

**2673A****TABLE OF CONTENTS**

|   |            |
|---|------------|
| <b>SECTION 1: PRODUCT INFORMATION</b> .....           | <b>1-1</b> |
| A. Introduction                                       |            |
| B. Specifications                                     |            |
| C. Equipment provided                                 |            |
| D. Options available                                  |            |
| E. Operating supplies                                 |            |
| <b>SECTION 2: ENVIRONMENTAL/INSTALLATION/PM</b> ..... | <b>2-1</b> |
| A. Environmental                                      |            |
| B. Product safety                                     |            |
| C. Electromagnetic compatibility                      |            |
| D. Changing the voltage                               |            |
| E. Preventive maintenance                             |            |
| <b>SECTION 3: CONFIGURATION</b> .....                 | <b>3-1</b> |
| A. Introduction                                       |            |
| B. Setting configuration defaults                     |            |
| C. Table 3-1, configuration features                  |            |
| D. Table 3-2, datacomm configuration features         |            |
| E. Table 3-3, printer interfacing                     |            |
| F. TPM PCA switch settings                            |            |
| <b>SECTION 4: TROUBLESHOOTING</b> .....               | <b>4-1</b> |
| A. Introduction                                       |            |
| B. Preliminary checks                                 |            |
| C. Power supply checks                                |            |
| D. TPM problems                                       |            |
| E. Table 4-1, error isolation codes                   |            |
| F. Table 4-2, self test messages                      |            |

**SECTION 5: DIAGNOSTICS/SELF-TEST ..... 5-1**

- A. Introduction
- B. Self test features
- C. Power-on test
- D. User invocable tests
  - Non-destructive confidence test
  - Print mechanism test
  - Control panel test
  - Destructive controller test
  - Data communication tests
    - HP-IB test
    - RS-232C test
- E. Manufacturing burn-in test
- F. Diagnostic test

**SECTION 6: ADJUSTMENTS ..... 6-1**

**SECTION 7: PERIPHERALS ..... 7-1**

**SECTION 8: REPLACEMENT PARTS ..... 8-1**

- A. Introduction
- B. Table 8-1, external parts
- C. Table 8-2, assemblies and associated parts
- D. Table 8-3, processor board parts (02670-60066)
- E. Table 8-4, processor board parts (02670-60106)
- F. Table 8-5, miscellaneous parts

**SECTION 9: DIAGRAMS ..... 9-1**

- A. Introduction
- B. Figure 9-1, wiring interconnection
- C. Figure 9-2, back panel wiring

**SECTION 10: REFERENCE ..... 10-1**

- A. Documentation Summary
- B. Control codes

**SECTION 11: SERVICE NOTES/IOSMs ..... 11-1**

**HP Computer Museum**  
**[www.hpmuseum.net](http://www.hpmuseum.net)**

**For research and education purposes only.**

# 1

## PRODUCT INFORMATION

### A. INTRODUCTION

The 2673A Intelligent Graphics Printer is a sophisticated raster graphics printer. It is targeted for use with desktop computers, personal computers, character mode terminals, and numerous test and measurement systems. Flexibility is a key feature in this product.

### B. SPECIFICATIONS

The specifications for the 2673A are listed in Table 1-1.

**Table 1-1. Specifications**

#### Alphanumeric Printing

|                     |   |
|---------------------|---|
| Print Speed         | 120 CPS bi-directional, optimized path  |
| Character Structure | 7 x 11 dot matrix character font in 9 x 15 character cell<br>128 USASCII character set – upper/lower case and control codes<br>Line Drawing character set<br>Roman Extension international characters (8-bit mode)<br>ISO international character sets (7-bit mode) |
| Printing Format     | 10 CPI and 16.2 CPI (80 and 132 columns/line)<br>5 CPI (40 columns/line)<br>6 lines per inch<br>Underlining character enhancement<br>Framing character enhancement<br>Triple-pass mode  |

#### Raster Graphics Copy

|               |  |
|---------------|--|
| Type          | Unidirectional raster graphics copy<br>90 dots per inch horizontal and vertical resolution<br>720 dots across a raster row                                   |
| Output Format | Dot-for-dot copies from HP raster devices<br>Dot-addressable graphics can be software-controlled by non-HP devices<br>Offsets, windowing, and auto-centering |

## 1-2 Product Information

### Output Controls

|               |  |
|---------------|--|
| General       | Form feed button, test button, margin control<br>Auto-page mode<br>Tabs<br>Fan-fold or roll paper  |
| Configuration | Front panel: paper feed,<br>form feed, self test and reset buttons<br>Simple escape sequences control margins,<br>print mode, character set selection<br>Non-volatile memory stores configuration<br>information entered via the control panel |

### Interfaces

|   |                                     |
|---|-------------------------------------|
| HP-IB (IEEE-488), standard                                  |                                     |
| HP 8-bit parallel (37 pin connector), optional              |                                     |
| Centronics-compatible parallel (36 pin connector), optional |                                     |
| RS-232C (CCITT V.24) serial (25 pin connector), optional    |                                     |
| Input buffer  | 2K characters                       |
| Receive rates   | up to 19.2K baud                    |
| Transmission mode   | full duplex, asynchronous           |
| Parity  | odd, even, zeroes, none             |
| Handshakes  | ENQ/ACK, X-ON/X-OFF, hardware, none |

### Electrical

|                             |                                      |
|-----------------------------|--------------------------------------|
| Voltage (Switch-selectable) | 100, 120, 220, or 240V (+5%, -10%)   |
| Frequency                   | 47.5 to 66 Hz                        |
| Power Consumption (maximum) | 75 watts operating, 30 watts standby |

### Dimensions

|        |                  |
|--------|------------------|
| Width  | 428mm (16.9 in.) |
| Depth  | 424mm (16.7 in.) |
| Height | 105mm (4.1 in.)  |

### Weight

|             |                         |
|-------------|-------------------------|
| Stand-alone | 8.3 kg (18 lbs., 6 oz.) |
| Shipping    | 14.1 kg (31 lbs.)       |

### Environmental

|                           |                                       |
|---------------------------|---------------------------------------|
| Operating Temperature     | +0C to +55C (+32F to +131F)           |
| Non-operating Temperature | -40C to +75C (-40F to +167F)          |
|                           | Thermal paper limited to +40C (+104F) |
| Humidity                  | 20% to 95% (non-condensing)           |

### Product Safety

UL Listed  
CSA Certified  
IEC 380 435 International Safety Standard Compliance

### Electromagnetic Compatibility

FCC Class B Certified Peripherals  
Any questions concerning regulatory agency compliance should be directed to your local Hewlett-Packard sales office.

**C. EQUIPMENT PROVIDED**

1. One pack of fan-fold paper
2. Power cord.
3. Paper rack, HP Part No. 02670-20012.
4. 2673A Owner's Manual, HP Part No. 02670-90016.



