▲ Apple Technical Procedures

Apple 3.5 Drive

Technical Procedures

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Apple 3.5 Drive

Section 1 – Basics

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❏ PRODUCT DESCRIPTION

Compatibility

The Apple® 3.5 Drive is a self-contained external data storage system that can record up to 800K of data on 3.5-inch double-sided disks. It works with the following systems:

- Apple IIGS™
- Macintosh™ Plus
- Macintosh 512K with ROM upgrade
- Macintosh 512K *enhanced*
- Macintosh 512K

Other 3.5-inch and 5.25-inch floppy disk drives may be daisy-chained off the connector at the rear of the Apple 3.5 Drive. The Macintosh family of computers does not support the daisy-chaining of floppy disk drives. (You can, however, connect a floppy disk drive to a hard disk.)

The Apple 3.5 Drive is similar to the other Macintosh 800K drives but has the following added features:

- DB-19 daisy-chain port and interface board
- Eject button
- LED
- Platinum case color

In general, you may use the Apple 3.5 Drive mechanical assembly in the 800K drives listed below, with the stated reservation:

- Macintosh External 800K Drive
- Macintosh Internal 800K drive — **use with the YELLOW logic board-to-drive cable only.**
  (The **red** logic board-to-drive cable is used only when installing a Macintosh External or Internal 800K mechanical assembly into the internal drive of the Macintosh.)

Note: The other 800K mechanical assemblies may not be used in the Apple 3.5 Drive (that is, there is downward compatibility but no upward compatibility).

The Apple 3.5 Drive 800K mechanism may be distinguished from other Apple 800K drives by the color of the label on the side of the drive mechanism itself:

- Apple 3.5 Drive   RED on silver
- All other Apple 800K drives   BLACK on silver

The Apple 3.5 Drive may also be distinguished from the Macintosh 800K internal and external drives by serial number series:

- Internal Macintosh 800K Drive   Series 51W
- External Macintosh 800K Drive   Series 51W-10
- Apple 3.5 Drive   Series 51W-03

Initialization

You may use 400K single-sided diskettes in the 800K drive. When you insert a blank unformatted diskette into the drive, the Macintosh will ask if you wish to initialize it as single or double sided. (If you are going to be using an 800K diskette in a 400K drive as well as in the Apple 3.5 Drive, you will have to initialize it as single sided — otherwise the 400K drive will not be able to read it.)

Inserting and Ejecting Diskettes

The Apple 3.5 Drive has an automatic diskette insert and eject system. The diskette is automatically ejected from the drive either by pressing the eject button or by using a software command. The eject cycle works only when the drive is under power.

> **Note:** When the Apple 3.5 Drive is connected to a Macintosh, the eject button on the front of the drive is automatically deactivated because Macintosh software controls disk ejection. The eject button works only when the drive is connected to an Apple IIGS.

The insert cycle starts when the diskette is partially inserted into the drive, triggering a loaded spring that completes the cycle automatically.

CAUTION: *Make sure the Macintosh or Apple IIGS is powered off before connecting the disk drive to a built-in port. Failure to do so can result in damage to the drive and/or the computer's logic board.*

**Drive Mechanism
Packaging**

When sending in the Apple 3.5 Drive 800K mechanism for exchange, it **must** be shipped in the Apple-approved packaging, which includes the shipping fixture and the protective packing diskette. Refer to the Illustrated Parts List for additional packaging information.

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Apple 3.5 Drive

Section 2 – Take-Apart

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Note: If a step is underlined, detailed instructions for that step can be found elsewhere in this section.

❏ CASE

Materials Required   Small Phillips screwdriver

Remove   To remove the case:

1. Place the Apple 3.5 Drive upside down on a padded surface.
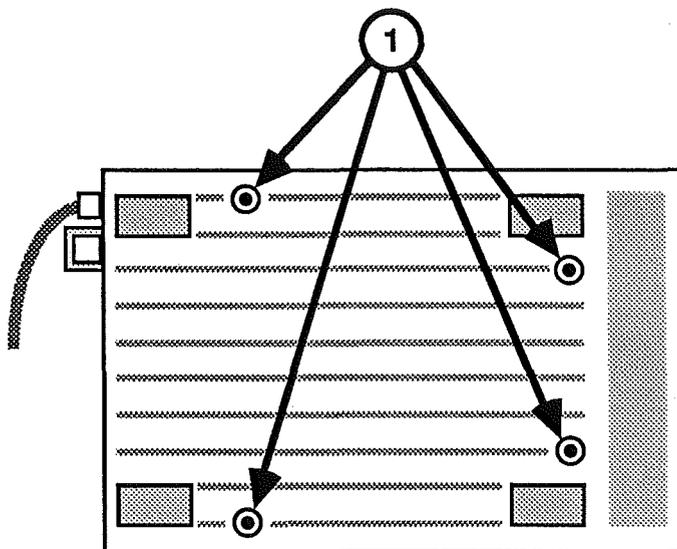
FIGURE 1

2. Remove the four screws from the case bottom (Figure 1, #1).

3. Lift off the case bottom.

4. Pull the external drive cable anchor free of the tab on the case top.

5. Grip the case top in one hand and the drive assembly in the other. Carefully slide the drive assembly as far as it will go toward the cable end.

