

Spectre
GCR

Gadgets 
by Small, Inc.

Spectre **GCR**

**The Premier Macintosh
Emulator**

(the one that reads Mac Disks)

by David Small

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Δ CAUTION Δ

Δ HIGH TECHNOLOGY Δ

Δ FUN TO READ Δ

WARNING: This manual is easy to read and actually entertaining. This may ruin your enjoyment of other computer manuals.

We can accept no responsibility nor liability for clarity of this manual, or if you decide that you strongly dislike other manuals after reading this one.

FURTHERMORE, SOME OF THE DIAGRAMS WERE DRAWN BY SOMEONE WITH THE ARTISTIC ABILITY OF GENGHIS KHAN.

Reading this manual is probably not necessary, as the GCR is so straightforward to hook up and use. However, **you should read this manual**, even if you've owned a Spectre (or Magic Sac) before, because of all the new things we've added to the software, like version 2.0 (and 128K Rom support). Besides, you'll kick yourself if you break your new GCR because you didn't read the manual first.

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Thank you for reading this notice. Oh, yeah, read the license agreement in back. It's a dirty job, but someone has to do it.



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Introduction: There and Back Again

THIS IS NOT AN INTRODUCTION WHERE THE AUTHOR THANKS HIS MOM AND DAD AND WIFE AND PET GILA MONSTER. THIS ONE IS ACTUALLY WORTH READING. IN FACT, NO ONE IS THANKED HERE (WELL, ALMOST NO ONE). IT WILL, HOWEVER, GIVE YOU A VALUABLE OVERALL "FEEL" FOR THE SPECTRE.

Four years ago, I began working on an impossible project: bringing up the Mac operating system on the Atari ST.

I had little idea* what I was getting into. I knew that the functionality of the Mac was contained in two 64K ROM chips; I knew I could physically connect the chips to the ST, and I knew a tiny bit about the Mac operating system. This was back when the ST didn't have its operating system on chips; you had to load it from disk. So plugging the Macintosh ROMs in wasn't any big problem, you understand!

As I looked into the challenge, I learned that there wasn't any problem I couldn't overcome with a mix of elegance, hacking, and (usually) sheer force, which translates to lots of late night programming sessions, coffee, and so on. I think I can honestly say I pushed myself to my very limit in making the Mac work on the ST – it took lots of hard work, real creativity for otherwise unsolvable problems, and imagination to figure out why something was failing.

From November 1985 to February 1986, I wrote around 12,000 lines of code, and brought up what was called the Magic Sac™. It was

* or I would have gone into the ice cream truck business instead



demoed for the first time that month.

It received a lot of publicity, and a lot of interest, so from February to September 1986, I cleaned it up, added all the stuff you need to make a "nice hack" into a "usable program", and unleashed it on the unsuspecting public.

Well, it worked, but... Lots of popular applications crashed. Sales were slow when word got around it wasn't perfect.

I spent September 1986 to May 1987 fixing bugs in Mac programs, which were causing the Magic Sac to crash. May 1987 saw release 4.32 of the Magic Sac, which finally started fixing the system crashes on a widespread basis. I wrote some code which recovered from "bus errors", which the faulty Mac programs were causing. (The Motorola manual says this is impossible, but I'd long since quit listening to words like "impossible".) I spent many hours online supporting users, answering questions, and helping out; I set up support areas on Bix, CompuServe, GENie, and Usenet. I got to know many people and made many friends there. They pointed out problems; I would put out a new version of the software that (sometimes) fixed the problems; and the cycle would repeat.

From May 1987 to January 1988, various goodies were added to Magic Sac. Version 4.52 brought the hard disk online for the first time. The Magic Sac grew to 23,000 lines of code. In 1988, version 5.9 brought HFS and the Translator One™ online, so the ST could read/write Mac disks directly. The Translator was a long, exhausting project, and wiped out Summer 1987; an 11,000 line Z-80 assembler program to control it, tricky hardware to read/write the weird Mac disk format, and keeping an external device in sync with the Atari over a variety of adverse conditions is not a trivial project.

When released, the Translator One was like a slow motion disaster; the boards didn't work right for a variety of reasons. Many were the days I left the office at 3 AM. Thus went winter 1987-1988.

In about March 1988, I left the company (Data Pacific) I'd helped build. The circumstances are much too painful to recount in what is otherwise going to be an upbeat manual. Suffice it to say I wasn't happy with the direction the company was going.

From March 1988 to June 1988, I more or less retired, taking it easy, having a long, long needed vacation. I turned 30 in April 1988,



and my wife Sandy and I had a baby a week later.*

The 128K ROMS

All through this time, a thought was running through my mind: the 128K ROMs.

See, the 64K ROMS were a good first try for Apple, but they had bugs. So Apple debugged them, sped them up considerably, did neat things, and came out with 128K ROMS (twice as big) in the new Mac Plus. Lots of programs *only* worked with these 128K ROMS. Important stuff like all Systems past 3.2, HyperCard™, Adobe Illustrator™, Aldus Freehand™, MacWrite 5™, MacWrite II™, MacPaint II™, FileMaker™, Quark X•Press™, Ready Set Go™, and you get the idea.

None of these programs worked on Magic Sac, and at that time there wasn't any way to make them work that anyone knew of. Anyway, after patching the fixes to the bugs for awhile, Apple completely dropped support for the 64K ROMs.

I remembered how hard it was to bring up the 64K ROMs, which was a lot like three months of wisdom teeth extraction. The 128K ROMs were, well, twice the code, and twice as much to do. Besides, I wasn't sure anyone *really cared* about the 128K ROMs.

Bruce Rogovin, a good man that had helped "Beta Test" new versions of Magic Sac, kept calling me. "People are interested, Dave. They'd buy it if you would do it." Darlah Pine and Sandy Wilson on the GENie network kept after me; they arranged an electronic conference on the 128K ROMs, asking, "Is anyone really interested?"

Forty people showed up to emphatically say "YES".

A hundred fifty people left positive responses to a GENie note I left, asking if they'd be interested in the 128K ROMS.

I began to wonder if my opinion was wrong. I said to myself, "Self, is my opinion wrong?"

I read the astrology column in the paper; Aries said, "DO THE 128K ROMS, I NEED MACWRITE 5". I did OUIJA board tests; other-worldly spirits chanted, "128... 128... 128". Demonstrators carried signs

* Okay, I didn't work ALL summer 1987.



outside my house. Mobs of howling computer groupies tore the clothes from my body and...

EDITOR: AHEM!

Oh, excuse me.

EDITOR: Isn't there something that you're forgetting?

Oh, yes. Readers, my EDITOR here is Sandy Small, otherwise known as my wife. Pleased to meet you. She'll pop in from time to time with corrections and to keep me from getting carried away.

So, back to the story.

I knew my opinion had been wrong. People wanted the 128K ROMs. They'd had a taste of what the Mac could do; now they wanted to shift into high gear. The Mac people were abandoning the 64K ROMs in droves.

Starting in June 1988, I came out of retirement. I ordered up a set of 128K ROMs, started looking them over. I dusted off my Neil Young album (more on this later). The late night sessions began anew. And I started pushing the envelope of what could and couldn't be done once again.

After a lot of very difficult work, I got a smiling Mac icon on the screen. Now, sure, I could have just drawn it with Degas, but **Noooooo**, I had to do it the hard way. "Welcome to Macintosh" came up; the 128K ROMs started up. And gradually things began to work. The Desktop started working. The mouse. One very exciting night, HyperCard started working. MultiFinder™ came up one night and ran eight Mac programs at once. Gradually, the system began to get stable; I tracked down bug after bug, pushing the limits of the system. And then came the day when I couldn't find any more ways to crash it.

So then I put some serious effort in the disk drives. I made them as fast as I could make them go. I've been coding disk drive software since 1982, when I did the software for the L.E. Systems disk drive, for the 8-bit Atari 800; that was the fastest disk drive ever done for the 8-bit. I went farther than even L.E. Systems.

I went to extremes on it. I measured where the bottlenecks were



and "unrolled" them. I did completely new algorithms for the floppy disk write code, and honestly, that drove me up a wall; debugging them was very difficult. Finally, they worked, and it was worth it.

The results were pretty surprising. Well, let me tell you. To copy a 500K file, hard disk to hard disk:

Magic Sac: 2 MINUTES +
Spectre 128: 8 SECONDS

First time I did that, I swear, I thought it was a mistake. The file must not have copied, I said to myself. Then, I started watching the disk drive lights, and checked files, and realized: *I was driving the ST hardware as fast as it could be driven.*

It was no surprise things were so fast. For all of its software problems, the ST is one **damn** fast hardware design. All it needed was someone to unleash what was already in silicon.

So passed my summer of '88.

In July 1988, my wife Sandy decided to come out of retirement, too.* She'd gotten bored with computers in about 1983, and decided children were much more interesting. (She has a computer science degree as well; we met in the CS program at Colorado State). She's the one responsible for getting this work to you; for taking care of the thousand and one thankless little jobs that have to be done to get a product out the door.** That's why she's the president of our company.

In August, we hocked ourselves to the gills, and sweated. Barb came to work with us, answering the phone, sending out literature, and assembling Spectre 128's. Dan wrote a "launcher" that knocked my socks off, and insisted I include it. Darlah Pine of GENie generously opened an area for people to leave their names and addresses for information. Ron Luks of Compuserve did the same thing. John DeMar and Mark Sloatman bent over backwards to get us plastic cases; the Jeffco Community Association, who employs handicapped personnel, did the circuit assembly work in record time (and has had our business ever since).

* We like to take our retirement in pieces, when we can afford it, like Travis McGee of John D. MacDonald fame.

** Thank you Sandy!!



By September 1988, we had circuit boards, plastic cases, software, and manuals, so we went to the Glendale Show in California, and put the Spectre 128 up for sale. Our packaging people couldn't get the "on the shelf" packaging to us in time, so we put the Spectres in colored manila envelopes. The night before the show opened, I don't think we slept at all, we were so worried that no one would care.

Morning. Doors open. A roaring mob swept from the doors directly to our booth and lined up. Mark Booth, his wife Cathy, and Doug Wheeler were working with us. Most of our stock disappeared within 2 hours, as our booth was besieged, and the rest were gone just a short time later.

We went home, amazed that people would buy a computer product in a manila envelope, and thankfully paid off the parts people, Visa, American Express, the house payment, the car payment, phone, utilities, etc...

Throughout the winter of '88, we did better. Barb helped us ship zillions of units. Contrary to popular belief, we didn't get rich. The Atari market was just a little too depressed for that, what with their dealers dying off right and left. What we did do was go from being "unknown" to "internationally known" in about 6 months.* We also discovered "being international" means "you need a fax machine". So we got one.



During that winter, I started on a new hack: The Spectre GCR.

I knew a lot about disks, from doing the Universal Disk Copier back in '84, and was sick to death of the ultra-slow Translator. Now mind you, I did the Translator software; I'm allowed to complain about it! The thing was strangled by use of the MIDI ports, which allow only a few thousand bytes per second to pass through. This is *slow* for floppies, which run at, well, the moral equivalent of 100,000 baud. Still, I shouldn't be hard on the Translator; it was the first time anyone had read and written Mac disks in Atari drives, and no one pushes the envelope perfectly the first time.

I knew that I could never look at the Translator code again without having a claustrophobia attack, so I resolved to do it right - a car-

* Even people in Iraq want more information about the Spectre!



tridge based Mac disk reader/writer. The cartridge port can move a *million bytes a second*, if you try.

So we got the first prototype boards in January 1989, and...

EDITOR: Yawn. Cut to the chase, Dave!

We showed the preliminary GCR for the first time in April, a better pass in June, and the final, here's-what-you-get unit in August. During this time, the Beta testers helped me debug the GCR, suggested features for it, and found strange quirks which otherwise would have been inflicted on you. Bless you, Beta Testers: Mark Booth, Jeff Greenblatt, Bruce Rogovin, Norman Walker, Doug Wheeler. I can safely say each one of them saved you at least one bug!

I don't know how many characters of code I've written to support the GCR. I've purposely not counted, because I blew away Spring and Summer 1989 getting final kinks out of it. I do know that I knew all my compact disk albums so well, and was so sick of them, that Sandy took pity on me and got me a random disk-changer. And I got my usual tan from fluorescent lights. Another summer gone.

Alas, we slightly missed our August shipdate, and I'm determined to put in why: a worker in Taiwan installing the plastic mold in the machine was hurt, and the mold was damaged in an industrial accident. He was hospitalized and was fortunate not to lose his hand; he's all right, but will be off work for two full months. It's a reminder that this package you have comes from parts from all over the world, and people have done a lot of work to get it to you. Sometimes I feel like I've done the least; I only dream the things up. Other people make them real.

The Envelope

There's a special feeling I get from doing all this. It's pushing the envelope. It's lying awake at night and knowing you're doing the impossible, that there is no one you can call for help – because no one has *ever* done it before. You wonder and wonder if it can be done; sometimes it just plain can't. You think of new ideas; the problem is always on the back of your mind. You mumble to yourself a lot, and your wife wonders what's running through your mind. You walk into doors a lot.

And sometimes an idea comes to you, you code it up and try it, and it works. And the limits of “possible” get pushed out a little farther.

Watching the Spectre 128 plotting “Welcome to Macintosh” for the first time is that feeling. Watching the hard disks unleashed for the first time at full speed is like that. Seeing HyperCard come up and fly is that feeling.

If you’ve ever heard the sound of a well tuned, high compression, long overlap cam engine winding up... or heard the clipped square wave sound of a guitar pushing an amplifier a little past its limits (listen to Foreplay/Long Time on Boston’s first album)... then you know the sound that’s in my mind every time I go through the envelope in software.

That’s *why* I do it. It’s just another form of art.

Welcome to my latest little hack. It’s called the Spectre GCR. In a way, it’s four years of my life – and I don’t get too many four-year timeframes in my whole life. It is the best program I have ever written. It is the fastest I have ever pushed a piece of computer hardware. It is far and away the most compatible Mac emulator in existence; in many ways you will notice, it is faster than the Mac.

I very much appreciate you paying your money to see it and use it; that money allows me to feed my family and continue doing something I love to do.

I’ve watched many friends who used to be independents go to work for big computer outfits. They get paid a great deal more than I do. But they don’t seem to push the envelope much anymore; they write things like text editing boxes or spelling checkers or whatnot. True, I could make a great deal more money than I make with Spectre if I was to work for, let’s say, Apple, but I’ve only got this one shot at living, and there’s this envelope waiting for me...

I wrote this introduction because I want you to understand that by running the Spectre, *you’re pushing the envelope, too*. There may be times you “crash and burn”. We’re doing something here, you and I, that is supposed to be impossible – running Mac software on an Atari – and it actually works better than a Mac in many ways.

Your Atari CPU moves things around 20% faster. If you’ve used a



Mac, you will notice the supercharging right away. Your screen is 30% bigger, and nearly all programs let you use that extra space. Try doing a drawing, or a newsletter, and you'll be hooked on the ST.

The hard disk is tremendously quick; subjectively, it is much faster than Apple units. Watching a megabyte get pulled through the ST in 7 seconds is awesome. Try this on for size: common Atari hard disks outrun the Mac II standard hard disk in speed on the Spectre!

And as you will see, the GCR moves data off the disk even faster than the no-slouch ST Spectre format floppy disks.

The few times it fails are where we push too hard, and go past the envelope. That's okay to me; nothing is completely perfect. What we can do *inside* the envelope extends the usefulness of your ST many, many times. The best spreadsheets in the world exist within the envelope. The best integration of software anywhere exists here. The best page layout programs; the best desktop publishing; the best human interface software. You can use it all with Spectre.

Conclusion

Let me leave you with a thought.

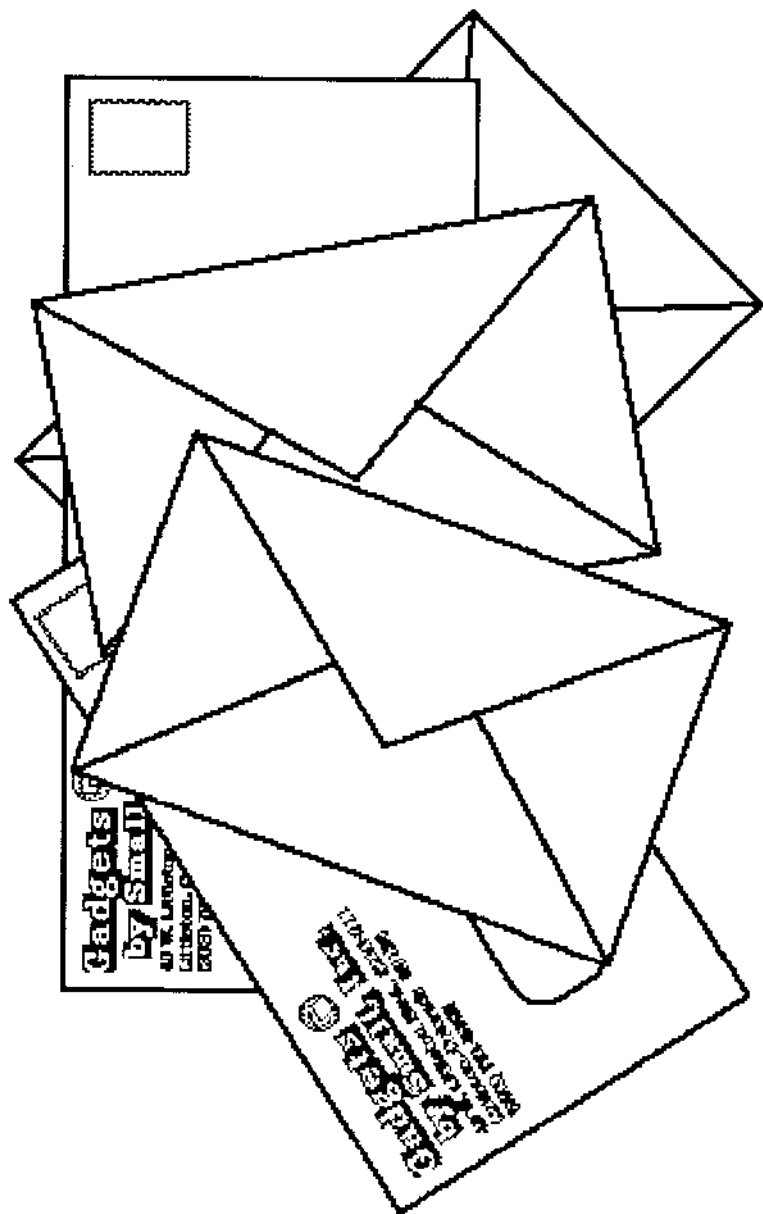
The Spectre's new. It opens up many, many Mac programs that never could run before on the ST.

If *you* run a new program on the Spectre, that may be the first time that program has ever run on an Atari, anywhere, ever. *It happens all the time.*

Welcome to the edge of the envelope.

Welcome to the Spectre GCR!

EDITOR: Psst...Dave, this next picture *IS* what you meant by "pushing the envelope", right?





A Preview Of Coming Attractions: What's in the Manual

Things You'll Need and Want

This section explains the things you'll need to run Spectre 128 and Spectre GCR. It also gives you suggestions on what you may want in the future, to "round out" your system so you get optimum use of your Spectre.

How to Bring Up a Spectre

After the Introduction and Preview, the next thing you'll find in your manual is how to bring up the Spectre – the one-time things you need to do, like plugging in the 128K ROMs. Then, we'll have a quick run through, just so you can get a little perspective on how things fit together. We'll also check out the GCR and make sure that all is well.

Stuff You Need To Know In Mac Mode

The next big section is the stuff you'll need to know while you're running in Mac mode. What key do you push to emulate the "OPTION" key, for instance? And what's the proper way to turn the machine off? I'll warn you right now, just switching the machine off may damage your Spectre format disks! **BETTER READ THE MANUAL FIRST!**

The Spectre Menus: A Survival Guide

The next section explains all about the new "Spectre menu page" that Dan wrote. It tells how to use the many, many utilities we built into the Spectre 128's pull-down menus. Things like formatting a disk, copying it, selecting memory size, and so forth are covered here.

Heavy Metal Rock And Roll: Hard Disks

Then we settle down for some major fun. We talk about running with a hard disk. Believe me, you haven't seen anything yet until you've seen the Spectre running off a hard disk. It screams.

If you can possibly afford a hard disk, get one. It's worth it.

Printers and Spectre

Here's where we talk about printers and printer drivers, and what to do with them.

It's also where we talk about our biggest area "Under Construction": teaching the otherwise mild-mannered Atari Laser Printer to talk to the Spectre. It's not as easy as it looks!

Where to Get Support

As you'll see, the Spectre users have formed a tight community to exchange information, and help each other out; they're good people. I'll tell you how to get in touch with them. We're at the dawn of the information age, with people on-line with computers; if you want to see state-of-the-art support for users, with the absolute latest news, revisions, hints, bug reports, and whatnot, you *want* to join this community. Believe me. There's nothing quite like asking a question, and having someone a few thousand miles away answer it within the hour ... it happens all the time, today, right now.

At first, you just take advantage of it ... then, someone asks a question you know the answer to ... and suddenly you're part of it. It's neat.

I know I'm a little wordy, but heck, I'm used to being paid by the



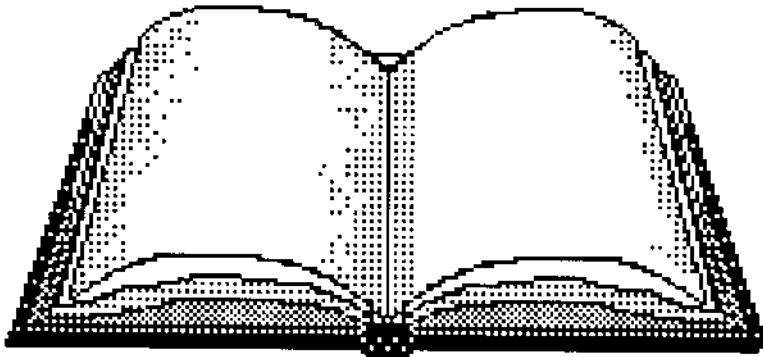
word. Magazines pay per written page, honest. I know Sandy's going to be a little peeved at what it costs to get this manual duplicated, but what the heck.

EDITOR: Ha-ha. Funny, funny. I am to laugh. Sleep on the couch, Dave.

Appendices

There are several different appendices included in the back of the manual. The information in them includes sources for 128K Mac Roms and printer drivers, special function keys, cable pin outs for connecting Macs to Ataris and Ataris to ImageWriters, how to hook up a SCSI hard drive, tips for using a Hard Disk, UltraScript tips, how to interpret the dreaded "crash page", and the ever-present license agreement.

Oh, yes, by the way...



Computer Manuals Are Dull

It is my personal view that most computer manuals are deadly dull to read. Thus, they don't get read; people haven't got time to be bored. So I try really hard not to write a boring manual. And it works; when people have some fun reading a manual, they take the time to **READ** it - and they understand the product better as a result. I think people appreciate not being insulted (e.g., "Hahahaha, I've got you now, you've got to read this turkey, so we're going to make it as bad as we can. We don't care, we don't have to.")

Computer manuals today are absolutely horrific. Oh, they usually tell you **EVERYTHING** - and that's the problem! They're lousy at telling you what's important and what's trivia bowl-only material. It's up to you to decide. It's something like reading a fiction book where pages and pages are devoted to describing the scenery, with the plot sometimes

thrown in, here and there. An editor would tell the author of such a book to "keep it moving". The other analogy that comes to mind is a dictionary with the words in random order.

EDITOR: Keep it moving, Dave.

Thus, I try hard to tell you what's important in this manual, what's merely interesting, and what's frankly kinda boring. Because of this, Spectre users are the best informed users I have ever seen, and many are the people that know more about using the Spectre than I do. The legal stuff is... well, you can guess. It's on the last page, if that gives you any idea, only because our lawyer locked us in his office until we put it in **SOMEWHERE**.

Welcome to the last four years of my life, all those hours spent in front of a CRT, coaxing a stubborn CPU into running an operating system never intended for it. Welcome to some extremely dynamite applications software, huge public domain libraries, and in all truth, an occasional crash on something new. Welcome to being able to write a note straight to the author online and give him a piece of your mind - and get an answer! Welcome to my wife and I putting



*out a product and staking our
future on it. Welcome to the
hardest I've ever worked on
something.*

Welcome to the Spectre.

And now the manual.



Requirements and Other Things

This the stuff you'll need to run the Spectre, that we don't include in the package for one reason or another.

You definitely need:

- ◆ One set of 128K ("Mac Plus") Apple Macintosh ROMs; part numbers 342-0341 and 342-0342.
- ◆ Apple Macintosh Operating System software: "System" and "Finder".
- ◆ Mac software: the programs you want to run.

It doesn't matter if these are on the original Mac disks, or on Spectre format disks (pre-transferred). The whole idea of the GCR is that you can use Mac disks without having to worry about it.

You probably want:

- ◆ An Atari Computer: ST, Mega, or Stacy at this point
- ◆ Monochrome Monitor.
- ◆ Hard Disk.
- ◆ Compatible Printer Driver, and/or
- ◆ An Atari Laser Printer.
- ◆ An all expenses paid trip to Tahiti. (Me too)

Yep, not all parts are included with the Spectre. We would, but we don't for varied and obvious reasons.

Needless to say, we won't have any part of copying the ROMs either to EPROM or to disk, and **strongly** recommend that you don't, either. For your own sakes, don't copy the ROMs! Use original, Apple

parts ONLY.

You need:

◆ One set of 128K (“Mac Plus”) Apple Macintosh ROMs.

The part number varies, depending on the revision of the ROMs. According to Apple, there are three versions. I’ve tested them, and they all work; the differences are in code that I **don’t even use** with the Spectre. So don’t sweat it, okay? There is not going to be one whit of difference if you use the “newest” or “oldest” ROMs.

The sets I’ve got here say “342-0341-C” and “342-0342-B” on them – not to mention, “Copyright Apple 1983-1986.” They Are Not Kidding, people.

Apple’s older ROMs, the 64K version, are numbered “342-0220-A” and “342-0221-A”. Sometimes the “A” becomes “B”. Again, the version DOES NOT MATTER. (Just *don’t mix versions* on the 64K ROMs, or things get confused; the software thinks you have a bad cartridge, since it doesn’t know about that mix. Mixing versions on the 128’s doesn’t matter; if your set has one chip with a “B” and one with a “C”, don’t worry about it.)

We left in 64K ROM compatibility strictly for people who want to upgrade to Spectre but can’t afford both it and the 128K ROMs at the same moment – so that people have the option to “get by” on 64K ROMs for a few weeks.

Since the entire *point* of Spectre 128 is the 128K ROMs very, very few owners actually used 64K ROMs. In fact, with our first release, 1.51, 64K ROM support didn’t work right, and it took people a month to notice!

◆ Apple Operating System Software (“System” and “Finder”)

The “System” file contains the stuff which, when combined with the Apple ROMs, make the Mac go. The fonts (type faces, *like this sort of stuff*) are in System, as well as the Desk Accessories, nifty little utilities you can pull up most anytime. (You’re limited to 15 DA’s, but that limit can be stretched with various aftermarket utilities, like Suitcase II or Font/DA Juggler Plus).



The “Finder” is the program that makes the “Desktop” user interface go. It’s a program like any other, with the ability to copy files, load them and execute them, and so forth. Don’t worry if you don’t see a file named “Desktop” on your disk though, because it is never shown; it’s invisible.

The System and Finder files are periodically revised by Apple, adding new features, fixing old bugs, and adding new bugs. (I said I’d be honest in here). They should *always* be kept as a pair. It’s important. If you mix and match, you’re going to have the weirdest crashes yet seen on a Spectre.

Spectre runs *every* System and Finder, except the very first one ever made, System 0.97/Finder 1.0, from way back in 1984. (Big deal.) As I write this, Finder 6.1/System 6.0.3 is more or less current. This will change with time; Apple keeps trying.

Naturally, the System and Finder are COPYRIGHT APPLE, and are NOT to be illegally copied. They come to you either straight from your Apple Dealer, with a Macintosh, or on many applications disks, whose authors have paid for a license from Apple. I recommend purchasing the System and Finder (and manuals) from a dealer; they will tell you a lot about how the Mac and System/Finder operate.

Some Mac programs require a specific System/Finder to work. For instance, at one point, the early games from Infocom only worked on Finder 1.1g /System 1.1, which is mighty ancient stuff. Read your program’s documentation to find out if it’s touchy in this manner.

◆ Macintosh software – the programs you want to run.

There are commercial programs, that you can purchase from your local Apple Dealer or computer store. There are shareware programs, where you basically get them for free, and if you decide you like them and want to use them, you’re supposed to send a small fee to the author. Finally, there are public domain programs, that can be given away and used freely.

Most Mac users have a combination of all three. There are some excellent public domain (“PD”) programs out there, particularly Desk Accessories, that are extremely useful. Some of the shareware programs, such as some versions of Red Ryder (a telecomm, or modem, program) are excellent, too. Commercial programs vary from complete rot to complete excellence – Microsoft’s Excel™, for instance,



is widely regarded as the best spreadsheet you can use on any machine. Naturally, it works on the Spectre.

You Probably Want:

◆ An Atari Computer: ST, Mega, STE, or even Stacy

I'm just checking to see if you're still awake.

◆ A Monochrome Monitor

Is nice, but not absolutely essential. Basically, a monochrome monitor gives you an excellent, sharp, crisp, clean, 400-line display. A color monitor gives you a fuzzy, sometimes unreadable, 200-line display. Monochrome monitors cost between \$90 and \$150 at periodic sales (and check mail order), and Mark Sloatman at Practical Solutions can get you a neat little switch ("Monitor Master") for going between color and monochrome without swapping cables.