**D. OPTIONS AVAILABLE**

| OPTIONS | DESCRIPTIONS   |
|---------|--|
| -039    | Delete HP-IB, add Data Link Interface and 02670-80163 Data Link to 2673A Cable.  |
| -040    | Delete HP-IB, add RS-232C Serial interface (no cable).   |
| -042    | Delete HP-IB, add Centronics-compatible parallel interface (no cable).   |
| -044    | Delete HP-IB, add HP parallel (no cable).  |
| -240    | HP 264X Character Terminal Interface Kit: Delete HP-IB, add HP parallel interface, 13238A Duplex Register Card and 13232J interface cable. |
| -888    | Refurbished 2673A  |

**E. OPERATING SUPPLIES**

| PAPER NUMBER                    | DESCRIPTION  |
|---------------------------------|--|
| 92160M (blue)<br>92160N (black) | Thermal paper, page-perforated and fan folded. 4 packs, 330 sheets 8.5" x 11" each pack. |
| 92160A (blue)<br>92160B (black) | Thermal paper. 24 rolls. 8.5" x 100' each roll.  |
| 92160C (black)                  | Thermal paper. Page-perforated. 24 rolls. 100 sheets 8.5" x 11" each roll.               |



# 2



## ENVIRONMENTAL/ INSTALLATION/PM

### A. ENVIRONMENTAL

#### Temperature

Operating ..... 0°C to + 55°C (+ 32°F to + 131°F)  
Non-operating ..... -40°C to + 75°C (-40°F to + 167°F)  
Thermal paper limited to + 40°C (+ 104°F)  
Humidity ..... 20% to 95% (Non-condensing)

### B. PRODUCT SAFETY

UL Listed  
CSA Certified  
IEC 380 435 International Safety Standard Compliance

### C. ELECTROMAGNETIC COMPATIBILITY

FCC Class B Certified Peripherals.  
Any questions concerning regulatory agency compliance should be directed to your local Hewlett-Packard sales office.

### D. CHANGING THE VOLTAGE

Before turning on the printer for the first time, check the rear panel voltage matrix to ensure the settings are correct. **IF THE SETTINGS OF THE VOLTAGE MATRIX DO NOT MATCH THE LOCAL LINE VOLTAGE, DO NOT TURN ON THE PRINTER.**

To correct an incorrect voltage setting:

1. Observe the matrix on the printer's rear panel. The numbers on the four curved lines are the voltages that will result from setting the switches to the positions indicated.
2. Position the two switches for the proper voltage.
3. Ensure the correct fuse is installed. Operation at 100V/120V requires a 2.0 Amp fuse, while 220V/240V requires a 1.25 Amp fuse.

### E. PREVENTIVE MAINTENANCE

There is no preventive maintenance required on the 2673A.







# 3

## CONFIGURATION

### A. INTRODUCTION

This section provides information on how to configure the printer's features. This can be done with escape sequences (temporary storage) or with the front panel CONFIG/EXIT key (permanent). Also included is information concerning interconnection to a variety of host systems and switch settings for the TPM PCA.

### B. SETTING CONFIGURATION DEFAULTS

DEFAULT settings can be implemented for each configuration feature by positioning the printhead immediately before the RESET CONFIGURATION parameter and depressing the **SELECT** key. Note that this will set default parameters for both the POWER-ON configuration (stored in EAROM) and the CURRENT configuration. The printer will print a warning message and ask the user if they wish to continue with the default settings. Table 3-1 states what default setting will be set for each feature. Defaults will also be set for DATACOMM parameters (see Table 3-2).

### C. TABLE 3-1. CONFIGURATION FEATURES

| FEATURE   | EQUIVALENT ESCAPE SEQUENCE<br>(Will alter current configuration but not power-on configuration) | FEATURE                                       | EQUIVALENT ESCAPE SEQUENCE<br>(Will alter current configuration but not power-on configuration) |
|---|---|---|---|
| <b>PRINT SIZE</b><br>Normal<br>Compressed<br>Expanded<br>(Default = Normal) | ESC&k0S<br>ESC&k2S<br>ESC&k1S   | <b>PERFORATED PAPER</b><br>(Default = On)     | Not applicable, front panel only.   |
| <b>LEFT MARGIN</b><br>(Default = 01)  | ESC&a-integer-L<br>where <integer> is the character position of the LEFT margin.                | <b>AUTO PAGE MODE</b><br>(Default = Off)      | ESC&i1L (enable)<br>ESC&i0L (disable)   |
| <b>RIGHT MARGIN</b><br>(Default = 80)                                       | ESC&a-integer-M<br>where <integer> is the character position of the RIGHT margin.               | <b>PHYSICAL PAGE LENGTH</b><br>(Default = 65) | ESC&k-integer-P<br>where <integer> is the number of text lines > 0 and < 256.                   |

(continued on next page)

Table 3-1. Configuration Features (continued)

| FEATURE   | EQUIVALENT ESCAPE SEQUENCE  | FEATURE  | EQUIVALENT ESCAPE SEQUENCE   |
|---|---|--|--|
| <b>TOP MARGIN</b><br>(Default = 2)                          | Not applicable, front panel only.   | <b>GRAPHICS X OFFSET</b><br>(Dot Columns)<br>(Default = 0)     | ESC*r<integer>X<br>where <integer> is the number of dot columns ≥ -9999 and ≤ 9999.  |
| <b>TEXT LENGTH</b><br>(Default = 60)                        | ESC&k<integer>F<br>where <integer> is the number of text lines > 0 and < 256. | <b>GRAPHICS Y OFFSET</b><br>(Raster Lines)<br>(Default = 0)    | ESC*r<integer>Y<br>where <integer> is the number of raster lines ≥ -9999 and ≤ 9999. |
| <b>MISCELLANEOUS SELECTIONS</b>                             |   | <b>PRIMARY CHARACTER SET</b><br>(Default = USASCII)            | ESC<int><char><br>where <int> and <char> defines a particular character set.         |
| Save Paper Mode<br>(Default = Disabled)                     | ESC&k1U (enable)<br>ESC&k0U (disable)   | <b>SECONDARY CHARACTER SET</b><br>(Default = Rom Ext)          | ESC<int><char><br>where <int> and <char> define a particular character set.          |
| Line Wrap Around<br>(Default = Disabled)                    | ESC&s0C (enable)<br>ESC&s1C (disable)   | <b>CHARACTER SET SELECTION</b>                                 |  |
| Permanent Enhancement Latching<br>(Default = Enabled)       | ESC&k1E (enable)<br>ESC&k0E (disable)   | Shift In/<br>Shift Out<br>(Default = Enabled)                  | ESC&k0I (enable)<br>ESC&k1I (disables SI/SO;<br>enables 8th bit mode)                |
| Tab With Enhancements<br>(Default = Enabled)                | Not applicable, front panel only.   | Eighth Bit Mode<br>(Default = Disabled)                        | ESC&k1I (enable)<br>ESC&k0I (disables 8th BIT MODE;<br>enables SI/SO MODE)           |
| CR = CR,LF<br>(Default CR = CR)                             | ESC&k1G   | <b>PERMANENT CHARACTER SET LATCHING</b><br>(Default = Enabled) | ESC&k1F (enable)<br>ESC&k0F (disable permanent latch and enable line-by-line mode)   |
| LF = CR,LF and FF = CR,FF<br>(Default: LF = LF and FF = FF) | ESC&k2G   |  |  |
| <b>DISPLAY FUNCTIONS</b><br>(Default = Off)                 | ESC Y (enable)<br>ESC Z (disable)   |  |  |

