

Cross Family Peripherals

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April 1991

TECHNICAL PROCEDURES FILING INSTRUCTIONS

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Apple Service Technical Procedures Cross Family Peripherals

Volume One

PN: 072-0230

(Cross Family Not Sold Separately)

Modems

Technical Procedures

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300/1200 Modems

Section 1 – Troubleshooting & Take-Apart

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1.3	Introduction
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□ TROUBLESHOOTING

Introduction

Most of the problems with modems will occur during the installation procedures. Other problems may occur only with certain baud rates or modes of operation. The purpose of this document is to give Apple Dealer Service-persons step-by-step checkout procedures to test, evaluate, and diagnose any failure related to the operation of either the Apple 300 or Apple 1200 MODEMS. These procedures can be performed using either an Apple II+, Apple IIe or Apple III. For testing and troubleshooting of modems connected to Macintosh or Lisa systems, refer to the Modem Manual (Part II) for those systems.

Self Test

Materials Required

Modem 300/1200 User's Manual (Part 1: Reference)
Apple II+, IIe, or III system with drive and monitor
Apple Term program diskette (Apple Term II or Apple Term III)
Super Serial Card (for Apple II+ or IIe only)
Modem 300/1200 User's Manual (Part II for Apple II or Apple III)

Note: There are two Part II manuals, one for Apple II+ and IIe systems, and one for Apple III systems. Use the one that matches your system.

Procedure

1. Connect the modem to a telephone line according to the instructions on page 14 (start at the top of the page) of the Modem 300/1200 User's Manual. (Part 1: Reference).
2. Complete the modem hook-up to your computer according to the instructions in chapter 1 of the Modem 300/1200 User's Manual (Part II).
3. Run the self-test given in chapter 1 (see Testing with the Self-Test Procedure) of the Modem 300/1200 User's Manual (Part II).

4. After completing the self-test, press and hold down the <OPEN-APPLE> key and type "Q" (IIe) or hold down the <ESCAPE> key and type "Q" (II+) to return to the main menu.
5. Type "C" to enter the **Change Configuration** menu. You will now select a different speed and repeat the self test.
6. Use the arrow keys (IIe) or arrow keys and space bar (II+) to select 110 baud.
7. Repeat steps 3 and 4. Press <ESCAPE> to return to the main menu.
8. If you are testing a 300 baud modem, skip this step and go on to step 9. Type "C" to enter the **Change Configuration** menu. Use the arrow key (IIe) or <SPACE> (II+) to select 1200 baud. Repeat steps 3 and 4.
9. Return the baud setting to 300 baud.
10. If the self-test passes skip over this step and perform the **MODEM VERIFICATION TEST**. If the self-test fails, check your installation using the checklist below:
 - Verify the setting of the switches on the back of your modem.
 - Is the modem data cable securely connected to the computer and to the modem?
 - Is the modem power module connected to the modem?

Note: Inspect the modem power module connector for bent or missing pins?

 - Is the modem power module plugged into an electrical outlet?

- Is the modem turned on?
- Verify the setting of the DIP switches on the Super Serial Card (Apple II+ or IIe only).
- Verify that the jumper block on the Super Serial Card has its triangle pointing to the word MODEM (Apple II+ or IIe only).

If no problems are found during the installation check, replace the following modules (in the order listed) one at a time and rerun the self-test:

- power module
- modem data cable
- modem PCB

After isolating and repairing the problem, continue on to the **MODEM VERIFICATION TEST**.

Modem Verification Test

This test will verify the correct operation of the modem and the telephone lines.

Materials Required

Apple II+, IIe, or III system with drive and monitor
Super Serial Card (if Apple II+ or IIe is used)
Apple Term program diskette
Local telephone line and a user service

Note: The user service may be a local bulletin board or any data service as long as the baud rate and protocol are known and can be verified. Do not attempt to test a modem by dialing an unverified user service. The results will be very confusing

Procedure

1. Obtain the telephone number of a compatible user service.
2. From the Apple Term main menu, type "U" to enter the phone directory menu.
3. Add the telephone number of the user service by holding down the <OPEN-APPLE> key and typing "A" (IIe) or holding down the <CONTROL> key and typing "A" (II+). The cursor will appear at the first available line on the telephone list.
4. Type a name or label that lets you identify the number to be added. Press <RETURN> and the cursor will move to the number column.
5. Type the complete telephone number including any prefixes required to get an outside line. Do not use spaces or dashes to separate parts of the telephone number. Press <RETURN> when you are finished entering the telephone number.
6. Press <ESCAPE> to get out of the phone directory screen and return to the main menu.
7. Type "E" to enter the terminal mode.

8. Hold down the <OPEN-APPLE> key and type "D" (Ile) or hold down the <CONTROL> key and type "D" (II+) - this will automatically dial the number you entered.

Note: If the **CONNECT** message appears on your monitor screen and a message from the user service you dialed appears, your modem is working properly. If a **NO CARRIER** message appears on your screen, your modem was unable to connect you with the number selected and you should replace the following components (one at a time) in the order listed:

- telephone cable
- modem power module
- modem PCB
- modem data cable

After isolating and repairing the problem, verify correct operation by running the **MODEM VERIFICATION TEST** again.

Back-To-Back Modem Test

This is an optional test that requires two complete computer systems and two identical modems. Perform this test only when a customer's modem does not function correctly, but no problem can be found by running the **SELF-TEST** or **MODEM VERIFICATION TEST**.

Materials Required

- (2) Apple II+, Ile, or III systems with drives and monitors
- (2) Super Serial Cards (one for each computer if Apple II+ or Ile is used)
- (2) Apple Term program diskettes
- (2) identical modems (one modem must be a known good unit)
- (2) local telephone lines (two separate phone lines must be used)

Note: If the modem fails any steps of this procedure, replace the modem power module and repeat the test. If that does not cure the problem, replace the modem PCB and repeat the test. If the modem passes all steps of this procedure, the **SELF-TEST**, and the **MODEM VERIFICATION TEST**, but the customer still cannot get the modem to work at their site, have the customer contact the telephone company to investigate their telephone line.

Procedure

1. With both modems installed according to the User's Manual instructions, turn the computers and modems on and boot the Apple Term software on both systems.
2. On the system with the suspected bad modem, type "U" to enter the phone directory menu.
3. Add the telephone number of the known good modem to the phone directory by holding down the <OPEN-APPLE> key and typing "A" (Ile) or holding down the <CONTROL> key and typing "A" (II+). The cursor will appear at the first available line on the telephone list.
4. Press <RETURN> and the cursor will move to the number column.
5. Type the telephone number of the known good modem. Do not use spaces or dashes to separate parts of the telephone number. Press <RETURN> when you are finished entering the telephone number.
6. Press <ESCAPE> to get out of the phone directory screen and return to the main menu.
7. Type "E" on both computers to enter the terminal mode.

8. On the system with the suspected bad modem, hold down the <OPEN-APPLE> key and type "D" (IIe) or hold down the <CONTROL> key and type "D" (II+) - this will automatically dial the number you entered (the known good modem). The **CONNECT** message should appear on your monitor screen; if it does, go to step 9. If a **NO CARRIER** message appears on your screen, check the setup of both modems and computers, then dial again. If a **NO CARRIER** message appears again, turn both modems and computers off, replace the PCB in the suspected bad modem, and start the test again from step 1. If the test passes, the modem PCB was faulty.
9. On the system with the suspected bad modem, type a short message and verify that it is displayed on the screen of the system with the known good modem.
10. On the system with the known good modem, type a short message and verify that it is displayed on the screen of the other system (the suspected bad modem).
11. On the system with the suspected bad modem, hold down the <OPEN-APPLE> key and type "H" (IIe) or hold down the <ESCAPE> key and type "H" (II+) to hang up the modem. The screen should now have the message **NO CARRIER**.
12. On the system with the known good modem, hold down the <OPEN-APPLE> key and type "Q" (IIe) or hold down the <ESCAPE> key and type "Q" (II+) to return to the main menu.
13. Type "U" to enter the phone directory menu.
14. Add the telephone number of the suspected bad modem to the phone directory by holding down the <OPEN-APPLE> key and typing "A" (IIe) or holding down the <CONTROL> key and typing "A" (II+). The cursor will appear at the first available line on the telephone list.
15. Press <RETURN> and the cursor will move to the number column.

16. Type the telephone number of the suspected bad modem. Do not use spaces or dashes to separate parts of the telephone number. Press <RETURN> when you are finished entering the telephone number.
17. Press <ESCAPE> to get out of the phone directory screen and return to the main menu.
18. Type "E" to enter the terminal mode.
19. Hold down the <OPEN-APPLE> key and type "D" (Ile) or hold down the <CONTROL> key and type "D" (II+) - this will automatically dial the number you entered (the suspected bad modem). The **CONNECT** message should appear on your monitor screen; if it does, go to step 20. If a **NO CARRIER** message appears on your screen, check the setup of both modems and computers, then dial again. If a **NO CARRIER** message appears again, turn both modems and computers off, replace the PCB in the suspected bad modem, and start the test again from step 1. If the test passes, the modem PCB was faulty.
20. Hold down the <OPEN-APPLE> key and type "H" (Ile) or hold down the <ESCAPE> key and type "H" (II+) to hang up the modem. The screen should now have the message **NO CARRIER**.
21. Hold down the <OPEN-APPLE> key and type "Q" (Ile) or hold down the <ESCAPE> key and type "Q" (II+) to return to the main menu.
22. Type "C" to enter the **Change Configuration** menu. Use the arrow keys to select touch-tone dialing.
23. Press <ESCAPE> to return to the main menu.
24. Type "E" to enter the terminal mode.
25. Hold down the <OPEN-APPLE> key and type "D" (Ile) or hold down the <CONTROL> key and type "D" (II+) - this will automatically dial the number you entered.

26. When the **CONNECT** message appears, type a short message and verify that it is displayed on the screen of the suspected bad modem. If the **CONNECT** message did not appear, or if the message you typed was not displayed on the suspected bad modem, replace the PCB in the suspected bad modem and run this test again.

□ TAKE-APART

Note: There are two types of Modem 1200 PCB's, one that requires a sprayed case and one that does not. The sprayed Modem 1200 service stock and exchange modules cannot be used to repair the unsprayed Modem 1200's. See the Illustrated Parts List for the differing service stock part numbers for the sprayed case Modem 1200 and the unsprayed case Modem 1200.

