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All wrong! Save
this cover for Dec.
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the top.
Jim

You Wanted It . . .
You Got It!
Your Own News Column . . .
REMark's Remarks
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April 1990

REMark®

The Official Heath/Zenith Computer Users Magazine



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MOC

The Official Heath Computer Users Magazine

REMark®

Volume 11, Issue 4 • April 1990

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HUG is provided as a service to its members for the purpose of fostering the exchange of ideas to enhance their usage of Heath/Zenith equipment. As such, little or no evaluation of the programs or products advertised in REMark. The Software Catalog, or other HUG publications is performed by Heath Company, in general, and HUG, in particular. The prospective user is hereby put on notice that the programs may contain faults, the consequence of which Heath Company, in general, and HUG, in particular, cannot be held responsible. The prospective user is, by virtue of obtaining and using these programs, assuming full risk for all consequences.

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HUG

PRODUCT NAME	PART NUMBER	OPERATING SYSTEM	DESCRIPTION	PRICE
H8 - H/Z-89/90				
ACCOUNTING SYSTEM	885-8047-37	CPM	BUSINESS	20.00
ACTION GAMES	885-1220-37	CPM	GAME	20.00
ADVENTURE	885-1010	HDOS	GAME	10.00
ASCIRITY	885-1238-37	CPM	AMATEUR RADIO	20.00
AUTOFILE (Z80 ONLY)	885-1110	HDOS	DBMS	30.00
BHBASIC SUPPORT PACKAGE	885-1119-37	HDOS	UTILITY	20.00
CASTLE	885-8032-37	HDOS	ENTERTAINMENT	20.00
CHEAPCALC	885-1131-37	HDOS	SPREADSHEET	20.00
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DEVICE DRIVERS	885-1105	HDOS	UTILITY	20.00
DISK UTILITIES	885-1213-37	CPM	UTILITY	20.00
DUNGEONS & DRAGONS	885-1093-37	HDOS	GAME	20.00
FLOATING POINT PACKAGE	885-1063	HDOS	UTILITY	18.00
GALACTIC WARRIORS	885-8009-37	HDOS	GAME	20.00
GALACTIC WARRIORS	885-8009-37	CPM	GAME	20.00
GAMES 1	885-1029-37	HDOS	GAMES	18.00
HARD SECTOR SUPPORT PACKAGE	885-1121	HDOS	UTILITY	30.00
HDOS PROGRAMMERS HELPER	885-8017	HDOS	UTILITY	16.00
HOME FINANCE	885-1070	HDOS	BUSINESS	18.00
HUG DISK DUPLICATION UTILITIES	885-1217-37	CPM	UTILITY	20.00
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LOGBOOK	885-1107-37	HDOS	AMATEUR RADIO	30.00
MAGBASE	885-1249-37	CPM	MAGAZINE DATABASE	25.00
MAPLE	885-8005	HDOS	COMMUNICATION	35.00
MAPLE	885-8012-37	CPM	COMMUNICATION	35.00
MISCELLANEOUS UTILITIES	885-1089-37	HDOS	UTILITY	20.00
MORSE CODE TRANSCIVER	885-8016	HDOS	AMATEUR RADIO	20.00
MORSE CODE TRANSCIVER	885-8031-37	CPM	AMATEUR RADIO	20.00
PAGE EDITOR	885-1079-37	HDOS	UTILITY	25.00
PROGRAMS FOR PRINTERS	885-1082	HDOS	UTILITY	20.00
REMARK VOL 1 ISSUES 1-13	885-4001	N/A	1978 TO DECEMBER 1980	20.00
RUNOFF	885-1025	HDOS	TEXT PROCESSOR	35.00
SCICALC	885-8027	HDOS	UTILITY	20.00
SMALL BUSINESS PACKAGE	885-1071-37	HDOS	BUSINESS	75.00
SMALL-C COMPILER	885-1134	HDOS	LANGUAGE	30.00
SOFT SECTOR SUPPORT PACKAGE	885-1127-37	HDOS	UTILITY	20.00
STUDENT'S STATISTICS PACKAGE	885-8021	HDOS	EDUCATION	20.00
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TERM & HTOC	885-1207-37	CPM	COMMUNICATION & UTILITY	20.00
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TINY PASCAL	885-1086-37	HDOS	LANGUAGE	20.00
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UTILITIES	885-1212-37	CPM	UTILITY	20.00
UTILITIES BY PS	885-1126	HDOS	UTILITY	20.00
VARIETY PACKAGE	885-1135-37	HDOS	UTILITY & GAMES	20.00
WHEW UTILITIES	885-1120-37	HDOS	UTILITY	20.00
XMET ROBOT X-ASSEMBLER	885-1229-37	CPM	UTILITY	20.00
Z80 ASSEMBLER	885-1078-37	HDOS	UTILITY	25.00
Z80 DEBUGGING TOOL (ALDT)	885-1116	HDOS	UTILITY	20.00

H8 - H/Z-89/90 - H/Z-100 (Not PC)

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BASIC-E	885-1215-37	CPM	LANGUAGE	20.00
CASSINO GAMES	885-1227-37	CPM	GAME	20.00
CHEAPCALC	885-1233-37	CPM	SPREADSHEET	20.00
CHECKOFF	885-8011-37	CPM	CHECKBOOK SOFTWARE	25.00
COPYDOS	885-1235-37	CPM	UTILITY	20.00
DISK DUMP & EDIT UTILITY	885-1225-37	CPM	UTILITY	30.00
DUNGEONS & DRAGONS	885-1209-37	CPM	GAMES	20.00
FAST ACTION GAMES	885-1228-37	CPM	GAME	20.00
FUN DISK I	885-1236-37	CPM	GAMES	20.00
FUN DISK II	885-1248-37	CPM	GAMES	35.00
GAMES DISK	885-1206-37	CPM	GAMES	20.00
GRADE	885-8036-37	CPM	GRADE BOOK	20.00
HRUN	885-1223-37	CPM	HDOS EMULATOR	40.00
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HUG SOFTWARE CATALOG UPDATE #1	885-4501	VARIOUS	PRODUCTS 1983 THRU 1985	9.75
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MBASIC PAYROLL	885-1218-37	CPM	BUSINESS	60.00
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REMARK VOL 3 ISSUES 24-35	885-4003	N/A	1982	20.00
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REMARK VOL 6 ISSUES 60-71	885-4006	N/A	1985	25.00
REMARK VOL 7 ISSUES 72-83	885-4007	N/A	1986	25.00
SEA BATTLE	885-1211-37	CPM	GAME	20.00
UTILITIES BY PS	885-1226-37	CPM	UTILITY	20.00
UTILITIES	885-1237-37	CPM	UTILITY	20.00

Price List

The following HUG Price List contains a list of all products in the HUG Software Catalog and Software Catalog Update #1. For a detailed abstract of these products, refer to the HUG Software Catalog, Software Catalog Update #1, or previous issues of REMark.

PRODUCT NAME	PART NUMBER	OPERATING SYSTEM	DESCRIPTION	PRICE
X-REFERENCE UTILITIES FOR MBASIC	885-1231-[37]	CPM	UTILITY	20.00
ZTERM	885-3003-[37]	CPM	COMMUNICATION	20.00

H/Z-100 (Not PC) Only

ACCOUNTING SYSTEM	885-8048-37	MSDOS	BUSINESS	20.00
CALC	885-8043-37	MSDOS	UTILITY	20.00
CARDCAT	885-3021-37	MSDOS	BUSINESS	20.00
CHEAPCALC	885-3006-37	MSDOS	SPREADSHEET	20.00
CHECKBOOK MANAGER	885-3013-37	MSDOS	BUSINESS	20.00
CP/EMULATOR	885-3007-37	MSDOS	CPM EMULATOR	20.00
DBZ	885-8034-37	MSDOS	DBMS	25.00
DUNGEONS & DRAGONS (ZBASIC)	885-3009-37	MSDOS	GAME	20.00
ETCHDUMP	885-3005-37	MSDOS	UTILITY	20.00
EZPLOT II	885-3049-37	MSDOS	PRINTER PLOTTING UTILITY	25.00
GAMES (ZBASIC)	885-3011-37	MSDOS	GAMES	20.00
GAMES CONTEST PACKAGE	885-3017-37	MSDOS	GAMES	25.00
GAMES PACKAGE II	885-3044-37	MSDOS	GAMES	25.00
GRAPHIC GAMES (ZBASIC)	885-3004-37	MSDOS	GAMES	20.00
GRAPHICS	885-3031-37	MSDOS	ENTERTAINMENT	20.00
HELPSCREEN	885-3039-37	MSDOS	UTILITY	20.00
HUG BACKGROUND PRINT SPOOLER	885-1247-37	CPM	UTILITY	20.00
KEYMAC	885-3046-37	MSDOS	UTILITY	20.00
KEYMAP	885-3010-37	MSDOS	UTILITY	20.00
KEYMAP CPM-85	885-1245-37	CPM	UTILITY	20.00
MAPLE	885-8023-37	CPM	COMMUNICATION	35.00
MATHFLASH	885-8030-37	MSDOS	EDUCATION	20.00
ORBITS	885-8041-37	MSDOS	EDUCATION	25.00
POKER PARTY	885-8042-37	MSDOS	ENTERTAINMENT	20.00
SCICALC	885-8028-37	MSDOS	UTILITY	20.00
SKYVIEWS	885-3015-37	MSDOS	ASTRONOMY UTILITY	20.00
SMALL-C COMPILER	885-3026-37	MSDOS	LANGUAGE	30.00
SPELLS	885-3035-37	MSDOS	SPELLING CHECKER	20.00
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UTILITIES	885-3008-37	MSDOS	UTILITY	20.00
ZPC II	885-3037-37	MSDOS	PC EMULATOR	60.00
ZPC UPGRADE DISK	885-3042-37	MSDOS	UTILITY	20.00

H/Z-100 and PC Compatibles

ADVENTURE	885-3016	MSDOS	GAME	10.00
ASSEMBLY LANGUAGE UTILITIES	885-8046	MSDOS	UTILITY	20.00
BACKGROUND PRINT SPOOLER	885-3029	MSDOS	UTILITY	20.00
BOTH SIDES PRINTER UTILITY	885-3048	MSDOS	UTILITY	20.00
CXREF	885-3051	MSDOS	UTILITY	17.00
DEBUG SUPPORT UTILITIES	885-3038	MSDOS	UTILITY	20.00
DPATH	885-8039	MSDOS	UTILITY	20.00
HADES II	885-3040	MSDOS	UTILITY	40.00
HELP	885-8040	MSDOS	CAI	25.00
HEPCAT	885-3045	MSDOS	UTILITY	35.00
HUG EDITOR	885-3012	MSDOS	TEXT PROCESSOR	20.00
HUG MENU SYSTEM	885-3020	MSDOS	UTILITY	20.00
HUG SOFTWARE CATALOG UPDATE #1	885-4501	VARIOUS	PROD 1983 THRU 1985	9.75
HUGMCP	885-3033	MSDOS	COMMUNICATION	40.00
ICT 8080 TO 8088 TRANSLATOR	885-3024	MSDOS	UTILITY	20.00
MAGBASE	885-3050	VARIOUS	MAGAZINE DATABASE	25.00
MATT	885-8045	MSDOS	MATRIX UTILITY	20.00
MISCELLANEOUS UTILITIES	885-3025	MSDOS	UTILITIES	20.00
PS's PC & Z100 UTILITIES	885-3052	MSDOS	UTILITY	20.00
REMARK VOL 5 ISSUES 48-59	885-4005	N/A	1984	25.00
REMARK VOL 6 ISSUES 60-71	885-4006	N/A	1985	25.00
REMARK VOL 7 ISSUES 72-83	885-4007	N/A	1986	25.00
REMARK VOL 8 ISSUES 84-95	885-4008	N/A	1987	25.00
SCREEN DUMP	885-3043	MSDOS	UTILITY	30.00
UTILITIES II	885-3014	MSDOS	UTILITY	20.00
Z100 WORDSTAR CONNECTION	885-3047	MSDOS	UTILITY	20.00

PC Compatibles

ACCOUNTING SYSTEM	885-8049	MSDOS	BUSINESS	20.00
CARDCAT	885-6006	MSDOS	CATALOGING SYSTEM	20.00
CHEAPCALC	885-6004	MSDOS	SPREADSHEET	20.00
CP/EMULATOR II & ZEMULATOR	885-6002	MSDOS	CPM & Z100 EMULATORS	20.00
DUNGEONS & DRAGONS	885-6007	MSDOS	GAME	20.00
EZPLOT II	885-6013	MSDOS	PRINTER PLOTTING UTILITY	25.00
GRADE	885-8037	MSDOS	GRADE BOOK	20.00
HAM HELP	885-6010	MSDOS	AMATEUR RADIO	20.00
KEYMAP	885-6001	MSDOS	UTILITY	20.00
LAPTOP UTILITIES	885-6014	MSDOS	UTILITY	20.00
PS's PC UTILITIES	885-6011	MSDOS	UTILITIES	20.00
POWERING UP	885-4604	N/A	GUIDE TO USING PCS	12.00
SCREEN SAVER PLUS	885-6009	MSDOS	UTILITIES	20.00
SKYVIEWS	885-6005	MSDOS	ASTRONOMY UTILITY	20.00
TCSPELL	885-8044	MSDOS	SPELLING CHECKER	20.00
ULTRA RTTY	885-6012	MSDOS	AMATEUR RADIO	20.00

Magazines everywhere, and no way to reference the wealth of information they hold? Not anymore! Now there's **MAGBASE**; a database designed specifically for referencing magazine articles. Don't let those one-hundred-and-some back issues of REMark, or C Users Journal, or Veterinary Medicine, (or any magazine) gather dust, use **MAGBASE**, and find that article you read two years ago! **MAGBASE** is available for **MSDOS HUG P/N 885-3050** or **CP/M (P/N 885-1249-[27])**.

LAPTOP OWNERS . . . don't feel left out! All of HUG's MSDOS software is available on 3-1/2" micro-floppies too! When ordering, just add a "-80" to the 7-digit HUG part number. For the standard 5-1/4" floppy, just add a "-37".

Make the no-hassle connection with your modem today! **HUGMCP** doesn't give you long menus to sift through like some modem packages do. With **HUGMCP**, YOU'RE always in control, not the software. Order **HUG P/N 885-3033-37** today, and see if it isn't the easiest-to-use modem software available. They say it's so easy to use, they didn't even need to look at the manual. "It's the only modem software that I use, and I'm in charge of the HUG bulletin board!" says Jim Buszkiewicz. **HUGMCP** runs on ANY Heath/Zenith computer that's capable of running MS-DOS!

ORDERING INFORMATION

For VISA and MasterCard phone orders, telephone the Heath Users' Group directly at (616) 982-3463. Have the part number(s), descriptions, and quantity ready for quick processing. By mail, send your order, plus 10% postage and handling (\$1.00 minimum charge, up to a maximum of \$5.00) to: Heath Users' Group, P.O. Box 217, Benton Harbor, MI 49022-0217. VISA and MasterCard require minimum \$10.00 order. No C.O.D.s accepted.

Questions regarding your subscription? Call Margaret Bacon at (616) 982-3463.



HUG NEW PRODUCTS



10 - Very Good
9 - Good
8 - Average

TABLE C Product Rating

Rating values 8-10 are based on the ease of use, the programming technique used, and the efficiency of the product.

- 7 - Hardware limitations (memory, disk storage, etc.)
- 6 - Requires special programming technique
- 5 - Requires additional or special hardware
- 4 - Requires a printer
- 3 - Uses the Special Function Keys (f1, f2, f3, etc.)
- 2 - Program runs in *Real Time**
- 1 - Single-keystroke input
- 0 - Uses the H19 (H/Z-89) escape codes (graphics, reverse video)

Real Time — A program that does not require interactivity with the user. This term usually refers to games that continue to execute with or without the input of the player (e.g., 885-1103 or 885-1211[-37] SEA BATTLE).

ORDERING INFORMATION

For VISA, MasterCard, American Express, and Heath Revolving Charge orders call Heath Users' Group at (616) 982-3463. For quick processing have the Part Number(s), Product Name and Price ready. VISA, MasterCard, American Express and Heath Revolving Charge require minimum \$10.00 order. By mail, send your order, plus 10% postage/handling (\$1.00 minimum, \$5.00 maximum) to: Heath Users' Group, P.O. Box 217, Benton Harbor, MI 49022-0217. Purchase orders are also accepted. No C.O.D.s.

Questions or problems regarding HUG software or REMark magazine should be directed to HUG at (616) 982-3463.

NOTES

When ordering any version of MSDOS software, you must specify what type of media you want the software supplied on. If you want 5-1/4" floppies, add a "-37" to the 7-digit part number. If you want 3-1/2" micro-floppies, add a "-80" to the 7-digit part number.

All special update offers announced in REMark (i.e., ZPC II update) must be paid by check or money order, payable to the Heath Users' Group. **NO CREDIT CARDS ACCEPTED.**

HUG P/N 885-6015 YAUD (Yet Another Utilities Disk) . . . \$20.00

Here's another collection of utilities by Pat Swayne. In this collection, you will find utilities to help you manage a large hard disk, set up a VGA color monitor, process text files, modify your keyboard, and other things.

Requirements: All of these utilities except KEYREP.COM and SCD.COM will run on any Heath/Zenith PC-compatible computer and MS-DOS version 2 or above. KEYREP.COM and SCD.COM require an AT-compatible (80286 or 80386) computer. Some of the programs (as noted below) will run on a Z-100 series dual processor computer.

Program Author: Patrick Swayne
HUG Software Engineer

Program Content: Here is a description of the programs on this disk.

GD.COM — This program is a replacement for the MS-DOS CD or CHDIR command. When you use GD (Go to Directory) instead of CD, you only have to supply the name of the directory you want to change to, and not the path leading to it. For example, suppose you are in the \ASM\UTIL directory, and you want to change to the \TEXT\LETTERS\MOM directory. If you use CD to make the change, you have to type:

```
CD \TEXT\LETTERS\MOM  
GD MOM
```

and GD will search through your directories until it finds MOM, and then change to it. To solve the problem of more than one directory with the same name, GD has a /V (Verify) switch. When this switch is set, GD will ask for confirmation before it changes to a directory it finds. This program will run on a Z-100.

KD.COM — KD (Kill Directory) allows you to quickly clean up unused directories on your disk. To use the program, you just type:

KD dirname

where dirname is the name of the directory you want to kill. KD will display the name of the specified directory and any subdirectories below it in a graphic tree format, and ask you to verify your request to kill the directory. If you answer Y, KD will delete the specified directory, any subdirectories below it, and any files in the directory and its subdirectories. Because of its ability to remove entire directory "families" whether they contain files or not, KD is a potentially dangerous utility, so use it with care. However, it is also very handy when you need it. This program will run on a Z-100.

Note: The following five utilities have been released on other HUG disks, but are included here because they go well with GD and KD. Two of them (D and HFM) are newer versions. They all will work on a Z-100.

DT.COM — This program displays all of the directories on your disk in a graphic tree format.

F.COM — This program is a directory utility that searches through all of your directories, not just the current one, for the specified file or files. It displays the complete path to each file that it finds, along with the date, time and size information as displayed by DIR.

D.COM — This is an alphabetizing, columnizing directory program. It shows file names, sizes, and optionally the attributes set on each file.

HFM.COM — This is the HUG File Manager. HFM can copy or delete selected groups of files or individual files, rename files, print files, create or remove directories, label disks, and more.

SEE.COM — This program is a fancy replacement for TYPE. You can move forward or backward in a file, search for text, and print selected text.

Note: The rest of the programs listed here are all new.

HATCH.COM — This program puts a cross hatch or dot pattern on your video monitor screen. It can display the pattern

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REMark's *Remarks*

Henry E. Fale
QuikData, Inc.
2618 Penn Circle
Sheboygan, WI 53081

This will be the beginning of a new column for REMark magazine. In the February issue, I noted the Buggin' Hug column "Wants News!" written by Jeffrey Kimball. He was asking why REMark did not contain news on the new Heath/Zenith computers, Bull purchase, latest developments pertinent to H/Z computers, etc.

I had to agree with him. That kind of information has always been absent from REMark. Thus I said to myself, "Self, why don't you call Jim and see if he really wants something like that." So I called Jim and told him I would be willing to try a column like that, and he was elated. I got the job and will do my best to make this column an asset to an already good magazine. Since I get the Zenith Data Systems press releases anyway, and I keep on the lookout for H/Z compatibility, I figure I should be able to swing this column without taking away excess time from my already crowded schedule.

Since so much has happened in the past few months with the Bull purchase of Zenith Data Systems and the new computers introduced, the first column or two will be catch up. After that I'll try to stay current.

If anybody has feedback, questions, criticism, etc., direct it to me at the following:

Henry Fale
2618 Penn Circle
Sheboygan, WI 53081
(414) 452-4172 Business voice line
(414) 452-4344 Fax line
(414) 452-4345 Bulletin board line



In an action designed to bring competitive benefits to both companies, Zenith Electronics Corporation of Glenview, Ill., and Groupe Bull of Paris, France, signed a definite agreement under which Bull will purchase Zenith's computer business (the Zenith Computer Group, which includes Zenith Data Systems, Heath Company, and Veritechnology Electronics Corp.).

The transaction will allow Zenith to

position itself for further growth and industry leadership in its original core business, consumer electronics, while Bull improves its position in the microcomputer industry by acquiring a world-class company.

Under the terms of the agreement, the exact purchase price will be based on the net asset value of the computer business, as defined in the contract, at the time of closing. Based on the balance sheet as of the end of July 1989, the purchase price would be \$635 million; however, it is expected that the net asset value, and thus the purchase price, will be lower as a result of inventory reductions through the date of closing. The closing was expected to take place by year-end, and indeed it did.

Francis Lorentz, chairman and chief executive officer of Groupe Bull, said, "Microcomputers are an essential element in our long-term strategy to enhance our position as one of the world's leading information systems suppliers. The acquisition of the Zenith Computer Group will move us into the first tier of the microcomputer industry, and will open new growth potential on both sides of the Atlantic. It further demonstrates Bull's commitment to the U.S. With complementary markets, products, plants and R&D resources, we make a perfect fit."

Zenith's Board of Directors has unanimously approved the transaction. Pearlman said, "The company has been offered a full and fair price for the computer business. The transaction will mean that our balance sheet will be strengthened significantly and our heavy debt burden will be lifted."

Pearlman and Zenith expects to report a net gain of approximately \$22 million from the transaction after taxes and expenses. Zenith plans to repay short-term obligations and to retire a portion of long-term debt. "The remaining proceeds will be available for appropriate investments in new consumer electronics and component technologies, particularly high-definition television (HDTV) and advanced high-resolution color displays," he

said.

In a continuation and enhancement of the existing close relationships between Bull and Zenith, the Zenith Computer Group will remain a long-term customer for Zenith's power supplies and monitors, including its "flat tension mask" monitor.

Both companies anticipate and will work to assure a smooth transition for employees and customers. The Zenith Computer Group will remain U.S.-based, with its existing management team, sales and corporate headquarters in the Chicago area, and primary manufacturing and engineering operations in St. Joseph, Michigan, the companies said.

Groupe Bull, with world headquarters in Paris and a majority investment in Bull HN Information Systems Inc., — 15 percent owned by NEC Corp. and 15.6 percent by Honeywell Inc. — based in the Boston area and headed by Roland D. Pampel, is one of the world's top 10 suppliers of information systems and solutions.

The Computer Group of Zenith Electronics Corporation, based in Glenview, Ill., consists of three wholly owned Zenith subsidiaries: Zenith Data Systems Corporation, Heath Company, and Veritechnology Electronics Corporation. The Group's primary engineering and manufacturing facilities are in St. Joseph, MI. Of Zenith's 37,000 employees worldwide, about 2,000 are part of the Computer Group. Zenith's computer products revenues were about \$1.4 billion in 1988. Zenith/Inteq is still considered part of Zenith Electronics Corp., but is currently negotiating with Zenith Data Systems.

Zenith's worldwide shipments of personal computers (PCs) that run on the MS-DOS operating system surpassed those by any company except IBM in 1988, and U.S. shipments of portable PCs exceeded all others', according to independent market research. The Computer Group's president is Carl A. Michelotti.

Founded in 1918, Heath is a world-famous supplier of electronic kits to hobbyists. Based in St. Joseph, Mich., the com-

pany offers a complete line of kit and fully assembled electronics products (including PCs), as well as home security systems, educational products, a voice-controlled PC and robot system for the disabled, and computer-based instruments for industry. Zenith acquired Heath in 1979 from Schlumberger Ltd. The president of Heath is William E. Johnson.

Veritechnology Electronics Corporation (VEC) operates the chain of Heath/Zenith Computers & Electronics Centers, considered one of the nation's top 10 computer retailers. With revenues of more than \$200 million in 1988, VEC's chain of 70 North American stores features the full ZDS and Apple lines, plus Heathkit and other Heath Company products. Joseph Schulte is VEC's president.

Based in Herndon, VA., Zenith/Inteq develops and modifies personal computers and related peripherals, most of which are designed to meet the U.S. government's high-security "Tempest" specifications. Zenith acquired Inteq in 1985. Zenith/Inteq's president is Hoy Chang.

Zenith Electronics Corporation is the only U.S.-owned integrated color television and picture tube manufacturer and a U.S. leader in high-definition television (HDTV) technologies.

A diversified electronics company, Zenith develops, manufactures and markets color television sets, cable products and related consumer electronics products, high-technology electronic components for other manufacturers, and portable and desktop personal computers. With 37,000 employees worldwide, the company is based in Glenview, Ill.

Zenith got its start in 1918 when two wireless-radio enthusiasts set up a "factory" on a kitchen table in Chicago and began making radio equipment for other amateurs. By the early 1920's, the infant radio industry began to grow as did the business which sold radios under the name "Z-Nith" (the origin of the Zenith trademark, derived from the call letters of the founders' amateur radio station, 9ZN). In 1923, Zenith Radio Corporation was incorporated in Illinois.

The young company's early accomplishments included the world's first portable radio (1924), the first home receivers to operate on household current (1926), and the first automatic pushbutton radio tuning (1927, the year the slogan, "The quality goes in before the name goes on," was first used).

In 1929, Zenith was first listed on the New York Stock Exchange under the symbol "ZE."

Founded on radio engineering, Zenith soon became a leader in other consumer electronics developments, such as the first all-electric television station (1939), the first FM radio station in the Midwest (1940) and the world's first subscription television system (1947).

Zenith pioneered AM and FM radio broadcasting (including the invention of the stereo FM radio broadcast system, authorized by the FCC in 1961 and still in use worldwide) and played a key role in developing broadcast standards for B&W and color TV.

[I understand Zenith also came out with the first "walkman", a radio to wear around the neck with headphones. Somebody there decided to kill the product, and it never got to market. Sony later came out with the same concept and made millions on it.]

Building on Heath's entry into personal computers, Zenith formed its computer-products subsidiary, Zenith Data Systems, in 1980.

Reflecting the strong growth of Zenith Data Systems and other newer businesses, the company changed its name from "Zenith Radio Corporation" to "Zenith Electronics Corporation" in 1984.

Today, building on the company's tradition of technical excellence, Zenith is a leader in the development of HDTV broadcast and display technologies.

The company's "Spectrum Compatible HDTV System," first unveiled in September 1988, is the only proposed HDTV broadcast technology that meets all the key criteria of performance, coexistence with existing TV technology and efficient use of the TV broadcast spectrum. In 1989, Zenith began initial research on building large-screen, low-cost versions of the FTM display for HDTV applications.

Groupe Bull is one of the world's ten leading suppliers of information systems. Founded in Europe more than 50 years ago, Groupe Bull today is a worldwide organization, consolidating two companies — Bull S.A., based in Europe, and Bull HN, based in the U.S. The group is the leading European-based supplier of integrated information systems.

A pioneer in data processing, Bull began as Egli Bull in 1931, manufacturing tabulating machines designed by Fredrik Rosing Bull, an engineer at a Norwegian insurance company. Right from the outset, the company distributed its products throughout Europe. The company's evolution tracked the growth of the data processing market. Bull introduced one of the world's first electronic computers in 1951. By the mid 1960's, Bull was Europe's largest and the world's second-largest computer manufacturer.

During the 1970's, Bull's sales were strong, revenues increased and the company (then called Cii-Honeywell Bull) consistently held the second market-share position in France (behind IBM). During the late '70's and early '80's, however, growth slowed and losses mounted. In 1982, the French state became Bull's majority shareholder and now owns about 92 percent of the share capital of Compagnie des Machines Bull (CMB), the

holding company for all of Groupe Bull's holdings. The remaining eight percent of CMB stock is publicly traded on nine European stock exchanges. As Chairman of the Board of CMB, Francis Lorentz bears fiduciary responsibility to the shareholders.

Bull HN Information Systems Inc. is the outgrowth of Honeywell Bull Inc., the company jointly created by Groupe Bull, Honeywell Inc. and NEC Corp. in March 1987 from the former Honeywell Information Systems Division. Bull HN's headquarters moved from Minneapolis, Minnesota to Billerica, Massachusetts in 1988. Its name became Bull HN Information Systems Inc. in January 1989, after CMB acquired a majority shareholding. CMB currently holds 69.4 percent of Bull HN, Honeywell Inc. holds 15.6 percent and NEC Corp. hold 15 percent.

