Personal Computer

Special Interest Group

DECUS Personal Computer Special Interest Group

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The UTILitieS-1 Diskette
Originated by
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The following is a breakdown of what is contained on this diskette. Included are verbose listings of the various .ARC files and comments on the sub-files themselves.

Executable images, files with a .EXE or .COM extension, will run on the Rainbow under MS-DOS, version 2.11. The .ARC files were produced using the ARC utility, version 4.10, which is contained on this diskette.

Comments are those of the originator of this diskette and do not necessarily reflect the comments, or opinions, of DECUS.

THE ARChive Utility--Version 4.10. ARC is an extremely powerful utility which combines up to four, computer determined compression formats with the grouping potential of a Library. Type 'ARC <CR>' for instructions, or read the .DOCs.

ASMGEN.ARC--Version 2.01. An 8086/8087/8088 file DIS-assembler. A MUST program for fix-it-yourselfers: Take an executable image; ASMGEN it; make the changes you want; reassemble it; and run it. (Note: Because this user is not a programmer, he can only repeat what ASMGEN is SUPPOSED to do; ASMGEN has NOT been tested on his system.)

BACK.ARC--Version 1.0. Use with DOWN.EXE (see below). BACK allows movement UPward through sub-directories, one level at a time. (Hint: Rename this one B.COM for speed.)

CHMOD.ARC--Version Unknown. Displays or changes a file's DOS modes.....

CLK.ARC--Version Unknown. Digital clock for the Rainbow.... Hit <EXIT> (F10) to quit.

COVER.ARC--Version Unknown. Prints directory listings for compact storage with floppies.... This version of COVER, however, does not always on the Rainbow, particularly on the 100A.

CV.ARC -- Version Unknown. Creates and changes Volume Labels.... Can be used with MS-DOS Version 1.1 diskettes.

DIRTREE.ARC -- Version 2.10. Gives a schematic representation of a disk's directory structure in the form of a sideways 'tree.' Can be used with many options. Requires MS-DOS Version 2.0 or higher.

DIS.ARC -- Version 3.0. A handy DIrectory Sorting program.... Type 'DIS' to get a sorted listing of the directory, including total filespace---both used and remaining. An excellent replacement for DIR, DIS allows the use of the /w and /p switches. (Note: DIS.COM was originally named 'DISK.COM'. For obvious reasons, however, (see below) one of two file names had to be changed. With apologies to MJH, this user changed this one.)

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DISK.ARC -- Version 1.00. An MS-DOS replacement for DEC's CP/M 'MAINT' program, which includes many of the nicer features of SWEEP (see the UTILS-2 diskette). DISK allows COPYing, VIEWing, RENaming, DELeting, changing drives, changing paths, showing free space, and more.

DOWN.ARC -- Version Unknown. Use with BACK.COM (see above). DOWN allows movement DOWNward through the directory structure, one level at a time. If more than one sub-directory is encountered, the name of each is displayed and the user enters the numerical selection. Rename this one D.EXE for additional speed, but be cautious: DOWN will not always work with sub-directories with names more than five (5) characters long.

DSKLBL.ARC -- Version 0.1. Also known as CLIP.COM. DSKLBL allows the creation, or the changing, of diskette volume labels. Written by Randy Tamura (IBM), DSKLBL (CLIP) works fine on the Rainbow.... After making sure that you are on the prerequisite drive, simply follow the instructions.

FDATE.ARC -- Version Unknown. DATE allows the setting, or re-setting, of date and timestamps....

FILTERS.ARC -- Version(s) Unknown. An additional set of filters (including source codes) for MS-DOS command line inputs: FECHO echos standard input to the screen (great for debugging); FEED reads a filspec and sends files to standard output; FORCLEAN takes a FORTRAN source and deletes comments and labels; LOWER translated all uppercase characters to lowercase; SNGLSPC removes extra blank lines from a file; TRANSLAT puts each word of a file onto a separate line; TRUNC truncates a line at the first matching character (or space); UNIQUE deletes multiple occurances from a sorted list; and UPPER translates all lowercase characters to uppercase. Use with the other filters---MORE, FIND, and SORT---Version 2.0 or higher.

FLIP.ARC -- Version Unknown. A Rainbow specific program, FLIP allows either of the following: Saves the screen to a file; restores the screen from a file; exchanges the current screen with one stored in a file.

FSTDSK.ARC -- Version Unknown. A rapid disk transfer program which will increase the file transfer rate by about 35%.... (Hint: Include this in your AUTOEXEC.BAT file.)

FV.ARC -- Version 1.03. Rainbow specific, FastVu program, written by Dan Pleasant.... This one is much faster than earlier versions.... Read the DOCs first, or simple type 'FV filename', <Next Screen>, <Next Screen>, <Next Screen>, etc. Hit the EXIT key (F10) to quit.

HIDESEEK.ARC -- Version Unknown. HIDESEEK can be used to find ''hidden'' directories, and/or sub-directories. For proper usage, type 'cd' to get to the root directory, then type 'HIDESEEK <CR>'. The rest of the program is self-explanatory....

HISTORY.ARC -- Version Unknown. A Rainbow specific program for MS-DOS, Version 2.0 or higher. HISTORY lets you recall, edit, and execute previously entered command lines.

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Note: HISTORY can be turned ON or OFF, at the users
discretion. Once turned on, however, this version of HISTORY
is NOT compatible with Rainbow REGIS.

Additional Note: HISTORY should be turned OFF before going
into an editor, or any key-stroke intensive program which
requires the use of the Help key: Since HISTORY remembers what
you have typed, and since the Help key recalls previous
entries, the use of HISTORY inside various programs can be very
confusing.

LU.ARC -- Version Unknown. Tom Jennings', ubiquitous Library Utility....
Type `LU <CR>' for instructions.

NEWDAY.ARC -- Version Unknown. NEWDAY.EXE is a painless way of setting
the date when booting the system. NEWDAY.DAV is the current fix for
version 2.11. Just make sure that both files are in the same directory
when accessed from your AUTOEXEC.BAT file.

NUSQ.ARC -- Version 1.10. A Newer UnSQueeze program.... 100% compatible
with SQ.EXE version 1.15.

PCLA50.ARC -- Version 1.0. A Rainbow specific, screen oriented LA50
printer set-up program, PCLA50 allows the setting, or re-setting, of any
of the LA50's parameters.

PRTSCR.ARC -- Version Unknown. PRTSCR allows the use of the `Print
Screen' key (<F2>) in MS-DOS. If you were used to that in CP/M, PRTSCR
is another MUST to be included in your AUTOEXEC.BAT file.

The UTILitieS-2 Diskette

The following is a breakdown of what is contained on this diskette.
Included are verbose listings of the various .ARC files and comments on
the sub-files themselves.

Executable images---files with a .EXE or .COM extension---will run on the
Rainbow under MS-DOS, version 2.11. The .ARC files were produced using
the ARC utility, version 4.10, which is contained on the UTILS-1
diskette.

Comments are those of the originator of this diskette and do not
necessarily reflect the comments, or opinions, of DECUS.

RENDIR.ARC--Version Unknown. A simple little program, RENDIR allows
users to REName their DIRectories. To use RENDIR, go to a level that is
one (1) level above the directory you want to rename. Type ``RENDIR,''
and simply follow the instructions. (Note: Do not include the backslash
as part of the directory name.)

REPLY.ARC--Version Unknown. REPLY allows the user to look for specified
matches, or ask YES or NO questions in a batch file.

RESETRB.ARC--Version Unknown. Rainbow specific program which provides
the software equivalent of ``Set-up/Cntrl Set-up.'' RESETRB, however,
leaves you where you were, instead of resetting to the Main Menu.

SCREENRB.ARC--Version Unknown. A Raibow specific program which allows
the selection, or the resetting, of all of the screen attributes. Type
``SCREENRB <CR>,'' and choose what you want.

SD.ARC--Version Unknown. SD is a Super Directory program which sorts and
lists directory files in an alphabetical, double-column format. The
number of files and the rounded estimate of file space appear to be OK,
but the estimate of the space remaining should not be believed.

SECRET.ARC--Version(s) Unknown. A set of MS-DOS programs originally
written for the IBM-PC. (This user has not tried them on his Rainbow.)
MDSECRET (MakeDirectory--SECRET) allows the user to create hidden
directories and/or sub-directories. CDSECRET (ChangeDirectory--SECRET)
and RDSECRET (RemoveDirectory--SECRET) perform the appropriate
supplemental functions.

SQ.ARC--Version 1.61pc. A recent MS-DOS version of Richard Greenlaw's
famous SQueeze program. Works geat, but it should: It was updated BY
Richard Greenlaw.

SWEEP.ARC--Version 2.14. Gary Berg's most recent version of SWEEP
(CWEEP) for MS-DOS....

TABS.ARC--Version 1.6. TABS was supposed to be an MS-DOS, ASCII
alignment program which replaces <TAB> characters with spaces. This
version of TABS, however, does NOT work properly on a Rainbow....

TD.ARC--Version Unknown. A Time-ordered Directory program, TD provides
directory listings which are sorted by time, size or name, in either the
forward, or reverse direction.

TOUCH.ARC--Version Unknown. TOUCH allows users to reset date and
timestamps to the current date and time. Global filenames are accepted,
but only from the default directory.

TREE.ARC--Version 1.1. A replacement for what Version 2.11 forgot, TREE
draws the directory structure of the default disk drive for any MS-DOS
computer with a VT1xx compatible terminal.

TREEDIR.ARC--Version 1.0. A combination of TREE and DIR, this program
produces a listing of the files in each directory along with the date,
time and file size. If the directory name is omitted, the listing starts
from the root directory. Use ``TREEDIR .<CR>'' to list the current
directory.

TY.ARC--Version Unknown. TY can be used to extract or type files which have been stored in a compressed format using SQ.COM (see above), or any of its variants. If you SQueeze files at all, this program is a must.

UNDEL.ARC--Version 2.0. Version 2.0 of an MS-DOS UNDELete utility.... Although it was supposed to work in the root directory (but NOT in subdirectories), this version of UNDEL does not seem work in the root directory, either. Moreover, after trying UNDEL at the root directory level, something went wrong, which ended up scrambling this user's File Allocation Table: A dozen files were truncated; a sub-directory was completely wiped out; and more than 180 files wound up cross-linked. UNDEL.COM, therefore, has been removed from this ARCive.

UNIXUTIL.ARC--Version(s) Unknown. A set of UNIX-like utilities for use under MS-DOS:
   CAT concatenates a list of files (or list of directories) for normal, or redirected output; FGREP searches through a list of files (or list of directories) for specified text strings; LIST produces a directory listing (in any of several formats) of files, or lists of files; TAIL displays the last 'n' lines of a file or list of files; and WC counts words or lines in a file or list of files.

   The MV utility moves files, or lists of files, from one place to another. MV differs from COPY in that MV deletes the original file after it has been copied. (Use MV, therefore, with caution.)

   SEARCH can be used to search a directory, or set of directories, to match a file, or set of files. Once matched, the entries may be output, moved (MVed), copied, or deleted, or the entries' attributes may be changed. An extremely powerful utility, use SEARCH with even more caution than MV.

   Note: Each of the UNIX utilities accepts wildcards, and work just as well on single or multiple directory listings.

   Additional Note: The MV utility does not always behave as expected, particularly when using wildcards. There may also be some difference in behavior in MV's usage on Rainbow 100A and 100B models.

VDIR.xxx--Version(s) Unknown. THIS NOTE IS INDENDED AS A WARNING: According to the San Francisco HELPLINE, run by Guy Stefano Romano, there is a program in the public domain called 'VDIR,' which apparently contains a 'worm.' During the check out of VDIR, the 'worm' intentionally seeks out the hard drive, where it installs itself for hibernation. And, after waking from its sleep, the 'worm' sets out to destory files at a not so leisurely pace.

VDIR, therefore, should be avoided at all costs.

WHEREII.ARC--Version 1.3(??). A newer, supposedly faster version of WHEREIS.COM. It is a little different, but I'm not sure it's any faster. But, with more than 600 files on this user's hard drive, it is very difficult to tell.

The SYS-STUFF Diskette

The following is a breakdown of what is contained on this diskette. Included are verbose listings of the various .ARC files and comments on the sub-files themselves.

Executable images---files with a .EXE or .COM extension---will run on the Rainbow under MS-DOS, version 2.11. The .ARC files were produced using the ARC utility, version 4.10, which is contained on the UTILS-1 diskette.

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BOOT.ARC--Version 2.4. These files are a MUST for the Rainbow 100A, or for users with a hard disk which has CP/M and MS-DOS partitions. AUTO, running TOE, allows 100A CP/M users to boot directly to the hard drive. (AUTO, by itself, can be used as a CP/M AUTOEXEC.BAT file. See "Simplify Your Life with 'Autoload,'" by J. Vanderwilt, pp. 7--9, in the +PLUS+ section of The DEC Professional, April, 1985.) The BOOT executables, BOOT.CMD and BOOT.EXE, allow users to boot back and forth between CP/M and MS-DOS partitions, without having to resort to the earlier 'Set-Up/Control/Set-Up', and reboot sequences.

   The documentation, particularly when supplemented with the aforementioned article, is more than adequate.

   NOTE: Caution will have to be be exercised when using these programs with the ENVBOOT package described below. The filenames in one package, or the other, will have to be renamed. For a variety of reasons, this user found it easier to rename these BOOT commands (i.e., BOOTDOS.CMD and BOOTCPM.EXE).

ENVBOOT.ARC--Version Unknown. A MUST installation for users with complex MS-DOS systems. This BOOT package changes the allowable MS-DOS environment space from a paltry 128 bytes to a much more acceptable 32,000 bytes.

   The documentation is more than adequate. Users are cautioned, however, that the AUTOEXEC.BAT and CONFIG.SYS files contained herein should be used as examples only. As such, ENVBOOT.ARC should NOT be un-ARC-ed in the user's BOOT directory: ENVBOOT.ARC should be un-ARC-ed in an unused directory; the CONFIG.SYS, ENV and AUTOEXEC.BAT can then be edited, and copied (in that order), to the user's BOOT directory.

LOGIT110.ARC--Version 1.10. A set of programs, for management and tax purposes, to keep track of your Rainbow's usage. Equally adept with single or multi-users, LOGIT records virtually ALL keyboard entries which were made at the system level. Easy to use; documentation more than adequate.

SYSLOG.ARC--Version Unknown. Another management/tax purpose, Rainbow usage program. SYSLOG may work quite well on the Rainbow, but, as of this writing, this user has not tried it.

SYS2SYS.ARC--The following is an individualized breakdown of the files contained in SYS2SYS.ARC. Included are verbose listings of the sub- .ARC files, as well as comments on the individual files, themselves.

AME86.ARC--Version 0.7-1. AME86.EXE allows level-1 CP/M files to be run under MS-DOS. It's supposed to work great on things like M-BASIC programs, compiled CP/M FORTRAN-77 programs, and less complex CP/M commands like HELP, but it does NOT, as of yet, work on programs that depend heavily on the internal structure of CP/M (i.e., communications programs, such as Poly-XFR and -HST, debuggers, such as DDT86, device maintence programs, such as STAT, MAINT, or FORMAT, or file intensive programs, such as MULTIPLAN-86.)

> The documentation, at first glance, appears to be sub-standard. It was, however, written by Jean-Marc Lugrin, who was trying to write in, what is to him, a foreign language. Deficiencies in the documentation, therefore, must be attributed to Jean-Marc's Swiss/ French background, and not to the performance of his program.
>
> EXCON.ASM, a CP/M86, assembly language source code for EXtended CONsole users, and AMEND.ASM, a CP/M86, assembly language end-of-file code, have been included for Do-It-Yourselfers.

AMEBAT.ARC--Version Unknown. AMEBAT allows the user to create CP/M86 'batch' files that will run under MS-DOS. As its documentation suggests, however, AMEBAT can create ``...all kinds of little .COM files...'' which run under MS-DOS programs, ``...and pass (all kinds of) fixed command lines.'' Potentially very powerful, AMEBAT should be great with AME86 (see above); it should be equally as great, however, with DOSFLX.CMD (see below).

DOSFLX.ARC--Version 1.00.15. DOSFLX allows users to run MS-DOS programs under CP/M. Written by the Digital Equipment Rainbow Engineering Group (see "Ways and Means," by A. J. Novachy, pp. 10--16, in the +PLUS+ Section of The DEC Professional, June, 1985), DOSFLX is an extremely powerful CP/M program that provides built-in documentation, and built-in help.

> Note: Using this version of DOSFLX to copy files from MS-DOS to CP/M leaves a binary trailer at the end of standard text files. Sometimes the trailer can be edited out; sometimes it cannot, causing a system crash. Copying from CP/M to MS-DOS, however, does not leave such a statement; text files and executables, going this way, seem to work just fine.

The MISCelaneous EDitorS Diskette

The following is a breakdown of what is contained on this diskette. Included are verbose listings of the various .ARC files and comments on the sub-files themselves.

Executable images---files with a .EXE or .COM extension---will run on the Rainbow under MS-DOS, version 2.11. The .ARC files were produced using the ARC utility, version 4.10, which is contained on the UTILS-1 diskette.

Comments are those of the originator of this diskette and do not necessarily reflect the comments, or opinions, of DECUS.

DED.ARC--Version 1.05. Written by Dan Pleasant, DED (Dan's EDitor) is a very fast, Rainbow specific editor with some very nice, easy to learn features. For a better description, however, read the .DOC files and see ``The Software Solution,'' by H. G. Lord, in the +Plus+ Section of The DEC Professional, June, 1985.

FEDIT.ARC--Version 2.0

FPRINT.ARC--Version 2.0

FONTS.ARC--Version(s) Unknown.--The above set of .ARC files is a complete set of programs for the MS-DOS equivalent of 'Fancy Font.' Based originally on A. Christopher Hall's CP/M 'MAKFNT' and 'FPRINT' programs, the executables and most of the .FNT files were written by J. Anthony Movshon.

> FEDIT is a special-purpose editor for creating and editing a desired set of font files. FPRINT uses these fonts to format text output for LA50 and LA100 printers in the graphics mode. (Note: FPRINT also supports LA34 printers.)
>
> The documentation appears to be quite good but, as of this writing (and because the requirement went away), FEDIT and FPRINT have yet to work on this writer's system.

SEDT.ARC--Version 1.1(18). SEDT is a multi-purpose editor for the Rainbow. It is a Screen oriented EDiTor which can be set-up to look like either EDT or WPS. If you are used to the keypad features of EDT, this editor is a MUST....

> NOTE: This writer recommends that you install the BOOT (also called ENVBOOT) package---see the MS-DOS, SYS-STUFF diskette---to use SEDT on a hard disk. SEDT requires additional SET parameters which can easily exceed the allowable MS-DOS environment space.
>
> ADDITIONAL NOTE: This writer has also found it useful to use the .TXT files in his EDT version of SEDT in place of the .EDT files. They have, therefore, been included in this particular .ARC file. (The Gold-Command selection, for example, allows the use of the Rainbow's EXIT key (F10) to exit, and save, the file being edited.)

The MISCelaneous CP/M Diskette

The following is a breakdown of what is contained on this diskette.
Included are verbose listings of the various .ARC files and comments on
the sub-files themselves.

Executable images---files with a .CMD or .COM extension---will, for the
most part, run on the Rainbow under CP/M-86, version 2.0. Users are
cautioned, however, that some of the programs have NOT been tested by
this author, due to the limited size of his CP/M system. (Files not
tested have been noted below.)

