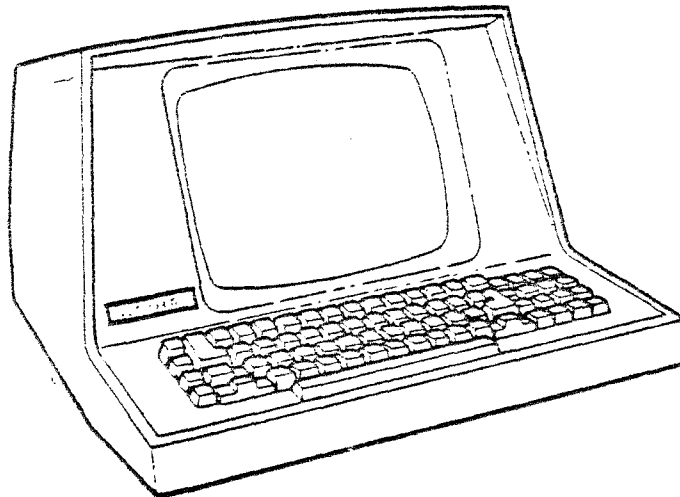


VECTOR 3

HARDWARE

MANUAL



VECTOR
VECTOR GRAPHIC, INC.

VECTOR 3 HARDWARE MANUAL

REVISION A

AUGUST 18, 1980

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Vector 3 Hardware Manual

FOREWORD

Audience	This manual is intended for dealers, distributors, salespersons, consultants, and service personnel. It requires a minimum of technical knowledge.
Scope	It describes what the Vector Graphic Vector 3 hardware consists of, the function of the hardware, how to adjust and test the hardware components, and some preliminary troubleshooting procedures for these components. This manual is intended for use with Vector 3 microcomputers built with the C. Itoh video subassembly.
Organization	For many dealers and users, no other hardware manuals will be necessary, though technicians will make use of the more technical publications. Users will reference specific software manuals, depending on the particular application.



TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
Table of Contents	
List of Illustrations	
Hardware Specifications	
I. Perspective	
1.1 Introduction.....	1-1
II. Video Console	
2.1 Video Monitor.....	2-1
2.1.1 External Controls.....	2-1
2.1.2 Adjusting Procedures for Video Monitor.....	2-1
2.1.3 Cables.....	2-6
2.1.3.1 Cable Routing.....	2-6
2.2 Keyboard.....	2-7
2.2.1 Keyboard Connection.....	2-7
2.2.2 Keyboard Code Conversion.....	2-7
III. Mainframe	
3.1 Power Supply.....	3-1
3.1.1 Troubleshooting.....	3-1
3.1.1.1 Preliminary Checkout (Without Power).....	3-1
3.1.1.2 Preliminary Checkout (With Power).....	3-3
3.2 Motherboard.....	3-4
3.2.1 S-100 Bus Termination.....	3-5
IV. Appendix	
S-100 Bus Pin List.....	4-1

LIST OF ILLUSTRATIONS

<u>Figure</u>	<u>Title</u>	<u>Page</u>
2-1	Vector 3 Video Console	1-2
3-1	Vector 3 Mainframe	2-2
3-2	Vector 3 Card Cage	3-2

Vector 3 Hardware Manual

Hardware specifications

POWER

For one unit

Voltage option	115 VAC +/-10%	220 VAC +/-10%
Frequency	60 Hz +/-0.5%	50 Hz +/-0.5%
Current, Operating	3 Amps	1.5 Amps
Current, Surge	15 Amps	7.5 Amps
Power Dissipation	350 Watts	350 Watts
Heat Generation	1200 BTU	1200 BTU

VIDEO MONITOR

Screen Size	12-inch diagonal CRT
Resolution	850 lines at center (mean) 700 lines at borders (mean)
Bandwidth	16MHz +3dB
Video Interface	Separate TTL video and sync
Compatibility of Video	Compatible with Vector Graphic Flashwriter I and II alphanumeric video display boards and most other alphanumeric video display boards
	Not compatible with Vector Graphic High Resolution Graphics Board
External Controls	Contrast
Internal Controls	Vertical hold Vertical height Vertical linearity Vertical Centering Focus Brightness Horizontal Centering

KEYBOARD

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

DIMENSIONS AND WEIGHT

	Height inches/cm	Depth* inches/cm	Width inches/cm	Weight lbs/kg
Console	12.8/32.4	18/45.7	21/53.3	22/10

* Dimensions do not include requirement for cabling, typically 4 in./10.2 cm

I. PERSPECTIVE

1.1 Introduction

The Vector 3 is a general purpose, full featured microcomputer featuring a video console with a keyboard featuring a 10-key number pad; a chassis with a heavy duty power supply and a 6-slot, fully terminated S-100 motherboard housed entirely within the console cover. For the purpose of definition, a Vector 3 is a subassembly of several systems, specifically the System VIP, the System 2800, and the System 3030. While the Vector 3 is a complete microcomputer system, many of its components are already covered in other documents; see the list below for further references.

1) 64K Memory Board; documented in the 64K Memory Board Dynamic RAM User's Manual.

2) ZCB Single Board Computer; documented in the ZCB Single Board Computer User's Manual.

3) Flashwriter II Video Board; documented in the Flashwriter II User's Manual.

4) The disk controller board appropriate for your system will be discussed in your system overview manual.

This manual will fully discuss the following subsystems:

1) Keyboard and video monitor display (See Figure 2-1).

2) Power Supply (See Figure 3-1).

3) Shielded S-100 6-Slot Motherboard (See Figure 3-2).

II. VIDEO CONSOLE

2.1 Video Monitor

The video monitor (CRT) portion of the Vector 3 (See Figure 2-1) has up to 850 lines resolution and 16MHz bandwidth. All elements of display are adjustable. Adjustment procedures are found later in this manual.

The CRT monitor portion of the Vector 3 requires that the Video information be provided at TTL levels as separate video horizontal sync and vertical sync. This is provided by the Vector Graphic Flashwriter video boards.

Operation of the video monitor (CRT) is very straightforward. The power to the monitor is provided by the computer power supply and is thus switched on and off by the computer power switch located on the rear panel of the console mainframe (See Figure 3-1).

Every video monitor comes supplied with a special glare reduced screen to eliminate annoying reflections and glare.

2.1.1 External Controls

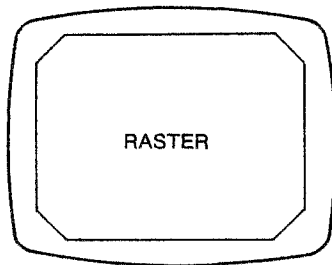
The only external control pertaining to the video monitor is the contrast control located on the rear panel of the console chassis (See Figure 3-1).

2.1.2 Adjusting Procedures for Video Monitor.

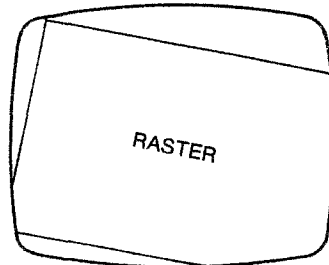
Normally, no adjustment of the monitor screen should be required as it is adjusted at the factory. However, if adjustment is required for any reason, the following explanation of the functions of the various adjustments is provided. All the adjustments except the last two must be made inside the console,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

A display which can be used to check adjustment is obtained by depressing the reset button (See Figure 3-1) on the rear of the console to call up the Monitor Executive then by typing Z F000 F7FF 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.



0001



0002

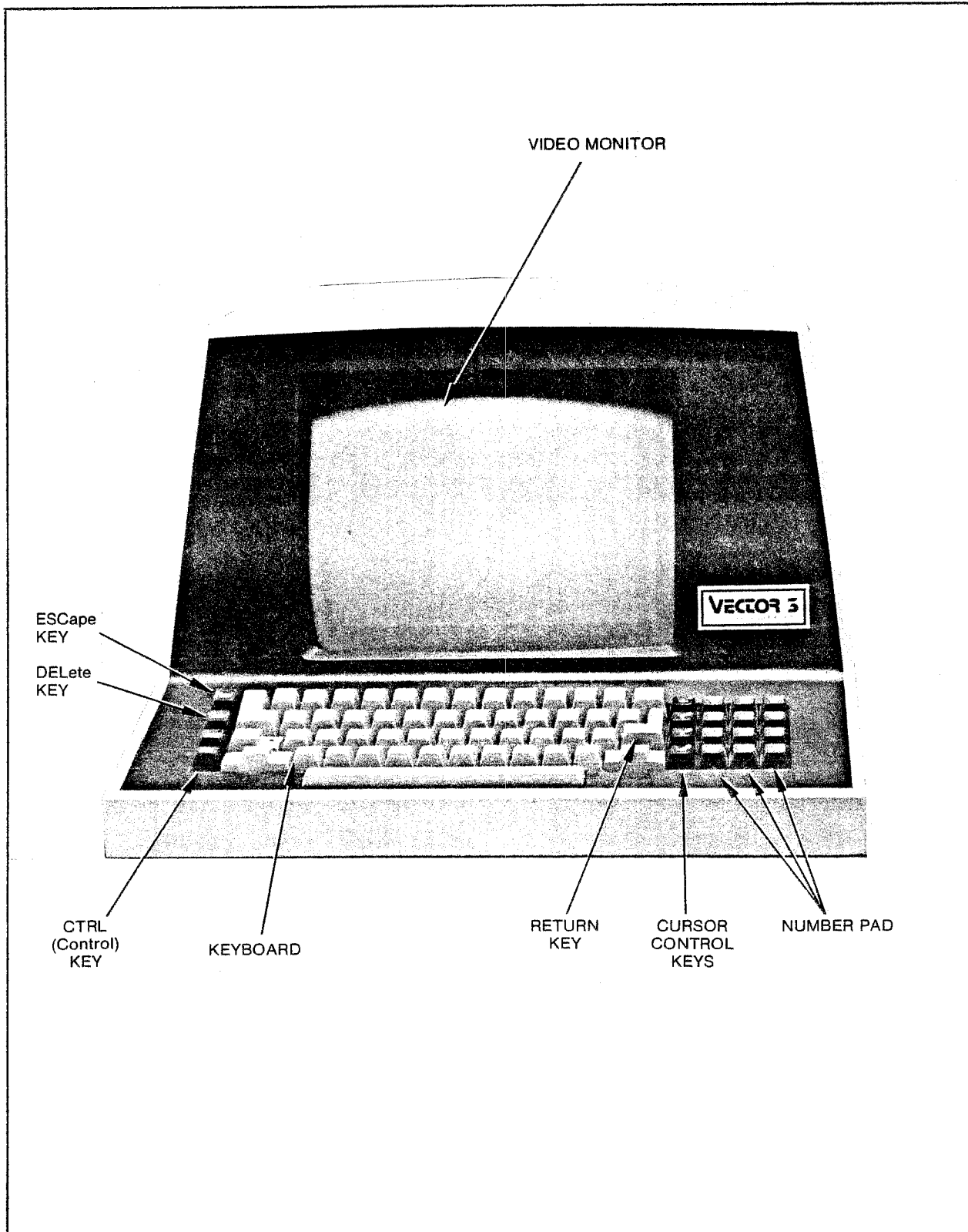
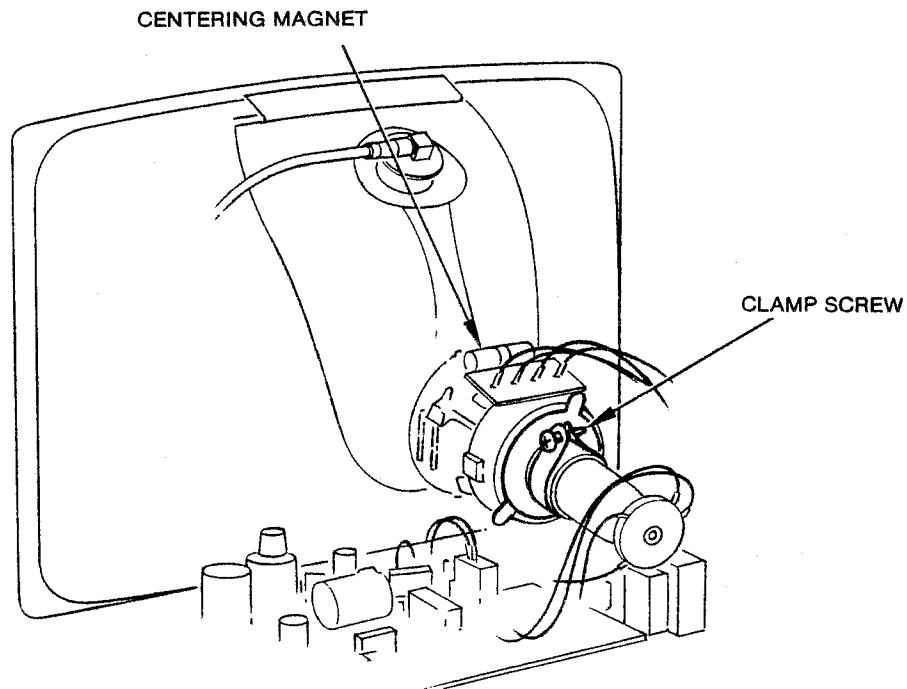


Figure 2-1 Vector 3 Video Console

Adjustment for this is made by first loosening the clamp screw holding the yoke and positioning it properly.

WARNING

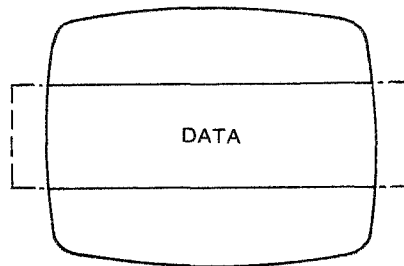
DO NOT TOUCH ANY OF THE ELECTRICAL TERMINALS ON THE TUBE OR YOKE, AS HIGH VOLTAGES ARE PRESENT.



0011

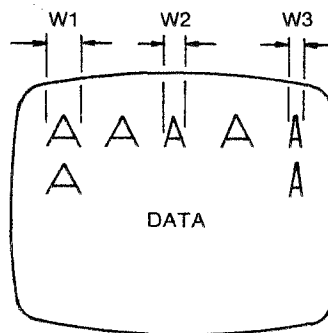
Vector 3 Hardware Manual

2. If the width of the display is improper, adjust the core of the width coil (L102) on the P.C. board.



0004

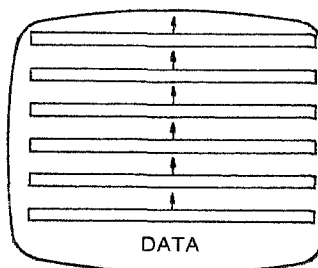
3. When data linearity in the horizontal direction is not good,



0003

turn the core of the horizontal linearity coil (L103) so that $W1=W2=W3$.

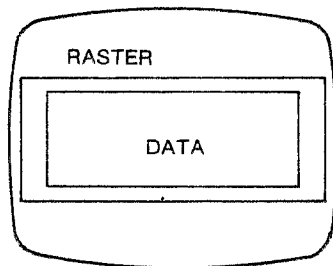
4. When the data runs in the vertical direction,



0005

turn the V. Hold pot with a screwdriver and stop data display.

