Qume®

QVT 101 PLUS™

Maintenance Guide

TROUBLESHOOTING

INTRODUCTION

This section provides a troubleshooting method for isolating most QVT 101 PLUS terminal failures to an easily replaced subassembly, by systematically advancing through a series of troubleshooting flowcharts and checking the results of the self-diagnostic test.

TROUBLESHOOTING TECHNIQUE

Effective troubleshooting technique should always begin with a thorough visual inspection. Look for obvious things that may adversely effect the performance of the terminal, such as:

- Is the bri htness control properly adjusted;
- Is the AC line fuse OK;
- Is the AC power source supplying adequate power;
- Are all connectors making good contact:
- Is there a compatibility problem between the terminal and the host?

TROUBLESHOOTING FLOWCHARTS

When using the following troubleshooting flowcharts, always begin with Fault Isolation Flowchart #1. Although each flowchart is more or less tailored to troubleshoot a general area, it should be noted that they have been purposefully arranged to quickly isolate a fault to a replaceable subassembly. It is not recommended that the flowcharts be used out of sequence.

Refer to the Circuits and Diagrams Section for more specfic information as necessary.

Tools and Equipment Required

- DB25 Loopback Connector
- Phillips Screwdriver
- Multimeter
- High Voltage Probe
- Extender, PCB (Qume Part Number 302152-01)
- Long Nose Pliers
- Terminal Extraction Tool (Qume Part Number 302156-01)
- Interconnect Wiring Diagram and Schematics (refer to Section 5)

Rear Connector Pin Designations

Tables 1-1 and 1-2 list the pin designations for the connectors on the rear panel (see Figure 1-1 for identification and location of connectors for the QVT 101 PLUS Terminal). Tables 1-3 through 1-5 provide information for troubleshooting power, logic PCB and keyboard malfunctions.

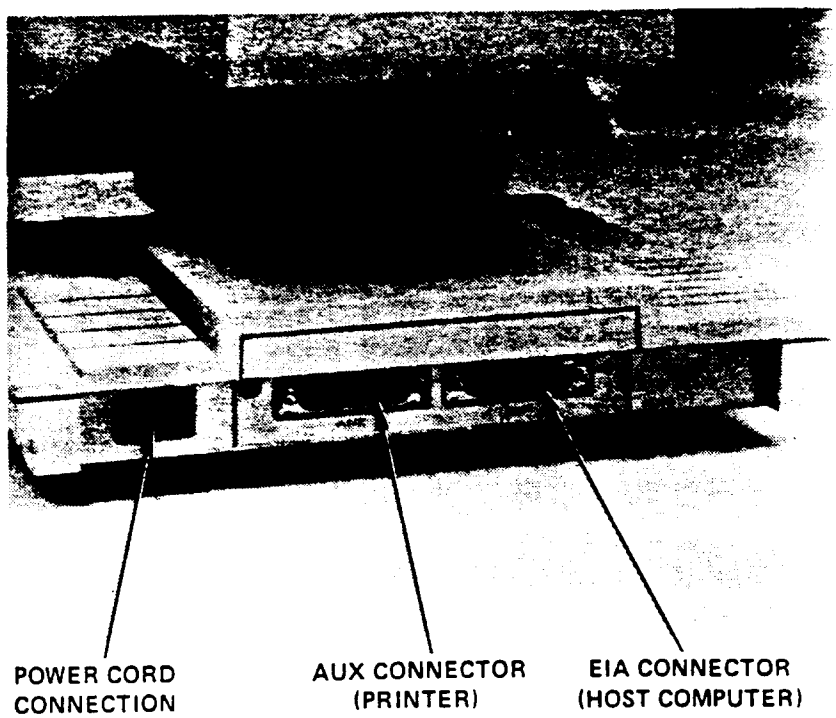


Figure 1-1. QVT-101 PLUS Rear Connector Panel

Table 1-1. AUXILIARY (EIA RS-232-C Interface DCE) Connector, J9

Pin Number	Description	Signal Direction
1	Chassis Ground	----------
2	Receive Data	To Terminal
3	Transmit Data	From Terminal
6	Data Set Ready	To Terminal
7	Signal Ground	----------
20	Data Terminal Ready	To Terminal

Table 1-2. EIA (System Interface RS-232-C DTE) Connector, J8

Pin Number	Description	Signal Direction
1	Chassis Ground	----------
2	Transmit Data	From Terminal
3	Receive Data	To Terminal
4	Request-to-Send	From Terminal
5	Clear-to-Send	To Terminal
6	Data Set Ready	To Terminal
7	Signal Ground	----------
8	Data Carrier Detect	To Terminal
12*	Current Loop, + Receive, or RS-422-A Receive -)	----------
13*	Current Loop, - Transmit, RS-422-A Transmit +)	----------
20	Data Terminal Ready	From Terminal
24*	Current Loop, - Receive, or RS-422-A Receive +)	----------
25*	Current Loop, + Transmit, or RS-422-A Transmit -)	----------

* Optional

NOTE: When the Current Loop/RS422-A option board is installed, Pins 12, 13, 24, and 25 will become active when RS422/CL is selected in Setup. Pins 2 and 3 (RS232) will become inactive when RS422/CL is selected in Setup.

Table 1-3. Power Troubleshooting

SYMPTOM	PROBABLE CAUSE	REMEDY
No power to terminal when power On/Off switch switch is On.	1. Blown AC fuse (under the terminal).	Replace fuse with one of proper rating.
	2. Defective Power Switch/ Fuse/Filter Assembly	Perform continuity check on the Power Switch and the Filter Assy. If defective, replace the assembly. Refer to Section 2.
	3. Defective Video/Power Supply PCB Assembly	Replace Video/Power Supply PCB Assembly. Refer to Section 2.
	4. Defective Power Supply Control PCB	Replace (see Section 2)
No raster on CRT when brightness control is moved across its entire range.	1. Defective Video/Power Supply PCB Assembly.	Replace the Video/ Power Supply PCB Assy. Refer to Section 2
	2. Defective CRT	Replace CRT. Refer to Section 2, Removing and Replacing CRT.
Brightness cannot be varied	Brightness control assy. problem	Perform resistance check across control. If defective, replace brightness control assy. Refer to Section 2, Removing and Replacing Brightness Control Assembly.

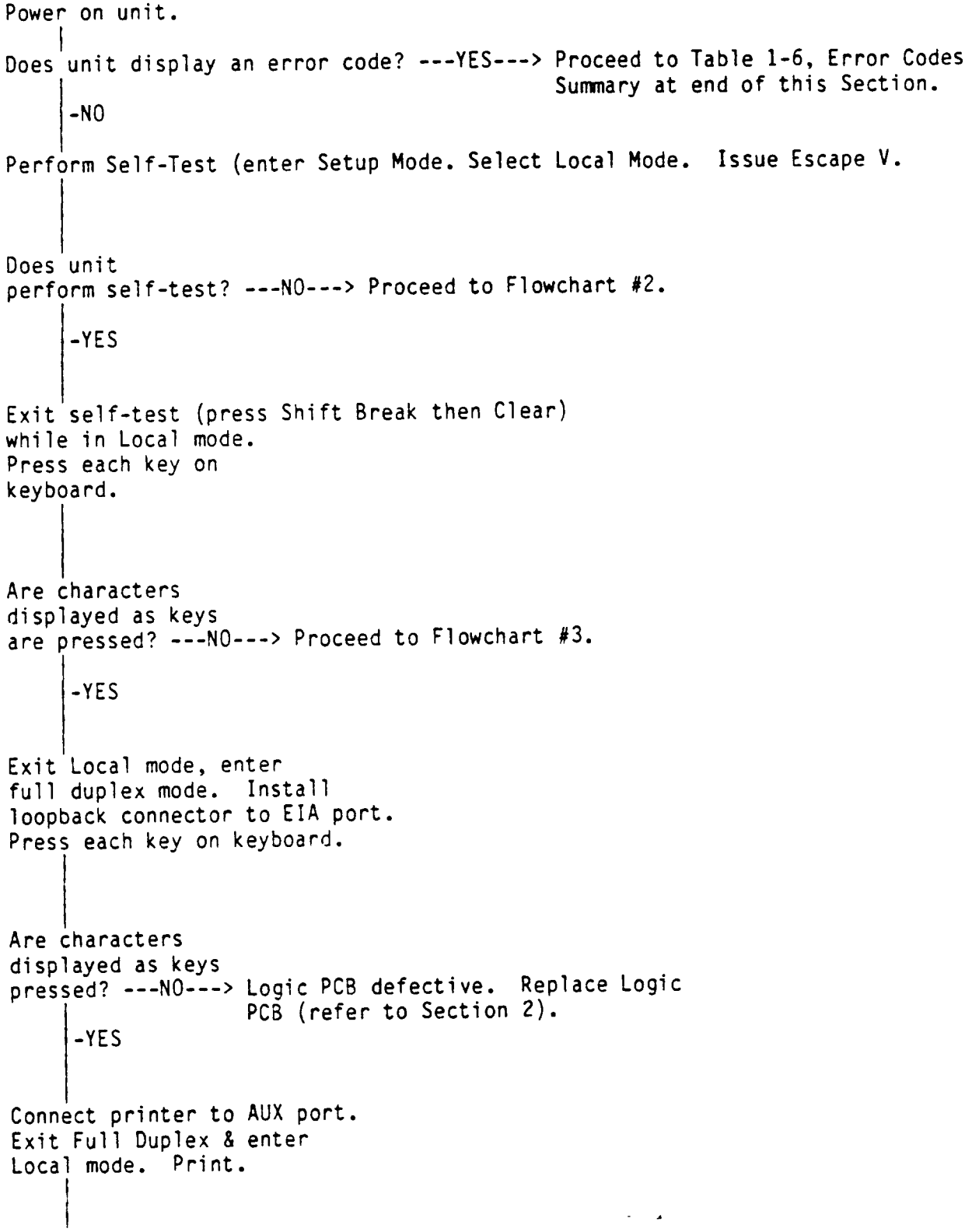
Table 1-4. Logic Board Troubleshooting

SYMPTOM	PROBABLE CAUSE	REMEDY
Self-test fails. (ESC V)	1. Weak or defective RAM back-up battery.	Replace RAM back-up battery on logic PCB. Refer to Section 2, Removing and Replacing RAM Back-Up Battery.
	2. Defective logic PCB	Replace logic PCB. Refer to Section 2, Removing and Replacing Logic Board.
	3. Check for loose interconnect cables	If loose, tighten.
	4. Defective Video/Power Supply PCB Assembly.	Check power supply voltages. If defective. replace Video/Power Supply PCB Assembly. Refer to Flowchart #5.

