

**CUSTOMER ENGINEERING DIVISION**



**PRODUCT:** INTERACTIVE TERMINAL

**NO:** 9

**MODEL NO:** 2236DE

**DATE:** 8/17/79

**I. DESCRIPTION**

The Model 2236DE Interactive Terminal is a replacement for the 2236D Terminal. It has several features not found on the 2236D terminal. These features include several character display attributes (highlighted displays, reverse video, etc.), alternate graphics set selection, box graphics, and a screen dump feature.

The Model 2236DE consists of a 12-inch (30.4 cm) diagonal measure CRT display unit, a KEYTRONIC keyboard, and a Z80 microprocessor mounted on a single PCB which contains the workstation electronics. The CRT displays a full 128 character set, including upper and lower case keyboard characters, foreign language characters, special symbols, and underlining.

The Model 2236DE can be attached locally to a CPU at distances of up to 2,000 feet or remotely via modems and telephone lines. It can be connected to a 2200 MVP System through either an MXD controller or a Model 22C32 triple controller and to a 2200VP System through a Model 22C32 triple controller. A total of nine 2236DE terminals may be connected to an MVP System; only one 2236DE may be connected to a VP system.

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**LABORATORIES, INC.**

ONE INDUSTRIAL AVENUE, LOWELL, MASSACHUSETTS 01851, TEL. (617) 851-4111, TWX 710 343-6769, TELEX 94-7421

Communication between the terminal and the CPU is asynchronous, full-duplex, with selectable line speeds ranging from 300 to 19.2K Baud.

An explanation of the various features available on the model 2236DE terminal is provided in the following paragraphs. It is not possible to upgrade a model 2236D terminal to a 2236DE model.

The first feature to be discussed is Character Display Attributes. These attributes can be selected for any character displayed on the screen and allow the user to highlight certain information. These attributes are as follows:

- 1) Bright -- characters are displayed in high intensity.
- 2) Blink -- characters appear to blink.
- 3) Reverse Video -- the character background display is white while the character itself is black.
- 4) Underline -- characters are displayed with an underscore.

The display attribute to be used is selected by sending a command of the following form to the CRT:

HEX(02 04 xx yy OE)	Activates attribute.
HEX(02 04 xx yy OF)	Terminates attribute.

where:   xx =     00 if not bright, no blink  
              02 if bright  
              04 if blink  
              0B if bright, blink (not supported by 2236DE)

         yy =     00 if not reverse video, no underline  
                  02 if reverse video  
                  04 if underline  
                  0B if reverse video, underline

The selected display attribute is activated by HEX(OE) in a manner similar to activating expanded print on certain Wang printers. If the selection sequence ends with HEX(OE), the selected display attribute begins immediately and remains in effect until the HEX(OF) command is given. Thus, it is possible to apply these display attributes to a portion of a line or to several lines. Subsequent termination of the display attribute generated by HEX(OE) is accomplished by either carriage return (HEX(OD)) or HEX(OF).

The following is a summary of rules governing character attributes:

- 1) HEX(02 04 xx yy OF) selects but does not activate the specified display attribute.
- 2) HEX(02 04 xx yy OE) selects and activates the specified display attribute. HEX(OD) does not turn off the attribute.
- 3) HEX(OF) is used to terminate the display attribute; normal display is then in effect.
- 4) CLEAR, RESET, and screen clear (HEX(03)) select normal display.
- 5) HEX(OE) reactivates the selected display attribute. The attribute remains in effect until the occurrence of a HEX(OF) or a HEX(OD) (carriage return).
- 6) Alternate attributes apply only to codes equal to HEX(10). Carriage return, line feed, non-destructive space, etc., preserve their meanings. Thus PRINT AT() may always be used to position the cursor. The third argument of PRINT AT(), used to blank sections of the screen, will work differently depending upon which attribute is currently selected.

- 7) HEX(20) is a destructive space. However, Programmers should remember that reverse video spaces are white, not black. PRINT TAB( and zoned format PRINT statements (PRINT, ) position the cursor with HEX(20)'s, so their effect will vary with the currently active display attribute.
- 8) The operating system considers all codes HEX(00)-HEX(0F) to occupy no space on output medium. Thus alternate attribute selection sequences may be included in programs without concern that the operating system may create automatic carriage returns at undesirable times.
- 9) The standard USA Model 2236DE uses bright for the fault attribute.

A second feature offered on the 2236DE terminal is Alternate Graphics Set Selection. This feature allows the user to redefine the meaning of characters HEX(80) to HEX(FF). The following sequence is used for alternate graphics set selection:

HEX(02 02 xx 0F)

where:    xx = 00 if codes HEX(90) to HEX(FF) are used to underline the normal characters HEX(10) to HEX(7F).  
          = 02 if the alternate character set is to be used for codes HEX(80) to HEX(FF).

Selection of the alternate character set provides up to 128 additional characters. The upper characters in the alternate character set are defined as graphics characters. When displayed, graphics characters are expanded to fill the entire character position enabling continuous lines (bars) to be displayed. The standard character graphics set consists of characters representing all the combinations of sixths of a character space.

The default mode for codes HEX(80) to HEX(FF) is fixed at either normal/underline or alternate character set.

The rules concerning the use of character set selection are as follows:

- 1) HEX(02 02 00 0F): selects the upper character set to be the normal characters, HEX(10) to HEX(7F) with underline.
- 2) HEX(02 02 02 0F): selects the alternate character set for codes HEX(80) to HEX(FF). This may include character graphics symbols.
- 3) Power on, CLEAR, and RESET: select the default mode for codes HEX(80) to HEX(FF).
- 4) The standard USA 2236DE uses normal character/underline as the default selection for codes HEX(80) to HEX(FF).

A third feature available on the 2236DE terminal is Box Graphics. This feature allows the user to display continuous horizontal or vertical lines enabling forms to be drawn or information to be separated by lines or boxes.

The horizontal line is displayed between character lines and is a line segment the length of a character space; however, it is positioned from the middle of one character space to the middle of the next character space. Vertical lines are drawn through the middle of a character space coexisting with the character at that location. The vertical line unit has the height of a character space.

The terminal allows the programmer to consider the CRT as two displays (a box graphics display and a character display) that just happen to be displayed on the same screen. In normal character mode, only the characters and their attributes are modified while box graphics remain intact, except during a screen clear which clears both characters and box graphics. Characters and their attributes are undisturbed during a box graphics sequence.

Because character mode and box graphic mode are independent of each other, it is easy to update portions of either display. The third argument of PRINT AT() is useful for clearing portions of the display. Though slower than screen clear, the statement "PRINT AT(0,0,)" is useful for clearing the characters from the screen without disturbing the box graphics.

A new BASIC-2 command "BOX (height, width)" is available to allow programmers to implement the box feature. The BOX function is used within a PRINT statement to draw or erase a box or line on a CRT with box graphics capability. The first expression specifies the height of the box; the 2nd expression expresses the width. The sign of the argument determines whether lines are drawn or erased; lines are drawn if the sign is positive, lines are erased if the sign is negative. If the box height is zero, a horizontal line is drawn or erased. A width of zero causes a vertical line to be drawn or erased. The BOX function positions the box so that the upper left hand corner is at the current cursor position. The CRT cursor does not move while a box is drawn.

A fourth feature offered on the 2236DE terminal is Screen Dump. This feature allows the user to obtain a hard-copy record of the CRT display through a local printer. The local printer must be directly connected to the 2236DE terminal through the printer connector located on the back of the 2236DE (printer address = 204). The screen dump is activated by depressing the EDIT key for approximately two seconds. The following sequence describes the screen dump operation:

- 1) EDIT key depressed and held (immediate click).
- 2) After approximately two seconds, a second click is sounded to indicate that the screen dump has been activated. Normal edit functions are invoked if key is released before second click.
- 3) CRT and Printer buffers are no longer serviced. (Present print job interrupted)
- 4) Carriage Return is transmitted to printer.
- 5) "Top-of-Form" command is transmitted to printer.

- 6) The screen contents are printed. (Non-printable characters appear as "#")
- 7) "Top-of-Form" command is transmitted to printer.
- 8) Normal processing resumes.

The keyboard remains active during a screen dump. Depressing any key will cause the screen dump to cease and normal processing will resume.

When a screen dump is requested, normal printing is interrupted. If a user is printing through the terminal printer, the screen dump will be inserted in the printout. Even though screen dumps cause a page eject before and after the dump, this could pose some minor problems depending on the type of document being printed.

Another feature of the 2236DE Terminal is the repeating key function. All keys on the keyboard, except RESET and EDIT, repeat after an initial delay if held down. This is particularly useful for moving the cursor when editing.

The Model 2236DE is shipped completely assembled. Installation involves plugging in the AC power cord and connecting the interface cable running from the terminal to the controller or modem. An 8 foot (2.4 m) AC power cord and one 25 foot (7.6 m) direct-connection cable is supplied with each Model 2236DE. Longer direct-connection cables may be ordered for a terminal.

Direct-connection cables (non-extendable) are available in 100 foot (30.5m) increments for distances up to 2000 feet (609.6 m). Modem cables are available in twelve foot (3.7 m), 25 foot (7.6 m), and 50 foot (15.2 m) lengths; however, combined cable distance from Wang equipment to a modem should not exceed a maximum of 50 feet (15.1 m) according to EIA standards.

2236 DE

BAUD RATE SELECT SWITCHES SHOULD BE SET AS FOLLOWS.

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
<u>300</u>	ON	OFF	ON	ON	ON
<u>600</u>	ON	OFF	OFF	ON	ON
<u>1200</u>	ON	OFF	ON	OFF	ON
<u>2400</u>	ON	OFF	OFF	OFF	ON
<u>9600</u>	ON	OFF	OFF	ON	OFF
<u>19,200</u>	ON	OFF	ON	OFF	OFF



SWITCH SETTINGS FOR THE 2236D TERMINALS

BAUD RATE	7292-1 E-REV3					7292-1 E-REV 4				
	SWITCH					SWITCH				
	1	2	3	4	5	1	2	3	4	5
19.2K			N/A			ON	ON	ON	OFF	ON
9600	ON	ON	ON	OFF	ON	ON	ON OFF	ON	OFF	OFF ON
4800	ON	ON	ON	OFF	OFF			N/A		
2400	ON	ON	ON	ON	ON	ON	ON	OFF	ON	OFF
1200	ON	ON	OFF	ON	OFF	ON	ON	OFF	OFF	ON
600	ON	ON	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
300	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF

TESTING 2200VP BASIC-2

GENERAL I/O

SPACK  
INTERNAL FORMAT.....OKAY  
DELIMITER FORMAT  
FIELD FORMAT  
MISCELLANEOUS

SUNPACK  
INTERNAL FORMAT.....OKAY  
DELIMITER FORMAT  
FIELD FORMAT

4.5 2236D SELF TEST

The 2236D microcode has some interesting properties that make it useful as a quick self-check of the terminal hardware. As part of communication protocol between the terminal and the MXD, the terminal identifies itself 2236D to enable the MXD's space compression feature.

The 2236D can be tested by installing a loopback connector on the rear of the terminal. When the 2236D is turned ON, the 2236D Microcode will display certain characters.

Wire an RS-232 loop back connector as follows:

Pin No.	2	3	4	5	6	20
Signal	Txdata	Rxdata	RTS	CTS	DSR	DTR

Install the loopback connector, then turn the 2236D on. With no printer plugged in, press RESET. If the CRT controller accepts data from the microprocessor, the characters

i x

should appear on the screen.

Connect a printer (or null printer plug described below) to the remote printer jack on the back of the terminal. Make sure the printer is ON and SELECTED. Press RESET on the terminal. If the printer controller is accepting data from the microprocessor, the characters

i x y

will appear on the CRT.

Deselect the printer. Press RESET. The CRT should read:

i x y

Press RESET again. The CRT should read:

i x

Null printer plug:

Connect pin 1 to pin 10

Connect pin 11 to pin 29

Now test the rest of the keyboard. The letters and numbers should appear correctly on the screen. SPACE should produce a space and BACKSPACE should move the cursor to the left without blanking any character.

The special function keys should appear as the underlined uppercase alphabet, starting with SF'0 = underlined @.

These few simple tests check

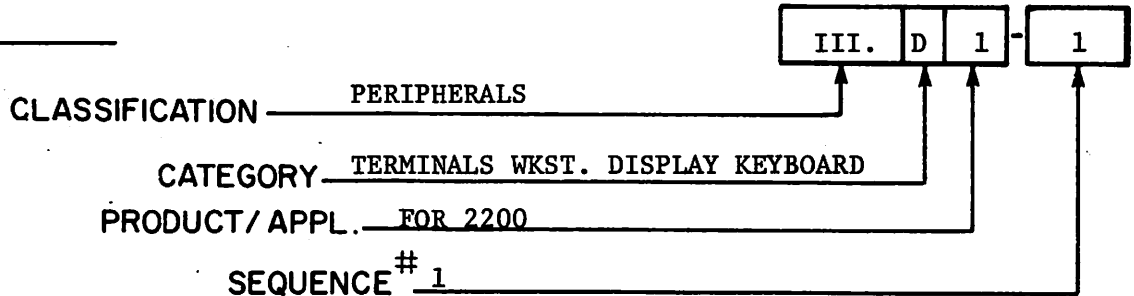
- 1) The keyboard
- 2) The CRT controller
- 3) The UART
- 4) The printer controller ready/busy

They do not test

- 1) The validity of the data sent to the printer
- 2) The blinking cursor
- 3) The CRT beeper
- 4) The hardware/firmware parity check logic

# PRODUCT SERVICE NOTICE

DATE : 1/11/80



TITLE:

2236DE INTERACTIVE TERMINAL PROBLEMS

Two problems exist in 2236DE Interactive Terminals with a WL #210-7592 Single-Board Terminal Electronics circuit board at E-REV level 2 and below. One problem is related to the screen prompt that occurs at power-on; the other problem is related to the operation of plotters.

NOTE:

All 210-7592 boards shipped (with terminals) from the Home Office Distribution Center are at E-REV level 2; those shipped from the Home Office Customer Engineering Department as spares or replacements are at E-REV level 4.



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13-5852 12-79

A. When the 2236DE Terminal is used as the primary console in a VP/MVP System, it is possible for a partial screen prompt to be displayed at power-on (e.g., "PRESS RESET" instead of "MOUNT SYSTEM PLATTER-PRESS RESET".) In some cases, only the cursor will be displayed. This problem will only occur if the VP/MVP CPU and 2236DE Terminal are powered on simultaneously. This problem does not affect overall system operation. All 210-7592 boards at E-REV level 2 and below have this fault.

There are two partial solutions to this problem:

1. If both the CPU and terminal are powered on together, depressing the RESET key will cause the "KEY SF" message to be displayed. The system will operate properly from that point on.
2. By applying power to the terminal prior to turning on the CPU, the screen prompt will be complete. Again, the system will operate properly from that point on.

A third solution-- the only valid, permanent one for this problem-- is to implement ECN #12,947 (E-REV level 3) and ECN #12,948 (no E-REV level change-- PROM revisions changed to R1) on the 210-7592 circuit board. These ECN's have been distributed in the standard corporate ECN format; the ECN's will be documented in a MUB at a later date.

NOTE:

1. If ECN #12,947 is performed, ECN #12,948 must be implemented also; however, ECN #12,948 may be performed without implementing ECN #12,947.
  2. ECN #12,948 (R1 PROM's) should be performed whether ECN #12,947 is implemented or not. The R1 PROM's correct system problems other than that described above.
- B. Wang plotters do not operate properly on the 2236DE Terminal. This problem is easy to recognize-- the plotters do not respond to commands from the terminal at all. All 210-7592 boards at E-REV level 3 and below have this fault.

To rectify this problem, perform ECN #13,176 (E-REV level 4) on the 210-7592 circuit board. This ECN has been distributed in the standard corporate ECN format; the ECN will be documented in a MUB at a later date.

## 2236DE SERVICE INFORMATION

The following information on installing and servicing 2236DE Terminals is valid as of July 19, 1980.

The current E Rev. of the 210-7592 PCB is 4 and an E Rev. of 2 will not cause problems as long as the terminal is not used as a primary console and does not have a local printer or plotter attached.

Manufacturing will continue to ship E Rev. 2 until the next art work update. It is Customer Engineering responsibility to update the PCB's if the update is needed.

### ECN History:

E Rev. 1	ECN 12304	PROM change
E Rev. 2	ECN 12482	To improve video
E Rev. 3	ECN 12947	Allows DE to be used as primary terminal
E Rev. 4	ECN 13176	To enable DE to work with Plotters

ECN #13269 updated the PROMS on the 2236MXD. All MXD's should be updated to R6 PROMs. They must be R6 PROMs to use a DE Terminal.

To use a DE Terminal, the operating system should be 2.2 for a VP or 1.9 for an MVP.

If a customer is experiencing problems with the special features, screen dump to local printer, box function inoperative or graphic character inoperatives. The level of the operating system should be verified before accepting a service call. If the operating system is the latest release then the first thing to be checked after arriving on site is the PROM level if a request for service is made because the KB Clicker or Audible Alarm is low or inoperative have the operator check the controls on the rear of DE before accepting a service call.

There has been numerous problems with multiple entry with the 725-2618 Keyboard. ECN #14545 added a 220 PF Cap, Wang part #300-1220 from IC26 Pin 10 and + 0 Volts.

An unofficial change was to replace Z6 (74LS123) with a 74123 (Wang #376-0080). It is my opinion that both of these changes should be made on call and that this problem will be corrected by the change.

If you have terminals that are operating in a warm environment it is very easy to mount a fan (Wang #400-1007) on top of the main xformer so it will blow across the heat sink. The AC wires from this fan can be run thru the grommet, that brings power to the xformer, and connected to the 115/230 switch on the reverse side of CRT and Xformer Mounting Plate. The addition of this fan should be for special cases only. It is not needed for equipment operating within the temperature range specified for Wang equipment.

Exposure of PROMs to light can cause failure of the chips in some cases. Place an opaque covering over the erasure window of L16, 17 and 18 to take care of the problem.

If a modem is used the connection must be made using RS-232-C compatible cable not the standard (direct connect) multiplexer/terminal cable. The RS-232-C cables are available in the following lengths.

### Extension Cable (male/female):

12 ft.	Part #120-2227-12
25 ft.	Part #120-2227-25
50 ft.	Part #120-2227-50



Modem to 2236DE (male/male):  
25 ft. Part #220-0219

An extension cable cannot be used without the 220-0219 cable. Combined cable distance from DE to modem should not exceed 50 feet.

**Recommended spares for a 2236DE:**

210-7592 PCB-Terminal  
270-0273 CRT (no power supply)  
725-2618 Keyboard Reytronis

The KB was originally listed as a 725-2524 (for D Terminals) do not use the 725-2524 part number.

Cable part number and their length are described below (direct connect 2236DE to MXD). 2,000 feet is maximum for direct connections.

<u>Length</u>	<u>Part No.</u>	<u>Length</u>	<u>Part No.</u>
25 feet	120-2236-25	700 feet	120-2236-7
50 feet	120-2236-50	800 feet	120-2236-8
100 feet	120-2236-1	900 feet	120-2236-9
200 feet	120-2236-2	1000 feet	120-2236-10
300 feet	120-2236-3	1250 feet	120-2236-11
400 feet	120-2236-4	1500 feet	120-2236-12
500 feet	120-2236-5	1750 feet	120-2236-13
600 feet	120-2236-6	2000 feet	120-2236-14

The baud rate selection switches for the 2236DE are located on the 210-7592 PCB. Access these switches by removing the large plug on the back of the terminal. Switch One must be ON and Switch Two must be OFF; these two switches determine the number of data bits and type of parity used. Ensure that the baud rate switch settings at the terminal are the same as those at the controller or modem. Set the baud rate switches according to Table A.

Table A: Baud Rate Settings

<u>Baud Rate</u>	<u>Switch 1</u>	<u>Switch 2</u>	<u>Switch 3</u>	<u>Switch 4</u>	<u>Switch 5</u>
300	ON	OFF	ON	ON	ON
600	ON	OFF	OFF	ON	ON
1,200	ON	OFF	ON	OFF	ON
2,400	ON	OFF	OFF	OFF	ON
4,800	ON	OFF	ON	ON	OFF
9,600	ON	OFF	OFF	ON	OFF
19,200	ON	OFF	ON	OFF	OFF

2236MXD - Part #177-3236-1

210-7290-1 Mother Board E Rev. 2  
210-7291 Daughter Board E Rev. 2

Must be loaded with R6 PROMs.

378-2140 R6  
378-2141 R6  
378-2142 R6  
378-2143 R6



LABORATORIES, INC.

# BULLETIN

DATE: 6-22-81 ADMINISTRATIVE \_\_\_\_\_ TECHNICAL X NUMBER 159

ORIGINATOR: Steve Scott REVIEWED BY: Earle Keizer

DISTRIBUTION:     ATS X           DTS X           DM \_\_\_\_\_     ATOM X

ALL OFFICES X ✓           HOME OFFICE X           EACH EMPLOYEE \_\_\_\_\_

SUBJECT: 2236DE Graphics                           PAGE 1 OF 1

Art Mathsen, a DTS in Gaithersburg, has discovered the reason why the graphics characters do not work on some of the new 2236DE terminals when running "Martians".

The reason is that on boards loaded with 378-4094, 378-4095, and 378-2446 Rev 2 proms in L18, L17, and L16 respectively, the microcode shows a bug in the original program.

The proper code for activating the graphics mode is Hex(0202020F). However, line 250 in the program is Print Hex(0D0306020202020F). The extra 02 in the sequence causes the character set to be de-selected.

Good work Art!

IV.A.3.

DATE: 8/14/80 ADMINISTRATIVE \_\_\_\_\_ TECHNICAL X NUMBER 135ORIGINATOR: Lattie Dean REVIEWED BY: Earle KeizerDISTRIBUTION: ATS X DTS X DM \_\_\_\_\_ ATOM XALL OFFICES X HOME OFFICE X EACH EMPLOYEE \_\_\_\_\_SUBJECT: 2236DE Information PAGE 1 OF 2

The following information on installing and servicing 2236DE Terminals is valid as of August 1, 1980.

The current E Rev. of the 210-7592 PCB is 4 and E Rev. of 2 will not cause problems as long as the terminal is not used as a primary console and does not have a local printer or plotter attached.

Manufacturing will continue to ship E Rev. 2 until the next art work update. It is Customer Engineering's responsibility to update the PCB's if the update is needed.

## ECN History:

E Rev. 1	ECN 12304	PROM change
E Rev. 2	ECN 12482	To improve video
E Rev. 3	ECN 12947	Allows DE to be used as primary terminal
E Rev. 4	ECN 13176	To enable DE to work with Plotters

ECN #13269 updated the PROMS on the 2236MXD. All MXD's should be updated to R6 PROM's. They must be R6 PROM's to use a DE Terminal.

To use a DE Terminal, the operating system should be 2.2 for a VP or 1.9 for an MVP.

If a customer is experiencing problems with the special features, screen dump to local printer, box function inoperative or graphic character inoperatives, the level of the operating system should be verified before accepting a service call. If the operating system is the latest release, then the first thing to be checked after arriving on site is the PROM level. If a request for service is made because the KB Clicker or Audible Alarm is low or inoperative, have the operator check the controls on the rear of DE before accepting a service call.

There have been numerous problems with multiple entry with the 725-2618 Keyboard. ECN #14545 added a 220 PF Cap, Wang part #300-1220 from ICZ6 Pin 10 and  $\pm 0$  Volts. If problems persist, replace Z6 (74LS123) with a 74123 (WLI #376-0080).

Exposure of PROM's to light can cause failure of the chips in some cases. Place an opaque covering over the erasure window of L16, 17 and 18 to take care of the problem.

If a modem is used, the connection must be made using RS-232-C compatible cable (TC cable) not the standard (direct connect) multiplexer/terminal cable. Combined cable distance from DE to modem should not exceed 50 feet.

Recommended spares for a 2236DE:

- 210-7592 PCB-Terminal
- 270-0372 CRT (no power supply)
- 725-2618 Keyboard Keytronics

The KB was originally listed as a 725-2524; (for D Terminals) do not use the 725-2524 part number, use new number.

The baud rate selection switches for the 2236DE are located on the 210-7592 PCB. Access these switches by removing the large plug on the back of the terminal. Switch 1 must be ON and Switch 2 must be OFF; these two switches determine the number of data bits and type of parity used. Ensure that the baud rate switch settings at the terminal are the same as those at the controller or modem. Set the baud rate switches according to Table A.

TABLE A: BAUD RATE SETTINGS

Baud Rate	Switch 1	Switch 2	Switch 3	Switch 4	Switch 5
300	ON	OFF	ON	ON	ON
600	ON	OFF	OFF	ON	ON
1,200	ON	OFF	ON	OFF	ON
2,400	ON	OFF	OFF	OFF	ON
4,800	ON	OFF	ON	ON	OFF
9,600	ON	OFF	OFF	ON	OFF
19,200	ON	OFF	ON	OFF	OFF

The 2236MXD addresses are set by means of a 5-section switchbank (SW1), located on the WL #210-7290-1A board. For systems to have 13 2236DE terminals, set the first 2235MXD to address HEX (00). The second to address HEX (40), and the third to address HEX (80). Set the address of the 22C32 controller to HEX (C0).

2236MXD DEVICE ADDRESSES	SWITCH SETTINGS					22C32 DEVICE ADDRESS	SWITCH SETTINGS				
	S-1	S-2	S-3	S-4	S-5		S-1	S-2	S-3	S-4	S-5
HEX (00)	0	0	0	0	0	HEX (C0)	1	0	0	1	1
HEX (40)	1	0	0	0	0						
HEX (80)	0	1	0	0	0						

\*0 = OFF; 1 = ON.

III.D.1

WANG

ECN CE#407

ECN No 14545

SHEET 1 OF 1  
DATE 2-25-80  
RFA NO. (REF)

ECN NO. 14545

ORIGINATOR Warren Joyce DEPT. 16 EXT. 2014 DATE 2/21/80  
MODEL NO. 2236DE TITLE

PART NO. 725-2618	PART NAME (DWG. TITLE) Keytronics Keybd Assy	REV. F	REV. T	PC.REV. FROM	PC.REV. TO	ELEC.REV. FROM	ELEC.REV. TO
DWG. NO. 35-1852							
-ASSY. PART NO.	ASSY. TITLE					EFFECTED <input type="checkbox"/>	NO EFFECT <input type="checkbox"/>

DESCRIPTION OF CHANGE

Change artwork, assembly drawing and schematic as follows:

Add a 220pf ceramic cap(300-1220) Z6 pin 10 and +0v

No BOM changes required

RECEIVED  
FEB 2 1980  
PRINT ROOM

**PRIORITY 1**

REASON FOR CHANGE

To eliminate double keystrokes

0707M/87 (60)

NEW PURCHASE REQ'D.  SHOP REWORK REQ'D.  VENDOR REWORK REQ'D.

CUSTOMER ENGINEERING  
 IMMEDIATE CUST.  
 CUST. PER NEXT CALL  
 INFORMATION ONLY  
 NONE

ACKNOWLEDGE BY: \_\_\_\_\_ DATE: \_\_\_\_\_

MANDATORY CHANGE  
 DOCUMENTATION CHANGE (PL, BOM, DWG)  
 EASE OF MFG., COST REDUCTION  
 PRODUCT IMPROVEMENT

DISPOSITION	Banded	FINAL ASSY AREA	SUB ASSY AREA	PARTS		FUTURE MFG.
				IN House	Outside Vendor	
USE AS IS TO REVIOUS REV.	X					
TO CONFORM	<del>X</del>	X	X			X
TO CONFORM IF NOT BEYOND OPERATIONS EFFECTED						

FINAL APPROVAL: *Paul Ricker* / *Molone* 2/22/80

APPROVED DESIGN ENGRG. *Therese Joyce* / *W.C.D.*

APPROVED MFG. ENGRG. *Dana Caffelle*

WRITTEN BY: *Judy Mulrod*

Lille Dean



LABORATORIES, INC.

M-E-M-O-R-A-N-D-U-M

ATO-66

TO: District Technical Specialists

FROM: Earle Keizer

DATE: February 26, 1980

SUBJECT: 2236DE Keytronic Keyboards

-----

The Home Office has come up with two possible solutions for the repeat problem on Keytronic keyboards. Please try these fixes only on customers who have chronic problems with the keyboard.

Since these are possible fixes, please do one fix at a time thereby allowing R&D to be aware which of the two or both fixes takes care of the problem.

Possible solutions:

1. Replace cap C18 with the attached cap (.033 u Tant.). C18 is connected between Z13 pin 8 and 0v.
2. Replace one shot Z6 (74LS123) with a 74123 (WLI 376-0080).

If you need more capacitors, please contact me. Both the Area and Home Office have limited supplies. If the capacitor rectifies the problem, sufficient quantities will be ordered by the Home Office.

Please inform me of any results, good or bad.

Regards,

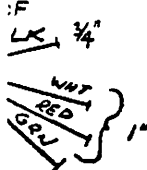
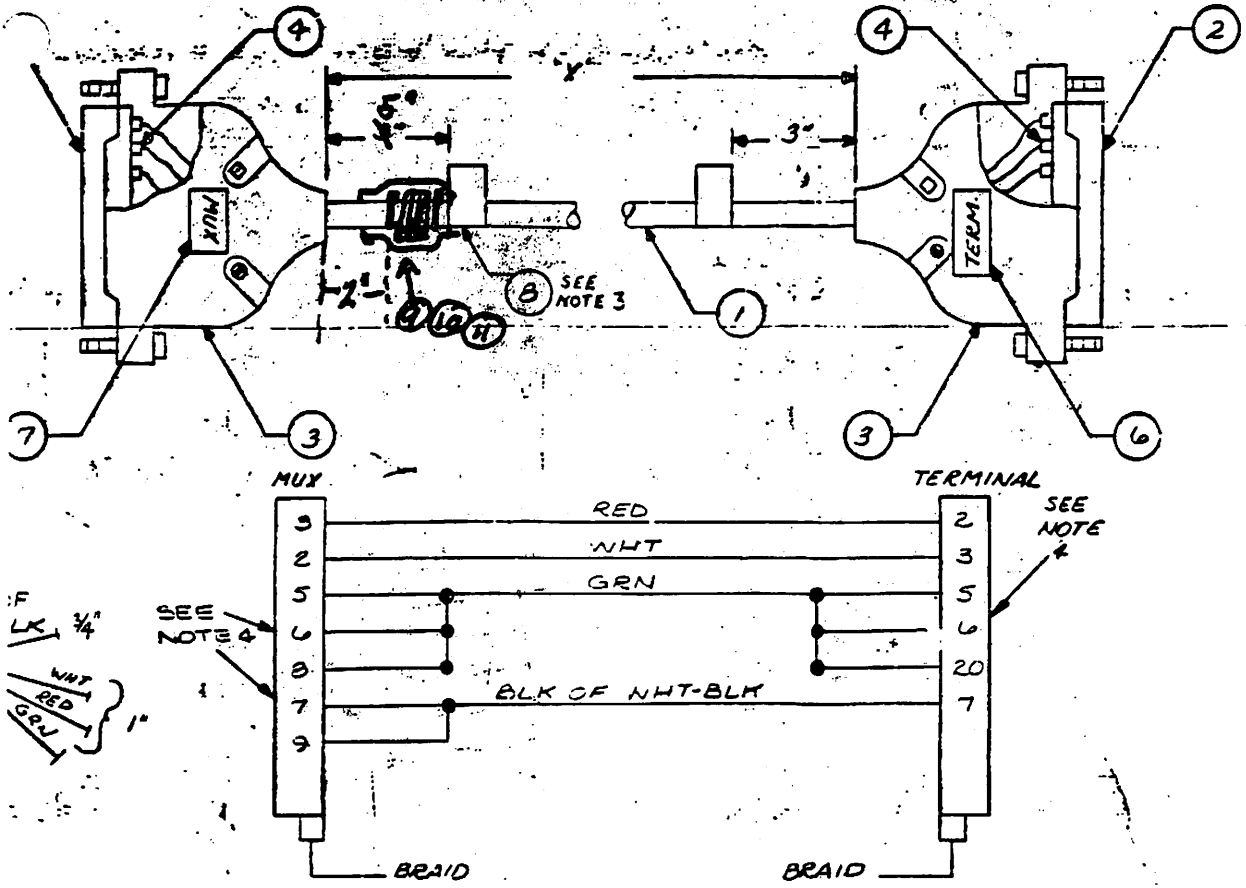
*Earle Keizer*  
Earle Keizer

EK/jh

cc: James Dean  
Crutcher Evans  
ATS's



DO NOT SCALE



- 11 605-0164
- 10 2 605-1006
- 9 1 410-1034

TUBING, SHANK .625" ID 2 1/2" LONG  
 TYE-WRAP  
 FERRITE BEAD

ITEM	QTY	WANG PART NO	DRAWING NO	DESCRIPTION
3	1	SEE ABOVE		CABLE ID MARKER
7	1	615-1343		CABLE LABEL, MUX
6	1	615-1344		CABLE LABEL, TERMINAL
5	1	670-9012		WIRE, YEL, 24 GA SOLID TEFLON 3" LONG
4	AIR	605-0002		SLEEVE #15 TUBING 1/2" LONG
3	2	350-0489		SHELL, CONN. METAL
2	2	350-1030		CONN. 25 POS. MALE
1	AIR	420-0101		CABLE SHIELDED BRAID 3 TWISTED PAIR

CHIT 2 NF  
 EDO NO 552271

<b>WANG</b> WANG LABORATORIES, INC. CORP. MAJSA.		BY	DATE	APPROVED BY	DATE
		JWNC / M	6/6/64	E ENGR [Signature]	
MATERIAL _____ MODEL NO 2236.2396 SEE INGV NOTATIONS		CHP		M ENGR	
		TITLE 2236.2396. CABLE PVC			
FINISH _____ TOL UN AS NOTED XX 2 0.0 FRAC 2 1 64 XXX 2 005 ANG 2 1 30 FINISH		SEE CHART	C	6432-1603	1
		SCALE _____	WT / OF /	WANG PART NUMBER	SIZE

E  
 D  
 C  
 B  
 A

11  
 11  
 8.5

2.5"  
 11"

PROBLEM CALL

CONTROL NUMBER 06233111

CONTACT NAME GORDON ING POSITION CE  
 ROB # 3810 TDX # PHONE # 415 391 9770 EXT # 4019

SYSTEM TYPE 2200MVP DEVICE TYPE 2236DE  
 UTILITY NAME SOFTWARE LEVEL

METHOD OF CALL P T = TELEX, P = PHONE, M = MEMO, E = EMS  
 HAS THE AREA OR DISTRICT BEEN CONTACTED  
 N A = AREA, D = DISTRICT, S = BOTH, N = NONE  
 IS THIS INQUIRY PERTAINING TO A NATIONAL ACCOUNT ?  
 U Y = YES, N = NO, U = UNKNOWN

USE THE FOLLOWING AREA TO DESCRIBE THE SITE THAT CREATED THIS REQUEST

CUST/OFFICE NAME PHONE #  
 ADDRESS CITY STATE  
 ON SITE CONTACT NAME

PROBLEM (\*) SOLUTION (+)

\*SPECIAL PRODUCTS # 9064. 2236DE EMMULATION OF DATA SPEED  
 #40. HANGS ON POLLING SEQUENCE. ILLEGAL TRANSMISSION ERROR  
 8/21/86: GORDON ING 415-391-9770 X 4019 WANG WEST COAST  
 PROBLEM: CUST HAS 3 OR 4 OF THESE WORKSTATIONS ONE HANGS  
 THEY TOOK A CHIP FROM A GOOD WS AND FIXED THE HANG  
 THEY ORDERED A #378-4304 FROM SIX TIMES ALL SIX  
 PROMS THEY GOT DID NOT WORK. THE PROMS THEY GOT  
 HUNG THE WS WHEN POLLING AND GAVE ILLEGAL TRANSM  
 ERROR. ALSO THE PROMS THEY GOT WERE TEXAS INS.  
 REV 0 AND REV1. THE ORIGINAL PROM (ONES THAT WORK  
 ARE MOTOROLA REV 1).  
 8/20/86: CALLED DAVE CAMER SP PROD GROUP HE TELLS ME SP  
 PROD IS NO LONGER AROUND CALL JOHN QUAN 70375 I  
 LEFT A MESSAGE. (30 MIN) JOE  
 8/25 11:25 CALL BACK PLS HE IS AT SAME NUMBER VPLANTE  
 8/25 1:45 CALL BACK IS STILL WAITING VPLANTE  
 08/25/1:50- CALL BACK NEEDED. ASAP! BOBBIE  
 8/25 2:30 CALL BACK VPLANTE  
 8/25/86: CUST HAS 2236 DE. CE SHOULD ORDER THE COMPLETE BD  
 + WITH THE CHIPS ON IT RATHER THEN JUST THE CHIP. ALL UP  
 +GRADES FOR THE TI CHIP SHOULD BE ON THE BD.  
 + DTS INVOLVED GARY LODGE SAME TEL # EX 4004  
 (20 MIN) JOE  
 +CE HAS A 210-7592-A ---CE SHOULD ORDER A 210-7592-1U AND A  
 +210-T294 BD. (10 MIN) JJE  
 8/25 4:20 CE REC'D INFO AND CALL NOT CLOSED VPLANTE  
 8/27/86: GORDON IS HAVING PROB WITH LOGISTICS JOHN TOTO CAN  
 NOT GET THE 210-7592-1U ED WILL SEND -1A AND CHIPS  
 MIKE STANWICK IS WORKING THE PROB OUT WITH ME NOW  
 WE ARE TRYING TO HAVE THE BD BUILT AT MFG (35 MIN)  
 JOE S.  
 9/3/86: MIKE STANWICK SENT MOTOROLA PROM TO GORDON THE CE  
 +INSTALLED THE PROM CUST IS NOW UP AND RUNNING ...THE TEXAS  
 +INST. PROM DOES NOT WORK AT ALL, THERE IS A ECO THAT CAN BE  
 +DONE ON THE BD BUT IS NOT COST JUSTIFIABLE AT THIS TIME.  
 +MOTOROLA, SIGNETICS, AND INTEL PROMS SEEM TO WORK WITHOUT  
 +ECO. (20 MIN) JOE



## EXTERNAL MONITORS ON WANG WORKSTATIONS

Wang cannot tell a customer what to change in his external monitor to make it work with Wang workstations. Below is a list of specs so the monitor vendor can change the configuration of their monitors to be compatible to our workstations, which are RS 170 compatible.