6. Lift the drive assembly out of the case top, and set the case top and the drive assembly next to each other on the padded surface.
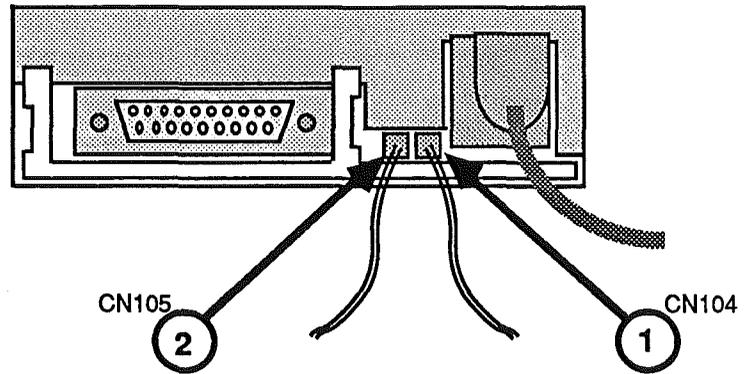
FIGURE 2

7. Using needlenose pliers if necessary, carefully disconnect the LED cable from CN104 on the drive assembly (Figure 2, #1).

8. Disconnect the eject button cable from CN105 on the drive assembly (Figure 2, #2).

Replace

To replace the case:

1. Reconnect the eject button cable to CN105 (Figure 2, #2).

2. Reconnect the LED cable to CN104 (Figure 2, #1) on the drive assembly.

3. Slide the drive assembly into the case top, making sure the metal tabs on the drive assembly fit flush against the inside of the case top. Tuck the LED cable and the eject button cable out of the way inside the edges of the case top.
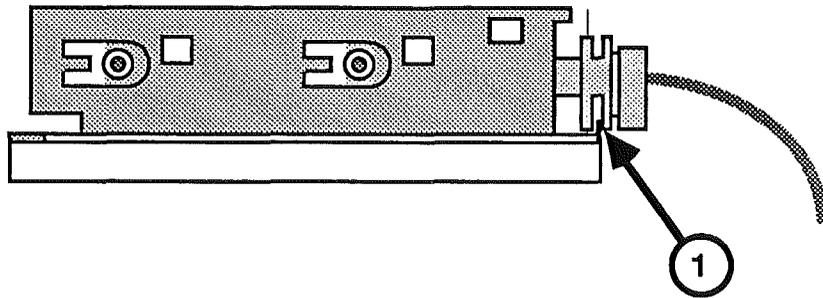
FIGURE 3

4. Now slide the drive assembly towards the front of the case top as far as it will go, so that the outermost groove on the external drive cable anchor fits over the tab on the edge of the case top (Figure 3, #1).

5. Place the case bottom over the drive assembly, fitting the external drive cable opening over the external drive cable anchor. Press the case top firmly into place.

6. Replace the four bottom screws.

❑ EXTERNAL DRIVE CABLE AND SHIELD

Materials Required   Small Phillips screwdriver

Remove   To remove the external drive cable and shield:

1. Remove the case.
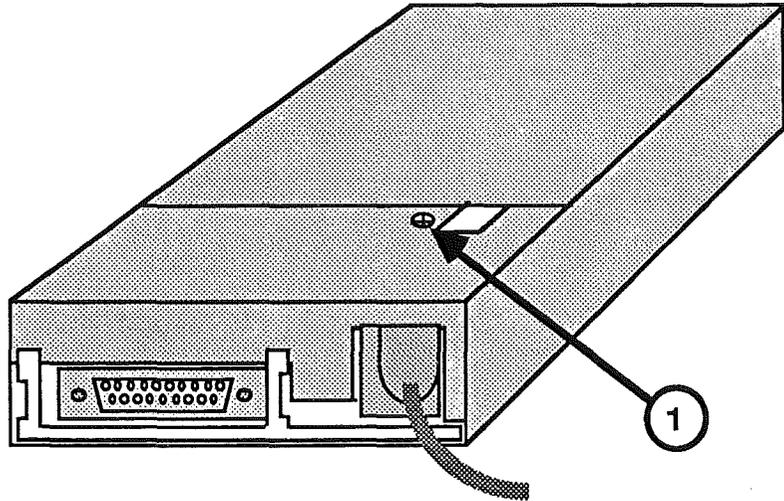
FIGURE 4

2. Remove the screw on the external drive cable shield (Figure 4, #1).
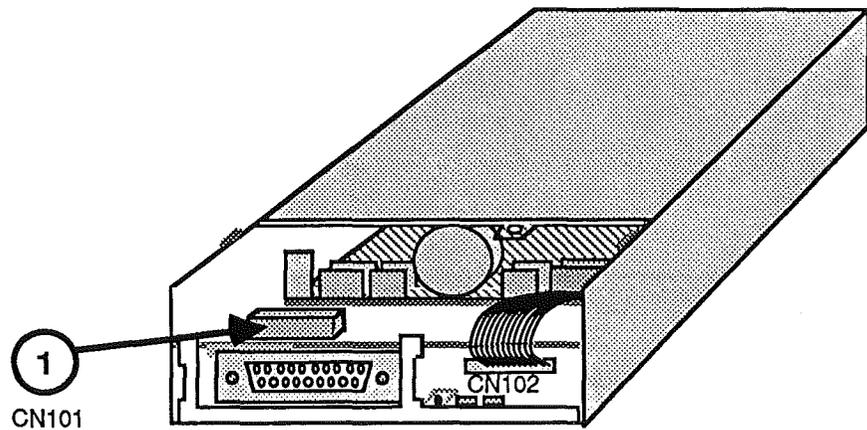

CN101

FIGURE 5

3. Disconnect the external drive cable from CN101 on the drive assembly (Figure 5, #1).
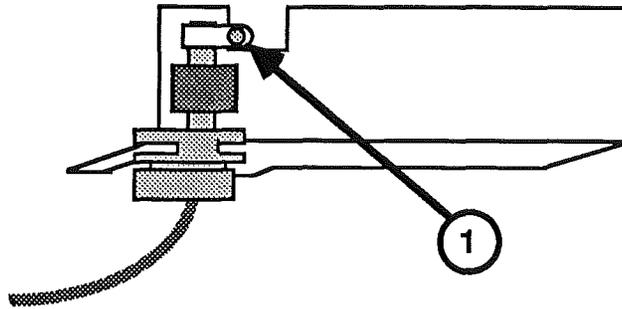
FIGURE 6

