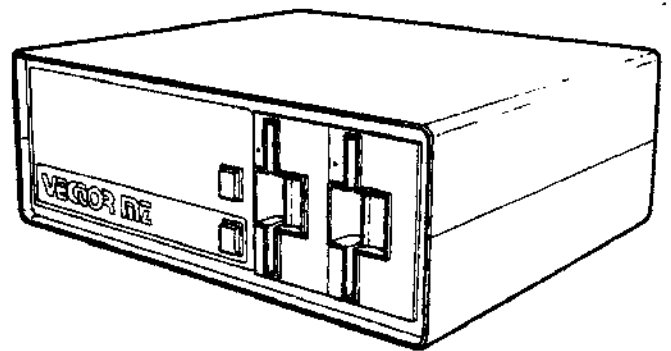
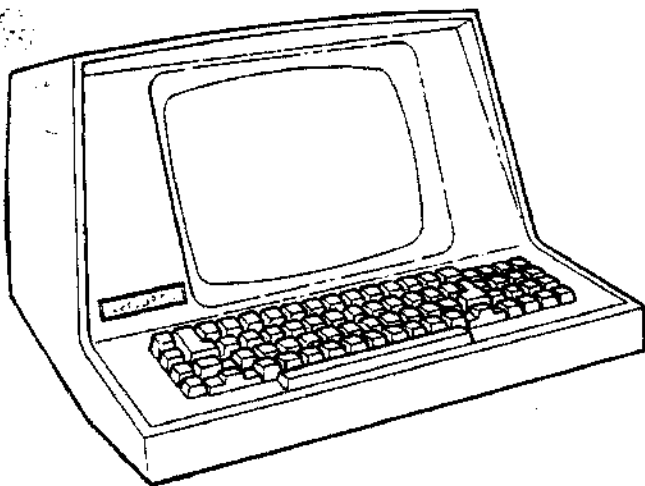


MINDLESS TERMINAL USERS MANUAL



 VECTOR GRAPHIC INC.

Vector Graphic Mindless Terminal Users Manual

REPAIR AGREEMENT

The Mindless Terminal sold hereunder is sold "as is", with all faults and without any warranty, either expressed or implied, including any implied warranty of fitness for intended use or merchantability. However, the above notwithstanding, VECTOR GRAPHIC, INC., will, for a period of ninety (90) days following delivery to customer, repair or replace any Mindless Terminal that is found to contain defects in materials or workmanship, provided:

1. Such defect in material or workmanship existed at the time the Mindless Terminal left the VECTOR GRAPHIC, INC., factory;
2. VECTOR GRAPHIC, INC., is given notice of the precise defect claimed within ten (10) days after its discovery;
3. The Mindless Terminal is promptly returned to VECTOR GRAPHIC, INC., at customer's expense, for examination by VECTOR GRAPHIC, INC., to confirm the alleged defect, and for subsequent repair or replacement if found to be in order.

Repair, replacement or correction of any defects in material or workmanship which are discovered after expiration of the period set forth above will be performed by VECTOR GRAPHIC, INC., at Buyer's expense, provided the Mindless Terminal is returned, also at Buyer's expense, to VECTOR GRAPHIC, INC., for such repair, replacement or correction. In performing any repair, replacement or correction after expiration of the period set forth above, Buyer will be charged in addition to the cost of parts the then-current VECTOR GRAPHIC, INC., repair rate. At the present time the applicable rate is \$35.00 for the first hour, and \$18.00 per hour for every hour of work required thereafter. Prior to commencing any repair, replacement or correction of defects in material or workmanship discovered after expiration of the period for no-cost-to-Buyer repairs, VECTOR GRAPHIC, INC., will submit to Buyer a written estimate of the expected charges, and VECTOR GRAPHIC, INC., will not commence repair until such time as the written estimate of charges has been returned by Buyer to VECTOR GRAPHIC, INC., signed by duly authorized representative authorizing VECTOR GRAPHIC, INC., to commence with the repair work involved. VECTOR GRAPHIC, INC., shall have no obligation to repair, replace or correct any Mindless Terminal until the written estimate has been returned with approval to proceed, and VECTOR GRAPHIC, INC., may at its option also require prepayment of the estimated repair charges prior to commencing work.

Repair Agreement void if the enclosed card is not returned to VECTOR GRAPHIC, INC. within ten (10) days of end consumer purchase.

Vector Graphic Mindless Terminal Users Manual

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
Repair Agreement	
Table of Contents	
I. Introduction	
1.1 Specifications.....	1-1
1.2 Description of the Mindless Terminal.....	1-2
1.3 Description of the Manual.....	1-2
II. Users Guide	
2.1 Keyboard Controls.....	2-1
2.2 Installation.....	2-2
2.3 Cables.....	2-6
2.4 Keyboard Code Conversion.....	2-8
2.5 Adjusting Procedure for the CRT.....	2-9 - 2-12
III. Schematics	
ASCII Code Chart.....	3-1
Interface Board in Mindless Terminal Schematic.....	3-2
Monitor Schematic.....	3-3
Monitor Parts List and Components Layout.....	3-4
Keyboard Schematic.....	3-5
Keyboard Mechanical Assembly and Keytop Layout.....	3-6
Keyboard Code Chart.....	3-7

Vector Graphic Mindless Terminal Users Manual

I. INTRODUCTION

1.1 SPECIFICATIONS

Screen Size	12-inch diagonal CRT
Resolution	900 lines at center 750 lines at borders
Bandwidth	12 MHz
Video Interface	Separate TTL video and sync
Compatibility of Video	Compatible with Vector Graphic Flashwriters I and II alphanumeric video display boards and most other alphanumeric video display boards Not compatible with Vector Graphic High Resolution Graphics board
Keyboard	Custom 60 keys, typewriter format, 12-key numeric pad, ESC, DEL, ALL CAPS CTRL, LF, and cursor movement keys
Keyboard Electronics	Capacitance key switches and LSI N-channel MOS encoding electronics
External Controls	Contrast
Internal Controls	Vertical hold Height Vertical linearity Vertical centering Focus Brightness Horizontal centering
Power	+16V @ 1.15A +8V @ 0.25A
Power Source	+16V and +8V from mainframe power supply
Cables	Purchased separately: cable to connect terminal to mainframe and to connect inside of mainframe to power, to keyboard port, and to video board

1.2 DESCRIPTION OF THE MINDLESS TERMINAL

The Vector Graphic Mindless Terminal is a high quality terminal that, particularly when used with Vector Graphic video display boards, provides the user with features and versatility not available in other terminals.

The CRT monitor has up to 900 lines resolution and 12 MHz bandwidth. All elements of the display are adjustable and adjustment procedures may be found later in this manual.

The keyboard is a high reliability unit with capacitive type switches. A numeric keypad and lighted shift lock and ALL CAPS lock keys are standard.

The Mindless Terminal is designed to receive power (+8V and +16V) from the computer power supply. Cables are available (ordered separately) which make these connections quite simple to implement.

The Mindless Terminal requires that the video information be provided at TTL levels as separate video, horizontal sync and vertical sync. This is provided by Vector Graphic alphanumeric video boards.

1.3 DESCRIPTION OF THE MANUAL

This manual provides a complete Users Guide for the Mindless Terminal, including detailed explanations of all the external and internal adjustments possible, and how to connect the terminal to your computer. Complete schematics as well as ASCII and keyboard code charts are included.

II. USERS GUIDE

2.1 EXTERNAL CONTROLS

Operation of the Mindless Terminal is very straightforward. The power to the Mindless Terminal is provided by the computer power supply and is thus switched on and off by the computer power switch.

The only external control is the contrast control located on the rear panel of the Mindless Terminal. This should be adjusted to suit personal preference and ambient light level.

For other adjustments see section on CRT monitor adjustments later in this manual.

2.2 INSTALLATION

In addition to the Mindless Terminal, you must order separately the VMTC cable set, which includes:

1. A 4-foot 25-conductor flat ribbon cable used to interconnect the Mindless Terminal to the computer interface.
2. A signal/power cable assembly, used inside the mainframe chassis, to connect the terminal to power supply and also provide the video signals and receive the keyboard signals.

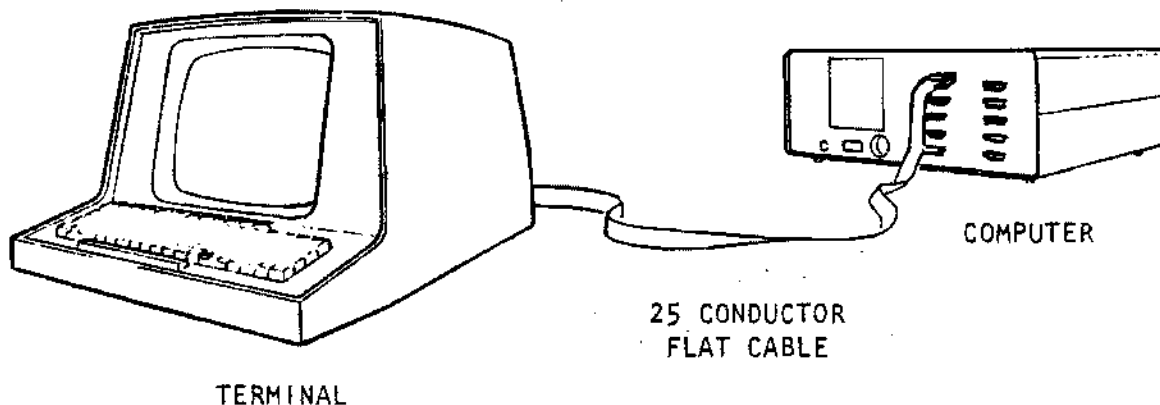


FIGURE 1

The following procedure describes how to connect the Mindless Terminal to Vector Graphic systems (such as the Vector MZ) utilizing a Vector Graphic Flashwriter Video Board and the above mentioned VMTC cable. Wire lists are provided for the user to fabricate custom cables for connection to non-standard devices. Please note that due to the large variations in manufacturer's products, it is impossible for Vector Graphic to provide interface cables for anything other than Vector Graphic products.

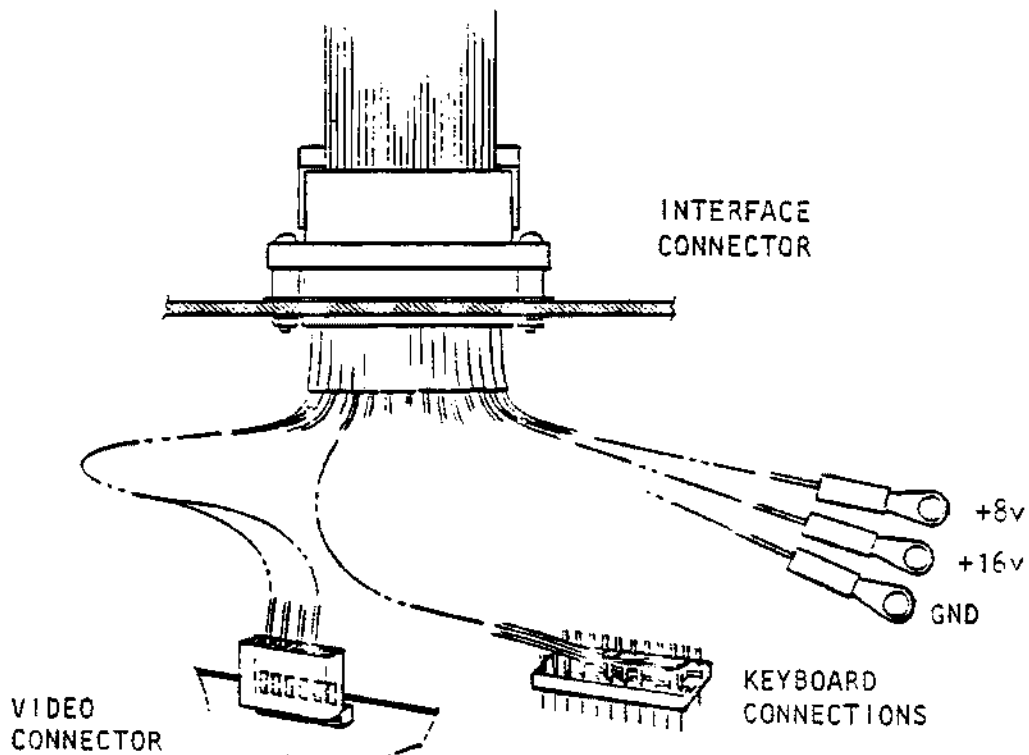


FIGURE 2

1. Before proceeding, familiarize yourself with the VMTc cables and this manual.

Note that the internal cable is divided into four parts: video connector; keyboard connector; power supply connections; and interface connector.

2. Mount the DB-25S Interface Connector in a convenient cutout on the computer chassis backpanel using the hardware supplied.
3. Connect the power terminal lug marked +8V to the +8V terminal on the large filter capacitor (see Figure 3). Verify all of the other terminal lugs are in place and tightened securely.
4. In a likewise manner connect the terminal lugs marked +16V and GND to their respective connection points as shown in Figure 3.

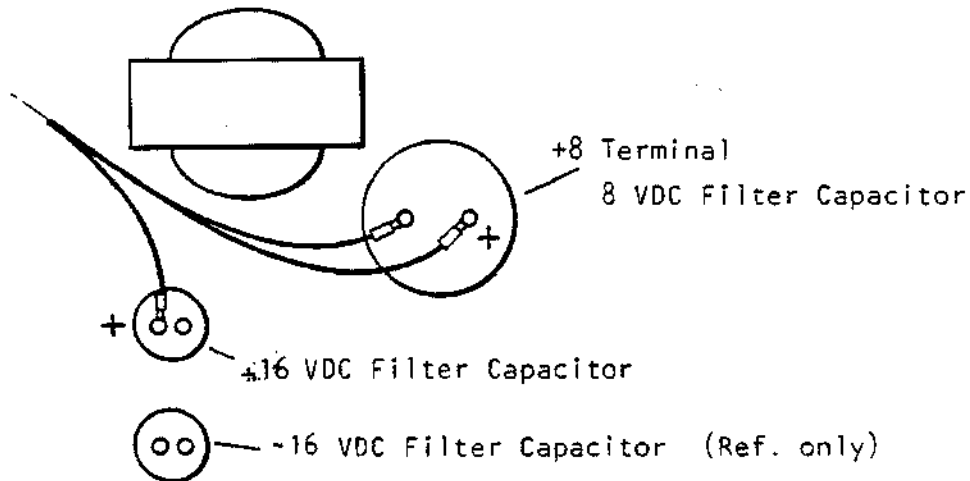


FIGURE 3

WARNING - It is very important that the power connections are made correctly. Failure to provide correct power may result in equipment damage.

