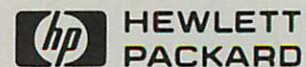
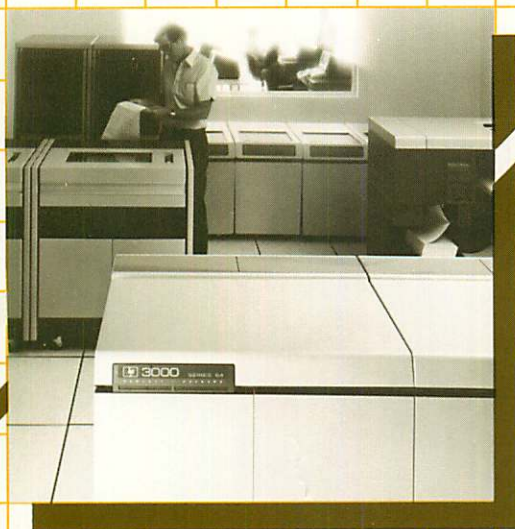


Distributed Systems Network



Advanced Terminal Processor
(DSN/ATP)
Offline Diagnostic Manual



DISTRIBUTED SYSTEMS NETWORK

Advanced Terminal Processor (DSN/ATP) Offline Diagnostic Manual



**INFORMATION NETWORKS DIVISION
19420 HOMESTEAD ROAD, CUPERTINO, CALIFORNIA 95014**

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First Edition March 1982

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First Edition March 1982

PREFACE

This manual describes the Offline Diagnostics for the Advanced Terminal Processor (ATP). The ATP is an asynchronous device controller for HP 3000/44 and HP 3000/64 computer systems. The ATP interfaces with the Intermodule Bus (IMB) for I/O data transfer. A minimum ATP subsystem consists of one System Interface Board, (SIB), and one Hardwired Port Controller or one Modem Port Controller. It requires 2 I/O slots, uses one IMB channel address and supports 12 ports. The maximum subsystem consists of one System Interface Board, and eight Port Controllers. It requires nine slots, uses one IMB channel address and can support 96 terminal ports. An HP 3000/64 computer may have a maximum of 2 ATP subsystems installed, which support 144 terminals. Each ATP subsystem requires one unique IMB channel address.

This manual is written for the HP Customer Engineer (CE) with the assumption that the reader has a good working knowledge of the HP 3000 system environment, and is specifically trained on troubleshooting HP 3000 products. This manual provides information and instructions for setting up the ATP subsystem, and for diagnostic testing. This manual may be used in conjunction with related documentation for the HP 3000 Series 44/64 Computer Systems. Related documents include the following technical manuals:

- HP 3000 Computer Systems, Console Operator's Guide, (for series II/III/30/33/40/44/64) part number 32002-90004.
- HP 3000 Computer Systems, Communication Handbook, part number 30000-90105
- HP 3000 Computer Systems, Systems Manager/System Supervisor Reference Manual, part number 30000-90014
- HP 3000 Distributed Systems Network/Advanced Terminal Processor Installation Manual, part number 30144-90002
- HP 3000 Distributed Systems Network/Advanced Terminal Processor On-Line Diagnostic Manual, part number 30144-90004
- HP 3000 Asynchronous Serial I/O Reference Manual, part number 30000-90250

PREFACE (Continued)

This manual is organized as follows:

Section I, General Information, briefly describes the main areas of importance in terms of diagnostic needs. It includes descriptions of the required software and hardware. It also discusses testing philosophy and limitations of the Advanced Terminal Processor diagnostics.

Section II, Operating Instructions, contains information pertaining to the proper operating procedures for the diagnostics. It explains the commands, prompts and program organization.

Section III, Execution Times, contains information pertaining to approximate run times of the diagnostic tests.

Section IV, Test Descriptions, covers the SIB, AIB and Port Connector test applications. Test explanations and a sample dialog are given.

Section V, Error Interpretation, supplies information for test result analysis. It also supplies sample error messages.

Appendix A, Troubleshooting Flow Chart, supplies information on troubleshooting the subsystem through the use of the diagnostics.

Appendix B, Loopback Hoods, contains pictures of the Loopback Hoods needed for running the Loopback Tests.

Appendix C, Wiring Diagrams, contains pictures for cable wiring.

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GENERAL INFORMATION

SECTION

I

INTRODUCTION

This diagnostic test program confirms correct operation of the System Interface Board, Asynchronous Interface Board, Port Connector Assembly and associated cabling. The Port Connector assembly consists of a Mother Board, either modem or direct connect, three or six Mini-Boards, and one cable. It operates on HP 3000 Series Series 44 and Series 64 systems. Communication with the operator is via the system console.

Hereafter, in this document, the following acronyms will be used:

System Interface Board.....SIB
Asynchronous Interface Board.....AIB
Advanced Terminal Processor.....ATP

Board replacement is the standard operating procedure and the diagnostics are designed to easily identify malfunctioning boards within the ATP system. The diagnostics allow you to run specific individual tests or all the tests as a group. After all the tests have been run on a particular board, a pass/fail indication will be displayed to indicate which SIB/AIB has passed or failed. We recommend you run the diagnostics by issuing the "ALL" command rather than specifying particular individual tests.

REQUIRED HARDWARE

The following hardware is required:

- a. A minimal mainframe configuration.
- b. A minimal ATP system, ie: one SIB, one Port Controller, which consists of one AIB and one Port Connector Assembly, either Modem or Direct Connect.
- c. Loopback Hoods which are included in the product support package (p/n 30144-67801).

One Standard 72 Pin Edge Connector	30145-60005
Twelve 25 Pin Hoods for HP-Modem B Connection	30146-60002
Twelve 3 Pin Hoods for HP-DC B Connection	30148-60002
Twelve 5 Pin Hoods for HP-DC A Connection	30147-60002

General Information

If necessary, the SIB can be tested without an AIB being present. Also, the AIB can be tested without Port Connectors being present. However, the most thorough testing is done with all ATP hardware installed.

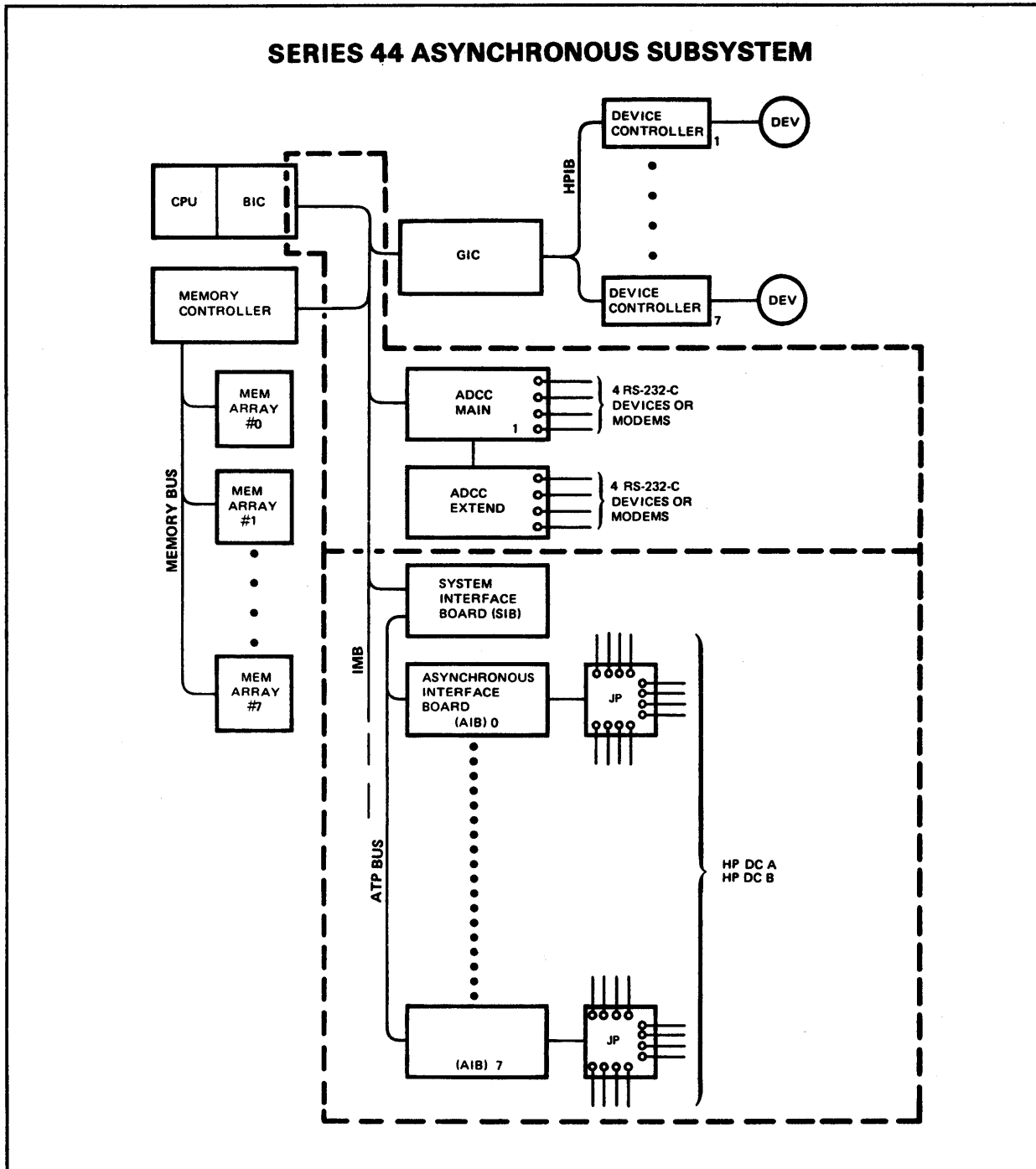


Figure 1-1. Series 44 Asynchronous Subsystem

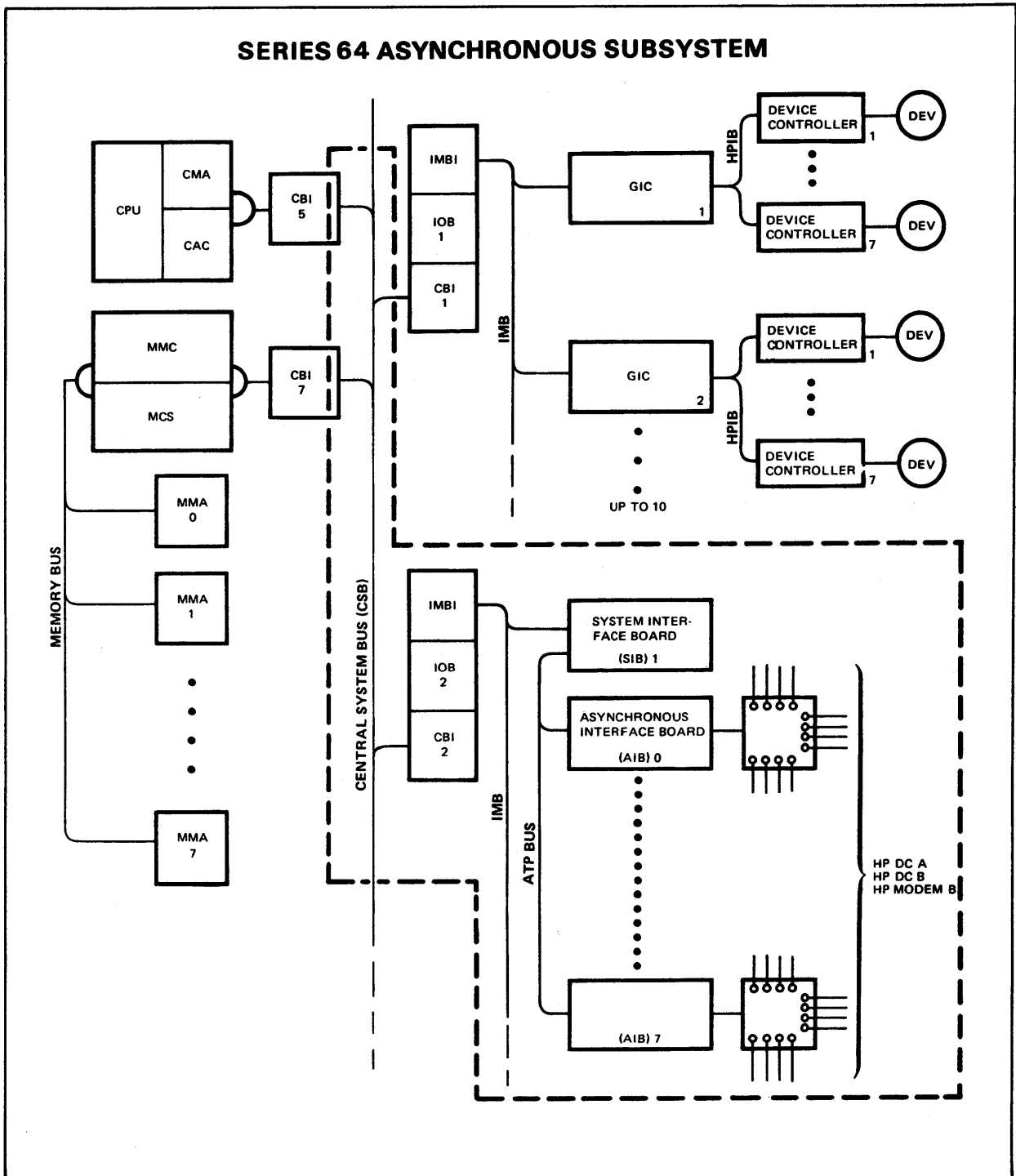


Figure 1-2. Series 64 Asynchronous Subsystem

General Information

REQUIRED SOFTWARE

The Diagnostic Utility operating System (DUS) tape or diskette, and the ATP Offline Diagnostics are required.

