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If you want it you have to ask for it
Carl B. Marbach

I have recently returned from the Australia DECUS meetings held during July in Melbourne, Victoria. Our RSTS friends 'down under' are some of the most friendly, fine people I have been privileged to meet during my years of RSTS involvement. Next year's symposium chairman Chris Brett was a terrific host and we were proud to be able to participate with them at their meeting. For the sightseers in the group we hope to have some pictures and a full report in the next issue.

I have now attended DECUS symposia in Canada, Britain, and Australia as well as the U.S. and I thought I would share with you one major difference between the U.S. and other countries which I think we can address. One of the valuable sessions I attended in Melbourne was titled 'non-DEC Software Packages for RSTS/E.' This session, given by users, gave no prices but did discuss what the package did, how well it did it, how easy it was to use, what kind of documentation was there and a users' overall evaluation of the product. Some of the products discussed included BACKUP packages, WORD PROCESSING packages, SORT utilities, SEARCH and SELECT packages and others. Each was discussed frankly, openly and by more than one person; every one of us in the room learned something about how to make our systems run and work better. Isn't that what we were there for?

The closest the U.S. chapter has come to this type of discussion is with a 'birds of a feather' session where we once discussed a Word Processing system among users of that system. Have you ever tried to schedule a 'birds of a feather session'? Hard to do within the time constraints of a jam-packed five day DECUS symposium. Clearly, the U.S. chapter needs to move more towards serving the user directly with practical knowledge he can take home with him. A RSTS site around the corner from here doesn't send someone to DECUS (well, once they did) and I am sure their reasoning is that it doesn't make economic sense to the company. Most DECUS symposia fees are paid by companies and they have a right to expect something in return. If we don't give it to them then won't come. Did you know that attendance was DOWN at the Atlanta meeting? I would suggest that one way to increase attendance is to make it more valuable for attendees and their companies.

I have been told that if the SIG (RSTS in this case) wants to do something, they can do it if it doesn't violate any DECUS rules. Well if it doesn't violate them in Australia it doesn't violate them in the U.S. (even if water does go down the drain counterclockwise). Would you like to have a session where users present their experience with non-DEC packages? Here's a deal: Write me a postcard (preferred) or a short note saying so and I'll fight a battle (if necessary) with the DECUS powers to make it happen. Send it to: Carl Marbach, non-DEC packages, Box 361, Fort Washington, PA 19034-0361. If you want it, we'll fight for you. Let there be no mistake: We want a non-DEC package seminar at the St. Louis spring DECUS meetings, I offer to chair the session and have at least ten packages presented by users. And remember: YOU asked for it!

"It was seven years ago today Sergeant Pepper taught the band to play . . . (sic)"

Dave Mallery

Seven years ago today, I was in Maynard, taking the RSTS series. I remember long afternoons in the lab getting that first record-ido program to work . . . finally understanding the difference between LET and LSET. I remember being shown a real live 11/70 there in the field service training area.

That was a great time for me. I was fresh from nine years of DP experience, first three years of RCA (remember the S01??(72-43-61)), then the balance in Big Blue, mostly assembly and communications, then a stint running a service bureau with a system-3/10, then back to mainframes with a 135 running DOS/VS and CICS. The transition from IBM to DEC was a radical change. It's hard to imagine two more totally different philosophies within the same industry. They certainly yield wildly different machines. Isn't it interesting how the 135's and 3/10's are all gone today, but the 11/70's from pre-1975 are still going strong?

My 70 had to go down last night because of a power glitch. It had been up for fifty days. Other than tape and printer problems, we were down a year ago with a disk problem. I can't remember when the processor went down last . . . probably about four years ago.

All the programs I wrote in the fall of 1975 are still operational, still in BASIC +. They have been through years of pruning and changing, and will probably be still functioning seven years from now on micro-J11 equipped desktop machines. They, basically, don't go down.

I still write code. I write it in BASIC +. I have learned a great deal about structured code in seven years (it didn't exist then) . . . I must say that I write much better code today than in 1975. I hope I can say the same in 1989.

Hey Carl, what about that Sabbatical???
BEFORE you add memory (or anything else) to increase system performance

You should add DOPTER!

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- Places the most used files at the front of the UFD's.
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CIRCLE 108 ON READER CARD
Dear Sir of Madam,

The implications raised by the Systems Manager for the RSTS System at the Baptist Memorial Hospital raise some interesting legal points.

There is an enormous installed base dependent upon RSTS and the PDP-11 System. It has become obvious over the last several years that the VAX family is receiving improved system support and that several new applications developed upon the VAX can be ported to other systems. However, the DEC has made this decision another marketing effort perhaps even more catastrophic than its ill-fated word processing efforts, WPS-100/102/200/202. If such is the case, market forces will soon demonstrate to DEC the error of their ways as it did in the case of the early DEC word processors.

What is most significant to me as an attorney and RSTS-dependent professional is that perhaps DEC has adopted as a corporate policy the method of planning system obsolescence and lack of software portability characteristic of certain other competitors in the field. If this is the case, then we, as DEC users committed to RSTS and the PDP-11 family, have a legitimate complaint and what the law refers to as a cause of action. Any legal action should be directed against DEC management and compel them to recognize their fiduciary obligations and responsibility toward the installed user base for their major systems. As DEC advertised, promoted, marketed, and sold, so they are responsible to the users who committed their business operations to those systems. Only a corporate catastrophe on the order of reorganization under the Bankruptcy Act should limit the responsibility of a Fortune 500 company toward its customer’s investment. This is even more the case where the company is primarily a hardware vendor rather than a company promoting software applications.

Once before DEC demonstrated similar cavalier disregard for its user base when it brought forth the PDP-11 system family. Our firm was one of those so unfortunate to have committed to the PDP-8 on the advice of DEC corporate management who assured us that legal systems applications did not require the investment in a PDP-11 system, and that two years later when the PDP-8 system proved totally inadequate and its promised upgrades were never brought to market, we were left to rebuild our firm’s data processing/word processing/data base management system with a used PDP-11/34 because DEC could not deliver 11/44 systems at the time we needed them.

We considered litigation at that time, but felt that we were an isolated case and that DEC, unlike IBM, had a corporate policy of user support and loyalty to its installed data base that would render it essentially immune from legal challenge. At this time, we are no longer so certain of these beliefs and are giving serious thought to raising the question in the Courts by way of a class action on behalf of all those users so unfortunate as to be similarly situated. Such an action would seek a declaratory judgment imposing upon DEC the duty to direct its systems evolution toward the defined needs of its established user base before diverting substantial corporate resources toward speculative ventures of limited utility and questionable market value. As a representative of stockholders in the company as well as a user myself, I believe that such an action has merit unless a rational explanation is forthcoming from corporate management at DEC.

The value of RSTS and the PDP-11 family is evidenced throughout the Department of Defense, other agencies of government, hospitals such as Baptist Memorial Hospital, and of most concern to me in the arena of litigation in the rather unequal struggle between two and half million essentially destitute Viet Nam combat veterans with a PDP-11/34 operating under RSTS E against six of the largest multinational conglomerate corporations in the chemical industry and all of their data processing resources in the Agent Orange litigation.

We would be interested in hearing the comments of other PDP-11 family users running RSTS and concerned about the corporate commitment of Digital Equipment Corporation to its installed data base. Very truly yours,

YANNACONE & YANNACONE, P.C.
Victor John Yannacone, Jr.

Thought you might find this interesting. It’s about the "NONAME-est" NONAME state I’ve ever seen. It was produced by executing a ‘CHAIN’ in BASIC-PLUS to - NL.

Questions:

a. Any way to get to EDIT to simulate TECO’s /72 and /B+ switches?

b. Will future releases of CSPCOM be compatible with the patches, etc. mentioned in the article ‘Getting The Most Out of CSPCOM/RSTS Pro., V.3, #1, Sept. 1981’ you printed a while back?

Thanks.

K. Wallewein, Programmer Analyst
ATCO Ltd., Calgary Alberta

Our Editor Columnist, David Spencer, answers your first question: Hold onto TECO because EDIT will not do that for you automatically, nor does there seem to be a way of writing a macro to do it.

b. The use of CSPCOM for non cousins is not supported. We believe that it will continue to be functional in new releases, and if we are lucky enough to have someone send us new (if necessary) patches, we will be able to keep ‘Getting the Most Out of CSPCOM’. Ed.

Might I suggest inclusion, every year or so, of an index based on all articles which have appeared in RSTS PROFESSIONAL up to date.

There is so much valuable information in your magazine that it tends to get a little frustrating when one can recall seeing an article on a particular topic, but cannot remember the issue or the heading page under which it appeared.

E. N. Lynskey, Systems Manager
CBL Wellington, Ltd., Wellington, New Zealand

No sooner said than done, see RSTS Professional Cumulative Index, by Greg Justice, on page 52 of this issue.

The following macros, included in our standard initialiser file (STECO.INI), loaded automatically if no user TECO.INI is available) may be helpful additions to the Erskine set (RSTS Pro., V.4, #3, June 1982, p.84).

M. T. Cumberbatch

Regarding LOGOUT’s deletion of .TMP files (August 1982, V.4, #4, Dear RSTS Man, p.36), Mr. (Ms?) Man’s answer neglected one consideration. LOGOUT will delete "???* + NUMIS(job- num)+*.TMP". Having chosen the format XXX**.TMP as a reasonable file name convention for some temporary files manipulated in several of our application packages, we discovered these files were ‘mysteriously’ disappearing. After sufficient finger-pointing and ‘you deleted them’ accusations aimed at our users (guilty until proven innocent), we suspended RSTS.

Sure enough, part of a successful LOGOUT includes housekeeping deletion of all files in the current account named ???* (your current job number); two positions; leading zero last.TMP. Useful when you know it.

Bob Dudley, President
Marianne Automated Solutions, St. Louis, Mo.

Since "??* is ambiguous in common usage (ours, not RSTS’s), strictly speaking the deletion is C0*+*0**.TMP in RT11’s wild card format; i.e. the job number must (!) occupy positions 5 and 6 of the filename or the file will not be deleted. Wouldn’t it be nice if RSTS understood RT11’s wildcard * and % conventions?

I must respond to Michael Kaplitz’s article on ‘The RSTS/E Environment’ (RSTS Pro., April 1982, V.4, #2, p.74).

The 31KW limitation is INDEED caused by a sign problem — The monitor maintains two locations: MAXLOW and MAXHI which contain respectively the highest location used by the user in the low-core PLUS one; and the LOWEST location used by the jobs RTS, with a 0 designating the NULL rts. RSTS core management routines and user mapping routines use the comparisons:

CMP MAXHI, MAXLOW
CMP Addr. MAXLOW

BHS . . . BLO . . . .

To determine the legality of the users low core. Since the allocation unit by the monitor for user memory is 1KW, a 32KW low core, by the rules above would be represented by a 1 in MAXLOW, and a 0 in MAXHI hence causing a sign problem in the comparisons, especially the BLO. NOTE however, that when using libraries or RSTS’s, the full 32KW virtual address space is available.

Under RXS monitor emulation, no interpretation of the user’s high core is used for pseudo-vectors. Instead, the monitor KNOWS about the user using RXS emulation, and traps errors at the

... continued on page 53
The next time your system is thrashing around, remember this: you could be losing up to 50 percent* of your performance due to fragmented files.

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*Based on information supplied by our customers.
**ADDLIB**

**ADD A RESIDENT LIBRARY WITHOUT AN ADDRESS**

By Edward A. Heinrich, Real-Time Software, Inc.
420 Lexington Avenue, New York, N.Y. 10017

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**Introduction:** With the release of V7.0 of RSTS, DEC provided us with the feature of resident libraries which can be used for a variety of applications such as interjob communications, shared data areas and/or re-entrant code that can be shared by many different tasks, i.e., RMSRES, BASICS and EDT. The major drawback of resident libraries, at least from a system management point of view, is the fact that they must be added at a specific address, which the user must calculate. Proper system management dictates that the libraries be added either at the beginning or end of user space. I personally prefer the high end of memory since we can make adjustments to XBUF and the amount of data space used for buffers without having to worry about computing new load addresses for all the libraries.

**The Problem:** At our installation we have several CPU's with different memory configurations. When we want to place the packs from one CPU on a different system, we have to recalculate the address to load the libraries or we wind up with either an "Illegal byte count for I/O" error message or fragmented memory. In addition, we also have 'foreign' memory on our systems. Whenever a memory problem arises, the old "It's the foreign memory" cry is heard and we have to pull it off the bus. Again a new address must be computed in order to successfully load the libraries.

**The Solution:** These problems are not unique to our shop. A friend has the same problems at his installation and he suggested a program that calculates the amount of memory on the system and computes a load address for each library. Thinking it was a good idea, and not being able to resist a challenge, I have written a little utility which will add either a resident library or a runtime system at the highest available address in memory. The program checks for any locked out memory and the location of XBUF in an attempt to avoid any problems caused by disabling memory in the event of hardware problems or the placing of XBUF in an area of memory other than that immediately following the monitor and default runtime system. The program is run at system start-up time using an INIT command file.

The input for ADDLIB consists of the amount of memory required by the library or runtime, a slash "/", and the name of the library or runtime to load and switches. For a resident library /REM, /1USER, /RW, /NOLOG are valid switches. When a runtime system is requested, ADDLIB reads the default values from the last block of the runtime. The only valid switch for runtimes is /STAY. (What do you want from free software?) The program works to the best of my knowledge, it is currently installed on all our CPU's and at several customer sites. However, Real-Time Software makes absolutely no commitment to support it and takes no responsibility for any errors in it. The program was coded in Basic Plus 2. It can be compiled under CSPCOM if you make the variable names use '.'s instead of '_'s. If you wish to make it run under Basic Plus, I leave it to you to take it down to that level.

The following is an example of an INIT command file used at system startup to run ADDLIB:

```plaintext
:DBO: [1.2]LIB.CMD
:Function: RUN ADDLIB To add Resident Libraries
:Edit Date: 26 May 82
:
:DETACH
:LOGIN KB:[1.2]
:FORC EB: RUN [1.3]ADDLIB
:FORC EKB: 8/CSPCOM.LIB/STAY
:FORC EKB: 8/BASICS.LIB/STAY
:FORC EKB: 1/SRUN.LIB<0>/REM/RW
:FORC EKB: 1/[1.3]SPOOL.LIB<0>/REM/RW
:FORC EKB:
:FORC EKB: 21/EDIT.LIB/REM
:FORC EKB:
:FORC EKB: FORC EKB: BYE/F
:FORC EKB:

ATTACH

```

The author has the same problems at his installation and he suggested a program that calculates the amount of memory on the system and computes a load address for each library. Thinking it was a good idea, and not being able to resist a challenge, I have written a little utility which will add either a resident library or a runtime system at the highest available address in memory. The program checks for any locked out memory and the location of XBUF in an attempt to avoid any problems caused by disabling memory in the event of hardware problems or the placing of XBUF in an area of memory other than that immediately following the monitor and default runtime system. The program is run at system start-up time using an INIT command file.

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---

CIRCLE 10 ON READER CARD
PROGRAM VARIABLES DEFINED

Program Used For

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F_RGB_MEM1</td>
<td>End of systems physical memory</td>
</tr>
<tr>
<td>F_I168</td>
<td>Pointer to the last block in .RTS</td>
</tr>
<tr>
<td>L_ENDS</td>
<td>Length of memory needed</td>
</tr>
<tr>
<td>L_OFFSET</td>
<td>Bit map</td>
</tr>
<tr>
<td>L_SWITCH</td>
<td>Any switches to apply to the Add</td>
</tr>
<tr>
<td>STE_CALLS()</td>
<td>Sys call work array</td>
</tr>
<tr>
<td>T_FLAGS</td>
<td>Flag for switches present</td>
</tr>
<tr>
<td>L_FLAGS</td>
<td>Flag, for either .LIB or .RTS</td>
</tr>
</tbody>
</table>

WORK SPACE

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIM SYS_CALLS(30$)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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COMPILE TIME VARIABLES

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFINE CPU = &quot;IBM 5100&quot;</td>
<td></td>
</tr>
<tr>
<td>DEFINE CPU = &quot;Real-Time Software, Inc. -- Adds XTO's and LIB's&quot;</td>
<td></td>
</tr>
<tr>
<td>USE Handy Strings</td>
<td></td>
</tr>
</tbody>
</table>

MAIN PROGRAM LOGIC

<table>
<thead>
<tr>
<th>Operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOTO 23000</td>
<td></td>
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TERMINALS

<table>
<thead>
<tr>
<th>CPU</th>
<th>TERMINALS</th>
<th>CPUs</th>
<th>COMPLETE DATA SYSTEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT100</td>
<td>LA12</td>
<td>11/44 &amp; VAX</td>
<td>with standard</td>
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<tr>
<td>VT101</td>
<td>LA13</td>
<td></td>
<td>and custom software</td>
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<tr>
<td>VT102</td>
<td>LA14</td>
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<td>VT125</td>
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<td>VT131</td>
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<tr>
<td>VT135</td>
<td>LA125</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Greetings, fellow RSTS users. This month, the Crystal Ball offers monitor enhancements, late breaking news on V7.2, and other items of interest to the RSTS community.

RANDOM

Before I dive into monitor hacking, I have a few random notes for you. The following definition was (anonymously) submitted last month. I thought I’d pass it along to you.

DCL \ de' eehl \ abbr. [cs. DEC’s “user interface”]
1: Decrepit Command Language. 2: Command Language of the Damned. 3: DEC's Colossal Lossage.

If you program in TECO, or even if you don’t, consider the next little gem. I wish I could give credit to the author, but alas, the version I have is completely uncommented, and I have no idea where it came from. Note that any dollar signs ($) in the following listing are really ESCapes. and uparrows (\) indicate control characters.

```
+OUN QN 'E 20UN 
+OUN HK 
QN < J BUQ QN*10/3U 
QI < / +2*10+QQ*QIU 
B L K QI*2-1U QA/QUQ 
QA=QQ*QQ*2 \ 10q@l/ / -1%l + 
QQ/10UT QH + QT +48UW QW 58'E 48UW %V ’ QV ’ QVIT ’ 
QWVU QQ-QT*10UH > 
QVIT @A/ 
/56
```

Don’t feel bad if it isn’t immediately obvious to you what this macro does. It’s name is PI.TEC. It takes one argument, the number of digits to calculate (default is 20), and outputs the value of pi on the terminal. The more digits of precision you ask for, the longer it takes to calculate each one. I have run it successfully with an argument of 1000, however, it took over a week to complete on our 70. If anyone knows who the original author is, please drop me a note.

MONITOR ENHANCEMENTS

If DEC saw the copy of RSTS that we are running, they probably wouldn’t recognize it. Our monitor is quite non-standard, due to many features I have added. My latest monitor hack is an implementation of system load averages, similar to those maintained by Tenex, TOPS-20, etc.

Load average is a figure which gives an immediate, obvious indication of system loading. Basically, load average is the number of processes (or jobs, in this case) needing CPU time, averaged over a period of time. (Conversely, you can think of load average as the average number of CPUs it would take to give everyone full attention.) Three averages are maintained: 1, 5, and 15 minutes.

The averages are internally computed using pseudo double-precision math, and are normalized to 16 bits for ease of use. The averages are fixed point, and are accessed by PEEKing at cells in monitor memory. I have modified my MACRO-11 SYSTAT program to print the averages (like TOPS-20), and it would be trivial to modify DEC’s SYSTAT to do the same. Eventually, I will rewrite the TTSYST code (control/T) and include the one minute load average in it (again, like TOPS-20).

The source for the load average code (LOADAV.MAC) is listed at the end of the article. The load average computation routine is called once a second through the DECnet NSP timeout hook. I used this since it is directly accessible in source form from TBL.MAC; i.e., requires no binary patches. I modified the hook so that DECnet SHOULD still work, however since our sites are running our own kludge-net for the moment, I can’t guarantee this. (If you have problems, contact me and I’ll investigate.)

Once a second, every second, the load average code scans JOBTBL and counts the number of jobs in a run state. Optionally, it will include jobs in a disk wait, or any other type of wait, so if your system is disk bound, the load average will still “feel right.” The code then takes this count, averages it into the old buckets, and normalizes the result to 16 bits. The computation routine is all executed at priority 3, and it is very short, so system impact should be minimal. (For those of you who are still having small buffer problems, the load average code takes up about 3-4 small buffers.)

The normalized result is stored as load average multiplied by 100 decimal. The three load averages are stored in three consecutive words. The address of these words is pointed to by a word I have located in TTYHCT, directly preceding TTYHCT (i.e., at TTYHCT-2). Since the TTYHCT address is returned by the get monitor tables call, it is easy to find the load averages, and without hard-coding an address in your programs.

I am currently running the load average code under V7.1, and it should work without problems under V7.0 and later. I have not encountered any complications as a result of this code, but please remember that it is unsupported and will void any DEC software service agreements you have.

Installation of the load average code is quite simple. The files TBL.MAC and TTDINT.MAC (on the RSTS syggen tape) need to be modified. CPATCH command files to do this are listed in figures 1 and 2. The source file LOADAV.MAC must be assembled and linked with RSTS in the syggen process. LOADAV.MAC should reside on the current account during syggen. The CPATCH command file to modify SYSGEN.CTL... continued on page 51
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RSTS/E 3271 protocol emulator (PE) allows a user program on a RSTS/E system to exchange data with an IBM 370 series computer. The IBM can be running either CICS/VS or IMS/VS operating system. 3271 PE emulates the IBM 3271 device. The RSTS/E system requires an additional software package and some additional hardware.

