

MEMOREX

1377 Display Station Operation and Service Manual

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PREFACE

This manual provides information about the operation of and service requirements for the Memorex 1377 Model 4 Display Station. The Introduction, Section 1, lists the advantages of the 1377 Display Station over other cathode-ray tube display stations. A description of the 1377 display, keyboards, and optional selector light pen operation is provided in Section 2.

Sections 3, 4, and 5 comprise installation procedures, maintenance instructions, and programming notes, respectively.

Appendix A shows the 1377 international keyboards with the I/O interface codes.

Appendix B provides wiring diagrams for the logic PCB interfaces and the internal monitor AC cable harness.

Because the Memorex 1377 is designed to interface specifically with the IBM 3271, 3272, or 3791 Control Unit, and System/3, the reader should refer to the following IBM publications for system information:

- An Introduction to the IBM 3270 Information Display System, GA27-2739
- IBM 3270 Information Display System Component Description, GA27-2749
- Introduction to Programming the IBM 3270, GC27-6999
- A Guide to Using the Test Request Feature on IBM 3270 Information Display Systems, GA27-2774
- An Introduction to the IBM 3790 Communication System, GA27-2767
- IBM System/3 Model 8 Components Reference Manual, GA21-9209
- System/3 Model 10 Card and Disk Systems Components Reference Manual, GA21-9103
- IBM System/3 Model 12 Introduction, GC21-5116
- IBM System/3 Model 15 Components Reference Manual, GA21-9193

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SECTION 1 INTRODUCTION

The Memorex 1377 Display Station, shown in Figure 1-1, consists of a high-performance cathode-ray tube (CRT), a typewriter, typewriter with numeric pad, operator console, or data entry keyboard, and an optional selector light pen. These Display Stations are used in local or remote clusters to display alphanumeric data, and to enter data into and retrieve data from an IBM System 3, System/360, or System/370. Figure 1-2 illustrates compatible system configurations.



FIGURE 1-1. MEMOREX 1377 DISPLAY STATION

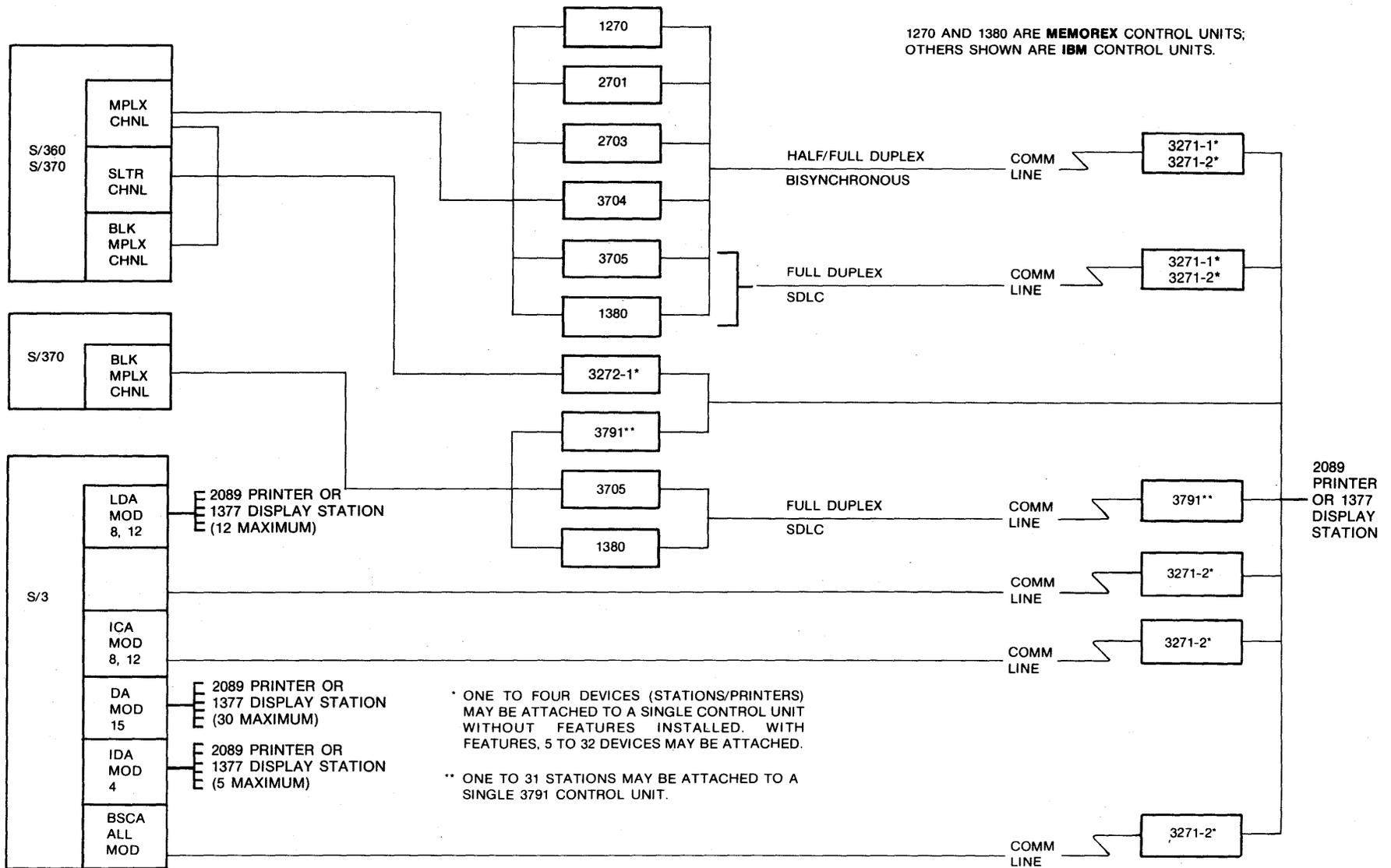


FIGURE 1-2. LOCAL AND REMOTE CLUSTERS OF 1377 DISPLAY STATIONS IN COMPATIBLE SYSTEM CONFIGURATIONS

The Memorex 1377 is a plug-compatible replacement for the IBM 3277-2 Display Station used in IBM 3270 Information Display Systems. Unique advantages of the 1377 are provided by the following **standard** features.

- Keyboard shift lock — Permits full secretarial shift.
- Audible Alarm for source error detection — Alerts the operator that a keyboard entry was not accepted or that the screen is full. Additional utilization of the Audible Alarm may be provided by the application program.
- Horizontal frequency of approximately 19 KHz — Provides quiet operation.
- Non-glare screen — Reduces eye strain.
- Refresh cycle of 60 Hz — Eliminates eye fatigue caused by noticeable blinking of the display.
- Reverse video cursor (dark print on light background when remainder of screen displays light print on a dark background) — Indicates clearly where the next character typed on the keyboard will appear on the screen.
- Additional line (line 25) — Indicates line and column numbers of cursor and defines status (i.e., SYSTEM AVAILABLE, INPUT INHIBITED, and INSERT MODE).
- Tiltable screen — Flexible position adjustment allows the screen to be tilted for maximum operator convenience or unusual operating environments.
- Fewer components resulting in reduced power consumption and increased reliability.

SECTION 2

OPERATOR'S GUIDE

2.1 1377 DISPLAY

The 1377 display, shown in Figure 2-1, allows up to 1920 characters to be entered and/or displayed in an area 24 lines by 80 columns. An additional line is provided at the bottom of the screen to display the cursor line and column number positions and machine status as illustrated in Figure 2-1. This 25th line is not accessible to the user for data entry or display.

The display may be unformatted or formatted, depending on the application program. An unformatted display allows entering data in any line. A formatted screen provides display fields intended for certain types of information, such as customer name, date, model number, etc. The fields on a formatted screen can be displayed with either normal or intensified brightness.

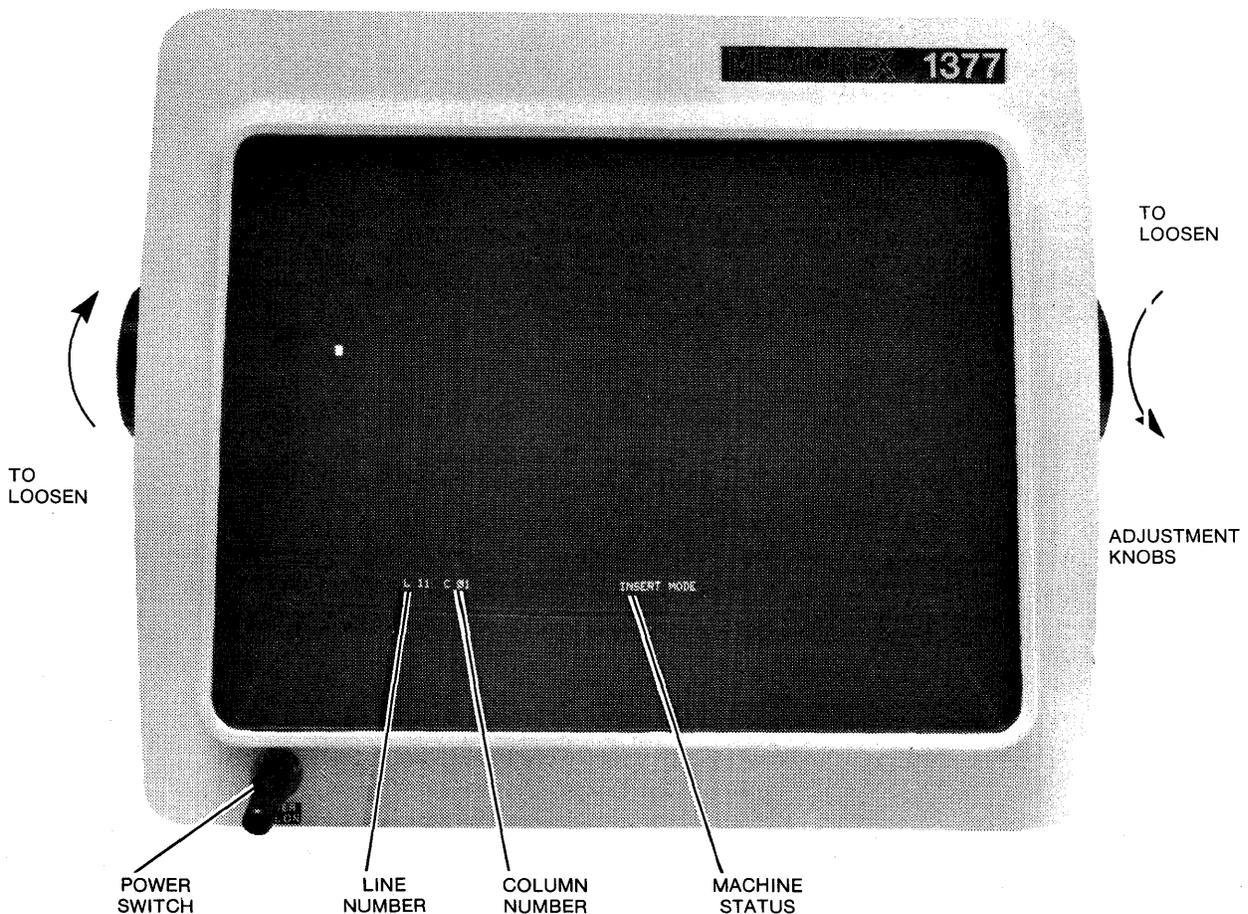


FIGURE 2-1. 1377 DISPLAY

Some of the fields on a formatted screen are protected by the program. Any attempt to enter data in a field that is protected is inhibited. A protected field is generally the title of the information to be entered by the operator (i.e., MODEL NO.). Data may or may not be displayed, depending on the program. In a personnel history, for example, SALARY display and/or modification would probably be inhibited to the operator. Since the program knows what type of information to expect from the fields set up on a formatted screen, it can process the data much more rapidly than it can process data entered randomly on an unformatted screen.

The keyboard Numeric Lock feature prevents entering any type of data except numeric data (numerals, minus sign, period, and DUP) into certain fields set up by the application program. If the operator attempts to enter an alphabetic character into a program-controlled numeric field, INPUT INHIBITED appears on the screen and the Audible Alarm sounds from the station. The computer may also indicate to the operator erroneous data entry into other display fields, although the alarm and system status may not indicate the error unless directed to do so by the program.

The Power switch for operation of the 1377 Display Station is located in the lower lefthand corner of the display as shown in Figure 2-1. The switch is a push-pull switch which provides power to the Display Station when pulled out and removes power when pushed in. In addition, the operator can adjust the brightness of the display by turning the switch clockwise for a brighter image or counterclockwise to dim the image.

Contrast and volume (Audible Alarm) adjustments can also be made, if necessary. The two controls provided for these purposes are located on the underside of the keyboard housing. By turning the desired control in a clockwise direction, maximum contrast or volume can be achieved.

To accommodate a variety of viewing angles, the 1377 display may be adjusted to individual preference with the adjustment knobs located on each side of the display (see Figure 2-1). This adjustment is made by turning each knob in a counterclockwise motion to release the display, adjusting the screen as desired, and turning each knob in a clockwise motion to tighten them, thus securing the desired viewing angle.

As noted in the Introduction, the 1377 display has several advantages for the operator that are provided as standard features of the Display Station. A non-glare screen and a rapid refresh cycle (60 Hz) eliminate eye fatigue caused by glare and blinking of the display. Features are also provided for quick reference and early error detection purposes. The reverse video cursor (light rectangular area on a dark background as shown in Figure 2-1) indicates clearly where the next character to be entered will appear on the screen. In addition to this quick reference aid, the 25th line continuously displays the cursor line number and column number and spells out the current status information for the operator.

2.2 KEYBOARD OPERATION

Four keyboards are available with the Memorex 1377 Display Station: a standard 78-key EBCDIC typewriter keyboard (Figure 2-2), a 66-key EBCDIC typewriter with 10-key numeric pad (Figure 2-3), a 78-key EBCDIC operator console keyboard (Figure 2-4), and a 66-key EBCDIC data entry keyboard (Figure 2-5). Typewriter and data entry keyboards are also available in seven languages, for international use. (Refer to Appendix A for the keyboard key formats and the I/O interface codes.)

The unshaded keys in Figures 2-2 through 2-5 are those keys which have an automatic repeat capability as long as they are pressed down (e.g., the SPACE bar). All other keys must be pressed down once for each keystroke. However, any character key can be automatically repeated if the operator simultaneously presses the SPACE bar and the character to be repeated. A space will occupy the first position on the screen, then the character will repeat from that point until the operator releases the SPACE bar.

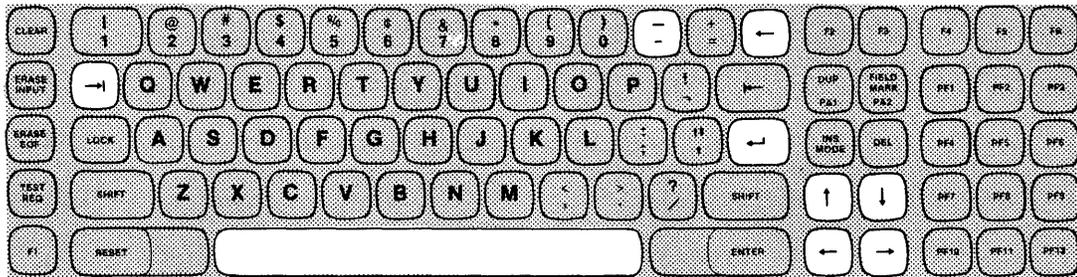


FIGURE 2-2. TYPEWRITER KEYBOARD

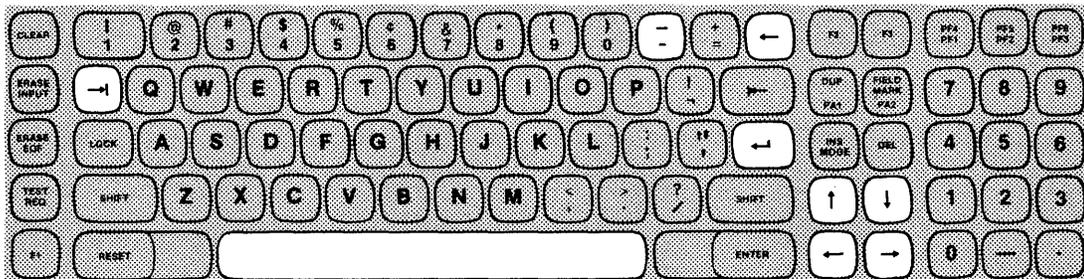


FIGURE 2-3. TYPEWRITER KEYBOARD WITH NUMERIC PAD

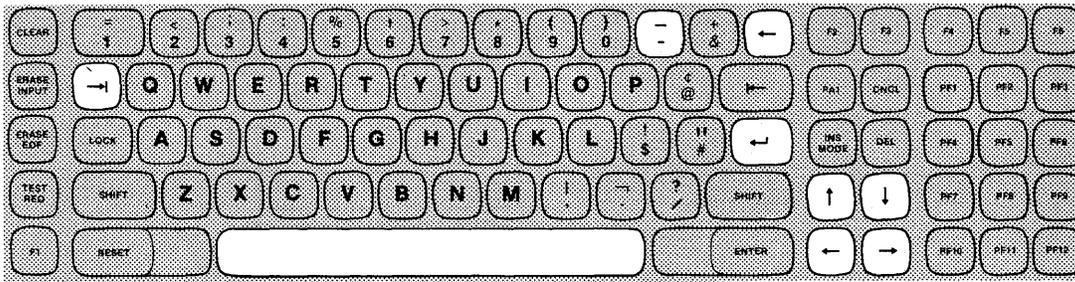


FIGURE 2-4. OPERATOR CONSOLE KEYBOARD

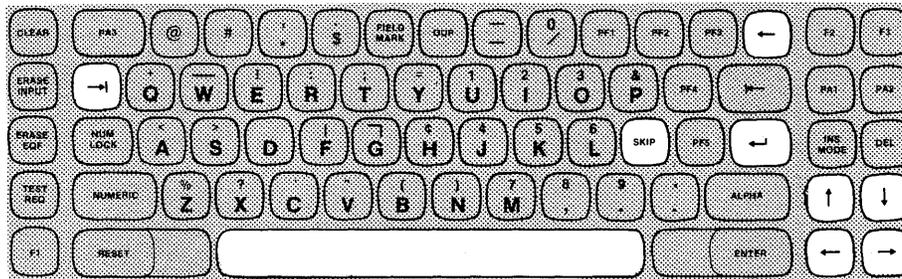


FIGURE 2-5. DATA ENTRY KEYBOARD

Six local function keys (F1 through F6) are available for future capabilities on the typewriter and operator console keyboards. The data entry and typewriter with numeric pad keyboards feature three function keys (F1 through F3). The F1 key, on the typewriter keyboard with numeric pad, is used to implement additional PF (program function) capabilities. (See the PF key description.)

An upper/lower-case alphabet is also available for the typewriter, typewriter with numeric pad, and operator console keyboards, as an optional feature.

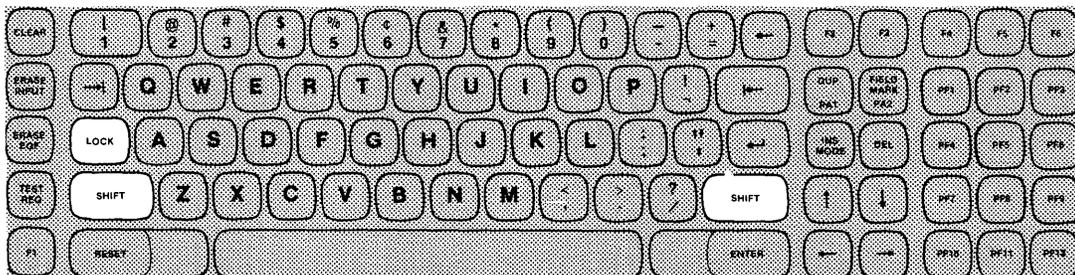
The operation of the Audible Alarm feature has been expanded to include these additional functions:

- Indicates that the operator has attempted to enter data while the system is in the INPUT INHIBITED mode.
- Indicates that the operator has attempted to tag a non-selectable field using the selector light pen.
- Indicates that the operator has attempted to enter non-numerical data into a program-defined numerical field.

Although the status INPUT INHIBITED appears on the screen when a keyboard entry is not accepted, the sounding of the alarm alerts the operator to discontinue entry at the exact point where input is inhibited should the operator fail to see the status indication appear on the screen. The Audible Alarm also indicates that the cursor is in the last character position on the screen. In addition, the Audible Alarm may be sounded by CPU control per the application program.

A description of the control, alphanumeric, symbol, and special purpose keys is provided below for each type of keyboard. The location of each key is shown as it is discussed. When keys are different or are in different locations on the four keyboards, an illustration of each keyboard is provided so that the differences may be compared easily. When the keys are identical on the four keyboards, only the typewriter keyboard is shown. If only the data entry keyboard differs, that keyboard is shown with the typewriter keyboard.

SHIFT/LOCK Keys (Operator Console, Typewriter, and Typewriter with Numeric Pad Keyboards Only)

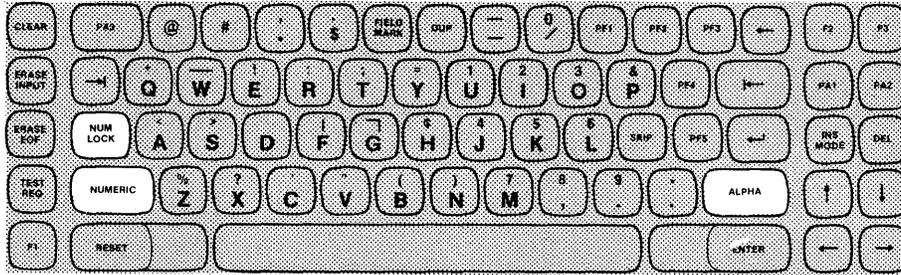


The SHIFT and LOCK keys are identical in function to those of a standard typewriter. When the SHIFT key is pressed in conjunction with a character key, the character shown on the upper half of the key is displayed. When the keyboard is shifted in conjunction with a dual-function control key, the function indicated on the upper half of that key is performed (e.g., DUP). Pressing a key without the SHIFT/LOCK key executes the character or function shown on the lower half of the key.

Pressing the LOCK key locks the keyboard in the shifted position until released by pressing either SHIFT key.

These keyboards provide a full secretarial shift. That is, when the LOCK key is pressed, the LOCK key remains down until released by pressing either SHIFT key. This provides the operator with a clear indication that the LOCK key is in the position desired before data is typed.

NUM LOCK, NUMERIC, ALPHA Keys (Data Entry Keyboard Only)

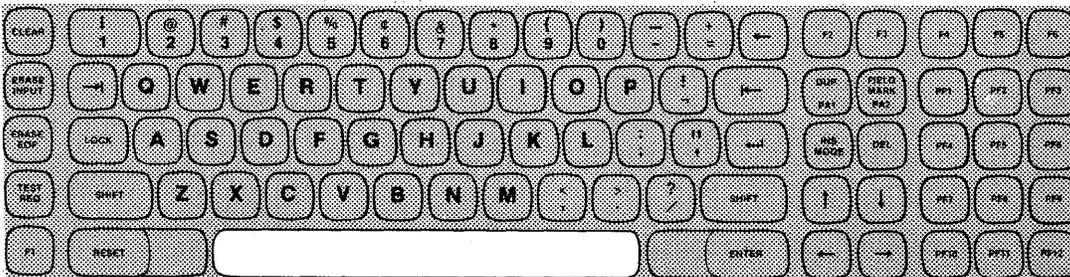


On the data entry keyboard, the NUM LOCK key, when depressed, locks the keyboard in the shifted position. This enables the consecutive entry of all upper-case characters. Depressing the NUM LOCK key a second time releases the keyboard from the shifted position. The NUMERIC key also allows the entry of uppercase characters; however, the NUMERIC key must be depressed simultaneously with each desired character entry. The ALPHA key enables the entry of any unshifted characters when the keyboard is in the shifted position; it must also be depressed simultaneously with each character to be entered. (The ALPHA or NUMERIC key can be pressed down once and held down while the desired character keys are depressed to facilitate consecutive character entry.)

NOTE

If the Numeric Lock feature is enabled, and the operator is entering data into a numeric field, entry of any characters other than 0-9, minus sign, period, and DUP is inhibited unless overridden by depressing either the NUMERIC or ALPHA key with the desired character key.