TESTING PHILOSOPHY

The offline diagnostics are designed to test the ATP hardware and a subset of the code resident in the Port Controller Chips (PCC), Modem Controller Chips (MCC), and Modem Scanner Chips (MSC), if applicable. Only a subset of the code can be tested because it is impossible to emulate all of the actions of terminals and/or modems simply by using loopback mechanisms. The SIB must be functioning correctly in order for the other components of the ATP to be tested. The recommended procedure is to initiate the diagnostics by thoroughly exercising the SIB to ensure that it is operating correctly. To initiate the SIB tests, respond with the "ALL" reply when prompted by the diagnostic. If the console goes through the SIB under test, the results must be directed to a line printer. Ensure that the line printer is on-line before you test the SIB. If the diagnostics find that the SIB is properly operating, testing of the AIB commences. It is recommended that the "ALL NO LOOPBACK" tests be run first. If these tests fail, the AIB must be replaced. If they pass, the loopback test should be performed with loopback hoods on the Port Connectors. If these loopback tests fail, loopback tests should be performed with loopback hoods on the AIB. By performing the tests in this sequence and through the use of multiple loopback hoods, each port on AIB is tested individually to ensure that the logic associated with it is operating. Thus all the ports on the AIB under test are analyzed.

DIAGNOSTIC LIMITATIONS

The diagnostic test limitations of the ATP are the following:

1) When the console is connected to the SIB under test, the messages must be output to a line printer. Make sure that the line printer being used is on line, when the DUS is brought up.

2) In order to be able to initiate the ATP offline diagnostics, the console port must be working. Therefore the console microdiagnostics supplied with the SPU microdiagnostics must be relied upon for diagnosing the console if there are any problems with it.

3) Sometimes it will be difficult to isolate the problem area to either the SIB or the AIB unless there are known good SIBs and/or AIBs with which to test.

OPERATING INSTRUCTIONS

SECTION

II

INTRODUCTION

The ATP diagnostics are designed to be operated easily. The tests can be run individually if so specified or as a group. We recommend that you do not specify individual tests since by running the tests as a group you will receive the same results in a much faster time.

To operate the diagnostics, the following steps must be executed:

- (1) Load the Diagnostic/Utility System (DUS) Tape or Diskette
- (2) Bring up the Diagnostic/Utility System (DUS)
"Enter Program Name" is displayed.
- (3) Respond 'ATPDIAG' to initiate the Diagnostic.
The ATP Diagnostic Program displays its title message and prompts for the Channel # of the SIB.

Respond accordingly to the questions presented.

MESSAGES AND PROMPTS

Four types of messages are output by the diagnostic: prompt, help, information and error messages.

Prompt messages (e.g., which channel number to test, etc.) require you to input the requested information.

Help messages are displayed whenever the HELP command is given, and provide a more complete description of what is needed.

Information messages (e.g., pass/fail) are displayed with no program pause.

Error messages are used to tell you when the ATP responded unexpectedly to a given stimulus. Error messages are normally inhibited. These are of the most use when doing actual debugging and repair of the individual boards.

Operating Instructions

Before the diagnostics are started you can specify whether the diagnostics should stop after the first error or whether they should continue to test as much of the system as possible. You can also specify whether success messages or failure messages should be printed. We recommend you respond with a NO to the questions concerning errors and messages, since the results will be summarized at the end of the diagnostic testing.

SAMPLE DIALOG

Advanced Terminal Processor Offline Diagnostic V-00.20

Enter HELP in response to any question for an explanation of what is required.

Enter EXIT in response to any question to terminate the program.

Channel number of IMB interface SIB is attached (0-3) 0
SERIES 64 ONLY

Enter the channel number of the SIB under test: 1
Print failure messages? NO
Print success messages? NO
Output results to line printer? YES
Stop on errors? NO
Loop count-(zero for continuous looping): 1
Enter SIB tests to be run:
>ALL
Enter AIB tests to be run:
>ALL NO LOOPBACK
Enter ports to be tested, separated by commas:
>AO

EXECUTION TIMES

SECTION

III

INTRODUCTION

The exact execution time for each test or for a group of tests is determined by the following constraints:

- the number of ports under test
- the computer system on which the test is being conducted (Series 44, 64)
- the selection of test sections to be executed

BOARD	TEST	APPROXIMATE RUN TIME
SIB	ALL	<10 seconds
AIB	ALL NO LOOPBACK	<2 minutes

EXAMPLE:

The total run time per pass on a fully loaded Series 64 with eight AIBs and 96 ports with no errors is:

SIB	ALL	2 seconds
AIB	ALL NO LOOPBACK	36 seconds

The execution times listed above are based on the fastest time; slower machines, of course, will result in slower pass times.

DESCRIPTION OF TESTS

SECTION

IV

ATP OFFLINE DIAGNOSTIC TESTS

Following is an explanation of the ATP Offline Diagnostic tests. You must specify which SIB to test to the diagnostics. The diagnostics ask for the channel address of the SIB and the ports which are to be tested. Listed below are all of the sub-tests involved in the diagnostics. The diagnostics run through all of the sub-tests in sequence.

OFFLINE DIAGNOSTIC ORGANIZATION

The SIB is considered to be the foundation of the ATP system. All of its modules must be operational in order to be able to communicate with any ports. Therefore, the SIB modules are tested first. These modules are:

- 1) Logic for responding to IMB commands,
- 2) registers,
- 3) memory,
- 4) DMA State Machine, and
- 5) ATP Bus State Machine.

Each port on the AIB is tested individually, in succession. The test on each port involves the following tests:

- 1) PCC self-test,
- 2) PCC RAM dump,
- 3) PCC/MCC Communication,
- 4) PCC diagnostic loopback,
- 5) PCC loopback of data signals offboard--requiring loopback hood.
- 6) MCC/MSC self-test which sends results back to the mainframe, and
- 7) MCC/MSC RAM Dump.

Description of Tests

SIB Tests

Following is a list of test names that can be performed on the SIB:

- | | | |
|------|----------------------------|------|
| (1) | IMB-SIB Communication | (IM) |
| (2) | Initial Register Values | (IN) |
| (3) | SIB Memory | (M) |
| (4) | Sequencing | (SE) |
| (5) | Time Out | (T) |
| (6) | Board Counter/Enable | (BO) |
| (7) | ATP Bus Buffers | (L) |
| (8) | Direct Command | (DI) |
| (9) | FIFO | (F) |
| (10) | DMA State Counter | (ST) |
| (11) | DMA Address Counter | (DM) |
| (12) | Comp/Counter Loopback | (C) |
| (13) | Read IMB | (R) |
| (14) | Write IMB | (W) |
| (15) | Begin Flag/Left-Right Flag | (BE) |
| (16) | None | (N) |
| (17) | All | (A) |

The test names may be abbreviated as indicated. You may enter a list of tests, separated by semi-colons. ALL indicates that all available SIB tests are to be run. NONE indicates that testing of the SIB will not be done. Pressing carriage return in response to this question will cause the last SIB tests specified (if any) to be retained.

NOTE: ALL is the recommended response.

TEST

DESCRIPTION

IMB-SIB
COMMUNICATION

This procedure does preliminary testing of the SIB determining that all the allowable IMB commands can be executed.

INITIAL REGISTER
VALUES

This procedure tests the values obtained from the readable registers after initialization.

Description of Tests

SIB MEMORY	This procedure tests the memory on the SIB. This memory is used to store the IMB memory offset, pack byte and flags associated with each of the 128 DMA paths. It is tested by writing/reading a checkerboard pattern and writing/reading the address of each location. The checkerboard test is done with the MDiag bit of the diagnostic control register both on and off. This tests all of the pack byte, as well as the flags.
SEQUENCING	This procedure tests the sequencing of the ATP bus state machine. It sets up a given set of conditions (e.g. no direct command, bus opcode=idle, board enabled) and then checks the ATP bus as it single stepped through the logic.
TIMEOUT	This routine tests the timeout which terminates the wait for either BusEnd from the ATP bus, or Halt from the DMA state machine.
BOARD COUNTER/ENABLE	This procedure tests the operation of the board counter on the SIB. It checks that the counter is incremented each time the ATP bus state machine passes through state zero. The counter must be checked by disabling all but one board, and checking when the state machine sees the current-board-enabled signal.
ATP BUS BUFFERS	This procedure tests the ATP Bus buffers. It first uses DMA test code to write data to the ATP bus and reads the looped back data. It then makes sure that the value of the port pointer looped back matches the value written into the port pointer register.
DIRECT COMMAND	This procedure tests the data paths which get a direct command to the ATP Bus.
FIFO	This procedure tests the operation of the FIFO which stores the number of each port wishing to generate an interrupt.
DMA STATE COUNTER	This procedure checks the function of the DMA state counter. It sets up an opcode which points to diagnostic DMA code containing all NOPS. This test simply checks that the counter increments each time until it gets to the halt command, and then resets to zero.

Description of Tests

DMA ADDRESS COUNTER This procedure uses test 1 of the diagnostic DMA code to check the operation of the DMA address counter. After an channel initialization, the counter value should be preset to !FFFF. On the next increment it should overflow and go to zero. It will then count up from zero. Each value of the counter will be stored in memory.

COMP/COUNTER LOOPBACK This procedure tests the DMA logic's COMP register and address counter. It loads the DMA registers from memory, and then runs the test which dumps the registers back to memory.

READ IMB This procedure tests an IMB read operation using the diagnostic DMA routine which reads a single word from the IMB and puts it in the SIB RAM.

WRITE IMB This procedure tests an IMB write operation using the diagnostic DMA routine which writes a single word from the SIB RAM and puts it in IMB memory.

**BEGIN FLAG/
LEFT-RIGHT
FLAG** This procedure tests the operation of the BeginFlag and LeftRightFlag on the SIB. The basic tool used in this test is the diagnostic DMA operation which increments the counter a different number of times for each state of BeginFlag and LeftRightFlag, then stores the count in memory. First each of the four possible states are written to SIB memory register 1 and the test is used to check that the DMA logic sees the correct value of the flags. Then the BeginFlag, LeftRightFlag are both set to 1 and the test is used to check the automatic updating of the flags.

Port Controller Tests

Nine diagnostic tests are performed on the AIB and Port Connector Assembly. The test names are listed below:

AIB

- | | | |
|------|---------------------------------|---------|
| (1) | Port Controller Chip Self-Test | (PCC S) |
| (2) | Modem Controller Chip Self-Test | (MCC D) |
| (3) | Port Controller Chip Dump | (PCC D) |
| (4) | Modem Controller Chip Dump | (MCC D) |
| (5) | PCC-MCC Communication | (PCC M) |
| (6) | Diagnostic Loopback | (D) |
| (7) | Off-board Loopback | (L) |
| (8) | ALL | (A) |
| (9) | All no Loopback | (ALL N) |
| (10) | None | (N) |

MODEM PORT CONNECTOR ASSEMBLIES

- (11) Modem Scanner Chip Self Test
- (12) Modem Scanner Chip Dump

The test names may be abbreviated as indicated. You may enter a list of tests separated by semi-colons. ALL indicates that all available AIB tests are to be run. ALL NO LOOPBACK indicates all AIB tests, except those which require a loopback hood, are to be run. NONE indicates that testing of the AIB is not to be done. Pressing carriage return in response to the prompt will cause the last AIB tests specified (if any) to be retained.

NOTE: ALL NO LOOPBACK is the recommended response when using the diagnostics. If loopback connectors have been installed, ALL is recommended.

Excluding the Modem Scanner Chip self-test and the Modem Scanner Chip dump, which cannot be separated from their MCC counterparts, each test is run individually, and the diagnostics are designed to run the tests sequentially in an order which exercises all the necessary components.

Before you begin the diagnostic tests, the AIB can be tested by initiating the on-board diagnostic as explained below. The offline diagnostic can then begin with the testing of the SIB. After it has been determined that the SIB is functioning properly, diagnostic tests on the AIB may begin.

- a. Flip the tiny toggle momentary switch on the edge of the AIB PCA to manually reset the AIB so that the self-test can be initiated. To initiate the self-test, use a screwdriver or a similar tool to short out Test Point 5 and Test Point 7, which are between the Junction Panel power switch and the thumbwheel switch on the AIB. (See figure 2-7 in Installation Manual).

Description of Tests

- b. Watch the 13 self-test light-emitting-diode (LED) indicators as the self-test program goes through its cycle. Upon completion of the self-test (approximately one second in duration), the LEDs will stop blinking. If no LEDs are lit, the AIB is working properly. If any LEDs are still lit, the AIB is malfunctioning.

The steps above test 90% of the logic on the chips on the AIB board. Once you have confirmed that the AIB chips are functioning, you can begin the AIB diagnostic tests. The diagnostics are able to pinpoint which board is malfunctioning and needs to be replaced. The response for each test is pass or fail. Since board replacement is the standard operating procedure, pass/fail is the only information needed from the diagnostic tests.

A quick way to check if the Modem Scanner Chip is properly functioning on the Modem Mother Board is to attach loopback hoods on the mini-boards and flip the momentary toggle switch on the rear of the mother board. If the LED remains lit, the mother board is malfunctioning and should be replaced. This test checks the modem logic on the mother board and therefore should not be used when the diagnostics are running.

TEST	DESCRIPTION
SELF TESTS (3)	This procedure verifies the operational status of the PCC. The maskable interrupt path to the PCC/MCC/MSD and the data and control paths from the PCC to the mainframe are tested.
PORT CONTROLLER CHIP	The tests exercise all the PCC's and return the results to the mainframe.
MODEM CONTROLLER CHIP	The self-tests includes a ROM check-sum, a RAM diagnostic and a timer test.
MODEM SCANNER CHIP	
DUMP TESTS (3)	This procedure freezes the PCC, issues a dump command and dumps the contents of RAM and Control Registers to mainframe memory. The non-maskable interrupt path to the PCC, the maskable interrupt path and the freeze code in the PCC are all tested. The test also writes known data from the PCC to the mainframe.
PORT CONTROLLER CHIP	
MODEM CONTROLLER CHIP	
MODEM SCANNER CHIP	
PCC-MCC COMMUNICATION	This procedure checks the data path between the PCC and the MCC and the PCC code involved in talking to the MCC, by having the PCC write one byte to the MCC and read one byte from the MCC.

