PC-DOS mode offered in new CP/M® release

Concurrent™ CP/M 3.1, the latest version of Concurrent CP/M operating system that is targeted for the Intel 8086/8088 microprocessors, offers a host of new features. Concurrent CP/M 3.1 provides both single user and multiusuer support within one real time operating system with increased capabilities that include networking, shared code, graphics and 8087 support.

In the single user mode, Concurrent CP/M 3.1 provides the professional workstation within the corporate environment with the following features: real-time kernel, virtual consoles, graphics support, networking and inter-task communication and synchronization. The multiusuer mode is an ideal solution to the needs of a small business or an office within a large corporation. It has benefits such as a high performance file system, a multiple virtual console environment at each terminal and network capability. Because Concurrent CP/M provides multiusuer support, it will replace Concurrent CP/M 2.0 and MP/M-86.

DR Soft/Net™, Graphics System Extension (GSX™) and a generic PRINT utility are all bundled with the product at no additional charge. The CHSET utility is included to toggle those bits in the command header needed in order to invoke the Intel 8087 math coprocessor support, the Shared Code Support facility to lower memory requirements and to lessen program load time, and the Suspend Mode that halts program execution when that program is pushed into the background.

PC-Mode compatibility option

A PC-Mode compatibility option is also available that allows most applications programs written for PC-DOS 1.1 to be run under Concurrent CP/M 3.1. The user can run PC-DOS application program from PC-DOS, MS-DOS® or CP/M formatted floppy diskettes in a concurrent multitasking environment. PC-Mode also allows the user to run application programs and read/write data contained in the root level directories of MS-DOS and PC-DOS 2.0.

PC-Mode supports the PC-DOS 1.1 system functions initiated by INTERRUPT 21. Programs using routines embedded in ROM in the IBM PC can now be run in a concurrent environment if the OEM includes PC-Mode in the Concurrent CP/M system and special routines in the I/O system. The major utilities — COPY, ERASE, RENAME, DIR, DATE, TIME and BATCH — are included in PC-Mode.

DR Soft/Net™ links CP/M based computers

Digital Research has just released DR Soft/Net, the first software to link CP/M based microcomputers via any local area network (LAN). The DR Soft/Net package enables offices to tie together diverse microcomputer work stations using any LAN such as Ethernet, Arcnet and Omninet. Its high level software provides a swift, flexible and inexpensive means of creating a network based on any combination of LAN and microcomputer hardware.

DR Soft/Net comes in two versions that can be efficiently customized by original equipment manufacturers (OEMs) for the retail market. One version is for CP/M and MP/M II™ systems, and the other is for Concurrent CP/M. The 16-bit version supports full Concurrent CP/M functionality and is compatible with the 8-bit version. Now 8- and 16-bit systems can be networked together to share files and peripherals while permitting password protection and record and file locking.

Two different types of network stations, requesters and servers are supported. Requesters act as CP/M® work stations, initiating all network activity. Servers respond to network requests, managing files, printers and console activity for multiple requesters. Stations are designated as servers or requesters when the network is configured. Concurrent CP/M systems can act as both a server and a requester due to the multitasking capabilities. In fact, a Concurrent CP/M system can act as both a server and a requester simultaneously.

An additional feature, print spooling, proves of great advantage to office automation. Print requests can be sent to a server to await the next available networked printer or they may be assigned to a designated printer.
DRI agreements reached on UNIX™ System V

Digital Research is making a major commitment to the UNIX System V operating system by signing three separate agreements with AT&T, Intel and Motorola. The primary objective of these agreements is to increase the commercial value of the UNIX System V operating system and to bring about the system's emergence as an industry standard.

Digital Research and AT&T have agreed to jointly produce a UNIX System V Applications Library. The products included in the library will be released by the end of 1984. They will be marketed through Digital Research's retail channels.

"AT&T Technologies is very pleased about what promises to be a constructive and mutually beneficial relationship with Digital Research," said Jack Scanlon, AT&T Vice President, Computer Systems. "We believe that relationships such as this will help us achieve our ultimate goal of making UNIX System applications, windows, hierarchical files support, single or multiuser configuration and GSX, the graphics extension. The agreement also includes development of these Digital Research languages for the VME/10; Digital Research C™, Pascal MT™, CBASIC Compiler™, DR FORTRAN-77™, PL/I™ and BASIC Interpreter™.

According to Tom Beaver, Director of Motorola Microsystems Operations, "The agreement reinforces Motorola's commitment to support the M68000 microprocessor family with state-of-the-art operating systems that facilitate implementation of the myriad of applications software developed by third party vendors. This latest development provides designers and end-users increased flexibility in software development along industry-standard lines and is being combined with development and support of advanced semiconductor components to provide a portable, performance oriented environment for applications software. This is the first in a series of moves to provide complete portability between the UNIX System V, the VME/10 standard and other major operating system software libraries."

Intel contracted with DRI to develop System V 286 UNIX after another company failed to do the job. DRI will release a UNIX System V Applications Library including a line of high quality applications and systems software by the end of the year for AT&T. When the Motorola project is complete, also by the end of the year, it will be possible to port source-code from Concurrent DOS to UNIX System V, or vice versa, with little or no code conversion required. This will allow new software products to enter the market earlier and at less expense.

DRI data base now provided on CompuServe

Go DRI™ to get on-line with Digital Research's newest microcomputer data base on the CompuServe Information Service. On January 26, 1984, just one week after CompuServe reached 100,000 subscribers, DRI went on-line with information aimed at the professional microcomputer user. The goal set for this data base is to provide microcomputer professionals with the timely and accurate information that is needed to keep up with this rapidly changing industry.

In order to accomplish this goal, DRI needs your help to find out what types of information you would like to see on the DRI data base on CompuServe and the MICROLINE™ data base on THE SOURCE™. Please help us provide you with what you want by completing the questionnaire found on MICROLINE or DRI or completing and returning the questionnaire in this issue of Micro Notes.

Go DRI and take a look at our latest data base offering and let us know what you think by completing the questionnaire or by sending a Letter to the Editor. See the next issue of Micro Notes to read about data base enhancements. Maybe one of your suggestions will result in an enhancement to the data base.

Letters welcomed

Let Digital Research know what you think of Micro Notes and the DRI and MICROLINE data bases by sending a Letter to the Editor. Send your messages by electronic mail addressed to CompuServe ID 76706,615 or Source ID STA809 or by mail to Editor, Technical Support Department, Digital Research, P.O. Box 579, Pacific Grove, CA 93950.

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Questions and Answers

Digital Research C

Q: When trying to compile the SAMPLE.C program supplied with the C Language for CP/M-86, a banner is displayed and the system prompt reappears. Some Temporary files may be created. What is happening?

A: At least two situations will cause these symptoms:
1) Not all of the appropriate files are present on the disk. Refer to section 1.4 in your documentation.
2) The patches to BDOS function 59 have not been installed on your CP/M-86 system. R.CMD relies heavily on function 59 to load the various compiler modules. Without the patch, R.CMD is overwritten when the next program is loaded.

Q: When trying to use the C Language V1.1 with Display Manager V1.0, a link-time error is generated that reads:

NO FILE
FILE: SYSLIBx.L86

A: An incompatibility exists due to the renaming of the DR C system run-time libraries from SYSLIBx.L86 to CLEARx.L86. A quick solution is to create and compile a C program which consists of only a "dummy" function. [EX: dummyt()] Then rename the object module to SYSLIBx.L86. A patch is available to correct the Display Manager libraries, DMDRCx.L86. Request Display Manager Application Note 04.

Q: When using Digital Research C under the CP/M-86 operating system, how are the "01","02" attributes and underlining handled?

A: Those value clauses serve as indexes into the jump table. They complement the routine definition for which they serve as an index for. Depending on where the routine resides in the table, determines the definition given to the routine within the Working Storage.

Pascal MT+86

Q: When I try to link an Assembly Language module to my Pascal program, I am told that the entry point is an undefined label. I have declared the entry point external from the Pascal program and the symbol has been defined in my assembly module. Why is the linker unable to locate the entry point?

A: The entry point name and the assembly module name must each be a unique identifier. If the same name is given to both labels, the linker attempts to use the module name as the entry point when in reality the program intended to use a name within that module.

CBASIC Compiler (CB86) V2.0

Q: In my application program, running under Concurrent CP/M V1.1, I call TIMES but only the hour and minutes are returned, not the seconds. I have checked and rechecked my code and I think that there must be something wrong with CBASIC COM-PILER.

A: The reason that TIMES does not return seconds is because of an operating system limitation. When you call TIMES, CB86 performs a BDOS Function 105, which in your version of Concurrent CP/M does not return the time in seconds. See the description of that call in your operating system manual. In the newest release of Concurrent, version 3.1 with Windows, the BDOS call has been modified to return the number of seconds, so if you should update at some point you will be able to get access to the seconds without changing your code. For this reason, I would recommend that you allow for the seconds in your TIMES string handling routines, so that you could take advantage of this feature in the future. If it bothers you to see the 00 seconds, then you could do a version check, BDOS Function 147, and then use the appropriate code for that version to break the time string into its components. Checking the version number would also allow you to avoid returning a null string under CP/M V2.2 or CP/M-86, neither of which return a time at all. CP/M V3.0 will return 00 for seconds. Finally, MP/M II and MP/M-86 behave like Concurrent V1.1 and do not return seconds in the TIMES.

PL-1-86™

Q: When I run DMSET on the IBM PC, I discover that multiple attributes and underlining are not supported. Why is this?

A: Multiple attributes are supported under PC DOS and CP/M-86, and underlining is supported under DOS. An error in DMSET accounts for this discrepancy and a patch is available to correct it. You can verify support for these attributes by testing them using the demonstration file, ORDERSDIS.

Display Manager™

Q: How can I clear the screen and control cursor movements through PL/1-86 V1.1 application programs under PC DOS V1.1?

A: The DRI Technical Support staff has developed an assembler subroutine and a PL/1-86 program for Screen Control Functions to help solve this problem. Licensed users may write to the DRI Technical Support Department for a hard copy of the subroutine and program or they may send a 5 1/4" blank disk to get electronic copy.

Q: Why am I not able to get SUBSTR to work correctly and consistently?

A: SUBSTR does not work correctly when you attempt to take a SUBSTR of a variable and assign it back into that variable in the same statement. It will work correctly if you assign it to a Temporary Variable and then reassign it to the original variable.
Application Notes on DRI products listed

Application Notes are available for each of our Digital Research products. These are available on our MICROLINE database on THE SOURCE. Only Professional Programmer Support subscribers may order them for no charge from our Technical Support Department, PO Box 579, Pacific Grove, CA 93950. Be sure to specify which set of application notes you are requesting and include your name and mailing address and Professional Programmer Support access number.

CP/M-86® V1.1 for the IBM® Personal Computer and Personal Computer XT

This implementation of CP/M-86 V1.1 supports a console status line that reports current user number, time, date, and the name of the file currently being processed by the PRINT CMD spooler. The information is updated once a second. The CPU overhead involved with each update is less than 4 milliseconds.

Some communications software might need data transmission at rates which do not allow such overhead. In this case, the status line can be disabled while the comm. program is active, then reenabled when the program terminates. If the updated version of CP/M-86 that supports the XT hard disk (serial number 1027-000-xxxxxx) is used, the comm. software need only send an ESC 0 sequence to the console to disable the status update, and a ESC 1 sequence to reenable it.

The older version of the operating system, which does not support the XT (serial number 1024-000-xxxxxx), requires a more involved method to toggle the status update. This is done by pointing the double-word vector for interrupt iCh to any location in memory that contains a byte with the value CFh. This is the opcode for an 8086 or 8088 IRET instruction. Thus, after such a switch is made, subsequent one second interrupts are terminated with no status line processing.

Attached is a program, written in ASM-86 assembly language, that demonstrates this method. When invoked at the CCP level, this program toggles the status line enablement. That is, it will enable if disabled and disable if enabled.

Licensed users are granted the right to include these changes in CP/M-86 V1.1 for the IBM Personal Computer software.