PCB Removal

1. Carefully pry off the two rubber feet from the bottom front of the modem.
2. Remove the four screws holding the two case halves together.
3. Remove the bottom cover and set it aside.
4. Lift out the modem PCB.
5. Remove the service spare modem from the shipping box. Notice that the top and bottom covers are labeled "service use only". These covers must be returned with the faulty board for service credit.
6. Remove the service replacement board in the same way as you did the customers board. Replace the bad board with the service spare, after first confirming that the two are the same model.
7. Place the bad board on the service covers and fill out the service repair order information. Ship the bad board and/or modem power module to Apple.

Modems

Section 2 – Apple Personal Modem

CONTENTS

2.2	Introduction
2.2	Equipment Required
2.3	Power Test
2.4	Computer Test
2.5	Self-Test Mode

□ INTRODUCTION

Most of the problems with modems will occur during the installation procedures. Other problems may occur only with certain baud rates or modes of operation.

Note: The Apple Personal Modem has no DIP switches to set. The baud rate, parity, and duplex settings for the modem are software controlled. The three baud rates available are 110, 300, or 1200. Verify all configuration settings on the application being used.

The Apple Personal Modem is composed of two pieces: the power connector (Figure 1, #1) and the body (Figure 1, #2). If the body is defective, *both* pieces must be returned to Apple. If the power connector is defective, this piece can be obtained separately.

For more information, refer to the *Apple Personal Modem User's Manual*.

Equipment Required

The following equipment will be needed for all procedures:

Apple Personal Modem
Apple Personal Modem User's Manual
Phone line
Appropriate cables for connection to computer

One of the following combinations:

Computer

Apple II Family
Macintosh
Macintosh XL

Software

Access II or AppleTerm
MacTerminal
MacTerminal or
LisaTerminal

❑ POWER TEST

The modem will beep when it is first plugged in, which means that it is receiving power and its circuitry is operating properly.

If the modem doesn't beep when it is plugged in, check the following:

1. Turn the volume control clockwise (see Figure 2), and try plugging in the modem again.
2. Verify that the power connector is firmly in place. Push it all the way in until it clicks into position. Try plugging in the modem again.
3. Exchange the whole unit. Try plugging in the new modem.
4. Continue to "Computer Test."

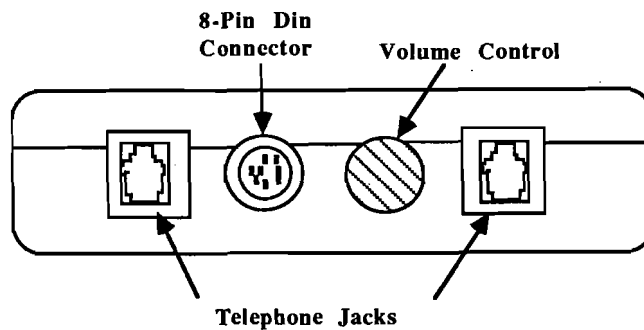


FIGURE 2

□ COMPUTER TEST

Note: To set up the modem, refer to the *Apple Personal Modem User's Manual*, Chapter 1.

To be sure the modem and computer are communicating, do the following:

1. Load the communications software, turn on the computer, and verify the configuration settings.

If you do not know how to use the software, refer to the appropriate software manual.

2. Enter terminal mode (if applicable). Type AT and press <Return>.

If everything is connected properly, the screen will display: **OK**.

If you type AT and press <Return> a few times and don't get an **OK** response, do the following:

- a) Verify that the software is set for 110, 300, or 1200 baud.
 - b) Power off the computer and unplug the modem. Verify that the Super Serial Card DIP switches are set correctly (Apple II users only), and that the cable and connections are correct (refer to the *Apple Personal Modem User's Manual*, Chapter 1).
 - c) Plug in the modem, turn on the computer, boot the communications software, and enter terminal mode.
 - d) Type AT and press <Return>. If you do not get an **OK** response, exchange the whole unit and try again.
3. Continue to "Self-Test Mode."

□ SELF-TEST MODE

You can run an Analog Loopback Test on your modem by following these instructions. (More information on these procedures can be found in *Apple Personal Modem User's Manual*, Appendix D.)

1. Load your software and enter terminal mode.
2. Type the modem command string ATS16=1D and press <Return>.

The modem speaker will turn on, allowing you to hear a dial tone or high-pitched tone. The message **CONNECT** (or **CONNECT 1200**) will be displayed on your screen.

3. Type a short test message—anything at all.

As you type, the modem directs the characters to loop back to the computer screen. If you can see what you're typing, the modem is functioning. (Don't worry if the <Return> key doesn't advance the cursor to the next line.)

4. To exit the test, wait one second and type +++ (three pluses) to go back to command mode.

Your screen should display the message **OK**.

5. Type ATZ and press <Return>.

This command will turn off the self-test mode. An **OK** response will appear on the display.

If the modem fails to function, exchange the whole unit and run the self test again.

For further information on specific problems, refer to the *Apple Personal Modem User's Manual*, Chapter 3.

Modems

Section 3 – Apple Data Modem 2400

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3.10	Main Logic Board and Speaker
3.14	Troubleshooting
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■ BASICS

Product Overview

These procedures cover the troubleshooting and repair of the Apple Data Modem 2400.

The Apple Data Modem 2400 is an external, stand-alone modem for Apple II and Macintosh family computers. Features of the modem include:

- Automatic and manual dialing and answering
- DTMF and pulse dialing
- An extended version of the Hayes® command set
- Local and remote self-test
- Implementation of levels 1 through 4 of the Microcom Networking Protocol (MNP) error correction standard
- Support of the Bell 103 (300 bps), Bell 212A (1200 bps), CCITT V.22A/B (1200 bps), and CCITT V.22bis (2400 bps) communication standards
- Two serial ports—one for connecting to the computer and one for daisy-chaining another serial device (See “Active and Pass-Through Modes.”)
- Two RJ-11 connectors—one for connecting the modem to the telephone line and one for connection to a telephone handset
- Modem settings stored in nonvolatile RAM

Figure 1 shows a front view of the unit with the external power adapter.

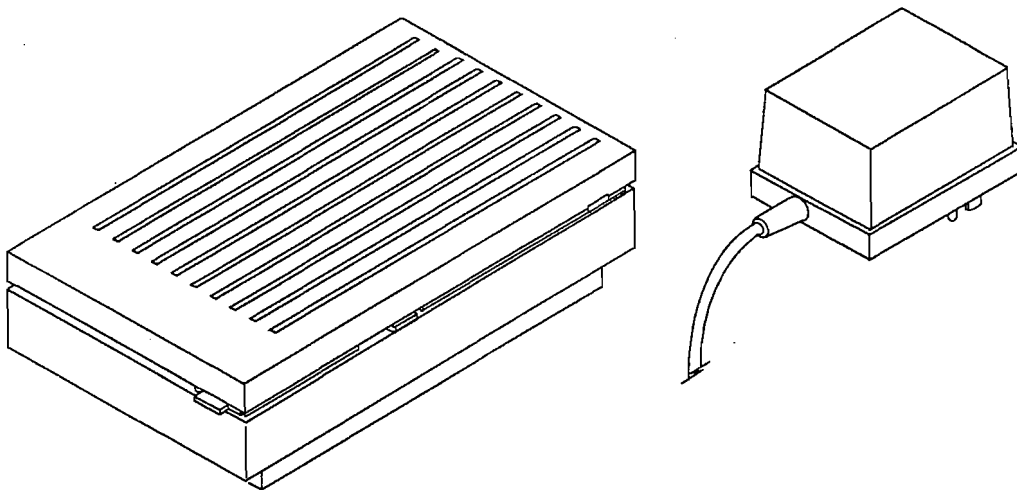


FIGURE 1
Apple Data Modem 2400

Active and Pass-Through Modes

The Data Modem 2400 can be used in one of two modes—active or pass-through. When the modem is in active mode, communication is established between the modem and the host computer. When the modem is in pass-through mode, the modem is bypassed and the host computer communicates with the device attached to the pass-through connector. The pass-through connector is marked with a telephone handset.

Controls and Indicators

The Apple Data Modem 2400 has three controls—the **power switch**, the **mode select switch**, and the **speaker volume control**. The power switch (Figure 2) applies the DC voltages available from the power adapter to the modem. The mode select switch (Figure 3) toggles the modem between pass-through and active mode. The speaker volume control adjusts the volume of the built-in speaker.

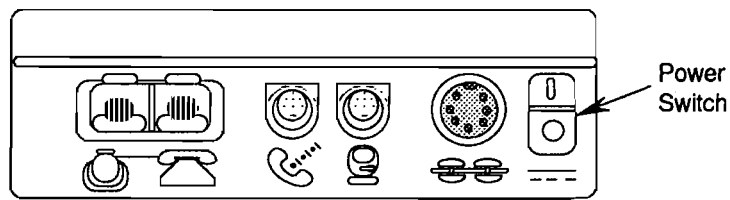


FIGURE 2
Power Switch

Two indicators are also provided—one **amber** and the other **green**. When the green indicator is lit, the modem is active and ready. When the amber indicator is lit, the modem is in pass-through mode; the modem is in this mode briefly after power on. Figure 3 shows the LEDs and the mode select switch.

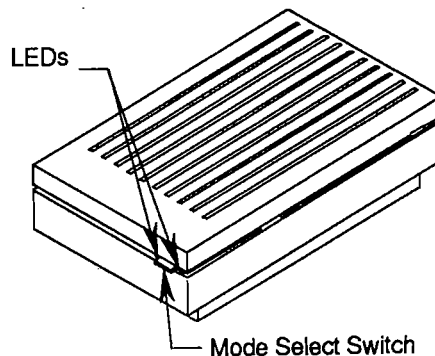


FIGURE 3
LEDs and Mode Select Switch

Connectors

Three of the connectors on the back of the modem must be used for operation:

- The **power connector** (Figure 4, #1) connects the modem to the external power adapter.

Note: The Apple IIc and AppleFax™ Modem use the same power adapter connector as the Data Modem 2400. Although it is possible to connect an Apple IIc or AppleFax Modem power adapter to the Data Modem 2400, the Data Modem 2400 will not work with either of those power adapters.

- The **Macintosh connector** (Figure 4, #2) connects the modem to the host computer.
- The **telephone connector** (Figure 4, #3) connects the modem to the telephone line.