[It's interesting to note that Groupe Bull made a \$50.9 million profit in 1985, with \$5.3 billion in net revenues. This is indeed a very strong company.]

So there you have the whole story along with some interesting history. And now we'll move on with the new computer announcements.



In the past, users had to pay a premium for '386 power. A cost effective means to '386 processing capabilities is now available, Zenith Data Systems' [BULL?] new Z-386 SX.

Zenith Data Systems, through innovative system design, has developed an Intel 386SX-based computer system that rivals 80386-based systems processing power. The Z-386 SX provides both high expandability and the ability to run '386-based software in a cabinet footprint no larger than most monitors.

- 16 MHz 386SX microprocessor
- Support for 80387SX co-processor
- 1M byte RAM standard expandable to 8M byte on system board
- Cache memory standard.
- Four open slots
- 16-bit VGA video card supporting EGA, CGA, MDA, and Hercules video standards
- 3.5" 1.4M byte floppy disk drive
- AT-type IDE hard disks:
 - 40M byte (23ms)
 - 80M byte (19ms)
- System board integrates an IDE (AT-type) drive host adapter and floppy disk drive controller
- 16-bit integrated I/O controller:
 - Two 9-pin serial ports
 - One 25-pin parallel port
- Zenith enhanced 101-key keyboard
- MS-DOS 3.3 Plus
- MS-WINDOWS/386 (hard disk drive models only)
- One year carry-in warranty.

The Z-386 SX is available in three configurations.

MODEL# Z-386 SX Model 1 — Description: Basic model as described without any hard drive.

MODEL# Z-386 SX Model 40 — Description: 40M byte 28ms IDE HDD with embedded 1:1 interleaving controller, and other features as described, plus MS-Windows/386.

MODEL# Z-386 SX Model 80 — Description: 80M byte 19ms IDE HDD with embedded 1:1 interleaving controller, and MS-Windows/386.

The 386SX microprocessor is a cost reduced version of the 80386 microprocessor. Like the 80386, the 386SX provides 32-bit internal processing. The 386SX is limited to 16-bit bus traffic and 24 address lines; this differs from the 80386 which has 32-bit address and data buses. These concessions, along with lower material costs, surface mount leads, and a higher yield ratio translates into a less expensive microprocessor capable of running 80386-based software. To a user, 386SX-based computers provide the ability to run 32-bit software at a much lower cost than 80386-based computers. It is somewhat slower, especially in memory R/W, but it's not that bad. Current disk I/O cards and video cards are at best 16-bit cards anyway. So even with a standard 80386, the disk I/O and video only operate with 16 data bits anyway. As for addressing, until you get high in the megamemory, you really do not use the extra addressing bits. The only real bottleneck by comparison will be memory which actually is 32 data bits on the 80386 systems.

In comparison to the 16 MHz 80386 processor, the 386SX chip provides 75% of the performance speed with 32-bit software, and 90% of the performance speed with 16-bit software. A system speed is dependent on more than raw processor speed. Video data width and video memory speed; system RAM speed, use of cache and caching scheme; hard disk drive average access time, data transfer rate, and interleave ratio; in addition to the use of slushware and other system speed enhancing methods all affect the speed of the system. The Z-386 SX is engineered to maximize the speed and capabilities of the 386SX processor while maintaining a favorable cost/performance ratio.

Memory Subsystem: 1M byte (four banks of 256K byte SIMMs) of system memory is standard in all models of the Z-386 SX. Up to 5M byte of memory can be installed on the system board using the optional 2M byte SIMM memory upgrades (Model number: Z-605-1). To increase system memory beyond 5M byte on the system board, the original 1M byte of memory (four 256K byte SIMMs) must be removed from the SIMM sockets. The addition of one Z-605-1 2M byte memory upgrade will increase system memory to

6M byte, a second Z-605-1 will increase memory to 8M byte. The memory located on the system board operates at an effective zero wait-states.

The system supports a maximum of 16M byte of memory. Memory above the 5M byte or 8M byte on the system board can be added using third party memory cards in any of the four open expansion slots.

System Cache Memory: In order to maintain effective zero wait-states, Zenith Data Systems has incorporated a fast cache in the Z-386 SX. Zenith Data Systems developed their own cache controller featuring a 16-level deep write queue which improves system performance on memory writes. Writes to system memory are stored until the processor is idle; once idle, the CPU clears the write buffer and updates system memory. If sixteen writes have been stored in the queue, the processor must suspend all tasks and write to the system memory in order to maintain system memory integrity.

The posted write technique allows the system to hold 16 times more data than competitor's systems in cache before the system must update memory. This creates a more efficient environment and lessens the amount of wait-states required to write to system memory.

System Board: All system hardware components, excluding the video controller, are located on the system board. These components include: CPU, memory, I/O, floppy disk drive controller, and hard disk drive interface.

The backplane is mounted perpendicular to the system board. Five 8/16-bit ISA slots are found in the Z-386 SX. Slot number one is located closest to the system board; slot number five is located furthest from the system board. A VGA video board is provided in slot number two.

16-Bit VGA Video Card: A 16-bit fast VGA card is standard in all configurations of the Z-386 SX. The video card provides VGA BIOS and hardware level compatibility and supports the EGA, CGA, MDA, and Hercules video standards.

Video performance is enhanced with Zenith Data Systems' "Slushware" technique whereby slow 8-bit video ROM is copied into fast 16-bit RAM at system boot-up.

Mass Storage: There are two hard disk drive configurations of the Z-386 SX. Both configurations incorporate IDE drives with an embedded controller and provide 1:1 interleaving. An interface is provided on the system board for the hard disk drive cable. Hard disk drive configurations are as follows:

Model 40 — 40M byte IDE with 28ms average access time

Model 80 — 80M byte IDE with 19ms average access time.

All configurations include a 1.4M byte 3.5" floppy disk drive. The floppy

disk drive controller is located on the system board. An optional 5.25" or 3.5" floppy disk drive is available for use internally to the system.

The system supports three internal devices and provides the circuitry for one IDE hard disk drive and up to two floppy disk drives. Bezel openings are provided for one 3.5" device and one 5.25" or 3.5" device. Jumpers are provided to separately disable the hard disk drive interface and the floppy disk drive controller. Once disabled, an SCSI, ESDI, or ST-506 controller and mass storage devices may be used with the system.

Power Supply: The 150 watt power supply provides ample power for a fully configured system and also incorporates 115/230V switch-mode capability for international operation.

System Software: MS-DOS 3.3 PLUS is standard on all Z-386 SX; MS-WINDOWS/386 is standard for all hard disk drive systems. MS-OS/2 Version 1.1 with Presentation Manager is also available as a software option.



Zenith Data Systems is introducing an innovative portable solution — "the SupersPort SX" — the first full-function, battery operated 80386-SX portable computer with VGA video. The SupersPort SX brings portable computing into the 1990s with cost effective 32-bit processing.

The SupersPort SX comes standard with VGA video, Zenith Data Systems' acclaimed Page-White screen, and a rapid charge (three hour charge time) battery. The performance advantages of the 80386 architecture are clearly understood. And, as software manufacturers continue to move their applications towards 32-bit performance, the SupersPort SX clearly establishes a cost effective solution today, with a link to tomorrow's application solutions.

- 16 MHz 80386-SX microprocessor (switchable to 8 Mhz via keyboard toggle or setup screen)
- 1M byte RAM standard, expandable to 8M byte
- 64K byte ROM for BIOS, including monitor ROM and real-time clock/calendar
- 40M byte and 100M byte hard disk drives available
- 1.4 byte floppy disk drive
- Page White screen
- VGA capabilities on LCD
- Co-processor socket
- 79-key keyboard (101 compatible)
- Slot for optional 300/1200/2400 bps modem
- I/O interfaces standard: -9-pin RS232C AT compatible serial port,
 - Centronics compatible parallel port
 - RGBi port
 - External floppy disk port
 - Expansion bus connection

- Rapid charge battery for 3 hour charge time, 4.7 pounds
- 12.2" wide X 12.2" deep X 3.4" high
- 12.1 pounds without battery
- Attached handle for easy carry
- One year carry-in warranty
- IQ warranty options, such as overnight
- MS-DOS 3.3 PLUS.

Video Display

- Page White screen which gives clear and sharp black characters on a white background
- 80 characters X 25 lines, 10 inch diagonal
- 640 X 480 VGA compatible
- 16 shades of gray for color emulation
- Fluorescent backlighting
- 180 degree tilt
- Separate brightness and contrast controls.

Input/Output Ports

- Serial: 9-pin male IBM-compatible serial port.
- Parallel: 25-pin female Centronics-compatible printer port (bi-directional)
- RGBi: VGA-level color monitor connection
- External floppy disk drive: Miniaturized 20-pin floppy disk drive connector
- Slot for optional 2400 bps Hayes-compatible modem with RJ11 connector.

Power

- Detachable/rechargeable 48 WHr Ni-Cad battery pack, 4.7 pounds.
- Rapid charge battery, 3 hours recharge time
- External autosensing 110/220 VAC, 60/50 Hz adapter/charger.

Warranty:

- One year limited carry-in warranty
- Executive warranty options available.

SupersPort SX Model 40 — SupersPort SX with 40M byte hard disk drive.

SupersPort SX Model 100 — SupersPort SX with 100M byte hard disk drive.

New Options

- ZA-180-85 Battery pack, 48 WHr Ni-Cad, rapid charge
- CB-31-6 Diagnostic, portable series
- ZA-3040-EB Expansion chassis, 3-slot box with cable
- ZA-180-86 Memory upgrade, 2M byte
- ZA-180-87 Memory upgrade, 2M byte to reach above 5M byte
- ZA-3700-CI Numeric co-processor, 80387-SX.

Current Options

- ZA-181-7 Adapter, automobile cigarette lighter
- ZA-180-69 Battery charger, external
- ZA-180-62 Carrying case, with pocket
- ZSS-180-54 Drive, lightweight 5.25" external floppy with cable and adapter
- ZKB-2 Keyboard, 101-key
- ZA-181-24 Modem, 300/1200/2400 bps asynchronous
- ZCM-1490-Z Monitor, FTM color VGA

- TS-81-02 Software, LAP-LINK PLUS data transfer kit.

Intelligent Power Management: In April 1988, ZDS introduced Intelligent Power Management techniques along with a new generation of portable computers. These techniques allows users to extend battery life by configuring the system dynamically or within a setup session. SupersPort SX's power management characteristics include:

- **Display:** From the setup screen, users can set backlight timeouts for typical use under either battery or AC power. Brightness and contrast controls allow adjustments for power conservation.
- **Mass Storage:** From the setup screen, the hard disk drive can be set for power down after a given period of inactivity.
- **Microprocessor:** 16 MHz and 8 MHz dual speeds available. Users can conserve power at the lower speed. Speeds can be selected from either the keyboard dynamically or from the setup screen.
- **Ports:** From the setup screen, users can enable or disable the ports, thus rechanneling the unused power flowing to power the ports into powering the CPU.

Microprocessor: SupersPort SX is designed around the Intel 80386-SX microprocessor. It runs at 16 MHz, but can be toggled down to 8 MHz for clock dependent software or for saving power. The system also comes standard with a co-processor socket.

Power Supplies: The system includes an autosensing adapter/charger with detachable AC cable. This will switch automatically between 110 VAC or 220 VAC operation.

In addition, a detachable 48 WHr rechargeable NiCad battery pack is included with the system. Battery life will vary depending heavily on backlight usage, disk access, and on-board memory usage. Battery life expectancy should be between 3-4 hours, and can be extended by use of the Intelligent Power Management capabilities within the Monitor ROM.

The battery is a rapid charge NiCad with a three hour charge cycle and can be recharged either connected or detached from the system.

Another beneficial feature of battery operation is the ability of the system to automatically switch from AC to DC power in case of a power failure while operating under AC power. This gives the user a "built-in" uninterruptible power supply.



SupersPort 286e adds register-level VGA video and other enhancements to the market-leading 80286-based laptop computer. The SupersPort 286e displays register-level VGA video on the new

Bright Mode screen which is a fluorescent-backlit black-on-white liquid crystal display (LCD) with contrast ratios rivaling those of CRT monitors.

SupersPort 286e also benefits from incorporation of the 16-bit video interface originally incorporated in ZDS portable products in April of 1988. 16-bit video interface allows fast refresh of the screen, thus increasing the speed with which graphics and text are updated on the screen.

The new video technology in SupersPort 286e is complemented by the preinstallation of the expansion bus port as a standard port in the laptop. Buyers would now simply order the optional expansion box under ZDS model number ZA-3040-EB.

Another performance enhancement in SupersPort 286e is the use of one-to-one (1:1) interleave hard disk drives from Conner Peripherals as pioneered by ZDS in the April 1988 introduction. This 1:1 interleave drive replaces the former 3:1 interleave Conner Peripherals hard disk drive.

With both the 16-bit video interface and the 1:1 interleave hard disk drives, users will see an increase in performance over the original SupersPort 286.

- 12/6MHz 80286 microprocessor with zero wait states
- 1M byte memory
- 20M byte or 40M byte 1:1 interleave Power-Miser drives
- 1.44M byte/720K byte 3.5" floppy disk drive
- Bright Mode screen
- Register-level VGA
- 16-bit video interface
- I/O interfaces that are standard:
 - 9-pin RS232C AT-compatible serial port
 - Centronics-compatible parallel port
 - RGBi port
 - External FDD port
 - Expansion bus out (XT-level)
- 12.2" wide X 12.2" deep X 3.35" high (without battery)
- 11.6 pounds (without battery)
- One-year carry-in warranty
- IQ Warranty options, such as overnight
- NiCad battery and 110/220VAC adapter/charger
- MS-DOS 3.3+

SupersPort 286e Model 20 — SupersPort 286e with 20M byte (28ms) hard disk drive.

SupersPort 286e Model 40 — SupersPort 286e with 40M byte (25ms) hard disk drive.

Model

ZA-180-85 Battery Pack, extra 48WHr NiCad with rapid-charge feature, 4.7 lbs.

ZA-180-64 Expansion Card, 2M byte RAM with EMS and extended memory capabilities

ZA-3040-EB Expansion Chassis, 3-slot XT-level with cable.

Model

- ZA-181-7 Adapter, automobile cigarette lighter
- ZA-180-69 Battery Charger, off-line for additional battery charging
- ZA-180-65 Battery Pack, replacement 48 WHr NiCad, 4.06 lbs.
- ZA-180-83 Carrying Case, nylon with printer pocket
- ZAS-180-54 Drive, external 360K byte 5.25" floppy with cable and 110/220 VAC power supply
- ZA-180-66 Expansion Card, 1M byte RAM with EMS and extended memory capabilities
- ZA-3034-NP Keypad, 24-key detachable numeric
- TMP-200 Manual, technical
- Z-416-SS Numeric Co-processor, 80C287
- ZA-181-24 Modem, 2400/1200/300 bps internal Hayes-compatible

The system will be available late 1989. The new peripherals will be available at the same time.



We will not devote much space to this one as it is basically the same thing as the old TurbosPort 386, but faster and with a new VGA display. Most everything else is the same.

ZDS is introducing a system which others thought could not be done — a high end 20 MHz 80386 portable system with 2+ hours of battery life and VGA video, the "TurbosPort 386e."

Now it's not necessary to compromise power computing when traveling. Users such as financial analysts, application software developers, and business consultants require fast, powerful computing, not only in the office, but on the road as well . . . TurbosPort 386e brings power portable computing to those in need.

- 20 MHz 80386 microprocessor
- 2M byte RAM standard, expandable to 3 MB
- 40M byte hard disk drive
- 1.4M byte floppy disk drive
- 640 x 480 Page White screen with 16 shades of grey VGA video
- 79-key detachable keyboard
- Standard 300/1200/2400 bps Auto-sync modem
- I/O interfaces standard:
 - 9-pin RS232C AT compatible serial port
 - Centronics compatible parallel port
 - RGBi port (VGA out)
 - Expansion bus connection
- 53 WHr rapid charge battery for two hour charge time, 3.3 pounds
- 13.25" wide x 14.75" deep x 4.75" high
- 14.7 pounds without battery
- Attached handle for easy carry

- One year carry-in warranty
- IQ warranty options, such as overnight
- MS-DOS 3.3 PLUS.

TurbosPort 386e Model 40 — TurbosPort 386e with 40M byte hard disk drive and internal Autosync modem

- ZA-3034-22 Adapter, 110/220 VAC
- ZA-3034-HC Battery Pack, 53WHr NiCad, rapid charge
- ZA-3034-CS Carrying Case, with pocket
- CB-31-6 Diagnostic, Portable series
- ZA-3034-EB Expansion Chassis, 3 slot box with cable
- ZKB-2 Keyboard, 101-key
- ZA-3034-NP Keypad, external numeric
- TM-3034 Manual, technical
- ZA-3034-ME Memory Upgrade, 1M byte
- ZCM-1490-Z Monitor, FTM color VGA

ZA-3600-CI Numeric Co-processor, 80387

TS-81-02 Software, LAP-LINK PLUS data transfer kit.

The system includes an autosensing adapter/charger with detachable AC cable. This will switch automatically between 110 VAC or 220 VAC operation.

The battery is a rapid charge NiCad with a three hour charge cycle and can be recharged either connected to the system or detached from the system.

Another beneficial feature of battery operation is the ability of the system to automatically switch from AC to DC power in case of a power failure while operating under AC power. This gives the user a "built-in" uninterruptible power supply.





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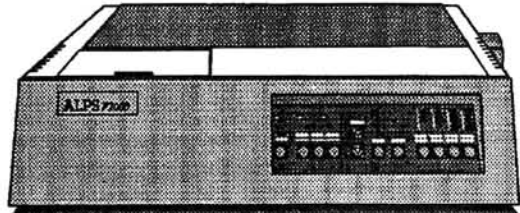
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Abort, Retry, Pfui! — COMMAND Error Messages

If you have owned a computer for any length of time, you have probably discovered that using a computer can occasionally be hazardous to your sanity, particularly when some unexpected error message causes a loss of data that may have taken hours of work to develop. There are many ways that you can lose data in a computer system, but the most common seems to be the series of MS-DOS error messages that are always accompanied by the infamous "Abort, Retry, Ignore" prompt. This article was designed to help you figure out what to do when you see one of those error messages, and it is intended to be used as a reference. Because these error messages are generated by the MS-DOS Command Interpreter — COMMAND.COM — this article discusses error messages in Zenith Data Systems (ZDS) MS-DOS version 3.3 Plus. Although some error messages may be unique to some DOS versions, the explanations in this article should help you figure out what is wrong, regardless of what DOS version you are using. In so far as possible, these error messages, and the corrective actions, were tested on my Z-386/16 and SupersPort 286.

This article will help you understand the *real* problem that has occurred and give you some practical suggestions on what to do when you see these error messages. You need not be a technical guru to understand how to correct these problems, and this article will give you some easy-to-understand solutions to common problems in non-technical terms. In addition, I have listed some suggestions for prevention of many common problems at the end of this article to help you avoid seeing the "Abort, Retry, Ignore" prompt, but let's begin by taking a look at what happened to cause these error messages.

What Happened?

If you have ever worked with the CP/M operating system, you may be fa-

miliar with the perverse BDOS (Basic Disk Operating System) error messages that nearly always signaled an irrecoverable loss of data. Fortunately, DOS (MS-DOS and PC-DOS) was designed to provide a modest recovery capability that you see in the form of a specific error message followed by the "Abort, Retry, Ignore" prompt. To understand how to cope with these errors, it is helpful to review a few of the basics.

All of these error messages make their home in the DOS Command Interpreter, COMMAND.COM, that must be included on any bootable system disk. The Command Interpreter allows you to talk to DOS by entering commands on the command line, trying to locate the programs associated with those commands, and occasionally displaying an error message when it can't execute or find the command you entered. While performing these functions, the Command Interpreter in turn must essentially relay your commands for appropriate hardware action (e.g., reading data from a disk drive) through the DOS Basic Input/Output System (BIOS).

The BIOS is just a special "program" that translates requests for hardware actions to appropriate commands for a specific device. For example, the PRINT command usually causes a file to be read from a disk drive and written to a printer. But if there is a problem such as no disk in the disk drive, you will get an "Abort, Retry, Ignore" error message. And since all of these error messages are reporting a problem with a hardware device such as a disk drive, printer or modem, they are generally called device error messages.

Device Error Messages

A device may be external to your computer, such as a printer or modem, or it may be an internal device, such as a disk drive. Device error messages are usually displayed when an error occurs during a

DOS attempt to read data from or write data to any of these devices, but some application software, like word processors or spreadsheets, may also be programmed to "intercept" these errors so that you won't lose data. Because there is no way to discuss all of the variations in software applications, we will confine this discussion to errors that may occur as a result of commands entered on the DOS command line.

Many device error messages indicate problems that are easy for you to fix. It may be as simple as closing the latch or door on a disk drive or turning on the power to the printer. In some cases, there may be little or nothing that you can do. The important point is to understand how to deal with the problem so that you can enter the appropriate response.

How to Respond to Abort, Retry, Ignore, Fail

When one of these error messages appears, you will generally have four choices in current DOS versions): Press an *A* for Abort, *R* for Retry, *I* for Ignore or *F* for Fail. It is unfortunate that the responses are listed with "Abort" first because you will nearly always want to try the *R* option first in an attempt to tell DOS to retry the operation. The *R* is usually the preferred first response. It is also important to note that DOS has already tried to perform the requested operation a few times before you ever see the error message, but if at first you don't succeed, it is usually safe to try it again.

For those of you interested in the technical details, the exact number of retries is actually coded in the BIOS, and most DOS versions attempt a read or write operation five or six times before displaying an error message in the first place. That is a particularly important point because it means there is a high probability that DOS will not be able to perform the operation unless it is some-

thing that you can fix, such as closing or latching the door on a floppy drive. Each time you try the *R* response, DOS will again attempt to perform the operation (i.e., a read or write) using the number of retries coded in the BIOS. Sometimes you can get lucky with an *R* response, especially if you remove and reinsert a floppy disk in the SAME drive, but that is more the exception than the rule. Of course, whether that trick works or not depends on exactly what caused the error message. For example, an attempt to read or write a disk that has not been initialized with the *FORMAT* command will never work, no matter how many times you Retry the operation. But you will want to look at each one of the error messages and consider the other three responses also.

You can also press an *A* to abort the program or operation in progress. This option actually terminates (i.e., aborts) the program attempting to read or write a disk, and it will normally return you to the DOS system prompt, even if you are in the middle of a program like a word processor. In most cases, this response will cause you to lose all data that have not already been saved to disk.

Pressing an *I* tells DOS to ignore the error and continue as if the error did not occur. DOS will attempt to continue with the program or operation, but this can be a dangerous response because the actual results depend on what you are doing at the time. For example, a "Bad sector" error that is Ignored during a *COPY* command will probably mean that the destination file is not complete or may even be corrupted. Still, it may be the only viable choice left because it is better to "recover" most of a file (using the *COPY* command, for example) than lose the whole thing. You are quite likely to lose at least some data with this response, but it may not be nearly as catastrophic as aborting the program or operation. Depending on exactly what caused this error, you may not always see this option displayed as part of the message in current DOS versions.

Current DOS versions, such as Zenith MS-DOS 3.3 Plus, have a fourth option that earlier versions did not have: Choosing the *F* option will Fail only the current operation, such as a read or write, but the current application (e.g., a word processor) will continue. In general, I do not recommend choosing this option when it appears while running a DOS program (e.g., *FORMAT*, *COPY*, etc.), but it may be a lifesaver if you are using an application, such as a word processor or spreadsheet.

This introduction was intended to help you understand the general kinds of responses to an error. In order to simplify the examination of these error messages, I have divided them into six categories beginning with the most commonly seen.

Strange as it may seem, we'll begin with the general device errors.

General Device Errors

For some reason, it seems that the most common error messages seem to fall into the category I have called General Device Errors. And of all these errors, you will probably see the "General Failure" error most often, which is the reason it is listed first (out of alphabetical order) in Figure 1.

If you refer to Figure 1, you will see that the "General Failure" message is listed first. In general, the device for these error messages is a logical device. When it refers to a disk drive, the device is a drive letter such as "B:". The device may also be displayed as "PRN" indicating a printer. In most cases, I have shown device in these Figures to indicate either a drive letter or other logical device unless the error message is quite specific to a hardware unit. Because some of the error messages may indicate either an error reading from or writing to a disk, I have indicated that possibility by including "(or writing)" as part of the message.

**General Failure error reading
(or writing) device**
Data error reading (or writing) device
Read Fault error reading device
Write Fault error writing device

**Figure 1
General Device Error Messages**

The "General Failure" is a catch-all error displayed when DOS finds an error that doesn't fit into any other message type, and I have listed it first (not in alphabetical order) because it seems to be the most common. It is a non-specific type of error message that indicates some kind of unusual error has been detected that DOS cannot really identify. I find the error occurs most often when I forget to *FORMAT* a disk since that will always cause this error message.

You will see this message in a form like "General Failure error reading B:" when you attempt to use the *DIR* command to check the directory on an unformatted or new disk. It also occurs any time DOS does not recognize the disk format. This includes attempts to read a CP/M formatted disk, a 1.2 MB disk in a 360 KB drive or a 1.44 MB 3.5-inch disk in a 720 KB drive. In all cases, it simply means that DOS does not recognize the format in the specified drive, and that also includes forgetting to insert a disk in the drive to begin with. I've done that too.

The other usual cause of the "General Failure" message is that the latch or door on the disk drive has not been closed properly. In many cases, you can successfully recover from this error by inserting a properly formatted disk in the

drive and being sure that the door or latch is closed and pressing *R* to retry the operation. If this error message cannot be corrected by trying one of these actions, you will probably have to use either the *F* or *A* options. In some cases, the Ignore option is not displayed or will not perform any useful action anyway. If this problem continues to occur with a specific application program on a variety of disks and drives, you may want to check with the dealer or manufacturer about the problem.

The "Data error" message is displayed when DOS cannot successfully read or write a file. In most cases, it means that the disk has developed a bad "spot" called a bad sector. If you have a hard disk, you may also see an additional message like "Sector address of error is hhhh" where hhhh is the hexadecimal address of the bad sector that you should write down for later use with the *DETECT* command that will be discussed later in this article.

If you are trying to read a data file, then you will want to try the *R* option first. You might get lucky and be able to read the data, and if you are using an application like a word processor, be sure to save the data to a difference file name. If that doesn't work, you might want to try the *I* option to ignore the error for now, and you will probably be able to read MOST of the data. If you are trying to write or save data to disk, your best bet is to change disk drives or subdirectories if the application will allow it. Then, you will probably be able to save that data to the new drive or subdirectory.

The "Read fault" and "Write fault" messages mean that DOS is unable to read from or write to the indicated device, which may be a disk drive or printer (i.e., PRN). If the problem occurs with a disk drive, be sure that the disk is correctly inserted in the drive and the latch/door is properly closed, then press *R* to retry the operation.

If the problem is another device, such as PRN for the system printer, you will probably have to Abort the operation to correct the problem. Be sure that the device is properly connected with the correct cables, powered-on, and on-line. I've had an occasional "Write fault" problem with my C. Itoh C-310 printer that I can usually correct by turning the power off and then back on. One other possibility to check is to be sure that your system is properly configured for the specific device, which will most likely involve the *CONFIGUR* or *MODE* command.

Although the General Device errors can apparently occur for any kind of logical device, I have found that the "General Failure" error message occurs most often when attempting to read a disk with the wrong format. I have been most fortunate in that I have only seen the "Data" error once when I was not testing, and that oc-

curred because of a bad sector during an attempt to run a DOS command. You will probably not encounter the "Read Fault" and "Write fault" errors in normal operation, but at least you have some idea of where to begin looking for the problem.

The next category of errors can be devastating if they are not handled properly since they are specific to reading and writing disk files.

Disk Unique Errors

All of the error messages in this category are directly related to reading data from or writing data to a disk. Figure 2 shows the disk unique errors.

Disk error reading (or writing) d:
Disk error reading (or writing) FAT
Invalid Disk Change error reading (or writing) d:
Non-DOS disk error reading (or writing) d:
Not ready error reading (or writing) device
Sector not found error reading (or writing) d:
Seek error reading (or writing) d:
Write protect error writing d:

Figure 2
Disk Unique Error Messages

The first two "Disk error" messages mean that DOS could not read from or write to a disk, usually because of a bad sector. Use the *R* option first. If that does not work, you will probably want to Abort (press *A*) the program and copy all files to another disk or subdirectory. Also try removing a floppy disk from the drive and insert it again before pressing *R*. If this occurs during a *COPY* command, you can usually press *I* (for Ignore) in an attempt to recover most of the data, so long as it is a drive error (indicated by the first message with a drive letter).

