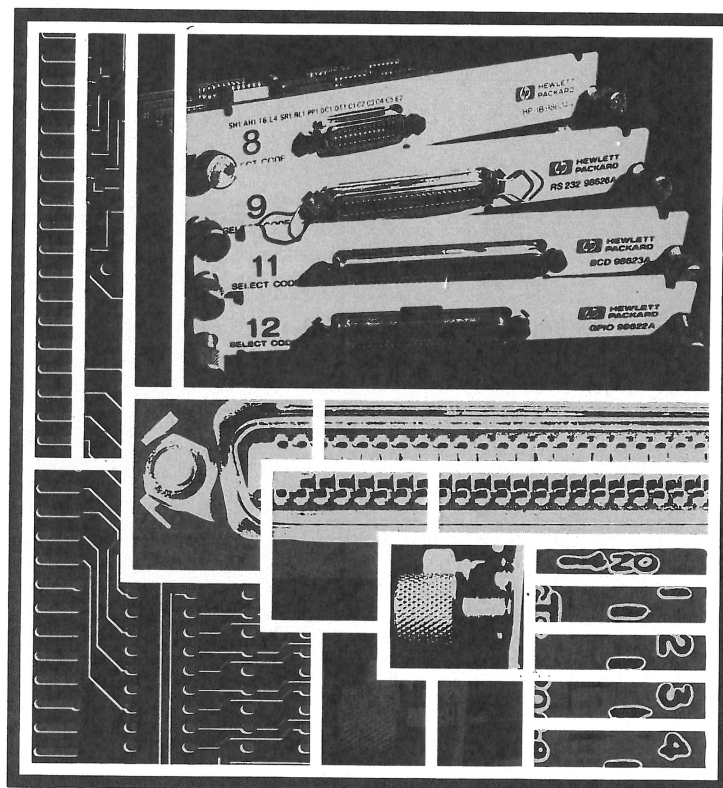


HP 98627A Color Output Interface Installation



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HP 98627A

Color Output Interface Installation

Part No. 98627-90000
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Chapter 1

General Information

Introduction

The 98627A Color Output Interface connects to an external monitor providing graphic displays of high resolution. Eight drawing colors are provided in several display formats. The standard display format is 512 dots horizontally by 390 dots vertically. A high resolution format of 512 dots by 512 dots is possible when using a high performance monitor.

The output signals are capable of driving up to four monitors, without sacrificing picture quality. Combining the output with regular television signals is possible but requires an external NTSC encoder.

This manual provides the necessary information for you to install the 98627A interface, and explains how to configure the interface for selected default operating conditions.

Technical Specifications

Product Description

The 98627A interface for the 9826 and 9836 supports an external color monitor for graphics display. Separate outputs are provided for red, green, blue, and sync. Sync information can be combined with the green signal output via an on-board switch. The two scan rates (24.8 kHz and 15.75 kHz) are also switch selectable.

Physical Description

Size: 135 mm by 170 mm

Weight: 0.5 kg

Environment Specifications

Temperature: 0°C to 45°C

Humidity: 0% to 80% non-conducting

Electrical Specifications

98627A Power Consumption

1.1 A at +5 V typical

Video Output Level

without sync:

1.0 V peak to peak into 75 Ω nominal

with sync:

1.6 V peak to peak into 75 Ω nominal

Sync/Green composite output mixture

40%/60%

Standard graphics

512 x 390 50/60 Hz, non-interlaced

High Resolution graphics

512 x 512 46.5 Hz, non-interlaced

TV Compatible graphics

512 x 474 30 Hz, interlaced

512 x 512 25 Hz, interlaced

Colors

White, Red, Yellow, Green, Cyan, Blue, Magenta, Black

Output Connectors

50 Ω BNC connectors (accepts 50 Ω or 75 Ω connector)

Cables

1.52 m, 75 Ω coaxial cable

Monitor Bandwidth Requirements

20 MHz (24.8 kHz scan)

Chapter 2

Installation

Unpacking and Inspection

If the shipping carton is damaged, ask the carrier's agent to be present when the interface is unpacked. If the interface is damaged or fails to operate properly, notify the carrier and the nearest HP sales and service office immediately. Retain the shipping carton for the carrier's inspection. The sales and service office will arrange for the repair or replacement of your interface without waiting for the claim against the carrier to be settled.

