

Miscellanea

Apparent bugs in Filer 1.1 and System Utilities 3.1 prevent them from correctly copying large (about 10,000 block) files between ProDOS devices. Copying a 9806-block text file of 50,000 100-byte records with Filer 1.1 resulted in a file containing only about the first 20,000 records; the copy apparently broke down at about block 3872. System Utilities 3.1 stopped with an "Incompatible file type" error after transferring 7968 blocks of the file.

Version 3.0 of the Apple II System Utilities seems to handle the file correctly, as do the *ProSel 16* utilities, *Cat Doctor* (from the 8-bit version of *ProSel*), *Copy II Plus*, and the GS/OS Finder. If you copy a file approaching the sizes mentioned, you should double-check it after copying to verify that the "endfile" value for the copy seems reasonable, and (since some of the mentioned copy failures did report the same endfile as the original file) that all of the file is accessible. Thanks to Barney Stone of Stone Edge Technologies for passing this on to us.

The GS/OS Finder didn't do as well with *AppleWorks GS*. Since the Installer script supplied with *AppleWorks GS* wouldn't put the program files where I wanted them (in a subdirectory), I tried copying the *AppleWorks.GS* file to my hard disk "manually" with Finder. When I tried launching *AppleWorks GS* and loading a file, the screen "disolved" as the data apparently was transferred into areas of IIGS memory that were also being used by the program. Booting from a fresh copy of my 5.0.2 master (with SCSI driver installed) and launching the application didn't improve the situation. Finally, I broke down and used the Claris's provided Installer script to install *AppleWorks.GS* where it wanted to (in the root directory of my hard disk). Then I drag the *AppleWorks GS* application and support files into my subdirectory and everything worked (dragging to a different folder on the same volume merely moves the file entry to the new directory, rather than creating a copy of the original file).

The *AppleWorks.GS* file contains a resource fork, so the number of utilities that can work with the entire file are currently limited. Thanks to the *Equal* utility from APDA's new *Programming Tools and Interfaces for APW* (\$50, part number A0228LL/A), I compared the data and resource forks of the original *AppleWorks.GS* file and a duplicate created by the Finder's "open-apple-D" command. The resource forks were identical, but the data forks diverged at byte \$5FE00 (392704 decimal). The *ProSel 16* utilities (and obviously the System 5.0 Installer) handled the file copy without problems.

The new Beagle Compiler 3.0 now adds support for the Innovative Systems's *Floating Point Engine* and Applied Engineering's *FastMath* math coprocessors. Alan Bird sent these sample timings along:

Mode	Hires Plot	Savage Benchmark
Applesoft BASIC	21.2 (1.0)	140.0 (1.0)
Compiled	15.8 (1.3)	138.0 (1.0)
Compiled w/FastMath	7.1 (3.0)	36.3 (3.9)
Compiled w/F.P.E.	2.0 (10.6)	4.8 (29.2)

(Timings are in seconds; the figures in parentheses are the approximate factors of improvement over standard Applesoft.)

The new compiler also includes a new version of GS.SYSTEM that uses better memory management; loading string arrays may be up to 20 times faster.

Beagle's new AW 3.0 Companion by Mark Munz and Randy Brandt fixes some bugs in the newest release of *AppleWorks* and also allows to you alter or add features. The bug repairs include solving a cursor jump to the beginning of the text when entering certain codes in the word processor, fixing the data base to allow (correctly) printing up to 255 copies of the same report, correcting a data-base "import" bug, an editing fix for the spreadsheet and data base, avoiding crashes when deleting more than 255 rows in a spreadsheet, solving problems with removing the default printer (a common problem for non-ImageWriter users), and more. The bug fixes will also be available for downloading on major on-line services; we'll also have them on this month's disk.

Patch capabilities include forcing the IIGS to use "Slinky" RAM rather than the IIGS memory expansion, limiting the amount of (Slinky or auxiliary slot) expanded memory *AppleWorks* uses, canceling some "Yes/No" prompts, modifying cursor characteristics, changing the nor-

mal error bell sounds, canceling the "file changed" indication normally registered after printing a word processor file, printing spaces instead of zeros in the data base, limiting the spreadsheet to 999 rows (speeds calculation if you can live with the size limitation), and (again) more.

Also included are *TimeOut* utilities that will show you the names and original pathnames of desktop files, allow you to empty the clipboard (to recover memory allocated to the clipboard contents), and load (multiple) text files into the word processor.

AW 3.0 Companion (\$39.95) will be available January 1, 1990.

Beagle Bros author Randy Brandt's "other" company, JEM software, has also announced new *AppleWorks* enhancements, along with a IIGS paint program and a re-issue of a classic Beagle Bros game.

SpellCopy (\$12.95) will copy your *AppleWorks 3.0* dictionaries to a RAM disk volume at startup for faster access. Or, you can modify *AppleWorks* to use the dictionaries from a disk other than your *AppleWorks* disk, for more flexibility in configuring your *AppleWorks* system.

DoubleData (\$30.00) allows you to double the number of categories for each database record to 60. *Open-apple-J* allows you to "jump" between two pages of up to 30 categories each.

Flexical (\$30.00) is a macro-driven appointment calendar program for *AppleWorks 2.0/2.1/3.0*.

Mr. Invoice (\$40.00) is a macro-driven invoicing system for *AppleWorks 3.0*. Each program includes a special version of *UltraMacros* so that you can use the macro features without having to purchase *UltraMacros* specifically for each program.

MiniPaint (\$25) is a IIGS paint program that supports both 320 and 640 modes.

Finally, *I.O.Silver* is an arcade game for any Apple II with at least 64K of memory.

All are available from JEM Software, P.O. Box 20920, El Cajon, Calif. 92021.

Closing the Gap is a national newspaper dedicated to making computer technology for special education and rehabilitation accessible to the public. **A2-Central** reader Donald Lipman mailed us a sample; the subscription rate is one year (six issues) for \$26 (\$41 in Canada and Mexico via First Class mail; \$50 overseas via airmail) or two years (12 issues) for \$42 from *Closing the Gap*, PO Box 68, Henderson, Minn. 56044.

Apple's new Apple II Technical Bulletin (part number B0134LL/A at \$129 per year; six issues) is available from:

Technical Bulletins
Apple Computer, Inc.
20525 Mariani Avenue, M/S 37N
Cupertino, Calif. 95014
AppleLink: TECHBULLETIN

A *Macintosh Technical Bulletin* is also available (also \$129); both versions include the full text in a hardcopy form as well as on disk. One technical problem Apple was apparently unable to overcome was translation of disk formats: the first Apple II issue was supplied on a Mac HFS disk in a proprietary word processor format.