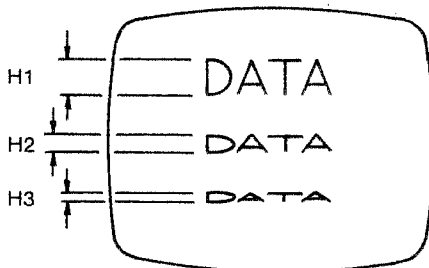
5. When the vertical size (height) of data is not proper,



0006

turn the Height pot (VR102) with a screwdriver to adjust the height as required.

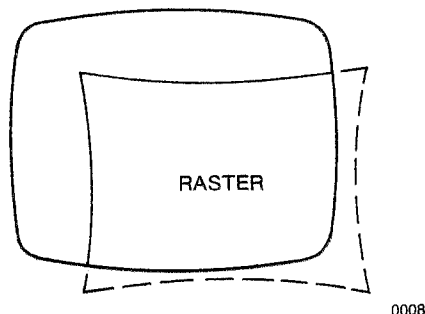
6. When vertical linearity of data is not good,



0007

turn the V. LIN pot (VR103) with a screwdriver so that $H1=H2=H3$.

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 (VR105) with a screwdriver so that focusing of the entire picture is optimum.

9. The correct adjustment of the Brightness pot (VR104) 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.

11. The horizontal position 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.

2.1.3 Cables

Standard cables provided with the Vector 3 are the Flashwriter II cables, Keyboard cable, and Line cord.

2.1.3.1 Cable Routing

See figure 3-1 and figure 3-2 for an illustration of proper cable routing. Instructions for cable routing are as follows:

1) Cable from keyboard (See Figure 3-2) should be attached to J1 of the Flashwriter board.

2) Cable from Video Monitor Interface Board (See Figure 3-2) should be attached to the 6-pin molex connector on Flashwriter II board (smooth side out).

- 3) Disk controller cable will be attached to disk controller board. See disk controller board manual for details.
- 4) A serial interface cable (See Figure 3-2) may be connected to the 16-pin output connector on the ZCB board.
- 5) If the system is equipped with a printer, a small printed circuit board may be installed on the twin parallel port connector on the ZCB board.
- 6) If the System is equipped with a Bitstreamer board, other cables may be present.

The following information is provided to inform users about the operation of the monitor. The "Interface Board" refers to the small PC board at the rear and inside the Video Monitor.

INTERCONNECT CABLE - VIDEO MONITOR / INTERFACE BOARD

<u>SIGNAL</u>	<u>MONITOR 10 PIN EDGE</u>	<u>WIRE COLOR</u>	<u>PIN DESTINATION</u>
HORZ GND	1	WHITE	P2 Flash II Bd and contrast control
H SYNC	6	PURPLE	P3 FLASH II Bd
V SYNC	7	GREEN	+12VDC
VIDEO	8	BLUE	Center tap- contrast control
V SYNC	9	RED	P4 FLASH II Bd
VIDEO GND	10	WHITE	GND

INTERCONNECT CABLE - KEYBOARD / FLASHWRITER BOARD

<u>Flashwriter board 24 PIN DIP-J1</u>	<u>SIGNAL</u>	<u>KEYBOARD DUAL TEN PIN EDGE</u>
7	DATA1	4
8	DATA3	2
9	-V REG	10
12	STROBE	E
13	GND	C,D
14	DATA4	1
15	DATA6	7
16	DATA7	6
17	DATA2	3
19	DATA8	5
20	DATA5	8
24	Vcc	9

2.2 Keyboard

The keyboard (See figure 2-1) provided with the Vector 3 is a standard typewriter keyboard with a 10 key number pad.

2.2.1 Keyboard Connection

The keyboard is connected to the Flashwriter II board by a 24-pin dip plug (See Figure 3-2) to socket J1 near the lower right-hand corner of the board (side facing rear of chassis).

NOTE:

If the keyboard fails, check connector at both ends of the keyboard cable.

2.2.2 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 4.X Monitor PROM, which is the companion PROM for this keyboard. Furthermore this PROM version accepts the codes generated by the cursor control keys.

III. MAINFRAME

The Vector 3 Mainframe (See Figure 3-1) contains a CRT (Video) monitor, a power supply, and a 6-slot motherboard (See Figure 3-2). The on-off switch and the reset button are also located on the rear panel of the mainframe (See Figure 3-1).

3.1 Power Supply

The Vector 3 power supply (See Figure 3-1) consists of two 12,000 uF Computer Grade capacitors, a 28,000 uF Computer Grade capacitor, and a 110V/220V Switchable Transformer.

3.1.1 Troubleshooting

This section is provided for reference. The chassis has been completely tested at the factory.

WARNING

THIS POWER SUPPLY USES 110V AC, WHICH IS A POTENTIALLY LETHAL VOLTAGE LEVEL. EXTREME CAUTION MUST BE EXERCISED WHEN WORKING WITH THESE CIRCUITS WHEN POWER IS APPLIED. IT IS SUGGESTED THAT THE USER ALWAYS KEEP ONE HAND IN HIS POCKET WHILE WORKING ON THE POWER SUPPLY. NEVER MAKE OHMMETER OR CONTINUITY MEASUREMENTS WHILE POWER IS APPLIED.

3.1.1.1 Preliminary Checkout (Without Power)

WARNING

DO NOT APPLY POWER DURING THESE TESTS AS HIGH VOLTAGES ARE PRESENT

Review schematic diagram and drawing (Figure 3-1) to ensure that the power supply is wired correctly. Check all connectors for mechanical integrity, such as the screw terminals on the electrolytic capacitors and the motherboard. A loose or unterminated wire can cause serious damage to the computer and present a safety hazard to the user.

Using an ohmmeter, check the continuity between the linecord receptacle ground terminal and the negative terminal of the 12,000 uF capacitor. Continuity (0 ohms) should be indicated between these points. Now measure from the capacitor to some bare metal portion of the chassis. Continuity should also be indicated here.

With the ohmmeter on the X1 scale, measure across the 28,000 uF capacitor. If a short is indicated, reverse the leads of the ohmmeter and repeat the measurement. The correct indication of the ohmmeter will be a slowly increasing value of resistance (in the order of minutes) to a final value of infinity. If a short is indicated at both times, then either the capacitor is shorted or there is a wiring error.

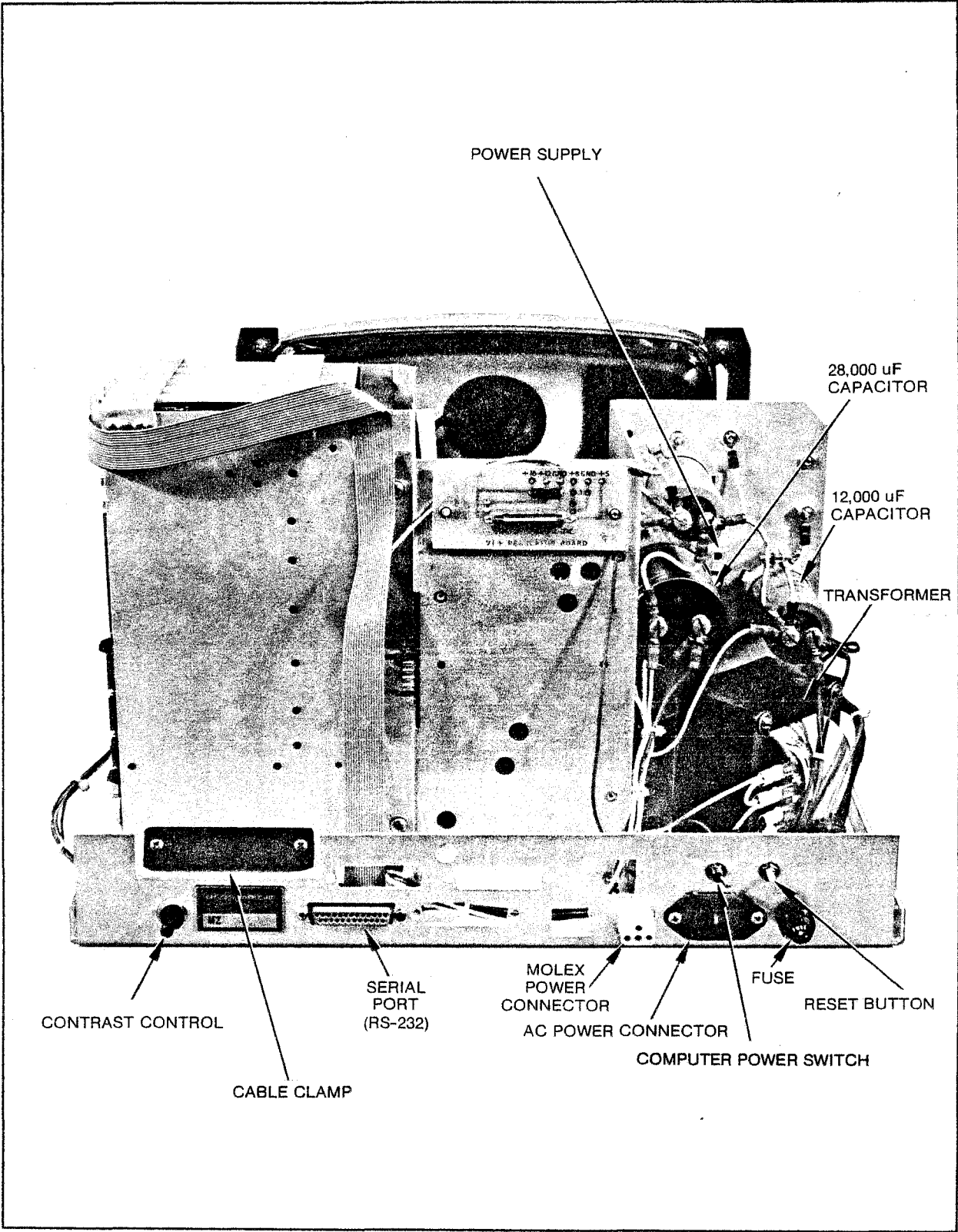
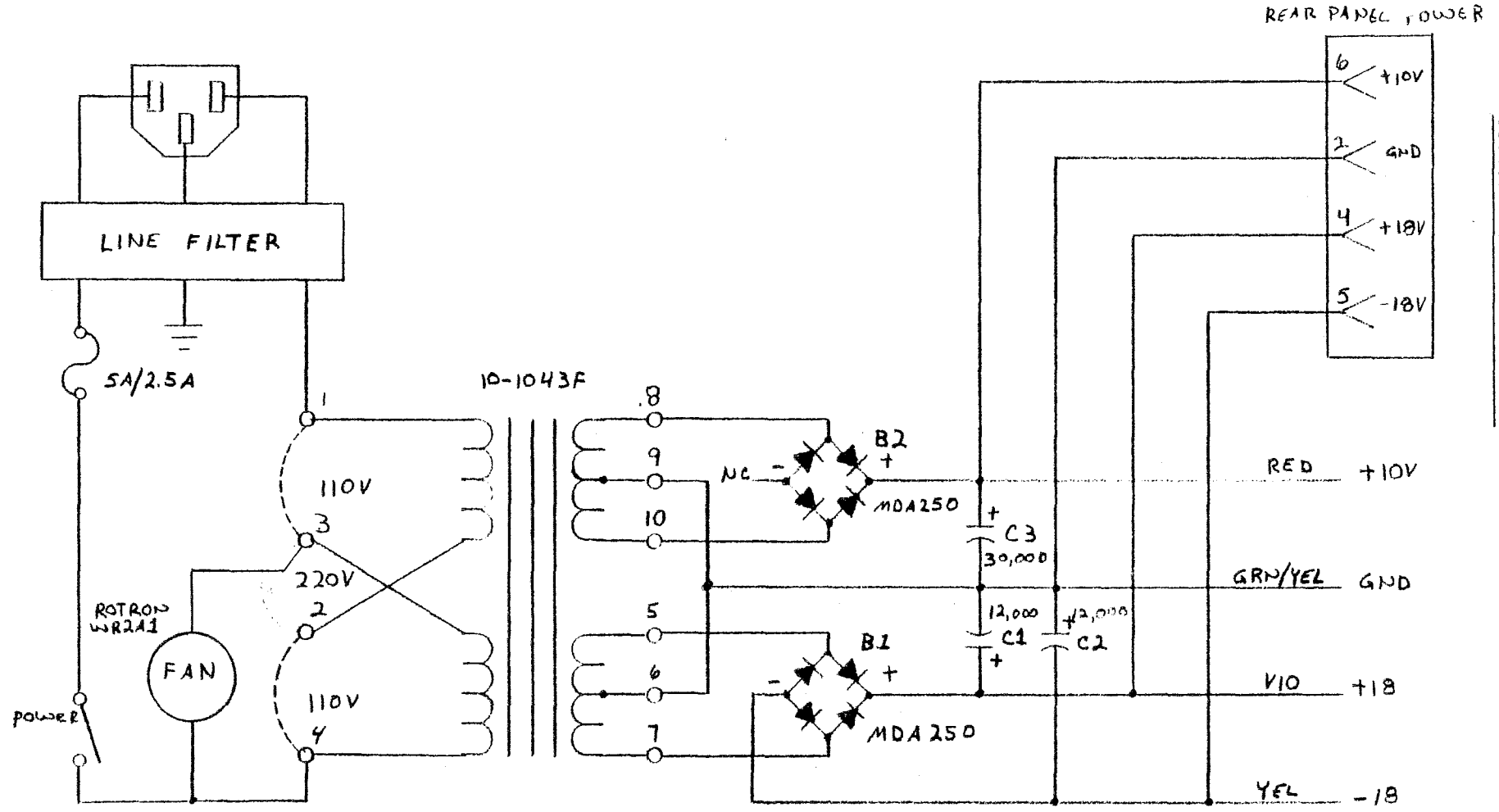


