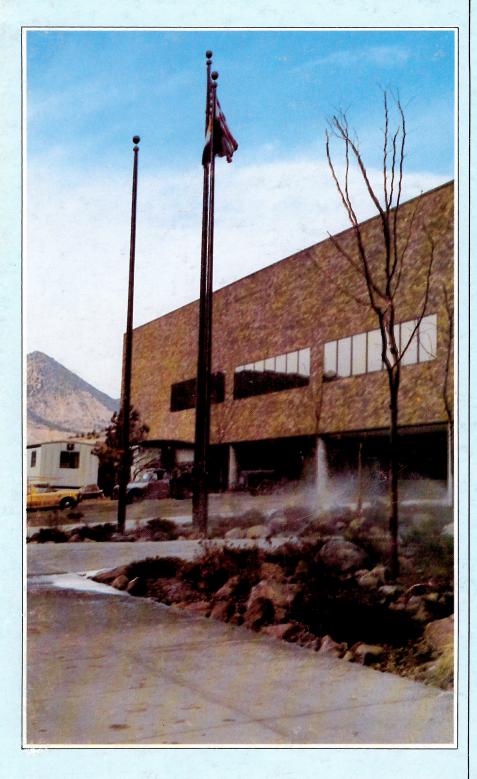
RSTS PROFESSIONAL

Volume 3, Number 3

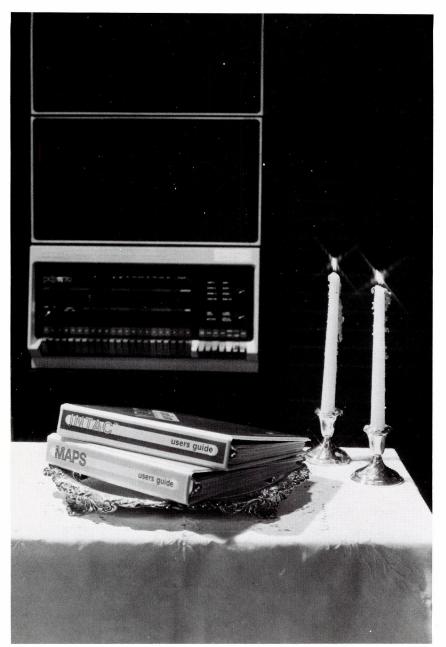
September 1981

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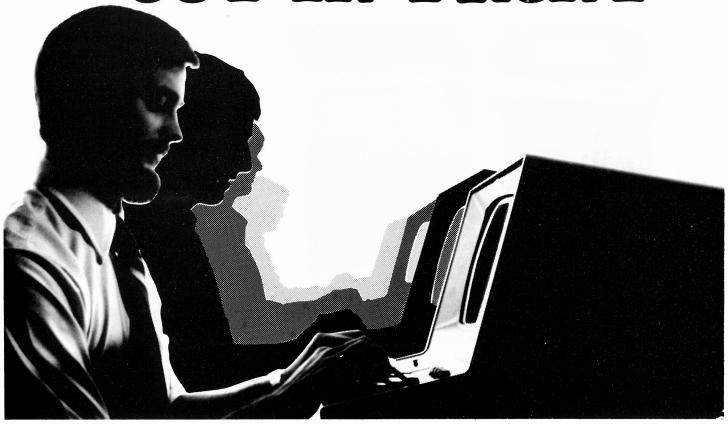
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- Report from UK RSTS Sig.
- The Vax Scene/ A RSTS to Vax Conversion
- More RSTS Internals by Mike Mayfield
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From the editors...

Dave Mallery

Yesterday I spent about 12 hours trying to make a megabyte 11/40. No one has ever made one before — in fact, it probably never entered the original architect's wildest dreams. I was working with several of the finest engineers I have ever met in an atmosphere of 'lets roll up our sleeves and make it go.' It didn't go, but it will.

The scene in that computer room was one of the high points of my career. I tend to wax philosophical at times, and this was one of them. Here we were, one of the senior design engineers in the industry, a RSTS internals man of the highest caliber, a regional sales manager whose hardware and software expertise overshadows most 'gurus' and yours truly using logic analysers, home made diagnostics and raw intuition to shoot a wierd glitch in the interaction of RSTS as it is initialising itself with the widest selection of foreign peripherals you ever saw - all to make a ten year old design cpu see a megabyte of 64k chips. There's more logic on any board in the backplanes of that machine than the entire cpu, yet that old cpu is such a supurb engine that all the effort is worth while.

What is it that justifies all that hipriced effort on a ten year old PDP-11? Simple — it runs RSTS.

Last month, I spent a day wandering through two floors of the New York Colesseum for the COMDEX show. That is a show for micro-computer manufacturers and distributors. I saw about fifty variations of the same machine — an 80nn processor with a 10 or 20 MB winchester running endless variations of cp/m based 'operating systems'. Everyone was telling me how they were going to have UNIX real soon and that would be the promised land. The trouble with all these systems is that the software (operating systems) for them is TERRIBLE (You think VAX has it bad!). Then, in a corner of the exhibits, without much fanfare and hoopla, I saw the giant killer. A box containing an 11/23 and a winchester, much like the others, except for one big difference. If you type ctrl/c, it says 'Ready'.

All DEC has to do to sweep that entire industry into the trash heap is to make a realistic oem RSTS license agreement for 23's. The hardware is priced right... how about the software???

THANK YOU

Carl Marbach

In New Orleans in 1979 Dave and I attended the DECUS meetings at the OMNI hotel. The RSTS SIG was in an uproar over funding for the SIG and its activities. DEC, they said, wanted to be less involved in paying for things like our newsletter; we were

going to have to pay for it ourselves. As a contributor to that infrequent and too small document I was concerned: I looked forward to its arrival even if it was only twice a year or so (there seemed to be no real schedule). Frankly, it didn't seem worthy of a price but, I thought, we could really have a dynamite newsletter! Paid authors, color, professional typesetting, advertising, regular columns, and a real schedule we could count on . . . this wasn't a newsletter it was . . .

I turned to Dave and said out loud for the first time, "what we need is a MAGAZINE". Without being too dramatic, the RSTS PROFESSIONAL was born in that meeting room. Can we? Could we? Will we? We did! But not without lots of help. We are indebted to our authors for their knowledge and their perseverance in turning it into the written word for all of us to read. We are indebted to our advertisers who went out on a limb with us, especially in the first issue when we didn't even exist in the real world. But we are most indebted to our readers: YOU. Without a readership that has continued to grow beyond our expectations (we print 7000 issues of what you are now reading), without the constant feedback we need to make this a better magazine, without your contributions of articles, and without your financial support we could not be where we are today. Even today, our "tell a friend" and the bounty hunter program are our best source of new subscriptions and sale of the classic back issues.

RSTS is indeed something special. What other operating system could have a Magazine like the RSTS PROFESSIONAL. People are amazed to find a magazine directed toward one type of computer usage, but RSTS has blazed the way for real "user friendly", "full featured", "robust", and functional operating systems. It is the standard that VMS will be measured against, the goal that the RT11 people will shoot for (and make), and a classic in the Computer Hall of Fame. You did it! Never forget, it is people who make things great, and it is all the great applications that are out there that have made RSTS what it is.

We are saying "thank you". Not only in words but in deeds as well. The wealth of material we have been getting is growing all the time, and we hate to hold any of it up for even one issue, but we can't fit any more in the size book we are putting together now. Therefore we offer the following two "thank you's":

First: Our December issue will be our gala second anniversary issue and will have 116 pages instead of our normal 100.

Second: Beginning in 1982 the RSTS PROFESSIONAL will be coming to you every other month, six times a year! As RSTS grows into the 80's we need the extra coverage to keep all the good things coming. So beginning in 1982, you'll be able to see us in February, April, June, August, October and December. — Thank you.



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LETTERS to the RSTS Pro...

Send letters to: Letters to the RSTS Pro, P.O. Box 361, Ft. Washington, PA 19034.

Dear Mr. Marino:

First, I would like to praise your new column in RSTS Professional on benchmarks. I think it gives much needed information and am looking forward to future issues. There are a couple of questions I would like to see answered in your column.

I am wondering what kind of performance increases I can realistically expect by adding cache (KK11-A) to an 11/34A that is running RSTS/E v 7.0. DEC says in their literature that a typical program 'could' execute in 40% less time. Their 40% figure comes from using 80% hit ratio with 80% memory reads. Are these figures applicable to a RSTS/E site running application software written in BASIC-plus? Also, what kind of performance can we get from larger foreign caches that hang on the UNIBUS such as ABLE CACHE/434?

These questions stem from the fact that our 34 is beginning to feel the effects of running approximately 25 jobs with about 6 to 8 active at any one time. I am wondering if cache would not be a way of getting a good return on investment.

Keep up the good work.

Sincerely,

Ed Horst, Elkhart, IN

RICHARD???

Dear Sir,

\$REORDR - Sorting Alphabetically

Your readers may be interested in this slight variation to \$REORDR which allows it additionally to sort the directory in alphabetic order as well as the normal date and time sorts. This can be useful if you want to look for a particular filename in a directory. I have found it helpful for program development directories where one tends to have a mass of files and date order is not so interesting, but names are. The attached source file \$REORDR. APP should be appended to REORDR.BAS and then compiled to \$REORDR.BAC < 124> or whatever it is called in a particular system.

G.T.A. May, Special Systems Division Software Sciences Limited, UK

P.S. I've attached an installation process and demonstration run. You've got to follow the installation process else RSTS Basic Plus runtime system screws you up because I've redefined function FNI%.

George, thank you. "\$REORDR - Sorting Alphabetically" is scheduled for the December 1981 issue.

Dear RSTS Pro,

At the Spring Symposium I got the impression that few people know of the dangers and loopholes of an unsecure RSTS system. There are many ways of getting into a system that has not had the relevant safeguards built in. I have been in RSTS for six years and below are a few that I have come across.

- 1. 1,2 password SYSLIB.
- 2. 1,1 password same as pack id.
- 3. Control C to 'Command file name?' prompt on tart up.
- 4. Temporary access to a privileged account, copy UTILITY.SAV < 232> to your own account, then rename; change PWs of privileged account when access wanted. Hence check that no dangerous cusps have protection code < 232>, even in (1,2).
- 5. If KB0 (or any KB used by a privileged user) is not set to PRiveleged in SET sub option, then a non privileged user can OPEN 'KB0:' and mimic LOGIN, hence receiving a privileged password as input. He could then login to the privileged account and run a pre-compiled program in his account to log the unsuspecting user in.

Graham Dare, Systems Support Manager Ladbroke Hotels, Holidays & Taverns Watford, England

Thanks, Graham, now not only do we know the dangers—we also know the loopholes.

Dear RSTS Pro:

First, I wanted to let you know that I have been enjoying your magazine a great deal. It's really fantastic to have a magazine devoted to RSTS!! Secondly, I wanted to thank

the folks at Software Techniques for their contributions. I did, however, find a minor problem with the Minidebugger (DEB, a Basic-Plus 2 Mini-debugger, RSTS Professional, Vol. 3, #2). If your compiler includes the patch to make \$CODE and \$PDATA read-only psects (patch seq. 45.2.12) the goto and resume functions will not work. This is because the routine depends on psect placement to determine some addresses. The cure is simply to make the \$CODD and \$CODF psects in the debugger read-only psects (ie: .psect \$CODD,RO).

Again, thanks for a great magazine.

Dave Patterson, Programer/Analyst Sivalls, Inc., Odessa, Texas

You're welcome, Dave. And, a "thank you" to you also — our readers help make it possible.

Dear RSTS:

I am very thankful for the many useful articles in the RSTS PROFESSIONAL dealing with disk optimization and monitor internals. I have been making good use of the information found in some of the articles in your March '81 issue, but I have found some problems and inaccuracies I'd like to convey:

On "Disk Structure Notes" by Dave Mallery:

Point #4 you said "Dump the SATT". This is disastrous, I think, for a RSTS pack. Could you explain more?

Point #10, you said creating a non-deletable zero length file would save the contiguity of a UFD. Upon close inspection, I've found that zeroing such an account will reduce the size of the UFD to one cluster — hence zeroing a UFD will break it up in any case.

On "All Things BRIGHT . . . "

This program was very helpful. I used what was in it to write another program, too.

The only problem I found was at line #9040 — if "ROOT%" is negative, the error "Interger Overflow" would occur. ROOT% would have to be an F.P. variable to work for such large disks.

Enclosed is a listing of a program we use to create accounts (UFD's). It will create an extended, contiguous account, on line, placing it near the center of the pack. Please feel free to publish if you wish. Thank you.

Sincerely.

James Swanson, Systems Analyst Area Two Educational Computer Center

Thank you, James. Readers can find your program "CREATE.BAS" on page 26 of this issue.

Response from D. Mallery: Point 4 - "I meant, inspect the satt to see how far towards the center we have progressed (the SATT algorithm assigns from lo to hi end)."

Hopefully you're planning to publish the VMS Professional soon. Please advise date of charter issue and put us on waiting list.

Stanley J. Swikart, Dublin, Ca.

Will do, Stanley.

Gentlemen,

Is this a record?

```
UT LIST CCL
SÉTOST-=[1,2]NET.TSK;PRIV 30000
NETRST-=[1,2]NET.TSK; PRIV 30000
DEC-ATH=[81,0]DECATH.BAC;PRIV 32000
ATT-ACH=[1,2]LOGIN.*;FRIV 30000
ATP-K=E1,23ATPK.*;PRIV 30000
@-=E1,23ATPK.*;PRIV 30000
BAC-KUP=E1,5JBACKUP.*;PRIV 30000
RES-TOR=[1,5]BACKUP.*;PRIV 30000
BCK-=E1,2]RMSBCK.TSK;0
BP2-IC2=E1,23BASIC2.TSK;30000
BPC-REF=[1,2]BPCREF.*;30000
BYE-=[1,2]LOGOUT.*;PRIV O
CNV-=E1,21RMSCNV.TSK#O
COB-OL=SY:E1,23COBOL.TSK;0
MRG-=SY:[1,2]MRG.TSK;0
RFM-=SY:[1,2]RFM.TSK;0
CRE-ATE=[1,2]EDIT.*;30000
DBUC-=C1,23DBUILD.*;0
DBUD-=Ely2JDBUILR.**;O
DEF-=01,23RMSDEF.TSK;0
DEN-=01,23RMSDEN.TSK)O
DES-=01,23RMSDES.TSK;0
DIS-MOUNT=E1,23UMOUNT.*;PRIV 30000
```

```
DI-RECTORY=E1,23DIRECT.*;PRIV 30000
USP-=E1,23RMSUSP.TSK (0
DTR-=E1,2JDTR.TSK#0
EDT-=[1,2]EDT.TSK;0
ED-IT=C1,2JEDIT.*;30000
FOR-M=[1,2]INDSHW.TSK;30000
F4-RAN=E1,23FORTRA.SAV;0
FIT-=E1,23FIT,*#PRIV 30000
FOCC-=E1,23FOCOMP.*;0
FOCR-=E1,23FOCOMR.*;0
SHWIND-=E1,23INDSHW.TSK;30000
FMP-=E1,23INDFMP.TSK;PRIV 30000
HELLO-=E1,23LOGIN.*;PRIV 0
HELP-=E1,23HELP.*;FRIV 30000
IFL-=E1,23RMSIFL.TSK#0
IND-ENT=[1,2]INDENT.SAV;30000
LBR-=E1,2JLBR.TSK;0
LIBR-=[1,2]LIBR.SAV;8208
LIN-K=E1,23LINK.SAV;8208
LOG-IN=[1,2]LOGIN.*;PRIV 0
LOOK-=[1,2]PIF.SAV(PRIV 30000
MACR-0=[1,2]MACRO.SAV;8216
MAC-=[1,2]MAC.TSK;0
MAK-E=[1,2]TECO.TEC;0
MOU-NT=E1,23UMOUNT.** PRIV 30000
MU-NG=E1,23TEC0.TEC;0
PAT-=C1,23PAT.TSK;0
PIP-=[1,2]PIP.SAV)8208
PL-EASE=[1,2]PLEASE.*;PRIV 30000
QU-EUE=[1,2]QUE.*;PRIV 30000
RMC-=E1,2JRMCOPY.BAC;PRIV 30000
RFG-=E1,2JRPG.TSK)FRIV 30000
ASN-=E1,2JRPGASN.TSK;PRIV 30000
ESP-=[1,2]RPGESF.TSK;PRIV 30000
RST-=E1,2]RMSRST.TSK;PRIV 0
TTY-SET=C1,23TTYSET.**PRIV 30000
SRT-=[1,2]SORT.TSK;0
SU-BMIT=[1,2]QUE.*;FRIV 30000
SW-ITCH=E1,23SWITCH.*;PRIV 30000
SY-STAT=[1,2]SYSTAT.*;PRIV 30000
TE-CO-E1,2JTECO.TEC;0
TKB-=[1,2]TKB.TSK;0
TY-PE=L1,2JTYPE.TEC;8
UT-ILTY=E1,2JUTILTY.*;30000
VT50-=61,23VT50FY.*;0
VT52-=C1,23VT52FY.*;0
COMTKB-=E1,23COMTKB.BAC;0
CLAS-=DB2:E103,OJDASCTL.TSK)O
FREU--DB2:[104,0]DASCTL.TSK;0
CHAINS-=DB2: C104, O1CHAINS. TSK; O
CLABAT-=DB2:0103,01CLABAT.TSK;0
SPS-=DB2:[103,0]SPSSEL.TSK;0
SEND-=01,93SEND.TSK#PRIV 30000
MAIL-=[1,9]MAIL.TSK;PRIV 30000
NIP-=[1,2]NIP.*;PRIV 30000
TLK-=[1,2]TLK.*#PRIV 30000
NET-=[1,2]NET.*;PRIV 30000
NCP-=E1,23NCF.*;30000
NFT-=E1,21MFT.TSK;0
VT-EDIT=[1,2]VTEDIT.TEC;PRIV 0
```

Kuada

Anonymous

If it's not it ought to be! See "CALLER.BAS" in the December 1981 issue and eliminate all this and save 98 small buffers. Did you enjoy seeing "the picture" last issue?

DO YOU REMEMBER THIS?

(Photo contest, RSTS Professional, Vol. 3, #2, p. 93.)

Photo contests appear in the RSTS Professional occasionally and readers have until publication of the next issue to submit their answers. We may, from time to time, limit the number of correct answers eligible to receive prizes.

Because we have not received a correct answer — this contest continues.



... continued on page 95

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The RSTS/E Benchmarks Part II

By Richard A. Marino, Data Processing Design, Inc.

In the last article I briefly defined benchmarking. Now we will look at one particular type of benchmarking — component benchmarking. This type of benchmarking compares a benchmark environment by measuring a single component. A component may be a program, a job stream, or even a single action. The purpose of a component benchmark is to measure differences in the benchmark environment and from this information determine characteristics of both the environment and the component.

Let's start with an example. One part of building a RSTS/E Version 7 system is the assembly of various files that are part of the monitor. One of these is the assembly of the file TTDVR.MAC (the terminal driver). The lines in the SYSGEN.CTL file which perform this task looks something like this:

R MACRO *TTDVR.TTDVR/C=COMMON.KERNEL,CONFIG,CHECK,KBDEF,TTDVR

This assembly requires no user interaction and is a good measure of the performance of a cpu and disk since the activity requires both extensive processing and plenty of i/o. For our test we have eliminated the listing part of the assembly and are using the command file in figure 1. If you want to duplicate this component benchmark use this command file and modify a CONFIG.MAC from any previous sysgen using the information in figure 2.

The purpose of this component benchmark is to evaluate the effect of cpu and disk combinations on this assembly. In order to provide the widest possible range of environments, we performed the assembly on both RT-11 and RSTS/E systems. This is very straight-forward since the assembly on RSTS occurs under the RT-11 run time system using a standard version of the RT-11 Macro assembler. The various environments are shown in figure 3. Since in all cases the environment was a single job environment, the amount of memory was not particularly relevant to this benchmark. Note, however, that while the amount of total physical memory does not impact this component benchmark significantly (a fact confirmed independently) this is not always the case, and one should be careful when benchmarking across operating systems.

The results are shown in figures 3 and 4. The elapsed times progressed about as one would expect given the differences in the environments. Some conclusions can be drawn concerning this particular component (the assembly of TTDVR.MAC):

- 1. An 11/23 with RXO2's is faster than an 11/03 with RL01.
- 2. Using an RXO2 in combination with an RLO1 is not much better than just using the RXO2.
- 3. An 11/44 is only slightly faster with RK07s than with an RL02.

4. An 11/70 with an RP06 is not much faster than an 11/44 with RK07.

What value are these conclusions? If you were planning for example to upgrade your system and a significant part of your system load were programmers doing assemblies, this type of benchmark might help you make your selection of new hardware. In this case you would certainly consider an 11/23 RL01 based system over an 11/34 RL01 system (less than 10% difference). Further you would probably choose the less expensive 11/44 RL02 system over the RK07, RM02, or 11/70 system.

This particular component benchmark was intentionally limited in its scope. You would need some further work to establish that a multi-user environment would perform the same.

Our second example of a component benchmark deals with much less hardware but a more complicated problem. The screen editing component of two of DPD's products, the WORD-11 word processing system (for documents) and the WAFE editor (for text files) are essentially the same. Each is a full-screen editor with keypad and keyboard functions. Each also is a complete editor not a pipeline editor (like TECO, or EDIT). This means that one can backup to the top of the file at any time. This one feature significantly complicates the editor since it must keep track of text it has passed and how to display it. The display format I should mention is changable throughout the document or text file by using 'rulers'.

Both of these products are available on a wide range of systems (since 1977 on RSTS/E for WORD-11). However the smallest hardware configuration has typically been an 11/34 with some 11/23's just now starting to be used. Written in a portable version of MACRO-11, the software itself is transportable, the question we needed to answer was what would the performance be on very small systems.

We converted the editor to run under RT-11 Version 4 and then set out to measure its performance on four very small benchmark environments:

- 1. 11/03, dual RX02
- 2. 11/23, dual RX02
- 3. 11/03, RL01 (equivalent)
- 4. 11/23, RL01 (equivalent)

In contrast to the example of the macro assembly, the editor is an interactive program and has many different features and operations. We decided to measure several typical operations:

- 1. Entering the Editor (Startup)
- 2. Display one screen (Move and display 7000 characters)
- 3. Move 10 pages (Move 35000 characters, display 7000)
- 4. Finish the Edit (Write the output file)

SISUSE

Oregon Software Sort-1-Plus

... I would like to single out two of the many products that I have personally bought and paid for. The first is OMSI Sort Version 1.6. I have used OMSI Sort since its original release as a macro replacement for SQWIK and MQWIK, the old DEC type-1 header sort. It was the best software buy I ever made, yielding staggering reductions in run time. Version 1.6 contains the final additions to a fine product - the macro rendition of XQWIK and OQWIK, the extract and reordering portions of the sort. Amazingly fast and truly flexible. Bravo!

Software Techniques DISKIT

The second entrant to my 'Hall of Fame' is a package from Software Techniques called DISKIT.

... Using DISKIT, I created 130 accounts and fully extended their centred UFD's in three minutes and forty seconds (a job that used to take four to eight hours). I then copied the full contents of a 300 Mb RM05 equivalent to this new 'well structured' disk in 45 minutes, optimising clustersize and contiguity in the process. I (for once) was speechless... The documentation is excellent. In short, this package is the 'final solution' to structured disks, eliminating all of the time and complexity and reducing the job to one of the simplicity of a SAVRES.

Editor Dave Mallery reprinted from March 1981 RSTS Professional magazine

Recommended by RSTS Professional Now available from RTP.

- * Is a complete replacement for \$SORT - no other software required
- *Sorts in excess of 32767 records
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DISKIT, DSU are trademarks of Software Techniques. Inc. Los Alamitos, Ca.

The results shown in figures 5 and 6, were interesting. Some conclusions are:

- 1. Invoking a program is, understandably, very disk speed dependent. The size of the editor (120 blocks) makes its startup time on floppy disks very slow (23
- 2. Display speed is cpu intensive. More so than expected. Disk speed plays only a minor part in how fast one can move in a document or file by small amounts.
- 3. Finishing an edit is disk bound.

What do these conclusions mean? Primarily, if one was engaged in editing a few documents, but each edit con-

sumed a long time, a faster processor is better than a faster disk. For frequent, small edits, a faster disk makes a lot of difference.

From this component benchmark we arrived at some answers, but since we were surprised at the cpu intenseness of displaying characters we decided to also look at the cost of printing. For the word processing system the print spooler does not simply copy a file to an output device. It must do much of the complicated work and in fact determines spacing, line wrapping, page breaks, proportional spacing, footnotes, and many other things itself. We did a short and simple component test of the spooler on the same configurations:

- 1. Start the spooler
- 2. Scan past 32000 characters without printing
- 3. Print one page

The results are shown in figures 6 and 7.

Here we were not very surprised. Startup was again very disk bound (the spooler is approximately the same size as the editor). Scanning past characters involves all the work of printing except the actual physical printing (since the spooler must still count lines, etc.) and this time was comparable to that of the editor, given that the editor must do extra work to enable the user to backup in a document. Printing was as expected somewhat cpu intensive. Except for program startup, printing is essentially cpu bound.

This implies several things. First, on a small floppy disk system, it is much better to print one document of 50 pages than 5 of ten pages, but if you are going to print 5 of ten pages, try to print them all at once and only invoke the spooler once. Finally, although the spooler is cpu intensive, by itself on an 11/03 it probably can still drive a 1200 baud

> printer continuously. Only printing to a fast printer, multiple devices or providing simultaneous editing and printing would the faster processor really help.

> These examples of component benchmarks demonstrate what simple elapsed time benchmarks can do if they are well planned and well executed. Often times it is not the physical activity of benchmarking that is difficult but the planning and the interpretation of the results. Hopefully these examples have given you some ideas for benchmarks on your system.

> Component benchmarks though are only part of the picture. In future articles we will examine program instrumentation, a method to measure specific program performance, operating system options and how they affect peformance, combined and system benchmarks which are methods to measure the performance of multiple components, and hardware contributions to performance.

This is a partial listing of the

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│ □ CONTRL	□ IMAGE	□ LOCK	
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Phone ()_	7		
Company			
Address			
City			
or call	Janet (617)275	5-6642	

ERMINAL TYPES
ERMINAL TYPES

KL11	#	1.	;# OF KL11 TYPE INTERFACES (INCLUDING CONSOLE)					
PK11	#	4.	;# OF PSEUDO-KEYBOARDS					
DH11 DM11BB DHONL DH1NL	= = =	2. 0 16. 16.	;# OF DH11 MULTIPLEXERS ;1 IF DM11BB'S; ELSE O ;NUMBER OF LINES ENABLED ;NUMBER OF LINES ENABLED					
DZ11 DZ11AB DZONL DZ1NL	= = =	2. 1 8. 8.	;# OF DZ11 MULTIPLEXERS ;1 IF DZ11A/B'S; ELSE 0 ;NUMBER OF LINES ENABLED ;NUMBER OF LINES ENABLED					
; TERMINAL	; TERMINAL OPTIONS							
MULTTY EKOCTL	=	1 1	:1 IF MULTI-TERMINAL OPTION; ELSE 0 :1 IF ECHO CONTROL OPTION; ELSE 0					
; DISKS								
CNT.DB	=	2.	;# OF RPO4/5/6'S; ELSE 0					

; OTHER DEVICES

LP11

TM02	=	1.	:# OF TU16/TE16/TU45/TU77'S; ELSE 0

;# OF LINE PRINTERS; ELSE O

; SYSTEM PARAMETERS

2.

JOBMAX	=	48.	;MAXIMUM # OF JOBS
LOGICL	=	50.	# OF SYSTEM WIDE LOGICALS
QSTATS JSTATS DSTATS	= = =	1 1 1	;1 FOR QUEUE STATISTICS ;1 FOR JOB STATISTICS ;1 FOR DISK STATISTICS

FIGURE 1

11/03, RX02 Single Floppy
11/03, RX02, "RL01" Winchester
11/03, "RL01" Winchester
11/23, RX02 Single Floppy

11/23, RX02, "RL01" Winchester
11/23, "RL01" Winchester
11/34, RX01, RL02
11/34, RL02
11/34, RL02 (RSTS/E)
,
11/44. RL01
111111111111111111111111111111111111111

11/44, RL02 11/44, RL02 (RSTS/E) 11/44, RK07 (RSTS/E)

11/70, RP06 (RSTS/E)

Unless otherwise indicated, the operating system is RT-11 V4. The "RL01" Winchester is the Data Systems Design DSD 880. The macro assembler from RT-11 Version 4 is being used.

FIGURE 2. Environments

CONFIG.MAC file used in the sample macro assembly component benchmark. It includes only the non-zero values in that file.

Processor	Disk(s)	Elapsed Seconds
11/03	RX02	403
11/03	RX02 + RL01	386
11/03	RL01	262
11/23	RX02	243
11/23	RX02 + RL01	228
11/23	RL01	143
11/34	RX01	278
11/34	RX01 + RL02	250
11/34	RL02	131
11/34 RSTS/	'E RL02	140
11/44 11/44 RSTS/ 11/44 RSTS/		79 83 82
11/70 RSTS/	'E RP06	68

FIGURE 3. Macro-11 Assembly (TTDVR)

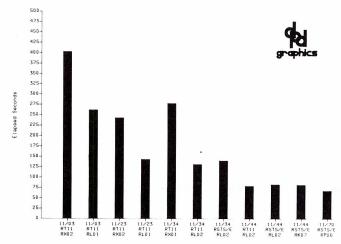


FIGURE 4. Macro-11 Assembly Time (TTDVR)

Editor

Elapsed Time in Seconds

	Component Activity	11/03 RX02*	11/23 RX02*	11/03 RL01**	11/23 RL01**
	Inter Editor (Startup) Move/Display 7000 characters	24 78	22 43	6 71	5 36
2000	Nove 35000 characters Tile Document (End)	107 27	71 25	81 5	43 5

^{*}RX02 was Digital Dual RX02 drive on VT103 using both drives.

FIGURE 5. WORD-11/WAFE Component Benchmark

^{**}RL01 was DSD 880 Winchester RL01/2 equivalent on VT103, single drive.

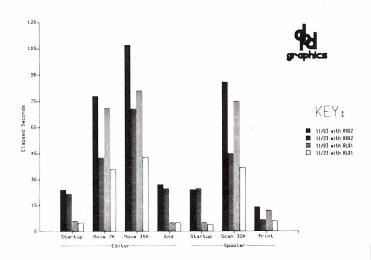


FIGURE 6. WORD-11 Component Benchmark

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Spooler

Elapsed Time in Seconds

Component	11/03	11/23	11/03	11/23
Activity	RX02*	RX02*	RL01**	RL01**
Enter Spooler (Startup)	24	25	5	4
Scan 32000 characters	86	45	75	37
Print one page	14	7	12	6

- *RX02 was Digital Dual RX02 drive on VT103 using both drives.
- **RL01 was DSD 880 Winchester RL01/2 equivalent on VT103, single drive.

FIGURE 7. WORD-11 Component Benchmark



IT'S AN 11/40 BORN AGAIN

... from the editors

What other kind of computer could the RSTS professional have but a RSTS system. But what to get? The menu looks like Howard Johnson's ice cream selection: 11/23, 11/24, 11/34, 11/35, 11/40, 11/44, 11/45, 11/50, 11/55, 11/60, 11/70, Magnum (Able computer) or ?? At Toronto last year the RSTS people had a paper tape based 11/20 running RSTS??

We wanted something small, small enough to be affordable. We wanted something big, big enough to hold lots of data and be used by many users. We wanted something new, new enough to have the new big reliable disks. We wanted something up to date, up to date enough to have all its memory on a single board and be semi-conductor so it would be fast. We wanted something that would be industry compatible, so it could have 800/1600 tape and a single board controller.

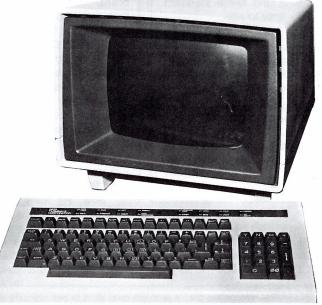
We discovered that all of what we wanted was available new, at lower prices than the old original equipment except for one thing, the processor. It seemed that old processors were readily available at very attractive prices. 11/40s were about half the price of the newer 11/34 yet seemed to offer the same power. The 11/40 looks like an original DEC computer; lots of lights and switches, it sort of has the appearance of an 11/45 or an 11/70. A classic.

We hunted for a while and learned a lot. In order to run RSTS the processor must have: memory management (standard on the 34), a clock, a stack limit register (KJ-11, ours ran without one just fine for some time), the EIS board for the 11/40 (11/34 standard again). You will also require memory, DL-11 console interface, and some type of disk. Of course, in order to connect terminals you will need a multiplexer (DH-11), a tape for backup (TU-10 type) and a line printer for high speed output.

Newman Computer exchange had a bare 11/40 with EIS but no memory management for sale and we bought it. Maybe we're picky, but it seemed awfully hard to deal with them; lots of phone calls never were returned and they seemed more distant that their Michigan location should have been. It was close to 6 weeks from the time we decided to buy that computer and when it was delivered; too long we thought. Newman gives a 30 day warranty and they check it out carefully before it goes out the door and into the moving van. They also included the prints and some manuals with it, but this can vary from machine to machine.

We tested their warranty because when we powered up there was no 5 volt supply to run the processor. It took a \$460 DEC service call to repair the faulty regulator. Newman stood behind their machine and paid the bill, no sweat. All in

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CIRCLE 8 ON READER CARD

all, they were distant, honest, snappish or short with us sometimes, slow, but in the end delivered what was promised and stood behind what they sold. We would buy from them again if they had the right piece at the right price. Why don't they advertise? Maybe Al Newman knows? If we all tell him, he might get the message.