5. Install the video board in a motherboard slot near the rear of the computer chassis to permit the video and keyboard cables to be connected to it conveniently.
6. Plug in the 24 pin DIP plug connector into the keyboard connector socket on the video board. Note correct pin orientation as shown in Figure 4.

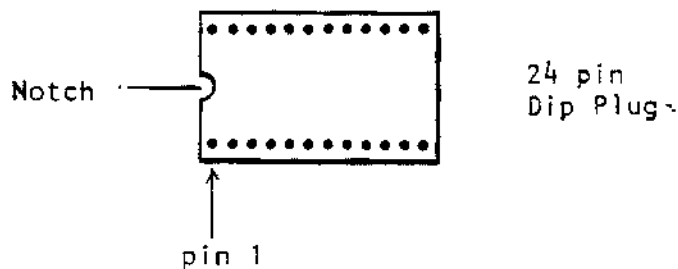


FIGURE 4

7. Connect video connector (MOLEX 6 PIN PLUG) to video output connector on video board. See figure 5.

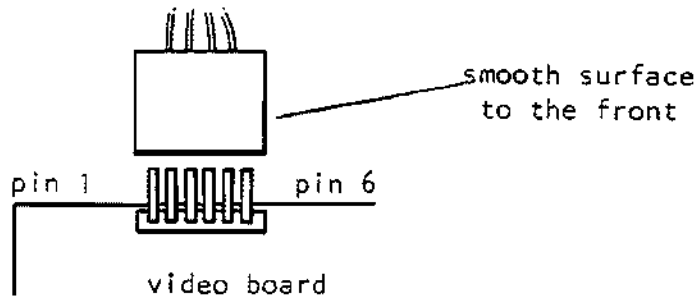


FIGURE 5

8. Check all connections; verify all boards are plugged into the motherboard. Connect the 25-conductor flat cable between the Mindless Terminal and the interface connector on the mainframe as shown in Figure 1. This completes the hardware connection of the Mindless Terminal.

2.3 CABLES

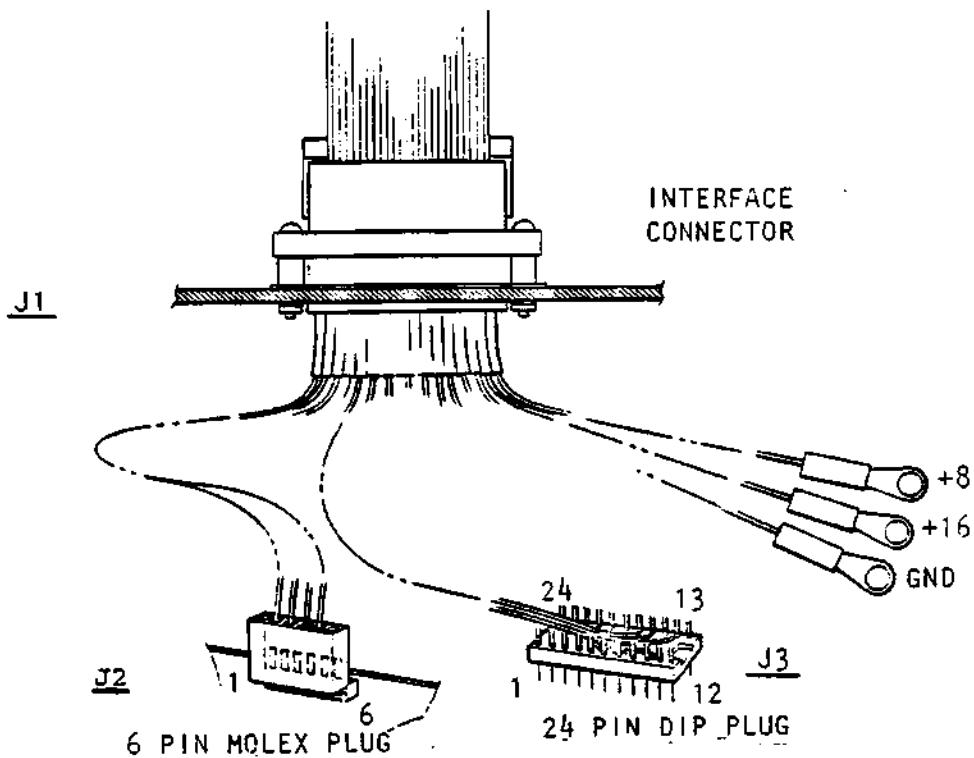
The following information is provided to help users connect the Mindless Terminal in non-standard situations. The "Interface Board" refers to the small PC board at the rear and inside the Mindless Terminal.

INTERCONNECT CABLE - CRT MONITOR / INTERFACE BOARD

<u>MONITOR</u> <u>10 PIN EDGE</u>	<u>INTERFACE BOARD</u> <u>16 PIN DIP</u>	<u>SIGNAL</u>
1	15, 16	HORZ GND
5	12, 13, 14	GND
6	6	H SYNC
7	1, 2, 3, 4	+12 VDC
8	7	VIDEO
9	5	V SYNC
10	9, 10, 11	VIDEO GND

INTERCONNECT CABLE - KEYBOARD / INTERFACE BOARD

<u>INTERFACE BOARD</u> <u>16 PIN DIP</u>	<u>KEYBOARD</u> <u>DUAL TEN PIN EDGE</u>	<u>SIGNAL</u>
1	C	GND
2	C	GND
3	5	DATA 8
4	6	DATA 7
5	1	DATA 4
6	4	DATA 1
7	N/C	<u>PRESET</u>
8	2	DATA 3
9	10	-V REG
10	E	STROBE
11	D	GND
12	7	DATA 6
13	3	DATA 2
14	8	DATA 5
15	9	VCC
16	9	VCC



INTERNAL PORTION OF VMTC

<u>FROM</u>	<u>TO</u>	<u>WIRE</u> <u>GAUGE</u>		<u>SIGNAL</u>
J2-2	J1-14	22	VIDEO	GROUND
-3	-15			TTL VIDEO
-4	-16			TTL HSYNC
-5	-17			TTL VSYNC
J3-7	J1-20	22	KYBD	DATA 1
-8	-21			DATA 3
-9	-22			-V REG
-11	-24			PRESET
-12	-25			STROBE
-13	-12			GND
-14	-11			DATA 4
-15	-10			DATA 6
-16	-9			DATA 7
-17	-8			DATA 2
-19	-6			DATA 8
-20	-5			DATA 5
+8V	J1-1	18	POWER	+8V VDC UNREG
+16	-18			+16 VDC UNREG
+16	-19			+16 VDC UNREG
GND	-2			GROUND
GND	-3			GROUND

2.4 KEYBOARD CODE CONVERSION

Due to limitations in the keyboard encoder chip, it was not possible to provide several codes, in particular, those for the following characters:

[(5B)
] (5D)
\ (5C)
~ (7E)

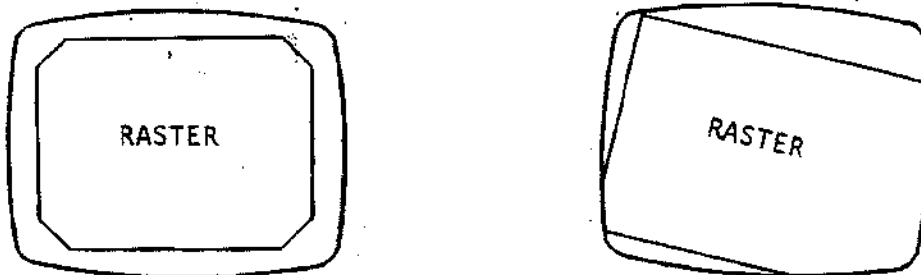
The conversion can be done in software, as the [] key generates unique codes for the four modes: unshifted, shifted, control, control shift. This conversion is done in the Version 3 Monitor PROM (purchased separately from Vector Graphic), which is the companion PROM for this keyboard. Furthermore this PROM version accepts the codes generated by the cursor control keys. Order Monitor 3 EV for the 64 X 16 Flashwriter I video board, and Monitor 3 EV-II for the 80 X 24 Flashwriter II video board.

2.5 ADJUSTING PROCEDURE FOR CRT MONITOR

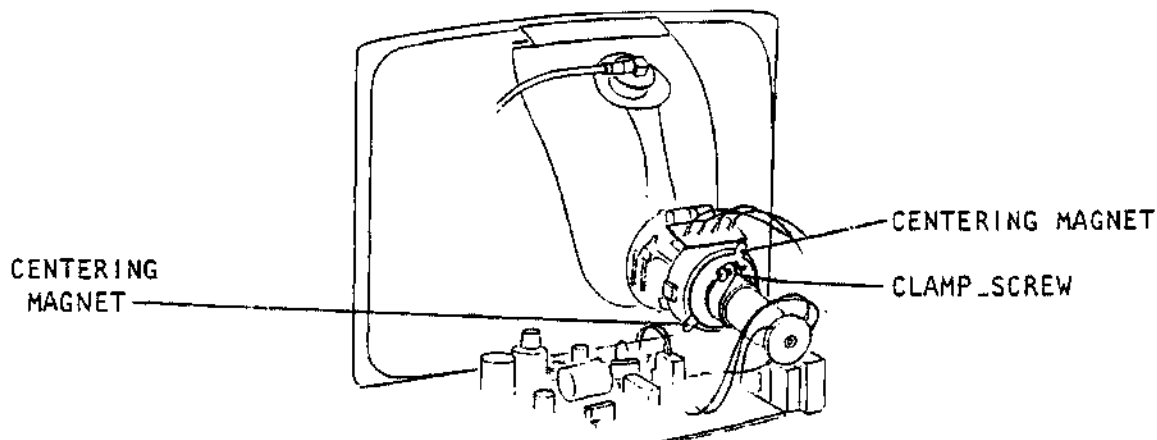
Normally, no adjustment of the CRT screen should be required as it is adjusted at the factory. However, if adjustment is required for any reason, the following explanation of the functions of the various adjustments is provided. All the adjustments except the last two must be made inside the Mindless Terminal, requiring you to unscrew and remove the shell.

It is assumed that the terminal is connected properly to the computer. A display which can be used to check adjustment is obtained by depressing RESET on the mainframe front panel to call up the Monitor Executive, then, for the Flashwriter I board, by typing Z D400 D7FF 06, or for the Flashwriter II video board by typing Z D000 D7FF 38.

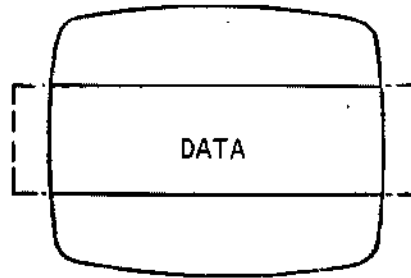
1. If the deflection yoke is not firmly against the bell of the tube, shadows will be caused at the corners of the display as shown below. If the yoke is slightly twisted, the display will also be twisted.



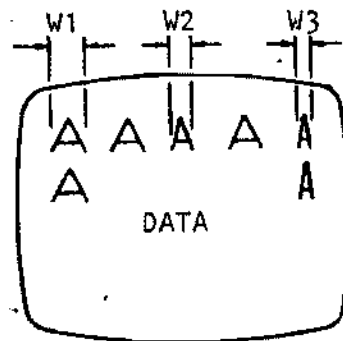
Adjustment for this is made by first loosening the clamp screw holding the yoke and positioning it properly. **CAUTION:** DO NOT TOUCH ANY OF THE ELECTRICAL TERMINALS ON THE TUBE OR YOKE, AS HIGH VOLTAGES ARE PRESENT. Tighten the clamp gently when finished.



2. If the width of the display is improper, adjust the core of the width coil (L103) on the P.C. board.

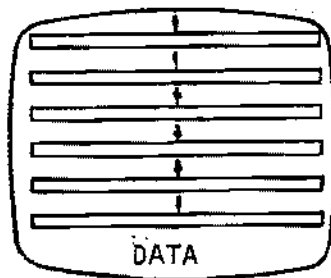


3. When data linearity in the horizontal direction is not good:



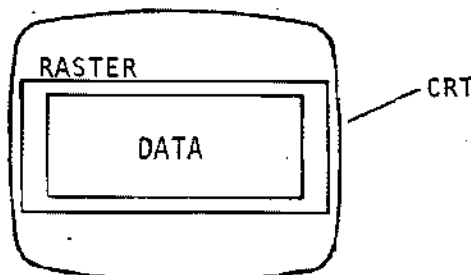
Turn the core of the horizontal linearity coil (L102) so that $W_1=W_2=W_3$.

4. When data runs in the vertical direction:



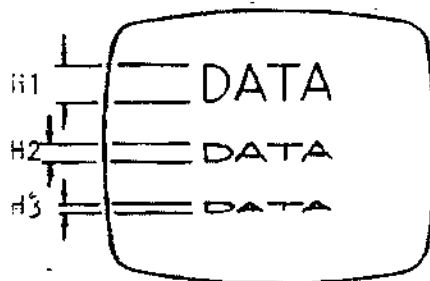
Turn the V. HOLD pot with a screwdriver and stop data display.

5. When the vertical size (height) of data is not proper:



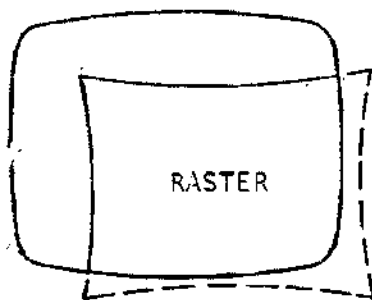
Turn the HEIGHT pot (R110) with a screwdriver to adjust the height as required.

6. When vertical linearity of data is not good:



Turn the V. LIN pot with a screwdriver so that $H_1=H_2=H_3$.

7. Raster deviation:



Turn the two centering magnets so that the raster is centered in the vertical direction.