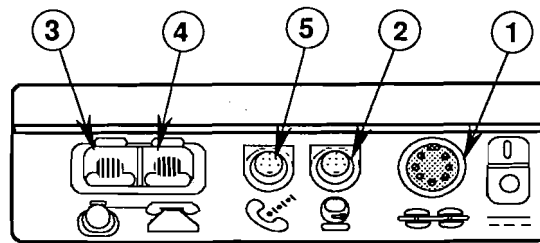


FIGURE 4
Connectors

The minimum configuration provided by these three connectors establishes a data path between the host computer and the worldwide network of telephone lines.

Two connectors on the Apple Data Modem 2400 serve auxiliary functions and are not required for operation. The second **telephone connector** (Figure 4, #4) can be used to connect a telephone to the same phone line used by the modem. The **modem connector** (Figure 4, #5) provides an additional serial port that may be used to connect a serial device, such as an ImageWriter® II, to the computer in a daisy-chain fashion.

Note: The maximum transmission speed of the daisy-chain port is 56.7 kilobits per second (kbps). This port cannot be used to daisy-chain an AppleTalk device.

Theory of Operation

Figure 5 provides a simplified block diagram of the Apple Data Modem 2400.

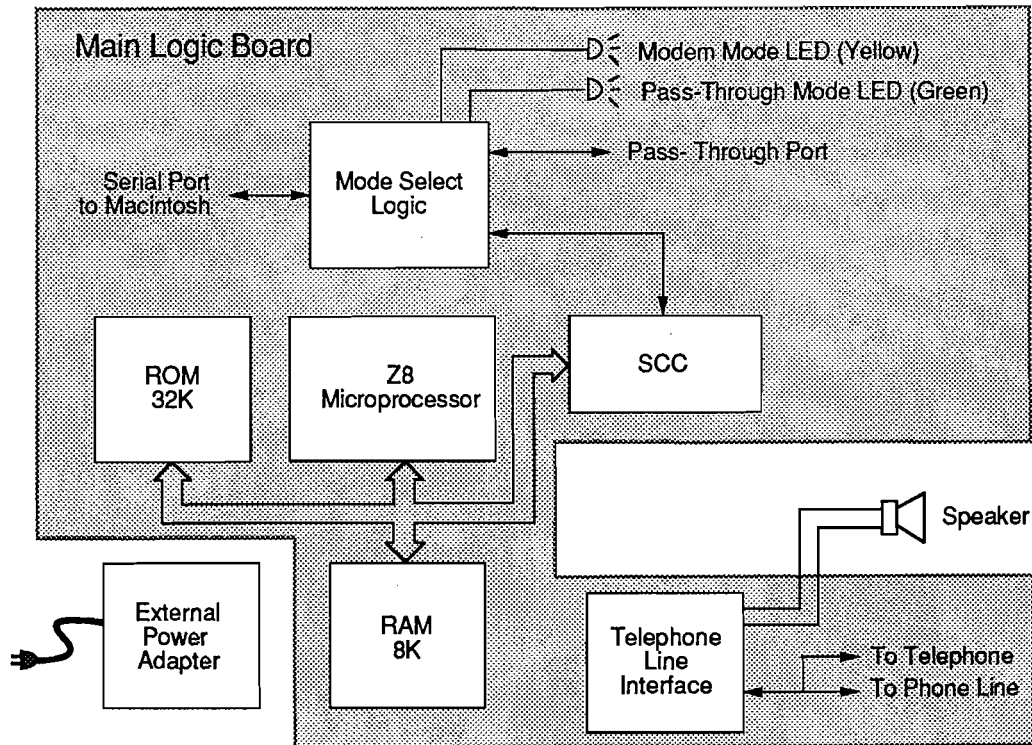


FIGURE 5
Block Diagram

Except for the power supply (external power adapter) and the speaker, all the functions described in Figure 5 are implemented on a single printed circuit board called the **main logic board**. Some power supply circuitry is located on the main logic board; however, most of the power supply circuitry is enclosed in the external power adapter (Figure 5).

Specifications

The following specifications apply to the US and Canadian version of the Apple Data Modem 2400.

Regulatory

FCC registration number:	BCG794-12381-DM-E
FCC ringer equivalence number:	1.1B
Canadian load number:	7
Jack type:	USOC RJ11 (US) CA 11 (Canada)

Communication

Protocol:	Asynchronous
Mode:	Full duplex
Transmission rates:	300 bps (Bell 103) 1200 bps (Bell V.22A/B and Bell 212A) 2400 baud (V.22bis)
Data formats:	7 data bits with 1 or 2 stop bits and fixed mark or space parity 7 data bits with 2 stop bits and no parity 8 data bits with 1 or 2 stop bits and no parity

Miscellaneous

Receiver dynamic range:	-10 dBm to -43 dBm full-duplex
Transmitter level:	-10 dBm $\pm$ 1 dB, fixed
Frequency tolerance:	$\pm$ 7 Hz
Error rates:	Less than 1 in 10^6 on 3002A (unconditioned line) channel specifications, with Gaussian noise over a receiver level range of 3 dB above the carrier detect threshold
Operating modes:	Auto or manual dial
Error protocols:	Microcom Network Protocol (MNP) classes 1 through 4
Computer Interface:	RS-422A, standard Apple Mini DIN-8 connector

*Telephone
Interface*

Tone:	DTMF (dual-tone multi-frequency)
Frequency tolerance:	±1%
Pulse:	
Duty cycle:	39%/61% mark/break ratio
Dialing rate:	10 pps

Physical

Weight:	500g (excluding power adapter)
Dimensions:	200 mm x 120 mm x 45 mm

Electrical

Power consumption:	7 Watts maximum
Power requirements:	110V AC ± 10%, 60 Hz

Environmental

Operating environment:	
Ambient Temperature:	32°-104° F (0°-40° C)
Relative Humidity:	95% (noncondensing)

□ TAKE-APART

Top Case

To remove the top case:

Materials Required

Flat-blade screwdriver
Grounded workbench pad
Grounded wriststrap

Remove

1. Turn off the Apple Data Modem 2400 and detach the power cord, telephone cable(s), and interface cable(s).
2. Place the modem on the grounded workbench pad. **Be sure the pad is grounded and put on your grounding wriststrap.**
3. Locate the two plastic tabs shown in Figure 6, #1.
4. Using a screwdriver, **carefully** push in each plastic tab until you can lift the top case off the bottom case.
5. Lift the back of the top case up and forward until the interior latch on the front of the top case separates from the bottom case.

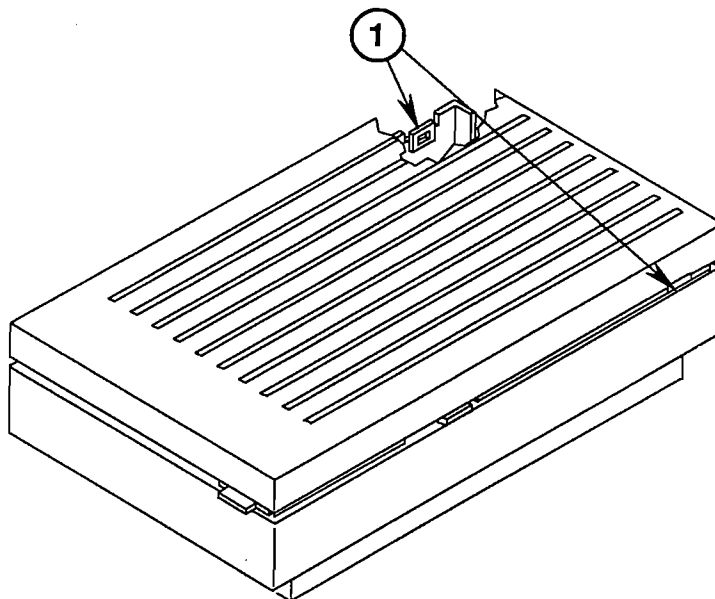


FIGURE 6
Top Cover Removal

Replace

1. Set the top case on top of the bottom case.
2. Push down on the front of the top case until it snaps into place.
3. Set one of the plastic tabs inside the back of the bottom case and push down on the top case until the tab snaps into place. Then push down on the other side of the top case until the other tab snaps into place. (If the second plastic tab will not fit inside the lower case, use a flat-blade screwdriver to push in gently on the tab while you push down on the top case.)

Main Logic Board and Speaker

To remove the main logic board and/or speaker:

Materials Required

#2 Phillips screwdriver
Grounded workbench pad
Grounded wriststrap

Remove

1. Remove the top case.
2. Lift up and remove the volume lever (Figure 7, #1).
3. Lift up and remove the light pipe assembly (Figure 7, #2).
4. Disconnect the speaker cable (Figure 7, #3).
5. Remove the two Phillips screws and star washers (Figure 7, #4).
6. Lift the main logic board out of the bottom case.
7. If you are replacing the speaker, lift the speaker out of the bottom case.

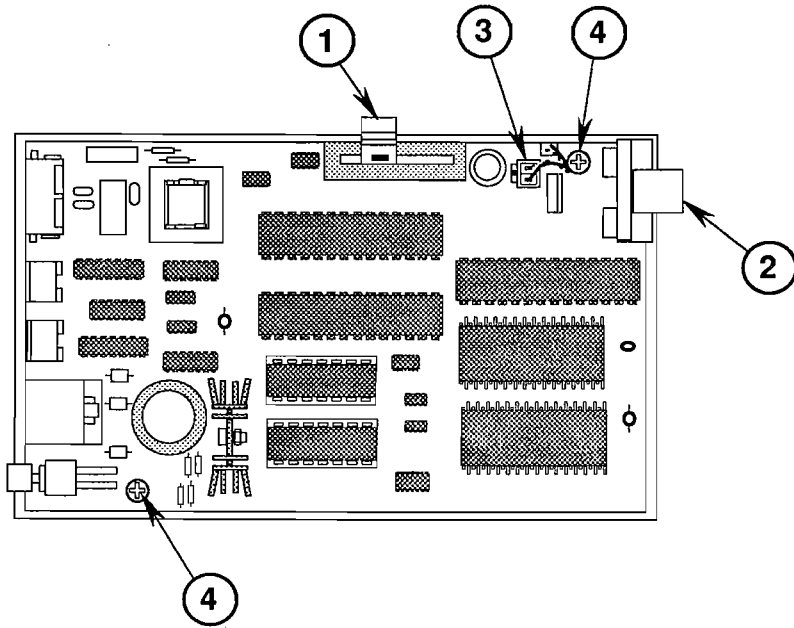


FIGURE 7
Main Logic Board and
Speaker Removal

Replace

1. If the speaker was removed, place the speaker in the bottom of the case so that the cable extends toward the right side of the case (Figure 8, #1).