IBM's 3271
The IBM 3271 is a hardware device that controls up to thirty-two printers and display terminals. 3271 is a part of the 3270 Information Display System (IDS). The 3270 IDS subsystem is a fixed function, terminal-oriented system designed for use in an on-line interactive data communications environment. The host IBM computer looks for input data from each of its transmission control unit (TCU) resources. The TCU controls data between the 3271 units attached to it. The IBM utilizes polling. The polling employs a round-robin method to see if each TCU has any messages. Every TCU is polled for information.

RSTS/E does not use polling. RSTS/E uses a vector interrupt scheme. RSTS/E will only respond to a terminal if it informs the CPU that data is waiting. This is a more efficient system. If one user is on the IBM, he must wait for all TCUs to be examined before his entries are processed. On the RSTS/E system the one user would have exclusive use of the system because his would be the only terminal interrupting the CPU.

RSTS/E 3271 EMULATION
RSTS/E 3271 is a combination of hardware and software. The major difference between IBM and RSTS/E 3271 is that the RSTS/E 3271 requires some program interface. The user program is responsible for transmitting and processing data. A KMC11/DUP11 device pair is used to transmit data between the PDP-11 and IBM 370. The KMC11/DUP11 supports up to eight simultaneous communication links.

DUP11
The DUP11 is a synchronous serial line interface which is capable of "full duplex" communications. The DUP11 translates serial data to parallel data and also translates parallel data to serial data. Data is transmitted to the DUP11 from the UNIBUS in parallel. The communication channel must have serial data transmission capabilities. The DUP11 can transmit data at a maximum speed of 19200 bits per second.

The DUP11 supports DIGITAL's DDCMP and IBM's Bi-SYNC protocols. A double-character-buffer is utilized for receiving and transmitting data. This feature allows for maximized data throughput. The DUP11 can be placed in a multiport network. The DUP11 adds the SYNC characters that IBM requires and also strips these SYNC characters when data is returned from the IBM.

KMC11
The KMC11 is a general purpose microprocessor with UNIBUS compatibility. The KMC11 is used to reduce the load on the CPU and is therefore used to be a data handler rather than a data processor. The functions of the KMC11 are determined by the microprogram contained in its instruction memory. The KMC11 is not programmed to modify its own instruction area, therefore the CPU must load this area for the KMC11.

In 3271 PE communications the KMC11 performs the following functions:
1. Monitors the synchronous communications line via the DUP11 for line errors.
2. Maintains the binary synchronous communication (BSC) line discipline required for interprocessor communications.
3. Translates EBCDIC to ASCII and ASCII to EBCDIC.
4. Calculates the CRC-16 (cyclic redundancy check function 16) for both incoming and outgoing data blocks. It validates CRC-16 on the incoming data's block check characters (BBC).
5. Controls transfers of messages between itself and the PDP-11 memory. The PDP-11 CPU is not involved in this transfer.
6. Handles the conversational BSC polling sequence.
7. Handles the conversational BSC protocol as implemented by the IBM 3271.

MODEMS
Any of the following modems or equivalents is needed at both ends of the communication line.
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3. Bell 208 (4800 bits/second)
4. Bell 209 (9600 bits/second)

SOFTWARE REQUIREMENTS

The 3271 PE package must be purchased from DEC; this is a separate software package. There are two drivers that are added to the monitor. The microprogram for the KMC11 and two utility programs come with the package. The rest is up to the user.

SYSGEN OPTIONS

During SYSGEN time the 3271 PE support must be added to the monitor. The SYSGEN questions are:

KMC11’s
*00*
1
Do you wish IBM protocol support *NO* YES

IIDVR

The IIDVR is the input/output interface between the RSTS/E program and the KMC11 program. The IIDVR also performs the following functions:

1. Strips buffer control orders from incoming data and adds a minimum set of outgoing data.
2. Maintains control blocks.
3. Maps the RSTS/E job and channel numbers to IBM terminal device addresses.
4. Monitors the amount of data being transferred, prevents too much data from being queued in the PDP-11 for any given terminal.

XKDVR

The XKDVR is the RSTS/E device handler for the KMC11 and DUP11. XKDVR initializes the KMC11 and DUP11 and monitors their activity.

KMCUT.BAS

KMCUT.BAS is a BASIC-PLUS compiled program which directs the IIDVR and XKDVR to initialize the KMC11/DUP11 communication link. It also can terminate the link. KMCUT.BAS also causes the loading of the KMC11 microprogram.

OPEN the KMC11. The open statement is in the form:

OPEN ln: AS FILE #X%, RECORDSIZE A%, FILESIZE C%, MODE D%

The RECORDSIZE, FILESIZE and MODE clauses are optional. The ln: actually associates the channel with the lineprinter device Lp:n.

TO create the data communication link with 3271 PE the program must

THE USER INTERFACE

The user interface to 3271 PE can be written in four languages: BASIC-PLUS, BASIC-PLUS-2, COBOL and DIBOL. The least cumbersome way is via BASIC-PLUS or BASIC-PLUS-2. Access to 3271 PE is done by OPENing the KMC11 on a RSTS/E channel. The KMC11 is identified as Ln:, where n can range from 0 to 7. The Ln: is analogous to the lineprinter device Lp:n.

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Evans Griffiths & Hart, Inc., a pioneer in the development of RSTS and the winner of an ICP million dollar award for KDSS and TAM, offers packages that save you time and improve your productivity.

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*RSTS/E is a registered trademark of Digital Equipment Corporation*
define the buffer length that will be used to store data sent and received. This value becomes the maximum amount of data that can be sent at a given time.

The FILESIZE clause is used to connect the channel to a specific IBM address. Each of the eight terminals assigned to the FILESIZE clause.

The model clause is used to establish special properties for the II DVR. These values are:

<table>
<thead>
<tr>
<th>Value</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>Non-screen mode. This value is used if the MODE clause is omitted. PUTs are limited to 248 bytes. Do not use this mode if the host IBM is using IMS/DC.</td>
</tr>
</tbody>
</table>

Sending data to II D VR to be transmitted to the IBM host is done via the PRINT or PUT statement. The PUT statement must be used in conjunction with the FIELD statement. The PRINT and PUT statements are used in the same way here as they would be if the information were being displayed on a terminal. Remember that the output buffer MUST be built in such a manner that the IBM host will understand the message.

When the data buffer is transmitted to the II D VR, user buffer space is used to hold the message until the message can be taken by the XKD VR and actually transmitted. The XKD VR then waits for the IBM to acknowledge the receipt of data. The SLEEP statement can be used to temporarily stall the job until data is received from the IBM.

SLEEP n% + 32767% + 1%

n% is the amount of seconds to wait. If there is data waiting the control is returned immediately to the program. If no data is waiting then the program sleeps. If the time expires then an error message is generated.

The GET statement in combination with the FIELD statement is used to retrieve data from the IBM. The GET statement has the same form as when doing block I/O. An error is generated if no data is waiting in the buffer.

Finally, the CLOSE statement is used to terminate the I/O over the channel. Any pending incoming messages are discarded and system buffers are returned (experience says that not always are incoming messages discarded; inform users to terminate their IBM applications before terminating the RSTS/E software).

CLOSE #1%

This CLOSE statement will terminate the data link on channel one.

REFERENCES
Digital Equipment Co. Manuals:
RSTS/E 3271 Protocol Emulator User’s Guide
System Generation Manual
KMC11 Microprocessor User’s Manual
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PROTCT is a program to toggle the protect bit of a file. To briefly recap the RSTS directory, the UFD of any RSTS account on disk contains a UFD NAME ENTRY for each file in the UFD. One of the bytes in the name entry is the STATUS BYTE which contains status information on the file. PIP prints out some of the status information in a directory command.

One of the bits in the status byte is the protect bit. If this bit is set no DELETE/RENAMe is allowed by RSTS no matter how privileged the user. RSTS uses this bit to protect System Managers or other privileged users from themselves.

We use PROTCT to aid in keeping well-structured disks. We create a protected zero-length file LOCK.LCK at the beginning of each UFO to prevent users from zeroing a contiguous chunk of file. Its basic use is to protect System Managers or other privileged users from themselves.

In theory the program could be used to modify any of the status bits:

- I am particularly thinking of a situation I know of where a file was contiguous, and someone used UTILITy to flag it as non-contiguous to try to fix a Protection Violation error. The program error had nothing to do with the contiguity of the file and we wanted to flag the file as contiguous. At the time what we did was copy the file someplace else, delete it and recreate it contiguous. However, this program could have quickly been patched to toggle the contiguous bit.

- I have also thought that maybe it's possible to toggle the "Marked for Delete" bit to bring back a file? I am wary of trying it because for an open file there is a memory-resident FCB which will have the MDL bit set: This means that the FCB is inconsistent with the DIRECTORY...
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- 64 MB Fixed/Removable Emulates DEC RK06/07

For PDP-11/70 CACHE BUS:
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- 160 MB Fixed Emulates Two DEC RM03s
- 675 MB Fixed Emulates Two DEC RM05s

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- 300 MB Removable Emulates DEC RM05

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EDT REVISITED

Since the last two EDT articles, there has been quite a bit of action on the EDT front. In this column I will attempt to provide an update on bugs corrected, commands added, limitations, etc.

1.0 VT52's IGNORED

In the previous two EDT articles, I made a fairly large blunder in announcing that my initializer file was good for everybody. Since I always use a VT100, I forgot about VT52 terminals.

Figure one is a list of the internal key numbering table for VT52's like the one for VT100's in the second article. I include this list in the interest of equal time. I understand that future releases of EDT will not allow defining keys by their internal number, so use this information at your own risk.

It seems a number of people have gotten confused when they tried to use my initializer file on their VT52's. My VT100 initializer file steps on some DEC keys, or defines keys that are not available on the VT52. The solution to this problem is to remove the definitions for the CONT F, GOLD arrow-up, and GOLD arrow-down keys from the initializer.

Among the people that reminded me of my forgetfulness was Larry Ingersoll of Tri-State University in Indiana. Larry also enclosed in his letter a humorous photocopy of a bogus help screen that he picked up at DECUS. I would like to thank whoever is responsible for it.

2.0 EDT RESTRICTIONS

There are two serious restrictions in EDT. The first is a key definition problem. Gordon Shepard of Dickinson College in Pennsylvania called and told me that he had written an initializer to make EDT pretend that it was WORD-11. However, he defined so many keys that he started getting the error message "That key is not definable." Well of course it was definable, so I tried it myself. I created the following ATPK command file to test the problem.

```
EDT NL:/RO,NL:
DEF K 69 AS "QUIT."
.
.
DEF K 69 AS "QUIT."
QUIT
```

This file invokes EDT "naked": i.e., without input and without an initializer file. On about the 195th redefinition of key 69 (CONT Y), I began receiving the "That key is not definable" error message. I SPR'd the problem, and was told that there is no garbage collection in EDT. In other words, as definable" error message. I SPR'd the problem, and was told without an initializer file. On about the 195th redefinition of keys are defined the text gets appended to a working area until that space is exhausted. I was promised that the next release of EDT will have garbage collection, but that it might be a while before we will be seeing it.

The second problem is related to the first. The space for additional buffers is also the same space used by key definitions. The more keys you define, the fewer buffers you can create. This means very complex initializer files may severely limit or eliminate the ability to define additional buffers. In fact, some quite complex initializer files are never able to get off the ground.

If I may get on a soapbox for a moment, this is a very serious problem and should be remedied as soon as possible. This problem prevents EDT from operating as documented and makes its use very limited. I can't hold the developers to blame, all early versions of the code we write have bugs or oversights. Instead blame must be given to Digital product management for holding back updated releases of EDT. I'm sure that the EDT group has a great number of improvements to EDT. Either they aren't receiving the funding to get new versions of EDT out, or management is holding EDT back. In either case, we, the users, are big losers.

(By the way, some food for thought. This problem does not seem to exist on VAX.)

3.0 MARK INCOMPATIBILITY WITH VTEDIT

It has been mentioned to me that the mark for the TECO VTEDIT keypad editor is a "~~/\~~" plus a carriage return. The mark I use in my initializer file is a "~~/\~~" only. Ideally, these marks should be identical. However, since it would be a problem to cleanly search for the mark with the carriage return, I have decided to allow this slight difference. If it bothers you badly enough, it is possible but sloppy, to solve the problem by imbedding a carriage return; but the listing becomes hard to follow.

4.0 INITIALIZER BUGS CORRECTED

There were a few bugs in the initializer file I presented in the first article. These problems were discovered via some very thorough examination by the folks at DCA in Minneapolis. In the June 1982 issue a letter appeared of their findings. I'd like to thank them for their work and interest in EDT. I have since corrected the initializer file where needed.

5.0 NEW COMMANDS ADDED TO INITIALIZER

GOLD CONT B—Move to beginning of sentence. This command makes use of the ESEN nokeypad command and moves the cursor to the beginning of the current sentence. This is very useful for editing text files, and even programs if your sentence delimiters are set right.

GOLD CONT F—Move to end of sentence. This command uses the ESEN command. This works like GOLD CONT B but in a forward direction to the end of the current sentence.

GOLD CONT I—Move cursor eight characters. I find this command useful as an "in between" from single character moves and moving big lumps at a time. This command works in either direction, and makes a line scan a lot easier.
GOLD CONT T—Make current line top line of screen. This command uses the nokeypad command TOP. What this command does is make the current line the top line on the screen. This is useful when you are interested in what’s coming, rather than what has preceded.

GOLD DELETE—Clear an entered buffer name. This one has become useful with the buffer limitations. Type GOLD and the delete key and EDT asks for a buffer name. Enter a buffer name and it is cleared of all text so it may be used again for whatever. It even works on PASTE and MAIN!

6.0 STOCK COMMAND MODIFIED
In the letter from the people at DCA, they suggested that the HELP key (PF2) be disabled. I couldn’t agree more. Most users learn the keypad very rapidly and don’t need to see the keypad diagram. And accidentally striking the key becomes annoying. Of course, those who would still like to see the HELP screen can still get help by striking the GOLD key and then PF2.

7.0 MY INITIALIZER PHILOSOPHY TOWARD LANGUAGES
Lately I have seen some neat language specific initializer files floating around. One of the better ones was presented by Paul O’Nolan in the June issue. I have purposely avoided including keys for languages because the need for these keys is specific to each installation. This column is a general forum and I want to reach as many people as possible. I don’t wish to crowd and confuse the file with things that not all people can use. (And in addition, as I mentioned before, there is currently a price to be paid in pool space for each key defined.)

By all means I encourage everybody to create his own key definitions for editing the languages he uses. If you have a good set of definitions, please send a copy to me and I would love to do an article on just various keys for languages. EDT is designed to help in doing whatever you’re trying to do, regardless of the language that you are using.

8.0 EDT HELP FILE FORMAT
The EDT "LB:EDTHEL.HLP" file is set up in a very simple format, and therefore is easy to modify. The following example demonstrates how the HELP levels are defined and used:

1 COMPUTER
A computer is a big electrified rock, which is designed to pass voltages through various other devices (other rocks) and make alleged sense.

2 DEVICES
A device is a special type of rock attached to the main rock (computer). This rock provides the “data” that the big rock uses.

3 DISKS
A disk is a spinning piece of rock that is magnetically charged to retain somewhat meaningful information to be garbled by the big rock.

4 TERMINALS
A terminal is a rock that glows in the dark and displays the somewhat meaningful information stored on the spinning rock (disk) and fed to the big rock (computer). And so forth. . .
If this were your help file, you could get into line mode and type “HELP COMPUTER” and receive the text dealing with a computer being a big rock. It would then say: “Additional information available: DEVICES”. If you typed “HELP COMPUTER DEVICES” then you would get the message about devices and “Additional information available: DISKS TERMINALS”. And to see the TERMINALS help message type “HELP COMPUTER DEVICES TERMINALS”.

The structure of the EDT help file is a level number, level name, and help text until a line starts with a number, space, and level name. In this format, you cannot get help for subtopic DEVICES without prefixing it with the help topic COMPUTER.

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INVADE Protect the planet with your laser base from the alien invaders from space. (VT100 only.)

SUBS Locate and sink your opponent’s submarine before he sinks you.

STRWRS You have five minutes to destroy the Death Star before it destroys your moon base.

WIGGIT Drop water crystals in front of the Martian Wiggits before they clone and capture you! (VT100 only.)

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(213) 820-2702
CIRCLE 87 ON READER CARD
The help processor is set up to accept the first matching string of the help topic. If the help file contained help for COMPUTER, CIVIL-WAR, and CINDY, then typing "HELP C" would match on the help for COMPUTER, and typing "HELP CI" would match on CIVIL-WAR. To get help for CINDY, you must type enough text to uniquely match CINDY. Thus "HELP COMPUTER DEVICES TERMINALS" can be reduced to "H C D T" if you wish.

In taking a look at the "LB:EDTHEL.HLP" file, you will notice that the help is just a big text file layed out in this fashion. The keypad mode help is an interesting case because EDT looks for "KEYPAD VT100" if you are a VT100 terminal, and "KEYPAD VT52" if you are anything else. EDT then translates the keys you type into their internal number and uses that to locate help for that key. For example, invoke the keypad help and type the keypad "1" key. EDT will internally generate a search for the text "KEYPAD VT100 01" (if you happened to be set as a VT100) and display the help text for that key.

In line mode you can type "HELP KEYPAD VT100" and actually get the help screen printed for you on the terminal, with one important difference. You also get all the subtopics (i.e., keypad numbers) listed as subtopics for additional information. Armed with this knowledge you can (as I have below) add additional help for keys you have defined or changed.

In addition, you can actually redesign the help screen itself. It is quite okay to use EDT on editing the EDTHEL.HLP file (although I recommend working on a copy until you are happy with the results). Wherever EDT prints the <ESC>, it is actually an ASCII 135. So if you are going to add any escape sequences, be sure to insert a 135 escape or EDT will recognize it as a line terminator and add a carriage return on writing the file. This creates some rather strange looking help screens.

9.0 HELP FILES AVAILABLE ON MAGTAPE

I have written a HELP.BAS format help file for all the EDT commands, stock DEC and my additional ones. I have also added about four blocks of help to the "LB:EDTHEL.HLP" file to provide help for my additional commands. These files and the latest version of my initializer file are available at cost of media plus shipping and handling for $25 from my company. Undoubtedly, I am breaking some DEC rule by distributing a largely DEC file. However, it is at my cost, and for a good cause, so perhaps they'll look the other way in this case.

Default EDT VT52 Key Assignments

The following list shows the internal EDT key number, stock key number editing definition, and keystroke. The numbering is bound to change and/or become unavailable in future releases of EDT. Use this information at your own risk.

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<tr>
<th>EDT Key</th>
<th>Definition</th>
<th>Keystroke</th>
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<td>65535</td>
<td>D-C.</td>
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<td>0</td>
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<td>7($)</td>
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<td>11</td>
<td>D+NL.</td>
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<td>12</td>
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<td>+C.</td>
<td>ARROW-LEFT +</td>
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<td>('-C).</td>
<td>CHGCSR.</td>
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<td>EXT '?'Command:</td>
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<td>Search for:</td>
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<td>CUTSR=DELETE PASTE.</td>
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# This is a keypad key.
* This key can be defined by using the internal EDT number, but cannot be used by either case conversion constraints or key sequence interpretations.

+ This key is a valid for editing, but can be defined using the internal EDT key number only.

---

107 No definition
108 No definition
109 No definition
110 No definition
111 No definition
112 No definition
113 No definition
114 No definition
115 No definition
116 No definition
117 No definition
118 No definition
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136 TC
137 No definition
138 No definition
139 TD
140 CL
141 No definition
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147 No definition
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152 No definition
153 No definition
154 No definition
155 TADJSR
156 DBL
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158 REF
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161 EX
162 No definition
163 No definition
164 No definition
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[unknown] [unknown] [unknown] [unknown]
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DEF K GOLD 12 AS "('E2V).".
DEF K GOLD 13 AS "('E2V).".
DEF K GOLD CONT B AS "BENN.."
DEF K GOLD CONT D AS "EXT DELIMITERS WORD PROCESSING.
DEF K GOLD CONT G AS "CUTSDELE PASTE?7Replace with buffer: ' ."
DEF K GOLD CONT F AS "RENE.
DEF K GOLD CONT H AS "C<C <C <C UNDO."
DEF K GOLD CONT I AS "(8C)."
DEF K GOLD CONT T AS "TOP."
DEF K GOLD CONT M AS "EXT WIDTH_132.
DEF K GOLD CONT K AS "EXT CO SELECT TO?Copy to buffer: ' ; F L."
DEF K GOLD CONT B AS "EXT EX.

SE WR 79
SE TR
SE K
SE M DELIMITERS PROGRAMMING
F=MAIN
Set Terminal Characteristics

Disp Time Cause Bug Go Lunch

You can write for the tape (please enclose a check) or ask questions or whatever via my company:

David Spencer
Infinity Software Corporation
2210 Wilshire Blvd., Suite 801
Santa Monica, Calif. 90403

Until next time, have a good edit.

**SCOPE MODE RUBOUTS IN INIT**

**By Michael Mayfield**
**Northwest Digital Software**

An undocumented feature of the FILL option is very useful for systems that use a video display for their system console. This feature enables scope mode rubouts while using INIT.

To enable scope mode rubouts, reboot the system and use the following command:

Option: FILL SCOPE

---

Photo submitted by Richard Rein, RMS Data Services, NY. The license plate belongs to Russell Dietz.
VT 131 from MTI. All the goodies at a lower price.

Digital’s new VT131 features built-in advanced video, printer port and block mode.