Handling

Precautionary measures should be taken to protect printed circuit board assemblies such as this interface card from static discharge during handling. Each card is shipped in a protective anti-static bag which provides adequate anti-static protection for the interface as long as it remains inside the bag.

It is good procedure to use other methods of anti-static protection, such as the use of commercially available personnel grounding straps, while handling the 98627A or other printed circuit boards outside of their anti-static bags.

Avoid touching integrated circuit leads while picking up or handling the 98627A. Static discharge through such leads can easily destroy integrated circuit components. It is best to handle the interface by the edges or its metal backplane cover. Do NOT handle the interface by its edge connector. If the edge connector should inadvertently get dirty, it can be cleaned by using a cotton swab and isopropyl alcohol.

Configuring the Card

There are two sets of switches on this card. One set is used for changing the select code and the other controls display options.

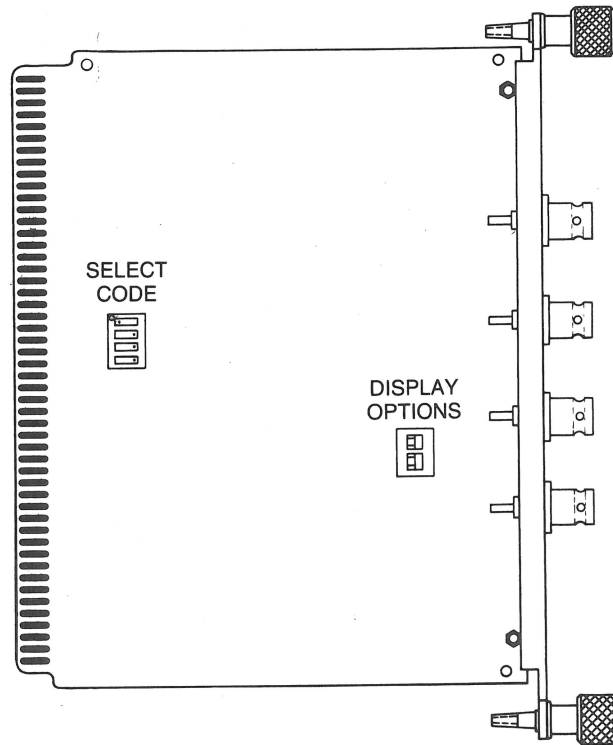


Figure 1. Switches

Select Code

Each interface card and internal peripheral, such as the display, has a unique device select code (address) by which it can be selected by the computer software. The actual select code may vary depending on the language of the operating system installed in the computer. Refer to the Interface Techniques manual for the language installed in your computer for the correct select code for your application.

Generally, select codes 1 through 6 are reserved for internal use by the computer (e.g., display, keyboard, etc.). Select code 7 is reserved for the built-in HP-IB interface. Depending on the language installed, select codes 8 through 31 are generally reserved for interface cards.

Select code 28 is recommended when this card is used with BASIC. All 98627A interface cards are preset to select code 28 at the factory. If the HPL Language system is used, the select code must be changed. Select code 12 is suggested for HPL systems.

Note

If you change the select code, check the select code assignments for all other interface cards in the system. Do not assign the same select code to more than one interface.

Select Code Settings

Select Code	Segments (4321)
0	0000
2	0001
4	0010
6	0011
8	0100
10	0101
12	0110
14	0111
16	1000
18	1001
20	1010
22	1011
24	1100
26	1101
28	1110
30	1111

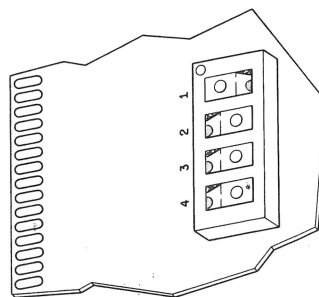


Figure 2. Select Code Switches

The 98627A occupies the space of two select codes. The switches are always set to even numbered select codes but both the code set on the switches and the next higher select code are used. Figure 2 shows the preset select code (28).

Option Switches

Option switches control sync and oscillator operation of the card. Switch 1 allows the sync signal to be combined with the green video output. This switch is preset for sync with green output. See figure 3. If your monitor requires separate video and sync signals, the switch setting may have to be changed.

Switch 2 sets the line rate output for either 24.8 kHz horizontal scan, or 15.75 kHz horizontal scan. This switch is preset for 24.8 kHz scan. See figure 3.