Table 1-5. Keyboard Troubleshooting

SYMPTOM	PROBABLE CAUSE	REMEDY
Incorrect character shown on screen.	1. Faulty coiled keyboard cable	Perform continuity check. Replace cable if defective. Refer to Section 2, Replacing the Keyboard Coiled Cable.
	2. Faulty connector/ receptacle assembly.	Perform continuity check. Refer to Section 2, Removing and Replacing Keyboard Cable Connector/Receptacle Assembly.
	3. Defective microprocessor.	Replace microprocessor. Refer to Section 2, Removing and Replacing Keyboard Microprocessor (302080-001).
	4. Defective keyboard	Replace keyboard.

Fault Isolation Flowchart #1



Fault Isolation Flowchart #1 (Cont)

Is screen
data printed? ---NO---> Logic PCB defective. Replace
Logic PCB (refer to Section 2)
|-YES
|
Unit checks OK.

Fault Isolation Flowchart #2

From Flowchart #1.
|
Is AC line fuse good ?---NO---> Replace bad fuse. Continue.
|-YES
|
Does fuse fail at power on? ---NO---> Return. Begin Flowchart #1.
|-YES
|
Verify operation of ON/OFF switch.
Is switch defective? ---NO---> Proceed to Transformer Measurement
|-YES
|
Replace Power Switch/Fuse/Filter Assembly (refer to Section 2). Continue.
|
|
Does fuse fail again at power on? ---NO---> Return. Begin Flowchart #1.
|-YES
|
Replace fuse. Disconnect P3 on Power Supply Control PCB to isolate power transformer.
Measure transformer output on P3 and verify voltage (23 volts AC $\pm$ 10%).
|
|
Is voltage present? ---NO---> Power transformer is defective.
| Replace power transformer (refer to
| Section 2).
|-YES
|

Fault Isolation Flowchart #2 (Cont)

Power transformer checks OK. Power off and reconnect P3 on the Power Supply Control PCB. Disconnect the keyboard connector from the Lower Monitor Assembly and remove the Logic PCB Assembly.

|

Power On the unit

|

Does fuse fail again at
power on?----------NO---->Video/Power Supply PCB Assembly checks OK

|

YES

|

Power Supply Contro PCB or Video/Power Supply PCB Assembly is defective. Disconnect the Power Supply Co trol PCB

|

Replace fuse and Power On the terminal

|

Does fuse fail again?--->NO---->Power Supply Control PCB is OK.
Video/Power Supply PCB Assembly is defective. Remove and replace the Video/Power Supply PCB. Reconnect the Power Supply Control PCB and install the Logic PCB.

|

Yes

|

Power Supply Control PCB is defective. Remove and Replace

|

Replace fuse. Does fuse blow?------NO--->Video/Power Supply Control PCB and Logic PCB check OK.

|

YES

|

Logic PCB is defective. Remove and Replace. Reconnect Keyboard

|

Replace fuse. Power On unit.
Does fuse blow?---------->No--->Begin Flowchart #1

|

YES

|

Keyboard or Keyboard cable is defective.
Proceed to Flowchart #3.

Fault Isolation Flowchart #3

From Flowchart #1.

Is +5 Vdc present between pin 1 (Sig. GND) and pin 2 (+5 VDC) on the Keyboard PCB (P1).

---NO---> Perform continuity check on coiled keyboard cable. If defective, replace keyboard cable (refer to Section 2).

-YES

Is the correct character displayed? ---NO---> Proceed to Flowchart #4.

-YES

Unit checks OK. Proceed to the System Test (Host)

Fault Isolation Flowchart #4

From Flowchart #3.

Check the following voltages (with respect to GND) on the Logic PCB edge Connector P1:
- Pin 9 +5VDC
- Pin 2 +5VDC
- Pin 21 +12VDC
- Pin 22 -12VDC
- Pin 6 GND

Are all voltages present? ---NO---> Defective Video/Power Supply PCB Assy. Replace.

-YES

Verify proper operation of the brightness control. Rotate control full CCW, then full CW. Observe a 3VDC voltage change between pins 13 and 14 of P1 (Logic PCB 22 pin connector).

Does voltage change approx. 3VDC? ---NO---> Brightness control is defective. Replace Brightness control (refer to Section 2).

-YES

Blank screen (enter **Clear**). At P1, pin 19 (Logic PCB) observe for an AC RMS voltage. Display self-test (enter in Local Mode-Escape V.). At P1, pin 19 observe for an AC RMS voltage.

Did voltage increase approximately 500mVac RMS when self-test was displayed? ---NO---> Logic PCB is defective. Replace Logic PCB (refer to Section 2).

-YES

Proceed to Flowchart #5.

Fault Isolation Flowchart #5

From Flowchart #4.

Display "H" Test Pattern (enter Shift/Setup-Ø).

Check voltages on Video/Power Supply PCB Assembly.

D-104 Anode	+12 Vdc
D-102 Anode	GND

Are voltages present? ---NO---> Defective Video/Power Supply PCB Assembly. Replace.

-YES

With brightness control full CW, check Video (P6 Pin 7) for approximately 400 mVac RMS.

Is approx. 400 mVac RMS present? ---NO---> Defective Video/Power Supply PCB Assembly. Replace.

-YES

With a high voltage probe, check the CRT anode cap for approx. 13 KVdc.

< **WARNING: HIGH VOLTAGE**

Is there approximately 13 KVdc present at CRT anode cap? ---NO---> Video/Power Supply PCB Assembly defective. Replace (refer to Section 2).

-YES

Fault Isolation Flowchart #5 (Cont.)

Check the following voltages on the Video/Power Supply PCB Assembly (tolerance ± 25%):

P4	Pin 1(Brown)	4.49 VAC RMS	G2		550 VDC
P4	Pin 2(Red)	27.0 VAC RMS	D154	Cathode	45 VDC
P4	Pin 3(Yellow)	0.40 VAC RMS	G4		175 VDC
P4	Pin 4(Blue)	1.5 VAC RMS	H		12 VDC
G1	-30 VDC				

Are all voltages present? ---NO---> Video/Power Supply PCB Assembly defective. Replace. (refer to Section 2).

-YES

CRT defective. Replace CRT (refer to Section 2).

SELF-DIAGNOSTICS

Each time the terminal is powered on, the terminal automatically performs a self-test that checks the integrity of four critical areas: the Program ROM, System RAM, Video RAM, and the Keyboard. A successful self-test displays **OK** in each tested area, and a failed self-test displays as a blinking **NG** (No Good) as shown in Table 1-6.

Table 1-6. Error Codes Summary

	Self-Test--	Program ROM:OK	System RAM:OK	Video RAM:OK	Keyboard:OK
Correct					
Error		NG	NG	NG	NG

OK: No error detected
NG: No Good, error detected

ALIGNMENT

INTRODUCTION

The alignment parameters presented in this section are to be regarded as guidelines only and not as specifications.

Video alignment of the QVT 101 PLUS™ terminal is divided into the following alignment procedures. These alignment procedures may be performed in any order.

- Horizontal Display Width (Line Width)
- Vertical Display Height
- Brightness
- Focus
- Display Centering (Raster Position)

TOOLS AND EQUIPMENT REQUIRED

The following tools are required to perform video alignment of the QVT 101 PLUS terminal:

- Phillips screwdriver (No. 2)
- Multimeter (for brightness alignment procedure)
- A metric ruler may be used in lieu of the template listed below
- QVT 101 Plus Field Service Tool Kit (Qume Part Number 84841-07), which consists of:
  - Non-metallic alignment tool, 7/64-inch Hex tip (Qume Part Number 10348-01)
  - Non-metallic screwdriver, 3/16-inch flat tip (Qume Part Number 10349-01)
  - Display Alignment Template, 14-inch CRT (Qume Part Number 10350-06)
  - Keycap Extraction Tool (Qume Part Number 84873-01)

ALIGNMENT CONDITIONS

Before attempting an alignment, the applicable alignment procedure should be thoroughly read and understood. Perform alignment procedures under the following conditions:

- Warm-up. Allow the terminal to stabilize at its operating temperature; approximately ten minutes.
- Remove the Terminal Back Cover as explained in Section 2.
- Local Mode. Enter Setup Mode and configure the terminal for local mode operation.
- Normal Video Mode. Perform all alignment procedures in the terminal's normal video display, i.e., not in reverse video mode.
- "H" Test Patter displayed. The terminal has a built-in test pattern that displays a ull screen of upper case "H"s. To display the full "H" test pattern, enter **Setup** Mode and press **Ø**. Figure 3-1 shows a typical "H" Pattern (25 lines, 80 columns) with display dimensions. Figure 3-2 shows the location of alignment components on the Video/Power Supply PCB. A Qume Display Alignment Template (Qume Part Number 10350-06) may be used over the "H" pattern for easy video alignment.

CAUTION

Take precaution when working in the general area of the CRT. Do not scratch or strike the CRT or subject it to unusual pressure. The CRT contains a high vacuum and breakage of the tube may result in injury from flying glass.

Hazardous voltages are present in the general area of the flyback transformer lead and the CRT anode cap. Exercise caution to avoid electrical shock when performing any video alignment procedure. Remember that the terminal is powered ON when the alignment procedures are made.