D. TABLE 3-2. DATACOMM CONFIGURATION FEATURES

| TYPE OF INTERFACE | FEATURE                               | TYPE OF INTERFACE      | FEATURE  |
|-------------------|---------------------------------------|------------------------|--|
| HP-IB             | SECONDARY COMMANDS<br>(Default = Off) | RS-232C<br>(continued) | HANDSHAKES<br>Enq/Ack<br>Xon/Xoff<br>Hardware<br>Binary<br>(Default = ENQ/ACK on,<br>all others off) |
|                   | LISTEN ALWAYS<br>(Default = Off)      |                        | STOP BITS<br>(Default = 1)   |
|                   | SERVICE REQUEST<br>(Default = On)     |                        | STRIP<br>NULL/DELETE<br>(Default = Off)  |
|                   | HP-IB ADDRESS<br>(Default = 1)        |                        |  |
| RS-232C           | BAUD RATE<br>(Default = 2400)         | PARALLEL               | DATA BITS<br>(Default = 8)   |
|                   | PARITY<br>(Default = None)            |                        | INVERT DATA<br>(Default = Off)   |
|                   | PARITY CHECKING<br>(Default = Off)    |                        |  |
|                   | DATA BITS<br>(Default = 8)            |                        |  |

E. TABLE 3-3. PRINTER INTERFACING

| SOURCE       | SYSTEM IF | IF TYPE | CABLE                   | COMMENTS/SWITCH SETTINGS   |
|--------------|-----------|---------|-------------------------|--|
| HP 83A/85A   | 82937A    | HP-IB   | N/A                     | The HP 83A/85A requires 82936A ROM drawer and 00085-15002 plotter/printer ROM.<br>S1 Switch Settings:<br>1 2 3 4 5 6 7 8 9 10<br>x 1 1 0 1 0 1 1 0 0   |
| HP 125       | —         | HP-IB   | 10631 A/B/C/D           | HP125 Printer Configuration Menu:<br>Display: OFF<br>Int Ptr: OFF<br>Port 2: OFF<br>HP-IB: ON  |
| HP 2624A/26A | —         | RS-232C | 13242G<br>(13242-60008) | 2624A/26A DATACOMM CONFIGURATION #2<br>FULL DUPLEX HARDWIRED<br>BAUD RATE: 2400<br>DATA BITS: 8<br>XMITCLKSOURCE: INT<br>STOP BITS: 1<br>RECV CLK SOURCE: INT<br>CHK PARITY: YES<br>STRIPNUDEL: YES<br>EXTCLKIN: X16<br>SRRXMIT: NO<br>XMITPACE: NONE<br>CS(CB) Xmit: NO<br>PARITY: ODD<br>BUFSIZE: 128<br>ASTERISK: OFF<br>ENQ/ACK: YES<br>TR (CD): HI<br>SR(CH): LO<br>XMITCLKOUT: X16<br>RECVSPACE: NONE<br>RR(CF)RECV: NO<br>SRRInvert: NO |

(continued on next page)

Table 3-3. Printer Interfacing (continued)

| SOURCE  | SYSTEM IF                               | IF TYPE | CABLE                   | COMMENTS/SWITCH SETTINGS  |    |     |     |    |
|---------|---|---------|-------------------------|---|----|-----|-----|----|
| HP 264X | 13296A<br>(02640-60128)                 | HP-IB   | 10631A/B/C/D            | Switches:   |    |     |     |    |
|         |   |         |                         | <table border="1"> <tr> <td>A4</td> <td>A11</td> <td>A10</td> <td>A9</td> </tr> <tr> <td>closed</td> <td>open</td> <td>closed</td> <td>closed</td> </tr> </table>                             | A4 | A11 | A10 | A9 |
| A4      | A11                                     | A10     | A9                      |   |    |     |     |    |
| closed  | open                                    | closed  | closed                  |   |    |     |     |    |
| HP264X  | 13238A<br>(02640-60031)                 | 8-Bit   | 13232J<br>(02640-60116) | PL6<br>closed<br>PL5 thru PL0<br>open<br>ATN, ATN2: open<br>FC, TA: closed<br>LA: open in 2642, 47; closed in 2648<br>B0-B4: terminal address (shipped as 29)<br>SC: open – system controller |    |     |     |    |
|         |   |         |                         | Requires device support ROM (13261A). The 2640 can dump only a maximum of 80 columns. Open switch N on keyboard interface PCA, P/N 02640-60123 to transfer escape codes to printer.           |    |     |     |    |
| HP 264X | 13250B<br>(02640-60089,<br>02640-60143) | RS-232C | 13232G<br>(02640-60098) | Switch Settings:<br>FC0, FC1, FC2: Baud Rate = 2400<br>O C O<br>FC3, FC4: Parity = none<br>O O  |    |     |     |    |

(continued on next page)

Table 3-3. Printer Interfacing (continued)

| SOURCE             | SYSTEM I/F | I/F TYPE | CABLE        | COMMENTS/SWITCH SETTINGS   |
|--------------------|------------|----------|--------------|--|
| HP 264X<br>(cont.) |            |          |              | <p>FC5, FC6, FC7: Number of null characters: Zero for a 2648 and 56 from<br/>                     O O O a 2645.</p> <p>2SB: open = one stop bit, closed = two stop bits.</p> <p>THE: closed = enable transmit handshake.</p> <p>All other switches = open.</p> <p>Comments: Requires device support ROM 13261A. Cable supports only<br/>                     hardware handshake, so enable this on 2673A.</p> <p>C = closed, O = open.</p> |
| HP 9815A           | 98135A     | HP-IB    | N/A          |  |
| HP 9825A           | 98034A     | HP-IB    | N/A          | Requires general I/O ROM.  |
| HP 9826A           | 98624A     | HP-IB    | N/A          |  |
| HP 9835A           | 98034A     | HP-IB    | N/A          | For graphics, requires plotter ROM and I/O ROM.  |
| HP 9845B/T/C       | 98034A     | HP-IB    | N/A          |  |
| HP 1000L           | 12009A     | HP-IB    | 10833A/B/C/D | Requires HP-IB if Driver ID:37 and Service Driver. While there is no de-<br>vice driver specifically for the 267X printer, the 2631B Printer Device<br>Driver, DD.12, will support alpha-numeric print capabilities on the 267X.<br>Graphics/1000 software does not support the 267X graphics capability.  |

## F. TPM PCA SWITCH SETTINGS

The 2673A printer uses a 02670-60085 TPM PCA. This board can be shipped with an 8039 microprocessor and an external ROM or with an 8049 microprocessor and no external ROM. Set the switches as follows.

8039: close switches 2, 9, and 10.

8049: close switches 8 and 10.







# 4

## TROUBLESHOOTING

### A. INTRODUCTION

This section provides troubleshooting information for isolating a printer malfunction to a replaceable assembly or component. See Section 5 for self test information.

### B. PRELIMINARY CHECKS

If the 2673A should fail to come up after power-on, a few preliminary checks should be performed before self-test diagnosis is attempted.

- Check the external line fuse and the fuse located on power supply (F1). If F1 is blown, turn the printer power off, pull connectors J11, J12, and J13, replace F1, and turn the printer back on. If F1 blows again, the power supply is probably defective and should be replaced.
- Check that TPM paper latch is fully closed and paper is installed.
- Check all internal and external cable connections.
- Check all socketed components for proper alignment (i.e. no bent pins) and firm seating.
- If the self test character display LED (located on the processor board) displays an ".8," refer to Table 4-1 for probable causes. If the LED is blank and the printer still fails to perform, check for power supply problems or incorrect voltage configuration (refer to Section 2 for proper line voltage switch settings).

