

TELEVIDEO®
965 VIDEO DISPLAY TERMINAL
MAINTENANCE MANUAL

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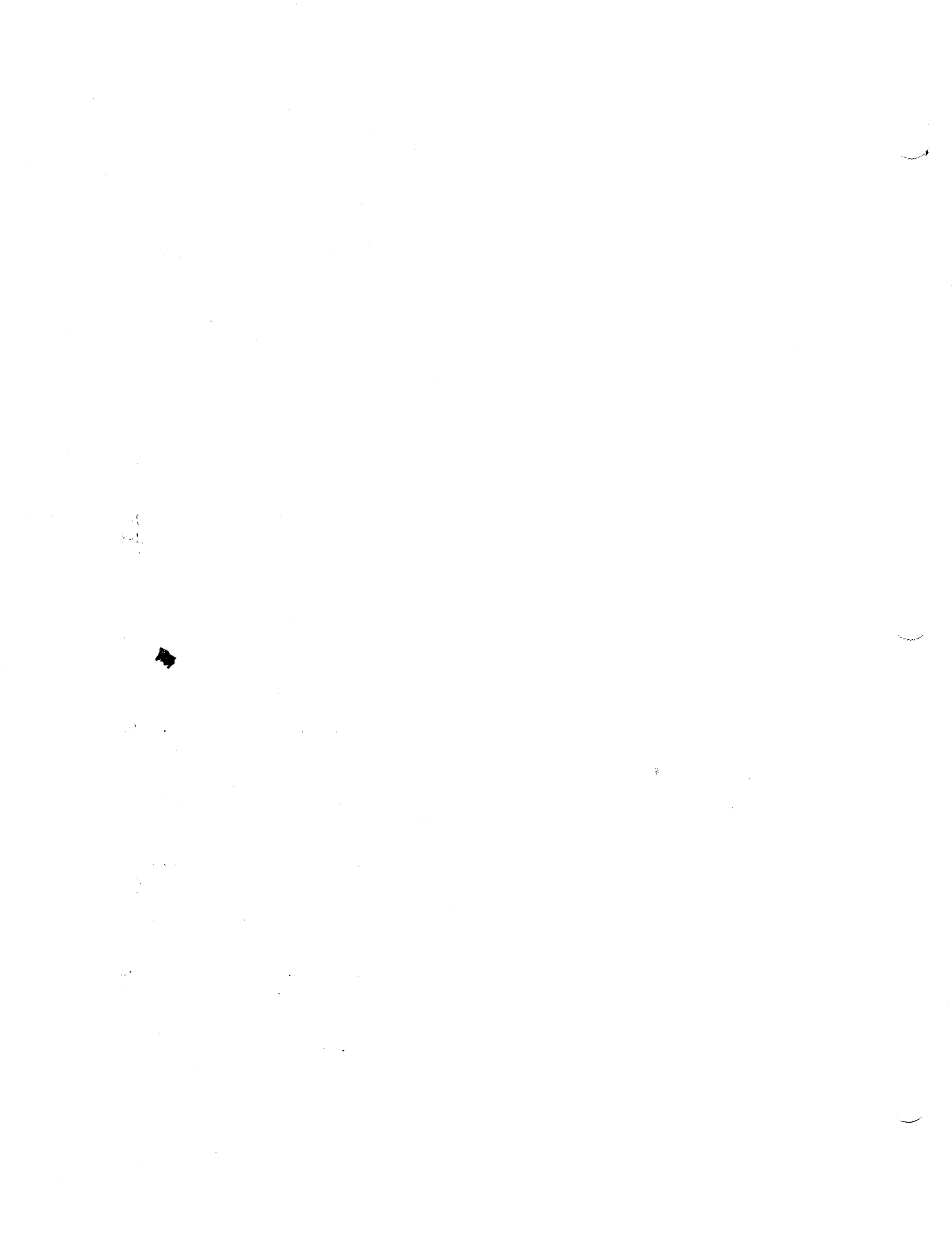
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1 Introduction

This manual is intended only for qualified repair personnel. You will find specifications for the 965 at the end of this Section and detailed circuit descriptions in Section 2.

Using the procedures in Section 3, the schematics in Section 5, and an **Operator's Manual**, you can repair most failures quickly. If difficulty arises, contact your dealer.

If you find that you need parts or service, you will find the information you need in Section 4.

OVERVIEW

TeleVideo's 965 terminal is an ASCII/ANSI terminal that emulates nine TeleVideo terminals and 15 other popular terminals, including PC TERM. The CPU for the 965 is the 65C816 microprocessor. The CRT controller is the 2672.

Figures 1-1 and 1-2 show front and rear views of the terminal.

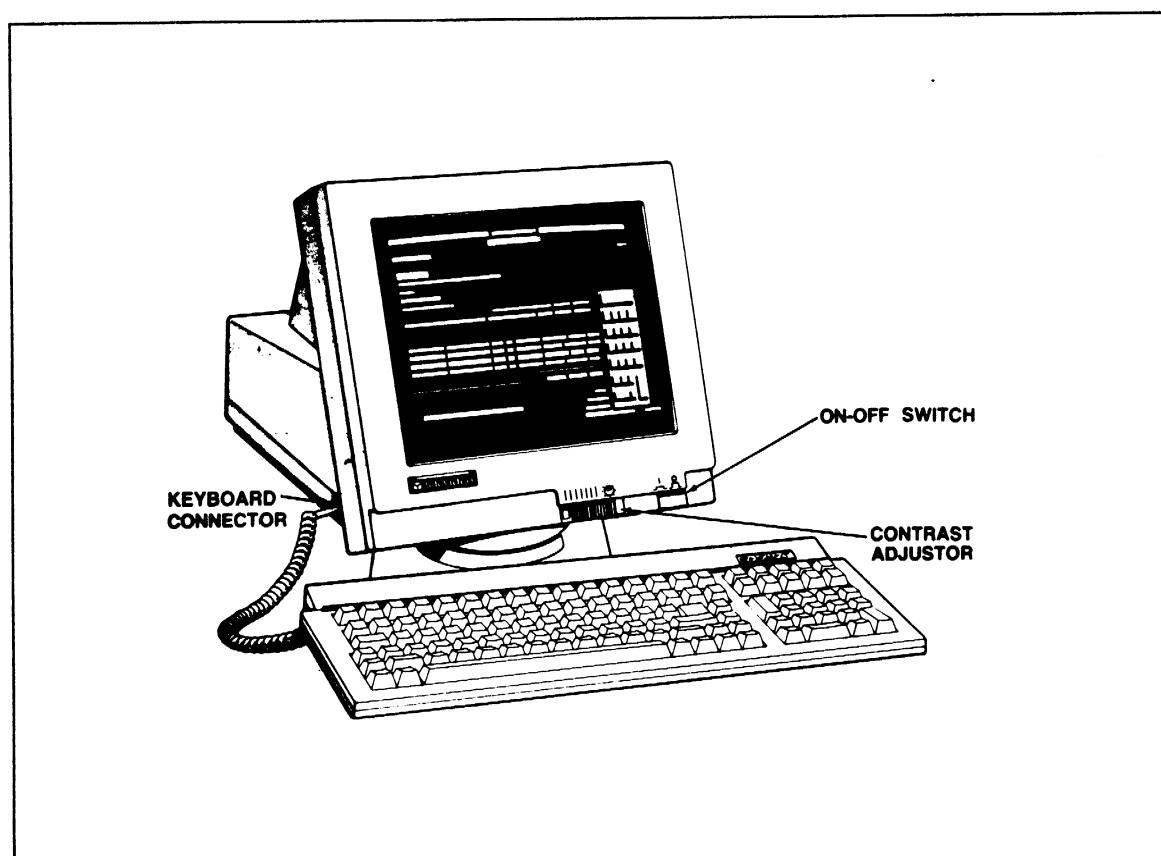


Figure 1-1. Front View of the 965

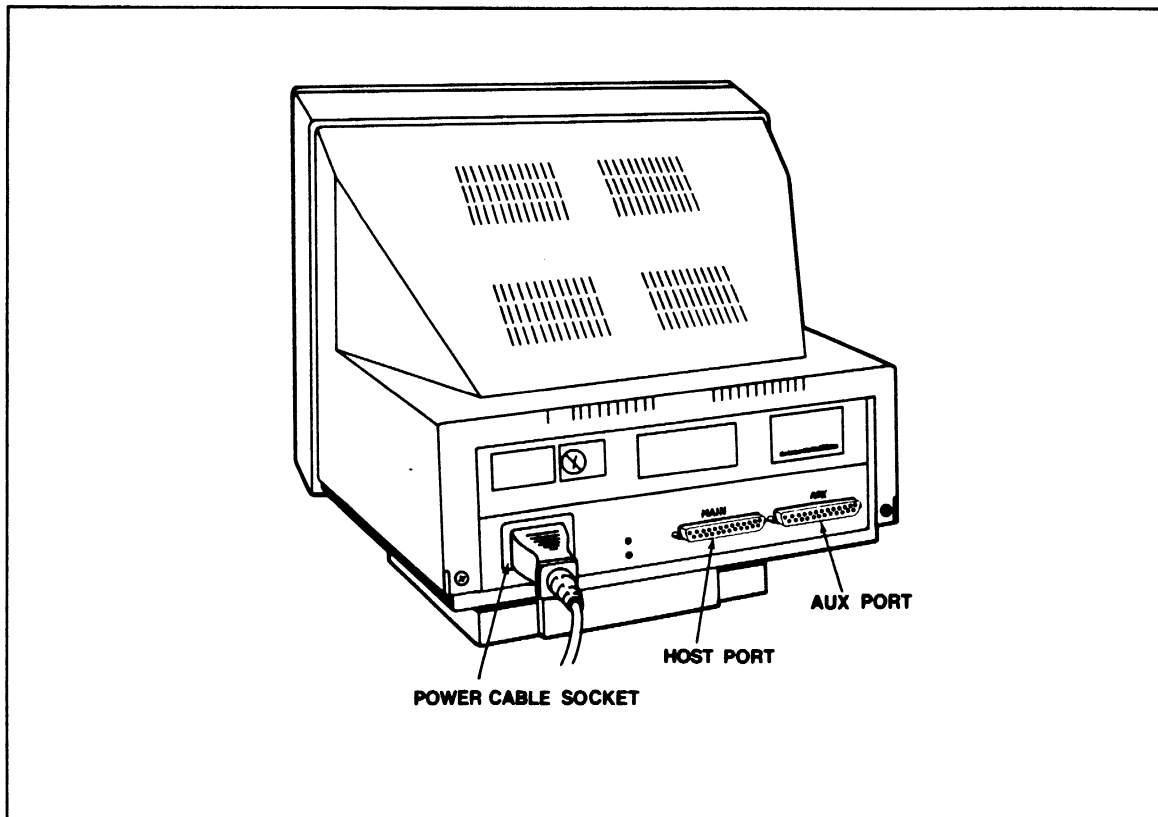


Figure 1-2. Rear View of the 965

DESCRIPTION OF THE MODULES

The logic, video, and power supply circuitry are all on one board--the circuit board, which is inside the plastic case under the CRT.

Logic Circuitry

The 65C816-based control circuitry on the circuit board generates the video and sync signals needed to display data on the CRT screen. It also processes and stores data to be transmitted or received.

The main logic of the circuit board includes four areas, which are described in detail in a later chapter ("Theory of Operation"):

- Main processor (CPU)
- Random access memory (RAM)
- Display processing
- Input/output interface

Video Circuitry

The video circuitry, which is also on the circuit board, takes care of horizontal and vertical sweep and video amplification. It produces a non-interlaced raster display on the screen. The video signals created by this circuitry generate a series of pixels to appear at pre-determined positions on each scan line. To display characters, the video circuitry forms dot matrices that are 10 pixels wide and either 8 or 16 pixels high (10 x 8 or 10 x 16 character cells).

Power Supply Circuitry

The components of a switching power supply are distributed along the right side of the circuit board. The power supply converts input voltage of 90-130 Vac (60 Hz) or 180-260 Vac (50 Hz) to the following:

+ 5 Vdc for TTL logic on the circuit board

+ 12 Vdc for the video signals and RS-232C communications

-12 Vdc for RS-232C communications

A user-replaceable fuse near the power plug protects the circuitry from excess current.

Keyboard

The 965 has a detachable keyboard connected to the terminal by a coiled cable. This keyboard contains an array of keyswitches mounted on a printed circuit board (PCB) that includes an 8049 microcontroller and other components.

The 8049 scans the keyboard matrix, encodes the data, and transmits the appropriate scan codes. Data is transmitted through a 4-wire cable over an asynchronous serial port at 9600 baud to the main logic board.

On the circuit board, the serial data is converted to parallel and decoded by the main processor using decoding firmware.

RS-232C SIGNAL ASSIGNMENTS

The 965 has two 25-pin D subminiature female EIA RS-232C data communication ports: a MAIN (host) port designated DTE and an AUX (printer) port designated DCE.

Table 1-1. Main Port (DTE) Pin Assignments

Pin	Signal Name	Direction
1	Frame Ground	n/a
2	Transmit Data	Output
3	Receive Data	Input
4	Request to Send	Output
5	Clear to Send	Input
6	Data Set Ready	Input
7	Signal Ground	n/a
8	Data Carrier Detect	Input
20	Data Terminal Ready	Output

Table 1-2. Printer Port (DCE) Pin Assignments

Pin.	Signal Name	Direction
1	Frame Ground	n/a
2	Receive Data	Input
3	Transmit Data	Output
5	Clear to Send	Output
6	Data Set Ready	Output
7	Signal Ground	n/a
8	Data Carrier Detect	Output
20	Data Terminal Ready	Input

SPECIFICATIONS

Physical

VDT Dimensions:

Height	13.6 inches (34.5 cm)
Width	12.9 inches (32.8 cm)
Depth	13.9 inches (35.4 cm)

VDT Net Weight

17.5 lbs.

Case Foot Print

8.6 inches by 8.0 inches (max.)

Case Features:

Tilt	-6 to +27 degrees
Swivel	360° left to right
Cooling	Convection system
Connectors	One RS232 communication port One RS232 printer port One RJ11 keyboard port One AC receptacle-type quick disconnect

CRT:

Diagonal Measure	34.8 cm (13.7 inches)
Phosphor	P31 (green)/P4 (white)
Fluorescence	Green/white
Bulb	90° deflection, 60" radius face
Face-plate	Filterglass
Screen	Aluminized
Persistence	Medium short (300us decay time)

Electrical

AC Supply:

Input Line Voltage	95V to 130V
(Jumper Selectable)	180V to 260V
Frequency	50/60 Hertz +/- 3 Hz.
Source Current:	
115V Line	1.0 Amp max.
230V Line	0.5 Amp max.
Phase	Single phase, 3-wire
Wattage	40 VA max.

DC Supply:

5V	+/- 0.25V at 1.5 Amp
12V	+/- 0.24V at 1.6 Amp
-12V	+/- 0.24V at 150mA

Ripple and Spike Noise

50mV peak to peak +5V
100mV peak to peak
+12V; -12V

Video Display

	80	132
Screen Specifications:		
Horizontal Scanning Frequency	26.46 Khz	26.46 Khz
Vertical Scanning Frequency	60 Hz	60 Hz
Character Lines	26, 44, 50	26, 44, 50
Columns Per Line	80	132
Cell Size (Character Block):	Dot Matrix	Dot Matrix
Width	10	10
Height	16, 8, 8	16, 8, 8
Electrical Characteristics:		
High Voltage (At Dark Screen)	13.5 KV +/- 500V	13.5 kV +/-500V
High Voltage Regulation (From Dark Screen to Full Bright)	500V +/- 250V	500V +/- 250V
Picture Brightness at Maximum Contrast Adjustment Equal to or Greater Than	40 ft.-Lambert	40 ft.-Lambert
Picture Size (Active Display):		
Format	26, 44, 50 lines of 80	26, 44, 50 lines of 132
Width	240 mm	240 mm
Height	180 mm	180 mm
Levels of Gray	Dark, half bright, full bright	Dark, half bright, full bright

Keyboard

Physical Description:

Height	1.5 in (3.8 cm)
Width	17.7 in (44.6 cm)
Depth	7.2 in (18.3 cm)
Net Weight	1.4 kg (3.2 lbs.)

Other Characteristics:

Style	Low profile
Home Row DIN std.	30 mm untilted
Microcontroller	8049
Operating Life	100 million keystrokes min.
Layout	See Chapter 5, Engineering Drawings, for illustration of the following keycap layouts:

965 ASCII Keyboard
965 VT320 (ANSI) Keyboard
965 RT/316 Keyboard
965 PC Enhanced Keyboard

Environmental

Operating:

Temperature	0 to 45° C (32 to 113° F)
Humidity	10 to 85% non-condensing
Altitude	3,000 m (10,000 ft.)

Non-operating:

Temperature	-40 to 60° C
Humidity	10 to 85%
Altitude	5,000 m (15,000 ft.)

Performance:

MTBF	20,000 hours min.
MTTR	30 minutes
Vibration	0.3G, 5 to 100 Hz., operational
Shock	20G, 11ms, 18 shocks

Shipping:

Girth	108 inches max.
Weight	50 lbs. max.

PC Board

Main Features:

Type of board	Two-sided, includes power and ground
Microprocessor	65C816 (5 MHz)
CRT Controller	2672 (5 MHz)
Gate Array	P/N 271049-00 (custom)
Battery	3V min. Lithium

Current Load:

Standard	1.2A (5V); 100 mA (12V)
with Options	1.5A (5V) max.

Memory:

System ROM	80K (27128 and 27512)
System RAM	8K
Display RAM	16K x 2 (max.)
Character generator RAM	8K

Communication:

Main Port	RS232 (P3) (50 - 38.4K bit/sec.)
Printer Port	RS232 (P4) (50 - 38.4K bit/sec.)
Parity	No, Odd, Even, Mark, Space
Data Bits	7 or 8
Handshaking	No, X-on/X-off, DTR, both

CRT Controller Format

	80 x 26	132 x 26
Character Cell:		
Number of Dots per Character	10	10
Number of Scan Lines per Character	16	16
Dot Frequency	26.9892 MHz	44.4528 MHz
Character Frequency	2.6989 MHz	4.4452 MHz
Screen Format:		
Display Characters per Line	80	132
Total Characters per Line	102	168
Number of Rows per Screen	26	26

2 Theory of Operation

INTRODUCTION

The 965 logic is based on a 4.45-MHz 65C816 microprocessor, using a 24-bit address bus that allows access to 16 MBytes of memory. A considerable amount of the terminal's functionality has been incorporated into a gate array. Refer to the block diagram (Figure 2-1).

In this chapter, we'll discuss the following topics:

- System clocking
- Gate array
- CPU system and control
- Character generation
- Video display generation
- Screen data storage
- Communications

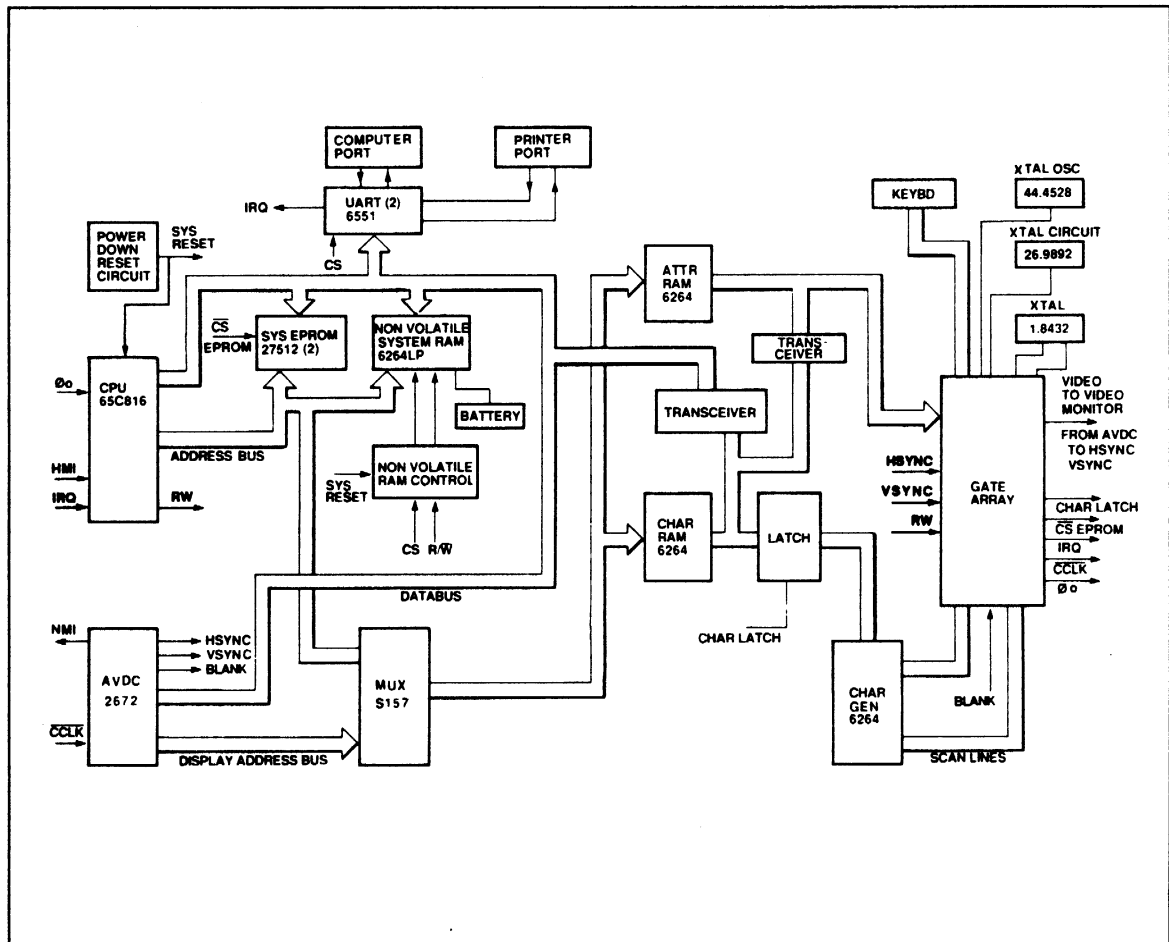


Figure 2-1. Block Diagram of the 965

DETAILED DESCRIPTIONS

System Clocking

The 965 displays 10 x 16 character cells in either 80-column or 132-column mode, using a different dot clock for each display mode. Clock oscillator Y1 at 44.4528 MHz serves as the basic clock in 132-column mode. A crystal circuit (Y2), which oscillates at 26.9892 MHz, serves as the basic clock in 80-column mode. (Crystal Y3 serves as a baud rate clock for the communication ports.)

Selection of 80 or 132 column operation is done inside the gate array chip through software programming. The frequency at which the microprocessor operates depends on which mode of operation is selected, 80 or 132 column. Oscillator Y1, the dot clock in 132-column mode, serves as a clock to send video data through a shift register inside the gate array, and serves as a processor clock after it is divided by ten. Crystal oscillator Y2, the dot clock in 80 column mode, provides the same two functions.

The Gate Array

The major functions of the gate array include basic timing functions, reading and writing attribute RAM, timing for writing to various areas of memory, control for the character RAM transceiver, font-loading, various scan line functions, keyboard communication, and handling video attributes and the video shift registers. Descriptions are given in the paragraphs that follow.

The CPU clock is stretched in 132 column mode when accessing the EPROM and CRT controller. The system clock is also stretched when accessing I/O ports in both modes. The CRT controller character clock is the inverted system clock. The baud rate clock generator circuit for the I/O ports is also generated inside the gate array.

The gate array controls attribute RAM data read/write operation. The gate array also provides a write pulse for screen RAM and

character generator RAM, address decode for EPROMs, screen RAM, I/O ports and other signals. It provides a control signal to control the direction of the character RAM transceiver.

The gate array loads fonts to the character generator. Four of the scan address lines come from the gate array. The scan line counter to control double width, double high and smooth scroll are also inside.

In addition, the gate array handles keyboard transmit and receive data, attribute logic, and the video shift register.

The CPU communicates with the gate array using internal registers that are accessed by reading or writing specific locations inside the gate array. One status register (read only) provides the CPU with the status of internal signals like Transmit register empty, Receiver full, Keyboard overflow, and interrupt.

CPU System And Control

The CPU system consists of the following four subsystems (with identifiers from the schematics in parentheses):

- the 65C816 CPU (U10)
- the system 27512 EPROMs (U8 and U9)
- the 6264 system RAM (U7)
- the system reset controller (U11)

The CPU is the controller for the entire board, initializing and controlling all of the UARTs, the CRT controller, the clock circuits and the gate array. It also processes all of the data received from the keyboard, computer, or printer, and updates the video RAM accordingly.

The CPU address space is divided into 256 banks of 64 Kbytes. It always reads instructions from the EPROM. Data is read from EPROM U9 as from bank 1 and EPROM U8 as from bank 3. Many of the display features, such as smooth scrolling and line lock are controlled by the CPU in conjunction with the CRT controller and gate array.

Each device on the board has a specific address or range of addresses, as shown on the memory map (Figure 2-2). Bank 0 is divided into 8 kbyte blocks inside the gate array. The first 8 kbytes block is for the system RAM. The next blocks are reserved for the CRT controller, gate array and communication ports, respectively. The next two blocks of 16 kbytes are for the character RAM and attribute RAM.

3FFFF	System ROM
30000	
1FFFF	System ROM
10000	
0FFFF	Attribute RAM
0C000	
0BFFF	Character RAM
08000	
07FFF	Communication
06000	
05FFF	G/A, keyboard data, character generator
04000	
03FFF	CRT controller
02000	
01FFF	System RAM
00000	

Figure 2-2. Memory Map for the 965

System RAM serves two purposes in the 965. Part of the RAM is used by the firmware as the stack and other temporary data, such as input and output buffers. In addition, the RAM is backed up by a battery, thus retaining the data even with power switched off. This allows portions of the RAM to be used for function key programming and to retain initialization parameters.

To retain data, two things must occur: 1) the voltage to the RAM must not fall below 2 volts; and, 2) the RAM must be deselected as power from the power supply discharges.

Voltage is maintained by the battery (B1). Deselecting the RAM is accomplished by using a transistor (Q1) in series with the chip select signal from the decoder, as described in the next paragraph.

System reset is controlled by the DS1231 power monitor (U11). As it is configured, the DS1231 uses a comparator to monitor VCC and outputs the signals RST (pin 5) and RST (pin 6) when VCC falls to 4.75 V. Upon power up, these signals are held active for at least 250 ms to allow the power supply to stabilize, and properly initialize the CPU.

With power on, SYSTEM RESET is high, turning Q1 on and allowing the chip select signal to go to the RAM. When power goes away, the SYSTEM RESET signal goes low when +5 volts falls below 4.4 volts. This turns Q1 off, causing pin 20 of the RAM to follow the voltage at the junction of CR3 and R10. This voltage is reached (typically 2.8 to 3 volts), at which time the battery voltage takes over.

The CPU system uses the control latches inside the gate array to give the firmware control over some hardware devices that do not interface with the data bus. There are three of these registers, which contain the following control bits:

Control Register 1:

7 80/ 132	6 Dark/ Light	5 CharGen M.S.B.	4 FontLoad On/Off	3 DispRAM A14	2 Protect U.L.	1 Protect RvVideo	0 Protect H.I.
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7. 80 or 132 column mode
6. Dark or light background works on whole screen.
5. Character generator most significant bit allows 512 different characters in the character generator.
4. During font load, character font load at the beginning of power on routines, or user defined font load at any time, this bit should be turned on.
3. Controls highest order address of 32Kx8 static RAM, allowing for two 16K blocks of display memory.
- 2.1.0 Protect characters could be Underline, Reverse or Half intensity.

Control Register 2:

7 Econ. Mode	6 Page/ Line	5 TVI/DEC Blink	4 NEMB/ EMB	3 920 Mode	2 Field H.I.	1 Attrib. Blank	0 Attrib. H.I.
--------------------	--------------------	-----------------------	-------------------	------------------	--------------------	-----------------------	----------------------

7. In Economy mode, no separate attribute RAM is needed. The attribute RAM area is used for character RAM, and vice versa.
6. Toggles between page or line attribute mode.
5. The blink in DEC mode is different, blinks from high intensity to next level of intensity. There are four levels of intensities available including blank.
4. NEMB/EMB controls the appearance of the attribute character. In embedded mode(space), the attribute character appears as a half-intensity space or blank and prevents displaying data in the attribute character position. In nonembedded mode (no space) the attribute character does not appear and it is possible to display data at any location on the screen.
3. In 920 mode Blank attribute blanks underline and reverse attribute.
2. Field base Half intensity on/off.
- 1.0. Attribute character space could be blank or half intensity; works along with bit 4 (NEMB/EMB).

Control Register 3:

7	6	5	4	3	2	1	0
Control I	Control II	HSYNC Delay	Blink Clock	ENTxD IRQ	Screen Mode	Speaker On/Off	DTR

- 7.6. Controls the baud rate up to 38.4 kbaud for communication ports. Used to control the transmit and receive clock to the computer and printer port UART.
5. HSYNC delay is used inside the gate array.
4. Blink on/off.
3. Enable transmit data IRQ.
2. Screen mode is used by video circuitry. This is a latch output. One mode is used for screens with up to 42 rows; the other is used for 43-50 rows.
1. Speaker on/off.
0. Data Terminal Ready. A signal sent to the host computer telling it to stop transmitting data to the 965.

Character Generation

The 965 uses character cells, rather than a full bit-mapped display, to produce characters on the screen. In 24-26 row mode, each character cell is 10 pixels wide by 16 pixels high. The screen displays either 3432 character cells in 132-column mode (132 x 26), or 2080 character cells in 80-column mode (80 x 26).

In 42-50 row mode, the character cell is 10 x 8. In 50-row mode, the screen can display up to 6,600 characters (132-column mode) or 4,000 characters (80-column mode). Each of the 512 possible characters is pre-defined and resides in the character generator RAM (U21). (During power-up, the character fonts are copied from EPROM to character generator RAM.) The CPU changes the display by changing the code stored in the screen RAMS at the desired location(s).

The codes written into the screen RAM are read out as the CRT controller refreshes the display (see "Video Display Generation" later in this chapter). As each code is read out, one per character clock cycle, it is latched into the character address latch (U22).

The outputs of the character address latch are used as the high order address lines of the character generator RAM. The low-order addresses are provided by the scan line counter inside the gate array. The 8-bit data from the character generator is transformed into 10-bit words inside the gate array.

In order to load the character generator RAM, the following circuits are provided inside the gate array. The scan line counter is loadable by the CPU via the scan line offset register, which is accessed as one of the registers in the gate array. It is loaded with data present on D0-D3 outputs of the scan line offset register. During normal operation, this counter is clocked by BLANK. During font load, it is clocked by accesses to the character generator data register.

During screen refresh, data is transferred from the scan line offset register to the scan line counter

on the rising edge of BLANK from the CRT controller. During a font load operation, the transfer does not occur.

Under certain conditions, two of the shift register's inputs are connected to provide a character cell 10 pixels wide without using a special 10-bit wide RAM. In normal text mode, D7 from the character generator is always a low (zero), creating a single dot space on the left side of each character cell.

Character address codes 00 through 7F cannot extend the entire width of the character cell, but character codes 80 through 9F can.

Video Display Generation

The video monitor board requires three signals from the logic board to produce a display on the CRT:

- vertical sync ($\overline{\text{VSYNC}}$)
- horizontal sync ($\overline{\text{HSYNC}}$)
- video ($\overline{\text{VIDEO}}$)

$\overline{\text{VSYNC}}$ and $\overline{\text{HSYNC}}$ originate from the CRT controller (U14). They are buffered and connect to the video section of the board. Video comes from the gate array (U16). It goes through a high-current open collector inverter (U15), where DEC and HI outputs are also tied.

$\overline{\text{HSYNC}}$ and $\overline{\text{VSYNC}}$ are timed pulses derived by the CRT controller from internal programmable counters that count CCLK cycles. For example, $\overline{\text{HSYNC}}$ might be a positive-going pulse starting 83 CCLK cycles after the beginning of each scan line and lasting 18 CCLK cycles. The CRT controller's internal counter would reset at the beginning of each scan line, count to 83, set $\overline{\text{HSYNC}}$ high, count 18 more CCLKs and set $\overline{\text{HSYNC}}$ low.

$\overline{\text{VSYNC}}$ is a much slower signal based on scan lines. Another counter inside the CRT controller counts scan lines and toggles $\overline{\text{VSYNC}}$ according to the way the firmware has programmed the internal registers.

As the SCN2672 CRT controller (U14) counts CCLKs, it is also putting out addresses on its display address lines (pins 21-34, DADD0-DADD13). These lines connect to four 74LS157 4-bit, two-way multiplexers (U17-U20). The select inputs of the multiplexers are normally high, allowing the CRT controller's address line to access the data in the screen RAMs.

As data in the screen RAMs is read out, it is latched into the character address latch (U22) for the character data bus and into the gate array for the attribute data bus.

The character generator data that goes into the gate array is shifted from parallel to serial data, and is combined with attribute data, the BLANK output of the CRT controller, the cursor output of the CRT controller, the screen background control (light/dark) and other signals to produce a series of pulses that come out on the VIDEO output of the gate array.

If the VIDEO output is high, the electron beam in the CRT is turned on, producing a light dot or series of dots on the screen. If VIDEO is low, the screen is dark.

Screen Data Storage

If the CPU needs to access either the character (U25) or attribute (U24) RAMs, the corresponding signal, CHAR RAM WR or ATT RAM WR goes low for half of a CPU cycle. Also, MUX DIR switches the multiplexers to the CPU's address bus.

Character data and attribute data normally go directly into the gate array. The CPU reads and writes character RAM through transceiver U26. In economy mode, where both character and attribute RAM is used as character and attribute RAM (embedded attributes), transceiver U27 comes into the picture.

Communications

There are three serial communications channels. Two channels have their own dedicated UARTS, the third is inside the gate array. They can send and receive data at speeds ranging from 50 to 38,400 bits per second.

U5 (6551A) is the UART used for communication to the host computer. It interfaces to a 25-pin D-subminiature connector (P3) via TTL to RS-232 level converters 1488 (U1) and 1489 (U3).

The baud rate is selectable under firmware control and is derived from the clock going in on pin 6 (commclk1). For the normal baud rate range of 50 to 19.2k, a 1.8432 MHz clock is used. When the 38.4k baud rate is selected, the firmware must also decrease the clock input to 614.4 kHz. It does this by using the HIGH-SPEED control line of the control latch inside the gate array. Using this slower clock and bypassing the internal divide down circuit in the 6551, the theoretical maximum baud rate is now 115.2 kilobaud. This is not possible with RS-232C, and is not supported by the firmware.

U6 is the UART dedicated to printer communications. It interfaces to a 25-pin D-subminiature connector (P4) via U4 (1489) and U2(1488). Its clock input is COMMCLK2 allowing the 50 to 38.4kbaud range.

The gate array's serial channel has a fixed baud rate of 9600.