Figure 3-1 Vector 3 Mainframe



For 110V: Jumper 1 to 3 and 2 to 4
 For 220V: Jumper 2 to 3 only

VECTOR 3 POWER SUPPLY SCHEMATIC

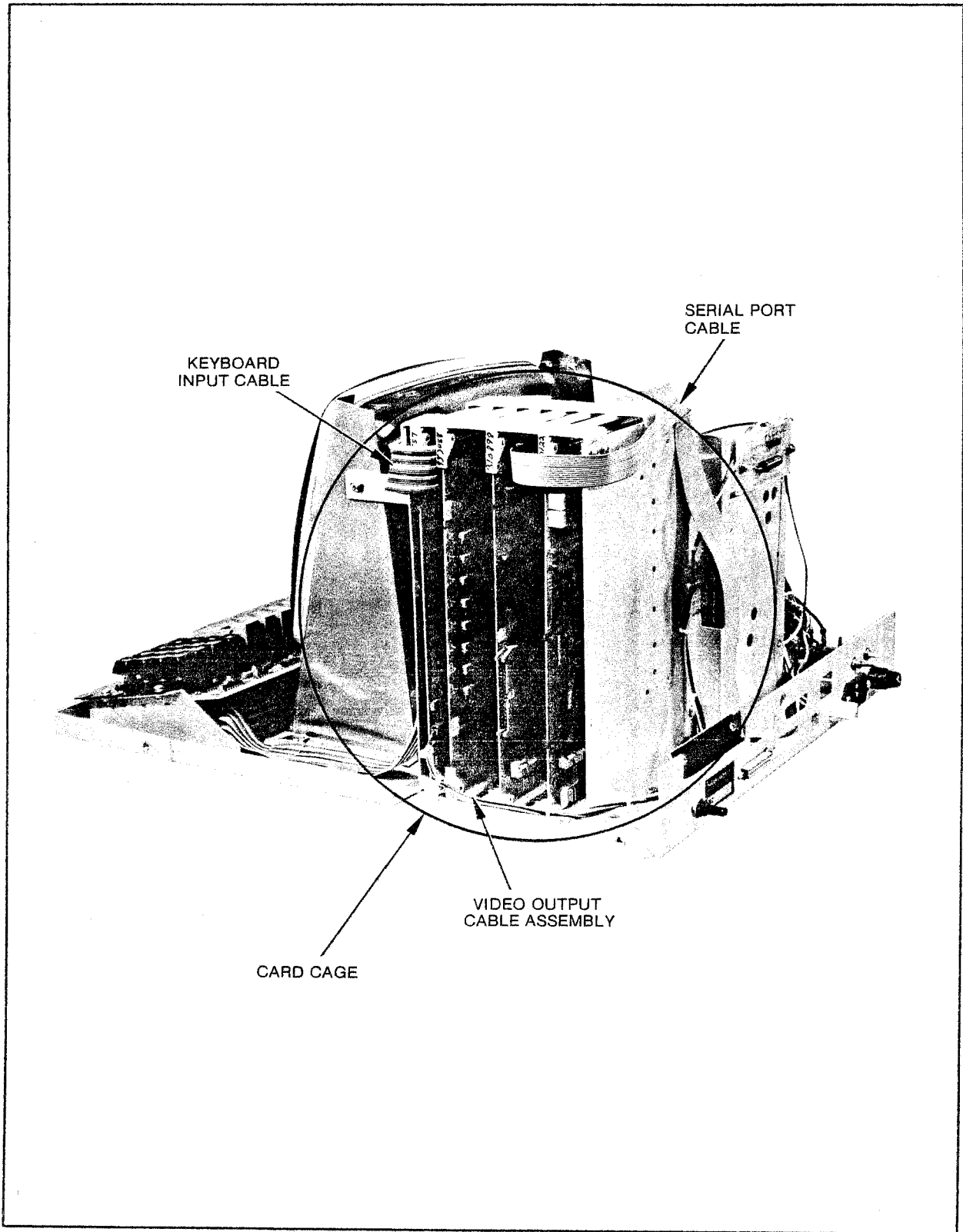


Figure 3-2 Vector 3 Card Cage

Repeat the above test on each of the two 12,000 uF capacitors. The final value of resistance for these tests should be 820 ohms + 20%. Therefore, adjust the scale of the ohmmeter accordingly. The response time will be much shorter for these capacitors.

3.1.1.2 Preliminary Checkout (With Power)

Before applying power to the computer, remove all plug-in circuit boards. Ensure that the fuse is installed and that the power switch is off. Connect the AC linecord and turn on the power switch. Listen for any crackling sounds or very loud buzzing in the transformer. Immediately disconnect power by unplugging the linecord if any unusual sounds are noted or if arcing is apparent.

Correct operation of the power supply shall be indicated by the fan running and both pilot lights on. With a voltmeter, check each of the power supply voltages. They should read as follows:

NOMINAL VOLTAGE	ACCEPTABLE LIMITS
+8V	+7.5 TO +11V
+16V	+15 TO +20V
-16V	-15 TO -20V

Any voltage reading out of the acceptable limits indicates a failure in that circuit. The most likely failures, after wiring errors have been eliminated, are defective diodes or transformers.

After the voltages have been tested at the power supply, carefully check for these voltages on the motherboard. They can be found on the following pins:

BUS VOLTAGE	BUS PIN
+8V	1, 51
+16V	2
-16V	52
GROUND	50, 100

Incorrect reading here could damage circuit boards when they are installed. If any wrong voltages are found, carefully check wiring to the motherboard.

3.2 Motherboard

The Vector 3 Motherboard (See figure 3-2) has 6 slots, is based on the S-100 bus structure, and is designed to provide a number of features not previously available.

Vector Graphic motherboards are supplied with bus terminators. Not to be confused with so called "active" terminators, full-time termination is provided.

The Vector 3 motherboard has the following features.

- 1) Industry standard S-100 bus structure.
- 2) 0.75 center-to-center spacing between connectors.
- 3) Extra heavy 0.93" warp resistant G-10 epoxy board.
- 4) Full groundplane reduces noise on bus lines.
- 5) Traces on back of board only.
- 6) Less risk of shorts from conductive item being inadvertantly dropped during operation.
- 7) Reduced capacitance between traces.
- 8) Solder masked to reduce risk of solder bridges during assembly.
- 9) Bus termination.

Vector 3 Hardware Manual

3.2.1 S-100 Bus Termination

The terminators provided are 220 ohm pull-up (to +5V) and 330 ohm pull-down (to GND).

TABLE 1
LINES TERMINATED

24 - O2	38 - DO4	68 - MWRITE	88 - DO2
25 - O1	39 - DO5	76 - PSYNC	89 - DO3
26 - PHLDA	40 - DO6	77 - PWR	90 - DO7
27 - PWAIT	41 - D12	78 - PDBIN	91 - D14
29 - A5	42 - D13	79 - A0	92 - D15
30 - A4	43 - D17	80 - A1	93 - D16
31 - A3	44 - SML	81 - A2	94 - D11
32 - A15	45 - SOUT	82 - A6	95 - D10
33 - A12	46 - SINP	83 - A7	96 - SINIA
34 - A9	47 - SMEMR	84 - A8	97 - SWO
35 - DO1	48 - SHLTA	85 - A13	
36 - DO0	49 - CLK	86 - A14	
37 - A10	58 - SXTRQ	87 - A11	

IV APPENDIX

S-100 Bus Pin List

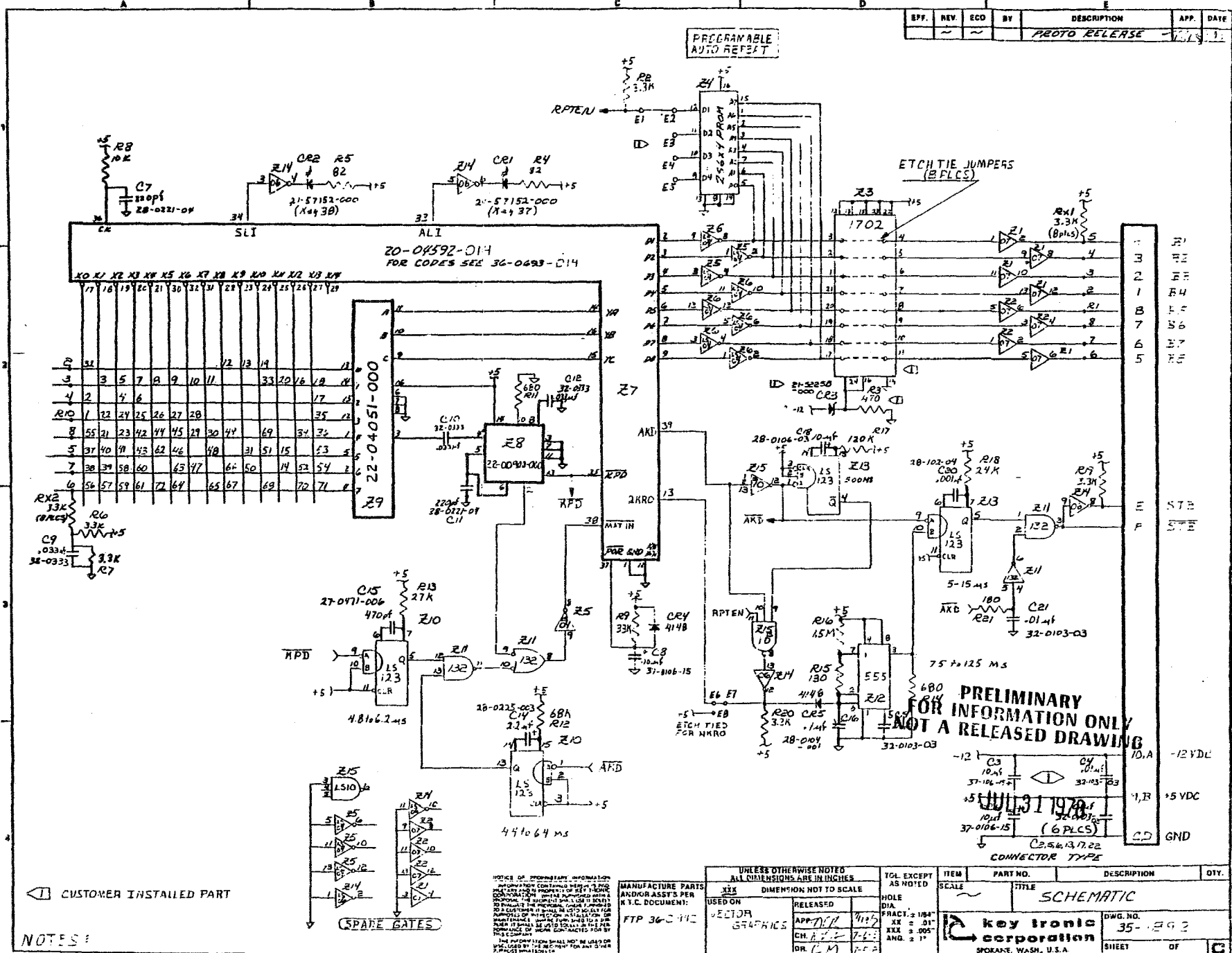
PIN NO.	SIGNAL & TYPE	ACTIVE LEVEL	DESCRIPTION
1	+8 VOLTS (B)		Instantaneous minimum greater than 7 volts, instantaneous maximum less than 25 volts, average maximum less than 11 volts.
2	+16 VOLTS (B)		Instantaneous minimum greater than 14.5 volts, instantaneous maximum less than 35 volts, average maximum less than 21.5 volts.
3	XRDY (S)	H	One of two ready inputs to the current bus master. The bus is ready when both these ready inputs are true. See pin 72.
4	VI0*(S)	L	O.C. Vectored interrupt line 0.
5	VI1*(S)	L	O.C. Vectored interrupt line 1.
6	VI2*(S)	L	O.C. Vectored interrupt line 2.
7	VI3*(S)	L	O.C. Vectored interrupt line 3.
8	VI4*(S)	L	O.C. Vectored interrupt line 4.
9	VI5*(S)	L	O.C. Vectored interrupt line 5.
10	VI6*(S)	L	O.C. Vectored interrupt line 6.
11	VI7*(S)	L	O.C. Vectored interrupt line 7.
12	NMI*(S)	L	O.C. Non-maskable interrupt.
13			
14			
15	A18 (M)	H	Extended address bit 18.
16	A16 (M)	H	Extended address bit 16.
17	A17 (M)	H	Extended address bit 17.
18	SDSB* (M)	L	O.C. The control signal to disable the 8 status signals.
19	CDSB* (M)	L	O.C. The control signal to disable the 5 control output signals.
20	GND (B)		Common with pin 100.
21	NDEF		Not to be defined. Manufacturer must specify any use in detail.
22	ADSB* (M)	L	O.C. The control signal to disable the 16 address signals.
23	DODSB* (M)	L	O.C. The control signal to disable the 8 data output signals.
24	Φ (B)	H	The master timing signal for the bus.
25	pSTVAL*(M)	L	Status valid strobe.
26	PHLDA (M)	H	A control signal used in conjunction with HOLD* to coordinate bus master transfer operations.
27	RFU		Reserved for future use.
28	RFU		Reserved for future use.
29	A5 (M)	H	Address bit 5.
30	A4 (M)	H	Address bit 4.
31	A3 (M)	H	Address bit 3.
32	A15 (M)	H	Address bit 15 (most significant for non-extended addressing.)
33	A12 (M)	H	Address bit 12.
34	A9 (M)	H	Address bit 9.
35	DO1 (M)/DATA1 (M/S)	H	Data out bit 1, bidirectional data bit 1.
36	DO0 (M)/DATA0 (M/S)	H	Data out bit 0, bidirectional data bit 0.
37	A10 (M)	H	Address bit 10.
38	DO4 (M)/DATA4 (M/S)	H	Data out bit 4, bidirectional data bit 4.
39	DO5 (M)/DATA5 (M/S)	H	Data out bit 5, bidirectional data bit 5.
40	DO6 (M)/DATA6 (M/S)	H	Data out bit 6, bidirectional data bit 6.
41	DI2 (S)/DATA10 (M/S)	H	Data in bit 2, bidirectional data bit 10.
42	DI3 (S)/DATA11 (M/S)	H	Data in bit 3, bidirectional data bit 11.
43	DI7 (S)/DATA15 (M/S)	H	Data in bit 7, bidirectional data bit 15.
44	sm1 (M)	H	The status signal which indicates that the current cycle is an op-code fetch.
45	sOUT (M)	H	The status signal identifying the data transfer bus cycle to an output device.
46	sINP (M)	H	The status signal identifying the data transfer bus cycle from an input device.
47	sMEMR (M)	H	The status signal identifying bus cycles which transfer data from memory to a bus master, which are not interrupt acknowledge instruction fetch cycle(s).
48	sHLTA (M)	H	The status signal which acknowledges that a HLT instruction has been executed.
49	CLOCK(B)		2 MHz (0.5%) 40-60% duty cycle. Not required to be synchronous with any other bus signal.
50	GND (B)		Common with pin 100.
51	+8 VOLTS (B)		Common with pin 1.
52	-16 VOLTS (B)		Instantaneous maximum less than -14.5 volts, instantaneous minimum greater than -35 volts, average minimum greater than -21.5 volts.
53	GND (B)		Common with pin 100.
54			
55	FAST RESET		

Vector 3 Hardware Manual

PIN NO.	SIGNAL & TYPE	ACTIVE LEVEL	DESCRIPTION
56			
57			
58	sXTRQ* (M)	L	The status signal which requests 16-bit slaves to assert SIXTN*.
59	A19 (M)	H	Extended address bit 19.
60	SIXTN* (S)	L	O.C. The signal generated by 16-bit slaves in response to the 16-bit request signal sXTRQ*.
61	A20 (M)	H	Extended address bit 20.
62	A21 (M)	H	Extended address bit 21.
63	A22 (M)	H	Extended address bit 22.
64	A23 (M)	H	Extended address bit 23.
65	NDEF		Not to be defined signal.
66	NDEF		Not to be defined signal.
67	PHANTOM* (M/S)	L	O.C. A bus signal which disables normal slave devices and enables phantom slaves—primarily used for bootstrapping systems without hardware front panels.
68	MWRT (B)	H	pWR* - sOUT (logic equation). This signal must follow pWR* by not more than 30 ns. (See note, Section 2.7.5.3)
69	RFU		Reserved for future use.
70	GND (B)		Common with pin 100.
71	RFU		Reserved for future use.
72	RDY (S)	H	O.C. See comments for pin 3.
73	INT* (S)	L	O.C. The primary interrupt request bus signal.
74	HOLD* (M)	L	O.C. The control signal used in conjunction with pHLDA to coordinate bus master transfer operations.
75	RESET* (B)	L	O.C. The reset signal to reset bus master devices. This signal must be active with POC* and may also be generated by external means.
76	pSYNC (M)	H	
77	pWR* (M)	L	The control signal signifying the presence of valid data on DO bus or data bus.
78	pDBIN (M)	H	The control signal that requests data on the DI bus or data bus from the currently addressed slave.
79	A0 (M)	H	Address bit 0 (least significant).
80	A1 (M)	H	Address bit 1.
81	A2 (M)	H	Address bit 2.
82	A6 (M)	H	Address bit 6.
83	A7 (M)	H	Address bit 7.
84	A8 (M)	H	Address bit 8.
85	A13 (M)	H	Address bit 13.
86	A14 (M)	H	Address bit 14.
87	A11 (M)	H	Address bit 11.
88	DO2 (M)/DATA2 (M/S)	H	Data out bit 2, bidirectional data bit 2.
89	DO3 (M)/DATA3 (M/S)	H	Data out bit 3, bidirectional data bit 3.
90	DO7 (M)/DATA7 (M/S)	H	Data out bit 7, bidirectional data bit 7.
91	DI4 (S)/DATA12 (M/S)	H	Data in bit 4 and bidirectional data bit 12.
92	DI5 (S)/DATA13 (M/S)	H	Data in bit 5 and bidirectional data bit 13.
93	DI6 (S)/DATA14 (M/S)	H	Data in bit 6 and bidirectional data bit 14.
94	DI1 (S)/DATA9 (M/S)	H	Data in bit 1 and bidirectional data bit 9.
95	DIO (S)/DATA8 (M/S)	H	Data in bit 0 (least significant for 8-bit data) and bidirectional data bit 8.
96	sINTA (M)	H	The status signal identifying the bus input cycle(s) that may follow an accepted interrupt request presented on INT*.
97	sWO* (M)	L	The status signal identifying a bus cycle which transfers data from a bus master to a slave.
98			
99	POC* (B)	L	The power-on clear signal for all bus devices; when this signal goes low, it must stay low for at least 200 nanoseconds.
100	GND (B)		System ground.



