

"MASTER DIAGONSTICS"

<http://www.cvxmelody.net/AppleUsersGroupSydneyAppleIIDiskCollection.htm>

This diskette has a modified DOS 3.3 and the write protect tab should "NEVER" be removed.

Insert the diskette into your drive and boot. The following will appear on your screen:

MENU OF OPTIONS //e~

1. Motherboard Rom Test
2. Apple 80 Column card test
3. Apple Parallel Card test
4. Ram Tests
5. Disk Drive Analysis
6. Micromodem II self test
7. Monitor routines
- H. Help % - Exit

Request: _

The "REQUEST" will accept only the numbers 1 through 7 and the characters "H" for HELP and "%" for Exit.

Choose selection number 1 and the screen will display the following for an error free pass:

MOTHERBOARD ROM TEST //e~

** TESTING **

D0 Rom Sec Verifies

D8 Rom Sec Verifies

E0 Rom Sec Verifies

E8 Rom Sec Verifies

F0 Rom Sec Verifies

F8 Rom Sec Verifies - Analysis Completed

AN EXAMPLE OF AN ERROR
DETECTION WOULD BE:

** TESTING **

D0 ROM SEC VERIFIES

D8 ROM SEC VERIFIES

ERROR ERROR ERROR

ERR...ERR..ERR..ERR..ERR..ERR..ERR..ERR

REPLACE E0 ROM SEC ON BOARD AND RE-TEST

80 Column Card Test~

After selecting option 2 from the main menu, the 80 column card test will first check to see if the card is present or not. The top of the screen will display:

Apple //e Configuration ID.

* TESTING *

//e with 80 Column Card Present

The 80 column card test is made up of two consecutive tests. The first will load a screen of data displaying all of the keys generated by the Apple //e, 8 times in sequential order. The text is loaded into the Motherboard Ram bank. Verification begins and each character will be written to the 80 column card ram space, read back, compared with what was written and verified. If an error is encountered, a message flag will show the error. The ERROR counter is located at the bottom right of the screen showing the total sum of errors. At the left of the lower screen is the number of Passes checked. This phase of the test will continue until it has scanned and tested each character eight times.

Apple Parallel Card Test~

If an error is encountered, the message flag will display the following and stop at the after all eight passes have been completed:

Data read in = X - Data written back = Y

Pressing the space bar will call the next phase of the test showing each of the control character codes and their functions. If no error was encountered in phase one then phase two will execute automatically until the last Control character is tested. Control S is this last character and will wait for any key move to complete the test and return you to the Menu of Options~.

If no 80 column card is recognized, you will return to the main menu.

You may choose to test the Proms of the Apple Parallel I/F Card by selecting option number three from the main menu. In order to test this card you must know which slot it is in. Usually the Parallel card will be driving a printer from SLOT number 1.

After selecting the card test, the screen will be viewed as follows:

PARALLEL I/F CARD TEST~

SLOT NUMBER OF THE PARALLEL CARD:

Here you would respond with the proper slot number. The input will accept only the numbers 1 through 7.

AN ERROR FREE TEST WILL SHOW THE FOLLOWING RESULTS:

** TESTING **

PARALLEL I/F ROMS VERIFY

AN EXAMPLE OF AN ERROR FAULT WOULD BE:

** TESTING **

IF PARALLEL CARD IS IN SLOT (X)
P1 ROM IS "DEFECTIVE"

- NOTE -

This test is for the Apple Parallel and compatible cards only. Invalid results will occur with cards such as the Grappler or other foreign printer drivers...Procedures on page 33 will help single out interface card trouble...

RAM TEST

The RAM TESTS will provide you with a menu of options, depending on the configuration of your //e.

The screen will read as follows:

//e Ram Test~

* Checking Configuration *

| | |
|-------------|-----|
| Apple //e | YES |
| 80 Col Card | YES |
| Aux Memory | YES |

(Configuration 64K Ram plus Aux 64K)

* TEST OPTIONS *

| | |
|---------------------|------------|
| 1 - Motherboard Ram | Auto |
| 2 - Motherboard Ram | Manual |
| 3 - Motherboard Ram | Continuous |
| 4 - Auxiliary Ram | Auto |
| 5 - Auxiliary Ram | Manual |
| 6 - Auxiliary Ram | Continuous |
| 7 - Return to Menu | _ |

The screen will show the following list of commands:

Choosing the automatic ram test will provide a one pass test of the Ram. Note that the DOS area of Ram (\$9600 to \$BFFF) will not be tested using the automatic option. This area of ram drives the test. The Continuous option will run the Ram test continuously until reset is pressed or an error occurs. If an error occurs it is suggested the you choose the Manual Ram test and test again...