I did the best I could in color; there's just 200 lines missing from the display, and there's not much to be done about it. If you're running color, and you see Spectre in monochrome, you'll understand why I say this. Monochrome is far and away the best. We *highly recommend* it if you are going to do any kind of serious work with the Spectre.

The Spectre DOES NOT RUN COLOR MAC SOFTWARE IN COLOR. IT DOES NOT RUN COLOR MAC SOFTWARE AT ALL! That's the realm of the Mac II, which is a different CPU (68020), different architecture (NuBus slots), and a whole different ballgame.

◆ Hard Disk

This will radically improve the performance of the Spectre, just as it radically improves a Macintosh. You'll have to see it to believe how much faster it is than floppies. The Mac hammers on disks *a lot*, far more than the ST, and hard disks are many times faster than floppies. It's your time.

Nowadays, you can get hard disks from lots of places. Atari makes a good one, ICD does too, Supra, Berkeley Microsystems, etc... it's really hard to go wrong.



◆ Compatible Printer Driver

Okay, here it becomes a little tricky. *You will not be able to print with the Spectre until you get a printer driver that works with your printer.*

Unlike every other computer, Apple didn't make the Mac use "standard printers". This means you can't plug in just any old printer and have it work. In particular, the Mac is meant to drive an ImageWriter™ (an Apple product), and outputs graphics to the ImageWriter in the form of individual dots. Most printers are built to accept standard characters, not individual dots. (Typically, one character is made up out of a 9 x 8 grid of dots, for 72 dots total).

When other printers get the Mac printer codes, they go nuts. My Okidata 84, for instance, starts beeping and ejecting pages of paper. Only a lobotomy can save it at that point.

Now, unless you happen to have an ImageWriter lying around, in which case, you can plug it right into the Spectre, you've got a problem. What you need is a "printer driver", which is Mac software that translates "Mac dots" into the dots your printer can use, and ships them to your printer.

If I've confused you hopelessly, think of Degas™, Tom Hudson's excellent painting program. Remember when you had to select the specific printer driver for it to output your pictures to the printer? It's for the same reason; printer manufacturers use different codes to send dots to the printer. Apple has a "dot standard" that almost no one but Apple uses; unless you translate it to something your printer understands, your printer will just get confused.

Various non-Apple people have written printer driver software, because Mac owners also have other printers than ImageWriters, and want to use them. Names and addresses are in the Sources Appendix.

HP DeskJet Drivers

One VERY popular printer these days is the amazing HP DeskJet, and now the DeskJet Plus. These give you true 300 dpi (e.g., same as LaserWriter or SLM804) printing off an inkjet scheme, at insanely low prices – I can get a DeskJet for around \$600, looking at the ads in Computer Shopper.



Naturally, we started getting questions on “Which is the best printer driver for the DeskJet”, since many Spectre owners have one.

Our own Mark Booth, Beta Tester, began a seeming life-long career testing various printer drivers for his DeskJet. He learned a lot of stuff about how the Mac prints things, how a font four times larger than the printed font has to be available to avoid “jaggies” to look the best, speed, compatibility, and whatnot. He gave us a running commentary on GENie on what was the best driver out of the ones he’d tested. I do get the impression that there are several quality drivers around; you just need to pick the one which suits you best.

Also, someone uploaded a give-away HP DeskJet driver to the GENie network Mac area for essentially public use. So overall, it sounds to me like it’s difficult to go wrong with an HP DeskJet and any of several different drivers.

So, if you’re looking for extremely high quality printing, and don’t need it to be superfast (e.g., you make more newsletters than program printouts), please check out the HP DeskJet and DeskJet Plus. They are impressive printers indeed.

◆ Atari Laser Printer

No, I’m not kidding. The prices on Laser Printers are falling so fast it’s incredible; you should seriously consider a Laser Printer as your next printer. They are fast, quiet, and the output is incredibly high quality. The Atari laser unit sure beats the Okidata 84 I have, which sounds like a B-52 landing on your head while printing. Or a cricket with an amplifier (“WHEET! WHEEET!”). But I digress.

There’s four flavors of Laser Printer to check out:

- ◆ Apple’s LaserWriter™ or LaserWriter II NT™ or NTX™. (Don’t even try with the LaserWriter II SC™; it can’t work on the ST, as it relies on the Apple implementation of SCSI and other weirdness.)
- ◆ Generic PostScript™ Printers, basically, anything that talks Postscript.
- ◆ Atari’s Laser Printer (SLM804 at the moment).
- ◆ Hewlett Packard™ LaserJet™ Printer. See above for Deskjet.



You should not consider any other Laser Printer at this time; there's little chance they'll work with the Spectre.

If you're wondering, PostScript™ is the laser equivalent of the Epson printer standard – it's a language that describes, in exacting detail, a printed page, from characters to drawings. A PostScript file is generally movable from printer to printer, and generally will produce the same printed page, drawings and all, on different brand printers. Apple adopted PostScript for their LaserWriter, and everyone else (except HP) went to PostScript as the only standard out there.

With Apple's laser printing software, it is possible to use the LaserWriter on the Spectre. It's a two step process, involving printing to a file using Command-k, then using a terminal program to move the file data into the LaserWriter. It's not as convenient as the one-step Apple process (where it puts the file directly to the LaserWriter), but it does work. Another option, using the GCR, is to save what you want to print on a Mac format disk and then using a Mac to print it with the LaserWriter.

With a generic PostScript printer, the Spectre works pretty much the same as Apple's LaserWriter, except you can't take the disk and print using a Mac. To print to a file, press Command-k, then output the file to the printer.

With either the Apple LaserWriter, or any generic PostScript printer, you can use Imagen's UltraScript. This involves printing-to-disk, Transverting that disk file to an ST disk, and using UltraScript to print it. It's not hard.

I am adding more support for the Atari Laser Printer at this time. (Well, last week, actually, not right at this minute. The "at this time" phrase is just something writers say to be vague on exactly when they are doing something.)

Anyway, right now you can take "screen snapshots" with the Atari LaserPrinter, either at 1:1 resolution, or flipped sideways at 72 dpi, and they look really great. You may also fool the system into thinking your SLM804 is an ImageWriter, either at low or high resolution (72 or 144 dpi) The printer driver (ImageWriter) used for this is standard on the Mac, and comes on those System disks you bought.

As of this instant, you can't do PostScript printing right out of



Spectre mode (e.g., pull down **Print** and it starts spitting out paper). But we're working on that.

EDITOR: Tisk. Tisk. Revealing information again, Dave?

One downside to the Atari SLM804: you need to dedicate one megabyte of memory to its use. (Atari chose to use ST system memory for the page layout, all 954,000 bytes of it, rather than putting RAM chips in their printer. It makes for a cheaper printer, true, but takes away from your actual system size.)

Plugging a Printer In

How do you plug the printer into the ST? Well, the ST has two output "ports", or places to plug things. One is parallel, one is serial. Use whichever one your printer takes.

CAUTION: It used to be that parallel printers pretty much always used a 36-pin big plug, and serial printers used a small 25-pin plug. You couldn't plug one into the other because the plug wouldn't fit. Nowadays, you find lots of parallel printers on 25-pin plugs, including the ST's. Now, **PLUGGING A SERIAL PRINTER INTO YOUR PARALLEL PORT CAN BLOW UP YOUR ATARI'S PRINTER CHIP. INTO SMALL FRAGMENTS.** If you get a new printer, either know what you're doing, or check with someone who knows what they're doing; don't just plug it in because the cable fits. This is an excellent question for your local Atari dealer; they do this stuff every day.

NEVER NEVER NEVER unplug your printer while your ST is turned on, unless you enjoy big repair bills. That's a quick and easy way to blow your printer chip. This applies not only to Spectre mode, but any old ST mode. Don't ask me how I know this. Quiet, editor.

EDITOR: ZZZzzzzzz....Huh??

Then you need to tell the Spectre which port you've got the printer hooked up to. Sorry, the Spectre can't figure that one out for itself. You do that on the "Printer" pull-down menu when you start up. It's really easy. We default to "parallel" because most people use parallel for their printer, leaving the serial port open for a modem (to call online services, BBS's, etc.)



Spectre and Mac Disk Formats

Okay, now to discuss one of the points of the Spectre that's difficult to get across to new users.

The normal Atari, without a GCR, *cannot read Macintosh diskettes*. If you hook in our Spectre GCR, then, yes, your Atari disk drive *can* read Macintosh diskettes. (That's the major point of the GCR!)

Unlike everyone else in the industry, the Mac records 3 1/2" diskettes in a weird format called GCR. They double the weirdness by varying the speed of the disk drive while recording the disk. Everyone else uses a recording technique called MFM, and a constant speed. Now I don't want to seem down on Apple; using GCR lets you get a reliable, inexpensive disk drive controller. GCR probably made the Apple II into a success.

"MFM" and "GCR" stand for... I can't remember. And I detest computer manuals that tell you what terms mean just to show off how much the technical writer knows.

EDITOR: Dave, I hate to tell you this, but a few pages ago, you told them...

PI equals 3.1415926535897932384643383...

Anyway, it's irrelevant, as long as you realize they are totally different.

Thus, even though the disks are the same size, a Mac disk just will not read into an ST without the Spectre GCR.

It's like trying to play a CD on a record player. It's the same shape, but the data is recorded in a different way. It's like feeding a cat dog food. It's like using a poor analogy in place of a good one.

So we have two disk formats:

- ◆ Spectre format, which is an Atari format, whose data happens to look like what you'd find on a Mac disk.
- ◆ Mac format, which is an Apple Macintosh format.

If you have a Spectre 128, you can only read Spectre format disks; you can't read Mac format disks. You have to use other means to get



stuff off of Mac disks and into your ST.

If you have a Spectre GCR, you can read both Spectre and Mac format disks directly.

This means if you have a Spectre 128 you cannot start up the Spectre in Mac mode until you get a System/Finder disk to Spectre format. With the Spectre GCR, you can start up directly off a Mac disk, as long as it has System/Finder on it.

ST and Macintosh Product Support

We're just going to assume you know how to run the Mac, the ST, and the Mac program you want to run. If not, check out the various manuals; I haven't possibly got room here to cover them, except for the Spectre-specific stuff.

Two good books for the Atari are The Atari ST Book, by Ralph C. Turner, and Helpful Hints for the Atari ST or Mega User, by Bill Skurski Enterprises. The ABACUS books for the ST are OK, but aren't that good for a beginner.


An excellent pair of Mac books are The Apple Macintosh Book, by Cary Lu, from Microsoft Press, which is a fine starter's book, and The Macintosh Bible, by Dale Coleman and Arthur Naiman, which is like every short cut and hint for the Mac ever found rolled into one book. Both are incredibly good, and highly recommended; you'll normally find them both in regular bookstores.

As far as instruction for running a specific Mac program, I'll refer you to that program's manual, shrug, and warn you it's likely to be awful; Mac manuals are usually as bad as Industry Standard manuals. It's a cross we all have to bear.

READER: Oh, no, here he goes again, another lecture on the state of the industry's manuals. Gah.

Okay, okay. Enough preaching.

The Neil Young Fable

hile writing the original Magic Sac, the time came for me to code the keyboard & mouse driver.

This was really hard, and I struggled over the design for a long time. Problem was, on the Mac, the mouse was run directly by the 68000 via interrupts, coming through the SCC chip. On the ST, the mouse is run by the keyboard microprocessor, which periodically interrupts the 68000 to tell it where the mouse moved to. Very different. Also, on both units, the keyboard was run by a standalone microprocessor, and the codes returned were totally different.

I dreaded doing this. I saw problems on top of the problems. Interrupt conflicts, mouse resolution, keyboard mapping... I did many loads of dishes, cleaned up the office several times, went for walks, and still couldn't figure my way through the problem.

It's a hard feeling, knowing that you're past the edge of the envelope, and what you want to do may not even be possible!

Finally, I began to dream of keyboard codes and CAPS LOCK keys; I'd loaded my brain to the brim with all known information.

In desperation, I reached far back into my bag of programmer's tricks for the old axiom: no pain, no gain.

I "logically inverted" this to: If pain, gain.

Well, it's logical, right?

So I looked through my record collection for something that would be true pain. And I found it: Neil Young, live in concert. Off key, trembly voice, songs whose lyrics would depress a hyena.

I put on the record player on automatic repeat, turned it on, and set to coding.

Time seemingly flew by. Neil wailed about Sugar Mountain, smoking your first cigarette, friends coming to him for drugs and then dying, the massacre of



the Mayans by Cortez. Neil whimpered about how it was better to burn out than to fade away, and how rust never sleeps.

Six hours and 1,500 lines of code later, I was done. I tried assembling it for the first time.

No errors.

For those of you who aren't programmers, this NEVER happens! Every program has a few bugs, if only because of typos, and most have logic flow problems as well. If you get a no-error, it usually means that your program has completely been wiped clean - and a no-program means no-errors.

Well, I looked at the disk, and golly, it seemed to have an assembled file on it.

So I ran it. The keyboard worked; I typed "a", and the Mac knew I'd typed "a". I was really impressed! I breathed, "Thank you, Neil". Neil replied about *The Needle And The Damage Done*.

So I got ready to debug the mouse code (which I was really dreading); I moved the mouse to make room for a legal pad to take notes on... and the mouse pointer onscreen tracked with the mouse as I moved it.

I played with the mouse in utter amazement for a few minutes. It worked.

This is the first piece of programming I have ever written that worked the first time. As any programmer will tell you, this doesn't ever happen; it did for me, just this once.

To this day I am terrified to touch that code, lest I break the spell that's clearly on it.

I attribute it all to Neil.

So, these days, I keep in reserve a cassette of Live Rust (no kidding, that's the name), and when the programming gets tough, Neil gets going.

Getting It Going

*“This is about half as hard as half of you think it is.”**

This is all stuff you'll have to do just once. This section covers installing the ROMS, and plugging your cartridge in (128 or GCR). Next, it walks you through starting up the Spectre off floppy for the first time, just to give you a quick lesson on what it's all about.

While you're wondering what on earth that means, take apart the Spectre 128 or Spectre GCR cartridge. Just pull it apart.

► **Spectre GCR:** On the GCR, pull it apart at the circular openings for the drive connectors. Note: we ship the GCR already apart to help you out.

► **Spectre 128:** On the Spectre 128 only, see the three pegs in the plastic cover? If you put it back together with those pegs aligned on the top and bottom halves, you're going to have a heck of a time getting it apart again, I promise you. That's why we ship with the top half "reversed", so you can get the lid off.

I'd recommend real strongly that you leave the lid off, or with the pegs reversed, until you're sure everything is working. It really is hard to get that lid off once those pegs grab ahold of each other.

Okay, inside the plastic, we have a circuit board. Put it component side up and check it out. Note the gold fingers. They aren't the usual cartridge connectors, because they're so expensive; gold is very malleable (soft) and thus makes a much better connection inside your ST. A lot of companies use tin, which corrodes, and needs periodic cleaning. Also note the green stuff on the cartridge; this is "solder masking", which helps prevent hair-thin solder shorts on the cartridge, which mean big trouble. When you make circuit boards, all these

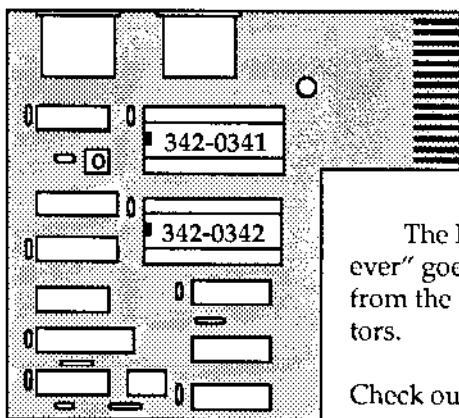
* What the quote means, by the way, is that I too read J.R.R. Tolkien.

things are optional; we went for the highest quality. Believe me, they charge you but plenty for the gold.

Now, it's time to take some anti-static precautions. This means take your shoes off, and don't do this next part while on a carpet. No kidding; shoes and carpets have zapped more computers than anything else I can think of. It doesn't take much static charge to cause trouble. Ground yourself before continuing; another fairly good thing to do is to do this part on a tile floor.

See the two 28-pin sockets? (Two rows of 14 pins each). That's where your ROM chips are going to go.

Installing the ROM Chips



► **Spectre GCR:** The ROM marked "342-0341-whatever" goes into the socket **CLOSEST** to the two floppy disk drive connectors.

The ROM marked "342-0342-whatever" goes into the socket **FARTHEST** from the two floppy disk drive connectors.

Check out Figure 1 to the left.

Figure 1

The **NOTCH** on the end of the chips – it's only on one end, you can't possibly miss it – goes on the socket end next to the capacitor. (The capacitor is the little thing with two legs sticking up from the board, next to each socket's end. Check out the appropriate diagram.) That square solder pad is pin 1, by the way. The notch on the chips should line up with the notch on the sockets, but, every now and then, a socket can go in backwards...

You **MUST** put the chip in with the notch towards the capacitor on the end of the socket. **If you don't, you will fry the chip when you turn on the Atari.** This is a mighty embarrassing way to blow \$150 worth of chips. Double, triple check it – the chip notch is next to the

capacitor end of the sockets.

► **Spectre 128:** The ROM marked “342-0341-whatever” goes into the socket FARTHEST AWAY from the gold fingers, right next to the little chip on the board.

The ROM marked “342-0342-whatever” goes into the socket CLOSEST to the gold fingers, next to the capacitor that goes across the board.

Check out Figure 2 to the right.

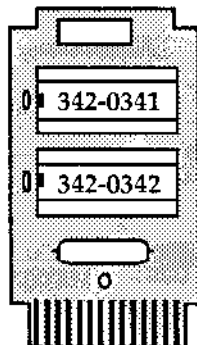


Figure 2

How to Insert Chips

Not a lot has been said so far about *how* to insert chips into sockets. What you want to do is get all 28 legs in there without bending one up, or having it stick out the side. Generally, the chips come to you a little splayed out; the legs point out too much. This can be cured by gently bending them, a wec bit, against a table or whatever. Don't overdo it. And if you blow it, a pair of needlenose pliers will fix many ills.

Start one row of 14 pins. Then, push *towards* that row gently, and get the other row started. Then, push the chip on in. If it really resists hard, you're probably bending a pin; ease up and try again.

Next, pick the board up and look between the chip and the socket; there's about 1/16th inch of space there to look in. You'll be able to see the row of pins. Look for one bent up, bent in, or splayed out. Make sure the chip notch is on the capacitor end of the chip; we have a \$10 bet here at the office that I can't write a manual well enough to prevent someone from blowing up their ROMs, so help me out, okay?

Do this for both chips. Now, that wasn't so bad, was it?

Be sure to press both chips down firmly. If they're only in part-way, they won't work.

If you're plugging in 64K ROM chips, the 341-0220 chip replaces the 342-0341 chip, and the 341-0221 chip replaces the 342-0342 chip. Once again, the notch goes towards the capacitors.

Plugging the Cartridge In

► **Spectre GCR:** The chips are face up; there's really only one way to get the board into the plastic, and that's with the chips up. Unlike the 128, you can't get it in upside down. Go ahead and snap the case together.

On Mega ST machines, if you've stacked the Mega on top of something (say, a MegaFile hard disk), you'll find that the cartridge will dangle in midair. This doesn't hurt anything, but possibly could make it more sensitive to vibration. You might want to think about putting the Mega on the bottom and thus supporting the GCR cartridge.

At this point, run the disk cable from either of the GCR's drive ports to an open ST drive port, but don't plug the cartridge in! This means:

- ◆ If you **only have an internal floppy**, plug the floppy cable from either of the sockets on the GCR to the External Floppy port on the ST.
- ◆ If you have **external floppies**, plug the floppy cable from either of the sockets on the GCR into "the end of the chain" – in other words, the last floppy drive's spare port.
- ◆ If you have an **external drive with only one port** (or just a cable sticking out the back), then plug that cable into either of the sockets on the GCR, then plug the floppy cable from the GCR to the ST. Generally, it's best to put the GCR on the end of the chain, for "signal reflection" reasons, but if you can't, you can't.

The floppy disk cable gets the GCR data from the disk drives (which it shoots into the ST through the cartridge port) and sends data coming from the cartridge port out to the disk drives. Thus until the floppy cables are hooked up, the GCR can't talk to disks. The GCR will be able to get to "put in a Mac disk" and if you put in a Spectre Format disk, it works; the GCR just won't be able to deal with Mac disks.

► **Spectre 128:** Now here's the key thing to remember: **THE CHIPS GO FACE DOWN.** This is real important, because if you put it into the ST and power on the ST with the chips up, you'll fry the ROM chips. And they're expensive little critters.



Remember: THE CHIPS GO DOWN.

Inevitably, someone plugs the cartridge in the wrong way because they didn't read the manual. And inevitably, they kill the ROMs that way.

So, go ahead and check to make sure the top of the chips are pointing down, then put the PC board back into the case. Go ahead and wait to put the lid back on until we're sure things are working, okay? (Remember, if you line up the three pegs, it's going to be very hard to get the case apart.)

➤ **Spectre 128 and Spectre GCR:** Now, next, make sure your ST is shut off. **Never, ever** plug in or take out the cartridge with the ST running; to do so is to likely doom your ST, your Cartridge, and...

EDITOR: the World in general, etc., etc...

Do You Need To Remove The Cartridge? Ever?

Let me try to be real clear on this point. The Spectre 128 or the Spectre GCR is completely idle unless it is specifically asked for. It does not interfere with *anything* ST – not memory, not hard disks, not anything. Unless you double click on the SPECTRE.PRG program to start the cartridge up, it has no effect on your Atari system.

Thus, there really is little reason to remove the cartridge. Plug it in and leave it in.

I mention all this because a lot of people are under the impression you should remove the Spectre while operating the ST in normal ST mode, or in IBM or 8-bit emulation mode. There's just no need, okay? The cartridge is completely idle, doing nothing, unless you specifically call for it.

Also, you don't need to worry about your ST connectors if you are swapping cartridges back and forth all the time. Speaking from personal experience, my computer has had more Spectres swapped in and out of it than I can count right now, and it hasn't affected the connector at all. So, don't worry about cartridge-swapping.

Time For A Test Drive

Now, I'm sure you're wondering if you got the chips in right, and if the ROM chips are okay after all this handling. Okay, we'll test them out. Every time the Spectre 128 or Spectre GCR is started up, the chips are tested. If they're okay, the startup continues; if not, the Spectre displays a warning message, and stops; it tells you in great detail that something is wrong, and even gives suggestions about things to fix.

Okay, start with the cartridge unplugged. Turn on the ST for a moment and watch the video display; mentally note how long it takes from the time you turn the switch on until the video pops on. It varies from almost instantly to 2-3 seconds on a 4-megabyte ST. (It's related to memory size.)

Now, make sure your ST is off, and plug the cartridge in. (CHIPS DOWN on Spectre 128! Maybe check one more time the chips are pointing down? Please?) On the GCR, the disk plugs will be in the back.

Now, we'll do the "smoke test". (That's really what they call it.) What we're going to do is apply power to the ST (and thus to the cartridge), *and see if the ST still turns on*. We'll verify it still turns on by watching the video display; if it goes from black to white, things are well.

What you want to do is turn on the ST and see if the video turns on, just like it did a minute ago. If the screen stays black, there's a cartridge problem – the board's in upside down, a chip is in backwards, both chips are in backwards, the board's in upside down and the chips are in backwards, or whatever.

So, go ahead. Turn your computer on. If the video comes up, you're doing fine. If not, turn the power off briskly, with a graceful downwards sweeping motion of the hand, and pull the cartridge out and examine it.

Editor: Don't panic; we haven't lost a patient yet, and we're not about to start now. We value our customers too much!

The ST is pretty rugged. In the history of the Magic Sac and Spectre, an ST has never, ever been killed by one of our cartridges. Don't sweat it!



Even if the cartridge is a dead short circuit, it takes *time*, many seconds, for enough heat to be generated to damage chips. That's why you're watching the video; the ST has to come up running for the video to go on. If the ST doesn't run because of the cartridge, shut it off, take the cartridge out, and find the problem; the chips won't have time enough to hurt themselves, and neither will your computer.

Common Problems

If your cartridge doesn't work right, check for:

- ◆ Chips in backwards
- ◆ Board in upside down. You just lost me \$10.

Both of these probably will kill the Apple ROMs, which is why I'm warning you so many times.

- ◆ (Rare) Board is inserted crooked. The cartridge can be pushed backwards slightly, and thus be inserted at a tilted angle. This shorts the gold pins across a couple of connector pins internally.

Note: Sometimes stuff gets piled up next to my ST, on the left side. It ends up getting pushed backwards, pushes against the Spectre, and swivels it in the cartridge socket, deftly screwing things up. Just a word to the wise.

- ◆ We have seen a rather odd problem on some boards where, when the cartridges were cut from the main PC board, there was a very thin strip of gold left across all the gold fingers (probably because the gold was malleable and the blade not ultra-sharp). It's rather hard to see (a magnifying glass helps), but electrons will find it.

Symptoms are a "dead-short", your ST doesn't light up. One easy solution is to lightly rub the edge of the cartridge fingers with sandpaper to get rid of the gold remnant; that's how we fix most returned "dead" cartridges here.



- ◆ (Incredibly Rare) Bad board. Call us if you think this is it; it probably isn't, but we'll help you isolate the real problem, or replace the board.

Let's Check It Out

Looking good so far. Okay, the ST will power up like it normally does. (If you've got a hard disk, and are set up to autostart off of the hard disk, that will happen too.) Should things be screwy at this point, say, lots of bombs / crashes, power off and remove the cartridge, and try it again; if the problems disappear, something's wrong in the cartridge; not bad enough to prevent the machine from starting at all, but bad enough to screw it up. Check for the abovementioned gold-finger problem and for chips with a leg up.

Put in the Spectre Program disk (the one we ship with it, not a Spectre-FORMAT disk, which is basically Mac software on an ST format).

Open the icon it's on (A or B), and double click on SPECTRE.PRG. You are now at the "Spectre Menu Page" (see Figure 3, page 36). You aren't in "Mac Mode" yet, but you've taken the first step.

Now, you're saying to yourself, why didn't he tell me to make a backup of the Spectre Program disk? Every other manual tells you to do that right here.

EDITOR: Make a backup! Make a BACKUP!

It's because I know it's a waste of time to ask you to; at this point, the suspense on whether or not the cartridge is working is going to be eating at you, and you won't stop to make a backup even if I beg you to. To be honest with you, I'm really bad at making backups too. The reason I'm rewriting this particular piece of the manual is I lost it to a disk crash, for instance, because I didn't back it up right. Put another way, them that tells you to back it up are the ones that do it the least.

So, like I said, double-click SPECTRE.PRG. In a moment, you'll get to the normal Spectre Menu page (Figure 3).

Now we set up Spectre to default to what you're generally going to want. This manual will cover the many Spectre options in a while, but for now, you're all set, okay? No problem. We just want to get into



Mac mode to see if the cartridge is working fine.

If you press RETURN, the Spectre will start up what we call "Mac Mode". You can also start Mac mode with a pull-down menu (see the File Menu if you want to do this), but let's do it the easy way, and press RETURN, okay?



Figure 3

There will be a pause, and if you're starting up off floppy, a few things will get read off disk. Then, Spectre will ask you to "Please insert System/Finder Disk".

What it's asking for now is the Macintosh System/Finder software. If you have a Spectre 128 System/Finder needs to be in ST format, on the Spectre-format disk. If you are using the GCR, any Mac disk with System/Finder will do. *It is not asking for the Spectre Program disk.*

Now, if you don't have a disk with System/Finder on it yet, *don't worry.* We can test the cartridge without that disk.

If you've got a System/Finder startup disk, put it in, and press RETURN. If not, put any old disk in there – even the Spectre Program disk will do – and press RETURN.

EDITOR: Please back up your Spectre disk first. Please? PLEASE?!!



There will be another pause. It's just long enough for you to think nothing is happening. If you'll look at the File menu entry (see Figure 3, page 37), though, you'll see that it's highlighted. Hang on.

Next, the screen will dissolve into the Mac startup screen. This is a grey screen with a small "Happy Mac" in the middle, smiling at you. But only if you've put in a disk with System/Finder on it.

Otherwise, it'll have a floppy disk with a question mark on it; that's normal too.

Either of these indicates your cartridge is working fine! The Mac software in the ROM chips has checked out, and is correct, and operating just fine. You won't get the fade-to-Mac if they aren't perfect.

Incidentally, I have *never* seen a cartridge "go bad" once it has worked once. The chips never "wear out". The cartridge is very high quality (and darned expensive to make), and will most likely outlast your ST. You may want to make provisions for it in your will.

EDITOR: Family Heirlooms, Dave?

Now, if you don't get the Mac screen with some sort of icon in the middle of it, something is wrong. You may get a "There is something wrong with your cartridge" message, in which case, *something is wrong*. The ST can't "see" and use the ROM chips properly in that case. Check under "Installing the ROM Chips" for common problems, and see if you can find anything. Fix it, and try again.

Congratulations! You've gotten the machine to the point where it thinks it is a Mac, and is asking for a startup disk (e.g., a disk with System and Finder on it). Things are working fine.

Now, this is as far as you can go unless you have System and Finder. If you have the GCR and a System and Finder on either Mac or Spectre format disk, you can start up off that disk.

If you have a Spectre 128, then you can *only* start up if you have System and Finder on a Spectre format disk.



Getting Mac Disks to Spectre Format

The following discussion does not apply to you if you have a Spectre GCR. You don't have to move Mac disks to Atari format, since your GCR can read those Mac disks directly.

With Spectre 128, you need to get the Macintosh programs and data you want to use off the Mac format and onto a format the ST can use. This is a hassle, true. It's the main reason why we came out with the Spectre GCR.