The $\overline{\text{IRQ}}$ outputs for all three UARTs are tied together in a wire-OR configuration. When any of the UARTS generate an interrupt request (IRQ), the $\overline{\text{IRQ}}$ * line goes low, signaling to the CPU that an interrupt has occurred. The CPU then polls the UARTs to determine which one generated the interrupt, and processes the interrupt as required.

(Signals referred to as "SIGNAL" appear on the schematic as \SIGNAL.)

3 Maintenance

VISUAL INSPECTION

A thorough visual inspection often makes the difference between success and failure in a repair attempt. Often a problem can be located just by close visual inspection.

Terminal and Keyboard Exterior

Look for signs of accidental damage, abuse, or neglect. Keyboard failures are often caused by spilled liquids, sprayed cleaning solvents, staples, or paperclips.

Are there any dents or deep scratches on the exterior of the terminal or keyboard? If so, ask the user how and when the damage occurred. It may contribute to the problem with the unit.

Terminal and Keyboard Interior

Open the cases and inspect the keyboard and terminal interiors.

- **Wiring Harness:** Check the condition of the wires and look for crushed insulation, exposed wires, and loose or broken connectors. Unplug the connectors and check that the pins are intact.
- **Circuit Board:** Check for loose chips, bent pins on chips, defective chip sockets, defective components and traces, poor solder joints, open fuses, and signs of overheating and burning. Check that devices are properly installed.
- **Keyboard:** Check for signs of spilled liquids, foreign objects, unplugged devices,

defective traces, and signs of overheating and burning. Check the telephone-style connectors.

Remove all defective modules for closer inspection and repair. When you finish the repairs, replace the module(s) and test them.

TESTS AND ADJUSTMENTS

This section describes how to test the 965's video monitor and how to make internal adjustments.

You can test the display geometry of the video monitor in the following six areas to make sure that it's functioning properly. Be sure to view the screen straight on to avoid parallax errors.

- Height and width
- Linearity
- Brightness
- Trapezoidal distortion
- Concave and convex distortion
- Display stability

For many of these tests, you must call up the alignment test display (a screenful of H characters). To do this, make sure your 965 is in 965 emulation mode, press **Shift-Setup** to enter setup mode, and type 3.

Height and Width

First measure the height and width of the display. Next, switch to reverse video (35 + /-3 fL for green, 20 + /-fL for white), with the following conditions: 25 lines, 80 columns, normal status line, line 25 = user line. Then measure the height and width again, using the following criteria:

Height: 174 mm (maximum)
170 mm (minimum)

Width: 239 mm (maximum)
235 mm (minimum)

Linearity

Next call up the alignment test display (screen filled with Hs) and measure the horizontal and vertical linearity of the display, using horizontal and vertical slot gauges. Take one reading for at least the first, middle, and last column and for at least the top, middle, and bottom row.

Count ten Hs across and find the left edge of the eleventh H. Then count ten Hs up and find the bottom edge of the eleventh H. The criteria are as follows:

Horizontal: 29.1 mm (maximum)
26.3 mm (minimum)

Vertical: 33.9 mm (maximum)
30.6 mm (minimum)

Brightness

Next test the brightness with a light meter: switch to inverse video, set the contrast to maximum, clear the screen of all characters, and take five readings (one at the center of the screen and one at each corner). The criteria are as follows:

Center: 35 +/-fL
Corner: Center +/-10%

Trapezoidal Distortion

Measure the height of the display at the left side and at the right side; then measure the width of the display at the top and the bottom. In each case, the pair of measurements must be within 2 mm of each other.

Concave and Convex Distortion

Then test concave and convex distortion (pin-cushion and barrel): measure the height of the display at the left side, middle, and right side; measure the width of the display at the top, middle, and bottom. In each case, the curvature of the display must not exceed 1.5 mm.

Display Stability

Finally, check display stability for the voltage and line frequencies given below. Conduct each test at the minimum, nominal, and maximum value.

AC Voltage: 127V (maximum)
115V (nominal)
103V (minimum)

253V (maximum)
230V (nominal)
207V (minimum)

Frequency: 63 Hz (maximum)
60 Hz (nominal)
57 Hz (minimum)

53 Hz (maximum)
50 Hz (nominal)
47 Hz (minimum)

Making Adjustments

You can adjust the picture on the 965's video monitor using one of the following:

Brightness	Pot VR605
Focus	Pot VR604
Contrast	Pot VR501
Height	Pot VR401
Linearity	Pot VR402
Horizontal width	Coil L302

TROUBLESHOOTING

This section is a guide to component-level repair of the logic board and keyboard modules. Find the symptoms in Table 3-1 that resemble the problems in the terminal you are repairing. Then locate the suspected defective components. If you are not sure that a component is satisfactory, replace it before proceeding to the next test point. Before replacing a chip or component, check its inputs and outputs for proper levels and signal quality.

Table 3-1. Troubleshooting Guide

Symptom	Component	Location	Schematic Page
Display/Video			
No display, no beep, fails self test	SYS.RAM	U7	1 of 4
	CPU	U10	1 of 4
	Power monitor	U11	1 of 4
	Gate array	U16	4 of 4
	EPROM	U8, U9	1 of 4
Distorted video	2672	U14	2 of 4
	6264	U6	4 of 4
	Gate array	U16	4 of 4
Incorrect characters	6264	U24, U25	2 of 4
	6551A	U5, U6	3 of 4
	Gate array	U16	4 of 4
	6264	U21	4 of 4
	EPROM	U8, U9	1 of 4
	8049 (Kybd)	U2	KYBD
No vertical sync	2672	U14	2 of 4
	7406	U15	2 of 4
No cursor	2672	U14	2 of 4
	Gate array	U16	4 of 4
Loss of attributes	Gate array	U16	4 of 4
	6264	U24	2 of 4

Table 3-1. Troubleshooting Guide (Continued)

Symptom	Component	Location	Schematic
			Page
Communications			
No full-duplex communication (FDX) at P3	6551A	U5	3 of 4
	1488	U1	3 of 4
	1489	U3	3 of 4
No full-duplex communication (FDX) at P4	6551A	U6	3 of 4
	1488	U2	3 of 4
	1489	U4	3 of 4
No status signal transmitted (DSR, DCD, CTS, DTR)	1488	U1	3 of 4
	6551A	U5	3 of 4
No status signal received (DCD, CTS)	1489	U3	3 of 4
	6551A	U5	3 of 4
All keys inoperative	Gate array	U16	4 of 4
	8049 (Kybd)	U2	KYBD
	7414 (Kybd)	U1	KYBD
One key inoperative	Keyswitch 8049 (Kybd)	U2	KYBD
SHIFT, CTRL, ALPHA LOCK, and function keys inoperative	EPROM	U8, U9	2 of 4
	8049 (Kybd)	U2	KYBD
No keyclick/no beep	Transducer		4 of 4
	2N2222	Q3	4 of 4
	Gate array	U16	4 of 4

REMOVING THE MODULES

Opening the Case

WARNING

The CRT and capacitors retain high voltages even after power has been turned off. Always discharge the CRT as soon as you open the case.

Without touching any of the metal surfaces, pick up a screwdriver by its insulated handle and slip the tip of the screwdriver under the plastic cap that covers the anode, as shown in Figure 3-1. Then touch the metal frame of the CRT with the shaft of the screwdriver. (You may need a second screwdriver to reach the CRT frame from the anode.)

Use Figure 3-2 as reference for opening and closing the terminal case.

1. Turn off the terminal.
2. Disconnect the power cord and data cable(s) from the back of the terminal; disconnect the keyboard cable from the left side of the terminal.
3. Remove the bezel from the front of the terminal by pressing down on the top section to release it and pulling it away.
4. Remove the two Phillips screws from the rear of the terminal using a size 1 Phillips screwdriver (Xcelite X1010).
5. Remove the cover by releasing the two plastic "gripper" tabs near the top in each side of the CRT and pushing to the rear.

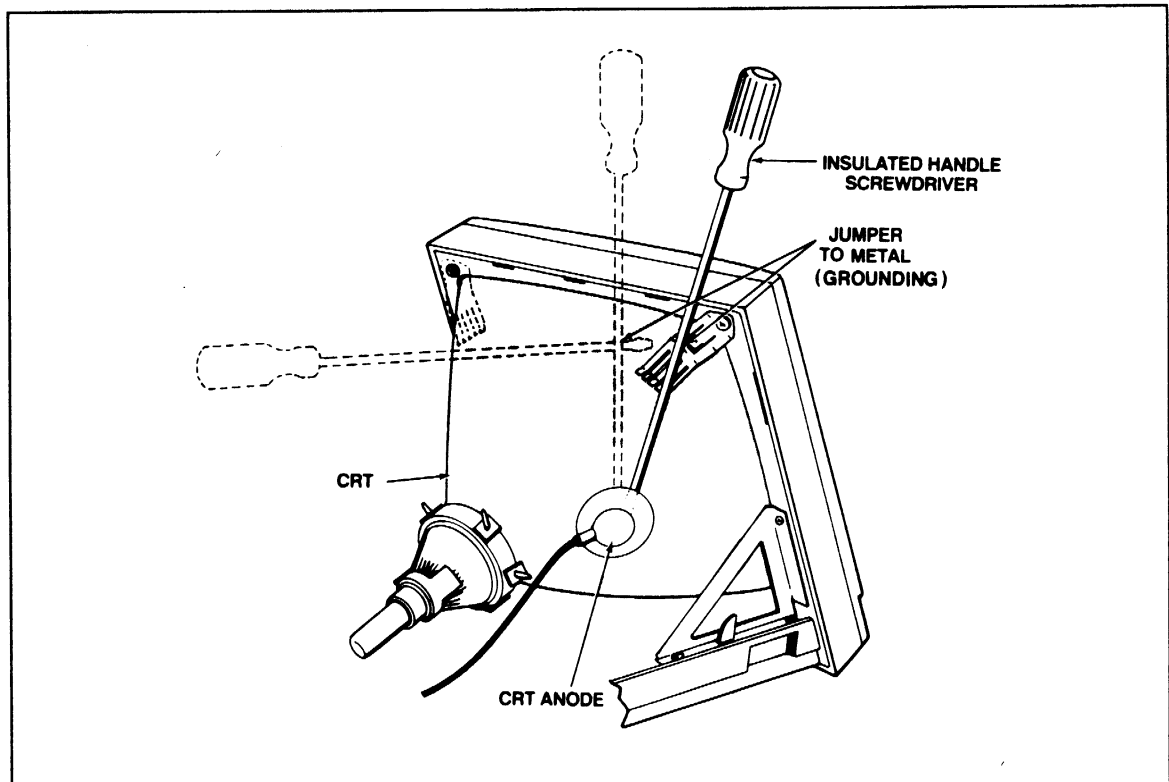


Figure 3-1. Discharging Voltages

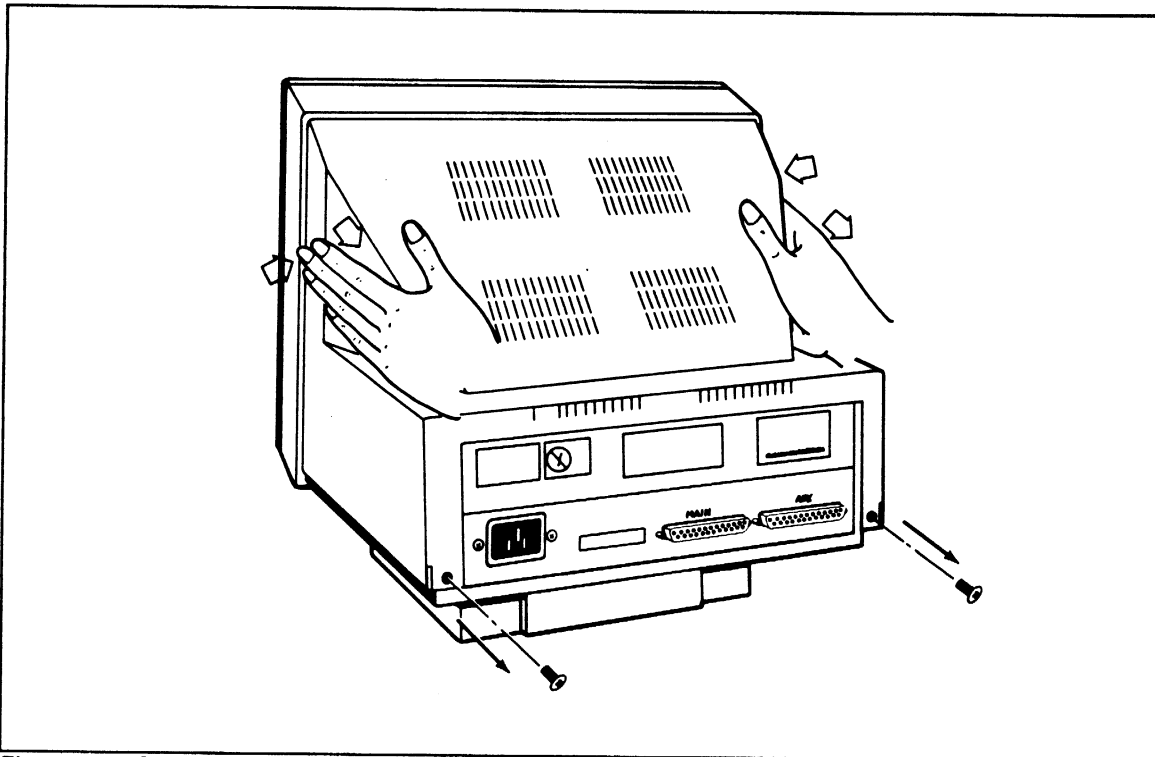


Figure 3-2. Opening the Terminal Case

Removing the Circuit Board

Use Figure 3-3 as reference for removing and replacing the circuit board.

1. Turn off the terminal and remove the cover, as described above.
2. Remove the two Phillips screws just below the CRT on each side. These will release the two ground wires.
3. Turn the unit around and remove the two Phillips screws that hold the circuit board down, using a size 1 Phillips screwdriver.
4. Disconnect the voltage lead on the anode by gently lifting the rubber cap and unhinging the metal lead.
5. Carefully remove the CRT connector (small round connector on the back of the CRT).

6. Remove the yoke connector (blue) from the circuit board.
7. Tilt the CRT forward by loosening the lower screws for the CRT support brackets. These are spring-loaded, and tilt the CRT forward automatically whenever the screws are loosened.
8. Pull the circuit board out through the rear of the chassis.

Replacing the Circuit Board

Use Figure 3-3 as reference for removing and replacing the circuit board.

1. Slide the circuit board in through the rear of the chassis.

2. Replace the two Phillips screws that hold the circuit board down, using a size 1 Phillips screwdriver.

3. Tilt the CRT back into position by tightening the lower screws for the CRT support bracket.

4. Reconnect the voltage lead to the CRT's anode:

a. Pull back the rubber umbrella of the anode cap, exposing the metal leads.

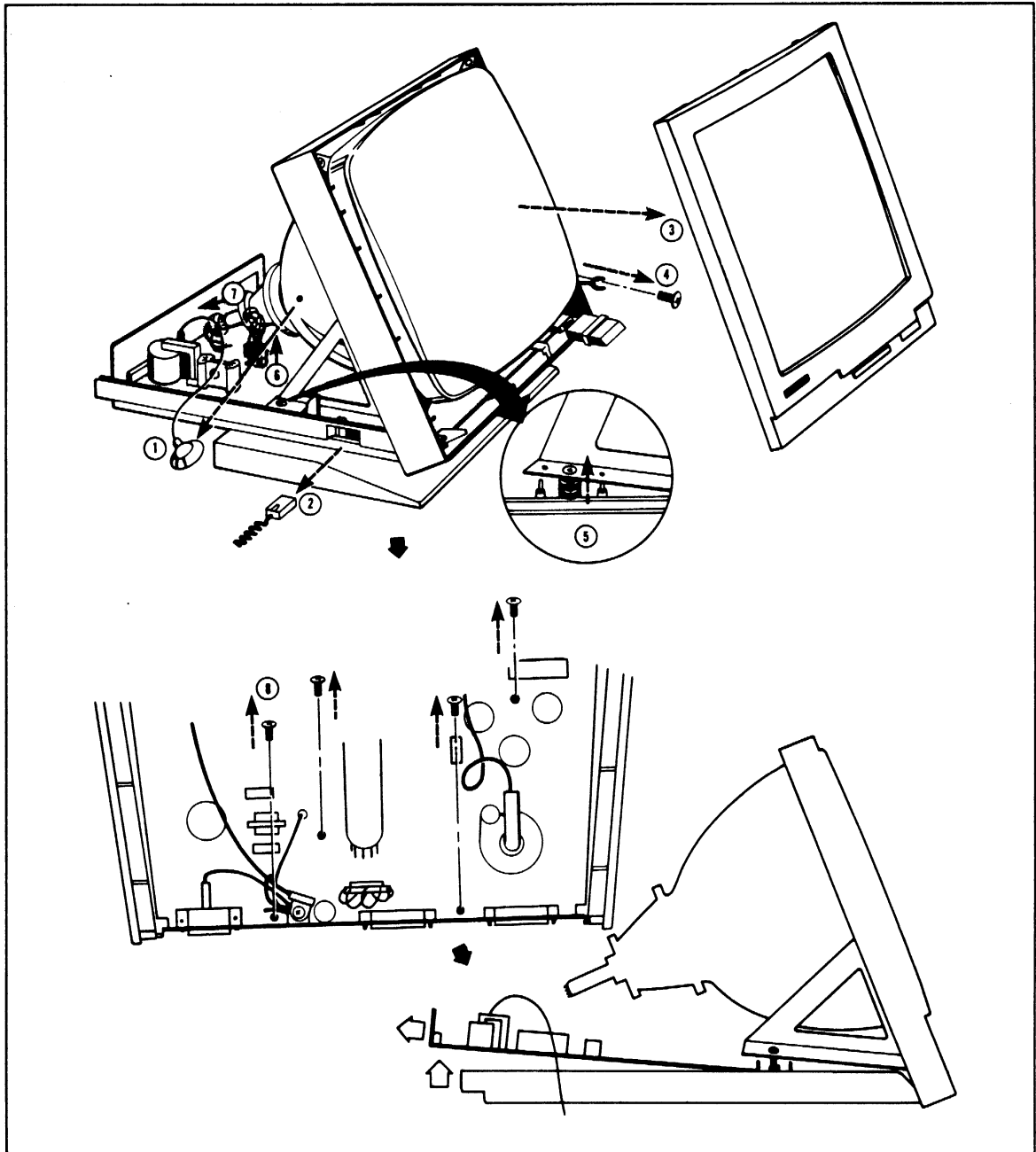


Figure 3-3. Removing the Circuit Board

- b. Pinch the two leads together, insert them into the glass opening on the side of the CRT, and then release them.
 - c. Smooth the rubber umbrella over the surface of the glass.
5. Replace the CRT connector (small round PC board on the back of the CRT).
 6. Replace the yoke connector (blue) from the circuit board.
 7. Replace the two Phillips screws just below the front of the CRT on each side (along with the two ground wires).

Closing the Terminal Case

1. Replace the cover:
 - a. Slide the cover into position.
 - b. With the seven tabs aligned with their slots, push the cover into the frame until the two tabs snap and the cover is seated.
 - c. Replace the two screws that fasten the cover to the back of the chassis.
2. Replace the bezel:
 - a. Turn the unit around so that you are facing the screen.
 - b. Slide the bezel into position.
 - c. Make sure that the ON/OFF switch is aligned on its opening, the slide switch is aligned on the plastic tab, and the gripper tabs are aligned on their slots.

CAUTION

Make sure the ON/OFF switch is aligned with its opening before you snap the bezel into place. Otherwise, the bezel will break the switch.

- d. Once the ON/OFF switch, the slide switch, and the three tabs are all aligned, pop the bezel into the frame.

Opening the Keyboard Case and Removing the Keyboard Circuit

1. Disconnect the helical cable from the left side of the terminal.
2. Turn the keyboard upside down and remove the two Phillips screws from the two sides of the housing.
3. Turn the keyboard over again and lift off the top cover, pressing the plastic tabs on the under side as needed.
4. Lift the entire assembly out of the keyboard case.

Replacing the Keyboard Circuit and Closing the Keyboard Case

1. Place the assembly back onto the keyboard case.
2. Replace the top cover, pushing the tabs into their respective slots.
3. Turn the keyboard upside down and replace the two Phillips screws.
4. Reconnect the helical cable to the opening on the left side of the terminal.

Procedure: TORS - 965

SUBJECT: TeleVideo Quality Requirements Specification.
Model 965 Terminal Inspection and Acceptance Requirements.

1.0 SCOPE:

This document outlines the Quality Assurance Acceptance Tests which will be the basis of acceptance or rejection of model 965 terminals received by TeleVideo Systems.

2.0 OBJECTIVE:

Product testing will be sufficiently adequate to ensure conformance of all TeleVideo standards of design, manufacture, quality, safety, and reliability.

3.0 TEST DESCRIPTIONS:

Each terminal selected for inspection shall be completely inspected for:

- 3.1 Part and assembly manufactured in conformance to drawings and specifications.
- 3.2 Conformance of all workmanship standards in regards to fabrication, assembly, and packaging.
- 3.3 Environmental testing to ensure proper operation under normal environmental conditions.

4.0 TEST EQUIPMENT:

- 4.1 Test equipment consists of the following; to ensure adequate inspection.
 - a.) Standard Test Equipment.
 - b.) Special or Dedicated Test Equipment.
 - c.) Fixtures and Inspection Aids.
- 4.2 All standard equipment shall be routinely inspected for need of calibration. Appropriate calibration decals shall be displayed on all equipment.
- 4.3 Special and dedicated test equipment, including fixtures and inspection aids, shall be identified by appropriate drawings and/or specifications. They will also be regulated by an approved acceptance and change control procedure.

5.0 FUNCTIONAL TESTS:

5.1 Standard Configuration for Acceptance Testing:

- 5.1.1 The keyboard is to be connected to the unit. The terminal is to be completely assembled and ready for operation.
- 5.1.2 The top cover must be removed for access to internal test points.
- 5.1.3 All viewing measurements of the display should be "head-on" observations at each particular area of the CRT to eliminate any "parallax" error. Avoid taking measurements at any other viewing angles.
- 5.1.4 A max/min AC operation test will consist of the use of a variable AC generator where AC voltage and frequency can be adjusted. [See section 5.3]
- 5.1.5 Normal video shall be defined as black background and inverse video as a bright background.

5.2 UL Hi-Pot Verification and Safety Ground Test:

- 5.2.1 This test requires a functional Hi-Pot tester and an audible continuity tester.
- 5.2.2 Set the test equipment to supply a high voltage of 1.2 KV between neutral and ground. Reject if audible noise present.
- 5.2.3 Designated test time is 10 +/- 0.5 seconds.
- 5.2.4 Measure continuity with an audible continuity tester from chassis terminal to the AC plug ground. Reject if audible sound NOT present.

5.3 AC Line Voltage and Frequency Test:

Acceptance tests are to be conducted at maximum and minimum AC voltages and frequencies.

- 5.3.1 Verify that there is no degradation to the CRT screen display during operation at the specified line voltage and frequency.

5.3.2 AC Voltage Inputs:

Nominal:	115 VAC	230 VAC
Minimum =	103 VAC	207 VAC
Maximum =	127 VAC	253 VAC

5.3.3 Line Frequency Inputs:

103/127 VAC -	Nominal:	60 Hz.
	Maximum:	63 Hz.
	Minimum:	57 Hz.

207/253 VAC -	Nominal:	50 Hz.
	Maximum:	53 Hz.
	Minimum:	47 Hz.

5.3.4 Line Current Ratings:

103/127 VAC - Maximum: 1.0 Amp.

207/253 VAC - Maximum: 0.5 Amp.

5.4 Brightness (Inverse Video):

5.4.1 Turn the power switch to the ON position and verify the start-up beep is heard.

NOTE: Unit must be powered on for minimum of twenty minutes prior to testing.

5.4.2 Bring up the "inverse video" screen and measure the screen brightness.

Acceptable Levels: 17-22 FL, White CRT
17-22 FL, Amber CRT
42-47 FL, Green CRT

5.4.3 Brightness levels at maximum brightness should measure no more than:

22 FL, White CRT
22 FL, Amber CRT
47 FL, Green CRT

6.0 DISPLAY GEOMETRY:

6.1 Screen Display Positioning, Length/Width Dimensions:

Configure the CRT screen to display in "inverse video" mode by setting the following parameters.

[TQRS_965.QAE]

- Column = 132
- Line = 24
- Page Length = 1 X Lines
- Status Line = Normal
- Top Line = Status
- Bottom Line = Status
- Cursor Type = Black Steady
- Background = Light
- Screen & Scrolling Speed = N/A
- Brightness Condition: "Inverse Video" per 5.4.2
- Screen Saver = Off

Limit of Acceptance:

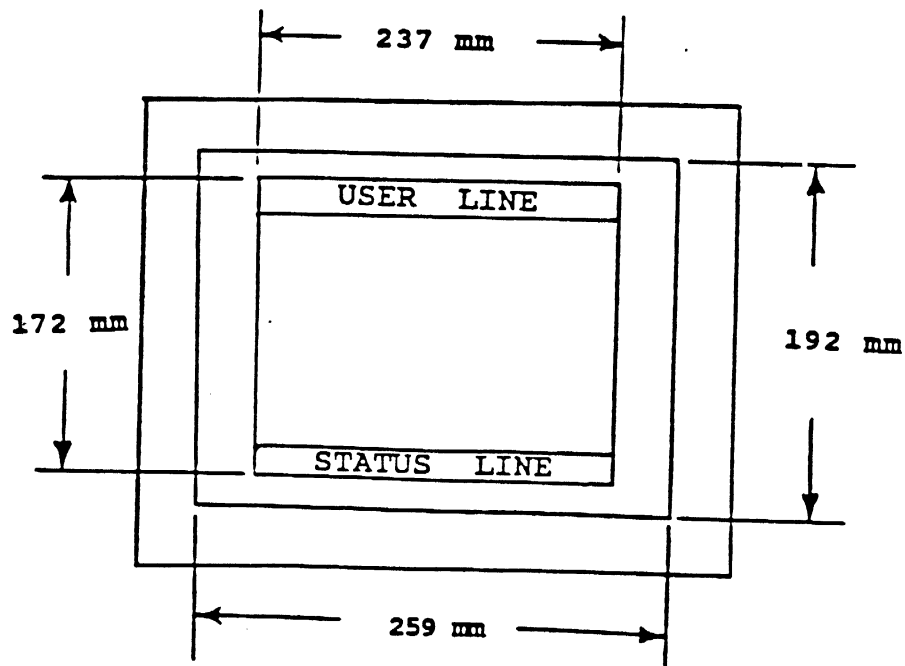
Length: 237 +/- 2 mm

Width: 172 +/- 2 mm

6.2 Raster Centering Verification:

Verify the conformance of the positioning of the area of the CRT display which is scanned by the electron beam with respect to the phosphor edge of the CRT as shown below.

Measure from edge of line to Bezel with a millimeter scale or template.



6.3 "Inverse Video" Linearity Verification:

With the raster adjusted within specified limits, no character shall differ by more than +/- 5% in a horizontal dimension or +/- 3% in the vertical dimension when compared to the average dimensions of the rest of the characters.

The accepted method to verify the horizontal and vertical linearity is with the use of "slot" gauges. As a minimum, vertical measurements shall be taken referenced to the first, middle, and last columns. Horizontal measurements will be referenced from the top, middle, and bottom rows.

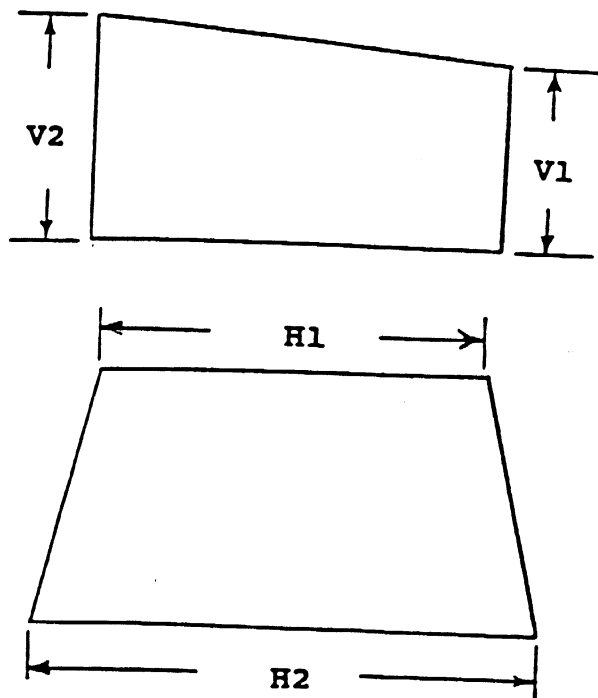
Overall CRT display measurements are to be taken along the center vertical and horizontal axis.

6.4 Trapezoidal Distortion:

Edge measured vertical and horizontal dimensions must not vary more than 2.0 mm.

The terminal manufacturer must use a template with 1.0 mm. tolerances for calibration and inspection of the terminal.

TeleVideo Q.A. auditing and production staff will use a template with 2.0 mm. tolerances for inspection of the units.



6.4.1 CRT Display Vertical Measurements:

$$V2 - V1 < / = 2.0 \text{ mm.}$$

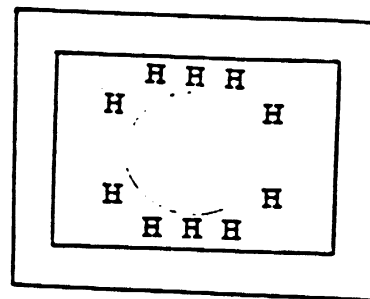
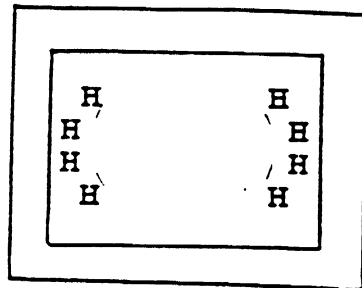
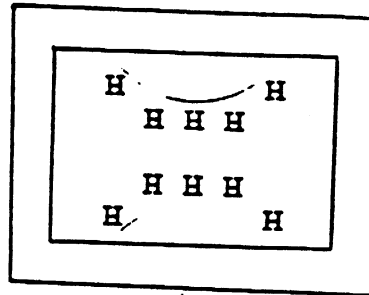
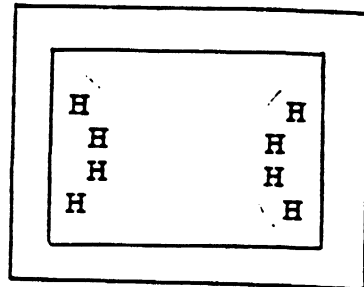
6.4.2 CRT Display Horizontal Measurements:

$$H2 - H1 < / = 2.0 \text{ mm.}$$

6.5 Concave / Convex Distortion, (Barrel/Pin Cushion):

With the raster adjusted within specification, each horizontal row and vertical column must not exceed raster curvature distortion limits of 2.0 mm.

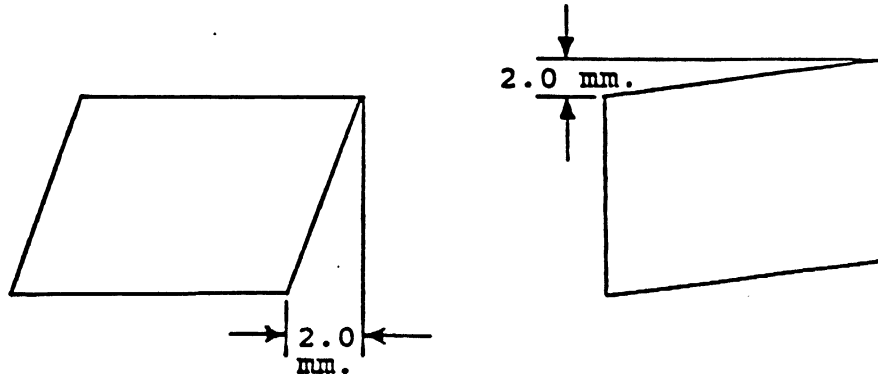
A combination of concave and convex distortion within a row or column is NOT permitted.



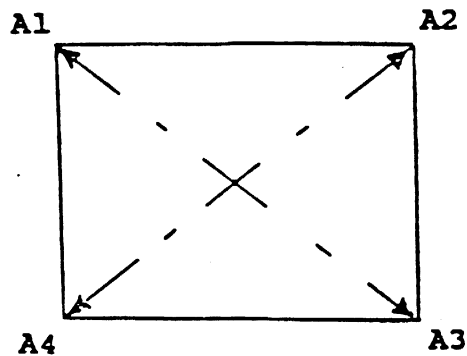
Measurements and judgements must be based on observations taken with the template or with the scale on the edge of the rows and columns.

6.6 Parallelogram (Orthogonal Distortion):

Orthogonal distortion in either the vertical or horizontal direction must not exceed 2.0 mm.



The accepted method for verifying the parallelogram measurement is as follows:



With a millimeter scale, measure the distance between A1 -> A3, and A2 -> A4.

NOTE: (A1 -> A3) - (A2 -> A4) < / = 2.0 mm.

6.7 Display Stability Verification:

Configure the CRT screen to display H patterns while in "inverse video" mode. Observe the CRT screen from approximately 15" away.

There must not be any jittering or waving affects on the CRT screen quality. This measurement should be performed by the naked eye.

6.7.1 Generation of "H" patterns:

- Configure the CRT screen to display H patterns while in "inverse video" mode.

6.7.2 Visual inspection of display screen for presence of "waving" or "jittering".

- Observe the CRT screen for the presence of any jittering or waving motion.

6.7.3 Visual inspection of display screen for clear focus.

- Observe the "H" characters on various locations of the CRT screen. There should be NO significant difference in the quality of the characters.

6.7.4 Visual inspection of terminal "video response".

- To Be Added in Near Future.

7.0 DIAGNOSTIC TESTING:

7.1 TeleDesk Application Test:

7.1.1 Press "FUNCT" & "F1" keys simultaneously.

The TeleDesk clock should contain default values.

DATE	January	1	1990
TIME	1	00	AM
ALARM	1	00	AM
DISPLAY	None		
12-24 Hr	12 Hour		
BELL	None		
NOTE:	TeleVideo !		

- 7.1.2 Press "FUNCT" & "F2" keys simultaneously.
The Calendar overlay should be displayed.

