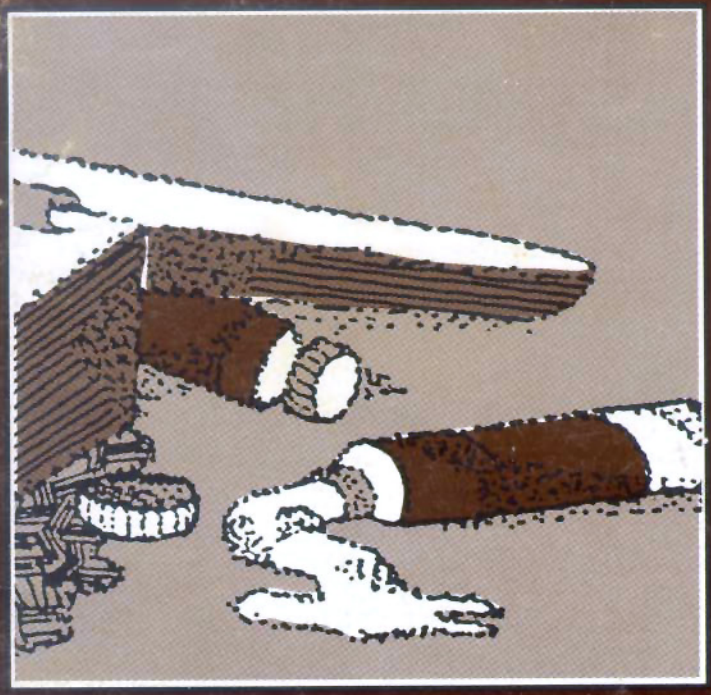
HOW TO BACKUP, UNLOCK, OR MODIFY COPY-PROTECTED SOFTWARE

Hardcore

COMPUTIST

Issue No. 8 $2.50

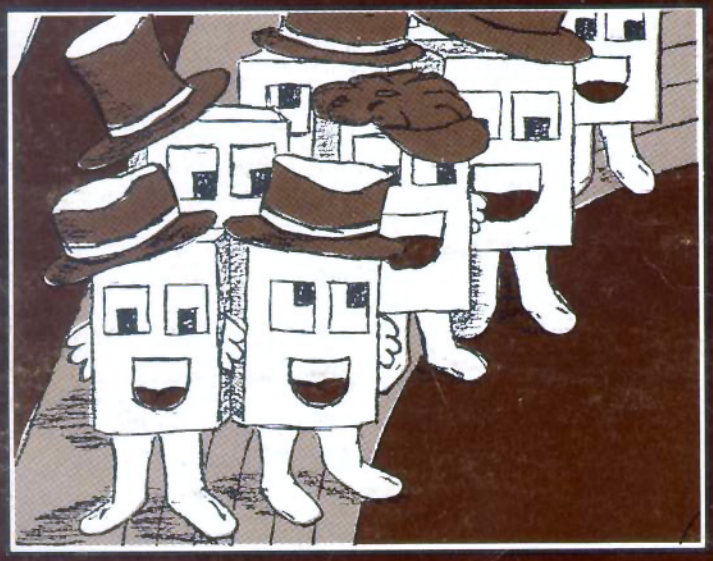


Softkey For The Artist

Backup this graphic design program and join the world of artistic modification

Breaking Windows: Softkey For Legacy Of Llylgamyn

A backup procedure for the sequel to Sir-Tech's Wizardry



Best Of The Bit Copiers: A Comparison

Answers to all your questions about the most popular bit copiers on the market

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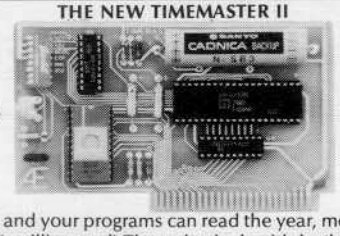

NEW 1984 DESIGN
An official PRO-DOS Clock

- Just plug it in and your programs can read the year, month, date, day, and time to 1 millisecond! The only clock with both year and ms.
- A rechargeable NiCad battery will keep the TIMEMASTER II running for over ten years.
- Powerful 2K ROM driver — No clock could be easier to use.
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- Basic, Machine Code, CP/M and Pascal software on 2 disks!
- Eight software controlled interrupts so you can execute two programs at the same time (many examples are included).
- On-board timer lets you time any interval up to 48 days long down to the nearest millisecond.

The TIMEMASTER II includes 2 disks with some really fantastic time oriented programs (over 40) including appointment book so you'll never forget to do anything again. Enter your appointments up to a year in advance then forget them. Appointment book will remind you in plenty of time. Plus DOS dater so it will automatically add the date when disk files are created or modified. The disk is over a $200.00 value along—we give the software others sell. All software packages for business, data base management and communications are made to read the TIMEMASTER II. If you want the most powerful and the easiest to use clock for your Apple, you want a TIMEMASTER II.

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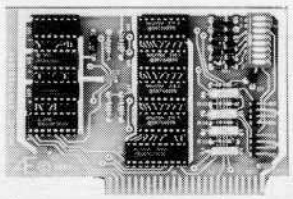
Improved Hardware and Software



- Complete 16 voice music synthesizer on one card. Just plug it into your Apple, connect the audio cable (supplied) to your stereo, boot the disk supplied and you are ready to input and play songs.
- It's easy to program music with our compose software. You will start right away at inputting your favorite songs. The Hi-Res screen shows what you have entered in standard sheet music format.
- Now with new improved software for the easiest and the fastest music input system available anywhere.
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- Easy to program in Basic to generate complex sound effects. Now your games can have explosions, phaser zaps, train whistles, death cries. You name it, this card can do it.
- Four white noise generators which are great for sound effects.
- Plays music in true stereo as well as true discrete quadraphonic.
- Full control of attack, volume, decay, sustain and release.
- Will play songs written for ALF synthesizer (ALF software will not take advantage of all our card's features. Their software sounds the same in our synthesizer.)
- Our card will play notes from 30HZ to beyond human hearing.
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- Many many more features.

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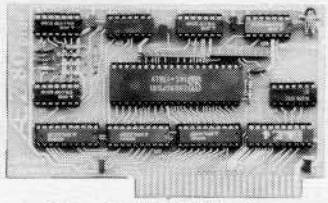
Z-80 PLUS!



- TOTALLY compatible with ALL CP/M software.
- The only Z-80 card with a special 2K "CP/M detector" chip.
- Fully compatible with microsoft disks (no pre-boot required).
- Specifically designed for high speed operation in the Apple IIe (runs just as fast in the II+ and Franklin).
- Runs WORD STAR, dBASE II, COBOL-80, FORTRAN-80, PEACHTREE and ALL other CP/M software with no pre-boot.
- A semi-custom I.C. and a low parts count allows the Z-80 Plus to fly thru CP/M programs at a very low power level. (We use the Z-80A at fast 4MHZ.)
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Don't confuse the Z-80 Plus with crude copies of the microsoft card. The Z-80 Plus employs a much more sophisticated and reliable design. With the Z-80 Plus you can access the largest body of software in existence. Two computers in one and the advantages of both, all at an unbelievably low price.

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There used to be about a dozen 80 column cards for the Apple, now there's only ONE.

- TOTALLY Videx Compatible.
- 80 characters by 24 lines, with a sharp 7x9 dot matrix.
- On-board 40/80 soft video switch with manual 40 column override
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- Both upper and lower case characters are standard.
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- The VIEWMASTER incorporates all the features of all other 80 column cards, plus many new improvements.

	PRICE	BUILT IN SOFTSWITCH	SHIFT KEY SUPPORT	LOW POWER DESIGN	80 COLUMN HOME	7x9 DOT MATRIX	LIGHT PEN INPUTS	40 COLUMN OVERRIDE	INVERSE CHARACTERS
VIEWMASTER	**169**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
SUP'RTERM	MORE	NO	YES	NO	NO	NO	NO	YES	YES
WIZARD80	MORE	NO	NO	NO	NO	YES	NO	YES	YES
VISION80	MORE	YES	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX80	MORE	YES	YES	NO	NO	YES	NO	NO	YES
SMARTERM	MORE	YES	YES	NO	NO	NO	YES	YES	NO
VIDEOTERM	MORE	NO	NO	YES	NO	YES	YES	NO	YES

The VIEWMASTER 80 works with all 80 column applications including CP/M, Pascal, WordStar, Format II, Easywriter, Apple Writer II, VisiCalc, and all others. The VIEWMASTER 80 is THE MOST compatible 80 column card you can buy at ANY price!

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- Expands your Apple IIe to 192K memory.
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- Compatible with all Apple IIe 80 column and extended 80 column card software (same physical size as Apple's 64K card).
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- Permits your IIe to use the new double high resolution graphics.
- Automatically expands Visicalc to 95 K storage in 80 columns! The 64K config. is all that's needed, 128K can take you even higher.
- PRO-DOS will use the MemoryMaster IIe as a high speed disk drive.
- Precision software disk emulation for Basic, Pascal and CP/M is available at a very low cost. NOT copy protected.
- Documentation included, we show you how to use all 192K.

If you already have Apple's 64K card, just order the MEMORYMASTER IIe with 64K and use the 64K from your old board to give you a full 128K. (The board is fully socketed so you simply plug in more chips.)

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- **Copy a disk with a 128 sector game on two drives in EIGHTEEN SECONDS (!) vs. 1 minute 33 seconds with COPYA.**
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INPUT INPUT INPUT

Wishes and Tips

I'd like to see an even higher percentage of your editorial material concentrate on applications/utility programs, with less attention to games. Here are my suggestions for future softkeys:

1. All the "Visi—-" programs. 2. Personal Finance Manager. 3. Various Applesoft compilers ...Einstein, Hayden, etc. 4. DB Master. 5. Apple Business Graphics. 6. PFS: Report, File, etc.

That ought to keep you busy for a few months.

Also some information you might want to pass on to your readers:

Sensible Speller:
The DOS 3.3, 3.2, Word Handler, Supertext, and Pascal versions can be copied separately with the Wildcard from East Side Software (have they changed their name recently?). East Side Software will send instructions on request. Does anyone know how to copy the CP/M version?

Locksmith v.5:
The latest issue (March, 1984) of Apple Assembly Lines gives instructions on copying this program with COPYA and ZAP by rewriting one of the sectors (Track $OF, Sector $ØE, Byte $6F, from $C6 to $ØF).

Steve Burke
Champlin Minn.

Mr. Burke:Thank you for the information on Sensible Speller IV. A lot of our readers sure do want to back this one up. Does AAL's tip on Locksmith 5.Ø mean they are going to be giving us competition in the softkey department?

Reading Apple ROM's

Just a note to thank you and Ernie Young for the excellent article called Modified ROMS.

I was not so interested in backing up my programs as I was in modifying some of the code that until now could not be changed.

I have a program called THE ROYAL NAVY REPLAY DISK that takes care of backups.

On page 16 (Hardcore #6) is a drawing of the socket needed to use 2716 EPROMS in the Apple. This works great. My problem was to read the Apple 9316 since I used an external burner.

To do this: Jumper pin 24 to 18. Jumper pin 2Ø to 21. Cut pins 21 and 18 off as the article instructs.

Now with the 9316 in this socket, it can be read by the burner just as if it was 2716.

Now make the changes to the code and burn your EPROM.

You must use a singe voltage 2716 (5v) EPROM. . There are others. Some numbers that work are: TMS 2516 and MCM 2716.

I hope to see more on this in your fine magazine.

Jim Willis
West Monroe LA

More Words on Homeward

I was looking for a simple word processor for home use. I had been using Apple Writer 1.1 but my wife thought the Escape key for shift was too hard to get used to. So, when I saw a softkey for Homeword in the COMPUTIST No.5. I knew this would be the choice. I don't like to have programs that I can't backup.

The tip seemed to work well except the copy wouldn't boot. Not uncommon I guess as I have a later version 1.2. But No.5 came through. I removed the disk cover and marked the cam. After doing that, I tried to reboot the copy of Homeword and saw that it kept spinning at track 3. It must be a common On-Line tactic to Nibble count track 3. After recopying track 3 with Nibble count, the copy will now boot.

Thank you for the tip and feel free to pass along the information about track 3.

Andy Lengenfelder
Renton WA

Bugs in Zork

Zork III has a bug in every version. The program hangs up if you go in the prison cell with the SWORD and then tell the dungeon master to push the button (you must be in the one with the bronze door for this to happen). Normally, this is the way to win, but if you have the sword, forget it.

Chris Koeritz
Charlottesville VA

Mr. Koeritz: But what would a prison be without bugs?

Stoneware's Support

I wish to compliment Monty Lee on his fine, in-depth, impartial review of DB Master in Hardcore COMPUTIST no. 6.

Of all the points covered, I must agree with him most about the massive protection scheme used by Stoneware and because of which, periodically, the

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Products below, when used appropriately, either singly or together, will enable you to copy virtually all software for the relevant computer. The copy-products are intended to be used for back-up purposes only! Products are Apple-compatible unless otherwise indicated.

Locksmith	75	Crack-Shot	129
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program suffers fatal errors, displays unintelligible error messages or just hangs up without notice. In all fairness, it does protect its files in most of these cases so user frustration, not data loss, is the big problem.

Both the review and Stoneware state that the company only guaranteees DB Master on Apple drives. In our case, the program will NOT run on Apple drives, but thank God a company called Quentin Research makes a drive upon which the DB Master works like a charm!

In the review, you stated that the accompanying manual does not indicate that the program can be upgraded to hard disk. We at Brother's Printing Company were told that it could NOT and we had to purchase a brand new, complete (with manual) Hard Disk version for our Corvus. We have had no problems but the Hard Disk version is the old pre-version 4 release (no line editing features, etc.) and no word from our dealer and/or Stoneware if it will ever be updated.

The final point which perhaps should be included in each review is support at the manufacturer level.

There has been NONE from Stoneware. We have half a dozen letters on file with requests for help in specific problems and queries on product improvement. We have even furnished disks DISPLAYING the problems and have yet to receive a note in reply.

We did, however, receive word from the Sales Department when we inquired about buying a set of backup disks.

Paul Raymer
Brothers Printing Co.
Los Angeles CA

Wizards and Chess

Here's a couple of notes on two of my favorite programs that you might want to pass on to your readers.

First, regarding backing-up Wizardry. You will be a lot more successful than "two out of nine times" (as Samborski's method in Hardcore No. 3 provides) if on the scenario side of the disk you SYNC the entire disk copy. Note: this should work on the Wizardry no. 2 and Knight of Diamonds, also.

Second, an APT for Sargon II. The "change board" option on the main menu is very helpful if you're losing. Just press CONTROL-R from the text screen, then 'c' for "change game". Following the rules in the Sargon II manual for "change game", you can delete Sargon's men or change a bishop to a pawn, etc. When you're happy with the way the game is progressing, press RETURN and answer the prompted questions to resume play.

I would appreciate more reviews and parameter changes of bit copy programs, for example Locksmith 5.0 and Essential Data Duplicator.

Gary Thunell
North Hollywood CA

A Hard Problem

I have seen copies of your magazine and found them to be very useful. Keep up the good work. In COMPUTIST No. 5 I was particularly thankful for the Softkey for Visifile as I was planning to make modifications to support my hard disk. This softkey, however, does not seem to allow me to copy the Visifile programs to the hard disk. VISIFILE.BIN reads some specific track and sector locations with RWTS that do not map directly on to the hard disk due to different track sizes. Before I spend many hours working through this, I thought I'd write in the hope that someone else had already succeeded. Please let me know if you have any information.

Scott. L Ksander
New Brighton MN

Mr. Ksander: Sorry, we don't have any tips on successfully moving Visifile onto a hard disk. We will have to turn this one over to our readers.

Mad about EDD

I feel compelled to write concerning your review of Essential Data Duplicator in Hardcore COMPUTIST no. 6.

I think, no I know, this review does a real disservice to EDD and your readers. I own and have used extensively Locksmith 4.1 and 5.0, Nibbles Away II, Copy II+, Back-It-Up and the original EDD and Version III. All these programs have their unique strengths and weaknesses, but there is no doubt in my mind that EDD is the best. Your criticisms of it are just not true in my experience.

Too many reviews are written after a relatively casual experience with a program, not just by your magazine, and are very misleading.

I would suggest you consider a reader's poll, somewhat like Popular Science does for cars, to directly determine user satisfaction and complaints.

For your information, the manual nibble count match on EDD works like a charm, as do similar features on all the other nibble copiers.

As far as the drive speed adjustment utilities go, I had no problem at all and I'm no genius. I've been stumped by poor documentation many times. They just have you set the original drive a little fast and the copy drive a little slow to ensure that you don't overwrite the beginning of the track. It has certainly helped me copy more reliably. This feature is unique to EDD. Also unique is the default value of copying from drive 2 to drive 1 on the theory that the drive that writes the disk is the best drive to boot and read the disk; it makes sense. Also unique is the requirement that the original be write protected to proceed; no more accidently ruining a disk! A minor but appreciated feature is that when you make an error like failing to write protect the original, it proceeds from where you left off rather than returning you to the menu as most other programs do.

Also unique is the idea for removing your cover and numbering your tracks on the inside so you can tell if your copy fails and just which track it failed on so you can recopy that track only. It is a tremendous feature! In any event, it is incredible to me that you failed to grasp any of this.

Version III, so far as I can tell, is not too different; both the documentation and the program itself are very similar but I would certainly take another look!

I am also digusted that the manufacturers copy-protect these nibble copiers; Copy II+ is the only one that gives parameters to back theirs up. I think it is very hypocritical not to provide these.

I also like Back-It-Up II alot. It has a unique feature to indicate if your drive is operating reliably. I had a bad chip on my drive and detected it with Back-It-Up III.

I like your letters column. The Time Zone hint is sure true. The copy utility is useless.

Jerry Kroege
Lincoln, NE

Mr. Kroege: Thank you for your response to our review of Essential Data Duplicator. You make a good case for EDD's strong points that our review seems to have overlooked.

We still feel, however, that EDD's poor documentation limits its value to the novice user and that EDD's claim to able to copy **most** *copy protected software is not justified.*

For a comprehensive comparison of EDD and four other popular bit copiers see Phillip Romine's article, "Best of the Bit Copiers: A Comparison" on page 27 of this issue.

EDD Again

I am a recent subscriber to your magazine and I enjoy it very much. I hope to see you publish some updated parms lists (for Locksmith, Nibbles Away, etc.) though. It seems like the same old programs are on all the lists I see.

I recently purchased Essential Data Duplicator (EDD) and I can recommend it as being a very good copy system. However, I have one major complaint: in what seems to be and extremely hypocritical move, the manufacturers of EDD have copy-protected their product! It is uncopyable by EDD, Wildcard, and all the others. I bought EDD to be able to make backup working copies of my expensive software and keep the originals in a safe place. The makers of EDD think this is a great idea as long as you don't want to do it with THEIR software.

And get this: the last page of the EDD manual lists, under the heading of "Recommended Reading", none other than Hardcore COMPUTIST. I have to give them credit.

Here's a backup tip for anybody who enjoys "Stellar 7" as much as I do, but cannot manage a backup copy. I used Wildcard (but any "copy card" will work) to create a copy at the point in the run AFTER you have pushed the Space Bar to "begin the mission' and the drive has stopped running. Make this copy on the flip side of your floppy disk. Then use EDD to make a copy of the entire disk on the certified side of your floppy. (EDD will not copy track 00, but that's OK because Wildcard did.) To run your copy disk of "Stellar 7", boot up with the flip side made from Wildcard. Then when the drive stops running, turn the disk over to the certified side made from EDD. When you finish Level One (SOL), the program will access the disk and take you to Level Two (ANTARES), and so on. The big problem with "Stellar 7"is getting past the boot-protection but once you do, it's a clean run.