8. When data is not focused satisfactorily, turn the FOCUS pot (R122) with a screwdriver so that focusing of the entire picture is optimum.
9. The correct adjustment of the brightness potentiometer R117 is when the background raster is just barely extinguished (black). If you can see faint lines zig-zagging across the screen in the background, turn the brightness down.
10. The contrast pot on the rear of the chassis should then be set to the minimum consistent with good legibility of the display. This will depend on the ambient light level and personal preference.

Vector Graphic Mindless Terminal Users Manual

11. The horizontal positioning is controlled by both the video CENT (A103) control and also the position control on the upper left hand corner of the Flashwriter board. The latter is the preferred adjustment.

**APPENDIX A
ASCII CODE CHART**

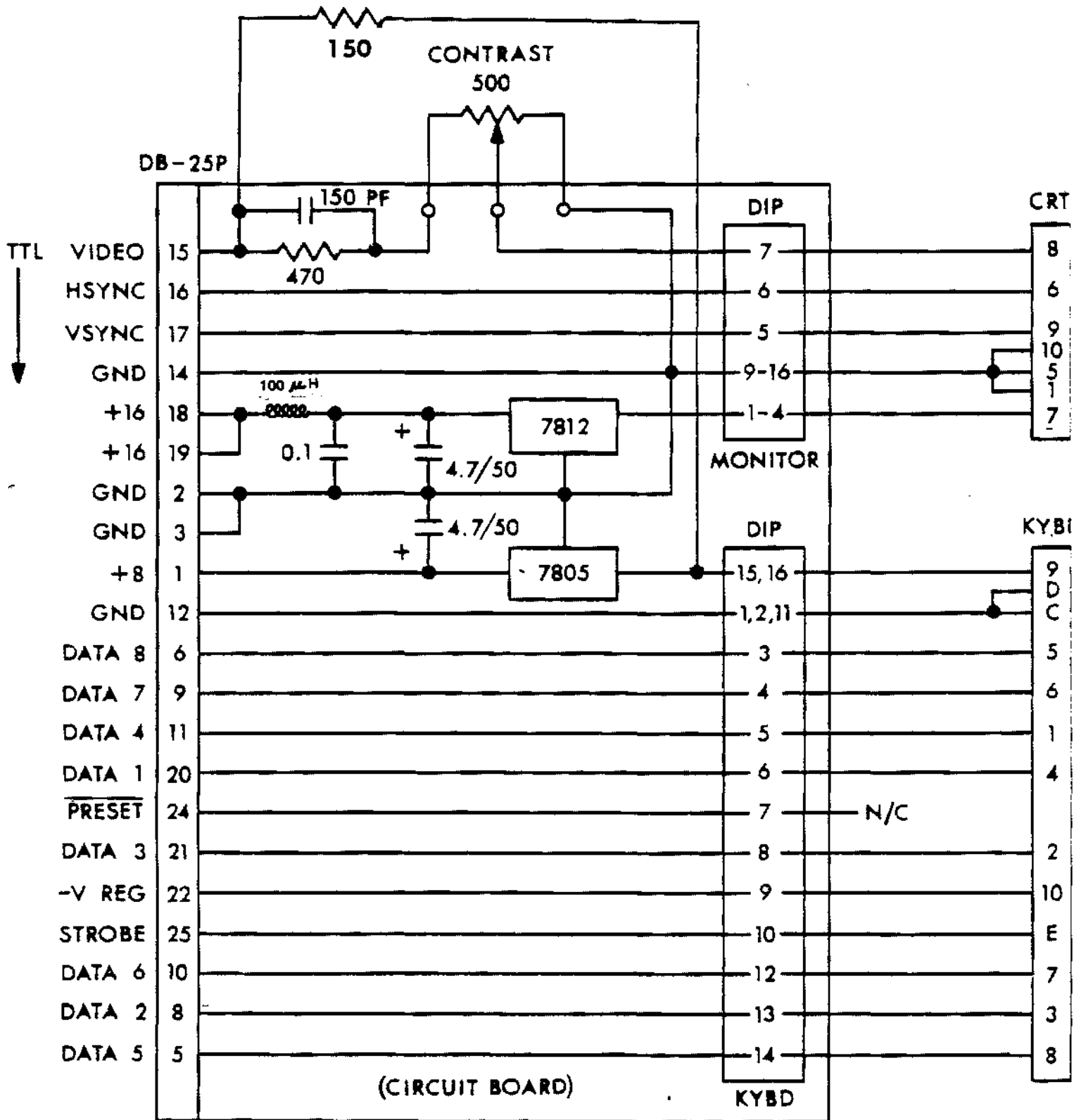
1968 ASCII: American Standard Code for Information Interchange. Standard No. X3.4-1968 of the American National Standards Institute.

Bits		b ₇ →	0	0	0	0	1	1	1	1		
		b ₆ →	0	0	1	1	0	0	1	1		
		b ₅ →	0	1	0	1	0	1	0	1		
b ₄ ↓	b ₃ ↓	b ₂ ↓	b ₁ ↓	COLUMN →	0	1	2	3	4	5	6	7
↓				↑ ROW ↑	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	'	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	A	LF	SUB	*	:	J	Z	j	z
1	0	1	1	B	VT	ESC	+	;	K	[	k	{
1	1	0	0	C	FF	FS	,	<	L	\	l	:
1	1	0	1	D	CR	GS	-	=	M	]	m	}
1	1	1	0	E	SO	RS	.	>	N	^	n	~
1	1	1	1	F	SI	US	/	?	O	_	o	DEL

All characters in these two columns and SP (Space) are non-printing.

When UPPER CASE ONLY is used, shaded lower case characters (columns 6 & 7) from keyboard are converted to their upper case equivalents (columns 4 & 5) before being printed or transmitted.





INTERFACE BOARD AT REAR OF MINDLESS TERMINAL - SCHEMATIC

SPECIFICATIONS

**MODEL CIQ-9
MODEL CIQ-12**

**9" and 12" CRT
DISPLAY
MONITOR**



C. ITOH ELECTRONICS, INC.

5301 Beethoven Street Los Angeles, Calif. 90066
Telephone: (213) 390-7778 Telex: (WU) 65-2451

280 Park Avenue, New York, NY 10017
Telephone: (212) 682-0420 Telex (WU) 12-5059

SPECIFICATIONS

GENERAL

The Model CIQ-12 and CIQ-9 are a 12-inch and 9 inch CRT Display Unit is to be used as an alpha-numeric display device. The CRT will be scanned in conventional TV fashion.

All input signal connections to the monitor will be via a single 10 pin card edge connector, and comprise:

Video
Horizontal Drive
Vertical Sync

RATING

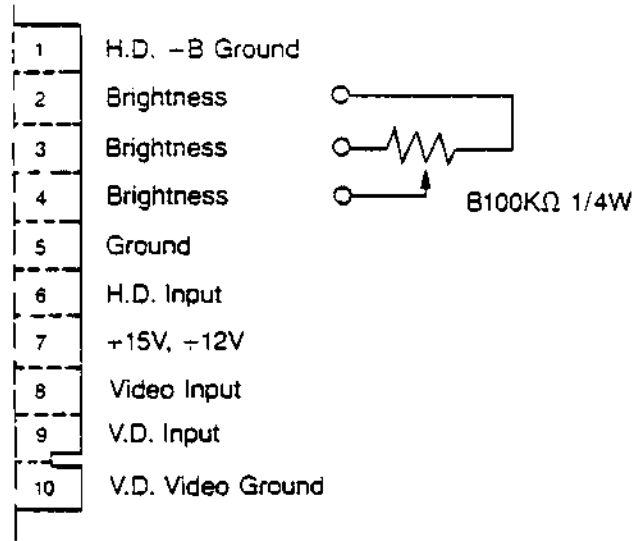
- | | |
|-------------------------------------|---|
| 1. Video Input | 4.0Vp-p \pm 1.5V positive going pulse |
| 2. Video Input Impedance | More than 1 K Ω |
| 3. Horizontal Drive | 4.0 Vp-p \pm 1.5V positive going pulse
Pulse width: 4 to 40 μ sec.
Frequency: 15.75 KHz \pm 500 Hz |
| 4. Horizontal Drive Input Impedance | More than 470 Ω |
| 5. Vertical Sync. | 4.0 Vp-p \pm 1.5V negative going pulse
Pulse width: 300 μ sec. to 1.4 msec.
Frequency: 55 Hz \pm 8 Hz |
| 6. Vertical Sync Input Impedance | More than K Ω |
| 7. Signal Level | Low: 0 \pm 0.4V
High: 4 \pm 1.5V |
| 8. Power Supply | DC \pm 15V \pm 0.2V (Less than 1.2A)
or DC \pm 12V \pm 0.2V (Less than 1.5A)
or AC 115/230V \pm 10%, 50/60 Hz (Option)
Input connector for AC power supply (customer supplied).
Housing: AMP1-480705-0 or equivalent
Contact pin: AMP 350690-1 or equivalent |

9. Ambient Temperature	0°C to 55°C (Operating) -30°C to 65°C (Storage)	
10. Humidity	10 to 90% (Non-condensing)	
11. C.R.T.	12 and 9-inch, 90° deflection 20°	
12. X-ray Radiation	Less than 0.5mR/H	
13. Weight	CIQ-12 Approx. 9.9 lbs (4.5 Kg) without AC power unit AC power unit Approx. 3.3 lbs. (1.5 Kg) CIQ-9 Approx. 6.2 lbs. (2.8 Kg)	
14. Dimensions	Based on the drawing of External View.	
15. Inside Controls	Sub-brightness Focusing Vertical Frequency Vertical Size	Horizontal Centering Horizontal Size Horizontal Linearity Vertical Linearity
16. Phosphor	P4 —Standard P31—Option P39—Option	

CHARACTERISTICS

1. Video Band Width	16MHz \pm 3dB
2. Rise Time And Fall Time	35 nsec or less (linear mode)
3. Storage Time	15 nsec or less (linear mode)
4. Horizontal Retrace Time	Approx. 8.5 μ sec.
5. Vertical Retrace Time	0.9 msec. or less
6. Resolution	CIQ-12 Center: 850 TV lines (mean) Corner: 700 TV lines (mean) CIQ-9 Center: 800 TV lines (mean) Corner: 650 TV lines (mean)
7. Distortion and Linearity Offset	Within limit equivalent to 2% measured with EIA's ball chart (with PC board mounted according to manufacturer's specification)
8. SN Ratio	40dB or more (80% area of CRT screen)
9. MTBF	More than 20,000 H (without CRT)
10. Performance range	0°C to 40°C

1. Connection of Connector



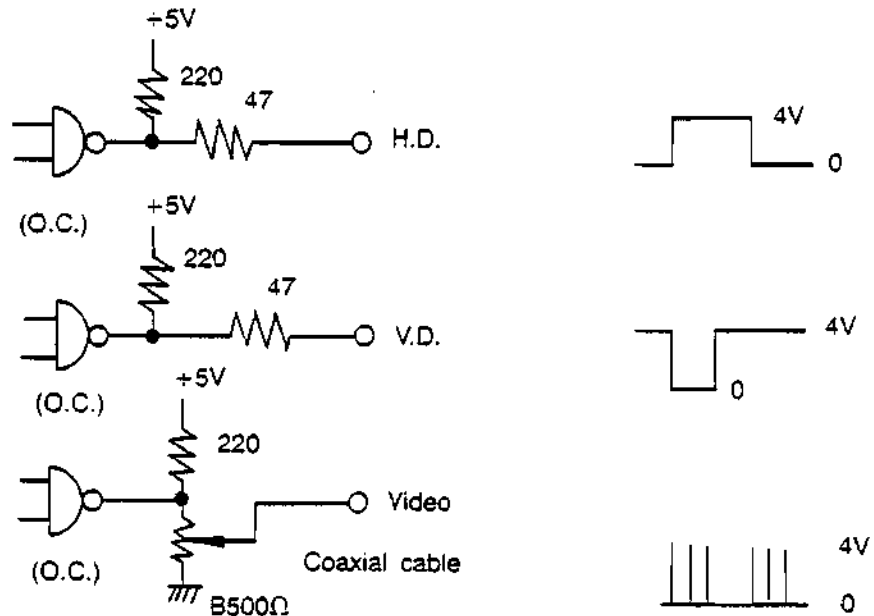
2. Input Connector

Card edge connector

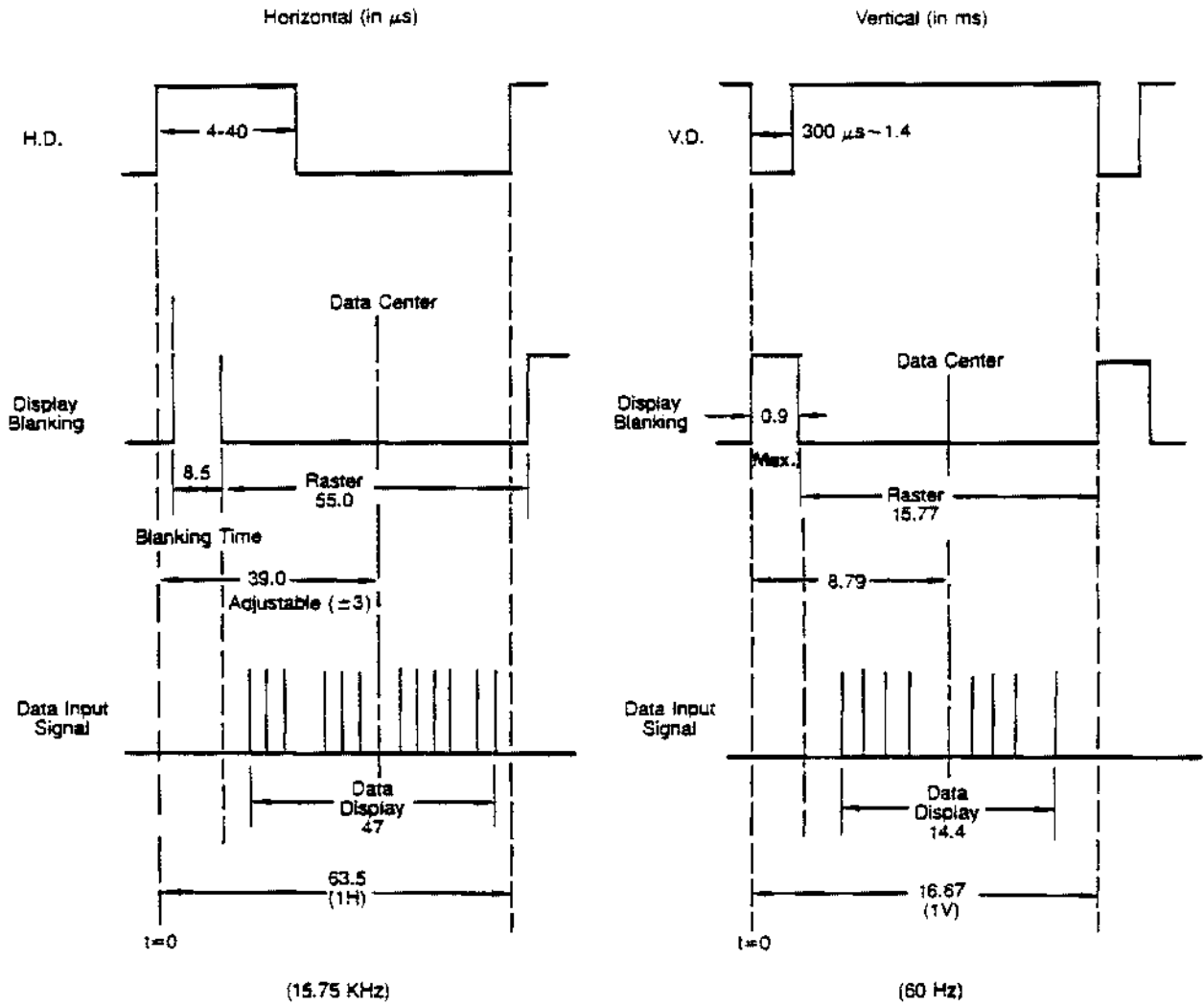
- Viking # 2VK10S/1-2
- Amphenol # 225-21031-101
- Cinch # 1-039-0119
- Hirose # CR7E-20DA-3.96E
- Or Equivalent