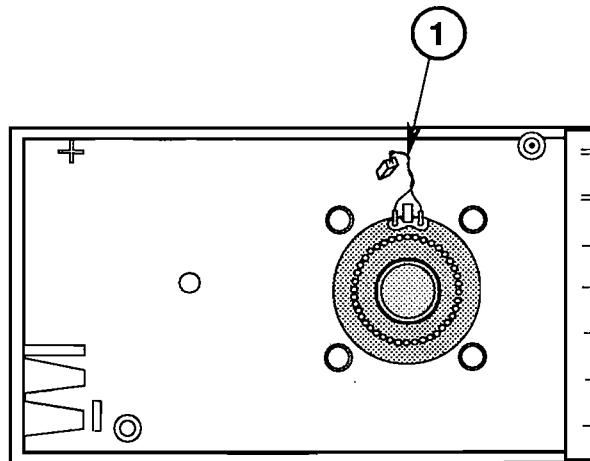


FIGURE 8
Speaker Wire Placement

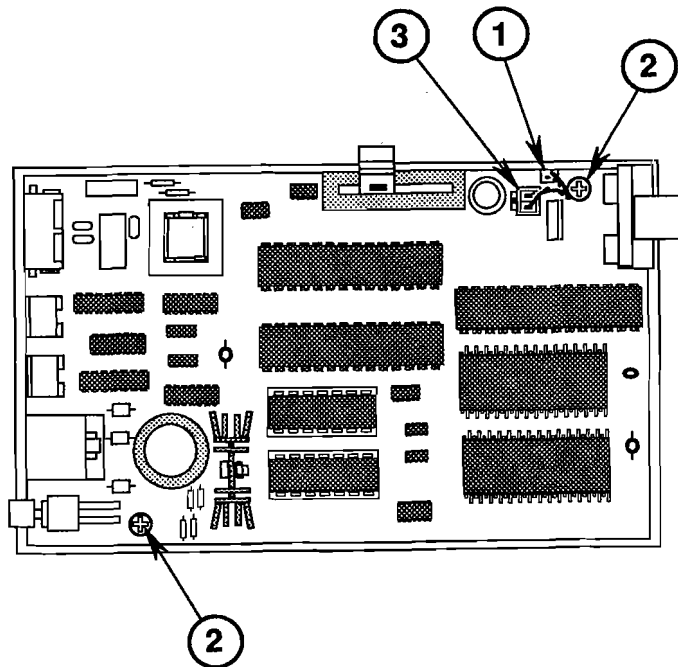


FIGURE 9
Main Logic Board and
Speaker Wire Placement

2. Position the main logic board above the bottom case and route the speaker cable through the slot on the upper-right side of the board (Figure 9, #1). Lower the main logic board into the bottom case.
3. Replace the two Phillips screws and star washers (Figure 9, #2).
4. Connect the speaker cable to the main logic board (Figure 9, #3).

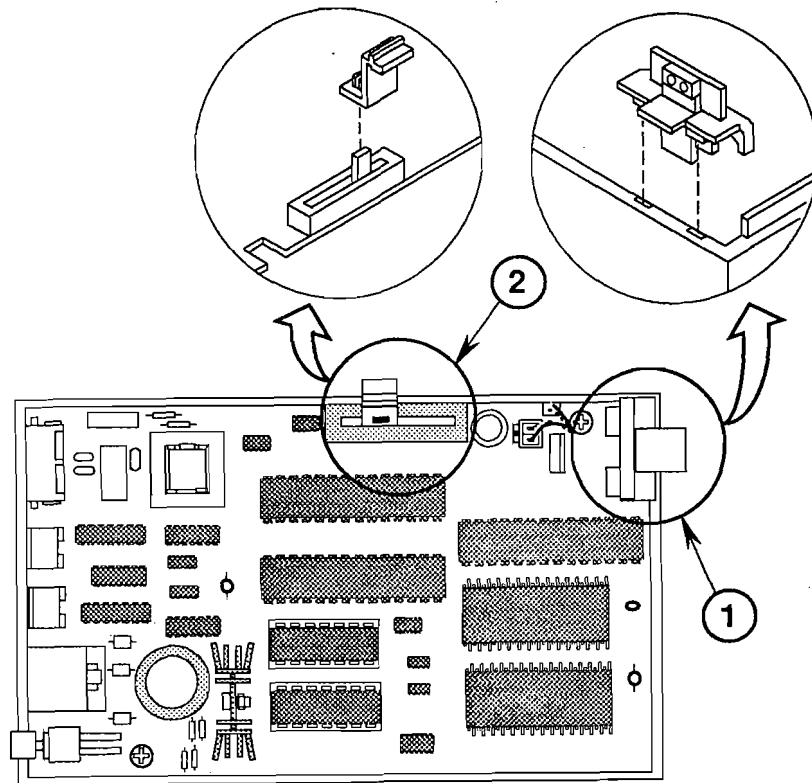


FIGURE 10
Volume Control Lever
and Light Pipe Assembly

5. Replace the light pipe assembly (Figure 10, #1).

CAUTION: *The smallest clear tabs on the bottom front of the light pipe assembly fit into the holes in the case. The assembly will break if the larger tabs (directly behind the smaller tabs) are forced into the holes.*

6. Replace the volume lever (Figure 10, #2).
7. Replace the top case.

□ TROUBLESHOOTING

Most of the problems with modems will occur during installation. Other problems may occur only with certain baud rates, modes of operation, or telephone lines. Two steps are used to verify that the Data Modem 2400 is operating correctly:

1. The built-in self-test performs a quick power-on test of the modem. The power-on test is described below.
2. *ModemTest* verifies operation of all modem circuitry except the circuits that interface the modem to the telephone network. If a customer experiences problems when using the Data Modem 2400, *ModemTest* can isolate the fault to the modem, the computer, or problems with the connection between the modem and the telephone network. Setup and operating procedures for *ModemTest* are in Section 4, Diagnostics.

Note: The Apple Data Modem 2400 is software, not hardware, configurable. The baud rate, parity, data word length, and duplex settings for the modem are software controlled. Many modem-related failures are due to incompatible settings of the modem when used with a specific remote system. Verify that the configuration of the communication program and/or the interface card (Apple II family computers only) matches the configuration of the remote system.

Some modem-related failures, such as an inability to connect to electronic bulletin boards, are due to incorrectly set parameters. Because the Apple *ModemTest* diagnostic indiscriminately fails incorrectly set main boards, the cause of these failures can be unclear.

If the modem is unable to connect to electronic bulletin boards, reset the modem parameters to the default setting by holding down the Select button while switching the modem off, then on. Release the Select button when the modem is powered on and the green LED is lit on the modem's front panel.

For additional information on connecting the modem to the computer, refer to the *Apple Data Modem 2400 Owner's Guide*.

Power-On Test

When turned on, the Apple Data Modem 2400 will light the amber LED, perform a short self-test, sound two tones, and light the green LED. If this sequence is completed, the modem is receiving power and the self-test has completed successfully. You should then perform the additional testing procedures described in Section 4, Diagnostics.

If the modem doesn't complete this sequence when it is switched on, refer to the Power-On Test Troubleshooting Flowchart, Figure 11.

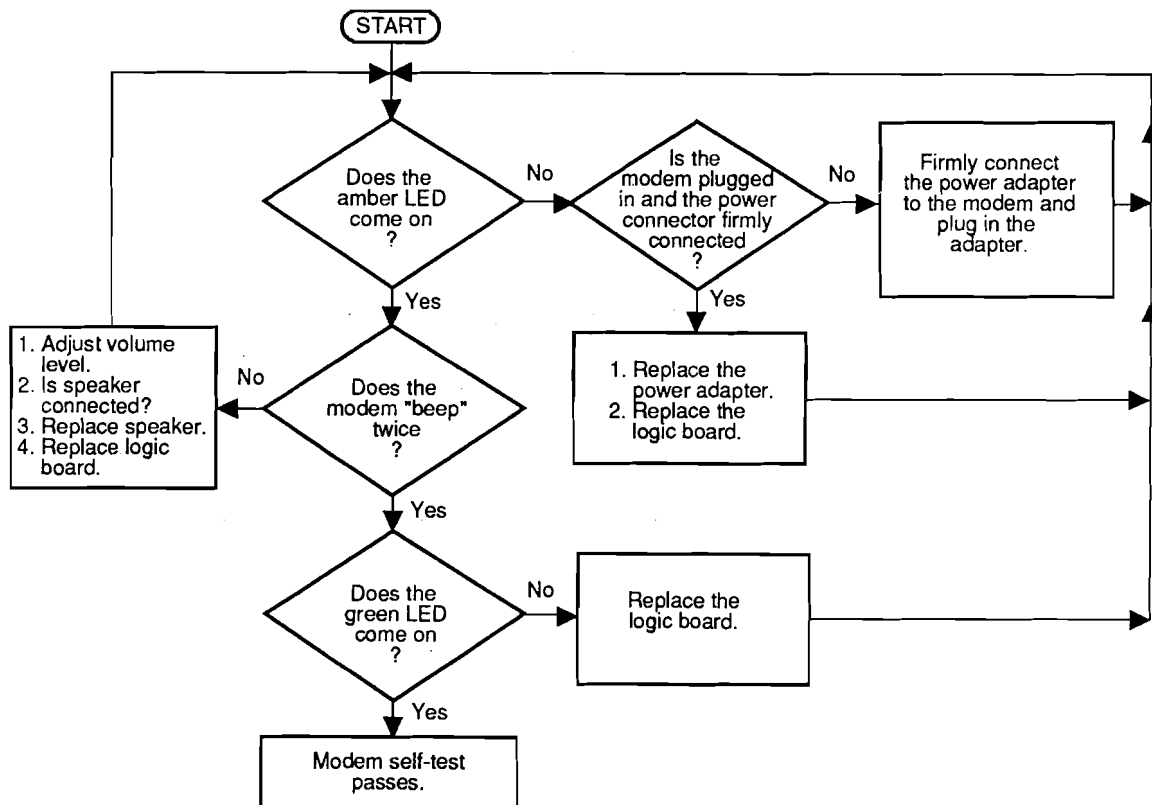


FIGURE 11
Power-On Test
Troubleshooting Flowchart

Communications Test

Note: For information on connecting the modem to the host computer, refer to the *Apple Data Modem 2400 Owner's Guide*, Chapter 1.