Softdisk now comes in Apple II and IIGS versions. The IIGS version costs \$29.95 for a three-month trial subscription; \$89.95 for a 12-month subscription. Issue number 2 includes the arcade-style game *Zappa Roidz* (asteroid shoot-em-up), *Measure for Measure Part II* (*AppleWorks GS* spreadsheet templates), a *Jukebox* player for *Music Studio* songs, and (as they say more). Entries on the Apple II disk (\$39.95 for 6 months) include *Dinosaurcerer* (a dinosaur design program), *Micro Byte List Manager*, and *Measure for Measure Part 2* spreadsheet templates in *AppleWorks* format. Contact *Softdisk* at 606 Common St., Shreveport, La. 71101, (318) 221-8718 for more information.

Our favorite new toy is ORCA/Disassembler for the IIGS. The package comes with both desktop and text-based versions; the desktop version can be run stand-alone from the Finder or other program launcher, the text version requires the *ORCA/M* (IIGS) or *APW* command shells. It can be used to disassemble files in the IIGS Loader Object Module Format, as well as ProDOS 8 SYS and BIN files and the IIGS ROM.

You can identify labels, data areas, code areas, and so on and insert comments as you scroll through the interim disassembly listing displayed on your screen. The display mode can be toggled between a hex and ASCII display of the file being examined, or the default assembly listing format. You can save the template for your disassembly at any time and quit; if you re-load the template when you resume disassembling the file you can pick up where you left off.

The disassembler also has a scripting feature that allows you to automate common functions; a script can be used to convert a common

data structure such as a window record into commented source, for example. A file containing several utility scripts is provided.

When everything is as you like it, you can generate the *ORCA/M (APW)* assembly source code for the disassembly (this is *Merlin* guerrilla Jay Jennings's least-liked feature).

The *Orca/Disassembler* requires an Apple IIgs, one 3.5 drive, and 512K for the text version or 800K for the desktop version. The price is \$49.95 from The Byte Works, Inc., 4700 Irving Blvd. NW, Suite 207, Albuquerque, N. M. 87114, (505) 898-8183.—DJ.D.



Ask (or tell) Uncle DOS

Corrections and amplifications

We mentioned **GRIDS+** last month ("Forms generation", p. 5.85) but omitted the author: Applause!, PO Box 8240, Lake Street Station, Minneapolis, MN 55408. Thanks to **GRIDS+** dealer Beverly Cadieux at Kingwood Micro Software, 3103 Lake Stream Drive, Kingwood, TX 77339, (713) 360-5013, for passing this on (a version of **GRIDS+** for **MultiScribe** was also mentioned in the literature).

When discussing the creation of **PostScript** files using the IIgs **LaserWriter** driver ("PostScript files and you", December 1989, p. 5.88), we neglected to mention that in order for the driver to work, you have to have **AppleTalk** selected in your IIgs Control Panel. For the older IIgs's, this means you must set Slot 7 to "Internal AppleTalk", and either slot 1 or 2 to "Your Card"; this may mean some "slot shuffling" when you want to generate the **PostScript** file. The new IIgs is less awkward, you can select among "Printer", "Modem", "AppleTalk", and "Your Card" for either slot 1 or 2, and it isn't necessary to also change slot 7 to "AppleTalk".

Bruce Rosenblum of Turning Point Software (one of the authors of TimeWorks's **Publish-It!** program) called to tell us that the combination of **PhoenixPage** and the Hewlett-Packard **LaserJet** probably wouldn't work as a **LaserWriter** replacement. The **PostScript** drivers for Apple systems (II and Mac), including the one in **Publish-It!**, normally assume a two-way communication between the printer and computer; the computer (actually, the driver) sends commands and expects to receive certain status messages back from the printer. **PostScript** printing systems designed for use from MS-DOS may assume one-way (computer to printer only) communications, and therefore may not send the expected status messages that the Apple drivers expect. His conversation with Phoenix Technologies confirmed this was the case with the **PhoenixPage** system.

If we'd just read Don Lancaster's **LaserWriter Secrets** book, we would have known. Don dropped us a copy in the mail; it contains many tips from how to refill cartridges to how to find inexpensive **PostScript** printers. The

sample programs are supplied on a ProDOS disk, and Don prints the book using his preferred engine: an Apple IIe hooked to a **LaserWriter NTX**.

The hunt for affordable high-quality print continues...

The Apple II Way

Here's my latest update in the continuing saga of Hewlett-Packard printer drivers for the Apple IIgs...

Early in the week, Ms. Bailey at HP's customer support phoned to tell me that HP does not have any in-house Apple programming expertise. The drivers for the Mac are from a third party (contract) software house. However, she noted that, due to the number of phone calls and other indications of interest in this type of product, she is redoubling her efforts to see how HP can help all Apple II owners.

In the interim, I was able to obtain the name and address of the third party programming house which produces Mac drivers for HP's products. I got a phone number and proceeded to contact them.

Insight Development Corp. is very interested in hearing from Apple II owners who are interested in being able to use HP and other products with their Apple IIs.

In the course of my very long, very pleasant conversation with Mr. Roger Mein, a sales representative for Insight Development, he asked that I and any other interested Apple users write to their software engineering department, expressing a strong interest in drivers for HP's products. He noted, quite rightly, that while phone calls are perhaps more convenient, the written word has greater impact. It puts the needs down in black and white, and can be used to convince management of a need, a market, an opportunity. Mr. Mein also noted that the product his firm makes for HP (**MacPrinter**) will enable printing on all HP products which use HP's printer control language (PCL). This includes, inter alia, the **DeskJet**, **DeskJet Plus**, **LaserJet**, **InkJet**, **ThinkJet**, **PaintJet**, and the new **LaserJet III**. Insight also provides **Postscript** products for the Mac, and could probably do likewise for the Apple II line...at the very least for the IIgs.

Needless to say, after that conversation, I wrote a letter, which went out today.