EFF.	REV.	ECO.	BY	DESCRIPTION	APP.	DATE
~	~	~	~	PHOTO RELEASE	~	~



Ⓛ CUSTOMER INSTALLED PART

NOTES:

SPARE GATES

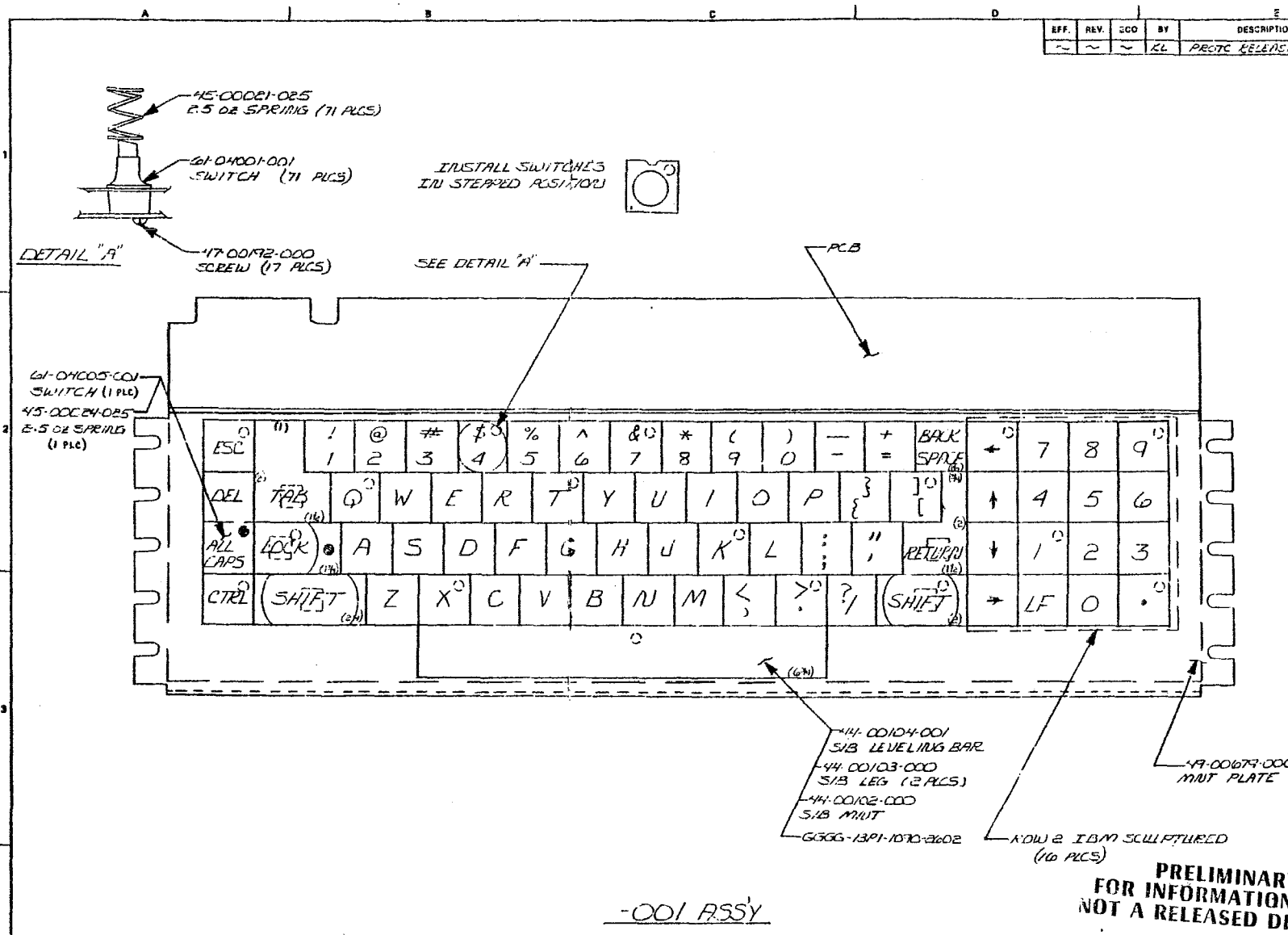
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 FTP 36-2-112

UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN INCHES		TOL. EXCEPT AS NOTED
XXX DIMENSION NOT TO SCALE	RELEASED	HOLE DIA.
USED ON VECTOR	APPROVED 7/11/70	FRACT. 2/164"
DR. C.M. 7-11-70	CH. A. 7-11-70	XX 2 01"
		XXX 3 005"
		ANG. 2 11"

KEY TRONIC CORPORATION	DWG. NO.
SPokane, Wash., U.S.A.	35-1393
SHEET	OF

EFF.	REV.	ECO	BY	DESCRIPTION	APP.	DATE
~	~	~	KL	PROTC RELEASE 7/19/78	KL	7/17/78



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

JUL 31 1978

- NOTES:
1. APPLY "DATE SERIAL NO." ADHESIVE TAG TO CONCAVEMENT SIDE OF PCB.
 2. KEYBD IS LOW PROFILE STEPPED UNLESS OTHERWISE MARKED.
 3. FLANGERS ARE CENTERED UNLESS OTHERWISE SHOWN.

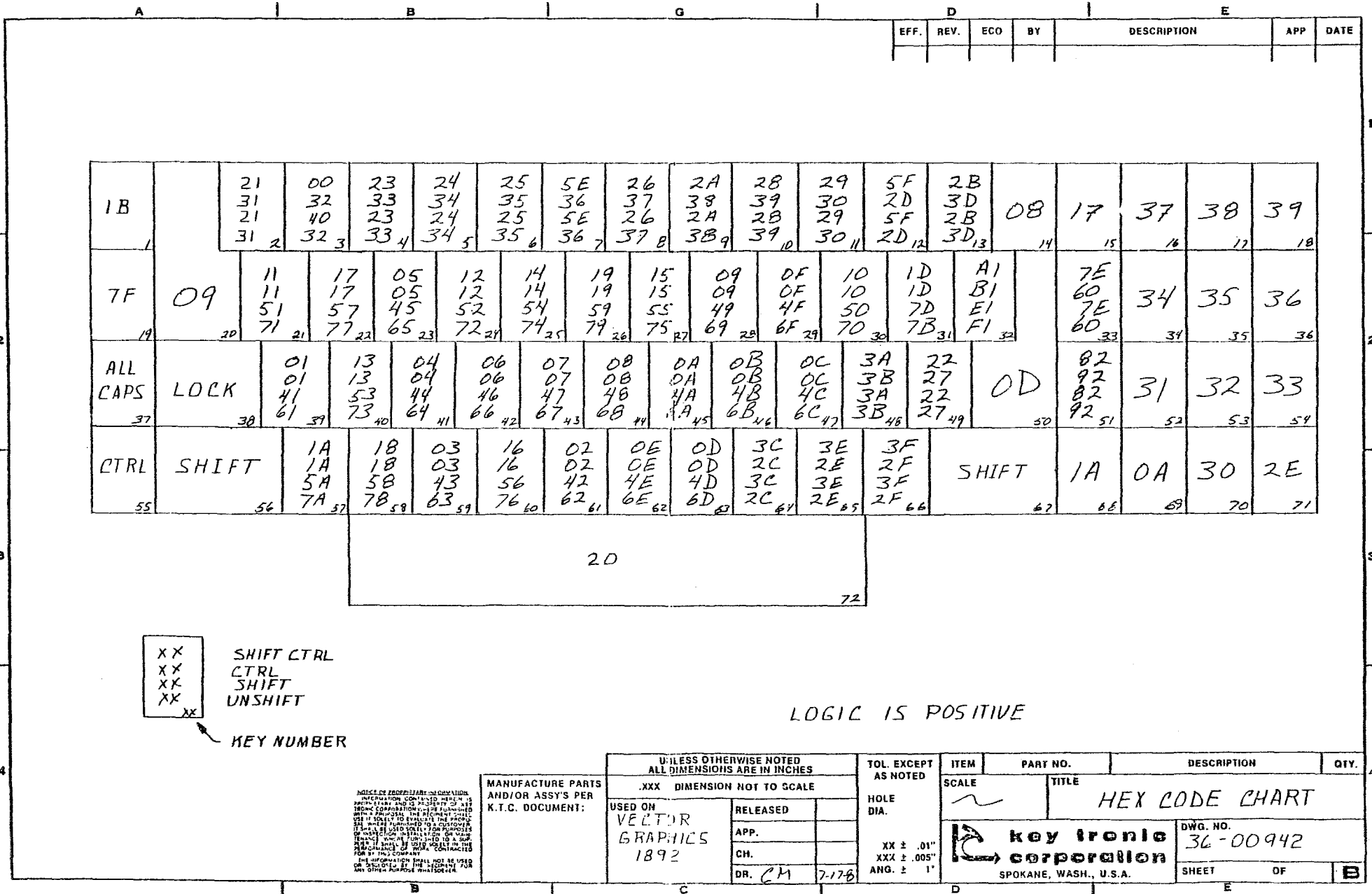
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M011
VICTOR
152/116K

UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN INCHES		TOL EXCEPT AS NOTED
USED ON	RELEASED	HOLE DIA.
APP 7/19	7/19	FRACT. ± 1/64"
CIL 15H	7/19	XX ± .01"
DRCL	7/19	XXX ± .005"
		ANG. ± 1°

ITEM SCALE	PART NO.	DESCRIPTION	QTY.
		MECH. & KEYTOP ASSY	
		keytronic corporation	DWG NO. 65-015-2
		SPOKANE, WASH., U.S.A.	SHEET OF 1





XX SHIFT CTRL
 XX CTRL
 XX SHIFT
 XX UNSHIFT
 XX
 KEY NUMBER


LOGIC IS POSITIVE

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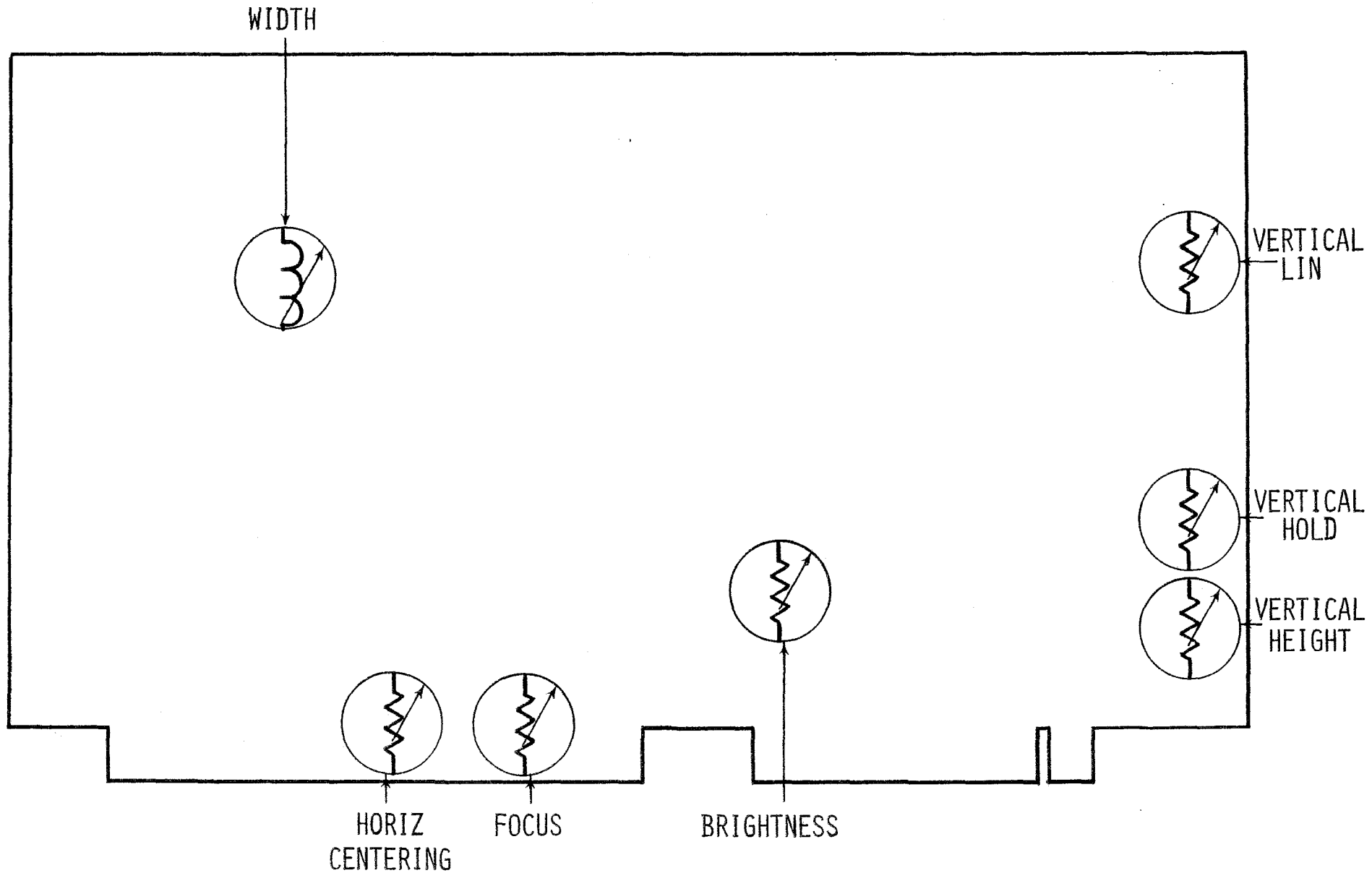
MANUFACTURE PARTS
 AND/OR ASSY'S PER
 K.T.C. DOCUMENT:

UNLESS OTHERWISE NOTED
 ALL DIMENSIONS ARE IN INCHES
 .XXX DIMENSION NOT TO SCALE
 USED ON
 VECTOR
 GRAPHICS
 1892
 RELEASED
 APP.
 CH.
 DR. CM 7-178