We now had this wonderful 11/40 with 16KW of DEC memory up and running a toggled in memory diagnostic 24 hours a day. What next? Let me give you a small anatomy lesson on PDP-11's. The processor and all other components plug into a six slot high backplane. Those that use all six slots are called HEX high modules, four slotters

are QUAD height modules, two slots and you are a DUAL height module, while the lowly one slot is a SINGLE height module. These backplanes come in a variety of configurations. There is a processor backplane. a memory backplane, a DH-11 backplane, other controller backplanes, and last the standard UNIBUS backplane that comes in 4 wide or 9 wide varieties to hold 4 or 9 modules. Well, our 11/40 had the processor backplane with the processor in it. The processor backplane also holds the memory management board, the stack limit board, the DL-11 console interface board, the KW-11L clock board, the EIS board, and the optional FIS (floating instruction set board,

page 14

\$200. RSTS/E* WORD PROCESSOR CBEDIT.BAS

Basic-Plus* program with VDT input, window edit and document save. Add, locate, change, replace, delete, block move and copy merge, etc. Crash and operator error recovery. Supports DEC, Hazletine and Mime standard VDT's. Others easy to add.

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> *TM Digital Equipment Corporation CIRCLE 9 ON READER CARD

which is on the 11/40 not supported with the 4 word math package and it, therefore, is almost useless). The only other backplane in the computer was a memory backplane capable of holding 32KW of old DEC memory.

No other backplane (DD-11C for 4 modules, DD-11D for 9 modules) was in the computer! Fortunately these are available from many used sources, new from DEC or new from several other suppliers. We opted for a new 9 module backplane from Able computer (see inside back cover). While the DEC backplane is a wire-wrap nightmare, the Able people have managed to do it with only one wire wrap (tell you about that one later); it is all a multi-layer printed circuit board, neat and compact. Installing a backplane should be easy; just mount it in the box (BA-11) and plug in the two power connectors. Our connectors, male and female, would not mate. Old style BA-11 and new style backplane. Order old style connectors, install and you're ok. Thank you DEC supplies catalog and 800 number! OOPS, extra wires on the backplane that the prints say shouldn't be there. They are right: the backplane has wires for battery backup of Semi-Conductor memory and some +20 Volt wires that our BA-11 doesn't have. Just wrap them up and don't connect them.

Now we have a computer, small memory, and a 9 module backplane. We decided to remove the small bulky DEC memory and replace it with a single board 256KB memory. We took CDC because it was available right then, but today it is

available from most of the memory suppliers. It is parity memory, but it requires an external 7850 parity controller. Some of the new ones have all of this right on the board itself. The memory comes with good instructions on installation and configuration so in it went. On went our toggle in diagnostic and we were running our tests on 32K of MOS memory in a new backplane. In order to access more that 32KW on an 11/40 you must have the memory management board. We shopped around again and found one with the COMPUCOM people in Atlanta, GA. Nice people. Shipped it immediately. While installation of this board is easy (it goes in the processor slot assigned for it), there are options on about 3 other processor boards that have to be changed. This will require some soldering of wire straps on these boards, all indicated in the memory management manual and the 11/40 processor manual as well as on the prints themselves. Once these changes were made and a new diagnostic toggled in, we were running diagnostics on the entire 256KB of memory. We later found that the KJ-11 should have been included with the memory management and the folks at Compucom shipped it right out.

Next issue: The disk, The magtape, The multiplexers, The printer.

The RSTS PROFESSIONAL recognizes that a problem does exist in our industry with illegal use of software. With this issue we begin a series on these problems — and solicit your comments and suggestions for this feature.

Have You Stolen Any Good Software Lately?

Richard A. Marino, Data Processing Design, Inc.

You are probably a thief! If not, you probably harbor one or are an accomplice to one. I used to have high expectations, but I no longer believe in honesty — when it comes to software. Almost all of us, have, at one time or another, been a SOFTLIFTER.

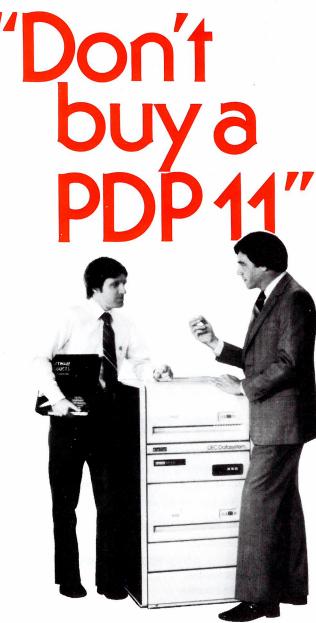
Is the theft of software that pronounced? BELIEVE IT! It's not always the kind of theft you might think. There certainly are cases of intentional, for-profit, thievery. Unfortunately vendors are finding that former employees who claim they are not stealing software but just re-inventing it find little support from the judiciary. But most software theft is less pronounced and rather innocent. It's the casual borrowing of software from another site to 'try it out'. Or running software you've purchased for one system on three. And it's not just the small companies — one of our users, a multi-million dollar institution, just got caught running WORD-11 on two unlicensed systems.

This type of theft is hard to track. People do not fink. I don't even expect my best friends and most faithful customers to tell me when they suspect somebody is running DPD's software illegally. This type of theft is unpolicable — but it is damaging. When a company like ours or any other large, successful software house puts decades of work in developing and documenting a product, it deserves the benefits. This casual thievery in the long run hurts the

user community as well. The investment in designing and building a new product along with the costs of documentation and support are more difficult to justify if one can't protect the investment by stopping the theft of the software.

The intangible nature of software and the difficulty of protecting it from clever as well as casual thievery weighs heavy on the minds of software producers. Some go to great effort to protect the software, sometimes including complex security routines in their software. But there are no perfect solutions.

What will be the result of this continuing illegal activity? There will certainly be more and more lawsuits. Despite the three-year wait we face to get a trial date and the possibility that there will be no monetary reward for winning our case, like all software producers we must pursue cases of obvious theft to their conclusion in court. Higher priced software may also be the result, to cover some of these new unexpected costs of the marketplace. Perhaps there will be fewer products coming to market and less innovation from the small software house unwilling to risk the callousness of the open marketplace. The problem is growing. It is racking the microcomputer marketplace and is threatening those of us producing software for the business minicomputer market as well. It is unfortunate we face this problem — and believe me we face it together. Innocent theft is still theft and it is not a victimless crime.



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Software	RABBIT RSTS UTILITIES RABBIT VAX UTILITIES WORD PROCESSING OTHER	
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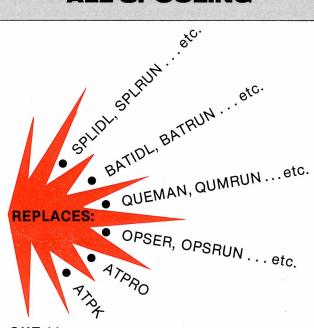
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Description:

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- · Absolute control of system access by keyboard. Manager may limit any keyboard to certain accounts or groups of accounts and control time of ac-
- Auto-login (with or without password) and chain with specified core common contents by KB.
- · Real time system surveillance. Manager specifies a list of alarm keyboards which log all infractions and probes as they happen. Opser is not required.
- · Password knowledge is no longer carte blanche system access. System detects unauthorized use of passwords. Privileged passwords don't work on non-privileged keyboards. Non-privileged passwords work only on specified keyboards.
- Manager may establish special priority/burst settings by KB.
- Manager specifies a list of console keyboards from which security file editor may operate.

Minimum Hardware/Software Required:

Any valid RSTS/E system running Version 7.0 or later. Any version of RSX emulation is needed.

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Dave Mallery Nationwide Data Dialog 215—364-2800

LD1: [1,3] EXTEND.BAS

By Scott Banks and Nationwide Data Dialog

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10	EXTEND.BAS	£ 3020	PRINT #KB%, 'Output file? ';
	WE TAKE AN INPUT FILE (DEFAULT .BAS) AND CREATE AN OUTPUT FILE (DEFAULT .BES) THAT WILL BE IN EXTEND MODE. IF THE FIRST LINE OF THE PROGRAM IS NOT LINE 1, WE WILL ADD A LINE 1 WITH AN EXTEND STATEMENT. OTHERWISE, YOU MUST ADD 'EXTEND' YOURSELF.	& & & & &	INPUT LINE #RB\$, Z\$ P.BES\$ = CVT\$\$(2\$,255\\$-64\\$)
	A NOTE ON COMMENTS. BASIC-PLUS, UPON SEEING A LINE-FEED AFTER AN EXCLAMATION POINT, TAKES ALL FOLLOWING	£ 3040 £	F.BES\$ = F.BES\$ + '.BES' UNLESS INSTR(1*,F.BES\$,'.')
1	TEXT AS COMMENTS. WE WILL ADD THE '!' IF NECCESSARY. HOWEVER, FOR ANY LINE THAT CONTAINS AN '!', WE MUST ASSUME	\$ 3100	OPEN F.BES\$ FOR OUTPUT AS FILE F.BES\$
Ī	THAT IT IS FOR COMMENT PURPOSES. IF YOU HAVE AN 'I' IN QUOTES (A PROGRAM CHAIN TO [1,3] PERHAPS), YOU MUST EXAMINE	3190	RETURN
į	THIS AND REPAIR IT YOURSELF IF NEED BE.	3200	CONVERT .BAS PROGRAM TO .BES
! ! !	PROGRAMS, OR PROGRAM SECTIONS THAT PREVIOUSLY WORKED IN EXTEND MODE ARE SELDOM A PROBLEM. THERE MAY BE SOME COMPLICATIONS IN CONVERTING CODE THAT WAS ORIGINALLY WRITTEN FOR NOEXTEND MODE. IN EXTEND MODE, UNLIKE NOEXTEND MODE,	& 3220 & 3240 &	BAS.COM% = 0% I NOT IN COMMENT MODE & INPUT LINE #P.BAS%, BAS.LINS Z\$ = CVT\$\$(BAS.LIN\$,-1%)
i	SPACES OFTEN TAKE ON GREAT SIGNIFICANCE.	£	\ Z\$ = ASCII(RIGHT(Z\$,2\$)) AND 127\$ \ IF
	BASIC-PLUS KEYWORDS MUST NOT CONTAIN SPACES IN EXTEND: 999 F N E N D (NOEXTEND)	£ .	OR LEFT(Z\$,1%) = '1' AND Z% >= 48% AND Z% <= 57%
į	999 F N E N D (NOEXTEND) 999 FNEND (EXTEND)	£ 3280	THEN PRINT #F.BES%, '1'; CHR\$(9%); 'EXTEND' & GOTO 3320 &
į	SPACES MUST SEPARATE KEYWORDS:	£ 3300	1
į	1020 GOTO1090	£	INPUT LINE #F.BAS*, BAS.LIN\$ 1 EOF -> 3390 &
i	1020 GOTO 1090 AND WATCH LSETS AND RSETS LIKE THIS:	≨ 3320 ≨	BAS.LIN\$ = CHR\$(9%) + '!' + CVT\$\$(BAS.LIN\$,8%) & UNLESS LEFT(CVT\$\$(BAS.LIN\$,8%),1%) = '!' & IF BAS.COM%
]]	4320 LSETA\$ = 'ZZ'	£ 3340	<pre>BAS.EOL% = ASCII(RIGHT(BAS.LIN%, LEN(BAS.LIN%))) </pre>
! !	4320 LSET A\$ = 'ZZ' FINALLY, ONCE A PROGRAM HAS BEEN CONVERTED AND WHATEVER	£ £	\ IF BAS.EOL% THEN BAS.LIN\$ = CHR\$(9%) + '!' IF LEN(BAS.LIN\$) <= 2%
! ! !	YOUR PROBLEMS, ALL EDITING CAN THEN BE DONE WITH TECO. A BARGAIN AT TWICE THE PRICE!	£	PRINT #F.BES\$, CVT\$\$(BAS.LIN\$,4\$) BAS.COM\$ = 00 GOTO 3300
90 200	GOSUB 19600 F.BAS% = 1% F.BES% = 2%	& 3360 &	BAS.COM% = INSTR(1%,BAS.LIN\$,'!') BAS.COM% = LEFT(CVT\$\$(BAS.LIN\$,8%),1%) = '!' PRINT %F.BES%, CVT\$\$(BAS.LIN\$,4%); CHR\$(9%); '&' E
1000	GOSUB 2000 ! OPEN INPUT FILE	4	\ GOTO 3300 &
1040	GOSUB 3000 ! OPEN OUTPUT FILE	£ 3390	RETURN &
1200	GOSUB 3200 ! BUILD OUTPUT FILE	£ 3800	! CLOSE OUTPUT FILE &
1600	GOSUB 2800 ! CLOSE INPUT FILE	£ 3820	CLOSE P.BES
1620	GOSUB 3800 ! CLOSE OUTPUT FILE	£ 3990	RETURN &
1880	GOTO 1000	£ 19600	I> S T A N D A R D I N I T I A L I Z A T I O N & ON ERROR GOTO 19800 &
2000 !	OPEN INPUT FILE	•	\ KB%=12% & \ OPEN 'KB:' AS FILE KB%, MODE 4% &
2020	PRINT #KB%, 'Input file? '; ! EOF -> 32767 INPUT LINE #KB%, Z\$	£ '	\ RETURN
	F.BAS\$ = CVT\$\$(Z\$,255%-64%) GOTO 32767 UNLESS LEN(F.BAS\$)	£ 19800 £	I> LOCAL ERROR TRAPS & E%=ERR &
`	F.BAS\$ = F.BAS\$ + '.BAS' UNLESS INSTR(1%,F.BAS\$,'.')	£ 19810	RESUME 3390 IF ERL=3300% IF E%=11% ! SOURCE EOF
2100	OPEN F.BAS\$ FOR INPUT AS FILE F.BAS\$,	19820 £ 19990	RESUME 32767 IF ERL=2020% IF E%=11% I INPUT EOF GOTO 32000 &
	RECORDSIZE 4096%, MODE 8192%	£ 20000	! !> STANDARD ROUTINES &
2190	RETURN	£ 32000	! !> STANDARD ERROR TRAPS &
2800 I	CLOSE INPUT FILE	£ 32500	I ON ERROR GOTO 0 ESTOP E
2820	CLOSE F.BAS&	32560	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
2990	RETURN	32767	END

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A WORD ABOUT THE AUTHOR . . .

Rudy Bazelmans is a Software Analyst at Sykes Datatronics Inc. where he designs language processors and helps maintain a PDP-11/70. His address at Sykes is 375 Orchard Street, Rochester, New York 14606.

ARE MACROS WORTH USING?

By Rudy Bazelmans, Sykes Datatronics Inc.

ABSTRACT

Often programmers fail to utilize the tools which are available to increase productivity. One powerful tool for the programmer is macros. This paper discusses the advantages and disadvantages of using macros and addresses the question of whether to use a macro preprocessor or a macro assembler.

Introduction

It is often necessary for programmers to repetitiously program particular sequences of code. Examples of these repeated sequences would be:

- Standard parameter passing and subroutine linkage.
- Stack and register manipulation.
- Test and branch sequences.
- I/O routines and their calls.
- · Error checking and aborting.
- Multiple byte arithmetic operations.

Many of these items are particularly error prone and require a certain amount of thought each time the routine is copied. Macros can offer a solution to some of these problems because they possess the conciseness of assembly language along with the ease of use of a high level language.

Macro instructions are one line abbreviations for a group of instructions. The programmer initially defines the group of instructions which make up the macro. Then subsequent calls to this macro will be expanded in-line. Macro instructions look very similiar to ordinary assembly language instructions. The parameters (or operands) passed on the macro call are used by the macro processor to customize each call.

Although macros have been used by programmers to simplify the programming of assembly language, they have also played an important part in the development of high level languages. SNOBOL for example, was initially implemented using macros. Fortran and PL/I have been revitalized thru the use of a structured macro package called Ratfor (RATional FORtran). Editors such as TECO (VTEDIT and EMACS) are incredibly powerful, this is partly due to their macro capability. Another area of computers which is heavily dependent on macros is system generation. On many Digital Equipment and Data General computers the system monitors are customized by having the user answer a number of questions and using these answers to include or exclude certain elements of the monitor.

Purpose

The main purposes of using macros are:

- 1. As an organizational tool to aid in the layout and design of a program or system.
- 2. As an abbreviation mechanism to help simplify the coding and understanding of programs.
- As an error checking tool to aid in writing bug free code
- 4. To aid in the correction of errors and changing programs.

Advantages of Using Macros

- After a macro is developed, only one line of code is needed to perform a repetitive task. The time required to develop a macro is usually only as long as the time needed to program the sequence of code the first time and check it when it is used the second time.
- Using macros reduces the number of bugs within a program because macros relieve the programmer of much of the housekeeping. A well designed macro will perform defaulting, error checking and local optimization. This reduces the amount of time which a programmer spends thinking about repetitive tasks.
 - A. When certain parameters are not specified in the macro call, the macro can use default values in the expansion. For example, if no output device is specified, the macro can assume the output device is the terminal and generate the appropriate code.
 - B. The macro can do error checking by flagging conflicting or missing parameters.
 - C. If desired, local optimization can be accomplished automatically. For example, jumps can be replaced with branches and adds replaced with increments.

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1/2" REEL-TO-REEL STD. & STREAMER	2315/5440/RK05 CARTRIDGE CLASS	CMD CARTRIDGE MODULE	SMD STORAGE MODULE	WINCHESTER 51/4", 8" OR 14"	1/4" TAPE CARTRIDGE	FLOPPY DISC DRIVE		
AMPEX CIPHER CONTROL DATA DIGI-DATA KENNEDY MICRODATA PERTEC TANDBERG DATA (IDT) WANGCO TDX	AMPEX CAELUS CENTURY DATA CONTROL DATA DEC DIABLO IOMEC MICRODATA PERTEC WANGCO WESTERN DYNEX DRI	AMPEX CONTROL DATA	AMPEX CENTURY DATA CONTROL DATA BALL COMPUTER MITSUBISHI	BASF CONTROL DATA FUJITSU KENNEDY MEMOREX PRIAM SHUGART SEAGATE QUANTUM IMI	DEI KENNEDY PEREX QUANTEX	BASF DECITEK MICROPOLIS PERTEC REMEX SHUGART		
			(CAPACITIES .25 TO 30	0 MB	ž.		
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- 2. Macro languages can be fairly complicated, and a preprocessor allows the same macro syntax to be used with any assembler or compiler. This reduces the training time for employees.
- 3. The amount of memory for macros within a preprocessor would be about twice as much as within a macro assembler and the amount of memory available for symbols within an assembler would be about 60% more than the memory available within a macro assembler.
- A preprocessor would be easier to design than a macro assembler and would take less time to implement.
- 5. A preprocessor expands the macros once whereas the macro assembler must expand them twice, thus reducing processing time.

Disadvantages of Using a Preprocessor Over a Macro Assembler

- 1. Many of the routines which are in the assembler must be duplicated within the preprocessor.
- 2. A preprocessor must make a pass through the source file.
- 3. A preprocessor must generate a temporary file for use as an input file for the assembler.

Structured Macros

A group from Duke University in North Carolina developed a set of structured macros early in 1974. These macros were implemented in order to provide PASCAL-like control structures for the PDP-11 assembly language. This package of macros called BIOMAC is perhaps the best known package of structured macros available. Below are the comments made by the authors of BIOMAC about their macro package:

- There were two important reasons for implementing BIOMAC:
 - A. To eliminate tedious test-and-branch code sequences.
 - B. To provide a block structure capability to reduce

the errors caused by the complexity of transfer instructions.

The important macros which are available are: IF...THEN...ELSE, CASE, WHILE, REPEAT and FOR.

- 2. BIOMAC provides both the benefits of the assembly language (efficiency and direct control) as well as the ease of programming provided by a high level language.
- 3. The primary benefits of structured macros are in increased programmer productivity and error reduction.
- 4. Unlike good compilers, good macro processors are incapable of making global optimizations and they can not enforce variable scope rules.
- BIOMAC adds approximately one jump instruction for each block (a block is the basic unit of a structured program). It is estimated that there is an overhead of about 5-10% in program size and speed.
- 6. Structured macros are useful when high level languages are not available for a particular machine or when these high level languages obscure the useful features of the machine in use.
- 7. Assembly languages don't have to be difficult.

General Comments

During a discussion concerning the overhead of high level macros in a book entitled Software Tools, Brian W. Kernighan and P. J. Plauger said; "We feel strongly that this [overhead] is absolutely immaterial in comparison to the benefits of this [macro] preprocessor. Even though a single compilation may cost twice as much, our experience has been that many fewer compilations are needed, because the code works sooner. If you can find a bug in a few minutes instead of a few hours it pays for a lot of compiling. The other saving is in the much reduced cost of modifying a program after it's been in service for a while." Kernighan and Plauger also warn us by saying: "Beware of becoming too clever with macros. In principle, [a macro language] is capable of performing any computing task, but it is all too easy to write unreadable macros that cause more trouble than they save work." Then at a later point in the book, "...whenever you can, let the machine do the work, for that is the ultimate purpose of building tools."

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PLACEHOLDER

PROGRAM DEVELOPMENT SYSTEM

By David Whip, Maryland National Bank, Baltimore, Maryland

PDS is a set of teco macros designed to aid in the development of structured Basic + and Basic + 2 programs. Some of the features included are: "shorthand" entry of often used phrases "OPEN", "PRINT USING", etc.; automatic indentation of FOR-NEXT and WHILE-NEXT loops; user entered "shorthand" entry; file include for often needed code such as MAP or COMMONs; automatic line numbering; and automatic alignment of comments.

It is assumed in the following discussion that the user is familiar with teco at, at least, a novice level and understands pointer manipulation and search commands. PDS may be included automatically by renaming PDS.TEC to TECO.INI and entering teco as usual, or, after entering teco do EI PDS\$\$. The pointer position will not be changed by the EI command which may safely be used at any time. Several Q registers are used by PDS (see Table 1.) and should not be used for other purposes.

TABLE 1. Q Registers Reserved by PDS

NUMERIC A,B,C,I,L,M,P,S,T ALPHA B,C,D,E,F,G,I,N,P,S,T,U,W

Once PDS has been loaded it is possible to change 4 preset values. The position at which comments will be aligned is kept in Q register C and is initialized to 50. This value may be changed by entering 30UC at which time newly entered comments would be aligned at column 30. The indentation constant is loaded in Q register I. This is the number of spaces which will indent each FOR-NEXT and WHILE-NEXT loop. The indentation feature may be turned off by entering OUI, or set to any other desired value by entering NUI where N is the desired constant. The starting line number is preset to 100 and may be changed by entering NUL; the line increment is initialized to 10 and is located in Q register M.

If desired the file include or keyboard entry macros may be invoked at this time.

To use the file include macro type MI\$\$

*MI\$\$
File to include:
FOO.BAS
Loaded . . . Use CTRL B To Insert

If the file is found the above message will be printed otherwise there will be an error message. The information to be inserted may be on multiple lines, but should not have any leading line numbers, spaces, or tabs in order that the automatic indention feature will work properly. It is also legal to use the tilde insert (see the section on keyboard entry macros).

```
The keyboard entry macro is called by entering ME$$ *ME$$ Enter Macro (End With CTRL Z) : For \sim = 1 to N% \ Print Date$(1000% + \sim) \ Next \sim †Z
```

The tilde (\sim) is used as an escape character in the macro definitions. Its purpose is to allow the user to type in information and have the macro continue after the entry is made. In the above case when the macro is invoked <For > will be printed and the keyboard moniter will be called recursively. The user may type in as many characters as desired followed by < CTRL Z> which will cause < = 1 to N% < CR> CLF> Print Date\$(1000% + > to be printed and characters will again be accepted from the keyboard. At any point the user may abort the macro by typing < esc>.

Either of the two macros may be used multiple times from the teco command level during a session, of course only the last macro entered or file read will be available to the user. Any indentation included in the macro must be implicitly typed into the macro since the indentation Q register is not updated during the macro invocation.

PDS is started or restarted by typing MS\$\$ from the teco command level. After entering the MS command you will be in the keyboard monitor loop. All characters typed at the keyboard are trapped and processed before being echoed at the terminal. Certain characters have special meaning to PDS as shown in Table 2.

TABLE 2. Control Characters Recognized by PDS

CHARACTER	MEANING
CTRL A	Open "~" As File ~
CTRL B	Include File Macro
CTRL C	As Usual
CTRL D	User Entered Macro
CTRL E	Auto Line Numbering
CTRL F	For Macro
CTRL L	List Program
CTRL I <tab></tab>	Indents To Proper Position
	(uses spaces)
CTRL N	Next Macro
CTRL P	Print Using Macro
CTRL R	Reprint Line
CTRL U	Delete Line
CTRL W	While Macro
CTRL Z	Exit Tilde Routine
<esc></esc>	Exit Macro
	Comment Start In Col C%
	As Usual

RSTSPROFESSIONALRSTSPROFES

The very nature of the shorthand approach makes it difficult to show the method of program entry, because the control characters are replaced by their associated strings.

```
<TRL E> < CTRL W> A < > B ! < CR>
<TAB> < CTRL P> < ESC> A ! < CR>
<TAB> A = A + 1 \ < CR>
<TAB> < CTRL N> < CR>
<CTRL E> END < CR>
```

FIGURE 1. Program As Entered At The Keyboard

FIGURE 2. Program As Typed At The Keyboard

Assume that MS\$\$ has been entered. Enter a line number <TAB>, or <CTRL E>, and <CTRL W>. <While> will print and the bell will sound. This is the indication that the keyboard monitor has exited from the inner loop associated with the while macro. Enter the condition associated with the while, now type <CR> and another <TAB>. Notice that automatic indentation has taken place. Type in some statements either with or without line numbers. In all cases the first <TAB> on a line will maintain the proper indentation. When you wish to end the loop enter the <TAB> at the beginning of a line, followed by <CTRL N>. As you see the effect is a <CR> with no <LF> followed by an extent to the proper position under the associated While. The same effect will be seen with the <CTRL F> or For Macro and <CTRL N>.

At any time you may exit from the PDS macro by typing < ESC> (except from the tilde entry macro). An example is the use of < CTRL P>. The terminal will type < Print> and pause. If you wish a plain print statement type < ESC>, the bell will ring, and you will still be in the keyboard monitor. To enter a < Print Using> statement you would type < CTRL Z>, Using> would print and the bell would ring. On the other hand, if you wished a < Print #1% Using> simply type #1% < CTRL Z> at the pause after < Print>. After exiting from PDS you may use any teco command you wish including dot moving. If MS is entered at the beginning of a line and a tab is typed, the correct indentation will be established. If the dot is in the middle of a line, the line up to the dot will be printed upon entry.

There are several restrictions on the use of PDS. The major restrictions deal with the indent feature. < CTRL F> and < CTRL W> must be used immediately after an initial < TAB> to have an indentation effect. If they are used at any other position on the line they are assumed to be statement modifiers and the indentation register is not adjusted. A line including < CTRL N> must have the < CTRL N> immediately after a leading < TAB> since its position is physically changed. If a line is deleted (< CTRL U> from within PDS) which contains < CTRL F>, < CTRL W> or < CTRL N> the indentation register will have to be ad-

justed. The method is to insert the opposite control character and then delete it. For example, <code><TAB><CTRL</code> <code>W><CTRL</code> <code>U></code> could be adjusted by <code><TAB><CTRL</code> <code>N><CTRL</code> <code>U></code>.

Clearly there is more that can be done with a system like PDS. For example it might be useful to develop a set of macros for Fortran or Runoff. Please let me know of any enhancements that you find useful in your applications. The basis of the keyboard monitor can be found in "Structured Programming In Teco" by Jacquie Stafsudd (RSTS Professional, Vol 2, Nbr 2) and "BLDCTL: Control File Processor" by David Spencer (RSTS Professional, Vol 3, Nbr 1). Anyone desiring further information on the type of text processing covered in this article should read Proceedings of the ACM SIGPLAN SIGOA Symposium On Text Manipulation Portland, Oregon June 8-10, 1981 published by the ACM.

```
PDS.TEC V1.1 22-APR-81
!COPYRIGHT (C) 1981
!DAVID WHIP
     CHANGES TO V1.0 INCLUDING: TRAP CTRL C
               INAP LIRL C
SAVE ET CONTEXT
CTRL U NOW WORKS FOR SCREENS
FIX 8UG IN <TAB> MACRO
FIX 8UG IN CTRL N
FIX 8UG IN CTRL N
FIX 8UG IN AUTO LN
      RENAME TECC.INI OR
     EIPOS$$
     ME - ENTER MACRO
MI - FILE INCLUDE
MS - START PDS
   CTRL A - OPEN !
CTRL A - FILE INCLUDE !
CTRL B - FILE INCLUDE !
CTRL C - AS USUAL !
CTRL O - USER MACRO
CTRL E - AUTO LINE NOR
CTRL E - AUTO LINE NOR
CTALE - TST TAB INCENTS TO PROPER POSITION IN LINE!
CTRL L - LIST PROGRAM !
CTRL N - NEXT
CTRL P - PRINT USING !
CTRL U - AS USUAL !
CTRL U - AS USUAL !
CTRL U - AS USUAL !
CTRL V - FILT TILDE< ROUTINE !
CTRL Z - EXIT TILDE< ROUTINE !
CSCS - EXIT MG !
     # REGISTERS

BS - MACRO PROCESSOR

CS - OPEN MACRO

DS - USER MACRO
                                                                                                                         A% - STRING INSERT POSITION
B% - CURRENT CHARACTER FROM KB
C% - INDENT COL FOR COMMENTS
S% - SCRATCH
T% - COLLMN TO INDENT TO - 7
1% - POSITIONS TO INDENT
L% - LINE NUMBER TO ENTER
M% - LINE NUMBER INCREMENT
     ES - ENTER MACRO FROM KE
FS - FOR MACRO
    FS - FOR MACRO
SS - KEYDOARD MONITOR
IS - ENTER MACRO FROM FILE
NS - NEXT MACRO
PS - PRINT USINS MACRO
SS - START POS
!
IS - TAS AND INDENT HANDLER
!
US - USER FILE MACRO
!
WS - WHILE MACRO
!
                                                                                                                        ! SAVE CONTEXT!
! TRAP CTEL C 3 TURN CFF ECHO!
FT#3#32763FT
               1"= .UA GC MB F<
2"= .UA GU MB F<
3"= .US :2S/^A/"S CS/.K
"95J <:1))> CCET
4"= .UA GD ME F<
5"= 0^C= CL\ CL:=
-1A"0 CL\ UL GL+ZMLL
                                                                                                                        ! OPEN
! FILE
                                                                                                         ! CTRL C !
  I AUTO INT
 ! LIST
                                                                                                                       ! NEXT
! PRINT
! CIRL
   UA 5', ME FK ' ! NEXT !
QB- 16"= UA GP MB FK ' ! PRINT !
QB- 18"= QB-T 13^T 10^T 0T FK ' ! CTRL R !
QB- 21"= ETS2"G 13^T -(C^L)< 32^T > 13^T
```

Q=^T 13^T 1C^T'

```
0K FK
25-23"= 0A.+LT+7"= 11%T
.UA GW MS FK
15-26"= 0;
28-27"= 0;
25-33"= -1A-32"N GAQUS
                                                            ! CTRL U !
                                                                                                                                           .UP J MG C..XD C..K QPJ
                                                           ! WHILE
! CTRL Z
! <ESC>
                                                                                                                                          i^UI

i^AAFile To Include: /

J 31/:ER/ MG 2731// 0XU 0K MULS

13^1 10^T

CS"S ZUS A 0S/ZXU QS/ZK

20^1/2700d - - Use CTRL
                4C+QS"L 13^T 16^T CUS
13aI// 10aI//
                15a1// | USI1// | CC+15< 32^T 32a1// > ' | COMMENT! | COMMENT! | O^C"= 7^T ! < OEL> !
                                                                                                                                                   @^A/Loaded . . . Use CTRL B To Insert/
                                                                                                                                          3^A/?Can't Find File Or Account/ 13^T 10^T 1
                        | R ET $2" = CA^T
                                          0A-32"L 2US
                                                                                                                                          $^US
Z-_"N .UA OL
\^[ <0a-72"N C; ' C >
-(O^Q)-7UT ::$S/NEXT/"S CIXT '
GT"L OUT
                                                      1 1 1 5
                                                                                                                                                                                                        ! AT EOF? _ NO !
! SKIP NBRS AND SPACES!
                                            QS< E^T 32^T 3^T > 1
 QBaI// QB^T
                                                                                                                                                                                                        ! SET T TC CRNT PCS-7 OR ZERO IF T<O! RESET DCT CALL KBMON!
                                                              ! CHAR !
10 QUET
                                                              ! PESTORE CONTEXT!
                                                                                                                                          C^AUS (7*((-QS)/7)+7)+QS< 32^T 32aI// > 7+(0^Q)"= QT<32^T 32aI// > *
1^UB
11I//
CAJ
                                                                                                                                         $^UWXWhile X
$^UFXFor X
$^UWXNext X
$^UXOpen """ As File 7 X
$^UPXPrint 7 Using X
 CA-^^"= D MG
CA- 1"= D C;
C3- 27"= JUS : 2S/^4/"S CS/.K'O;
-14-10"= MT
CA^T C
> 7^1
                                                               ! KESC>
                                                                                                                                           50UC
                                                                                                                                                                                                        ! COMMENT COL <- 50 !
                                                                                                                                                                                                        ! POSITIONS TO INCENT <- 3 !
! START LINE NBR <- 1CO !
! LINE NBR INCREMENT <- 10 !
                                                                                                                                             3UI
                                                                                                                                          10001
                                                                                                                                          10UM
a^uE
a^a/Enter Macro (End With CTRL I) : / 13^T 1C^T
```