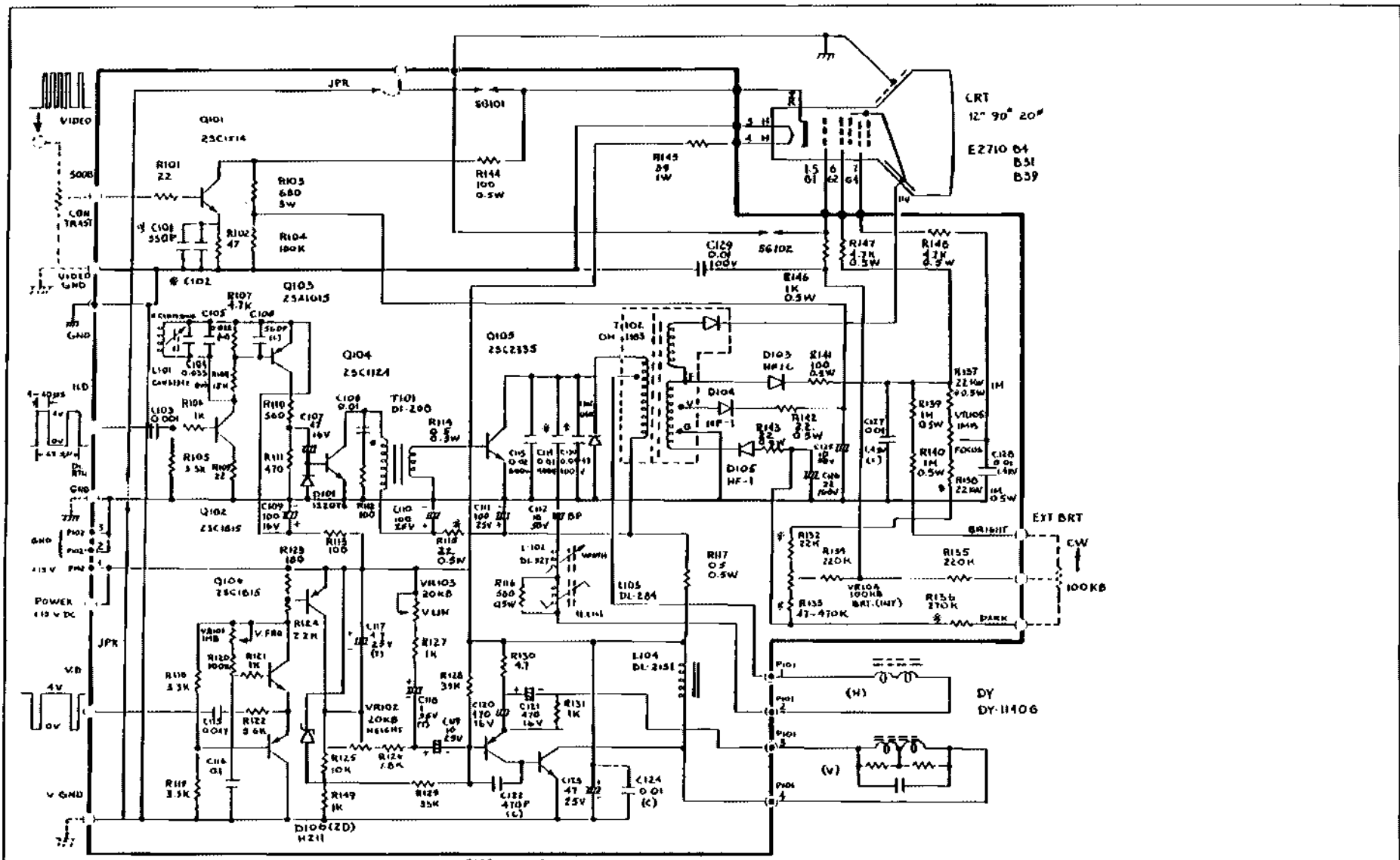
Polarizing key shall be inserted between 9 pin and 10 pin.

3. C.P.U. Output Circuit



TIMING CHART (Standard Type)

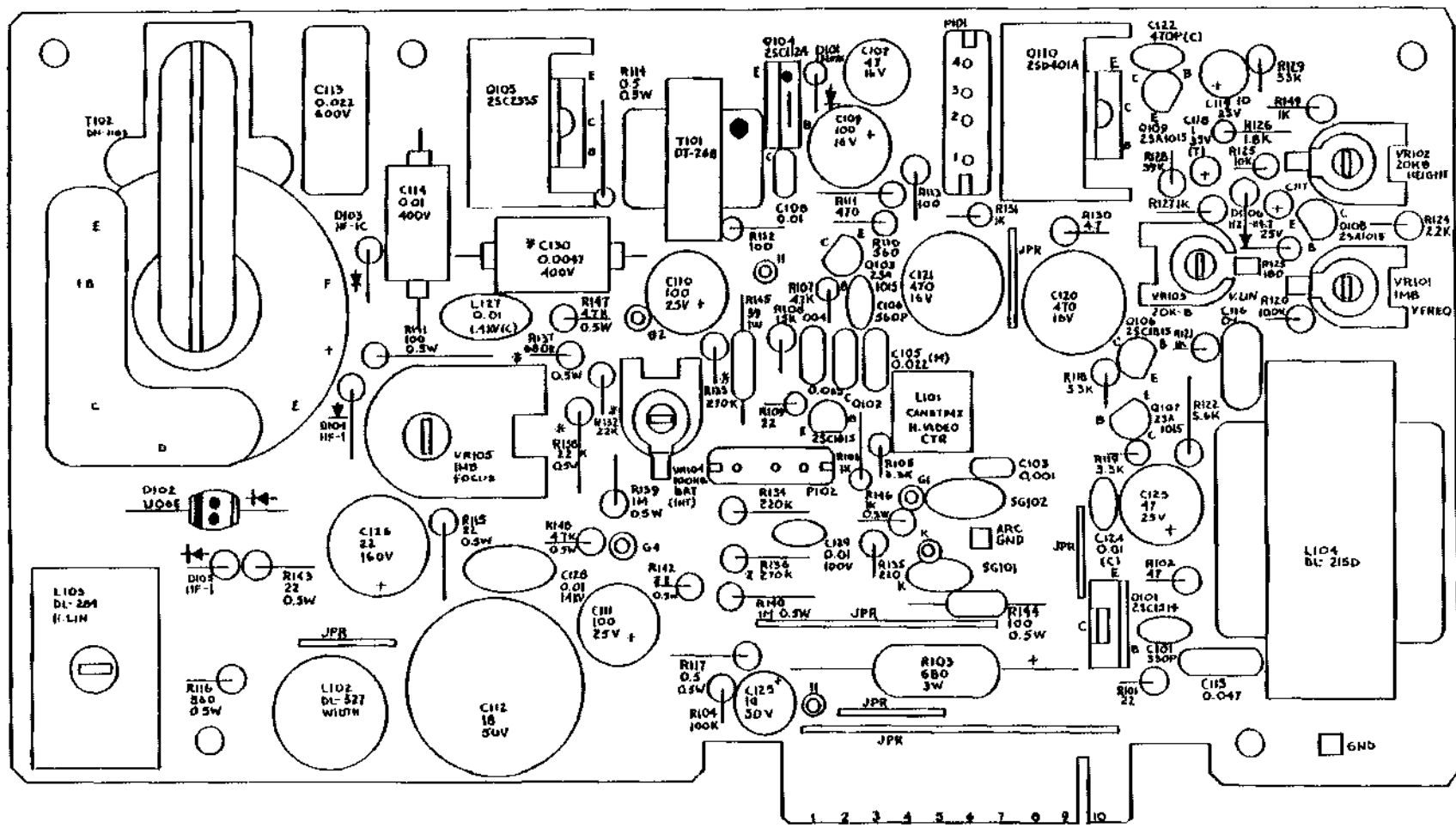




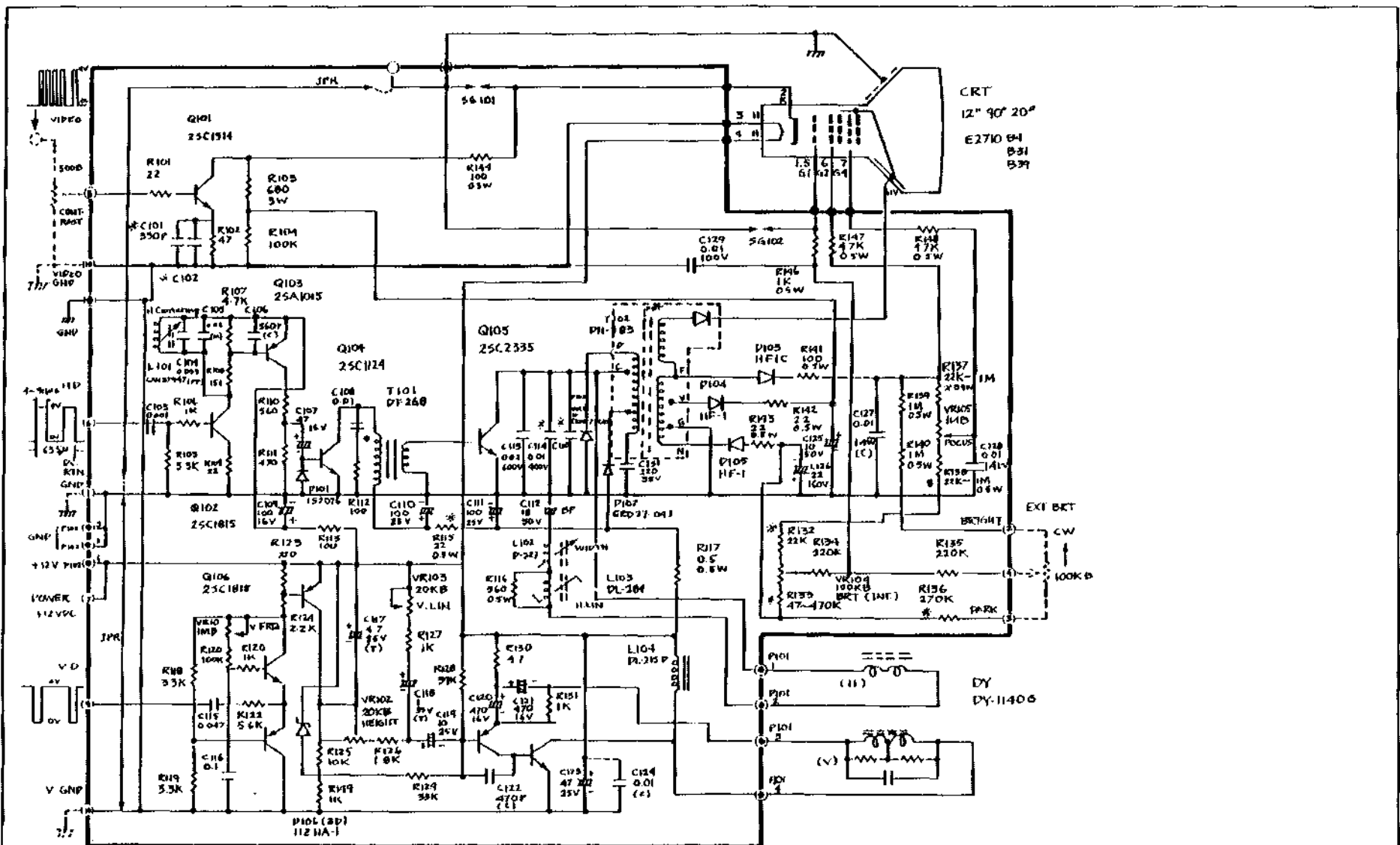
Q107 25A1015
 Q108 25A1015
 Q109 25A1015
 Q110 25D401A