Description of Tests

DIAGNOSTIC LOOPBACK

This procedure loops back 256 bytes of data as far as the PCC, but not to the UART or the Port Connector assembly. The data sent is very specific and the PCC expects the bytes in a specified order. If a byte is received out of order, the PCC interrupts the mainframe. During the test the diagnostics check the data and can now see whether the error occurred on the write path to the PCC or on the read path from the PCC.

OFF BOARD LOOPBACK TEST

This procedure reads data from the mainframe and writes it back to the mainframe through the use of a loopback hood. The read and write paths from and to the mainframe are tested. The test will send 62 bytes to the PCC and then back to the mainframe and the data is compared. This test requires the use of one or more of the supplied loopback hoods.

NOTE: In order to execute this test, you must place the loopback hood on the mini-boards or the AIB. If the loopback hood is placed on the AIB, you must power OFF the Port Connector Assembly via the power switch on the appropriate AIB. (See figure 4-1) This must be done in order to remove the port connector cable from the AIB and place the loopback hood on. When placing the loopback hoods on the mini-boards, the power may be on or off, however, when running the tests, the power out to the junction panel must, of course, be on.

The loopback test can exercise the AIB or the Port Connectors. If the hood is placed on the AIB, the SIB and AIB are tested. If it is placed on the Port Connectors, the SIB, AIB and Port Connectors are tested. If the AIB loopback fails, the AIB is malfunctioning. If the loopback passes the AIB test, but the Port Connectors fail, either the Port Connector cable is bad or a Port Connector is bad.

Description of Tests

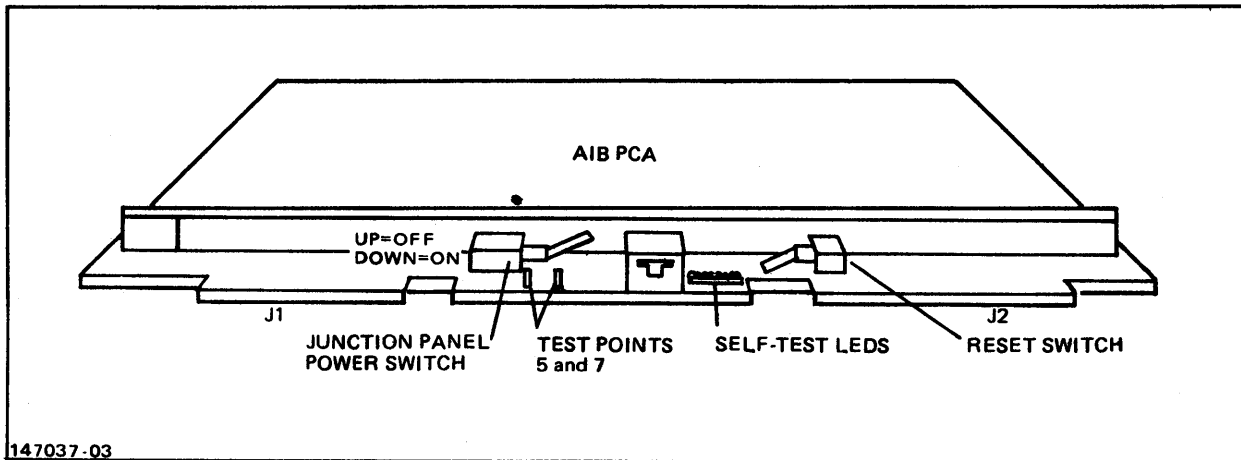


Figure 4-1. Location of AIB Power Switch

ERROR INTERPRETATION

SECTION

V

ANALYSIS OF TEST RESULTS

As each sub-test is completed, the diagnostic records a pass/fail indication for that sub-test and any pertinent information related to it. If a failure has occurred but it is still possible to proceed with other sub-tests, the diagnostics will do so unless you have previously specified stopping after the first error. At the end of the entire test, the diagnostic analyzes the test data and displays the results. The following examples are a representation of the messages that will be displayed after the tests have completed running.

SIB Test Results

SIB testing completed-without errors

Error(s) were detected during testing of the SIB.
Testing of the AIB will not be done.

AIB Test Results

AIB# 0		PASSED
AIB# 1		PASSED
AIB# 2		PASSED
AIB# 3	Port 2	FAILED
AIB# 4		PASSED
AIB# 5	Port 11	FAILED
AIB# 6	Port 7	FAILED

Error Interpretation

The recommended procedure for running the diagnostics is to respond no to the questions prompting for error messages to be printed. However, if you respond yes, the diagnostics will output error messages in three distinct formats. The responses will not be identical to the examples given, but the formats will be very similar. The information given will supply the user with the name of the board tested, the test exercised and the results of the test. Examples of the formats are listed below:

NOTE: These messages will only be displayed if you ask for success/failure messages to be printed. We do not recommend such an action and list the following for informational purposes only.

SIB Test Error Message Example

```
*** SIB Error      In: FIFO (test name)
Expected: %377;    Received: %357. Bad data read from
interrupt FIFO.
```

SIB Hardware Error Test Example

```
SIB hardware error detected:
  ATP Bus Timeout
```

AIB Test Error Message Example

```
AIB# 0          PORT# 1          FAILED   Real Loop (test name)
Receive buffer did not compare with source buffer.
Expected buffer
0123456789ABCDEF GHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrst
Received buffer
01234567899ABCDEF GHIJKLM
```

Error Interpretation

The following is an example of the diagnostic test results. The SIB is exercised first, followed by the AIB tests.

IMB-SIB communication test	passed
Initial Register Value test	passed
SIB Memory test	passed
ATP Bus State Sequencing test	passed
Timeout test	passed
Board Counter test	passed
ATP Bus Buffer test	passed
Direct Command test	passed
FIFO test	passed
DMA State Counter test	passed
DMA Address Counter test	passed
Comp Reg/Address Counter test	passed
IMB Read test	passed
IMB Write test	passed
BeginFlag/LeftRightFlag test	passed

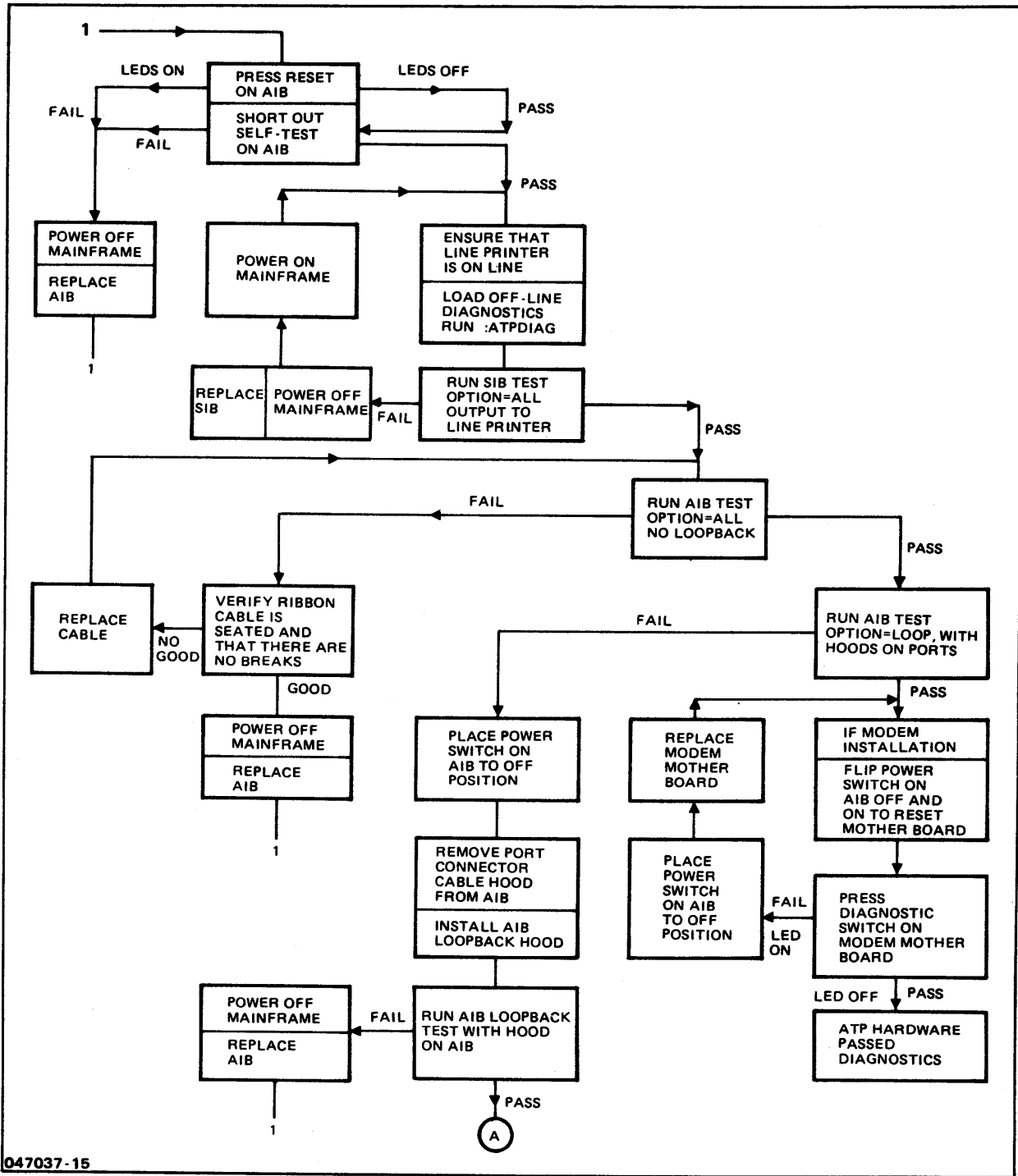
SIB testing completed - without errors

AIB# 0	PORT# 1	PASSED	SELF TEST
AIB# 0	PORT# 1	PASSED	DUMP TEST
AIB# 0	PORT# 1	PASSED	PCC/MCC/MSC SELF TEST
AIB# 0	PORT# 1	PASSED	MCC DUMP TEST
AIB# 0	PORT# 1	PASSED	PCC MCC TEST
AIB# 0	PORT# 1	PASSED	DIAGNOSTIC LOOP
AIB# 0	PORT# 1	PASSED	REAL LOOP
AIB# 0	PORT# 2	FAILED	SELF TEST
AIB# 0	PORT# 2	FAILED	DUMP TEST
AIB# 0	PORT# 2	FAILED	PCC/MCC/MSC SELF TEST
AIB# 0	PORT# 2	FAILED	MCC DUMP TEST
AIB# 0	PORT# 2	FAILED	PCC MCC TEST
AIB# 0	PORT# 2	FAILED	DIAGNOSTIC LOOP
AIB# 0	PORT# 2	FAILED	REAL LOOP