4. If you are replacing either the external drive cable or the shield, first separate them by removing the ground screw (Figure 6, #1)

Replace

To replace the external drive cable and shield:

1. Replace the ground screw if you removed it (Figure 6, #1).

2. Position the external drive cable and shield onto the drive assembly.

3. Connect the external drive cable to CN101 on the drive assembly (Figure 5, #1).

4. Replace the screw on the external drive cable shield (Figure 4, #1).

5. Replace the case.

❏ DAISY CHAIN INTERFACE BOARD

Materials Required

Small Phillips screwdriver

Remove

To remove the daisy chain interface board:

1. Remove the case and the external cable and shield.
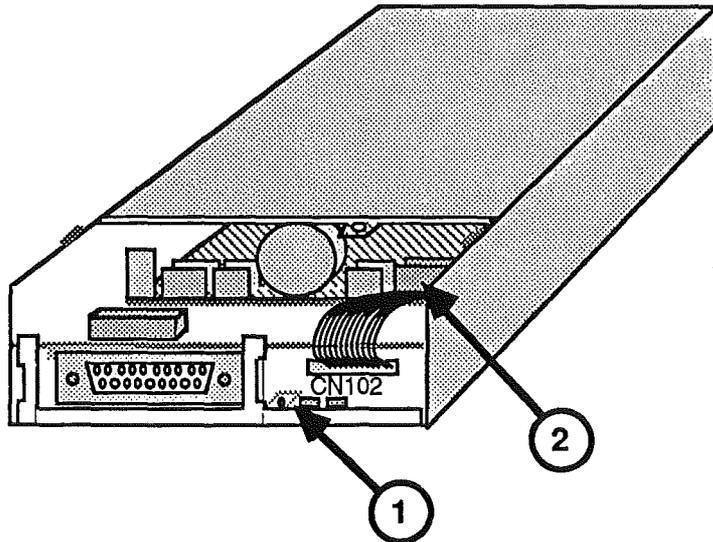
FIGURE 7

2. Disconnect CN102 from the drive mechanism (Figure 7, #2).

3. Remove the screw that secures the daisy chain interface board to the outer metal shield (Figure 7, #1).

4. Slide the daisy chain interface board to the right and lift it out.

Replace

To replace the daisy chain interface board:

1. Tuck the back edge of the daisy chain interface board under the holding tabs on the outer metal shield (Figure 7, #2).

2. Slide the board to the left as far as it will go and replace the screw (Figure 7, #1).

3. Replace the 800K drive mechanism, if you removed it.

4. Reconnect CN102 to the drive mechanism (Figure 7, #2).

5. Replace the drive cable and shield and the case.

❏ 800K DRIVE MECHANISM

Materials Required

Small Phillips screwdriver
Small flatblade screwdriver

Remove

To remove the 800K drive mechanism:

1. Remove the case and the external cable and shield.
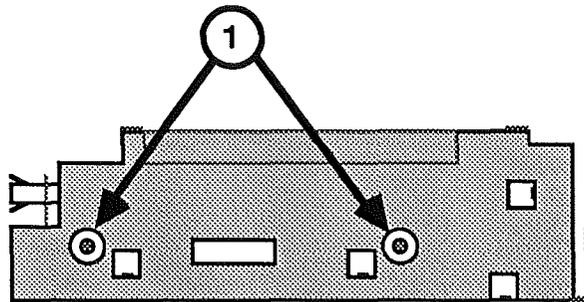
FIGURE 8

2. Remove the two screws from each side of the outer metal shield (Figure 8, #1).
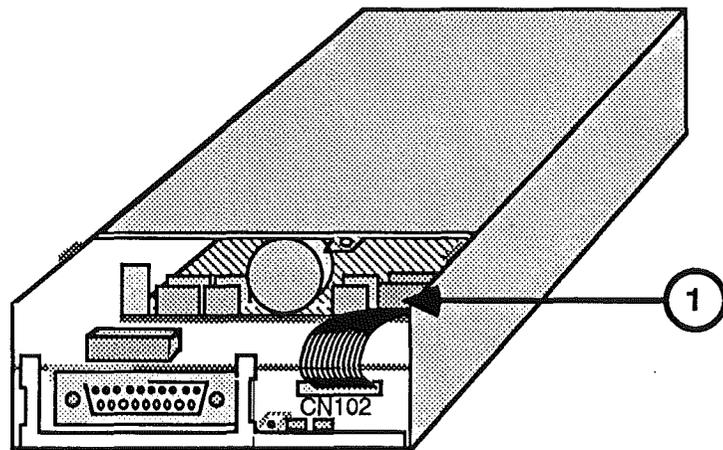
FIGURE 9