- NOTES () INTERFACE CONNECTOR
 (P) PIN CONNECTOR
 (L) PIN
 (D) DIRECT
 (A) ADJUSTED

CIQ-12 AND 9
 15VDC VERSION
 CIRCUIT DIAGRAM



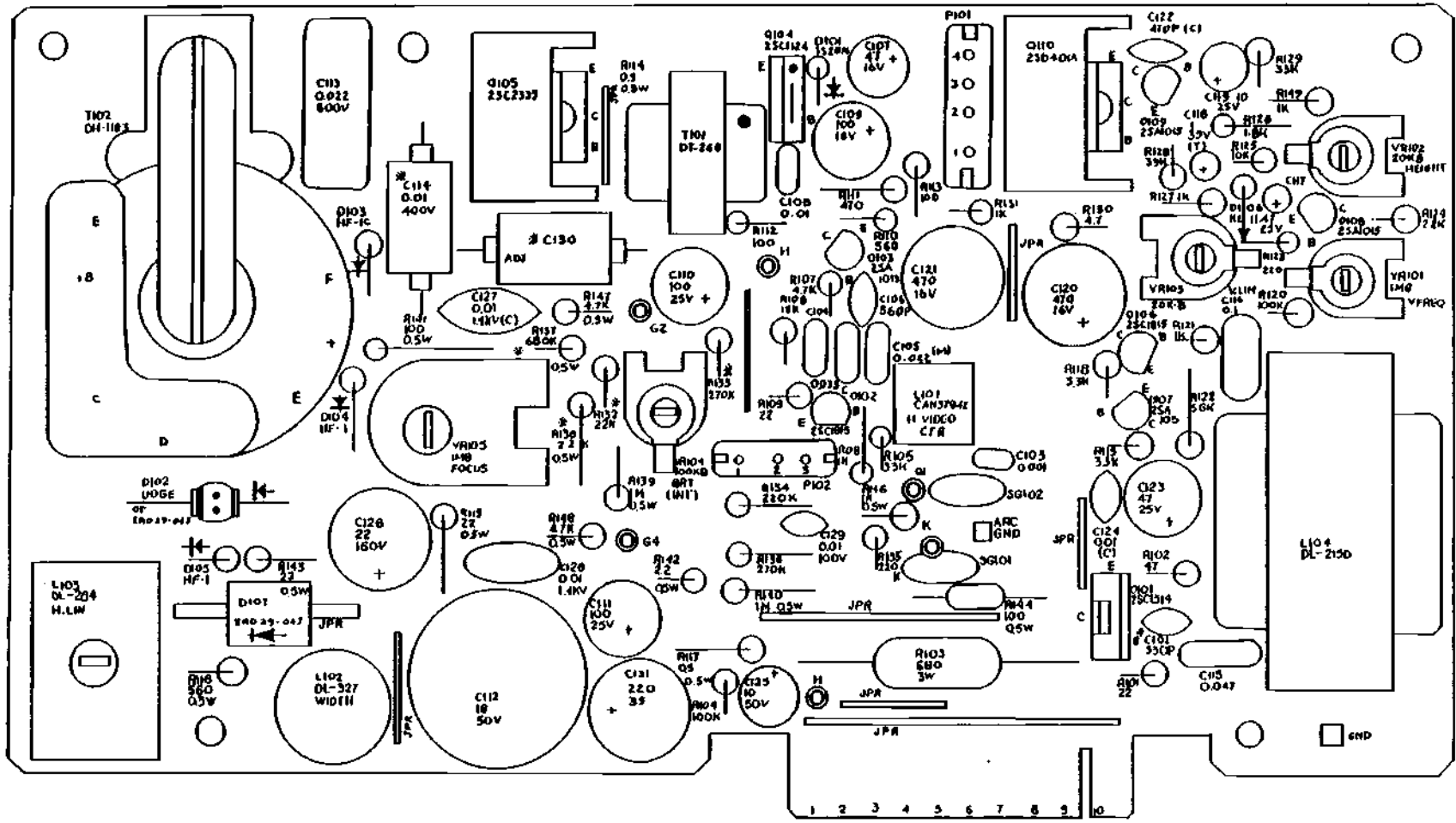
PB-811
 CIO-12 AND 9
 15VDC VERSION
 COMPONENTS LOCATION
 (COMPONENTS SIDE)



Q107 Q108 Q109 Q110
 25A1015 25A1015 25A1015 25D401A

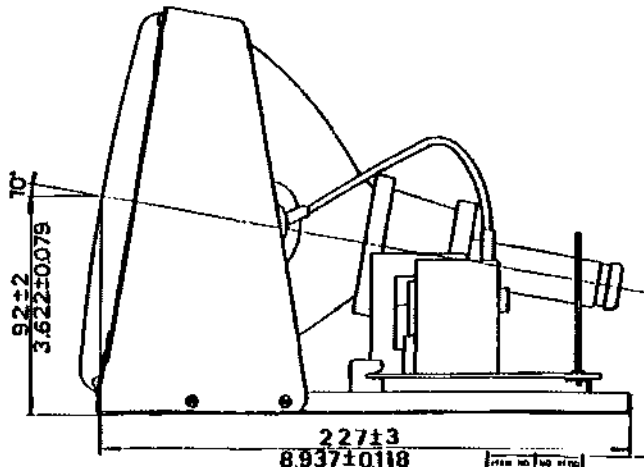
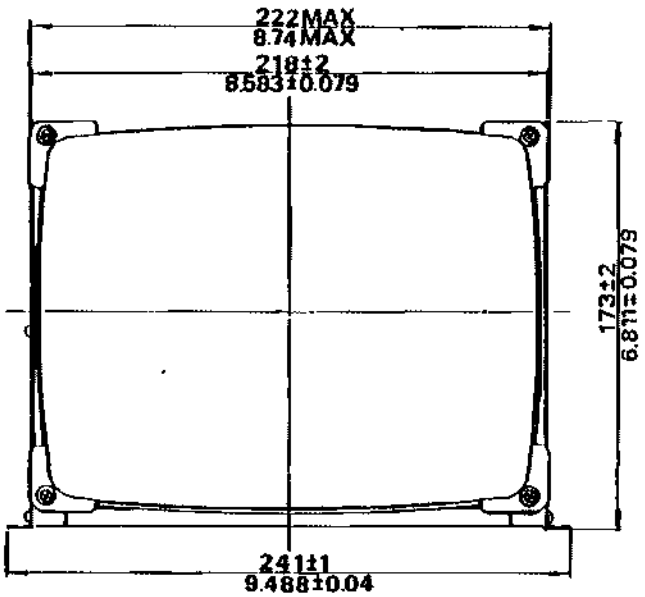
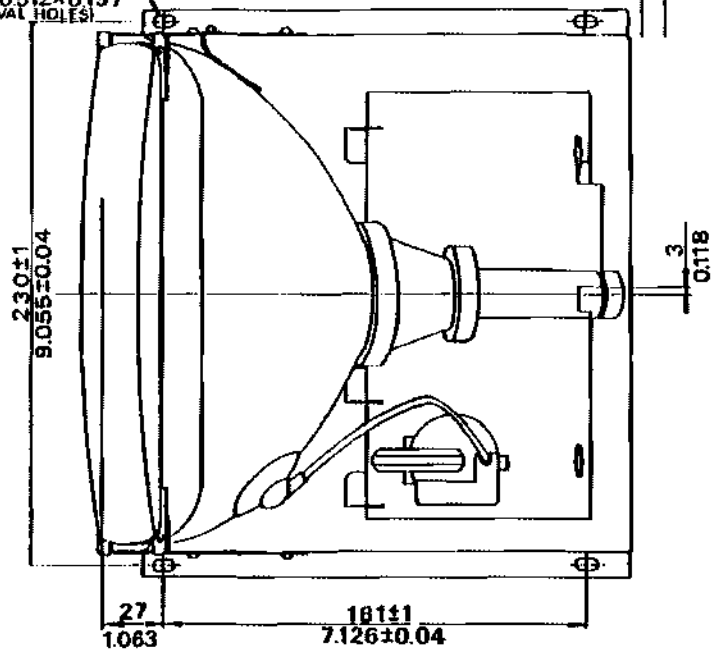
- NOTES () INTERFACE CONNECTOR
 ⊙ PIN CONNECTOR
 ⊕ I PIN
 ● DIRECT
 * ADJUSTED

C1Q-12 AND 9
 12VDC VERSION
 CIRCUIT DIAGRAM



PB-811
 CIQ-12 AND 9
 12VDC VERSION
 COMPONENTS LOCATION
 (COMPONENTS SIDE)

4-13×5 美孔
4-0.512×0.197
KIVAL HOLES



mm
inch

DATE	BY	CHKD	APP'D
7/23	Ohishi		
7/23	Ohishi		
7/23	Ohishi		
7/23	Ohishi		

CIQ-9 SERIES
OUTSIDE DIMENSION

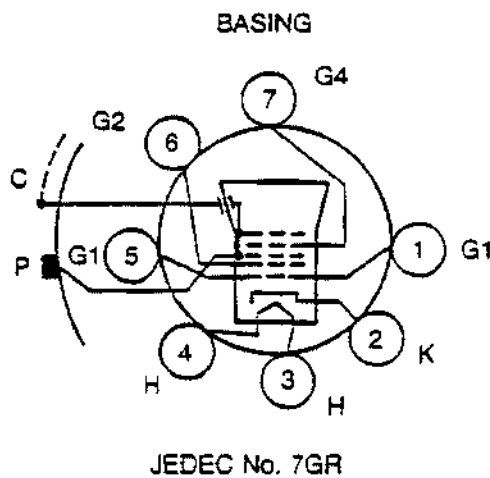
3Q
CLIKOMUSEN CO., LTD

E 3C845-01

A3

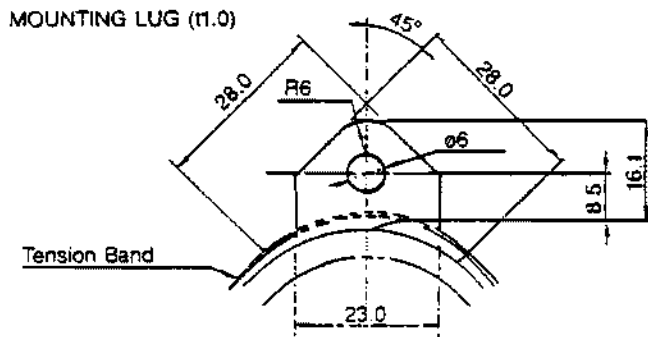
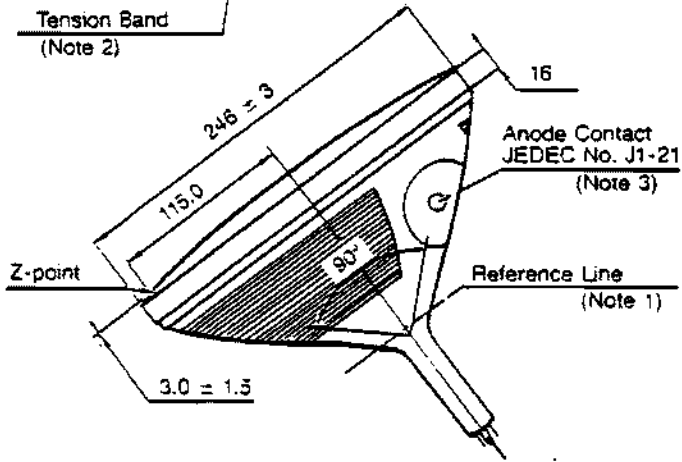
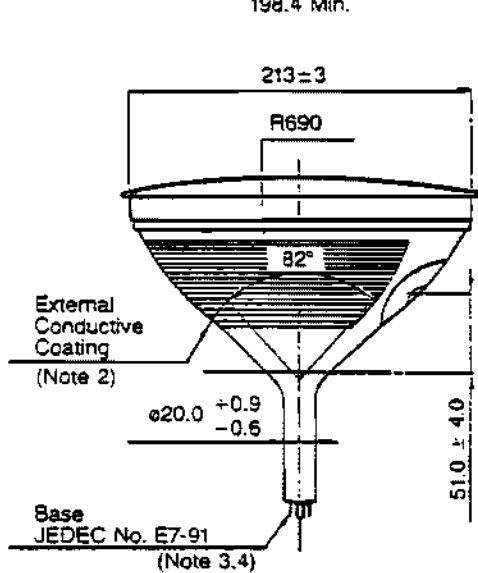
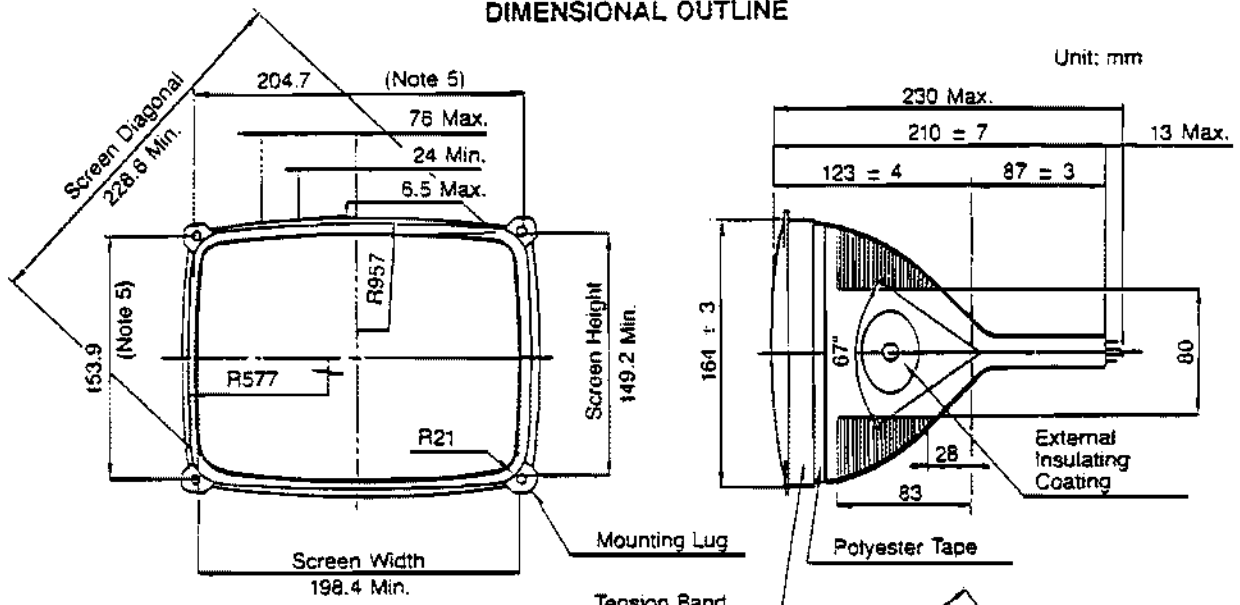
NOTE FOR DIMENSIONAL OUTLINE

1. Reference line is determined by EIAJ G-R90J5 reference line gauge, when the reference line gauge is seated against the bulb.
2. External conductive coating and implosion protection hardware must be grounded.
3. The plane through the tube axis pin No. 5 may vary from the plane through the tube axis and anode contact by angular tolerance of ± 30 degrees. Anode contact is on same side as pin No. 5.
4. Socket for this base should not be rigidly mounted. It should have flexible leads and be allowed to move freely.
5. The mounting bolts in the cabinet must be situated inside a circle of 4.5 mm (0.177 inch) diameter on the true geometrical positions.