TROUBLESHOOTING FLOW CHART

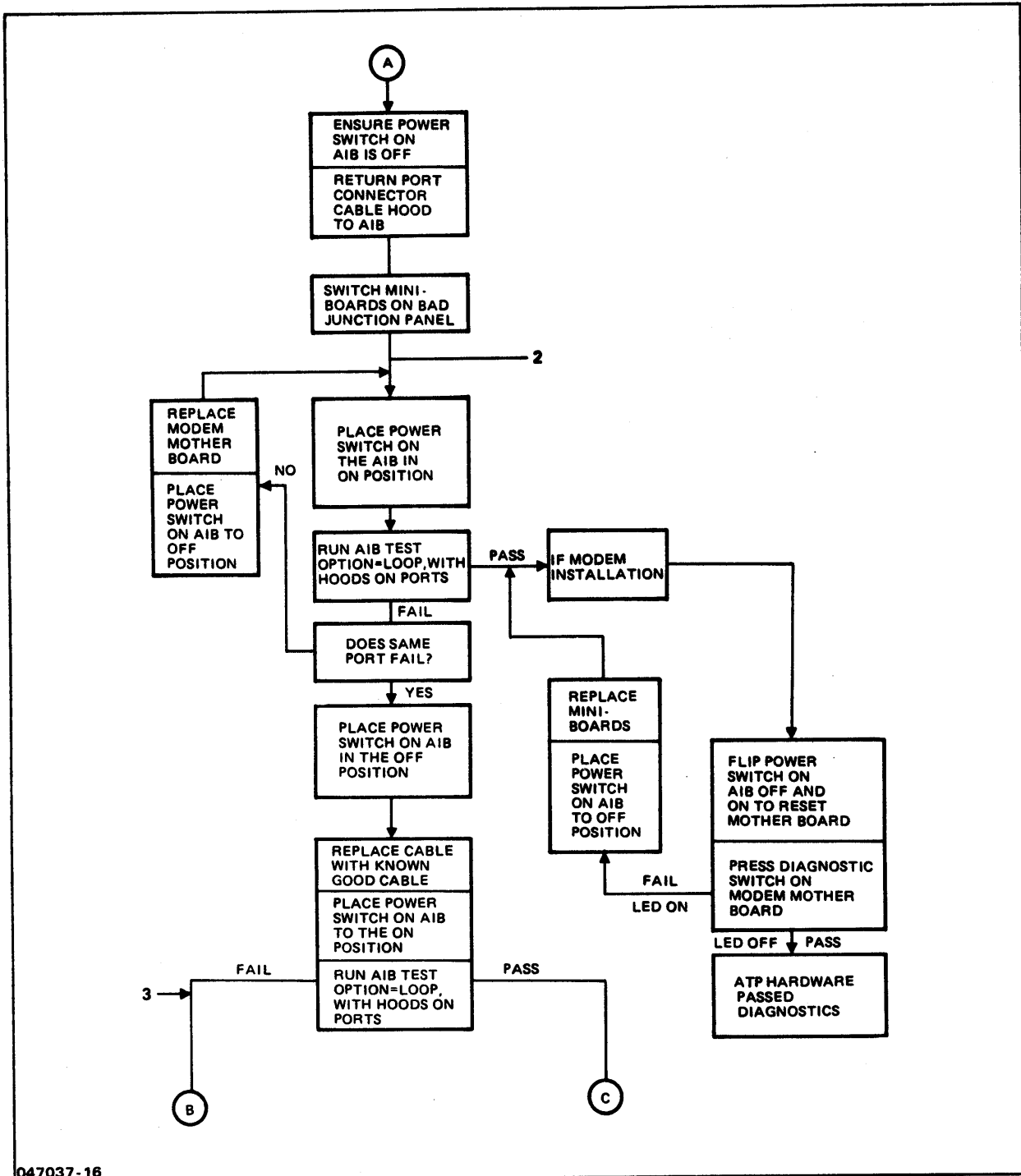
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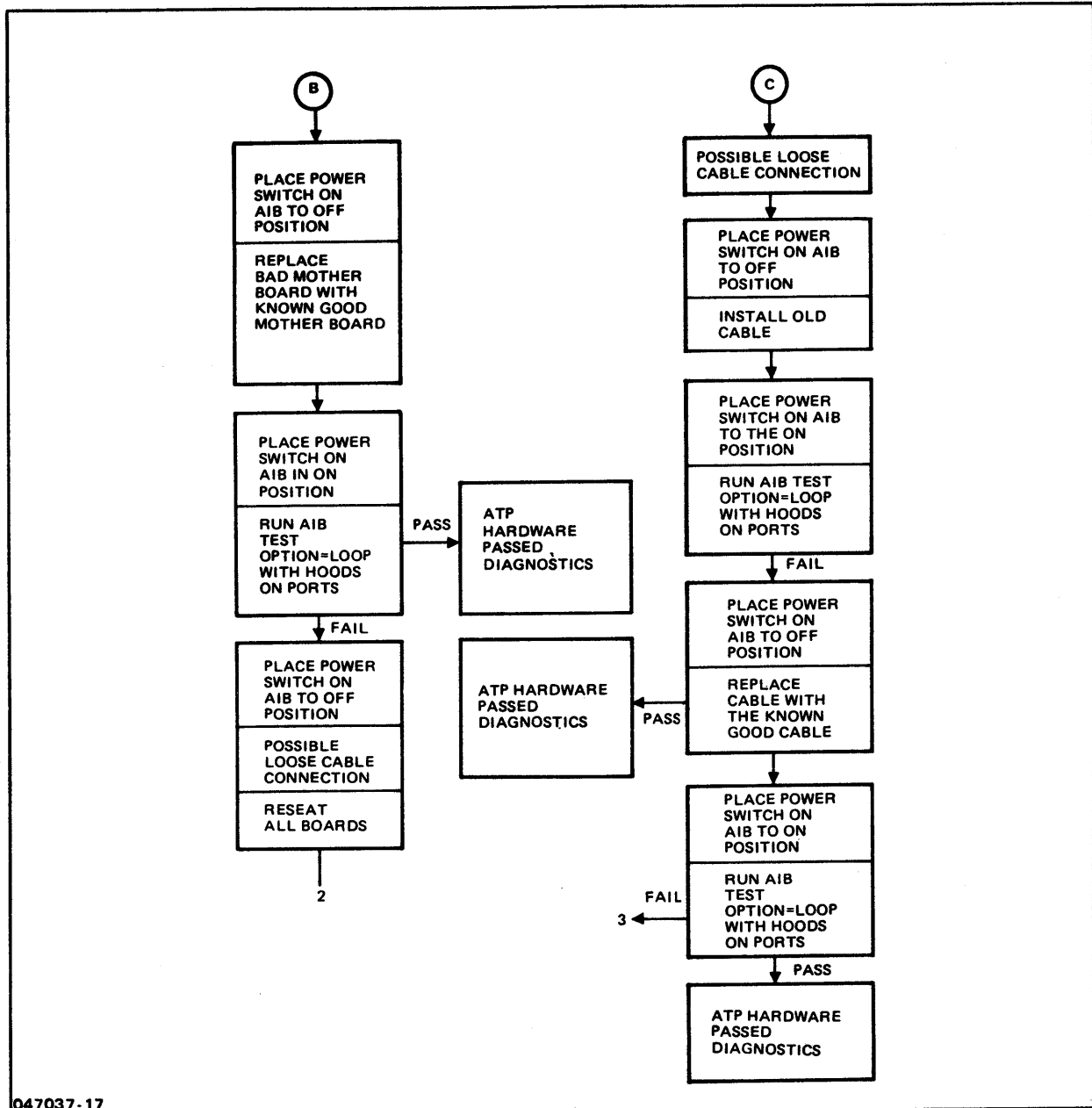


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Appendix A



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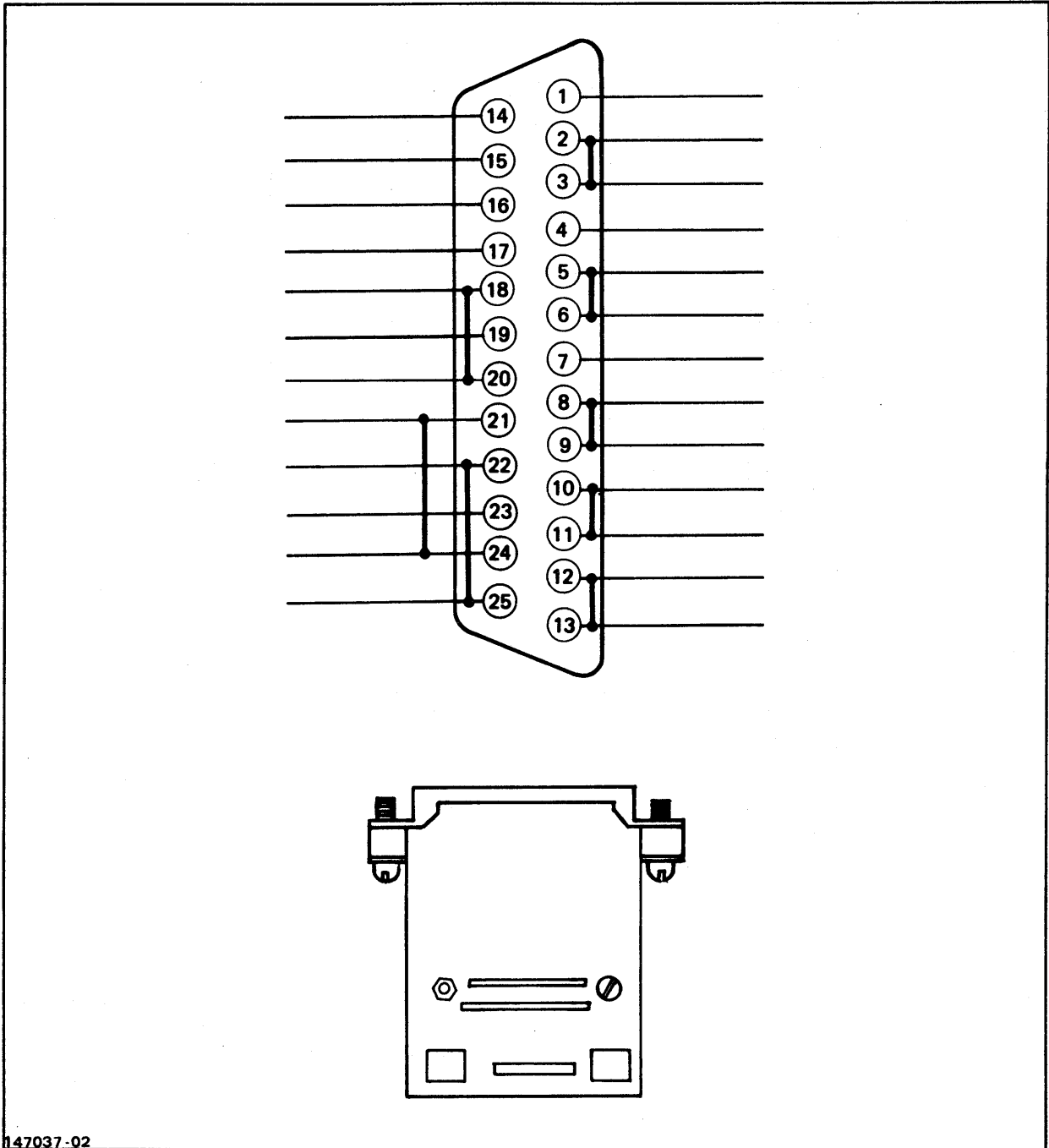


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LOOPBACK HOODS

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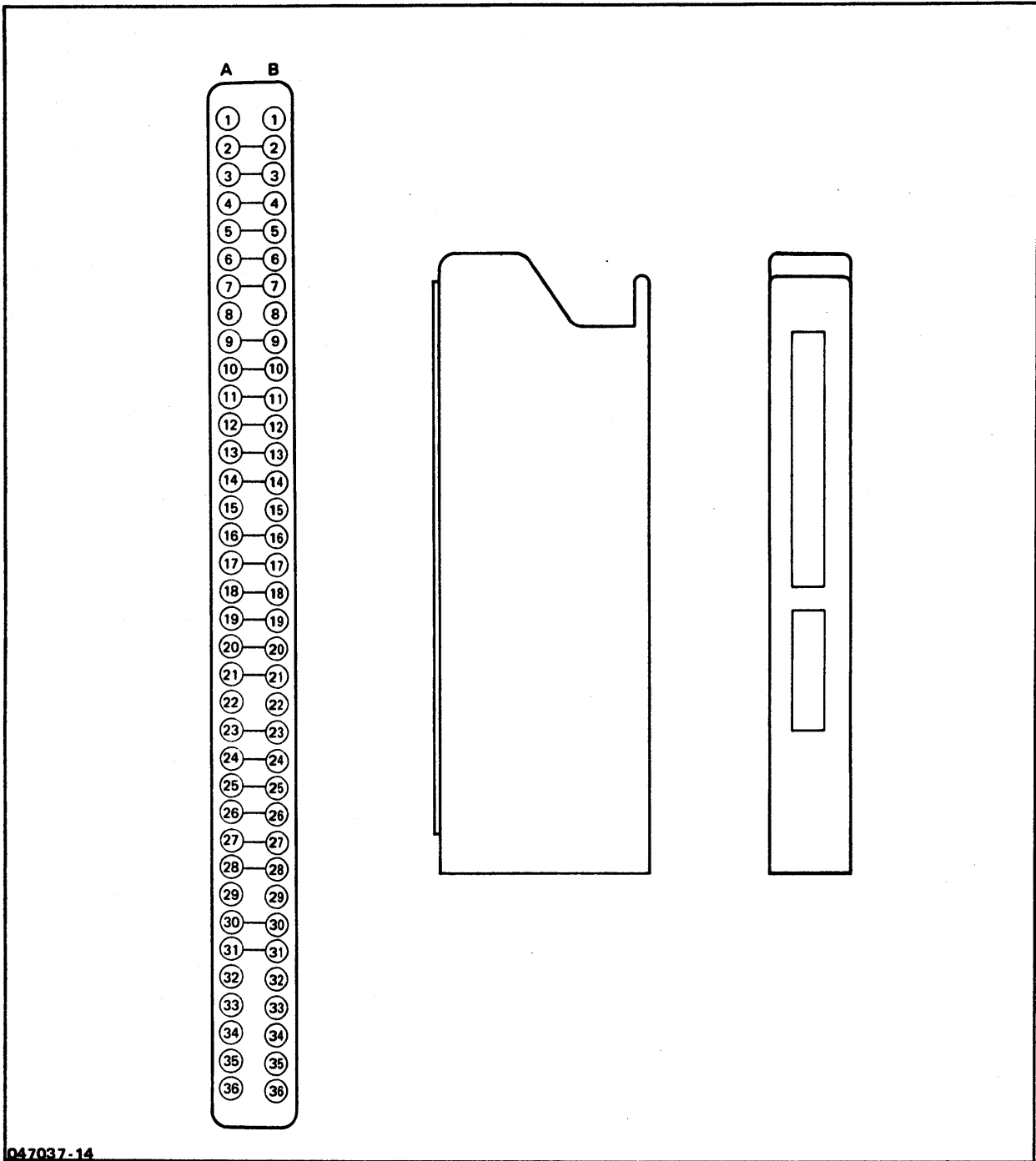
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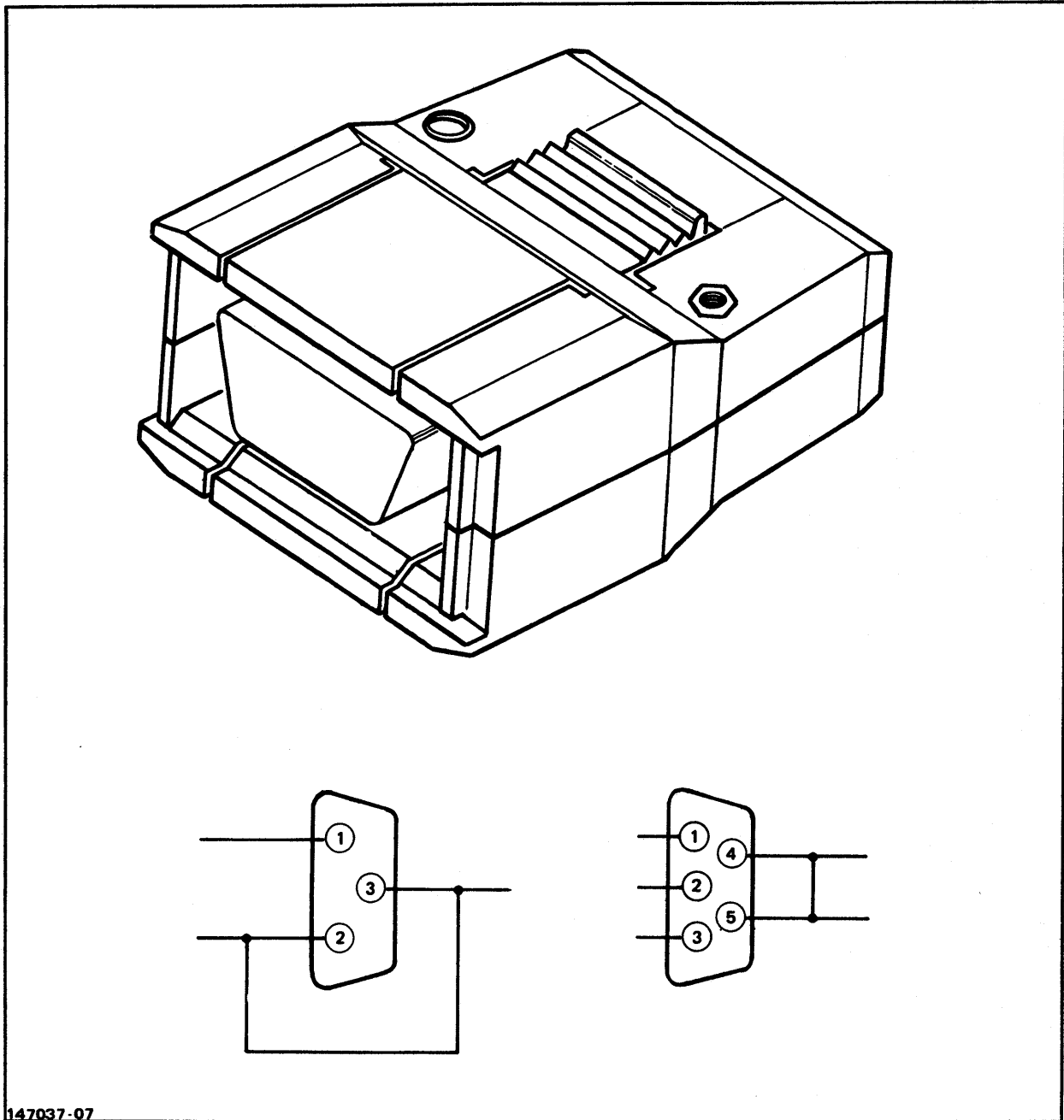
Figure B-1. HP-Modem B Loopback Hood