1. Output impedance = 75 ohms.
2. Refresh = 550 lines at 60 lines per frame per second.
3. Video signal = 1.5 VPP + or - composite video signal.
4. Composite video and sync.
5. Negative sync.
6. Horizontal frequency = 17.1 khz.
7. Horizontal retrace = 11.7 usec.
8. Vertical frequency = 60 hz. (50 hz where applicable)
9. Vertical retrace = 1.228 msec.

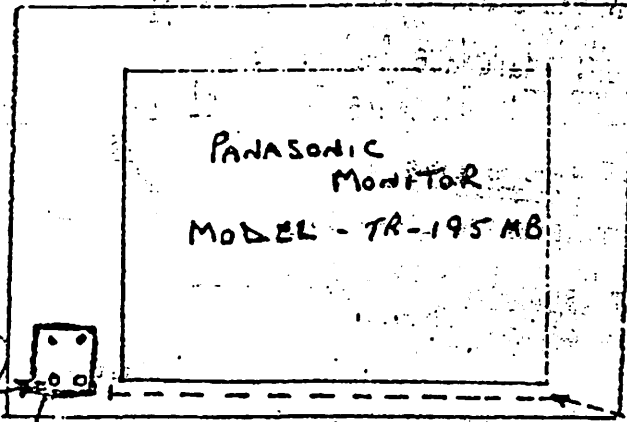
Wang Special Products Group now makes an external monitor adapter which can be ordered through standard sales channels. Part numbers are: 190-0309 video adapter; 190-0309-1 video adapter with 25 ft. coax (BNC) cable; 190-0309-2 video adapter with 50 ft. coax (BNC) cable.

Modifications basically are parallel hookups to the video cables in the Wang workstations.

This Tac Newsletter supercedes Tac Newsletters 01021, 01123, and 20824.

\*\*\*\*\*  
THE INFORMATION CONTAINED HEREIN IS COMPANY CONFIDENTIAL  
\*\*\*\*\*

REAR VIEW



BNC/TWC.  
Conn. required

VIDEO IN  
(VHF connector)

SOLDER CABLE TO  
VIDEO OUTPUT  
OF CRT CONTROL  
CRT CARD.

OK  
75ohm THIN/SINGLE  
STRAND COAX CABLE.

REPLACE C443.  
ON BOTTOM RIGHT  
CORNER OF CRT  
BOARD WITH A  
0033 MF 1000V  
CAP. (METALLIZED  
POLYESTER T/A)

Pig Tails to  
use Built into  
extend to Projector

Composite?

CRT/VIDEO  
CONNECTOR

MEMORY/DATA  
LINK PCBs

WIRING  
SIDE

CRT  
CONTROL

COAX DATA LINK  
TO VS MAINFRAME

CRT

REGULATOR PCB

KEYBOARD

COMPONENT SIDE

BRIGHTNESS

CONTRAST

AFTER CONNECTION OF THE MONITOR THE HORIZ. HOLD, VERT. HT & LW MAY NEED ADJUSTMENT.

MODEL	9609	ADAPTER
	9609-1	" + 25' CABLE
	9609-2	" + 50' CABLE

## 2236DE KEYBOARD

### PROBLEM/SOLUTION

#### 1.0 REPEATING KEYS

- (1) Check to see if keyswitch in 'ON' position
- (2) Is keyswitch missing keycap or spring
- (3) Spacebar stuck in down position
- (4) Z5 Defective (74L574 WLI# 376-0155)

#### 2.0 NO INPUT FROM KEYBOARD

- (1) Check +5v on each I.C.
- (2) Ensure Z12 installed properly
- (3) Replace Z12 (377-0375), Z13 (726-6362), and/or Z14 (726-6363)

#### 3.0 NO SHIFT LAMP OR CLICKER

- (1) Check for +17volts on Q1 (726-0179) and Q2 (375-1027)

210-7456 VIDEO AMPLIFIER

1.0 NO RASTER

Replace L1 and/or Q4

2.0 NO VIDEO RASTER O.K.

Replace L2 and/or C1

3.0 NO VERTICAL HOLD

Replace L3 )

4.0 POOR HORIZONTAL HOLD AFTER WARMUP

Replace C24

5.0 HORIZONTAL LINES JITTER AFTER WARMUP

Replace C25

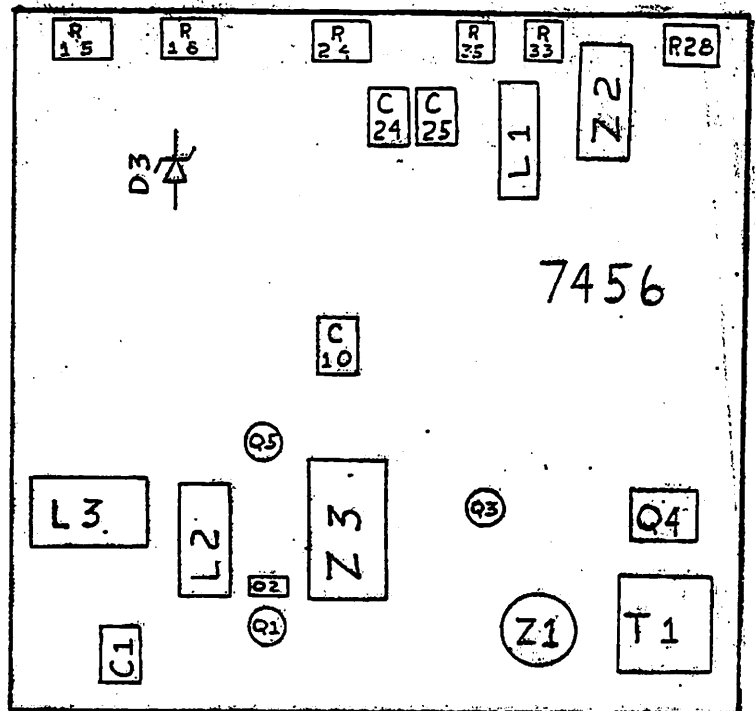
6.0 POOR VERTICAL LINEARITY

Replace D3

7.0 POOR VERTICAL SIZE

Replace C10

L1	TBA950	WLI#	376-0360
L2	NE952	WLI#	376-0239
L3	TDA1044	WLI#	376-0261
Q4	BU124	WLI#	375-1057
C1	10uf/15v	WLI#	300-3006
C10	35uf/15v	WLI#	300-3009
C24	10uf/15v	WLI#	300-3006
C25	.01uf/50v	WLI#	300-2414
D3	1N757/9.1v	WLI#	380-2091



TECHNICAL SERVICE BULLETIN  
SECTION: HardWare Technical

NUMBER: HWT 7200x REPLACES: \_\_\_\_\_ DATE: 12/02/88 PAGE 1 OF 2

MATRIX ID. 3400 PRODUCT/RELEASE# 210-7456 VIDEO CONTROLLER

TITLE: HANDLING AND ADJUSTMENT PROBLEMS

PURPOSE:

To alert the field of the proper handling and adjustment procedures for the 210-7456 video controller.

EXPLANATION:

A high volume of the 210-7456 video controllers being returned for repair are exhibiting problems in two areas.

A) Z1 coil damage.

B) Standard adjustments are not being checked before board replacement.

CORRECTIVE ACTION

Proper care should be taken when transporting, handling and performing R&R procedures on the 210-7456 to avoid damage to the components on the PCB. Ensure that the original shipping containers are used when transporting the PCB to and from the customer site.

Before replacing the video controller all adjustments should be completed in the proper sequence as outlined below.

Create a document to display a full screen (80x24) filled with alternating characters "HO".

Set both Horizontal Hold (R33) and Vertical Hold (R15) to the middle of the stable display range.

Adjust the vertical raster size (R24) for a vertical height of 6.5"  $\pm$  0.20" (16.5cm  $\pm$  0.51cm) on the 12" display. (Use a standard or metric scale.)

Adjust the vertical linearity (R18) for character rows of equal height.

Repeat 2 and 3 until both requirements are met.

GROUP: VS/OA System Hardware Support Group

MAIL STOP: 001-220

COMPANY CONFIDENTIAL

WANG Laboratories, Inc.

TECHNICAL SERVICE BULLETIN  
SECTION: HardWare Technical

NUMBER: HWT yxxx REPLACES: \_\_\_\_\_ DATE: 12/02/88 PAGE 2 OF 2

MATRIX ID. 3400 PRODUCT/RELEASE# 21-7456 VIDEO CONTROLLER

TITLE: HANDLING AND ADJUSTMENT PROBLEMS

CORRECTIVE ACTION:(continued)

Adjust the width coil (Z2) for  $8'' \pm 0.25''$  ( $20.3\text{cm} \pm 0.64\text{cm}$ ) of horizontal deflection on the 12" display. (Use standard or metric scale. )

Adjust the horizontal phasing (R35) for characters centered horizontally on the raster. Turn up the brightness sufficiently to observe the raster frame.

Adjust the focus (R28) for the best overall screen display.

Center the raster with the trim tabs located on the yoke.

These adjustment procedures can be found in the appropriate maintenance manual and in the C.E handbook "WORKSTATIONS" part number 729-1100-A.

GROUP: VS/OA System Hardware Support Group MAIL STOP: 001-220

C O M P A N Y C O N F I D E N T I A L

WANG Laboratories, Inc.

Bruce B. said would  
go out some time.  
6/5/79

S.N. #  
2200/2600 #

3/11  
Tech W/...

### KEY TRONIC KEYBOARD FOR 2236D TERMINAL

Wang Labs is currently buying a capacitive type keyboard from Key Tronic Corporation, which will be used in most 2236D Terminals manufactured in the future. The assembly number for this keyboard is WL #725-2524.

#### A. INSTALLATION

The new keyboard is installed and connected exactly like the old keyboard. "See note below."

#### B. REPLACEMENT

The Key Tronic Keyboard has a slightly different "feel" than the keyboards currently in the field. Due to this fact, it is desirable (for the Customer's sake) to replace a defective keyboard with one the same type. If this is not possible, the defective keyboard should be repaired as soon as possible (while the customer is using the available replacement keyboard) and then returned to the customer's unit. This repair and return policy will only be necessary if the customer is unhappy about the "feel" of the replacement keyboard.

NOTE: The two types of keyboards are directly compatible on all newer units (Terminal motherboard Revision 1 and above), however, if a KEY TRONIC keyboard has to be installed in a terminal with a 219-7293 motherboard Revision 0, pins 4 and 5 of J1 (24 pin combi socket on

the keyboard) have to be tied together. If this is not done, pin 5 will float and the keyboard will not operate. The revision level of the motherboard can be seen by looking down on the unit.

### C. KEY SWITCH REPLACEMENT

1. Remove the key cap by pulling straight up on the cap.
2. Remove the spring.
3. Pry the switch up with a small screw driver by inserting the screw driver on either the right or left (or both) side of the switch (as viewed from the <sup>front</sup> ~~front~~ of the keyboard).  
CAUTION: Some keys have small brass colored screws inserted in <sup>them</sup> through the circuit board on the underside of the keyboard. Remove the screw <sup>if</sup> it is in the switch to be changed.
4. Insert a new key switch by simply pressing the switch into the keyboard. Insure the switch is not upside down <sup>or</sup> on the key cap will slant at the wrong angle.
5. Replace the spring and <sup>to</sup> snap the key cap on.



<u>Part #</u>	<u>Description</u>	<u>Location</u>
6 726-6360	CAP. .033 uf <sup>5</sup> 20V TANT	C16,18,19
300-4014	CAP. 2.2 uf 20V TANT	C3
2, 726-6356	CAP. 10 uf 15V TANT	C2,10
11 726-6355	CAP. 4.7 uf 35V TANT	C11
7 726-6361	CAP. 47 uf 35V TANT	C7
✓ 726-0179	XSTOR 2N2222	Q1
✓ 375-1027	XSTOR2N3725	Q2
ADD ✓ 726-6351	DIODE IN4001	CR2
✓ 726-0908	DIODE IN4148	CR1
ADD 377-0375	I.C. ROM	Z12
18 726-6362	I.C. 900C	Z13
14 726-6363	I.C. CD4051	Z14
10 376-0055	I.C. 7406	Z10
2, 376-0207	I.C. 74LS00	Z1,2
376-0180	I.C. 74LS04	Z4
3, 376-0153	I.C. 74LS08	Z8,9
1 376-0209	I.C. 74LS10	Z11
376-0155	I.C. 74LS74	Z5
726-5124	I.C. 74LS123	Z6,7
726-5145	I.C. 74LS132	Z3

<u>Part #</u>	<u>Description</u>
325-0014 (use 325-0033)	SWITCH, TOGGLE SPDT
320-0049	CLICKER
370-0004	LAMP, WHITE 28V
376-9016	SOCKET, 24 PIN CAMBION
376-9011	SOCKET, 40 PIN I.C.

COMPONENTS

<u>Part #</u>	<u>Description</u>	<u>Location</u>
726-6350	RESISTOR PACK 3.3K	RX 1
726-6352	RES. 82 OHM 1/4W 5%	R12
726-6354	RES. 240 OHM 1/4W 5%	R13
330-2040	RES. 390 OHM 1/4W 5%	R11
330-2057	RES. 560 OHM 1/4W 5%	R6
330-2069	RES. 680 OHM 1/4W 5%	R19
330-3011	RES. 1K OHM 1/4W 5%	R10
330-3016	RES. 1.5K OHM 1/4W 5%	R9
330-3034	RES. 3.3K OHM 1/4W 5%	R 1,3,8,14-16,18,20, 21
330-4011	RES. 10K OHM 1/4W 5%	R17
330-4028	RES. 27K OHM 1/4W 5%	R7
330-4034	RES. 33K OHM 1/4W 5%	R2,5
726-6353	RES. 68K OHM 1/4W 5%	R4
300-1220	CAP. 220 pF 500V CER.	C14,17
726-6359	CAP. 470 pF 50V CER.	C6
300-1906	CAP. 1000 pF 500V CER	C12
726-6357	CAP. 3300 pF 100V POLY.	C4
726-6358	CAP. .01 uF 100V POLY.	C8
300-1903	CAP. .01 uF 25V CER.	C1,5,9,13,15

<u>Part #</u>	<u>Description</u>
552-0575	LOAD
552-0576	RESET
552-0577	RUN
552-0578	.
552-0579	,
552-0580	-
552-0581	/
552-0582	"
552-0583	: ;

552-0850	B
552-0851	C
552-0852	M
552-0853	N
552-0854	V
552-0855	X
552-0856	Y
552-0857	Z
552-0858	.
552-0859	,
552-0860	? /

ACCESSORIES

<u>Part #</u>	<u>Description</u>
552-0975	1.5 oz SPRING
552-0976	2.0 oz SPRING
552-0977	2.5 oz SPRING
552-0978	6.0 oz SPRING
552-0979	SWITCH, KEY

D. PARTS LIST

Key Caps

<u>Part #</u>	<u>Description</u>
552-0026	Lock
552-0027	Shift (LT)
552-0028	Shift (RT)
552-0029	FN
552-0030	Space Bar
552-0031	Return
552-0126	! 1
552-0127	@ 2
552-0128	# 3
552-0129	\$ 4
552-0130	% 5
552-0131	^ 6
552-0132	& 7
552-0133	* 8
552-0134	( 9
552-0135	) 0
552-0136	Backspace
552-0137	- =
552-0138	+ =
552-0400	><
552-0401	[ ]
552-0402	W
552-0403	U
552-0404	T

<u>Part #</u>	<u>Description</u>
552-0405	R
552-0406	Q
552-0407	P
552-0408	O
552-0409	I
552-0410	E
552-0550	A
552-0551	D
552-0552	F
552-0553	G
552-0554	H
552-0555	J
552-0556	K
552-0557	L
552-0558	S
552-0559	1
552-0560	2
552-0561	3
552-0562	4
552-0563	5
552-0564	6
552-0565	7
552-0566	8
552-0567	9
552-0568	0
552-0569	Relegendables
552-0570	CLEAR
552-0571	<del>EDIT</del> CTNUE
552-0572	EDIT
552-0573	ERASE
552-0574	HALT

WANG

ECN

CE#3.9

ECN No. 13176

SHEET 1 of 2  
DATE 10-23-79  
RFA NO. (REF)

ECN NO. 13176

ORIGINATOR Warren Joyce DEPT. 16 EXT. 2014 DATE 10/17/79  
MODEL NO. 2236DE TITLE

PART NO. <u>209-7592</u>	PART NAME <u>Single Bd Term Elec</u>	REV. F	REV. T	PC.REV. FROM	PC.REV. TO	ELEC.REV. FROM	ELEC.REV. TO
DWG. NO. <u>7592</u>	(DWG. TITLE)					<u>3</u>	<u>4</u>
ASSY. PART NO.	ASSY. TITLE					EFFECTED <input type="checkbox"/>	NO EFFECT <input type="checkbox"/>

DESCRIPTION OF CHANGE

Change assembly drawing and schematic per attached print

No BOM changes required

NOTE: At the request of Manufacturing the Artwork will not be modified per this ECN

RECEIVED  
OCT 30 1979

REASON FOR CHANGE PRINT ROOM

To enable board to work with plotters

0234M/65 (51)

NEW PURCHASE REQ'D.  SHOP REWORK REQ'D.  VENDOR REWORK REQ'D.

CUSTOMER ENGINEERING  
 IMMEDIATE CUST.  
 CUST PER NEXT CALL  
 INFORMATION ONLY  
 NONE

ACKNOWLEDGE  
 BY: \_\_\_\_\_  
 DATE: \_\_\_\_\_

MANDATORY CHANGE  
 DOCUMENTATION CHANGE (PL, BOM, DWG)  
 EASE OF MFG., COST REDUCTION  
 PRODUCT IMPROVEMENT

DISPOSITION	Domestic	FINAL ASSY AREA	SUB ASSY AREA	PARTS		Future MFG.
				IN House	Outside Vendor	
USE AS IS TO PREVIOUS REV.	X	X	X			
TO CONFORM						X
TO CONFORM IF NOT BEYOND OPERATIONS EFFECTED						

FINAL APPROVAL W. Joyce 10/18  
 APPROVED DESIGN ENGRG. Warren Joyce 11/1/79  
 APPROVED MFG. ENGRG. \_\_\_\_\_  
 WRITTEN BY Paul Fisher 10/18

WANG

ECN CE#407

ECN No 14545

SHEET 1 OF 1  
DATE 2-25-80  
RFA NO. (REF)

ECN NO. 14545

ORIGINATOR Warren Joyce DEPT. 16 EXT. 2014 DATE 2/21/80  
MODEL NO. 2236DE TITLE

PART NO. 725-2618	PART NAME (DWG. TITLE) Keytronics Keybd Assy	REV. F T	PC.REV. FROM TO	ELEC.REV. FROM TO
DWG. NO. 35-1852				
-ASSY. PART NO.	ASSY. TITLE	EFFECTED <input type="checkbox"/> NO EFFECT <input type="checkbox"/>		

DESCRIPTION OF CHANGE

Change artwork, assembly drawing and schematic as follows:

Add a 220pf ceramic cap(300-1220) Z6 pin 10 and +0v

No BOM changes required

RECEIVED  
FEB 2 1980  
PRINT ROOM

PRIORITY 1

REASON FOR CHANGE

To eliminate double keystrokes

0707M/87 (60)

NEW PURCHASE REQ'D.  SHOP REWORK REQ'D.  VENDOR REWORK REQ'D.

CUSTOMER ENGINEERING  
 IMMEDIATE CUST.  
 CUST. PER NEXT CALL  
 INFORMATION ONLY  
 NONE

ACKNOWLEDGE  
 BY: \_\_\_\_\_  
 DATE: \_\_\_\_\_

MANDATORY CHANGE  
 DOCUMENTATION CHANGE (PL, BOM, DWG)  
 EASE OF MFG., COST REDUCTION  
 PRODUCT IMPROVEMENT

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS		Future MFG.
				IN House	Outside Vendor	
USE AS IS TO PREVIOUS REV.	X					
TO CONFORM	<del>X</del>	X	X			X
TO CONFORM IF NOT BEYOND OPERATIONS EFFECTED						

FINAL APPROVAL: *Paul Ricker* 2/22/80  
 APPROVED DESIGN ENGRG. *Dementjeff* / W.C.D.  
 APPROVED MFG. ENGRG. *Dana Caffette*  
 WRITTEN BY *Judy Mulard*

9. 2236D/DE KEYBOARDS: There is a difference between the keytronics keyboards and the 2236D and 2236DE terminals. The DE has the ability to allow all keys to repeat. This is not an E-Rev to the board. It generates a new WLI No.

725-2524--Keytronic keyboard (2236D)

725-2618--Keytronic keyboard (2236DE)

To convert a 2236D keyboard to a 2236DE keyboard, perform the following:

- A. Cut etch between Z1 Pin 4 and Z2 Pin 11
- B. Cut etch between pads E1 and E2 (located above Z7 and right of Z6).
- C. Add a (4.7K) resistor from Pad E2 to plus 5 volts (located right of pad ~~E2~~ --large etch and plate-thru).
- D. Add a jumper wire from Z1 Pin 4 to Z6 Pin 10

SPECIAL NOTE: When shipped, the keyboards may have a piece of foil taped to the etch side of the board covering the pins of Z12. Remove before using, or damage will result.

2230-3047  
2230-3048



CUSTOMER ENGINEERING  
TECHNICAL ASSISTANCE CENTER  
NEWSLETTER

#11006

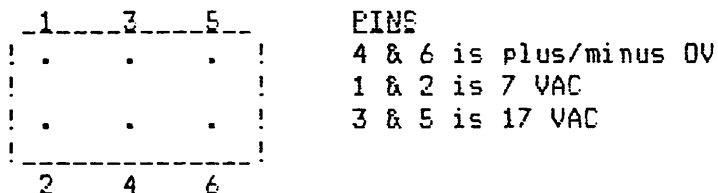
III.D.1

PERIPHERALS-TERMINALS, WORKSTATION DISPLAYS, KEYBOARDS-FOR 2200.

TOPIC: PROBLEMS THAT MIGHT BE ENCOUNTERED WITH THE 2236DE/DW  
CHASSIS

The number of 2236DE/DW chassis (270-0576) ordered in the past six months are too high for this type of part. To assure the chassis is the problem, we must test it first, then if you suspect a problem with it, here are the steps to take:

1. Check the AC power input to the 210-7592 board (J3).



Use pins 4 or 6 of J3 for the DVM voltage return. If the AC voltage is at J3, then most likely, there is no problem with the chassis.

2. Check the 12V going to the monitor (220-1136 cable at the top left hand side of the board). If there is no voltage, disconnect the cable and check again. The monitor can pull down the 12 VDC and short out the power supply.
3. If the terminal blows fuses, disconnect J3 from the 210-7592 board and try again. If it blows a fuse again, then the problem is in the chassis.
4. Some terminals have a 110/220 switch beside the transformer, be certain that the switch is in the proper position for the incoming line voltage.

If these steps are followed, we should see a reduction in the number of 2236DE/DW chassis ordered by the field.

2236DW/2336DW TERMINALS  
KEYBOARD LOCKUP WITH POWER ON

Some Keytronics' keyboards, part number 725-2637, used in the 2236DW and 2336DW are missing a ketronics ECN. Common symptoms are:

1. Lock light will not light upon keying Lock Key.
2. Terminal will receive data but cannot transmit.

The problem may be resolved by installing this ECN. On the keyboard is a 33uf cap between Z11 pin 4 and ground. Tie a 33K resistor in parallel to a silicone diode to the etch coming off Z11 pin 4 to +5V.\* The diode's cathode (negative, black marked end) must be tied to the +5V side.

NOTE: \* +5V may be found on the top etch on the keyboard.

33K Resistor	330-4034
Silicone Diode	380-0001

Powering the terminal off and back on will usually correct the problem if parts are not available.

## DIFFERENCES BETWEEN 2200 AND OIS/WPS WORD PROCESSING

2200 Word Processing Release 1.15 is available for general release from the Software and Literature Control Center (order number 195-2174-3/5). 2200 Word Processing Release 2 should be available for general release during the June-July 1982 time frame. The following descriptions refer to 2200 Word Processing Releases 1.15 and 2 and the ways in which they differ from Word Processing on the OIS and WPS systems.

- When Edit Old Document has to recover an improperly closed document, a message is displayed on the screen indicating that recovery is taking place.
- The document summary screen in Edit Old Document and Create New Document has some minor cosmetic differences from that of the OIS/WPS.
- When transferring control from one page to another (including Next and Previous screen across page boundaries) there will be a noticeable pause of two or three seconds; a message on the screen will indicate that the system is saving and loading pages.
- There will be a two or three second pause whenever a DELETE, FORMAT, SEARCH, REPLACE, COPY, MOVE, SHIFT/COPY or SHIFT/MOVE key is struck.
- The 2200 Word Processor displays no end-of-text character (the dotted space), although the cursor will be sent to the proper place (i.e., the position for entry of the next character) when the cursor is moved to the end-of-text and the 'End of Document' message is displayed.
- The CENTER function is noticeably slower than on the WPS and OIS systems.
- Page size will be limited to 4181 characters. When inserting text, the message 'Page Full' will appear when the operator reaches this limit. When retrieving from archive, page breaks will be inserted at the nearest word break if necessary to preserve the limited page size; a warning will be displayed to the operator.
- Glossaries will be text recall only. Command strings, Decision Processing, and Mathpak will not be supported. The traditional glossary library of space will not be supported. Glossaries will be stored in letter-name libraries. Because the scheme for storing verified glossaries is different from the OIS, any glossary documents transferred from the OIS will have to be re-verified on the 2200. The 'verified glossary' is deleted separately from the 'source' glossary and glossaries can be edited at one terminal while they are attached at the same or another terminal. It is not possible to attach or detach during edit.
- Keystroke statistics will use a slightly different approximation than OIS/WPS. Until a time-of-day clock is generally available through the 2236 MXE controller, time statistics will be saved (when recalled from archive) and displayed, but not updated.
- Single character INSERTs and DELETEDs will be allowed while in Insert mode and Overstrike mode. This will be invoked by the SHIFT/INSERT and SHIFT/DELETE keys.
- Horizontal scroll capabilities will not be included in the initial version of 2200/WP Release 2, although it is planned for a later version. At best, 2200 horizontal scroll will be much slower than on the OIS because of communication time between the 2200 CPU and the terminal.
- Command Note, Global Hyphenation and Repagination will be available in Release 2.
- INSERT will be terminated when a page character is struck. In DELETE, and while specifying text to be copied or moved, the system will not allow the cursor to move beyond the end-of-page character.

(continued)

- Passwords cannot be entered during editing.
- Pressing the **FORMAT** key while in the format line will not bring in the format line from the prototype document.
- Keying **TAB** as a line end in an indented line will not bring you back to the indent. It will end the line the same way **RETURN** does.
- Some minor differences in messages are listed below.

<b>Action</b>	<b>OIS/WPS Response</b>	<b>2200 WP Response</b>
COMMAND-MOVE, INSERT and DELETE at End of Text	'Move Cursor'	'Unknown Command'
COMMAND-BACKSPACE at End of Text	'No Next Screen'	'Unknown Command'
INSERT at end of text	'Insert What'	'Move Cursor'
In format line, press space bar when cursor is in position 2.	'Move Cursor'	'Invalid Key - Ignored'
In imbedded format line, press <b>FORMAT</b>	Replaced with page format line	'Invalid Key - Ignored'
In format line, press <b>COMMAND</b>	'Which Command'	'Invalid Key - Ignored'
Press <b>DELETE</b> in page format line other than Page 1	Format line is deleted, and text is moved to end of previous page.	'Invalid Key - Ignored'
SEARCH-SHIFT/HYPHEN (Underscore)	Cancels <b>SEARCH</b> and returns use to normal editing	Underlines the next characters entered and executes search on that character
SEARCH-PAGE	Cancels <b>SEARCH</b> and returns user to normal editing	Executes <b>SEARCH</b> for PAGE graphics ( <u>  </u> )
SHIFT/REPLACE-PAGE	'Cannot Globally replace that'	'Invalid Key - Ignored'
Press <b>NEXT SCR</b> N at last screen	'No Next Screen'	If cursor is not on last character of screen, it is moved there. Otherwise, 'No Next Screen'.
Press <b>PREV SCR</b> N at first screen	'No Previous Screen'	If cursor is not on first character of screen, it is moved there. Otherwise, 'No Previous Screen'.

## 2200/WP VOLUME CAPACITY UTILITY

by Kathy Curran, Systems Support

A new function, the VOLUME CAPACITY utility, is available on the 2200/WP Utilities Menu with WP software Release 1.15. This utility is used to determine how much free space is available on a specified 2200/WP volume.

To determine how much space is available on a volume, select a library which is contained on that volume and press EXECUTE. The utility will search through the volume and display the approximate number of 4096-character pages available on that volume.

If the VOLUME CAPACITY utility encounters a problem with the volume, a message will be displayed requesting the user to archive all documents on that volume. If this occurs, archive all documents from all libraries contained on that volume, delete the volume, recreate the volume, recreate libraries which are to be contained on that volume, and retrieve the documents from archive.

After this has been done, the VOLUME CAPACITY utility will verify the volume and return to the operator entry screen, where the operator may verify another volume or press CANCEL to exit. Note that if two libraries are contained on one volume it is only necessary to verify one library.

## 2200/WP RELEASE 1.15 PROBLEMS AND CIRCUMVENTIONS

Problem Area	Problem Description
EDITOR	Attempting to edit a document containing a format line greater than 80 characters, which has been retrieved from an archive diskette, will result in a P59 error. Circumvention: Reformat any such documents on original system before archiving.
EDITOR	Recalling a Glossary entry that includes a (-PAGE-) keyword stops program. Circumvention: Hit the CONTINUE key and RETURN.

(continued)

**Problem Area****Problem Description**

- EDITOR** Attempting to SUPER MOVE the first page of a document into a full 4096-character page results in the complete text loss of the page being copied. (Attempts to SUPER MOVE portions of a document other than the first page into a full page result in an appropriate error message.)  
Circumvention: If the page to which information is to be moved appears to be approaching 4096 characters, insert a page break prior to performing the SUPER MOVE.
- EDITOR** Underscored text preceding or following a DEC TAB does not align or print properly.  
Circumvention: None, other than entering the underscored text and the DEC TAB on separate lines.
- PRINT** Text on a centered line which includes a DEC TAB does not print.  
Circumvention: None, other than using format line tabulation or spaces rather than the CENTER key to center the text.
- PRINT** TABs do not function as line enders for centered lines.  
Circumvention: Use RETURN to end a centered line.
- PRINT** Documents containing notes within superscripted text will not print properly.  
Circumvention: None, other than including the note either before or after the superscripted text.
- PRINT** Superscripted text prints incorrectly if printed "Justified".  
Circumvention: None, other than inserting hyphens to align the right margin and printing "Unjustified".
- PRINT** SUPER/SUBscripts preceded by a space or COMMAND space will omit the first following character during print.  
Circumvention: Insert a space after the SUPER/SUBscripted text.

**Other Anomalies**

- EDITOR** Messages displayed concerning the addition of text to a full volume are inconsistent.
- EDITOR** In some cases, SHIFT/FORMAT creates a new format line instead of moving the cursor to the previous format line.
- EDITOR** In some cases, the replacement of a CENTER graphic via the REPLACE key results in temporary incorrect cursor movement.
- CRT IMAGE PRINT** Image print of specific documents containing CENTERS and several FORMATS is erroneous.
- CRT IMAGE PRINT** Document name is sometimes listed incorrectly.
- PRINT** Print jobs cannot be cancelled while the Summary page is being printed.
- PRINT** Left margin selection does not affect the left margin of the printed Summary page.
- PRINT** An OIS document retrieved from archive diskette must be edited before it can be printed.
- GLOSSARY** If the last entry in a Glossary is (-COMMAND-), the wrong error message is returned.
- VOLUME MAINTENANCE** Attempt to create a volume on a full disk platter gives no message to this effect.
- RETRIEVE** No message is given when the user specifies a non-existent document ID during an attempt to 'Retrieve From Archive Diskette.'

1136A T. Carter



MEMO TO: DISTRIBUTION  
FROM: TOM CAMP  
SUBJECT: 2236DE PRICING  
DATE: JUNE 15, 1979

The 2236DE Interactive Terminal further strengthens Wang Laboratories' position in the small business systems marketplace. This product is a direct result of your numerous field requests for features not possible on our other interactive terminals. The Model 2236DE will replace the Model 2236D, effective August 1, 1979.

This new terminal easily facilitates forms processing and data entry applications through extensive new features. Character and line graphics, reverse video, and dual intensity are but a few of these new features.

Orders are now being accepted for this exciting new product. Deliveries will begin 1st Quarter Fiscal '80.

<u>U.S. Price</u>	<u>Monthly Maintenance</u>
\$2,700	\$16.00

Canadian Prices

<u>FST &amp; Duty Exempt</u>	<u>Duty Paid FST Exempt</u>	<u>FST &amp; Duty Included</u>	<u>Monthly Maintenance</u>
\$3,350	\$3,625	\$3,900	\$20.00

Tom  
Tom Camp

TC:pn

COPY to Tina



*Bill Halberin*  
*You have a problem*  
*Carl*

TO: RUSS CARY, RALPH CRUSIUS, WARREN HAYES, RICHARD HEBERT, FRANK KUSHMEREK, DENNIS NOONAN, PAUL RICKER, AND JEAN VEST

FROM: TOM CAMP

SUBJECT: 2236DE INTERACTIVE TERMINAL ANNOUNCEMENT

DATE: JUNE 14, 1979

On Friday, June 15, 1979, we will announce the availability of Model 2236DE Interactive Terminal for the 2200VP and 2200MVP. This terminal will utilize the existing MXD controller or the new 22C32 triple controller announced last April. This means that the 2236DE terminal can be configured in place of the Model 2236D.

Customer deliveries are scheduled to begin August 1, 1979, and a six-to-eight week delivery should be quoted on all initial orders.

<u>U.S. Price</u>	<u>Monthly Maintenance</u>
\$2,700	\$16.00

Part No. 177-3236DE

Please begin accepting orders for this new product immediately.

NO UPGRADES OF EXISTING 2236D's ARE POSSIBLE!!

Four new direct connect cable lengths have also been announced. They are as follows:

<u>Length</u>	<u>Part No.</u>	<u>U.S. Price</u>
1. 1250 Feet	120-2236-11	\$590.00
2. 1500 Feet	120-2236-12	\$700.00
3. 1750 Feet	120-2236-13	\$810.00
4. 2000 Feet	120-2236-14	\$920.00

(All 2236 cables are non-extendable).

Should you have any questions, please don't hesitate to call me at Ext. 2059.

*Tom Camp*  
\_\_\_\_\_  
Tom Camp

TC: jc:2742M

cc: Bob Bozeman  
Herb Holzman

Paul Knight  
Carl Masi

Sam Gagliano  
Dennis Shepard  
Frederick A. Wang  
Dr. An Wang



**WANG**

LABORATORIES, INC.

MEMO TO: DISTRIBUTION  
FROM: TOM CAMP  
SUBJECT: 2236DE INTERACTIVE TERMINAL  
DATE: JUNE 14, 1979

Wang Laboratories, Inc. is today announcing a new interactive terminal, the model 2236DE, for the 2200VP and 2200MVP family of computer systems.

This exciting new terminal was designed as a replacement for the existing model 2236D. As such, it provides greatly expanded features at an extremely competitive price (\$2,700 U.S.A.).