January 1990						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

- 7.1.3 Press "FUNCT" & "F3" keys simultaneously.
Calculator overlay should be displayed.

a.) Move the calculator to middle of screen by pressing "shift" & "<-" (left arrow) keys simultaneously approximately five times.

b.) Using the numeric keypad on right side of keyboard, perform the following;

- Press "," key (located above "Enter" key). The "+" key should be highlighted on the CRT display.
- Press 0.123456789 on the numeric keypad. Each corresponding numeric key (displayed on CRT) should become highlighted as that numbered key is depressed.
- Press "-" key which is above "," key. The "-" key should be highlighted on the CRT display.
- Press 0.123456789 on the numeric keypad. Again, each corresponding numeric key (displayed on CRT) should become highlighted as that numbered key is depressed.
- Press the "Enter" key. The "=" key should be highlighted on the CRT display.
- The calculator should display the correct result. (0.123456789 - 0.123456789 = 0)

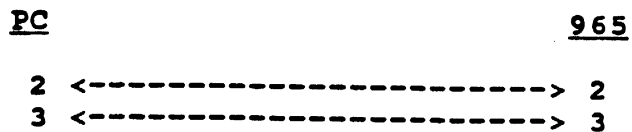
7.2 Keyboard Test:

- 7.2.1 Plug the 935 ASCII or the Enhanced AT keyboard (LED indicator in Caps Lock Key) into the 965 terminal and turn the power on to the terminal.
- 7.2.2 Check the status of the LED indicator on the "Caps Lock" key on the keyboard.
- 7.2.3 Depress the "Caps Lock" key and check the status of the LED indicator.

The LED indicator should change states when ever "Caps Lock" key is depressed.

- 7.3.1 Connect a 25 pin RS-232 cable between COM1 on the Host PC and the 965 computer port.

Cable Requirements:



- 7.3.2 Place the disk labeled "965 Diagnostic Ver 1.0 10/30/87" in drive A and turn the power on to the PC.

Performing a "copy a:*. * c:" will copy all of the diagnostic files over to your hard disk.

- 7.3.3 Make sure that the baud rate, word (data), parity, and stop bit are correctly set up on the PC. You may use the DOS "Mode" command to reconfigure these serial parameters if needed.

Example: mode com1:9600,n,8,1 sets the baud rate at 9600 baud, provides no parity, eight data bits, and one stop bit.

- 7.3.4 Type "K65" on the PC and press Return. The CRT screen on the 965 should display an ASCII type keyboard.

Press the corresponding highlighted key on the keyboard.

NOTE: Verify that the "ALPHA_LOCK" key is locked.

Press all corresponding highlighted keys simultaneously if more than one highlighted.

The last key to be depressed is lower case "a". Release the "ALPHA_LOCK" prior to pressing a.

- 7.3.5 An audible "beep" will be heard and an "ERROR" message will be displayed at the bottom of the CRT screen if wrong key pressed or if wrong scan code generated.

If this occurs, press the highlighted key once again. If still no reaction, then no scan code generated. Unit failed test.

The 965 will display a "PASS" message upon successfully completing the keyboard test.

7.4 Visual / Line Attribute Test:

- 7.4.1 Type "A65" on the PC then press "return." The 965 CRT screen should be displaying different types of attributes, (i.e. half intensity, double high, and double wide characters).

- 7.4.2 Toggle the "Loc Esc" (shift esc) "K" (uppercase k) keys on the 965 terminal to see different visual and line attributes.

Observe the attributes for conformance.

7.5 Communication, Computer Port, & Video RAM Test:

- 7.5.1 Type "M65" on the PC, then press "return". This test doesn't require intervention.

The terminal will display "PASSED 965 MEMORY TEST" upon successful completion of all tests.

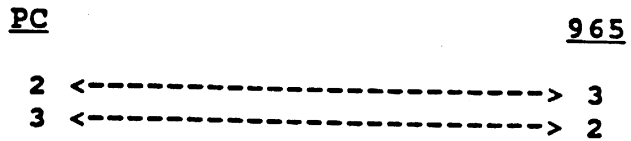
If no character is displayed, a communication problem exists. Check cable assembly.

7.6 Printer Port Test:

- 7.6.1 Connect the RS-232 cable between COM1 on the PC and the Auxiliary port on the 965.

NOTE: Pins 2 and 3 need to be swapped for the auxilliary port tests of the 965 terminal.

Cable Requirements:



7.6.2 Press the "SET_UP" (shift no scroll) key to enter the Set_Up menu.

a.) Press the "->" (right cursor) key once to move to the General menu.

b.) Press the "v" key three times to move down to the Main/Aux menu. Then press space bar once to toggle entry to Print/Host.

c.) Press the Set_Up (shift no scroll) key to exit from Set_Up.

7.6.3 Type "P65" on the PC. Then press "return".
This test doesn't require intervention.

The terminal will display "PASSED 965 MEMORY TEST" upon successful completion of all tests.

If no character is displayed, a communication problem exists. Check cable assembly.

7.7 Battery / Function Key Test:

7.7.1 Power down the 965 terminal.

7.7.2 Power up the 965 terminal.

NOTE: The "M65" program and tests must have been successfully completed prior to this test.

7.7.3 Press the "F6" key on the top row. The 965 CRT screen should display H patterns in inverse video.

If H patterns not present, then either battery defective or function key incorrectly programmed.

7.8 Power Supply & Video Adjustment:

- 7.8.1 Adjust "SFR201" on the power supply so that the voltage between pin7 and pin 14 of U3 is 5.1 vdc.
- 7.8.2 Set the video voltage at the base of Q501 to 3.75 vdc by adjusting the VR502 pot.
- 7.8.3 Press the "F6" (24 line 80 column) or "F7" (49 line 132 column) key to fill display with H patterns in inverse video.
- 7.8.4 Set contrast level to maximum contrast. Adjust VR605 until "raster" scan lines begin to appear.
- 7.8.5 Set contrast level to minimum contrast. Adjust VR602 until video present.
- 7.8.6 Adjust focus with VR604.
- 7.8.7 Adjust the horizontal width with L302.
- 7.8.8 Adjust vertical height with VR401.
- 7.8.9 Adjust vertical linearity with VR402.
- NOTE: Decrease the vertical height before adjusting vertical linearity.
- 7.8.10 Adjust "Yoke" rings on back of tube/yoke assembly to center the whole screen.

7.9 Static Burn In:

- 7.9.1 Place the 965 terminal into the "static" burn in area.
- 7.9.2 Power up the 965 terminal.
- 7.9.3 Press the "F5" key on the top row.

NOTE: The "M65" program and tests must have been successfully completed prior to this test.

- 7.9.4 The 965 CRT screen should display various messages in inverse video. The smooth scroll feature should also be noticeable.

7.10 Setting Factory Default Values:

- 7.10.1 Press the "Loc Esc", " - ", & "0" keys in sequence to reset non-volatile memory to its factory default values.

8.0 ASSEMBLY WORKMANSHIP VERIFICATION:

Verify assembly workmanship by using TQRS-88-003 and assembly documents as guidelines to inspect the following:

- 8.1 With the keyboard overlay in place, verify that all keyswitches / keycaps have been correctly installed.
- 8.2 Verify that all cable harnesses and wire assemblies conform to standards.
- 8.3 Verify that all required labels are correct and properly placed on the unit.
- 8.4 Verify that the terminal enclosure (top assy) is free from defects, and is properly assembled.
- 8.5 Randomly select four screws and verify their tightness. Use a torque wrench/screwdriver to verify torque if necessary.

9.0 VDE INSPECTION CRITERIA:

Terminals manufactured to meet VDE Class B specifications should conform with all criteria listed below.

- 9.1 There should be a "VDE" approval decal displayed on the back of the terminal.
- 9.2 There should be a conductive coating (Ni or Cu) on the inside of the enclosure and bezel.
- 9.3 There should NOT be any conductive coating on the masked off portions of the enclosure or bezel.
- 9.4 The conductive coating should NOT interfere with the fit of the enclosure and bezel.
- 9.5 The four ground mounting holes should be connected to the conductive coating.
- 9.6 To Be Added In The Future.

10.0 RELATED DOCUMENTATION:

Referenced documentation can be found in this section. These documents include but are not limited to engineering specifications, schematics, marketing products requirements, and quality requirements.

- TeleVideo Workmanship Specifications: TQRS-88-003.
TeleVideo Part Number - 143074-00
- TeleVideo Engineering Specifications:
TeleVideo Part Number - 143070-01
- TeleVideo Engineering Test Procedures:
TeleVideo Part Number - 143070-02

I. TELEVIDEO CUSTOMER SERVICE POLICY FOR CONTRACT DISTRIBUTORS

To be successful, Resellers need to have responsible technical support and quality after sales service. TeleVideo has a number of programs which are designed to help you achieve this.

II. LIMITED WARRANTY

A. LIMITED WARRANTY

1. TeleVideo warrants all of its products and spare parts delivered hereunder against defects in workmanship, performance and construction (per the product specification) for 1 year (products, except software) and 30 days (spare parts) from date of shipment from TeleVideo.
2. The repaired product, or module is warranted for 30 days, but this repair warranty does not extend the original warranty date.

B. LIMITED WARRANTY EXCLUSIONS

1. TeleVideo sells its products F.O.B. shipping point. Collection of insurance for all shipping damage or lost shipments is the responsibility of the customer.
2. The limited warranty is void and no warranty shall apply if the failure has resulted from modification, misuse or out of spec conditions of operation.
3. The limited warranty does not cover the failures caused by improper or inadequate maintenance.

C. LIMITED WARRANTY STATEMENT

1. STATEMENT

TeleVideo warrants to Customer that Products manufactured by TeleVideo will be free from defects in material and workmanship. TeleVideo's obligations under this warranty will be limited to repairing or replacing, at TeleVideo's option, the part or parts of the Products which prove defective in material or workmanship within one year after shipment by TeleVideo, provided that Customer gives TeleVideo prompt notice of any defect and satisfactory proof thereof.

Products may be returned by Customer after a Return Material Authorization ("RMA") number has been obtained from TeleVideo by telephone or in writing. Customer will prepay all freight charges to return any Products to the repair facility designated by TeleVideo and include RMA number on the shipping container. TeleVideo will deliver replacements for defective Products or parts on an exchange basis to Customer freight prepaid. Products returned to TeleVideo under this warranty will become the property of TeleVideo. With respect to any Product or part thereof not manufactured by TeleVideo, only the warranty, if any, given by the manufacturer thereof, will apply.

2. EXCLUSIONS

This limited warranty does not cover losses or damages which occur in shipment to or from Customer, or due to (1) improper installation or maintenance, misuse, neglect or any cause other than ordinary commercial or industrial application, or (2) adjustment, repair or modifications by other than TeleVideo-authorized personnel, or (3) improper environment, excessive or inadequate heating or air conditioning and electrical power failures, surges or other irregularities, or (4) any statements made about TeleVideo's Products by salesmen, dealers, OEM or agents unless confirmed in writing by an officer of TeleVideo.

3. THE FOREGOING TELEVIDEO LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER ORAL, WRITTEN, EXPRESS, IMPLIED OR STATUTORY. IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WILL NOT APPLY. TELEVIDEO'S WARRANTY OBLIGATIONS AND CUSTOMER'S REMEDIES HEREUNDER ARE SOLELY AND EXCLUSIVELY AS STATED HEREIN.

4. TELEVIDEO'S LIABILITY, WHETHER BASED ON CONTRACT, MISREPRESENTATION, FRAUD, NEGLIGENCE, WARRANTY, STRICT LIABILITY OR ANY OTHER THEORY, SHALL NOT EXCEED THE PRICE OF THE INDIVIDUAL UNIT WHOSE DEFECT OR DAMAGE IS THE BASIS OF THE CLAIM. IN NO EVENT SHALL TELEVIDEO BE LIABLE FOR ANY LOSS OF PROFITS, LOSS OF USE OF FACILITIES OR EQUIPMENT, OR OTHER INDIRECT INCIDENTAL OR CONSEQUENTIAL DAMAGES. NO ACTION AGAINST TELEVIDEO FOR BREACH OF THE WARRANTY OR OF THIS AGREEMENT SHALL BE COMMENCED MORE THAN ONE (1) YEAR AFTER THE CAUSE OF ACTION.

III. TECHNICAL SUPPORT

If for any reason your product is not performing satisfactorily, read your operator's manual to make sure you have installed and are operating it properly. If you still have a problem, call your dealer. If they are unable to help you, call our Technical Support Department for assistance. Ready to help you are factory-trained specialists. They can assist you to make sure your unit is properly configured for your application and you are operating it properly. In the event the diagnosis of your product has failed, you can go to your dealer to have it repaired, or you may be referred to our Customer Service Department for Factory Repair Service (see IV, Factory Repair Service).

IV. FACTORY REPAIR SERVICE

TeleVideo maintains an in-house repair group which is staffed with highly qualified technicians and operators and has access to its own, as well as production test and assembly equipment. The standard factory repair turnaround time is 5 to 10 working days from the date the defective unit is received at TeleVideo.

A. RETURN MATERIAL AUTHORIZATION (RMA)

1. An RMA (Return Material Authorization) number is required for factory repair service of parts, modules and products in and out of warranty. The authorization must be obtained from TeleVideo Customer Service before returning parts, modules or products for any repair service.

2. Contact TeleVideo Customer Service for an RMA number with the following information:
 - a. Precise and complete description of failure or defect so that your unit can be repaired and tested to assure the problem is corrected.
 - b. Model of unit and configuration.
 - c. Serial number (required for all warranty repairs).
 - d. Ship to and bill to address with method of shipment.
 - e. Contact name and telephone number.
 - f. Customer number if you have an account with TeleVideo.
 - g. Credit card number and expiration date.
 - h. Items to be returned (module or whole unit).
3. The RMA number expires on the 30th calendar day of issuance. If an extension is needed, please call Customer Service.
4. Customer sends unit to TeleVideo freight prepaid. The RMA number must appear on the outside of the box or the shipment will be refused.
5. When TeleVideo receives the returned product, we will review the problems documented on the RMA and verify them by testing the product. If TeleVideo is unable to duplicate the problem, we will call you to verify proper unit was sent, or if something more should be checked. If TeleVideo is still unable to verify the problem, TeleVideo will return the product to the customer freight collect. If the problem is verified, TeleVideo will determine whether to repair or exchange the product.
6. After the product has been repaired, burned-in and tested, TeleVideo will then send the product back to the customer freight prepaid (in-warranty) and freight collect (out-of-warranty).

B. GENERAL INFORMATION ON REPAIRS

1. All authorized enhancements or modifications to improve product's value will be charged. All prices and turnaround time must be quoted by TeleVideo Customer Service before product is received by TeleVideo.
2. If, in the judgment of TeleVideo, the out-of-warranty product or module is non-repairable, the product will be returned to the customer at no charge and freight collect.
3. TeleVideo reserves the right to replace a defective part or module with a new or factory refurbished part in lieu of repairing.
4. Price protection, stock rotation and co-op advertising do not apply to spare parts or repairs.

V. SPARE PARTS

A. LEAD TIME

1. Spare parts and modules listed in this manual are carried in our spares inventory and will normally be shipped within 24 hours. If we are temporarily out of stock, we will give you a promised ship date.
2. Other parts and modules may not be immediately available. Please contact Customer Service for delivery dates and prices.

B. PLACING AN ORDER

1. To place an order for spare parts, contact Customer Service by phone, fax or in writing with the following information:
 - a. Part number
 - b. Quantity of parts
 - c. Contact name and telephone or fax number
 - d. Ship to address and bill to address
 - e. Method of shipment
 - f. Purchase Order (P.O.) number
2. There is a \$50.00 minimum per order.

C. METHOD OF PAYMENT AND SALES TAX

1. If there is no account number established for your company, then your payment options are credit card (Mastercard, Visa or American Express) and C.I.A. (Cash In Advance).
2. TeleVideo reserves the right to hold shipment if payment or credit accounts are overdue.
3. California residents or businesses may be subject to state and local sales tax.
4. A customer who does not have an open account with TeleVideo must provide a Reseller Certificate to be exempt from paying California state and local sales tax.
5. A hard copy P.O. (Purchase Order) must be received by TeleVideo from an open account customer.

D. SHIPMENT OF SPARE PARTS

1. All shipments are F.O.B. shipping point. All freight charges and custom duties and insurance are paid by the customer. The customer must state the type of carrier and service they prefer. Otherwise TeleVideo will designate a freight carrier and service. Insurance will be issued only at the customer's request.
2. TeleVideo is not responsible for delays, damages, or loss of shipment made by freight carriers. It is the customer's responsibility to claim the insurance through the freight carrier on all damaged or lost shipments.

E. SPARE PARTS RETURNS

1. Spare parts may be returned to TeleVideo if purchased within the past 30 days and if they are in new, resalable condition with the original packaging. Software products and component level spares are not eligible for return.
2. A restocking fee of 25% of the purchase price will be charged and deducted from the credit issued.
3. A Return for Credit (RFC) number must be requested from TeleVideo and written on all packing slips and on the outside of the shipping carton.
4. Freight must be paid by the customer.

F. SPARE PARTS DEAD ON ARRIVAL

1. Any spare part that fails within 30 days is considered Dead on Arrival (DOA).
2. A Return for Credit (RFC) number must be requested from TeleVideo and written on all packing slips and on the outside of the shipping carton.
3. Within 24 hours after issuance of the RFC number, TeleVideo will ship the replacement spare (if in stock), freight prepaid. Customer will be invoiced the spare part price (and receive credit when the returned spare is received).

VI. FACTORY MODULE EXCHANGE PROGRAM (REPAIRABLE MODULES)

The goal of the Module Exchange Program is to have a partnership in service between TeleVideo and its Resellers. This partnership will create an efficient, cost-effective service program and promote total customer satisfaction.

The most convenient and fastest way a Reseller can service a defective terminal that saves both time and transportation costs is to remove the defective module inside the terminal and replace it with a spare module. Spare modules can be immediately purchased from TeleVideo and sent to the Reseller's location where the defective module can be removed from the terminal chassis.

Any defective repairable module may be exchanged for a good module. The replaced module may be new or used, at TeleVideo's option. To take advantage of this program:

- A. Purchase an exchange module per TeleVideo's Spare Parts Procedure (V). Specify "EXCHANGE" on your order. The module will be sent the next working day freight prepaid via 2nd day air for modules from in-warranty products and freight collect for out-of-warranty products. You will be invoiced for the module (charge outgoing) being shipped to you at the spare parts price. For modules from out-of-warranty products, there will be a \$50.00 extra charge for this service in addition to the repair charge.
- B. Return the defective module under the RMA Procedure (IV.A). Put "EXCHANGE" on the RMA. You will be credited (credit incoming) the exact spare parts price when your returned module is received by TeleVideo. The returned module must be repairable and have all components and returned within thirty (30) days to receive credit.

TELEVIDEO TERMINALS SPARE PARTS AND REPAIRS PRICE LIST

TVI 965 TERMINALS

<u>TELEVIDEO MODEL</u>	<u>PRODUCT DESCRIPTION</u>	<u>REPAIR PRICE</u>
TVI 965	TERMINAL	\$150.00
KEYBOARDS	ALL	60.00
LOGIC PCB	PCB ASSY 965	125.00

*****THE FOLLOWING ITEMS ARE FOR PURCHASE ONLY*****

NOTE: (A) After part number means manufactured by Kabil. This PCB has an IC in Location U29.
 (B) After part number means manufactured by AOC. This PCB does not have an IC in Location U29.

<u>TELEVIDEO PART NUMBER</u>	<u>PRODUCT DESCRIPTION</u>	<u>LIST PRICE</u>	<u>DISTR PRICE</u>	<u>PART LOCATION</u>
133146-00	CASE ASY 965 W/O TUBE	\$100.00	\$ 80.00	
133045-00	HSG REAR 965	20.00	16.00	
133046-00	HSG BTM 965	20.00	16.00	
133043-00	BEZEL FRONT 965	10.00	8.00	
133051-00	BASE PEDESTAL 965	25.00	20.00	
<u>T132970-00</u> (A)	PCB ASY, 965, (KABIL)	NO LONGER AVAILABLE		
<u>133066-00</u> (B)	PCB ASY, 965, (AOC)	240.00	192.00	
T131386-00	BATTERY LITHIUM CYLINDER	10.00	8.00	BT1
271295-01	FERRITE BEAD 6-H, 6MM	NA		FB1,2
T120530-00	IC SY6551A/I 2MHZ SYN/AMI	10.00	8.00	U5,6
120382-00 (A)	IC 74S157 4X 2 TO 1	NA		U17-20
270523-00 (B)	IC 74F157 4X 2-IN DATA SEL.	NA		U17-20
271238-00	IC STAT RAM 8KX8	12.00	10.00	U7
120484-00	IC 74S08 4X 2-IN AND GATE	NA		U23
120388-00	IC 74S32 4X 2-IN POS OR GTE	NA		U13
S120292-00	IC 75188 4X LINE DRIVER	NA		U1,2
S120294-00	IC 75189A 4X LINE RCVR	NA		U3,4
S120362-01	IC 74ALS245 BUS TRANSVR	4.00	3.00	U26,27
120264-00	IC 74S74 4X D-TYPE	NA		U29
120246-00	IC 74S04 6X INVTR	NA		U12
S120348-00	IC 7406 6X INVTR BFR/DRVR	2.00	1.00	U15
120446-00	IC 74S174 6X/4XD-TYPE FF	NA		U28
271046-00	IC 2672 CRT CONT 5MHZ	32.00	25.00	U14
270961-00	IC 1231 PWR MONITOR	13.00	10.00	U11
271048-00	IC STAT RAM 8KX8 7ONS	12.00	9.00	U24,25
121396-00	IC 74S374 8X D-TYPE F/F	NA		U22
271582-00	IC GATE ARRAY 965	20.00	16.00	U16
271045-00	IC 65C816 MICROPROC 5MHZ	20.00	16.00	U10
180003-30K	IC EPROM SYS 965	20.00	16.00	U8
180003-38K	IC EPROM CHAR GEN 965	20.00	16.00	U9
T131634-00	IC STATIC RAM 8KX8 100NS	20.00	16.00	U21
271043-00	CRY 26.9892 MHZ	3.00	2.00	Y2
122168-00	CRY 3.6864 MHZ	4.00	3.00	Y3

TELEVIDEO TERMINALS SPARE PARTS AND REPAIRS PRICE LIST

TVI965

<u>TELEVIDEO PART NUMBER</u>	<u>PRODUCT DESCRIPTION</u>	<u>LIST PRICE</u>	<u>DISTR PRICE</u>	<u>PART LOCATION</u>
271044-00	CRY OSC 44.4528 MHZ	\$ 8.00	\$ 6.00	Y1
131551-00	TRAN 2N4264 NPN	NA		Q1,2
120469-00	TRAN 2N2222A METAL	NA		Q3
131746-00(A)	DIODE IN5817 RECT 1A	2.00	1.00	CR1-3
131746-00(B)	DIODE IN5817 RECT 1A	2.00	1.00	CR1&3
271877-00(B)	DIODE SCHOTTKY ITT/SD101A	NA		CR2
120475-00(A)	DIODE IN914	NA		CR4,5
120475-00(B)	DIODE IN914	NA		CR4
271698-00(B)	DIODE 5232B 5.6V ZENER	NA		CR7-8
T122151-00	TRANSDUCER AUDIO	3.00	2.00	SPEAKER
120477-00(B)	DIODE 1N4001, K2	NA		CR11,12
271188-00	SWITCH 125/250W 8/4 SPST	4.00	3.00	
271223-00	RECPT PWR 6A/250V PCMT	NA		
270967-00(A)	TRAN SWITCHING MJE 13007A	4.00	3.00	Q101
271785-00(B)	TRAN TIPL760C	4.00	3.00	Q101
291451-00(A)	TRAN MJE13003/2SC1862	NA		Q102
271811-00(B)	TRAN MPSA44 (MT)	2.00	1.00	Q102
271170-00(A)	TRAN DRIVE KTC-1959Y	NA		Q103
271787-00(B)	TRAN DRIVE C1213A	NA		Q103
T130167-00(A)	TRAN KTA1015	2.00	1.00	Q104
271812-00(B)	TRAN A01015 A733D TO-92(C)	2.00	1.00	Q104
271144-00	IC TL494 PULSE WIDTH MOD	3.00	2.00	U101
T271145-00	IC 4N35 OPTO COUPLER	2.00	1.00	U201
271146-00	TRAN TL431 V.REGULATED	NA		U202
130018-00	VOLT REG 7912	NA		U203
271147-00(A)	THYRISTOR TYN416 400V	NA		SCR201
271789-00(B)	THYRISTOR 8A 50V, TIC126M(T1	NA		SCR201
270872-00	RECT BRIDGE 2A 1000 PRV	NA		BD101
271148-00(A)	DIODE FR107 FAST RECOVERY	NA		D101-
				103,207
271148-00(B)	DIODE FR107 FAST RECOVERY	NA		D101,207
291558-01(B)	DIODE 10DF2	NA		D102
271813-00(B)	DIODE FR101	1.00	1.00	D103
271149-00	DIODE FR104 FAST RECOVERY	2.00	1.00	D202
291564-00	DIODE ZENER 20V	NA		D104
241319-00	DIODE ZENER IN5234B 6.2V	NA		D204,
				205
291552-00	DIODE ZENER 4.7V 1/2W	NA		D107,
				206
S120485-00	DIODE IN4148	NA		D105,
				108
T271152-00(A)	DIODE SR506 SCHOTTKY	4.00	3.00	D201
271564-00(B)	DIODE FR304 FAST RECOVERY	2.00	1.00	D201
T271153-00(A)	DIODE SR504 SCHOTTKY	3.00	2.00	D203
271946-00(B)	RECTIFIER, SHOTK 31DQ10	5.00	4.00	D203
131746-00	DIODE 1N5817 SCH BAR RECT	2.00	1.00	D106,
				208
123241-00	THERMISTER 10.0 OHMS 3A	NA		TH101

TELEVIDEO TERMINALS SPARE PARTS AND REPAIRS PRICE LIST

TVI965

TELEVIDEO PART NUMBER	PRODUCT DESCRIPTION	LIST PRICE	DISTR PRICE	PART LOCATION
271168-00	POT 500 OHM CERMET 1T	NA		FR201
271168-01(A)	POT 10K OHM CERMET 1T	NA		SFR101
271818-00(B)	POT 1K OHM CERMET 1I	NA		SFR101
T271171-00(A)	TRANSFMR MAIN P40-01D	\$10.00	\$ 8.00	T101
271791-00(B)	TRANSFMR MAIN X80A700-1	12.00	10.00	T101
T271172-00(A)	TRANSFMR DRIVE P40-02B	12.00	10.00	T102
271819-00(B)	TRANSFMR DRIVE X79A167-23	3.00	2.00	T102
271173-00(A)	TRANSFMR SYNC P40-04A	3.00	2.00	T103
271793-00(B)	TRANSFMR SYNC X79A168-5	NA		T103
271174-00(A)	FILTER LINE P40-03	NA		L101
271820-00(B)	FILTER LINE X73C174-1	NA		L101
271799-01(B)	LINE FILTER 38mH, 73A174-4	NA		L101
				VDE ONLY
271175-00	COIL CHOKE 150 (965)	NA		L201
271176-00(A)	COIL CHOKE 3.0 (965)	NA		L202
293552-00(B)	COIL CHOKE 0.5UH	NA		L202
271376-00(A)	FERRITE BEAD WITH LEAD	NA		L601
271295-00(B)	FERRITE BEAD 6-HOLE W/WIRE	NA		L601
242000-00	IC VERT AMP TDA-1170N	5.00	4.00	IC401
120469-10	TRAN 2N2222A METAL	NA		Q601
T270883-00	TRAN BU406	3.00	2.00	Q302
271090-00	TRAN 2N2369A	NA		Q501
T130117-00	TRAN KTC200Y	2.00	1.00	Q301
241205-00(A)	TRAN BF 259	NA		Q502
241203-00(B)	TRAN 2441, 2911	NA		Q502
271097-00(A)	TRANSFMR FOCUS FT-90010	NA		T301
271805-01(B)	TRANSFMR H DR, X79D167-25	12.00	10.00	T301
271088-00(A)	TRANSFMR H DRIVE HDT 7224	NA		T601
271821-00(B)	TRANSFMR FOCUS, X79D167-24	3.00	2.00	T601
271091-00(A)	TRANSFMR FLYBACK 965	NO LOGER AVAILABLE		T302
271804-01(B)	TRANSFMR FLYBACK, X79A349-2	25.00	20.00	T302
271092-00(A)	COIL LINEARITY FIXED	NA		L301
271807-01(B)	COIL LINEAR, FXD, X73A147-37	3.00	2.00	L301
271089-00(A)	COIL WIDTH 965	NA		L302
271808-01(B)	COIL WIDTH, X9A483-28	3.00	2.00	L302
271100-00(A)	POT TRIM 100K OHM H TYPE	NA		VR402, 605
271100-00(B)	POT TRIM 100K OHM H TYPE	NA		VR402
271104-00(A)	POT TRIM 2M OHM H TYPE	NA		VR604
271801-00(B)	POT TRIM 2.2M OHM H TYPE	NA		VR604
271101-00	POT TRIM 500 OHM H TYPE	NA		VR501
271105-00(A)	POT TRIM 220K OHM H TYPE	NA		VR401, 602
271105-00(B)	POT TRIM 220K OHM H TYPE	NA		VR401, 602, 605
271187-00	POT SLIDING 100K OHM 0.1W	2.00	1.00	VR603
241300-00	DIODE BA159	NA		D301, 603, 604

TELEVIDEO TERMINALS SPARE PARTS AND REPAIRS PRICE LIST

TVI965

<u>TELEVIDEO PART NUMBER</u>	<u>PRODUCT DESCRIPTION</u>	<u>LIST PRICE</u>	<u>DISTR PRICE</u>	<u>PART LOCATION</u>
S120485-00	DIODE IN4148	NA		D302,606
122022-00	DIODE IN4004 MOT	NA		D401
241301-00	DIODE MR856	NA		D303,304
241319-00	DIODE ZENER IN5234B 6.2V	NA		D502
133047-00	SHROUD CONN 965	NA		
271189-00	TUBE CRT 14" FLAT PRO GRN	\$ 74.00	\$ 59.00	
271189-01	TUBE CRT 14" FLAT WHITE	74.00	59.00	
133710-00	KYBD ASCII 965 935 W/LED	124.00	(74.00)	
133090-00	KYBD ANSI 965	124.00	(74.00)	
133117-00	KYBD PC ENHANCED 965	124.00	(74.00)	
133019-00	KYBD OVERLAY LABEL,STRIP 965	5.00	4.00	
133054-00	HOUSING BOTTOM KB, ASCII	20.00	16.00	
133055-00	HOUSING TOP KB, ASCII	20.00	16.00	
133097-00	HOUSING TOP KB VT220	20.00	16.00	
T131157-00	KEY SWITCH LOCKING HITEK	5.00	4.00	
T131158-00	KEY SWITCH NON-LOCKING HITE	2.00	1.00	
133049-00	KNOB PWR 965	2.00	1.00	
133050-00	KNOB BRIGHTNESS 965	2.00	1.00	
133075-00	LINK KNOB BRIGHTNESS 965	2.00	1.00	
293551-00	YOKE DEFLECTION DY-2016D	16.00	13.00	
133071-00	FOOT RUBBER MONITOR 965	3.00	2.00	
133072-00	STOPPER 965	3.00	2.00	
132978-00	CARTON SHIP OUTER 965	15.00	12.00	
133008-00	MANUAL OPER 965 VDT	20.00	16.00	
133007-00	MAINTENANCE MANUAL 965	50.00	40.00	
132979-00	FOAM CARTON LEFT 965	5.00	4.00	
132979-01	FOAM CARTON RIGHT 965	5.00	4.00	
T122911-00	PWR CORD 6FT 115 VAC	9.00	7.00	
T131738-00	PWR CORD 6FT 230 VAC	10.00	8.00	
133347-00	RS232 TO RS422, FIN ASSY	85.00	(50.00)	
133348-00	RS232 TO RS422, CONVER KIT	70.00	(42.00)	
133349-00	965 CURRENT LOOP	98.00	(60.00)	
133350-00	RS232 TO PARALLEL, CONN KIT	98.00	(60.00)	

5 Engineering Drawings

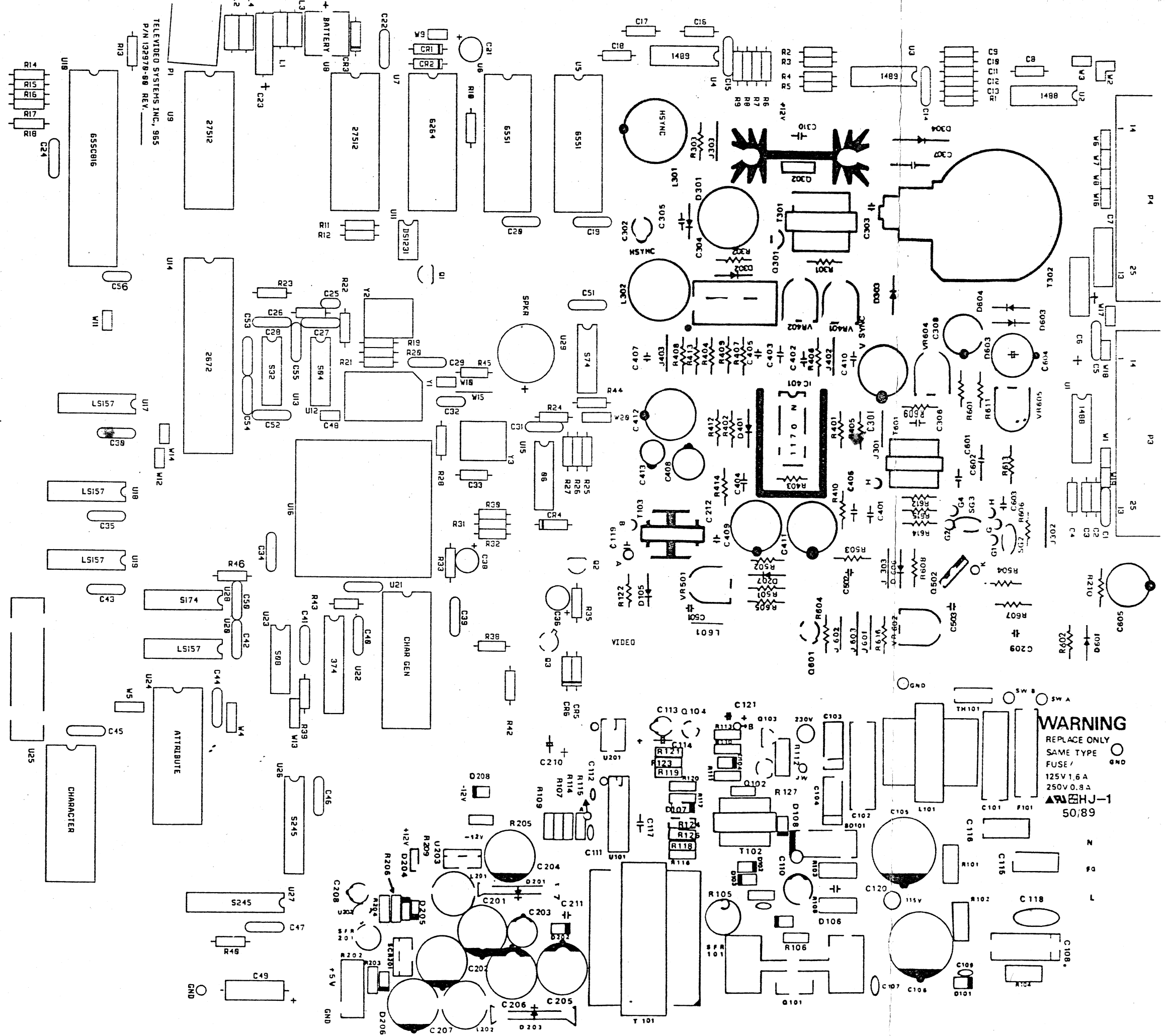
Table 5-1 gives a brief description of the ICs on the logic section of the circuit board. Although there is only one circuit board, note that you can read the revision levels of the logic board, video board, and power supply as if they were three separate boards. Find the word "Revision" on the side of the circuit board, followed by three letters (such as "E B D"). These letters indicate the revision levels of each module in the following order:

LOGIC BOARD VIDEO BOARD POWER SUPPLY

For example, if you see "Revision E B D" on the side of the board, this means level E (logic board), level B (video board), and level D (power supply).