Appendix B



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Figure B-2. AIB Loopback Hood



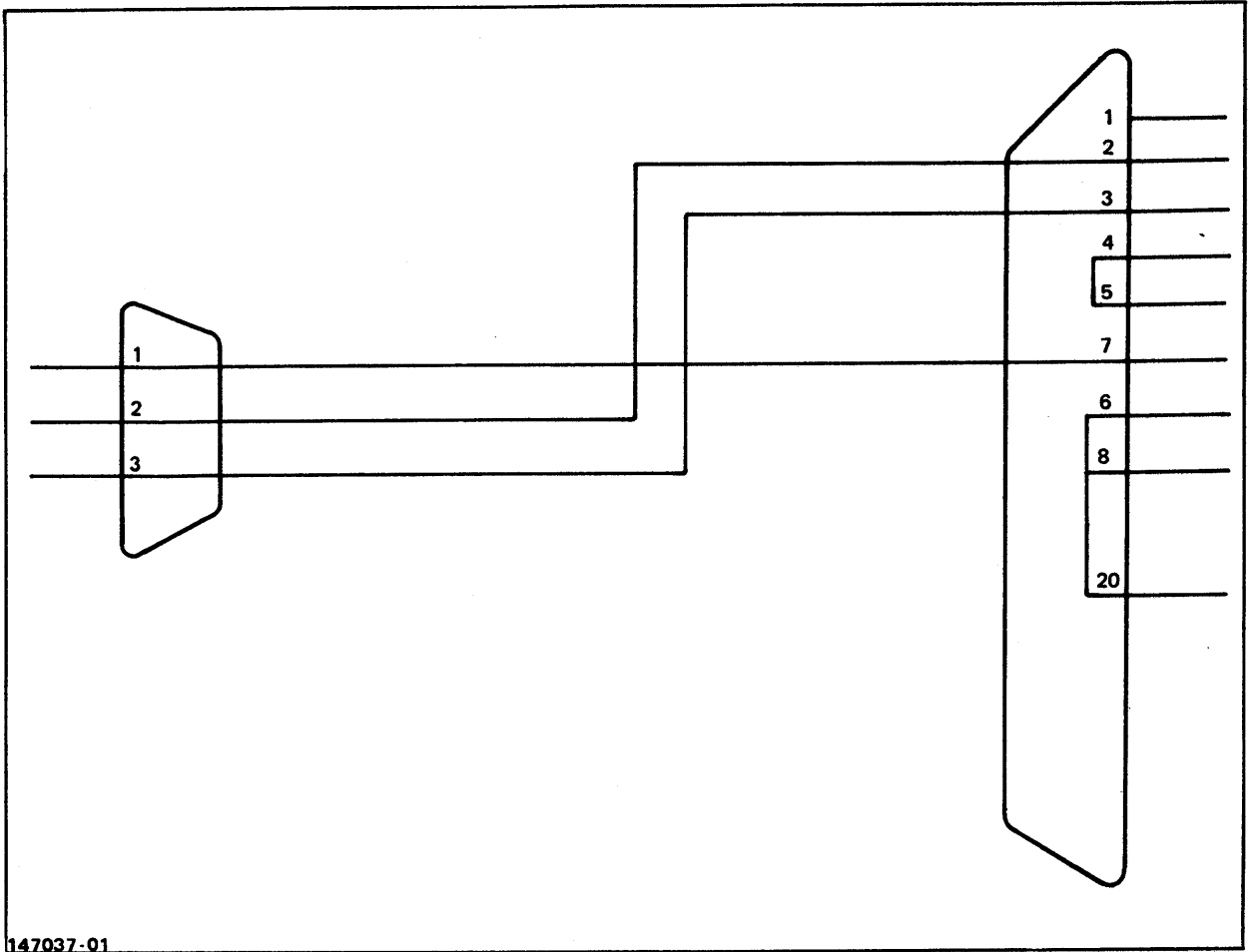
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Figure B-3, HP DC A and HP DC B Loopback Hoods

WIRING DIAGRAMS

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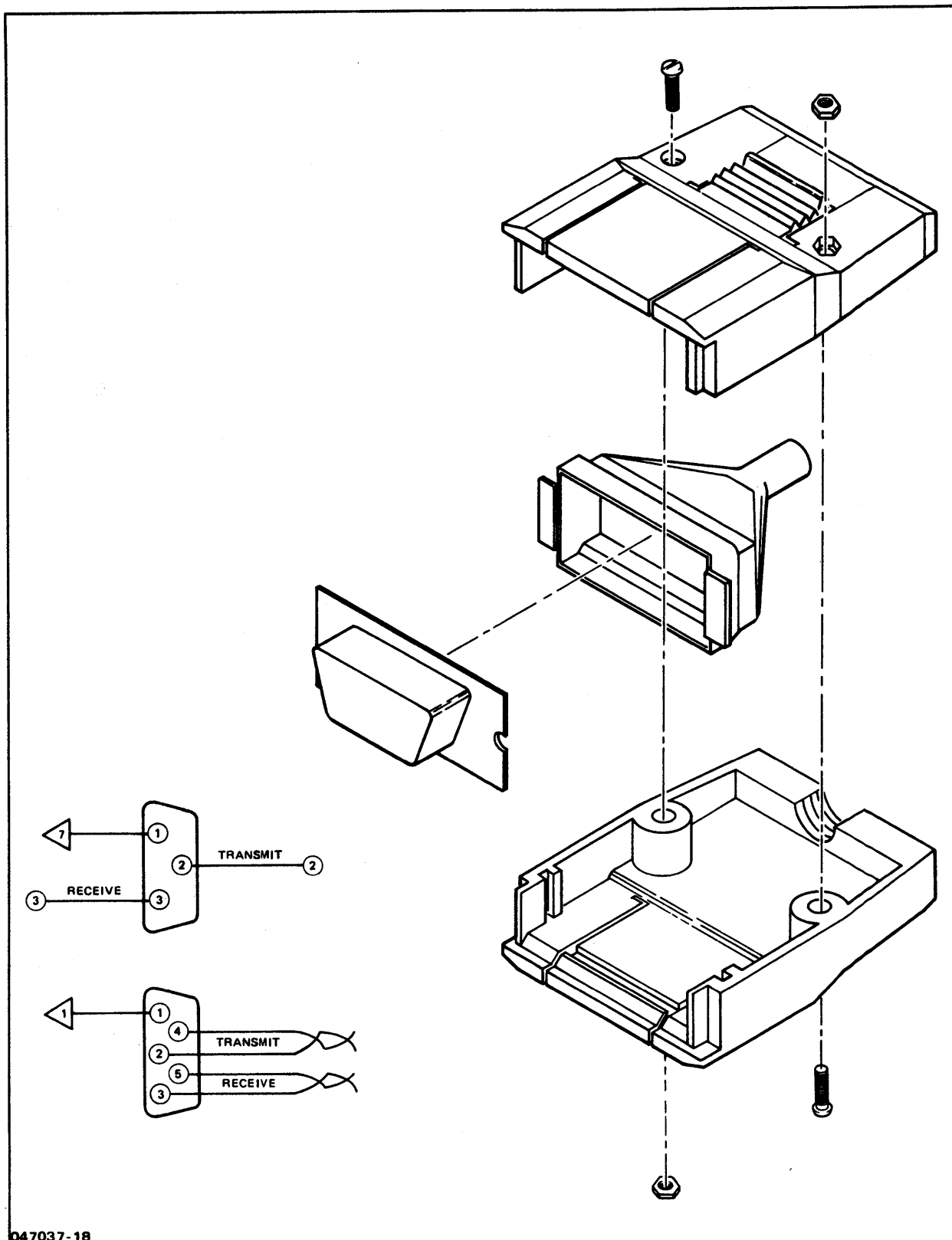
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Figure C-1. Wiring Diagram for HP DC B Adapter Cable

Appendix C



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Figure C-2. Cable Wiring for HP DC A and HP DC B

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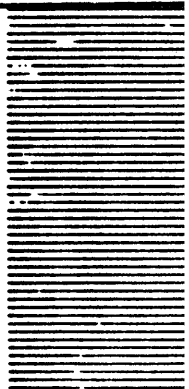
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Tel: (1) 502-12-20
Telex: 613663F
CH,M,P

Hewlett-Packard France
124, Boulevard Tourasse
F-64000 **PAU**
Tel: (59) 80 38 02

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2 Allée de la Bourgonnette
F-35100 **RENNES**
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Telex: 740912F
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F-76100 **ROUEN**
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Telex: 770035F
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Boite Postale 56
F-67033 **STRASBOURG Cedex**
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20, Chemin du Pigeonnier de la
CAEpiGEere
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Tel: (75) 42 76 16

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Tel: (8) 771 20 22
CH

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Immeuble PErcentre
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D-1000 **BERLIN 30**
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Hewlett-Packard GmbH
Geschäftsstelle
Herrenberger Strasse 130
D-7030 **BÖBLINGEN**
Tel: (7031) 14-0
Telex: 07265739
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Hewlett-Packard GmbH
Geschäftsstelle
Emanuel-Leutze-Strasse 1
D-4000 **DUSSELDORF**
Tel: (0211) 5971-1
Telex: 085/86 533 hpdd d
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Hewlett-Packard GmbH
Geschäftsstelle
Schleefstr. 28a
D-4600 **DORTMUND-Aplerbeck**
Tel: (0231) 45001

Hewlett-Packard GmbH
Vertriebszentrale Frankfurt
Berner Strasse 117
Postfach 560 140
D-6000 **FRANKFURT 56**
Tel: (0611) 50-04-1
Telex: 04 13249 hpffm d
A,CH,CM,CS,E,M,P

Hewlett-Packard GmbH
Geschäftsstelle
Aussenstelle Bad Homburg
Louisenstrasse 115
D-6380 **BAD HOMBURG**
Tel: (06172) 109-0

Hewlett-Packard GmbH
Geschäftsstelle
Kapstadtring 5
D-2000 **HAMBURG 60**
Tel: (040) 63804-1
Telex: 021 63 032 hphh d
A,CH,CS,E,M,P

Hewlett-Packard GmbH
Geschäftsstelle
Heidering 37-39
D-3000 **HANNOVER 61**
Tel: (0511) 5706-0
Telex: 092 3259
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Hewlett-Packard GmbH
Geschäftsstelle
Rosslauer Weg 2-4
D-6800 **MANNHEIM**
Tel: (0621) 70050
Telex: 0462105
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Hewlett-Packard GmbH
Geschäftsstelle
Messerschmittstrasse 7
D-7910 **NEU ULM**
Tel: 0731-70241
Telex: 0712816 HP ULM-D
A,C,E*

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Geschäftsstelle
Ehericherstr. 13
D-8500 **NÜRNBERG 10**
Tel: (0911) 5205-0
Telex: 0623 860
CH,CM,E,M,P

Hewlett-Packard GmbH
Geschäftsstelle
Eschenstrasse 5
D-8028 **TAUFKIRCHEN**
Tel: (089) 6117-1
Telex: 0524985
A,CH,CM,E,M,P

GREAT BRITAIN

See United Kingdom



SALES & SUPPORT OFFICES

Arranged alphabetically by country

GREECE

Hewlett-Packard A.E.
178, Kifissias Avenue
6th Floor
HALANDRI-ATHENS
Greece
Tel: 6471673, 6471543, 6472971
A,CH,CM**,CS**,E,M,P
Kostas Karayannis S.A.
8 Omirou Street
ATHENS 133
Tel: 32 30 303, 32 37 371
Telex: 215962 RKAR GR
A,CH,CM,CS,E,M,P
PLAISIO S.A.
Eliopoulos Brothers Ltd.
11854
ATHENS
Tel: 34-51-911
Telex: 216286
P

GUATEMALA

IPESA
Avenida Reforma 3-48, Zona 9
GUATEMALA CITY
Tel: 316627, 314786
Telex: 4192 TELTRO GU
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HONG KONG

Hewlett-Packard Hong Kong, Ltd.
G.P.O. Box 795
5th Floor, Sun Hung Kai Centre
30 Harbour Road
HONG KONG
Tel: 5-8323211
Telex: 66678 HEWPA HX
Cable: HEWPACK HONG KONG
E,CH,CS,P
CET Ltd.
10th Floor, Hua Asia
Bldg. Gloucester
64-66 Gloucester Road
HONG KONG
Tel: (5) 200922
Telex: 85148 CET HX
CM

Schmidt & Co. (Hong Kong) Ltd.
18th Floor, Great Eagle Centre
23 Harbour Road, Wanchai

HONG KONG

IS-REYKJAVIK
Tel: 5-8330222
Telex: 74766 SCHMC HX
A,M

ICELAND

Elding Trading Company Inc.
Hafnarnvoli-Tryggvagotú
P.O. Box 895
IS-REYKJAVIK
Tel: 1-58-20, 1-63-03
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Prabhadevi

BOMBAY 400 025
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Telex: 011-3751
Cable: BLUESTAR
A,M

Blue Star Ltd.
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Telex: 041-379
Cable: BLUESTAR
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91 Nehru Place

NEW DELHI 110 024
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PUNE 411 011
Tel: 22775

Cable: BLUE STAR
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Blue Star Ltd.
2-2-47/1108 Bolarum Rd.