The .ARC files were produced using the MS-DOS ARC utility, version 4.10
(available on the MS-DOS, UTILS-1 diskette). Files can be un-ARC-ed
using this same utility and moved to CP/M using the DOSFLX utility
(available on the MS-DOS, SYS-STUFF diskette). Owing to their
complexity, these files will probably not run under AME-86, but, as of 12
Aug 85, this has not been tested.

Comments are those of the originator of this diskette and do not
necessarily reflect the comments, or opinions, of DECUS.

AUTO-C.ARC--Version Unknown. AUTO, written in C.... May be as good, or
better, than AUTO.CMD (see BOOT.ARC, the SYS-STUF Diskette). As of this
writing, however, AUTO-C has not been tested.

BARGRAPH.ARC. Version Unknown. Generate a BARGRAPH, on the screen, or
on your printer---from a file, or from the keyboard. (Not yet fully
tested.)

BJACK.ARC--Version Unknown. Blackjack (i.e., the '21' card game) for
CP/M. Probably a great game, but size limitations prevented BJACK.CMD
from running on this user's system.

DU.ARC--Version 7.5. A very powerful CP/M Disk Utility.... Probably
excellent, but as of this writing, DU's full power has not been fully
explored.

MODEM.ARC--Version Unknown. A CP/M-86 translation of Ward Christensen's
famous transfer program. Like the preceeding programs, however, this is
another which has not been tested.

PICTS.ARC--Version(s) Unknown. LA50 portraits from various places we've
come to know and love: BC, POGO and TWEETY are from their respective
Comic Strips; GROUCHO, of course, is Groucho Marx; SALTGIRL, of course,
is the Morton Salt-Girl; and PARADOX I'm still trying to figure out....

SD.ARC--Version 4.3. A "Super Directory" program, particularly useful
with files under more than one or two users.

SOURCES.ARC--Version(s) Unknown. The EX02 files are graphics test,
source files from DEC Engineering. REBOOT was written by Stan Wileman,
as a first step in solving the 100A hard disk upgrade, semi-autoboot
difficulties--- see ''Strangers in Paradise,'' by T. A. Brantigan, pp.
8--9 in the +PLUS+ section of "The DEC Professional," February, 1985.

SQUEEZE.ARC--Version(s) 1.5. Early versions of Dick Greenlaw's SQueezer
and UnSQueezer---the DOCs are dated 08/29/81. A file which should have
been included, FLS.COM, was not available.

SWEEP.ARC--Version 3.8. Everyone's favorite, CP/M file transfer utility.

TY.ARC--Version 1.7. A file typing utility which displays the output one
screen at a time. Rename the file 'TY', put it in USER 0, give it system
attributes, and use it all over the place. Works great....

The COMMunicationS Diskette

The following is a breakdown of what is contained on this diskette.
Included are verbose listings of the various .ARC files and comments on
the sub-files themselves.

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Rainbow under MS-DOS, version 2.11. The .ARC files were produced using
the ARC utility, version 4.10, which is contained on the UTILS-1
diskette.

Comments are those of the originator of this diskette and do not
necessarily reflect the comments, or opinions, of DECUS.

AC.ARC--Version Unknown. An Area Code finder program written by Marty
Smith, AC can be used in several different formats: Enter AC xxx, where
xxx is the Area Code or three letter state name; enter AC and the
two-letter state postal abbreviation (i.e., TX for Texas, CA for
California, etc.); enter the one or two-word state name (i.e., AC
California, AC NewJersey, etc); or enter AC for the full list of Area
codes, state names, and state name abbreviations.

DAC.ARC--Version 1.5. A Dialer, Address book and Calander utility with
features similar to those of ALL-IN-ONE, DAC is a menu-driven program
that was written by Jeffrey Miller. Deceptively easy to use, the heart
DAC is an integrated database which is created the first time the program
is run. The database, which consists of the four files MASTER.DAT,
MASTER.IXC, MASTER.IXN and MASTER.IXD, allow DAC to be used as an
excellent vehicle for communicating person-to-person.

DECMINI.ARC--Version 3.2. Also known as 'MINITEL,' DECMINI is Tom
Jenning's miniature version of 'TELINK' for the Rainbow. The .DOCs are
great, and the .EXE is probably great, but, as of this writing, the full
power of DECMINI has yet to be explored by this user.

    Note: According to Guy Stafano Romano of the San Francisco
    'HELPLINE,' one of the earlier versions of DECMINI (Version
    3.0(??)) contained a substantial number of bugs. In what
    little testing of DECMINI this writer has done, whatever bugs
    were there are gone from Version 3.2.

DIALER.ARC--Version of 2 August 1985. A brand new version of Doug Brantley's Rainbow Dialer program, RBDIALER is an extremely useful program. 'Help' is built-in with the automatic inclusion of DIAL.HLP (the .HLP and the .COM files MUST be in the same directory), but the creation of a default phone number list has been left to the user's discretion.

    On startup, RBDIALER looks for a default file named 'DIAL.NBR'. If the default file is not found, the user is asked if he/she wants to create it. With a 'no' response, the user is then asked for an alternative filename. A carriage return <CR> brings you to the main menu.

    Helpful Hints: If you are a general purpose FIDO Board user, rename FIDO.NBR, DIAL.NBR. (FIDO.NBR, which was part of the package originally obtained by this writer, is a sequential list of the FIDO boards, BBDs 1-40.) If you are a Rainbow specific FIDO Board user, rename RBFIDO.NBR to DIAL.NBR. (RBFIDO.NBR is the RBDIALER equivalent of Rob Elliot's most recent Rainbow 100 Bulletin Board listing (see below). If you want to do mixing and matching, print the two .LIS files and create phone lists to your heart's content. (FIDO.LIS is Tom Jenning's 9 August version of all FIDO boards, world-wide; RBFIDO.LIS is Rob Elliot's most recent list, in its original format.)

    Additional Note: The only obvious disadvantage to DIALER is that, after exiting, the screen is left in the BOLD text mode. Use RESETRB or SCREENRB (both of which are available on the UTILS-2 Diskette) to reset the screen to its normal, default setting.

LCTERM.ARC--Version 3.30. The latest version of Larry Campbell's, excellent terminal emulation program. Unique among the public-domain terminal emulators, LCTERM supports both KERMIT and XMODEM file transfer protocols, it supports manual and automatic Script File processing, and it supports, beginning with Version 3.28, the VT2xx series special function keys.

    Note: Function key binding files created with earlier versions of LCTERM are no longer compatible with Versions 3.28 or 3.30.

LOGIN.ARC--Version Unknown. Written by Jay Jervey, LOGIN is a 'MUST' for communicating with your Rainbow remotely. LOGIN provides protection for your Rainbow by: 1) requiring a password before exiting to MS-DOS; 2) not echoing your password; and 3) using direct console I/O so Ctrl/C will not break out to MS-DOS.

    For a more complete description, read the introductory statements in LOGIN.ASM.

MSKERMIT.ARC--Version 2.26. KERMIT for MS-DOS.... Between the .DOC and .UPD files, this is one program which has been thoroughly documented. Run MSKERMIT.INI to initialize KERMIT for your Rainbow.

PHONE.ARC--Version 1.0. PHONE is a very handy, Phone Book Search program which searches a user-defined phone book for input entry strings. The default phone book, normally named 'PHONE.TXT,' can be created with any standard text editor, and there are absolutely no restrictions as to the format of PHONE.TXT. PHONE supports the use of wildcards and, because it makes use of the 'Soundex Algorithm,' PHONE will find matches even if you (slightly) misspell your entry.

    Note: Handy though it may be, PHONE is a text string finder, only; PHONE does not contain, nor was it intended to contain, any part of an auto-dialer program.

The GAMES-1 Diskette

The following is a breakdown of what is contained on this diskette. Included are verbose listings of the various .ARC files and comments on the sub-files themselves.

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ALIENS.ARC--Version Unknown. As of this writing, this version of ALIENS does not run on the Rainbow. It does, however, run under ATT's version of MS-DOS (UNIX systems), and it will (more than likely) run on PCs and clones. ALIENS is made available here for you handy ''fix-it-yourselfers.''

CHESS.ARC--Version 1.26. Chess for the Rainbow.... Levels of difficulty ('depth of search'), are selected at the beginning. Alternatively, the player can select a position to be analyzed.

EMPIRE.ARC--Version 5.0. A war-game between two emperors (you and the computer), EMPIRE is a complex computer game that will take some time to learn. According to the documentation, EMPIRE does require graphics; displays, however, may be selected as being either enhanced, or normal. Much like HACK (available on the MS-DOS, GAMES-2 diskette), EMPIRE is a game you can really sink your teeth into.

    One disadvantage of EMPIRE is that, by computer standards, it takes a long time to load. If it is unable to find, or make use of, the file EMSAVE.DAT (a file containing the previous game information), EMPIRE creates a new version of EMSAVE. Since this takes about five (5) minutes in virtual memory, it will take somewhat longer on a hard drive, and a whole lot longer using floppies.

KALAH.ARC--Version 1.4. An excellent peg moving game, requiring time,
logic and fore-sight. Levels of difficulty, and the number of pegs per
section, are selected variables from the outset. Help is available by
typing 'HELP' while playing.

MONOPOLY.ARC--Version Unknown. As of this writing, this version of
MONOPOLY does not run on the Rainbow. It does, however, run under ATT's
version of MS-DOS (UNIX systems), and it will (more than likely) run on
PCs and clones. Like ALIENS (above), MONOPOLY is also being made
available for you handy ''fix-it-yourselfers.''

PACMAN.ARC--Version Unknown. PACMAN for the Rainbow.... What's to
say?!?

QIX.ARC--K. Porter's MS-DOS Version of 03/20/85. QIX is an excellent
little game which should only be played for fun. An area filling game,
QIX is very fast, and to the point. The highest attainable score is, as
yet, unknown --QIX generates its own 'TOP TWENTY' score PAD---but, with
luck, players can score over 2,000. Highly recommended....

ROCKET.ARC--Version Unknown. A 'Lunar Lander' game requiring nothing in
the way of graphics. It is, however, quite fast, and it will require
some thought for the novice to beat....

> NOTE: This version of ROCKET does not work quite right, in
> that there is apparently some sort of data file that the
> program is supposed to access. A "File not found in line 425"
> error message gets printed at the end of each game. Other than
> that, however, ROCKET works just fine....

SCRAM.ARC--Copyright 1984--DEC. SCRAM is a player vs. time game which
does require graphics---it is especially good with color graphics. The
object is to SCRAM (shut down) the lunar nuclear reactor before the
reactor melts down.

> Maneuvering their way from the surface of the moon to the
> depths of the reactor, players are required to keep the reactor
> filled with water and keep their fuel tanks full of fuel.
> Scores are determined by the amount of time to complete the
> task.

> Difficulty levels, ranging from 1--3, are a variable from the
> start. Although SCRAM is somewhat slow---giving the player the
> impression of being on the moon---its speed will be improved by
> playing on a hard drive, and even more improved by playing in
> virtual memory (M-Drive).

The GAMES-2 Diskette

The following is a breakdown of what is contained on this diskette.
Included are verbose listings of the various .ARC files and comments on
the sub-files themselves.

Executable images---files with a .EXE or .COM extension---will run on the
Rainbow under MS-DOS, version 2.11. The .ARC files were produced using
the ARC utility, version 4.10, which is contained on the UTILS-1
diskette.

Comments are those of the originator of this diskette and do not
necessarily reflect the comments, or opinions, of DECUS.

HACK.ARC--Version 1.0.1E.

LEVELS.ARC--HACK is a marvelous 'Dungeons and Dragons' game that draws
diagrams of where you've been and, in some cases, where you're going.
The game requires a minimum of 256k of memory and can be somewhat
difficult to set-up. (The LEVELS.ARC file, for example, can (should??,
must??) be set-up as a sub-directory of HACK.) Once HACK is set-up
properly, however, it's a great way to while away the hours.

TTT.ARC--Version Unknown. A three-dimensional, 4x4x4 Tic-Tac-Toe game
for the Rainbow. Good, and very fast....

The Generation of General
Curves on a DEC Rainbow.

by

Mike Brannigan

Personal Software

15 Normandy Court

Atlanta,GA 30324

15

Introduction   Several methods exist for the computer representation of curves, such representations being of fundamental importance in computer graphics and especially computer aided design and manufacture.

One such method considers the curve to be set in the traditional Cartesian Plane, the representation of the curve being via parametric functions of a variable t for each of the x, y variables. The drawing of the curve uses these functions to produce sufficient (x,y) pairs to present the curve to the graphics device. Examples of such an approach are Bezier curves [4,5], parametric B-splines [6], and Beta-splines [2,3]. These methods are all forms of piecewise polynomials using different criteria to fit the pieces together to form a curve in the Cartesian plane. With such a philosophy two circles drawn in different parts of the plane have different equations and are, therefore, different curves. A computer graphics system should see curves as graphics primitives, the positioning of these primitives being achieved by the usual transformations of translation, rotation and scaling.

A second group of methods does treat curves as graphics primitives, these being representations by a functional relationship between the curvature at any point on the curve and the arc-length, see [7,8,9,10]. To obtain the curve on the graphics device some form of double integration is needed, hence the restriction of such representation to linear curvature profiles.

The approach that we propose is intermediary between these two groups of methods. We suggest that a natural way to represent a curve is to relate the direction the tangent at a point on the curve is pointing as the point progresses along the curve. With this relationship the curve is simple to generate and is computationally efficient. By using an appropriate spline representation the strain

16

energy of the curve can be minimized.

Angular Profiles   Let s be the arc-length of a curve measured from an initial point P_0. At any point on the curve we can define a tangent vector $\underline{u}$, a normal vector $\underline{v}$, the curvature k at the point and the angle θ which the tangent makes with a given line. We then have the Serret-Frenet equations of a two-dimensional curve namely

$$\frac{d\underline{u}}{ds} = k\underline{v},$$

$$\underline{u} = (\cos\theta, \sin\theta),$$

$$k\underline{v} = (-\sin\theta \frac{d\theta}{ds}, \cos\theta \frac{d\theta}{ds})$$

and

$$k = \frac{d\theta}{ds}.$$

The relationship between these variables and Cartesian coordinates (x,y) are given by

$$\underline{u} = (\frac{dx}{ds}, \frac{dy}{ds}),$$

$$d\theta = \arctan(\frac{dy}{dx}),$$

and

$$(ds)^2 = (dx)^2 + (dy)^2.$$

With these equations in mind we consider the representation of two dimensional curves by $\theta(s)$ a linear continuous function of s. The properties of such a relationship between θ and s conform to the requirements of computer graphics in that each curve can be thought of as a graphics primitive the position and orientation of the curve not being an intrinsic property of the function.

Other useful properties of such a representation lie in the ease with which graphics transformations can be performed. The positioning of the curve is fixed by the initial point P_0 and initial angle $\theta(0)$. Translation is performed by changing the point P_0 while rotation about P_0 is effected by the addition of a constant to $\theta(s)$. Due to the linearity of $\theta(s)$ then scaling the curve by a factor β only needs the coefficients of $\theta(s)$ to be multiplied by β. From this scaling property storage of the curve need only be as a function of s where $s \in [0,1]$. Further normalization of the curve can be obtained by requiring $\theta(0) = 0$. With such a normalized curve every instance of the curve is completely defined by three values namely, P_0, $\theta(0)$ and a scaling factor β, with the curve stored only once. An added property, which is useful in computer aided design, is continuity of curvature when $\theta(s)$ is at least C_1.

The form of $\theta(s)$ is suggested by engineering considerations. The strain energy of an elastic beam of length L is a linear function of the integral

$$\int_0^L k^2 \, ds.$$

In equilibrium this functional is minimal a pleasing structural property. To effect such a minimal energy let $0 = s_0 \leq s_1 \leq \ldots \leq s_n = L$ be a knot sequence of the variable s and $\psi(s)$ a function of s such that

$$\theta(s) = \frac{d\psi}{ds}.$$

From this knot sequence and appropriate additional knots let $\psi(s)$ be a cubic spline namely

$$\psi(s) = \sum_{i+1}^{n+3} \alpha_i N_{4i}(s),$$

where N_{4i} are normalized cubic B-splines. With end point conditions that second derivatives are zero we obtain $\psi(s)$ as a natural cubic spline. We also have that

$$\frac{d^2\psi}{ds^2} = k.$$

Hence from the minimal property of natural splines we obtain the minimal of

$$\int_0^L k^2 ds.$$

In our suggested representation we assume that at each knot s_i, $i = 0, 1, \ldots, n$ we have the angle θ_i. How these angles are found is outside the scope of this presentation but suggestions on methods are to be found in [1]. From the known derivative of a cubic spline and the scaling property of $\theta(s)$ we arrive at the final form for our curve, namely

$$\theta(s) = \sum_{i=1}^{n+2} \left(\frac{\alpha_{i+1} - \alpha_i}{s_i - s_{i-3}}\right) N_{3i}(s),$$

with N_{3i} the normalized quadratic splines. Here the $n + 3$ coefficients α_i, $i = 1, \ldots, n + 3$, are found from the angles θ_j, $j = 0, 1, \ldots, n$ and the end conditions that the curvature is zero.

Control of the curve can be effected by changing individual θ_j values. As these angular values are on the right hand side of a system of linear equations new coefficients for the changed curve can be computed on most systems in real time until the designer is satisfied.

Conclusions   The representation of two dimensional curves by an angle θ as a quadratic spline of the arc-length s has been shown to have several positive qualities for use in computer graphics. Curves so represented are true graphics primitives and

the compactness with which the curve can be stored in the machine enhances the space complexity of a picture with many instances of such primitives. Translation, rotation and scaling are simply effected and continuity of curvature is guaranteed. For the computer aided designer curves having minimal energy result and the real time interaction of the design procedure gives the designer a practical alternative to present extant methods.

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PUTTING THE READER BACK IN MANUALS:
COMPUTER MANUALS AND THE
PROBLEMS OF READABILITY

by
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ABSTRACT

A common myth about aircraft is that the plane is ready to fly
when the weight of the paper equals the weight of the aircraft.
The paperwork, unfortunately, includes manuals and other
documents. As experience has unfortunately shown, manuals confirm
another generalization: When all else fails, read the manual. The
novice, as well as the experienced user, turns to manuals to
answer questions and solve problems. Various 800 numbers help,
but, in the dark of the night, only the manual is there. This
paper examines manuals from the reader's perspective, beginning
with a review of how humans process information. It then analyzes
ten sample texts using nine readability formulas, and text
analysis programs. While demonstrating the inherent weaknesses of
readability formulas and text analysis results, the study does
pinpoint some troublesome areas in current PC manuals.

PUTTING THE READER BACK IN MANUALS:
COMPUTER MANUALS AND THE
PROBLEMS OF READABILITY

by

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Psychologists tell us that we mortals have an inordinate fear of many things. High on the list are death, taxes, and public speaking. With the recent, unfortunate series of air accidents, the plane crash is climbing fast. What the list makers overlook is something that strikes terror in the heart of computer users--young and old, neophyte and pro, PC or VAX user. I'm speaking, of course, of the technical manual, that harbinger of things unlightening.

Picture the poor user desperately trying to find out what happened to 35% of a file that disappeared when he searched forward (an event that recently happened to me). Calls to the 800 number didn't work. Reviewing the manual led to more confusion, and I still have no idea how GOTO in Select-86 can wipe out so much text.

My point is not to swap horror stories related to poor documentation. Rather, my purpose is to present some recent findings about the design of technical manuals--putting the reader back in the manual. I want to limit my remarks to the PC manuals first, because they are the manuals I'm familiar with, and second, because of time. What I have to say, however, can apply to other manuals.