**C. POWER SUPPLY CHECKS**

Voltage levels can be measured for correct tolerance at certain labeled test points on the Processor PCA.

| <b>VOLTAGE</b> | <b>ACCEPTABLE LEVELS</b> | <b>POWER SUPPLY CONNECTORS CARRYING THIS VOLTAGE</b>           |
|----------------|--------------------------|--|
| +5V            | 4.85V to 5.15V           | J11 pins 2 & 3<br>J13 pins 12, 13, 14                          |
| +16.1V         | 15.6V to 16.6V           | J12 pins 3 & 4<br>J13 pin 4                                    |
| -12V*          | -13.2V to -10.8V         | J13 pin 8  |
| -28V           | -30.8V to -25.2V         | J13 pin 2  |
| +12V           | 11.4V to 12.6V           | J13 pin 6  |
| GND            |                          | J11 pins 1 & 4<br>J12 pins 1 & 2<br>J13 pins 1, 3, 5, 7, 9, 10 |

If any of the voltages should measure out of tolerance, the power supply should be replaced.\*

\*-12V is used only by the RS-232C interface. If this interface is not present, this voltage may measure out of tolerance even though the supply is not defective.

If fuse F1 on the power supply is blown, it may indicate a defective crowbar circuit. To check, turn the printer power off, disconnect J11, J12 and J13, replace F1, and turn the printer back on. If F1 blows again, the power supply is defective and should be replaced. If F1 does not blow, the processor board is probably defective.

## D. TPM PROBLEMS

For replacement purposes, the TPM is divided into four sections:

1. Print head cable assembly, P/N 02670-60014
2. TPM mechanical module (minus print head and PCA), P/N 02670-69091
3. TPM PCA, P/N 02670-60085
4. Cable assemblies:
  - (a) TPM power cable, P/N 8120-3388
  - (b) TPM logic cable, P/N 8120-3440

If during one of the self tests the self test character display LED displays a "–5.1.0" or a "–5.2.0," the failure is probably in the TPM PCA or cable assemblies. If the TPM is not printing correct characters or if certain dots are missing, the problem may be a faulty print head or TPM PCA. To determine if the print head is defective, use the head load assembly (02670-60029) to check the status of the print mechanism's dot matrix scheme.

### CAUTION

**A defective TPM PCA may cause a print head replacement to become defective. Before replacing the print head, use the Head Load Assembly to determine if the TPM PCA is working properly.**

To use the Head Load Assembly, proceed as follows:

1. Turn off terminal power and open paper door.
2. Raise paper latch and remove paper roll.
3. Carefully disconnect the flex end of the print head cable from the TPM PCA connector.
4. Plug the long connector side of the Head Load Assembly into the TPM PCA connector. Ensure that the Head Load Assembly is seated fully into the TPM mainframe.
5. Place a small piece of paper over the opto-switch located inside TPM mainframe near the right side. It may help to tape this piece of paper down to prevent the print head movement from sweeping it away.
6. Lower and close the paper latch.
7. Power the printer up and press the **TEST** key.
8. Press the **▶** key once, then depress the **SELECT** key. The printer will begin to execute the Print Mech Test.
9. Observe the LEDs on the Head Load Assembly. During the test, each LED should blink at least once. If any LED stays on or off continuously during the test, then the TPM PCA is probably defective.

E. TABLE 4-1. ERROR ISOLATION CODES

| ERROR CODES |                       |   | MEANING   | PROBABLE CAUSES  |
|-------------|-----------------------|---|---|--|
| A           | B                     | C |   |  |
| .8          |                       |   | Basic kernel failure, testing not begun   | -Z80<br>-ROM #1 (U101)<br>-Processor board<br>-ROMs 2-6<br>-RAMs 1-3 |
| 1           |                       |   | Z80 Processor error   | -Z80<br>-Processor board<br>-ROM #1 (U101)<br>-RAMs 1-3              |
| 2           | 1<br>2<br>3<br>4<br>5 |   | Firmware ROM error<br>Error with first 8K ROM (U101)<br>Error with second 8K ROM (U201)<br>Error with third 8K ROM (U301)<br>Error with fourth 8K ROM (U401)<br>Error with fifth 8K ROM (U501)<br>For 02670-60106 board only. |  |
|             |                       | 1 | Missing ROM   | -ROM not present<br>-Bad ROM<br>-Processor board                     |
|             |                       | 2 | Incorrect ROM ID  | -ROMs in incorrect slot<br>-Bad ROM<br>-Processor board              |
|             |                       | 3 | Checksum error  | -Bad ROM<br>-Processor board   |
| 3           | 1                     | 0 | RAM error<br>Error with first 2K of RAM   | -Bad RAM 1 (U102)<br>-Processor board<br>-Z80                        |
|             | 2                     | 0 | Error with second 2K of RAM   | -Bad RAM 2 (U202)<br>-Processor board<br>-Z80                        |
|             | 3                     | 0 | Error with third 2K of RAM (optional)   | -Bad RAM 3 (U302)<br>-Processor board<br>-Z80                        |
| 4           | 1                     | 0 | Subroutine CALL/stack error<br>Stack usage error  | -Z80<br>-RAMs 1-3<br>-Processor board                                |

(continued on next page)

Table 4-1. Error Isolation Codes (continued)

| ERROR CODES |   |   | MEANING  | PROBABLE CAUSES  |
|-------------|---|---|--|--|
| A           | B | C |  |  |
| 5           | 1 | 0 | TPM error<br>Not connected   | -Cable connections<br>-TPM board<br>-Processor board<br>-TPM board<br>-TPM assembly<br>-Processor board<br>-Cable connections  |
|             | 2 | 0 | Self-test failure  |  |
| 6           | 1 |   | Character set ROM error<br>Standard character set ROM<br>(U501 for 02670-60066; U601 for<br>02670-60106) | -ROM missing<br>-Bad ROM<br>-Processor board<br>-ROM in incorrect slot<br>-Bad ROM<br>-Processor board<br>-Bad ROM<br>-Processor board   |
|             |   | 2 | Extended Character ROM or Demo<br>ROM (U601 for 02670-60066;<br>U402 for 02670-60106)                    |  |
|             |   | 1 | Missing ROM (std. only)  |  |
|             |   | 2 | Incorrect ROM ID   |  |
|             |   | 3 | Checksum error   |  |
| 7           | 1 | 0 | Timer error<br>Non functional  | -Processor board<br>-Z80<br>-Processor board<br>-Z80<br>-Processor board<br>-Z80   |
|             | 2 | 0 | Too fast   |  |
|             | 3 | 0 | Too slow   |  |
| 9           | 1 | 0 | EAROM error<br>Not initialized   | -Perform POWER ON<br>Configuration or RE-<br>SET CONFIGUR-<br>ATION (see section<br>3)<br>-EAROM missing or<br>bad (if replaced, will<br>have to be reini-<br>tialized)<br>-Processor board<br>-Power Supply |

(continued on next page)