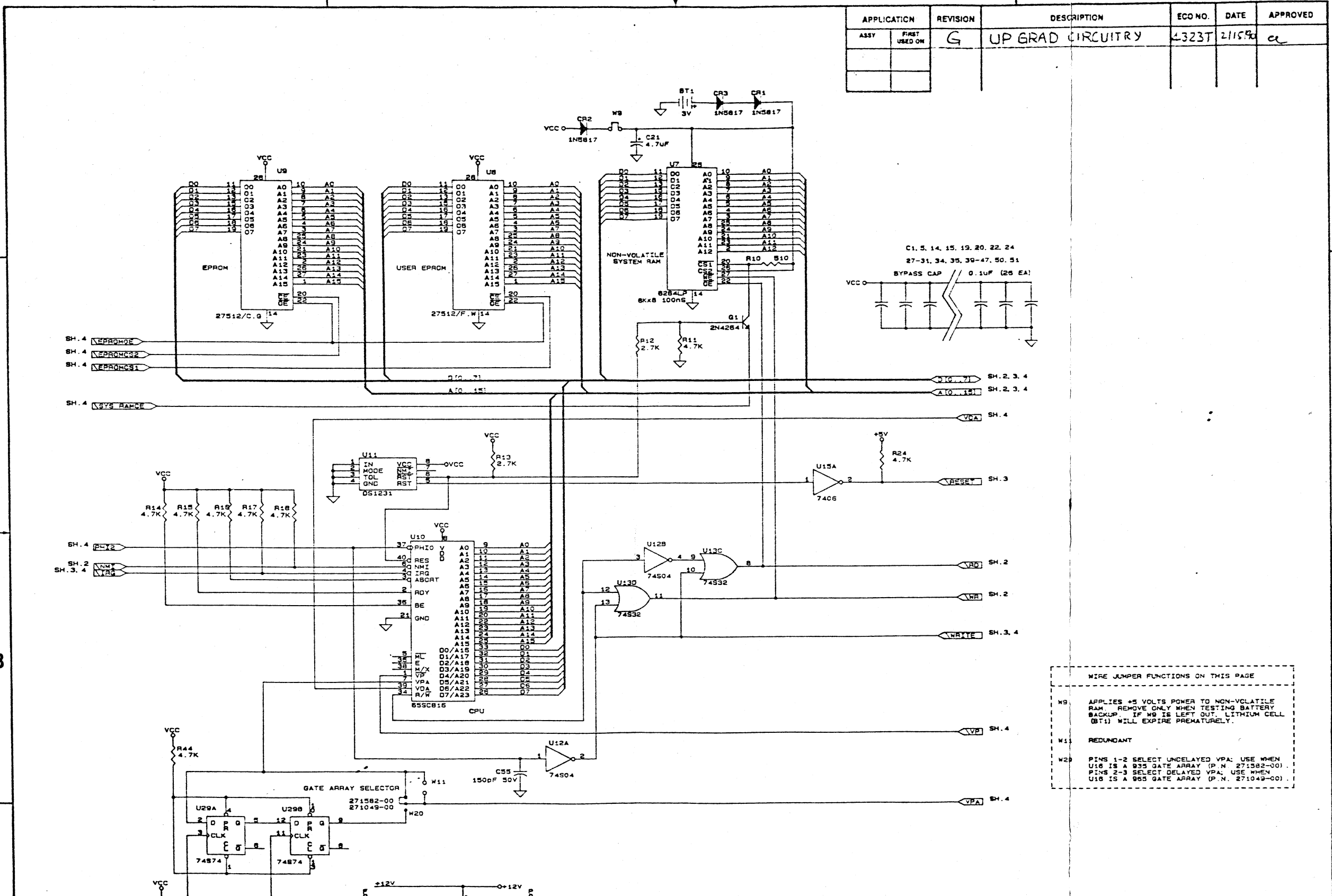
Table 5-1. Circuit Board IC Reference (Logic Section)

Location	Schematic Page	Type/Description
U1, 2	3	IC 75188 4X LINE DRIVER
U3, 4	3	IC 75189A 4X LINE RECEIVER
U5, 6	3	IC SY6551A/1 2 MHz SYN/AMI
U7	1	IC STATIC RAM 8K X 8 LOW POWER
U8	1	IC SYSTEM EPROM
U10	1	IC 65C816 MICROPROCESSOR 5 MHz
U11	1	IC 1231 POWER MONITOR
U12	1	IC 74S04 6X INVERTER
U13	1	IC 74S32 4X 2-IN POS OR GATE
U14	2	IC 2672 CRT CONTROLLER 5 MHz
U15	1	IC 7406 6X INVERTER BUFFER/DRIVER
U16	4	IC GATE ARRAY
U17-20	2	IC 74S157 4X 2 TO 1 DATA SEL
U21	4	IC STATIC RAM 8K X 8 100ns
U22	4	IC 74S374 8X D-TYPE FLIP-FLOP
U23	2	IC 74S08 4X 2-IN AND GATE
U24, 25	2	IC STATIC RAM 8K X 8 70ns
U26, 27	2	IC 74ALS245 BUS TRANSCEIVER 3-STATE



WARNING
 REPLACE ONLY
 SAME TYPE
 FUSE!
 125V 1.6A
 250V 0.8A
 50:89

APPLICATION		REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASSY	FIRST USED ON	G	UP GRAD CIRCUITRY	4323T	2/15/90	a



WIRE JUMPER FUNCTIONS ON THIS PAGE

W9 APPLIES +5 VOLTS POWER TO NON-VOLATILE RAM. REMOVE ONLY WHEN TESTING BATTERY BACKUP. IF W9 IS LEFT OUT, LITHIUM CELL (BT1) WILL EXPIRE PREMATURELY.

W11 REDUNDANT

W20 PINS 1-2 SELECT UNDELAYED VPA; USE WHEN U16 IS A 935 GATE ARRAY (P.N. 271582-00). PINS 2-3 SELECT DELAYED VPA; USE WHEN U16 IS A 965 GATE ARRAY (P.N. 271049-00).

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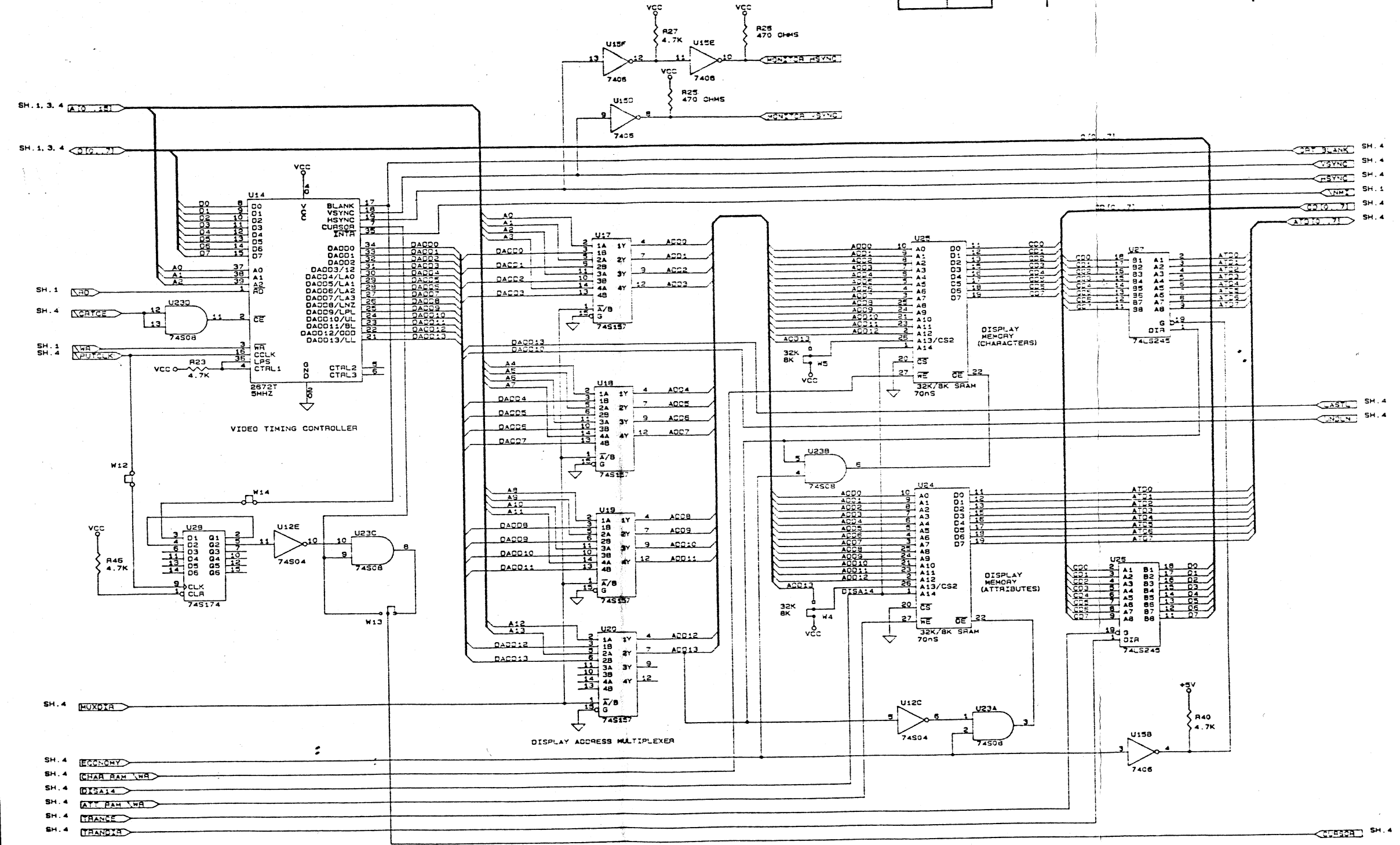
MATERIAL	TOLERANCES UNLESS NOTED		CONTRACT NUMBER		DES. DATE	DATE
	DIMENSION	mm INCH	DR.	PHIL ANNEH		
FINISH	X =		CHK.	W.K.	DATE	
	XX =		ENGR.		DATE	
REMOVE ALL BURRS AND SHARP EDGES	ANGLES		DESIGN ACTIVITY APPROVAL		CUSTOMER APPROVAL	
			W.K. KIM 3/15/90			

		965 TERMINAL LOGIC	
SIZE	CODE IDENT	REV	
C	132973-00	G	
SCALE	SHEET 1 OF 4		

APPLICATION		REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASSY	FIRST USED ON		SEE PART 1 OF 4			

D
C
B
A

D
C
B
A



WIRE JUMPER FUNCTIONS ON THIS PAGE

W4 PINS 1-2 ALLOW ADDRESSING OF A 32K SRAM (SUCH AS 8225B) AT U24. PINS 2-3 ALLOW USE OF AN BK SRAM (SUCH AS 8284) AT U24.

W3 PINS 1-2 ALLOW ADDRESSING OF A 32K SRAM AT U25. PINS 2-3 ALLOW USE OF AN BK SRAM AT U25.

W12, 13, 14 THE DEFAULT SETTINGS OF THESE JUMPERS (W12 & W14 INSTALLED AND W13 IN THE 1-2 POSITION) PREVENTS THE CURSOR SIGNAL TO THE GATE ARRAY FROM GOING TRUE DURING HORIZONTAL OR VERTICAL BLANKING INTERVALS. THIS FUNCTION MAY BE DEFEATED BY SETTING W13 TO THE 2-3 POSITION (W12 & W14 THEN BECOME REDUNDANT).

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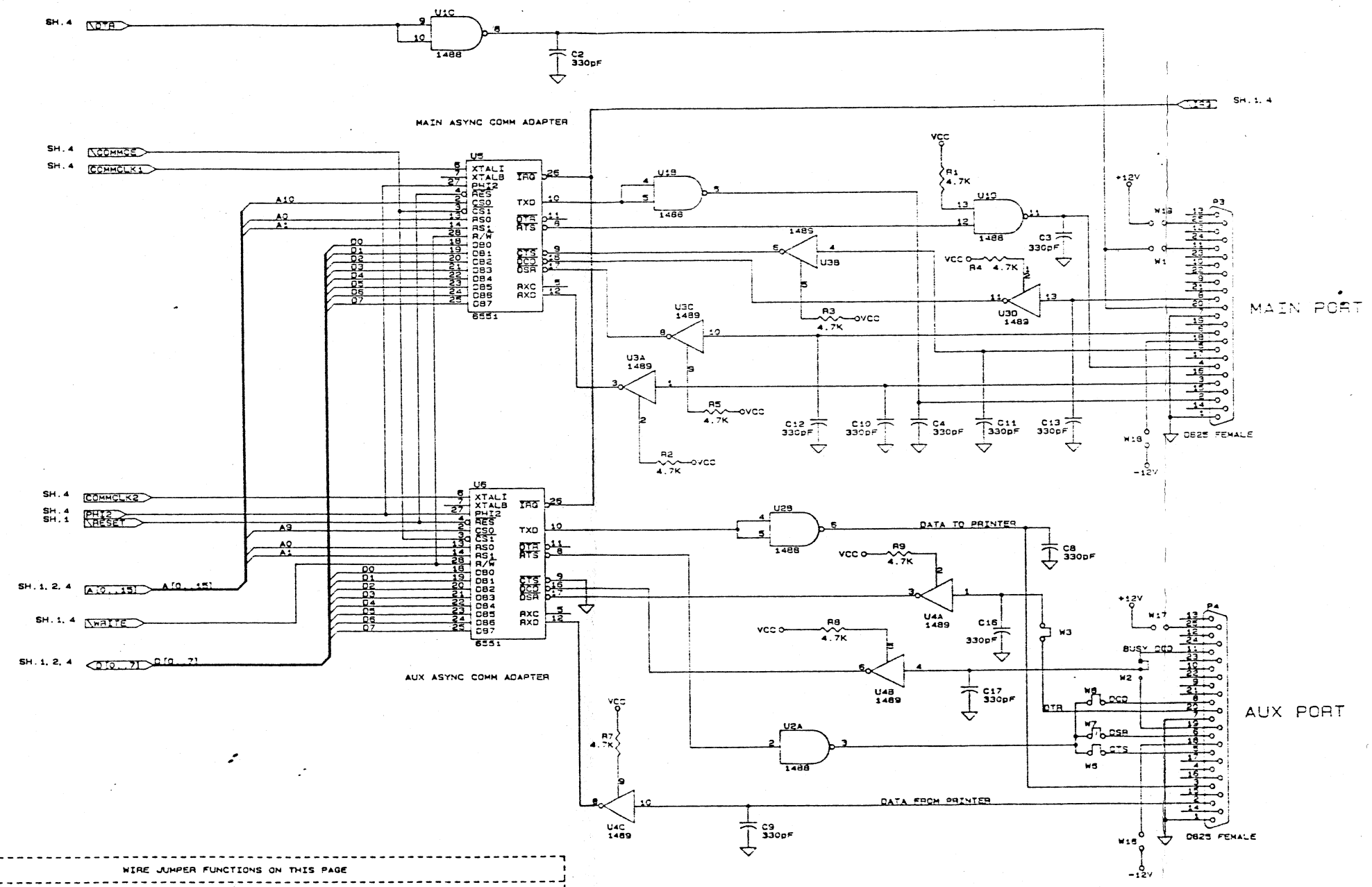
MATERIAL	TOLERANCES UNLESS NOTED		CONTRACT NUMBER		DESIGN ACTIVITY APPROVAL		DESIGN ACTIVITY APPROVAL		DESIGN ACTIVITY APPROVAL	
	DIMENSION	mm INCH	DES	DATE	DR	PHIL ANNEN	DATE	CHK	U.K.	DATE
FINISH	X =		ENGR	DATE	CUSTOMER APPROVAL		SIZE	CODE IDENT	REV	
	XX =				U. K. Kim 3/15/90		C	132973-00	G	
REMOVE ALL BURRS AND SHARP EDGES	ANGLES =						SCALE	SHEET 2 OF 4		

TeleVideo Systems, Inc.

965 TERMINAL LOGIC

SUPERSEDES 1

APPLICATION		REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASSY	FIRST USED ON		965 TERM 1 of 4			

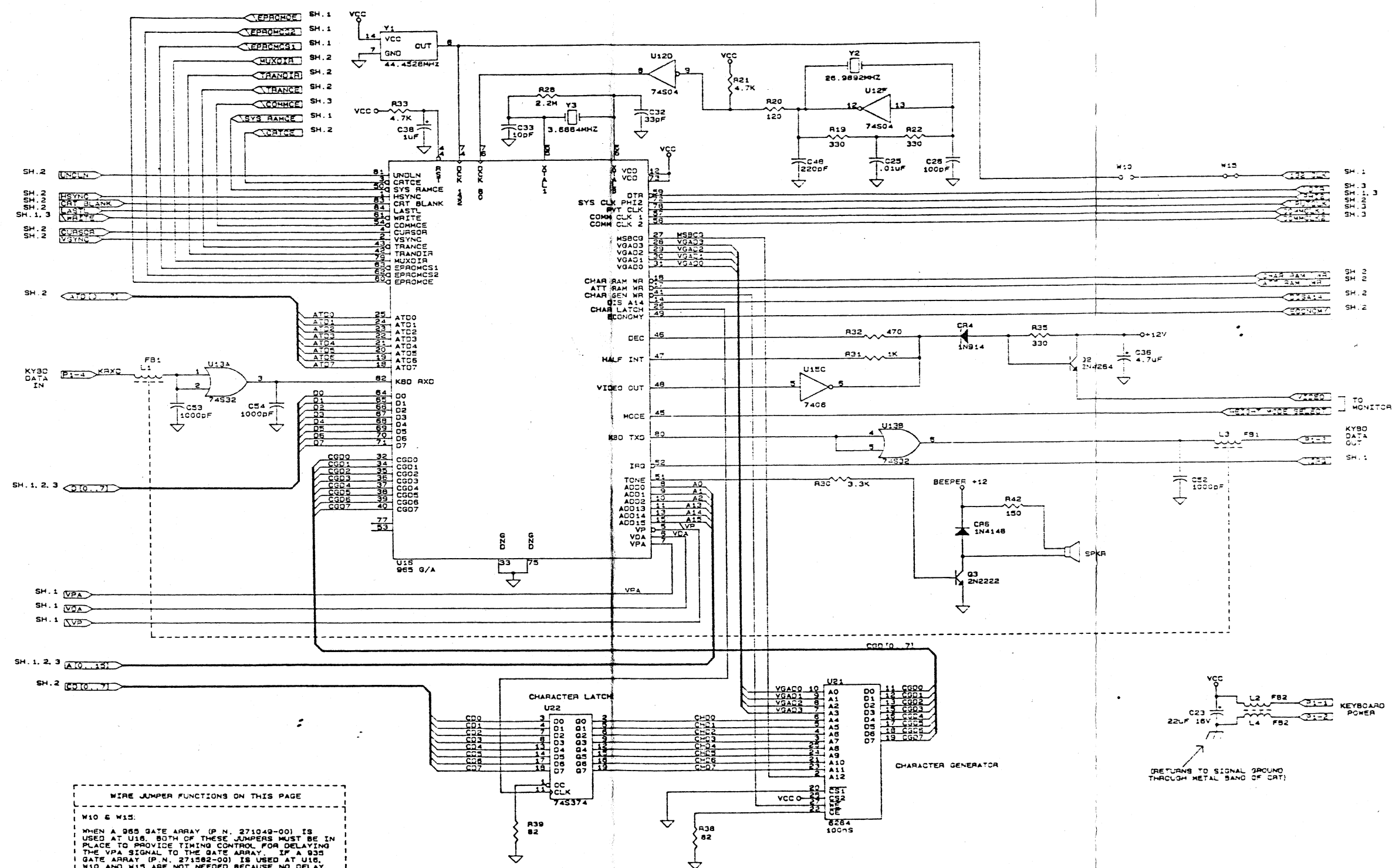


- WIRE JUMPER FUNCTIONS ON THIS PAGE
- W1 CONNECTS EIA LEVEL DTR SIGNAL (CONTROLLED BY GATE ARRAY) TO PIN 11 OF MAIN COMM PORT.
 - W2 PINS 1-2: CONNECTS PIN 11 OF AUX COMM PORT TO AUX DCD INPUT.
 - W3 PINS 2-3: CONNECTS PIN 19 OF AUX COMM PORT TO AUX DCD INPUT.
 - W4 CONNECTS PIN 20 OF AUX PORT TO AUX DSR INPUT.
 - W5 CONNECTS EIA LEVEL RTS SIGNAL TO PIN 5 OF AUX COMM PORT (PROVIDES CTS INPUT TO AUX DEVICE).
 - W6 CONNECTS EIA LEVEL RTS SIGNAL TO PIN 6 OF AUX COMM PORT (PROVIDES DSR INPUT TO AUX DEVICE).
 - W7 CONNECTS EIA LEVEL RTS SIGNAL TO PIN 8 OF AUX COMM PORT (PROVIDES DCD INPUT TO AUX DEVICE).
 - W8 CONNECTS EIA LEVEL RTS SIGNAL TO PIN 8 OF AUX COMM PORT (PROVIDES DCD INPUT TO AUX DEVICE).
 - W9 APPLIES -12V TO PIN 18 OF AUX COMM PORT.
 - W10 APPLIES +12V TO PIN 25 OF AUX COMM PORT.
 - W11 APPLIES -12V TO PIN 18 OF MAIN COMM PORT.
 - W12 APPLIES +12V TO PIN 25 OF MAIN COMM PORT.

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MATERIAL	TOLERANCES UNLESS NOTED	CONTRACT NUMBER	DESIGN ACTIVITY APPROVAL		TELEVIDEO SYSTEMS, INC.	
FINISH	DIMENSION mm INCH	DES	DATE	DR	DATE	965 TERMINAL LOGIC
REMOVE ALL BURRS AND SHARP EDGES	X = ±	CHK	DATE	ENGR	DATE	SIZE CODE IDENT
	XX = ±	DESIGN ACTIVITY APPROVAL		CUSTOMER APPROVAL		SCALE
	XXX = ±	N.K. K.M. 3/15/40				REV
	ANGLES =					132973-00
						G
						SHEET 3 OF 4

APPLICATION	REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASSY	FIRST USED ON	965 TERM LOGIC			



WIRE JUMPER FUNCTIONS ON THIS PAGE

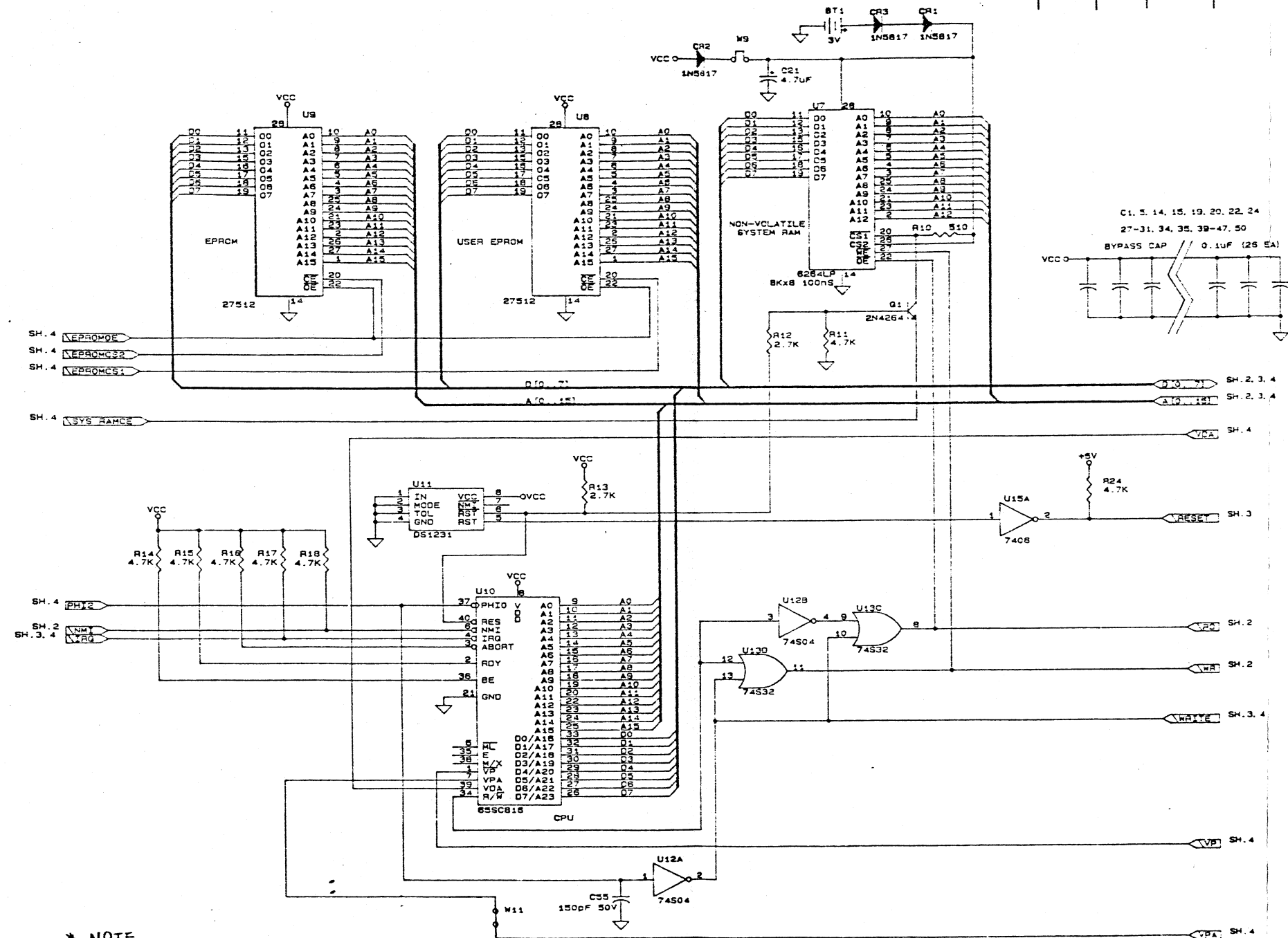
W10 & W15:
 WHEN A 965 GATE ARRAY (P.N. 271049-00) IS USED AT U18, BOTH OF THESE JUMPERS MUST BE IN PLACE TO PROVIDE TIMING CONTROL FOR DELAYING THE VPA SIGNAL TO THE GATE ARRAY. IF A 935 GATE ARRAY (P.N. 271582-00) IS USED AT U18, W10 AND W15 ARE NOT NEEDED BECAUSE NO DELAY OF THE VPA SIGNAL IS REQUIRED.

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MATERIAL	TOLERANCES UNLESS NOTED		CONTRACT NUMBER		
	FINISH	REMOVE ALL BURRS AND SHARP EDGES	DES	DATE	
			DR	PHIL ANNEN	03/22/90
			CHK	W.K.	DATE
			ENGR	DATE	
			DESIGN ACTIVITY APPROVAL		
			CUSTOMER APPROVAL		
			W.K.	3/15/90	
			SCALE	CODE IDENT	REV
				132973-00	G
			SHEET 4 OF 4		

APPLICATION		REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASSY	FIRST USED ON	A	PROD REL INCL VDE CCL 'B')	4426	9/26/90	W.K.

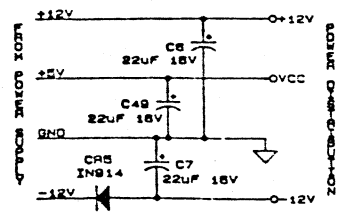


WIRE JUMPER FUNCTIONS ON THIS PAGE

W9 APPLIES +5 VOLTS POWER TO NON-VOLATILE RAM. REMOVE ONLY WHEN TESTING BATTERY BACKUP. IF W9 IS LEFT OUT, LITHIUM CELL (BT1) WILL EXPIRE PREMATURELY.

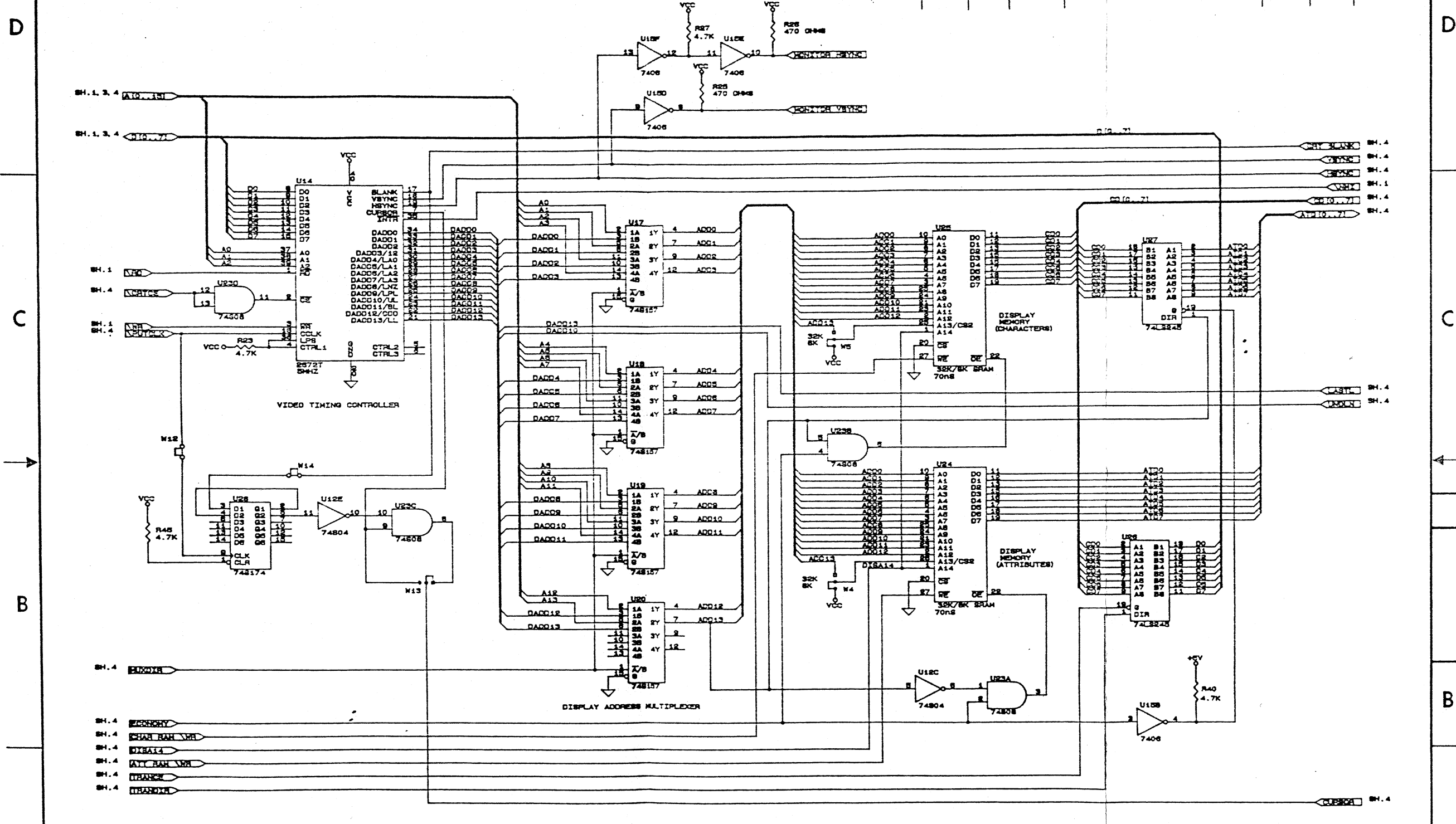
W11 REDUNDANT

* NOTE
DELETED U19, R44, R45, C51, W20, W10
9126190



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:			DES		DATE	TeleVideo Systems, Inc. 965 TERMINAL LOGIC
FRACTIONS	DECIMALS	ANGLES	DR	AK	DATE 8/10/90	
1	.XX	°	CHK	F.HIL ANNA	DATE 8/10/90	SIZE C CODE IDENT 132973-02-C REV A
MATERIAL			ENGR	W.K. KIM	DATE 9/20/90	
REMOVE ALL BURRS AND SHARP EDGES			CUSTOMER APPROVAL		SCALE	SHEET 1 OF 4

APPLICATION	REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASSEMBLY	FIRST USED ON	SEE PAGE 1 OF 4			



WIRE JUMPER FUNCTIONS ON THIS PAGE

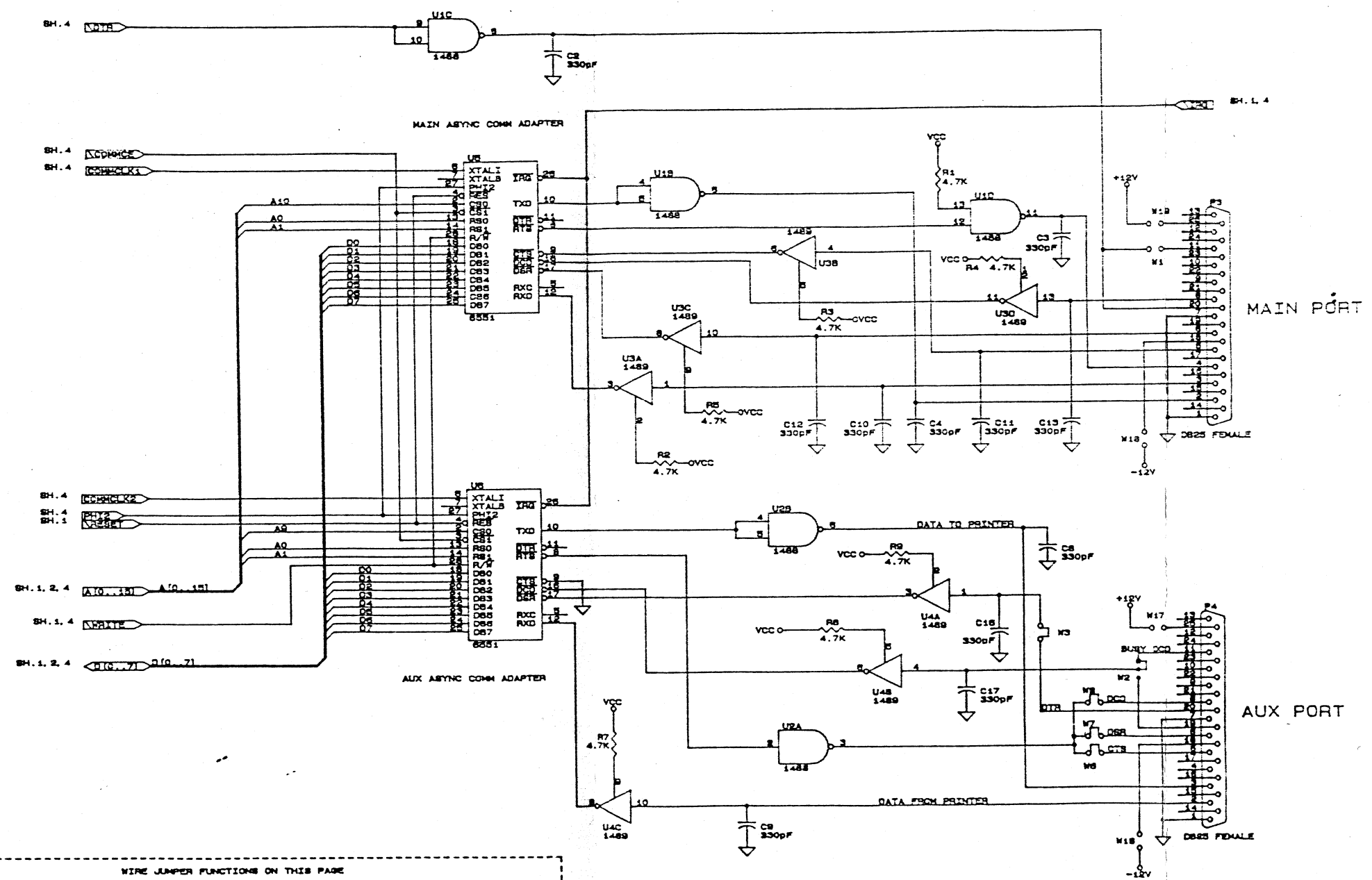
W4 PINS 1-8 ALLOW ADDRESSING OF A 256K SRAM (SUCH AS 6264) AT U84.
PINS 9-8 ALLOW USE OF AN 8K SRAM (SUCH AS 6264) AT U84.

