program to modify the terminal portion of dmdebug (given below) and call it "tdebug.c". Note that there are no values to fill in.

4. Copy tdebug.c to $DMD/lib.

    Change directory to $DMD/lib.

    Copy dmdebug.m to dmdebug.m.save.

    Compile tdebug.c using cc by typing "cc tdebug.c -o tdebug".

    Execute it by typing "./tdebug".

```
*************************************
*                                   *
*    UPLOADING SYMBOL TABLE:        *
*    FOR STEP A1 USE THIS PROGRAM   *
*                                   *
*************************************

#include  < jerq.h >
#include  < blitio.h >
#include  < font.h >

/*********************************************************************
 *
 *    This program reads the packed symbol table of 8;7;5 roms in the 1.1
 *    software format from the high end of the roms memory. The program
 *    should be executed using jx. It will create the file lsym.8;7;5.z
 *    which must then be unpacked and moved to $DMD/lib/lsym.8;7;5.
 *
 *********************************************************************/

#define LSYMLENGTH       0x06368
#define LSYMBASE         0x01720c
#define ypos(a)          (Drect.corner.y - muldiv(a-LSYMBASE, Drect.corner.y
                            — Drect.origin.y,LSYMLENGTH))

FILE *fp;

main( )
{
        register i, nypos, oypos;
        Point p;

        p = add(Drect.origin,  Pt(3,3));
        fp = fopen("lsym.8;7;5.z","w");
        if (fp)  {  /* file was successfully opened, start pumping out data */
                string(&defont, "beginning upload of lsym.8;7;5.z",
                        &display,p, F_OR);
                /* tell the user that up-loading has begun */
                for (i = LSYMBASE; i < LSYMBASE + LSYMLENGTH; i++) {
                        if (i != LSYMBASE) {  /* make it look like a download */
                                nypos = ypos(i);
                                oypos = ypos(i-1);
                                if (nypos != oypos)
                                        rectf(&display, Rect(Drect.origin.x,
                                                nypos, Drect.corner.x, oypos),
                                                F_XOR);

                        }
                        putc(*(char *)i,  fp);

                }
                fclose(fp); /* flush the queue */
        } else /* could not open the file */
                printf("error:  failed to open lsym.8;7;5.z \ n");
        exit( );
```

```
********************************************
*                                          *
*    MODIFYING HOST PORTION OF DMDEBUG:    *
*    USE THIS PROGRAM IN STEP C1           *
********************************************


#include  < stdio.h >

/*********************************************************
 *
 *        This program modifies the binary of dmdebug version 1.1 or
 *        1.2 to make it run better with version 8;7;5 terminals.
 *
 *********************************************************/


#define BYTE1   xxxxx     /* take this number from the table supplied */
#define BYTE2   yyyyy     /* take this number from the table supplied */


main( )
{
        int  fd;

        if( (fd = open("dmdebug",1) ) == -1){
                printf("error:  could not open dmdebug for writing \ n");
                exit(1);
        }
        lseek(fd,BYTE1 - 1,0);
        if(write(fd," 03",1)  ! = 1) {
                printf("error:  could not write first byte \ n");
                exit(1);
        }
        lseek(fd,BYTE2 - 1,0);
        if(write(fd," 03",1)  ! = 1) {
                printf("error:  could not write second byte \ n");
                exit(1);

        }
        close(fd);
        printf(" dmdebug modified \ n");
}
```

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```
*********************************************************
*     MODIFYING DOWNLOADED PORTION OF DMDEBUG:     *
*     USE THIS PROGRAM IN STEP C3                  *
*********************************************************

#include <stdio.h>

/*********************************************************
*
*     This program modifies the binary of dmdebug.m version 1.1 or
*     1.2 to make it run better with version 8;7;5 terminals.
*
*********************************************************/

#define  BYTE      487     /* This value is the same for all entries in the table. */

main()
{
        int  fd;

        if((fd = open("dmdebug.m",1)) == -1) {
                printf("error:  could not open dmdebug.m for writing");
                exit(1);
        }
        lseek(fd,BYTE - 1,0);
        if(write(fd," 03",1)  != 1) {
                printf("error:  could not write first byte \ n");
                exit(1);