TOL. EXCEPT
 AS NOTED
 HOLE
 DIA.
 XX ± .01"
 XXX ± .005"
 ANG. ± 1°

ITEM	PART NO.	DESCRIPTION	QTY.
SCALE	TITLE	HEX CODE CHART	
 key tronic corporation		DWG. NO.	36-00942
SPOKANE, WASH., U.S.A.		SHEET	OF B

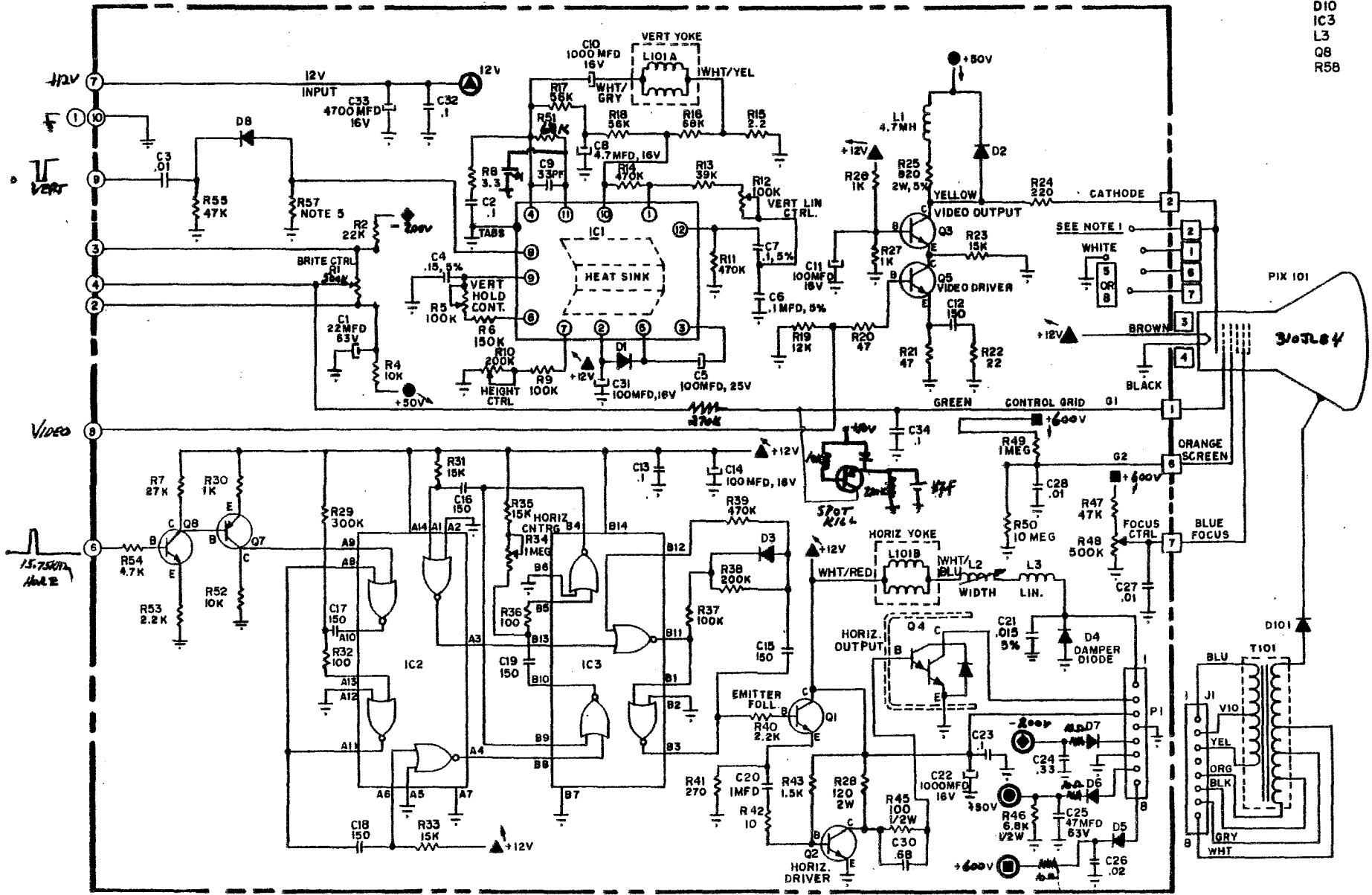
Physical Position of Controls on P.C. Board



12" MONITOR KIT SCHEMATIC

LAST N°S USED

C34	L101A
D10	L101B
IC3	D101
L3	T101
Q8	
R58	



NOTES:

1. PIN 5 OF PIX SOCKET IS GROUND. RETURN FOR SPARK GAPS TO PINS 1, 2, 6 AND 7.

2. SOURCE VOLTAGES. SYMBOL CIRCLED. ARROWS POINT TO SOURCE.

3. EDGE CONNECTOR NUMBERS INDICATED IN CIRCLES. PIX SOCKET PIN CONNECTIONS IN RECTANGLES.

5. R57 REQUIRED WITH TD1170S BUT NOT WITH TD1170.

6. CAPACITANCE VALUES OF 1 OR LESS ARE IN MICROFARADS, ABOVE 1 IN PICOFARADS, UNLESS OTHERWISE INDICATED.

WELLS GARDNER
SCHEMATIC FOR
VECTOR GAMES

12/3/80

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

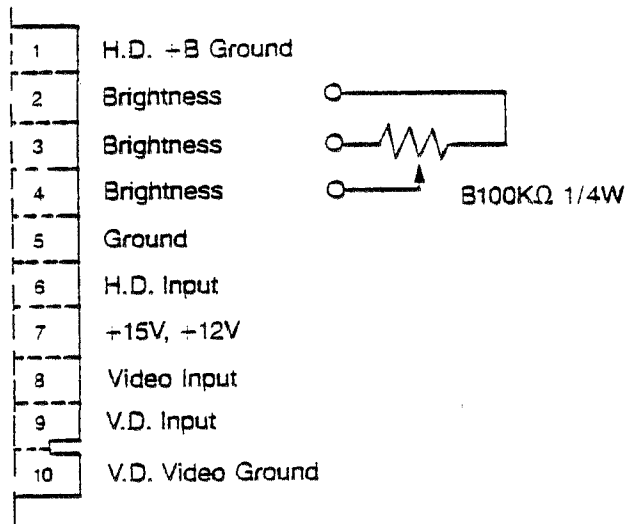
- | | |
|-------------------------------------|---|
| 1. Video Input | 4.0Vp-p \pm 1.5V positive going pulse |
| 2. Video Input Impedance | More than 1 K Ω |
| 3. Horizontal Drive | 4.0 Vp-p \pm 1.5V positive going pulse
Pulse width: 4 to 40 μ sec.
Frequency: 15.75 KHz \pm 500 Hz |
| 4. Horizontal Drive 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 ± 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 μsec.
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



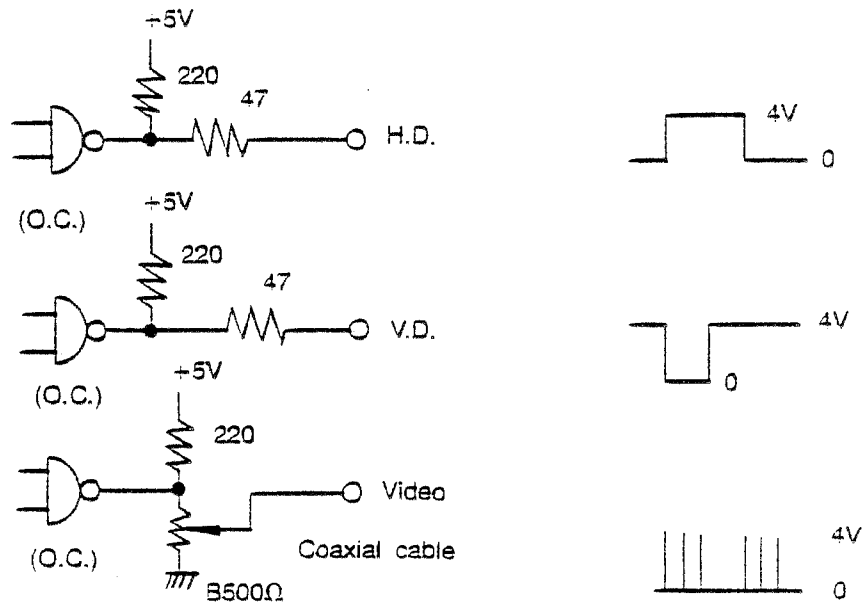
2. Input Connector

Card edge connector

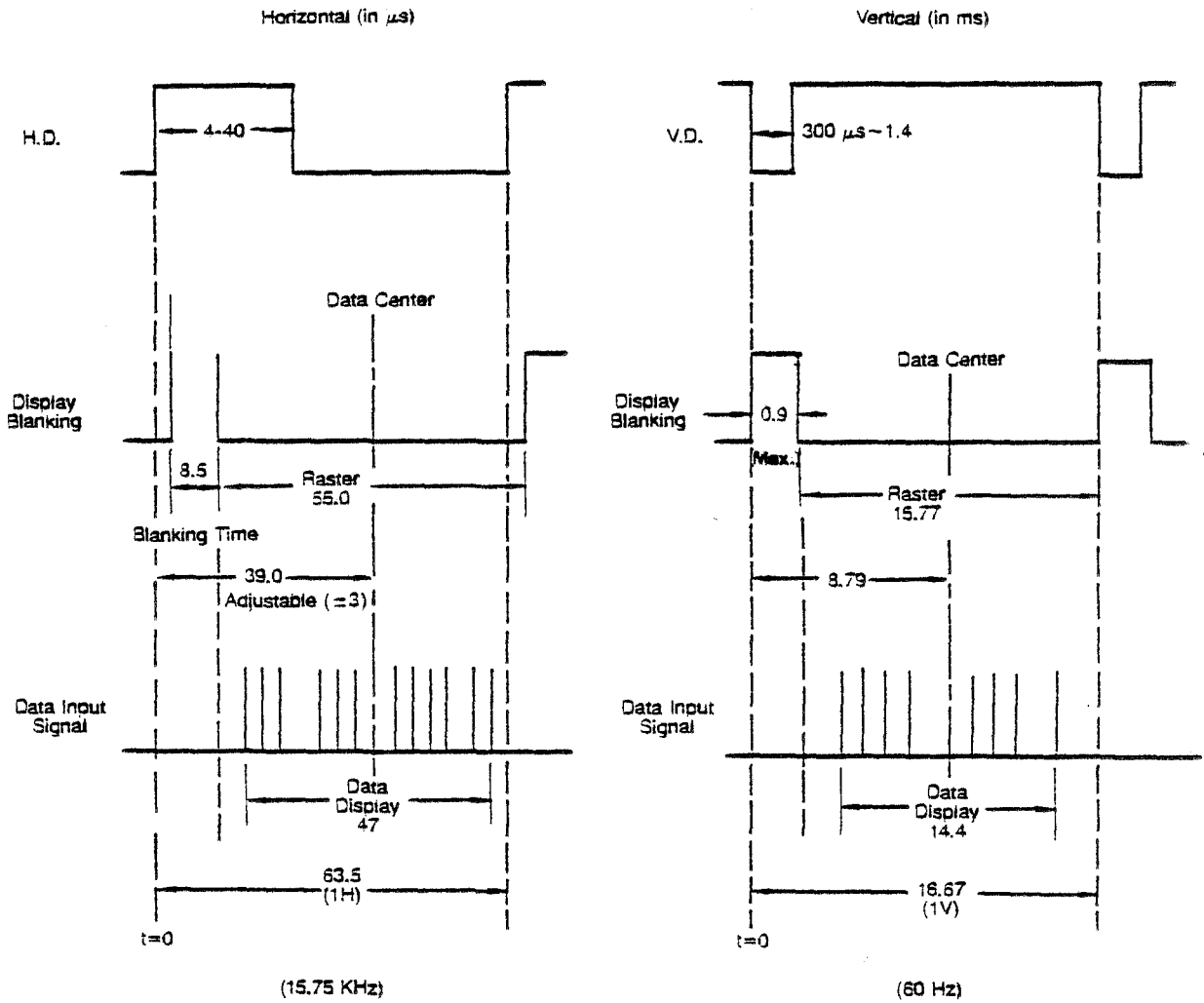
- Viking # 2VK10S/1-2
- Amphenol # 225-21031-101
- Cinch # 1-039-0119
- Hirose # CR7E-20DA-3.96E
- Or Equivalent

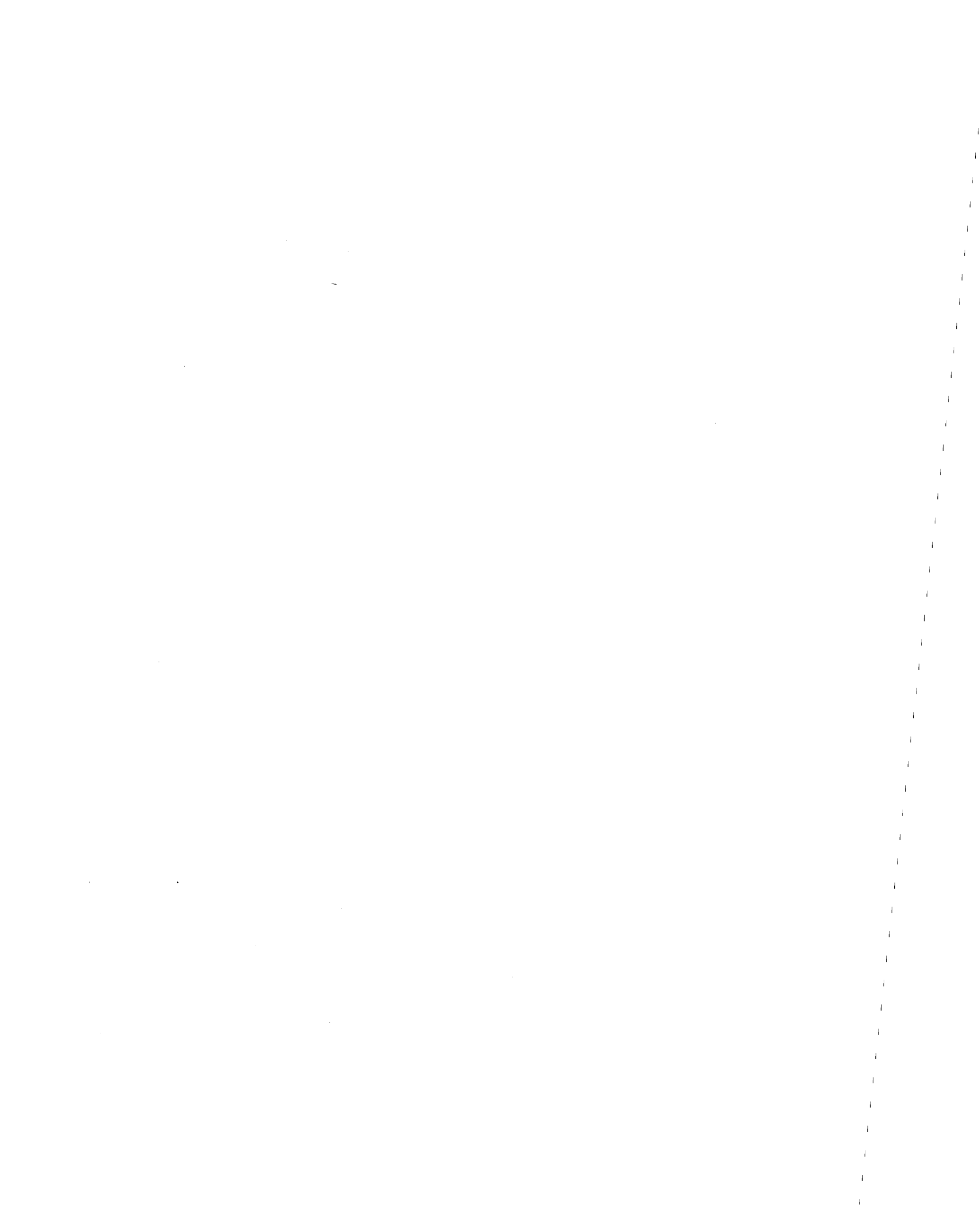
Polarizing key shall be inserted between 9 pin and 10 pin.