CREATE.BAS

```
UFD CLUSTER SIZE TO CREATE &
                                                                                                                                                                                                                                                                                                                                                                               ! UFDCLU%
                                                                                                                                                                                                                                                                                                                                              800
By James Swanson, Area Two Educational Computer Center, Mason City, Iowa
                                                                                                                                                                                                                                                                                                                                                                               ! &
                                                                                                                                                                                                                                                                                                                                                                                                             ! USER FUNCTIONS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        &
                                   EXTEND
                                                                                                                                                                                                                                                                                                                                                                               ! &
                                                                                                                                                                                                                                                                                                                                                                                                                                                        DESCRIPTION
                                                                                                                                                                                                                                                                                                                                                                                                            FUNCTION
                                                                                             CREATE.BAS
         !&
CREATE.BAS will create a user account on-line. It will create it as contiguous and extend it to its full length. The UFD will be placed at or near the center of the pack or at any location indicated by the floating point variable "CENTR" at line 1000 which contains the block number to place the UFD at.
This program has been tested for only a short while but it has created accounts that have survived SONLCLN as well as the REFRESH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PRINTS A STANDARD ERROR MESSAGE & DECIPHERS THE DIRECTORY LINK WORDS &
                                                                                                                                                                                                                                                                                                                                                                               ! FNERR%( )
! FNL%( )
                                                                                                                                                                                                                                                                                                                                              820
                                                                                                                                                                                                                                                                                                                                               900
                                                                                                                                                                                                                                                                                                                                                                               ! &
                                                                                                                                                                                                                                                                                                                                                                                                             DIMENTION STATEMENTS
                                                                                                                                                                                                                                                                                                                                                                               18
                                                                                                                                                                                                                                                                                                                                                                               ! &
         option in INIT.
                                                                                                                                                                                                                                                                                                                                                                              DIM #1%, M%(3583%,7%) & 
\ DIM #2%, U%(3583%,7%) & 
1 > M%(3585,7) = MFD VIRTUAL ARRAY 
!> U%(3585,7) = UFD VIRTUAL ARRAY
                                                                                                                                                                                                                                                                                                                                              902
                                                                 PROGRAM NAME: CREATE.BAS
AUTHOR: JIM SWANSON
DATE WRITTEN: 16-JUN-81
VERSION: 1.1
  3
                                                                                                                                                                                                                                                                                                                                                                              DIM C%(30%) & !> C%(30) = FOR CHANGE-TO'S
                                                                                                                                                                                                                                                                                                                                              903
                                             &
                                    !
! &
                                                                                                                                                                                                                                                                                                                                                                             1000
                                    ! &
!
                                                                                                        COPYRIGHT &
                                  !&
Copyright (C) 1981 by &
Area Two Educational Computer Center, Mason City, IA &
                                                                                                                                                                                                                                                                                                                                                                              1010
                                  This software is furnished free of charge to members of the North American DECUS organization and may be copied only with the inclusion of the above copyright notice. This software or any other copies thereof may not be provided or otherwise made available to any other person. No title to and ownership of the software is hereby transferred. &
                                                                                                                                                                                                                                                                                                                                                                                PRINT 'CREATE - Create and extend user accounts.'
                                                                                                                                                                                                                                                                                                                                                1020
                                                                                                                                                                                                                                                                                                                                                2000
                                                                                                                                                                                                                                                                                                                                                                                 ! &
! &
                                                                                                                                                                                                                                                                                                                                                                                                                MAIN PROGRAM
                                                                                                                                                                                                                                                                                                                                                                               !
! &
! &
                                   The information in this software is subject to change % \left( 1\right) =1 without notice and should not be construed as a commitment by The Aree Two Computer Center. &
                                                                                                                                                                                                                                                                                                                                                                               PRINT 'PPN to create'; &
INPUT LINE S.PPN$ &
PRINT ' ';PPN$ IF ASCII(S.PPN$) = 61% !"=" &
S.PPN$ = PPN$ IF ASCII(S.PPN$) = 61% !"=" &
S.PPN$ = PPN$ IF ASCII(S.PPN$) = 61% !"=" &
OTO 32767 UNLESS LEN(PPN$) &
OTO 32767 UNLESS LEN(PPN$) &
OTO 32767 UNLESS INSTR(1%,PPN$,'(') > 0% &
OTO 32767 UNLESS INSTR(1%,PPN$,'(') > 0% &
OTO 32767 UNLESS INSTR(1%,PPN$,'(') > 0% &
OTO 32767 UNLESS INSTR(1%,PPN$,')') > 0% &
OTO 32767 UNLESS INSTR(1%,PPN$,')') > 0% &
OTO 32767 UNLESS INSTR(1%,PPN$,'') > 0% &
                                                                                                                                                                                                                                                                                                                                                                                PRINT 'PPN to create': &
                                                                                                                                                                                                                                                                                                                                                2010
                                    ATECC assumes no responsibility for the use or reliability {\bf A} of its software. 
 &
                                   ON ERROR GOTO 19000 & ... STANDARD ERROR TRAP &
    10
                                    ! 1000
                                                                                                                                   ### CENTER OF DISK SOMEWHERE AFTER 61536 ### &
    150
    400
                                    18
                                                                 ! USER VARIABLES
                                                                                                                                                     &
                                     ! &
                                                                 VARIABLE
                                                                                                              EXPLANATION
                                                                                                                                 EXPLANATION 6

ACCOUNT IN FILE FORMAT FOR TESTING 6
FOR CHANGE-TO'S 6

LEFT OF CENTER OF DISK TO PLACE DIRECTORIES 6
DEVICE TO CREATE ACCOUNT ON 6

RSTS ERROR MESSAGE 6
NAME OF FILE OT BE OPENED IN MFD 6
MFD VIRTUAL ARRAY 6
POINTER INTO THE MFD ARRAY 6
POINTER TO MFD'S ACCOUNTING ENTRY 6
POINTER TO MFD'S ACCOUNTING ENTRY 6
POINTER TO MFD'S UAR 6
LARGEST POSSIBLE UPD CLUSTER SIZE 6
M% (31%, 0%) MFD CLUSTER SIZE 6
FIRST 3 CHARACTERS OF PASSWORD 6
SECOND THREE CHARACTERS OF PASSWORD 6
PASSWORD 6
PASSWORD 6
INTERCER VALUE FOR THE PPN 6
UOTOTA FOR THE NEW ACCOUNT 6
RAD-50 VALUE FOR SECOND 3 CHAR. OF PASSWORD 6
RAD-50 VALUE FOR SECOND 3 CHAR. OF PASSWORD 6
RAD-50 VALUE FOR SECOND 3 CHAR. OF PASSWORD 6
RAD-50 VALUE FOR SECOND 3 CHAR. OF PASSWORD 6
RAD-50 VALUE FOR SECOND 3 CHAR. OF PASSWORD 6
RAD-50 VALUE FOR SECOND 3 CHAR. OF PASSWORD 6
RAD-50 VALUE FOR THE NEW UPD FILE 6
UFD VIRTUAL ARRAY 6
POINTER TO THE NEW UPD FILE 6
                                                                                                                                                                                                                                                                                                                                                                                INPUT 'Password'; PASS$ &
                                                                                                                                                                                                                                                                                                                                               2012
                                                                                                                                                                                                                                                                                                                                                                               PASS = MID (PASSS, 1%, 3%) &

PASS = MID (PASSS, 1%, 3%) &

PASS = MID (PASSS, 1%, 3%) &

!> PASS = PASSWORD &

!> PASIS = PIRST 3 CHARACTERS OF PASSWORD &

!> PASIS = SECOND THREE CHARACTERS OF PASSWORD &

!> PASS = SECOND THREE CHARACTERS OF PASSWORD &

! GET THE NECESSARY DATA &
                                     ! ACCNT$
! C%(30)
! CENTR
    450
                                           DEV$
                                             FILS
                                          FILS
M% (3585,7)
M, PTR%
M, DAR%
M, UAR%
MAXCLU%
MFDCLU%
PAKCLU%
PAS1S
PAS2S
PAS2S
PPNS
PPN%
OU%
                                                                                                                                                                                                                                                                                                                                                                               FIL$ = 'UFD'+PAS1$+'.'+PAS2$ & ACCNT$ = DEV$+PPN$+FIL$ & BE OPENED IN MFD & ACCNT$ = ACCOUNT IN FILE FORMAT FOR TESTING &
                                                                                                                                                                                                                                                                                                                                               2015
                                                                                                                                                                                                                                                                                                                                                                              !> ACCNTS = ACCOUNT IN FILE FORMAT FOR TESTING &

CHANGE SYS(CHRS(6%)+CHRS(-10%)+ACCNTS) TO C% &

RAD.UFD% = C%(7%)+SWAP%(C%(6%)) &

RAD.PAS1% = C%(9%)+SWAP%(C%(10%)) &

RAD.PAS2% = C%(11%)+SWAPA(C%(10%)) &

PPN% = C%(5%)+SWAP%(C%(6%)) &

IF LEM(PASSS) = 0% &

THEN GOTO 2012 IF C%(23%) = ASCII('S') &

AND C%(24%) = ASCII('Y') &

ELSE IF SWAP%(C%(28%)) < 0% &

THEN FRINT 'Invalid password or account.' &

THEN FRINT 'Invalid password or account.' &

SOTO 2000 &

I > RAD.UFD% = RAD-50 VALUE FOR "UFD" &

!> RAD.FAS1% = RAD-50 VALUE FOR FIRST 3 CHAR. OF PASSWORD &

!> RAD.PAS2% = RAD-50 VALUE FOR SECOND 3 CHAR. OF PASSWORD &

!> RAD.PAS2% = RAD-50 VALUE FOR SECOND 3 CHAR. OF PASSWORD &
                                                                                                                                                                                                                                                                                                                                               2020
                                           RAD. PAS1%
                                           RAD.PAS2%
RAD.UFD%
                                      U% (3585,7)
U.PTR%
UAR%
                                            STA%
                                                                                                                                  VALUE OF THE RIFU'S STATES WORK
UFD VIRTUAL ARRAY &
POINTER TO THE NEW UFD FILE &
STARTING DCN OF THE NEW UFD &
```

MENU/AUTHORIZATION PROCESSOR SYSTEM

M APS is a system to generate Application Menus and provide system security by controlling user access.

- Unlimited number of menu levels Menu entry points may vary between users
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- Variable arguments passed between menu and program
 Menus are all file driven
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CIRCLE 57 ON READER CARD

```
!> UAR% = STARTING DON OF THE NEW UFD &
1 GET THE MFP'S UAR TO FIND THE CLUSTER NUMBERS OF THIS &
1 NEW UFD. &
2 PUT THE PPN INTO THE NAME ENTRY OF THE MFD &
2 SET THE MFD ENTRY BIT (64) IN THE MFD STATUS WORD. &
3 SET UP THE LABEL ENTRY FOR THE NEW UFD &
4
                                                            !> PPN% = INTERGER VALUE FOR THE PPN & 
! GET THE RAD 50 VALUES OF THE STUFF & 
! VERIFY THE VALIDITY OF THE DATA RETURNED
                              ON ERROR GOTO 2043 &
OPEN DEVS+PPNS FOR INPUT AS FILE #2%
PRINT 'This account already exists.'
CLOSE #2% &
                                                                                                                                                                                                                                                                                                                                                            PRINT IF POS(0%)
\ INPUT 'Quota';QU%
\ GOTO 2070 IF
                                GOTO 2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                      QU% < 0%
                                                                                                                                                                                                                                                                                                                                                                  CREATE
                                                                                                                   THE
                                                                                                                                                      UFD
                               RESUME 2045
                             2045
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CLUSTER SIZE. &
SURE "IN USE". &
                                                                                                                                                                                                                                                                                                                                                            M%(M.PTR%,1%) = PPN%
\ M%(M.PTR%,4%) = STA%
\ M%(M.PTR%,7%) = UAR%
\ CLOSE #1% &
                                                    2050
                              OR
                                                                                                                                                                                                                                                                                                                                                                                                 PUT THE PPN, STATUS WORD, AND UPD'S FIRST DCN INTO THE MFD ENTRY & CLOSE UP THE MFD & FINISH UP.
                              THEN
                                                                                                                                                                                                                                                                                                                              2090
                                                                                                                                                                                                                                                                                                                                                            PRINT ' Account '; DEV$; PPN$; ' placed at DCN# '; NUM1$ (UAR%); '.' &
                             2100
                                                                                                                                                                                                                                                                                                                                                                                          HERE A ROUTINE TO MAKE AN ENTRY INTO AN "ACCT.SYS" OR OTHER & FILE CAN BE MADE. &
                                                             ! OPEN THE ACCOUNT AS A FILE
                             OPEN DEVS+'[1,1]' FOR INPUT AS FILE #1% &
\[ \text{N.PTR} = \text{PNL} \( \text{M} \) (0%,0% \) , MFDCLU% \]
\[ \text{UNTIL M.PTR} = \( 0 \) \[ \text{S} \]
\[ \text{GOTO 2060} \quad \text{IF} \quad \text{M} \) (M.PTR$,4% \]
\[ \text{GOTO 2060} \quad \quad \text{IF} \quad \text{M} \) (M.PTR$,1% \]
\[ \text{COTO 2060} \quad \quad \text{IF} \quad \text{M} \quad \text{M} \quad \text{PTR} \quad \qquad \quad \quad \quad \quad \quad \quad \quad \quad \q
2057
                                                                                                                                                                                                                                                                                                                              4000
                                                                                                                                                                                                                                                                                                                                                            GOTO
                                                                                                                                                                                                                                                                                                                                                                                          2000
                                                                                                                     &
    M% (M.PTR%,4%) AND 64% &
    M% (M.PTR%,1%) <> RAD.UFD%
    M% (M.PTR%,2%) <> RAD.PAS1%
    M% (M.PTR%,3%) <> RAD.PAS2%
                                                                                                                                                                                                                                                                                                                                                                                           ERROR
                                                                                                                                                                                                                                                                                                                                                                                                                                      TRAPS
                               \ GOTO 2060
\ GOTO 2060
\ GOTO 2063
                                                                                          IF
IF
                                                                                                                                                                                                                                                                                                                                                              18
                                                           2063 &
! FIND THE UFD IN THE MFD &
!> M.PTR% = POINTER INTO THE MFD ARRAY
                                                                                                                                                                                                                                                                                                                                                             \begin{array}{lll} {\tt E\$} &=& {\tt RIGHT(SYS(CHR\$(6\$) + CHR\$(9\$) + CHR\$(ERR)), 3\$)} & \& \\ & {\tt !>E\$} &=& {\tt RSTS} & {\tt ERROR} & {\tt MESSAGE} & \& \\ \end{array} 
                                                                                                                                                                                                                                                                                                                              19005
                             M.PTR% = FNL%(M%(M.PTR%,0%),MFDCLU%) &

\NEXT &

\PRINT 'OOPS!!, file not found again during reset search.'
2060
                                                                                                                                                                                                                                                                                                                              19020
                                                                                                                                                                                                                                                                                                                                                                                           ERL = 2020% & PRINT "Invalid information, can't create."
                                                                                                                                                                                                                                                                                                                                                             THEN
                                \ PRINT .002...,
\ GOTO 32767 &
! SHOULD NEVER GET HERE
                                                                                                                                                                                                                                                                                                                                                                                           \ RESUME 2000% & 
! AND ERROR IN FILE-NAME-STRING-SCAN HERE
                                                                                                                                                                                                                                                                                                                              19980
                                                                                                                                                                                                       UFD
                                                                                                                                                                                                                                                           MAKE &
                                                                                                                                                                                                                                                                                                                                                                                           PRINT ES
                                                             BUILD UP
                                                                                                                                  THE
                                                                                                                                                                    NEW
                                                                                                                                                                                                                                         AND
                                                                                                                                                                                                                                                                                                                                                            THEN
                                1 &
                                                                   THE
                                                                                                MFD
                                                                                                                                      SEE
                                                                                                                                                                      IT
                                                                                                                                                                                                   A S
                                                                                                                                                                                                                                           II F D
                                                                                                                                                                                                                                                                                                                                                                                           ! BAD NUMBERS ON USER INPUT HANDLED HERE
                                                                                                                                                                                                                                                                                                                                                                              FNERR%('MAIN',ERR,ERL,'Aborting...')
                                                                                                                                                                                                                                                                                                                              19990
                                                                                                                                                                                                                                                                                                                                                              RESUME 32767
2064
                               PRINT 'Extending...'; &
                             M.UAR% = FNL%(M%(M.PTR%,7%),MPDCLU%) &

\PIELD #2%,512% AS 2% &

\PDCMS = CVT%(SWAP%(UPDCLU%)) &

\PDCMS = FDCMS + CVT%(SWAP%(M%(M.UAR%,P%))) &

\PDCMS = FDCMS + CVT%S(SWAP%(M%(M.UAR%,P%))) &

\POCKS = FDCMS + CVT%S(SWAP%(M%(M.UAR%,P%))) &

\POCKS = FDCMS + CVT%(SWAP%(M%(M.UAR%,P%))) &

\POCKS = FDCMS + CVT%(SWAP%(M%(M.UAR%,P%))) &

\POCKS = FDCMS + CVT%(M.E.CMP)) &

\POCKS = FDCMS + CVT%(M.E.CMP) &

\POCKS = FDCMS + CVT%(M.E.CMP)) &

\POCKS = FDCMS + CVT%(M.E.CMP) &

\POCK
                                                                                                                                                                                                                                                                                                                              22000
                                                                                                                                                                                                                                                                                                                                                             ! &
! &
 2065
                                                                                                                                                                                                                                                                                                                                                                                          DEFINE
                                                                                                                                                                                                                                                                                                                                                                                                                                                         FUNCTIONS
                                                                                                                                                                                                                                                                                                                                                            ! &
                                                                                                                                                                                                                                                                                                                              22002
                                                                                                                                                                                                                                                                                                                                                          DEF FNL% (L%, CLU%)
                                                                                                                                                                                                                                                                                                                                                                                         & LL$,CLU$) & .
=(((L& AND 3584$) /512$) *CLU$ & .
+(SWAP$(L& AND -4096$) /16$)) *32$ & .
+((L& AND 496$) /16$) & .
LY FNL$() = DECIPHERS THE DIRECTORY LINK WORDS & .
                                                                                                                                                                                                                                                                                                                                                          DEF FNERR% (F.S,E%,EL%,MS) & 
PRINT CHRS(7%);RIGHT(SYS(CHRS(6%)+CHRS(9%)+CHRS(E%)),3%);' in ';F.S & 
PRINT ' at line';EL% & 
PRINT MS IF LEN(MS) &
                                                                                                                                                                                                                                                                                                                             22060
                                      TA% = SWAP%(60%) OR (16%+32%+64%)
UAR% = M%(M,UAR%,1%) &
U%(0%,1%) = -1% &
U%(0%,6%) = PPN% &
  2067
                                                                                                                                                                                                                                                                                                                                                             | FNEND & | PRINTS A STANDARD ERROR MESSAGE &
                                                                                     RAD.UFD%
                                                                !> STA% = VALUE OF THE MFD'S STATUS WORD FOR THIS UFD &
                                                                                                                                                                                                                                                                                                                             32/67
```

SO YOUR DISK PACK IS IRREVOCABLY CORRUPT

```
By Mark Diebert, E.R. Squibb & Sons, Inc., East Brunswick, N.J.
```

```
EXTEND
! This program supports extend mode
                       1********
                    !*****
!****
!****
!****
!****
!****
!****
!****

!****

!****

!****

!****

!****

!****

!****

!****

|*****

|*****

|****

|*****

|*****

|*****

|*****

|*****

|*****

|*****

|*****

|*****

|*****
                        ***** This program is intended solely for the purpose of

***** illustrating various data manipulation techniques as

***** an adjunct to the DECUS Symposium workshop entitled:

**** So Your "Disk Pack Is Irrevocably Corrupt".
                      90
                                                 ON ERROR GOTO 19000
! Set the standard error trap
                                                PRINT "The function of this program is to demonstrate ";
    "simple RSTS/E directory handling."

PRINT "There are two read options available:"

GOSUB 11000

PRINT

GOSUB 11100

PRINT "Output to <KB:>";

INPUT LINE Outfil$,

Outfil$=CVT$$(Outfil$,38%)

Outfil$=CVT$$(Outfil$,38%)

Outfil$="KB:" UNLESS LEN(Outfil$)

OPEN OUtfil$ AS FILE 12%

! Print the header

! GOSUB to print the various options
! GOSUB to print the write instructions
! Route the output
 1000
                                                 INPUT "1-Read 2-Write a blockette 0-End";Code$
\GOTO 32700 UNLESS Code$
\Input "Which disk";Disk$
\GOSUB 10000
\ON Code$ GOSUB 1050,3000 IF (Code$>0$) AND (Code$<3$)
\GOTO 1010
\Lambda GOTO 1010
\Lambda GOTO 1010
 1010
                                                                                                 1010

! Get a macro option (read/write/end)
! Get the disk name
! GOSUB to set up the pack information
! GOSUB to the proper routine if the option is in range
! Get another option
 1050
                                                PRINT
                                              INPUT "Enter link";Link.next%

GOSUB 11200

PRINT "Link:";NUM1$(Link.next%);" UFD Cluster:";

NUM1$(Clus.next%);" Block offset:";NUM1$(Block.next%);

" Entry offset:";NUM1$(Entry.next%)
                                                 \ PRINT
                                                 RETURN
                                                                                                        Get the link to be parsed
GOSUB to break apart the link
Print the components of the link
                                                Proceed%=0%
\ INPUT "DCN of blockette";Dcn.find%
\ PRINT "Block offset into DCN (0 to ";NUM1$(Pcs%-1%);")";
 1200
                                                | PRINT FIGURE CITES AND ACTION OF THE PROPERTY OF THE PROPERT
                                            | Temp%=512*Temp% | GOSUB 11300 | & GOSUB 1128, "Word", TAB(10%); "Value"; TAB(20%); "Lo Byte"; TAB(30%); & FOR I% 12%, "Word", TAB(10%); "Value"; TAB(20%); "Lo Byte"; TAB(30%); & GOSUB 12%, "RAD50" | & GOSUB 12%, "RAD50" | & GOSUB 12%, "RAD50" | & GOSUB 12%, "RAD50", "RAD50"
                                                            Proceed%=-1%
                                                                                                        Reset the "OK to proceed" switch (for write)
ROULINE to dump a blockette
Input the DCN of the blockette
Input the block number within the DCN
Input the position in the block
Get the device cluster from the disk
Compute the offset into the buffer
GOSUB to field the buffer
Load the print array within the blockette
Dump the blockette
Set the "OK to proceed" switch (for writes)
Return
3000
                                                         PRINT "You are now in the routine that allows the user to write" & PRINT "onto the disk. Are you sure that you want to do this"; & INPUT Temp$ & RETURN UNLESS ASCII(CVT$$(Temp$,32%))=89% &
```

```
\ GOSUB 1200
\ RETURN UNLESS Proceed%
                                        \ RETURN UNLESS FIGURES.\
FOR I%=0% TO 7%
\ PRINT "Enter word ";NUM1$(I%);
\ INPUT Tmp.arayl%(I%)
                                         \ INPUT Tmp.aray1%(I%)
\ NEXT I%
\ INPUT "Ok to write (Y/N)";Temp$
\ RETURN UNLESS ASCII(CVT$$(Temp$,32%))=89%
\ LSET Dir.field$(Entry.find*,I%)=CVT%$(SWAP%(Tmp.aray1%(I%)))
\ FOR I%=0% TO 7%
\ PUT $1%,BLOCK Dor.find%
\ PRINT "Blockette written."
                                          \ PRINT "
                                                                             Prompt for and get verification that we want to be here & Return unless we want to stay & REMEMBER: Non-file structured access required to write !! GOSUB to get the blockette that we want to write to & Enter the seven words of the blockette & E ! Verify that we want to write the blockette & Return unless we want to write & Return unless we want to write & F ! Place the blockette into the buffer & E ! Put the record out to disk & & E ! Print the verification message & & Return & & E Return & & E Return & & E | Return &
                                 10000
                                        PRINT TAB(10%);"1-Print the components of a specific link" 
\PRINT TAB(10%);"2-Dump the contents of a specified blockette"
 11000
                                         RETURN
                                                                              ! Subroutine to print READ help message
                                     \ PRINT
\ RETURN
                                                                                ! Subroutine to print the WRITE help message
                                      Clus.next%=(SWAP%(Link.next%) AND 14%)/2%
Block.next%=(SWAP%(Link.next%) AND 240%)/16%
Entry.next%=(Link.next% AND 496%)/16%
RETURN
                                                                              I Subroutine to break apart the next link:

Clus.next% is the next UFD cluster needed & Block.next% is the block offset within that cluster & Entry.next% is the entry offset within that block & Church Church & 
                                                                                ! Return
                                     FIELD #1%,Temp%+(1%*16%+11%+11%) AS Temp$, & & 2% AS Dir.field$(I%,I1%) FOR I1%=0% TO 7% FOR I%=0% TO 31% &
11300
                                        \ Temp%=0%
\ RETURN
                                                                             ! Offset into the buffer Temp% blocks and field as 32,
! 16-byte arrays
! Return
19000
                                     IF ERR=11 THEN
                                                                                                                  RESUME 32700 IF ERL=1010
                                                                                    RESUME 19999 & &

If the error is "End of file" then
Resume @ program end if we are looking for a task &
Resume @ RETURN &
                                     ON ERROR GOTO 0 ! Abort end all else
19990
 19999
                                      RETURN
                                                                            ! Convenient return for error handler
                                     CLOSE I% FOR I%=1% TO 12%
! Prepare to end
 32700
32767
                                      END
```

! The end

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LOVE segmented keys?

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HATE compiling and tkbing?

HATE recoding old programs?

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- Segmented keys
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- Journaling
- Power fail protection
- Automatic logical record split into variables

AND

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DATA BOSS 2 USERS

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FIP's Alignment Algorithm

By Paul R. Laba, Computer Services, Le Moyne College

Introduction

This article is the result of a Software Performance Report I recently submitted to DEC seeking clarification on the alignment algorithm used by FIP in the placement of files or UFDs on RSTS disks. It is assumed that the reader is familiar with the usual notations and definitions concerning RSTS disk directories; some brief definitions are presented here for completeness, although more detailed explanations can be found in several past articles of the RSTS PROFESSIONAL.

Block

256 contiguous words of data.

Cluster

A collection of one or more contiguous blocks. The number of blocks in a cluster is always a power of 2 in the range 1-256.

Disk Cluster (DC)

The primary storage unit on a RSTS disk. A DC is the smallest allocatable unit of disk data.

Disk Clustersize (DCS)

The number of blocks in each disk cluster. This value is based on the disk type (RMO2, RLO1, etc.), such that every disk cluster can be addressed with a single 16-bit word. This value is hardware dependent and cannot be altered.

Disk Cluster Number (DCN)

The address of each disk cluster on a disk pack, starting at 0 and increasing to the maximum disk cluster. DCN 0 always contains the disk's boot block; DCN 1 always addresses the start of the MFD (Master File Directory).

Pack Cluster (PC)

A collection of one or more contiguous disk clusters. The pack cluster serves as the minimum unit of storage for all data structures on a RSTS disk. Pack clusters can be thought of as logical extensions of disk clusters. The Storage Allocation Table (SAT) on a RSTS disk maps each pack cluster (not disk cluster!) with a single bit, indicating whether the pack cluster is allocated (1) or free (0).

Pack Clustersize (PCS)

The number of blocks assigned to each pack cluster, defined when a disk pack is initialized (via DSKINT).

The pack clustersize must always be greater than or equal to the disk clustersize.

Pack Cluster Number (PCN)

The address of each pack cluster on a disk pack, starting at 0 and increasing to the maximum pack cluster. PCN 0 is aligned with DCN 1, with the effect that no pack cluster includes DCN 0 (unnecessary, since DCN 0 is always allocated).

File Cluster (FC)

A collection of one or more pack clusters. File clusters can be thought of as logical extensions of pack clusters, since they serve as the minimal storage unit for a specific file.

File Clustersize (FCS)

The number of blocks contained in a file cluster. This value is defined when the file is created, and must always be greater than or equal to the pack cluster-size. The maximum clustersize for a file is 256.

The Alignment Algorithm

It is common knowledge that FIP aligns file clusters on pack cluster boundaries. This is necessary, since each bit in a disk's SAT represents a pack cluster. What is not commonly known is that FIP goes one step further in aligning file clusters; it aligns them on **file** cluster boundaries! The alignment algorithm, formally stated:

Let ROOT = starting DCN of a file cluster,

FCS = File Clustersize, DCS = Disk Clustersize.

Then, for FCS > DCS,

ROOT modulo (FCS/DCS) = 1.

The algorithm restricts "where" on a disk a file's clusters may be placed. For example, a file with FCS = 8 must have all of its clusters aligned on a disk with DCS = 1, at DCNs in the set $\{1,9,17,25,...,8n+1\}$; no cluster of the file can ever be placed at any DCN not in the set. If the FCS is 64, then the alignment set becomes $\{1,65,129,...,128n+1\}$. For a disk with DCS = 4, a file with clustersize 64 will have its clusters aligned in the DCN set $\{1,17,33,...16n+1\}$, where 16=64/4.

Less formally, the effect of the algorithm is for FIP to alter the pack clustersize to match the clustersize of a file

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being created or extended. For example, when a file with clustersize 256 is created or extended, FIP logically segments the disk into pack clusters of size 256 in order to align the file clusters. Note from the algorithm that the placement of a file's cluster is completely determined by the FCS and DCS. This is a significant change from the general notion that the pack clustersize plays the dominant role in FIP's determination of a file cluster's placement on a RSTS disk; instead the file clustersize itself plays a more important part. (Of course, the PCS defines the minimum FCS, so that the pack clustersize does have some control over a file cluster's alignment).

Files with clustersize equal to the disk clustersize can have their clusters placed at **any** available disk cluster. However, this is impossible for disks having a pack clustersize larger than the disk clustersize, since the minimum clustersize for a file is the pack clustersize.

Experimentation

In order to confirm this phenomenon, a small BASIC-PLUS program was written to scan a selected UFD, passing the DCNs of files with various clustersizes through the above algorithm. The file cluster alignment was confirmed in every case. Furthermore, the results were verified for the root DCN of all UFDs on the disk. (This is not surprising, since UFDs are nothing more than files with clustersize limited to 16).

While the alignment algorithm is itself interesting, the implications of the algorithm are quite surprising. Consider the following scenario.

A freshly DSKINTed RF-11 fixed-head disk shows the following attributes:

Disk Clustersize (DCS):

e (DCS):

Pack Clustersize (PCS):

1

1

Allocated DCNs:

{0,1,5-9}

Non-allocated DCNs:

{2-4,10-1023}

Note that 1,014 contiguous blocks exist, starting at DCN 10. I now enter the following command to create a file:

PIP DF0:DUMMY.FIL/M0:16/CL:128/SI:896 = NL:

My wish is to create a contiguous, 896-block file with clustersize 128. Since 1,014 contiguous blocks are available, the file creation should succeed. Instead, I get the dreaded ?NO ROOM FOR USER ON DEVICE message. The reason: since FIP must align the file clusters on a **file** cluster boundary, the file must begin at DCN 129, leaving only 895 contiguous, non-allocated blocks. If I re-enter the above command, changing the file clustersize to 64 (/CL:64), then the creation succeeds. Analysis shows that the file starts at DCN 65, with enough contiguous blocks to hold the entire file (DCNs 65-960).

Another implication of the algorithm appeared when I attempted to build a UFD on a non-file-structured disk (via my own utility). Concerned only with pack cluster alignment, I created the UFD, only to receive the message, ?BAD DIRECTORY FOR DEVICE when trying to read it later. Once

the UFD was moved to a cluster that satisfied the alignment algorithm, the problem disappeared. Point of the story? FIP not only utilizes the algorithm in creating or extending files or UFDs; it expects and requires that such alignment is always maintained.

Rationale

While becoming more aware of the algorithm's effects, I was still puzzled by its purpose. Why should FIP require that all file clusters start on file cluster boundaries, rather than pack cluster boundaries? Clearly, disk fragmentation is not reduced by the algorithm. It can be argued that fragmentation actually increases (consider the above example on a large, almost-full disk pack). Furthermore, files thought to be "back-to-back" on a disk may actually have small "gaps" between them, where the second file could not be aligned on the pack cluster immediately following the first. DEC provided the not-so-obvious reason for the algorithm:

"We always start files on **file** cluster boundaries to guarantee that the entire file cluster (or UFD cluster) will never cross a SAT block boundary."

Without the algorithm, files with clustersize greater than the pack clustersize (requiring two or more bits in the SAT per file cluster) could end up spanning a SAT block boundary in order to map a single file cluster. This would be undesirable, since it would increase SAT disk access overhead. DEC concludes their explanation saying, "We have no intention of changing this algorithm."

A Bug in FIP

The SPR submitted also pointed out a bug in FIP having to do with (you guessed it) the alignment algorithm for placed files. One of the features added to RSTS version 7.0 was the ability to place files starting at specified disk cluster numbers, via the /POSITION switch. (When will they provide us the ability to place UFDs?). Documentation on the matter indicates that a placed file will be located at or after the specified DCN, with a bit set in the file's directory marking it as placed (an "L" appears in directory listings). Continuing with the DFO:#disk scenario from above, I attempt to place a 16-block contiguous file at DCN 970, with a file clustersize of 16. The following command is issued:

PIP DF0:TEST.FIL/M0:16/CL:16/SI:16/P0:970 = NL:

Since all DCNs from 961 through 1023 are non-allocated, the file creation succeeds. However, a directory listing shows the file's starting DCN as 961, and the file is **not** marked as placed. As expected, the alignment algorithm would not permit the file to be placed at DCN 970 (since 970 modulo 16 <> 1), but why not place the file at the next higher aligned DCN (977)? DEC described the bug this way:

"The problem results from the fact that the routine that allocates the blocks out of the SAT rounds the requested DCN down to the PCN on the file cluster boundary. Later, when the file is created, the code checks to see if the DCN where the file was created is greater than or equal to the DCN requested by the user. Because of rounding, this test fails and the file is not marked as being placed."