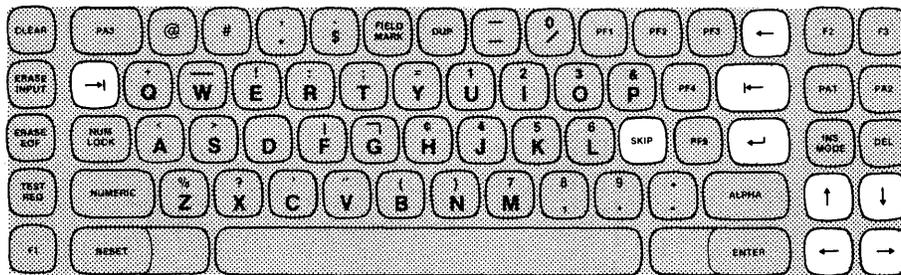
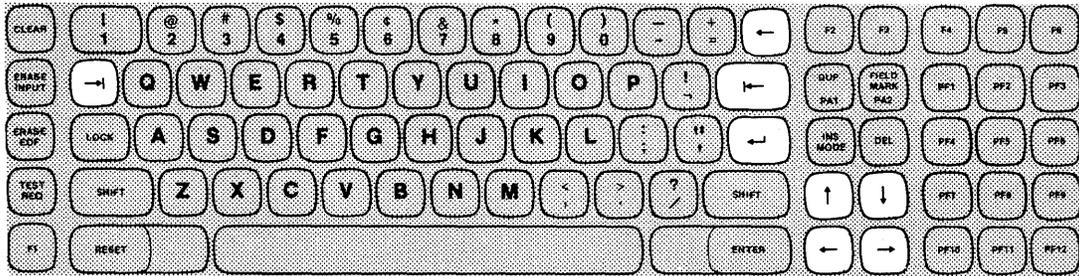
SPACE Bar



The keyboard SPACE bar is interpreted by the 1377 as any other character entry. When the SPACE bar is pressed, a space character replaces any character that appears in the position indicated by the cursor on the display. Therefore, caution should be taken not to use the SPACE bar to reposition the cursor.

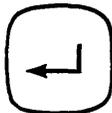
The SPACE bar has an automatic repeat capability.

CURSOR CONTROL Keys



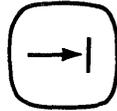
The cursor indicates to the operator where the next character entered will appear on the screen. Eight keys (nine on the data entry keyboards) allow the operator to move the cursor quickly from one position to another. As noted in the individual key descriptions below, some of the CURSOR CONTROL keys move the cursor one character location at a time, while others move the cursor from one position on the screen to a position on a new line or at the beginning of a new field. The CURSOR CONTROL keys have automatic repeat capability with the exception of the backtab key. A brief description of each CURSOR CONTROL key function follows, with illustrations presented as required.

NEW LINE Key—



Moves the cursor to the first unprotected character position on the next line containing an unprotected data field. If no unprotected field exists, the cursor returns to line 1, column 1 of the screen. (The NEW LINE key has an automatic repeat capability).

TAB Key—



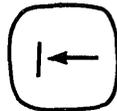
Moves the cursor to the beginning of the next unprotected data field. If the display is unformatted, the cursor moves to line 1, column 1. (The TAB key has an automatic repeat capability).

SKIP Key— (Data Entry Keyboard Only)



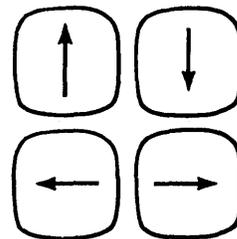
Functions identically to the TAB key. (The SKIP key has an automatic repeat capability.)

BACKTAB Key—



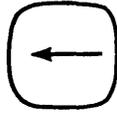
Moves the cursor back to the first unprotected character position in the field in which the cursor is located; if the entire field is protected or if the cursor is located at the beginning of the field, the cursor moves back to the first character location in the preceding unprotected input field.

HORIZONTAL and VERTICAL POSITIONING Keys—



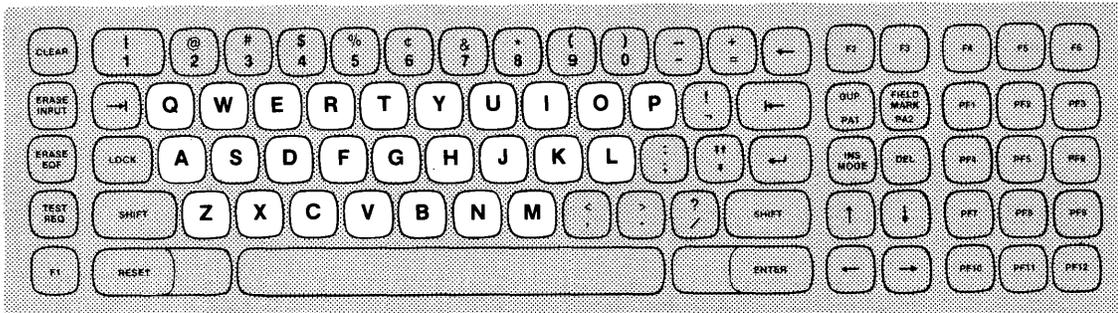
Moves the cursor one character position at a time in the direction indicated by the arrow. When located in the last character position in a line or column, the cursor moves to the opposite side of the screen (wraps around) if a positioning key is pressed. In the case of the horizontal keys, the cursor wraps around and appears on the righthand side of the line above if the arrow pointing to the left is pressed; the cursor wraps around and appears on the lefthand side of the line below if the key showing the arrow pointing to the right is pressed. When either vertical key is pressed, the cursor moves off the screen and reappears on the opposite end of the screen in the same column location. (These keys have an automatic repeat capability.)

BACKSPACE Key—

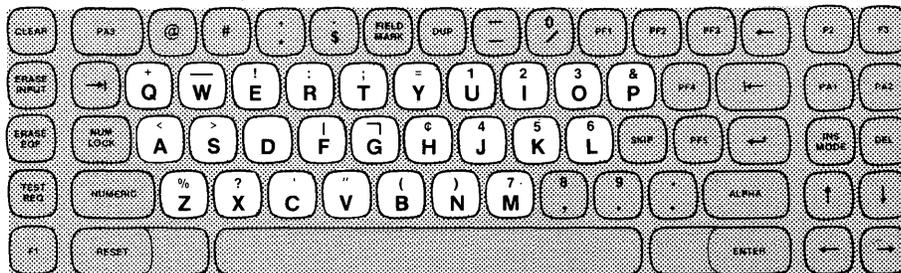


Moves the cursor one character position at a time to the left; operates the same as the left horizontal positioning key described above. (The BACKSPACE key has an automatic repeat capability.)

ALPHABETIC Keys

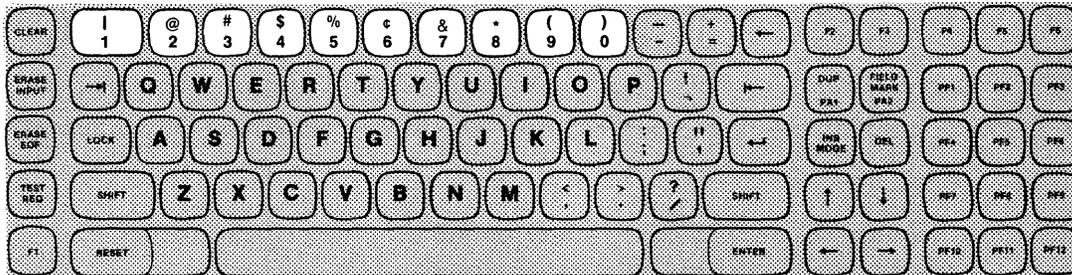


The ALPHABETIC keys on standard 1377 keyboards are identical to those of a typewriter, with the exception that only upper-case letters can be entered. However, on the optional upper/lower-case typewriter, typewriter with numeric pad, and operator console keyboards, lower-case letters appear on the screen when the letters are typed and the SHIFT/LOCK keys are not pressed. The SHIFT/LOCK keys must be pressed in conjunction with an ALPHABETIC key to enter an upper-case alphabetic character on these keyboards.

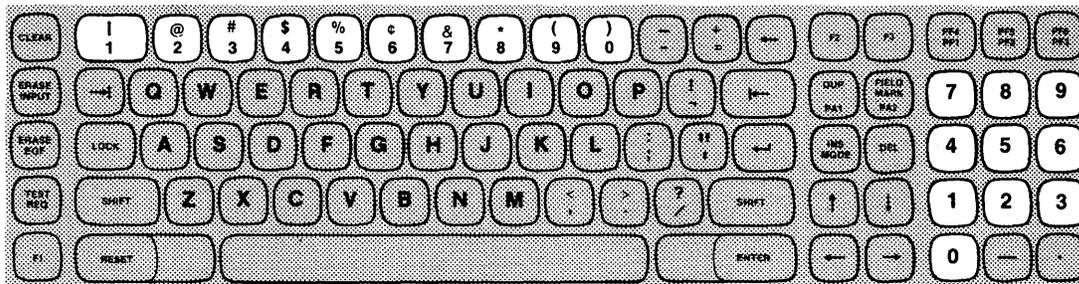


On the data entry keyboard, the ALPHABETIC keys are upper-case only. The keyboard must be in the unshifted position (NUM LOCK key released) to enter and display these characters.

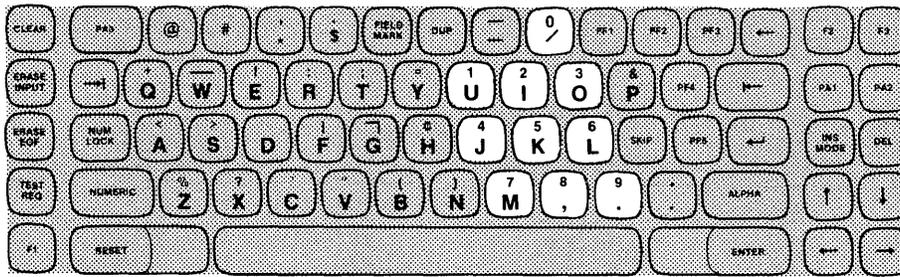
Numeric. Keys



On the typewriter and operator console keyboards, numbers are entered and displayed on the screen by pressing the Numeric keys while the keyboard is in the unshifted position.

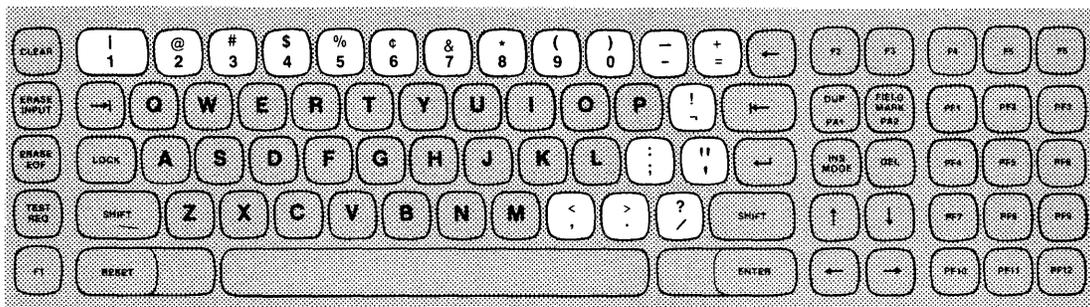


On the typewriter keyboard with numeric pad, the Numeric keys operate identically and are in the same location as the Numeric keys on the typewriter and operator console keyboards. In addition to these keys, this keyboard also includes a standard accounting 10-key pad. The numeric pad operates as the other set of Numeric keys: numbers are entered and displayed on the screen by pressing the desired Numeric keys while the keyboard is in the unshifted position. Two symbol keys, a minus sign (-) and decimal sign (.) are also included as part of the standard pad. These keys operate as the Numeric keys.

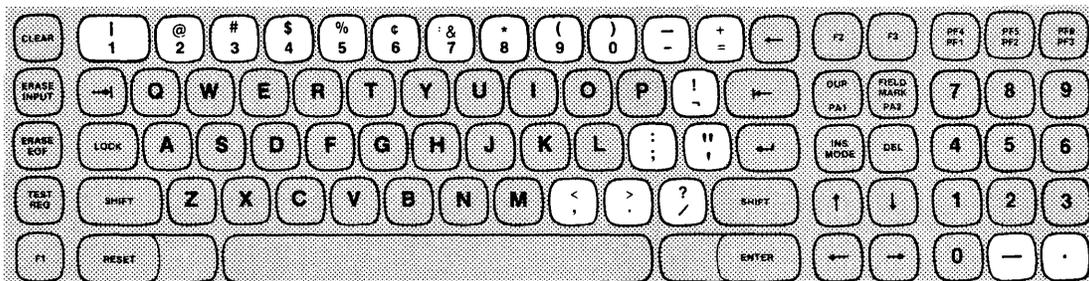


On the data entry keyboard, either the NUMERIC or NUM LOCK Key must be depressed (putting the keyboard in a shifted position) in order to enter and display numbers in a nonnumeric field.

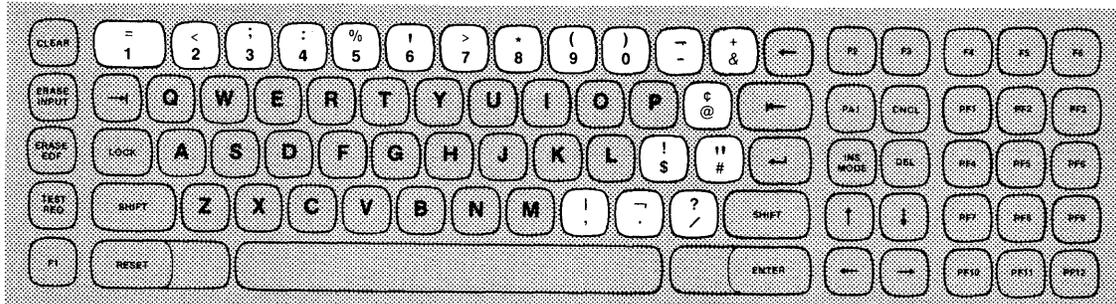
PUNCTUATION MARK and SYMBOL Keys (Typewriter, Typewriter with Numeric Pad, and Operator Console Keyboards)



Typewriter Keyboard



Typewriter Keyboard with Numeric Pad



Operator Console Keyboard

PUNCTUATION MARKS and SYMBOLS are entered and displayed by pressing the appropriate key while the keyboard is in either the shifted (for characters appearing on the upper portion of the keys) or the unshifted (for characters appearing on the lower portion of the keys) position.

PUNCTUATION MARKS and SYMBOLS may be located in different keyboard positions on the four types of 1377 keyboards. Because the layout of these keys is completely different on the data entry keyboard, it is pictured and described separately. These keys are identical on the typewriter and typewriter with numeric pad keyboards except for the two additional symbol keys on the numeric pad keyboard. The names of the PUNCTUATION MARKS and SYMBOLS on the typewriter, typewriter with numeric pad, and operator console keyboards are described below.

UPPER HALF OF NUMERIC KEYS

**TYPEWRITER/TYPEWRITER
WITH NUMERIC PAD KEYBOARDS**

**OPERATOR CONSOLE
KEYBOARD**

Key	Name	Key	Name
	Logical OR, Vertical Bar	=	Equals Sign
@	At Sign	<	Less Than Sign
#	Number Sign	;	Semicolon
\$	Dollar Sign	:	Colon
%	Percent Sign	%	Percent Sign
¢	Cent Sign	'	Apostrophe
&	Ampersand	>	Greater Than Sign
*	Asterisk	*	Asterisk
(Left Parenthesis	(Left Parenthesis
)	Right Parenthesis)	Right Parenthesis

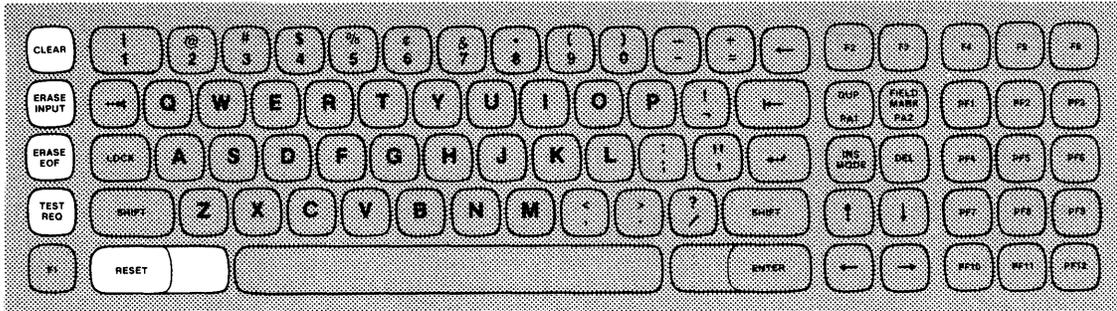
UPPER/LOWER PUNCTUATION MARK AND SYMBOL KEYS

**TYPEWRITER/TYPEWRITER
WITH NUMERIC PAD KEYBOARDS**

**OPERATOR CONSOLE
KEYBOARD**

Key	Name	Key	Name
— -	Underscore Minus Sign	}	Automatic Repeat Capability
+	Plus Sign	+	Plus Sign
=	Equals Sign	&	Ampersand
!	Exclamation Point	¢	Cent Sign
¬	Logical NOT Sign	@	At Sign
:	Colon	!	Exclamation Point
;	Semicolon	\$	Dollar Sign
"	Quotation Mark	"	Quotation Mark
'	Apostrophe	#	Number Sign
<	Less Than Sign		Logical OR, Vertical Bar
,	Comma	,	Comma
>	Greater Than Sign	¬	Logical NOT Sign
.	Period	.	Period
?	Question Mark	?	Question Mark
/	Slash	/	Slash
- (.)	Minus Sign Decimal Sign		
			Typewriter with Numeric Pad Only

CLEAR, ERASE INPUT, ERASE EOF, TEST REQ, and RESET Keys



The CLEAR key erases the entire screen and returns it to an unformatted state. When the CLEAR key is pressed, INPUT INHIBITED appears in the status area on the 25th line of the display. Keyboard entry is then inhibited until released by the program or by pressing the RESET key.

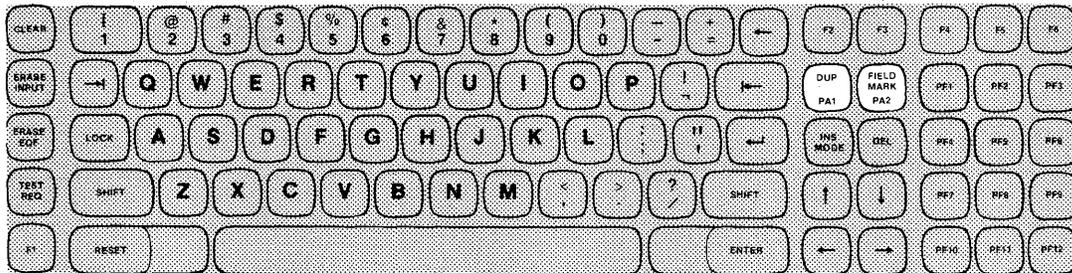
The ERASE INPUT key erases all unprotected fields on the screen and moves the cursor to the first position where data may be entered. If the entire display is unformatted, the cursor moves to line 1, column 1 of the screen.

The ERASE EOF (End of Field) key erases all characters from the cursor position to the end of the unprotected field in which it is located. The cursor does not move when this key is pressed. The primary function of this key is to correct erroneous data entered by tabbing to the beginning of the data field, erasing data entered in that field by pressing ERASE EOF, and typing in the correct data.

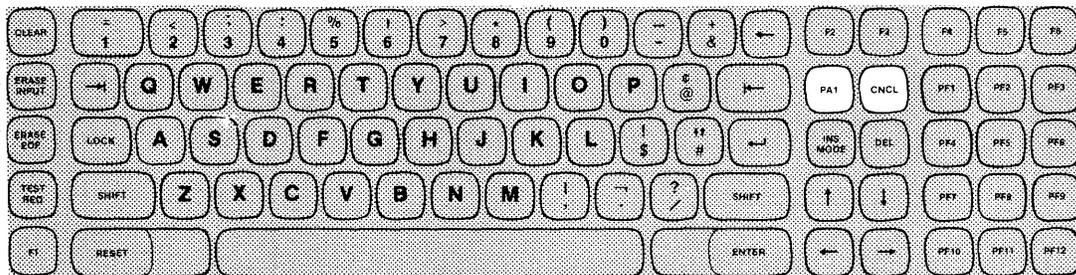
The TEST REQ key signals the computer that a test message is desired on the screen and causes INPUT INHIBITED to display on the screen. Data entry is then inhibited until released by the program or by pressing the RESET key. After TEST REQ has been pressed, the computer should provide further instructions. For details regarding the use of this key, the reader should refer to the IBM manual *A Guide to Using the Test Request Feature on IBM 3270 Information Display Systems*, GA27-2774.

The RESET key resets the INSERT MODE and INPUT INHIBITED status indications, unless data is being transferred to or from the system. When these indications are not reset because of data being transferred, the RESET key must be pressed again after data transfer has been completed.

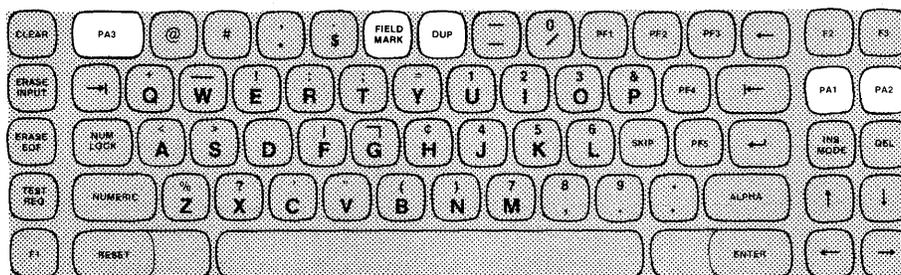
**DUP/PA1 and FIELD MARK/PA2 Keys
 (Typewriter, Typewriter with Numeric Pad Keyboards)
 PA1 and CNCL Keys (Operator Console Keyboard)
 PA1, PA2, PA3, DUP, FIELD MARK Keys (Data Entry Keyboard)**



Typewriter Keyboard
 (Identical location on Typewriter with Numeric Pad Keyboard)



Operator Console Keyboard



Data Entry Keyboard

The PA1 (for all keyboards), PA2 (typewriter, typewriter with numeric pad, and data entry keyboards) and PA3 (data entry keyboard only) keys provide Program Access from the keyboard. The function of these keys is determined by the program being executed at the time one of the keys is pressed. After a PA key is pressed, INPUT INHIBITED is displayed on the screen until reset by the program or by pressing the RESET key.

The DUP key (typewriter, typewriter with numeric pad, and data entry keyboards) enters an asterisk (*) in the cursor position on the display and moves the cursor to the beginning of the next unprotected data field. The DUP key signals the program that a duplication function is necessary. The program, however, determines the exact interpretation of this function. (On both typewriter keyboards, the SHIFT key must be held down when pressing the DUP key.)

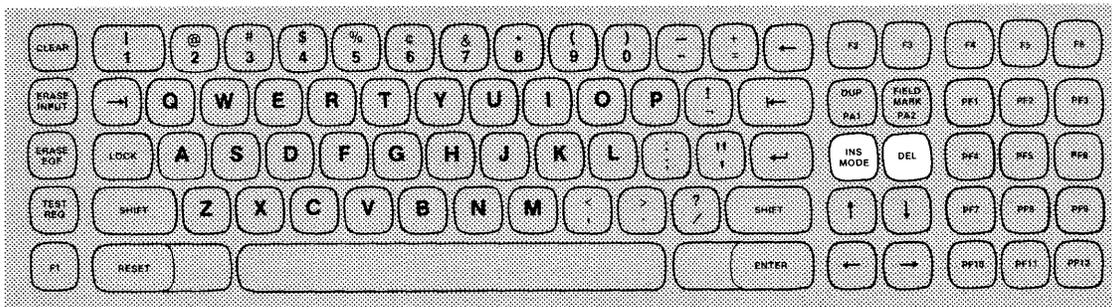
The FIELD MARK key (typewriter, typewriter with numeric pad, and data entry keyboards) causes a semicolon (;) to be displayed in the cursor position on the display. This code is normally used when the display is unformatted to indicate to the program that the end of a field has been reached. (On both typewriter keyboards, the SHIFT key must be held down when pressing the FIELD MARK key.)

The CNCL (Cancel) key, unique to the operator console keyboard, normally signals the computer to erase all data entered in unprotected fields and moves the cursor to the beginning of the first unprotected data field on the screen. The program determines the exact function of this key.

NOTE

On the optional upper/lower-case typewriter and typewriter with numeric pad keyboards, the DUP key enters a backward slash (\) in the cursor position on the display and the FIELD MARK key enters an arrow (→) in the cursor position.

INS MODE and DEL Keys

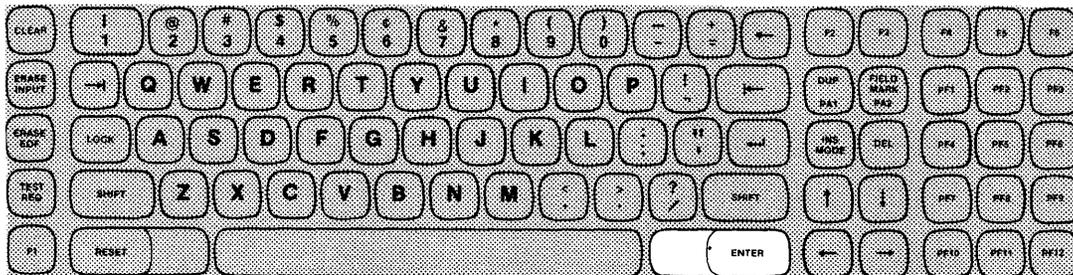


The INSERT MODE key allows the operator to enter or correct data in an unprotected field without changing the data following the insertion. When this key is pressed, the Display Station enters the Insert Mode. Keyboard operation is not inhibited unless the cursor is positioned in a protected field. Once the cursor has been moved to the location where an insertion is necessary, any key entry moves the character in the cursor location one space to the right and enters the new character in its place. Each character is inserted into the location originally occupied by the cursor, shifting the remaining letters to the right one character position. If necessary, and if the field is long enough, the characters may move to the line below to complete the insertion. The Audible Alarm sounds and the INPUT INHIBITED status appears if character insertion attempts to exceed the length of the field.