The Manual Ram test will provide the instructions on the screen:

Use LEFT arrow <- to the chosen command

Trace over the command using the RIGHT arrow -> KEY to the Stop Bar_, type a CTRL Y on the Bar_ and press RETURN

PRESS RETURN TO BEGIN

| Command | Ram Location |
|----------|--------------|
| *400.4_ | \$0400.7FFF |
| 800.8_ | \$0800.9FFF |
| 1000.10_ | \$1000.1FFF |
| 2000.20_ | \$2000.3FFF |
| 3000.20_ | \$3000.4FFF |
| 4000.40_ | \$4000.7FFF |
| 7000.20_ | \$7000.8FFF |
| 8000.40_ | \$8000.BFFF |
| D000.10_ | \$D000.DFFF |
| E000.10_ | \$E000.EFFF |
| F000.8_ | \$F000.F800 |

By typing in a Control Y on the Bar_ after the command and pressing the RETURN key, that section of Ram will be tested and then the screen will be refreshed. After the last command, the screen will not be refreshed as this section of Ram contains routines that do the screen I/O.

Naturally if you do not have a 64K auxiliary card the menu will not give options to test that card, however the procedures are the same for both options.

DEFAULT TRACK IS ' 0 - 34 ':

(THE ENTIRE DISKETTE)

SET A DIFFERENT RANGE... (Y)

LOWEST TRACK TO BE TESTED... 22

(eg.)

HIGHEST TRACK TO BE TESTED...34

Here you may make a selection between 0 and 34, any range within the two outside limits of the diskette.

If the test senses an ERROR it will be displayed on the screen:

ERROR =

(EG.) DISKETTE NOT INITIALIZED
UNABLE TO WRITE

REPLACE WITH UNPROTECTED DISKETTE
DISKETTE MUST BE INITIALIZED!

This "ERROR" sensed that the scratch diskette was not properly initialized or that the disk was "WRITE PROTECTED"

Read/Write errors will show which track, what was written and what was read.

With the proper procedure, the screen will display the test profile as such:

Disk Read || Write Test~

READING TRACK 0

+ + + + - - - - - - - - - - - - - - - -

SECTOR (05)

ERROR FLAG (0)

The minus signs (-) will turn into a plus (+) as the test verifies each write and read. The TRACK and SECTOR counters will show the head position and indicate whether writing or reading.

- NOTE -

A "CTRL C" will return you to the main menu anytime during the test...

Any error encountered here indicates that qualified service is needed. Head alignment requires specialized equipment and service. You should contact an Apple Service Center for qualified repair...

Disk Speed Calibration~

Requesting option 2 from the DISK MENU will run the DISK SPEED CALIBRATION program. When run, you will be instructed to first, insert a SCRATCH diskette into the drive to be tested.

THIS IS CRITICAL AS THIS DISKETTE WILL BE WRITTEN OVER AND IT'S CONTENTS WILL BE OBLITERATED. IT IS SUGGESTED THAT YOU USE A DISKETTE FOR THIS PURPOSE ONLY AND MARK IT AS SUCH FOR FUTURE USE...

The screen format of the program is:

SLOT # DEFAULT: 6

DRIVE # DEFAULT: 1

Hit RETURN here for DEFAULT values or key in the option. Make sure that the SCRATCH diskette is in the drive to be tested. The Diagnostic's disk is write protected for added safety.

**** NEVER REMOVE THIS PROTECT TAB ****

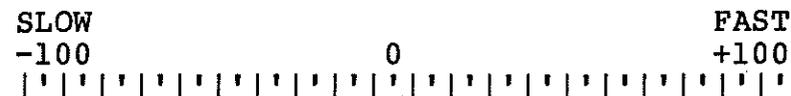
When the final RETURN is pressed, the drive being tested will start-up and a calibration scale will appear on the screen :

DISK SPEED CALIBRATION~

**** TESTING ****

SLOT #6

DRIVE #1



THIS INDICATOR WILL MOVE ACCORDING TO DRIVE MOTOR SPEED

THIS NUMBER WILL INDICATE THE NUMBER OF UNITS TOO SLOW OR TOO FAST

The ideal setting for your drive would be a straight ZERO; however, a drift of 4 units to the positive or negative is acceptable. That is you should calibrate to as near to zero as possible drifting from -4 to +4.