SECUNDERABAD 500 003
Tel: 72057

Telex: 0155-459
Cable: BLUEFROST
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Blue Star Ltd.
T.C. 7/603 Poornima
Maruthankuzhi

TRIVANDRUM 695 013
Tel: 65799

Telex: 0884-259
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Computer Maintenance Corporation Ltd.
115, Sarojini Devi Road

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Tel: 310-184, 345-774

Telex: 031-2960
CH**

INDONESIA

BERCA Indonesia P.T.
P.O.Box 496/Jkt.

Jl. Abdul Muis 62
JAKARTA

Tel: 21-373009
Telex: 46748 BERSAL IA
Cable: BERSAL JAKARTA
P

BERCA Indonesia P.T.
P.O.Box 2497/Jkt

Antara Bldg., 17th Floor
Jl. Medan Merdeka Selatan 17

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Telex: BERSAL IA
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Telex: 31146 BERSAL SB
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Telex: 212-455 HEPAIRAQ IK
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IRELAND

Hewlett-Packard Ireland Ltd.
82/83 Lower Leeson Street

DUBLIN 2
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Telex: 30439
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Cardiac Services Ltd.
Kilmore Road

Artane
DUBLIN 5

Tel: (01) 351820
Telex: 30439

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ISRAEL

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P.O.Box 1270

JERUSALEM 91000
16, Ohallav St.

JERUSALEM 94467
Tel: 533 221, 553 242

Telex: 25231 AB/PAKRD IL
A,M

Computation and Measurement
Systems (CMS) Ltd.
11 Masad Street
67060

TEL-AVIV

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ITALY

Hewlett-Packard Italiana S.p.A.
Traversa 99C

Via Giulio Petroni, 19
I-70124 **BARI**

Tel: (080) 41-07-44
M,CH

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Via Martin Luther King, 38/III

I-40132 **BOLOGNA**
Tel: (051) 402394

Telex: 511630
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Via Principe Nicola 43G/C

I-95126 **CATANIA**
Tel: (095) 37-10-87

Telex: 970291
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Via G. Di Vittorio 9

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(Milano)
Tel: (02) 923691

Telex: 334632
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Via C. Colombo 49

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(Milano)
Tel: (02) 4459041

Telex: 322116
CH,CS

Hewlett-Packard Italiana S.p.A.
Via Nuova San Rocco a

Capodimonte, 62/A
I-80131 **NAPOLI**

Tel: (081) 7413544
Telex: 710698

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Hewlett-Packard Italiana S.p.A.
Viale G. Modugno 33

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Tel: (010) 68-37-07

Telex: 215238
E,C

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Via Pelizzo 15

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Tel: (049) 664888

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Telex: 610514
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Corso Svizzera, 185
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Tel: (011) 74 4044
Telex: 221079
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Yokogawa-Hewlett-Packard Ltd.
152-1, Onna
ATSUGI, Kanagawa, 243
Tel: (0462) 28-0451
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Yokogawa-Hewlett-Packard Ltd.
Meiji-Seimei Bldg. 6F
3-1 Hon Chiba-Cho
CHIBA, 280
Tel: 472 25 7701
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Yokogawa-Hewlett-Packard Ltd.
Yasuda-Seimei Hiroshima Bldg.
6-11, Hon-dori, Naka-ku
HIROSHIMA, 730
Tel: 82-241-0611

Yokogawa-Hewlett-Packard Ltd.
Towa Building
2-3, Kaigan-dori, 2 Chome Chuo-ku
KOBE, 650
Tel: (078) 392-4791
C,E

Yokogawa-Hewlett-Packard Ltd.
Kumagaya Asahi 82 Bldg
3-4 Tsukuba
KUMAGAYA, Saitama 360
Tel: (0485) 24-6563
CH,CM,E

Yokogawa-Hewlett-Packard Ltd.
Asahi Shinbun Daiichi Seimei Bldg.
4-7, Hanabata-cho
KUMAMOTO, 860
Tel: (0963) 54-7311
CH,E

Yokogawa-Hewlett-Packard Ltd.
Shin-Kyoto Center Bldg.
614, Higashi-Shiokoji-cho
Karasuma-Nishiru
Shiokoji-dori, Shimogyo-ku
KYOTO, 600
Tel: 075-343-0921
CH,E

Yokogawa-Hewlett-Packard Ltd.
Mito Mitsui Bldg
4-73, Sanno-maru, 1 Chome
MITO, Ibaraki 310
Tel: (0292) 25-7470
CH,CM,E

Yokogawa-Hewlett-Packard Ltd.
Meiji-Seimei Kokubun Bldg. 7-8
Kokubun, 1 Chome, Sendai
MIYAGI, 980
Tel: (0222) 25-1011
Telex:
C,E

Yokogawa-Hewlett-Packard Ltd.
Sumitomo Seimei 14-9 Bldg.
Meieki-Minami, 2 Chome
Nakamura-ku
NAGOYA, 450
Tel: (052) 571-5171
CH,CM,CS,E,M

Yokogawa-Hewlett-Packard Ltd.
Chuo Bldg.,
4-20 Nishinakajima, 5 Chome
Yodogawa-ku
OSAKA, 532
Tel: (06) 304-6021
Telex: YHPOSA 523-3624
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Yokogawa-Hewlett-Packard Ltd.
27-15, Yabe, 1 Chome
SAGAMIHARA Kanagawa, 229
Tel: 0427 59-1311

Yokogawa-Hewlett-Packard Ltd.
Daiichi Seimei Bldg.
7-1, Nishi Shinjuku, 2 Chome
Shinjuku-ku, **TOKYO** 160
Tel: 03-348-4611
CH,E

Yokogawa-Hewlett-Packard Ltd.
29-21 Takaido-Higashi, 3 Chome
Suginami-ku **TOKYO** 168
Tel: (03) 331-6111
Telex: 232-2024 YHPTOK
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Yokogawa-Hewlett-Packard Ltd.
Daiichi Asano Building
2-8, Odori, 5 Chome
UTSUNOMIYA, Tochigi 320
Tel: (0286) 25-7155
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Yasuda Seimei Nishiguchi Bldg.
30-4 Tsuruya-cho, 3 Chome
YOKOHAMA 221
Tel: (045) 312-1252
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AMMAN

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Kangnam-Ku
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Telex: K27364 SAMSAN
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Telex: 30336 TOWELL KT
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Telex: 42309
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de C.V.
Av. Periferico Sur No. 6501
Tepepan, Xochimilco
16020 **MEXICO D.F.**
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Hewlett-Packard Mexicana, S.A.
de C.V.

Czda. del Valle
409 Ote. 1 ° Piso
Colonia del Valle
Municipio de Garza Garcia
66220 **MONTERREY**, Nuevo LeAOn
Tel: 78 42 41
Telex: 038 410
CH

Equipos Cientificos de Occidente, S.A.
Av. Lazaro Cardenas 3540
GUADALAJARA

Tel: 21-66-91
Telex: 0684186 ECOMÉ
A

Infograficas y Sistemas del Noreste, S.A.
Rio Orinoco #171 Oriente
Despacho 2001
Colonia Del Valle
MONTERREY

Tel: 782499, 781259A
A

MOROCCO

Dolbeau
81 rue Karatchi
CASABLANCA

Tel: 3041-82, 3068-38
Telex: 23051, 22822
E

Gerep
2 rue d'Agadir
Boite Postale 156
CASABLANCA
Tel: 272093, 272095
Telex: 23 739
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Sema-Maroc
Rue Lapebie
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CH,CS,P

NETHERLANDS

Hewlett-Packard Nederland B.V.
Van Heuven Goedhartlaan 121
NL 1181KK **AMSTELVEEN**

P.O. Box 667
NL 1180 AR **AMSTELVEEN**
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Telex: 13 216 HEPA NL
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Hewlett-Packard Nederland B.V.
Bongerd 2
NL 2906VK **CAPELLE A/D IJSSEL**

P.O. Box 41
NL 2900AA **CAPELLE A/D IJSSEL**
Tel: (10) 51-64-44
Telex: 21261 HEPAC NL
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Hewlett-Packard Nederland B.V.
Pastoor Petersstraat 134-136
NL 5612 LV **EINDHOVEN**

P.O. Box 2342
NL 5600 CH **EINDHOVEN**
Tel: (040) 326911
Telex: 51484 hepae nl
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SALES & SUPPORT OFFICES

Arranged alphabetically by country

NEW ZEALAND

Hewlett-Packard (N.Z.) Ltd.
5 Owens Road
P.O. Box 26-189

Epsom, **AUCKLAND**
Tel: 687-159

Cable: HEWPAK Auckland
CH,CS,CM,E,P*

Hewlett-Packard (N.Z.) Ltd.
4-12 Cruickshank Street
Kilbirnie, **WELLINGTON 3**
P.O. Box 9443

Courtenay Place, **WELLINGTON 3**
Tel: 877-199

Cable: HEWPAK Wellington
CH,CS,CM,E,P

Northrop Instruments & Systems Ltd.
369 Khyber Pass Road
P.O. Box 8602

AUCKLAND

Tel: 794-091
Telex: 60605
A,M

Northrop Instruments & Systems Ltd.
110 Mandeville St.
P.O. Box 8388

CHRISTCHURCH

Tel: 488-873
Telex: 4203
A,M

Northrop Instruments & Systems Ltd.
Sturdee House
85-87 Ghuznee Street
P.O. Box 2406

WELLINGTON

Tel: 850-091
Telex: NZ 3380
A,M

NORTHERN IRELAND

See United Kingdom

NORWAY

Hewlett-Packard Norge A/S
Folke Bernadottes vei 50
P.O. Box 3558

N-5033 **FYLLINGSDALEN** (Bergen)
Tel: 0047/5/16 55 40
Telex: 16621 hpnas n
CH,CS,E,M

Hewlett-Packard Norge A/S
UCOsterndalen 16-18
P.O. Box 34

N-1345 **OCUSTERÅS**
Tel: 0047/2/17 11 80
Telex: 16621 hpnas n
A,CH,CM,CS,E,M,P

OMAN

Khimjil Ramdas
P.O. Box 19

MUSCAT

Tel: 722225, 745601
Telex: 3289 **BROKER MB MUSCAT**
P

Suhail & Saud Bahwan
P.O. Box 169

MUSCAT

Tel: 734 201-3
Telex: 3274 **BAHWAN MB**
E

Imtac LLC
P.O. Box 8676

MUTRAH

Tel: 601695
Telex: 5741 **Tawoos On**
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PAKISTAN

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House No. 16, Street No. 16
Sector F-6/3

ISLAMABAD

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Mushko & Company Ltd.
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Abdullah Haroon Road
KARACHI 0302

Tel: 524131, 524132

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Electronico Balboa, S.A.
Calle Samuel Lewis, Ed. Alfa
Apartado 4929

PANAMA 5

Tel: 63-6613, 63-6748
Telex: 3483 **ELECTRON PG**
A,CM,E,M,P

PERU

Cia Electro Médica S.A.
Los Flamencos 145, San Isidro
Casilla 1030

LIMA 1

Tel: 41-4325, 41-3703
Telex: Pub. Booth 25306
CM,E,M,P

SAMS

Rio De La Plata 305

SAN ISIDRO

Tel: 419928
Telex: 394 20450 **PELIBERTAD**
P

PHILIPPINES

The Online Advanced Systems
Corporation
Rico House, Amorsolo Cor. Herrera
Street

Legaspi Village, Makati
P.O. Box 1510

Metro MANILA

Tel: 815-38-11 (up to 16)
Telex: 63274 **Online PN**
A,CH,CS,E,M

Electronic Specialists and
Proponents Inc.

690-B Epifanio de los Santos
Avenue

Cubao, QUEZON CITY

P.O. Box 2649 Manila
Tel: 98-96-81, 98-96-82, 98-96-83

Telex: 40018, 42000 **ITT GLOBE MAC-
KAY BOOTH**
P

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Mundinter
Intercambio Mundial de ComAercio
S.A.R.L.