The keyboard is taken out of the Insert Mode by pressing the RESET key.

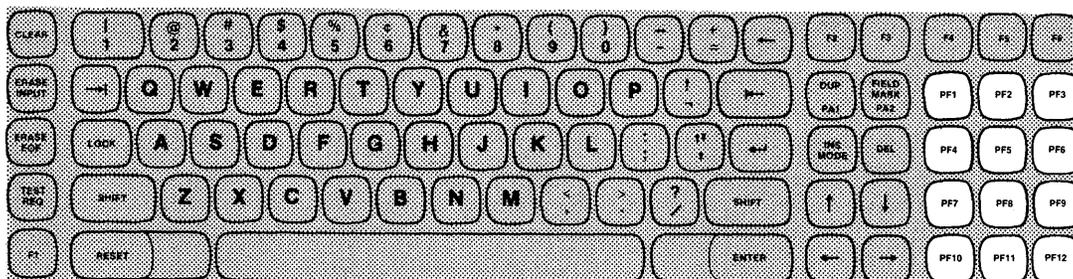
The DEL key allows the operator to delete data entered in the keyboard and displayed on the screen. This is accomplished by moving the cursor over the character to be deleted and pressing the DEL key. The character is removed and all characters following to the end of the field shift one character position to the left, thereby filling in the space left by the deleted character. The DEL key must be pressed once for each character deletion.

ENTER Key

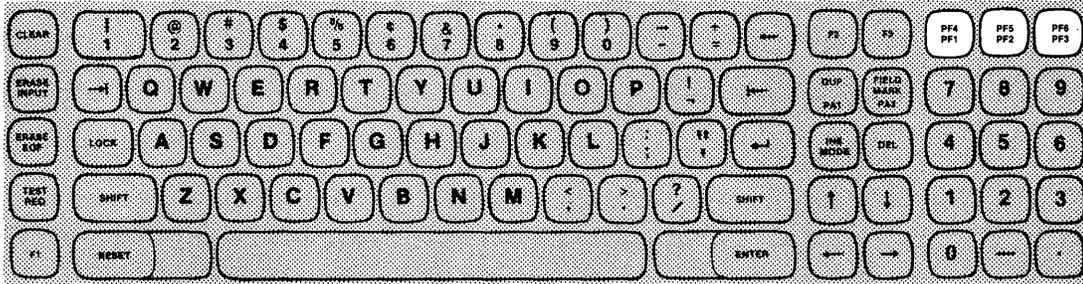


The ENTER key signals the computer that keyboard entry is complete and ready for transfer into the computer. When pressed, INPUT INHIBITED appears in the status area of the display and input is inhibited until released by the program or by pressing the RESET key (this is also true for the PF keys).

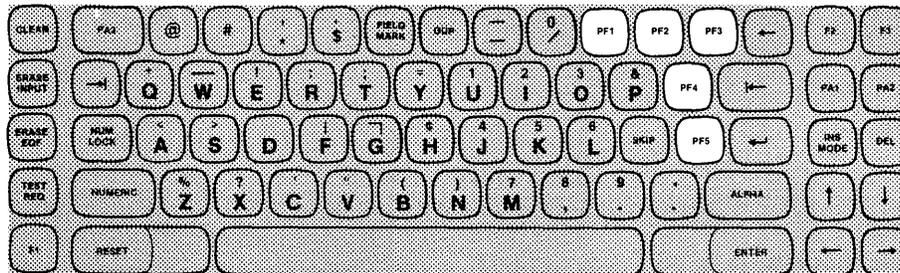
PF1 Through PF12 Keys (Typewriter and Operator Console Keyboards)



PF1 Through PF6 Keys (Typewriter Keyboard with Numeric Pad)



PF1 Through PF5 (Data Entry Keyboard)



The function performed by pressing a PF (Program Function) key is determined by the application program being executed at the time the key is pressed. Under one program, pressing PF1 may signal the computer to send a specified form to the display. The function of PF1 may be entirely different under another application program.

The PF keys on the typewriter keyboard with numeric pad function when the keyboard is in the shifted and unshifted positions. PF1, PF2, and PF3 operate normally (keyboard in unshifted position) when depressed. To operate PF4, PF5, and PF6, the keyboard must be put in the shifted position; this is done by pressing and holding the F1 key while pressing the desired PF4, PF5, or PF6 key. The F1 key only shifts to PF4, PF5, and PF6; all other functions remain the same.

2.3 1377 SELECTOR LIGHT PEN

A selector light pen is available as an optional feature of the 1377 Display Station. When used, the pen selects certain fields displayed on the screen. The addresses of these fields are then sent to the computer to be used as defined in the program.

A light pen field is denoted by a designator character located at the beginning of the field. These designators may be either a Greater Than Sign (>), a Question Mark (?), or a null or space character. Whenever a light-pen-detectable field showing a designator character is selected (tagged), the designator displayed changes (i.e., a Question Mark becomes a Greater Than Sign and vice versa). This indicates to the operator that the field has been tagged. Selectable fields without a Greater Than Sign or a Question Mark designator are attention fields and function like the ENTER key when selected.

To use the selector light pen, the operator presses the tip of the pen against the screen at a location within the field to be tagged (Figure 2-6). The electronic eye inside the pen reacts to the presence of light on the screen by changing the designator.

In operating the selector light pen, care should be taken to make sure that the tip of the pen is placed perpendicular to the screen. Slight tipping of the point may cause the field above or below the desired selection to be tagged. If this should happen, the operator simply presses the pen against the tagged field to deselect it and proceeds to reselect the proper field.

After all correct fields have been tagged, the field addresses are sent to the computer by pressing the light pen against a selectable field designated by a space or a null on the screen. These selectable fields are usually identified by the messages they spell out (e.g., ORDER COMPLETE).

2.4 1377 SECURITY KEY LOCK

A Security Key Lock feature is provided for each keyboard as an optional feature to prevent unauthorized operation. Although the cursor appears on the screen when this feature is installed, the keyboard is inoperable unless the key is turned in the key lock where it must remain for the duration of keyboard operation. The Security Key Lock is located on the righthand side of the keyboard. (See Figure 2-7.)

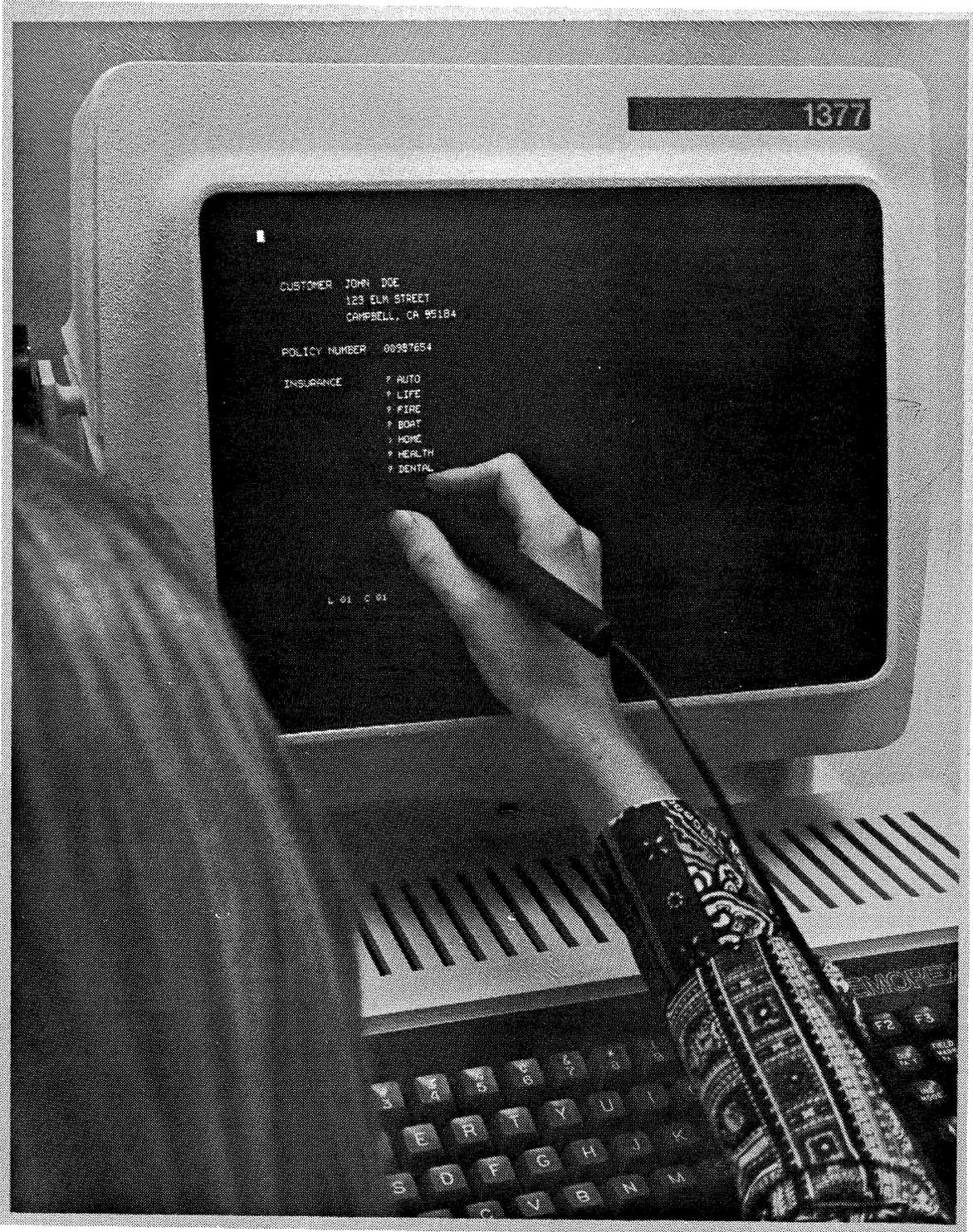


FIGURE 2-6. SELECTOR LIGHT PEN OPERATION

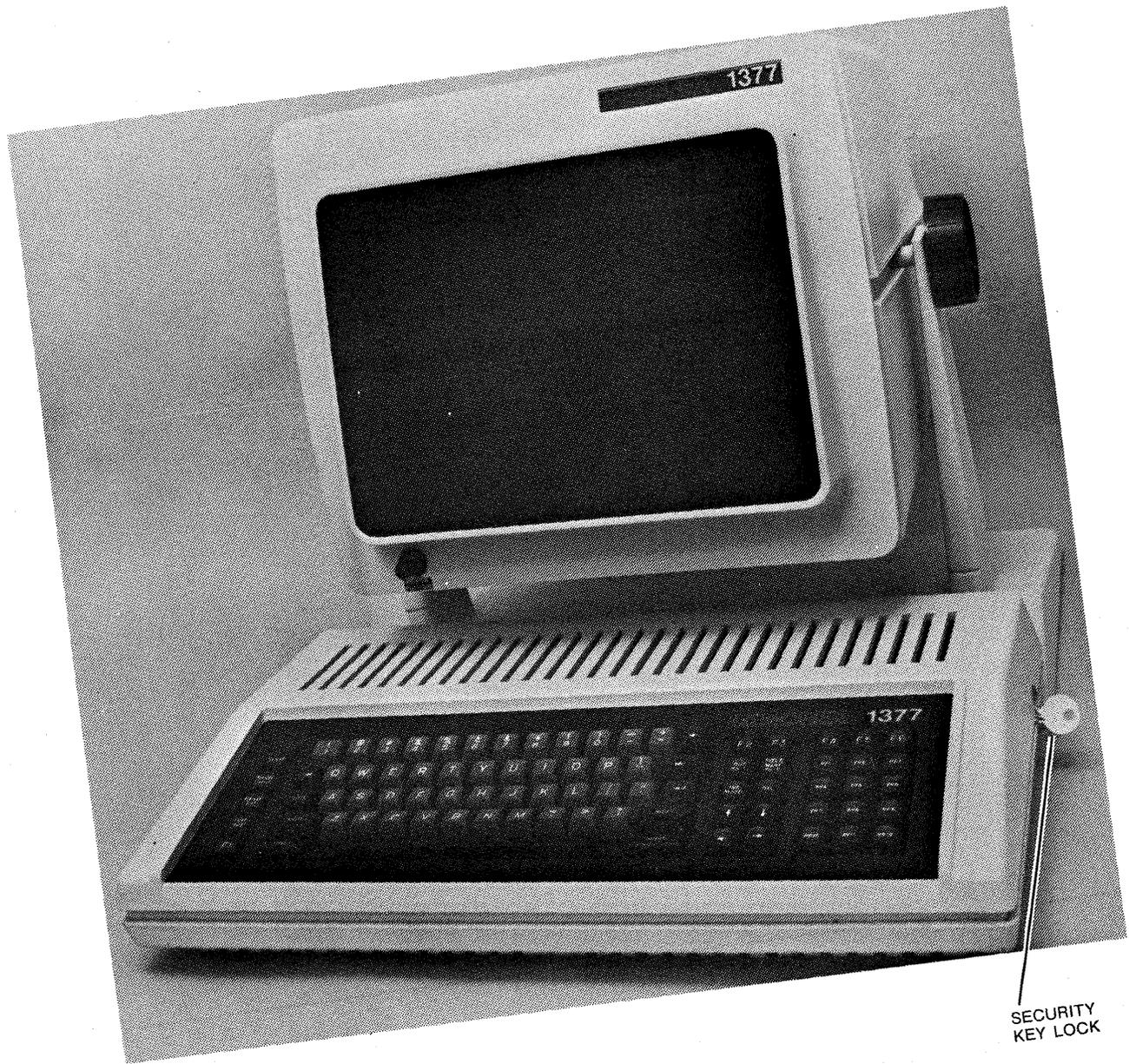


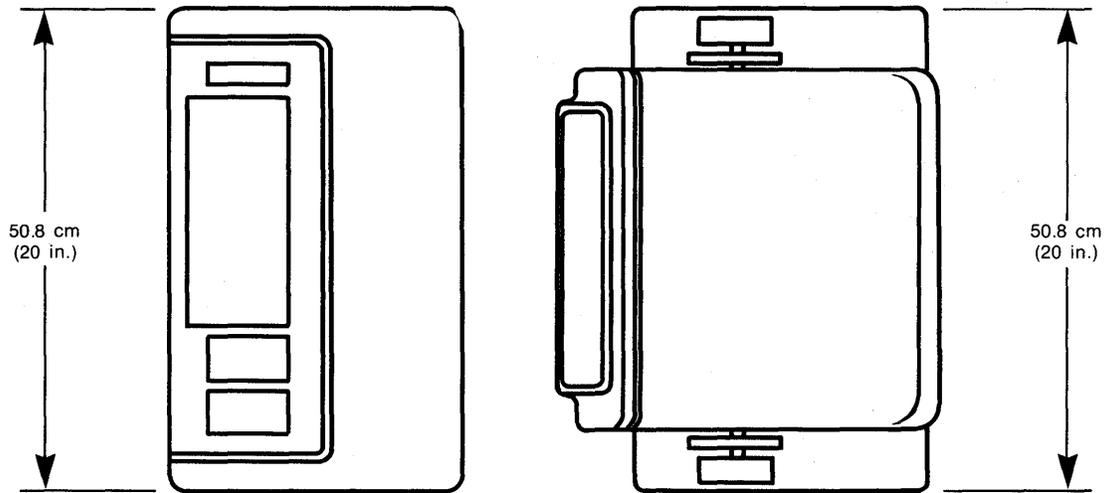
FIGURE 2-7. SECURITY KEY LOCK

SECTION 3 INSTALLATION

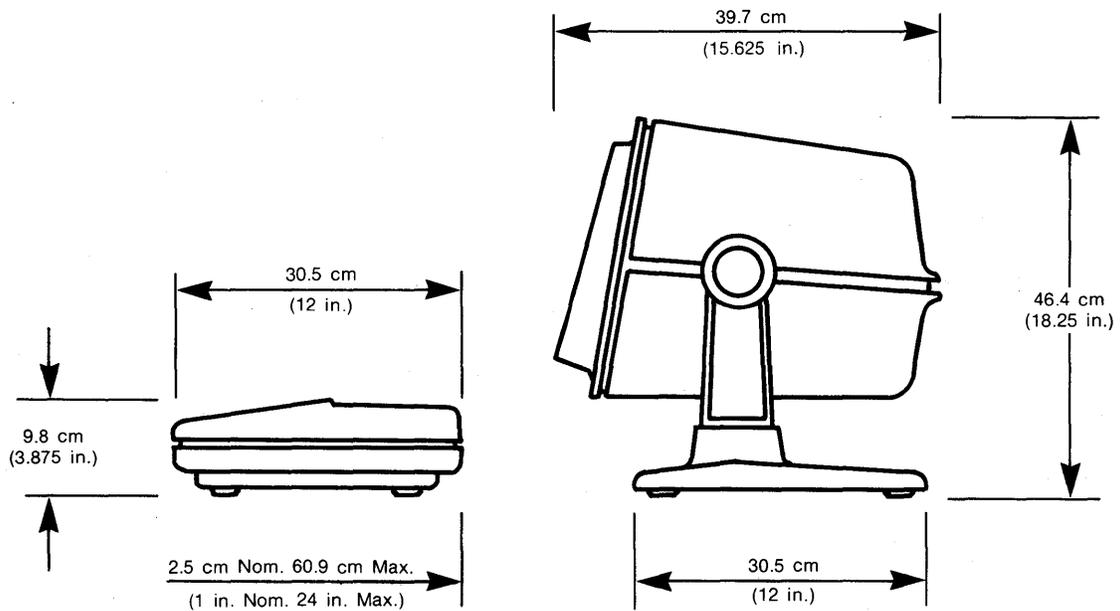
3.1 SPECIFICATIONS

Dimensions	Refer to Figure 3-1*
Weight	25.4 kg (56 lb), including keyboard
Operating Clearances	
Top	15 cm (6 in.)
Bottom	No requirement
Sides	8 cm (3 in.)
Front	0 cm (0 in.)
Rear	3 cm (1 in.)
Airflow	Convection only
Power Requirements	
kVA	0.085
Phases	Single — 117 VAC ($\pm 10\%$) or 230 VAC (+15% -10%)
Power Cord Length	2.43 m (8 ft)
Environment, Operating	
Temperature	10° to 43°C (50° to 110°F)
Relative Humidity	10% to 90%
Maximum Wet Bulb	27° C (80° F)
Environment, Nonoperating	
Temperature	10° to 49°C (50° to 120°F)
Relative Humidity	10% to 90%
Maximum Wet Bulb	27° C (80° F)

*The 1377 is designed for tabletop use. Recommended table height is 66 cm (26 in.). The keyboard can be physically located up to 60.9 cm (24 in.) from the front of the display stand.



TOP VIEW



SIDE VIEW

FIGURE 3-1. DIMENSIONS OF 1377 DISPLAY STATION

3.2 CABLE REQUIREMENTS

The customer is responsible for the interconnect cable between the Display Station and the Control Unit. Cable length may not exceed 609 m (2000 ft).

Cable Type: Coax Commercial Type RG-62 A/U

Connector Type: Commercial Type BNC UG-260 B/U

3.3 PROCEDURE

1. Remove Display Station from packaging per instructions provided on the container.

CAUTION

Do not remove the adjustment knobs in the next step.

2. Release the monitor from its tightened position, if desired, by turning each adjustment knob in a counterclockwise direction.
3. Connect display to keyboard by attaching keyboard cable to back panel of display as illustrated in Figure 3-2.
4. Interconnect AC cord between connector at back of display (see Figure 3-2) and wall outlet.

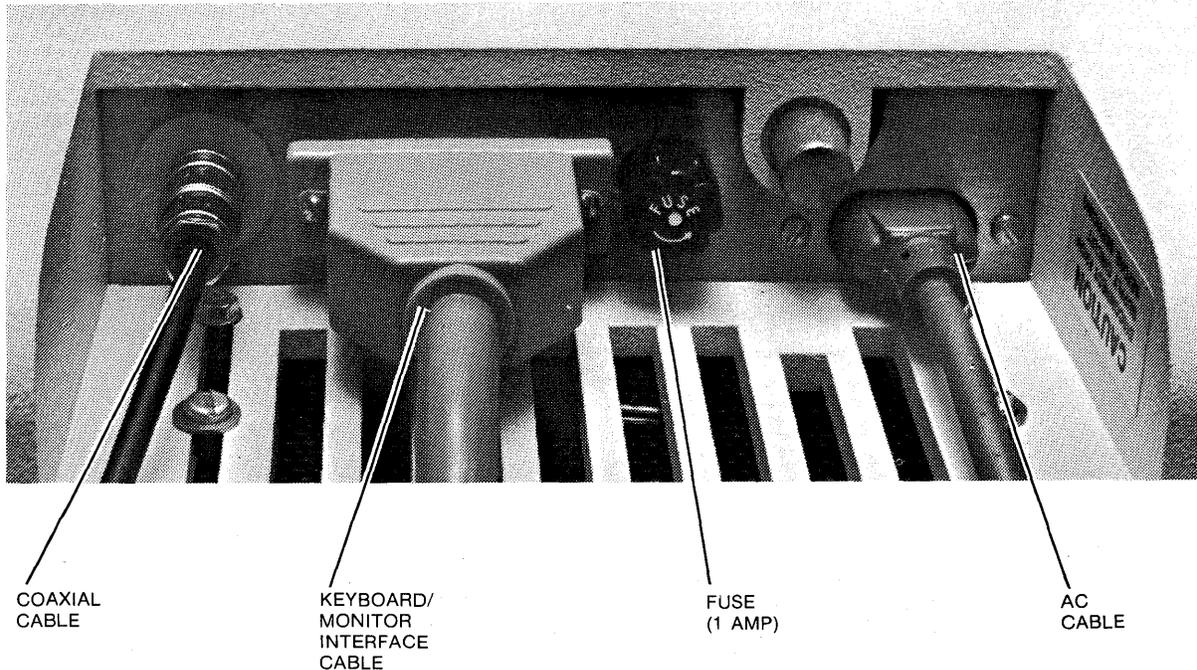


FIGURE 3-2. CABLE CONNECTIONS

5. Offline Check

- a. Pull power switch out to apply power to Display Station. Assure that Audible Alarm sounds and that cursor, line number, and column number appear on the screen (within 30 seconds) before proceeding. (If an error or malfunction occurs at this point, follow applicable steps in customer troubleshooting flowchart, Figure 4-8.) If INPUT INHIBITED appears, press RESET key.
- b. Enter several random characters from the keyboard to verify accuracy in character display.
- c. Test function of CURSOR CONTROL keys.
- d. Test INSERT MODE by pressing key. INSERT MODE should appear on 25th line of screen. Move the cursor to a location in the center of data displayed on the screen. Insert two or three characters to assure that INSERT MODE is functioning properly. Press Reset key.
- e. Test DEL key by moving cursor to location in the center of data displayed on the screen and pressing DEL two or three times to assure that characters are properly deleted from display.
- f. Test ERASE EOF key by moving cursor to a location in the center of data displayed on the screen and pressing the ERASE EOF key. All data from the cursor location to the last character typed on the screen should disappear.
- g. Test ERASE INPUT by pressing key and assuring that all data displayed on the screen is erased.
- h. Test the CLEAR key by entering data on the screen and then pressing CLEAR to assure that the screen is cleared. INPUT INHIBITED should appear. Press Reset key.

If an error should occur or the Display Station should malfunction during Offline Check (steps b. through h.), notify Memorex service. Otherwise, proceed to Step 6.

6. Connect coaxial cable from the Control Unit to the Display Station as shown in Figure 3-2. Identify Display Station Coaxial Cable by tagging it at the Control Unit connector and at the Display Station.

7. Online Check

If customer programs include IBM Online Tests (OLTs) or Requests for Tests (RFTs), these programs may be run to check the online functioning of the Display Station. If these programs are unavailable, the customer application program should be run for online testing. Should an error or malfunction occur during the test program, the customer should follow the troubleshooting guidelines set forth in Figure 4-8.

SECTION 4 MAINTENANCE

All procedures in this section are performed by Memorex field service personnel except the contrast/volume adjustments, which can be performed by the customer, and the customer troubleshooting procedures outlined in Figure 4-8.