Late this morning, I again contacted Ms. Bailey. She was very happy to tell me that our efforts are having an effect at HP. The director of marketing has been contacted and the necessary memos are now being circulated in-house. She also told me that the printer division(s) have been brought into the loop now. Believe it, friends...that is real progress in a short time! I discussed with Ms. Bailey the conversation I had had with Insight Development. She then asked me to send her a copy of my letter to Insight, along with a cover letter. She assured me that the letters will be faxed to the printer division, the developers, the people who

take care of outside contracting, and to HP's marketing division. She also noted that the written word will carry far more weight than the phone calls. Ms. Bailey also promised that my letters would be provided to the folks "upstairs" as a way to demonstrate the interest in having Apple II products developed.

When I asked both Mr. Mein and Ms. Bailey if they were ready for a flood of letters, each of them responded "yes". Mr. Mein said the ark is standing by and we should flood away. Ms. Bailey said she would welcome any and every letter we can send to her in support of our needs.

So there you have it friends. The wheels are beginning to turn. Let's warm up the ol' word-processors and get the letters out. Even a line or two showing your interest will help. Get your local user groups involved and let's go for it. My letter to Ms. Bailey will be on its way tomorrow morning.

Let's not fall into the old thing of "you don't have, because you don't ask".

For Insight Development:

Mr. Burt Johnson
Insight Development Corp.
2200 Powell St.
Suite 500
Emeryville, Calif. 94608

For Hewlett-Packard:

Ms. Lea Bailey, 49AS
Hewlett-Packard
19310 Pruneridge Ave.
Cupertino, Calif. 95014

or on **Genie** in the **HOSB RoundTable**, page 370, Cat 19, Top 8 for HP-Help from Curtis Hopewell.

And from me, THANK YOU ALL for your support and for helping mount this effort.

Daniel Slaven
College Park, Maryland

Grappling with control-I

As a new user of **AppleWorks 3.0** I am writing to provide some information on a problem I had in setting up a custom printer for this program, in the hope that it might save other users some time and frustration.

I am using an Epson DX-10 (a Diablo 630 compatible printer) for letter quality printing. This printer is driven by a **Grappier+** interface card. The problem I had arose the first time I used the printer in **AppleWorks**. The results of printing with **AppleWorks** were quite bizarre with characters being missed and character and line spacing upset.

With this printer the standard 6 line per inch spacing is set by the command string:

ESC Ctrl-^ Ctrl-I

Unfortunately, control-I is also the command code used by the **Grappier** interface itself.

The solution to the problem was obvious once the problem was recognized—the 6 line per inch command was changed to:

```
Ctrl-I Ctrl-Z <Esc> Ctrl-^ Ctrl-I Ctrl-Z Ctrl-I
```

which changes the *Grappler* code temporarily from control-I to control-Z.

The AppleWorks manual gives no hint of the possibility of this problem. In fact the PRINTER CODES data base file included with AppleWorks lists the "<Esc> Ctrl-^ Ctrl-I" code for a Brother HR-15 printer (a very similar printer).

When *Word Juggler IIe* (my usual word processing program) is given the same printer control string no problems occur, so AppleWorks must be using the *Grappler* firmware while *Word Juggler* must be bypassing this firmware.

Tracking this problem down was somewhat time consuming. Perhaps other readers setting up custom printers in AppleWorks can save some time by looking carefully at the interface card control codes as well as the printer codes.

D. G. Chapman
Winnipeg, Manitoba

IlgS taxed?

As always, we read your December issue with great interest and general agreement. Noting your mention of Softview's dropping of their tax software for the Apple Ilgs (joining the ranks of Simon and Schuster's J.K. Lasser, by the way, which dropped the Apple II line a while back), we'd like to point out that HowardSoft's *Tax Preparer* continues strong in tax software for the entire Apple II family.

Tax Preparer is pricier than the less serious packages (\$250 suggested retail for a new package and \$79 annually for updates), but it has the tax depth that individuals need and tax professionals demand. And we've been updating it annually since 1979 not only for the tax laws but to take advantage of the new technologies. True, it runs faster on a sped-up Apple IIe or Ilgs with 512K of memory, but it still works on the original Apple II Plus, a commitment we've been dedicated to from the start. In fact, thousands of professional tax preparers still use their original Apple IIs to prepare tax returns for their customers with HowardSoft's *Tax Preparer*. I believe that Softview's failure in the Apple II market has more to do with the inappropriateness of porting an Apple Mac program to an Apple II environment than any supposed demise of the Apple II market. Apple and Softview may think that the Apple II is not a serious business machine, but Apple's users know better.

Keep up the good work.

J. E. Howard, Ph.D.
President
Howardsoft
1224 Prospect Street, Suite 150
La Jolla, Calif. 92037
(619) 454-0121

We estimate the split of the 5 million Apple II systems that have been manufactured at about one million Apple II and II Plus machines, about one million Apple Ilgs systems, and the remainder as IIe and IIc machines. We don't have a clue as to how many Apple II clones are out there, except to say most are II Plus or IIe compatibles.

The largest market is obviously to go for the II Plus, or at least the IIe and IIc, as the "lowest common denominator". HowardSoft should be commended for its commitment to this entire market in its first decade. A tax program with

annual updates is much more useful than one you have to learn anew each year.

The situation with companies such as Softview is a special case for Ilgs owners; certainly one of the reasons for buying a Ilgs (rather than enhancing a IIe or IIc) is in order to run desktop-based applications. Merely blaming the "environment" of the Ilgs may be overlooking some stronger factors. One is that "porting" a product from the Mac (or MS-DOS) environment to the "equivalent" Ilgs environment won't yield a product that performs as well as one written specifically for the Ilgs. Companies may then blame the performance of the machine, rather than a "poor fit" of its software, for any perceived weaknesses.

But another problem may not lie with Softview; they are a company that at least attempted to enter the Ilgs market with a program that utilized the desktop environment of the Ilgs. Softview got caught in the same trap as a lot of prospective Ilgs companies: their product release pre-dated Apple's release of System 5.0, and the associated performance improvements that may have made it more attractive to users. The greatest shame here is that companies that have invested in long development curves to bring Ilgs products to market before System 5.0 may not decide to test the waters again. Users (and Apple) should encourage them; make yourself heard.—DJJ

More REM remarks

In the December 1989 *A2-Central* (p. 5.84), J. E. Douglas of Baton Rouge, La., mentioned using "REMark statements at the top of (his) program listings that explain the use of all variables." Documenting the variables is a very good idea, especially if you go for months without using or modifying the program. In this time you become unfamiliar with the inner workings of the BASIC program and that makes it difficult to modify it.

