

INSTALLATION MANUAL FLOPPY DISK SYSTEM

A73/A143

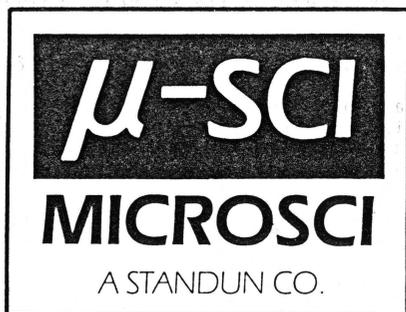


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1. INTRODUCTION

This manual describes the installation and operation of the Microsci A73 and A143 disk drives for the Apple® III computer system. The A73 is a 70-track, single-sided (96 tracks per inch) drive with a usable storage capacity of 286,720 bytes. The A143 is a 140-track, double-sided (96 tracks per inch) drive with a usable storage capacity of 573,440 bytes. Both the A73 and A143 drives connect to the Apple III computer through the Apple III built-in disk controller. These drives are powered from the Apple III computer and do not have separate AC power cords, nor do they use one of the four Apple III expansion slots.

The Apple III computer system can have up to three external floppy disk drives connected to the built-in disk controller. These three external drives can be any mix of Apple Disk IIIs or Microsci A3s, A73s or A143s. The Microsci A3 drive is a direct replacement for the Apple Disk III drive and therefore does not require any special instructions. The Microsci A73 and A143 disk drives provide additional features, such as faster access time and greater diskette capacity. Therefore, these drives require a new SOS device driver module to take advantage of these extra features. This manual will describe how to connect the A73 and A143 disk drives to your Apple III computer and how to add the new SOS device driver module to your Apple III software, so that you can use the A73s and A143s with your existing software.

Before attempting to connect the A73 or A143 drives to your Apple III computer, you should read through the chapters on unpacking, familiarization, and installation. The few minutes it takes to read these chapters could save you several hours of frustration and many dollars of repair expenses. Before actually connecting the Microsci drives to your computer, you should follow the procedures in Chapter 5 and add the A73/A143 drivers to your Apple III System Utilities diskette. After you have added the drivers, you should then connect the new drives to your computer following the instructions in Chapter 6. Chapter 7 outlines a short checkout procedure which can be used to verify that your new disk drives are operational.

This manual will assume that the user is familiar with the Apple III computer. If you have just purchased your Apple III computer and are not yet familiar with the Apple III and its operating system, SOS, then we strongly suggest you do not attempt to connect the Microsci A73 or A143 disk drives to your computer at this time. You should take at least a few hours to become familiar with the Apple III SOS commands. At a minimum, you must know how to format diskettes, perform a directory listing, verify diskettes, copy diskettes, transfer files, and use the System Configuration Program. (This information is covered in Chapters 4 and 5 of the Apple III Owner's Guide and Chapter 2 of the Apple III Standard Device Drivers Manual.)

Once you feel comfortable with at least these basic operations, then you should proceed to connect the A73 and A143 disk drives. If you encounter problems during the installation and checkout procedures or during normal operation of the drives, you should contact either your local Microsci dealer or Microsci Customer Service.

2. UNPACKING

With your Microsci A73/A143 drive, you should have received the following:

- * This manual
- * A diskette containing the A73/A143 Device Drivers
- * Disk drive ID tags
- * A warranty registration card

You should fill out and return your warranty registration card as soon as possible. The A73/A143 shipping box has been specifically designed to protect the drives during shipment. We suggest you keep this packaging material for use in the event you have to ship the equipment to a dealer or the factory for service. If any item is missing or appears to be broken, you should contact your dealer or Microsci.

While you are unpacking your new disk drives, please notice that the model A143 disk drive has a cardboard insert inside the drive. This cardboard insert acts as a protective cushion for the Read/Write head assembly during shipping. We strongly suggest that whenever you transport your A143 disk drives you put this cardboard insert into the drive to protect the Read/Write heads.

3. FAMILIARIZATION

Before connecting your A73 or A143 disk drives to your computer, you should pick them up and take a close look at them. Notice that there is a flat signal cable connected to the back of the disk drive. This flat cable provides both the signals and the power from the Apple III computer to the disk drive. If you look closely at the back of the disk drive, you should notice a small opening in the upper left corner. This is the opening from which the signal cable exits the drive. Just inside this opening is a 26-pin connector similar to the floppy disk drive connector on the back of the Apple III computer. Disk IIIs, A3s, A73s, and A143s all have these connectors. As we have mentioned, the Apple III computer can support up to three external disk drives. The external drives are referred to as drives 2, 3, and 4. Drive 1 is the built-in disk drive. Drive 2 is always the drive which plugs directly into the back of the Apple III computer. Drive 3 is added to the system by plugging the drive 3 cable into the connector on the back of drive 2. Likewise, drive 4 is then added by plugging the drive 4 cable into the connector on the back of drive 3. The Apple III hardware will not support more than three external drives, and therefore, you should never have anything plugged into the connector on the back of drive 4. Chapter 6 on installation will have more information on how to connect your disk drive to the Apple III computer.

Continuing on with our examination of the A73 and A143 disk drives, you should take a close look at the front of the drive. Notice that just below the recessed door on the front of the drive is a push button. Push this button to open the door of the drive. To close the door, push down on the door handle until the door securely latches closed.

Another component of the disk subsystem with which you should become familiar is the diskette. Diskettes are similar to audio magnetic tapes. The "tape" in this case is circular and enclosed in a protective plastic jacket. The recording surface is visible through the oblong cutout at one end of the diskette. You should be very careful when handling and storing diskettes that this area is always protected. Dust, dirt, fingerprints or spilled liquids on the recording surface can affect the information stored on the diskette. Furthermore, if you take a contaminated diskette and put it in the disk drive in an attempt to recover the information stored there, the contamination can be deposited on the disk drive Read/Write head and subsequently transferred to other diskettes. Scratches on the recording surface can also affect the data stored on the diskette. Information is stored on the diskette on .012 x .0002-inch areas. With dimensions this small, even invisible scratches can be damaging. Obviously, bending or folding a diskette is not recommended.

As you begin to collect diskettes, you will want to label each one. The suggested method is to first write on a label, then put the label on the diskette. If you need to change something on the label, you should use only a felt-tip pen. Ballpoint pens can easily scratch the recording surface, even through the protective jacket.

As a last word of caution, both heat and magnetic fields can erase information stored on a diskette. Be careful where you set or leave your diskettes.

If you hold a diskette with the label facing you and the oblong slot down, you will probably have a small notch about one inch from the top on the right side. This is called the Write-Protect notch. When this notch is covered or missing, as in the case of some Program Master diskettes, the disk drive write circuitry is disabled. This is the safest way to insure that you do not accidentally "overwrite" a piece of valuable information. When you purchase a box of new diskettes, you will usually receive a supply of small write-protect stickers. If you wish to "write-protect" a diskette, take one of these stickers and wrap the sticker around the edge of the diskette until the write-protect notch is covered on both sides. If you ever want to write on the diskette again, you must remove the write-protect sticker.

The A73 and A143 are high-capacity floppy disk drives. With the A73, we suggest you use single-sided, double-density, 40- or 77-track diskettes. With the A143, you must use only double-sided, double-density, 40- or 77-track diskettes. The A73 Read/Write head and the lower Read/Write head on the A143 use the same surface area as the head on the Disk III or Microsci A3. That is, track 0 on the A73 and the A143 lower head is in the same place as track 0 on the Disk III. Each track on the A73 and the A143 is exactly 1/2 the width of a track on the Disk III. Therefore, track 70 for the A73 and the A143 lower head is in the same location as track 35 on a Disk III.

The A143 has a second Read/Write head that doubles the diskette capacity by recording on both sides of the diskette. This upper head is offset from the lower head by 8 tracks towards the center of the disk. When you are reading or writing track 70 with the upper head on an A143, you are actually using what would be track 38 on a Disk III. If you are not using double-sided, double-density, 40- or 77-track media, this head will be attempting to use an uncertified area of the diskette. This can greatly diminish the data reliability of the disk drive system.

A more serious problem could result if you attempt to use a diskette designed for 35-track operation on an A143. Such diskettes have a shorter diskette Read/Write head opening than 40- or 77-track diskettes. When the A143 Read/Write head is positioned all the way to the inside track, the diskette jacket on a "short" 35-track diskette can interfere with the upper head and cause permanent damage to the upper head mounting springs.