3. C.P.U. Output Circuit

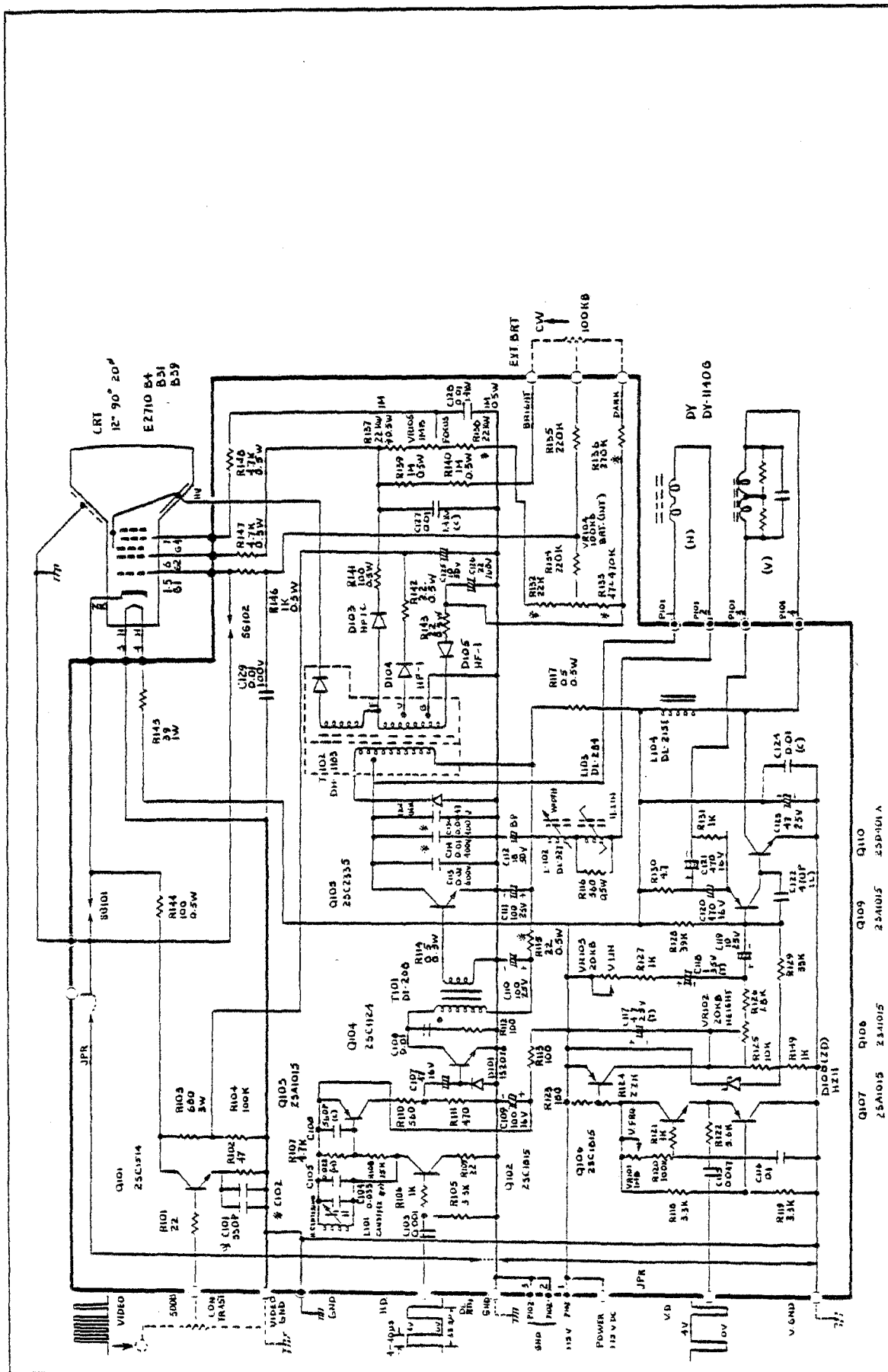


TIMING CHART (Standard Type)



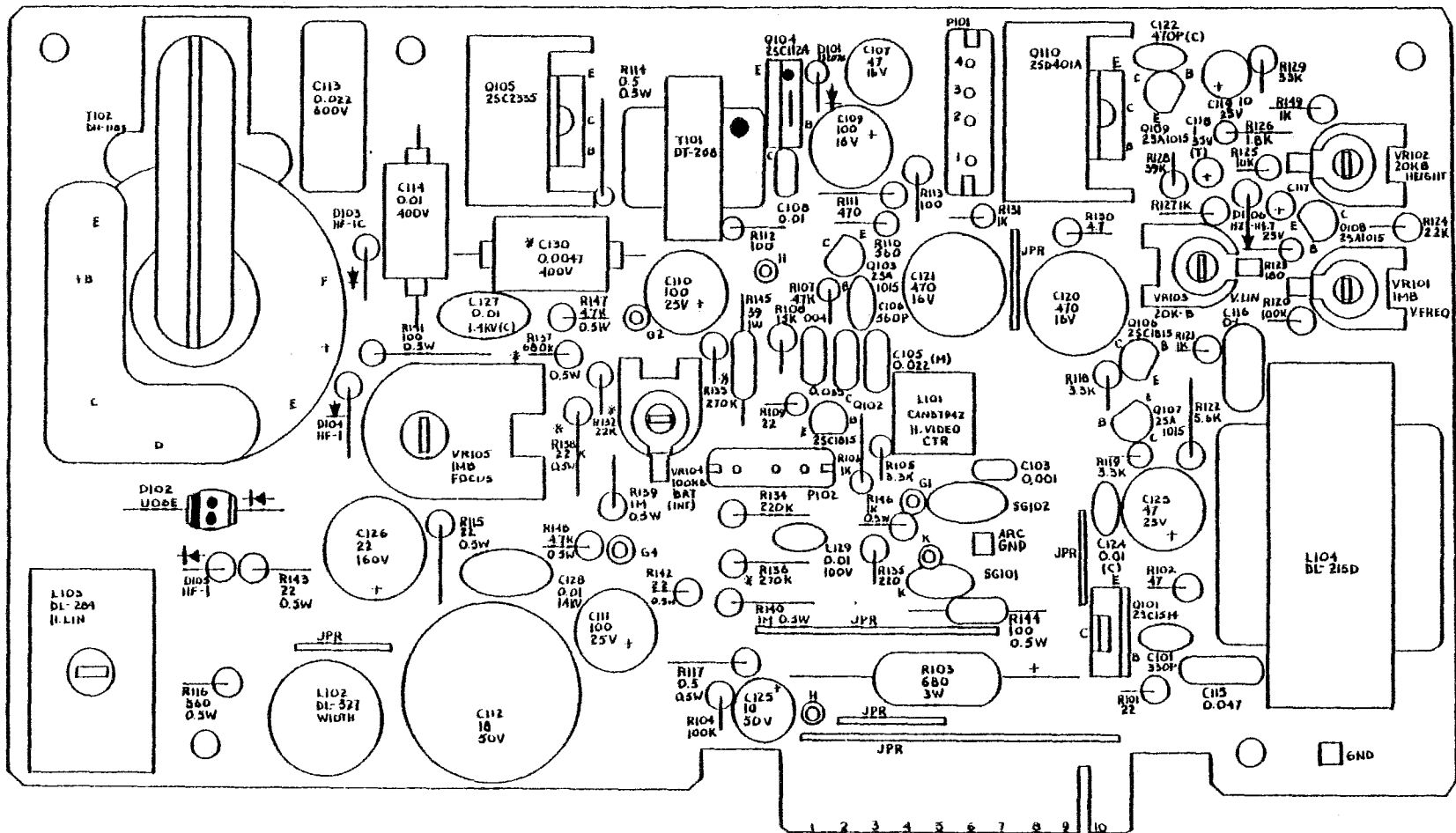


C10-12 AND 9
15VDC VERSION
CIRCUIT DIAGRAM

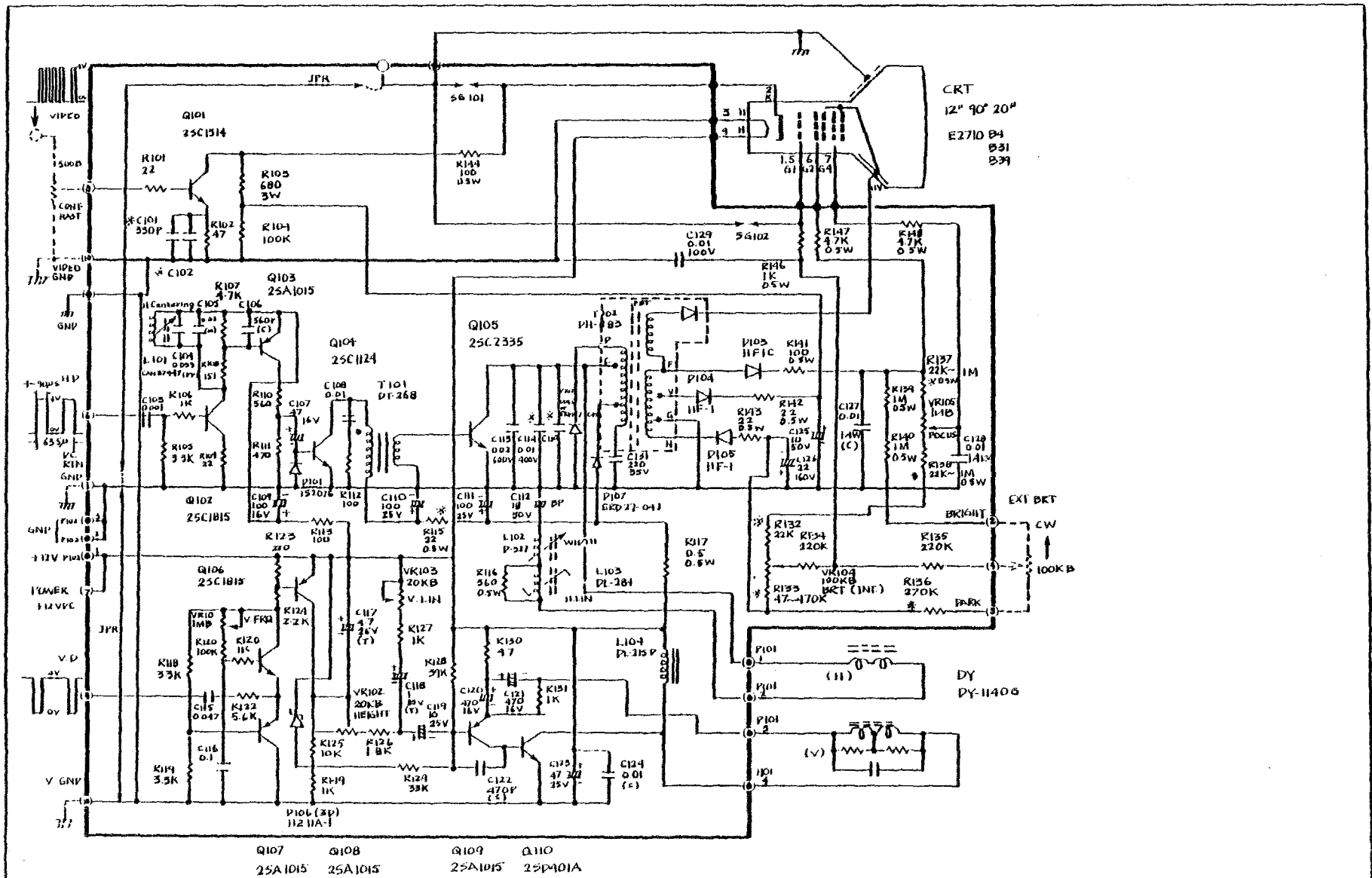


- NOTES: () INTERFACE CONNECTOR
 () PIN CONNECTOR
 () PIN
 ● DIRECT
 * ADJUSTED

Q101 25C124
 Q102 25C124
 Q103 25C124
 Q104 25C124A
 Q105 25C124B
 Q106 25C124

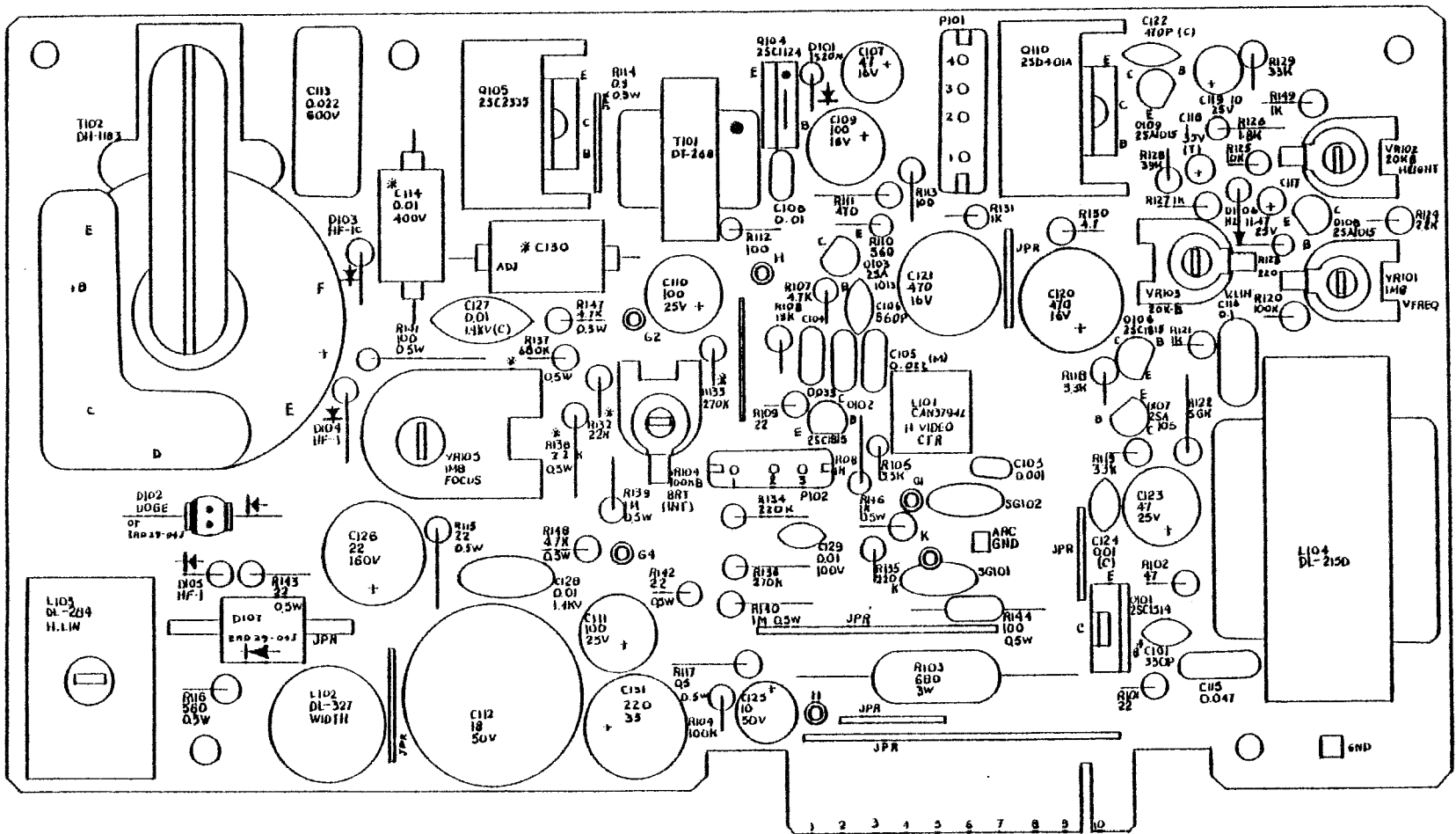


PB-811
 CIQ-12 AND 9
 15VDC VERSION
 COMPONENTS LOCATION
 (COMPONENTS SIDE)