But instead of wasting precious disk space with REM statements, why not use A-DOC? It's an excellent shareware program by Robert M. Merrill (6180 Via Real #25, Carpinteria, Calif. 93013, \$15). A-DOC will find all ampersand calls, CALLs, defined functions, GOSUBs, PEEKs, and POKEs, and variables contained in the BASIC program. In addition, it finds every line number that uses each item. You may also enter a usage definition of up to 56 characters in length for each one. For standard CALLs and PEEKs and POKEs, A-DOC will fill in a description for you! A-DOC also has a full-featured text editor for entering and editing the usage line. It contains sample files on your disk for your reference, too.

After entering descriptions, you may save the entire list for future reference (type \$F1 file). You may also save the list as a standard text (TXT) file that includes the program name and date. Or if you want a hard copy, A-DOC will print out the list. You can choose from half a dozen printers or create your own custom printer.

Each time you use A-DOC, it will update each entry in the list. New line numbers are added and old ones are removed. New items are added to the list in alphanumeric order. Unused entries are marked so that you may purge (delete) them from the list. You may re-save the file at any time with the new information.

Best of all, A-DOC will work on any Apple, from the original II to the new Ilgs. If you want to document a DOS 3.3 file, simply use a utility

program such as Copy II Plus to transfer the BASIC program from DOS 3.3 to ProDOS. A-DOC requires ProDOS 8 and BASIC.SYSTEM.

David Kilzer
Eldridge, Iowa

Scanning on the horizon?

Will a hand scan unit be built for business applications?

Will a tie-in be made to use a software business program, cash drawer or register, printer for customers, regarding inventory control, sales, and so on?

M. Howard
Imlay City, Mich.

Two companies we know of currently make bar code scanners for the Apple II series. One is a slot-based product for the II, II Plus, and IIe:

Data Recall
1771 Dell Avenue
Campbell, Calif. 95008
(800) 621-0854 x470

The other connects to the Apple Desktop Bus connector of the Ilgs:

TPS Electronics
4047 Transport
Palo Alto, Calif. 94303
(415) 856-6833
FAX: (415) 856-3843

We don't know of commercial Apple II products that directly support the use of bar codes, but the TPS device we have seems to lend itself to straightforward use. The TPS interface attaches to the Ilgs ADB port and will send the ASCII equivalent of the code it scans (followed by a carriage return) to your program just as if you typed it in from the keyboard. To print the barcodes themselves, we have a short program that downloads a "3 of 9" set of bar code characters to the *ImageWriter* for printing.

Another type of scanner is one used for converting printed or video images into a form that can be digested and manipulated by the computer. Usually, the range of colors and intensities that the computer can represent are limited so the image rendered in the computer will be simplified to use only the number of hues that the computer can support for its graphics. Image scanners for the Apple II include:

ImageWorks II (\$350)
Redshift Limited
PO Box 4335
Mountain View CA 94040
(415) 322-7373
ComputerEyes/2 (\$129.95)
ComputerEyes IIgs (\$249.95)
Digital Vision, Inc.
66 Eastern Avenue
Dedham MA 02026
(617) 329-5400
(800) 346-0090
ThunderScan (\$219)
Thunderware
21 Orinda Way
Orinda CA 94563
(415) 254-6581

ImageWorks II was mentioned in the June 1988 issue, pages 4.35b and 4.35c., and in the May 1988 issue of *Sky and Telescope*, page 526. It's designed primarily for digitizing

and analyzing images rather than for producing purely Apple II graphics.

The **ComputerEyes/2** and **ComputerEyes IIgs** are for the Apple II and IIgs respectively, and take their input from a video source such as a video camera or videocassette player. We have worked with the IIgs version and it gives nice results, especially when digitizing images as 16-level grayscale (a mode where colors are translated into the closest corresponding intensity out of 16 levels of gray) in the super high-res format of the IIgs. Color super high-res renderings were less satisfactory as the number of colors available to represent the image seemed rather limited; the IIgs is capable of using one of 16 tables ("palettes") of 16 available colors for each of the 200 vertical scan lines but the **ComputerEyes** software doesn't appear to deal with optimizing the palette for each line. But a wonderful feature is that **Computereyes** can save the raw data collected to a file and the format of this data is documented in the manual so an enterprising programmer can try to write a better display routine. Images can be saved in IIgs super high-res formats for 320 and 640 modes (of horizontal resolution), as well as converted into standard Apple II video modes such as single and double high-res graphics.

The **ThunderScan** is a device that can be plugged into an **ImageWriter** (other than the **LQ**) in place of the printer ribbon. You then feed the image to be digitized through the printer and let the **ThunderScan** scan the information into the computer's memory. The **ThunderScan** is limited to 16-level grayscale images.

All of these devices create computer-based representations of the graphics image itself. In the Mac and MS-DOS worlds, there are also hand-held and desktop scanners resembling copy machines that digitize printed images and send them into a computer, as well as optical character recognition software that allows decoding of printed characters into ASCII text that can be digested by word processing programs. Unfortunately, we have not seen such a combination for the Apple II. In particular, Apple has not provided Apple II support software for their own scanner, despite a number of requests.—DJJD

Ultramacros primer

Is there any book available to the general public that teaches how to write macros using **TimeOut UltraMacros**? The manual helps with simple macros. However, I am not a programmer and I would like to learn about writing more complex macros.

Greg Kebbekus
Monona, Wisc.

AppleWorks enthusiast Mark Munz has written a 250-page introduction called **The UltraMacros Primer**, which is being sold through:

National AppleWorks Users Group
P. O. Box 87453
Canton, Mich. 48187
(313) 454-1115

It's \$19.95 to NAUG nonmembers (\$17.95 to members) plus \$2 shipping for each book.—DJJD

Monitor alternatives

I'm running a Thompson 4125 monitor with my IIgs. After running all over the world with it

attached to my IIc, I bought a IIgs. Where you come in is your great article on the pinout and type of output the IIgs has.

I paid \$200 for the Thompson two years ago in Singapore, when my old Taxan amber monitor was accidentally plugged into 220 volts. I hated the thought of buying a new Apple monitor with the IIgs so I ran through your articles. The Thompson will take 50 or 60 cycles, 90 to 220 volts, digital or analog RGB and has proven highly impact resistant. Your pinout was all I needed to do a cable, as Thompson supplied their connector and pinout. I'm a merchant seaman, which means I use a very poor power supply. Each of our IBM PS/2's needs an uninterruptible power source to isolate it or it will occasionally re-boot after a power surge. Neither Apple has ever done more than flicker.