Note: Do not confuse these "short" 35-track diskettes with the 35-track diskettes referred to in the .Xx driver discussions later in this manual. The latter 35-track diskettes are simply ones which have been created on a 35-track drive such as the Apple Disk III or the Microsci A3.

4. THE MICROSCI DEVICE DRIVER DISKETTE

The Microsci Device Driver diskette is a special diskette. It contains both a SOS directory and a CP/M® directory. This means that part of the diskette is readable under SOS, and part is readable under CP/M.

If you boot your System Utilities diskette and list the files on the Microsci diskette, you will find the following files listed:

- * USCIDX.CODE
- * USCIFMTDX.CODE
- * CPMDX.CODE
- * CP/M.spc

If you boot your CP/M Master diskette and list the directory of the Microsci diskette, you will find these files listed:

- * PTCH1.SUB
- * PTCH2.SUB
- * PTCH3.SUB
- * SOS.spc

The SOS file USCIDX.CODE contains the driver for the Microsci A73 and A143 drives for use with Pascal, Business BASIC, PFS™, VisiCalc®, etc.

USCIFMTDX.CODE is the formatter driver for the A73 and A143. This is used with the System Utility and any other programs which require a formatter.

CPMDX.CODE is the driver for the A73 and A143 for use with CP/M only.

CP/M.spc is a "bogus" file which reserves the CP/M space on the diskette so that SOS does not attempt to use it.

The CP/M files PTCH1, PTCH2, and PTCH3 are used with the SUBMIT program on the CP/M Master diskette. They patch CP/M to fix several "bugs" which otherwise prevent the A73 and A143 from working.

SOS.spc is another "bogus" file which reserves the SOS space of the diskette so that CP/M does not attempt to use it.

5. THE MICROSCI DEVICE DRIVERS

It is assumed that the user has read and is familiar with the material contained in the Apple III Owner's Guide, Chapters 4 and 5, and the Apple III Standard Device Drivers Manual, Chapters 1 and 2. To generate the Microsci SOS Drivers, the user will need only the built-in drive (drive 1) and two diskettes -- the System Utilities diskette and the Microsci Device Driver diskette. Briefly, the procedure is as follows:

1. Make work copies of the System Utilities and Microsci diskettes.
2. Configure the USCIDX.CODE driver.
3. Save the newly configured driver as TMPDX.CODE on the Microsci work diskette.
4. Configure the formatter driver USCIFMTDX.CODE.
5. Save this newly configured driver as TMPFMT.CODE on the Microsci work diskette.
6. Generate a new SOS.DRIVER and save it on the System Utilities work diskette.

If you have several external drives with a mix of 35-, 70-, or 140-track units, we suggest you connect the lower-capacity units first. A system configured this way could have D1 and D2 as 35-track drives with D3 and D4 as 70-track drives.

STEP 1: Let's Make the WORK Diskettes

Put the original (write-protected) System Utilities diskette into the Apple III's built-in drive (drive 1). Turn on the power or press CTRL-RESET. The user will want to format two blank diskettes. (See Apple III Owner's Guide, Chapter 4, for details). When formatting is complete, the user will want to make backup copies of both the System Utilities diskette and the Microsci diskette. The backup copy of the System Utilities diskette will be called UTILBK diskette. The backup copy of the Microsci diskette will be called USCIWK. Once the copying process is complete, the original System Utilities diskette and the original Microsci diskette should be kept in a safe place, and the backup diskettes used in daily operation. To continue, insert the UTILBK diskette and reboot. Select the option System Configuration Program (S).

STEP 2: Let's Configure the Driver USCIDX.CODE

- A. When the SCP menu appears, select the option Read a Driver (R).
- B. Remove the UTILBK diskette and insert the USCIWK diskette.
- C. Enter .D1/USCIDX.CODE. *← NO PERIOD*

- D. When reading is complete, remove the USCIWK diskette and insert the UTILBK diskette.
- E. Return to the SCP menu by pressing the ESC key.
- F. Select the option Edit Driver Parameters (E).
- G. Select the driver to be edited (.D2).
- H. Select the option Configuration Block Data.

The values allowed are:

- 1 for an A3 or Disk III drive,
 - 2 for an A73 drive, or
 - 3 for an A143 drive.
- I. Enter the appropriate response and return to the Edit Driver Parameters menu.
 - J. Select the option Driver Status.
 - K. Enter A to make the device driver Active.
 - L. Return to the Edit Driver Parameters menu.
 - M. If you have a third or fourth drive, repeat Steps 2G through 2K for drive 3 (.D3) and drive 4 (.D4).
 - N. If you will need to read 35-track disks in an A73 or A143, then you should make one or more of the .Xx drives Active. Repeat Steps 2G, 2J and 2K for .X2, .X3, or .X4. Do not activate an .Xx driver unless the corresponding drive is an A73 or A143.
 - O. Return to the SCP menu.

STEP 3: Let's Save the Configured Driver on the USCIWK Diskette

- A. Select the option Generate New System (G). (Warning messages will appear from the system validation, but ignore them for the now.)
- B. Put the USCIWK diskette into the drive.
- C. Enter .D1/TMPDX.CODE.
- D. After System Generation is complete, remove the USCIWK diskette and insert the UTILBK diskette.
- E. Return to the SCP menu.
- F. Exit SCP back to the main menu.

STEP 4: Let's Configure the Formatter Driver USCIFMTDX.CODE

- A. Enter the System Configuration Program, and when the SCP menu appears, select the option Read a Driver File (R).
- B. Insert the USCIWK diskette.
- C. Enter .D1/USCIFMTDX.CODE.
- D. When reading is completed, remove the USCIWK diskette and insert the UTILBK diskette.
- E. Return to the SCP menu.
- F. Select the option Edit Driver Parameters (E).
- G. Select the driver to be edited (.FMTD2).
- H. Select the option Configuration Block Data and enter 1, 2 or 3 (see Step 2H).
- I. Select the option Driver Status and enter Active.

NOTE: Remember that the Configuration Block Data and driver status of the formatters must agree with those entered for the drivers themselves.

- J. Return to the SCP menu.
- K. If you have a third or a fourth drive, repeat Steps 2G through 2I for drive 3 (.FMTD3) or drive 4 (.FMTD4).
- L. Return to the SCP menu.

STEP 5: Let's Save the Configured Driver on the USCIWK Diskette

- A. Select the option Generate New System (G). (Warning messages will appear from the system validation, but ignore them for the moment.)
- B. Insert the USCIWK diskette into the drive.
- C. Enter .D1/TMPFMT.CODE.
- D. After System Generation is complete, remove the USCIWK diskette and insert the UTILBK diskette.
- E. Return to the SCP menu.
- F. Exit SCP back to the main menu.

STEP 6: Let's Generate SOS.DRIVER

- A. Enter the System Configuration Program and select the option Read a Driver File (R).

B. Enter .D1/SOS.DRIVER.

C. Return to the SCP menu.

NOTE: Because this is the final phase of this process, it is necessary to determine which drivers in SOS.DRIVER should be deleted. The Microsci SOS Driver requires the formatter drivers just configured, so .FMTD1, FMTD2, .FMTD3, and .FMTD4 should be deleted. Depending on the type of printer used, .PRINTER or .SILENTYPE should be deleted.

D. Select the option Delete a Driver (D).

E. Delete all unnecessary drivers.

F. Return to the SCP menu. (The list of drivers at this time contains .CONSOLE and a printer driver.)

The following steps will complete the final phase. The Microsci device drivers will be added to SOS.DRIVER.

G. Select the option Read a Driver File (R).

H. Insert the USCIWK diskette.

I. Enter the filename of the device driver file (.D1/TMPDX.CODE).

J. Enter the file name of the formatter file (.D1/TMPFMT.CODE).

K. Remove the USCIWK diskette.

L. Insert the UTILBK diskette.

M. Return to the SCP menu.

N. Select the option Change System Parameters (C).

O. The first parameter is Number of Disk III Drives. You must enter a 1 for this parameter, regardless of the actual number of Disk III Drives because the Microsci driver controls ALL external drives.

P. Select the option Generate New System (G). (No warning messages should appear. If they do, return to step 6A.)

Q. Enter .D1/SOS.DRIVER.

R. Return to the SCP menu.

S. Reboot the UTILBK diskette to load the newly configured SOS.DRIVER.

6. INSTALLATION

It is now time to connect the MICRO-SCI A73 or A143 disk drives to your Apple III computer. Floppy disk drives are electromagnetic devices and are susceptible to electronic noise interference generated by other devices, such as your display monitor. Monitors generate very high voltage signals (10,000 to 15,000 volts) which can interfere with the floppy read data. For this reason, we suggest that you do not place your display monitor directly on top of your external disk drives. The Apple III internal disk drive has a special shield over it which minimizes this interference when the monitor is placed on top of the computer. The best configuration is to place the external disk drives just to the right of the computer. Never connect or disconnect a disk drive while the Apple III power is on.