Table 4-1. Error Isolation Codes (continued)

| ERROR CODES |                                   |   | MEANING   | PROBABLE CAUSES  |
|-------------|-----------------------------------|---|---|--|
| A           | B                                 | C   |   |  |
| 9           | 2                                 | 0   | Checksum error  | -EAROM (if replaced, will have to be reinitialized)<br>-Processor board                                |
| A           | 1                                 | 0   | Datacomm error<br>Hardware missing                                    | -I/O board missing or bad<br>-Processor board<br>-Z80<br>-Ribbon cable between Processor and I/O board |
|             |                                   | 2   | HP-IB register access error   | -HP-IB interface<br>-Processor board<br>-Z80<br>-Ribbon cable between Processor and I/O board          |
|             | 3 or 4                            | 1   | RS-232C error or Data Link error<br>False datacomm interrupt detected | -Interface board<br>-Processor board<br>-Ribbon cable between Processor and I/O board                  |
|             |                                   | 2   | False transmit ready state detected                                   | -Interface board<br>-Processor board<br>-Ribbon cable between Processor and I/O board                  |
|             |                                   | 3   | False receiver interrupt detected                                     | -Interface board<br>-Processor board<br>-Ribbon cable between Processor and I/O board                  |
|             |                                   | 4   | Datacomm interrupt not detected                                       | -Interface board<br>-Processor board<br>-Ribbon cable between Processor and I/O board                  |
| 5           | Transmit ready state not detected | -Interface board<br>-Processor board<br>-Ribbon cable between Processor and I/O board |   |  |

(continued on next page)









**Table 4-1. Error Isolation Codes (continued)**

| ERROR CODES |        |   | MEANING                                | PROBABLE CAUSES   |
|-------------|--------|---|--|---|
| A           | B      | C |  |   |
| A           | 3 or 4 | 6 | Receiver ready state not detected      | <ul style="list-style-type: none"> <li>-Interface board</li> <li>-Processor board</li> <li>-Ribbon cable between Processor and I/O board</li> </ul>   |
|             |        | 7 | Wrong character seen on loopback test  | <ul style="list-style-type: none"> <li>-Interface board</li> <li>-Processor board</li> <li>-Ribbon cable between Processor and I/O board</li> <li>-Interface cable</li> <li>-Failure in external interface</li> </ul>   |
|             |        | 8 | No character returned on loopback test | <ul style="list-style-type: none"> <li>-Interface board</li> <li>-Processor board</li> <li>-Printer configured for EXT baud rate, and/or no baud rate present from external loopback device</li> <li>-Ribbon cable between Processor and I/O board</li> <li>-Interface cable</li> <li>-Failure in external interface</li> </ul> |
|             |        | 9 | Framing error                          | <ul style="list-style-type: none"> <li>-Interface board</li> <li>-Processor board</li> <li>-Ribbon cable between Processor and I/O board</li> <li>-Interface cable</li> </ul>   |
|             |        | A | Parity error                           | <ul style="list-style-type: none"> <li>-Interface board</li> <li>-Processor board</li> <li>-Ribbon cable between Processor and I/O board</li> <li>-Interface cable</li> </ul>   |
|             |        | B | Baud rate too fast                     | <ul style="list-style-type: none"> <li>-Interface board</li> <li>-Processor board</li> <li>-Ribbon cable between Processor and I/O board</li> <li>-Interface cable</li> </ul>   |

(continued on next page)



Table 4-1. Error Isolation Codes (continued)

| ERROR CODES |        |                                      | MEANING  | PROBABLE CAUSES  |
|-------------|--------|--------------------------------------|--|--|
| A           | B      | C                                    |  |  |
| A           | 3 or 4 | C<br><br>D                           | Baud rate too slow<br><br>Control signal malfunction   | <ul style="list-style-type: none"> <li>-Interface board</li> <li>-Processor board</li> <li>-Ribbon cable between Processor and I/O board</li> <li>-Interface cable</li> <li>-Interface board</li> <li>-Processor board</li> <li>-Ribbon cable between Processor and I/O board</li> <li>-Interface cable</li> </ul>   |
| b           |        |                                      | Printing character set test pattern during manufacturing burn-in test or print mechanism test.   | <ul style="list-style-type: none"> <li>-Paper path problem</li> <li>-TPM</li> <li>-Processor board</li> </ul>  |
| C           | 1      | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8 | Control panel error<br>Stuck key on control panel keypad<br> key<br> key<br> key<br> key<br> key<br> key<br> key<br> key | <ul style="list-style-type: none"> <li>-Control panel</li> <li>-Processor board</li> <li>-Z80</li> <li>-Control panel</li> <li>-Processor board</li> <li>-Z80</li> <li>-Control panel</li> <li>-Processor board</li> <li>-Z80</li> <li>-Control panel</li> <li>-Processor board</li> <li>-Z80</li> <li>-Control panel</li> <li>-Processor board</li> <li>-Z80</li> <li>-Control panel</li> <li>-Processor board</li> <li>-Z80</li> <li>-Control panel</li> <li>-Processor board</li> <li>-Z80</li> </ul> |

(continued on next page)

**Table 4-1. Error Isolation Codes (continued)**

| ERROR CODES |   |   | MEANING   | PROBABLE CAUSES |
|-------------|---|---|---|-----------------|
| A           | B | C |   |                 |
| E           |   |   | Non-fatal error encountered during a self-test (if printable, will be displayed in a printed error message). Also displayed after user has overridden a fatal error condition with RESET key. |                 |



**F. TABLE 4-2. SELF TEST MESSAGES**

**NOTE**

This table should be used with Table 4-1 to define the error isolation codes, A, B, and C.

| MESSAGE   | MEANING  |
|---|--|
| <b>CHARACTER ROM FAILURE ABC</b>                                | Failure in Standard or Optional character set ROM, or Demo ROM.  |
| <b>CONFIGURATION ROM FAILURE ABC</b>                            | Failure in EAROM test or configuration.  |
| <b>CONTROL PANEL FAILURE ABC</b>                                | Stuck key encountered during Control Panel test.   |
| <b>DATACOMM FAILURE ABC</b>                                     | Failure in Datacomm interface test.  |
| <b>DATACOMM LOOPBACK HOOD NOT DETECTED</b>                      | During Manufacturing Burn-in test, the RS-232C datacomm test could not fully test at level 2 due to the absence of the loopback test hood. |
| <b>EXT BAUD RATE configuration limits datcomm test</b>          | Unit is configured for external baud rate; reconfigure for some standard baud rate to fully run DATACOMM test.                             |
| <b>IGNORING FAILURE ABC</b>                                     | User has overridden an error condition with the RESET key, printer is reinitialized.   |
| <b>INTERNAL TIMER FAILURE ABC</b>                               | Failure in System Timer test.  |
| <b>Level 0 Datacomm Test (no loopback device detected)</b>      | Entering Level 0 of RS-232C Datacomm test, no test hood or external interface detected.  |
| <b>Level 1 Datacomm Test (external loopback device assumed)</b> | Entering Level 1 of RS-232C Datacomm test, external interface sensed.  |
| <b>Level 2 Datacomm Test (loopback test hood detected)</b>      | Entering Level 2 of RS-232C Datacomm test, test hood present.  |
| <b>RESET abort of Manufacturing Test</b>                        | User has overridden the Manufacturing self test loop with the RESET key.   |
| <b>Self Test OK</b>   | Successful completion of self test.  |