If the error occurs in the FAT (the second "Disk error message"), then there is one other thing you can try. First, immediately back up all files on the drive with the problem because this message means that there is a bad sector in one of the File Allocation Tables (FATs). Although the *CHKDSK* program with the */F* (Fix error) switch may help correct the problem, it is always good practice to make a backup as soon as possible, especially on a hard drive. More importantly, you need to recognize that a bad sector in a FAT will usually affect many files because the file chains are stored in the FAT (See "How Disks and DOS Work Together" — March 1990 or Chapter 5 in this book). After the files on a floppy or hard drive are backed up, then run the *CHKDSK* command with the */F* switch on that drive, and press a *Y* in response to the prompt. Then, you can look at all of the files with a "CHK" file type and attempt to recover as much of the information as possible.

The "Invalid Disk Change" error means precisely what it says: you changed a floppy disk when you should not have.

Replace that disk with the ORIGINAL disk that was in the drive when you entered the last command, and press *R* to Retry the operation.

The "Non-DOS disk" error is displayed because DOS cannot use the disk for some reason. Although you may want to press *R* to Retry the operation a couple of times, you will usually find that you must press *A* to Abort the operation. Insert the disk in another disk drive (if available) and try the same command or application again. Whatever the problem, this message usually means that the disk was not initialized with the *DOS FORMAT* command for the DOS version you are us-

ing. In a few cases, this kind of message may also indicate a problem with the alignment of a floppy disk drive, especially if the disk was originally created on another computer. If you are absolutely certain that the disk does not contain any valuable files, then you will probably want to *FORMAT* it so you can use it on your system. Some manuals suggest that running *CHKDSK* with the */F* switch may be appropriate, but I have found that is a waste of time because *CHKDSK* will also display an error message that you have a "Non-DOS" disk.

For a disk drive error, such as "Not ready error reading (or writing) B:", this error message usually means that the drive door is not closed or latched properly. Verify the disk is correctly inserted in the drive, make sure the door or latch is closed properly, and press *R* to Retry the operation. If you have recently made a hardware change in your system, it may also mean that a cable from the disk drive is not connected properly.

Both the "Sector not found" and "Seek error" messages may indicate either a bad disk (with a bad sector) or a hardware problem. Like most problems of this kind, you should first verify that the disk is inserted properly in the drive and the drive is closed or latched correctly. Then, respond with an *R* to Retry the last operation. If that does not work, you will probably need to Abort the process and do some checking. If the "Sector not found" message appears only when a specific floppy disk is used, then the problem is most likely a bad spot on that particular disk. In that case, backup all files on that disk (not with *DISKCOPY*), and try to re-

construct the file from the new disk. If you use the *COPY* command for this, you will probably have to use the *I* option to ignore the problem so that you can successfully copy all files to a new disk. Since both messages may indicate a hardware problem with either the disk drive or the disk controller (either floppy or hard drive), you should also consider running the *ZDS Disk Diagnostics* for your computer to check out the hardware. In some cases, you may find that it is appropriate to have your system serviced by an authorized Zenith Data Systems dealer.

The "Write protect" error simply means that the disk is physically write protected. First, remove the disk from the drive. If you are using a 5.25-inch disk, remove the write protected tab covering the notch in the disk. If you are using a 3.5-inch disk, move the write protect tab to the "closed" position. Note the difference in the way the write protect tab works for the different disk sizes. To write on a 5.25-inch disk, the write protect notch must be "open" (i.e., uncovered) while the write protect notch on a 3.5-inch disk must be "closed" (i.e., covered). Then, insert the disk back into the same drive, and press *R* to Retry the operation.

Printer Unique Errors

Two errors can specifically occur when you are attempting to print a file on the system printer as shown in Figure 3.

No paper error writing device
Not ready error writing device

Figure 3
Printer Unique Error Messages

The "No paper error" usually, but not always, occurs as the error message indicates; however, there are a number of common problems that can generate this problem that are strictly a problem with the printer. Epson printers seem to have more problems in generating a false "No paper" error, even when the printer is not really out of paper. For that reason, many of the parallel printer cables you can buy will not have line 12 (the Paper Empty signal) connected, and in some cables, it may be missing altogether, which eliminates the problem of sending a false signal to the computer. By the way, I should note that this cable trick does not affect the printer's capability to generate a paper out indication *BY* the printer (usually a beep). Disconnecting the Paper Empty line only affects the computer's capability to notify you of the condition and will not usually cause any problem. In fact, this false signal problem can be so bad that many manufacturers of current parallel printers, including Epson, provide a way to disable the Paper Empty signal to the computer. Based on that knowledge, fixing the problem is fairly easy. First, be sure

that the printer is not really out of paper. If it is, then load more paper, and press *R* to Retry the operation. If it is not out of paper, then you will probably have to Abort the print operation because you probably have a hardware problem. Check the printer manual to see if it has the capability to disable the Paper Empty signal by some configuration setting, such as a DIP switch on the printer. If that does not work, you might want to get a friend to help you permanently disconnect line 12 on the parallel printer cable.

For a printer problem, the second message in Figure 3 will nearly always appear as "Not ready error writing PRN." When you see a message like that, it means the printer cable is not properly connected or you have the wrong cable (check it), the printer is not powered on (turn it on) or the printer is off-line (check the switch on the printer). If the printer is not powered on or is off-line, then correct the problem, and Retry the operation. If that does not work, you will have to Abort the operation, power off the equipment, and be sure that you have the correct cable that is properly connected.

Configuration Error

It is rare that you will see this kind of configuration error, which may occur with older application programs. The general form of this error message is shown in Figure 4.

FCB Unavailable error reading
(or writing) device

Figure 4
Configuration Error Message

Older application programs, such as word processors, used a technical feature of DOS that required the use of a File Control Block or FCB. This error message means that there was not enough "memory" to store all of the FCBs that a program requested. Newer programs generally require the use of the FILES= command in the CONFIG.SYS file in a form like: FILES=25; however, this particular command will not solve the problem indicated by this error message. To fix this problem, just add a command like FCBS=8 in your CONFIG.SYS file. Because the "default" in many DOS versions is 4, I suggest incrementing the FCBS= line in units of 4 until the problem disappears in the short term. In the long term, it is a good idea to contact the software manufacturer about getting an updated version of the program you are using.

Device Driver Unique Errors

There are a number of potential problems that can cause problems with various device drivers that are installed by the DEVICE= command in the CONFIG.SYS file. Error messages unique to a prob-

lem with a device driver are shown in Figure 5.

Bad call format error reading (or writing) device
Bad command error reading (or writing) device
Bad unit error reading (or writing) device

Figure 5
Device Driver Unique Error Messages

The error messages shown in Figure 5 indicate some kind of technical problem with a device driver that is usually beyond the capability of a user to fix. About the best you can hope for is to pinpoint exactly which device driver is causing the problem, and that's done by eliminating each device driver (the DEVICE= command line) and testing the system after removing each one. The objective is to isolate the device driver which is causing the problem so you can call the software manufacturer for some help. Unfortunately, the nature of device drivers is such that these error messages may indicate there is a conflict between two device drivers, and that can be extremely difficult to isolate. Remember that all device drivers are essentially memory-resident programs, and they may have conflicts with one another because of a program bug in one or more of these "programs." If you have more than one DEVICE= command in your CONFIG.SYS file, you will need to have a lot of patience and time to isolate the problem. It is extremely important to try to isolate this kind of problem because if you do not before you call a software manufacturer, you are almost certain to hear something like: "It must be a problem in your computer because we have thousands of users and have never received a complaint of this kind." That's why you need to isolate the problem to a specific manufacturer. And if you don't know much about computers, you might want to find a friend who can help you with the problem.

File Sharing Unique Errors

Messages related to file sharing can occur on a Local Area Network (LAN) when two or more computers are connected together. Because more than one computer can access the same file, the network must keep track of who is using a file to prevent problems, such as two users attempting to update a file at the same time. The file sharing errors are shown in Figure 6.

Lock Violation error reading (or writing) device
Sharing buffer exceeded error reading (or writing) device
Sharing Violation error reading (or writing) device

Figure 6
File Sharing Unique Error Messages

The "Lock violation" messages indicate that a program you are using at-

tempted to access a file that was already in use by another user and program.

When a program successfully accesses a file (technically called opening a file) on a network, all other users and programs are "locked out" of that file until the first user and program is finished with that file (technically called closing a file). You can wait a few minutes and press *R* to Retry the operation or you can press *A* to Abort the operation and go on to something else. Another possibility is to call the System or Network Administrator for help in identifying who is using a file.

The "Sharing buffer exceeded" message indicates that a network parameter may need some adjustment. Call the System or Network Administrator to report the problem.

The "Sharing violation" error usually means that you have attempted to access a file that is not flagged as "share" in the network. You should contact the System or Network Administrator for assistance because you will not usually be able to change this kind of network access privilege, except on your own files.

Correcting Bad Sectors

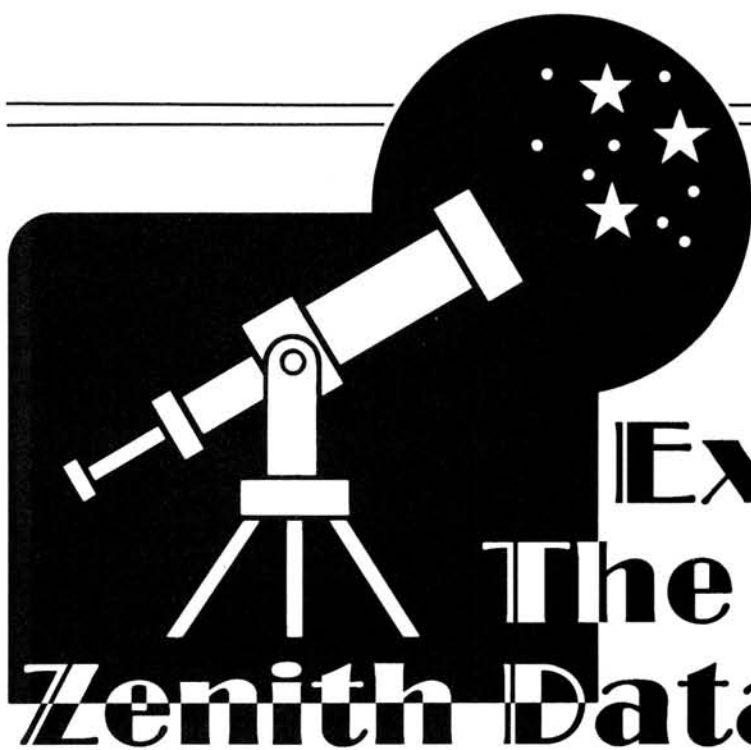
If any error message suggests that you have a bad sector on a hard drive, be sure to write down the address of the bad sector as displayed by the error message. Then, run the ZDS DETECT command, and when asked for the bad sector address, type the value EXACTLY as it was displayed by the original error message. In many cases, a valid bad sector address will contain the letters A through F, so be sure that you record and enter it correctly.

After you have run the DETECT command, the next step is to back up ALL files on the hard drive. This is an important step because you will need to FORMAT that hard drive partition to eliminate the possibility of DOS attempting to use that bad sector again. Then, you can restore all files to the hard drive and operate your system in the normal way.

Powering Down

In the next installment, we will dis-

cuss "Coping with Common DOS Error
Continued on Page 17



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Exploring The Extras in Zenith Data Systems' MS-DOS

If you use one (or more) of Zenith Data Systems' (ZDS) MS-DOS computers, chances are you're not taking full advantage of the enhancements in ZDS' version of the MS-DOS operating system. Some of the enhancements are added commands such as the ZSPOOL print spooler and ZCOM file-transfer program. Others are expanded capabilities for standard MS-DOS commands such as PRINT and FIND.

When I compared the command set for ZDS' MS-DOS version 3.3 with the "standard" commands for MS-DOS 3.3, I found that ZDS included 16 additional commands, expanded capabilities for 9 other commands, and more.

This article presents a summary of what I found. Though you're not likely to make use of everything described here, you're bound to discover something useful, especially if you learned about MS-DOS on a non-Heath/Zenith machine or through magazines and books aimed at MS-DOS users in general.

Zenith Data Systems' MS-DOS Versus Others

Microsoft Corporation's MS-DOS is an operating system (software that controls a computer on a basic level) that Zenith Data Systems and other vendors provide with their computers. One component of MS-DOS, or DOS for short, is a set of commands that help you in using your computer. The familiar COPY, DEL and DIR commands are part of this set.

Some vendors add commands of their own to the basic set, but I don't think anyone has added as many as ZDS.

ZDS' MS-DOS version 3.3 Plus even includes a mini-set of disk utilities that are similar to the popular Norton and Mace utilities.

If you use an earlier version of MS-DOS, you won't have all of the commands described here. (To find out your version number, type VER at the DOS prompt.) If you're interested in upgrading to version 3.3 Plus, check with a ZDS dealer in your area. Owners of recent versions may be eligible for a discount from the \$149.00 price.

My descriptions of the commands are brief — I've tried to tell enough so you'll know whether or not a command might be useful to you. For more information about a command, see the MS-DOS Command Reference and User's Reference manuals.

Miscellaneous Utilities

I'll begin by describing three utilities for executing multiple DOS commands, spooling files to be printed, and transferring files between computers.

APPLY

APPLY can save you keystrokes when you need to execute a DOS command several times in a row. Its use is best illustrated by example: To copy the files APPLES.TXT, ORANGES.TXT, and BANANAS.TXT from the FRUIT directory of the C drive to the root directory of the A drive, you could type:

```
COPY C:\FRUIT\APPLES.TXT A:  
COPY C:\FRUIT\ORANGES.TXT A:  
COPY C:\FRUIT\BANANAS.TXT A:
```

Or, using APPLY, you could instead type:

```
APPLY "COPY C:\FRUIT\% A:"  
APPLES.TXT  
ORANGES.TXT  
BANANAS.TXT
```

After you type each of the three file names, APPLY executes the command in quotes, substituting the file name for the percent sign. When you're finished, Control-C quits APPLY.

The above example uses the keyboard for input, but APPLY also can read input from a file. A limitation to using APPLY is that COMMAND.COM must be in the root directory of the current default disk.

ZCOM

ZCOM lets you copy files between computers via their serial ports directly or by modem. If you have two computers with incompatible floppies, such as a laptop with 3.5" drives and a '158 with 5-1/4" drives, ZCOM provides a way to get files from one computer into the other.

ZCOM must be installed in the computers at both ends of the link, and they must be connected either by a null-modem cable between their serial ports or by phone via modems.

ZSPOOL

ZSPOOL sets aside a chunk of memory as a printer buffer, or spooler. With ZSPOOL installed, any files you print are sent to the spooler, instead of directly to the printer. The spooler then parcels the file out to the printer while letting you use your computer for other tasks.

ZSPOOL can be used when you're printing from a word processor or other applications software, so it's more flexible

than the print queue created with the DOS PRINT command.

A disadvantage: The memory set aside for the spooler is unavailable for other uses, and once the spooler memory is allocated, you can free it up only by rebooting.

Managing Disks

The next group of commands and utilities can help you use disks (especially hard disks) more efficiently. Some of these commands can keep you from getting into trouble, or even get you out of trouble after the fact.

COMPACT

COMPACT unfragments files and arranges them sequentially on a disk. This command exists because DOS saves files on a disk wherever it can find room, which often results in a file being saved in fragments, with pieces scattered in different locations around the disk.

Normally, a fragmented file is no problem, since the disk's FAT (file allocation table) keeps track of which fragments make up a file. But fragmented files can take longer to read from the disk, and they can be harder to recover if deleted by mistake (more on this later). COMPACT sorts through an entire disk, putting any fragmented files back together.

ZDS recommends backing up your disk before running COMPACT.

DETECT

DETECT tests a hard disk for bad sectors and keeps a record of any found. A sector is a unit of data storage (usually 512 bytes) on a disk. If you're getting the DOS error message:

Data error reading drive C:

or otherwise suspect you have a hard-disk problem, DETECT will tell you if a bad sector is the cause.

A few bad sectors don't mean the entire disk is unusable. Reformatting (be sure to back up first) can "lock out" the bad sectors and keep them from being used.

GDU

If you type GDU at the DOS prompt, you'll see a menu of the functions of ZDS' General Disk Utilities. Their most vital function is probably the ability to bring back deleted files.

If you delete a file accidentally, chances are good that GDU can restore it. The DOS delete command doesn't delete the file itself, only its entry in the FAT, which tells where the file is located on the disk. Deleting the FAT entry frees the file's space for use by another file, but the original file remains on the disk until it's written over.

GDU offers a choice of several techniques for recovering deleted files, or even deleted directories. It doesn't hurt

to practice before you need to undelete. Delete a file or directory you no longer need, then see if you can use GDU to recover it.

GDU also lets you sort your directories by name, extension and name, attribute, date, or size. Sorting can turn a mishmash of a directory into a coherent list. Or you can sort to locate your most recent files, or all files with the same extension, or another characteristic you're interested in.

Other GDU Options Include

Display Disk Parameters — Presents a screen of information about a selected disk, including its data capacity, cluster size, and more.

Display FAT Cluster Chain — Shows which disk clusters are used by a given file. (Cluster size is set when a disk is formatted, and consists of one or more sectors. Each file takes up one or more clusters.)

Search/Display — Lets you view the contents of any disk cluster. You also can use this option to search a disk for a text string you request — this can help put back together an erased, fragmented file.

List/Edit — Lets you view and edit a file or directory, byte by byte.

Display/Edit — Lets you edit any disk sector.

Editing with List/Edit or Display/Edit should be done only after reading about GDU in your MS-DOS Command Reference, and then with care. A mistake here can make a file or an entire disk unusable.

GDUTSR

GDUTSR (General File Utilities Terminate and Stay Resident) is a companion to GDU that automatically records the cluster locations of each file and directory you delete. This gives you a better chance of recovering a deleted item if the need arises.

To use GDUTSR, you must install it by typing GDUTSR each time you boot, before you delete any files or directories. You can add GDUTSR to your AUTOEXEC.BAT file so it's installed automatically on boot-up.

SEARCH

SEARCH displays the directory location(s) of a requested file or files. If you use lots of subdirectories, it's easy to lose track of where a file is stored. To find the file ABC.TXT, type:

```
SEARCH ABC.TXT
```

SEARCH looks only in the current directory and its subdirectories, so if you want to search an entire disk, run SEARCH from the root directory.

SEARCH will also quickly find multiple copies of the same program, and you can use "wild cards" to search for files with similar names or the same extensions. For example, SEARCH *.BAK will find all files with the extension BAK.

SHIP

SHIP moves the read/write heads of a hard disk to a safe location, away from the disk's data storage area. This helps to protect your data if the drive is moved or bumped and the heads contact the disk surface.

Needless to say, you don't have to be shipping the drive for it to get bumped, so it doesn't hurt to "park" the heads each time you power down. Some hard drives do this automatically; if yours doesn't, running SHIP will do it for you.

Setup commands

The following commands are mainly for the preliminary work of configuring and formatting hardware.

CONFIGUR

CONFIGUR is a menu-driven utility for configuring serial and parallel ports. You can specify serial-port parameters such as baud rate, number of stop bits, and word length. CONFIGUR lets you map, or reroute, data from the parallel port to the serial port. This may be necessary when using a serial printer. CONFIGUR also provides a convenient way to view your current configurations.

Many applications programs provide their own means of performing these functions, without using CONFIGUR. The functions also can be accomplished by the DOS MODE command, but CONFIGUR is a more user-friendly way to do it.

DSKSETUP

DSKSETUP has two functions. It allows you to change the default drive type and capacity for your floppy drives (as much as your hardware allows), and it enables you to turn format protection for a hard-disk partition on or off. Format protection can keep you from formatting a hard disk by mistake — before formatting, you have to take the extra step of turning off the format protection with DSKSETUP.

MACHINE

MACHINE contains several options to help you configure your system for certain hardware options. Different computers will have different options available, depending on the system's capabilities.

You can select a video mode (VGA, EGA, CGA, etc.), within the limits of your video card and display.

You also can change the clock speed of your CPU (central processing unit). If you've ever tried to run a game, a demo, or other software that flew by too fast on the screen to see, slowing down your CPU speed may help.

If you have hardware memory caching, MACHINE is where you can turn it on and off.

Options of special interest to laptop users are power saving features that turn off the hard disk motor, modem, and

backlighting, and shading control for LCD (liquid-crystal display) screens.

PART

In implementations of MS-DOS other than ZDS', an FDISK command is used to divide a hard disk into partitions or logical drives and to select the default boot partition. If you've seen references to FDISK and wondered why you don't have it, it's because Zenith Data Systems performs these same functions with its PART command.

PREP

PREP is the first program to be run when installing a hard disk. PREP initializes the disk, tests it, and locks out any bad sectors found. PREP is also where you can store information about a "non-standard" disk, if you want to install a disk not specifically provided for in the installation procedure. PREP also lets you vary your interleave factor, which may give you faster disk access time.

PREP destroys all data on the disk, so should be used only after backing up. Many users will never run PREP, as new disks usually have PREP's low-level formatting already done.

Compatibility

Zenith Data Systems also includes a couple of commands for taking care of software incompatibility problems.

BOOTF

BOOTF forces your computer to boot from floppy disk even if you have a hard disk. This may be necessary for running certain copy-protected programs. Once you run BOOTF, you need to reboot to access your hard drive again.

NOSTACK

NOSTACK enables you to run programs that otherwise would "crash" due to incompatibilities in their use of the user-stack memory area. According to the ZDS manual, the only programs known to require NOSTACK are Smartcom II and Multilink Advanced.

Enhanced commands

ZDS also provides extra capabilities for some standard DOS commands.

BACKUP

If you use the DOS BACKUP command to back up your files, ZDS has added some extra options you may find useful. You can back up files only before a certain date (/b:date), exclude the files you list (/x), not format the backup disks (/n), verify (/v), query before backing up each file (/q), or beep when a response is required (/r).

COMMAND

COMMAND.COM is the MS-DOS

command interpreter that takes control of your system on boot-up. ZDS' /d switch prevents COMMAND.COM from prompting for the time and date automatically.

DISKCOMP

An added option to the DISKCOMP disk compare command causes a beep when a response is required (/r).

DISKCOPY

Additions to the DISKCOPY command are options to verify that the contents of both disks match (/v), to format the destination disk automatically instead of asking whether or not to do it (/f), and to beep when a response is required (/r).

FIND

FIND searches a file for requested text. In most implementations of DOS, FIND is case-sensitive — if you ask it to look for cat, it won't find CAT or Cat. This makes it useless in many situations.

ZDS' /i switch lets you ignore case when you search. The command: FIND/i"cat"ANIMALS.TXT will locate each occurrence of cat — in uppercase, lowercase, or combined — in the file ANIMALS.TXT. (The occurrences will all be displayed as uppercase.)

FORMAT

The /q switch for the FORMAT command suppresses the usual on-screen prompts and messages that appear when formatting. This might be useful if you format from within a batch file — but be careful not to create a situation where the lack of prompts might cause you to format when you didn't mean to.

KEYB

The KEYB keyboard loading command can be forced to use 101-key (/e) or 84-key (/o) mapping, to match the extended or original keyboard layout.

PRINT

In addition to the standard print options, Zenith Data Systems' PRINT command includes options that let you choose how many copies (/c:n), left margin (/L:n), right margin (/r:n), page length (/p:n), and whether or not to formfeed after printing (/f).

A few other differences in ZDS' PRINT command could cause confusion. ZDS uses /a (instead of /c) to remove a file from the queue, /s (instead of /p) to add a file, and /n (instead of /s) to set the time-slice value.

RESTORE

Extra options for RESTORE (the companion to BACKUP) are restoring all files to the current directory (/f), restoring operating system files to the destination disk (/o), querying before restoring (/q), beep-

ing when a response is required (/r), restoring files with today's date only (/t), verifying before restoring (/v), and excluding listed files (/x).

Device drivers

Device drivers enable MS-DOS to communicate with additional hardware, or to use existing hardware in different ways. Zenith Data Systems has included a couple of extra device drivers in its MS-DOS:

EMM.SYS

EMM.SYS is required in order to use a Zenith Data Systems EMS card as expanded memory.

ZCACHE.SYS

ZCACHE.SYS speeds up system operation by reserving a portion of memory as a disk cache. With ZCACHE, information read from disk is also saved in the cache memory. Frequently read information can then be reread from the cache memory, instead of from disk, for faster operation.

(ZCACHE is different from the "hardware-caching" of a cache-memory card, which contains its own high-speed memory and caches data from other, slower memory, rather than from disk.)

This completes our tour of Zenith Data Systems' additions to MS-DOS. I hope you've found something here to make your computing life easier, more efficient, or both.

Product information

MS-DOS 3.3 Plus (OS-51-3) \$149.00
Call (800) 447-4700 for a
Zenith Data Systems Dealer nearest you *

Continued from Page 14

Messages", such as the infamous "Invalid command or file name", which can mean one of several things, depending on what command it is associated with.

If you have any questions about anything in this column, be sure to include a self-addressed, stamped envelope (business size preferred) if you would like a personal reply to your question, suggestion or comment.

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Software

MS-DOS 3.3 Plus (OS-51-3)
List Price \$149.00
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Managing MS-DOS

Resident Programs

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Introduction

One of the most annoying problems effecting frequent PC users is the clashing of various resident utilities, or simply running out of memory from using too many of them. (Resident utilities, or Terminate and Stay Resident utilities as they are properly called, are those programs which you run once to make them part of the DOS environment until rebooting.) Wouldn't it be nice to be able to add and remove resident utilities at will?

Well, there exists a software package for doing just that, known as the TSR Utilities Version 2.5 by TurboPower Software (3109 Scotts Valley Drive #122, Scotts Valley, CA 95066). I've seen a couple other software packages do similar things, but my experimentation shows the TSR Utilities to be the most robust. The package is also free of charge — not shareware, but literally free. You may obtain a copy from the PC Magazine BBS, PC SIG, or other public domain sources. You may also obtain a copy from TurboPower for a ten dollar handling fee.

Unfortunately, the documentation may be slightly forbidding to the new user because it only provides a description of the eight programs in the package, and their options. Virtually no mention is made of why this software is so useful, how to incorporate it into your daily PC environment, or how to investigate problems with conflicting resident utilities.

The purpose of this article is to address these issues. We will look closely at the three main TSR Utility programs, FMARK, RELEASE, and MAPMEM. We will create a few batch files which will enable you to do the most useful, basic functions, without having to read all of the documentation. Once you have this basic control over your resident utilities, and see how much more useful your PC environment becomes as a result, you can explore the more advanced features of this fine software package.

The MAPMEM Program and Other Basic Concepts

After obtaining the software package,

you will want to put the following files in the directory where you keep your DOS commands: FMARK.COM, RELEASE.COM, and MAPMEM.COM.

MAPMEM is a program no PC user should be without: it provides a display of all resident programs loaded into DOS, along with their memory usage and interrupt vectors. Even if you were not going to use the rest of the package to manipulate the resident utilities, the MAPMEM command is useful anyway. Here is a sample output of MAPMEM:

PSP	Blks	Bytes	Owner	Command Line	Hooked Vectors
0008	1	142288	config		22 24 2E
2C60	2	3536	command		13
2D5C	2	608	DSKWATCH		17 2F
2D83	2	33408	ZSPOOL	32	21
32BF	2	9760	CED	-FINIT.CED	21
3523	1	560	EGASET	AUTO COLOR=1,7	08 10
356C	2	2208	KBFX	/BO /DO /FO /VO	09 16 1C
3602	2	439144	free		

It is not necessary to understand the numbers here! Basically, all resident utilities are listed in the order they are invoked after bootup. "Owner" is the name of the resident utility, which will sometimes show up as "N/A" (program name not available because the program did not supply its name to DOS when going resident), and "command line" shows parameters used to invoke the utility. Owner "config" is MS-DOS, and "command" is the resident portion of COMMAND.COM; these two are always present (the 142,288 bytes occupied by "config" actually refers to bytes occupied by DOS plus all DEVICES in CONFIG.SYS). The amount of free conventional memory appears at the bottom of the list.

The size information is useful if you find yourself running out of memory from loading too many resident utilities, because you'll be able to see which ones are the worst memory hogs. The interrupt vectors will be touched upon later when I discuss how to deal with resident programs that conflict with each other.

While MAPMEM shows exactly what happens when we install and remove resi-

dent utilities, the other two commands, FMARK and RELEASE, will together provide the capability of removing the resident utilities.

First, however, there is one important point to be made: resident utilities must be removed in the opposite order of their installation. Think of the set of resident utilities as a last-in, first-out stack. This is due to the fact that DOS cannot re-claim the memory used by a resident utility unless it is the most recent addition to the stack.

So, FMARK and RELEASE will operate in such a fashion as to remove one or more utilities from the end of the stack.

FMARK and RELEASE

FMARK is a resident program which creates a file containing the exact state of the PC's memory usage, interrupt vectors, and everything related to loading resident utilities as it appears when FMARK is run. The RELEASE utility removes all resident programs added since the time FMARK was run; it would use the information in FMARK's file to restore the system to the same state it was in before.

For example, looking at the above MAPMEM output, suppose you ran FMARK after running DSKWATCH (just before running ZSPOOL, CED, EGASET, and KBFX). The RELEASE command would then remove ZSPOOL, CED, EGASET, and KBFX, but leave DSKWATCH intact. If you were to run FMARK before loading any resident utilities, the RELEASE command would remove all resident utilities (except for FMARK itself, which will remain intact, so more utilities can be loaded, and another RELEASE done later).