I want to divide my talk into two main sections:
1. Reader Considerations
2. Access to the Text

READER CONSIDERATIONS

Students do not realize that someone must read the material they write. In school, Miss Grundy and Professor Flunkemoften were paid to read their essays, tests, and lab reports. Their families were glad to read letters (usually notes pleading for more money) from the young scholars. But once they leave school, they enter a much different world. Teachers read to verify that the student understands the material; employers and supervisors read because they need the information the document contains. We frequently hear that the key to success in any organization is the ability to communicate. What that means is that those who get promoted realize someone has to read their materials and write accordingly.

The same is true with PC manuals. I brought my Rainbow 100+ home in several boxes, as we all do, but one box was full of manuals and programs. As I write this, I count 24 manuals--an awesome sight for my wife who wants to learn to use this "new toy," as she calls it.

When we look at a page from a manual (Figure 1), what do we see? What happens when we read this page looking for information?

Insert Figure 1 Here

Technical manuals for computer users are not text in the same sense that a novel or newspaper story is text. Readers of manuals are interested in random access of information; not reading from beginning to end. They read these manuals differently than they might other forms of nonfiction prose. Many computer companies (Digital included) recognize this situation and normally prepare two documents or two sections in one document. One section is to be read through completely by the user (the "Getting Started" section); the other is for random access (the "Reference Manual" or "User's Guide"). For a better understand why writers must keep their readers in mind, let me turn to how we read--how we process the information from the printed page.

Information Processing

If we can assume that communication changes uncertainty, we can become better communicators if we know how that change occurs, how a reader processes the text that leads to a response. Figure 2 shows the stages through which the material passes during processing.

Insert Figure 2 Here

Sensory Store

A stimulus enters the reader's mental system through the eye. It is temporarily stored before moving to the next stage. The processing at this stage involves page layout and design, typography, foregrounding, and line (see Appendix A for a list of design variables). Consider how easily the eye can pick up the stimulus from these pages(Figures 3,4, and 5). Are these easy or hard to decipher?

Insert Figures 3, 4, and 5 Here

When we process a page of text, the signal moves through the visual sense (sight) and pauses slightly before moving along for further processing. At this temporary storage point, many of the signal's characteristics influence the encoding of that signal so

that it can pass to the next stage. A rapid analysis of the signal evaluates the line, angle, and brightness of the image; its position on the page; the amount of material in the foreground and background; and color. In addition, the analysis includes the layout of the text on the page. For example, spacing becomes critical when looking for specific pieces of information (the random access of information). That spacing is of two types: vertical and horizontal. (Material in the following sections adapted from Hartley.)

Vertical Spacing: Space separates one line on the page from another. Titles, headings, subheadings, paragraphs, and the like all have space between them and the next element. This amount of space between lines in the text constitutes 1 unit of space. Adding extra units of space between heading elements isolates them and insures that the eye quickly picks up and separates headings from text. Coupled with the type style (roman, italic, bold), space makes the random access of information easier, reducing the amount of text that the reader must search to find specific information.

Another element in vertical spacing is the end of the body's text at the bottom of the page. Traditional layout has a fixed number of lines per page. When pasteup artists reach that number, they begin a new page. Dividing the text based on number of lines often interrupts the syntactic unit--the group of words in the sentence that carries meaning. If the sentence that carries over to the top of the next page is complicated, the reader is likely to turn back and forth between the two pages trying to understand it. Having a flexible line count insures that the reader will carry a full syntactic unit over to the next page.

Finally, breaking a paragraph at the bottom of the page after one or two lines may also interrupt the syntactic flow. Paragraphs should not begin on the last line of a page nor end in the first line of the next page.

With these thoughts in mind, let's look at the sample pages (Figures 6 and 7).

Insert Figures 6 and 7 Here

Note in Figure 6 how the headings and subheadings are set apart from the text. Figure 7 shows good use of vertical space, but runs the listing to the page bottom and on to the next page. Had the text ended before Step 4, Steps 4-8 could occur on one page with "Copying a Format Line" starting a new page. Steps 4-8 also constitute a sub-block of commands, separated from 1-3 by the "Note."

Horizontal Spacing: Normally, type is set with equal spacing between the words and unequal spacing between the letters.

The designer wants to provide a uniform line, justified at the right-hand margin. The appearance, however, is of a massive black block of text. Consider the effect the sample from the Text3 (Figure 8) has on one looking for help in moving a block of text.

Insert Figure 8 Here

Notice how Figure 8 has the right-hand margin justified while Figure 9 shows an unjustified right-hand margin.

Insert Figure 9 Here

The psychological impact of such an arrangement encourages feelings of progress. Shorter lines mean that you can read more of the page in a shorter time than with justified format. It also means less text per page, so that you have less to scan in looking for the information you need.

In addition, unjustified right-hand margins eliminate the need to hyphenate a word at the end of the line. Hyphenation forces the reader to hold a part of the word in memory until picking up the rest of it on the next line (Figure 10).

Insert Figure 10 Here

If the reader accidentally skips a line, the rest of the word becomes a full word and not the end of a hyphenated one.

Another element in horizontal spacing is that with unjustified right margins, you are not obliged to start a sentence at the end of a line, breaking a syntactic unit when the space runs out (see Figure 11).

Insert Figure 11 Here

The designer determines line length by the syntactic units, so that the reader can process the units as units and not as fragments.

Filter

The stimulus is now filtered by both psychological and physical means. Preconceptions can be called from long-term memory and affect the stimulus as surely as the physical factors (poor eyesight, for example). Some people have preconceived notions about computers and manuals so that their response to the signal will vary from that of another person who holds another view.

Pattern Recognition

The stimulus now enters pattern recognition. Because communication transfers information and that transfer involves meaning, the mind extracts that meaning from the word, sentence, and organization.

Word (Semantic): When we communicate, each word conveys a dual meaning: that meaning found in any dictionary and that meaning associated with the word. <u>Rat</u>, for example, has dictionary and associative meanings. We may use technical terms our reader does not know. For our reader to understand what we mean, we much choose words that also occur in the reader's vocabulary or define them if they are vital to our meaning.

Sentence (Syntactic): Pattern recognition also extends to recognizing sentence patterns. The predominate sentence pattern in English is the group of words with a subject, a verb, and, often, an object or complement. Any of the elements may be multiple, but each subject slot contains subjects, verb slot verbs, and object/complement slot objects/complements. Our minds are attuned to that pattern and can almost understand a sentence regardless of the words used if it follows that pattern. For example, Lewis Carroll's "Jabberwocky" opens

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe;
All mimsy were the borogoves,
And the mome raths outgrabe (Carroll)

and it <u>almost</u> sounds right. Consider this example in prose:

The concept of the unit includes a new structure. The nature of this function supports the use of basic inputs. This concept also supports other factors via a system approach. The system status, not the structure status, requires that aspect. In terms of size, the effort is small. But in terms of function, it provides the support required. To address these goals involves using all the system's support function. Among the factors, of course, are unit input functions. The support, which uses a system approach, affects these goals. These too require new concepts. We shall reach these goals. (Cohen)

It likewise <u>almost</u> sounds right. The mind recognizes the pattern and tries to gains meaning from those patterns. As a further demonstration of this point, we know that "John hit Bill" differs in meaning from "Bill hit John.' We know that because of the position of the words in the sentence (its syntax). The reader <u>expects</u> sentences to fall into commonly recognized patterns. One study shows that professional writers of all sorts of prose use a

very high percentage (98.5%) of basic sentences or that basic sentence with a short opener (Christensen). Basic does not mean primer sentences ("See Dick run).

Organization: Meaning also comes through patterns of organization. Suppose you wanted to list ten keystrokes that a user needs to move text around in a document. You could prepare a numbered list with the lower numbered steps being more important than the higher numbered steps, or sequentially proceeding to the higher numbered statements. You could, instead of using numbers, use letters (A, B, C, and D). But what if you used none of these? That you listed one step before another tells the reader that that step was prior to the next one. But what if, in putting the keystrokes together, they get somewhat jumbled? The reader is left to impose an order that may or may not be correct.

Selection

The third stage is pattern selection. When we read a computer manual, we read it to find specific information. I need to know how to move text in my document. Because moving text is not a frequent occurrence for me, I don't remember all the commands to use. So, I consult the manual. My success or failure depends on how easily I can access the specific information. The semantic meanings may be there, but other factors may prevent my getting the information (such as layout and design and readability). With these points as background, leet me now turn to access of text.

ACCESS TO TEXT

Random access of information is made possible by such devices as titles, headings, subheadings, running heads, and numbering systems. Of these, the two most important are headings and subheadings and numbering systems.

Headings-Subheadings

Because readers of computer manuals do not read sequentially, retaining and sifting the information as needed, they must find the relevant sections. Indexes and tables of contents all help, but they only get the reader to the page, rarely indicating where on the page to find the information.

Once having located the page in the manual, the reader must find the particular section. If the writer uses headings, they should allow rapid access to the information. They should combine with typographical access structures (italic, bold, roman, size, caps, and lower case--see Appendix A) to prove distinctive enough for quick access. Positioning the element is also important. Is it in the margin? Embedded? Centered? Finally, the heading's

content should be helpful providing information rather than a
generic label (see Figures 12, 13, and 14).

Insert Figures 12, 13 and 14 Here

Figure 12 shows a page with no headings to break-out the
steps. Figures 13 and 14 show good use of headings, but, in the
case of Figure 14, a poor use of numbering and use of generic
headings ("Basic Concepts").
The second access device is a numbering system that indicates
the level of heading in combination with its position. Numbering
systems can be helpful when they do not get in the way (what if
you had to number headings/subheadings to five levels [I.A.1.a.(1)
or 1.1.1.1.1 or 11111]). Such systems can be confusing,
especially if you have cross references in the manual. A reader
looking for heading numbered 1023 on page 17-32 might have
problems. If page and section numbers were commonly written 12-34
as were the figure and table numbers, imagine the confusion in
trying to crossreference "See Figure 10-17 on page 10-12." Figure
15 demonstrates this point.

Insert Figure 15 Here

Understanding

If all other elements (layout and design, spacing, headings,
numbers) contribute to helping readers get into the text, all is
lost if they do not understand the material. Understanding is but
one of three measures of a reader's access to the information. At
one level, we have readability (applying various formulae to
passages to determine grade level), then understanding, and
finally comprehension (having the information become part of the
person's database and permitting that person to draw inferences).
Mechanically, at least, readability can be influenced by the
number of syllables and words per sentence. On a different
mechanical level, readability can be influenced by the number of
clauses (groups of words that have subjects and verbs) because
sentences with several clauses look and are hard to understand.
Understanding occurs when responses occur--the reader
understands when he or she can perform a task, solve a problem, or
agree with someone on a situation, among others (Lee). The
availability of the material to the final stage of processing in
forms that allow easy access is crucial to that understanding. The
various readability formulas are important because they give some
insight into the form the signal takes when it enters final
processing.
Now we can turn to some sample texts (listed in Appendix B)
and evaluate their availability to the reader.

ANALYSIS OF TEN TEXTS

The various samples I have conform, to some degree, to the
principles mentioned above. So, why all the fuss about unreadable
manuals? Certainly, they need better layout and design to improve
the random access of information. But, do they actually help the
reader understand what to do?
For simplicity, I analyzed the ten texts for readability and
style. What follows are the methods and discussion of that
analysis.

Methods

I selected one wordprocessing command to analyze: "Move a
Block of Text." I typed it into two text analysis programs, (1)
"Grammatik" and "Comment" on my 100+, and (2)"Readability
Calculations" on an IBM PC. "Grammatik" and "Comment" analyze such
factors as Content Index (a measure of the information in a
document--see Appendix C, number of "to be" verbs, number of
prepositions per sentence, percentage of transitions, use of "Th"
openers for sentences, vagueness, number of short and long
sentences, and number of problems identified based on a phrase
dictionary (Barker).
"Readability Calculations" analyzes the text for nine
readability formulas (see Appendix C): Dale Chall, Holmquist, ARI,
Flesch, Kincaid, Powers, Fry, Coleman, and the Gunning Fog Index
(Micro Power & Light Company).
Appendix C presents the results of analyzing nine computer
manual instructions for moving a block of text (four examples from
WordStar, four examples from other word processing programs, and
one new version of a word processing program), plus a control text
(not from a word processing program manual).

Discussion

We can note a number of unusual findings when examining the
data. First, few of the readability formulas can agree on the
level of the text. The levels of Text9 range from 2-3 (Fry and
ARI) to 9.5 (Dale Chall), suggesting that readability formulas may
be statistically valid when looking at multiple samples using one
formula, but that range widely when looking at one text with
several formulas. This view is supported by looking at the actual
readability scores (before converting to grade level). While
having a Fog Index of 7, Text9 has a Flesch Reading Ease score of
88 that is described as "easy" and for 5th grade readers of pulp
magazines (see Appendix C).

The "Grammatik" and "Comment analysis shows that the samples range widely in content (53-99 on a scale of 100). They also show that no text consistently falls in the acceptable range on the various elements for analysis (Table 1).

TABLE 1. Scores of Selected Items from "Comment"

ITEM	ACCEPTABLE LEVELS[a]	NUMBER SAMPLES ACCEPTABLE
"To Be's"	Under 30%	1 (Text8)
Prepositions	2 per Sentence	4 (Text1,4,5,8)
Transitions	Above 20%	5 (Text1,3,5,7,8)
"Th" Openers	Under 9%	2 (Text6, 10)
Vagueness	Under 1%	6 (Text1,4,6,7,8,10)
Short Sentences	Under 30%	3 (Text4,5,8)
Long Sentences	Under 22%	All but 1 (Text8)

[a]Based on standards for Freshman Composition at Texas Tech University

CONCLUSION

The conclusion based on the data, it seems to me, is obvious. Text8 had more categories acceptable (5) than any other sample, yet it certainly is far from easy for the reader to follow. It has the highest Fog Reading and Dale Chall Grade Level (12) because of an average sentence length of 24 words (with the longest being 62 words), supporting the notion that it requires a higher level of formal education to comfortably read and understand.

A significant test, however, is just how easily the reader can access the information. Manual writers combining layout and design, typography, and statistical analyses can present for verification and validation manuals that will place the reader back into them. Ultimately, however, all the measures available are useless if the writer fails to remember that there is a reader in the act of reading who needs to access specific information to solve a problem.

REFERENCES CITED

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APPENDIX A
DESIGN VARIABLES

Typography
    Typefaces
    Type Size
    Emphasis (Underlining, Marginal Notations, etc.)
    Numerals

Paper
    Color
    Weight
    Reflectance
    Surface

Color (Contrast)

Spatial Arrangement of Text
    Page Size
    Number of Columns
    Separation Between Columns
    Length of Lines
    Leading
    Paragraph Indentation
    Vertical Spacing
    Margin Size (Inside, Outside, Top, Bottom)
    Margin Justification
    Hyphenation

Special Features [Includes Typography, Spatial Arrangement of Text]
    Titles
    Subheadings
    Tables
    Figures
    Abstracts
    Summary
    Table of Contents
    Bibliography
    Reference in Text
    Cover
    Spine Titles

Aesthetic Considerations
    Typeface
    Page Size
    Horizontal Spacing

Practical Considerations

Interaction of Variables
    Type Size, Line Length and Leading
    Margin Justification, Line Length and Hyphenation
    Margin Justification and Leading
    Typeface and Type Size
    Line Length and Typeface   34

APPENDIX B
MATERIALS ANALYZED

TEXT1   pfs:Write. User's Manual. Software Publishing
        Company, 1983, pp. 7-5 to 7-7.
TEXT2   Puotinen, C.J. The Last Word on WordStar. NY:
        Holt, Rinehart, and Winston, 1983, p. 156.
TEXT3   WordStar manual supplied with Epson QX-10 (Release 3.3),
        p. 6-4.
TEXT4   WordStar manual supplied with Kaypro (Release 3.3), 1983,
        pp. 4-8 to 4-9; and Rainbow 100, 1983, pp. 4-8 to 4-9.
TEXT5   Curtin, Dennic P. The WordStar Handbook (release
        3.3). Somerville, MA: Curtin and London, Inc., 1983, pp.
        88-89.
TEXT6   Samna Word II manual supplied with Rainbow 100, 1984, pp.
        68-69.
TEXT7   Select-86 manual supplied with Rainbow 100, 1983, pp.
        56-57.
TEXT8   MASS-11 Reference Manual, WS-200 Editor
        (Version 4-C), Hoffman Estates, IL: Microsystems Engineering
        Corporation, 1984, pp. 6-9 to 6-13.
TEXT9   Samna Word III manual supplied with Rainbow 100, 1984,
        pp. 3-17 to 3-19.
TEXT10 "Symposium Invoice Form Instructions," Fall DECUS
        U.S. Symposium, 1985, p. 10.

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APPENDIX C
COMMENTS ON
PROGRAMS

COMMENT

A Revision Aid Program for Writing Classes

DESCRIPTION

COMMENT is a computer-assisted revision aid designed to adapt Grammatik (tm Digital Marketing), a style and grammar analysis program, to writing classes. After students type in their papers on a word processor they correct the spelling and then run Grammatik. COMMENT then prompts students to enter data from Grammatik's statistical summary.

COMMENT automatically calculates percentages of surface-level elements, compares the percentages to standards pre-set by the instructor, and prints out advice in several modules (see below).

SET-UP, a companion program to COMMENT, allows the instructor to customize the standards against which COMMENT evaluates student writing.

COMMENT ADVICE MODULES

CONTENT INDEX

This module calculates the number of verbs, nouns, adjectives, and pronouns in a paper or report. The percentage of these "content" words over articles, conjunctions, and prepositions, "structure," words, gives the writer a gauge of the paper's informative value. The CONTENT INDEX is also adjusted for the number of weak "to be" verbs and the count of possible vague terms like "great" and "many."

TO BE'S

This module counts the number of weak "to be" verbs in a student's paper and compares the total to standards set by the instructor. The program uses GRAMMATIK's count of forms of "be" verbs and adjusts the figure down by 30 percentage points to account for repeated verbs in sentences and to achieve a more accurate reflection of the percent of "to be" verbs per total sentences.

PREPOSITIONS

The PREPOSITIONS module divides the number of sentences by the number of prepositions to calculate the number of prepositions per sentence. Acceptable numbers of prepositions per sentence are pre-set by the instructor. If students, say, use more than 2 prepositions per sentence, they are warned of possible dullness and wordiness and given examples as models for revision.

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Comments, cont.

CONTINUITY

The CONTINUITY module uses the count of transitional phrases and the total sentence count to calculate the percent of transitional phrases per sentence. Optimum percents of transitional phrases are set by the instructor. The program tests the calculations for "too few" and "too many" transitional phrases and advises the writer either to add phrases or to be alert to possible wordiness. The CONTINUITY module is only useful to writers with an understanding of the limits and uses of mechanical transitions.

TH OPENERS

The TH OPENERS module counts the number of occurrances of ". Th... ." phrases and calculates the percent of these openers to the total sentence count. The acceptable percentage is pre-set by the instructor. The default value of 8% is based on a study of 25 first-year papers written by Texas Tech English students. In the case of descriptive reports (i. e. descriptions of mechanisms in technical writing courses) the allowable percentage of TH OPENERS may be as high as 50%.

VAGUENESS

The VAGUENESS module uses the count of possible vague terms in GRAMMATIK'S User Category 7 that is provided by the Microlab with the program. The program calculates the percent of possible vague terms per total words and advises the student to revise if the count is above the instructor's pre-set standard. Percents for possible vague terms often fall around 2-5%.