# 5

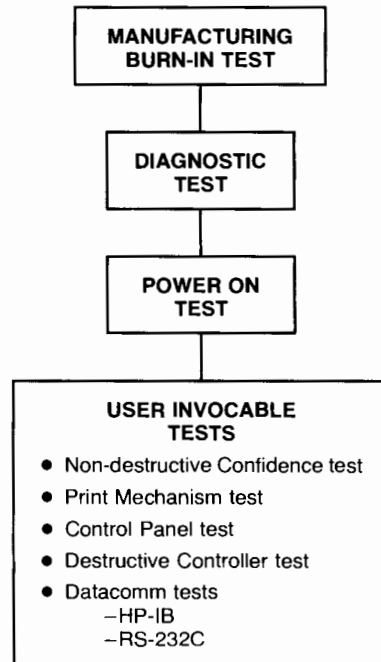
## DIAGNOSTICS

### A. INTRODUCTION

This section explains the various self tests available in the 2673A, and how these tests may be used for troubleshooting. Through use of these tests, the failing board or socketed component can be isolated, and troubleshooting can be easily accomplished within a minimal amount of time. See Section 4 for troubleshooting and error isolation codes.

### B. SELF TEST FEATURES

Four modes of testing are available in the 2673A, using a total of 8 tests. These tests are illustrated below:



## 5-2 Diagnostics/Self-Test

Use of these tests can verify the integrity of the following areas:

- Z80 Processor (Functional)
- Firmware ROMs (Present, correct ID, correct checksum)
- Static RAMs (Functional)
- Character ROM (Present, correct ID, correct checksum)
- Optional character ROM or Demo ROM (Correct ID, correct checksum)
- EAROM (Correct Initialization, correct checksum)
- 16 ms Timer (Functional)
- HP-IB Interface (Present, functional registers)
- RS-232C Interface (Present, functional data loopback, baud rate timing, byte configuration, control lines, interrupts)
- Parallel Interface (Present)
- Thermal Print Mechanism (TPM) (Present, functional processor, correct ROM checksum, functional RAM, paper present and door closed)
- Control Panel (Functional)

All of the above tests turn on the front panel LEDs when initiated. Successful completion of a test causes the 2673A to beep and turn off all LEDs except for the POWER ON indicator. When an error is encountered, the self-test character display LED located on the Processor board will indicate the error condition or an error message will be printed. Table 4-1 contains error codes and corrective action. Table 4-2 explains messages.

### C. POWER-ON TEST

This test is invoked automatically at POWER-ON. No information will be printed for successful completion. Fatal errors will be displayed in the self test character display LED, and non-fatal errors will be printed. Refer to Table 4-1 for error codes and corrective action. Table 4-2 explains printed error messages.

### D. USER INVOCABLE TESTS

#### Non-Destructive Confidence Test

This test is similar to the Power On test in all respects except the test on RAM, where it will retain all data previously stored. Errors that are non-fatal will be printed, and errors that are fatal will be displayed in the self test character display LED (refer to Table 4-2 for error message interpretation, and Table 4-1 for error codes and corrective action). To invoke this test, push the TEST button and then select CONFIDENCE.

#### Print Mechanism Test

This test verifies the function of the Thermal Print Mechanism (TPM) controller, checks the character set ROMs for presence, correct ID and checksum, and also prints a character set test pattern. Displayed are the Line Drawing set, Roman Extension set, USASCII set, Expanded print sample, Normal print sample, Compressed print sample, Enhancements (Bold, Framed, Underlined, and Combinations), and a TPM alignment pattern. Errors that are non-fatal will be printed, and errors that are fatal will be displayed in the self test character display LED (refer to Table 4-2 for error message interpretation, and Table 4-1 for error codes and corrective action). To invoke this test, push the TEST button and then select PRINT MECH.

### Control Panel Test

This test allows functional verification of all front panel keys. It may be invoked either by selecting the CONTROL PANEL test through means of the front panel **TEST** switch, or else by setting an internal switch on the Processor board prior to Power On (this is necessary in case the front panel **TEST** switch is non-operative). If the test is successful, the printer will beep each time the correct key is depressed. Failure to beep indicates non-contact of that switch, and stuck keys are displayed in a printer error message. To invoke this test, push the TEST button and then select CONTROL PANEL. Or, close switch 2 prior to power on.

### Destructive Controller Test

This test is similar to the Power On test in all respects. It will also print ROM identification data. Errors that are non-fatal will be printed, and errors that are fatal will be displayed in the self test character display LED (refer to Table 4-2 for error message interpretation, and Table 4-1 for error codes and corrective action). To invoke this test, push the TEST button and then select CONTROLLER.

### Data Communication Tests

The HP-IB and RS-232C interfaces can be tested by means of user-invocable self-tests; there is no self test available for checking the parallel interface. Both self tests are described below.

#### HP-IB Test

This test verifies the presence of the HP-IB hardware and performs a read/write check of the interface registers on the Intel 8291A. No exhaustive testing is done, because to do so would require an external HP-IB controller. Errors will be displayed in a printed error message (refer to Table 4-2 for error message interpretation, and Table 4-1 for error codes and corrective action). To invoke this test, push the TEST button and select DATA COMM.

#### RS-232C Test

This test performs internal data loopback tests, baud rate checking, various byte configuration checks, and interrupt checking of the printer interface. A special test hood (part no. 02620-60062) is required to perform this test completely, although certain checks can be performed without a test hood. The levels of testing are defined as: Level 0, no test hood or external loopback device present; Level 1, loopback device present (detected by presence of CLEAR TO SEND (CB) signal), and Level 2, test hood present. If Level 1 is to be used with an external interface that does not support data loopback, an error message will be printed, in this case, disconnect the interface cable and perform the Level 0 or Level 2 (using test hood) test. Tests performed for each level are described below:



| LEVEL | TESTS PERFORMED   |
|-------|---|
| 0     | Transmit, Receive, and Interrupt capabilities of the interface chip; internal hardware data loopback; configured baud rate*; parity and data byte configurations.   |
| 1     | Transmit, Receive, and Interrupt capabilities of the interface chip; internal hardware data loopback; configured baud rate†, parity and data byte configurations; external data loopback (if CLEAR TO SEND (CB) is present) at the user defined configuration parameters. |
| 2     | Transmit, Receive, and Interrupt capabilities of the interface chip; internal hardware data loopback; configured baud rate*, parity and data byte configurations; external data loopback; modem control signals (CH, CB, CF, SCF, and CE).                                |

**NOTE**

\*If configured for EXTERNAL baud rate, no data loopback tests can be performed; reconfigure to some internal baud rate and re-run test.

**NOTE**

†If configured for EXTERNAL baud rate, the printer will assume that the external looping device is supplying the clock. Data loopback checks will be performed at that baud rate.

If the test is successful, the printer will beep and all front panel LEDs will turn off except the POWER ON LED, plus the message "Self Test OK" will be printed. Time to complete is dependent upon the configured baud rate, with the slowest baud rate (110 baud) taking the greatest amount of time to complete the test. Errors will be displayed in a printed error message (refer to Table 4-2 for error message interpretation, and Table 4-1 for error codes and corrective action). At the time each test is entered, a message will be printed indicating which test Level (0, 1, or 2) is being run. To invoke this test, push the TEST button and then select DATACOMM.

