

# HP 82718A

Expansion Pod

Service Manual







# **HP 82718A Expansion Pod Service Manual**

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# About This Manual—

This manual contains the information you will need to service the HP 82718A Expansion Pod.

*You should read this manual through once completely before attempting any repairs, as some steps assume a prior knowledge of other steps and cautions.*

The manual contains the following seven sections:

- *Section 1 - Product Information.* This section gives a general overview of the pod as well as its physical and electrical specifications.
- *Section 2 - Installation.* This section tells how to prepare the pod for use and how to verify its functional operation.
- *Section 3 - Functional Description.* This section gives a brief description of the functions of the major blocks in the pod.
- *Section 4 - Removal and Replacement.* This section tells how to remove and replace pod assemblies.
- *Section 5 - Troubleshooting and Diagnostics.* This section tells how to troubleshoot and repair the pod.
- *Section 6 - Replaceable Parts.* This section lists the replaceable parts and contains an exploded view and component location diagram of the pod.
- *Section 7 - Diagrams.* This section contains the schematic drawings of the pod.

Appendix A contains component-level repair information, and appendix B contains listings of the diagnostic ROM programs.

The tools and test equipment required to service the pod are listed in tables 4-1 and 5-1 on pages 4-1 and 5-2 respectively.





# **Section 1**

## **Product Information**

### **1-1. Introduction**

This section provides an overview of the HP 82718A Expansion Pod.

The pod is a portable, battery-operated accessory for the HP-75C/D computer; it adds two enhancements to the computer that are valuable for RDDP (remote data distributed processing) applications: an integral direct-connect modem and extended memory.

### **1-2. Description**

The 300 baud modem has the following features:

- Bell 103-compatible originate/answer.
- Two RJ11C direct-connect jacks.
- Automatic reporting of call failure, communications established, and loss of communications.
- Automatic call answering.
- Automatic disconnect on call failure or loss of communications.
- Automatic dialer (pulse, tone).

The modem is controlled by its own MPU (microprocessing unit) and associated circuitry. Low-level modem commands are included in 4K bytes of ROM.

Up to 64K bytes of extended electronic disc memory can be installed in the pod in increments of 8K bytes. Standard configurations are 24K-, 32K-, and 64K bytes.

High-level modem and electronic-disc commands are included in 16K bytes of ROM that are identical to the HP-75 plug-in ROMs.

The pod connects directly to the HP-75 bus through the right-hand front ROM port and is controlled by a memory-management IC (integrated circuit).

The two battery packs in the pod provide power for both the pod and the HP-75. They can be recharged by plugging an ac adapter into the HP-75 while it is installed in the pod.

## 1-3. Specifications

Equipment specifications are shown in table 1-1.

**Table 1-1. Specifications**

### Physical

- Dimensions (HP-75 plus pod): 29.2 cm by 16.5 cm by 6.4 cm (11.5" by 6.5" by 2.5")
- Weight (HP-75 plus pod): 1.60 kilograms (56.5 ounces)

### Electrical

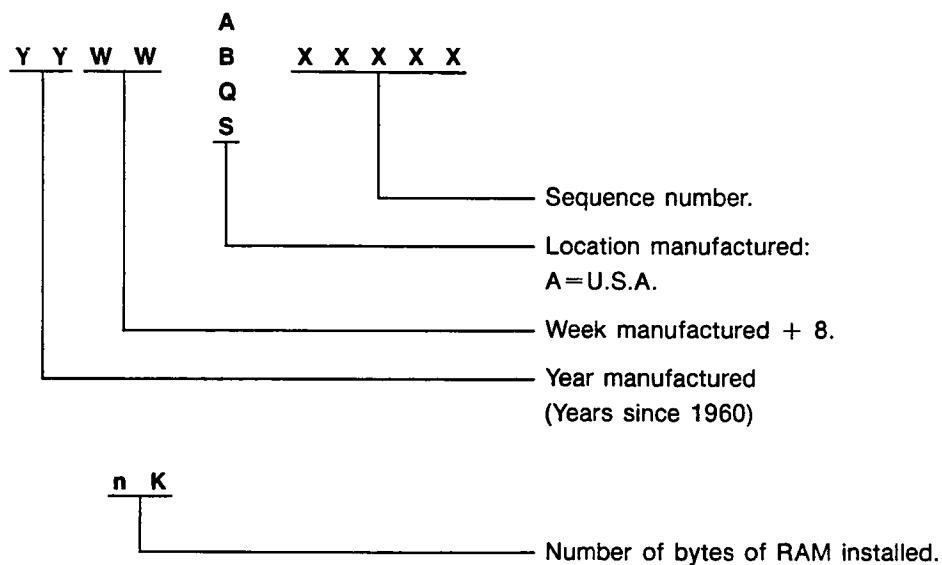
- 175 milliamps (max) at 5.2 to 5.5 Vdc.

### Environmental

- Operating temperature: 0 to +45°C (32° to 113°F).
- Storage temperature: -40° to +55°C (-40° to 131°F).
- Recharging temperature: +10° to +40°C (50° to 104°F).

## 1-4. Identification

The serial number of the HP 82718A is used for identification and the determination of warranty status. It is located on the bottom overlay. Its format is described below.



# Section 2

## Installation

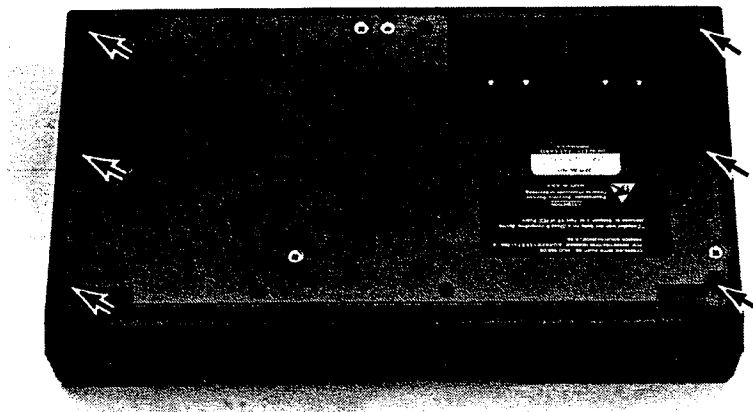
### 2-1. Introduction

This section tells you how to prepare your HP 82718A Expansion Pod for use and how to verify its functional operation.

### 2-2. Preparation

To prepare your pod for operation, do the following:

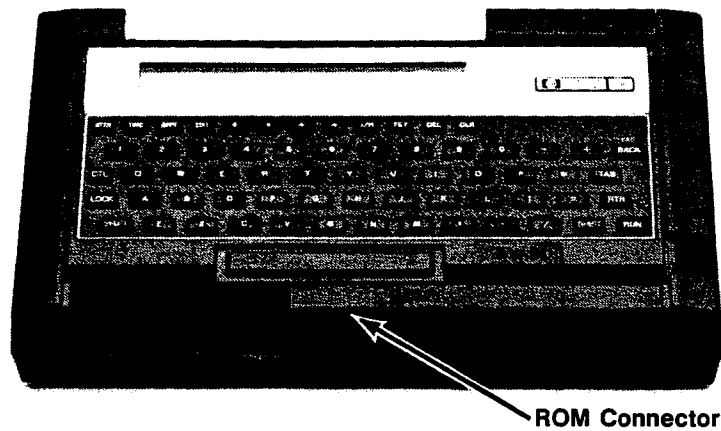
- a. If the end retainers are in place, remove them by unscrewing the six long screws in the bottom case.



**Figure 2-1. End Retainer Screws**

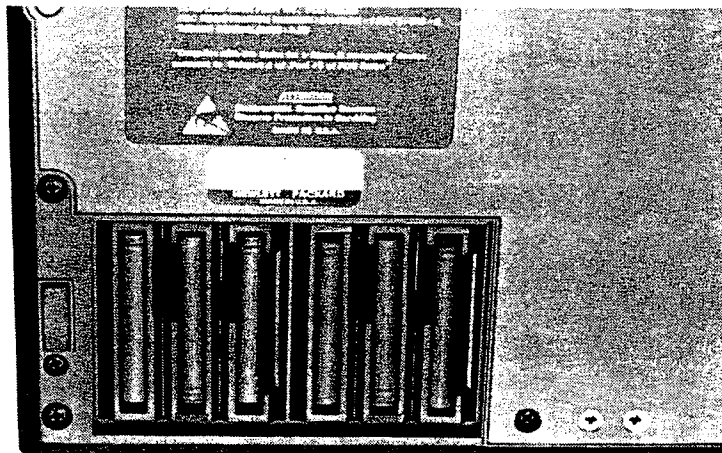
- b. Be sure the HP-75 is turned off.
- c. Remove the battery pack from the HP-75.