There's several ways to get Mac data to Spectre Format:

► You can wire together a Mac and an ST, and "modem" the programs and data across a "null-modem" cable. The Mac will read the Mac disks with its disk drive, the ST will write the ST disks with its disk drive. Any modem program will do the trick; "Freeterm" and "Termworks" seem to be popular. Look on the bright side: you'll only have to download it once.

When starting up, run a terminal program on each machine, and download System, Finder, and a Mac terminal program (like "Termworks") from the Mac to the ST.

Then use DCFormatter (included on your Spectre Disk) to format an 800K MFS Spectre format disk (sometimes it is also called Magic format). Use Transverter (see the Transverter Appendix) to transfer the stuff you downloaded from ST format to Spectre Format. Then boot up with the Spectre System/Finder disk. *Then...*

► You can use software that you've downloaded with a Mac terminal program *while* in Spectre Mac mode. The ST will go ahead and write the data with its disk drive into Spectre format, and have no problems. Of course, this assumes you've gotten the terminal program, and the System/Finder to start up with, over to Spectre format already, something of a chicken-and-egg problem. See above for a solution.

► Your local Atari dealer or a friend may have a Spectre GCR or a Mac and be able to convert the software to Spectre format for you.

► There are various public domain libraries available in Spectre format (also called Magic format, since it started out as disks for Magic Sac). The best, far and away, is Current Notes' library.



After It Starts Up: Mac Mode

There will be a short pause as the disk is read. Then the ST will most likely display, "Welcome to Macintosh". (Some games and such don't bother with this). Then there will be a pause, and you'll get to the Macintosh Desktop. This looks incredibly like the Atari ST Desktop, and works much like it.

If this doesn't happen, you have a bad System/Finder disk. Replace it and try again. If you get a little floppy icon with a "?" or an "X" in the middle of the screen, your disk isn't recognized as a "boot disk".

There's many variations on this theme. You can get a "Sad Mac" (no kidding, it's a little pouting Mac with numbers under it), indicating the disk is bad. You can get a "freeze", or "hang", where the machine just sits there, after plotting the smiling Mac, or after the Welcome to Mac, or at the Desktop. Or, you can get the "crash page", which you'll run into some time or other. They all mean the same thing: bad disk.

It all boils down to the same thing, though – make sure you have a good System/Finder disk! You can't get anywhere until you do.

When you're at the Desktop, look around a little bit. You'll notice that you must "pull down" the menus by clicking on the menu entry, as opposed to the ST method of having them fall down on you, sometimes by accident. Try the Desk Accessories; the ST is limited to 6, but the Mac can have up to 15 (or more, using programs like Suitcase or Font/DA Juggler!). You can open and close the disk icon much like the ST, and you can move individual files within the disk around by "dragging them", very much unlike the ST (where doing that would result in a file copy).

Okay, time to shut down. There will be a long, dull explanation of this shortly, but the summary is this:


- ◆ DO NOT use the **ShutDown** or **Restart** Menu options under **Special**.
- ◆ Eject all disks shown on the Desktop (including Hard Disks). There are two ways to eject disks: click on the disk icon to highlight it, then pull down the **File** menu and select **Eject** (Alternately, just press Ctrl-E), or se-

lect all the disk icons and drag them to the Trash (This *does not* throw away the data on the disks!). The disk will likely whirr a bit (this is the final update being done). Then a blinking "A" or "B" will appear at the top of the screen. This is the Mac asking you to eject the disk, since the ST does not have an automatic eject mechanism.

- ◆ Now, you've got the disk ejected okay. It's safe to power off. Or, you can press Shift-UNDO to restart into Mac mode, or Shift-HELP to reboot into ST mode. Whatever.

You must make the Mac *ask you to eject the disk* before powering off. On the Mac, the computer controls disk eject. On the ST, you do. On the Mac, the computer puts off updating the disk until just before it ejects it, because it knows the disk is there until it specifically ejects it, right? So you must force the Mac to "**Eject**" the disk, and wait until the Mac writes its stuff to the disk, then tells you it's okay for you to physically eject it.

In other words, you need to play disk eject mechanism for the Mac.

One of Apple's System/Finder versions has a bug where it ignores you telling it to Eject the disk. This is Finder 5.3. (Look on the **About the Finder** selection under Desk Accessories (the  menu) to get the version #.) If you have this version, you can only eject disks by clicking on the disk icon, then "dragging" it to the trashcan. Again, don't worry; this doesn't throw your data away! It just ejects the disk and removes the icon from the desktop. Only Finder 5.3 requires this, and yes, it's annoyed a whole lot of users who are used to doing it differently.

Well, there you have it, a quick test drive of your cartridge. It's working fine. You might as well go ahead and button up the case. On the Spectre 128, it's up to you if you leave the lid on in the "easy to remove" way or align the pegs up, in which case it'll take a lot to open it up again. The GCR has a special, unique, custom designed (by Cathy Sloatman at Practical Solutions) snap-apart case so - no worries.

Auto-Running Spectre

You can set up the SPECTRE.PRG program to run automatically, without stopping at the ST desktop. To auto-run Spectre:

- ◆ Copy the contents of the Spectre Program disk to where you want them on your hard disk, or if you want to autorun from floppy, onto a floppy disk.
- ◆ Run the SPECTRE.PRG and use the Spectre Menu page to select the configuration you want, and use "Save Settings" to save the configuration. This will create a file called SPECTRE.CNF, or replace any existing SPECTRE.CNF file in that directory.
- ◆ Copy the LAUNCH.PRG and new SPECTRE.CNF file into your AUTO folder. If you don't have a folder named AUTO, just make one.

Now, you will launch automatically into the Spectre program when you boot your ST. To start into Mac mode, just press RETURN. (You can press RETURN before you get to the Spectre menu page – the ST should remember the keypress.)

If you want to run as an ST, just press either "SHIFT" key while you are booting. This will abort the autorun, and take you to the ST desktop instead.

If you ever change the location of your SPECTRE.PRG program, you will need to make a new SPECTRE.CNF file and copy it into your AUTO folder.

From here, the manual will continue on to tell you things about running in Mac mode. Until you're experienced a bit more in Mac operations, some of it won't make sense (for instance, until you know what a Command key is, you won't know why we made the ST's Control key be the Command key, or what it does.)

Then, the manual will talk about the many options available from the Spectre's startup menu, and how you can customize it to be the Mac you want the most. Thus, it's clearly time for an Interlude!

EDITOR: Yeah!



Jennifer and the Mac Disk

Back when Jennifer, our daughter, was four years old, she started wanting to do things for herself. Everything. From washing her own hair to choosing her clothes to...whatever, she wanted to do it. Especially food making.

Sandy and I had gone to a Mac store to pick up a copy of the new MacWrite/MacPaint disk. We got it home, and left it (along with lots of other stuff) on the kitchen counter.

Jennifer came toddling into the kitchen, and decided to make herself a ham sandwich. Out came the bread. Out came the mayonnaise. But ...no ham in the refrigerator. So, she used the disk instead. Didn't taste so good, so she put it down.

We discovered this, to the tune of wailing and gnashing of teeth on our part, several hours later, when the hard disk burped and lost the writing program; the

data files were there, but no program. I needed the original program disk. It took a while to find.

Said I to my wife, "Hey, no problem. These 3 1/2" disks have a little shutter door; the gunk won't be inside." I cleaned the mayonnaise off the outside, opened the door to show Sandy - and found that Jennifer was one clever little girl indeed. She'd gotten the mayonnaise inside, too.

Could we get back to the store? Nope, no time.

So, out came the isopropyl alcohol. We cleaned the disk surface as best we could with about a thousand Q-tips, plugged it into the Mac drive (which sounded most odd indeed; probably it was well lubricated), and, miracle of miracles, copied the programs off the mayonnaise disk, and made a backup. That drive, by the way, has been a little weird since.

Moral of the story: I realize you're perfect, and don't make mistakes. I'm not even suggesting that you need to backup for that reason. But there are many little Jennifers out there, in many shapes and form, just waiting to destroy your data.





Stuff You Need to Know While in Mac Mode

This section of the manual deals with using the Spectre 128/GCR in Mac mode, and on how the ST in Mac mode is different from a Mac.

Ejecting Floppy Disks

You **MUST NOT** eject the floppy disks unless specifically asked to. To treat the Spectre like you treat the ST (changing disks anytime) will likely kill your disks.

EDITOR: Not to mention the frustration involved!

If you've ever seen a Mac, you know the disk drives control their own eject. In other words, the CPU sends a signal to the disk drive, and the drive spits out the floppy disk; you do not have an eject button on a Mac, as you do on the Atari. (Believe it or not, if the system crashes, and you have to get a disk out, you have to stick a straightened paperclip into a small hole on the front of the drive to force the disk out. And believe it or not even more, this is an improvement from Apple's first design; on the Lisa, if the system crashed, you had to remove the front cover to get a diskette out!)

There's advantages to the Mac operating system knowing the disk is locked in there. The Mac doesn't have to leave the disk in a "clean" state every time it's written to, as the ST does (because you can eject an ST disk, at least any time the light isn't on). So the Mac operating system doesn't bother updating the "directory" on the disk; it just keeps the directory in memory, until right before eject. Then, it writes the directory to disk.

On the ST, you have the eject button, which is pretty dangerous



while you are running in Mac mode. Let's say you eject right out of the blue. The Mac doesn't know. The Mac puts off updating the disk "directory" until right before the Mac thinks it should Eject – and by the time it thinks it should write that directory out, you've already removed the disk. Result: the directory isn't updated, *and your work is lost*. Bad news!

Thus you must **ALWAYS WAIT** for the Mac to ask you to eject the disk; in other words, you get to play disk eject mechanism for the Mac Operating System.

Thus, you ask the Mac to eject the disk. It goes and updates the disk, preparing it to be ejected, waves goodbye, and sends a signal to physically "eject". The Atari drives ignore this, since they haven't got an eject motor. But my software starts blinking an "A" or "B" to tell *you* to eject the disk – and the software waits until you do it before continuing.

There's *lots* of ways to politely ask the Mac to let you do a disk eject. Under Finder (the Desktop), you can

- ◆ Click on a disk icon to select it, and pull down **Eject** from the **File** menu
- ◆ Click on a disk icon, and press Control-E (which is **Eject**)
- ◆ Press Control-A to select all disk icons, then press Control-E; this will eject all disks. (A helpful trick to remember!) Control-A is **Select All...**, Control-E is **Eject** whatever is selected.
- ◆ You can select **Eject** at "File Selector" dialogs (e.g., when you are telling a program where a file is going to be loaded from or saved to). If you click on it, you'll ask the Mac to eject that disk.
- ◆ When running on a system with just floppies, the Mac often decides, on its own, that it wants to eject one disk and asks you to insert a different one.



- ◆ There's other tricky key combinations that will force an eject, that I won't get into here. See the [Macintosh Bible](#) or Cary Lu's book for them. (They're worth the money, believe me).

When in Mac mode, and the Mac wants to eject a floppy, the Spectre software plots a blinking letter. That blinking "A" or "B" won't go away until you do the eject. You're stuck until you do it, so you might as well get it over with; remember, you have to play disk eject mechanism for the Mac.

If it wants you to eject drive A, a blinking "A" appears at the top of the screen. If it wants you to eject drive B, a blinking "B" appears at the top of the screen.

If the ST "sees" the eject, it'll tell the Mac that the eject is done, and the A or B will quit blinking at you.

If the ST does not see the eject (which happens mostly with write protected disks), you'll have to notify the ST that you ejected the disk. Press F1 to notify it you ejected the disk in drive A; press F2 to notify it you ejected the disk in drive B.

Blinking "A" means that you should eject the disk in Drive A.	Blinking "B" means that you should eject the disk in Drive B.
--	--

If you're working with non write-protected disks, things will usually work fine; you won't need F1 or F2. However, if you write protect the disks, you'll have trouble. Why? The ST rarely "sees" an eject or insert of a write-protected disk because of the way the Atari hardware works.

All that pressing F1 or F2 does is tell the ST to take notice of a "disk change", either an eject or a disk insert. If there's no disk in the drive, it tells the Mac OS that you just put a disk in there (and the Mac OS begins checking it out, eventually plotting its icon on the screen or whatever); if there was a disk in there, and the Mac OS was trying to eject it, the Function key tells the Mac OS that the eject has been performed, and to move on.

Now, just to complicate things a little, let's add some Atari hardware peculiarities.

I just mentioned the ST will usually miss a disk-insert or disk-eject if the disk is write protected. Why? Well, it has to do with how the ST sees those events. Every 1/70th of a second, the ST checks out each disk drive, to see if the "write protect" switch is closed (that's the little tab you set on the disk to write protect it.) During disk-insert or disk-eject, there is a "glitch", where the write protect signal shifts, because of how a disk goes into the drive. When the ST sees this glitch, bing!, it knows you're doing something to the disk. Unfortunately, this clever idea doesn't work on write-protected disks. Whups.

You've seen this before in ST mode, where you have to press ESC to get the ST to notice that you've changed disks.

Sometimes the ST's *keyboard microprocessor*, which is a full computer itself (!), gets confused if you type *too fast*. If you hit S, then E, real quickly, sometimes the keyboard sends an "F1" keypress on to the ST. The Mac OS thinks you just put a disk into the "A" drive, and starts dealing with it. If the Mac OS thinks you already had a disk in there, it gets very confused; sometimes it asks you to put the disk back in AGAIN, thinking you manually ejected it with a paperclip (and probably mumbling to itself about its users.) Usually, hitting F1 again cures this problem.

You'll know this happens if the ST's disk drive suddenly turns on when you haven't put a disk in it, and the ST informs you that the (non-existent) diskette in there has a problem. It will then ask if you'd like to initialize or eject the disk; click on Eject, press F1 again, and you're out of it.

With Spectre GCR, note that the GCR nearly dies trying to read whatever disk is in the drive, doing retries of all sorts, recalibrating itself, chanting prayers to the gods of silicon chips, and so on. This takes time. The GCR doesn't know that there's no disk in that drive; it just thinks your disk is in really terrible shape. You're going to appreciate all that hang-in-there trying when you have a flaky disk, so Patience!, okay?

There's nothing to be done about this bug. Go easy on S-E keys.

The next problem is some aftermarket drives. The ST senses disk changes by watching the write-protect switch on the disk drives, 70 times per second. If it sees the switch change position, then it knows a disk has been inserted or removed. Again, if a disk is write protected,



the change happens so swiftly that the ST misses it.

On some aftermarket drives, if you have no diskette in the drive, the write protect switch wildly flops up and down (“floats” electrical-ly). This convinces the ST that you’re inserting and removing disks all the time, *and drives the Mac OS nuts*.

The solution to this is to “Disable Disk Insert Detect” at the Spectre startup menu; at that point, the only thing the ST will listen to is the F1/F2 keys. By the way, this feature was added at the request of many users with aftermarket drives, and isn’t the default state. This is just one of many improvements made to Spectre as the result of user suggestions.

So, in summary: **NEVER** eject a Spectre disk unless the Mac OS is specifically telling you to, by presenting you with a flashing A or B. If you need to eject a disk, ask the Mac OS politely, by doing an **Eject** selection of some sort, wait for the flashing A or B, then do it.

Eject Pontifications

You’ve just found out why Mac owners regard system crashes with such dread horror. On the ST, your disk is usually left in a *cleaned-up state* after any write to it, since the ST’s operating system doesn’t know when you’re going to switch disks, and must live in terror of you pressing the ol’ EJECT button. On the Mac, it’s usually left in a *messed-up state* until **Eject**. **If you crash before Eject, big troubles.** This applies ultra-especially to the HFS disk operating system, which the Mac uses in all the newest System/Finders. Sometimes you lose whatever data you’ve written since the last eject. Sometimes you lose the disk. This happens to real Macs all the time. Let me quote from one ad: “Fifty percent of all Mac hard disks have some degree of directory damage”.

When we get to the hard disk chapter, you’re going to see you have a big advantage over Mac owners. You can force the directory to be updated and the disk to be “cleaned” by doing an “eject” to the hard disk. Now, it doesn’t really eject the hard disk – the platter doesn’t come whizzing out of the hard disk drive across the room – but the Mac OS does go “clean up” the hard disk.

Inserting a Disk

When you turn on the ST, you're given two disk icons, for drive A and B, immediately, regardless of whether or not you have floppy drives hooked up or whether they have diskettes in them.

On the Mac, it's a different world. You only get a disk icon when you put a floppy disk into the drive. There isn't the same "A" and "B" icons as in the ST; rather, the disk icon is named whatever the diskette is named. Sometimes it's easy to lose track of which disk is in what drive. (Eject, however, will always tell you with the blinking A or B).

When you start up the Mac, you get one icon by default; it's the one you started up with! If you then push a second diskette into drive B, drive B will light up by itself, whirr a moment as the Mac OS examines the disk, then put B's icon up on the screen, along with the floppy's name.

Note the difference between the ST and Mac operating systems.

If you eject drive B (using Control-E), the icon will stay there, but it will be "dimmed", to let you know that diskette isn't in a drive anymore. (If you eject by dragging the icon to the trash, the icon will disappear).

Now let's say you now insert a third diskette. You get a third icon! You'll have the startup disk icon, the dimmed icon of the disk you ejected, and the new one.

Note each icon has a name; that's the name of the diskette. Thus, icons aren't really related to disk drives, as they are on the ST. For instance, if you take a disk out of drive B, the icon will dim; if you put that same floppy back into drive A, the icon will light back up!

I wanted to point this out to you because it's confusing to first-timers.

How would you copy a file between diskettes? Just select and drag the file as you would on the ST. Note, however, that just dragging a file within a disk's own window will just reposition the icon; on the ST, that would cause a file copy to happen. On the Mac, it just repositions the icon. In fact, you can arrange your "Desktop" any way you want. You can even drag icons out of the windows and onto the Desktop! It's heady stuff.



So how do you make a copy of a file on the same diskette? Select the file by clicking once on it, then use **Duplicate File** under the **File** menu on the Desktop. You'll get a new file named "Copy Of (whatever it was)". You can then rename it to whatever you want. How? Click on the name under the icon; the name will highlight and the cursor will change (to an I-Beam). Press backspace to delete the old name, and type in a new one.

If all of this sounds like pretty wild territory, it's time to get an introductory Mac book, like Cary Lu's *Macintosh Book*, and check it out.

Sometimes the Macintosh will need something off a diskette you've taken out. (This happens a LOT on single drive systems, where you booted with one disk, then ran a program off another disk). It'll display a message asking you to switch disks, and will eject the present one; you'll see the blinking A or B. You have to take the disk out, to satisfy the blinking A or B, and press F1/F2 if the ST misses you taking out the disk. Then, you have to put in the disk the Mac is asking for, and again press F1/F2 if the ST misses the disk-insert. Yes, in some ways, it's akin to being a slave to the computer.

Well, I'm sure that when you were growing up, you never thought you'd grow up to be a disk change mechanism, so let's talk about something else.

One or Two Drive Floppy Systems

If you have a single disk drive system, you're quickly going to find out why Mac owners ran, not walked, to buy second disk drives (or hard disks). The amount of forced disk swapping you'll do will soon drive you crazy. It's that way on a single drive Mac, too. Why?

Usually, when this happens, the Mac is looking for something from the "System" file while running a program – a font, a "resource", or something else. Say the program needs the "Times" font, and doesn't have it on the current disk (since it's stored in the System file). Well, the Mac OS will ask you to change disks to one that has the System/Finder it ran first, and thus the Times font on it, for long enough to read in the Times font. Then it'll switch back to the other disk to get on with the program.

Complicating all this is that Mac programs make lots of subroutine calls to the operating system, parts of which are in System as resources, and every one of those calls can require a disk change.

If you can possibly arrange to have your program and the System file on the same disk, you won't have to switch disks much at all, except possibly to save data. As you will see, this is a real hot idea. Unfortunately, nowadays the System/Finders and Mac programs are so big, they won't fit on one disk!

A two drive system helps lots. On a two disk drive system, just boot off the System/Finder disk in drive A, and put your programs in drive B. That way, the System file is always handy for the Mac to use.

Another very good solution is to use a Ramdisk, such as Ramstart, copy the System and Finder into it, and let the Mac "swap" to the Ramdisk to get what it needs; that way, you won't have to physically change disks. If you've got a RamDisk with System on it, the Mac will usually find whatever it needs in there.

Single/Double Sided Disk Drives

This is a real easy one. If you use single sided drives, you get 400K per disk. If you use double sided drives, you'll get 800K per disk. Of course, you may not put a *double* sided disk into a *single* sided drive and expect results.

However, I did set things up so that if you have a double sided Spectre disk, and you put it into a single sided drive, you can access the first half of it. This is intended just for desperation – you know, user group demos where someone forgot to bring a double sided drive – and if it's to work, all your data must be on the first 400K of the disk (e.g., the front side).

Mac disks are different; you can't get away with double sided disks in single sided drives at all.

400K Spectre disks are in "MFS" format. 800K Spectre disks are in "HFS" format. (This is exactly how the Mac does things, too.) Yes, it's possible to do things other ways, but this is a very rarely encountered thing.



Now, you ask, “MFS? HFS? What do they stand for?” Well, I’m not going to tell you, because this isn’t the usual user manual that tells you a lot of useless trivia; I’m trying to just tell you *important* stuff that you’ll **need**. Nikola Tesla’s patent challenge to Marconi for inventing the radio was upheld by the Supreme Court in 1943, so the next time someone tells you Marconi invented the radio, tell ‘em about the Spectre manual.

EDITOR: *WHAT?!!?* Macintosh Filing System. Hierarchical Filing System.

Ha ha, I just shocked the editor into using italics.

MFS and HFS, very briefly, were two different file storage schemes Apple used, famous for causing nightmares when you changed from one to the other. But the bad old days of worrying about them ended with the 128K ROMs you installed into the Spectre.

On 64K ROMS, you had all sorts of headaches and had to know all about MFS and HFS. In this manual, I don’t even need to mention them – because the 128K ROMs take care of all that nonsense by themselves.

Okay, okay, if you’re into history, the 64K ROMS only had MFS built into them; this “MFS” is the low-level way a disk is laid out and data stored. HFS was Apple’s new, and much more efficient way, of laying disks out, which came built-in with the 128K ROMs. The 64K ROMS could only access HFS disks (which to a Mac, means any double sided disks) through a horrid kludge called Hard Disk 20, which sort-of installed HFS capability into a 64K ROM Mac.

EDITOR: Sort of...

If you’re upgrading from Magic Sac, *please forget everything you had to learn* about MFS and HFS, delete Hard Disk 20 (although it is harmless with 128K ROMS installed), and grin from ear to ear; you can now boot 800K HFS disks directly.

Hard Disks

If you don’t have “Automount” selected on the Spectre Menu Page, then you will need to “manually mount” you selected Hard Disks (or partitions). To do this, just press F3 to mount the first one, F4 for the second, and so on, until you’ve mounted all the drives. Also,



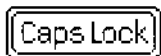
you don't have to mount *any* of the drives when you're in Mac mode; you can leave all or some unmounted.

As far as the Spectre is concerned, Hard Disk ejects are treated the same as floppies, except that you don't get told to remove them with a flashing "C" or "D", or whatever, after you throw the icon in the trash. The Mac doesn't insist on seeing the platter taken out! It realizes even a disk eject slave has limitations.

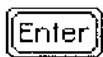
Enough about disks already! Let's talk about something else for a change.

Those Funny Mac Keys

Check out a Mac keyboard sometime. It's got letters and numbers, arranged the usual ways. But it has some strange keys, too.



► **CapsLock:** First, the Mac has a CAPS LOCK key. The Mac's CAPS LOCK physically locks down the first time you press it; the second time you press it, it unlocks. (This is a lot like many typewriter CAPS LOCK keys). Of course, the ST hasn't got a lock-down CAPS LOCK, so use it like you would in ST mode – press once to CAPS LOCK, press again to de-CAPS LOCK.



► **Enter:** Next, the Mac has an ENTER key. On the ST, you can find this key on the right side of the numeric keypad, on the far right of the keyboard. Contrary to popular belief, this is NOT the same as the RETURN key, particularly to Macintosh applications.

Next, we get the two most confusing keys.



► **Command:** On the Mac, there's a key called "Command". It's the one with a cloverleaf symbol on top of it (it doesn't say "Command"). You use the Command key a lot for shortcuts on the Mac – for instance, Command-E (pressing E while holding down COMMAND) ejects a disk. Command-X is always "Cut to Clipboard"; Command-V is always "Paste from Clipboard". There's many more "keyboard shortcuts"; check your program manual for more details.



On the ST, the Command key is the Control key. I did it that way so the first two letters (Command - Control) were the same, so it would be easy to remember.



► **Option:** Next, the Mac has an OPTION key. This key is usually used to let you get to (guess) optional stuff.

For instance, go into the Key Caps Desk Accessory, hold down OPTION, and you'll see a bunch of different, optional characters you can display.. stuff like a © or ™ symbol.

On the ST, the OPTION key becomes the ALTERNATE key.

Thus, if your Mac software wants you to press OPTION-6, just hold down ALTERNATE and press 6. If your Mac software wants a COMMAND-G, just hold down CONTROL and press G. Okay?

Some people get confused by this, because on the Mac keyboard, OPTION and COMMAND are both down on the bottom row, by the space bar, and on the ST, only ALTERNATE is by the space bar. Some even write nasty letters chiding me for not making the ALTERNATE key into COMMAND. Oh well.

EDITOR: You can't please all of the people all of the time.

There are some keys on the ST keyboards that aren't on the Mac keyboard. For instance, the ESC key. You'll note when you press it, nothing happens; it's a ghost key the Mac has no use for, so the Spectre doesn't pass it along. Remember, we're kidding the Mac OS into thinking it's running on a real Mac, and we don't want to disillusion it; disillusionment in a computer means a crash.

The four arrow keys correspond to the arrow keys on the Mac Plus keyboard. Remember, when the Mac first came out, it had no arrow keys, except on an optional numeric keypad. The Mac Plus keyboard made them standard.

I don't think *shifted* arrow keys work yet. I use shift-arrow for various Spectre debug functions (Orwell's Disk Monitor and High Speed Mode On/Off), which I'll go into in a minute.

The INSERT, CLR/HOME, HELP, and UNDO keys do nothing for the Mac.

The keypad keys pretty much do what you think they should do



(a "9" makes a "9", for instance.) However, they don't generate an "extended Mac keypad 0 through 9", they make a regular, plain ol' 0 through 9. Apparently some Mac software cares, so I'll probably update this soon.

I recommend going to the Key Caps Desk Accessory, and typing a few keys, and pressing CONTROL and ALTERNATE until you're comfortable with how the keyboard is laid out; there's a visual display of what Mac key the Mac thinks you're pressing there.

You can turn on Orwell's Disk Monitor by pressing SHIFT-⌘; this will tell you what track and sector number is being read from the disk. It's kind of interesting to see those numbers flying by! To turn it off, press SHIFT-⌘.

Turbo disk mode defaults to ON when you run the Spectre program. This means your drives are running at maximum speed. If you have a certain type of hard disk, Spectre may be running too fast for the drive. You can test this by pressing SHIFT-⇨ to turn Turbo disk mode OFF. (To turn Turbo mode ON again, press SHIFT-⇩.)

If your hard disk performance improves with Turbo OFF, you should select the "Slow SCSI" option under Hard Disk on the Spectre menu page. (This changes the default Turbo setting from ON to OFF.) The "Slow SCSI" option actually just slows the hard disk down to a normal access rate; it's not really slow.

Foreign Keyboards

This section tells you how non-USA keyboards work. If you're using a USA keyboard, feel free to skip over this to the "Mouse Button" section. If you're using a non-USA keyboard, you must have the correctly Localized System to work correctly.

As a user of a foreign ST, you must be aware of how this all works, to avoid problems. I know it appears complex; it IS complex. I had to write it.

Apple makes two physically different types of keyboards for the Mac. The first is US, the other is International. They print various keycaps on top of the keys for the different International keyboards (French, German, UK, and so forth).



Atari *also* makes two physically different types of keyboards, the US and International type. Again, Atari also prints different key caps on top of different keys for the International keyboard.

What I do in Spectre is determine which Atari machine (US, UK, German, etc) you have, at startup time. Then, whenever you press a key, I translate that key into what the Mac *expects* to get from the keyboard *to make that key*.

The idea is that you'll type the key *as it appears on the label* of the Atari keyboard, and that key will appear on the Spectre screen as though a Mac keyboard had pressed it.

This is hard in some places, because (for instance), on a Mac keyboard, a certain key is accessed by pressing it without the SHIFT key – and the ST requires SHIFT down to access that key.

To handle this, I sometimes “press” or “un-press” the SHIFT key without telling you, the user, in order for the Mac to get the right keycode. This press or un-press of SHIFT only lasts as long as the key needs it to work right.

To see this in action, go to the Key Caps Desk Accessory, and work your way through the various punctuation keys. You'll sometimes see the SHIFT key being pressed or un-pressed to make the Mac “see” the proper key.

There is often one key on foreign keyboards that doesn't exist on the Atari keyboards; on the International Mac keyboards, it's to the left of the RETURN key. There is just one key less on that row of keys on the ST than on the Mac. To generate this key, press the DELETE key on the ST keyboard (to the right of the RETURN key). Again, I refer you to the Key Caps Desk Accessory; it will make this all quite clear. Go into Key Caps, press the DELETE and Shift-DELETE, and see what shows up.

Not only do you have an International keyboard to worry about, you must also be aware of which Macintosh System software you are working with. The Macintosh has a *different* keyboard map for each different country. If you use, let's say, a UK Atari ST with a USA System/finder, you will run into keyboard problems; for instance, the “Pound” currency symbol will not work, because that's not accessed the same on US Mac keyboards, and the US System knows it.



To solve this, you must use the Apple "Localizer" utility; this utility "localizes" your System to the proper country, and gives you the correct key map. See your local Apple dealer for the Localizer; it's not included with System/Finder (at least not here in the US).