3. Disconnect CN102 from the drive mechanism (Figure 9, #1).

4. Slide the 800K drive mechanism out of the outer metal shield (away from the external cable end).
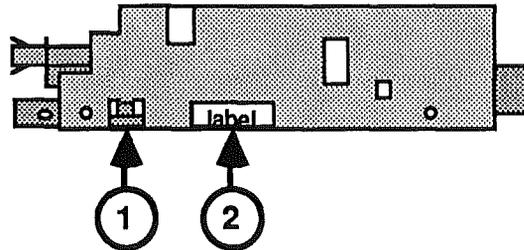
FIGURE 10

5. Slide the inner metal shield in the direction of the arrow in Figure 9 until the tabs on each side (Figure 10, #1) clear the holes; then lift off the shield. (If this is difficult, try carefully inserting a small flat-blade screwdriver under the shield to free it from the tabs.)

> *Note:* Send the drive mechanism back to Apple **WITHOUT the inner metal shield.** (Save the shield to put on the replacement drive mechanism.) The drive mechanism **MUST** be sent back to Apple **in the Apple-approved shipping fixture**, with the packing diskette installed in the drive. See the Illustrated Parts List for more packaging information.

Replace

To replace the 800K mechanism:

1. If necessary, remove the shipping fixture from the new 800K drive mechanism. Then place the inner metal shield over the 800K drive mechanism, matching the label on the mechanism to the cutout on the shield (Figure 10, #2). Snap the shield into place.

2. Slide the drive mechanism into the outer metal shield, making sure the end with connector CN102 goes in first.
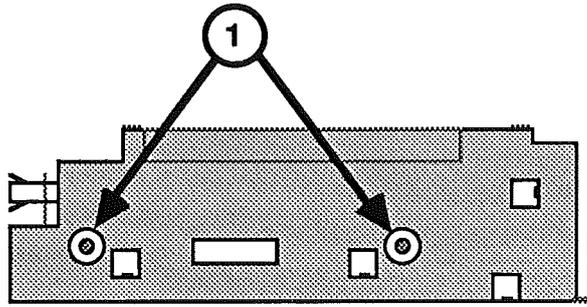
FIGURE 11

3. Replace the two screws on each side of the outer metal shield (Figure 11, #1).

4. <u>Replace the daisy chain interface board</u>, if you removed it.
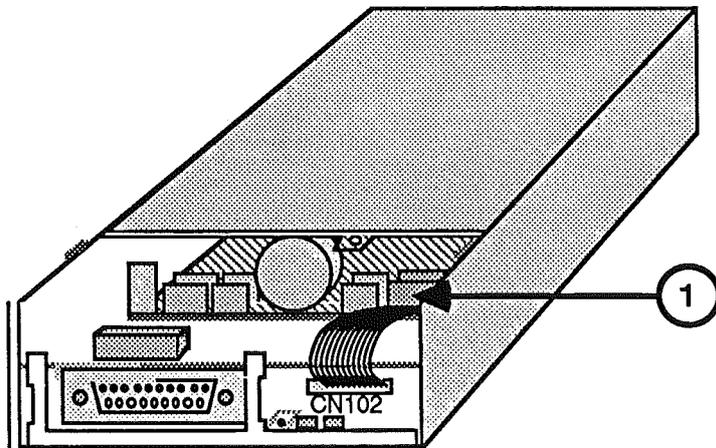
FIGURE 12

5. Connect the cable at CN102 on the daisy chain board to the drive mechanism (Figure 12, #1).

6. <u>Replace the external drive cable and shield</u>.

7. <u>Replace the case</u>.

❑ EJECT SWITCH ASSEMBLY

Materials Required   Small Phillips screwdriver

Remove   To remove the eject switch assembly:

1. Remove the case.
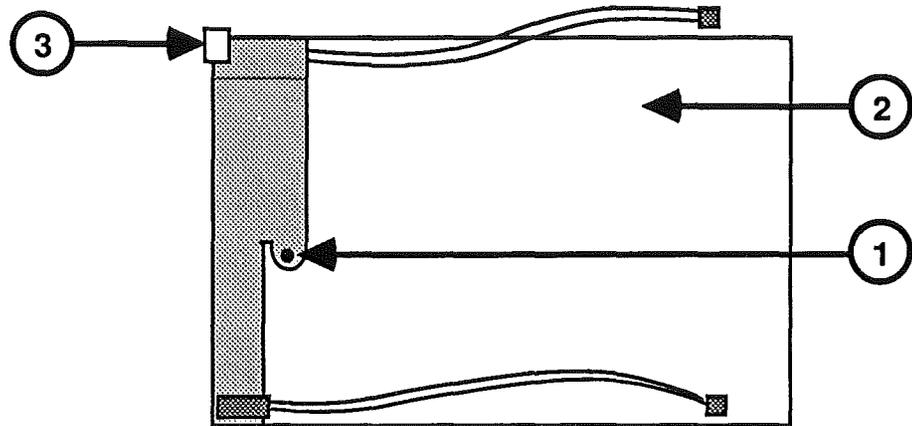
FIGURE 13

2. Remove the screw (Figure 13, #1) that secures the metal bracket to the case top (Figure 13, #2).

3. Lift the eject switch assembly (Figure 13, #3) off the holding tabs.

Replace   To replace the eject switch:

1. Position the eject switch (Figure 13, #3) over the holding tabs.

2. Replace the screw (Figure 13, #1) that secures the metal bracket to the case top.

3. Replace the case.

❏ LED ASSEMBLY

Materials Required   Small Phillips screwdriver

Remove   To remove the LED assembly:

1. Remove the case.
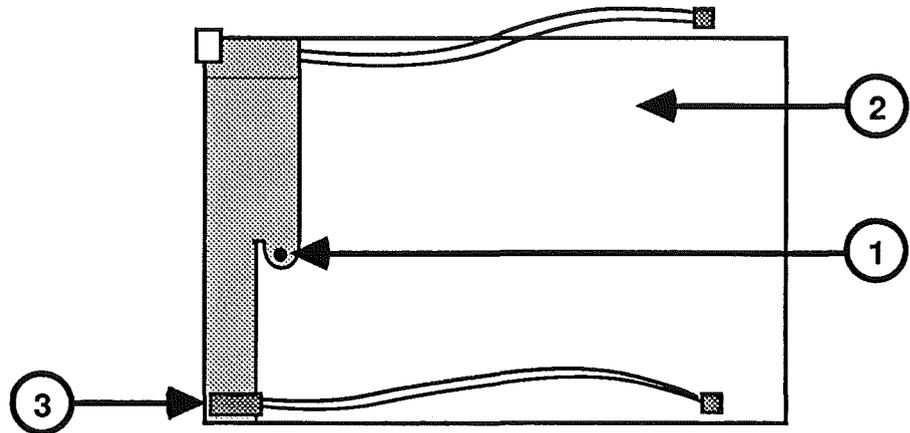
FIGURE 14

2. Remove the screw (Figure 14, #1) that secures the metal bracket to the case top (Figure 14, #2).

3. Lift the LED assembly (Figure 14, #3) off the holding tabs.

Replace   To replace the LED assembly:

1. Position the LED assembly (Figure 14, #3) over the holding tabs.

2. Replace the screw (Figure 14, #1) that secures the metal bracket to the case top.

3. Replace the case.

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Apple 3.5 Drive

Section 3 – Diagnostics

❑ CONTENTS

❏ INTRODUCTION

The Apple 3.5 Drive may be tested on either the Macintosh or the Apple IIGS.

1. On the Macintosh, use MacTest to do a read/write test. (Refer to the *Macintosh Technical Procedures*, Section 2, Diagnostics.)

    Note: Second and later repetitions of MacTest on an Apple 3.5 Drive may cause the "in use" LED to remain on throughout the test, even when the drive is not actually in motion. This will cause no harm and may be ignored.

2. On the Apple IIGS, use *System Utilities* to test the read/write functions of the drive as it demonstrates formatting, copying, and booting.

❏ USING SYSTEM UTILITIES (APPLE IIGS)

Introduction

The *System Utilities* diskette (version 2.1 or higher) may be used to test various functions of the Apple 3.5 Drive, among them the three procedures in this section:

1. Formatting a diskette in the Apple 3.5 Drive.

2. Copying all the files from the *System Utilities* diskette onto the formatted diskette.

3. Booting directly from the Apple 3.5 Drive using the boot diskette just created.

If the Apple 3.5 Drive displays any problems with these procedures, turn to Section 4, Troubleshooting.

Note: Refer to the *System Utilities* manual and the *Apple IIGS Owner's Guide* for more information if you are uncertain how to use the diskette with the Apple IIGS.

Materials Required

Apple IIGS
Apple 3.5 Drive to be tested
Apple 5.25 Drive or UniDisk
Disk controller card
System Utilities diskette (5.25" format)
Blank 3.5" diskette

Formatting

1. Connect the Apple 3.5 Drive to the drive port. Install an Apple 5.25 Drive (or UniDisk) in slot 6 with a disk controller card.

2. Insert the *System Utilities* diskette in the 5.25 drive.

3. Hold down <Option> and <Escape> while you power on the system. When the ROM menu comes up, type 1 to access the Control Panel.

4. Configure the Control Panel as follows:

   Slot 6: **<YOUR CARD>**   (for the 5.25 drive)
   Slot 5: **<SMART PORT>** (for the 3.5 drive)
   Startup Slot: **6**

   Note: Use the up and down arrows to move from one line to another, and the left and right arrows to change the designation for each line. CAPITAL LETTERS indicate that a choice is currently selected.

   When the slots are configured correctly, press <Return>.

5. To exit the Control Panel, select **<QUIT>** and press <Return>.

   The system will boot from the 5.25 drive.

6. When asked **Prefer 80 column display?**, type Y.

7. When the *System Utilities* menu appears, use the arrows to select **<FORMAT A DISK>** and press <Return>.

8. When asked **Where is your disk?**, select **<SLOT AND DRIVE>** and press <Return>.

Note: Do not be confused if **<SLOT AND DRIVE>** is the only selection listed. Simply make sure it is selected (in capital letters) and press <u>Return</u>.

9. The screen will now appear as below:

   Slot: **[N]**   (this could be any number from 1 to 7)

   Type <u>5</u> (because you will be placing your blank diskette to be formatted in the 3.5 Drive, which is designated for slot 5).

10. The screen will now appear as below:

    Slot: **[5]**   Drive: **[N]** (any number from 1 to 7)

    Type <u>1</u> (because there is only one drive associated with slot 5).

11. The screen will now appear as below:

    Using Slot 5, Drive 1
    Select the operating system:

    Use the arrows to highlight **<PRODOS>** and press <u>Return</u>.

12. The screen now shows:

    Using Slot 5, Drive 1
    Operating System: ProDos
    Enter Name of New Volume: /BLANKN......