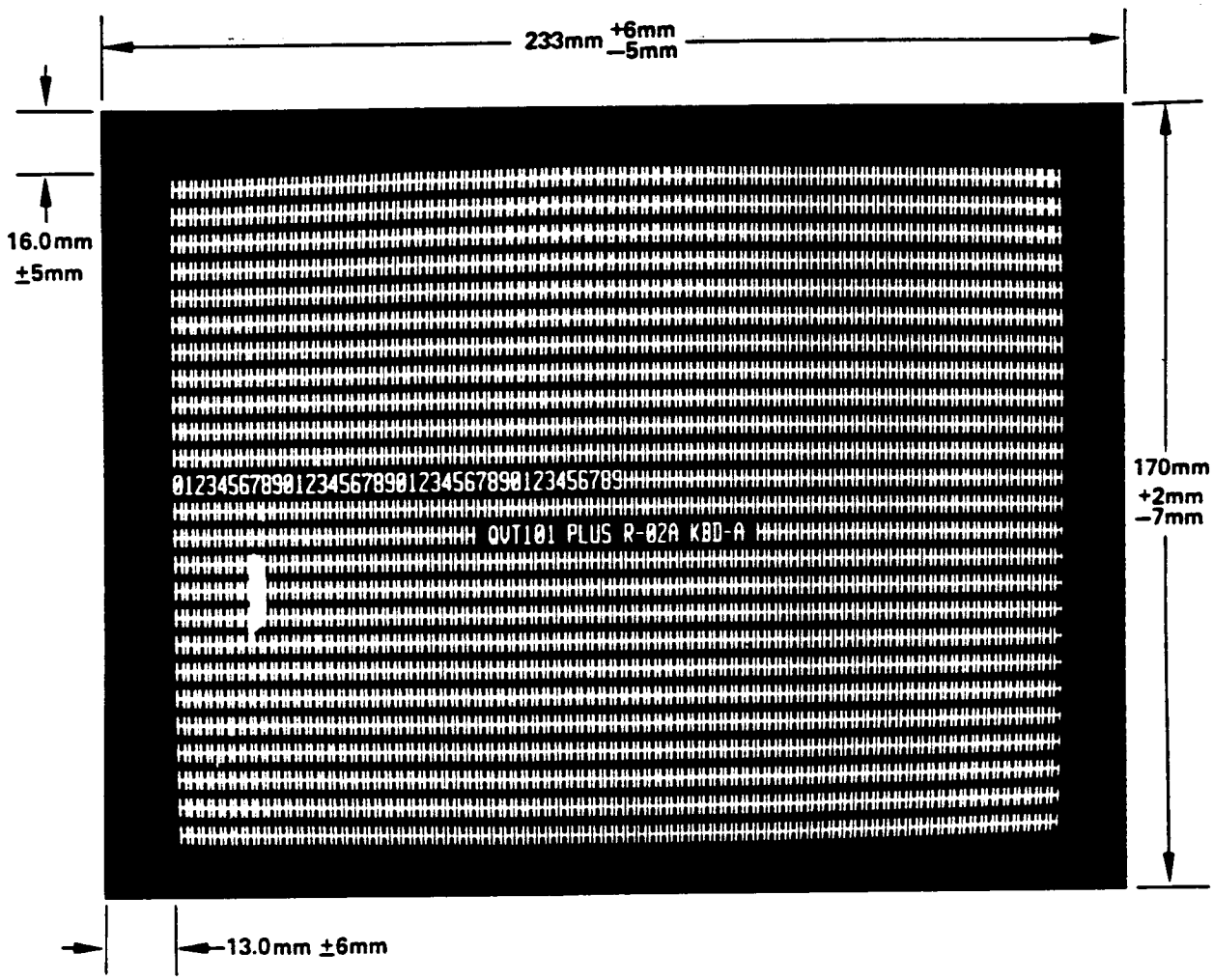
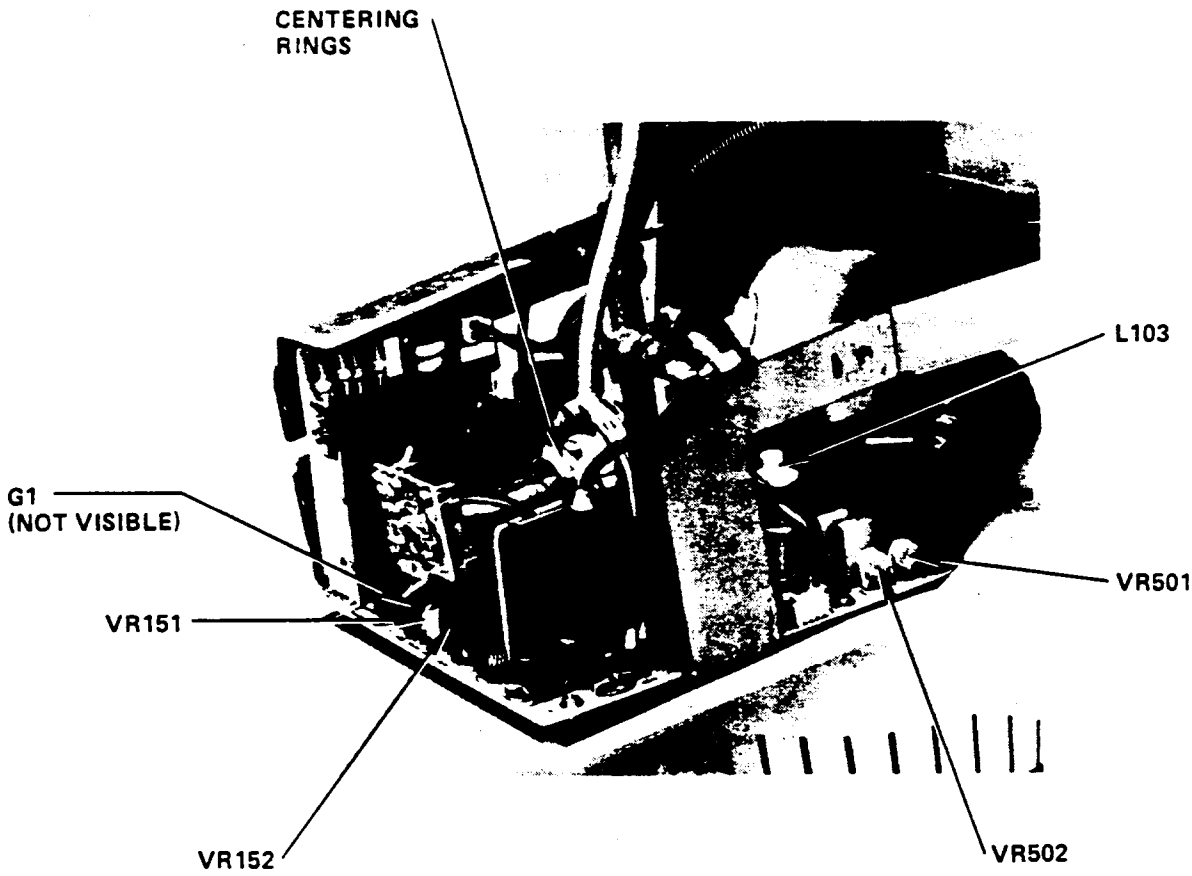


Figure 3-1. The "H" Test Pattern

VIDEO ALIGNMENT PROCEDURES

Video alignment of the QVT 101 PLUS™ Terminal is accomplished by adjusting one or more of the adjustment components shown in Figure 3-2. Each alignment procedure is described below.



LEGEND

VR501	Vertical Display Height
VR502	Vertical Linearity
VR151	Brightness
VR152	Focus
L103	Horizontal Display Width
G1	Test Point (just to the left of VR151)
Centering Rings	Display Centering

Figure 3-2. Location of the Video Alignment Components

Horizontal Display Width (Line Width)

The horizontal display width may be checked for accuracy and adjusted in one of two ways as described below:

1. Display the "H" Test Pattern (enter **Setup** Mode, and press **Ø**; exit test pattern by pressing the **Clear** key). There should be 25 rows of "H"'s on the screen at this time.

2a. Using the Display Alignment Template (Qume Part Number 10350-06), proceed as follows:

Place the Display Alignment Template against the front of the CRT. The horizontal display width window is properly aligned when the outer edges of the "H" characters in the test pattern lie in or on the window lines as shown in the Display Alignment Template.

When taking this measurement of the test pattern, be careful to minimize parallactic distortion, i.e., move the position of "head and eyes" so that each reading is taken at a 90 degree angle to the screen (straight on).

2b. Using a Metric Ruler:

The distance between the inner edge of the front bezel and the outer edge of the first (last) character "H" can be measured using a metric ruler with accurate fine graduations. Near all four corners of the front bezel, this distance should be the same and lie within 13.0 ±6.0 mm as shown on the "H" Test Pattern (Figure 3-1).

When taking this measurement of the test pattern, be careful to minimize parallactic distortion, i.e., move the position of "head and eyes" so that each reading is taken at a 90 degree angle to the screen (straight on).

3. If adjustment is required, rotate L103 (Horizontal Display Width) on the Video PCB (see Figure 3-2) with a non-metallic 7/64-inch Alignment Tool (Qume Part Number 10348-01) until the display has the proper width. Clockwise rotation increases the display width and counterclockwise rotation reduces display width.

4. Verify that the horizontal display width is still correct. If necessary, readjust.

Vertical Display Height

The vertical display height may be checked for accuracy and adjusted in one of two ways as described below, proceed as follows:

1. Display the "H" test pattern (enter **Setup** Mode and press **0**; exit the test pattern by pressing the **Clear** key). There should be 25 rows of "H"'s on the screen at this time.

2a. Using the Display Alignment Template (Qume Part Number 10350-06), proceed as follows:

Place the Alignment Template against the front of the CRT. The vertical display width window is properly aligned when the upper edges of the "H" characters in the test pattern lie in or on the window lines as shown on the Display Alignment Template.

When taking this measurement of the test pattern, be careful to minimize parallactic distortion, i.e., move the position of "head and eyes" so that each reading is taken at a 90 degree angle to the screen (straight on).

2b. Using a Metric Ruler:

The distance between the inner edge of the front bezel and the top edge of the first line of "H" characters may be measured using a metric ruler with accurate fine graduations. Near all four corners of the front bezel, this distance should be the same and lie within 16.0±5 mm as shown on the "H" Test Pattern (Figure 3-1).

When taking this measurement of the test pattern, be careful to minimize parallactic distortion, i.e., move the position of "head and eyes" so that each reading is taken at a 90 degree angle to the screen (straight on).

3. If adjustment is required, change the setting of the VR501 control (Vertical Display Height) on the Video PCB (see Figure 3-2). Using a small non-metallic standard flat blade screwdriver,(Qume Part Number 10349-01) clockwise adjustment of VR501 increases display height; counterclockwise rotation reduces display height.

4. Verify that vertical display height is still correct. If necessary, readjust.

Brightness

Display brightness can be adjusted as follows:

1. Display the Reverse Video, (enter **Setup** Line, Change to Reverse **Video** Press Setup again to Exit.

2. Rotate the external brightness control on the display module pedestal fully counterclockwise (CCW).

3. Locate pot VR151 on the Video PCB (see Figure 3-2), and with a small non-metallic flat blade screwdriver (Qume Part Number 10348-01) adjust VR151 until the background raster is just visible.

4. Locate test point **G1** on the Video PCB (see Figue 3-2) and measure the DC voltage between **G1** and ground. **Note**: This voltage may be a positive or negative voltage. Record the voltage observed.

5. Adjust VR151 to increase the negative voltage observed between G1 and ground by approximately 11 +3,-1 VDC.

Focus

The Display focus can be adjusted as follows:

1. Display the "H" Test Pattern (enter **Setup** Mode and press **Ø**).

2. Locate VR152 on the Video PCB (see Figure 3-2), and with a small non-metallic flat blade screwdriver, adjust VR152 for optimum focus at the center of the display. Optimum focus occurs when the individual dots that form a character are well defined and clear. Note the setting of VR152.

3. Observe a corner area of the display and change the setting of VR152 for optimum focus there. Note the setting of VR152.