Slight variations are acceptable. A plus or minus 10 being indicates potential problems.

Drives should drift to the slow side rather than the fast.

Ideal = -4 to 0

CALIBRATING THE DRIVE

- NOTE -

The first thing to take into consideration here is this:

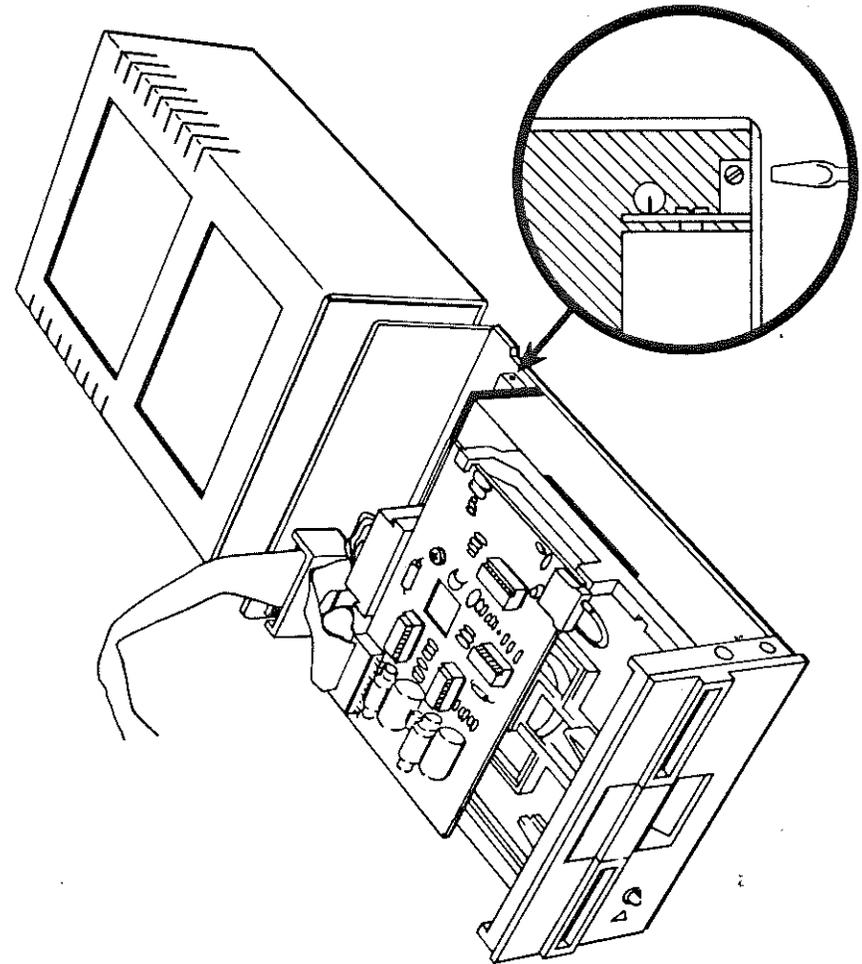
If your drives are under warranty, or if you have the "Extended Warranty", then removing the drive housing may violate and void all contracts, even though there is NO seal... You may run the test and have your dealer service the equipment if you so choose.

REMOVING THE DRIVE HOUSING

- CAUTION -

FIRST TURN POWER "OFF" TO THE COMPUTER
Place the drive on it's side and remove the four Phillips screws from the bottom of the drive. Place the drive right side up and carefully slide the housing back towards the ribbon cable that feeds the drive. Look at the diagram provided on the following page and find the small trimmer that will adjust the speed of the drive motor.

IT IS IDEAL THAT YOU USE A NON CONDUCTING ALIGNMENT TOOL BUT A SMALL SCREWDRIVER WILL DO IT, TRY NOT TO TOUCH THE METAL SHAFT WHILE CALIBRATING.



Now turn ON the computer, booting with the Master Diagnostic's Disk and run the Disk Speed Calibration test again.

With the drive running, watch the screen and slightly adjust the trimmer until you are satisfied with the results. When finished, press the <RETURN> key to go back to the Main Menu and Exit.

Turn OFF the power again, reassemble the Drive and re-boot.