STATUS.A86

Program to toggle the status line update, CP/M-86 V1.1 for the IBM PC

from Digital Research, Inc

Command file generation:

ASM86 STATUS
GENCMD STATUS 8080

INT_NUM equ 1Ch "user" TOD interrupt number
INT_ADR equ INT_NUM * 4 ;offset of vector
PRNT_STR equ 9 ;BDOS print-string function
BDOS equ 224
YES_OFF equ 02E4Ah ;vector offset for normal update
YES_SEG equ 00051h ;vector segment for normal update
NO_OFF equ 00E2Fh ;vector offset of IRET in ROM
NO_SEG equ 0F000h ;vector segment of IRET in ROM

org 100h ;8080 model
xor ax,ax ;point ES at interrupt vectors
mov ES,ax
mov di,INT_ADR ;DI at appropriate vector
mov si,offset YES_STATUS ;prepare for possible jump
mov dx,offset MSG_Y

cmp ES[di], YES_OFF ;check for present value
jnz SWITCH ;jump if the status line is disabled
mov si,offset NO_STATUS
mov dx,offset MSG_N

SWITCH:
cl ;forward direction
cli ;disable interrupts for the switch
movsw
movsw
sti
mov cl,PRNT_STR ;print the message
int BDOS
xor cl,cl ;do system reset
int BDOS

YES_STATUS dw YES_OFF ;normal value
NO_STATUS dw NO_OFF ;IRET instruction
MSG_Y db 0dh,0ah,'STATUS update enabled.$'
MSG_N db 0dh,0ah,'STATUS update disabled.$'

END

CBASIC COMPILER (CB80)

Application Note: CB-06

Applicable Products and Release Numbers: CB80, all versions

CP/M Utility Required: RMAC (Relocatable Macro Assembler)

1) Compile this program with CBASIC:

This program will pass an assembly module a string of data to print then return, demonstrating the method used to pass parameters to an assembly language module. When a string is passed only the pointer to the location of the string is actually placed on the stack.

Note: To print the string with BDOS function 9 it must be terminated with a $.

STRING MY STRING
DEF PRTMSG (MSG) EXTERNAL
INTEGER PRTMSG
STRING MSG
FEND

Continued on next page
Application Notes

continued from preceding page

MYSTRING = "This is the string to be printed"
PRINT "Calling Assembly Module...": PRINT
CALL PRTMSG (MYSTRING): PRINT
PRINT "...and the printing is completed": PRINT
END

2) Compile this Assembly module with RMAC:

This assembly module will print a string using BDOS FN 9.

Note: It is the responsibility of the programmer to save and restore the register contents.

PUBLIC PRTMSG

PRTMSG: POP H : get the return address
POP D : get pointer to the string
PUSH H : put return address on stack
INX D : make D point to first char in
INX D : string rather than string length
MVI C,9 : BDOS print string function
CALL 5 : call BDOS
RET : return to the BASIC program

3) Link the modules together:

LK80 TEST = TEST, PRTMSG

Concurrent CP/M™ V1.0 for the IBM® Personal Computer and Personal Computer XT

Applicable Products and Version Numbers: Concurrent CP/M™ V1.0 for the IBM® Personal Computer and Personal Computer XT

Concurrent CP/M version 1.0 for the IBM Personal Computer and Personal Computer XT is distributed on two single-sided, double-density 5¼-inch floppy diskettes. These diskettes are also readable on double-sided drives. If a hard disk is not used, both diskettes must be present in the drives to boot. After the operating system loads from the boot disk, it reads a DIP switch on the system board (SW1) to determine how many 5¼-inch disk drives are attached (0 to 4) and automatically configures for the correct number of diskettes. During the initialization sequence, Concurrent CP/M assigns the highest numbered drive described by SW1 to be the system drive. The system drive is the one searched when a command is not found on the default disk. It is also the TEMP drive used for temporary file storage by the OS and its utilities. If memory is found in the MDISK address space, C0000h to EFFFFh (D0000h to EFFFFh in the new XT version), drive M becomes the TEMP drive.

If a hard disk is found by the initialization code and has been properly initialized by HDMAINT, it becomes the SYSTEM disk. It also becomes the TMP disk when no MDISK is present.

If double-sided 5¼-inch drives are attached, enough space exists on one diskette to eliminate the two-disk boot requirement. However, if no hard disk is present, the last drive is assigned as the TEMP drive and a second diskette is still required to be present when no MDISK is found.

Note: Some applications require SW1 to be set to reflect something other than the number of physical 5¼-inch drives. As this is a nonstandard use of the switch settings, Concurrent CP/M is unable to complete its initialization sequence because it attempts to write temporary files on the last drive.

The Concurrent CP/M operating system, contained in the file CCPM.SYS, can be patched to cause it to do the following:

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- disregard the settings of switches 7 and 8 on SW1 and force the operating system to recognize two (or one) 5¼-inch drives
- assign drive A as the default SYSDISK and TEMPDISK on boot. (See Note 2.)

The following procedure explains how to do this. You should have a backup copy of CCPM.SYS and a working knowledge of how to use the DDT-86™ utility before you patch CCPM.SYS with these commands. User entries are in bold type and comments are parenthesized.

Note 1: The following addresses apply to the original or non-XT version of Concurrent CP/M V1.0 for the IBM Personal Computer (serial number CCP-000-xxxxxx or 1009-000-xxxxxx). If the updated version that supports the XT (serial number 1026-000-xxxxxx) is to be patched, see the second DDT-86 session below.

0A>set ccpm.sys [rw]
A:CCPM  SYS set to system (SYS), read write (RW)
0A>ddt86
DDT86 1.2
-rccpm.sys
START END
XXXX 0000 YYYY 6FFF (Note: XXXX and YYYY will vary)
-1890b,891d
XXXX 890B MOV CL,06
XXXX 890D SHR AL,CL
XXXX 890F AND AL,05
XXXX 8911 MOV [2A9E],AL
XXXX 8914 CS MOV [004B],AL
XXXX 8918 CS MOV [0050],AL
XXXX 891C ADD AL,31
-a890h
XXXX 890B Xor AL,AL
XXXX 890D cs: mov [38],al
XXXX 8910 cs: mov [50],al
XXXX 8912 mov al,01 <— (replace 01 with number of 5¼-inch floppy drives in the system)
XXXX 8916 mov [2A9E] inc floppy drives in the system
XXXX 891A add al,31 minus 1
XXXX 891C nop
XXXX 891D nop
XXXX 891E
-s8ae6
XXXX 89AE6 20 28
XXXX 89AE7 20 46
XXXX 89AE8 20 6f
XXXX 89AE9 20 72
XXXX 89AEA 20 63
XXXX 89AEB 20 65
XXXX 89AEC 20 64
XXXX 89AED 20 29
XXXX 89AEE 20 .
-wccpm.sys
-a c
DDT86: Abort (Y'N)? y
0A>set ccpm.sys [ro]
A:CCPM  SYS set to system (SYS), read only (RO)
0A>
Use the following commands to patch only Concurrent CP/M version 1.0 for the IBM Personal Computer and Personal Computer XT (serial number 1026-000-xxxxxx):
0A>set ccpm.sys [ro]
A:CCPM  SYS set to system (SYS), read only (RO)
0A>ddt86
DDT86 1.2
-rccpm.sys

Continued on next page.
Display Manager V1.0

Applicable Products and Version Numbers:
Display Manager V1.0, Digital Research C V1.1 or Later

Error Description: When trying to link DMDRCS.L86 (for small model programs) or DMDRCB.L86 (for large model programs)
LINK-86 aborts with the message:
NO FILE
FILE: SYSLIBC.L86 (or SYSLIBB.L86)
due to the renaming of the DR C system subroutine libraries to
CLEAR.L86 and CLEAR.L86.

Patch Procedure: Make backup copies of DMDRCS.L86 and
DMDRCB.L86 before making the following changes.

For use under CP/M-86:
A>ddt86
DDT86 1.2
-rdmdrcs 186
START END
NNNN:0000 NNNN:39FF
-s37c3
NNNN:37C3 F0 20
NNNN:37C4 80 .
-s37cc
NNNN:37CC E5 b5
NNNN:37CD 96 .
-wdmdrcs 186
-rdmdrcb 186
NNNN:0000 NNNN:39FF
-s37e1
NNNN:37E1 F0 20
NNNN:37E2 80 .
-s37ea
NNNN:37EA 36 b6
NNNN:37EB 96 .
-wdmdrcb 186
A>

For use under the IBM Personal Computer Disk Operating System:
A>debug dmdrcs.186
-e 38c3 20
-e 38cc b5
-w Writing 3A00 bytes
-q
A>
A>debug dmdrcb.186
-e 38e1 20
-e 38ea b6
-w Writing 3A00 bytes
-q
A>

Micro Notes
First Quarter 1984
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Managing Editor: Nan Borreson
Senior Technical Editor: Joe Byrd
Production: Terril Neely
Typsetting: Talking Bear Graphics
Printing: Commercial Press of Monterey

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The Rev Table

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NOTE #1: DR C upgrade from 1.0 to 1.1 supports overlays for both small and large memory models, includes the new common run-time libraries and allows the user to call routines in FORTRAN-77 and vice versa. Registered users will receive update notification automatically.

NOTE #2: V1.1 is a free update to V1.3 owners due to a banner change bug. Registered users will receive update notification automatically.

NOTE #3: Upgrade from 5.5 to 5.6 is a maintenance release only. Registered users will receive update notification automatically.

NOTE #4: Upgrade from 1.0 to 1.1 eliminates the 512 line limit restriction and fixes some minor bugs. Registered users will receive update notification automatically.

PRODUCTIVITY TOOLS:

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<td>DR Assembler Plus Tools</td>
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NOTE #5: DR Assembler Plus Tools combines PUB and SID to include RASM, XREF, LINK, LIB and SID. This new package is available for CP/M and CP/M-86.

GRAPHICS:

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NOTE #6: GSX Programmers Tool Kit is available for 8-bit and 16-bit systems and includes ISV redistribution license, tailoring tools and documentation. The 16-bit kit contains development details for the CP/M-86 family, IBM PC DOS and MS DOS.

First Quarter 1984, Digital Research Inc.
The Rev Table

OPERATING SYSTEMS:

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Questionnaire

We need your opinions on the DRI data base on CompuServe and on the MICROLINE data base on the Source.

1. Please indicate your status as one of the following:
   ______ Professional Support Subscriber ______ Dealer ______ Other (specify) ______________________________

2. Which of the following information services do you use?
   ______ CompuServe ______ Source ______ Other (specify) ______________________________

3. Which information on DRI or MICROLINE is most useful to you?
   ______________________________

4. What additional types of information would you like to see?
   ______________________________

5. How would you rate your usage of DRI or MICROLINE?
   ______ daily ______ weekly ______ monthly ______ rarely

6. How would you rate your usage of CompuServe or the Source?
   ______ daily ______ weekly ______ monthly ______ rarely

DIGITAL RESEARCH

P.O. Box 579
Pacific Grove, CA 93950
The power and sophistication of 16-bit microcomputers and their experienced operators are wasted if the operating system in use has to wait for one operator to process one application at a time. At the same time a multuser, multitasking operating system is wasted if it is not available on a variety of machines running a wide range of applications.

Concurrent DOS (Concurrent CP/M®3.1) is the operating system to take full advantage of the advances in technology if OEMs and ISVs take advantage of its powerful capabilities. ISVs can fully exploit the capabilities of Concurrent DOS if they exercise care and caution in their adaptations, particularly when it comes to memory requirements. Concurrent DOS can run its four virtual consoles on a system with as little as 256K bytes of memory. It must be kept in mind that memory management is controlled by OEMs who determine the partition boundaries based on an extended fixed-partition model. OEMs also have the option to create a virtual disk in RAM that can be used to store system utilities and temporary files, and can improve system responsiveness as much as five times.