To see if the modem and computer are communicating, do the following:

1. Load the communications software, turn on the computer, and verify the configuration settings.
2. Enter terminal mode (if applicable). Type AT and press <Return>.

If everything is connected properly, the screen will display **OK**.

If you type AT and press <Return> a few times and don't get an **OK**, refer to the Communications Fault Troubleshooting Flowchart, Figure 12.

3. Continue to the Loopback Test.

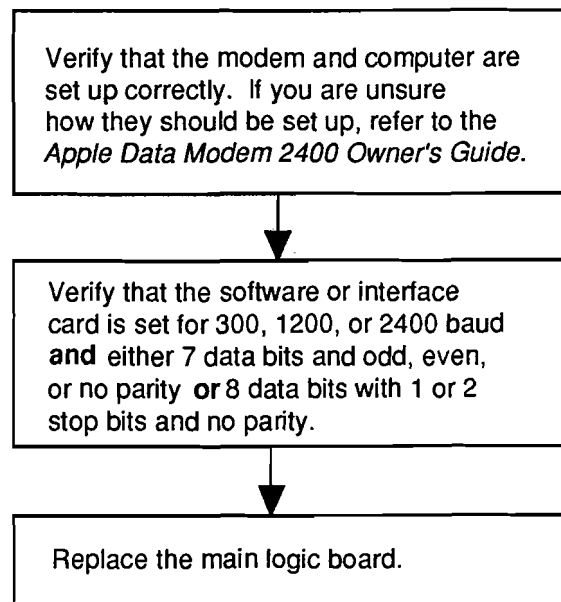


FIGURE 12
Communications Fault Troubleshooting Flowchart

Loopback Test

You can run an **analog loopback test** on your modem by following these instructions. (Additional information on these procedures can be found in the *Apple Data Modem 2400 Owner's Guide*, Appendix D.)

Note: The modem must be connected to a known-good telephone line to perform the following test.

1. Connect the modem to the telephone line and the computer. Attach the power adapter and plug it in.
2. Turn on the modem.
3. Load your communications software and enter terminal mode.
4. Type the modem command string ATS16=1D and press <Return>.

The modem speaker will turn on, allowing you to hear a dial tone or high-pitched tone. The message **CONNECT** will be displayed on your screen.

5. Type a short test message—anything at all.

As you type, the modem directs the characters to loop back to the computer screen. If you can see what you're typing, the modem is functioning. Don't worry if the <Return> key doesn't advance the cursor to the next line.

6. To exit the test, wait one second and type +++ (three pluses) to go back to command mode.

Your screen should display the message **OK**.

7. Type ATZ and press <Return>.

This command will turn off the self-test mode. An **OK** response will appear on the display.

If the modem fails the self-test, refer to the Loopback Test Fault Troubleshooting Flowchart, Figure 13.

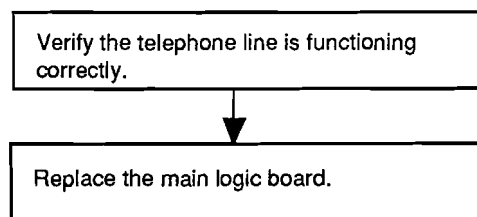


FIGURE 13
Loopback Test Fault Troubleshooting Flowchart

Modems

Section 4 – Diagnostics

□ CONTENTS

4.2	Introduction
4.2	ModemTest
4.3	AppleLink
4.4	Testing Using ModemTest
4.4	Testing the Apple Data Modem 2400
4.8	Testing the Portable Data Modem 2400
4.10	Testing the Int'l XP 2400
4.13	ModemTest Reference
4.13	Illustrations Menu
4.13	Test Selections/Configuration Window
4.13	Keyboard Equivalents
4.14	Installing ModemTest on a Hard Disk
4.15	Troubleshooting Checklist
4.15	General
4.15	Problems When Testing with ModemTest
4.16	Problems When Testing with AppleLink

□ INTRODUCTION

Testing of the Apple Data Modem 2400, Portable Data Modem 2400, and Int'l XP 2400 modems is accomplished through two methods—by using *ModemTest*[™] (a disk-based diagnostic program) and by using AppleLink[®] to establish communication with a known-good modem.

ModemTest checks all the circuitry of the modem, with the exception of circuits that interface the modem to the telephone network. To verify that these circuits are functioning correctly, the modem should be used to connect to a second computer and modem setup or dial-up service, such as AppleLink.

This section covers the setup, operating procedures, and reference information for *ModemTest* and provides a troubleshooting checklist to which you can refer if you encounter problems diagnosing modem failures. If you need assistance in using AppleLink to perform the final check of the modem, refer to the documentation provided with AppleLink.

ModemTest

ModemTest supports testing of all the modem's circuitry with the exception of the circuits used to connect the modem to the telephone network. Specifically, *ModemTest* can be used to perform the following tests:

Self-Tests – Executes the modem's built-in self-test diagnostics. The self-test checks RAM, ROM, and the microprocessor. These are the same tests that run when the modem is turned on.

Command Tests (Apple Data Modem 2400 and Portable Data Modem 2400 only) – Tests the functionality of each of the Hayes-compatible commands.

Register Tests (Apple Data Modem 2400 and Portable Data Modem 2400 only) – Tests each of the modem's hardware registers. To pass the test, each register must be able to be written to, changed, and read from within its specified range.

Analog Tests – Tests the circuits in the modem used to perform digital-to-analog and analog-to-digital signal processing, handshaking, and baud rate changes. This test does not check the circuitry used to connect the modem to the telephone network.

Digital Tests – Tests the digital portion of the modem.

Speaker Test – Tests the modem's speaker circuitry. The speaker test generates the Touch-Tone tones for 0 through 9, followed by a carrier signal. (The Touch-Tone tones are not generated for the Int'l XP 2400.)

Pass-through Mode Test (Apple Data Modem 2400 only) – Tests the pass-through port on the Data Modem 2400. This test verifies that data can be passed and is passed only at the proper times.

Ring Detect Test – Tests the modem's ability to detect an incoming phone call. The modem being tested must be connected to a working analog telephone line. A telephone or second computer with a modem is used to dial or originate a call. To pass the Ring Detect test, the modem must answer the incoming call. This test can also be used to check the wake-up when phone rings feature of the Macintosh Portable.

DAA Test (Int'l XP 2400 only) – Tests the circuitry within the data access arrangement module. The DAA test verifies that the DAA is able to detect the presence and absence of a dial tone.

All of the above tests are individually selectable and may be used in any combination.

AppleLink

Although *ModemTest* provides extensive testing, it is not able to test 100% of the modem's circuitry. To ensure that the modem is capable of communicating properly over the telephone network, the modem must be attached to an analog telephone line and connected to another system equipped with a modem.

Since most Apple-trained service technicians have access to AppleLink and are already familiar with its operation, Apple recommends that AppleLink be used to check the telephone network interface circuitry.

□ TESTING USING MODEMTEST

Testing the Apple Data Modem 2400

The following procedures cover testing of the Apple Data Modem 2400. Any model Macintosh computer except the 128K, 512K, or 512K enhanced can be used.

Note: The Apple Data Modem 2400 is software, not hardware, configurable. The baud rate, parity, data word length, and duplex settings for the modem are software controlled. Many modem-related failures are due to incompatible settings of the modem when used with a specific remote system. Verify that the configuration of the communication program being used and/or interface card (Apple II family computers only) match the configuration of the remote system.

Some modem-related failures, such as an inability to connect to electronic bulletin boards, are due to incorrectly set parameters. Because the Apple *ModemTest* diagnostic indiscriminately fails incorrectly set main boards, the cause of these failures can be unclear.

If the modem is unable to connect to electronic bulletin boards, reset the modem parameters to the default setting by holding down the Select button while switching the modem off, then on. Release the Select button when the modem is powered on and the green light display is visible on the modem's front panel.

Materials Required

ModemTest diagnostic disk
Macintosh computer (excluding the 128K, 512K, or 512K enhanced)
Peripheral-8 serial cable (mini DIN-8 to mini DIN-8)

For the Ring Detect test, you will also need:
An analog telephone line with an RJ-11 jack
An RJ-11 telephone cable
A telephone or second computer and modem from which to dial the modem being tested

For the Pass-through Mode test, you will also need a second peripheral-8 serial cable