This section describes the procedures to be taken for disassembly and assembly of the 1377 Display Station, the contrast and volume adjustments, the various procedures for monitor alignment, and the customer and Memorex field service troubleshooting procedures. Disassembly/assembly procedures are provided first since these procedures may be required for either monitor alignment or troubleshooting.

4.1 DISASSEMBLY/ASSEMBLY

The following disassembly procedures cover the two major components of the 1377 Display Station: the monitor and the keyboard. To assemble the 1377, reverse the procedures specified in paragraphs 4.1.1 and 4.1.2.

4.1.1 Monitor Disassembly

1. Put power switch in the OFF position.
2. Disconnect the external AC, coaxial, and keyboard/monitor interface cables from the back of the monitor (Figure 4-1).
3. Remove the external fuse shown in Figure 4-1.
4. Loosen the top cover screw (Figure 4-1).

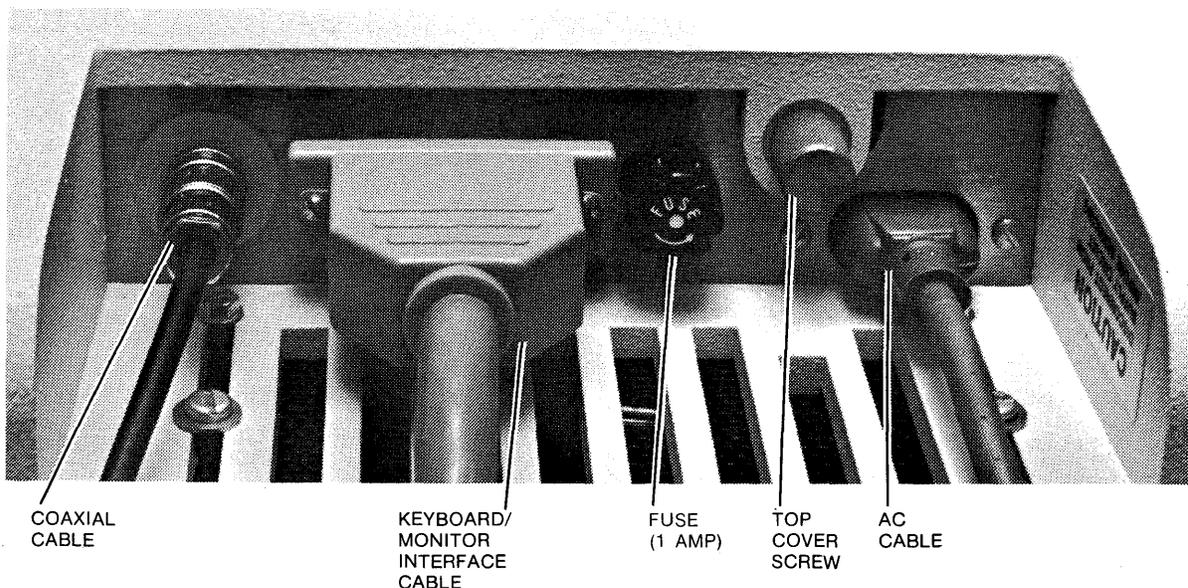


FIGURE 4-1. MONITOR CONNECTOR PANEL

WARNING

Note the areas of high voltage on the monitor chassis shown in Figure 4-7 before removing the monitor top cover.

5. Remove the top cover of the monitor (Figure 4-2).

CAUTION

Do not remove the adjustment knobs in the next step.

6. Loosen the monitor adjustment knobs until the housing rocks back and forth freely. (Figure 4-2)

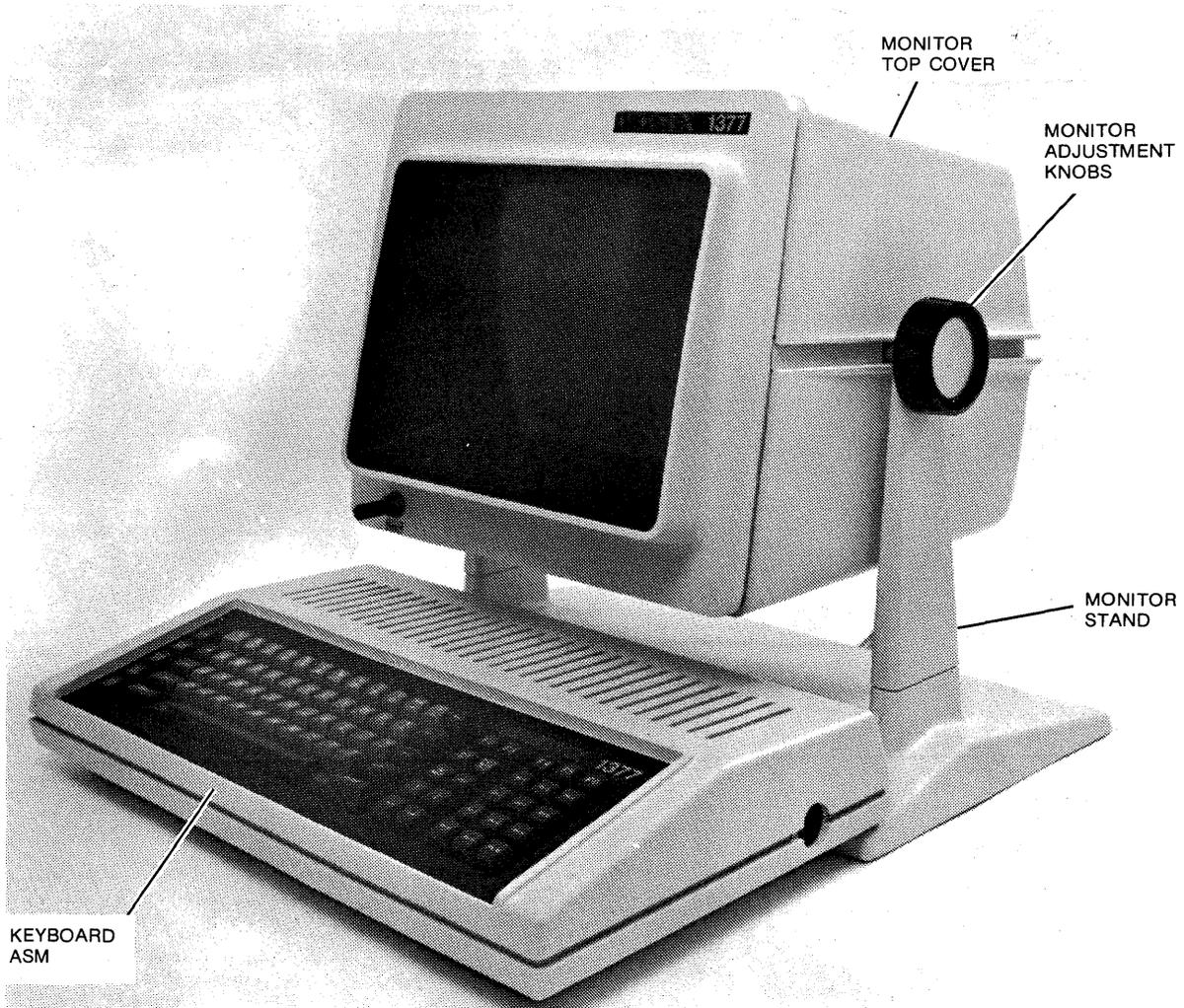


FIGURE 4-2. DISPLAY STATION MAJOR ASSEMBLIES

7. Position the monitor and monitor stand as shown in Figure 4-3.
8. Remove the adjustment knobs.
9. Remove the stand from the monitor.

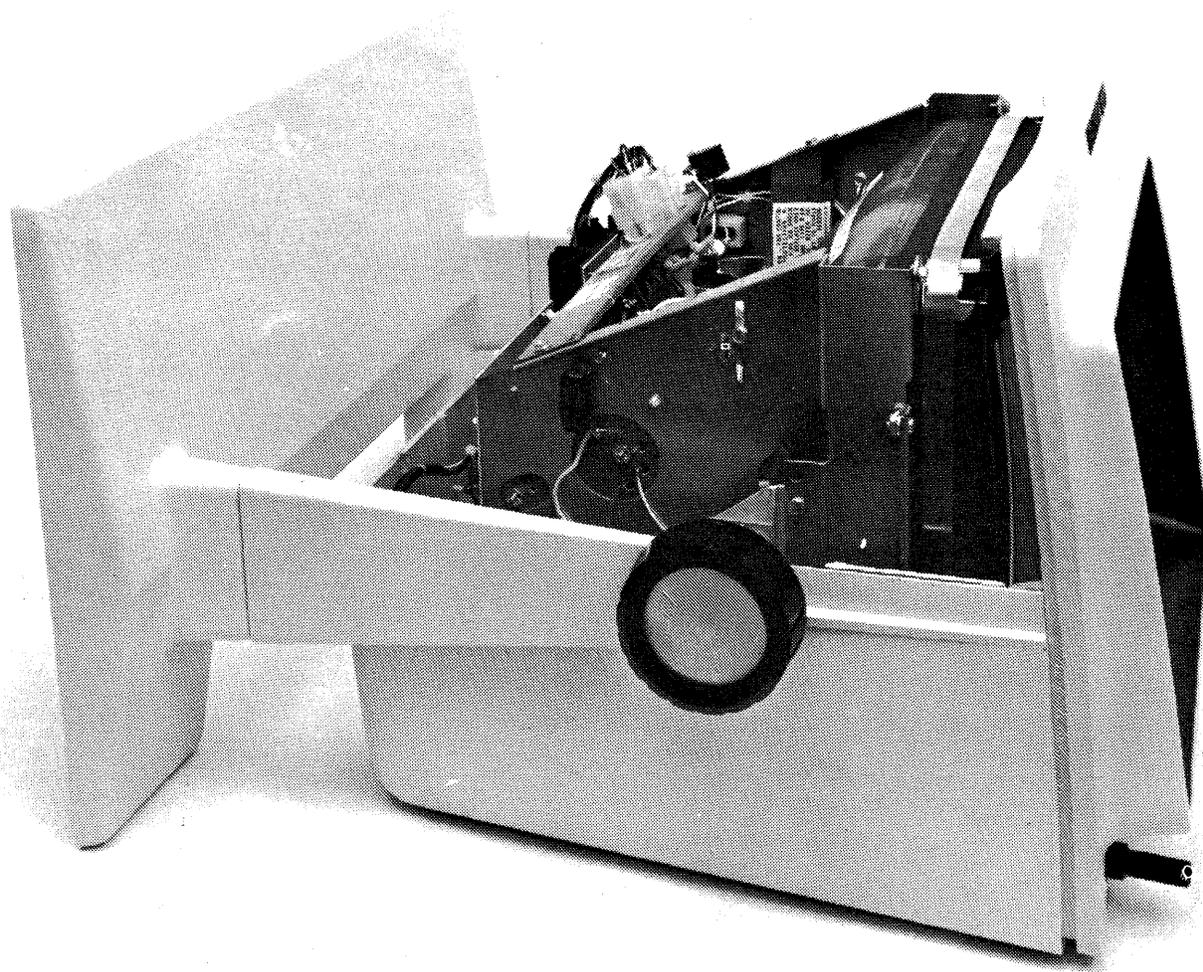


FIGURE 4-3. ADJUSTMENT KNOB AND STAND REMOVAL POSITION

4.1.2 Keyboard Disassembly

1. Tilt the keyboard as shown in Figure 4-4.
2. Remove the six keyboard housing cover mounting screws located on the bottom of the keyboard (Figure 4-4).
3. Set the keyboard in an upright position.
4. Remove the keyboard housing cover.
5. Disconnect the logic PCB/keyboard PCB interface cable (two places), the Audible Alarm cable, and the internal monitor/keyboard interface cable (Figure 4-5).
6. Using a 1/4" hex driver, remove the keyboard assembly from the keyboard brackets by removing the four mounting screws (Figure 4-5).

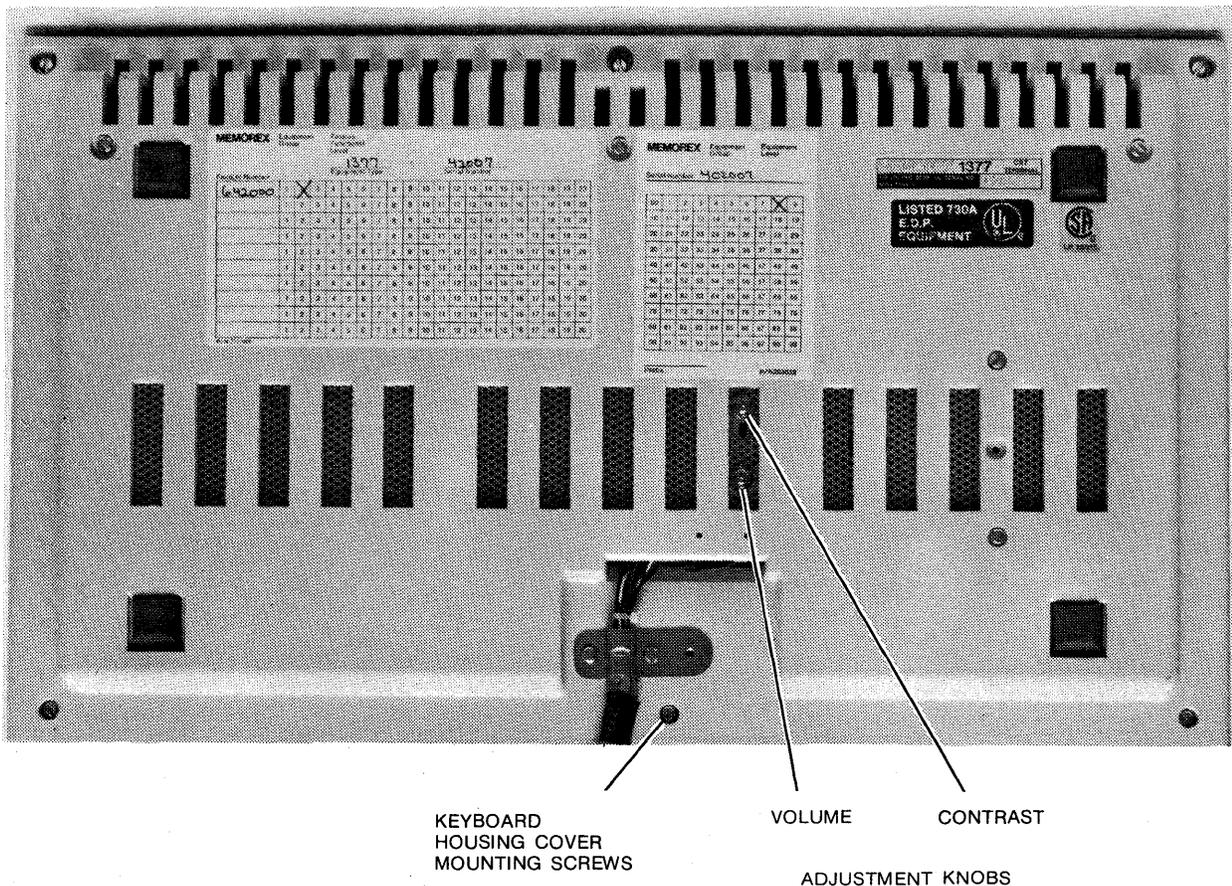


FIGURE 4-4. KEYBOARD (BOTTOM VIEW)

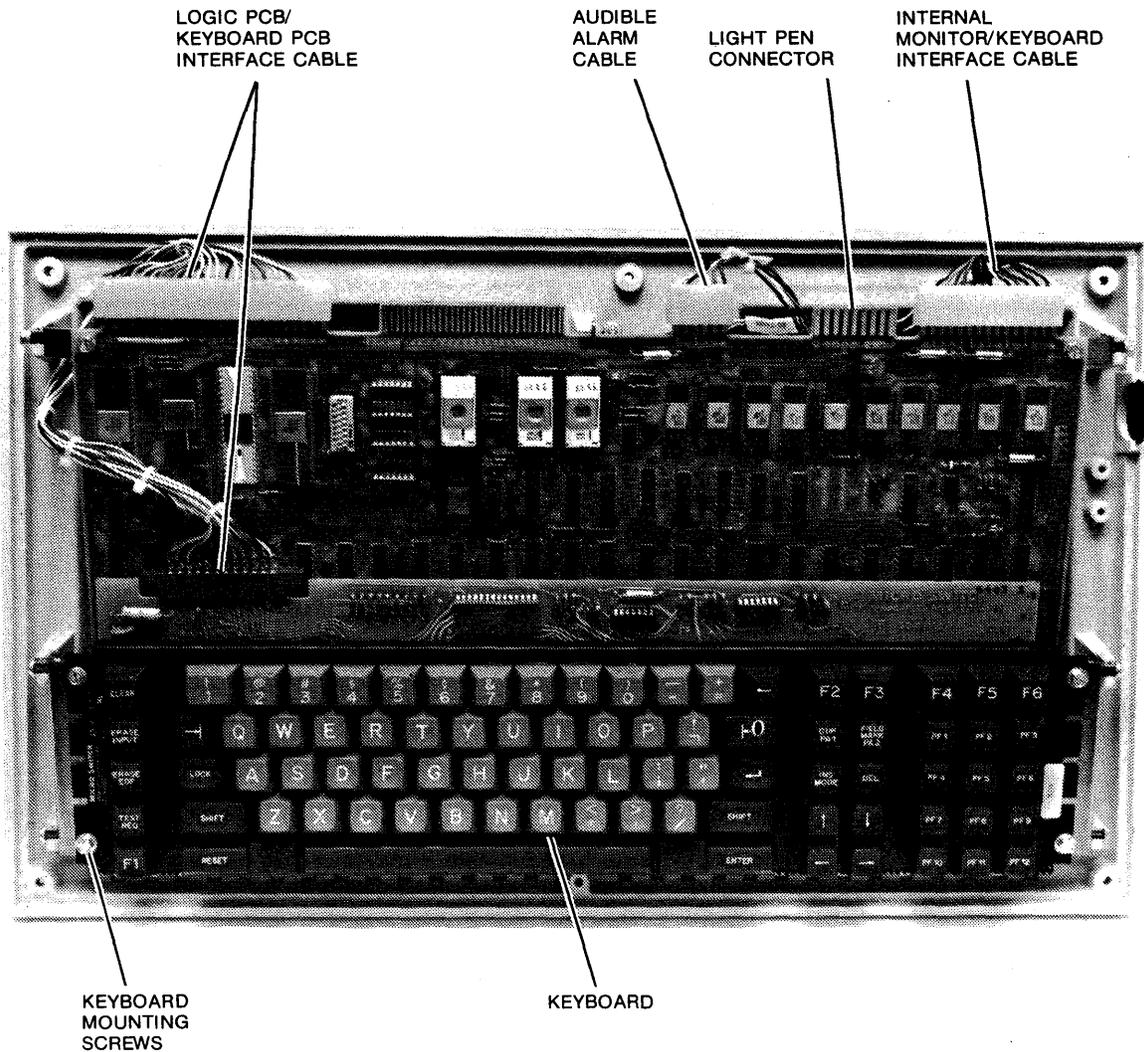


FIGURE 4-5. CABLE DISCONNECT AND PCB REMOVAL

7. Remove the logic PCB by taking out the screws and nuts shown in Figure 4-6.

CAUTION

If removing or replacing any of the three EROMs or the character generator (shown in Figure 4-6), make sure the area is static-free. These are static-sensitive devices.

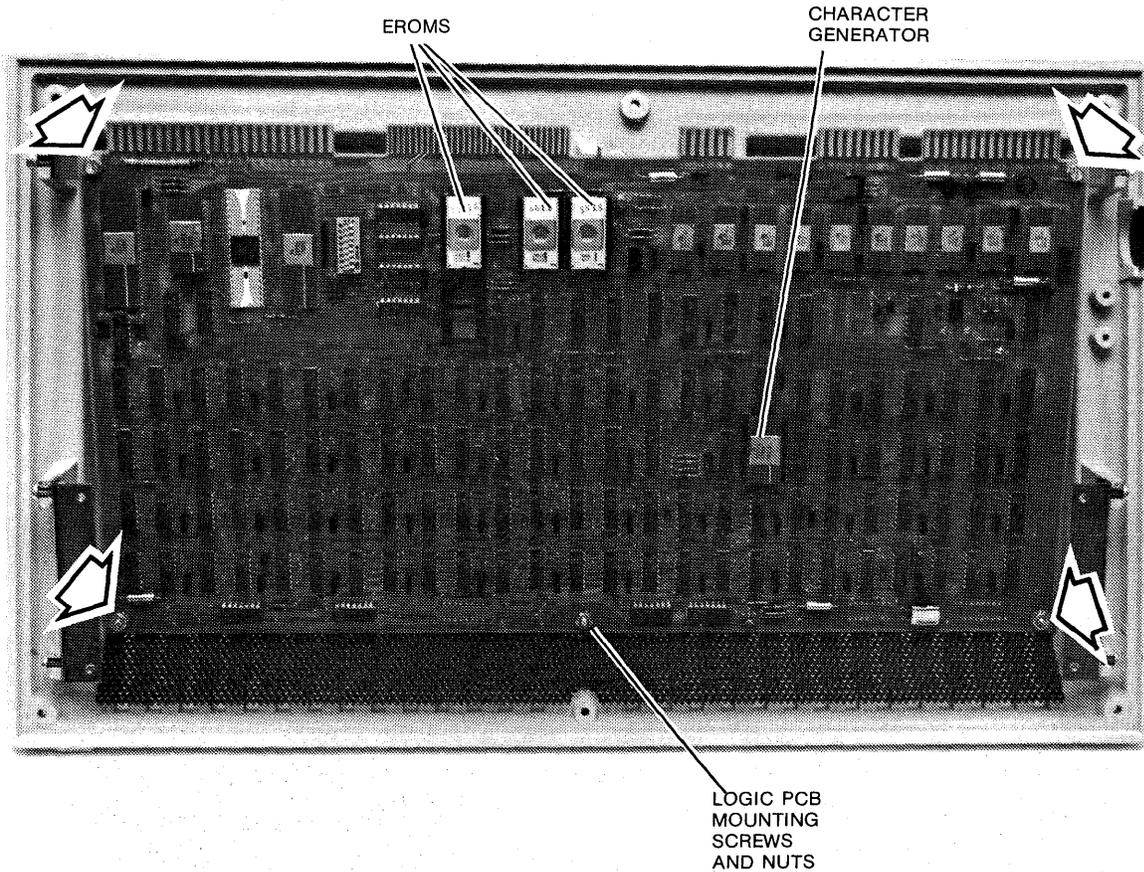


FIGURE 4-6. REMOVAL OF LOGIC PCB

4.2 CONTRAST/VOLUME ADJUSTMENTS

Contrast and volume adjustments are made with the two controls located on the underside of the keyboard housing. (Reference Figure 4-4.) Maximum contrast (display clarity, brightness) and volume (audible alarm volume level) is achieved by turning the appropriate control in the clockwise direction.

4.3 MONITOR ALIGNMENT

Monitor alignment may be required in the maintenance of the 1377 Display Station. Most of the adjustments are made with two special tools: a long plastic screwdriver and a long plastic hex tip. These tools are available to Field Engineering personnel.

WARNING

Extremely high voltage is present on several areas of the monitor chassis. When performing an alignment procedure, observe the warning affixed to the monitor chassis. Areas of high voltage are shown in Figure 4-7.