W5 PINS 1-8 ALLOW ADDRESSING OF A 256K SRAM AT U85.
PINS 9-8 ALLOW USE OF AN 8K SRAM AT U85.

W12, 13, 14 THE DEFAULT SETTINGS OF THESE JUMPERS (W12 & W14 INSTALLED AND W13 IN THE 1-8 POSITION) PREVENTS THE CURSOR SIGNAL TO THE GATE ARRAY FROM GOING TRUE DURING HORIZONTAL OR VERTICAL BLANKING INTERVALS. THIS FUNCTION MAY BE DEFEATED BY SETTING W13 TO THE 9-8 POSITION (W12 & W14 THEN BECOME REDUNDANT).

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES		DES	DATE	TeleVideo Systems, Inc.	
1	XX I	DR	DATE 7/92	965 TERMINAL LOGIC	
1	XX I	CHK	DATE 8/92		
MATERIAL		ENGR	DATE 8/92	SIZE	REV
FRESH		CUSTOMER APPROVAL		C	A
REMOVE ALL BLURS AND SHARP EDGES				SCALE	SHEET 2 OF 4

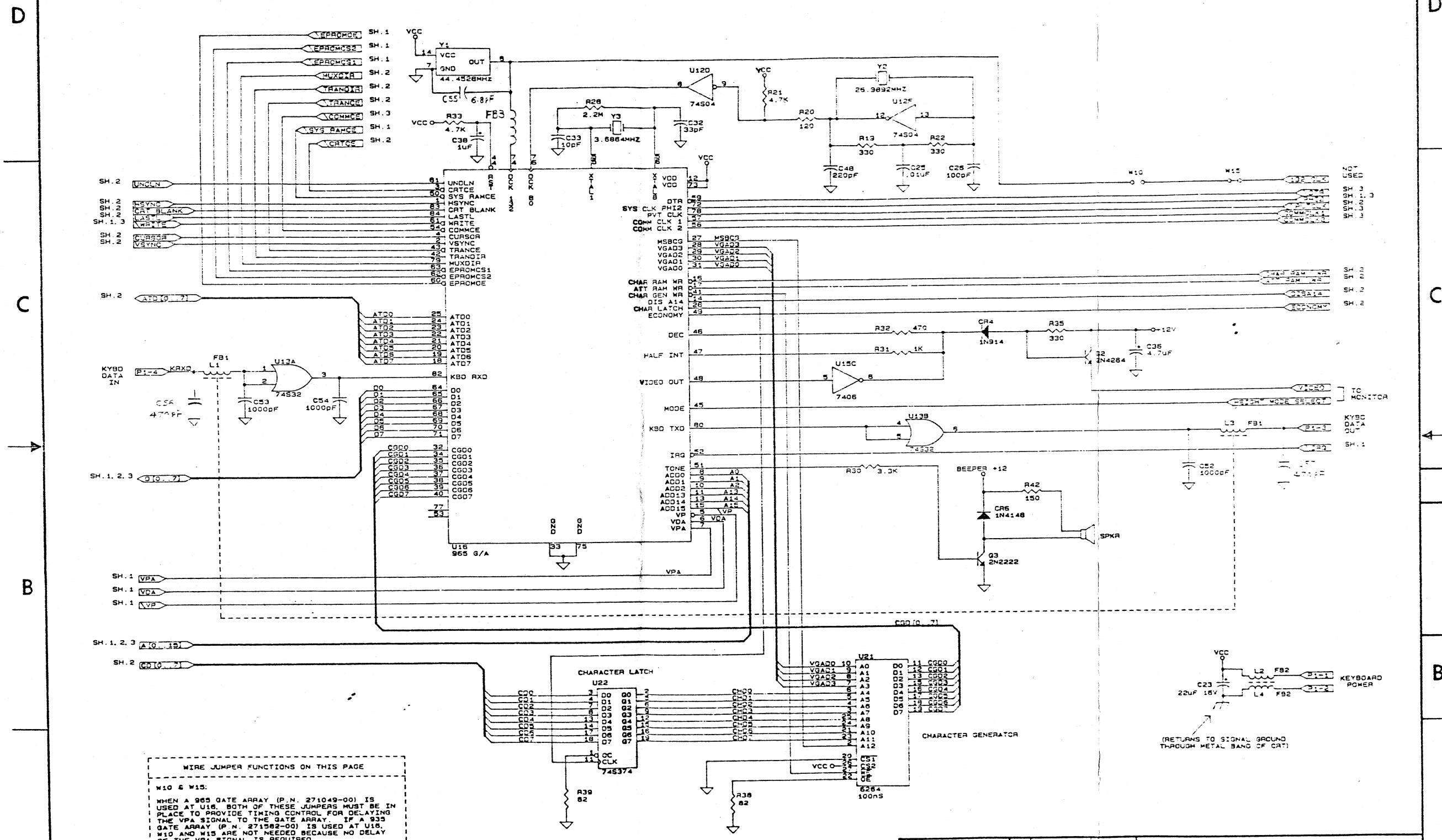
APPLICATION	REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASSY	FIRST USED ON	SEE PAGE 1 OF 4			



- WIRE JUMPER FUNCTIONS ON THIS PAGE
- W1 CONNECTS EIA LEVEL DTR SIGNAL (CONTROLLED BY BATE ARRAY) TO PIN 11 OF MAIN COMM PORT.
 - W2 PINS 1-E CONNECTS PIN 11 OF AUX COMM PORT TO AUX DCD INPUT.
 - W3 PINS 2-3 CONNECTS PIN 18 OF AUX COMM PORT TO AUX DCD INPUT.
 - W3 CONNECTS PIN 20 OF AUX PORT TO AUX DSR INPUT.
 - W6 CONNECTS EIA LEVEL RTS SIGNAL TO PIN 8 OF AUX COMM PORT (PROVIDES CTS INPUT TO AUX DEVICE).
 - W7 CONNECTS EIA LEVEL RTS SIGNAL TO PIN 8 OF AUX COMM PORT (PROVIDES DSR INPUT TO AUX DEVICE).
 - W8 CONNECTS EIA LEVEL RTS SIGNAL TO PIN 8 OF AUX COMM PORT (PROVIDES DCD INPUT TO AUX DEVICE).
 - W16 APPLIES -12V TO PIN 18 OF AUX COMM PORT.
 - W17 APPLIES +12V TO PIN 20 OF AUX COMM PORT.
 - W18 APPLIES -12V TO PIN 18 OF MAIN COMM PORT.
 - W19 APPLIES +12V TO PIN 20 OF MAIN COMM PORT.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES FRACTIONS DECIMALS ANGLES		DES	DATE	TeleVideo Systems, Inc.
1	XX 1	CHK	DATE	
MATERIAL	ENGR	W. K. K.	DATE	965 TERMINAL LOGIC
FRESH	<small>THIS DOCUMENT IS THE PROPERTY OF TELEVIDEO SYSTEMS, INC. AND IS TO BE USED ONLY FOR THE PROJECT AND FOR WHICH IT WAS PRODUCED. IT IS TO BE RETURNED TO TELEVIDEO SYSTEMS, INC. UPON COMPLETION OF THE PROJECT. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE WRITTEN PERMISSION OF TELEVIDEO SYSTEMS, INC.</small>			
REMOVE ALL BURRS AND SHARP EDGES		CUSTOMER APPROVAL		SIZE C CODE IDENT REV A SCALE SHEET 3 OF 4

APPLICATION		REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASSY	FIRST USED ON		SEE PAGE 1 OF 4			



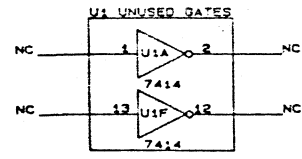
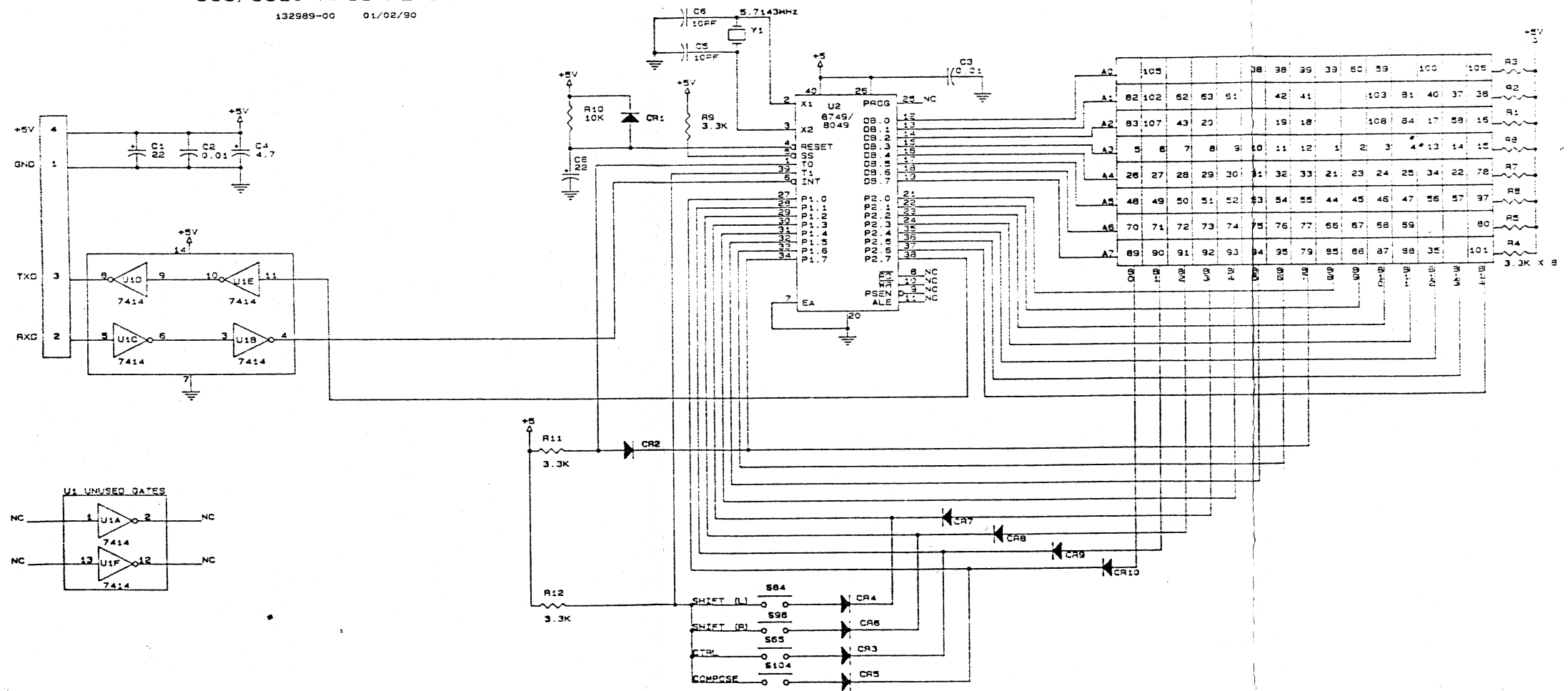
WIRE JUMPER FUNCTIONS ON THIS PAGE

W10 & W15:
 WHEN A 965 GATE ARRAY (P.N. 271049-00) IS USED AT U16, BOTH OF THESE JUMPERS MUST BE IN PLACE TO PROVIDE TIMING CONTROL FOR DELAYING THE VPA SIGNAL TO THE GATE ARRAY. IF A 933 GATE ARRAY (P.N. 271582-00) IS USED AT U16, W10 AND W15 ARE NOT NEEDED BECAUSE NO DELAY OF THE VPA SIGNAL IS REQUIRED.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES ± .010 ± .005 ± .010	DES DR CHK	DATE DATE DATE	 965 TERMINAL LOGIC
MATERIAL	ENGR	DATE	SIZE C
FINISH	CUSTOMER APPROVAL		CODE IDENT 132973-02-C
REMOVE ALL BURRS AND SHARP EDGES			REV. A
			SCALE SHEET 4 OF 4

APPLICATION		REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASBY	FIRST USED ON	A	PRODUCTION RELEASE	4087		

965/9320 ANSI KEYBOARD
132989-00 01/02/90



- 3. ALL DIODES ARE 1N4148
 - 2. ALL CAPACITOR VALUES ARE IN MICROFARADS. +/-20% AND ARE 18 VDC MIN.
 - 1. ALL RESISTOR VALUES ARE IN OHMS. +/-5% AND ARE 1/4 WATT
- NOTES: UNLESS OTHERWISE SPECIFIED

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MATERIAL	TOLERANCES UNLESS NOTED	CONTRACT NUMBER
FINISH	DIMENSION mm INCH	DES. DATE
	X = ±	DR. DATE
	XX = ±	CHK. DATE
	XXX = ±	ENGR. DATE
REMOVE ALL BURRS AND SHARP EDGES	ANGLES	DESIGN ACTIVITY APPROVAL
		CUSTOMER APPROVAL

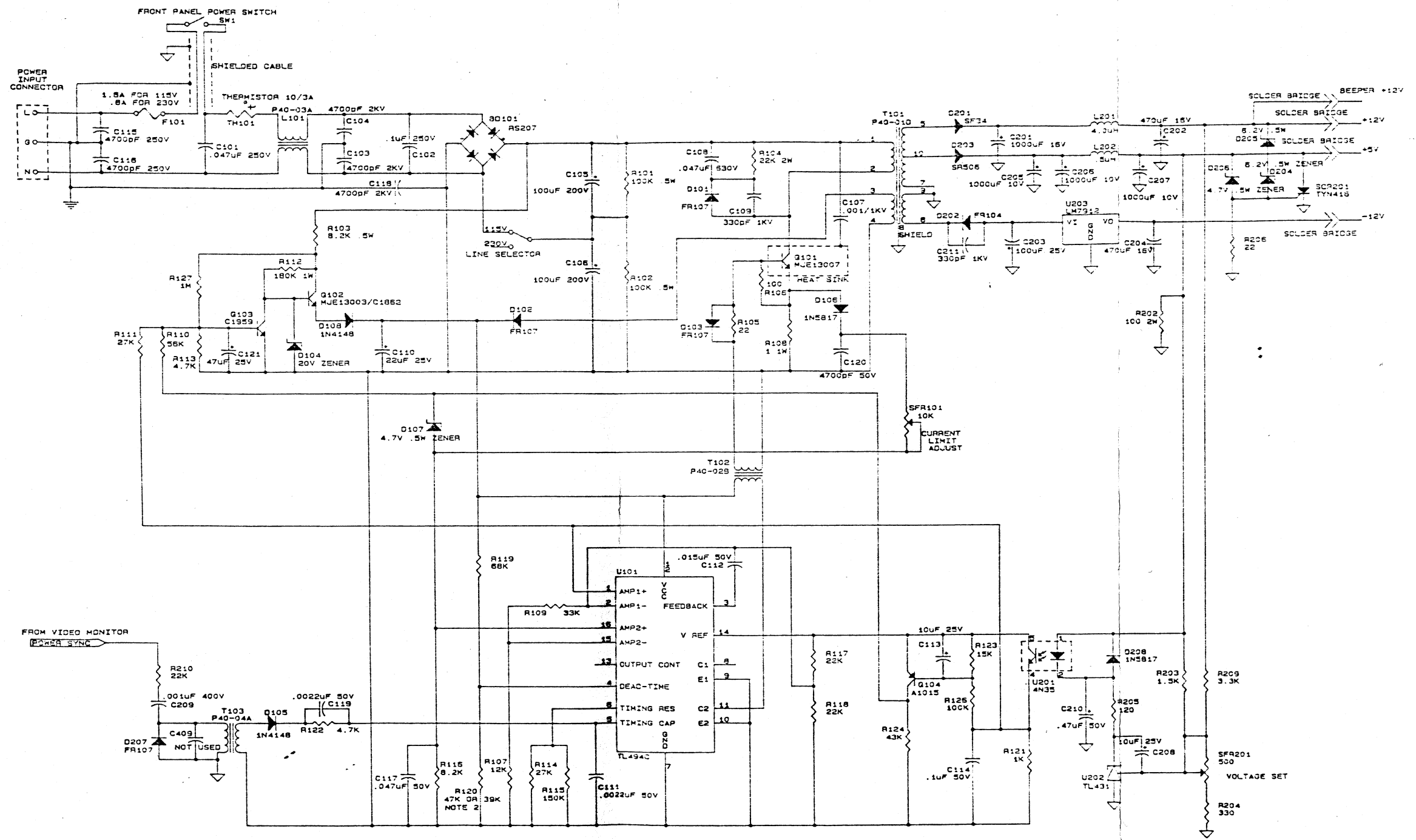
TeleVideo Systems, Inc.

965/9320 ANSI KEYBOARD

SIZE C CODE IDENT 132989-00 REV A

SCALE SHEET 1 OF 1

APPLICATION	REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED	
ASSY	FIRST USED 2M	H	UP GRADE CIRCUITRY	4323T	2/15/90	CC



- NOTES:
- UNLESS OTHERWISE SPECIFIED, ALL RESISTOR VALUES ARE IN OHMS. 1/4W. 5%.
 - IF U101 IS A MOTOROLA DEVICE, USE 47K AT R120. IF U101 IS A TEXAS INSTRUMENTS DEVICE, USE 39K AT R120.

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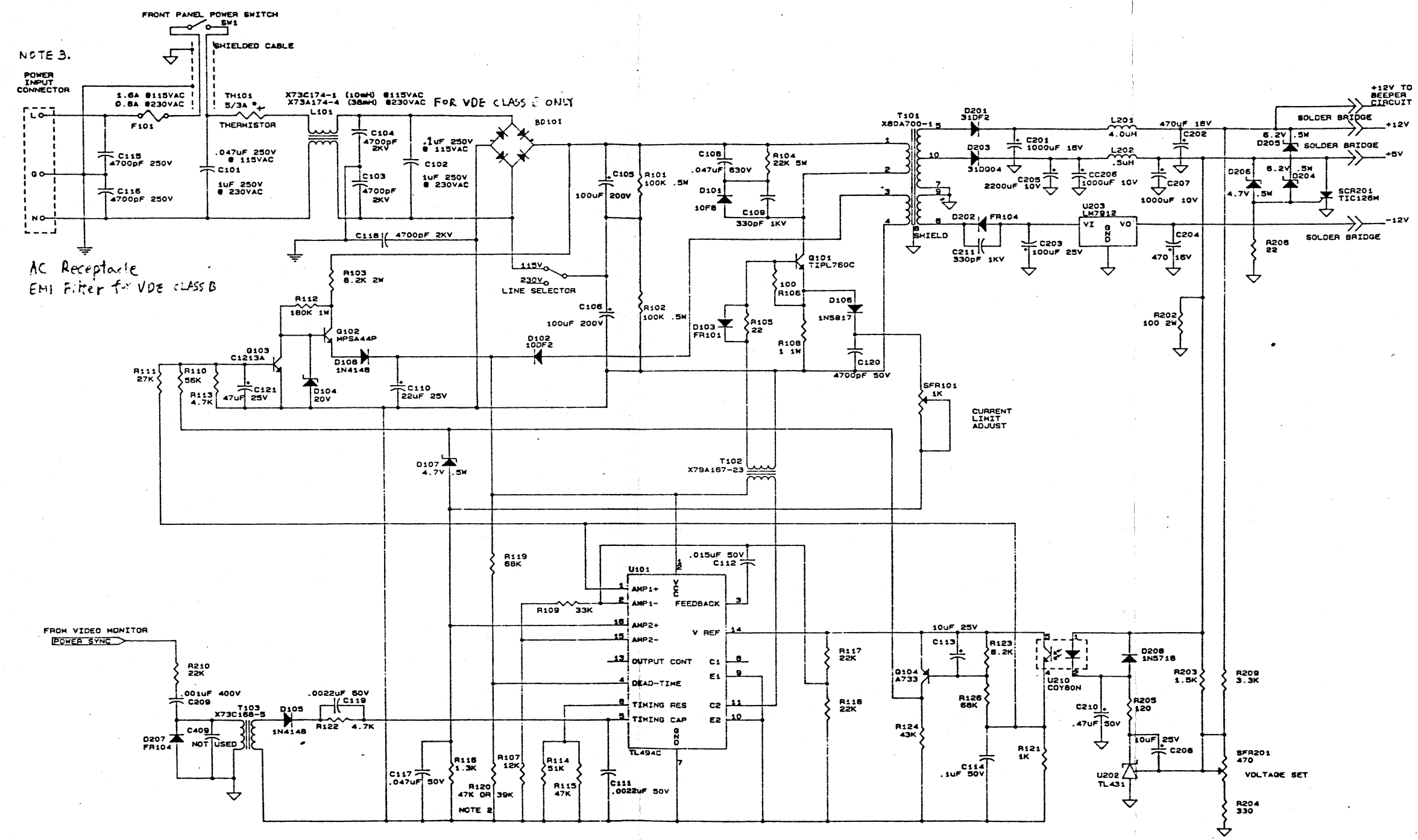
MATERIAL	TOLERANCES UNLESS NOTED	CONTRACT NUMBER
FINISH	DIMENSION mm INCH	DESIGN ACTIVITY APPROVAL
	X = $\frac{\quad}{\quad}$	DR. PHIL ANKEN 02/22/90
	XX = $\frac{\quad}{\quad}$	CHK. W.K. DATE
	XXX = $\frac{\quad}{\quad}$	ENGR. DATE
REMOVE ALL BURRS AND SHARP EDGES	ANGLES $\frac{\quad}{\quad}$	CUSTOMER APPROVAL

TeleVideo Systems, Inc.

965 POWER SUPPLY

SIZE	CODE IDENT	REV
C	133059-00	H
SCALE	SHEET 1 OF 1	

APPLICATION		REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASBY	FIRST USED ON	A	PROD REL INCL VDE (CL 'B')	4426	9/26/90	WIC



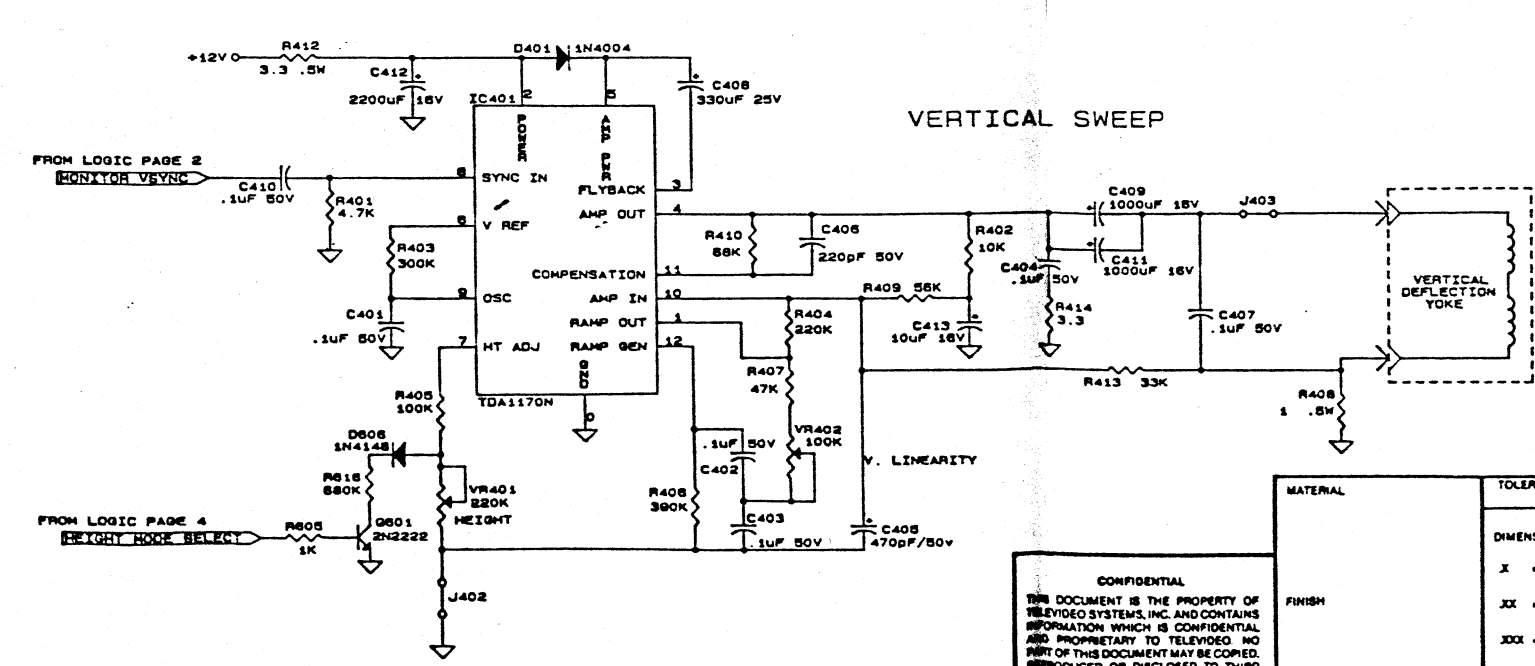
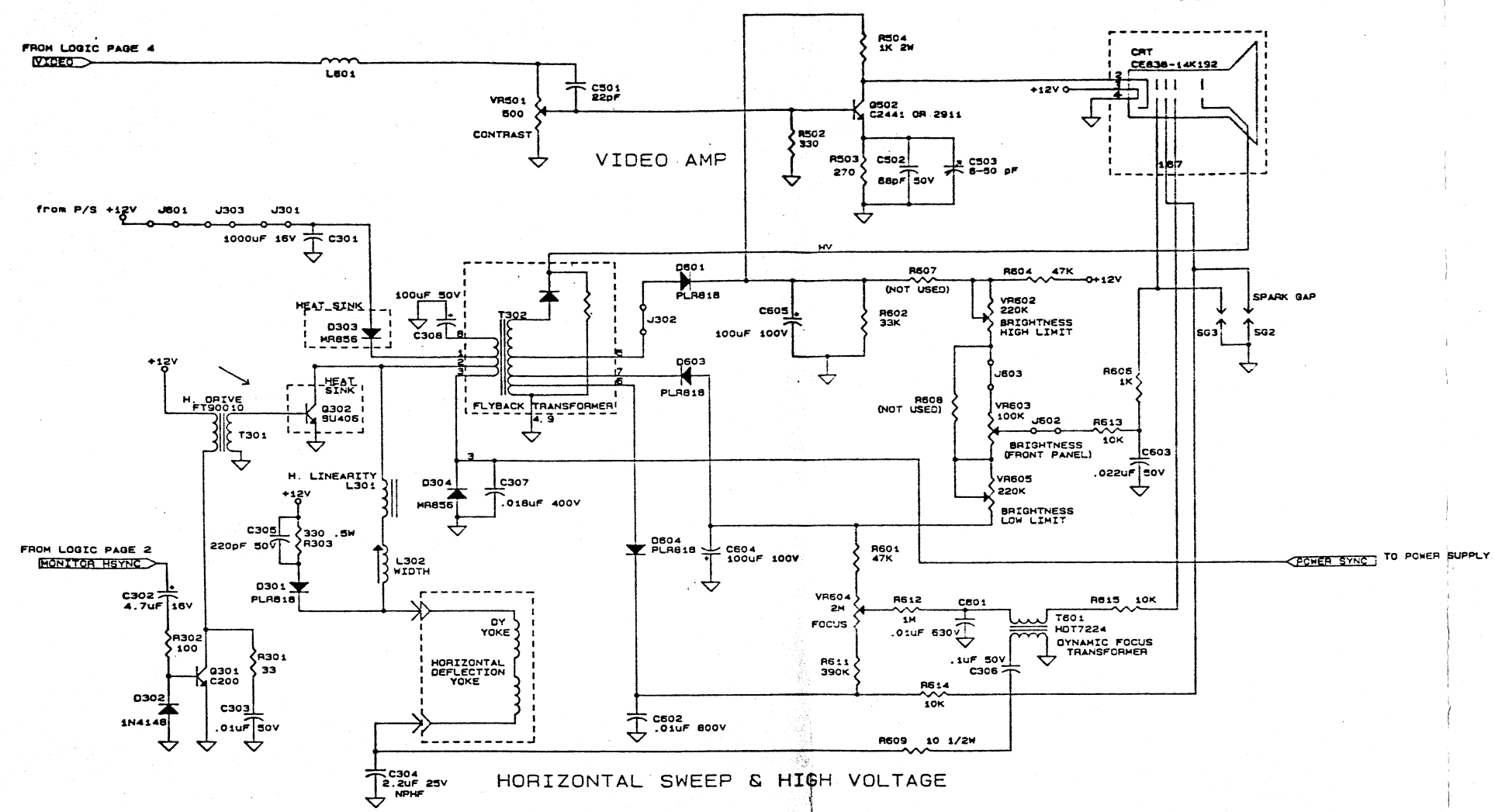
NOTE 3.

AC Receptacle
EMI Filter for VDE CLASS B

- NOTES:
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTOR VALUES ARE IN OHMS: 1/4W, 5K.
 2. IF U101 IS A MOTOROLA DEVICE, USE 47K AT R120.
IF U101 IS A TEXAS INSTRUMENTS DEVICE, USE 39K AT R120.
 3. FOR VDE, REPLACE AC RECEPTACLE WITH EMI FILTER.
(CORCOM 3EFI OR EQUIVALENT)
 4. C55, C56, C57, FB3 ADDED 9/26/90 (SEE PAGE 4 OF 4)

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .010 ± .005 ± .010		DES. DR. CHK. MATERIAL FINISH REMOVE ALL BURRS AND SHARP EDGES	DATE DATE DATE DATE	TeleVideo Systems, Inc. 965 POWER SUPPLY SIZE C CODE IDENT 133059-02-C REV A SCALE SHEET 1 OF 1
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APPLICATION		REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASBY	FIRST USED ON	G	UP GRAD CIRCUITRY	4323T	2/15/79	CL



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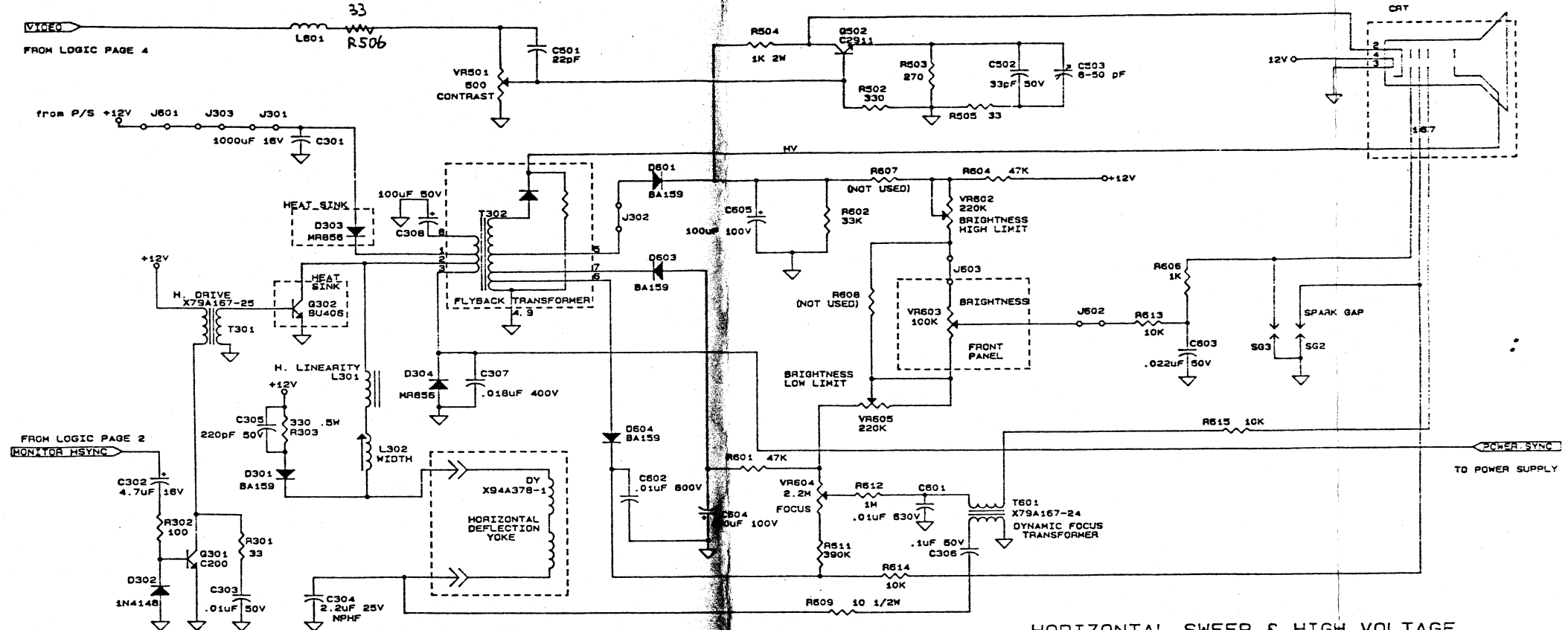
MATERIAL	TOLERANCES UNLESS NOTED		CONTRACT NUMBER	
	DIMENSION	mm INCH	DES.	DATE
FINISH	X	± .005	DR.	PHIL. ANNEN 2/22/90
	XX	± .002	CHK.	W.K. 3/15/90
	XXX	± .001	ENGR.	