- d. Install the HP-75 in the pod by plugging in the ROM connector, placing the HP-75 on the top case, and installing the end retainers.



**Figure 2-2. HP-75 Installation**

- e. Install charged batteries and the battery door in the pod.



**Figure 2-3. Batteries Installed in the Pod**

- f. Remove a dummy ROM if present from either of the other two ports in the HP-75 and install a pod diagnostic ROM.

## 2-3. Functional Verification

To verify the functional operation of the pod, do the following:

- a. Press **ATTN**. The HP-75 should turn on. If it doesn't, go to table 5-2.
- b. If the HP-75 turns on, go into the edit mode (press **EDIT**), type in RUN "P" and press **RTN**. The pod test program runs. (You will need to press **EDIT** twice if this is a cold start.)
- c. If the unit is good, various messages are displayed, and then "pod OK (nn)" is displayed, where nn corresponds to the number of K bytes of installed RAM as indicated on the pod label. In case an error message is displayed, refer to section 5 for analysis of the results.



# Section 3

## Functional Description

### 3-1. Introduction

This section gives you a brief functional description of the major blocks in the HP 82718A Expansion Pod. Refer to the system block diagram shown in figure 3-1.

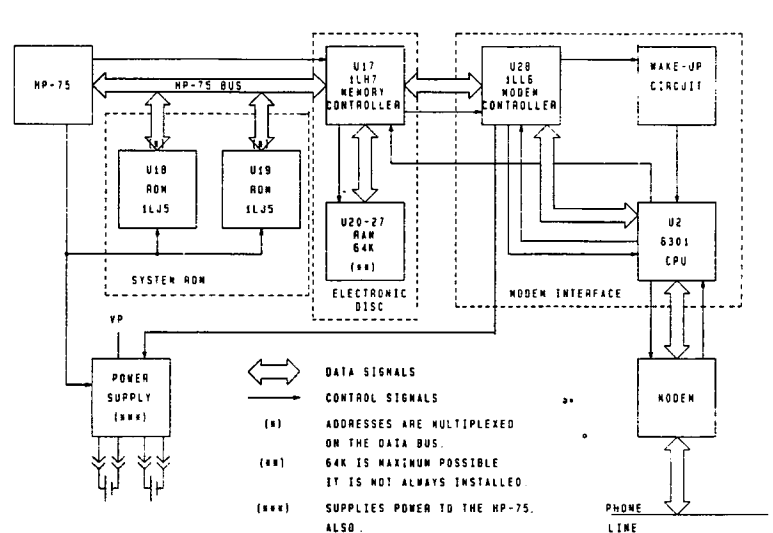


Figure 3-1. HP 82718A Block Diagram

### 3-2. The Memory Management IC (MEMIC, 1LH7)

Memory Manager 1LH7 (U17) provides the general interface between the HP-75 bus, and the external memory and modem controller in the pod.

The input to U17 comes from the HP-75 8-bit time-multiplexed address/data bus. Output to the HP-75 is placed on the HP-75 bus by U17. Six control lines are used to indicate the type of information being transmitted on the bus and when it is available.

U17 outputs read/write, chip enable, and address signals to the pod allowing one of eight possible RAM ICs, or the modem to be accessed. Data is transferred to and from the RAMs and the modem on the 8-bit U17 bus.

A global-disable signal, pin 2, can be tied high to isolate U17 from the bus for troubleshooting.

### 3-3. ROM ICs

The two ROM ICs (U18 and U19) contain the interface software for the HP 82718A. They are identical to the HP-75 plug-in ROMs and are located at I/O addresses FF40H and FF48H. They reside on the HP-75 bus and appear to the HP-75 the same as a 16K-byte-plug-in ROM. Pin 11 of each ROM is a chip-inhibit pin; when it is tied high, the ROM is disabled.

### 3-4. Modem Controller Circuitry

The 63A01 IC (U2) is the modem controller CPU. It provides a full-duplex asynchronous serial communication interface between the HP-75 and the modem. The first 30 to 50 pods will have a U2 that does not contain on-board ROM and will therefore require three additional ICs, U3, U4 and U16. In this configuration, U2-9 is grounded through R12 and jumper W2. U3 is an octal D-type address latch that is required because the addresses and data are time multiplexed on the port 3 bus from U2. The output of U3 goes to U4, a 4K byte EPROM that contains operating information for U2. Three upper address bits are routed directly from U2 port 4 to U4. U16 is an address decoder for U4. (The units containing this configuration will be identifiable only by the presence of the three additional chips.) Subsequent units will have only a U2 with 4K bytes of on-board ROM. In this configuration, U2-9 is tied to Vp through R12 and jumper W2.

The 1LL6 (U28) contains handshake logic circuitry for the modem interface. It provides an interface between U2 and the memory space in U17. (Modem status is in the electronic-disc memory at address 05F020H. Modem data is at address 05F000H.) It also provides a signal to the power supply to turn on the modem power when it is required.

A global-disable signal INIT (U28-41) can be tied high to isolate U28 from the bus for troubleshooting.

U15 is a Schmitt trigger that provides proper timing signals for the STANDBY, RESET, and STABLE lines in U2 and U28.

### 3-5. Power Supply

The DC-to-DC converter is self-oscillating and stores energy in an inductor (transformer primary) and then transfers the energy into capacitors. The energy in the capacitors is then supplied to the load while the switching circuit begins storing energy into the inductor again. The converter is capable of providing 175 ma to a load at 5.3V with a minimum battery voltage of 3.3V.

There are two output voltages, Vp and Vm. Each voltage has two levels. Vp is controlled by  $\overline{\text{PSON}}$ , the inverted HP-75 PWO signal. When  $\overline{\text{PSON}}$  is low, Vp is from 5.1 to 5.4 volts. When  $\overline{\text{PSON}}$  is high, Vp is a minimum of 2.2 volts. This will maintain data in the RAM ICs. Vm is a switchable supply line to the modem module. When the modem is on, Vm is 4.75 to 5.25 volts. When the modem is off, Vm = 0. (It is assumed here that all assemblies are connected and that the ROM connector is plugged into the HP-75.)

When the power supply is turned on, Vp is controlled by comparing the sense voltage from resistor network R2 and R20 to the reference voltage across the reference diode VR2 (1.235V). When the sense voltage is above the reference voltage, U1A allows current to flow through R8 turning Q4 on and thereby turning Q3 off. Any power required by the system during this period is provided by the capacitor C5 and the rest of the capacitance on the Vp bus.



When  $V_p$  drops sufficiently low, the sense voltage falls below the reference voltage, and the output of U1A goes to 0 volts; Q4 is turned off and Q3 is turned on. The energy-storing sequence then begins.

Energy is stored in T1 by the battery current flowing through Q3. This is a ramp current of up to approximately 1.2A maximum; it flows from the battery through Q3 and the primary winding of T1. The current induced in the secondary of T1 flows through R3 and C2 and provides a positive feedback voltage to the base of Q4, quickly driving Q4 into saturation. Since the current in the primary of T1 is no longer increasing, the current in the secondary of T1 starts to fall, thereby applying a negative-going voltage to the base of Q3, quickly turning Q3 off. The energy stored in the primary of T1 then flows through diode CR2 into C5, causing  $V_p$  and the sense voltage to rise to or above the reference level. The energy-storing sequence is then completed until the sense voltage again falls below the reference level.

Capacitors C3 and C5 and transistors Q3 and Q4 are returned to B- rather than ground because the series resistance of R5 would limit the amount of energy that could be stored in T1 and the speed with which this energy is transferred to capacitor C5. The feedback network consisting of resistor R3 and capacitor C2 is designed to permit a collector current of at least 1.2A to flow in Q3. R18 increases the voltage on the base of Q3 when the modem is turned on to provide for the additional energy required by the modem.

