small computer support group

Indiana University Bloomington, 1125 Atwater, 337-2893

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Editor: J.V. Lombardi, Bryan 205, IUB, 7-8669

Manager SCSG: J.W. Smith, 112 Atwater, 7-2983

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FILE TRANSFER--COMMUNICATIONS PACKAGES

As announced in the last issue of the NEWSLETTER, the Small Computer Support Group has completed file transfer, communications packages for two of the popular microcomputer systems on campus: the Apple II and the CP/M based microcomputers. A short description of each of these packages follows. Those interested in working with these programs should check with the SCSG for complete documentation and assistance.

APPLE COMMUNICATIONS PACKAGE

This package provides the user with a means to transfer data from the Apple computer to another computer. The user can collect text or raw experimental data and then transfer the data to another computer for further processing by a statistical package or obtain output from a special printer. Additionally, the Apple can operate as a dumb terminal for interactive computing.

Currently, the program allows communication with WCC and the DEC-10. There are several modes of transfer which are all fully described in the documentation. Typically, a user selects one of the three modes from the menu. Choosing the dumb terminal option clears the screen and the user then follows the normal log-on procedure for WCC or the DEC-10. The program permits an exit from this program and then return at a later time without logging off the host computer.

A file on the host computer can be received by the Apple and saved on diskette. This involves using the dumb terminal mode to get the file ready to list and then returning to the menu, selecting the receive option, and identifying the Apple file name to receive the data. A new disk is put in drive 1, and the data is written from the host computer to the Apple disk automatically. Similarly, an Apple file can be sent to WCC or the DEC-10 using much the same procedure.

The Apple communications package requires an Apple II+, 48K, one disk drive, Applesoft, the California Computer Systems Model 7710 Asynchronous Serial Interface, and a modem or directran. If the modem is capable of 1200 baud, the program will transfer data at that speed. The D.C. Hayes Micromodem is not supported yet.

This program is available from the Small Computer Support Group and was written by John B. Buckley III.

CP/M XTERM--COMMUNICATIONS PACKAGE

XTERM is an integrated software package which transfers CP/M files to and from other computers. This transfer program does not do any error checking or correction. It will work at standard baud rates from 75 to 2400. Along with file transfer, XTERM allows a CP/M computer to behave like a terminal for full or half duplex communication.

The file uploading mode is used to transfer a file from a CP/M computer to another computer. The program has options for a variety of host machines, baud rates, and file types. To transfer a file to the DEC-10 or WCC the user logs on using terminal mode. Then the options are set and the file transfer takes place. Once completed, the program returns to the terminal mode.

File downloading is possible with host computers that recognize the XON-XOFF conventions for stopping and starting listings. This feature has recently be added to WCC for use with text files but may not work properly with binary files. The DEC-10 and PRIME computers also support XON-XOFF. The procedure for downloading files is similar to the one for uploading.

XTERM will run on any CP/M computer with at least 24K of memory and a serial port connected to a modem or directran.

Complete program details are available from the Small Computer Support Group. XTERM was written by Craig Campbell.

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FLOPPY DISK COMPATIBILITY

Although most people agree that the floppy disk is the best way to store information on a small computer, there are many different varieties that are seldom interchangeable between computers. At least seven characteristics determine the compatibility of floppy disks: size, sectoring, track spacing, format, density, operating system, and boot code.

The size of a disk, either 8 or 5-1/4 inch, is the most obvious characteristic. It is not possible for a 5-1/4" diskette to work in an 8" disk drive, nor can an 8" disk fit into a 5-1/4" drive. Sector arrangments also constitute a physical incompatibility, but in a less obvious way. All disks have a series of sectors of information on each track. There are two ways of separating the sectors: hard and soft sectoring. Soft sectoring uses the information being read from the disk to mark the beginning and end of a sector, while hard sectored disks use a series of small holes punched in the disk to separate the sectors. Although all floppy disks have one hole in them, an index mark used for counting revolutions and checking drive status, hard sectored disks can have 10, 16, or 32 holes in them. These holes are visible through the small round opening of the disk envelope near the center. If a hard sectored disk is put into a system expecting soft sectoring, the holes will be interpreted as index marks rendering the disk unreadable. If a soft sectored disk is used in a system expecting hard sectoring, the holes needed to identify the sectors are not there so the disk can not be read. Most disk systems today are soft sectored with the exception of the Micropolis, Heath H-8, and Vector MZ 5-1/4" systems. Hard sectoring on 8" disk systems is rare.