Programmers and users alike will appreciate that some of the old annoyances, such as the error-handling facilities, have been improved. Many of the old favorite features have been retained. A user who encounters a disk error will be given a choice to "try again," "abort" or "replace disk." Many familiar CP/M features such as virtual RAM disks, start-up files, multi-sector I/O, date/time stamping and automatic diskette log-in are supported. The same operator interface is maintained as with the 8-bit CP/M systems including device and file naming conventions, the command language, line editing control characteristics and even the standard utility programs. That is because the difference between the systems is mostly internal.

Concurrent DOS provides some exciting capabilities such as two screen output modes, dynamic and buffered, that allow the user a choice of seeing a process in action as it is happening or of saving the progress of a process in a buffer and viewing the accumulated changes since it was last monitored. Each step of the executing processes is normally attached to one of the four virtual consoles. If you don't need to monitor a process, like print spooling, it can be detached from a console which frees that console for another task.

Data can be transferred between processes by means of queues which allow data from one virtual console (a spreadsheet program, for example) to be fed directly to another virtual console (a word processing program, for example). Data files can be shared if separate applications are running on more than one console and they are attached to the same disk drive. These features are particularly important to users who take advantage of the built-in DR Net™ networking capability.

In addition to multitasking, Concurrent DOS also offers multiuser capability that provides a low cost means for many terminals in one office to be tied into a single CPU. This approach, however, can exact a price in speed and performance since there is only one computing source available to all the users. DR Net, on the other hand, allows 8- and 16-bit CP/M workstations to share peripherals such as hard disk and printers while keeping full local processing capabilities.

A comprehensive status line that lets users know what process is running on each of the virtual consoles is a significant feature that all OEMs and ISVs are encouraged to implement.

Welcome to MicroNotes

MicroNotes is a newsletter published bi-monthly for the technical community of Digital Research customers. This newsletter provides technical information on Digital Research products, explanations of support programs, announcements of new product releases, questions and answers, application notes, lists of available application notes, patches and revision tables.
Digital Research is continuing its efforts to provide the best and most innovative professional support program available in the microcomputer software industry.

The Professional Programmer Support (PPS) service is presently available to subscribers on an unlimited access basis. Service includes an unlimited number of communications per period for the designated contact person plus 24 hours per day.

One new addition to the DRI electronic information system is the “Computer Chronicles,” a PBS television program aimed at microcomputer professionals. It is hosted by Stewart Cheifet and Gary Kildall, founder of Digital Research. The program is broadcast on 129 PBS stations nationwide and is being considered for international broadcasts in London, Tokyo and Sydney. Information on upcoming segments is available on MICROLINE on THE SOURCE and on DRI on CompuServe. Complete transcripts of the segments are available in the Section 7 data base library on DR SIG. "Computer Chronicles" is being incorporated into a telecourse by SRI International with a textbook and manuals published by Wadsworth Publishing.

If you would like more information about MICROLINE on THE SOURCE or DRI and DR SIG on CompuServe, call (408) 646-4928. If you would like to offer your comments or suggestions regarding the DRI and MICROLINE data bases, please complete the on-line questionnaire found on the main menu of each data base.

If you are interested in learning more about the PPS service, call (408) 646-4928 or write Professional Programmer Support, Technical Support Department, Digital Research Inc., P.O. Box 579, Pacific Grove, CA 93950.

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- Digital Research continues efforts to offer best-in-the-industry professional support program, page 2.
- Experienced professional engineers and analysts are ready to assist PPS subscribers, page 3.
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- Manufacturers can embed the Personal CP/M operating system on an inexpensive ROM chip, page 4.
- Technical Q&A, applications, patches, lists and rev table, pages 5 through 11.
- Digital Research's family of graphic products help OEMs reach a wide user market, page 12.
The Technical Support department at Digital Research has undergone a reorganization in order to provide even better service to Professional Programmer Support (PPS) and OEM subscribers. The number of Technical Support analysts and engineers available to reply to subscriber questions has increased by more than 60 percent. The analysts or engineers subscribers contact are experienced, trained microcomputer professionals. They are divided into two groups, languages and operating systems, according to their special area of expertise.

The languages group is managed by Bob Prince who has a Ph.D., five years of experience as a programmer analyst and two years of experience with DRI. Jim Needham and Gary Groom are the technical engineers for all of the CBASIC languages. Needham has a background in program design, independent graphic consulting, technical writing and is a published photographer. Groom has more than 15 years of experience working with IBM mainframe systems in operations and technical support for such companies as Bank of America, California Casualty and Nabisco.

Joe Cotham and John Aliotti are the technical engineers and Kathy Welch is the analyst for the Pascal product line, Display Manager®, Access Manager® and Dr. Logo. Cotham has a Ph.D. degree in science education and has taught college courses in computer literacy, BASIC and Pascal. Aliotti has experience with B10960, VM/CMS, HP3000, PDP 11/70, has worked as a junior applications programmer and has a degree in computer science. Welch has spent three years with DRI, and is studying for a degree in computer science.

Kishore Pradhan is the technical engineer and Nancy Wood is the technical analyst for both 8- and 16-bit versions of PL/1. Pradhan was sales manager for Electro Service Corp. and has degrees in chemistry and computer science. Wood has spent nearly a year with DRI, has a degree in biology and has studied extensively in the field of microcomputers.

Bob Becker, manager of the operating systems group, has more than a year of experience with Digital Research Inc. and 12 years before that as a field engineer working on mainframe computers. Lynda Haigh is the technical engineer and Mitch Smith is the technical analyst for the Digital Research C™ product line. Haigh has spent over a year and a half with DRI in Customer Service and Technical Support and has a degree in business administration and information systems management. Smith has a year in Sales Support and Technical Support with DRI, eight years of computer experience with the Navy and a degree in computer science.

Gary Silvey is the technical engineer and Dave Mackenzie is the technical analyst for the 8-bit operating systems. Silvey was a software engineer at Ford Aerospace and Communications Corp. and has a degree in computer science. Mackenzie directed the Navy’s Fleet Numerical Oceanography Center’s mainframe computers and has degrees from the U.S. Naval Academy and the Naval Postgraduate School.

Donna Schoenecker is the technical engineer and Bill Wobber is the technical analyst for the 16-bit operating systems. Schoenecker was with Victor Technologies in technical support and founded the International Microcomputer Society and is working on a degree in computer science. Wobber has worked in technical support for TeleVideo Inc. and has degrees in computer science and earth sciences.

Dick Lovelace is the manager of the data base system that monitors and tracks the PPS contacts with Technical Support personnel. Lovelace has worked for more than two years with DRI’s Technical Support Department, has operations experience with IBM mainframes and has taught computer operations. His degrees are in computer science, public administration and police sciences.

Engineers and analysts available to assist subscribers to Professional Programmer Support include (left to right) front row: Bob Prince, Gary Silvey, Jim Needham; middle row: Mitch Smith, Bob Becker, Kathy Welch, Donna Schoenecker, Gary Croom; back row: Dick Lovelace, Kishore Pradhan, Joe Cotham, John Aliotti, Bill Wobber, Dave Mackenzie; not pictured: Lynda Haigh and Nancy Wood.
DRI ships 128K version of Dr. Logo

OEMs may profit from the growing popularity of Dr. Logo with a series of products aimed at the consumer and educational markets.

Generic versions of Dr. Logo may be licensed from Digital Research. An 8-bit version is currently available and a 16-bit version is being released in May. The availability of these versions supports a marketing effort to promote Dr. Logo as a standard. Meanwhile, dealer programs and advertising are increasing awareness for the product.

Promotions are timed with the introduction of a 128K version of Dr. Logo for the IBM PCjr. The new release runs under PC-DOS and may also be used on the IBM PC, PC/XT or most compatible computers. All of the features found on the 192K version are included on the smaller version except debugging windows.

The package provides a diskette and documentation in the form of the Dr. Logo Dictionary and an enjoyable guide called "Dennis the Menace Meets Dr. Logo." The guide was written and designed by cartoonist Hank Ketcham, creator of Dennis the Menace.

Dr. Logo first appeared on the retail market in fall of 1983 for the IBM PC and climbed to the top of the SoftSel Hot List. The retail release included SpeedStart CP/M, an abridged version of CP/M that boots automatically when the system is turned on.

Advanced features bundled with Personal CP/M

Personal CP/M was shipped May 1 to microprocessor manufacturers who are embedding the operating system on an inexpensive ROM chip. The first shipments have been made to Zilog Corp., American Microsystems Inc. and Sord in Japan. Zilog and AMI are implementing Personal CP/M on a Z-80 microprocessor. Under terms of the agreement, AMI is designing the ROM chip. It will be manufactured, distributed and marketed by both AMF and Zilog for 8-bit microcomputers.

"Personal CP/M brings a new technology to microcomputers," said Jim Tillinghast, product manager. "It's the first major operating system to be placed on a ROM chip, and users can draw from literally thousands of applications written for CP/M."

Computers may be produced cost effectively since the chip can be incorporated into assembly of the system. Tillinghast explained. Using a ROM chip avoids the inconvenience of having to load the operating system from disk.

The Visual Console Command Processor was included in the first shipments of Personal CP/M. The VCCP was designed to be an easy-to-learn method of operating a microcomputer. Based on menus, it provides a system of help screens. Users are given a list of options for opening, copying, renaming and printing a file.

Some of the advanced features in the operating system include auto disk login, improved communications support, support for hard or floppy disks and extended error trapping so applications are easier to write. Error messages are stored in a separate file that may be transferred easily into different international languages. There's also an easy-to-use code for direct screen functions and character graphics.

Personal CP/M is compatible with CP/M Release 2.2. A 16-bit version of Personal CP/M also may be licensed from Digital Research.

"Personal CP/M makes computers easier to learn and use. Non-technical people don't have to remember cryptic commands for operating a computer," Tillinghast said. "The availability of a ROM-based version of CP/M increases the applicability of the operating system in home computers."

mail message with an order to buy, doing correspondence and overseeing his spreadsheet crunch numbers that will feed into that correspondence.

With an operating system as powerful and flexible as Concurrent DOS at your fingertips, the responsibility of implementing and using it correctly is great. But along with that high level of responsibility comes an equally high level of opportunity, and great opportunities have made great successes in the microcomputer industry.

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Digital Research

May 1984
Concurrent CP/M With Windows

Q: I am running CP/M Plus on a 128K system. How can my program access memory past 64K?
A: A transient program running under CP/M Plus can only access memory that is in the TPA. Any memory beyond 64K is divided into "banks". These banks store part of the BDOS and BIOS, and the rest is used by BDOS for sector buffering.

Q: When I run programs that use direct cursor addressing under Banked CP/M Plus, sometimes the cursor appears in column 1 on the line below where it should be. The program works fine under Non-banked CP/M Plus and CP/M 2.2 but not under Banked CP/M Plus. Why is that?
A: To enable command line editing under Banked CP/M Plus, the BDOS keeps track of what column the cursor is in. When an application program uses direct cursor addressing, the BDOS loses track of the current cursor position. If you cannot change the program you are using, use the DEVICE command to set the column width to 0 before running the program. If you are writing a program that will use direct cursor addressing, change the function that moves the cursor to include code that updates the Console Column Position field in the System Control Block.

DR Assembler Plus Tools

Q: When using the 1 and R commands while running SID, I type /filename> followed by an R. SID responds with a question mark and the file is not read in. Why is this?
A: The new version of SID included with DR APT has changed the assembly language utilities. It is available for $70.00 from the distributor (or dealer) who sold me the product, downloaded for the NEC A PC format, and the items you mentioned plus programming examples and the assembly language utilities. It is available for $70.00 from the address listed on the coupon.

Concurrent CP/M With Windows

Q: I have just purchased Concurrent CP/M With Windows for my IBM PC and did not get the CP/M programmers guide or any manuals on programming with GSX. How can I get these manuals?
A: In the back of your CCP/M Manual is a coupon for the Concurrent CP/M PC/XT Programmers PAK. This package includes the items you mentioned plus programming examples and the assembly language utilities. It is available for $70.00 from the address listed on the coupon.