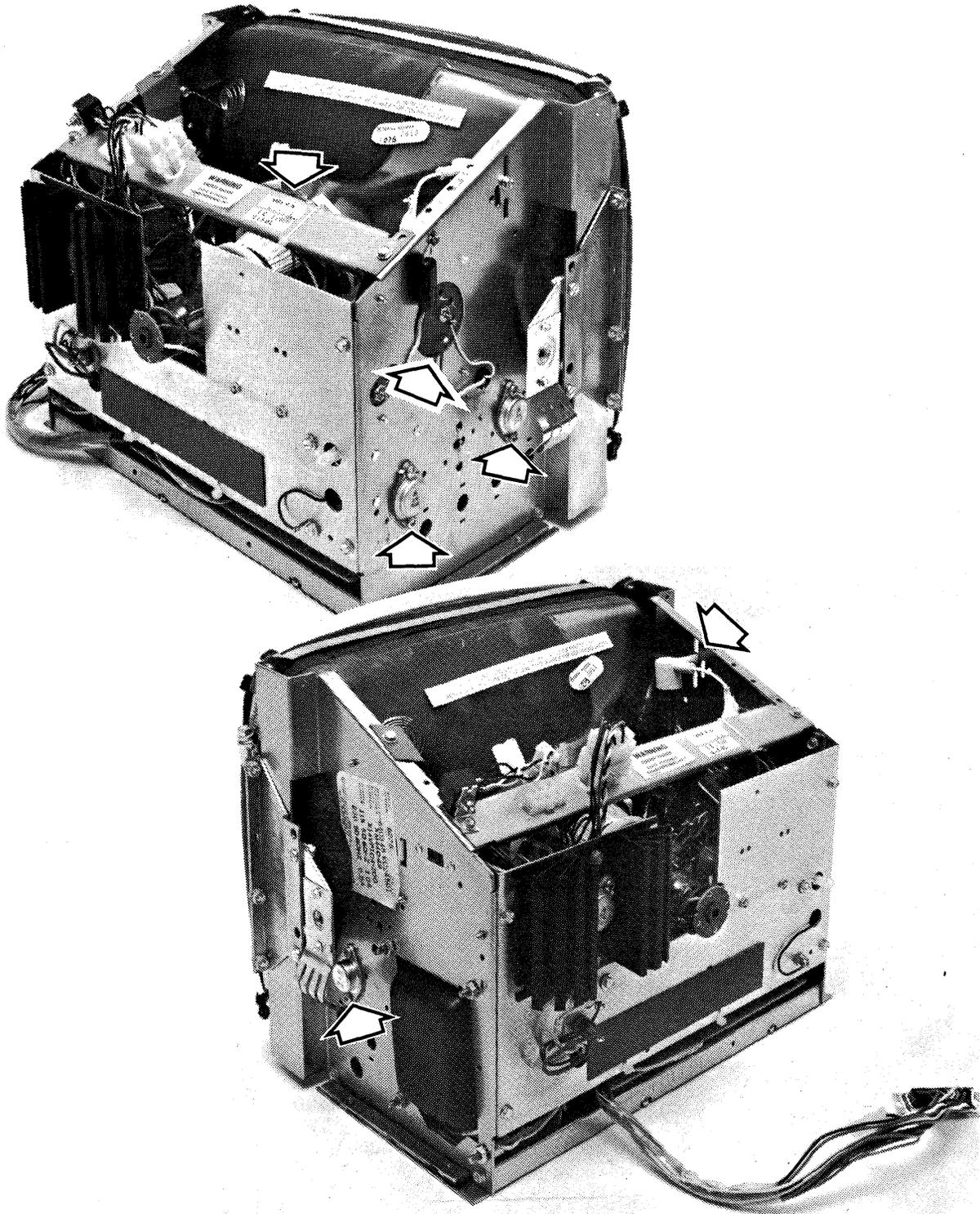
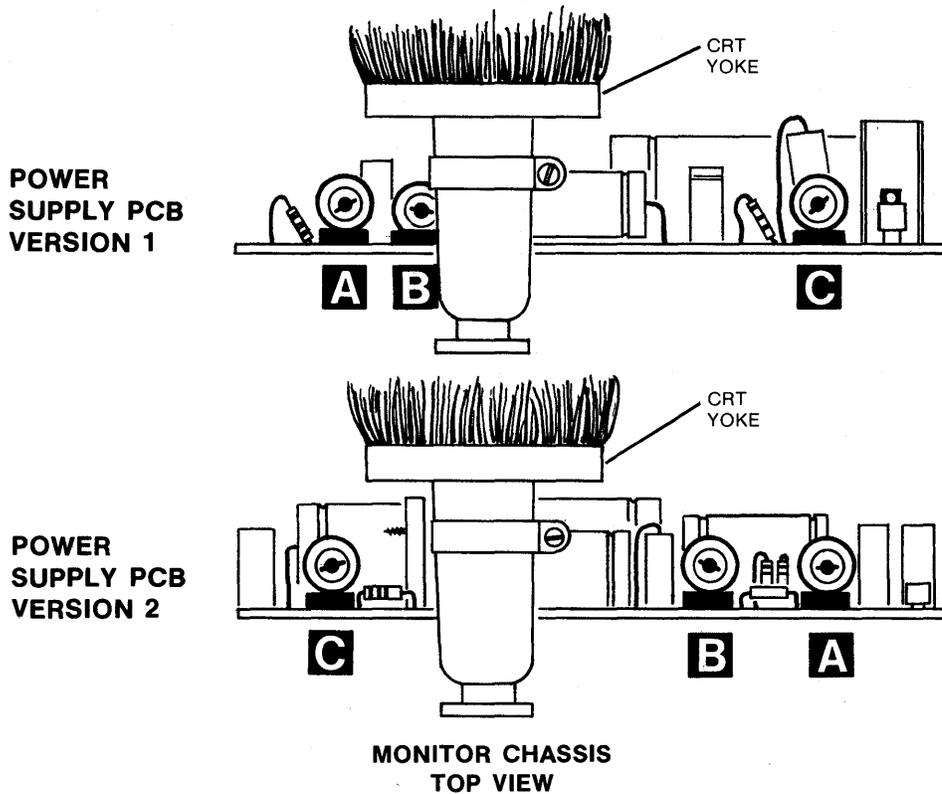


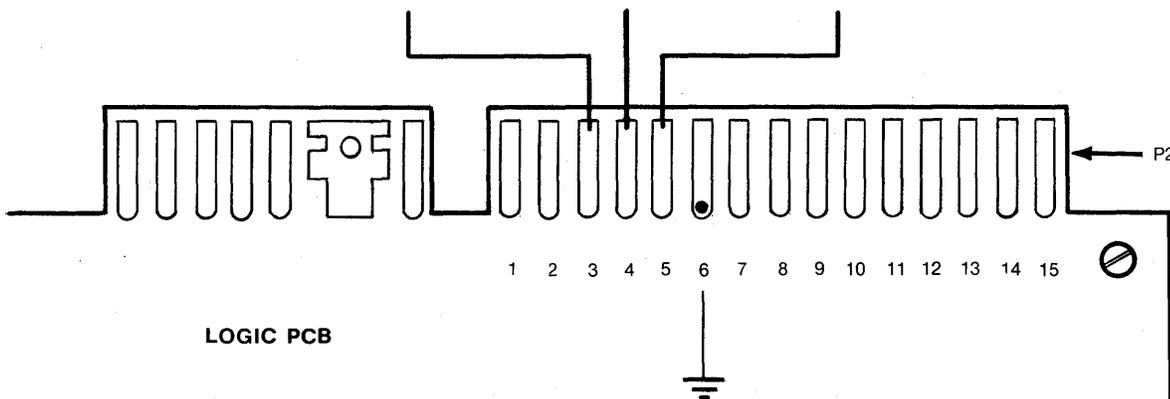
FIGURE 4-7. HIGH VOLTAGE AREAS

4.3.1 Voltage Levels

Potentiometer locations for +12, -12, and +5 VDC adjustments are shown below. Measure these voltages on P2 of the logic PCB with respect to Pin 6 (ground).



A	+12 VDC	B	-12 VDC	C	+5 VDC
ADJUST TO		ADJUST TO		ADJUST TO	
+12.00 ± .05		-12.00 ± .05		+5.00 ± .05	



Measure +73 VDC between the point shown on the vertical output transformer and the monitor chassis.

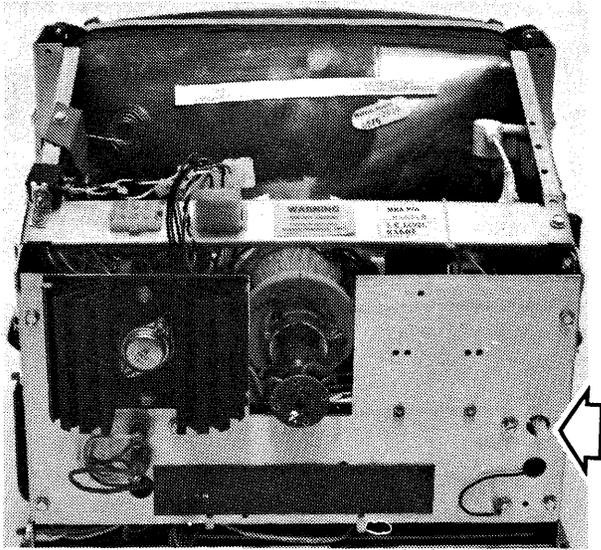
MEASURE
+73 VDC



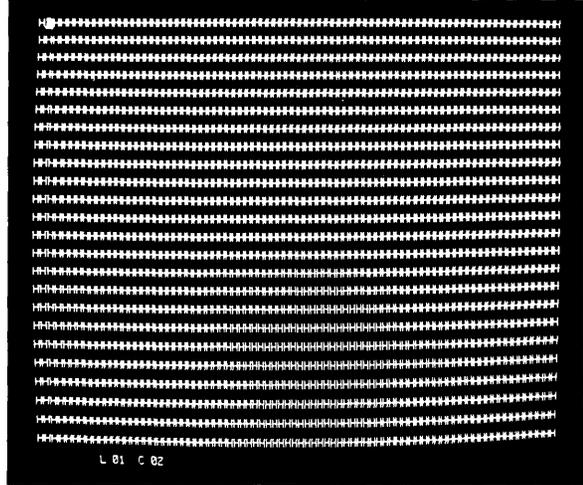
MONITOR

4.3.2 Horizontal Size

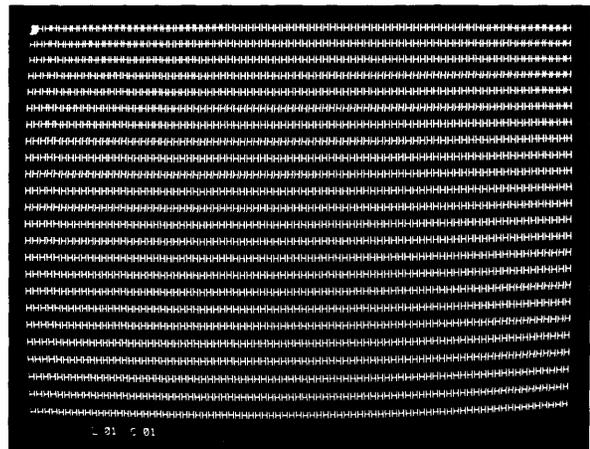
Adjust the horizontal size by turning the knob located on the back of the monitor. An illustration of how this adjustment affects the monitor image is shown below.



**MONITOR
(REAR VIEW)**



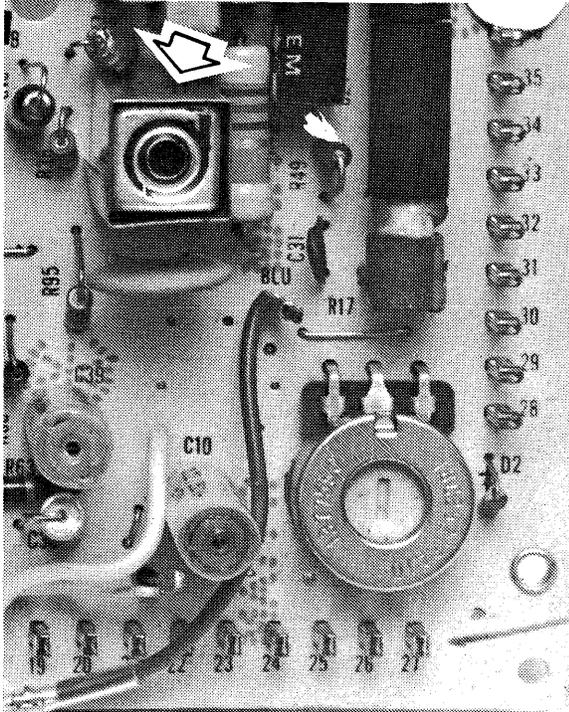
MAXIMUM ADJUSTMENT



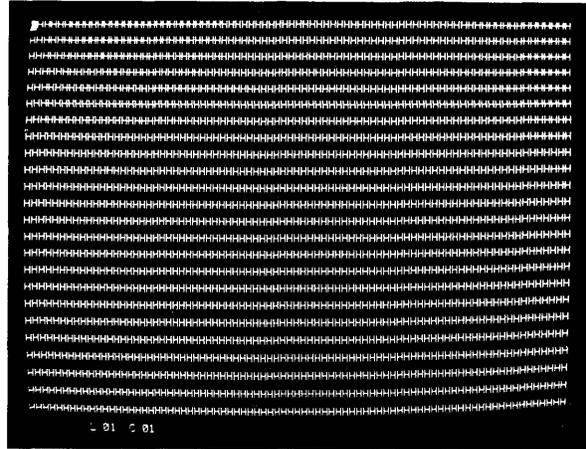
MINIMUM ADJUSTMENT

4.3.3 Horizontal Frequency

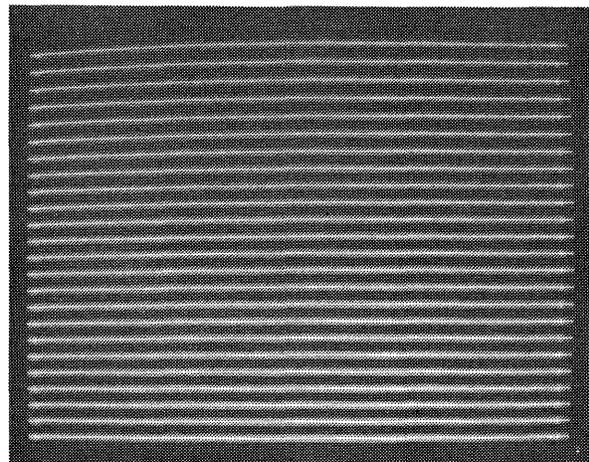
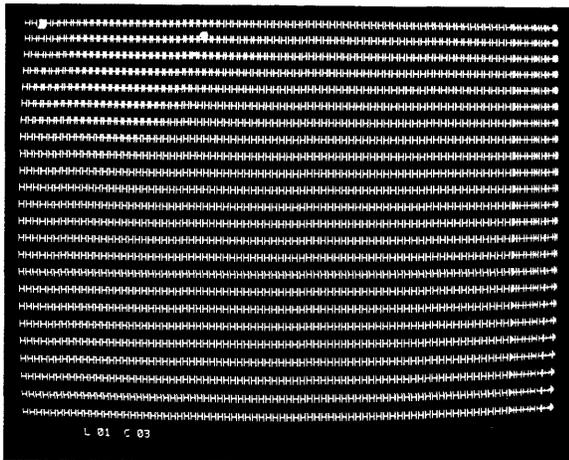
To center data within the monitor raster, adjust the horizontal frequency potentiometer located on the monitor PCB. The illustrations depict the ideal adjustment, along with two photographs showing how the monitor may appear before the adjustment is made.



MONITOR PCB



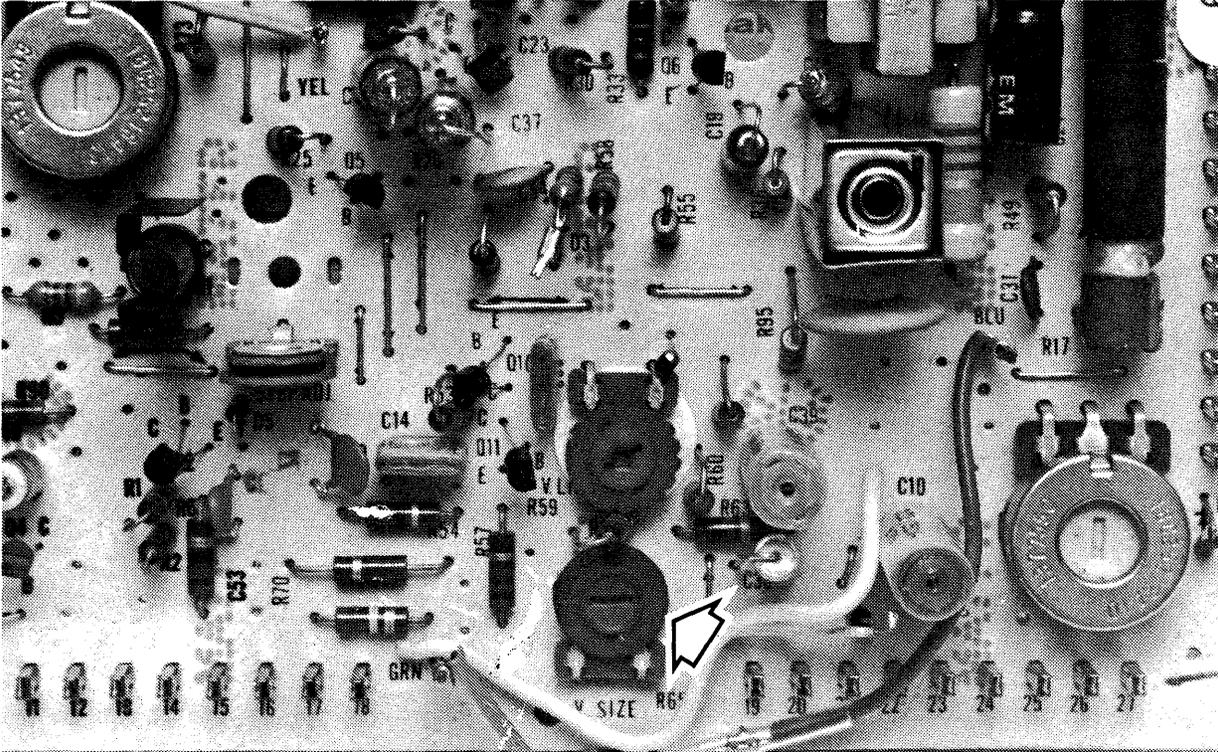
IDEAL HORIZONTAL FREQUENCY



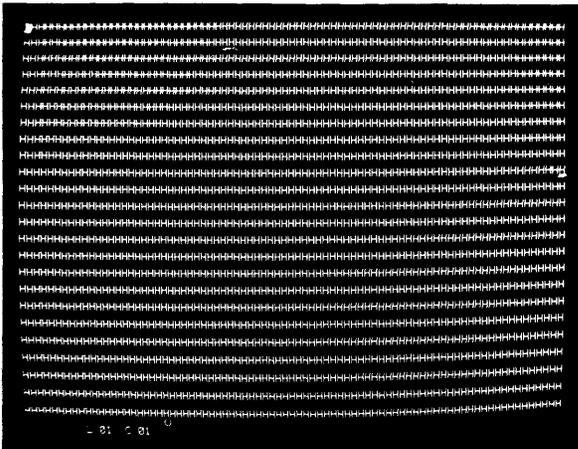
PARTIAL AND TOTAL MISADJUSTMENT

4.3.4 Vertical Size

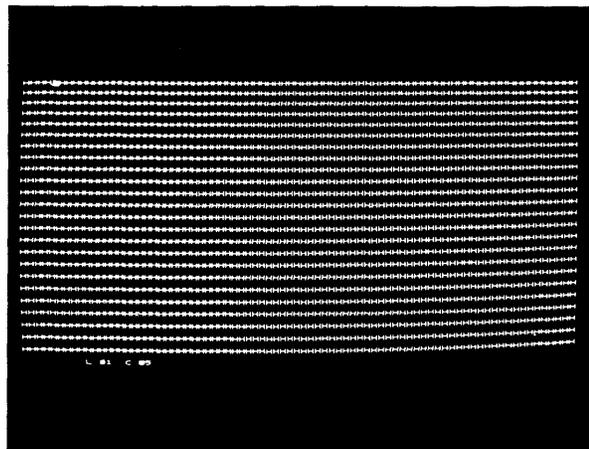
The vertical size adjustment potentiometer is located on the monitor PCB. Illustrations of minimum and maximum adjustment are shown below.



MONITOR PCB



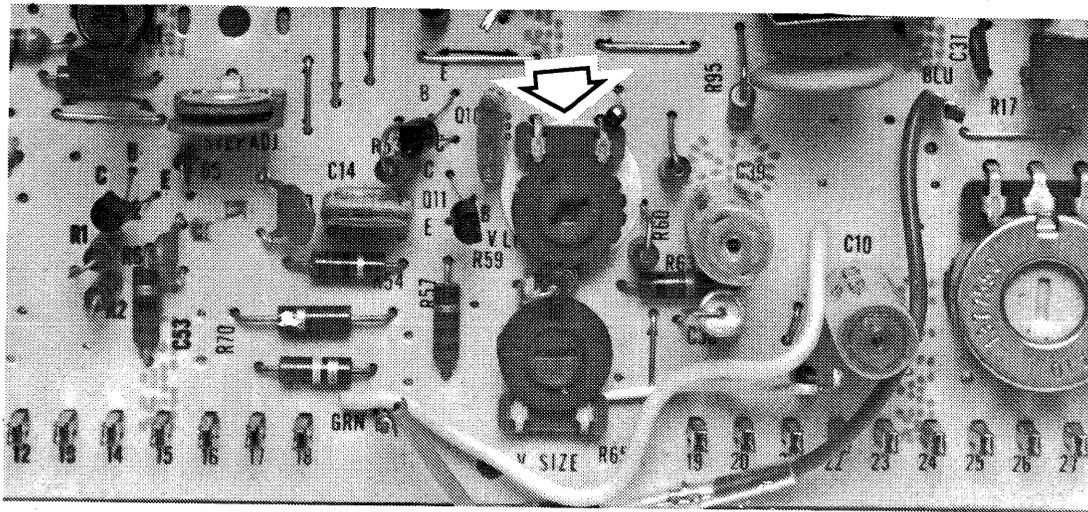
MAXIMUM ADJUSTMENT



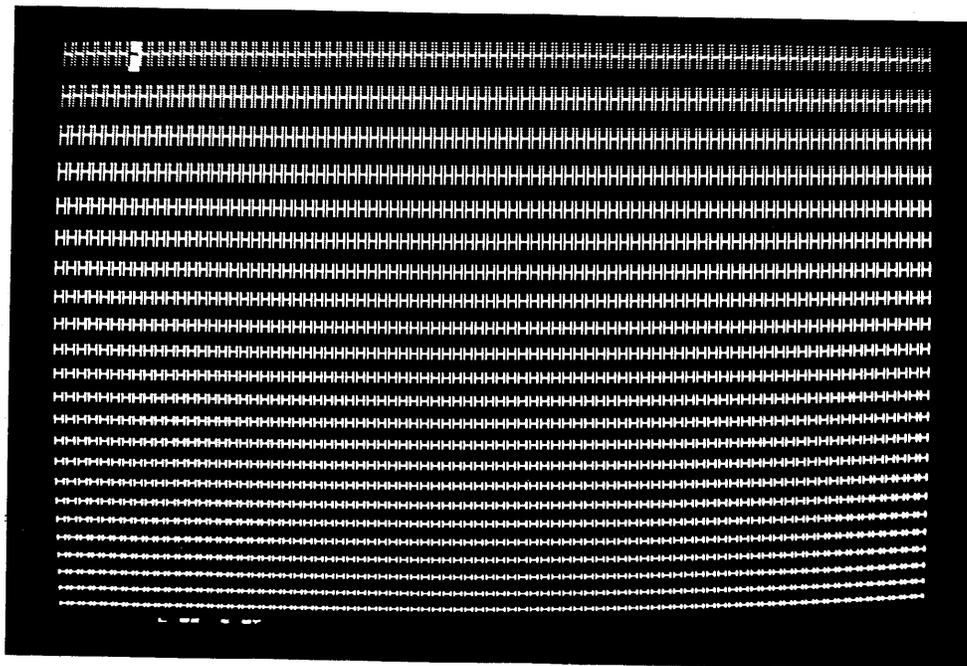
MINIMUM ADJUSTMENT

4.3.5 Vertical Linearity

To provide equal spacing between lines of data, adjust the vertical linearity potentiometer located on the monitor PCB. An illustration shows a misaligned monitor requiring this type of adjustment.



