Apple Technical Procedures

Apple FDHD/SuperDrive

Technical Procedures

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Note: The Apple FDHD Drive is now called the Apple FDHD/SuperDrive™. Use of either name in the following procedures refers to the same product.

Apple Technical Procedures

Apple FDHD Drive

Section 1 – Basics

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❑ PRODUCT DESCRIPTION

Introduction

The Apple® FDHD™ Drive (Floppy Disk High Density) is a stand-alone external data storage and retrieval system that can record up to 1.4 megabytes of data on special high-density (HD), 3.5-inch disks. When used with the Apple File Exchange Utility (version 1.1 or later), the FDHD drive can also provide quick and easy data exchangeability between Macintosh and MS-DOS computers. The FDHD is also fully backward compatible with the current Apple 400K and 800K disk formats.

Features

The Apple FDHD Drive is similar to Apple's 800K drives but has the following additional features:

- Formats HD disks, and stores up to 1.4 MB of data
- Reads and writes Apple 400K and 800K data disks (backward compatible)
- Reads and writes MS-DOS-formatted, 3.5-inch 720K and 1.4 MB data disks
- Formats 720K and HD disks for use in MS-DOS computers
- Formats 400K and 800K disks for use in 400K and 800K disk drives

  Note: You should not, however, use HD disks in 400K or 800K disk drives. The magnetic characteristics of HD disks prevent 400K and 800K drives from reliably reading and writing information on an HD disk, and also prevent these drives from properly initializing HD disks for use in an FDHD drive.

- Transfers data between Macintosh and MS-DOS computers

Identification

The Apple FDHD Drive looks like the Apple 3.5 Drive and other Apple 800K drives. You can identify an FDHD external drive by checking the external case for the following distinguishing features:

1. Check the front of the case; **FDHD** (Figure 1, #1) has been added to all FDHD external drive cases.

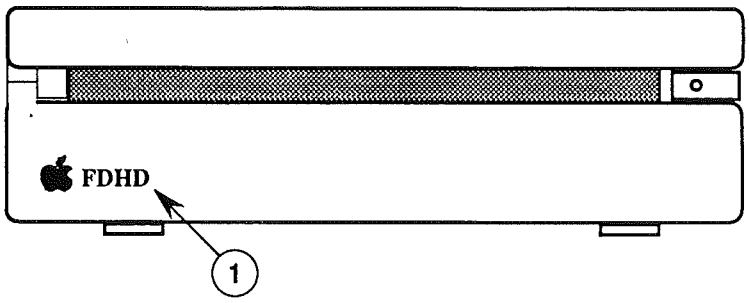


FIGURE 1

2. Check the product label (Figure 2, #1) on the bottom of the case; **Apple FDHD** appears on all FDHD external drive cases.

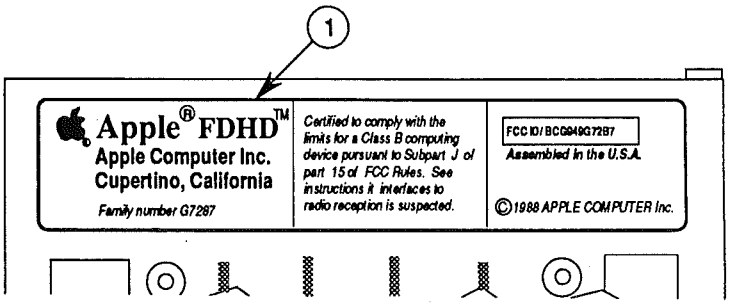


FIGURE 2

Identifying the FDHD Mechanism

If the FDHD drive mechanism has been removed from the external case, you can distinguish the FDHD mechanism from Macintosh 800K internal and external drive mechanisms in the following ways:

1. Check 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
• **Apple FDHD Drive**	**BLUE on silver**

2. Check the manufacturer's label (Figure 3, #1) on the bottom of the drive mechanism; **2MB** has been added to the label on all high-density drives.

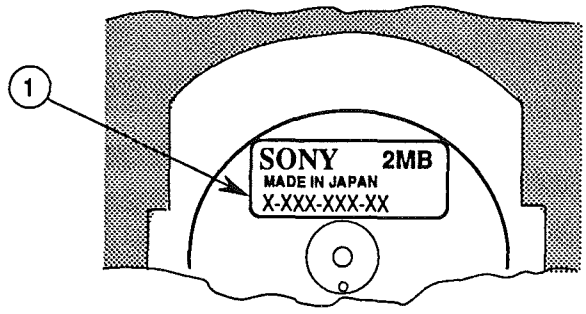
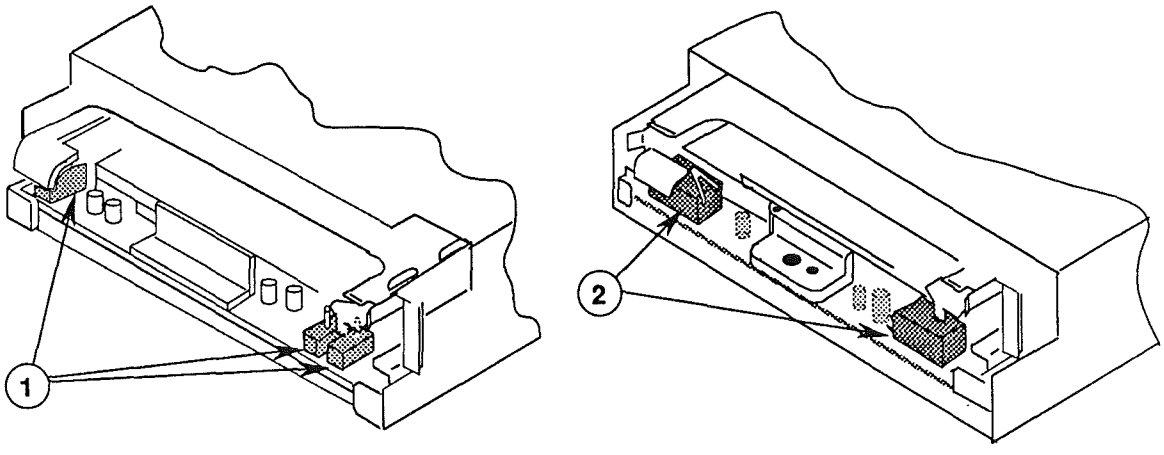


FIGURE 3

3. Check the serial number on the label:

• Internal Macintosh 800K Drive	Series 51W
• External Macintosh 800K Drive	Series 51W-10
• Apple 3.5 Drive	Series 51W-03
• **Apple FDHD Drive**	**Series 75W-01**
	Series 75W-11

4. Check the microswitches located at the front of the drive. **The FDHD has three microswitches** (Figure 4, #1) aligned perpendicular to the front edge of the drive. The 400K and 800K drives have only two microswitches (Figure 4, #2) aligned parallel to the front edge of the drive.



1.4 MB 800K

FIGURE 4

❑ PRODUCT REQUIREMENTS

System Requirements

The Apple FDHD Drive can be used on any Macintosh computer that has a disk drive port on the rear panel, and whose logic board has the appropriate disk controller circuitry (upgraded ROM and the SWIM disk controller chip). At present, the FDHD external drive can be used with the following systems:

- Macintosh SE/30
- Macintosh IIcx

Because the Macintosh SE/30 and Macintosh IIcx systems come standard with an internal FDHD drive, these systems include the FDHD disk controller circuitry needed to add an FDHD external drive.

Revised ROM

The new 512K ROMs (permanent, Read-Only Memory) include code that supports the FDHD disk drive and SWIM disk controller chip.