1. Turn off the Apple III power switch.
2. Your first external drive (the drive you intend to refer to as .D2) plugs into the "Floppy Disks" connector in the rear of your Apple III computer. Notice that one side of the ribbon cable connector from the drive has a keyed notch in the middle. The "Floppy Disks" connector is keyed such that the ribbon cable connector can only be plugged in one way, with the keyed notch up.
3. Your second external drive (.D3) plugs into the connector on the rear of your first external drive. This connector is keyed like the "Floppy Disks" connector so that the ribbon cable connector can only be plugged in with the keyed notch up.
4. Your third external drive (.D4) plugs into the rear of the second external drive, as in the previous step.

7. CHECKOUT

At this point, you should have the external disk drives connected to the Apple III, and the Microsci supplied device drivers added to the work copy of the System Utilities diskette (UTILBK). To checkout the external drives, you will format, then verify a diskette in each of the external drives. When you added the Microsci supplied device drivers to the SOS.DRIVER file, you configured all of the external drives to be controlled by the new Microsci supplied device driver. Therefore, even if you have previously had Disk III drives (or Microsci drives) connected to your computer, you must go through the checkout procedure for all of your external drives.

During the checkout procedure you may get a few SOS messages. These messages are explained in the Apple III Owner's Guide. A primary source of problems during the checkout procedure is improper driver configuration. When you added the Microsci device drivers to SOS.DRIVER, you had to use the System Configuration Program to define the capacity of each drive. Problems arise when, for example, .D2, .D3, or .D4 is specified as a 35-track drive in the Formatter and a 70-track drive in the Device Driver. Another potential problem can occur if both the Device Driver and the Formatter specify a 70-track drive, but .D2, .D3, or .D4 is actually a 35-track drive. Should you encounter errors during the format or verify commands, we suggest you check both the driver configuration and the actual position of the external drives. Also make sure that the system parameter Number of Disk III Drives is set to a 1.

1. Insert your UTILBK diskette into the built-in drive and turn on the computer power or press CTRL-RESET.
2. After the utility menu is displayed, select Device Handling Commands.
3. After the device handling commands menu is displayed, select FORMAT A VOLUME (F).
4. Insert a scratch (blank) diskette in your first external drive.
5. In response to "Format the medium of the volume:", type .D2 <RETURN>.
6. In response to "With the new volume name:", type <RETURN>.
7. When the formatting is complete, the display should indicate FORMATTING SUCCESSFUL.
8. Press the ESC key to return to the menu.
9. Select VERIFY A VOLUME.
10. In response to "Verify the medium of the volume:", type .D2 <RETURN>.

11. In response to "Reading the first [xxx] blocks:", type <RETURN> (xxx will be 280 for an A3 or Disk 111; 560 for an A73; and 1120 for an A143).
12. The drive should start verifying the diskette. It takes approximately the same amount of time to verify as to format.
13. When the verifying is complete, the display should indicate 0 BAD BLOCK(S).
14. This completes the checkout of the first external drive. Repeat steps 3 through 13 for each of the remaining external drives.

APPLICATION NOTE 1

THE .Xx DRIVERS

The .X2, .X3, and .X4 drivers, collectively called the .Xx drivers, are used to read a 35-track diskette in an A73 or A143. They cannot and should not be used for any other purpose.

The only decision you have to make regarding the .Xx drivers is whether to make them active or inactive. If the drive that an .Xx driver refers to is not an A73 or A143, then that driver serves no purpose and should be made inactive. For example, you should make .X2 inactive if drive 2 is an A3 or a Disk III.

The primary purpose of the .Xx drivers is for making backups of 35-track diskettes. If all your external drives are A73s or A143s, you can still do a two-drive copy of a 35-track diskette. You would, for example, put your original diskette in drive 2, the duplicate diskette in the built-in drive, and copy from .X2 to .D1.

If you do not need to read 35-track diskettes in your A73 or A143, you should make its .Xx driver inactive. Certain programs, notably those written in Pascal such as PFS and Apple III Business Graphics, will not work properly if the .Dx and .Xx drivers for a given drive (i.e. .D3 and .X3) are both Active. You must make certain that you have at most one .Dx/.Xx driver Active for each drive when running these programs. You will usually want the .Dx driver Active rather than the .Xx driver so you can use the full data storage capacity of the A73 or A143.

The .Xx drivers are not available under CP/M.

APPLICATION NOTE 2

ERRORS

The most probable cause for errors is improper device configuration. You must make certain that the configuration block data in the driver matches the configuration block data in the formatter and that they both agree with the actual drive which is connected. Also, make sure you have set the system parameter Number of Disk III Drives to 1, (unless you are using CP/M).

The following is a list of standard SOS error numbers that the Microsci drivers can return:

17 (\$11)	Invalid Device Number
32 (\$20)	Invalid Request Code
33 (\$21)	Invalid Control/Status Code
38 (\$26)	Invalid Operation
39 (\$27)	I/O Error
40 (\$28)	Drive Not Connected
43 (\$2B)	Write-Protect Error
44 (\$2C)	Byte Count Not Multiple of 512
45 (\$2D)	Block Number Too Large
46 (\$2E)	Disk Changed

The following are errors unique to the Microsci drivers:

48 (\$30)	Diskette Type Mismatch
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An attempt was made to read or write the wrong size diskette in a drive, such as a 70-track diskette in an A143.

49 (\$31)	Invalid Configuration Block Data
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The configuration block data is not 1, 2, or 3. If any active drive has an invalid data, all active external drives will give this error.

The following errors may occur during the formatting if the drive rotational speed is out of adjustment.

51 (\$33)	Drive Speed Too Slow
52 (\$34)	Drive Speed Too Fast

APPLICATION NOTE 3

APPLE II EMULATION MODE

The A73 and A143 disk drives cannot be used in Apple® II emulation mode. This is due primarily to the fact that the Apple II DOS 3.3 seek routine will not work properly with the A73 and A143 hardware.

APPLICATION NOTE 4

THE FLICKERING LIGHTS

Due to a necessary interaction between the Microsci device driver and the driver for the built-in drive, a peculiar thing happens. Every time the Microsci driver is exited, the built-in drive is selected, causing the external drive's IN USE light to go out and the built-in drive's IN USE light to possibly go on. This means that when reading multiple blocks, you will see the external drive's IN USE light "flicker"; the built-in drive's IN USE light may also "flicker". This "flickering" is perfectly normal and is not a cause for alarm.

APPLICATION NOTE 5

DISKETTE INTERCHANGEABILITY

You can do the following:

- * Read a 35-track diskette in an A73 or A143 drive by using the .Xx drivers
- * Copy files from any size diskette to any size diskette, space permitting

You cannot do the following:

- * Write on a 35-track diskette in an A73 or A143 drive
- * Read a 35-track diskette in an A73 or A143 using the .Dx drivers
- * Read/write a 70-track or 140-track diskette in an A3 or Disk III
- * Read/write a 140-track diskette in an A73
- * Read/write a 70-track diskette in an A143

APPLICATION NOTE 6

APPLE III PASCAL

Apple III Pascal does a strange thing with device drivers during the booting process. If a device driver module contains more than five active drivers, Pascal checks the sixth and subsequent drivers to see if they are on line; if not, they are removed from the active device table. The manner in which this affects the Microsci driver is as follows:

Our driver module contains six drivers (.D2, .D3, .D4, .X2, .X3, .X4). If all six drivers are made active, then Pascal activates .X4 (physical drive 4) during the boot. If no diskette or a blank diskette is in drive 4 at this time, then Pascal thinks that .X4 is off line and you won't be able to access .X4.

This phenomenon occurs with any boot diskette which contains the Pascal interpreter, not only the Apple III Pascal /PASCAL1 diskette. Specifically, it occurs with the System Utilities diskette, since the System Utility is written in Pascal.

The simple solution to this problem is to make sure that there is a valid SOS diskette in drive 4 when you boot.

APPLICATION NOTE 7

ADDING THE MICROSCI DRIVERS TO YOUR PASCAL SYSTEM

Once the Microsci device drivers are configured, they can be added to your Pascal system. You will need the built-in drive (drive 1) and your UTILBK diskette. The procedure is as follows:

1. Make a backup copy of the /PASCAL1 diskette.
2. Using the UTILBK diskette and the SCP program, read in the SOS.DRIVER from the backup copy of /PASCAL1.
3. From the USCIWK diskette, read in TMPDX.CODE.
4. Check the system parameter Number of Disk III drives. It should be 1; change if necessary.
5. Generate SOS.DRIVER.