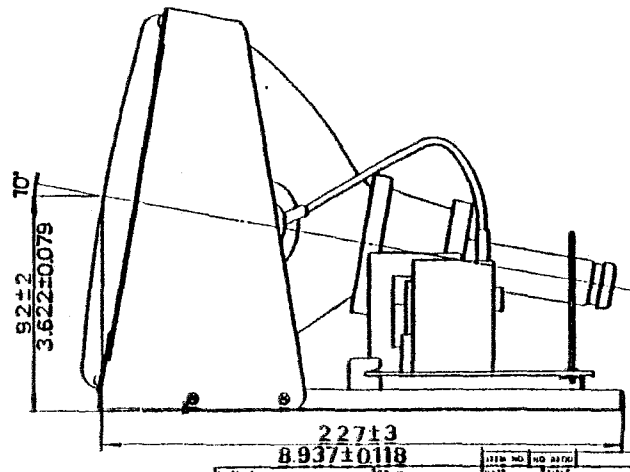
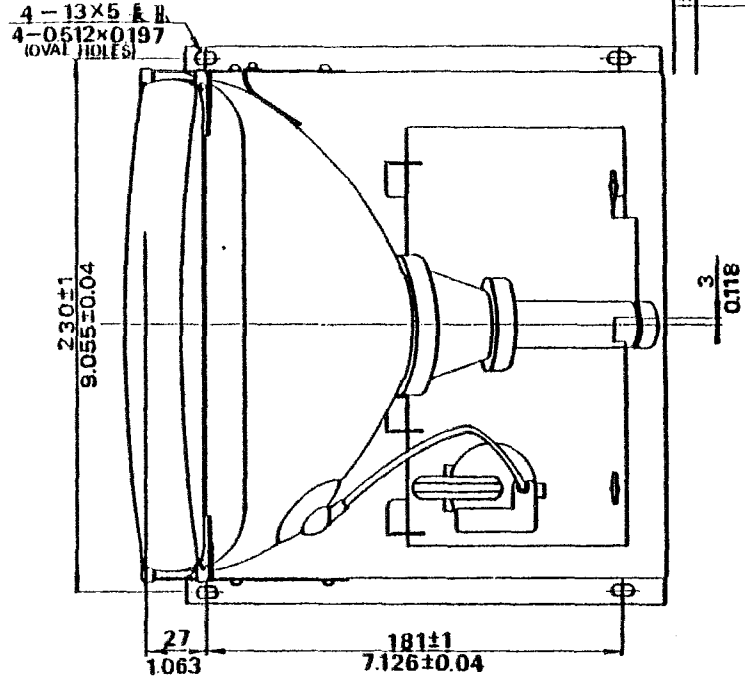
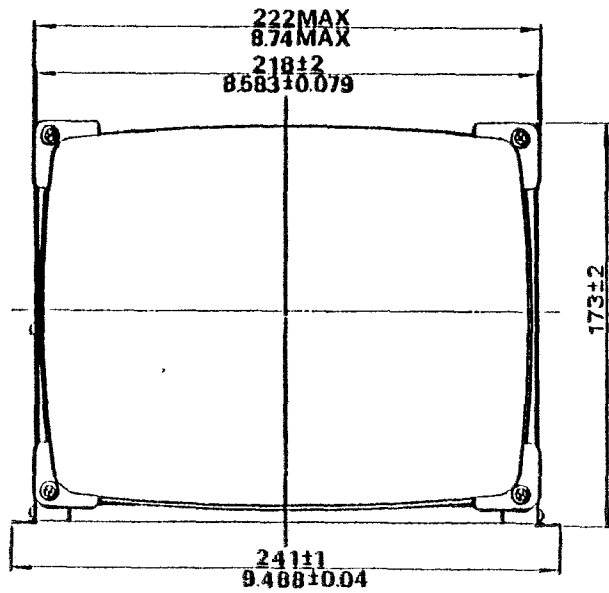


- NOTES () INTERFACE CONNECTOR
 (⊙) PIN CONNECTOR
 (⊕) 1 PIN
 (●) DIODE
 (⋆) ADJUSTED

C10-12 AND 9
 12VDC VERSION
 CIRCUIT DIAGRAM



PB-811
 C10-12 AND 9
 12VDC VERSION
 COMPONENTS LOCATION
 (COMPONENTS SIDE)



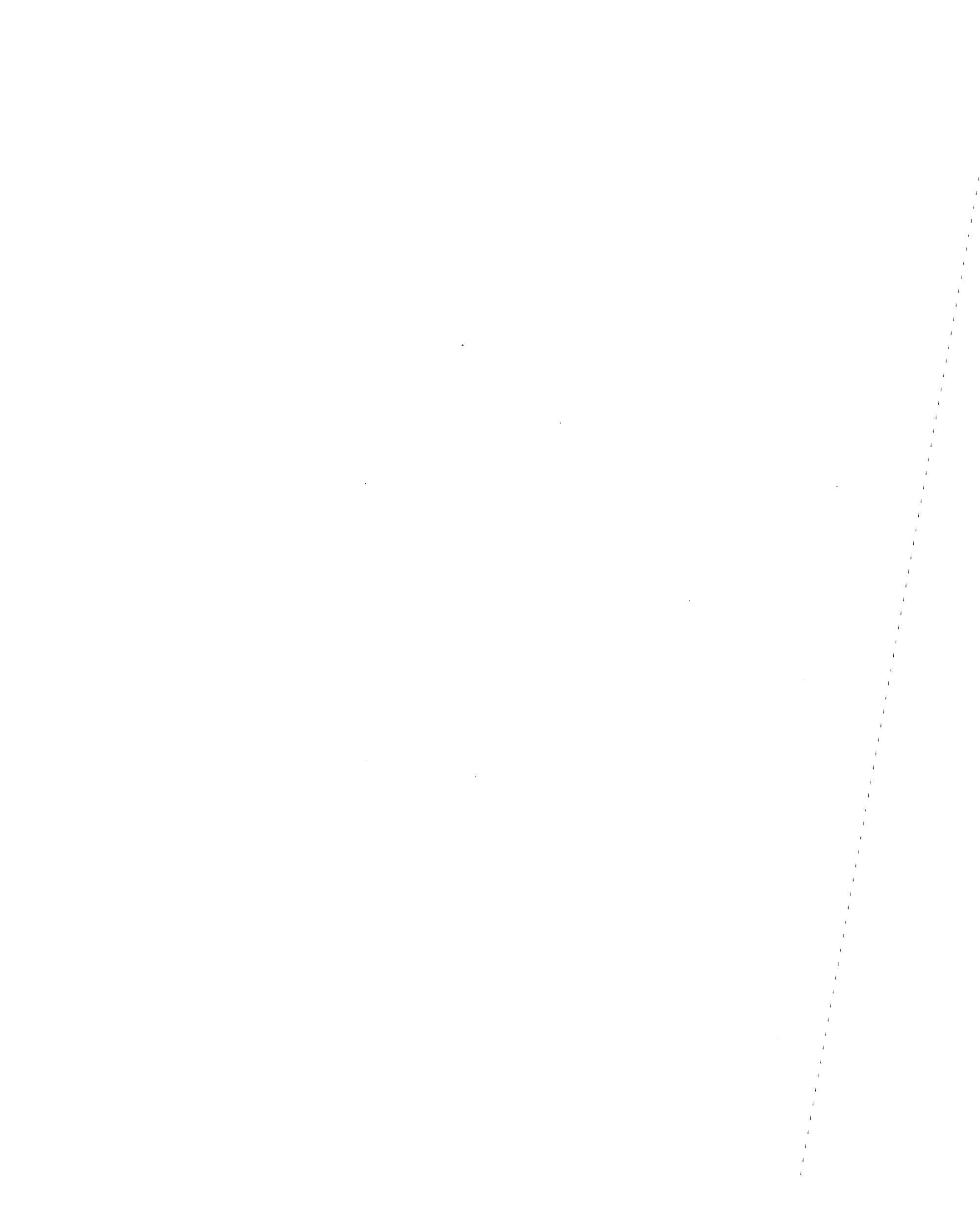
mm
 ———
 inch

MATERIAL		ITEM NO.		PART NAME		DIMENSION	
DATE	BY	NO	DATE	NAME	UNIT	UNIT	UNIT
	<i>Choshi</i>	<i>78.7.25</i>					
	<i>Choshi</i>	<i>78.7.23</i>					
	<i>K. S. Sengul</i>	<i>28.7.22</i>					
	<i>R. Sakurai</i>	<i>78.7.22</i>					

1/2		=		R. Sakurai		A3		E.3C845-01	
-----	--	---	--	------------	--	----	--	------------	--

CHIOMUSEN CO., LTD.
 E.3C845-01

CIQ-9 SERIES
 OUTSIDE DIMENSION



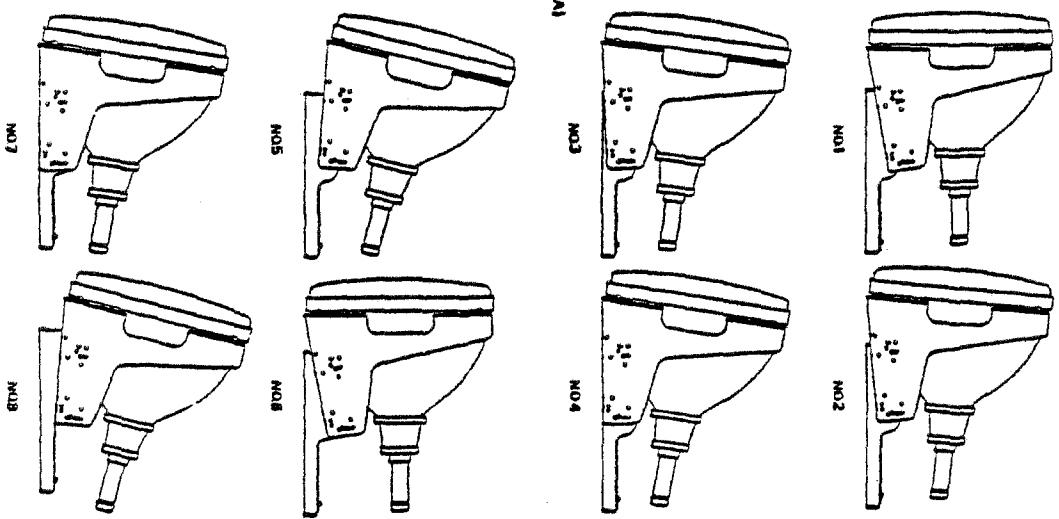
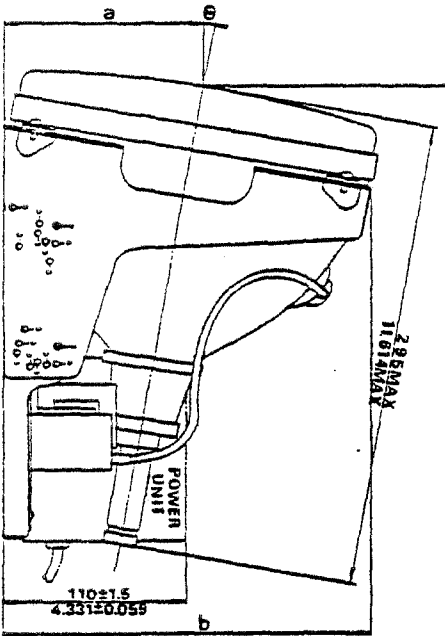
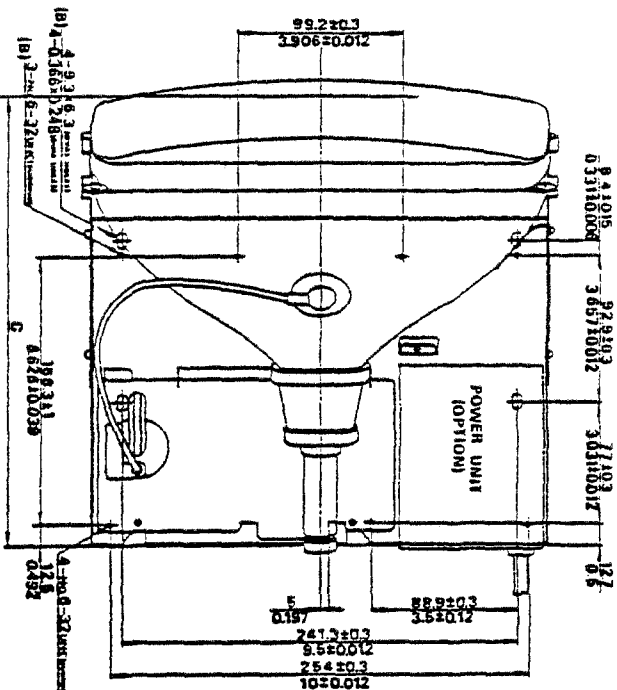
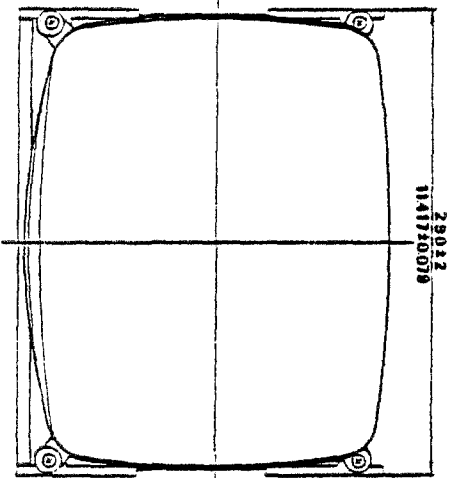
QDM-12W

(POWER SUPPLY)

(POSITION)

(FACE TR-
EATMENT)