Pod battery number one is located electrically in the HP-75 battery circuit, and pod battery number two is effectively connected in parallel with it. Therefore, it is possible for the HP-75 battery-detect circuit to detect the level of the pod batteries. The BATT annunciator appears first; then the "WARNING: low batteries" message appears, and the system shuts down. The batteries can be charged by plugging an ac adapter into the HP-75.

Resistor R1 is connected between the negative terminals of the two batteries to limit the equalizing current that will flow if the batteries are not charged to the same voltage. R5 is a 1/8W resistor that burns out quickly if  $V_p$  is shorted to ground thereby acting as a fuse to protect the circuitry on the PCA. (R5 on the Pwr/Mem PCA in the HP-75 could also be burned out.) It also acts as a charging-current limiter when the batteries are charged from the HP-75.

## 3-6. Jumpers

Jumper W1 is connected to ground in units used in the US. It will be connected to  $V_m$  in a European unit that includes the modem, although there are no plans to develop such a product at this time.

Jumper W2 connects resistor R12 to  $V_p$  in units containing U2s with on-board ROM. In units with external ROM, W2 grounds R12.

Jumper W3 permits adjustment of the 6301 modem controller (U2) to operate with modems of differing noise characteristics. It connects RX0 (U2-11) to either  $\overline{RX1}$  (J2-11) or  $V_p$  (U2-9). Pods using the 82718-60907 modem should have W3 connecting U2-11 to J2-11.



# Section 4

## Removal and Replacement

### 4-1. Introduction

This section describes the steps you must take to remove and replace assemblies and components in the HP 82718A Expansion Pod. Disassembly procedures are described in paragraph 4-3. Reassembly procedures are described in paragraph 4-7.

### 4-2. Required Tools

The tools you will need to disassemble and reassemble the pod are listed in table 4-1.

**Table 4-1. Required Tools**

HP Part Number	Description
HP 82059D	Adapter, ac
82718-60906	Cable, extension, four wire
HP-75C or HP-75D	Calculator, test, HP-75
8720-0001	Nutdriver, 3/16 inch
8710-0555	Pliers, needlenose, right-angle
5061-7248	ROM, diagnostic
8710-0899	Screwdriver, Pozidriv #1

### 4-3. Disassembly Procedure

The following procedure describes the steps you should take to disassemble the pod.

#### CAUTION

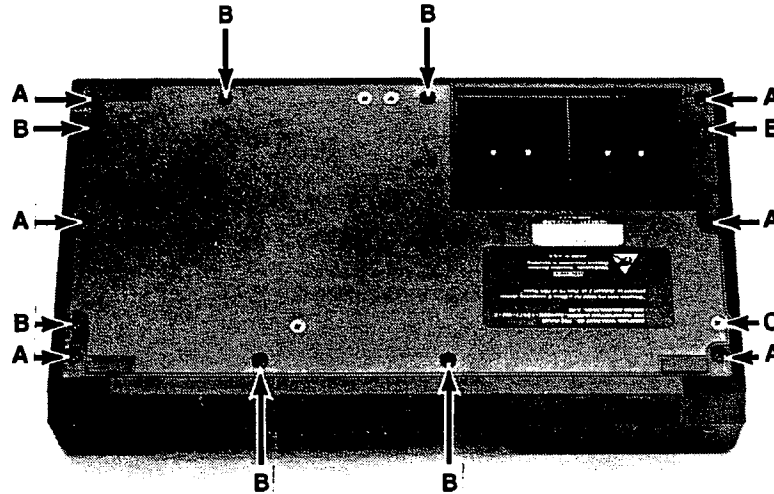
Always remove the batteries before disassembling the pod. Otherwise, damage to components may result.

Make sure your work station is protected against ESD (electrostatic discharge) with a static mat and a static fan and that you are wearing a grounded wrist strap before opening the pod. CMOS components on the main PCA are subject to ESD damage.

The overlays on the top- and bottom cases are cosmetically sensitive parts. Handle them with care in order to prevent damage to them.

#### 4-4. To remove the power PCA:

1. Remove the two end retainers by removing the six large screws (A) from the bottom case.

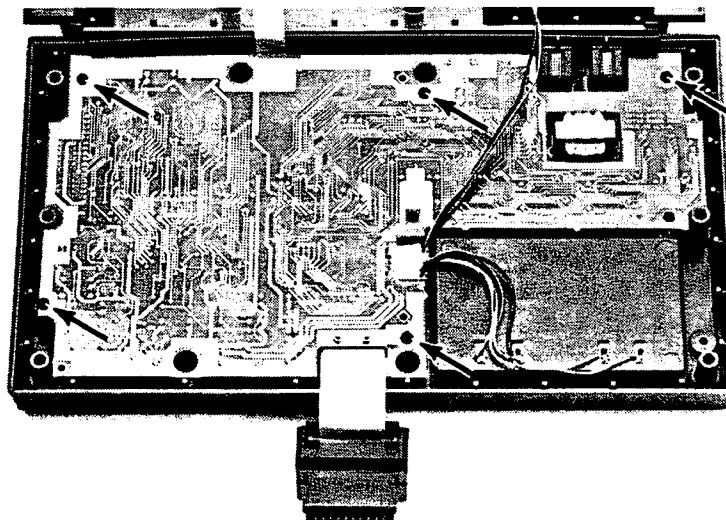


**Figure 4-1. Bottom-Case and End-Retainer Screws and Battery Compartment**

2. Remove the seven small panhead screws (B) and the one flathead ESD screw (C).
3. Turn the pod right-side-up with the ROM connector facing you. If an HP-75 is present, remove it. Lift off the top case, and lay it upside down next to the bottom case.

#### CAUTION

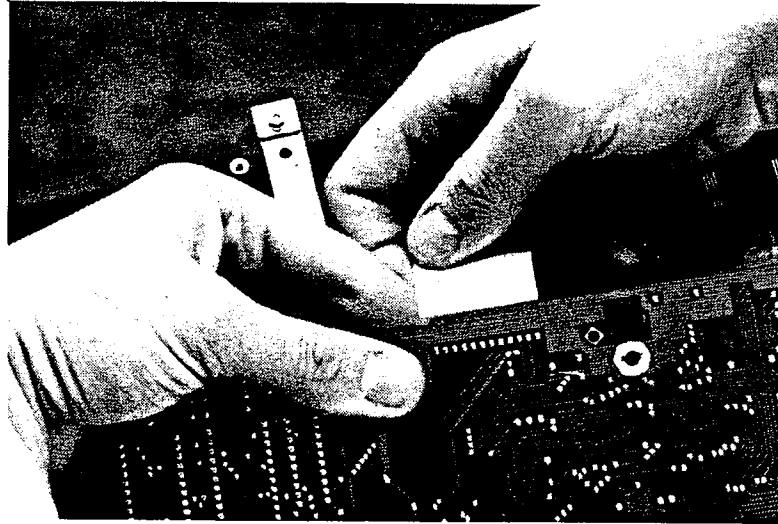
Be careful not to pull too hard on the two-wire battery cable connecting the top case to the PCA. The wires or connector may be damaged.



**Figure 4-2. Power-PCA Mounting Screws**

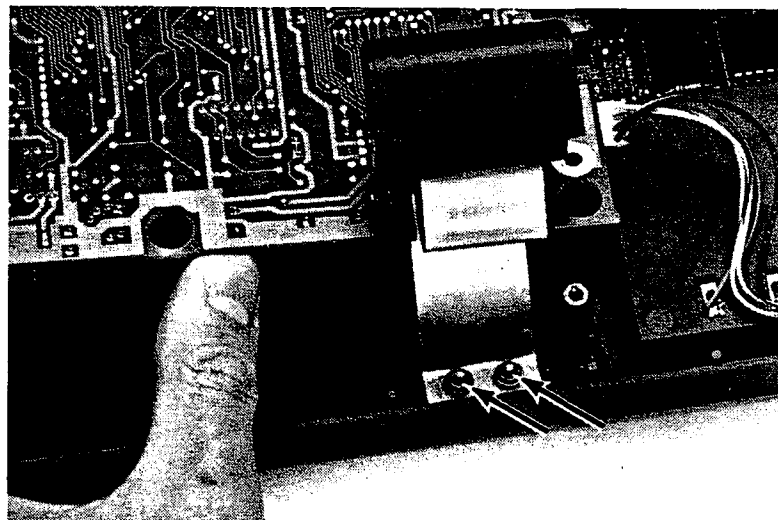
4. Remove the five PCA mounting screws.
5. Lift the PCA up, and disconnect the two- and four-wire connectors.