In the above example, if any DCN from 961 to 976 had already been allocated, the file placement would have succeeded, with the file starting at DCN 977, and the "placed" bit being set.

DEC further noted that the problem is difficult to repair and would not be corrected until the next RSTS release (will there ever be a next release?). Note that, even with the bug. the placement of files still works, if you are willing to accept "works" to mean that files end up somewhere near (before or after) your specified DCN, and the "placed" bit may sometimes not get set.

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DEAR **RSTS** MAN:

DEAR RSTS MAN:

What solutions have other users found to make disk garbage unreadable? Our students sometimes erase a file without meaning to and then search around through disk garbage until they find it and then pull it back into their account. Last week, while looking for a paper he had erased by accident, a student stumbled across an instructor's grade book and pulled that along with his paper into his account. The instructor whose grade book it was, was not exactly thrilled.

Cordially, Gordon G. Henderson Director, Computing Center Earlham College, Richmond IN

Dear Mr. Henderson: Confer RSTS Programming Manual, p. 1-8. Modify your grade book program & other sensitive programs to use their normal protection codes + 128. Other folks, not willing to endure the FIP overhead incurred zeroing files, use batch programs to open & zero files until they run out of space, then delete them all. Others suffer.

DEAR RSTS MAN:

How does PIP.SAV work so quickly? K. Wallewein Calgary, AL 12K5B3

Dear K: PIP.SAV is written in MACRO (RT11 version). That makes it about seven to ten times faster than B+2 and 20 to 100 times faster than B+ (on average). It also avoids SYS calls for directory lookup & uses huge buffers (if you let it) and swaps buffers when copying. The problem with writing in MACRO is that the difficulty of producing debugged code is directly proportional to the relative speed enhancements noted above.

DEAR RSTS MAN:

I attach a solution to the problem raised by Wilf Forrow (Vol. 3, No. 1, p. 15). I hope this may be of use to your readers. I have not used it with an LA120 but it works with similar devices.

1. Problem: When outputting to a terminal device RSTS does not check

whether the device is actually present and on-line. Data can be lost down a hole.

2. Solution

The RSTS/E operating system detects and acts on device status only for modem configured terminal devices.

A local device, or remote device using private wires must be made to look like a modem configured device. Then, the operating system must be informed that the device is "remote". The device itself must be made to set and unset the modem control signals via its V24 interface connection. So the steps taken are as follows:

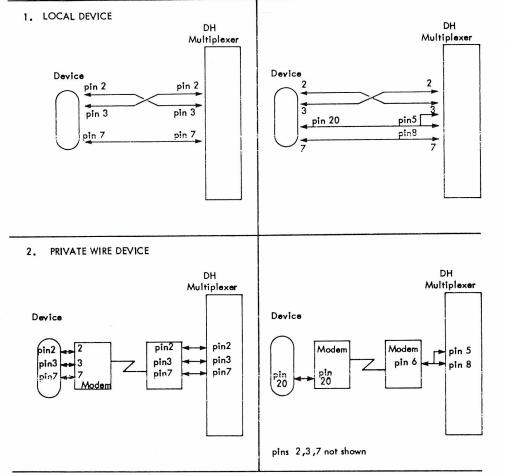
- A. Ensure that Modem Support is requested at SYSGEN time.
- B. Rewire the device connections as shown in Figure 1.
- C. Using the 'SET' option when the system is booted up change the

- relevant devices from "LOCAL" to "MODEM". This means RSTS will respond to the modem control signals.
- D. Using TTYSET set the device characteristics, especially speed, using the /RING option. This means that every time the device fails, RSTS effectively "hangs the line up" and sets the device characteristics back to those set in the /RING option. If this option is not used the device is always set back to 110 baud.
- E. When printing to the device, always open it in MODE 16% to prevent hibernation on device failure. Error 27 (I/O to detached keyboard) will always occur when the device is unavailable. Yours faithfully, George T.A. May Special Systems Division

Software Sciences Limited, UK

BEFORE MODIFICATION

AFTER MODIFICATION



TRANSMIT pin 2 RECEIVE pin 3

CLEAR TO SEND pin 5 pin 6 DATA SET READY pin 7 SIGNAL GROUND pin 8 CARRIER DETECT pin 20

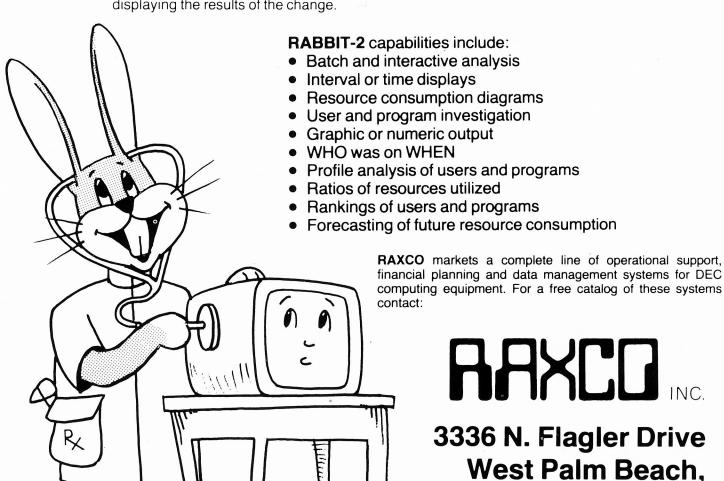
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RSTS/E MONITOR INTERNALS Part 3

By Mike Mayfield, Northwest Digital Software, Box 2-743, Newport, WA 99156

The demand for information on RSTS internals has been so great that I have decided to write a complete book on RSTS monitor internals. It will include not only monitor tables but disk structures, writing device drivers, runtime systems, and resident libraries, FIP, file attributes and performance optimization. Look for more information on it here in the RSTS Pro.

This is the third in a series of four articles describing the internal structure of the RSTS/E V7.0 monitor tables. The articles to date have described job and memory control. This article will describe the structures involved in the device and file control. Both the large and small file systems will be discussed.

After reading this article you may want to go back and take another look at Francois Dubois' article entitled "JBSTAT" in Volume 3, Number 2 of the RSTS Pro. His program makes use of much of the information presented in this article.

3.0 FILE CONTROL

A disk is typically broken down into several files. Each file can be treated as if it were a separate disk. RSTS takes care of finding a place to put the file data and then retrieving that information when needed.

Since most RSTS systems are used in commercial and general purpose applications which make frequent use of disk files, improvements in the file control system can have a significant impact on system performance. For this reason DEC essentially rewrote the file control system for version 7 of RSTS.

The result was the large file system. As the name implies this new file control system allows large file sizes (larger than 65,535 blocks). It also includes many performance improvements, especially when the same file is in use by more than one person.

For purposes of this discussion we will call the standard file control system the small file system and the new file control system the large file system.

3.1 SCB — SMALL FILE CONTROL BLOCK

Each time a file is opened a structure called a Small Control Block (SCB) is allocated to the opener. This stucture contains all the information needed to access the opened file. This information includes the file size, current block number, pointers to seven clusters of the file and a pointer to the remaining cluster information in the directory.

When a file is accessed the file size (S\$SIZ) is checked against the desired block number. If the desired block number is greater than the current file size an error is returned for GETs and an automatic file extension is done for PUTs (except in the case of contiguous files and update mode).

The window base block number (S\$FVB) and the window information (S\$WND) are used to map the logical block number supplied by the user into a physical block number on the disk. A window holds pointers to seven clusters of the file. If the desired logical block is contained in the seven clusters pointed to by the current window the physical block can be determined immediately. If it is not contained in the current window a window turn is performed.

A window turn in the small file system consists of following the linked list of retrieval entries in the directory starting at the beginning and continuing until the entry for the desired cluster is found. (See Scott Banks' articles on directory structure). Once the desired retrieval block is found it is loaded into the window (S\$WND) and the window base block (S\$FVB) is updated to show the new window mapping base.

A small file system control block (SCB) has the following format:

1	Status flags Disk driver index	0	S\$IDX
3	 FIP unit number Pending transfers	2	S\$PT
	 File size	4	S\$SIZ
	 Next block to read/write	6	S\$NVB
	 Block number of first block in window	8	S\$FVB
13	 Flag bits Cluster size - l	10	S\$CLUS
	Block number of UFD name entry (LSB)	12	S\$UFND
	 Offset in block/2 MSB of S\$UFND	14	
		16	S\$WND
		18	
	 Retrieval entry window	20	
		22	
		24	
		26	
		28	
		30	
	13	FIP unit number Pending transfers File size Next block to read/write Block number of first block in window Flag bits Cluster size - 1 Block number of UFD name entry (LSB) Offset in block/2 MSB of S\$UFND	FIP unit number Pending transfers 2

Offset	Symbol	Description
0	S\$IDX	This byte is the driver index. It is always 0 to show that the device associated with
1	S\$STS	the SCB is a disk device. This byte contains the file status bits (see section 3.1.1).

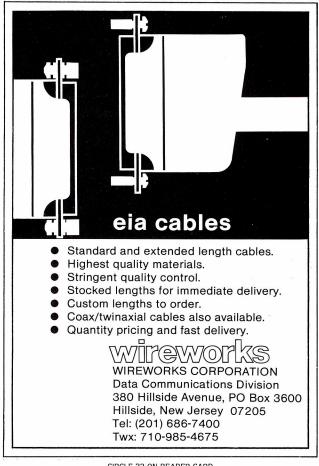
RSTSPROFESSIONALRSTSPROFESSIONA

2	S\$PT	This byte contains a count of the number of transfers pending on this file by this user. When an I/O is requested this byte is set to 1. If the request requires more than one physical I/O transfer, this value is increased as necessary. An I/O request can require more than one transfer if it involves more than one block and the blocks either cross a cluster boundary or cross a cylinder boundary on a disk that doesn't do automatic cylinder movement (such as
3	S\$UNT	RL01/02). This byte contains the FIP unit number for the disk in use. Each disk unit on the system has a unique FIP unit number associated with it.
4	S\$SIZ	This word contains the current file size, in blocks. The file size may range from 0 to 65,535 blocks.
6	S\$NVB	This word contains the next block to read or write if a sequential I/O transfer is requested.
8	S\$FVB	This word contains the block number of the first block in the retrieval window (\$\$WND). The block number corresponds to the first block of the first cluster in the window. Knowing this block number and the file's cluster size you can determine which blocks are mapped by the current window.
10	S\$CLUS	This byte contains the file's cluster size minus one.
11	S\$FLG	This byte contains file status bits and locked block information (see 3.1.2).
12	S\$UFND	These two words contain a pointer to the name entry in the UFD for this file. The first two bytes are the low order bytes of the block number of the UFD. The next byte is the high order byte of the block number. The last byte is the offset, divid-
16	S\$WND	ed by 2, into the block to the name entry. The first word contains status bits (see section 3.1.3). The following seven words are the current retrieval window. Each word contains the device cluster number (DCN) of the first block of the associated cluster.

3.1.1 S\$STS — Status Flags

The status flags show the current status and restrictions placed on the file in use. These bits correspond to conditions in effect at the time the file was opened (such as write protection) and conditions in effect as of the last I/O. The format of S\$STS is as follows:

Bit	Symbol	Description
8	DDNFS	The disk is opened non-file structured.
		The remaining status bits apply as if the
		disk were opened file structured.
9	DDRLO	The file is read protected against the user.



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10	DDWLO	The file is write protected against the
		user.
11	SC\$UPD	The file is opened for update (mode 1).
12	SC\$CTG	The file is contiguous.
13	SC\$LCK	The current block (shown in S\$NVB) is implicitly locked.
14	SC\$UFD	The file is really a UFD opened in non-file structured mode (ie. OPEN "DKO:[1,2]" AS FILE 1).
15	SC\$USE	This user received the original write privileges.

3.1.2 S\$FLG — Flag Bits

S\$FLG serves two purposes. First, it defines the number of blocks that are included in an implicit lock. Second, it contains status bits similar in purpose to S\$STS. The format of S\$FLG is as follows:

Bit	Symbol	Description
0-4	SC\$LLK	These five bits specify the number of blocks that are included in the current implicit lock. This value may vary from 0 to 31.
5	SC\$RR	The file is opened in read regardless mode (mode 4096).
6	SC\$EXT	This SCB is followed immediately in memory by another small buffer's worth of information about explicitly locked blocks. The information in this extended portion of the SCB consists of a table of double-words where the first byte is the most significant byte of the block number of the first explicitly locked block, the second byte is the number of blocks included in the lock, the third and fourth bytes (as a word) are the least significant bytes of the block number of the first locked block.
7	SC\$DLW	The file was either written into or extended. The file size and date last written need to be updated when the file is closed.

3.1.3 S\$WND — Retrieval Window Flags

The first word of the retrieval window contains flag bits used for new version 7 features. The format of S\$WND is as follows:

Bit	Symbol	Description
0	SC\$SPU	The file is open in special update mode (mode 5).
1	SC\$AEX	Always do a real extend on the file (mode 8).
2	SC\$CHE	The file is open for user data caching (mode 256 or mode 2048)
3	SC\$CSQ	The user data caching specified by SCSCHE is sequential (mode 2048)

3.2 FCB — LARGE FILE CONTROL BLOCK

With version 7 of RSTS came the optional large file support. If this option is taken at sysgen time the standard file processing code in FIP is replaced with a new improved version. This new file processor uses totally different control structures which allow many improvements in performance, especially when the same file is opened by more than one user.

With the new file system control structures, less disk overhead is required to open a file for the first user and no disk overhead is required for subsequent users of the same file. In addition, disk overhead associated with window turns (loading the retrieval window from the directory) is reduced, especially when the file is open more than once.

The structures used in the new file system are the File Control Block (FCB) and the Window Control Block (WCB). When a file is opened a list of FCBs for currently opened files is searched. If the desired file is not found in this list the directory is searched to find the information for the file. This information is loaded into an FCB and a WCB.

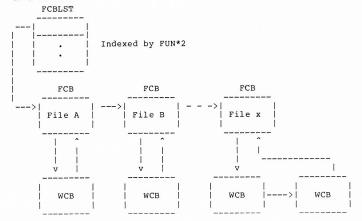
When the same file is opened simultaneously on another channel, or by another user, the information about the file is already in an FCB. No search of the directory, with its attendant disk accesses, is needed. All the information about the file is already contained in the existing FCB. A new WCB is allocated for the open and linked to the previous WCB or list of WCBs for this file. No disk accesses are required and FIP is released immediately.

As you can see, the overhead of opening a file when someone else already has it open is drastically reduced. This can be used to our advantage by writing a small program that opens the most commonly used files in read/regardless mode and then detaches and goes to sleep indefinitely. Both data files and commonly used programs can be opened in this way. Once opened, there will essentially be no overhead the next time any of these files are opened.

To allow the existing FCBs to be searched quickly they are kept in a linked list. Each disk unit has its own linked list. The base address of each list is kept in a table (FCBLST) and is accessed by the FIP unit number (FUN), times two, for the associated disk unit.

The window control blocks (WCBs) associated with each file are also kept in a linked list. The pointer to the base of this list is kept in the FCB for the file. The last WCB in the linked list contains a pointer back to the FCB.

The following diagram shows the linked list of FCBs and WCBs:





The format of a File Control Block (FCB) is as follows:

	Link to next FCB on this FIP unit	0	F\$LINK	
	File ID (link to name entry in UFD)	2	F\$FID	
	PPN project # PPN programmer #	4	F\$PPN	
	 	6	F\$NAM	
		8		
	File name extension in RAD50	10		
F\$PROT 13	Protection code Status byte	12	F\$STAT	
F\$RCNT 15	RR access count N/U access count	14	F\$ACNT	
	 FBB of first retrieval entry	16	F\$WFND	
		18		
	FBB of name entry	20	F\$UFND	
	I I I I I I I I I I I I I I I I I I I	22		
F\$SIZM 25	File size (MSB) FIP unit number	24	F\$UNT	
	File size (LSB)	26	F\$SIZL	
	File cluster size	28	F\$CLUS	
	Pointer to first WCB for this file	30	F\$WCB	

Offset	Symbol	Description
0	F\$LINK	This word contains a pointer to the next FCB on this FIP unit. The end of the list is
2	F\$FID	terminated by a forward link of 0. This word contains the file ID for this file. It is used when searching the FCB list during an open by file ID (only available in MACRO).
4	F\$PPN	This word contains the PPN of the file. The programmer number is in the first byte, the project number in the second byte.
6	F\$NAM	These three words contain the file name and extension in RAD50. The file name is in the first two words, the extension in the third word.
12	F\$STAT	This byte contains file status bits (see section 3.2.1).
13	F\$PROT	This byte contains the file's protection code.
14	F\$ACNT	This byte contains a count of the number of times this file is currently open for normal or update access.
15	F\$RCNT	This byte contains a count of the number of times this file is currently open for read/regardless access.
16	F\$WFND	This double word is the FIP block/sub- block (FBB) of the first retrieval entry for this file in the directory. FBBs are de-
20	F\$UFND	scribed in section 3.2.2. This double word is the FIP block/sub-block (FBB) of the name entry for this file in the directory. FBBs are described in sec-

tion 3.2.2.

byte of the file size.

This byte contains the FIP unit number

This byte contains the most significant

for the disk unit containing this file.

24

25

F\$UNT

F\$SIZM

26	F\$SIZL	This word contains the least significant
		bytes of the file size.
28	F\$CLUS	This word contains the file's cluster size.
30		This word contains a pointer to the first
		window control block (WCB) for this file.

3.2.1 F\$STAT — Status Flags

The status flags contained in F\$STAT have the following for mat:

Bit	Symbol	Description
0	US.OUT	This file is a swapping disk that is not included in the SAT.
1	US.PLC	This file is placed starting at a specific disk block.
2	US.WRT	Write access has already been given out.
3	US.UPD	This file is open in update mode.
4	US.NOX	This file is contiguous. No extends are allowed.
5	US.NOK	This file may not be deleted or renamed.
6	US.UFD	This file is really a UFD opened in non-file structured mode (i.e.; OPEN "DKO:[1,2]"AS
		FILE 1).
7	US.DEL	This file has been deleted.

3.2.2 FBB — FIP Block/Sub-block

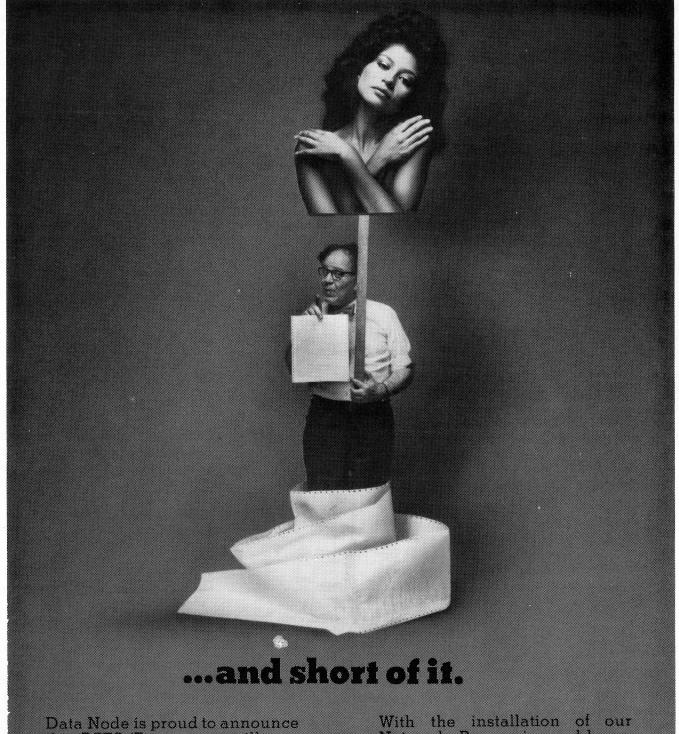
A FIP block/sub-block provides all the information necessary to immediately retrieve any entry in a directory if the FIP unit number is known. Given this information a directory entry can be accessed in one seek. The format of an FBB is as follows:

Offset	Description
0	This byte contains the offset within the directory
	block, divided by 2, to the desired directory entry.
1	This byte contains the block offset within the
	cluster to the desired block of the directory.
2	This word contains the device cluster number of
	the first block of the desired cluster.

3.3 WCB — WINDOW CONTROL BLOCK

The window control block (WCB) contains all the information needed by the monitor for an individual user of a file. Each simultaneous opening of a file generates a unique WCB. These WCBs are pointed to by the user's IOB (see section 1.4, Volume 3, Number 1).

When an I/O request is made for a file, the WCB associated with the specified user and channel number is used to access the retrieval window. If the desired retrieval information is not already present in the WCB a window turn is performed. Unlike the small file system, the large file system will start a search at the current position if the desired retrieval information is beyond the current position in the linked list of retrieval entries.

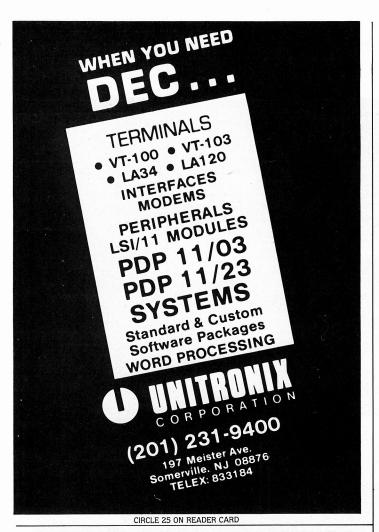


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As the list of retreival entries is followed, the linked list of WCBs for this file is checked. If the desired retrieval entry is already contained in a WCB, that WCB is used instead of following the link on disk. When the desired retrieval entry is found the information is copied into the current WCB's retrieval entry window.

The format of a window control block is as follows:

W\$STS 1	Status flags Disk driver index	0	W\$IDX
W\$FLAG 3	Flag bits Job number *2	2	W\$JBNO
W\$NVBM 5	Next block # (MSB) Pending transfers	4	W\$PT
	Next block number (LSB)	6	W\$NVBL
	Pointer to FCB at F\$CLUS	8	W\$FCB
	Retrieval entry number	10	W\$REN
	Pointer to next WCB for this FCB	12	W\$WCB
	FBB of next window	14	W\$NXT
	16		
1200 12		18	W\$WND
		20	
	Retrieval entry window	22	
		24	
		26	
		28	
		30	

	Offset	Symbol	Description
	0	W\$IDX	This byte is the driver index. It is always 0 to show that the device associated with the WCB is a disk device.
	1	W\$STS	This byte contains the file status bits for this user (see section 3.3.1).
l	2	W\$JBNO	This byte contains the job number, times 2, of the user that owns this WCB.
	3	W\$FLAG	This byte contains file status bits and locked block information (see section 3.3.2).
	4	W\$PT	This byte contains a count of the number of transfers pending on this file by this user. When an I/O is re-
			quested this byte is set to 1. If the request requires more than one physical I/O transfer this value is increased as necessary. An I/O request can require more than one transfer if it involves more than one block and the blocks either cross a cluster boundary or cross a cylinder boundary on a disk that
			doesn't do automatic cylinder movement (such as RL01/02).
	5	W\$NVBM	This byte contains the most significant byte of the next block number to use for sequential access.
	6	W\$NVBL	This word contains the least significant bytes of the next block number to use for sequential access.

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8	W\$FCB	This word contains a pointer to the file control block (FCB) at offset F\$CLUS in the FCB.
10	W\$REN	This word contains the current retrieval entry number. It identifies which retrieval entry is currently stored in W\$WND of the WCB.
12	W\$WCB	The low order bits of this word are file status bits. The high order bits are a pointer to the next WCB for this FCB. See section 3.3.3 for more information.
14	W\$NXT	This double-word is the FIP block/sub- block (FBB) for the next retrieval entry in the directory. It allows immediate access to the next retrieval entry in the directory if sequential access is taking place.
18	W\$WND	The following seven words are the current retrieval window. They contain the device cluster number of the first block of each cluster for this retrieval entry.

3.3.1 W\$STS — Status Flags

The status flags in W\$STS show the status and restrictions placed on the file for the current user. Bear in mind that each time a file is simultaneously opened a new WCB is allocated and each WCB has its own set of status flags. The format of W\$STS is as follows:

Bit	Symbol	Description
8	DDNFS	The disk is opened non-file structured. The remaining status bits apply as if the disk were opened file structured.
9	DDRLO	The file is read protected against the user.
10	DDWLO	The file is write protected against the
		user.
11	WC\$UPD	The file is open for update (mode 1).
12	WC\$CTG	The file is contiguous.
13	WC\$LCK	The current block of the file is implicitly locked.
14	WC\$UFD	The file is really a UFD opened in non-file structured mode (i.e.; OPEN "DKO:[1,2]"AS
15	WC\$USE	FILE 1). This WCB received the original write privileges.

3.3.2 W\$FLAG — Flag Bits

W\$FLG serves two purposes. First, it defines the number of blocks that are included in an implicit lock. Second, it contains status bits similar in purpose to W\$STS. The format of W\$FLG is as follows:

Bit	Symbol	Description
0-4	WC\$LLK	These five bits specify the number of
		blocks that are included in the current im-
		plicit lock. This value may vary from 0 to
		31

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5 WC\$EXT This WCB is followed immediately in memory by another small buffer's worth of information about explicitly locked blocks. The information in this extended portion of the WCB consists of a table of double-words where the first byte is the most significant byte of the block number of the first explicitly locked block, the second byte is the number of blocks included in the lock, the third and fourth bytes (as a word) are the least significant bytes of the block number of the first locked block. 6 WC\$DLW The file was either written into or extended. The file size and date last written need to be updated when the file is closed. 7 WC\$NFC The file is opened non-file structured in

3.3.3 W\$WCB — File Flags and Link to WCB

Since the small buffers from which WCBs are allocated always lay on even boundaries of 32 bytes, the low order five bits of their address are always 0. These low order bits are used as extended flag bits. They are not actually part of the address of the next WCB and should be treated as zeroes when used in a pointer. The format of W\$WCB is as follows:

cluster mode (mode 128 was not used).

Bit	Symbol	Description
0	WC\$RR	The file is open in read regardless mode (mode 4096).
1	WC\$SPU	The file is open in special update mode (mode 5).
2	WC\$AEX	Always do a real extend on the file (mode 8).
3	WC\$CHE	The file is open for user data caching (mode 256 or mode 2048)
4	WC\$CSQ	The user data caching specified by SC\$CHE is sequential (mode 2048).
5-15		These bits, combined with low order bits of 0, are the address of the next WCB for this FCB.

4.0 DEVICE CONTROL

Device control breaks down into two parts: information needed by the monitor to perform logical operations (opens, closes, etc.) on the device and information needed by the device driver to interface with the device at the physical level.

While we will be talking about data structures that are used by device drivers, we will not be discussing how to actually write a device driver. Writing drivers is beyond the scope of this article but is covered in my book on RSTS monitor internals.

The logical operations available to a user are OPEN, CLOSE, GET, PUT and SPEC. Except for opening a device, the only structures required are the user's XRB (see the RSTS/E System Directives Manual) and the Device Data Block (DDB).

Opening a device requires the data structures DEVNAM. DEVCNT, DEVPTR, UNTCNT and DEVTBL, which are used to verify the name and unit number specified for the device and associate it with the physical device information.

The physical operation of a driver uses information passed by the user in his XRB and device specific information kept in a structure called the Device Data Block (DDB). Portions of the information in the DDB are standardized between all devices and portions of it are specific to the needs of the particular devices.

4.1 DDB — DEVICE DATA BLOCKS

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The structure used to control physical use of a device by a driver and to communicate between monitor routines and the driver is the Device Data Block (DDB). Every unit of every device has its own DDB associated with it.

A DDB contains information about device opens and assignment, small buffer usage and printer position, as well as other information specific to the particular device, such as controller status and temporary buffering.

Every DDB must contain a certain amount of specific information. This minimal DDB has the following format (the information starting at offset 8 is only required if character oriented output is to be performed):

DDSTS	1	Device type flags Driver index	0	DDIDX
DDUNT	3	Unit number Owner job # *2	2	DDJBNO
		Ownership start time of day	4	DDTIME
		Ownership count and flags	6	DDCNT
		Device dependant flag bits	l 8	DDFLAG
		Small buffer empty pointer	10	DDBUFC
		Small buffer fill pointer	12	
		Small buffer count	14	
DDHORC	17	Line width +1 Horiz position	16	DDHORZ

Offset	Symbol	Description
0	DDIDX	This byte contains the driver index. This
		value is unique to each device type.
1	DDSTS	This byte contains a set of bits that
	DDDID	describe the characteristics of the device
_		(see section 4.1.1).
2	DDJBNO	This byte is the job number, times 2, of
		the job that has this device unit assigned,
		either explicitly by an ASSIGN or implicitly
		by an OPEN.
3	DDUNT	This byte specifies the unit number of this
_		device.
4	DDTIME	
4	DOTTIVIE	J =
		time the device was assigned. It is used to
		charge device time when the device is
		closed.
6	DDCNT	This byte is the ownership count for this
		device unit. It is incremented each time
		the device is opened and decremented
		when it is closed.
7		
1		This byte is a set of device flags (see sec-
		tion 4.1.2).

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8 DDFLAG This word contains device specific flag bits and is not used by the monitor. 10 DDBUFC The following three words contain small buffer control information. The first word is the pointer to where bytes are to be removed from the small buffer chain. The second word is the pointer to where bytes are to be inserted into the small buffer chain. The third word is the number of small buffers remaining in the allocation for this device. When this word reaches 0 the program may be stalled for small buffer wait. 16 DDHORZ This byte is the current horizontal position of the "print head". A value of 0 is the right hand margin. A value equal to DDHORC is the left hand margin.

4.1.1 DDSTS — Device Characteristics Flags

one.

17

The device characteristics bits in DDSTS have the following meaning:

DDHORC This byte is the device's line width, plus

Bit 8		Description Ownership of this device unit requires
	2211110	privileges.
9	DDRLO	Read privileges are never given for this device. This device is inherently write

- only. 10 DDWLO write privileges are never given for this device. This device is inherently read only.

 DDNET This device exists elsewhere in a DECNET
- 11 DDNET This device exists elsewhere in a DECNET network.
- 12 Unused.
- DDAUX This device can use KMC11 bridge blocks.

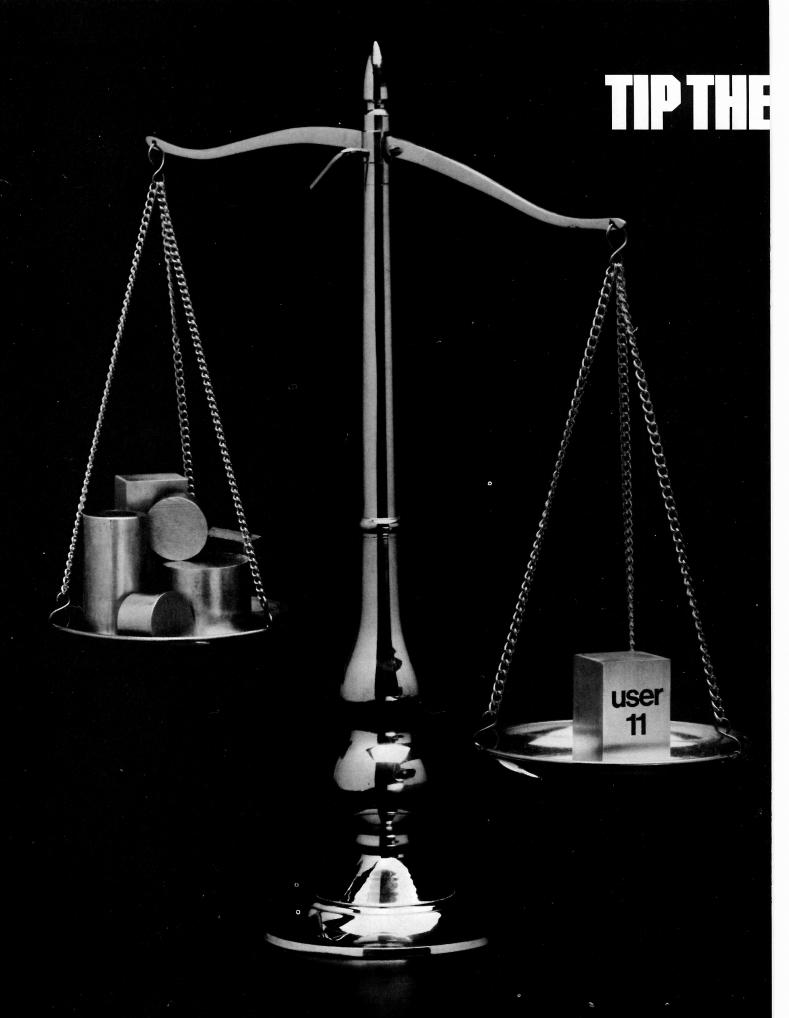
 Bridge blocks provide a means of communication between the computer and a KMC11 processor.
- DDAUXA This device is currently bridged to a KMC11.
- DDSTAT This bit is not used by the monitor but is cleared each time the device is closed. The driver can use this bit to automatically reset a condition when the device is closed.

4.1.2 DDCNT — Device Flags

The device flag bits in DDCNT have the following meaning:

Bit	Symbol	Description
8-12		Unused
13	DDCONS	This device is its owner's console terminal.
14	DDUTIL	This device is temporarily assigned to FIP.
15	DDASN	This device is explicitly assigned by the job shown in DDJBNO.