SWIM Disk Controller

Like the IWM chip that it replaces, the SWIM chip controls reading and writing operations between the CPU and the internal and external disk drives. In addition, the SWIM chip reads and writes data disks formatted on both GCR (Apple's variable rotational speed format) and MFM (a constant rotational speed format used in MS-DOS systems) disk drives. This enables the FDHD external drive to exchange data between Macintosh and MS-DOS systems.

Software and Media Requirements

To take full advantage of the Apple FDHD Drive, you need the following:

- System file version 6.0 or later
- HD (high-density) disks
- Apple File Exchange utility, version 1.1 or later

CAUTION: *High-density media are more likely to have problems than low-density media. To avoid media-related problems, use only known-good media or high-density media bearing the Apple label.*

You will not be able to take advantage of the features of the FDHD drive by using any System file older than version 6.0. Also, although the FDHD drive can read, write, and format 400K and 800K data disks, you cannot take advantage of the high data storage capability of the FDHD drive unless you use special HD disks. To avoid media-related problems, Apple advises using HD media bearing the Apple label with the FDHD disk drive.

The Apple File Exchange utility is necessary both to format disks for use on MS-DOS computers and to work directly with information on disks formatted from MS-DOS computers. When using the Apple File Exchange utility, remember always to open the AFE utility before inserting the MS-DOS disk that you intend to read or format.

Identifying HD Disks

To distinguish between HD disks and other 3.5-inch disks, check the label. The Apple label has **HD** stamped on the plastic case (Figure 5, #1) and **High Density** stamped on the metal shutter (Figure 5, #2). In addition, all HD disks have a second read/write window, located in the upper left corner of the disk (Figure 5, #3).

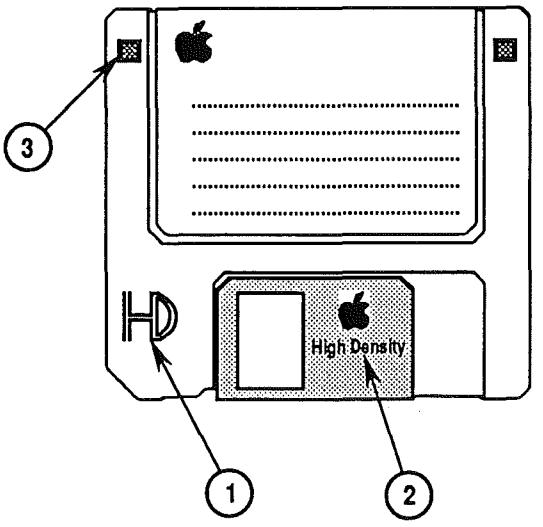


FIGURE 5

❑ USING THE PRODUCT

Connecting the FDHD Drive

To use the Apple FDHD Drive with properly configured Macintosh systems, simply connect the FDHD drive cable to the disk drive port on the rear panel of the computer. *If users are experiencing electromagnetic interference problems with the FDHD external drive, remind them to position the drive to the right of the computer*, allowing at least two inches between the drive and the computer. Positioning the drive in this way will help avoid interference problems caused by power supplies, which are located on the left side of the computer and of most monitors.

Drive and Media Compatibility

As shown in the drive and media compatibility matrix below (Figure 6), **400K drives** can read, write, and format single-sided media and double-sided media (in 400K format only). The **800K drives** can also read, write, and format single- and double-sided media. However, **Apple does not recommend using high-density media in either 400K or 800K disk drives.** Data saved to high-density media using 400K or 800K drives is unreliable and could be lost later. **FDHD drives** can read, write, and format single-sided, double-sided, and high-density media. In addition, FDHD drives can read and write 720K, double-sided MFM format media (for MS-DOS systems).

DRIVE AND MEDIA COMPATIBILITY MATRIX

Drive	Media		
	Single-Sided	Double-Sided	High Density
400K	R/W/F	R/W/F (400K format only)	N R
800K	R/W/F	R/W/F	N R
1.4 MB	R/W/F	R/W/F (800K Apple)	R/W/F (Apple or IBM)
		R/W/F (720K IBM)*	

LEGEND:
R = Read
W = Write
F = Format
NR = Not Recommended
IBM = MS-DOS or OS/2 format

*The Apple File Exchange utility is required to format double-sided disks for MS-DOS or OS/2 systems

FIGURE 6

Note: To help understand drive and media format compatibility, try thinking in terms of the drive/media of lowest capacity. For example, if your system has both an 800K drive and an FDHD drive, to ensure media format compatibility between the two drives you must use 800K media (the drive and media of lowest capacity).

Initialization

The Apple FDHD Drive can initialize single- and double-sided GCR format (Apple) media, double-sided 720K MFM format media (MS-DOS), and HD media. The Apple File Exchange utility is required to initialize both 720K and HD disks for use in MS-DOS computers.

Formatting 400K, 800K, and HD Apple disks

The Apple FDHD Drive can differentiate between 400K/800K and HD media. When you insert a blank, unformatted 400K or 800K disk into the drive, the Macintosh will ask if you wish to initialize the disk as single or double sided. (If you are going to be using an 800K disk in a 400K drive as well as in the Apple FDHD Drive, you will have to initialize the disk as single sided—otherwise the 400K drive will not be able to read it.) When you insert a blank, unformatted HD disk into the FDHD drive, simply click Initialize and follow the on-screen instructions.

Formatting 720K and HD MS-DOS disks

To initialize a blank and unformatted 720K double-sided disk, or an HD disk for use in an MS-DOS system, first open the Apple File Exchange utility (version 1.1 or later). When you insert the unformatted disk, you will see the Apple File Exchange dialog box for either HD disks or 800K/720K disks. After clicking in the appropriate box, you will be shown a dialog box with an MS-DOS option. Click in the MS-DOS box, and follow MS-DOS naming conventions to complete the initialization process.

Inserting and Ejecting Disks

The Apple FDHD Drive has an automatic disk insert and eject system. The insert cycle starts when the disk is partially inserted into the drive, triggering a loaded spring that completes the cycle automatically. The eject cycle works only when the drive is under power, and is controlled by using a software command.

Note: When the Apple FDHD Drive is connected to a Macintosh, the eject button on the front of the drive is automatically deactivated because Macintosh software controls disk ejection.

Drive Mechanism Packaging

When sending in the FDHD drive mechanism for exchange, it **must** be shipped in the **Apple-approved shipping fixture**. Also be sure to **remove the inner metal shield** before returning the drive mechanism to Apple. Save the inner metal shield and install it on the replacement drive mechanism. Refer to the Illustrated Parts List for additional packaging information.

Apple FDHD Drive

Section 2 – Take-Apart

❑ CONTENTS

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

❑ CASE

Materials Required

Small Phillips screwdriver
Needlenose pliers

Remove

To remove the case:

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

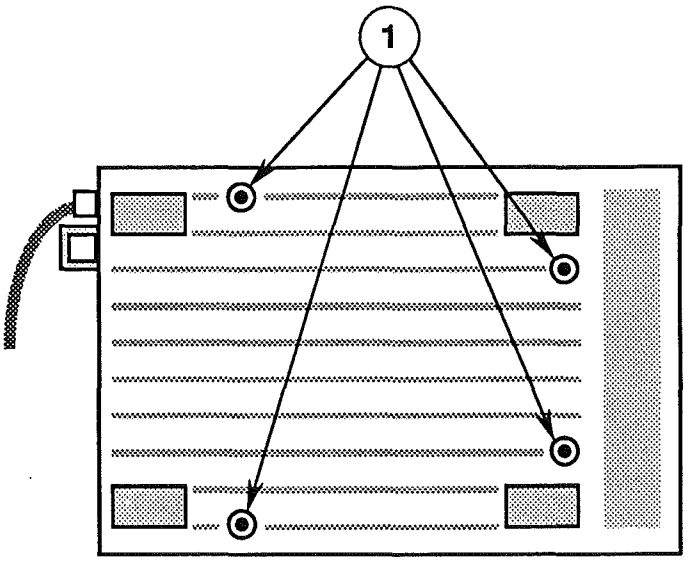


FIGURE 1

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

3. Pull the case bottom (Figure 2, #1) off the rubber, external drive cable anchor (Figure 2, #2).

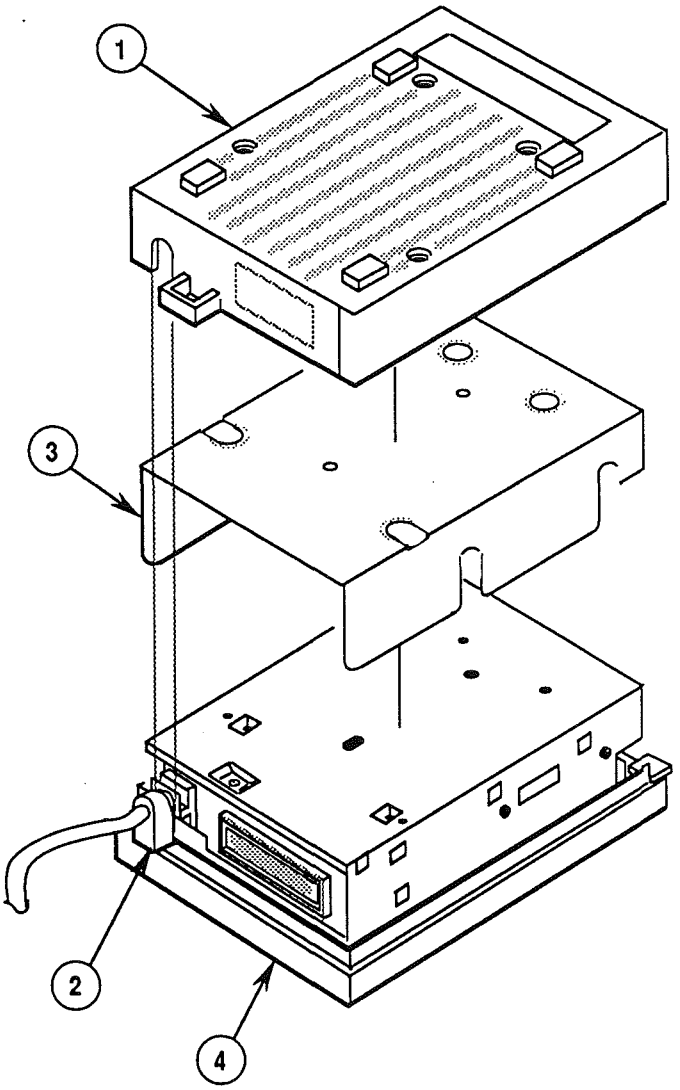


FIGURE 2

4. Remove the floppy metal shield (Figure 2, #3) from the drive assembly.

5. Pull the rubber, external drive cable anchor (Figure 2, #2) off the case top (Figure 2, #4).

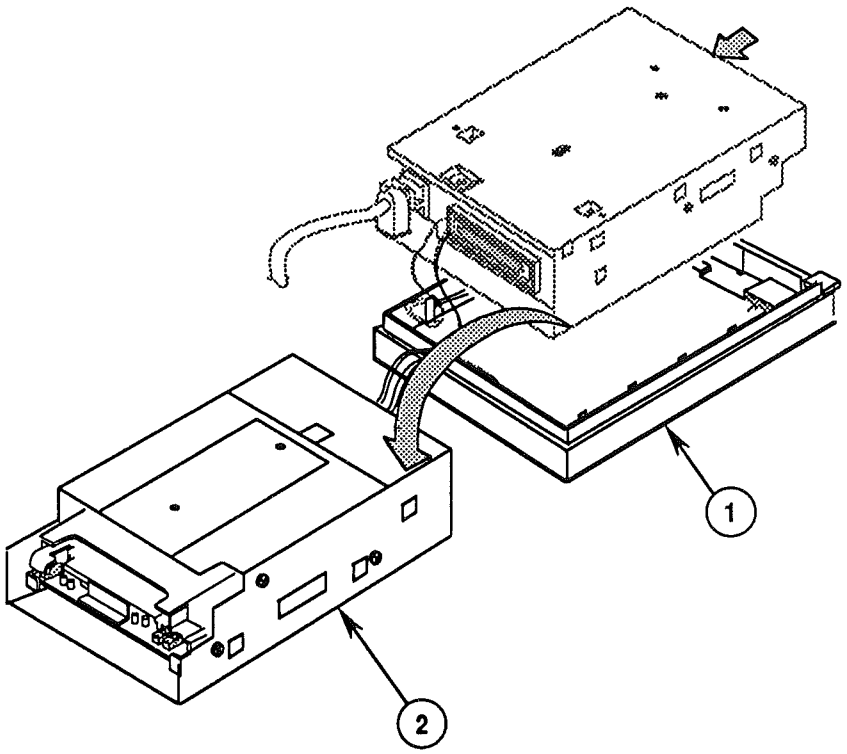


FIGURE 3

6. Grip the case top (Figure 3, #1) in one hand and the drive assembly (Figure 3, #2) in the other. Carefully slide the drive assembly as far as it will go toward the cable end of the case top.

7. Lift the drive assembly out of the case top. Then flip the drive assembly over as shown in Figure 3, and set it right side up on the padded surface. The drive assembly and case top will be end to end.

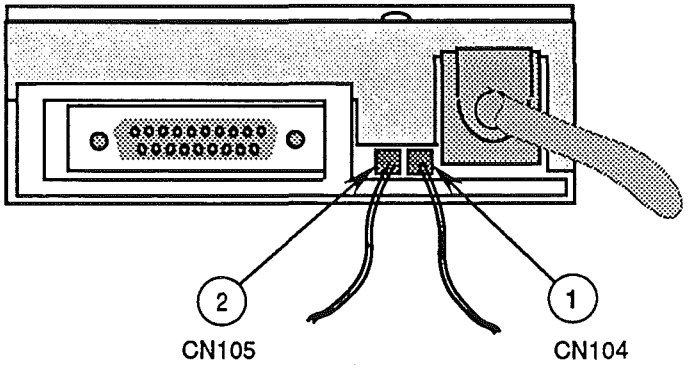


FIGURE 4

8. Using the needlenose pliers (if necessary), carefully disconnect the following cable connectors:

   - LED cable from drive assembly connector CN104 (Figure 4, #1)
   - Eject button cable from drive assembly connector CN105 (Figure 4, #2)

Replace

To replace the case:

1. With the case assembly right side up on a padded surface as shown in Figure 4, reconnect the following cable connectors:

   - Eject button cable to drive assembly connector CN105 (Figure 4, #2)
   - LED cable to drive assembly connector CN104 (Figure 4, #1)

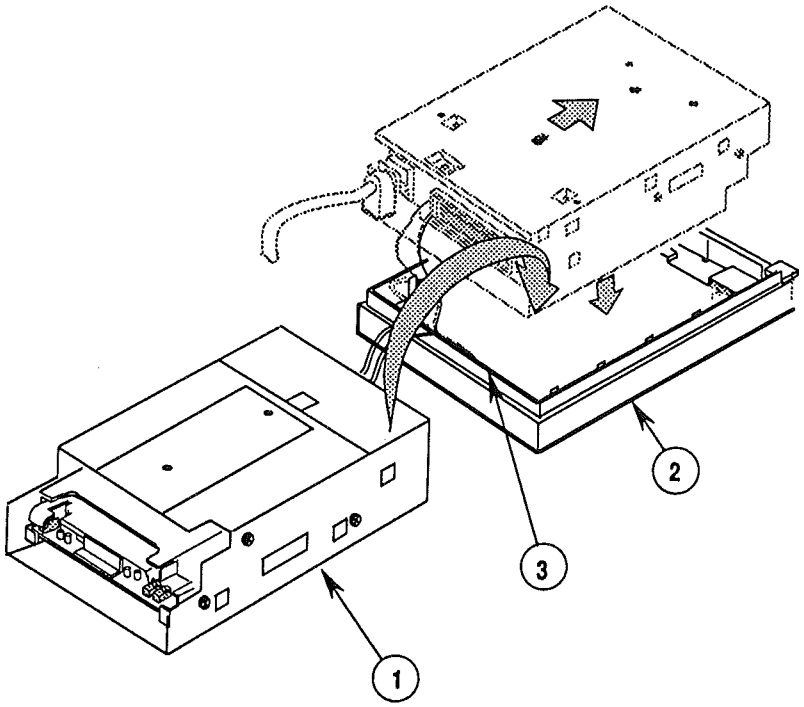


FIGURE 5

2. Flip the drive assembly (Figure 5, #1) over and place it upside down in the case top (Figure 5, #2). Place the drive assembly with its metal mounting tabs flush against the back edge (Figure 5, #3) of the case top.