CIQ-9 CATHODE RAY TUBE DIMENSIONAL OUTLINE

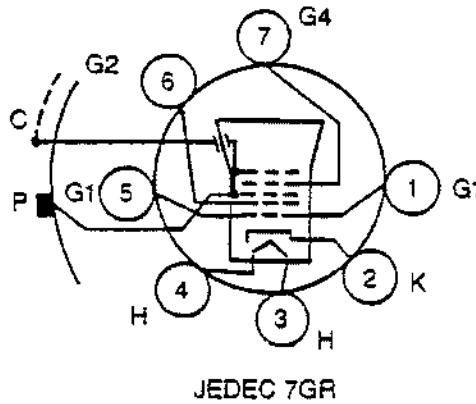
Unit: mm



NOTE FOR DIMENSIONAL OUTLINE

1. Reference line is determined by EIAJ G-R90J3 reference line gauge, when the reference line gauge is seated against the bulb.
2. External conductive coating and implosion protection hardware must be grounded.
3. The plane through the tube axis pin No. 5 may vary from the plane through the tube axis and anode contact by angular to tolerance of ± 30 degrees. Anode contact is on same side as pin No. 5.
4. Socket for this base should not be rigidly mounted. It should have flexible leads and be allowed to move freely.
5. For the mounting bolt holes, a free space of 4.0 mm (0.157 inch) diameter is ensured around this nominal position.

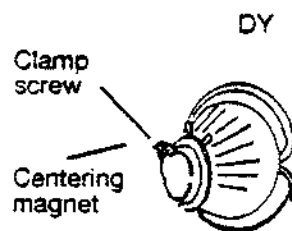
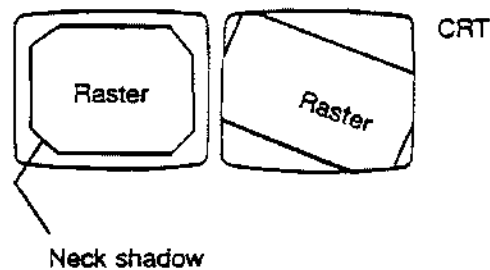
SOCKET CONNECTION (BOTTOM VIEW)



INSPECTION/ADJUSTMENT PROCEDURE

1. Inspect the following items thoroughly upon arrival for any physical damage:
 - 1) Metal works (bent, loose, and/or missing screws, etc.)
 - 2) Printed circuit board (crack, fracture, etc.)
 - 3) Discrete components (crack, poor soldering, etc.)
 - 4) Wiring (broken lead, poor soldering, damaged insulation, etc.)
 - 5) Illegible label

2. Raster Check and Adjustment Procedure
 - 1) Apply HD and VD signal to the input terminal (No. 6 and 9 respectively) of the circuit board. Ref. P3-1
 - 2) Apply 15VDC or 12VDC to the input terminal No. 7 of the circuit board. Raster will appear in 15 seconds or so.
 - 3) Check tilting of the raster.



Loosen DY clamp screw, and correct tilted raster or neck shadow. Tighten clamp screw, and fix it with paint lock.

3. Internal Controls and Adjustments

Display Width-L102
Display Horizontal Centering-L101
Horizontal Linearity-L103
Vertical Hold-VR101
Vertical Height-VR102
Vertical Linearity-VR103
Focus-VR105
Sub-brightness-VR104

(SEE PC BOARD PARTS LAYOUT FOR LOCATION)

- 1) The brightness can be controlled by adjusting VR104. If EXT-BRT is utilized, set it to the center before Internal Brightness Control is adjusted.
- 2) Blurred display may not be caused by improper focus adjustment. High video signal will also create a blurred image. In this case, reduce video signal level by EXT-CONTRAST CONTROL.

4. Shock Test

Lift one side of the unit about 2 inches off the surface and release. Observe whether or not the display is affected by the shock; if the unit is affected, check for loose soldering, screws, etc.

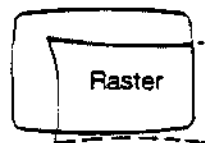
5. CRT Spot Test

One minute after the power is turned off, if the spot appears at the center of the CRT screen, it may be defective.

6. Raster Deviation

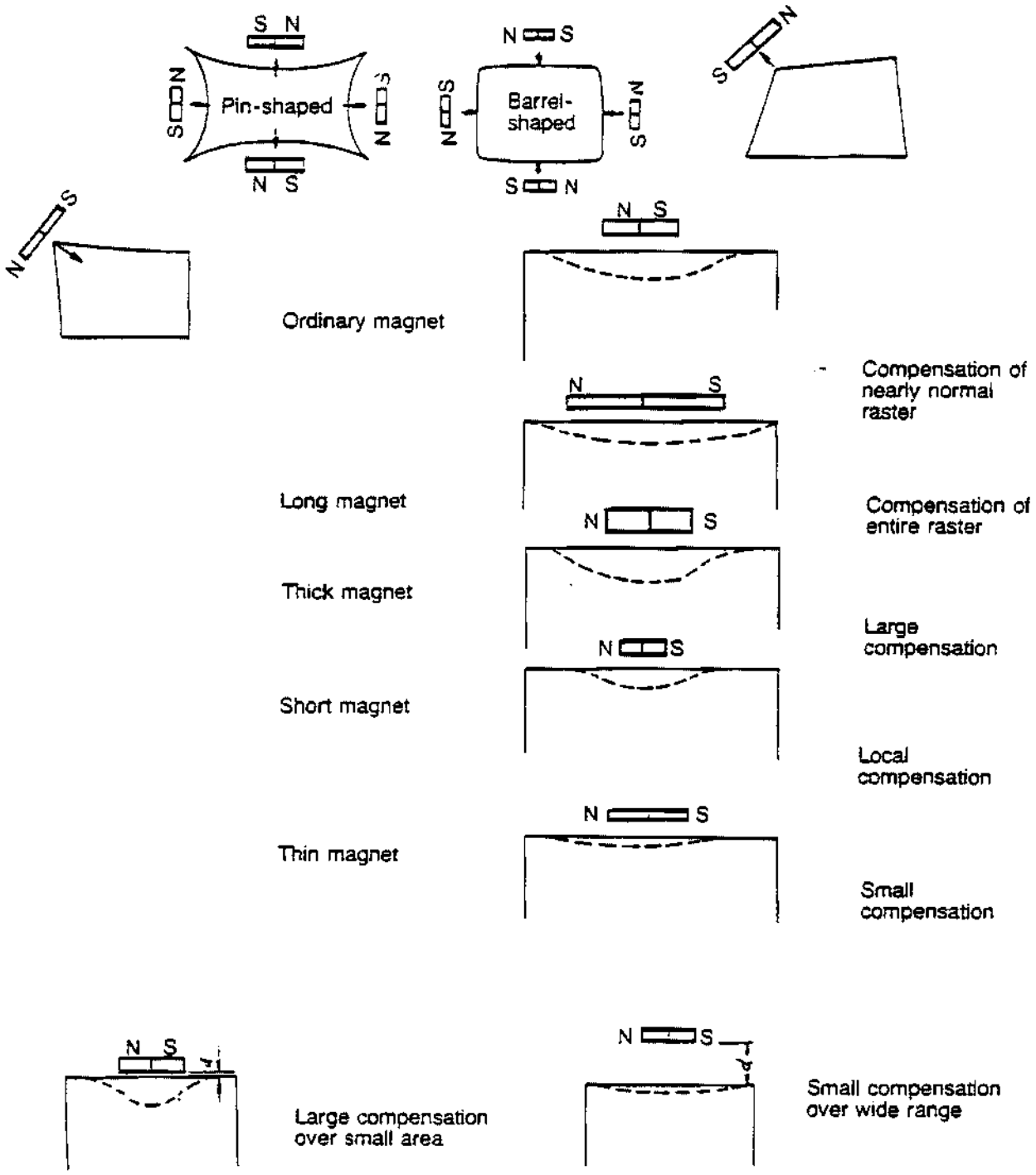
Turn the two centering magnets until the raster is centered. Apply screw lock when correction is completed.

(6) Raster deviation



(7) Raster distortion

Raster distortion can be compensated by applying a small magnet to the deflection yoke, as shown.



**PART NUMBER CLASSIFICATION
FOR CIQ SERIES CRT DISPLAY MONITOR**

CIQ -

A	B	C	D	E	F	G	H	I	J
---	---	---	---	---	---	---	---	---	---

- A - 12: inches, diagonal measurement of CRT screen
 - 09: " " " " " "
 - 05: " " " " " "
- B - C: with chassis
 - X: kit version
 - U: universal chassis (settings for 0, 5, 7.5, 10, 15, -10, or -15 degree tilt positions)
 - Z: chassis per customer's requirement
- C - Q: chassis compatible with Ball TV-12 by physical measurement
 - P: " " " " " " according to Ball drawing
(Slight difference between drawing and actual measurement.)
 - X: kit version
 - Z: chassis per customer's requirement
- D - 00, 05, 7.5, 10, 15: degree(s) tilt angle of CRT
 - XX: kit version
- E - D: DC power
 - A: AC power
- F - 015: 15 VDC
 - 012: 12 VDC
 - XXX: 115/230 VAC
- G - C: clear face (standard)
 - E: etched face (non-glare)
- H - 04: P4 phosphor
 - 31: P31 phosphor
 - 39: P39 phosphor
- I - (25-30): Horizontal drive input, 25-30 μ s pulse width
 - (04-40): " " " 4-40 μ s pulse width
- J - S: separate signal
 - C: composite signal

outside the jumper area! To cut this connection, locate pad 7 of area J on the component side of the board and turn the board over. Locate pad 7 on this side of the board and notice that there is a trace which leads from the pad to the large 5V trace at the left. This also leads to pad 5 via an indirect route. To cut the jumper from pad 7 to pad 5 of jumper area cut this trace.

Schematic errata- on page 5 of the Schematic.

Area L pad 6 should be labelled pad 7 and pad 7 should be labelled pad 6.

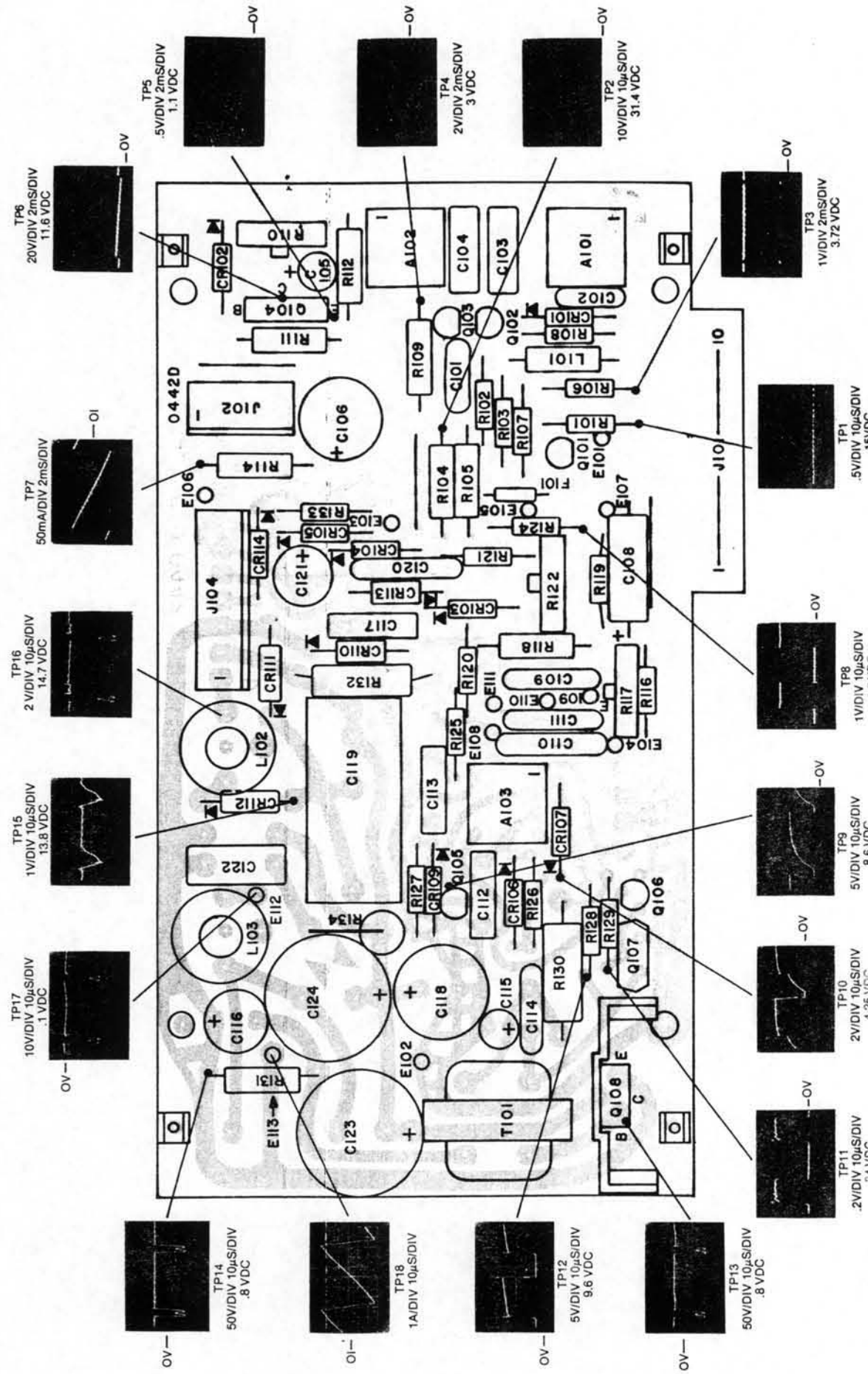
Make the same change for area M.