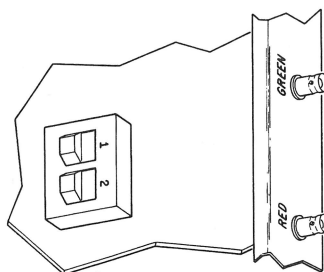


Figure 3. Sync and Oscillator

Interface Cables

Four cables are provided with the card. If the monitor has only three video inputs, it expects the sync signal to be present on the green video output. Connect one cable from each of the three video outputs to the appropriate video input on the monitor. Optionally connect the sync output from the interface to the sync input to the external monitor.

Installing the 98627A

Although there are eight slots in the computer backplane, only four interface cards, such as the 98627A, can be installed in it. Each interface card installed decreases by one the number of memory boards that can be installed.

CAUTION

BE SURE TO HANDLE THE 98627A ONLY BY ITS MOUNTING PLATE TO AVOID DAMAGE DUE TO STATIC DISCHARGE.

1. Set the switches on the card according to the instructions in the section on Configuring the Interface Card.
2. Turn the computer off.
3. Interface cards must go into any of the four slots just below a pair of cover bolt holes. Remove the metal backplane covers one by one until you find an empty slot just below a pair of cover bolt holes.
4. The metal plate on the interface card takes the place of a backplane cover. A memory or DMA board can be installed in the slot above the interface card.
5. Slide the interface card into the slot, component side up, until it mates with the backplane connector board. Tighten the dog bolts until they are finger tight.
6. If there are no empty slots just below a cover bolt hole pair, rearrange the memory boards to provide a slot. Remove any memory board in a slot beneath a bolt hole pair and re-install it in an empty slot above a bolt hole pair. It is not necessary to change the address of the memory board because the computer CPU automatically finds the board at its new location.
7. If there are no empty slots, a memory board or interface card must be removed and left out if the interface card is to be installed. If a RAM memory board must be left out, remove the RAM board with the lowest address.
8. Connect the interface to the desired peripheral using an appropriate cable or adapter.
9. Turn the computer and the peripheral on and operate according to the instructions in the appropriate operating manual. If you have difficulty, contact your nearest HP Sales and Service Office.

In Case of Trouble

Depending on the Language System, the interface may require a special binary file to be loaded before it will operate correctly. Check the appropriate manual. If there is a problem, check the following before calling your HP Sales and Service Office.

1. Verify the select code switches are configured correctly. Be sure no other I/O card is set to either of the select codes used by the 98627A. Remember that the 98627A uses two consecutive select codes, and that the switches on the card always address it to an even numbered select code.
2. Refer to the appropriate Language Reference manual for the proper statement to activate the card.
3. Check the interface cables for breaks or shorts.

Monitor Recommendations

The specifications for the following monitors meet or exceed the timing requirements necessary for use with the 98627A.

Color: Barco CDCT 3/51 - 20" with cabinet
Conrac 7211, C13 - 13" with cabinet
Conrac 7211, C19 - 19" with cabinet
Mitsubisi C39-19 - 19" with cabinet

B/W: Conrac 2400, C19 - 19" with cabinet

Other monitors can be used with the 98627A, provided they meet the specifications outlined in this manual. Refer to the technical specifications and the timing diagrams for further information.