Effective August 1, 1979, the model 2236D interactive terminal will be discontinued. Therefore, no 2236D orders will be accepted after this date.

This package contains the following release items:

1. Position Paper
  - Product Objective
  - Selling Strategies
  - Product Overview
  - Questions and Answers
2. Product Bulletin
  - Detailed Product Description
  - Features and Benefits
  - Competition
  - Product Statistics
3. Data Sheet
4. Pricing Memo

This new product strengthens our position as a leading supplier of the most advanced general purpose computer system. It also serves to reaffirm our commitment to provide the most sophisticated cost effective products for our present and future users.

Use this new product to help close those tough competitive deals.

Good Selling!

  
Tom Camp

TC:pn

Enclosure

2236DE Interactive Terminal  
Position Paper

Wang Laboratories, Inc. is pleased to announce the availability of a new interactive terminal for the 2200 family of small computers. Designed to replace the Model 2236D, the Model new 2236DE offers the following features and capabilities previously unheard of on terminals in its price range:

- . Advanced screen formatting through the use of character display attributes - dual intensity, blinking, reverse video, and underscore.
- . Graphics Character Set.
- . Line and Box Graphics capabilities.
- . Screen Dump feature.
- . Repeating keys.
- . Programmable Blinking Cursor.

## Product Objective

With the rapid success of the 2200MVP, the demand for interactive terminals has grown exponentially. This demand, paralleled by numerous field requests for enhanced features, led to the design of the new Model 2236DE Terminal. The Model 2236DE was built to provide an advanced product to replace the Model 2236D.

With the success of the 2236D, one might ask why develop a replacement terminal? The answer to this question involves one of Wang Laboratories oldest philosophies - use the latest, proven technologies, to provide a cost effective product, with a price/performance ratio unequalled by our competitors.

The 2236DE uses a well proven micro processor to control communications between the 2200 central processing unit and the terminal. Advanced integration design allowed us to reduce the number of components and provide an easily maintainable terminal. This also allows us to streamline our manufacturing operations to meet the growing world-wide demand for Wang Interactive Terminals. The net result - an advanced terminal product for a rapidly advancing market.

The 2236DE provides a cost effective solution for our customers' interactive terminal needs, providing more power at an economical cost.

## Selling Strategies

The Model 2236DE terminal gives you, the Wang Sales representative, a distinctive competitive edge. Keep in mind that other terminals generally offer these features only as options. With Wang, the added power is included in our one low price. Use this advantage to close those highly competitive deals.

Because the new terminal is micro-processor controlled, the System 2200MVP is free to process while the terminal handles such tasks as blinking characters, alternate character set generation, reverse video, etc. This means that advanced interactive screen formatting can be quickly and easily implemented with no apparent loss of systems performance.

The new terminal provides the capabilities of displaying line and BAR graphics. This makes possible the display of BAR charts, previously only available on expensive, high resolution graphics displays. Almost any business application program would be enhanced by the use of these features.

Use these added features to help close competitive deals. Awareness of Wang's added value may help convince those skeptical prospects.

## Product Overview

The product overview is written to provide an insight to the new features of the Model 2236DE. Each feature is discussed briefly. For more detailed information regarding the implementation of a specific feature, please see the attached "Product Bulletin".

Character Display Attributes allow the programmer to highlight information on the screen in several modes. Dual intensity of the screen allows bright characters to be displayed in high intensity, while unhighlighted characters are displayed via normal intensity.

Blinking characters can be displayed to emphasize operator error or to signal situations which require immediate operator intervention. Underlines can be implemented more easily than previously through use of the underscore attribute. Reverse Video causes the character background to appear white while the character is displayed in black.

These display attributes can be selected character by character, line by line, or any combination through program control. This gives programmers the flexibility to design screen displays in any manner they desire.

The 2236DE Terminal also supports an alternate character set for displaying graphic characters. This means that an additional 64 graphics characters are available. These can be used for displaying bar graphs for business or technical applications.

The standard character graphics set consists of characters representing all combinations of sixths of a character space.

Box Graphics is also provided to display continuous horizontal and vertical lines. This provides programmers the means to draw special forms or separate information by lines or boxes. A new BASIC-2 command, PRINT BOX (height, width), allows easy implementation - a Wang tradition.

The Screen Dump feature is an off-line operation controlled by the terminal user. A dump of the screen to a local printer (directly connected to the terminal) is initiated by depressing the edit key for approximately two (2) seconds. The screen dump can be used even when a system error has occurred. This means that users may easily record information from the screen on hard copy.

Repeat will be available for all character keys on the 2236DE. Users simply need to depress the key and hold it for the repeat function to initiate. This is particularly useful for moving the cursor when editing a line.

The cursor can be turned on and off with a blinking attribute under program control. This can prove useful for special screen displays, and aid in locating the cursor during data entry when the edit feature is not invoked (as when using KEYIN).

With the Model 2236DE terminal, both the programmer and the user benefit. The programmer can use these new features to develop a better information exchange between the user and the machine. The user benefits through receiving a system which is more responsive and easier to use.

Programs developed for the 2236D require no modification to operate on the 2236DE. Conversely, programs developed for the new 2236DE Terminal will work properly on the 2236D except that the previously mentioned features will be ignored. Graphics Characters will, however, display non-meaningful characters when used on the 2236D.

#### UPGRADES

Upgrades of existing 2236D terminals to include the features of the 2236DE are NOT possible. The 2236DE terminal's design prohibits simple modification of the 2236D.

## Questions and Answers

1. Can existing programs be used with the new terminal?

YES!! The 2236DE functionally operates identically to the 2236D. Existing 2200 programs will operate on the 2236DE with no modification. Modification is required, however, to utilize the new features.

2. Can the new terminal be connected to the unused parts of existing 2200MXD's?

YES!! The 2236DE uses the MXD or the 22C32 triple controller.

3. Can BOX graphics be used independently without effecting normal character display.

YES!! The system treats the BOX graphics as though it were being displayed on a separate screen. Character display is untouched by BOX graphics and vice versa.

4. Can existing software use the screen dump feature?

YES!! The screen dump feature is software independent and can be initiated at any time.

5. Will all alphabetic characters be printed during screen dump?

YES!! The terminal will print all characters between HEX (20) and HEX (7E). This includes all numerics and special characters found on the keyboard.

6. Will all character keys be repeatable?

YES!! Only the EDIT and RESET keys will not repeat.

7. What is the default character attribute?

Bright.

8. Does the 2236DE also operate on a 2200VP?

YES. The 2236DE can be used with the 2236MXD or the 22C32 triple controller on a 2200VP. The VP, of course, only supports a single terminal.

## Computers

<b>TO</b> DISTRIBUTION	<b>PUBLICATION #</b>
<b>FROM</b> GUY SUYKERBUYK	<b>DATE</b> FEBRUARY 1980
<b>SUBJECT</b> 2236DE INTERACTIVE TERMINAL - SPANISH	<b>REORDER FROM:</b>
<b>THIS RELEASE SUPERSEDES:</b>	<b>DESTROY SUPERSEDED INFORMATION</b> <input type="checkbox"/> YES <input type="checkbox"/> NO

Wang is pleased to announce the availability of its 2236DE Interactive Terminal with Spanish character set. This terminal, together with its related peripherals, enables the input/output of all characters used in the Spanish language.

The layout of the keyboard and the CRT hex code set are shown in the attached appendices. Note that on the keyboard the numeric keypad is numeric in both uppercase and lowercase. The syntax characters that appear above the numerals are called out via the sequence glossary number (e.g., Glossary 1 creates &).

### Ordering Information

Order through International Order Processing. Specify Model 2236DE and an equal amount of language options - L02236DE-SP.

For printers, use the following model numbers:

2221WSP  
2231WSP  
2281WSP

Note that on the 2281WSP, which uses the Wang 05 printwheel, some characters are not available and because of their importance, they are replaced by other characters as follows:

# replaced by =  
< replaced by (  
> replaced by )

There is no extra charge for this language feature.





2220-A	A	^	A	A	NP	^	A	NP	NP	A	A	A	A	A	A	A
2220-B	A		A	A	A		A	A	A	A	A	A	A	A	NS	NS
2226-A	A		A	A	NP		A	NP	NP	A	A	A	A	A	A	A
2226-B	A	NS	A	A	A	NP	A	A	A	A	A	A	A	A	NS	NS
2210-A	A		A	A	NP		A	NP	NP	A	A	A	A	A	A	A
2210-B	A		A	A	A		A	A	A	A	A	A	A	A	NS	NS
W5	A		A	A	A		A	P	P	A	A	A	A	A	NS	NS
PCS	A		A	A	A		A	P	P	A	A	A	A	A	NS	NS
PCS II	A	✓	A	A	A	✓	A	P	P	A	A	A	A	A	NS	NS
2221-W	A	A	A	A	A		A	A	A	A	NP	A	A	A	A	A
2231-W	A	NP	A	A	A		A	A	A	A	A	A	A	A	NS	NS
2261-W	A	A	A	A	A		A	A	A	A	A	A	A	A	NS	NS
2263	A	P	A	A	A		A	P	P	A	A	A	A	A	P	P
2272	A	NP	NP	A	A		A	NP	NP	A	NP	A	A	NP	NS	NS
2281	A	A	A	A	A		A	P	P	A	NP	NS	A	NS	NS	NS
2281 P	NP	NP	NP	NP	NP		NP	NP	NP	NP	NP	NS	NP	NS	NS	NS
2281-W	?															?
2282	NP															NP
2231-W3	"															"
2231-W6	"															"

<b>2236-D</b>	NP	A	A	A	A	A	A	A	A	P	P	A	A	P	NS	NS
2221-W	NP	A	A	A	A	A	A	A	A	P	P	A	A	P	NS	NS
2231-W	NP	A	A	A	A	A	A	A	A	P	P	A	A	P	NS	NS
2261-W	NP	A	A	A	A	A	A	A	A	P	P	A	A	P	NS	NS
2263	P	P	P	P	P	P	P	P	P	P	P	NS	P	P	NS	NS
2272	NP	NP	NP											NP	NS	NP
2281	P	P	P	P	P	P	P	P	P	P	P	NS	P	NS	NS	NS
2281 P	P	P	P	P	P	P	P	P	P	P	P	NS	P	NS	NS	NS
2281-W	?															?
2282	NP															NP
2231-W3	"															"
2231-W6	NP															NP

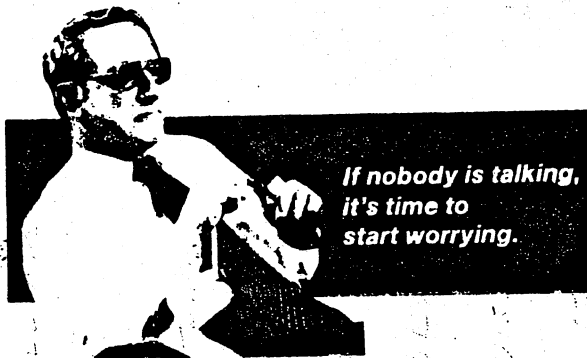
A = AVAIL  
 NS = NOT SCHEDULED  
 RF = READY FOR  
 RP = READY FOR PRODUCTION  
 P = PLANNED  
 NP = NOT PLANNED BY  
 AGENCY ✓ C.C.

FULL AGENCY  
 GERMAN  
 SWEDISH  
 UK  
 HOLL.  
 NORWAY  
 SWISS GERMAN  
 SWISS FRENCH  
 FINISH = SWEDISH  
 DANISH  
 SPANISH  
 GREEK/LATIN  
 CYRILIC/LATIN  
 ICELANDIC  
 LATIN/ARABIC - ME  
 LATIN/FARCI - ME

A II

Status EURO-support      2200 series.

- A. Attached please find two listings of Wesa-supported configurations / peripherals for EURO-character generation.
- B. When marked "R" (= Released) - on appendix A - this does not necessarily mean that a specific "national" version has already been released ; as these releases are and have been based on closed sales.
- C. For all configurations / peripherals listed in the publication "Character Generation of NON-Qwerty Character sets". (WPN 901-6319/ -2 and -3) the status per August 78 is listed for : 2222E, 2223, 2216A, 2216B, 2220A, 2226A, 2226B, 2210A, 2210B, WS, PCS, PCS-II, 2236 - used with "old" MXC -, plus : 2201, 2221, 2221L, 2221W, 2231, 2231W (-1 and -2), 2251, 2261, 2261W, 2263, 2272, 2281. This publication surely available with your Service Manager.
- D. You have to bear in mind, that code-tables in relation to KB-, CRT-, and Printer-Proms depend on the console used, and that with the 2236D/MXD these all change.
- E. Very specific "Release-memos" on 2236D/MXD and related peripherals, per specific language area are being distributed as soon as a specific "language"-version has been dealt with ; and will be followed by updates of the publication per C). Sequence of release(s) dictated by backlog on closed sales.
- F. If any doubt on support of a given configuration, please contact European Headquarters or Wesa-E.C.E., before committing.
- G. Appendix A gives you a general survey, as stated. Please check on "national" support.
- Appendix B gives you a survey of 2236D/MXD - carrying configurations supported, and planned to be supported. As already stated, priorities set by closed sales.
- H. Wesa-E.C.E. will do its utmost best to provide a monthly update of this memo.



N. Van Zuuren.  
Jan. 16/79

A II

A III

GENERAL EURO-SUPPORT  
RELATION 2200 CONSOLES TO OUTPUT PERIPHERALS

configurations /

- this does not  
has already been  
on closed sales.

the publication  
is listed for :  
2210A, 2210B, WS,  
2201, 2221, 2221L,  
263, 2272, 2281.  
Manager.

ion to KB-, CRT-,  
and that with the

ated peripherals,  
d as soon as a  
; and will be  
es.

1, please contact  
ing.

ing configurations  
stated, priorities

monthly update of

LINKED TO :	PCS-II	WS	"T" WITH 2226/ 2210	"vp" WITH 2226/ 2210	"vp" WITH 2236D/ MXD	"MVP" WITH 2236D/ MXD	
					CODING CHANGED !		
2221W	O.R.	O.R.	O.R.	O.R.	R.R.*	R.R.*	* for major languages in relation to backlog.  " only swedish ready
2231W-1	O.R.	O.R.	O.R.	O.R.	R.R.*	R.R.*	
2231W-2	O.R.	O.R.	O.R.	O.R.	R.R.*	R.R.*	
2231W-3	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	
2231W-6	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	
2251	O.R.	O.R.	O.R.	O.R.	N.R.	N.R.	
2261W	O.R.	O.R.	O.R.	O.R.	R.R.*	R.R.*	
2263-1	N.R.	N.R.	N.R.	N.R.	P"	P"	
2263-2	N.R.	N.R.	N.R.	N.R.	P	P	
2272-2M	O.R.	O.R.	O.R.	O.R.	N.R.	N.R.	
2281	O.R.	O.R.	O.R.	O.R.	P	P	
2281P	N.R.	N.R.	N.R.	N.R.	P	P	
2282	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	

Legend : O.R. : "Old"-releases, please check availability of  
specific version per C).  
R.R. : Recent releases, please see Appendix B.  
N.R. : Not released, needs E.H. - approval per version.  
P : Planned / N.S. : not supported.

N. Van Zuuren.  
Jan. 16/79

**B**

2236D/MXD RELATED TO LANGUAGE AND OUTPUT PERIPHERALS

2236D/MXD	2221W	2231W-1 2231W-2	2231W-6	2261W	2263	2272	2281	2281P	2282 + 2231W-3
TO : →	R.R.	R.R.	N.R.	R.R.	P	N.R.	2 WEEKS ↓	↓	
FOR : ↓									
FULL AZERTY E 125	R.R.	R.R.	N.R.	R.R.	P	N.R.	P 16/2	P 16/2	N.R.
SWEDISH E 127	R.R.	R.R.	N.R.	R.R.	R.R.	N.R.	P 23/2	P 23/2	N.R.
NORWEGIAN E 128	R.R.	R.R.	N.R.	R.R.	P	N.R.	P 2/3	P 2/3	N.R.
D.K. E 129	R.R.	R.R.	N.R.	R.R.	P	N.R.	P 9/3	P 9/3	N.R.
DUTCH E 130	R.R.	R.R.	N.R.	R.R.	P	N.R.	P 16/3	P 16/3	N.R.
GERMAN E 145	P 26/1	P 26/1	N.R.	P 26/1	P	N.R.	P 30/3	P 30/3	N.R.
CYRILLIC/LATIN E 148	R.R.	P 31/1	N.R.	P 31/1	P ?	N.R.	P 4/4	N.R.	N.R.
GREEK/LATIN E 158	P 12/4 R.R.	P 19/4 R.R.	N.R.	P 19/4	N.R.	N.R.	N.R.	N.R.	N.R.
SWISS - GERMAN E 135	R.R.	R.R.	N.R.	R.R.	P	N.R.	P 23/3	P 23/3	N.R.
SWISS - FRENCH E 136	R.R.	R.R.	N.R.	R.R.	P	N.R.	P 23/3	P 23/3	N.R.
DANISH, FINNISH, ICELANDIC SPANISH, ASV-CODAR ETC.	ALL DEALT WITH L.I.M.	N.R. -		ALL DEALT WITH	CO-OP LOHES?				

Note : 2236 D - coding 1

Legend : R.R. = Recent Release  
 N.R. = Not released, needs E.H. - approval per version.  
 P = Planned ; T.D. = target date.

Other languages ; sequence by closed sales !

*Handwritten signature*  
 Feb 21/79

**A IV**

SECRET

BE

WP - Euro Support.

Status at Wesa-E.C.E., on general support.

Please find enclosed status at Wesa-E.C.E., on WP-Euro support.

Note : For system 10/20/30 new release levels (17.2 / 7.2) have been announced by Lowell, resulting in extra workload for translations on menus/prompts etc. ; plus modifications on encoding/decoding tables.

Wesa E.C.E. will do its utmost best to provide you with a monthly update of this memo.



N. Van Zuuren  
Jan. 16/79

SITUATION WP SOFTWARE JAN 16/79

GREECE
DENMARK
CYRILLIC USSR
CZECH CSSR
PORT. US EMB
ITALY
HUNGARY
WHO
SWEDEN US EMB
SWISS/FRENCH
SWISS/GERMAN
SPAIN
FINLAND
SWEDEN
NORWAY
SOUTH AFR.
SOUTH AFR. (NED)
FLEMISH
NETHERLANDS
UK
FRENCH
GERMAN
US

Country ↑

BI

BI

SITUATION WP SOFTWARE JAN 16/79

Country	US	GERMAN	FRENCH	UK	NETHERLANDS	FLEMISH	SOUTH AFR. (NED)	SOUTH AFR.	NORWAY	SWEDEN	FINLAND	SPAIN	SWISS/GERMAN	SWISS/FRENCH	SWEDEN US EMB	WHO	HUNGARY	ITALY	PORT. US EMB	CZECH CSSR	CYRILLIC USSR	DENMARK	GREECE
MAIN SOFT - SYST 10/20/30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	2	1	
R-X WHEELS																							
WANG WHEELS	1	1	1	5	3	3	3	3	1	1	3	3	3	3	3	3	3	3	3	3	3	3	X
TC SOFT	1	2	1	1	1	1	7	1	1	2	2	7	6	7	X	1	1	7	X	3	X	7	
AUXILIARY FUNCTIONS - MATH FU.	1	1	2	1	2	6	6	1	1	1	2	2	7	6	X	X	1	7	X	3	X	7	
SORT SEQUENCE	1	3	3	1	2	2	6	1	3	1	1	2	2	2	X	X	3	2	X	3	X	2	
CALENDAR MANAGEMENT TRANSLAT.	1	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2

- 1 = Finished
  - 2 = Waiting for translations (original already mailed) !
  - 3 = In development phase
  - 4 = Waiting for approval for Wess to act, as WP local staff should be able to take care of translation
  - 5 = Demo package available
  - 6 = Waiting other country
  - 7 = ACTION !
  - 8 = PENDING
- \* If Wang wheel available, R-X wheel dropped.

port.

7.2) have been workload for modifications on

monthly update

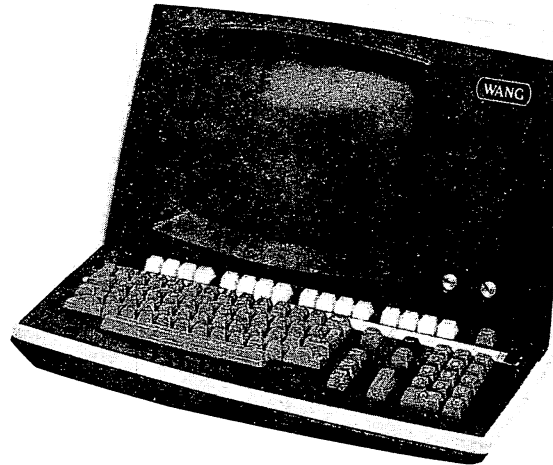
iren



# PRODUCT BULLETIN

# NO. 186

MODEL 2236DE INTERACTIVE TERMINAL PRODUCT BULLETIN



## INTRODUCTION

Wang Laboratories, Inc., is pleased to announce the addition of a new interactive terminal for the 2200VP and 2200MVP family of computer systems. This new microprocessor-controlled terminal offers our customers features not previously available, including:

- . Dual Intensity —
- . Reverse Video -
- . Underlining -
- . Blinking Characters -
- . Graphics Character Set -
- . Box Graphics
- . Screen Dump to Printer
- . Repeating Keys .
- . Self-test Diagnostics

These sophisticated new features can be implemented with a minimum of programming effort because of recent changes in the 2200VP and 2200MVP operating systems.



# PRODUCT BULLETIN NO. 186

Through the use of these new features, it is now possible to easily display BAR Charts. The BOX graphics feature can be used to construct graphic grids, while the alternate character set can display the BAR graphics. Reverse video and bright and blinking attributes can be used to display label information. Previously, this capability was available only on high resolution graphics CRT displays.

The screen dump feature allows the operator to obtain a hard-copy record of the screen display on a printer attached to the terminal. Special programming will no longer be required to provide operators a convenient method for obtaining hard copy output. When software errors occur, the new user can print the screen as it appeared at the time of the failure. The screen dump can also be used when a customer requests a copy of his accounting record.

Providing a well-proven, technically advanced product has been the mainstay of Wang's success, and the Model 2236DE is no exception. By offering advanced design and sophisticated features, Wang will continue to supply the office products of the future, today.

## DETAILED PRODUCT DESCRIPTION

The Model 2236DE Interactive Terminal provides several new features not available on its predecessor, the 2236D. These characteristics, being somewhat technical in nature, require special treatment. This document outlines the new features of the 2236DE Terminal, explaining their syntax and function. In some cases, examples are given to further aid the programmer.

### 1. CHARACTER DISPLAY ATTRIBUTES

In order to highlight information on the screen, the 2236DE provides several display attributes that can be selected for any character displayed on the screen; these are:

- 1) Bright -- characters are displayed in high intensity.
- 2) Blink -- characters blink.
- 3) Reverse Video -- the character background display is white while the character itself is black.
- 4) Underline -- characters are displayed with an underscore.

# PRODUCT BULLETIN NO. 186

The display attribute to be used is selected by sending a command of the following form to the CRT:

```
                OE  
HEX(02 04 xx yy OF)
```

where:   xx =     00 if not bright, no blink  
              02 if bright  
              04 if blink  
              0B if bright, blink (not supported by 2236DE)

         yy =     00 if not reverse video, no underline  
                  02 if reverse video  
                  04 if underline  
                  0B if reverse video, underline

The selected display attribute is activated by HEX(OE) in a manner analogous to activating expanded print on certain Wang printers. Characters are output after HEX(OE) is highlighted. If the selection sequence is terminated by HEX(OE), the selected display attribute is immediately invoked and remains in effect until the occurrence of a HEX(OF). Thus, it is possible to highlight a portion of either one or several lines. Subsequent activation of the display attribute by HEX(OE) is terminated by carriage return (HEX(OD)), as well as by HEX(OF).

# PRODUCT BULLETIN NO. 186

Some examples are shown below:

1. LIST D

The 2200 sends out a HEX(OE) at the beginning of the REM% statement. Thus, comment statements appear in the alternate display attribute.

2. 1000 PRINT HEX(OC030E),, "TITLE"

This is an example of a print line appropriate for use with either the new terminal or a printer. For both devices, the alternate attribute is in effect for only the one line generated by statement 1000.

3. 100 PRINT "PROMPT";: LINPUT HEX(OE), A\$: PRINT A\$

The field to be entered appears in the alternate attribute. When entry is terminated with a carriage return, the alternate attribute is cancelled, so the PRINT statement prints A\$ in normal intensity.

4. 150 PRINT HEX(OE); "PROMPT"; HEX (OF);

160 LINPUT A\$

This time, only the prompt appears in the alternate attribute.

Summary of rules governing character attributes:

- 1) HEX(02 04 xx yy OF) selects but does not activate the specified display attribute.
- 2) HEX(02 04 xx yy OE) selects and activates the specified display attribute. HEX(OD) does not turn off the attribute.
- 3) HEX(OF) is used to turn off the display attribute; normal display is then in effect.
- 4) CLEAR, RESET, and screen clear (HEX(03)) select normal display.
- 5) HEX(OE) reactivates the selected display attribute. The attribute remains in effect until the occurrence of a HEX(OF) or HEX(OD).

# PRODUCT BULLETIN NO. 186

- 6) Alternate attributes apply only to codes greater than or equal to HEX(10). Carriage return, line feed, non-destructive space, etc., preserve their meanings. Thus, PRINT AT( may always be used to position the cursor. The third argument of PRINT AT(, used to blank sections of the screen, will work differently depending upon which attribute is currently selected.
- 7) HEX(20) is a destructive space. Programmers should remember, however, that reverse video spaces are white, not black. PRINT TAB( and zoned format PRINT statements (PRINT,) position the cursor with HEX(20)'s, so their effect will vary with the currently active display attribute.
- 8) The operating system considers all codes HEX(00) through HEX(0F) to occupy no space on the output medium. Thus, alternate attribute selection sequences may be included in programs without concern that the operating system may create automatic carriage returns at undesirable times.
- 9) The standard USA, 2236DE uses bright for the default attribute.

## 2. GRAPHICS CHARACTER SET SELECTION

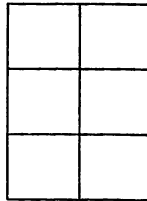
The 2236DE provides the capability to display graphics characters HEX(80) to HEX(FF). The following sequence is used for alternate character set selection:

```
HEX(02 02 xx 0F)
```

where:   xx =    00 if codes HEX(90) to HEX(FF) are used to underline the normal characters HEX(10) to HEX(7F).   02 if the alternate character set is to be used for codes HEX(80) to HEX(FF).

# PRODUCT BULLETIN NO. 186

Selection of the Graphics character set provides up to 128 characters in addition to the normal characters HEX(00) to HEX(7F). When displayed, graphics characters are extrapolated to fill the entire character position, enabling continuous lines (bars) to be displayed. The standard character graphics set consists of characters representing all the combinations of sixths of a character space where the character space is divided as follows:



The default mode for codes HEX(80) to HEX(FF) is fixed at either normal/underline or alternate character set.

The rules concerning the use of character set selection are as follows:

- 1) HEX(02 02 00 0F) selects the graphic character set to be the normal characters, HEX(10) to HEX(7F) with underline.
- 2) HEX(02 02 02 0F) selects the graphic character set for codes HEX(80) to HEX(FF). This may include character graphics symbols.
- 3) Power on, CLEAR, and RESET select the default mode for codes HEX(80) to HEX(FF).
- 4) The standard USA 2236DE uses normal character/underline as the default selection for codes HEX(80) to HEX(FF). The Graphics Character Set is represented on the chart on the following page.

# PRODUCT BULLETIN NO. 186

## STANDARD USA 2236DE UPPER CHARACTER SET

		Normal Characters				Character Graphics			
		80	90	A0	B0	C0	D0	E0	F0
	00								
	01	◆							
	02	▶							
	03	◀							
	04	→							
Low Order	05	┌							
	06								
	07	..							
	08	/'							
	09	\`							
	0A	^							
	0B	■							
	0C	!!							
	0D	↑ ↓							
	0E	β							
	0F	¶							

High Order

# PRODUCT BULLETIN NO. 186

## 3. BOX GRAPHICS

The 2236DE can display continuous horizontal or vertical lines, enabling forms to be drawn or information to be separated by lines or boxes. The horizontal line unit is a line segment the length of a character space, but positioned from the middle of one character space to the middle of the next character space. Horizontal lines are displayed between character lines. Vertical lines are drawn through the middle of a character space; the line coexists with the character at that location. The vertical line unit has the height of a character space.

The terminal allows the programmer to consider the CRT as two displays, a box graphics display and a character display, that just happen to be displayed on the same screen. While in normal character mode, only the characters and their attributes are modified while box graphics remain intact. The one exception to this rule is screen clear, which clears both characters and box graphics. During a box graphics sequence, characters and their attributes are undisturbed.

Because the character and box graphic modes are independent, it is easy to update portions of either display. The third argument of PRINT AT( is useful for clearing portions of the display. Though slower than screen clear, the statement

```
PRINT AT(0,0,)
```

is useful for clearing the characters from the screen without disturbing the box graphics.

A new BASIC-2 Command BOX (height, width) is now available to allow easy implementation of this feature.

# PRODUCT BULLETIN NO. 186

## Print Function

### General Form:

BOX (height, width)

where: height = expression specifying the height of the box

width = expression specifying the width of the box

### Purpose:

The BOX function is used within a PRINT statement to draw or erase a box or line on a CRT which has box graphics capability. The first expression specifies the height of the box; the second is the width of the box. The sign of the arguments determines whether lines are drawn or erased. If the signs are positive, lines are drawn; negative signs cause lines to be erased. If the box height is zero, a horizontal line is drawn or erased. A width of zero causes a vertical line to be drawn or erased. The BOX function positions the box so that the upper left-hand corner is at the current cursor position. Drawing a box does not move the CRT cursor.

### Examples:

PRINT BOX (3, 4);	- draws a 3 x 4 box
PRINT BOX (-3, -4);	- erases a 3 x 4 box
PRINT BOX (0, X);	- draws a horizontal line X units long
PRINT BOX (-7, 0);	- erases a vertical line 7 units long
PRINT AT (0, 10); BOX (1, 6); "TITLE"	- displays "TITLE" enclosed in a box



## 4. SCREEN DUMP

The screen dump feature allows the user to obtain a hard-copy record of the CRT through a local printer. The local printer must be directly connected to the 2236DE terminal through the printer controller, located on the back of the 2236DE. The screen dump is activated by depressing the EDIT key for approximately two seconds. The following sequence describes the screen dump operation:

1. EDIT key depressed and held (immediate click).
2. After approximately two seconds, a second click is sounded to indicate that the screen dump has been activated. (If key is released before two seconds, normal edit functions are invoked.)
3. CRT and Printer buffers are no longer serviced. (Present print job is interrupted.)
4. Carriage Return is transmitted to printer.
5. Top-of-Form is transmitted to printer.
6. The screen contents are printed. (Non-printable characters appear as "#".)
7. Top-of-Form is transmitted to printer.
8. Normal processing resumes.

### NOTE

During screen dump, the keyboard remains active. Depressing any key will immediately terminate the screen dump and restore normal processing. The key will be processed normally.

CAUTION:

Normal printing (i.e., background) is interrupted when a screen dump is requested. This means that should a user be printing a report in background through the terminal printer, the screen dump will be inserted into this report. Screen dumps will cause a page eject before and after the dump, yet the user's report may be temporarily halted in the middle of the page. For some reports, this restriction may be acceptable, but for pre-printed forms such as invoices, customer statements, etc., the screen dump could present problems.

5. REPEATING KEYS

All keys on the keyboard, except RESET and EDIT, repeat after an initial delay if held down. This is particularly useful for moving the cursor when editing.

6. COMPETITION

The next several pages provide a feature-by-feature comparison of the Model 2236DE as compared to our major competitors' terminal offerings. This information is designed to give an insight into the positioning of our new product.

Of particular importance is the fact that none of our major competitors offer features similar to our character and BOX graphics. These two features alone can be of major importance for any data entry application. They also provide the ability to develop BAR charts for the graphic display of data.

Simple program modifications can yield extremely impressive screen displays. Users will certainly be proud to have these advanced capabilities.

# PRODUCT BULLETIN NO. 186

## INTERACTIVE TERMINAL COMPARISONS

Display Characteristics	Wang	Burroughs	Cado	Data 100	Data General	Datapoint	DEC
	Characters Arrangement	1920 24x80	480 to 2000 12x40 24x80	1920 24x80	1920 24x80	1920 24x80	960-1920 12x80 24x80
Area	12" diag	4.7x8.4 7.5x9	12" diag 5.25x11.25	14" diag	6x9	3.5x7 5.5x8.35	8.7x4.3 8x4.5
Character Display	192 to 256	64 to 128	96 to 127	96	64	96 to 128	64 to 128
Dot Matrix	5x7	5 x 7	7 x 9	7x9	5x7	5x7	5x7 7x7
Reverse Video	Yes	(1)	(2)	No	No	(9)	No
Programmable Brightness	Yes	(1)	Yes	Yes	No	Yes	(11)
Character/Field Blinking	Yes	Yes	Yes	Optional	Yes	Yes	(11)
Roll	Yes	Yes	(3)	No	(8)	Yes	(11)
Cursor Positioning	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cursor Blinking	Yes	Yes	(4)	Optional	Yes	Yes	Yes
Screen Dump	Yes	Yes	Yes	Yes	No	Yes	No
Tabulation	Yes	Yes	Yes	Yes	No	Yes	Yes
Character Repeat	Yes	Yes	Yes	Yes	Yes	Yes	(12)
<b>Keyboard Characteristics</b>							
Style	Typewriter	Typewriter	Typewriter	Typewriter/ Data Entry	Typewriter	Typewriter	Typewriter/ Data Entry
Character Set	128	128	128	96	64 to 96	128	ASCII
Detachability	No	Yes	(5)	Yes	Yes	No	(13)
Program Function Keys	Yes	Yes	(6)	Yes	Yes	Yes	Yes
Numeric Keypad	Yes	Optional	(7)	N/A	Yes	Yes	(14)
<b>Auxiliary Devices</b>							
Printer	Yes	Yes	Yes	Yes	Yes	Yes	No
Cassette	No	Yes	Optional	No	No	No	No
Diskette	No	No	Yes	Yes	No	Yes	No
<b>Communications</b>							
Mode	Full Duplex ASCII	Half/Full Duplex BSC	Half/Full Duplex BSC	Half/Full Duplex BSC/SDLC	Full Duplex Async.	Half/Full Duplex ASCII	Half/Full Duplex ASCII
Protocol	300-19,200 baud	to 38,400	110 to 9600	to 9600	110-19,200	to 40,800	75 - 9600
Speed (bits/second)							
Estimated Purchase Prices	\$2700	\$3600 to \$4600	N/A	\$3000	\$1900 to \$2200	N/A	\$1400 to \$2100

\* See page following chart for notes.

# PRODUCT BULLETIN NO. 186

## INTERACTIVE TERMINAL COMPARISONS (CONTINUED)

Display Characteristics	Hewlett/ Packard		Honeywell		IBM Gen. Sys. Div. (GSD)		IBM Data Proc. Div. (DPD)		Texas Instruments		Four Phase	
	Wang	1920 24x80	1920 12x24 80 24x80	960 - 1920 12x24 80 24x80	240-1920 6x40 24x80	480 to 2560 12 24x80 40x80, etc. 43x80	1920 24x80	1152-1920 24x48 80				
Area	12" diag	5x10	12" 5.5x8.5 diag 6x9	9 to 12" diag	64-96 7x9/14	96 7x9	7.25x10.25					
Character Set	192 to 256	64 to 512	63-96	64-96	64-96	96	125					
Dot Matrix	5x7	7x9	5x7/7x9	8x16	7x9/14	7x9	7x9					
Reverse Video	Yes	Yes	No	Yes	No	Yes	No					
Programmable Brightness	Yes	Yes	(16)	Yes	Yes	Yes	Yes					
Character/Field Blinking	Yes	Yes	(17)	Yes	No	Yes	Yes					
Roll	Yes	Yes	(17)	Yes	No	Yes	Yes					
Cursor Positioning	Yes	Yes	(17)	Yes	(21)	Yes	Yes					
Cursor Blinking	Yes	Yes	(17)	Yes	(21)	Yes	Yes					
Screen Dump	Yes	(15)	(17)	Yes	Yes	Yes	Yes					
Tabulator	Yes	(15)	(17)	Yes	Yes	Yes	Yes					
Character Repeat	Yes	(15)	Yes	Yes	Yes	Yes	Yes					
<b>Keyboard Characteristics</b>												
Style	Typewriter	Typewriter	Typewriter	Typewriter	Typewriter	Typewriter	Typewriter					
Character Set	128	128	128	128	EBCDIC	128	ASCII/EBCDIC					
Detachability	No	Yes	(17)	Yes	Yes	No	Yes					
Program Function Keys	Yes	Yes	Yes	Yes	Yes	Yes	Yes					
Numeric Keypad	Yes	Yes	(18)	Yes	Yes	Yes	Yes					
<b>Auxiliary Devices</b>												
Printer	Yes	Yes	(19)	Yes	Yes	Yes	Yes					
Cassette	No	No	No	No	No	Yes	No					
Diskette	No	No	(20)	Yes	No	No	Yes					
<b>Communications</b>												
Mode	Full	Half/Full	Half/Full	Half/Full	Half/Full	Half/Full	Half/Full					
	Duplex	Duplex	Duplex	Duplex	Duplex	Duplex	Duplex					
	ASCII	ASCII/BSC	ASCII/Honeywell	BSC/SDLC	BSC/SDLC	ASC/BSC	BSC/SDLC					
Speed (bits/second)	300-19,200 baud	110 to 9600	75-9600	to 9600	to 9600	110-4800	1200 - 9600					
Estimated Purchase Price (000)	\$2700	\$2500 to \$6000	\$1500 to \$8700	\$3100 to \$4200	\$2700 to \$4200	\$2700 to \$4900	\$4900					

\$2.4 to \$1.9

\* See page following chart for notes.