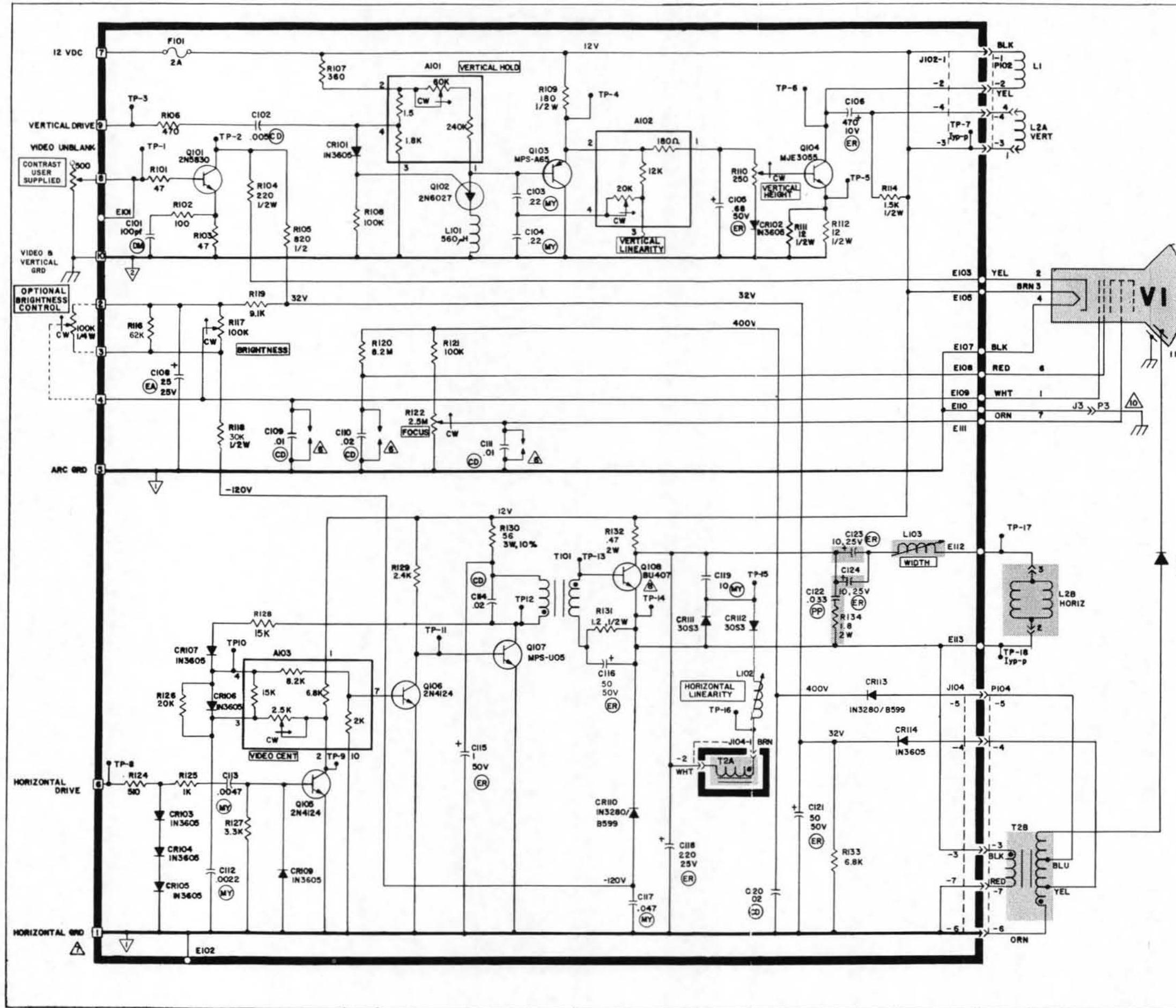
Area J is correct as it is.



REF SYM	DESCRIPTION	BBRC PART NUMBER	USED ON 6-002						
			0698	0686	0697	0710	0733	0731	0735
A101	RES TRIM, 60K, VERT HOLD	1-011-8006	X	X	X	X	X	X	X
A102	RES TRIM, 20K, VERT L/N	1-011-8005	X	X	X	X	X	X	X
A103	RES TRIM, 2.5K, VIDEO CENTER	1-011-8001	X	X	X	X	X	X	X
CAPACITOR, FIXED, uF UNLESS NOTED									
C101	100uF±5%, 500v, DM	1-012-0300	X	X	X	X	X	X	X
C102	.005±20%, 100v, CD	10-12-7508	X	X	X	X	X	X	X
C103	.22±10%, 100v, MY	1-012-2277	X	X	X	X	X	X	X
C104	.22±10%, 100v, MY	1-012-2277	X	X	X	X	X	X	X
C105	.68; 50v, E	1-012-2264	X	X	X	X	X	X	X
C106	.47; 10v, E	1-012-2158	X	X	X	X	X	X	X
C107	NOT USED								
C108	25; 25v, E	1-012-1380	X	X	X	X	X	X	X
C109	.01±20%; 1000v, CD	1-012-2214	X	X	X	X	X	X	X
C110	.02±20%; 1000v, CD	1-012-2217	X	X	X	X	X	X	X
C111	.01±20%; 1000v, CD	1-012-2214	X	X	X	X	X	X	X
C112	.0022±10%; 630v, MY	1-012-2254	X	X	X	X	X	X	X
C113	.0047±10%; 630v, MY	1-012-2279	X	X	X	X	X	X	X
C114	.02±20%; 100v, CD	10-12-7209	X	X	X	X	X	X	X
C115	1; 50v, E	1-012-2189	X	X	X	X	X	X	X
C116	50; 50v, E	1-012-2157	X	X	X	X	X	X	X
C117	.047±10%; 250v, MY	1-012-2240	X	X	X	X	X	X	X
C118	220; 25v, E	1-012-2159	X	X	X	X	X	X	X
C119	10±10%; 100v, MY	1-012-2255	X	X	X	X	X	X	X
C120	.02±20%; 500v, CD	1-012-0780	X	X	X	X	X	X	X
C121	50; 50v, E	1-012-2157	X	X	X	X	X	X	X
C122	.033±10%; 250v, MY	1-012-2298	X	X	X	X	X	X	X
C123	10; 25v, E	1-012-2273	X	X	X	X	X	X	X
C124	10; 25v, E	1-012-2273	X	X	X	X	X	X	X
DIODE									
CR1	H510	1-021-0424	X	X	X	X	X	X	X
CR101	1N3605	1-021-0410	X	X	X	X	X	X	X
CR102	1N3605	1-021-0410	X	X	X	X	X	X	X
CR103	1N3605	1-021-0410	X	X	X	X	X	X	X
CR104	1N3605	1-021-0410	X	X	X	X	X	X	X
CR105	1N3605	1-021-0410	X	X	X	X	X	X	X
CR106	1N3605	1-021-0410	X	X	X	X	X	X	X
CR107	1N3605	1-021-0410	X	X	X	X	X	X	X
CR108									
CR109	1N3605	1-021-0410	X	X	X	X	X	X	X
CR110	1N3280/B599	1-021-0403	X	X	X	X	X	X	X
CR111	30S3	1-021-0458	X	X	X	X	X	X	X
CR112	30S3	1-021-0458	X	X	X	X	X	X	X
CR113	1N3280/B599	1-021-0403	X	X	X	X	X	X	X
CR114	1N3605	1-021-0410	X	X	X	X	X	X	X
FUSE									
F101	2A-125v, PICO	1-028-0247	X	X	X	X	X	X	X
CONNECTORS									
J102	CONNECTOR, 4 PIN MALE	1-039-0146	X	X	X	X	X	X	X
J103	NOT USED								
J104	CONNECTOR, 7 PIN MALE	1-039-0145	X	X	X	X	X	X	X
P3	CONNECTOR, 1 PIN FEMALE	1-034-0323				X			X
J3	CONNECTOR, 1 PIN MALE	1-034-0300				X			X
COIL									
L1	VERTICAL CHOKE	6-003-0572	X	X	X	X	X	X	X
L2	DEFLECTION, TV 120	1-023-0239			X	X	X		X
	OR DEFLECTION, TV 90	1-023-0240	X	X			X		
L101	560uH	1-016-0302	X	X	X	X	X	X	X
L102	L INEARITY	1-016-0328	X	X	X	X	X	X	X
L103	WIDTH	1-016-0323	X	X	X	X	X	X	X

REF SYM	DESCRIPTION	BBRC PART NUMBER	USED ON 6-002-						
			0698	0686	0697	0710	0733	0731	0735
TRANSISTOR									
Q101	2N5830	1-015-1172	X	X	X	X	X	X	X
Q102	2N6027	1-015-1157	X	X	X	X	X	X	X
Q103	MPS-A65	1-015-1186	X	X	X	X	X	X	X
Q104	MJE3055	1-015-1156	X	X	X	X	X	X	X
Q105	2N4124	1-015-1139	X	X	X	X	X	X	X
Q106	2N4124	1-015-1139	X	X	X	X	X	X	X
Q107	MPS-U05	1-015-1159	X	X	X	X	X	X	X
Q108	BU407	1-015-1210	X	X	X	X	X	X	X
RESISTOR, FIXED, CARBON, ±5%; 1/4w UNLESS NOTED									
R101	47	70-16-0470	X	X	X	X	X	X	X
R102	100	70-16-0101	X	X	X	X	X	X	X
R103	47	70-16-0470	X	X	X	X	X	X	X
R104	220; 1/2w	1-011-2254	X	X	X	X	X	X	X
R105	820; 1/2w	1-011-2268	X	X	X	X	X	X	X
R106	470	70-16-0471	X	X	X	X	X	X	X
R107	360	70-16-0361	X	X	X	X	X	X	X
R108	100K	70-16-0104	X	X	X	X	X	X	X
R109	180	1-011-2252	X	X	X	X	X	X	X
R110	VAR; 250±20%; CO VERT HGT	70-89-0251	X	X	X	X	X	X	X
R111	12; 1/2w	1-011-2224	X	X	X	X	X	X	X
R112	12; 1/2w	1-011-2224	X	X	X	X	X	X	X
R113	NOT USED								
R114	1.5K; 1/2w	1-011-2274	X	X	X	X	X	X	X
R115	NOT USED								
R116	62K	70-16-0623	X	X	X	X	X	X	X
R117	VAR; 100K±20%; CO BRT ADJ	1-011-5435	X	X	X	X	X	X	X
R118	30K; 1/2w	1-011-2305	X	X	X	X	X	X	X
R119	9.1K	70-16-0912	X	X	X	X	X	X	X
R120	8.2M	70-16-0825	X	X	X	X	X	X	X
R121	100K	70-16-0104	X	X	X	X	X	X	X
R122	VAR; 2.5M±20%; CO FOC ADJ	1-011-5566	X	X	X	X	X	X	X
R123	NOT USED								
R124	510	70-16-0511	X	X	X	X	X	X	X
R125	1K	70-16-0102	X	X	X	X	X	X	X
R126	20K	70-16-0203	X	X	X	X	X	X	X
R127	3.3K	70-16-0332	X	X	X	X	X	X	X
R128	15K	70-16-0153	X	X	X	X	X	X	X
R129	2.4K	70-16-0242	X	X	X	X	X	X	X
R130	56±10%; 3W, WW	70-16-2521	X	X	X	X	X	X	X
R131	1.2; 1/2w	1-011-2520	X	X	X	X	X	X	X
R132	.47±10%; 2w, WW	1-011-1394	X	X	X	X	X	X	X
R133	6.8K	70-16-0682	X	X	X	X	X	X	X
R134	1.8±5%; 2W	1-011-2417	X	X	X	X	X	X	X
R135	NOT USED								
TRANSFORMER									
T1	NOT USED								
T2	HIGH VOLTAGE, TV90	6-003-0605	X						X
	OR HIGH VOLTAGE, TV90/TRW	6-003-0571		X					
	OR HIGH VOLTAGE, TV120	6-003-0599			X		X		
	OR HIGH VOLTAGE, TVX120	6-003-0586				X			X
T101	HORIZ DRIVER	1-017-5402	X	X	X	X	X		X
MISCELLANEOUS									
	CRT SOCKET	1-022-0427	X	X	X	X			X





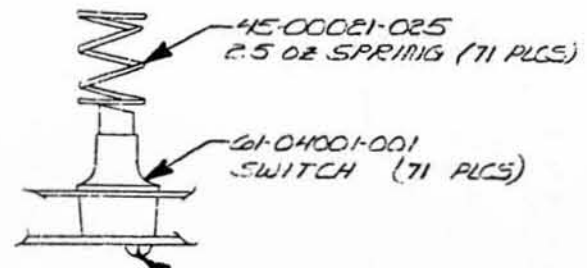
- GENERAL NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS 1/4W, 5%, VALUES IN OHMS.
 2. ALL CAPACITOR VALUES IN MICROFARADS. FOR CAPACITOR TYPES, SEE NOTE #9.
 3. \square DENOTES J101 PC CARD EDGE CONNECTOR.
 4. \rightarrow DENOTES CONNECTION TO OFF BOARD COMPONENTS.
 5. REFERENCE DESIGNATIONS NOT USED: R113, R115
LAST REFERENCE DESIGNATION USED: R134, C124
 6. \triangle PROTECTIVE ARC GAPS ARE AN INTEGRAL PART OF PRINTED WIRE BOARD.
 7. \triangle THE PWB CIRCUIT GROUNDS ARE BROUGHT OUT SEPARATELY TO PINS 1, 5 AND 10 OF J101. PWB CIRCUIT GROUNDS FOR PINS 1 AND 5 OF J101 ARE CONNECTED TOGETHER BY A JUMPER WIRE ON THE BOARD AND ARE CONNECTED TO CHASSIS GROUND VIA A WIRE FROM E110.
 8. THE DATA DISPLAY UNIT IS CONNECTED TO THE SYSTEM GROUND THROUGH PINS 1 AND 10 OF J101. FOR NON-STANDARD GROUNDING TECHNIQUES REFER TO SECTION 2 OF THE SERVICE MANUAL.
 9. \triangle DENOTES HEATSINK
- (DM) = DIPPED MICA
 (CD) = CERAMIC DISC.
 (MY) = MYLAR
 (EA) = ELECTROLYTIC AXIAL
 (ER) = ELECTROLYTIC RADIAL
 (PP) = POLYPROPYLENE
 P3 AND J3 ARE USED ONLY ON THE TVX90 AND TVX120 MODELS.