Track spacing, or the physical distance between two consecutive tracks on a disk, is not consistent in all disk systems. New read/write head technology has made possible narrow track distances on 5-1/4" disks with

good reliability. This technique is not yet possible with 8" disks because the larger disk size introduces more flex and the required precision cannot be achieved. Double tracking techniques are not yet very common in 5-1/4" disks, except for the high density Micropolis system and the Vector MZ. The Micropolis system is not actually double tracked, as the track to track distance is slightly more than half of the standard distance. If a disk of the wrong track spacing is used in a system, the disk head will be in the wrong position to read the data on that disk.

The format or organization of the data in a disk sector is also different from one system to another. There is a lot of information on a disk besides data. This allows soft sectoring and error detection and can take up as much as 40 percent of the space available on a disk. Each sector has a certain amount of space for addresses, inter-sector gaps, and error detection. The larger the data field for each sector, the more efficiently the disk space is used. The larger the sector, however, the larger the allocation blocks for disk space must be and the more space wasted at the end of files that do not fill the sector. The data field size varies from 128 bytes to 2048 bytes for most disk systems. The most common disk format is the IBM 3741 which is an 8" disk with 76 tracks of 26 soft sectors each. The sectors contain data fields of 128 bytes. The format of the Apple and Superbrain disk system have both recently changed to allow more storage on each disk. The Apple system increased the number of 256 byte sectors per track from 13 to 16. The Superbrain system went from 128 byte sectors to 512 byte sectors. It is possible to change a disk from one format to another, and programs to change format can be written for most disk systems, although they are quite complex and require extensive technical knowledge about the disks and their operating systems.

Single and double density disks use different clock signals to encode the information for reliable recovery. The two most common encoding schemes are FM (frequency modulation) and MFM (modified frequency modulation). FM is single density and MFM is the most common double density encoding scheme. Double density allows twice the data to be stored on a disk as single density encoding does. The reliability of MFM encoding seems to be very near that of FM encoding, so double density should definitely be considered for new systems or upgrades. If a disk of the wrong encoding scheme is used in a system, the signals being read from the disk will be misinterpreted giving erroneous data. The DEC RX-02 disk system implements a special encoding scheme in which the track and sector address are in FM encoding and only the sector's data field is MFM encoded. This technique requires more complex hardware to implement. It is possible to convert from one density to another. The SCSG Microsystem I, some WCC Z-80 development systems, and any DEC RX-02 system can read both single and double density disks and can convert between the two.

The preceding considerations determine whether data can be correctly read from a floppy disk, but they do not exhaust the compatibility problems. The computer system must interpret the data on the disk correctly to make it useable. This is done by the operating system which runs on that computer. Some common operating systems are CP/M, Apple DOS, TRS-DOS, FLEX, UNIX, RT-11, MP/M, RSX, and NEWDOS. Each of these systems has a different way of defining and manipulating files on the disk. If, for instance, an otherwise compatible FLEX disk is put into a CP/M system, the

directory of what is on the disk will not be in the CP/M format and the files will not be accessible. This is purely a software problem, and it is possible to write conversion programs, but this can be as much work as developing a new operating system. Ready-made conversion programs are by far preferable but not always available.

Because many systems have their own unique hardware configurations, there are often differences in the implementation of an operating system on different computers. When a system is first turned on the operating system program is read from the disk and loaded into memory. The operating system program for different computers may be slightly different, so it is possible that compatible disks with the same operating system but different hardware implementations will not be interchangeable. Although all of the files on the disk can be read, the system can not be loaded into memory using the incompatible disk. This problem can usually be solved by using a disk with the proper operating system implementation to load into memory and then reading or writing files on the other disks with different operating system implementations.