SENTENCE VARIETY

The SENTENCE VARIETY module uses the count of short sentences (<14 words) sentences and the count of long sentences (>30 words). It attempts to give the writer some idea of the balance of long and short sentences. It advises the writer either to try sentence combining or sentence splitting techniques in the event of a disproportion. The proportions of long and short sentences are pre-set by the instructor.

"Readability Calculations"

```
*** GENERAL NOTES ***

This program uses nine different formulas to compute read-
ability. All formulas are not appropriate to all grade levels,
although they may all return scores. For example, it is not
possible to compute grade levels less than FOURTH GRADE with
the Dale Chall formula. It is up to the user to determine
which formula and which scores are most appropriate for
the text being analyzed.

There are more than fifty readability formulas in existence.
A good overview is found in George Klare's article 'ASSESSING
READABILITY' which appeared in READING RESEARCH QUARTERLY,
Volume 10:1 (1974-1975), pp62-102.

        PRESS [Q] to QUIT or [ENTER] to Continue
```

Comments, cont.

One of the most often asked questions regarding this program
is, °Why do scores vary so much?' The answer is complicated,
but one part of it is that most people who have used formulas
in the past have used only one. It is simply too time consum-
ing to compute more than one. Because of this, the wide vari-
ations in scores often was undetected. Formulas tend to give
a false sense of accuracy. By computing more than one form-
ula a valuable element of comparison is added. They do dis-
agree, and some have better °reputations' than others. The
notes on the following pages will give you an idea of the
intent and limitations of the formulas used in this program.
For a more complete discussion, see °A Readability formula
program for use on microcomputers' JOURNAL OF READING, 25:6,
March, 1982, pp560-591.

PRESS [Q] to QUIT or [ENTER] to Continue

*** COLEMAN ***

Coleman designed this formula specifically for machine scoring.
Rather than count syllables, this formula counts letters per
100 words. Letters can be counted by scanning devices such as
optical character recognition scanners or even barcode read-
ers. This would be especially helpful in measuring text which
has already been typeset. However, there is no reason why a
program such as this could not be incorporated into a word
processing system to measure all words prior to typesetting.

Coleman, Meri & T.L. Liau. °A Computer Readability Formula
Designed for Machine Scoring,' JOURNAL OF APPLIED PSYCHOLOGY,
Vol. 60 (1975), pp.283-284.

PRESS [Q] to QUIT or [ENTER] to Continue

Comments, cont.

*** DALE-CHALL ***

Probably the most highly regarded formula in current use, the
Dale-Chall formula uses an extensive list of 3000 words known
to 80% of a sample of fourth graders. This list is used in
conjunction with sentence length and other factors in an
equation which yields broad grade ranges. Rather than at-
tempting to pin grade level to a month, the Dale Chall scores
cover two grades at a time. The list of 3000 was developed
in the 1940s, is outdated, and difficult to apply manual-
ly, but the formula is well regarded by reading specialists.

See °A Formula for Predicting Readability,' EDUCATIONAL RE-
SEARCH QUARTERLY, Vol 27, 1-21-48 (p.11) & 2-17-48 (p.37.)

PRESS [Q] to QUIT or [ENTER] to Continue

FLESCH READING EASE

Rudolf Flesch published his first readability formula in 1943.
He was primarily interested in adult reading matter both in
terms of reading ease and human interest. He has a formula
for each. It is the °Reading Ease' formula which is calcu-
lated here. The formula uses data from the Dale List of 3000
words. The score obtained is an index score which is then
translated to grade level by this program.

Source for this formula is: °A New Readability Yardstick'
by Rudolf Flesch, °JOURNAL OF APPLIED PSYCHOLOGY', No. 34
December, 1950, pp.384-390.

PRESS [Q] to QUIT or [ENTER] to Continue

Comments, cont.

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]                                                                  ²
]               *** FLESCH-KINCAID ***                             ²
]                                                                  ²
]    Kincaid has modified the original Flesch formula for use      ²
]    with Navy enlisted personnel undergoing technical training.   ²
]    Unlike the original Flesch formula, the Flesch-Kincaid will   ²
]    calculate grade levels less than fourth. The Flesch-Kincaid   ²
]    Formula has also become a Military Standard, a dangerous      ²
]    precedent because °READABILITY' may not be so rigidly defined.²
]                                                                  ²
]    The primary source for the Flech-Kincaid Formula is:          ²
]    Kincaid, Peter, et al. °Development and Test of a Computer     ²
]    Readability Editing System (CRES). Final Report,' Naval       ²
]    Training and Evaluation Group, TAEG-R-83, March, 1980.        ²
]    ED 190-064 (ERIC Document)                                    ²
]                                                                  ²
]           PRESS [Q] to QUIT or [ENTER] to Continue               ²
]                                                                  ²
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]                                                                  ²
]               *** The FOG Index ***                              ²
]                                                                  ²
]    The FOG index is a very popular readability formula largely    ²
]    because of its ease of manual application. It does tend to    ²
]    give scores which are higher than scores given by other       ²
]    formulas. One explanation offered for this is that the FOG    ²
]    formula is designed to measure the level of comprehension     ²
]    as opposed to the level of speaking. Whether or not this is   ²
]    considered a valid explanation is up to the reader.           ²
]                                                                  ²
]    The FOG Index was developed by Robert Gunning in 1952. It     ²
]    was published originally in °The Technique of Clear Writing'  ²
]    McGraw Hill, c1952, Revised edition, 1968.                    ²
]                                                                  ²
]                                                                  ²
]           PRESS [Q] to QUIT or [ENTER] to Continue               ²
]                                                                  ²
```

Comments. cont.

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]                                                                     ²
]                                                                     ²
]               *** FRY GRAPH ***                                     ²
]                                                                     ²
]    The Fry Graph is very popular for assessing readability both     ²
]    because it is highly regarded and because one needn't use a      ²
]    formula to apply it manually. The number of words and sent-      ²
]    ences per 100 words is plotted on a graph containg lines         ²
]    which indicate grade levels. This program will draw a Fry        ²
]    Graph and plot the grade level for you.                          ²
]                                                                     ²
]    The Graph itself is available from many sources. One is:         ²
]    °Diagnosis Correction and Prevention of Reading Disabilities'    ²
]    °by STAUFFER, et al, Harper and Row, c1978, p.152.               ²
]                                                                     ²
]                                                                     ²
]                                                                     ²
]           PRESS [Q] to QUIT or [ENTER] to Continue                  ²
]                                                                     ²
```
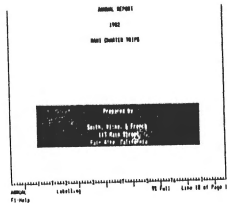
```
±                                                                     ²
±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±
]                                                                     ²
]                                                                     ²
]               *** HOLMQUIST ***                                     ²
]                                                                     ²
]    This is a re-calculation of the Dale-Chall formula. Holmquist    ²
]    has developed several formulas, one of which has an updated      ²
]    °Dale List.' It is true that the Dale List, developed in the     ²
]    1940s, is out of date. Words such as °Schoolmaster' are on       ²
]    the list, but words such as °television' are not. This           ²
]    Holmquist formula uses the older list. It is worth noting        ²
]    that Dale and Chall have recently updated their entire           ²
]    formula, although it is not yet in general circulation.          ²
]                                                                     ²
]                                                                     ²
]                                                                     ²
]                                                                     ²
]           PRESS [Q] to QUIT or [ENTER] to Continue                  ²
]                                                                     ²
```

Comments, cont.

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±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±  2
]                                                                 2
]                       *** POWERS ***                            2
]                                                                 2
]       This is a re-calculation of the original FLESCH formula. It   2
]       gives a score in the °grade level' range rather than an index, 2
]       but tends to grade much lower than other formulas in the  2
]       higher grade ranges.                                      2
]                                                                 2
]       A source for this formula is: POWERS, R.D., et al.,°A Recalc- 2
]       ulation of Four Readability Formulas,' in JOURNAL OF EDUCA- 2
]       TIONAL PSYCHOLOGY, No. 49, April, 1958, pp.99-105.        2
]                                                                 2
]                                                                 2
]                                                                 2
]             PRESS [Q] to QUIT or [ENTER] to Continue            2
]                                                                 2
```

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±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±±  2
]                                                                 2
]                        *** ARI ***                              2
]                                                                 2
]       The °Automated Readability Index' or 'ARI' was developed in   2
]       1961 by Edgar Smith specifically for its ease of automation.  2
]       Unfortunately, this general term has been adapted by several  2
]       different formulas yielding differing results and confusion.  2
]                                                                 2
]       The ARI formula used in this program has been taken from: 2
]       KINCAID, et al. °Derivation of New Readability Formulas'  2
]       Research Branch Report 8-75. CNTT Naval Air Station, Memphis- 2
]       Millington, TN, February, 1975.                           2
]                                                                 2
]                                                                 2
]                                                                 2
]             PRESS [Q] to QUIT or [ENTER] to Continue            2
]                                                                 2
```

MOVE

The MOVE command moves a block of text from one part of your document to another part. The MOVE command is helpful when you want to rearrange text in your document.

How to Use

The following steps describe how to use the MOVE command:

1. Set the first pointer (see the POINTER command) at the top of the block of text you want to move.
2. Set the second pointer at the bottom of the block of text you want to move.
3. Move the cursor to the point where you want to put the block of text.
4. Press:

The following message displays:

>MOVE: Top Bottom (pointers) From

5. After From, press the letter or number of the first pointer. For this example, press:

1

The screen displays the following message:

>MOVE: Top Bottom (pointers) From 1 , To

6. After To, press the letter or number of the second pointer, and the text is moved.

NOTE
Before using the MOVE command, you must know how to use pointers. If the block of text that you move does not start and end at the left margin, you may need to justify the text afterwards.

FIGURE 1. Text7

Moving a Block

When you want to move a block of text from one location to another in a document, label the block and use Del to remove it from its original location. WRITE puts it in the block buffer. Then move the cursor to the new location and press F6. WRITE brings in a copy of the block in the block buffer and inserts it at the cursor location (again, the block remains in the buffer).

For example, suppose you want to move the "prepared by" section of the annual report so that it appears on the financial statement page of the annual report. Press Home and then the down arrow to move to the line

> Prepared by

Label the section by pressing F5 and then press the Enter key five times. The screen looks like this:

Then press Del to remove the lines from that location, as shown below:
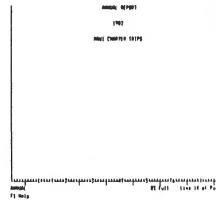
Next, move the cursor to the financial statement on page 3 using the down arrow or PgDn key. Insert 6 blank lines so that the words Financial Statement appear at the top of page 4. Page 4 now looks like this:

FIGURE 3. Text1

Input   Response

| Sensory store | Filter | Pattern recognition | Selection | Short term memory | Long term memory |
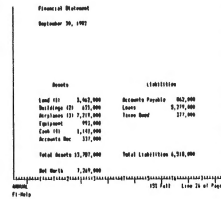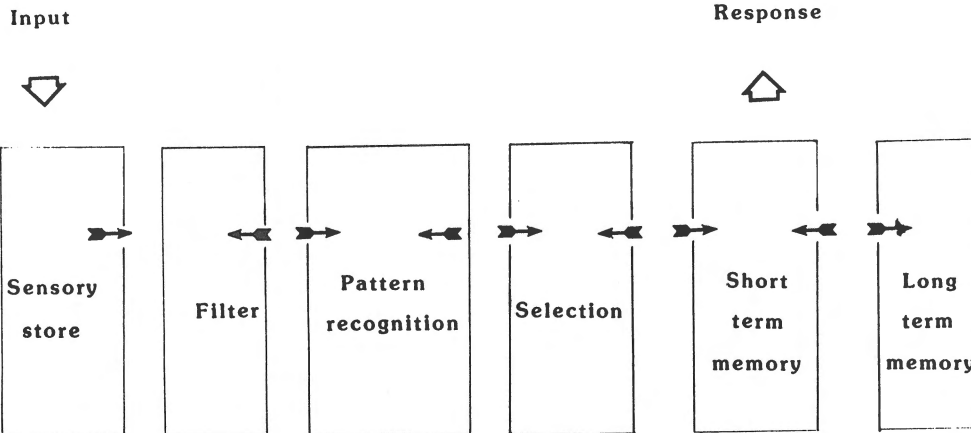
FIGURE 2. Stages of an Information Processing Model

Adapted from: Reed, Stephen K. Cognition: Theory and Application. Monterey, CA: Brooks/Cole Publishing Company, 1982, p. 4.

Move the cursor to the second line under the date. Then press F6 to duplicate the contents of the block buffer at the cursor position. The beginning of the financial statement now looks like this:

If you want to move a block of text from one document to another, you follow much the same procedure. First, label the block and remove it from the original document. Then retrieve the second document and move the cursor to the location where you want to insert the block from the original document. When the cursor is in place, press F6 to insert the block at the specified location.

FIGURE 3, cont.

MOVE A BLOCK

For the next command, select a sentence that has several lines preceding or following it from your practice file. Mark this sentence with ^KB and ^KK so that it appears highlighted. Now move the cursor a good distance away from the marked block in either direction. Position the cursor in the line you would like your marked block to begin at and press ^KV, the block move command. This is easy to remember because of the V in "moVe."

If your block is not displayed, ^KV will not work.

Your displayed block should disappear from its original place and reappear (in highlighted letters) at the new location. Press ^KH to hide this block.

Your revised paragraphs may need reforming after this move, especially if you positioned the cursor within a line of text before entering ^KV. Use ^B, the paragraph reform command, to correct the text's position.

FIGURE 4. Text2

Moving a Block

The block move command (^KV) **moves** all the text in the marked block to the **cursor position**, deleting the original at its old position. If no block is marked when the command is given, or if either marker is hidden, an error message occurs (Appendix B).

The destination may be in the middle of a line, if desired — for example when rearranging sentences in a paragraph. Just put the cursor where you want the block moved to. The cursor is left at the beginning of the moved text.

The beginning and end markers **move with the block** and remain displayed. After inspecting the result, type ^KH to hide the block markers -- both to remove the distraction from the screen, and to protect against block commands typed by accident. If you wish to use the same block markers later, just type ^KH again.

The block move command moves **exactly** the characters you have marked, and does no automatic reformatting. Thus, **text** reformatting is often required after a move. After rearranging sentences, for example, use paragraph reform (^B, Section 4) to re-establish the margins. You may also notice that you included too many or too few spaces or carriage returns at the beginning or end of the block. These errors are easily corrected with a few regular editing commands.

After a block move, the command ^QV will move the cursor to the place the block came from. It's a good idea to inspect here after moving, as you may have left too many spaces or carriage returns behind, or you may need to reform the paragraph. Note that any place markers 0-9 in the marked block do not move with it—they remain at the place the block came from.

For an example of moving a column block, see Figure 6-1.

FIGURE 5. Text3

Copying or Moving Text

You use the copy or move procedure to save a specific block or column of text and insert it in a different location in the file. This is useful when you need to repeat the same information or to copy Format Lines. You can copy text to a temporary buffer or to a stored file.

Copying or Moving a Block of Text

To copy or move an entire block of text:

1. Position the cursor at the beginning of the text you want to copy.
2. Press the Do key.
3. Type the letter C (for copy) or M (for move).

   When you move text, it is deleted from its original location. When you copy text, it is not deleted from the original location, and therefore exists twice in your file.

   If you are storing the text in a separate file:

   - Press the File key.
   - If you do not want to use the default file name TEMP, type a file name.
   - Press the Return key.

      NOTE
      If you do not specify a file to store the text in when you copy it, Samna stores it in a temporary buffer. This buffer can hold only about one full page of text. Therefore, if you have a large block of text to copy, you should store it in a separate file.

4. Shade the text you want to copy.
5. Press the Return key.
6. Move the cursor to where you want to insert the copy.

FIGURE 7. Text9

---

7. Hold down the Ctrl key while you press the Insert Here key. If you stored the text in a file:

   - Press the File key.
   - Type the name of the file, unless you used the default file TEMP.
   - Press the Return key.

Samna asks:

```
Which format should be used?
Type Y to use the current format. Type N to insert the
stored format.
Will the text be inserted into the current (displayed)
format? Yes/No (N)
Is the text you are inserting a column? Yes/No (N)
```

8. Respond to these questions and press the Return key.

      NOTE
      To move text with its original format, you must save the text in a separate file.

Copying a Format Line

To copy a format line:

1. Position the cursor immediately below the format line you want to copy.
2. Press the Do key.
3. Press the C key (for copy). If you are storing the line in a separate file:

   - Press the File key.
   - Type the name of the file if you do not want to use the default file name TEMP.
   - Press the Return key.

2.18

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MOVE

Purpose

You use the MOVE command to move a specific block of text from one place to another. MOVE lets you delete the original block of text and insert it anywhere else you want.

Moving a Block of Text

1. Position the cursor at the beginning of the text you want to move.
2. Press the Do key.
3. Press the M key (for Move).
4. Shade the text you want to move.
5. Press the Return key.
6. Position the cursor where you want to insert the text.
7. Hold down the Ctrl key while you press the Insert Here key.
8. Press the Return key.
9. Press the N key (for No) if you want SAMNA to insert the text with its stored format. Press the Y key (for Yes) if you want SAMNA to insert the text with the current format.
10. Press the Return key.

FIGURE 6. Text6

Helpful Information

- The text you move is deleted from its original location. If you want to move a block of text and also retain it in the original file, use the COPY command.
- You can move any amount of text. You shade the text you want to move using the Word, Sentence, Line, Paragraph, Page, File, and arrow keys. However, the File key is not recommended.
- Any marks within the text are moved with the text.
- The text you move is temporarily saved, along with its format, in the TEMP file.
- The TEMP file holds one block of text at a time. Therefore, when you move (or copy) text, SAMNA replaces the contents of the TEMP file.
- If you want to save text stored in the TEMP file after you finish moving or copying, give the TEMP file another name. The text is now safely in the file with the new name.
- You can display and edit the TEMP file.

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4. Press the Line key to shade a line.
5. Press the Return key.
6. Position the cursor where you want to insert the Format Line.
7. Hold down the Ctrl key while you press the Insert'Here key. If you saved the text in a file:

• Press the File key.
• Type the name of the file unless you used the default file name TEMP.
• Press the Return key.

Samna asks if you want to insert the line in the current format. If you are inserting a format line without text, you must specify No.

NOTE
You can type over the line that was copied.

Helpful Information

• You cannot use the insert procedure if the text you want to copy is on a different directory. First, you must copy the TEMP file to the correct directory.

• Any marks in the text are copied along with the text.

The text you move is temporarily saved, along with its format, in the TEMP file.

• If you insert the text with the stored format, your document looks as if you reformatted the new text. You have text with the old format, new text with its format, and the rest of the text with the old format.

• You can move any amount of text. You shade the text you want to move using the Word, Sentence, Line, Paragraph, Page, File, and arrow keys. However, using the File key is not recommended.

• If you want to save text stored in the TEMP file after you finish moving or copying, give the TEMP file another name. The text is now safely in the file with the new name.

3-19

FIGURE 7, cont.

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Moving a Block

The block move command (^KV) **moves** all the text in the marked block to the **cursor position**, deleting the original at its old position. If no block is marked when the command is given, or if either marker is hidden, an error message occurs (Appendix B).

The destination may be in the middle of a line, if desired — for example when rearranging sentences in a paragraph. Just put the cursor where you want the block moved to. The cursor is left at the beginning of the moved text.

The beginning and end markers **move with the block** and remain displayed. After inspecting the result, type ^KH to hide the block markers -- both to remove the distraction from the screen, and to protect against block commands typed by accident. If you wish to use the same block markers later, just type ^KH again.