... continued on page 86



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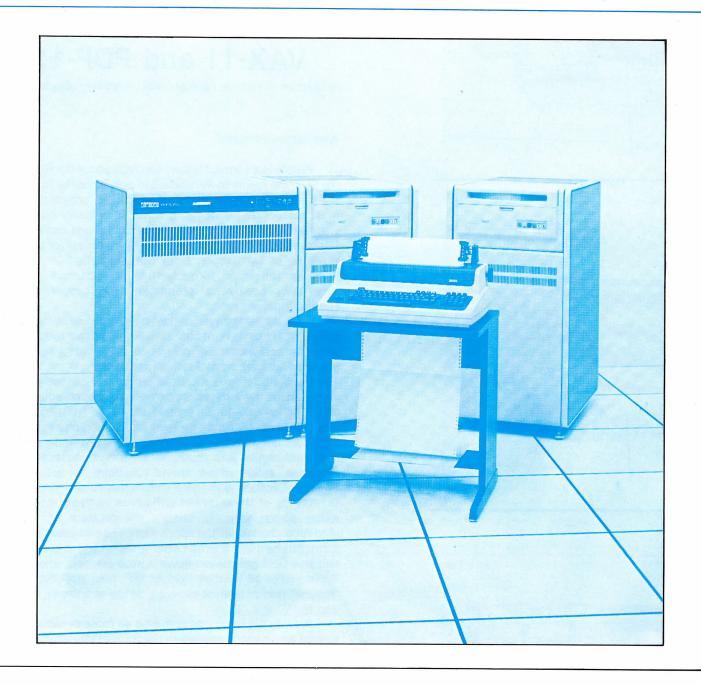
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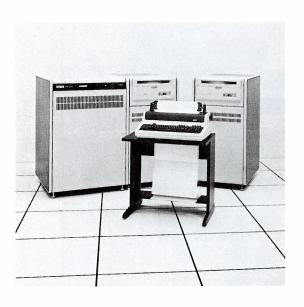


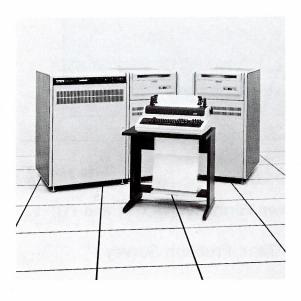
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VIDIO/11 and SCRNIO/11:

CRT-Independent Screen Forms for VAX-11 and PDP-11

By Stephen F. Heffner, President, PSI (Pennington Systems Inc.)

Why Screen Formats?

People like forms. I know, we curse about the IRS 1040, the W-2, the report to Purchasing in quintuplicate; but when we have to supply data to an interactive program, we're most comfortable filling in a form. It probably has to do with the comforting prompting messages and explanatory information surrounding the field we're filling in, or perhaps a feeling of satisfaction from the completion of a form. Whatever the reason, forms seem to be much more satisfactory than line-by-line prompted entry, especially for computer-naive people.

With the widespread and ever-growing use of video terminals (CRTs to us hard-core types), interactive forms are a very practical method of communicating with a computer program, at least from a human-engineering point of view. The trouble is, they're a pain to program! First you have to worry about the intricacies of cursor control on your brand of CRT. Then how do you protect the screen from erroneous input? About the time you have all that figured out, your boss goes out and buys another brand of CRT and you start over. Meanwhile, your programs are a crazy quilt of escape sequences, reads, writes, special functions; the actual logic of the application is in there somewhere, but where?

On top of the technical difficulties of creating and servicing screen formats, there's the problem of accommodating changes in the application. The end user likes the form, but he'd like it even better if the title was over there, and this field got moved down a little bit, and, and, and... While you're at it, that "yes or no" field just became a "maybe" field as well, so allow an "M" to be entered, in addition to "Y" and "N".

Wouldn't it be nice to just drop all those capabilities into your application program in the form of straightforward, readable subroutine calls? We thought so too: enter SCRNIO/11 (screen eye oh) and VIDIO/11 (vid eye oh).

A Little History

As Ted Baxter might say, it all started in a little data entry application on a PDP-11/03, under RT-11. There were about 1,500,000 documents waiting to be entered onto floppy disks, and they had to go in fast and with minimum error. We started with a set of "primitives' for video I/O and

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used them to hard-code some formats for data entry, on a VT-52 as it happened. That worked pretty well, and we studied the data entry operators to see what could be done to speed up the input while (we hoped) cutting down on the error rate; this resulted in some 'tuning' of the field input function. At this point, we had the first cut at VIDIO/11, the video "primitives", pretty well shaped up.

Meanwhile, we started analyzing the error checking process in terms of field attributes, although the screen formats were still "hard coded" in the application. It became pretty clear we wanted the formats out of the application program, in as generalized a fashion as possible. That requirement became even stronger when we provided VIDIO/11 to an OEM for use in a banking application package, under RSX-11M; the application would involve many screen formats and a wide variety of input error checking.

In the process, we found we also needed to use our "primitives" on a totally different brand of CRT, so we reimplemented them for the new model. This rubbed our noses in the need for CRT independence, so we added that to our list of things to do. Furthermore, it turned out that the same programs had to run from different kinds of CRTs on the same system; the independence ought to be at run-time so the same task image would be usable with any supported CRT. We added support for RSX-11D and IAS at about the same time.

The result of all this was SCRNIO/11, our screen format subroutine library and editor. Recently we have converted both VIDIO/11 and SCRNIO/11 to VAX-11 native mode (using CONPAX, our assembly language conversion utility I wrote about in the last issue); we have a RSTS version underway, and will thus have both packages usable under almost every major DEC operating system.

Anatomy of a Screen Format

SCRNIO/11 stores screen formats in files (one per file); alternatively, they can be built into the user task (memory-resident). A screen format consists of background text and fields (for input or output). The background text can be anything the user wants; any connection between it and the fields imbedded in it is up to the user. A screen format occupies an area on the physical screen determined by its first and last lines, and can be as small as a single line or as large as the whole screen (except the last line, reserved for messages and operator communication). This allows multiple formats on the screen at the same time, without any limitations on their simultaneous use.

If a screen format is disk-resident (the usual case), the application program retrieves it into a user-supplied buffer with a SCRNIO/11 subroutine call; it is then available for use. This lets the programmer choose whether to read all his formats in once, to save on disk I/O during use, or to have several formats share a common buffer, to save memory.

Field Attributes: a Baker's Dozen Plus a Few

Each field in a screen format can have a wide variety of attributes assigned to it. These attributes come in two

flavors: **processing** attributes and **error-checking** attributes. They include:

- Field number, 1 through 127. Arbitrary as far as SCRNIO/11 is concerned. Shows on the screen (unless suppressed by "no number" attribute), so CRT operator can refer to a field the same way the application program does.
- 2. Line and column. This is relative to the screen format, so fields move with the format if it is relocated on the CRT screen.
- 3. Field length. In the case of a variable-length field, maximum length. For a fixed-length field, this is the length to which the field will be filled with its fill character when it is left or right justified.
- Fill character (any printable character or < NULL>), and whether to justify left or right. (Only for fixed-length fields.)
- 5. A default value (optional). This is returned to the application program if the CRT operator just hits <RTN>. This can be used to save keystrokes when a field is usually one particular value, but may be other values from time to time.
- 6. A "missing" value (optional). This is returned to the program if the CRT operator just hits <TAB>, or just hits <RTN> and no default value is defined. This can serve as a "place marker" (for instance, in a record) meaning we don't have a value for this field yet.
- 7. "Mandatory" or "optional". If a field is mandatory, SCRNIO/11 will require an explicit override by the operator if he doesn't enter (or default) a value for this field.
- 8. A mask for the field's values (optional). This mask is an image of the value; each character may specify numeric, alpha, a special character, or anything. A "DEC standard" date mask would be "99-AAA-99" (for instance, 12-AUG-81).
- 9. A low and/or high value for the field, for range checking (optional).
- 10. A set of "legal values" for the field (optional). Up to 127 such values are allowed per field. They must match the field's mask (if any). For instance, a field might have to be 0, 2, 7, or 9; or the Y/N/M (yes, no, maybe) field mentioned above.
- 11. Display only. This means the field can't be use for input. Also suppresses the field's number on the screen.
- 12. No number. The field may be used for input, but don't show its number on the screen.
- 13. No terminator required. If the operator types to the end of the field, complete the input. Otherwise, SCRNIO/11 requires an explicit terminator (such as < RTN>).
- 14. No echo. Good for password fields and such.
- 15. No override permitted. If an error is detected, SCRNIO/11 won't allow the operator to override it if this attribute is turned on.
- 16. No reentry on error. This attribute tells SCRNIO/11 to perform all error checks and indicate the results in the status returned to the program, but don't complain about any errors found. The application can then choose what to do about errors.

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When the application program gets a field value via SCRNIO/11, the status returned with the value indicates any errors found (and overridden, unless the field is "no reentry"). The program can ignore such errors or take action, as appropriate. If a field is "no override", the program need not worry about data errors; they will never get through SCRNIO/11. (But the operator can always abort the input with < will return an error status to the program.)

An Editor for Nonprogrammers

Since one of our goals was to remove the programmer from his "middle man" position between the end user and his application, we felt that it was important to provide a way to create or edit screen formats that wouldn't be intimidating to a nonprogrammer. The result was SCRFMT (SCReen ForMaT editor), a menu-driven, self-prompting format editor. SCRFMT is about as "bullet-proof" as we can make it; it error-checks all inputs and behaves gracefully when it gets something unexpected, and the user can "back up" from any point where he's being asked for input, just by hitting <ESC>, with no harm done. It also has default values established for all inputs where they make sense, so the user can "carriage return" his way through many of the required inputs.

SCRFMT allows the user to create a new screen format, change one he already has, or simply review a format in various ways. (See the SCRFMT menus and forms.) It runs on any supported CRT with a screen at least 24 lines by 80 columns, and uses reverse video (if available) to highlight the field it's currently requesting input on.

Video Primitives: Cursor Control, Scrolling and More

We have retained VIDIO/11, the video I/O "primitives" we started with, for use when screen formats won't do

the whole job. These include read and write (fixed and variable length) with cursor control, with or without echo or required terminator; clear line or screen; video attributes (such as reverse video); and partial screen scrolling. For instance, an application might require a dynamic display on part of the screen while reserving another part for a screen format; or the user might request that some text data be scrolled in the middle of the screen, between two formats.

VIDIO/11 tracks the cursor position, so the application program can find out where the cursor is at any time, and can specify "current" line or column. VIDIO/11 also provides a save/restore function for the current cursor position and video attributes, on all CRTs.

VIDIO/11 comes with SCRNIO/11 (which uses it for all video I/O), and is also available separately. For example, it might be used in a real-time applica-

tion where formats aren't appropriate, or to provide CRT independence for a screen-oriented text editor.

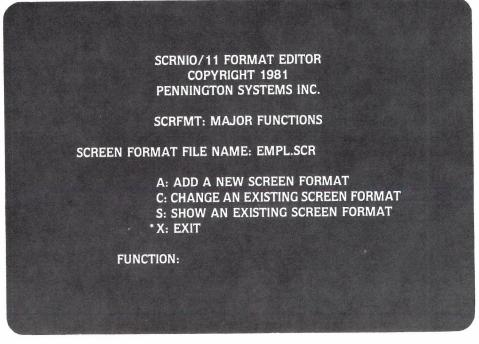
More About CRT Independence

VIDIO/11 (and therefore SCRNIO/11) configures itself at run-time for the CRT on which it's being run. It finds the CRT model through a configuration file created with VCRCNF (Vidio CReate CoNFiguration). The system manager creates a text file in which each port's CRT may be described; this text file is then run through VCRCNF to create the configuration file VIDIO/11 wants. When an application program containing VIDIO/11 is run, VIDIO/11 first checks the user's directory for such a configuration file, then the system account; so a user can have a "local" version of the configuration file. (On the VAX, the file is found through a logical name, allowing complete flexibility for the user.) The configuration file can include a "wildcard" entry that matches all ports (normally the last entry if used, for obvious reasons).

If no configuration file is found, or if the user's port isn't described, VIDIO/11 prompts the user on the CRT to enter the terminal model name.

Once VIDIO/11 knows the CRT name, it looks for a CRT support file. As with the configuration file, it first checks the current directory, then the system account. (And, again, on the VAX it uses a logical name.) Assuming such a support file is found, VIDIO/11 reads it to configure for the CRT being used. The whole process is carried out without attention from the application program or the CRT operator (unless he must enter the CRT name).

After VIDIO/11 has configured for the current CRT, it handles requests for video functions (either directly from the application program or from SCRNIO/11) on a CRT-independent basis. If the program tries to do something



Screen format editor's "major functions" menu

DBL

for

RSTS

DBL is a DEC DIBOL-11 source code compatible language and compiler, with structured extensions, available from DISC for RT-11, RSTS and RSX-11M operating systems. DBL runs under the RT-11 runtime under RSTS, and uses the normal RT-11 linker to link DBL programs. Because DBL object modules are compatible between RT-11 and RSTS, it is possible to do program development under RSTS and run the same programs under RT-11.

Some of the features offered with DBL under RSTS:

- Structured Programming Extentions
- A more powerful and sophisticated debug facility which requires no special linking of a "debug" module
- Better ISAM support file reorganizations are seldom necessary
- Intra-job and Inter-job message communication
- Easy interfacing with assembly-level subroutines and chaining to assembly-language programs

Discounts are provided to OEM's along the following discount structure:

Quantity 1 \$4,200.00 11 - 25 \$2,520.00 2 - 10 \$2,940.00 26 + \$2,100.00

Prices effective February 1, 1981

For more information about DBL under RT-11, RSTS or RSX-11M, or any of DISC's program development tools, call or write:

DISC

Digital Information Systems Corporation

6247 Fair Oaks Blvd. Carmichael, CA 95608 (916) 485-4849

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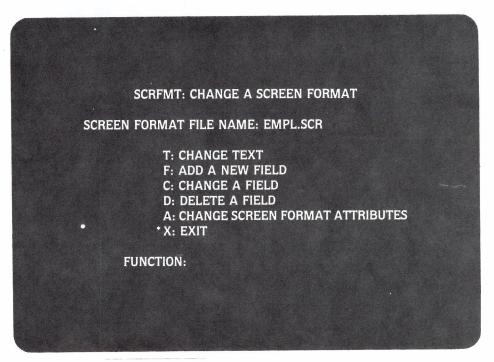
that's impossible on the current CRT, VIDIO/11 returns a specific error code that says so. This makes it possible to write application programs that are completely CRT-independent but take advantage of whatever functions the current CRT provides; SCRFMT is a good example of such a program.

What About Overhead?

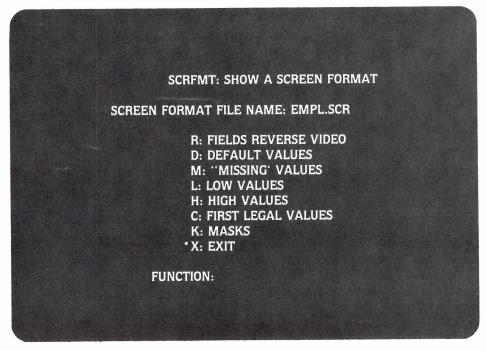
Since we expected VIDIO/11 and SCRNIO/11 to be used in a wide variety of situations, on all shapes and sizes of VAXes and PDP-11s, we had to worry about the burden they place on the system. We were concerned about three areas of overhead: run-time processing, physical memory, and (on the PDP-11) address space in the user task. VIDIO/11 (and therefore SCRNIO/11) is implemented to require only one I/O request on a typical field input or output. We looked at the advantages of doing character-by-character I/O (instant character checking, character insert and delete, etc.) and decided they didn't justify the considerable overhead required to service all those exec requests (or worse yet, swapping on each character!). On the other hand. we wanted to trap illegal input or output characters, in order to protect the screen contents; fortunately we were able to do so without character-bycharacter I/O (except under RSX-11D and IAS, where it is unavoidable). The resulting CPU overhead is no greater than required for normal terminal I/O.

We also didn't want to take up any more physical memory than absolutely necessary, so we made all the code pure, reentrant, and position independent. This means it can go into shared libraries, shared sections, multiuser tasks, or Run Time Systems. (For multi-user tasks under RSTS, see the June issue of the RSTS Professional.)

To use a minimum of address space (a subject dear to the heart of any B+2 or COBOL user), we structured VIDIO/11 and SCRNIO/11 to be overlaid effectively, using either diskresident or memory-resident overlays. Also, only the specific subroutines needed by the application are built into the image; unused routines don't take up space. We also fully data-compress the text of a screen format, to



Screen format editor's "change a format" menu



Screen format editor's "show a format" menu

minimize the size of the user buffer required for it.

The Bottom Line

VIDIO/11 and SCRNIO/11 are proving themselves in a wide variety of application areas, from Berkeley to

Boston and France to the Persian Gulf. They find themselves employed in pharmaceutical laboratories, financial institutions, government offices, and manufacturing plants, running on CRTs made by Hazeltine, GTC, H-P, DEC (of course), and others.

SCRNIO/11 and VIDiO/11 are

RSTS/E ON VAX ROSS/V

(RSTS/E Operating System Simulator for VAX)

ROSS/V is a software package, written in VAX-11 MACRO, which provides a RSTS/E monitor environment for programs running in PDP-11 compatibility mode on DEC's VAX-11.

ROSS/V supports:

- The BASIC-PLUS interactive environment.
- Concurrent use of multiple run-time systems.
- Update mode (multi-user read/write access to shared files.)
- CCL (Concise Command Language) commands.
- An extensive subset of RSTS/E monitor calls.

ROSS/V runs under VMS and interfaces to programs and run-time systems at the RSTS/E monitor call level. ROSS/V makes it possible for DEC PDP-11 RSTS/E users to move many of their applications directly to the VAX with little or no modification and to continue program development on the VAX in the uniquely hospitable RSTS/E environment. Most BASIC-PLUS programs will run under an unmodified BASIC-PLUS run-time system.

RSTS, PDP-11, VAX-11, and DEC are trademarks of Digital Equipment Corporation.

ROSS/V is available from:

(Eastern U.S.)

Evans Griffiths & Hart, Inc.
55 Waltham Street

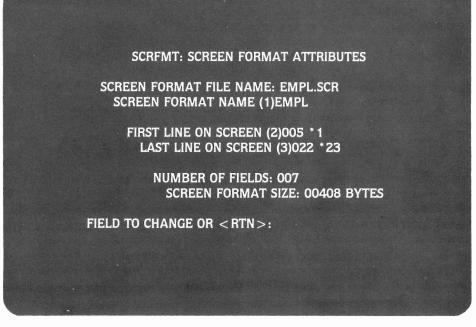
Lexington, Massachusetts 02173
(617) 861-0670

(Central U.S.)
Interactive Information Systems, Inc.
10 Knollcrest Drive
Cincinnati, Ohio 45237
(513) 761-0132

(Western U.S.)
Online Data Processing, Inc.
N. 637 Hamilton
Spokane, Washington 99202
(509) 484-3400



available under permanent license from PSI. Both products cost \$3,500 for the first CPU; VIDIO/11 by itself costs \$1,500. Additional CPUs can be licensed at substantial discounts. OEM licenses are available as well. Consulting and application assistance are also available from PSI on a per diem



Screen format editor's "format attributes" form

basis.

Further information can be obtained from PSI (Pennington Systems Incorporated), 65 South Main Street, Pennington, NJ 08534; phone: (609)

737-2727 cable address: PSIUSA. (SCRFMT screen formats COPYRIGHT 1981 by Pennington Systems Incorporated reprinted by permission.)

```
; ACME WIDGET COMPANY ;
                       ; EMPLOYEE DATA ENTRY ;
        FIRST NAME (1)
     MIDDLE INITIAL (2)
        LAST NAME (3)
            STATUS (4)
                      - *W E = EXECUTIVE, S = SALARIED, W = WAGE,
                             V = VOLUNTEER
YEARS W/COMPANY (5)
                       ← ← 0-50
              AGE (6)
                      ← ← 15-65
INSTRUCTIONS: < ESC> ON ANY FIELD EXCEPT FIRST STARTS RECORD OVER
              <ESC> ON FIRST FIELD MEANS DONE WITH
                     ENTRY
                     * MEANS DEFAULT VALUE
POSITION OF TEXT IN FORMAT: LINE, COL OR < RTN>:
```

Entering or changing a screen format's text

```
SCRFMT: FIELD ATTRIBUTES
 FIELD TO CHANGE OR < RTN>:
                                               (5)0 *0 FIXED(0)/VAR(1) LENGTH
        FIELD NUMBER (1)023
                                               (6)0 *1 MANDATORY(0)/OPTIONAL(1)
                                            : (7)0 *0 DISPLAY-ONLY(1)
         FIELD LENGTH (2)002
                                 ATTRIBUTE: (8)0 *0 NO-NUMBER(1)
      LINE OF FORMAT (3)004
   COLUMN OF FORMAT (4)015
                                   FLAGS : (9)0 *0 NO-ECHO(1)
                                            : (10)0 *0 NO-TERMINATOR(1)
                                            : (11)0 *1 RT(0)/LEFT(1) JUSTIFIED
                                            : (12)1 * 1 NO-OVERRIDE(1)
                                            : (13)0 *0 NO-REENTRY(1)
                                              LEGAL VALUES:
                                                  U: UP A: ADD
                                                  D: DOWN X: EXIT
                                                  K: KILL
                                             (27)
FILL CHARACTER (21)0 *s s < SPACE >, @ < NULL >
             DEFAULT (22)01
              MISSING (23)00
                MASK (24)99
                 LOW (25)01
                 HIGH (26)29
```

Entering or changing a field's attributes

About the Author... Stephen F. Heffner has been an independent consultant since 1972 in the areas of distributed processing, timesharing systems, data communications networks, database management, minicomputer-based dedicated applications, and software conversion, among others. He established Pennington Systems Incorporated (PSI) in 1977 to provide software products and consulting services. He is the designer and implementer of both VIDIO/11 and SCRNIO/11.

Report For Commercial Working Group On Mag Tape Problem Survey

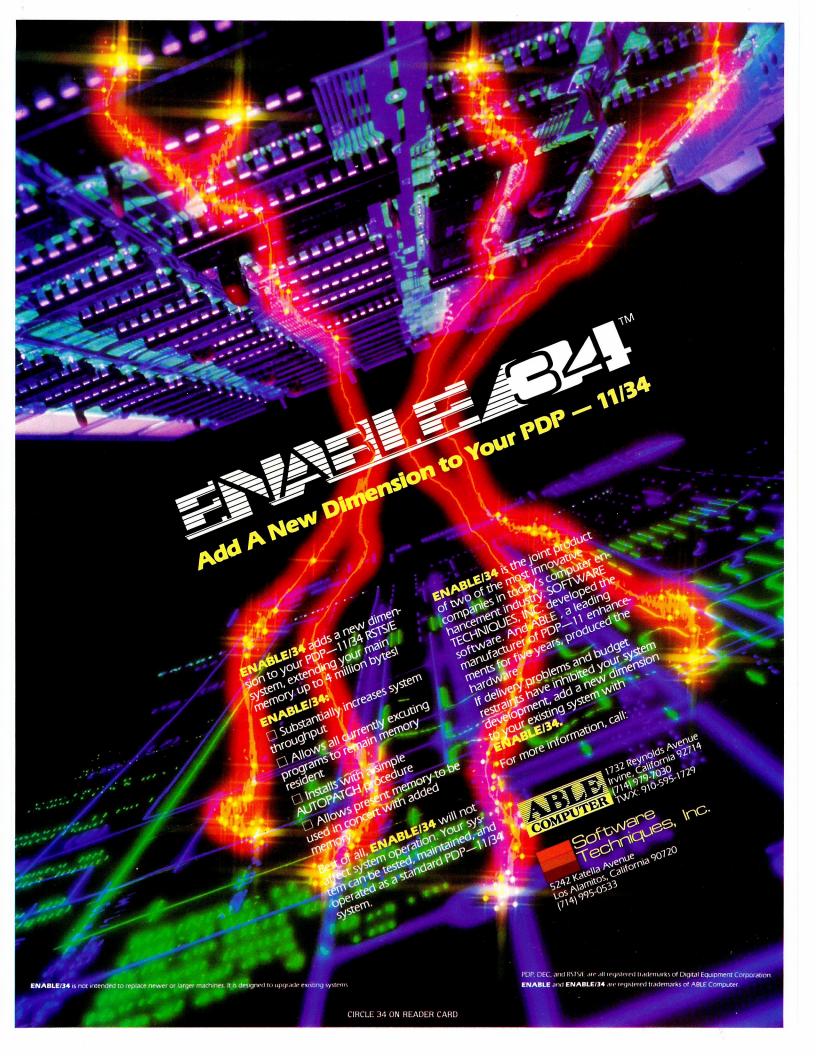
By Ross Miller, Online Data Processing, Inc.

The following is a compilation of the type of mag tape failures that were reported in a recent tape survey we conducted, together with user comments regarding fixes or ways of preventing problems. It was apparent from the respondants comments that if DEC would produce a manual on proper handling of tapes, selection of tapes and handling and cleaning procedure of tape transport, geared specifically for operators, it would be a significant step toward solving mag tape problems.

Tape Transport Problems

A significant cause of problems resulted from a dirty capstan or improperly cleaned capston which causes the tape to slip as it tries to start tape motion. This will show up as possibly hundreds of errors on the tape when the tape drive encounters an error. What actually happens is that when an error is encountered, the tape transport will stop the tape, back the tape up and try to write it again. If there isn't good traction on the capstan as it reverses and goes forward, you will get creep in your positioning on the tape as well as a condition where the tape doesn't come up to speed fast enough.

It should be pointed out that the capstan on the DEC tape drives should be cleaned only with a clean, lint-free cloth and water. No other cleaning materials or solutions should be used on the capstan.



IPS & ECHNIQUES

A Column For The Advanced RSTS/E User

By Steven L. Edwards, Software Techniques

Welcome to "Tips & Techniques." This column is dedicated to the premise that the free exchange of knowledge between users will benefit the entire user community.

Further, this column is dedicated to the premise that RSTS is not an end point, but it is an excellent starting point to build upon. We all know that one system can not be all things to all people. The RSTS developers do a very good job, but their efforts can not solve everyone's problems, ie., the developers are currently required to maintain Basic-Plus (read 16KW) compatibility. In future columns we will see how this limits the performance of the CUSPs, and what to do about it.

Correction!

In the last issue of the RSTS Professional, there was an article about a mini Basic-Plus-2 debugger routine (DEB). The routine located line numbers by searching through the program section (PSECT) named \$CODE. The routine located the starting address and the length of \$CODE by defining two additional PSECTs named \$CODD, and \$CODF. These new program sections had the default access code of readwrite (RW). Since that article was written, a patch to the compiler has been released that changes \$CODE and \$PDATA to have the read-only attribute. Since TKB allocates memory for program sections alphabetically within access code (RO or RW), \$CODE is no longer allocated between \$CODD and \$CODF. If you change the access code of \$CODD and \$CODF to be read-only, the routine will work as described.

EDT Version 2

In this issue we will examine EDT version 2. EDT V2 is an entirely new full screen editor with journaling and user definable keys. EDT V2's relation to EDT V1 is purely casual. EDT V1 was (yes WAS) difficult to learn and worse to use. EDT V2 is the most incredible editor I've seen, and it is available on all of DEC's major operating systems. If you are using anything else, please stop, you are wasting your valuable time. Using EDT V2 as a full screen editor (change/keypad mode) will increase your productivity. I never thought anything could replace TECO as my primary editor, but EDT V2 won me over in a single afternoon. EDT V2 lacks the conditional features of TECO, but it performs better (speed-wise) on an 11/34 than TECO/VTEDIT on an 11/70! I recommend building the memory resident library shared version if you have more than one user editing at a time.

I strongly urge any serious RSTS/E user to read the EDT manual that came with patch kits "E" and "F."

After I used EDT V2 for a while, I began to notice a few minor irritations:

- EDT V2 leaves your VT100 in ANSI mode regardless of it's initial setting.
- EDT V2 requires your terminal to be set to 'NO ESC SEQ' for the alternate keypad to be of any value.
- EDT V2 requires each user to have their own initializer file in their account.

Soon these minor irritations exceeded my tolerance, so I developed the patches below.

Each of these patches can 'stand alone,' ie. don't install the first patch if you don't want your VT100 to always be reset to VT52 mode.

If you have developed minor irritations of a software nature, developed a useful tip or technique, or have a question requiring an in-depth response, please drop me a line.

```
EDT V2 PROGRAM PATCHES
           EDT FEATURE PATCH
           JAM VT100 BACK TO VT52 MODE UPON EXIT.
           COPYRIGHT (C) 1981 SOFTWARE TECHNIQUES, INC., LOS ALAMITOS, CA
           MAC EDTV52.PAT=EDTV52.COR
LBR IOMOD.OLD=ED2LIB/EX:IOMOD
PAT IOMOD.NEW=IOMOD.OLD/CS:176443,EDTV52.PAT/CS:21276
           LBR ED2LIB/RP=IOMOD.NEW
           TKB @ED2???
           .TITLE IOMOD
           .IDENT /SOFTEC/
           .PSECT
                      IOCOD
$$$LOC
                                                         ; START OF PSECT.
IO.CXR
IO.CFR
                       $$$LOC+742
                                                        ; CLEAR XRB.
; CLEAR FIRQB.
; ADD SOME NEW CODE.
                       $$$LOC+3360
                                                        ; CLEAR FIRQB.
; POINT TO FIRQB+FQFUN.
; UU.TRM.
; FOR OUR TERMINAL.
; .UUO HOOK.
           CALL
                       IO.CFR
           MOV
MOVB
                       #405,R0
#20,(R0)+
                       #-1,(R0)
                                                         : FIROB+FONAM1+2.
           CMPB
                       0#414,#377
                                                           XON?, NOPE.
WE ASSUME THAT ANY TERMINAL
WITH XON SET IS A VT100.
                       IO.CXR
                                                          CLEAR XRB.
POINT TO XRB.
                       #442,R0
#LEN,(R0)
(R0)+,(R0)+
#TXT,(R0)
           MOV
           MOV
MOV
                                                         ; LENGTH OF TEXT.
                                                         ; ADDRESS OF TEXT.
           MOV
           EMT
                                                           .WRITE
10$:
           CALL
                       IO.CFR
                                                        ; CLEAR FIRQB.
                       50
                                                         ; .RTS
           EMT
                                                        : ESCAPE.
ESC
                      155.
                      ESC, '[, '?, '2, '1
TXT:
                                                        ; SET VT52 MODE.
           . BYTE
                       .-TXT
           . END
```

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YOURTITLE		WOULD LIKE A PRICE QUOTE ON THE COST TO MAINTAIN MY COMPUTER SYSTEM	EQUIPMENT TYPE	QUANITY	EQUIPMENT TYPE	QUANTITY
ADDRESS	_	PE OF MAINTENANCE COVERAGE YOU DESIRE (CHECK ONE)				
PHONE NO	☐ 8 ☐ 2 ☐ 2 ☐ P	am to 5 pm Monday through Friday am to 8 pm Monday through Friday 4 hour Monday through Friday 4 hour, 7 days per week er Call Only other — Please indicate below:				
		-				

```
EDT V2 PROGRAM PATCHES
         EDT FEATURE PATCH
         SET 'NO ESC SEQ' UPON ENTRY.
         COPYRIGHT (C) 1981 SOFTWARE TECHNIQUES, INC., LOS ALAMITOS, CA
         MAC EDTNES.PAT=EDTNES.COR
         LBR IOINIT.OLD=ED2LIB/RX:IOINIT
PAT IOINIT.NEW=IOINIT.OLD/CS:46475,EDTNES.PAT/CS:15150
LBR ED2LIB/RP=IOINIT.NEW
         TKB @ED2???
         .TITLE IOINIT
         .IDENT /SOFTEC/
         .PSECT IOINIT
.=.+76
         CALL
                  EDTNES
                                               ; CLEAR ESC SEQ.
         NOP
          . PSECT
                                                 OUR TERMINAL.
         MOVB
                  #200,0#431
                                                 NO ESC SEO.
                                                 .UUO HOOK
         RETURN
         .END
         EDT V2 PROGRAM PATCHES
         CHANGE DEFAULT INITIALIZER FILENAME TO 'LB:INI.EDT'
         EDT FEATURE PATCH
         COPYRIGHT (C) 1981 SOFTWARE TECHNIQUES, INC., LOS ALAMITOS, CA
         LBR EDTDAT=ED2LIB/EX:EDTDAT
         RUN $ONLPAT (WITH APPOLOGIES FOR USING ONLPAT TO PATCH A '.OBJ')
         LBR ED2LIB/RP=EDTDAT
TKB @ED2???
File to patch? EDTDAT.OBJ
Base address? 1462
Offset address? 0
 Base
         Offset
                  old
                  042105
044524
001462
         000002
001462
001462
         000004
                  044516
                              "NI
C
                                               (UPARROW/C TO EXIT)
```

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a Routine from Rick

Dear Carl & Dave — Maybe you can use this routine in your next issue. It's a great magazine — keep up the good work. Rick Powell

> Software Performance Research 8090 Steeple Chase Ct., Springfield, VA 22153

> > use an editor to create TEST.CMD

with the command ATPK TEST.CMD

count the number of times it nests

to see how many psuedo-keyboards

are available.

then type ATPK TEST.CMD

CRE TEST.CMD

ATPK TEST.CMD

*EX

Ready

ATPK TEST.CMD

?No PK's available - please try again later ?Command file aborted

?No PK's available - please try again later ?Command file aborted

Ready

Ready

Ready

Ready

Ready

Ready

Ready

Ready

Ready Ready

[Thanks, Rick.]