Thanks again, and keep that power coming.

Robert E. Wilson
Fremont, Calif.

We just purchased a Magnavox model 8CM515 color monitor for one of our new IIgs's and ordered the cable from Redmond Cable (which stocks cables for several other monitors). We like the combination enough that we're selling them (see this month's catalog).

Be careful when ordering monitors mail-order; we had to return one model (A Magnavox model CM8762) that was advertised as "analog RGB" because it wasn't.—DJJD

More input, please

Any of you know where I could get a galvanometer that could be hooked up to an Apple IIgs?

Todd M. Land
Conshohocken, Penn.

I am interested in setting up a weather station at Catawba College, to be used in general science and science education courses. Of course, many manufacturers of fine weather instruments exist around the world, but I have not seen any that advertise sensors, interface hardware and software for the Apple II. One company at least, Digital, makes a weather stations that can be connected to an IBM PC, but the system has some seeming shortcomings. (For example, data can be graphed only over 24-hour periods. One would like to be able to graph weather information over any desired time interval.) Do you know of other options? Here's my fantasy. The weather station will include a full array of analog gauges, for quick glances at the current situation, as well as a digital data logger. The data file(s) will be in appropriate form so that AppleWorks users (perhaps networked to the data logger) will be able to review the accumulating information, even though we expect to be collecting mountains of data.

Speaking of mountains of data—is it better to design the system so that it mechanically records data at preset intervals, or design it so that it records data only when it detects a change in the data of preset magnitude (for example, one degree change in temperature, 0.2mm change in pressure, etc.)

Doug Brower
Catawba College
Salisbury, N. Y.

It may not be possible to find an "off the shelf" product ready to just plug into your device and the Apple; you may need to create some software for your specific application.

Several companies make interfaces for attaching equipment specifically to an Apple II, or to any computer with an RS-232C (serial) interface. One type of common interface is an analog to digital converter (ADC) that takes a voltage from an instrument and converts it into a digital number that the computer can manipulate; the built-in Apple II paddle circuit is a simple example. A digital to analog converter does the opposite; it takes a digital signal and converts it to a voltage that may be used to control a device. There are also devices to interface switches to the computer (such as the built-in paddle button circuits for the Apple), devices to detect an "on/off" signal from the Apple (such as from the built-in annunciators), and so on. The complexity (and price) of these devices can vary widely, based on their resolution (the relative amount of a change they can register), their speed of operation, and other factors.

You may want to try asking the following companies about their products (these are suggestions, our direct experience with these companies is limited or nonexistent) and their applicability for your purposes:

A-BUS adaptable interface bus

Alpha Products

242-B West Avenue

Darien, Conn. 06820

(203) 656-1806

RS-232C interface and monitoring equipment

B&B Electronics

4004A Baker Road

PO Box 1040

Ottawa IL 61350

(815) 434-0846

Data acquisition, communications, and industrial

control interfaces

MBC MetraByte

440 Myles Standish Blvd.

Taunton MA 02780

(508) 880-3000

FAX: (508) 880-0179

Scientific supply/interfaces

Omega Engineering, Inc.

One Omega Drive

Box 4047

Stamford CT 06907

(203) 359-7874

(800) 826-6342

Products available specifically for the Apple II are available:

Analog/digital conversion interfaces

Applied Engineering

P. O. Box 5100

Carrollton TX 75011

(214) 241-6060

ADALab Laboratory interfaces; data acquisition, display, and analysis software

Interactive Microware, Inc.

PO Box 139

State College PA 16804-0139

(814) 238-8294

Analog Connection (\$490)
Strawberry Tree, Inc.
160 S. Wolfe Road
Sunnyvale, Calif. 94086
(408) 736-8800

Interfacing and analysis software
Vernier Software
2920 SW 89th Street
Portland OR 97225
(503) 297-5317

Some of the first products Applied Engineering produced were interfaces: analog to digital, digital to analog, and so on. Interactive MicroSystems and Strawberry Tree, Inc., also have years of stature in Apple II interfacing.

Vernier's catalog lists **Temperature Plotter III** hardware and software to record temperature changes. In addition to their hardware and software products, Vernier Software produces publications describing Apple II interfacing for experimentation. They are the authors of the **How to Build a Better Mousetrap** manual (which we stock) that describes simple interfacing experiments with the Apple game port including "Humidity meter" and "Temperature Probe" projects.—DJJ

Reading /RAM from BASIC

Do you know of a fix for (or to) ProDOS that will allow BASIC to read a /RAM directory?

Ted Faust
Greendale, Wisc.

BASIC.SYSTEM will allow you to open a directory file (by specifying the filetype in the OPEN command) and use the Applesoft INPUT statement to read the directory information as if the directory was a text file. In order to do this, BASIC.SYSTEM has to convert the directory information (which is not in text format) into the format that is eventually fed to INPUT. OPENing and READing a directory file is therefore a special case, distinct from normal text file access. For example, you can't interrupt READing the directory file to READ another file or BASIC.SYSTEM loses its place.

BASIC.SYSTEM assumes /RAM's volume directory is the standard four blocks in size when in reality it's only 1 block in length for the standard ProDOS /RAM driver. When you try OPENing and READing /RAM, after you read the last filename BASIC.SYSTEM hits the end of the directory before it expects to and generates an OUT OF DATA error, which shuts down your READ operation. This means you can't access the "BLOCKS" information line which is normally generated at the end of the directory listing.

Incidentally, the program side of the 5.25 AppleWorks disk also has a "short" volume directory, and can cause the same crash. Some other programs may also expect a four block volume directory, so trying to modify the 51-file limit by "extending" the directory is also not recommended.

Our solution from BASIC is two-fold: we OPEN and READ the directory file, but we make sure we have an error trap for odd-sized directories. Second, rather than trying to read the block usage from the last line of the directory listing (which we can't get to for /RAM), we'll steal it from the get_file_info information BASIC.SYSTEM generates when it OPENs the file.