3. Slide the drive assembly as far as it will go toward the front edge of the case top. The metal mounting tabs on the drive assembly should be secure beneath the plastic holding tabs on the case top, and the external drive cable anchor should be aligned with the edge of the case top.

4. Tuck the LED cable and the eject button cable out of the way inside the edges of the case top.

5. Replace the outermost groove on the external drive cable anchor (Figure 6, #1) over the edge (Figure 6, #2) of the case top.

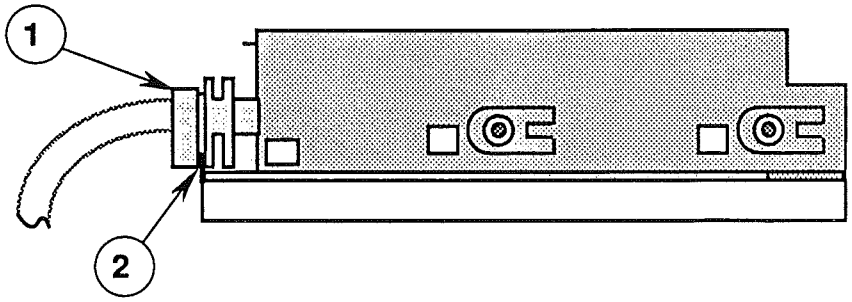


FIGURE 6

6. Replace the floppy metal shield (Figure 7, #1) on the drive assembly.

7. Replace the case bottom (Figure 7, #2) over the drive assembly. The external drive cable opening (Figure 7, #3) in the case bottom should fit over the innermost groove in the external drive cable anchor (Figure 7, #4). Press the case top firmly into place.

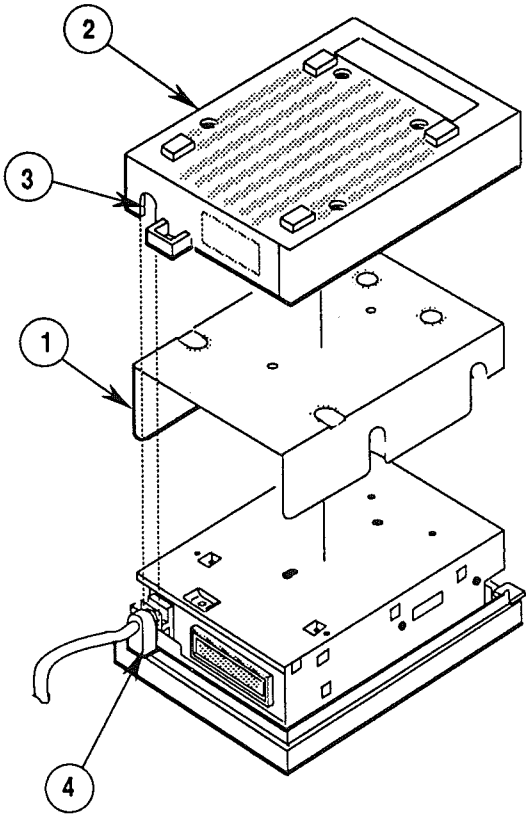


FIGURE 7

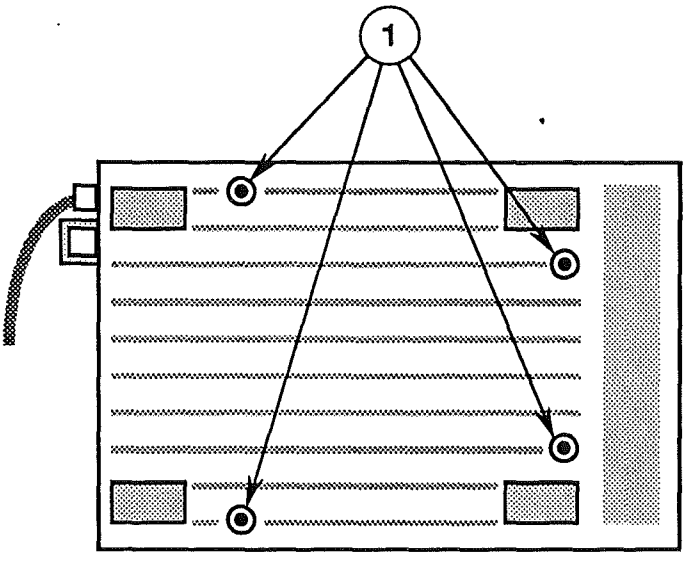


FIGURE 8

8. Replace the four screws (Figure 8, #1) in the case bottom.

❑ EXTERNAL DRIVE CABLE AND SHIELD

Materials Required

Small Phillips screwdriver

Remove

To remove the external drive cable and shield:

1. Remove the case.

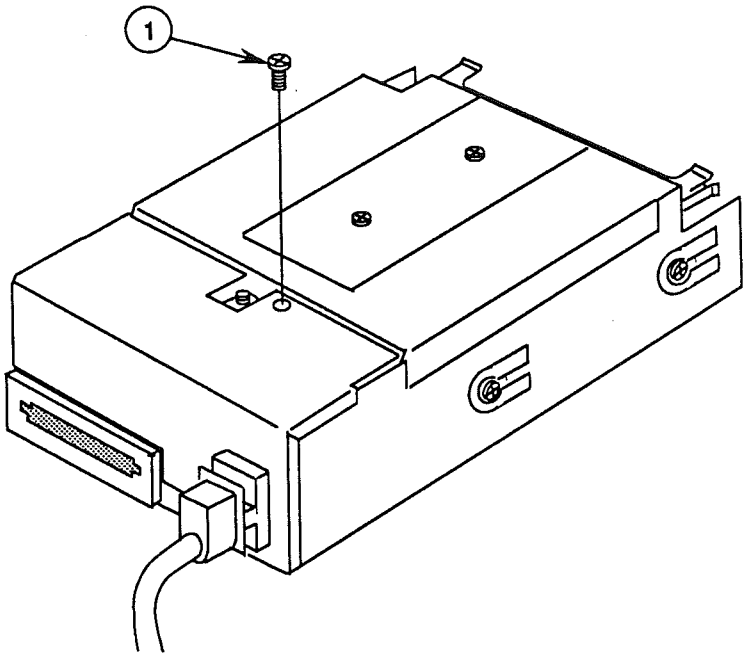


FIGURE 9

2. Remove the mounting screw (Figure 9, #1) from the external drive cable shield.

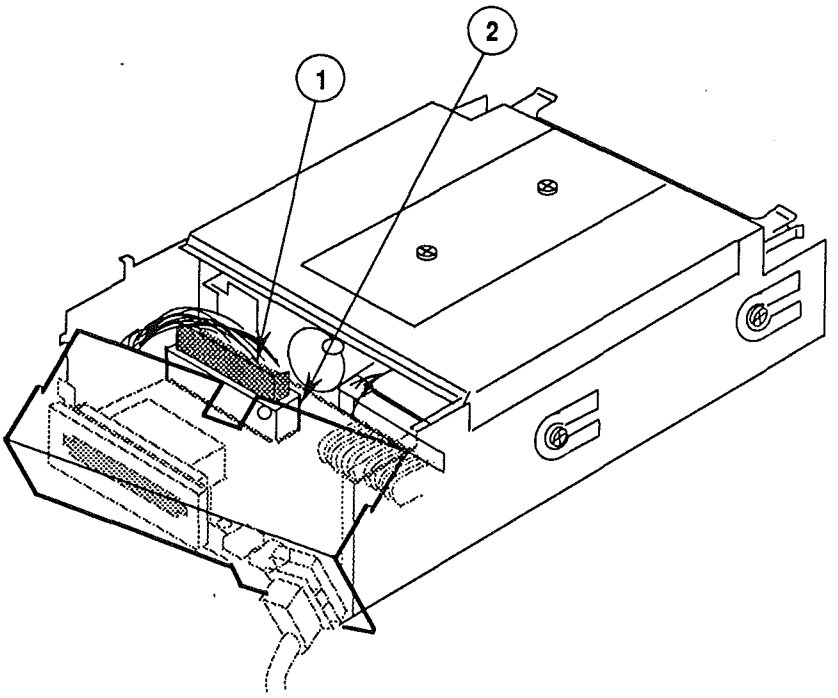


FIGURE 10

3. Carefully pull back the external drive cable shield, and disconnect the external drive cable (Figure 10, #1) from drive assembly connector CN101 (Figure 10, #2).

4. If you are replacing either the external drive cable (Figure 11, #1) or the shield (Figure 11, #2), first separate them by removing the ground screw (Figure 11, #3).

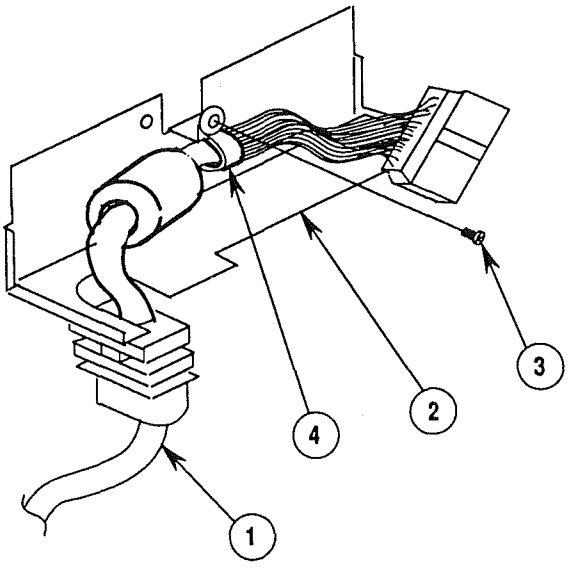


FIGURE 11

Replace

To replace the external drive cable and shield:

1. If necessary, replace the external drive cable (Figure 11, #1) in the shield clamp (Figure 11, #4), and replace the ground screw (Figure 11, #3).

2. Position the external drive cable and shield near the drive assembly, and connect the external drive cable (Figure 10, #1) to the drive assembly connector CN101 (Figure 10, #2).

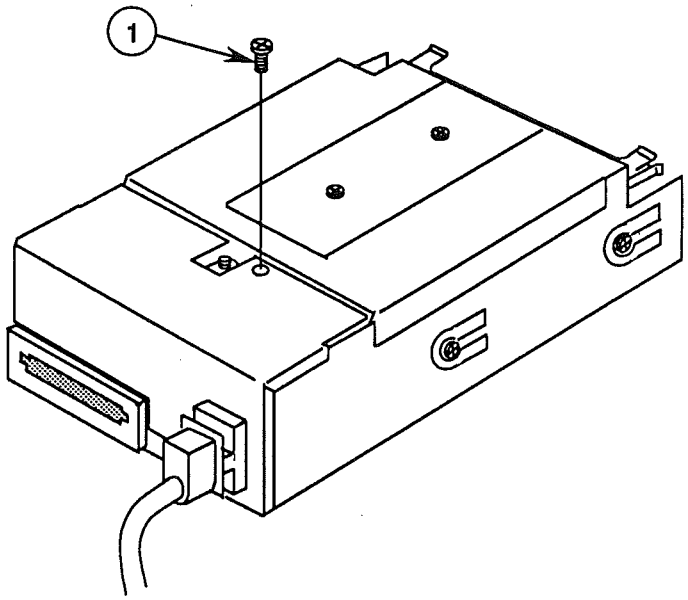


FIGURE 12

3. Replace the external drive cable shield on the drive assembly, and replace the mounting screw (Figure 12, #1).

4. Replace the case.

❑ DAISY CHAIN INTERFACE BOARD

Materials Required

Small Phillips screwdriver
Small flat-blade screwdriver or jeweler's screwdriver

Remove

To remove the daisy chain interface board:

1. Remove the case.

2. Remove the external drive cable and shield.

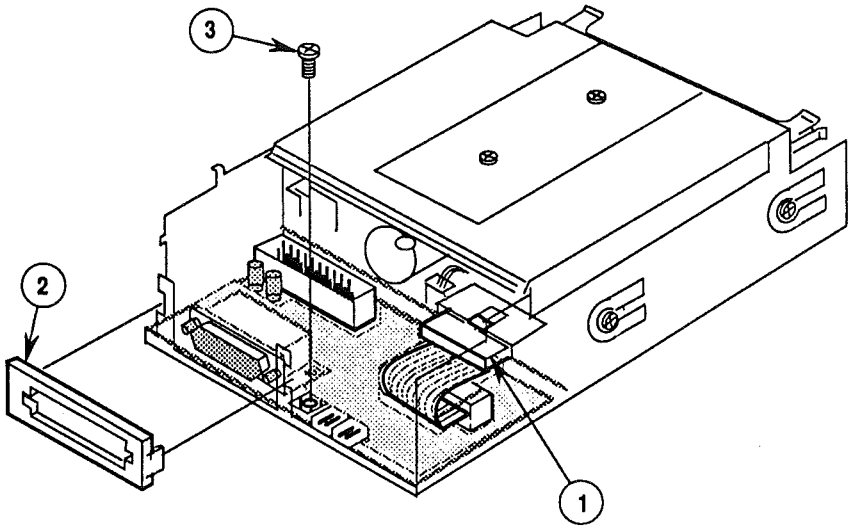


FIGURE 13

3. Disconnect cable connector CN102 (Figure 13, #1) from the drive mechanism. You may need a jeweler's screwdriver to pry off the connector at the small plastic tab.

4. Using a jeweler's screwdriver (if necessary), pull back the two side tabs and remove the plastic daisy chain cover (Figure 13, #2) from the outer metal shield.