6. Hold your forefinger on the modem flex-cable connector to prevent it from bending, and pull the flex cable out of the connector.



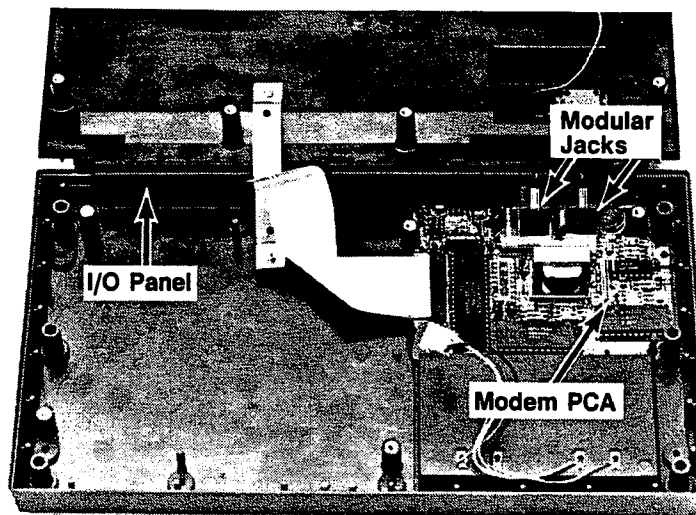
**Figure 4-3. Disconnecting the Modem-Flex Cable**

7. Using a 3/16 inch nutdriver, remove the two nuts that secure the ROM-connector shield to the bottom case.



**Figure 4-4. ROM-Connector-Shield Screws**

8. Lift the PCA out of the bottom case.

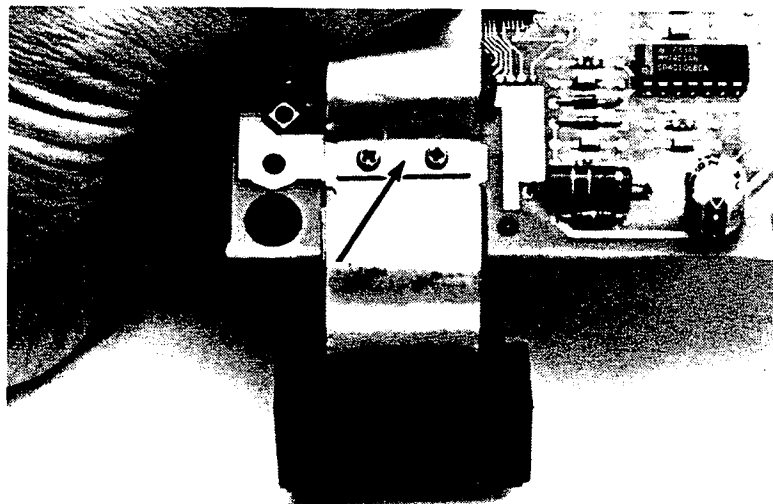
**4-5. To remove the modem PCA:**

**Figure 4-5. Modem PCA, Modular Jacks, and I/O Panel**

1. Remove the power PCA as described in paragraph 4-4 if you haven't already done so.
2. Lift the modem PCA up out of the bottom case. (The I/O panel may come out with it.)

**4-6. To remove the ROM connector:**

1. Remove the power PCA as described in paragraph 4-4.
2. Remove the two screws holding the strain-relief bar in place.



**Figure 4-6. ROM-Connector Cable Strain-Relief Bar and Connector**

3. Open the zero-force connector by pulling the collar out, and carefully pull the flex cable out of it.

**4-7. Reassembly Procedure**

The following procedure describes the steps you should take to reassemble the pod.

#### 4-8. To reassemble the ROM connector:

1. Open the zero-force connector, and insert the flex cable using right-angle needlenose pliers. Make sure the cable is inserted as far to the left in the connector as possible without damaging the cable. Check that the traces on the cable are aligned with the leads coming out of the back of the connector. Close the zero-force connector by pressing on the front of it with your thumb or by using the needlenose pliers.
2. Plug an ac adapter into the HP-75, and plug the ROM connector into the right-hand ROM port.

When you have completed steps 1 and 2, your setup should look like figure 4-7.

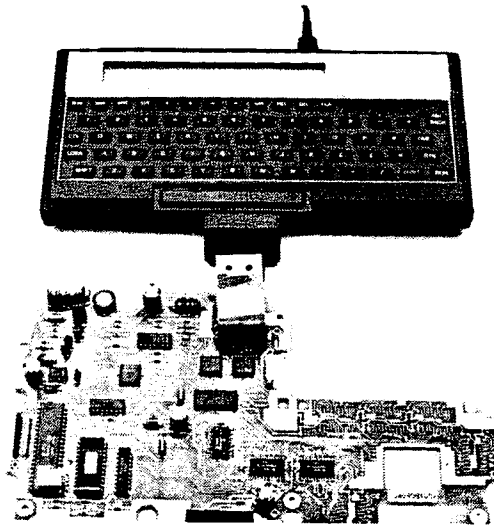
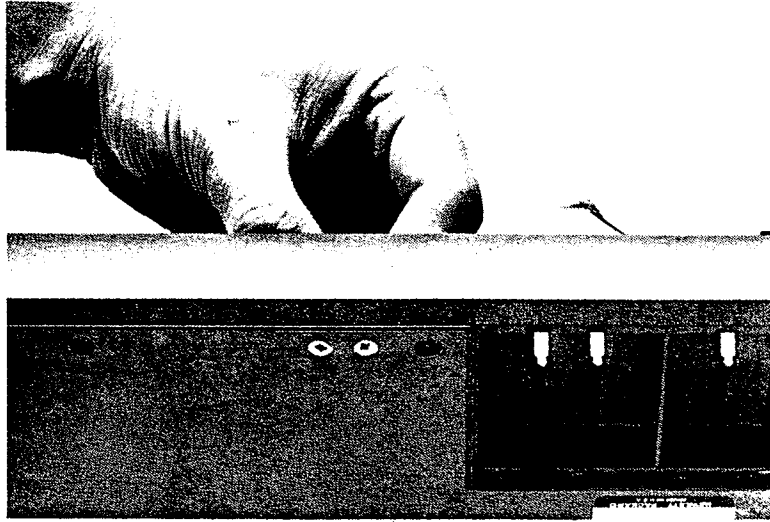


Figure 4-7. ROM-Connector Test Setup

#### CAUTION

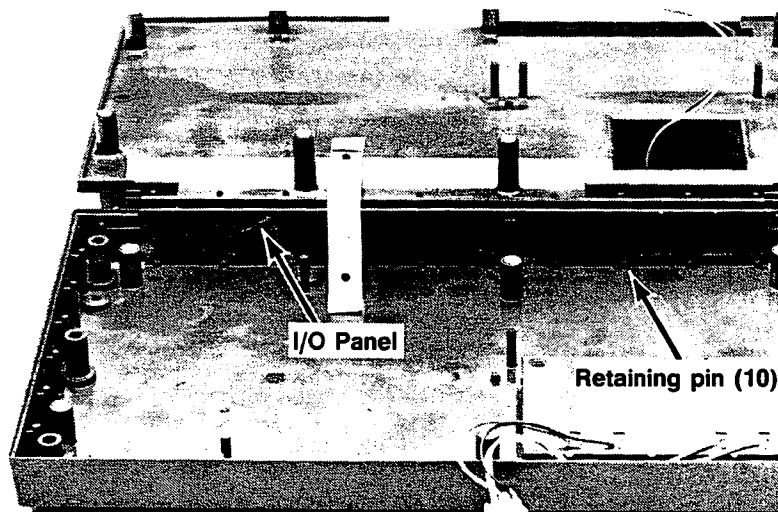
Make sure there is nothing on your bench under the PCA, such as screws or washers, that could cause a short circuit when power is applied. Otherwise, damage to the PCA may result.