# PRODUCT BULLETIN NO. 186

1. Not available on Burroughs TD 730; Standard on TD 830.
2. Not available on Cado System 20; Standard on System 40.
3. Roll up only, on the Cado System 20.
4. Optional on Cado System 20; not available on the System 40.
5. Not available on Cado System 20; optional on System 40
6. 16 on Cado System 20, not available on System 40.
7. Standard on Cado System 20, optional on System 40.
8. Data General terminals offer roll up as a standard feature.
9. Standard on the Datapoint 1500. No information is available on other terminals.
10. BSC/SDLC is available on the Datapoint 1150/1170. SDLC is not available on the Datapoint 1500.
11. Roll up is standard on DEC VT-50. Roll is not available on the VT-52/55 and DS 78. Roll up, as well as programmable brightness and character field blinking, are standard on the VT-100.
12. Character repeat is not available on DEC VT 50. It is standard on all others.
13. Detachable keyboard is only available on DEC VT 100.
14. The numeric keypad is standard on the VT 52/55/etc. It is not available on the VT-50.
15. Screen dump tabulation and character repeat are standard on all H/P displays. It is optional on the 2649A display.
16. Programmable brightness is not available on some Honeywell terminals.
17. Many of these features are not available on the Honeywell V/P 7100/7105, and 7200 terminal. Standard on most models are cursor positioning and tabulation.
18. A numeric keypad is not available on the Honeywell V/P 7100/7105. It is standard on all other terminals from Honeywell.
19. Printers are not available on the Honeywell V/P 7100/7105, and 7200. They are optional on the V/P 7760, and standard on the V/P 7700 and V/P 7700R/7705R.
20. Diskettes are only available in the Honeywell V/P 7760.
21. Cursor positioning is available on all DPD terminals. Some have limited capability. Cursor blinking is standard only on the IBM 3274 terminal.
22. Program function keys are optional on the IBM 3275 and 3276 terminals. They are standard on the 3271 and 3274.

# PRODUCT BULLETIN

# NO. 186

Feature	Benefit
1. Character Attributes	. Improve interactivity by highlighting important information via blinking, bright, reverse video and underline, or combinations of these.
2. Alternate Character Set	. Allows the display of graphics characters for special formats and Bar charts.
3. Box Graphics	. Allow lines to be drawn on CRT for forms design or data separation. Make information easy to locate on CRT.
4. New BASIC-2 Command (PRINT), BOX (X, Y)	. Allows easy implementation of BOX Graphics.
5. Microprocessor Controlled	. Allows the CRT to control functions, thus freeing the MVP CPU to process data of other terminals and/or partitions. Provides self-test diagnostics at power on time.
6. Dual Intensity	. Allows information to be highlighted in bright or regular intensity.
7. Dual Display Mode Character/Box Graphics	. Alters displayed information without effecting BOX Graphics and vice versa.
8. Screen Dump	. User does not need to manually transcribe displayed information. The information may be printed by depressing one key.

# PRODUCT BULLETIN

# NO. 186

## 2236DE Specifications

### CRT

Display Size - 12 in. diagonal (30.4 cm)  
Capacity - 24 lines, 80 characters/line

### Character Size

Height - 0.16 in. (0.41 cm)  
Width - 0.09 in. (0.23 cm)

### Character Set

128 characters, including upper/lowercase letters; each character assigned one or more attributes for high- or low-intensity display, blinking, reverse video, or underlining. Additional, alternate character set consisting of 64 graphic characters. Also capable of displaying line-segment (box) graphics, separate from either character set.

### Transmission Rate

Manually selectable for each terminal at 300, 600, 1200, 2400, 9600, or 19,200 baud.

# PRODUCT BULLETIN NO. 186

## Cable

One 8-foot (2.4 m) cord to power source. One 25-foot (7.6 m) direct connection cable is provided with each Model 2236DE, unless an optional direct connection cable is ordered for a terminal. Nonextendable cables are optionally available in 100-foot (30.5 m) increments for direct connection up to 2,000 feet (609.6 m). Modem cables are optionally available in lengths of 12 feet (3.7 m), with extensions of 25 feet (7.6 m) and 50 feet (15.2 m); however, combined cable distance from Wang equipment to a modem is 50 feet (15.1 m) maximum according to EIA standards.

<u>Length</u>	<u>Part No.</u>
25 feet	120-2236-25
50 feet	120-2236-50
100 feet	120-2236-1
200 feet	120-2236-2
300 feet	120-2236-3
400 feet	120-2236-4
500 feet	120-2236-5
600 feet	120-2236-6
700 feet	120-2236-7
800 feet	120-2236-8
900 feet	120-2236-9
1000 feet	120-2236-10

Extended length cables are also available in the following lengths:

<u>Length</u>	<u>Part No.</u>
1,250 feet	120-2236-11
1,500 feet	120-2236-12
1,750 feet	120-2236-13
2,000 feet	120-2236-14

## UPGRADES

Upgrades of existing Model 2236D terminals to 2236DE capabilities are NOT possible. NO upgrades will be offered.



# PRODUCT BULLETIN

# NO. 186

## 2236DE Product Statistics

Model Number:	2236DE
Part Number:	177-3236DE
Release Date:	June 15, 1979
Availability:	August 1, 1979
Classification:	Electrical
Warranty:	Standard

# Service Newsletter

NO. 181

PERIPHERAL #55

December 28, 1979

## 2236DE INTERACTIVE TERMINAL

This Newsletter contains information necessary to unpack, install, and maintain the 2236DE Interactive Terminal. Also contained in this newsletter is a description of the 2236DE including electrical and physical specifications, and an explanation of the various features found on the 2236DE.



BOB PORTER 1 1182 4951

### 1. GENERAL DESCRIPTION

The 2236DE Interactive Terminal is a Z80-based intelligent CRT/-Workstation. It consists of a 12-inch (30.4 cm) diagonal measure CRT, a KEYTRONIC capacitive-type keyboard, a 12-Inch Monitor Electronics PCB (210-7456), and a Terminal PCB (210-7592) containing a Z80 micro-processor and the remaining workstation electronics. By locating most of the CRT electronics on one terminal board, production, installation, and maintenance procedures have been simplified.

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The 2236DE replaces the 2236D terminal on the VP/MVP product line. It offers several features not found on the 2236D Terminal. These features include character display attributes (highlighted displays, reverse video, etc.), alternate graphics set selection, box graphics, and screen dump. These features are explained in detail in Section 7 of this newsletter.

Power-up diagnostics are another feature of the 2236DE terminal. These diagnostic routines are run automatically whenever the terminal is turned on. Refer to Section 4 for further information.

The 2236D terminal will continue to be supported in the field; however, it will no longer be manufactured. It is not possible to upgrade a 2236D to a 2236DE.

#### 1.1 CRT and Keyboard

The 2236DE CRT displays a full 128 character set, including upper and lower case keyboard characters, foreign language characters, special symbols, and underscore. Each character can be assigned one or more display attributes such as high- or low-intensity display, blinking, reverse video, or underscore. The CRT can also display box graphics separate from character sets.

The KEYTRONIC keyboard (See Figure 1) operates in either of two modes, selected by a toggle switch labeled "A/A" and "A/a". In the "A/A" mode, alphabetic characters are displayed as upper-case whether shifted or unshifted, and numeric keys produce symbols and special characters. In the "A/a" mode, the keyboard functions as a standard typewriter keyboard. All keys on the keyboard, except RESET and EDIT, repeat after an initial delay, if held down.

The RETURN and FN keys are located in the alphanumeric section of the keyboard. The RETURN key is used to signal the CPU that entry of a particular data-field is complete. The FN key is a special function key used with 2200VP/MVP CPU configurations.

The Program Control Keys (for program control and execution) are as follows:

RESET	stops program listing and execution immediately, clears CRT screen and returns control to the user.
HALT/STEP	causes program execution to halt at completion of current statement or to execute one line at a time.
CONTINUE	continues program execution after a STOP verb has been executed or the HALT/STEP key has been touched.
CLEAR	clears program text and variable areas.
LOAD	loads specified programs from storage into memory.
RUN	initiates execution of the program.

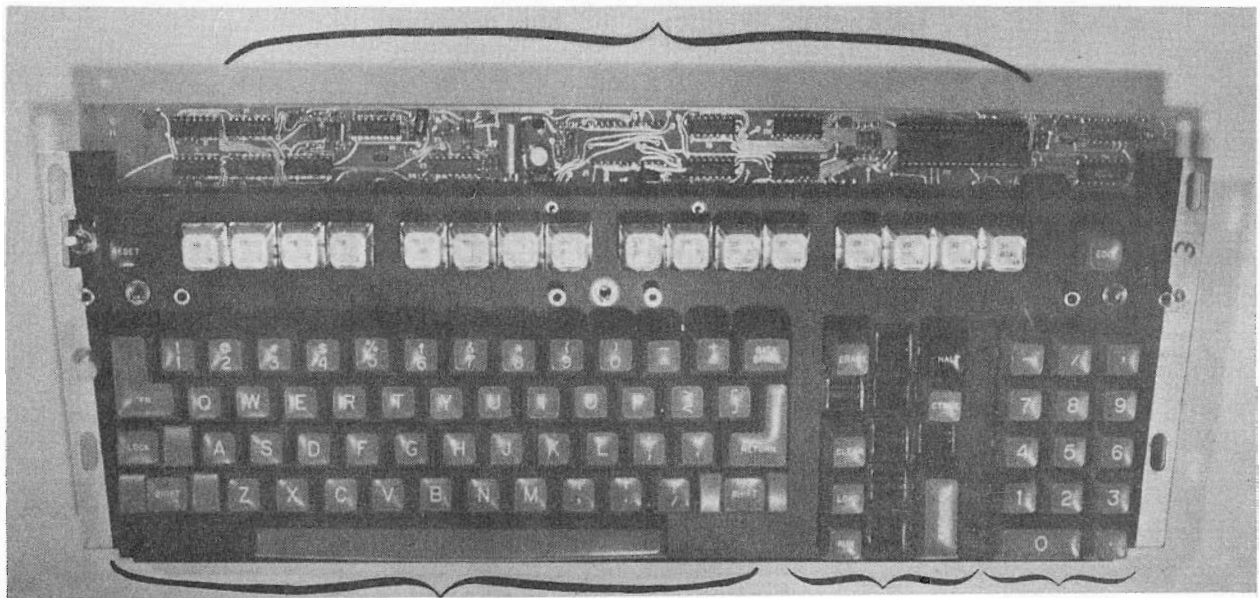
The numeric keypad is a standard 10-key pad. Digits can be entered by using the numeric keys in either the numeric or the alphanumeric section of the keyboard.

The 16 Special Function Keys, located at the top of the keyboard, can be used in conjunction with the SHIFT key to provide a total of 32 special functions. These keys are user-definable; their meanings can be changed under software control. They are also used by the 2200VP/MVP System Bootstrap during Master Initialization to load the BASIC-2 Interpreter and Operating System.

The EDIT key is used to enter and exit the Edit mode. When in Edit mode, the Special Function Keys operate as follows:

RECALL	Used to recall a program line or Immediate Mode statement from memory for edit.
←-----	Moves cursor five spaces to the left.
←	Moves cursor a single space to the left.
-----→	Moves cursor five spaces to the right.
→	Moves cursor a single space to the right.
INSERT	Expands a line for additional text and data entry by inserting a space character at current CRT cursor position.
DELETE	Deletes the character at current cursor position.

SPECIAL FUNCTION KEYS



TYPEWRITER  
KEYBOARD  
(Alpha-Numeric Section)

PROGRAM  
CONTROL KEYS

NUMERIC  
KEY PAD

FIGURE 1 KEYTRONIC Keyboard

ERASE	Erases that portion of the line from the current CRT cursor position to the end of the line.
BEGIN	Moves cursor to the beginning of current text line.
END	Moves cursor to the end of current text line.
↑	Moves cursor up to the previous CRT line (current text must occupy more than one CRT line).
↓	Moves cursor down to the next line on the CRT (current text must occupy more than one CRT line).

## 1.2 Chassis Controls

There are four controls located on the terminal. The Brightness and Contrast controls are on the lower right side of the terminal front panel. These controls are used to adjust the video display.

Two controls, labeled Tone and Clicker, are located on the back of the terminal chassis. The Tone control is used to adjust the volume of the audio alarm, which is programmed to sound whenever an illegal operation is attempted. The Clicker control is used to adjust the volume of the clicker, a sound emitted when a key is stroked, indicating an acceptable keycode has been entered. (See Figure 8.)

## 1.3 Specifications

Following are the specifications for the 2236DE Terminal:

### Physical Specifications:

Height	13.50 inches (34.3 cm)
Depth	20.50 inches (52 cm)
Width	19.75 inches (50.2 cm)
Weight	51 lbs (23.1 kg)

### Electrical Specifications:

Power Requirements	115 or 230 $\pm$ 10%
	50 or 60 Hz $\pm$ .5 Hz
	40 Watts
Heat Output	140 BTU/hr

Electrical Specifications: (Cont'd)

Fusing	2A @ 115V/60 Hz
	1A @ 230V/50 Hz

Display Specifications:

Size	12 in. diagonal (30.4 cm)
Capacity	24 lines, 80 char. per line

Character Size:

Height	0.16 in. (0.41 cm)
Width	0.09 in. (0.23 cm)

Operating Environment:

50° to 90° F (10° to 32° C)  
20% to 80% relative  
humidity (noncondensing)

Transmission Rate:

Manually selectable at 300,  
600, 1200, 2400, 4800,  
9600, or 19,200 baud.

## 2. SITE PREPARATION

The 2236DE is designed to operate in a normal office environment; radical changes in temperature or humidity can adversely affect the terminal (Operating Environment, Section 1.3). The 2236DE should be located in an environment similar to that of the central processor and a separate grounded outlet should be provided for it. Refer to the 2200MVP Maintenance Manual (03-0071-1), Section 2 for more details.

## 3. UNPACKING AND INSTALLATION

The 2236DE is shipped completely assembled. An 8 foot (2.4 m) AC power cord and one 25 foot (7.6 m) direct-connection (signal) cable is supplied with each terminal. Longer direct-connection cables can be ordered if desired. Refer to Section 8 for cable part numbers.

Before unpacking the terminal, check the packing slip to ensure that the proper equipment has been delivered. After checking the packing slip, inspect the shipping carton for damage (crushed corners, punctures, etc.). If the carton appears undamaged, carefully remove the terminal and inspect it for damage. If damage is discovered, file an appropriate claim promptly with the carrier involved and notify the WLI Distribution Center (Dept. #90), Quality Assurance Dept., Tewksbury, MA 01876. Inform them of the extent of damage and arrange for equipment replacement, if necessary.

After inspecting the terminal exterior, trace the outline of the exposed portion of the CRT screen with a grease pencil. This outline is used in Section 3.3 for video display adjustments. (See Figure 2.)

Remove the terminal cover as follows: (See Figure 3.)

- a. Remove the three Phillips screws located under the plastic strip on the keyboard and remove the keyboard plate.
- b. Remove the Phillips screws on the left and right side of the terminal cover.
- c. Lift the cover up and away from the terminal; take care not to hit or nick the CRT, or strain the Brightness/Contrast wires.
- d. Remove the Brightness and Contrast control wires from the clamp on the side of the cover. Lay the cover on its side next to the terminal. Do not unplug the Brightness and Contrast Molex connector from the cross-brace at the top of the CRT.
- e. Remove foam packing material from front of 210-7456 PCB.

Visually inspect the inside of the terminal for metal shavings, solder splashes, loose connections, and improperly seated PCBs. Do not replace the cover at this time.

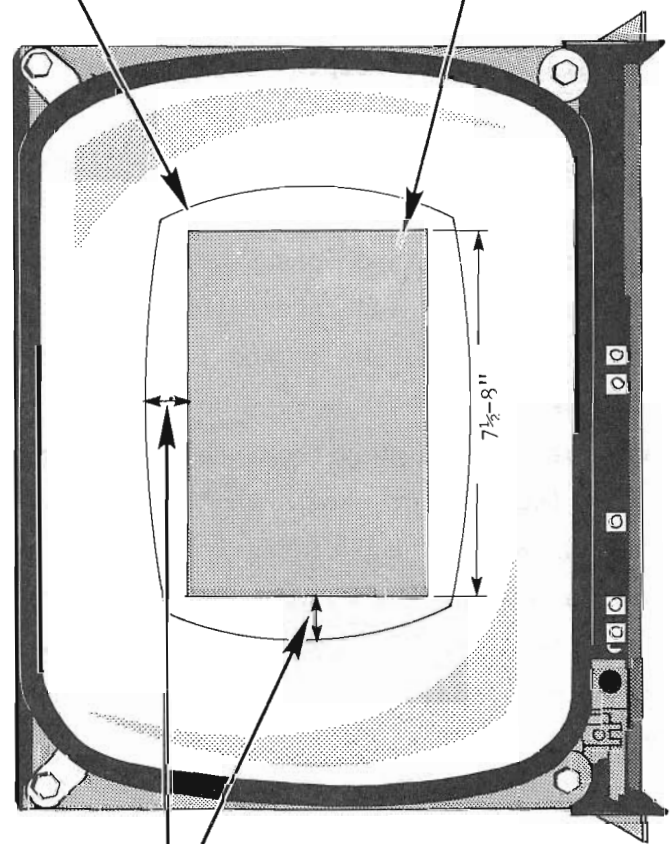
### 3.1 Voltage and Frequency Selection

The 2236DE operates on either 115 or 230 VAC and at either 50 or 60 Hz. Before connecting the terminal to a power source, check the serial



DRAW PERIMETER LINE AT START  
OF INSTALLATION

RASTER



DISTANCE BETWEEN PERIMETER LINE  
AND RASTER SHOULD BE BETWEEN  $\frac{1}{2}$ "  
AND 1"

FIGURE 2 CRT Outline

tag attached to the terminal. Set the voltage-select switch on the lower right side of the CRT monitor to the appropriate position (115 or 230) and ensure that jumper J11 on the 210-7592 PCB is in position, if required. Install J11 if the terminal is to operate at 60 Hz, remove J11 if the terminal is to operate at 50 Hz. (See Figures 4 and 5.)

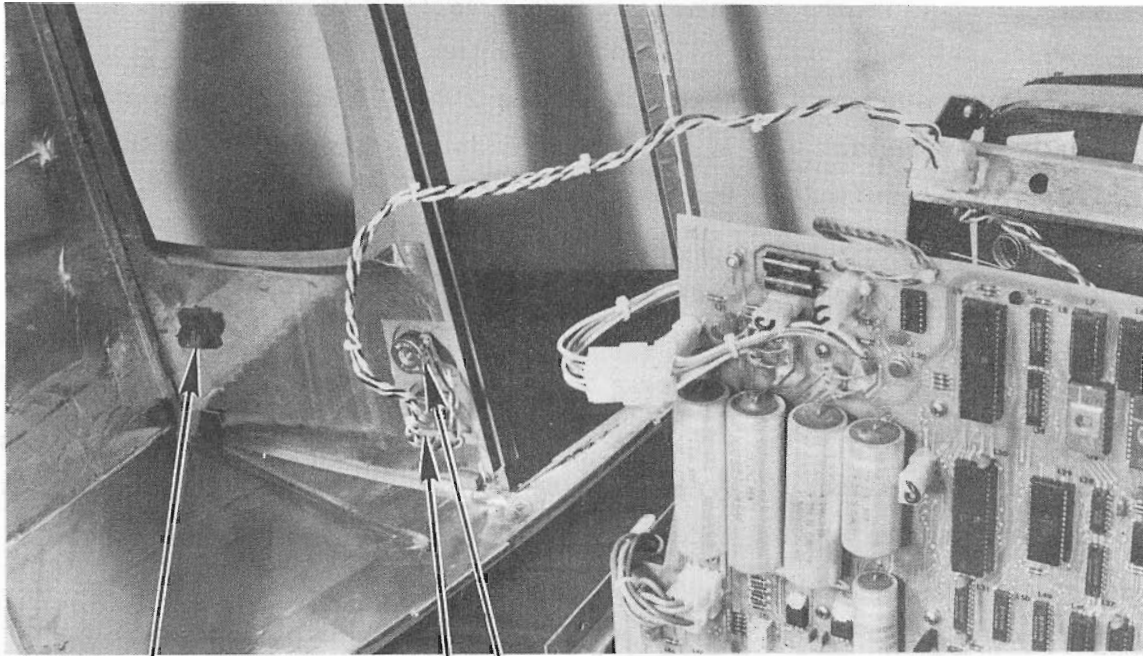
### 3.2 Voltage Checks and Adjustments

The power supply is located on the 210-7592 PCB. Five jumpers, labeled J14, J15, J16, J17, and J18, connect the power supply voltage to the logic circuits. Remove these five jumpers before performing the initial voltage checks and adjustments, which are performed as follows: (See Figures 5 and 6.)

#### **\*\*NOTE\*\***

Use only one hand when working inside an electronic chassis that is powered-up. This avoids the risk of grounding oneself to the chassis with one hand while touching an electrical connection with the other, causing severe shock.

- a. Place the terminal in its permanent location.
- b. Ensure that the terminal ON/OFF switch on the rear of the chassis is in the OFF position. Plug in the AC power cord.
- c. Power-up the terminal.
- d. Connect the Common lead of a DVM to a  $\pm$  0V location on the 210-7592 PCB. (Negative side of capacitor C19, for example.)
- e. Place the DVM probe against pin 1 of the J14 connector; a reading of +12 VDC  $\pm$  .12 should be obtained. Adjust R72 to obtain the proper reading if voltage is out of limits.
- f. Place the DVM probe against pin 1 of the J15 connector; a reading of +5 VDC  $\pm$  .05 should be obtained. Adjust R66 to obtain the proper reading if voltage is out of limits.
- g. Place the DVM probe against pin 2 of the J16 connector; a reading of +20 VDC  $\pm$  3.0 should be obtained. This voltage is non-adjustable, replace PCB if voltage is out of limits.
- h. Place the DVM probe against pin 2 of the J17 connector; a reading of -5 VDC  $\pm$  .25 should be obtained. This voltage is



BRIGHTNESS AND  
CONTRAST CONTROL  
CLAMP

BRIGHTNESS  
AND  
CONTRAST

FIGURE 3 CRT and Cover



VOLTAGE SELECT SWITCH

← 115  
230 →

FIGURE 4 Voltage Select Switch

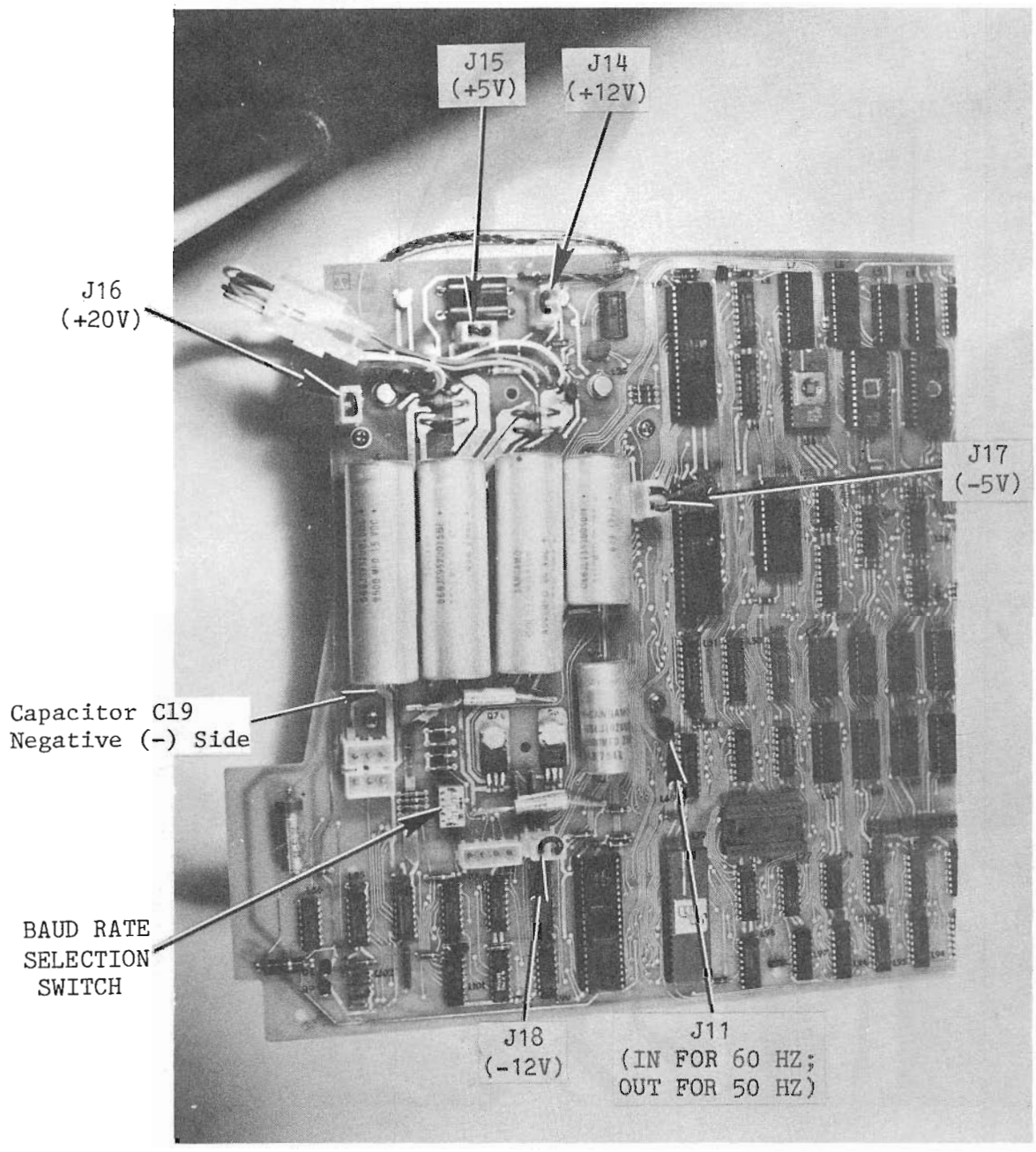
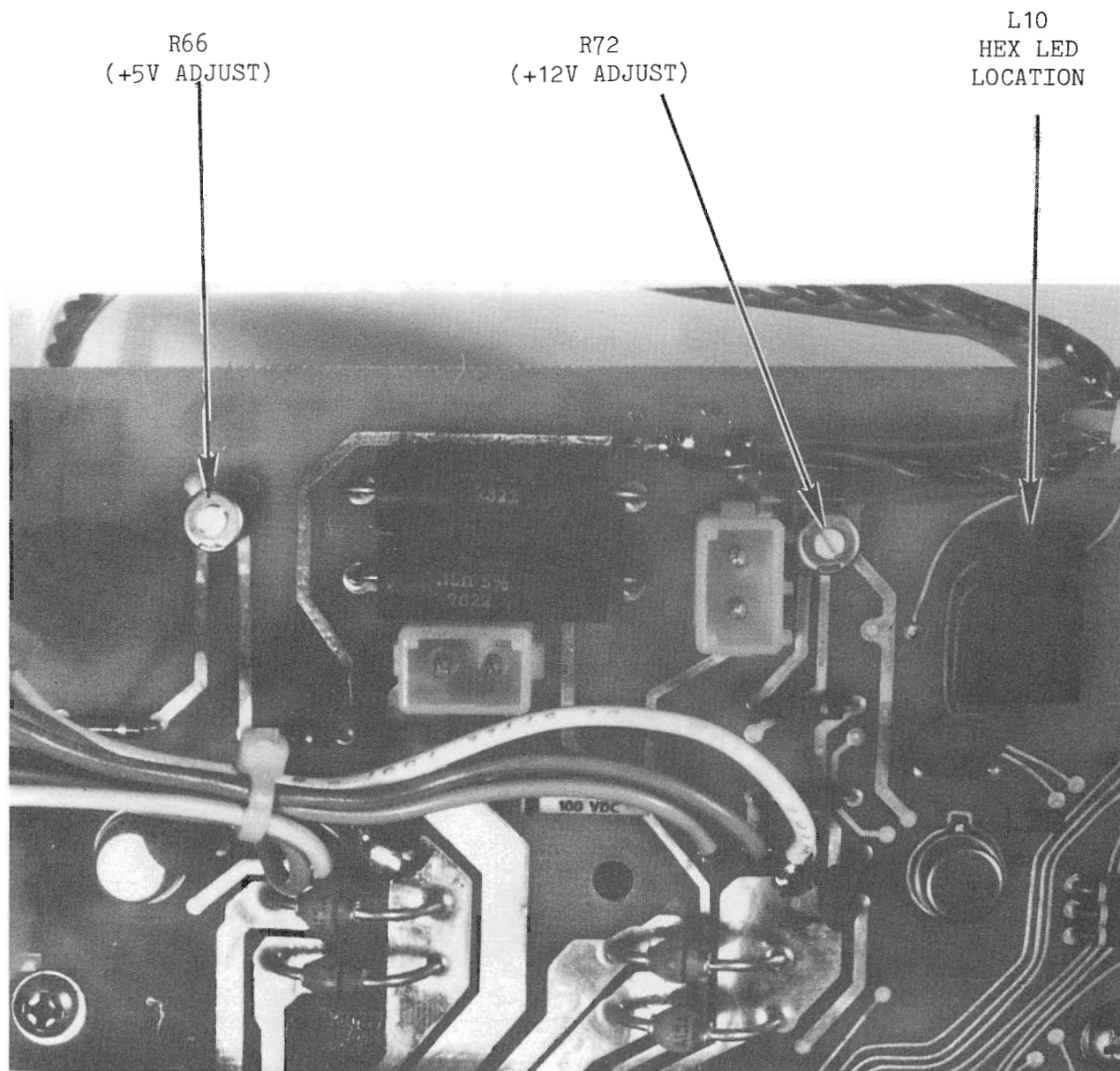


FIGURE 5 Jumper Locations (210-7592 PCB) and Baud Rate Selection Switch



R66  
(+5V ADJUST)

R72  
(+12V ADJUST)

L10  
HEX LED  
LOCATION

FIGURE 6 Close-up of R66 and R72

non-adjustable, replace PCB if voltage is out of limits.

- i. Place the DVM probe against pin 1 of the J18 connector; a reading of  $-12 \text{ VDC} \pm .60$  should be obtained. This voltage is non-adjustable, replace PCB if voltage is out of limits.
- j. If voltages are within limits, power-down the terminal and reinstall the five jumpers.
- k. To check voltage under load conditions, power-up the terminal and recheck voltage readings according to the previous steps. Adjust voltages as necessary.

### 3.3 Video Display Adjustments

The following adjustments should not be attempted by anyone not familiar with CRT servicing procedures and precautions. Avoid prolonged close-range exposure to unshielded portions of the CRT to prevent injury from unnecessary exposure to X-ray radiation. Refer to Figures 2 and 7 when performing the following procedures.

Access to most display adjustment controls on the 7456 PCB is through the front of the terminal, using a non-conductive adjustment tool. Enter the following program on the 2236DE to display the letters HO over the entire CRT screen before performing the display adjustments:

```
1 FOR A = 1 TO 960
2 PRINT "HO";
3 NEXT A
```

- a. Adjust the brightness potentiometer (POT) located on the terminal cover until the video raster appears on the screen.
- b. If the character rows on the CRT are of unequal height, adjust the Vertical Linearity POT (R18) on the 210-7456 PCB.
- c. Adjust the Vertical Size POT (R24) on the 7456 PCB if a gap greater or less than  $3/4" \pm 1/4"$  exists between the top edge of the raster and the pencil line (from Section 3) on the CRT face.
- d. Adjust the Width Coil (Z2) on the 7456 PCB if the horizontal size of the raster is not  $7-3/4" \pm 1/4"$ .



- e. If the random character pattern is not horizontally aligned within the CRT display raster, adjust the Phase POT (R35) on the 7456 PCB to center the character set.
- f. Adjust the Focus POT, R28, on the 7456 PCB for best focus.

Once these adjustments have been made, power-down the terminal. Wash the grease pencil markings off the CRT face with a cloth dampened in a mild detergent solution. Perform Power-Up Diagnostics, as described in Section 4. If the diagnostics are successful, reassemble terminal and proceed as follows.

### 3.4 Terminal Interconnection

An RS-232-C and an AMP connector are located on the back of the terminal chassis. (See Figure 8.) As viewed from the rear of the terminal, the RS-232-C connector is on the right side, and connects the terminal to a CPU I/O controller (or a modem, for remote applications). The AMP connector is located beside the RS-232-C and connects the terminal directly to a printer. (Refer to Paragraph 7.4, Screen Dump.)

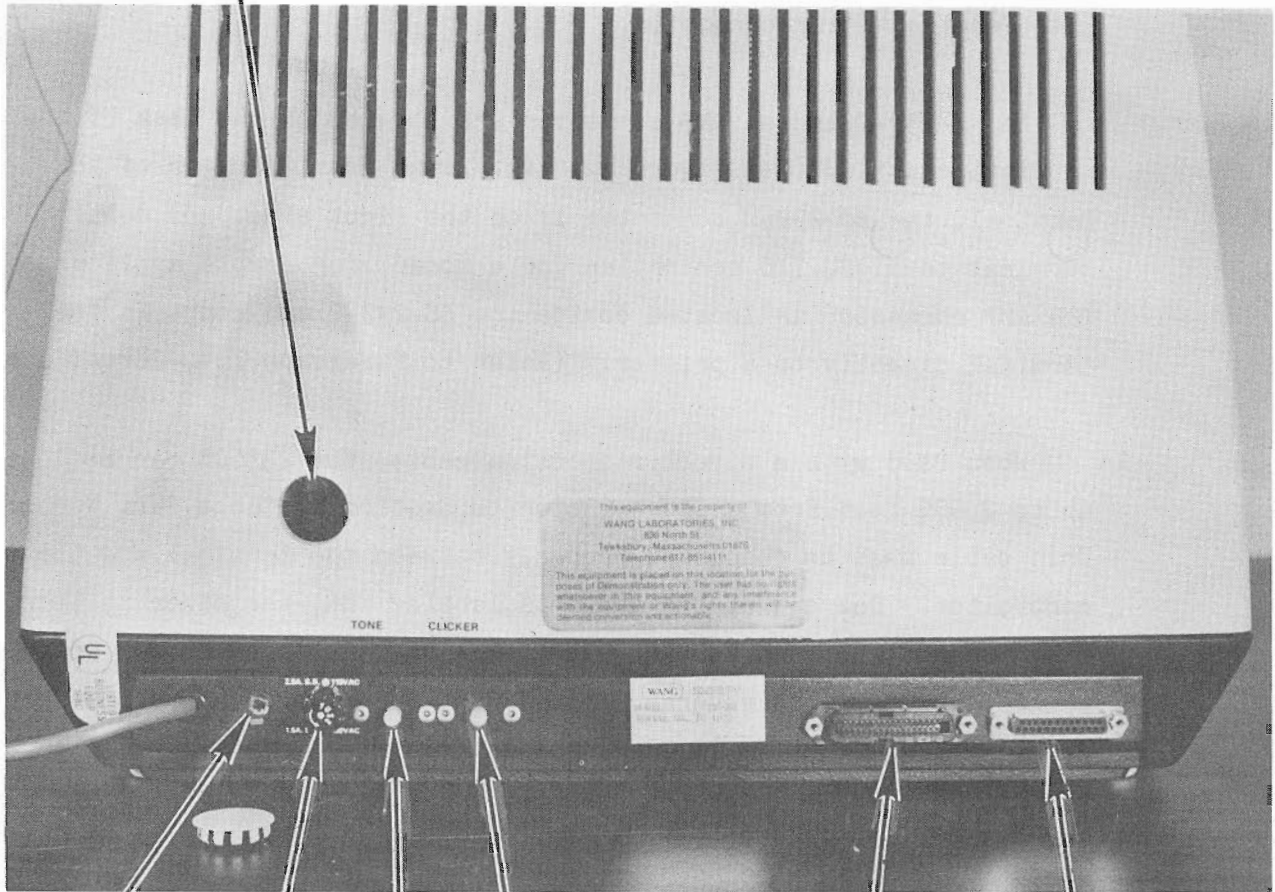
When used with a direct-connection cable, the 2236DE can be located up to 2,000 feet from a CPU. (Refer to Section 8, Cable Part Numbers.) This cable must be connected properly between the terminal and the controller. One end of the cable is labeled TER, the other is labeled MUX. Connect the end labeled TER to the RS-232-C connector. Do not connect the cable in reverse. The 2236DE can also be connected remotely to a CPU, via modems and telephone lines.