It sounds kludgy, but it works very well. With the single exception of the FASTOPEN command, any resident utility can be removed once installed, and the memory it occupied is immediately freed.

The exact syntax for FMARK is:

FMARK filename

The form of the RELEASE command we will be using is:

RELEASE /R /K filename

The "filename" parameter may be any file name of your choosing, but obviously the RELEASE command must specify the same name as the FMARK command used.

Incorporating the Utilities into Your PC Operating Environment

We will now look at a set of batch files which make the process of controlling resident utilities more automatic. There are three batch files, but first we must make modifications to AUTOEXEC.BAT.

1. AUTOEXEC.BAT will contain two FMARK commands (which is legal, as long as different filename parameters are used). One will mark the system state before any resident utilities are added (except FASTOPEN, as mentioned before). The other will mark the state after the default set of resident utilities are loaded.

Sample AUTOEXEC.BAT:

```
@ECHO OFF          ("ECHO OFF" in DOS 3.2 or earlier)
CLS
PATH= ...          (however you usually set your path)
FASTOPEN C:=70     (remember we cannot RELEASE this!)
FMARK C:\LOWMARK.SET (first mark, before utilities are added)
DSKWATCH
ZSPPOOL 32        | some default resident utils: disk
CED -FINIT.CED    | error check, print spooler, command
EGASET AUTO COLOR=1,7 | editor, EGA util, and keyboard util
KBFIX /B0 /V0 /D0 /F0 /
FMARK C:\HIGHMARK.SET (second mark follows default utilities)
...and the rest of AUTOEXEC.BAT (PROMPT, etc.)
```

This setup enables us to use RELEASE, which will be called by the next two batch files, to remove either all resident utilities or just the ones added since AUTOEXEC installed the default set.

Note that if you want to speed things up, put the two files LOWMARK.SET and HIGHMARK.SET in a RAM disk: there is no reason to keep them on a hard disk. To do this on RAM drive D:, for example, replace the filename arguments in these commands with "D:\LOWMARK.SET" and "D:\HIGHMARK.SET".

2. RESET.BAT will remove all resident utilities you added manually after AUTOEXEC.BAT completed. This command is useful because resident utilities tend to build up on you! You might run SIDEKICK, then the PRINT command (which is resident), and so on, and the next thing you know, you have insufficient memory for some application, or perhaps one resident utility

is conflicting with another one. You can simply run RESET, and everything will be back the way it was when you started working. Obviously, you would want to make sure any open SIDEKICK files are closed or print jobs finished before you do this!

Listing of RESET.BAT:

```
@ECHO OFF          (or "ECHO OFF"...)
RELEASE /R /K C:\HIGHMARK.SET
```

The idea here is that you will want some resident utilities — the default set — to always be present. Others, like SIDEKICK and PRINT, might be considered unnecessary luggage you would like to get rid of during a memory crunch.

3. REMOVE.BAT will remove all resident utilities (except FASTOPEN). Unlike RESET, this will include all default utilities run by AUTOEXEC.BAT. This is handy when you want to run software that wants no resident programs installed, like FASTBACK PLUS, or perhaps you want the maximum amount of free RAM available for some task.

Listing of REMOVE.BAT:

```
@ECHO OFF          (or "ECHO OFF"...)
RELEASE /R /K C:\LOWMARK.SET
DEL C:\HIGHMARK.SET (precaution -- see REINST.BAT)
```

This file is smart enough not to re-install the default resident programs twice by checking for the presence of the HIGHMARK.SET file, which is created by the second FMARK command (in AUTOEXEC.BAT and REINST.BAT), and is removed by REMOVE.BAT.

Using RELEASE Within Batch Files (Other Than "RESET" and "REMOVE")

RELEASE displays a short message when it is run, indicating the amount of memory re-claimed. When run within a batch file, like RESET.BAT and REMOVE.BAT, the message is slightly different; it still indicates how much memory is freed, but the indicated amount of memory will not be available until the batch file completes.

Basically, this means that when the RELEASE command is called within a batch file, the memory it will re-claim cannot be obtained — it is temporarily trapped — until all batch files are completed, and you are looking at the DOS prompt. This is due to the way DOS handles batch files, which is more of a design oversight than a bug.

You may ignore this message when you run the RESET and REMOVE commands from the DOS prompt, because the only purpose of these batch files is to run RELEASE with certain parameters. Once that is done, they terminate, at which time the memory re-claimed by RELEASE becomes permanently available.

You cannot, however, run an application after the RELEASE command within a batch file, and expect to be able to obtain the memory re-claimed by RELEASE. For example, Harvard Total Project Manager requires so much memory that I must do a REMOVE before running it. Although one would be tempted to make a batch file like this to run HTPM, it will not work:

```
@ECHO OFF
CALL REMOVE
HTPM
```

(The "CALL" command, which was added in DOS 3.3, allows a batch file to be called from within another batch file, like a subroutine. If you just entered "RE-

4. REINST.BAT will re-install all default resident utilities after you have REMOVED them. This way, you can get back to your regular system environment quickly after doing some task that required a REMOVE. This file is essentially identical to the lines in AUTOEXEC.BAT after (not including) the first FMARK, and up to and including the second FMARK.

Sample REINST.BAT based on the above AUTOEXEC.BAT:

```
@ECHO OFF
IF EXIST C:\HIGHMARK.SET GOTO ERROR
DSKWATCH
ZSPPOOL 32
CED -FINIT.CED
EGASET AUTO COLOR=1,7
KBFIX /B0 /V0 /D0 /F0
FMARK C:\HIGHMARK.SET
GOTO STOP
:ERROR
ECHO Resident utilities already installed -- no REMOVE was done!
:STOP
```

MOVE" here without the "CALL", you would not be returned to the original batch file after REMOVE finished. To do the same thing as "CALL" in DOS 3.2 or earlier, use "C:\COMMAND /C" followed by the batch file name.)

Still, let's create a batch file to run HTPM, called HTPM.BAT, to at least check that the REMOVE command was run. It will, again, use the presence of the HIGHMARK.SET file to indicate that a REMOVE has not been done:

```
@ECHO OFF
IF NOT EXIST C:\HIGHMARK.SET GOTO OK
ECHO Running REMOVE. Please re-run HTPM batch file again after
ECHO REMOVE completes.
REMOVE (will return to DOS after REMOVE completes)
:OK
HTPM
```

There are other reasons that one might want to remove resident programs before running an application, besides needing the memory occupied by the resident programs. Some programs state in their documentation that they must be run without any resident programs installed. Others will not work when certain resident programs are installed. In either case, one can create a batch file which does a REMOVE, calls up the application, and performs a REINST upon completion:

DOS 3.2 or earlier:

```
ECHO OFF
C:\COMMAND /C REMOVE
... run application here ...
REINST
```

DOS 3.3 or later:

```
@ECHO OFF
CALL REMOVE
... run application here ...
REINST
```

Note that some applications are still better off being treated like HTPM and getting as much memory as possible. FASTBACK PLUS, which documents that no resident programs should be present, will run if you call it from one of the above batch files. It will, however, run faster and compress better if it has as much free memory as possible (which is stated elsewhere in the documentation, although not too clearly).

Resident Program Conflicts

You won't need to run applications this way too often, but sooner or later you are likely to see a resident program conflict. For example, a co-worker recently thought a virus had infected his PC because Lotus 1-2-3 Rel. 2.00 would suddenly terminate within a minute after being brought up. By removing resident programs before loading 1-2-3, the problem disappeared. It was eventually discovered that the presence of SIDEKICK and a mouse driver causes 1-2-3 to crash when the clock on the bottom of the screen is updated!

This is just one example of many. The general rule is that when something

strange or unexplainable happens with an application, try running it after doing a REMOVE. This is often all that is necessary to clear up the problem.

The conflict, however, may not be with the application, but between two (or more) resident programs! Correcting this problem is often simply a matter of installing the resident programs in a different order. The TSR Utilities, of course, provides the means of doing this type of experimentation without having to reboot the

PC between trials; we already know how to do this.

We will now, however, look at how the MAPMEM command's display of interrupt vectors will help us see which resident programs are most likely to conflict, and thus would be the first candidates for having their order of installation changed. To do this, we will need to use another file from the TSR Utilities package called WATCH.COM.

First, modify AUTOEXEC.BAT to run the WATCH command before installing any resident utilities. Follow this by the set of utilities you wish to use in any order (with the FMARKs properly positioned, as shown in the sample AUTOEXEC.BAT above), and then reboot the PC. Here is a sample MAPMEM output after rebooting (and note that the FMARK commands show up as "N/A"):

PSP	Blks	Bytes	Owner	Command line	Chained Vectors
0008	1	142288	config		
2C60	2	3536	command		
2D4D	2	3808	WATCH	TSR WATCHER	16 21 27
2E3D	2	4288	FASTOPEN	c:=70	
2F4B	1	144	N/A	d:lowmark.set	
2F55	2	608	DSKWATCH		13
2F7B	2	33408	ZSPOOL	32	16 17 1C 2F
34B6	2	9760	CED	-FINIT.CED	21
3711	1	560	EGASET	AUTO COLOR=1,7	08 10
3758	2	2192	KBFIX	/FO /DO /BO /VO	09 16 1C
37E3	1	144	N/A	d:highmark.set	
..37F3	2	426192	free		

To identify resident programs most likely to conflict, look for those that share an interrupt vector — those for which the same vector number appears in their listing. For example, the above MAPMEM shows two utilities, ZSPOOL and KBFIX, that have the numbers 16 and 1C under "chained vectors". This means they share these two interrupt vectors. WATCH also shares vector 16, but do not worry about WATCH.

Suppose, for example, that you had installed the print spooler, ZSPOOL, and the keyboard enhancer, KBFIX, in the opposite order. You would have noticed the keyboard response was too slow. Using

this procedure, you would have found they shared these two interrupt vectors. So, you would want to try switching their order: use REMOVE to remove all resident utilities, and either re-install the set from DSKWATCH on manually, or modify REINST.BAT to reverse the order of ZSPOOL and KBFIX. The keyboard response would then be back to normal.

There will be occasional conflicts between resident programs that do not share interrupt vectors. The most likely such programs are those which use many interrupt vectors, and their documentation usually states they should be installed last. Obviously, if you use two resident programs that wish to be installed last, one of them will be out of luck.

Why would a program want to be installed last? Because interrupt vectors are accessed by resident programs in the reverse order of their installation. In the above example, KBFIX sees the two interrupts 16 and 1C first, followed by ZSPOOL, followed by DOS itself (which would include any devices installed via CONFIG.SYS). Programs which do many fancy tricks work better if they get first access to interrupt vectors (which means they only cause more problems when working with other programs which do fancy tricks).

How do you know in which order to install things to start with? Keeping this "last first" order in mind, try a little common sense. The disk error checker, DSKWATCH, which provides extended disk IO error information, will not report on disk errors caused by any other resident

programs unless it is installed first. In the case of the keyboard enhancer, KBFIX, it makes sense that would be the first in the chain of command to see actual keyboard input, so it should be installed last.

So, start with a little guess work at picking the original order of utilities, and rearrange those which share the same interrupt vector if problems arise.

The purpose of the WATCH command, incidentally, was to allow MAPMEM to display all interrupt vectors a program is hooked into, including those which have been hooked by another program installed later. Without WATCH, MAPMEM would not show vectors taken

over by another program. Notice how MAPMEM refers to the list of interrupt vectors as "hooked" when run without WATCH installed, and "chained" with WATCH present.

Once this type of experimentation is no longer being done, you do not need to use WATCH any more, unless you wish to use the DISABLE utility.

DISABLE, another program included in the TSR Utilities, can temporarily disable any individual resident program without effecting any others. It does not remove the utility, and therefore, does not help increase your amount of free memory.

Conclusion

My goal was just to get you started manipulating resident utilities. Once you

get used to not having to reboot between changes in resident utility arrangement, you might want to read the documentation that came with the package, so you may take advantage of DISABLE, among other features.

When you finally do peruse the documentation, keep the following in mind:

- FMARK is one of two utilities used to mark the current system state. The other one — the original one — is MARK. MARK keeps the current state information in memory instead of writing it to a file. FMARK is really better because it does exactly the same thing without tying up so much memory.
- The options of the RELEASE command I am suggesting you use in the batch files are described in the manual. These batch files depend on the /K

option being used, which keeps the FMARK information intact so more utilities can be loaded and again removed.

- The /R option of RELEASE restores certain internal attributes, which will ensure that RELEASE works with badly behaved resident utilities. It is, therefore, normally a good idea to use it. If, however, you get funny results when using RELEASE, and you were not attempting to remove ALL resident utilities (after the first FMARK), then the /R option is probably resetting something the remaining resident utilities(s) are using, so you would want to remove the /R option.

Editor's Note: This software is available for downloading on HUG PBBS. *

Continued from Page 4

using a text video mode, the EGA 640 X 350 mode, or the VGA 640 X 480 mode. The hatch or dot patterns can be displayed in 15 colors. If you have a Zenith Data Systems FTM monitor, you can use this program to help you "tweak" your monitor to perfection. Caution: Do not attempt to make internal adjustments to your monitor unless you are familiar with such work.

VOLORS.COM — This program puts a VGA compatible system into the 256 color mode, and displays all of the available colors in the default palette. The colors are numbered on the screen for reference. This program is useful for adjusting the two external controls on an FTM or other VGA monitor for the best color picture.

KEYREP.COM — This program can adjust the key repetition rate (the rate at which a key repeats if it is held down) on an AT-compatible computer, and it can adjust the delay before repetition. The repetition rate can be as slow as 2 repetitions per second or as fast as 30 repetitions per second. The delay can be from 1/4 second to 1 second. Unlike other programs that allow you to adjust the keyboard repetition rate, this one can restore the ZDS mode (where the repetition rate starts out slow and then speeds up as you hold the key down). The ZDS mode can be restored after the rates have been altered by this or any other program. If you prefer the ZDS mode, and you have some other program that "messes it up", you can fix it after you exit from the offending program by running KEYREP.

10184.COM — If you have one of the newer 101-key keyboards and a program that only "understands" the older 84-key keyboards, this program may help you to run it. It causes the separate arrow keys and Home, End, Page Up and Page Down to produce the same codes as the numerical keypad 1 through 9 keys when they are pressed with a shift key held

down. If you have a program that instructs you to press an arrow key with a shift key held down, and does not respond as it should, it may work properly after you install 10184 on your system. This program is great for running old software on laptops which emulate a 101-keyboard, but do not have a separate keypad.

NOMON.COM — This utility is a memory resident program that disables the Ctrl-Alt-Ins and Ctrl-Alt-Enter key combinations, to protect your computer from unauthorized access to your ROM monitor. If you have an AT-compatible, it can prevent unauthorized access to the Setup utility. If your computer is used by a number of people, you may feel safer with this utility installed.

CS.COM — This program can change the speeds on ZDS computer models that have the ability to run at SLOW, SMART, or FAST speeds. It is easier to use than the MACHINE command for changing speeds. If your computer has a cache memory system installed, CS can be used to disable and enable the cache for further control on the speed of your computer.

TABSPC.COM — This program is like the TABSPC program supplied with the ZDS Programmer's Utility Pack except that it buffers input and output, and therefore runs MUCH faster. It converts tab characters in a text file into an equivalent number of spaces.

SPCTAB.COM — This program is like the SPCTAB program supplied with the Programmer's Utility Pack except that it also buffers input and output, and runs MUCH faster. It converts spaces in a text file into tab characters where they occur at standard tab locations. This SPCTAB is a little smarter than the original one in deciding where to put tabs. For example, it will not put in a tab in a place where there is only one space character, because that would not accomplish any size reduction of the file, and it could mess up future revision of the file.

WSON.COM — This program is a "filter" that works like TABSPC and SPC-TAB, except that it converts an ordinary text file into a WordStar document mode file. Its output is compatible with WordStar versions up to 5.5.

SCD.COM — This program is yet another version of the HUG Screen Clock. This version reads the real time clock on an AT-compatible computer instead of the MS-DOS clock, and it displays both the date and time on the screen. The date and time are displayed in the upper right corner of the screen even while you run other programs.

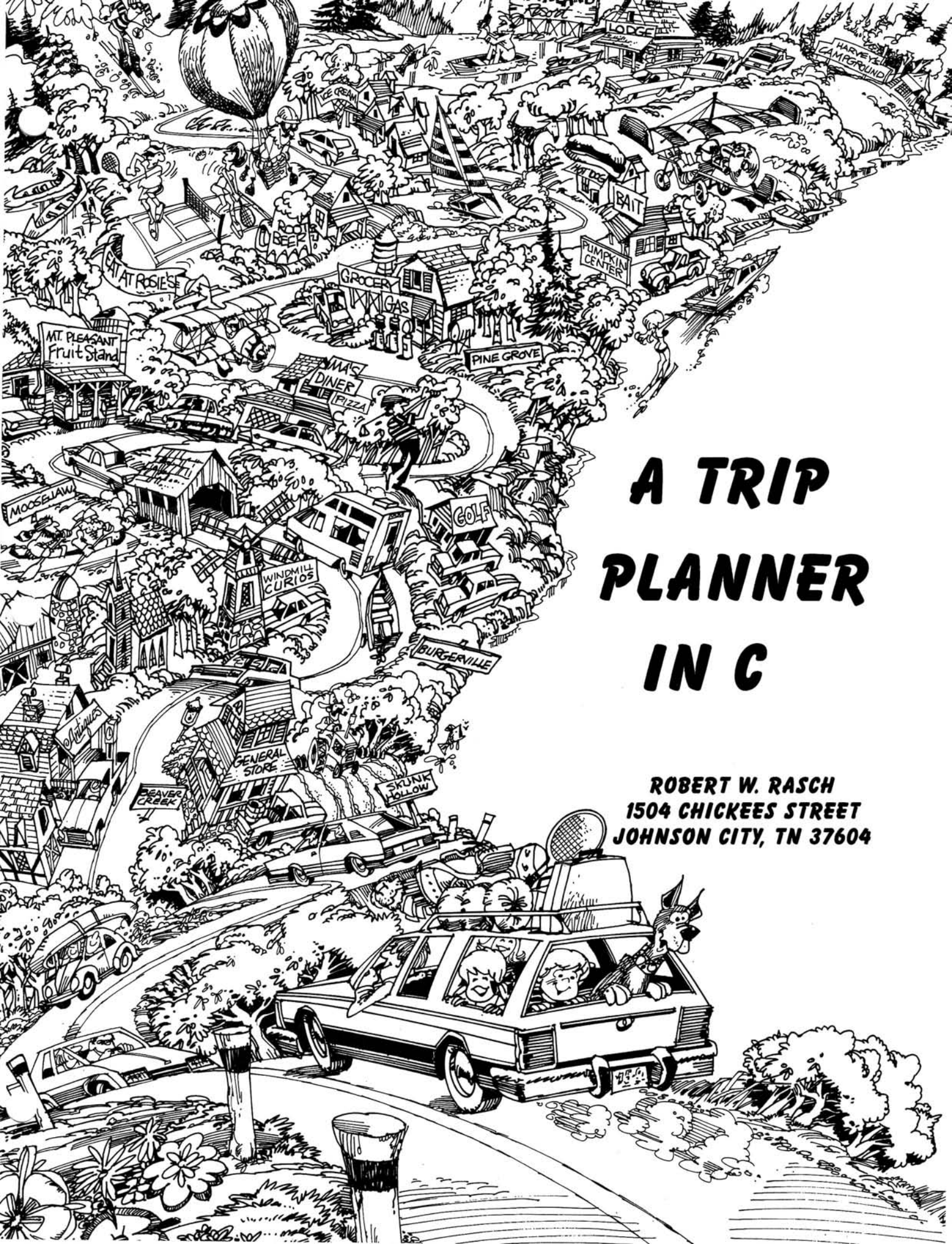
The assembly source code for these programs is included on the disk.

HUG P/N 885-3045[-37] HEPCAT Update

HEPCAT (the HUG Engineer's and Programmer's Calculation Tool) has been upgraded to version 1.7. This new version has the following enhancements:

1. The ability to pop up over any standard CGA, EGA, VGA, or Hercules graphics video mode. HEPCAT can now pop up over programs like Windows 386 and AutoCAD release 10 while they are running in the VGA mode. It can even pop over CSHOW while you are viewing a 256 color GIF image. And it restores the screen perfectly when you exit from it.
2. The ability to turn off concurrent operation. This allows you to pop up HEPCAT while graphics programs are updating the screen.
3. HEPCAT can be temporarily disabled without removing it from memory. This allows you to run a game or other program that uses HEPCAT's activation key.

To upgrade to the latest HEPCAT version, send in your original HEPCAT disk and \$10. If you do not already have HEPCAT, see the description of 885-3045 in the January issue. *



A TRIP PLANNER IN C

**ROBERT W. RASCH
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JOHNSON CITY, TN 37604**

One of the tedious parts of interstate travel by automobile is the lack of diversity in the scenery. Sometimes it is even difficult to know where you are. Your computer can make travel easier by calculating a "trip plan."

I find that it helps to make a detailed trip plan; then a glance at the odometer tells me where I am and reference to the clock indicates how well I am progressing. Periodic reference to the plan helps keep me awake.

Making a detailed plan can be inconvenient. Before I wrote "TRIP2.C" I would get out my map measuring wheel to fix the distances between points and would use spreadsheet software to make up a detailed plan that included odometer readings and estimated times of arrival at stages of travel. A recent "blooper" in distance measurements convinced me that there must be a better way. I was way off from what actually happened. I had misread the distances, an easy thing to do.

TRIP2.C is my answer to the problem. After the program is compiled and the data base loaded; the entry of a text file locations list returns a detailed trip plan that has odometer readings and estimated times of arrival at each point of interest. An example is provided below. For the automobile traveler it is the equivalent of the aviator's flight plan.

Example of the output from trip2.c.

```
Starting Time is set at 8.00 hours
JOHNSON CITY, TN ==> BRISTOL, VA
 16 miles 8:21am time of day
BRISTOL, VA ==> ABINGDON, VA
 29 miles 8:38am time of day
ABINGDON, VA ==> MARION, VA
 91 miles 10:01am time of day
MARION, VA ==> WYTHEVILLE, VA
101 miles 10:15am time of day
WYTHEVILLE, VA ==> BLACKSBURG, VA
142 miles 11:09am time of day
BLACKSBURG, VA ==> ROANOKE, VA
168 miles 11:44am time of day
ROANOKE, VA ==> LEXINGTON, VA
214 miles 12:45pm time of day
LEXINGTON, VA ==> STAUNTON, VA
245 miles 1:27pm time of day
STAUNTON, VA ==> HARRISONBURG, VA
269 miles 1:58pm time of day
HARRISONBURG, VA ==> MIDDLETOWN, VA
323 miles 3:10pm time of day
MIDDLETOWN, VA ==> WASHINGTON, DC
389 miles 4:38pm time of day

Starting Time is set at 8.00 hours
WASHINGTON, DC ==> MIDDLETOWN, VA
 66 miles 9:28am time of day
MIDDLETOWN, VA ==> HARRISONBURG, VA
120 miles 10:39am time of day
HARRISONBURG, VA ==> STAUNTON, VA
143 miles 11:11am time of day
STAUNTON, VA ==> LEXINGTON, VA
175 miles 11:53am time of day
LEXINGTON, VA ==> ROANOKE, VA
221 miles 12:54pm time of day
ROANOKE, VA ==> BLACKSBURG, VA
246 miles 1:28pm time of day
BLACKSBURG, VA ==> WYTHEVILLE, VA
287 miles 2:23pm time of day
WYTHEVILLE, VA ==> MARION, VA
```

Listing for trip2.c.

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <math.h>
#include <ctype.h>
#define EMPTY (-2)
#define SIZE 2
#define SPEED 45.0
#define LAT_INDEX 69.23
#define LONG_INDEX 53.85
int file_output = 0;
struct locations {
    char name[81];
    float latitude;
    float longitude;
};
main()
{
    int hours, minute;
    int flag, i, j, find_dat();
    float start, temp_min, time, distance, total, x, y;
    char a, buffer[30];
    /* Now set up the data base */
    struct locations map[SIZE+1];
    strcpy(map[0].name, "WASHINGTON, DC");
    map[0].latitude = 38.90;
    map[0].longitude = 77.02;
    strcpy(map[1].name, "JOHNSON CITY, TN");
    map[1].latitude = 36.40;
    map[1].longitude = 82.34;
    strcpy(map[2].name, "BRISTOL, VA");
    map[2].latitude = 36.60;
    map[2].longitude = 82.18;
    /* end of data */
    printf("Enter 'f' for output to a file with prompts suppressed.\n");

    if( ((a = getch()) == 'f') || (a == 'F') ) file_output = 1;
    if(!file_output) {
        printf("Do you need instructions? [y/n]\n");
        if( ((a = getch()) == 'y') || (a == 'Y') ) explain();
    }
    /* locate two cities and then find latitude and longitude */
    printf("Do you want to see the list of locations [y/n]\n");
    if( ((a = getch()) == 'y') || (a == 'Y') ) show_dat(&map);
}
total = 0; j=0; flag = 0;
printf("Enter a value for the starting time in hours\n");
if((start = atof(gets(buffer))) == NULL) start = 6.5;
/* now get the first value for i; or quit the program */
printf("Starting Time is set at %6.2f hours \n", start);
if((i = find_dat(&map)) != EMPTY) flag = 1;
while( flag == 1 ) /* infinite loop */
{ if( (j = find_dat(&map)) == EMPTY ) continue;
  else ;
  x = fabs(map[j].latitude - map[i].latitude) * LAT_INDEX;
  y = fabs(map[j].longitude - map[i].longitude) * LONG_INDEX;
  distance = sqrt(( x * x) + (y * y));
  printf(" %s ==> %s\n", map[i].name,
        map[j].name );
  total = total + distance;
  printf(" %6.0f miles ", total);
  if( (time = start + (total/SPEED)) > 24 ) printf("ERROR NEXT DAY\n");
  hours = time;
  temp_min = time - hours;
  minute = 60 * temp_min;
  if( hours < 12 )
      printf(" %2d:%02dam time of day \n", hours, minute );
      if( hours == 12 && minute > 0 )
          printf(" %2d:%02dpm time of day \n",
                hours, minute);
  if( hours > 12 )
      printf(" %2d:%02dpm time of day \n",
            hours - 12, minute);

  i = j;
}
}
int find_dat(argument)
```

298 miles 2:37pm time of day
 MARION, VA ==> ABINGDON, VA
 360 miles 3:59pm time of day
 ABINGDON, VA ==> BRISTOL, VA
 373 miles 4:16pm time of day
 BRISTOL, VA ==> JOHNSON CITY, TN
 389 miles 4:38pm time of day

The "navigation" involved in TRIP2.C is by means of latitude and longitude. It can be as accurate as the "fixes" that you make for it. The more closely placed points of interest, the more accurate the total mileage will be. I estimated my points with a ruler from the Rand McNally World Atlas and two decimal points seems adequate to get mileage for a 500 mile trip accurate to about 5%. The value for LAT_INDEX and LONG_INDEX vary with position on the globe. The values used here were obtained for South Eastern United States by measurements of the miles per degree of Latitude or Longitude from appropriate maps in the Atlas. You may want to use other values for other regions of the world or locations within the U.S. You might even want to provide the flexibility of making these values variables within the data base structure.

You could load your data base by hand coding the values, but that is tedious and error prone. It is easier to construct a text file that has the following format:

START, which is an integer that will represent the first value of your index. This will be zero if you are starting out, it will be a larger value if you are adding to an existing data base. You can have 255 locations with the index as defined.

LOCATION NAME in the form of CITY, STATE. LATITUDE in degrees (floating point number of decimal degrees). LONGITUDE in degrees (floating point number of decimal degrees).

For example: To create the data base shown in the listing use the following:

```
0
WASHINGTON, DC
38.90
77.02
JOHNSON CITY, TN
36.40
82.34
BRISTOL, VA
36.60
82.18
```

End the file with an empty line.

Then, having compiled the program ADD2MAP.C, run it with the following command line.

```
add2map <input.txt >output.c
```

File output.c will then have the data base loader in the form shown in the listing for trip2.c.

Append that file to your listing in the location just after the line that reads "struct locations map[SIZE+1];"

Then move the "#define SIZE" value up to the top of the listing file and the data base loader should be in proper position for the compilation of trip2.c.