APPLICATION NOTE 8

ADDING THE MICROSCI DRIVERS TO BUSINESS BASIC

Once the Microsci device drivers are configured, they can be added to Business BASIC. You will need the built-in drive (drive 1) and your UTILBK diskette. The procedure is as follows:

1. Make a backup copy of the Business BASIC diskette; unlock SOS.DRIVER on this backup diskette.
2. Using the UTILBK diskette and the SCP program, read in SOS.DRIVER from the backup copy of Business BASIC.
3. Delete any unnecessary drivers (.AUDIO, for example) to make room for the Microsci driver.
4. From the USCIWK diskette, read in TMPDX.CODE.
5. Check the system parameter Number of Disk III Drives. It should be 1; change if necessary.
6. Generate SOS.DRIVER.

APPLICATION NOTE 9

ADDING THE MICROSCI DRIVERS TO APPLE WRITER III

Once the Microsci device drivers are configured, they can be added to APPLE WRITER III. You will need the built-in drive (drive 1) and your UTILBK diskette. The procedure is as follows:

1. Using the UTILBK diskette and the SCP program, read in SOS.DRIVER from the APPLE WRITER III diskette.
2. From the USCIWK diskette, read in TMPDX.CODE.
3. Check the system parameter Number of Disk III Drives. It should be 1; change if necessary.
4. Generate SOS.DRIVER.

APPLICATION NOTE 10

ADDING THE MICROSCI DRIVERS TO PFS

Once the Microsci device drivers are configured, they can be added to PFS™. You will need the built-in drive (drive 1) and your UTILBK diskette. The procedure is as follows:

1. Using the UTILBK diskette and the SCP program, read in SOS.DRIVER from the PFS diskette.
2. From the USCIWK diskette, read in TMPDX.CODE.
3. If you have a 128K Apple III, the maximum size of SOS.DRIVER should be 30 blocks. (If the driver file is larger than this, a stack overflow message will appear when the system is booted.) Delete unnecessary drivers.
4. Check the system parameter Number of Disk III Drives. It should be 1; change if necessary.
5. PFS will not work properly if the .Dx and .Xx drivers for a given drive (i.e. .D3 and .X3) are both Active. Make sure you have at most one .Dx/.Xx driver Active for each drive.
6. Generate SOS.DRIVER.

APPLICATION NOTE 11

ADDING THE MICROSCI DRIVERS TO CP/M

The procedure for adding the Microsci device drivers to CP/M® is significantly different than the procedure for adding them to SOS. This is due in part to the fact that CP/M is a very different operating system than SOS, and in part to several "bugs" in CP/M.

To add the Microsci drivers to CP/M, you will need the built-in disk drive (drive 1) and four diskettes -- your CP/M System Master, your USCIBK diskette, your UTILBK diskette, and a diskette containing SOS.DRIVER. Briefly, the procedure is as follows:

1. Make the necessary work diskette.
2. Add the Microsci CP/M drivers to the SOS.DRIVER file.
3. Fix the "bugs" on the CP/M System diskette.
4. Transfer the SOS.DRIVER file onto the CP/M System diskette and configure the drivers under CP/M.
5. Check out the new driver configuration.

STEP 1: Let's Make the WORK Diskettes

You will need to make a work copy of your CP/M System Master. The work copy of your CP/M Master will be called the CPMBK diskette; it is made using the COPY program, which is on the CP/M Master diskette. The COPY Program is described in Chapter 4 of the SOFTCARD III™ Installation and Operation Manual.

The second diskette you will need to make is one which contains the file SOS.DRIVER. This diskette should contain only the SOS.DRIVER file. You will probably want to copy the SOS.DRIVER file from your System Utilities diskette onto a newly formatted diskette to make this diskette. We will call this diskette the SDRVR diskette.

STEP 2: Configuring the Drivers Under SOS

- A. Insert your UTILBK diskette (which was made in Chapter 5) in the built-in drive and turn on the Apple III power.
- B. When the menu appears, select System Configuration Program (S).
- C. When the SCP menu appears, select Read a Driver File (R).
- D. Insert the SDRVR diskette and enter .D1/SOS.DRIVER.
- E. Insert the UTILBK diskette and return to the SCP menu.

- F. Select the option Delete a Driver (D).
 - G. Delete all drivers except .CONSOLE and return to the SCP menu.
 - H. Select the option Read a Driver (R).
 - I. Insert the USCIWK diskette (which was made in Chapter 5) and type .D1/CPMDX.CODE.
 - J. Insert the UTILBK diskette and return to the SCP menu.
- NOTE: For Steps 2K through 2R, refer to Table 11-1.
- K. Select the option Edit Driver Parameters (E).
 - L. Select the driver to be edited (.D2).
 - M. If the corresponding drive is on A3 or Disk III, skip Steps 2N and 2O (The driver must be left Inactive).
 - N. Select the option Configuration Block Data. The values allowed are:
 - * 2 for an A73
 - * 3 for an A143
- Enter the appropriate response and return to the Edit Driver Parameters menu.
- O. Select the option Driver Status. Enter A to make the device driver Active. Return to the Edit Driver Parameters menu.
 - P. If you have a third or fourth drive, repeat Steps 2L through 2O for drive 3 (.D3) and drive 4 (.D4).
 - Q. Return to the SCP menu and select the option Change System Parameters (C).
 - R. Select the system parameter Number of Disk III Drives and enter the actual number of A3 or Disk III drives. Return to the SCP menu.
 - S. Select the option Generate New System (G). (No warning messages should occur.)
 - T. Insert the SDRVR diskette and enter .D1/CPM.TEMP.
 - U. Insert the UTILBK diskette and exit SCP back to the main menu.
 - V. Reenter SCP by selecting option S.
 - W. Select option Read a Driver File (R).
 - X. Insert SDRVR diskette and enter .D1/CPM.TEMP.

- Y. Read SOS.DRIVER by entering .D1/SOS.DRIVER.
- Z. Insert UTILBK diskette and return to the SCP menu.
- AA. Select the option Delete a Driver (D).
- AB. At this point, the list of drivers starts with .CONSOLE, .D2, .D3, .D4, and then some other drivers. Among the other drivers will be another .CONSOLE driver and possibly another .D2, .D3, and .D4 drivers. There may also be a module of .FMTD1, .FMTD2, .FMTD3, and .FMTD4 drivers.

You will need to delete the second .CONSOLE driver, the second .D2, .D3, and .D4 drivers (if there) and the .FMTDx drivers (if there).
- AC. Exit to the SCP menu and select the option Generate New System (G). (No warning message should appear.)
- AD. Insert the SDRVR diskette and enter .D1/SOS.DRIVER.CPM.
- AE. Insert the UTILBK diskette and return to the main menu.

STEP 3: Fixing the "Bugs" in CP/M ✕

NOTE: Skip this step if you are using CP/M Version 2.21 or later.

- A. Insert the CPMBK diskette in the built-in drive and press CTRL-RESET.
- B. Using the MFT program, transfer the files PTCH1.SUB, PTCH2.SUB, and PTCH3.SUB from the USCIWK diskette to the CPMBK diskette. MFT is described in the SOFTCARD III Manual, Chapter 4.
- C. Enter SUBMIT PTCH1.
- D. When SUBMIT is finished, enter SUBMIT PTCH2.
- E. When SUBMIT is finished, enter SUBMIT PTCH3.
- F. If you get a VERIFICATION ERROR at Steps 3C, 3D, or 3E, please contact Microsci.
- G. Press CTRL-RESET to boot the now-patched CPMBK diskette.

STEP 4: Configuring the Drivers Under CP/M

- A. Using the SOSXFER program, transfer the file SOS.DRIVER.CPM from the SDRVR diskette to the file DRIVER.SOS on the CPMBK diskette. SOSXFER is described in the SOFTCARD III Manual, Chapter 4.
- B. Enter CONFIG to run the CONFIG program. The CONFIG program is described in Chapter 4 of the SOFTCARD III manual.

The standard configuration is A:=.D1, B:=.D2, C:=.D3, and D:=.D4. However, you may configure according to your own needs; but do not assign drive A: to an A73 or A143 Disk Drive. When you exit the CONFIG program make sure you make the changes permanent.

- C. Press CTRL-RESET to reboot CP/M to use the new driver configuration.