### 3.5 Terminal Controllers

The 2236DE is attached locally to a CPU by means of either of two devices: a 22C32 Triple Controller that connects the 2236DE to either a 2200VP or a 2200MVP system, or a 2236MXD Terminal Processor that connects the 2236DE to a 2200MVP system. By using a combination of two 2236MXDs and one 22C32, a total of nine terminals can be connected to an MVP System; only one 2236DE terminal can be connected to a VP system.



BAUD RATE SELECTION  
(PLUG REMOVED)



ON/OFF SWITCH

FUSE  
(2.5A, 3AG)

AUDIO ALARM  
TONE CONTROL

CLICKER  
VOLUME CONTROL

AMP-TYPE  
CONNECTOR  
(TO PRINTER)

RS-232-C TYPE  
CONNECTOR  
(TO CPU)

FIGURE 8 Rear of Terminal

The 22C32 and 2236MXD handle I/O operations between the terminal and CPU and act as buffers for data transmitted to/from the terminal. Communications between the terminal and the CPU by means of either a 2236MXD or 22C32 is asynchronous, full-duplex. The 2236MXD offers selectable line speeds ranging from 300 to 19.2K Baud; the 22C32 Triple Controller has a fixed communication rate of 19.2K Baud.

There are no modems capable of handling a 19.2K transmission rate, at this time. Because of this, the 22C32 Triple Controller, with its fixed 19.2K Baud rate, cannot support remote workstation applications. A 2236MXD controller must be used because of its selectable line speeds.

### 3.6 Controller Switch Settings

Refer to Paragraphs 3.3.2 through 3.4.2 of the 2200MVP Maintenance Manual (03-0071-1) for information concerning device address and baud rate settings for the 2236MXD. PROMs used on the 2236MXD must be R5 or above, the 210-7290-1 PCB must be at Rev. 1 or greater, and the 210-7291-1 PCB must be at Rev. 2 or greater in order to use a 2236DE terminal with a 2236MXD controller.

Because the 22C32 Triple Controller has a fixed baud rate of 19.2K, only device address switches, located on the lower right side of the 210-7515 PCB, are set in the controller. There are three switch banks on the 7515 PCB, the bottom right-most bank is used to set the terminal device address. Set these switches as follows:

<u>Number of Terminals</u>	<u>Switch Settings*</u>					<u>Device Address</u>
	<u>Sw1</u>	<u>Sw2</u>	<u>Sw3</u>	<u>Sw4</u>	<u>Sw5</u>	
One	1	0	0	0	0	00 <sub>16</sub>
Five**	1	0	0	1	0	40 <sub>16</sub>
Nine***	1	0	0	0	1	80 <sub>16</sub>

\* 0 = OFF; 1 = ON. Sw1 is the Terminal Enable, it is always set to 1; Sw2 - Sw5 are the Terminal Device Address Switches.

\*\* One 2236MXD; One 22C32 (MVP System only)

\*\*\* Two 2236MXDs; One 22C32 (MVP System only)

### 3.7 Baud Rate Selection

The baud rate selection switches for the 2236DE are located on the 210-7592 PCB. Access these switches by removing the large plug on the back of the terminal. (See Figures 5 and 8.) Switch One must be ON and Switch Two must be OFF; these two switches determine the number of data bits and type of parity used. Ensure that the baud rate switch settings at the terminal are the same as those at the controller or modem. Set the baud rate switches according to Table A.

Table A: Baud Rate Settings

<u>Baud Rate</u>	<u>Switch 1</u>	<u>Switch 2</u>	<u>Switch 3</u>	<u>Switch 4</u>	<u>Switch 5</u>
300	ON	OFF	ON	ON	ON
600	ON	OFF	OFF	ON	ON
1200	ON	OFF	ON	OFF	ON
2400	ON	OFF	OFF	OFF	ON
4800	ON	OFF	ON	ON	OFF
9600	ON	OFF	OFF	ON	OFF
19,200	ON	OFF	ON	OFF	OFF

### 4. POWER-UP DIAGNOSTICS

Whenever the 2236DE terminal is powered-up, diagnostic routines resident in the Z80 microcode are performed. If the diagnostics pass, the power-up message is displayed (see Figure 9) and control passes to the main microcode. The power-up message is displayed for three seconds and is cleared when the first character is received from the CPU. However, if the CPU is powered-up before the terminal CRT is sufficiently warmed-up, the terminal power-up message may not appear. If this occurs, power-down then immediately power-up the terminal.

If a failure is detected by the diagnostics, an audio alarm is activated and control is not passed to the main microcode. A HEX LED (WLI #340-0015) installed at location L10 on the 7592 PCB (see Figure 6) will display the failing diagnostic phase. Table B lists the diagnostic displays and possible causes of failure.

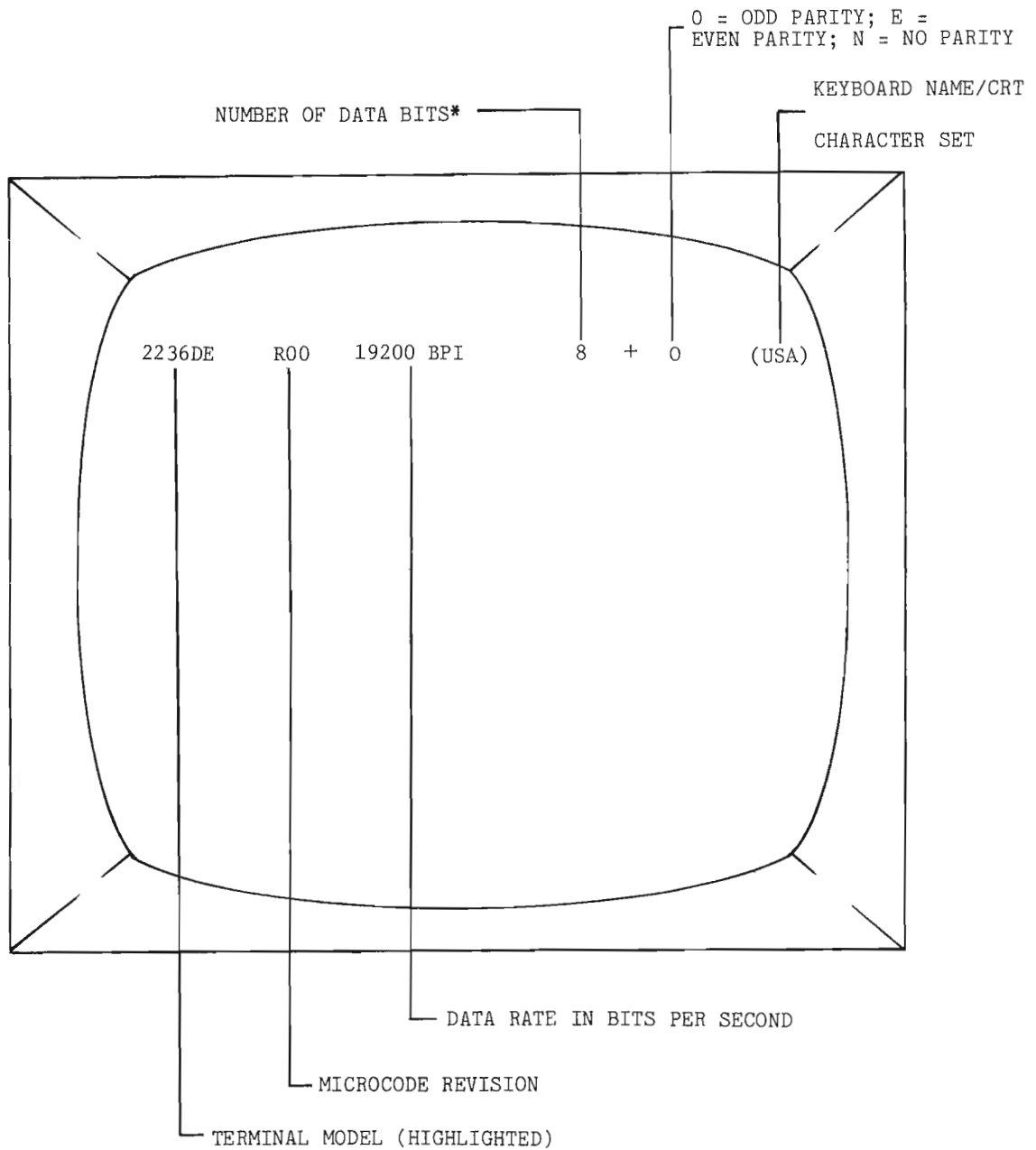


Figure 9: Terminal Display

\* If the # symbol is displayed, either the baud rate switches are incorrect or a problem exists in the terminal. If "???00BPS" is displayed, the baud rate switches are in an illegal setting. In this state the baud rate is undefined.

Table B: Power-Up Diagnostic Definitions

HEX LED DISPLAY	DISPLAY MEANING	TROUBLE LOCATIONS
0000	Z80 or PROM malfunction, or address decoding logic malfunction.	L2, L8, L9, L16, L17, L18, L19
0001	Z80 Reset and Conditional Jump Test	L2, L8, L9, L16, L17, L18, L19, L44
0010	Z80 Register and Processor Test	L9, L2, L44
0011	Memory Select Test	L8, L9, L19
0100	Data Bus Test	L9, L44, L51
0101	Address Bus Test	L8, L9, L19
0110	RAM Test	L4, L5
0111	RAM Test	L4, L5
1000	Not Used	
1001	PROM Test	L16, L17, L18, L56
1010	Keyboard Table PROMs Test	L16, L17, L18, L56
1011	Vertical Retrace Interrupt Test	L52, L79, L96

At power-up, the hardware blanks the Hex display. If either the Z80 (L9) and PROMs (L16, 17, 18), or the address decoding (L8, 19) logic are malfunctioning, the display could stay blanked. If any test fails in a predicted manner, the Hex display remains at the value of the failed test. After all tests are completed, the diagnostic loads a "0" into the display and passes control to the main microcode.

#### 5. PREVENTIVE MAINTENANCE

Preventive maintenance on the 2236DE is scheduled for every six months. It consists of inspecting the terminal for worn parts, adjusting the terminal controls as needed, general cleaning of the terminal, and updating the terminal with the appropriate ECNs.

Routine maintenance consists of cleaning the terminal cover, keyboard, and CRT face with a mild detergent solution when necessary.

## 6. MAJOR ASSEMBLY REMOVAL AND REPLACEMENT

This section discusses removal and replacement procedures for several major workstation assemblies. (See Figures 10, 11 and 12.) Before removing the following assemblies, ensure that the power switch is OFF and the AC power cord is unplugged. Remove the terminal cover as described in Section 3.

### 6.1 CRT Anode Discharge Procedure

Even with power removed, the terminal cathode ray tube can hold a charge of several thousand volts. To eliminate the risk of accidental CRT discharge, which can result in serious injury, discharge the CRT anode as follows: (See Figure 12)

- a) Attach\* one end of a length of insulated wire to the metal shaft of a plastic-handled, heavy-duty screwdriver.
- b) Attach\* the other end of the wire to CHASSIS GROUND.
- c) Using a non-conductive tool such as a plastic alignment tool, carefully raise the edge of the rubber anode cap high enough to insert the screwdriver.
- d) Taking care not to touch the metal shaft of the screwdriver or any metal part of the terminal, discharge the CRT anode by touching the anode clip with the grounded screwdriver.
- e) After discharging the CRT, remove the grounding wire and reseal the rubber anode cap.

### 6.2 Terminal Electronics PCB Removal

Remove the Terminal Electronics PCB (210-7592) as follows:  
(See Figures 10, 11, and 12.)

- a) Unplug all Molex connectors on the PCB.

\* Attach wire by means of alligator clips. If no clips are available, strip 3/4" of insulation from each end of the wire. Tightly wrap one end around the screwdriver shaft, secure the other end to CHASSIS GROUND, NOT LOGIC GROUND.

- b) Unplug the keyboard, printer, and CPU ribbon cables.
- c) Remove the four Phillips-head screws holding the PCB to the CRT chassis support rods.
- d) Lift the board up and out of the terminal.

To replace or reinstall the Terminal Electronics PCB, reverse the above procedure.

### 6.3 CRT Chassis Assembly Removal

Remove the CRT Chassis Assembly (270-0372) as follows: (See Figure 12)

**\*\*NOTE\*\***

In a 2236DE Terminal, replace a defective CRT chassis with a Wang CRT Chassis Assembly only.

- a) Unplug all Molex connectors on the 210-7592 PCB.
- b) Unplug the keyboard, printer, and CPU ribbon cables from the 210-7592 PCB.
- c) Unplug the Brightness/Contrast Molex connector from the cross-brace at the top of the CRT chassis.
- d) Remove the four Phillips-head screws holding the 7592 PCB support rods to the CRT chassis.
- e) Lift the 7592 PCB, still attached to the support rods, up and out of the terminal.
- f) Remove the four screws and star washers securing the CRT chassis to the terminal. The Monitor Electronics PCB (7456) is part of this chassis.
- g) Carefully lift the CRT Chassis Assembly up and out of the terminal.
- h) Reverse the above procedure to install a new assembly.
- i) Adjust Z1 on the 7456 PCB to achieve an 80X24 character display on the CRT.
- j) Perform the video display adjustments found in Section 3.3.

#### 6.4 Monitor Electronics PCB Removal

Remove the Monitor Electronics PCB (7456) by grasping the front of the PCB and pulling with a slow steady pressure, moving the PCB gently from side-to-side. Insert the Monitor PCB by reversing this procedure.

#### 6.5 KEYTRONICS Keyboard Assembly Removal

Remove the KEYTRONICS Keyboard Assembly (725-2618) as follows:

- a) Remove the four Phillips-head screws securing the keyboard to the chassis. Check that all four washers located between the keyboard and the chassis are accounted for.
- b) Unplug the keyboard ribbon cable from the keyboard PCB.
- c) Remove screw connecting keyboard ground strap to terminal chassis.
- d) Lift the keyboard up and away from the chassis.

To replace or reinstall the keyboard, reverse the above procedure.

#### 6.6 Power Transformer Removal

Remove the Power Transformer (410-0116) from the chassis as follows:

- a) Unplug the Molex connector joining the transformer to the 7592 PCB.
- b) Remove the four Phillips-head screws and washers securing the transformer to the chassis.
- c) Lift the transformer up and out of the chassis.

To replace or reinstall the transformer, reverse the above procedure.



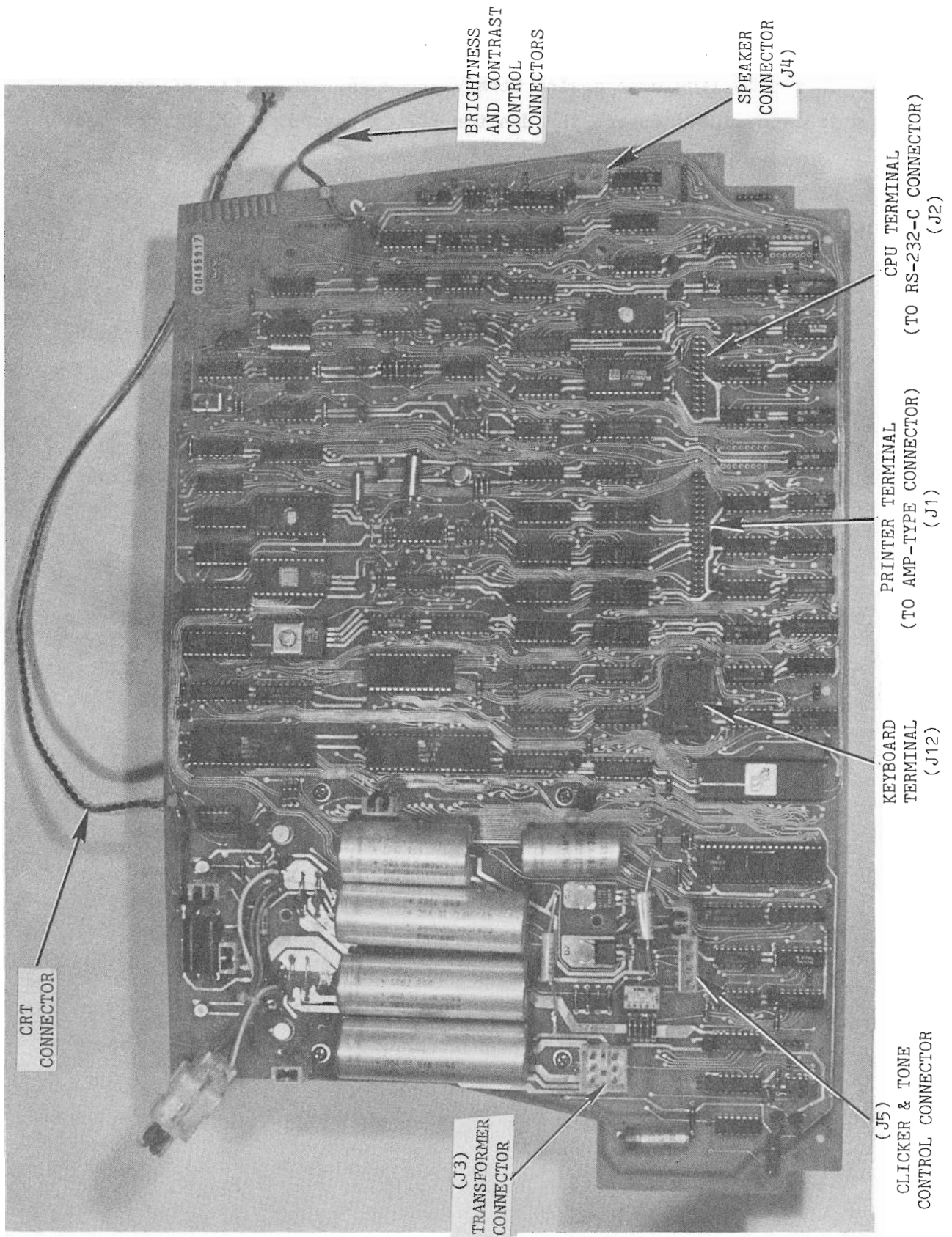


FIGURE 10 210-7592 PCB



FIGURE 11 7592 PCB in Chassis

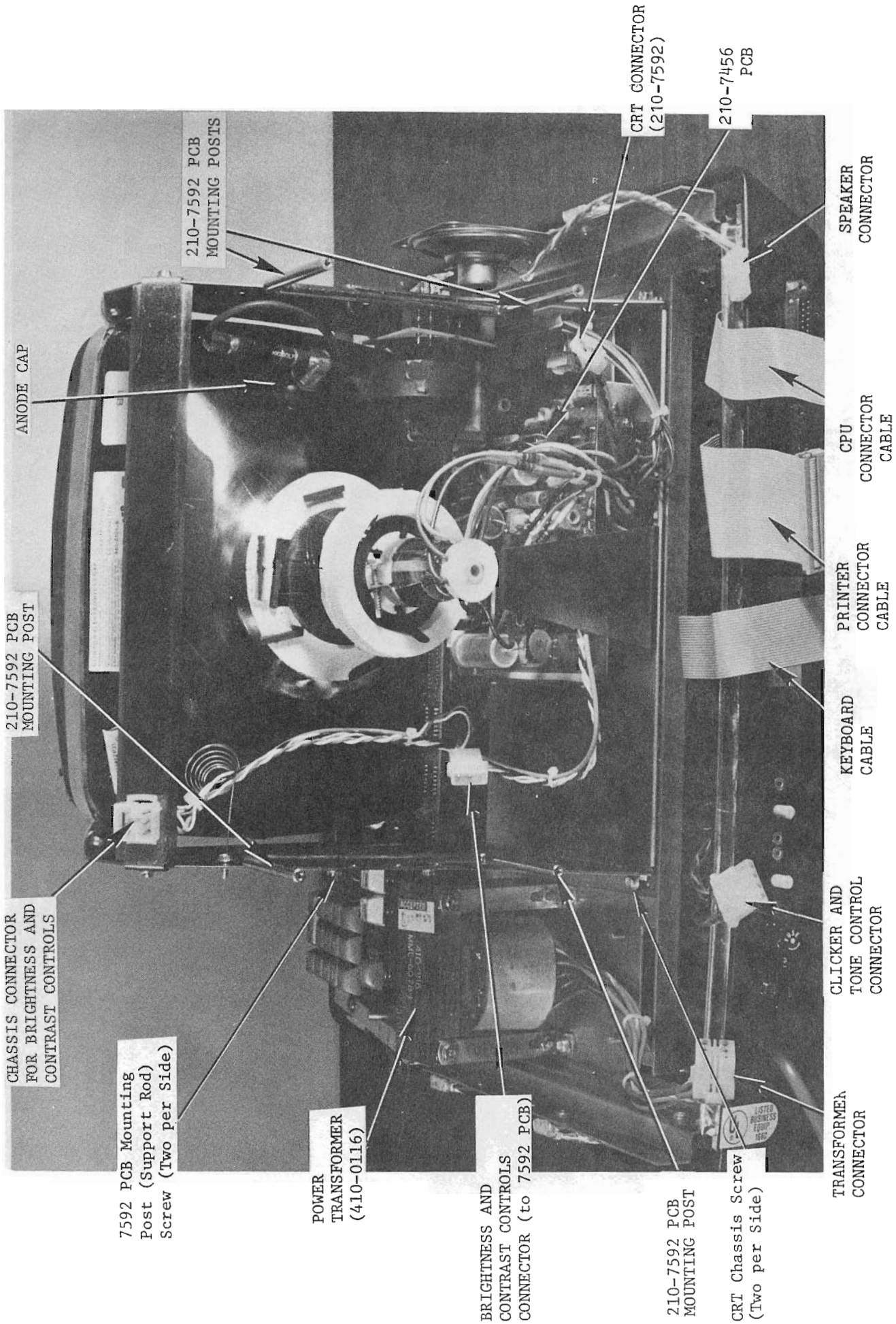


FIGURE 12 Rearview of Chassis with 7592 PCB Removed

## 7. STANDARD FEATURES

This section explains four standard features found on the 2236DE Terminal. These features are: Character Display Attributes, Alternate Graphics Set Selection, Box Graphics, and Screen Dump.

### 7.1 Character Display Attributes

Character display attributes can be selected for any character on the screen. They allow the user to highlight certain information. These attributes are as follows:

- a. Bright -- characters are displayed in high intensity.
- b. Blink -- characters appear to blink.
- c. Reverse Video -- background is white, characters are black.
- d. Underscore -- characters are displayed with an underscore.

The display attribute to be used is selected by sending a command of the following form to the CRT:

```
HEX(02 04 xx yy OE)      (Activates attribute)
HEX(02 04 xx yy OF)      (Terminates attribute)
```

```
where  xx =  00 if not bright, no blink
           02 if bright
           04 if blink
           0B if bright, blink (not supported by 2236DE)

        yy =  00 if not reverse video, no underscore
           02 if reverse video
           04 if underscore
           0B if reverse video, underscore
```

The selected display attribute is activated by HEX(OE) as in activating expanded print on certain Wang printers. If the selection sequence ends with HEX(OE), the selected display attribute begins immediately and remains in effect until the HEX(OF) command is given. Thus, it is possible to apply these display attributes to a portion of

a line or to several lines. Termination of the display attribute is accomplished by either carriage return (HEX(0D)) or HEX(0F).

The following is a summary of rules governing character attributes:

- a. HEX(02 04 xx yy 0F) selects but does not activate the specified display attribute.
- b. HEX(02 04 xx yy 0E) selects and activates the specified display attribute. HEX(0D) does not turn off the attribute.
- c. HEX(0F) is used to terminate the display attribute.
- d. CLEAR, RESET, and Screen Clear (HEX(03)) select normal display.
- e. HEX(0E) reactivates the selected display attribute. The attribute remains in effect until the occurrence of a HEX(0F) or a HEX(0D) (carriage return).
- f. Alternate attributes apply only to codes equal to HEX(10). Carriage return, line feed, non-destructive space, etc., preserve their meanings. PRINT AT() can be used to position the cursor. The third argument of PRINT AT(), used to blank sections of the screen, will work differently depending upon which attribute is currently selected.
- g. HEX(20) is a destructive space. PRINT TAB() and zoned format PRINT statements (PRINT, ) position the cursor with HEX(20)s, their effects vary with the currently active display attribute.
- h. The operating system considers all codes HEX(00)-HEX(0F) to occupy no space on output medium. So alternate attribute selection sequences can be included in programs without concern that the operating system may create automatic carriage returns at undesirable times.
- i. The USA Model 2236DE uses Normal/Underline as the default selection for codes HEX(80)-HEX(FF).

## 7.2 Alternate Graphics Set Selection

This feature allows the user to redefine the meaning of characters HEX(80) to HEX(FF). Use of the alternate character set provides up to 128 additional characters. The upper characters in the alternate character set are defined as graphics characters. When displayed, graphics characters are expanded to fill the entire character

position, enabling continuous lines (bars) to be displayed. The graphics character set consists of characters representing all combinations of sixths of a character space. The following sequence is used for alternate graphics set selection:

HEX(02 02 xx 0F)

where: xx = 00 if codes HEX(90) to HEX(FF) are used to underscore the normal characters HEX(10) to HEX(7F).  
= 02 if the alternate character set is to be used for codes HEX(80) to HEX(FF).

The rules governing character set selection are as follows:

- a. HEX(02 02 00 0F) selects the upper character set to be the normal characters, HEX(10) to HEX(7F) with underline.
- b. HEX(02 02 02 0F) selects the alternate character set for codes HEX(80) to HEX(FF), including character graphics symbols.
- c. Power On, CLEAR, and RESET select the default mode for codes HEX(80) to HEX(FF).
- d. The standard 2236DE uses normal character/underline as the default selection for codes HEX(80) to HEX(FF).

### 7.3 Box Graphics

This feature allows the user to display continuous horizontal and vertical lines, enabling information to be separated by lines or boxes. The horizontal line unit is displayed between character lines. It is the length of a character space and is positioned from the middle of one character space to the middle of the next. Vertical lines are drawn through the middle of a character space, coexisting with the character at that location. The vertical line unit is the height of a character space.

The Box Graphics feature allows the user to consider the CRT as having two separate displays (a box graphics display and a character display) located on one screen. In normal character mode, characters

and their attributes are modified while box graphics remain intact (Screen Clear clears both characters and box graphics). Characters and their attributes are undisturbed during a box graphics sequence. Because character mode and box graphic mode are independent of each other, it is easy to update portions of either display.

The BASIC-2 command "BOX (height, width)" allows users to implement the box feature. The first expression specifies the height of the box, the second specifies the width. The sign of the argument determines whether lines are drawn or erased: lines are drawn if the sign is positive, lines are erased if the sign is negative. If the box height is zero, a horizontal line is drawn or erased. A width of zero causes a vertical line to be drawn or erased. The box function positions the box so that the upper left hand corner is at the current cursor position. The CRT cursor does not move while a box is drawn.

The third argument of PRINT AT() is useful for clearing portions of the display. Though slower than screen clear, the statement "PRINT AT(0,0,)" is useful for clearing the characters from the screen without disturbing the box graphics.

#### 7.4 Screen Dump

This feature allows the user to obtain a hard-copy record of the CRT display through a local printer. The local printer must be directly connected to the 2236DE through the printer connector located on the back of the terminal (printer address =  $204_{16}$ ).

Screen Dump is activated by depressing the EDIT key for two seconds. The Screen Dump sequence is as follows:

- a. EDIT key is depressed and held (immediate click).
- b. After two seconds, a second click is sounded to indicate that the screen dump has been activated. Normal edit functions are invoked if key is released before second click.
- c. CRT and Printer buffers are no longer serviced. (Present print job interrupted)

- d. Carriage Return is transmitted to printer.
- e. "Top-of-Form" command is transmitted to printer.
- f. The screen contents are printed. (Non-printable characters appear as "#")
- g. "Top-of-Form" command is transmitted to printer.
- h. Normal processing resumes.

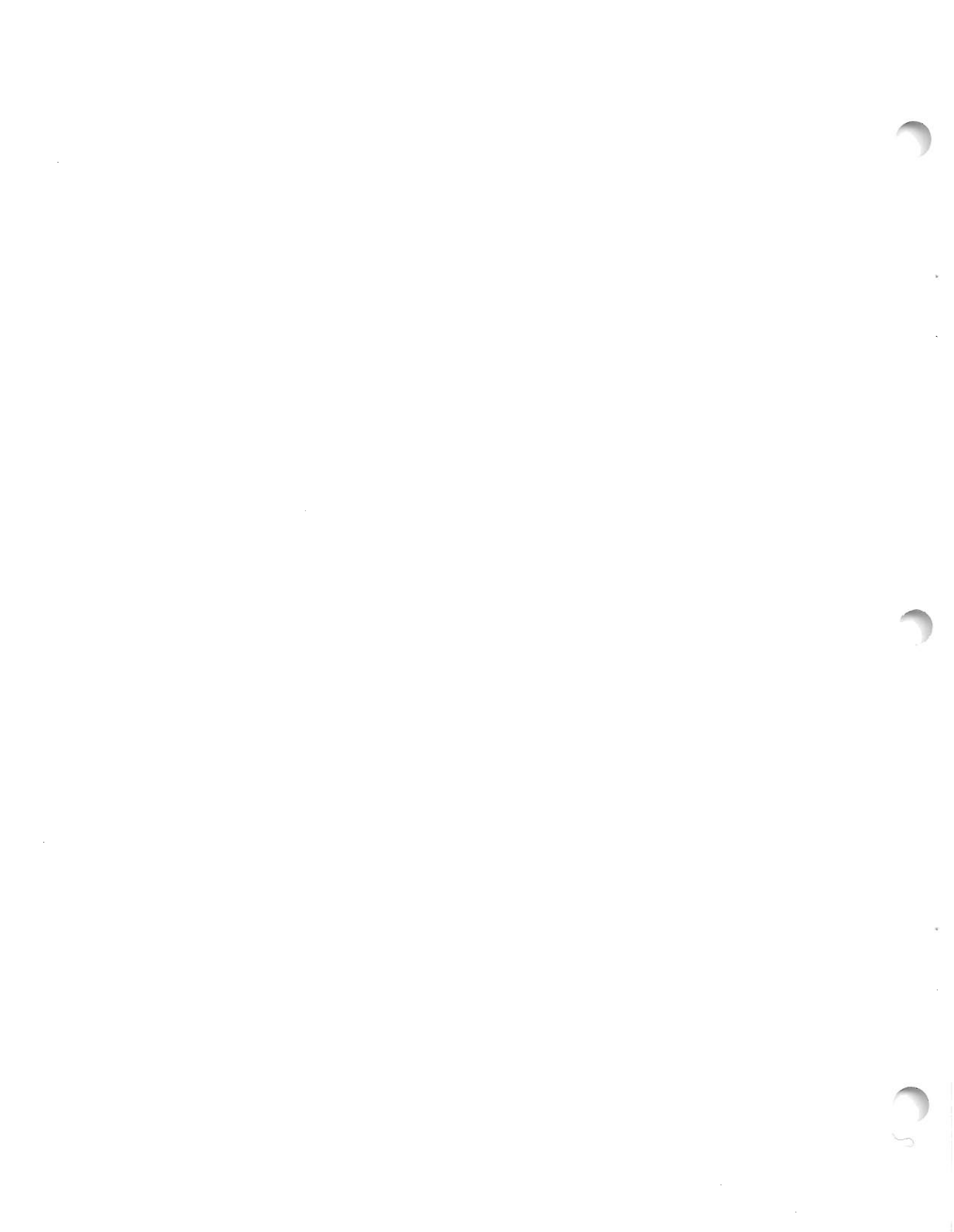
The keyboard remains active during a screen dump. Depressing any key causes the screen dump to cease and normal processing to resume. If a user is printing through the terminal printer, the screen dump will be inserted in the printout. Even though screen dumps cause a page eject before and after the dump, minor problems could occur depending on the type of document being printed.