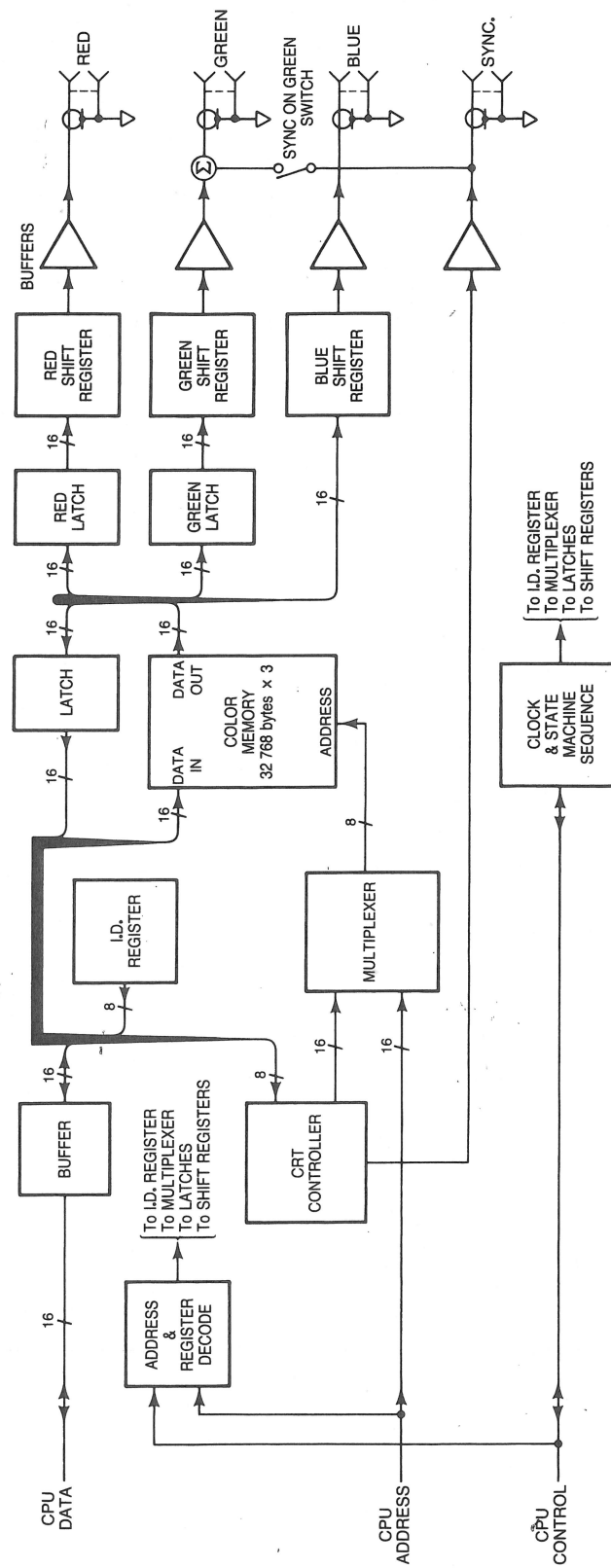


Figure 4. Block Diagram

Chapter 3

Theory of Operation

Overview

The 98627A is a 96 kbyte memory card with the ability to display the contents of its memory. The memory is divided into three planes. Each plane holds the bit patterns for one of three video outputs.

A crystal oscillator module provides all timing references. A second crystal (switch selectable) allows a slower scan rate compatible with NTSC video.

The oscillator drives logic which repeats a series of instructions to sequence the operations of the card. Four memory accesses are possible during one cycle of this state machine. Three are used by the card to access the three planes of memory, while the fourth is used by the host CPU to update the memory on the card.

As the red and green memory planes are accessed their data is placed in holding registers. When the blue picture data is ready, all three are serially shifted to the display. This operation allows all three bits to be combined to produce one dot. Shifting continues until 16 dots are displayed.

The next cycle repeats this process on the next location of memory. During one horizontal scan, 32 words of sixteen bits each are shifted out of memory, thus 512 dots appear in one horizontal scan.

The CRT controller supplies the necessary memory addressing and video timing. Control registers hold software supplied information to maintain the number of lines that are shifted out of memory, thus allowing either 50 or 60 Hz operation without hardware changes. Additional bus interface logic provides the necessary communication signals between the CRT controller, state machine, and the computer backplane.

Timing diagrams for the various display formats are presented on the following pages.