Thomas E. Monteleone
Baltimore MD

Mr. Monteleone: There seem to be varying opinions about the usefulness of EDD. However, virtually everyone we have heard from has negative feelings concerning this product's heavy copy protection.

We think the article on page 24 of this issue should be of interest to you and a lot of other people.

Thanks for the tips on Stellar 7.

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The μD-1000™ I/O System for Apple II* simplifies computer control. Software support allows control of all inputs and outputs using simple BASIC variable names. System includes two boards shown, cables, 60-page manual and disk.

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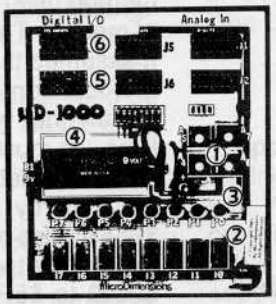

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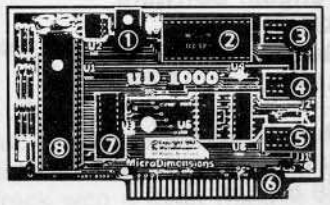

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READERS' SOFTKEY & COPY EXCHANGE

Backing-Up The Spy Strikes Back

By Clay Harrell

Penguin Software
830 4th Ave.
Geneva, IL 60134
$19.95

Requirements:
48K Apple with old style
F8 monitor Rom
One disk drive with DOS 3.3
Initialized 48K DOS 3.3 slave disk
The Spy Strikes Back

Penguin Software has started what I consider to be the best idea since canned beer: inexpensive software! It is at the point where backing up software is not really necessary since the cost of Penguin's games are under 20 dollars! But there is a catch to The Spy Strikes Back: Penguin has a contest in which the first person in each state who can solve their puzzle will win $100 in software. This means code snooping is a must (I'm lazy I guess) and de-protection is along this line.

Upon booting the Spy disk, I notice that the boot is very short. It seems to load only six or seven tracks before the game starts. The game has some disk access within it for hi-scores and the like, and to discourage the WILDCARD/REPLAY CARD crowd from getting easy copies. After loading the game and hitting RESET, I notice that both hi-res pages are being used for the graphics (therefore, no code exists there). Keeping in mind the short load, snoop through memory looking for a starting location. The typical starting location for a game that uses both hi-res pages is $800 or $6000. Sure enough, a 6000G from monitor starts the game up with the disk spinning to load the hi-scores. Further examination of memory reveals that $1800-$1FFF is the code to draw the pictures for the demo and that the two hi-res pages do not have to be saved. Locations $6000 to $9A00 seem to be the actual code for the game.

Note: a good way to see what part of memory is being used is to zero out all of memory and then boot the program and see what is used. For example, from monitor type

800:0 N 801<800.BFFFM

This will wipe out memory from $800 to $BFFF with zeroes. This was the method used to determine what areas of memory The Spy Strikes Back used. (I assumed that RWTS lived at it's normal location of $B700).

Now that we know where The Spy lives, we must clear the way for a slave disk boot. Recall that a slave disk does not destroy memory from $900 to $95FF. Also recall that we do not have to save the two hi-res pages (locations $2000 to $5FFF) since the game redraws these for us using the data at $1800 to $1FFF. This means we can move the code at $9600 to $9A00 to $1000 so not to destroy it when we boot our slave disk.

Another thing to consider is the disk access in the game. I have done the work for you and have found the locations to change to remove this pesty protection.

With these things in mind, the exact procedure for backing-up The Spy Strikes Back is as follows:

1) Boot the original disk The Spy Strikes Back

PR#6

2) Reset into the monitor when the demo starts

3) Move the code at $9600-9A00 to $1000 where it is safe during a slave boot

1000<9600.9A00M

4) Bypass the disk access routines

101F:EA EA EA

5) Boot a 48K DOS 3.3 slave disk

PR#6

6) Set MAXFILES to 1

MAXFILES1

7) Enter the monitor

CALL -151

8) Move the code saved in step 3 back to $9600

9600<1000.1400M

9) BSAVE the first portion of code

BSAVE SPY2,A$6000,L$3A00

10) BSAVE the second portion of code

BSAVE SPY1,A$1800,L$800

11) Re-enter BASIC

3D0G

12) Clear any Applesoft program in memory

FP

13) Create the following Applesoft program:

```
10 HIMEM:24576
20 D$ = CHR$(4)
30 PRINT D$;"MAXFILES1"
40 PRINT D$;"BLOAD SPY2"
50 PRINT D$;"BLOAD SPY1"
60 FOR I = 0 to 14: POKE 768+I,32:
   NEXT: FOR I = 15 to 254: POKE
   768+I,0: NEXT
70 CALL 24576
```

14) SAVE the Applesoft program

SAVE SPY STRIKES BACK

Final notes: The code that you changed at location $101F takes out the disk access in the game. The poke statements at location 768 set up the hi-scores as zero with no one's initials.

Good luck in finding the hints to the puzzle (you didn't expect me to tell you how to find them, did you??).

Softkey for Hayden Software

By Floyd Splidnik

Hayden
600 Suffolk St.
Lowell, MA 01853

Requirements:
Apple II+ with 48K
Integer card or some means to RESET in the monitor
One disk drive with DOS 3.3
DeMuffin Plus
A DOS 3.3 slave disk with a null HELLO program

Any of several original program disks from Hayden

I have found that the following procedure will work on a number of releases from Hayden such as Shuttle Intercept, Alibi, Kamikaze , etc. Unfortunately, this procedure will not work on Sargon II or Sargon III.

The technique works because the Hayden disks I mentioned use a 13 sector DOS that has been modified but still has the normal routines intact and in their proper locations. Demuffin Plus is used to read the original disk with the Hayden DOS and then write with normal 3.3 DOS. If you don't already have Demuffin Plus, see the box on page 15 in this issue for instructions on creating it.

1) INITialize one or more disks with a "null" HELLO program

FP
INIT HELLO

2) Boot up with one of the Hayden Disks

PR#6

3) As soon as Applesoft prompt (]) appears on the screen, hit RESET to enter the monitor.

4) To test if this technique will work on your disk, do a call to the CATALOG entry point

A56EG

If a CATALOG is displayed, then this technique should work for the disk in question.

5) Now move the Hayden RWTS out of the way so it is not destroyed when normal DOS is booted

6000<B800.BFFFM

6) Next, boot up with one of the disks INITialized in step 1

6CTRLP

7) Load, but do not run, Demuffin Plus

BLOAD DEMUFFIN PLUS

8) Enter the monitor

CALL -151

9) Move the Hayden RWTS back into position so that Demuffin Plus can utilize it

B800<6000.67FFM

10) Start execution of Demuffin Plus

803G

11) Transfer all the files from the original disk to an initialized 3.3 disk using the wildcard character ("="). The HELLO file on the 3.3 disk should be replaced with the HELLO file from the Hayden disk.

The above technique not only works on the Hayden disks but also on a number of other disks which display an Applesoft prompt when booting. It is not always quite so easy as with the Hayden disks however, as nibble counts and/or other protection sometimes need to be eliminated.

How to Copy Apple LOGO

By Anne Rachel Gygi

Apple Logo
Logo Computer Systems
Apple Computer
20525 Mariani Ave.
Cupertino, CA 95014
$175.00

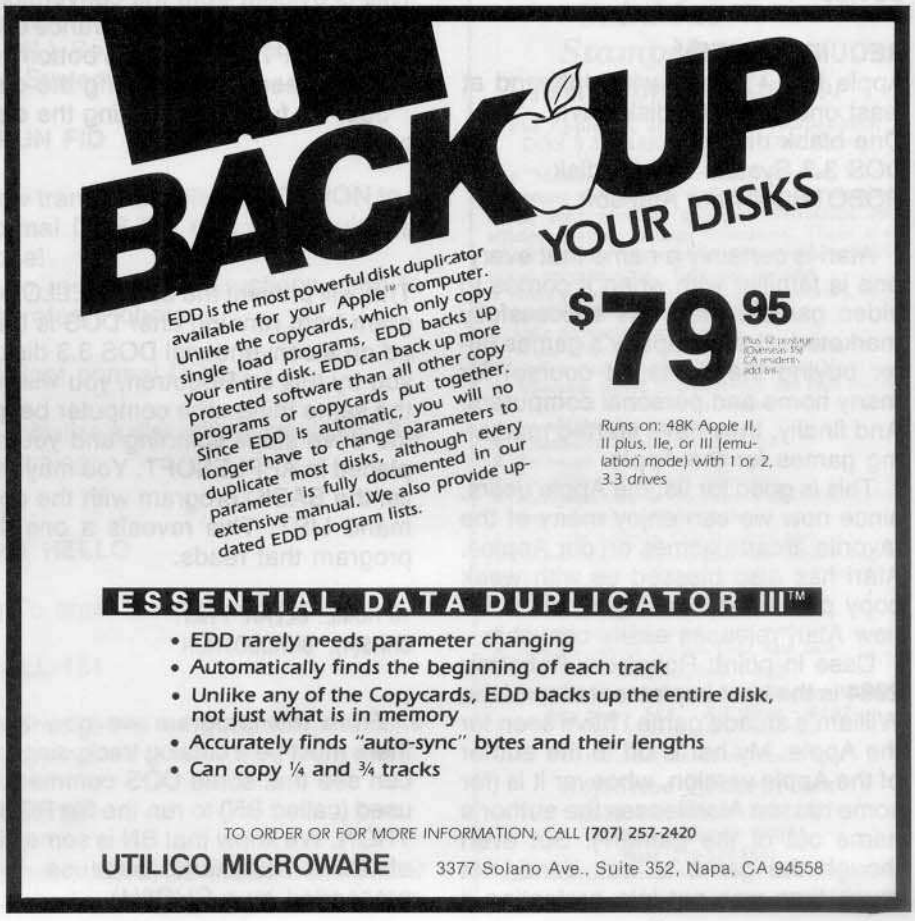
Requirements:
Apple II+ with 64K RAM
One disk drive with DOS 3.3
A sector editor such as Disk Edit
A Bit Copy program such as Locksmith or Copy II+
One blank disk

How is Apple LOGO Protected?

Apple LOGO is copy protected by writing track $1 in a non-standard format. A nibble count technique is used on this track with a fixed number of $FFs being written between $D6. If a copy is made and the number of $FFs between $D6s on track $1 is not the same as on the original disk, then the copy will not work. Track $1 on the distributed disk has the following format:

Number of Bytes	Value
1	$D6
124	$FF
1	$D6
132	$FF
1	$D6
Rest of Track	$FF

Continued on page 15



De-Protecting Robotron

By Clay Harrell

Atarisoft
1265 Borregas Ave.
Box 427
Sunnyvale, CA 94086
$34.95

REQUIREMENTS:
Apple II, II+, or IIe with 48K and at least one DOS 3.3 disk drive.
One blank disk
DOS 3.3 System Master disk
ROBOTRON from Atarisoft

Atari is certainly a name that everyone is familiar with when it comes to video games. Atari has successfully marketed other company's games (after buying the rights, of course) for many home and personal computers. And finally, they have started marketing games for the Apple.

This is good for us, the Apple users, since now we can enjoy many of the favorite arcade games on our Apples. Atari has also blessed us with weak copy protection, making most of the new Atari releases easily copyable.

Case in point: Robotron. Robotron 2084 is the best implementation of the William's arcade game I have seen for the Apple. My hat is off to the author of the Apple version, whoever it is (for some reason Atari leaves the author's name out of the game!?). But even though the game is well done, not much time was put into protecting it from prying eyes, especially since copy protection has evolved so far on the Apple....

Atari uses a slightly modified DOS. This is evident from the conventional boot sounds and the appearance of an APPLESOFT cursor at the bottom left of the screen when booting the disk.

Just for fun, after booting the disk, type

CTRL C

This will prevent the basic HELLO program from running after DOS is loaded on a conventional DOS 3.3 disk. If you try this on Robotron, you will find the same thing...the computer beeps, the drive stops spinning and you are placed in APPLESOFT. You may now list the BASIC program with the command LIST. This reveals a one line program that reads:

```
10 HOME: CLEAR: PRINT
CHR$(4);"BNROBOTRON"
```

From this program we now know there must be a catalog track, since we can see that some DOS command is used (called BN) to run the file ROBOTRON. We know that BN is some kind of DOS command because it is preceeded by a CHR$(4).

So naturally, the next thing to do is to type

CATALOG

Well, we get disappointed with a **SYNTAX ERROR** . The conclusion we can draw from this is that someone at Atari was thinking enough to change the DOS commands from the normal ones (they probably used DOS BOSS from Beagle Brothers, no doubt).

So the next thing to do is to boot a normal DOS 3.3 disk and then put the Robotron disk in a drive. Now try typing

CATALOG

This exercise provides us with the rewarding message **"I/O ERROR"**. This is to be expected. Atari has made the disk uncopyable by changing the epilogue bytes on the disk from DE AA EB to a perverted DE AB FE. This can be seen by using the nibble read commands from either THE INSPECTOR from Omega Software or NIBBLES AWAY II (if you don't have either of these fine utilities, don't worry about it).

For those of you who don't know what "epilogue bytes" are, I will discuss it here for you....

First we must discuss the formatting of a DOS 3.3 disk. Every normal DOS 3.3 disk has 35 tracks (0 through 34) and 16 sectors (0 through 15). How the tracks are located on the disk is hardware dependent, but how the sectors are located is software dependent, hence the name "soft sectored". Since software determines the sectoring, it was easy for Apple to change from 13 sector format to 16 sector format back in 1981. With this convenience it is easy to protect the Apple disk format. For DOS to find the sector it is looking for, it must rely on some road markers. Every sector has what is called an "Address field". The address field is a unique set of bytes on every sector that lets DOS know the current disk volume, track, and sector number. It also has a checksum byte to determine if some damage has occurred to the sector making it unreadable. The unique set of bytes that represent the address field are formatted as such:

prolog	vol	trck	sectr	chk	epilog
D5 AA 96	XX YY	XX YY	XX YY	XX YY	DE AA EB

Whenever DOS sees the unique set of bytes D5 AA 96, it knows the above information follows. Similarly,

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there is a "Data field". It has its own set of unique bytes to alert DOS to its whereabouts:

prolog		chk	epilog
D5 AA AD	PROGR., DATA, ETC.	XX	DE AA EB

Whenever DOS sees the unique set of bytes D5 AA AD, it knows that a program or some kind of data follows. This information is on every sector of a normal DOS 3.3 disk.

If any one of the prologue bytes are changed, normal DOS would not be able to locate the Address or Data fields and an I/O error would result.

If the epilogue bytes are not what they should be, an I/O error will result. This is not due to their uniqueness, since DOS will read whatever two bytes follow the information fields and use them for verification.

Therefore, two easy things to do in protection are to alter the Address field and/or the Data field prologue bytes, and alter the protected DOS accordingly to locate these unique bytes. Now normal DOS cannot find the Address field, so it does not know what sector it is trying to read. Or, it cannot read the data field because it cannot find the unique set of bytes that designates the data. So COPYA will not copy the protected disk.

Atari has just changed the epilogue bytes. This is a minor change since normal DOS can still find the address field (so it knows what sector it is looking at) and the data field (so it knows where the data is), but you still get an I/O error since the epilogue bytes are not what DOS 3.3 expects to find.

To read the disk from normal DOS, we must defeat the routine that detects errors. If we do this, we will not get an I/O ERROR and we will be able to read the disk from normal DOS 3.3. The routine that does this lives at $B942. If an error exists, the carry byte is set and DOS says "bad boy" and scolds you with an I/O error. A change at location $B942 from $38(SEC) to $18(CLC) will clear the I/O ERROR problem!

Now we may catalog the Robotron disk. Upon doing this, we find two files-RUNNER and ROBOTRON. RUNNER is the hello program and is unneeded (and also unusable without modification since Atari has changed the DOS commands as follows: CATALOG has been removed. BLOAD is BD. BRUN is BN.). So get out FID from your DOS 3.3 System Master and

BRUN FID

Now transfer the file ROBOTRON to a normal DOS 3.3 disk and you're all done!

To re-cap the instructions used to deprotect Robotron:

1) Boot normal DOS 3.3

2) Initialize a disk with normal DOS 3.3 by typing:

FP
INIT HELLO

3) To enter the monitor, type:

CALL-151

4) Change the error detection routine by typing:

B942:18

5) Insert your DOS 3.3 System Master into a drive and type:

BRUN FID

6) Use FID to transfer the file ROBOTRON from the original Robotron disk to your freshly initialized DOS 3.3 disk.

7) **BRUN** the file ROBOTRON on your normal DOS 3.3 disk to play Robotron.

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BREAKING WINDOWS:

Softkey For Legacy Of Llylgamyn

By Jim Kaiser

Sir-Tech Software Inc.
6 Main Street
Ogdensburg, N.Y. 13669
(315) 393-6633

$39.95

Requirements:
Apple][,][+, //e or compatible
Legacy of Llylgamyn disk
One disk drive
A Sector Editing Program, such as Diskedit
COPYA from DOS 3.3 System Master Disk
Two blank disks

Legacy of Llylgamyn is the newest Scenario in the Wizardry Series. After trying to back up my original using the softkey presented in Hardcore COMPUTIST #4 and not succeeding, I set out to do it myself. The program uses what Sir-Tech calls Window Wizardry, a technique they probably implemented upon seeing a LISA computer in action. I liked the "window" concept so much that I purchased Legacy of Llylgamyn as soon as it came out.

Both sides of Legacy of Llylgamyn can be copied with COPYA if DOS is patched so that any errors encountered when reading or writing are ignored. The COPYA version of the boot side (side B) needs a sector edit performed on it so that the routine to check for a non-original disk is circumvented. This routine is on Track $1A, sector $0C of the boot side. The scenario disk (side A) is unprotected and the COPYA version of it will work just fine.

The step-by-step method for backing-up Legacy of Llylgamyn is presented below.

Breaking Windows

1) Get out your DOS 3.3 Sytem Master disk and run COPYA

RUN COPYA

2) After the drive has stopped, halt the program

CTRL-C

3) Prevent COPYA from reloading COPY.OBJ0 by deleting line 70

70

4) Enter the monitor

CALL-151

5) Patch DOS so that any Read or Write errors are ignored

B7C0:18

6) Return to Applesoft

3D0G

7) Run the program

RUN

8) Copy both sides of the original Legacy of Llylgamyn disk.

9) After you have copied both sides, put the original disk away in a safe place.

10) Run your sector editing program on the backup copy.

11) Read Track $1A, Sector $0C of the boot disk (side B)

12) Start editing at byte $15, entering the following bytes

D0 16 EA AD 2D 00 CE FB 00 D0 F8 AD DE 00 A9 01 48 A5 01 48 A5 00 48 60 A9 00 F0 FD

13) Write the sector back to the disk.

14) To remove the serial number, edit Track 0, Sector 5, bytes $01 through $06, changing all these bytes to 00's

00 00 00 00 00 00

15) Write this sector back to the disk.

The scenario side (side A) is not protected on The Legacy of Llylgamyn, so no modifications to the scenario side of the disk are needed. You should now have a working copy and, by the way, you have to write-protect both sides of this disk. The only difference between the master scenario and the duplicate is that the master is write-protected, and the duplicate is not.

This disk is now copyable with COPYA or any standard copy program.

OF SPECIAL INTEREST: I was bothered and didn't like to always have to switch disks for the scenario, just to enter the master disk, and then the duplicate. So, I set out to find how I could modify the disk so that I could enter the duplicate without a write-protect tab over the hole and still be able to have the program not give the dreaded "NOT A MASTER DISK" error. To make this modification, you should edit Track 6, Sector A, Byte 73, Change it from a CB to a C3. You no longer have to put in the master and then, the duplicate. Just enter the duplicate and enter <**RETURN**> twice. Now, if I could just figure out how to pronounce "Llylgamyn".

