

My Mac's Medicine

by Don Sanders

An alternate title for this article might have been: "How I Finally Got Up Enough Nerve to Open My Mac". Actually, it is a book recommendation and an account of how I have progressed from being afraid to install an internal fan in my Mac Plus (even after Apple's generous 90-day warranty had expired) to where I have boldly ventured into the unknown and fixed a nasty *intermittent* (one of the most time-consuming and exasperating problems faced by electronic repairmen), and upgraded a number of critical electrical components along the way with the help of a book entitled: "Macintosh Repair & Upgrade Secrets" by Larry Pina. This softbound 351-page volume published by Howard W. Sams & Company (Hayden Books), A Division of Macmillan Computer Publishing, 11711 North College, Carmel, Indiana 46032, and retailing for \$34.95, is worth many times its price in repair shop charges for a single repair job *if* you are willing, able, and equipped to follow the author's recommendations.

After purchasing my Mac Plus in December of 1988 and running it for a little over a year without any known hardware problems, I had an internal fan installed, since I had neither the tools nor the nerve to open my Mac. Sometime later I mustered the courage to take the plunge and buy a special 8" Torx® screwdriver with a T15 hexagonal star bit, a "case cracker", and grounding wrist strap to try to install some 1 Meg. RAM modules. Following the written instructions I received with my memory modules, I successfully installed them, saving money and gaining a great deal of self-confidence in the process.

A few months later my Mac gradually developed its first problem with the screen suddenly going dark and restarting with a "beep" for no obvious reason. Needless to say, I soon learned (the hard way) to Save my work regularly, but the problem worsened to the point where I could scarcely run a minute after bootup without experiencing a "dark screen/restart" cycle. At this point I called the local repairman (who had installed my internal fan) and found that I might have to wait a couple of weeks on account of his backlog. I didn't want to wait so I called Total Systems, a mail-order parts supplier, about my problem and they suggested the 5-volt power supply might only need a simple adjustment to compensate for the aging of components. Being emboldened from my past success in installing my own RAM upgrade, I followed their verbal instructions, confirmed the voltage was indeed low (by about 0.25 v.) and easily found the well-marked internal 5-volt power supply adjustment pot on the power supply board, made the adjustment using a digital voltmeter, and.....voila!!..... I had a good solid 5 volts and a stable, working Mac again! This eliminated my immediate problem and gave me almost another year of trouble-free operation, thanks to Total Systems' policy of trying to help the Mac owner and not withhold repair shop "trade secrets". They are to be commended for this, and even though they are not listed in Appendix B (Dealer/ Manufacturer Addresses) of Mr. Pina's book, I have found them to be extremely helpful, courteous, and a good source for components for my Mac Plus.

At this point I decided to invest in a copy of "Macintosh Repair & Upgrade Secrets" and be ready for battle the next time my Mac got sick! I did a lot of reading to become familiar with its contents before actually needing to use it. I didn't have long

to wait....pretty soon my Mac started showing strange new symptoms whereby a portion of the screen raster (the fine horizontal line pattern that the electron beam spot makes as it sweeps across the screen in line-by-line vertical steps) would momentarily collapse into thick bright wiggly lines for a split second, usually near the central and bottom portion of the screen. These incidents occurred more frequently the longer the set was on. I found that turning it off to cool for even 10 minutes helped a lot, as did placing a fan to blow across the top of my Mac (utilizing the Bernoulli effect). Week by week as the incidents became more frequent, the dark screen and startup “beep” cycle and even “flapping” noises (the protective crowbar circuit in operation) often occurred immediately after the collapse of the raster. Also I noticed a correlation between the screen flashes and the insertion of a diskette. This suggested that the intermittent problem was being induced by mechanical vibration as well as heat, and was probably due to a poor connection somewhere.

After searching thru “Macintosh Repair & Upgrade Secrets” for guidance, and checking internal cable plug and socket contacts to no avail, I finally got to the root of the problem by *visually* detecting a couple of cracked solder joints on the analog (power supply) board where one of the cable sockets was mounted. I found these only after a very close inspection with an 8X magnifying glass. They did not even look suspicious without the magnifying glass! Reflowing the solder corrected the intermittent problem, but since I had gone this far into my Mac, I decided to do a little preventive maintenance by upgrading known critical components as recommended in the book. Most of my parts were obtained from Total Systems, and the tools from Radio Shack. These included some desoldering braid, a vacuum desoldering tool, and a small *grounded* (3-wire plug) 15-watt soldering iron. Radio Shack also sells a heat sink compound and other supplies which I didn’t need then. After installing most of the upgraded, higher-rated components in the Parts List for Maximum Analog Board Upgrade (Table 7-2 on p. 129) and replacing the 20-AWG wire cable with a heavier 18-AWG cable, I readjusted my 5-volt supply and went thru a series of tests which was run with the diagnostic software disk supplied with the book. The disk generates test patterns for adjusting the screen size, linearity, and beam focus, etc. It was surprising to find how much my screen had shrunk in the 2+ years I had used my Mac! Now I expect my Mac to be able to make it through the Arizona summer without a failure---at least due to the components I replaced.

“Macintosh Repair & Upgrade Secrets” which covers only the Lisa and the small-screen Macintoshes up thru the SE may not be for everyone, but the author says that even if you’ve never held a soldering gun before, you could save yourself hundreds of dollars. I described my last problem to a local Apple dealer who said it would be \$75 per hour to put it on the bench, and if the trouble were found to be in the power supply board, they would have to replace the whole board at over \$200, since Apple would not allow them to make repairs at the component replacement level. Is this enough motivation for you to at least try and see if the problem is simple enough to fix it yourself? It was for me! Larry Pina says that, “Unlike the proprietary ROM chips on the logic board, there’s nothing special about resistors, filter caps, and rectifiers on the power-supply board”. Fortunately, my problem was on the power-supply board which generates most of the heat in the Mac and has the largest frequency of component failures.

This book is well-illustrated, and the author puts safety first in all of his directions, which are clear and written so that non-technical people can understand them. After all, as the back cover sums it up, Pina reveals that the greatest “secret” of all is that Macintosh users can repair and upgrade their Macs, using parts available at the local electronics store and the proven, step-by-step instructions in this book. I found this to be true for me, and perhaps it can be true for you also!