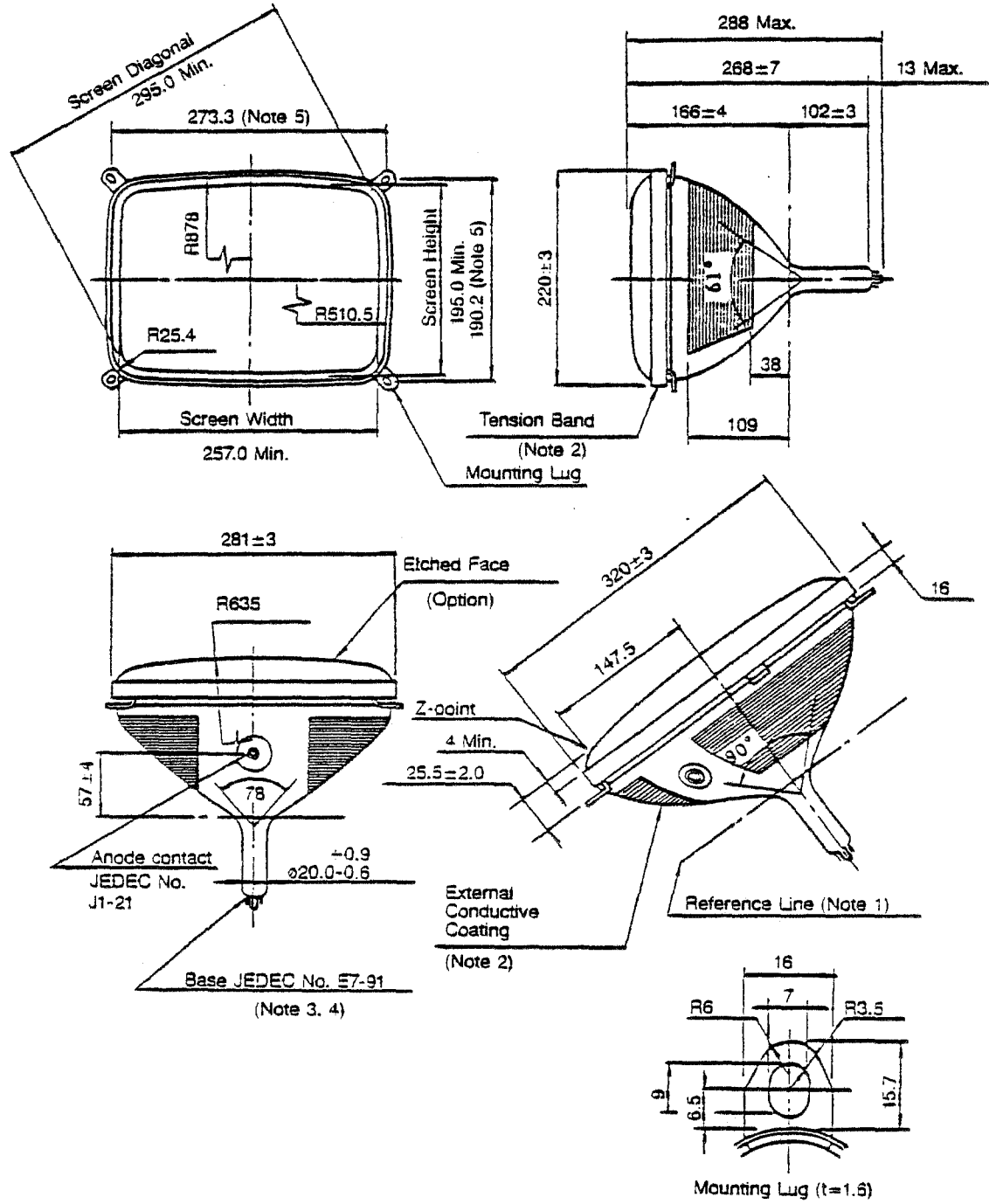
CR1 ANGLE	DIMENSIONS mm(Inch)			MOUNT- ING HOLES
NO.	a	b	c	
1	115 ± 2 (4528 ± 0.079)	225 ± 3 (8858 ± 0.119)	301 ± 4 (11850 ± 0.571)	(A, B)
2	118 ± 2 (4654 ± 0.079)	224 ± 3 (8827 ± 0.119)	298 ± 4 (11732 ± 0.157)	(A, B)
3	120 ± 2 (4724 ± 0.079)	223 ± 3 (8791 ± 0.119)	295 ± 4 (11634 ± 0.157)	(A, B)
4	121 ± 2 (4764 ± 0.079)	218 ± 3 (8724 ± 0.119)	291 ± 4 (11457 ± 0.157)	(A, B)
5	151 ± 2 (5955 ± 0.079)	245 ± 3 (9693 ± 0.119)	283 ± 4 (11142 ± 0.157)	(A, B)
6	115 ± 2 (4528 ± 0.079)	225 ± 3 (8858 ± 0.119)	295 ± 4 (11634 ± 0.157)	(A, B)
7	120 ± 2 (4724 ± 0.079)	220 ± 3 (8685 ± 0.119)	280 ± 4 (11024 ± 0.157)	(A, B)
8	153 ± 2 (6024 ± 0.079)	247 ± 3 (9752 ± 0.119)	289 ± 4 (11370 ± 0.157)	(A, B)



QDM-12W SERIES
OUTSIDE DIMENSION
E 3C854-01

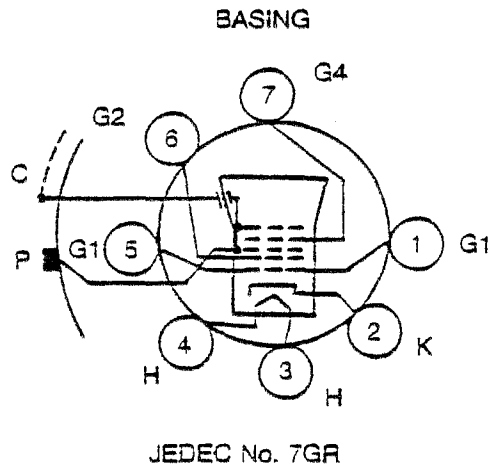
CIQ-12 CATHODE RAY TUBE DIMENSIONAL OUTLINE

Unit: mm



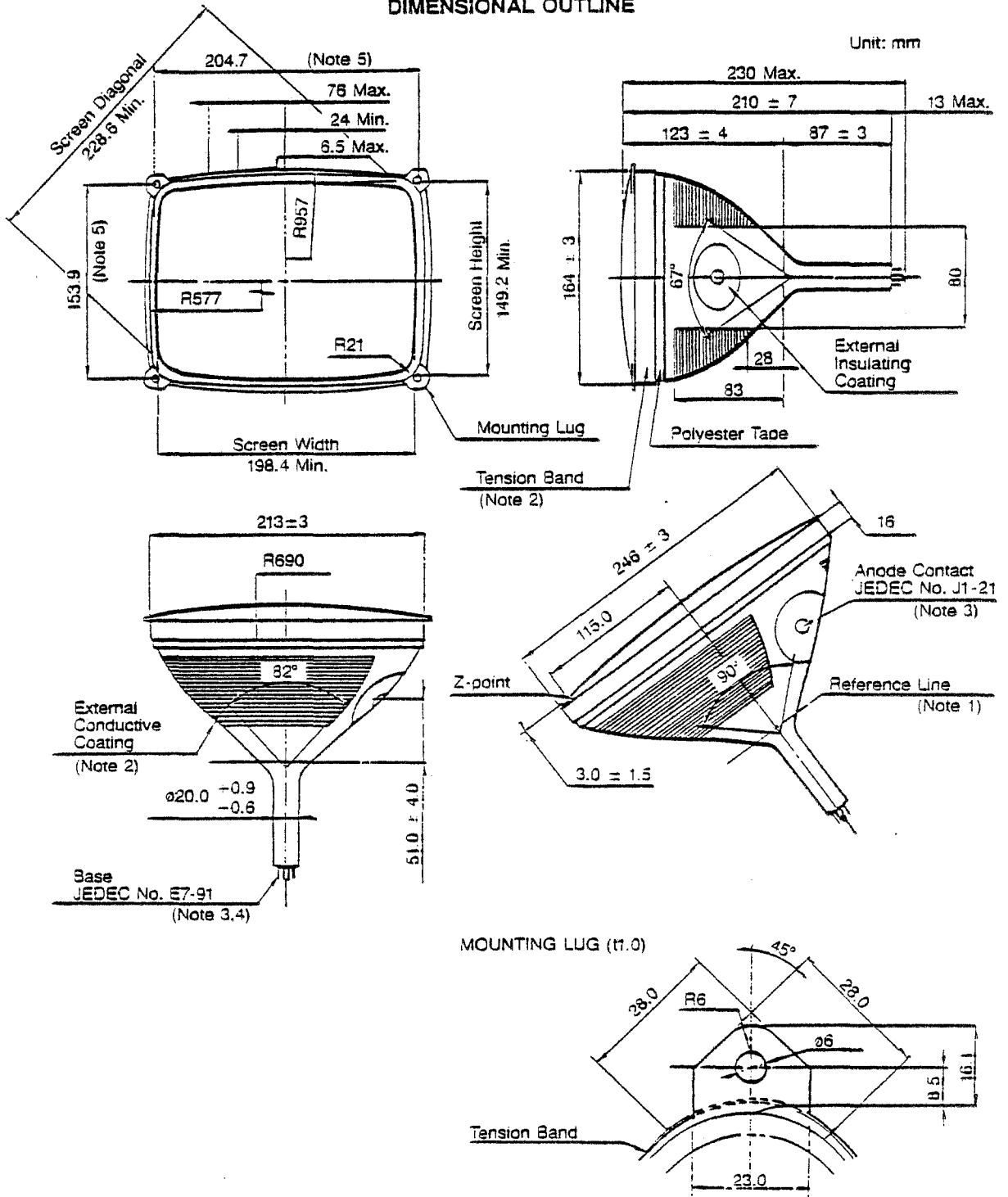
NOTE FOR DIMENSIONAL OUTLINE

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

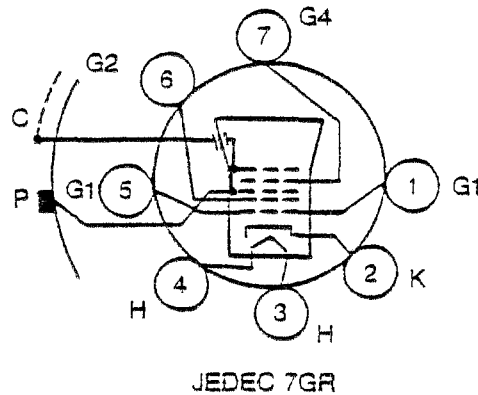
Unit: mm



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)



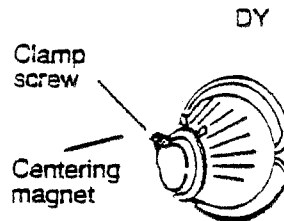
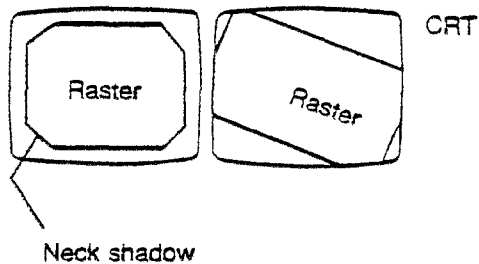
INSPECTION/ADJUSTMENT PROCEDURE

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.

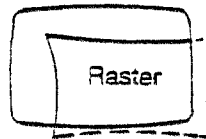
5. CRT Spot Test

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

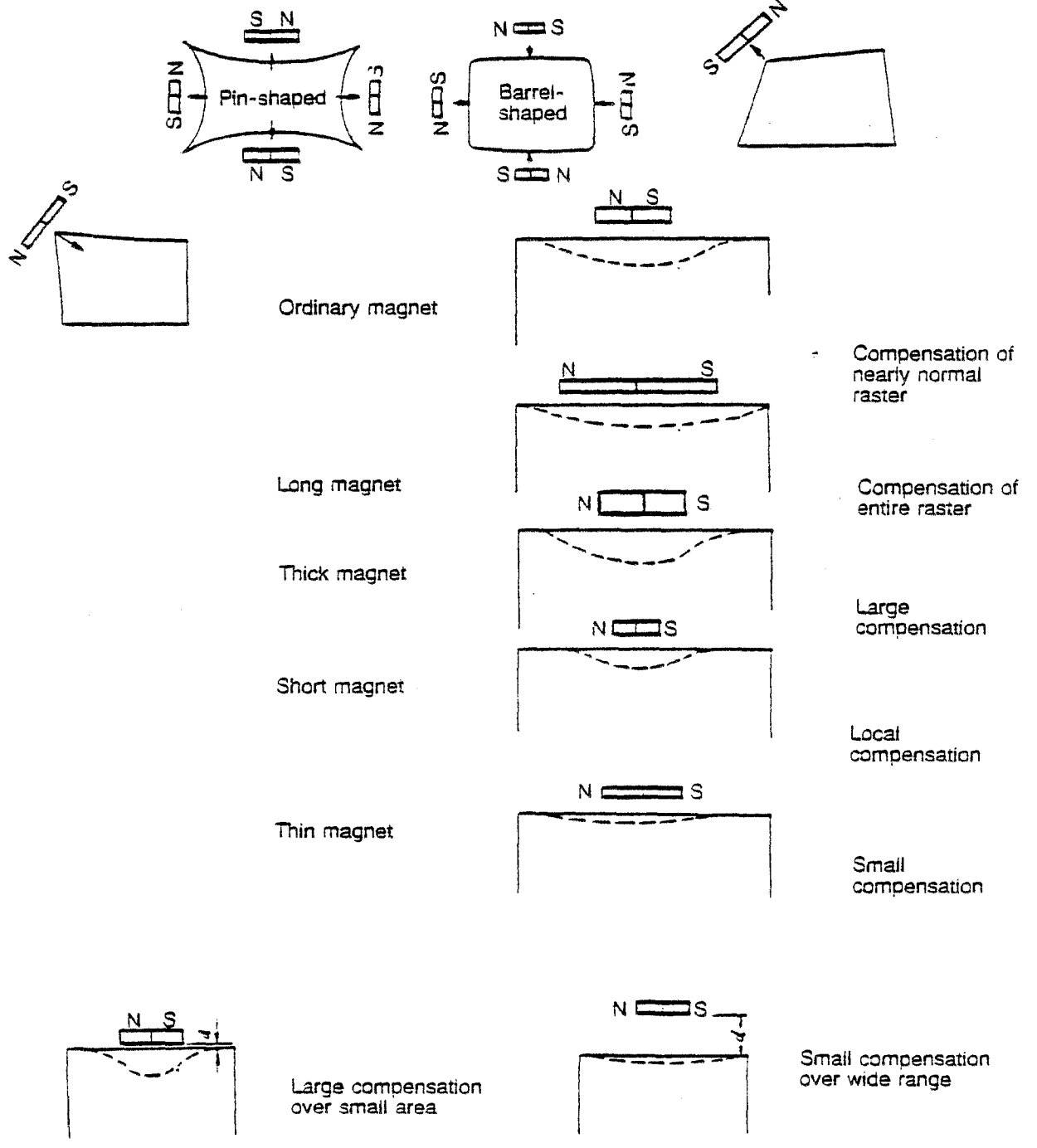
Turn the two centering magnets until the raster is centered. Apply screw lock when correction is completed.

(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

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 → b ₆ → b ₅ → b ₄ ↓ b ₃ ↓ b ₂ ↓ b ₁ ↓	COLUMN→									
	↑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.