    Enter any name you wish and press <u>Return</u>.

13. Place the blank diskette to be formatted in the Apple 3.5 Drive. Press <u>Return</u>.

14. If the diskette was previously formatted, you will be asked **Is it okay to destroy /OLDNAME?** Select **<YES>** and press <u>Return</u>.

    The formatting will begin. At its conclusion the message will appear: **Formatting: ....Done!**

15. Press <u>Return</u>. Then press <u>Escape</u> to return to the *System Utilities* menu.

Copying

1. From the *System Utilities* menu, select <COPY FILES> and press <Return>.

2. When asked **Where is your source disk?**, select <SLOT AND DRIVE> and press <Return>.

3. The screen will now appear as below:

   Slot: [N]

   Type 6 (because the *System Utilities* diskette you will be copying is in the 5.25 drive, which is designated for slot 6).

4. The screen will now appear as below:

   Slot: [6]   Drive: [N]

   Type 1 (because there is only one drive associated with slot 6).

5. When asked **Where is your destination disk?**, select <SLOT AND DRIVE> and press <Return>.

6. The screen will now appear as below

   Slot: [N]

   Type 5 (because the blank formatted diskette you will be copying to is in the Apple 3.5 Drive, which is designated for slot 5).

7. The screen now shows:

   Slot: [5]   Drive: [N]

   Type 1 (because there is only one drive associated with slot 5).

8. The screen will now appear as below:

   Source disk: Slot 6, Drive 1
   Destination disk: Slot 5, Drive 1

9. When asked **Select some or all files on this disk?**, select <ALL> and press <Return>.

10. The copying will begin. At its conclusion, the message will appear: **Copying complete!**

11. Press <Escape> to return to the *System Utilities* menu.

12. Select **<EXIT SYSTEM UTILITIES>** and press <Return>.

13. When asked **Are you sure you want to leave System Utilities?**, select **<YES>** and press <Return>.

Booting from the Apple 3.5 Drive

1. Press <Option>-<Control>-<Reset> to return to the ROM menu.

2. Type 1 to access the Control Panel.

3. Configure the Control Panel as follows:

   Slot 6: **<YOUR CARD>**   (for the 5.25 drive)
   Slot 5: **<SMART PORT>** (for the 3.5 drive)
   Startup Slot: **5**

   Press <Return>.

4. Select **<QUIT>** and press <Return> to exit the Control Panel.

   The system will boot the *System Utilities* from the new diskette in the Apple 3.5 Drive.

   Note: If the Apple 3.5 Drive has performed all of these procedures, it is functioning normally.

5. Power off the system.

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Apple 3.5 Drive

Section 4 – Troubleshooting

CONTENTS

❏ USING THE APPLE 3.5 DRIVE SYMPTOM CHART

Troubleshooting Rules

General rules for troubleshooting the Apple 3.5 Drive are:

1. Use known-good software. (It can save you a lot of time!)

2. Be sure the cable is installed securely in the external disk drive port (on the Macintosh).

3. Be sure you are addressing the correct slot (on the Apple IIGS).

4. If the Apple 3.5 Drive demonstrates a symptom listed on the chart, replace modules or parts in the order listed under the corrective action(s). If a corrective action does not fix the problem, the original module or part should be reinstalled before the next step is performed.

❏ APPLE 3.5 DRIVE SYMPTOM CHART

Symptom	Corrective Action
• *Drive will not come on.** LED flashes once or does not light*	1. Swap interface card (IIGS)* 2. Swap drive mechanism 3. Swap external drive cable 4. Swap LED assembly
• *Drive will read but not write*	1. Swap drive mechanism 2. Swap interface card (IIGS)* 3. Swap external drive cable
• *Drive will not read but LED comes on*	1. Check software 2. Swap drive mechanism 3. Swap interface card (IIGS)*
• *Drive will not eject diskette*	1. Swap drive mechanism 2. Swap eject switch cable assembly
• *Drive functions, but LED does not light*	1. Swap LED assembly 2. Swap drive mechanism

* The Apple 3.5 Drive may be connected to the Apple IIGS, either via the drive port or via a disk controller card inserted in one of the slots. If the drive is connected to the drive port, check to ensure that the Control Panel configuration is set up correctly for the use of the drive port. If the configuration is correct, but the drive still does not work, change the logic board.

** If the Apple 3.5 Drive 800K mechanical assembly is being used in the Macintosh internal drive, check to make sure the logic-board-to-drive cable is **yellow**, not red.

Symptom	Corrective Action
• *When one or more Apple 3.5 drives are daisy-chained to a DuoDisk or to one or more UniDisk 5.25 drives, the drive(s) suddenly start to spin and can no longer be accessed by the Apple IIGS*	– Check the part number on the gate array component on the daisy chain interface board. If the part number indicates a Revision A board (CXD1085A), replace the board with a Revision B board (CXD1085B).

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Apple 3.5 Drive

Section 5 — Additional Procedures

❏ CONTENTS

Note: If a step is underlined, instructions for that step can be found in Section 2, Take-Apart.

❏ APPLE 3.5 DRIVE SPINNING PROBLEM

In certain configurations a spinning problem may occur when Apple 3.5 drives and UniDisk 5.25 drives are daisy-chained and connected to an Apple IIGS. When this happens, one or more of the drives suddenly start to spin and can no longer be accessed. The problem **only** occurs on Apple 3.5 drives with Revision A daisy chain interface boards in the following configurations:

- An Apple IIGS with one or more Apple 3.5 drives attached, and one or more UniDisk 5.25 drives daisy-chained to one of the Apple 3.5 drives.