The Spectre has been tested for each and every key on US, UK, French, and German keyboards; as far as we know, it handles them all, including the pre- and -post "accent" symbols. If you can't find a key, or are getting strange results, remember to check if your System has been localized, and to check Key Caps to see what keys are currently known by the system. Beware of the tricky "two Systems" bug, where you get two Systems on two different disks in the system at once, and where one of the System files is not localized to your country.

So, if you are having keyboard problems, use the Key Caps Desk Accessory to find out which key is what on the Mac/Atari keyboard. Then use Localizer if necessary to setup for a foreign language keyboard.

Mouse Button

This is probably going to be the shortest section in the manual.

The left-hand mouse button corresponds to the Mac's mouse button; use it just as you mostly use it when running ST software.

There, I'll bet that was too easy to be true, right?

Versions of Spectre before 2.0 did not use the right-hand button at all. At a user's suggestion, the right-hand button was made into a Shift key; press it to Shift-down, release it to Shift-up. Why would you want this? Well, in Mac mode, often you have to pick a number of items out of list, and the most common way of doing it is to press Shift, and while holding it down, click on each item. With the new implementation of the right mouse button, you can do this without touching the keyboard.

Sound

The original Spectre software (versions 1.51, 1.75) could not cope



with sound. Even the "Sound Manager", the part of the Mac's operating system that does sound, was switched off. (This caused a few compatibility problems; some programs insisted on using it even though it was off, and crashed, such as World Builder Adventure Construction Set programs.)

Starting in version 1.9F, sound was allowed. It's selected from the main Spectre menu page; as of this writing, you can select either Sound Off (as with the original Spectre), Sound at 11 khz, or Sound at 22 khz. If you want sound, use the 11 khz mode; the 22 khz mode is not yet tuned up properly, and sounds like a cat being tortured.

The Mac's hardware generates sound automatically without the CPU having to fiddle with it, as a spin-off from the disk controller (of all things). The Atari hasn't got it so easy; the CPU has to work itself silly to make MacSound.

Hence, you're going to notice that when Mac Sounds are playing, the system seems very slow; that's because up to half of the CPU is generating sound, leaving only half for you.

This slowdown only occurs during the time that sound is actually being played, not all the time. You've only enabled the *possibility of sound* happening from the Spectre menu page.

Generally this works okay. For instance, a system Beep slowing the system down doesn't matter at all. It doesn't work out as well in games that use sound a lot, especially high speed, reflex-type games – one instant, while sound is being played, the game is very slow, then it speeds back up. Games like this are probably best played with sound cut completely off.

There is a very popular program called SoundMaster which lets you "attach" digitized sounds to certain mouse functions. For instance, the "Beep" on the system I'm typing this on now sounds like a sonar "pin-n-ng-g-g". You'll want to get SoundMaster; you can download it from most any BBS, Compuserve, or GENie, along with some digitized sounds for it; they're a lot of fun.

One thing, though: disk access and SoundMaster don't mix, even on a real Mac. So don't attach a sound to Disk Eject or Disk Insert, okay?

Version 1.9F used to slow the system unnecessarily and force the



user to toggle off sound manually by pressing ESC; this bug has been fixed in 2.0. In general, it's best to leave Sound-11 selected as the default. If, for some strange and arcane reason, Sound doesn't turn itself off after playing, you can force it off by pressing ESC.

Alternate Video

Since this is related to sound, I'll put it here.

Briefly, in the memory of the machine, you must set aside room for the "video screen memory"; this is memory that is displayed up on the monitor (this happens 70 times per second). You must also set aside room for the "sound image memory"; this is sound that is output 370 times per refresh, which happens 70 times per second, or 25,900 times per second.

Now this memory is the same as any ol' computer memory. It just happens to do something else as well; whatever is in screen memory happens to show up on the screen, and whatever is in the sound area gets played on the speaker.

If the two memory areas "collide", then your sound effects show up onscreen as a messy pattern of white/black dots, and the sound becomes very strange. Mac programs that used to "force" sound on, regardless of the volume setting, would end up drawing strange, shifting boxes about two-thirds of the way down the ST's screen; that's the sound data being interpreted as a video image. (The ultimate "music video", I guess.)

On the Mac, video screen memory is 21,888 bytes long. On the ST, screen memory is 32,000 bytes long. If we begin the video memory at where it usually is on the Mac, the ST screen memory, while running Mac mode, runs into the sound memory, and into other stuff, causing trouble.

Thus, I usually shift screen memory down around 10,000 bytes, so it misses sound buffers, error memory, and other things. This is selected by default with the "alternate video" option on the Spectre front panel.

This works on almost *all* Mac programs, which rely on "soft pointers" to tell them where the screen is. A very few Mac programs are "hard coded" to assume the Mac screen starts at where it always



does on the Mac (\$7A700); if you run into one of those programs, select “normal video” instead of “alternate video” on the Spectre startup page. Probably, though, the program will also assume the screen is 64 bytes wide, instead of the ST’s 80 bytes, and will present a messy screen anyway – MacPaint 1.3 pulled this trick in FatBits mode, and makes a mess. (MacPaint 1.5 or 2.0 fix this bug). I believe a commercial Golf program also makes this mistake, and that’s all the times I’ve seen it, in many thousands of applications.

So, anyway, leave it in Alternate Video and don’t worry about it.

Color Monitor Support

Well, look, we might as well say one thing right up front.

Color Monitor support isn’t half as good as monochrome; if you get a chance, go monochrome by all means!!

Also, we do not support Mac II software that works in color, either. The Mac II requires 256K ROMS and a 68020 processor, plus a strange video setup, NuBus cards, and a million other things that aren’t in ST’s. It won’t work.

Here’s the problem with color monitors.

On a monochrome monitor, there are 400 individual “scan lines”, or rows of 640 dots. This means there are 640 x 400 dots on the screen, which means we can paint sharp, crisp pictures onscreen. The Mac has 512 x 342, so we have 128 more dots horizontally, and 58 more vertically. That’s why you can have a “bigger” screen on an ST, when running Spectre.

A color monitor only has 200 scan lines, or a 640 x 200 display. This is 142 less scan lines than the Mac has. Hence, we have several (bad) choices:

- ◆ We can show you half the Mac screen (200 scan lines out of 342 total). This gives a pretty *clear* picture of *half* the Mac’s screen (either the top half, or the bottom half).

- ◆ We can sort of scrunch two Mac scan lines into one color line. This gives a *fuzzy* picture of the *entire* Mac screen; text isn't especially readable, although you can stand it for awhile.

Neither one of these is particularly appealing, so we at least give you the option of doing either. You can change anytime you're in Mac mode with a key press.

If you're working in a small area of the screen, you may want to stay in "half screen" mode, since you can see what you're doing. Perhaps you can size the working window to half-screen; in that case, you're in fine shape.

- ◆ To toggle to half screen mode, press "SHIFT-(*"* on the *numeric keypad* to the right of the main keyboard.
- ◆ To toggle to scrunch screen mode, press "SHIFT-*)*" on the *numeric keypad*.
- ◆ While in half-screen mode, to see the top half of the screen, press "SHIFT-***" (asterisk) on the *numeric keypad*. To see the lower half, press "SHIFT-*-*" (minus sign) on the *numeric keypad*. (The "***" is on top of "*-*", thus it's a bit intuitive).

When in "scrunch" mode, your color settings are going to be *critical* to your visibility. We used to force them to an optimal setting, but persistent complaints resulted in us taking that out; now, you can now set them however you like in the ST's control panel, and we'll use those settings.

To understand what's going on in scrunch mode, look at the ST's hardware manual sometime. Each color dot onscreen is derived from two memory bits, which can be one of four combinations. That forms a number, 1-4; that number is used to determine which "color register" to output from.

The screen is "scrunched" by taking one Mac dot, putting it into one ST screen bit, taking the Mac dot underneath it, and putting that in the other screen bit.



Hence, if both Macdots are white, you want a white Atari dot to result; if one or the other MacDots is white, but not both, you want a grey Atari dot to result; if both MacDots are black, you want a black Atari dot to result.

Using the Atari Control Panel, set the first four colors to black, grey, grey, and white, and you should be in good shape.

With the default red-green-blue colors, you'll get a *weird* "Mac Desktop in color" effect, with colors changing depending on where you are in the screen. It's worth a look; try especially the "fill" patterns in MacPaint. The colors resulting are, of course, accidental, but it is fun to see; then go back to black-grey-grey-white, okay?

EDITOR: After all, you bought it so you could *use* it, right?

I would also suggest using two slightly different greys to help enhance visibility. We've found that the following settings work the best:

Palette	Hex	Decimal	Greyness	Default
0	0FFF	4095	7	0777
1	0CCC	3276	4	0000
2	0333	879	3	0700
3	0000	0	0	0600

In color mode, you're going to notice overall speed is down about 30%, the mouse seems to move "notchily" or "jerkily", and the screens seem to open in sudden movements rather than smooth animation. This is because of how I had to do color. The Mac only knows about monochrome (1-color), and sets up screen memory for monochrome; this is completely wrong for the ST hardware in color. Thus, every 1/30th of a second or so, I take a "snapshot" of the monochrome screen, format it for color, and write it to a separate "color screen". Thus, you're getting a series of snapshots, and hence the strange special effects.

On the highest memory mode of a 1-meg ST, you'll lose some memory going to color mode, as I have to reserve 64K for the "color buffer" (actually, only 32K, but these things work on 64K borders - trust me, they do.)

Monochrome monitors are under \$150, and if you try, you can find them for much less. Many ST dealers tell me that Mac emulation is

one big reason they're selling so well. On the other hand, some people tell me they're perfectly happy in color mode. Make your own decision on this one; I prefer black and white, myself.

The Mac Toolbox

One of the basic ideas behind the Mac, and the reason we can actually run Mac programs on the ST, is that everything done by a Mac program is done through a "Toolbox Call", a sort of subroutine call. For instance, a program might need to write text onscreen; it calls the Mac Toolbox to do it.

The Toolbox, instead of the program, talks to the hardware to get the writing done.

By altering the parameters of the Toolbox, it'll work with the ST. This is how Spectre 128 and Spectre GCR work.

Alas, some Mac programs insist on going straight to the Mac hardware, either by accident or deliberately. When they do, they're trying to crash, because the Mac and ST hardware setups are only vaguely alike. Depending on what exactly the program does, it will either continue, malfunction, or fail instantly.

Be aware that programs such as "disk copiers", "LaserWriter spoolers", and so forth go directly to the Mac hardware to do their job, whereas programs such as spreadsheets, word processors, and such (the vast majority of Mac software) have no need to. Thus, the programs using Mac hardware are specific to the Mac, and cannot run on the Spectre. Honestly, this isn't a Spectre bug.

You're going to be surprised how few programs feel any need to go the hardware. The Mac Toolbox is extremely rich and varied, and covers nearly every need a program can have. This is why the Spectre is so compatible. The only programs which consistently do not use the Toolbox are games and midi programs.

Some programs go to the hardware by accident. They use something called a Pointer, which is a variable that "points to" another variable. Well, through some foulup or other, the Pointer gets set to 0 (the Mac's way of indicating an error condition exists), and then the program tries to store into where the Pointer points: location 0.



On the Mac, this works by accident. Location 0 is reserved by the 68000 for the power-on condition stack pointer, and really ought to be in ROM (read only memory). By an accident of the Mac's design, location 0 ends up in RAM (read/write memory), so the program doesn't crash instantly. Usually, however, a crash is in the works down the road; whatever function that Pointer was needed for just failed. Typically, an "Address Error" sometime later is the fallout from a "Zero-Store".

On the Atari, any "zero-store" causes a crash, since writing into location zero tries to write into "read-only memory", and causes a Bus Error. Zap, the ST dies.

It was depressing to find out how many Mac programs screwed up in this manner. Probably a majority of Mac programs, commercial and otherwise, have this problem somewhere along the line.

In Magic Sac 4.32, I included code that attempted very hard to ignore zero-stores. Since they're done in so many different ways, Mac programmers being creative and all, it took until version 5.9 to catch most of the zero-stores out there. Also, there were three zero-stores I could not help: those caused by BTST, BSET, and BCLR 68000 instructions.

EDITOR: Are you *sure* people want to know this? Dave?

If a program does something like this, the "zero-store handler" tries very hard to take care of it. If it succeeds, you never know anything went wrong. (Of course, later your Mac program may crash, usually with an "ID=2" "BOMB" message, but it would do that on a Mac too.) If it fails, you will get the Crash Page, and the "Bus Cycle" digits will all be 0's. This means the Mac program screwed up.

If this happens, it's usually repeatable, so try to avoid doing whatever it was that caused the crash. It's not going to get better or vary, usually. Thus, there will always be a few Mac programs that won't work, and that's not going to change; just avoid them. Note that if they're doing this, they're headed for a crash on a real Mac anyway.

Those of you with Mac experience will know the "zero-store" as the dreaded "dereferenced Pointer" problem, an extremely common and tricky problem for Mac programs.

EDITOR: We promise not to name names.

Naturally, the Spectre contains a Zero Store Handler, with improved whitener and bleach for those tough to handle stains.

Things You Definitely Should Not Ever Do

- ▶ You should never take a disk out of the drive without the Mac mode flashing an "A" or "B" at you. (Short of a crash, when you've run out of choices anyway).
- ▶ You should never shut the system off without "legally" ejecting the disks, unless you crash.
- ▶ You should never use **Shutdown** or **Restart** from the Finder. I realize they "seem" to work, but our testing has found that they often don't update a disk's directory, thus neatly losing all the work you've done that session. To shut down the Spectre, first, eject all disks (a quick way to do this from Finder is press CTRL-A, CTRL-E, to **Select All** disks, then **Eject** them all), then when done removing disks, power off the machine.

Some day we may catch and repair **Shutdown** and **Restart**. It is very hard, because at present they execute a 68000 RESET instruction, which thoroughly clobbers the ST. I haven't even been able to get the video to come back on without big black bars running through it vertically after this RESET, so don't hold your breath. (Yes, the RESET is why the screen goes black when you select this button; it's also why the ST never wakes up again until you power-off power-on. The 68000 RESET instruction sends a RESET to all the chips in the ST except for the 68000, which pretty well plays bombs-away to the ST.)

- ▶ When you put a disk into the Spectre (Mac or Spectre format) that the Spectre can't make sense of, it puts up a dialog, asking if you'd like to initialize (format) the disk, or just eject it. This is how people usually format disks for the Mac.

As of the writing of this manual, we're not certain yet whether or not we've gotten all the bugs out of our "Disk Initialize" routine. Please see the README file on the Spectre release disk for the most up to date information. We're certainly trying.

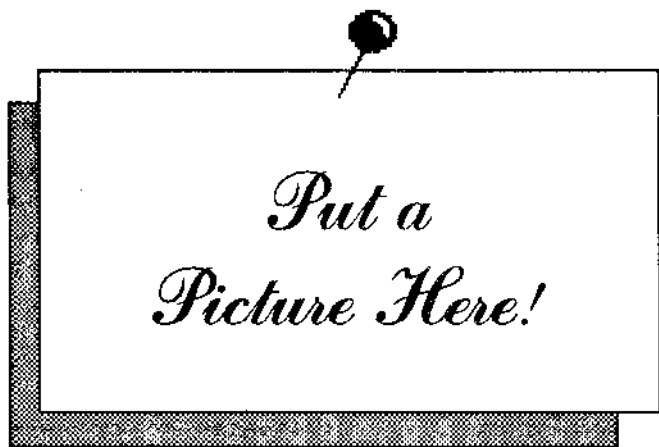


We do allow you to format disks from the Spectre Menu, under Floppy Disk. You can choose either GCR or Spectre format.


You will see "This is Not a Mac Disk" if you put an ST GEM disk into the ST while in Mac mode. Again, choose **Eject** to exit safely.

► You should never try to read a Spectre format disk from GEM (while in regular ST mode). To do so will instantly hang the ST system; you'll have to RESET to restart the machine. GEM does not check that a diskette has even remotely valid data before trying to read things from it, and it happens that the things on a Spectre diskette crash GEM.

The next section discusses the "Spectre Menu Page"; this is the first set of menus you reach immediately upon running the SPECTRE.PRG program. They let you do things like configure what kind of Mac you'll be, format disks, set up hard disks, and more.



Dynamic RAM Horror Stories

 *RAM is the read/write memory inside your machine.*

Now to begin with, we need to expose The Great CoverUp in the industry.

"ROM", "Read-Only-Memory", is one form of memory. In ROM, stuff is burned into a chip, and it can't be changed. ROMs are used, for instance, in game cartridges, inside your ST, and those chips you plugged into the Spectre or GCR are Mac ROM chips.

"RAM" stands for, get this, "R,andom Access Memory". The rationalization behind this name is that you can access any part of it at any time. Well, foo. You can do that with ROM too.

The TRUTH of the matter is far different.

Obviously, if we have "ROM" for Read Only Memory, we need "RWM" for Read Write Memory,

which is what RAM really is.

But unfortunately, it is impossible to pronounce "RWM". Riwum? Ruwum? Rowum? Rurum?

So that's why they call it RAM.

On with the story.

The original RAM was called "Static RAM". If you wrote something into a static RAM, it stayed there for good, as long as you gave it power. Alas, it was hard to pack much static RAM into a chip. The most I've seen is 32K per chip.

So the engineers came up with a horror story called Dynamic RAM, which we're stuck with today. Your ST has between 512,000 and 4,000,000 bytes of this stuff.

When you write to a dynamic RAM, what you wrote immediately begins "leaking away". I AM NOT KIDDING. The CPU must "refresh" the data, to "fill the cup up again", before the data all leaks away, at the rate of thousands of times per second.

Thus, every micro you see on the market is actively struggling



just to keep its marbles.

Now add the influence of cosmic rays to all this. No, I'm not into UFO's or Shirley Maclaine; it's for real. When a cosmic ray, which you and I and both of our computers are constantly being bombarded with, hits a dynamic RAM bit, the bit goes "twang", and sometimes flips. Some computer designers put in "parity bits" to detect this; if a memory bit magically changes (like due to a cosmic ray), the computer knows it's a lost cause, and gives up. This is the dreaded Parity Check fault on the IBM PC. On the ST, though, we don't have "parity bits", and if the computer hits one of the bad data bits, there's no way to tell.

And when your CPU tries to execute that instruction, that's the ball game.

Think of it as Russian Roulette Computing. If you live at

Denver's altitude, as I do, you can expect one cosmic ray "memory hit" per day; lower altitudes have somewhat better shielding, because of the atmosphere.

Thus, when your computer flakes out, loses your work, or whatever, it might not even be your computer's fault - might just be a cosmic ray.

Try to think of that cosmic ray, traveling for possibly millions of years, and millions of miles, all to end up zapping some bits in your computer. The philosophical implications are staggering, the sort of thing I consider at three in the morning, while writing computer manuals.

Or...

Just think... the next time your system inexplicably crashes ... that you just might have caught a cosmic ray from Darth Vader's ship.



The Spectre Menus

When you first double click on SPECTRE.PRG, you're taken to the Spectre main menus. Through these menus, you can do a variety of things. (For people upgrading from Magic Sac, all the functions that used to be handled by different files are handled within one file SPECTRE.PRG, such as disk format, disk duplicate, hard disk format, hard disk status, etc.)

Going from left to right, the first menu entries have to do with the Mac you'll be emulating ("configured as", in computerese) if you start up the Spectre - what memory size it is, what printer it is set up for (serial or parallel), etc. The menu entries towards the right are for things like formatting disks, setting up your hard disks, goodies, and other magic.

Let's go through the menus one at a time and discuss their functions. Actually, we can't really discuss their functions because this is a printed manual, and I'm talking at you, and you can't really say anything back, except by writing on the page maybe and mailing it to me. But it's considered very posh to say "discuss" instead of "talk about". So I used "discuss".

About Spectre

This shows you the Spectre logo, our company name, address, and phone number, and importantly, the version number of the Spectre program (see Figure 4, page 71). You can bet the Spectre will be periodically improved and revised; you need to know what version number you are. We started out at 1.51. The current version of Spectre is 2.0; we've had 1.51, 1.75, 1.9F, and now are at 2.0. Registered owners received 1.75 and 1.9F for free.

Please note this software is copyrighted by Gadgets by Small, Inc.

While it may only seem like a disk file to you, it's the last four years of my life, and my hopes for continuing with this project. If you copy it and give it away, or *especially* if you upload it to a BBS, you'll help to prevent the Spectre from surviving long, and from being improved. We are not making much profit off this product, and the ST market is relatively small compared to the Mac or IBM market; it only takes a little piracy to destroy an ST product. What profit we make gives us time to improve the Spectre, so it's plowed right back in; you see it as an improved product down the road. We have proven we do improve and upgrade the product; you've made our new product, Spectre GCR, possible. Thank you for your support. Please help keep upgrades possible by not giving the software away to anyone.

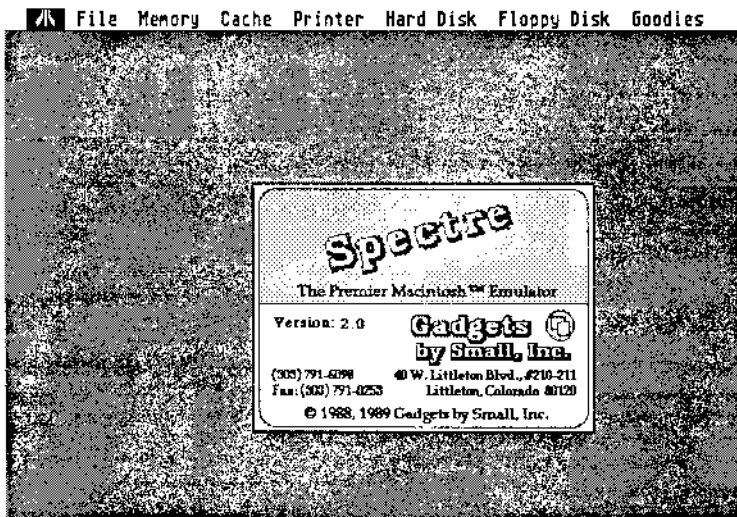


Figure 4

It only takes a few people to upload to BBS's and destroy a product, as has been proven time and time again; the average lifespan of an ST program is often measured in weeks, due to pirates. Please don't be one of the people to hurt the Spectre.

File Menu

There's three options here (see Figure 5, page 73).

- ▶ **Save Settings** takes the way the Spectre is currently configured



(memory size, printer selection, etc.) and saves it to a file named **SPECTRE.CNF**, on whatever the current directory is (where you ran the program from). If the disk is write protected, of course this will fail.

The nice thing about saving your configuration is next time you run Spectre, it'll come up pre-configured the way you want it, so you need to only press RETURN to start up.

If Spectre ever finds that you've changed memory sizes or hard disks or something since you last wrote the configuration file **SPECTRE.CNF**, it'll reset everything and ask you to start over; this is to prevent you from accidentally walking into a disaster area after changing hard disks, getting a memory upgrade, running on a friend's machine or at a user group demonstration, etc.

- ▶ **Quit** (or pressing Control-Q) just exits you back to GEM, if you came into Spectre accidentally, or were only here to store your configuration file, format some disks, etc.
- ▶ **Spectre** (or just pressing RETURN) starts up the Spectre into Mac mode in whatever form it's currently configured to be.

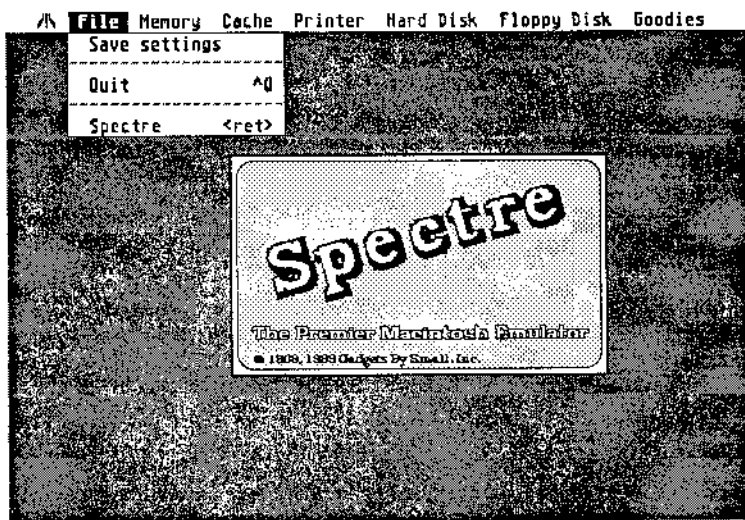


Figure 5

Hence, the first time you run Spectre, you'll spend time in the menus configuring it, and save the configuration, then (if you want)



press RETURN to go to Mac mode; after that, you need only run SPECTRE.PRG, and press RETURN, to start up with your customized configuration. You can also press ENTER; I find that early in the morning, it's a lot easier to hit ENTER than RETURN.

Memory Menu

This menu basically tells the Spectre how much of the ST's memory to allocate to the function of being "Mac Main Memory"; e.g., memory the Mac operating system will know about and use. (see Figure 6) This is the amount of memory that shows up on the **About Finder...** page while you are in Mac mode.

There are four places memory is devoted to, or is affected by:

- ◆ Mac Main memory (what we're selecting now – your choice)
- ◆ Floppy Cache (a 320K floppy accelerator that you may turn on/off)
- ◆ SLM804 Laser memory (1 megabyte, only needed if you have an Atari Laser Printer)
- ◆ Memory that the Spectre must use for runtime code (always needed, and you can't change it).

This all adds up to whatever amount of RAM you have in your computer.

Generally, it is best to use the maximum memory possible. This is the default, by the way. This way your programs and data on the Mac will have the largest possible working space. The Mac has the ability to "get by" with less memory, by constantly going to disk; if you do this, you'll find spiderwebs on you by the time you're finished; floppies are far slower than memory.

If you don't have enough memory for a given size, it will be "greyed out" and thus unavailable. You can't allocate memory you don't have! So, overall, just leave it at the default and forget about it. (There are exceptions I'll tell you about in a moment, particularly if you're running on a 1 meg ST.)



The original Mac was 128K big. The Fat Mac followed; it was 512K. (A 256K Mac was apparently planned by Apple, but never released; there's support for it built into the Mac software, one of many surprises I had while doing this project.) Then, we had the Mac Plus and Mac SE, which have 1 megabyte, expandable to 4 megabytes.

The Atari 520, in contrast, has 512K; the 1040 has 1 megabyte; the Mega-2 has 2 megabytes, and the Mega-4 has 4 megabytes. The STE is expandable from 1 to 4 meg, and the Stacy only has 1 meg (for now).

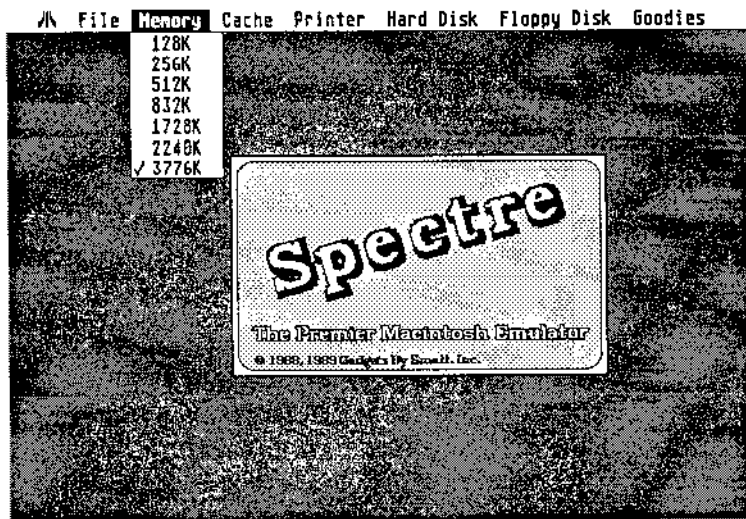


Figure 6

You can pick sizes from 128K to nearly 4 meg from this menu, depending on the amount of memory available on your system.

Exceptions

► 832K is a special mode. It's there, really, for the sole purpose of letting people with 1 megabyte ST's run HyperCard, which requires 750K or so of RAM to run, and 800K to really do good stuff. **You should not use this mode if you don't have to.**

This mode should really have been 768K; getting it to work was a real nightmare. But users needed the extra 64K ($768 + 64 = 832$) memory to hack on HyperCard. We definitely had to make some compromises to make it work.



This mode forces color off, and forces there to be no floppy disk cache. The floppy cache speeds things up radically. If you're running off floppies on a 1 meg machine, such as the 1040, you would do better to use the 512K mode and a 320K cache (see next menu item), than to run in the highest memory mode, except if you absolutely must have that memory – such as for HyperCard. If you don't care about floppy speed, (e.g., you're running a hard disk), then feel free to turn the cache off, and get another 320K of available memory.

You can't use 832K with a color monitor, so you'll be set to 512K automatically.

Laser Printer

If you select the Atari SLM804 Laser Printer "on", you will lose 1 meg of memory to the Laser Printer buffer (the Laser, by its design, requires 954,000 bytes of system memory to be reserved to build up a memory image of what the page will look like; the memory image is then dumped into the Laser Printer at very high speed.)

If you're on a 2 meg machine, and turn the Laser Printer on, you'll be left at 408K memory for Mac mode if you leave the cache on. That's very shaky for many Mac programs. It might be best to disable the cache, and recover the 320K of memory it takes up. A 2.5 meg machine will be okay, as will a 4 meg machine.

Because different people use the Mac for different things, we've left all these options configurable. For instance, if the Mac tells you it needs more memory, turn off the cache on the Spectre menu page and try again.

Cache Menu

The Cache is a dedicated RAMDISK. It works like this: Whenever you read or write a disk sector, it is remembered in memory, in the Cache. The next time you need that disk sector, it's read from memory instead of from disk, at much, much higher speed (see Figure 7).