ADVENTURE TIPS ADVENTURE TIPS ADVENTURE TIPS

Ulysses and The Golden Fleece
Sierra On-Line Systems

Be polite to royalty.

Guards can usually be bribed.

It is hard to sail anywhere without first "casting off".

Death in the Caribbean
Microlab

Look for writing on the cannon.

A life belt is useless if you are not wearing it.

The ghost likes to hide things where the dead people hang out.

Zork I
Infocom Inc.

Hang on to the garlic because it will come in handy.

To stop the echo, say it.

Pray at the alter.

Keep a map of the coal mine.

Zork II
Infocom Inc.

The answer to the riddle is a very deep one.

Combining the brick and the string will give you a big charge.

Robots can do some things humans cannot.

* Lead the dragon into the ice room.

* When you reach the crypt, you've almost solved it. Just douse your lantern.

Gruds In Space
Sirius

* Stealing can sometimes be beneficial, especially when Gruds are around.

* Vandalism is perfectly acceptable in Gruddian (Gruddish?) society.

* Lords like shiny objects (especially coins!)

Enchanter
Infocom Inc.

* After sleeping, examine the four-poster for hidden scrolls.

* Turtles can get through machinery safely when they have been speeded-up magically.

Infidel
Infocom Inc.

* To get the mast, examine it closely beneath the deck.

* To avoid being swept away by the sand, put the mast in the holes and stand on it.

* To get the scarab, add items to the silver chalice until it is equal in weight to the golden chalice.

Serpent's Star
Ultrasoft

* Western Explorers enjoy drinks. The more, the better.

* Monks often reward foreigners who honor their gods with tea.

*** Contributed by Chris W. Cowell**

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S-C Word Processor. The one we use for manuals, letters, our monthly newsletter, and whatever. 40-columns only, requires lower-case display and shiftkey mod. Works with standard DOS text files, but at super fast (100 sectors in 7 seconds). No competition to WordStar, but you get complete source code! $50.

Apple Assembly Line. Monthly newsletter published since October, 1980, for assembly language programmers or those who would like to be. Tutorial articles, advanced techniques, handy utility programs, and commented listings of code in DOS, ProDOS, and the Apple ROMs. Helps you get the most out of your Apple! $18/year.

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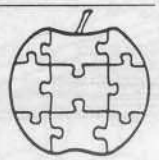


THE ARTIST
Sierra On-Line
Sierra On-Line Bldg
Coarsegold, CA 93614
$79.95

Requirements:
Apple II+/IIe, 48K
At least one disk drive
THE ARTIST master disk
A blank disk
FID or COPYA

THE ARTIST is the graphics package used to develop some of Sierra On-Line's biggest selling games, such as CROSSFIRE and MOUSKATTACK. That is what the introduction to the program claims and after using the package for quite awhile, I can believe it. It contains two separate but compatible screen drawing routines, a zoom lens type bit editor, a 21-color fill routine, shape table construction and editor utilities, and some nifty high speed byte shape design and move routines. All in all, an exceptional set of graphics tools.

The problem, as with all of Sierra On-Line's programs, is that it's copy-protected. The copy protection scheme is similar to the one outlined by Dan Price in the SCREENWRITER II Softkey in Hardcore COMPUTIST No. 6. The program uses direct disk access to check the format of the disk tracks for embedded keys. If the keys are not present, it clears memory and reboots the disk. The program is otherwise pretty much box-stock DOS 3.3 and can be easily copied using FID or COPYA from the DOS System Master disk.

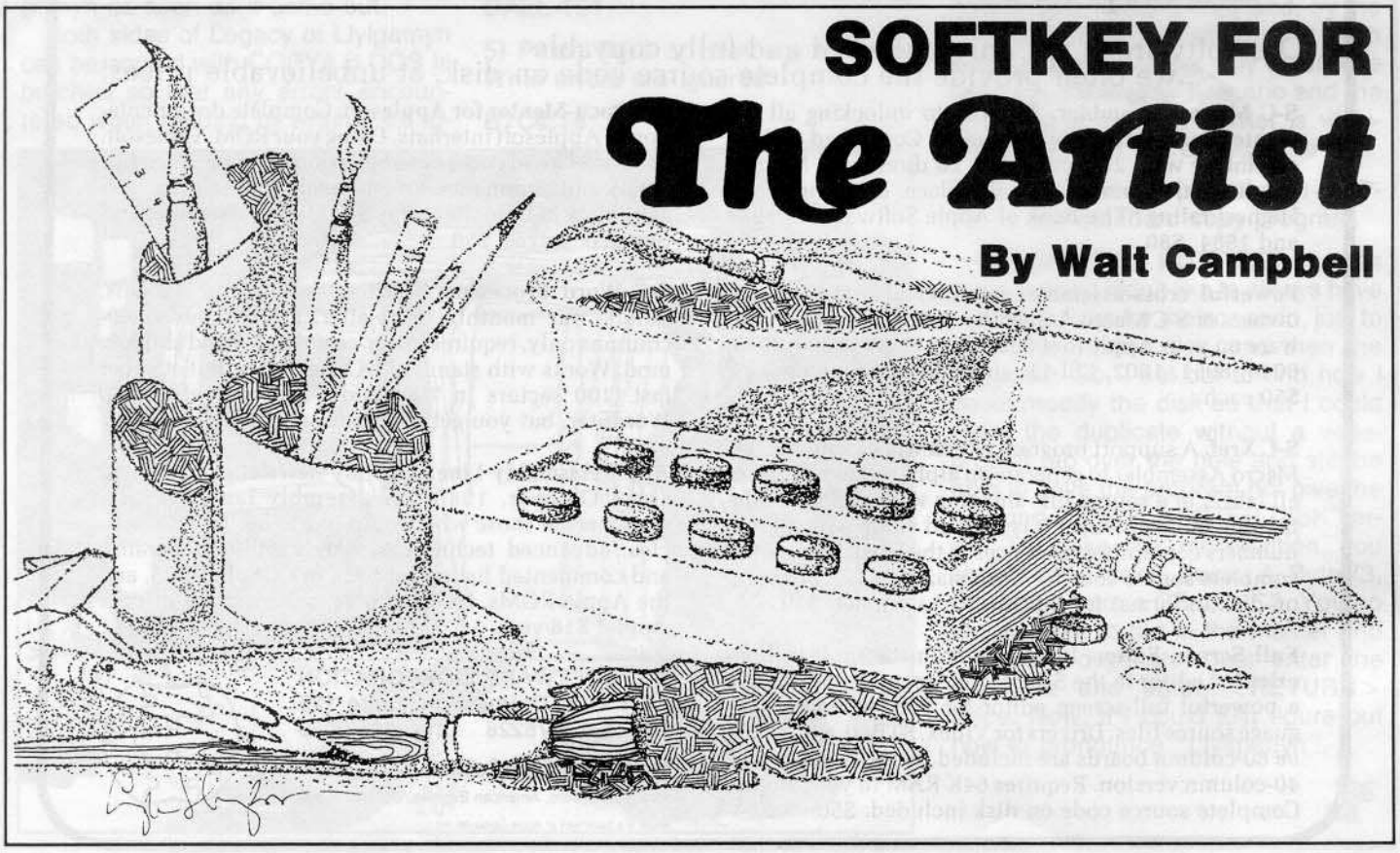
I jumped into the project of deprotecting the disk after reading Mr. Price's softkey, feeling confident that in a short time I would have identified the sub-routine that checked the disk, bypassed it, and have a "clean" unprotected copy. Eight hours later I was no closer to a copy and much more frustrated. I took a break from the computer and skimmed through my back issues of HARDCORE COMPUTIST looking for a hint or clue that might aid me in "cracking" this code.

In Ray Darrah's article on boot code tracing PEST PATROL in Hardcore COMPUTIST no. 4, I found a discussion of concealed code and disguised jumps in machine language programs. This "turned on a light" and I returned to the project with new optimism. Two hours later I had my unprotected copy! Once discovered, the procedure is (naturally!) simple and can be done in fifteen minutes. Before outlining the procedure I would like to explain the protection scheme more fully in hopes of aiding other enterprising hackers and maybe saving them hours of time. Those of you not interested in the procedures used to break the copy protection can skip to the fix on the next page.

The copy protection method used on THE ARTIST is similar to the one used on SCREENWRITER II, but the author of the program not only uses concealed jumps and stack manipulation to hide return addresses, he has a particularly sneaky portion of code that actually rewrites itself before it checks the disk, and then rewrites itself after it's done to conceal its existence.

After much experimentation, I isolated the disk checking routine to a range of code in the main menu program. This code plays some tricks with branch instructions and forces branches to what seems to be the middle of other valid instructions. It pushes addresses on the stack and executes a machine language return to jump to those addresses, etc. This kind of code has become pretty standard in copy and code protection but is frustrating, nonetheless.

After digging through this mess I came to a section of code that seemed to make no sense whatsoever and ended by jumping to an area of memory that I knew contained no program code! I started inserting breaks in the code to try and isolate the



SOFTKEY FOR The Artist

By Walt Campbell

offending section and, BINGO!! I found a short section of disguised code that actually rewrote successive bytes of the program! This type of protection was new to me and may serve to illustrate further the possibilities available to machine code programmers in code manipulation.

The program loads the Y register with a value of $29, indexes to an address $29 bytes away from itself, and performs an exclusive "OR" operation (EOR) with a value of $8A on the code at this new location.

This transforms a seemingly meaningless section of code to a detailed byte check of the tracks on the disk and checks for the embedded keys. If the proper format keys are not found, it clears memory and reboots the disk. If it finds the proper keys, it rewrites itself and returns to the main section of code!! Once I got this far in the analysis the fix became obvious and extremely simple.

THE FIX:

In order to remove this protection it is necessary to first copy the disk with either the COPYA or the FID programs. THE ARTIST master disk uses a binary HELLO program, so if you use FID to copy the programs, you must either INIT your blank disk to BRUN the HELLO program (as outlined in the Softkey for SCREENWRITER) or use a DOS utility, such as PRONTO DOS, to change the disk boot program. Using a modified DOS like PRONTO DOS also will noticeably speed up program disk access and the loading and saving of hi-res pictures.

Once you have prepared your new program disk and it contains all the files from the original master disk, follow the series of steps listed below:

1. Boot up a normal DOS 3.3 disk

PR#6

2. Insert the copy of The Artist in your disk drive.

3. Unlock the MAIN MENU program so it can be modified

UNLOCK MAIN MENU

4. BLOAD the MAIN MENU program

BLOAD MAIN MENU

6. Enter the monitor

CALL -151

5. Modify address $4257 from $8A to $57 and address $4662 from $B9 to $60

4257:57
4662:60

6. Save the modified MAIN MENU program

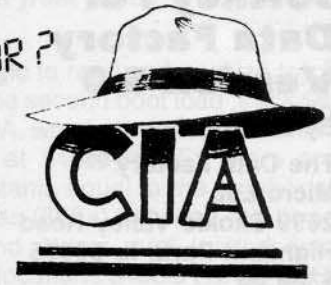
BSAVE MAIN MENU,A$4000,L$4D

7. Finally, relock the now modified program

LOCK MAIN MENU

BEEP! I/O ERROR ?

OH Shhhh – YOU NEED THE CIA



Now the fun begins! With the CIA (Confidential Information Advisors) on the trail of your disks, fixing those I/O ERRORS is really fun! But repairing clobberred disks quickly and easily is actually just the beginning. The CIA is a collection of five advanced disk utilities, working together to investigate, edit, locate, list, trace, rescue, translate, patch, repair, verify, examine, protect, unprotect, analyse encrypt and decrypt programs or textfiles on normal and even protected disks, be they DOS, PASCAL, or CPM! As you can see this is no ordinary bag of tricks! It is, in fact a new generation disk utility that goes far beyond anything else offered so far.

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Alternatively,if you used COPYA to copy the disk, the changes can be made directly to the disk with a sector editor. On my copy of The Artist, the first change to make was at Track $05, Sector $0C, Byte $5B. I changed this byte from $8A to $57. The second change is at Track $05, Sector $08, Byte $66. This byte needs to be changed from $B9 to $60. This probably won't work on a FID copy because the sector allocation may be different.

THAT'S IT!! You now have a copy of THE ARTIST that is unprotected and copyable with any DOS copy program!

APT'SAPT'SAPT'SAPT'SAPT'S

Miner 2049'er

Contributed by
Dan Rosenburg and Paul Anderson

The following is an easier method of entering Miner 2049'er on any level than the one that was printed in Hardcore COMPUTIST no. 7.

1) When the game asks "HOW MANY PLAYERS?", type # and a number corresponding to the level (1-9 or 0 for level 10) you wish to start on.

Softkey For Data Factory Version 5.0

By L.S. Davis

The Data Factory
Micro Lab
2699 Skokie Valley Road
Highland Park, IL 60035
$300.00

Requirements:
48K Apple II Plus or equivalent
Two blank disks
DeMuffin Plus

Like most of us, I try to follow the Golden Rule: back-up thy disks. I did just that with Data Factory Ver. 5.0 using Locksmith 4.1. I followed the Parms carefully, read the notes and yes, it works. However, to use the bitcopy of The Data Factory you must:

1) Boot the disk

2) Open disk drive door and press RESET when the computer starts to beep repeatedly

3) Close door and press RESET when the computer prints "BREAK IN 5"

4) Use the program

This procedure sounds simple and works well, but that irritating beeping noise causes wives to yell, dogs to howl and nerves to be on edge. What a pain. I just wanted a copy, not problems! Why did this disk act this way? Having read Hardcore COMPUTIST from issue no. 1, I thought maybe the answer would be in there. So...to the books.

Finding lots of good hints and ideas, I began. The first thing I saw when I booted the copy was "Break in 5". Applesoft, I hoped. Articles in Hardcore had mentioned using DEMUFFIN PLUS, so I thought maybe I could DeMuffin the files over to normal DOS. I tried this, but had no luck. The program did try to work, but came up instead with the infamous I/O Error. Back to Hardcore for more reading.

Finding several articles which referred to reducing error checks on copying, I began again. I looked through a book titled "What's Where In The Apple", and found an area of code that looked promising.

In a 48K Apple with DOS 3.3 booted, the code at $B8DC to $B943 is a routine which reads in a sector of data from the disk. If any READ errors are encountered, the 6502's carry bit is set and the "I/O ERROR" message is printed. At $B942 is the instruction which sets the carry bit (SEC, op code $38), so if this instruction is changed from SEC to CLC (CLear carry, op code $18) then any READ errors will be ignored. Hopefully, making this change would solve my problem.

I booted the System Master to clear the trash already in memory and made a Call -151, entered B942:18 (like I knew what I was doing!) and placed my disk with DEMUFFIN PLUS in the drive. I typed BRUN DEMUFFIN PLUS, then placed the copy of The Data Factory in the drive, and WOW! No I/O Errors. It read the disk! Just luck? I wondered.

So, I turned off the machine and started over. I initialized two disks with just a Hello program and made one copy of each Data Factory disk using the following steps:

1) Boot System Master

PR#6

2) Clear the BASIC program in memory

FP

3) Initialize two disks with TDF as the boot file

INIT TDF

4) Enter the monitor

Call -151

5) Change the instruction at $B942 from SEC ($38) to CLC ($18) so that any READ errors are ignored

B942:18

6) Re-enter BASIC

3D0G

7) Place copy of DeMuffin Plus in drive and get up and running

Note: See the box on page 15 for instructions on creating DEMUFFIN PLUS

BRUN DEMUFFIN PLUS

8) There are two Data Factory disks: one Report, one Utility. DeMuffin all the files on each to a disk formatted in step 2 above, using the "wildcard" op-

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tion (=). Replace the file called TDF on both disks.

9) When you have finished copying both disks, reboot with a normal 3.3 disk

PR#6

Both of your DeMuffined disks are standard 3.3 DOS and are "copyable". However, on each disk is a file TDF. This file on each disk contains Line 5 which reads: 5 PRINT CHR$ (4) "BRUN READER, A$8E00". This file contains the code which causes that obnoxious beeping. All we have to do is change the boot program (TDF) so that it does not load and execute this code.

10) Load the Applesoft file TDF, delete line 5 and then reSAVE TDF

LOAD TDF
5
SAVE TDF

You should do this to both disks. If you want to, you can also delete the file READER which is not used after you delete Line 5 in TDF.

In order to prevent a reboot if RESET is pressed, the binary file AMPER FACTORY.OBJ0 needs to be modified.

11) Load the AMPER FACTORY.OBJ0 file into memory (it loads at $8240)

BLOAD Amper Factory.OBJ0

12) Enter the monitor

CALL -151

13) Change the instrucions at $8340 from JMP $C600 (reboot the disk) to three NOP's

8340: EA EA EA

14) Return to BASIC

3D0G

15) Save the modified code

SAVE Amper Factory.OBJ0, A$8240,L$1305

The disk will now boot and work just like the original, except that you can now hit RESET without the disk rebooting.

I have run the de-protected copies and have not yet found any problems. I hope you have as much fun using this softkey as I had making it. You may notice that I worked from the copy of the original, not the original. This is much safer. That's another of the Golden Rules I like to follow: never use the original disk to make changes.

How to Create DEMUFFIN PLUS

1) Boot DOS 3.3 Master to load Integer BASIC

2) Enter the other BASIC

]INT

3) Load the MUFFIN program

>BLOAD MUFFIN

4) Enter the monitor

>CALL-151

5) Initialize the Programmers Aid relocation feature

***D4D5G**

6) Tell the monitor what is being moved and where it is going

***1900<B800.BFFF CTRL Y**

7) Relocate the first chunk of code

***1900<B800.BA10 CTRL Y**

8) Move the data segment

***.BC57M**

9) Relocate the rest of the code

***.BFFF CTRL Y**

10) Make the following modifications to MUFFIN and the relocated RWTS subroutine

```
*1155:00 1E
*115B:D9 03
*1197:A0 20
*15A0:A0 D2 C5 D3 C9 C4 C5 CE
*15A8:D4 A0 C4 AE CF AE D3 AE
*15F7:C4 C5
*20A0:A9 1E 8D B9 B7 20 FD AA
*20A8:48 A9 BD 8D B9 B7 68 60
```

11) Save this new code

***BSAVE DEMUFFIN PLUS, A$803,L$1900**

Continued from page 7

The logic to read and analyze track $1 is in the second boot load ,track $0, sector $0A, which ultimately resides in memory at $4000-$40FF. There are two constants equal to the number of sync bytes ($FFs) between the three $D6s and these are loaded into memory locations $40CD (124 or $7C) and $40CE (132 or $84). These are locations $7C and $7D on track $0, sector $0A.

Unlocking the Turtle

The technique for copying Apple Logo involves making a sector edit to a bit copy so that the code to seek and read track $1 is disabled. The necessary steps are outlined below.

1) Use a bit copier, such as Locksmith 4.1 or Nibbles Away, to copy tracks $0-$22 with no parameter changes. An error on track $1 is OK.

2) Use a sector editing program such as Disk Edit or ZAP from Bag of Tricks to make the following changes to the copied disk.

Trk	Sct	Byte	From	To
0	$A	$13	$20	$EA
0	$A	$14	$00	$EA
0	$A	$15	$3D	$EA
0	$A	$22	$BD	$4C
0	$A	$23	$8C	$55
0	$A	$24	$C0	$40
0	$A	$79	$4C	$EA
0	$A	$7A	$00	$EA
0	$A	$7B	$C6	$EA

Don't forget to write the sector back to the disk.