STEP 5: Checking Out the New Driver Configuration

- A. Insert the CPMBK diskette into the built-in drive and press CTRL-RESET to boot.
- B. To check out the new drivers, we will format a diskette in each external drive. Formatting is performed by typing COPY d:/F/V, where "d" is B, C, or D. Only format the external floppies; if, for example, you have configured C: to be the ProFile™ hard disk, do not format it.
- C. Each format operation should end with "Operation Complete." (No errors should occur.)

Some Additional Notes on Apple III CP/M

- 1) Block size is 1K for A3s and Disk IIIs; it is 4K for A73s and A143s. Block size determines minimum allocation size and therefore minimum file size. This means that a small, 10-byte file, for example, takes up 1k of disk space on an A3, but 4K of space on an A143. Block size is determined by the CP/M Operating System and cannot be changed.
- 2) You cannot copy an entire disk between drives of different sizes. You should copy files using PIP or MFT instead.
- 3) On A73s and A143s, you cannot release the system tracks with "COPY x:/D".
- 4) If you have any external A3s or Disk IIIs, they must be the first drives on the daisy chain.

TABLE 11-1

CP/M DRIVE CONFIGURATION			# DISK	.D2		.D3		.D4	
.D2	.D3	.D4	III's	STAT	DAT	STAT	DAT	STAT	DAT
A73/A143	A73/A143	A73/A143	1	A	2/3	A	2/3	A	2/3
A3	A73/A143	A73/A143	2	I	X	A	2/3	A	2/3
A3	A3	A73/A143	3	I	X	I	X	A	2/3
A3	A73/A143	-----	2	I	X	A	2/3	I	X
A73/A143	A73/A143	-----	1	A	2/3	A	2/3	I	X
A73/A143	-----	-----	1	A	2/3	I	X	I	X
A73/A143	A3	A3	NOT ALLOWED						
A73/A143	A73/A143	A3	NOT ALLOWED						
A73/A143	A3	A73/A143	NOT ALLOWED						
A3	A73/A143	A3	NOT ALLOWED						
A73/A143	A3	-----	NOT ALLOWED						

NOTES:

DISK III's = System Parameter 'Number of Disk III Drives'

STAT = DEVICE STATUS

DAT = CONFIGURATION DATA

X = DON'T CARE

A = ACTIVE

I = INACTIVE

- = NO DRIVE

APPLICATION NOTE 12

ADDING THE MICROSCI DRIVERS TO APPLE III BUSINESS GRAPHICS

Once the Microsci device drivers are configured, they can be added to Apple III Business Graphics. You will need the built-in drive (drive 1) and your UTILBK diskette. The procedure is as follows:

1. Make a backup copy of the Apple III Business Graphics BOOT diskette.
2. Using the UTILBK diskette and the SCP program, read in SOS.DRIVER from the backup copy of the BOOT diskette.
3. From the USCIWK diskette, read in TMPDX.CODE.
4. Apple III Business Graphics will not work properly if the .Dx and .Xx drivers for a given drive (i.e. .D3 and .X3) are both Active. Make sure you have at most one .Dx/.Xx driver Active for each drive.
5. Check the system parameter Number of Disk III Drives. It should be 1; change if necessary.
6. Generate SOS.DRIVER.
7. If you do not have a 35-track drive (an A3 or Disk III) as drive 2, you will have to copy the files from the Apple III Business Graphics DATA diskette onto an A73 or A143 diskette. This A73 or A143 copy of the DATA diskette can go in drive 2 instead of the original 35-track DATA diskette. This diskette will have to have the same name as the original diskette, so make sure you change the volume name to /DATA.

RADIO AND TELEVISION INTERFERENCE

The equipment described in this manual generates, uses and can radiate radio interference energy. If it is not installed and used properly it may cause interference with radio and television reception.

This equipment has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules. These rules are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to correct the interference.

You can determine whether your computer is causing interference by turning it off. If the interference stops, it was probably caused by the computer or its peripheral devices. To further isolate the problem:

Disconnect the peripheral devices and their input/output cables one at a time. (First turn off the computer power, disconnect the I/O cable, then turn the computer power back on.) If the interference stops, it is caused by either the peripheral device or its I/O cable. These devices usually require shielded I/O cables. For Microsci peripheral devices, you can obtain the proper shielded cable from your dealer or Microsci. For other peripheral devices, contact the manufacturer or your dealer for assistance.

If your computer does cause interference to radio or television reception, you can try to correct the interference by using one or more of the following measures:

- * Turn the TV or radio antenna until the interference stops.
- * Move the computer to one side or the other of the TV or radio.
- * Move the computer farther away from the TV or radio.
- * Plug the computer into an outlet that is controlled by a different circuit breaker or fuse than the TV or radio.
- * Consider installing a rooftop television antenna with coaxial cable lead-in between the antenna and TV.

If necessary, you should consult your dealer or an experienced radio/television technician for additional suggestions. You may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio/TV Interference Problems"

This booklet is available from the
U.S. Government Printing Office
Washington, DC 20402
Stock No. 004-000-00345-4

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CP/M is a registered trademark of Digital Research, Inc.

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9/26/8

Appendix A

Spares Pricing

PART NO.	KIT QTY	DESCRIPTION	PRODUCTS APPLICABLE	DEALER PRICE	SUGGESTED RETAIL
0010-0019	2)	BASE SCREWS; TAN 10 ea.	ALL	2.00	-
0010-0020	2)	COVER SCREWS; TAN 10 ea.	ALL	2.00	-
0200-0018	*	Full Mechanism	A2, A3	150.00	200.00
0200-0019	*	PCB	P2	50.00	100.00
0200-0021	* 2)	Cable	A2	20.00	40.00
0300-0142		Cover (tan)	ALL	15.00	30.00
0300-0170		Base (tan)	A2, A40, A70	12.00	24.00
0300-0171		Base (black)	A2, A40, A70	12.00	24.00
0300-0172		Cover (black)	A2, A40, A70	15.00	30.00
0400-0209	* 2)	22uf Capacitor	P2 ECO	1.00	2.00
0400-0211	* 2)	1000pf Capacitor	C2 ECO	.50	1.00
0500-0024	* 2)	4.7K Resistor	P2 ECO	.50	1.00
0900-0023	* 2)	7400	C2	1.00	2.00
0900-0026	* 2)	74LS02	C47, P47, C2	1.00	2.00
0900-0031	* 2)	74LS08	C47, C2	1.00	2.00
0900-0032	* 1)	74LS32	C47, C2	1.00	2.00
0900-0073	* 1)	74LS373	C47, C2	4.50	9.00
0900-0148	* 3)	2708 PROM	C47, C2	10.00	20.00
0900-0172	* 2)	74LS14	C47, C2	2.00	4.00
0900-0176	* 4)	CA3054	P47, P2	2.00	4.00
0900-0177	* 2)	LM311	P47, P2	1.25	2.50
0900-0179	* 3)	NE592	P47, P2	3.00	6.00
0900-0189	* 2)	74LS74	C47, C2, P47, P2	5.00	10.00
0900-0190	* 2)	74LS86	C47, P2	1.50	3.00
0900-0191	* 2)	74LS109	C47, C2	1.50	3.00
0900-0192	* 1)	74LS123	C47, C2, P47, P2	4.00	8.00
0900-0193	* 1)	74LS163	C47, C2	2.00	4.00
0900-0194	* 2)	74LS174	C47, C2	1.50	3.00
0900-0195	* 1)	74LS194	C47, C2	2.00	4.00
0900-0197	* 2)	NE556	C47, C2	2.50	5.00
0900-0199	* 5)	9334	C47, C2	5.00	10.00
0900-0202	* 2)	ULN2003	P2	1.50	3.00
0900-0203	* 10)	74LS125	P2	2.00	4.00
1600-0061		A2 1&2 LABEL		.50	1.00
1600-0062		MICRO-SCI LABEL		.50	1.00
1600-0070		A2 R&B LABEL		.50	1.00
1600-0075		ONE LABEL		.25	.50
1600-0076		TWO LABEL		.25	.50
1600-0077		THREE LABEL		.25	.50
1600-0078		FOUR LABEL		.25	.50
1600-0082		ROUND MICRO-SCI; RED LABEL		.25	.50
1700-0196		SOCKET 24 PIN	C47, C2	2.00	4.00