As a demonstration, turn the cache on, and run MacPaint from floppy. It'll take 17 seconds to load; that's normal floppy load time. All those sectors you just read were stored in the Cache. Now, quit from MacPaint, and rerun it; this time, it will load in 3 seconds, straight out



of cache memory, probably without even switching the disk on.

Note also that the time it takes to return to the Desktop is very fast with the Cache on; that's because the Finder gets put into the Cache. It's liking having a flexible RAMDISK.

Now, you should turn the cache off if:

- ◆ You're running in 832K mode. (This is automatic; there's not enough room for 320K of cache).
- ◆ You badly need the Mac main memory, like with HyperCard on a 1040-ST.
- ◆ You don't care much about floppy speed, like if you're running off a hard disk and rarely touch floppies. Then, the 320K is more valuable being given to the Mac OS than to floppies.



Figure 7

Printer Menu

As mentioned previously, the Mac has two serial ports. One is assigned to modem functions, the other assigned to printer functions.

With this menu, you select where "printer" output goes – your

ST's serial or parallel port. Usually, it's parallel. (see Figure 8)

You may also select the SLM804 Laser Printer at this menu (it works independently of the serial/parallel selection.) If you select the SLM804, you may do screen dumps and print to the SLM804 in Mac mode. However, you'll lose the 1-megabyte of memory needed for the Laser Printer's memory buffer; you'll see this loss reflected in the main memory menu. If you're running on a 2 megabyte ST, and need the Laser, I'd recommend turning off the cache, as memory will be tight.

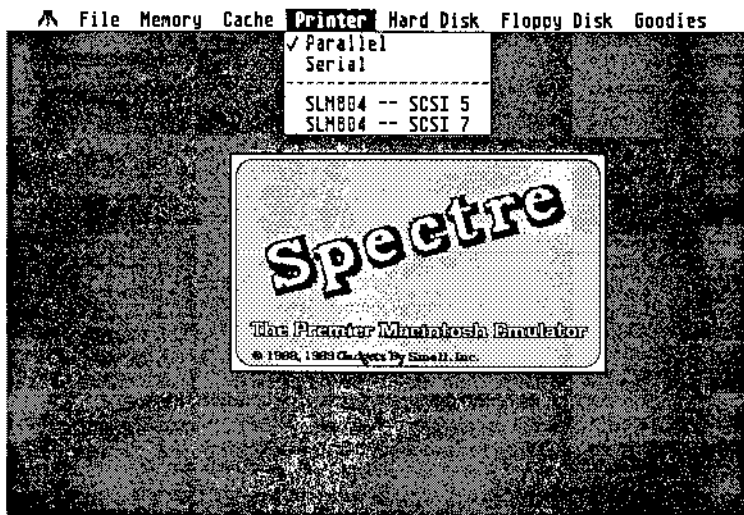


Figure 8

There's two SLM804 selections. The SLM804 - 5 uses a SLM804 connected as SCSI device 5, which is for all new Laser Printers (as of, let's say, about January 1989). SLM804 - 7 uses SCSI device 7, and is for older Laser Printers, like mine. If you don't know which Laser Printer you have, try 5 first; go into Mac mode, and do a screen dump (press shift-keypad-0). If nothing happens, then try 7.

We added this option at the request of users who were tired of flipping switches, trying to get their laser to be SCSI 7.

As of the writing of this manual, we're tracking down a problem in writing to SLM804's built for the European market. Apparently the differing paper sizes are giving the software a problem. Please see the README file on disk for updates about this.



Hard Disk Menu

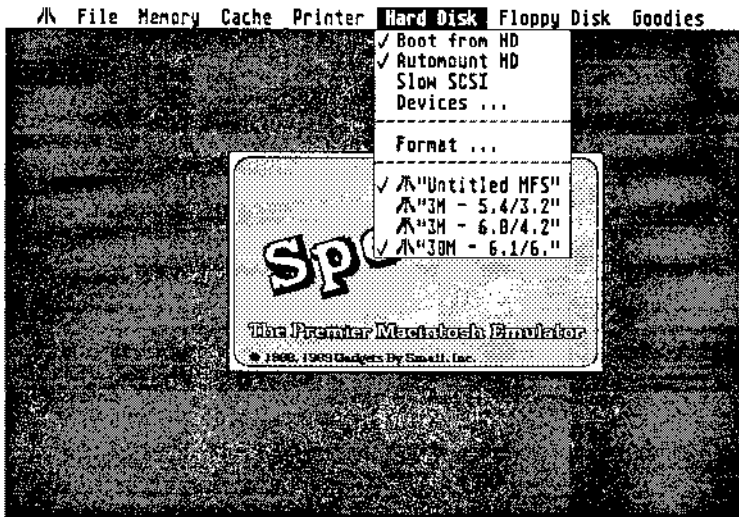


Figure 9

You're going to have to read the hard disk section of the manual ("Heavy Metal Rock And Roll: Hard Disks") to gain full understanding of these options. See Figure 9 for the menu choices.

- **Boot from HD** selects whether or not the system attempts to boot into Mac mode off the hard disk. This assumes you have a good System, Finder, and Desktop on the hard disk's first Spectre partition, and have installed them properly using the Installer program, which is included on the Systems disks from Apple. (If the boot fails, and you've got System/Finder out there, assume the hard disk is damaged; boot from floppy, and manually add the hard disk drives by pressing the Function Keys.)
- **Automount HD:** This option automatically mounts all available Spectre hard disk partitions upon bootup.
- **Slow SCSI** allows the Seagate 277N and 296N hard drives to work properly. Strictly speaking, this option does not mean your hard drive is going to slow down to a snail's pace; it just slows hard drive accesses to a speed they can handle.

If you are getting "File xxxx was skipped; could not be copied" messages or crashes while booting into Mac mode, this option should

eliminate the problem.

► **Devices...:** The Devices menu brings up a submenu (see Figure 10), which allows you to pick exactly which SCSI devices and logical unit numbers are polled by Spectre for Spectre partitions. This allows you great flexibility in your hard disk setup. Also, it allows you to disable SCSI device 6 (used by the ICD clock) and 7 (used by the older Atari Laser Printers), as well as 5 (new Laser Printer address), to avoid possible conflicts with those devices during polling.

For SCSI devices 1-7, with two drives per SCSI device, this menu controls if a given drive is “polled”, or looked at, for Spectre partitions. This allows you to easily enable or disable an entire drive’s Spectre partitions; this is extremely helpful for selecting customized Systems and configurations, for instance.

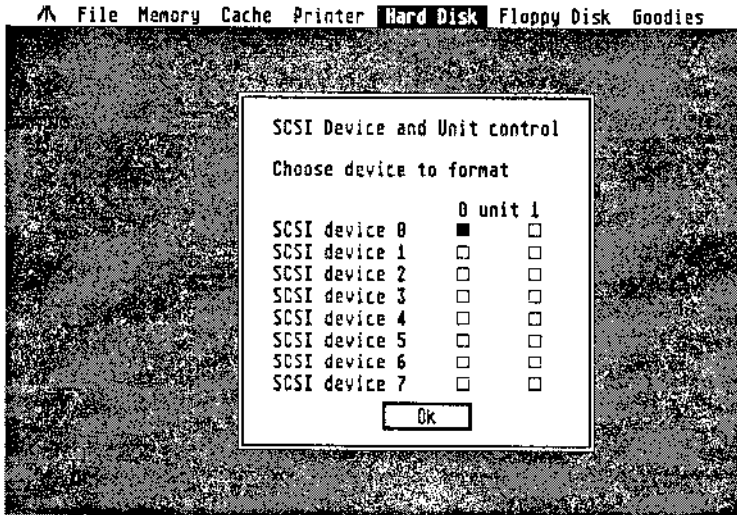


Figure 10

If the block in a given entry is filled in, the drive is selected. If it’s empty, it is not selected. Click on it to change.

The ICD’s clock uses SCSI ID 6 and could conceivably be changed by the Spectre if enabled; note that the Atari Laser Printer either uses SCSI ID 7 or 5, and again, could conceivably be upset over the Spectre’s polling process. That’s why we leave 6 and 7 off by default. If you have a Laser Printer, you will need to find out what SCSI ID it is



set to, and turn it off.

Atari's model SH204 and possibly SH205 hard disks have a bug in their hardware which can cause problems, which you must fix at this menu. Briefly, even though there's only one disk drive mechanism inside the 204/205, the drives respond as though there's two. Thus, a "ghost" of the first drive shows up. You'll see this as a "repeat" of all the partitions of the first drive.

To get rid of this "ghosting", disable the second LUN (logical unit number) on any Atari drive, or use someone else's (Supra's, ICD's) host adaptor, which work properly. There's even rumored to be an outfit that sells a replacement PAL chip that fixes the bugs in the Atari drive; it's called the ADE Chip, and is sold by Berkeley Microsystems.

► **Format:** This brings up the hard disk formatting menu (see Figure 11). This menu allows you to specify a given hard disk's SCSI and LUN (logical unit number), and a partition (from 1 to 12, using the Supra extended partitions scheme). The partition you select will be formatted into Spectre-format hard disks for use *only* with the Spectre. If you do this, the partition will become unavailable to GEM, probably for good until a reformat/rezero. It is no easy task to get it back to GEM, by the way; we're working on a way to do this, but it's not complete yet.

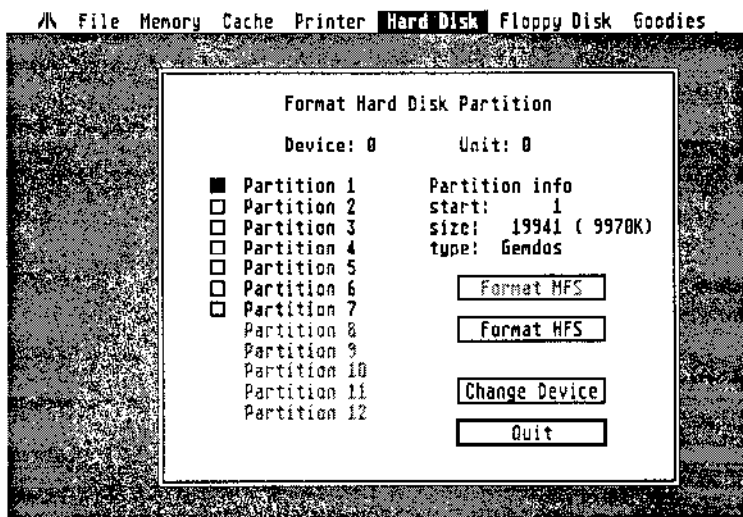


Figure 11

We do not support Atari's brand-new 3.0 super-big partition scheme. We didn't find out about it until after the software was too far along. If you are using HDX 3.0, and have more than 4 partitions, *do not reformat partition #3* as a Spectre partition. You will destroy all the partitions after it.

You select the SCSI Device and Unit number at screen top by pointing to them, clicking, and entering a new number. For the drive you've just selected, the partitions that exist will be shown in black; the nonexistent partitions will be greyed out and unselectable.

Next, select the partition you wish to inspect/modify, by clicking on the box next to it's number. The partition's data will be put on the right half of the box; it's starting sector number (decimal), size in sectors (decimal), and type (GEM, Spectre, or unknown).

To get the partition size in "K", divide the sector size by 2; to get the size in megabytes, divide by 2000. For instance, 20,000 sectors is 10 megabytes; 40,000 sectors is 20 megabytes.

To format a partition into MFS (the Macintosh Filing System, the older file system), click on the "Format MFS" button. *WARNING: You are not given a chance to undo this once done; the format happens immediately.*

To format a partition into HFS (the Hierarchical Filing System, the newer and current file system), click on the "Format HFS" button. *WARNING: You are not given a chance to undo this once done; the format happens immediately.*

All GEM (ST) DATA IS LOST ON THIS PARTITION, just like with any format.

If you have a very small partition, less than 2 meg, you may only select MFS; partitions above 5 meg may only be HFS. These sizes were determined by experiment; the Mac doesn't like huge MFS partitions, for instance.

If you have a hopelessly damaged Spectre partition, formatting will "re-zero" the partition so you can use it again. All data on it is lost, so it's kind of a "Final Option".

► The last section of the Hard Disk menu shows you the names of every Mac hard disk partition found that's available for the Spectre



(see Figure 9, page 78). This way, you can quickly determine what partitions are enabled/disabled, what drives you have online, and if a drive is functioning/responding.

This menu also has “check marks” by partitions that are “switched on”. You can switch a partition on or off just by clicking on it. Only partitions which are Spectre mountable are visible. The first activated partition is the one you will boot from, so it needs System/Finder “Installed” on it, using the Apple Installer program.

Atari drives (drives with Atari partition tables) are marked with the Atari symbol at left, whereas real Apple Macintosh drives are not so marked. *The Spectre will recognize Apple-SCSI formatted hard disks and use them correctly.*

An Extremely Cool Trick

Sometimes it's a great advantage to be able to use different Systems and Finders. For instance, Finder 5.3/System 3.2 uses little memory, but doesn't support CDEVs or INITs; Finder 6.1/System 6.0.2 uses lots of memory, supports CDEVs and INITs, but sound won't work on it at the moment. And so forth.

If you feel like it, set up your hard disk this way. Put two or three 1-2 megabyte partitions at the start of your Spectre partitions. Put Finder 5.3/System 3.2 on the first little partition, Finder 6.0/System 4.2 on the second, Finder 6.1/System 6.0.2 on the third. Then, use this menu to enable just one of the three “boot” partitions; you can thus quickly and easily flip back and forth between different System/Finders.

Floppy Disk Menu

► **Format:** This allows you to format floppies into Spectre or Macintosh format (see Figure 12).

You select the drive to be formatted, single or double sided, and whether to format into Spectre (modified ST) format or into Mac (CCR) format. (The Mac format is only available if you are using the Spectre CCR.)

The formatting will begin when you click on the format menu; if any errors are encountered, an error message will be shown. You do

not have the option of creating a double sided MFS or single sided HFS floppy; neither of these is necessary with the 128K ROMS!

DCFormatter, included on the Spectre disk, has an option to format an 800K MFS floppy, if you need it.

Incidentally, because memory was so tight in 832K mode after adding support for the GCR, we were forced to remove support for the Translator One to make room. We didn't know this was going to be

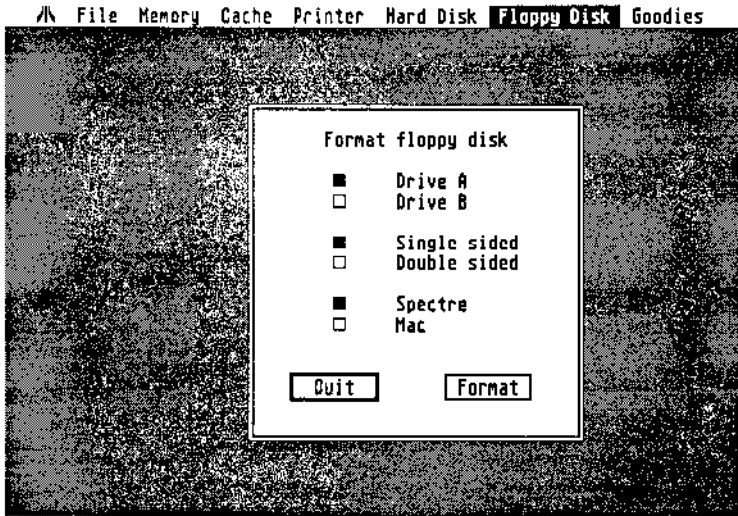


Figure 12

necessary until right before the GCR was to be released. (We started getting the ol' out-of-memory errors.) It's impossible to use the GCR and Translator One at the same time anyway, since they'd fight over the disk drives. If you badly need to use the Translator, just drop back to an earlier version of the Spectre, like 1.9F, to do your translating.

► **Duplicate:** This submenu gives you a convenient way to clone a Spectre (modified ST) or Mac (GCR) disk. (see Figure 13)

You select the "from" drive (the source diskette) and the "to" drive (the destination diskette). If these are the same, you'll be prompted to switch diskettes as necessary.

You also select the disk type you are copying, either Spectre (ST) or Mac (GCR). The Mac mode is only available if you are using the

GCR.

Finally, you select single or double sided duplication. When you click on Duplicate, the copying will begin.

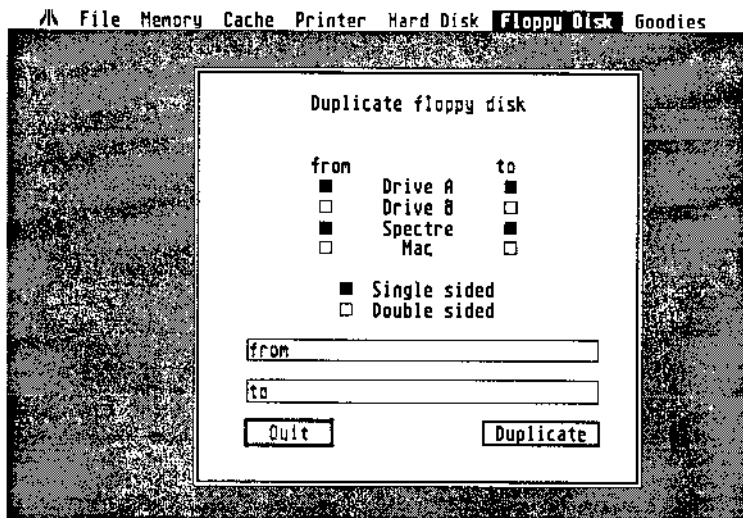


Figure 13

You can monitor progress of the copying by watching the twin boxes at the bottom of the screen; they are updated every 5 tracks during the copy process. There are 80 tracks total per side of a disk, thus, 160 on a double sided disk.

Also, the copy process is "smart" with regards to the ST's memory; if enough memory is available to hold the disk image, no disk swapping is necessary.

► **Detect Disk Insertion:** This option tells the Spectre whether or not to use the write-protect line to the floppy drives to detect a disk being inserted into a drive, or a disk being removed from a drive. (see Figure 14)

(This has already been mentioned, but...)

EDITOR: The manual is getting longer, Dave...

The ST hardware uses the disk's write protect line to detect disk



changes. During a disk insert or removal, there is a brief glitch on the write protect line; the ST senses for this glitch 70 times per second. Unlike other 3 1/2" disk systems, the ST does not specifically use a line to monitor disk change. Unfortunately, this sensing doesn't work on write-protected disks, due to drive sensor design.

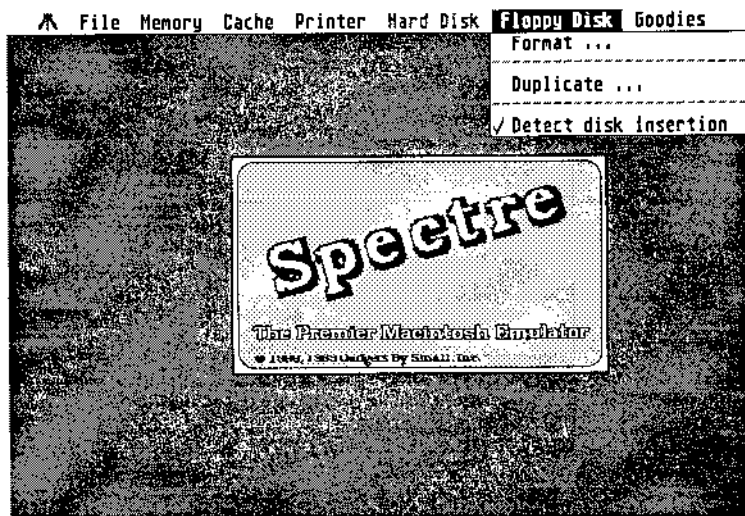


Figure 14

The Mac OS depends on this disk-change signal for two things:

- ◆ Detecting that you've inserted a disk. If you have, the Mac OS will go read it, find out if it's a valid Mac disk, and "mount it" (plot its icon if you're at the Finder, or make it available to you on the Select File menus).
- ◆ Detecting that you've removed a disk after the Mac requests a disk eject (the blinking A or B).

The F1/F2 keys simulate this "disk change signal" to allow things to work with write protected disks, or drives that just plain don't work right.

This particular menu option lets you turn off sensing completely. This is for drives that return many write protect line glitches; some mechanisms do this when no disk is inserted, making the Mac OS see nearly continual disk "inserts". Without the ability to ignore those disk



inserts, the Spectre would be unusable on those machines; the continual glitches “lock up” the Mac operating system, making it think its operator has gone berserk inserting and ejecting disks.

EDITOR: A drive functioning over and above the call of duty...

If you de-select this option, you’re responsible for pressing F1/F2 to notify the Mac OS of inserts/ejects. Otherwise, Mac mode will just sit there with a flashing A or B on the screen.

Goodies Menu



Figure 15

- **Sound:** There are three options with sound.
 - ◆ The first is no sound at all. This also disables Sound at the Macintosh “Device Manager” level; literally, when programs try to do sound, the Mac will reply, “Huh? Sound? Whazzat?” to them. Selecting this option crashes a few programs, such as the World Builder Adventure Construction Set.
 - ◆ The second is Sound - 11, or sound at 11 khz. This is probably the option you want to use.



- ◆ The third is Sound - 22, or sound at 22 khz. This isn't such a good option at the moment; it slows the system beyond belief. Try it and you'll see what I mean.

Telling you how Mac sound works is a bit beyond the scope of this manual. Unless you're familiar with digitized sound, interrupts, and so forth, it's going to look pretty techno-geeky.

Essentially, the Mac gets sound for free from its disk hardware; the ST has to work hard to produce sound the Mac way. Doing it completely the same way as the Mac takes up to 75% of the total processor, and just beats the poor 68000 to death; you'll see this as drastically slowed speed. This is 22 khz mode.

I put in a "compromise" option, 11 khz, which works half as hard, and only loses a small portion of the sound to be output (the really high frequency stuff). Because I've been to a Van Halen concert, I can't hear sounds that high frequency anymore to begin with, so it doesn't matter to me. Because it's only making the ST work half as hard, you lose about 40% of the processor.

Now the slowdown only occurs while sound is actually playing. For things like Beeps and Boinks and digital sounds (believe me, you want to download SoundMaster and some sounds, and check them out; they're hilarious), this is just fine. For sound during, say, an arcade game, this may not be so good, in which case, just shut it off from the front menu.

Version 1.9F of Spectre had the original "let's try it" release of sound. It worked okay, but had a nasty habit of not shutting off when it wasn't needed, and thus slowed the system down a lot of the time. This has been fixed.

► **Alt Video:** This option forces the Mac to shift video downwards from its normal location. (see Figure 15, page 87) The sound buffer immediately follows the video buffer in the Mac memory map; because the ST's screen takes up 32,000 bytes, as opposed to the Mac's 22,000 bytes, the ST screen collides with the Mac sound buffer. This causes sounds to plot onscreen.

By shifting video downwards about 10,000 bytes in memory, this collision is avoided. With this, the error handler and sound handler do not plot onscreen. It will be necessary to run in Alternate Video mode when you are using sound.



So far, it seems to present no problems to Mac software under test. Just in case there is a compatibility problem, though, we leave you the option of toggling it off. There could be a few (probably public domain) programs out there that hard-wire the beginning of Mac video memory.

More than a few Mac programs hardcode the start of Mac sound memory, so we moved the video memory pointers instead. It works far better; since QuickDraw handles video, and is entirely pointer based, and almost no one bypasses QuickDraw for screen updates, the shifting downwards appears to be glitch free.

Me, I'd leave this option alone, at it's default position: On.

Future "goodies" will be added to this menu, and to others, so please check out the README file on the Spectre disk for the most up to date information.



Hard Disk Horror Stories



ry to imagine your floppy disks as they really are. That little 3 1/2" piece of plastic has some goo on its surface which can be magnetized.

Technical writers call it "iron oxide", or "ferris oxide" if they're really showing off.

Common people call it "rust". That's right - that's why the disks are that color. (Hey, perhaps that's why Neil Young works - the album name is "Live Rust!").

Anyway, there are 400,000 characters crammed in per side of that disk.

Try to think of each character as 8 separate magnetic field transitions (8 bits) on that disk. Thus, we're talking 2,400,000 little magnetic fields on a double sided floppy.

Sort of horrifying to consider how tiny they must be, right? (Now, imagine how much

mayonnaise being smeared on them does for them..)

Now, floppies rotate at 300 RPM, which means each byte spins by the read/write head within 32 millionths of a second of each other. (Thus, each bit takes 4 millionths of a second).

What's unbelievable is that they're fairly reliable!

Now, take the RPM up to 3600 RPM, twelve times faster. Instead of rubbing the head on the relatively flexible surface of the floppy disk, let's fly the head over a rigid platter (still coated with Live Rust, though). And let's put five million bytes per disk instead of a mere 400,000 - forty million magnetic fields.

That's a "hard disk".

If the head ever touches the disk platter, you have what is known as a "head crash". The sound of this will curdle your blood; it sounds a lot like a cat being drawn and quartered. And you can kiss off the data on that hard disk.

To crash a hard disk, merely lean back in your chair, and gently kick the desk that your ST is



sitting on. It doesn't take much more than a tap. If you're lucky, you lose merely the section of the disk where the head touched down; if you're not, you lose big time.

Possibly it has something to do with me. I've crashed probably ten hard disks in the last two years. I've crashed HP hard disks, "the most reliable hard disks in the industry". I've crashed Microscience, Seagate, and Tulin hard disks. I'm not really sure why. In some cases, it's been power problems (lightning does wondrous things for hard disks); in

other cases, I come in in the morning, the system won't start up, and I get out my Hard Disk Toolkit and start looking.

Don't take your hard disk for granted. The heads fly above the hard disk surface at a distance 1/20th the thickness of a human hair. Be prepared at any point to lose those 20, 40, 60, or whatever megabytes of data.

Or, as a friend has put it, "You'll find out how good your backups are when your hard disks crash".



Heavy Metal Rock And Roll: Hard Disks and Spectre

Easily the best peripheral to add to any ST is a hard disk.

It may not seem like it at first, but floppy disks really slow you down while using the ST. The ST admittedly drives floppies as quickly as they can be driven, but still, floppies are just plain slow.

Floppies cost you a few minutes here, a few there, and it all adds up to less time to *use* your ST, and more time spent tapping your foot.

Floppies also cost you. At \$2.00 each, on the average, they add up after awhile. Ever added up the cost of that shelf full of floppies, just in media cost?

A 20 megabyte drive can be had for under \$500, and that's a terrific deal. In one step you'll gain great speed, storage capability, and stop wasting your time on floppies.

A hard disk will *particularly* help the Spectre, because the Mac operating system hammers on the disk a great deal. This is because Mac programs end up being written in small chunks called "resources", which are called into memory only when needed, as opposed to the ST approach, where everything is called in at the beginning. Both approaches have their advantages; the Mac's is more memory efficient, as it doesn't keep stuff around it doesn't need anymore; the ST's is nice, because it doesn't do much disk reading once it's started.

If you ever get into a situation where the Mac needs resources that aren't on the current drive, you'll get to start swapping disks. Doing

this a few times will rapidly encourage you to get a hard disk.

Anything you can do to speed up disk input or output (I/O) helps the Mac really get moving. If you ever use the Spectre with a hard disk, you'll find it very hard to go back to floppies.

The Atari ST has amazing hard disk capability, if you set things up properly and stay out of the way while it's happening. The ST has never been a speed slouch in terms of pure hardware; a lot of the speed gets wasted by inefficient operating systems and programs. But when you team a good OS with fast disk handlers, you can really get a feel for what the ST is capable of – that's what you see in Spectre.

Let's have a look at hard disks.

About Hard Disks

Hard disks are just like floppy disks in many ways. They are composed of a number of circular tracks, each pie-sliced into 17 (or 26, sometimes, with RLL) 512-byte "Sectors". Everything that is read from or written to the hard disk is done in 512-byte chunks; the operating system worries about making those 512-byte chunks into odd byte sized files for you and I.

A 20 megabyte hard disk thus has 40,000 512-byte sectors on it (multiply it out: 20 million bytes).

Unless you have HDX 3.0 (Atari's new hard disk driver) or ICD's Version 4.0, you're stuck with Atari's Disk Operating System for GEM (GEMDOS); which falls on its face when confronted with hard disks bigger than 16 megabytes. The limit ought to be 32 megabytes, but there was a 2-character typo in the GEMDOS source code that wasn't caught in time, so now we're stuck with 16. So, how to use all of a 20 meg drive? Well, we split it up into pieces, called "partitions". Atari allows you to split a hard disk up into 4 partitions. So, for instance, if we take a 20 megabyte drive and slice it into four 5 megabyte partitions, it looks like this:

C:	Sectors 1-10,001	first partition
D:	Sectors 10,002-20,002	second partition
E:	Sectors 20,003-30,003	third partition
F:	Sectors 30,004-40,004	fourth partition



Note that it isn't exactly even – for instance, you start at 30,004, not 30,000.

To the operating system, these are all completely different drives (say, C:, D:, E:, and F:). Only at the lowest level do the drives come together on the mechanism. The hard disk handler does this.

When we ask for sector #1 of drive C:, we get physical sector #1 of the drive. And when we ask for sector #1 of drive D, we get the first physical sector of the D: "partition", #10,002, off the drive. Similarly, asking for the first sector of the F: partition gives us sector #30,004. See how they're all put on one drive together?

There's a place where the "offsets" for each partition are kept; that's the first sector of the hard disk. It's also called the "partition table" and "boot sector". The data for the Hard Disk menu (starting sector # and size, and type) comes from here.

Okay, shortly after Atari did this, Supra and other people came out with huge hard disks, compared to Atari's 20 megabyte unit. Given that we were stuck with 16 megabyte partitions because of the GEMDOS typo, the most that a hard drive could hold was four 16 megabyte partitions – 64 megabytes total. Supra and ICD were already selling 130 megabyte units!