PRODUCT SAFETY MUST BE CONSIDERED WHEN ANY COMPONENT IS REPLACED IN THIS MONITOR. THE CRITICAL COMPONENTS THAT AFFECT X-RADIATION ARE DENOTED IN THE SHADED AREAS ON THE SCHEMATIC. COMPONENTS IN THE SHADED AREA ARE TO BE REPLACED ONLY WITH EDD DIV. APPROVED COMPONENTS.

THE USE OF SUBSTITUTE COMPONENTS WHICH DO NOT HAVE THE SAME CHARACTERISTICS AS THE EDD DIV. ORIGINAL COMPONENTS MAY CREATE EXCESSIVE X-RADIATION.

Ball		TITLE		SCHEMATIC	
		TV-90/120 DC		12 VOLT	
DRAFTSMAN	SIGNATURE	DATE	SIZE	DRAWING NO	REV
CHKR			D	I-024-0584	B
DESIGNER			UNDO ON	SCALE	SHEET
ENGINEER				NONE	1 OF 2

EFF.	REV.	ECO	BY	DESCRIPTION	APP.	DATE
~	~	~	KL	PROTC RELEASE 7/19/78	KL	7/19/78



INSTALL SWITCHES
IN STEPPED POSITION



DETAIL "A"

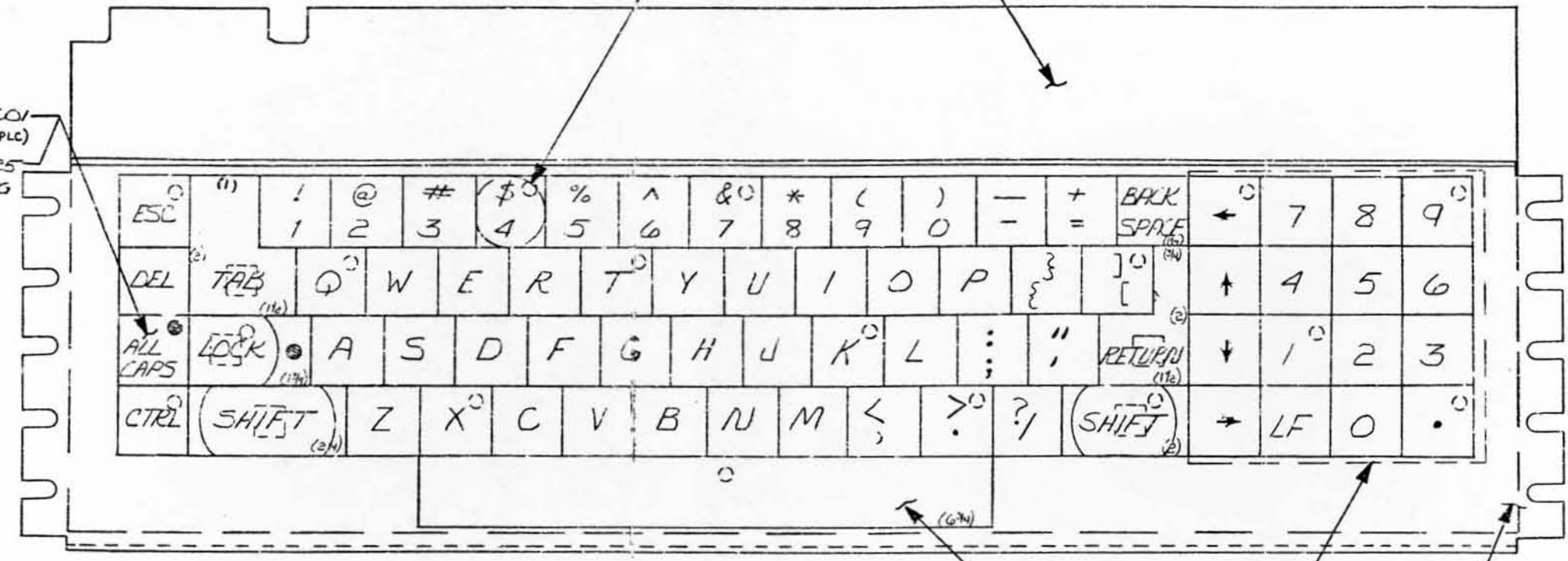
47-00192-000
SCREW (17 PLCS)

SEE DETAIL "A"

PCB

61-04005-001
SWITCH (1 PLC)

45-00024-025
2.5 OZ SPRING
(1 PLC)



44-00104-001
SIB LEVELING BAR

44-00103-000
SIB LEG (2 PLCS)

44-00102-000
SIB MOUNT

GGGG-13P1-1070-3602

49-00679-000
MOUNT PLATE

KDW 2 IBM SCULPTURED
(16 PLCS)

-001 ASSY

**PRELIMINARY
FOR INFORMATION ONLY
NOT A RELEASED DRAWING**

JUL 31 1978

3. KYBD IS LOW PROFILE STEPPED UNLESS OTHERWISE MARKED.
2. FLUIDERS ARE CENTER LOCATED UNLESS OTHERWISE SHOWN.
1. APPLY "DATE SERIAL NO." ADHESIVE TAG TO COMPONENT SIDE OF PCB.
- NOTES:

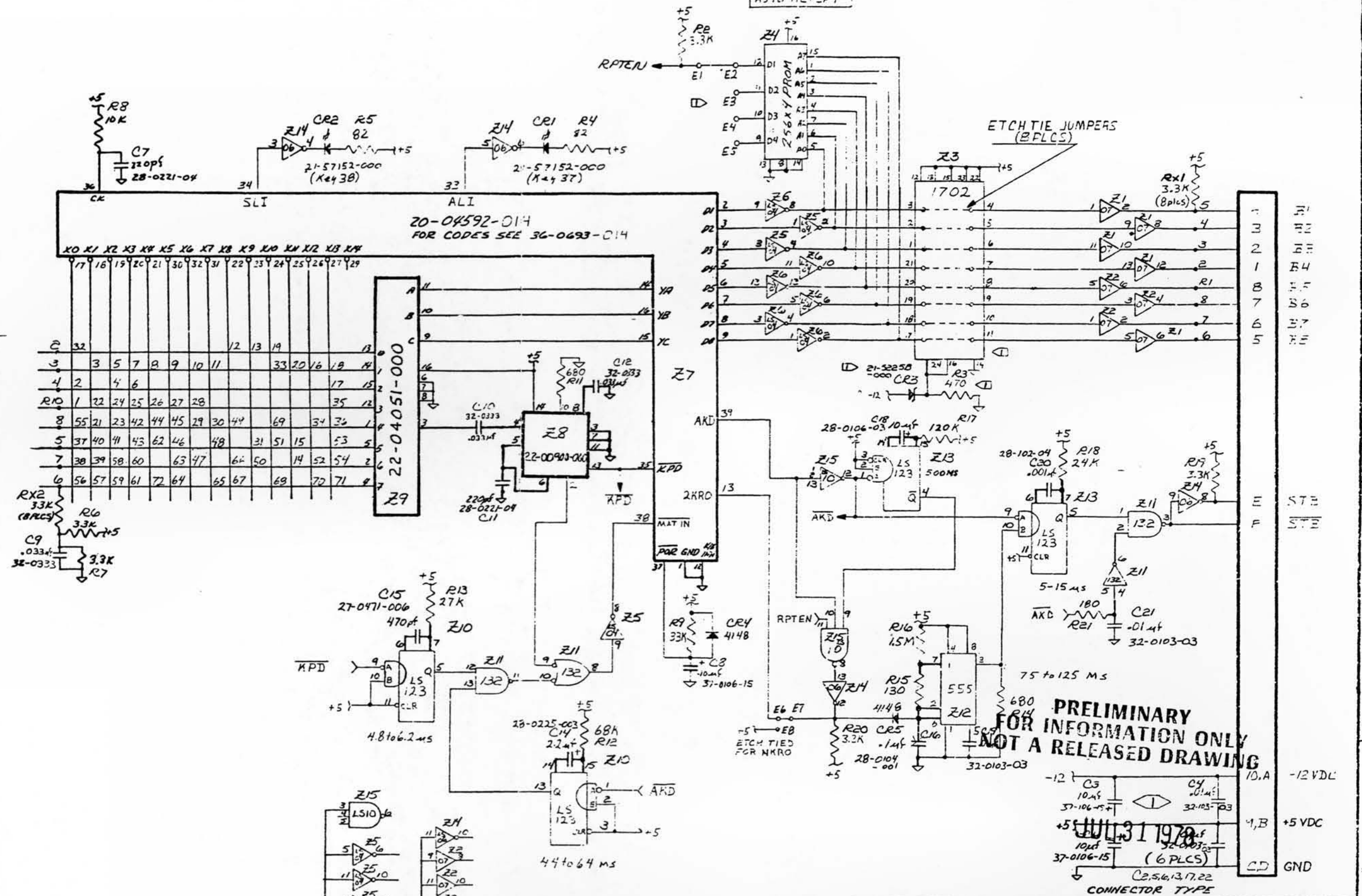
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INFORMATION CONTAINED HEREIN IS PROPRIETARY AND IS THE PROPERTY OF KEY TRONIC CORPORATION. IT IS TO BE FURNISHED WITH A REPRODUCTION OF THE ORIGINAL DRAWING FOR THE PURPOSES OF INSPECTION, INSTALLATION, OR MAINTENANCE. WHEN FURNISHED TO A CUSTOMER, IT SHALL BE USED ONLY IN THE PERFORMANCE OF WORK CONTRACTED FOR BY THE COMPANY. THE INFORMATION SHALL NOT BE USED OR DISCLOSED BY THE RECIPIENT FOR ANY OTHER PURPOSE WHATSOEVER.

MANUFACTURE PARTS AND/OR ASSY'S PER K.T.C. DOCUMENT:
M011

UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN INCHES		TOL. EXCEPT AS NOTED	ITEM	PART NO.	DESCRIPTION	QTY.
XXX	DIMENSION NOT TO SCALE	HOLE DIA.	SCALE	TITLE		
USED ON	RELEASED	FRACT. = 1/64"		MECH. & KEYTOP ASSY		
VICTOR	APP: YJK 7/19/78	XX = .01"				
GRIP/HK	CH. 104 7-19-78	XXX = .005"				
	DR. K.L. 7.5.81	ANG. = 1°				

key tronic corporation
SPOKANE, WASH., U.S.A.

DWG. NO. 65-018-42
SHEET OF 3



1 CUSTOMER INSTALLED PART

NOTES:

SPARE GATES

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MANUFACTURE PARTS AND/OR ASSY'S PER K.T.C. DOCUMENT: FTP 36-0442

ITEM	PART NO.	DESCRIPTION	QTY.
XXX		UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN INCHES	
USED ON		DIMENSION NOT TO SCALE	
VECTOR GRAPHICS		RELEASED	
		APP. T.P.R. 11-0-3	
		CH. R.S. 7-6-3	
		DR. C.M. 7-5-3	
TITLE		SCHEMATIC	
DWG. NO.		35-1292	
SHEET		OF	
key tronic corporation		SPOKANE, WASH., U.S.A.	

		D		E															
EFF.	REV.	ECO	BY	DESCRIPTION	APP	DATE													
1B		21 31 21 31	00 32 40 32	23 33 23 33	24 34 24 34	25 35 25 35	5E 36 5E 36	26 37 26 37	2A 38 2A 38	28 39 28 39	29 30 29 30	5F 2D 5F 2D	2B 3D 2B 3D	08	17	37	38	39	
7F	09	11 51 71	17 57 77	05 45 65	12 52 72	14 54 74	19 59 79	15 55 75	09 49 69	0F 4F 6F	10 50 70	1D 7D 7B	A1 B1 E1 F1		7E 60 7E 60	34	35	36	
ALL CAPS	LOCK	01 01 41 61	13 13 53 73	04 04 44 64	06 06 46 66	07 07 47 67	08 08 48 68	DA DA 4A 6A	OB OB 4B 6B	OC OC 4C 6C	3A 3B 3A 3B	22 27 22 27	OD	82 92 82 92	31	32	33		
CTRL	SHIFT	1A 1A 5A 7A	1B 1B 5B 7B	03 03 43 63	16 16 56 76	02 02 42 62	0E 0E 4E 6E	OD OD 4D 6D	3C 2C 3C 2C	3E 2E 3E 2E	3F 2F 3F 2F	SHIFT	1A 0A	30	2E				
				20															

XX
 XX
 XX
 XX
 XX

SHIFT CTRL
 CTRL
 SHIFT
 UNSHIFT

KEY NUMBER

LOGIC IS POSITIVE

NOTICE OF PROPRIETARY INFORMATION
 INFORMATION CONTAINED HEREIN IS
 PROPRIETARY AND IS PROPERTY OF KEY
 TRONIC CORPORATION AND IS FURNISHED
 WITH A PROPOSAL. THE RECIPIENT SHALL
 USE IT SOLELY TO EVALUATE THE PROPOSAL
 WHERE FURNISHED TO A CUSTOMER.
 IT SHALL BE USED SOLELY FOR PURPOSES
 OF INSPECTION, INSTALLATION, OR MAINTENANCE
 WHERE FURNISHED TO A SUPPLIER. IT SHALL BE USED SOLELY IN THE
 PERFORMANCE OF WORK CONTRACTED FOR BY THIS COMPANY.
 THE INFORMATION SHALL NOT BE USED OR
 DISCLOSED BY THE RECIPIENT FOR
 ANY OTHER PURPOSE WHATSOEVER.

MANUFACTURE PARTS
 AND/OR ASSY'S PER
 K.T.C. DOCUMENT:

UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN INCHES	
.XXX DIMENSION NOT TO SCALE	
USED ON VECTOR GRAPHICS 1892	RELEASED
	APP.
	CH.
DR. CM	7-17-8

TOL. EXCEPT AS NOTED	ITEM	PART NO.	DESCRIPTION	QTY.
HOLE DIA.	SCALE	TITLE	HEX CODE CHART	
XX ± .01" XXX ± .005" ANG. ± 1°			DWG. NO. 36-00942	
key tronic corporation SPOKANE, WASH., U.S.A.			SHEET	OF B