The first set of changes at $13-$15 eliminates (NOP) the branch to Logo's RWTS at $3D00 which seeks track $1. The changes at $22-$23 cause a branch around the code which reads track $1 and the final changes at $79-$7B eliminate (NOP) the branch which would be taken if the nibble count is not correct.

The resulting disk can now be copied with any bit copier and Apple Logo will run because it now completely ignores whatever is on track $1.

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LOOK WHAT YOU'VE MISSED!

The COREFILER FORMatter

By Ray Darrah

Requirements:
Apple][Plus with 48K RAM
One disk drive

Now that you've finally finished keying in COREFILER, here are the two remaining files in the CORE Database Management System.

The largest, COREFILER FORM, is a program that creates configuration files for COREFILER (that mysterious file it asks for when you RUN it).

In order to use COREFILER, you must **first** use COREFILER FORM to set up a file that tells COREFILER what type of information you wish to record (ex. mailing list, Samurai swords or panty hose).

Once you type it in (and check it with checksoft) you should save it with:

SAVE COREFILER FORM

Next, you will be wondering how to use it. Here's how:

COREFILER FORM Functions

I,J,K,M - These keys move the field you are currently working on in one of the four escape directions.

P - Names the current field by allowing the entry of a prompt.

F - Changes the maximum number of characters allowable for this field.

A - Enters the add fields mode and adds the field you are working with if it hasn't been added before.

N - Allows you to view the order in which the fields will be filled in by COREFILER. "N" is also used to work with a previously added field.

ESC - Exits program.

R - Assigns the fields new numbers so that the first field is in the upper-left position and the last field is in the bottom-right position.

L - Loads a previously saved COREFILER configuration file to be edited.

S - Saves all of the added fields.

COREFILERCOREFILERCOREFILERCOREFILERCOREFILERCOREFILERCOREFILERCOREFILERCOREFILERCOREFILER

COREFILER FORM

COREFILERCOREFILERCOREFILERCOREFILERCOREFILERCOREFILERCOREFILERCOREFILERCOREFILERCOREFILER

Z - Enters a secondary menu where you may delete the field you're working with or insert a field before the one your working with.

C - Erases all the fields and starts over.

The second file, HELLO.DB, is the file you RUN to invoke the entire system. Type in the listing and

SAVE HELLO.DB

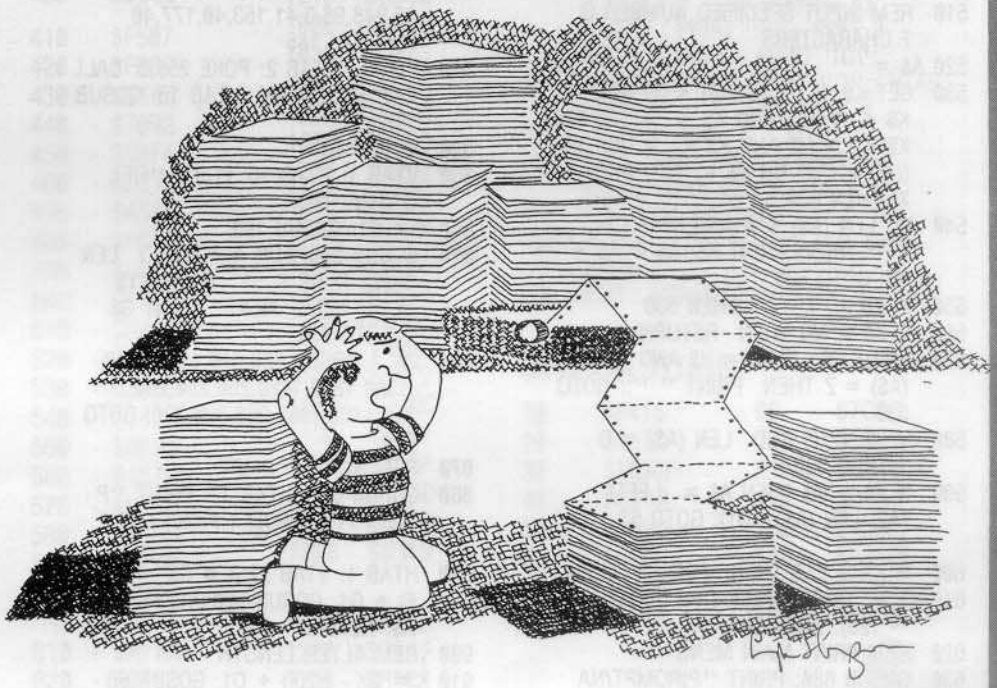
Congratulations! You are now the proud owner of the CORE Data Base Management System. Knock 'em dead!

COREFILER Form Program

```
10  REM COREFILER FORM
20  REM
30  REM BY RAY DARRAH
40  REM
50  REM INITIAL RESEARCH
60  REM BY DAVE THOMPSON
70  REM
80  GOTO 710
90  REM PRINT FIELD WE ARE WORKIN
      G ON
100 GOSUB 180
110 HTAB HT(F): PRINT PR$(F);
120 IF X THEN  INVERSE
130 VTAB VT(F): HTAB H2(F): IF H
      2(F) = HT(F) AND PR$(F) < >
      "" THEN 150
140 PRINT  LEFT$ (BF$,LN(F));: NORMAL
      : RETURN
150 PRINT  LEFT$ (PR$(F),LN(F));
      : IF LN(F) >  LEN (PR$(F)) THEN
       PRINT  LEFT$ (BF$,LN(F) -  LEN
      (PR$(F)));
160 NORMAL : RETURN
170 REM ERASE THE FIELD
180 VTAB VT(F): POKE 255,255: CALL
      768: RETURN
190 REM MOVE FIELDS
200 VT(A) = VT(A + B):HT(A) = HT(
      A + B):LN(A) = LN(A + B):PR$
      (A) = PR$(A + B):H2(A) = H2(
      A + B): RETURN
210 REM PRINT ALL THE FIELDS
220 X = Z: VTAB 3: HTAB 1: PRINT
       SPC( GX);: VTAB 3: POKE 255
      ,Z: CALL 768: POKE 255,255: FOR
      A = 3 TO 17: VTAB A
230 CALL 768: NEXT : FOR F = 01 TO
      FD: GOSUB 100: NEXT : RETURN

240 REM MOVE FIELD IN A DIRECTIO
      N
250 POP : IF K$ <  > "I" AND K$ <
       > "M" THEN 290
260 GOSUB 180:VT(F) = VT(F) + 01
      : IF K$ = "I" THEN VT(F) = V
      T(F) - TW: IF VT(F) < 3 THEN
      VT(F) = 17
270 IF VT(F) > 17 THEN VT(F) = 3

280 VTAB VT(F): POKE 255,Z: CALL
```



```
768: GOTO 840
290 IF K$ = "J" THEN HT(F) = HT(
F) - 01:H2(F) = H2(F) - 1
300 IF K$ = "K" THEN HT(F) = HT(
F) + 01:H2(F) = H2(F) + 01
310 IF HT(F) > Z AND H2(F) > Z AND
H2(F) + LN(F) < 42 AND HT(F)
+ LEN (PR$(F)) < 42 THEN 8
40
320 X = H2(F) - HT(F): IF H2(F) +
LN(F) > HT(F) + LEN (PR$(F)
) THEN 360
330 IF HT(F) = Z OR H2(F) = Z THEN
HT(F) = 41 - LEN (PR$(F)): GOTO
350
340 HT(F) = 01: IF X < 01 THEN HT
(F) = 01 - X
350 H2(F) = HT(F) + X: GOTO 840
360 IF HT(F) = Z OR H2(F) = Z THEN
H2(F) = 41 - LN(F):HT(F) = H
2(F) - X: GOTO 840
370 GOTO 340
380 REM POSITION DATA
390 IF PR$(F) = "" THEN 440
400 IF K$ = U$ AND HT(F) = H2(F)
THEN X = LEN (PR$(F)): GOTO
450
410 IF HT(F) = H2(F) THEN X = -
LN(F): GOTO 450
420 IF K$ = U$ AND H2(F) = HT(F)
- LN(F) THEN X = LN(F): GOTO
450
430 IF K$ = H$ AND H2(F) = HT(F)
+ LEN (PR$(F)) THEN H2(F) =
HT(F): GOTO 460
440 X = 01: IF K$ = H$ THEN X = -
1
450 H2(F) = H2(F) + X: IF H2(F) <
01 OR H2(F) + LN(F) > 41 THEN
H2(F) = H2(F) - X
460 POP : GOTO 840
470 REM INITIALIZE FIELD VALUES
480 HT(A) = 20:VT(A) = 10:H2(A) =
20:LN(A) = 01:PR$(A) = "": RETURN
490 REM GET A KEY
500 WAIT - 16384,128: GET K$: RETURN
510 REM INPUT SPECIFIED NUMBER O
F CHARACTERS
520 A$ = ""
530 GET K$: IF ( ASC (K$) < 32 AND
K$ < > M$ AND K$ < > ES$ AND
K$ < > H$ AND K$ < > U$) OR
((K$ = "," OR K$ = ":") AND
X) THEN 530
540 IF LEN (A$) < A AND K$ >=
" " THEN PRINT K$;:A$ = A$ +
K$: GOTO 530
550 IF K$ > = " " THEN 530
560 IF K$ = M$ THEN RETURN
570 PRINT K$;: IF K$ = H$ AND LEN
(A$) = Z THEN PRINT " ";: GOTO
530
580 IF K$ = H$ AND LEN (A$) = 0
1 THEN 520
590 IF K$ = H$ THEN A$ = LEFT$
(A$, LEN (A$) - 01): GOTO 53
0
600 IF K$ = ES$ THEN POP : RETURN
610 K$ = CHR$ ( PEEK ( FN SC(0))
- 128): GOTO 540
620 REM PRINT MAIN MENU
630 GOSUB 680: PRINT "P)ROMPT/NA
ME" TAB( 25)"F)IELD LENGTH":
PRINT "A)DD FIELD(S)" TAB(
25)"N)EXT FIELD"
640 PRINT "ESC)APE PROGRAM" TAB(
25)"R)ENUMBER FIELDSL)OAD FO
RMAT" TAB( 25)"S)AVE FORMAT"
650 PRINT "Z)AP FIELD" TAB( 25)"
C)LEAR WORK ARE";: POKE 2039
,193
660 VTAB 19: HTAB 17: PRINT "<-
->": HTAB 20: PRINT "I"H$J
$"!"H$H$H$J$"J-+-K"H$H$H$J$"
!"H$J$"M";: RETURN
670 REM ERASE MESSAGE AREA
680 VTAB 19: HTAB 1: CALL 64578:
PRINT : RETURN
690 REM PRINT 40 '='
700 FOR A = 1 TO 40: PRINT "=";:
NEXT : RETURN
710 REM INITIALIZE VARIABLES
720 DIM VT(25),HT(25),PR$(25),H2
(25),LN(25):MXFIELDS = 25
730 D$ = CHR$ (4):CH = 20:CV = 1
0: DEF FN SC(A) = PEEK (40
) + PEEK (41) * 256 + PEEK
(36)
740 FOR A = 768 TO 808: READ X: POKE
A,X: NEXT
750 NF = 0:Z = 0:01 = 1:GX = 40:G
Y = 17:TW = 2:F = 01
760 FOR A = Z TO MX: GOSUB 480: NEXT
: DEF FN WH(X) = 41 * (VT(X
) - 3) + HT(X)
770 U$ = CHR$ (21):H$ = CHR$ (8
):J$ = CHR$ (10):G$ = CHR$
(7):M$ = CHR$ (13):ESC$ = CHR$
(27):KY$ = "PFANRLSIJKMZC" +
ES$ + H$ + U$
780 BF$ = CHR$ (95) + CHR$ (95)
: FOR A = 1 TO 5:BF$ = BF$ +
BF$: NEXT :BF$ = LEFT$ (BF$
,40)
790 DATA 160,4,162,0,36,255,16,2
,162,5,189,31,3,153,22,3,232
,136,16,246,160
800 DATA 39,185,41,3,145,40,136,
16,248,96,3,41,153,40,177,40
,145,3,41,185
810 HOME : VTAB 2: POKE 255,0: CALL
768: GOSUB Z00: VTAB 18: GOSUB
700
820 GOSUB 630
830 VTAB 1: HTAB 16: PRINT "FIEL
D #"F" ";
840 X = 01: GOSUB 100
850 GOSUB 500: FOR A = 01 TO LEN
(KY$): IF K$ < > MID$ (KY$
,A,01) THEN NEXT : PRINT G$
;: GOTO 850
860 ON A GOSUB 880,910,1100,1040
,1300,1380,1420,250,250,250,
250,1160,1000,960,390,390: GOTO
820
870 REM NAME PROMPT
880 GOSUB 680: HTAB 17: PRINT "P
ROMPT?": PRINT : PRINT PR$(F
);
890 HTAB 1: VTAB 22:A = GX - HT(
F) + 01: GOSUB 520:PR$(F) =
A$: RETURN
900 REM ALTER LENGTH
910 X = GX - H2(F) + 01: GOSUB 68
0: PRINT "CURRENT LENGTH=>"L
N(F): PRINT : PRINT "MAXIMUM
LENGTH=>"X
920 PRINT : PRINT "NEW LENGTH=>"
;:A = LEN ( STR$ (GX - H2(F
) + 01)): GOSUB 520
930 IF VAL (A$) < 01 OR VAL (A
$) > X THEN 910
940 LN(F) = VAL (A$): RETURN
950 REM ESCAPE PROGRAM
960 GOSUB 680: PRINT "LEAVE PROG
RAM ? (Y/N)"H$H$H$H$H$H$H$;
970 A = 1: GOSUB 520: IF A$ < >
"Y" THEN RETURN
980 HOME : PRINT : VTAB 24: PRINT
D$"RUNHELLO.DB"
990 REM CLEAR WORK AREA
1000 GOSUB 680: PRINT "CLEAR WOR
K SCREEN ? (Y/N)"H$H$H$H$H$H
$H$;
1010 A = 1: GOSUB 520: IF A$ < >
"Y" THEN RETURN
1020 HOME : RUN
1030 REM GRAB NEXT FIELD
1040 IF F > FD THEN GOSUB 180:F
= 01: GOTO 1060
1050 X = Z: GOSUB 100:F = F + 01:
IF F > FD THEN F = 01
1060 B = F:X = Z: VTAB VT(B): HTAB
01: PRINT SPC( 40);: FOR A =
01 TO FD
1070 IF VT(A) = VT(B) AND A < >
B THEN VTAB VT(B):F = A: GOSUB
110
1080 NEXT :F = B: POKE 255,Z: VTAB
VT(F): CALL 768: POP : GOTO
830
1090 REM DEFINE THE FIELD
1100 IF F = Z THEN PRINT G$;: RETURN
1110 X = Z: GOSUB 100: IF F = FD +
01 THEN F = F + 1:FD = FD +
01: GOTO 1130
1120 F = FD + 01
1130 IF F = MX THEN F = Z
1140 VTAB VT(F): POKE 255,Z: CALL
768: RETURN
1150 REM ZAP (DELETE OR INSERT)
A FIELD
1160 GOSUB 680: PRINT : PRINT "D
)ELETE FIELD" TAB( 19)"OR" TAB(
26)"I)NSERT A FIELD": PRINT
TAB( 17)"WHICH ?"H$;
1170 GET A$: IF A$ < > "I" AND
A$ < > "D" AND A$ < > ES$ AND
A$ < > M$ THEN 1170
1180 IF A$ = ES$ OR A$ = M$ OR F
> FD THEN RETURN
1190 X = Z: IF A$ = "I" THEN 1250
1200 GOSUB 680: VTAB 20: HTAB 13
: PRINT "DELETING FIELD"
1210 B = 01: FOR A = F TO MX - 01
: GOSUB 200: NEXT
1220 A = MX: GOSUB 480:FD = FD -
01
1230 GOSUB 220:F = FD: IF FD = Z
THEN F = 01
1240 RETURN
1250 IF FD = MX THEN RETURN
1260 GOSUB 680: VTAB 20: HTAB 13
: PRINT "INSERTING FIELD"
1270 B = - 1: FOR A = MX TO F +
01 STEP - 1: GOSUB 200: NEXT
```

```
1280  GOSUB 480:FD = FD + 01:B =
      F: GOSUB 220:F = B: VTAB VT(
      F): POKE 255,Z: CALL 768: RETURN
1290  REM RENUMBER FIELDS
1300  IF FD < TW THEN  POP : GOTO
      850
1310  GOSUB 680: PRINT  TAB( 11)"
      RENUMBERING FIELDS":X = Z: GOSUB
      100:X = 01: IF F > FD THEN  GOSUB
      180
1320 B = X:A = Z
1330  FOR X1 = X + 01 TO FD: IF  FN
      WH(X1) <  FN WH(B) THEN B =
      X1
1340  NEXT : GOSUB 200:A = B:B =
      X - A: GOSUB 200:A = X:B =  -
      X: GOSUB 200
1350 X = X + 01: IF X < FD THEN 1
      320
1360  RETURN
1370  REM LOAD FORMAT

1380 K$ = "LOAD FORMAT": GOSUB 14
      90: IF K$ = ES$ THEN  RETURN
1390  PRINT D$"READ"A$: INPUT FD:
       FOR A = 01 TO FD: INPUT VT(
      A),HT(A),PR$(A),H2(A),LN(A),
      X: NEXT
1400  PRINT D$"CLOSE": GOSUB 220:
      F = 01: RETURN
1410  REM SAVE THE WORKPAD
1420 K$ = "SAVE FORMAT": GOSUB 14
      90: IF K$ = ES$ THEN  RETURN
1430  PRINT D$"DELETE"A$: PRINT D
      $"OPEN"A$: PRINT D$"WRITE"A$
1440  PRINT FD:B = Z: FOR X = 01 TO
      FD: PRINT VT(X)","HT(X)","PR
      $(X)","H2(X)","LN(X)",B:B =
      B + LN(X) + 01: NEXT
1450  PRINT B: PRINT 0:A$ =  LEFT$
      (A$,A - 01): PRINT D$"OPEN"A
      $: PRINT D$"DELETE"A$: PRINT
      D$"OPEN"A$",L"B
1460  PRINT D$"WRITE"A$",R0": PRINT
      "1,450,0": PRINT D$"WRITE"A$
      ",R1": FOR A = 01 TO FD
1470  FOR B = 1 TO LN(A): PRINT "
      X";: NEXT : PRINT M$;: NEXT
      : PRINT D$"CLOSE": RETURN
1480  REM OPEN A FILE
1490  GOSUB 680: PRINT  TAB( 15)K
      $: PRINT : PRINT "NAME OF FI
      LE:": IF F > FD THEN  GOSUB
      180
1500  VTAB 23:X = Z:A = 22: GOSUB
      520: IF A$ = "" THEN  POP : RETURN
1510  GOSUB 680: FOR A = 01 TO  LEN
      (A$): IF  MID$ (A$,A,01) <  >
      "," THEN  NEXT :A$ = A$ + ".
      CONFIG": GOTO 1530
1520 A$ =  LEFT$ (A$,A - 01) + ".
      CONFIG" +  RIGHT$ (A$,01 +  LEN
      (A$) - A)
1530  PRINT D$"OPEN"A$:A$ =  LEFT$
      (A$,A + 6): GOSUB 680: VTAB
      21: PRINT  TAB( 11)"ONE MOME
      NT PLEASE.": RETURN
```

STILL CONFUSED about the combined Hardcore COMPUTIST/CORE?
See pg. 23 for information.