The block move command moves **exactly** the characters you have marked, and does no automatic reformatting. Thus, text reformatting is often required after a move. After rearranging sentences, for example, use paragraph reform (^B, Section 4) to re-establish the margins. You may also notice that you included too many or too few spaces or carriage returns at the beginning or end of the block. These errors are easily corrected with a few regular editing commands.

After a block move, the command ^QV will move the cursor to the place the block came from. It's a good idea to inspect here after moving, as you may have left too many spaces or carriage returns behind, or you may need to reform the paragraph. Note that any place markers 0-9 in the marked block do **not** move with it—they remain at the place the block came from.

For an example of moving a column block, see Figure 6-1.

| A | \|BB | \|CCCC | ▮DDDDDDDD | | A | CCCC | \|BB | \|DDDDDDDD |
A	|BB	|CCCC	DDDDDDDD		A	CCCC	|BB	|DDDDDDDD
A	|BB	|CCCC	DDDDDDDD		A	CCCC	|BB	|DDDDDDDD
A	|BB	|CCCC	DDDDDDDD		A	CCCC	|BB	|DDDDDDDD
A	|BB	|CCCC	DDDDDDDD		A	CCCC	|BB	|DDDDDDDD

FIGURE 8. Text3

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Moving Blocks

Use ^KV to moVe all text in a marked block to the current cursor position. The remaining text will move up to fill the space left by the moved block.

The destination of your block may be anywhere in the text area—between paragraphs or in the middle of a line. Place the cursor wherever you want to move the block, and press ^KV.

Here is an example:

Before	After
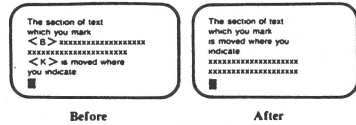
HOW MANY CHARACTERS MOVE?

The beginning and end markers move with the block and remain in the display. After the move, use ^KH to hide the markers, both to remove the distraction from the screen and to protect against block commands typed inadvertently. Place markers (0-9) in the marked block do not move with the block; they remain at the block's former place.

CAUTION

When WordStar print control or dot commands are within a marked block of text, they move to the block's new location, too. If any of these commands are toggle switches, check both the block and the block's previous location for matching pairs.

With ^KV, characters move exactly as they are, without any reformatting. Use regular editing commands to make changes or corrections at the block's new location.

⌐ Q V

Use ^QV to position the cursor back at the beginning marker's location preVious to moving, copying, or deleting a block. Then check to verify that the move was what you intended, and use regular editing commands as necessary to reformat the original area.

FIGURE 9. Text4

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Moving Blocks

In preparing letters, reports, lists, tables, articles, or books, you will frequently find it necessary to reorganize the draft as you are polishing it. One of the great advantages of a word processor is the freedom it gives you to rearrange text without having to cut and paste everything you want to move. WordStar can move rows of text, and later versions can also move columns.

STEP 1. TYPE CTRL K B TO MARK THE BEGIN-NING OF THE BLOCK
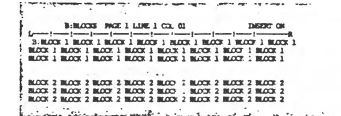
Move the cursor under the first letter in the block you want to move. Type ^KB and a control character (B) will appear on the screen just to the left of the letter under which you positioned the cursor. (If you are marking a column see page 90.)

STEP 2. TYPE CTRL K K TO MARK THE END OF THE BLOCK
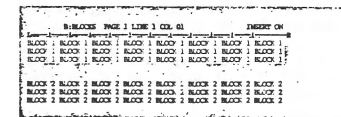
Move the cursor one space to the right of the last character in the block you want to move. If you ended the block with a carriage return, which will be indicated by a < flag in the far right column, place the cursor at the beginning of the next line so the carriage return will be moved along with the block. (If you are marking a column see page 90.)

STEP 3. MOVE THE CURSOR ONE LINE BELOW THE LINE ON WHICH YOU WANT TO MOVE THE BLOCK
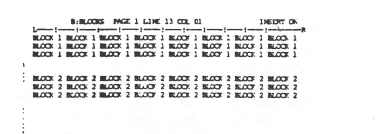
When you move the block, the first line of text will appear one line ABOVE the line on which you place the cursor.

STEP 4. TYPE CTRL K V TO MOVE THE BLOCK
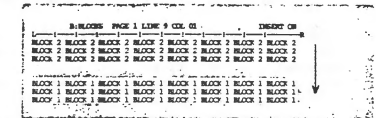
The block will move from its former position to one line above the line on which you placed the cursor. The space vacated by the block you moved will be filled up by the rows of text below the block, which will move up into this space.

STEP 5. TYPE CTRL Q V TO RETURN TO THE POSITION FROM WHICH THE BLOCK WAS MOVED
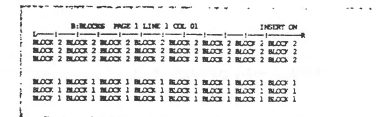
The text in the space vacated by the moved block, as well as the moved block itself, might require paragraph reforming with ^B. To return the cursor to the position from which the block was moved type ^QV.
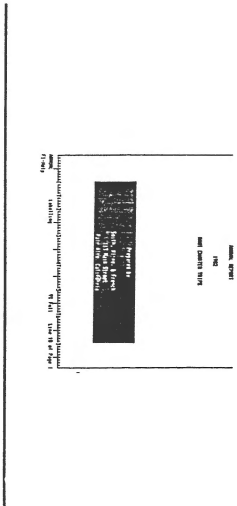
FIGURE 10. Text5

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Moving a Block

Moving a Block

The block move command (^KV) **moves** all the text in the marked block to the
cursor position, deleting the original at its old position. If no block is
marked when the command is given, or if either marker is hidden, an error
message occurs (Appendix B).

The destination may be in the middle of a line, if desired — for example when
rearranging sentences in a paragraph. Just put the cursor where you want the
block moved to. The cursor is left at the beginning of the moved text.

The beginning and end markers **move with the block** and remain displayed. After
inspecting the result, type ^KH to hide the block markers -- both to remove
the distraction from the screen, and to protect against block commands typed
by accident. If you wish to use the same block markers later, just type ^KH
again.

The block move command moves **exactly** the characters you have marked, and does
no automatic reformatting. Thus, text reformatting is often required after a
move. After rearranging sentences, for example, use paragraph reform (^B,
Section 4) to re-establish the margins. You may also notice that you included
too many or too few spaces or carriage returns at the beginning or end of the
block. These errors are easily corrected with a few regular editing commands.

After a block move, the command ^QV will move the cursor to the place the
block came from. It's a good idea to inspect here after moving, as you may
have left too many spaces or carriage returns behind, or you may need to
reform the paragraph. Note that any place markers 0-9 in the marked block do
not move with it—they remain at the place the block came from.

For an example of moving a column block, see Figure 6-1.

```
A    |BB   |CCCC  ▮DDDDDDDD        A    CCCC  |BB   |DDDDDDDD
A    |BB   |CCCC   DDDDDDDD        A    CCCC  |BB   |DDDDDDDD
A    |BB   |CCCC   DDDDDDDD        A    CCCC  |BB   |DDDDDDDD
A    |BB   |CCCC   DDDDDDDD        A    CCCC  |BB   |DDDDDDDD
A    |BB____|CCCC  DDDDDDDD        A    CCCC  |BB____|DDDDDDDD
```

FIGURE 11. Text3

Moving a Block

When you want to move a block of text from one location to another in a
document, label the block and use Del to remove it from its original location.
WRITE puts it in the block buffer. Then move the cursor to the new location
and press F6. WRITE brings in a copy of the block in the block buffer and
inserts it at the cursor location (again, the block remains in the buffer).

For example, suppose you want to move the "prepared by" section of the
annual report so that it appears on the financial statement page of the annual
report. Press Home and then the down arrow to move to the line

Prepared by

Label the section by pressing F5 and then press the Enter key five times. The
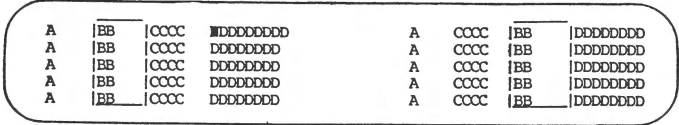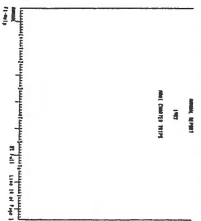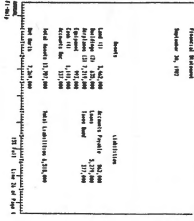screen looks like this:

FIGURE 12. Text2

Then press Del to remove the lines from that location, as shown below:

Next, move the cursor to the financial statement on page 3 using the down
arrow or PgDn key. Insert 6 blank lines so that the words Financial Statement
appear at the top of page 4. Page 4 now looks like this:

4. Press the Line key to shade a line.

5. Press the Return key.

6. Position the cursor where you want to insert the Format Line.

7. Hold down the Ctrl key while you press the Insert'Here key. If you saved the text in a file:

  • Press the File key.

  • Type the name of the file unless you used the default file name TEMP.

  • Press the Return key.

    Samna asks if you want to insert the line in the current format. If you are inserting a format line without text, you must specify No.

    NOTE
    You can type over the line that was copied.

Helpful Information

  • You cannot use the insert procedure if the text you want to copy is on a different directory. First, you must copy the TEMP file to the correct directory.

  • Any marks in the text are copied along with the text.

    The text you move is temporarily saved, along with its format, in the TEMP file.

  • If you insert the text with the stored format, your document looks as if you reformatted the new text. You have text with the old format, new text with its format, and the rest of the text with the old format.

  • You can move any amount of text. You shade the text you want to move using the Word, Sentence, Line, Paragraph, Page, File, and arrow keys. However, using the File key is not recommended.

  • If you want to save text stored in the TEMP file after you finish moving or copying, give the TEMP file another name. The text is now safely in the file with the new name.

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FIGURE 13, cont.

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Copying or Moving Text

You use the copy or move procedure to save a specific block or column of text and insert it in a different location in the file. This is useful when you need to repeat the same information or to copy Format Lines. You can copy text to a temporary buffer or to a stored file.

Copying or Moving a Block of Text

To copy or move an entire block of text:

1. Position the cursor at the beginning of the text you want to copy.

2. Press the Do key.

3. Type the letter C (for copy) or M (for move).

   When you move text, it is deleted from its original location. When you copy text, it is not deleted from the original location, and therefore exists twice in your file.

   If you are storing the text in a separate file:

   • Press the File key.

   • If you do not want to use the default file name TEMP, type a file name.

   • Press the Return key.

   NOTE
   If you do not specify a file to store the text in when you copy it, Samna stores it in a temporary buffer. This buffer can hold only about one full page of text. Therefore, if you have a large block of text to copy, you should store it in a separate file.

4. Shade the text you want to copy.

5. Press the Return key.

6. Move the cursor to where you want to insert the copy.

FIGURE 13. Text9

---

7. Hold down the Ctrl key while you press the Insert Here key. If you stored the text in a file:

  • Press the File key.

  • Type the name of the file, unless you used the default file TEMP

  • Press the Return key.

  Samna asks:

  ```
  Which format should be used?
  Type Y to use the current format. Type N to insert the
  stored format.
  Will the text be inserted into the current (displayed)
  format? Yes/No (N)
  Is the text you are inserting a column? Yes/No (N)
  ```

8. Respond to these questions and press the Return key.

   NOTE
   To move text with its original format, you must save the text in a separate file.

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Copying a Format Line

To copy a format line:

1. Position the cursor immediately below the format line you want to copy.

2. Press the Do key.

3. Press the C key (for copy). If you are storing the line in a separate file:

  • Press the File key.

  • Type the name of the file if you do not want to use the default file name TEMP.

  • Press the Return key.

The Select Marker is still in force. even though it may no longer be visible.

If at any point you decide that you do not want to carry through with the Select operation. just press [SEL] again. and the Select Marker will be removed. allowing you to resume normal editing.

6.4.2 THE CUT COMMAND

This feature allows you to remove any amount of text from a document. Using the Paste command described later in this chapter. you may then move the cut text to another position within the same document or to another document within the same Document Directory. You may also elect to do nothing with the text you have cut. thus deleting it from you document. The Paste command in this case allows you to recover the last block of text you deleted in this manner.

6.4.2.1 Basic Concepts

Think of the Cut function as performing the same operation you would perform with a knife on a paper document. At the point where you would begin your cut in the paper document. you place the Select Marker in MASS-11. Moving the cursor in MASS-11 is similar to running your knife around the text you want to remove. working towards the end of the section. Finally. at the opposite end of the text from where you started. you executed the MASS-11 Cut function. which is similar to lifting the section of text from the document. Unlike the knife and paper operation. however. you are not left with a gaping hole in your document. MASS-11 automatically moves the text below the cut up to meet the text above the cut. so that there is never a hole left by the Cut operation.

The cut text is stored in a temporary holding area. or "paste buffer". The paste buffer contains the cut text until another piece of text selected with [SEL] is cut or copied. until you change Document Directories. or until you exit MASS-11. The amount of text that can be cut at one time is limited only by the disk quota allocated to your account by the System Manager.

6.4.2.2 Rulers in Cut Text

If the text you select has any rulers embedded in it. these rulers will also be stored in the paste buffer with the text. If you paste the cut text into another location. these rulers will be inserted into the document along with the cut text. When you cut text with rulers from a document. the last ruler which occurred in the cut text will be placed in the document at the point of the cut. This will preserve the format of the text which remains in the document below the point of the cut.

FIGURE 14.   Text8

6.4.2.3 To Cut Text Out of a Document

1. Position the cursor on the first character of the text to be cut.

2. Press the [SEL] key. Observe the diamond Select Marker.

3. Using any of the cursor movement commands. position the cursor one position past the last character to be cut.

4. Press [CUT] ([KP-]) to remove the text.

6.4.3 THE COPY COMMAND

This feature allows you to make a copy of any amount of text in a document. Using the Paste command described later in this chapter. you may then insert this text in another position within the same document or in another document within the same Document Directory. Use this function to avoid having to retype identical text in several places in a document. or in several different documents. Use it also when you want to be absolutely sure that text which appears in one place is identical in every respect to text which appears in another place.

6.4.3.1 Basic Concepts

The operation of the Copy function is fairly straightforward. An identical copy of the text you have selected is stored in the same paste buffer which is used for Cut operations. The paste buffer contains the copied text until another piece of text selected with [SEL] is cut or copied. until you change Document Directories. or until you exit MASS-11. The amount of text that can be copied at one time is limited only by the disk quota allocated to your account by the System Manager.

6.4.3.2 Rulers in Copied Text

If the text you select has any rulers embedded in it. these rulers will also be stored in the paste buffer with the text. If you paste the copied text into another location. these rulers will be inserted into the document along with the text.

6.4.3.3 To Copy Text from a Document

1. Position the cursor on the first character of the text to be copied.

2. Press the [SEL] key. Observe the diamond Select Marker.

FIGURE 14, cont.

3. Using any of the cursor movement commands, position the cursor <u>one</u>
<u>position</u> past the last character to be copied.

4. Type **[GOLD] [CUT]** to make a copy of the text. The original text is
unchanged.

6.4.4 CUMULATIVE COPY AND CUT COMMAND

Normally, each time a Cut or Copy command is executed, the previous text stored
in the paste buffer is replaced by the text selected in the latest Cut or Copy
operation. MASS-11 also allows you to add to the text in the paste buffer without
erasing the previous contents. This is accomplished with a "Cumulative" command.

These operations are useful if you wish to copy several paragraphs located in
different places in a document, and then paste the combination elsewhere in the
document or in another document. Also, since the contents of the paste buffer are
preserved until you change Document Directories or exit MASS-11, text can be
taken from several different documents and then pasted into a new document.

6.4.4.1 Basic Concepts

In cumulative operations, sections of text are cut out of the document in the order
in which you want them to be added to the paste buffer. They "line up" in the
buffer one after the other. A single Paste command inserts them all into a
document in the order in which they were selected - first at the top, and last at
structuring and restructuring documents.

6.4.4.2 To Add Cut Text to the Paste Buffer

1. Perform a regular Cut operation on the first section of text. This will replace
the previous contents of the paste buffer with the new text.

2. Position the cursor over the first character of the second section of text to
be removed from the document and added to the paste buffer. Type **[GOLD]**
[SEL] ([KP.]). Observe the diamond select mark and the "Cumulative"
message at the bottom of the screen.

3. Position the cursor one position beyond the last character of the text to be
cut, and press **[CUT]**. The paste buffer now contains both sections of text
in the order that they were cut.

FIGURE 14, cont.

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6.4.4.3 To Add Copied Text to the Paste Buffer

1. Perform a regular Copy operation on the first section of text. This will
replace the previous contents of the paste buffer with the new text.

2. Position the cursor over the first character of the second section of text to
be copied and added to the paste buffer. Type **[GOLD] [SEL]**. Observe the
diamond select mark and the "Cumulative" message at the bottom of the
screen.

3. Position the cursor one position beyond the last character of the text to be
copied, and type **[GOLD] [CUT] ([KP-])**. The paste buffer now contains
both sections of text in the order that they were copied.

6.4.5 THE PASTE COMMAND

This command is used to insert text placed into the paste buffer with Cut or Copy
Commands at any location in any document. Text that has been copied or cut can
be pasted multiple times and remains in the paste buffer until a new Copy or Cut
function is executed, or until you change Document Directories or exit MASS-11.

6.4.5.1 Basic Concepts

Recalling the knife and paper example of Cut in the section above, think of the
Paste function as a "scotch tape" operation on a paper document. To insert the
text on the piece of paper you had cut out with your knife above, you would make
another cut in the document, separating the page where you want to insert the cut
text into two halves. Using tape, you would tape the cut text in between the two
halves of the page you just separated to make it appear in the correct position in
the document. When you use the paste function, MASS-11 does all the page
separation work for you, neatly inserting the contents of the paste buffer into the
existing text, then recomputing the line endings of all the text following the
insertion to ensure that no holes appear in the document.

6.4.5.2 Paste Buffers

Up to ten paste buffers can be used in each directory. If you press **[RETURN]** at
the "Paste Buffer Name" prompt, the cut text will be stored in the MAIN buffer. If
you want to use any of the other nine buffers, you can enter a name up to ten
characters.

When pasting, you will be asked for the name of the paste buffer if more than one
exists. If you cannot remember the name, press **[?] [RETURN]** and a list of the
paste buffers will appear.

FIGURE 14, cont.

Once you have given names to the ten paste buffers during an editing session, you cannot rename them. You can replace the contents of one paste buffer with newly-cut or -copied text, however.

When you log off, the contents and the names of the paste buffers are deleted. If these buffers contain text that you plan to use frequently, it is best to store that text in a glossary.

If you need to paste text into a document in another directory or account, it is best to use the split screen editing option. (See Chapter 9 -- Using Stored Text.)

6.4.5.3 To Paste Text into a Document

1. Move the cursor to the position where you want to insert the text contained in the paste buffer. Remember to leave space on either side of the cursor so that words do not run together when the new text is inserted. You can insert a few extra spaces or Hard Returns on either side of the cursor before you paste in the new text, then edit them out later, if you wish.

2. Press [PASTE] ([KP,]). The contents of the paste buffer will be inserted into the document. All text to the right of and below the original position of the cursor will be pushed down to make room for the new text. The line endings of all text from the new insertion downward will be recomputed automatically.

There is no "Cumulative Paste" operation. The same Paste command used for a regular Copy or Cut is used to paste the text added to the paste buffer with Cumulative Copy or Cut commands. All text in the paste buffer is inserted with a Paste command, regardless of how the text got into the paste buffer.