TeleVideo Systems, Inc.			
965 VIDEO MONITOR			
SIZE	CODE IDENT	REV	
C	133061-00	G	
SCALE	SHEET 1 OF 1		

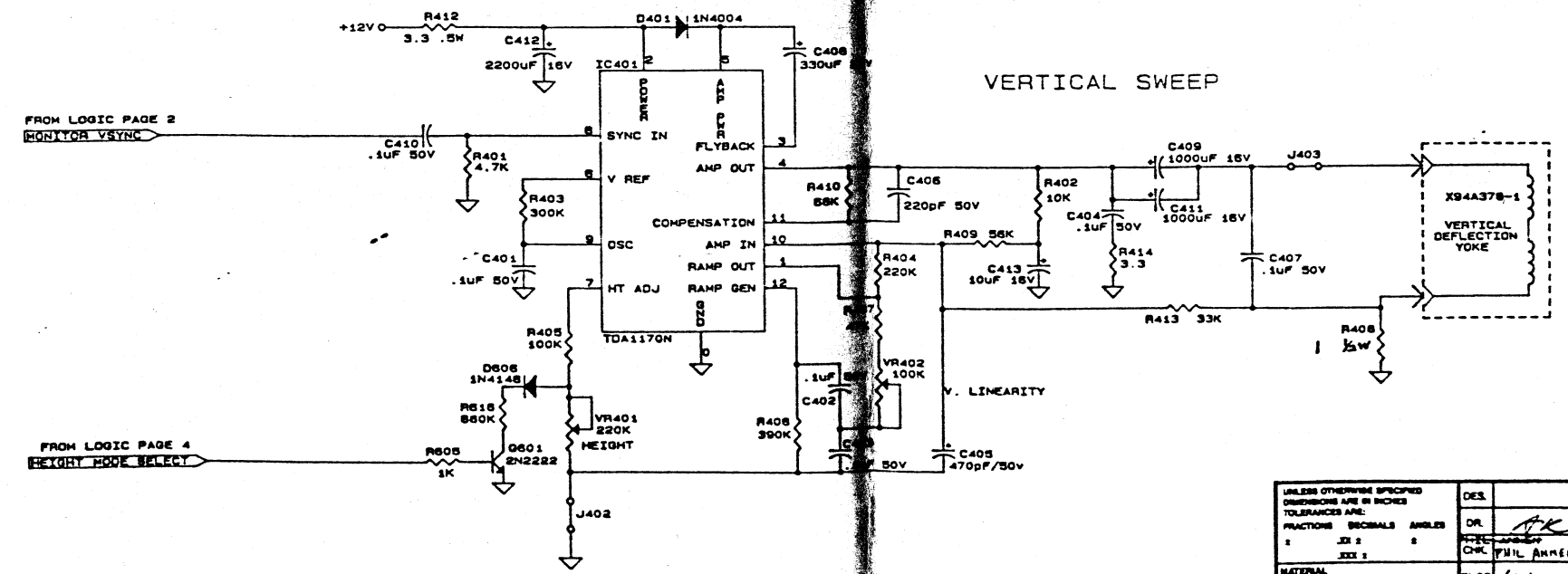
APPLICATION		REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASBY	FIRST USED ON	A	PROD REL INCL VDE (CL "B")	4426	7/26/90	W.K.

NOTES:
 1. FOR 230VAC, THE FOLLOWING RESISTOR SHOULD BE ADDED IN SERIES WITH L801.
 R506 : 33 OHM, 1/4W

NOTE 1



HORIZONTAL SWEEP & HIGH VOLTAGE



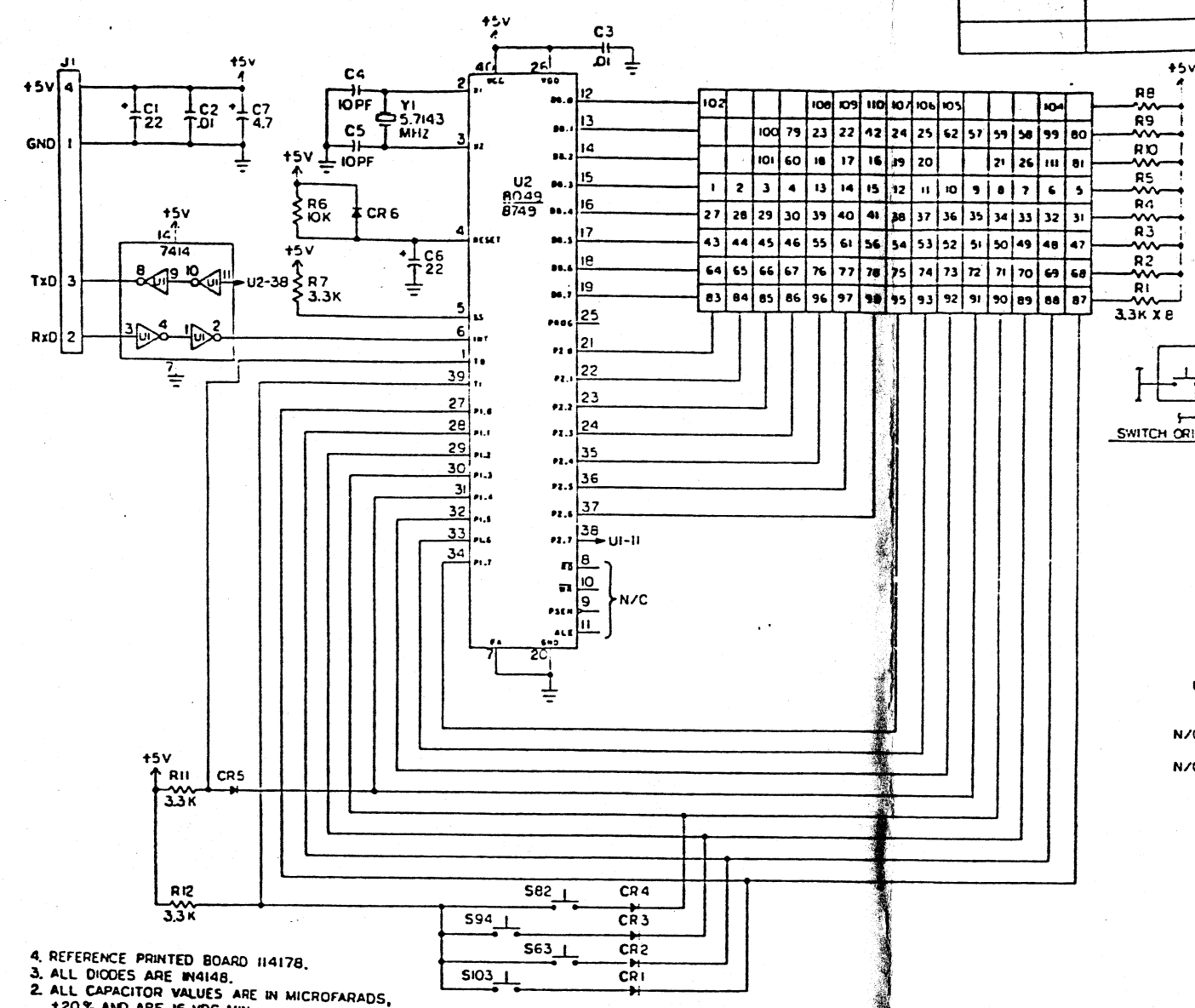
VERTICAL SWEEP

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:	DES.	DATE
FRACTIONS DECIMALS ANGLES	DR.	DATE
1 1/2 1/16 1/32 1/64	CHK.	DATE
MATERIAL	ENGR.	DATE
FINISH	CUSTOMER APPROVAL	
REMOVE ALL BURRS AND SHARP EDGES		

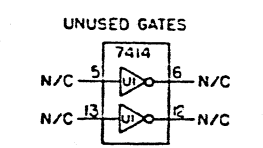
TeleVideo Systems, Inc.		
965 VIDEO MONITOR		
SIZE	CODE IDENT	REV
C	133061-02-C	A
SCALE	SHEET 1 OF 1	

100587

APPLICATION		REV	DESCRIPTION	ECO NO.	DATE	APPROVED
NEXT ASSY	FIRST USED ON	A	RELEASE	4015T	3/28/88	[Signature]



Y1	
U2	
S111	
R12	
J1	
CR6	
C7	
LAST USED	NOT USED
REFERENCE DESIGNATORS	



- 4. REFERENCE PRINTED BOARD 114178.
 - 3. ALL DIODES ARE IN4148.
 - 2. ALL CAPACITOR VALUES ARE IN MICROFARADS, ±20%, AND ARE 16 VDC MIN.
 - 1. ALL RESISTOR VALUES ARE IN OHMS, ±5%, AND ARE 1/4 WATT.
- NOTES: UNLESS OTHERWISE SPECIFIED

MATERIAL	TOLERANCES UNLESS NOTED	CONTRACT NUMBER		TeleVideo Systems, Inc.			
	DIMENSION	mm	INCH				
FINISH	X =	±		CHK	DATE	ENG	DATE
	XX =	±		DESIGN ACTIVITY APPROVAL		SIZE	CODE IDENT
	XXX =	±		CUSTOMER APPROVAL		B	133107-00
REMOVE ALL BURRS AND SHARP EDGES	ANGLES	±				SCALE	SHEET OF

KYBD SCH 965 ASCII

SUPERSEDES

D
C
B
A

D
C
B
A

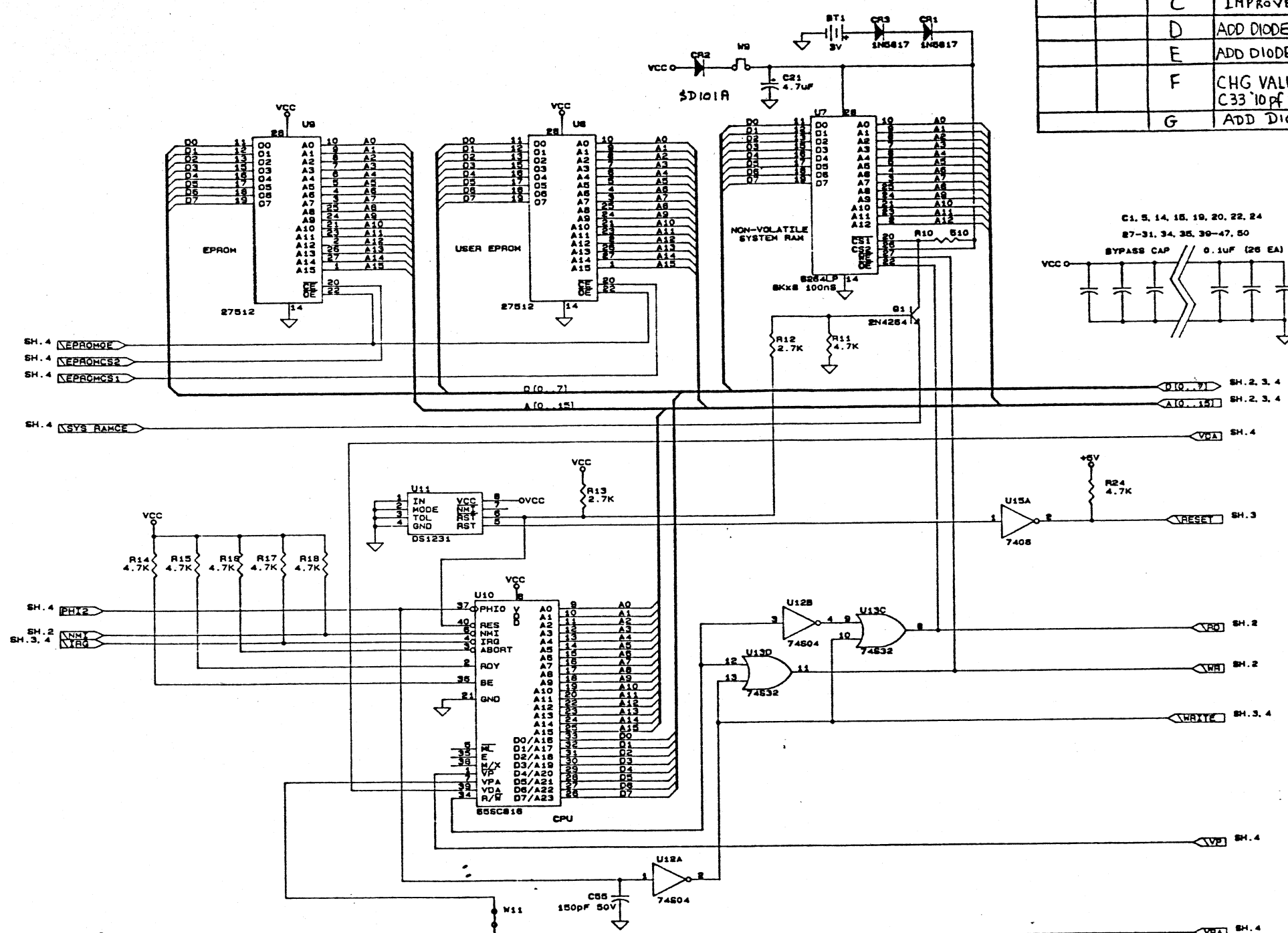
4

3

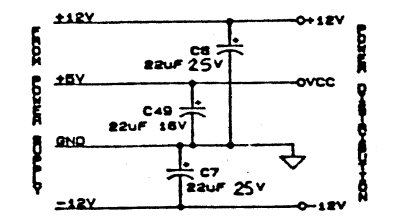
2

1

APPLICATION	REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASSEMBLY	USED ON	PROD REL INCL VDEC CL 'B')	4426	9/26/90	WLC
		CHANGE CR2 DIODE P/N	4488	1/11/91	PHIL ANNEN
		IMPROVE RELIABILITY	4521	4/1/91	PHIL ANNEN
		ADD DIODE CR9-12 & RES. R47	4537	5/21/91	PHIL ANNEN
		ADD DIODE CR13-16 & RES. R48	4544	9/4/91	PHIL ANNEN
		CHG VALUE C38 1uf TO 10uf, C33 10pf TO 33PF, R2B 2.2M TO 1.0M	4554	10/1/91	PHIL ANNEN
		ADD DIODE 6.2V (CR17)	4623	1/8/93	PHIL ANNEN



* NOTE
DELETED U29, R44, R45, C71, W20, W10
9126190



WIRE JUMPER FUNCTIONS ON THIS PAGE

W8 APPLIES +5 VOLTS POWER TO NON-VOLATILE RAM. REMOVE ONLY WHEN TESTING BATTERY BACKUP. IF W8 IS LEFT OUT, LITHIUM CELL (BT1) WILL EXPIRE PREMATURELY.

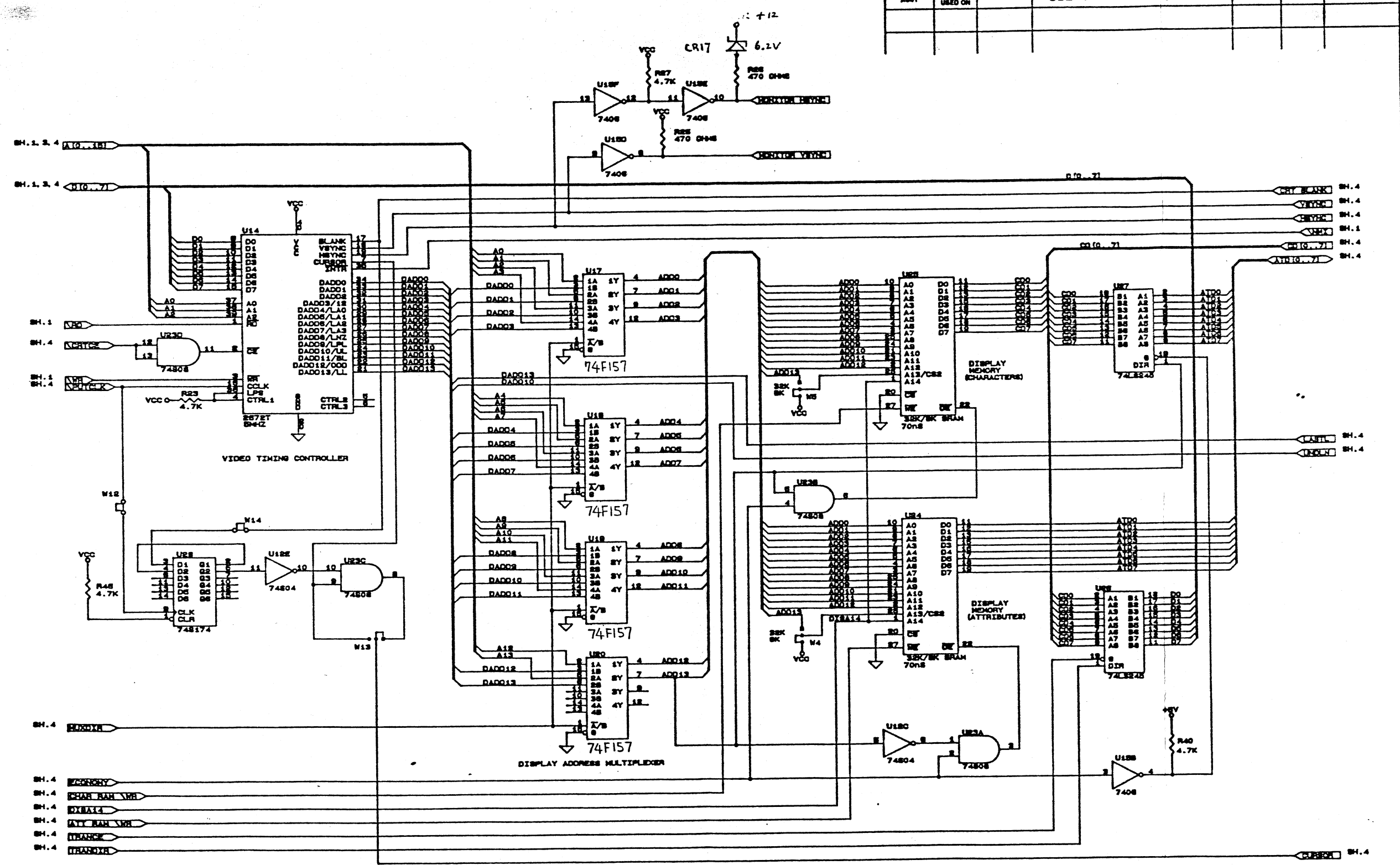
W11 REDUNDANT

DRAWING NUMBER
132973-02-C

DRAWING NUMBER
132973-02-C
1 of 4

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .010 ± .005 ± .010		DES. DATE	TeleVideo Systems, Inc.	
DR. <i>AK</i>	DATE 8/20/90	CHK. PHIL ANNEN	DATE 8/20/90	PCB SCHEMATIC 965 TERMINAL LOGIC
ENGR. <i>W.K.E.</i>	DATE 8/20/90	CUSTOMER APPROVAL		
MATERIAL	SIZE C	CODE IDENT	132973-02-C	REV. G
REMOVE ALL BURNS AND SHARP EDGES	SCALE	SHEET 1 OF 4		

APPLICATION		REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASSY	FIRST USED ON		SEE PAGE 1 OF 4			



WIRE JUMPER FUNCTIONS ON THIS PAGE

M4 PINS 1-2 ALLOW ADDRESSING OF A 256K BRAM (SUCH AS 2566) AT U54.
PINS 2-3 ALLOW USE OF AN 8K BRAM (SUCH AS 2564) AT U54.

M5 PINS 1-2 ALLOW ADDRESSING OF A 256K BRAM AT U55.
PINS 2-3 ALLOW USE OF AN 8K BRAM AT U55.

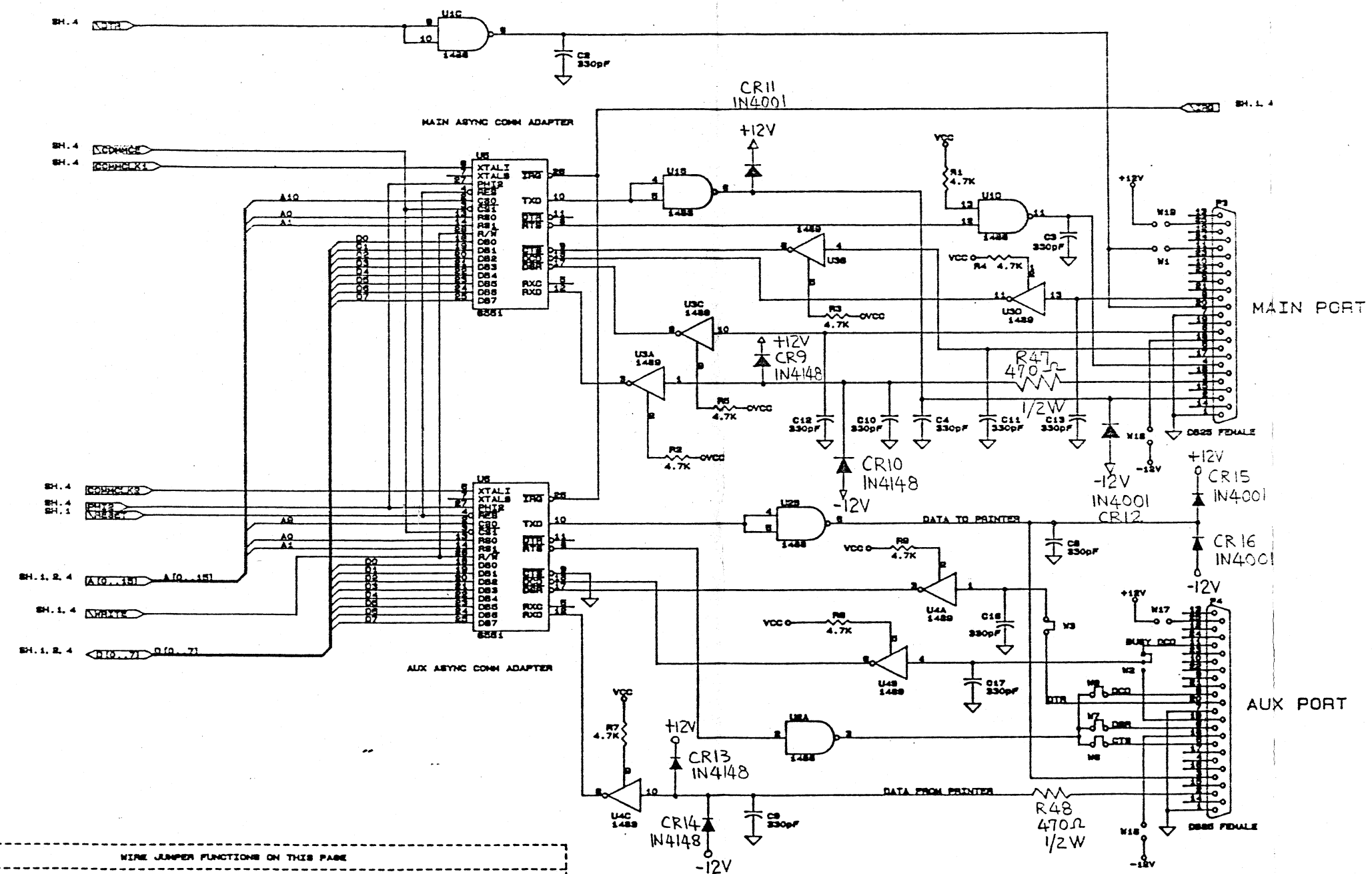
M12, 13, 14 THE DEFAULT SETTINGS OF THESE JUMPERS (M12 & M14 INSTALLED AND M13 IN THE 1-2 POSITION) PREVENTS THE CURSOR SIGNAL TO THE GATE ARRAY FROM GOING TRUE DURING HORIZONTAL OR VERTICAL BLANKING INTERVALS. THIS FUNCTION MAY BE DEFEATED BY SETTING M12 TO THE 2-3 POSITION (M12 & M14 THEN BECOME REDUNDANT).

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		DES.	DATE	TeleVideo Systems, Inc.	
FRACTIONS	DECIMALS	DR.	DATE 8/20/80	PCB SCHEMATIC	
1	.XX X	CHK.	DATE 8/22/80	965 TERMINAL LOGIC	
1	.XXX X	ENGR.	DATE 8/22/80	SIZE	CODE IDENT
MATERIAL				C	132973-02-C
FINISH				SCALE	REV
REMOVE ALL BURRS AND SHARP EDGES					G
CUSTOMER APPROVAL			SHEET 2 OF 4		

DRAWING NUMBER

DRAWING NUMBER
2 of 4

APPLICATION		REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASY	PART USED ON		SEE PAGE 1 OF 4			



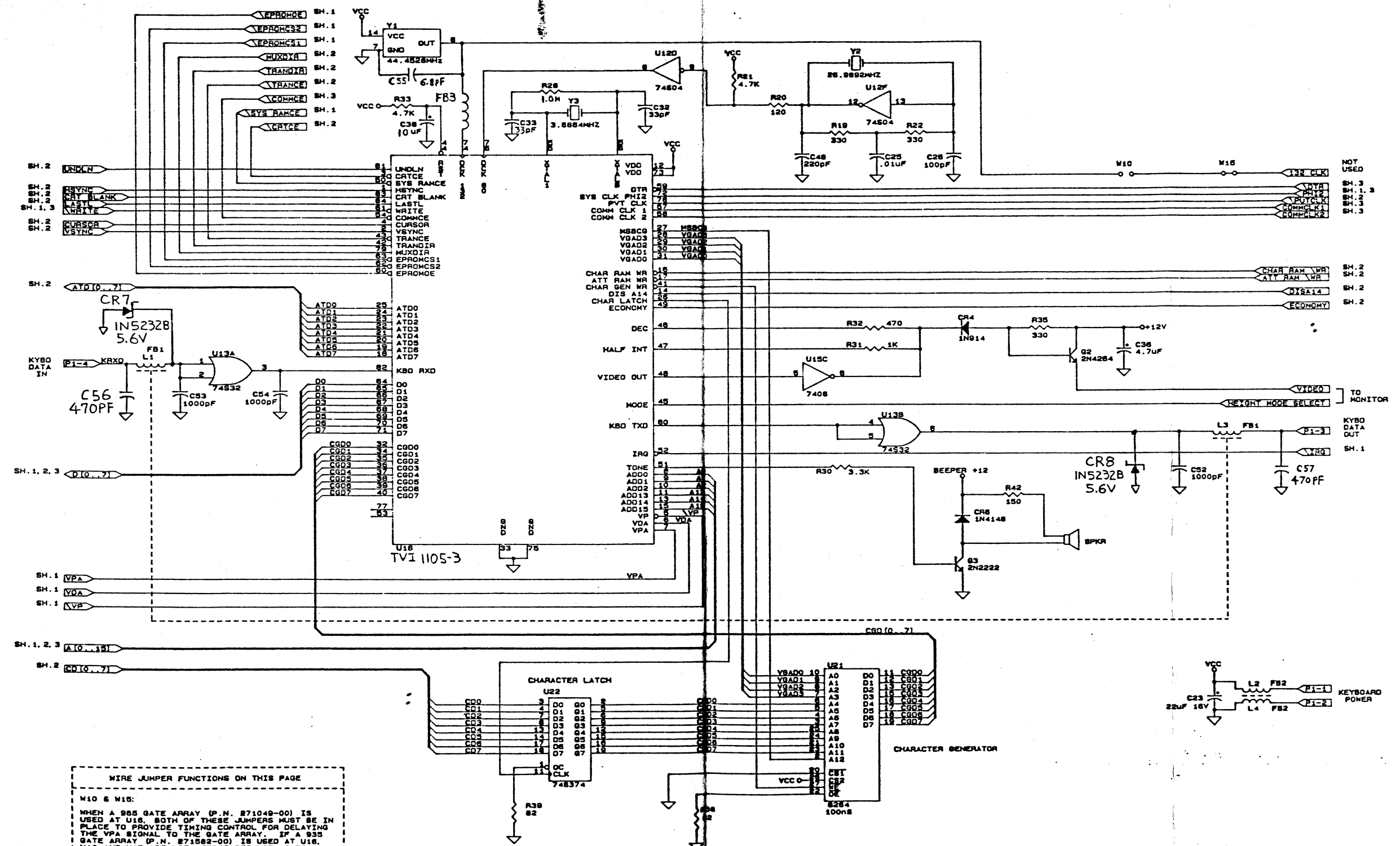
- WIRE JUMPER FUNCTIONS ON THIS PAGE
- W1 CONNECTS EIA LEVEL DTR SIGNAL (CONTROLLED BY BATE ARRAY) TO PIN 11 OF MAIN COMM PORT.
 - W2 PINS 1-2: CONNECTS PIN 11 OF AUX COMM PORT TO AUX DCD INPUT.
 - W3 PINS 2-3: CONNECTS PIN 18 OF AUX COMM PORT TO AUX DCD INPUT.
 - W4 CONNECTS PIN 20 OF AUX PORT TO AUX DSR INPUT.
 - W5 CONNECTS EIA LEVEL RTS SIGNAL TO PIN 8 OF AUX COMM PORT (PROVIDES RTS INPUT TO AUX DEVICE).
 - W6 CONNECTS EIA LEVEL RTS SIGNAL TO PIN 8 OF AUX COMM PORT (PROVIDES DSR INPUT TO AUX DEVICE).
 - W7 CONNECTS EIA LEVEL RTS SIGNAL TO PIN 8 OF AUX COMM PORT (PROVIDES DCD INPUT TO AUX DEVICE).
 - W8 APPLIES -12V TO PIN 18 OF AUX COMM PORT.
 - W9 APPLIES +12V TO PIN 25 OF AUX COMM PORT.
 - W10 APPLIES -12V TO PIN 18 OF MAIN COMM PORT.
 - W11 APPLIES +12V TO PIN 25 OF MAIN COMM PORT.

DRAWING NUMBER

DRAWING NUMBER
3 of 4

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES 1/16 0.031 30°		DES DR CHK ENGR	DATE DATE DATE DATE	TeleVideo Systems, Inc. PCB SCHEMATIC 965 TERMINAL LOGIC	
MATERIAL		W.K.K.	8/10/76	SIZE C	CODE IDENT 132973-02-C
REMOVE ALL BURRS AND SHARP EDGES		CUSTOMER APPROVAL		REV G	SHEET 3 OF 4

APPLICATION	REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASSY	FIRST USED ON	SEE PAGE 1 OF 4			



WIRE JUMPER FUNCTIONS ON THIS PAGE

W10 & W15:
 WHEN A 965 GATE ARRAY (P.N. 871049-001) IS USED AT U18, BOTH OF THESE JUMPERS MUST BE IN PLACE TO PROVIDE TIMING CONTROL FOR DELAYING THE VPA SIGNAL TO THE GATE ARRAY. IF A 935 GATE ARRAY (P.N. 871582-001) IS USED AT U18, W10 AND W15 ARE NOT NEEDED BECAUSE NO DELAY OF THE VPA SIGNAL IS REQUIRED.

DRAWING NUMBER
 4 of 4

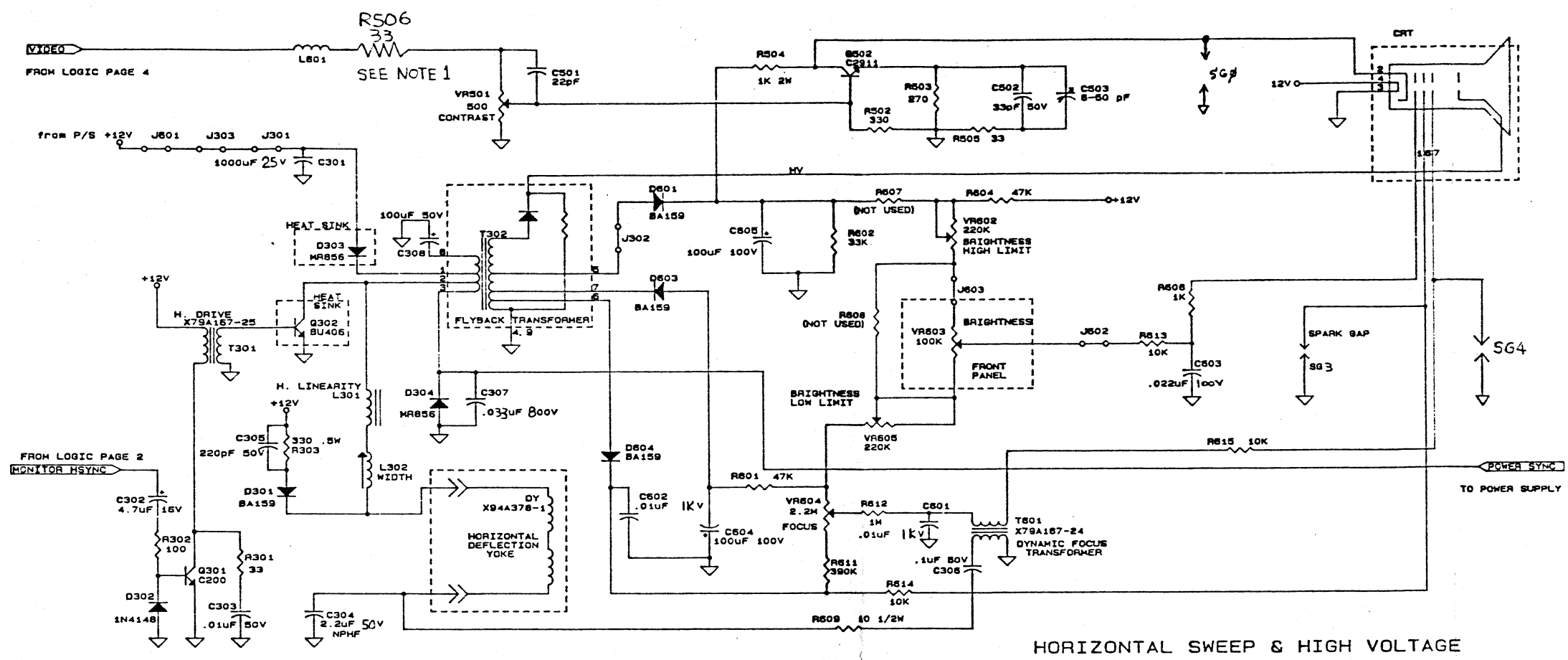
DRAWING NUMBER
 4 of 4

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .010 ± .005 ± .010		DES. DATE 8/20	TeleVideo Systems, Inc. PCB SCHEMATIC 965 TERMINAL LOGIC
MATERIAL		DR. PHIL ANKEN DATE 8/17	
FINISH		CHK. DATE 1/70	ENGR. W.K. K.M. DATE 9/10/80
REMOVE ALL BURRS AND SHARP EDGES		CUSTOMER APPROVAL	SIZE C CODE IDENT 132973-02-C REV G SCALE SHEET 4 OF 4

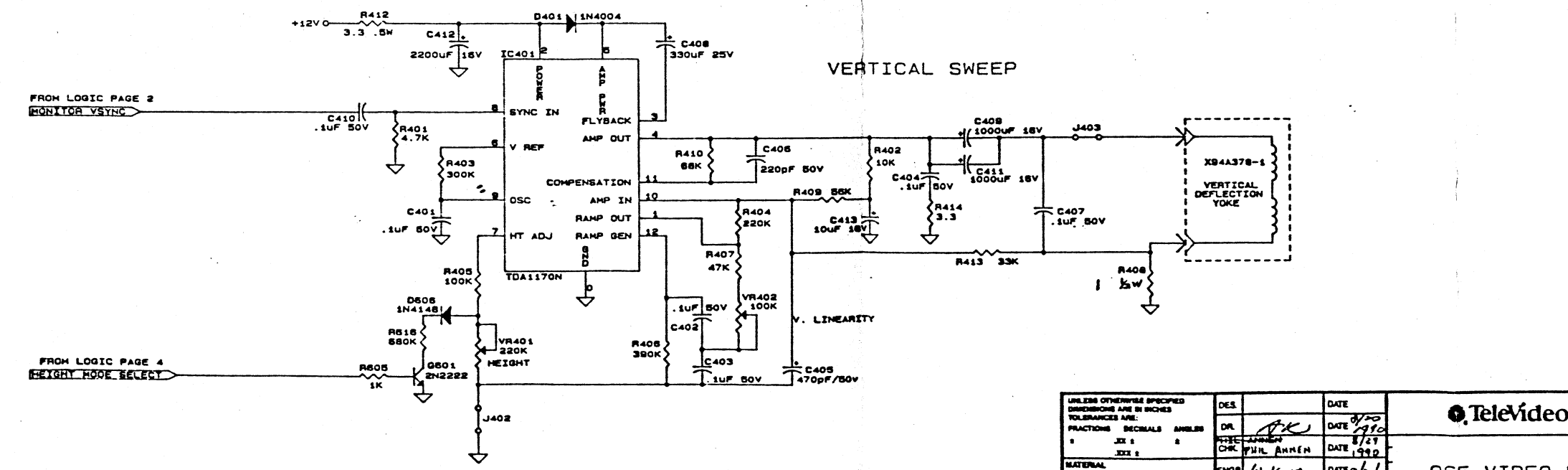
APPLICATION	REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
	A	PROD REL INCL VDE(CL "B")	4426	9/26/90	W.K.
	B	IMPROVE RELIABILITY	4534	6/30/91	
	C	IMPROVE RELIABILITY	4548	9/4/91	PHIL ANNEN
	D	INCORPORATES DAUGHTER BD	4604	9/15/92	W.K.