P.O. Box 2761
Av. Antonio Augusto de Aguiar 138
P-LISBON

Tel: (19) 53-21-31, 53-21-37
Telex: 16691 munter p
M

Soquimica

Av. da Liberdade, 220-2
1298 **LISBOA Codex**

Tel: 56 21 81/2/3
Telex: 13316 **SABASA**
P

Telectra-Empresa Técnica de
Equipmentos Eléctricos S.A.R.L.
Rua Rodrigo da Fonseca 103

P.O. Box 2531

P-LISBON 1

Tel: (19) 68-60-72
Telex: 12598
CM,E

Rarcentro Ltda

R. Costa Cabral 575
4200 **PORTO**

Tel: 499174/495173
Telex: 26054
CH,CS

PUERTO RICO

Hewlett-Packard Puerto Rico
101 MuAnoz Rivera Av
Esu. Calle Ochoa

HATO REY, Puerto Rico 00918

Tel: (809) 754-7800
A,CH,CS,CM,M,E,P

QATAR

Computer Arabia
P.O. Box 2750

DOHA

Tel: 883555
Telex: 4806 **CHPARB**
P

Nasser Trading & Contracting
P.O. Box 1563

DOHA

Tel: 422170
Telex: 4439 **NASSER DH**
M

SAUDI ARABIA

Modern Electronic Establishment
Hewlett-Packard Division
P.O. Box 281

Thuobah

AL-KHOBAR

Tel: 895-1760, 895-1764
Telex: 671 106 **HPMEEK SJ**
Cable: **ELECTA AL-KHOBAR**
CH,CS,E,M

Modern Electronic Establishment
Hewlett-Packard Division

P.O. Box 1228
Redec Plaza, 6th Floor

JEDDAH

Tel: 644 38 48
Telex: 4027 12 **FARNAS SJ**
Cable: **ELECTA JEDDAH**
A,CH,CS,CM,E,M,P

Modern Electronic Establishment

Hewlett-Packard Division
P.O. Box 22015

RIYADH

Tel: 491-97 15, 491-63 87
Telex: 202049 **MEERYD SJ**
CH,CS,E,M

Abdul Ghani El Ajou

P.O. Box 78

RIYADH

Tel: 40 41 717
Telex: 200 932 **EL AJOU**
P

SCOTLAND

See United Kingdom

SINGAPORE

Hewlett-Packard Singapore (Sales)
Pte. Ltd.

#08-00 Inchcape House

450-2 Alexandra Road

P.O. Box 58 Alexandra Rd. Post
Office

SINGAPORE, 9115

Tel: 631788

Telex: HPSGSO RS 34209

Cable: HEWPAK, Singapore
A,CH,CS,E,MS,P

Dynamar International Ltd.

Unit 05-11 Block 6

Kolam Ayer Industrial Estate

SINGAPORE 1334

Tel: 747-6188

Telex: RS 26283

CM

SOUTH AFRICA

Hewlett-Packard So Africa (Pty.) Ltd.
P.O. Box 120

Howard Place **CAPE PROVINCE 7450**

Pine Park Center, Forest Drive, Pine-
lands

CAPE PROVINCE 7405

Tel: 53-7954

Telex: 57-20006

A,CH,CM,E,M,P

Hewlett-Packard So Africa (Pty.) Ltd.

P.O. Box 37099

Overport Drive 92

DURBAN 4067

Tel: 28-4178

Telex: 6-22954

CH,CM

Hewlett-Packard So Africa (Pty.) Ltd.

6 Linton Arcade

511 Cape Road

Linton Grange

PORT ELIZABETH 6001

Tel: 041-301201

CH

Hewlett-Packard So Africa (Pty.) Ltd.

Fountain Center

Kalkden Str.

Monument Park

Ext 2

PRETORIA 0105

Tel: 45-5723

Telex: 32163

CH,E

SALES & SUPPORT OFFICES

Arranged alphabetically by country

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SOUTH AFRICA (Cont'd)

Hewlett-Packard So Africa (Pty.) Ltd.
Private Bag Wendywood
SANDTON 2144
Tel: 802-5111, 802-5125
Telex: 4-20877
Cable: HEWPACK Johannesburg
A,CH,CM,CS,E,M,P

SPAIN

Hewlett-Packard Española S.A.
Calle Entenza, 321
E-BARCELONA 29
Tel: 322.24.51, 321.73.54
Telex: 52603 hpbee
A,CH,CS,E,M,P

Hewlett-Packard Española S.A.
Calle San Vicente S/No
Edificio Albia II 7B
E-BILBAO 1
Tel: 423.83.06
A,CH,E,M

Hewlett-Packard Española S.A.
Crta. de la Coruña, Km. 16, 400
Las Rozas
E-MADRID
Tel: (1) 637.00.11
Telex: 23515 HPE
CH,CS,M

Hewlett-Packard Española S.A.
Avda. S. Francisco Javier, S/no
Planta 10. Edificio Sevilla 2,
E-SEVILLA 5
Tel: 64.44.54
Telex: 72933
A,CS,M,P

Hewlett-Packard Española S.A.
C/Isabel La Católica, 8
E-46004 VALENCIA
Tel: 0034/6/351 59 44
CH,P

SWEDEN

Hewlett-Packard Sverige AB
Sunnanvagen 14K
S-22226 **LUND**
Tel: (046) 13-69-79
Telex: (854) 17886 (via Spånga office)
CH

Hewlett-Packard Sverige AB
Östra Tullgatan 3
S-21128 **MALMÖ**
Tel: (040) 70270
Telex: (854) 17886 (via Spånga office)

Hewlett-Packard Sverige AB
Våstra Vintergatan 9
S-70344 **ÖREBRO**
Tel: (19) 10-48-80
Telex: (854) 17886 (via Spånga office)
CH

Hewlett-Packard Sverige AB
Skalholtsgratan 9, Kista
Box 19
S-16393 **SPÅNGA**
Tel: (08) 750-2000
Telex: (854) 17886
Telefax: (08) 7527781
A,CH,CM,CS,E,M,P

Hewlett-Packard Sverige AB
Frötallsgatan 30
S-42132 **VÄSTRA-FRÖLUNDA**
Tel: (031) 49-09-50
Telex: (854) 17886 (via Spånga office)
CH,E,P

SWITZERLAND

Hewlett-Packard (Schweiz) AG
Clarastrasse 12
CH-4058 **BASEL**
Tel: (61) 33-59-20
A

Hewlett-Packard (Schweiz) AG
7, rue du Bois-du-Lan
Case Postale 365
CH-1217 **MEYRIN 2**
Tel: (0041) 22-83-11-11
Telex: 27333 HPAG CH
CH,CM,CS

Hewlett-Packard (Schweiz) AG
Allmend 2
CH-8967 **WIDEN**
Tel: (0041) 57 31 21 11
Telex: 53933 hpag ch
Cable: HPAG CH
A,CH,CM,CS,E,M,P

SYRIA

General Electronic Inc.
Nuri Basha Ahnaf Ebn Kays Street
P.O. Box 5781
DAMASCUS
Tel: 33-24-87
Telex: 411 215
Cable: **ELECTROBOR DAMASCUS**
E

Middle East Electronics
P.O. Box 2308
Abu Rumnanah
DAMASCUS
Tel: 33 45 92
Telex: 411 304
M

TAIWAN

Hewlett-Packard Taiwan
Kaohsiung Office
11/F 456, Chung Hsiao 1st Road
KAOHSIUNG
Tel: (07) 2412318
CH,CS,E
Hewlett-Packard Taiwan
8th Floor Hewlett-Packard Building
337 Fu Hsing North Road
TAIPEI
Tel: (02) 712-0404
Telex: 24439 HEWPACK
Cable: HEWPACK Taipei
A,CH,CM,CS,E,M,P
Ing Lih Trading Co.
3rd Floor, 7 Jen-Ai Road, Sec. 2
TAIPEI 100
Tel: (02) 3948191
Cable: **INGLIH TAIPEI**
A

THAILAND

Unimesa
30 Patpong Ave., Suriwong
BANGKOK 5
Tel: 235-5727
Telex: 84439 Simonco TH
Cable: **UNIMESA Bangkok**
A,CH,CS,E,M

Bangkok Business Equipment Ltd.
5/5-6 Dejo Road
BANGKOK
Tel: 234-8670, 234-8671
Telex: 87669-BEQUIPT TH
Cable: **BUSIQUIPT Bangkok**
P

TOGO

Societe Africaine De
Promotion
B.P. 12271
LOME
Tel: 21-62-88
Telex: 5304
P

TRINIDAD & TOBAGO

Caribbean Telecoms Ltd.
Corner McAllister Street &
Eastern Main Road, Laventille
P.O. Box 732
PORT-OF-SPAIN
Tel: 624-4213
Telex: 22561 CARTEL WG
Cable: **CARTEL, PORT OF SPAIN**
CM,E,M,P

Computer and Controls Ltd.
P.O. Box 51
66 Independence Square
PORT-OF-SPAIN
Tel: 623-4472
Telex: 3000 POSTLX WG
P

TUNISIA

Tunisie Electronique
31 Avenue de la Liberte
TUNIS
Tel: 280-144
CH,CS,E,P
Corema
1 ter. Av. de Carthage
TUNIS
Tel: 253-821
Telex: 12319 CABAM TN
M

TURKEY

E.M.A
Mediha Eldem Sokak No. 41/6
Yenisehir
ANKARA
Tel: 319175
Telex: 42321 KTX TR
Cable: **EMATRADE ANKARA**
M
Kurt & Kurt A.S.
Mithatpasa Caddesi No. 75
Kat 4 Kizilay
ANKARA
Tel: 318875/6/7/8
Telex: 42490 MESR TR
A

Saniva Bilgisayar Sistemleri A.S.
Buyukdere Caddesi 103/6
Gayrettepe
ISTANBUL
Tel: 1673180
Telex: 26345 SANI TR
C,P

Teknim Company Ltd.
Iran Caddesi No. 7
Kavaklidere
ANKARA
Tel: 275800
Telex: 42155 TKNM TR
E,CM

UNITED ARAB EMIRATES

Emitac Ltd.
P.O. Box 1641
SHARJAH,
Tel: 591181
Telex: 68136 EMITAC EM
Cable: **EMITAC SHARJAH**
E,C,M,P,A
Emitac Ltd.
P.O. Box 2711
ABU DHABI,
Tel: 820419-20
Cable: **EMITACH ABUDHABI**

Emitac Ltd.
P.O. Box 8391
DUBAI,
Tel: 377951
Emitac Ltd.
P.O. Box 473
RAS AL KHAIMAH,
Tel: 28133, 21270

UNITED KINGDOM

GREAT BRITAIN
Hewlett-Packard Ltd.
Trafalgar House
Navigation Road
ALTRINCHAM
Cheshire WA14 1NU
Tel: 061 928 6422
Telex: 668068
A,CH,CS,E,M,M,P
Hewlett-Packard Ltd.
Miller House
The Ring, **BRACKNELL**
Berks RG12 1XN
Tel: 44344 424898
Telex: 848733
E

Hewlett-Packard Ltd.
Elstree House, Elstree Way
BOREHAMWOOD, Herts WD6 1SG
Tel: 01 207 5000
Telex: 8952716
E,CH,CS,P
Hewlett-Packard Ltd.
Oakfield House, Oakfield Grove
Clifton **BRISTOL,** Avon BS8 2BN
Tel: 0272 736806
Telex: 444302
CH,CS,E,P



SALES & SUPPORT OFFICES

Arranged alphabetically by country

GREAT BRITAIN (Cont'd)

Hewlett-Packard Ltd.
Bridewell House
Bridewell Place
LONDON EC4V 6BS
Tel: 01 583 6565
Telex: 298163
CH,CS,P

Hewlett-Packard Ltd.
Fourier House
257-263 High Street
LONDON COLNEY
Herts. AL2 1HA, St. Albans
Tel: 0727 24400
Telex: 1-8952716
CH,CS

Hewlett-Packard Ltd.
Pontefract Road
NORMANTON, West Yorkshire WF6 1RN
Tel: 0924 895566
Telex: 557355
CH,CS,P

Hewlett-Packard Ltd.
The Quadrangle
106-118 Station Road
REDHILL, Surrey RH1 1PS
Tel: 0737 68655
Telex: 947234
CH,CS,E,P

Hewlett-Packard Ltd.
Avon House
435 Stratford Road
Shirley, **SOLIHULL**, West Midlands
B90 4BL
Tel: 021 745 8800
Telex: 339105
CH,CS,E,P

Hewlett-Packard Ltd.
West End House
41 High Street, West End
SOUTHAMPTON
Hampshire SO3 3DQ
Tel: 04218 6767
Telex: 477138
CH,CS,P

Hewlett-Packard Ltd.
King Street Lane
Winnersh, **WOKINGHAM**
Berkshire RG11 5AR
Tel: 0734 784774
Telex: 847178
A,CH,CS,E,M,P

Hewlett-Packard Ltd.
Nine Mile Ride
Easthampstead, **WOKINGHAM**
Berkshire, 3RG11 3LL
Tel: 0344 773100
Telex: 848805
CH,CS,E,P

IRELAND

NORTHERN IRELAND

Hewlett-Packard Ltd.
Cardiac Services Building
95A Finaghy Road South
BELFAST BT10 0BY
Tel: 0232 625-566
Telex: 747626
CH,CS

SCOTLAND

Hewlett-Packard Ltd.
SOUTH QUEENSFERRY
West Lothian, EH30 9TG
Tel: 031 331 1188
Telex: 72682
CH,CM,CS,E,M,P

UNITED STATES

Alabama

Hewlett-Packard Co.
700 Century Park South, Suite 128
BIRMINGHAM, AL 35226
Tel: (205) 822-6802
C,CH,CS,P*

Hewlett-Packard Co.
420 Wynn Drive
P.O. Box 7700
HUNTSVILLE, AL 35807
Tel: (205) 830-2000
C,CH,CM,CS,E,M*

Alaska

Hewlett-Packard Co.
3601 C St., Suite 1234
ANCHORAGE, AK 99503
Tel: (907) 563-8855
CH,CS,E