One of the best reasons for having disk system compatiblity with other disk systems at Indiana University is the ability to use the Floppy Remote Job Entry station developed by WCC. The Floppy RJE, located in the basement of Memorial Hall, is a CP/M, Z-80 microcomputer system with a card reader, line printer, and disk system that is capable of high speed communication with WCC. Using this system it is possible to replace cards for input with floppy disks. The current RJE can read two different disk formats:

1. 8" IBM 3741 soft sectored, CP/M compatible
2. 8" soft sectored double density 1024 byte/sector CP/M compatible.

The first format is much more common around campus than the second. The possibility of supporting different formats is planned for the future. The Floppy RJE is still under development, but if someone has an immediate need to use it, please contact the Small Computer Support Group for details.

In regard to the disk systems available on campus, it needs to be emphasized that Apple, TRS-80, and Superbrain disks can not be interchanged in any way. There is not yet a good way of converting files from 5-1/4" disks to 8" disks at IU. The DEC RX-01 or RX-02 disks are not compatible with the Floppy RJE format. If it is necessary to transfer information from one machine to another with incompatible disks, the easiest procedure is to use an RS-232 serial port to transmit from one computer and receive and save the file on another computer. Package programs to accomplish this are under development by the SCSG for transfers between the Apple, Superbrain, TRS-80, CDC6600, DEC-10, LSI-11, PRIME, and CP/M. A commercial program for this purpose for Apple computers was reviewed in NEWSLETTER No. 2, and packages for the Apple and CP/M microcomputers are described in this issue of the NEWSLETTER.

Craig Campbell

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THE SUPERBRAIN MICROCOMPUTER

For me, the major advantages of the Superbrain over other microcomputers were its cost, its storage capacity, and its compactness. Secondary benefits are its quiet operation, the "QWGRTY" keyboard (with apostrophes and other such characters in the same places as on a typewriter), and the smooth typing action. The screen is 80 characters wide by 24 lines down and displays both upper and lowercase letters (the lowercase letters don't have descenders, though). I bought my Superbrain from B & A Electronics (666 Walnut Street, Terre Haute, 47808) and have received some excellent support.

My version is a QD (it writes in double density, on both sides of a 5-1/4 inch diskette), which gives me up to 64 files per diskette and something between 125 and 200 pages, depending on the width of margins and the spacing. The memory provides 64K of storage. A single diskette provides 256K of storage; together the two diskettes provide 512K of storage. For approximately $3800, then, I was able to buy a machine that would store most of a book on a single diskette and that would allow me to move files (or parts of files) back and forth between diskettes. I haven't looked into optional equipment, although I note users can attach an optional S-100 Bus adapter.

The compactness--a single unit exclusive of printer--means I don't have disk drives connectors, keyboards, screens, and cords trailing all over my desk. (On occasion, though, as when I've been working for hours, it would be nice to have a separate keyboard so that I could change chairs, lean back, and still type.) Everything except the printer fits into a small case the size of many intelligent terminals. The case fits neatly on the return section of my desk. One keyboard feature I've become addicted to is the "caps lock" key, which acts like a shift key but leaves numbers and other nonalphabetic characters unaffected.

I keep in touch informally with other Superbrain owners, and my general impression is that those who have bought since July 1980 are as happy as I am.

The major disadvantage is the lack of a repeat key, although the word processing packages I use have enough compensating features that I don't miss it much. Two other minor disadvantages: the keyboard gets dusty easily (so vacuum it frequently and get a dust cover for it), and occasionally the system has frozen on me--B & A tells me that my use (up to 12 hours per day) is so heavy that I should be cleaning the heads occasionally. Once I get the cleaner, this problem should stop. Finally, I've observed that the disk drives appear to run all the time when the machine is on; I don't know what effect this will have on the diskettes over time.

I use my machine mainly for word processing (both Magic Wand and WordStar). I use the CP/M operating system. I am about to put MicroSoft Basic and a general ledger package on the system. My husband has been

playing with Forth. Our children (12, 14, and nearly 15) handle the mechanics as easily as we do.

Carolyn J. Mullins

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COPY THE UNCOPYABLE APPLE DISKS

As many users have discovered, microcomputer software frequently comes on disks that are copy protected to prevent unauthorized duplication. These disks can not be backed up using conventional methods. The justification for this procedure is that unless these disks are effectively protected users will copy them and distribute them to their friends, thereby depriving the software author and publisher of the price of the programs. The software is, of course, copyrighted, but like books, records, and audio tapes, this copyright protection is virtually unenforceable at an individual level, although it can be effectively used against commercial software pirates.