6.4.5.4 Rulers in Pasted Text

As noted in the discussion of Cut and Copy, any rulers which are in the cut or copied text are also stored in the paste buffer. When you paste the text into a new position, the rulers are also pasted into the document. However, when you use the [PASTE] ([KP,]) key to insert text, the text from the beginning of the paste buffer to the first ruler in the paste buffer, if there is one, is formatted according to the current ruler which governs the text into which you are pasting. If you determine that you do not want this to happen, but would rather have the text in the paste buffer formatted according to the ruler which was current in the area from which it was cut or copied, use [GOLD] [PASTE] instead of just [PASTE]. MASS-11 remembers the ruler which governed the text when it was cut or copied, and inserts it at the beginning of the pasted text.

FIGURE 14, cont.

The Select Marker is still in force, even though it may no longer be visible.

If at any point you decide that you do not want to carry through with the Select operation, just press [SEL] again, and the Select Marker will be removed, allowing you to resume normal editing.

6.4.2 THE CUT COMMAND

This feature allows you to remove any amount of text from a document. Using the Paste command described later in this chapter, you may then move the cut text to another position within the same document or to another document within the same Document Directory. You may also elect to do nothing with the text you have cut, thus deleting it from you document. The Paste command in this case allows you to recover the last block of text you deleted in this manner.

6.4.2.1 Basic Concepts

Think of the Cut function as performing the same operation you would perform with a knife on a paper document. At the point where you would begin your cut in the paper document, you place the Select Marker in MASS-11. Moving the cursor in MASS-11 is similar to running your knife around the text you want to remove, working towards the end of the section. Finally, at the opposite end of the text from where you started, you executed the MASS-11 Cut function, which is similar to lifting the section of text from the document. Unlike the knife and paper operation, however, you are not left with a gaping hole in your document. MASS-11 automatically moves the text below the cut up to meet the text above the cut, so that there is never a hole left by the Cut operation.

The cut text is stored in a temporary holding area, or "paste buffer". The paste buffer contains the cut text until another piece of text selected with [SEL] is cut or copied, until you change Document Directories, or until you exit MASS-11. The amount of text that can be cut at one time is limited only by the disk quota allocated to your account by the System Manager.

6.4.2.2 Rulers in Cut Text

If the text you select has any rulers embedded in it, these rulers will also be stored in the paste buffer with the text. If you paste the cut text into another location, these rulers will be inserted into the document along with the cut text. When you cut text with rulers from a document, the last ruler which occurred in the cut text will be placed in the document at the point of the cut. This will preserve the format of the text which remains in the document below the point of the cut.

FIGURE 15.   Text8

6.4.2.3 To Cut Text Out of a Document

1. Position the cursor on the first character of the text to be cut.

2. Press the [SEL] key. Observe the diamond Select Marker.

3. Using any of the cursor movement commands, position the cursor one position past the last character to be cut.

4. Press [CUT] ([KP-]) to remove the text.

6.4.3 THE COPY COMMAND

This feature allows you to make a copy of any amount of text in a document. Using the Paste command described later in this chapter, you may then insert this text in another position within the same document or in another document within the same Document Directory. Use this function to avoid having to retype identical text in several places in a document, or in several different documents. Use it also when you want to be absolutely sure that text which appears in one place is identical in every respect to text which appears in another place.

6.4.3.1 Basic Concepts

The operation of the Copy function is fairly straightforward. An identical copy of the text you have selected is stored in the same paste buffer which is used for Cut operations. The paste buffer contains the copied text until another piece of text selected with [SEL] is cut or copied, until you change Document Directories, or until you exit MASS-11. The amount of text that can be copied at one time is limited only by the disk quota allocated to your account by the System Manager.

6.4.3.2 Rulers in Copied Text

If the text you select has any rulers embedded in it, these rulers will also be stored in the paste buffer with the text. If you paste the copied text into another location, these rulers will be inserted into the document along with the text.

6.4.3.3 To Copy Text from a Document

1. Position the cursor on the first character of the text to be copied.

2. Press the [SEL] key. Observe the diamond Select Marker.

FIGURE 15, cont.

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3. Using any of the cursor movement commands, position the cursor one position past the last character to be copied.

4. Type [GOLD] [CUT] to make a copy of the text. The original text is unchanged.

6.4.4 CUMULATIVE COPY AND CUT COMMAND

Normally, each time a Cut or Copy command is executed, the previous text stored in the paste buffer is replaced by the text selected in the latest Cut or Copy operation. MASS-11 also allows you to add to the text in the paste buffer without erasing the previous contents. This is accomplished with a "Cumulative" command.

These operations are useful if you wish to copy several paragraphs located in different places in a document, and then paste the combination elsewhere in the document or in another document. Also, since the contents of the paste buffer are preserved until you change Document Directories or exit MASS-11, text can be taken from several different documents and then pasted into a new document

6.4.4.1 Basic Concepts

In cumulative operations, sections of text are cut out of the document in the order in which you want them to be added to the paste buffer. They "line up" in the buffer one after the other. A single Paste command inserts them all into a document in the order in which they were selected - first at the top, and last at structuring and restructuring documents.

6.4.4.2 To Add Cut Text to the Paste Buffer

1. Perform a regular Cut operation on the first section of text. This will replace the previous contents of the paste buffer with the new text.

2. Position the cursor over the first character of the second section of text to be removed from the document and added to the paste buffer. Type [GOLD] [SEL] ([KP.]). Observe the diamond select mark and the "Cumulative" message at the bottom of the screen.

3. Position the cursor one position beyond the last character of the text to be cut, and press [CUT]. The paste buffer now contains both sections of text in the order that they were cut.

FIGURE 15, cont.

6.4.4.3 To Add Copied Text to the Paste Buffer

1   Perform a regular Copy operation on the first section of text. This will replace the previous contents of the paste buffer with the new text.

2. Position the cursor over the first character of the second section of text to be copied and added to the paste buffer. Type [GOLD] [SEL]. Observe the diamond select mark and the "Cumulative" message at the bottom of the screen.

3. Position the cursor one position beyond the last character of the text to be copied, and type [GOLD] [CUT] ([KP-]). The paste buffer now contains both sections of text in the order that they were copied.

6.4.5   THE PASTE COMMAND

This command is used to insert text placed into the paste buffer with Cut or Copy Commands at any location in any document. Text that has been copied or cut can be pasted multiple times and remains in the paste buffer until a new Copy or Cut function is executed, or until you change Document Directories or exit MASS-11.

6.4.5.1   Basic Concepts

Recalling the knife and paper example of Cut in the section above, think of the Paste function as a "scotch tape" operation on a paper document. To insert the text on the piece of paper you had cut out with your knife above, you would make another cut in the document, separating the page where you want to insert the cut text into two halves. Using tape, you would tape the cut text in between the two halves of the page you just separated to make it appear in the correct position in the document. When you use the paste function, MASS-11 does all the page separation work for you, neatly inserting the contents of the paste buffer into the existing text, then recomputing the line endings of all the text following the insertion to ensure that no holes appear in the document.

6.4.5.2   Paste Buffers

Up to ten paste buffers can be used in each directory. If you press [RETURN] at the "Paste Buffer Name" prompt, the cut text will be stored in the MAIN buffer. If you want to use any of the other nine buffers, you can enter a name up to ten characters.

When pasting, you will be asked for the name of the paste buffer if more than one exists. If you cannot remember the name, press [?] [RETURN] and a list of the paste buffers will appear.

FIGURE 15, cont.

Once you have given names to the ten paste buffers during an editing session, you cannot rename them. You can replace the contents of one paste buffer with newly-cut or -copied text, however.

When you log off, the contents and the names of the paste buffers are deleted. If these buffers contain text that you plan to use frequently, it is best to store that text in a glossary.

If you need to paste text into a document in another directory or account, it is best to use the split screen editing option. (See Chapter 9 -- Using Stored Text.)

6.4.5.3   To Paste Text into a Document

1. Move the cursor to the position where you want to insert the text contained in the paste buffer. Remember to leave space on either side of the cursor so that words do not run together when the new text is inserted. You can insert a few extra spaces or Hard Returns on either side of the cursor before you paste in the new text, then edit them out later, if you wish.

2. Press [PASTE] ([KP,]). The contents of the paste buffer will be inserted into the document. All text to the right of and below the original position of the cursor will be pushed down to make room for the new text. The line endings of all text from the new insertion downward will be recomputed automatically.

There is no "Cumulative Paste" operation. The same Paste command used for a regular Copy or Cut is used to paste the text added to the paste buffer with Cumulative Copy or Cut commands. All text in the paste buffer is inserted with a Paste command, regardless of how the text got into the paste buffer.

6.4.5.4   Rulers in Pasted Text

As noted in the discussion of Cut and Copy, any rulers which are in the cut or copied text are also stored in the paste buffer. When you paste the text into a new position, the rulers are also pasted into the document. However, when you use the [PASTE] ([KP,]) key to insert text, the text from the beginning of the paste buffer to the first ruler in the paste buffer, if there is one, is formatted according to the current ruler which governs the text into which you are pasting. If you determine that you do not want this to happen, but would rather have the text in the paste buffer formatted according to the ruler which was current in the area from which it was cut or copied, use [GOLD] [PASTE] instead of just [PASTE] MASS-11 remembers the ruler which governed the text when it was cut or copied, and inserts it at the beginning of the pasted text.

FIGURE 15, cont.

SYMPOSIUM INVOICE FORM INSTRUCTIONS

Do not use the Symposium Invoice Form if you do not plan on attending the Symposium or Pre-symposium Seminar.

GENERAL INFORMATION:
- Digital employees note: no cross charges will be performed for products offered on Symposium Invoice Form.
- Cancellations: apply only to symposium, session notes, and pre-symposium seminar sections of the invoice form.
- Transfers:
  - **Will only be accepted when no changes are made to original attendee's record.**
  - If any changes to original attendee's record are made, a cancellation will take place and a new registration form and payment must be submitted.

INVOICE FORM HEADER INFORMATION:
- Make sure DECUS number, if known, is provided.
- If not a DECUS member you are required to fill out a membership form (found on page 89) and submit with the Symposium Invoice Form.

SYMPOSIUM SECTION:
- Indicate number of days you plan to attend.
- Check which days you are attending if less than five.
- Enter corresponding dollar amount on appropriate line.
- Enter symposium amount due on line (A).
- If you are not ordering additional products carry subtotal (A) to line (F) at bottom of form.

SESSION NOTES:
- Enter quantity.
- Enter corresponding dollar amount on appropriate line.
- Enter session note amount due and place on line (B).

SUBSCRIPTION SERVICE:
- For U.S. Chapter members **only.**
- No cancellations for subscriptions will be accepted.
- Enter quantity.
- Enter corresponding dollar amount on appropriate line.
- Enter subscription service amount due and place on line (C).

LIBRARY:
- For U.S. Chapter members **only.**
- No purchase orders accepted for library programs offered on this form.
- No cancellations of library orders will be accepted.
- If registration is cancelled you will receive library programs by mail.
- Fill out "Ship To" address on back of invoice form.
- **LIB1 = 11-SP-18**
  Language System for RSTS/E V7.2,-8, RSX-11M V4.0, RSX-11M-PLUS, RT-11 V4.0, VMS V3.2 in Compatibility Mode, TSX-PLUS V2.2/3.0 on 9 Track Magtape, 800 BPI, DOS-11 Format.
- **LIB2 = 11-SP-47**
  PORTACALC: 3D Spreadsheet, for IAS, RSX-11D, RSX-11M, RSX-11M-PLUS, VAX/VMS on 9 Track Magtape, 1600 BPI, RMSBCK Format.
- **LIB3 = VAX-LIB-3**
  1985/1986 DECUS VAX/VMS Library Tape #4 on 9 track Magtape 1600 BPI, VMS/BACKUP Format.
- **LIB4 = PRO-123**
  PRO Package of BASIC, PASCAL, PORTACALC, KERMIT, and a Desk Top Calendar for PO/S on 5¼" Floppy Diskettes, FILES-11 Format.
- Enter quantity (no more than 9).
- Enter corresponding dollar amount on appropriate line.
- Enter library program amount due and place on line (D).

PRE-SYMPOSIUM SEMINAR:
- Enter code number for first, second, and third choices (see pages 15—52 for code description).
- Enter pre-symposium seminar amount due ($195) and place on line (E).

INVOICE FORM TOTAL:
- Add lines A and other product lines (B,C,D, and E) and place total amount due on line (F).
- Signature: By signing this form you agree to abide by the Canons of Conduct listed on the reverse side of the invoice form.

Credit Card Customers: ● MC = Mastercard ● V = Visa ● D = Diners Club/Carte Blanche
- Check appropriate credit card box and enter credit card number and expiration date.

- Mail To: DECUS Symposium Administration, 219 Boston Post Road, (BP02), Marlboro, MA 01752

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TEXT10. Control Text   68

APPENDIX D
TABLE OF DATA

PROGRAM	SECTION	1	2	3	4	5	6	7	8	9	10
READABILITY	#WORDS	280	148	288	234	492	300	193	1193	689	363
	3-SYLLABLE	24	20	29	19	33	13	9	90	33	48
	SENTENCES	16	10	16	13	27	26	15	55	59	30
	SYLLABLES	885	217	413	341	671	385	258	1625	872	569
	SYLL./100 WDS	137	147	143	146	136	128	134	136	127	157
	SENT./100 WDS	5.7	6.8	5.6	5.6	5.5	8.7	7.8	4.6	8.6	8.3
	FOG READING	10	11	11	10	10	6	7	12	7	10
	FLESCH EASE	73	68	67	65	73	86	81	70	88	61
	FLESCH GRADE	6	7-8	7-8	7-8	6	5	5	7.8	5	7.8
	POWERS EASE	5.4	5.6	5.7	5.8	5.4	4.5	4.9	5.7	4.5	5.8
	HOLMQUIST	6.8	6.6	6.7	7	6	6.6	6	7.1	6.3	6.9
	ARI	7.5	7.5	8.6		9	7.3	3.2	4.6	9.4	3	7.7
	FLESCH/KINCAID	7.4	7.5	8.3	8.6	7.6	4.1	5.2	9	4	7.6
	COLEMAN	7.7	9.1	8.8	9.2	7.5	5.1	6.4	7.8	4.8	10
	DALE CHALL	9.5	9.5	9.5	12	7.5	9.5	7.5	12	9.5	12
	GRADE LEVEL										
	DALE CHALL	9.5	9.5	9.5	12	7.5	9.5	7.5	12	9.5	12
	HOLMQUIST	6	6	6	6-7	5-6	6	5	6-7	5-6	6
	ARI	7	7	8	8-9	7	2-3	4	9	2-3	7
	FLESCH	6	7-8	7-8	7-8	6	5	5	7-8	5	7-8
	KINCAID	7	7	7-8	8	7	3-4	4-5	8-9	3-4	7
	POWERS	5	5	5	5	4	4-5	5	4	5	
	FRY	6-7	6-7	7-8	7-8	6-7	3-4	4-5	7-8	2-3	8-9
	COLEMAN	7	8-9	8	8-9	7	4-5	5-6	7	4	10
	GUNNING FOG	10	12	12	10	9.5	5-6	6-7	11	6	9.5
GRAMMATIK	AV.SENT.LENGTH	16	13	16	17	19	11	13	24	12	12
	AV.WORD LENGTH	4.3	4.5	4.5	4.4	4.1	4.0	4.1	4.2	3.9	4.8
	LONGEST SENTENCE	36	23	27	25	42	23	25	62	41	25
	SHORTEST SENTENCE	5	6	9	11	9	4	2	3	2	2
	"TO BE'S"	1	2	7	5	12	5	2	40	16	10
	PREPOSITIONS	53	21	37	37	76	38	33	194	79	39
COMMENT	CONTENT	53	68	58	72	52	99	57	56	97	85
	"TO BE'S' (30%)	24	12	11	6	16	11	16	44	1	4
	PREPOSITIONS (2)	3	2	2	3	3	1	2	4	1	1
	TRANSITIONS (20%)	72	9	29	7	27	12	29	37	7	7
	"TH" OPENERS (9%)	11	9	24	21	15	4	21	16	7	0
	VAGUENESS (1%)	0.4	1.3	1.5	0	2.2	0.3	0.5	0.6	1.3	0.3
	SHORT SENT.(30%)	44	45	35	21	27	58	43	22	69	66
	LONG SENT. (15%)	11	0	0	8	0	8	0	22	2	0
	PROBLEMS NOTED	3	4	7	1	15	1	3	22	13	1

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Rainbow MS-DOS

(Session P034)

◆

by Personal Computing Systems Group

Digital Equipment Corporation

WHAT'S A PERSONAL COMPUTER O/S???

*"MANAGES THE HARDWARE RESOURCES..."
 BASIC INPUT/OUTPUT SYSTEM (BIOS)

*"PROVIDES SOFTWARE INTERFACE TO SYSTEM
 SERVICES..."
 BASIC DISK OPERATING SYSTEM (BDOS)

 -FILE SYSTEM
 -PROGRAM EXECUTION & TERMINATION
 -MEMORY ALLOCATION
 -CONSOLE DEYBOARD & VIDEO
 -DATE & TIME SERVICES

o "PROVIDES USER INTERFACE..."
  CONSOLE COMMAND PROCESSOR (CCP)

o "ACCESSES PHYSICAL PERIPHERAL DEVICES..."
  DEVICE DRIVERS

  - FLOPPY DISK DRIVES
  - WINCHESTER HARD DISK
  - PRINTER PORT(S)
  - COMMUNICATIONS PORT(S)

MS-DOS BASIC COMMANDS: DIRECTORY AND TYPE

DIR D: PATH [FILESPEC]   - DISPLAY DIRECTORY

  DIR B: - DISPLAY DIRECTORY OF DRIVE B:

  DIR *.BAT   - DISPLAY DIRECTORY OF FILES
                                   WITH EXTENSION ".BAT"

TYPE [D:] [PATH] FILESPEC   - DISPLAY THE CONTENTS OF A FILE

  TYPE MYFILE.TXT
  TYPE\BIN\YOURFILE.TXT

              MS-DOS BASIC COMMANDS: COPY AND RENAME

COPY [D:] [PATH] [FILESPEC] [D:] [PATH] [FILESPEC]   - COPY FILES

  COPY MYFILE.TXT B:NEWFILE.TXT

  COPY OLDFILE.DAT B:

  COPY CON QUICK.BAY

REN [D:] [PATH] OLDFILE NEWFILE   - RENAME FILE

REN B:ARTICLE.TXT ARTICLE.OLD
REN *.DAT *.LOG

MS-DOS BASIC COMMANDS: PRINT, DATE AND TIME

PRINT [D:] [PATH] [FILESPEC]   - PRINT FILE ON PRINTER

  PRINT ARTICLE.TXT

  PRINT   - DISPLAYS CONTENTS OF PRINT QUEUE

DATE [MM/DD/YY]   - SETS/DISPLAYS DATE

TIME [HH:MM:SS]   - SETS/DISPLAYS TIME

MS-DOS UTILITY COMMANDS

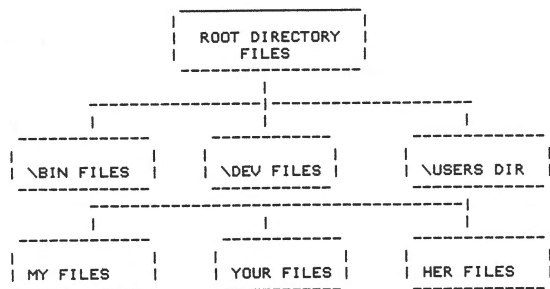CHKDSK [D:]   - SCANS THE DIRECTORY OF SPECIFIED
                                      DISK FOR ERROR