Here's our test routine to get a directory filename to read into F\$:

```
1000 REM -- read any directory --
1010 D$ = CHR$(4)
1020 DIM A$(200): REM limit of 200 filenames:
1040 INPUT "Path?: ";F$
1050 GOSUB 2000: REM read directory
1080 FOR F = 1 TO I: PRINT A$(F): NEXT F: REM show files
1090 PRINT "Blocks total = ";BT,"; blocks used = ";BU
1100 END
```

Our subroutine to read the directory starts by opening the file and snatching the block counts from BASIC.SYSTEM's global page. BT is total blocks available; BU is blocks used:

```
2000 REM -- "Catalog" routine.--
2010 REM enter with F$ = directory
2020 PRINT D$;"OPEN ";F$;" ,TDIR": REM open directory
2030 REM -- get block count from B/S get_file_info list
2040 BT = PEEK(48825) + PEEK(48826) * 256: REM blocks total
2050 BU = PEEK(48828) + PEEK(48829) * 256: REM blocks used
```

Now we read the directory. Line 2070 reads and discards the directory name, the header line, and a blank spacing line:

```
2060 PRINT D$;"READ ";F$; REM now read files
2070 FOR I = 1 TO 3: INPUT " ";A$: NEXT I: REM discard header
```

Next we activate the error trap and read filenames until we hit the blank spacing line (null string "") at the end of the file list, or until an error occurs. Line 2110 continues this loop until the error subroutine returns a non-zero error code:

```
2080 ONERR GOTO 10000: REM trap OUT OF DATA error for /RAM
2090 I = 0: REM number of files read
2100 EC = 0: REM clear error code
2110 IF EC = 0 THEN INPUT " ";A$(I + 1): IF A$(I + 1) <> "" THEN I = I + 1: GOTO 2110
```

If we didn't have an error, then we have read one line past the last file (the null line), so for that case line 2120 reduces the file count by one. Then we close the directory and return BT, BU, I (the number of filenames read), and the array of filenames (A\$(I)):

```
2120 IF NOT (EC) THEN I = I - 1: REM adjust count if not /RAM
2130 PRINT D$;"CLOSE ";F$: REM close directory
2140 POKE 216,0: REM cancel ONERR
2150 RETURN
```

All our error routine does is grab the error code out of zero page and return it:

```
10000 REM -- error recovery --
10010 EC = PEEK(222): RESUME: REM just get error code
```

Since the IF statement in Line 2110 depends on EC being equal to 0 in order to get the next INPUT line, when we RESUME from the error trap the IF statement "falls through" and the loop is broken.—DJJ

ProDOS 8 and partitioning

I have a question about hard disk partitioning. At present, I have two 20 meg hard disks daisy-chained onto a SCSI card in slot 7 of my IIGs, and it's easy to understand that one disk is mapped to slot 7, drive 1 and the other to slot 7, drive 2. Lately I've been thinking of replacing the other two with a single disk of even greater capacity, but I am confused about how it and/or

its partitions would be handled. I have read that GS/OS 5.0 allows numerous partitions on a single disk. I also seem to remember having read that while ProDOS limits each partition to 32 megabytes in size, GS/OS has no such limits. Is that true? On the other hand, if limitations are necessary and one has, for example, a 100 meg hard disk with four partitions (three at 30 megs and one at 10 megs), how are they addressed assuming the SCSI card (or equivalent) is in slot 7? Are they all addressed as slot 7, drive 1, with each partition named separately like subdirectories or are they addressed as separate drives in various slots?

Constance L. Graves
San Jose, Calif.

System Software 5.0 and the Apple II SCSI interface will allow you to connect up to 7 SCSI devices with up to 32 partitions per device; that should cover most needs. The 32 megabyte limitation on the volume size for each ProDOS partition is not a function of GS/OS in itself, but only of the ProDOS FST which GS/OS uses to "communicate" with the hard disk volume(s). Since the ProDOS FST is currently the only one available for use with a non-network hard disk, the 32 megabyte constraint remains.

GS/OS (and the ProDOS FST) does not equate the devices with "slot and drive" settings, and you'll be able to see all the partitions of your hard disk from GS/OS (up to its limits, and those of the application you're using). ProDOS 8 does depend on the slot and drive metaphor, and furthermore has a limit of two devices per slot. A mechanism was added to later versions of ProDOS to allow it to attempt to re-assign up to two extra devices under select circumstances.

ProDOS 8 versions 1.2 and later first check for a disk interface ROM in slot 2. If none is found, and a SmartPort interface is found in slot 5, ProDOS will perform a STATUS call (see "How to keep from getting pregnant", January 1987) to see how many devices are attached. If drives 3 and 4 are found, they will be "mirrored" to slot 2 as devices 1 and 2 respectively. This is all explained in Apple II Technical Note #20 for ProDOS 8.

The note also explains how the firmware finds devices 3 and 4, since the ProDOS unit_number identifying the drive only has one bit assigned to designate the drive, and that leaves only two possibilities ("0" for drive 1, and "1" for drive 2). The note says:

"When ProDOS makes an MLI call with the unit_number of a mirrored device, it sets up the call to the device driver then goes through the vector in the device-driver table starting at \$BFO0. When the block devices driver (located on the interface card or the firmware) gets this MLI call, it checks the unit number which is stored at \$43 and verifies if the slot number (bits four, five, and six) is the same as that of the interface. If it is _not_, the ProDOS block device driver of the interface realizes it is dealing with a mirrored device, internally adds three to the slot number and two to the drive number, then processes it, returning the desired information or data to ProDOS."

If that were fully true, you could move the SCSI card to slot 7 and either (not recommended) patch ProDOS 8 to search any slot 7 SmartPort for extra devices and map them to slot 4, or (better) write a ".SYSTEM" program to do the re-mapping. Since slot 4 is not often used for a

for a SCSI card!), that would allow you to re-map up to two slot 7 drives to slot 4 (this would let ProDOS 8 still mirror slot 5 drives to slot 2). If the interface cards indeed added three to the slot in which the mirrored devices are assigned, this would be easy. Unfortunately, the Apple II SCSI interface doesn't; it specifically checks for slot 5.

Craig Peterson has written a utility (**SWAP-SCSI**, available on on-line services) which adds a command to ProDOS BASIC that allows you to "swap" drive volumes; you aren't allowed access to more than two SCSI volumes, but you can at least pick which two. —DJJ

Other European sources

In your August '89 issue, a letter from Germany (June Baker, Wiesbaden) caught my attention!

She recommended two companies which sell hardware and software for the Apple II series.

For people living in Germany I would not recommend either of them! Both have a great disadvantage, they are very expensive. The British Apple II market, compared to the German market, has a higher price level so it does not pay to buy in Britain.