In the true American tradition, the invention of a copy protection scheme has led to the invention of copy programs that will circumvent the protection. The preparation and sale of these copy programs is, of course, as legal as is the production and sale of Xerox machines, even though the software vigilantes represented by such periodicals as InfoWorld would like to enforce a conspiracy against the authors of such copy programs.

For Apple users, one excellent copy program is LOCK SMITH marketed by Omega Software Products, Inc., and sold at Data Domain in Bloomington for $75. This is an outstanding utility that permits the backing-up or pirating of most programs. It is a single-minded utility that makes an exact copy of what is on the disk. It can not be used to change 13 sector disks to 16 sector disks or any other data manipulation. But it will create a clone of most disks that will run on the Apple II disk drive, whether 13 or 16 sector. It does this by copying a track at a time with error checking. The program works with single or dual disk drives. Its copy procedure is slow but effective. With a single disk drive it takes about 10 minutes to copy a disk.

Although the documentation is purposefully skimpy, presumably to keep us from knowing exactly how the copy is achieved, it is adequate for the task. The program will handle disks that have unusual arrangements of tracks, that have synchronized tracks, that use half-tracks, and that employ a variety of other tricks to make the disks uncopyable by other means. This is a bit copy program that attempts to transfer exactly what is on one disk to another.

It copies Visicalc and the various uncopyable games that are available. It copies, in short, almost anything. But this bit copy program is not infallible. While it will copy disks published before the copy program was issued, subsequent disks may not be copyable as the software houses invent new copy protection schemes. Then there will be a revised copy program. And so it goes.

The instructions indicate that should the program fail to copy a disk, the user can send the uncopyable disk to Omega Software, and when a new version of LOCK SMITH is available that can copy the uncopyable, the user will get it free.

What about morality, you say? The software vigilantes would ban this useful item from the marketplace. They would withhold all information about disk operating systems from users, as recommended by InfoWorld. And they would keep users from understanding computer systems so that the vigilantes can maintain the purity of the software business. If the morality of owning such a useful, if expensive, program is distasteful, I suggest not buying or using the program. If not, this is a fine utility and I recommend it highly. Oh yes, LOCK SMITH will NOT copy itself!

John V. Lombardi

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THE BRAIN SURGEON FOR APPLES

With the advent of a large number of Apple II and II+ computers in the hands of users, the need for repair and diagnosis has increased. Because the ways of computer malfunction are frequently mysterious, the delays in repairs long, and the results not always satisfactory, the software industry has invented a variety of diagnostic aids. One of these is THE BRAIN SURGEON published by Nikrom and sold at Data Domain in Bloomington for $45.

The program comes on a copy protected disk that will boot on either 13 or 16 sector disk drives. Once booted the program offers a menu that will permit the testing of almost all of the Apple II's innards. It tests the following in separate operations:

1. Motherboard ROM Test
2. Applesoft Card Test
3. Integer Card Test
4. RAM Test
5. Disk Speed Calibration
6. Micromodem II Self Test
7. Monitor Alignment

These tests cover most of the varieties of Apple II and II+. Some of the tests are ordinary in the sense that any user can perform them by following the instructions in the Apple manuals. Such is the case with the RAM test. Similarly, the Micromodem II Self Test is described in the Micromodem manual and could be done by a user, although it is complicated. The Motherboard ROM Test, Applesoft Test, and Ineger Card Test are not easily accessible without THE BRAIN SURGEON. If an error is detected, the program signals where the error occurred, that is which ROM or RAM or other hardware unit failed. This permits the replacement of relatively inexpensive chips and retesting and, if you are lucky, the avoidance of a service call.

The disk speed calibration routine is very nice. You put in a blank diskette, run the test, and the screen shows you how far off the disk drive speed is from normal. The manual shows how to adjust the drive for the most accuate speed. Finally, the Monitor Alignment test generates a perfectly symmetrical test pattern on the screen so that adjustments to the monitor can be made.

Basically, the program is neat, clean, and effective. It is a fine security blanket. If it tested the Disk Drive interface, disk electronics, and the Pascal card it would be even more useful.