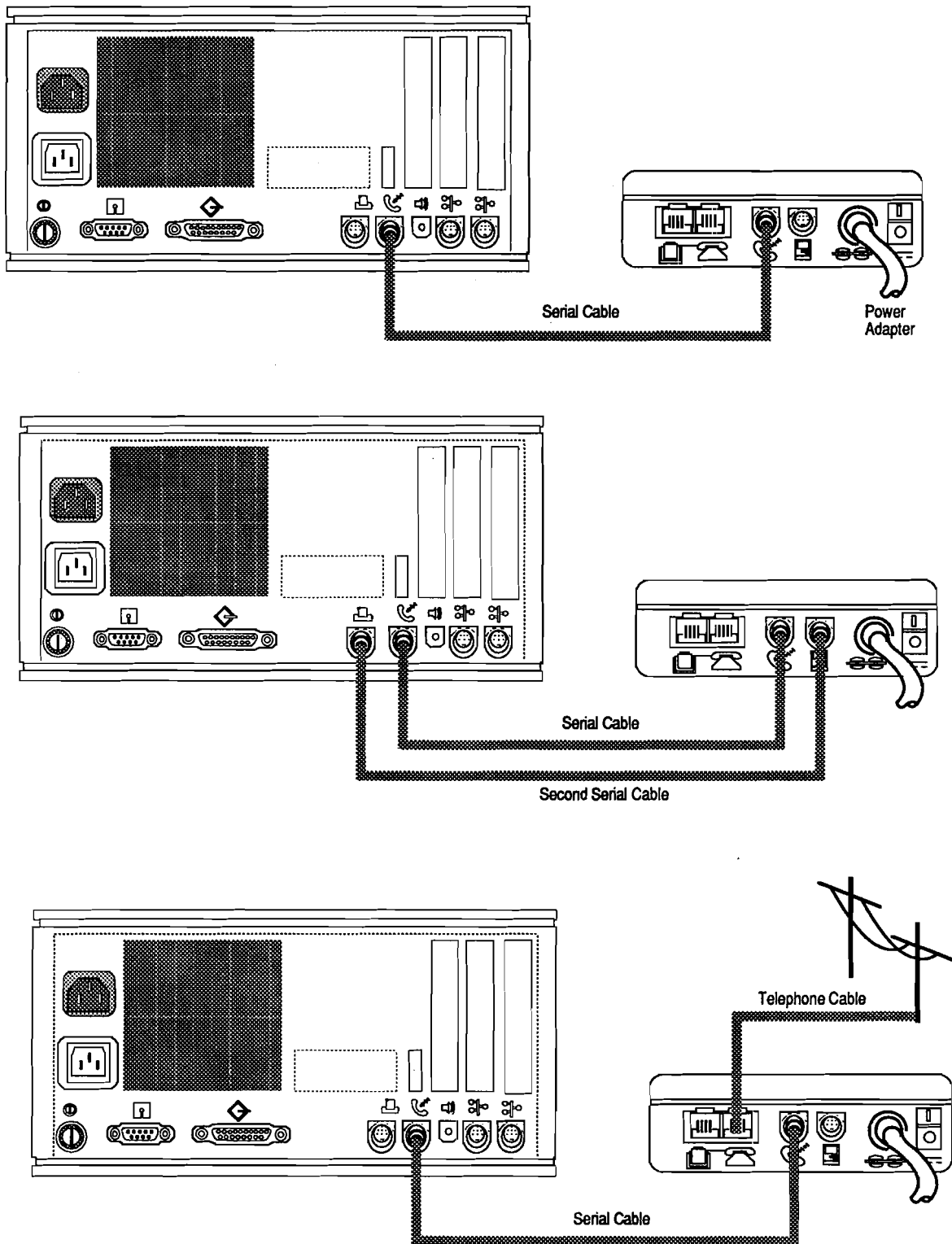


FIGURE 1
Apple Data Modem 2400 Setup

Setup

The following setup is shown in Figure 1.

1. Set up the computer if it is not ready for use.
2. Connect the power adapter to the Data Modem 2400 and plug in the power adapter.
3. Connect one end of the serial cable to the modem port on the Data Modem 2400.
4. Connect the other end of the serial cable to the modem port on the computer.
5. If you are running the Ring Detect test, connect one end of the telephone cable to an available telephone jack. **Do not** connect the other end to the modem yet. Connecting the cable at this time can yield unpredictable results.
6. If you are running the Pass-through Mode Test, connect one end of the other serial cable to the printer port on the Data Modem 2400 and the other end to the printer port on the computer.
7. Turn on the Data Modem 2400.

Running ModemTest

1. Place the *ModemTest* diagnostic disk into any available floppy disk drive.
2. Switch on the computer. If you are using a Macintosh Portable, press any key except <Caps Lock> to bring the computer out of system sleep.
3. If a Macintosh Portable is being used and an internal modem is installed, check to see that the external modem is selected in the Control Panel. Check the selection by opening the Control Panel and clicking the Portable CDEV icon. (You may need to use the scroll bar to find the icon for the Portable.) If the external modem is not selected, select it.
4. When the desktop appears, double-click the *ModemTest* disk icon to open the disk if it is not already open.
5. To launch the program, double-click the *ModemTest* application icon.

6. The Modem Selection window appears. Click on **Data Modem 2400**.

The Test Selections/Configuration window appears. After a slight delay while the program establishes communications with the modem, the modem configuration appears.

7. Select the tests to be run by clicking the name of each test until an **X** appears in the box next to the test name.
8. If you want to repeat testing of the modem, click **Looping** until an **X** appears in the box.
9. If you want to save this setup for future use, click **Save Test Selections**.
10. Click **Start Tests** or press <Return> to begin testing. Click **Cancel** to return to the modem selection window.

Ring Detect Test

If you selected the Ring Detect test, you will need to connect the free end of the telephone cable when the Ring Detect test begins. You will be prompted to connect the cable at the proper time.

After the Ring Detect test begins and the telephone cable is connected, wait approximately 30 seconds before dialing the telephone number of the modem under test.

11. If testing is completed and all tests ran without error, the Test Results window displays the message **All selected tests passed**. If any problems occur, an Alert box indicates the type of failure and the module you must replace.
12. If you desire a printed copy of the test results, click **Print**.
13. When you finish using *ModemTest*, select **Quit** from the File menu.

Testing the Portable Data Modem 2400

The following procedures cover testing of the Apple Portable Data Modem 2400. A Macintosh Portable computer is required.

Materials Required

ModemTest diagnostic disk
A Macintosh Portable computer

For the Ring Detect test, you will also need:

- An analog telephone line with an RJ-11 jack
- An RJ-11 telephone cable
- A telephone or second computer and modem from which to dial the modem being tested

Setup

1. Install the modem card to be tested. Procedures for installing the modem can be found in *Macintosh Portable Technical Procedures*, Section 5, Additional Procedures, "Internal Data Modems."
2. If you are running the Ring Detect test, connect one end of the telephone cable to an available telephone jack. **Do not** connect the other end to the modem yet. Connecting the cable at this time can yield unpredictable results.
3. Set up the computer if it is not ready for use.

Running ModemTest

1. Place the *ModemTest* diagnostic disk in any available floppy disk drive.
2. Press any key except <Caps Lock> to bring the computer out of system sleep.
3. When the desktop appears, open the Control Panel desk accessory and click on the Portable icon. (You may need to use the scroll bar to find the icon for the Portable.) Click on the Internal Modem icon to highlight the button. Close the Control Panel.
4. Double-click the *ModemTest* disk icon to open the disk if it is not already open.
5. To launch the program, double-click the *ModemTest* application icon.

6. The Modem Selection window will appear. Click **Portable Data Modem 2400**.

The Test Selections/Configuration window appears. After a slight delay while the program establishes communications with the modem, the modem configuration appears.

7. Select the tests to be run by clicking on the name of each test until an **X** appears in the box next to the test name.
8. If you want to repeat testing of the modem, click **Looping** until an **X** appears in the box.
9. If you want to save this setup for future use, click **Save Test Selections**.
10. Click **Start Tests** or press <Return> to begin testing. Click **Cancel** to return to the modem selection window.

Ring Detect Test

If you selected the Ring Detect test, you must connect the free end of the telephone cable when the Ring Detect test begins. You will be prompted to connect the cable at the proper time.

After the Ring Detect test begins and the telephone cable is connected, wait approximately 30 seconds before dialing the telephone number of the modem under test.

11. If testing is complete and all tests ran without error, the Test Results window displays the message **All selected tests passed**. If any problems occur, an Alert box indicates the type of failure and the module to be replaced.
12. If you desire a printed copy of the test results, click **Print**.
13. When you are finished using *ModemTest*, select **Quit** from the File menu.

Testing the Int'l XP 2400

The following procedures cover the testing of the Int'l XP 2400, data access arrangement modules, and optional MNP board. A Macintosh Portable computer is required.

Materials Required

ModemTest diagnostic disk
A Macintosh Portable computer
Correct model Data Access Arrangement (DAA) module

For the Ring Detect test you will also need:

- An analog telephone line
- An RJ-11 telephone cable
- A telephone or second computer and modem from which to dial the modem being tested

Setup

1. Install the modem card to be tested. If an MNP board is also being tested, connect it to the modem at this time. Procedures for installing the modem can be found in *Macintosh Portable Technical Procedures*, Section 5, Additional Procedures, "Internal Data Modems."
2. Connect the data access arrangement module to the modem card.
3. If you are running the Ring Detect test, connect one end of the telephone cable to an available telephone jack. **Do not** connect the other end to the modem yet. Connecting the cable at this time can yield unpredictable results.
4. Set up the computer if it is not ready for use.

Running ModemTest

1. Place the *ModemTest* diagnostic disk in any available floppy disk drive.
2. Press any key except <Caps Lock> to bring the computer out of system sleep.
3. When the desktop appears, open the Control Panel desk accessory and click on the Portable icon. (You may need to scroll the icons to find the one for the Portable.) Click on the Internal Modem icon to highlight the button. Close the Control Panel.
4. Double-click the *ModemTest* disk icon to open the disk if it is not already open.
5. Double-click the *ModemTest* application icon to launch the program.
6. The Modem Selection window appears. Click **Intl'1 XP 2400**.

The Test Selections/Configuration window appears. After a slight delay while the program establishes communications with the modem, the modem configuration appears.

7. Select the tests to be run by clicking on the name of each test until an **X** appears in the box next to the test name.
8. If repeated testing of the modem is desired, click **Looping** until an **X** appears in the box.
9. If you want to save this setup for future use, click **Save Test Selections**.
10. Click **Start Tests** or press <Return> to begin testing. Click **Cancel** to return to the modem selection window.

Ring Detect Test

If you selected the Ring Detect test, you will need to connect the free end of the telephone cable when the Ring Detect test begins. You will be prompted to connect the cable at the proper time.

After the Ring Detect test begins and the telephone cable is connected, wait approximately 30 seconds before dialing the telephone number of the modem under test.

DAA Test

If you selected the DAA test, you will need to connect and disconnect the telephone cable from the DAA while the DAA test is running. The test indicates the state of the dial tone detect circuit as the telephone cable is connected and disconnected.

11. If testing is completed and all tests ran without error, the Test Results window displays the message **All selected tests passed**. If any problems are encountered, an Alert box indicates the type of failure and the module to be replaced.
12. If a printed copy of the test results is desired, click **Print**.
13. When you are finished using *ModemTest*, select **Quit** from the File menu.

❑ MODEMTEST REFERENCE

Illustrations Menu

Drawings of how to set up the Apple Data Modem 2400, Apple Personal Data Modem 2400, Int'l XP 2400, Data Access Arrangement (DAA), and MNP option board for testing are available under the Illustrations menu.

Test Selections/ Configuration Window

The Test Selections/Configuration window is used to select the tests to be run, to display various information about the modem being tested, to enable and disable looping (extended testing), and to save test selections.

Configuration Information

The right side of the Test Selections/Configuration window displays the ROM version of the modem selected. (The ROM version is not displayed for the Int'l XP 2400 modem.) If a Macintosh Portable is being used, the screen indicates the presence or absence of a Portable Data Modem 2400 or Int'l XP 2400, whether the modem or external serial port is selected in the Control Panel, and whether the automatic wake-up option is enabled. If an Int'l XP 2400 modem is being tested, then the DAA country code and status are indicated.