4. Carefully adjust VR152 for optimum focus compromise setting between the center and corner of screen areas.

Display Centering (Raster Position)

The display is considered to be centered when the bottom edge of the first line of "H"'s and the top edge of the first line of "H"s in the "H" Test Pattern are parallel to, and visible between the parallel maximum and minimum lines on the Display Alignment Template (Qume Part No. 10350-06). The raster position may be changed by rotating the centering rings on the back end of the CRT yoke (see Figure 3-2). These rings are Glyptaled in place to prevent a change in position from vibrations and should only be broken loose if a raster adjustment is really necessary. If an adjustment is required, proceed as follows:

1. Display the "H" Test Pattern (enter **Setup** Mode and press **Ø**).

2a. Position the Display Template (Qume Part Number 10350-06) over the "H" test pattern. (Tape the template to the front bezel so that it is securely held in place.) If the display is correctly centered, the edges of the "H" Test Pattern will be visible between the parallel maximum and minimum lines on the display template. If a template is not available proceed with step 2b.

2b. On a sheet of paper with straight edges, make two sets of marks along the edges near a corner at the distances and tolerances from the corner shown by the "H" Test Pattern on Figure 3-1. By holding this paper scale directly against the CRT surface, use the marks to measure and to adjust the display centering. A flexible metric ruler with accurate divisons may be used in place of the paper scale.

When measuring the display position of the test pattern, be careful to minimize parallactic distortion, i.e., move the position of "head and eyes" so that each reading is taken at a 9Ø-degree angle to the screen surface (straight on).

3. Only if a display centering adjustment is required, use a knife to carefully cut the Glyptal on the centering rings on the yoke of the CRT and rotate the rings as required to center the display.

NOTE

Do not loosen the deflection yoke clamp; the yoke position has been fixed at the factory and should not be changed in the field.

4. Check for proper display size and linearity if the setting of the centering rings has been changed.

5. Apply some Glyptal (or equivalent) on the centering rings after adjustment to prevent inadvertent movement of the rings due to vibration.