DR Graph

Q: I am having problems positioning the cursor when running DR Graph on the NEC Advanced Personal Computer. The arrow keys fail; it is impossible to backspace. The distributor (or dealer) who sold me the product, downloaded for the NEC APC format, has instructed me to call DRI.
A: Check the serial number of the product which you are trying to use. If the first four digits are 5017, you are using a non-generic version which has been keyboard mapped to the IBM Personal Computer, as the documentation indicates. You should return the product to your distributor (or dealer). NEC has licensed with Digital Research to distribute DR Graph for their hardware. You should contact them for a version designed for the APC.

PL/1-86

Q: In some programs, I get a SYNTAX ERROR when I use an ON ERROR(11) condition statement. There does not seem to be anything wrong with my code.
A: This can happen if you have used the following %REPLACE statement:

%REPLACE ON BY ‘1B;

In this case the compiler substitutes ‘1B on every occurrence of ‘ON’. The Work-Around is:

%REPLACE ONN BY ‘1B,

May 1984

Digital Research
On data bases or may be ordered:

Application Notes and Patches on DRI products

The following is our complete list of the Application Notes and Patches available for each of our Digital Research products. These are available on our electronic data bases on THE SOURCE and CompuServe or may be ordered for no charge from our Technical Support Department, PO Box 579, Pacific Grove, CA 93950. Be sure to specify which set of Application Notes or Patches you are requesting, and include your name, mailing address and zip code.

CBASIC®:
CA01 - Assembly Language and CBASIC-80 Under CP/M PLUS
CA02 - Assembly Language and CBASIC Under CP/M V2.x - Calc. Space on Disk
CA03 - Assessing CP/M II Internal Time/Date with Assembly Lang. & CBASIC-80
CA04 - CBASIC-80 Dynamic Memory Management
CA05 - Chaining to a COM/CMD File From CBASIC
CA06 - Assembly Language in CBASIC Compiler under CP/M PLUS

CBASIC COMPILER®:
CB01 - Dynamic Memory Management (OM'  error)
CB02 - Disk Files in a Shared Environment
CB03 - Using the GET and PUT Functions
CB04 - Accessing MP/M II's Time-Date Function
CB05 - Assembly Language in CBASIC Compiler under CP/M PLUS

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CP/M Plus:
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CP/M-86 V1.0 For the IBM Display Manager:
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CP/M-86 V1.1:
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May 1984 Digital Research
**Application Notes and Patches**

Concurrent CP/M-86
Release 1.0 for the IBM Personal Computer
Application Note 02, 12/29/82

Shifting the Horizontal SYNC Position of the CRT Display

Program: SHFTRITE.A86

Applicable products and version numbers: Concurrent CP/M-86 (PC) R1.0

This program is used to adjust the horizontal SYNC position of the monochrome (or color/graphics) monitor attached to the IBM™ Personal Computer. It sends instructions to the 6845 CRT controller, as described in the IBM PC Technical Reference Manual (IBM part number 6025008). You can use the program two ways:

- interactively, or,
- with a one-digit (zero to nine) command tail, specifying the number of character positions to shift the display.

To customize this program, change the appropriate equates, then:

```
A>ASM6 SHFTRITE
A>GEMCMO SHFTRITE 8888
```

This program has been tested only on the IBM PC Monochrome Display.

```
;******************************************************************************;
; BDOS equ 224               ; function call interrupt #0
; COM_OUT equ  2              ; console_out function #0
; COM_IN  equ  1              ; console_in function  #0
; PR_STA equ  9               ; default buffer offset
; DEF_BUFF equ 88h             ; default buffer offset
; CRT_ADDR equ 384h            ; monochrome 6845 address reg.
; CRT_DATA equ 385h            ; monochrome 6845 data reg.
; HOR_SYNC equ 2               ; monochrome 6845 sync reg.
; HOR_SYNC_DEF equ 52h         ; default value for mono-80 col.

;main program:
org 100h                     ; this pgm. is written as 8080
model

; call PARSETAIL
; call STRINGOUT
; call SHIFT_SYNC

; routine to return to Concurrent
; CP/M-86
mov cl,8                      ; function #
mov dl,8                      ;
int BDOS                      ;

; check for command tail
cmp byte ptr .def_buff,0      ;
jz INTERACT                   ; if zero, interactive mode
mov al,.def_buff+2            ; get single digit
cmp al,'0'                    ; if valid
jbe pl                       ; jump if invalid
cmp al,'9'                    ; if valid
ja pl                        ; jump if invalid
sub al,10                     ; convert to binary
sub al,8                      ; update column variable

;print #8 numbers across screen
mov al,2                      ; routine to print string
out dx,CRT_DATA               ; register
out dx,CRT_ADDR               ; address register
mov cx,HOR_SYNC_DEF           ; number of horizontal sync.
sub cx,1                       ; set up for SYNC reg.
int BDOS                      ; function call
push cx                       ; save reg.
pop dx                        ;
mov cl,CON_OUT BDOS con-out function
int BDOS                      ;
pop dx                        ;
pop cx                        ;

;shift it
push cx                       ;
push dx                       ;
mov al,.def_num               ;
int BDOS                      ;

;ask for another shift
push cx                       ;
push dx                       ;
mov cl,.def_num               ;
int BDOS                      ;

;print #8 numbers
```

**Display Manager**

for CP/M-86 V1.0 Application Note 03
Accessing Display Files In User 0 Under
CCP/M-86, CP/M-86, MP/M-86

**Applicable Products and Release Numbers:** Display Manager V1.0; Concurrent CP/M-86 V1.0; 2.0; MP/M-86 V2.1; CP/M-86 V1.1

**Description of Problem:**
Display files set to SYS and RO in user 0 are not accessible in other user areas. The Display Manager run-time procedures don't check for operating system information to determine if the process is multi-user or multi-task.

**Workaround:**
Set the high-order bits of bytes 5 and 6 of the filename that is passed to OPNDIS. This allows Display Manager to find the file in user 0 that is set to SYS and RO. In the example, ORDERS.DIS, the high-order bits of "R" and "S" are set. Note that if the filename is less than 6 characters in length, spaces with high-order bits set must be inserted.

1) Pascal
   
   ```
   filename:=concat('ORDE',chr$(82+128),chr$(83+128),'.DIS');
   ```
2) Basic
   ```
   a$="ORDE"&chr$(82+80h)&chr$(83+80h)+".*.DIS"
   ```
3) PL/I
   ```
   astring="ORDE"||asci$(210)||asci$(211)||".*.DIS".
   ```

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May 1984
For use under the IBM Personal Computer Disk Operating System:

Display Manager

V1.0 for PC DOS
Patch 03
Patch to DMSET

Products that require updating: Display Manager for PC DOS V1.0

Program: DMSET3.OVR

Error Description:
Testing the terminal control codes with DMSET produces erroneous results for multiple attributes and the underline attribute. The test results are that multiple attributes and underlining are not supported. This is an error. Both are supported on the IBM PC. Note that these attributes are available in spite of the error in DMSET.

Patch Procedure:
Make a backup copy of DMSET3.0VR before using DEBUG to install DMDRCB.L86 before making the following changes. User entries are testing the terminal control codes with DMSET produces erroneous attributes are available in spite of the error in DMSET.

For use under CP/M-86:

Applicable Products and Version Numbers: Display Manager V1.0, Digital Research C V1.1 or Later

Applicable Products and Version Numbers:

Error Description:
When trying to link DMDRCS.L86 (for small model programs) or DMDRCB.L86 (for large model programs) LINK:86 aborts with the message:

```
NO FILE
```
due to the renaming of the DR C system subroutine libraries to CLEARS.L86 and CLEARL.L86.

Patch Procedure: Make backup copies of DMDRCS.L86 and DMDRCB.L86 before making the following changes. User entries are in bold type.

For use under CP/M-86:

```
A>ddt86
DDT86 1.2
-rddt86.CBd
START END
NHHH:0000 NHHN:337F
-s3703
NHHH:37CC F8 20
NHHN:37C4 80
-s370c
NHHN:37CC E5 B5
NHHN:37C6 96
-wmdrcrb.186
-wmdrcrb.186
NHHN:0000 NHHN:337F
-s3761
NHHN:37C1 F8 20
NHHN:37C2 00
-s37ca
NHHN:37CA E5 B6
NHHN:37CB 96
-wmdrcrb.186
-wmdrcrb.186
```

For use under CP/M-86:

```
A>ddt86
DDT86 1.1
-rddt86.cmd
START END
NHHH:0000 NHHN:3367F
-s12f0
NHHH:12F0 00
-wdtt40.cmd
```

For use under IBM Personal Computer Disk Operating System:

```
A>debug dmdrcb.186
-e 39e 10
-e 38c6 b5
-w
-writing 3400 bytes
-A>
```

```
A>debug dmdrcb.186
-e 39e 10
-e 38e6 b6
-w
-writing 3400 bytes
```

Do the following to force a 40 column display:

```
Version 1.1:
A>ddt86
DDT86 1.1
-rddt86.cmd
START END
xxxx:0a4b 03.4
-wddrcb.186
```

```
Version 1.2:
A>ddt86
DDT86 1.2
-rddt86.cmd
START END
xxxx:0a4b 03.4
-wddrcb.186
```

To remove both the assembler and disassembler, do the following:

```
Version 1.1:
A>ddt86
DDT86 1.1
-rddt86.cmd
START END
xxxx:0a4b 03.4
-wddrcb.186
```

```
Version 1.2:
A>ddt86
DDT86 1.2
-rddt86.cmd
START END
xxxx:0a4b 03.4
-wddrcb.186
```

see Notes, page 11

Digital Research

May 1984

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If you have any questions about these products and their availability, call Digital Research Sales Support at (800) 227-1617, ext. 400 or, in California, (800) 772-1545, ext. 400. The following is a list of current Digital Research product versions and last revision dates:

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<td>PASCAL/MT+</td>
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<td>PC DOS</td>
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NOTE #1: DR C upgrade from 1.0 to 1.1 supports overlays for both small and large memory models, includes the new common run-time library and allows the user to make notes and call routines in FORTRAN -77 yet to be released, and vice versa. Registered users will receive update notification automatically.

NOTE #2: V1.4 is a free update to V1.3 owners due to a banner change bug. Registered users will receive update notification automatically.

NOTE #3: Upgrade from 5.5 to 5.6 is a maintenance release only. Registered users will receive update notification automatically.

NOTE #4: Upgrade from 1.0 to 1.1 eliminates the 512 line limit restriction and fixes some minor bugs. Registered users will receive update notification automatically.

**PROGRAMMING TOOLS:**

<table>
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<tr>
<th>PRODUCT NAME</th>
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<tr>
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<td>CP/M</td>
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<tr>
<td>Access Manager</td>
<td>CP/M-86</td>
<td>1.1</td>
<td>August 83</td>
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<tr>
<td>Access Manager</td>
<td>PC DOS</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>Access Manager*</td>
<td>MS DOS</td>
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<td></td>
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<td>CP/M-86</td>
<td>2.1</td>
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<td>ANIMATOR for LEVEL II</td>
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<td>1.3</td>
<td>August 83</td>
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<tr>
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<td>1.0</td>
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NOTE #5: DR Assembler Plus Tools for CP/M combines SID and PUG to include MAC, RMAC, LINK, XREF, SID, ZSID. DR Assembler Plus Tools for CP/M-86 includes RASM-86, LINK-86, LIB-86, XREF-86, and SID-86.

**GRAPHICS:**

<table>
<thead>
<tr>
<th>PRODUCT NAME</th>
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<th>VERSION</th>
<th>LAST UPDATE</th>
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<td>CP/M-86</td>
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<td>DR Graph for IBM PC</td>
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<td>GSX-86*</td>
<td>MS DOS</td>
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<td>October 83</td>
</tr>
<tr>
<td>Programmers Tool Kit*</td>
<td>CP/M-86,</td>
<td>1.0</td>
<td>See NOTE #6</td>
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<td></td>
<td>Concurrent CP/M-86, PC DOS</td>
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</table>

NOTE #6: GSX Programmers Tool Kit is available for the IBM PC and includes ISV redistribution license, tailoring tools and documentation. The 16-bit kit contains development details for the CP/M-86 family, IBM PC DOS and MS DOS.
OPERATING SYSTEMS:

PRODUCT NAME
Concurrent CP/M (generic)
Concurrent CP/M With Windows
CP/M*
CP/M PLUS*
CP/M-686* (generic)
CP/M-86 for IBM PC/XT
CP/M-86 for IBM DW
CP/M-60KC**
CP/NET**
MP/M II
MP/M-86**

HARDWARE:

PRODUCT NAME
CP/M Gold Card* 64k
CP/M Gold Card 128k
Disk Cache
CP/M Gold Card 192k

The Rev Table

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<tr>
<th>OS FAMILY</th>
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<td>1.0</td>
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<td>February 82</td>
</tr>
<tr>
<td></td>
<td></td>
<td>July 82</td>
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</tbody>
</table>

NOTE #7: The CP/M Gold Card is a 6 Mhz Z-80B microprocessor board for the Apple II, II Plus, and IIe. Product ships with CP/M 3.0 and CBASIC language.