- - NOTE - -

The above procedure is rather simple, but have respect for what you are doing. Disk Drives are very expensive and precise instruments. Don't touch things once you are inside of the unit. Nothing else should be moved or lubricated. Any squealing sound you might hear is normal and caused by a "Bowling" effect while the diskette is rotating. The squealing may come from some vibration of the Rail Carriage and should never be lubricated. Once you have adjusted the speed to it's proper point, re-assemble.

~~~~~

## WRITE PROTECT SWITCH TEST~

---

The Write Protect Switch is a micro leaf switch located internally, at the front left of the disk drive. This switch senses the notch on diskettes by either falling into the notch or by being disabled by a piece of write protect tape on the diskette.

The screen format of the test displays:

Disk Write Protect Switch Test~

---

ENTER SLOT #6

ENTER DRIVE #2

INSERT INITIALIZED SCRATCH DISKETTE

SLOT '6'... DRIVE '2'

HIT RETURN WHEN READY...

After keying in the proper SLOT and DRIVE numbers, the "TESTING" flag will appear at the top of the screen and results will be displayed:

## ERRORS:

**\*\* I/O ERROR SENSED \*\***  
(INDICATES BAD DISK OR NOT DOS 3.3)

**\*\* PROBLEM UNKNOWN... RETEST \*\***  
(CAUSE UNKNOWN)

SWITCH PROBLEM DETECTED - SERVICE  
NEEDED (SWITCH PROBLEM SENSED)

Note that you will be prompted when to insert a "Write Protected" diskette and when to insert a diskette "Without" a Write Protect Tab. It is important to follow these instructions properly, or invalid results will occur. To check the truth of the test you may deceive the program into sensing 'errors'.

Sometimes the leaf switch may loosen and cause a malfunction. If the trigger is not able to insert itself into the notch of the diskette it will not function. Alignment may be accomplished by inserting a write protected disk into the drive and listening for a faint click of the switch. Raise or lower the position of the switch until you hear this 'Click' and then tighten the two Allen screws to hold secure. Now the switch should 'Click' ON and then OFF with the write protect tab removed.

If this technique does not provide a remedy then a new switch is indicated.

## HEAD CLEANING ROUTINE~

---

Drive Heads should be cleaned routinely according to the use of the drive itself. Once a month will provide a well scheduled maintenance procedure for the entire computer.

To clean the drive head, ready the "Head Cleaning Diskette" by cutting or tearing along the dotted line on the pouch. Remove the cleaning element from the pouch and carefully insert into the special jacket provided with our +PLUS kit. Do NOT remove the label covering the access hole on the top of the jacket.

Now run the Head Cleaning Routine.

The following will be displayed on the screen:

## HEAD CLEANING ROUTINE~

---

SLOT =?                      DEFAULT SLOT =6

DRIVE =?                     DEFAULT DRIVE =1

**\*\* VERIFY \*\***

Keying in an "N" here will return you to the drive select, a "Y" will prompt you to: **\*\* INSERT HEAD CLEANING DISKETTE**

Pressing RETURN will start the procedure and the screen will display the sweep of the Head:

SWEEP UP

HEAD POSITION... TRACK 0-34

SWEEP DOWN

HEAD POSITION... TRACK 34-0

---

- NOTE -

You may purchase additional DATALIFE Cleaning Diskettes, 10 to a package from the store where you purchased this program or from any Verbatim dealer. Reorder stock number #21145. Replacement jackets are available as Reorder #21144.

The cleaning diskette is good for one cleaning on one or two drives and will remove up to 90% of the debris contaminating the drive heads. When finished, discard the used cleaning element and save the jacket.

J F M A M J J A S O N D  
A E A P A U U U E C O E  
N B R R Y N L G P T V C

|  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

## Micromodem II Self Test

---

The DC Hayes Micromodem II is one of the most versatile communication devices available. The routine provided on the Master Diagnostic's disk will test each phase of the Micromodem II separately and report the results at the end of each phase. A summ total of all errors detected is given.

The test will ask only the Slot number of the interface card. Make sure that you answer the question correctly. An incorrect response will cause the test to either crash or give invalid results. In the event of a crash, Re-boot and try again.

After giving the Slot #, you will be given instructions to disconnect the Micromodem Coupler. This is the device housed in the smoked acrylic box, fed by a BLUE ribbon cable. Unplug the cable, hit <RETURN> and the test begins.

When finished, re-plug the BLUE cable back into the Microcoupler. Looking from above, the cable has a dark blue strand on it's right side. This is the correct position of the cable. If you look inside the connector, you will notice a small white plug in the bottom left receptacle. Align this so that it mates with the void of it's male counterpart.

## Monitor & RF - Modulator Routines

Requesting the Monitor Routines will give the following menu of options:

### Monitor Routines~

---

1. - Skewing Test
2. - Test Pattern
3. - Text Page Test
4. - Yoke Alignment
5. - Help
6. - Main Menu % - Exit

Request: \_

The monitor & RF - Modulator routines provide several tests to adjust the vertical and horizontal trim, color trim and skewing (twisting) of the monitor CRT or TV screen.

In adjusting your monitor the screen is the best and only visual aid you have and should be utilized to the utmost. Remember that there are anywhere from 12,000 to 20,000 volts being fed to the Anode of the CRT. This HIGH VOLTAGE is enough to be FATAL. Seek professional help if you are not sure of what to do!

The first step is to look at the screen to see that the picture is truly horizontal and vertical. Use the YOKE Alignment Pattern~ (option #4) and adjust the "Deflection Yoke" on the neck of the picture tube to bring a true horizontal plane onto the tube. Loosen the yoke set screw and turn the entire yoke slightly until you are satisfied that the pattern is horizontal. When finished, tighten the set screw and choose the option: Monitor Test Pattern~. (option #2)

This test pattern is an accurate drawing with no distortion. Any deformity displayed by the CRT is most likely caused by the "Guns" feeding the tube. There is no precise way of telling how to adjust the gun trimmers. Making slight adjustments to the HEIGHT; V-LIN and the S-HOLD on TV's or using the HORIZONTAL and VERTICAL trimmers on the back of a monitor, adjust so that the pattern is as near round as possible with all opposite patterns appearing equal.

This will take some trial and error. Make slight movements in conjunction with the controls on the front of the TV or Monitor until you are satisfied with the picture. Next run the Page Text Test~ (option #3) and choose the "Select Character" option. Use the character "H" and let the screen fill with NORMAL H's. (Use of the arrow keys will convert to INVERSE or NORMAL)

Look at the size of the characters on the top line and compare them to the center and bottom lines. They should be the same size or close enough not to recognize a difference. If not, then re-adjust the vertical and horizontal trimmers again until you are satisfied.

When finished, hit any key to return to the menu and choose the option: Skewing Test~ (option #1).

After the screen is filled with white, look to see if any skewing (twisting) is present. Raise or lower the video trim on an RF - Modulator along with the brightness and contrast controls on the monitor itself until little or no skewing is present. This might be difficult when using a television and RF - Modulator.

A pure white screen will cause the most skewing, so try filling the screen with INVERSE H's or any other character, using the "Select Character" again.

Most of these routines require just trial and error to bring all of the above into balance. With a little patience a near perfect picture is possible, especially when using a Monitor.

Color tests provided will display any or all of the 16 Lo-Res colors or 8 Hi-Res colors available. Adjust the

contrast, color and tint controls on your TV or Monitor until you get acceptable color. Pay particular attention to the purple, pink, yellow and the three blue colors.

The color test menu also provides a random Hi-Res generator. This program is written in Applesoft Basic and is only 14 lines long. Here it is:

```
10 HGR2: CX% = 1: CY% =1: S% = -16336
20 X1% = RND(1) * 100: Y1% = RND(1) * 100
30 X0% = RND(1) * 100: Y0% = RND(1)*100
40 DX% = RND(1) * 6 - 2: DY% = RND(1) *
   6-2
50 HCOLOR = INT (RND (1) * 7 +1)
60 FOR A = 0 TO INT (RND (1)) * 500
   +300
70 X1% = X1% + DX%: IF X1% < 0 OR X1% >
   279 THEN DX% = -DX%: GOSUB 140: GOTO
   70
80 Y1% = Y1% + DY%: IF Y1% < 0 OR Y1% >
   191 THEN DY% = -DY%: GOSUB 140, GOTO
   80
90 X0% = X0% + CX%: IF X0% < 0 OR X0% >
   279 THEN CX% = -CX%: GOSUB 140: GOTO
   90
100 Y0% = Y0% +CY%: IF Y0% < 0 OR Y0%
   > 191 THEN CY% = -CY%: GOSUB 140:
   GOTO 100
110 HPLOT X0%,Y0% TO X1%,Y1%
120 NEXT A
130 GOTO 40
140 FOR I = 1 TO 5:II% = PEEK (S%) - PEEK
   (S%): NEXT I: HCOLOR = INT (RND (1)
   * 8): RETURN
```

## Paddle & Sound Routines

The paddle and sound routines will provide the following menu:

### Paddle & Sound Generator~

---

1. - Square Wave Modulation
2. - Paddle & Speaker Function
3. - Paddle Stability
4. - Paddle & Button Test
5. - Main Menu
- H. - Help    % - Exit

Request: \_

### Speaker Function Tests

The first speaker function test, "Modulated Square Wave", will generate an innumerable combination of sounds. One side of the scale will increase as the other decreases in combination with duration. You will notice that some of these combinations are displeasing to the ear while others are not. This is due to a mixture of harmonic scales; however, it does provide for a full range of sound synthesis. If no sound is heard, check

the wire lead from the speaker connector at the right front edge of the Motherboard to the speaker itself at the left front edge.

If all is intact then a problem could be in the audio section or most likely with the speaker itself. The audio section puts out a half watt of power at +5 volts into 8 Ohms. The speaker may be replaced with any other 8 Ohm speaker that will fit into the housing. A 3.5" or 4" oval speaker will fit nicely and greatly enhance the tone quality.

One problem some of the older Apple IIs had was resonance of the housing at certain frequencies. Use the "Paddle & Speaker Function" and rotate the paddle until you hear a vibration or rumbling sound. If this is present it may be corrected by prying off the speaker and re-mounting it using double-stick FOAM tape. If the speaker cloth is torn, replace the entire speaker. They are available at any electronic supply store such as Radio Shack.

### Paddle Stability

The "Paddle Stability Test" will display any drift of the 150K Ohm trimpot located inside the game paddle housing. Occasionally, the resistive element in the potentiometer will wear, or clog with particles causing a skip from one resistance value to another. This will

cause a sporadic jump while using the game paddles rather than a smooth increase or decrease in resistance.

To use the stability test, rotate the game paddles in any number of combinations and let them rest for a moment. Look at the screen and watch the Drift. This is the actual loss or gain in resistance. A normal drift is a plus or minus 1 to 2 with the ideal being a steady zero. Try any number of settings.

#### Paddle Button Test

The "Paddle & Button Test" uses a graphic plotting routine to display the functions of the trimpots and momentary contact switches in the paddle housing.

Turn the paddle knobs to any desired setting and press either of the paddle buttons or the open or closed Apple keys. On the Apple //e, the OPEN and CLOSED Apple keys are the same as button zero and button one. When a button or Apple key is pressed, the line plotted will remain and an increment or decrement in horizontal location will occur depending on which button or key was depressed. A modified version of this routine may be used to draw Hi-Res graphics.