Now you can get all the features of DEC’s VT100 plus the options you’ve always wanted: advanced video, printer port, U.S./European half and full duplex communications and modem controls, and local edit/block mode transmission.

And all of these features are hundreds of dollars less than it would cost to buy them option by option for a VT100. Although the new VT 131 is totally self-contained and has no functional upgrade options, MTI can retro-fit your terminal with graphics from Digital Engineering to make it Tektronix 4010 and 4027 compatible.

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MULTIPLE VERSIONS
OF RSTS ON ONE DISK
By Michael Mayfield, Northwest Digital Software

Here it is Saturday. The wife and kids are at the beach but you’re stuck in the computer room installing a new release of RSTS. You did the sysgen last week but you couldn’t install it because RSTS doesn’t allow you to have more than one release on the same disk.

Your only choice is to come in when no one else is using the system and install V7.1 on a new disk and then copy everything from your V7.0 system pack to the new disk. If you could only install V7.1 directly onto your existing system disk, you wouldn’t have to wait for all that tape to spin.

Even worse, what if you find a problem in V7.1 and have to switch back to V7.0 until it is fixed. More tape spinning while you copy everything from the V7.1 disk back to the V7.0 disk.

If you were only able to have more than one release of RSTS on the system disk at once, you could switch between versions without having to copy all the files back and forth each time. If a problem occurred with the new release you could simply switch back to the previous one and continue execution.

Well, go ahead and go to the beach. This article details a method which allows any number of releases to be contained on the same disk. You can change releases any time you want. Any of the releases can be specified as the default to use for future startups.

The reason that RSTS does not allow more than one release on the same disk pack has to do with the way the bootstrap works. The bootstrap consists of a 512 byte program located at the first block of the disk. The bootstrap hardware loads this bootstrap program into memory and then executes it.

The job of the bootstrap program is to load INIT.SYS into memory and pass control to it. It does this using a list of device cluster numbers which identify the blocks that contain INIT.SYS. In order to boot a different copy of INIT it would be necessary to change the list of device cluster numbers to identify the blocks used by the new copy of INIT.

As it happens, two undocumented features of the monitor allow you to do just that. The LOAD option allows you to load a new version of INIT while at the OPTION level. The WRITEBOOT option updates the bootstrap to identify the blocks used by the version of INIT that is currently loaded.

The following procedure is used to install a new version of INIT on a disk. Please note that use of this procedure is not documented by Digital and, therefore, they have no responsibility to support it:

1. Copy the current version of [0,1]INIT.SYS into a file in [0,1] with a name other than INIT and a filetype of SAV.
2. Copy INIT.SYS for the new release onto the disk in account [0,1] with a name other than INIT and a filetype of SAV.
3. Bootstrap the disk.
4. Patch both new copies of INIT using the patch shown in the example below.
5. Use the LOAD option to load the desired version of INIT.
6. Use the WRITEBOOT option if the currently loaded version of INIT is to be used as the standard INIT for future bootstraps.

The following example shows the sequence used in installing RSTS V7.1 on a disk that already contains RSTS V7.0. INIT70.SAV is the copy of INIT for V7.0. INIT71.SAV is the copy of INIT for V7.1:

```
RUN $PPIP.SAV
*10.11INIT70.SAV=*0.11INIT.SYS
*10.11INIT71.SAV=*0.11INIT.SYS
*2

Reboot the system.
```

Option: PATCH
File to patch? INIT70.SAV
Base address? FQINIT
Offset address? 10
Base Offset Old New
?????? 000010 035171 ? INIT 8 First 3 characters of filename
?????? 000012 076400 ? V70 8 Last 3 characters of filename
?????? 000014 075273 ? SAV 8 Filetype is .SAV
?????? 000016 000000 ? C 8 Patch complete

Option: PATCH
File to patch? INIT71.SAV
Base address? FQINIT
Offset address? 10
Base Offset Old New
?????? 000010 035171 ? INIT 8 First 3 characters of filename
?????? 000012 076400 ? V70 8 Last 3 characters of filename
?????? 000014 075273 ? SAV 8 Filetype is .SAV
?????? 000016 000000 ? C 8 Patch complete

To load INIT for V7.0:
Option: LOAD INIT70
To load INIT for V7.1:
Option: LOAD INIT71
To make the currently loaded version of INIT the default for future bootstraps:
Option: WRITEBOOT

If the WRITEBOOT option is not used, the normal version of INIT will be used the next time the system is bootstrapped.

I wish to thank Software Techniques for their invaluable assistance in developing the procedure described in this article.
## SCHERERS SPECIALS

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</tr>
<tr>
<td>VT100-WA</td>
<td>$1,450</td>
</tr>
<tr>
<td>VT101-AA</td>
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<td>VT102-AA</td>
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<tr>
<td>VT102-WA</td>
<td>$1,450</td>
</tr>
<tr>
<td>VT125-AA</td>
<td>$2,750</td>
</tr>
<tr>
<td>VT125-AA W/AVO</td>
<td>$2,850</td>
</tr>
<tr>
<td>VT131-AA</td>
<td>$1,295</td>
</tr>
<tr>
<td>VT131-WA</td>
<td>$1,350</td>
</tr>
<tr>
<td>VT132-AA</td>
<td>$1,450</td>
</tr>
</tbody>
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### DEC HARDWARE & OPTIONS

#### UNIBUS

- **DZ11-A**: $2,000
- **DZ11-B**: $1,500
- **DZ11-E**: $3,500
- **DMC11-AL/MD Set**: $2,500
- **DD11-CK/CF**: $300
- **DD11-DK/DF**: $600
- **DH11-AD**: $4,900
- **BA11-KE**: $2,400
- **FP11-A**: $2,100
- **DL11-A & C**: $375
- **DL11-WA**: $595
- **DL11-WB**: $675

#### DISKS

- **RLV22-AK**: $4,400
- **RL211-AK**: $4,000
- **RL02-AK**: $2,400
- **RXV211-BA**: $2,700

#### CPU BOARD SETS

- **11/34A CPU-SET**: $1,200
- **KDF11-AA**: $1,500

#### MEMORY

- **MSV11-DD**: $300
- **MS11-MB**: $2,000
- **MK11-CE**: $5,500
- **MS11-LD**: $1,400
- **MS11-JP (used)**: $105
- **MJ11-BE**: $3,000

### DEC PRINTERS

<table>
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<tr>
<td>LA38-GA</td>
<td>$895</td>
</tr>
<tr>
<td>LA38-HA</td>
<td>$995</td>
</tr>
<tr>
<td>LA38-AA</td>
<td>$1,000</td>
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<tr>
<td>LA34-DA</td>
<td>$795</td>
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<tr>
<td>LA34-AA</td>
<td>$825</td>
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<tr>
<td>LA120-RA</td>
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<tr>
<td>LA120-BA</td>
<td>$1,975</td>
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<td>$1,625</td>
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<td>LA100-YA</td>
<td>$1,725</td>
</tr>
<tr>
<td>LA100-ZA</td>
<td>$1,995</td>
</tr>
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**SCHERERS**
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(614) 889-0810

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Louisville, KY 40223

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**BRAND NEW WARRANTY**
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By Greg Justice, Texas Distributors, Inc., Dallas, TX 75234

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October 1982
IS YOUR RSTS/E SYSTEM SLOW?
IMPROVE YOUR SYSTEM RESPONSE
REORG YOUR FILE STRUCTURES

EASY ★ FAST ★ SIMPLE
ONE STEP DISK TO DISK REORGANIZATION

REORG is a high speed tool used to create copies of RSTS/E disk packs. The new packs created have well structured directories, thus providing system performance enhancements. REORG may optionally create a tape backup of the disk being copied. Some of the major features of REORG are:

- REORG transfers data at over 500,000 Blocks per hour (RM05 to RM05).
- No DSKINT, REFRESH, or HOOK steps are needed.
- All the file handling functions which are usually done by the RSTS/E file processor are done within REORG, using large buffers, thus allowing REORG to run much faster and with less system load than a similar program using the RSTS/E FIP.
- The Storage Allocation Table (SAT) is kept entirely in memory during REORG processing, thus eliminating disk accesses of the SAT.
- Tapes created by REORG are in a DOS compatible format.
- All accounting data is preserved by REORG.
- The location of placed files may be preserved.
- REORG may copy mounted disks (a system disk for example) as long as precautions are taken to prevent changes to the input disk during the copy.
- REORG allows copying between different disk types as long as sufficient space is available on the output drive.
- If the output pack is already a RSTS/E structured disk the Bad Blocks file will be preserved. REORG can also do a quick check for bad blocks on the output disk (even if pack isn't RSTS/E, structured) and add them to the bad block file.
- The output disk will be bootable if INIT.SYS is present in account [0,1] of the input disk.

NORDATA
4433 27TH AVE. WEST
SEATTLE WA  98199
(206) 282-1170
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I was recently retained as a consultant by a company to assist in training and design for a large word processing application. They have dedicated a PDP 11/44 primarily to word processing with as few other data processing applications as possible.

The company receives numerous telephone or written inquiries on a daily basis. The goal is to reply promptly with a professional personalized letter which contains highly technical information. In the previous 'typing pool' operation, clerks using IBM mag-card typewriters chose from hundreds of standard form letters. Most responses were able to fit into one of these letters although it was often necessary to combine information from more than one. Considerable control and effort were required in this manual system to ensure both timely and accurate information.

WORD-11 was chosen in part because of its extensive List Processing capabilities. List Processing’s basic function:
- Merges a LIST document (records containing field names with variable information) with a FORM document (a standard format with field names for variable placement) to produce an OUTPUT document of the finished product.
- A SELECTION SPECIFICATION document allows specific records in the LIST to be merged with a FORM document based on the variable information using conditional keywords, boolean operators, wildcard expressions, etc.

The SELECTION SPECIFICATION can also be set-up to access more than one FORM document during the merge process, essential since the standard letters vary each day. List Processing also can sort records in a list by any field value. Data processing type reports can be generated by creating a FORM document in the format desired with headings, breaks, footings etc.

I expect that most of the information I give is applicable to DEC’s DEWORD as well as to WORD-11. I’m not trying to teach WORD-11 here but rather to supply enough background information to make the problem and its solution intelligible.

The WORD-11 Files
There are three main types of files used by WORD-11 in an active account:
- INDEX.WPS: The WORD-11 index of documents
- WPS.TSK: Contains among other things stored settings and user defined sequences (referred to as UDK’s; stored keystroke sequences)
- WPSnnn.WPS: The actual WORD-11 documents (where nnn is the document number).

Because there are so many, the standard letters are divided across accounts by their basic technical category. While this improves directory look-up time, the protection codes of the documents have to be considered for cross-account access when combinations of documents are required.

The default protection code given to the above mentioned files is < 60 >. This allows read and write access only to the owner’s account. There are two commands in the Document and Transfer Utility which allow a user to manipulate the protection codes:
- PI for the index file (INDEX.WPS) and PR for each individual document (WPSnnn.WPS).

Using the same project number, e.g. [200.1], [200.2], [200.3], [200.4], the codes are changed to < 56 > to allow read access across programmer number boundaries. (‘PIP’ was used to change all the documents in each account to < 56 > after the letters were converted.) Once a document and index have allowed this access, the CO command is used to perform the copy with a subsequent GOLD-GET (inserting one document into another) to combine text into one document.

What follows is a description of some of the WORD-11 features that we use in the system along with ways of securing them.

Library Document
This document contains many of the technical terms, standard paragraphs of the existing letters, the list processing record format, and other repetitive information.

The Library Document allows frequently used text to be easily recalled and inserted into other documents. What make this document unique are the identifiers used before the text; for example «< beginning paragraph >» could be an identifier with a standard beginning paragraph to follow.

It is necessary to inform each individual WORD-11 account of the document number and location to access as its library document. This is a one time notification if the same document is to be used all the time and is handled in the Editor’s Menu accessed via any WORD-11 document.

A Library Document may be shared by different accounts if it has been properly protected. A shared Library Document is easy to secure by placing it in a separate account since the password of that account is controlled.

User Defined Sequences (UDK’s)
The user defined key feature (UDK), a method of storing pre-defined keystrokes, is used extensively to automate the entire list processing procedure as well as to sort lists, generate reports, etc.

The UDK’s were created in the same account as the Library Document and the WPS.TSK file containing them was then ‘PIPed’ to the accounts where needed. The specific documents in each account, such as the LIST, FORM, SPECIFICATIONS, OUTPUTS, etc. all needed the same WORD-11 document numbers to allow the UDK’s to work.

Security can be enhanced by the periodic replacement of all WPS.TSK files from a secure source.
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Standard Letters

The technical content is such that changes to the standard letters can and do occur on a regular basis. Control of these documents is of utmost importance as the information is used by the recipients as 'truth'. While human error is the primary concern, maliciousness is not ruled out as a possibility.

Placing these sensitive documents in other accounts where the password could be controlled will not work because WORD-11 requires all documents merged during List Processing to be in the same account.

It initially appeared that a customized program would be required to maintain control of these sensitive documents. A file would be created to store the document numbers and the date of the most recently approved change. A look-up in the RSTS directory would be made to compare the actual date a document was changed (per the directory) to the date of an approved change (in the file). Maintaining this file of sensitive documents would require manual up-keep.

'Write Protecting' the document files by adding '2' to the protection code wouldn't work because while preventing editing or deleting from occurring, list processing wouldn't work either. The error message '?'n' is in use or protected against modification (where 'n' is the document number) occurs while attempting the merge process.

Unauthorized deletion of a letter will show up when a UDK trying to access the document halts the process.

The solution for securing the letters still seemed to be the program and file mentioned above. It occurred to me that if there were something unique about these documents perhaps the RSTS directory could be used instead of a separate file. . . oh yes, the <56> protection code to allow the copying across accounts. A program would still be needed; however, now a much simpler version could be written. The date would be checked on only those files with a protection code of <56>. The date of last access is changed by the program and file mentioned above. It occurred to me perhaps the RSTS directory could be used instead of a directory to the date of an approved change (in the file).

Maintaining this file of sensitive documents would require manual up-keep.

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A subsequent chain to the WPSDAT program converts the ASCII text to a WORD-11 document. Finally, WPSDAT returns the user to the WORD-11 Main Menu, giving the user the impression that the terminal has always been controlled by WORD-11. Then a UDK is invoked to sort the list in document number order and execute list processing, printing the desired report.

It should be noted that this is not a fool-proof security system since the users could change protection codes if they knew how. This possibility is minimized since the clerks are kept in the WORD-11 environment. In addition, since they are unaware of the protection code process in the first place,
REAL RSTS SECURITY

• LOCK-11
  • Access control with 'hardened' security file and editor.
  • Unlock specific \([p, pn]\) or \([p,*]\) for specific user or keyboard.
  • Unlocks can cover specific day & time ranges.
  • Comprehensive alarms from independent sources.
  • Auto log in available, with or without password.
  • Auto keyboard disable on probe.
  • All user-assignable logicals, default KBM, etc, automatic.
  • Person-oriented user-id or (mix/match) KB: based security specifications.

• SAFE-11
  • A MENU run-time environment \([KBM]\)
  • Total containment of non-privileged users.
  • Multi-level MENU access control;
    entire applications, selected menus or parts of menus can be locked by:
    a) system manager
    b) supervisor.

REAL RSTS CONTROL

• LCKDPY TSK (VT5DPY in MACRO) The ultimate MACRO SYSTAT.
  • The system manager's observation platform
  • Issue 'UTILITY' commands without exiting display.
  • Hi-light activity of selected keyboards.
  • Alarms certain critical conditions.
  • Negligible load.

• DYNPRI TSK (Macro-of course)
  • LOCK-11's observation platform.
  • Online-tunable dynamic priority changer.
  • Biases response in favor of KB-state users.
  • Auto hibernate detect and alarm.
  • Can kill HB-s in selected \([p, pn]\) or \([p,*]\)
  • Can print audit trail of arrivals and departures.
  • Negligible system load.
PRINT 'Last date checked: ' ; DATE$(PAR.DATJ)
PRINT CHR$(15) ; 'Enter new date (MMDDYY) or <ER>1 ; X$'
X$ = VAL(X$) ; ERR = SJ
IF ERR THEN 'ERL'
FOR IS = 1 TO PAR.TOTJ
     IF X$ < '1' THEN D()J • -1
     D()J : IHD9J"100J)
     D9J : (D8J-JD) • 30J - (D8J>1J) + (D8J>2J)
     D7J : D8J,D1D,J2,((D8J>3J) AND ((D8J>4J) <> INT (D8J/4J))) - (D8J>5J) - (D8J>7J) - (D8J>8J) - (D8J>10S)
     HHDDYY$ : MID(TODAY$,4J,2J)
     DEF FNJj FND.DAY(D)
     FND.DAY : D7J
     D7J • D7J • D7J
     DATE$(PAR.DATJ) & DATE$(FIL.DATJ) & KID(FIL.NAM$,4J,3J) & PAR.PPN$(PPNJ)
     IF ERR THEN 'ERL'
     X$ = VAL(X$) I ERR -> 6230
     REM ~------
     PRINT IF. LSTJ
     PRINT IF. LSTJ
     PRINT IF. LSTJ
     PRINT IF. LSTj
     PRINT IF. LSTJ
     PRINT IF . LSTJ
     PRINT IF. PARJ USING
     X$ = VAL(X$)
     OPEN F. PAR$ AS FILE IF . PARJ
     PRINT USING
     KILL
     F. PAR$ = FND.DAY(X$) UNLESS X$ • "
     X = VAL(X$) I ERR -> 6230
     PRINT IF. LSTJ
     RESUME 6230 IF ERL
     PRINT IF. PARJ, PAR. TOTj
     RETURN
     LISTING CLOSE & WORD-11 CHAIN
     CLOSE . LOTS
     COR.COME = F.LOTS + CHR$(15)
     + '"(INIT) LIST: FI Security' + CHR$(15)
     + '"NO' + CHR$(15)
     + '"WHEN, MAC[11,0]' + CHR$(15)
     + CVTS$(15)
     FF$ = DEF(CHCHR(65) + COR.COME)
     CHAIN '([11,0]WPSDAT' 300000
     RETURN
     PRINT WORD-11 TEXT FILE
     PRINT . LOTS
     "(open)" ; PAR.PPN$(PPNS)
     PRINT . LOTS
     "(close)" ; MID(FIL.NAM$,45,15)
     PRINT . LOTS
     "(date)" ; DATE$(FIL.DATJ)
     PRINT . LOTS
     "(last date)" ; DATE$(PAR.DATJ)
     PRINT . LOTS
     PRINT . LOTS
     RETURN
     OPEN LISTING FILE
     OPEN F. LOTS FOR OUTPUT AS FILE IF . LSTj
     PRINT IF. LSTJ
     PRINT IF. LSTJ
     PRINT IF. LSTJ
     PRINT IF. LSTJ
     PRINT IF. LSTJ
     PRINT IF. LSTJ
     PRINT IF. LSTJ
     RETURN
     LISTING CLOSE & WORD-11 CHAIN
     CLOSE . LOTS
     DEF FNJj FND.DAY(D)
     RETURN
     EXIT
     STOP
     PRINT 'RSTS Error 4: ' ; X$ ; 'at line number ' ; X$ ; 'EML.
     STOP
     PRINT 'Floating moddy to julians'
     DEF FNJ. ATS(I)
     IF D < 010000.
     THEN DTS=15
     GOTO 20708
     I EARLIER THAN ALLOWED
     D0S,D0S=D0S/10000.
     D0S=INT((DI)*10000.)
     D0S=D0S/100.
     D0S=D0S/(D0S*100)
     I DECOMPOSE MODDY TO D0S
     20706 DTS = (D0S-15)*D0S - (D0S-15) + (D0S)*D0S)
     D0S=D0S/D0S
     DTS = DTS
     + (((D0S)AND((D0S-15) <> INT((D0S-15))) + (D0S))
     D0S=INT(D0S-15)) - (D0S-15) - (D0S-15)
     + (D0S = 70+ * 105 ++ 35) + D0S
     D0S=FND.ATS + DTS
     END
20712 DEF FNJ. ATS,ATS(D0S)
     RETURN
     CHANGE TODAY'S DATE TO JULIANS
     = FND.ATS('DATE$(D0S)
     20716 MOD SS= MID('TO.DATJ,45,24)
     = RIGHT('TO.DATJ,75)
     = LEFT('TO.DATJ,35)
     20718 PNJ = FND.ATS('VAL(MODDAYS))
     20720 FEND
     32767 END

TIPS & TECHNIQUES

A Column For The Advanced RSTS/E User

Optimizing BASIC-PLUS-2 Programs Through Profiling

Profiling is a technique that can help you tune a program by detecting which lines (sections, subprograms) are executed most frequently. After all, why spend your time optimizing a line of code that is executed only a few times. First, a few caveats:

1. although significant improvements in execution time can be realized if you know where to look, no amount of optimizing can save a poor algorithm.
2. all lines are not created equal — some lines take considerably more computer resources than others. This technique cannot differentiate multi-statement lines.

This technique was implemented by writing a short piece of MACRO-11 code named BP2PRO. BP2PRO replaces the BASIC-PLUS-2 LIN$ thread routine and prints the current module name and line number to the user's terminal. This data can be captured and sorted into meaningful information.

Let's take a 'real-life' example. Several years ago, there was a program on one of the RSTS SIG tapes (authored by Richard Case) named TRACE. TRACE 'traces' the directory blocks read to locate a file. In effect, it shows you how many directory blocks FIP will have to read to open a file. The version of TRACE that we use in-house is loosely based on Richard's program. We'll return to the original program (TRANslated to BASIC-PLUS-2) for our example.