John V. Lombardi

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WORD PROCESSING REVIEWS

The Small Computer Support Group is developing a file of word processing reviews culled from the many magazines on small computers. We would be delighted to have any additions.

Glenn A. Hart, "Magic Wand Word Processor," Creative Computing (August 1980). Magic Wand.

Steven Jong, "Word Processing Software Roundup," Personal Computing (January 1981). The Word Processing Program, Scripsit, Apple Writer, Super-Text, EasyWriter, EasyWriter Professional, Wordcraft 80, PIE+Format, Word-4, The Text Processing System (TPS), TEX, TFS, Textwriter III, Textformer, Pro-Type, Electric Pencil II, Wordsmith, WpDaisy, Word-Star

Tricia Jordan, "EASY or PIE: Experiences with Two Apple Word Procesing Systems," Applesauce (February 1981). EasyWriter and PIE+Format.

Peelings II, "Special Word Processor Section," (Nov-Dec 1980). Apple Writer, EasyWriter, Magic Window, PIE+Format, Scribe, Supertext, Correspondent.

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CHEMISTRY DEPARTMENT COMPUTER SYSTEMS GROUP

Among the scientific users of microcomputers at Indiana University, the Chemistry Department Computer Systems Group maintains an exceptionally complex and sophisticated Research Microcomputer System. In general, the Research Microcomputer System is designed to fulfill the data acquisition and control requirements encountered in scientific research. The system is so designed that adding the individual interface logic boards tailors it for different laboratory needs.

The main computer system is divided into two 19-inch rack mountable chassis. One chassis is composed of the computer and its memory. The second chassis is the home of the various interface logic boards and device controllers. Expansion chassis may be added to this input/output chassis as needed. Currently the microcomputers in the system are Z-80

based. The basic configuration has 64K of memory, and the largest system currently in operation has 192K. Microprocessor type can be changed by replacing a single $100 board, thus preserving the flexibility needed in the rapidly changing technological environment of microcomputers.

Input devices to this system range from data sense switches to 1000 cards per minute card readers. Output devices range from light emitting diodes to 600 lines per minute line printers. Controllers and interfaces exist in these ranges to satisfy the thirty-three computer systems used in different types of research and teaching environments in Chemistry.

Generally, research systems want either analog or digital monitoring of instruments or events. For these purposes the Computer Systems Group has designed 12 and 14 bit analog to digital converters with sampling rates that are programmable. Common sampling rates of 2.5 khz, 5 khz, 10 khz, and 20 khz are selectable. Additionally, there is a specially designed 12 bit 250 khz a/d and a 10 to 20 mhz a/d that is computer controlled. A full range of digital input/output cards exist for interfacing parallel devices such as digital voltmeters, temperature bridges, and similar equipment. For systems requiring plotting or data display the Chemistry Group has developed 10 and 12 bit digital to analog converters.

In addition to the custom designed interface logic cards, the Chemistry Group has developed a full line of device controllers for the following equipment:

1. Documentation card readers M600 and M1000
2. Data Printer 600 LPM lineprinter
3. Texas Instrument's silent 745 terminal
4. Lear Siegler ADM3A video terminal
5. Versatec Printer/Ploter's model 1100 and 1200
6. Sugart SA800 and SA400 floppy disk drives using SMS formatter-IBM compatible
7. Tektronics 4010 graphic terminal
8. Acoustic couplers
9. Five axis stepper motor controller
10. Diablo Hytype II printer/plotters
11. All RS232C interfaces
12. Bell 301B data set
13. ASR 33 teletype.

The last and most important interface card of the expansion chassis is the controller that interfaces the remote research laboratory microcomputer to the departmental system. This link is currently 9600 baud and allows complete central system capability under the control of the remote micro. Data storage, program downline loading, and Fortran data processing are just a few of the capabilities extended by the central system to the remote microcomputers. This type of network support is currently serving remotes up to a quarter mile away. The central system initially has been provided with 32 channels of microcomputer support. Twenty-four channels of computer support already existed prior to the microcomputer's existence to support departmental and private research groups' mini-computers.