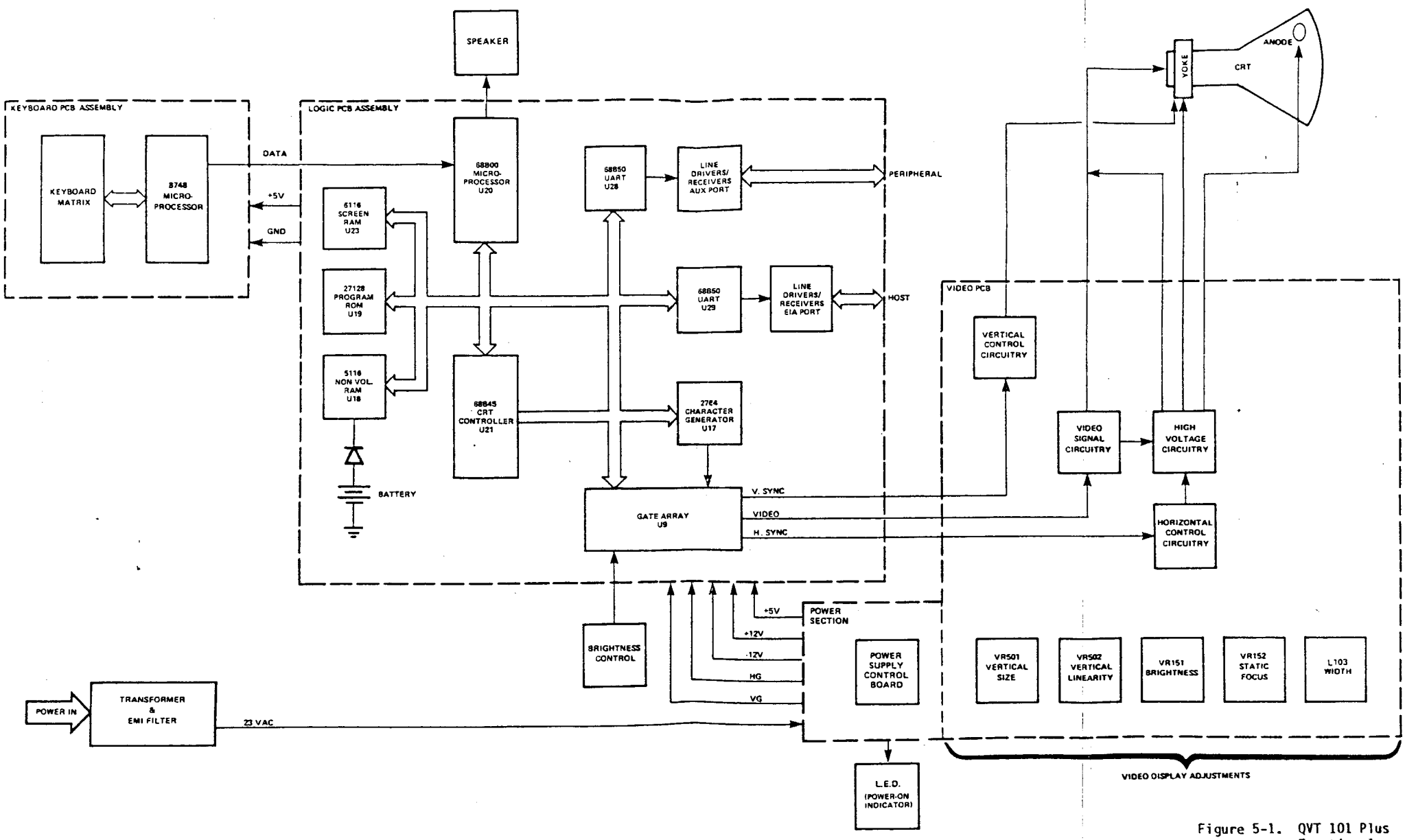


Figure 5-1. QVT 101 Plus Functional Block Diagram

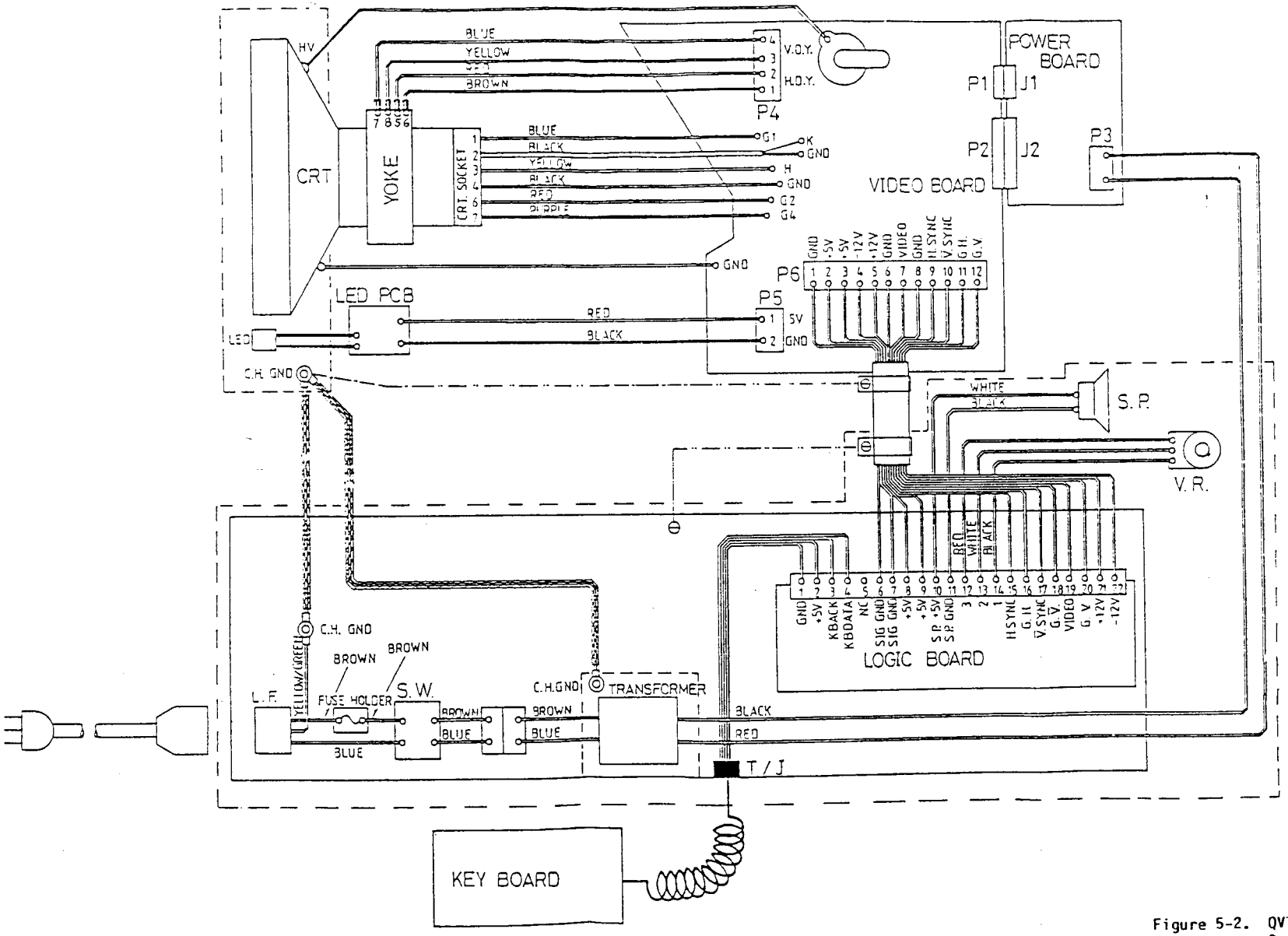


Figure 5-2. QVT 101 Plus Overall Interconnect Diagram

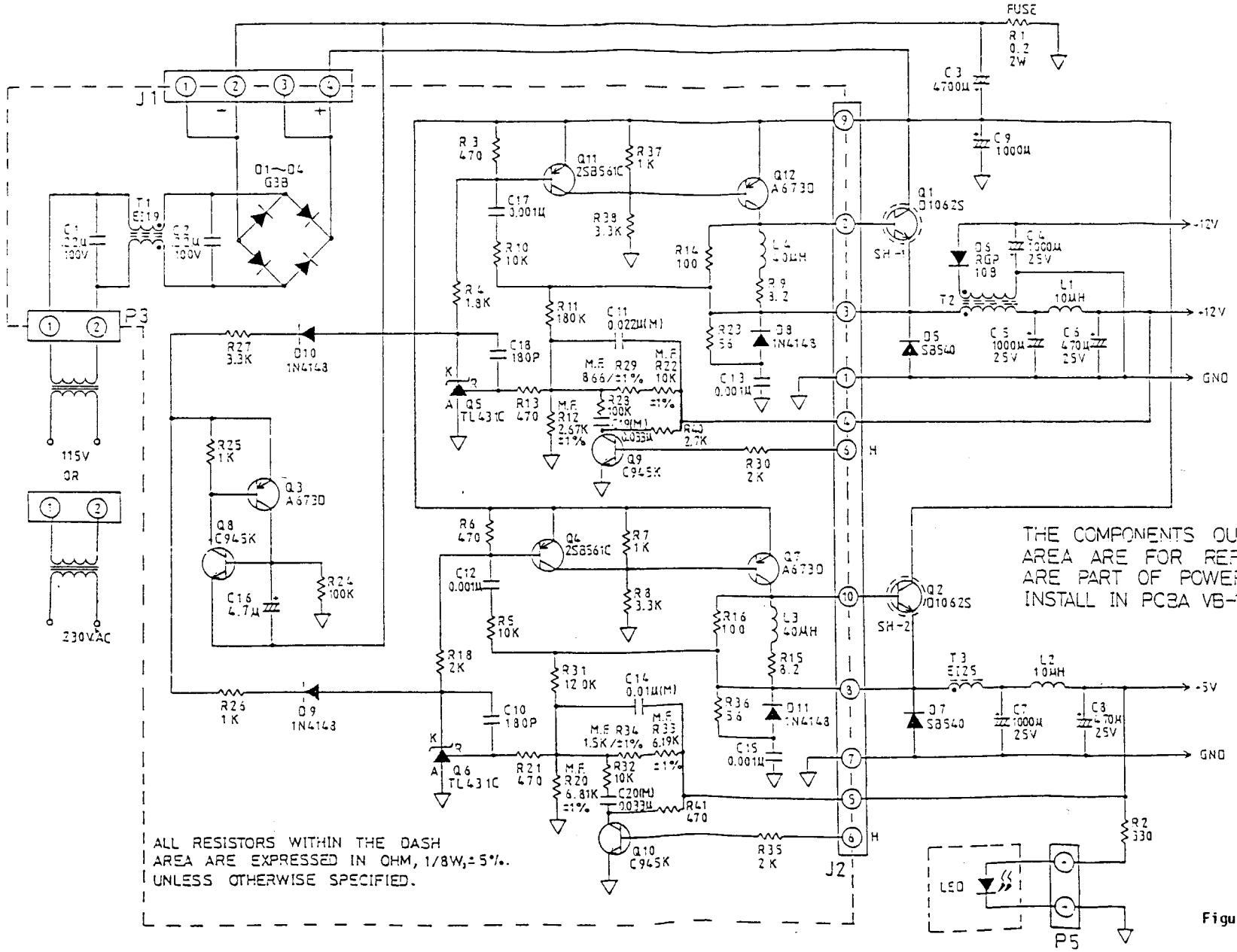


Figure 5-3. QVT 101 Plus Video/ Power Supply Control PCB Schematic

NOTES. UNLESS OTHERWISE SPECIFIED.

1. ALL RESISTORS ARE EXPRESSED IN OHMS, 1/4W, ±5%.
2. ALL CAPACITORS ARE EXPRESSED IN FARADS, 50V.
3. VOLTAGES ARE DIRECT CURRENT.
4. DIFFERENCES BETWEEN EACH -XX

	T201N(-01)	T119N(-02)	T101N(-03)
R106	24K / 1/8W	18K / 1/8W	18K / 1/8W
C109	0.047μ / 400V	0.03μ / 400V	0.033μ / 400V
C108	15μ / 25V	12μ / 25V	12μ / 25V
L103	6~36μH	3.5~20μH	6~36μH
T4	VT-544	VT-543	VT-543
C156	0.01μ / 400V	0.0056μ / 630V	0.0068μ / 500V

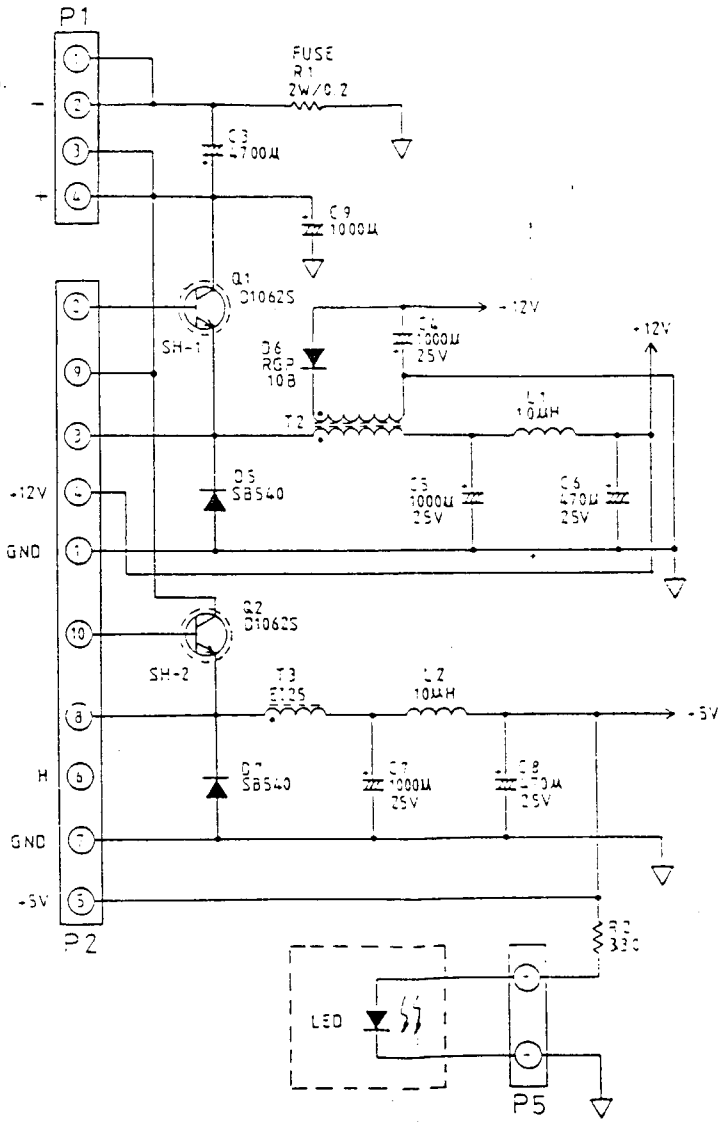


Figure 5-4. QVT 101 Plus Video/ Power Supply PCB Schematic (Sheet 1 of

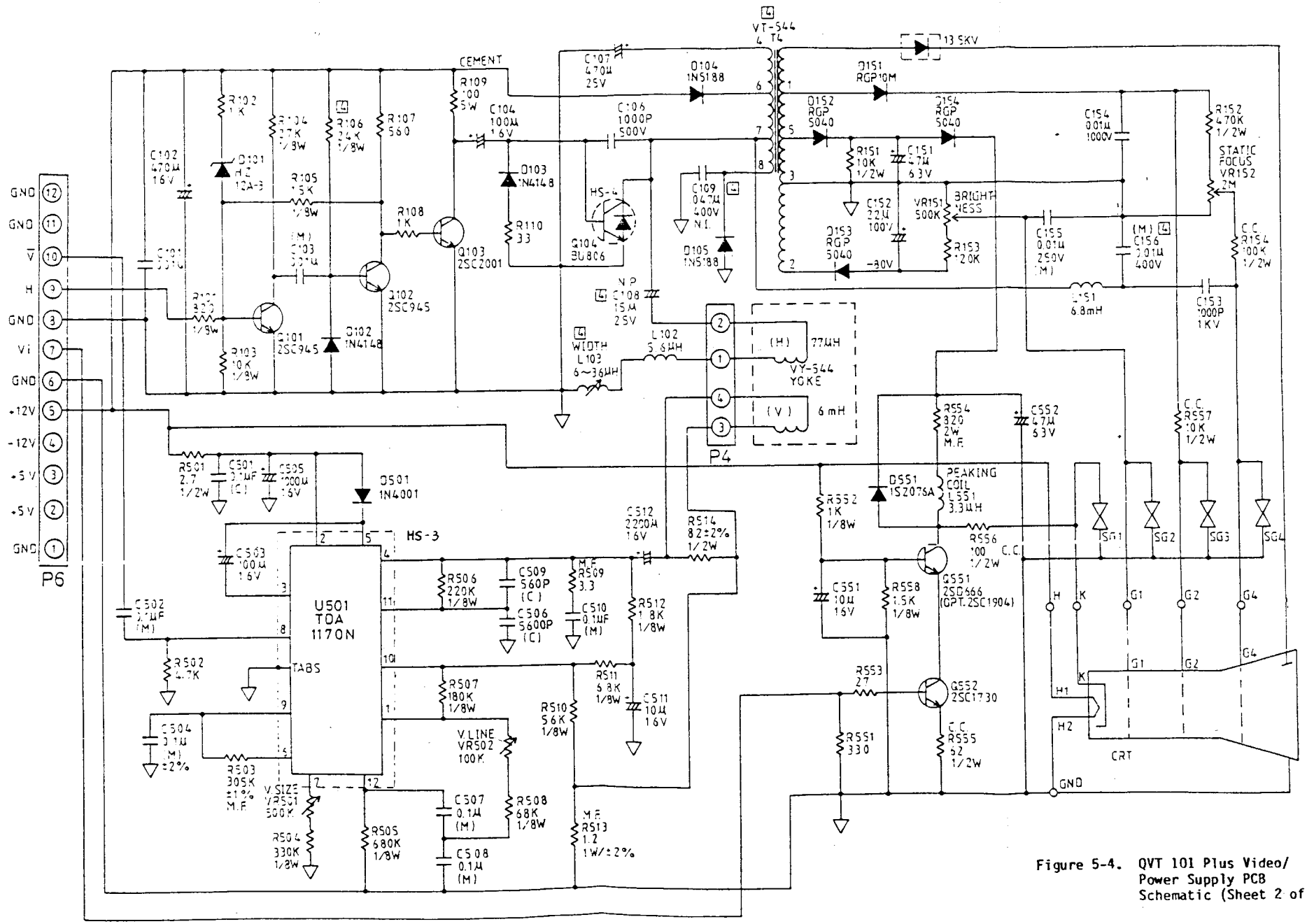
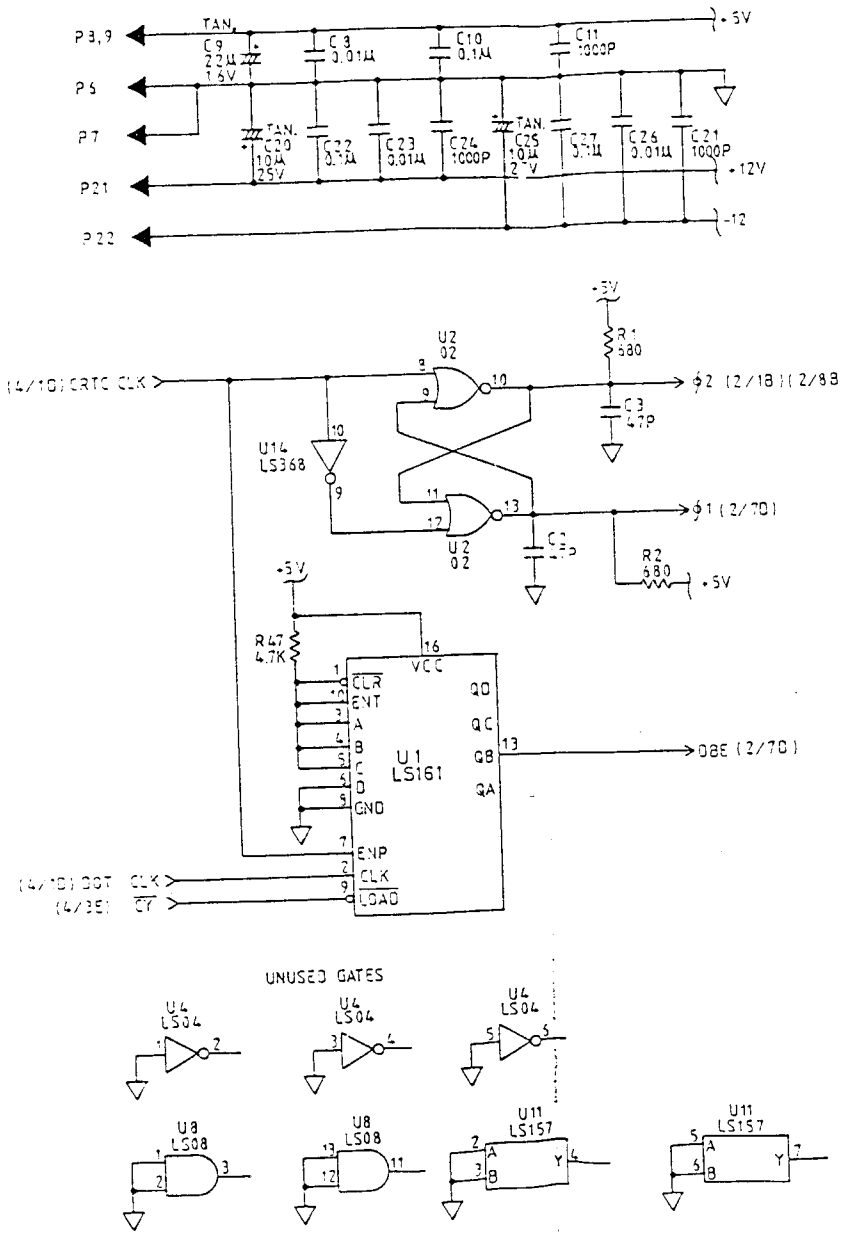