Here is the procedure to profile a BASIC-PLUS-2 program:

1. Assemble the BP2PRO module, using COMMON (from the RSTS distribution tape) and PRE (from the BASIC-PLUS-2 distribution tape).
2. Compile the program and link with the BP2PRO module.
3. Run the program via ATPK to collect the profiling data.
4. Sort the log file.
5. Count the number of times each line was executed. I use the UNIQ program from the DECUS "C" language tape to count the number of times each line was executed. If you don't have this program it is a minor task to write a BASIC program to do the same function.
6. Sort the log file from running UNIQ to produce a file listing the lines by frequency of occurrence.

---

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Using this procedure on TRACE we learn that 92 different lines were executed a total of 5642 times. We can see from the portion of PROFIL.SRT above that 16 of the lines (about 15%) account for about 90% of the lines executed. Clearly these lines are where we should look to optimize this program.

Upon examining the source to the program, we see that these lines comprise 2 sections of code. The first section (figure 1) determines if the requested file has been found, and the other section (figure 2) unpacks the directory link from the buffer.

Let's see what we can learn from these 2 sections of code (listed in order of contribution to reducing execution time).

1. BASIC-PLUS-2 allows the programmer the means to access word oriented data structures in I/O buffers (via MAP statements) much more efficiently than BASIC-PLUS.

Using a MAP statement to define the I/O buffer as a large word oriented array allows us to re-write line 1160 to be more efficient.

**NOTE**

Line 1160 contains a "FOR" modifier. BP2PRO counts all 8 executions of statement 1160 as 1 line. Thus statement 1160 is really executed 8 times as frequently as shown in PROFIL.SRT.

2. Most of the lines involve a reference to the array W%( ). However, the subscript is almost always a constant! Array address calculation is a fairly expensive operation compared to a simple variable reference (11 instructions v. 2 instructions).

We'll re-write the references to W%() to reference separate simple integers instead.

3. Lines 1010-1050 determine the address of the desired blockette within the UFD, using a flag word (T6%) to indicate if the sign bit is on in the link word.

We can simplify lines 1010-1050 a little bit so that the flag word is not needed.

4. BASIC-PLUS-2 (unlike some other languages) guarantees that all expressions in an IF statement are executed, even if the first expression is sufficient to determine the final outcome.

The IF statement on line 730 determines if the current file is the desired file by comparing the 3 RADIX-50 encoded words that make up the file name and the file type. Obviously, if the first word of the file name does not match (which is the most frequent condition), we know the current file cannot be the desired file.

5. BASIC-PLUS-2 evaluates a number of expressions at compile time.

The expression "NOT 15%" on line 740 is not one of them. We'll save a few instructions by evaluating it ourselves.

The 'optimized' sections of code are presented in figures 3 & 4.

**Summary**

We have limited our effort to 2 short sections of code. Profiling the program indicated where our effort could best be applied—and where it could not. The result of this exercise is that the 'optimized' version of the program takes less than 1/3 of the CPU time than the original version did.
Figure 3

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- VAX PERFORMANCE NOTES
- $FAO, The Formatted ASCII Output Directive
The current offering of VAX computers consists of the dual processor 11/782, the single processor 11/780, mid-range 11/750 and the smallest VAX the 11/730. Knowing which one of these is right for your application is a hard job. There is one major premise which all performance data must be measured against:

All application systems are different.

Thus, it is impossible to accurately predict how your system will run on any given processor, with any given options. Before you despair, it is possible to find out the general performance of these machines and make an educated guess about whether your particular application will run. The RSTS newsletter recently carried an article on performance that made some DEC people mad, mostly because it was possible for the reader to become confused about what the data really said. The best way to get performance data is to call your local DEC salesperson and ask him to come out and discuss performance with you, tell him to bring his 'sales guide' and to make sure it has the chapter that includes performance. What I am trying to tell you here is what kind of information you can get, and how to get it; not what the information is.

Inside DEC there are groups designated to do performance measurement and reporting. They have very sophisticated tools (computers and programs) to help them do this measurement. They also have some of the expertise necessary to do this job. These engineers load up various machines with several different 'workloads' to simulate different user application environments. Some of these workloads are an insurance company simulation, a specialized application package (COBOL programs), college registration system simulation and an order entry system.

Each of these simulations is run and data gathered on certain 'metrics'. The metrics measured include average response time, transaction throughput, transactions per hour, mean service time (time needed to complete on whole transaction, user productivity and computation time). This is not meant to be the whole list, but is representative of the type of measurement that is made.

Results of these tests are informative ONLY if the reader takes the time to reflect on the reasons for the differences between two configurations. The number of batch jobs per hour run with 12 interactive terminals by an
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.

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

CIRCLE 67 ON READER CARD

11/730 is not improved by increasing from 2MB to 3MB. Why? An 11/750 can support about 50% more interactive terminals while running the same number of batch jobs per hour with a similar increase from 2MB to 3MB of main memory. Why? The 11/730 has run out of CPU power at that level of batch jobs and interactive terminals, adding memory won't stretch the CPU, but the 11/750 has more CPU power to go and adding the memory frees the CPU power to be used by the application instead of managing the (too small) 2MB. What this tells you is not that the 11/730 is a 12 terminal machine and the 11/750 is a 24 terminal machine, but rather that the 11/750 can benefit from more memory and the 11/730 can't. It was interesting to note that on one of these simulations the 11/730 peaked (2 second response) at 20 terminals and 2 MB, the 11/750 at 44 terminals and 6MB, and the 11/780 at 56 terminals and 6MB. Just to show you how foolish a comparison like this can be, during a different simulation an 11/780 NEVER had less than a 2 second response time even with 4MB and 8 terminals! We know that the task must have been more complicated in this case, and that the 2 second response time stayed the same until there were more than 32 active users.

Another interesting parameter to watch in these 'metrics' is when the flat line of a graph begins its sharp upward swing: that is, when response time goes way up as you add the 35th terminal. One of the very nice things about RSTS is the way it seems to degrade slowly rather than 'falling off the end of the table' when it reaches some limit. Up to a point this is true, but beyond that limit — bad news. Small buffers used to be a problem where large systems would run very slowly when the small buffer count dropped below 50-60; memory can be a problem when swapping starts eating up CPU and disk transfer capacity and this hurts more on the slower CPUs. I have seen systems that overload their disk transfer capability and go slowly when several disk intensive jobs are running; even though lots of CPU is still available. Even when systems slow down, or response time increases this can still mean that tuning (software) or some hardware enhancement can significantly increase the machine's capacity. With all this in mind, for one workload the 11/730 started to slow down sharply at 16 users, the 11/750 at 28 users and the 11/780 at 36 users. For comparison between machines these results may be valid, but an 11/780 is more than a 36 user machine! In fact, for comparison the 11/780 is a little more than twice an 11/730 and about 133% of an 11/750 under these conditions. In yet another simulation the 11/750 (6MB) began slowing rapidly at 56 users and the 11/780 (6MB) at almost 80 users, giving the 11/780 about 140% of the 11/750's performance. Getting a flavor for relative power? More can be gotten directly from your DEC salesperson!

There is much more to be said about performance, and lots more VAX information. Next we will talk about single user performance, standard benchmarks like 'whetstones', single instruction timings and some comparisons with the 11/44 and others.

...continued on page 84
The $FAO monitor call (excuse me, I mean 'System Service': Oh, how I wish they'd stop changing terms...) turns out to be quite a handy tool. Basically, the call provides a means of getting numeric data to the outside world (which under RSTS requires various numeric conversion subroutines), formats the data just about any way you like, allows you to intermix text with the numbers (i.e. 'Balance: $1950.50'), AND does output in octal,decimal or hex!

The heart of the $FAO directive is the 'control string' parameter. This .ASCID string (.ASCID is like .ASCII, but the assembler creates a STRING DESCRIPTOR before the string for you) is interpreted by VMS when the directive is executed and gives you strict control on how the output will look.

If you'll turn to the sample program, in the TEXT psect, locate the label CTRL:; this is the control string for our demo. What your looking at is as follows: The '11(3<' specifies a field with a length of 13; this field is terminated after the first parameter (P3 in hex. The '!/' adds a CRLF to the output. Such commands must be upper case.)

Moving down the control string, you'll find the command 'IOW' (OCTAL WORD), which will output the second parameter (P2) in octal, and 'IXW' (HEX WORD) will display the parameter P3 in hex. The '1/' adds a CRLF to the output.

Some other FAO commands are:

- $%D: insert today's date in the output string (except for the 3 dots . . . )
- $%T: insert the current time
- $%S: insert the letter 'S' if the next parameter is > 1
- $I: insert the current channel
- $J: insert an .ASCID string into the output string
- $P: insert a decimal number, and zero fill to n places
- $R: repeat counts can also be used:
- $S: insert 3 decimal numbers, each 6 characters long

The special symbol '#' tells FAO to use the next parameter on the list for the next required value; for example, the command:

$#(4UW)

interprets the first parameter to be a count of the number of items to follow; each item will be taken as an unsigned word with a length of four.

To use the $FAO call, you must provide the following info: (see label 10$: in the demo program) a control string (as described above); a buffer where the system can return the formatted string ('FAODESC' points to the descriptor which points to the actual FAO buffer); a word in which the system can put the length of the formatted string (FAOLEN); and finally, a number or list of numbers that you'd like formatted in the output string. (A second call is also provided, $FAOL, which acts like $FAO but accepts the address of a LIST of arguments as the P1 parameter, for applications where several pieces of data are to be output.)

Once the $FAO call has been executed, we actually print the contents of the FAO buffer on the terminal. From there I just bump the counter NUM, and loop till I'm convinced that it works.

This demo program should work if keyed in as is. To assemble & link:

$ MAC DEMO
$ LIN DEMO
$ R DEMO

The results should look something like:

Decimal: 0 Octal: 000000 Hex: 0000
Decimal: 1 Octal: 000001 Hex: 0001
Decimal: 2 Octal: 000002 Hex: 0002
Decimal: 3 Octal: 000003 Hex: 0003
Decimal: 4 Octal: 000004 Hex: 0004

(000000, 000001, 000002, 000003, 000004)

Have fun!
For more information, Call: (206) 821-7507

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- Alpha or Numeric Column Coordinates
- IF - THEN - ELSE
- Conditional formatting
- Equations may contain text

is shown in figure 3. A sample BASIC+ program which prints the load averages is listed at the end of the article, after LOADAV.MAC.

If you encounter any problems with the installation or the code, please contact me. If you are not in the mood to try has changed in size. What this means is if you use ONLRES source from last month. Please specify 800 or 1600bpi.

RSTS V7.2 NOTES

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I do know of two internal changes in V7.2. The first is a fix for the UU.TRIM (set terminal characteristics) call. There are no problems with setting terminal speeds in V7.2.

Secondly, I heard that INIT.SYS was changed to automatically shuffle the memory allocation table, if any entry has changed in size. What this means is if you use ONLRES to change your monitor size, or change other memory allocation values in the monitor SIL, INIT will fix the memory allocation table for you when you reboot. If your monitor got smaller, INIT will push XBUF and the default RTS down in memory so there is no wasted space. Alter-

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nately, if the monitor grew in size, it will push up the other entries to make room.

Finally, a note about named directories. I don’t know if named directory support has been removed from V7.2 (I’d have guessed that it hasn’t). Although the code more or less works, there are several dangerous bugs in it. Occasionally, the code will blast the first block of disks with named directories (i.e. the root of the MFD). This means a potentially nasty cleanup job. I don’t have a fix for this bug, nor have I even had the time to look and see what causes it. I would advise against using named directories without such a fix.

CONCLUSION

Several people have requested an ONLSET program; i.e., something that will perform some or all of the functions of INIT’s SET command on-line. Also, I have had some time to play with FMS, and have managed to design forms using DECUS sessions, etc.

I hope you have enjoyed this installment of the RSTS Crystal Ball. I will continue to try to present information which is interesting and useful. In the future, I may be able to answer any technical or semi-technical questions that you send to me. In any case, I would enjoy hearing from you, so if you have any questions, gripes, or suggestions, call or write me at the address below. Until next time, hack hack!

Michael C. Greenspon. C/O Integral Information Systems, 9832 Vicar Street, Suite 100, Los Angeles, California 90034, (213) 558-0732

The JDB’s connected to the IOB. The IOB’s connected to the WCB . . .

See the RSTS Internals Manual.
In an attempt to use the memory exerciser submitted by R.A. Smith of Digital and published in the June/July issue, "Basic Memory Exercising Programs", RSTS Pro. June 1982, V.4, #3, p.8, I have found several major bugs which will prevent the program from performing its intended function.

The basic concept of this program is good and if implemented correctly, it will work. However, if this program found any defective memory locations it was due to random chance.

The memory exerciser program is intended to write to, and read from, the resident library. Thus by moving the library around physical memory the program will be able to access specific physical memory locations, and pin-point the actual address at which there is a memory problem.

It is unfortunate that the program as published did not perform the desired function, even though it would give all appearances of doing so. Shown below are the reasons that this program will not work properly. I have also outlined the changes necessary to have the program access specific physical memory locations.

**PROBLEM:** The memory exerciser never accesses the resident library MEMCOM. As a result the memory in the common area MEMDAT is never mapped to MEMCOM and the memory that is exercised is somewhere the program happens to be loaded in memory.

**SOLUTION:** Force the program to access the resident library. To access a resident library the program must be attached to the library, create a window into the library, and map that window. The means for accessing a resident library can be done in either of two ways: 1. Use the task builder resident library directives RESLIB or RESCOM. When using these directives the task builder includes in the task image all of the necessary code to access the resident library. All of this is totally transparent to the programmer. For the memory exerciser program this directive would be:

```
RESLIB = S Y : [1,800:MEMCOM/RW
```

2. Use MACRO-11 subroutines to issue the .PLAS directives to attach to a resident library, create a window, map that window and detach from the resident library. This method requires MACRO-11 subroutines because the .PLAS directives are not available from Basic-Plus 2. See the RSTS/E System Directives Manual for more information on using the .PLAS directives to access resident libraries.

**PROBLEMS:** When a program is attached to a resident library that library cannot be unloaded and loaded at a new memory location. This problem occurs when using the task builder directive RESCOM to attach to the resident library. When the problem attempts to unload the resident library, RSTS will return error number 3, "Account or device in use".

**SOLUTION:** The .PLAS monitor directives must be used to allow access to the resident library, and to allow the resident library to be unloaded and re-loaded at different memory locations. To accomplish this the .PLAS directives must be issued:

- Attach to a Resident Library
- Create and Map a Window
- Detach from the Resident Library

The first two directives must be issued AFTER the resident library is loaded at the correct address and BEFORE an attempt is made to exercise that memory. The third directive must be issued AFTER the memory has been exercised and BEFORE an attempt is made to unload the resident library.

- Attach to a Resident Library — requires (1) the library ID, numbered 0-7. These APR's map memory in 4K-word sections. The RTS associated with the program will utilize the highest APR's, and the program will utilize the lowest APR's. Thus, the resident library will need to be mapped with an APR somewhere in the middle. The best APR to use is the first one available below the RTS. With the RSX disappearing RTS this APR would be APR7 with a virtual address of 160000(8). With a 4K RTS such as RXS or BP2COM this would be APR67 with a virtual address of 140000(8). Refer to the PDP-11 Processor Handbook for more information on APRs and the virtual addresses of each.

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Thank you for taking the time to publish my articles in the June edition of RSTS Professional (V.4, #3, pp. 51 and 76).

Rather than constantly sending you enhancements and corrections to our ‘JUMP’ program, would it be possible for you to mention that any individual interested in the new release contact me personally. The program would be written in PIP FORMAT at 1600 BPI on a tape provided by the interested party.

Thank you for your assistance in this matter.

Patrick Holmay
Director, Computation Laboratory
Collegeville, Minnesota

I really appreciated your pre-symposium seminar here a few weeks ago. You said you were looking forward to some contributions from down-under, so I present this modest little goodie from my software tool kit. Use it with care!

Ralph Zwier, Professional Software
Victoria, Australia

Thank you, Ralph;
[Readers see, PROTCTB2S, p.20 this issue.]

Your correspondent SPIDL ("Dear RSTS Man" August 1982, V.4, #4, P.36) may find some help in a letter of mine you published in September 1981, (V.3, #3, p.36). If he connects a signal from the lineprinter, which is set when the lineprinter is on, through to pins 5 and 8 of the DH 11 then you can get the spooler to detect the lineprinter being turned off and spooling will be inhibited until the machine is turned on next day.

George May
Software Sciences Limited
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Thank you for the excellent magazine; it proves to be an indispensable resource. I have a suggestion for software vendors. Seeing as most of the ones we deal with either subscribe to and/or contribute to the magazine, I am presenting it here.

We have purchased a number of software products advertised in the ‘Pro’, and implemented some of the monitor enhancements and utilities from the articles. As a result, we have encountered a problem that is more likely to occur as more non-DEC products are put into use: conflicting control-characters. I would like to suggest to those offering software which uses control characters, that provisions be made for users to select which character should be used at installation time. This should result in quite a few additional benefits to both vendors and purchasers, along the lines of reduced maintenance, returned products, additional distribution, etc.

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Good idea. Vendors!

Only as I was building my house this summer did I find out what was TECO TESTED . A sheet of 4 x 6 1/2" COX Plywood!

What a stumper ... Hope I'm not too late to win the booby prize or something.

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... is your column! Send us your comments, suggestions, photos, or notes of interest to the RSTS community. We'd enjoy hearing from you.
In the last issue of RSTS Professional, I presented the first part of the SIMINI user guide — the index, introduction and specification. In this issue I present the second part — how to use SIMINI.

Following on from the user guide, as such, is included a few example programs as demonstrated within the complementary simulation MINSIM.

The next issue will contain Part 3, the source listings of SIMINI and MINSIM.

If you would like a complete copy of the SIMINI user guide, please send a self addressed sticky label and £3.75, or $7.50US, to cover photocopying and postage to me: John Cato, R.T.Z. Computer Services Ltd., P.O. Box 19, 1, Redcliff Street, Bristol BS99 7JS, England.

Any thoughts or comments on SIMINI will also be welcomed.

1. Introduction (See last issue, August 1982, V.4, #4, p.71)

2. Specification of SIMINI (See last issue, August 1982, V.4, #4, p.71)

3. How to use SIMINI
   i. LOG INTO THE HOST COMPUTER
   ii. Type "RUN SIMINI"
   iii. At "PRINT SPEED FACTOR"
        enter a decimal no.

   The number input will slow down the printing of the registers during program execution, the higher the number, the slower the registers will be printed.

   iv. At "?" prompt you are now in communication with SIMINI. You may issue an Operating System command (2.2) or input a program instruction to be assembled (2.3.2 and Appendix B.1/2/3). If you receive an Operating System or Assembler message not familiar or self explanatory then refer to Appendix A.

   v. Example.