NOTES:
 1. FOR 230VAC, THE FOLLOWING RESISTOR SHOULD BE ADDED IN SERIES WITH L801.

R506 : 33 OHM 1/4W



HORIZONTAL SWEEP & HIGH VOLTAGE



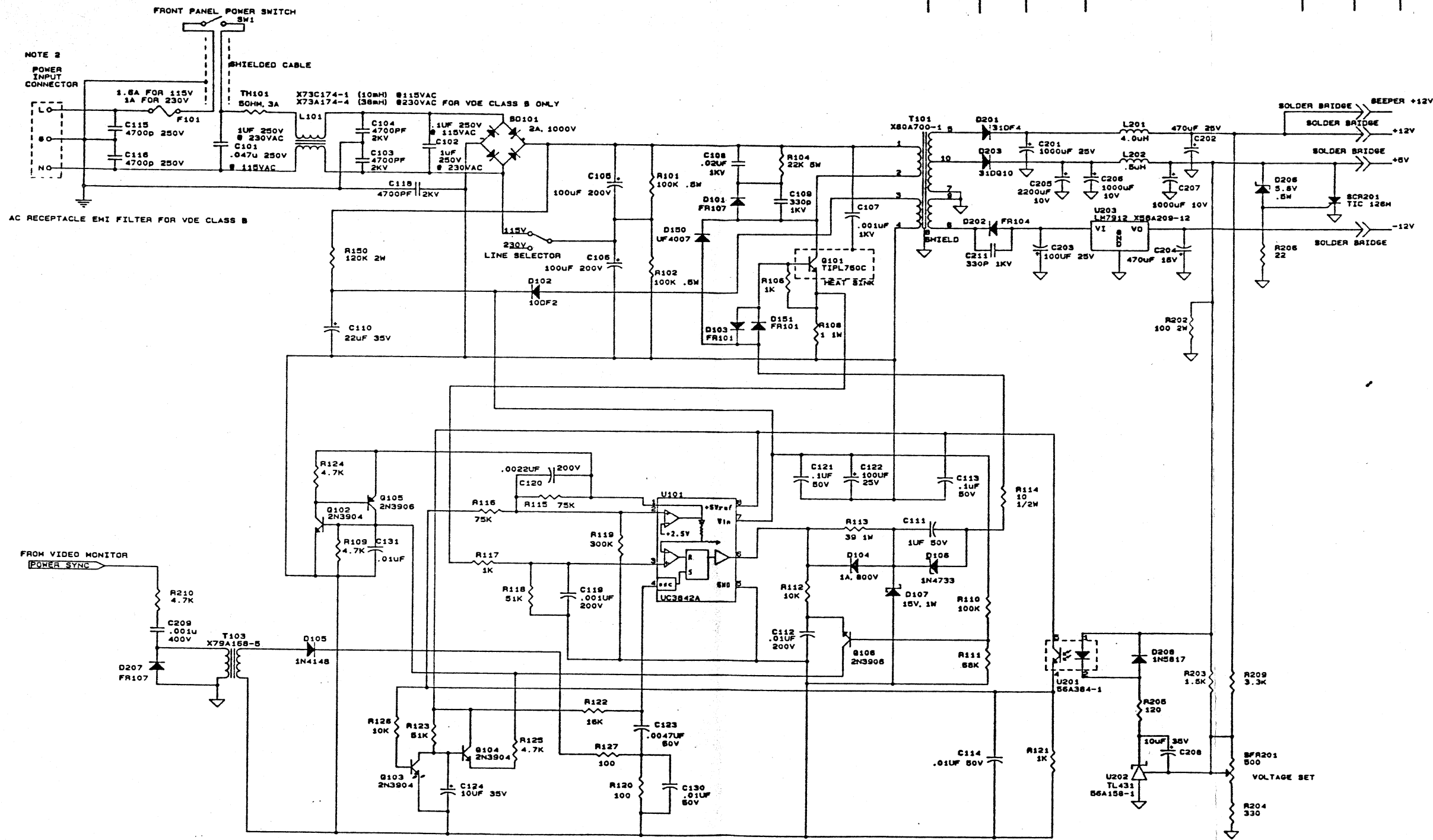
VERTICAL SWEEP

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES XX ± .XX ± .XX ±		DES	DATE	TeleVideo Systems, Inc.	
MATERIAL		DR	DATE	9/20/90	
FINISH		DESIGNER	DATE	8/27/90	
REMOVE ALL BURRS AND SHARP EDGES		CHECKER	DATE	9/9/90	
CUSTOMER APPROVAL		ENGR	DATE	8/26/90	
SIZE	CODE IDENT	REV		D	
C	133061-02-C	SHEET		1 OF 1	

DRAWING NUMBER
 133061-02-C

DRAWING NUMBER
 133061-02-C

APPLICATION		REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASMY	FIRST USED ON	G	Revise & Redrawn per	4620	11/2/72	<i>[Signature]</i>



NOTE 2
POWER
INPUT
CONNECTOR

1.5A FOR 115V
1A FOR 230V

TH101
50HM, 3A

X73C174-1 (10HM) #115VAC
X73A174-4 (38HM) #230VAC FOR VDE CLASS B ONLY

AC RECEPTACLE EMI FILTER FOR VDE CLASS B

- NOTES:
- UNLESS OTHERWISE SPECIFIED, ALL RESISTOR VALUES ARE IN OHMS; 1/4W; 5%.
TOLERANCES ARE: FRACTIONS DECIMALS ANGLES
 - FOR VDE, REPLACE AC RECEPTACLE WITH EMI FILTER.
(CORCON 3EFI OR EQUIVALENT)

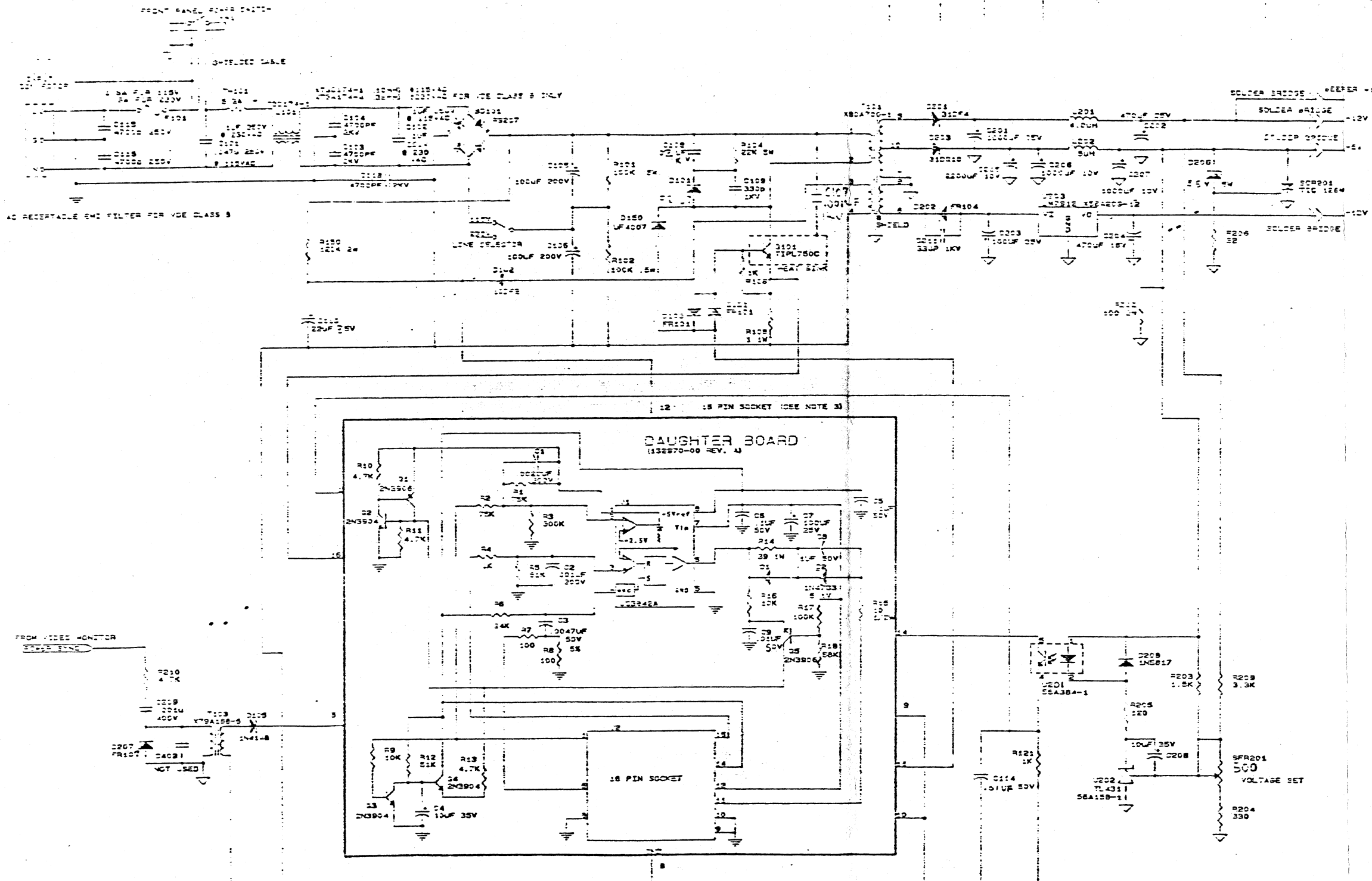
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES		DES.	DATE	TeleVideo Systems, Inc.	
1 XX 1 2 XXX 1		DR. <i>A.K.</i>	DATE <i>11/2/72</i>	PCB SCHEMATIC DWG	
MATERIAL		CHK.	DATE	965 POWER SUPPLY	
FINISH		ENGR.	DATE	SIZE C	CODE IDENT
REMOVE ALL BURRS AND SHARP EDGES		CUSTOMER APPROVAL		133059-02-C	REV G
				SCALE	SHEET 1 OF 1

DRAWING NUMBER

DRAWING NUMBER

133059-02-C

APPLICATION	REVISION	DESCRIPTION	ECO NO	DATE	APPROVED
ASST	REV 02-04	133059-02-C		5/24/65	[Signature]



- NOTES
- UNLESS OTHERWISE SPECIFIED, ALL RESISTOR VALUES ARE IN OHMS 1/4W 1%. 100K = 100,000 OHMS.
 - FOR VDE, REPLACE AC RECEPTACLE WITH EMI FILTER (SEE DRAWING JEP2 OR EQUIVALENT).
 - | | | | | |
|-------------|---------------|--------|---------------------------|-----------|
| OTHER BOARD | 16 PIN SOCKET | PIN 1 | CONNECT TO DAUGHTER BOARD | 16 PIN 1 |
| OTHER BOARD | 16 PIN SOCKET | PIN 2 | CONNECT TO DAUGHTER BOARD | 16 PIN 2 |
| OTHER BOARD | 16 PIN SOCKET | PIN 3 | CONNECT TO DAUGHTER BOARD | 16 PIN 3 |
| OTHER BOARD | 16 PIN SOCKET | PIN 4 | CONNECT TO DAUGHTER BOARD | 16 PIN 4 |
| OTHER BOARD | 16 PIN SOCKET | PIN 5 | CONNECT TO DAUGHTER BOARD | 16 PIN 5 |
| OTHER BOARD | 16 PIN SOCKET | PIN 6 | CONNECT TO DAUGHTER BOARD | 16 PIN 6 |
| OTHER BOARD | 16 PIN SOCKET | PIN 7 | CONNECT TO DAUGHTER BOARD | 16 PIN 7 |
| OTHER BOARD | 16 PIN SOCKET | PIN 8 | CONNECT TO DAUGHTER BOARD | 16 PIN 8 |
| OTHER BOARD | 16 PIN SOCKET | PIN 9 | CONNECT TO DAUGHTER BOARD | 16 PIN 9 |
| OTHER BOARD | 16 PIN SOCKET | PIN 10 | CONNECT TO DAUGHTER BOARD | 16 PIN 10 |
| OTHER BOARD | 16 PIN SOCKET | PIN 11 | CONNECT TO DAUGHTER BOARD | 16 PIN 11 |
| OTHER BOARD | 16 PIN SOCKET | PIN 12 | CONNECT TO DAUGHTER BOARD | 16 PIN 12 |
| OTHER BOARD | 16 PIN SOCKET | PIN 13 | CONNECT TO DAUGHTER BOARD | 16 PIN 13 |
| OTHER BOARD | 16 PIN SOCKET | PIN 14 | CONNECT TO DAUGHTER BOARD | 16 PIN 14 |
| OTHER BOARD | 16 PIN SOCKET | PIN 15 | CONNECT TO DAUGHTER BOARD | 16 PIN 15 |
| OTHER BOARD | 16 PIN SOCKET | PIN 16 | CONNECT TO DAUGHTER BOARD | 16 PIN 16 |

DESIGN	DATE	SCALE	1:1
CHKD	BY	DATE	5/24/65
APPROVED	DATE	SCALE	1:1
<p>TeleVideo Systems, Inc.</p> <p>PCB SCHEMATIC DWG</p> <p>665 POWER SUPPLY</p>			REV
SIZE	CODE IDENT	133059-02-C	1
SCALE: 1:1			SHEET 1 OF 1

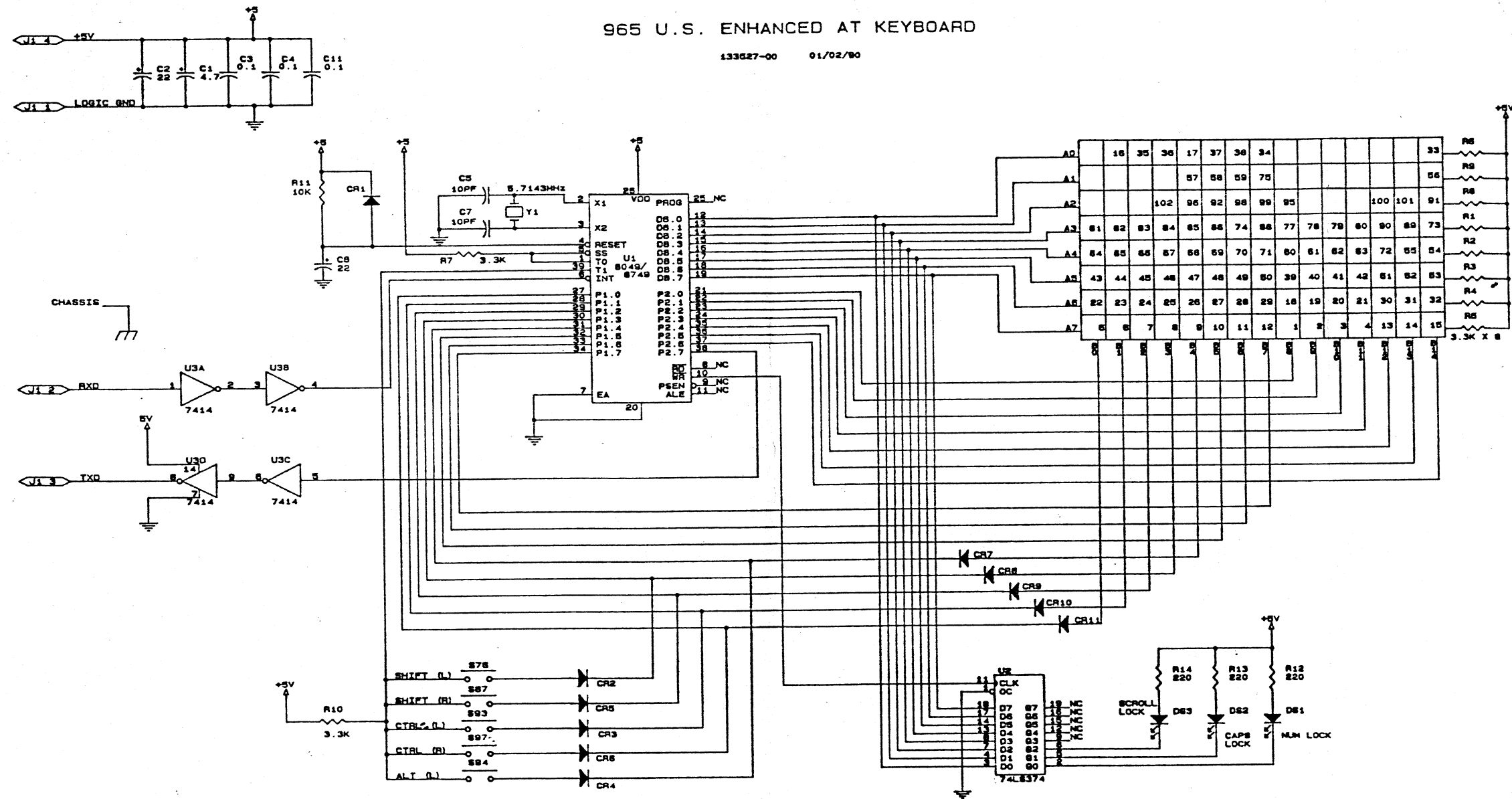
133059-02-C

A

APPLICATION		REVISION	DESCRIPTION	ECO NO.	DATE	APPROVED
ASBY	PRST USED ON	A	RELEASE TO PRODUCTION	4262T	7/19/87	B10NG

965 U.S. ENHANCED AT KEYBOARD

133527-00 01/02/80



3. ALL DIODES ARE 1N4148
2. ALL CAPACITOR VALUES ARE IN MICROFARADS
+75% -20%, AND ARE 16VDC MIN
1. ALL RESISTOR VALUES ARE IN OHMS, Ω, K, AND ARE 1/4 WATT

NOTE: UNLESS OTHERWISE SPECIFIED

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MATERIAL	TOLERANCES UNLESS NOTED	CONTRACT NUMBER		TeleVideo Systems, Inc.	
		DES.	DATE	DES.	DATE
CHK.	DATE	CHK.	DATE		
FINISH	ANGLES	DESIGN ACTIVITY APPROVAL		SIZE	CODE IDENT
REMOVE ALL BURRS AND SHARP EDGES		CUSTOMER APPROVAL		C	133527-00
				SCALE	SHEET OF
					REV A

DRAWING NUMBER
133527-00

DRAWING NUMBER
133527-00

REV	REV	DESCRIPTION	DATE	APPROVED
01		ENG FEL	2/20/79	TL
02		CHANGED STA. W3 CUSTOMER REQUEST	4/13/79	TL
03		CHANGED KEYCAP STA. 56	4/18/79	TL
04		CHANGED STA. 56 ADDED NOTE w/	4/19/79	TL
A		PROD REL ECD 6106	4/18/79	TL
B		CHANGED STA. NO. 03, 07 SEE ECD 6987	4/18/79	TL

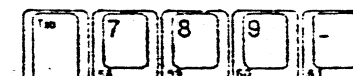
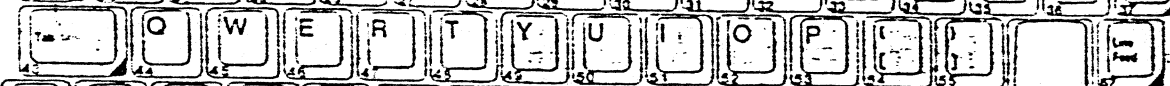
ROW 5
(USE ROW 4)



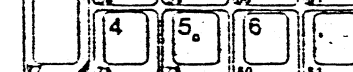
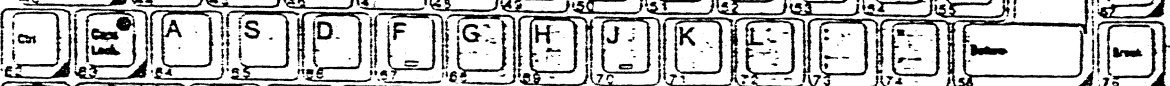
ROW 4



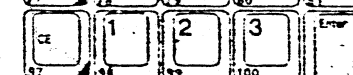
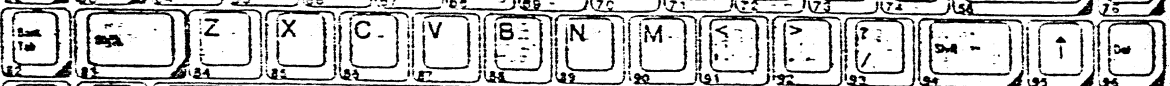
ROW 3



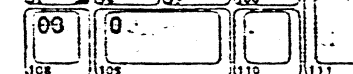
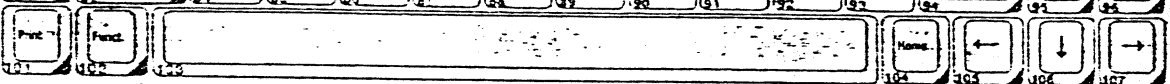
ROW 2



ROW 1



ROW 0
(USE ROW 1)



- 6. STATION #63 ● DENOTES GREEN LENS AND LED.
- 5. STATION #79 ○ DENOTES TACTILE DOT KEYCAP.
- 4. STATIONS #67 & #70 ARE TACTILE BARS.
- 3. ALL LEGENDS SHALL BE BLACK PER PMS COLOR NO. 20 PROCESS (412 # 112633).

- 2. NUMBERS ON KEYCAPS NOTED THUS ARE STATION NUMBERS FOR REFERENCE PURPOSES ONLY AND DO NOT APPEAR ON KEYCAPS.
- 1. KEYCAP COLOR CODE DENOTES LIGHT GRAY, 5670 305 - 3165 (HTC #330).
 DENOTES DARK GRAY, 5670 305 - 7165 (HTC #050).

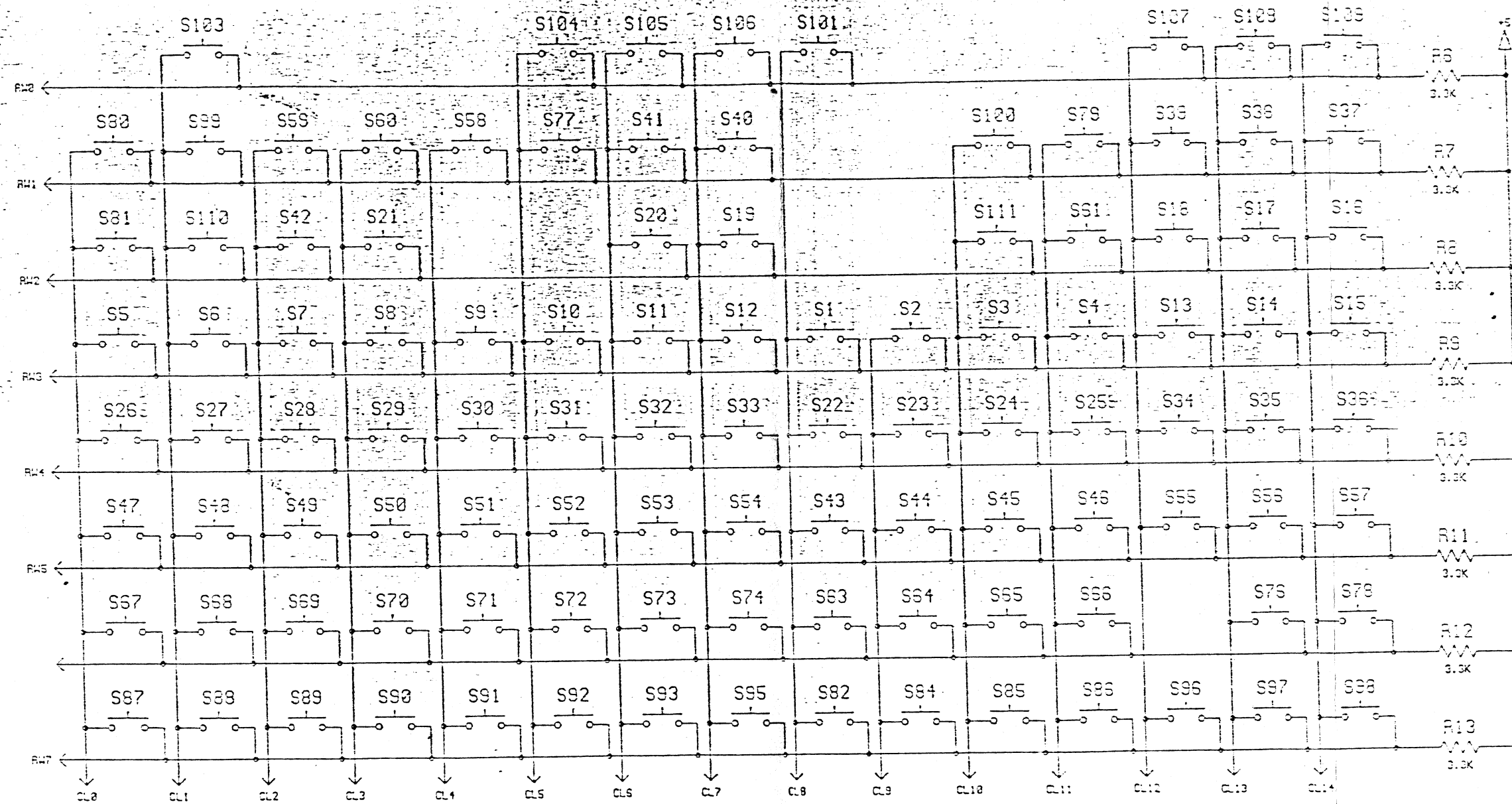
NOTES: UNLESS OTHERWISE SPECIFIED

APPROVAL OF THIS DOCUMENT VERIFIES THE CORRECT SIZE, SHAPE, POSITION & COLOR OF LEGEND GRAPHIC ART ON THE CORRECT SIZE, SHAPE, LOCATION & COLOR OF KEYCAPS.

CUSTOMER APPROVAL Tom Smith DATE 12/12/79

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APPROVALS		DATE	
DRAWN 	CHECKED 	12/12/79	
CUSTOMER APPROVAL DRAWING KEYCAP SET - TELEVIDEO			D 27233 116523 B
SCALE: SEE 50014 SHEET 1 OF 1			



TeleService Bulletin

JANUARY 1992
ISSUE NO. 1003

TERMINAL RELIABILITY IMPROVEMENT

MODELS: TVI965, TVI935 and TVI9320

In order to prevent arching inside the terminal, the following instructions explain how to add grounding inside the terminal.

It is recommended that all field returns, at depot level repair centers, add grounding per this TeleService Bulletin.

All logic boards that are sent to TeleVideo for repair, will have the ground changed on the logic board. All depot level repair centers should to the same for their customer field returns.

The ground braided wire assembly will be done if the complete terminal is sent in for repair. It is not suggested to add the ground braided wire assembly in the field or by untrained Tele-Video Repair Technicians.

TOOLS REQUIRED:

1. 25 Watt soldering iron and solder.
2. Desolder tool and flux remover.
3. Phillips and flat screw driver.
4. Wire cutter and stripper.
5. X-Acto knife.

PARTS REQUIRED:

1. QTY 1, Ground Braided Wire Assembly, P/N 143307-00

Note: A 1/4"D x 1/2"L Phillips Machine Screw may have to be added for some terminals.

PROCEDURE:

1. Opening the terminal case.
 - A. Follow instructions and drawings on Figure 3-2 and 3-3.

WARNING! BEFORE DISASSEMBLING MODULES, YOU MUST FOLLOW INSTRUCTIONS FOR "HIGH VOLTAGE DISCHARGE" PER FIGURE 3-4.

(continue) SB #1003, Terminal Reliability Improvement

2. Locate green ground wire on the logic board, near the keyboard connector.
 - A. Cut off wire at 1 inch from keyboard connector. Discard the rest of the wire.
 - B. Strip back about 1/8 inch of insulation of the green wire and solder it.
 - C. A ground pad location has to be made first to connect the green ground wire to the PCB.
 - TVI965: Stretch the green ground wire to the adjacent logic ground plane between location U8 and U9, mark the location on the PCB of the wire's solder tip.
 - TVI935: Stretch the green ground wire to the adjacent logic ground plane between location U8 and PCB edge, mark the location on the PCB of the wire's solder tip.
 - TVI9320: Stretch the green ground wire to the adjacent logic ground plane between location C30 and PCB edge, mark the location on the PCB of the wire's solder tip.
 - D. Using your X-Acto knife, scrap at least a 1/16 inch diameter of insulation material off the ground plane where you marked the end of the wire's solder tip.
 - E. Clean board and remove all flux as required.
 - F. Solder green wire to ground plane.
 - G. Check wire is properly soldered to ground plane with OHM Meter at keyboard connector to another ground location.
 - H. Verify entire green wire has a good solder connection and clean as required.
3. Install ground braided wire assembly to terminal chassis.
 - A. Follow drawing in Figure 3-5, for installation of ground braided wire assembly to the terminal.
4. Assembly instructions.
 - A. Reinstall logic board, Figure 3-3.
 - B. Reinstall terminal case, Figure 3-2.
 - C. Power up terminal and test as required.

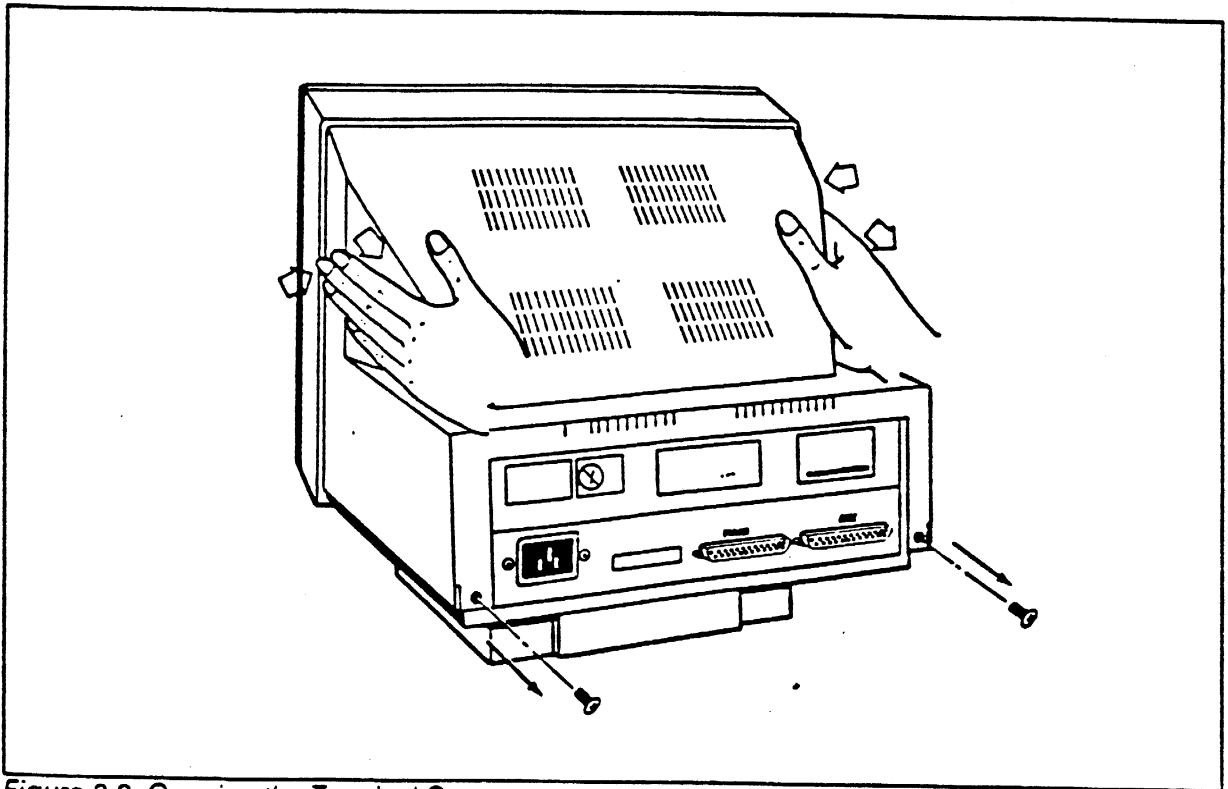


Figure 3-2. Opening the Terminal Case

Removing the Circuit Board

Use Figure 3-3 as reference for removing and replacing the circuit board.