So, Willie Brown and Mark White up at Supra came up with a new partitioning scheme. (Yup, I'm just name dropping). You could have up to 12 partitions per drive. And eventually they let you put up to 32 megabytes per partition, with the stipulation that you only go bigger than 16 megabytes if the use for it wasn't GEMDOS (e.g., wasn't anything in ST native mode). The Spectre is a perfect example.

So, what we do to make the Spectre hard disk compatible is take one, or more, of the hard disk's partitions, and first, mark it so GEM never looks at it again. (For GEM to look at it would crash GEM, just as reading Spectre format floppies crashes GEM). Next, we "stamp" Macintosh formatting information on it – boot sectors, blank directory, and so forth. Then, we're all set; the partition is ready.

As for you, next time you reboot your ST, that partition will have disappeared from your Desktop in ST mode (depending on certain things). If there was a disk icon hooked to that former GEM partition, you'll find it either doesn't work anymore ("drive doesn't exist") or it now hooks to the *next* available GEM partition, if there is one (e.g., if

the Spectre partition isn't the last one on the drive).

Setting Up Spectre With a Hard Disk

You'll need to experiment to find out what combination of GEM and Spectre partitions is right for you. Only *you* know how much space you need for Mac programs vs. space for ST programs. You'll have to juggle until you come up with what you're comfortable with. In my lab, I need lots of Mac space to test Mac stuff, and lots of ST space to develop the Spectre program on...

EDITOR: You only use that as an excuse to get more Hard Disks, Dave!

Let's assume you have a 20 megabyte drive (the most common), with 3 partitions, one 10 meg, two 5 meg. You want the 10 meg for GEM, the two 5 megs for Spectre 128. Fine!

Let's go do it. First off, get anything off the 5 meg partitions you wanted to keep, as GEM is shortly going to lose them.

Run SPECTRE.PRG.

Select the Hard Disk menu; pull down to Format.

You may have to select the drive/LUN; it's probably 0,0 (the default) unless you've been customizing your hard disks. Note that you get only 3 partition choices to click on; the program knows you've only got three partitions to choose from.

Click on the first partition. This is your 10 megabyte ("20,000 sectors") partition for GEM. We want to leave it alone. Click on the second partition button. This says 10,000 sectors; that's 5 megabytes. Click on HFS Format; in a few seconds, it will be done. Click on the third partition; it also says 10,000 sectors (5 meg). Click on HFS format once again. All done. Click on Quit.

The Hard Disk menu should now show you two Spectre partitions; the ones you just made. Make sure they're selected (a checkmark next to each of them).

Now, let's boot up off of floppy; we can't boot off hard disk yet to Mac mode, there's no System/finder installed on the hard disk yet. So make sure that the "Boot from HD" selection is turned OFF on the



hard disk options; we don't want to try to boot off the hard disk.

Press RETURN to start. When prompted to, put a floppy with Finder 5.3/System 3.2 or later in the floppy drive A, and press RETURN. If you are using a GCR, this disk can be a Mac disk; with a Spectre 128, the disk *must be* in Spectre format. You'll start up Mac mode, and you'll end up at the Mac Desktop.

At this point, allow me to introduce 8 new buttons, F3-F10 at the top of your keyboard. Remember how F1 and F2 are used to tell Mac mode that you are inserting/ejecting a floppy with drive A or B? Well, F3 inserts the first Spectre hard disk partition, F4 the second, and so on, up to eight at once.

That means you could access 256 meg of hard disk (32 meg per part x 8 parts) at once on the Spectre...I've only tested to 120 Meg, but that looks quite solid.

So, press F3 to mount the first 5 megabyte partition. We are not mounting the 10 megabyte GEMDOS partition at all; GEM partitions don't enter into the game at all. You can't mount them from Mac mode.

The hard disk lights will come on, and in a few seconds you'll have a disk icon for the 5 megabyte drive. Open it up, and sure enough, there will be "5,000K bytes available." (That's 5 megabytes)

Okay, if you are using a System 4.2/Finder 6.0 or newer version, run the Installer program included with the System disks from Apple. It will ask where you want your System Folder put, what kind of Mac you have, and will set it all up for you on your hard drive. If you have an earlier System/Finder, just copy the System Folder (at the very least, System and Finder) from floppy to the hard disk.

When done, you might copy an application or two onto the hard disk, just for fun.

Okay, time to close down. Just grab all the disk icons (draw a box around them), and drag them to the trash. Don't worry, we're not throwing away their data! We're just throwing away their icon, which forces an eject. This is the best way to eject any kind of disk.

Sometimes, if you do Control-A, Control-E to eject the hard disks, you'll be asked to "re-insert" one or more hard disk partitions. While a



function key would reinsert the partition, just ignore the request and shut off your computer. Which ever way you choose to do the hard disk eject is irrelevant; what matters is the directory update that happens right before the “eject”.

Shut the ST off. At this point, you will *not* be able to “autoboot” the ST because you have changed the partition types, so you need to reenable it. Boot the ST with the Utility disk that came with your Hard Drive, and run the “autoboot maker”. It is called “HDUTIL” if you used ICD’s software, and “SUPUTIL” if you used Supra’s. Then restart your ST to make sure the autoboot is working.

This time, re-run SPECTRE.PRG. Now we’ve got a hard disk partition out there with System and Finder on it; thus, it is bootable. Select “Boot from HD” under the Hard Disk options. (Of course, you should see your hard disks’ names there. Feel free to rename them when in the Mac mode at the Desktop.)

Press RETURN, and you’ll boot from the hard disk (provided all is well), and darn fast, too. It takes maybe a fourth of the time of the floppy boot.

Try running a few applications; you’ll notice how very fast they load, and exiting back to Finder is fast, too. That’s what it’s all about.

When you want to access your second Spectre partition, press F4. (If you had a third, you could press F5, but since you don’t in this example, the system will ignore F5).

Try copying the System and Finder from one 5 meg partition to the other. Zip. Zipzip. It’s done. Amazing, isn’t it? Again, to close down, eject the hard disks. Use the safe eject-all, power off.

Well, there’s a quick run-through of setting up Spectre partitions on a hard disk. Again, you will have to customize it your needs, and I guarantee you’ll end up playing with it a few times before you’re happy with it; no one ever has enough hard disk storage when they need it!

Well, that covers hard disks. Get in there and experiment, until you find the combination of partitions, GEM and Spectre, that suits you best.

The Online Revolution



here's a society right now that exists entirely via computer. The members gather on networks Bix, CompuServe, Genie, Usenet, some of which span around the world. They send "electronic mail" or "e-mail" to each other; they take part in dialogs, giving hints, reporting bugs, and helping out people thousands of miles away that they've never met; and they have online conferences about a particular subject, where they gather at the same time and "coffee klatch".

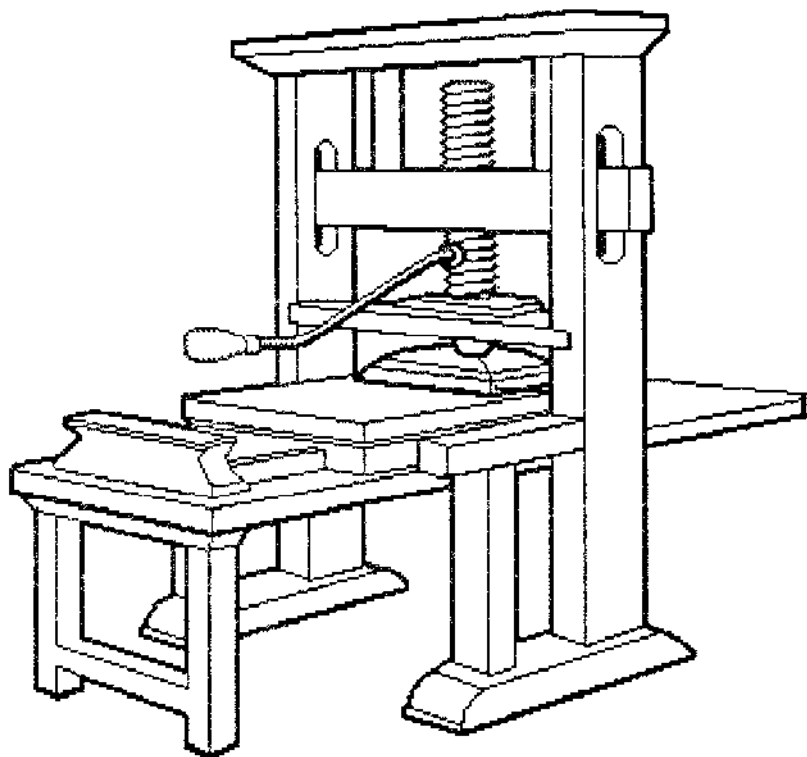
While not everyone can afford a modem, or the network costs (\$5-\$30 per hour), each online member generally knows nonmembers, and talks with them. Thus each online member contacts a few offline members as well. All this is via a loose, informal network.

I'd supported Magic Sac via these networks for two years previous to the Spectre's release. This was critical to the Magic Sac's success; the first versions of

the Magic Sac had bugs, and as they were reported, I would fix my software, often "posting" the new version of software online, so users could immediately download it. In an industry where you're usually lucky to get a software company to acknowledge a bug, much less fix it, here I was immediately available, could fix bugs, and get new software back to you - once within 8 hours.

In the process, I got to know many people, answered a lot of questions, and had a good time. There's not a lot of ST users in Denver, where I live, but there's hundreds of people interested in Spectre just a phone call away, on the various networks. The user loyalty built up through this contact is why the Spectre exists; the people on G'Enie talked me into doing the product, convinced me there was a market for it, and helped me test it.

It's a whole new form of society. If you haven't checked the networks out, it's time you did. An excellent Supra 2400 baud modem will set you back just \$149. If you want practically instant replies to your questions, access to good software, and to chat with other people interested in the Spectre, go online.



Printers and Spectre

Printers and the Serial Port

To print, you have to get the data to the printer. You'll need to tell the Spectre whether or not your printer is hooked up to the Atari's serial or parallel port. If you don't know which port to plug your printer into, find out; generally, printers are parallel these days (as it is much faster than serial), but it's best to find out *before* you plug it in. Then select either "parallel" or "serial" on the Spectre menu page, and the Spectre will know where to output printing to (either parallel or serial; parallel is default).

Things get a little tricky here.

The ST has *one serial port and one parallel port*. Usually, the ST's serial port is devoted to a modem, and the parallel port is devoted to the printer. Again, there's *only* one serial port on the ST.

The Mac is different; it has *two serial ports, and no parallel port!* The Mac uses one serial port as the "Mac modem/serial" device, and the other as the "Mac printer/serial" port, but they're both "serial" ports.

I thus had an interesting design decision to make. In the interest of ~~passing the buck~~ maximum user flexibility, I let you decide how to resolve it.

EDITOR: Don't you just love fancy word processors??



The Mac "modem/serial port" (the one on the Mac marked with the little telephone) will always talk to the Atari's serial port, period. Thus, things like modem programs, which use the "Mac modem port" in software, will end up talking to

the serial (RS-232) port on the ST, as they should.



Now you have a choice as to whether or not the “Mac printer port” (the one on the Mac marked with the little printer) talks to the Atari’s serial or parallel port; usually, it’s parallel, but you can force it to serial if you need to for a serial printer, like the ImageWriter.

Of course, then you’ve got a problem! Anytime the Mac talks to the Mac modem port, it will output to the ST’s serial port, and anytime the Mac talks to the Mac printer port, it will *also* output to the ST’s serial port. If you don’t have the proper device connected at the proper time, you’re going to have trouble. Or garbage. Or something.

You cannot get away with having both a modem and the printer hooked up to the serial port at the same time, even with a three-way cable. The modem and printer will “fight” one another for control, and whoever loses sometimes loses with a blown driver chip. Please don’t try. It’s also not good for cables and tempers to swap back and forth all the time.

If you *have* to use a serial printer and serial modem, *please* get an “A/B switch box”, and manually switch between devices when you need to. CompuAdd sells those boxes for about \$14. It’s much more convenient than swapping cables around. For instance, you set the switch to the modem when you’re in a telecommunications program; then switch to the printer when you need to print. That way, only one device is hooked up to the ST at any one time. (I use one of these on my ST, and it works quite well.)

This is all further complicated if you decide to use an Atari Laser Printer, but I’ll leave that for later.

The Software Part of Printing

A whole manual could be devoted to the art of getting the Mac to print something, especially and particularly if you’re not using an Apple-manufactured printer.

As I mentioned earlier, the Mac is very “dot” oriented; to print something, it outputs a string of dots, specially coded, to the ImageWriter. The ImageWriter then puts the dots on the page, and if everything works right, the dots form letters (if you’re printing



characters) or drawings (if you're drawing graphics).

Since nearly no other printers talk ImageWriter-ese, we have to translate for the printer you DO have.

Fortunately, many Mac owners have non-ImageWriter printers, and various software people have come up with "printer drivers" to translate the ImageWriter codes into something those printers can use; generally, they're for Epson or Epson compatible codes. These printer drivers are Macintosh programs; they are accessed and installed totally in Mac mode, not under ST mode. They can't be used in ST mode, either, to (for instance) print ST Degas™ or Neochrome™ pictures.

There's several sources for this software. The most well known seems to be Epstart, from Softstyle, out in Hawaii. Epstart, and the later PrintWorks, supports the Epson™ series of printers, including the popular MX, which is what the missile was named for. Yep, you're still awake. Anywho, what you do is put the the Epstart driver file in your System Folder, "Choose" it with a Mac **Chooser** Desk Accessory, then you can print away, just as though your Epson was an ImageWriter.

Since nearly every sane printer manufacturer offers Epson compatibility, as it is FAR and away the standard, this will get you rolling a great portion of the time.

Other excellent printer drivers are available from GDT Softworks and Orange Micro. And then there are Epson's own Mac drivers; contact Epson America about that. The Epson brand is fairly new. The others have been around for awhile and seem to work pretty well. Names and addresses are listed in the Sources Appendix in the back of the manual.

Using a printer driver is very easy. For example, the Epstart printer driver consists of a number of different files (Epson MX, RX, FX, etc) for the different Epson drivers. You copy whichever printer driver you need, or the whole lot, into your System Folder on your startup disk. (The printer drivers *must* be in the System Folder – otherwise it won't work.)

To print, get something ready to print (a document, drawing, or whatever). Hence, you are in the program that generates whatever you want to print (this is important). Then, select the **Chooser** or **Choose**



Printer Desk Accessory (the name will vary depending on your System/Finder version number). A list of available drivers will appear; click on the proper driver. For instance, to use an MX-80 driver, click on "MX-80", then **Quit**. The **Chooser** dialogue will disappear. Next, you'll need to use **Page Setup** under the **File** menu to make sure your program knows the MX-80's page size; if you forget **Page Setup**, you'll get screwy printouts (typically, too tall or too small). Finally, choose **Print**, select the options you want, and away you go.

You should know right up front that you'll be experimenting for awhile to find out the differences between the "quality" of print you can select (which really is how many passes the printer makes per line) vs. speed of printout, different printer drivers, how tall the printed page is, and so forth.

To get the best results with a printer, you need the right size fonts. Each kind of printer seems to require different proportioned fonts. For example, if you have a 9-pin printer, Epson MX, and your document is in 12 point, you will also need 24 point in your System to get the best results.

If you have a serial printer, you can count on having to set some switches inside it; I've always had to. This isn't much fun; get out your serial printer's manual, and start experimenting. You're going to want 8 data bits, no parity, 1 stop bit; the rest is up to you.

Several hints are in order, to save you time and trouble.

- ◆ Epstart is unable to print a "catalog listing" (a listing of the files on the disk) more than one page long. Two pages or more equals a crash.
- ◆ Epstart doesn't seem to work with HyperCard. We're talking with Softstyle about this; obviously an update is needed. We've been told that PrintWorks will do the job, but we haven't tested it ourselves.
- ◆ Epstart has some other known kinks; it's best to be in touch with our online support group on this, as someone else is sure to run into the same problem you're having, and can tell you about it.



- ◆ Certain programs, such as Microsoft Word, totally ignore the Chooser, and use whatever file is called "ImageWriter" as the printer driver. Thus, it's a darned good idea to copy whatever printer driver you're going to use to the System Folder, and name it ImageWriter (note the capital W), to avoid problems like this. Of course, the original ImageWriter file will have to go. (i.e., change it's name to something else like OldImage or something)

Atari's SLM804 Laser Printer

Atari makes a pretty neat Laser Printer, called the SLM804. It features a very classy "printer engine", which makes very good dots, and very little on-board brains – at a very low cost.

Many Laser Printers have their own processor and memory. For instance, an Apple LaserWriter II NTX has a 68020, a more powerful processor than the Mac Plus! Problem is, the only time this memory and processor get used is during printing.

Atari went for a more sensible approach. They use the Atari's 68000 and memory to support the Laser, and they're used when laser printing; otherwise, they're available to the user.

We currently offer three levels of Atari SLM804 Laser Printer support. In order of complexity, they are:

- ◆ Screen dump support
- ◆ QuickDraw™ printing support
- ◆ PostScript™ printing support

➤ **Screen Dumps:** Screen dumps are two step procedures. First, you must enable the SLM804 option at the Spectre Menu page; the option requires at least 2 megabytes of memory to even be available. This will remove 1 megabyte of free space and assign it to the Atari Laser Printer.

Next, anytime after starting up Spectre (it is best to wait until disk drives are off), press **Shift-Keypad-0**. The screen will turn inverted as the screen data is processed, and the image is built up for the printer. Next, the screen will be inverted back to normal, and the image will be dumped to the Laser Printer. It takes just a few seconds.



This is a 72 dpi image; each Atari/Mac screen dot becomes 16 laser dots (4 x 4 grid). It's rotated 90 degrees on the page and is centered, so that the wide part of the paper matches the width of the Atari screen, much like Atari's screen dump.

Bit for bit screen dumps are done with **Shift-Keypad-1**. This dumps the current screen memory in the ST to the Laser Printer. A normal 640 x 400 screen is only an about 2 x 1.5" inches on the laser output, so I suggest using a program such as **Stepping Out™** to expand available screen memory (it works), then call up **Shift-Keypad-1**. Some experimentation is in order here; the program attempts to adjust for different screen sizes, but there are limits. Still, it's very interesting to see a large **Stepping Out** screen size showing up on the laser.

I don't expect you to use **Shift-Keypad-1** a lot, but it's useful in certain situations, and as you see, I try to give you the maximum flexibility.

► **QuickDraw Support:** The Mac uses something called QuickDraw (fun name, huh?) to do all its screen draws. It can also use it to print things, since QuickDraw is really smart.

Unfortunately, a "printer driver", the software that makes QuickDraw talk to the printer, is an extremely obscure and hard to write thing. Just to make it more fun, the rules of printer drivers keep changing; HyperCard, for instance, does things in a totally new way.

So, I decided to handle printing by emulation. I make the SLM804 act like an ImageWriter. The printer emulator accepts data as though it were an ImageWriter dot-matrix printer, and prints it to the SLM804. The only printer driver required is Apple's own ImageWriter, which is included with the System disks, and goes in the System Folder. You use **Chooser** to select the driver, and then select **Print** from the **File** menu. Easy, huh?

To use this option, once again, you must enable SLM804 from the Spectre Menu page. When you select SLM804, Spectre also automatically enables the ImageWriter "printer interceptor".

The printer interceptor grabs printer stuff instead of sending it out the printer port, and redirects it to the SLM804. While the interceptor is active, you can't "print" out the normal Atari printer hookup



ports.

Shift-Keypad-3 disables the printer interceptor. You can then use **Chooser**, select another printer driver, and print to a normal dot-matrix printer. Press **Shift-Keypad-2** to reenable the "printer interceptor".

In this mode, only ImageWriter formatted output is supported. "Standard" mode gives you 72 dpi output; "High Quality" output gives you 144 dpi. This is pretty good; remember, the laser goes 300 dpi maximum. You cannot use other printers in this mode, since to get speed, I made lots of ImageWriter-Only assumptions.

Real ImageWriters don't "page eject" the last page when they're done printing. Hence, we give you...

EDITOR: Oh, no, not another key!

... another key to do this page eject, to finish printing your document. This is exactly like the Atari Diablo Emulator's Page Eject feature. When you're done printing, press **Shift-Keypad-9** to do a Form Feed. You can do this anytime.

Eventually, we plan on changing to other keys, but for now the Keypad was most convenient to use. Because by now we've mentioned lots of keys, here's a handy table:

• **Snapshots** •

Shift-Keypad-0: 72 dpi, rotated screen-snapshot.
Shift-Keypad-1: 300 dpi, straight screen snapshot.

• **Printer Interceptor** •

Shift-Keypad-2: Enable printer interceptor for SLM804 printing.
Shift-Keypad-3: Disable printer interceptor.

• **Debugger Only** •

Shift-Keypad-4: (debugger option: dumps bytes in hex. Don't use.)
Shift-Keypad-5: (disables hex dump. Don't use.)

• **Instant Page Dump** •

Shift-Keypad-6: Dump whatever is in the laser buffer to the Laser.

• **Page Eject** •

Shift-Keypad-9: Send a form-feed to the printer (page eject)

► PostScript Printing

As I mentioned before, PostScript is the laser printer “standard language”; it describes what a printed page looks like. The Apple LaserWriter is a PostScript printer; when you select Print from a Mac, you are actually sending a PostScript file to the LaserWriter, which has to “interpret” it in order to print. That’s why it takes so long to print sometimes; the LaserWriter has to figure out what the pages sent to it look like before it can print them.

The Atari Laser Printer can’t print PostScript files by itself; it requires an “interpreter” called UltraScript by Imagen. You must have a 2 meg Atari in order to use UltraScript with the Laser Printer. (There is also another version for the Epson FX, HP DeskJet, and other miscellaneous printers – ask your Atari dealer.)

If you want to print a Mac PostScript file to the Atari Laser Printer, you have to...um...follow a few simple steps. It’s not just a matter of selecting **Print** while in Mac mode.

First, if you don’t have an MFS Spectre partition on your hard disk (or don’t have a hard disk), you will need to format some 800K MFS floppies using DCFormatter. This is because Transverter only works with MFS; you will probably need that much room (see the Transverter Chapter for more information).

Next, run the Spectre program. Make sure you have the files “Laser Prep” and “Laser Writer” in your System Folder. They come with the System disks from Apple. Also, apparently not all Laser Prep versions work with UltraScript; we’ve been told that version 5.2 definitely does not work. Laser Prep versions 3.1, 5.0, 5.1 and 6.0 work fine.

Next, create a “PostScript masterpiece” in Mac mode, using a program like Ready, Set, Go or MacDraw II. Make sure you select “LaserWriter” from the “Chooser” Desk Accessory, and then do **Page Setup** under the **File** menu.

In order to get your “masterpiece” from Mac mode to UltraScript, you need to **Print** to a *file* rather than to the LaserWriter. It’s a lot easier to do than you think; the Mac’s OS will send PostScript to a disk file (instead of the LaserWriter) if you press Command-K (Control-K in



Mac mode) when you choose **Print** from the **File** menu. Hold down Control-K until you see "Creating PostScript file on Disk". It won't take very long to save the file to disk.

The newly created file, "PostScript0", will usually show up in the same place as application, or sometimes in your System Folder. If you save several files, the name will change each time: PostScript1, PostScript2, etc.

Once you have the PostScript files on disk, you need to copy them onto the MFS floppies you formatted earlier, or onto your MFS hard disk partition. Then eject your Spectre disks and return to Atari mode. (Either press Shift-Help, the reset button, or flip the power switch.)

Next, you need to use Transverter to get the PostScript files from the MFS Spectre disks to ST disks that UltraScript can read. Here is a quick overview (for more detail, see the Transverter chapter):

- ◆ Run Transverter, and set the "from" and "to" drives. Since you're Transverting Mac to ST, the "from" drive should be either a Mac floppy or MFS partition, and the "to" drive should be an ST partition or floppy.
- ◆ Select Mac -> ST from the File menu, and transfer the file as "TEXT". Don't worry about adding linefeeds, since it works either way, and adding linefeeds takes longer to transvert.
- ◆ When the file is done transverting, save it, then print it using UltraScript.

To print your Mac PostScript file, just add the file to the UltraScript list, and choose Print. There are a few things you need to be aware of, though.

PostScript files can take a long, *long*, LONG, LONG time to print .

EDITOR: Kind of like the manual, right Dave? Long.

This isn't really UltraScript's fault. It just takes a long time to process all the information in a PostScript file. Be prepared for waits of up to 15 minutes for really complex documents, like greyscale pictures, to print. Actually, average print times are pretty good; a full page of text usually starts printing in about a minute.



Life In The Kid Lane

It was a bit late in the evening when someone phoned Gadgets. A strange, high pitched voice answered. "Hello?", it said. It was not the voice of our phone answerer, Barb. It was not the voice of Sandy. It was not even my voice.

It was a six year old's voice.

The caller wanted information on the Spectre 128. The answerer wanted information on Tyrannosaurus Rex. The caller wanted to know if it was available. The answerer said that T-Rex stood for "terrible lizard". The caller was stumped for a moment.

The caller wanted to know if Mom or Dad was available. "No, silly, I'm talking to you", the answerer replied, and hung up.

The caller called back the next day. To our surprise, he was a very good sport about the whole thing; turns out he was an elementary

school teacher. He ended up ordering a cartridge, chuckling the whole time.

It's been really different working in an office with three kids around Two (6, 7) are school age, one (18 months) learned to walk during the GCR development period. They can be accurately described as "terrorists".

They don't mean badly. I've already related the story of Jenny (6 years) and the Mayonnaise on the MacDisk. Purely innocent.

Take Barb. Barb used to be rather a computerphobe; she'd seen IBM's only, and was properly intimidated by them. One day, Eric (7 years) came hiking in. turned on the Mac as she watched, popped in the MacPaint disk labeled "ERIC", double clicked on MacPaint, and started drawing. He made a nice drawing, pulled down PRINT, and printed it off, then over to the copier machine to make some copies.

Barb stuck her chin out, decided she'd had enough of this intimidated-by-computers-stuff, and now is the proud owner of a MacPlus I hacked together. She uses it about 7.9 hours a day. (She does not yet have a terminal in-

stalled in the ladies' room.)

Usually, we lock up the office area, so the kids can't get in. However, there's always that one time you forget.

One day we came downstairs to find xeroxes of our weird cat, PyeWackette, all over the floor. Prints of her her paws, her belly, her fur. They're, well, modern art. To this day Pye gets wild eyed and twitches when we run the ol' Canon.

One time the kids decided it might be fun to watch PyeWackette being chased by Fang, our dog. The natural place to put them in together was our office. Pye defied laws of gravity getting away from the dog, going straight up walls, shelves, equipment racks, and so on. An inferno of destruction followed in Pye's wake; tools, carefully sorted floppy disks, manuscript pages, and so on wafted to the floor in Pye's wake. I have yet to find the new TurboST disk that Wayne sent me, and the Mega-4 didn't appreciate the cat hair in the keyboard, either. (Pye sleeps on the monitor now; nice and warm.)

Or the Miraculous Walking Disks, where certain popular disks

walk upstairs, completely by themselves, and hide under the kid's beds. "How did I HyperCard get up here?" "We don't knowwwww." (They like HyperCard because of "Manhole" and "Inigo's" adventures, you see. If you have kids, you owe it to yourself to check out these games, which run under HyperCard; they are entrancing.)

I did not think it was funny to find a tube of expensive PAL chips in Eric's room, their little legs bent around to help form some creature built partly of Legos, partly of GCR's. And my alligator clips are too often used as The Jaws Of Death.

The most terrifying to me is Jamey, 18 months old. Why? Jamey is at that stage where he can walk, get into trouble, scream louder than any smoke detector you've ever seen, but can't talk to tell you where it hurts. OSHA recently certified our office as a noise hazard because of him. (I hope to remedy this situation soon with specially designed ear protectors originally designed for howitzer firing.)

Jamey will magically get into the storage room, and reappear, holding (say) a soldering iron, 34-



pin cable, DB-25 cable, or a LittleFoot Dinosaur (his favorite; he sleeps with it). It is extremely depressing to find your last test probe clip, which you MUST use, at the bottom of the toilet.

Jamey will often toddle up to any keyboard that's available, and bash it a few times. (You see, he wants to do JUST what Mom and Dad do; he's very observant. Soon he will learn to moan, "Illegal Instruction Trap? You stupid machine!"). The Mac II next to me actually cringes when he walks into the room.

Needless to say, it is somewhat distracting, while trying to trace a tricky 68000 interrupt problem, to have someone toddle up to you, scream "DEEEEEE!", and bash the keyboard. Jamey has also learned that The Primal Scream is remarkably effective at getting him out of the Baby Jail (e.g., play pen), back to "where the action is". He is training his parents, you see.

Now I realize I've shot our image as a Big Corporation, but look, we are a family owned outfit, and you're going to be seeing more and more of that in the future, so you might as well be comfortable with it. I've seen other corporations get downright snob-

bish about us having kids around the workplace; you see, the kids are relatively quiet until I get on the phone, at which point, it suddenly becomes DreadFully Urgent for them to ask me questions, or to provoke The Siren into another earth-shattering roar. At that point, the person on the end of the phone realizes that Kids Are Around.

(Funny thing, though. The cold snobbishness usually disappears about one millisecond after we offer to pay cash up front for parts.)

Security

Now given all these happenings, we took SPECIAL precautions with this manual. Eric and Jenny have this thing about doodling on the stuff Mommy and Daddy doodle on - you know, Rolodexs, notes, printouts, HyperCard stacks, and so forth, and are fully hacker qualified to run computer machinery, as Eric proved to Barb. (Eric has shown me things about MacPaint and NEOchrome that no one else seems to know.)