   **Response**
   **Action**
   Ready
   Run SIMINI
   PRINT SPEED FACTOR?
   1200
   O/S MODE
   000 RACC
   001 STO 010
   002 RACC
   003 ADD 010
   004 PACC
   005 JANZ 000
   RUN
   RUN MODE
   4
   5
   4
   -4
   O/S MODE
   ?
### APPENDIX A

**OPERATING SYSTEM**

<table>
<thead>
<tr>
<th>O/S Mode</th>
<th>Mnemonic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INVALID RUN COMMAND</td>
<td>LDA</td>
<td>A = M</td>
</tr>
<tr>
<td>INVALID SAVE COMMAND</td>
<td>STA</td>
<td>M = A</td>
</tr>
<tr>
<td>INVALID UNSAVE COMMAND</td>
<td>ADD</td>
<td>A = A + M</td>
</tr>
<tr>
<td>XXXXXXX IS NOT A VALID COMMAND</td>
<td>SUB</td>
<td>A = A - M</td>
</tr>
<tr>
<td>XXXXXXX SIM SUCCESSFULLY SAVED</td>
<td>MUL</td>
<td>A = A * M</td>
</tr>
<tr>
<td>XXXXXXX SIM SUCCESSFULLY LOADED</td>
<td>DIV</td>
<td>A = A / M</td>
</tr>
<tr>
<td>XXXXXXX SIM SUCCESSFULLY APPENDED</td>
<td>AND</td>
<td>A = A AND M</td>
</tr>
<tr>
<td>CAN'T FIND FILE OR ACCOUNT</td>
<td>OR</td>
<td>A = A OR M</td>
</tr>
<tr>
<td>NO FILE SPECIFIED</td>
<td>XOR</td>
<td>A = A XOR M</td>
</tr>
<tr>
<td>XXXXXXX.SIM - Catalogue</td>
<td>JMP</td>
<td>PC = M</td>
</tr>
<tr>
<td>I/O TO DETACHED KEYBOARD</td>
<td>JANZ</td>
<td>PC = M if A not zero</td>
</tr>
<tr>
<td>ILLEGAL NUMBER</td>
<td>JALZ</td>
<td>PC = M if A less zero</td>
</tr>
<tr>
<td>NNNNN IS NOT AN OCTAL NUMBER</td>
<td>INCH</td>
<td>M = M+1 : PC = PC + 1 if M = zero</td>
</tr>
<tr>
<td>Memory Referencing Instructions</td>
<td>JSR</td>
<td>S = PC : PC = M</td>
</tr>
<tr>
<td>01</td>
<td>LDX</td>
<td>X = M</td>
</tr>
<tr>
<td>02</td>
<td>STOX</td>
<td>M = X</td>
</tr>
<tr>
<td>03</td>
<td>LDPC</td>
<td>PC = M</td>
</tr>
<tr>
<td>04</td>
<td>STPC</td>
<td>M = PC</td>
</tr>
<tr>
<td>05</td>
<td>JAP</td>
<td>PC = M if A &gt; zero</td>
</tr>
<tr>
<td>06</td>
<td>JAZ</td>
<td>PC = M if A = zero</td>
</tr>
<tr>
<td>07</td>
<td>JXNZ</td>
<td>PC = M if X not zero</td>
</tr>
<tr>
<td>08</td>
<td>JXLT</td>
<td>PC = M if X less zero</td>
</tr>
<tr>
<td>09</td>
<td>JXZ</td>
<td>PC = M if X = zero</td>
</tr>
<tr>
<td>10</td>
<td>JSI</td>
<td>PC = M if OV set</td>
</tr>
<tr>
<td>11</td>
<td>JNOV</td>
<td>PC = M if OV clear</td>
</tr>
<tr>
<td>12</td>
<td>IR</td>
<td>M and re-execute</td>
</tr>
<tr>
<td>13</td>
<td>PC = PC + 1 if X = M</td>
<td></td>
</tr>
</tbody>
</table>

* All these errors will cause a return to Executive mode.
### APPENDIX B2

<table>
<thead>
<tr>
<th>Op Code</th>
<th>Mnemonic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>STOP</td>
<td>Return control to operating system</td>
</tr>
<tr>
<td>01</td>
<td>CLA</td>
<td>A = 0</td>
</tr>
<tr>
<td>02</td>
<td>INC</td>
<td>A = A + 1</td>
</tr>
<tr>
<td>03</td>
<td>DEC</td>
<td>A = A - 1</td>
</tr>
<tr>
<td>04</td>
<td>ADDS</td>
<td>S(+1) = S(+1) + S : SP = SP+1 V,C</td>
</tr>
<tr>
<td>05</td>
<td>SUBS</td>
<td>S(+1) = S(+1) - S : SP = SP+1 V,C</td>
</tr>
<tr>
<td>06</td>
<td>SWAB</td>
<td>Swap bytes on A</td>
</tr>
<tr>
<td>07</td>
<td>HOP</td>
<td>PC = PC + 1</td>
</tr>
<tr>
<td>10</td>
<td>HOPV</td>
<td>PC = PC + 1 if A = 0</td>
</tr>
<tr>
<td>11</td>
<td>HOPN</td>
<td>PC = PC + 1 if A ≠ 0</td>
</tr>
<tr>
<td>12</td>
<td>HOPL</td>
<td>PC = PC + 1 if A &lt; 0</td>
</tr>
<tr>
<td>13</td>
<td>HOPG</td>
<td>PC = PC + 1 if A &gt; 0</td>
</tr>
<tr>
<td>14</td>
<td>NOT</td>
<td>A = A</td>
</tr>
<tr>
<td>15</td>
<td>NEG</td>
<td>A = -A</td>
</tr>
<tr>
<td>16</td>
<td>INCX</td>
<td>X = X + 1</td>
</tr>
<tr>
<td>17</td>
<td>DECX</td>
<td>X = X - 1</td>
</tr>
<tr>
<td>20</td>
<td>SWAX</td>
<td>X = A : A = X</td>
</tr>
<tr>
<td>21</td>
<td>SWAR</td>
<td>R = A : A = R</td>
</tr>
<tr>
<td>22</td>
<td>ASL</td>
<td>Arithmetic shift left 1 bit V,C</td>
</tr>
<tr>
<td>23</td>
<td>ASR</td>
<td>Arithmetic shift right 1 bit V,C</td>
</tr>
<tr>
<td>24</td>
<td>NOR</td>
<td>Rotate right 1 bit V</td>
</tr>
<tr>
<td>25</td>
<td>ROL</td>
<td>Rotate left 1 bit V</td>
</tr>
<tr>
<td>26</td>
<td>CLV</td>
<td>V = 0</td>
</tr>
<tr>
<td>27</td>
<td>SEV</td>
<td>V = 1</td>
</tr>
<tr>
<td>30</td>
<td>HOPV</td>
<td>PC = PC + 1 if V = 1</td>
</tr>
<tr>
<td>31</td>
<td>CLC</td>
<td>C = 0</td>
</tr>
<tr>
<td>32</td>
<td>SEC</td>
<td>C = 1</td>
</tr>
<tr>
<td>33</td>
<td>HOPC</td>
<td>PC = PC + 1 if C = 1</td>
</tr>
<tr>
<td>34</td>
<td>CCY</td>
<td>C,V+0</td>
</tr>
<tr>
<td>35</td>
<td>SCV</td>
<td>C,V+1</td>
</tr>
<tr>
<td>36</td>
<td>SWAP</td>
<td>SP = A : A = SP</td>
</tr>
<tr>
<td>37</td>
<td>PUSH</td>
<td>S = A : SP = SP -1</td>
</tr>
<tr>
<td>40</td>
<td>POP</td>
<td>A = S : SP = SP + 1</td>
</tr>
<tr>
<td>41</td>
<td>RTS</td>
<td>PC = S : SP = SP + 1</td>
</tr>
<tr>
<td>42</td>
<td>MULS</td>
<td>S(+1) = S(+1)×S : SP = SP + 1 V,C</td>
</tr>
<tr>
<td>43</td>
<td>DIVS</td>
<td>S(+1) = S(+1)/S : SP = SP + 1 R,V,C</td>
</tr>
<tr>
<td>44</td>
<td>PACC</td>
<td>Print accumulator</td>
</tr>
<tr>
<td>45</td>
<td>RACC</td>
<td>Receive integer in accumulator</td>
</tr>
<tr>
<td>46</td>
<td>PSSTR</td>
<td>Print string</td>
</tr>
<tr>
<td>47</td>
<td>PSTR</td>
<td>Receive 2 byte string</td>
</tr>
<tr>
<td>50</td>
<td>NLIN</td>
<td>Move cursor to next line and clear</td>
</tr>
</tbody>
</table>

**Notes:**

- M = Contents of address
- S = Stack (SP)
- V = Overflow
- PC = Program counter
- C = Carry
- A = Accumulator
- X = Index Register
- R = Remainder Register

---

### APPENDIX B3

<table>
<thead>
<tr>
<th>Library Subroutine Calls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assembler</strong></td>
</tr>
<tr>
<td><strong>Mnemonic</strong></td>
</tr>
<tr>
<td>PACC</td>
</tr>
<tr>
<td>RACC</td>
</tr>
<tr>
<td>PSTR</td>
</tr>
<tr>
<td>RSTR</td>
</tr>
</tbody>
</table>

**Appendix B4**

**Operating System Commands**

- RUN NNN Begin program execution at address NNN (default 0)
- DUM NNN-NNN nn Dump specified memory on KNN. Default all to user KB.
- SAV xxxxxxx Save program xxxxxxx
- OLD xxxxxxx Load program xxxxxxx
- APP xxxxxxx Append program xxxxxxx
- UNS xxxxxxx Unsave program xxxxxxx
- CAT Catalogue saved programs
- BYE Return control to host machine
- RUNT NNN As RUN but with trace option. (MINTIM only)

**Note:** All NNN address locations are specified in octal.
Appendix C

References

1. A.U.C.B.E. Herfordshire
Beginners Mini Computer
April 1977 - Bill Tagg

2. MACRO-11 Programming Manual

3. PLAN Programming Manual

4. Intel-8080 Microprocessor Handbook

5. Electronic Data Processing - Emery

6. 808 CPU Architecture and instruction set

RUN MINSIM
O'S MODE
Would you like a command summary (Y or N)? N

OLD SORT!
SORT SIM SUCCESSFULLY LOADED.

DUM
PROGRAM SORTL.SIM

---

Send your articles of interest to the RSTS community to the RSTS Professional on tape mail in either RNO, PIP or WORD-11 format. Eighty percent of this issue was transmitted via telecommunications from author's mag tapes to phototypesetting equipment and was not retyped.
Having completed the SIMINI guide as a complete document, I will now give some simple examples, as used within the complimentary simulation MINSIM, to illustrate further what may be done.

Firstly, the program MEAN1.SIM which takes a list of n values and calculates the mean. The number of values, n, is contained in location = 400. For ease of use I have stored the list as a separate file named SRTDAT.SIM on backing store - note there is no effective difference between data and programs in this context. The data is subsequently appended to the program prior to execution. In the educational sphere, tutors may use this technique to allow students' programming exercises to be proved out on the tutors' own definitive set of test data.

The second example is SORT1.SIM which is a simple bubble sort routine. It operates on data to the same conventions as MEAN1. Listings are included of both these programs followed by an example run of them.

The third example is NFACT.SIM which calculates N factorial. Points of interest in this example are the use of the stack in subroutine calling, which incidentally is recursive in this case, and the use of the Trace option on running.

Further examination of these programs will, I hope, lead to the subsequent development of your own ideas (e.g., what to do if the sum of the list supplied to MEAN1 is greater than 32767?) and new programming exercises such as the use of linked lists, tree searching, boolean logic tests ... etc.

I wish you many hours of interest and fun.
In the June issue of RSTS I discussed a proposed startup command file that provided a superset of EDT commands. In this article I'd like to expand on that just a little, correct a few minor errors, and look at using and teaching EDT the VAX environment.

First, corrections:
1. The TD (tab decrement) in the insert ruler command: GOLD _ is redundant and should be deleted.
2. The final line of the macro APP (for copying to the end of the PASTE buffer) should end with a full stop - returns one to the right place in the MAIN buffer. A fifth line: INSERT= APP SO; may be added if the direction set will always be forward when the command is used - returns to the line the command was issued on.
3. One inconsistency: CTRL/F is a preassigned function, (though I never use it); I suggest changing the key definition assignment to CTRL/G, - go forward 20 lines!

Finally, the last line of the first page (P 68) should not have been justified!

**ENTRY OF A PL/I PROGRAM STUB**

On the subject of PL/I, here's a command that I use quite often especially when starting a new program and working top down, enter a procedure name, then type GOLD CTRL/D and get a ready made stub, eg:

```
DEMONSTRATION: PROCEDURE;
```

The key definition is:

```
DEF K GOLD CONT D AS
"ADV -W DW UNDW El 1: PROCEDURE;CR> 
<CR> END1 UNDW El 1:Z BACK EL ADV."
```

Since the GOLD CTRL key sequences cannot be used in autorepeat mode they are well suited to this type of occasional use.

**UNDERLINING**

On Diablo printers the <ESC> E & <ESC> R key sequences switch the auto underline facility on & off respectively. GOLD CTRL/U defined below will insert the escape sequences at the beginning and end of a line.

```
DEF K GOLD CONT U AS "<ESC> E <ESC> R".
```

Alternatively, macros may be used to toggle the definition of GOLD CTRL/U between inserting <ESC>E and <ESC>R, allowing the underlining of individual words and groups of words as required.

```
DEFINE MACRO UON
INSERT=UON 10; INSERT <ESC>E ; 
INSERT=UON 20; DEF K GOLD CONT U AS "EXT UOFF."
```

```
DEFINE MACRO UOFF;
INSERT=OFF 10; INSERT <ESC>R ; 
INSERT=OFF 20; DEF K GOLD U AS "EXT UON."
```

Next a couple of items on David Spencer's wish list (RSTS April). First a 'view all' mode, to distinguish between spaces and tabs.

**‘VIEW ALL’ MODE**

The following macro does the job:

```
DEFINE MACRO TAB
INSERT=TAB 10; CLEAR TABSHOW
INSERT=TAB 20; COPY SELECT TO: TABSHOW
INSERT=TAB 30; FIND: TABSHOW
INSERT=TAB 40; SUBSTITUTE/ /TAB>
```

and it may be activated using GOLD CTRL/T via the following definition:

```
DEF K GOLD CONT T AS "EXT TAB."
```

The macro copies a selected range to a buffer and substitutes the character string "<tab>" for each tab, and the buffer is displayed. The command may be used for inspection only, or the tabs may be edited out and the original select range replaced using the GOLD R command, as follows:

1. type GOLD M — return to the main buffer
2. reselect text range
3. type GOLD R, then enter the buffer name: TABSHOW

```
Of course, it's only a pseudo 'view all' mode, but that's better than none.

ON THE VAX: (Some DCL procedures)

Next, a way of remembering the last file edited. This is a command procedure for the VAX. To edit a file using this procedure (EDIT.COM below) type:

$ ED [filename]

where filename is optional & defaults to the last file edited if not specified. The procedure uses a temporary file EDIT.TMP to store the name of the last file edited. This file, the command file, and the EDITIN.EDIT startup file may all be kept in a subdirectory and used throughout the account — provided adequate file specification is used in LOGIN.COM, and EDIT.COM.

EDIT.COM

$ED Procedure to automatically 'remember' last file edited
$ ON ERROR THEN CONTINUE
$ SET MESSAGE/NOERROR/NOFACILITY/NOIDENTIFICATION/NOTEXT
$ IF $1 .NES. "*" THEN GOTO NEWFILE
$ OPEN/READ LAST EDIT.TMP ! Get last file edited
$ READ LAST EDITFILE
$ CLOSE LAST
$ GOTO OLDFILE

ANDFILE:
$ EDITFILE := "P1"
$ DELETE/NOLOG EDIT.TMP:*!
$ OPEN/WHITE LAST EDIT.TMP
$ WRITE LAST EDITFILE ! Save file name
$ CLOSE LAST

$CLEAN:
$ CLEAR ! Clears screen, see below
$ TYPE EDIT.TMP
$ SET PROTECTION = (S:RWED,G:RWED,O:RWED,W:RWED) 'EDITFILE'
$ ASSIGN/USER SYS$COMMAND SYS$INPUT
$ EDIT/EDIT.COM [PAULUS,SUBJECT,IN.IOFILE] 'EDITFILE'
$ SET PROTECTION = (S:RWE,G:RWE,O:RWE,W:RWE) 'EDITFILE'
$ SET MESSAGE/TEXT

The following command synonyms are useful to have defined in one's LOGIN file:

$ ED := EDIT
$ DEL := DELETE/EDIT.BAK:*!
$ TIE := TYPE EDIT.TMP ! What was the last file I edited?
$ CLEAN := CLEAN ! See below
$ KILL := KILL ! " "

The following are useful definitions to have in the system symbol table:

USER.COM

...$ P1 [: SET PROTECTION = (S:RWED,G:RWED,O:RWED,W:RWED) ! Delete protect
$ PRO [: SET PROTECTION = (S:RWED,G:RWED,O:RWED,W:RWED) ! Unprotect
$ CLS[0,7] := 27 ! <ESC>
$ CLS[6,7] := 72 ! T
$ CLS[16,7] := 77 ! <ESC>
$ CLS[24,7] := 74 ! J
$ CLEAR := WRITE SYSTEMPUT CLS ! Clears screen...
...

Another handy little procedure is: CLEAN.COM, for tidying up mail. Used as follows; e.g.:

$ CLEAN TEST.FOR

CLEAN.COM

$ IF $1.NES. "*" THEN $1 := "$" ! See definitions of PRO & PRI above
$ PRI [P1]:*
$ PRO [: SET PROTECTION = (S:RWED,G:RWED,O:RWED,W:RWED) ! Unprotect
$ CLS[0,7] := 27 ! <ESC>
$ CLS[6,7] := 72 ! T
$ CLS[16,7] := 77 ! <ESC>
$ CLS[24,7] := 74 ! J
$ CLEAR := WRITE SYSTEMPUT CLS ! Clears screen...

This procedure deprotects, purges, renames and then protects. Deprotection is required to avoid renaming resulting in ancestral files with higher version numbers than the most recent version. The /NP switch of the CLEAN command is

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A VAX version will be available later.

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TEACHING EDT

If your system can take the load, the increased productivity of programmers using EDT should be advantageous. Certainly, once learned it will not willingly be forsaken for anything less. DEC's EDTCAI package has some disadvantages: It requires a VT100 and a lot of patience. There is little or no disadvantage in learning EDT on a 'foreign' terminal, as it's easy to find one's way around a DEC keyboard, especially with the help of an accurate keypad diagram! A yellow and a green sticker on the GOLD and HELP keys respectively is helpful.

The following command procedure, again for the VAX, provides a simple alternative. In this installation it's the LOGIN command file of an account called EDTHELP. This facility and 'the monkey see monkey do school of editing' has now converted most editor using colleagues to EDT. This procedure uses a number of files of filename type EDTn.LRN, where n = the number of the lesson. The EDTINI.EDT file in this account merely sets screen mode.

EDTLRN.COM

EDTLRN.COM

$ DCL Command procedure to instruct in the rudiments of EDT. Get started!
$ $END + 10 ! Number of lessons available
$ CLEAR
$ COPY/MOD SYS$OUTPUT SYS$INPUT

INTRODUCTION TO EDT:

Required: A Lear Siegler ADM 31 terminal and a map of the keypad.

This command file will present a number of introductory sessions with EDT. Most consist of a little over one screen in content, and you may exit when you feel that you've had enough.

$ INQUIRE COUNT "Commence with lesson number" $ IF COUNT .GE. 1 , AND. COUNT .LE. END THEN GOTO LOOP $ WRITE SYS$OUTPUT " " $ WRITE SYS$OUTPUT "Defaulting to lesson number 1" $ COUNT = 1 $ LOOP: $ ASSIGN/USER MODE SYS$COMMAND SYS$INPUT $ EDT/EDIT/PERSONAL EDT=COUNT*LRN;1 $ IF COUNT .EQ. END THEN GOTO FINISH $ CLEAR $ INQUIRE ENOUGH "Next lesson [Y/N]" $ IF ENOUGH .NE. "Y" THEN GOTO FINISH $ COUNT = COUNT + 1 $ GOTO LOOP $ FINISH:
$ LOGOUT

The following are the first 3 EDT*.LRN files, for illustration: EDT1.LRN

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useful when working in other less privileged accounts. Note: using EDT.COM above, the latest version is automatically protected against deletion.

KILL.COM

KILL.COM

$ IF P1.EQ. "*;*" THEN GOTO REFUSE ! Prevents a nasty accident $ PRO 'P1' $ DELETE/LOG 'P1' $ EXIT ! Will also exit on privilege violation $ REFUSE: $ WRITE SYS$OUTPUT "$ 'DEL-W-TUTU, Don't be silly"

The above procedure is useful for deleting all files of any generic specification (with the exception of "*;*", which is not allowed), whether or not they are protected; test programs, etc. Should be used with care, and preferably only after a DELETE command has failed.

October 1982

INTRODUCTION

EDT is a full screen keypad editor. Function keys are the numeric keypad keys. Text is entered by typing using the keyboard.

There are 2 ways of leaving EDT. First type CTRL/Z then either QUIT or EXIT QUIT does not save your edits. EXIT creates a new file incorporating changes. While using this course you should always use QUIT.

There is a HELP key available while using EDT, however there are some slight differences between the positions of the keys on a VTS2 and the ADM 31, and the latter does not have a backspace key.

To overcome this a diagram of the ADM 31 keypad is available interactively should you require it. This is accessed by typing the GOLD key followed by H (the GOLD key is immediately to the right of the BREAK key on the top line of keys). Use GOLD H to get back to your text.

Try using GOLD H to get to the keypad diagram and back again. Next quit this lesson by typing CTRL/Z followed by QUIT.

EDT2.LRN

Pin the key map on the wall behind your terminal for reference, and you are ready to begin. First memorize the position of the following keys: (refer to map)

GOLD HELP DELETE LINE

next find the cursor moving keys, marked with arrows.

Move the cursor to the start of the line after this one, NOW DELETE THIS LINE, USING THE DELETE LINE KEY.

Now undelete that line by typing GOLD followed by DELETE LINE (do not hold both keys down together)

OK Now you can delete & undelete lines. Note that to copy a line you can delete it, and then undelete 2 or more times.

***************Try it with this line**************

Similarly you can move a line by deleting it, moving the cursor to where you wish the line to go, and then undeleting the line.

(line is inserted before the cursor position) now QUIT

EDT3.LRN

There are ways of moving around the screen and up and down in the file other than by using the arrows.

*Move the cursor so that it is over the asterisk (left) using the down arrow.

Now type the keypad 2, followed by CTRL/H

That is how to get to the beginning & end of a line respectively

Now type the keypad 0 until the cursor is over the # on the next line.

# Fine, this key allows you move up and down a line at a time.

To move UP type [5] and then type [0] a few times.

To move DOWN again type [4] and then [0] until you get back to where you want.

TOP: To get to the top of the file type [G] [5] [G] = GOLD

BOTTOM: To get to the bottom of the file type [G] [4]
BACmac is a unique software tool, running under RSTS/E, which provides the following conversions:

- Translation from Basic-Plus "compiled" back to Basic-Plus source code (only the comments will be missing)
- Translation from Basic-Plus into Macro source code, which compiled under RSTS runs faster than Basic-Plus
- Translation from Basic-Plus into Macro source code which may be compiled under RSTS for execution under RT11 — a migration facility
- Translation from Basic-Plus into a RUN-TIME SYSTEM. Now you can write an RTS in Basic-Plus. The ideal solution to memory thrashing due to "multi-copy" applications programs.

RSTS/E, RT11, Macro-11 and Basic-Plus are trademarks of Digital Equipment Corporation.

Now you can do the following:
1. Delete, undelete, copy and move lines.
2. Use the arrowed keys, [0], [2] and CTRL/H to move around the screen.
3. Get to the top and bottom of the file.

Now QUIT

TIPS ON USING EDT:

1. Try to do your editing at the end of a buffer, where possible, to minimize whole screen updates. Typing beyond the end of a line, unintentionally, on a full screen can cause a lot of unnecessary I/O (unless TRUNCATE is set).
2. If you are worried about the availability of disk space as you are about to leave EDT, use the QUIT/SAVE command to save your edits in the journal file, and then reapply them later using the /RECOVER facility. Regular use of the CLEAN command (see above) will keep your directories uncluttered.
3. Make a backup of your edits at suitable intervals. 'Suitable' depends on a number of criteria, mainly: a) how often your machine goes down b) the size of the file you’re editing c) how much you’ve done since you last exited or backed up EDT provides the facility — use it!

A COMMON ERROR

Incomplete specification of redefined key for use with a repeat count:

The CTRL/K command is used to redefine keys interactively. The HELP & PAGE keys should be redefined first, as they will require only one keystroke to be used, and their original functions will hardly be missed.

Example:
Required: To delete the 14th through 19th characters on every line in a file.

CTRL/K

Press the key you wish to define [HELP]
Now enter the definition:
(+ 13C 6DC L) <enter>

The parentheses define the command as a single operation, and the full stop will cause it to be executed immediately the key is pressed, without having to type <enter> to terminate the command. It’s always a good idea to test key redefinitions before letting them loose with a repeat count, so having verified that the definition functions correctly, proceed with the edit:

GOLD n [HELP] n = repeat count > lines in file

An error commonly made is to omit the parentheses, which in this case would cause the + 13C operation to be repeated ‘n’ times before 6 characters were deleted and the remainder of the command executed.
Be sure you know the introductory material in Volumes I — IX of the RASCAL documentation. Pay particular attention to sections K — Q of Chapter 38, pages 852-1921. You should memorize the material in Volumes XII — XIV. The information in Volumes XXI — XXXIV will not be needed until next week.

Note:
The RASCAL "compiler" performs 256 passes on your source code. This turns the source code of your program into compact pseudo-code. For example, after one pass, the following program requires 1.042 blocks of storage for the pseudo-code. After the 256th pass, the pseudo-code needs only 168 blocks. Here is the program:

```
START //@
ASSIGN THE VALUE 'Z' TO THE VARIABLE :A ://@
ASSIGN THE VALUE 'Z' TO THE VARIABLE :B ://@
REVEAL ACCUMULATED SUM// @
STOP// @
QUIT// @
END//@
```

Note also that since the RASCAL run-time system takes 26K words, user programs must not exceed 4K words. This can be easily accomplished by using no more than four variables in any one program. Programs over 8 or 9 lines usually do not compile anyway.

Note also that since the RASCAL run-time system takes 26K words, user programs must not exceed 4K words. This can be easily accomplished by using no more than four variables in any one program. Programs over 8 or 9 lines usually do not compile anyway.

RASCAL requires a new disk directory structure and must DELETE all disk files currently in your account. Please wait..

---

**QUE.11 — V2.2**

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- QUEMAN, QUMRUN... etc.
- OPSE, OPSRUN... etc.
- ATPK, ATPRO

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---

CIRCLE 11 ON READER CARD
**RSTS SITE MANAGEMENT AND APPLICATION DEVELOPMENT TOOLS**

- **M/APS**
  - A menu/authorization processor and application security system that controls user access to menus and applications programs. Uses DEC's VT series CRTs.

- **VT100 ACCOUNTING CALCULATOR**
  - A multi-function calculator designed for users of DEC's VT100 CRTs. Options and features beyond the capabilities of the normal Accountant's calculator.

- **SOURCE/FILE CROSS-REFERENCE (XREF)**
  - XREF provides cross-reference listings which detail the relationship between source files, callable routines, data files and task images.

- **APC**
  - An automatic password changer that creates meaningful six-character passwords and updates the ACCT.SYS file, allows selective changing of passwords and produces three informative reports.

- **KEYBOARD MASTER**
  - A system support tool that allows the system support manager to monitor, interact or take control of an interactive session.

- **STANDARD SUBROUTINE LIBRARY**
  - Callable macro-11 routines that perform screen and terminal I/O, cursor positioning and many other necessary program functions, including data conversions.

- **ENCRIPTION ROUTINES**
  - A site security feature which encodes ASCII characters and can be incorporated into any application where sensitive data is processed. Also exists as a stand alone program for encoding and decoding entire files.

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**CIRCLE 57 ON READER CARD**
October 1982

RSTS PROFESSIONAL RSTS PROFESSIONAL RSTS PROFESSIONAL RSTS PROFESSIONAL RSTS PROFESSIONAL RSTS PROFESSIONAL

\[1320 \text{PIPP.CALLS} = \text{SYS( TRAP.CTRL.CS) \}
\]
\[1310 \text{PIPP.CALLS} = \text{SYS(CHR$(ll)) \}
\]
\[1300 \text{CLOSE KB} = \text{CANCEL.ALL.TYPE.AHEAD$} = \text{SYS(CHRS(11)) \}
\]
\[1290 \text{RESUME 1300 IF ERL = 28 OR ERR = 11 AND ERL > 1290} \]
\[1280 \text{RESUME 1100 IF ERR = 11 AND ERL < 1050} \]
\[1270 \text{PRINT CLEAR.SCREENS} = \text{BELLS} \]
\[1260 \text{PRINT TAB(S POT); 1---------------------1} \]
\[1250 \text{PRINT TABCSPOT; 1 APRIL F 0 0} \]
\[1240 \text{PRINT TABCSPOT; 1---------------------1} \]
\[1230 \text{SPOT 27} \]
\[1220 \text{PRINT CLEAR.SCREENS} = \text{BELLS} \]

SHORT BUT USEFUL

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DEGRADING YOUR RSTS/E SYSTEM

By PHRED

ABSTRACT

When, in the course of computing events, it becomes necessary to convince management of the need to acquire new hardware, many users and software people have found it very useful to tune their RSTS/E systems in strange and unusual ways. This paper will discuss some of the more effective ways to bring your system to a grinding halt, particularly by using features that are available with RSTS/E version 7.0 (7.1 and 7.2 included).

The Disk Sub-System

The disk sub-system of RSTS/E is probably the most fruitful area of endeavor for the fertile imagination. Though some recommendations have been discussed in various publications to improve the performance of the RSTS/E disk subsystem, they have never been explained in a way which would allow the system manager to be sure that he was getting the worst performance possible.

A very important area of study is the use of public versus private disks. Wherever possible, the use of private disks should be discouraged. One should take full advantage of the time required to search the directories of all the disks in the public structure when performing file lookups. While one or two private disks might not greatly affect the performance of a large system, every little bit helps.

Seldom used files should be explicitly placed and positioned on the system disk. These files should preferably be placed at the front of the directory and made contiguous in the center of the largest free contiguous space on the disk. This will help to ensure that the longest directory search possible will be required when opening, creating, looking for, or deleting a file, as well as making contiguous space a scarce resource. Conversely, often used files should be placed at the end of the device list. The last disk drive of your public disk structure (in order listed by SYSTAT) is an ideal place for files that must be accessed by many users on your system.

Create and use the smallest number of accounts as is possible. Ideally, all file creation and deletion should occur in the system account (account [1,2]) or in the library account (account [1,1]). Since this is rarely practical due to security problems, one could compromise by placing the large, frequently extended files in [1,1], as many of the system and language related files as possible in [1,2], and all the users files in their own directories.

If you must use many accounts then try to put as many files as possible in [1,1] or [1,2]. And, by all means, put every program possible in the system or library accounts with the least-frequently used programs at the front of the directory. If you do not care to re-create your system directories to accomplish this, then you can use the appropriate OPEN mode to place the file at the "front" of the directory. Temporary files should always be created at the "front" of an accounts directory.

Avoid the use of random access files. It is always better to read ordered files sequentially, creating a new copy of the file
on each pass through the file. If a file will be extended in the course of normal operation, avoid pre-allocating the disk space required, as this usually significantly reduces the time required to extend the file during production. On the other hand, all files which will never change should be extended to at least twice the required size, to allow for future growth.

Disk Caching

An important feature of RSTS/E version 7.0 is the user data caching. While this feature is designed to enhance system performance, careful abuse can make file-processing worse than has been possible on previous major releases of RSTS/E. A good rule of thumb is to cache all random files sequentially, and sequential files randomly. It is also exceedingly important that you make your cache clustersize at least twice the pack cluster size of your most frequently used disk. This will help the cache be filled with data it will probably never use. These suggestions are even even more effective if XBUF is kept very small.

Memory Allocation

Proper abuse of available memory is essential for system degradation, and may even be more effective on some systems than abuse of the disk sub-system. The following suggestions emphasize the reduction of memory available for user jobs, an essential consideration in creating bottle-necks.

XBUF is the means by which Small Buffers are saved and directory and data caching is implemented. A properly sized and placed XBUF can aid in crippling a system. If your system uses disk and data caching or uses the SEND/RECEIVE system service, then the XBUF file should be no more than 8KW. However, if your system does not use these services then XBUF should be allocated to take up at least 30% of the available system memory.

Run-Time System should always be loaded with the "/STAY" when possible. The only requirement imposed by RSTS/E is that there be one contiguous region of memory large enough to accommodate the largest possible user job. It is exceedingly wasteful to allow more than one job to reside in core if it can be avoided.

If your system is too small to accommodate all possible Run-Time Systems, select the least used Run-Time System to be permanently resident. It is highly desirable for the user jobs to compete with Run-Time Systems for available space in memory.

Permanently-resident Run-Time Systems should not be loaded contiguously in memory. An initial guess would be that 3KW to 8KW of free memory should appear between each Run-Time System. This should help to keep the memory manager busier than might otherwise be possible.

If you have too much memory, filling it with Run-Time Systems, Resident Libraries (new feature as of version 7.0) should help. It is relatively easy to create Resident Libraries, and useless routines can be effectively combined to occupy memory space that might otherwise go wasted as user job space. The same care should be used in placing Resident Libraries as was used in placing Run-Time Systems.

When placing XBUF, Resident Libraries, or Run-Time Systems, one should always begin about 5KW above the MONITOR. This allows the memory management routine to search through the greatest amount of memory before allocating space.

The feature patch "First Fit" is another excellent way to keep the memory boggled. Whenever there is less than 128KW of memory on a system the patch should always be installed. Conversely, whenever there is more than 512KW of memory, it should never be installed. Systems with memory between 128KW and 512KW may need to experiment with it before making a decision on using this patch.
Daily Operations

It is essential to understand the correct use of the so-called 'utility' programs, or CUSPs. These tools can be used in seemingly innocent ways to make life on your system a disaster.

The BACKUP package, of course, is your biggest problem. It was designed to create copies of your system that can be used if some catastrophic error causes you to lose one or more files. Aside from being very carefully designed to recover from bad blocks, BACKUP attempts to optimize your directory structure when it restores files. While this may be insignificant on some systems, it is rumored that there are systems where a complete BACKUP and RESTORE of the public disk structure has greatly increased system throughput. (If that is your goal, this document is not for you anyway.) The following suggestions should help you keep your system running even more poorly.

Instead of using the BACKUP package, use the COPY program that was used during SYSGEN (after all, if it’s good enough for SYSGEN, then it’s good enough for production). When at all possible, backup should be performed during production. This increases the probability of incomplete backup volumes and degraded performance. COPY is singularly susceptible to bad blocks on disks; a well-timed bad block will allow you to go screaming to your management, crying that you must have another computer to back up your current system. This procedure is common in government agencies: and it usually works.

Never install patches that are described in the RSTS/E Software Dispatch. These patches are intended strictly to improve the performance of your RSTS/E system and will be of little help to you. True, you may lose days, weeks, or even months of work from a bug that should have been corrected nine months ago, but what better reason to ask for more money (for a new computer)?

Miscellaneous

Here are a few miscellaneous tips for continued performance degradation:

- Run as much in batch mode as possible.
- New Files First directory structure on the system disk.
- Use (or at least create) as many CCL's as possible.
- Have a terminal continuously running VT50P (at XO).
- Set all terminals to the highest baud rate possible.
- Always use DIRECT, not PIP/LI, for directory searches.
- SYSGEN as few small buffers as possible.
- SYSTEM the system with the statistics gathering option. This one feature can use as much as 12% overhead.
- Only create one swap file, and create it twice as large as needed. Or create a second swap file on the slowest or the busiest disk.

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"BRING YOUR BOSS FOR FREE" ADMISSIONS POLICY ANNOUNCED FOR DEXPO/WEST 82; MORE THAN 200 BOOTHS ALREADY TAKEN FOR 2ND DEC-COMPATIBLE EXPOSITION
Anaheim, CA — A new "Bring Your Boss for Free" admissions policy makes it possible for data processing managers, top corporate executives and senior technical staff members at companies using Digital Equipment Corp. computers to register for DEXPO/West 82 at reduced prices . . . when they come in pairs. DEXPO/West 82, the Second National DEC-Compatible Industry Exposition, will be held at the Anaheim Convention Center, Anaheim, CA, December 7-9, 1982.

The announcement was made today by Larry Hollander, president of Expoconsul International, Inc., organizer of the DEXPO Shows. "We hope to encourage greater communication among all levels of management at DEC-using companies," Hollander explained. "Because the DEXPO features all the latest in DEC-compatibles, and only DEC-compatibles, the Show gives DEC-users an excellent opportunity to explore maximum potential of their computer systems, — and then make fully informed decisions." Visitors from the same company will be required to register in pairs and present business cards as documentation in order to take advantage of the program. Both registrants will then pay only half the usual at-door registration fee — that is, two for the price of one.

DEXPO/West 82 will be the largest DEC-compatible show ever — twice the size of the first DEXPO held last May. The first Show featured 125 vendors occupying 150 booths. DEXPO/West will have 250 vendors in 300 booths. For additional information, contact Larry Hollander, president, Expoconsul International, Inc., Cranbury, NJ 08512; Call (609) 799-1661.

TALKS ON DEC-COMPATIBLE SOFTWARE DOMINATE SCHEDULE OF PRODUCT FORUMS TO BE PRESENTED AT DEXPO WEST 82
Anaheim CA — Reflecting the rapid pace of technical advances in DEC-compatible software, discussions of these advances dominate the Product Forums scheduled for DEXPO West 82. While the wide-ranging program affords ample coverage of hardware topics as well, talks on software productivity, data analysis programs and relational data base management systems typify the software orientation of the Product Forums as a whole.

"By attending a Product Forum, in the space of only twenty minutes, executives who own, manage or use DEC computers will discover exactly what the latest DEC-compatible technology has to offer," said Larry Hollander. Hollander is president of Expoconsul International, Inc., organizers of the DEXPO Shows: DEXPO WEST 82; DEXPO EAST 83; and DEXPO EUROPE 83. "And since the presentations will be made by exhibiting DEC-compatible vendors," he continued, "visitors will have the opportunity to follow up on sessions of greatest interest to them by contacting the speakers right in their exhibit booths."

Among the exhibits, visitors will find 250 vendors demonstrating thousands of DEC-compatibles, including hardware, software and related services and supplies. The Product Forums, which complement what will be the world's largest exhibition of DEC-compatible products and services ever held, are free to all Show registrants. Approximately 60 Product Forum presentations will be made during the three-day event.

For additional information, contact Larry Hollander, president, Expoconsul International, Inc., 19 Yeger Road, Cranbury, NJ 08512; call (609) 799-1661.

DEC-COMPATIBLES AT DEXPO WEST 82 TO INCLUDE FULL RANGE OF HARDWARE, SOFTWARE & SERVICES: MANY ON EXHIBIT FOR FIRST TIME
Anaheim CA — In preparation for what will be the world’s largest exhibition of DEC-compatible products and services ever held, approximately 250 vendors are readying their latest offerings for exhibit at DEXPO WEST 82. The Second National DEC-Compatible Industry Exposition. And an informal survey of exhibitors plans reveals that visitors will find the entire range of DEC-compatible hardware, software and related services and supplies well represented at the December 7-9 event, set for the Anaheim Convention Center, Anaheim, CA.

"Literally thousands of DEC-compatibles will be demonstrated," announced Larry Hollander, president of Expoconsul International, Inc., "including hundreds that have never been exhibited before." As a notable example, Hollander cited the totally new category of DEC-compatibles spawned by the introduction of DEC's personal computers. Expoconsul International, Inc., is the organizer of DEXPO WEST 82 as well as the other DEXPO Shows — DEXPO EAST 83 and DEXPO EUROPE 83.

"The fact is, most owners, managers and users of DEC computers are not aware of all the technically advanced DEC-compatible resources on the market," Hollander explained. "Now for the first time, they’ll have access to the technologies that promise to make their DEC systems even better." DEXPO WEST 82 is expected to attract 8,000 visitors from every management level — top management, DP management, senior technical staff, administrative management and other members of the decision-making team.

Additional information is available by contacting Larry Hollander, president, Expoconsul International, Inc., 19 Yeger Road, Cranbury, NJ 08512, call (609) 799-1661.

"MRP PLUS" TO BE INTRODUCED AT DEXPO/WEST 82
Belmont MA — Interactive Management Systems, Belmont, MA, will introduce "MRP PLUS": An Innovative Approach to MRP II” at the Second Annual DEC-Compatible Exposition, Anaheim Convention Center, December 7-9, 1982.

The product of the total integration of IMS' twelve accounting and manufacturing software packages, "MRP PLUS" is designed to give the executive and data processing professional the tools he or she needs for successful Manufacturing Resource Planning (MRP II).

MRP II, as defined by Oliver Wight in The Executive's Guide to Successful MRP II (Oliver Wight Limited Publications/Prentice-Hall, 1982) is, "a company game plan for manufacturing, marketing, engineering, and finance." The objective of the plan is to ensure that all divisions of a company are working as a team for the betterment of overall corporate productivity and growth.

"MRP PLUS" not only meets the objectives of MRP II, but helps the executive to break through specific corporate bottlenecks and to achieve critical goals such as reduced inventory and obsolescence, improved customer service and accountability, and decreased purchasing costs and overtime.


IMS' native mode software is written in VAX-11 BASIC, utilizing VAX-11 RMS, making it compatible with DEC's Datatrieve query language.

For more information on "MRP PLUS", write or call Mike Carabotta, IMS V.P. Marketing, 375 Concord Avenue, Belmont, Massachusetts 02178-3094, (617) 499-3850.

COMPUTER SYSTEMS CORPORATION ANNOUNCES VERSION 1.1 OF CALC-11

October 1982
Indianapolis IN — CALC-11, Version 1.1 of the electronic spreadsheet system, is now available for the PDP-11 and VAX computers. Computer Systems Corporation will be demonstrating CALC-11 at the Second National DEC-Compatible Exposition, Anaheim Convention Center, December 7-9, 1982.

The CALC-11 product is one in a series of products from the Software Products Division of Computer Systems Corp. CALC-11 has been designed to operate on all of the popular PDP-11 operating systems (RT-11, RT-11 with TSX plus, RSX-11, RSTS/E) as well as the VMS operating system for the VAX computer. CALC-11 will be available for the Unix operating system in the near future.

CALC-11 incorporates some exciting features not generally available on previous spreadsheet systems. In addition to providing many of the standard features, CALC-11 allows for data access to non CALC-11 files, file encryption, three dimensional spreadsheet (paging), multiple nested function capability, very flexible spreadsheet adjustment and various date formatting options.

Distribution and media is supplied with each purchase of CALC-11. The user manual incorporates both the tutorial section and the user reference section. The first time user of CALC-11 need only follow the tutorials in order to become proficient with this utility. The installation section of CALC-11 is very easy and requires less than a page of instruction.

CALC-11 licenses are priced according to which particular operating system is required. CALC-11 pricing starts at $2000.00. Educational and volume discounts are available. For additional information, contact: Computer Systems Corporation, 5540 Rock Hampton CT., Indianapolis, IN 46268, Attn: David Tortora, Phone (317) 872-7200, Telex 27-6243.

NYPLAN 3.0 — AN IMPORTANT NEW RELEASE OF THE NYPLAN FINANCIAL MODELING SYSTEM TO BE EXHIBITED FOR THE FIRST TIME AT DEXPO WEST 1982

Kirkland WA — Sophisticated business graphics which can be output to a wide variety of plotting devices, a matrix window with split screen, logic window with editor, visible calculation, help command, and goal seeking capabilities are a few of the exciting new features potential users will be able to try out at the 2nd National DEC Compatible Exposition, Anaheim Convention Center, Dec. 7-9, 1982. The NYPLAN system is presently available on RT-11, TSX+, RSX, IAS, RSTS, VAX/VMS, and TOPS 10/20 operating systems. Information available from NYPLAN INC., 135 Lake St., So. Kirkland, WA 98033, (206) 822-6074.

XYLOGICS TO DISPLAY COMPLETE LINE AT DEXPO WEST

Burlington MA — XYLOGICS will have their complete line of Peripheral Processors on display. These controllers are emulators interfacing disk and tape subsystems to Digital Equipment Corp.'s Q-Bus and Unibus; Data General's I/O Bus; and Intel/National's Multibus computer systems.

Software Saver Systems will be displayed in XYLOGICS "XL" series of packaged products. Utilizing Digital Equipment Corp.'s 'LSI-11/23 microprocessor and software products, the "XL" series, is a complete desk top packaged system that contains 22 bit addressing, up to 4MB of memory with RSX-11M, Q-Bus backplane, 34MB Winchester disk, 17MB tape cartridge, and 8 previred RS232 ports.

XYLOGICS new Storage Cells which provide new data storage solutions for PDP-11, LSI-11, VAX, Nova/Eclipse, and Multibus users will also be exhibited. The XSC100 disk and streamer tape unit provides up to 320MB of on-line storage capacity for PDP-11 and VAX users. The XSC200 series provides up to 140MB of storage capacity in a 5 1/2" x 19" cabinet for Q-Bus, Unibus, Multibus, and DG I/O Bus systems.

LOW COST, POWER-LOSS DATA RETENTION FOR LSI-11 AT ADAC DEXPO/WEST BOOTH 427

Woburn, MA — ADAC's Model 1816CMOS battery-backed RAM memory boards offer up to 30-day retention of 8 or 16 K word units of system data in the event of power outage or shutdown. Available in 168-hour and 30 day models for either 8K or 16K words, these half-quad boards plug directly into a single slot of the LIS-11 backplane.

On-board automatic switching and recharging circuitry keep the self-contained nickel cadmium batteries charged to peak efficiency. System data will be maintained at temperatures as high as 40°C for 30 days or longer. Full operating temperature range is 0° to 55°C.

Model 1816CMOS features write protect dip switches that are accessible while the memory board is positioned in the backplane.

Pricing for the 1816CMOS series is highly competitive with extremely low "per word" storage cost. Unit prices are:

- Model 1816CMOS-8S (8K, 168 hour retention) $695.00
- 8LS (8K, 30 day retention) $795.00
- 16S (16K, 168 hour retention) $1095.00
- 16L (16K, 30 day retention) $1295.00

For complete details and for special quantity pricing information, contact: Mr. Ben Minsk, ADAC Corp., 70 Tower Office Park, Woburn, MA 01801; Phone: (617) 935-6668; Telex: 949329.

DISC'S DBL AT DEXPO

Sacramento, CA — DBL is a business-oriented programming language which provides users of PDP-11 and VAX computers with portability, increased programmer productivity, and efficiency of operation. DBL is a much extended superset of DEC's DIBOL-11 but can accept virtually all existing DIBOL-11 sources unmodified. The extensions in DBL include structured programming facilities, source library 'include' capabilities, self-contained ISAM file structures, auto/load shared runtime support, and intermodule "global" data storage features. The DBL Symbolic Debugger permits immediate debugging of DBL programs without special advance preparations. The DBL ISAM facility is tree-structured and self-reorganizing. Reorganizing includes reclamation of unused index and data entries thus