CHECKSUMS

```
10   - $BADD
20   - $9B13
30   - $4D3B
40   - $AD92
50   - $C899
60   - $FF65
70   - $A3BF
80   - $AB34
90   - $662F
100  - $8BD1
110  - $886D
120  - $7C43
130  - $58F3
140  - $3E2C
150  - $410D
160  - $463B
170  - $FDF0
180  - $32DF
190  - $79BE
200  - $1890

210  - $EA4C
220  - $C639
230  - $852A
240  - $D884
250  - $A3E0
260  - $C6DF
270  - $E04B
280  - $BC13
290  - $2604
300  - $9A81
310  - $9FD1
320  - $BF0F
330  - $7388
340  - $F631
350  - $6B28
360  - $C80D
370  - $D8DD
380  - $291C
390  - $1F46
400  - $D0E6

410  - $F507
420  - $F30F
430  - $C165
440  - $7092
450  - $98F4
460  - $DC77
470  - $A35D
480  - $FEF1
490  - $DD9D
500  - $E7C4
510  - $A4A8
520  - $6191
530  - $804E
540  - $1457
550  - $BFBA
560  - $457C
570  - $DE0B
580  - $06BD
590  - $2233
600  - $753E

610  - $A7A6
620  - $0142
630  - $B5BA
640  - $0DD0
650  - $BCDF
660  - $FB3A
670  - $C5CB
680  - $B9CD
690  - $4E21
700  - $F8BB
710  - $385A
720  - $A03E
730  - $8AAE
740  - $0150
750  - $67F0
760  - $0AFA
770  - $76DD
780  - $1044
790  - $81D5
800  - $F5E1

810  - $DAA2
820  - $DC0B
830  - $CF85
840  - $DA79
850  - $1813
860  - $39A8
870  - $EDA8
880  - $18F0
890  - $A73C
900  - $51D3
910  - $08CE
920  - $6DDA
930  - $8145
940  - $48EE
950  - $7B59
960  - $E71B
970  - $8B7D
980  - $C0B5
990  - $ACA3
1000 - $CA0F

1010 - $CD38
1020 - $DB8B
1030 - $DF73
1040 - $2DCB
1050 - $00B0
1060 - $F7EC
1070 - $D209
1080 - $5E79
1090 - $DDAC
1100 - $86B3
1110 - $4113
1120 - $6F0E
1130 - $BE53
1140 - $B0F9
1150 - $DD9C
1160 - $2581
1170 - $818A
1180 - $5A5D
1190 - $BCA6
1200 - $D1F9

1210 - $FBEE
1220 - $BEAF
1230 - $B908
1240 - $3BCD
1250 - $3550
1260 - $7CA5
1270 - $0549
1280 - $3B98
1290 - $B22A
1300 - $0881
1310 - $652E
1320 - $303A
1330 - $D1E5
1340 - $1EAC
1350 - $F10E
1360 - $47FC
1370 - $E6E6
1380 - $1233
1390 - $4D12
1400 - $9771
1410 - $BFB0
1420 - $C09E
1430 - $F6E0
1440 - $487D
1450 - $BDDE
1460 - $A9CB
1470 - $F071
1480 - $AFFA
1490 - $9F96
1500 - $2477
1510 - $CB3B
1520 - $4651
1530 - $D785
```

Hello.DB Program

```
10  TEXT : HOME : GOSUB 110
20  FOR X = 1 TO 10: POKE 768 + X
    ,0: NEXT
30  VTAB 8: HTAB 5: PRINT "1. ENT
    ER/CHANGE DATA": PRINT
40  HTAB 5: PRINT "2. ADD/EDIT CO
    NFIGURATION FILE(S)": PRINT

50  HTAB 5: PRINT "3. EXIT TO BAS
    IC": PRINT
60  PRINT : HTAB 16: PRINT "WHICH
     ?";: GET A$: PRINT A$;: IF
    (A$ < "1" OR A$ > "3") AND A
    $ <  > CHR$ (27) THEN 60
70  ON  VAL (A$) GOTO 90,100,80
80  HOME : END
90  PRINT  CHR$ (4)"RUN COREFILER
    "
100  PRINT  CHR$ (4)"RUN COREFILE
    R FORM"
110  INVERSE :A$ = "COREFILER ": FOR
    X = 1 TO 4: PRINT A$;: NEXT

120  VTAB 24: PRINT  RIGHT$ (A$,8
    );: FOR X = 1 TO 3: PRINT A$
    ;: NEXT : PRINT "C";: POKE 2
    039,15: VTAB 23: PRINT "O";
130  VTAB 2: HTAB 1: PRINT "O";: HTAB
    40: PRINT " " CHR$ (8);:Y =
    1:Z = 3: FOR X = 1 TO 21
140  PRINT  MID$ (A$,Y,1) MID$ (A
    $,Z,1);: HTAB 40:Y = Y + 1: IF
    Y >  LEN (A$) THEN Y = 1
150 Z = Z + 1: IF Z >  LEN (A$) THEN
    Z = 1
160  NEXT : NORMAL : RETURN
```

CHECKSUMS

```
10   - $F415
20   - $A1B3
30   - $ECA2
40   - $C71A
50   - $75FD
60   - $F28C
70   - $746A
80   - $EEA3
90   - $7CBB
100  - $6D9C
110  - $FA08
120  - $D2C5
130  - $1592
140  - $B56E
150  - $57B5
160  - $93D6
```

ProDOS Data Encryptor

By Gary Peterson

"...with the widespread availability of nibble copiers and with the use of other techniques such as boot code tracing, it is not easy to be confident in the security of the information contained on any disk."

Most readers of Hardcore COMPUTIST are familiar with at least some of the techniques used by software companies to make their disks uncopyable by users. The normal protection techniques involve using a disk operating system which has been modified so that the normal Apple DOS cannot read or copy the disk. However, with the widespread availability of nibble copiers and with the use of other techniques such as boot code tracing, it is not easy to be confident in the security of the information contained on any disk. Aside from software manufacturers' reasons for copy protecting programs, there are legitimate reasons why a person might want to prevent files contained on their disks from being read by unauthorized persons.

In an office where payroll and other confidential information is stored on computer disks, it is often desired that this information only be accessed by employees. If the system does not have a password protection scheme incorporated into it, then just about anyone could view the information stored in ordinary text files. One problem with the password system is that often the passwords become common knowledge. An alternate method of protecting privileged information contained in files is the use of an encryption routine whereby the file is made unreadable to anyone who does not know the key by which the file was encrypted. This article and the program which accompanies it will demonstrate a simple process by which information can be encrypted and decrypted.

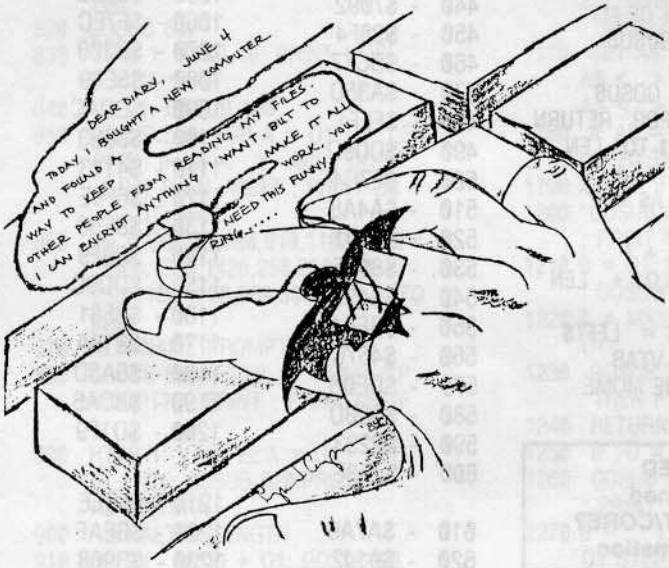
There are a great many documented methods of encoding and encyphering information with the aid of computers. One of the most secure methods of encryption, called public key cryptography, has received quite a bit of publicity in recent years in various publications. Public key cryptography is a very well documented method of encryption which does not require the exchange of keys between the sender and the receiver of the message. Because of this and the mathematical impossibility of unauthorized decryption of encyphered messages, public key cryptography is a very desirable method of encryption. The problem with implementing the public method on microcomputers lies in the floating point method used by micros to represent large numbers. On the Apple, each variable can only be represented in floating point form by a maximum of nine significant digits. This means that integer numbers larger than one billion lose significant digits when stored in floating point form. For most applications of microcomputers, this form of representation is acceptable. But because public key cryptography involves modulo and exponential arithmetic, the lost significant digits cannot be tolerated. Although it is possible to write a program for the Apple which uses the public key method of encryption, any enciphered information would not be very secure because the encryption key could be fairly easily guessed by practically anyone.

For someone who merely wishes to protect his files from the prying eyes of the casual browser, there are some relatively simple techniques which can be used to encrypt confidential data. One of the most elementary methods of encryption is to add or subtract a constant from the values of the characters in the file. This method might confuse the uninformed, but the encrypted file can be fairly easily read by someone who could extract or guess the single constant value. A variation on this encryption theme might use the computer to generate a random number which can be added or subtracted from the values in the file. To decrypt the file, the computer must be able to generate the exact same sequence of numbers as was generated when the file was encrypted. On the Apple it is possible to do this if the RND function is first seeded with a negative number. After RND is seeded with a particular negative number a unique series of values will be generated until RND is reseeded. My encryption program relies on this fact so that Applesoft, Binary and Text files can be encrypted and then decrypted when given the "key"(the value used to seed RND). Then RND is used to generate a value to add or subtract from the value of each character in the file. Whether the value will be added to or subtracted from the original value in the file is also chosen randomly using RND.

I had originally written this program to run under DOS 3.3 but, when I saw some of the capabilities of ProDOS, I decided to utiliize the new Apple operating system for the program because a cumbersome machine lanaguage program which accessed the DOS 3.3 file manager would not be needed.

Even though you may have no interest in encrypting files, you may want to take a look at the program to see some of the advantages of ProDOS over tried and true DOS 3.3. Table One gives an explanation of the ProDOS commands and parameters which are used in the program.

To use the program, simply pick either the encryption or decryption operation from the main menu and enter the key to use in encrypting and decrypting. Be sure to record your key in a secure location or it will be very hard to return the file to its original form.



The program will then BLOAD the input file into memory starting at address $4000. After the encryption or decryption process has been completed, the output file will be written to disk. If the input file is more than forty blocks (eighty sectors) in length, more than one encrypt/decrypt cycle will be required. While the machine language program is encrypting or decrypting, the program will display a flashing message on the screen. Even though the machine language program is short, each decryption/encryption pass can take up to two and a half minutes because of the large number of random values being generated.

As presently written, the entries of the input and output paths must reside in the same directory block, be it the main directory or a subdirectory. Your choice for input and output file names may be the same so that disk space is conserved. If you choose a new name for the output file be sure the disk has enough room for this new file, otherwise the process will fail. The maximum path length that the program will encrypt or decrypt is 80 blocks.

There are some precautions to observe when encrypting/decrypting Binary (BIN) or Applesoft (BAS) files. Because ProDOS stores certain file information including path length and target address on the directory block and not physically in the file, when an encrypted file is restored to its original form some information in the directory may no longer be correct. For restored Binary files, the load address is affected because my program loads and saves at $4000. To correct this simply BLOAD and then BSAVE the file using proper address and length parameters.

For Applesoft (BAS) files, the program pointers need to be properly set. To do this, type NEW to clear any programs in memory. Next type CATALOG and write down the length information of the decrypted BASIC file which is displayed. Then BLOAD the Applesoft program at $801 using the T (type) parameter. For example, if the file is called UNSCRAMBLED, type

BLOAD UNSCRAMBLED, A$801,TBAS

To set the program pointers properly, type the following in immediate execution mode replacing *n* with the file length you recorded above

POKE 103,1:POKE 104,8:POKE 176, INT(*n*/256):POKE 175, (*n*-PEEK(176)*256)

Finally, just reSAVE the program with the proper path name.

These gyrations would not be necessary if there were more information available on the structure of a directory block. Unfortunately, at the time of this writing, Apple has not yet released the ProDOS reference manuals to the general public. The only materials on ProDOS which are available to me are articles in CALL A.P.P.L.E. and Nibble and the less than adequate user's manual which is included with the Apple disk drive or Apple //e at the time of purchase. Besides the lack of reference materials, a few other aspects of ProDOS can also be a bit bothersome.

Programming without access to GPLE and other useful DOS 3.3 utilities is a real inconvenience. I had to go back to POKE 33,33 for program editing. Having a 16K language card plus $9600-$BFFF gobbled up by an operating system was also a bit of a shock.

The DOS 3.3 < = > ProDOS conversion program (DUCK) also needs two disk drives to operate properly, a fact which is not documented in the ProDOS user's manual. Oh, I almost forgot to mention the fact that ProDOS will only boot on genuine Apples and not on compatibles like Syscom and Franklin. I guess nothing can be done about ProDOS's memory requirements but, hopefully, the other shortcomings will be rectified by Apple and/or other enterprising people.

Bibliography:

Bosworth, Bruce, ***Codes, Ciphers and Computers- An Introduction to the Information Society.*** New Jersey: Hayden Book Company, 1982.

Smith, John. ***Public Key Cryptography***. Byte (January 1983): Vol. 8/ No.1, 198-218.

Table 1

CAT - Displays a forty column directory of the current pathname.

CATALOG - Displays an eighty column directory of the current pathname which contains file lengths, load addresses and other path information.

CREATE - This creates a new path in the current directory. With the use of the T (type) parameter, any path type can be created. If a T parameter is not specified, then a DIR (directory) type path is created.

BLOAD/BSAVE - There are several new parameters associated with these two commands.

T - This is the path type parameter which allows any path (file) type to be BLOADed and BSAVed to and from memory.

B - This is the byte parameter which can be used to BLOAD and BSAVE to and from any byte position in the path (file).

E - The E (End) allows an ending address to be specified when BSAVEing so that the number of bytes to be saved does not need to be specified.

PREFIX - When PREFIX is followed by a pathname the path to the directory (DIR) block of interest is set so that the entire pathname does not have to be typed to access the paths (files) within that directory. If PREFIX is not followed by a pathname the current prefix is displayed. If PREFIX/ is typed, then the current prefix is eliminated.