3. Turn on the HP-75, type in CAT ":XMEM", and press **[RTN]**. The words NAME TYPE LEN TIME DATE should appear in the display. If this message appears in the display, the ROM connector is good and is connected properly. Go to step 5. If the message does not appear, go to step 4.
4. If the message described in step 3 does not appear in the display, either the flex cable is not aligned correctly in the connector or the ROM connector is bad. Open the collar on the connector and remove the flex cable from the connector; then reinstall it and repeat the test described in step 3. (You may have to remove and reinstall the flex cable several times before you decide the ROM connector is bad.)
5. Position the strain-relief bar on top of the ROM-connector shield, and put one of the screws through one of the holes.
6. While holding the screw in place with your finger, turn the board over, and put a nut on the screw.
7. Repeat step 6 with the other screw. Tighten both screws securely.

**4-9. To reassemble the power PCA:**

**Figure 4-8. Installing the ROM-connector Shield Screws**

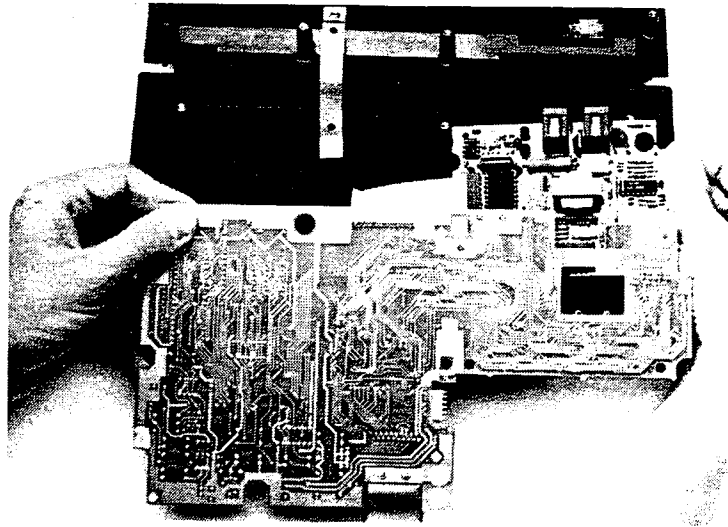
1. If it is not already present, install the ROM connector on the power PCA as described in paragraph 4-8.
2. Stand the bottom case up on edge. Insert the two ROM-connector-shield screws in the bottom case. Hold the two screws inside the bottom case between your thumb and forefinger, and lay the bottom case down flat on the bench. The screws are now held in place protruding up into the bottom case.
3. Install the I/O panel in the bottom case. Make sure it is seated properly behind the ten retaining pins.



**Figure 4-9. I/O-Panel Installation**

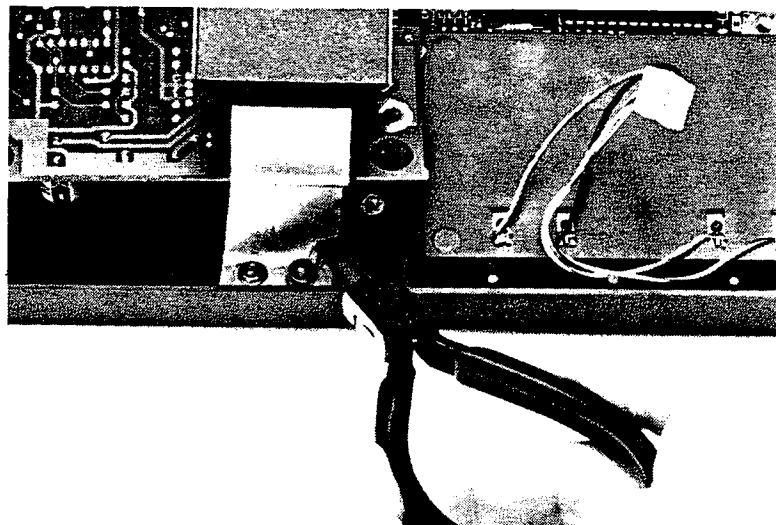
4. Insert the modem flex cable into the connector on the modem PCA. Make sure it is inserted all the way and is aligned correctly.
5. Insert the modem flex cable into the connector on the power PCA. Hold the connector while doing so, so it won't bend.
6. Holding the two PCAs in the correct orientation relative to each other, place the modem PCA into position in the bottom case. Lay the power PCA down in front of its normal position so that the modular jacks on the modem PCA are exposed.





**Figure 4-10. Installing the PCAs**

7. Bend the I/O panel slightly, as required to seat the two modular jacks in the holes in the panel.
8. Lift the power PCA up, and position the ROM-connector shield on the screws. Place a washer and nut on one screw. (You may need to use right-angle needlenose pliers to handle the washers and nuts.) Start the nut with a nutdriver. Do the same with the other washer and nut. To make sure both screws are securely fastened, lift up the bottom case and tighten the nuts using both a nutdriver and a screwdriver.



**Figure 4-11. Securing the ROM-Connector Shield**

9. Connect the two- and four-wire battery cables. Make sure that the connectors are oriented so the black wires are on the outside and that the connector is pressed all the way onto the pins on the PCA.
10. Install the five screws in the PCA. Start all five screws before tightening to insure proper board alignment.
11. Install the top case on the bottom case, turn the pod upside down, and install the eight screws. Make sure the flat-head screw that secures and grounds the modem PCA is in the proper location.
12. Install a charged set of batteries in the pod.
13. If not already present, install the pod-diagnostic ROM in the HP-75.
14. Plug the ROM connector into the test HP-75, and install the HP-75 in the pod.

15. With the cursor present, type RUN "p" RTN. If "pod OK (nn)" does not appear, refer to section 5 for a description of any error messages that do appear.
16. Remove the HP-75, and install the end retainers.

# Section 5

## Troubleshooting and Diagnostics

### 5-1. Introduction

This section describes the procedures you should follow to troubleshoot and repair the HP 82718A Expansion Pod. Read this whole section before attempting to repair a pod for the first time.

#### CAUTION

The HP 82718A Expansion Pod contains components that are susceptible to ESD (electrostatic discharge). Be sure your work station is protected against ESD with a static mat and a static fan. Use a grounded wrist strap and follow all precautionary procedures while troubleshooting and repairing the HP 82718A. Failure to do so could result in damage to components in the unit.

The diagnostic ROM is the basic tool you will use for troubleshooting the HP 82718A. By executing the test programs and test commands, you will be able to locate a faulty component with a good degree of accuracy. Listings of the programs contained in the diagnostic ROM appear in appendix B.

If you are unable to determine which component is faulty by means of the diagnostic tests, you can use other test procedures using available test equipment. Section seven contains schematics you will find helpful for this purpose.

The modem PCA will be repaired to the assembly level only.

## 5-2. Required Tools

The tools and test equipment you will require to troubleshoot and repair the pod are listed in table 5-1.

**Table 5-1. Required Tools**

Part Number	Description
5061-7248	Diagnostic ROM
82718-60906	Battery cable
HP 82059D	Ac adapter

## 5-3. Initial Preparation

Do the following first:

- Inspect the unit for physical damage. Replace any components that are visibly damaged.
- Determine the customer's concern if possible. Frequently the customer includes with the unit a message describing the problem.

## 5-4. Test Procedures

In the following procedures, you will come to steps in which you are told to replace one or more parts. Replace the parts in the order indicated. After each new part has been installed, repeat the procedure from the beginning to determine whether the fault has been eliminated. If the fault has not been eliminated, replace the original part.

Remove the two end retainers by unscrewing the six long screws in the bottom case.

Plug the ROM connector into the HP-75, and install the HP-75 in the pod.

(You may wish to leave the end retainers off as a matter of convenience.)

Install charged batteries in the pod, and plug an ac adapter into the HP-75.

Remove a ROM if necessary, and install a pod diagnostic ROM in the HP-75.

Press **ATTN**.

If the HP-75 does not turn on, go to table 5-2.

If the HP-75 turns on, go to table 5-4.