greatly minimizing the need for frequent file reorganization. Portability of DBL programs is of paramount concern. Currently spanning all of DEC's major operating systems, DBL is now being developed for non-DEC environments so as to provide the widest possible choice of hardware and systems for the DBL users and distributors.

This product will be on exhibit for the first time by DISC at DEXPO WEST 82.

"TWICE-THE-LIFE", 8" DUAL-SIDES, DUAL-DENSITY FLOPPY DISKS FOR DEC'S Q-BUS.

Berkeley, CA — The FD4 Two-Megabyte Floppy Disk System from Synemed, Inc., offers twice the MTBF, twice the media life of other systems and a happy solution to the threat of critical data losses!

Based on NEC's reliable Soft-Touch** drive, this competitively priced dual-sided, dual density disk system provides Q-Bus™ users with a superlong MTBF of 15,000 hours (compared to an average of 8,000 for other drives) — and the FD4 is the only system with air-cushion protection to extend media life. A unique air dampener at the base of the head-loading mechanism eliminates the pinching, or biting of disk surfaces that leads to the excessive wear and information dropout common to other double-sided floppy disk systems. Now, even in those applications where data loss is most critical, media wear and it's associated costs can be cut dramatically without jeopardizing data integrity.

Pluggable in half-quad slot and completely transparent to DEC RX02 software, the FD4 runs DEC's ZRXDBO diagnostic and looks like a double size RX02 with 1962 formatted blocks per disk.

Please direct inquiries to: DEXPO/WEST 82 - BOOTH 606, SYNEMED, INC., 1215 Fourth Street, Berkeley, CA 94710, Attn: Kevin Miller.

NIS, INC. AT BOOTH 432 WILL INTRODUCE PASCAL-PLUS AND PRES Cupertino, CA — National Information Systems will be showing ACCENT R and VUE and introducing PASCAL-PLUS and PRES at the Second National DEC-Compatible Exhibition, DEXPO/WEST.

ACCENT R is a high productivity development tool allowing computerized information management applications to be developed in a fraction of the normal time. ACCENT R's combination of a relational DBMS with a non-procedural query language and a 4th generation high-level structured programming language makes immediate and direct access to information a reality for strategic planning, decision support, and information management on DECsystem-10 and -20 computers.

VUE is an interactive project management system that provides a convenient tool to plan and manage complex projects. VUE performs critical paths analysis for projects with up to 3,000 activities. VUE performs very well in environments where multi on- and/or off-site users need program access. The menu-driven user interface allows easy data entry, modification, and report selection. VUE runs on DECsystem-10/20, HP3000, VAX, PDP-11, and Perkin Elmer. Reporting is done on CRT's, printers, or optional graphics plotters.

PASCAL-PLUS is a production oriented compiler for DEC-10 and DEC-20 users, developed for the serious Pascal implementor. PASCAL-PLUS extends standard features, removes many of the arbitrary restrictions appearing in standard PASCAL versions, and utilizes an advanced optimization design. New features, normally occurring in languages such as ADA, FORTRAN, and ALGOL, have been added to increase programming power and flexibility. The PASCAL-PLUS compiler produces code that is 30-40 percent more compact than most standard compiler versions, with a corresponding increase in processing speed.

PRES is an interactive personnel resource management system. PRES provides record keeping and record tracking for all employees, including such features as job history, benefits administration, compensation, and salary.
A FIRST FOR THE U.S. SOFTWARE INDUSTRY (at DEXPO/WEST '82) — HINDITRON OFFSHORE SOFTWARE SERVICES

...is the first time exhibition of a service that offers cost effective options to the software industry that will help you get more from your computer for less.

HINDITRON's software development centre in Bombay, India, is geared to meet your specific requirements, using a wide range of computer and microprocessor systems.

HINDITRON offers software services for developing Application Software, System Software, Process Control Software and Software Conversions on turnkey and contract basis.

A multidisciplinary team of over one hundred software professionals has provided such services satisfactorily to DEC and DEC OEMs in the Asian, African and Middle-East regions.

Now for the first time these services are offered to the U.S. software industry.

For more information on HINDITRON OFFSHORE SOFTWARE SERVICES contact Harish Mehta, Director, HINDITRON COMPUTER SYSTEMS & CONSULTANTS PRIVATE LIMITED, Eros Bldg., 5th Floor, 42, M. K. Road, Bombay 400 020, India, Tel. No. 22-09-20.

RSTS/E NETWORKING SOFTWARE TO BE DEMONSTRATED AT DEXPO/WEST

Toronto, Canada — Digital Management Group Ltd will demonstrate DMG/NET — networking software for RSTS/E users — at DEXPO/WEST.

DMG, a DEC-oriented software and consulting company, developed DMG/NET as an effective and economical solution to today's complex networking problems. DMG/NET provides a networking growth path as the user's needs grow, since network carriers from direct cable links through leased lines and auto-dial units to X.25 networks are supported in any combination. Thus a network that starts out as a simple 2 system link can grow to a multi-system, multi-carrier network as and when required.

"DMG/NET evolved out of a project for a client," says John Dightam, President of DMG. "Their need was for a communication network that would provide low cost interactive access from any of their head office terminals to a wide variety of DEC and non-DEC computers throughout Canada and the United States. They also needed low cost file transfer capability between their seven RSTS/E sites across Canada. We were asked to provide all this, with the mandatory specification that no modifications be made to either the standard RSTS/E system or their PDP-11 hardware, as supported by DEC."

DMG/NET provides reliable, trouble-free networking and takes advantage of the cost savings offered by X.25 networks, especially over long distances. DMG/NET interfaces with Tymnet, Telnet and overseas X.25 networks. Some users have found that they have cut their communication costs by as much as 90%.

DMG/NET provides two-way file transfer and interactive dialogue capabilities between a local RSTS/E host and other RSTS/E systems. Interactive communication with IBM and other non-RSTS/E systems is also possible, and file data can be transferred from non-RSTS to RSTS by use of the "log" option contained in DMG/NET. All this is accomplished using short, English language commands, which can be easily understood by non-computer personnel.

The "alternate path" capability of DMG/NET allows all available alternatives for network connection to be explored, including all outgoing ports, remote access numbers and different carriers, if these facilities are available on the computer. If a connection cannot be completed because all lines are in use, or because of a fault in the network or communications unit, DMB/NET will describe the situation in an easily understood message displayed on the user's screen. When a network problem occurs, DMG/NET diagnostic routines help pinpoint the problem quickly. Comprehensive usage statistics recorded by the system facilitate management of day-to-day traffic on the network.

Through table-driven software, DMG/NET provides total interface and network flexibility. For example, as new micro-computers become available and are interfaced with the RSTS/E host, DMG/NET can handle the dialogue requirement between the two central processors.

DMG/NET is available on either a perpetual license or a rental basis — both with comprehensive support plans. "We are really committed to support," says DMG President Dightam, "and we have designed DMG/NET so that it lends itself to remote diagnosis. For example, from our Toronto office, we can reconfigure, diagnose faults, and load new versions into customer computers anywhere in the world — just as if they were in the next office."

DMG/NET will be exhibited by DMG in Booth No. 125, at DEXPO/WEST '82.

For more information on DMG/NET, contact Ken Allsopp, Digital Management Group Ltd., 4800 Yonge Street, Willowdale, Ontario, Canada M2N 6G3, Telephone: (416) 225-7788.

RSTS/E, PDP-11 and DEC are registered trademarks of Digital Equipment Corporation. DMG/NET is a registered trademark of Digital Management Group Ltd.

BRITTON-LEE INTRODUCES RELATIONAL DBMS FOR DEC VAX/VMS

Los Gatos CA — Britton-Lee, Inc. announces the introduction of the SYSTEM 300 and SYSTEM 600 relational database management systems for DEC computer systems. These products are for use with the VAX-11/750 and VAX-11/780 computers that use the VMS operating system. Additionally, versions of the SYSTEM 300/600 are available for use with PDP-11 and VAX-11 computers running the UNIX operating system.

The heart of the SYSTEM 300/600 is the Britton-Lee Intelligent Database Machine (IDM). The IDM combines relational database management software with hardware designed specifically to perform database management at high speeds. Located between computer and disks, the IDM offloads the entire database management function from the computer.

The low-priced SYSTEM 300 is ideally suited for medium demand VAX applications. The SYSTEM 600 is a higher performance product, making it an ideal match for high demand applications with large databases and many users. The SYSTEM 300 can control up to four SMD compatible disk drives for databases of up to 2.7 billion bytes. The SYSTEM 600 controls up to sixteen disk drives for a maximum database size of 10.8 billion bytes. The SYSTEM 300/600 attaches to the VAX computer via a high speed IEEE-488 parallel interface.

The SYSTEM 300/600 includes an IDM (mounted in a 40 inch cabinet), hardware to interface directly to the VAX UNIBUS adapter, and Support Software that runs under the VMS operating system. Also included is one year of software maintenance, which includes software updates and phone-in consulting. Additional software maintenance and hardware service contracts are available. Installation is available separately.

Also included with the SYSTEM 300/600 is the Britton-Lee IDL Query
Language. This user-friendly query language allows unskilled users to easily access and modify SYSTEM 300/600 databases. Included for application programming, is a runtime subroutine library that allows VAX-1 FORTRAN and COBOL programs, and "C" programs to access SYSTEM 300/600 databases. Optional VMS precompilers allow IDL commands to be embedded in VAX-11 FORTRAN and COBOL programs, and "C" programs. Database administration utilities, which allow for backup, crash recovery and bulk loading of data, are included in the standard product.

A unique feature of the SYSTEM 300/600 is that it can be connected to several computers simultaneously. This allows multiple VAX computers to use it as a centralized database resource. The optional SYSTEM 300/600 Interface Package provides this feature.

The Britton-Lee SYSTEM 300 and SYSTEM 600 can be ordered beginning June 1, 1982. The SYSTEM 300 is priced starting at $62,900 and the SYSTEM 600 starts at $85,300. The SYSTEM 300/600 Interface Package that allows the System 300/600 to be connected to additional VAX computers is available for $15,800. Pricing for the UNIX versions of the SYSTEM 300/600 is the same.

A public demonstration of the SYSTEM 300/600 will be held at DEXPO West.

For more information: Phil Amend, Vice-President, Marketing, Britton-Lee, Inc. Kathy Shadley, Marketing Administrator, Britton-Lee, Inc. 408/378-7000.

Intelligent Database Machine, IDM, and IDL are registered trademarks of Britton-Lee, Inc.

DEC, VAX, VMS, PDP and UNIBUS are registered trademarks of Digital Equipment Corporation.

CAMBEX AT DEXPO IN DECEMBER
Waltham MA - Cambex Corporation will be announcing new memory products for the DEC VAX-11/780* and VAX-11/750* series of processors at "The Second National DEC-Compatible Exposition (DEXPO).*" Cambex has been a supplier of OEM memories for over a decade and will exhibit its UNIBUS and Q-Bus compatible memories along with the new VAX products. Additionally, there will be an add-on version of their semiconductor RKOS* emulator disk.

All of the products have gained wide acceptance in varied applications areas and across the PDP-11* and LSI-11* families. Many users have boasted of significant increases in performance, since the products are utilizing 64K dynamic RAMS and the highest quality components and manufacturing facilities available.

The Cambex Booth is '232. Any inquiries can be made to Mini/Micro Marketing Department (617) 890-6000.

*Registered Trademarks of Digital Equipment Corporation.

COMPLETE DATA ANALYSIS SYSTEM FOR VAX ANNOUNCED
Nashville TN — S&H Computer Systems, Inc. has introduced INDAS™ (Integrated Data Analysis System), the first complete data analysis system for Digital Equipment Corporation VAX/VMS systems.

What Is INDAS™

INDAS™ (Integrated Data Analysis System) is a complete data analysis system for Digital Equipment Corporation VAX/VMS systems. In one integrated system INDAS™ provides (1) databases facilities (including the ability to sort, merge, update and join databases); (2) a complete programming language; (3) a matrix manipulation language; (4) powerful statistical analysis procedures including the General Linear Model.

Although a number of products are available for the VAX that provide programming languages or database access or statistical analysis, INDAS™ provides all of these features in a single integrated system. Using INDAS™ the data analyst performs the complete analysis from the raw data to the final printed results within the INDAS™ system.

The database, programming language and plotting and charting facilities make INDAS™ a flexible system well suited to a broad range of applications in science and business.

INDAS™ Database

INDAS™ features relational database capabilities. The MERGE statement implements the relational join operator, linking data from several data sets by a common key. The UP-DATE statement applies transaction records to a master file. The IF, KEEP and DROP statements implement subsetting by records and variables. Taken together, these statements allow users to maintain and extract data with a minimum of programming.

INDAS™ Programming Language

INDAS™ provides a complete programming language that includes structured programming facilities, subprograms, numeric and character data types, matrices, as well as statements for selecting, merging, dating and joining data sets. Because the language compiler is part of the INDAS™ system, it is not necessary to compile and link programs separately.

A powerful set of intrinsic functions is part of the programming language. In addition to the usual mathematical and transcendental functions, INDAS™ provides functions to perform operations such as computing probability functions, character string manipulation, and state name and zip code conversion.

Operations on character strings include the ability to extract or alter substrings, determination of the length of a string, concatenation of two or more strings, location of one string within another and removal of selected characters. INDAS™ also provides character-string matrices.

INDAS™ Matrix Manipulation Language

In addition to a conventional programming language, INDAS™ provides a complete matrix manipulation language. This facility is similar in power to APL but does not require a special terminal. The matrix manipulation language allows matrix variables, constants and functions. The allocation of memory space for matrices is completely dynamic and automatic. Arithmetic expressions involving matrices can be written as simply and directly as those involving scalars.

For example, if X is a matrix variable, the following statement computes the inverse of the matrix resulting from the product of the transpose of X with X:

$ Y = \text{INV}(X' \times X) $

Matrix operators available in the language include: addition, subtraction, matrix multiplication, scalar multiplication, transpose, horizontal concatenation, vertical concatenation, comparison and summation over selected rows and columns. Generalized subscripts allow access to single matrix elements or sections of the matrix. Intrinsic matrix functions include: inverse, generalized inverse (Moore-Penrose), determinant, singular value decomposition, solution of linear equations, sweep operator, transcendental functions and probability functions.

INDAS™ General Linear Model

The General Linear Model procedure analyzes data within the framework of an arbitrary linear statistical model. This procedure is exceptionally comprehensive, encompassing in a unified setting:

- Analysis of Variance (ANOVA)
- Regression
- Analysis of Covariance (COANOVA)
- Multivariate Analysis of Variance (MANOVA)

The syntax is simple yet powerful, paralleling the notation used to describe linear models. A particular strength of the General Linear Model is its ability to accept unbalanced data, which allows analysis of the type of data frequently encountered in applications but which cannot be analyzed with traditional methods.

INDAS™ Statistical Procedures

INDAS™ has a comprehensive set of procedures for statistical analysis. This
THE NEW BRITTON-LEE SYSTEM 300 AND SYSTEM 600 (SYSTEM 600 shown) BRING HIGH-PERFORMANCE RELATIONAL DATABASE MANAGEMENT TO DEC VAX COMPUTER USERS.

includes descriptive and univariate statistical analysis; analysis of variance for balanced and unbalanced designs; non-parametric analysis of variance; t-tests; probit analysis; linear models for categorical data; multiple, stepwise and non-linear regression; autoregression; correlation (Pearson, Spearman and Kendall), canonical correlation; discriminant analysis; cluster analysis; and factor analysis. Graphics facilities include procedures for generating curve and contour plots, bar charts, pie charts, star charts and block charts.

INDAS™ is Extensible
INDAS™ users can write procedures to be incorporated into the INDAS™ system and called just as the standard INDAS™ procedures. This allows a flexible and convenient way to develop specialized analyses. All of the database and programming features of INDAS™ can provide the input to a user-written procedure.

INDAS™ Is Another Quality Product From S&H
S&H Computer Systems, Inc. has been developing high quality system software for Digital Equipment Corporation computers since 1976. In addition to INDAS™, S&H has developed the popular TSX-Plus™ operating system, the high-performance COBOL-Plus™ compiler and the versatile RTSORT™ disk sort program. S&H products are in use at over 3,000 sites in more than 25 countries. S&H plans to deliver the first INDAS™ systems early in 1983.

Please address domestic sales inquiries to Gary Manookian, and all other inquiries to Richard Dohrmann, Vice President, at S&H Computer Systems, Inc. 1027 17th Avenue S., Nashville, Tennessee 37212, (615) 327-3670, Telex 786577 S&H NAS.

ADVANCED SOFTWARE PRODUCTS announces QSORT Version 3.0
Lathrup Village, MI — Advanced Software Products has developed a sort utility, QSORT, that uses the operating system’s efficiency — not the programmer’s — to sort large quantities of data and merge unsorted files. QSORT Version 3.1 with expanded file sorting capacity, will be released for the first time at DEXPO/WEST 82. Meanwhile, QSORT, Version 3.0, to be released October 1st, 1982, now lets programmers get on with the business of programming systems instead of programming sorts.

Performance
QSORT is a high performance sort utility developed for the PDP-11 computers utilizing CTS-500/RSTS-E operating systems. Written completely in PDP-11 MACRO enables QSORT to take full advantage of the powerful features of the operating system. Programmers no longer have to build, translate and compile a sort file; QSORT allows the programmer to describe the sort with a SINGLE command line.

Efficiency
QSORT has been developed and installed over a two year period in institutions where large volumes of data are sorted for daily and monthly reporting. To enhance speed performance, QSORT was developed as a run-time system utility-only the data swaps in and out, not the program. The program will only swap in-never out. This is due to the fact that the code is fixed and need not be saved. QSORT is re-entrant; only one copy of the program is ever loaded into memory no matter how many users are concurrently utilizing QSORT.

Generally, QSORT requires 1.5 times the input file for work space. This space can be allocated to any random access device supported by the system it is running on.

Enhanced
In addition to high performance and efficiency, the three major features of the newest version of QSORT (Version 3.0) gives QSORT file sorting capacity that supports $2^{16}$ blocks of data with any number of records. QSORT is also capable of merging two unsorted files into a single sorted file. And, QSORT can handle fixed length, no-span, unformatted ASCII files as typically used by BASIC-PLUS programmers.
Features

QSORT is flexible and may be called by any language which supports "core common." Upon successful completion, QSORT can be chained to execute another program.

Enhanced speed performance, full RSX-11 compatibility, and auto attribute recognition for RMS-11 sequential files round out the additional enhancements of QSORT Version 3.0.

An optional SORTG/GSORT processor allows QSORT to be substituted for most DIBOL or MCBA sorts without any user program modifications.

Availability

QSORT Version 3.0 is available for $1,200.00. Marketed exclusively by ADVANCED SOFTWARE PRODUCTS, further information, including a 7-day trial DEMO, may be obtained by calling or writing: Advanced Software Products, 28690 Southfield Rd., Suite 291, Lathrup Village, MI 48076 (313) 569-5570.

SOUTH SYSTEMS ANNOUNCES PLAN TO BEGIN OEM SALES OF INTERFACES

Fort Lauderdale, FL — Southern Systems, Inc. (SSI), add-on printer company, has announced the start of a new OEM sales program for SSI-developed and manufactured computer-printer interfaces.

The OEM program of interface sales will be an addition to the company's servicing of end-users with complete line printer systems using the newest technologies in speed ranges of 200 to 1600 lines per minute.

In the interface sales program, OEMs, system houses, distributors and other volume users will receive quantity purchase prices that range from $200 to $2,000 depending on the type of computer interfacing required.

Southern Systems designs and manufactures line printer interfaces and controllers for all Digital Equipment Corporation computers as well as for Data General, Interdata, Texas Instruments, Hewlett-Packard, IBM and Burroughs.

SSI also makes a wide range of serial communication interfaces, both synchronous and asynchronous, including those compatible with IBM protocols 2780/3780, Burroughs, Univac and NTR.

The company is located at 2841 Cypress Creek Road, Fort Lauderdale, FL 33309, (305) 979-1000.

WHY SYSTEMS RELEASES DECISION SUPPORT TOOL FOR DEC COMPUTERS

Redmond, WA — A new decision support system has been released by WHY Systems Inc. The DIGICALCTM package was designed for Digital Equipment Corporation computers, and is currently available on VAX using the VAX/VMS operating system and on PDP-11 systems running under RSTS/E or CTS-500.

DIGICALC is an interactive, CRT-oriented planning and forecasting tool used by accountants, engineers, managers, executives, scientists and

PRODUCT NOTES & UPDATES

SOUTHERN SYSTEMS ANNOUNCES PLAN TO BEGIN OEM SALES OF INTERFACES

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DIGICALC is an interactive, CRT-oriented planning and forecasting tool used by accountants, engineers, managers, executives, scientists and
others who want to automate their number processing needs. Both simple and complex numeric calculations can be quickly and easily performed, giving the user more time to work on other matters.

"Increased productivity is the key," said Wayne Yarnall, President of YELLOW Systems. "DIGICALC is designed to give key personnel the answers to complex problems quickly, so that they can make important decisions with the best possible data at their fingertips," Yarnall added. "An investment in DIGICALC gives your top people additional leverage, and it has a payback period that can be measured in days or weeks, not months or years."