PROGRAM

```
10  REM ********************************
20  REM *                              *
30  REM *        DATA ENCRYPTOR        *
40  REM *                              *
50  REM *        WRITTEN UNDER         *
60  REM *          PRODOS 1.1          *
70  REM *                              *
80  REM ********************************
90  REM
100  ONERR  GOTO 1190
110  GOSUB 1100
120  REM MAIN PROGRAM MENU
130  HOME : HTAB 09: VTAB 07: PRINT
     "P) SET PRODOS PREFIX"
140  HTAB 09: VTAB 9: PRINT "E) E
     NCRYPT A PATH"
150  HTAB 09: VTAB 11: PRINT "D)
     DECRYPT A PATH"
160  HTAB 09: VTAB 13: PRINT "C)
     CATALOG"
170  HTAB 09: VTAB 15: PRINT "Q)
     QUIT"
180  HTAB 10: VTAB 18: PRINT "CHO
     OSE ONE"
190  GOSUB 230
200  ON S% GOTO 310,350,390,510
210  POKE 34,0: HOME : END :
220  REM KEYBOARD INPUT ROUTINE
230  HTAB 21: VTAB 18: GET S$: IF
     S$ < > "C" AND S$ < > "D" AND
     S$ < > "E" AND S$ < > "P" AND
     S$ < > "Q" THEN 230
240  PRINT S$
250  IF S$ = "C" THEN S% = 1
260  IF S$ = "P" THEN S% = 2
270  IF S$ = "E" THEN S% = 3
280  IF S$ = "D" THEN S% = 4
290  IF S$ = "Q" THEN S% = 5
300  RETURN
310  REM CATALOG
320  HOME : PRINT D$"CAT"
```

```
330  HTAB 9: VTAB 24: PRINT "HIT
     ANY KEY TO CONTINUE": POKE -
     16368,0: WAIT - 16384,128: GOTO
     130
340  REM  SET PRODOS PREFIX
350  HOME :PF = 1:VT = 9:HT = 1:A
     $ = "SET PRODOS PREFIX": GOSUB
     620
360 PF$ = "/" + PN$ + "/"
370  PRINT D$"PREFIX"PF$: PRINT D
     $"BLOAD"PF$",A$3000,TDIR"
380 PF = 0: GOTO 130
390  REM  ENCRYPT A PATH
400  POKE 794,24: POKE 795,101: POKE
     814,56: POKE 815,229
410  HOME :HT = 1:VT = 09:A$ = "P
     ATH NAME TO ENCRYPT": GOSUB
     620
420  PRINT D$"VERIFY"PF$PN$
430 PI$ = PN$: GOSUB 840
440 HT = 1:VT = 12:A$ = "PATH NAM
     E FOR ENCRYPTED FILE": GOSUB
     620
450 PO$ = PN$
460  PRINT D$"CREATE"PO$",T"TY$
470  GOSUB 740
480 M1$ = "ENCRYPTING " + PI$:M2$
     = "WRITING " + PO$: GOSUB 1
     000
490  GOTO 130
500  REM  DECRYPT A FILE
510  POKE 794,56: POKE 795,229: POKE
     814,24: POKE 815,101
520  HOME :HT = 1:VT = 09:A$ = "P
     ATH NAME TO DECRYPT": GOSUB
     620
530  PRINT D$"VERIFY"PN$
540 PI$ = PN$: GOSUB 840
550 HT = 1:VT = 12:A$ = "PATH NAM
     E FOR DECRYPTED FILE": GOSUB
     620
560 PO$ = PN$
570  PRINT D$"CREATE"PO$",T"TY$
580  GOSUB 740
590 M1$ = "DECRYPTING " + PI$:M2$
     = "WRITING " + PO$: GOSUB 1
     000
600  GOTO 130
610  REM INPUT PATH NAME
620  HTAB HT: VTAB VT:C = 0:PN$ =
     "": PRINT A$: PRINT "/";
630  GET PC$: IF PC$ = CHR$ (13)
      AND LEN (PN$) > 0 THEN RETURN
640  IF PC$ = CHR$ (27) THEN POP
     : GOTO 130
650  IF ( ASC (PC$) < 65 OR ASC
     (PC$) > 90) AND ( ASC (PC$) <
     46 OR ( ASC (PC$) > 57)) AND
      ASC (PC$) < > 8 OR ( LEN (
     PN$) = 15 AND NOT PF) OR ( LEN
     (PN$) = 64 AND PF) THEN PRINT
     G$;: GOTO 630
660  IF PC$ = CHR$ (8) AND LEN
     (PN$) < 1 OR ( LEN (PN$) > 1
     5 AND NOT PF) OR ( LEN (PN$
     ) > 50 AND PF) THEN PRINT G
     $;: GOTO 630
670  IF PC$ = CHR$ (8) AND LEN
     (PN$) = 1 THEN PRINT PC$;: PRINT
     " ";: PRINT PC$;:PN$ = "":C =
     0: GOTO 630
680  IF PC$ = CHR$ (8) THEN PRINT
     PC$;: PRINT " ";: PRINT PC$;
     :PN$ = LEFT$ (PN$, LEN (PN$
     ) - 1): GOTO 630
690  IF NOT C AND ASC (PC$) > 4
     5 AND ASC (PC$) < 58 THEN PRINT
     G$;: GOTO 620
700 C = 1:PN$ = PN$ + PC$: PRINT
     PC$;: GOTO 630
710  PRINT PC$;: GOTO 630
720  REM WAIT ROUTINE
730  PRINT G$: VTAB 11: HTAB (20 -
      LEN (MG$) / 2): PRINT MG$: VTAB
     24: HTAB 8: PRINT "HIT ANY K
     EY TO CONTINUE": POKE - 163
     68,0: WAIT - 16384,128: RETURN
740  REM GET ENCRYPTION KEY
750 EK$ = "": VTAB 15: HTAB 1: PRINT
     "ENCRYPTION KEY ";
760  GET NU$: IF ASC (NU$) = 13 AND
      LEN (EK$) > 0 THEN EK = VAL
     (EK$): RETURN
770  IF NU$ = CHR$ (27) THEN POP
     : GOTO 130
780  IF NU$ = CHR$ (8) AND LEN
     (EK$) < 1 THEN PRINT G$;: GOTO
     760
790  IF NU$ = CHR$ (8) AND LEN
     (EK$) = 1 THEN PRINT NU$;: PRINT
     " ";: PRINT NU$;:EK$ = "": GOTO
     760
800  IF NU$ = CHR$ (8) THEN PRINT
     NU$;: PRINT " ";: PRINT NU$;
     :EK$ = LEFT$ (EK$, LEN (EK$
     ) - 1): GOTO 760
810  IF VAL (NU$) < 1 OR LEN (E
     K$) = 3 THEN PRINT G$;: GOTO
     760
820 EK$ = EK$ + NU$: PRINT NU$;: GOTO
     760
830  REM  GET PATH INFO
840 A = 12332:CT = 0
850 FC = ASC ( LEFT$ (PI$,1))
860  IF PEEK (A) = FC THEN 900:REM
     FIND PATH IN DIRECTORY
870 CT = CT + 1:A = A + 39: IF CT
     = 12 THEN A = A + 5:CT = -
     1
880  IF A > EN THEN 1350
890  GOTO 860
900 NM$ = ""
910  FOR I = A TO A + LEN (PI$) -
     1:NM$ = NM$ + CHR$ ( PEEK (
     I)): NEXT
920  IF PI$ = NM$ AND (( PEEK (I)
     ) = 0 OR LEN (PI$) = 15) THEN
     PL = PEEK (A + 22) * 65536 +
      PEEK (A + 21) * 256 + PEEK
     (A + 20): GOSUB 940: RETURN
930  GOTO 870
940 TY = PEEK (A + 15): IF TY <
     > 252 AND TY < > 4 AND TY <
     > 6 THEN MG$ = "UNSUPPORTED
     FILE TYPE!": HOME : GOSUB 7
     30: POP : POP : GOTO 130
950  IF PL > 40960 THEN MG$ = PI$
      + " IS TOO LARGE TO ENCRYPT
     !": HOME : GOSUB 730: POP : POP
     : GOTO 130
960  IF TY = 252 THEN TY$ = "BAS"
     : RETURN
970  IF TY = 6 THEN TY$ = "BIN": RETURN
980 TY$ = "TXT": RETURN
990  REM ENCRYPTION/DECRYPTION RO
     UTINE
1000 BC = 0:NB = 20480:B = 20480:
     NR = INT (PL / NB): HOME : VTAB
     11: HTAB INT (20 - LEN (M1
     $) / 2): FLASH : PRINT M1$
1010  NORMAL
1020  FOR I = 0 TO NR
1030  POKE 6,0: POKE 7,64: POKE 8
     , INT (NB / 256) + 65
1040  IF I = NR THEN NB = FN MOD
     (PL): POKE 8, INT (NB / 256)
      + 65
1050  PRINT D$"BLOAD"PI$",T"TY$",
     A$4000,L"NB",B"BC:Z = RND (
      - EK): CALL 768: HOME : VTAB
     11: HTAB INT (20 - LEN (M2
     $) / 2): FLASH : PRINT M2$: NORMAL
1060  PRINT D$"BSAVE"PO$",T"TY$",
     A$4000,L"NB",B"BC
1070  IF I = NR - 1 THEN NB = FN
     MOD(PL):
1080 BC = BC + 20480: VTAB 11: PRINT
     : VTAB 11: HTAB (20 - LEN (
     M1$) / 2): FLASH : PRINT M1$
     : NORMAL : NEXT : RETURN
1090  REM  PROGRAM INITIALZATION
1100  FOR AD = 768 TO 836: READ B
     Y: POKE AD,BY: NEXT : REM PO
     KE ENCRYPTION ROUTINE
1110  TEXT : HOME : INVERSE : HTAB
     (8): PRINT "RANDOM ENCRYPTIO
     N SYSTEM": NORMAL
1120  POKE 34,1: HIMEM: 10496
1130 D$ = CHR$ (4):G$ = CHR$ (7
```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```
):EN = 14336
1140  DEF  FN MOD(A) =  INT ((A /
      B -  INT (A / B)) * B + .05)
       *  SGN (A / B)
1150  PRINT D$"PREFIX/"
1160  PRINT D$"PREFIX": INPUT PF$
      : PRINT D$"BLOAD"PF$",A$3000
      ,TDIR"
1170  RETURN
1180  REM ERROR HANDLING
1190 ER =  PEEK (222): POKE 216,0
      : ONERR  GOTO 1190
1200  IF ER = 19 THEN 1270
1210  IF ER = 9 THEN 1330
1220  IF ER <  > 6 AND ER <  > 2 AND
      ER <  > 3 AND ER <  > 11 AND
      ER <  > 7 AND ER <  > 16 THEN
      1340
1230  HOME : VTAB (VT):MG$ = "PAT
      H NOT FOUND!": HTAB (20 -  LEN
      (MG$) / 2): HOME : GOSUB 730
1240  IF S% = 2 THEN PF$ = "": GOTO
      350
1250  IF S% = 3 THEN 410
1260  GOTO 520
1270  POKE 34,10: HOME : PRINT G$
      :MG$ = PO$ + " ALREADY EXIST
      S!": HTAB (1): VTAB 12: PRINT
      MG$: HTAB 1: PRINT "REPLACE
      IT Y/N";
1280  GET AN$: IF AN$ <  > "Y" AND
      AN$ <  > "N" THEN 1280
1290  IF AN$ = "N" AND S% = 2 THEN
       HOME : POKE 34,1: GOTO 440
1300  IF AN$ = "N" THEN  HOME : POKE
      34,1: GOTO 550
1310  IF AN$ = "Y" AND S% = 2 THEN
       HOME : POKE 34,1: HTAB 1: VTAB
      12: PRINT "PATH NAME FOR ENC
      RYPTED FILE ": PRINT "/";PO$
      : GOTO 470
1320  HOME : POKE 34,1: HTAB 1: VTAB
      12: PRINT "PATH NAME FOR DEC
      RYPTED FILE ": PRINT "/"PO$:
       GOTO 580
1330  TEXT : HOME : PRINT "DISK F
      ULL ERROR!": PRINT G$;: END
1340  TEXT : HOME : PRINT G$: PRINT
      "ERROR # ";ER: END
1350  TEXT : HOME : PRINT "FILE N
      OT FOUND ERROR!": PRINT G$;:
       END
1360  DATA 169,0,133,6,169,64,133
      ,7,160,0,152,72,32,174,239,1
      65,159,48,20,32,174,239,104,
      168,177,6,56,229,159,145,6,2
      00,152
1370  DATA 72,240,20,76,12,3,32,1
      74,239,104,168,177,6,24,101,
      159,145,6,200,152,72,208,212
      ,230,7,165,7,197,8,240,3,76,
      12,3,104,96
```

CHECKSUMS

10	- $BADD	60	- $FF65
20	- $9B13	70	- $A3BF
30	- $4D3B	80	- $A900
40	- $AD92	90	- $924D
50	- $C899	100	- $84EB
110	- $D6DA	460	- $3342
120	- $502F	470	- $2E4B
130	- $3579	480	- $E838
140	- $D1EE	490	- $BB36
150	- $0BBB	500	- $5671
160	- $08E0	510	- $FE4C
170	- $BC4E	520	- $EC0D
180	- $E88C	530	- $E015
190	- $A064	540	- $CBC8
200	- $B385	550	- $7D42
210	- $E2E7	560	- $1F08
220	- $A9AB	570	- $338E
230	- $94F9	580	- $98D8
240	- $96BC	590	- $CCF9
250	- $CE4A	600	- $C3A4
260	- $D2D8	610	- $13A9
270	- $BF38	620	- $11C6
280	- $4FB5	630	- $1484
290	- $E8DE	640	- $E584
300	- $E5E3	650	- $051D
310	- $2F18	660	- $D48B
320	- $6C41	670	- $5C9F
330	- $FEC4	680	- $6F6C
340	- $C4D4	690	- $9565
350	- $F69D	700	- $0E79
360	- $451B	710	- $3A66
370	- $7B3F	720	- $D90D
380	- $6BFB	730	- $F815
390	- $E7A6	740	- $A653
400	- $535A	750	- $0C5B
410	- $7BE1	760	- $648D
420	- $2DED	770	- $4D69
430	- $A8F5	780	- $CB6F
440	- $F6B1	790	- $957F
450	- $690B	800	- $B8C3
810	- $9746	1110	- $5424
820	- $37B2	1120	- $81E5
830	- $8F36	1130	- $5F98
840	- $BE16	1140	- $57F9
850	- $BC55	1150	- $0670
860	- $3354	1160	- $B2F9
870	- $037C	1170	- $7EB9
880	- $9F3C	1180	- $655F
890	- $33FA	1190	- $542A
900	- $B3BA	1200	- $D156
910	- $E2DC	1210	- $F485
920	- $B224	1220	- $A1DB
930	- $10A1	1230	- $B396
940	- $5253	1240	- $55E8
950	- $1121	1250	- $6869
960	- $6F79	1260	- $097C
970	- $6DD5	1270	- $FA64
980	- $80D9	1280	- $6D48
990	- $703B	1290	- $D5EF
1000	- $1B83	1300	- $24B5
1010	- $05A1	1310	- $16EC
1020	- $65E8	1320	- $8976
1030	- $6964	1330	- $3B37
1040	- $0ACC	1340	- $E73B
1050	- $429F	1350	- $85BC
1060	- $56CE	1360	- $C4F3
1070	- $DA11	1370	- $B8F7
1080	- $B3DB		
1090	- $9FB1		
1100	- $B209		

Note To Subscribers:

Following the combination of Hardcore COMPUTIST and the CORE quarterly (February 1984) into a single magazine, many subscribers have expressed concern about the total number of issues they will receive.

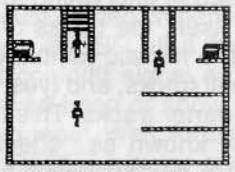
For Your Information:

Each issue of Hardcore COMPUTIST now contains a CORE Section within its pages. Subscribers still receive twelve magazines annually, but are provided with both the controversial articles of Hardcore and the general how-to's of CORE in one monthly issue.

The Database articles promised for CORE 4 now appear in the CORE Section in Hardcore COMPUTIST 6,7, and 8.

For more information, write our subscription department.

APT'SAPT'SAPT'S



Castle Wolfenstein

Contributed by
Eric Holman Whitaker

In the room that has a stairway at the top of the screen (see picture), the following will allow you to escape from the castle immediately:

Open the disk drive door but do not remove the disk. Exit the room via the stairway at the top of the screen. Castle Wolfenstein will attempt to save that room on a particular sector, but with the drive's door open, this will not be possible. After your disk drive has tried twice to save the room, your man appear above the stairway and his head will be directly to the left. *Do not close the drive door yet, or the game will fry.*

Wait twice more for Castle Wolfenstein to try and save the sector and observe what happens: You will have escaped!! As soon as you see the escape screen, close the drive quickly. The picture will load, and if you have the plans, you will receive extra congratulations and a raise in rank.

Copying The Uncopyable- Essential Data Duplicator Version I

By Steven Zupp

Essential Data Duplicator
Utilico Microware
3377 Solano Ave., Suite 352
Napa, CA 94558
$79.95

Requirements:
48K Apple II or equivalent
One disk drive
Essential Data Duplicator Version I
A blank initialized disk with no Hello program
A basic knowledge of machine language helps but is not necessary
Integer firmware card or other means of RESETing into the monitor

The Scheme

EDD (Essential Data Duplicator), in my opinion, is one of the most incredible copy programs around. My main reason for this praise is due to the fact that EDD requires few or no parameter changes to duplicate many copy protected programs currently on the market. Its power *almost* makes Locksmith 4.1 look like COPYA.

Unfortunately, along with its incredible copying abilities comes an incredible copy protection. EDD uses 4 phases of super fast track arcing that sounds more like an army of cockroaches tap dancing than a disk booting. Instead of encrypting the data on the disk itself, the tracks of data are placed in a mosaic jumble of normal tracks, half tracks, and (yes, believe it or not) quarter tracks. This technique is loosely known as "checkerboarding" and is a very difficult scheme to crack.

Luckily for everybody, EDD is a one time only load program which leaves it open to attack from snapshot type devices. In fact, a friend of mine armed with his Wildcard and some address changes successfully copied it, but his copy takes forever to load, is hard to modify, and takes up most of a disk. So, armed with my trusty INTEGER firmware card I decided to try it my way.

Getting The Data

This section deals with the breaking process in detail. If you just want to do it, then go to the section labeled "Summary."

Boot EDD. Press any key a couple of times to get to the main menu, then flip the switch on the card to INTEGER (if it's not already there) and press RESET. You should end up in the monitor.

Conveniently, EDD mainly uses the memory from $800 to $3FFF, with the hi-res picture residing from $4000 to $5FFF. There is some code in the keyboard input buffer ($200 to $300) but is has no effect on the main program, and I assume it is part of a disk loading routine. Before booting up our normal 3.3 slave disk we need to move the code at $800-$8FF to a safe location ($6000-$60FF) so it won't get stomped upon. To move the code out of the way type

6000<800.8FFM

This moves $800 through $8FF, to $6000 through $60FF.

Now boot up DOS 3.3 by inserting your initialized disk in the drive and typing

C600G

This boots the disk in the drive in slot 6. If your disk controller is in another slot, replace the 6 with that slot number; i.e. slot 7 = C700G.

When the cursor appears, enter the monitor by typing

CALL -151

To relocate the portion of memory we moved back to its original location, type

800<6000.60FFM

Next we will make this hunk of data useable. You should now save this in case you mess up the steps following. If there is an accident, just BLOAD DATA and start at "Making It Useable". To save it type

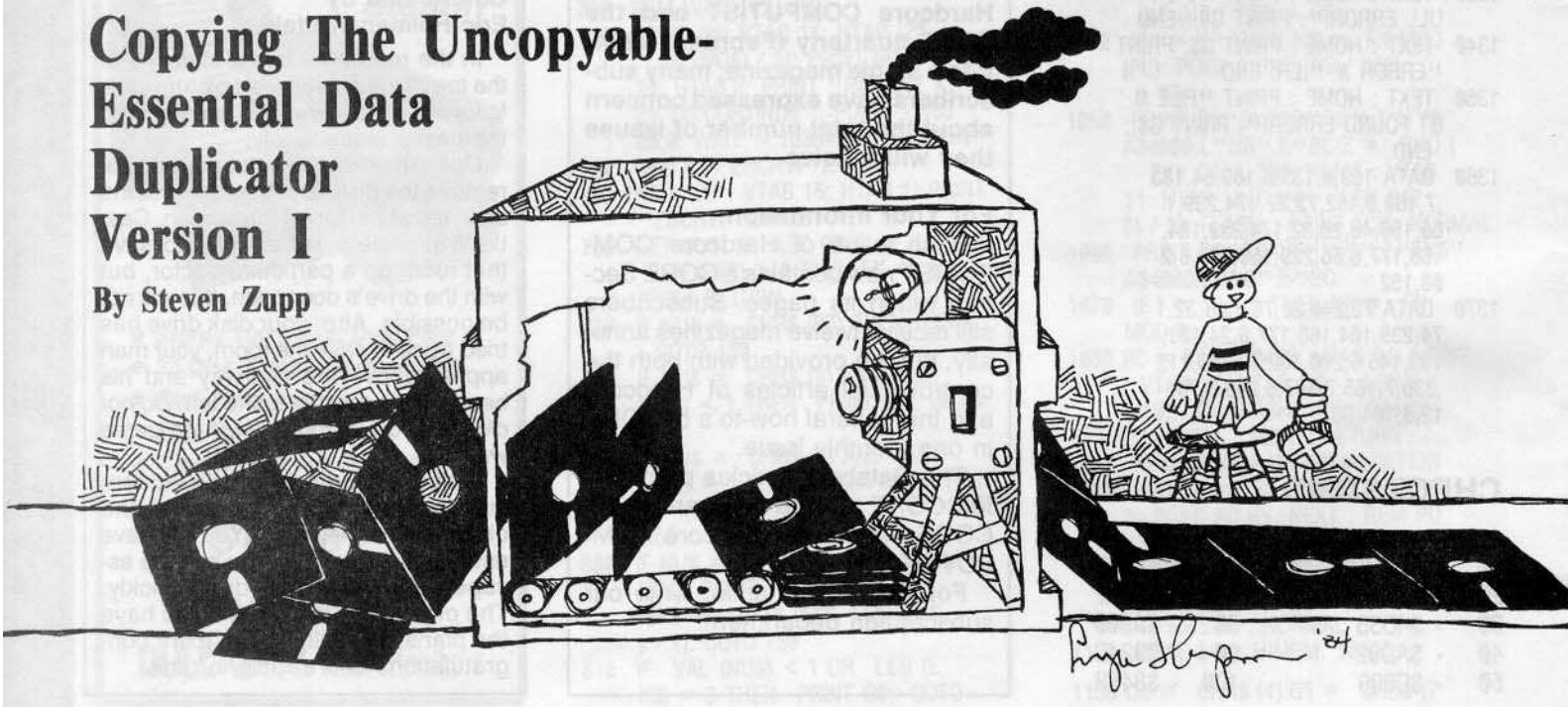
BSAVE DATA, A$800, L$5800

Making It Useable

The main copy protection routine in EDD starts at $21C9. Assuming you still have the EDD data in memory, and are still in the monitor, make the following modification

21C9:60

This puts an RTS at the beginning of the routine that checks certain memory



locations. All there is to be done now is to add a short routine which will perform some necessary housekeeping functions.

Since we will not be using hi-res page 2 ($4000), we can put our routine over it. Because the body of the program starts at $800, we must put a jump to our routine before that. So at $7FD we will put a jump instruction to $4000. Type this:

7FD:4C 00 40

In our routine there are three things that need to be done:

1. Disconnect the DOS pointers. The reason for this is EDD writes over DOS when in operation. When DOS is connected, the CSW (Character output SWitch) and KSW (Keyboard input SWitch) vectors are pointing to DOS. DOS looks at the characters coming in and going out and then sends them back along their merry way to the monitor COUT and KEYIN routines. If DOS is connected (the pointers are set for DOS locations) and those locations in DOS are erased, the computer will seemingly die, unable to input or output characters. If you want to learn more about this process refer to the section of this article titled "More On DOS Hooks."

2. Change two zero page locations. These are used by EDD to display which drives and slots are being used. These have nothing at all to do with the operation of the program, but it is nice to have them correct.

3. Jump to the actual start of the program (no, it's not $800).

Also changing the reset vector to C600 adds a nice touch so that when reset is pressed, EDD will reboot instead of breaking into Applesoft. If your controller is in another slot you can change the slot (6) to whatever slot you want, although the wisest thing to do would be to move your controller to slot 6. Examine the code below then type in the hex dump following.