```
10 HGR
50 Y = 10
100 X1 = PDL (0)
110 FOR Q = 1 TO 10
```

```
120 X2 = PDL (1)
150 HCOLOR = 0: H PLOT H1,Y TO H2,Y
190 F = 1: IF Y/2 = INT (Y / 2) THEN
    F = 0
200 ON (Y + 12) / 20 GOTO 1000,1000,2000
    3000,4000,5000,6000
500 H PLOT X1,Y TO X2,Y
550 IF PEEK (-16287) <128 THEN 100
600 GET A$
605 REM U TO PLOT AND ASCEND
610 IF A$ = "U" THEN Y = Y - 1
615 REM D TO PLOT AND DESCEND
620 IF A$ = "D" THEN Y = Y + 1
625 REM E TO EXIT
630 IF A$ = "E" THEN VTAB 23: END
700 GOTO 100
1000 HCOLOR = 1
1010 GOTO 500
2000 HCOLOR = 3
2010 GOTO 500
3000 IF F = 0 THEN HCOLOR = 5
3010 IF F = 1 THEN HCOLOR = 1
3020 GOTO 500
4000 HCOLOR = 5
4010 GOTO 500
5000 IF F = 0 THEN HCOLOR = 5
5010 IF F = 1 THEN HCOLOR = 1
6000 HCOLOR = 2
6010 GOTO 500
```

To save the drawing:

```
BSAVE DRAWING, A$2000,L$1FFF <RETURN>
```

### NOTE:

The Lissajous program at the Color Menu provides no specific analytical function. However, the patterns produced on the screen simulate sine-wave signal voltages of various amplitude and phase relationships applied to the horizontal and vertical deflection circuits in a simultaneous fashion. It also does a nice job of showing off the Apple's graphics capabilities.

There are no video trimmers on the Motherboard, nor other adjustments are available within the computer. One problem causing agent that may arise after a period of time is an "Oxide" layer or residue on any of the fingers of the external device controller cards, such as the DISK I/O card, PARALLEL card, SERIAL card, etc., or any of the IC pins on those cards.

Oxides may form on any of the cable connectors or the pins on any of the IC chips within the computer itself, or peripheral device such as the analog board in the DISK DRIVE II. If this brown layer is present, then it should be removed. These contaminants will be unavoidable with the presence of cigarette smoke around the computer and can provide for some unpredictable events.

An oxide layer can cause either a difference in resistance on any electrical contact or cause a complete dis-connect of any contact. The use of gold plated contacts will prevent most of these problems as gold does not oxidize and is the best conductor of electricity. Gold plated contacts don't have to be cleaned. Many of the newer peripheral boards have gold plated fingers as will the pins on some of the older RAM chips.

Sometimes an intermittent problem may

be do to this oxide layer.

A pencil eraser is a good tool for cleaning contacts. There is just enough abrasive in the rubber to clean the metal without wearing down any of the circuit foil on the cards or the IC pins.

On the card fingers, buff in one direction from the card towards the end of the finger. This will prevent lifting the foil off of the epoxy-glass circuit board.

### Procedures

---

To run a diagnostic check, go through each of the diagnostic routines provided on the MAIN MENU such as ROM test, RAM test, etc. This group of tests will perform a functional analysis of each of the Motherboard or Language card components. Naturally if a test shows that a ROM or RAM is bad it must be replaced. Intermittant problems are the hardest to diagnose.

If a Problem is evident try to pinpoint exactly what area that problem is coming from. For example, if the computer hangs when the printer slot is activated, most likely the problem is either in the printer itself or on the parallel or serial card. Accordingly if the printer has a self test and passes then one variable is eliminated, the printer. The next step is to POWER-DOWN, remove the card and look at it. Check the

fingers on the card for any deformities or oxide deposits and see that all of the ICs are seated properly. If there is a black or brown layer on any of the contacts then clean the entire card.

### - NOTE -

One danger of damaging the components is unavoidable... STATIC ELECTRICITY. You must make certain that you discharge any static electricity from your body before attempting to touch ANY internal component. Always touch a metal object such as the frame of your desk and then the metal bottom of the computer EVERY time you are going into the computer. One small discharge of static on any internal component can provide for an expensive session.

It is also a good idea to remove any metal jewelry from your hands or wrist. You could be adjusting a video trimmer and accidentally touch something with your metal ring. The danger here isn't getting a shock but jumping a few contacts could be fatal for the computer.

One method of narrowing down an intermittent problem is to POWER-DOWN and remove all of the peripheral cards except the DISK DRIVE controller and test. Run all of the diagnostic tests and then run the RAM test continuously for a 12 hour period. If all goes well then you are somewhat certain that it's a controller

that is causing the problem. Replace ONE of the external devices again, eg.: Communications Interface Card, and retest. Some cards are not compatible side by side. Refer to your device manuals or ask an authorized service center. Continue adding cards after each test and test until a fault occurs. If a test fails after replacing a certain card, then most likely the problem is coming from that card.

### Disk Drive Maintenance

---

The Disk Drive II is a precise piece of equipment and requires almost no maintenance. Disks store information magnetically, the same way a tape recorder does. The biggest difference is that a disk is round, like a record. It spins like a record too. Inside the disk drive there is a HEAD which can read and write information and the computer can move the head to any location on the surface of the disk. After a period of use this head must be cleaned. Several manufacturers offer head cleaning kits and these are the easiest to use. If necessary, the head may be cleaned using a 75% solution of isopropyl alcohol.

Power-down and remove the 4 Phillips head screws on the bottom of the drive. Turn the drive right side up and slide the housing skirt back towards and over

the ribbon cable. Using a lint free wand dampened with the cleaning solution and not soaked, gently wipe the head in one direction until it is clean. Using a new, dry wand, wipe dry.

One other check you might make is the WRITE PROTECT switch located at the front left of the drive and held secure by two Allen head screws. The switch should be held in a position so that you hear a faint click when tripped by a diskette being inserted into the drive.

While the drive is apart, this might be a good time to check and calibrate the DISK SPEED. When finished, POWER DOWN and replace the housing skirt and 4 screws.

- NOTE -

Head alignment and other complex problems require sophisticated equipment and technical know-how. This type of service is provided by your authorized service centers.

### General Maintenance

---

The housing of the Apple //e is molded of high impact expanded polystyrene and sprayed with a high density polymer coating. These plastic materials are durable and easily maintained by using most non-abrasive

cleaners that are safe to use on plastic. If using a spray cleaner, spray on a clean, soft cloth and not on the computer or keyboard itself. This will prevent any overspray from seeping into the computer. Our chamois wands will aid in cleaning between the keys and other niches. If there is an unyielding stain a mild abrasive such as "Soft-Scrub", may be used gently to remove the spot. Rinse clean by using another cloth dampened with clear water. A good protective coating after this helps future cleaning. Eg. "Armor-All" protective coating, available at most hardware stores.

Clean the glass window of the monitor with a "Glass Cleaner". Again do not spray directly onto the screen but rather onto a soft lint free cloth.

If the vinyl fasteners that hold the computer cover in place come unwelded, they may be re-glued with "Pliobond Cement", available at hardware stores. Any scores on the metal bottom of the computer may be touched-up with clear nail polish.

## GLOSSARY OF TERMS

---

**CRT:** Acronym for "Cathode-Ray Tube", meaning any television screen, or a device containing such a screen.

**CHIPS:** Integrated circuit, a small wafer of a silicon material into which an electronic circuit has been etched. A single IC can contain from ten to ten thousand discrete electronic components. ICs are housed in DIPs, and the term IC is sometimes used to refer to both the circuit and its package.

**DIP:** Acronym for a "Dual In-Line Package", the most common container for an integrated circuit. DIPs have two parallel rows of pins, spaced on one tenth of an inch centers. DIPs usually come in 14-, 16-, 18-, 24-, and 40-pin configurations.

**I/O:** Input/Output

**INTERFACE:** An exchange of information between one device and another, or mechanism which make such an exchange possible.

K: Stands for Greek prefix "Kilo"  
meaning one thousand.

LINE:  
On a video screen, a "line" is a horizontal sequence of graphic symbols extending from one edge of the screen to the other.

MONITOR:  
A closed-circuit television receiver.

PERIPHERAL:  
Something attached to the computer which is not part of the computer itself. Most peripherals are input and/or output devices.

POTENTIOMETER:  
An electronic component whose resistance to the flow of electrons is proportional to the setting of a dial or knob. Also known as a "pot" or a "variable resistor".

RAM: Random-Access Memory chip

ROM: Read-Only Memory chip

SCRATCH DISKETTE:  
A diskette initialized and ready for use with a set of tests.

VIDEO:  
Information presented on the face of a "cathode-ray tube".