PLACEHOLDER

Getting The Most Out Of CSPCOM

By Kevin Paul Herbert

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The release of Version 7.0 of RSTS added many new features. Among these features are CSPCOM, the Cusp Compiler, and resident libraries. CSPCOM is used to compile the CUSPs (Commonly Used System Programs) to run under the RSX run-time system. DECs intended purpose was to allow users of DIBOL and COBOL to use RSX as their default runtime system and never need Basic-Plus, the language most CUSPs are written in.

CSPCOM is a scaled-down version of Basic-Plus 2. It contains most of the functionality of B+2, but is only supported for use in the compilation of CUSPs. Programs compiled under CSPCOM tend to be larger than their Basic-Plus counterparts, since under Basic-Plus, programs have a very large run-time system for support (a typical Basic-Plus run-time system is from 13K to 16K, depending on whether it is built with various optional features and whether the system has a floating point processor) but under RSX all the support code needs to be linked in with the program itself.

The resident library feature of RSTS/E allows regions of code (libraries) to be shared among several users at once. Any number of users may use a library at one time, and only one copy of the library will occupy physical memory.

Using resident libraries, it is possible to overcome the problem of CSPCOM CUSPs being larger than their Basic-Plus counterparts. I have included a command file to build a CSPCOM resident library, which occupies 8K of physical memory. Using CSPCOM and the CSPCOM resident library yields CUSPs the same size or smaller (typical savings of 1K per CUSP) as their Basic-Plus counterparts, which run considerably faster.

Users of DIBOL and COBOL can make use of the CSPCOM library to save memory. The addition of an 8K resident library is easily balanced by the reduction in CUSP size (typically 3K to 4K per CUSP). Since DIBOL and COBOL users already have compiled their CUSPs under RSX, there will be no speed increase, but there will be memory savings.

Users of Basic-Plus can reduce their overall memory usage by using the CSPCOM resident library. Since CUSPs are an average of 1K smaller under RSX with the CSPCOM library, and most systems have 8 CUSPs running at one time (take a look at your detached jobs!) the addition of the CSPCOM library will certainly not hurt. Combined with the speed increase as a result of running true compiled programs, most systems will realize an overall speed increase (a speed increase is especially noticable in the spooling package).

In addition to the creation of the CSPCOM resident library, it is possible to declare some heavily-used CUSPs as sharable tasks. These sharable tasks use both the CSPCOM resident library and a special resident library created just for one specific CUSP. Systems using two copies of any of the DEC spoolers (BATRUN, SPLRUN, etc.) can reduce their

memory usage tremendously (if you use more than one spooler at once, you can save an average of 10K per additional spooler), which easily makes up for the addition of any features needed to use CSPCOM.

I have written patches to the BUILD program to support building CUSPs against the CSPCOM resident library. In addition, BUILD also will handle the creation of multi-user CUSPs. The patch to the CSPCOM program causes the compiler to indicate that the code generated is read-only (CSPCOM, like Basic-Plus 2, generates read-only code, but a bug in the compiler flags the code as read/write). The program FIXBP2.B2S (which may be compiled with CSPCOM) is used to correct the attributes of the CSPCOM library to indicate that the modules in the library are also read-only. In addition, FIXBP2 has a switch (/RW) which will change the .PSECT attributes back to the original read-write (this should be used if it becomes necessary to install patches to CSPCOM.OLB since the patches released by DEC assume that the library is read-write.)

The following procedure should be used to install the patches. This procedure assumes the following things:

- Resident library support was included in your monitor.
- 2. RSX emulation was included in your monitor.
- You have built RMS-11 (used by FIXBP2).
- Seq 11.16.001 for MAKSIL (creating multi-user tasks) has been installed. This is only necessary if you wish to use the new multi-user feature of BUILD.
- 5. You have installed the RSX run-time system.

If you do not have any of these features, please include them before attempting to use these patches.

```
Step 1. Patch CSPCOM to create read-only code:
PHN SONLPAT
Command file name? FIXCSP
                                 ;The rest is automatic
File to patch? $CSPCOM.TSK
  .. patch will be installed ...
Command file name? ^Z
                                 ;Control/Z to exit
Step 2. Compile the FIXBP2 program
RUN SCSPCOM
CSP>FIXBP2/OBJ=FIXBP2.B2S
CSP>^Z
                                 :Control/Z to exit
Step 3. Task build the FIXBP2 program
RIIN STKB
TKB>@FIXBP2
Step 4. Extract the CSPCOM object library
LBR>CSPCOM=LB:CSPCOM/EX:??????
                                 ;Control/Z to exit
LBR>^Z
Step 5. Fix the CSPCOM object library
```

*\$BUILD.BAC/DE:NOWARNING

RUM FIXBP2 What is the name of the .OBJ file holding the library? Step 6. Save the old CSPCOM library in case something happens RUN \$PIP *LB:CSPCOM.OLD=LB:CSPCOM.OLB/RE ;Control/Z to exit Step 7. Create a new CSPCOM library. RUN \$LBR LBR>LB:CSPCOM/CR:165.:1152.:256. LBR>LB:CSPCOM=CSPCOM ;Control/Z to exit Step 8. Patch the BUILD program RUN SCPATCH CPATCH V7.0-07 RSTS V7.0-07 SOFTEC Dev 11/70 File to patch - BUILD.BAS=BUILD.BAS #CSPBLD/CS:28071 ;Control/Z to exit File to patch - ^Z ;Control/Z to exit Step 9. Compile the BUILD program RUN SCSPCOM CSP>BUILD/OBJ=BUILD ;Control/Z to exit Step 10. Task-build the BUILD program TKB>BUILD=BUILD, LB:CSPCOM/LB ENTER OPTIONS: TKB>UNITS=12 TKB>ASG=SY:5:6:7:8:9:10:11:12 TKB>EXTTSK=512 TKB>// Step 11. Replace the BUILD program on your library account *\$BUILD.TSK=BUILD.TSK

;Control/Z to exit

Step 12. Task-build the CSPCOM library

RUN \$TKB
TKB>@CSPLIB

Step 13. Convert the task builder's output to a resident library

RUN \$MAKSIL
MAKSIL V7.0-07+/MU PATCH RSTS V7.0-07 SOFTEC Dev 11/70
Resident Library name? CSPCOM
Task-built Resident Library input file <CSPCOM.TSK>?
Include symbol table (Yes/No) <Yes>?
Symbol table input file <CSPCOM.LIB>?
Resident Library output file <CSPCOM.LIB>?
CSPCOM built in 8 K-words, 516 symbols in the directory
CSPCOM.TSK renamed to CSPCOM.TSK<40>

At this point, you have completed the patch and installation procedure. The files CSPCOM.TSK and CSPCOM.STB should be placed in an important account other than [1,2]. I recommend the use of account LB: for this purpose. The file CSPCOM.LIB should be placed in account [0,1]. After the files are placed in the appropriate accounts, use UTILTY to add the resident library and modify your start-up procedure to add the library automatically.

If you want to create any multi-user tasks, it will be necessary to use your preferred editor (Steve would rather have me say EDT) to modify the BUILD command files. The procedure involves locating the command lines to build a program, and appending the /MU switch to the COMPILE command. For example:

\$BREAK \$DOPAT @~PATLOC:PA1023.CMD OLD ~INPUT:SYSTAT.BAS COMPILE ~SYSTEM:SYSTAT<232>/MU

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After you have made all the desired changes to the command files, run the BUILD program to build the new library. When BUILD requests the Run-Time System to use, respond with 'RSX.' BUILD will then ask about using CSPCOM. Answer 'Yes.' BUILD will then ask if you want to use the cusp RESLIB, and where it is located. After answering these questions, BUILD will act as described in The System Generation Manual.

After the BUILD is complete, users of Basic-Plus should delete all the old .BAC files on the library. It is not necessary for current CSPCOM users (Dibol and Cobol) to delete anything.

```
[1.4] FIXBP2.B2S
                                        PROGRAM
                                                                                                                 FIXBP2 & CHANGES THE .PSECT BP2OTS TO BE READ-ONLY &
                                      MAP (OBJFIL) REC%(255%) &
! DEFINE A RECORD OF A .OBJ FILE &
! SET UP THE ERROR TRAP &
\ ON ERROR GOTO 19000 &
  900
                                    LINPUT "What is the name of the .OBJ file holding the library";OBJ$ & \OBJ$=ODJ$+".OBJ" UNLESS INSTR(1%,OBJ$,".") & \OBJ$=DITS(ODJ$,-1\) & \RM$=INSTR(1\),OBJ$,"/RW") &
 1000
                                      \ IF RWW & FROM BERT COBJS, RW%-1%)+RIGHT(OBJS, RW%+3%) & HEAD OBJS=LEPT(OBJS, RW%-1%)+RIGHT(OBJS, RW%+3%) & HEAD OBJ FROM REATENSION WASN'T & HEAD OBJS FROM SOME OF THE INFORMATION OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROCESSING. & HEAD OBJS FROM SOME OBJS
                                    OPEN OBJ$ FOR INPUT AS FILE 1%, ORGANIZATION SEQUENTIAL VARIABLE, &
1005
                                     MAP OBJFIL & ! OPEN UP THE FILE. &
                                    GET #1% & GOTO 1010 IF (REC%(0%) AND 255%) <> 1% OR RECOUNT<10% & CNT%=RECOUNT &
 1010
                                    OR RADS(REC&(WORD*+1&))
**REC&(WORD+2*)=REC&(WORD*+2*)
**REC&(WORD+2*)=REC&(WORD*+2*)
**REC&(WORD*+2*)=REC*(WORD*+2*)
**AND -17* IF RW* &

DIRTY*=-1* &

I READ A RECORD. GET ANOTHER ONE IF IT ISN'T POSSIBLY GOING TO CONTAIN &

I PESCT INFORMATION. STORE THE LENGTH OF THIS RECORD AND SET THE &

! DIRTY FLAG TO FALSE. READ THROUGH ALL THE ENTRIES, LOOKING FOR &

! SOMETHING CALLED "BP2OTS". IF IT IS FOUND, SET THE "RO" BIT IN &

! THE .PSECT ATTRIBUTES. CHANGE THAT NO TO RW IF WE ARE UNPATCHING &

! THE OTS. FLAG THIS RECORD AS DIRTY. &
 1020
                                                                                            COUNT CNT% IF DIRTY% &
                                      GOTO 1010 &
! LOOP FOR THE REST OF THE ENTRIES IN THIS RECORD. WRITE IT BACK &
! TO DISK IF DIRTY. GET ANOTHER RECORD &
 19000
                                   IF ERR=11% &
THEN CLOSE 1% &
RESUME 32767
! HANDLE EOF ERRORS &
19011
                                   ON ERROR GOTO 0 & ! ALL OTHER ERRORS ARE FATAL AND UNEXPECTED &
 19999
 32767
                                    END &
```

```
[1,4] FIXBP2.ODL
         .ROOT BASIC2-RMSROT-USER, RMSALL
HSER:
         - FCTR
                  SY:FIXBP2-LIBR
                  LB:CSPCOM/LB
         .FCTR
LIBR:
                  LB:CSPCOM/LB:SICIO2-BP2RM1-BP2RM2-BP2SEO-BP2SCR
BASIC2: .FCTR
                  LB:CSPCOM/LB:$IMROT:$IMERR:$IMALQ-BP2R11
BP2RM1: .FCTR
BP2R11: .FCTR
                  LB:CSPCOM/LB:$IMALL:$IMFSS:$IMATR
                  LB:CSPCOM/LB:$IMOPN:$IMCLS:$IMFGC-BP2R22
LB:CSPCOM/LB:$IMPUT:$IMUPD:$IMULK:$IMRES
BP2RM2: .FCTR
BP2R22: .FCTR
                  LB:CSPCOM/LB:$ISROT:$ISOPN:$ISFGC:$ISPUT-BP2SE1
BP2SEQ: .FCTR
BP2SE1: .FCTR
BP2SCR: .FCTR
                  LB:CSPCOM/LB:$ISUPD
                  LB:CSPCOM/LB:$ISSCR
@LB:RMS11X
```

```
[1,4] FIXBP2.CMD

SY:FIXBP2=SY:FIXBP2/MP

UNITS = 12

ASG = SY:5:6:7:8:9:10:11:12

EXTTSK= 952

//
```

```
[1,4] CSPLIB.CMD
        This file builds a resident
library tailored for the CUSPS
CSPCOM/-HD, CSPCOM, CSPCOM=
LB:CSPCOM/LB:$BBTKS
LB:CSPCOM/LB:$BFPER
LB:CSPCOM/LB:$BINIT
LB:CSPCOM/LB:$BTDID
LB:CSPCOM/LB:$BXTRA
LB:CSPCOM/LB:$CHANG
LB:CSPCOM/LB:$CNTRL
LB:CSPCOM/LB:$ECONV
LB:CSPCOM/LB:$ERROR
LB:CSPCOM/LB:$FADD
LB:CSPCOM/LB:$FADDM
LB:CSPCOM/LB:$FCMP
LB:CSPCOM/LB:$FCON1
LB:CSPCOM/LB:$FDIV
LB:CSPCOM/LB:$FMOV
LB:CSPCOM/LB:$FMUL
LB:CSPCOM/LB:$FTIME
LB:CSPCOM/LB:$FUNC1
LB:CSPCOM/LB:$FUNC2
LB:CSPCOM/LB:$ICEND
LB:CSPCOM/LB:$ICEOL
LB:CSPCOM/LB:$ICFLD
LB:CSPCOM/LB:$ICFNS
LB:CSPCOM/LB:$ICFSS
LB:CSPCOM/LB:$ICINI
LB:CSPCOM/LB:$ICRCL
LB:CSPCOM/LB:$ICRED
LB:CSPCOM/LB:$ICRFG
LB:CSPCOM/LB:$ICROP
LB:CSPCOM/LB:$ICRPT
LB:CSPCOM/LB:$ICULT
LB:CSPCOM/LB:$ICWRT
LB:CSPCOM/LB:$IECHN
LB:CSPCOM/LB:$IEMSC
LB:CSPCOM/LB:$IESYS
LB:CSPCOM/LB:$IEULT
LB:CSPCOM/LB:$IVOPN
LB:CSPCOM/LB:$IVVIR
LB:CSPCOM/LB:$JADDS
LB:CSPCOM/LB:$JCMPS
LB:CSPCOM/LB:$JCOMP
LB:CSPCOM/LB:$JCON1
LB: CSPCOM/LB: $JCONV
LB:CSPCOM/LB:$JDIVS
LB:CSPCOM/LB:$JMOVS
LB:CSPCOM/LB:$JMUL
LB:CSPCOM/LB:$JNCR
LB: CSPCOM/LB: $JNEXT
LB:CSPCOM/LB:$JSUBS
LB:CSPCOM/LB:$JXII
LB:CSPCOM/LB:$LOADS
LB:CSPCOM/LB:$NEGAT
```

LB:CSPCOM/LB:\$SSFLT

LB:CSPCOM/LB:\$SSINT

MENU THE MISSING LINK.

MENU is an applications development aid that provides the DEC RSTS software developer with a powerful process control device.

MENU easily generates menus that guide the application user into selected programs based on his security level.

MENU supplements RSTS security by allowing multilevel access capabilities within an individual account. Separate project-level control minimizes System Manager interaction for system level security.

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MENU provides a common interface for all your users and application needs.

For information on MENU, please give us a call. We would be delighted to show you the missing link.





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```
LB:CSPCOM/LB:$SSVIR
LB:CSPCOM/LB:$STCFS
LB:CSPCOM/LB:$STCMP
LB:CSPCOM/LB:$STCOS
LB:CSPCOM/LB:$STCVT
LB:CSPCOM/LB:$STFN1
LB:CSPCOM/LB:SSTFNS
LB:CSPCOM/LB:$STGTA
LB:CSPCOM/LB:$STLSS
LB:CSPCOM/LB:$STMOS
LB:CSPCOM/LB:$STMSC
LB:CSPCOM/LB:$STNMF
LB:CSPCOM/LB:$STPDB
LB:CSPCOM/LB:$STVLF
LB:CSPCOM/LB:$STXCM
LB:CSPCOM/LB:$TESTS
LB:CSPCOM/LB:$TIME
LB:CSPCOM/LB:ROLCB
LB:CSPCOM/LB:SAVRG
LB:CSPCOM/LB
STACK=0
PAR=CSPCOM:140000:40000
```

```
[1,4] FIXCSP.CMD
! Correct $CODE and $PDATA
attributes in CSPCOM.TSK
File to patch?
Base address? 551:440
Offset address? 0
        Offset
 Base
                 Old
                          New?
000440
        000000
                 002750
                          ? 2740
000440
        000002
                 000000
Offset address? 10
 Base
        Offset
                 Old
                          New?
000440
        000010
                 002750
                          ? 2740
000440
        000012
                 000002
                          ?
Offset address? 20
 Base
        Offset
                 Old
                          New?
000440
        000020
                 002750
                          ? 2740
000440
        000022
                 000000
Offset address?
Base address? 551:654
Ofiset address? 0
 Base
        Offset
                 Old
                          New?
000654
        000000
                 002650
                          ? 2660
000654
        000002
                 002650
                          ? 2640
000654
        000004
                 002650
                          ?
                            2640
000654
        000006
                 002450
                          ?
                            2460
000654
        000010
                 002650
                          ? 2640
000654
        000012
                 002650
                          ? 2640
000654
        000014
                          ?
                 002650
                            2640
                            ^Z
000654
        000016
                 000001
Offset address? ^Z
Base address? 551:572
Offset address? 0
 Base
        Offset
                 01d
                         New?
```

```
000572
        000000
                 002650
                         ? 2640
0005/2 000002
                         ? ^Z
                000002
Offset address? 10
 Base
        Offset
                Old
                         New?
000572
        000010
                 002754
                         ? 2744
                            ^ Z
000572
        000012
                 000200
Offset address?
Base address? ^Z
File to patch?
```

```
*H/2!/V<cr>
21:tab><tab>PROGRAM<tab><tab>: BUILD.BAS<cr>
#H/2250<tab>/V<cr>
2250<tab>! &<cr>
*7AV<cr>
    | 2250 (tab): 6 < cr) 
'7AVccr' 
(tab) \tab) GOTO 2250 UNLESS KBM% & < cr) 
'1(cr) 
(tab) \tab) FRINT NOLIBS IF RESLIB% AND RESLIBS=NL$ 6 < cr) 
(tab) \tab) FRINT NOLIBS IF RESLIB% AND RESLIBS=NL$ 6 < cr) 
(dab) \tab) FRINT RTSDS UNLESS RTS. TYP% & < cr) 
'G/RBM% AND RTS. TYP%/V<cr) 
(tab) \tab) \tab) FRINT RTSDS UNLESS RTS. TYP% THEN & < cr) 
'I/ AND (RESLIB% - (RESLIB% - NLS)) / V \tab \tab) Then 6 < cr) 
'I/ (ab) \tab) \tab) \tab) \tab) \tab) FRINT RTSDS IF KBM% & < cr) 
'I/ (cr) 
\tab) \ta
         10000(tab): &<cr>
*33AVc;cr>
\RTSDS="Run-Time System must have a default extension of '.BAC' or '.TSK'" &<cr>
\RTSDS="Run-Time System must have a default extension of '.BAC' or '.TSK'" &<cr>
\tab>\ NAMS="Resident library name" &<cr>
\tab>\ NAMS="Resident library name" &<cr>
\tab>\ NAMS="Resident library can not be used" &<cr>
\escs\">v(cr)
\RTSDS="Run-Time System must have a default extension of '.BAC' or '.TSK'" &<cr>
\#/15860(tab)/ \tac'cr>
\#/15860(tab)/ \tac'cr>
\end{\tab}/\SSECSP$ UNLESS FNCSPCOM%(S$) \tab>IF CSP% &<cr>
\tab>\ MU%=0% &<cr>
\tab>\ P%=0% &<cr>
\tab<\ P%=0% &<cr>
\tab<\ P%=0% &<cr>
\tab<\ 
(tab) MUB=108 & CCr)

(tab) PB=08 & CCr)

(tab) MUB=MUSTC(18, MUB=18) + RIGHT(SS, MUR+38) IF MUR & CCr)

(tab) MUB=MUR<08 & CCr)

(tab) MUB=MUR<08 & CCr)

(tab) MS=CSPS UNLESS FNCSPCOMR(SS) (tab) IF CSPR & CCr)

*H/15900(tab) / CCr)

*1990(tab) & CCr)

*39AVCcr)

(tab) (tab) FRINT #128, CVTSS (FNFLMRGS (TOS, ".TSK", 78) + "/FPP" + TOS+", "+ & CCr)

*317C/T1S=/G/FP/11C/"/VCCr)

(tab) (tab) T1S=FNFMRGS (TOS, ".TSK", 78) + "/FPP" & CCr)

*AVCcr)

(tab) (tab) T1S=FNFMRGS (TOS, ".TSK", 78) + "/FPP" & CCr)

*AVCcr)

(tab) (tab) T1S=T1S+"/MU" IF MUR & CCr)

*1CCr)

(tab) (tab) T1S=T1S+"-"+TOS+", "+CESC) *3DVCcr)

(tab) (tab) T1S=T1S+"="+TOS+", "+CESC) *3DVCcr)

(tab) (tab) T1S=T1S+"="+TOS+", "+ESS+LIBS+".OLB/LB", 28) + CRLFS+"/" & CCr)

*2G/"/1/CCr)

& CCr)
              -Zey / TCCL/
&CCT>

<tab>\Ctab>\Ctab>\PRINT #128,CVT$$(T1$\cesc>*V\cr>
<tab>\Ctab>\PRINT #128,CVT$$(T1$,28)+CRLP$+"/" &\cr>
*3AV\cr>
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PLACEHOLDER

RSTSPROFESSIONALRSTSPROFES

OPERATIONAL SYSTEM STATUS

Gary W. Miller, System Software Manager, Garden Way Manufacturing

This paper describes a system status program that is used by our operational staff. This program seems to give all the information needed about the system without the problems encountered using the VT50PY or some other similar program. This program is 'not' system or terminal independent. Due to the massive number of PEEK's and other system table references, any changes by DEC to RSTS/E's internal structure could make this program useless. Even with these restrictions, I feel that a program like this could be helpful to anyone managing a RSTS/E system.

Before I get down to the bells and whistles of the program I think a little history would be appropriate. The idea for this program came from my exposure to an 'IBM' devotee who said RSTS/E could not be a very good system if it didn't allow you to monitor the system and use the terminal at the same time. Well, whenever I hear someone say that some hog of an 'IBM' system is better than my RSTS/E system, I see red! So, to prove that anything he could do I could do better, I sat down one evening and started to code. As the work progressed I was very surprised at the information I could pull out of the system and then display. Truthfully, I was afraid that I had bitten off more than I could chew, but to fail in a test against 'IBM' was unacceptable. The first test version was ready in about two days, and after some minor adjustments the program was working. After that, the changes that have been made have only added functionality and have not changed the original program design. I hope that this paper will inspire some thought amongst the RSTS/E community as to what kind of management utilties could be available and maybe someone would be willing to approach DEC to pass along those ideas.

The functional description of the program is somewhat vague since the display is very full, but I will make an attempt. The program's name is GSYS and is written in BASIC-PLUS for use on RSTS/E version 7 with a monitor configured for large files. When running on the system the program is 13K words and ties up two job slots. The terminal connected to the program must be a VT100 with an advanced video option installed. The set-up should have the AUTO XON bit turned on to allow the program to turn off the keyboard during a display. When the program starts out it assumes that the VT100 is set up as a VT52, part of the initialization changes the set-up to be ANSI and sets the width to 132. At termination the terminal's set-up is restored to the original values. At this writing a further enhancement has been added to allow an abbreviation library using the key-pad mode of the terminal.

For each job on the system, the job's PPN, job status, job name and keyboard number is displayed on the screen. For a detached job 'DET' is displayed in place of the key-

board number and for a job running on a PK the controling job's job number is displayed with a 'J' preceeding it in place of the keyboard number. Should a detached job go into hibernation, then the entire job area on the screen will flash to draw attention to the problem.

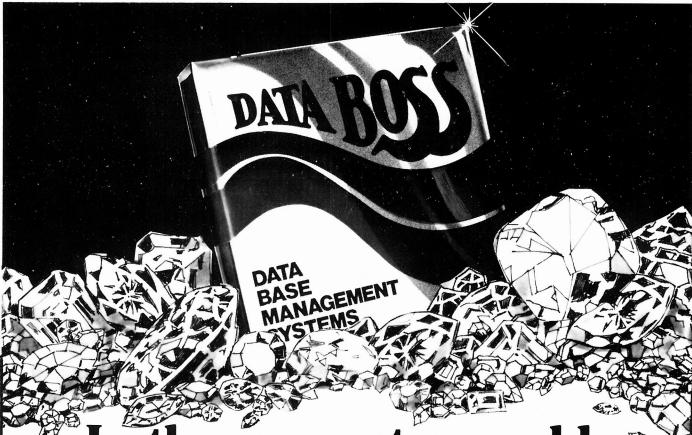
For each disk drive on the system, the pack ID, number of opened files, and free space is displayed. Should the number of errors on a drive exceed ten, then the open files count will flash to point out the situation. If the number of free blocks on a disk drop below 11,000 then the free space number will flash.

To point out a problem that most large RSTS/E users have, the small buffer count is displayed on the screen, and if the count drops below 100 then the number will flash. The number of jobs and the maximum number of jobs are also displayed on the screen and when the system is full these numbers will flash. The rest of the display is made up of the first 10 message receivers. On each receiver the job name, job number, and receiver ID is displayed. On the line printer and batch spoolers a special text is also displayed if a file is being printed or a batch stream is being run. For line printers this text contains the file name being printed, the file size, and what block is currently being printed.

The rest of the screen is set up as scroll region for output from a PK. The operator can type any command on the screen and see it execute in the scroll region. The output of the PK can also be directed to a file if an audit trail of the dialog is required.

To minimize typing the program function keys along with the special key-pad mode are used to create an abbreviation library for use by the operators, this library is set up by data statements in the program. These commands are both full commands as well as partials where the operator must fill in the rest of the command.

This program has been in use now for about five months and the response to it has been enthusiastic from all concerned. I am also pleased to add that my 'IBM' contact is now eating a lot of crow since his system can't do what my program does. Should anyone be interested in my program I could be convinced to let it loose as long as I don't have to maintain it.



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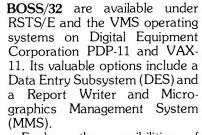
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FOR JOBS-IR TO MAX.JOBS
JOBS-PEEK[JOBTBL8-10G8-10G8]
IF JOBS-PEEK[JOBTBL8-10G8-10G8]; IF JOBS (JOBS); FNATTRS('7'); SPACES(258); IF JOBS (JOBS)
IF JDBS-CR JDBS-10G8 (JOBS)=08
GCTO 51G0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          UNIBUS#=0#
GOGNE 12000#
GOSNE 12000#
IF UNIBUS#
IF UNIBUS# THEN PRINT FRAJORM/JOBA(JOBA); FNATTR$('7'); SPACE$(25%); IF JOBA(JOBA)
GOTO 5100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PRINT KRB, FNJOBS (JORB, )FNATTRS ('7');

JOSS-RATUGS, (28) = 'HB'

JOSS-RATUGS (28) = 'HB'

JOSS-RATUGS (28) = 'HB'

JOST-RATUGS (18) = 'HB'

JOST-RATUGS (18) = 'HB'

TTYS-WINDS (18) = 'HB'

TTYS-WINDS (18) = 'HB'

TTYS-WINDS (18) = 'HB'

JOB, JOHS-WINDS (SAARA (JOB PPRN) AND 255%)

JOB, JOHS-WINDS (SAARA (JOB PPRN) AND 255%)

JOB, JOHS-WINDS (18) = 'HB'

JOB, JOHS-RATUGS;

JOB NAMES, JOSTATUSS;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1>>LOOK FOR JOB IF NOT ACTIVE CLEAR ENTRY ON SCREEN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ON ABNORMAL EXIT
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: SUBROUTINES FOLLOW
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PRINT #KB%,FNV$(1%,24%,NS,0%,V%);CHR$(155%)+'[K';
IF CHDS-'ECHO' THEN 3000% ELSE
IF CHDS-'GSYS' THEN 2000% ELSE
GOYO 2010
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       UNDERSTANDS
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PRINT RESPECTOR:
PR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  I>>WAIT FOR COMMAND
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CMD$='GSYS'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       I>>COMMAND'S THAT "GSYS"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 !>>THATS ALL OF SYS'TAT'
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JOB8(JOB8) =-18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   I>>WAIT FOR COMMAND
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             I>>PRINT JOB INFO
       MAIT 00

CODO 20008 IF E%-8192%

PRINT 088, CHRS (155%) +=;

COSU 15000%

PRINT 1889, CHRS (155%) +'>;

COTO 2010 E %
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     OR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1>>RESET ECHO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         UNIBUS%=0%
NEXT JOB%
PRINT #KB%,FNATTRS('0');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CMD$='ABORT'
CMD$='ECHO'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ECHO% = NOT (ECHO%)
GOTO 2010
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GOTO 4950 IF C
GOTO 3100 IF C
GOSUB 14120%
T$=CMD$
GOSUB 14030%
GOTO 2010
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5010
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>PROCRAM : GSTS.LD.Z

DEDIT DATE : 00-XXX-00
VERSION : 1.0

VERSION : 1.0

CREATE VOT

CREATE VOT

CREATE VOT

AUTHOR : GARY/MILLE

AUTHOR : GARY/MILLE

AUTHOR : GARY/MILLE

THE PROCRAM WILL ALLOW THE OPERATOR TO KEEP TRACK OF WHAT IS GOING

WITH THE ADVANCED VIDEO OFTION INSTALLED.
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PARTI&(13)=PARTIX(13%)+PARTIX(24%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PARTIX(14%)+PA
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PERABLE C'TRAP

NS-HULL STRING

EGS-FILE-OPENING ERROR STRING

ESS-STRING ERROR STRING

KR#-EKFURORD FROMPT

KR#-EKFURORD CHANNEL

EGS-CLEAR TO DES

EGG-ECTEAR TO DES
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I CHORGE FORTINGING
FRINT $KB$, L$; FNV$(1$,1$,N$,F0S,V$)
FNV$(1$,1$,F9S+" "+DAYES(D$)," "+TIMES(0$),0$,V$)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            I>>BEGIN MAINLINE PROCESSING
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(UNUSED)

(UNUSE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DIM PARTIS(308), PARTIIS(308), RC$(108,38)
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DIM FTBL$ (48,138),FTBL8 (48,138)
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JOB%(K%) =-1% FOR K%=1% TO 63%
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\ X5=SYS(GHS(64)+CHRS(-74))

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    COT KRB PRRTW (39)
MAXCHT = PRRTW (49)
DEVORT = PRRTW (59)
DEVORT = PRRTW (79)
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2-0
3-0
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POR K%=1% TO 10%
GOTO 7030 F FOR (K%)=0%
PRINT MKBM, PRECS (K%, 0%); ', ', FCS (K%, 2%); ', ', RCS (K%, 2%); ', RCS (K%, 3%); RCK (K%, 9) B F RCS (K%, 0%) = ', ', RCS (K%, 0%); ', RCS (K%, 0%); ', ', RCS (K%, 0%); '
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CHR$(0%)+CHR$(0%)+CHR$(0%)+CHR$(0%)+CHR$(255%))
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    JOBS A
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CHR$(0%) +CHR$(0%) +CHR$(0%) +CHR$(0%) +CHR$(0%) +
CHR$(0%) +CHR$(0%) +CHR$(0%) +CHR$(0%) +CHR$(0%) +
                                                                                                                                                                                                                                                                                                                       NEXT DIAGREEK (JOBCHT)
JOB. LOGREER (ADBCHT)
JOB. LOGREER (ADBCHT)
JOB. LOGREER (ADBCHT)
JOB. LOGREER FRING (1) (COL. MAN. PLISKELL, NS. OB. VN);
PRICH KER, FUNTER (1); 17; 1F JOB. NOWH. >-JOB. LOGR.
PRICH KER, JOB. NOWH. >-JOB. LOGR.
PRICH KER, FUNTER (10.7); 1F PEEC. BUFW (10.9);
PREC BUFW FER, FUNTER (10.7); 1F PEEC. BUFW (10.9);
PRICH KER, FUNTER (11.5); 1F PEEC. BUFW (10.9);
PRICH KER, FUNTER (11.5); 1F PEEC. BUFW (10.9);
PRICH KER, FUNTER (11.5); 1F PEEC. BUFW (10.9);
PRICH RER. FUNTER (11.5); 1F PEEC. BUFW (10.9);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    OF
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GS=DATES(0%)+' '+TIMES(0%)
PRINT #KB%,FNVS(30%,COL.MAX%+5%+1%,NS,EOL%,V%);GS;
RETURN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PRINT NUMBER
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1>>GET AND SAVE ALL RECEIVERS
                                                                                                                                                                                              !>>PRINT DISK STATUS
#KB%, USING '###', OPEN.FILES%;
#KB%, FNATTR$('0');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  OF SEND LIST
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    :>>AFTER DISK STATUS !
: SMALL BUFFER COUNT
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RETURN IF NOT( JOB. NAME$='BATBUN'
JOB.NAME$='BATBUN'
JOB.NAME$='RAISSPL'
JOB.NAME$='SPLRUN'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CHANNEL&=3% COGNALIZATION CHANNEL&=3% FOR NAMES="BATRUN" CHANNEL&=7% IF JOB.NAMES="RJESPL" GOGUE 11000% LISET RCS(RC%,3%)=FILOPNS RETURN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          :>>THATS ALL FOLKS
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SYS.GFF = 18
DISK.STRATE = 18
DISK.STRATE = 18
STS.GFF = 58
REC.GFF = 58
REC.GFF = 58
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SCOLL STRATE = 28
SCOLL 
                                                                                                          MOVE DATA INTO FAMILIAR NAMES (RSTS/E PROGRAMMERS MANUAL)
SECTION 7.2.17.1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         MAX.JOSE.SMAPR(PEEK(JOBCNTA)) AND 2558
(LHARZ STORTER(64)-CHRS(144)) MADS(MR(118) + SWAPR(MR(128)))
MASMEDS SANDS(MR(58) + SSAARH(MR))
PEPS-SHOTIS (MR(18) + */** + MUMIS (MR(78))
TSF-SHELLO **PERS
GOSDE 14000*
GOSDE 14000*
TSF-MRS(MRS)
TSF-MRS(MRS(MRS)
TSF-MRS(MRS)
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DISK.ENTRY%=08 TO DEVOKB%=28 STEP 28
DISK.TYPES=CUTY$(SMAPA(PERK(DEVARM%=DISK.ENTRY%)))
DISK.TYPES=CUTY$(SMAPA(PERK(DEVARM%=DISK.ENTRY%))
DOG*=CUTY*(DISK.UNTY*=0% TO PEEK(DEVCHY*+DISK.ENTRY%))
DISK.NAMES(DCS)=DISK.TYPES+NUMI$(DISK.UNTY*)+':'
T DISK.ENTRY%
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1 EACH UNIT.
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IF CUTS, GNAM% (EDEK KK %) 1 - 1 FW ' THEN
PRODEW = PEEK IDEVETR8 + K% - DEVNAM%)
FR(% + DEEK | PEEK | EDEK | FWEDVY %) + 8%) / 2%
GOTO 1070
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UB 50004
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SUB 70004
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PRINT KRB, JECODO 40654, CHS (174);
1 DO SY/M
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SATCTM%=PARTI%(25%)
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DEVAMM = PARTIE (34)