10 Theory of Operation

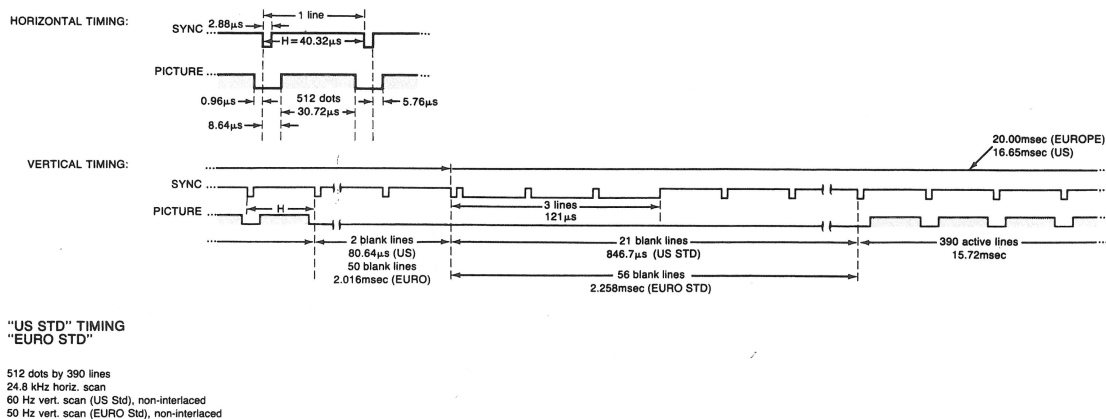


Figure 5. Standard Timing

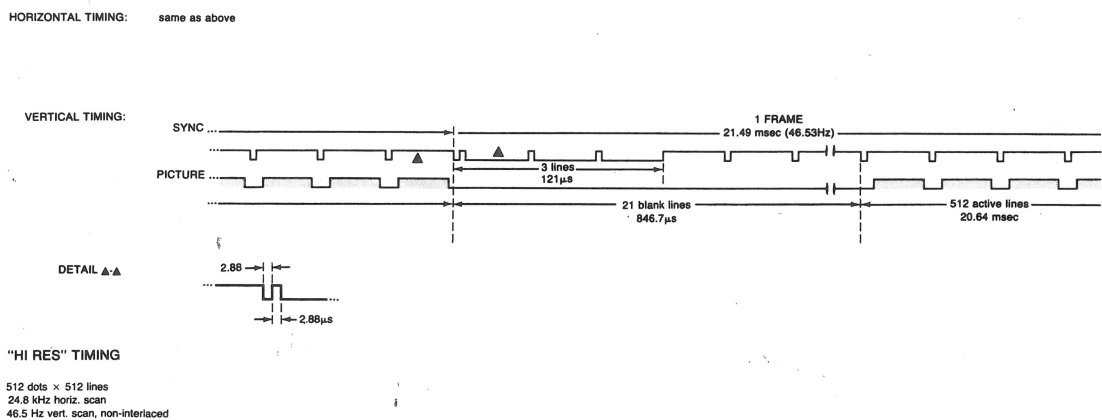