5. Remove the screw (Figure 13, #3) that secures the daisy chain interface board to the outer metal shield.

6. Slide the daisy chain interface board (Figure 14, #1) to the right and remove it from the outer metal shield.

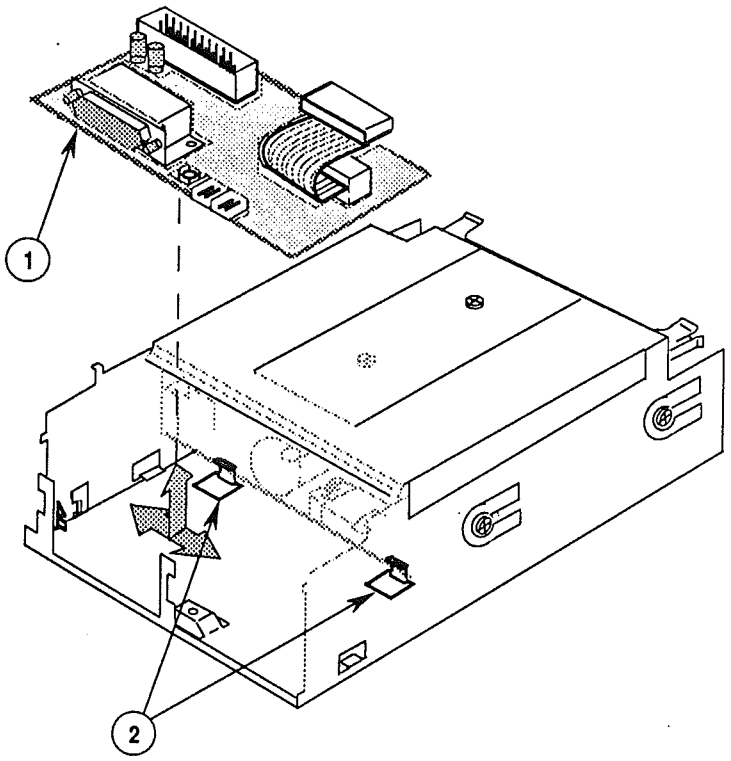


FIGURE 14

Replace

To replace the daisy chain interface board:

1. Tuck the back edge of the daisy chain interface board (Figure 14, #1) under the holding tabs (Figure 14, #2) on the outer metal shield.

2. Slide the interface board to the left until the notch in the board clasps the holding bracket on the metal shield. Replace the interface board mounting screw (Figure 13, #3).

   Note: If you also removed the 1.4 MB drive mechanism, you should replace the mechanism now.

3. Replace the plastic daisy chain cover (Figure 13, #2) on the outer metal shield. Be sure to secure the two cover side tabs around the metal shield.

4. Reconnect cable connector CN102 (Figure 13, #1) to the drive mechanism.

5. Replace the external drive cable and shield.

6. Replace the case.

❑ 1.4 MB DRIVE MECHANISM

Materials Required

Medium Phillips screwdriver
Small flat-blade screwdriver or jeweler's screwdriver

Remove

To remove the 1.4 MB drive mechanism:

1. Remove the case.
2. Remove the external drive cable and shield.

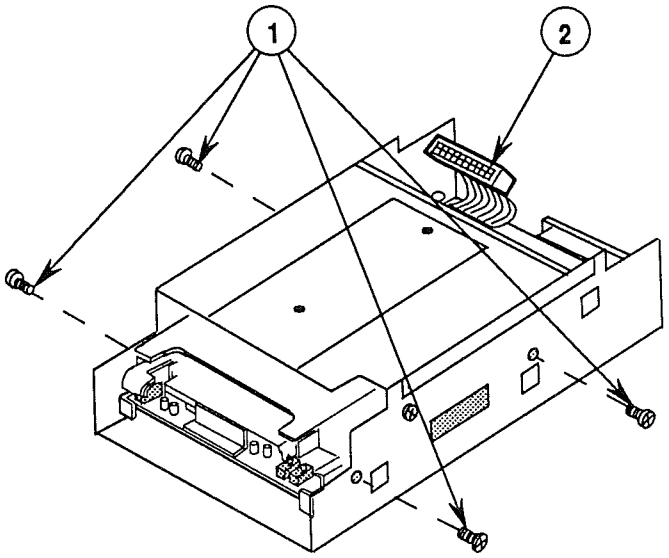


FIGURE 15

3. Remove the four screws (two screws from each side) (Figure 15, #1) from the outer metal shield.
4. Disconnect cable connector CN102 (Figure 15, #2) from the drive mechanism.

5. Slide the 1.4 MB drive mechanism out of the outer metal shield (Figure 16, #1) (away from the external cable end).

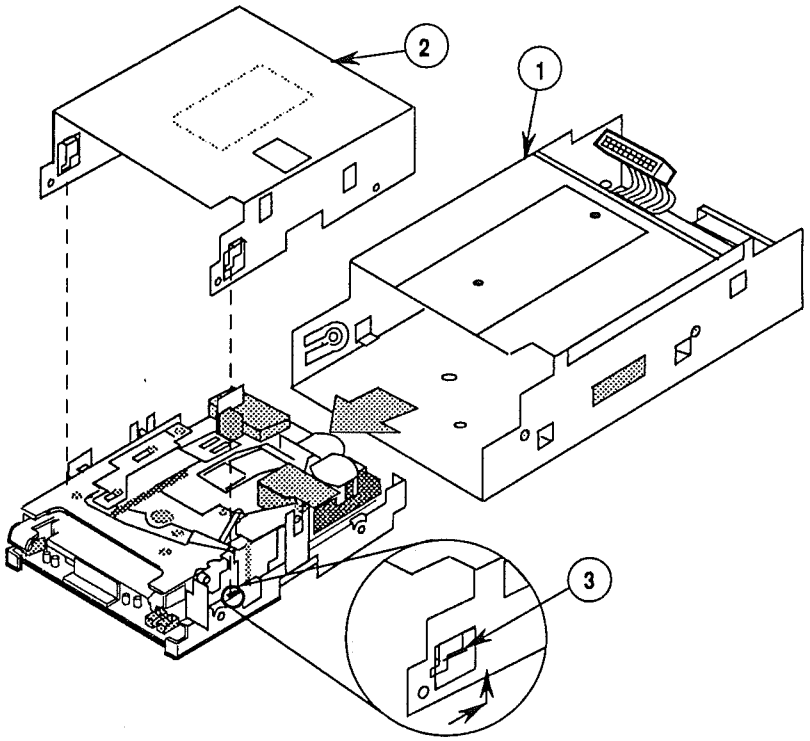


FIGURE 16

6. Remove the inner metal shield from the drive mechanism. To do this, first place the drive mechanism on a soft surface. Then push the inner metal shield (Figure 16, #2) in the direction of the arrow (see detail) until the tabs (Figure 16, #3) on each side of the shield clear the holes in the drive mechanism. Lift the drive mechanism off the shield.

   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**. See the Illustrated Parts List for more packaging information.

Replace

To replace the 1.4 MB mechanism:

1. If necessary, remove the shipping fixture from the new 1.4 MB drive mechanism. Then place the inner metal shield over the 1.4 MB drive mechanism as shown in Figure 16. Insert the two brackets (Figure 17, #1) on the shield into the holes in the drive mechanism, and push the shield in the direction of the arrow as shown in the detail below.

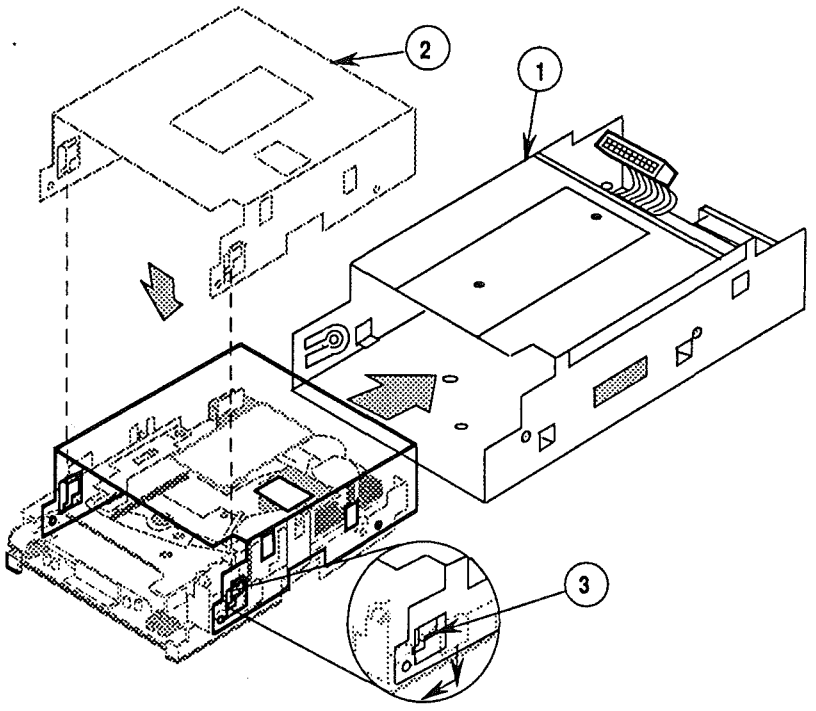


FIGURE 17

2. Slide the drive mechanism into the outer metal shield (Figure 17, #2). Be sure to insert the connector (CN102) end of the drive mechanism first.