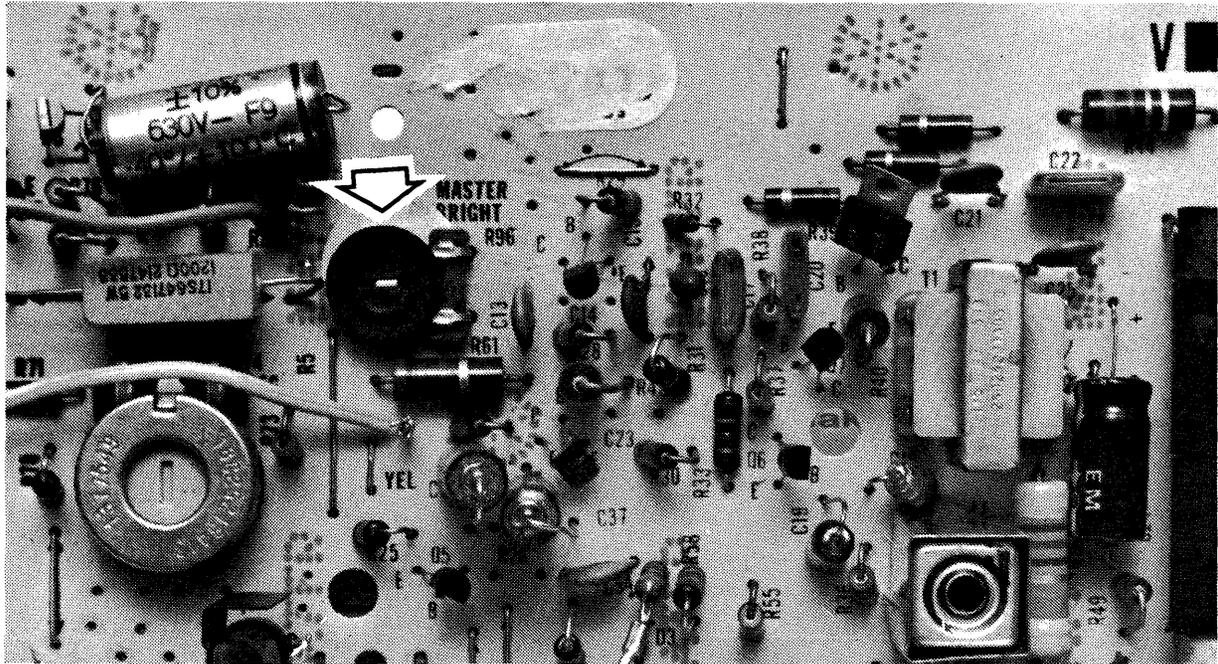
MONITOR PCB



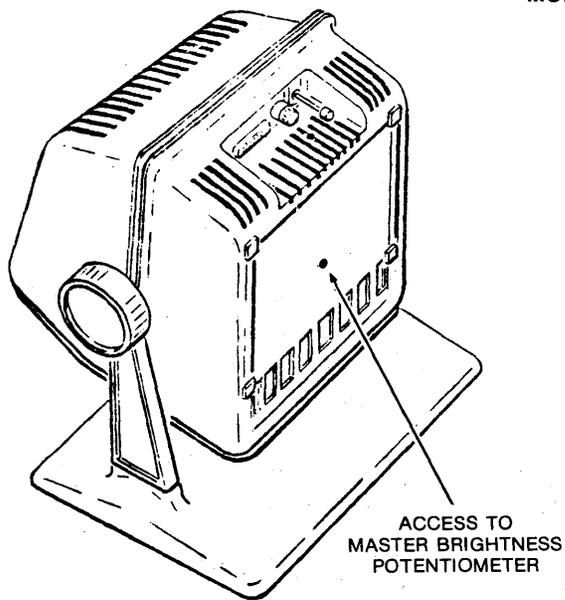
UNEVEN CHARACTER HEIGHT

4.3.6 Master Brightness

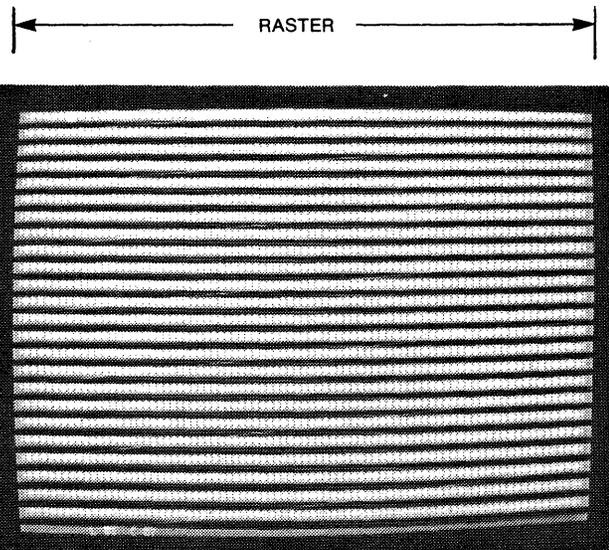
The raster should be barely visible when the Contrast Control (ON/OFF pushbutton) is turned to its brightest intensity. Set this maximum brightness by adjusting the master brightness potentiometer located on the monitor PCB. The potentiometer adjustment can also be made through the hole on the underside of the monitor. See the drawing below.



MONITOR PCB



UNDERSIDE VIEW
(MONITOR)

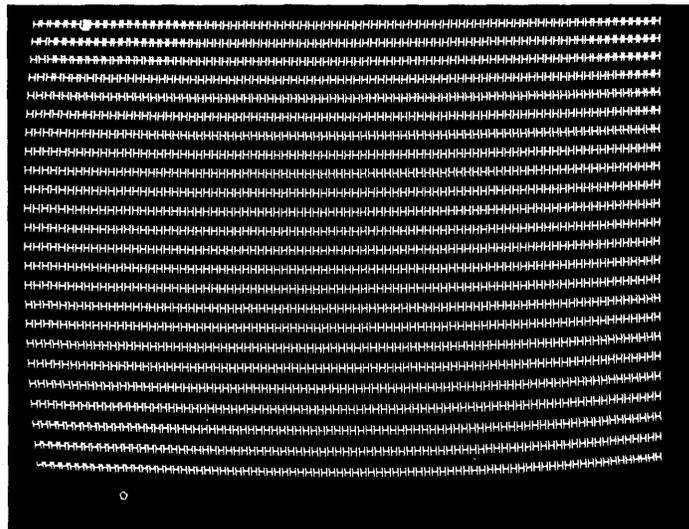
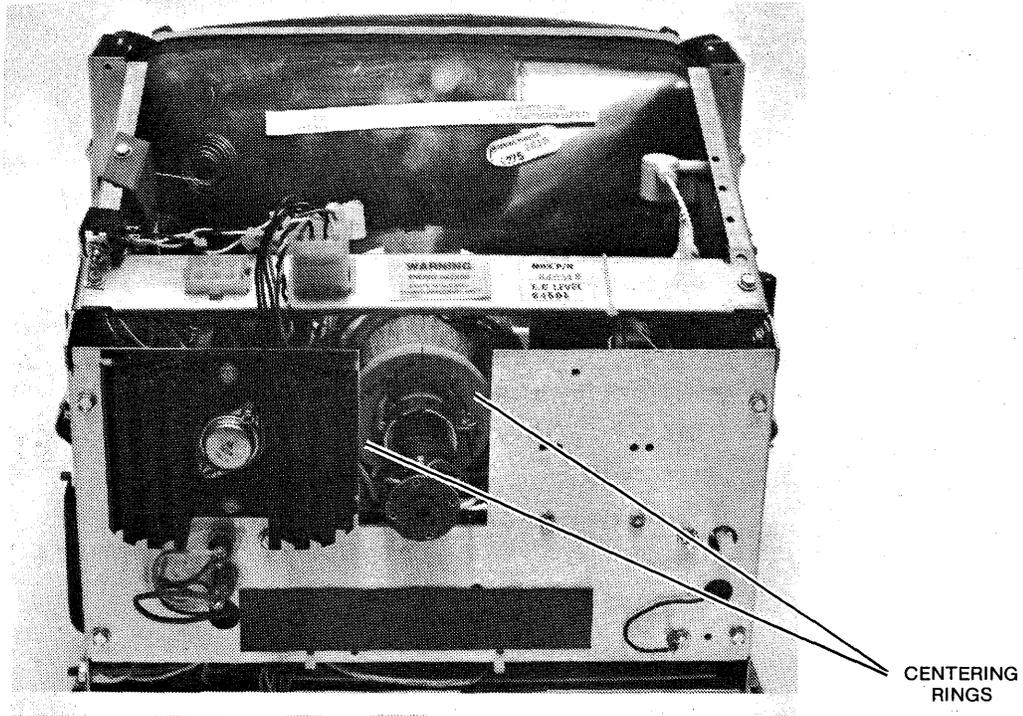


4.3.7 Centering

To center the image on the monitor, manually adjust the centering rings located on the monitor yoke. An off-center image is illustrated below.

WARNING

Extremely high voltage is present on several areas of the monitor chassis. Refer to the high voltage areas shown in Figure 4-7.

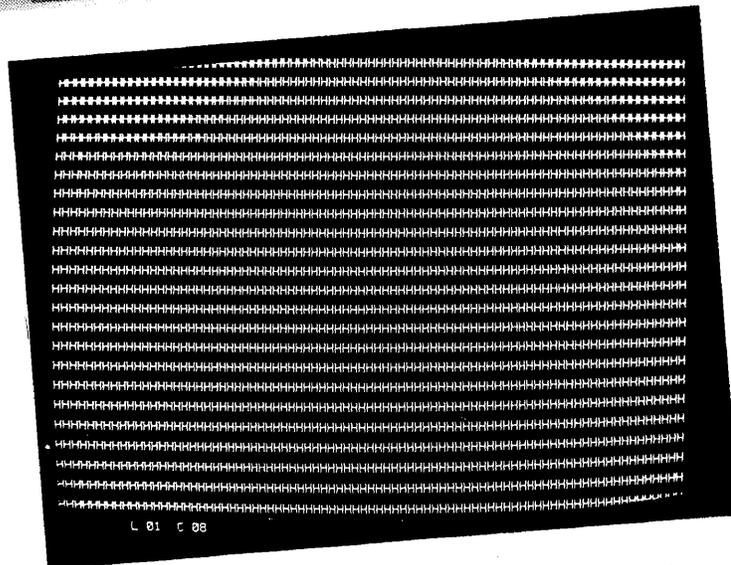
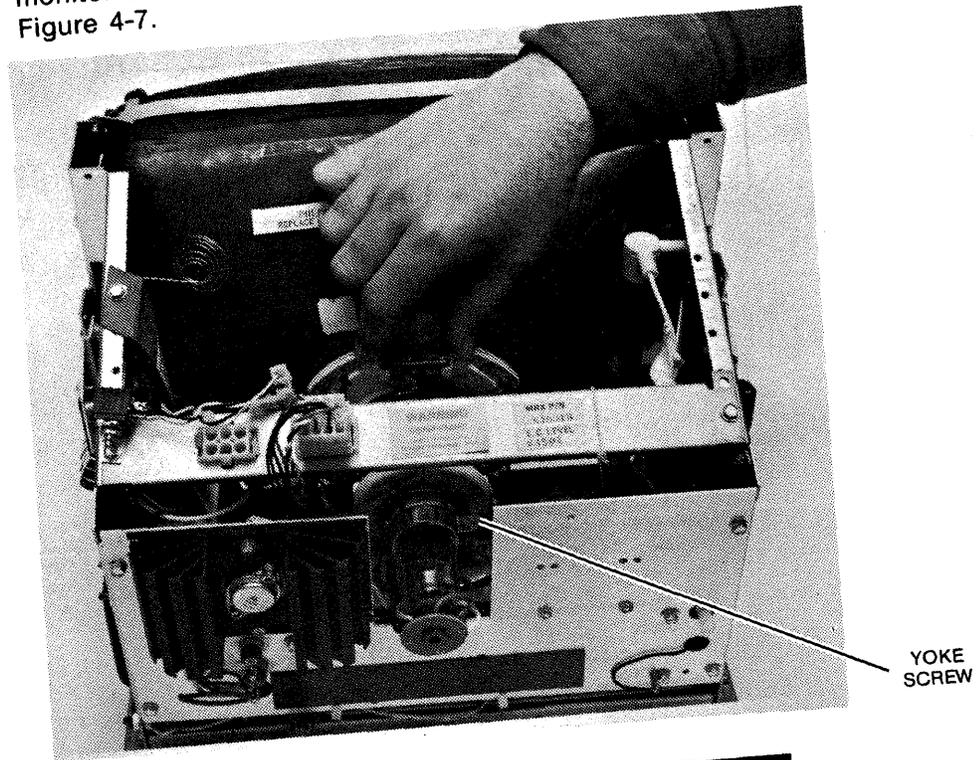


4.3.8 Tilted Raster

If the image on the monitor is rotated, adjust the yoke by loosening the screw on the right side of the yoke, adjusting the image, and securing the screws. Image rotation is illustrated below.

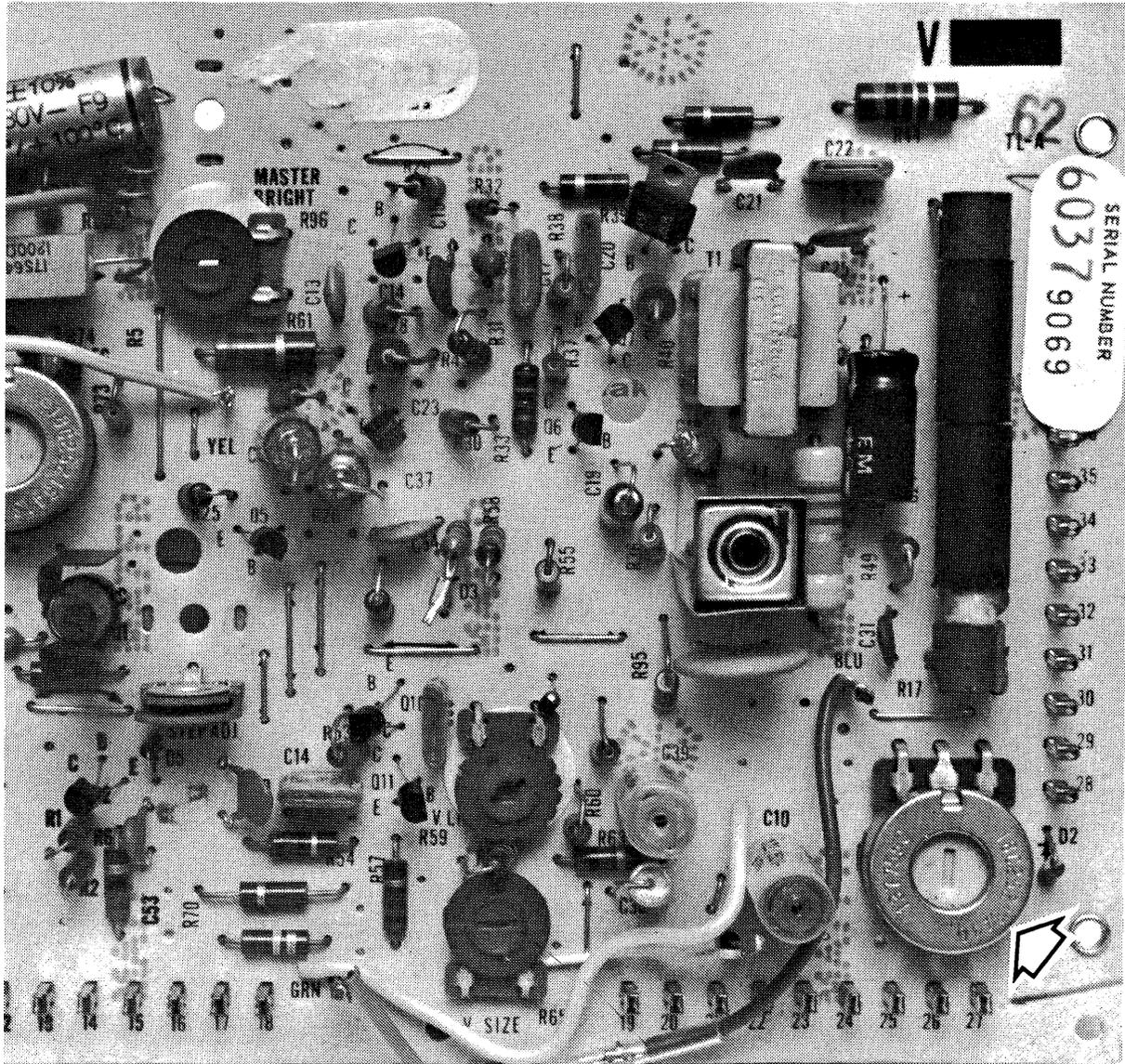
WARNING

Extremely high voltage is present on several areas of the monitor chassis. Refer to the high voltage areas shown in Figure 4-7.



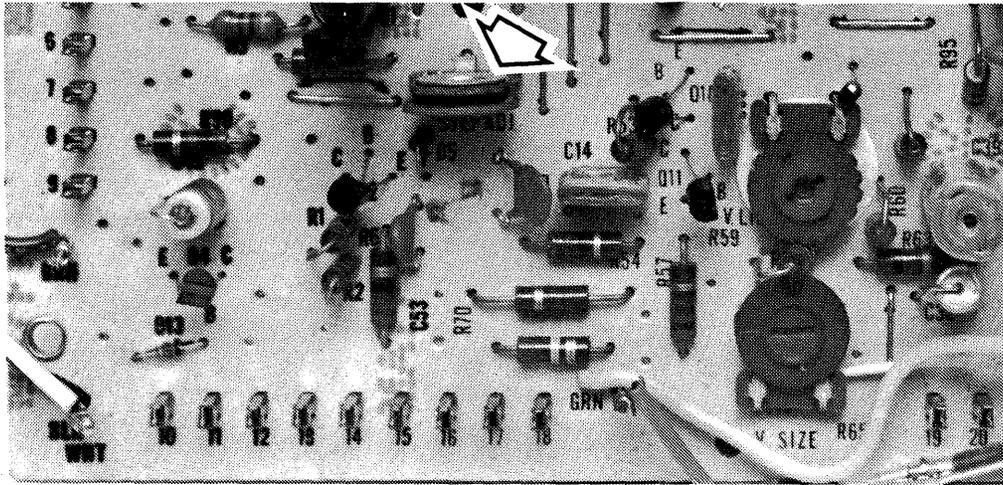
4.3.9 Focus

To focus the image on the monitor, adjust the potentiometer shown below.

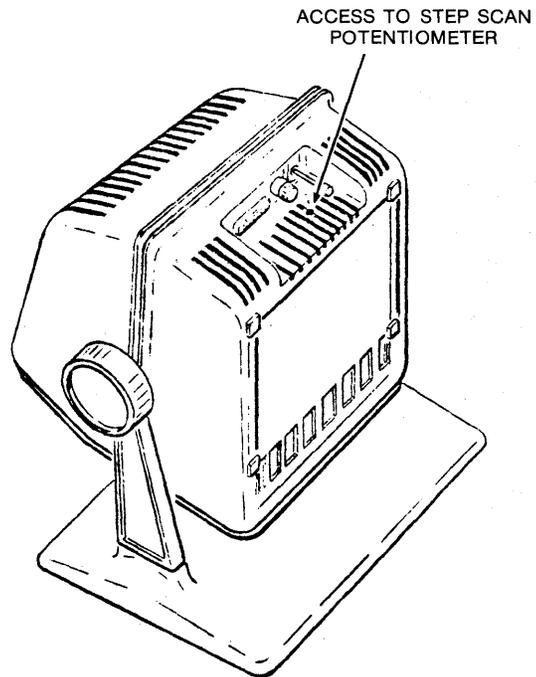
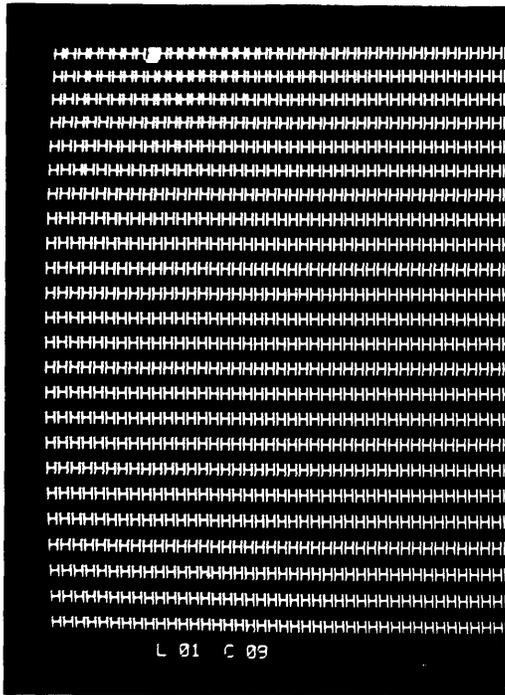


4.3.10 Line Spacing

The step scan potentiometer allows adjustment of the space or gap between adjacent lines of characters. Clockwise rotation increases the space, counterclockwise rotation decreases it. Note that changing the step scan adjustment requires concurrent readjustment of the vertical size control, since changing the space between lines also changes the total vertical size of the display. The potentiometer adjustment can be made through the hole in the rear screen of the monitor. See the drawing below. An example of an ideal step scan adjustment is also shown below.

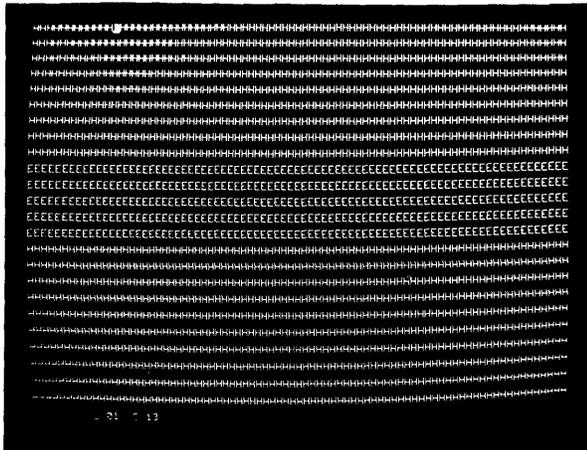
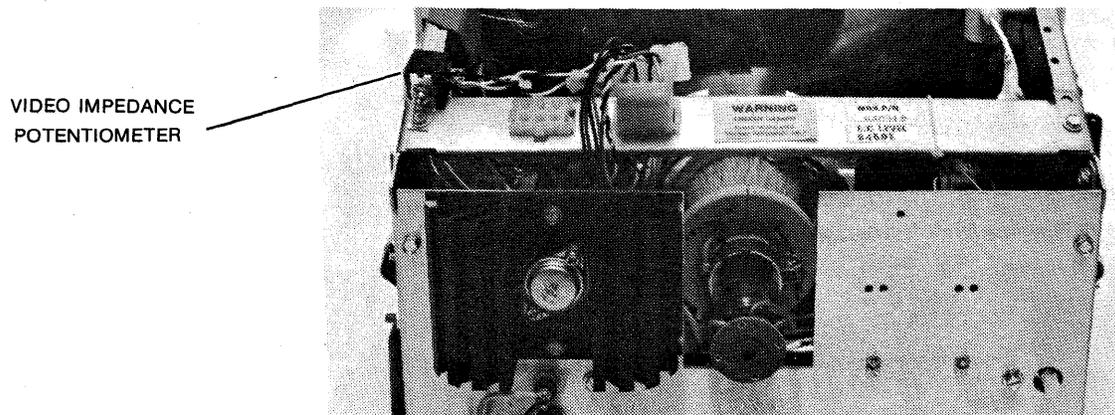


STEP SCAN POTENTIOMETER ON MONITOR PCB

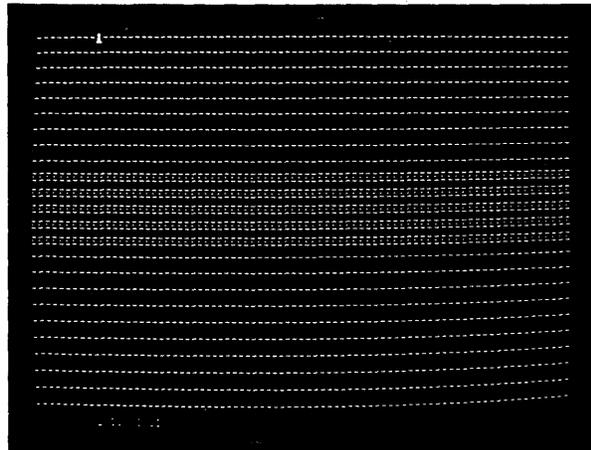


4.3.11 Line Brightness Balance

The video impedance potentiometer balances the brightness of the horizontal and vertical lines of a character. This enables maximum readability at low intensity, so dual intensity fields can be used over a wider brightness range. Excessive clockwise rotation of the potentiometer will cause horizontal lines to brighten; excessive counterclockwise rotation will brighten the vertical lines. When adjusting this potentiometer, the operator brightness control may have to be readjusted — since clockwise rotation of the video impedance potentiometer will also decrease brightness. Examples of excessive horizontal line brightness (excessive vertical line brightness is similar) and of ideal line brightness balance are shown below.



IDEAL LINE BRIGHTNESS BALANCE



EXCESSIVE HORIZONTAL LINE BRIGHTNESS

4.4 TROUBLESHOOTING

Figures 4-8 and 4-9 illustrate the steps to be taken by the customer and Memorex field service, respectively, should a malfunction occur during Display Station operation. Whenever the monitor housing must be removed to comply with procedure, make certain to observe the warning notice affixed to inside of chassis. For high-voltage locations, refer to the illustration presented in Figure 4-7.