Figure 6. High Resolution Timing

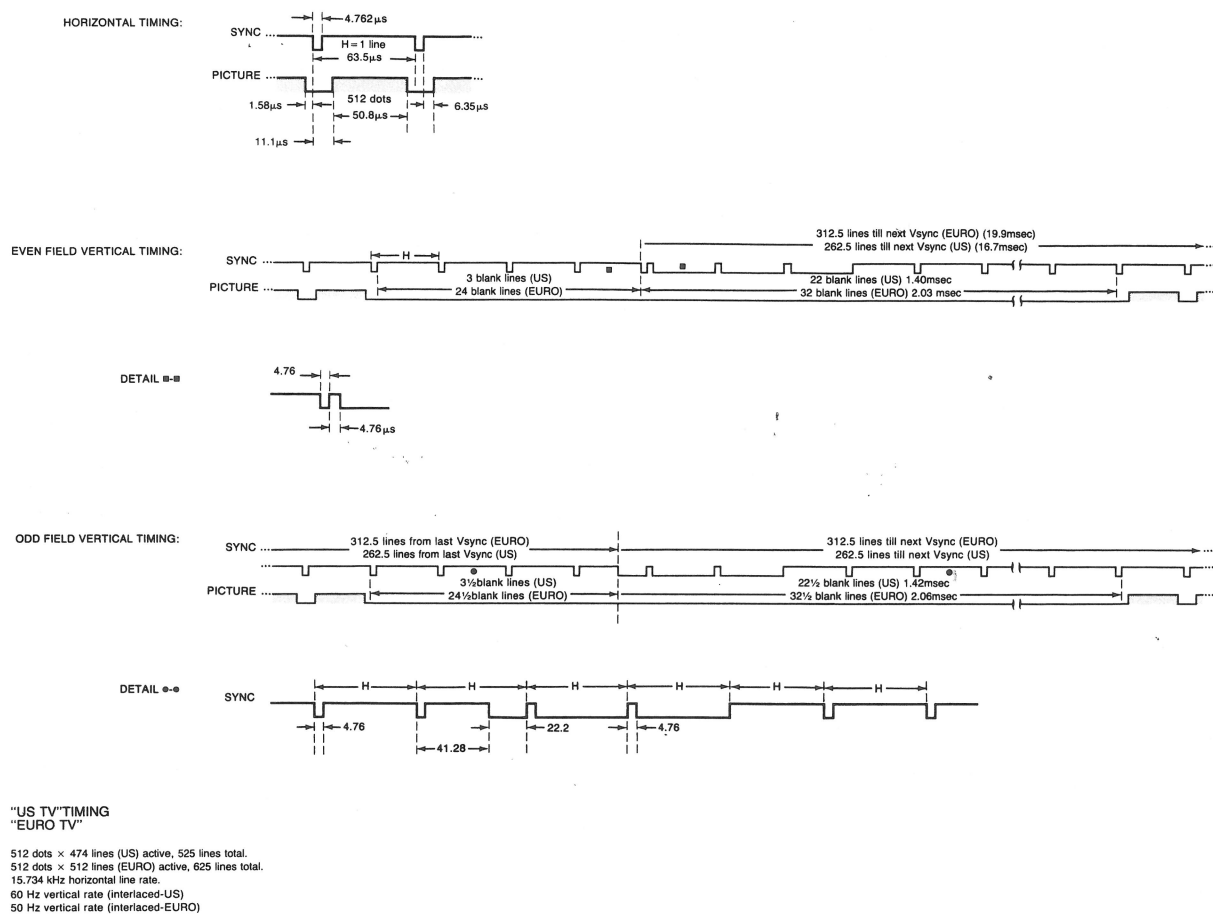
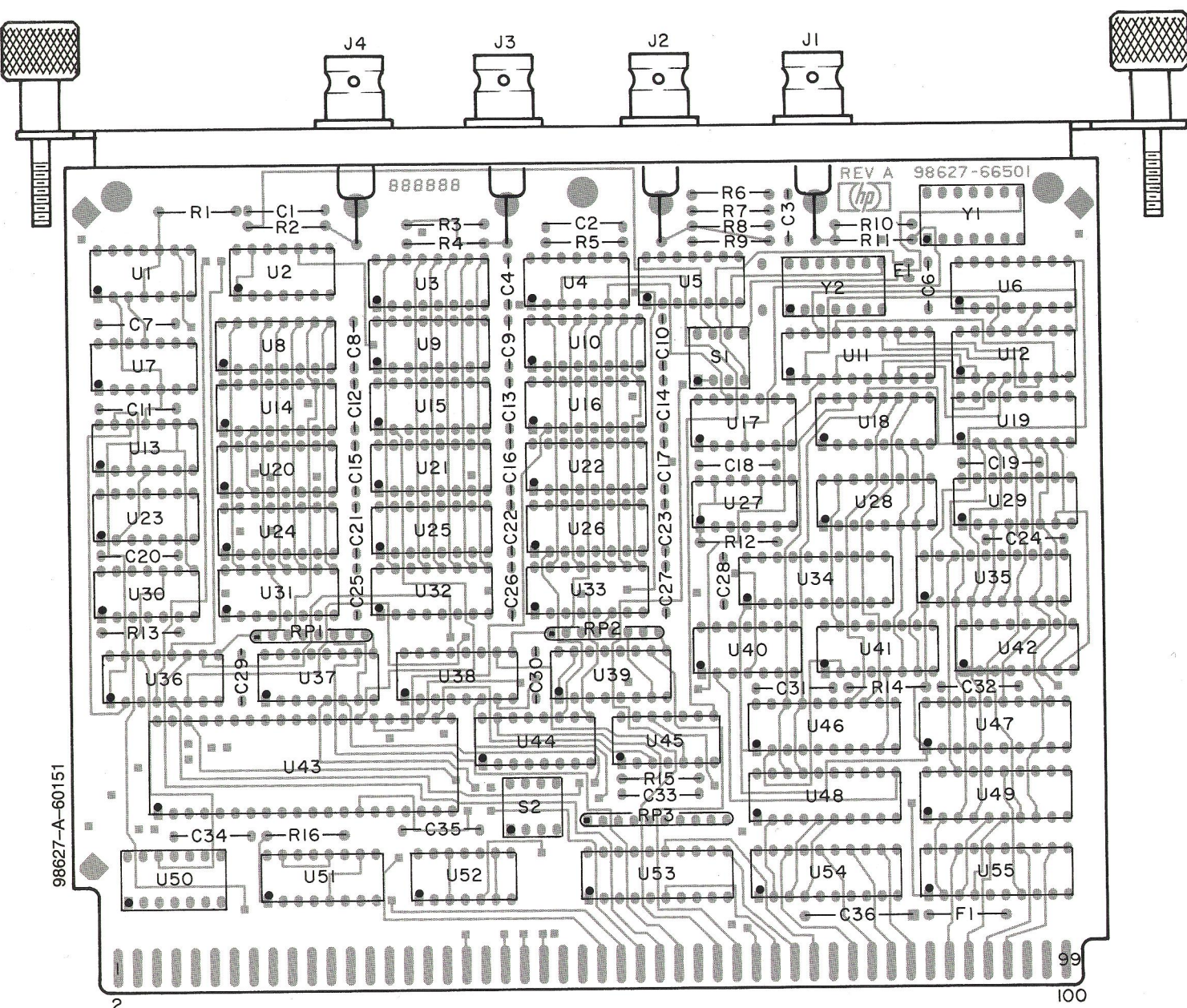