CONSUMER PRODUCTS:

PRODUCT NAME
Owlcat* Diagnostic P.S.A.T.
Owlcat Diagnostic P.S.A.T.
Owlcat 15 hour S.A.T. Preparatory Course
Owlcat 60 hour S.A.T. Preparatory Course
Owlcat 60 hour S.A.T. Preparatory Course

Owlcat 15 hour S.A.T. Preparatory Course
Owlcat 60 hour S.A.T. Preparatory Course

Note #8: The Owlcat is designed to test and train students to take their S.A.T.*, an aptitude test often required for college entrance.

* MS DOS products are only available from Original Equipment Manufacturers of Digital Research.
** No longer available effective April 1, 1984.
*** Contact Digital Research Sales and Support staff for product availability.

Application Notes (continued from page 9)

Display Manager
V1.1 for CP/M
Patch Note 02
Patch to DMALLO

Products that require updating: Display Manager for CP/M V1.0

Error Description:
For Pascal MT*86, calls to DMALLO(0x6) result in "OUT OF MEMORY" when this is not the condition. This only occurs when the argument is 6.

Patch Procedure:
Make a backup copy of DMPASC.ERL before using DDT to install the patch as shown below (user entries are in heavy type):

A>DDT DMPASC.ERL
-D4E0,4E6
04E0: 52 8D AA 66 02
-S4E0
04E0 52 56
04E1 80 ED
04E2 AA .
-C
A>SAVE 40 DMPASC.ERL

The string of bytes at 04E0 must be indicated (it confirms that the version is 1.1). This patch will allow the use of DMALLO(6). Please note that allocation of less space than needed will not cause an error but will have unpredictable results.

DRI specifically disclaims any express or implied warranties and shall not be liable for any loss of profits, loss of business, loss of use of or of data, interruption of business, nor of indirect, special or consequential damages caused by use or adaptation of these application notes.

Licensed users are granted the right to include these modifications in their Digital Research software.

MicroNotes May 1984

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Typesetting: Talking Bear Graphics
Printing: Commercial Press of Monterey

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NWS-106-002
DRI promotes graphics standards

Digital Research is promoting the development and use of graphics applications with a family of products that may be licensed by OEMs. The products complement each other to provide solutions for day-to-day business assignments involving visual communications.

"The advent of new and inexpensive peripheral graphics hardware has brought quality graphics within the reach of personal computer owners," said Bill Higgs, product line manager. "Our family of products are a first step toward implementing standards so that graphics applications may take advantage of the latest technology. The products help OEMs reach a wide user market."

Digital Research provides a standard software link to different peripherals with GSX™, a graphics extension to popular operating systems. GSX allows software writers to develop applications that are machine-independent. Users can then choose different types of peripherals and software rather than being locked into specific products on the basis of their operating systems.

"GSX is an emerging standard. It helps create an expanding pool of software by providing portability of object code between computers and operating systems," Higgs said. "OEMs who have licensed GSX do not have to completely rewrite their graphics applications."

Digital Research is leading the way for office graphics that run under GSX. The following products may be licensed for redistribution by OEMs:

• **DR Draw™**, a picture editor for creating foils, word slides and charts. Users pick from a menu of arcs, circles, polygons, lines and text that may be written in different font styles. Images may be saved, recalled, copied and modified. There are zoom and pan options for enlarging or condensing pictures.

• **DR Graph™**, which produces a variety of bar charts, pies, charts and scatter plots. Data may be entered manually or from electronic spreadsheets such as SuperCalc, MultiPlan or VisiCalc. Axes are labeled automatically by DR Graph.

• **Access 10™**, a software link between a personal computer and mainframes. It gives users the graphics power of a mainframe while retaining the autonomy of a desktop computer. Access10 turns the microcomputer into the functional equivalent of a Tektronix 4010, 4012 or 4014 graphics terminal.

Software vendors are being encouraged to develop new applications for GSX with the introduction of the GSX-86™ Programmer’s Toolkit for the IBM PC. The Toolkit includes two versions of GSX — one for PC-DOS and the other for CP/M-86 (including Concurrent DOS).

Included in the kit are the GSX Programmer’s Manual, GSX Programmer’s Language Reference Manual, the GSX-86 User’s Guide and GSX-86 Technical Note for Customizing GINSTALL (a menu-driven program that allows end users to install GSX-86 drivers). GINSTALL may be modified for any computer-specific set of screen and peripheral devices.

GSX now supports hardware from 16 manufacturers. The list of device drivers supplied in GSX grows as new products are introduced. Here are some of the newest peripherals supported by GSX: Polaroid Palette™ (part of the Presentation Master™ package from Digital Research), Diablo C150 Color Ink Jet printer, Transtar color printer, Houston Instruments CMP-29/40/41/42 plotter series, Strobe 100/260 plotter series, the Hewlett-Packard 7475A plotter and Phillips GP 300L Hi and Lo Res printers.

GSX - PRODUCT EVOLUTION
Concurrency enters PC-DOS world

Concurrent™ PC-DOS, an operating system that brings multitasking CP/M® to the PC-DOS world, helps programmers develop applications efficiently and for a wider market than previously possible.

"Concurrent PC-DOS is a complete solution to increase the productivity of professionals who rely on computers," said Darrell Miller, marketing manager for operating systems at DRI. "Digital Research has included all of the necessary applications to expand the utilization of personal computers."

For the first time software written for PC-DOS may be used in a multitasking environment. Concurrent PC-DOS supports most popular applications developed for PC-DOS—Lotus 1-2-3™, dBASEII™, WordStar®, Multiplan®, the pfs:™ series and a growing list of others.

"Differences in the operating system are transparent to professional users," Miller said. "Support for PC-DOS is called on automatically, and the operating system recognizes diskettes formatted for PC-DOS or CP/M."

Concurrent PC-DOS reads data files and program code from both CP/M-86® and PC-DOS operating systems. Concurrent PC-DOS supports hierarchical files as in PC-DOS Release 2.0. According to Miller, applications written under Conguent PC-DOS may be sold with little or no modification for CP/M or PC-DOS markets.

Further, syntax from both operating systems is supported by Concurrent PC-DOS. All of the traditional CP/M® commands are provided since the system is compatible with previous versions of CP/M-86.

Those who prefer PC-DOS syntax may continue to use system commands such as "dir," "erase," "copy," "rename" and "batch." Function calls provided are ABSOLUTE DISK READ and WRITE, PROGRAM TERMINATE, TERMINATE ADDRESS and calls up to 30 hex through INTERRUPT 21. Common DOS functions supported include I/O calls to the video terminal, keyboard, disk, printer, memory size detect and equipment detect.

Concurrent PC-DOS offers multitasking to PC-DOS users for the first time. According to Darrell Miller, marketing manager for operating systems at Digital Research, it gives applications writers the opportunity to develop sophisticated communications packages.

Like its predecessors, Concurrent PC-DOS lets professionals run up to four programs at once. Now, however, professional users may use PC-DOS applications in a multitasking environment. Also, PC-DOS and CP/M applications can be run at the same time.

Each application is provided a virtual console that may be displayed in its own window or run as a background task. For instance, one program may be edited while a different one is compiled and a third is debugged.

Professionals who access electronic data bases may dedicate one of the four virtual consoles to communicating over a modem. A communications package is included with Concurrent PC-DOS. The package provides asynchronous communication to remote computers or data.

See Concurrent, page 2
StarLink opens up new multiuser market for PC

Applications writers may enter a new market for multiuser software as a result of StarLink, a package that expands an IBM® PC from one to five users. StarLink supports applications written for CP/M or PC-DOS. Concurrent PC-DOS recognizes .EXE and .COM files for instant, error free commands. Programmers may call on CP/M or PC-DOS utilities, including those for creating and debugging 8086/8088 assembly language programs, listing directories, transferring files and editing.

Concurrent PC-DOS recognizes the .EXE and .COM files for instant and error free commands. Programmers may call on CP/M or PC-DOS utilities, including those for creating and debuggin 8086/8088 assembly language programs, listing directories, transferring files and editing.

Also, StarLink provides RS-232 connection for the addition of four dumb terminals. The stations perform as if they were single user systems, and different applications may be run by each user. Speed of the system is increased with the addition of an 8088 microprocessor and 64K of RAM on the expansion board to provide I/O buffering between the terminals and the IBM PC.

Time saving applications possible with Concurrent PC-DOS

bases services such as CompuServe or THE SOURCE. Data files may be transferred from a lap computer in the field to a desktop running Concurrent PC-DOS in the office. The transfer proceeds without interfering with other tasks — such as word processing or printing — that are performed on the office computer.

"Concurrent PC-DOS addresses the growing need for communications between data base services and work stations," Miller explained. "Digital Research has integrated communications into the multitasking environment of Concurrent PC-DOS. It is the only major operating system for the IBM PC that transmits data over a modem and offers multitasking."

Since communications proceeds without interference of other programs, Miller said new applications that incorporate multitasking are possible.

"Programmers are limited only by their imaginations," said Miller. "The field of communications is facing dramatic growth as businesses seek software that helps them transfer data among computers easily and efficiently. Also, Fortune 2000 companies are expanding rapidly into pc communications."

An additional aid to communications is provided with a Rolodex®-like file for storing hundreds of names, addresses and related information. The electronic card file searches or sorts automatically.

The card file may be incorporated into a menu system designed for Concurrent PC-DOS. Experienced users may bypass the menus in favor of using traditional systems commands.

A standard configuration is provided, and users may modify or create their own menus using the "make-menu" utility. Free-form menus may be assigned to items in the menu.

"The menus are especially helpful for non-technical professionals because they provide a way to operate computers intuitively," Miller said. "Programmers may incorporate the menus into highly sophisticated applications that may be called on with a single keystroke."

Several other features have been bundled with Concurrent PC-DOS. Among them:

• A "queue" facility for developing integrated applications. Data from one window may be cut and pasted to another window.
• A simple editor suitable for writing programs and short memos.
• Applications may call on auxiliary hardware through GSX™, the graphics extension to operating systems. GSX supports the latest hardware including plotters and ink jet printers.
• An on-line help facility that serves as a reference to utilities and commands.
• A software print spooler that allows users to print text files without interrupting other tasks.

Concurrent PC-DOS requires 256K of memory and two disk drives. For multiple applications, 512K of memory and a hard disk are recommended. The package includes a "Getting Started" guide and a reference manual.

"In summary," Miller concluded, "this is really an operating system with the functionality and power of a minicomputer operating system, but with the user interface that people expect in micros, such as windows and menus."
European offices of DRI assist foreign OEMs

OEMs who wish to market their microcomputers in Europe can turn to Digital Research for help in making their efforts a success.

"The European market is growing as rapidly as the American market," said Paul Bailey, vice president of European operations. "Europeans are interested in the latest technology from overseas, especially Digital Research products. Our overseas operations are expanding to keep up with the demand for products and technical expertise. We are providing all of the key services OEMs need to enter the European market."

European headquarters was opened almost two years ago in Newbury, England. Operations in France and Germany were added during the past year along with full staffs of technical and sales specialists in all three locations.

Each country in Western Europe poses slightly different challenges for the introduction of new products, Bailey said. The Digital Research experts help OEMs clear hurdles in language and hardware.