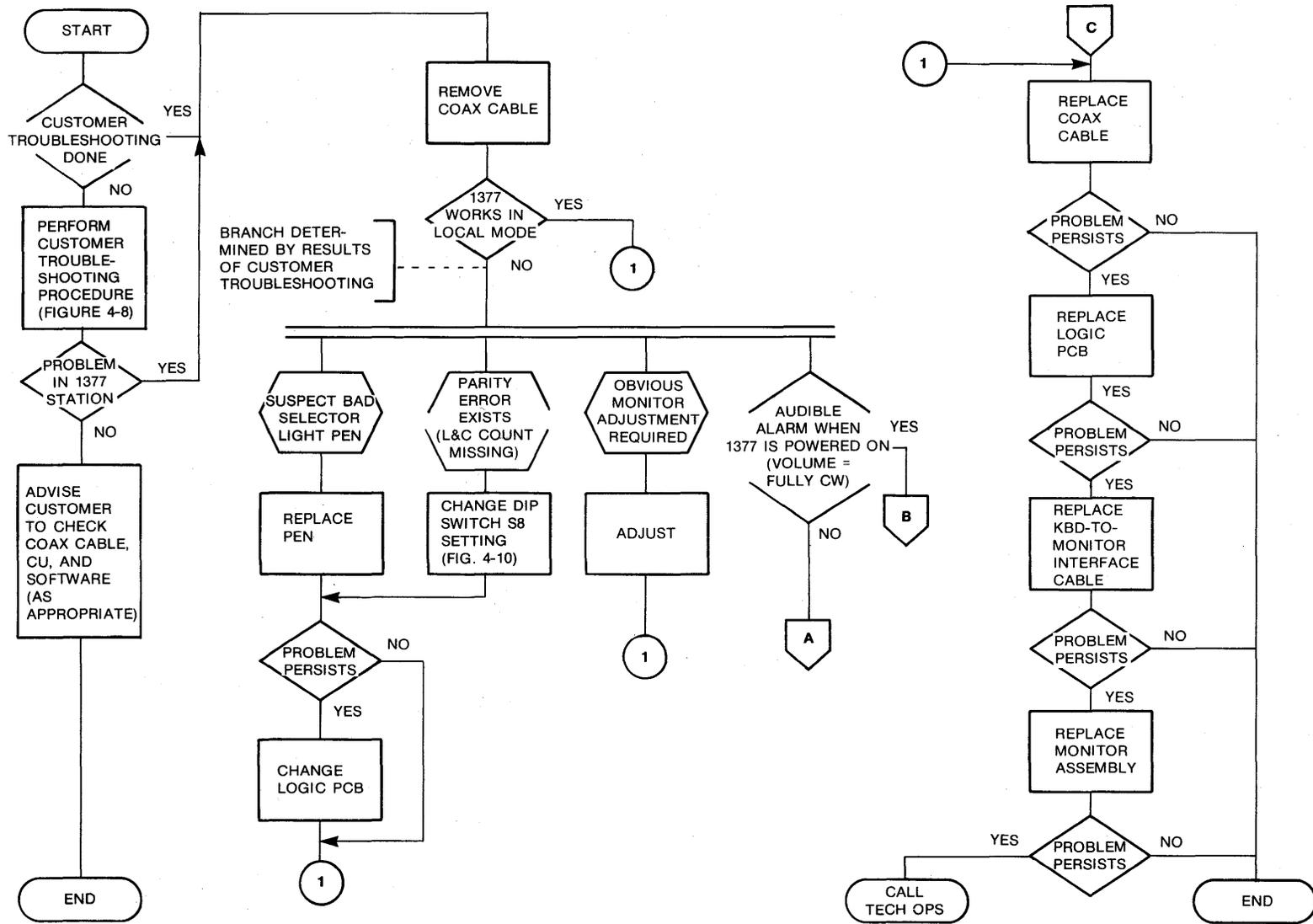


FIGURE 4-9. STATION FAULT ISOLATION AND REPAIR PROCEDURE (Sheet 1 of 2)

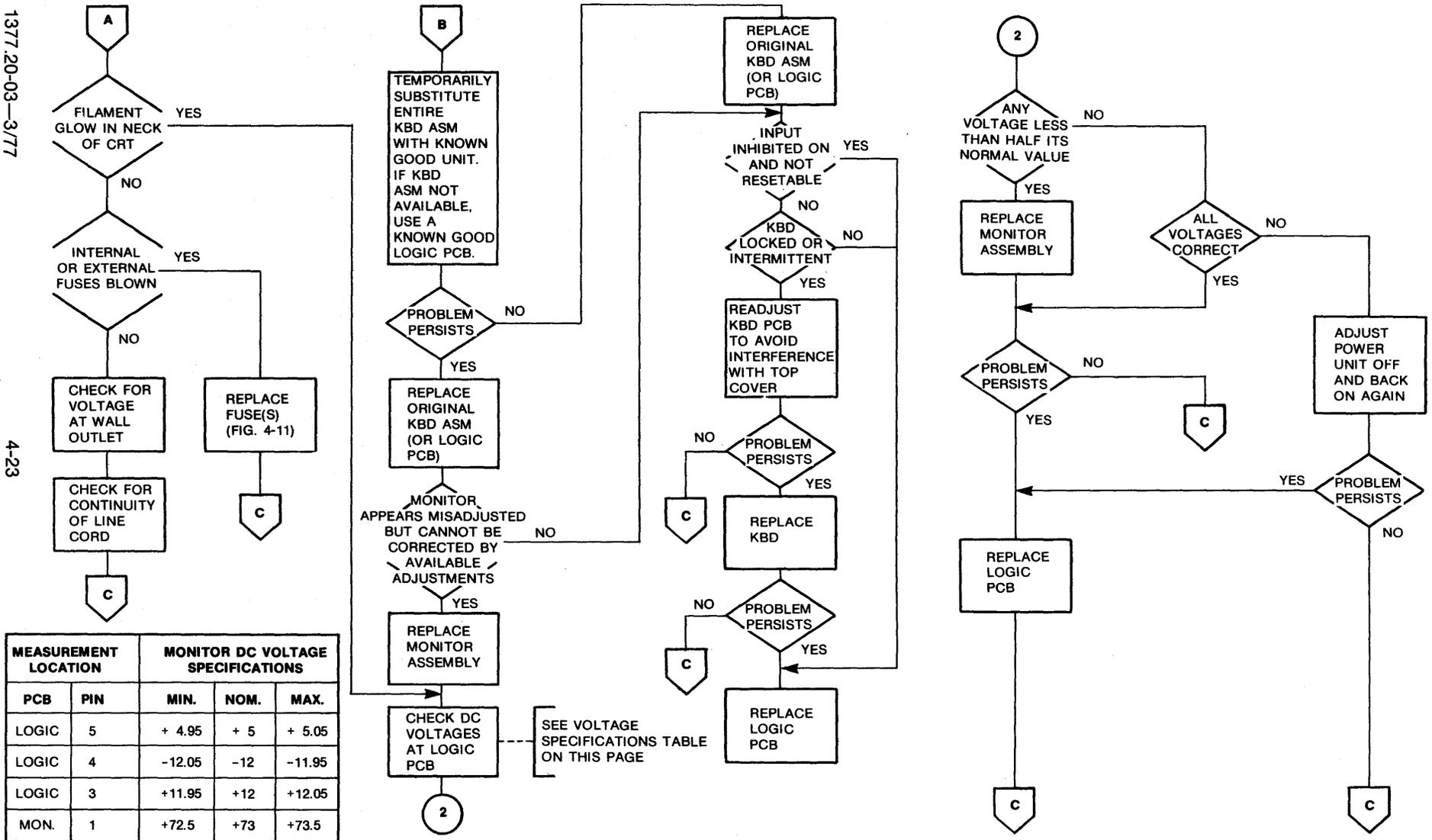
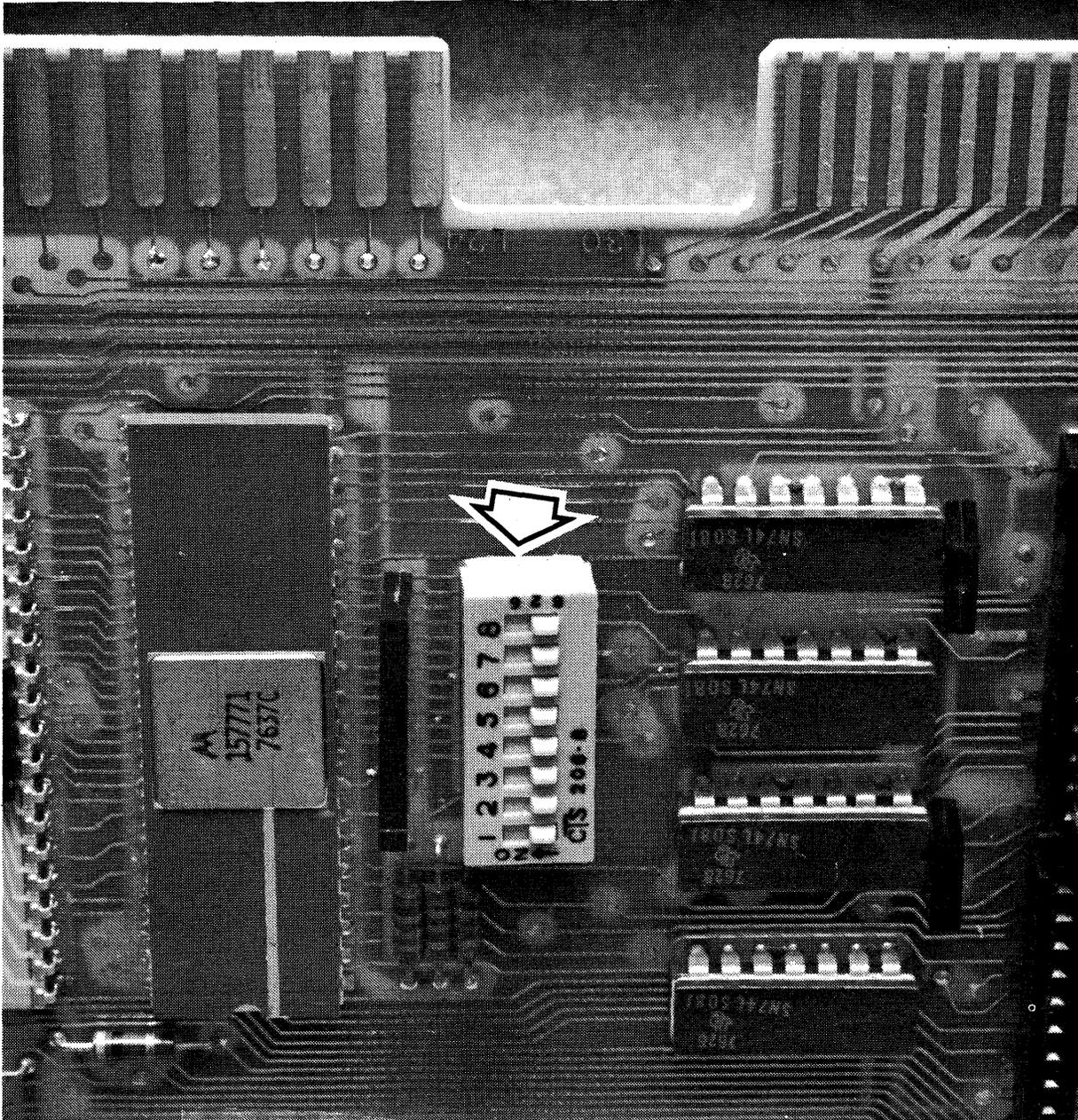


FIGURE 4-9. STATION FAULT ISOLATION AND REPAIR PROCEDURE (Sheet 2 of 2)



(SEE TABLES 5-2 AND 5-3 FOR SWITCH SETTINGS)

FIGURE 4-10. LOGIC PCB DIP SWITCH

INTERNAL FUSES
(0.8 AMP)
2 EACH
FOR ALL
VOLTAGES

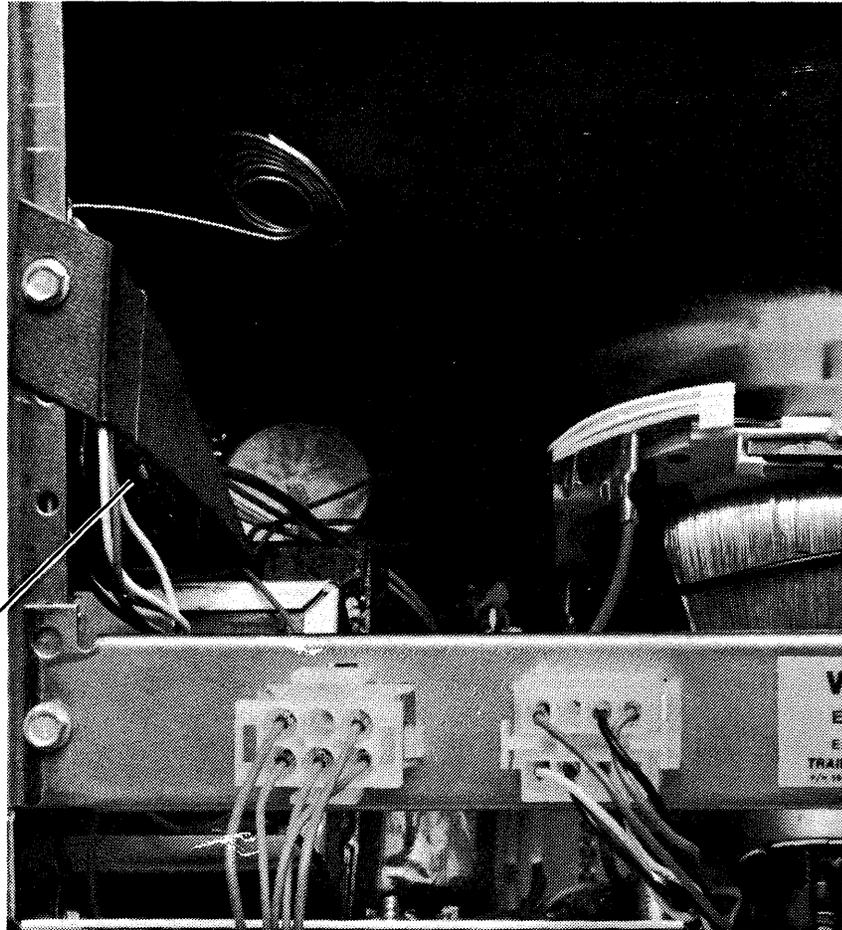


FIGURE 4-11. INTERNAL FUSES

SECTION 5 PROGRAMMING NOTES

The 1377 Display Station is plug and program compatible with the IBM 3270 Information Display System. Therefore, the reader should refer to the IBM manuals listed in Section 1 for programming details. The enhancements of the Memorex 1377 are pointed out in this section.

5.1 CHARACTER DISPLAY

Table 5-1 presents the EBCDIC Input/Output Interface Code used by the Control Unit and the Display Station.

TABLE 5-1. EBCDIC INPUT/OUTPUT INTERFACE CODE

Bits 4567	Hex ↓	00				01				10				11				Bits 0,1 2,3 Hex 0
		00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11	
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0000	0	NUL	DLE			SP	&	-		SP	∞	≈	⊠					0
0001	1	SOH	SBA				/			a	j	Σ	1	A	J			1
0010	2	STX	EUA		SYN					b	k	s	2	B	K	S		2
011	3	ETX	IQ							c	l	t	3	C	L	T		3
0100	4		EM							d	m	u	4	D	M	U		4
0101	5	PT	NL							e	n	v	5	E	N	V		5
0110	6			ETB						f	o	w	6	F	O	W		6
0111	7			ESC	EOT					g	p	x	7	G	P	X		7
1000	8									h	q	y	8	H	Q	Y		8
1001	9		EM							i	r	z	9	I	R	Z		9
1010	A					¢	!		:	μ	π	≤	™					
1011	B					•	\$,	#	{	[≥	Ⓜ					
1100	C		DUP		RA	<	*	%	@	°	\	+	Ⓒ					
1101	D		SF	ENQ	NAK	()	-	'	}]	-	•					
1110	E		FM			+	;	>	=	!	-	+	~					
1111	F		ITB		SUB		⌋	?	"	↓	-	X	^					

NOTE

1. Characters not shown in either a solid or broken outline are control characters. Of these control characters, NL, EM, FF, DUP, and FM are displayed as N (n), R (r), < (°), * (\), and ; (→). (Characters in parentheses are displayed on the optional upper/lower case keyboards.) The display of other control characters is not defined.
2. Characters outlined by solid lines are displayed in the form shown. Of these characters, those which are shaded are not identified for the 3277-2 but are specified for, and displayed by, the 1377.
3. Characters outlined by broken lines are displayed in upper case form unless the upper/lower case feature is present — in which case they are displayed in the lower case.

The standard Memorex 1377 displays upper case letters only; optional 1377 typewriter, typewriter with numeric pad, and operator console keyboards display both upper- and lower-case letters. Although the IBM 3277-2 displays only upper-case letters, both upper- and lower-case letters are transmitted. Therefore, no software changes are required when using a Memorex 1377.

5.2 ATTRIBUTE CHARACTERS

Each program may contain non-displayable control characters called attribute characters. These characters are sent to the 1377 by the program. They indicate the start of each new field and define its specific characteristics or 'attributes'. The end of a field and beginning of another is indicated by the appearance of the next attribute character. Each attribute character consists of a byte of control information which defines the following:

- Start of a field
- Protected/unprotected fields
- Displayable/non-displayable fields
- Intensified display fields
- Light pen detectable/non-detectable fields
- Tap stop positions
- Skip-over fields

For further information refer to the *IBM 3270 Information Display System Component Description*, GA27-2749.

5.3 DIP SWITCH SETTINGS

Table 5-2 shows the various settings of the dual inline package (DIP) switch, mounted on the original logic boards. These boards can be characterized by the use of a different set of EROMs for each configuration. Table 5-3 shows the various settings of the DIP switch mounted on the new style logic boards. These boards require only one set of EROMs for all configurations (by country). (Also refer to Figure 4-10.) This switch contains eight switches (S1 through S8) which enable the program to recognize specific 1377 applications.

On the original logic boards, switches S3 through S6 are used to select one of among 7 international typewriter and data entry keyboards and three domestic keyboards (typewriter, typewriter with numeric pad, operator console, and data entry). Switch S7 enables or disables the keyboard numeric lock feature. Switch S8 selects either the upper 2K or lower 2K of the display character buffer memory. The choice of either half is determined by the detection of a parity error as outlined in Figure 4-9.

TABLE 5-2. DIP SWITCH CHART (ORIGINAL LOGIC BOARDS—EC 24595 AND BELOW)

S6	S5	S4	S3	SELECT COUNTRY/KEYBOARD
OFF	OFF	OFF	OFF	US—TYPEWRITER KEYBOARD
OFF	OFF	OFF	ON	US—OPERATOR CONSOLE KEYBOARD
ON	ON	ON	ON	US—DATA ENTRY KEYBOARD
OFF	OFF	ON	OFF	DENMARK—TYPEWRITER/DATA ENTRY KEYBOARDS*
OFF	OFF	ON	ON	BELGIUM—TYPEWRITER/DATA ENTRY KEYBOARDS*
OFF	ON	OFF	OFF	UNITED KINGDOM—TYPEWRITER/DATA ENTRY KEYBOARDS*
OFF	ON	ON	ON	AUSTRIA/GERMANY—TYPEWRITER/DATA ENTRY KEYBOARDS*
ON	OFF	OFF	OFF	FRANCE—TYPEWRITER/DATA ENTRY KEYBOARDS*
ON	OFF	OFF	ON	FINLAND/SWEDEN—TYPEWRITER/DATA ENTRY KEYBOARDS*
ON	OFF	ON	OFF	NORWAY—TYPEWRITER/DATA ENTRY KEYBOARDS*
OFF	ON	OFF	ON	
OFF	ON	ON	OFF	
ON	OFF	ON	ON	
ON	ON	OFF	OFF	
ON	ON	OFF	ON	
ON	ON	ON	OFF	

S1—NOT USED
 S2 ON—USED ON AUSTRIA/GERMANY, DENMARK, NORWAY, OR FINLAND/SWEDEN KEYBOARDS IF UPPER CASE ONLY.
 S2 OFF—IN ALL CASES EXCEPT FOR THOSE DEFINED FOR S2 ON.

S7 OFF—ENABLES KBD NUMERIC LOCK FEATURE
 S7 ON—DISABLES KBD NUMERIC LOCK FEATURE
 S8 ON—SELECTS LOWER 2K OF MEMORY
 S8 OFF—SELECTS UPPER 2K OF MEMORY

* Although the switch settings are the same for each international typewriter and data entry keyboard, they require different PCBs.

On the new style logic boards, switches S3 through S5 are used to select one of the four keyboards. Switches 1 and 6 are not used. Switch 7 is still used to enable or disable the keyboard numeric lock feature and Switch 8 to select either the upper 2K or lower 2K of the display character buffer memory.

TABLE 5-3. DIP SWITCH CHART (NEW LOGIC BOARDS—EC 24611 AND ABOVE)

S5	S4	S3	SELECT KEYBOARD
OFF	OFF	OFF	TYPEWRITER
OFF	OFF	ON	DATA ENTRY
OFF	ON	OFF	OPERATOR CONSOLE
ON	OFF	OFF	TYPEWRITER WITH NUMERIC PAD

S1—NOT USED

S2 ON—USED ON AUSTRIA/GERMANY, DENMARK, NORWAY, OR FINLAND/SWEDEN KEYBOARDS IF UPPER CASE ONLY.

S2 OFF—IN ALL CASES EXCEPT FOR THOSE DEFINED FOR S2 ON.

S6—NOT USED

**S7 OFF—ENABLES KBD NUMERIC LOCK FEATURE
S7 ON—DISABLES KBD NUMERIC LOCK FEATURE**

**S8 ON—SELECTS LOWER 2K OF MEMORY
S8 OFF—SELECTS UPPER 2K OF MEMORY**

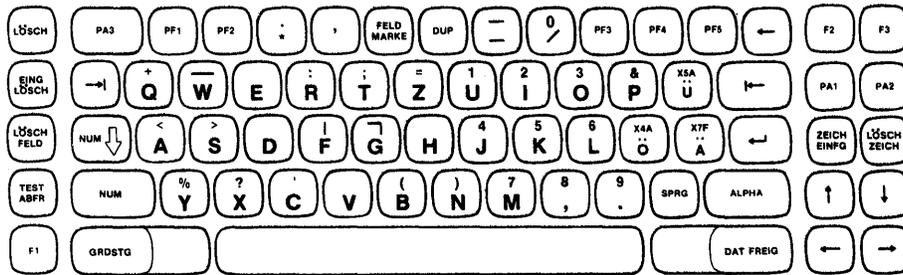
**APPENDIX A
INTERNATIONAL KEYBOARDS AND I/O
INTERFACE CODES**

TABLE A-1. AUSTRIAN/GERMAN I/O INTERFACE CODES

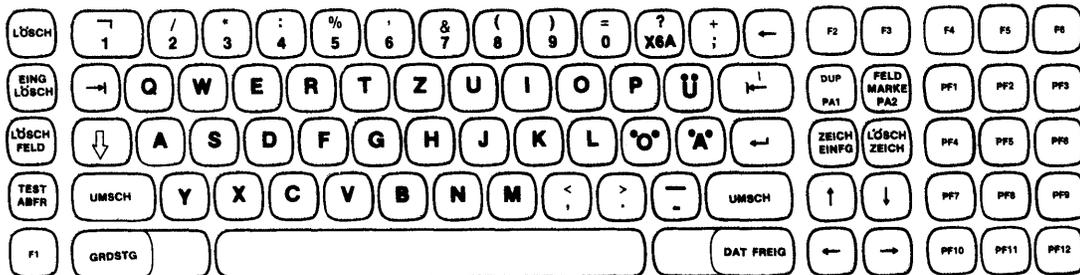
Bits 4567	Hex ↑ ↓	00				01				10				11				Bits 0,1 2,3 Hex 0
		00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11	
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0000	0	NUL	DLE			SP	&	-		SP	∞	≈	¶					0
0001	1	SOH	SBA					/		a	j	Σ	ı	A	J			1
0010	2	STX	EUA		SYN					b	k	s	ı	B	K	S		2
0011	3	ETX	IC							c	l	t	ı	C	L	T		3
0100	4									d	m	u	ı	D	M	U		4
0101	5	PT	NL							e	n	v	ı	E	N	V		5
0110	6			ETB						f	o	w	ı	F	O	W		6
0111	7			ESC	EOT					g	p	x	ı	G	P	X		7
1000	8									h	q	y	ı	H	Q	Y		8
1001	9		EM							i	r	z	ı	I	R	Z		9
1010	A					ö	ü	ı	:	μ	τ	≤	™					
1011	B					.	Ü	,	Ä	{	[≥	®					
1100	C	FF	DUP		RA	<	*	%	Ö	°	\	+	©					
1101	D		SF	ENQ	NAK	()	—	'	}]	—	•					
1110	E		FM			+	;	>	=	↑	→	+	~					
1111	F		ITB		SUB		⌋	?	ä	↓	←	X	^					

NOTE

1. Characters not shown in either a solid or broken outline are control characters. Of these control characters, NL, EM, FF, DUP, and FM are displayed as N (n), R (r), < (°), * (), and ; (→). (Characters in parentheses are displayed on the optional upper/lower case keyboards.) The display of other control characters is not defined.
2. Characters outlined by solid lines are displayed in the form shown. Of these characters, those which are shaded are not identified for the 3277-2 but are specified for, and displayed by, the 1377.
3. Characters outlined by broken lines are displayed in upper case form unless the upper/lower case feature is present — in which case they are displayed in the lower case.
4. Characters in hex code 4A, 5A and 7F are converted to characters in hex code 7C, 5B and 7B respectively on upper case only keyboards.