MICRO-SCI MAINTENANCE MANUAL

1700-0197	2) SHORTING CLIP 10 ea.	C47,C2	1.00	2.00
1700-0218	2) Rubber Feet 4 ea.	ALL	2.50	-
1700-0250	3) SOCKET 14 PIN	P2	1.50	3.00
1700-0284 *	2) DRIVE MOTOR		20.00	40.00
1900-0001 *	4) Door	A2,A3	3.00	6.00
1900-0002 *	2) Indicator LED Assembly	ALL	1.50	3.00
1900-0003 *	2) Write-Protect Switch	A2,A3	4.25	8.50
1900-0004 *	10) Load Pad	A2,A3	2.00	4.00
1900-0005 *	2) Belt	A2	6.00	12.00
1900-0006 *	SPEED CONTROL PCB	A2	25.00	50.00
1900-0007 *	4) Cone Clutch Assembly	A2	10.00	20.00
1900-0010 *	Bezel	ALL	3.50	7.00
1900-0011 *	RIGHT DISKETTE GUIDE	A2	7.50	15.00
1900-0012 *	LEFT DISKETTE GUIDE	A2	7.50	15.00
2000-0016	INSTALLATION MANUAL	A2	5.00	10.00

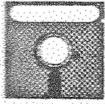
0200-0107 Component Level Spare Parts Kit 315.00
All parts numbered in kit column above

0200-0108 Board Level Spare Parts Kit 400.00
1) SPEED CONTROL BOARD
2) C2 Controller Boards
2) P2 Analog Boards
1) Mechanism

Both Kits 700.00

2000-0045 A2 Maintenance Manual
Separate 75.00
With Kit N/C

* These parts are also compatible with APPLE DISK II units



Apple III

THE MICRO SCI A143 DRIVE FOR THE APPLE III (Part 1 of 3)

By Tom Lindners

INTRODUCTION

The Micro Sci A 143 was the only large capacity disk drive available for the Apple III, other than a 5 to 20 megabyte Winchester unit such as the Profile, etc. This drive has 4 times the capacity of the normal Disk III (sometimes][on some Apple paper work) and has removable media.

PURPOSE

The purpose of this article is to explore, in enough detail and be able to repair, the A 143 drive. I had hoped that some kind soul, like the designer of the A143, would step forward, and bare his soul to the world, but that has not happened. Alas, I believe that Micro Sci has gone claws up, and I have taken it upon myself to be the "poor fool" that tries to explain what and why someone else did five to seven years ago. As with all showings of the lottery on the local German Tee Vee, this article is also, "ohne Gewaehr", or no guarantee. I need to state this as I do not have all of the Micro Sci data that I need to make a fool-proof article, and, you all might have a different drive than I do.

AUTHOR AS A REPAIRMAN

I have repaired several of the drives, and can only say that the design is pretty good. The main gripe that I have is that the chips are not socketed, but are soldered in. That should stop many of the timid people from getting in there, after looking around. How do you get a bad IC (or worse yet, one you suspect is bad) out and off the mother board. First you take a pair of small sidecutters, and you crush the little fellow, clean the board off, and then use some sort of a solder sucker to pick off the bones, wings, antlers,

claws, and anything else that may happen to be left over. But wait, I'm getting ahead of myself.

EASY THINGS TO CHECK

Would you believe it, of the eight or so drives that I have repaired, two of them had a bad cable from the drive to the outside world. All I did was cut the last two inches off and reuse the connector. The way to find the problem is to run diagnostics as in the following paragraph and wiggle the cable. This simple act should take care of finding 25 % of your problems.

The second thing to do is run speed diagnostics on the unit. There are several diagnostics around that can find a problem with the unit. The best one to use is the Apple][Disk][diagnostics. With the disk speed check, you can repair perhaps 40 % of the problems that come your way. It is real simple, just boot the Apple III in the Emulation mode, and run the Apple][Disk][diagnostics program, or any Apple][disk drive speed checker program. The adjustment of the drive speed is easy to do and can be done in a matter of seconds, not minutes.

I usually switch heads, and run the speed test from both heads, just to make sure that all is O K on both sides of the disk. Both sides of the disk read circuits are tied together and are gated thru a 4:1 mux, but only one side works in the Apple][Emulation mode. At the end of this test you should know that the Unit can read and write to both sides of the disk and that the speed is OK. Make sure that you return the heads to their original connections.

Make sure that when you are

checking the speed, you know if you have a European Apple III, or an American Apple III. The difference is in the crystal and some of the proms. The crystal in an American computer is set at 14.31818 MHz, or four times the color burst signal, while some of the European computers are set to run at 14.250450 MHz. This is enough of a difference to put you off about 1/2 % on disk speed, which you do not want to be. If necessary, run the test using the wheel on the underside of the disk and monitor it with a neon strobe lamp, or a fluorescent bulb. If all else fails, you can use a regular light, but it is hard to see the change in the pattern. Everything is O K if one bar remains within 1/2 a position in ten seconds.

The next thing that I have had a small amount of trouble with has been the head slide mechanism. I put a bit of alcohol on a text wipe, and cleaned the unit up, but it was still sluggish. I then put a tiny amount of WD-40 on a rag and wiped the two rails, and then wiped the rails dry with a clean rag. You do not want an oily film here as it will tend to attract dust and dirt and raise a bit of havoc later on. If you have a problem in this area and have to go in and clean things up, you should also check the door release mechanism. I have also used TufOil (\$10/oz) from:

Fluoramics, Inc.
103 Pleasant Ave.
Upper Saddle River, NJ
07458

Address any questions to:
Thomas E. Lindners
12604 Wardell Ct

Edl Note: This article will be continued next month.

of naughtyword, the only real solution is to get a ten-pound bag. Have your MasterPlastic card ready, call 1-800-443-8877, and tell the nice person from ON THREE that you want a 512K memory upgrade. It is \$399, with a \$35 cash or \$45 merchandise rebate when you return your 256K memory board. That is a pretty big check even for someone as rich and famous as I, but it is remarkably cost effective.

Cost effective? Yup. If nothing else, four hundred bucks isn't much to pay for the ability to stomp on your sincere-tie colleagues. A 512K Apple /// will blow the doors off anything equivalent to an IBM PC/XT. It'll give fancier MS-DOS machines a run for their money, too. The extra memory

alone could keep you from having to foot the bill for a new computer. The memory upgrade comes with some program upgrades to take advantage of same — like a 414K

A 512 K Apple /// will blow the doors off anything

desktop in /// EZ Pieces and a 442K spreadsheet space in Advanced VisiCalc. And 512K in an Apple /// has more useful memory than a 640K MS-DOS machine. The ///'s system space is lots smaller.

That stuff is nice, but what really blows away the Baby Blue

competition is "resident" software, what the MS-DOS world calls TSR's — terminate and stay resident programs. MS-DOS TSR's tend to stomp on each other and to interfere with the operation of normal programs. When a colleague says that he can't get a terminal program to work on his or her Baby Blue, I always say to remove the TSR's and then try it. I am almost always right. The Apple /// equivalents to TSR's — hard disk program selectors like Catalyst and Selector /// and "desk accessories" like TDM and Daryl Anderson's PowerKeys — neither conflict with each other nor stop other programs from working. Old Sara is just better designed to handle such things. Hee-hee.



Apple ///

HOW TO ALIGN THE A 143 MICRO SCI DRIVE By Tom Linders

Address any questions to: Thomas E. Linders
12604 Wardell Ct., Saratoga, CA 95070

Poor old Joe bought an A143 from someone who had moved it from its nice metal enclosure and put it into an Apple Disk /// enclosure. The end result was a bit of jury rigging and a drive that wouldn't read any disks at all due to a bad write I C as well as screwed up alignment.

HOW DO YOU ALIGN THE A143?

There are four parts to the alignment, and, if done correctly, they should result in a reasonable job. I do not have an alignment disk, so I used one of my A143 data disks, as well as one of Joe's ///EZP disks.

Step zero...verify the problem

The best thing to do, if you're sure the disk is out of alignment, is to read and write from a disk, or at least format and verify a blank

disk. When the drive formats and verifies it reads the bottom side and then the top side. If it will read and write on itself, but not from another disk, then alignment is the problem.

Step one...The mechanical stop

To start with, make sure that step zero has been attempted. If that has been done and the drive reads and writes on itself, but not on other disks, then back the mechanical stop off a turn or two. The mechanical stop is an allen head screw that is at the far right hand rear of the drive.

Step two...The optical stop

On the left side of the drive rail is the optical stop. Before proceeding into the how of the adjustment, it is wise to take a moment to review the way the optical stop works. From my

earlier article, the optical stop is activated when a light path is interrupted by a mechanical device. This signal is "wired" into the write protect circuit and sensed during the head retract operation. If the optical beam is cut, then the write protect line supplies a signal to the computer that causes the head step pulses to stop. (The fourth pulse line is used as a head select line).