  CHKDSK E: - SCANS HARD DISK DIRECTORY

DISKCOPY [D:] [D:]   - COPIES ENTIRE CONTENTS TO DISK
                                      (TRACK-FOR-TRACK)

  DISKCOPY A: B: - DUPLICATES DISK IN A:

  DISKCOPY   - PERFORMS 1 DRIVE COPY

FC <FILE1> <FILE2>   - COMPARES FILE CONENTS

  FC NEWFILE.TXT OLDFILE.TXT

FORMAT D:[/S] [/I]   - FORMATS DISKETTES

  FORMAT B: - INITIALIZES DISKETTE WITH
                                      MS-DOS FILE FORMAT

  FORMAT B:/S   - INITIALIZES DISKETTE WITH
                                      MS-DOS FILE FORMAT AND
                                      COPIES OVER SYSTEM FILE

  FORMAT B:/I   - "HARD" FORMATS DISKETTE

MORE ADVANCED MS-DOS   COMMANDS

CTTY <DEV>   - CHANGES THE CONSOLE TERMINAL DEVICE

  CTTY AUX   - CHANGES CONSOLE TO AUXILLARY PORT

MEDIACHK [ON/OFF]   - ENABLES OR DISABLES MS-DOS PHYSICAL
                                      "MEDIA CHECKING"
                                      DISPLAYS MEDIA CHECKING STATUS

PATH [<PATH1> [<PATH2>]...]   - DEFINES WHICH DIRECTORIES COMMAND.COM
                                      SEARCHES WHEN PROCESSING EXTERNAL
                                      COMMANDS

  PATH\:\USER\JOE:\B: - SEARCH ROOT \JOE THEN DRIVE B: IN THAT
                                      ORDER

  PATH   - DISPLAYS CURRENT SEARCH PATH

PROMPT [<PROMPT TEXT>]   - DEFINE/CHANGE THE MS-DOS SYSTEM PROMPT
                                      (E.G., "A>")

  PROMPT ng   - CURRENT DRIVE + ">"(e.g., "E>")

  PROMPT pg   - CURRENT DIRECTORY + ">"(e.g.,
                                      "E: \USER")

VERIFY [ON/OFF]   - CAUSES READ-AFTER-WRITE CHECK TO BE
                                      ENABLED/DISABLED
                                      DISPLAYS VERIFY ON/OFF STATUS

MS-DOS SUB-DIRECTORIES

o TOO MANY FILES IN A DIRECTORY CAN BE DIFFICULT TO MANAGE

o THERE ARE A LIMITED NUMBER OF ENTRIES IN THE ROOT DIRECTORY

o MS-DOS PERMITS CREATION OF "TREE-STRUCTURED" SUB-DIRECTORIES
   IMPLEMENTED AS SPECIAL FILES

o EACH SUB-DIRECTORY HAS A "PATH" BY WHICH IT MAY BE REACHED FROM
   OTHER DIRECTORIES

o YOU CAN CHANGE YOURT "CURRENT" DIRECTORY TO BE ANY OF YOUR
   SUB-DIRECTORIES

o THERE IS NO LIMIT TO THE NUMBER OF ENTRIES IN A SUB-DIRECTORY

o PROGRAMS AND DATA CAN BE ORGANIZED BY "USER", FUNCTION, ETC.

```
                    ----------------------
                    |                    |
                    |  ROOT DIRECTORY    |
                    |      FILES         |
                    |                    |
                    ----------------------
                             |
         ------------------------------------------
         |                   |                    |
  --------------      --------------       --------------
  |            |      |            |       |            |
  | \BIN FILES |      | \DEV FILES |       | \USERS DIR |
  --------------      --------------       --------------
         -----------------------------------------
         |                   |                    |
  --------------      --------------       --------------
  |            |      |            |       |            |
  | MY FILES   |      | YOUR FILES |       | HER FILES  |
  --------------      --------------       --------------
```

MS-DOS COMMANDS TO ACCESS SUB-DIRECTORIES

MKDIR (MD)\DIRNAME	- CREATE A NEW SUB-DIRECTORY
MKDIR\USER	- CREATES SUB-DIRECTORY "USER" AS A CHILD OF THE ROOT DIR.
MKDIR\USER\JOE	- CREATES SUB-DIRECTORY "JOE" AS A CHILD OF "\USER"
CHDIR (CD)\DIRNAME	- CHANGES YOUR "CURRENT" DIRECTORY
CHDIR (CD)\USER\JOE	- MAKES "JOE" CURRENT DIRECTORY
CHDIR..	- MAKES "JOE'S" PARENT DIRECTORY THE CURRENT DIRECTORY
CD\	- MAKES THE ROOT DIRECTORY CURRENT
RMDIR (RD)\DIRNAME	- REMOVES SUB-DIRECTORY (MUST BE EMPTY)
RD\USER\JOE	- REMOVES "JOE" FROM TREE

MORE ON MS-DOS SUB-DIRECTORIES

o SPECIFYING A "PATH" REQUIRES A SPECIAL SYNTAX.

- A BACKSLASH ("\") PREFIXES PATH (DIRECTORY) NAME

- A "\" ALONE SPECIFIES THE ROOT DIRECTORY

- A PERIOD (".") MEANS START AT THE "CURRENT" DIRECTORY

- 2 PERIODS ("..") MEANS START AT THE "PARENT" DIRECTORY

o ASSUMING THE DEFAULT SUB-DIRECTORY HAS BEEN SET TO \USERS\YOU
   THEN THE DIR COMMANDS BELOW WILL YIELD THE FOLLOWING RESULTS:

    DIR   - LISTS FILE IN \YOU

    DIR..   - LISTS FILES \USERS

    DIR..\SAVED   - LISTS FILES IN \USERS\SAVED
                           (\SAVED IS A "SISTER" DIRECTORY)

    DIR ARCHIVE   - LISTS FILES IN \YOU\ARCHIVE
                           (\ARCHIVE IS A "CHILD" DIRECTORY)

    DIR \   - LISTS FILES IN ROOT DIRECTORY

HOW MS-DOS "WORKS"

o WHEN MS-DOS IS INITIALLY LOADED, IT INSPECTS A SPECIAL FILE,
   CONFIG.SYS FOR INFORMATION AS TO HOW THE SYSTEM IS TO BE CONFIGURED

o IN CONFIG.SYS THE USER MAY SPECIFY CERTAIN SYSTEM PARAMETERS TO
   "CUSTOMIZE" THEIR CONFIGURATION

o PARAMETERS WHICH MAY BE INCLUDED IN CONFIG.SYS ARE:

    - BREAK ON/OFF (CONTROLS FUNCTION OF CTRL/C)
    - FILES=n (NUMBER OF FILES OPEN AT ONE TIME - DEFAULT=8)
    - BUFFERS=n (NUMBER OF DISK CACHE BUFFERS - DEFAULT=2)
    - SHELL=FILENAME (COMMAND "SHELL" TO REPLACE COMMAND.COM)
    - DEVICE=FILENAME (INCLUDE LOADABLE DEVICE DRIVER)

o USER-WRITTEN DEVICE DRIVERS

   - MS-DOS ALLOWS ADDITIONAL DRIVERS (DEVICE=)
   - SUPPORT NON-STANDARD DISKS, PRINTERS, ETC.
   - MDRIVE.SYS (RAM DISK) INCLUDED

o NEXT, MS-DOS LOOKS FOR A SPECIAL BATCH FILE, AUTOEXEC.BAT WHICH,
   IF FOUND, WILL AUTOMATICALLY BE INVOKED BY COMMAND.COM AT STARTUP.

o AUTOEXEC.BAT CAN BE USED TO FURTHER "CUSTOMIZE" THE SYSTEM BY
   DEFINING DEFAULT "PATHS", SWITCHING THE DEFAULT DRIVE AND/OR
   INVOKING YET ANOTHER USER SUPPLIED PROGRAM WHICH MAY PERFORM ANY
   OTHER TASKS DESIRED BY THE USER AT STARTUP.

o IF NO APPLICATION OR UTILITY PROGRAM IS RUNNING, COMMAND.COM IS
   THE "ACTIVE" TASK WAITING FOR YOU TO ENTER A COMMAND.

o WHEN A COMMAND IS ENTERED, COMMAND.COM VALIDATES IT, LOADS THE
   PROGRAM REQUIRED AND TRANSFERS CONTROL TO IT.

o WHEN THE PROGRAM TERMINATES, CONTROL IS GIVEN BACK TO THE O/S,
   WHICH RELOADS COMMAND.COM AND GIVES IT CONTROL.

o MS-DOS IS VERY FLEXIBLE WHEN IT COMES TO DEFINING THE USER
   "INTERFACE":

o ALL COMMANDS ARE PROCESSED BY COMMAND.COM USING THE FOLLOWING
   ALGORITHM:

   1. CHECK "INTERNAL" COMMAND TABLE
   2. CHECK CURRENT DIRECTORY FOR EXECUTABLE PROGRAM (.COM/.EXE)
   3. CHECK CURRENT DIRECTORY FOR BATCH FILE (.BAT)
   4. CHECK OTHER DIRECTORIES AS SPECIFIED BY PATH AND REPEAT
       STEPS 2 & 3 FOR EACH DIRECTORY

o COMMAND.COM IS A "SHELL", WHICH MAY BE REPLACED BY THE USER IN
   CONFIG.SYS.

ADVANCED FEATURES

o UNIX-STYLE, TREE-STRUCTURED DIRECTORIES/SUB-DIRECTORIES
o UNIX-STYLE "FILTERS" - COMMANDS THAT TAKE INPUT, TRANSFORM
   IT IN SOME WAY, THEN OUTPUT IT (E.G., SORT, MORE, FIND)
o UNIX-STYLE "PIPING", ALLOWING MULTIPLE COMMANDS ON A SINGLE
   COMMAND LINE, THE OUTPUT OF ONE COMMAND BECOMING THE INPUT TO
   THE SUBSEQUENT COMMAND (E.G., DIR|SORT)
o I/O "RE-DIRECTION" ALLOWING INPUT/OUTPUT FROM/TO FILES OR
   ALTERNATE DEVICES (E.G., DIR >DIR.DIR| SORT<DIR.DIR>DIR.SRT
   PRINT DIR.SRT)

MORE "ADVANCED" FEATURES

o USER-DEFINABLE COMMAND PROMPTS
o DATE AND TIME STAMPED FILES
o "SPECIAL" EDITING KEYS WHICH ALLOW LIMITED EDITING OF COMMANDS,
   RECALL LAST COMMAND, ETC.
o FULL PRINTER SPOOLING (UP TO 10 JOBS IN QUEUE)

o POWERFUL BATCH PROCESSING WHICH ALLOWS PARAMETER PASSING, ERROR
   TRAPPING, EXECUTION CONTROL VIA LOGICAL OPERATIONS (FOR, DO, IF)

o "TERMINATE AND REMAIN RESIDENT" SYSTEM CALL ALLOWS LIMITED
   "MULTI-TASKING" VIA INTERRUPT SERVICE ROUTINES (E.G., PRINT SPOOLER)

TYPICAL MS-DOS MEMORY MAP

XXXX:FFFF

```
------------------------------------------------------------
|              COMMAND.COM (TRANSIENT PART)                |
|----------------------------------------------------------|
|            USER STACK FOR .COM FILES (32 WORDS)          |
|----------------------------------------------------------|
|        "EXTERNAL" COMMAND,UTILITY OR APPLICATION         |
|                          o                               |
|                          o                               |
|                          o                               |
|----------------------------------------------------------|
|              COMMAND.COM (RESIDENT PART)                 |
|----------------------------------------------------------|
|              "LOADABLE" DEVICE DRIVERS                   |
|                (E.G., MDRIVE.SYS)                        |
|----------------------------------------------------------|
|                     MSDOS.SYS                            |
|----------------------------------------------------------|
|                       IO.SYS                             |
|----------------------------------------------------------|
|                 INTERRUPT VECTOR TABLE                   |
------------------------------------------------------------
```

0000:0000

THE RESIDENT PART OF COMMAND.COM CONTAINS INTERRUPT HANDLERS FOR
INT 22H (TERMINATE ADDRESS), INT 23H (CTRL/C EXIT) AND INT 24H
(FATAL ERROR ABORT ADDRESS) PLUS THE CODE TO RELOAD THE TRANSIENT
PART OF COMMAND.COM WHICH CONTAINS THE COMMAND INTERPRETER, BATCH
PROCESSOR AND THE CODE FOR "INTERNAL" COMMANDS (E.G., COPY, DIR, ETC.).

IO.SYS CONTAINS ALL RESIDENT, SYSTEM DRIVERS.

MS-DOS FILE STRUCTURE

DESCRIPTION OF ATTRIBUTES

VALUE	MEANING
01H	READ-ONLY FILE
02H	HIDDEN FILE
04H	SYSTEM FILE
07H	CHANGEABLE WITH CHGMOD
08H	VOLUME ID
0AH	SUB-DIRECTORY
16H	HARD ATTRIBUTES (FOR FINDENTRY)
20H	ARCHIVE BIT

MS-DOS FILE STRUCTURE

DIRECTORY ENTRY

BYTES	FIELD DESCRIPTION
00-07H	FILENAME
08-0AH	EXTENSION
0BH	ATTRIBUTES
0C-15H	<RESERVED>
16-17H	TIME OF LAST WRITE
18-19H	DATE OF LAST WRITE
1A-1BH	STARTING CLUSER #
1C-1FH	FILE SIZE (IN BYTES)

MS-DOS FILE STRUCTURE

ON-DISK ALLOCATION
RX50 DISKETTE

TRK/SEC	
0/1	BOOTSTRAP/LOADER
2/1	1ST COPY OF FILE ALLOC. TABLE (FAT)
2/4	2ND COPY OF FILE ALLOC. TABLE (FAT)
2/7	ROOT DIRECTORY (128 ENTRIES)
2/10	DATA AREA (FILES)
	o
	o
	o

MS-DOS V2.05

DIGITAL-ADDED FEATURES IN MS-DOS V2.05 INCLUDE

- SUPPORT FOR WINCHESTER DISKS
- EXTENDED COMMUNICATIONS SUPPORT
- RAM "DISK" (MDRIVE)
- READ IBM 8/9-SECTOR SINGLE-SIDED MEDIA
- BACKUP/RESTORE UTILITY
- HARD FORMAT DISKETTES
- RDCPM (READ CP/M DISKETTES) UTILITY

MS-DOS V2.11

TIMELY OPERATING SYSTEM UPDATE/ENHANCEMENT

- NEW FEATURES
- IMPROVED INTERNATIONAL CAPABILITIES
- CORRECTS PREVIOUS BUGS
- MINI-EXCHANGE SUPPORT FOR DEVICE SHARING
  (PRINTERS AND MODEMS) BETWEEN MULTIPLE USERS
- SETPORT COMMAND TO PROGRAM COMM PORT AND SET
  UP AND MODIFY DEC SERIAL PRINTERS FROM THE
  KEYBOARD, WITH SIMPLE COMMANDS
- 8-BIT CHARACTER SUPPORT
- INTERNATIONAL CHARACTER GENERATION
  - USE 82 MULTINATIONAL CAHRACTERS FOR
    FILE NAMING AND TEXT
  - WITH COMPOSE KEY (3-KEY SEQUENCE)
- IMPROVED SORT UTILITY KEEPS U.S. AND MULTINATIONAL
  CHARACTERS IN PROPER SEQUENCE FOR FILE MANAGEMENT
  (DEC STANDARD 169)
- INTERNATIONAL SYSTEM CALL
  - EASILY INCORPORATES COMMERCIAL METRICS FOR 99
    COUNTRIES: DATE, TIME, DECIMAL POINT CONVENTIONS,
    CURRENCY SYMBOLS
  - INCLUDES METRICS FOR FRANCE, GERMANY, ISRAEL,
    ITALY, JAPAN, PORTUGAL, SPAIN, UK

DIFFERENCES BETWEEN THE OPERATING SYSTEMS

o CP/M-86/80 -VS- MS-DOS

  - CP/M-86/80 MAKES THE MOST OF HAVING DUAL PROCESSORS; MS-DOS
    CAN'T GET AT THE Z80 EXCEPT VIA RX50 DRIVER
  - MS-DOS IS A "REAL" O/S AS OPPOSED TO CP/M'S RELATIVELY
    "PRIMITIVE" NATURE
  - MS-DOS COMMANDS ARE MORE "NATURAL" (VERY DCL-LIKE) AS
    OPPOSED TO CP/M'S MORE ARCANE SYNTAX (A LA OS/8)
  - CP/M USES A VASTLY DIFFERENT FILE STRUCTURE THAN MS-DOS
  - PROGRAMS WRITTEN FOR ONE O/S CAN'T BE RUN ON THE OTHER,
    ALTHOUGH CONVERSION CAN BE RELATIVELY SIMPLE IF WRITTEN IN
    HIGH-LEVEL LANGUAGE, LIKE "C".

o CCP/M-86 -VS- MS-DOS & CP/M-86/80

  - CCP/M-86 IS A MULTI-TASKING O/S - MS-DOS & CP/M-86/80 ARE
    NOT ("SINGLE THREADED")
  - CCP/M-86'S FILE STRUCTURE IS EXPANDED TO ACCOMMODATE PASSWORDS
    AND DATE/TIME STAMPS
  - SOME FUNCTIONS IMPLEMENTED IN RAINBOW FIRMWARE ARE EMULATED AND
    ENHANCED BY SOFTWARE (E.G., SET-UP AND PRINT SCREEN)
  - CCP/M-86 REQUIRES A "LOT" MORE MEMORY THAN EITHER MS-DOS
    OF CP/M-86/80 (512 KB RECOMMENDED MINIMUM - VS - 128KB)

o MS-DOS -VS- PC-DOS (IBM)

  - THE BIOS REFLECTS THE HARDWARE IT IS RUNNING ON
  - VIDEO, KEYBOARD AND GRAPHICS VASTLY DIFFERENT SO MOST
    AVAILABLE APPLICATIONS CAN'T RUN ON BOTH MACHINES BECAUSE
    THEY "FONDLE" THE HARDWARE DIRECTLY, BYPASSING THE O/S!!!
  - IBM 96TPI DISKETTES NOT AS "DENSE" AS RAINBOW
    (9 SECTOR/TRACK -VS- 10-SECTOR/TRACK)
  - RAINBOW MS-DOS CAN READ/WRITE IBM MEDIA; IBM CAN'T DO
    ANYTHING WITH RAINBOW MEDIA

Rainbow Communications & Networking Solutions

(Session P036)

♦

by Personal Computing Systems Group

Digital Equipment Corporation

COMMUNICATIONS ON THE RAINBOW

o   HARDWARE FACILITIES

o   OPERATING SYSTEM

o   APPLICATIONS SOFTWARE

o   PROTOCOL CONVERSION

HARDWARE FACILITIES

STANDARD COMM PORT

o   ASYNCHRONOUS

o   SYNCHRONOUS

o   RS-423 ELECTRICAL INTERFACE

EXTENDED COMM OPTION

o   2 PORTS

o   ASYNCHRONOUS

o   SYNCHRONOUS

o   DIRECT MEMORY ACCESS

RAINBOW VT102 EMULATION

o   USES SET-UP

o   SUPPORTS PRINTER

o   SUPPORTS "PRINT SCREEN"

OPERATING SYSTEM SUPPORT

MSDOS 2.05

CP/M-86/80 V2

o GENERAL PURPOSE ASYNCHRONOUS

o 3 PORTS SUPPORTED

o 2 LEVELS OF SOFTWARE INTERFACES

APPLICATIONS SOFTWARE

o DEC CONNECTION

o IBM CONNECTION

o OTHER CONNECTIONS

DECnet - Rainbow

OVERVIEW

     o DNA PHASE IV END NODE

     o ASYNC DDCMP COMMUNICATIONS

BENEFITS

     o PC TO LARGE SYSTEM CONNECTIONS

     o WIDE AREA NETWORKING CAPABILITIES

     o PC USE OF NETWORK RESOURCES

     o PROVIDES FOR DISTRIBUTED APPLICATIONS

FEATURES

     o FILE TRANSFER

     o REMOTE RESOURCE ACCESS

     o NETWORK COMMAND TERMINAL

     o TASK-TO-TASK COMMUNCATIONS

     o NETWORK MANAGEMENT

CONFIGURATION

     o MS-DOS V2.11

     o 256K BYTES (64K FOR NETWORK DRIVER)

     o 100K BYTES DISK SPACE

     o 12K BYTES/NETWORK DISK DRIVER

DECnet - Rainbow (Cont.)