```
4000-  A9 00     LDA #$00
4002-  8D F2 03  STA $03F2   Sets RESET vector
4005-  A9 C6     LDA #$C6    to reboot from slot 6
4007-  8D F3 03  STA $03F3
400A-  20 6F FB  JSR $FB6F
400D-  A9 F0     LDA #$F0
400F-  85 36     STA $36
4011-  A9 FD     LDA #$FD
4013-  85 37     STA $37     Disconnects DOS
4015-  A9 1B     LDA #$1B
4017-  85 38     STA $38
4019-  A9 FD     LDA #$FD
401B-  85 39     STA $39
401D-  A9 60     LDA #$60
401F-  85 0A     STA $0A     Sets up screen
4021-  A9 60     LDA #$60    display locations
4023-  85 0B     STA $0B     and starts program
4025-  4C 5E 09  JMP $095E
```

```
4000:  A9 00 8D F2 03 A9 C6 8D
4008:  F3 03 20 6F FB A9 F0 85
4010:  36 A9 FD 85 37 A9 1B 85
4018:  38 A9 FD 85 39 A9 60 85
4020:  0A A9 60 85 0B 4C 5E 09
```

Now that you have entered the routine, it is time to save the whole thing. Type the following

BSAVE EDD, A$7FD, L$382B

That's it! You can Delete the file "DATA" now if you want to, or keep it on hand as a space taker-upper on your disk. Just BRUN EDD whenever you want to use it, and hide the original in a locked safe in a bomb shelter and you should feel safer (watch out for safecracking rats wielding magnets, however.)

Summary

Boot EDD and press any key twice to get to the menu. Now use whatever device you have to enter the monitor. After you are in the monitor type this

6000<800.8FFM

Now insert your blank disk and type

C600G

When the prompt appears enter the monitor by typing

CALL -151

Now type

```
800<6000.60FFM
2C19:60
7FD:4C 00 40
4000:A9 00 8D F2 03 A9 C6 8D
4008:F3 03 20 6F FB A9 F0 85
4010:36 A9 FD 85 37 A9 1B 85
4018:38 A9 FD 85 39 A9 60 85
4020:0A A9 60 85 0B 4C 5E 09
```

BSAVE EDD, A$7FD, L$382B

That's all! Just type "BRUN EDD" to run it.

More On DOS Hooks

This exercise is for some rainy day when you have nothing better to do. First boot a normal DOS disk. Whenever you get a cursor on the screen, type

CALL -151

to get into the monitor. Now we will check the present settings of the CSW and KSW switches. Type

36.39

You should see

```
36- BD 9E
38- 81 9E
```

This means CSW is set to $9EBD and KSW is set to $9E81, both DOS locations. Now we will erase DOS. Type

```
800:00
801<800.BFFFM
```

Wait about 5 seconds. Your Apple is temporarily dead. It will continue to be so until you press RESET to resurrect it. When you press RESET, there will be a beep and you will see a status line indicating $9DC1. What happened is when you pressed RESET, the computer realized what happened, set the CSW and KSW switches back to normal, and showed you where the screwup was.

When the move routine had finished, the Apple needed to output a character, the "*" prompt for the monitor. So it looked at the CSW pointer which still pointed at DOS, which we just erased. When it went to the location $9EBD all it found was zeroes. It couldn't signal an error. It couldn't even beep or show any sign of output or input. Well, fortunately we have the RESET key for such situations. The RESET key is wired directly to the Apple's microprocessor, which means it couldn't care less what the CSW and KSW pointers were. What happened is the RESET routine went through memory and fixed all the locations to default values, including our pointers. The Apple has a very good memory and it loves to beep at us when we screw up, and it does just that by beeping and telling us exactly where the error was.

Now that we're back on stable ground lets look at our pointers and see what's happened. Type

36.39

You should see

```
36- F0 FD
38- 1B FD
```

Note that these are the monitor locations COUT1 and KEYIN. When DOS is not connected (like now) these are

the values that are present. When DOS is connected all input and output goes to DOS and then to these locations.

Now type clear memory from $800-$BFFF again by typing

800:00
801<800.BFFFM

After a few seconds you will see the monitor prompt again. Why did the Apple die the first time we did this and not now? It is because the first time we did this the CSW and KSW pointers were pointing at the DOS locations which we later erased, causing massive heart failure. This time they were pointing at safe ROM routines which cannot be erased.

So remember to never erase or change the routines at $9EBD and $9E81 unless you know how, and have the incoming data ending up at $FDF0 and $FD1B.

Alternative devices

The snapshot type devices currently on the market advertise the ability to stop the execution of any program. However, when I tried to use Wildcard to stop EDD and jump into the monitor there were problems. Evidently, EDD can recognize that something's amiss when this is done because it changes parts of itself and will not resume operation. If you have another type of snapshot card, or want to try it anyway, just use it to break into the moniter instead of a firmware board.

I will list what I know about EDD so that if you want to try fixing or avoiding this problem you can give it a try. My friend successfully made a Wildcard copy of EDD using a few address changes. This suprised me since I had found, when I had used it and gone into the monitor, that it had changed itself. His copy took up a whole disk and was not easily modified. Here are the changes he made if you want to try them with your snapshotter or figure out their meaning.

113A: A9
113B: 0B
113C: EA
21D8: 00
21DF: 00
21DE: 00

Some of the area around $CE9 was also changed, but there are probably others.

Bugs In Hardcore COMPUTIST #6

The hexdump listed along with the article "**Personalizing a Program**" on page 13 of Hardcore COMPUTIST no.6 was incorrect. The correct hexdump and checksums are listed below.

```
02A1: A9 4C 8D F8 03 A9 00    $2B77
02A8: 8D F9 03 A9 03 8D FA 03 $4059
02B0: A0 00 B9 C0 02 48 09 80 $4DB1
02B8: C8 20 F0 FD 68 30 F3 60 $33F4
02C0: 8D 8D C3 D2 D5 C3 C9 C1 $0550
02C8: CC A0 C3 CF C4 C5 A0 C6 $B2CF
02D0: C9 CE C4 C5 D2 A0 C9 CE $00C9
02D8: D3 D4 C1 CC CC C5 C4 BA $2C88
02E0: 8D 8D D5 D3 C5 A0 BC C3 $B3D1
02E8: D4 D2 CC BE D9 A0 C6 D2 $78BD

02F0: CF CD A0 D4 C8 C5 A0 CD $C694
02F8: CF CE C9 D4 CF D2 8D 0D $F996
0300: A5 3E 85 40 A5 3F 85 41 $9DA8
0308: E6 31 A0 00 84 FF C8 B9 $5537
0310: 00 02 C9 99 D0 F8 C8 B9 $ABE7
0318: 00 02 C9 A0 F0 F8 20 A7 $72F4
0320: FF A5 3E A6 FF 9D 00 02 $A9CC
0328: E6 FF 88 B9 00 02 C8 C9 $3724
0330: 8D F0 18 C9 D8 F0 04 C9 $2FF1
0338: A0 F0 E3 A9 DB A6 FF E6 $0FBC

0340: FF 9D 00 02 CA 9D 00 02 $5569
0348: C8 D0 D3 A0 00 A2 00 BD $EF6D
0350: 00 02 C9 DB D0 07 E8 DD $9ABB
0358: 00 02 F0 05 CA D1 3C D0 $41FE
0360: 28 E8 C8 E4 FF 90 E8 20 $7A95
0368: 58 FC A5 3C 85 3A A5 3D $B52B
0370: 85 3B A9 17 20 63 FE 2C $B118
0378: 00 C0 10 FB 8D 10 C0 AD $1DB2
0380: 00 C0 C9 1B D0 03 4C 69 $B671
0388: FF E6 3C D0 02 E6 3D A5 $7B1F
0390: 3D C5 41 90 B6 A5 3C C5 $073D
0398: 40 90 B0 B0 E9          $4E1F
```

. . . . . .

We committed a serious oversight in Hardcore COMPUTIST no.6 concerning the **Modified Roms** article.

The program as listed does not save the registers. This is needed if one does a non-maskable interrupt instead of a RESET and wishes to re-start the program. Below is a new hexdump that you should type instead of the one presented on page 28 of Hardcore COMPUTIST #6.

This new program works exactly like the original program except that the accumulator is saved at location $2092, the X register is saved at location $2903 and the Y register is saved at location $2904.

```
2ECD: 2C 00 C0                $0E8B
2ED0: 10 FB 8D 10 C0 AD 00 C0 $B6A9
2ED8: C9 2D F0 7D B0 03 4C 62 $1B98
2EE0: FA 8D 02 29 8E 03 29 8C $D7E2
2EE8: 04 29 BA 8E 01 29 A0 00 $8A66
2EF0: B9 00 00 4C FD FE 20 00 $FC5F
2EF8: FE 68 68 D0 6C 99 00 20 $9CE5
2F00: B9 00 01 99 00 21 C8 D0 $4EF7
2F08: E7 84 3C 84 42 84 3E A9 $78CA
2F10: 09 85 3F A9 02 85 3D A9 $90D5