CSSFREL = PARTIE (34)

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JDBS-PEEK(JOBTEL*+JOB*+JOB*)
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JOB_TTY_TYPES=1PK'
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                                                                                                                                                                                                                                                                                                                       GET KEYBORAD NUMBER AND SET UP TYPE AND NUMBER, DO SPECIAL ADJUST FOR PSEUDO KEYBOARD NUMBERS.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             THIS ROUTINE GETS A JOBS PRY , KEYBOARD NUMBER , JOB NAME , JOBINES IF THE CONNECT THE , CON UTHE , JOB SIZE , AND DETERMINES IF THE JOBIS DETACRED OR NOT.
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\PILOPNS-FILOPNS+'C+NUNIS ((SMAPR (FCB4 (68.)) AND 2558))+'>'
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\ SI=(SWAP&(FCB&(12&)) AND 255&)*65536.+32768.+(FCB&(13%) EQV 32767%)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SUBROUTINE TO DETERMINE JOB STATUS FROM THE MONITOR FLAGS AND OTHER DATA.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 LIST OF FILE CONTROL BLOCKS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CHANNEL YOU WANT INFO ON
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          JOB YOU ARE LOOKING AT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1>>LOOK IN 10B FOR CHANNEL SPECIFIED IF NOT A DISK FILE FORGET LOOKING. THIS ROUTINE ONLY WORKS ON LAGE FILE SYSTEMS.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              REC=(WCB%(3%) AND 255%) + 256.*(SWAP%(WCB%(3%)) AND 255%) \ FILOPNS=FILOPNS+NUMIS(REC)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         JOB TABLE LOCATION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SUBROUTINE TO FIND INFO ABOUT A DISK FILE OPENED BY A JOB.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               FILE INFORMATION
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WCEN +CONS (KN) = PEEK (KNCSH+K%+K%+)
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FCEN + WCEN +CONSH+K%+K%+)
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\ GOTO 11040 IF F.CLUS%=2%'I% FOR I%=0% TO 8%
\ RETURN
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                                                                                                                                                                                                                                                                                                                                                          I>>SET UP KB AS NO
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                                                                                                                                                                                                                                          / RETURN
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11030

11020

11040

11050

11070

12000

11060

11010

11000

. RSTSPROFESSIONALRSTSPROFES

PLACEHOLDER

FUNCTION

PROGRAM

!>>GET FUNCTION WITHIN

E%=FNI%(FNV%(1%,24%,CMD%,EOS%,V%)) CMD%=CMD%+IO% RETURN

15020

LAST OF DATA FOR COMMAND

I>>GET

DEF RNOBS (JOBS)
1%-JOBS (JODS)
1%-JOBS (GOL, MAX* * (JOBS-18)/COL, MAX*
1%-STS (CORS-10) (COL. MAX*
1%-STS (CORS-10) (COL. MAX*
1%-STS (STRATS, STS) (STRATS, STS) (STRATS, STS) (STRATS, STS)
1%-STRATS, STRATS, STR

20000

DEF FNATTR\$(2\$) FNATTR\$=CHR\$(155%)+'['+Z\$+'m' FNEND

20010

DEF PNDISK\$(DISK%)
Y&=DISK%+COL.MAX%
X%=DISK,START%
FNDISK\$=FNV\$(X%,Y%,N\$,0%,V%)
PNEND

20020

I>>DISK OFFSET

DDF FNRECS (RC%)
Y8-RC% - [S% ((RC%-1%)/5%))
X8-K(RC%-1%)/5%
X8-XK REC. OFF+REC. START%
Y8-XY RECOL. PAR.
PRIECS - FNVS (X*, Y*, NS, O%, V%)
PRIECS - FNVS (X*, Y*, NS, O%, V%)

20030

COMMAND

I>>READ IN

READ F%,CS,FLG%
. RETURN IF C\$='<<END>>'
FPLE,F(F%,P%)=C\$
. FTBL% (F%,P%)=FLG%
. GOTO 16000%

16000

PC#-INSTR(1%, "Grscuvxypnlm", IOS)
PRINT REM.PNVS(1%, 244, NS, EOSM, vw.); FTBLS (PFW, PCW);
ONGS-FTBLS (PFW, PCW)
IF FTBLX (PFW, PCW) THEN PRINT #RDW
RETURN

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258-CH8(1558)+"["+NUMIS(Y8)+";"
258-CH8(1558)+"[" IF 218--18
258-258+CHR8(1558)+"[" IF 218--28
258-258+CHR8(1558)+"[" IF 218--28
258-258+CHR8(1558)+"[" IF 218--28
258-258+CFR8(1558)+"[" IF 218--28
258-258+CFR8(1558)+"[" IF 218-08
258-258+CFR8(1558)+"]
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1>>FNV4%=CENTER 25, PRINT AT BOTTOM OF SCREEN
1 21%=0 FOR LINE 23
1 1 FOR LINE 24
                                                                                                                                                                                           |>>FNV5=CONSTRUCT CURSOR POSITIONED STRING
| **, **, ****CEREN COORDINATES
| 25=EASE STRING
| 121=LENGTY TO "CLEAR"
| VW = "CLEAR" CHARACTER
                                                                                                                                                                                                                                                                                                                     24850 DEF FWUART(25,218)

24850 DEF FWUART(25,218)

(X=11 FF X418

(X=24CHR (TA)+ZE FF LEN(ZS)

(X18-Z34 EX FF Y4 + Z2 FF LEN(ZS)

(X18-Z34 EX FF Y4 + Z4 FF TEN(ZS)

(X18-Z34 EX FF Y4 + Z4 FF
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IF ERL=14040% THEN RESUME 14100
IF ERL=14080% THEN RESUME 14100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     IF ERR=3% AND ERL=24020% THEN RESUME 24030%
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TF ERL=4440 THEN RESUME 14590 ELSE
IF ERL=14080 THEN ESSUME 14990
IF ERR=11% AND ERL=14130% THEN RESUME 14140%
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               UNIBUS TIMEOUT FATAL ERROR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         in
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RETURN FOR MORE FUN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       F ERR-8% THEN FK%-FK%+1%
RESUME 14020% IF PK%<8%
PRINT 'All psuedo keyboards are :
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              !>>WAIT EXAUST ...
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      I>>KEEP TRYING ...
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IF ERR=15% AND ERL=24030% THEN FNI18, E%=-8192%
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           IF ERR<>33% THEN 32040 ELSE
UNIBUS%=1%
\ RESUME 32030
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1>> STANDARD ERROR TRAPS
IF ERL=24030 AND ERR=11%
THEN IO$=CHR$(26%)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IO$=N$
RESUME 24050
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RETURN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 H///
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PRINT *KB%, Z5;
\ PRINT *KB%, RECORD 256%, CHR8(22%)+CHR8(V%); IF ZZ%
| PRINT PROMPT STRING
| SET MODE, MAX LENGTH, PAINT CHAR
```

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1 FNV% ERROR HANDLER 1 FNV ERROR HANDLER DETECTED IN "; P9\$ EXIT THRU HERE CLOSE EVERYTHING ! ERRORS END HERE I>>CHAIN AWAY
I>>T2APP IF ERL = 24060 THEN FNV% = 0% \(\text{Eg} = -1\) \(\text{Eg} = -1\) \(\text{Eg} = \text{LFSUME} 24070 \) \(\text{IF ERL} = 24080 THEN FNV = 0 \) \(\text{Eg} = -1\) \(\text{Eg} = -1\) \RESUME 24090
PRINT L\$; "?UNFORESEEN ERROR \ ON ERROR GO TO 0 CLOSE Z8 FOR Z8 = 18 TO 128 CHAIN UI\$ UI% IF UI\$ <> N\$ END 32660 32760 32700 I>>FNV% = CONVERT STRING TO INTEGER ES.FNI18=ER OR (105="/E")

| [105=LEPT[105] IF Z18=18
| PRINT #KRB UNLESS XNS
| IF X38
| THEN Z8=PWV44 (NS, 18) IF XNS AND 5128
| Z8=PWV44 (NS, 18) IF XNS AND 10248
| XNS EXNS AND 2559 | CLEAR BOTTON OF SCREEN I>>FNV=CONVERT STRING TO REAL 1>>SCREEN 1 CONTROL 1 FUNCTIONS

24810 DEF FNU\$(X8, Y8, Z\$, Z18, V8) \ IF X8*Y8*X38=08

24050 DEF FRIND 24060 DEF FRING (S) (SW = 0.0) 24070 DEF FRING (S) (CR = 0.0) 24080 DEF FRING (S) (CR = 0.0) 24090 FRIND

24090

I>>ECHO-CONTROL INPUT FUNCTION

Z28=Z18 Z28=28 IF Z28=18 SF FNI18 (Z\$, Z18) \FNI18, E8=08 \E18=-18

> 24020 24030

GEF #KBB FIRST #KBB, RECOUNT AS 215 | IGS=CVTSS(Z15,378) +1 | ISSCI(Z15)=128 | IGS=CPTSS(Z15,378) | IP ASCII(Z15)=128 | AND SET IGS

24040

DEF FNSCROLLS (T%, B%) FNSCROLLS-CHRS (155%) + '['+NUM1\$ (T%) + ';'+NUM1\$ (B%) + 'r' FNSRD

20040

1>>KEYBOARD 1 (NO ECHO

24000 1>>STANDARD FUNCTIONS 24005 DEF FNI8(Z\$)=FNI18(Z\$,0%)

24010 DEF

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The Implementation of Hidden Files Under RSTS/E Version 7.0

By John F. Sandhoff, Data Processing, California State University at Long Beach

An Introduction to Hidden Files

There exists in certain RSTS/E applications a desire to make certain files 'invisible' to the general user public. DEC has partly recognized this need and incorporated, under version 7.0, a means of making it impossible for non-privileged users to get directory information of cross-account, private files. This article describes a method developed by and in use at Long Beach State University that permits specific public files to be transparent to non-privileged users.

Why a need for hidden files? In many environments, especially educational installations, it is highly desirable for certain programs to be able to access a data file without using privileges, but still be able to maintain a high degree of security. Defining a file as public allows a program to access it, but unfortunately it also allows anyone that knows the filename to access it. If the name could be kept secret, and a discreet name chosen to prevent a lucky guess, all requirements would be met.

The \$DIRECT program can be disabled, but such an action is not very practical. Besides, users can still write their own directory program by using the appropriate SYS calls. If the directory SYS calls are also disabled (or privileged), many programs that rely on performing a directory lookup, such as \$PIP.SAV and the task builder, would fail to operate. Even though it can be argued that disabling \$TKB provides definite system throughput gains, such a move is generally impractical.

The process of hiding files as described in this document is a relatively simple change to the FIP directory lookup code. It is an extension of feature patch 3.5.9, which restricts directory lookups. What happens is this:

When a directory lookup request is made to FIP (SYS calls 6+15 or 6+17), a section of code is executed that scans a user's UFD. Normally, if the specified file exists, the directory information is returned. With patch 3.5.9 installed, this information is returned only if the requested file is defined as public to the calling user. (Please refer to the System Release Notes for more information). The hidden files patch presented here carries this mechanism one step further — if a file is public, another status bit is checked, and if this bit is on, the file is considered by FIP to be hidden, resulting in no directory information being returned.

After the installation of the hidden files option, a hidden file can be opened by a program (OPEN statement,

CALFIP), and loaded or run with the 'OLD' or 'RUN' command, as applicable. However, such a file will not appear on a directory listing (except, of course, to the owner or a privileged user), and can not be accessed by programs that perform a directory lookup before opening the file. (Note that this includes PIP.SAV, TKB.TSK, and some RSX-based programs. RNO is not affected.)

Particular attention should be given to the fact that this patch functions in conjunction with DEC feature patch 3.5.9. Any installation that is interested in enhanced file security should already have this feature patch installed. This patch can be applied to either sub-version -07 or -08 of RSTS V7.0.

Please understand that the modifications described in this document do not in any way cause the RSTS file structure or FIP to lose track of any files. The modifications affect ONLY the return of information as requested by the directory lookup SYS calls by non-privileged tasks. A privileged user or job maintains full functionality of the SYS calls. It should also be pointed out that files can never be hidden from their owner. They will ALWAYS appear on the owner's directory listing, and this patch by design will NOT hide the files from their owner (or any privileged user).

Installing Hidden Files on your system involves the following changes:

- A patch to the RSTS FIP routines to modify the directory lookup calls
- A patch to \$DIRECT to look for and respect the 'hidden file' status bit. Since \$DIRECT does not use SYS calls, a separate procedure is necessary to implement hidden files in this program.
- A one-word patch to the CLEAN option of INIT.
 Without this patch, all hidden files will be reset to non-hidden status every time your system crashes.
- A one-word patch to \$ONLCLN, for the same reason as given above.
- DEC feature patch 3.5.9 MUST be installed to enable hidden files.
- DEC feature patch 10.3.1 should be installed to the DIRECT program. While this is not mandatory, it is

PLACEHOLDER

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```
THE ROUTINE LISTED BELOW IS CONTAINED WITHIN PSECT 'DIRO' OF THE FIP CODE, IT IS RESPONSIBLE FOR RETURNING DIRECTORY INFORMATION AS REQUESTED BY SYS CALLS 6+15 AND 6+17 WHEN
                 THE TARGET DEVICE IS DISK.
                THE FIRST FEW LINES DEAL WITH RETRIEVING THE NEXT FILENAME AND ARE NOT NECESSARY TO THE UNDERSTANDING OF WHAT WE ARE INTERESTED IN. STARTING AT THE CODE LABELED 'XXXX', WE HAVE A VALID FILENAME ENTRY BLOCKETTE IN CORE, POINTED TO BY REGISTER R5. SEE FIGURE 1 ELSEWHERE IN THIS DOCUMENT FOR THE LAYOUT OF THIS INFORMATION.
                THIS ROUTINE RETURNS WITH THE CARRY BIT SET IF THE FILENAME WAS NOT FOUND. NOTE THAT UFD'S AND FILES MARKED FOR DELETION ARE IGNORED.
                THIS CODE ASSUMES THAT FEATURE PATCH 3.5.9 HAS BEEN INSTALLED. THIS PATCH CHANGES THE INSTRUCTION AT '..DIRP' FROM AN UNCONDITIONAL BRANCH TO A CONDITIONAL BRANCH.
                                                                   ; GET NEXT UNIT ELSEWHERE
START:
                                  @#RDENXT
                CALL
                                                                       GET NEXT FILENAME
                 BEO
                                                                   ; NO MORE FILES, GET NEXT UNIT
                 вітв
xxxx:
                                  #US.UFD!US.DEL,10(R5); CHECK THE USTAT BYTE
                                                                   ; IF UFD OR DELETED, ACT AS IF NOT THERE
; IS THIS USER PRIVILEGED?
; SKIP ROUTINES IF PRIV USER
; ARE WE REQUESTING DATA ON OURSELVES?
                                  @#FIPRIV
20$
(R0),@#FIUSER
                 TSTR
..DIRP:
                BEO
                                                                    ; YES, SKIP ROUTINES
                                 11(R5),R2; RETRIEVE FILE'S PROTECT 1(R0),@#FIUSER+1; SAME PROJECT NUMBERS? 10$; YES, SHIFT ACCORDINGLY
                 MOVE
                                                                       RETRIEVE FILE'S PROTECTION CODE
                BEO
                                 #-2,R2
#-3,R2
                                                                      SHIFT PROTECTION CODE
SHIFT AGAIN
                 ASH
                THE FOLLOWING CODE CONTAINS THE MODIFICATIONS ADDED BY THE HIDDEN FILES PATCH. THE LOCATION LABELED HERE AS 'PATCH' I WITHIN THE RSTS PATCH SPACE.
                                                                   ; GET NEXT UNIT ELSEWHERE
; GET NEXT FILENAME
; NO MORE FILES, GET NEXT UNIT
TUP:
START:
                                  @#RDENXT
                 BEO
                                  #US.UFD!US.DEL,10(R5); CHECK THE USTAT BYTE
START ; IF UFD OR DELETED, ACT AS IF NOT THERE
@#FIPRIV ; IS THIS USER PRIVILEGED?
xxxx:
                 BITB
                                 START
@#FIPRIV
                 BNE
TSTB
                                                                   ; SKIP ROUTINES IF PRIV USER
; ARE WE REQUESTING DATA ON OURSELVES?
; YES, SKIP ROUTINES
..DIRP:
                                   (RO),@#FIUSER
                 CALL
                                  PATCH
                                                                        *** THIS IS OUR JUMP TO THE PATCH
                                 1(R0), ##FIUSER+1; SAME PROJECT NUMBERS?
10$ YES, SHIFT ACCORDINGL
#-2,R2; SHIFT PROTECTION CODE
#-3,R2; SHIFT AGAIN
                 CMPR
                 ASH
                 RETURN
PATCH:
                                                                   ; THIS IS THE ROUTINE PLACED IN PATCH
                                                                      SPACE
RETRIEVE FILE'S PROTECTION CODE
LOOK FOR 'HIDDEN BIT' IN UAA FIELD
NOT HIDDEN, PROCEDE, ELSE
FUDGE THE PROTECTION CODE TO
ASSURE FAILURE
                                 11(R5),R2
#10,14(45)
                MOVB
                 BEQ
                                  #24,R2
                RETURN
55:
```

Patching Procedure

This section lists step-by-step instructions to apply the hidden files patch to RSTS/E V7.0 systems. This patch to FIP assumes that there is enough space in 'PATCH' to add the necessary code. (This is discussed more completely elsewhere.)

For those of you brave enough to venture into the fascinating world of bit-twiddling, here goes:

NOTE: If ANY of the old values appear incorrect, ESPECIAL-LY if any of the locations in the patch space are non-zero, ABORT THE PATCH PROCEDURE by typing a Control/C. Do NOT install the patches if things "don't seem right".

 Add the following patch to FIP. If the directory code on your system is non-resident, this patch can NOT be installed to your currently running monitor. You must use the INIT PATCH option. Note that if DEC patch 3.5.9 has already been installed, the portions marked by asterisks must be deleted!

```
RUN $ONLPAT
Command file name?
                                                                      (Type a <LF> if entering it by hand)
(Type 'filnam=' to save the patch)
(Type a <LF> for current SIL)
 File to patch? RSTS.SIL Module name? OVR
                                                                       (FIP if code is resident)
Module name? OVR
Base address? .DIRP
Offset address? 0
Base Offset Old
?????? 000000 000415
?????? 000002 ??????
                                                                      (This is DEC patch 3.5.9)
? 4737
? PATCH+356
? ^Z
Base address? PATCH
Offset address? 356
Base Offset Old
?????? 000356 000
                                                    116502
11
32765
                                000000
??????
??????
??????
??????
??????
                000360
000362
                                 000000
                                                ? 32765
? 10
? 14
? BEQ+2
? 52702
                000364
                000372
000374
                                 000000
                                000000
000000
??????
 ??????
                000400
                                                                                  (Uparrow/C to exit)
```

Add the following patch to (0,1)INIT.SYS

```
File to patch? (0,1)INIT.SYS
Base address? CLEAN
Offset address? 3402
Base Offset Old New?
113002 003402 042765 ? <LF> (This step is for verification)
113002 003404 000013 ? 3
113002 003406 000014 ? °C (Uparrow/C to exit)
```

3) Add the following patch to \$ONLCLN.SAV

```
File to patch? SY:[1,2]ONLCLN.SAV
Base address? 55702
Offset address? 0
Base Offset Old New?
055702 000000 042765 ? <LF> (This step is for verification)
055702 000004 000013 ? 3
055702 000004 000014 ? ^C (Uparrow/C to exit)
```

- 4) Marvel that your system is still running. The binary patches are finished, all that is left is a modification to the \$DIRECT program, and the typing in of a program that makes it easy to hide a file.
- Change the following three lines in the \$DIRECT source. The first line contains only an addition, as indicated.

- Recompile the \$DIRECT source.
- 7) If you are lucky enough to have this document on a release tape, load the tape and copy the file 'HIDE.BAS' from it. Otherwise, limber up your typing finger(s), and start typing in the listing from Ap-

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pendix A. Of course, files can be hidden by CAREFULLY using \$ODT from a privileged account, but I am not one to recommend it.

8) Compile the program obtained from step 7 and make it public and privileged. If desired, place the following two CCL commands into your system startup procedure:

```
CCL HIDE-=LB:HIDE.*;PRIV 30000
CCL UNHIDE-=LB:HIDE.*;PRIV 30000
```

Change the file spec to indicate where this program resides on your system.

 You are finished.
 The FIP patch will not take effect until the system is shut down and rebooted.

Appendix A

This section lists the program used to hide and unhide files on the system. It is suggested that you try to beg, borrow or steal a distribution tape instead of trying to type this whole mess in.

```
10 EXTEND

6

9

1 GENERAL DESCRIPTION &

6

1 THIS PROGRAM ALLOWS A USER TO HIDE OR UNHIDE A FILE. BIT 3 &

1 OF THE ACCOUNTING LINK WORD IN A FILE'S UPD ENTRY INDICATES &

1 WHETHER OR NOT IT IS HIDDEN. &
```

```
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                                    DIMENSIONS&
                      DIM MATCH%(9), FIL%(9), M%(30) 8
930
                      DIM #2, UFD%(3583,7) &
! UFD AS A VIRTUAL ARRAY &
1000
                                    MAINLINE CODE&
1010
                       I$ = "V7.0-07A" & 
! VERSION/EDIT &
1020
                      PRINT & PRINT "HIDE - File Hide Utility "; I$ & PRINT FNERR$(0%) &
                     PRINT
                                   & ! TELL THEM WHO WE ARE &
                      GOSUB 18000 & ! GO GET INITIALIZED &
1030
                    PRINT "Do you wish to Hide or Unhide files (H or U) "; & INPUT XS & XS = LEFT(CVTSS(XS,39%),1%) & GOTO 1090 UNLESS XS = "H" OR XS = "U" & HIDE = (XS = "H") & FIND OUT WHAT THEY WISH TO DO &
                   ERR.FLAG% = 0% &
\UNLESS IN% THEN &
PRINT &
PRINT "File(s) to "; &
```

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```
PRINT "un"; UNLESS HIDE% &
PRINT "hide"; &
! ERR.PLAG IS USED WITH INDIRECT FILES &
! IF WE'RE TALKING TO THE KEYBOARD (AND NOT AN INDIRECT &
! FILE), PROMPT WITH THE RIGHT QUESTION &
                                     INPUT LINE #IN%, FILE.SPEC$ & UNLESS IN% THEN &
 1105
                                                                        IN% THEN & GOSUB 23000 &
                                                                     GOSUB 23000 &
GOTO 1100 IF ERR.FLAG% &
GOTO 1105 IF IN% &
GOTO 1105 IF IN% &
! CET AN INPUT FILE SPEC. THEN: &
! IF INPUT IS CURRENTLY FROM THE KEYBOARD, THEN &
! SEE IF AN INDIRECT COMMAND FILE WAS SPECIFIED &
! IF SO, WE NEED TO GET A FRESH INPUT LINE (FROM THE FILE) &
! MOTE THAT AN INDIRECT FILE CAN ONLY BE SPECIFIED FROM &
! TERNINAL INPUT. AN AT-SIGN APPEARING INSIDE AN &
! INDIRECT FILE IS TREATED AS PART OF THE FILENAME. &
                                         CHANGE SYS(CHRS(6%)+CHRS(-23%)+FILE.SPECS) TO M% &
FILE.SPECS = RIGHT(FILE.SPECS,LEN(FILE.SPECS)-RECOUNT+2%) &
FLAG2% = M% (29%) OR SWAP% (M% (30%)) &
GOTTO 1170 UNLESS (FLAG2% AND 1%) &
IF FLAG2% < 0% THEN &
PRINT "?Not a valid device - "; &
RADS(M% (23%) OR SWAP% (M% (24%))); &
RADS(M% (25%) OR SWAP% (M% (26%))); ": - Continuing" &
GOTTO 1170 &
! IGNORE THIS FILESPEC IF NO FILENAME &
! IF WE GOT A BAD DEVICE NAME, WARN THEM, THEN CONTINUE &
 1110
                                  DEV$ = "" &

IF FLAC2% AND 8192% THEN &

DEVS = CHR$(M%(23%)) + CHR$(M%(24%)) &

DEV$ = DEV$ + CHR$(M%(25%)+48%) IF M%(26%) &

DEV$ = DEV$ + ":" &
 1120
                                          UNLESS (FLAG2% AND 128%) THEN & PPN% = MY.PPN% &
 1130
                                                                      IF PRIV% THEN & PPN% = M%(5%) OR SWAP%(M%(6%)) &
                                                                        PRINT "?Cross-account not allowed - continuing" &
                                                                        PRINT "ZCross-account not allowed - continuing"
GOTO 1170 &
! USE OUR PPN IF NONE SPECIFIED, ELSE &
! USE SUPPLIED PPN IF WE ARE PRIVILEGED, ELSE &
! ISSUE A COMPLAINT AND CONTINUE &
                                    PPN$ = "[" + NUM1$(SWAP&(PPN%) AND 255%) + NUM1$(PPN% AND 255%) + "]" &

VITOS = DEV$ + PPN$ &

! BUILD THE PPN STRING &
! BUILD THE UFD SPECIFICATION &
                                          1150
                                                                             11D% = -15 UNLESS 12D-12.

6
CHANGE THE SCANNED FILENAME INTO A 9-CHAR STRING & ADD A WILD EXTENSION IF NONE SPECIFIED & CONVERT THE STRING TO BYTES & SET UP FOR WILDCARD MATCH FUNCTION & STREAM OF THE STRING OF THE STREAM OF THE WILDCARD & STREAM OF THE WILDCARDS & STREAM OF T
                                             NEXT I%
                                                                        ! FLAG WHETTHER WE ARE DEALING WITH WILDCARDS &
 1160
                                             GOSUB 2000 & ... DO THE ACTUAL WORK &
                                           GOTO 1110 IF LEN(FILE.SPECS) &
GOTO 32767 IF CCL% UNLESS IN% &
GOTO 1100 &

! FIGURE OUT WHERE TO DISPATCH TO: &
! 1110 IF MORE TO DIGEST &
! END IF CCL ENTRY AND NO MORE &
! ELSE BACK FOR ANOTHER COMMAND LINE &
 1170
 2000
                                                                       GET SOME WORK DONE&
                                    OPEN UPDS FOR INPUT AS FILE 2%, MODE 16384% & IF CYTS%(MID(SYS(CHR$(12%)),13%,2%)) = 0% THEN & PRINT "?No files in account "; UPD$ & CLOSE 2% &
 2010
                                     CLOSE ---
                                                                       ! OPEN THE UFD, WRITE ENABLED & ! COMPLAIN IF NOTHING THERE &
                                            ERR.FLAG% = 0% &
FOUND% = 0% &
FOUND% = 0.0% &
NEXT.LINK% = UFD%(0%,0%) &
UCS% = UFD%(31%,0%) &
! INITIALLY SAY NO ERRORS AND NO FILES FOUND &
! GET LINK TO FIRST FILE &
! ALSO GET UFD CLUSTER SIZE &
 2020
                                            UNTIL ERR.FLAG% &
LINK% = FNLINK% (NEXT,LINK%,UCS%) &
GOTO 2040 UNLESS LINK% &
USTAT% = UFD% (LINK%,4%) &
NEXT.LINK% = UFD% (LINK%,0%) &
GOSUB 3000 UNLESS (USTAT% AND 192%) &
ERR.FLAG% = 1% IF FOUND% UNLESS WILD% &
NEXT &
                                                                        ! LOOP UNTIL WE GET AN ERROR &
! RETRIEVE LINK TO NEXT FILE &
! EXIT LOOP IF NO MORE FILES &
! ELSE GET STATUS WORD AND NEXT LINK &
! ELSE GET STATUS WORD AND NEXT LINK &
! CO PROCESS THIS FILENAME &
! FAKE AN ERROR (TO TERMINATE LOOP) IF WE FOUND A FILE &
! AND WE ARE NOT WILDCARDING (FOR SPEED) &
! CONTINUE LOOP (FALLS THROUGH IF ANY ERRORS) &
                                   CLOSE 2% & UNLESS FOUND% THEN & PRINT "File not found - "; FSPEC$; " - continuing" & UNLESS WILD% & "" - stobing files - "; FSPEC$; " - continuing"
 2040
                                                                      PRINT "No matching files - "; FSPEC$; " - continuing" & IF WILD% &
 2050
                                             RETURN &
```

```
CHANGE THE FILE'S STATUS&
                     P%(1%) = UPD%(LINK%,1%) FOR I% = 1% TO 3% &
RETURN UNLESS FNMATCH% &
FOUND% = -1% &
FULNAMS = RADS(P%(1%))+RADS(P%(2%))+"."+RADS(P%(3%)) &
IF WILD% THEN &
PRINT FILNAMS; &
INPUT XS &
RETURN UNLESS LEFT(CVT$S(X$,39%),1%) = "Y" &
! RETURN UNLESS LEFT(CVT$TAT THIS FILE IS RIGHT &
! IF WILDCARDING, VERIFY THAT THIS FILE IS RIGHT &
3010
                     GOTO 3100 IF HIDE% &
UNLESS (UFD%(LINK%,6%) AND 8%) THEN &
PRINT "%File is not hidden" &
RETURN &
! GO ELSEWHERE IF WE ARE HIDING FILES &
! COMPLAIN IF WE WANT TO UNHIDE AN UNHIDDEN FILE &
3020
                     UFD%(LINK%,6%) = UFD%(LINK%,6%) AND -9% & PRINT UFD%; FILNAM%; " unhidden" UNLESS WILD% & RETURN & : ZERO THE 'HIDDEN' BIT &
3030
                      IF (UFD%(LINK%,6%) AND 8%) THEN & PRINT "%File is already hidden" & RETURN & FLOWN E WANT TO HIDE A HIDDEN FILE &
3100
                     UFD%(LINK%,6%) = UFD%(LINK%,6%) OR 8% & PRINT UFD%; FILNAM%; " hidden" UNLESS WILD% &
3110
                     RETURN & ! SET THE 'HIDDEN' BIT &
3120
                      ERR.FLAG% = 1% &
                 18000
                                  INITIALIZATION&
18100
                IN% = 0% & . ! SPECIFY INITIAL INPUT FROM THE CONSOLE &
                 ON ERROR GOTO 19000 & 
\ Y$ = SYS(CHR$(6%)+CHR$(-7%)) & 
! SET ERROR HOOK AND ENABLE CTRL/C TRAP &
18110
                 MY.PPN% = PEEK(PEEK(528%)+24%) &

\PRIV% = (PEEK(PEEK(520%)+2%) AND 1024%) <> 0% &

! GET OUR PPN &

! SEE IF WE ARE PERMANENTLY PRIVILEGED &
                     RETURN &
18130
19000
                                  ERROR RECOVERY&
                     IF ERR=28% THEN & CLOSE 2% & GOTO 32767 & : CLOSE UP SHOP (NEATLY) ON A CTRL/C &
19100
                    IF ERR=11% THEN &
RESUME 32767 IF ERL=1090% OR (ERL=1105% AND IN%=0%) &
RESUME 3120 IF ERL=3010% &
IF ERL=1105% THEN &
IN%=0% &
RESUME 1170 &
! HANDLE CTRL/Z ON INPUT: &
! DURING 'HIDE/UNHIDE' QUERY &
! DURING 'HIDE/UNHIDE' QUERY &
! DURING 'FILE' QUERY TO THE CONSOLE &
! DURING WILDCARD VERFICATION &
! IF INPUT FROM AN INDIRECT FILE, AND EOF FOUND, &
! RESET INPUT CHANNEL AND RESUME &
19200
                     IF ERR=5% AND ERL=2010% THEN &
PRINT "TNon-existant account - "; UFD% &
RESUME 2050 &
! PROBLEMS FINDING THIS UFD &
19400
                                  PRINT "JIVALIA" & PRINT "JIVALIA" | FILE.SPEC$ = "" &
                                  RESUME 1170 & ! PROBLEMS DURING THE FILE STRING SCAN &
19500
                     RESUME 23200 IF ERL=23100% & ! HANDLE PROBLEMS WITH INDIRECT COMMAND FILE &
                CLOSE 2% | PRINT "7Untrapped error - report to system manager" & PRINT CVTS$(RIGHT(SYS(CVT%$(1545%)+CHR$(ERR)),3%),4%); & "at line"; ERL & GOTO 32767 & "
19900
                                     OOPS... &
```



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```
20000
                                                          DEFINED FUNCTIONS&
                                   DEF* FNMATCH% & ! FUNCTION CHECKS FOR A MATCH IN FILENAMES &
21000
                             FNMATCH% = 0% & CHANGE RADS(P%(1%))+RADS(P%(2%))+RADS(P%(3%)) TO MATCH% & GOTO 21020 IF MATCH%(1%) <> FIL%(1%) IF FIL%(1%) & FOR I% = 1% TO 9% & CHANGE = 1% & CHANGE & CHANGE = 1% & CHANGE & C
21010
                                                           H8 = 18 &
! ASSUME THAT WE WILL FAIL &
! SEE IF WE ARE RIGHT &
! IF NOT, CHANGE OUR MIND AFTER THE FACT &
21020
                                   DEF* FNLINK%(L%,C%) = &
(((L% AND 3584%)/512%)*C% + &
(SWAP*(L% AND -4096%)/16%))*32% + &
((L% AND 496%)/16%) &
! FUNCTION DECODES LINK INFORMATION INTO A &
! SUBSCRIPT FOR OUR ARRAY &
 22000
23000
                                                          CHECK FOR AN INDIRECT FILE&
                                   RETURN UNLESS ASCII(FILE.SPEC$) = 64% & FILE.SPEC$ = RIGHT(FILE.SPEC$,2%) & OPEN FILE.SPEC$ FOR INPUT AS FILE 4%, MODE 8192% &
23100
                                                                SEQUENCE IS IMPORTANT IN CASE OF ERRORS: & MUST OPEN THE FILE BEFORE REASSIGNING IN% &
                                      PRINT "?Indirect file error - "; FNERR$(ERR) & ERR.FLAG% = -1% &
                                   RETURN & ! HANDLE ERRORS OPENING THE FILE &
                                    DEF* FNERRS(E%) = CVTS$(RIGHT(SYS(CVT%$(1545%)+CHR$(E%)),3%),4%) & ! RETURN RSTS ERROR TEXT FOR SPECIFIED MESSAGE &
24000
30000
                                                          CCL ENTRY POINT&
                                    WE ALLOW TWO CCL'S TO CALL US, 'HIDE' AND 'UNHIDE' &
30100
                                    GOSUB 18000 8
                                                      CVT$$(SYS(CHR$(7%)),188%) &
                                   GOTO 1000 UNLESS LEN(Y$) &

! GO GET INITIALIZED &

! GET CORE COMMON AND CLEAN IT UP &
                                    IF LEFT(YS,4%) = "HIDE" THEN &
HIDE% = -1% &
YS = RIGHT(YS,5%) &
GOTO 30300 &
! I LOOKS LIKE THE HIDE COMMAND, CLEAN THINGS UP &
! AND LET'S CHECK &
 30110
                                    IF LEFT(Y$,6%) = "UNHIDE" THEN &
HIDE% = 0% &
Y$ = RIGHT(Y$,7%) &
GOTO 30300 &
! IT LOOKS LIKE THE UNHIDE COMMAND. CLEAN THINGS UP &
! AND LET'S CHECK &
 30120
                              PRINT "?Invalid CCL entry" & \ GOTO 32767 & . ! WHAT DID HE SAY? &
 30130
                               GOTO 1100 UNLESS LEN(Y$) & 

\GOTO 30130 IF ASCII(Y$) <> 32% & 

! TREAT AS (ALMOST) NORMAL ENTRY IF NO FILESPEC & 

! BAD CCL COMMAND ALMOST FOOLED US &
 30300
                                      FILE.SPEC$ = RIGHT(Y$,2%) & CCL% = -1% &
  30310
                                      CCL% = -1% &
GOSUB 23000 &
                                     GOTO 32767 IF ERR.FLAG% & GOTO 1110 UNLESS IN% & GOTO 1100 &
                                                                00 & THIS IS A VALID CCL ENTRY, FLAG IT AS SUCH. (MAKE SURE & THAT WE REMOVE THAT LEADING BLANK). THEN: & CHECK FOR AN INDIRECT COMMAND FILE SPECIFICATION & PROCEED NORMALLY IF NONE, ELSE & JUMP INTO THE RIGHT SPOT &
  32767
                                       END
```

Appendix B

Listing all Hidden Files For Backup Purposes

The method presented here is very simple, very short, and very crude. It is provided in this form due to a lack of time and space. The release of a very fast and efficient system cataloging program is planned for the near future.