Keyboard Equivalents

These are the keyboard equivalents that may be used to invoke menu selections:

<u>Menu Item</u>	<u>Keyboard Equivalent</u>
Stop Testing	<Command>-.
Save Test Selections	<Command>-S
Quit	<Command>-Q

Installing ModemTest on a Hard Disk

Although it is possible to run *ModemTest* from a hard disk, Apple strongly recommends that you run *ModemTest* from a floppy disk. Using a floppy disk reduces the amount of hardware required to run the diagnostic. However, if you would like to run *ModemTest* from a hard disk, you should check the following:

1. *ModemTest* is not compatible with MultiFinder®. Change to Finder™ using **Set Startup** under the Special menu.
2. Remove any non-Apple-supplied INITs or desk accessories from the System Folder. Failure to do so could cause unreliable results or crashes.
3. You must have 12 point Monaco and 10 point Geneva fonts installed for *ModemTest* to display text correctly.

□ TROUBLESHOOTING CHECKLIST

General

- If you are unable to establish communication with an internal modem, remove the modem from the Macintosh Portable for approximately five minutes. Then reinstall and retest the modem. If communication still cannot be established, substitute the modem being tested with a known-good modem and retest. If the substitute modem functions correctly, replace the modem. If communications cannot be established with a known-good modem, refer to "Troubleshooting" in Section 5, Additional Procedures, of the *Macintosh Portable Technical Procedures* for the Portable Data Modem 2400.
- If the icon for the internal modem is not displayed in the Portable CDEV when an internal modem is installed, the internal modem or the Portable main logic board is bad. To isolate the failure, try a known-good modem. If the internal modem icon now appears, the original modem is defective and should be replaced. If the icon still doesn't appear, replace the main logic board in the computer.
- If you are unable to establish communication with an Apple Data Modem 2400, verify that the serial cable is connected to the proper ports on the computer and on the modem.

Problems When Testing with ModemTest

- Internal modems should beep each time the Test Selections window appears, assuming the speaker volume is not set to 0. If you do not hear a beep, first check the volume control setting in the Control Panel. If the volume is set to 1 or above, the modem is most likely defective. Replace the modem being tested with a known-good modem. If a known-good modem beeps when the Test Selections window appears, replace the original modem.

- If you are running the Ring Detect test in conjunction with other tests, be sure not to connect the telephone cable to the modem until the Ring Detect test begins. Connecting the cable while other tests are running can yield inaccurate results.
- If the cursor freezes when the Test Selections/Configuration window appears, replace the modem and retest. If the cursor still freezes, try a different computer.

Problems When Testing with AppleLink

- Verify that AppleLink is configured for 2400 baud or below.
- Verify that AppleLink is set up to use the correct serial port—the one the modem is connected to.

Modems

Illustrated Parts List

❑ CONTENTS

- IPL.3 Apple 300/1200 Modems (Figure 1)
- IPL.5 Apple 300/1200 Modems – Cables and Connectors (Figure 2)
- IPL.7 Apple Personal Modem and APM Modem Cables (Figure 3)
- IPL.9 Apple Data Modem 2400 (Figure 4)

The figures and lists in this section include all piece parts that can be purchased separately from Apple for the Apple Personal Modem, along with their part numbers. These are the only parts available from Apple. Refer to your *Apple Service Programs* manual for prices.

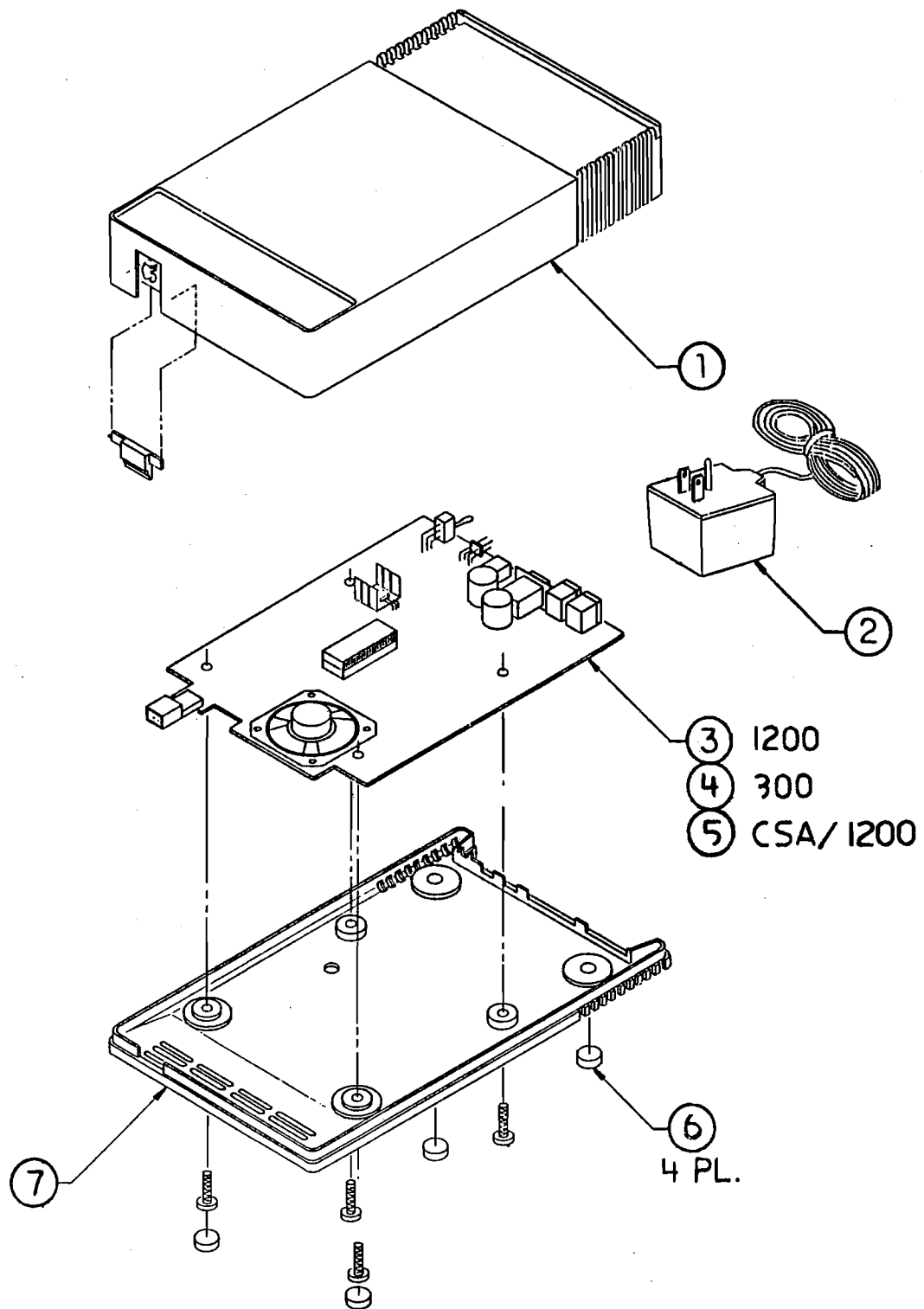


FIGURE 1

□ APPLE 300/1200 MODEMS (Figure 1)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
1	815-0790	Top Cover
2	076-8077	Transformer, Cable Assembly
3	661-75164	PCB, Modem 1200
4	661-75165	PCB, Modem 300
5	661-0293	PCB, Modem 1200, w/CSA
6	865-0003	Rubber Foot
7	815-0791	Bottom Cover