- An Apple IIGS with one or more Apple 3.5 drives attached, and a DuoDisk daisy-chained to one of the 3.5 drives.

The spinning problem is the result of electrostatic buildup within the circuitry of the Revision A daisy chain interface board. This problem causes no permanent damage to the drive, and normal functioning returns if the system is powered off and back on.

If an Apple 3.5 drive exhibits the spinning problem while in one of the configurations described above, replace the Revision A daisy chain interface board with a Revision B board.

IMPORTANT: Do not replace the Revision A board unless the drive has exhibited the spinning problem. Only when used in the configurations described above does the Revision A board have a performance problem.

**Replacing the
Revision A
Board**

To identify and replace the Revision A daisy chain interface board:

1. Place the Apple 3.5 Drive on the grounded workbench pad.

2. Remove the case, the external cable and shield, and the daisy chain interface board. (Refer to Section 2, Take-Apart, if necessary).

3. Locate the part number on the gate array component (Figure 1, #1). The gate array is located on the side of the daisy chain interface board without a cable. Part number CXD1085A indicates a Revision A board, and part number CXD1085B indicates a Revision B board. **If the part number is CXD1085A (Figure 1, #1), replace the Revision A board with a Revision B board.**

FIGURE 1

é Apple Technical Procedures
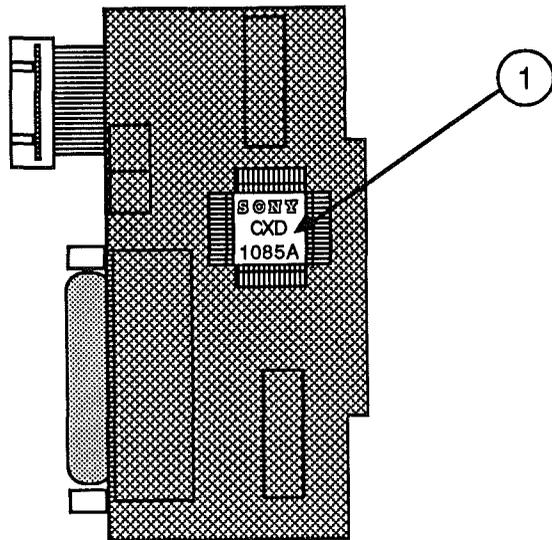
Apple 3.5 Drive

Illustrated Parts List

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The figures and lists in this section include all piece parts that can be purchased separately from Apple for the Apple 3.5 Drive, along with their part numbers. These are the only parts available from Apple. Refer to your *Apple Service Programs Manual* for prices.
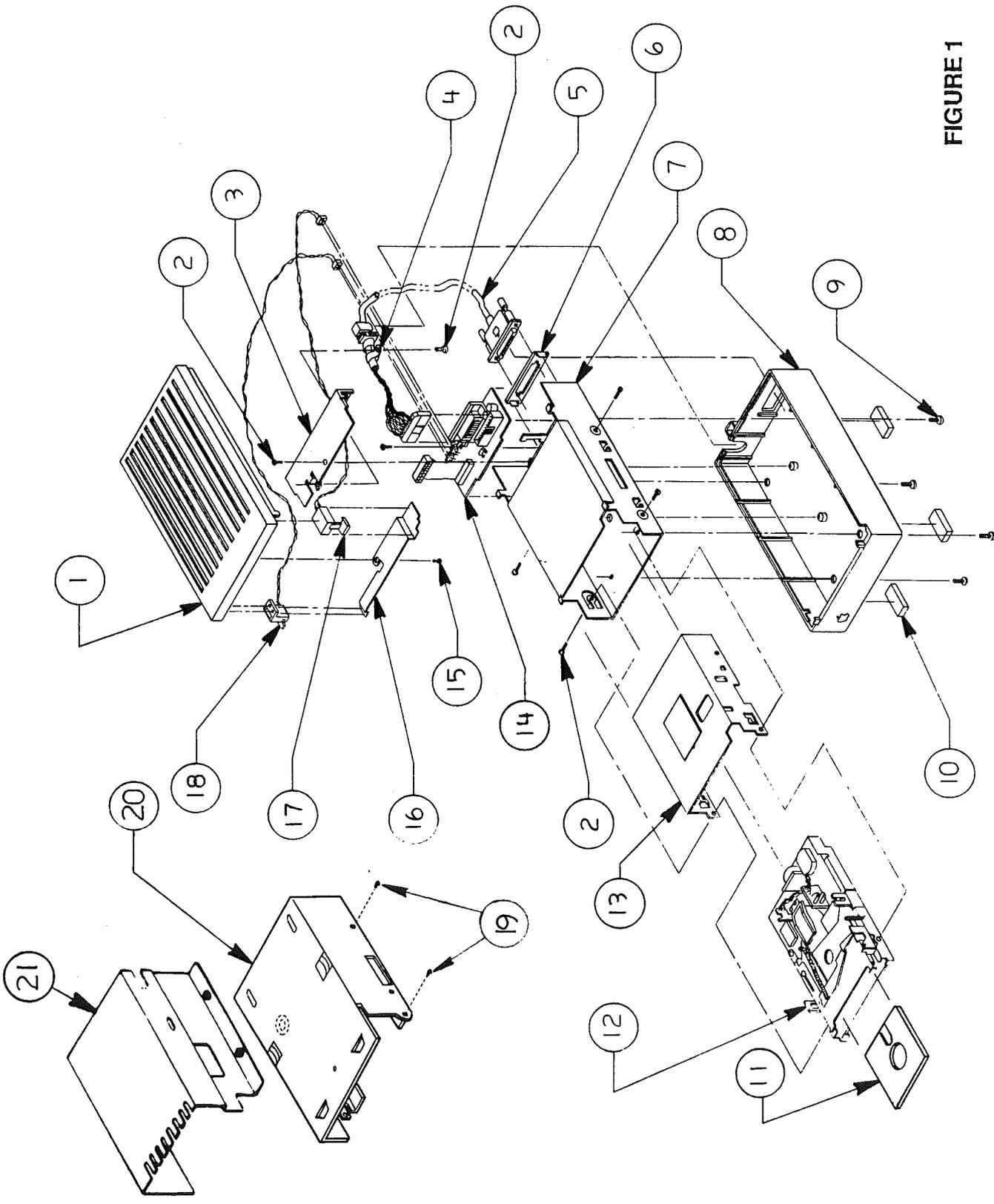
FIGURE 1