To align the optical stop, loosen the two screws and push the optical stop as well as the head toward the center of the drive as far as they will go. Put in a disk that has A143 data on it and try to read from it. I like to use the systems utility "list file" option. As the disk tries to read track 00, it may stop and try real hard. It will be observed that the optical

continued on next page

continued from page 15

sensor has three stop points, and the best place to try to find track 00 is when it is right at the front point of the rear phillips screw head (middle position).

If, try as you might, you cannot get the drive to read track 00, this would be a good place to stop and repeat step zero. Put the optical stop just in front of the rear most phillips head screw and tighten the two screws down prior to running step zero again.

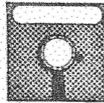
Step three...The stepper motor

If step two doesn't work, and it didn't work on Joe's drive, then the final step will be to move the head step motor slightly by loosening the two mounting screws and turning the motor one way and then the other. Prior to doing this, it is advisable to mark the motor ear positions with a pencil, in case you have a strong desire to return to the place you started. As you rotate the motor, you can see the head et al move with it. On Joe's drive, it was a simple adjustment of the motor, and then everything was quite normal.

Then you should run the mechanical stop screw back until the point just about contacts the moving part of the head mechanism.

I tightened up the screws and then read a Word Juggler disk of mine, as well as Joe's ///EZP disks. I also did this as I finished up each step of the disk reassembly. Then, prior to shipping it back across the Atlantic, I did a read and write, as well as a read and write from my WJ disk as well as his ///EZP disk.

This procedure is not for the faint of heart, but it works, and would probably work better if I had a decent alignment disk.



Apple ///

A REVIEW OF SUPER ACCESSORIES DISK #3 FOR THE DESKTOP MANAGER

By: Ed Gooding

Earl T. Brelje has done it again, but even better this time! The author of Super Accessories Disk #2 has now developed another Super Disk (#3), which is chock full of modules to store in your Desktop. As usual, you can order it from ON Three. The price is \$33, which includes shipping costs. This disk contains some of the best and most powerful stuff that Earl has programmed to date for the Desktop Manager.

The disk contains the following modules: /// Accessory Manager - a true boon to those of us who like to grab up every DTM module that comes out. /// Rulers - a handy tool for those of us who have a hard time lining up columns on the screen. /// Infohelp - a different type of notepad that is blazing fast to access. /// SOS.Errors - a sample Infohelp notepad that contains all the SOS errors you ever hope to avoid. /// Hex.View and Hex.Print - complement the File.View and File.Print modules included in Super Disk #2, except that they work with non-text type files. /// Block.Edit - if you have hacker blood in your veins, then this is a must-have. /// File.Disk.Utilities - an umbrella for Earl's disk utilities that appear on both Super Disk #2 and #39.

Accessory Mgr. - a terrific utility that replaces the Option List and Reload and Exit modules. This utility allows you to load new

modules to your desktop, delete existing modules, rename modules, and even manage any modules in Menu Mgr. sub-menus. You can also print out the contents of your desktop, with both the functional and OPTIONx names displayed. See Exhibit 1 for a peek at what this wonderful module can do for you. Rulers - Have you ever worked on columnar data in your word processor, or tried to set up a display page where certain data had to be in just

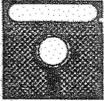
he right horizontal and vertical position?

Well, the Rulers module is designed to make your life easier. With it, you can display a horizontal line, a vertical line, or both lines anywhere on the

Block.Edit - if you have hacker blood in your veins, then this is a must-have.

screen. After you go back to your foreground program, and then return to the Rulers module, your line(s) will be right where you left them. Imbedded inside the ruler displays are the row (for the horizontal ruler) and column (for the vertical ruler) where the rulers are currently located. The rulers are also marked off inside so you can see where a specific horizontal or vertical position on the screen is located.

InfoHelp - is similar to the original Notepad that is part of the basic Desktop Mgr. package, but is different in that it does not store the data in each note in a file on your disk. Instead, it imbeds the information that you insert in each note in the actual program module.



Apple III

THE MICRO SCI A143 DRIVE FOR THE APPLE III (PART 2 OF 3)

By Tom Linders

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12604 Wardell Ct Saratoga, CA 95070

Assuming that last month's simple tricks don't work, it's time to bite the bullet and either turn the unit over to a repairman, or dive in. The following brief explanations may help you dive in. Remember, I reverse engineered the drive, along with the help of some prints on some Micro Sci drives. Let's start.

As can be seen from figure one, I have divided the unit into several sections:

- read/write
- erase
- track
- 00 sense
- head step
- A][/write prot
- spin disk

MOTOR CONTROL CIRCUITRY

Prior to doing anything, take a pad soaked in isopropyl alcohol and clean the heads and then the fingers of the long connector on the board in the rear of the unit. Then use a new toothbrush with isopropyl alcohol and clean the connectors that have pins, like the input connector and the read/write/erase heads. Use 90% or better isopropyl alcohol and not rubbing or denatured alcohol unless you know what the barfing agent is. Some of the denaturing agents tend to damage computer hardware.

The motor control area is the most frustrating to dive into as the motor speed is controlled, but it has a speed variation higher than the Apple drives. Even the regular Micro Sci drives have a wider speed variation than the Apple drives. At the back of the board on the top of the unit is a very long 32 pin connector, that has three mating connectors, two 5 pin small ones, and one 22 pin large one. The small five pin connector on the left is the motor control connector. The drive motor current is controlled thru a

TIP 110 (111, or 112 will also work) in an emitter follower configuration. If the motor does not spin up, verify that there is 12 volts on the collector, and that the base and emitter are at about five volts, with the base being about a diode drop higher than the emitter.

If the motor doesn't work at this point, verify that there is a signal on the input 26 pin connector on pin 14, called not.motor.on. This signal should be on U-8 pins 5 & 6 and it's inverse on U-8 pin 4. If the above is O K, verify that there is a feedback system available from the motor on the left most connector in the back on pins 28 & 29. This signal is "shaped up" in U-13, and run thru an LS 123. The 123 is a good candidate to be the problem, as I personally hate all multivibrators, especially the 121 & 123, but that is probably a personal dislike.

CHASSIS MOUNTED SENSORS

Next, it is probably a good idea to verify two of the three sensors on the chassis of the drive. These are:

- write protect
- track 00
- in use

These things have been a problem. I have had to take two sensors out, clean them off with alcohol, and put them back. Someone either smokes a lot, or the installer had greasy fingers. Anyway, you do not have to do anything to the in use sensor as it is not used in any unit I have worked on.

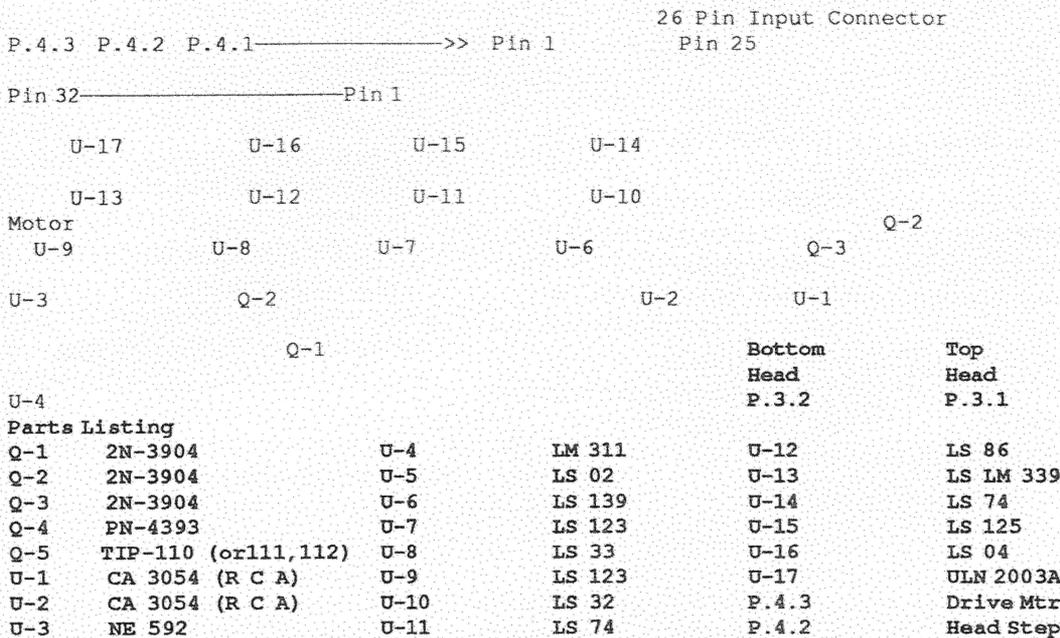
The reason for using light sensors in lieu of switches was probably that the chassis that Micro Sci purchased came with them and they wanted the track 00

sensor to be very fast. These devices are supposed to be more reliable than a switch, and they probably are if they do not have a lot of contamination on them.