1. Turn off the terminal and remove the cover, as described above.
2. Remove the two Phillips screws just below the CRT on each side. These will release the two ground wires.
3. Turn the unit around and remove the two Phillips screws that hold the circuit board down, using a size 1 Phillips screwdriver.
4. Disconnect the voltage lead on the anode by gently lifting the rubber cap and unhinging the metal lead.
5. Carefully remove the CRT connector (small round connector on the back of the CRT).

6. Remove the yoke connector (blue) from the circuit board.

7. Tilt the CRT forward by loosening the lower screws for the CRT support brackets. These are spring-loaded, and tilt the CRT forward automatically whenever the screws are loosened.

8. Pull the circuit board out through the rear of the chassis.

Replacing the Circuit Board

Use Figure 3-3 as reference for removing and replacing the circuit board.

1. Slide the circuit board in through the rear of the chassis.

2. Replace the two Phillips screws that hold the circuit board down, using a size 1 Phillips screwdriver.

3. Tilt the CRT back into position by tightening the lower screws for the CRT support bracket.

4. Reconnect the voltage lead to the CRT's anode:

a. Pull back the rubber umbrella of the anode cap, exposing the metal leads.

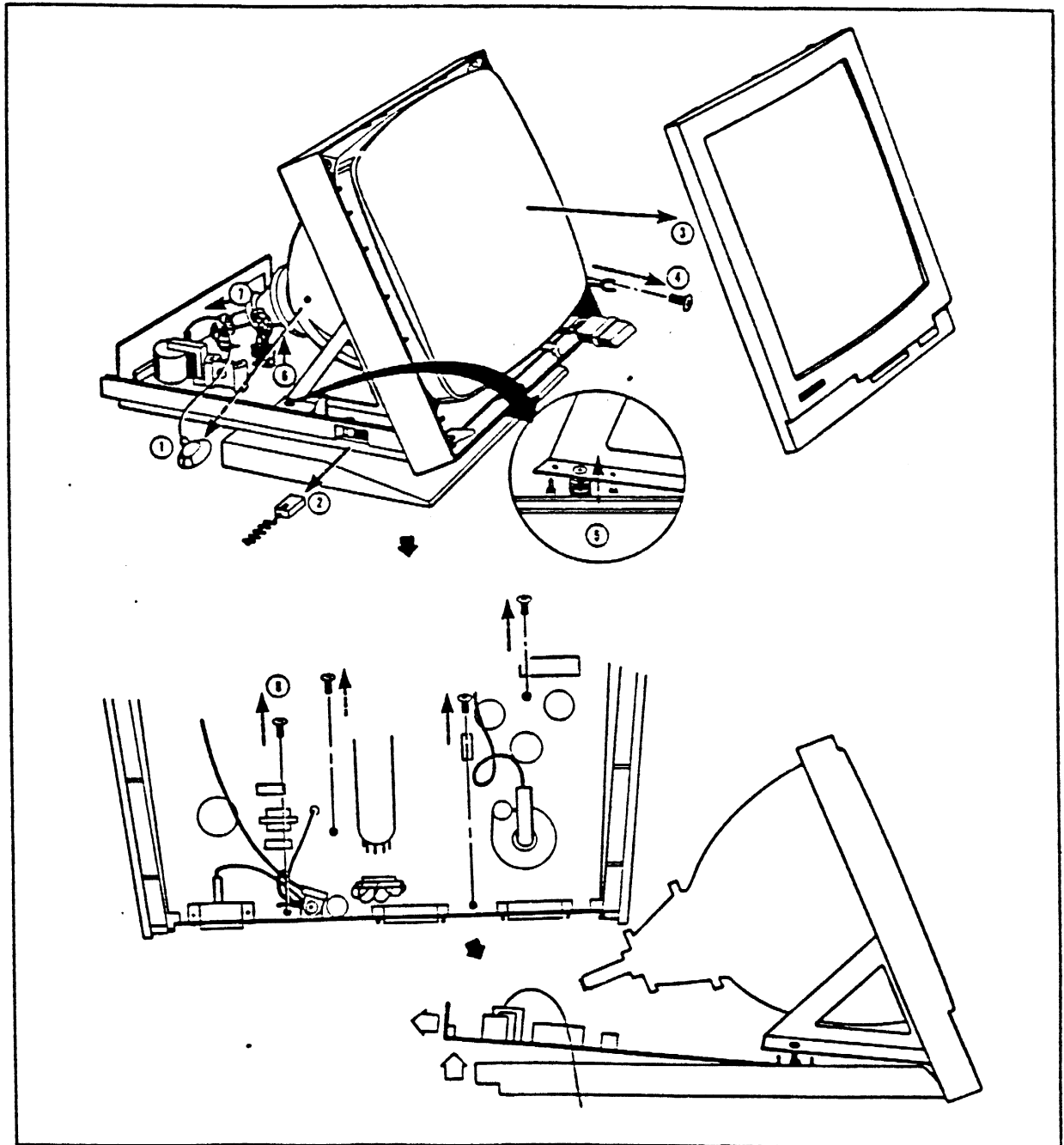


Figure 3-3. Removing the Circuit Board

WARNING

The CRT and capacitors retain high voltages even after power is removed. Avoid electrical shock by discharging the CRT as soon as you open the case.

High Voltage Discharge

Without touching any of the metal surfaces, pick up a screwdriver by its insulated handle and slip the tip of the screwdriver under the plastic cap that covers the anode, as shown in Figure 3-2. Then touch the metal frame of the CRT with the shaft of the screwdriver. (You may need a second screwdriver to reach the CRT frame from the anode.)

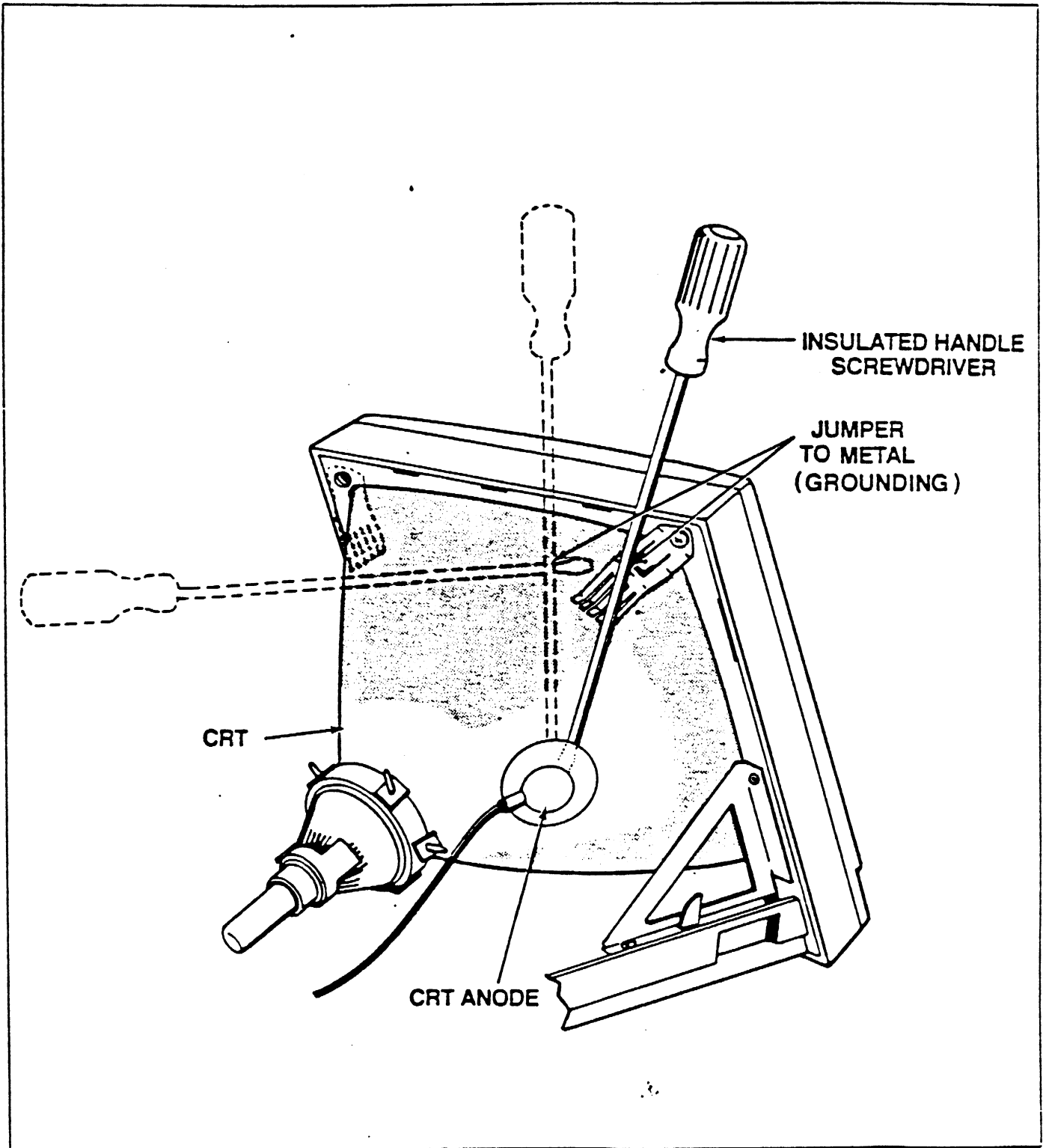
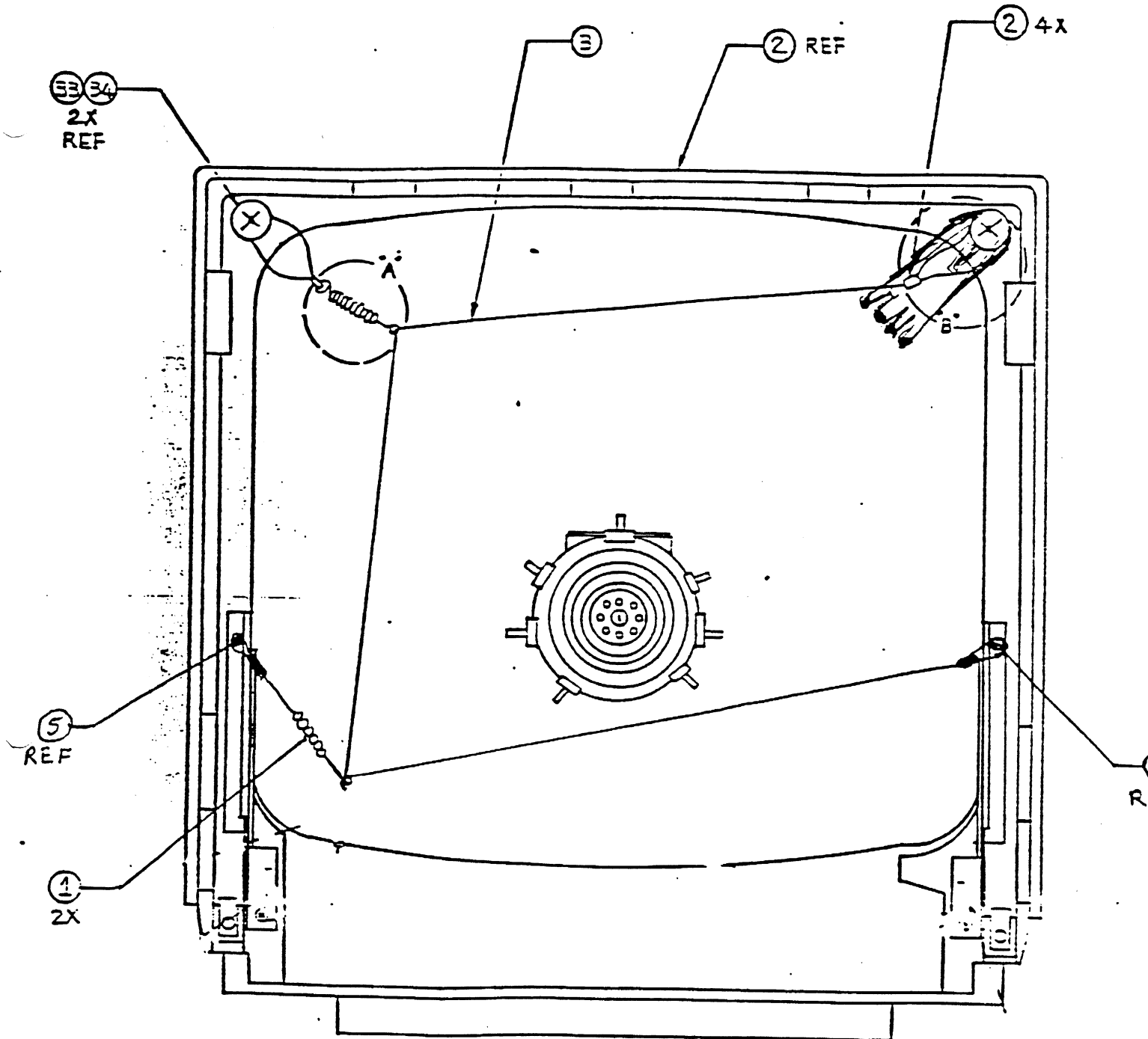


Figure 3-4) High Voltage Discharge



REAR VIEW

ITEM NO.	DESCRIPTION	QTY	
1	SPRING P/N: 197457-B	2	L
2	CLIP, TERMINAL	4	L
3	BRAIDED WIRE Q.12/64C	1	L

3-5

GROUND BRAIDED WIRE
AS7.

TeleVideo Systems, Inc.
550 E. Brokaw, Rd.
San Jose, CA 95112

Issue No 1004
August 1992

POWER SUPPLY IMPROVEMENT

TVI965

This bulletin describes the power supply improvement to the TVI965 logic board by replacing the UC3842 IC with a Daughterboard Controller at U101. Besides adding the Daughterboard Controller, the total rework requires removing 37 components, changing 3 components and adding 2 components to the logic board.

Beginning with date codes **0492** (6th to the 9th digits in the product serial number) and later, the Daughterboard will have been installed by the factory.

This Service Bulletin is to help the field technician to identify the power supply improvement, the purpose of the daughter board and when it is required for a 965 logic board that has a date code before **0492**.

PURPOSE

In addition to the normal current regulator functions, the Daughterboard contains the following:

Overcurrent Monitor: The purpose of this monitor is to prevent an initial fault from generating multiple failure points that make repair and troubleshooting more difficult.

Duty Cycle Monitor: This monitor provides the following functions:

1. Shuts the Controller off when input line voltages drop below levels that would cause unstable operation of the Controller.
2. Prevents destruction of Q101 on the main board if the current feedback signal gets removed.
3. Prevents destruction of Q101 if its gain is low.

(continue) SB # 1004, 965 Power Supply Improvement

WHEN INSTALLED:

The Daughterboard is only required to be installed in terminals that fail with date codes before **0492**.

Due to the extensive rework to the logic board, it is recommended that the Daughterboard rework only be installed at TeleVideo's Repair Center.

All failed 965 in-warranty terminals sent to TeleVideo for repair, will have the Daughterboard installed at no charge. However, there is a **\$50.00** charge if there was **No Trouble Found** with the terminal.

All failed out-of-warranty 965 terminals sent to TeleVideo for repair will have the Daughterboard installed at no charge. There is an out-of-warranty repair charge of **\$150.00** for the complete terminal or **\$125.00** repair charge if the 965 logic board is removed from the chassis and sent alone to TeleVideo.

Please contact TeleVideo's Repair Department, at Phone Number 408-955-7446 or Fax Number 408-954-0931 for additional information on the theory of operation, parts lists or drawings on the 965 power supply improvement.

TeleService Bulletin

TeleVideo Systems, Inc
550 E. Brokaw, Rd.
San Jose, CA 95112

Issue No. 1005
August 1992

SRAM PROTECTION

TV1965

This bulletin describes how to modify the grounding on the 965 logic board to improve protection of U7 and U27 from being damaged or losing memory setups.

It is recommended that all field returns at depot level repair centers must perform this modification on grounding.

TOOLS REQUIRED:

1. 25 Watt soldering iron, flux remover and solder vacuum.
2. Phillips screw driver.
3. Long nose pliers and wire cutter.

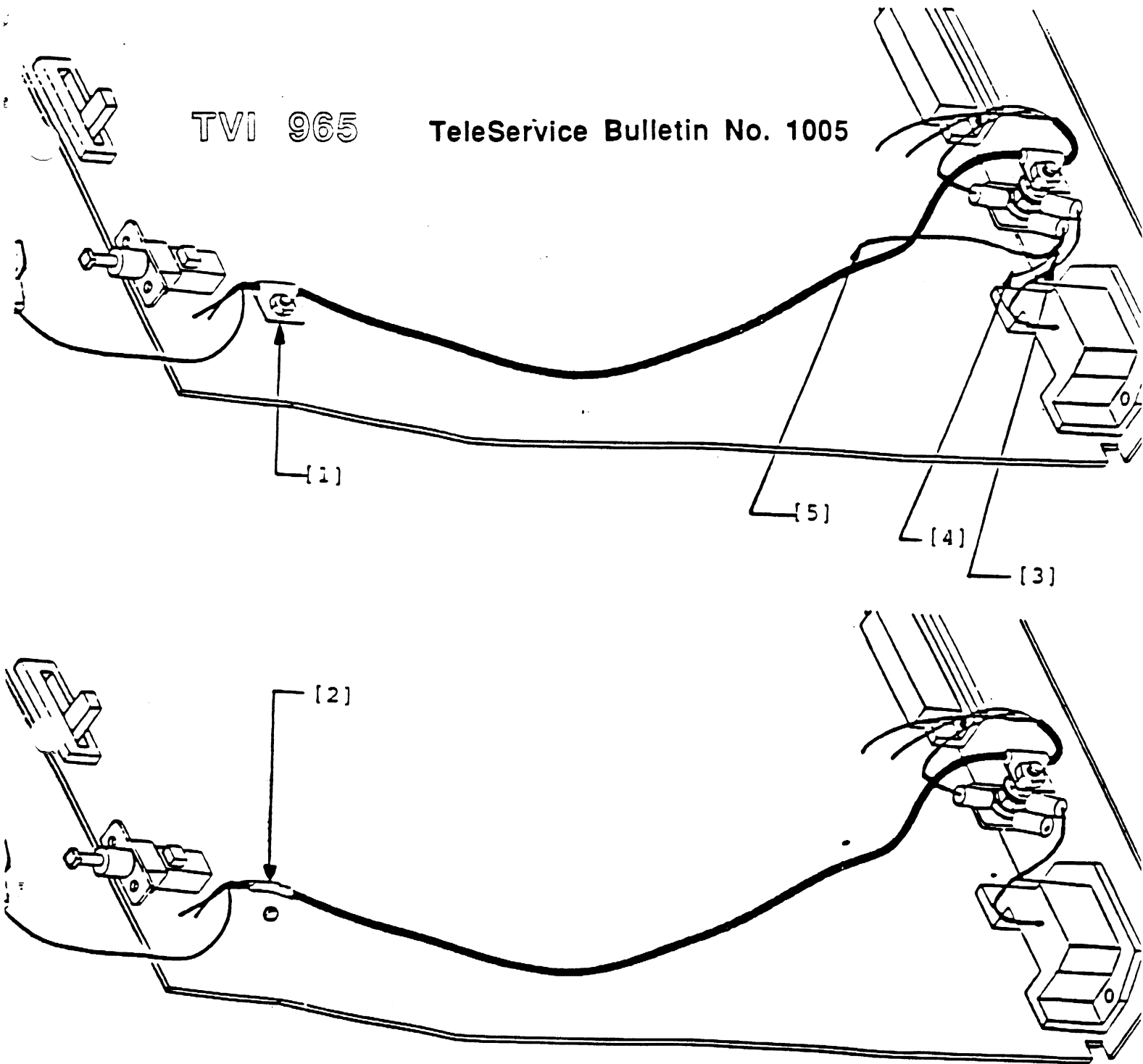
PARTS REQUIRED:

1. Vinyl plastic electrical tape.

PROCEDURE:

CAUTION: Professional workmanship and safety standards must be maintained. High voltages are present and damaged units or components will void warranty. Please read the TV1965 Maintenance Manual for proper disassembly and safety.

1. Remove all AC power cords and communications cables from rear of terminal and remove terminal case per **Figure 3-2**.
2. Remove circuit (logic) board from the terminal's chassis per **FIGURE 3-3** and **3-4** Maintenance Manual instructions.
4. Follow the instructions per **FIGURE 3-1** for location points on the logic board to remove grounding.
5. Install logic board into terminal per **FIGURE 3-3** and instructions.
6. Test unit and verify no loss of user's setup during operation.
7. Power off and then back on and verify user's setup was retained.

**FIGURE 3-1**

- [1] Remove the metal holder, bolt, and shield of the AC power shield from the AC wiring located near the AC power switch. Discard these parts.
- [2] Using vinyl plastic electrical tape, wrap 2 to 3 times to completely cover the exposed ground shield on the AC power cable.
- [3] Cut the two green wires which are tied together at the yellow lug.
- [4] Desolder the one cut green wire from PCB near the rear panel GND stud.
- [5] Desolder second cut green wire from PCB and discard both wires.

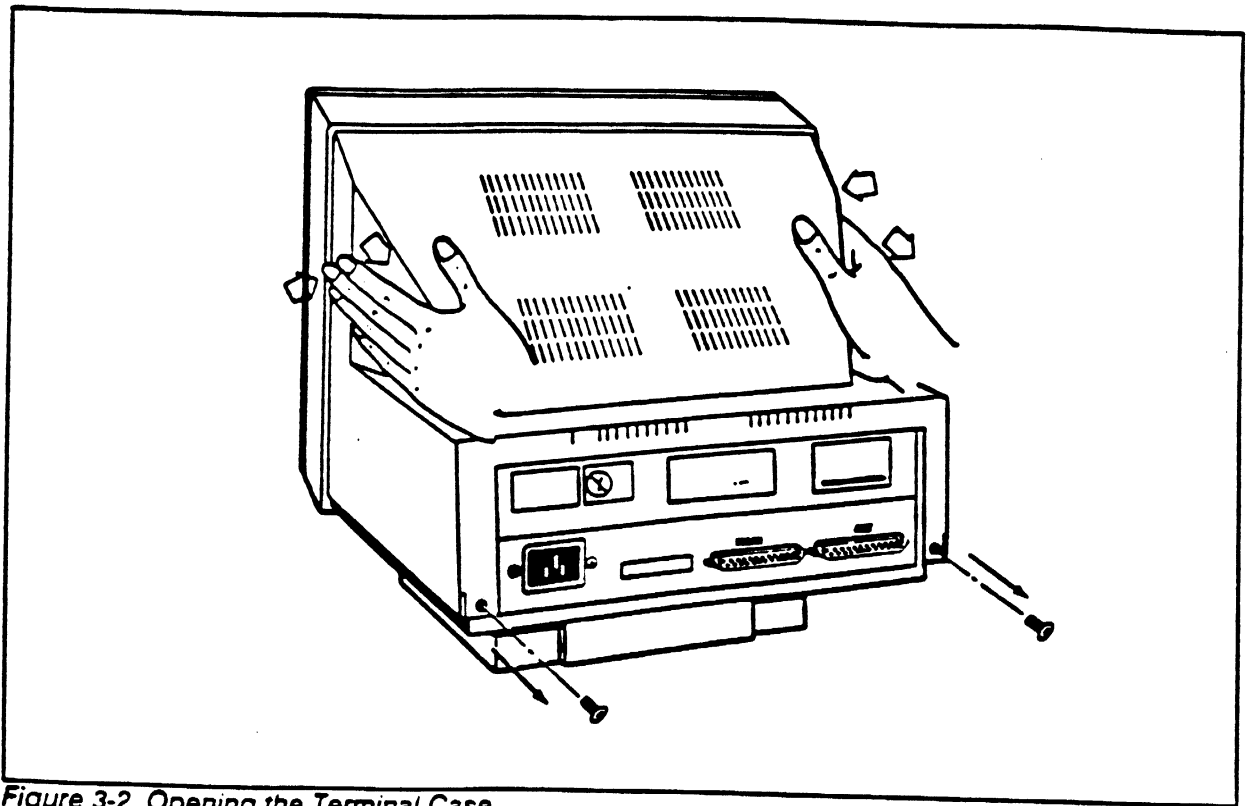


Figure 3-2. Opening the Terminal Case

Removing the Circuit Board

Use Figure 3-3 as reference for removing and replacing the circuit board.

1. Turn off the terminal and remove the cover, as described above.
2. Remove the two Phillips screws just below the CRT on each side. These will release the two ground wires.
3. Turn the unit around and remove the two Phillips screws that hold the circuit board down, using a size 1 Phillips screwdriver.
4. Disconnect the voltage lead on the anode by gently lifting the rubber cap and unhinging the metal lead.
5. Carefully remove the CRT connector (small round connector on the back of the CRT).

6. Remove the yoke connector (blue) from the circuit board.

7. Tilt the CRT forward by loosening the lower screws for the CRT support brackets. These are spring-loaded, and tilt the CRT forward automatically whenever the screws are loosened.

8. Pull the circuit board out through the rear of the chassis.

Replacing the Circuit Board

Use Figure 3-3 as reference for removing and replacing the circuit board.

1. Slide the circuit board in through the rear of the chassis.

2. Replace the two Phillips screws that hold the circuit board down, using a size 1 Phillips screwdriver.

3. Tilt the CRT back into position by tightening the lower screws for the CRT support bracket.

4. Reconnect the voltage lead to the CRT anode:

a. Pull back the rubber umbrella of the anode cap, exposing the metal leads.

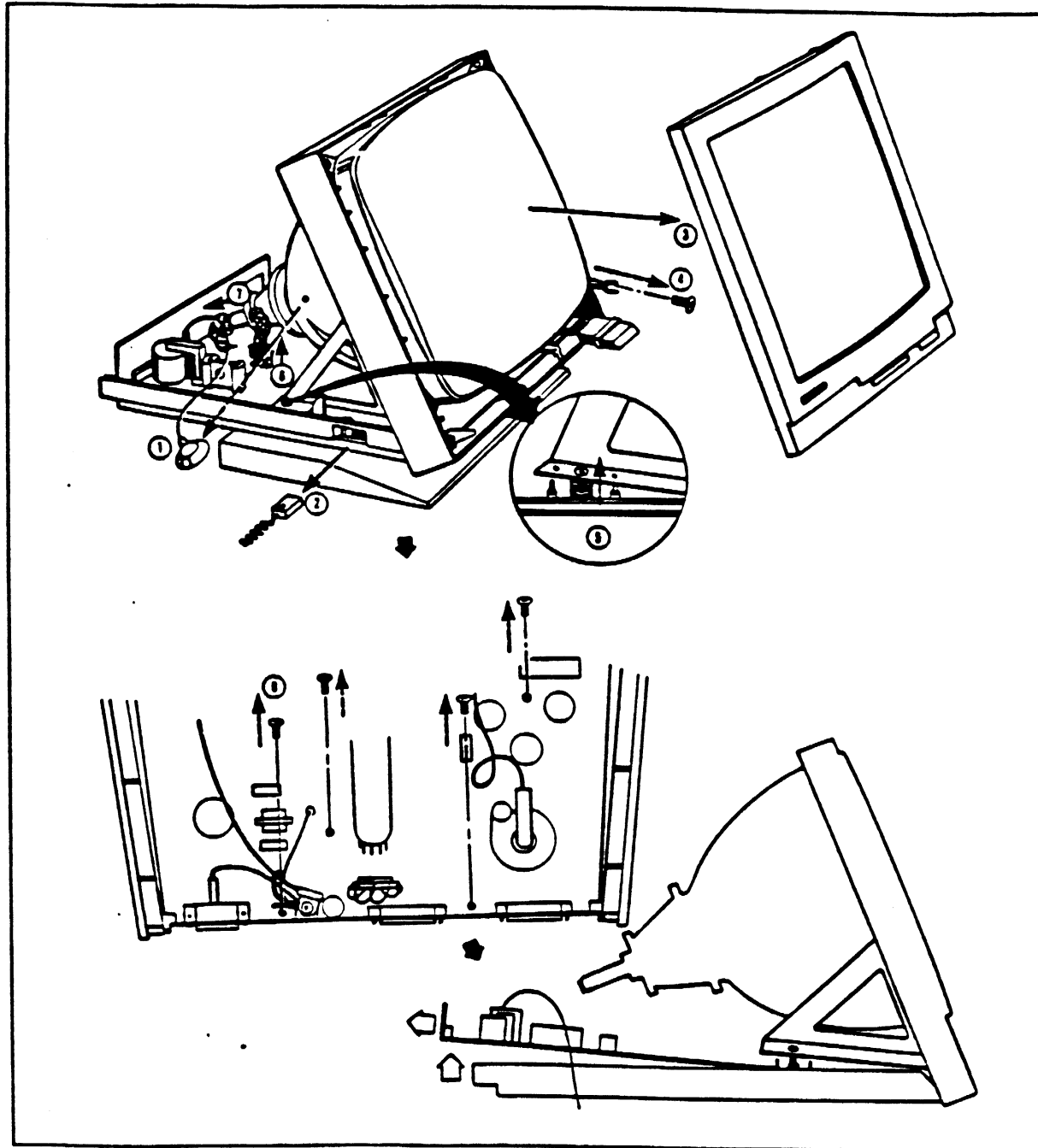


Figure 3-3. Removing the Circuit Board

WARNING

The CRT and capacitors retain high voltages even after power is removed. Avoid electrical shock by discharging the CRT as soon as you open the case.

High Voltage Discharge

Without touching any of the metal surfaces, pick up screwdriver by its insulated handle and slip the tip of screwdriver under the plastic cap that covers the anode, shown in Figure 3-2. Then touch the metal frame of CRT with the shaft of the screwdriver. (You may need second screwdriver to reach the CRT frame from the anode.)

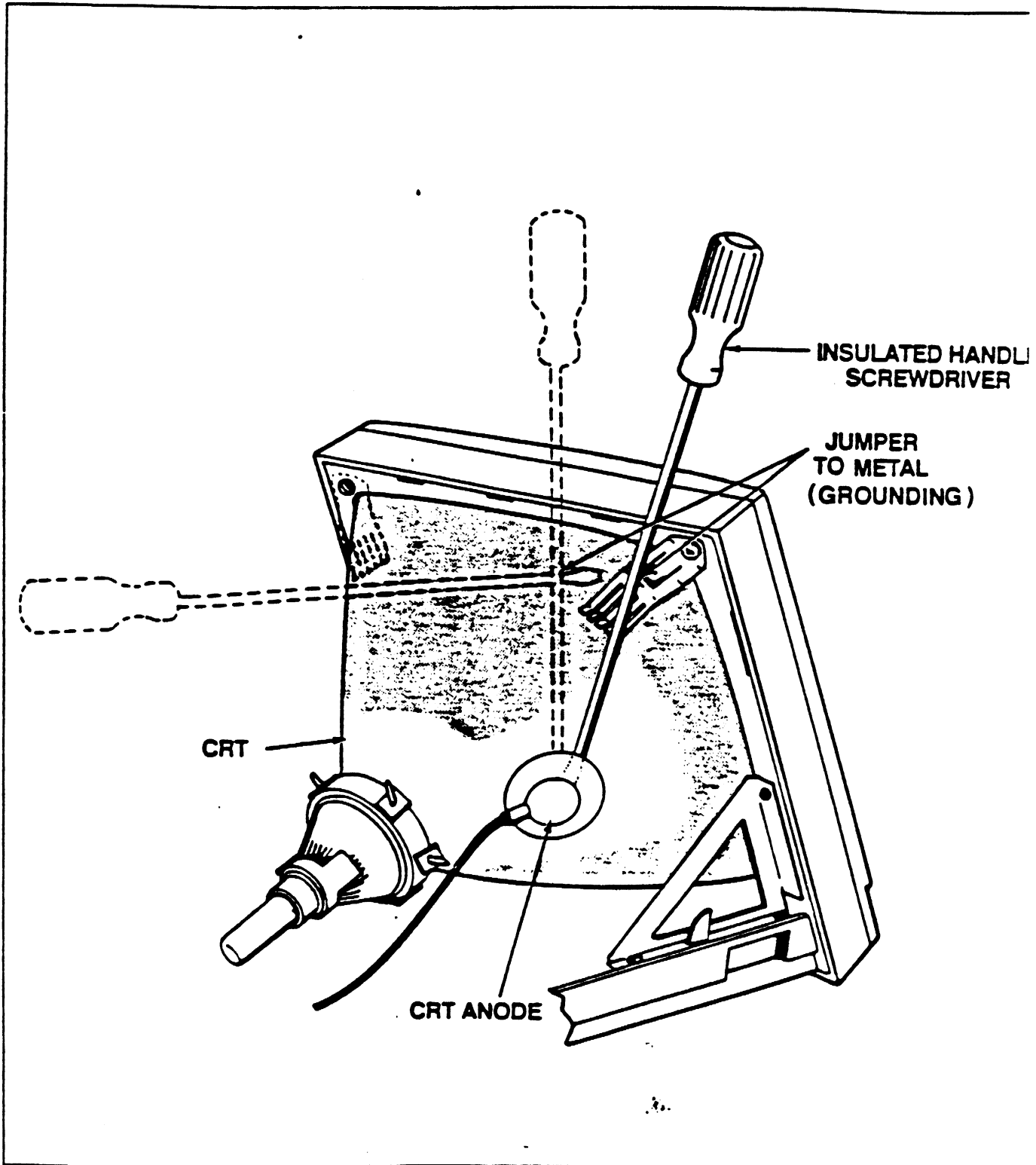


Figure 3-4) High Voltage Discharge

TeleService Bulletin

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San Jose, CA 95112

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TVI965

Increase tolerance to transients on communication lines

This bulletin describes how to modify the TVI965 terminal to increase the tolerance to externally generated intermittent transients on host communication lines.

This rework is to prevent a transient on the +12V supply from tripping the OVP circuit.

It is recommended that all field returns to depot level repair centers perform this modification on 965 logic boards with revision "F" or lower.

TOOLS REQUIRED:

1. 25 Watt soldering iron, flux remover and solder vacuum.
2. Solder
3. Phillips screw driver.
4. Long nose pliers and wire cutter.

PARTS REQUIRED:

1. Diode, IN5232B, 5.6V, 5%, TeleVideo P/N 271698-00.

PROCEDURE:

CAUTION: Professional workmanship and safety standards must be maintained. High voltages are present and damaged units or components will void warranty. Please read the TVI965 Maintenance Manual for proper disassembly and safety.

1. Remove all AC power cords and communications cables from rear of terminal and remove terminal case.

TS1006, 965

2. Remove circuit (logic) board from the terminal's chassis per 965 Maintenance Manual instructions. .
3. Located in the power supply section, remove the following 3 diodes, D204, D205 and D206. Discard the three diodes.
4. Solder into PCB at location D206 the IN5232B (P/N 271698-00) diode. Fill in solder holes at location D204 and D205.
5. Install logic board per 965 Maintenance Manual.
6. Test unit and verify no loss of user's setup during operation.
7. Power off and then back on and verify user's setup was retained.
8. Install terminal case and secure screws.