Since none of the standard backup packages recognize the existence of hidden files, some other means of keeping track of them is required. The best way is to have some routine that can create an indirect command file recognizable by the HIDE program that contains all of the currently hidden filenames. Naturally, care should be taken to assure that this file does not get released to the user public.

After the two patches are made to \$DIRECT, a hidden file is flagged by having a minus sign ('-') appended to its name. This procedure simply creates a complete directory of the system and then runs a program that looks for the minus sign. Presented here is a sample BATCH control file, and the program that scans for the minus sign.

Following is a sample BATCH control file. Note that this example is set up to process two disks, one with a logical name of 'SYS:' and the other known as 'AUX:'. All output is directed to the 'AUX:' device. Make changes as appropriate to your system.

```
$JOB/CCL/NOLIMIT/ERROR:WARNING
RUN $PIP
AUX:SYSLST.DIR/DE/WO:NOWARN
AUX:AUXLST.DIR/DE/WO:NOWARN
SEOD
RUN $DIRECT
AUX:SYSLST.DIR=SYS:(*,*)
AUX:AUXLST.DIR=AUX: (*,*)
$EOD
RUN HIDDEN
AUX:SYSLST.DIR
RUN HIDDEN
AUX: AUXLST. DIR
RUN $PIP
AUX:SYSLST.DIR/WO
AUX: AUXLST. DIR/WO
$EOD
$EOJ
```

The following is a simple program to process the directory listing. It creates a file that can be supplied to HIDE as an indirect command file.

```
EXTEND PRINT "Input directory listing file"; &
10
100
                        PRINT "Input directory listing file"; &
INPUT LINE A$ &
OPEN A$ FOR INPUT AS FILE 2%, MODE 8192%
DFLT$ = CVT$$(DATE$(0%),32%) &
DFLT$ = MID(DFLT$,1%,2%) + MID(DFLT$,4%,3%) + ".HID" &
Print "Output command file to create <"; DFLT$; "> ";
INPUT LINE B$ &
B$ = CVT$$(B$,39%) &
B$ = DFLT$ UNLESS LEN(B$) &
OPEN B$+"<188>" AS FILE 4%, MODE 2%
ON ERROR GOTO 19000
110
                        OPEN BS+"<188>" AS FILE 4
ON ERROR GOTO 19000
WHILE 1% &
INPUT LINE #2%, INS &
INS = CVTS$(IN$, 4%) &
X% = INSTR(1%, IN$,"[") &
120
200
                     \ X% = INSTR(1:
\ IF X% THEN &
                         X% = X% - 1% UNTIL X% = 1% OR MID(IN$,X%,1%) = " " & X% = X% + 1% IF MID(IN$,X%,1%) = " " & PPN$ = MID(IN$,X%,1%,1%,1%,1") - X%+1%)

GOSUB 500 IF MID(IN$,X%,11%,1%) = "-" &
210
                     \ NEXT
                           CLOSE 2%, 4% &
300
                         PRINT &
PRINT "Total of"; CNT%; "hidden files" &
                        PRINT #4% &
LAST.PPN$ THEN &
PRINT #4% &
LAST.PPN$ = PPN$
PRINT #4%, PPN$, LEFT(IN$,10%) &
RETURN
IF POT
500
510
                           IF ERR=11% THEN &
19000
                                          RESUME 300 IF ERL=200% & RESUME 32767
                          ON ERROR GOTO
19999
32767
                           END
```

** End of Document **

The RSTS/E System Manager

By Jeffrey R. Harrow, 485 Creekview Dr., Stone Mountain, GA 30083

Welcome to another issue of the RSTS/E Pro. Let's begin this month by talking about some SPR responses:

In an earlier issue I pointed out that Datatrieve's error messages did not contain the "%" or "?" initial character utilized by the RSTS/E BATCH and ATPK processors. This omission is causing undetermined results while your control file continues processing after a DTR error has occurred.

DEC indicated that:

"Datatrieve-11 is a layered product that is available on six (6) different operating systems. The same message is used by all. Therefore, it is not appropriate that operating system specific things be included . . ."

Now considering what we pay for these layered products, purchased specifically for a given operating system, I continue to feel that whatever operating system dependent modifications are required should well be made. How do you feel about this? Send some letters for publication and perhaps we can get DEC's attention.

In any event, I was provided with a site-by-site work-around: \cdot

The DTR message file (LB:QUERY.MSG) is an RMS Indexed file and can be modified as you see fit (of course there are a LOT of messages in there and you will have to determine the severity of the event which causes each message and prepend the appropriate "%" or "?" characters).

The record definition follows:

01 MESSAGE.

O3 MESSAGE-NUMBER PIC 9(4); USAGE COMP; EDIT-STRING IS -(5)9.

03 MODULE PIC IS X(4).

03 SUBROUTINE PIC X(6).

03 TYPE PIC X.

03 TEXT PIC X(60).;

Have fun.

EDT Version 2, when put into "C"hange (keypad) mode, sets a VT100 terminal to ANSI mode. When EDT exits, it does not return the terminal to VT52 mode if that is how it was originally set.

A large body of older software (including TECO's VTEDIT and several Word Processing Products) assume a terminal in VT52 mode. Now, DEC is advising:

"...The VT100 was not intended to be used in VT52 compatibility mode except to replace VT52s."

"...suggest that he leave the VT100s in native mode, and place some code at the front of his programs that detects the presence of a VT100 and switches it to VT52 mode."

Well, that's one way to take care of the problem if you have the source code (or a hook) for the program. Of course there are many programs puchased from another vendors where this is not the case. Most of us operate in a mixed environment. [See "Tips & Techniques", page 60.]

As no recommended "standard" for dealing with these bi-modal terminals has been set up, consider the following:

It is really quite simple for any program which intends to utilize the new "ANSI" functionality of a VT 100 to, during program initiation, query the terminal and remember what type it actually is, then change the terminal to ANSI mode if it is a VT100, and just prior to termination, change the terminal back to VT52 mode if that was its original configuration.

This methodology would allow users with "older" unchangable software to leave their terminal in VT52 mode, and will allow newer software, with very little additional overhead, to use the newer VT100 features. Remember, a philosophy which attempts to consider the **global** picture, rather than a picture selective to a given program, will help prevent incompatibility and its attendant problems at a later time.

The NFT (DECnet Network File Transfer Utility) documentation indicates that the "/BL" (Block mode) switch must be used for non-ASCII files without recorded "attributes" and indicates, as an example, files with .OBJ extensions.

Well, it turns out that MAC (the RSX assembler under RSTS/E) turns out .OBJ files **with** attributes. DEC's response is:

"What it (the documentation) should further state is that it should NOT be used for files with record attributes (ie. MAC .OBJ files). The problem is that those utilities which rely on the record attributes to indicate the correct EOF pointer with a variable or Fixed length file get confused when you transfer a file that has attributes with the "/BL" switch. Those utilities (like RT11's MACRO.SAV) which don't use record attributes rely on the binary data alone to give it the EOF pointer, and must be copied with the "/BL" switch to preserve the binary data block for block. The proper way to transfer .OBJ files is to use the "/BL" switch only with unattributed files."

RSTSPROFESSIONALRSTSPROFESSIONA

A problem has been identified where a program which has opened an RMS Relative or Indexed file and has CTRL/C Trapping (FIP Syscall -7) enabled will, once a CTRL/C is typed, stop all output (as in CTRL/O mode), even across program CHAINs, until the next INPUT statement is executed (and then you only get the "?" prompt).

The TSC was able to reproduce this, but was unable to provide me with a workaround. I've submitted an SPR and will keep you informed.

I'd like to bring to your attention **The BASIC Primer**. This is a Computer Managed Instruction (CMI) course from DEC which includes various books and workbooks plus a set of programs, written in BASIC, which create, administer,

and record results of tests for the modules in the course.

The concept of CMI is **great**, but this software package presents a **very serious** problem:

The installation procedures for the software indicate that the main body of the programs go into a single "CMI" account. You then put a copy of the parameter file (indicating, among other things, the account and name of the program to be run) and a copy of the initial program to be run into each account from where students will access the CMI package.

The student then runs the CMI program in his account which reads the parameter file in his account, determines where it must CHAIN to, and does the CHAIN.

Now for the fun . . . If the programs in the central CMI account are NOT given Temporary Priv., all of the files from where the tests are created and the student record files MUST BE GIVEN A PROTECTION CODE OF FORTY AND ZERO (respectively) to allow users across the system the necessary read and write access. This means that anyone on the system can peruse the test files, can peruse his (or others!) progress in the records files, and can change information in these files if he is so inclined! Needless to say prudence, if not the Privacy Act requirements, make this undesirable.

Well, perhaps we can, as indicated (in general terms) in the installation manual, give the programs a <232> Protection Code including Temporary Priv. Consider this: The user now has

a program in his account with Temp. Priv. which reads a filename within a file in his account and then CHAINs to it. Your user can then modify the program name in the parameter file in his account and execute ANY program on the system, and retain the Temporary Priv. attribute! In effect, the entire security of your system is compromised!!!!!

When I pointed this out to Pete McVey of DEC's Educational Service Product Line (the source of this package) he indicated that they "...totally agree with your technical assessment of the condition of the software...", that "...it was not intended to run on a secure system..." and that they have no intention of changing it at this time.

... continued on page 92



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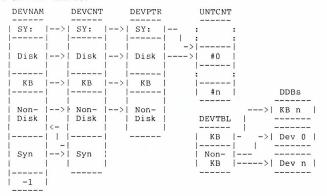
RSTS/E MONITOR INTERNALS, Part 3

. . . continued from page 47

4.2 LOGICAL DEVICE TABLES

Verifying device names and unit numbers and associating these logical names with physical device DDBs when a device is opened is performed using a series of related tables. The entries in each table are ordered so that once an entry is found in one table the associated information in the other tables will be found at the same offset.

The following figure shows the relationship between the device tables:



4.2.1 DEVNAM — Device Name Table

The device name table (DEVNAM) contains an entry for every disk type supported by RSTS and an entry for every other device generated into this system. It also contains a list of synonyms for physical device names, such as MT: for

All of the entries in DEVNAM consist of a pair of ASCII characters stored in a word. Each disk name and the name of each configured device is included. DEVNAM has the

following format:						
Offset -2	Symbol	Description This word always contains the ASCII value for "SY". It is used for specifying the system disk structure, SY:. It is at an offset of -2 to show that it is not a normal device.				
0-16	DEVNAM	These nine words contain the names of all the disks supported by RSTS in the order: DC, DF, DS, DK, DL, DM, DP, DR, DB. All disk names are included, even if the device is not configured in this system.				
18	DEVNKB	This word contains the device name "KB" and corresponds to all keyboard type devices, including pseudo-keyboards.				
20		This word contains the device name "NL", the null device.				
22		The device names for all remaining devices configured in this system begin at this word.				
+ n	DEVSYN	Beginning at this word is a list of synonyms for the devices configured in this system. These synonyms are: $TT = KB$, $CR = CD$, $MT = MM$, $MT = MS$, $DX = DY$.				

the table.

This word contains a -1 to show the end of

+n+m

4.2.2 DEVCNT — Device Unit Count Table

The device unit count table (DEVCNT) contains one entry for each entry in DEVNAM (except the terminating -1). Each entry is the maximum unit number for the corresponding device in DEVNAM. A maximum unit number of -1 indicates that the associated disk device is not configured in this system.

DEVCNT has the following format:

Offset -2	Symbol	Description This word contains a 0 to specify that SYO: is the only explicit unit number allowed for SY:.
0	DEVCNT	The nine words starting here correspond to the maximum unit number for each corresponding disk type in DEVNAM. A value of -1 indicates that the corresponding disk type does not exist on this system.
18		This word contains the maximum unit number for KB type devices, including pseudo-keyboards.
20		This word always contains a 0 to specify that only unit 0 may be specified for NL:.
22		Each following word corresponds to the maximum unit number for the corresponding device in DEVNAM.
+ n		Each word beginning at an offset equivalent to DEVSYN is a pointer to the appropriate physical name in DEVNAM for that synonym.

4.2.3 DEVPTR — Device Information Pointer Table

The device information pointer table (DEVPTR) contains pointers into one of two other tables. In the case of disk devices DEVPTR points into the disk unit status table. UNTCNT. For non-disk devices DEVPTR points into the device retrieval table, DEVTBL.

In both cases the entry pointed to is the information for unit zero of the associated device. If more than one unit is present for a device, the entries for the additional units immediately follow the unit 0 entry. See section 4.2.4 and 4.2.5 for more information on UNTCNT and DEVTBL.

DEVPTR has the following format:							
Offset -2	Symbol	Description This word contains a pointer to the entry in UNTCNT corresponding to SYO:, the device from which RSTS was bootstrapped.					
0	DEVPTR	The nine words beginning here contain pointers to the entries in UNTCNT for unit 0 of the corresponding disk type. If a disk type does not exist on this system its pointer is to the entry in UNTCNT for the next valid disk type. If no following disk types are valid this word points to a dummy entry at the end of UNTCNT.					
18		The words beginning here contain pointers to the entries in DEVTBL for unit 0 of each non-disk device in DEVNAM.					

4.2.4 UNTCNT — Disk Unit Status Table

The disk unit status table (UNTCNT) contains information about each disk unit configured in this system. There is one word for each disk type and unit. These words are ordered by disk type in the same order as the disk names in DEVNAM and, within disk type, by unit number. Each word contains the status and current open count for the corresponding disk unit.

The last entry in the table is followed by a word containing 177001(octal), which denotes a non-mounted disk which cannot be mounted. This is used for proper termination of DEVPTR entries for non-existent disk types (see section 4.2.3).

Each word of UNTCNT has the following format:

Bit 0-8	Symbol UC.CNT	Description Count of currently open files.
9	UC.TOP	Order the directory with new files first.
10	UC.WLO	The disk is mounted read only.
11	UC.DLW	Update access date with date last written.
12	UC.NFS	Non-file structured processing is currently occurring.
13	UC.LCK	Don't allow non- privileged opens on this disk.
14	UC.PRI	This disk has a private pack mounted.
15	UC.MNT	

4.2.5 DEVTBL — Device Retrieval Table

The device retrieval table (DEVTBL) contains a pointer to the DDB for each unit of each non-disk device on the system. The entries are ordered in the same order as DEVNAM. The pointers for each device with more than one unit are stored in sequential memory locations, beginning with the pointer

DEVTBL has the following format:

Offset Symbol Description DEVTBL The words beginning here are the pointers to the DDBs for the each terminal device and pseudo-keyboard unit, beginning with unit 0.

DEVTBE The words beginning here are the pointers to the DDBs for each unit of the nonterminal devices, beginning with NLO:.

4.2.6 Examples of Device Table Use

The following examples show how to access the information in the device tables from BASIC-PLUS:

- DEVNAM%=SWAP%(CVT\$%(MID(SYS(CHR\$(6%)+CHR\$(-12%)),5%,2%)))
- | IGet address of DEVNAM table |
 | DEVOKB%=SWAP%(CVT%%(MID(SYS(CHR\$(6%)+CHR\$(-12%)),9%,2%))) |
 | IGet offset to first non-disk device in DEVNAM

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- DEVCNT%=SWAP%(CVT\$%(MID(SYS(CHR\$(6%)+CHR\$(-3%)),5%,2%)))
 DEVCNT.KB%=PEEK(PEEK(DEVCNT%+DEVOKB%))

 !Get maximum unit number allowed for KB devices
 DEVPTR%=SWAP%(CVT\$%(MID(SYS(CHR\$(6%)+CHR\$(-3%)),7%,2%)))
- !Get address of DEVPTR table DDBPTR.KB2%=PEEK(PEEK(DEVPTR%+DEV0KB%)+4%)
 - !Get pointer to DDB for KB2:. Note: DDB pointer !for KB2: is at entry in DEVTBL pointed to by KB !entry in DEVTR offset by 2 times the unit number. DKO.MOUNTED%=PEEK(PEEK(DEVPTR%+6%)) >= 0%
- !Determine if DKO: is currently mounted. Return !TRUE if mounted.

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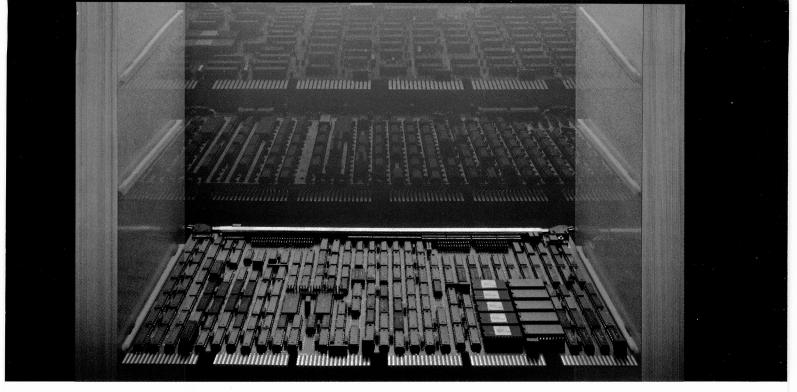
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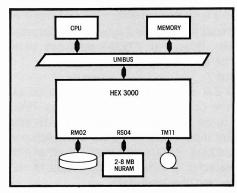
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With this issue we are pleased to present our Editor, David Spencer. David will be writing a series of articles on Editors for RSTS and other operating systems.

VTEDIT.TEC: EDT V2.0 Emulated With TECO

By David Spencer, Infinity Software Corporation

We heavy users of TECO and VTEDIT were both elated and deflated with the arrival of the new EDT version 2.0 (also known as ED2). The speed and capabilities of EDT as a screen editor made it far too attractive to pass up. Unfortunately, the keypad layout of EDT is quite different from the layout of VTEDIT. This would normally cause no problems if VTEDIT was orphaned.

However, TECO has unique editing qualities that EDT can't even come close to emulating in its current implementation. And occasionally returning to VTEDIT to perform some editing would give me a strong case of vertigo.

A Proposed Solution

I have written a new VTEDIT macro to emulate the standard EDT. True, all the EDT keys could be redefined to emulate VTEDIT instead. But that is a short-sighted solution. By knowing the EDT keypad layout, one can move to other operating systems and still be able to instantly use the standard editor on that system; EDT.

Intent of the Rewrite

My intent in rewriting VTEDIT was not to replace EDT, but to allow users of EDT and TECO to smoothly move between the two, with heavier emphasis on use of EDT.

I have attempted to incorporate all of the EDT keypad commands. I have, as well, also tried to mix in some of the more useful VTEDIT keys. As a result, all of the EDT tab level keys have been left in the cold, and quite a few VTEDIT commands have been left out as well.

The VTEDIT described in this acticle is a completely new program, and is similar to the original VTEDIT in name only. However, a deep debt of gratitude is due to the developers of the first VTEDIT. Without their code to examine, my development in TECO would not hardly be as great.

Limitations

The VTEDIT described operates ONLY on VT100 type terminals. This was a conscious decision. The VT52 is old technology, which, by the way I understand DEC no longer manufactures. At the risk of hurting some users, I chose to simplify the task of writing VTEDIT and supported only the VT100. (However, a VT52 only version would be fairly easy.)

Keys That Operate Differently

This is a list of keys that operate differently between the two editors.

1. Delete key

Delete in ED2 deletes single characters at a time. When used in a GOLD-arg format, delete is used for editing the numeric amount. VTEDIT accepts an argument to the delete key for multiple character deletes.

2. Right and Left arrows

EDT version 2.0 properly maintains the current position in the line. The VTEDIT macro arrow keys sometimes lose the correct position in the line when encountering tabs. The current implementation has a quick routine that could be improved. The trade-off is, of course, the extra overhead required to handle these special cases.

3. GOLD PF3

The GOLD-PF3 key in both ED2 and VTEDIT allow entry of a search string. In addition, VTEDIT allows editing of the previous search string as in the DEC supplied version of VTEDIT. VTEDIT supports direction changing in search with the keypad "4" and "5" keys. The new VTEDIT, however, will not terminate a search argument on an arrow key, or one of the four "PF" keys.

4. Keypad 6

In the standard version of ED2, the Keypad-6 key is used to cut a selected region to the PASTE buffer. VTEDIT cuts the selected region to a named register. To use this command, select a region. Next, hit the Keypad-6 key, and then the single letter name of your Q-register. Note VTEDIT does not prevent cutting to the Q-register "I", which houses the VTEDIT macro.

5. GOLD keypad 6

In ED2, this combination pastes the "PASTE" buffer into the current position in the MAIN buffer VTEDIT operates in the same fashion, but requires the single character register name. This character does not echo. Note that VTEDIT does not allow pasting of the special registers "*" and "—".

6. GOLD Keypad 7

EDT version 2.0 allows EDT commands to be executed via the GOLD-7 key. VTEDIT allows TECO commands to be entered and executed with this key. Note that input must be terminated with one of the keypad keys. Escape also does not echo until a second character is entered. This is due to the keypad character checking code.

7. GOLD Keypad 8

In ED2, the GOLD-8 key is used for filling regions of text to a given margin. Because of the complexity involved, the VTEDIT macro does not implement this function. Instead, a page (in TECO, "P") command replaces this key.

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- 8. GOLD Keypad Enter The GOLD-Keypad-Enter key is used for replace of selected region with the paste buffer in ED2. VTEDIT uses the Q-register "P" as the replace buffer, but does not assign it. In order to load the replace buffer, use one of the register loading commands on register "P".
- 9. CTRL/Z The CTRL/Z key in ED2 returns to line editing mode. CTRL/Z in VTEDIT returns to normal TECO editing.
- 10. Word delimiters In ED2, the standard word delimiter set is space, carriage-return, and formfeed. VTEDIT uses the old delimiter set of space, tab, comma, carriage-return, and line-feed.
- 11. Entering Numeric Arguments EDT has a twenty-two line window with the bottom two lines used for the display of numeric arguments, search strings, and EDT commands. This is a fairly efficient arrangement. VTEDIT follows the old convention of not echoing entered numeric arguments. The advantage is no screen update at all is required. The disadvantage is the argument cannot be edited or even be seen on the screen.
- 12. Entering TECO Commands / Search Arguments EDT uses the bottom two lines for entering search strings and commands. VTEDIT utilizes the old convention of clearing the top two lines on the screen to enter the text, and then having to refresh those lines when finished. The routine that does this is not as glorious as the one in the original VTEDIT, but it does get the job done.

Changed Keys

This is a list of redefined EDT keys in VTEDIT.



CIRCLE 51 ON READER CARD

1. CTRL/A

The EDT CTRL/Z has been redefined to the old VTEDIT CTRL/A that appends from the open file to the text buffer.

CTRL/D

This key has been redefined in VTEDIT to be a synonym for GOLD-Keypad-2.

3. CTRL/E

CTRL/E is used to execute a register. After entering CTRL/E, type the one character name of the register to execute. Note that if a numeric argument is used, it will be used for iteration and

not passed to the macro.

- 4. CTRL/K This key is a synonym of Keypad-6.
- 5. CTRL/T This EDT CTRL/T key is not defined in VTEDIT.
- 6. Undefined Control Keys EDT version two ignores control keys that are not defined to perform any function. VTEDIT inserts any unknown control key into the buffer.

New keys

This is a list of keys not defined in ED2.

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CIRCLE 52 ON READER CARD

1. CTRL/Y

This key operates very much like the old VTEDIT CTRL/Y yank.

2. GOLD CTRL/Z

The GOLD-CTRL/Z key will close the file being edited and exit TECO to the monitor. This used to be <esc> CTRL/Z in the old VTEDIT.

3. GOLD Q

Use this combination to abort the current edit and exit TECO. This is equivalent to the old VTEDIT < esc> — CTRL/Z.

4. CTRL\

Type CTRL \setminus (Control-backslash) and VTEDIT will insert the ASCII value of next character typed. This operates the same as the old VTEDIT.

5. GOLD ARROW ±

Using this combination will move upward a screen. This operates like the old VTEDIT.

6. GOLD ARROW v

Using this combination will move downward a screen (a screen is 24 lines). This operates like the old version of VTEDIT.

AUTHORS!!!

I have provided the new VTEDIT macro in a "run"able source program form. I realize that everybody is going to want to stick in some extra feature. So, it is left as an exercise to the student to squish VTEDIT down to a smaller size. (The source program runs in 10K, and can be cut down to at least 7K, and perhaps 6.) Infinity Software Corporation makes no guarantee for the performance of VTEDIT.TEC, nor takes any responsibility for the use of VTEDIT.TEC. However, inquiries, suggestions, bugs, or whatever can be sent to:

David Spencer
Infinity Software Corporation
2210 Wilshire Blvd Suite 801
Santa Monica, California 90403
(213) 820-2702

Send your articles of interest to the RSTS community to the *RSTS Professional* on mag tape in either RNO, PIP or WORD-11 format. Eighty percent of this issue was transmitted via tele-communications from author's mag tapes to phototypesetting equipment and was not retyped.

THE RSTS/E SYSTEM MANAGER

... continued from page 85

In my opinion it's one thing to unintentionally put out a product which has a minor problem in its operation and, perhaps, choose not to fix it. It is quite another thing to sell a product **specifically to run under RSTS/E** (see the label on the distribution tape . . . it **says** RSTS/E) and either leave sensitive files open to examination and modification or, far worse, **compromise the security of the system and then**, after being advised of the problem, **choose not to do anything about it!**

Come on, DEC! If you truly didn't intend for this to run on a secure system, yet you sell it for what is highly touted as a secure, multi-user system (see your publication "RSTS/E Technical Summary", pages 6-1 and 6-2), it should be so stated, with appropriate details, so this can be determined by the potential buyer prior to purchase!

Let me close for this month with a warning. I've been working for several weeks with S.E. Regional and Corporate DEC engineers on a problem with my TU77 tape drives connected to PDP-11/70s.

Although we do not yet know why, we have determined that, under as yet unknown circumstances which are greatly increased when the capstan ramp-up speed is set to factory specs, the drive is writing corrupt data onto the tapes and is *NOT* flagging an error condition!

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More information next month.

See you then.

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To Betsy, Dick, Gerry, Greg, Kathy, Joe, Judy, Pat, Rick, Rod & Tom. Thanks for the educational intellectual and emotional impact in Winona, 1981. Hope to see you all in Bermuda, 1982. (Names sorted using Macro 11 subroutine.) Les.

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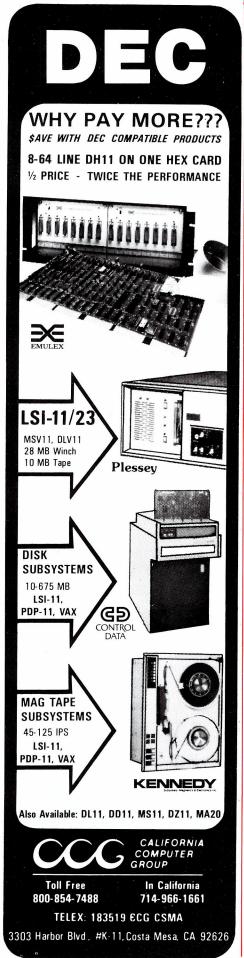
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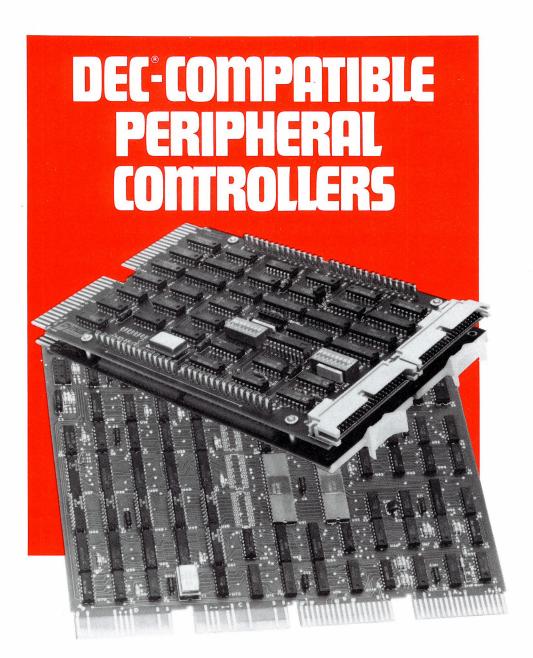
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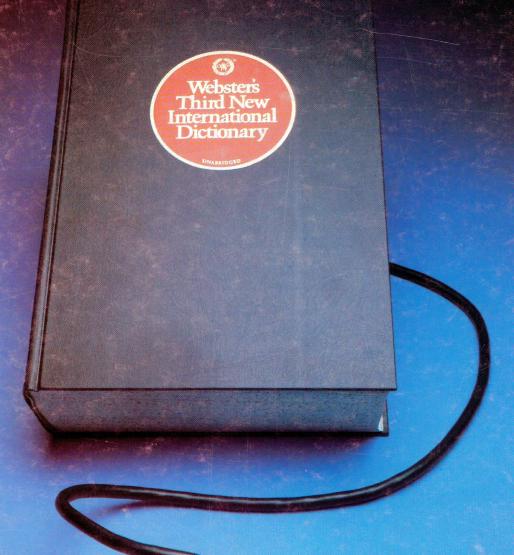


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