**Table 5-2. The HP-75 Does Not Turn On**

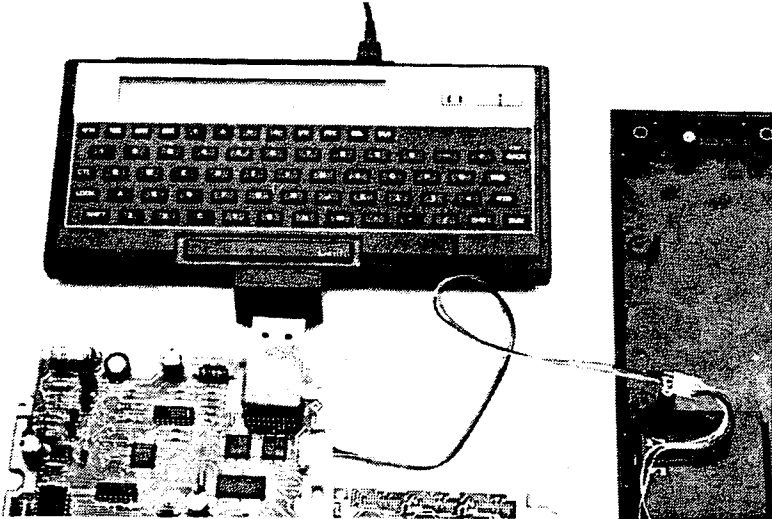
Action
1. Remove the power PCA. (Refer to section 4 for disassembly procedures.)
2. <div data-bbox="293 390 1445 552" style="border: 1px solid black; padding: 10px; margin: 5px 0;"> <p style="text-align: center;"><b>CAUTION</b></p> <p>Make sure there is nothing on your bench under the PCA, such as screws or washers, that could cause a short circuit when power is applied. Otherwise, damage to the PCA may result.</p> </div> <div data-bbox="293 583 1445 762" style="border: 1px solid black; padding: 10px; margin: 5px 0;"> <p style="text-align: center;"><b>CAUTION</b></p> <p>When installing the extension cable, make sure the orientation of the cable at both ends is correct. Otherwise, the PCA may be damaged.</p> </div>
<p>Reconnect the PCA as shown in the picture below. Use the extension cable to connect the batteries to the power PCA. The black wire on the extension cable goes to the outside when the connector is pushed all the way onto the pins on the PCA.</p>
<p>Plug an ac adapter into the HP-75.</p>

3. Go to table 5-3. Make sure that the batteries are fully charged and that the modem is turned off. Check the voltages on the test points and replace those components that are bad as indicated by incorrect voltages. Refer to the power supply schematic in section nine. 4. Press <b>ATTN</b> . If the HP-75 does not turn on, remove the ROM connector from the PCA and plug it into the HP-75. 5. Press <b>ATTN</b> . If the HP-75 does not turn on, the ROM connector is bad; replace it. 6. If the HP-75 turns on, the ROM connector is good. Reassemble it on the PCA. 7. Check the ROM-connector flex-cable connector and ICs U17, 18, and 19 for shorts or solder bridges. Then ground test points 12, 10, and 8 one at a time in that order. While grounding each test point, press <b>ATTN</b> . If the HP-75 turns on, you have located the faulty IC. Replace the power PCA. 8. If the HP-75 does not turn on during step 7, replace the power PCA.

Table 5-3. Power Supply Voltages

Test Point	Signal Name	Voltage
1	Battery voltage	3.3 to 4.2V, typical
2	Collector of Q3	0 to 4.1V, oscillating
3	Vp1	5.1 to 5.4V
4	Vref	1.2 $\pm$ 0.5V
5	Vp2	5.2V typical

Table 5-4. The HP-75 Turns On

Action
<ol style="list-style-type: none"> <li>1. Turn the HP-75 off, and install the pod diagnostic ROM.</li> <li>2. Key in RUN 'p' <span style="border: 1px solid black; padding: 0 2px;">RTN</span>.</li> </ol> <p>The Pod self test runs.</p> <p><b>NOTE:</b> You may wish to key in 'DELAY n', where n is the number of seconds delay, before running the self test in order to slow down the display of the messages, or you may wish to use an HP-IL monitor.</p> <p>A series of messages are displayed indicating whether certain components or functions are 'OK' or 'BAD'. If the error message, "modem BAD" is displayed, replace the modem PCA; otherwise, replace the power PCA.</p> <p>If you are doing assembly-level repair only, and a 'BAD' error message is displayed, replace the entire power PCA.</p> <p>If you are doing component-level repair, and a 'BAD' error message is displayed, refer to the tables in appendix A for a description of probable and possible causes of the error, and replace in order the components indicated.</p>

# Section 6.

## Replaceable Parts

### 6-1. Introduction

This section lists the replaceable parts and assemblies of the HP 82718A Expansion Pod you will use for assembly-level repairs.

The pod is illustrated in figure 6-1.

The component location diagram is shown in figure 6-2.

### 6-2. Ordering Information

To order replacement parts or assemblies, address your order or inquiry to the Corporate Parts Center. Specify the following information for each part ordered:

- Product model and serial number.
- HP part number.
- Part description.
- Complete reference designation.

**Table 6-1. Replaceable Parts, Assembly-Level**

Index Number, Figure 6-1.	HP Part Number	Description	Qty
1	82718-60005	ASSEMBLY, battery door	1
2	82718-60016	ASSEMBLY, bottomcase	1
3	82718-60907	ASSEMBLY, modem printed-circuit	1
4	82718-69002	ASSEMBLY, power printed-circuit, 24K (exchange)	1
	82718-69001	ASSEMBLY, power printed-circuit, 32K (exchange)	
	82718-69003	ASSEMBLY, power printed-circuit, 64K (exchange)	

**Table 6-1. Replaceable Parts, Assembly-Level (Continued)**

<b>Index Number, Figure 6-1.</b>	<b>HP Part Number</b>	<b>Description</b>	<b>Qty</b>
5	82718-60002	ASSEMBLY, ROM- port connector	1
6	2360-0493	ASSEMBLY, screws, retainer (6)	1
7	82718-60003	ASSEMBLY, topcase	1
8	8120-4463	CABLE, flex	1
9	82718-00005	CLAMP, cable, strain- relief	1
10	82718-80009	LABEL, name	1
11	0610-0001	NUT, hex #2	2
12	2340-0002	NUT, 4-40	4
13	82001-60001	PACK, battery	2
14	82718-40010	PLATE, I/O	1
15	82718-40005	RETAINER, left	1
16	82718-40006	RETAINER, right	1
17	0520-0306	SCREW, 4-40, 0.188 inch	1
18	0520-0128	SCREW, 2-56, 0.25 inch	2
19	0520-0308	SCREW, 4-40, 0.25 inch	1
20	2200-0209	SCREW, 4-40, 0.375 inch	12
21	0520-0307	SCREW, 4-40, 0.5 inch	1
22	82718-80021	STRAP, jumper	1
23	2190-0732	WASHER, #4	4