HEAD STEP CIRCUITRY

The next area to look at is the head step circuits. The Apple non quad density drives use input pins 2, 4, 6, & 8 to supply the drive pulses to a four winding stepper motor to drive the head in and out. The Micro Sci A 143 uses only the first three pins as it uses the fourth pin for selecting the upper or lower head. The best thing to do to check these signal out is to look at them with a scope and run the Apple][diagnostic disk. These diagnostics ask the head to retract to track 00, and so you only have to start the diagnostics several times and you will have a gaggle of head step pulses to look at. If all the pulses are present, then move to the output and monitor the ULN 2003 to see if the voltage on pins 11, 12, 13, & 16 is usually high and goes low when the head is stepped. The circuitry in this area is rather straight forward, the 4 : 1 Mux, an LS 139, drives a set of four hex inverters, and then the current drivers. Pins 2 & 4 on the mux tell it which one of the four outputs to put out a signal on, and the output of U-10 pin 11 enables the mux, or it would step whenever there is head step activity. The only problems I have had here has been caused by a bad current driver and a bad wire at the end of the cable. I cannot stress enough, check that input cable before you go off and kill a bug, as it is a real pain to destroy an IC to get it out, still have the same problem when you put the new one in, and then have your wife ask you again if

Layout of the Micro Sci A 143 board
REAR OF UNIT



you really checked out the connector, and you didn't. I know, and I even did it twice on two different units.

READ/WRITE, ERASE, AND 4 : 1 MUX

Who's on first is determined by the other half of the head step 4 : 1 mux. This mux selects which of the two read/write heads will be reading or writing, and is controlled by the not.write.gate & write protect. The mux is enabled whenever the not.enable signal is low. The write circuit is straight forward, but the read circuit contains a multi pole filter, and is followed by a reclocking circuit that would make Rube Golberg (sp) proud. It's too bad that these, and other disk drives, didn't use a digital clock to run the motor and a lot of the other circuitry, and then the likes of the seven ICs needed to send the data out would, for the most part, be unnecessary. C'est la vie.

Of special interest is the write protect circuit, as it is just like all the other write protect circuits, in that it sets a software switch, and does not clamp the write circuit so

that it cannot write. This is one area that needs redesign on all disk drives I have ever seen. The write protect switch may send a signal to software, but it should always crowbar the write circuits to prevent accidental writing. Why they used a fancy light circuit is beyond me, but is one of the circuits that does go bad. You may need to replace the device, or at least clean it to get the system up and running. One big problem that I had was that the write protect circuit wouldn't turn on as there was not enuf light getting into the receiver, and the input was always high. The device was dirty, and I had to remove the receiver, clean it, and put it back.

This drive also uses the write protect line during the head retract operation to sense track 00. The write protect signal and the track 00 signal are wire ored at U15 pin 5. When the track 00 sensor interrupts the light beam, the write protect line goes high, telling the software to stop sending head step pulses.

Alignment of track 00 is

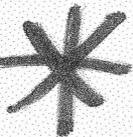
covered in another article.

CONCLUSION

Remember, check the cable before you pull the unit apart. I had two problems with the eight drives that I have repaired, that were traced to the cable. Two problems were the optics used for track 00 and write protect, one unit had someone's elbow inside it and made one of the heads fly about a micron too high (that was a real bear to find). Also, three problems were speed related, as the owner of the drive had holes for the students to adjust the speed. If it can be done it will, and the units were used on German Apples, and they didn't know about the speed difference due to the different clock.

All in all, if you have a bit of guts, you can fix these units. Once again, no guarantee on the schematic as it was made from bits and pieces, reverse engineering, and the like.

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HOW TO ADJUST THE SPEED OF YOUR MICRO-SCI A143 (or Apple) DISK DRIVE by Ed Gooding

Here's a technique to adjust the speed of your Micro-Sci A143 disk drive. It does NOT require a special program like Locksmith or Copy II+. What you will need is:

- . 1 Phillips screwdriver to remove the cabinet from the drive;
- . 1 small slotted screwdriver to turn the speed adjustment POT with;
- . the System Utilities program or Business Basic;
- . a fluorescent light that can be positioned over the disk drive.

NOTE: Read all instructions before starting this procedure, particularly #5.

The advantages of using this technique include not having to buy Locksmith or Copy II+ if you have no other use for them (they are awfully useful programs, though), and not having to remove the A143's from their position in the disk drive daisy chain to adjust them.

Here are the steps to adjust the drive: (Done with Power ON)

1. Remove the 4 Phillips Head screws on the sides of the disk drive (2 on each side). Slide the top/side cover toward the rear of the drive and set it aside. The circuit board that covers the top of the drive as you look down on it is the Analog board. The speed adjustment POT is directly opposite location P1 at location P2 in the middle of the LEFT side as you look at the front of the drive. It has the same little brass adjustment screw as the Disk /// and II, sticking out at a 90 degree angle to the left side of the disk drive. Do NOT adjust the POT at P1, it does NOT control the speed, but it will prevent you from reading/writing data if you adjust it from its factory setting

2. Remove the 4 Phillips Head screws on the bottom of the drive. Remove the bottom cover and set it aside. I usually lay my drive on its right side (looking at it from the front). This exposes the strobe wheel, which has black squares on it. It also exposes the adjusting POT. You will see a 50 and a 60 on the wheel. You use the 60 MHZ wheel, or the outside one. I move my fluorescent light over the drive so the light will shine on the strobe wheel and the adj. POT at location P2.

3. You now need a way to make your drive run so you can check the speed. If you have basic, you can write a program like 10 CATALOG ".Dx":GOTO 10. This will spin your drive continuously until you press CONTROL/C. If you don't have basic, use your System Utilities List Files function, but you'll have to do a lot of keying (good use for Powerkeys). Incidentally, the little program above is also good for cleaning your drives. Get the drive spinning and watch the strobe wheel. If the little black squares on the outside of the strobe wheel are moving, then your drive speed is off. Insert your screwdriver in the adj. POT at location P2 and turn it until the black squares stop moving. If you are using a metal screwdriver, be sure to remove the screwdriver from contact with the POT before doing your final check; as it will influence the speed.

Continued on next page.

Adjusting your disk drive..continued

4. You can now re-assemble the bottom cover, then the top/side cover to the drive.

5. To test the speed, try to format a blank disk. The system utilities will inform you if the speed is off. Note that if your speed was appreciably off before you adjusted the drive, you might not be able to read any disks that were created on the pre-adjustment drive(s). To resolve this, you will have to copy your A143 files to another media (Profile, 143K floppy) BEFORE you adjust the drive, then copy them back to the A143 after you adjust them.

NOTE: This technique will also work on the Micro-Sci A3 and Apple Disk /// drives. The only difference is that the speed adjustment POT is located on the vertically mounted board at the back of the drive, and the POT adjusting screw projects at a 90 degree angle from the RIGHT side of the drive. The A3 has a predrilled hole by the POT so you don't have to remove the top/side cover, as well. I have drilled 1/4" holes in the cabinets of my Disk ///'s and my Apple /// computer cover to allow me access to the adjusting POT's without having to remove the covers. I have to use a speed measuring program to test the inboard drive since I don't take the cover off and turn the drive over.

Compliments of ///'s Company - (804) 747-8752 (300/1200, 7 bits, odd parity)
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Introducing: * /// PEOPLE (A Person to Person Network) *

Over the past few years, the /// community has become in many ways a family. We have greatly enjoyed meeting and sharing information with other /// users. Mel Ashtrahan (author of Draw on /// and several games for the ///) called recently and suggested that it would be a good idea if people had an idea of how to contact other /// users when they were going to travel around the country (world?).

Following up on that idea, we discussed it with several user groups and prominent /// people and found that it was truly an idea whose time had come. Thus, TAU will create a file with names, addresses, phone numbers of people willing to be contacted when another ///'er is coming into their region. It is expected that those people would provide information on local meeting places, dates etc. and in some cases be interested in getting together with the traveler to discuss the ///.

If you would be interested in being contacted by ///'rs planning a visit to your area, please send us:

Name, Address, Phone, User Group/Club association, and any other information that you feel would be pertinent.

Be forewarned, the Rann's do travel on business once and a while...you could get a call from us.