**E. MANUFACTURING BURN-IN TEST**

This test is a continuous loop test that checks all printer modules except the continuity portion of the control panel test. It is a useful test for troubleshooting intermittently failing units. As the tests execute successfully, once each hour the printer will display the TPM self test pattern. Errors that are non-fatal will be printed, and errors that are fatal will be displayed in the self test character display LED (refer to Table 4-2 for error message interpretation, and Table 4-1 for error codes and corrective action). To invoke this test, close switches 1 and 2 prior to power up.

**F. DIAGNOSTIC TEST**

This test is a continuous loop test that checks all printer modules except the continuity portion of the control panel test. Nothing is ever printed during this test, and all errors (fatal and non-fatal) will be displayed in the self test character display LED (refer to Table 4-1 for error codes and corrective action). To invoke this test, close switch 1 prior to power on.

# 6

## ADJUSTMENTS

There are no adjustments necessary for the 2673A, including the power supply.





# 7



## PERIPHERALS

**DOES NOT APPLY.**



## 8

REPLACEMENT  
PARTS**A. INTRODUCTION**

This section lists major field replaceable parts for the 2673A printer.

**B. TABLE 8-1. EXTERNAL PARTS**

| HP PART NUMBER | UNITS<br>PER ASSEMBLY | DESCRIPTION        |
|----------------|-----------------------|--------------------|
| 02670-60093    | 1                     | Top Cover Assembly |
| 02670-20012    | 1                     | Paper Rack         |
| 02670-40038    | 1                     | Front Panel        |
| 02670-40037    | 1                     | Base               |
| 7121-2212      | 1                     | Nameplate, 2673A   |
| 5040-7223      | 2                     | Foot, Bottom       |

**C. TABLE 8-2. ASSEMBLIES AND ASSOCIATED PARTS**

| HP PART NUMBER | UNITS<br>PER ASSEMBLY | DESCRIPTION                            |
|----------------|-----------------------|--|
| 02670-69091*   | 1                     | Printer Mechanism                      |
| 1390-0281      | 2                     | Snap In Plunger (TPM)                  |
| 1390-0104      | 2                     | Snap-In Grommet (TPM)                  |
| 02670-60081    | 1                     | Control Panel                          |
| 02670-60014    | 1                     | Print Head Assembly                    |
| 02670-60085    | 1                     | TPM PCA - DOT                          |
| 02670-60067    | 1                     | HP-IB Interface                        |
| 02670-60068    | 1 (Opt 040)           | RS-232C Interface                      |
| 02670-60069    | 1 (Opt 044 or 042)    | Parallel (or Centronics) Interface     |
| 02670-60066    | 1                     | Processor PCA (without socketed parts) |

(continued on next page)

**C. Table 8-2. Assemblies and Associated Parts (continued)**

| HP PART NUMBER | UNITS<br>PER ASSEMBLY | DESCRIPTION                            |
|----------------|-----------------------|--|
| 02670-60106    | 1                     | Processor PCA (without socketed parts) |
| 02670-60060    | 1                     | Power Supply                           |
| 02670-60101    | 1 (Opt 039)           | Data Link Interface                    |
| 2110-0030      | 1                     | Fuse, 5.0A                             |
| 02670-60063    | 1                     | Rear Panel Assembly                    |

\*Exchange Part

**D. TABLE 8-3. PROCESSOR BOARD PARTS (02670-60066)**

| HP PART NUMBER            | UNITS<br>PER ASSEMBLY | DESCRIPTION                   |
|---------------------------|-----------------------|-------------------------------|
| 1818-1777                 | 1                     | ROM #1 (U101)                 |
| 1818-1778                 | 1                     | ROM #2 (U201)                 |
| 1818-1779                 | 1                     | ROM #3 (U301)                 |
| 1818-1823                 | 1                     | ROM #4 (U401)                 |
| 1818-1760                 | 1                     | Character ROM (U501)          |
| N/A                       | —                     | Optional Character ROM (U601) |
| 02670-80099               | —                     | Optional Demo ROM (U601)      |
| 1818-1611 or<br>1818-1718 | 2 (U302 is optional)  | RAM, 2KX8 (U102, 202)         |
| 1820-2298                 | 1                     | Z80A Microprocessor (U203)    |
| 1818-1757                 | 1                     | EAROM (U307)                  |

**E. TABLE 8-4. PROCESSOR BOARD PARTS (02670-60106)**

| HP PART NUMBER | UNITS<br>PER ASSEMBLY | DESCRIPTION                   |
|----------------|-----------------------|-------------------------------|
| 1818-3007      | 1                     | ROM #1 (U101)                 |
| 1818-3008      | 1                     | ROM #2 (U201)                 |
| 1818-3009      | 1                     | ROM #3 (U301)                 |
| 1818-3010      | 1                     | ROM #4 (U401)                 |
| 1818-3011      | 1                     | ROM #5 (U501)                 |
| 1818-1760      | 1                     | Std. Character ROM (U601)     |
| 1818-3012      | 1                     | Extended Character ROM (U402) |
| 1820-2298      | 1                     | Z80A Microprocessor (U203)    |
| 1818-1757      | 1                     | EAROM (U307)                  |

F. TABLE 8-5. MISCELLANEOUS PARTS

| HP PART NUMBER | UNITS<br>PER ASSEMBLY | DESCRIPTION         |
|----------------|-----------------------|---------------------|
| 3101-0402      | 1                     | AC Power Switch     |
| 2110-0002      | 1                     | Fuse, 2.0A (115V)   |
| 2110-0094      | 1                     | Fuse, 1.25A (230V)  |
| 02670-00023    | 1                     | HP-IB Panel         |
| 02670-00020    | 1                     | RS-232C Panel       |
| 02670-00018    | 1                     | Parallel Panel      |
| 8120-3441      | 1                     | 5V Power Cable      |
| 8120-3422      | 1                     | I/O Processor Cable |
| 8120-3388      | 1                     | TPM Power Cable     |
| 8120-3421      | 1                     | Control Cable       |
| 8120-3440      | 1                     | TPM Logic Cable     |
| 1400-0611      | 1                     | Cable Clamp         |
| 02670-60071    | 1                     | Fan Assembly        |



# 9

## DIAGRAMS

### A. INTRODUCTION

This section includes wiring diagrams for the 2673A.