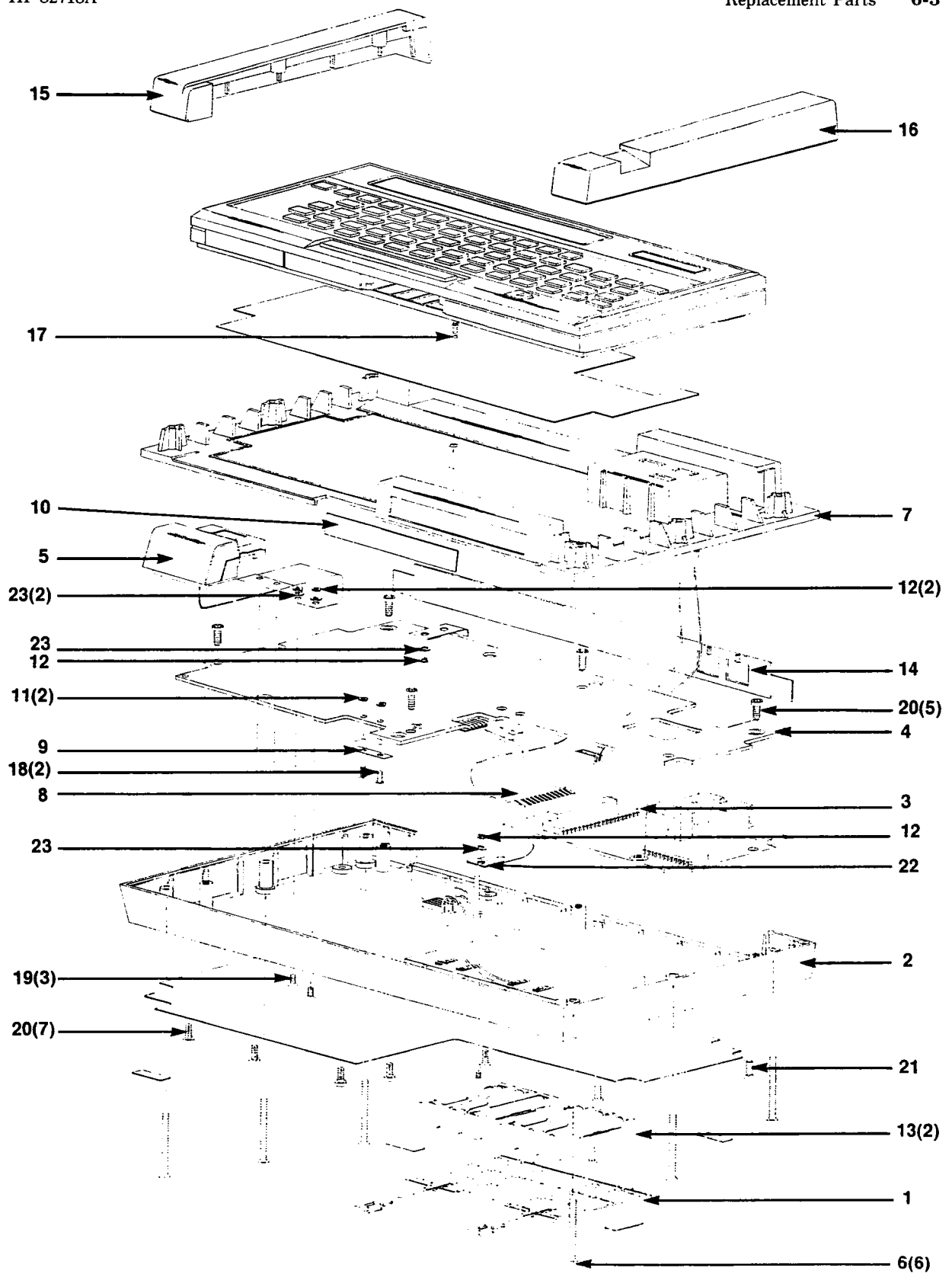


Figure 6-1. HP 82718A Expansion Pod Exploded View

**Table 6-2. Replaceable Parts, Component-Level**

<b>Reference Designator</b>	<b>HP Part Number</b>	<b>Description</b>	<b>Qty</b>
C7, 8*	0160-4787	Capacitor, 22 pF, 100V 5%	2
C19,20,44,45*	0160-5471	Capacitor, 0.1 uF, 25V	4
J3	1252-0085	Connector, 20-pin	1
Q3	1854-0739	Transistor	1
R14*	0698-8824	Resistor, 560K 5%	1
R15,22*	0757-0442	Resistor, 10K 5%	2
R23*	0757-0283	Resistor, 2K 5%	1
U2	1820-3652	Microprocessor, 63A01	1
U15	1820-1563	Integrated Circuit, MM74C14	1
Y1	0410-1410	Crystal, 4.9152 MHz	1
* These components are used to replace surface-mounted devices.			

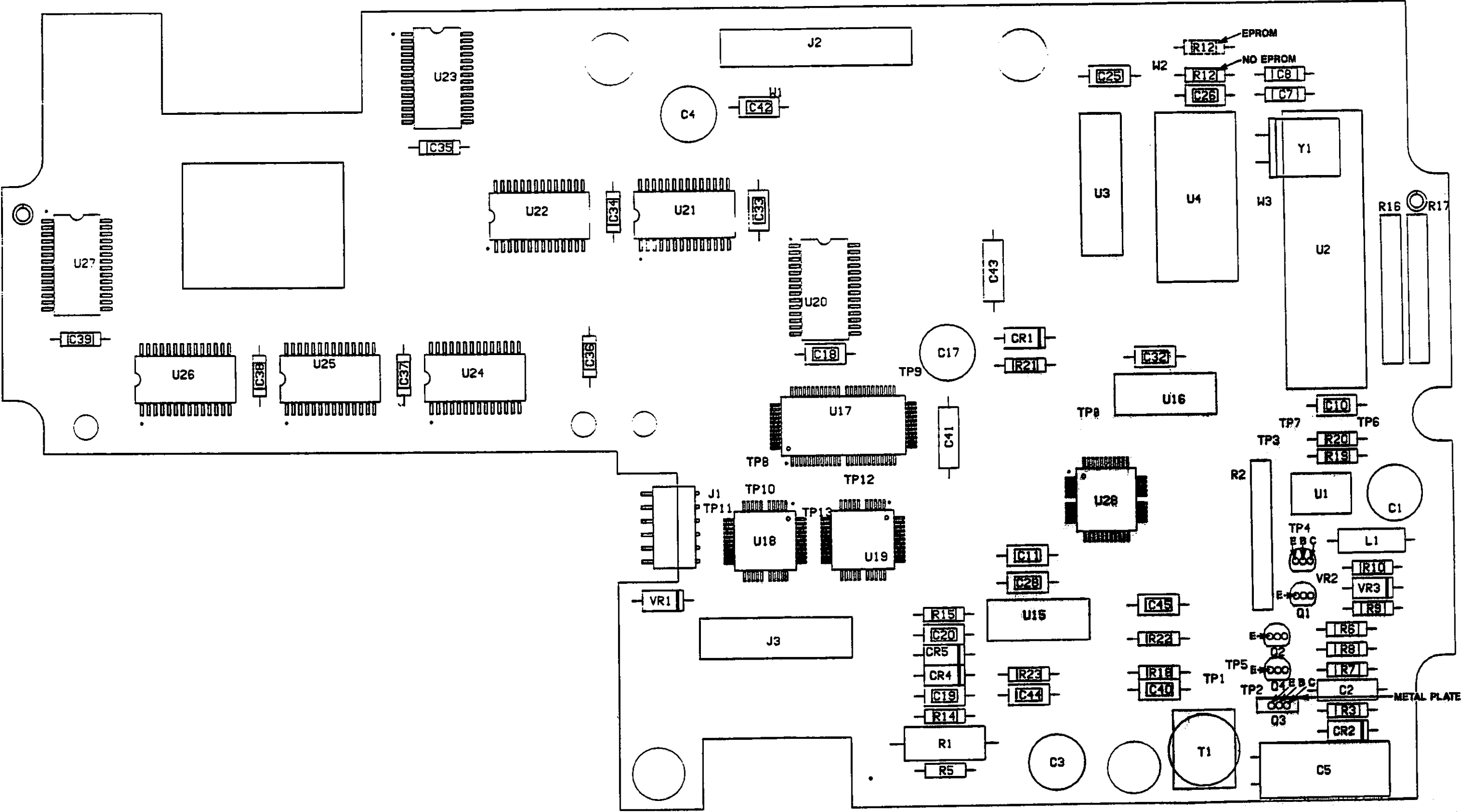


Figure 6-2. Component-Location Diagram



# **Section 7**

## **Diagrams**

### **7-1. Introduction**

This section contains the schematic diagrams you will find helpful for troubleshooting and testing the HP 82718A Expansion Pod.