Data Entry



Typewriter

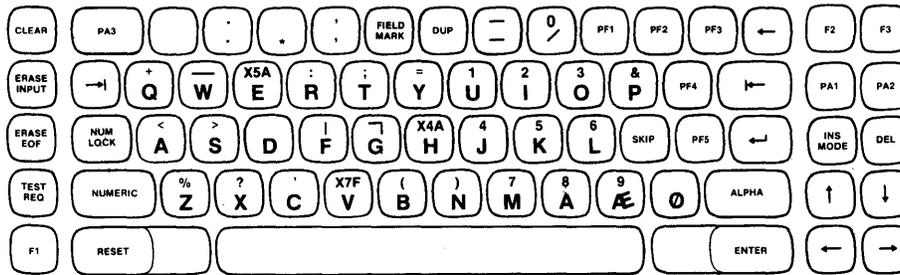
FIGURE A-1. AUSTRIAN/GERMAN KEYBOARDS

TABLE A-2. DANISH/NORWEGIAN I/O INTERFACE CODE

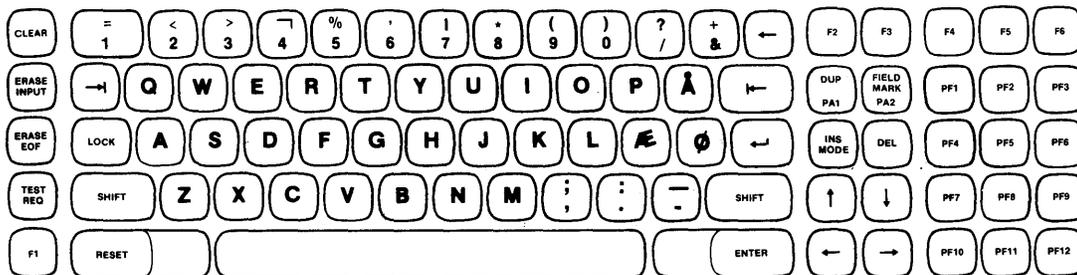
Bits 4567	Hex ↓	00				01				10				11				Bits 0,1
		00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11	2,3
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	Hex 0
0000	0	NUL	DLE			SP	&	-		SP	∞	≈	0					0
0001	1	SOH	SBA					/		a	j	Σ	1	A	J			1
0010	2	STX	EUA		SYN					b	k	s	2	B	K	S		2
0011	3	ETX	IC							c	l	t	3	C	L	T		3
0100	4									d	m	u	4	D	M	U		4
0101	5	PT	NL							e	n	v	5	E	N	V		5
0110	6			ETB						f	o	w	6	F	O	W		6
0111	7			ESC	EOT					g	p	x	7	G	P	X		7
1000	8									h	q	y	8	H	Q	Y		8
1001	9		EM							i	r	z	9	I	R	Z		9
1010	A					ø	å	!	:	μ	π	≤	T _M					
1011	B					·	Å	,	Æ	{	[≥	Ⓡ					
1100	C	FF	DUP		RA	<	*	%	Ø	°	\	+	Ⓒ					
1101	D		SF	ENQ	NAK	()	—	'	}]	-	•					
1110	E		FM			+	;	>	=	↑	→	±	-					
1111	F		ITB		SUB		⌋	?	æ	↓	←	×	∧					

NOTE

1. Characters not shown in either a solid or broken outline are control characters. Of these control characters, NL, EM, FF, DUP, and FM are displayed as N (n), R (r), < (<), * (*), and ; (;). (Characters in parentheses are displayed on the optional upper/lower case keyboards.) The display of other control characters is not defined.
2. Characters outlined by solid lines are displayed in the form shown. Of these characters, those which are shaded are not identified for the 3277-2 but are specified for, and displayed by, the 1377.
3. Characters outlined by broken lines are displayed in upper case form unless the upper/lower case feature is present — in which case they are displayed in the lower case.
4. Characters in hex code 4A, 5A and 7F are converted to characters in hex code 7C, 5B and 7B respectively on upper case only keyboards.

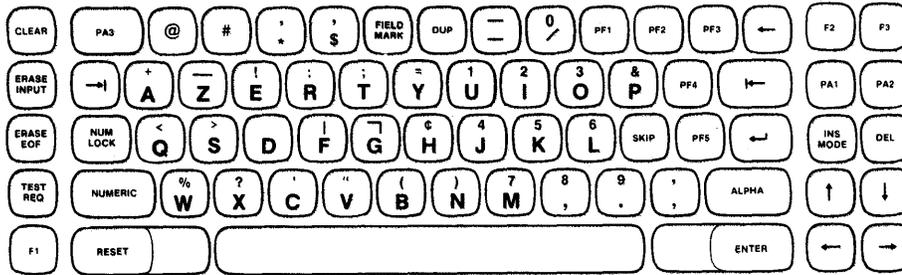


Data Entry

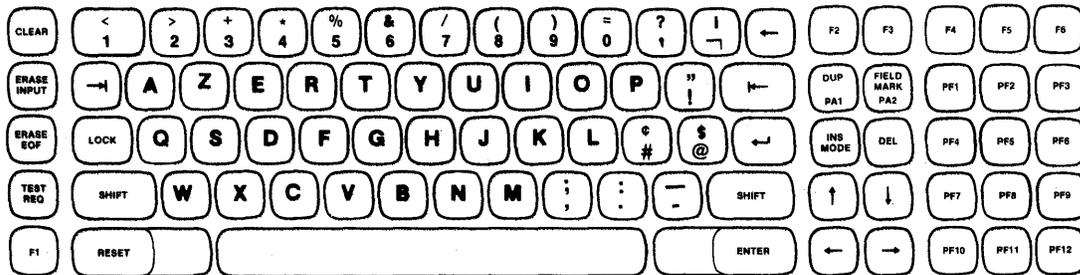


Typewriter

FIGURE A-2. DANISH KEYBOARDS



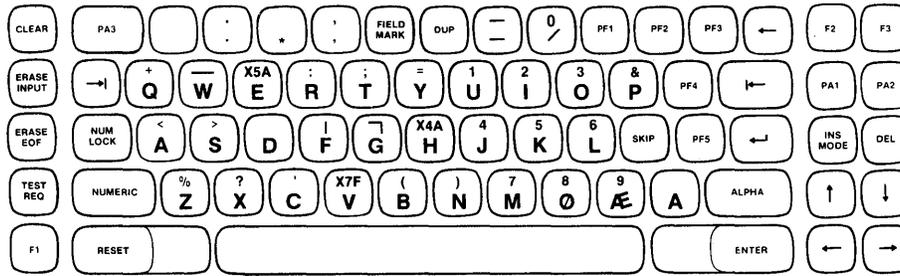
Data Entry



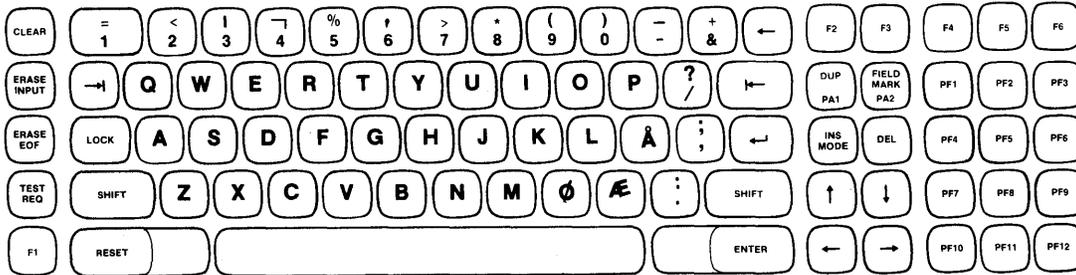
Typewriter

Note: The Belgian I/O interface codes are the same as the United States EBCDIC. Refer to Table 5-1.

FIGURE A-3. BELGIAN KEYBOARDS



Data Entry



Typewriter

Note: Norway and Denmark use the same I/O interface codes. Refer to Table A-2.

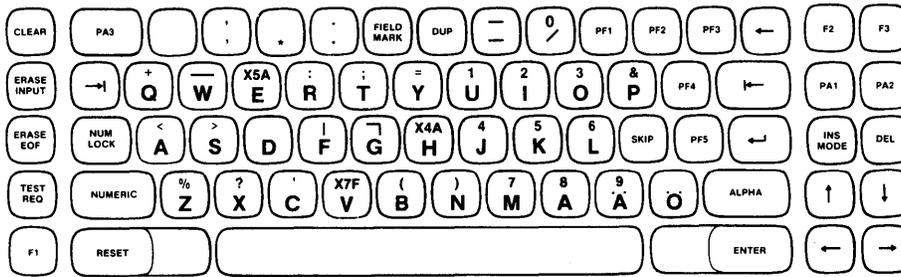
FIGURE A-4. NORWEGIAN KEYBOARDS

TABLE A-3. FINNISH/SWEDISH I/O INTERFACE CODE

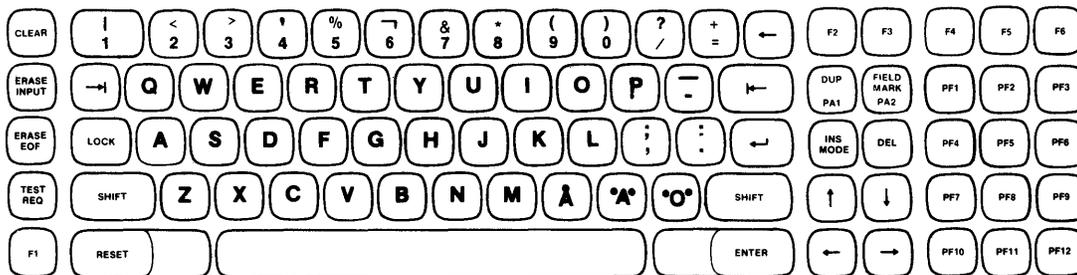
Bits 4567	Hex 1 ↓	00				01				10				11				Bits
		00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11	0,1
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	2,3
		Hex 0																
0000	0	NUL	DLE			SP	&	-		SP	∞	≈	•					0
0001	1	SOH	SBA				/			a	j	z	•	A	J		1	
0010	2	STX	EUA		SYN					b	k	s	•	B	K	S	2	
0011	3	ETX	IC							c	l	t	•	C	L	T	3	
0100	4									d	m	u	•	D	M	U	4	
0101	5	PT	NL							e	n	v	•	E	N	V	5	
0110	6			ETB						f	o	w	•	F	O	W	6	
0111	7			ESC	EOT					g	p	x	•	G	P	X	7	
1000	8									h	q	y	•	H	Q	Y	8	
1001	9		EM							i	r	z	•	I	R	Z	9	
1010	A					ö	ä		:	μ	π	≤	™					
1011	B					•	Å	,	Ä	{	[≥	Ⓜ					
1100	C	FF	DUP		RA	<	*	%	Ö	°	\	+	Ⓢ					
1101	D		SF	ENQ	NAK	()	-	'	}]	-	•					
1110	E		FM			+	;	>	=		-	+	~					
1111	F		ITB		SUB		⌋	?	ä		-	χ	^					

NOTE

1. Characters not shown in either a solid or broken outline are control characters. Of these control characters, NL, EM, FF, DUP, and FM are displayed as N (n), R (r), < (°), * (), and ; (⌋). (Characters in parentheses are displayed on the optional upper/lower case keyboards.) The display of other control characters is not defined.
2. Characters outlined by solid lines are displayed in the form shown. Of these characters, those which are shaded are not identified for the 3277-2 but are specified for, and displayed by, the 1377.
3. Characters outlined by broken lines are displayed in upper case form unless the upper/lower case feature is present — in which case they are displayed in the lower case.
4. Characters in hex code 4A, 5A and 7F are converted to characters in hex code 7C, 5B and 7B respectively on upper case only keyboards.



Data Entry



Typewriter

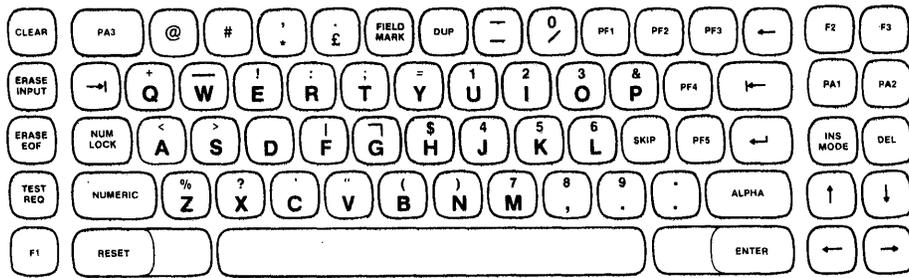
FIGURE A-5. FINNISH/SWEDISH KEYBOARDS

TABLE A-4. UNITED KINGDOM I/O INTERFACE CODE

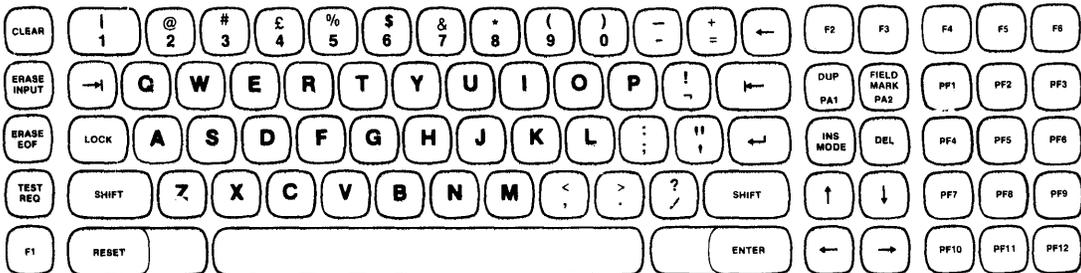
Bits 4567	Hex ↓	00				01				10				11				Hex 0
		00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11	
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0000	0	NUL	DLE			SP	&	-		SP	←	≈	°					0
0001	1	SOH	SBA					/		a	j	Σ	†	A	J			1
0010	2	STX	EUA		SYN					b	k	s	‡	B	K	S		2
0011	3	ETX	IC							c	l	t	§	C	L	T		3
0100	4									d	m	u	¶	D	M	U		4
0101	5	PT	NL							e	n	v	§	E	N	V		5
0110	6			ETB						f	o	w	¶	F	O	W		6
0111	7			ESC	EOT					g	p	x	§	G	P	X		7
1000	8									h	q	y	¶	H	Q	Y		8
1001	9		EM							i	r	z	¶	I	R	Z		9
1010	A					\$!		:	μ	τ	≤	™					
1011	B					•	£	,	#	{	[≥	®					
1100	C	FF	DUP		RA	<	*	%	@	°	\	+	©					
1101	D		SF	ENQ	NAK	()	-	'	}]	-	•					
1110	E		FM			+	;	>	=	↑	→	±	~					
1111	F		ITB		SUB		⌋	?	"	↓	←	X	^					

NOTE

1. Characters not shown in either a solid or broken outline are control characters. Of these control characters, NL, EM, FF, DUP, and FM are displayed as N (n), R (r), < (°), * (), and ; (→). (Characters in parentheses are displayed on the optional upper/lower case keyboards.) The display of other control characters is not defined.
2. Characters outlined by solid lines are displayed in the form shown. Of these characters, those which are shaded are not identified for the 3277-2 but are specified for, and displayed by, the 1377.
3. Characters outlined by broken lines are displayed in upper case form unless the upper/lower case feature is present — in which case they are displayed in the lower case.

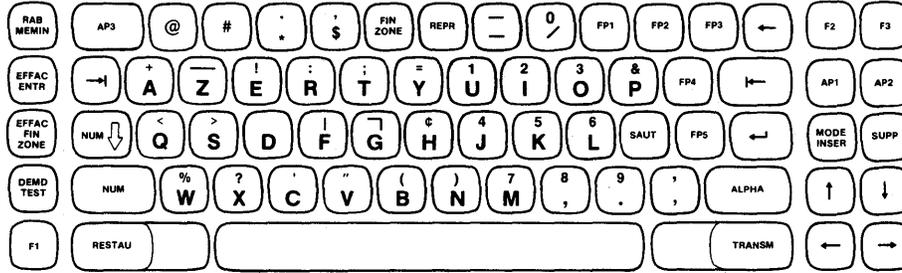


Data Entry

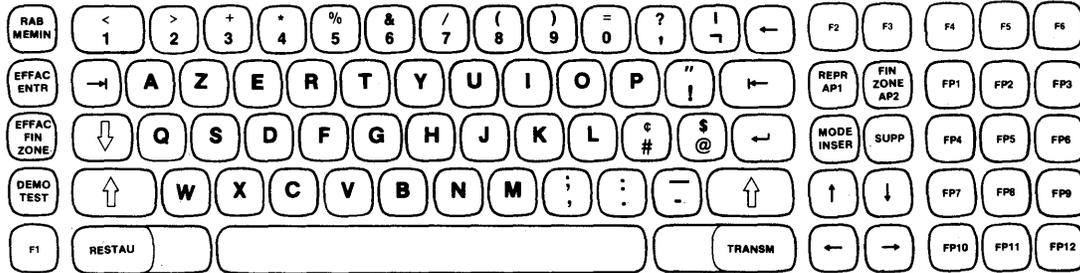


Typewriter

FIGURE A-6. UNITED KINGDOM KEYBOARDS



Data Entry



Typewriter

Note: The French I/O interface codes are the same as the United States EBCDIC. Refer to Table 5-1.

FIGURE A-7. FRENCH KEYBOARDS

**APPENDIX B
WIRING DIAGRAMS**

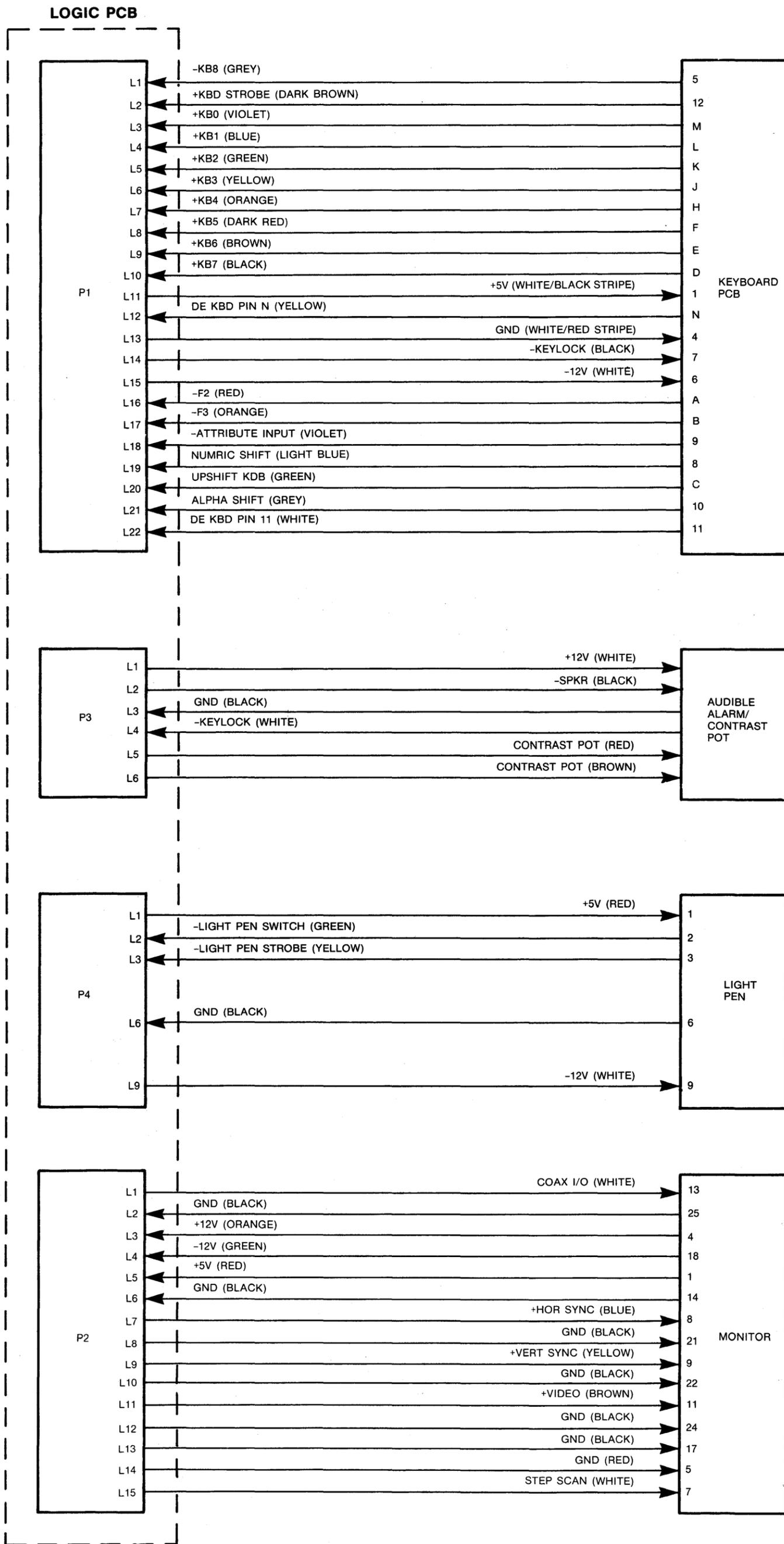


FIGURE B-1. LOGIC PCB INTERFACES—WIRING DIAGRAM

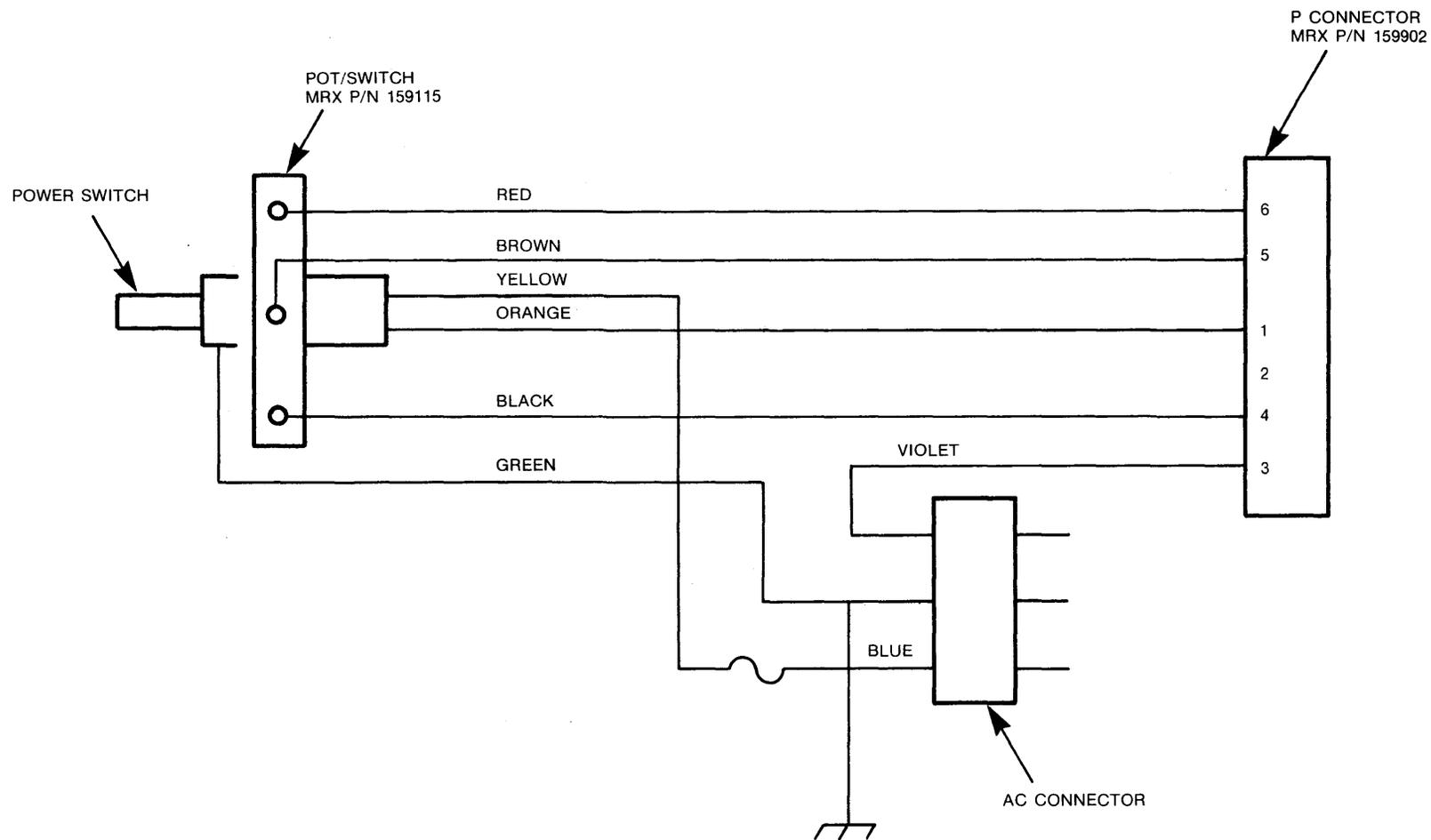


FIGURE B-2. INTERNAL AC CABLE HARNESS (MRX P/N 641017) WIRING DIAGRAM

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