Figure 5-4. QVT 101 Plus Video/ Power Supply PCB Schematic (Sheet 2 of 2)



NOTES: UNLESS OTHERWISE SPECIFIED.

1. ALL RESISTORS ARE EXPRESSED IN OHMS, 1/4W, ±5%.
2. ALL CAPACITORS ARE EXPRESSED IN FARADS, 50V.
3. VOLTAGES ARE DIRECT CURRENT.
4. TYPE IDENTIFICATION FOR 7400-SERIES IC'S IS OBTAINED BY PREFIXING NUMBER WITH 74, EXAMPLE: LS04 = 74LS04.
5. JUMPER SELECT:
   - a. CHARACTER GENERATOR W2: 2764(450NS)(DEFAULT). W3: RO9864B-0017.
   - b. SYSTEM MEMORY SIZE W4: 2K(5516/5517)(DEFAULT). W5: 8K(5564. 250NS).
   - c. TERMINAL'S DCD SOURCE W7: EIAS DCD (DEFAULT). W6: EIA'S DSR.
   - d. EIA'S DTR SOURCE W9: TERMINAL'S DTR (DEFAULT). W8: TERMINAL'S RTS.
   - e. DISPLAY MEMORY SIZE W10: 2K (6116-3) W11: 8K (5564 250NS).

REFERENCE DESIGNATOR	
LAST USED	NOT USED
U33	—
R49	—
C76	C28
D13	—
Q6	—
L2	—
Y1	—
W11	—

Figure 5-5. QVT 101 Plus Logic PCB Schematic (Sheet 1 of 6)

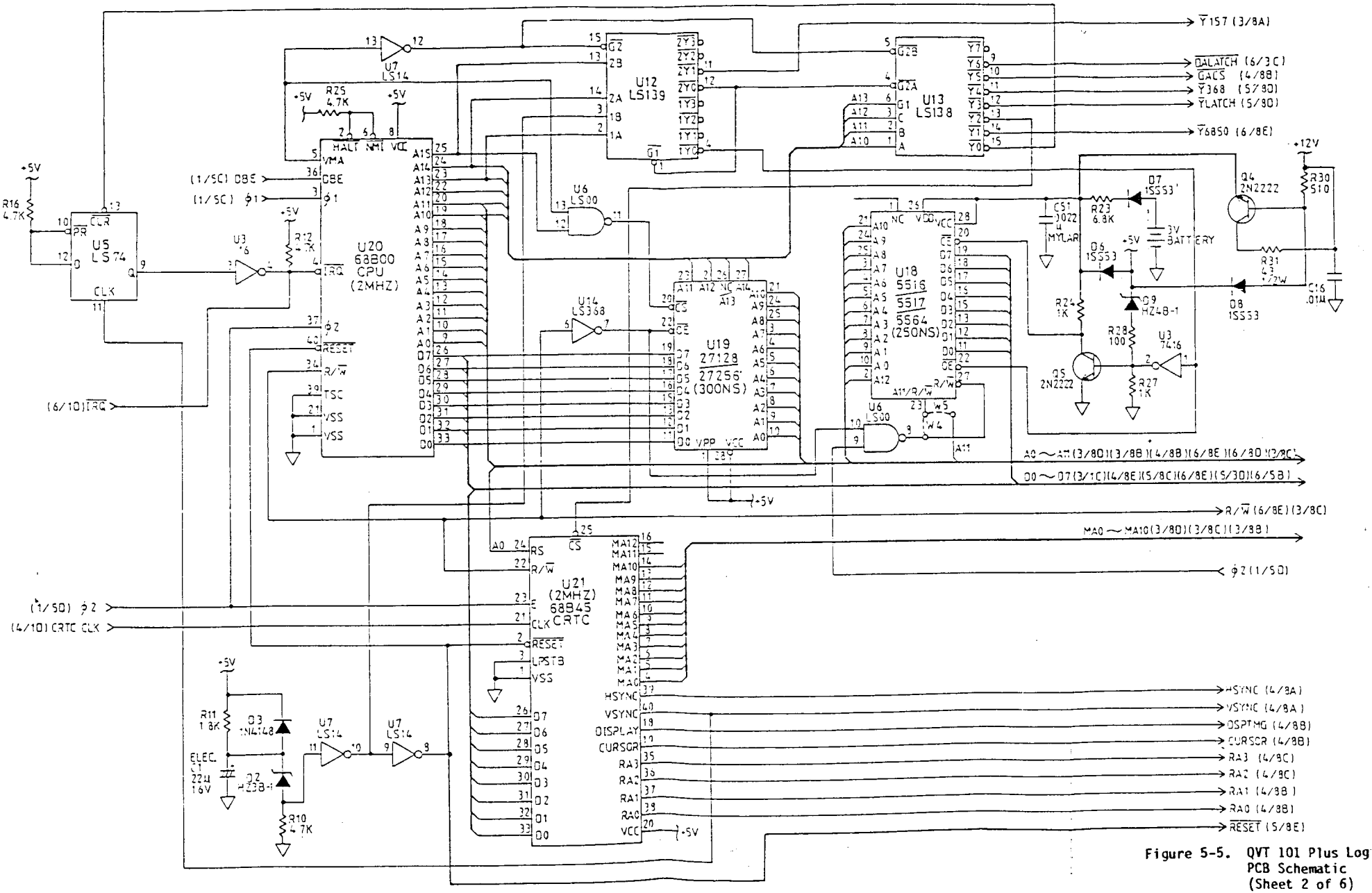


Figure 5-5. QVT 101 Plus Log
PCB Schematic
(Sheet 2 of 6)