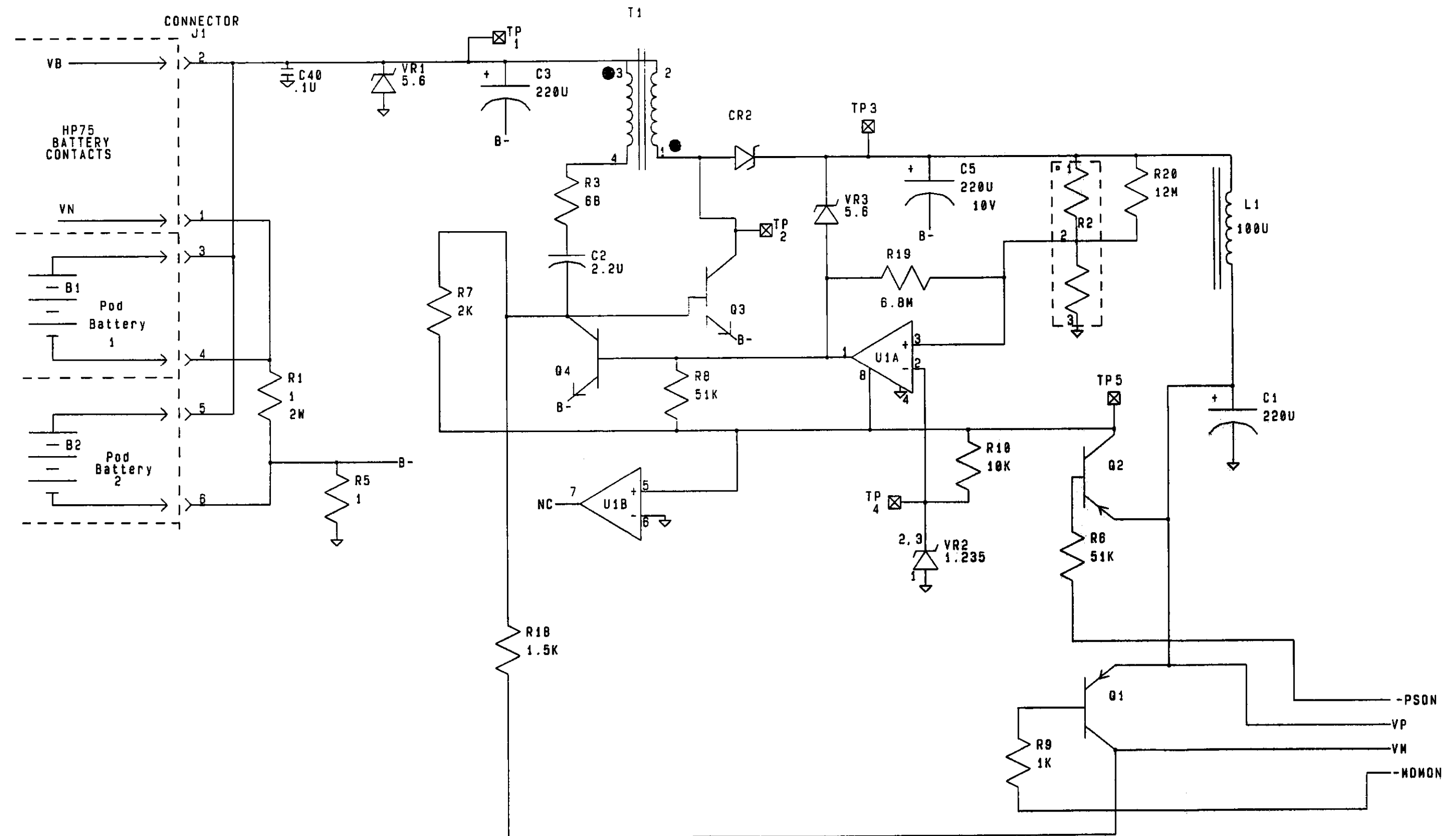


Figure 7-3.  
Power PCA, Power-Supply Schematic



# Appendix A

## Component-Level Repair

### A-1. Introduction

The table and procedure in this appendix describe the probable and possible causes for error messages that appear while running the pod diagnostic tests. You should first replace the components listed under probable cause in order and then the components listed under possible cause in order.

After replacing a component, be sure to run the diagnostic test over again from the beginning to verify that the error has been corrected.

**Table A-1. Diagnostic Test Error Messages**

Error Message	Probable Cause	Possible Cause
HP-75 does not turn on.	J3, U18, U19	U17, ROM connector
"firmware" is displayed, and the unit resets.	Q3 in the power supply.	
HP-75 system ERROR 16 is displayed.	There is not enough memory left in the HP-75 to run the pod diagnostic.**	
rom (U18) BAD	U18	J3, ROM connector
rom (U19) BAD	U19	J3, ROM connector
1LH7 BAD, *block move:MEM, *2 bytes indirect:BAD, and *Address lines BAD:0,1 all are displayed	U20	U17
ram 1 BAD	U20	U17
ram 2 BAD	U21	U17
ram 3 BAD	U22	U17
ram 4 BAD	U23	U17
ram 5 BAD	U24	U17
<b>** Possible solutions:</b> <ul style="list-style-type: none"> <li>• Delete one or more lines from a file in the HP-75.</li> <li>• Execute CLEAR VARS to clear calculator variables.</li> <li>• Lessen the precision or reduce the dimensions of program.</li> <li>• Purge one or more files from memory.</li> <li>• Execute ASSIGN # TO *, specifying any unused data file pointers.</li> <li>• Purge one or more files.</li> <li>• Execute ASSIGN I/O to * to clear the HP-IL loop.</li> </ul>		

Table A-1. Diagnostic Test Error Messages (Continued)

Error Message	Probable Cause	Possible Cause
ram 6 BAD	U25	U17
ram 7 BAD	U26	U17
ram 8 BAD	U27	U17
ram (--K) (incorrect amount)	RAM with highest address	U17
mcf <number> BAD	U2	
mcf BAD	Y1, U2, U15, U28, R14, R15, C7, C8, C19, C20	
*buss BAD:wrote xxx, read YYY	shorts in RAM bus (U20-27) U17 pins 5, 7, 9, 11, 15, 17, 19, 21	
*BM:dir bit won't set	U17	U20
*P not updated after BM up	U17	U20
*P not updated after BM down		
*blockmove:MEM	U20	U17
*address lines BAD:xxx,yyy	U20	U17
1LL6 BAD	Y1, C7, C8, U2, U15, U28, R14, R15, R22, R23, C19, C20, C44, C45	1LL6
rom (U18) BAD, rom (U19) BAD, and 1LH7 BAD all appear.	J3, ROM connector	1LH7
*no MEMIC chips	U17, J3	
*A,B,C,D BAD	U17	
A,B,C,D not unique	U17	
*H, D+H BAD	U17	
*adders BAD	U17	
*MEMIC didn't select	U17	
*decoders/chip enables BAD	U17	U20 - 27
*sum set	U17	U20 - 27
*sum Pset		
*sum add		
*update bits screwy	U17	
*update bits BAD		
*rollover didn't	U17	
*2 byte indirect BAD	U17	U20
*2 byte indirect updated		
*2 byte indirect not updated		
modem BAD	modem PCA	power PCA, modem PCA, flex connector, J2, U2

**Table A-1. Diagnostic Test Error Messages (continued)**

If 'mcf BAD', '1LL6 BAD', and 'pod BAD' all appear together, turn the HP-75 off, and monitor U2-40 with an oscilloscope while turning the HP-75 on.	
If	Then
The signal changes from a dc level to an ac clock (1.2 MHz) and remains as a clock signal.	U2 or U28 is bad.
The signal remains at a dc level.	Replace Y1, C7, C8, U15, R14, R15, R22, R23, C19, C20, C44, C45

```

*****
*
*NOTE:  this does does not write or read
*        to system ram/rom (0-64K nonswitched).
*        It tests the entire address space
*        when in switch mode.
*
*        note that the start address (512K-ramsiz)
*        HAS to be a integer multiple of ramsiz
*        for the test to stop.
*
*        this test depends on the the fact
*        that there are 64 ram chips on
*        4 MEMIC chips (64 bits=8 bytes)
*
*****

```

## ADDRESS LINES

```

*****
*
*test the address lines
*alg
*    fill first 8K ram chip with zero
*    addr<-0
*    loop
*        M(addr)<-FF
*        for j=0 to 8K
*            if j=addr then
*                if M(j)<>FF then error
*                "address lines BAD: addr,j"
*            else
*                if M(j)<>0 then error
*                "address lines BAD: addr,j"
*        next j
*        M(addr)<-0    { reset ram }
*        if addr=0 then addr<-1
*        else addr<-addr+addr
*    while addr<>8K
*    done
*
*Note: I assume that the last live MEMIC chip
*      (ie the one selected) has ram on it.
*
*****

```





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