The European engineering staff is stationed at the Newbury office. Under the direction of Andy Wightman, OEM software group manager, the group specializes in implementation of Digital Research operating machines to OEM hardware.

"The effort to provide various translations is an ongoing job that involves the latest Digital Research products," said Howard Kornstein, director of technical support in Europe. "We have completed the legwork necessary to market microcomputer products in Europe, and our staff keeps informed about the needs of users in different countries."

"Small or large computer manufacturers who want to sell their products overseas may not have the resources to develop foreign implementations of operating systems and other software products," Kornstein explained. "We have acquired a staff that is knowledgeable in conversions, and we have established procedures to produce translations easily."

The strategy to translate Digital Research products has created a successful line of well-supported software for Europe, Kornstein said. Among the products translated into foreign languages are Personal BASIC™, DR DRAW™, DR Graph™, Dr. Logo in 8-bit and 16-bit versions, CP/M and CP/M-Plus™.

Concurrent™ DOS, a new operating system from Digital Research that runs applications for CP/M and PC-DOS, has gained support throughout Europe, Kornstein said. He attributed part of the product's success to the availability of versions in French and German languages.

Europeans received their first look at Concurrent DOS in April at the Hanover Faire, a German trade show that has become one of the most popular European exhibitions. At the fair, more than 20 OEMs demonstrated microcomputers running under Digital Research's multitasking operating system.

"European manufacturers and ISVs are excited about the potential applications for Concurrent DOS, especially communications and electronic mail," Kornstein said. Some 40 machines using Concurrent DOS have been introduced in Europe, and another 40 personal computer manufacturers are expected to offer it by fall.

Meanwhile, Digital Research has conducted several field seminars to assist with the development of applications running under foreign versions of Digital Research's products. The Digital Research Software Forum in April at London's Cavendish Conference Centre was attended by some 200 ISVs and OEMs. Experts from Digital Research discussed DR NET™, DR Draw, the GSX graphics extension to operating systems, multiuser systems, multitasking, windows and Concurrent DOS including its PC-Mode™ emulation.

Similar topics were discussed at a technical forum in France. More than 60 ISVs participated in the day-long session, a follow-up to a seminar presented in March.

In Germany, the EDP Training Centre and Digital Research have agreed to develop technical seminars for Concurrent DOS. EDP already offers training for CP/M, Personal Basic, CBasic Compiler™, Pascal/MT™, CIS COBOL, Level II COBOL, SID™, Display Manager™, PL/I™, DR Graph and GSX.

"We have committed ourselves to expanding our product line and increasing our support to the technical community," Vice President Bailey said. "We are meeting a growing demand for high quality products in Europe, a market that represents some 30 percent of worldwide computer-related sales."

The acceptance of Concurrent DOS follows the enthusiastic reception received by Concurrent CP/M. Thames Television's Database program named Concurrent CP/M "The Software of the Year." The award presentation was made at the British Microcomputer Awards Ceremony.

July 1984

Digital Research

Page 3
DRI expands engineering with new facility in Austin

A new engineering facility has been opened by Digital Research to broaden the company's base of operations and strengthen its ties with OEMs located in Texas.

The Austin Development Center initially supports a group of system engineers working on projects for languages and operating systems. Allen Beebe, director of Systems Software at the Pacific Grove headquarters of Digital Research, is relocating to manage the operation.

"The Austin Development Center is dedicated to specific projects for OEMs in Texas," Beebe explained. "It helps facilitate the completion of contracts and makes the company more accessible to clients in the Southwest. The projects carried out in Austin are intended to complement those at Digital Research headquarters, where the majority of engineering development continues."

Larry Wolfe, previously the director of research and development at Execucom Systems Corp., was hired as director of engineering. Wade Shaw, a technical project manager at Execucom, was retained as manager of language engineering.

Language bindings available on data base services

Assembler source code programs to call GSX from all major microcomputer languages have become part of the public domain software available on CompuServe and THE SOURCE.

Subscribers to either of the electronic data base services may use these "bindings" to develop graphics applications with GSX, a graphics extension to operating systems. Also, Digital Research is supplying bindings for all of its 8- and 16-bit language compilers and for Microsoft's 16-bit compilers.

Bindings are required to transform high level language pass parameters to the GSX integer convention. Says Product Line Manager Rob LaTulipe, "The availability of bindings means that users of the major languages for microcomputers easily program to GSX without writing any assembler code. This is a value added to GSX with no additional cost to subscribers to MICROLINE and THE SOURCE. We are providing the source code which simply needs to be assembled. We also will provide short sample programs to show how the calls are made."

Further documentation in the form of the GSX Language Reference manual is available for 16-bit DRI languages inside the GSX-86 Programmer's Toolkit. The product contains both versions of the newest GSX version 1.3 — one for CP/M-86 (including Concurrent CP/M) and the other for PC-DOS.

The Toolkit provides ISVs a license to distribute GSX with their graphics applications on the IBM/PC, PC/XT and 3270 PC.

The GSX-86 Programmer's Toolkit is available from Westico, a value-added distributor of Digital Research products located at 25 Van Zant St., Norwalk, CT 06855. (203) 853-6880.

Generic versions of Dr. Logo ship to 8- and 16-bit OEMs

OEMs may license 8- and 16-bit versions of Dr. Logo, which is being shipped by Digital Research in formats for CP/M and MS-DOS.

The generic versions are directed toward the consumer and education markets. The 8-bit version provides most of the same functions as the 16-bit version, including turtle graphics, list processing, an on-line help facility, sophisticated debugging and easy-to-understand user's guides.

For more information on Dr. Logo and licensing agreements, call Becky Jones at (408) 649-3896, extension 6332.
DR FORTRAN-77 aids portability

The shipment of DR FORTRAN-77 from Digital Research introduces a new technology and makes portability of applications between mainframes, minicomputers and microcomputers a reality.

DR FORTRAN-77 was shipped in versions for CP/M-86, MS*DOS and PC-DOS. It meets the specifications set by the American National Standards Institute, and is the only full-featured version of FORTRAN for Intel 8086 and 8088 microprocessors.

According to Lowell Wolf, product marketing manager, no other microcomputer FORTRAN meets all of the ANSI standards. DR FORTRAN-77 is compatible with mainframe and minicomputer versions of the language, which have become popular for scientific and engineering applications involving algebraic equations.

"Software developers benefit from the ease of transferring applications from one type of computer to the next," said Wolf. "This means they can spend their time developing new ideas rather than poring over laborious conversions.

The ease of transferring software increases its value and means products may be brought to market quickly," said Wolf. "OEMs benefit because they may attract the software solutions needed for new systems."

DR FORTRAN-77 is the first compiler to incorporate Digital Research's common backend technology, the basis for all of the company's future compilers. The technology speeds development of compilers for new chips and operating systems.

The compilers use a common intermediate language and couple to a code generator and run-time library, which constitute the common backend. The compiler frontend and backend then produce object code.

The new compilers are written in C. Eventually they will provide source code compatibility across the 8086, 80286 and 68000 chips, and across CP/M-86, Concurrent CP/M, PC-DOS, MS-DOS and UNIX* System V operating systems.

Further, the new version 4.0 compilers, including DR FORTRAN-77, allow programmers writing in one language to call subroutines written in another language.

DR FORTRAN-77 supports programs as large as one megabyte of combined code and data. For programs of less than 64K of data, there is a compiler option to produce shorter memory addresses for faster execution. This is one of the few compilers that can invert a 100 by 100 matrix.

Floating point calculations using the 8087 math coprocessor may be performed with DR FORTRAN-77. A linker option determines whether the compiler produces in-line math coprocessor functions or simulates floating point operations in software.

Subroutines for the compiler may be organized into overlays. These may be organized into a tree-like structure so each overlay can call others. The size of the "root overlay" plus the largest individual overlay determines the maximum memory size requirement.

"Digital Research is helping develop standards that benefit end users who depend on software writers and OEMs for new applications," Wolf said. "DR FORTRAN-77 is the first of several forthcoming compilers that provide a consistent set of software tools that increase portability."

PATH OF CODE THROUGH COMPILER

[Diagram of the path of code through the compiler]

July 1984
Digital Research
Application Notes on DRI products

The following is our complete list of the Application Notes for each of our Digital Research products. These are available on our electronic data bases on THE SOURCE and CompuServe or may be ordered for no charge from our Technical Support Department, PO Box 579, Pacific Grove, Ca 93950. Be sure to specify which set of Application Notes you are requesting, and include your name, mailing address and zip code.

CBASIC®:
CA01 - Assembly Language and CBASIC-80 Under CP/M PLUS
CA02 - Assembly Lang. & CBASIC Under CP/M V2.x - Calc. Space on Disk
CA03 - Assessing MP/M II Internal Time/Date with Assembly Lang. & CBASIC-80
CA04 - CBASIC-80: 86 Dynamic Memory Management
CA05 - Chaining to a COM/ CMD File From CBASIC
CA06 - Assembly Language & CBASIC-86 Under CP/M-86

CBASIC COMPILER®:
CB01 - Dynamic Memory Management (OM error)
CB02 - Disk Files in a Shared Environment
CB03 - Using the GET and PUT Functions
CB04 - Accessing MP/M II's Time-Date Function
CB05 - Assembly Lang. in CBASIC Compiler under CP/M-86
CB06 - Calling Assembly Language Subroutines from CBASIC Compiler

Concurrent CP/M-86 For The IBM PC:
01 - Using The IBM PC ROM BIOS Under Concurrent CP/M-86
02 - Shifting The Horizontal Sync Position of the CRT Display
03 - Booting Concurrent CP/M-86 (PC) From A Single Drive
04 - Self attaching RSP

CP/M V2.2:
04 - Concurrent C P/M -86 For The IBM DisplayWriter:
06 - Examples of Intersegment Program Transfer in ASM-86
07 - The CCP Autoload Feature
08 - Booting From Drives Other Than A:
09 - Changing the Restart Number in DDT
10 - Cold Boot Startup
11 - SUBMIT Enhancements
12 - SPOOL Utility Modifications
13 - Record Locking/Unlocking
14 - GENSYS Enhancements
15 - Changing the Priority of SPOOL PRL.
16 - Changing the Backspace and Rubout Key Functions

PASCAL/MT®:
MT80-01 - Program Chaining Under CP/M V2.2 or CP/M PLUS V3.0
MT80-02 - Memory Peaks and Pokes Using Inline Only
MT80-03 - Modification to the Built-In ODD Function
MT80-04 - An Improved @ BDOS Function
MT80-05 - Improved Utilities Module
MT80-06 - Overlay Linker Switch Calculator
MT80-07 - Direct Console I/O Using BIOS Calls

MP/M II:
01 - Suppressing the MP/M Loader Display
02 - Setting and Resetting the Raw Console I/O Mode
03 - Changing PRL File Minimum Buffer Size Requirements
04 - Accessing the Internal MP/M II TOD (Time-of-Day) Function
05 - DMA Disk Controllers With Banked Memory Systems
06 - Using the Send CLI Command XDOS Function
07 - Creating a SUBMIT File From An Application Program
08 - File Sharing
09 - Program Control of the Control-P Switch
10 - Changing the Backspace and Rubout Key Functions
11 - SUBMIT Enhancements
12 - SPOOL Utility Modifications
13 - Record Locking/Unlocking
14 - GENSYS Enhancements
15 - Changing the Priority of SPOOL PRL.
16 - Changing the Backspace and Rubout Key Functions

PASCAL/MT V86**: MT86-01 - Improved Utilities Module
MT86-02 - Improved @ BDOS86 Function With a New Name: @SERVICE
MT86-03 - An Alternative Method of Chaining Using CP/M-86 Function 47

PERSONAL BASIC®:
PB01 - Appending To A Sequential File

PL/I 80**:
01 - Including Local Symbols in RMAC (revision of RMAC app note #1)
02 - Linking Fortran Overlays (revision of LINK-80 app note #1)

SID** V1.4:
01 - Changing the Restart Vector of TRACT LITL and HIST.UTL
02 - Changing the Backspace and Rubout Key Functions

ZSID** V1.4:
01 - Changing the Restart Number
02 - Changing the Screen Display
03 - Changing the Restart Vector of TRACT UTIL and HIST.UTL

TEX 2.1:
01 - Editor Compatibility
Application Notes and Patches

CP/M-86® V.1.1 for IBM PC and PCXT
Application Note 05
Floppy Disk Format

Applicable Products and Release Numbers: CP/M-86® V.1.1 for the IBM PC and PCXT.