❏ FINISHED-GOODS ASSEMBLY (Figure 1)

Item	Part No.	Description
1	815-0955	Plastic Top Case, Platinum
2	416-1304	Metal Shield Screw
3	805-0807	External Drive Cable Shield
4	805-0378	External Drive Cable Clamp
5	590-4360	External Drive Cable (replacing part number 590-0360)
6	815-0969	Plastic Daisy-Chain Cover
7	603-5106	Outer Metal Shield
8	815-0956	Plastic Bottom Case, Platinum
9	416-1305	Plastic Case Screw
10	865-0045	Plastic Case Foot
11	003-0003	Packing Disk (for transporting)
12	661-0345	800K Mechanism, Apple 3.5 Drive (Red on Silver Label)
13	805-0156	Inner Metal Shield
14	076-0234	Daisy-Chain Interface Board
15	420-1011	Eject Switch Bracket Screw
16	805-0811	Eject Switch Bracket
17	603-5110	Eject Switch Cable Assembly
18	603-5109	LED Cable Assembly
19	462-3401	Screw, M 3 x 6, with two washers
20	805-5050	Floppy Metal Housing (for transporting)
21	805-0217	800K Internal Drive Shield (for transporting)

Note: The floppy metal housing for transporting is required when using using 1.4 MB drive packaging.

The 800K internal drive shield for transporting is required when using 800K drive packaging.
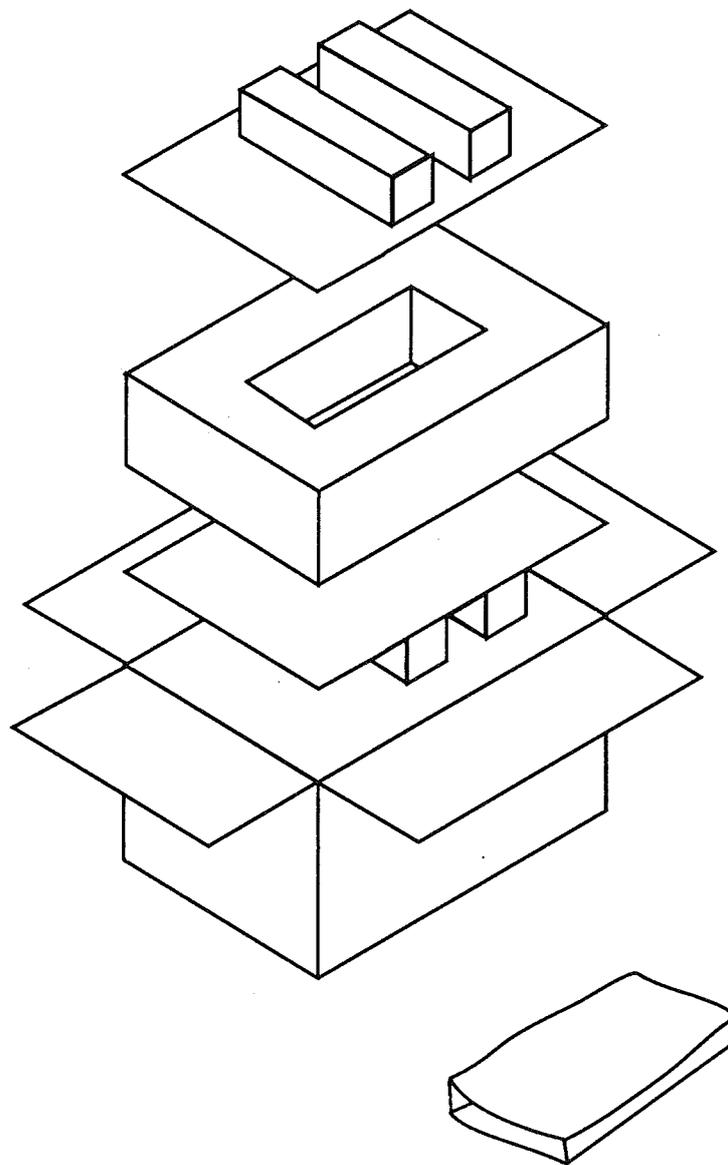
FIGURE 2

❏ SERVICE PACKAGING, 800K/1.4 MB DRIVES (Figure 2)

Item	Part No.	Description
–	602-0210	Service Packaging, 800K/1.4 MB Drives