FILE TRANSFER

     o BI-DIRECTIONAL

     o WITH ANY MULTITASKING DECNET NODE

     o WITH IBM MAINFRAME

     o ONE STEP SERVICE

REMOTE RESOURCE ACCESS

     o FILE ACCESS

     o VIRTUAL DISK

     o VIRTUAL PRINTER

     o SUBMIT COMMAND FILES

NETWORK COMMAND TERMINAL

     o VT100 EMULATION

     o ONE STEP OPERATION

TASK-TO-TASK COMMUNICATIONS

     o NETWORK STATUS

     o FAULT ISOLATION

     o INSTALLATION/SETUP

DECnet - Rainbow (Cont.)

SUMMARY

o   A BASE TO BUILD ON

o   A NETWORKING SOLUTION

o   FULLY SUPPORTED BY DIGITAL

DCS PRODUCTS

o   POLY-COM

o   PHONELINK

Poly-COM

o   VALUE-ADDED VT100 TERMINAL EMULATION

o   ERROR-FREE FILE TRANSFER

o   REMOTE PC OPERATION

o   DEVELOPED BY POLYGON ASSOCIATES

Poly-TRM

o   VT100 EMULATION

o   SEND/CAPTURE ASCII FILES

o   PRINTER SUPPORT

o   USER-DEFINED KEYS

o   VT52/ANSI MODES

Poly-XFR

o   ERROR-FREE FILE TRANSFER

o   DEC MINIS

o   DEC SUPERMINIS

o   DECSYSTEM-20

o   DECMATE II

SWITCH

o   REMOTE PC OPERATION

o   USE RAINBOW AS A "HOST"

PHONELINK

o   COMMUNICATIONS WITH "THE BRIDGE"

o   FILE TRANSFER

OTHER PRODUCTS

o   KERMIT

o   BLAST

o   ACCULINK

o   SMARTCOM

THE IBM CONNECTION

o   2780/3780

o   3270 FAMILY

o   OTHER TERMINALS

3270 COMMUNICATIONS

Poly-BSC/3270

   o BISYNC CONTROL UNIT WITH:

       - ONE DISPLAY
       - ONE PRINTER

   o SCREEN TO DISK/PRINTER

   o DISK TO HOST

   o DIAGNOSTIC FACILITIES

   o 9600 BPS OPERATION

2780/3780 COMMUNICATIONS

Poly-BSC/RJE

   o 9600 BPS OPERATION

   o DIAGNOSTIC FACILITITES

   o MULTIFILE TRANSMIT

   o RECEIVE TO PRINTER OR DISK

   o PRE-DEFINE QUEUES

PROTOCOL CONVERTERS

3278 COAX EMULATION

o PA1000	(AVATAR TECHNOLOGIES)
o IRMALINE	(DIGITAL COMMUNICATIONS ASSOC.)
o A/C-1(B)	(BLACK BOX)
o INTERLYNX /3278	(LOCAL DATA)
o MC 80/900	(INNOVATIVE)

SINGLE TERMINAL CLUSTER CONTROLLER EMULATION

o SNA-P	(MODEMS PLUS)
o PROGRAMMABLE INTERFACE TRANSLATOR	(INCAA COMPUTERS)

3270 CLUSTER CONTROLLER EMULATION

o TRANSLATOR	(RENEX)
o DATALYNX/3274	(LOCAL DATA)
o HYDRA II	(DIVERSIFIED DATA RESOURCES)
o PCII76	(PROTOCOL COMPUTERS INC)
o PC1171	(PROTOCOL COMPUTERS INC)
o A/S-3	(BLACK BOX)
o MC 80/600	(INNOVATIVE)
o MC 800	(INNOVATIVE)

PROTOCOL CONVERTERS (Cont.)

5251 COMMUNICATIONS

- o RT51   (RENEX)
- o PCI151   (PROTOCOL COMPUTERS)
- o PQ-4(B)   (BLACK BOX)
- o MC 8051   (INNOVATIVE)

OTHER CONNECTIONS

- o HONEYWELL GRTS   (AIR LAND SYSTEMS)
- o SPERRY U100   (AIR LAND SYSTEMS)
- o NCR   (SW COMPUTER SYSTEMS)
- o SPERRY UNISCOPE   (CHI, KAUFMAN)
- o BURROUGHS POLL/SELECT (BLACK BOX)
- o HEWLETT PACKAGE   (COMMUNICATIONS RESEARCH GROUP)
- o DATA GENERAL   (COMMUNICATIONS RESEARCH GROUP)

- o POLY-COM
- o MODEM
- o CROSSTALK
- o SMARTCOM
- o MOVE-IT
- o TXL: TELEX-LINK
- o CTL: COMPUTER-TELEX LINK

LAN CONNECTIONS

- o UNINET ETHERNET CONTROLLER

- o FUSION by NETWORK RESEARCH CORP

- o OMNINET by CORVUS

RAINBOW

COMMUNICATIONS PROGRAMMING SUPPORT

o BASE SYSTEM CAPABILITIES

o EXTENDED COMMUNICATIONS OPTION

o OPERATING SYSTEM SUPPORT

BASE COMMUNICATIONS PORT

o OPERATING MODES

- ASYNCHRONOUS

- BYTE SYNCHRONOUS

- BIT SYNCHRONOUS

- INTERNAL OR EXTERNAL CLOCKING

- LOOPBACK FOR DIAGNOSTICS

BASE COMMUNICATIONS PORT

o CHARACTER SET

- 5 TO 8 BIT CHARACTERS

- EVEN, ODD, NO PARITY

o ERROR DETECTION

- VRC

- LRC

- CRC

BASE COMMUNICATIONS PORT

o STANDARDS

  - RS-232 FUNCTIONAL

  - RS-423 ELECTRICAL

o MODEM CONTROL

  - PRIMARY & SECONDARY SIGNALS

o HARDWARE

  - 1/2 NEC 7201

  - SHARED WITH PRINTER PORT

ADDRESS ASSIGNMENTS

PORT#	DESCRIPTION
02	COMM CONTROL/STATUS
06	CLOCK GENERATOR
OE	CLOCK SOURCE
40	7201-B DATA
42	7201-B CONTROL/STATUS

PRINTER PORT

o DIFFERENCES

  - IMPLEMENTED AS DCE

  - SPEED ONLY TO 9600

EXTENDED COMMUNICATIONS OPTION

o 2 PORTS

o SYNCHRONOUS, ASYNCHRONOUS

o DMA SUPPORT

o BASED ON NEC 7201
        INTEL 8237

o

PORT A

o HALF DUPLEX

o TRANSMIT CLOCK 721.6 KHz

o DATA AND CLOCK LEADS

o DEDICATED DMA CHANNELS

o RS-422 ELECTRICAL INTERFACE

o DB-9 CONNECTOR

PORT B

SUPERSET OF BASE COMM PORT

- DMA CAPABILITY

- DTE TRANSMIT CLOCK

- IDLE LINE DETECTION/GENERATION

- CLOCK SUBSTITUTION FOR CRC COMPLETION

ADDRESS ASSIGNMENTS

PORT#	DESCRIPTION
20	PORT B COMM CONTROL/STATUS
21	PORT B CLOCK GENERATOR
22	DMA INTERRUPT CLEAR
23	OPTION RESET
28	7201 CH. A DATA
29	7201 CH. B DATA
2A	7201 CH. A CMD/STATUS
2B	7201 CH. B CMD/STATUS

8237 ADDRESS ASSIGNMENTS

PORT#	READ	WRITE
60-67	COUNT & ADDRESS	BASE & CUR. ADD.
68	DMA STATUS REG.	COMMAND REGISTER
69		REQUEST REGISTER
6A		SINGLE MASK REGISTER BIT
6B		MODE REGSITER
6C		CLEAR BYTE POINTER F/F
6D	TEMP. REGISTER	MASTER CLEAR
6F		ALL MASK REGISTER BITS

OPERATING SYSTEM SUPPORT

o ASYNCHRONOUS

o COMM, PRINTER, XCOM "B" PORTS

o PRIMITIVE PROTOCOL SUPPORT

o MULTI-LEVEL INTERFACE

PROTOCOL SUPPORT

o NONE ASSUMED

o OPTIONAL XON/XOFF

o OPTIONAL "LIMITED MODEM CONTROL"

MULTI-LEVEL INTERFACE

o TASK LEVEL

o ISR USER EXIT

o DEVICE INTERRUPT

TASK-LEVEL INTERFACE

o SAME SUPPORT FOR

    MS DOS

    CP/M - 86/80

    CCP/M

o OPTIONAL USER-SUPPLIED BUFFER

o ALTERNATE XON/XOFF CHARACTER

TASK-LEVEL CONTROL CALLS

- o REPROGRAM 7201

- o RESET RECEIVE CHARACTER BUFFER

- o SET MODEM STATUS

- o START/STOP BREAK

TASK LEVEL I/O CALLS

- o GET INPUT CHARACTER (PENDED/IMMEDIATE)

- o OUTPUT CHARACTER (PENDED/IMMEDIATE)

- o OUTPUT CHARACTER IMMEDIATELY

TASK LEVEL STATUS CALLS

- o READ DEVICE SETUP INFO

- o GET INPUT STATUS

- o GET OUTPUT STATUS

- o GET MODEM STATUS

INTERRUPT SERVICE LEVEL INTERFACE

- o "USER-EXIT" ORIENTED

- o AT BEGINNING (XMIT) OR END (RCV) OR ISR

- o SELECTIVE CONTROL

ISR INTERFACE CALLS

o SET/RESET RECEIVER INTERRUPT SERVICE

o SET/RESET TRANSMITTER INTERRUPT SERVICE

o SET/RESET STATUS CHANGE INTERRUPT SERVICE

DEVICE LEVEL INTERFACE

YOU'RE THE BOSS!!!!

Rainbow Office Workstation

(Session P037)

◆

by Personal Computing Systems Group

Digital Equipment Corporation

Rainbow
Workstations

Personal Computer Choice and Innovation

VAX Systems System Solutions and Performance
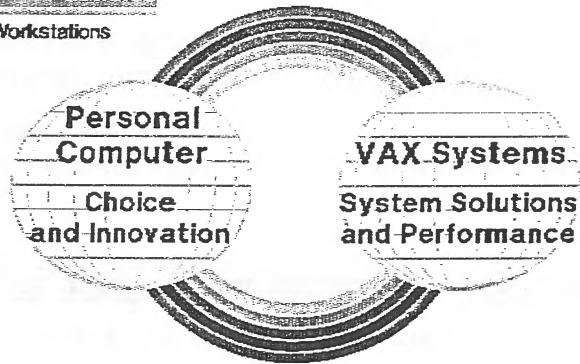
Rainbow Workstations Link
Rainbow Personal Computers
to
VAX Computer Systems

Personal Computing Characteristics

- User chooses from wide array of innovative software

- User works at own pace

- Equipment is inexpensive and easy to use

But the user works in isolation

Multi-User System Characteristics

The User is part of a system:

- Users share common, current, information
- Powerful resources available like DATATRIEVE and ALL-IN-1
- Communications networks link users together
- Gateways access mainframes and other info resources

But has no independence

Rainbow Workstations

The best of both worlds...

- Personal computer flexibility
- Large system communications, power, data access

Without compromise to either

The Rainbow Office Workstation

A software connection with simple menus consistent with Digital's other Office Workstations...
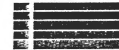
Rainbow Workstation Features

- A software link between Rainbow and VAX Systems
- Simple menu access to both VAX and Rainbow applications and resources

The Rainbow Office Workstation Features

- User shell invokes personal computer applications
- Transparent communications with VAX
- Electronic Postmaster
- Rainbow System Server
- Personal Computing Manager

One Simple Menu System

Menu-Driven Shell
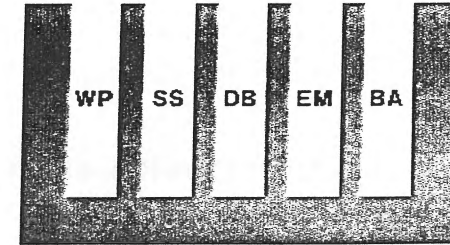
Your Choice of Applications from One Simple Menu

Menu-driven Shell for
Personal Computer Applications

- User selects preferred MS-DOS spreadsheet, word processor, database manager, and business application
- Selected application loads with a two-character command from the menu
- Menus styled for both novices and experts

**Personal
Computer Applications
Plus
Transparent
VAX Communications
on
One Menu**

Transparent VAX Communications

- Two-character command connects user to host and logs in
- Communications script can handle any access procedures
- Password kept secure through software encryption

Transparent VAX Communications

- Connect to VAX DATATRIEVE using menus
- Convert DATATRIEVE extracts into Rainbow MS-DOS formats automatically
  - DIF, SYLK, ASCII
- Analyze with any MS-DOS spreadsheet without re-keying

Transparent VAX Communications

- Connect to ALL-IN-1 Office Information Systems from workstation menu
- No re-orientation necessary to users of ALL-IN-1
- Menus consistent with other Digital Office Workstation menus

Transparent VAX Communications

- Connect to VAX as a terminal
- Send and receive files easily with two-character commands

Electronic Postmaster

- Send and receive mail at four pre-selected "mail runs" or instantly
- Choose preferred text editor for mail
- Edit mail locally to offload VAX

Rainbow System Server

- Back-up MS-DOS personal computer files to the VAX routinely, day or night
- Automatic and unattended, or upon request
- "Smart" backup sends only newly created or edited files

Personal Computing Manager

- Lets up to 5 people share the same Rainbow
- Organizes data under a Cabinet/Folder structure
- Offers simple commands for manipulat' personal computer files and directo'

Rainbow and VAX Work as One

- Consistent User Interface
  - Reduces training, confusion, and error

Rainbow and VAX Work as One

- Offload generic functions

  - Local flexibility and control
  - More users per VAX
  - Lower cost per user

Rainbow and VAX Work as One
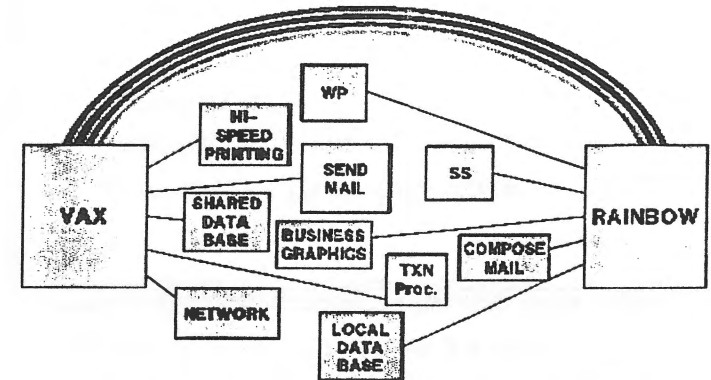
Put the task where it makes the most sense

Rainbow and VAX Work as One

Runs all categories of software

- Industry standard
- Host applications
- Distributed applications
- Cooperating industry standard and host applications

Rainbow and VAX Work as One

RIGHT INFORMATION

RIGHT TOOLS

RIGHT ANSWER

RIGHT PLACE

RIGHT NOW!

Benefits to the Corporation

- Maximizes efficiency of computing resources
- Adds user functionality without increasing demands on system personnel
- Makes current data available throughout corporation while retaining data control

Benefits to the Corporation

- Increases employee satisfaction by respecting individual computing preferences
- Simple interface reduces confusion and retraining
- Protects data by ensuring back-ups are done

Benefits to Department Managers

- Shows ongoing commitment by Digital to protect your investment
- Makes efficient use of VAX by offloading personal tasks
- Lets your staff use their favorite personal computer applications with data from VAX

Benefits to Department Managers

- Increases productivity by transferring VAX data to personal computer without "paper chases" or re-keying of data
- Ensures that your staff can access the most current data
- Automatically makes sure that your staff has file back-ups

Benefits to Department Managers

- Offers flexibility in planning growth
- Establishes low-cost linking standard
- Offloads VAX of personal tasks

Benefits to System Managers

- Simple but powerful solution
- Needs no special hardware
- Single simple interface for both VAX and Rainbow reduces training and support
- Provides data base access to users while you retain control

Benefits to System Managers

- Satisfies users' software needs without your support
- Built-in help keeps your users productive without your support
- Provides automatic back-up to VAX as inexpensive alternative to streaming tape drives

Benefits to System Managers

- Offloads mail creation, editing, display and filing to maximize host performance
- Supports all Digital mail products with no conversion
- Improves load distribution and minimizes comm cost through automatic scheduling
- Provides shared print and comm services to users

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Benefits to Users

- Add VAX resources and power, but keep the personal computer software you already know
- Access all personal computer applications and VAX resources from one fast menu system
- Share data easily
- Move latest VAX data into your favorite personal computer application automatically

Benefits to Users

- Be a user, not a computer expert
- Perform complicated functions transparently by simple menu commands
- Use the same text editor for word processing and mail editing
- Share expensive peripherals
- Have backups of data performed automatically after hours

The Rainbow Office Workstation in the Office Environment

- Interface consistent with ALL-IN-1
- Provides generic ALL-IN-1 functions locally
- Integrates industry standard software and ALL-IN-1

The Rainbow Office Workstation in the Engineering Organization

- Highly productive low-end workstation for engineers
- Four software slots in user shell may be loaded with any desired MS-DOS applications
- Performs decision support, word processing and electronic mail locally

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The Rainbow Office Workstation in the Engineering Organization

- Drawings may be transmitted through a VAX network for review or correction
- Drawings may be transmitted to VAX-based CAD system such as Intergraph for inclusion in larger design project

Manufacturing Environment Scenario

- MRP data extracted from DATATRIEVE and converted automatically into MS-DOS formats
- Data entered into Lotus 1-2-3 with two-character command
- Graph made using Lotus 1-2-3
- Results included in mail message to other manufacturing personnel

Rainbow Requirements

- 256K of memory or more (640KB recommended)
- 5MB, 10MB, or 20 MB hard disk
- MS-DOS Operating System V2.11
- poly-COM Communications Software (included)
- Modem or hard wired connection

Optional:

- PC1XX-BA Graphics Option Board
- MS-DOS spreadsheet, word processing, data base management and other software

VAX Requirements

- VAX/VMS Operating System
- poly-XFR Communications Software for VAX/VMS

Optional:

- ALL-IN-1
- DATATRIEVE
- DECmail

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ALL-IN-1	Digital logo	RSTS
DEC	EduSystem	RSX
DECnet	IAS	RT
DECmate	MASSBUS	UNIBUS
DECsystem-10	PDP	VAX
DECSYSTEM-20	PDT	VMS
DECUS	P/OS	VT
DECwriter	Professional	Work Processor
DIBOL	Rainbow	