```
struct locations *argument;
{
    int i, j, val, flag;
    char buffer[81];
    if( !file_output )
        printf("Enter: City, State\n");
    gets(buffer);
    if(strlen(buffer) == NULL) exit(1);
    for(i=0;i<strlen(buffer);i++)
        buffer[i]=toupper(buffer[i]);
    flag =0;j=0;i=0;
do {

    if((val = strcmp(buffer, argument[i].name )) == NULL) { j=i;flag=1;
        i++;
    } while( ( i <= SIZE ) );
    if(flag) return j;
else {putchar(7);printf("Location is not in database\n");
    return EMPTY;}
}
show_dat(argument)
struct locations *argument;
{
int i;
    for(i=0; i <= SIZE ; i++)
        printf("%s\n", argument[i].name );
}
explain(void)
{
printf("TRIP2.C      Compliments of Robert W. Rasch\n\n");
printf("You can make your trip plans with a text file.\n");
printf("First capture the locations in a text file that contains ");
printf("the following:\n");
printf("nny\n<return>\n");
printf("Execute it with the command line: trip2 <trip.inp >trip.txt\n");
printf("and you will have a list of the locations. Put them into ");
printf("the order of your\n");
printf("trip and then on the first line enter:\n");
printf("f7.00\n<return> \n");
printf("The list of location names follow the above and the file must");
printf(" terminate with\n");
printf("an empty line. \n");
printf("Execute it with the command line:\n");
printf(" trip2 <file.inp >trip.txt\n");
printf("and you will have the complete trip plan\n");
printf("with a starting time of 7am.\n");
}
}
```

Listing for add2map.c

```
/* add2map.c
   (2.13.89) Robert W. Rasch
   adds to the location name, latitude, and longitude data tables
   in trip2.c.
Use a text file of the following format:
    starting record number
    CITY, STATE
    LATITUDE FLOAT
    LONGITUDE FLOAT
    CITY, STATE
    LATITUDE FLOAT
    LONGITUDE FLOAT
    <return>
Be sure to terminate the file with an empty line.
The program format is then:
    add2map <input.txt >output.txt
Output.txt becomes your data structure loader. Relocate SIZE and you are
ready to compile the program.
*/

#include <stdlib.h>
#include <stdio.h>
#include <string.h>

main()
{
```

```

int i, record;
char j, k, l, buffer[81];
j = "";
k = ' ';
l = ' ';
/* printf("Enter the starting value for the record numbers\n"); */
gets(buffer);
for(i=0;i<strlen(buffer);i++)
record = atoi(buffer);
while( strlen(buffer) != NULL )
{
gets(buffer);
if(strlen(buffer) == NULL ) continue;
for(i=0;i<strlen(buffer);i++)
buffer[i] = toupper(buffer[i]);
printf("strcpy(map[%d].name,%c%c%c%c\n", record, j, buffer, j, k, l);
gets(buffer);
printf("map[%d].latitude = %.2f%c\n", record, atof(buffer), l);
gets(buffer);
printf("map[%d].longitude = %.2f%c\n", record, atof(buffer), l);
++record;
}
printf("#define SIZE %d\n", record-1 );
}

```

The program is "ready to go" for ECOC88 (it is supplied with "C Programming A Hands-on Approach" as available from Heathkit; you may have to make some minor changes in the included files for other compilers. The manual for your compiler will tell you what files are needed for the functions used here.

A list of the functions (all from the Standard Library) are: strcpy(), getch(), atof(), gets(), strlen(), strcmp(), toupper(), fabs(), sqrt(), exit() and printf().

Note that the format statement for

the time of day is %2d and %02d where the digit is a zero and not an '0'. One of your included files should have "#define NULL 0".

The program instructions will tell you how to use the program. It can be used directly from the keyboard to display output on your terminal or you can present it with an input file and have it create an output file to be modified with your text editor and printed out.

I keep my plans stuck to the sun visor of my automobile where a glance tells me

what I need to know.

As I need other locations for travel I add them to my listing with ADD2MAP .EXE and recompile the program. The data base has grown slowly as needed. *



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Reader Service #121

Using VGA Graphics Modes in GW-BASIC Version 3.2

Pat Swayne
HUG Software Engineer



BASIC is the programming language of choice for many users, and many of those are still using the GW-BASIC interpreter. The last version of GW-BASIC released by Zenith Data Systems, version 3.2, supports EGA, but not VGA graphics. In this article, I will show you how to use both the 640×480 high resolution graphics mode, and the 320×200 256-color graphics mode in GW-BASIC version 3.2.

The 640×480 Graphics Mode

Note: The examples presented in this section work on a "real" VGA video adapter, such as the Z-549 or the HVB-550. They should also work on a Z-449, but have not been tested on one.

About the only difference between the VGA 640×480 video mode and the EGA 640×350 video mode is that there are more lines on the screen in the VGA mode. The computer ports and memory locations that a program must work with in order to create images on the screen in these modes are the same. When GW-BASIC switches to the EGA mode using the SCREEN 9 command, it should theoretically be ready to work with the high resolution VGA mode as well. All that is needed is a way to switch to that mode once the EGA mode has been selected.

In machine language, only two instructions are required to switch to the high resolution VGA mode:

```
MOV  AX,1200H
INT  10H
```

You can implement a simple machine language routine in GW-BASIC by placing the numerical codes for the instructions in an integer array, and using the CALL command to execute the routine. Here is a BASIC program which executes the two instructions shown above (plus a Return instruction to get you back into BASIC) to switch into the high resolution VGA mode. (Line 20 is "folded" to fit

in the magazine column. Type it as one line.)

```
10 DIM CODE%(2)
20 CODE%(0)=&H12B8:CODE%(1)=&HCD00:
   CODE%(2)=&HCB10
30 SCREEN 9:rem Set EGA mode
40 GOSUB 180:rem Now set VGA mode
80 PRINT " VGA 640X480 GRAPHICS MODE "
90 CIRCLE (100,100),50,14
150 A$=INPUT$(1)
160 SCREEN 0,1:WIDTH 80
170 END
180 SETMODE=VARPTR(CODE%(0))
190 CALL SETMODE
200 RETURN
```

This program turns on the high resolution VGA mode, draws a small circle on the screen, and waits for you to type any key. When you do, it resets the normal text mode (which clears the screen), and quits. Key the program in (number the lines as shown), run it, and watch what happens. You'll notice that the circle is a flat ellipse rather than a circle. Since we now have more lines on the screen, the default aspect ratio for circles used by GW-BASIC in the EGA mode is incorrect. As it turns out, the aspect ratio for circles in the high resolution VGA mode is a perfect one to one. So change line 90 to:

```
90 CIRCLE (100,100),50,14,,1
and run the program again. This time the circle will be circular (assuming that your video monitor is correctly adjusted). Now add these lines to the program.
```

```
60 COLOR 15,1
70 LINE (10,10)-(630,470),2,BF
100 PAINT (100,100),6,14
110 CIRCLE (320,240),200,11,,1
120 PAINT (320,240),5,11
```

Here is what these new lines do (or at least, what they are supposed to do). Line 60 sets the foreground color to 15 (bright white — actually it was already set there) and the background color to 1 (blue). Line 70 draws a large solid green box that nearly fills the screen. Line 100 paints the cir-

cle drawn by line 90 with brown. Lines 110 and 120 draw a larger circle at the center of the screen and paint it with magenta. Now run the program with the above lines added and watch what actually happens. You will see that the green box does not fill the screen (the bottom fourth is not filled), and that the bottom of the large circle is cut off. The problem is that GW-BASIC still "thinks" that there are only 350 lines on the screen, so it will not paint or draw below the 350th line. The only reason that the COLOR command colored the whole screen is that GW-BASIC issued a command to the hardware that affects the whole screen regardless of the number of lines.

Those of you who are really "in" to programming with GW-BASIC know that there are certain memory addresses within GW-BASIC itself that you can POKE to change things. For example, you can POKE a value into address &H4E that will change the color of text printed on the screen. Fortunately, there is an address that you can POKE that contains the highest line number on the screen, so it is possible to make GW-BASIC use the whole screen in the high resolution VGA mode. The highest line number in the EGA 350 line mode is 349 (lines are numbered starting with zero), which is 15D in hexadecimal. The highest line number in the 480 line mode is 479, or 1DF hexadecimal. The only difference in the two hexadecimal values is the low byte, so you can change the value just by changing the low byte. The address of the low byte is &H6DA, so add this line to our program.

```
50 POKE &H6DA,&HDF:rem Fix max line
```

Now run the program and watch what happens. You will see that the box is now drawn completely, and the large circle is also drawn completely, but all of it is not painted. The PAINT command still does not seem to know that there are 480

lines on the screen, and I have not been able to find an address to POKE to fix it. However, if you place the paint starting point below the 350th line, it can be made to work correctly. Change line 120 to:

```
120 PAINT (319,410),5,11
```

and run the program again. Now the large circle is painted fully, and everything looks as it should. Notice, however, that I not only changed the pixel row from 240 to 410, but I also changed the column from 320 to 319. This is because the PAINT command is "flaky" down in the "new territory" below line 349, and a starting location must be carefully chosen. Change the column in line 120 from 319 to 320, run the program again, and watch what happens. If you have to paint something fully below line 349, you may have to use your "thinking cap" to find a starting point that will get the object fully painted. To illustrate, add these lines to the program.

```
130 CIRCLE (539,379),50,15,,.1
140 PAINT (539,428),4,15
```

When you run the program, you will see that a small chunk of the new circle drawn by line 130 is not painted. I was not able to find a single starting point by trying random points that would paint the whole circle. So I used a little junior high math to find a point in the missing chunk. I took the radius of the painted area of the circle (the radius of the circle is 50, so the radius of the painted area is 49), squared it, divided that by two, and took the square root. The result was 34.6, so I decided to use 34. I subtracted 34 from the X coordinate of the center of the circle, and added 34 to the Y coordinate to get my new paint coordinates. Plug these into line 140, so that it looks like this.

```
140 PAINT (505,413),4,15
```

Now the circle is fully painted. If you are wondering how I figured out the math, it's called the Pythagorean theorem. I hope you folks didn't forget all that good stuff you had back in junior high and high school.

If you have a complex figure below line 349 that you need to paint, you may have to use more than one PAINT command with different starting points for each one. I thought I would need two commands for the lower circle until I found that the coordinates I used to fill the missing chunk would also fill the whole circle.

There is one problem with this method of using 640x480 graphics in GW-BASIC 3.2 that I have not been able to solve. In the 640x480 mode, there are 30 text lines on the screen, but GW-BASIC still only recognizes 25 lines. I have not found an address to POKE to fix this, so you will have to do without text in the bottom 1/6 of your screen.

Here is the final version of my program that illustrates the 640x480 graphics

mode.

```
10 DIM CODE%(2)
20 CODE%(0)=&H12B8:CODE%(1)=&HCD00:
   CODE%(2)=&HCB10
30 SCREEN 9:rem Set EGA mode
40 GOSUB 180:rem Now set VGA mode
50 POKE &H6DA,&HDF:rem Fix max line
60 COLOR 15,1
70 LINE (10,10)-(630,470),2,BF
80 PRINT " VGA 640X480 GRAPHICS MODE "
90 CIRCLE (100,100),50,14,,.1
100 PAINT (100,100),6,14
110 CIRCLE (320,240),200,11,,.1
120 PAINT (319,410),5,11
130 CIRCLE (539,379),50,15,,.1
140 PAINT (505,413),4,15
150 A$=INPUT$(1)
160 SCREEN 0,1:WIDTH 80
170 END
180 SETMODE=VARPTR(CODE%(0))
190 CALL SETMODE
200 RETURN
```

The 256-Color Graphics Mode

Note: The examples presented in this section will only work on a "real" VGA video adapter, such as the Z-549 or HVB-550. They will NOT work on a Z-449.

Unlike the 640x480 mode, the 256-color graphics mode is unlike any of the other graphics video modes. Therefore, we cannot set GW-BASIC to an existing video mode and expect things to be set up for the 256-color mode. However, the 256-color mode is the easiest of the modes to work with at the machine code level. Once the mode is set, all you have to do to put pixels on the screen is to put bytes into video memory. The value of the byte you put into video memory determines the color of the pixel. The position of the byte in video memory determines the position of the pixel on the screen, with position 0 being the upper left corner. The GW-BASIC POKE command can be used to draw on the screen, as shown in this example.

```
10 DIM CODE%(2)
20 CODE%(0)=&H13B8:CODE%(1)=&HCD00:
   CODE%(2)=&HCB10
30 SCREEN 1:rem Set a graphics mode
40 GOSUB 180:rem Set 256-color mode
50 PRINT "256-COLOR GRAPHICS MODE";
80 DEF SEG=&HA000:L=3200
90 FOR I%=1 TO 47
100 FOR J%=1 TO 3
110 FOR K=L TO L+100:POKE K,I%:NEXT K
120 L=L+320:NEXT J%
130 L=L+320:NEXT I%
140 DEF SEG
150 A$=INPUT$(1)
160 SCREEN 0,1:WIDTH 80
170 END
180 SETMODE=VARPTR(CODE%(0))
190 CALL SETMODE
200 RETURN
```

This program paints colored bands on the screen, which represent the first 48 of the 256 colors available. I should point out that there are actually far more than 256 colors available, because there are some "palette registers" in the VGA adapter that can be programmed to alter any of the 256 colors. However, I will not

cover changing palettes in this article.

If you run this program on anything other than a 386 or fast 286-based machine, you will see that it runs quite slowly. The GW-BASIC POKE command is not too fast, and this method of drawing on the screen would not be suitable for games or other animated programs.

Now I will explain what some of the lines in this program do. Line 30 turns on the CGA low resolution graphics mode. This is done mainly so that GW-BASIC will know that it is not in the text mode anymore, so that the SCREEN 0 command in line 160 will work in resetting the text mode. Another purpose for setting the CGA video mode is to let GW-BASIC know that there are only 40 characters per line on the screen. Line 80 sets the segment to A000 (hexadecimal), which is the video memory segment while the 256-color mode is active. It also sets a variable L to 3200. This variable is used as a pointer to video memory. It is set to 3200 so that the program will start writing to the screen 10 scan lines down from the top. There are 320 pixels per line, and $320 \times 10 = 3200$.

The variable I% in the FOR loop in line 90 is used as the color value that is POKEd into video memory. As you can see, colors 1 through 47 are used. I did not start with color 0, because it is black, and the screen is already black. The program paints 3 scan lines of each color (see line 100), with 100 pixels per line (see line 110), and it skips a scan line between each color band. If you would like the color bands to touch each other, change the 3 in line 100 to a 4, and remove the $L=L+320$ in line 130.

As I stated previously, you can change the color of text on the screen in GW-BASIC by using POKE to insert a color value at address 4E (hex). This still works in the 256-color mode. To demonstrate this, add the following lines to the program and run it again.

```
60 POKE &H4E,14
70 PRINT " WITH COLOR TEXT"
```

Because this method of changing colors works, it provides another way to make graphic displays in the 256-color mode. If the display you want to put on the screen can be made up with text mode IBM™ graphics characters, you can do it much more quickly than by POKing into video memory. Here is a program that illustrates this.

```
10 DIM CODE%(2)
20 CODE%(0)=&H13B8:CODE%(1)=&HCD00:
   CODE%(2)=&HCB10
30 SCREEN 1
40 GOSUB 180
50 PRINT "HERE ARE ALL 256 COLORS:"
60 PRINT
70 C%=0
80 FOR I=1 TO 8
90 FOR J=1 TO 32
100 POKE &H4E,C%:C%=C%+1
110 PRINT CHR$(3);:NEXT J
```

Continued on Page 38

- *Expansion Memory*
- *Installing a 4 MB Z-515 Board in a Z-386/16*

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As I was working on the article that I had planned for this month, I found it necessary to install the Z-515 memory board that I had removed from my Z-386/16 for testing EMM.SYS for the January article. The specific reason for reinstalling the Z-515 was that I had to finish some testing on some software that ran under OS/2, so I needed the additional memory. However, I ran into a number of problems with the Z-515 Installation Guide, so I decided to discuss that situation in this article instead. In particular, I was setting up OS/2 so that I could run Hilgraeve's new HyperACCESS version 5 on my system under OS/2.

In case many of you have wondered, any kind of technical writing can occasionally be hazardous to your sanity. Sometimes the old adage that "No good deed goes unpunished" really fits. And occasionally, I find that it happens to me. That happened to me when I was trying to reinstall the 4 MB Z-515 memory board in my Z-386/16 this month. You may remember that I mentioned removing this memory board when I did the testing and research for the "How to Use EMM.SYS" article that was published in January. And since I always try to follow the boss' advice (one from a number of years ago), that article contains a significant mistake in the definition of Zenith Data Systems' (ZDS) Expansion Memory used in the SETUP command. One of my old bosses always told me: "If you are going to make a mistake, make it a BIG one, and make it in front of everyone so that nobody has any doubt." And this mistake is particularly embarrassing for me because I made some tacky comments that the ZDS manual did not have it right either. Obviously, the problem is even bigger than I thought, and it is also one of the hazards of trying to write and edit articles while I'm traveling, without access to my Z-386.

The interesting point is that I discov-

ered the problem in trying to install the Z-515 board back into my system. Since I could not find the original notes I made when I installed the board about two years ago, I thought that I would just follow the manual included with the Z-515 board. It is clear that at least one ZDS technical writer has as much difficulty as I did with the definitions that are part of many ZDS systems. Installing the Z-515 board should have only taken 30 minutes or so, but it ended up taking me all day because of several errors in the installation manual and considerable testing of various configurations. But before I get into that discussion, I need to correct a problem with the definition of Expansion Memory (for the SETUP command) that was published in the January article.

Expansion Memory

As I stated in the previous article: "In Zenith Data Systems terminology, *EXPANSION MEMORY* is any memory hardware — a board or SIMMs — that is physically added to a computer above the Base Memory limit of 640 K, regardless of what the standard (minimum) memory configuration is for any computer." That's true, as far as it goes, but it does not go far enough. Later in that article I mentioned the use of Expansion Memory that included both extended and expanded memory, and that is just wrong. Expansion Memory only includes *EXTENDED MEMORY* so far as the SETUP command is concerned. I should have known that because of the way the original Z-241 and Z-248 were configured with the Expansion Memory field, and neither computer had a ZDS memory board that supported expanded memory, as mentioned in the previous article. Such are the hazards of making article corrections while traveling without having a test computer available; however, the fact that Expansion Memory is really just an "alias" or synonym for ex-

tended memory confuses a lot of people. I did not realize how bad the problem was until I tried to install the 4 MB memory board back into my Z-386. As you will see, I found all kinds of interesting situations, including a total system freeze on my system after installation.

In short, Expansion Memory is still hardware that you add to a computer, but it only includes extended memory for purposes of the SETUP command. And because I rediscovered there are a few tricks to installing a Z-515 board, I am including that information as part of this article. Moreover, there are a few things that I did not mention in the previous article that are important to understanding how all of this stuff works together.

The Z-515 4 MB Memory Board

Since the memory board that I have was one of the first ones, the Installation Guide is also fairly "old", and I assume that many of the errors in my manual were corrected in later versions. Trying to find another Z-515 board and manual turned out to be virtually impossible because the Z-386/16 was discontinued some time ago, so I was not able to verify whether or not the errors in my manual had been corrected. I will mention the specific errors later during the description of the installation, but first let's review some of the facts about the Z-515 board.

Although I mentioned it in one of my articles some time ago, I still continue to get questions about whether one can simply upgrade a Z-505 (1 MB) memory board to 4 MB by simply adding 1 megabit memory chips. The answer is NO! Although it is not clearly explained in the Z-515 Installation Guide, there is a drawing (Figure 4) on page 7 of my manual that is titled "Memory Card Identification." If you look at that drawing carefully, you will notice that the drawing of the memory chips for the "4 MBYTE" card has

18 pins (1 megabit chips) and the "1 MBYTE" card (Z-505) has 16 pins (256 kilobit chips). Obviously, you cannot plug an 18-pin chip into a 16-pin socket, so there is no way to upgrade a 1 MB board to a 4 MB configuration, aside from other technical differences that are quite apparent when one compares the two boards side-by-side.

There is one other important point that is kind of hidden in the manual, which is one reason that I always recommend reading a small manual like this in its entirety before starting anything. On page 10 of my manual, there is a clear paragraph that says: "When EMS is selected on a 4-megabyte card, only two megabytes will be EMS memory. The other two megabytes will be system memory." What that really means is that, with the usual configuration of a 4 MB and 1 MB board, you will actually have 3 MB of expanded memory and 1 MB of extended memory, along with the usual 1 MB of "system memory". Or, if you configure the 4 MB board as extended memory only, you can have a maximum of 4 MB of extended memory. You will see how all of this works out as we look at the installation of the Z-515 board for both types of memory.

Installing the Z-515 board is a little easier to explain when the extended memory is used exclusively, even though it is not exactly what I did to originally install it back in the Z-386. What I actually did was try to install the board with expanded memory first, and then because of some problems, I went back to installing extended memory. In any case, let's begin with extended memory.

Installing the Z-515 as Extended Memory

Installing the Z-515 as extended memory is relatively straightforward. First, you remove the 1 MB Z-505 board from slot 6 of the Z-386/16 (pages 2 and 3 of the Installation Guide). Then, you set the SW401 switches on the new 4 MB Z-515 board as shown in Figure 2 on page 3. All switches are set to ON, except for switch 2, which is OFF (EMS disable), and you install the Z-515 into slot 6 on the backplane board. No problem.

Now you have to check the SW401 switches on the old Z-505 memory board, and for extended memory, you simply set them as shown in Inset A of Figure 3 (page 4 of my manual). Switches 0, 4, 5, and 7 are set to ON; and switches 1, 2, and 6 are set to OFF. If you checked those settings carefully, you will notice that switch 3 is not mentioned. In the manual I have, switch 3 is shown as a blank because it does not matter. If you dig around in the Z-386 Owner's Manual (page 4-28 in my manual), you will find that switch 3 is only used to set "Base System Memory", which is not relevant to this board in its

new position. Therefore, I left switch 3 ON (0-640 K of base memory) because that was its original position when I removed it. I installed the old Z-505 card in slot 7 as recommended in the manual. Now for the tricky part.

Step 7 on page 4 (Z-515 Installation Guide) says to reset the CPU Card switches to reflect the total amount of system (not EMS) memory, as shown in the Owner's Manual, so I had to go to the Z-386 Owner's Manual to find that. The basic description of setting the CPU Card switches SW201 and SW202 is shown on page 4-21 of my manual, although it can be difficult to understand what you are supposed to do if you are not familiar with the hexadecimal numbering system. Part of the problem is that the manual notes that these switches tell the CPU where the 32-bit ZDS memory is located, and the manual also states that: "All switch sections except section 0 of SW201 should be set to the ON position." That's true, except that this only applies to the standard 1 MB configuration using the original Z-505 board. Although the manual notes that you must set the switch for the appropriate hex address range in the OFF position when you add additional memory, the drawing on that page could have been improved by adding a slightly more detailed comment, such as Table 1 below.

must be OFF for the new memory configuration. Again, which switches are set to OFF is dependent on how much total ZDS memory (e.g., the Z-505 or Z-515 card) is installed in the entire system.

One particular point about adding memory to a Z-386 is that if you add a non-Zenith board (e.g., a 16-bit board), the switches on the CPU board are NOT set. The switches on the CPU board only apply to fast ZDS 32-bit memory cards (as stated in the manual on page 4-21), not to third party cards. And because non-Zenith Data Systems boards are not as "fast", at least one wait state will be added to accommodate the slower 16-bit memory. I have not tried any third-party memory cards in my system because it seems silly to slow down processing with a 16-bit card, even though they are admittedly cheaper.

Once both cards have been installed and checked, I usually begin testing the system for proper functioning BEFORE I replace the cover. That is good practice, just in case something got bumped during the installation process. It can save a lot of time in having to remove the cover again if something does not work correctly.

Now it's time to power up the system. If you have correctly set up everything, you will get a ROM error message indicating that the amount of installed memory is incorrect. If you add a single Z-

Total Memory	Range	Hex Address	Switch Settings
1 MB	0-1	000000-0FFFFFFF	SW201, 0 OFF
2 MB	1-2	100000-1FFFFFFF	SW201, 0-1 OFF
3 MB	2-3	200000-2FFFFFFF	SW201, 0-2 OFF
4 MB	3-4	300000-3FFFFFFF	SW201, 0-3 OFF
5 MB	4-5	400000-4FFFFFFF	SW201, 0-4 OFF
6 MB	5-6	500000-5FFFFFFF	SW201, 0-5 OFF
7 MB	6-7	600000-6FFFFFFF	SW201, 0-6 OFF
8 MB	7-8	700000-7FFFFFFF	SW201, 0-7 OFF
9 MB	8-9	800000-8FFFFFFF	SW201, 0-7 OFF; SW202, 0 OFF
10 MB	9-10	900000-9FFFFFFF	SW201, 0-7 OFF; SW202, 0-1 OFF
11 MB	10-11	A00000-AFFFFFFF	SW201, 0-7 OFF; SW202, 0-2 OFF
12 MB	11-12	B00000-BFFFFFFF	SW201, 0-7 OFF; SW202, 0-3 OFF
13 MB	12-13	C00000-CFFFFFFF	SW201, 0-7 OFF; SW202, 0-4 OFF
14 MB	13-14	D00000-DFFFFFFF	SW201, 0-7 OFF; SW202, 0-5 OFF
15 MB	14-15	E00000-EFFFFFFF	SW201, 0-7 OFF; SW202, 0-6 OFF
16 MB	15-16	F00000-FFFFFFFF	ALL SWITCHES OFF

Figure 1
CPU Card Switches SW201 and SW202

To use the information in Table 1 for checking the CPU Card switches, simply look at the first column called Total Memory, which is the total of the capacities of all memory cards in the system. For example, this discussion is specifically about adding a 4 MB card, and with the existing 1 MB card, there is a total of 5 MB of Total Memory. Assuming that you start with the usual configuration of all switches being ON, except for the old memory that already existed, you read across to find out ALL switches which

515 card like I did, the message will say that the SETUP command indicates zero bytes of expansion memory, but the actual value found is 4096 K (which is four megabytes). When you work with computer memory or disk capacity, you always need to keep in mind that one kilobyte is 1,024 bytes, and one megabyte is 1,024 kilobytes, so 4 MB is just 4,096 K.

In any case, you must press the ESC key as instructed by the error messages, and the system will usually boot the oper-

ating system normally, depending on exactly which ROM version you have. At this point, you should use the CTRL-ALT-INS key sequence to activate the ROM Monitor, enter the SETUP command, and adjust the value of the Expansion Memory field to 4096 K. Save the values, and reboot the system. By the way, I suggest you use the SHIFT-PRTS key to print the SETUP screen any time you update it so you will know the current values of all parameters.

Now that everything is set up properly, you can use the extended memory for a new operating system, such as OS/2, or for various other purposes as described in the January 1990 article on "How to Use EMM.SYS." Now let's take a look at setting up expanded memory in the Z-386/16.

Installing the Z-515 as Expanded Memory

When I added the Z-515 back into my system, I tried to follow the steps listed in the Installation Guide, which got me into all kinds of problems. I had all kinds of system freezes, and it took me a while to get everything back up and running. That was apparently due to several errors in the Installation Guide, which explains why there is some confusion about this information.

Even when you are just reinstalling something, it is always good practice to pull out the installation manual to check everything. I never trust my memory for this kind of stuff because I frequently swap out hardware for one reason or another. So, I started with page 2 of the Z-515 Installation Guide on the "Installation of One Z-515 Memory Expansion Card." Figure 2 on page 3 shows the switch SW401 settings, but you must set the section 2 switch ON to enable EMS memory as stated in step 3. For this configuration, ALL of the SW401 switches are set to ON. Note that section 3 of the switch determines whether you will have 512 K (section 3 OFF) or 640 K (section 3 ON) of system memory.

I eventually ran into problems with step 5 because it states that one should use Inset B on Figure 3 to set the SW401 switches for the Z-505 card. So I did that, without noticing that the settings were wrong as shown in the Inset. Although step 5 clearly states that section 2 should be ON for EMS memory, Figure 3 just as clearly shows that section 2 is OFF. Moreover, the switch settings for sections 4-7, which are used to set the board address, are slightly different from those shown in Inset A (for extended memory). This is the first place in the manual where I found a problem. More on that in a minute.

Then I installed the 1 MB card in slot 7 as instructed. Step 7 on page 4 states that the CPU Card DIP switches should be reset to "reflect the total amount of sys-

tem (not EMS) memory, as shown in the Owner's Manual for your computer." After some thought, I decided that this must mean the total amount of memory, excluding expanded (EMS) memory. At this point, I remembered the paragraph on page 10 noting the Z-515 had "two megabytes of EMS memory" and the other two megabytes were system memory. So I decided that my system must have a total of 2 MB of "system memory" and 2 MB of expanded memory on the Z-515 board, plus 1 MB of expanded memory on the old Z-505 board. Based on the instructions in the Z-515 Installation Guide, I then set the CPU card switch SW201 section 1 to OFF, so that both sections 0 and 1 were OFF (for 2 MB), and all other switches were ON.

When I powered up the system, I got the expected message that there was an error in the SETUP — 1024 K of expansion memory was installed, but the SETUP had 0 K. So I changed that and rebooted the system. Everything seemed to work fine, but the system kept freezing when it apparently tried to run the AUTOEXEC.BAT file (as far as I could tell). So I used the usual troubleshooting trick of going back and checking everything — switch settings on all boards, board slots, connectors, etc. All switch settings and everything else was exactly as stated in the first part of the Z-515 Installation Guide, so I decided that there must be at least one error in that manual.

I won't bore you with all of the gory details of this troubleshooting process, but I tried just about every valid combination that I could find to get the system working again. I also made a considerable stack of notes about what I tried, and what happened when I powered up the system. What I found during all of this experimenting is that, in most cases, the system freezes when it is apparently trying to run the AUTOEXEC.BAT file, and that's it. That happens after you have installed device drivers in CONFIG.SYS that *SHOULD* be able to allocate the entire values of the new memory just installed — i.e., 1 MB of extended memory and 3 MB of expanded memory. If any of the switches on any of the cards (CPU or memory) are not set exactly right, then there are problems with a system freeze. At this point, it is worth a minute to mention an easy troubleshooting technique that I have discussed before.

Testing and Troubleshooting

When problems like system freezes occur during system boot, it is most likely a problem with some command in either the CONFIG.SYS or AUTOEXEC.BAT files, especially if a change has just been made to the amount and/or type of memory installed. For the CONFIG.SYS file, it is best to delete *all* DEVICE= commands because they install a memory-resident de-

vice driver. For the AUTOEXEC.BAT file, I use only the PATH and PROMPT commands for trying to isolate this kind of problem. If you are interested in more details about this technique, you should take a look at Figure 1 in the article on "How to Use EMM.SYS" that was published in the January 1990 issue.

Since I had 3 MB of expanded memory, 1 MB of extended memory, and 1 MB used for the "standard" system memory, I had attempted to install a 3 MB (3072 K) VDISK for testing purposes with the following command lines:

```
DEVICE=C:\DOS\EMM.SYS
DEVICE=C:\DOS\VDISK.SYS SIZE=3072
SECT=512 DIRS=128 /A
```

All of this was done on my Z-386/16 with ROM version 2.6E using Zenith Data Systems MS-DOS 3.3 Plus (BIOS 3.30.05). My system had a serious case of heartburn, which I found was due to the VDISK command line, despite the fact that it *should* have worked. When I removed the VDISK command line, the system booted up with no problem, so it was back to the drawing board.

What Finally Worked

As previously mentioned, the Z-515 Installation Guide I have is wrong in terms of how the CPU Board switches are set. Based on extensive testing, I am satisfied that the CPU Board switches *MUST* be set to identify the TOTAL amount of ZDS memory installed, regardless of what kind of memory it is. After testing a number of combinations, it appears that the Z-386/16 Owner's Manual description that the CPU switches are set for ZDS fast 32-bit memory is intended to imply that this includes all memory. Conversely, you would not set these switches if you installed any third-party memory card, such as 16-bit expanded memory. So, the suggestion that the CPU Card switches are set to only the value of non-EMS (expanded) memory is wrong in the Z-515 Installation Guide, and that is the first problem I found.

The second specific problem I found was that Inset B of Figure 3 (page 4) is also wrong, or at least I could not get that to work on my system. After some consideration, it makes a lot more sense that the only difference in setting the Z-505 (1 MB) board switches should be simply section 2, which enables or disables EMS. That's what I found. And what I found is also consistent with Table 1 (page 11) which describes the switch settings for up to 16 MB of total memory installed. The point is that sections 4-7 set the base address for each card, and if that base address is set incorrectly, then there will be some problems when you try to allocate the memory on that card — using a device driver for example. By referring to that Table, I noticed that the setting suggested by Inset B actually set the base address for the 1 MB

card at Block 3 of memory, which clearly overlapped memory addresses on the 4 MB card. That also explains why I had a system freeze when I set the Z-505 base address as shown in Inset B. For this reason, I am convinced that Inset B is also wrong, because I can understand why I had the system freeze.

Here's what finally worked on the installation of a 4 MB Z-515 plus the old 1 MB Z-505 boards for expanded memory. First, the Z-515 card switches on SW401 were all set to ON. The Z-505 card switches were set with sections 0, 2, 3, 4, 5, and 7 to ON, and sections 1 and 6 to OFF. Since a total of 5 MB is now installed, sections 0-4 (5 sections) of switch SW201 on the CPU Card were set to OFF; all other sections are ON. And of course, the EMM.SYS device driver had to be added to CONFIG.SYS in order to use expanded memory.

Once I got all of the switches set correctly, it was a fairly easy matter to verify that I could access the memory. I knew that the first megabyte was reserved for conventional system memory as described in the "On the Leading Edge" article published in the February 1990 issue. And I knew that another megabyte was defined as extended memory (Expansion Memory in the SETUP command) as noted on page 10 of the Z-515 Installation Guide. So, I should be able to allocate the remaining three megabytes as expanded memory, and testing indicates that all of that now works properly. And although all of my testing was based on using MS-DOS 3.3 Plus with ROM version 2.6E, I believe that the specific DOS and ROM versions probably are irrelevant for this — it should work with any DOS and ROM version on a Z-386/16.

Testing the Memory

For testing purposes to verify that I actually had 1 MB of extended memory and 3 MB of expanded memory, my CONFIG.SYS file was set up as shown in Figure 2.

```
FILES=40
BUFFERS=35
DEVICE=C:\DOS\EMM.SYS
DEVICE=C:\DOS\VDISK.SYS SIZE=3072 SECT=512 DIRS=128 /A
DEVICE=C:\DOS\VDISK.SYS SIZE=1024 SECT=512 DIRS=128 /E
```

Figure 2
CONFIG.SYS File for Testing Memory

Note that the EMM.SYS device driver must be loaded first, before any attempt is made to use expanded memory. Then, I loaded a 3 MB VDISK in expanded memory using the /A switch as required. And finally, I defined a 1 MB VDISK in expanded memory using the /E switch. Once the EMM.SYS device driver is loaded, I found that it made no difference whether I defined the expanded memory or the extended memory VDISK first, ex-

cept that the drive letters were different of course. When two VDISKS are defined as shown in Figure 2, the 3 MB expanded memory VDISK is drive E and the 1 MB extended memory VDISK is drive F.

For the particular values I defined in CONFIG.SYS, it is easy to verify that each type of memory is accessible on each drive by using CHKDSK. The results of running CHKDSK on drive E with the 3 MB VDISK using expanded memory are shown in Figure 3.

```
Volume VDISK V3.3 created Dec 6, 1984 12:00p
3136512 bytes total disk space
      0 bytes in 1 hidden files
3136512 bytes available on disk
```

```
655360 bytes total memory
477344 bytes free
```

Figure 3
CHKDSK Run for Drive E (3 MB Expanded Memory)

The results of running CHKDSK on drive F with the 1 MB VDISK in extended memory are shown in Figure 4.

```
Volume VDISK V3.3 created Dec 6, 1984 12:00p
1040896 bytes total disk space
      0 bytes in 1 hidden files
1040896 bytes available on disk
```

```
655360 bytes total memory
477344 bytes free
```

Figure 4
CHKDSK Run for Drive F (1 MB Extended Memory)

If you do some quick calculations, you will note that the space on each VDISK is slightly less than the defined values of 3 MB and 1 MB, respectively, because of the space requirements for the File Allocation Tables (FATs) and directory. If you do not understand why that happens, you might want to review the "Powering Up — Volume 2" column published in last month's issue which described how that works out on 3.5-inch and 5.25-inch floppy disks. The principle is the same, although the actual recording medium is different.

expanded or extended memory in a computer, you may also be wondering how I knew what values to use for the VDISK device drivers shown in Figure 2. For expanded memory, it really is easy because the addition of the EMM.SYS device driver tells you exactly how much expanded memory has been initialized as shown in Figure 5.

That was the message I was looking for when I was setting up the two memory boards because it tells me that all possible

expanded memory was initialized on both boards. Based on the switch settings I used, I expected two MB on the Z-515

board and one MB on the Z-505 board, which was initialized as shown in Figure 5.

I also knew which virtual disk had which drive letter because of the sign-on messages displayed by the VDISK device driver when it is initialized in the memory. Figure 6 shows the sign-on messages that were displayed on my system.

Because the first DEVICE= command specified the VDISK for expanded memory (because of the /A switch) was to be loaded first (see Figure 2) as drive E. For my system, drive E was the next available drive letter because I have a hard drive with partitions C and D. The VDISK device driver will assign drive letters based on the next available drive letter, which means that you will want to watch the sign-on messages carefully the first time so you will know which drive letter is which.

- At this point, we have only looked at two configuration options for these two memory boards. There is a third option.

The Third Option

The third option is one that you might unknowingly choose if you forget to enable the expanded memory on the 1 MB Z-505 board by setting section 2 to ON, which means that this board will be assigned as extended memory. The mistake should be obvious because you will have to set the Expansion Memory field in

Zenith Data Systems, EMS 4.0 Driver, Version 3.30.09
Copyright (C) 1988 Zenith Data Systems Corporation
Two EMS boards responding with 3072K memory initialized
The Expanded Memory driver is installed

Figure 5
EMM.SYS Sign-On Message

the SETUP command to 2048 K because you will see a ROM error message if you don't. The whole point of mentioning this option is because I have received a couple of letters claiming that when a Z-515 board is added, one can only have a maximum of 2 MB of extended memory and two MB of expanded memory, which is not exactly the case. In fact, the amount of memory you have, as well as which type it is, is strictly dependent on how you set section 2 of the SW401 switch on each board, assuming that all other switches are set correctly. As I said earlier, it is particularly important to set the CPU Card switches for the TOTAL amount of memory (e.g., 5 MB in this case); otherwise, you will probably find all kinds of strange problems like I did. In fact, the setting of section 2 is so critical that I added it to the "How to Use EMM.SYS" article because it is the significant difference as to what works and what doesn't. You will find that a ROM message will tell you exactly how much extended memory (for the Expansion Memory field in SETUP) is available, which makes it easy to tell what option you have selected.

This third option centers on the fact that section 2 on the 4 MB Z-515 board is set to ON (EMS enable) and section 2 on the 1 MB Z-505 board is set to OFF (EMS disable). In this configuration, you will have 1 MB of standard or "conventional" memory (on the Z-515), 2 MB of extended memory (1 MB on the Z-515 and 1 MB on the Z-505), and 2 MB of expanded memory (on the Z-515). The SETUP command Expansion Memory field should be updated to show 2048 K of Expansion Memory.

To review the first two options, the first option was to set only extended memory, which means that section 2 on both boards is set to OFF. In this configuration, you will have 1 MB of standard memory and 4 MB of extended memory (3 MB on the Z-515 and 1 MB on the Z-505). And the SETUP Expansion Memory field should be updated to show 4096 K of Expansion Memory.

The second option was to set up the maximum amount of expanded memory (3 MB) which means that section 2 on both boards is set to ON. In this configuration, you will have 1 MB of standard memory, 1 MB of extended memory, and 3 MB of expanded memory (2 MB on the Z-515 and 1 MB on the Z-505). The SETUP Expansion Memory field should be updated to show 1024 K of memory.

```
VDISK Version 3.30.02 virtual disk E:  
Buffer size:          3072 KB  
Sector size:         512  
Directory Entries:   128  
Transfer size:       95
```

```
VDISK Version 3.30.02 virtual disk F:  
Buffer size:          1024 KB  
Sector size:         512  
Directory Entries:   128  
Transfer size:        8
```

Figure 6
VDISK Sign-On Messages

Whichever option you decide to use, I recommend testing the configuration by attempting to load a virtual disk which uses all of each type of memory defined. If the VDISK device driver can be successfully installed to utilize the maximum amount of memory available, then all of the switches on all of the cards (including the CPU Card) are probably set correctly. The basic rationale behind this testing technique is that if a DOS device driver can successfully access all of the memory of each type that you think you have installed, then everything is probably set up correctly. A successful test also means that any other application using the particular type of memory will also probably work correctly. This testing process is how I discovered that the CPU Card switches must correctly reflect the TOTAL amount of memory installed, not just the expanded memory as suggested in the Z-515 Installation Guide. As I mentioned earlier, my system would generally freeze during the boot process if the CPU Card switches were not correctly set, regardless of which configuration I was testing with VDISK. Also, I do not believe the results of that testing were particularly unique either to the ROM version I have or the MS-DOS version I was using, although I did not attempt to change either.

One other particular note about this kind of testing by using DOS device drivers in CONFIG.SYS — be SURE to have a bootable floppy disk handy so you can reboot the system in case you have a system freeze like I did. Depending on what kind of switch settings you have, you may find that the system will freeze when you try to boot from any drive (hard or floppy), so you need to have a "spare" bootable disk to fix the problem. And I should emphasize the fact that an incorrect switch setting can cause a system to freeze during the boot process while attempting to load a device driver is not unique to either

Zenith Data Systems computers or ZDS MS-DOS. Under the right circumstances, it is easy to freeze any computer system if the switch settings are not correct or the wrong values for a device driver are used.

It is especially important to have a spare bootable floppy disk for a hard drive system because you never know when the hard drive might become unbootable for some reason. If you do a lot of traveling like I do, it can become critical to have a bootable floppy disk on a laptop because you never know when something unexpected can happen. One of my columns last summer detailed my experiences with the SupersPort 286 when I lost the capability to boot the hard drive while I was in New York. In that instance, an application program clobbered the boot sector on my hard drive, so I was forced to boot from a floppy until I had time to reconstruct the boot sector on the hard drive by hand.

Powering Down

For next month, I will talk about the Covox Voice Master Key voice recognition system and Hilgrave's new Hyper-ACCESS version 5, which will be of special interest if you are using OS/2.

For help in solving specific computer problems, be sure to include the exact model number of your system (from the back of the unit or the model series from the Owner's Manual), the ROM version you are using (use CTRL-ALT-INS to find it), the DOS version you are using (including both version and BIOS numbers from the VER command), and a list of ALL hardware add-ons (including brand and model number) installed in your computer. The list of hardware add-ons should specifically include memory capacity (either added to an existing board or on any add-on boards), all other internal add-on boards (e.g., modems, bus mouse or video cards), the brand and model of the CRT monitor you have, and the brand and model of the printer with the type of interface (i.e., serial or parallel) you are using. Also be sure to include a listing of the contents of the AUTOEXEC.BAT and CONFIG.SYS files unless you have thoroughly checked them out for potential problems (e.g., TSR conflicts). If the problem involves any application software, be sure to include the name and version number of the program you are running when the problem appears.

If you have questions about anything in this column, or about Zenith Data Systems or Heath systems in general, be sure to include a self-addressed, stamped envelope (business size preferred) if you would like a personal reply to your question, suggestion, comment or request.

Products Discussed

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Continued on Page 38

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Programming Reports and Custom Printer Drivers

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If you write application software that produces hardcopy, then you've probably limited yourself to plain ASCII text, using simple LPRINT or WRITELN(LST) commands.

While printing in boldface, italic, and other formats would add impact to your printouts — and value to your software — there are no standards used in the printing industry.

You could look up and imbed the codes for formatted output on a specific type of printer, such as IBM Graphics and compatibles. But this would limit your customers to those who own this type of printer. Not a very strong marketing technique.

Well, most major software manufacturers handle the problem in one of two general ways. Some seek the easy route and treat all printing generically, outputting straight ASCII text. But the most successful companies include printer drivers, special files that can customize your printouts to specific printers.

Since there are no standards, the printer drivers take many forms. WordPerfect, for example, stores printer drivers in libraries with the ALL extension. When you select a printer, the specific data is extracted into a PRS file. Microsoft Word supplies a number of PRD files, each for a specific printer. This is similar to the technique used by many other programs, such as WordStar, Multimate, Ventura Publisher, and Pagemaker.

In some cases, utility programs are provided for modifying the driver. These let you add support for other printing features and fonts. WordPerfect comes with the PTR program, Word has MAKEPRD to convert driver files into text, and MERGEPRD to combine drivers to support a greater number of fonts.

(My book, "Your HP LaserJet Hand-

book", from Sybex Computer Books, includes a detailed look at LaserJet printer drivers on the most popular application packages.)

Xywrite Plus takes a somewhat different approach. Printer drivers are stored in ASCII text files, with the PRN extension. To edit or modify the driver, just load it into your word processor and make the necessary changes — no special utility is needed.

Most of the word processing programs mentioned include drivers for hundreds of different printers — a rather monumental task for small program developers. While other types of applications don't need this much support, it would be nice to produce professional looking output not possible in straight ASCII. Accomplishing this is actually rather easy if you create custom drivers for a limited number of printers.

For example, by creating drivers for just two classes of printers — IBM Graphics and compatible dot matrix printers, and HP LaserJet printers — you can effectively account for a majority of the market. By also including a generic driver, your software can be used by everyone, while allowing many customers to print in boldface, underlining, italic, and other formats.

Later in this article, I'll show you how to create and use custom printer drivers in your BASIC programs. But first, let's handle another common problem, printing multipage reports.

Pagination

It would be nice if everyone who bought your software used continuous paper. That way, your program could simply count output lines and perform a form feed when you reached the bottom margin.

But why limit your users to continuous paper? Some customers might want to manually feed individual sheets, or they might have laser printers with minimum top and bottom margin requirements.

These considerations will add some overhead to your program, but they will make it more "user friendly" and more commercially viable.

In a recent project of mine, a program used by hospital infection control practitioners to track nosocomial infections, I used Turbo Pascal routines to handle pagination problems.

While this program handles different types of pagination, I did not customize it with printer drivers, as you'll soon see.

In planning the program, I realized that several routines were needed. First, I had to give the user some method of designating their type of printer. I settled on three options:

Manual Feed — Loading individual sheets of paper and pausing between pages.

Laser Printers — "Continuous" feed printing with an automatic default top margin.

Continuous Feed — Tractor paper, requiring the program to leave a top margin.

Second, a routine was required to handle pagination itself. For manual feed, the user is prompted to insert a new page, then press return to continue printing. For all printers except laser, several blank lines must be printed for a top margin. Then for all printers, page headers, including date and page numbers, have to be printed. Since I planned to use the same routine for a number of different reports, heading variables would have to be passed to the routine.

Finally, each report procedure need-

ed a mechanism for counting lines and calling the pagination routine.

My routine for designating the printer and feed type was this:

```

procedure ptype;
begin
  clearframe;
  choose('Select C)ontinuous, H)and-fed, L)aser, or Q)uit',
        ['C','H','L','Q'],15,1,TC);
  if TC='H' then sheetflag:=1 else
  if TC='L' then sheetflag:=2 else sheetflag:=0;
end;

```

Clearframe calls a small routine that clears the center portion of the screen. The "choose" line calls my standard input routine used for accepting single characters. It passes the prompt, valid input characters, line and row position, and return variable. Using stock routines like these make programming even complex problems much easier. In this case, the user can only input the characters C, H, L, or Q, on row 15, column 1. The input character is returned as the variable TC.

The variable sheetflag is assigned a value of 0, 1, or 2, and will be used in later routines.

This procedure is called from the Select Printer option on a general utility menu in the program. By default, the program assumes continuous feed. When the user wants to change, they choose the Select Printer option that calls the ptype procedure.

Now within my report procedures, the general call to the pagination routine, that I'll discuss soon, looks like this:

```

newpage(heading, heading2,heading3,sheetflag,t,QA);

```

Within the report printing procedures, code like this counts detail lines and calls newpage:

```

l:=l+1;
if l > 55 then begin write(lst,chr(12));
  newpage(heading, heading2,heading3,sheetflag,t,QA);
  if QA='Q' then goto leave;
  l:=13;
end;
end;

```

The call to newpage sends three heading variables that are assigned values at the start of the report module, like this:

```

Heading:= "          Weekly History Data Report"
Heading2:=" Week      Site      Base"
Heading3:="Number    Code      Microbe  Level"

```

It also transmits the sheetflag variable, a page counter (t), and the variable QA used to allow the customer to abort the print job between pages. The report routines include their own keyboard interrupt to abort the job at any time. (I know my use of Goto might upset some purists, but practical considerations won out in this case.)

When the line limit is reached (56), a form feed is transmitted, then the new-

page routine called.

The pagination routine itself looks like this:

```

procedure newpage(heading, heading2, heading3: str80;
  sheet: integer;
  var page: integer;
  var QA:char);
var
  x: integer;
begin
  if sheet=1 then begin
    choose('Press Return when page is ready or
          Q)uit', ['^M','Q'],20,1,QA);
    gotoxy(1,20); clreol; end;
    if QA<>'Q' then begin
      if sheet <> 2 then for x:=1 to 6 do writeln(lst);
      writeln(lst,'          BOSS SOFTWARE (c)');
      writeln(lst,heading);
      writeln(lst,date,'          ',page);
      writeln(lst);
      writeln(lst,heading2);
      writeln(lst,heading3);
      writeln(lst);
      page:=page+1
    end;
  end;
end;

```

If the customer is using manual feed, they are prompted to insert a sheet of paper then press the Return key. The prompt is then erased from the screen. For manual and continuous (non-laser) printers, a six line top margin is then

printed. LaserJet printers automatically leave a top margin.

The standard page heading is printed,

then the first heading variable. This is followed by the date and page number, then the two other headings. A blank line is printed, then the page number incremented. On return to the calling routine, the line count is set to 13 to account for this page overhead.

Manual feed users are given this opportunity to abort the printout. I hate programs that don't give the user options like this. Suppose the customer runs out of

paper, or decides they've already printed everything they want. As I mentioned above, each report also checks keyboard status before every output line. On keyboard activity, the printout stops.

There are several small housekeeping chores to handle using routines such as these. Remember to set the page number to 1 when starting the report, accepting or reading the date, and assigning default values for printer type. When you start the report, call the pagination routine to print the headings on the first page.

Creating Printer Drivers

Beyond simple pagination, there's not much you can do to improve the quality of your output unless you create your own drivers.

How difficult it is to create drivers depends on the range of features you want to include and the number of printers supported. For another recent project of mine, a program to maintain college loan information, I wanted to print reports that had some extra impact. Since the report included warnings when certain minimum and maximum levels were reached, I decided features such as boldface, underlining, and italic would be useful.

I took a quick survey of potential users and found that most had either an IBM Graphics/Epson compatible printer or a Hewlett-Packard LaserJet. So, I decided to use these minimum specifications for the drivers:

Printers Supported: LaserJet, all models
IBM Graphics (dot matrix)
and compatible
All others in generic ASCII

Features: Boldface
Underlining
Italic
Reset
Page eject

Language: BASIC

Writing the Driver

The first task was to identify the codes for the supported features. In some cases, such as boldface, underlining, and italic, separate codes were needed to turn on and off the feature. Other times, as with reset and eject, only one command was required.

I looked through the technical manuals of the supported printers and noted the control codes:

Feature	LaserJet	Dot-Matrix
Bold On	<ESC>(s3B	<ESC>G
Bold Off	<ESC>(s0B	<ESC>H
Underline On	<ESC>&dD	<ESC>-1
Underline Off	<ESC>&d@	<ESC>-0
Italic On	<ESC>(s1S	<ESC>I1
Italic Off	<ESC>(s0S	<ESC>I0
Reset	<ESC>E	<ESC>@
Eject	ASCII 12	ASCII 12

In this case, I was lucky since all codes except Eject began with the <ESC> character. This made it easier to use the drivers in the application. Since both printers use the ASCII form feed character (12) and all other commands start with <ESC>, I didn't have to include these in the drivers — they could be entered directly in the application instead. The drivers themselves are plain ASCII text files that can be created with any word processing program.

LASER.DRV contained the codes for LaserJet printers:

```
(s3B
(s0B
&dD
&d@
(s1S
(s0S
E
```

IBMGRAPH.DRV stores the commands for the dot matrix printers:

```
G
H
-1
-0
I1
I0
@
```

Finally, GENERIC.DRV contains seven lines of single blank spaces. On the distribution disks, I included these three drivers, as well as a copy of GENERIC.DRV called DRIVER.DRV.

In my documentation, I tell the user to rename their specific driver DRIVER.DRV, if they want to take advantage of their dot-matrix or LaserJet fonts.

Writing the Application

I now needed a mechanism for accessing the driver (DRIVER.DRV) in the application. As an example, look at this sample program that reads the commands from the driver and imbeds them in the appropriate locations to format output.

```
10 E$=CHR$(27)
20 EJECT$=CHR$(12)
30 OPEN "I",1,"DRIVER.DRV"
40 INPUT #1, BON$, BOFF$, UON$, UOFF$,
```

```
ION$, IOFF$, RST$
50 CLOSE
60 IF BON$<>" " then GOTO 80
70 E$="": BON$="": BOFF$="": UON$="": UOFF$="": ION$="":
   IOFF$="": RST$="":
80 LPRINT E$+RST$
90 LPRINT E$+UON$;"This is underline";E$+UOFF$
100 LPRINT E$+BON$;"This is bold";E$+BOFF$
110 LPRINT E$+ION$;"This is italic";E$+IOFF$
120 LPRINT EJECT$
```

To make sure you understand how it works, let's review each line.

Line 10 assigns the <ESC> code to the string E\$. Making this initial assignment saves typing the full CHR\$(27) every time the code is required.

In line 20, I assign that ASCII form feed code (12) to the page eject variable EJECT\$.

Since the specific driver has been renamed DRIVER.DRV, line 30 opens that file for input, then line 40 reads in the seven commands and assigns them to variables. Easy to remember mnemonic names have been assigned standing for Bold ON, Bold OFF, etc. With the codes read into memory, the file is closed in line 50.

Line 60 tests to see if the driver is either for the IBM or LaserJet, and if so jumps to line 80. Otherwise, the generic driver is being used, and all of the variables are assigned null values in line 70.

Line 80 resets the printer by combining <ESC> with the printer's reset command. This line is equivalent to CHR\$(27) "E" on the LaserJet, and CHR\$(27) "@" on the dot matrix. Then, the three formats are used to output text in lines 90, 100, and 110. Notice that the Escape character E\$ is added before the appropriate on and off codes.

The text will be formatted properly on either LaserJet or IBM Graphics compatible printers. Using the generic driver, unformatted ASCII characters are printed.

Finally, line 120 ejects the current page from the printer.

While this is a small example, the same process can be used in more sophisticated BASIC programs, or converted to equivalent code in any other language. The basic features described here can be quite effective when printing reports, separating your application from the competition.

Graphics

Including graphics in your programs is a much more complicated process. Both IBM graphics and LaserJet printers use a similar "bit-map" system in which individual dots of the graphic are plotted in rows. With the dot-matrix printer, however, each row is considered one print-head deep.

With both, start by drawing the image, such as a logo or small drawing, in graph paper. For best reproduction, use a system where each grid on the paper represents a single dot — either a pin on the

dot matrix printer, or a 1/300 inch LaserJet dot.

Unfortunately, the difference in graphic systems means that you can't use a common routine as you can with text. Separate procedures will be required. But to get you started, we'll look at a very small example, a simple figure of an automobile just a few dots high and wide.

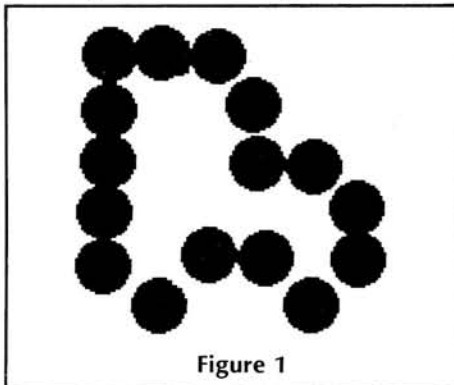


Figure 1

LaserJet Graphics

The first task is to draw the graphic on graph paper. Figure 1 shows a very magnified version of the image. Then, draw the figure again, but placing a 1 where each dot will print, a 0 at each blank location. Along the top of the graph paper, number the eight columns in binary, like this:

	128	64	32	16	8	4	2	1
0	0	0	0	0	0	0	0	0
1	1	1	0	0	0	0	0	0
1	0	0	1	0	0	0	0	0
1	0	0	1	1	0	0	0	0
1	0	0	0	0	1	0	0	0
1	0	1	1	0	1	0	0	0
0	1	0	0	1	0	0	0	0
0	0	0	0	0	0	0	0	0

Now add up the decimal equivalent for each of the rows:

Row	Number
1	0
2	224
3	144
4	152
5	132
6	180
7	72
8	0

Write the program using the appropriate PCL commands, adding the bitmap information in data statements:

```
10 width "lpt1:"; 255
20 open "lpt1:" as #1
30 print #1, chr$(27);"*t300R";
40 print #1, chr$(27);"*r0A";
```

```

50 for x=1 to 8
60 print #1, chr$(27);"*b1W";
70 read A
80 print #1, chr$(a);
90 next x
100 print #1, chr$(27);"*rB";
110 close
120 data 0, 224, 144, 152, 132, 180, 72, 0

```

If you're new to PCL graphics programming, here's what each of these lines do:

```

10 width "lpt1:", 255

```

Sets the line width to 255 characters to avoid an automatic carriage return-line feed after 80 dots — just a fraction of an inch — have been transmitted. (Some versions of BASIC require a semicolon in place of the coma.)

```

20 open "lpt1:" as #1

```

Opens the printer port for output.

```

30 print #1, chr$(27);"*t300R";

```

Sets the printer resolution to 300 dots per inch. For a larger graphic, use 75 or 100 dots per inch.

```

40 print #1, chr$(27);"*r0A";

```

Issues the Start Raster Graphics command.

```

50 for x=1 to 8

```

Begins the cycle for 8 printed rows.

```

60 print #1, chr$(27);"*b1W";

```

This is the Transfer command, indicating that each row will be just one byte long — a very tiny graphic.

```

70 read A

```

Reads the bitmap value.

```

80 print #1, chr$(a);
90 next x

```

Transmits the value to the printer, then loops back for the next value.

```

100 print #1, chr$(27);"*rB";

```

Sends the End Raster Graphics command.

```

110 close

```

Closes the print file.