Figure 7. TV Compatible Timing

Table 1. Replaceable Parts List

Reference Designator	CD	HP Part No.	TQ	Description
A1		98627-66501	1	Interface assembly
C1,C2,C7,C11, C18-20,C24, C31-C35		0160-4832	13	C: fxd .01 uf 100v
C3-C6,C8-C10, C12-C17,C21- C23,C25-C30 C36		0160-5246	22	C: fxd .1 uf 50v
F1		0180-0229	1	C: fxd 33 uf 10v
R1,R5,R12, R13-R16		2110-0592	1	Fuse 4 A
R2		0698-3155	7	R: fxd 4.64K 1%
R3,R8,R11		0698-4037	1	R: fxd 46ohm 1%
R4,R9,R10		0757-0403	3	R: fxd 121ohm 1%
R6,R7		0757-0407	3	R: fxd 200ohm 1%
RP1,RP2		0757-0346	2	R: fxd 10ohm 1%
RP3		1810-0322	2	R: Network 20
SW1		1810-0279	1	R: Network 4.7K
SW2		3101-2363	1	Switch, 2 SPDT
U1,U2,U4 U3,U8-U10, U14-U16, U20-U22,U24- U26,U31-U33		3101-2507	1	Switch, 4 SPST
U5		1820-2488	3	IC: 74ALS74
U6		1818-1717	16	IC: 4864-2
U7		1820-1197	1	IC: 74LS00
U11		1820-2760	1	IC: 74F191
U12		1820-2691	1	IC: 74F74PC
U13		1820-2701	1	IC: 74F374PC
U17		1816-1522	1	IC: TBP185030
U18,U19, U28,U29, U41,U42		1820-1144	1	IC: 74LS02
U23		1820-1074	1	IC: 74128
U27		1820-1922	6	IC: 74LS166
U30		1820-1568	1	IC: 74LS125
U34,U35, U46,U47 U36-U39		1820-1211	1	IC: 74LS86
U40		1820-1201	1	IC: 74LS08
U43		1820-1730	4	IC: 74LS273
U44		1820-2769	4	IC: 74F153
U45		1820-1199	1	IC: 74LS04
U48,U49		1820-2546	1	IC: 6845
U50		1820-1266	1	IC: 80C97
U51		1820-1202	1	IC: 74LS10
U52		1820-2102	2	IC: 74LS373
U53		1813-0197	1	IC: DM-100
U54,U55		1820-1195	1	IC: 74LS175
Y1		1820-1208	1	IC: 74LS32
Y2		1820-2740	1	IC: 74LS688
W1		1820-2075	2	IC: 74LS245
		1813-0265	1	Crystal, 16.667 MHz
		1813-0269	1	Crystal, 10.07 MHz
		8120-3616	4	Color Cables
		9222-0682	1	Anti-Static Bag