Hence this manuscript has been carefully protected from them, so that we can project our professional image to you. Every night

it's locked into a vault, which is patrolled by our vicious guard dog, Fang. ("Fang" is something of a misnomer, a truer name would be "Lick".) Anything flesh within range is slobbered on, leading to cries of "yeeeee!" and rapid wipings and smuttings. We've had to obtain a Duplicating Weapon Permit from our county sheriff!) All disks are backed up to optical WORM drive, which cannot be altered once written. The manuscript was guarded day and night, and kept in a secure, child-proof safe when not being edited. It was rushed to the printers in a locked, sealed, tamper-proof bag.

We are proud of the results! For O'JCE, we got something out the door without the kids doing something to it.

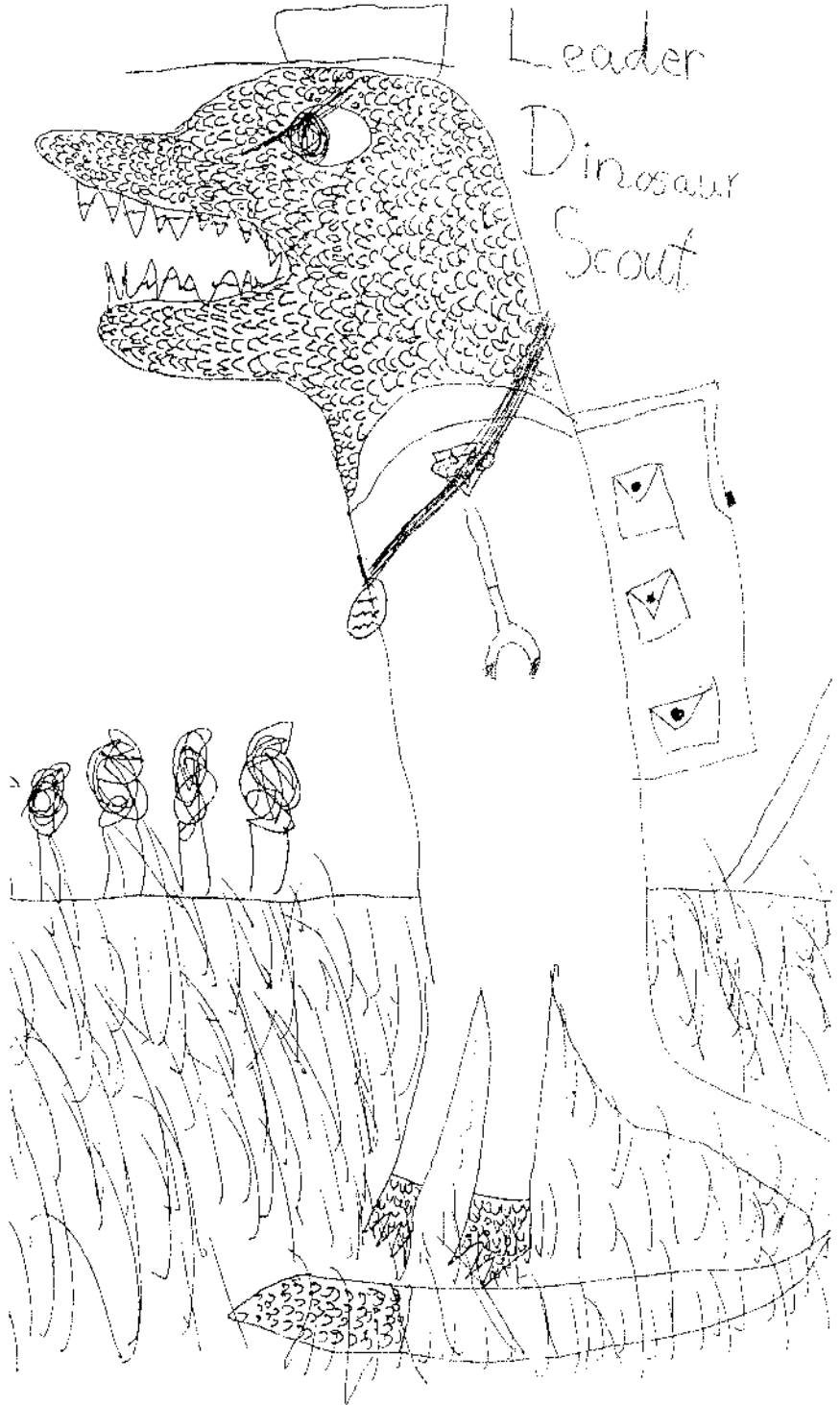
We'd like to give credit where credit is due, since it results in a clean, professional looking manual for you, something like (say) AT&T would put out for UNIX System V programmers.

The Specyre GCR Manual's
Security Team

- Manual Security Chief:
Sandy Small
- Assistant Security (Weapons):
Dave Small

- Backup Security (During Phone Calls):
Doug Wheeler
- Convinced Not To Have Kids:
Barb Hahn Lewin & Doug
- Tried To Help With James:
Lynn
- Baby Nail Manufacturing Co:
Gail Co.
- State Supported Child Day Care:
Northridge Elementary
- Gadgets Security/Testing Team:
Eric, Jennifer, Jamey
- Slobbering Special Effects:
Fang
- Hissing, Clawing, and Glaring Special Effects:
PyeWackette
- Essential Babysitting by:
Christie
- Movies for the next ten years:
Panasonic VCR division and
Movie Time movie rentals
- Drop-proof phones:
Pac-Tel
- Tough mouse cords:
Apple, Inc.
- Slobber-proof keyboards:
Atari Corp.
- Door locks:
VaultLock
- Safe:
Fort Knox Safes
- WORM drive:
Panasonic, Software: COREL

Leader
Dinosaur
Scout



Scout





Transverter

Transverter is an ST utility designed to allow you to transfer/convert (hence, the name) files between ST format and Spectre format disks. The files can be either standard text (ASCII) or Macintosh files.

This allows you to download Macintosh software, then move the files over to a Spectre Format disk. You can download files to your ST from a Macintosh, or commercial services (such as GENIE or CompuServe), or local Bulletin Boards, using an ST terminal (modem) program (like Flash, ST-Talk Professional, etc.).

You can save a PostScript file (basically a text file) in Mac mode with a Mac program and then move the file with Transverter to an ST format disk for printing with UltraScript.

Limitations

First and foremost, *Transverter will not work if you try to transfer to/from HFS disks.* This means that if you are transverting floppies, your Spectre or Mac format disk must be formatted as an MFS disk, either 400K or 800K. (Use DCFormatter to make 800K MFS Spectre disks.) If you are transverting with your hard drive, it must have an MFS partition. To transvert Mac format, you must have a GCR, and Transverter must be in the same place as SPECTRE.PRG.

In either case, just copy the files between the HFS and MFS disks while in Mac mode and then transvert using the MFS one. This is important to remember!

Transverter can transfer either Macintosh applications or text files. There are a few restrictions on the format of these files. Macintosh applications must be in MacBinary or Unary format to be transverted properly. Most Macintosh terminal programs automatically create



MacBinary files when sending files to a non-Macintosh computer, so you won't have to worry about it.

In general, if you download Mac files to your ST, they will be in MacBinary format. Files transferred with a Copy II PC Option Board will be in Unary format.

Any Mac file which is *not* a MacBinary or Unary file, must be transverted as a text file (technical explanation: the complete file will be put into a Macintosh Data Fork). In most cases, you will want to use a straight ASCII file; one without any special control codes or formatting commands.

Since the Macintosh uses just a carriage return to signify the end of a line, whereas most other computers (including the ST) use both a carriage return and a linefeed at the end of each line, Transverter gives you the option of removing or adding linefeeds (depending upon direction of transfer) for text.

If you have a *Mac application* (program) which is *not* in MacBinary or Unary format, you can transvert it as a text file. Then, while in Mac mode, you *must* use the program BinHex to convert the text file back to a Mac application. Warning: the transverted application may not work; it depends on how it was transferred from the Macintosh originally.

About Transverter

The first entry in the Desk menu is the Copyright/Trademark notice. (see Figure 16) After that are all your ST Desk Accessories. Please note that Gadgets by Small *does not own* the copyright to Transverter; it belongs to Doug Wheeler, one of our beta testers and general fixer-upper person. He lets us distribute it.

Doug has helped us a lot here; for example, he is the one who figured out why Ready, Set, Go 4.5 wouldn't print with UltraScript, and came up with a fix for it. It's been very helpful having him work with us. And, not only is he sharp, he's a nice guy, too.*

Anyway, back to copyrights, please don't make copies of Transverter for your friends, or upload Transverter to any Bulletin

* He is also 22 and single. Girls, send inquiries to Doug Wheeler, Gadgets by Small, marked "*personal*".



Figure 16

Boards or other online service. Thank you!

File Menu

This menu has several options which are, for the most part, self

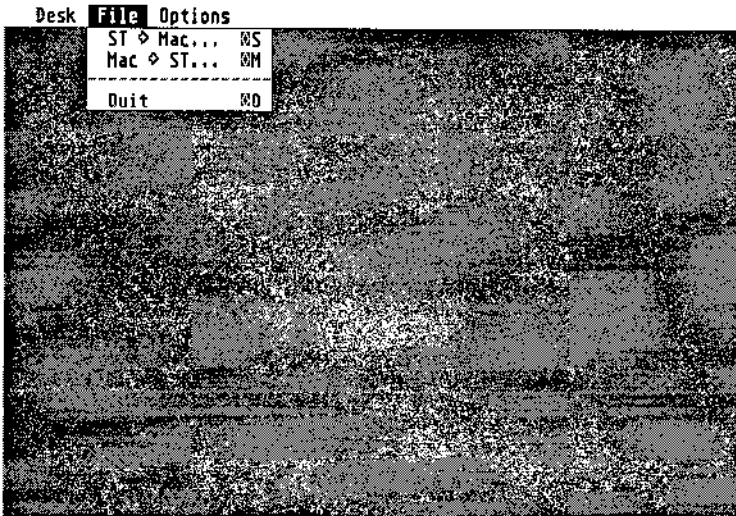


Figure 17



explanatory (see Figure 17). For example, you can select “ST -> Mac” or “Mac -> ST”, depending on whether you want to convert files from ST format disks to Spectre or Mac format disks or vice versa. You can also use a keypress to select the menu options, instead of selecting them. Press “s” or “Alt-S” to transvert ST format to Spectre format. To transvert Spectre format to ST format, press “m” or “Alt-M”.

The last option is “Quit”. You can also press “q” or “Alt-Q”.

Options Menu

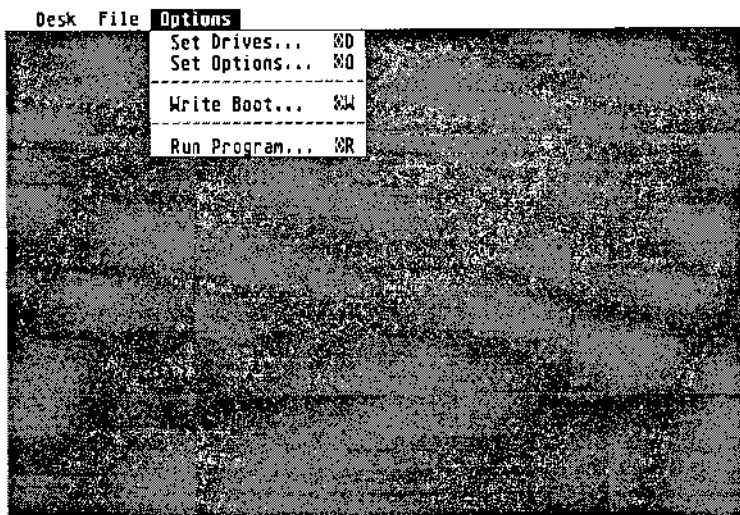


Figure 18

► **Set Drives...:** This allows you to select which drive will be designated as the “ST format drive” and which will be the “Spectre or Mac format drive” (“d” or “Alt-D”, from the keyboard). You can only use Mac format if you have a GCR. To select the ST drive, all you have to do is click on the appropriate drive, A or B. (see Figure 19)

To select a Spectre or Mac floppy drive, again just click on A or B; if you wish to use a hard drive partition, select HD, and then answer the questions. Specifying the hard drive is a bit trickier, as you need to fill in the blanks yourself.

The first bit of information you need to provide is the SCSI device. Devices are numbered 0-7 and refer to the number of the hard drive



Controller (if you only have one hard drive, leave it set to 00). Next is the SCSI LUN (logical unit); these are also numbered 0-7, and refer to the number of the hard drive attached to the Controller you already specified (again, this will be 00 in most cases).

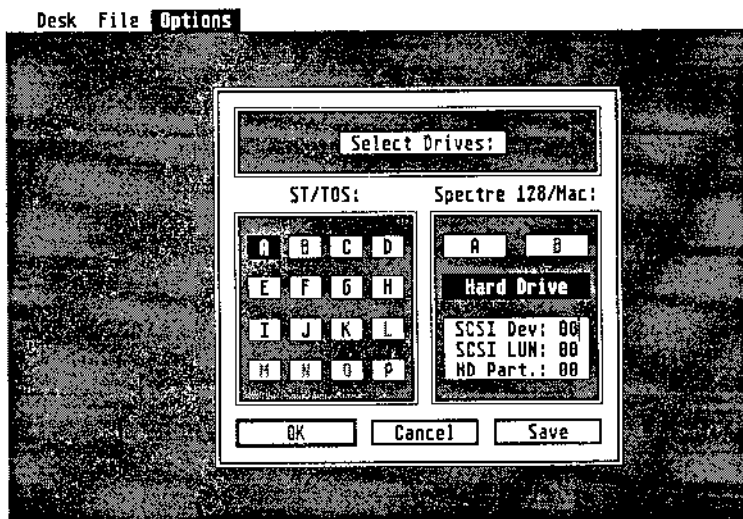


Figure 19

The last number is the partition number, these are numbered 0-11, and correspond to the partitions on your hard drive. (These numbers *do not* correspond to the ST drive letters, because the ST skips over the Macintosh partitions.) Use the same partition number you used when you "Formatted MFS" on the Spectre menu page.

After setting everything, you may accept the changes by selecting "OK", cancel the changes by selecting "Cancel", or save the changes by selecting "Save". Save will cause the drive selections to be stored in "TRNSV4.INF", along with the options set in "Set Options...".

One little quirk the ST has is that if it tries to read a Spectre disk when it thinks it is an ST disk, it may lock up the computer – no error or dialogue, just lock-up. *It is up to you to make sure there is not a Spectre disk in a drive which the ST thinks is supposed to contain an ST disk.* This is especially important when returning to the ST Desktop, where you may have a window open for one of the floppies.

► **Set Options...**: You can press "o" or "Alt-O" from the keyboard to access this; then you have 3 options you can set (see Figure 20).



The first is whether you want Transverter to write MacBinary headers or Unary headers on files transverted to an ST disk. MacBinary is the format used by most Macintosh terminal programs, and is considered the standard. Unary is a variation of MacBinary which is used by the Copy II PC Option Board.

The second parameter is for linefeed conversions. You can either select "Leave," in which case there will be no linefeed conversions or "Add/Strip" which will cause linefeed conversions to occur. Adding or stripping linefeeds will increase the transfer time of a file by 2-3 times. This usually isn't a problem with short files (< 50K), but can really take some time with longer files.

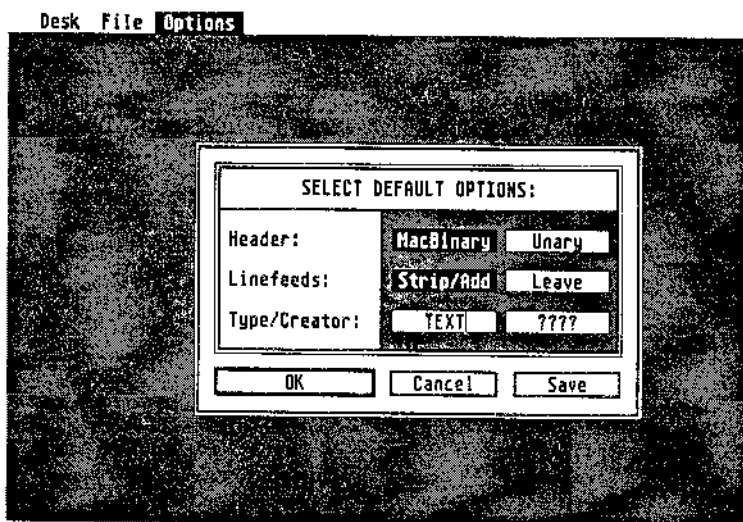


Figure 20

If you are transverting ST to Spectre or Mac, "Add/Strip" will cause linefeeds to be stripped. Linefeeds will be added if you are transverting from Spectre to ST.

The third parameter is the FileType and Creator to use when transverting text (ASCII) file to a Macintosh disk. You can change these if you wish, but unless you know what you're doing, you will get some very strange results when in Mac mode.

The linefeed and FileType/Creator options can also be changed from other menus, such as "ST -> Mac". This dialogue box just brings



all the settings together in one place, and allows you to change the default settings.

After selecting your options, you can select "OK", "Cancel", or "Save", just like with the "Set Drives..." option. Again, the ST file "TRNSV4.INF" contains these settings, along with the drives chosen in "Set Drives...".

➤ **Write Boot...:** In order for the Spectre to be able to boot from a disk, even if it has System/Finder on it, there must be "special data" on the first two sectors. These are called the "boot blocks". With this and the ST -> Mac option, you can create a Spectre format startup floppy disk for use with the Spectre 128. (You can press "w" or "Alt-W" to select this option from the keyboard.)

Before selecting this option, you need to use "Set Drives..." to set up which drive is the ST and which is the Spectre. The ST drive selected should be where the BOOTBLKS.BB file is located (usually with the Transverter program), and which floppy to use as the Spectre drive (A or B). After doing that, select "Write Boot...". A file selector will show you which boot blocks you can choose (currently there is only one set, which works with all current System/Finder combinations). After selecting the boot blocks file, Transverter will write them out to the Spectre drive.

Once you have boot blocks on a disk, you can transvert the previously downloaded Apple Macintosh System/Finder files to the Spectre disk. At this point, you have a bootable Spectre format disk.

➤ **Run Program...:** Another feature offered by Transverter is the ability to run any .PRG, .TOS, or .TTP program from it. ("p" or "Alt-P", from the keyboard) When you exit that program, you'll be returned to Transverter. One use for this is to format new Spectre disks without quitting Transverter.

To use this feature, select "Run Program...", and choose the program you want to run. If you chose a .TTP program, you will get a dialogue box where you can type in any parameters needed by the program.

Transverter will change the current drive and path to that of the program being run. This makes sure the program will be able to find it's support files, if any. Upon exiting, Transverter will change the default drive and path back to what it was originally.



Keep in mind that while running another program, Transverter remains in memory, and in some cases may not leave enough free memory for the other program.

If you run out of memory, try removing Desk Accessories and RAMdisks and try again. Transverter will make use of all available memory.

Transverting ST to Spectre

Let's assume that you wish to transvert a Macintosh program from an ST disk to a Macintosh disk. To do this, select "ST -> Mac..." from the File menu; you will get a file selector. You can select just one file, or you can use wildcards, such as "*.MAC" (all the files which match will be transverted). If the file is in MacBinary or Unary format, Transverter will then read the file into memory.

If the file is not in MacBinary or Unary format, you will get a dialogue box asking whether you want linefeeds removed (stripped), gives you a chance to change the Filetype and Creator of the file, along with the option to cancel the transfer. The Macintosh OS uses the Filetype and Creator to determine what kind of file it is, and what program created it. Usually, the FileType should be left as "TEXT" and the Creator as "????". To put it simply, if you don't know what they mean, just leave them the way they are. After selecting your options and clicking on OK, then Transverter will read in the file.

While the transfer is in progress, a status indicator will be visible on the screen. The status indicator consists of three bars, which fill in from left to right, indicating the portion of the operation which has been completed. For the ST format disk, there is only one bar. A Mac does things a little differently; a Mac file has two parts, the Resource Fork and the Data Fork (the Resource Fork consists of the program, icons, menus, dialogue boxes, etc. and the Data Fork consists of other data, such as text files). Usually, an application will be mostly Resource Fork and a text file will be mostly Data Fork. (see Figure 21)

After Transverter has read the file off the ST disk, it will check to make sure the disk you are transverting to is an MFS formatted Spectre or Mac disk; then it will write the file. In the case of MacBinary files, Transverter will write the *complete* filename to the Spectre disk (usually



not the same as the filename on the ST disk).

Transverting Spectre to ST

As you might imagine, transverting from Spectre to ST Format is very similar. The only real differences are in the file selector, the status indicator, and linefeed handling.

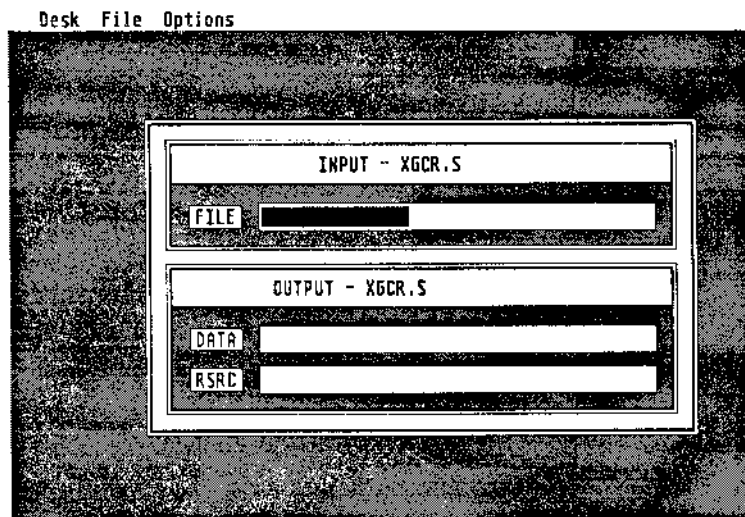


Figure 21

First you need to select "Mac -> ST" from the File menu; then you select the file to be transverted.

When transverting to an ST disk, Transverter will automatically add a MacBinary or Unary header, unless the file has a Data Fork, in which case Transverter will ask if you wish to transfer the file as "Mac" or "Text" (ASCII). (see Figure 22) If you select text, just the Data Fork of the Macintosh file will be transverted; if you select linefeed conversion, linefeeds will be added instead of removed.

Errors

In most cases, disk errors will not cause any permanent damage, but there may be a few exceptions. If Transverter reports an error

Desk File Options

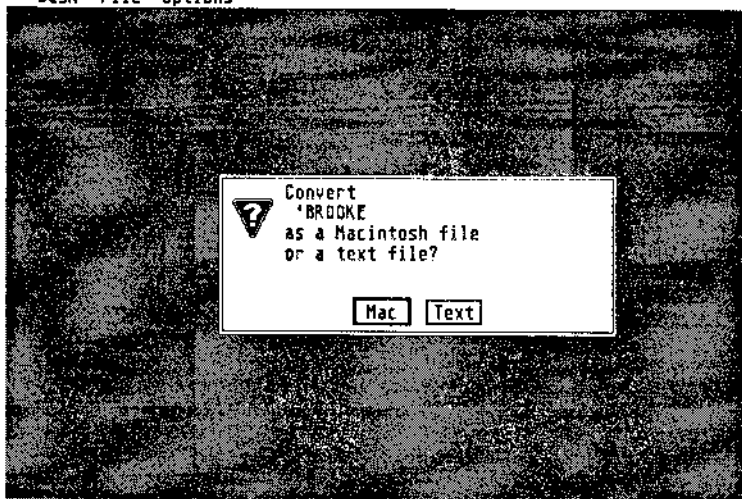


Figure 22

when writing to a Spectre disk, stop everything and try the disk with your ST in Mac mode. If the disk works, copy all the files to a new disk and reformat the one that gave the error.

If Mac mode can't read the disk, don't panic; even though it can't, Transverter may be able to. Use Transverter to transfer all the files to an ST disk and then transfer them back to a newly formatted Spectre disk.

If you get any other errors, please report them to me* along with what you were doing at the time of the error.


Earlier versions of Transverter had problems with large files. Transverter 3.xx and above has a new memory management system which allows for much larger files. Before reporting errors, make sure you have the latest version.

Disclaimer

Gadgets by Small, Inc. and/or Doug Wheeler cannot be held responsible for any loss of data through the use of this program.

* Doug Wheeler, c/o Gadgets by Small, DOUG.W on GEnie

Where'd the Name "Spectre" Come From?

hen I left Data Pacific, in March 1988, word quickly spread that the Magic Sac was dead, since I was so heavily associated with it. Subsequent events proved (in my opinion) that this was true.

While Sandy and I were searching for a name for this new program I was writing, we had the mental image of Mac emulation "rising from the dead". The thesaurus we consulted listed Spectre under that meaning, along with ghost, phantom, vapor (really names you want to use!) and we liked it.

The 128, of course, comes from the 128 ROMs.

The GCR comes from Group

Coded Recording, which is the technical name for how the Mac does disks. The Atari's normal mode is Modified Frequency Modulation, also known as MFM, sometimes called MFM-106, The Rock Of Colorado.

EDITOR: You're stretching. Dave. That's really stretching.

Long after we decided on the name, we remembered Antic software's "Spectrum 512", a multi-color painting program. We're sorry if this caused any confusion, but given how very different the functions of the products were, and the different pronunciation, we didn't think of it as a problem.

As I write this, a cricket in the next room has been frantically chirping for about three hours, and driving me slowly crazy. Our weird cat, Pye'Wackette, is not in a hunting mood (never is when it would do any good). Sandy has just appeared with a can of RAPD.

Ah. Blessed silence. Back to the manual.



Where and How to get Support

We try to support our users to the best of our ability, but in order to do so, we need your help! The best way is to send us your Registration Card, so you can get the latest news and updates.

When it comes time to get questions answered, report a bug, or whatever, you've got several choices:

- ▶ Drop us a letter. This takes a while to turn around, but is mighty inexpensive. It also allows you to enclose a disk, showing us the problem (generally, some MacProgram that MacCrashes), so we can see it and fix it.
- ▶ Contact us online, on BIX, CompuServe, GENie, or Usenet. My signons there are:

BIX:	dsmall
CompuServe:	76004,2136, or type "go atariven" to go to the Atari ST Vendor conference areas.
GENie:	Type "gadgets" at any prompt to go to the Gadgets Roundtable.
Usenet:	...!hplabs!well!dsmall (The Well), or, perhaps, if the phase of the moon is right, you'll get through on: ...!hplabs!boulder!tcr!gadgets!dsmall

The last one's our in-house UNIX machine, which takes delight in losing mail and unlinking itself from Usenet. But that's how you learn. If you don't get a reply from either The Well or the Gadgets machine, it's because the reply to you "bounced back" – the mailers "aren't very smart", to use UNIX technical-talk.



If we've established a Gadgets online area on the system you dial into, you probably will be able to find a topic that answers your questions, up there and ready to look at, from some previous user who asked the same question. So take a moment and browse around, looking at the questions. This takes very little time and doesn't cost you an arm and a leg.

Generally, we try to reply to email within 72 hours, and if you post the question online, usually some Spectre user will reply within 12 hours. Not bad, eh?

► Fax us at (303) 791-0253. We have a handy dandy little device that just *loves* to spit out paper.

We find this is the best way for us to support non-online users, as the questions and problems are *written down*. Generally, we just fax back the original, with the questions answered, so please leave space for writing.

► You can call us on the phone.

This isn't much fun. First, it's a long distance call for you, almost certainly. Denver is not an oasis of Spectre users.



Second, we may be in the middle of something, in which case we can't come to the phone. You have to understand that when we take one tech call, we spend X minutes satisfying one person (maybe); when we put a fix or upgrade into the software, we make a few thousand users happy. Where do you think we should draw the line? We enjoy talking with people, but there's only a certain number of five-minute periods each day.

Third, the lines may be busy because we're dealing with someone else. This happens. There are a lot of someones.

Also, the depressing fact is that a lot of our tech calls are questions that are covered in the manual, or are from people who don't have a manual – because it's, err, a copy of the Spectre, not an original.

Also, Barb, who answers the phone, has heard every possible question at least sixteen times. Feel free to ask her questions; she usually knows the answer. Honest, we don't have any no-knowledge phone answerers here.



Appendix A: Sources

Sources for Mac 128K ROMs

Pre-Owned Electronics
30 Clematis Avenue
Waltham, Massachusetts 02154
(800) 274 5343, (617) 891-6851, Fax: (617) 891-3556

Shreve Systems
2421 Malcolm Street
Shreveport, Louisiana 71108
(318) 865-6743, Fax: (318) 865-2006

Source for Mac 64K ROMs

Berkeley Microsystems
PO Box 20119
Oakland, California 94620
(415) 547-2191, Fax: (415) 547-0184

Sources for Printer Drivers

Epstart, MacEnhancer
SoftStyle; Phoenix Technologies
6600 Kalaniana'ole Highway
Honolulu, Hawaii 96825
(808) 396-6368, (800) 367-5600, Fax: (808) 395-8972

Print-Link
GDI SoftWorks
PO Box 1865
Point Roberts, Washington 98281
(604) 291-9121, Fax: (604) 291-9689

Grappler C
Orange Micro
1400 Lakeview Avenue
Anaheim, California 92807
(714) 779-2772, Fax: (714) 779-9332



Source for UltraScript

UltraScript

Imagen Corporation
PO Box 58101
Santa Clara, California 95052
(800)635-3997, (408)986-9400

Sources for HP DeskJet Drivers

MacPrint

Insight Development Corp.
1024 County Club Drive
Moraga, California 94556
(415) 376-9500, Fax: (415) 631-0595

JetLink*

GDT SoftWorks
PO Box 1865
Point Roberts, Washington 98281
(604) 291-9121, Fax: (604) 291-9689

Printworks

SoftStyle; Phoenix Technologies
6600 Kalaniana'ole Highway
Honolulu, Hawaii 96825
(808) 396-6368, (800) 367-5600, Fax: (808) 395-8972

Grappler C

Orange Micro
1400 Lakeview Avenue
Anaheim, California 92807
(714) 779-2772, Fax: (714) 779-9332

Printer Interface III

DataPak
14011 Ventura Avenue, #507
Sherman Oaks, California 91423
(800) 327-6703, (818) 905-2201

* Mark Booth's pick



Sources for Mac PD Software

Current Notes Magazine
122 N. Johnson Road
Sterling, Virginia 22170
(703) 450-4761

AccuSoft
PO Box 02214
Columbus, Ohio 43202

UpTime
221 3rd Street
Newport, Rhode Island 02840
(401) 847-2455

Network Customer Service Numbers

CompuServe Customer Service
1 (800) 848-8990 or (614) 457-8650

GENie Client Services
1 (800) 638-9636

Bix Customer Service
1 (800) 227-2983 or (603) 924-7681



Appendix B: Special Function Keys

General Keys

► Disk Drives

Function-1:	Mount floppy drive A.
Function-2:	Mount floppy drive B.
Function-3:	Mount first Spectre HD partition
.	.
Function-10:	Mount eighth Spectre HD partition.