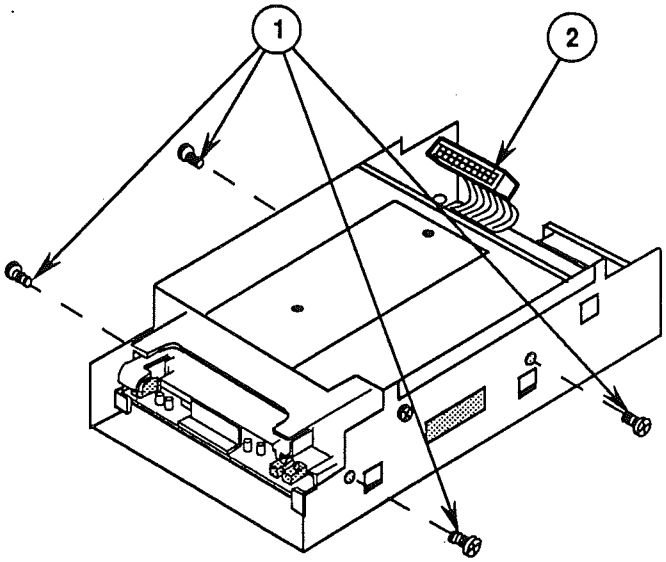


FIGURE 18

3. Replace the four screws (two screws on each side) (Figure 18, #1) on the outer metal shield.

   Note: If you also removed the daisy chain interface board, replace it now.

4. Connect cable connector CN102 (Figure 18, #2) to the drive mechanism.

5. Replace the external drive cable and shield.

6. Replace the case.

❑ EJECT SWITCH ASSEMBLY

Materials Required

Small Phillips screwdriver

Remove

To remove the eject switch assembly:

1. Remove the case.

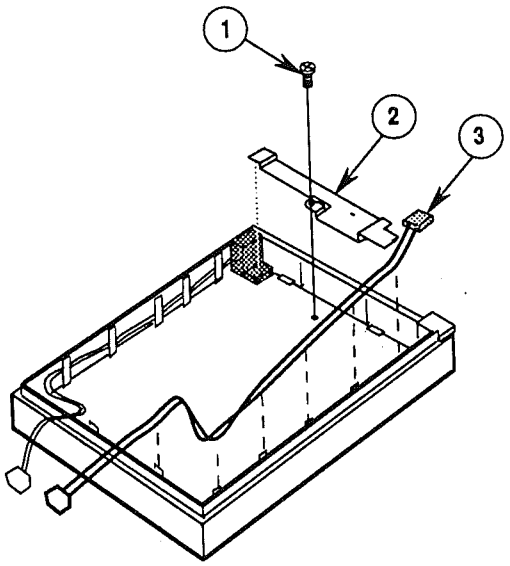


FIGURE 19

2. Remove the mounting screw (Figure 19, #1) that secures the metal bracket (Figure 19, #2) to the case top. Remove the metal bracket.

3. Lift the eject switch assembly (Figure 19, #3) off the holding tabs.

Replace

To replace the eject switch:

1. Position the eject switch (Figure 19, #3) over the holding tabs.

2. Replace the metal bracket (Figure 19, #2) on the case top, and replace the mounting screw (Figure 19, #1).

3. Replace the case.

❑ LED ASSEMBLY

Materials Required

Small Phillips screwdriver

Remove

To remove the LED assembly:

1. Remove the case.

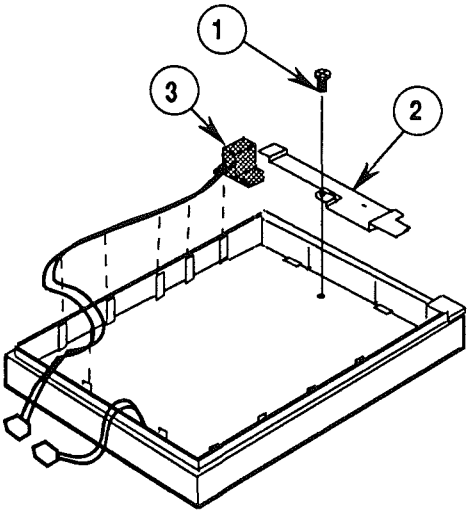


FIGURE 20

2. Remove the mounting screw (Figure 20, #1) that secures the metal bracket (Figure 20, #2) to the case top. Remove the metal bracket.

3. Lift the LED assembly (Figure 20, #3) off the holding tabs.

Replace

To replace the LED assembly:

1. Position the LED assembly (Figure 20, #3) over the holding tabs.

2. Replace the metal bracket (Figure 20, #2) on the case top, and replace the mounting screw (Figure 20, #1).

3. Replace the case.

Apple Technical Procedures

Apple FDHD Drive

Section 4 – Troubleshooting

❑ CONTENTS

❑ USING THE APPLE FDHD DRIVE SYMPTOM CHART

Troubleshooting Rules

General rules for troubleshooting the Apple FDHD Drive are as follows:

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. If the Apple FDHD Drive demonstrates one of the symptoms listed on the symptom chart, replace the suspected 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 FDHD DRIVE SYMPTOM CHART

Symptom	Corrective Action
• *Drive will not come on; LED flashes once or does not light*	1. Replace drive mechanism. 2. Replace external drive cable. 3. Replace LED assembly.
• *Drive will read but not write*	1. Replace drive mechanism. 2. Replace external drive cable.
• *Drive will not read but LED comes on*	1. Check software. 2. Replace drive mechanism.
• *Drive will not eject disk*	1. Replace drive mechanism. 2. Replace eject switch cable assembly.
• *Drive functions, but LED does not light*	1. Replace LED assembly. 2. Replace drive mechanism.
• *MS-DOS drive does not recognize a disk formatted on a 1.4 MB FDHD drive*	– If compatibility in reading and writing files with the 1.4 MB FDHD is desired, format all disks with the MS-DOS drive first.
• *Drive will read/write to 800K disks but not to HD disks*	1. Check that the drive is an FDHD. If you are unsure, refer to Section 1, Basics. 2. Replace drive mechanism.