        }
        close(fd);
        printf(" dmdebug.m modified \ n");
}
```

6. Modification Kits or Accessories

Modification kits and optional accessories that may be used with the 5620 Terminals are listed below. Installation instructions are included with each kit.

Item	Part Number	COMCODE	Price Element Code
Modification Kit to Increase Memory Size to 1M Bytes	416563	524-165-636	33501
Tilt/Swivel Base for 5620	416575	524-165-750	33500
Modification Kit to Upgrade 5620 Display Terminal to Version 8;7;5 Firmware (2.0)	416583	524-165-834	33502

7. 5620 Terminal Software Package Version 2.0

Core Package

Processor	3B2 (Floppy)	3B5 (Lark)	3B5 (Tape)	3B20 (Tape)
COMCODE	104-298-922	—	—	—
Price Element Code	1041-560	—	1051-560	1081-560
J-Number	J1P097F4 L-1M1	J1P097D4 L-3M7	J1P097D4 L-1M1	J1P097A4 L-1M1

Application's Development Package

Processor	3B2 (Floppy)	3B5 (Lark)	3B5 (Tape)	3B20 (Tape)
COMCODE	104-298-930	—	—	—
Price Element Code	1041-561	—	1051-561	1081-561
J-Number	J1P097F4 L-1M2	J1P097D4 L-1M2	J1P097D4 L-3M8	J1P097A4 L-1M2

Text Processing Package

Processor	3B2 (Floppy)	3B5 (Lark)	3B5 (Tape)	3B20 (Tape)
COMCODE	104-298-906	—	—	—
	104-298-914	—	—	—
Price Element Code	1041-562	—	1051-562	1081-562
J-Number	J1P097F4 L-1M3	J1P097D4 L-1M3	J1P097D4 L-3M9	J1P097A4 L-1M3
	J1P097F4 L-1M4			

8.   Other Documentation

5620 Terminal Documentation

Complete document set contains all available user documents on the 5620 Terminal.	Price Element Code 1610-110

Individual Manuals

Individual manuals may be ordered by calling 1-(800) 432-6600, the AT&T Consumer Information Center. The ordering information follows:

Catalog Code	Select Code	Individual Manuals
999-801-122IS	306-145	Product Overview
999-300-127IS	930-127	Terminal User's Guide
999-801-119IS	306-140	5620 DMD User Guide
999-801-120IS	306-141	Administrators Guide
999-801-121IS	306-144	5620 DMD Reference Manual
999-801-123IS	306-146	Installation Guide and Release Notes for Core Package
999-801-037IS	306-142	5620 DMD Applications Development Guide
999-801-038IS	306-147	Installation Guide and Release Notes for Applications Development Package
999-801-322IS	306-143	5620 DMD Text and Graphics Applications Guide
999-801-323IS	306-148	Installation Guide and Release Notes for Text and Graphics Package

AT&T SOFTWARE SERVICE INFORMATION

All of the documentation for the AT&T 5620 Software Products have been carefully written to cover most of the questions that may arise during normal use.

For assistance in areas not covered in the documentation, and requests for media replacement under the limited warranty, a toll free hotline is available during normal business hours. The hotline will assist with usage and problem diagnosis for a period of 90 days after the date of purchase, delivery, or AT&T provided installation, whichever is latest provided that a completed Software Registration Card is returned within 5 days of that date.

For assistance, call AT&T at:

800-922-0354

Or write:

AT&T Customer Systems Support
Dept. TCD
1 Speedwell Avenue
Room 927
Morristown, New Jersey 07960

Frequently a problem can be diagnosed more accurately if AT&T technical personnel can remotely access the computer on which the software is executing. If possible, please connect an auto answer 300 or 1200 bps modem* to the direct dial phone network and to an appropriate port on the computer.

When you call or write, be sure to provide the 16 character serial number of the AT&T Software Product. The serial number can be found on the media (disk, tape or cartridge) label. Also mention:

- the date of purchase, delivery or date of AT&T installation

- your name and telephone number

- computer location

- your company name

- how purchased (either directly from AT&T or through an authorized AT&T dealer)

Additional assistance programs are available from AT&T. These include hotline service and updates beyond the initial 90 day period as well as a variety of on-site options. Contact your AT&T Account Executive or call 800-922-0354 for further information.

*A Dataphone®212 AR or equivalent