The IBM PC Floppy Disk Drive can be either a Single (SS) or Double (DS) sided, double density, 40 track per side unit. It is capable of reading and recording data using the Modified Frequency Modulation (MFM) method. Additional information regarding the specifics of the IBM Floppy Disk Controller and Floppy Disk Adapter can be found in Chapter 2 of the IBM PC Technical Reference Manual.

The drive characteristics are as follows:

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Track Type</th>
<th>Tracks Per Side</th>
<th>Physical Tracks</th>
<th>Format Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Sided</td>
<td>Single Side (SS)</td>
<td>120</td>
<td>0 - 39</td>
<td>32: 128 Byte Records / Track</td>
</tr>
<tr>
<td></td>
<td>Double Side (DS)</td>
<td>256</td>
<td>0 - 32</td>
<td>32: 128 Byte Records / Track</td>
</tr>
</tbody>
</table>

**Disk Parameter Block:**

<table>
<thead>
<tr>
<th>Offset</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>SPT</td>
<td>Total number of Sectors Per Track</td>
</tr>
<tr>
<td>1</td>
<td>BSH</td>
<td>Block allocation size</td>
</tr>
<tr>
<td>2</td>
<td>BLM</td>
<td>Block Mask which is also determined by the data block allocation size</td>
</tr>
<tr>
<td>3</td>
<td>EXM</td>
<td>Extent Mask, determined by the data block allocation size and the number of disk blocks</td>
</tr>
<tr>
<td>4</td>
<td>DSM</td>
<td>Maximum number of disk tracks supported, determined by the data block allocation size</td>
</tr>
<tr>
<td>5</td>
<td>DRM</td>
<td>Maximum number of sectors on the disk</td>
</tr>
<tr>
<td>6</td>
<td>AL0</td>
<td>Determine reserved (Allocated) directory blocks</td>
</tr>
<tr>
<td>7</td>
<td>AL1</td>
<td>Additional directory blocks</td>
</tr>
<tr>
<td>8</td>
<td>CKS</td>
<td>Size of the directory check vector</td>
</tr>
<tr>
<td>9</td>
<td>OFF</td>
<td>Offset from the beginning of the physical disk, the number of reserved tracks at the beginning of the disk</td>
</tr>
</tbody>
</table>

The values of BSH and BLM determine (implicitly) the data allocation size BLS, which is not an entry in the Disk Parameter Block (DPB). For the values listed above the BLS is 2048 and 1024, respectively for the double and single sided drive.

The product of BLS * (DSM + 1) is the total number of bytes held by the drive and, of course must be within the capacity of the physical disk, not counting the reserved operating system tracks.

The DRM entry is one less than the total number of directory entries, which can take on a 16-bit value. The values of ALO and AL1, however, are determined by DRM. The two values ALO and AL1 can together be considered a string of 16-bits numbered 00-15 (left to right). Each bit position reserves a data block for a number of directory entries (bits are assigned starting at 00 and filled to the right). Each directory entry occupies 32 bytes, thus for 64 directory entries 1 bit is set for the double sided drive (BLS = 2048) and 2 bits are set for single sided drive (BLS = 1024).

The CKS value is determined as follows:

CKS = (DRM+1)/4, where DRM is the last directory entry number.

Products and Serial Numbers Affected: CP/M Plus™ V3.0, Serial numbers 2-000-00001 through 2-000-xxxxx.

Program: CCP.COM

**Error Description:**
- If a DIR command that is given for a disk that has System files on it is terminated by a control C, a subsequent DIR command for a disk that does not have System files on it will incorrectly print the message "SYSTEM FILE(S) EXIST".
- The error message "Cannot Load Program" is not terminated with a "S". This results in garbage being displayed after the error message is printed.

**Patch Procedure:** Make a back-up copy of CCP.COM before making any changes. The program SID is required to make the changes. The changes are made by the following sequence of commands. User entries are in bold type.

```
A>SET CCP.BAWCCP.COM
A>SID CCP.BAW
CP/M 3 DIAG - Version 3.0
REST HLLR PC END
R000 R000 0180 0000
A>0861 CALL 480
A>0649
A>0480
A>0481 XBA A
A>0494 STA 04D
A>04E7 CMP 099
A>046A
A>0204
A>0205 2E 24
A>0249 22
A>WCCP.COM
A>0190 Record(s) written.
A>2F
```

**CP/M-86® V.1.1 for IBM PC and PC/XT**
Application Note 04
Early iAPX 8088 Problem

**Applicable Products and Release Numbers: CP/M-86® V.1.1 for the IBM PC and PCXT.**

Early Intel 8088 microprocessor chips have an obscure design problem that can cause unexpected memory writes if an interrupt occurs when the stack is moved. It takes two instructions to load the Stack Segment-Stack Pointer (SS-SP) register pair, and if an interrupt is acknowledged after the stack segment is loaded and before the stack pointer is loaded, the interrupt status will be "pushed" to an arbitrary place with indeterminate results.

It is recommended that all iAPX 88/86 software disable interrupts prior to doing stack loads. The following is a representative sample of a code sequence which will accomplish this:

```
mov bx,new_stack_segment
pushf
push ax
mov ds, ax
mov es, ax
cli
mov si,SS
push si
push bx
mov ds, bx
next
```

Non-maskable Interrupts (NMI) can still occur, as can trace interrupts generated by the debuggers using the TRAP flag.

The CPU chips were fixed some time ago (1Q, 1980). The new 8088's mask ALL interrupts automatically for one instruction following any segment register load.

July 1984
Applicable Products and Release Numbers: CP/M™ 68K V.1.0.
The standard CP/M 68K CCP contains four different program modules. In order to write your own customized version of the CCP it is necessary to substitute your CCP for two of the four existing modules. However, it is essential to understand the interfacing procedures between the four different modules and their relationship to the BDOS and BIOS of CP/M 68K.

The Four CCP Program modules are:
1. CCPIF.O
2. CCPBDOS.O
3. CCPLOAD.O
4. CCP.O

The first three modules of the CCP perform general CP/M housekeeping functions. CCPIF.O is the coldboot and warmboot interface between the CCP, the BDOS, and the BIOS. CCPBDOS.O is an assembly language module that performs the BDOS function calls for the main CCP module: CCP.O. CCPIF.O is the assembly language module that performs the program load function for CCP.O. CCP.O is the main module of the CCP. Substitute your custom CCP for modules three and four of the standard CCP for CP/M 68K. A description of the CCP input and output interface requirements with modules one and two as well as the BDOS and BIOS follow.

**CP/M 68K™ Application Note 01 Customization of the CCP**

**Applicable Products and Release Numbers:** CP/M™ 68K V.1.0.

The standard CP/M 68K CCP contains four different program modules. In order to write your own customized version of the CCP it is necessary to substitute your CCP for two of the four existing modules. However, it is essential to understand the interfacing procedures between the four different modules and their relationship to the BDOS and BIOS of CP/M 68K.

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**CP INPUT INTERFACE**
The main module for the CCP is entered via a jsr (jump to subroutine) instruction from CCPIF.O. Here is the exact instruction as it appears in CCPIF.O:
```
jsr _main *call the CCP
```
The label _main contains the underscore character because the C compiler places an underscore before every external variable and function name. CCP.O contains the function:
```
main()
```
which orchestrates the function of the Console Command Processor. This jsr instruction is the only entry point to the CCP.

**CP OUTPUT INTERFACE**
The CCP needs to access the BDOS to perform its function. The module CCPBDOS.O contains assembly language instructions to fill registers D0 and D1 with the BDOS function number and the BDOS parameter, respectively. This module is expecting to pull off the stack a word for the function number and a long word for the parameter.

The function is defined in the main module as follows:
```
EXTERN UWORD bdos();
```
The BDOS will return a word value for the current user number.
```
(1) userno = bdos(GET_USER_NO,(long)255));
(2) move.l #255,-(jsp)
move.w #GET_USER_NO,-(sp)
jsr _bdos
tl de *return value in register DL
move.w de,userno *get return value
etc.....
```
The BDOS will return a word value for the current user number.

In the standard CP/M 68K CCP, a warmboot occurs after the termination of every transient program. Upon warmboot, control is transferred to the BDOS and eventually back to the CCP via that jsr instruction. Before entrance to the main module, the system stack is reset to its original starting address. CCPIF.O must be the first module of CP/M 68K. This module also performs coldboot startup procedures essential to coldboot loading. Any interface to the BIOS is done through the BDOS direct BIOS call. See the Programmer's Guide for details.

If you experience problems with doubly defined global variables, use the NM08 utility to get a listing of the system symbol table. For example:
```
A>NM08 REL
```
will give you a listing of the CP/M 68K symbol table. For further details regarding the use of NM08 see the CP/M 68K Programmer's Guide.

Finally it is necessary that the CCP use BDOS function 10 to read in a command line from the console if you wish to make use of BDOS function 47 (Chain to Program). The chain to program function traps function calls and supplies the CCP with the next command to execute from an internal buffer.

**LIST OF COMMON QUESTIONS AND ANSWERS**

**Access Manager**
**Display Manager**
**CBASIC**
**Display Manager for PC DOS**
**CBASIC Compiler**
**Level II Cobol**
**CP/M V2.2**
**MP/M II**
**CP/M Plus**
**micro/SPF V2.0**
**Concurrent CP/M**
**Pascal/MT+ V3.1**
**With Windows**
**Pascal/MT+ V5.6.1**
**CP/M Gold Card**
**for CP/M**
**DR Assembler Plus Tools**
**Pascal/MT+86**
**DR Graph**
**PL/1-80 and LINK-80**
**Digital Research C**
**PL/1-86 and LINK-86**

July 1984
Common Questions and Answers

**micro/SPF V2.0**

**Q:** How can I make use of PC-DOS 2.0 hierarchical directories when using micro/SPF?

**A:** If you are using DOS 2.0 with a fixed disk, you are probably familiar with the new tree-structured directories. Currently, very little software supports this new directory structure adequately. micro/SPF intends to fully support tree-structured directories in a future release. As a temporary measure, we have included a utility program which we find useful. This program allows you to 'rename' a file, using the full path and file names for both the old and the new names. If the path names are different, the file is 'moved' from the first directory to the second directory; no copying is performed, only the directory entries themselves are changed. The command format is:

```
XREN [d:] [path] old-name [path] new-name
```

The drive name may be used ONLY for the old file name. Both old and new file names must be specified.

**Q:** What changes have been made regarding the use of the function keys?

**A:** 1) The default definition of the Program Function Keys has been changed to be compatible with the PC Keyboard. The <PgUp> and <PgDn> keys are now the SCROLL-UP and SCROLL-DOWN functions.

2) Alt-1 through Alt-9 keys may now be used as functional equivalents for the F1-F10, PgUp, and PgDn keys.

**Q:** What constitutes a valid USERID?

**A:** A valid USERID consists of one to eight of the following characters:

- A) Letters A .. Z (lower case letters are converted to upper case).
- B) Numbers 0 .. 9.
- C) The following special characters:

```
! @ # $ % ^ & * ()_- {} " ">
```

There are any special considerations when using an IBM Personal Computer (not an XT) with a fixed disk:

**A:** micro/SPF now uses all of the available memory, therefore it overlays the transient portion of COMMAND.COM. This normally causes no problems since the transient is reloaded by DOS as necessary. However, if you are using a PC (not an XT) with a fixed disk, the transient portion will normally be reloaded from the A: drive only, since this device was used to boot the system. The following solution to this problem was found in the January 1984 edition of Softalk magazine, but has not been submitted to any formal testing:

1) Copy COMMAND.COM from your boot disk to a directory on your hard disk.
2) Add the following command to the CONFIG.SYS file on your boot disk:

```
SHELL=d:\pathname\command.com
d:\pathname/P
```

The drive and pathname should point to the drive and directory on your hard disk where you have put the copy of COMMAND.COM.
3) Make sure that the path used in step 2 is included in your default PATH.