If you like you can publish my address and I will inform interested people about the alternatives on the German market!!!

I believe that this is the best way, because I don't think that it is very useful to waste the valuable **A2-Central** space with five German addresses!

Stuart Hollywood
Bohnstedtstr. 10
1000 Berlin 49
West Germany

Data transfer revisited

I thought I would clarify my MS-DOS reference in my earlier letter ("file extensions, October 1989, p. 5.66). When doing file conversions to and from the Mac/Apple II environments, it is necessary to deal with the different file formats used by the various programs used on each side of the fence.

Word processors are the easiest to work with. Most all programs can save text as raw ASCII code. This makes it a snap to convert to or from the Mac using *Apple File Exchange*.

Spreadsheets and data base formats are a different matter entirely. AppleWorks can print data base information to a text file where a carriage return is used to delimit field information in the records. Each actual field name is ignored, as is the individual nature of the record. Other data bases such as PFS:File can do the same thing. The Mac world follows the MS-DOS world; most data bases use tabs to delimit fields in a record, with carriage returns marking the end of each record. The field names are used as a header on the file itself. This follows dBASE protocol. The problem comes up when attempting to move Mac database information to the AppleWorks database. AppleWorks cannot read the data properly when it is in this form. My experience has shown that even those Mac programs that create a text file still follow this format.

The solution which I have used quite often is to convert the Mac file to MS-DOS format using *Maclink Plus* software and either a *DaynaFile* drive (for reading/writing MS-DOS disks on the Mac) or direct serial hookup of the computers. Once into MS-DOS, the file still contains the

combination of tabs and carriage returns. The next step is to use *CrossWorks* to send the file to the Apple II which produces a native AppleWorks database file.

This same basic procedure is used to get the spreadsheet files from Mac to Apple II. First go to MS-DOS, then to Apple via *CrossWorks*. (*CrossWorks* is a very good program. It is fast, goof proof, and works perfectly.)

I have done other conversions where I have used a series of Mac programs to do the conversion without resorting to MS-DOS tools. This involves the use of database software which can convert the tab-delimited format to the return-delimited format for the text file. From there you go to a word processor to strip off the unneeded file header information and extraneous stuff and then through *Apple File Exchange* to Apple II format. This method is time consuming but it works.

My favorite approach is the Mac to MS-DOS to Apple II. This may sound like a lot of running around the block, but of all the file conversion approaches I have tried, it works the best.

Vern L. Mastel
Mandan, N. D.

What has Claris done now? Released an AppleWorks Classic database fixer and a new Macintosh *Apple File Exchange* translator? Read on...

Bag of Tricks won't help? *RepairWorks* can't recover? Before you throw that "lost" database disk in the trash, try this last trick to recover your data (without using the word processor and deleting extra characters and adding returns in). Many database errors can be traced to damaged report formats—the data is intact, but basically inaccessible by AppleWorks. Step in AppleWorks GSI. Since it "ignores" report formats when it imports AppleWorks Classic database files, I've used it to recover a number of databases and then exported it as an ASCII file. How to get it back to AppleWorks format? Use AppleWorks 3.0 to start a new database from an ASCII file (using tabs between categories). Save this in standard AppleWorks format and, since the file format on the 3.0 database has been changed the least, the resulting file can still be loaded into earlier versions of AppleWorks. Finally, a good use for the database module of *AppleWorks GSI*!

Now for the *Apple File Exchange* translator... With the release of AppleWorks 3.0, Claris has in effect given us the second half of the Macintosh *Apple File Exchange/Works to Works* transporter. AppleWorks to *Microsoft Works* transfers have always gone relatively smoothly, but the reverse has not been the case (much to Microsoft's delight). Since AppleWorks 3.0 handles tabs properly in all three modules, simply save your Macintosh document in ASCII format, use *Apple File Exchange* to bring it to ProDOS format and import it into the proper module of AppleWorks through the use of the ASCII file. No more having to use slow, graphics-based Macintosh applications! Do your "real" work in AppleWorks and then send it back. Saving AppleWorks documents in ASCII format with version 3.0 also insures complete compatibility with most Macintosh word processing, database, and spreadsheet applications in addition to *Microsoft Works*. The gray line just hit another one of those 256 shades of gray.

James Hirsch
Coon Rapids, Minn.

Can you help me? I have several *Format II* data base files that I need to convert to AppleWorks. These data base disks have special formatting which cannot be cataloged or copied. I hope in your archives there is a program that will accomplish part or all of this task. If not, could you give me a clue as to how to proceed?

Edwin L. Dyer
Lake Havasu City, Ariz.

We've since had occasion to convert a *Microsoft Works* database file to AppleWorks 3.0 and the new capability of AppleWorks 3.0 to import "tab delimited" files indeed makes it easy.

We have mentioned the *Works to Works* utility in the past, but the new formats of AppleWorks 3.0 will render it useless unless the translator is upgraded.

One company that advertises format conversions to AppleWorks is:

Burke Software
Data Transfer Division
PO Box 515
Park Ridge IL 60068
(312) 823-1357

Formats mentioned include *PFS, DB Master, Data Factory, Data Handle*, and "other" (unspecified), at a cost of \$59.95 (for the first 1000 records) up.—DJJ

Hyper hype?

I read your article in **A2-Central** on rumors with interest. I like your observations about *HyperStudio*. Your implication that hyper-stuff is an important direction for education is probably correct for several reasons. One is that it provides access to multiple media including still photos, "film clips", and sound. CD technology is essential to hyperstuff. Text stacks alone don't hold much promise. Another is that it is random access. The linear property of media (tapes, film strips, videotapes, etc.) is their greatest disadvantage: lack of flexibility. Hypermedia overcomes that.

But economics is the overriding factor. I was told by one major software distributor that school software sales were soft, that piracy was so rampant that many software producers (writers) were leaving the education market. Further, he felt that the vision of two computers for every student (school and home) was unrealistic; rooms full of equipment were not becoming reality. Growth slowing?

His suggestion was that a single set of equipment in each classroom, including a data-projection screen and an overhead projector, was the coming trend. Maybe there could be a few extra sets in the library or "media room."

He said his ideas followed that of Tom Snyder (famed software author.)

Your suggestion that the video-overlay card would turn the Apple monitor into a TV monitor (with extras) is the first I have heard of this idea. Don't keep that a secret! It was just this problem (plus its huge size) that was the obstacle for me getting into this stuff. Now a system could be just two IIGs wide, with one monitor. Maybe the GS is about to BOOM.