~~~ DISCLAIMER ~~~

DISCLAIMER OF ALL WARRANTIES
AND LIABILITY

NIKROM TECHNICAL PRODUCTS INC. MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THIS DOCUMENTATION OR WITH RESPECT TO THE SOFTWARE DESCRIBED IN THIS DOCUMENTATION, IT'S QUALITY, PERFORMANCE, OR FITNESS FOR ANY PARTICULAR PURPOSE. NIKROM TECHNICAL PRODUCTS INC. SOFTWARE IS SOLD OR LICENSED "AS IS". THE ENTIRE RISK AS TO IT'S QUALITY AND PERFORMANCE IS WITH THE USER. SHOULD THE PROGRAMS PROVE DEFECTIVE FOLLOWING THEIR PURCHASE, THE USER (AND NOT NIKROM TECHNICAL PRODUCTS INC., OR IT'S RETAILER) ASSUMES THE ENTIRE COST OF ALL NECESSARY SERVICING, REPAIR, OR CORRECTION OF ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECT IN THE SOFTWARE, EVEN IF NIKROM TECHNICAL PRODUCTS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

- NOTICE -

Nikrom Technical Products, Inc. reserves the right to make improvements or changes in the product described in this documentation at any time without notice.

WARRANTY INFORMATION

Below is a partial copy of the PRODUCT REGISTRATION CARD. At the time of purchase, the registration card should be filled in and mailed to us. Fill in the copy below for future reference.

Our warranty policy is to guarantee the diskette performance for the first thirty days of ownership. If for any reason the diskette fails to operate during the first 30 days, we will replace the diskette at no cost to the purchaser. After the first thirty days of ownership, the diskette may be re-copied for a fee of \$10.00 if the media is usable. If the diskette itself is damaged, the fee will be \$12.50 post paid, U.S.A. Foreign countries add appropriate postage.