The Chemistry Department's Computer System Group's network is known as Micro-Net and communicates with WCC as well as within the Micro-Net. The

Group is headed by Ray Sporleder, Systems Engineer, and operates as a self supporting unit within the Chemistry Department. Microcomputer users with scientific needs can find inspiration and good advice from the Chemistry Department's Computer Systems Group located in the Chemistry Building.

Ray Sporleder

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DISK UTILITIES FOR APPLE II

The Small Computer Support Group has three disk utilities for the Apple Disk II that may help some users. These are programs under development, and users are requested to evaluate the programs and suggest refinements and improvements.

DISKETTE DIRECTORY SORT. This is a program that provides an alphabetized list of the files on a diskette. The alphabetized list can then be viewed on the screen, sent to a printer, and saved as a disk file. Any number of disks can be processed in this fashion, creating a sequence of disk files that are alphabetized disk directories. When this is completed, the following program, Master Directory Sort, can be called to provide an alphabetized master listing of all the files with the name of the diskette for each of the files.

MASTER DIRECTORY SORT. This program takes the files built by Directory Sort and constructs the master directory.

TRACK AND SECTOR INSPECT. This utility allows users to examine any sector on an Apple diskette. The user can specify a particular track and sector to inspect or ask for an Apple file by name. Thus, any file, text, binary, Basic, Applesoft, can be examined as well as the directory and DOS. The utility permits the inspection to be in ASCII or Hex. The display can be stopped at any point for detailed inspection. Furthermore, the user can modify any byte in the sector being displayed and rewrite the sector back to the disk. These programs are by John B. Buckley III.

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SCSG SOFTWARE COPY POLICY

Most people who use computers know that the cost of programming a computer often exceeds the cost of the hardware. For example, Digital Equipment Corporation, the inventor of the mini-computer, now spends more money developing software than they do hardware.

Ten years ago a small computer cost $20,000, and the manufacturer could include the software with the purchase price. Today, a machine of comparable power sells for $2000, and there is not enough profit in such a price to pay for the cost of software development.

In the past, most software was produced by the computer manufacturers. Today, many independent programmers and companies produce software as their only business and support themselves on the income from sales. Software is expensive to develop and the user must pay a fair share of that cost.

Unfortunately, the quality of software available for small systems varies greatly, and often there is no relationship between price and performance. Because it is often impossible to know whether a program will do what is advertised or whether it will be suitable for a special application, users must be able to borrow software for evaluation purposes. There is no other way for users to avoid paying for software that is inappropriate or poorly written.

Ultimately, the decision to copy licensed software and use it without paying the author or publisher must be made by the user. No one will police individual machines.

The SCSG has developed guidelines for software copying that permit us to retain the flexibility required by our environment and remain fair and legal. These guidelines are for the Small Computer Support Group and do not represent overall Indiana University policy.

Software Copy Policy

1. SCSG will not copy licensed software that it owns for users who do not have a license.
2. SCSG will not directly support unlicensed software on users systems
3. SCSG will assist users in gaining access to software for evaluation purposes.

John W. Smith

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SOFTWARE AND HARDWARE EVALUATIONS

The SCSG publishes the NEWSLETTER to fulfill its responsibility to keep the campus informed about activities related to small computers. We believe that articles written by users from a user point of view are valuable. This reflects the SCSG's basic philosophy that computing should be for people and not the other way around.

Because of this, the SCSG does not revise the content of the articles contributed. Sometimes, in consultation with the author, errors of fact are corrected or additional information is inserted. Opinions about the desirability of software and hardware necessarily differ, and readers are encouraged to consult with the SCSG before investing in major software or hardware packages. Readers should also call the authors of software or hardware reviews and discuss the strengths and weaknesses of the items described in the NEWSLETTER.

The Small Computer Support Group does not necessarily endorse or recommend the items reviewed in the NEWSLETTER. Equipment appropriate for one application may not be the best for another. Differences in the levels of expertise among users can also influence the appropriateness of any software or hardware package. The Small Computer Support Group encourages users to discuss alternative solutions to small computer needs before

choosing any particular equipment or program.

John W. Smith

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IU Department and Phone_____
Special Interests_____

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SMALL COMPUTER SUPPORT GROUP
NEWSLETTER
Bryan Hall 205 IUB
Bloomington, IN 47405

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