```

120 data 0, 224, 144, 152, 132, 180, 72, 0

```

Contains the bitmap data.

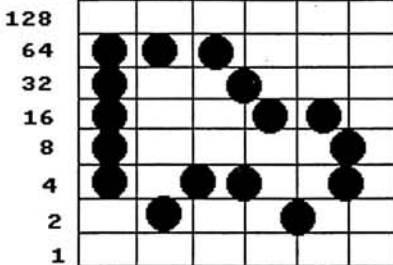


Figure 2

Dot-Matrix Graphics

A similar graphic can be printed on IBM compatible dot-matrix printers using dot graphic techniques. However, instead of using graphics, you can download this small image as a character in a 6 by 8 grid. Dots can be placed between grids — on the line between blocks on graph paper, for example — as long as no two dots overlap. This way your character can include more than six dots horizontally (Figure 2). Notice that the binary numbers are used for rows, not columns as on the

LaserJet. Add up the positions on each column — both within the blocks and on the lines:

Column	Number
1	124
2	0
3	66
4	4
5	64
6	36
7	16
8	2
9	16
10	12
11	0

The one other number needed is called the attribute byte. In this case, the byte is 139. Calculating the attribute byte is a complicated process based on whether or not you're using a descender for the character, and its width. With these numbers, we can now write the program for downloading the character:

```

10 lprint chr$(27) "&" chr$(0) chr$(126) chr$(126)
20 for x = 1 to 12
30 read x
40 lprint chr$(x)
50 next x
60 lprint
70 data 139, 124, 0, 66, 4, 64, 36, 16, 2, 16, 12, 0

```

Continued from Page 28

```

120 PRINT:NEXT I
130 A$=INPUT$(1)
140 SCREEN 0,1:WIDTH 80
150 END
160 SETMODE=VARPTR(CODE%(0))
170 CALL SETMODE
180 RETURN

```

This program displays all 256 colors from the default palette on the screen (8 rows of 32 colors each), using the heart shaped character (CHRS(3)) from the IBM character set. Run the program and notice how the colors are arranged. The first 16 colors are the same 16 colors used in the text video modes. The next 16 colors are a gray scale, and would be useful for doing monochrome pictures. The rest of the colors (except for the last 8) are arranged in three "rainbows" of 72 colors each. The second and third rainbows are dimmer repetitions of the first one. The last 8 colors in the default palette are all black normally. However, if you run another pro-

Continued from Page 33

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Line 10 informs the printer that it is about to receive a downloaded character to replace ASCII code 126, normally the tilde character. Because you can download more than one character at a time, starting and ending ASCII values are needed. Since we're downloading one character, both values are the same — the two chr\$(126) commands.

The twelve values (11 plus the attribute byte) are read from data statements then transmitted to the printer.

When you want to print the character, use this program:

```

10 lprint chr$(27) "%10" chr$(126)

```

This switches the printer into the downloaded character set, then prints character 126.

Using similar techniques, you can print larger dot graphics. Instead of downloading them, then printing, the bitmap data is printed immediately.

gram that uses the 256-color mode before you run this one, any of the last 8 colors may be something other than black, because some programs will alter the palette registers for these colors, and leave them in an altered state when they exit.

If you are unfamiliar with the IBM graphic character set, here is a program that displays them on the screen. Type WIDTH 40 before you run this program if you want to see the characters as they would appear in the 256-color mode.

```

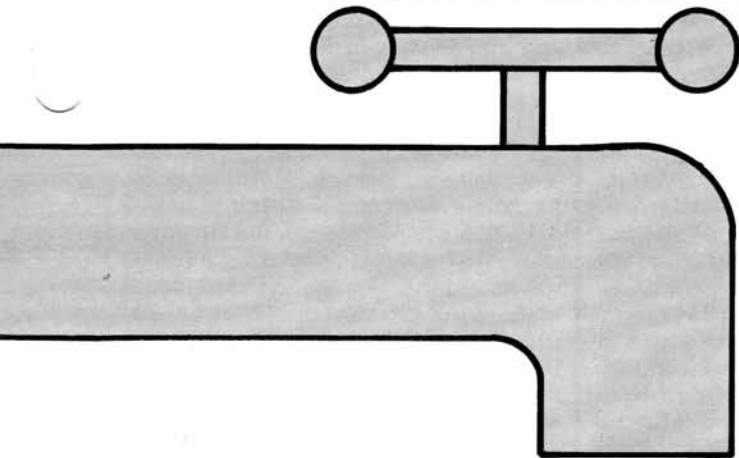
10 PRINT "IBM GRAPHIC CHARACTERS"
20 PRINT:FOR I=1 TO 6
30 PRINT CHR$(I);" ";:NEXT I
40 PRINT CHR$(8);" ";:PRINT
50 FOR I=14 TO 27
60 PRINT CHR$(I);" ";
70 NEXT I:PRINT:PRINT
80 C=128:FOR I=1 TO 8
90 FOR J=1 TO 16
100 PRINT CHR$(C);" ";:C=C+1
110 NEXT J:PRINT:PRINT:NEXT I

```

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Part 4

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A Final Look at the Newest Version . . . PC Tools Deluxe Version 5.5

Introduction

People who make a living writing for computer magazines are quite familiar with the bind I found myself in when finishing up the third installment in this series. Writing about software is akin to taking a shot at a rolling target! As I finished up the discussion of the "miscellaneous" utilities bundled into the PC Tools package, I discovered that Central Point Software had released Version 5.5, a more powerful, network-aware version. In my closing comments, I mentioned that I had already upgraded my copy, and that I was eager to determine whether the upgrade was worth the price and whether some of the earlier problems I discovered had been addressed.

I've now had a chance to revisit each of the problems I mentioned during the first three articles, and have taken some time to familiarize myself with the "new and improved" features of Version 5.5. In this article, I'll share my discoveries, describe the upgrade process, and highlight the changes made to the Installation Procedure and the documentation. If you haven't taken the upgrade step yet (or have never TRIED PC Tools Deluxe), this should help you choose between sitting tight and grabbing the checkbook, once and for all!

How to Get the Upgrade

There are two ways for Version 5 owners to upgrade to Version 5.5, and two ways for those with earlier versions (or none at all!) to proceed. If you current-

ly own Version 5, you can either download encrypted copies of the new files from the Central Point Bulletin Board system (503-690-6650) or send \$20.00 to Central Point Software, for your choice of diskettes (3.5 or 5.25), new copies of the three documentation manuals, and of course, the usual "shipping and handling."

If you're a new customer, or never upgraded from a version earlier than 5, you can pay full-blown retail (\$129) or find a discount mail order source, which usually saves you 15-20%. However, the best way to go may be to find a mail order house with copies of Version 5.1 still in stock. These are being sold at around \$50, and tacking on \$20 for the upgrade to 5.5 gives you the current version for around \$70. This isn't the path I took, but I've heard from some people who have, and it may be worth exploring.

Installation and Manuals

In a continuing drive towards consistency, Central Point changed the appearance of the Installation screens from simple white text on a black background to a screen resembling PC Shell. You now have the choice of installing any or all three of the major "parts" of PC Tools Deluxe (which corresponds to the three manuals you receive). Part 1 contains the Data Recovery and DOS Utility programs (including PC Shell), Part 2 contains the file Backup and Restore programs, and Part 3 contains all of the programs that make up the Desktop Manager (including

Notepads, Outlines, the Calculators, the Database Manager, and so on).

The text that guides you through Installation has been clarified in a few key areas. It's still one of the best Installation Procedures I've used. For example, you will be warned if installation will write over an existing subdirectory containing PC Tools programs. The procedure even notices the existence of temporary or customization files from a previous version of PC Tools, and queries you before replacing them with default files. This version required about the same amount of space as 5.1 on my Z-159 system, so there weren't really any surprises.

Those of you planning to download the files and save a few dollars should note that the manuals have all changed, to differing extents. The Data Recovery and DOS Utilities manual is about 40 pages longer, adding sections listing all of the program file names and their contents, describing examples of the new PC Shell capabilities (File Locating, Viewing and Launching), and covering typical error messages and solutions encountered while working with the utility programs (Appendix B). The Hard Disk backup manual is about 15 pages longer, but has been extensively reorganized and rewritten. The Desktop Manager manual is about 35 pages longer, and covers the use of new features, such as the on-screen HP11C Scientific Calculator. Although you can use the new files without updated manuals, the easiest way to get up to speed with Version 5.5 is to have the new

manuals nearby. After all, your *time* is worth something, too!

Have They Fixed The Old Bugs Yet?

Well, fans, the news from the front-line is mixed, at this point. Let's consider each of the problems I've mentioned earlier, and see how this version addresses (or fails to address) it. I'll try to differentiate between "bugs" and personal preferences on my part, since opinions are like noses (everyone has one!)

Does Notepads Act Like a Word Processor Yet?

The short answer is No. Notepads still lacks line centering capabilities and a Delete Word command, both preferences of mine. On the other hand, there have been some useful improvements. In order to delete a string of characters, it was necessary to choose Mark Block from the Edit menu, mark the offending section, and choose Cut to Clipboard, if you didn't care to use the Delete Character key, one character at a time. There's a new (undocumented) way to easily mark text now. Place the cursor at the start of the text, press a Shift key and the right arrow or left arrow, highlighting characters you pass. Release the keys, and you have a marked string that can be Cut or Copied to the Clipboard. Using either arrow key means that you can mark in either direction. A tip to remember when marking in this way: RELEASE THE ARROW KEY FIRST, THEN THE SHIFT KEY. Reversing this order will cause Notepads to "forget" the marked string.

The overall appearance of Notepads has been improved, with a time-of-day display added to the bottom left of the window border, and a new status line placed on the last line of the screen (see Figure 1). This line acts as a reminder of four new "short-cut" keys; F4 (Load), F5 (Save), F6 (Find/Replace), and F7 (Spell-check File). Now these common Notepads commands are only a single key-stroke away. Even mouse users will find that handy!

Finally, some commands have been added to the basic Notepads editing set, which are also available in other applica-

tions (like Outlines) that use the same set. ASCII graphics characters can now be entered into a file by pressing the ALT key followed by the ASCII value of the character or symbol desired. And the <CTRL>-Left Arrow/<CTRL>-Right Arrow combinations have been redefined to move the cursor one word to the left (or right) instead of moving it to the beginning/end of the current line (as the Home and End keys already do). I complained about the lack of such a feature in Version 5.1, and I'm pleased to see it added. I can't claim any cause-and-effect here, but I suspect that Central Point is user-oriented enough to take such comments to heart. Note one small anomaly in the way the control sequences work: <CTRL>-Right Arrow moves the cursor to the first character of the next word to the right, while <CTRL>-Left Arrow moves the cursor to the first space following the word to the left, NOT to the first character of that word. I expected identical behavior, and this way takes some getting used to.

How's That Spell Checker Coming Along?

Spell checking in Notepads is still slow and steady. The only improvement I found in this area was the addition of the F7 short-cut key to initiate the checking. Speed hasn't improved, the "holes" I found earlier in the dictionary still remain, and adding new words to the dictionary still takes around 10 seconds each (though this last measurement is highly variable). I would again classify these as preferences in the area of performance rather than bugs.

Has That Copy-To-Clipboard Bug Been Fixed?

This is surprising: No, it hasn't. Recall that if you run the Desktop Manager with the command DESKTOP/R/CS, the Clear Screen parameter listed will display a gray background screen when running the Desktop in resident mode to ease your visual confusion. The trouble is, when you hot-key into Desktop to cut some text from your on-screen application onto the Clipboard, the gray screen appears and prevents you from seeing (and thus se-

lecting text from) your application's screen display. A contact at Central Point said that this bug had been fixed in later releases of Version 5.1, but I found it still present in Version 5.5. If you load Desktop without the CS option, the gray screen will not display, and you can mark and copy text quite easily.

There were problems in the reverse operation which remain in the current release. If you hot-key into Desktop from within another application and try to Paste the contents of the Clipboard into your application, you'll end up with only the first 50 or so characters from the Clipboard. This hasn't changed, unfortunately, and so a potentially powerful capability remains hamstrung by some unresolved problem.

Is Telecommunications Still Stuck With TTY Emulation Only?

Happily, NO. this is another area that was improved just before Version 5.5 went public. Central Point has added ANSI, VT100, and VT52 terminal emulation capabilities to the Telecommunications program, which is a boon to users who use their personal computers to connect to mainframe or minicomputers in order to run full-screen applications. I'm a fan of full-screen editors, and most of the powerful applications I use on the Prime computer at work support ANSI terminals, so this is a welcome addition. You'll have to search carefully to find mention of this recent addition; it's not documented in the new manual or in the helpful "What's New" overview provided in the upgrade package. However, the on-disk README file describes this and other late-breaking improvements, which underscores a time-honored lesson in software installation: Always Obey The README File.

Where Did My DMA Controller Go, Anyway?

I stated earlier in this series that PC Backup couldn't verify the presence of a DMA controller in my 8 MHz Z-159. Actually, the error message stated that my machine "may not handle high-speed DMA backups" properly. According to Technical Support at Central Point, this message is often generated when PC Backup is run on an 8088 or 8086 machine running in "Turbo" (8 MHz and above) mode. I tested PC Backup using the DMA mode; it worked properly in every case, and was faster than the standard "DOS" mode, as it should have been.

Is the Disk Analysis Command of Compress Really Brain-Dead?

I don't believe so. But it certainly goes south when I try to execute it on my Seagate ST238R 30 MB hard disk with ST11R controller. After I called Central Point about this problem, I began receiving weekly return calls on a regular basis,



Figure 1

updating me on their progress. At this point in time, the cause of the problem hasn't been isolated, but they were very interested to hear a suggestion I passed along from Tom Jorgenson of First Capitol Computer. Tom noted that the ST11R controller "is a bit unusual in the monitor ROM area." The specially customized ROM allows quick and easy installation of Seagate drives in combination with this controller, making use of information stored in specially-formatted files on the hard disk itself. Tom notes that they've seen some odd errors generated by this combination when using "hard disk utilities that don't work through standard entry points." I thank Tom for his insight; hopefully, Central Point's Tech Support people can get together with folks at Seagate to clear up this mystery.

So give Central Point a mixed grade for version 5.5 of PC Tools Deluxe in the area of bug resolution. Let's take a look at some of the more interesting new features included, so we can better evaluate the upgrade as a whole.

New and Improved: Getting Down to Business

As you glance through the 8-page Overview of "What's New" and the new manuals, it becomes apparent that Central Point is mounting a concerted effort to broaden its user base to include corporate users. Can PC Tools Deluxe add the functionality required to attract clients from the business world without alienating the independent and "home" users that made earlier versions successful? Keep this balance in mind as we cover some of the major new features offered, and you'll be able to judge for yourself!

Network Support

This release of PC Tools Deluxe is compatible with IBM Token Ring networks or networks running Novell's Netware. The PC Tools programs can be loaded onto a network file server machine and accessed by other users on the network. A typical setup would install PC Tools in a write-protected server directory and have users store their personal data files, script files, and specific configuration information on their own machine. The "What's New" pamphlet details the PC Shell functions that cannot be used on networked drives (for example, commands that rename, resort, and prune/graft directories) for server security purposes.

This capability isn't of much use to home users, but it does add a selling point to the package. If you currently use PC Tools Deluxe at home and would like to work with the same tools on your work machine, you can make a compelling case to your local bean-counters for a Network or Site License to make PC Tools available to your entire networked work

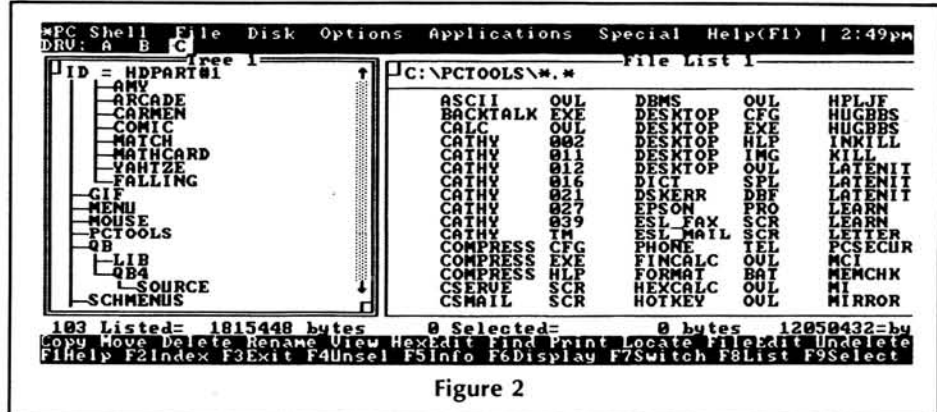


Figure 2

group. There are many advantages to standardizing software within work groups where practical. You may be able to replace a whole collection of incompatible utility programs currently in use by installing PC Tools on your network server. Contact Central Point Software for information about licenses for network environments.

PC Shell — A New Look

The display screen for PC Shell sports three new lines at the bottom of the screen (see Figure 2). The Status Line lists the number and size of files in the currently selected directory, the number and size of selected files (if any), and the remaining space on the current drive. The Command Bar is a nice improvement which lists 12 of the most common PC Shell commands, highlighting the letter that initiates the command. The Message Bar is used to display help suggestions, general information, and currently active "shortcut" keys. Figure 2 shows the initial display, which lists the commands bound to each of the ten function keys. Note that these commands, as well as the commands listed on the Command Bar are still available in the pulldown menus at the top of the screen. Users who prefer using keyboards to mice will appreciate the convenience of this layout, and will notice modest speed gains in their file-related work.

Fear not, mousers; you haven't been overlooked! The right mouse button has been activated in Version 5.5, and provides additional scrolling and selection capabilities. There are a few other nice surprises. For example, if you select a file from the active Tree List, move the cursor to the file name, and hold the right mouse button down, the Status Line will display the indicated file's name, size in bytes, date of last change and attributes set. Yes, just like the DOS DIR command, along with an attributes display. This isn't earth-shaking, just handy!

Prepare for Launch!

One of the points Central Point seems most proud of is the addition of File Viewers and Application Launchers.

File Viewers allow you to read the contents of Lotus 1-2-3 worksheets and dBASE data base files without incurring the overhead of starting up the application programs themselves. In a typical scenario, you Locate all of the files with a certain extension (WK1 for 1-2-3 spreadsheets), View each of them until you find just the one you were looking for, and Launch the application, which loads Lotus 1-2-3 and automatically reads in this spreadsheet file.

In order to launch an application in this way, the program has to be added to the PC Shell Applications List. During the PC Setup routine, certain standard applications like Lotus 1-2-3, dBASE, Microsoft Word, and WordPerfect are added to this list if found on your machine. But you don't have to be a user of Power Software to take advantage of this Launching capability. Here's how you prepare one of your favorite applications for launching.

First, install the program in the Applications List by starting PC Shell and choosing Modify Applications List from the Options menu. You'll have to answer a few questions about your program; Figure 3 shows the way I installed PC WatchWord as my standard word processor. Note that I listed extensions of WW, TXT, and ART as typical for files I edit with PC WatchWord (ARTicle, see?). Once installed in this way, my new application joins the PC Tools programs already installed in the Applications List (see Figure 4).

Now the fun starts. I use the PC Shell Locate command to list all files with a WW extension. Reading the list (Figure 4, background window), I choose the file I want to edit. When I click twice on that file name, PC Shell is temporarily exited, PC WatchWord is executed, and I find myself with the selected file loaded and ready for editing! I found this a very useful feature while writing this article; when I need to verify a point about the workings of PC Shell, I save my text, exit PC WatchWord (which places me back in PC Shell), doodle around in Shell for awhile, then double-click my way back into the article. Yet another feature that can grow on you!

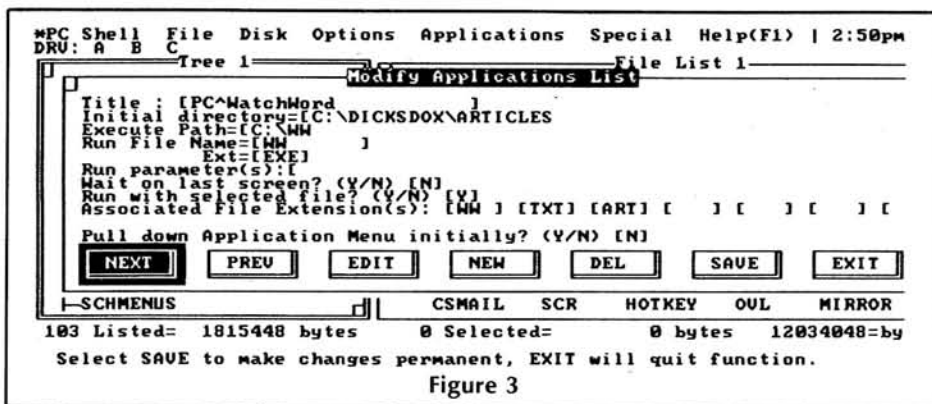


Figure 3

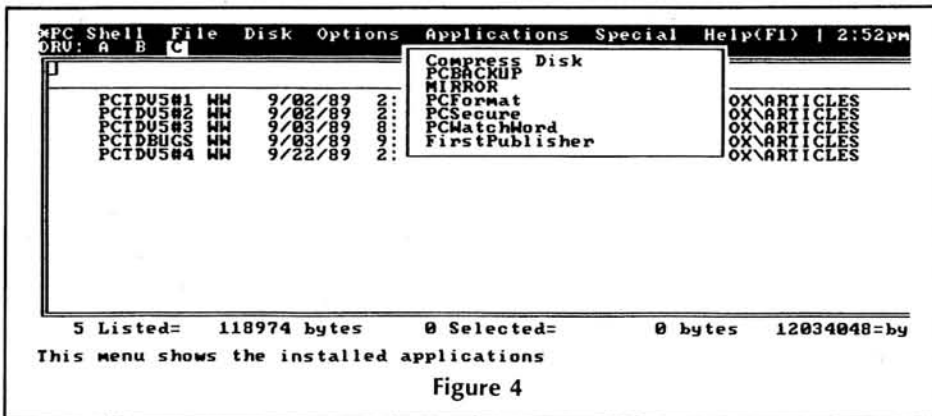


Figure 4

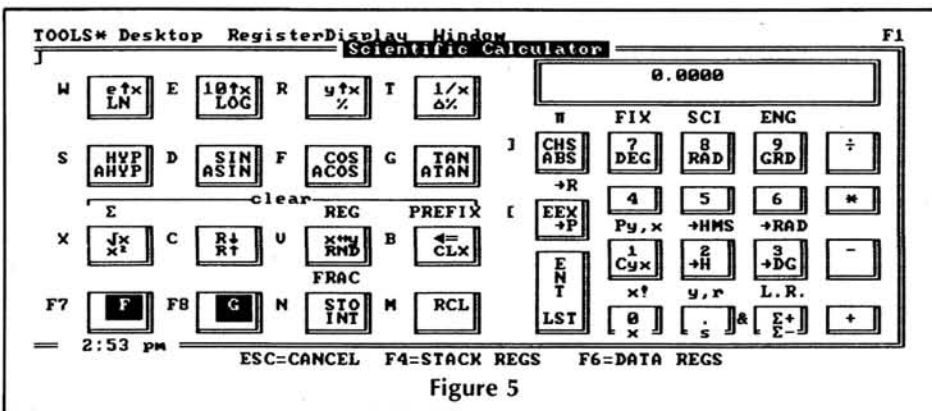


Figure 5

...And Points Too Numerous to Mention...

The sales literature and documentation for PC Tools Deluxe Version 5.5 are only too happy to point out the many, MANY additions, changes and refinements this version brings. Some of the pleasant surprises are: PC Secure can now be run from the command line, making encryption/decryption much quicker, Databases is now compatible with dBASE IV, as well as dBASE III files, serial ports COM3 and COM4 can be defined and used by the Telecommunications program, and the Calculators module of the Desktop Manager now includes an emulation of my favorite reverse polish contraction, the Hewlett-Packard HP11C Scientific Calculator (Figure 5). I know it's illogical, but there's something about fooling around with an onscreen calculator

that appeals to me. Maybe it's just the way it puts the entire personal computer phenomenon into perspective; the ultimate powerful computational device serving as a desktop adding machine. I vote for an abacus in Version 6.0!!

Conclusions

If you've currently got a copy of PC Tools Deluxe, get the upgrade. It's a powerful new tool for a very reasonable price. If you're still considering a purchase of PC Tools, get 5.1 if you can, and then upgrade. Not all of the bugs have been fixed, but Central Point is a company that is willing to listen and work on problems that users report. Knowing that no software is perfect, I'd rather deal with a company that respects your concerns than one that assumes the major problem lies between your ears. You can get the latest

information on Central Point products, and even post comments, complaints and great thoughts, on their Bulletin Board System at (503) 690-6650. They've even included a script file in Telecommunications to handle the dialing and logging in for you: now THAT'S service.

This concludes the series on PC Tools Deluxe, Version 5. If you have any comments or questions, I'd be happy to respond by mail. And now, why not take some time to consider sharing some of the things YOU'VE learned while using your Zenith machine? This magazine will always remain FOR the users, as long as it is written BY the users! Topics that seem ordinary to you may fascinate others, and you'll never know unless you put together a draft and send it to our Friendly Local Editor. So what are you waiting for? . . .

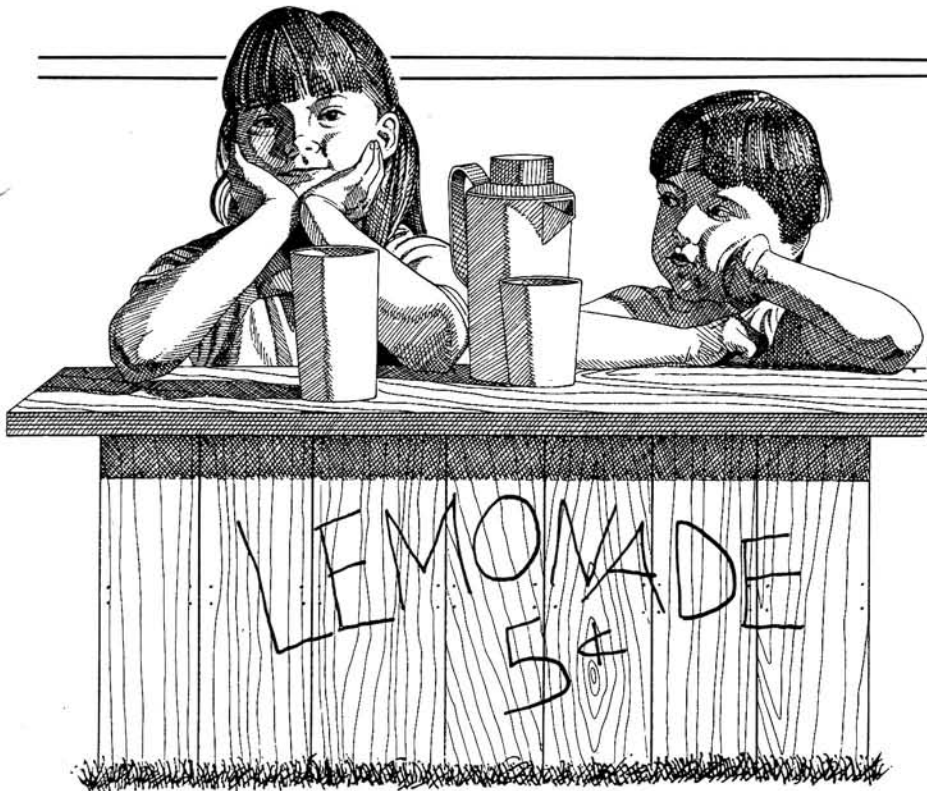
Products Discussed

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- PC WatchWord, Version 3
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Small Business

Doris M. Pitney
16 Las Islas
Boynton Beach, FL 33426

Reports, Spreadsheets, Etc.

Accounting and record keeping for a small business has to be as accurate and complete as that for a large firm. The profitability of the business is important to the proprietor and to the Internal Revenue Service.

Bookkeeping by the double entry system seems redundant and awkward for the new small business. New systems have emerged with entries into books designed for keeping all the figures at hand and with composite sheets for balancing and totaling results.

This was the method we used in our small business originally, but using a pencil and handheld calculator and even one with a tape meant many hours of searching for little errors or omissions.

The Zenith PC solved our bookkeeping problems. The program that we were given at the onset was First Choice. It proved to be designed for someone who wanted to learn quickly how to put the computer to work.

File and Reports

Files and reports supplied all the figures in a neat and organized format. Total sales, total receipts, total expenses and inventory figures all were easily accessed and were printed out for review.

To collect total figures for Sales, Receipts and Balances start with creating a file folder. Each file is a record of the pertinent facts of a sale and/or receipt transaction. Fields for the records can be few or many. Name, date, amount of sale, amount of receipt, previous balance are the most important. Invoice number, items sold, shipping costs and account

number are other possible fields.

Reports give you totals, subtotals, balances, counts and averages. Subtotals for individual accounts can be separately collected for monthly statements. All open account sales (not COD sales) if coded by account number, can be in a report separate from the other to facilitate statement preparation.

The columns for a typical Sales and Receipts Report are:

- Column 1 — Account #
 - Column 2 — Date
 - Column 3 — Inv. #
 - Column 4 — Co. Name
 - Column 5 — Prev. Bal.
T (Calc. Option)
 - Column 6 — Sales
T (Calc. Option)
 - Column 7 — Receipts
T (Calc. Option)
 - Column 8 — Balance
T (Calc. Option)
- (Derived—Formula: #5+#6-#7)

The Report will sort first for type of account (Column 1) and second for date of transaction (Column 2). The calculation option totals all columns.

The columns for a typical Statement-Report are:

- Column 1 — Co. Name
- Column 2 — Ent. Date
- Column 3 — Inv. #
- Column 4 — Prev. Bal.
ST (Calc. Option)
- Column 5 — Sales
ST (Calc. Option)
- Column 6 — Receipts
ST (Calc. Option)
- Column 7 — Pd. Date
- Column 8 — Balance

ST (Calc. Option)

(Derived — Formula: #4+#5-#6)

The sort is by company and the calculation option ST gives you subtotals of sales, receipts and balances.

Addressing

Addressing statements and mailing pieces are both accomplished by having a customer folder with files holding all pertinent information on each customer's record. First Choice has simple instructions for creating a folder and making labels, etc.

Expense Spreadsheet

Expenditures for merchandise and operation of the business are categorized and totaled monthly, quarterly, and yearly by recording in a spreadsheet, totaling by item across the sheet, as well. All the figures are complete by the time the IRS asks for your return. Daily entries make for error free, complete expense charges.

Two formulas make all your calculations quickly and immediately.

To total columns — TOT(R1..R20)

To total rows — TOT(C1..C12)

Use Alt Q (Quick Entry) to repeat the formula all the way down and over. If calculation seems slow with many entries, change from automatic calculation to manual temporarily. To speed up preparing headings for a spreadsheet use Alt Q after your first heading and First Choice will complete your Titles — JAN, FEB, MAR, etc. — for days, months or years. (See Figure 1.)

Cash Spreadsheet

Another spreadsheet can combine

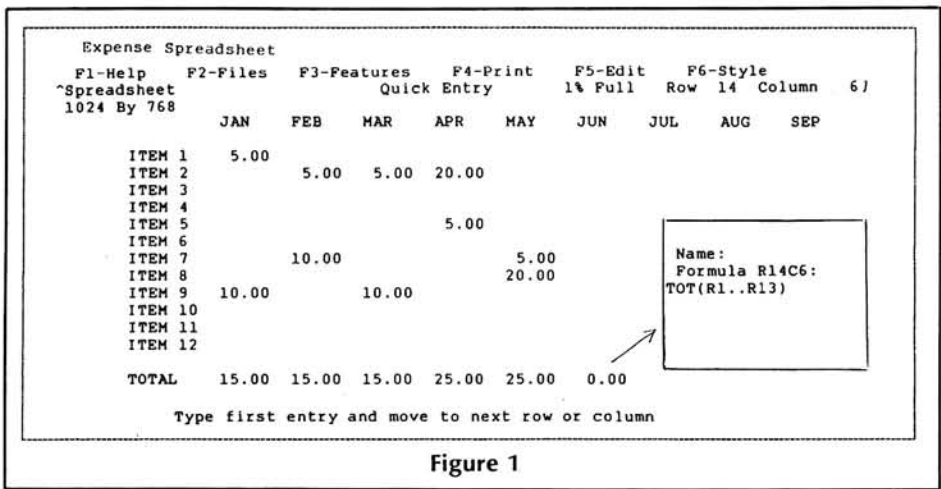


Figure 1

cash and check transactions and give a double check for expense totals. It will show up any errors in the checkbook where transposed figures have caused a problem.

Inventory Spreadsheets

Inventory presents several opportunities for creating spreadsheets. Costs of inventory are easily figured and also updated as often as necessary with just new costs per item entered. If UPS or Freight charges change, just that column can be altered. Extensions are automatic each time any change is made. Total inventory cost reflects the changes immediately.

Inventory Control

Some businesses will find that a spreadsheet can be an inventory control device. Columns for Shipments Received and Shipments Out give balances for Inventory on Hand. The items listed can be all or just those most frequently sold. (See Figures 2 and 3.)

Monthly Worksheet

Incorporating the Balance Sheet and Profit and Loss Statement in a Spread-

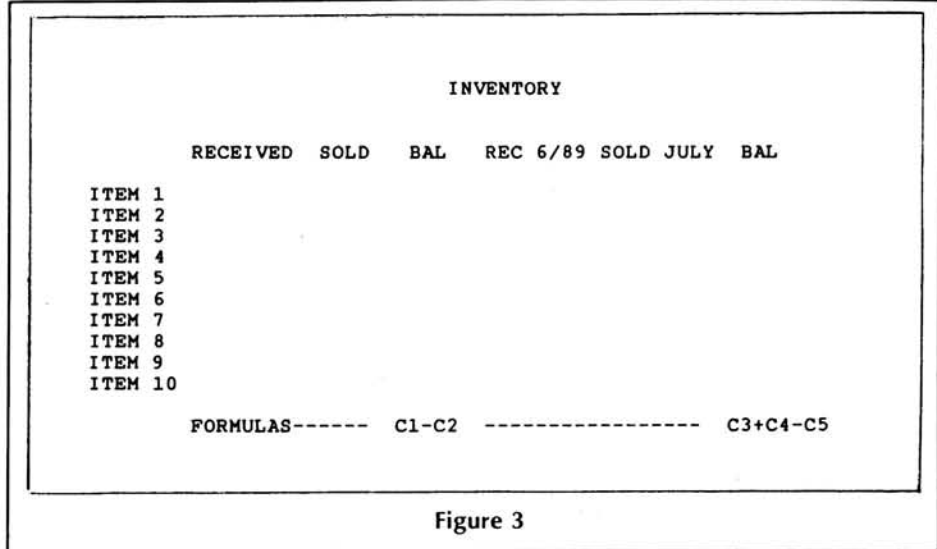


Figure 3

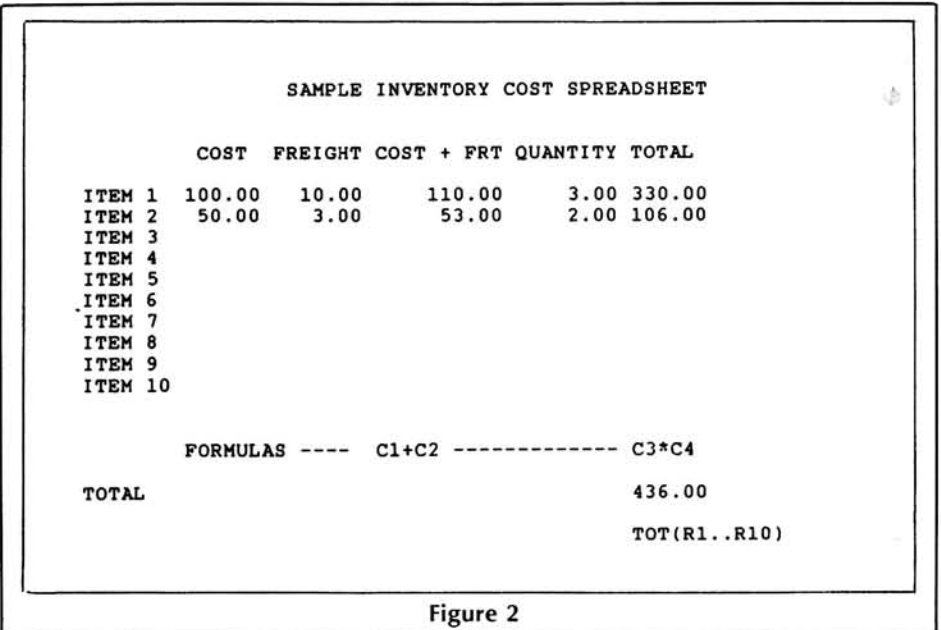


Figure 2

sheet was the challenge. A Worksheet is prepared each month. The first two columns are the Assets and Liabilities of the Balance Sheet. The next two columns are the Debit and Credit of Cash. Following

Credit side of Cash will be automatic and correct after completion of the Adjustments and Profit and Loss columns. Cash is then automatically completed. The Trial Balance will automatically check your work up to this point.

The automatic entry figures are the result of typing formulas in the formula boxes (Alt F) for the debit and credit entries of Cash opposite Cash and in all of the Trial Balance. Formulas:

Cell C3R3 — TOT(C4R4..C4R20)

Cell C4R3 — TOT(C3R4..C3R20)

Cell C5R3 — C1+C3

Cell C5R4 thru C5R20 —

Repeat Cell C5R3 (Alt Q, Quick Entry)

Cell C6R3 — C2+C4

Cell C6R4 thru C6R20 —

Repeat Cell C6R3 (Alt Q)

Next, enter the new Accounts Receivable figure in R4C7 and the new Inventory in R5C7. Enter Reserve for Depreciation in R7C8. Enter the following formulas:

Cell R4C8 — C5 (Previous Receivables)

Cell R5C8 — C5 (Previous Inventory)

Cell R16C7 — R4C8

Cell R18C7 — R5C8

Cell R20C7 — R7C8

SAMPLE WORKSHEET - SMALL BUSINESS

DC 30 88 BAL SHEET		---CRSH SUMMARY---				--TRIAL BALANCE --ADJUST MENT--				PROFIT & LOSS---		JN 31 89 BAL SHEET	
Assets	Liab.	Debit	Credit	Debit	Credit	Debit	Credit	Expense	Income	Assets	Liab.		
Cash		5,000		5,480	2,400	8,480	2,600				5,880		
Accts Receivable		2,000			2,000	0	2,500	2,000			2,500		
Inventory		6,000			6,000	0	6,500	6,000			6,500		
Fix & Equipment		14,000			14,000	0					14,000		
Reserve for Dep.								200			200		
Accounts Payable			1,000			0	1,000				1,000		
Loans Receivable		0				0	0				0		
Loans Payable													
1. Car			5,000	200		200	5,000				4,800		
2. Bank			1,000	100		100	1,000				900		
Capital													
Partner 1			10,000			0	10,000				10,000		
Partner 2			10,000			0	10,000				10,000		
Sales				3,480		0	3,480	2,000	2,500		4,000		
Returns & Dis.											-20		
Purchases			2,000			2,000	0	6,000	6,300	1,800			
Operating Expenses			800			800	0			800			
Depreciation							200			200			
Totals		27,000	27,000	6,080	6,080	33,080	33,080	17,200	17,200	2,000	3,980	26,880	
Profit or Loss										1,980		1,980	
										3,980		28,860	
Column		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12

Figure 4

In the Profit and Loss columns enter the actual Sales of the month in Cell R16C10 and Returns and Discounts in Cell R17C10 as a negative amount. Enter the following formulas:

Cell R18C9 — C5-C6+C7-C8

Cell R19C9 — Same Formula (Alt Q)

Cell R20C9 — Same Formula

The last two columns will automatically complete the end of month Balance Sheet. The Cash figure in the Assets column must be equal to the balance in the checking account plus cash on hand. Formulas:

Cell R3C11 — C5-C6+C7-C8

Cell R4C11 — Same Formula (Alt Q)

Cell R5C11 — Same Formula

Cell R6C11 — Same Formula

Cell R7C12 — C6-C5+C8-C7

Cell R8C12 thru R15C12 — Same Formula (Alt Q)

All columns in the Spreadsheet will have Totals. Enter formula:

Cell R21C1 — TOT(R3..R20)

and repeat with Alt Q across. Totals agree in each pair of columns for Balance Sheet, Cash, Trial Balance and Adjustments. The difference between the Income and Expense columns is the profit or loss for the month. Formula:

Cell R22C9 — R21C10-R22C9

The Assets and Liabilities

Columns for end of the month also will show a difference which should agree with that in the Profit and Loss Statement. Formula:

Cell R22C12 — R21C10-R22C11

Row 23 shows that adding the profit results in the columns equaling. Formulas:

Cell R23C9 — R21+R22

Cell R23C12 — R21+R22

The following month, the Spreadsheet is copied and numbers replaced only as necessary and all formulas ARE LEFT INTACT. Then it is saved under a new name so that both month's work-

sheets are kept.

The style is adjusted to 0 Decimal so that printing is possible without a paste up printout. Wide or sideways can be used also if the spreadsheet is too wide.

All of the company's records are kept in one Data Binder. There is a Sales and Receipts Report, and Inventory Cost Spreadsheet, Checkbook Record, Expense Spreadsheet and the Comprehensive Worksheet. Traditional Profit and Loss Statements and Balance Sheets can be produced from these if necessary. (See Figure 4.)

Word Processing and Graphics

Letters and mailings increase business and are easy with First Choice. At times, it helps to see a graphic presentation of profits or of a sales comparison. This program does it all. *

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DOS File Backup Utilities

Frank Starr
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One of the most important things anyone working with a PC needs to do is back up their files. You learn early on to make safety copies of all software you use on your machine. When you begin working with a hard disk, you have a large number of files to deal with, and it takes extra effort to insure that all new or revised files get backed up regularly. One of the easiest ways to insure you have a safe copy of any work file is to avoid putting it on the hard disk to start with. If you use a word processor or another application program which doesn't create large data files, you can log onto your floppy disk, and do all your work there. Should the slower speed be acceptable, you only have to make sure you do regular saves if you are doing a lot of work, or spend a lot of time on a project. Then you are taken care of if your system goes down. You only have to go to another with the same application(s), or lease one, as the case may be.

Just having backed up copies of the work files created by your application isn't always enough, however. If you are working with just one computer, at work or at home, you may find it to your advantage to back up all files on the hard disk, onto a sufficient number of floppies. Having back up copies of your application programs, already installed and configured just as you want them, can save a lot of time returning things to the way they were before. If you don't remember or haven't written down the names of all directories, the default color schemes, etc., you will spend a lot of time rediscovering how to set these things up, or end up looking at a black and white screen, even though you have a color monitor.

There are backup machines which use tape, which are quicker and allow you to store more files into a much more compact area than using floppy disks. You can

even buy a kit which will let you back up your hard disk using your video recorder. Even this arrangement costs a couple of hundred dollars. Until you're ready to buy an extra, expensive piece of computer equipment, you'll have to do the best you can with floppy disks. Since these are inexpensive, the only disadvantages are time spent changing disks and storage space for your backed up files.

While there are many file backup programs on the market, DOS 3.1 introduced a couple of utilities which do the job well enough for someone who has to consider saving some money, and who only needs to back up their entire hard disk a few times a year, or monthly at the most. The programs I'm speaking of are XCOPY.EXE and BACKUP.EXE. Both programs can do hard disk file dumps with a minimum of key-ins, and give you options to save selective files, or copy the entire hard disk.

I'll begin by discussing XCOPY. My copy of the Microsoft MS-DOS User's Guide, Operating System Version 3.2, gives XCOPY's purpose: Copies files and directories, including lower level directories, if they exist. This it does, and does it well enough. Once the program runs out of space on your disk, however, it gives you an error notice: "Insufficient Disk Space, XX File(s) Copied", and then stops. So you have to create a batch file to keep it going. My first batch file looked like this:

FILEDUMP.BAT