### B. FIGURE 9-1. WIRING INTERCONNECTION

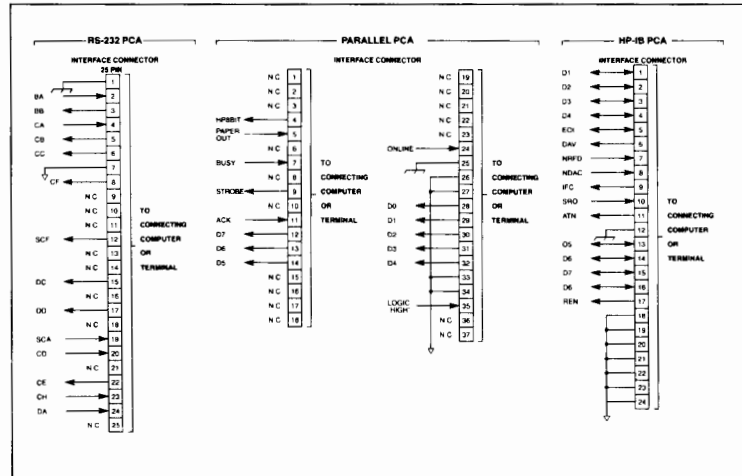
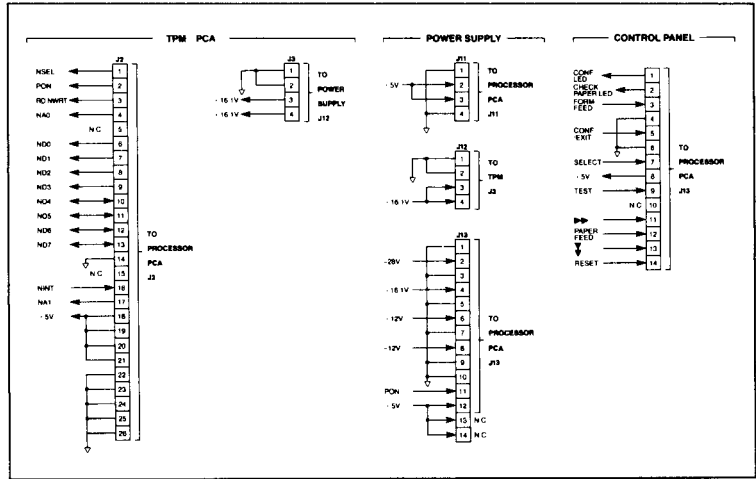
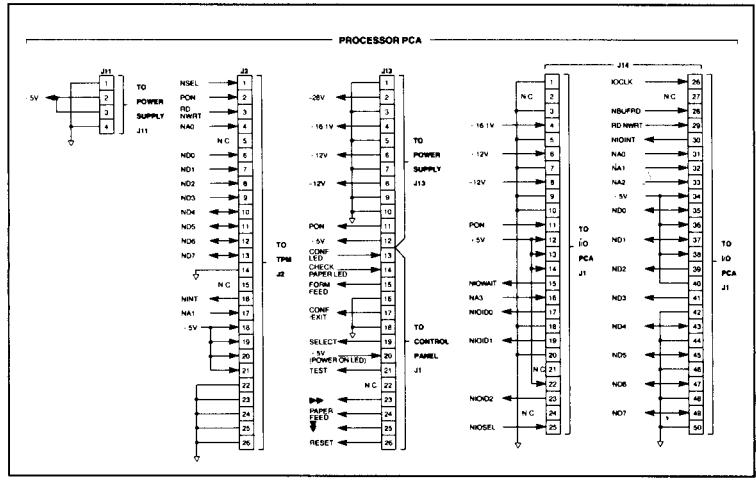
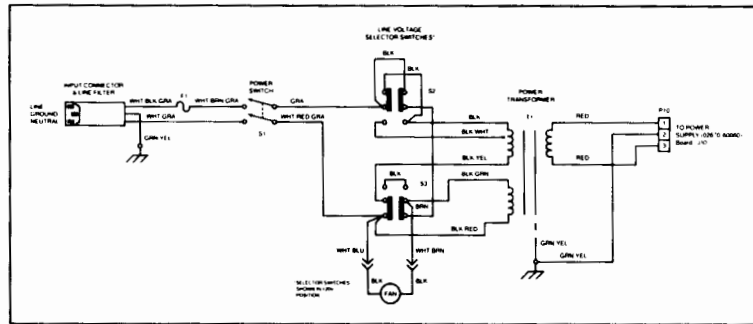




Figure 9-1. Wiring Interconnection



C. FIGURE 9-2. BACK PANEL WIRING





# 10

## REFERENCE

### A. DOCUMENTATION SUMMARY

| TITLE                   | HP P/N      |
|-------------------------|-------------|
| HP 2673A Service Manual | 02670-90018 |
| HP 2673A Users' Manual  | 02670-90016 |
| HP 2673A Data Sheet     | 5953-6261   |

### B. CONTROL CODES

Control Codes are used to perform certain printer or terminal functions (e.g. backspace, form feed, etc.) and also handshaking functions for serial data transfer (e.g. Enquiry, Acknowledge, etc.). Hex values 0 through 1F and 7F are control codes. The chart below contains the control codes recognized by the 2673A.

### C. TABLE 10-1. CONTROL CODES

| MNEMONIC   | SYMBOL       | KEYS   | DECIMAL EQUIVALENT | DESCRIPTION   |
|------------|--------------|--------|--------------------|---|
| <b>NUL</b> | $\text{^}_u$ | CNTL @ | 0                  | Null; usually used as a fill character for timing purposes. Null has no other function except as an 8-bit character in graphics mode.   |
| <b>ENQ</b> | $\text{^}_o$ | CNTL E | 5                  | Enquiry; received by printer from the host computer or controller. Printer will respond with an ACK when ready to accept data. (This code used for RS-232C interfacing only).               |
| <b>ACK</b> | $\text{^}_k$ | CNTL F | 6                  | Acknowledge; transmitted by printer in response to an ENQ from the host computer or con- Indicates that the printer is ready to accept data. (This code used for RS-232C interfacing only). |

| MNEMONIC   | SYMBOL     | KEYS   | DECIMAL EQUIVALENT | DESCRIPTION  |
|------------|------------|--------|--------------------|--|
| <b>BEL</b> | $\text{␣}$ | CNTL G | 7                  | Bell; causes the printer to beep.  |
| <b>BS</b>  | $\text{␣}$ | CNTL H | 8                  | Backspace; moves the character position one space toward the left margin.  |
| <b>HT</b>  | $\text{␣}$ | CNTL I | 9                  | Horizontal Tabulation; moves the printhead to the next preset tab stop to the right of the present position. If no tabs are set, printer will perform a CR/LF. |
| <b>LF</b>  | $\text{␣}$ | CNTL J | 10                 | Line Feed; advances the paper one line.  |
| <b>FF</b>  | $\text{␣}$ | CNTL L | 12                 | Form Feed; advances the paper to the first printable line on the next page.  |
| <b>CR</b>  | $\text{␣}$ | CNTL M | 13                 | Carriage Return; moves the printhead to the left margin. Does not advance paper.   |
| <b>SO</b>  | $\text{␣}$ | CNTL N | 14                 | Shift Out; selects the currently-designated secondary character set to be active for printing operations.  |
| <b>SI</b>  | $\text{␣}$ | CNTL O | 15                 | Shift In; selects the currently-designated primary character set to be active for printing operations.   |
| <b>DC1</b> | $\text{␣}$ | CNTL Q | 17                 | Device Control 1; trigger for output status request. Used as an XON handshake character for RS-232C interfacing.   |
| <b>DC3</b> | $\text{␣}$ | CNTL S | 19                 | Device Control 3; used as an XOFF handshake character for RS-232C interfacing.   |
| <b>ESC</b> | $\text{␣}$ | CNTL [ | 27                 | Escape; indicates that the characters immediately following are part of a command sequence.  |

# 11

**SERVICE NOTES/  
IOSMs**

**SERVICE NOTES**

| SEQ. NO. | PUB. DATE | TITLE             |
|----------|-----------|-------------------|
| 2673A-1  | June 1982 | Mylar Tab Problem |
| 2673A-2  | June 1982 | Pinched Wires     |