2F18: 22 85 43 20 2C FE 20 2F $DAA6
2F20: FB 20 58 FC 4C 59 FF    $E8AD
```

APT'SAPT'SAPT'SAPT'SAPT'SAPT'SAPT'S

Ultima][

Contributed by Wes Felty

When you board a ship and leave land, your ship will often split into two ships. The second ship will attack you, but do not sink it. Instead, land your ship, exit it and board the second ship. Then sail to another continent and exit the ship.

If you reboard the ship and set sail, it may split in two again. You can leave ships all over the world using this technique.

Serpentine

Contributed by Paul Andersen

After all the snakes have appeared in the "cage", type !$ to get extra snakes.

Best Of The Bit Copiers: A Comparison

By Phillip Romine

For you incorrigible Apple-users, eagerly awaiting bit copier Nirvana, I offer hope! Not the ultimate copy program of course, for there is no such thing. But some recent updates of popular bit copiers are very, very good. With a couple of these bit copiers, a copyboard which doesn't change any memory, and just a little experience, the average Apple user should be able to back up 95% to 99% of all current Apple software.

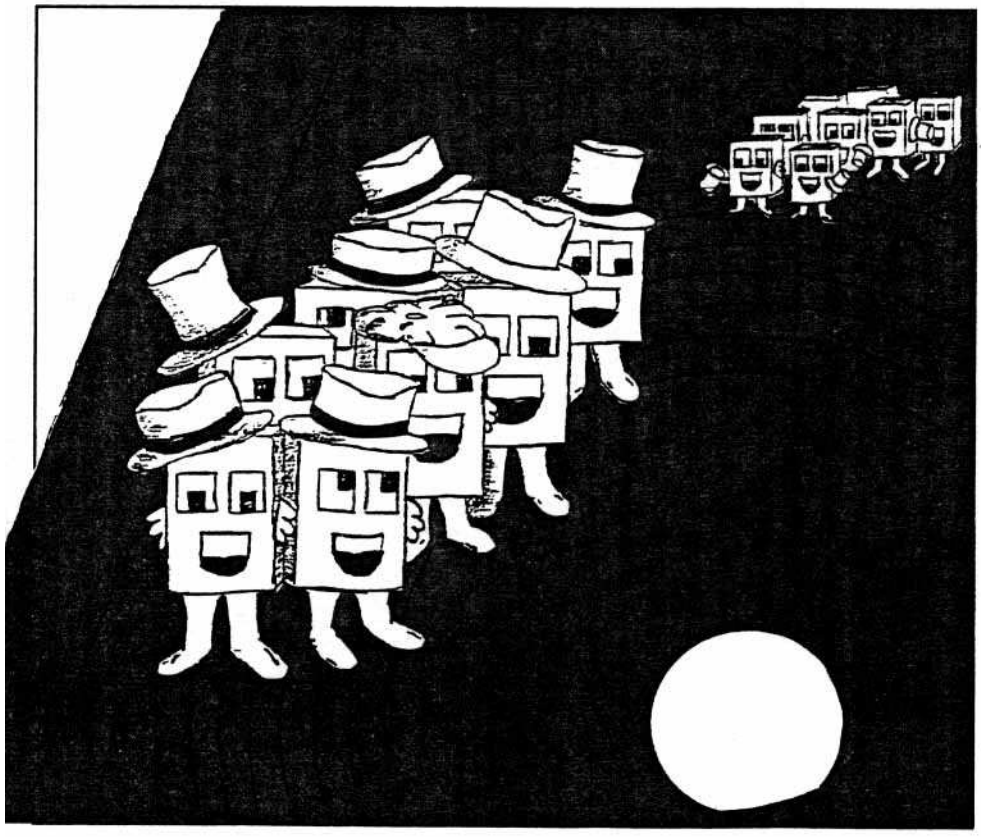
While teaching and helping students, I am constantly asked which Apple copy program is best. But best for what or for whom? Computer sophistication varies widely among Apple users. A program which is both superb and cost effective for the inveterate hacker may be almost worthless for the elementary school teacher who knows only that many small and grimy hands are using her only copy of "The Great Math Attack."

But the question is a fair one, which I'll try to answer. First, the ground rules: Time and finances prevented my examining all of the available copiers, so I chose five of the most popular:

(1) Essential Data Duplicator, Version III (Utilico Microware, 1984)
(2) Locksmith, Version 5.0 (Omega Microware, Inc., 1983)
(3) Back It Up III, Version 3.4 (Sensible Software, 1983)
(4) Nibbles Away II, Version C3 (Computer Applications, 1983)
(5) Copy II Plus, Version 4.3 (Central Point Software, Inc., 1982).

I attempted to back up only original disks, both drives were set to the speed recommended for the bit copier being used (if such speeds were specified), copying was from the faster to the slower drive when the drives were set to different speeds, only new or erased destination disks were used, and tracks which showed read errors were re-copied if the disk failed to boot or operate properly.

I evaluated each bit copier's performance with its parameters at their default settings (a reasonably objective task), and also evaluated its capabilities after appropriate parameter settings (a much more subjective approach).



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We were overwhelmed with the number of Softkeys that were recently submitted to us for Sensible Software's "Sensible Speller" and Sir Tech's "Legacy of LLylgamyn." We would like to thank all of the people who responded to the input column of Hardcore COMPUTIST No. 6.

This has prompted us to regularly print a list of the most wanted softkeys. If there is a program that you have just been pulling your hair out over backing it up, let us know about it. Send your vote for the most wanted softkey to:

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Below is the second list. If you know how to de-protect, unlock or modify any of these programs, we encourage you to help other Hardcore COMPUTIST readers and earn some extra money at the same time. Be sure to send the information to us in article form on a DOS 3.3 diskette. For a complete format description, ask for our Writers guide.

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12. **Word Juggler**
    Quark, Inc.
13. **Catalyst**
    Quark, Inc.
14. **Rocky's Boots**
    The Learning Company

I chose 20 disks, arranging them in five groups of four each according to the difficulty of their copy protection and tried each of the five bit copiers on every disk. Group A included lightly protected disks with simple header changes or changes in the volume, track, sector or checksum designations. Group B disks were slightly harder, and included some written on half tracks and using bit insertion techniques. Group C disks were still harder, with some disks written on quarter or three-quarter tracks, some requiring nibble counting, and some including combinations of these protection methods together with other methods such as header changes. Group D disks were hard: nearly all used a combination of methods including quarter and three-quarter tracking, dynamic header changing, and tracks with a little intelligence hidden among much junk. Group E was made up of disks which are truly hard to copy: all used a combination of methods (including track arcing for some),and most were noted as "hard to copy" in parameter lists. The results of the comparisons are shown in Tables A thru E.

KEY TO TABLE INTERPRETATION

Y = Yes, disk copied: No setting of the copier program was necessary beyond the default values.

N = No, disk did not copy (even with track and parm settings).

Y( ) = Yes, disk copied, with one or more of the following subscripts in the parentheses.

R = Required re-copying of tracks showing read errors.

T = Required designation of tracks and/or track increments.

S = Required track synchronization.

N = Required nibble count preservation on one or more tracks.

H = Required an address or data header.

P = Required other parameter settings.

Example: Y(S,P) = The disk copied, but required track synchronization and other parameter settings.

TABLE A

	A1	A2	A3	A4
BACK IT UP III	Y	Y	Y	Y
COPY II PLUS	Y	Y	Y	N
E. DATA DUP.	Y	Y	Y	Y
LOCKSMITH 5.0	Y	Y	Y	Y
N. AWAY II	Y	Y	Y(H)	Y(H)

A1: Meet the President (Versa Computation) has changes in the volume, track, sector and/or checksum information.

A2: This is Applewriter IIe, which has a changed data header and minor data field changes.

A3: Visicalc IIe uses a DOS 3.2 address header, changes in the volume, track, sector, checksum sequence, and no data on track 1.

A4: A popular applied statistics program with an address header change.

TABLE B

	B1	B2	B3	B4
BACK IT UP III	Y	Y(T,S)	Y	Y(P)
COPY II PLUS	Y(H,P)	Y(T,S,H,P)	N*	N
E. DATA DUP.	Y	Y(T,S)	Y	Y(P)
LOCKSMITH 5.0	Y	Y(T,S)	Y(R)	Y
N. AWAY II	Y(H)	Y(T,S,H)	Y(H,P)	Y(H,P)

*The regular copy program from the II Plus disk copies this one.

B1: This is Copy II Plus itself. It has no address field and a changed data header.

B2: This is DB Master 3.02. It's on Tracks 0 thru 5,then uses half tracks 6.5 to 22.5, with track synchronization.

B3: A popular graph program from the company noted for the user friendly programs and manuals. It uses bit insertion protection.

B4: This is Bag of Tricks. It uses bit insertion, changed headers, and 10 bit sync bytes.

TABLE C

	C1	C2	C3	C4
BACK IT UP III	Y(N)	N	Y(H)	(S,N)
COPY II PLUS	Y(N)	N	Y	N
E. DATA DUP.	Y(N)	Y(R)	Y(T,R)	(S,N)
LOCKSMITH 5.0	N	Y	Y(T)	N
N. AWAY II	Y(N)	N	N	N

C1: Apple Logo. Track 1 has a changed address header, and requires that the nibble count be preserved.

C2: A popular family-level word processor noted for its ease of use and simplicity. It uses quarter tracking from Tracks 1.25

thru 1C.25, requires sync, and hides a little data among much garbage.

C3: The Big Math Attack (Software Guild), has two tracks with a little intelligence well hidden. Copy Tracks 0 thru 2; then 3.25 thru 21.25.

C4: A kiddie disk on computers by Aristotle's friend. It uses quarter tracks thru 22.25, and requires both sync and nibble counting.

NOTE: Both C3 and C4 are hard to copy, and could easily fit into Group D.

TABLE D

	D1	D2	D3	D4
BACK IT UP III	Y(H)	N	Y(T)	(T,R)
COPY II PLUS	Y	N	N	N
E. DATA DUP.	Y(T,R)	Y(T)	Y(T,R)	(T,P,R)
LOCKSMITH 5.0	Y(T)	Y(T,R)	N	N
N. AWAY II	N	N	N	N

D1: This is Supermap (Software Guild). It uses tracks 0 thru 3; then 4.25 thru 13.25, and hides data amid garbage on tracks 4.25 and 5.25.

D2: From the same source as D1, and apparently using similar protection, the Game Show is much harder to copy. It uses Tracks 0; then Track 1.25 and 2.25; then 4 thru 22.

D3: Teddy and Iggy (Sunburst Communications). This entire series on memory uses Tracks 0 thru 10, then 11.5 thru 22.5. They also use dynamic header changes.

D4: Same source as D3, but Simon Says is harder to copy.

TABLE E

	E1	E2	E3	E4
BACK IT UP III	Y(S,N)	N	Y(P)	N
COPY II PLUS	N	N	N*	N
E. DATA DUP.	Y(S,N)	Y(T)	Y(P)	Y(S)
LOCKSMITH 5.0	Y(S,N)	N	N	N
N. AWAY II	N	N	N*	N

*Sector editing can produce a workable copy, however.

E1: The Legacy of Llylgamyn (Wizardry) needs sync on the bootside, and both sync and nibble counting for Tracks 0A thru 0E on the scenario side. It's labeled "hard to copy, drive speed critical" in most sets of parms.

E2: Seafox (like Choplifter) from Broderbrund uses track arcing; labeled "hard to copy: drive speed critical" in various parameter listings. Tracks 0 thru 0B; b.75 thru 20.75; 22.

E3: A professional-level word processor with a "Hollywoodish" name. It uses bit insertion protection, with 10 bit sync bytes.

E4: This is Back It Up III itself. It is written on Tracks 0, then 3 thru 12. Sync must be used on Tracks 3-12. Read errors and apparent lack of data on Track 3 are OK. It, no doubt, employs other protection. It's tough!

GENERAL EVALUATION

Scanning the tables shows E.D.D. to be the clear winner for the particular group of disks which I selected for my comparison. By using parameters and re-copying many tracks with read errors, E.D.D. copied every disk. Back It Up was second, and in certain respects was superior to E.D.D.

There was a noticable drop in performance after E.D.D. and Back It Up. Locksmith held an intermediate position, and may well have much more potential than this evaluation suggests because of its poor directions and lack of parameters. It copied one more disk in the default mode than either E.D.D. or Back It Up. Nibbles Away and Copy II Plus are both excellent when supplied with detailed parameter settings, but were outclassed by the other copiers in these comparisons. It is entirely possible - in fact, a virtual certainty - that I did not locate all of the protection schemes used on some of these disks. So, if detailed parameters had been available, Copy II Plus and Nibbles Away might have looked very good.

EVALUATION OF INDIVIDUAL COPY PROGRAMS

An overall evaluation of the five copiers including their strengths, weaknesses, ease of use, cost effectiveness, available parameters, and additional features is clearly a more subjective task. Moreover, one should not expect too much of any single bit copier. The default parameter settings chosen by the program's author must of necessity be a compromise which cannot be appropriate for every disk. There is not - nor will there ever be - one Apple bit copier for all seasons.

ESSENTIAL DATA DUPLICATOR (III)

E.D.D. is a superb bit copier! It will duplicate a relatively high percentage of protected software without parameter changes. And if the user is willing to become even moderately proficient at identifying disks which have been written on half or quarter tracks, the percentage improves even more. It is very easy to use. The parameter list is short and almost requires a magnifying lens to read, but is adequate. Remember that relatively few parameters are needed. The manual is mediocre at best. The disk includes some useful (but far from foolproof) utilities for analyzing protected disks. Parameter changes are easy to make, but not always easy to understnd for folks schooled in II Plus and Nibbles terminology.

I must respectfully disagree with Dave Thompson who reviewed E.D.D. II in Issue 6 of Hardcore COMPUTIST. He contends that the ability to copy quarter tracks is "...superfluous..." and "...not very useful". It is true that data on some disks written on quarter tracks bleeds over enough to be read adequately on the half tracks, but many do not. Six disks in this sample of 20 use quarter or three quarter tracking for at least some tracks. Three of these could be copied on half tracks to produce workable copies, but three could not. E.D.D., which copied all three with proper quarter or three quarter reading, would not produce a workable copy on full or half tracks.

E.D.D. is expensive - $79.95 retail, $65 from discounters - but worth every penny.

I acquired Version III of E.D.D. very recently and, although I used the new version for this evaluation, my comparison of Versions II and III should be accepted as strictly preliminary. So far I have found little difference in the ability of the two versions to backup protected disks. Version III is much faster, which is its greatest improvement in my judgment. A few new or changed parameters have also been added. For example, the user can now provide an address header for Version III, a much needed improvement. In practice, however, when E.D.D. has difficulty locating a track start/end, it is often easier to set parameter four to allow additional tries above the default value. This allows the program more chances to use the self-sync fields to find track start/end. A new disk-analyzing utility has been added to Version III. It is not as convenient as Locksmith's, however. Utilico's price (for registered owners) to update Version II to Version III is a very reasonable $19.95 plus $3 handling.

E.D.D.'s greatest strengths are its default copying ability, ease of use, the few parameter settings required, and its ability to read quarter tracks.

Its weaknesses include a mediocre manual, difficulty in finding track start/end when valid data is buried within lots of garbage, few supplemental utilities, heavy copy protection with no backup disk (although there is a backup program on the back side of the single disk), and high cost.

LOCKSMITH 5.0

With parameters in their default setting, Locksmith 5.0 finished first in the competition, but with even minimal use of parameter settings it fell to third. On the particular disks that I have tried to copy, especially on tracks containing a little good data interspersed among much garbage, E.D.D.'s read routines seem better, and Back It Up's are markedly better. Back It Up and E.D.D. also seem less prone to overwrite the track beginning. But on disks requiring all sync bytes to be written as 10 bit bytes (such as Bag of Tricks), Locksmith 5.0 will make a good copy from its default setting while E.D.D. and Back It Up require one parameter change. In fact, this is why it won the default competition. (In fairness to E.D.D. and Back It Up, however, I must add that the need for 10 bit sync bytes is rare).

The additional Locksmith utilities are good but unremarkable. One exception is the Quickscan function which is very helpful in identifying the tracks or partial tracks upon which data have been recorded. This utility is far from perfect, as data will bleed over quarter track increments (and on some disks even over half tracks), so Quickscan can't always discriminate well. Back It Up and E.D.D. have similar, but less convenient, functions.

There are a limited number of parameters to change, and no listing of parameters for popular disks is provided. Omega was not noted for liberal parameter policies with Locksmith 4.1; only time will tell whether Locksmith 5.0 is to bring more of the same.

The manual is attractive, with large print and an easy-to-read format. Unfortunately, the explanations for how to customize the program by inserting, sequencing, and/or removing various algorithms is totally inadequate for the novice. This is unfortunate because the program is touted as one which can be customized by the user as future disk protection schemes appear. Perhaps more detailed instructions will be forthcoming in newsletters.

I consider Locksmith 5.0 overpriced, but this is of course a value judgement. It retails for $99.95, and can be obtained for around $80 from discounters. It still has some bugs: it hangs up sometimes, and two supposedly different parameters for track syncing occupy the same location.

BACK IT UP III

Back It Up III is a remarkably good bit copier. It was second only to E.D.D. in number of disks copied, and if it would handle quarter and three quarter tracking, might easily have ranked first. It is better at locating the track start/end than any of the other copiers tested, requiring fewer read attempts and much less re-copying of individual tracks. On the rare occasions when it has difficulty, address marks are very easy to provide. Once address marks are provided, the program uses them (instead of the self-sync fields) to set track start/end. E.D.D. does not seem to use any address marks provided as well as Back It Up.

The manual is good, but not exceptional. Back It Up does not have as many parameters as some copiers, but it doesn't need as many because of its superior default performance. Its disk analyzing functions are about as effective as E.D.D.'s and Locksmith's, but cause the Number 1 disk drive to run constantly during the analysis. Again, I must give Locksmith's Quickscan the vote here. Back It Up's utility functions such as disk erasure are rather standard and unremarkable.

In my opinion, Back It Up III has only two serious flaws. It will not handle quarter or three quarter tracking, and it has no automatic nibble count preservation routine.

I have found the parameters and procedures to combat track arcing to be much more complex and less satisfactory on the programs which will not read quarter and three quarter tracks. To copy certain Choplifter disks with Back It Up requires complex global parameter settings and is a real hassle (even when it works). With E.D.D. set to the appropriate quarter tracks, it's a breeze.

The second problem, no automatic nibble count preservation, is also pesky. It's true that changing the drive speed of the destination drive produces a more accurate copy. And it's true that adding or deleting sync bytes (as E.D.D. does) can theoretically cause the copy to fail. So, for you purists who have a compulsive need to do things the best way, grab your screwdrivers and full speed ahead. But the fact is, after having copied a hundred or more disks using nibble count protection techniques, I have never found a single disk for which the automatic count wouldn't work.

In my judgement, these two weaknesses are all that keep Back It Up III from being the best nibble copier available.

COPY II PLUS (4.3)

Copy II Plus allows a large number of parameter changes and thus offers, for sophisticated users, the potential to tailor the copier to fit many different types of protection. Because it does require numerous parameter changes, it is not one of the easier bit copiers to use. The Central Point Software staff provides the most comprehensive parameter list (of these five diskmakers), and is very prompt about parameter list updates (available every two months for only one dollar). The II Plus Manual is excellent. The additional utilities that are included on the II Plus disk are also excellent, extremely useful, and easy to use. The FID functions, presented in an easier-to-use format, are supplied, as well as several additional goodies. Best of all, there is a fast standard copy program which automatically handles disks protected by bit insertion techniques. This allows quick copies of the Visi series and the PFS series without parameter changes. Even a minor address header change defeats this copier, however. Finally, Copy II Plus is cost effective. It retails for $39.95 from Central Point, and I have seen it advertised by software discounters for as little as $24.95. Even if one never uses the bit copier, the other utilities, parameters (which are easy to translate for use with Back It Up or Nibbles), and the standard copy disk make II Plus a true bargain. To balance these accolades, however, I must add that II Plus will not handle quarter tracks, and I have not been able to back up nearly as many of the difficult disks with II Plus (even with parameter changes) as with some of the other copiers.

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WHIZ KID by Ray Darrah

Information on the diskette is stored in concentric tracks which are smaller and smaller rings of information placed one inside another. On each of these rings, sixteen (or thirteen if you're back in the Stone Age and still using DOS 3.2) spots of information (called sectors) are placed end to end. The tracks are traditionally numbered zero through thirty four and the sectors zero through fifteen. See **Figure 1**.

35 TRACKS **(Fig.1)** **16 SECTORS**

Between each sector (not shown in the diagram) is a 'gap' which consists of typically 15-25 special bytes called sync or timing bytes. These bytes are ignored by DOS but are used by the hardware in the disk drive to ensure proper reading of the sectors.

Where is a sector?

All the bytes that are on the diskette surface were put there during initialization. This includes four sequences of bytes which are used to mark certain things on the track. These marker sequences are called Start of address (or Address prologue), End of address (or Address epilogue), Start of data (or Data prologue) and End of data (or Data epilogue). All four markers exist for every sector on the track and appear in the listed order.

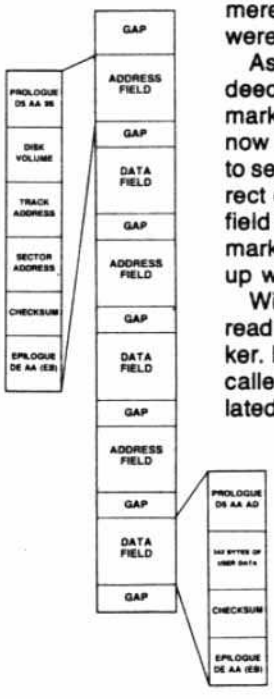
Here are the steps DOS goes through when it accesses a sector.

First of all, it has to move the disk arm to the desired track. This is a complicated procedure and will be explained in a later Whiz Kid article.

The second step is to search for the correct sector on this track. DOS waits until it sees the first marker (start of address) because this designates the start of the sector.

Directly after the **Start of address** marker is a string of bytes (called the address field) which tell DOS which track and sector is soon to follow. Also, the address field contains the disk volume number and a checksum for this address field. The checksum merely ensures that the three other values were valid.

(Fig.2)



As insurance that the values read were indeed an address field, the **End of address** marker directly follows the checksum. DOS now examines the track and sector number to see if the sector that is coming is the correct one. If it isn't, DOS waits past the next field and gap until the next start of address mark and tries again. After 34 tries, it gives up with an I/O error.

With the right track and sector number read in, DOS waits for the **Start of data** marker. Immediately after this is a 342 byte area called the data field. These bytes are translated into the 256 bytes you see with a sector editor. The reason there are more than 256 bytes in the data field is because the disk hardware cannot read certain bytes from the disk surface. Therefore, the actual data is encrypted on the disk. More on this later.

To verify that it read in valid data, the **End of data** mark follows the data field.

Figure 2 illustrates the format of a track. This information is EXTREMELY useful. I suggest you become very familiar with it.

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NIBBLES AWAY II (C3)

Nibbles is a fast, well balanced bit copier that is easy to use even when parameter changes are necessary. While its performance is below average when all parameters are at default, the simple addition of an address header turns it into an excellent performer. I have been able to quickly copy several difficult disks by adding the header. The quantity of parameters available is excellent, and most can be loaded automatically from updated parameter disks which are supplied by subscription. The user selects the name of the disk to be copied from the disk catalog, and the parameter is loaded into Nibbles quickly and painlessly. Printed parameter lists are also provided, and using them is easy because of Nibbles' user friendly design features. The functions of the various Nibbles parameters are also explained in its excellent and educational manual (which contains a good short course in disk protection for the novice). For a beginner willing to learn a little about parameter changing, Nibbles is very good. For the experienced parameter changer, it is excellent and will copy many disks with sophisticated protection schemes.

The other utilities on the Nibbles disk are only average, as is the cost effectiveness. The lowest price I have seem among the discounters is $55, and it's usually more. Nibbles' weaknesses include its lack of ability to find track starts/ends well fronm the sync fields (hence, the need for the address header), and its inability to handle quarter tracks.

COPYING THE COPIERS

Self-copying is easy with Nibbles. Use an address mark of D5 AA 96 for track 0; then D7 AA 97 for the remaining tracks with data. Tracks 0F and 16-22 are blank. The other copiers will also copy Nibbles with no problems, although II Plus required parameter settings.

Parameters for self-copying by Copy II Plus are provided in the manual. Central Point Software should be commended for this kindness. Also, E.D.D. and Locksmith will back up II Plus with their default settings, and Nibbles will copy it with address marks of D5 AA 96 for Track 0, and 94 92 CD for Tracks 1 thru 0F.

The entire Locksmith 5.0 disk is not memory resident, but the bit copier, Quickscan, and some other functions, do load together and can be copied successfully with a copyboard which does not use compression. (Compressed copies fall into the monitor and don't work). The following parameters for copying Locksmith 5.0 with E.D.D. III are from a competent anonymous source, but so far I have not had an opportunity to verify them: all tracks normal (use Copy A) except Track 0A. For 0A, set parms:

28	=	20	3A	=	1	4D	=	2
32	=	AA	49	=	1	4F	=	1
33	=	AF	48	=	0	50	=	1
39	=	18	4C	=	1			

I have not yet been able to copy E.D.D III with itself (asexual reproduction) or any other bit copy program (sexual reproduction). E.D.D. II may be copied with a copyboard by loading it, then entering the copyboard monitor and making the following memory changes:

location 113A - change from AD to A9
location 113B - change from F1 to 0B
location 113C - change from 1B to EA
location 21D8 - change from 2C to 00
location 21DF - change from 25 to 00
location 21FE - change from 06 to 00

After the changes are made, go ahead and use the copyboard's normal procedures for a 48K compressed or noncompressed copy. A workable alternative is possible if you have a copyboard which does not change any memory and requires the copy to be booted by the copyboard (such as Replay II). Such a copy will work properly without making the memory changes.

Back It Up III may be copied with E.D.D. Copy track 0 normally (default settings); then copy Tracks 3 thru 12 with sync. Skip Tracks 1, 2, and 13 thru 22. (Track 03 appears to have no data and will give a read error, but copy it anyway). Also, a copyboard which does not change any memory will copy Back It Up, and it can be made into a 48K binary file if compression is not used.

SUMMARY

So which is the best bit copier? It depends. If I had a thorough knowledge of the Apple DOS and protection methods, I'd choose Copy II Plus. Its low cost, excellent parameter support, light copy protection, great utilities, and flexibility are highly commendable. If I were a novice, or a busy individual needing the most successful copies with the least effort, I'd choose E.D.D. You can't argue with the bottom line. If Back It Up's two disadvantages are corrected in a later version, it would become my first choice. Nibbles Away would be next, based on its ease of use, good speed, and excellent parameter support. Locksmith 5.0 would be my last choice at this time because of its inadequate user instructions, lack of parameters, and high price.

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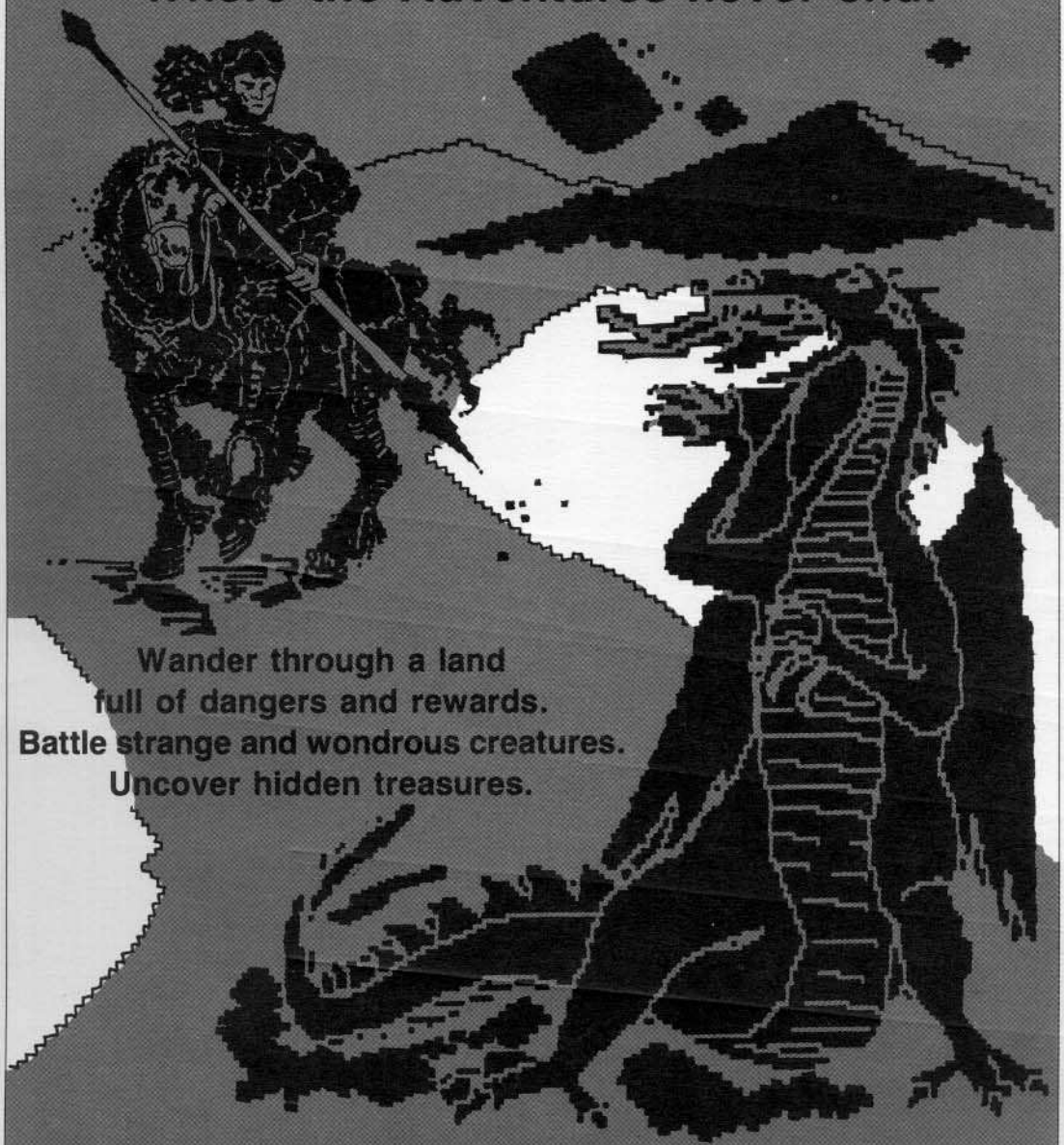

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