```
:label  
cls  
echo off  
echo insert blank disk  
pause  
xcopy c:\ /m/s/e/v a:\  
goto label
```

This tells XCOPY to start at the root of drive C:. The /m switch says to copy ar-

chived files and turn each file's archive bit off as it is copied. The /s switch says to copy directories and subdirectories. The /e switch says to copy even empty subdirectories, while the /v switch makes XCOPY verify each copied file to insure that it is identical to the source file.

By having XCOPY turn off the archive bit for each file it copies, you can rerun this batch file, and it will only copy files which have changed. You also won't copy the same file twice during each run of the batch file. Application files won't change that much, so you will save disks on later file backups.

At first, my only complaint with XCOPY was that, as things went past the first few floppy disks, it took longer to fill each one. The program has to start from the root of your hard disk with each run, and then scan each file for the next one with the archive bit still on. When I reviewed my disks with a DIR command, however, I discovered that the program was wasting a lot of space. It would copy a directory the first time. Then, when it came back through again, it would see the same directory now as an empty directory, since all the archive bits would be off. The /e switch says to copy empty directories, and so that is what it did. This was wasting some space on my backup floppy. While this is only 128 bytes per directory, this mounts up if you have a large hard drive with several directories and subdirectories.

I thought that there should be some way around this, but it took me a while to figure it out. My user's guide said that "you must use this switch with the /s switch". So, according to the book, and another one I checked with at SPERRY PC, it looked like I might be stuck with this annoyance.

However, after a number of years of experience with different types of main-

frame and micro computers, I have discovered that sometimes the documentation doesn't always make what's being said obvious. So, I decided to experiment and see if there wasn't a workaround of some kind. Below is my next try at an XCOPY batch file.

FILEDMP2.BAT

```
:label
cls
echo off
echo insert blank disk
pause
xcopy c:\ /m/s/v a:\
goto label
```

The only difference here is the elimination of the /e switch. When I ran xcopy this time, I didn't make copies of "empty" directories which had already been dumped. While you don't get empty directories, you can copy a subdirectory which is below an empty directory. I think that what the documentation was trying to say was that the /e switch wouldn't work without the /s switch. There are cases where your application may require blank directories or subdirectories, and you will want to copy them to insure that you can properly restore your system.

A review of the disks with the DIR command now showed no empty directories which were already dumped. However, there were several disks which had a good deal of empty space. Some only had a few hundred bytes open, but some had a few thousand. You would usually want to keep all files in their appropriate subdirectories, and having to manually move files around or copy them to fill up unused space would miss the point of automating your file backups. It looks like XCOPY can do a good file backup, but can't get the best use from floppy disks.

I then decided to experiment with the BACKUP program. It also lets you copy files from hard disk to floppy. You can't control which files you copy by checking the archive bit, but you can tell it to copy only those files modified since the last backup, or those modified after a certain date or time. You also get more efficient use of floppy disks. BACKUP does this by splitting files. If it comes to the end of a disk while copying a large file, it closes off what it has room for, writes it to the floppy, and then calls for and continues copying onto the next floppy. Once you start off BACKUP, it keeps going, so you don't have to create a batch file to get all your files copied from your hard disk. This was my command line for the BACKUP program:

```
BACKUP C:\ A: /s/l:filedump.doc
```

The /s switch says to back up subdirectories. The /l switch is explained below.

In terms of performance, BACKUP could be considered the better of the two

programs, overall. I backed up a 10 meg. partition on my 40 meg. winchester, which had about 7 meg. of data. BACKUP only required 50 minutes, while XCOPY with my batch file took closer to two hours. I needed 16 disks for BACKUP, while I used 18 with XCOPY. If I had backed up my 30 meg. partition, it would have taken about 6 to 7 hours and 77 disks with XCOPY, as opposed to about 4 hours and 69 disks with BACKUP. These figures would only be accurate assuming 30 meg. full of data, and extrapolating from the times on the 7 meg. backups. They are useful only to get a rough idea of the differences in disks and time needed for BACKUP and XCOPY. It might be more practical to say that BACKUP requires about 89% of the disks and 33% of the time needed by XCOPY.

One thing to remember when using BACKUP is that you need to insure that you are using blank disks before you start the program. This is because BACKUP will overwrite whatever is on your floppy disk. You get a message before the program begins copying: "Warning! Files in the target drive A:\ root directory will be erased. Strike any key to continue." This warning prints out on the screen before each disk is copied. In any case, if you don't use the /a switch to add backed up files to those already on your target disk, without overwriting files already there, BACKUP will erase your disk. Some versions of BACKUP also give you the option to format your floppy before beginning the copy operation.

BACKUP also provides the useful feature of creating a log file of all files backed up, and which disk each one was copied to (see command line example above). You have to number each disk yourself, to keep them in order for easiest file restoration. You restore files backed up using BACKUP with the RESTORE.EXE program. It's best to use RESTORE, since BACKUP sometimes splits a file over two or more floppy disks. You don't have to begin with disk #001, although the program by default will tell you it is starting with disk #001. If you begin with disk #005, however, you will be prompted for disk #006 as the next disk.

Using BACKUP or XCOPY would be best to back up hard disks used by people who own their own PC with a small hard disk, or who don't do backups that often. Of course, once you back up your hard disk the first time, you could use an option to copy only files which have changed. This shouldn't require a lot of disks, and could be done as often as daily.

There is one case where XCOPY can be very useful — in copying floppy disks. I have one floppy disk drive and a 512K RAM disk, and find the following batch file just as useful and a bit quicker than DISKCOPY, when you already have for-

matted floppies:

COPI.BAT

```
cd\
e:
:label
pause insert source disk in a:
xcopy a:\ /s/v
pause insert blank disk
del a:. <c:\dos\yes.inp
xcopy \ a:\ /s/e/v
del. <c:\dos\yes.inp
goto :label
```

I always check to make sure that my copy to disk is indeed blank, and then save some keystrokes by piping the yes response in to my delete command. This batch file saves me a good bit of time. I can save using DISKCOPY for things like copying disks with the system files already placed on them with the /s switch of the FORMAT command, or copying disks likely to contain other hidden files. Below is my YES.INP file:

YES.INP

```
y
n
```

I created YES.INP using EDLIN per the following example:

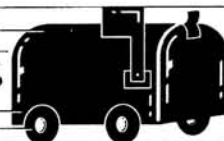
EDLIN YES.INP

1. y
2. [Press the RETURN or ENTER key]
3. n
4. [Press the CTRL and Z keys]

I then pressed the e key to finish my inputs and save my YES.INP file.

My research for this article was done with a Zenith Z-248. As long as you have DOS 3.1 or above, you could use any other Zenith Data Systems DOS-based machine, including a Z-100. I used 360K disks, 5-1/4 inch, double-sided, double-density. *

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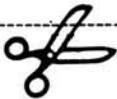
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February	December 15	August	June 15
March	January 15	September	July 15
April	February 15	October	August 15
May	March 15	November	September 15
June	April 15	December	October 15



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21-\$9.40	22-\$9.80	23-\$10.20	24-\$10.60	25-\$11.00
26-\$11.40	27-\$11.80	28-\$12.20	29-\$12.60	30-\$13.00
31-\$13.40	32-\$13.80	33-\$14.20	34-\$14.60	35-\$15.00
36-\$15.40	37-\$15.80	38-\$16.20	39-\$16.60	40-\$17.00
41-\$17.40	42-\$17.80	43-\$18.20	44-\$18.60	45-\$19.00
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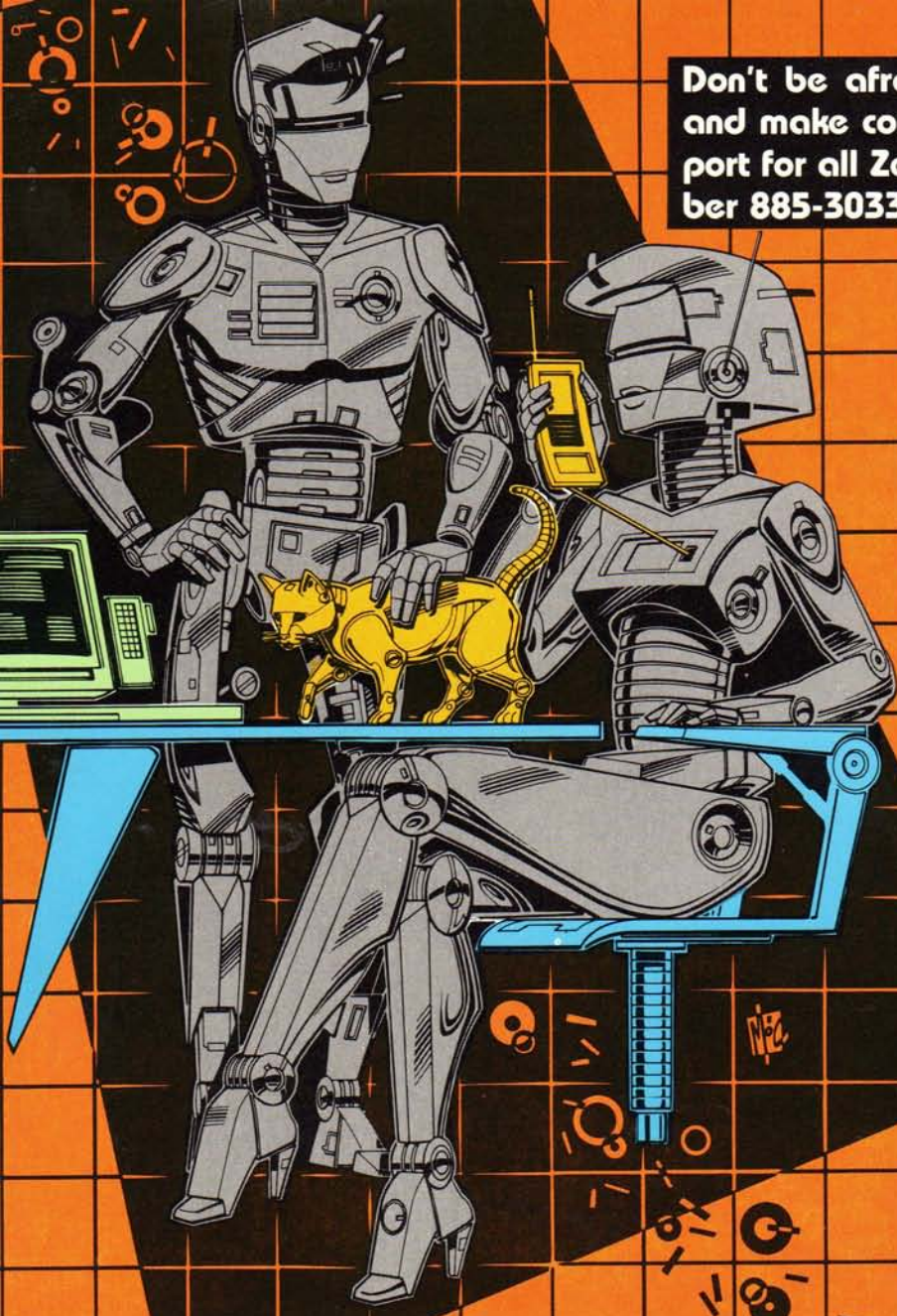
HADES II

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- Automatic Erased File Recovery
- Manual Rebuild File Recovery
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```

HUGMCP Commands
F1 -- Prints This List, Your Storage Buffer Size, And How Many
     Bytes Are Presently In The Storage Buffer.
F2 -- Allows Sending A Defined Message, Or Character Sequence.
     These Messages Are Entered Using The (F5) Setup Command.
F3 -- Toggles The Storage Buffer On and Off. When The Buffer
     Is On, The (Ctrl) On The 25th Line Will Be High-Lighted.
F4 -- Allows Saving Data To Disk From The Storage Buffer, Or
     Directly From The Modem By Way Of XMODEM Protocol.
F5 -- Allows Sending Data From Disk, Using Either XDM-MSDF,
     Which Optionally Can Be Ignored, Or XMODEM Protocol.
F6 -- Enters The Setup Mode So This Software Can Be Configured.
F7 -- Clears Out Any Data That May Be In The Storage Buffer.
F8 -- Send Data In Storage Buffer To Printer.
F9 -- Exits Back To MS-DOS.

Storage Buffer = 524288 Bytes
Storage Buffer Usage = 0 Bytes

Select Message (A-0), (F1) To List, Anything Else To Abort --) _
F1-Hlp F2-Msg F3-Bufr F4-Sav F5-Snd F6-Cfg F7-Clr F8-Print F9-Exit COM
  
```

```

HUGMCP Configuration Help #1
This function allow the baud rate to be changed. Depending upon which
type of modem you have, you will be able to select either 300, 1200, or
14400. Some direct connections to a host, will allow higher baud rates.

This function allow you to change the word parity. Normally you
select "None" parity. This is acceptable for most remote systems,
and it is also necessary for XMODEM protocol to work properly.

This function allows the changing of the word length. Normally the
length should be set to 8 data bits. This value is acceptable for most
remote systems, and it is necessary for XMODEM protocol to work properly.

This selection allow you to enter messages which can be automatically
sent with the (F2) key. Up to 14, 31-character messages can be listed.
Messages of 14 special -- (F) should contain your computer's 15 word
and password. Selection can be done special. This selection can auto-
matically be used when this program is first executed by selecting the
proper system during setup.

Type (H) or (F1) for more help, anything else to configure.
F1-Hlp F2-Msg F3-Bufr F4-Sav F5-Snd F6-Cfg F7-Clr F8-Print F9-Exit COM
  
```

```

HUGMCP Configuration Menu:
A -- Modify Baud Rate
B -- Modify Parity Type
C -- Modify Word Length
D -- Modify Or Add Auto-Messages
E -- Miscellaneous Functions
F -- Change Screen Color Assignments
G -- Display Current Configuration
H -- Make Changes Permanent

Select A-G, (F1) For Help, Anything Else To Quit --) _

Baud Rate: 19200
Parity: NONE
Word Length: 8
Duplex: Full
Response To Keyboard Disable: NO
Storage Buffer Data Parity Bit: SET TO ZERO
Send Modem Initialization Text: NO
Delete Character: NORMAL
Modem Port Set To: COM1

F1-Hlp F2-Msg F3-Bufr F4-Sav F5-Snd F6-Cfg F7-Clr F8-Print F9-Exit COM
  
```



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