## 8. CABLE PART NUMBERS

Direct-connection cables (non-extendable) are available in 100 foot (30.5m) increments for distances up to 2000 feet (609.6 m). Modem cables are available in 12 foot (3.7 m), 25 foot (7.6 m), and 50 foot (15.2 m) lengths; however, combined cable distance from Wang equipment to a modem should not exceed a maximum of 50 feet (15.1 m) according to EIA standards. Cable numbers and lengths are as follows:

<u>Length</u>	<u>Part No.</u>
25 feet	120-2236-25
50 feet	120-2236-50
100 feet	120-2236-1
200 feet	120-2236-2
300 feet	120-2236-3
400 feet	120-2236-4
500 feet	120-2236-5
600 feet	120-2236-6
700 feet	120-2236-7
800 feet	120-2236-8
900 feet	120-2236-9
1000 feet	120-2236-10
1250 feet	120-2236-11
1500 feet	120-2236-12
1750 feet	120-2236-13
2000 feet	120-2236-14





APPENDIX A

2236DE BILL OF MATERIALS

POSITION IN STRUCTURE	LEGEND	COMPONENT PART NUMBER	DESCRIPTION	E C N	QUANTITY PER ASSY	U/M	L/T
1	IN	187-3236-DE-	2236-DE INTERACTIVE TERM WK/ST		1.0000	EACH	00010
2	IN	000-0003-	LABOR CALCULATING SYSTEMS		1.5530	00000	00000
2	IN	000-0011-	LABOR QUALITY CONTROL		.3110	00000	00000
2	IN	210-7592-A	PCA 2236E SINGLE BD TERM ELEC		1.0000	EACH	00010
3	IN	209-7592-	PCA 2236E SINGLE RD TERM ELEC		1.0000	EACH	00010
4	IN	000-0001-	LABOR CIRCUIT SYSTEMS		6.6210	00000	00000
4	IN	000-0011-	LABOR QUALITY CONTROL		1.3240	00000	00000
4	IN	000-6011-	CIRCUIT SYS.-ASSY. A	E11192	3.5000	EACH	00000
4	IN	220-1103-	CRT BRD (W2)(COAX)B6482-122		1.0000	EACH	00010
5	IN	000-0004-	LABOR SUB-SYSTEMS		.0740	EACH	00000
5	IN	000-0011-	LABOR QUALITY CONTROL		.0150	00000	00000
5	IN	000-6043-	SUB-SYS.-CABLES		.0580	EACH	00000
5	FS	420-0018-	1 COND 24 GA SHIELDED CABLE AL 1702	EC8399	.8300	FEET	
5	IN	606-1103-	1/4" DIA WHT SHRNK BLK NUM 220-1103	E11776	1.0000	EACH	00001
5	IN	654-1150-	SOCKET HOUSING 1-480303-0		1.0000	EACH	
5	FS *	654-1165-R	SOCKET 30-22 GA (REEL) AMP 3500078-4		2.0000	EACH	
4	IN	220-1136-	12 VOLT CABLE 2210 B6482-157	E12244	1.0000	EACH	00010
5	IN	000-0004-	LABOR SUB-SYSTEMS		.1300	EACH	00000
5	IN	000-0011-	LABOR QUALITY CONTROL		.0260	00000	00000
5	IN	000-6043-	SUB-SYS.-CABLES		.1300	EACH	00000
5	P FS *	600-1000-	WIRE 22 GA BLACK		1.5800	FEET	
6	FS	600-1009-	WIRE 22 GA WHITE		1.0000	FEET	
5	P FS *	600-1062-	WIRE 22 GA RED		1.5800	FEET	
5	FS	600-1009-	WIRE 22 GA WHITE		1.0000	FEET	
5	FS *	605-0014-	TUBING #5 CLEAR		1.3700	FEET	
5	IN	606-1136-	3/8" DIA WHT SHRNK BLK NUM 220-1136	E11776	1.0000	EACH	00001
5	IN	654-1148-	SOCKET HOUSING 1-480318-0		1.0000	EACH	
5	FS *	654-1145-R	SOCKET 30-22 GA (REEL) AMP 3500078-4		2.0000	EACH	
4	IN	300-1150-	CAP 100 PF 10% 500 V CERAMIC DISC		2.0000	EACH	
4	IN	300-1160-	CAP 150 PF 10% 500 V CERAMIC DISC		1.0000	EACH	
4	IN	300-1220-	CAP 220 PF 10% 500 V CERAMIC DISC		1.0000	EACH	
4	IN	300-1560-	CAP 560 PF 10% 500 V CERAMIC DISC		1.0000	EACH	
4	IN	300-1900-	CAP .05 UF +80-20% 12 V CERAMIC D	X13726	32.0000	EACH	00000
4	IN	300-1903-	CAP .01 UF +80-20% 25 V CERAMIC D	E13029	4.0000	EACH	
4	IN	300-1918-	CAP .1 UF +80-20% 20 V CERAMIC DISC	E13664	1.0000	EACH	
4	IN	300-1930-	1 UF 50V +80-20% CERAMIC CAP(HIFREQ)	E12036	2.0000	EACH	
4	IN *	300-1931-	1 UF CERAMIC CAPACITOR(HIGH FREQ)	E13029	8.0000	EACH	
4	IN	300-1966-	CAP .047 UF 50V+80-20% CERAMIC MLD	X13726	32.0000	EACH	
4	IN	300-2115-	CAP .015 UF 100 V MYLAR	E13664	1.0000	EACH	
4	IN	300-2147-	CAP .047 UF 10% 100 V MYLAR	E13029	1.0000	EACH	
4	IN	300-2248-	CAP .47 UF 10% 50 V MYLAR	E13664	2.0000	EACH	
4	IN	300-3010-	CAP 50 UF 50V -10+75% ELECT AXIAL	E12036	1.0000	EACH	
4	IN	300-3055-	1150 UF 50V ELECTROLYTIC CAPACITOR		1.0000	EACH	
4	IN	300-3062-	1000 UF 25V ELECTROLYTIC CAPACITOR		1.0000	EACH	
4	IN	300-3080-	4K UF 30V ELECT CAP(AXIAL LEAD)		1.0000	EACH	
4	IN	300-3081-	9.5K UF 15V ELECT CAP(AXIAL LEAD)		1.0000	EACH	
4	IN	300-4010-	CAP .56 UF 35 V 10% TANT AXIAL	E13664	2.0000	EACH	
5	FS	300-4010-R	CAP .56 UF 35V 10% TANT AXIAL T&R		1.0000	EACH	

QTY	REF	DESCRIPTION	UNIT	PRICE	DATE	REVISION
4	4	300-4016-R	-	-	-	-
4	4	300-4020	-	-	-	-
4	4	300-4022	-	-	-	-
5	5	300-4022-R	-	-	-	-
4	4	321-0029	-	-	-	-
4	4	325-1501	-	-	-	-
4	4	330-1010	-	-	-	-
4	4	330-1022	-	-	-	-
4	4	330-1057	-	-	-	-
4	4	330-1092	-	-	-	-
4	4	330-2011	-	-	-	-
4	4	330-2013	-	-	-	-
4	4	330-2016	-	-	-	-
4	4	330-2022	-	-	-	-
4	4	330-2033	-	-	-	-
4	4	330-2040	-	-	-	-
4	4	330-2047	-	-	-	-
4	4	330-2048	-	-	-	-
4	4	330-3010	-	-	-	-
4	4	330-3015	-	-	-	-
4	4	330-3022	-	-	-	-
4	4	330-3047	-	-	-	-
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5	5	330-3047	-	-	-	-
4	4	330-3052	-	-	-	-
4	4	330-3052-4B	-	-	-	-
5	5	330-3052	-	-	-	-
4	4	330-3076-4B	-	-	-	-
5	5	330-3076	-	-	-	-
4	4	330-3082	-	-	-	-
4	4	330-4047-4B	-	-	-	-
5	5	330-4047	-	-	-	-
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4	4	334-1001	-	-	-	-
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4	4	374-0003	-	-	-	-
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4	4	375-1052	-	-	-	-
4	4	375-0001	-	-	-	-
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4	4	300-4020	-	-	-	-
4	4	300-4022	-	-	-	-
4	4	300-4022-R	-	-	-	-
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4	4	334-1001	-	-	-	-
4	4	330-0200	-	-	-	-
4	4	330-0001	-	-	-	-
4	4	374-1002	-	-	-	-
4	4	374-0003	-	-	-	-
4	4	375-1012	-	-	-	-
4	4	375-1014	-	-	-	-
4	4	375-1027	-	-	-	-
4	4	375-1050	-	-	-	-
4	4	375-1052	-	-	-	-
4	4	375-0001	-	-	-	-
4	4	300-4016-R	-	-	-	-
4	4	300-4020	-	-	-	-
4	4	300-4022	-	-	-	-
4	4	300-4022-R	-	-	-	-
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4	4	330-3082	-	-	-	-
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5	5	330-4047	-	-	-	-
4	4	332-1068	-	-	-	-
4	4	334-0315	-	-	-	-
4	4	334-1001	-	-	-	-
4	4	330-0200	-	-	-	-
4	4	330-0001	-	-	-	-
4	4	374-1002	-	-	-	-
4	4	374-0003	-	-	-	-
4	4	375-1012	-	-	-	-
4	4	375-1014	-	-	-	-
4	4	375-1027	-	-	-	-
4	4	375-1050	-	-	-	-
4	4	375-1052	-	-	-	-
4	4	375-0001	-	-	-	-

4	IN	376-0002-	-	IC 7400N 4 2 IN POS NAND GATE	E12036	5.0000	EACH
4	IN	376-0003-	-	IC 7410N 3 3 IN POS NAND GATE		1.0000	EACH
4	IN	376-0006-	-	IC 7474N 2 D EDGE TRIG FLIP-FLOP	E13029	5.0000	EACH
4	IN	376-0010-	-	IC 7404N HEX INVERTER	E12036	4.0000	EACH
4	IN	376-0012-	-	IC 7451N EXP 2 W 2 IN AND OR INV GT		1.0000	EACH
4	IN	376-0015-	-	IC 7402N 4 2 IN POS NOR GATE		2.0000	EACH
4	IN	376-0049-	-	IC 74155 2 2-4 LINE DECODER DEMX	E11192	1.0000	EACH
4	IN	376-0056-	-	IC 723 VOLTAGE REGULATOR		2.0000	EACH
4	IN	376-0076-	-	IC 75150P 2 LINE DRIVER	E13664	1.0000	EACH
4	IN	376-0077-	-	IC 75154 4 LINE REC		1.0000	EACH
4	IN	376-0081-	-	IC 7408 4 2 IN POS AND GATE		1.0000	EACH
4	IN	376-0082-	-	IC 74157 4 2 IN MX		3.0000	EACH
4	IN	376-0085-	-	IC 7409 4 2 IN AND GATES		1.0000	EACH
4	IN	376-0093-	-	IC 7432 4 2 IN OR GATE	E12036	4.0000	EACH
4	IN	376-0094-	-	IC 74161 SYNCHRONOUS 4 BIT COUNTER		4.0000	EACH
4	IN	376-0104-	-	IC 9602 2 RETRIG RESET MONOSTBL MVB		2.0000	EACH
4	IN	376-0109-	-	IC 74166 8 BIT REGISTER		2.0000	EACH
4	IN	376-0119-	-	IC 74175 4 D TYPE EDGE TRIG F/F	E12036	1.0000	EACH
4	IN	376-0125-	-	IC 7427 3 3 IN NOR GATE		1.0000	EACH
4	IN	376-0126-	-	IC 555 TIMER	PATREL	2.0000	EACH
4	IN	376-0139-	-	IC 7414 HEX SCHMITT TRIGGER		1.0000	EACH
4	IN	376-0176-	-	IC 74367 HEX BUFFER		1.0000	EACH
4	IN	376-0185-	-	IC 7497 SYN RATE MULTIPLIERS	E13029	1.0000	EACH
4	IN	376-0191-	-	IC 74160 SYN 4 BIT CTR	E12036	1.0000	EACH
4	IN	376-0194-	-	IC 7411 3 3 IN POS AND GATE	E13029	1.0000	EACH
4	IN	376-0197-	-	IC 74S04 HEX INVERTER		1.0000	EACH
4	IN	376-0109-	-	IC 74S02 4 2 IN POS NOR GATE	E11192	2.0000	EACH
4	IN	376-0205-	-	IC 74S260 2 5 IN POS NOR GATE		1.0000	EACH
4	IN	376-0209-	-	IC 74LS10 3 3 IN POS NAND GATE		1.0000	EACH
4	IN	376-0226-	-	IC 74LS139 2 2-4 LINE DECODE	E12036	1.0000	EACH
4	IN	376-0232-	-	IC 74LS29R 4 IN MX STORAGE		1.0000	EACH
4	IN	376-0270-	-	IC 74S175 4 D-TYPE F/F		1.0000	EACH
4	IN	376-0271-	-	IC 74S86 4 2 INPUT EXCLUSIVE OR		1.0000	EACH
4	IN	376-0285-	-	IC 74LS245 8 BUS TRANS W/TR ST OUTP	E12036	3.0000	EACH
4	IN	376-0285-	-	IC 74LS374 8 LATCHES W/TR ST OUTP		1.0000	EACH
4	IN	376-0288-	-	IC 74LS244 OCTUAL BUF/LINE DR 3 OUT		3.0000	EACH
4	IN	376-0294-	-	IC 74LS138 3-8 LINE DECODER/MPX	E13029	2.0000	EACH
4	IN	376-0297-	-	IC 74LS240 OCTAL BUF/LINE DR/LN REC		1.0000	EACH
4	IN	376-0301-	-	IC 74S158 QUAD 2/1 DATA SELECT/MVX		1.0000	EACH
4	IN	376-0309-	-	IC 74LS378 HEX D-TYP F/F SCHTT	E12036	1.0000	EACH
4	IN	376-0310-	-	IC 74LS373 OCTL D-TYP LATCHES SCHTT	E11192	3.0000	EACH
4	IN	376-0312-	-	IC 74LS75 4-BIT R1STARBLE LATCH		1.0000	EACH
4	IN	376-9001-T	-	IC 14 PIN SOCKET LCW PROFILE T1	E12036	1.0000	EACH
4	IN	376-9003-	-	IC 24 PIN SOCKET BURNDY	E13029	5.0000	EACH
4	IN	376-9010-	-	IC 22 PIN SOCKET BURNDY # DILBZ22P1	E13029	2.0000	EACH
4	IN	376-9011-	-	IC 40 PIN SOCKET BURNDY # DILBZ40P1	PATREL	4.0000	EACH
4	IN	376-9014-	-	IC 18 PIN SOCKET	E12036	10.0000	EACH
4	IN	376-9015-	-	IC 28 PIN SOCKET BURNDY		1.0000	EACH
4	IN	376-9016-	-	IC 24 PIN SOCKET CAMBION	E13664	1.0000	EACH
4	IN	376-9017-	-	IC 24 POS ANTI-WICKING WAFER	E12036	1.0000	EACH
4	IN	360-1031-	-	D635 SIL DIODE 30V 100 MA AT 1V T&R	E13664	4.0000	EACH
4	IN	380-3008-	-	A15A RECTIFIER		4.0000	EACH

4	FS	380-400-R	-	EM403 / 1V40C4 RECTIFIER (REEL)	E13664	4.0000	EACH	00010
4	IN	510-7592-	-	PCR 2236E SINGLE PD TERM ELEC	PATREL	1.0000	EACH	00000
4	FS	605-1014-	-	CABLE TYE, PAN-TY PLTIM-M	E13029	2.0000	EACH	00000
4	IN	650-3087-	-	SCR 6-22 1/4 PAN SLOT MS NYL	E12036	2.0000	EACH	00000
4	IN	552-3022-	-	NUT 6-32UNC HEX REG PAT NYLON	E12035	2.0000	EACH	00000
4	IN	554-0104-	-	CONN HEADER 3 .100 1ROW STR PIN	E12035	3.0000	EACH	00000
4	IN	554-0106-	-	CONN HEADER 6 .100 1ROW STR PIN	E13029	3.0000	EACH	00000
4	IN	654-1186-	-	6 POS PIN HEADER AMP 1-380999-0	E13029	2.0000	EACH	00000
4	IN	554-1194-	-	4 POS P.C.HEADER ASSY AMP 350211-1	E12035	1.0000	EACH	00000
4	IN	554-1198-	-	2 POS PIN HEADER ASSY AMP 350209-1	E12035	6.0000	EACH	00000
3	IN	220-1351-	-	JUMPER PLUG CABLE 2236DE A64F2-522	E13029	1.0000	EACH	00010
4	IN	000-0004-	-	LABOR SUB-SYSTEMS		.0620	EACH	00000
4	IN	000-0011-	-	LABOR QUALITY CONTROL		.0120	EACH	00000
4	IN	000-5043-	-	SUR-SYS.-CABLES		.0500	EACH	00000
4	P	600-0000-	-	WIRE 18 GA BLACK UL		.1000	FEET	00000
4	IN	654-1148-	-	SOCKET HOUSING 1-480318-0		1.0000	EACH	00000
4	FS	654-1163-R	-	PN TERM 30-22 GA(REEL) AMP 350079-4		2.0000	EACH	00000
3	WC	377-0071-	-	TR 1402A / 1602A TRANS & REC I.C.		1.0000	EACH	00000
3	IN	377-0323-	-	EAB308APC 710 1ROW PATTERN	F13639	1.0000	EACH	00000
3	IN	377-0341-L	-	2114L 1024X4 BIT STATIC RAM LOW PWR	E13639	10.0000	EACH	00000
3	IN	377-0342-	-	Z80 PIO 40 PIN I.C.		1.0000	EACH	00000
3	IN	377-0343-	-	Z80 CTC 28 PIN I.C.		1.0000	EACH	00000
3	IN	377-0344-	-	Z80 CPU 40 PIN I.C.	PATREL	1.0000	EACH	00000
3	IN	377-0372-	-	IC 5027-1/5037 CPT VTAC		1.0000	EACH	00000
3	P	378-2446-R1-	-	2236DE KBC LOOKUP TABLE #3 L16	E12948	1.0000	EACH	00000
4	FS	377-0317-	-	IC 2708 1X8 E PROM 450 NS INTEL	E12948	1.0000	EACH	00000
3	P	378-2447-R1-	-	2236DE GRAPHICS CHAR TABLE #4 L55	E12948	1.0000	EACH	00000
4	FS	377-0317-	-	IC 2708 1X8 E PROM 450 NS INTEL	E12948	1.0000	EACH	00000
3	P	378-4094-R1-	-	2236DE TERMINAL MICROCODE #1 L18	E12948	1.0000	EACH	00000
4	FS	377-0348-	-	TMS 2716 2K BY 8 BIT E PROM	E12948	1.0000	EACH	00000
3	P	378-4095-R1-	-	2236DE TERMINAL MICROCODE #2 L17	E12948	1.0000	EACH	00000
4	FS	377-0348-	-	TMS 2716 2K BY 8 BIT E PROM	E12948	1.0000	EACH	00000
2	IN	270-0576-	-	2236DE WK/ST CHASSIS	E12542	1.0000	EACH	00010
3	IN	000-0004-	-	LABOR SUB-SYSTEMS		2.2110	EACH	00000
3	IN	000-0011-	-	LABOR QUALITY CONTROL		.4420	EACH	00000
3	IN	000-6041-	-	SUR-SYS.-CHASSIS		3.0000	EACH	00000
3	IN	220-1075-	-	POWER CORD ASSY(F CHAS)B6482-95		1.0000	EACH	00010
4	IN	000-0004-	-	LABOR SUB-SYSTEMS		.1840	EACH	00000
4	IN	000-0011-	-	LABOR QUALITY CONTROL		.0370	EACH	00000
4	IN	000-6043-	-	SUR-SYS.-CABLES		.1730	EACH	00000
4	IN	420-1096-	-	POWER CORD 10 FT 18AWG	X11034	1.0000	EACH	00000
4	P	600-0001-	-	WIRE 18 GA BROWN UL	E11034	.7100	FEET	00000
5	FS	600-0009-	-	WIRE 18 GA WHITE UL		1.0000	FEET	00000
4	P	600-0054-	-	WIRE 18 GA GREEN/YELLOW UL		.6200	FEET	00000
5	FS	600-0009-	-	WIRE 18 GA WHITE UL		1.0000	FEET	00000

4	FS	605-0101-	-	-	TUBING 1/4 BLACK			.5400	FEET
4	FS	605-1004-	-	-	CABLE TYE, PAN-TY PLTIM-M			1.0000	EACH
4	IN	606-1076-	-	-	1/2 DIA WHT SHRK BLK NUM 220-1076	E12008		1.0000	EACH
4	FS *	654-0052-R	-	-	#6 RING TONGUE BLU BA14-6M(2K/REEL)			1.0000	EACH
4	FS	654-0133-R	-	-	FASSTON TERY 18-2? RED AMP2-350803-2	E12144		3.0000	EACH
3	IN	220-1101-	-	-	P054 WIREX LUG ASSY(E CHAS)6482-12			1.0000	EACH
4	IN	000-0004-	-	-	LABOR SUB-SYSTEMS			.0070	EACH
4	IN	000-0011-	-	-	LABOR QUALITY CONTROL			.0010	EACH
4	IN	000-6043-	-	-	SUB-SYS.-CABLES			.0090	EACH
4	P FS	600-0054-	-	-	WIRE 18 GA GREEN/YELLOW UL			.2500	FEET
5	FS	600-0009-	-	-	WIRE 18 GA WHITE UL			1.0000	FEET
4	FS *	654-0050-R	-	-	#6 RING TONGUE RED BA16-6M(2K/REEL)	EC5924		1.0000	EACH
3	IN	220-1143-	-	-	WIRE & LUG ASSY TYPE P065 D6482-12	E13527		1.0000	EACH
4	IN	000-0004-	-	-	LABOR SUB-SYSTEMS			.0090	EACH
4	IN	000-0011-	-	-	LABOR QUALITY CONTROL			.0020	EACH
4	IN	000-6043-	-	-	SUB-SYS.-CABLES			.0090	EACH
4	P FS	600-5100-	-	-	12 GA BLACK STRANDED WIRE			.5000	FEET
5	FS	600-5109-	-	-	12 GA WHITE STRANDED WIRE			1.0000	FEET
4	FS	654-0017-R	-	-	TERMINAL FASTON .250X.032 P010R258M			1.0000	EACH
4	FS	654-0075-R	-	-	#10 RING TNG YLO BA10-10 MIK			1.0000	EACH
3	IN	220-1301-	-	-	CABLE SPEAKER 2236E	B6482-462	E11322	1.0000	EACH
4	IN	000-1004-	-	-	LABOR SUB-SYSTEMS			.1600	EACH
4	IN	000-0011-	-	-	LABOR QUALITY CONTROL			.0320	EACH
4	IN	000-6043-	-	-	SUB-SYS.-CABLES			.1600	EACH
4	P FS	600-2004-	-	-	WIRE 24 GA YELLOW UL			.5400	FEET
5	FS	600-2009-	-	-	WIRE 24 GA WHITE UL			1.0000	FEET
4	P FS	600-2006-	-	-	WIRE 24 GA BLUE UL			.5400	FEET
5	FS	600-2009-	-	-	WIRE 24 GA WHITE UL			1.0000	FEET
4	FS	605-0010-	-	-	TUBING PVC #8 CLEAR	E12244		.5780	FEET
4	FS	605-1004-	-	-	CABLE TYE, PAN-TY PLTIM-M	E12244		1.0000	EACH
4	IN	654-1148-	-	-	SOCKET HOUSING 1-480318-0			1.0000	EACH
4	FS	654-1165-R	-	-	SOCKET 30-22 GA (REEL) AMP 350078-4			2.0000	EACH
3	IN	220-1302-	-	-	CABLE POT	B6482-466	E11322	1.0000	EACH
4	IN	000-0004-	-	-	LABOR SUB-SYSTEMS			.3400	EACH
4	IN	000-0011-	-	-	LABOR QUALITY CONTROL			.0680	EACH
4	IN	000-6043-	-	-	SUB-SYS.-CABLES			.3400	EACH
4	P FS	600-2000-	-	-	WIRE 24 GA BLACK UL	E11560		.7600	FEET
5	FS	600-2009-	-	-	WIRE 24 GA WHITE UL			1.0000	FEET
4	P FS	600-2005-	-	-	WIRE 24 GA GREEN UL	W/OFF-76		.3800	FEET
5	FS	600-2009-	-	-	WIRE 24 GA WHITE UL			1.0000	FEET
4	P FS	600-2006-	-	-	WIRE 24 GA BLUE UL			.3800	FEET

5	FS	600-2009-	-	-	WIRE 24 GA WHITE UL	1.0000	FEET
4	FS	605-0010-	-	-	TUBING PVC #8 CLEAR	.4540	FEET
4	FS	605-1004-	-	-	CABLE TYE, PAN-TY PLTIM-M	1.0000	EACH
4	FS	654-1165-R	-	-	SOCKET 30-22 GA (REEL) AMP 350078-4	4.0000	EACH
4	IN	654-1195-	-	-	4 POS SOCKET HOUSING AMP 1-480424-0	1.0000	EACH
3	IN	220-3085-	-	-	FLAT CABLE ASSY RS/232	1.0000	EACH 00010
4	IN	000-0004-	-	-	LABOR SUB-SYSTEMS	.2500	EACH 00000
4	IN	000-0011-	-	-	LABOR QUALITY CONTROL	.0500	EACH 00000
4	IN	000-6043-	-	-	SUB-SYS.-CABLES	.2500	EACH 00000
4	IN	350-0413-	-	-	13-26 RECEPT CONN .100	1.0000	EACH
4	IN	350-2500-M	-	-	CONN 25 POS RCPT CBL TYPE D MOD	1.0000	EACH
5	IN	350-2500-	-	-	CONN 25 POS RCPT CBL TYPE D	1.0000	EACH
4	FS	420-0078-	-	-	25 COND FLAT CABLE S0600-0500	.5000	FEET
3	IN	220-3086-	-	-	FLAT CABLE ASSY 2236E	1.0000	EACH 00010
4	IN	000-0004-	-	-	LABOR SUB-SYSTEMS	.3400	EACH 00000
4	IN	000-0011-	-	-	LABOR QUALITY CONTROL	.0580	EACH 00000
4	IN	000-6043-	-	-	SUB-SYS.-CABLES	.3400	EACH 00000
4	IN	350-0600-	-	-	CONN 20-20 RCPT .100 SPG W/STR REL	1.0000	EACH
4	IN	350-2506-	-	-	CON 36 POS RCPT CBL TYPE D W/O BUSH	1.0000	EACH
4	FS	420-0045-	-	-	40 COND FLAT CABLE	.5000	FEET
3	IN	270-3139-	-	-	TRANSFORMER HARNESS	1.0000	EACH 00010
4	IN	000-0004-	-	-	LABOR SUB-SYSTEMS	.3400	EACH 00000
4	IN	000-0011-	-	-	LABOR QUALITY CONTROL	.0680	EACH 00000
4	IN	000-6043-	-	-	SUB-SYS.-CABLES	.3400	EACH 00000
4	IN	410-0116-	-	-	MMC 6078 XFMR 50/60H(83WS)C5068-116	1.0000	EACH
4	FS	605-0105-	-	-	TUBING 1 BLACK	.5000	FEET
4	FS	605-1004-	-	-	CABLE TYE, PAN-TY PLTIM-M	4.0000	EACH
4	FS	654-1163-R	-	-	PW TERM 30-22 GA(REEL) AMP 350079-4	6.0000	EACH
4	IN	654-1185-	-	-	6 POS SOC HOUSING AMP 1-480270-0	1.0000	EACH
3	IN	320-0300-	-	-	SPEAKER 3 IN 8 OHM MAGNETIC SQUARE	1.0000	EACH
3	IN	325-0033-	-	-	TOGGLE SWITCH(SPDT)C&K U11P3YZQ	1.0000	EACH
3	IN	325-2112-	-	-	SLIDE SW.115/230 VAC	1.0000	EACH
3	IN	335-0033-	-	-	100 OHM 2W	1.0000	EACH
3	IN	336-0034-	-	-	250 OHM 2W 20% POT(1/2"SHAFT)	1.0000	EACH
3	IN	360-0000-	-	-	FUSE HOLDER 90 DEGREE CONTACT	1.0000	EACH
3	IN	360-9000-	-	-	RUBBER WSHR FOR 360-0000 / 360-0001	1.0000	EACH
3	IN	360-9002-	-	-	HEX NUT FOR 360-0000 / 360-0001	1.0000	EACH
3	IN	360-9003-	-	-	LOCK WSHR LF#905023(FOR 360-0000/1)	1.0000	EACH
3	IN	380-5001-	-	-	250 VCLT VARISTOR V250LA20	1.0000	EACH
3	IN	410-2005-	-	-	LINF FILTER F AMP CORCOM 5K1	1.0000	EACH
3	IN	451-1100-	-	-	CHASSIS,CRT (F)E#R29-105	1.0000	EACH
3	IN	451-3998-	-	-	PANEL,REAR GRND	1.0000	EACH
3	IN	458-0423-	-	-	GRND,STATIC REAR PANEL B6841-113	1.0000	EACH
3	IN	462-0411-	-	-	SPACER PTR MULTPLXR B6647-110	4.0000	EACH
3	IN	462-0426-	-	-	SPCR 10-32 .250 HEX .250L 452-0002	4.0000	EACH
3	IN	510-6749-	-	-	6749 PRINTED CIRCUIT BOARD	1.0000	EACH





4	IN	350-4251-	-	CABLE SHELL CLAMP ASSY	E12590	2.0000	EACH	
4	IN	420-0101-	-	3 TWISTED PR 24GA BRAIDED SHLD CBL	E12590	25.1600	EACH	
4	IN	458-0361-	-	GROUND STRAP C6815-28	E12590	4.0000	EACH	
4	FS	605-0000-	-	TUBING #10 CLEAR		.0800	FEET	
4	FS	605-0002-	-	TUBING #15 CLEAR		.2700	FEET	
4	FS	605-0123-	-	SHRINK TUBING TYPE RNF 3/16 ID BLK	E12590	.3300	FEET	00001
4	FS	605-2236-25-	-	CBL MARKER WH/BK 2236 120-2236-25	E12590	2.0000	EACH	00001
5	FS	605-0137-	-	TUBING 1/4 WH SHRINK POLYOLEFIN		.1140	FEET	
4	IN	615-1343-	-	LABEL*MUX CABLE CONN A5300-1072		1.0000	EACH	
4	IN	615-1344-	-	LABEL*TERMINAL CABLE CON A5300-1072		1.0000	EACH	
3	IN	220-3339-	-	24 PIN FLAT CABLE ASSY(18")C6482-79	E12542	1.0000	EACH	00010
4	IN	000-0004-	-	LABOR SUB-SYSTEMS		.0330	EACH	00000
4	IN	000-0011-	-	LABOR QUALITY CONTROL		.0070	EACH	00000
4	IN	000-6043-	-	SUB-SYS*-CABLES		.0490	EACH	00000
4	IN	350-0403-	-	24 PIN FLAT CABLE PLUG		2.0000	EACH	
4	FS	420-3350-	-	24 COND FLAT CABLE 3M 3365/24		1.5000	FEET	
3	IN	270-0372-	-	12" MONITOR ASM II (LESS PWR SUP)	E12150	1.0000	EACH	00010
4	IN	000-0004-	-	LABOR SUB-SYSTEMS		3.7100	EACH	00000
4	IN	000-0011-	-	LABOR QUALITY CONTROL		.7420	EACH	00000
4	IN	000-6045-	-	SUB-SYS*-MONITORS		3.7100	EACH	00000
4	IN	* 210-7456-	-	PCA 12" MONITOR FLEC	EC8373	1.0000	EACH	00010
5	IN	000-0005-	-	LABOR PRODUCTION SYSTEMS		.4950	EACH	00000
5	IN	000-0011-	-	LABOR QUALITY CONTROL		.0990	EACH	00000
5	IN	000-9899-	-	OTHER DIRECT COST		10.4210	EACH	00000
5	IN	300-1347-	-	CAP 47 PF 10% 500 V CERAMIC DISC		1.0000	EACH	
5	IN	300-1470-	-	CAP 470 PF 10% 500 V CERAMIC DISC		1.0000	EACH	
5	IN	300-1470-	-	CAP 820 PF 10% 500 V CERAMIC DISC	E13020	1.0000	EACH	
5	IN	300-1920-	-	CAP .02 UF 20% 500 V CERAMIC DISC		3.0000	EACH	
5	IN	300-1912-	-	CAP .02 UF 20% 500 V CERAMIC DISC		2.0000	EACH	
5	IN	300-1915-	-	CAP .0056 UF 20% 500 V CERAMIC DISC		1.0000	EACH	
5	IN	300-1916-	-	CAP .02 UF +80-20% 1.4 V CERAMIC D		2.0000	EACH	
5	IN	300-1918-	-	CAP .1 UF +60-20% 20 V CERAMIC DISC		1.0000	EACH	
5	IN	300-1931-	-	1 UF CERAMIC CAPACITOR(HIGH FREQ)	EC9161	1.0000	EACH	
5	IN	300-2215-	-	CAP .15 UF 10% 100 V MYLAR		1.0000	EACH	
5	IN	300-2247-	-	CAP .47 UF 10% 100 V MYLAR	EC7776	2.0000	EACH	
5	IN	300-2310-	-	CAP .1 UF 10% 400 V MYLAR	EC7775	1.0000	EACH	
5	IN	300-2412-	-	CAP .033 UF 10% 400 V METL MYLAR		1.0000	EACH	
5	IN	300-2413-	-	CAP 4.0 UF 10% 100 V METL MYLAR		1.0000	EACH	
5	IN	300-2414-	-	CAP .01 UF 10% 50 V POLYSTYRENE		1.0000	EACH	
5	IN	300-2415-	-	CAP .0033 UF 10% 600 V MYLAR		1.0000	EACH	
5	IN	300-2418-	-	CAP 2.2 UF 10% 100 V METL MYLAR	EC7776	1.0000	EACH	
5	IN	300-3076-	-	CAP 10 UF 16V -10+75% ELECT AXIAL		2.0000	EACH	
5	IN	300-3009-	-	CAP 35 UF 16V -10+75% ELECT AXIAL		3.0000	EACH	
5	IN	300-3010-	-	CAP 50 UF 50V -10+75% ELECT AXIAL		1.0000	EACH	
5	IN	300-3033-	-	CAP 100 UF 25V -10+75% ELECT AXIAL		1.0000	EACH	
5	IN	300-3062-	-	1000 UF 25V ELECTROLYTIC CAPACITOR		3.0000	EACH	
5	IN	300-4100-	-	CAP 1.0 UF 35 V 10% TANT AXIAL		1.0000	EACH	00001
5	FS	300-4100-R	-	CAP 1.0 UF 35V 10% TANT AXIAL T&R		1.0000	EACH	
5	IN	300-4022-	-	CAP 15.0 UF 20 V 10% TANT AXIAL	EC7776	1.0000	EACH	00001



5	P	FS *	330-4027-48-	-	RES	27K	OHM	1/4W	10%	FIXED	COMP			1.0000	EACH
6	FS *	330-4027-	-	-	RES	27K	OHM	1/4W	10%	FIXED	COMP			1.0000	EACH
5	P	FS	330-4068-48-	-	RES	68K	OHM	1/4W	10%	FIXED	COMP	EC8519		1.0000	EACH
6	FS *	330-4068-	-	-	RES	58K	OHM	1/4W	10%	FIXED	COMP			1.0000	EACH
5	P	FS *	330-5010-48-	-	RES	100K	OHM	1/4W	10%	FIXED	COMP			3.0000	EACH
6	IN *	330-5010-	-	-	RES	100K	OHM	1/4W	10%	FIXED	COMP			1.0000	EACH
5	P	FS *	330-5022-48-	-	RES	220K	OHM	1/4W	10%	FIXED	COMP			1.0000	EACH
6	IN *	330-5022-	-	-	RES	220K	OHM	1/4W	10%	FIXED	COMP			1.0000	EACH
5	P	FS *	330-5027-48-	-	RES	270K	OHM	1/4W	10%	FIXED	COMP			1.0000	EACH
6	FS *	330-5027-	-	-	RES	270K	OHM	1/4W	10%	FIXED	COMP			1.0000	EACH
5	P	FS *	330-6012-48-	-	RES	1.2M	OHM	1/4W	10%	FIXED	COMP			1.0000	EACH
6	IN *	330-6012-	-	-	RES	1.2M	OHM	1/4W	10%	FIXED	COMP			1.0000	EACH
5	P	FS *	330-6047-48-	-	RES	4.7M	OHM	1/4W	10%	FIXED	COMP			1.0000	EACH
6	IN *	330-6047-	-	-	RES	4.7M	OHM	1/4W	10%	FIXED	COMP			1.0000	EACH
5	IN		331-0022-	-	RES	2.2	OHM	1/2W	10%	FIXED	COMP			1.0000	EACH
6	FS		331-0022-R	-	RES	2.2	OHM	1/2W	10%	FIXED	COMP T&R			1.0000	EACH
5	IN		331-2010-	-	RES	100	OHM	1/2W	10%	FIXED	COMP	EC7776		1.0000	EACH
6	FS		331-2010-R	-	RES	100	OHM	1/2W	10%	FIXED	COMP T&R			1.0000	EACH
5	IN		332-1033-	-	RES	33	OHM	1W	10%	FIXED	COMP			1.0000	EACH
5	IN		333-0067-	-	RES	8.25K	OHM	1/8W	1%	FIXED	FILM			1.0000	EACH
5	IN		336-0031-	-	2.5	MFG	OHM	POT	750V					1.0000	EACH
5	IN		336-1015-	-	RES	10K	OHM	VAR	TRIM	SIDE	ADJ	SG		1.0000	EACH
5	IN		336-1019-	-	RES	100K	OHM	VAR	TRIM	SIDE	ADJ	SG		1.0000	EACH
5	IN		336-1020-	-	RES	5K	OHM	VAR	TRIM	SIDE	ADJ	SG	EC7776	2.0000	EACH
5	IN		336-1021-	-	RES	20	OHM	VAR	TRIM	SIDE	ADJ	SG		1.0000	EACH
5	IN		337-1056-	-	RES	56	OHM	2V	10%	FIXED	COMP			1.0000	EACH
5	IN		337-3012-	-	RES	1.2K	OHM	2W	10%	FIXED	COMP			1.0000	EACH
5	IN		375-1012-	-	MPS	6512	SILICON	TRANSISTOR						1.0000	EACH
5	IN		375-1014-	-	MPS	6510	SILICON	TRANSISTOR						1.0000	EACH
5	IN		375-1027-	-	TSTR	2N3725	0.8W	80V	SH	NPN	S			1.0000	EACH
5	IN		375-1056-	-	MPS-U04	TRANSISTOR								1.0000	EACH
5	IN		375-1057-	-	9U-124	TRANSISTOR								1.0000	EACH
5	IN		375-9001-	-	TRANSIPAD	8977887-1	LARGE							1.0000	EACH
5	IN		375-9015-	-	MICA	INSUL#CF1038	FOR 375-1034/1035	E11035						1.0000	EACH
5	IN		375-0239-	-	IC	NE592A	VICFO	AMP						1.0000	EACH
5	IN		376-0250-	-	TBA	950	I.C.							1.0000	EACH
5	IN		376-0241-	-	TDA	1044	I.C.							1.0000	EACH
5	P	FS *	380-1001-48-	-	D035	SIL	DIODE	30V	100MA	AT	1V	48	EC7776	2.0000	EACH
6	FS		380-1001-R	-	D035	SIL	DIODE	30V	100MA	AT	1V	T&R		1.0000	EACH
5	IN		380-2056-	-	D10	ZEN	1N752	A	5.6V	400MW	S	D0-7		1.0000	EACH
5	IN		380-2091-	-	D10	ZEN	1N757	A	9.1V	400MW	S	D0-7		1.0000	EACH