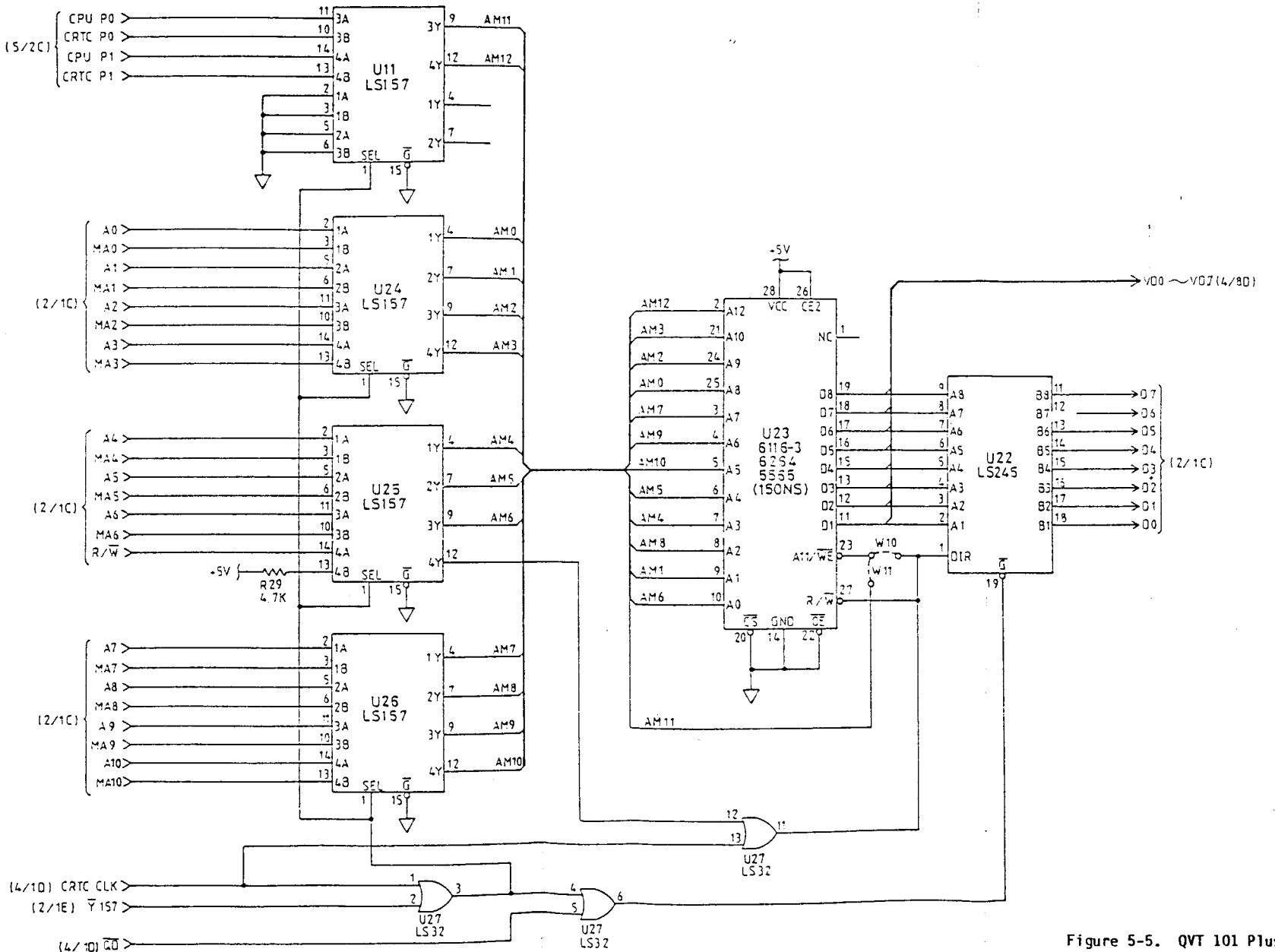


Figure 5-5. QVT 101 Plus Logic PCB Schematic (Sheet 3 of 6)

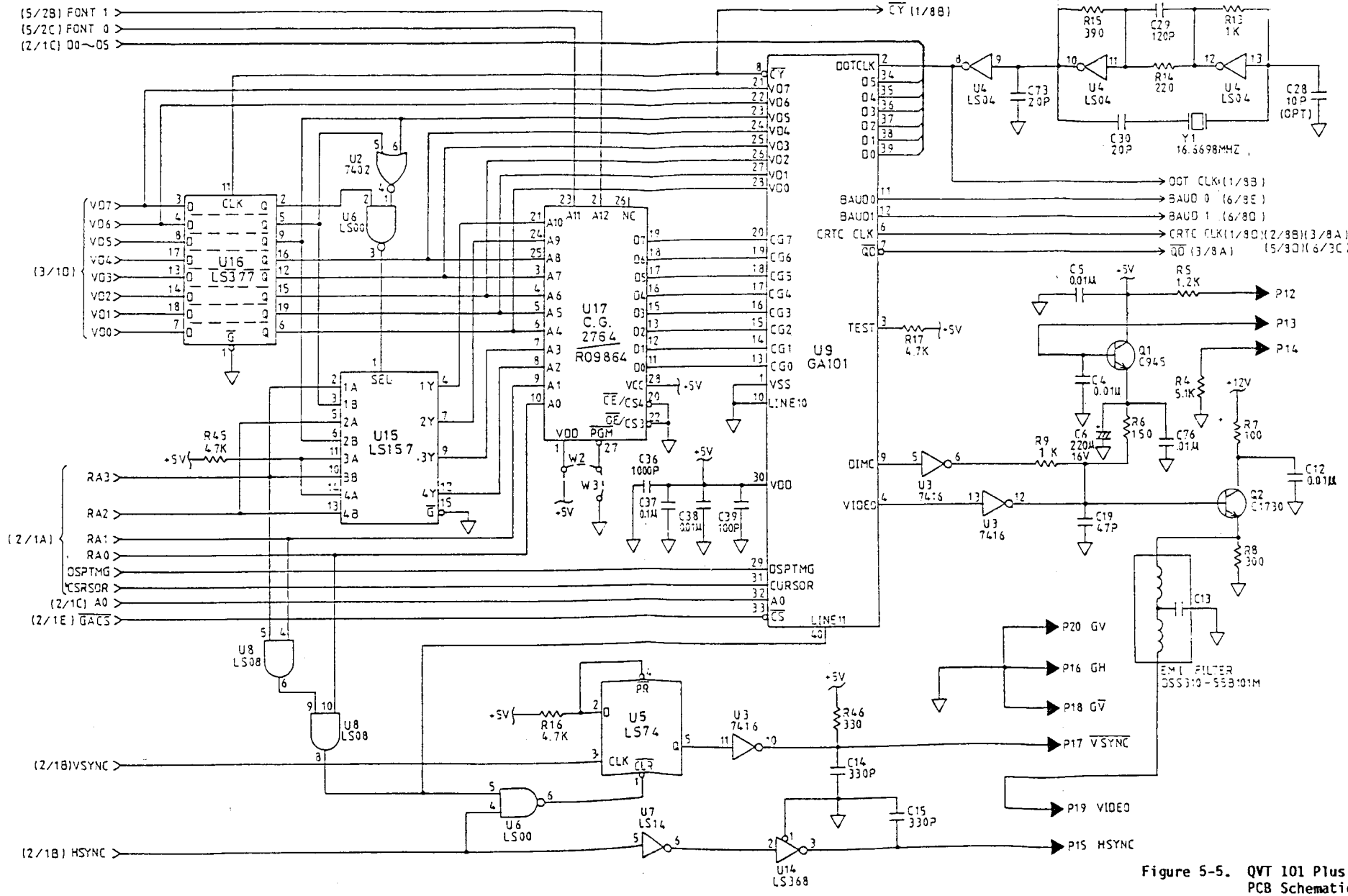


Figure 5-5. QVT 101 Plus Logic PCB Schematic (Sheet 4 of 6)

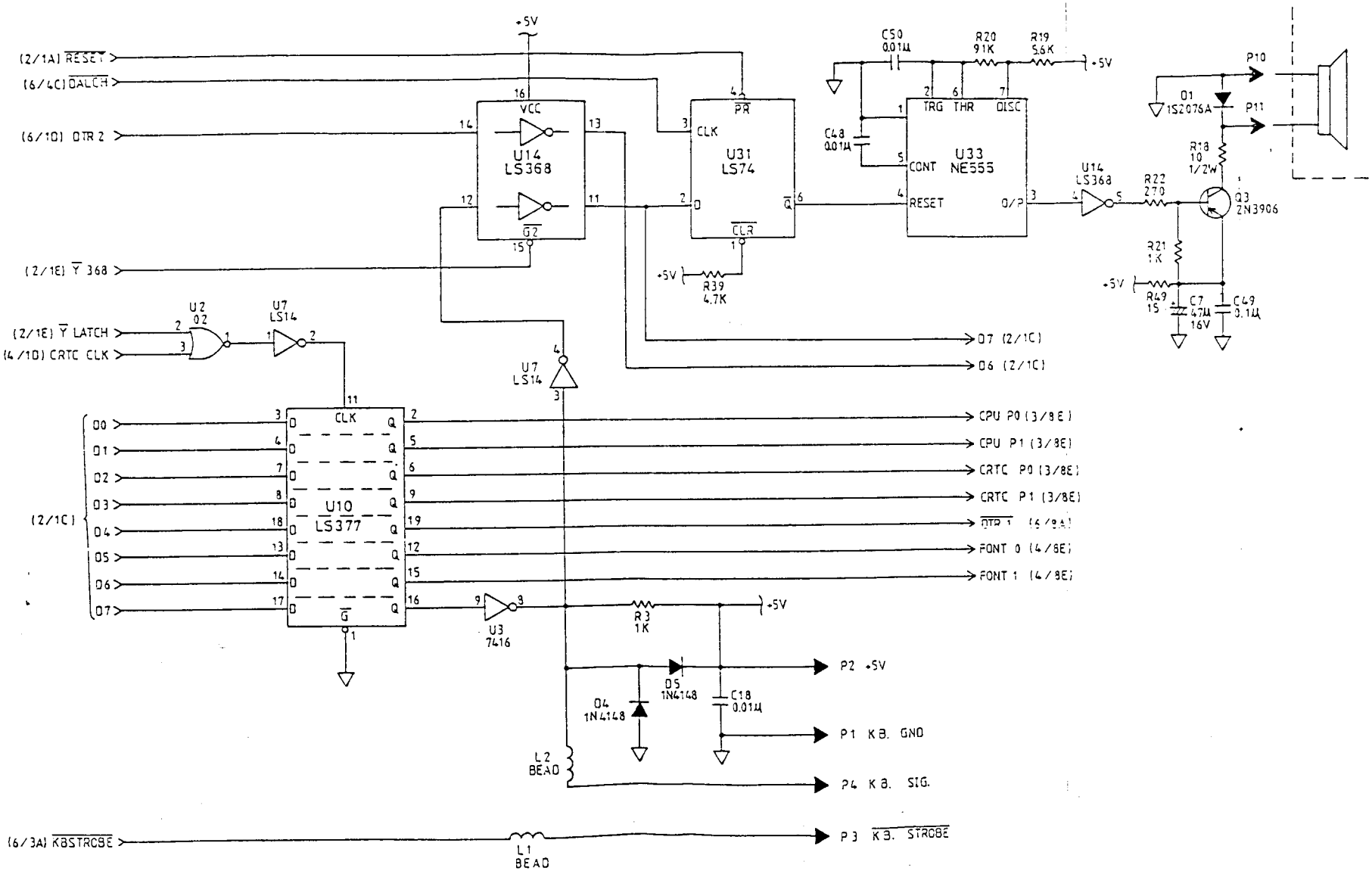


Figure 5-5. QVT 101 Plus Logic PCB Schematic (Sheet 5 of 6)