Arizona

Hewlett-Packard Co.
8080 Pointe Parkway West
PHOENIX, AZ 85044
Tel: (602) 273-8000
A,CH,CM,CS,E,M

Hewlett-Packard Co.
2424 East Aragon Road
TUCSON, AZ 85706
Tel: (602) 573-7400
CH,E,M**

California

Hewlett-Packard Co.
99 South Hill Dr.
BRISBANE, CA 94005
Tel: (415) 330-2500
CH,CS

Hewlett-Packard Co.
P.O. Box 7830 (93747)
5060 E. Clinton Avenue, Suite 102
FRESNO, CA 93727
Tel: (209) 252-9652
CH,CS,M

Hewlett-Packard Co.
1421 S. Manhattan Av.
FULLERTON, CA 92631
Tel: (714) 999-6700
CH,CM,CS,E,M

Hewlett-Packard Co.
320 S. Kellogg, Suite B
GOLETA, CA 93117
Tel: (805) 967-3405
CH

Hewlett-Packard Co.
5400 W. Rosecrans Blvd.
LAWDALE, CA 90260
P.O. Box 92105
LOS ANGELES, CA 90009
Tel: (213) 643-7500
Telex: 910-325-6608
CH,CM,CS,M

Hewlett-Packard Co.
3155 Porter Drive
PALO ALTO, CA 94304
Tel: (415) 857-8000
CH,CS,E

Hewlett-Packard Co.
4244 So. Market Court, Suite A
P.O. Box 15976
SACRAMENTO, CA 95813
Tel: (916) 929-7222
A*,CH,CS,E,M

Hewlett-Packard Co.
9606 Aero Drive
P.O. Box 23333
SAN DIEGO, CA 92123
Tel: (619) 279-3200
CH,CM,CS,E,M

Hewlett-Packard Co.
2305 Camino Ramon 'C'
SAN RAMON, CA 94583
Tel: (415) 838-5900
CH,CS

Hewlett-Packard Co.
3005 Scott Boulevard
SANTA CLARA, CA 95050
Tel: (408) 988-7000
Telex: 910-338-0586
A,CH,CM,CS,E,M

Hewlett-Packard Co.
5703 Corsa Avenue
WESTLAKE VILLAGE, CA 91362
Tel: (213) 706-6800
E*,CH*,CS*

Colorado

Hewlett-Packard Co.
24 Inverness Place, East
ENGLEWOOD, CO 80112
Tel: (303) 649-5000
A,CH,CM,CS,E,M

Connecticut

Eff. Dec. 1, 1984
Hewlett-Packard Co.
500 Sylvan Av.
BRIDGEPORT, CT 06606
Tel: (203) 371-6454
CH,CS,E

Hewlett-Packard Co.
47 Barnes Industrial Road South
P.O. Box 5007
WALLINGFORD, CT 06492
Tel: (203) 265-7801
A,CH,CM,CS,E,M

Florida

Hewlett-Packard Co.
2901 N.W. 62nd Street
P.O. Box 24210
FORT LAUDERDALE, FL 33307
Tel: (305) 973-2600
CH,CS,E,M,P*

Hewlett-Packard Co.
4080 Woodcock Drive, Suite 132
JACKSONVILLE, FL 32207
Tel: (904) 398-0663
C*,CH*,M**

Hewlett-Packard Co.
6177 Lake Ellenor Drive
P.O. Box 13910
ORLANDO, FL 32859
Tel: (305) 859-2900
A,C,CH,CM,CS,E,P*

Hewlett-Packard Co.
4700 Bayoue Blvd.
Building 5
PENSACOLA, FL 32505
Tel: (904) 476-8422
A,C,CH,CM,CS,M

Hewlett-Packard Co.
5550 Idlewild, #150
P.O. Box 15200
TAMPA, FL 33684
Tel: (813) 884-3282
A*,C,CH,CS,E*,M*,P*

Georgia

Hewlett-Packard Co.
2000 South Park Place
P.O. Box 105005
ATLANTA, GA 30348
Tel: (404) 955-1500
Telex: 810-766-4890
A,C,CH,CM,CS,E,M,P*

Hawaii

Hewlett-Packard Co.
Kawaiahao Plaza, Suite 190
567 South King Street
HONOLULU, HI 96813
Tel: (808) 526-1555
A,CH,E,M

Illinois

Hewlett-Packard Co.
304 Eldorado Road
P.O. Box 1607
BLOOMINGTON, IL 61701
Tel: (309) 662-9411
CH,M**

Hewlett-Packard Co.
525 W. Monroe, #1300
CHICAGO, IL 60606
Tel: (312) 930-0010
CH,CS

Hewlett-Packard Co.
1200 Diehl
NAPERVILLE, IL 60566
Tel: (312) 357-8800
CH*,CS

Hewlett-Packard Co.
5201 Tollview Drive
ROLLING MEADOWS, IL 60008
Tel: (312) 255-9800
Telex: 910-687-1066
A,CH,CM,CS,E,M

Indiana

Hewlett-Packard Co.
11911 N. Meridian St.
CARMEL, IN 46032
Tel: (317) 844-4100
A,CH,CM,CS,E,M

Iowa

Hewlett-Packard Co.
4070 22nd Av. SW
CEDAR RAPIDS, IA 52404
Tel: (319) 390-4250
CH,CS,E,M



UNITED STATES (Cont'd)

Hewlett-Packard Co.
4201 Corporate Dr.
WEST DES MOINES, IA 50265
Tel: (515) 224-1435
A**,CH,M**

Kentucky

Hewlett-Packard Co.
10300 Linn Station Road, #100
LOUISVILLE, KY 40223
Tel: (502) 426-0100
A,CH,CS,M

Louisiana

Hewlett-Packard Co.
160 James Drive East
ST. ROSE, LA 70087
P.O. Box 1449
KENNER, LA 70063
Tel: (504) 467-4100
A,C,CH,E,M,P*

Maryland

Hewlett-Packard Co.
3701 Koppers Street
BALTIMORE, MD 21227
Tel: (301) 644-5800
Telex: 710-862-1943
A,CH,CM,CS,E,M
Hewlett-Packard Co.
2 Choke Cherry Road
ROCKVILLE, MD 20850
Tel: (301) 948-6370
A,CH,CM,CS,E,M

Massachusetts

Hewlett-Packard Co.
1775 Minuteman Road
ANDOVER, MA 01810
Tel: (617) 682-1500
A,C,CH,CS,CM,E,M,P*
Hewlett-Packard Co.
32 Hartwell Avenue
LEXINGTON, MA 02173
Tel: (617) 861-8960
CH,CS,E

Michigan

Hewlett-Packard Co.
4326 Cascade Road S.E.
GRAND RAPIDS, MI 49506
Tel: (616) 957-1970
CH,CS,M
Hewlett-Packard Co.
39550 Orchard Hill Place Drive
NOVI, MI 48050
Tel: (313) 349-9200
A,CH,CS,E,M
Hewlett-Packard Co.
1771 W. Big Beaver Road
TROY, MI 48084
Tel: (313) 643-6474
CH,CS

Minnesota

Hewlett-Packard Co.
2025 W. Larpenteur Ave.
ST. PAUL, MN 55113
Tel: (612) 644-1100
A,CH,CM,CS,E,M

Missouri

Hewlett-Packard Co.
1001 E. 101st Terrace
KANSAS CITY, MO 64131
Tel: (816) 941-0411
A,CH,CM,CS,E,M
Hewlett-Packard Co.
13001 Hollenberg Drive
BRIDGETON, MO 63044
Tel: (314) 344-5100
A,CH,CS,E,M

Nebraska

Hewlett-Packard
10824 Old Mill Rd., Suite 3
OMAHA, NE 68154
Tel: (402) 334-1813
CM,M

New Jersey

Hewlett-Packard Co.
120 W. Century Road
PARAMUS, NJ 07652
Tel: (201) 265-5000
A,CH,CM,CS,E,M
Hewlett-Packard Co.
20 New England Av. West
PISCATAWAY, NJ 08854
Tel: (201) 981-1199
A,CH,CM,CS,E

New Mexico

Hewlett-Packard Co.
11300 Lomas Blvd.,N.E.
P.O. Box 11634
ALBUQUERQUE, NM 87112
Tel: (505) 292-1330
CH,CS,E,M

New York

Hewlett-Packard Co.
5 Computer Drive South
ALBANY, NY 12205
Tel: (518) 458-1550
A,CH,E,M
Hewlett-Packard Co.
9600 Main Street
P.O. Box AC
CLARENCE, NY 14031
Tel: (716) 759-8621
CH,CS,E
Hewlett-Packard Co.
200 Cross Keys Office Park
FAIRPORT, NY 14450
Tel: (716) 223-9950
A,CH,CM,CS,E,M
Hewlett-Packard Co.
7641 Henry Clay Blvd.
LIVERPOOL, NY 13088
Tel: (315) 451-1820
A,CH,CM,CS,E,M
Hewlett-Packard Co.
No. 1 Pennsylvania Plaza
55th Floor
34th Street & 8th Avenue
MANHATTAN NY 10119
Tel: (212) 971-0800
CH,CS,M*
Hewlett-Packard Co.
15 Myers Corner Rd.
WAPPINGER FALLS, NY 12590
CM,E

Hewlett-Packard Co.
250 Westchester Avenue
WHITE PLAINS, NY 10604
Tel: (914) 684-6100
CM,CH,CS,E

Hewlett-Packard Co.
3 Crossways Park West
WOODBURY, NY 11797
Tel: (516) 921-0300
A,CH,CM,CS,E,M

North Carolina

Hewlett-Packard Co.
305 Gregson Dr.
CARY, NC 27511
Tel: (919) 467-6600
C,CH,CM,CS,E,M,P*
Hewlett-Packard Co.
9600-H Southern Pine Blvd.
CHARLOTTE, NC 28210
Tel: (704) 527-8780
CH*,CS*
Hewlett-Packard Co.
5605 Roanne Way
P.O. Box 26500
GREENSBORO, NC 27420
Tel: (919) 852-1800
A,C,CH,CM,CS,E,M,P*

Ohio

Hewlett-Packard Co.
9920 Carver Road
CINCINNATI, OH 45242
Tel: (513) 891-9870
CH,CS,M
Hewlett-Packard Co.
16500 Sprague Road
CLEVELAND, OH 44130
Tel: (216) 243-7300
A,CH,CM,CS,E,M
Hewlett-Packard Co.
980 Springboro Pike
MIAMISBURG, OH 45343
Tel: (513) 859-8202
A,CH,CM,E*,M
Hewlett-Packard Co.
675 Brooksedge Blvd.
WESTERVILLE, OH 43081
Tel: (614) 436-1041
CH,CM,CS,E*

Oklahoma

Hewlett-Packard Co.
304 N. Meridian, Suite A
P.O. Box 75609
OKLAHOMA CITY, OK 73147
Tel: (405) 946-9499
C,CH,CS,E*,M
Hewlett-Packard Co.
3840 S. 103rd E. Ave., #100
P.O. Box 35747
TULSA, OK 74153
Tel: (918) 665-3300
A**,C,CH,CS,M*,E,P*

Oregon

Hewlett-Packard Co.
9255 S. W. Pioneer Court
P.O. Box 328
WILSONVILLE, OR 97070
Tel: (503) 682-8000
A,CH,CS,E*,M

Pennsylvania

Hewlett-Packard Co.
50 Dorchester Rd.
P.O. Box 6080
HARRISBURG, PA 17111
Tel: (717) 657-5900
C
Hewlett-Packard Co.
111 Zeta Drive
PITTSBURGH, PA 15238
Tel: (412) 782-0400
A,CH,CS,E,M
Hewlett-Packard Co.
2750 Monroe Boulevard
P.O. Box 713
VALLEY FORGE, PA 19482
Tel: (215) 666-9000
A,CH,CM,CS,E,M
Hewlett-Packard Co.
100 Executive Cntr. Dr.
Koger Executive Center
Chesterfield Bldg., Suite 124
GREENVILLE, SC 29615
Tel: (803) 297-4120
C
Hewlett-Packard Co.
One Energy Centr. #200
Pellissippi Pkwy.
P.O. Box 22490
KNOXVILLE, TN 37933
Tel: (615) 966-4747
A,C,CH,CS,M
Hewlett-Packard Co.
3070 Directors Row
MEMPHIS, TN 38131
Tel: (901) 346-8370
A,C,M
Hewlett-Packard Co.
220 Great Circle Road, Suite 1*
NASHVILLE, TN 37228
Tel: (615) 255-1271
C,M,P*
Hewlett-Packard Co.
11002-B Metric Boulevard
AUSTIN, TX 78758
Tel: (512) 835-6771
C,CM,E,P*
Hewlett-Packard Co.
5700 Cromo Dr
P.O. Box 12903
EL PASO, TX 79913
Tel: (915) 833-4400
CH,E*,M**



SALES & SUPPORT OFFICES

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UNITED STATES (Cont'd)

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GLEN ALLEN, VA 23060
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SPOKANE, WA 99220-3808
Tel: (509) 922-7000
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West Virginia

Hewlett-Packard Co.
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CHARLESTON, WV 25304
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Wisconsin

Hewlett-Packard Co.
275 N. Corporate Dr.
BROOKFIELD, WI 53005
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URUGUAY

Pablo Ferrando S.A.C. e l.
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Tel: 239-4133

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Hewlett-Packard de Venezuela C.A.
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C,E*

Hewlett-Packard de Venezuela C.A.
Urb. Lomas de Este
Torre Trebol — Piso 11
VALENCIA, Estado Carabobo
Apartado 3347

Tel: (041) 222992/223024
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Albis Venezolana S.R.L.
Av. Las Marias, Ota. Allx,
El Pedregal
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Tel: 747984, 742146
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Calle 70, Los Olivos
No. 66-86

Apartado 1843

MARACAIBO

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Telex: 62144

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