6	FS	380-2091-R	--	DID ZEN 1N757A 9.1V 400MW SD07 T+R	1.0000	EACH	
5	IN	380-3009-	--	VG-1X RECTIFIER 1KV	2.0000	EACH	
5	IN	380-3010-	--	SIF4 400V DIODE	2.0000	EACH	
5	IN	380-3012-	--	3SIF2 3AMP 200V RECTIFIER	1.0000	EACH	00001
5	FS	380-4000-	--	DIO 1N4004 400V 1A RECT S D041	1.0000	EACH	
5	FS	380-4000-R	--	EM403 / 1N4004 RECTIFIER (REEL)	1.0000	EACH	
5	IN	410-1006-	--	EX4061 TRANSFMR HORZ DR C5068-1006	1.0000	EACH	
5	IN	451-4833-	--	BRACKET HEATSINK 12"MNTR B6836-133	1.0000	EACH	E11119
5	IN	510-7456-	--	PCB 12" MONITCR ELEC	1.0000	EACH	
5	FS	505-0003-	--	TUBING #18 CLEAR	.2500	FEET	E11035
5	FS	505-0120-	--	TEFLON TUBING #22 CLEAR 100 FT ROLL	.2500	FEET	E11035
5	IN	550-3080-	--	6-32 X 1/4 PAN HD PHL MS SS SEMS	1.0000	EACH	E11119
5	IN	550-3087-	--	SCR 6-32 1/4 PAN SLOT MS NYL	1.0000	EACH	E11119
5	IN	653-3002-	--	WASH 6 .14110 .25000 .062 FL NYL	1.0000	EACH	E13020
5	IN	653-4004-	--	WASH 8 .17010 .37500 .062 FL NYL	1.0000	EACH	E12880
5	FS	650-0123-	--	THERMAL COMPOUND DCW#340(14 OZ TUBE	.0100	EACH	
4	IN	220-0160-	--	BRIGHTNESS POT CABLE ASSY C6482-140	1.0000	EACH	00010
5	IN	000-0004-	--	LABOR SUB-SYSTEMS	.0640	EACH	00000
5	IN	000-0011-	--	LABOR QUALITY CONTROL	.0130	EACH	00000
5	IN	000-6043-	--	SUB-SYS--CABLES	.3600	EACH	00000
5	P	FS * 330-1058-48-	--	RES 68 OHM 1/4W 10% FIXED COMP	1.0000	EACH	
6	IN	* 330-1058-	--	RES 58 OHM 1/4W 10% FIXED COMP	1.0000	EACH	
5	IN	336-0032-	--	250K OHM POT (BRIGHTNESS)	1.0000	EACH	
5	IN	336-0035-	--	250.0HM CONTRAST CONTROL	1.0000	EACH	RF2401
5	P	FS * 600-1000-	--	WIRE 22 GA BLACK	4.0000	FEET	EC7092
6	FS	600-1009-	--	WIRE 22 GA WHITE	1.0000	FEET	
5	P	FS * 600-1002-	--	WIRE 22 GA RED	2.0000	FEET	EC7092
6	FS	600-1009-	--	WIRE 22 GA WHITE	1.0000	FEET	
5	P	FS * 600-1004-	--	WIRE 22 GA YELLOW	2.0000	FEET	EC7092
6	FS	600-1009-	--	WIRE 22 GA WHITE	1.0000	FEET	
5	FS	* 600-1009-	--	WIRE 22 GA WHITE	4.0000	FEET	EC7092
5	FS	605-0010-	--	TUBING PVC #8 CLEAR	.5000	FEET	E10842
5	FS	* 605-1004-	--	CABLE TYE, PAN-TY PLTIM-M	6.0000	EACH	RF2401
5	FS	* 654-1165-R-	--	SOCKET 3C-22 GA (REEL) AMP 350078-4	6.0000	EACH	EC8399
5	IN	654-1185-	--	6 POS SOC HOUSING AMP 1-480270-0	1.0000	EACH	RF2401
4	P	IN 270-3068-	--	12" CRT HARNESS ASSY D6482-139	1.0000	EACH	
5	IN	000-0004-	--	LABOR SUB-SYSTEMS	.6370	EACH	00000
5	IN	000-0011-	--	LABOR QUALITY CONTROL	.1270	EACH	00000
5	IN	000-6045-	--	SUB-SYS--MONITORS	.0000	EACH	00000
5	IN	350-2072-	--	110 DEG CRT SOCKET	1.0000	EACH	
5	FS	420-0018-	--	1 COND 24 GA SHIELDED CABLE AL 1702	1.4200	FEET	EC8495
5	P	FS * 600-1000-	--	WIRE 22 GA BLACK	2.0400	FEET	EC8495
6	FS	600-1009-	--	WIRE 22 GA WHITE	1.0000	FEET	

5	P	FS *	600-1002-	-	-	-	-	-	WIRE 22 GA RED			1.2500	FEET
6	FS		600-1009-	-	-	-	-	-	WIRE 22 GA WHITE			1.0000	FEET
5	P	FS *	600-1004-	-	-	-	-	-	WIRE 22 GA YELLOW	EC8495		1.4200	FEET
6	FS		600-1009-	-	-	-	-	-	WIRE 22 GA WHITE			1.0000	FEET
5	FS *	600-1009-	-	-	-	-	-	-	WIRE 22 GA WHITE	EC8495		2.2500	FEET
5	FS *	605-0014-	-	-	-	-	-	-	TUBING #5 CLEAR	E10607		.2920	FEET
5	FS	605-0021-	-	-	-	-	-	-	TUBING,HEATSHRINK 1/801A IRRAD POLY	EC8495		.0600	FEET
5	IN	654-0100-	-	-	-	-	-	-	15 DUAL POS EDGE CONN MOL#09-506155			1.0000	EACH
5	FS	654-0101-R	-	-	-	-	-	-	CRIMP TERMINAL EDGE CONN#08-05-0301	E12147		13.0000	EACH
5	IN	654-1004-	-	-	-	-	-	-	#4 GROUND LUG 1414-4			1.0000	EACH
5	IN	554-1147-	-	-	-	-	-	-	PIN HOUSING 1-480319-0			1.7000	EACH
5	IN	554-1149-	-	-	-	-	-	-	PIN HOUSING 1-480305-0	RF2401		1.0000	EACH
5	FS *	654-1164-R	-	-	-	-	-	-	PIN TERM 20-14 GA(REEL)AMP 61118-4	RF2401		1.0000	EACH
5	FS *	654-1156-R	-	-	-	-	-	-	PIN TERM 30-22 GA(REEL)AMP3500079-4	RF2401		9.0000	EACH
4	P	IN	270-3092-	-	-	-	-	-	YOKE ASSY (12" MONITOR) B6482-246			1.0000	EACH
5	IN	000-0004-	-	-	-	-	-	-	LABOR SUB-SYSTEMS			.0400	EACH
5	IN	000-0011-	-	-	-	-	-	-	LABOR QUALITY CONTROL			.0080	EACH
5	IN	000-6045-	-	-	-	-	-	-	SUB-SYS.-MONITORS			.0000	EACH
5	IN	320-0952-	-	-	-	-	-	-	DEFLECTION YOKE EX5012 C6815-902			1.0000	EACH
5	FS *	654-0101-R	-	-	-	-	-	-	CRIMP TERMINAL EDGE CONN#08-05-0301			4.0000	EACH
4	P	IN	270-3104-	-	-	-	-	-	12"FLYBACK XFORMER HARN C6482-327	EC9723		1.0000	EACH
5	IN	000-0004-	-	-	-	-	-	-	LABOR SUB-SYSTEMS			.2080	EACH
5	IN	000-0011-	-	-	-	-	-	-	LABOR QUALITY CONTROL			.0420	EACH
5	IN	000-6045-	-	-	-	-	-	-	SUB-SYS.-MONITORS			.0000	EACH
5	IN	410-1607-	-	-	-	-	-	-	EX4002 FLYBACK TRANSFMR C5068-1007			1.6000	EACH
5	P	FS	600-0500-	-	-	-	-	-	20 GA WIRE FLK UL			.9100	FEET
5	P	FS	600-0501-	-	-	-	-	-	20 GA WIRE SRN UL	W/OFF-75		.8700	FEET
6	FS		600-0509-	-	-	-	-	-	20 GA WIRE WHT UL			1.0000	FEET
5	P	FS	600-0502-	-	-	-	-	-	20 GA WIRE RED UL			.8700	FEET
6	FS		600-0509-	-	-	-	-	-	20 GA WIRE WHT UL			1.0000	FEET
5	P	FS	600-0503-	-	-	-	-	-	20 GA WIRE GRN UL	W/OFF-73		.9100	FEET
6	FS		600-0509-	-	-	-	-	-	20 GA WIRE WHT UL			1.0000	FEET
5	P	FS	600-0505-	-	-	-	-	-	20 GA WIRE GRN UL	W/OFF-76		.8700	FEET
6	FS		600-0509-	-	-	-	-	-	20 GA WIRE WHT UL			1.0000	FEET
5	P	FS	600-0506-	-	-	-	-	-	20 GA WIRE BLU UL			.8300	FEET
6	FS		600-0509-	-	-	-	-	-	20 GA WIRE WHT UL			1.0000	FEET
5	P	FS	600-0507-	-	-	-	-	-	20 GA WIRE VIC UL	W/OFF-73		.8300	FEET
6	FS		600-0509-	-	-	-	-	-	20 GA WIRE WHT UL			1.0000	FEET
5	FS	605-1004-	-	-	-	-	-	-	CABLE TYE PAN-TY PLT1M-M	E11874		2.0000	EACH
5	IN	605-1011-	-	-	-	-	-	-	TY-WRAP IDENT MARKER	E11874		1.0000	EACH
5	FS	654-0101-R	-	-	-	-	-	-	CRIMP TERMINAL EDGE CONN#08-05-0301	E12147		7.0000	EACH

4	IN *	374-0048-	-	RES 18 OHM 5W 5% KW NON-IND	E11E11	.0000	EACH
4	IN *	340-0101-	-	TUBE CATHODE RAY 12" RECT P31		1.0000	EACH
4	IN	340-0101-F	-	12"CRT 6.3V @ 300 MA FILAMENT W/PPG	E11511	.0000	EACH
4	IN	350-2073-	-	AVODE CONNECTOR (125-29)		1.0000	EACH
4	IN	380-3011-	-	HX200LP 20KV RECT. DIODE		1.0000	EACH
4	IN	451-1121-	-	CHASSIS*12" MONITOR-MOD D6836-119		1.0000	EACH
4	IN	451-3856-	-	PANEL*SIDE(L.H.)(12"W)D6836-102		1.0000	EACH
4	IN	451-3857-	-	PANEL*SIDE(R.H.)(12"W)D6836-102		1.0000	EACH
4	IN	451-4472-	-	BRKT*NECKSAVER(12"W)C6836-107		1.0000	EACH
4	IN	451-4473-	-	BRKT,SUPPORT(12"W)B6836-104		1.0000	EACH
4	IN	451-4895-	-	BRKT FLYBACK MTG C6836-135	E12469	.0000	EACH
4	IN	452-4042-	-	GUIDE,CARD RCG-2 4"		2.0000	EACH
4	IN	452-0293-	-	SPCR,DELIN 3/8DIA 4-40TAPB6835-505		2.0000	EACH
4	IN	465-1543-	-	SPRING,GROUNDING(12"MON)B6836-105		1.0000	EACH
4	IN	478-0448-	-	INSULATOR,NECKSAVER BRKT B6836-132	E10052	1.0000	EACH
4	FS	605-1004-	-	CABLE TYE, PAN-TY PLTIM-M		2.0000	EACH
4	FS	515-1454-	-	LABEL,MODEL 12W B6611-207	E10479	1.0000	EACH
4	IN	650-2120-	-	4-40 X 3/8 PAN HD PHL MS SS SEMS		2.0000	EACH
4	IN	651-0025-	-	#10X5/16 HEX HD SLOT TAP SCR TYPE-B	E12461	.0000	EACH
4	IN	651-0030-	-	SCREW,SELF TAP T-B #4X1/2"L PNHD PH	E10723	3.0000	EACH
4	IN	651-0037-	-	SCR RX3/8 HEX HD SLT SELF TAP B CAD	E10125	9.0000	EACH
4	FS	651-0053-	-	#10X3/8 HEX HD SLOT TRAP SCR TYPE-B	E12461	4.0000	EACH
4	IN	654-1184-	-	CONN 6 POS HOUSING AMP 1-470271-0		1.0000	EACH
4	IN	654-1275-	-	CABLE CLAMP 1/4" ADHESIVE BACK KRU4	E10948	1.0000	EACH
4	IN	656-1008-	-	MAGNET,YELLOW TYPE 1 (2169)	E10787	5.0000	EACH
4	IN	656-1009-	-	MAGNET,SILVER TYPE 2 (1165)	E10787	2.0000	EACH
4	IN	656-1010-	-	MAGNET,PED TYPE 3 (169)	E10787	2.0000	EACH
4	IN	656-1011-	-	MAGNET,PURPLE TYPE 4 (4167)	E10787	2.0000	EACH
4	IN	656-1013-	-	MAGNET,LG YELLOW TYPE 5	E10787	2.0000	EACH
4	IN	656-1014-	-	MAGNET,LG RED TYPE 6	E10787	2.0000	EACH
4	FS	660-0027-	-	1" PERMACELL TAPE #672 (BLACK)		1.0000	FEET
4	FS	660-0196-	-	GLUE,HOTMELT(.750DX1.375LG)	EC9775	.0500	EACH
3	IN	270-0579-	-	HEATSINK ASSY 2236E	E12542	1.0000	EACH
4	IN	000-0004-	-	LABOR SUB-SYSTEMS		.5000	EACH
4	IN	000-0011-	-	LABOR QUALITY CONTROL		.1000	EACH
4	IN	000-5042-	-	SUBSYSTEMS-HEATSINKS		.5000	EACH
4	IN	220-1351-	-	HEATSINK CABLE	E12244	1.0000	EACH
5	IN	000-0004-	-	LABOR SUB-SYSTEMS		.5000	EACH
5	IN	000-0011-	-	LABOR QUALITY CONTROL		.1000	EACH
5	IN	000-6043-	-	SUB-SYS.-CABLES		.5000	EACH
5	P FS	600-0001-	-	WIRE 18 GA BROWN UL		.8500	FEET
6	FS	600-0009-	-	WIRE 18 GA WHITE UL		1.0000	FEET
5	P FS	600-0002-	-	WIRE 18 GA RED UL		.7000	FEET
6	FS	600-0009-	-	WIRE 18 GA WHITE UL		1.0000	FEET
5	P FS	600-0003-	-	WIRE 18 GA ORANGE UL		.9300	FEET
6	FS	600-0009-	-	WIRE 18 GA WHITE UL		1.0000	FEET
5	P FS	600-0004-	-	WIRE 18 GA YELLOW UL		.9300	FEET
6	FS	600-0009-	-	WIRE 18 GA WHITE UL		1.0000	FEET





5	IN	560-0028-	-	-	TAPE,AL 28X36 SHT .004	E6841-114			.0172	EACH
4	IN	560-0028-8	-	-	TAPE,ST SHLD 1 1/2"X17	1/2E6841-129	EC7391		1.0000	EACH
5	IN	560-0028-	-	-	TAPE,AL 28X36 SHT .004	E6841-114			.0277	EACH
4	IN	660-0028-9	-	-	TAPE,ST SHLD 2 1/2"X7"	E6841-131	EC7391		2.0000	EACH
5	IN	660-0028-	-	-	TAPE,AL 28X36 SHT .004	E6841-114			.0192	EACH
3	WC	279-4116-	-	-	2236 DE COVER ASSY		E11811		1.0000	EACH 00010
4	IN	000-0011-	-	-	LABOR QUALITY CONTROL				.1130	00000
4	IN	000-0024-	-	-	LABOR PREP AREA				.5650	EACH 00000
4	IN	449-0289-	-	-	COVER MACH (OPEN VENTS)	E6621-62			1.0000	EACH
4	IN	560-0028-1	-	-	TAPE,ST SHLD 9 3/4"X15"	E6841-120			2.0000	EACH
5	IN	550-0028-	-	-	TAPE,AL 28X36 SHT .004	E6841-114			.2500	EACH
4	IN	560-0028-2	-	-	TAPE,ST SHLD 12"X16"	E6841-119			2.0000	EACH
5	IN	660-0028-	-	-	TAPE,AL 28X36 SHT .004	E6841-114			.2500	EACH
4	IN	560-0028-3	-	-	TAPE,ST SHLD 2 1/2"X12"	E6841-135			2.0000	EACH
5	IN	660-0028-	-	-	TAPE,AL 28X36 SHT .004	E6841-114			.0322	EACH
4	IN	560-0028-4	-	-	TAPE,ST SHLD 3 1/4"X22"	E6841-127			1.0000	EACH
5	IN	560-0028-	-	-	TAPE,AL 28X36 SHT .004	E6841-114			.0833	EACH
3	IN	350-4506-	-	-	CONN 2 POS, SHUNT .100 CTR	2236DE	E12322		2.0000	EACH
3	IN *	449-0246-	-	-	RETAINER,CRT STRIP	C6872-106	X13699		2.0000	EACH
3	IN	452-0524-	-	-	PLATE KEYBOARD STATIC	B6827-502	E11812		1.0000	EACH
3	IN *	452-1058-	-	-	FIN PLT WLDMT & SS CHA/GR	D6621-110	X13699		1.0000	EACH
3	IN	452-2342-5	-	-	ORS EC13699 USE 452-106A		X13699		1.0000	EACH 00000
3	IN	452-2517-	-	-	700 PROGRAM CLAMPS R5900-39		(2 X13699		2.0000	EACH 00000
3	IN	452-2436-	-	-	SUPPORT,ROD WELDMENT(LH)	C6852-702			1.0000	EACH
3	IN	452-0437-	-	-	SUPPORT,ROD WELDMENT(RH)	C6852-702			1.0000	EACH
3	IN	462-0110-	-	-	301 MB SPACER (3/8 OD 5/32 ID NYLON		E11812		4.0000	EACH
3	IN	478-0051-	-	-	700 PROGRAM CLAMP NUTS B5900-27		(2 X13699		2.0000	EACH 00000
3	FS	605-1054-	-	-	CABLE TYE, PAN-TY PLTIM-M				2.0000	EACH
3	IN	615-0398-	-	-	PROGRAM STRIP (SILK SCR)	C6857-5	E12542		1.0000	EACH
3	IN	615-1322-	-	-	LABEL,HDW LEVEL WK STA C6611-62				1.0000	EACH
3	IN	615-1328-	-	-	LABEL,928W1&W2 CONN IDENT	C6841-112			1.0000	EACH
3	IN	650-2121-	-	-	SCR 4-40 3/8 PHIL FLAT H MS SS		E11812		6.0000	EACH
3	IN	650-3120-	-	-	6-32 X 3/8 PAN HD PHL MS SS SEMS		E11812		4.0000	EACH
3	IN	650-3250-	-	-	SCR 6-32 5/8 PHIL PH MS SS		E11812		3.0000	EACH
3	IN	650-4133-	-	-	8-32 X 3/8 FLANGE WHIZ-LOCK MS ZINC				6.0000	EACH
3	IN	650-6121-	-	-	10-32X3/8 TRUSS HD PHL MS SS				2.0000	EACH
3	IN	650-5360-W	-	-	10-32X1 1/8 TRUSS HD PHL SS(WHITE)				2.0000	EACH
3	FS	650-5542-	-	-	CLIP TINFERMAN C12041-012-4		E13095		3.0000	EACH
3	IN *	651-0507-	-	-	8-32 LOCK-VUT KEPS 511-081800-50		X13699		2.0000	EACH
3	IN	652-0029-	-	-	6-32 LOCK-VUT KEPS 511-061800-00				4.0000	EACH
3	IN	652-0032-	-	-	SPEED NUT U TYPE C7852 824		E11812		7.0000	EACH
3	FS	652-0100-	-	-	WASH 3/8 .398ID .69200 INT T ST		E13326		1.0000	EACH
3	IN	653-0022-	-	-	WASH 6 .141ID .25000 .062 FL NYL		E11812		4.0000	EACH
3	IN	653-3002-	-	-	WASH 8 .176ID .38100 INT EXT ST				8.0000	EACH
3	IN	653-4015-	-	-					3.0000	EACH

3	IN	653-6022-	-	-	WASHER, #10 SPRING	4.0000	EACH
3	IN	654-0126-	-	-	FAST-ON TERMINAL AMP #60465-2	1.0000	EACH
3	IN	654-1274-	-	-	CABLE CLAMP ADH.BACK DKLSP 021-0375	1.0000	EACH
3	IN	655-0099-9	-	-	PLUG PUTTON WHITE C-6815-79	2.0000	EACH
3	IN	655-0018-9	-	-	PLUG PUTTON WHITE C-6815-79	2.0000	EACH
3	IN	655-0157-	-	-	5127712 KNOB ALCO KN700BA	2.0000	EACH
2	IN	360-1025-SB-	-	-	FUSE 2 1/2 AMP 250V SB CERAMC 3AG E12149	1.0000	EACH
2	IN	725-2618-	-	-	2236DE KEYTRONICS KEYBOARD ASSY E12319	1.0000	EACH

END OF REPORT MB0080-A



APPENDIX B

SCHEMATICS

<u>SCHEMATIC #</u>	<u>BOARD NAME</u>	<u>PAGE</u>
210-7456	Electronics for 9" and 12" Monitors	B-2
210-7592	Single Board Terminal Electronics	B-3/B-10
725-2618	Keytronics Keyboard	B11

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MILLIMETERS IN PARENTHESES TOLERANCES TO BE EQUIVALENT TO INCH DIMENSIONS.

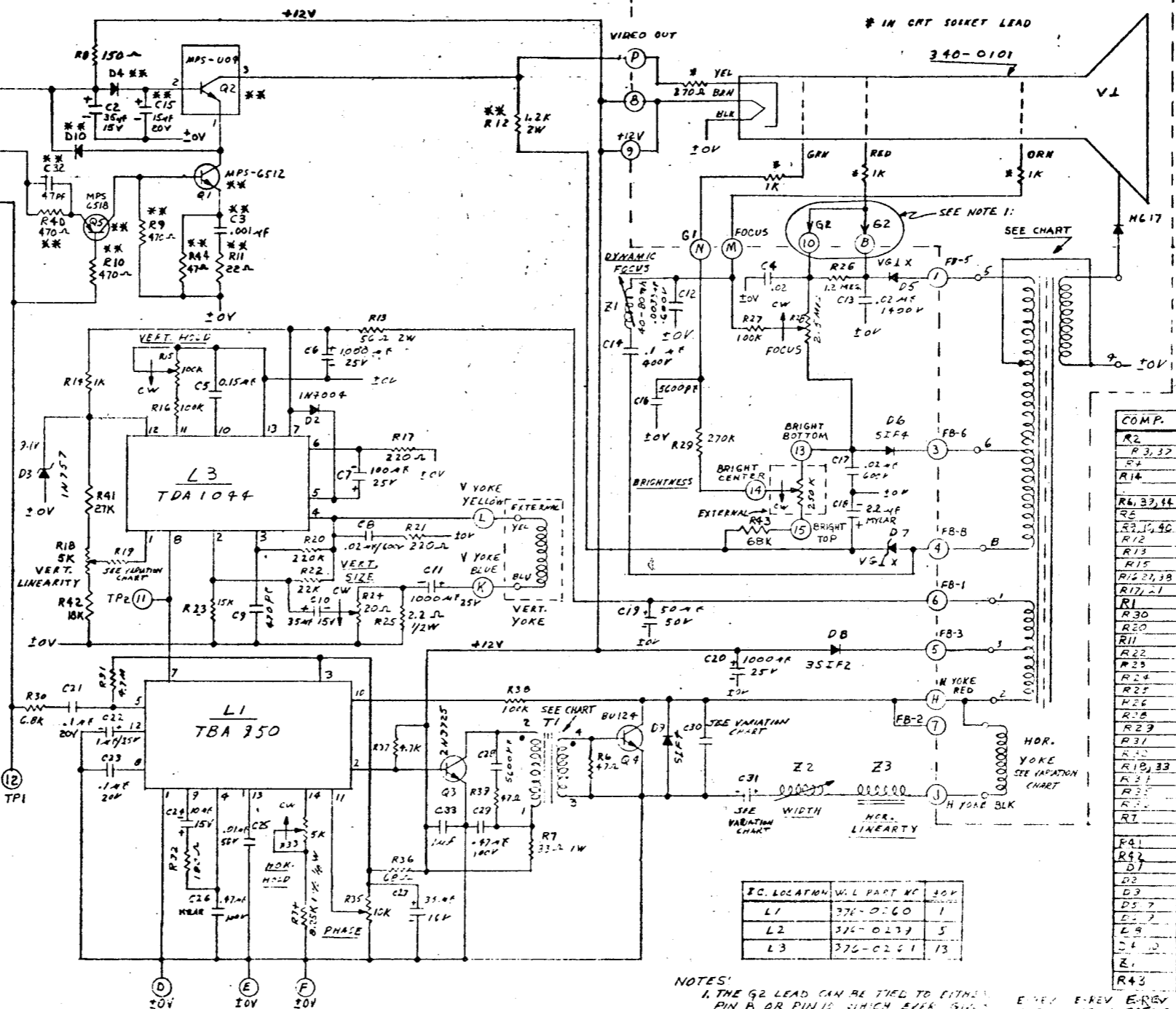
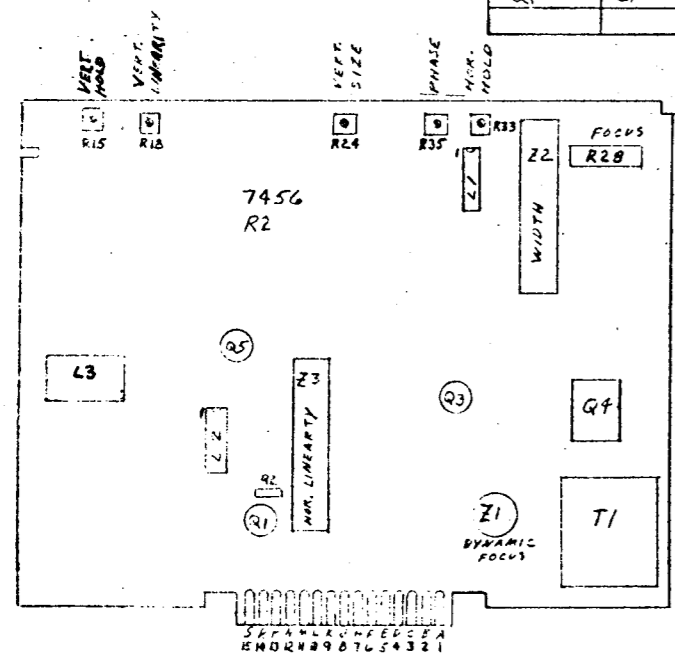
NOT LOADED FOR 7456-2

**VARIATION CHART**

COMP.	7456	7456-1	7456-2
R19	330-2068	330-4007	330-3043
C20	330-2412	330-2417	330-3412
C31	330-2418	330-2419	330-3413
Z2	330-3501	330-3506	330-3505
Z3	330-3502	330-3507	330-3501
HORIZONTAL	330-3507	330-3508	330-3509
V. Y. BALANCE	330-3507	330-3508	330-3507
R5	330-2065	330-3065	330-3065

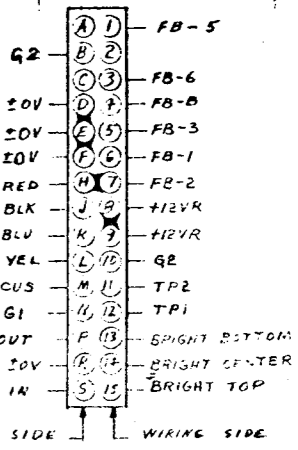
**COMPONENTS NOT LOADED FOR 7456-2**

R9	1040	330-2017
R1		330-1022
R2		337-3012
R44		330-1047
C5		300-1906
C15		300-4022
Q5		375-1014
Q2		375-1056
D4,10		330-1001
C32		300-1047
Q1		375-1012



**HOLE LEGEND & TOLERANCES**

HOLE DIA	TOLERANCE
.0133 - .025	+ .003 - .001
.125 - .150	+ .004 - .001
.151 - .500	+ .005 - .001



**COMP. W.L. PART No.**

R2	330-2022
R3,32	330-3017
R4	330-3012
R14	330-3010
R6,33,44	330-1047
R8	330-2015
R3,32,40	330-2017
R12	337-3012
R13	337-1056
R15	330-1017
R12,13,18	330-5010
R17,21	330-2022
R1	331-2010
R30	330-3065
R20	330-5032
R11	330-1022
R22	330-4022
R23	330-4015
R24	330-1021
R27	331-2022
R26	330-2017
R29	330-5031
R31	330-5017
R30	330-5017
R19,33	330-1020
R31	330-5027
R3	330-1015
R32	330-1056
R7	330-1022
R41	330-4017
R42	330-4015
D7	330-1001
D2	330-4000
D3	330-2017
D5,7	330-3010
D2,7	330-3010
D8	330-3010
D4,9	330-1001
Z1	330-3506
R43	330-4068

**COMP. W.L. PART No.**

C11,24	330-3006
C10,27	330-3002
C2	330-1006
C1	330-1001
C3	330-2415
C20,29	330-2247
C4	330-2015
C12	330-1012
C9	330-3010
C21,23	330-1918
C17	330-4006
C15	330-2414
C18	330-2415
C4,5,17	330-1912
C5	330-2015
C6,11,16	330-3010
C7	330-3010
C13	330-1022
C14	330-1024
C8	330-1022
C1	330-1001
C2	330-1006
C3	330-1001
C4	330-1001
C5	330-1001
C6	330-1001
C7	330-1001
C8	330-1001
C9	330-1001
C10	330-1001
C11	330-1001
C12	330-1001
C13	330-1001
C14	330-1001
C15	330-1001
C16	330-1001
C17	330-1001
C18	330-1001
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C29	330-1001
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C68	330-1001
C69	330-1001
C70	330-1001
C71	330-1001
C72	330-1001
C73	330-1001
C74	330-1001
C75	330-1001
C76	330-1001
C77	330-1001
C78	330-1001
C79	330-1001
C80	330-1001

**PC LOCATION W.L. PART NO. 10V**

L1	375-0760	1
L2	375-0277	5
L3	375-0261	13

**NOTES:**  
 1. THE G2 LEAD CAN BE TIED TO EITHER PIN B OR PIN 15 WHICH EVER GIVES BEST PERFORMANCE.

REV 152-1 7456-2

**(WANG)**

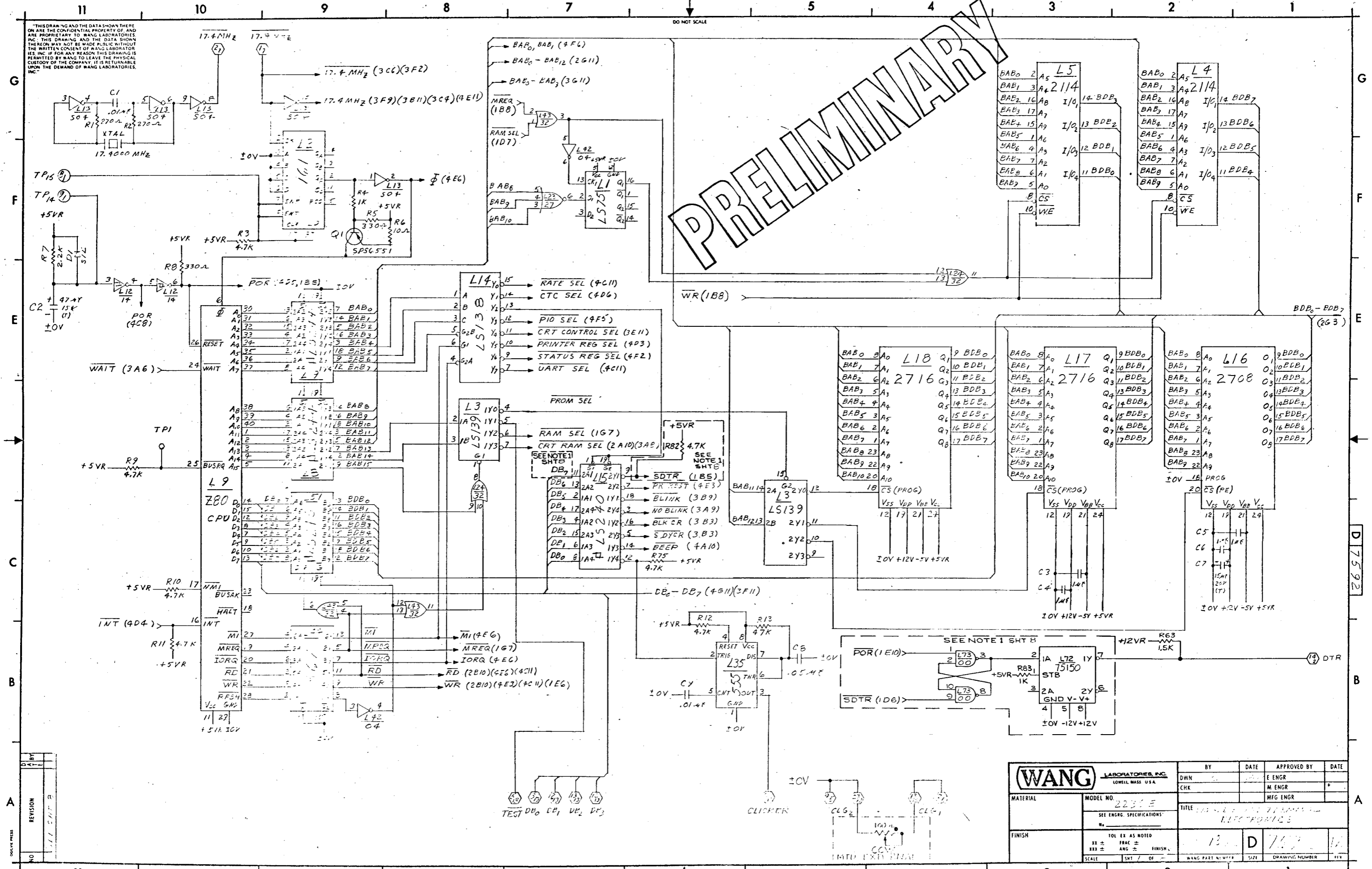
ELECTRONICS FOR 9" AND 12" MONITOR

D 7456

THIS DRAWING AND THE DATA SHOWN THERE ON ARE THE CONFIDENTIAL PROPERTY OF AND ARE PROPRIETARY TO WANG LABORATORIES, INC. THIS DRAWING AND THE DATA SHOWN THEREON MAY NOT BE MADE PUBLIC WITHOUT THE WRITTEN CONSENT OF WANG LABORATORIES, INC. IF FOR ANY REASON THIS DRAWING IS PERMITTED BY WANG TO LEAVE THE PHYSICAL CUSTODY OF THE COMPANY, IT IS RETURNABLE UPON THE DEMAND OF WANG LABORATORIES, INC.

DO NOT SCALE

PRELIMINARY

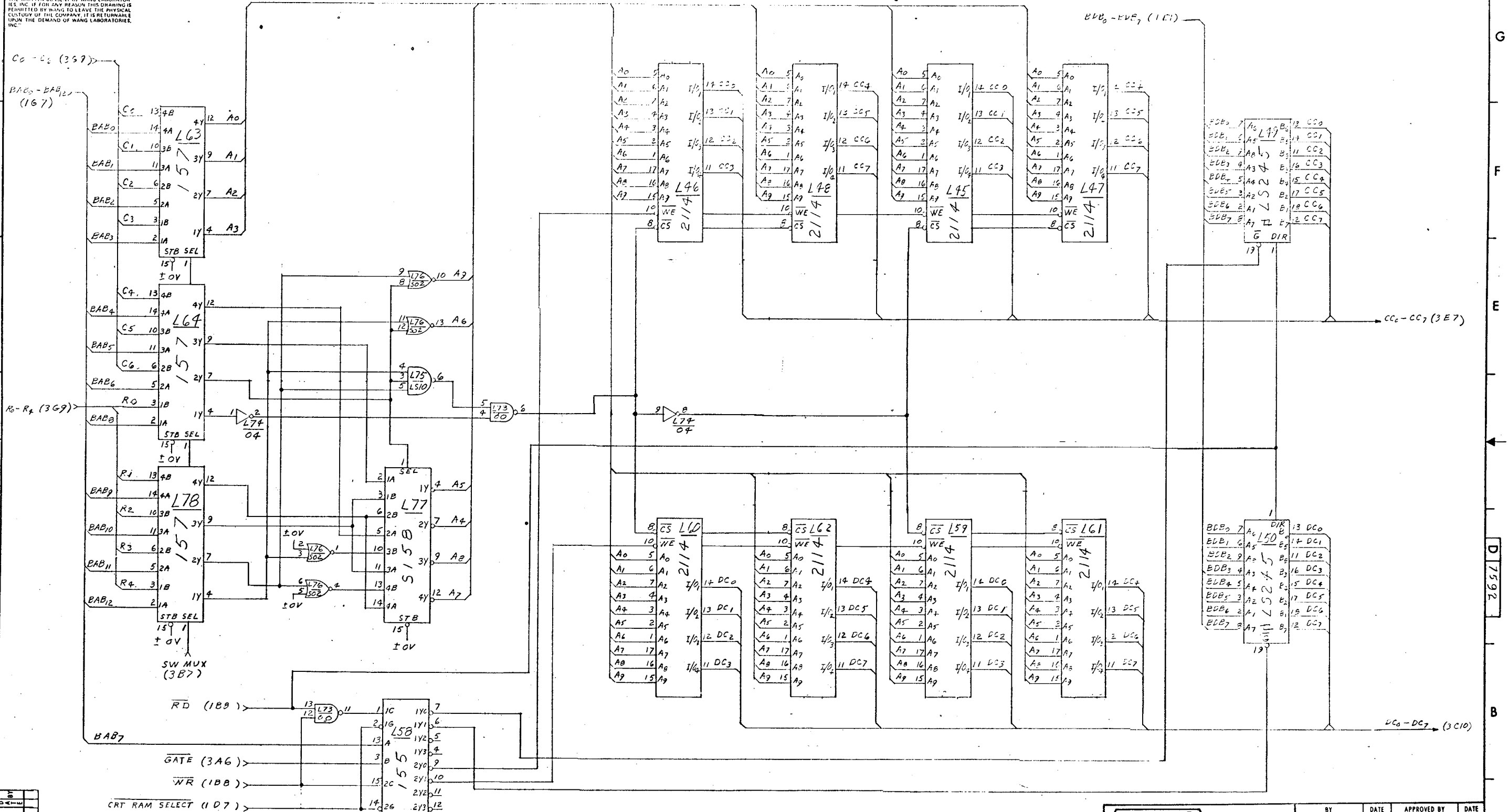


NO.	REVISION	DATE	BY
1	1.1	1/15/72	...

WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY	DATE	APPROVED BY	DATE
MATERIAL	MODEL NO. 2200 E	DWN		E ENGR	
FINISH	SEE ENGR. SPECIFICATIONS	CHK		M ENGR	
	TITLE: WANG 7592 ELECTRONICS			MFG ENGR	
	TOL EX AS NOTED				
	XX ± FRAC ±				
	XX ± ANG ± FINISH				
	SCALE SMT / OF -				
	WANG PART NUMBER				
	SIZE				
	DRAWING NUMBER				

DO NOT SCALE

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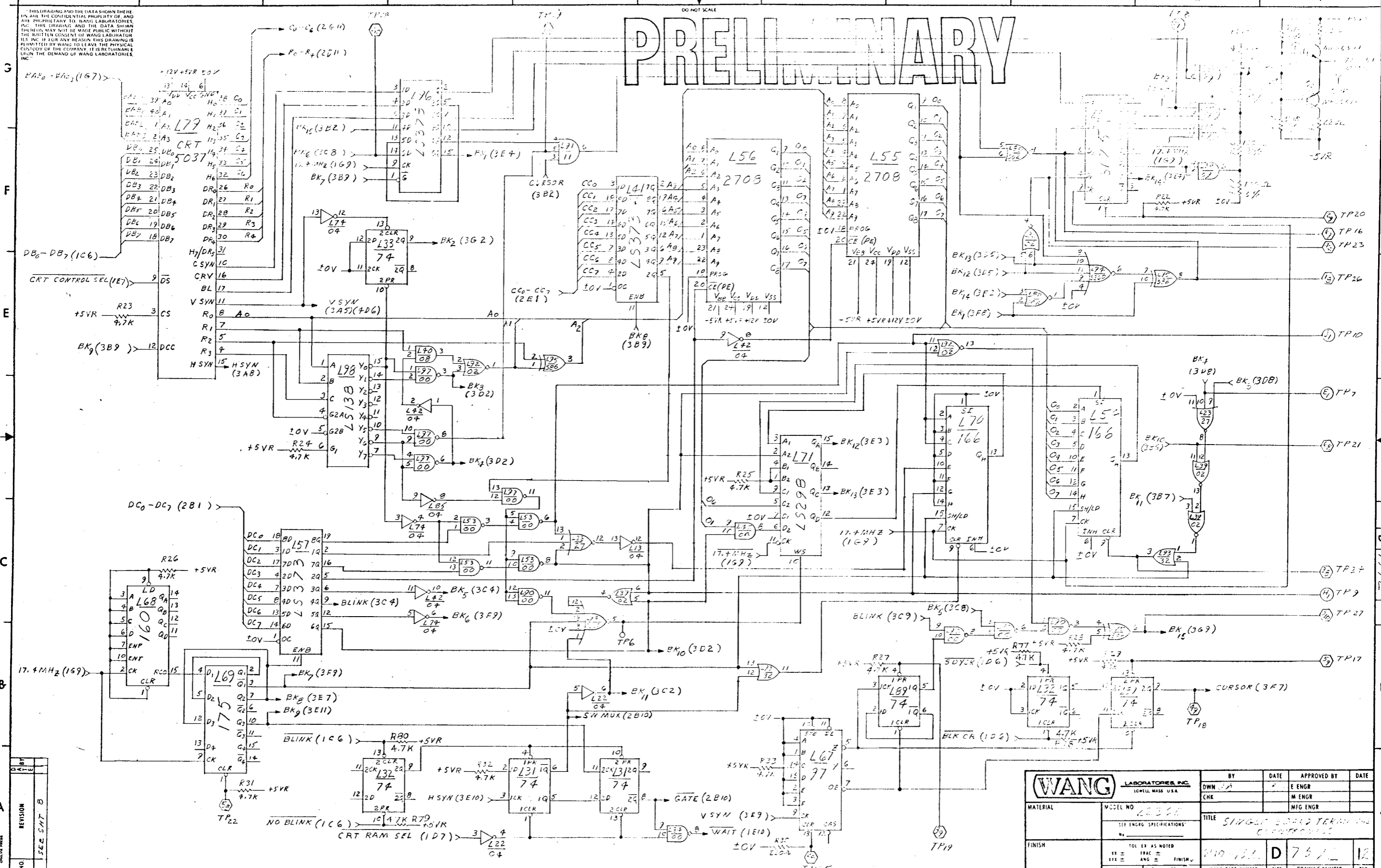


NO.	REVISION	BY	DATE

# PRELIMINARY

<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. USA		BY	DATE	APPROVED BY	DATE
MATERIAL		OWN		E ENGR	
MODEL NO. 22-2		CHK		M ENGR	
SEE ENGR SPECIFICATIONS		TITLE			
FINISH		MULTI-BIT DATA TERMINAL ELECTRONIC			
TOL EX AS NOTED		10-17-72	D	7592	12
FINISH		WANG PART NUMBER			
SIZE		DRAWING NUMBER			
REV		REV			

# PRELIMINARY



THIS DRAWING AND THE DATA SHOWN THEREON ARE THE CONFIDENTIAL PROPERTY OF AND ARE PROPRIETARY TO WANG LABORATORIES, INC. THIS DRAWING AND THE DATA SHOWN THEREON MAY NOT BE MADE PUBLIC WITHOUT THE WRITTEN CONSENT OF WANG LABORATORIES, INC. IF FOR ANY REASON THIS DRAWING IS PERMITTED BY WANG TO LEAVE THE PHYSICAL CUSTODY OF THE COMPANY, IT IS RETURNABLE UPON THE DEMAND OF WANG LABORATORIES, INC.

NO.	REVISION	BY	DATE

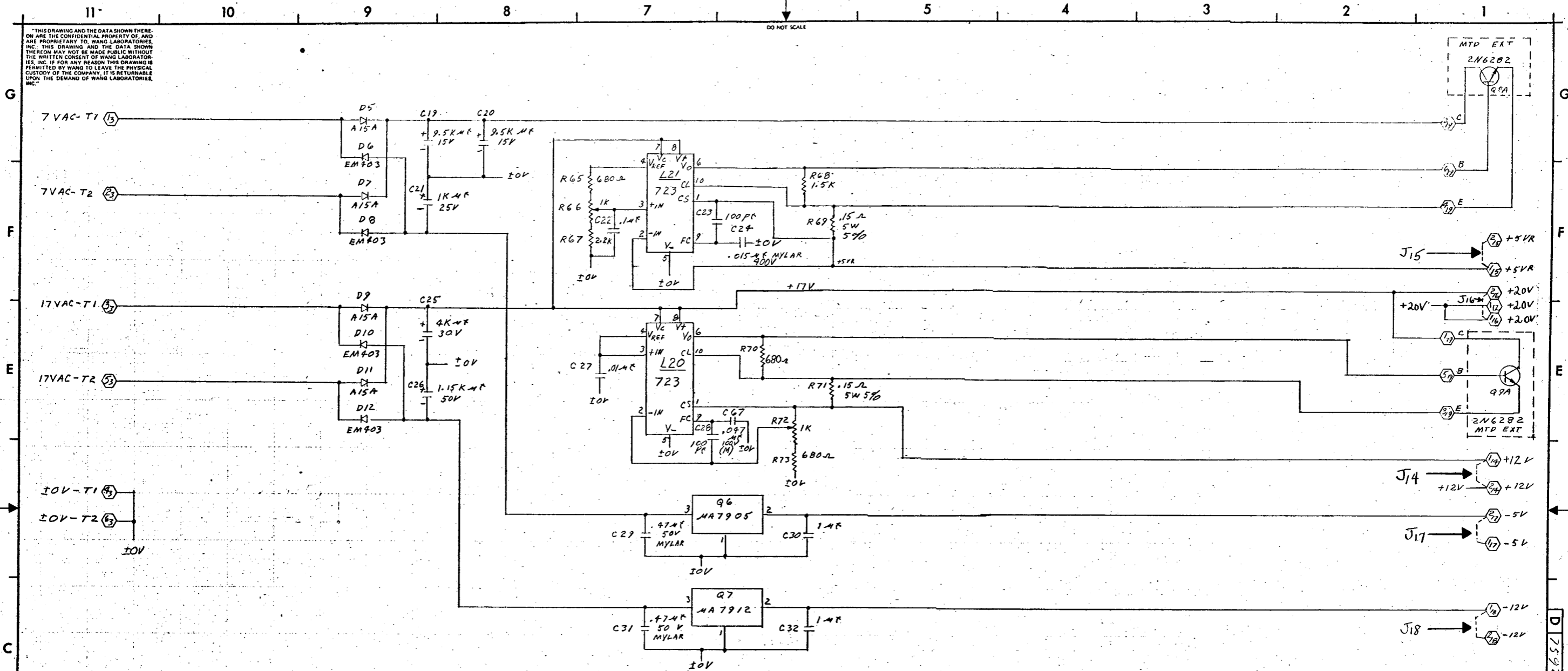
WANG LABORATORIES, INC. LITTLE FALLS, MASS. USA		BY	DATE	APPROVED BY	DATE
MATERIAL	MODEL NO. 22322	DWN		E ENGR	
FINISH	SEE ENGR. SPECIFICATIONS	CHK		M ENGR	
TITLE		SINGLE BOARD TERMINALS			
WANG PART NUMBER		SIZE	D 7 5/16	DRAWING NUMBER	12





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DO NOT SCALE



PRELIMINARY

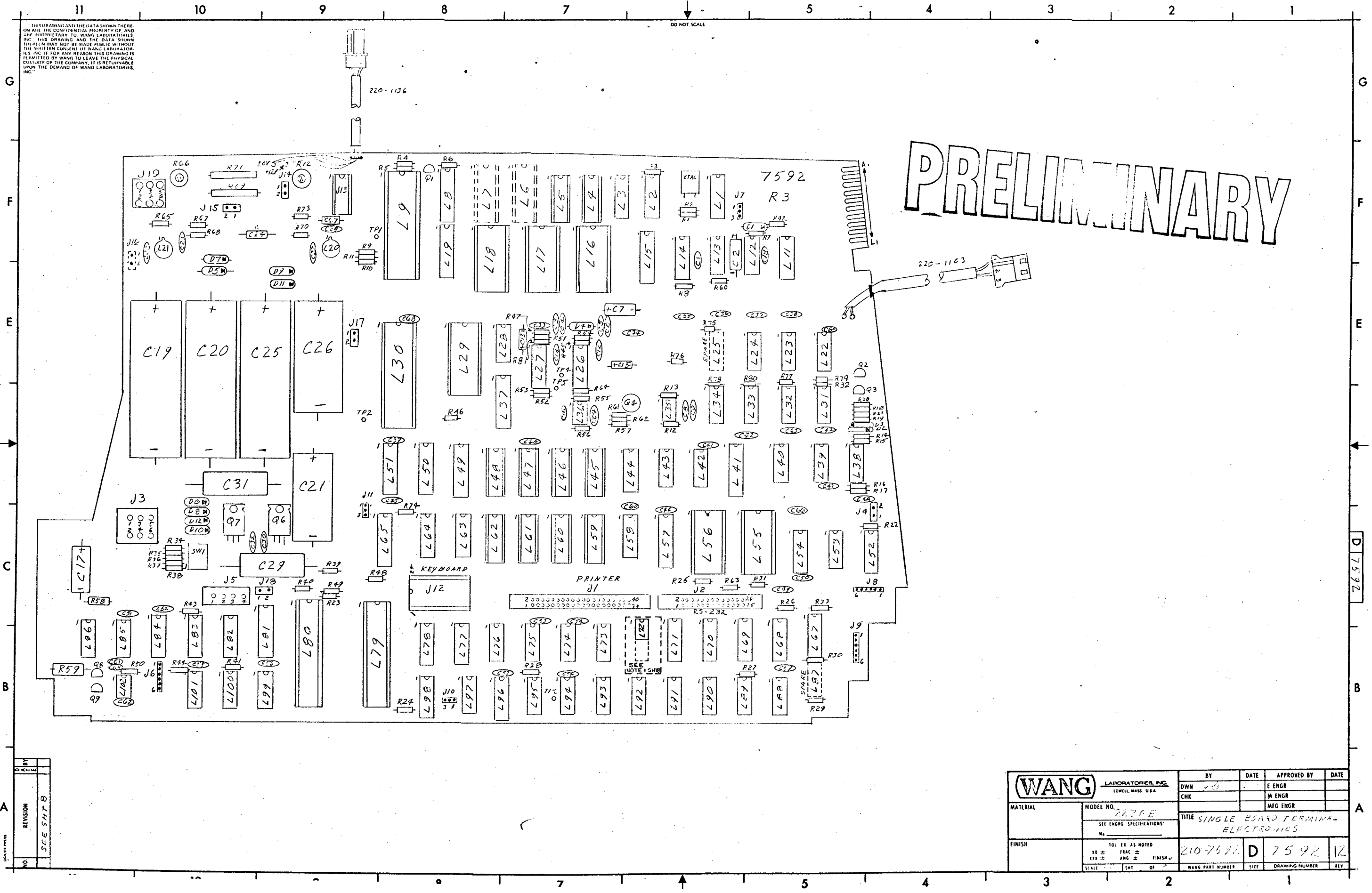
NO.	REVISION
	SEE SHT 8

<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY	DATE	APPROVED BY	DATE
MATERIAL		DWN	7/23/72	E ENGR	
MODEL NO. 2236 E		CHK		M ENGR	
SEE ENGR SPECIFICATIONS				MFG ENGR	
FINISH		TITLE SINGLE BOARD TERMINAL ELECTRONICS			
XX = FRAC ±		210-7592	D	7 5 9 2	12
XXX = ANG ± FINISH					
SCALE	SHT OF	WANG PART NUMBER	SIZE	DRAWING NUMBER	REV.

THIS DRAWING AND THE DATA SHOWN THERE ON ARE THE CONFIDENTIAL PROPERTY OF, AND ARE PROPRIETARY TO, WANG LABORATORIES, INC. THIS DRAWING AND THE DATA SHOWN HEREIN MAY NOT BE MADE PUBLIC WITHOUT THE WRITTEN CONSENT OF WANG LABORATORIES, INC. IF FOR ANY REASON THIS DRAWING IS PERMITTED BY WANG TO LEAVE THE PHYSICAL CUSTODY OF THE COMPANY, IT IS RETURNABLE UPON THE DEMAND OF WANG LABORATORIES, INC.

DO NOT SCALE

PRELIMINARY



NO.	REVISION
	SEE SMT 8

<b>(WANG)</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY	DATE	APPROVED BY	DATE	
		DWM		E ENGR		
MATERIAL MODEL NO. 2276E SEE ENGR. SPECIFICATIONS No.		CHK		M ENGR		
		TITLE SINGLE BOARD TERMINAL ELECTRONICS				
FINISH 10L EX AS NOTED XX ± FRAC ± XXX ± ANG ± FINISH ✓		210-7592		D	7592 12	
		SCALE	SMT	OF	WANG PART NUMBER	SIZE

THIS DRAWING AND THE DATA SHOWN THEREON ARE THE CONFIDENTIAL PROPERTY OF, AND ARE PROPRIETARY TO, WANG LABORATORIES, INC. THIS DRAWING AND THE DATA SHOWN THEREON MAY NOT BE MADE PUBLIC WITHOUT THE WRITTEN CONSENT OF WANG LABORATORIES, INC. IF FOR ANY REASON THIS DRAWING IS PERMITTED BY WANG TO LEAVE THE PHYSICAL CUSTODY OF THE COMPANY, IT IS RETURNABLE UPON THE DEMAND OF WANG LABORATORIES, INC.

DO NOT SCALE

210 = 209 + 378 OR 377

	210	209	L4545-43562	L9	L16	L17	L18	L29	L30	L55	L56	L79	L80
	7592-A	7592	377-0341-L	377-0344	378-2416-R1	378-1095-R1	378-4094-R1	377-0343	377-0342	378-2447-R1	377-0323	377-0372	377-0071
	AZERTY 7592-B	7592	377-0341-L	377-0344	378-2620	378-4095-R1	378-4094-R1	377-0343	377-0342	378-2447-R1	378-2415	377-0372	377-0071
	SWEDISH 7592-C	7592	377-0341-L	377-0344	378-2624	378-4095-R1	378-4094-R1	377-0343	377-0342	378-2447-R1	378-2416	377-0372	377-0071
	U.K. 7592-D	7592	377-0341-L	377-0344	378-2627	378-4095-R1	378-4094-R1	377-0343	377-0342	378-2447-R1	378-2418	377-0372	377-0071
	GERMAN 7592-E	7592	377-0341-L	377-0344	378-2629	378-4095-R1	378-4094-R1	377-0343	377-0342	378-2447-R1	378-2420	377-0372	377-0071
	SWISS/GER. 7592-F	7592	377-0341-L	377-0344	378-2626	378-4095-R1	378-4094-R1	377-0343	377-0342	378-2447-R1	378-2414	377-0372	377-0071
	SWISS/FR. 7592-G	7592	377-0341-L	377-0344	378-2625	378-4095-R1	378-4094-R1	377-0343	377-0342	378-2447-R1	378-2414	377-0372	377-0071
	NL 7592-H	7592	377-0341-L	377-0344	378-2630	378-4095-R1	378-4094-R1	377-0343	377-0342	378-2447-R1	378-2419	377-0372	377-0071
	NO 7592-J	7592	377-0341-L	377-0344	378-2622	378-4095-R1	378-4094-R1	377-0343	377-0342	378-2447-R1	378-2417	377-0372	377-0071
	CYRILLIC 7592-K	7592	377-0341-L	377-0344	378-2628	378-4095-R1	378-4094-R1	377-0343	377-0342	378-2447-R1	378-2413	377-0372	377-0071
	DANISH 7592-L	7592	377-0341-L	377-0344	378-2623	378-4095-R1	378-4094-R1	377-0343	377-0342	378-2447-R1	378-2417	377-0372	377-0071
	GR/LT 7592-M	7592	377-0341-L	377-0344	378-2621	378-4095-R1	378-4094-R1	377-0343	377-0342	378-2447-R1	378-2421	377-0372	377-0071
	AL 7592-N	7592	377-0341-L	377-0344	378-2647	378-4095-R1	378-4094-R1	377-0343	377-0342	378-2447-R1	378-2648	377-0372	377-0071

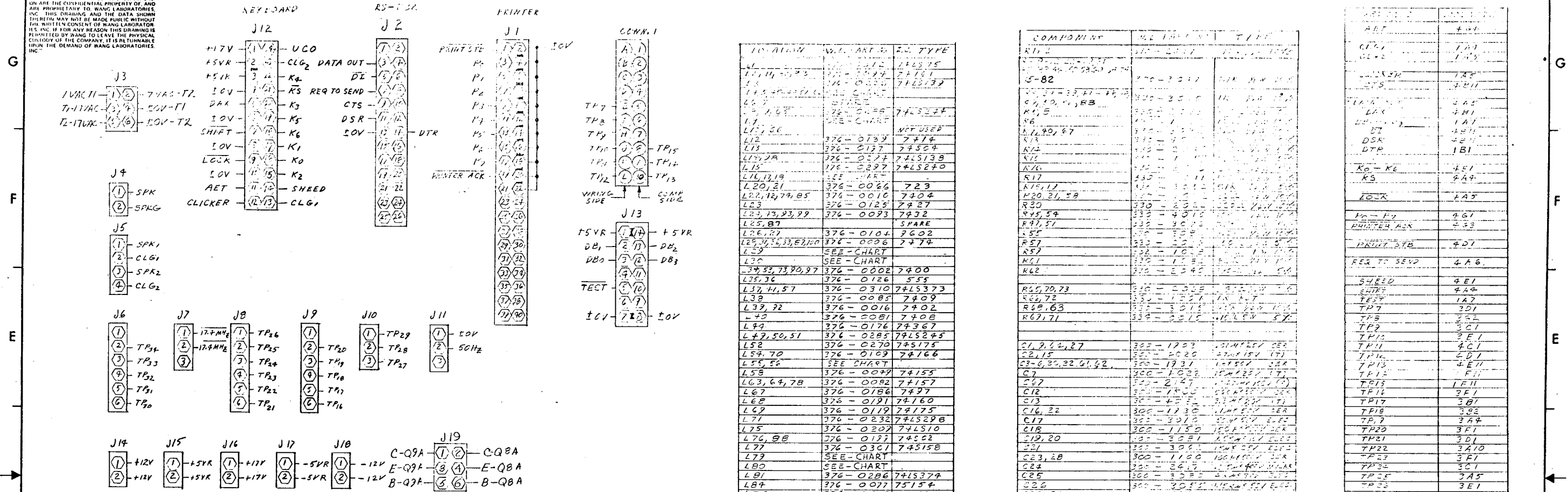
PRELIMINARY

NO	REVISION	DATE	BY
	SEE SHEET B		

<b>(WANG)</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY OWN	DATE 11/22/52	APPROVED BY E ENGR	DATE
MATERIAL		CHK		M ENGR	
MODEL NO. 2236E		TITLE SINGLE BOARD TERMINAL ELECTRONICS			
FINISH		TOL EX AS NOTED XX ± FRAC ± XXX ± ANG ± FINISH		210-7592	D 7592 12
SCALE		SHT 7 OF 7		WANG PART NUMBER	SIZE DRAWING NUMBER

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DO NOT SCALE



COMPONENT	W.L. PART NO	TYPE
J1	350-0201	40 POS CONN.
J2	350-0200	26 POS CONN.
J3,19	654-1186	6 POS CONN.
J4,12-18	654-1198	2 POS HEADER
J5	654-1194	4 POS HEADER
J6,9,9	654-0106	6 POS HEADER
J7,10,11	654-0104	3 POS HEADER
J12	376-9118	24 POS CONN.
J13	376-9001	14 POS CONN.
L9,30,77,80	376-9011	SOCKET 40 PIN
L10,12,13,14,15,16,17,18,19	376-9014	SOCKET 18 PIN
L6,7	376-9010	SOCKET 22 PIN
L1,2,3,4,5,8,11,21,22,23,24,25,26,27,28,29	376-9003	SOCKET 24 PIN
L20	376-9015	SOCKET 28 PIN

LOC. ALLOC	W.L. PART NO	TYPE
L1	376-0122	74LS75
L2	376-0124	74LS1
L3	376-0125	74LS13
L4	376-0126	74LS13
L5	376-0127	74LS13
L6	376-0128	74LS13
L7	376-0129	74LS13
L8	376-0130	74LS13
L9	376-0131	74LS13
L10	376-0132	74LS13
L11	376-0133	74LS13
L12	376-0134	74LS13
L13	376-0135	74LS13
L14	376-0136	74LS13
L15	376-0137	74LS13
L16	376-0138	74LS13
L17	376-0139	74LS13
L18	376-0140	74LS13
L19	376-0141	74LS13
L20	376-0142	74LS13
L21	376-0143	74LS13
L22	376-0144	74LS13
L23	376-0145	74LS13
L24	376-0146	74LS13
L25	376-0147	74LS13
L26	376-0148	74LS13
L27	376-0149	74LS13
L28	376-0150	74LS13
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L78	376-0200	74LS13
L79	376-0201	74LS13
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L100	376-0222	74LS13

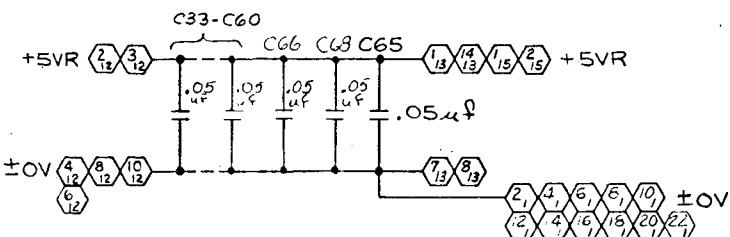
I.C. TYPE	LOCATION	SPARE
7400	L39	2
7402	L39	1
74502	L85	2
7404	L22	4
	L42	1
	L85	1
7408	L45	1
7410	L86	2
74LS10	L75	2
7411	L91	2
7432	L24	1
	L93	2
7451	L101	1
7477	L28	1
7477	L12	2
7422	L43	1
7450	L93	1

COMPONENT	W.L. PART NO	TYPE
R11,2	376-0127	74LS13
R13	376-0127	74LS13
R14	376-0127	74LS13
R15	376-0127	74LS13
R16	376-0127	74LS13
R17	376-0127	74LS13
R18	376-0127	74LS13
R19	376-0127	74LS13
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R43	376-0127	74LS13
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R64	376-0127	74LS13
R65	376-0127	74LS13
R66	376-0127	74LS13
R67	376-0127	74LS13
R68	376-0127	74LS13
R69	376-0127	74LS13
R70	376-0127	74LS13
R71	376-0127	74LS13
R72	376-0127	74LS13
R73	376-0127	74LS13
R74	376-0127	74LS13
R75	376-0127	74LS13
R76	376-0127	74LS13
R77	376-0127	74LS13
R78	376-0127	74LS13
R79	376-0127	74LS13
R80	376-0127	74LS13
R81	376-0127	74LS13
R82	376-0127	74LS13
R83	376-0127	74LS13
R84	376-0127	74LS13
R85	376-0127	74LS13
R86	376-0127	74LS13
R87	376-0127	74LS13
R88	376-0127	74LS13
R89	376-0127	74LS13
R90	376-0127	74LS13
R91	376-0127	74LS13
R92	376-0127	74LS13
R93	376-0127	74LS13
R94	376-0127	74LS13
R95	376-0127	74LS13
R96	376-0127	74LS13
R97	376-0127	74LS13
R98	376-0127	74LS13
R99	376-0127	74LS13
R100	376-0127	74LS13

REF	VALUE	TYPE
C1	100	100PF
C2	100	100PF
C3	100	100PF
C4	100	100PF
C5	100	100PF
C6	100	100PF
C7	100	100PF
C8	100	100PF
C9	100	100PF
C10	100	100PF
C11	100	100PF
C12	100	100PF
C13	100	100PF
C14	100	100PF
C15	100	100PF
C16	100	100PF
C17	100	100PF
C18	100	100PF
C19	100	100PF
C20	100	100PF
C21	100	100PF
C22	100	100PF
C23	100	100PF
C24	100	100PF
C25	100	100PF
C26	100	100PF
C27	100	100PF
C28	100	100PF
C29	100	100PF
C30	100	100PF
C31	100	100PF
C32	100	100PF
C33	100	100PF
C34	100	100PF
C35	100	100PF
C36	100	100PF
C37	100	100PF
C38	100	100PF
C39	100	100PF
C40	100	100PF
C41	100	100PF
C42	100	100PF
C43	100	100PF
C44	100	100PF
C45	100	100PF
C46	100	100PF
C47	100	100PF
C48	100	100PF
C49	100	100PF
C50	100	100PF
C51	100	100PF
C52	100	100PF
C53	100	100PF
C54	100	100PF
C55	100	100PF
C56	100	100PF
C57	100	100PF
C58	100	100PF
C59	100	100PF
C60	100	100PF
C61	100	100PF
C62	100	100PF
C63	100	100PF
C64	100	100PF
C65	100	100PF
C66	100	100PF
C67	100	100PF
C68	100	100PF
C69	100	100PF
C70	100	100PF
C71	100	100PF
C72	100	100PF
C73	100	100PF
C74	100	100PF
C75	100	100PF
C76	100	100PF
C77	100	100PF
C78	100	100PF
C79	100	100PF
C80	100	100PF
C81	100	100PF
C82	100	100PF
C83	100	100PF
C84	100	100PF
C85	100	100PF
C86	100	100PF
C87	100	100PF
C88	100	100PF
C89	100	100PF
C90	100	100PF
C91	100	100PF
C92	100	100PF
C93	100	100PF
C94	100	100PF
C95	100	100PF
C96	100	100PF
C97	100	100PF
C98	100	100PF
C99	100	100PF
C100	100	100PF
D1	11.4 MHZ	1G10
D2	50 HZ	4G3
D3	SPK1	4A7
D4	SPK2	4A6
D5	SPK3	4A6
D6	SPK4	4A6

**PRELIMINARY**

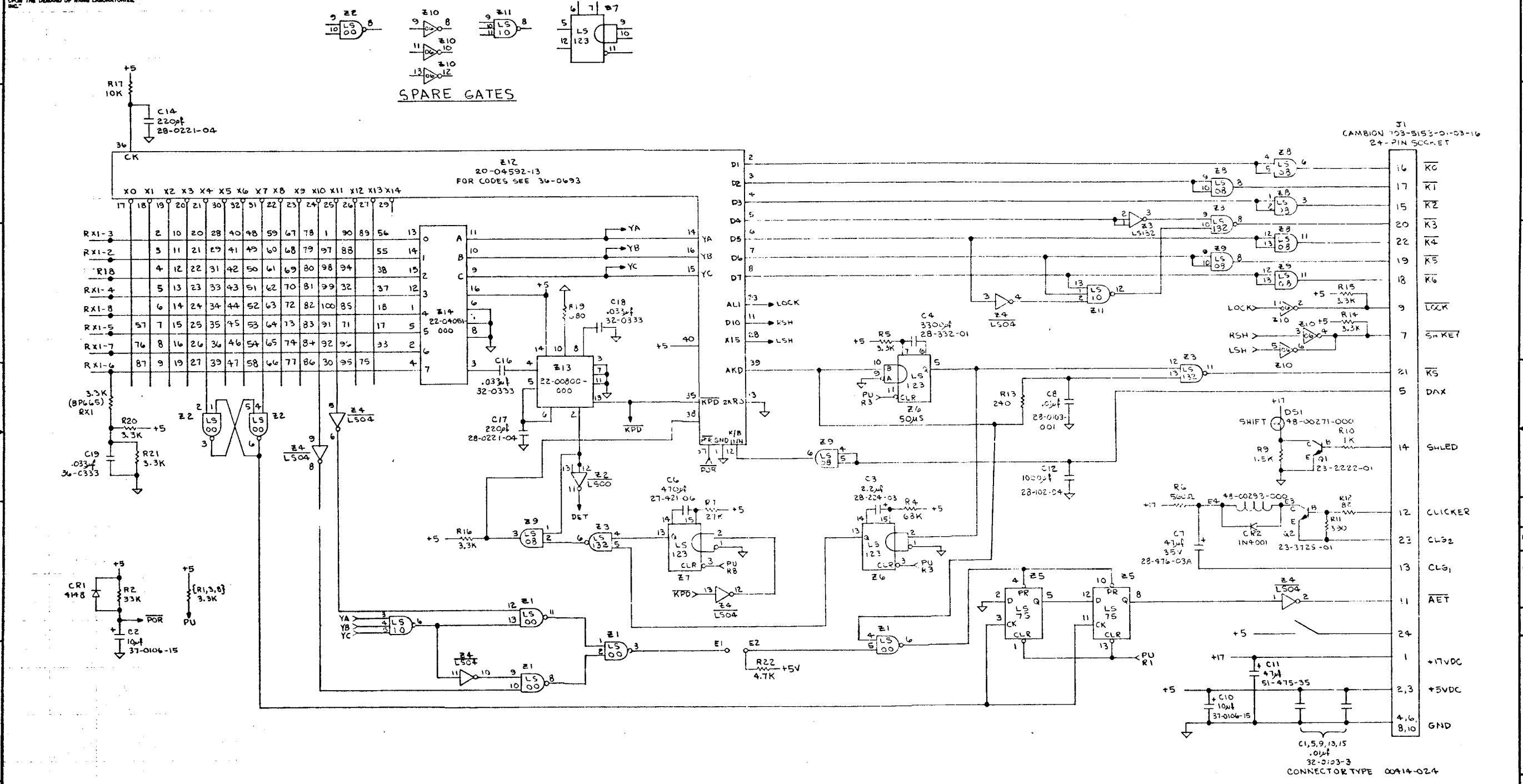
NOTE:  
1. THESE COMP MAY OR MAYNOT BE ON BOARD.  
E REV 2# BELOW COMP NOT PRESENT.  
E REV 3# ABOVE COMP SHOULD BE PRESENT. SEE 1D7,1D8,1B3&4F3.



E-REV  
4

NO.	REVISION	DATE	BY	APP'D	DESCRIPTION
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

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REV	DATE	BY	APP'D
0	12-27-75	DMC	WLB
1	12-27-75	DMC	WLB

JAN 16 1980  
PRELIMINARY

<b>(WANG)</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY	DATE	APPROVED BY	DATE
MATERIAL		DMC	12-27-75	E ENGR	
MODEL NO. 928		CHE		M ENGR	
SEE ENGR. SPECIFICATIONS				MFG ENGR	
TITLE		KEYTRONICS KEYBOARD			
FINISH		TOL. EX. AS NOTED		725-2618	D
		XX ± PVAL. ± FINISH		725-2618	1
SCALE		SMT	OF	WANG PART NUMBER	SIZE
					DRAWING NUMBER

\*\*\* MEMO \*\*\*

To: Bob Kolk, Sam Gagliano, Ray Cullen, Corporate Systems Support, Alan Bertman, Jo Ann Kelch

From: Roger Droz

Date: July 13, 1981

Subject: Terminal Controller Upgrade Required for 2236DW Terminal

Some users are discovering extra special function keys on their 2236DW terminals. This is not a supported feature, but rather an installation error caused by failing to update the firmware in the terminal controller when the 2236DW terminal was added to a 2200MVP or 2200LVP system that was manufactured before March 1981.

The firmware in the 2236MXD should be updated to revision 7 as per ECO #18475. (part numbers 378-2140 R07, 378-2141 R07, 378-2142 R07, 378-2143 R07)

The firmware in the 22C32 controller should be updated to revision 1 as per ECO #18474. (Part numbers 378-2591 R01, 378-2449 R01, 378-2450 R01, 378-2451 R01)

The firmware in the SVP terminal controller should be updated to revision 1 as per ECO #18473. (Part numbers 378-4092 R01, 378-4093 R01) Controllers manufactured after the introduction of the 2236DW terminal should contain the correct firmware.

The addition of more special function keys to the terminal keyboard would have severely restricted the use of the BASIC-2 DEFFN' statement for defining marked subroutines that are not to be accessed from the keyboard. The correct firmware in the terminal controller prevents the insert, delete, next screen, previous screen and cursor keys from accessing marked subroutines. The correct firmware permits the insert, delete, and cursor keys to be used within the field editor (INPUT, LINPUT, program entry).

2200VP and 2200SVP users may find that the same extra special function key symptom exists when using a 2236DW terminal. Release 2.4 of the VP (single user) operating system contains changes similar to those made in the terminal controller firmware -- the cursor keys do not invoke DEFFN' marked subroutines and the cursor keys may be used to position the cursor within INPUT and LINPUT statements.

**WANG**

LABORATORIES, INC.

# MARKETING RELEASE

## Computers

TO	DISTRIBUTION	PUBLICATION #	1D
FROM	INDUSTRY MARKETING	DATE	MARCH 16, 1981
SUBJECT	2236DE/2236DW INTERFACE TO CASH DRAWER	REORDER FROM:	
THIS RELEASE SUPERSEDES:		DESTROY SUPERSEDED INFORMATION	<input type="checkbox"/> YES <input type="checkbox"/> NO

The information contained in this release does not constitute an endorsement of the cash drawer. This is intended to furnish the capability to interface the WANG 2236DE and 2236DW Multi-Function Terminal to the cash drawer manufactured by APG, Inc.

The function of the 2236DE/DW Workstation as cashier or teller unit will aid in securing 2200 sales in a number of industries. The following are representative of industry areas where combination of 2236DE/DW and cash drawer are in demand.

Retail	Distributors
Credit Unions	Small Banks
Restaurants	Utilities
Local Government	College Food Service

With the cooperation of the Special Product Group within Customer Engineering, the interface has been developed for mounting in the 2236DE/DW Terminal prior to shipment of 2236DE/DW to customer.

Model 9057  
 Part Number 190-0300  
 Purchase \$750.00  
 Monthly Maintenance \$8.00

### Operation

The cash drawer is under program control of the 2200. A hex (02) sent to the 2236DE/DW printer output (address 204) will open the drawer. Examples of two program sequences to open the drawer are given below:

Example No. 1 - Using Function Key 0 to open drawer

```
05 DEFFN'0
10 Select Print 204
20 Print Hex (02)
30 Select Print 005 (or last device selected)
```

Example No. 2

```
10 $G10/204 (4002)
```