Shift-↑:	Orwell's Disk Monitor ON.
Shift-↓:	Orwell's Disk Monitor OFF (default OFF).
Shift-←:	Turbo Disk Mode ON (default ON).
Shift-→:	Turbo Disk Mode OFF.

► Color

Shift-Keypad-*:	Show top of scrolled screen.
Shift-Keypad--:	Show bottom of scrolled screen.
Shift-Keypad-(:	Switch to scrunched mode.
Shift-Keypad-):	Switch to scrolled mode.

► Sound

ESC:	Sound off.
------	------------

► Miscellaneous

Alt-Insert:	Patch SCC and VIA addresses (default ON).
Alt-Delete:	Restore SCC and VIA addresses.
Alt-Keypad-+:	Emulate a Mac Plus.
Alt-Keypad--:	Emulate a Mac 512KE (default ON).
Shift-Help:	Reboot from Mac mode to ST Desktop.
Shift-Undo:	Reboot Mac mode.

► After Crashing

Return:	Reboots Mac mode (same as Shift-Undo).
Keypad-*:	Return to Finder in Mac mode (if possible).



SLM804 Keys

► Screen Snapshots

Shift-Keypad-0: 72 dpi, rotated screen-snapshot.

Shift-Keypad-1: 300 dpi, straight screen snapshot.

► Printer Interceptor

Shift-Keypad-2: Enable printer interceptor (default ON).

Shift-Keypad-3: Disable printer interceptor.

► Debugger Only

Shift-Keypad-4: (debugger option: dumps bytes in hex. Don't use.)

Shift-Keypad-5: (disables hex dump. Don't use.)

► Instant Page Dump

Shift-Keypad-6: Dump whatever is in the laser buffer to the Laser.

► Page Eject

Shift-Keypad-9: Send a form-feed to the printer (page eject)

Shift-Keypad-7 and Shift-Keypad-8 are disconnected and are no longer in service.

Appendix C: Connections

Atari Serial to ImageWriter I

Atari DB-25 Female		ImageWriter I DB-25 Male	
CTS	5	DTR	20
TxD	2	RxD	3
RxD	3	TxD	2
GND	7	GND	7

Null Modem or ImageWriter II Cable

A null modem cable is used to connect a Mac Plus, SE, or II, to the Atari, in order to download Mac software when using the Spectre 128. The same cable is also used to connect an Atari to a Mac Imagewriter II. (see Figure 23)

Atari DB-25 Female		ImageWriter II or Mac 8pin din	
DTR	20	CTS	2 (HKS _i)
CTS	5	DTR	1 (HKS _o)
TxD	2	RxD-	5
RxD	3	TxD-	3
GND	7,1	GND	4, 8, 6

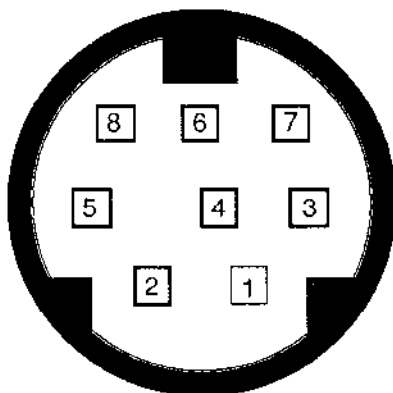


Figure 23

Appendix D: SCSI Hard Disks

Well, here's certainly a topic not for the faint-hearted. As we mentioned before, you can indeed hook up an Apple SCSI hard disk to the Atari, and the Spectre will recognize and use it. LOTS of people have asked us how to do this.

Now for the "ifs, ands, or buts." SCSI is an extremely complex thing, and not at all "industry standard". Apple doesn't use standard SCSI, neither does Atari. Hence, it can take some doing to make SCSI work; and every now and then, I run into something SCSI that I just plain can't get working period, for no apparent reason, no matter what. (The last one was a Rodime disk drive...) Folks at ICD and Supra make their living straightening out SCSI.

Apple SCSI is done in a variety of interesting ways, too, depending on who you buy the drive from. For a fun afternoon, read the "termination" section in an Apple SCSI manual; it's reminiscent of a nightmare.

Thus, it is no simple "buy a cable and go" hookup. It depends on your present hard disk setup, and what kind of Apple hard disk you want to hook up to. Since we don't want people casually trashing expensive hard disks; this is not a good place to start learning about digital electronics and soldering!

However, we also do believe in information exchange, so we don't want to suppress details on this just to cover ourselves legally. Thus, we can't be responsible for what you do with this information, okay?

Now, with that out of the way, here's the details.

Atari uses ACSI, their 19-pin disk cable. This is not SCSI, it is just a cousin. The ACSI cable goes into an Atari disk drive unit, and is electrically translated into "true" SCSI (well, not multiple machine, but close enough), a 50-pin ribbon cable. You can buy the ACSI-SCSI translation unit separately from disk drive makers like ICD and Supra; I happen to like ICD's, as it lets me daisy-chain to the SLM804 laser printer, but there's a lot of quality units around from other companies, too. (I just tend to find one that works and stick to it... I've lost my "spirit of adventure" when it comes to computer hardware, I guess.)



This "true" 50-pin SCSI is then routed to the disk drive controller. The controller is sometimes built into the disk drive, sometimes not. If you have multiple disk drive controllers, the 50-pin cable is routed to each one (that means it connects to them one after another). You absolutely cannot do things like "Y" cables or a circular cable. Note that the common Adaptec 4000 controller can handle two drives by itself, so a two drive system doesn't necessarily imply two controllers.

Also, Atari's MegaFile series of drives has merged together the ACSI-SCSI board and the disk controller board, and doesn't use the 50-pin "true SCSI" at all. You can't get at true SCSI with that kind of hard disk. (The older SH204 is fine).

Thus, in my system here (just as an example), the 19-pin cable comes out of the Atari, and goes to an ICD board, thence to the SLM804 laser printer. The 50 pin cable starts at the ICD board's other end. It's routed to an OMTI controller, then to an Adaptec controller, then (finally) to a hard disk with built-in controller, where the terminator is; this last hard disk happens to be a Mac-formatted drive. I can unhook that drive and move it straight to the Mac, to move big chunks of data around **fast**.

Check out Figure 24.

Apple uses their own SCSI. It comes out of the Mac on a 25-pin connector, a DB-25, that looks identical to the ones on the back of the ST (where you hook up a printer and modem).

It's fairly close to "true" SCSI, except Apple doesn't put any "terminators" inside the Mac, like they should have. (<- editorial comment.) Now, you say, "true" SCSI is 50 pins... how do they manage with 25? Well, the 50-pin "standard" SCSI has odd pins as ground, and some pins that aren't really used, so 25 is enough for the essentials. NOTE: true SCSI pin 25 is NOT ground; every other odd numbered pin is.

What you need to do is connect the Apple 25 pin connector to the 50-pin connector "true SCSI" ribbon cable inside the Atari drive. This is a matter of connecting pin A to pin B for Apple's 25 wires, and is a nice afternoon project with some Radio Shack style parts. I've included the necessary pin numbers:



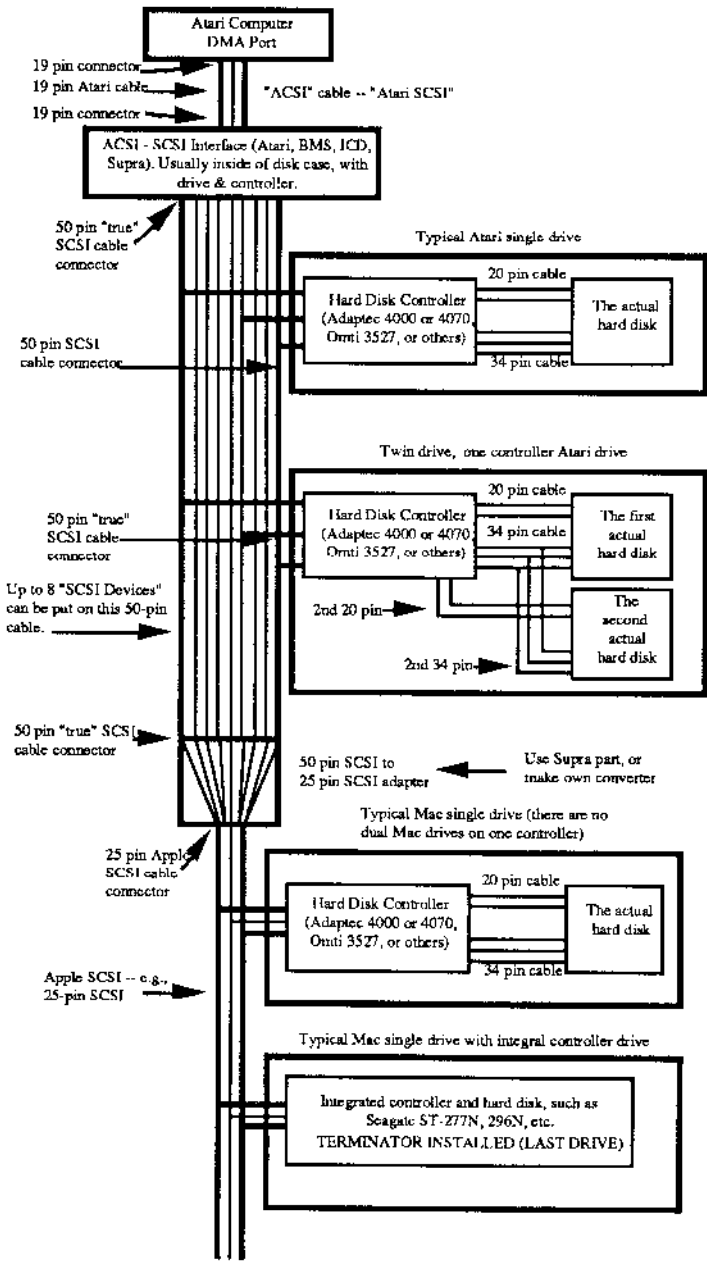
SCSI Specification (50 pin standard SCSI)		Apple SIDE (DB-25 Apple standard)
Pin	Signal	Pin
1.*	GROUND	1.*
2	-DB(0)	8
4	-DB(1)	21
6	-DB(2)	22
8	-DB(3)	10
10	-DB(4)	23
12	-DB(5)	11
14	-DB(6)	12
16	-DB(7)	13
18	-DB(PARITY)	20
20	GROUND	14
22	GROUND	16
24	GROUND	18
25	<-TERMPWR	25. (n/c)
28	GROUND	9
30	GROUND	24
32	-ATN	17
34	GROUND	7
36	-BSY	6
38	-ACK	5
40	-RST	4
42	-MSG	2
44	-SEL	19
46	-C/D	15
48	-REQ	1
50	-I/O	3

If you've never done this sort of work, forget it, for your own sake!

Now, for some real fun, look at pin 25 on standard 50-pin SCSI. This is "termination power", and is the only odd numbered pin on the 50-pin connector that is not ground. It sometimes supplies power for termination networks. Adaptec 4000 controllers don't use it; they supply their own. OMTI RLL 3527 controllers have a switch to let you decide whether or not to use it, and so on and so on, depending on what SCSI device you hook on.

Next, look at the Termination Resistor Pack situation. 50-pin SCSI

* All odd pins except #25 are ground.



Up to 7 SCSI devices can be on the total SCSI chain, "true" SCSI and Apple combined. Last Drive on the chain *must* have terminator; all others *must not* have it.

Figure 24



wants a “terminator” on either end of the cable to prevent “ringing” and other signal troubles. You want exactly one on either end of the 50-pin “true SCSI”; two is too many, and may actually cause damage, by making the chips that drive SCSI work too hard. Zero is too few, as the signal will be lost in all the ringing and noise.

What this boils down to is when you daisy-chain hard disks to an Apple hard disk, you have to determine if the Apple hard disk is terminated, and depending on how you’ve hooked things up, make it so that the last disk drive on the 50-pin “true SCSI” cable is terminated, and no others are. You’ll probably have to pull the terminator packs off any present Atari drives. But again, it depends on your present rig. Maybe you’ll want the Apple drive in the middle, in which case, it should not be terminated.

You’ll also have to do some creative cabling to get the 25 wires out of the Atari drive and to the Apple drive connector.

For portability between the Mac and Atari, you might want to use an unterminated Apple drive, and terminate with other drives on your Mac and Atari. Or, for a single drive, terminate it. (You’re beginning to see why we were hesitant to tell people all this, right?)

To transfer between a Mac and the Atari, you must format the hard disk on the Mac. You’re going to find that each and every Mac hard disk manufacturer makes their own formatter, and they’re all a little different, unlike the Atari, where everyone’s formatter pretty much works with everyone else’s hardware. I use Supra’s Mac SCSI formatter for the Mac brand of hard disks; I have had zero luck with other ones.

Finally, you have to set the SCSI ID number on the Apple unit to something that doesn’t conflict with the Atari devices. Atari’s SLM804 Laser Printer uses 7, and has just been changed to use 5, because Ken Badertscher’s birthday was on the fifth. Your present hard disk is probably 0, but check.

After all this fun, you can check for a valid connection several ways. First, when you press RESET or power on, the Atari will zip through all connected and working SCSI devices, 0-7, and briefly “light them up.” It’s looking for “partition sectors” on all connected disk drives. You should see all the lights flash on your connected units; if none flash, you’ve locked up the SCSI bus (usually, termination troubles, or two same-numbered SCSI devices). If one doesn’t flash,



that particular unit is miswired or bad or.. ?

When you bring up the Spectre's first menu, it should also poll every hard disk, looking for Spectre partitions, and if it's been formatted on a Mac, the drive will show up on the Spectre hard disk pull-down menu. (Note that you can select and deselect SCSI ID's within that menu.)

Is this fun, really?

When I had to do this, I made a 25 to 50 pin cable the usual way (ribbon cable and brute force). It would work fine with one controller, but not with two. I then called Supra, got one of their Mac disk cables (which is a 25 to 50 pin cable, with the essential termination power supply that you hook onto the +5 supply), and their unit worked fine with multiple drives. I'm still not entirely sure why theirs worked and mine failed with two drives; when you enter SCSI, you're entering the land of Voodoo.

Supra drives now feature a 25-pin "daisy chain" connector for SCSI that is Apple SCSI. Hence you've got a fighting chance to plug in an Apple drive to that and work, provided you get the termination right.

Anyway, if you're confident with SCSI and this is all old hat, go ahead; if not...

For those of you trying to make up your minds: I just got done failing to hook up an Adaptec 4000 controller to a Mac. I still don't know why it doesn't work. Its brother Adaptec 4000 works just fine on the Mac.. Bad cable? Bad connector? Bad karma? I don't know.

Appendix E: Hard Disk Tips

◆ After formatting Spectre partitions from the Spectre menu page, you should always reboot. Otherwise, GEM may try to access data on that partition, not realizing the partition has been subverted to Spectre format. It could damage the Spectre directory and boot data, or whatever. Let GEM reboot, it'll figure out the partition is off-limits to GEM, and reshuffle the icons.

◆ Beware this icon shuffle. You'll note how the icons are assigned one at a time, starting at "C", to the next available GEM-only partition. If you change a GEM partition in the middle of a bunch of GEM partitions, all the GEM partitions past it will shift down one letter as of next reboot.

◆ I strongly recommend purchasing a copy of ICD's or Supra's Hard Disk Utilities, to help keep track of your hard disk and what's going on in general. They are extremely valuable, and have saved me many times.

◆ When you format Spectre partitions, you'll temporarily lose the autoboot ability of your disk drive (to autoboot into ST mode at all). No sweat! Just re-run the "Enable Boot" program, to re-enable hard disk autoboot. This happens because tweaking the partition table to tell GEM we're taking over a partition upsets a flag that tells GEM that the hard disk is bootable.

◆ Atari's driver software quits looking for partitions on a drive, and assigns drive icon letters to partitions, as soon as it finds a non-GEM one. Thus, you end up with GEM partitions you cannot access if you put a Spectre partition in the middle of a group of GEM partitions, and use Atari's hard disk boot software. (ICD's and Supra's software is smarter than that.)

◆ If you have more than one hard disk (alright!), they are mounted in ascending SCSI and LUN order. 0,0; 0,1; 1,0 ...etc. Then they are displayed in the "Hard Disk" menu, so you can check there. Note that deselecting a drive in the "Devices..." menu changes this order. That order determines what Function key hooks to what partition, so keep a eye on it.



◆ You will find it difficult to return a Spectre partition to GEMDOS use. It depends on your utility software. If you can change the drive ID from “ACK” (Spectre) to “GEM”, that may help you at least get it zeroed. Careful on this; don’t zero the wrong partition!

◆ F3-F10 work anytime (provided there is a hard disk hooked to them, otherwise they are ignored). Such places as Finder, File Selector Dialogues, and so on work fine – just like you inserted a big, fast floppy disk. It’s treated the same way, incidentally.

◆ I do not as yet understand why the hard disk sometimes refuses to fully eject; maybe there’s a flag somewhere not cleared. I know the “Please Insert Disk xxxx” dialog can be forced off by Command Period (Control-.), but this could be dangerous. If you are shutting down, just ignore this message and turn the computer off.

◆ It is extremely valuable that we can “eject” hard disks, and thus force their directories to be updated. For instance, if you’ve just saved The Great American Novel to the hard disk, and want to make absolutely sure it’s there, go eject the hard disk icon. The Mac will think it’s a big, fast floppy, update its directory, and in general neaten things up. Now, if you crash, the hard disk directory is there.

On the Mac, I’ve had the charming experience of saving T.G.A.N. to the hard disk, and crashing a little while later – and coming back to find the Mac didn’t know anything about the file. Plausible deniability or something.

So I made sure you could *make* it work on the Spectre.

◆ The 128K ROMs are sensitive to crashes. A crash can leave the “Desktop file” a mess, which will result in a crash on autobooting. The cure is to boot off floppy, then mount the hard disk with F3 (or whichever Function key it is). If you’re going to mess with known crashable software, leave the hard disk out of it (just never mount it).

◆ If it still crashes, try mounting the hard disk while holding down CONTROL and ALTERNATE; this forces a rebuild of the Desktop file, and fixes it. Regrettably, it loses all Get Info comments, but it’s worth it to get the hard disk partition back.



◆ If the CTRL-ALT mount doesn't work, there's one more thing to try. Go into a program, say, MacWrite, if there's MacWrite files you need. Get to a "Open" dialog, mount the dead partition with F3 (or whatever), and see if you don't get a list of files. IF you do, pick what you can, grab it, and save it elsewhere. Often, a hard disk that cannot display its wares to Finder's Desktop can still have them accessed in this way.

Needless to say, this is a desperation move. Once you've gotten the data, go reformat the drive using SPECTRE.PRG.

◆ Keep backups of your hard disks. The only stable program I'm aware of to do this is Meg-a-Minute Elite, which Dan Moore and I wrote for START magazine, Fall 1988. This produces an image of any partition that can later be restored.

◆ Perhaps one of the commercial Macintosh backup programs will start working, but they all seem to go straight to the SCSI and IWM disk chips to get maximum speed. Don't hold your breath.

◆ Backup one partition to... another partition! It takes hardly any time at all, with Spectre speeds, to move 5-10 megabytes of data, if you've got the space.

◆ ICD's superb, excellent FA•ST tape backup works very well with the Spectre, and whips through 8 megabytes per minute to or from Spectre partitions. This is past cool into frigid. I strongly recommend it. It is a bit pricey, but look, I've checked out the cost of the components inside that tape unit, and ICD isn't making very much; it's a high quality Teac tape unit.

◆ If you are in Mac mode and it starts acting "bonkers", it usually cures itself when you recopy System/Finder from a known good disk. This usually is related in some way to a "crash", and is a Mac peculiarity. Such crashes have a way of damaging System/Finder, without you realizing it until later.

◆ Strong recommendation: Keep a known good System/Finder on a write protected floppy to boot from and restore your hard disk from, especially if you are running new and unknown software.

◆ Put your applications in the "root", or non-folder, directory; that way, HFS can find them quickly and easily when you try to launch a document directly.



◆ Apple disks bigger than 32 megabytes could possibly have a problem, depending on how they were formatted, and what Atari OS Software you are using.

◆ Finder 5.3/System 3.2 or above is required to run HFS. Don't try hard disks with Finder 4.1 /System 2.0. Finder 5.3/System 3.2 has known bugs which include not being able to eject with Control-A, Control-E, and not plotting the Spectre disk icons. We recommend Finder 6.0/System 4.2, but you can use whichever you prefer, as all System/Finder combinations work.

◆ I don't even want to talk about Mac viruses. They'll work on the Spectre, too. Look out; I do know that one anti-virus program zaps out the Spectre's hard disk partition for good. Absolutely use the VACCINE "INIT" (Inits are like AUTO folder programs, they are run automatically at system startup). Absolutely use Disinfectant from time to time to check your system for infection and clear it up. These programs are on the Mac disk that comes with the Spectre package.



Appendix F: UltraScript Tips

◆ If you are getting “Out of Memory” errors with UltraScript, get rid of your Desk Accessories; large PostScript files can really chew up space when printing.

◆ Freehand 2.0 PostScript files *sometimes will not print* with UltraScript. In order to print these files, save them in EPS (Encapsulated PostScript) format, load them into another program, like PageMaker, and print the PostScript file to disk from PageMaker, rather than directly from Freehand.

◆ PageMaker has a “Print to disk” option. Just press Option when you select **Print** from the **File** menu.

◆ UltraScript program looks for a file called STARTUP.PS during its initialization process, and uses it if found. We include a STARTUP.PS file on the Spectre disk, which allows you to use downloadable Mac fonts such as CassidyWare without having to modify each one, and allows a Ready, Set Go 4.5 PostScript file with text in it to print properly. As a bonus, we also include a replacement error handler.

The first section of the STARTUP.PS file is a replacement for the error handler which gives you a little more information if you crash while printing. It will print what instruction you “died” at, plus whatever would have been printed on that page. If you don’t want the error handler, just delete the whole `errordict` section.

The first line of the second section (after `systemdict`) fixes the problem with fonts like CassidyWare. The next two lines fix the problem Ready, Set, Go 4.5 has when printing text.

◆ In order to get downloadable Mac fonts to work you have two choices. You can either use the STARTUP.PS file we send on the Spectre disk, or you can use a program like FEdit to find this line (found near the beginning of the data fork) in *each font* you are printing:

```
/cache{NL 0 eq{setcachedevice}{6{pop}repeat}ifelse 0 0 moveto}def
```



and change it to:

```
/cache{0 0 moveto NL 0 eq{setcachedevice} {6{pop}repeat}ifelse}def
```

◆ Get the additional 35 fonts available for UltraScript.

◆ *Adobe brand fonts are encrypted, and are not compatible with UltraScript, and UltraScript fonts aren't compatible with Adobe fonts, so don't buy Adobe fonts to use with UltraScript. This does not mean that you can't print programs in Mac mode that use Adobe fonts; you just need to have the same fonts for UltraScript that you have in the Adobe brand. As far as PostScript is concerned, Times Roman is Times Roman.*

◆ Thanks to Graeme Bennett for his notes from his expedition into UltraScript and Spectre.

Appendix G: Crashing

There you are, peaceably minding your own business, running some MacProgram, when *wham*, the crash page scrolls up. It sadly informs you that the program crashed so badly that the zero-store handler couldn't even restore it to life. Various incantations and prayers also didn't help; it just plain died. As it expires, the Spectre gasps out the information that killed it in the form of LOTS of hexadecimal numbers.

Hexadecimals? That's Base-16 counting. It's real easy if you have 16 fingers. It counts like this: "0-1-2-3-4-5-6-7-8-9-A-B-C-D-E-F, then 10-11-12..."

Interpreting the Crash Page

You're naturally a little curious what all these numbers are. They're the "Crash info" given me by the 68000 as it died, to let me do a postmortem analysis and find the problem. Remember, you only get this page if some pretty sophisticated retry code fails to restart the ST, invisible to you. (It does this successfully dozens of times per Mac sessions; it works darn well.)

Bus Errors

MOST crashes are "bus errors". This means the ST was told to read or write information somewhere that's a no-no on the memory "bus", hence the name.

The pertinent information on "bus errors" is the "bus cycle". The "bus cycle" is where the transfer was tried from/to, and since that *address* was the no-no, it thus tells us the problem.

If problem is Bus Error, look at Bus Cycle. If:

00000000-00000007, it tried to write into location 0. Typical zerostore; I couldn't catch it and save it either because it's an instruction that lies to the IR (Instruction Register) about what it was – bit test, bit save, bit clear – or because I haven't figured out someone could do things this way yet. I thought I'd seen 'em all. But some Mac Programmer just

came up with a new, creative way to crash.

0040xxxx-0041xxxx: Someone tried to directly access the Mac ROMS at the address they would be on the Mac. Ooops. Perhaps a hardcoded jump in someone's program, or a goofup on my part. \$0040008 or \$0040009 used to be hit all the time; this was the test if you were a Lisa or a Mac, but with the declining popularity of the Lisa, few people bother any more.

0050xxxx: Someone tried to access the SCSI port directly. (Rare!!)

0009BFFFF: Someone tried to write to the serial (modem) chips directly, without going through the toolbox.

000B9FFFF: Someone tried to write to the serial (modem) chips directly, without going through the toolbox.

00C8xxxx: Apparently an in-house debugger at Microsoft, or perhaps a direct test for the Radius Full Page display card. I usually catch this. Report this if you see it, okay?

000DExxxx: Someone tried to read/write directly to the disk chip. Tisk, tisk.

000EFxxxx: Someone wrote to the VIA chip, which has many different functions. The most common of these is turning the sound on directly, with bit 7 of \$EFE1FE.

Address Errors

This means an address register was pointing to an odd-numbered address when a word or long move was tried. Generally, this is the fallout from the previously mentioned zerostore problem – the pointer has gone whacko, is loaded with a bad position, and that's it for the program. One of the address registers will likely match the Bus Cycle; that points to the scene of the crime.

Illegal Instruction Errors

These generally mean something on my end – data getting executed somehow. I use these as breakpoints sometimes to flag impossible conditions that never should happen.



Other Registers

Here's what the rest of the stuff on the page is:

The **PC** is the program counter; it's 2-10 bytes past where the fatal error occurred. The **IR** is the Instruction Register; generally, it matches the opcode that caused the fatality. The **AT** is the Access Type; that's not real useful, generally it's an encoded form of the IR. The **SR** is the Status Register; it should be 21xx to 27xx, to ensure supervisor mode, and IPL whatever. Then, the **data** and **address** registers, **D0-D7** and **A0-A7**, are dumped.

Usually, with a zerostore, you see an address register at 0; any other bus errors usually have a bus cycle pointing off to Mars somewhere. Usually, with an address error, a register is pointing to the same place that **Bus Cycle** reported.

With a little disassembly at this point, you can trace down the offending pointer, and possibly fix the program – providing you're developing it. If you're a user, and it's a minor feature that causes the crash, fine, don't do that anymore; if it's a major feature, get the manufacturer to fix it, or use the competition.

I am always anxious to see programs that crash to see if I can improve my error handler. Feel free to send disks to the Gadgets Address. It's even, so you don't get an address error.

EDITOR: Moan.

Okay, okay, it wasn't that good. Also, remember that online there are numerous reports of what programs and what programs fizzle, and why – as well as potential fixes.

Mega 2 Problems

A few Mega 2s have a problem driving the Mac 128K Roms because of "insufficient muscle power"; those Mega 2's have too much capacitance for some of the chips on the motherboard. The symptoms include random crashes, even while in ST mode, funny disk problems, and other weird happenings like those previously mentioned. Note that these symptoms occur even when the Spectre program is *not running*.

Taking your Mega 2 to a dealer will only result in him telling you it works just fine (it does, except when a Spectre is plugged in). The fix, courtesy of Norm Walker, Dean Muller, and Larry Rymal is fairly simple, if you are handy with a soldering iron.

Between the Roms and Ram on your Mega 2 board are 4 chips: two 74LS373's and two 74LS24's. The 74LS373's are the ones with not enough muscle, and this only applies to the ones with "SGS" on them. You have two choices if you have the problem, both of which involve soldering:

- ◆ Remove (clip out and desolder) the SGS 74LS373 chips and replace them with EITHER 74AS373's or another brand of 74LS373's, or
- ◆ If you don't feel comfortable soldering, you may be able to get your local Atari dealer to do it for you.

This should solve all those strange problems, assuming they were caused by the load put on the Mega 2 by the Spectre in the first place.

Recovering From a Crash

If you crash, you have several things you can do to try to recover:

- ◆ Press Keypad-* to try to return to the Finder, or
- ◆ Press RETURN to try to restart Mac mode (no guarantees), or
- ◆ Give up on trying to recover, and RESET the ST.

The first two options will fail if the system or Spectre was damaged too badly by the crash; however, they are worth a try if it gives you a chance to recover your data.



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