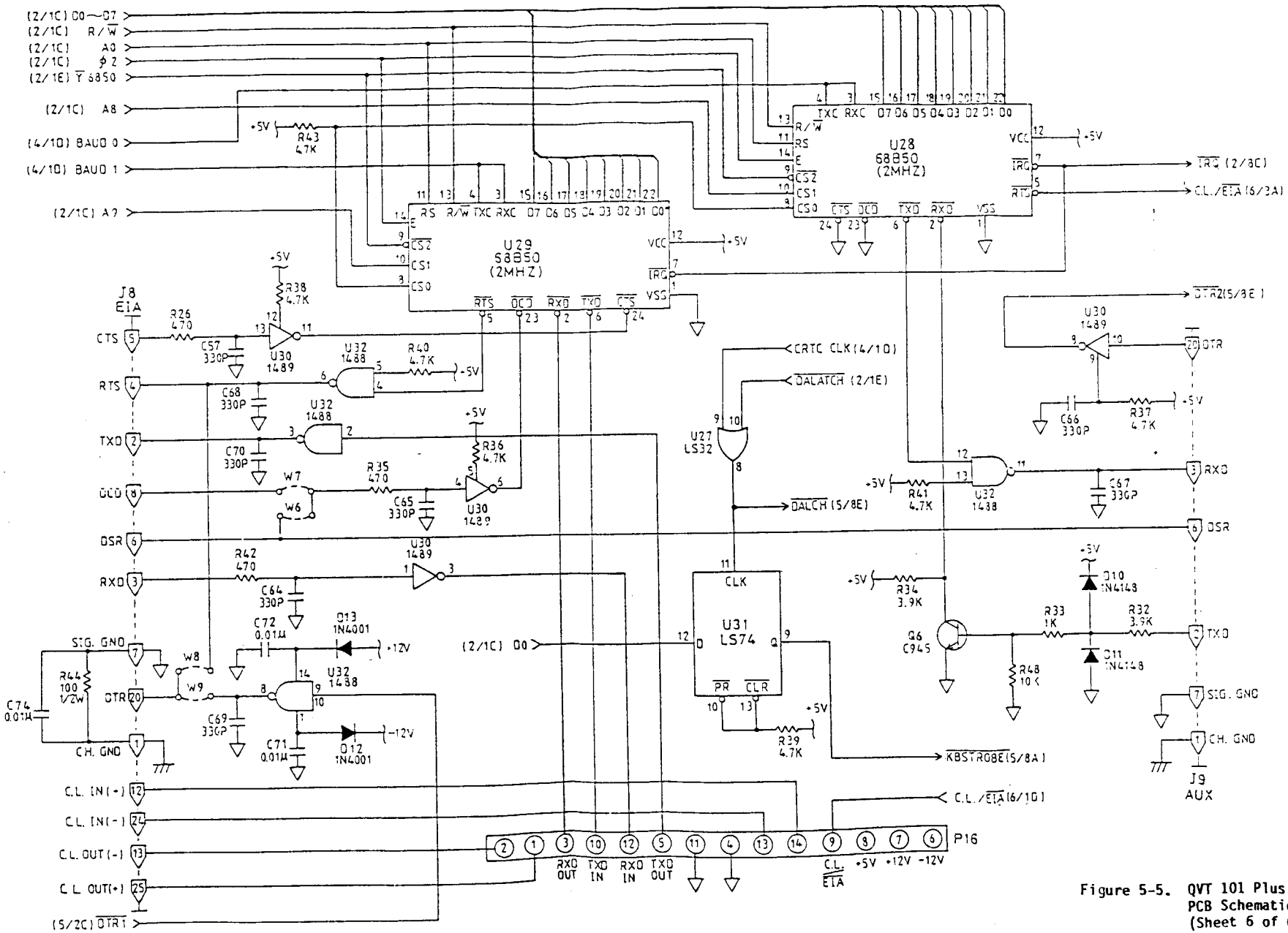


Figure 5-5. QVT 101 Plus Logic PCB Schematic (Sheet 6 of 6)

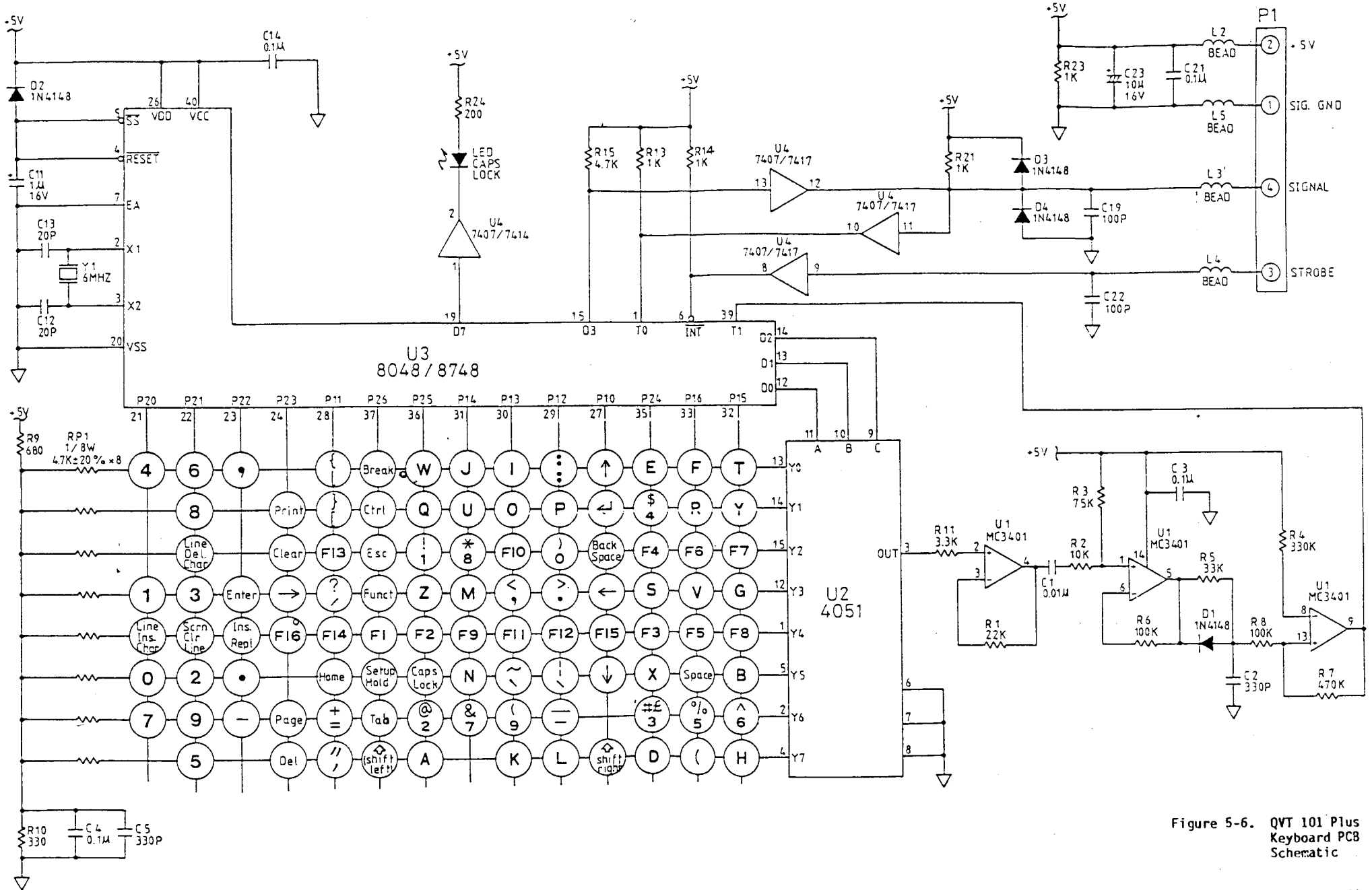


Figure 5-6. QVT 101 Plus Keyboard PCB Schematic

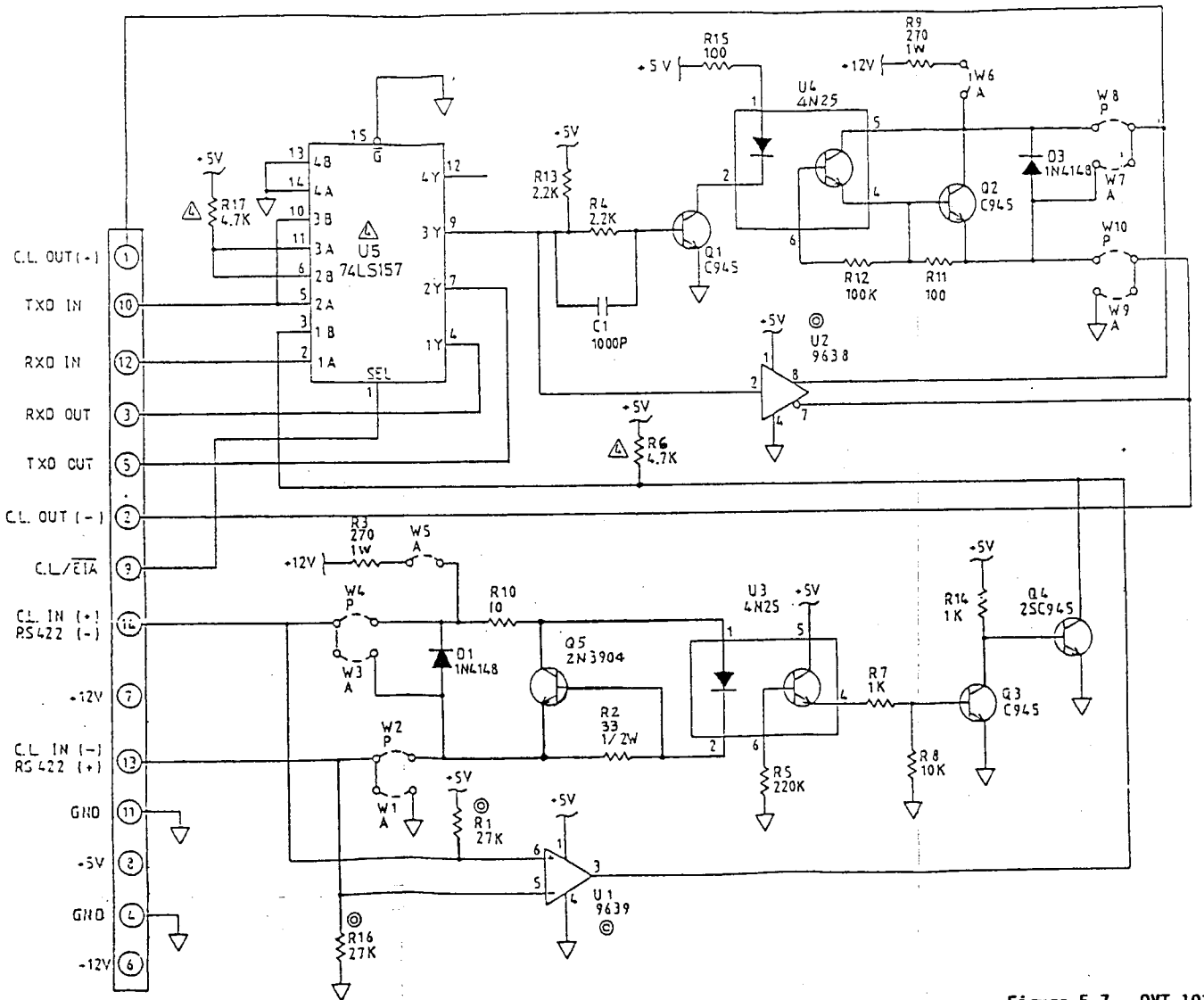


Figure 5-7. QVT 101 Plus RS-422/ Current Loop PCB Schematic