I applaud **A2-Central** for being on the forefront of this trend.

Robert R. Hall
Nantucket, Maine

Hard work, not hype

I enjoyed very much your "dissertation" in the December 1989 issue of **A2-Central**. It's not often that I see prognosticated ideas (about the Apple II) supported with any semblance of logical thought. Everyone seems to argue from the "heart" instead of the "head". One thing I will mention: I don't think enough is said about the devotion and hard work of the Apple II crew puts in at Apple, Inc., to continue improving the system software etc. The hard line Apple II folks may find Apple, Inc., motives suspect at times, but those Apple II guys and gals seem to be working their tails off for a machine that I think they really care for. We should all remember this and make sure we direct our frustrations (and appreciations) toward the correct people.

Craig Peterson
Santa Monica, Calif.

Apple boosters down under

You guys must get an unbelievable number of letters every day. I don't know how you cope. I was prompted to write this time by the enclosed *Apple Talks* newsletter I received the other day from Apple Australia. It has been difficult to convince Apple that the Apple II series computers can be anything but primary school education tools and home game machines, but the two articles on pages 2 and 3 of *Apple Talks* may be a sign that things are turning around. What is even more significant is that the Australian Wine industry is putting Australia

on the international map and Yalumba is one of the best known of the Australian wineries. And they use the Apple II as a production control machine. And Apple Australia is giving them recognition for it!

The Editorial on page 2 even asks for information about business software for the Apple II. This is hard to believe, but it is a breath of fresh air. Maybe Apple is starting to support the II as a productivity machine.

By the way, the Option key keyboard combination features of System 5.0 that gives an alternate character set confuses *WordPerfect GS v2.1* more than somewhat. Option key combinations that activate macros and key equivalents of menu items don't work unless the user sets the Alphabet Translation option in the Control Panel NDA to "None". *WordPerfect Oz Tech Support* didn't know that, and in fact are still doing their homework to figure out what to do about this new feature of System 5.0. The letter in the November **A2-Central** from Stephen Harker ("Problems Solved") clued me in to this solution. I have passed it on to *WordPerfect*.

Thanks for such a mind-bogglingly useful newsletter. I have been hugely enjoying the newsletter and the disk and look forward each month to the next edition. You guys are doing a great job.

Ross Barrell
Queensland, Australia

Peter Sandys (High Volume Marketing Manager for Apple Pacific) sent us an interesting note which may also be of interest to Australian (and possibly other) Apple II users:

"...so I can beat my Aussie counterpart, the Apple II Video Overlay Card should be available in a PAL format by January 1990. Those interested should contact Frank Revill at Apple Australia."

We have the address listed as:

Apple Computer Australia Pty. Ltd.
16 Rodborough Road
French's Forest, NSW 2086

for Apple Australia.—DJD

Can you spare a program?

The CD-ROM Project that I'm working on is for the National Apple Users Group Conference. NAUGC, a non-profit organization, holds an annual conference, usually in April, where we have presentations that are geared toward User Group leaders. The 1990 Conference will be held in Arlington Heights, Ill. (my home, coincidentally) on April 20 through 23. The sponsoring groups of the 1990 Conference are TAU, the Dearborn (Michigan) Apple Users, University of Chicago MUG, AppleTree, DuPage Apple User Group, ITTMUG, the Northern Illinois Computer Society (my group), and others (it's a long list). InterChange is the name of the company that we have formed to handle the finances of NAUGC '90.

At previous NAUGC meetings, we had Public Domain disk swapping. Usually, one of the sponsoring groups of that year's Conference would provide the PD collection. Attendees could purchase copies of the entire collection to bring back to their User Groups.

This time, we won't be having any disk swapping parties. Instead, we are producing a software collection on CD-ROMs. Our current plan is to create two disks, one for the Apple II and one for the Macintosh. I am co-ordinating the Apple II disk group, although any submissions for the Project, either Apple II or Macintosh,

may be sent to me. I'll pass the Mac software on to the Mac group.

We intend to have a diversified collection of software on these disks. Not just the usual Public Domain stuff, but also the best Shareware that we can find, plus demo versions of commercial software. For my end of the Project, any good program is welcome, and all Apple II operating systems will be represented. Yes, even DOS 3.3 software is being included, as Shrink-It full-disk archives.

The copyrights of any software that is submitted to us, be it commercial, shareware, free-ware, or public domain, remain with the holder of the copyright. If we find a particular application that we desire to include on our disks, and that application contains a copyright notice or a restriction on its distribution, we are attempting to make contact with the author to gain approval for the application's inclusion. (We don't need any legal problems, thank you.)

Demonstration versions of commercial software, especially recent releases, are appreciated. As of today, we are including demonstration versions of *HyperStudio*, from Roger Wagner Publishing, and *Talk Is Cheap*, by Don Elton. Other programs are under consideration.

The format of the Apple II CD-ROM will be two 32 megabyte ProDOS-format partitions, with the remainder of the disk in High Sierra (or ISO 9660, which is the same thing) format. The ProDOS partitions will be present for any user who has a CD-ROM drive on a non-IIGS machine, and wishes to access the file descriptions on the disk. We're also planning on a front-end application to display the catalog, probably a hypermedia program.

Since most Apple II users, or User Groups, for that matter, do not have CD-ROM drives, we are also negotiating a deal to offer a new CD-ROM drive at a discounted price. At this time, we have no firm commitment from any particular manufacturer.

The cost of the disks is planned to be \$40.00. (Yes, that's forty dollars, and not a typo.) Since a CD-ROM disk can hold approximately 550 megabytes of data, and since we intend to fill a disk with nothing but Apple II software, it's a pretty reasonable price. All attendees to the Conference will be offered the change to purchase the disks; and after the conclusion of the Conference, we will be offering the disks for sale to the general public, at the same price. All profits from the sale of the disks will be applied toward the next NAUGC meeting in 1991.

If you want to send me anything, the address is:

InterChange/NAUGC '90
1865 W. Spring Ridge Drive
Arlington Heights, Ill. 60004-1217

Both Apple II and Macintosh submissions should be sent to this address.

Questions? Answers? I can be reached at any of the following electronic addresses:

GEnie: E.FLODEN
CompuServe: 73220,1624
America Online: EdwardF4
ProLine: pro-harvest!edward

Edward Floden
Arlington Heights, Ill.

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