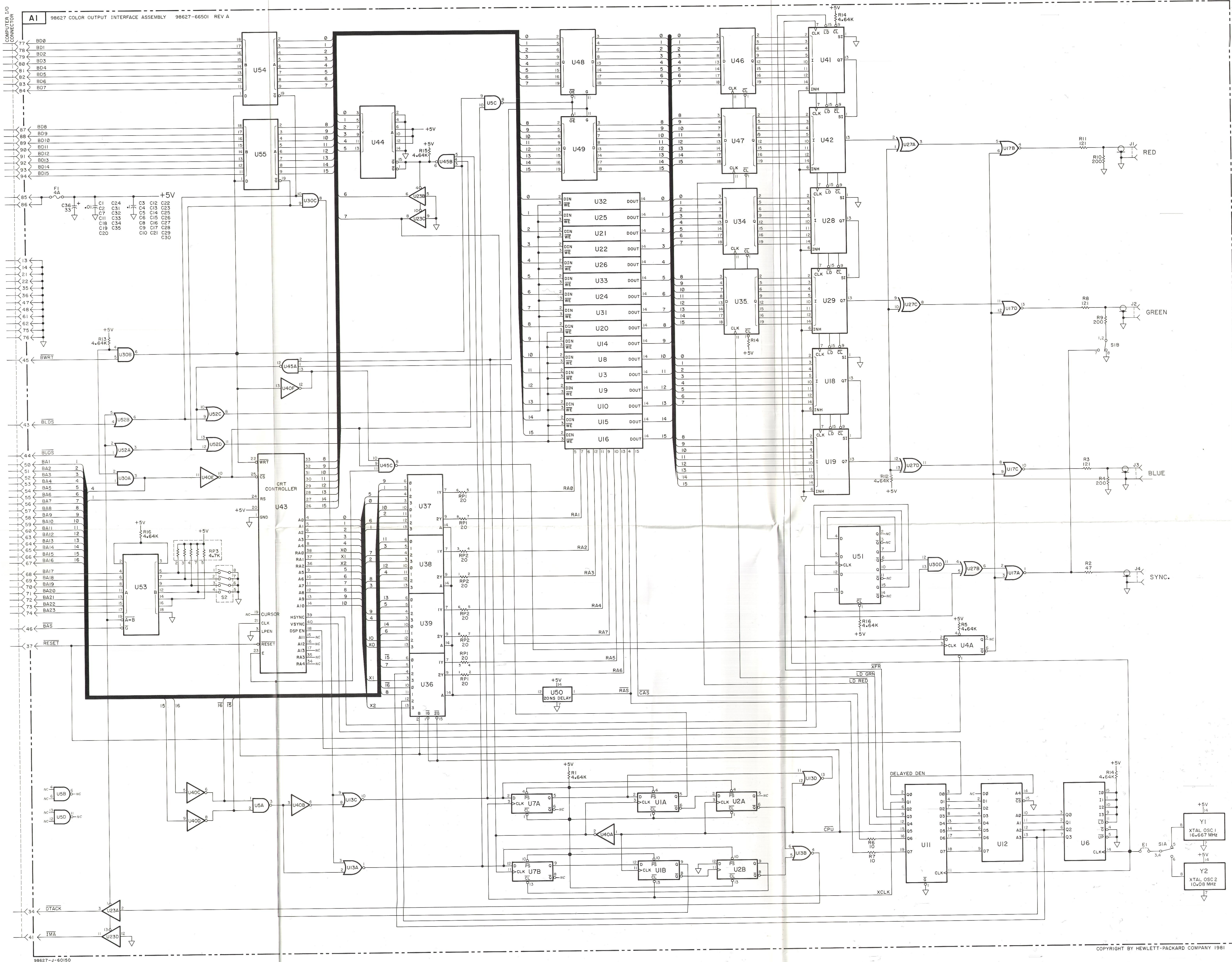




COMPONENT SIDE
A1
HP Part No. 98627-66501 Rev A

SCHEMATIC NOTES

- PARTIAL REFERENCE DESIGNATIONS ARE SHOWN, PREFIX WITH ASSEMBLY OR SUBASSEMBLY DESIGNATION(S) OR BOTH FOR COMPLETE DESIGNATION.
- COMPONENT VALUES ARE SHOWN AS FOLLOWS UNLESS OTHERWISE NOTED.
RESISTANCE IN OHMS
CAPACITANCE IN MICROFARADS
- A CURVED LINE MEETING A BUS DENOTES THAT LINE ENTERS THE BUS, A STRAIGHT LINE MEETING THE BUS DENOTES THAT LINE DOES NOT ENTER THE BUS.



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A1
98627 COLOR OUTPUT INTERFACE
SCHEMATIC DIAGRAM

Manual Part No. 98627-90000

Dwg Rev A Sheet 1 of 1