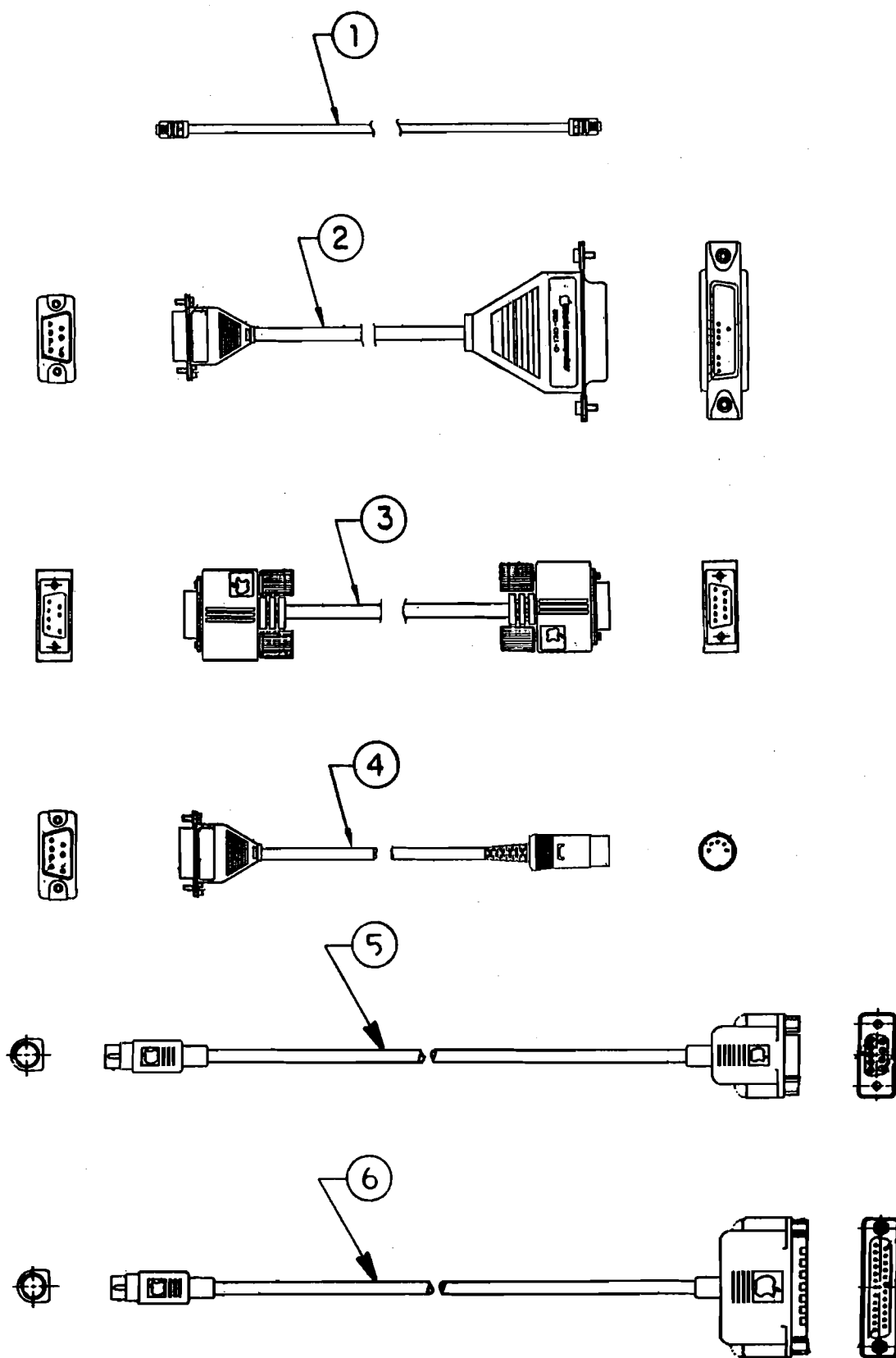


FIGURE 2

□ APPLE 300/1200 MODEMS – CABLES AND CONNECTORS
(Figure 2)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
1	076-8075	Cable Assembly, RJ-11
2	590-0121	Cable Assembly, Interface (II, III, Lisa/Macintosh XL)
3	590-0197	Cable Assembly, Interface (Macintosh)
4	590-0192	Cable Assembly, Interface (IIc)
5	590-0553	Cable Assembly, Macintosh Plus Peripheral Adaptor
6	590-0550	Cable Assembly, Apple IIgs Peripheral Adaptor

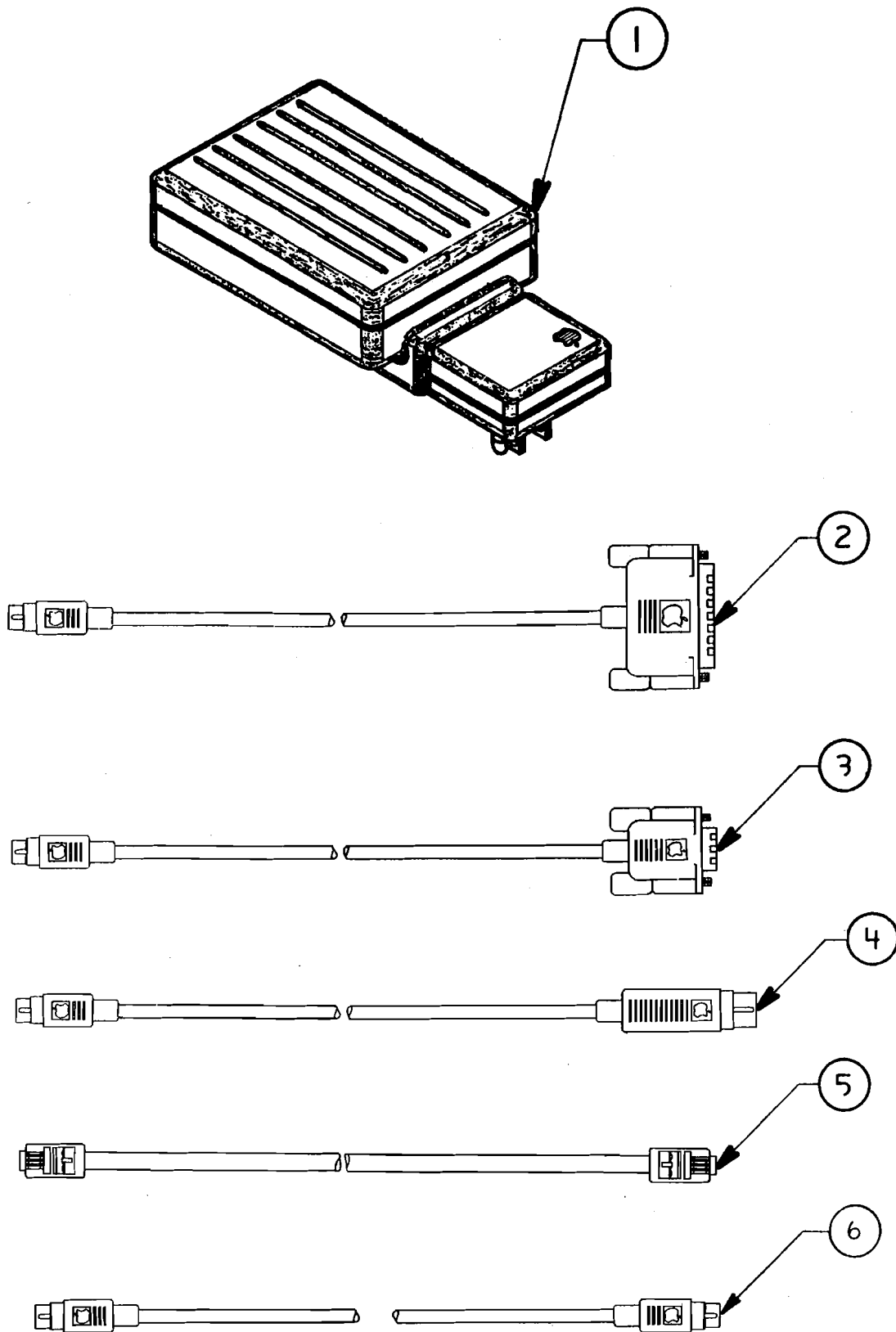


FIGURE 3

□ APPLE PERSONAL MODEM AND APM MODEM CABLES
(Figure 3)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
1	661-0313	Main Body, Apple Personal Modem (includes Power Connector)*
	933-0001	Plug Head, Power Connector (only)*
2	590-0555	Cable, APM to Apple II, II+, IIe, Apple III, Macintosh XL
3	590-0551	Cable, APM/ImageWriter II to Macintosh, Smoke
4	590-0554	Cable, APM/ImageWriter II to Apple IIc, Smoke
5	076-8075	Cable Assembly, RJ-11
6	590-0552	Cable, APM/ImageWriter II to Macintosh Plus, Smoke

* The whole-unit module includes the power connector. If desired, the power connector can be ordered separately.

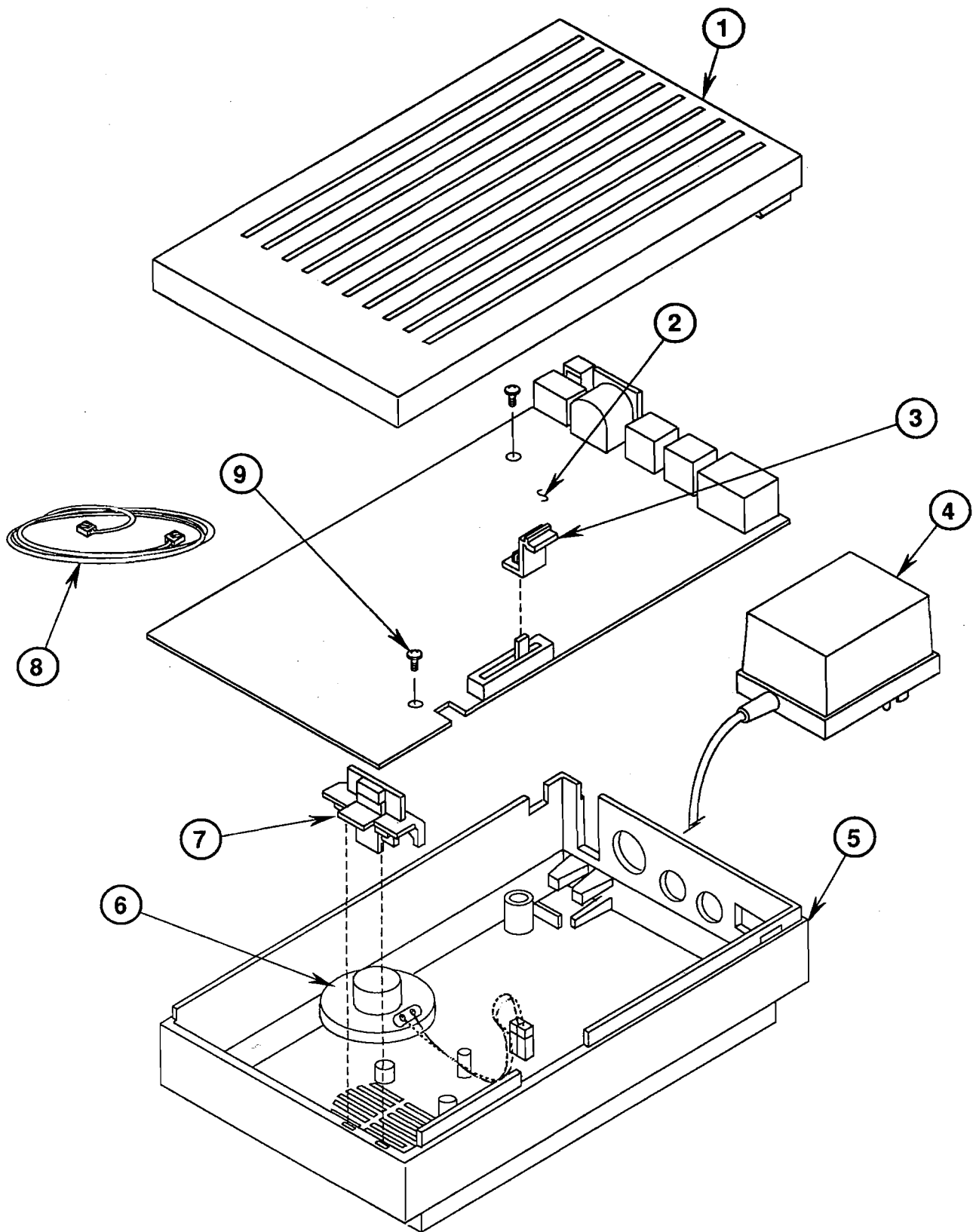


FIGURE 4

❑ **APPLE DATA MODEM 2400 (Figure 4)**

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
1	815-5073	Top Case
2	661-0516	Main Logic Board
3	815-5076	Volume Lever
4	600-0455	Power Supply
5	630-5506	Bottom Case
6	600-0403	Speaker
7	630-5505	Light Pipe Assembly
8	590-0590	RJ-11 Cable
9	462-3100	Screw, M 3 x .5 x 6