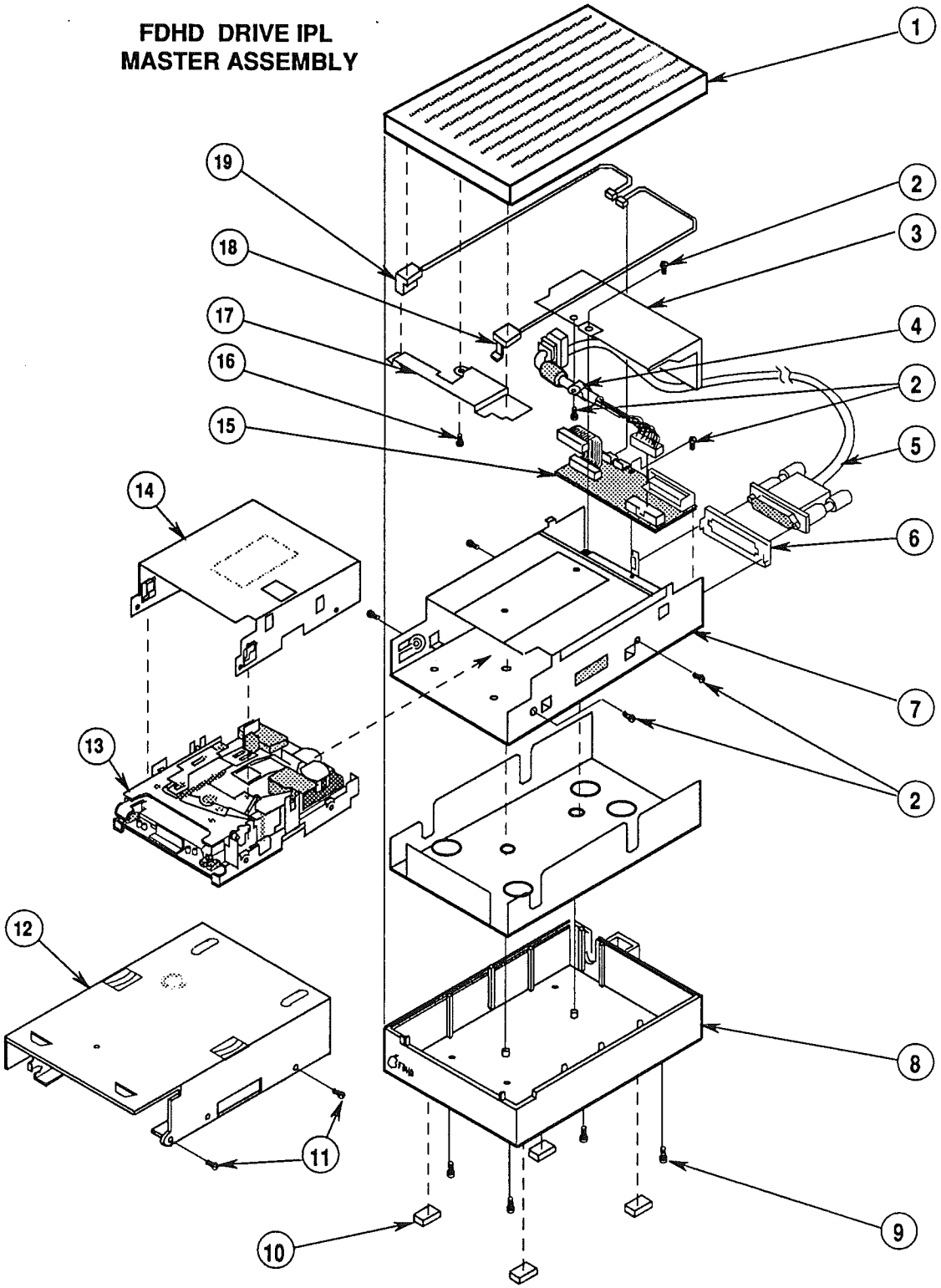
Apple Technical Procedures

Apple FDHD Drive

Illustrated Parts List

❑ CONTENTS

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


FDHD DRIVE IPL
MASTER ASSEMBLY
1
19
2
18
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16
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10
9

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
6	815-0969	Plastic Daisy-Chain Cover
7	603-5106	Outer Metal Shield
8	603-5117	Bottom Case Assembly
9	416-1305	Plastic Case Screw
10	865-0045	Plastic Case Foot
11	462-3401	Screw, M 3 x 6 (with two washers)
12	805-5050	Floppy Metal Housing (for transporting)
13	661-0474	1.4 MB Mechanism, Apple FDHD (blue-on-silver label)
14	805-0156	Inner Metal Shield
15	076-0234	Daisy-Chain Interface Board
16	420-1011	Eject Switch Bracket Screw
17	805-0811	Eject Switch Bracket
18	603-5110	Eject Switch Cable Assembly
19	603-5118	LED Cable Assembly

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.

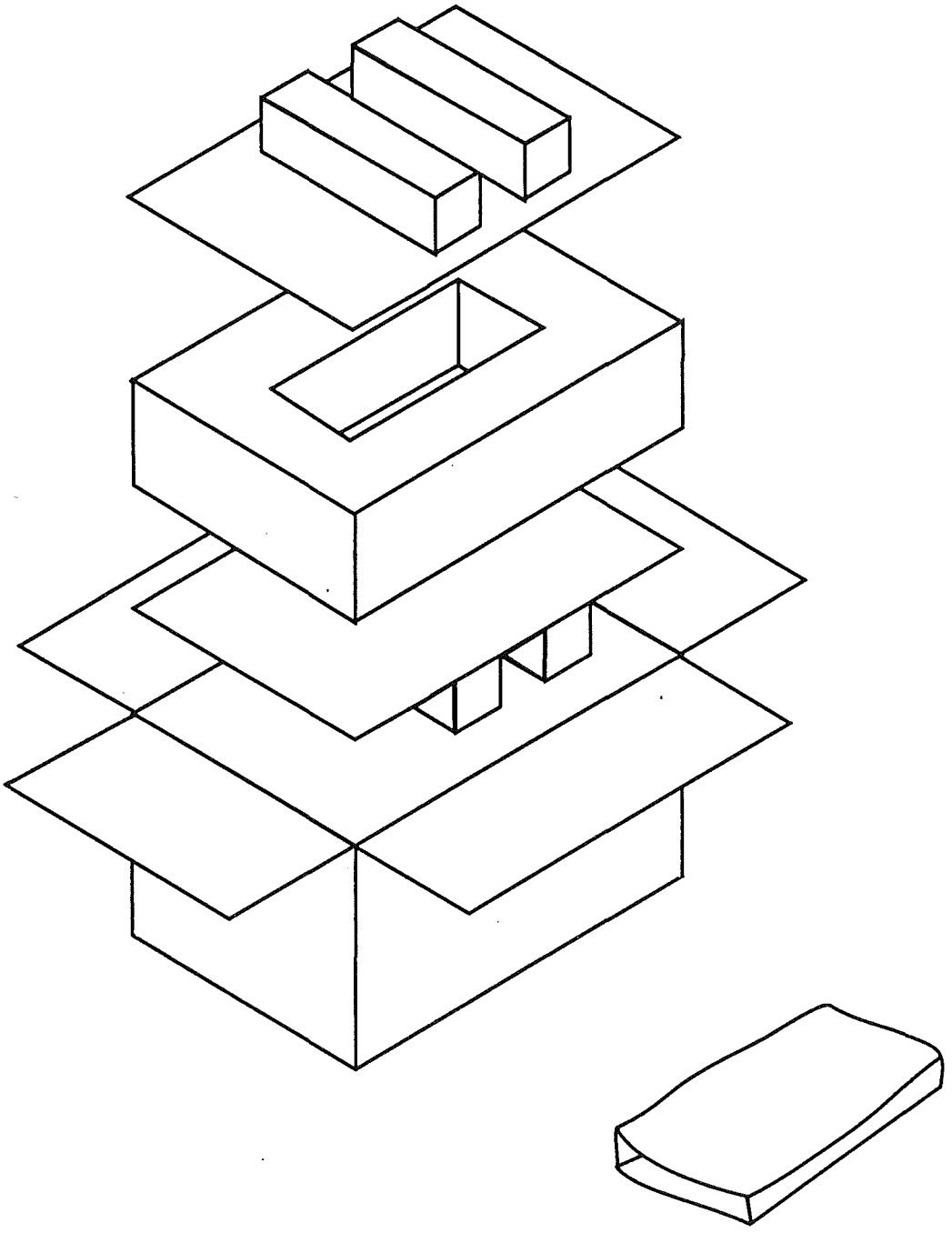

FIGURE 2

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

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