**Q:** What does the message: "EDIT MEMORY CAPACITY: xxxK" mean?

**A:** micro/SPF grabs all available memory for your editing purposes. The message is telling you how much is left after the operating system and micro/SPF have been loaded.

**Q:** What are the minimum memory requirements to load micro/SPF V2.0?

**A:** The IBM PC-DOS version requires a minimum of 320K, 384K is needed for use under CP/M-86 and 512K under Concurrent CP/M-86 on the IBM Personal Computer.

**DR Graph**

**Q:** I am having problems positioning the cursor when running DR Graph on the NEC Advanced Personal Computer. The arrow keys fail, it is impossible to backspace. The distributor (or dealer) who sold me the product, downloaded for the NEC APC format, has instructed me to call DRI.

**A:** Check the serial number of the product which you are trying to use. If the first four digits are 5017, you are using a non-generic version which has been keyboard mapped to the IBM Personal Computer, as the documentation indicates. You should return the product to your distributor (or dealer). NEC has licensed with Digital Research to distribute DR Graph for their hardware. You should contact them for a version designed for the APC.

**Digital Research C**

**Q:** When trying to compile the SAMPLE.C program supplied with the C Language for CP/M-86, a banner is displayed and the system prompt reappears. Some Temporary files may be created. What is happening?

**A:** At least two situations will cause these symptoms:

1) Not all of the appropriate files are present on the disk. Refer to section 1.4 in your documentation.

2) The patches to BDOS function 59 have not been installed on your CP/M-86 system. R.CMD relies heavily on function 59 to load the various compiler modules. Without the patch, R.CMD is overwritten when the next program is loaded. Request CP/M-86 V1.1 patches #8 and #13.

**Q:** When trying to use the C Language V1.1 with Display Manager V1.0, a link-time error is generated that reads:

```
NO FILE
FILE: SYSLIBX.L86
```

**A:** An incompatibility exists due to the renaming of the DR C system run-time libraries from SYSLIBX.L86 to CLEARX.L86. A quick solution is to create and compile a C program which consists of only a "dummy" function. (EX: dummy(x)). Then rename the object module to SYSLIBX.L86. A patch is available to correct the Display Manager libraries, DMDRCx.L86 Request Display Manager Patch 04.

**Q:** DR CV1.1 does not work properly under MP/M-86. The banner displays and the system prompt reappears.

**A:** The compiler is searching for its modules on the drive specified as one lower than the current default drive. Place all compiler modules on the A: drive or use the -0 and -1 toggles to specifically reference the current drive. (i.e. 0E>DRC TEST -OE: -1E:). Direct the compiler to look for DRC.ERR with an additional -4E: toggle. If the lower drive is a floppy drive, be certain to have a disk logged into that drive, to avoid system error messages. This inconsistency has been corrected in V1.11.

**Q:** Using Digital Research C under the CP/M-86 operating system, the -f switch for 8087 support does not seem to work correctly in all cases. Will I ever be able to use my 8087?

**A:** While the floating point routines have been improved tremendously under version 1.1, the 8087 support is not completely functional. DR C V1.11 for CP/M-86 corrects the 8087 deficiencies. DR C for PC-DOS will be corrected in a future release.

**PL/1-86**

**Q:** I am unable to link the new OVERLAY without linking the root and all other overlays.

**A:** Since the $OZ does not function properly the way to get around it is to rename the COM file which was created by the first link execution and then relink the new overlay with the root module.

**Q:** How do I use record LOCKING/UNLOCKING facility under PL/1-86 V1.0?

**A:** Since record LOCKING/UNLOCKING has not been implemented under PL/1-86 V1.0 it is recommended that you use Access Manager to use that feature.

July 1984

Digital Research
## The Rev Table

The following is a list of current Digital Research product versions and last revision dates:

### LANGUAGES:

<table>
<thead>
<tr>
<th>PRODUCT NAME</th>
<th>OS FAMILY</th>
<th>VERSION</th>
<th>LAST UPDATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Research C</td>
<td>CP/M-86</td>
<td>1.1</td>
<td>See NOTE #1</td>
</tr>
<tr>
<td>Digital Research C</td>
<td>PC DOS</td>
<td>1.1</td>
<td>February 84</td>
</tr>
<tr>
<td>CBASIC*</td>
<td>CP/M</td>
<td>2.8</td>
<td>June 83</td>
</tr>
<tr>
<td>CBASIC</td>
<td>CP/M-86</td>
<td>1.4</td>
<td>See NOTE #2</td>
</tr>
<tr>
<td>CBASIC Compiler (CB80)*</td>
<td>CP/M</td>
<td>2.0</td>
<td>June 83</td>
</tr>
<tr>
<td>CBASIC Compiler (CB86)*</td>
<td>CP/M-86</td>
<td>2.0</td>
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<td>2.1</td>
<td>June 83</td>
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<tr>
<td>CBASIC Compiler (CB86)*</td>
<td>MS DOS</td>
<td>2.1</td>
<td>June 83</td>
</tr>
<tr>
<td>CBASIC Compiler (CB68K)**</td>
<td>CP/M 68K</td>
<td>1.0</td>
<td>April 84</td>
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<tr>
<td>CIS COBOL*</td>
<td>CP/M-86</td>
<td>4.5</td>
<td>November 82</td>
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<tr>
<td>LEVEL II COBOL*</td>
<td>CP/M</td>
<td>2.1</td>
<td>February 84</td>
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<td>LEVEL II COBOL</td>
<td>CP/M-86</td>
<td>2.1</td>
<td>August 83</td>
</tr>
<tr>
<td>LEVEL II COBOL</td>
<td>PC DOS</td>
<td>2.1</td>
<td>August 83</td>
</tr>
<tr>
<td>LEVEL II COBOL*</td>
<td>MS DOS</td>
<td>2.1</td>
<td>August 83</td>
</tr>
<tr>
<td>DR LOGO*</td>
<td>CP/M-86</td>
<td>1.0</td>
<td>—</td>
</tr>
<tr>
<td>PASCAL/MT+*</td>
<td>CP/M</td>
<td>5.6.1</td>
<td>See NOTE #3</td>
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<td>PASCAL/MT+</td>
<td>CP/M-86</td>
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<td>PC DOS</td>
<td>3.2</td>
<td>February 84</td>
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<tr>
<td>PERSONAL BASIC*</td>
<td>CP/M-86</td>
<td>1.1</td>
<td>See NOTE #4</td>
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<td>PL/I*</td>
<td>CP/M</td>
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<td>February 83</td>
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<td>—</td>
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<tr>
<td>PL/I</td>
<td>PC DOS</td>
<td>1.0</td>
<td>July 83</td>
</tr>
</tbody>
</table>

**NOTE #1:** DR C upgrade from 1.0 to 1.1 supports overlays for both small and large memory models, includes the new common run-time library and allows the user to call routines in FORTRAN -77 yet to be released, and vice versa. Registered users will receive update notification automatically.

**NOTE #2:** V1.4 is a free update to V1.3 owners due to a banner change bug. Registered users will receive update notification automatically.

**NOTE #3:** Upgrade from 5.3 to 5.6 is a maintenance release only. Registered users will receive update notification automatically.

**NOTE #4:** Upgrade from 1.0 to 1.1 eliminates the 512 line limit restriction and fixes some minor bugs. Registered users will receive update notification automatically.

### PROGRAMMING TOOLS:

<table>
<thead>
<tr>
<th>PRODUCT NAME</th>
<th>OS FAMILY</th>
<th>VERSION</th>
<th>LAST UPDATE</th>
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**NOTE #5:** DR Assembler Plus Tools combines SID and PUG to include MAC, RMAC, LINK, XREF, SID, XSID. DR Assembler Plus Tools for CP/M to include RASM-86, LINK-86, LIB-86, XREF-86, and SID-86.

### GRAPHICS:

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Programmers Tool Kit™

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OPERATING SYSTEMS:

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Note #6: The CP/M Gold Card is a 6 Mhz Z-80B microprocessor board for the Apple II, II Plus, and Ile. Product ships with CP/M 3.0 and CBASIC language.

CONSUMER PRODUCTS

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Note #7: The Owlcat line is designed to test and train students to take their S.A.T., an aptitude test often required for college entrance.

* These products are not available from Digital Research.
** Contact Digital Research Sales and Support Staff for product availability.

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July 1984

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This is a ______ add ______ delete ______ change

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Professional support draws subscribers' praise

Professional Programmer Support (PPS) subscribers are a diverse group with one strong, common interest: they need to get a quick and accurate response to their requests for technical information. PPS was established for just that purpose: to provide microcomputer professionals with the technical assistance that they need when they need it. How are PPS subscribers using this information and what do they think of the PPS service?

"... worked perfectly"

"PPS worked perfectly for me," said Bill Pryor who joined the program in January, 1984. "We would have been lost without the help from PPS," Pryor of Pryority Software predicted. Pryor used DRI's Pascal language to develop game programs and felt that PPS was a real asset to his efforts.

"No delay ..."

"No delay in accessing the right people is the main advantage of PPS," said Jean Vanderbrouke. "Developing a good working relationship with the analysts is a great thing," explained Vanderbrouke who has been working with the PPS program since the beginning. Vanderbrouke works with the Northern California Conference to create vertical applications for churches and missions using DRI's PL/I language.

"... very helpful"

"The phone always gets answered and the PPS people are very helpful in getting Patches, Application Notes and Common Questions and Answers out to me right away," said Frank Barberis. Barberis who also has been with PPS since its inception feels that "the PPS fee is reasonable for the serious software developer." Barberis works with the Computa-Link Company that provides laboratory data control systems using DRI's MP/M operating system.

"... eliminates hours of frustration"

Bob King of Crown Software was one of the first PPS subscribers when the program started. He finds that PPS "helps eliminate hours of frustration" when trying to resolve a problem. King also remarked that PPS is a "very helpful, very fast service that rarely causes him to wait long to contact an analyst." King uses DRI's Access Manager, Display Manager and CBASIC to create vertical market applications. One of his projects is a comprehensive sports center management package that includes membership management.

"... saved my life"

"PPS saved my life a few times," is a strong statement but that is how John Zumsteg of NW Micro feels about the program. Zumsteg points out that he "figured out problems with the help of PPS that he could never have figured out otherwise. The analysts I have worked with are always helpful and friendly and well worth the money. PPS paid for itself on the first phone call." He uses Pascal/MT+ and Display Manager for writing systems for the commuter aviation industry that include doing everything from creating a model of the air routes to designing accounting and scheduling programs.

"... someone in the know"

Bill Page of General Electric Energy Enterprises offered his reaction to the PPS Program. "You get to talk to someone in the know; someone is almost always there when I call; I am never put on hold and I always get to talk to someone; I have questions on many products and the analysts that I have worked with know the nature of my questions from previous conversations." Page works with the DOS and CP/M versions of Pascal, Access Manager and Display Manager to create a sophisticated file handling systems for oil and gas reserves.

"PPS has been great ...

"PPS has been great for us," reported Roland Myer of Tech America. "One of the nice things is to get on the phone and the guy is there. Professionals need to get through immediately with their problems without competing on a 'Hot Line' with a bunch of end users." Myer's work involves using Pascal/MT+ with 17 overlays in a network of grocery store scales. He saw the need for being able to upload source code to DRI and have it evaluated by an analyst without waiting for it to go through the mails. He is anticipating the electronic support that is planned for PPS subscribers through the use of DR SIG on CompuServe.

The above PPS subscribers do have a common need to get the information that they want when they want it. This need is being met for a group that ranges from the start-up software house to Fortune 500 OEM's and systems integrators. These individuals have put PPS through some pretty sophisticated hurdles since its inception, and they are pleased with the results. If you have some experiences with PPS that you would like to share, please contact the Technical Communications Manager, Technical Support Center, Digital Research, P.O. Box 579, Pacific Grove, CA 93950.