The most common uses of DIGICALC are for budgeting and financial modeling. An accounting worksheet is displayed on the video screen. A simple model might consist of budget descriptions down the left-hand column, headings for twelve months across the top, with totals for each month, and cross totals for each budget category. Data can be entered directly onto the screen by the user, or it can come from an external source such as an existing General Ledger system on the same computer.

In a modeling session, any of the factors that make up the model can be changed, and the entire model can be immediately viewed from the new prospective. This "What if?" capability is especially helpful to the business manager. The manager can say "What if sales drop 3.8 percent, and inflation increases 1.2 percent per month for the next six months?" The new scenario will be displayed, and the results are available to continue the modeling process. Worksheets can be prepared for individual departments, and can be consolidated into divisional and organization-wide models. After all the interactive modeling is complete, DIGICALC will print reports that can be used throughout the organization.

The product can be used effectively in any environment with the proper operating system. DIGICALC is completely self-contained, and no extra-cost system hardware or software options are required in order to use it. Facilities for transferring data into and out of DIGICALC for use with other computer applications are provided.

WHY Systems, Inc. specializes in the development of software for DEC computer systems. Its offices are located at 16902 Redmond Way; Redmond, Wash. 98052; tel. (206) 881-2331.

DIGITAL PRODUCTS REPAIR CENTER BROCHURE FROM RELIANCE ELECTRIC

Cleveland, OH — A new four-page illustrated brochure describing how the Reliance Electric Digital Products Repair Center provides fast, reliable repair, exchange or replacement of PC Boards and related equipment is now available.

The file-size brochure points out that the Digital Products Repair Center is equipped to solve every possible kind of PC Board problem through the use of advanced state-of-the-art equipment and instrument calibration procedures. PC Boards can be diagnosed and tested under simulated operating conditions, including heat and humidity environmental simulations, plus no-load and full-load testing.

Explained in the brochure, containing photos of troubleshooting and testing procedures, is that the Center's capabilities include repair of PC Boards from Reliance® and Toledo® equipment plus AutoMate® Programmable Controllers, computer and computer interface systems, and UDAC™ Programmable Process Controllers. Repair service is also furnished for computer and control equipment made by Digital Equipment Corp., Data General and GRI. Noted is that 10-day service is normal but emergency repairs can be made in 24 hours.

Also described is the Reliance Electric parts exchange program for selected AutoMate Programmable Controller components which gives users immediate repair service to minimize equipment downtime, and the AutoMate CRT Programmer Rental System for reducing programming costs.

To obtain a copy of the new Digital Products Repair Center Brochure — H-2661-2 — write to Reliance Electric Company, 24701 Euclid Avenue, Cleveland, Ohio 44117.

DIGITAL EQUIPMENT TO MARKET IN-INTERNATIONALLY RAXCO RABBIT SOFTWARE

Atlanta, GA — RAXCO Inc. announces an international marketing agreement with Digital Equipment. Under the terms of the agreement, Digital Equipment Australia Pty Limited, will market and support RAXCO's "Digital tested" RABBIT Software on an exclusive basis throughout Australia and New Zealand. Negotiations to provide similar services throughout Europe are expected to be concluded shortly. RAXCO will continue to directly provide RABBIT Software throughout North America.

In the July 1982 issue of "digital news" Digital is quoted as follows: "Digital is pleased to announce a new program designed to make it easier for customers to obtain some of the Software written by third parties in Australia, New Zealand and Overseas.

"This worldwide program was established in response to the many requests made by customers to Digital, especially in countries such as Australia and New Zealand. Customers had expressed a concern at DECUS Meetings and in their Survey responses to Software Services, that it was expensive and time consuming to obtain Software Applications packages written by Software Houses and by major customers in Europe and the U.S.A. It was not easy for them to evaluate packages remotely or to negotiate an agreement for their purchase. They were also concerned about local support for these packages.

"In addition, many customers have developed software which they believe to be of a high enough quality to be marketed. They asked Digital to use its extensive marketing capabilities to make these Applications Packages available to Digital's customer base worldwide.

"The Digital Application Software Library has been setup by Digital to provide customers with access to packages developed locally and overseas by software houses and by customers."

RABBIT Software is available for DEC computers running VMS, RSTS/E and soon-to-be-announced RSIX-11 m plus.

RABBIT-1 Software provides system resource accounting, auditing and billing reports.

RABBIT-2 Software provides graphic system performance analysis through an interactive command language.

RABBIT-3 Software is a job accounting and monitor program for RSTS/E systems.

RABBIT-4 Software is a computer security system for users and data files under RSTS/E.

RABBIT-5 Software is a high speed file backup and restore system for VMS.

Over 500 RABBIT Systems have been installed worldwide in the past two years, including England, Ireland, Germany, France, Australia, South Africa, Mexico, Canada and the U.S.A.

For more information contact: RAXCO Inc., Suite 200, 6520 Powers Ferry Road, Atlanta, Georgia 30339; U.S.A., Telephone: (404) 955-2553; TWX 810-766-2256; Telex 54-2659.
with full colour and computer-provided questions. Researchers can branch to different questions based on the consumer's response. Product discount coupons or vouchers can be automatically printed at the end of an interview as a gift for co-operation.

CableShare Inc. is a public company which develops computer information systems, software products and Telidon business systems and markets them in Canada, the United States and abroad.

INNOVATIVE ELECTRONICS OFFERS IBM 3270 BSC CONVERSION
Miami, FL — Innovative Electronics, Inc. has announced the MC-80/600-01 communications processor. Emulating an IBM 3274-5IC communications controller running configuration support level A, this device converts an inexpensive DEC VT-100 compatible terminal into a full function IBM 3277-1, 3277-2, 3278-1, 3278-2 terminal communicating with the IBM host using the EBCDIC binary synchronous communications (BSC) protocol.

Economical asynchronous ASCII terminals such as the DEC VT-100 can be used in both local and dial-up applications. Full screen mapping is performed by the MC-80/600-01: data displayed on the asynchronous ASCII terminal will be the same as an IBM 3277/3278 display station, with virtual screen sizes of 480, 960, and 1920 characters. All screen formatting capabilities are supported. These include protected or unprotected alphanumeric, numeric, and non-display fields, character highlighting, and auto-tabbing. All keyboard functions are supported including vertical and horizontal cursor movement, erase, insert, delete 24 program function (PF) and program access (PA) keys. Status information is displayed in English at the bottom of the display.

Maintainability of the unit is dramatically increased by the extensive on and off line diagnostics. Diagnostic indications, provided through a seven segment display, include indications of the device being polled or selected and transmission errors. Off-line diagnostics are executed when the system is powered on, as well as when initiated by the operator. The CPU, ROM, RAM, and data paths are always tested. Operator initiated tests include the exercise of attached peripheral devices or "canned" messages to and from attached processors. A third level of testing is provided through test connectors, which connect outputs to inputs, completely testing every interface signal. These diagnostics enable the clerical operator to easily isolate failures to the communications processor, mode, or terminal device allowing the system vendor to reduce the cost to maintain the system through initial telephone assistance. This stand alone self powered micro-communications processor provides up to 16K of ROM, 16K of RAM, and two serial communications ports. The price for the basic unit is $1745.00. A model sharing port is optional. Delivery is from stock to 30 days. An additional port, allowing two independent terminal devices to be supported is $250.00 additional and will be available this fall.

NEW MDB MODEM CONTROL BOARD DOES ITS OWN TROUBLESHOOTING
Orange, CA — A new asynchronous serial interface with model control for LSI-11 based systems will be introduced by MDB Systems, Inc., the world's largest independent manufacturer of interface products. The interface is completely compatible with the DEC CLV11-E and, at the same time, offers a number of significant features which are not present on the DEC board. Notable among these is a troubleshooting capability.

The single line RS-232-C interface is designated the MLSI-DLV11-ED, and it is appropriate for a wide range of modem oriented applications. Among its unique features are device addressing, and interrupt vectors which are switch selectable for operating convenience.

Data rates from 50 to 19.2K baud are both switch and program selectable. To assure complete functionality in contemporary systems, the MDB board has four level interrupt capability which is jumper selectable.

VAX USERS GET A REMOTE, INTERACTIVE TRAINING TOOL
Provo, UT — Clyde Digital Systems, Inc., a principal supplier of application software, announces DEMO, a stand alone utility package for interactive user training and trouble-call support under VAX/VMS. The product also provides a framework for remote software demonstration. VMS software vendors can now demonstrate software and support customers without expensive traveling. DEMO is also invaluable to any VAX site which supports remote users.

This new product runs entirely in VAX native mode and gives users system support never before available under VMS. DEMO allows an authorized support manager to watch any terminal on the system, remote or local. This includes seeing all user keystrokes and computer response. This is invaluable in training and consulting situations where the user needs advice or assistance with computer interaction. The program even allows the support manager to insert input from his terminal as though he were the user. This input as well as the computer's response is echoed to the user's terminal.

DEMO captures in a log file the events of the entire session. All input whether from the support manager's terminal, the user's terminal, or the computer, is identified. This provides the user valuable documentation for future reference.

Product information may be obtained from: Mary at: (801) 224-5306, 3707 N. Canyon Road, Suite 3-E, Provo, UT 84604.
EMULEX INTRODUCES STATCON SERIES 21 MULTIPLEXER THAT ADDS PORT CONCENTRATION FOR REMOTE DEVICES
Santa Ana, CA — Emulex Corporation today introduced a unique communications product line that for the first time combines both standard host computer multiplexing and remote statistical port concentration capabilities in a single interface module.

The new STATCON SERIES 21 Multiplexer/Port Concentrator takes advantage of the company's CS21 series host multiplexers and adds special microprogramming to provide the demultiplexing capabilities required to funnel remotely concentrated data into a single computer RS-232 port. Up to 32 local and/or remote lines may be connected to any DEC PDP-11 or VAX-11 computer system using just a single backplane slot and without any user modification of standard software. Each remote link plugs into one of the 16 local RS-232 ports and the remaining number of RS-232 ports may be allocated to local, asynchronous line applications.

"The object in using any statistical data concentrator is to reduce telephone line costs by sharing one line among several remote terminals," explained William Dollar, Emulex product manager for communications. "In the past, this was accomplished by having a statistical concentrator at each end of the communications link; but this meant that at the CPU end there were as many local ports and cables between the CPU and the local concentrator as were there remote terminal interfaces. While the number of phone lines was reduced, the user paid for a full local concentrator and host multiplexer capabilities.

"Users would obviously prefer to interface the composite communication line directly into the CPU through a single high speed data channel, thus using only one port," he continued. "This previously presented a problem because a complex customer software package had to be developed to handle all aspects of multiplexing, demultiplexing, error handling, line initialization and synchronization, and remote concentrator configuration. Very few users could justify this kind of effort, even in view of the hardware cost savings.

"The new CS21/MX host multiplexer and its companion CM22/EX local statistical port concentrator have been programmed by Emulex to provide all of these demultiplexing functions in a manner which is completely transparent to the DEC system's existing operating software," he said. "Now the network user can reduce total system hardware and also free up available RS-232 ports for other uses without having to make a substantial software development effort.

"In addition, the CM22/EX is protocol compatible with the standard Micro800/2 and the Micro8000/2 remote data concentrators made by Micom Systems, Inc. Existing or potential users of these Micom products may therefore avail themselves of this capability without any remote concentrator modification," Dollar said.

The CSM21/MX is offered with either DH11 or DZll emulations for use with PDP-11 or VAX-11 computer systems made by DEC. Both are transparent under all PDP-11 Operating Systems and the DZ11 version is transparent under VAX/VMS. Emulex also supports the DH11 emulation under VAX/VMS with its own software to give users a higher performance alternative than the DZ11 version.

"The CS21/MX computer interface plays an important role in the task of port concentration since it acts as the interpreter between the host computer and the local port concentrator," Dollar added. "On the port concentrator side, it is responsible for multiplexing and demultiplexing of data, for modem control, for handling data rate changes, for monitoring link error status, for providing a local/remote diagnostic loopback, and for control of data flow. On the CPU side, it makes the local and remote mix of lines appear to be two functional DH11 asynchronous line multiplexers; or, in the case of the DZ11 emulation, it appears as four separate DZ11 asynchronous line multiplexers. This means the operating system does not have to be patched or otherwise modified for concentration applications."

A single remote link configuration consists of the CS21/MX controller, a 16-port RS-232 Distribution Panel, and a CM22/EX Port Concentrator. An additional CM22/EX is added for each remote link; each CM22/EX plugs into one of the local RS-232 ports. Unused RS-232 ports may be used for local asynchronous lines, provided the total number of local plus remote channels does not exceed 32. The CM22/EX Port Concentrator can be ordered with or without integral modems. Standard Micom Micro800/2 and/or 8000/2 statistical concentrators are used at the remote end of each link.

The user defines through the communication I/O driver whether modem control will be a function of the remote channels or not. If it is not defined, the CM22/EX will not pass modem information to or from the remote
concentrator. If it is defined, the CS21/MX will inform the local port concentrator and the modem signal states for each remote channel on the link will be passed through the CM22/EX transparently. These passed signals then serve as the status or action elements to and from the communication I/O driver.

Individual channel data rate changes are passed through the CM22/EX to the remote data concentrator. Standard DH11 and DZ11 data rates are supported in the corresponding emulation. Link status is sent by the CM22/EX Port Concentrator to the CS21/MX for error reporting to the I/O driver. Data flow is generally controlled by the CM22/EX, which also monitors buffer status of the remote concentrator. Each channel may control data flow, however, through the normal XON/XOFF function. During extremely busy CPU periods, the CS21/MX can also control the incoming data flow from the CM22/EX to the host.

"The CM22/EX Port Concentrator also serves several important functions in management of the communication link and the remote concentrator," Dollar noted. "It is responsible for all error control of data and transfers only error-free data blocks to the host computer. It also handles data buffering requirements, initialization and synchronization of the communication link, and configuration of the remote terminal concentrator to establish data rates and code levels for each channel."

A minimum STATCON SERIES 21 configuration includes a single CS21/MX computer interface PC board, a CP21 16-port distribution panel, and a CM22/EX statistical port concentrator without model. List price for this capability is $6,300. Additional port concentrators may be added at a list price of $2,200, without modem capability. Emulex also provides the remote Micom-compatible statistical concentrators with 4-16 channels, with or without integral modems, at standard established prices.

Like all other Emulex products, these new units may be combined in the company’s mix-and-match OEM volume purchase plan to qualify for pricing discounts. Emulex will market and support the STATCON SERIES 21 products both directly and through certain of its authorized dealers.

CP/M Micro Co-processors for the DEC UNIBUS and Q-Bus

Berkeley, CA — Virtual Microsystems Inc. announced today the release of the z-Board micro co-processor for the UNIBUS and Q-Bus. The z-Board works with VMI’s product THE BRIDGE Virtual Microcomputer System, to provide a complete virtual CP/M environment on a VAX, PDP-11, or LSI-11 minicomputer.

The UNIBUS version of the z-Board features 4 z-80 micro-processors and a full 256 kbytes of memory, along with a bit slice state machine which handles the bus interface. The Q-Bus version is similar, but may be populated with 1 to 4
z-80's. Each of the z-80's operates independently, providing each BRIDGE user with full microcomputer functionality at any of the attached terminals.

A BRIDGE user begins a session by running THE BRIDGE as a task under VMS, RSX, RSTS, RT-11, or UNIX. THE BRIDGE first tests to see if a z-80 is available on the z-Board. If one is available, the user is "attached" to it. From that point on, the user feels as though his terminal is a fast CP/M microcomputer using hard disk. He can then run any of the programs in the vast CP/M software library. If a slot on the z-Board is not available (any number of z-Boards can be added to a system), the user is "attached" to THE BRIDGE simulator, which performs all calculations in software. THE BRIDGE handles all I/O, disk storage, printing, and communications. The system also makes use of "virtual floppy disks," files on the hard disk which are like a CP/M floppy disk.

THE BRIDGE Virtual Microcomputer System, complete with z-Board, helps the information manager to manage the proliferation of microcomputers. A virtual microcomputer is available to any person on the system at anytime, yet the files are not distributed among various incompatible devices. A virtual microcomputer system can help reduce the costs of hardware significantly, and provide a much more integrated data processing environment. THE BRIDGE and z-Board combination are extraordinarily cost-effective; each slot on the z-Board costs around $1000 — far less than a "low-end" personal computer; yet THE BRIDGE provides hard disk, access to the fast system printers, and is integrated into an already existing, professionally managed system.

THE BRIDGE and z-Board are available now for the full range of DEC computers under all the major DEC operating systems. THE BRIDGE costs between $1000-$3500 depending on the size of the minicomputer; each UNIBUS z-Board costs $4000 — Q-Bus versions vary between $1250 and $3500 depending on the number of installed microcomputers.

THE BRIDGE and z-Board are trademarks of Virtual Microsystems Inc.

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DEC, RSX, VMS, RT-11, RSTS, and VAX are trademarks of Digital Equipment Corporation.

HELP NEEDED

The RSTS PRO with Carl and Dave is trying to put together a working PDP-11/20 running RSTS V4A.

This was the first PDP-11 to run RSTS and we think it would make a nice addition to the DEC Computer Museum (if they accept it).

We need documentation for Version 4, as well as any SYSGEN-related information. If you have any or know where some is, please contact us at 215-542-7008.

Thank you.

Carl & Dave
VAX PERFORMANCE NOTES

... continued from page 49

This workload demonstrates that for the 11/730 1 MB is too little memory. 2 MB is adequate up to 16 users and that the CPU has the power to support 3 MB.

The 11/780 continues to support more users up to 6 MB, but 8 MB doesn't seem to help at all.

Adding memory to the 11/750 continues to increase performance up to 6 MB.

This supports our contention that 2-3 MB is a better memory size for the 11/730.

The 11/730 which dies with 8 users and 1 MB, begins to degrade at 24 users and 3 MB. Note that the 11/750 with 3 MB shows no signs of degradation at 32 users.
RSTS/E INTERNALS MANUAL

The RSTS community has been clamoring for years for a book that details the inner workings of RSTS/E. Well, clamor no more. Michael Mayfield of Northwest Digital Software, and M Systems, the publisher of The RSTS Professional and The DEC Professional Magazines, have teamed up to produce the RSTS/E Monitor Internals Manual.

This manual describes the internal workings and data structures of the RSTS/E monitor. It also notes differences in the internal structures between version 7.1 and earlier versions of the monitor. Future updates will include changes for new versions of the monitor.

Information is available for all levels of users:

• Gain a basic understanding of the workings of the monitor for optimizing system performance.
• Information on disk structures allows recovery of data from corrupted disk packs.
• Special uses of runtime systems and resident libraries allow complex applications to be developed without degrading system performance.
• Write your own custom device drivers for that "foreign" device you need to add but thought you couldn't.

CONTENTS:

Chapter 1 describes the structures used by the monitor that are resident on disk. These include the directory structure, disk allocation tables, Save Image Library (SIL) formats, bootstrap formats and bad block mapping.

Chapter 2 describes the tables used within the monitor to control system resources and provide program services. These tables provide job, memory, file and device control, as well as program services such as interjob communication.

Chapter 3 contains information on writing and installing a custom device driver. It describes the entry points and information the driver must provide to the monitor as well as the subroutines and macros the monitor provides for the driver.

Chapter 4 contains information that enhances information already provided by Digital on writing custom resident libraries and runtime systems. It concentrates mainly on non-standard uses of resident libraries and runtime systems to increase system performance and functionality.

Appendix A provides six quick reference foldout charts:

• The directory structure.
• The monitor tables.
• Fixed memory locations and common data structures.
• Monitor subroutines.
• Device driver entry points.
• Device driver macros.

Appendix B provides examples of the peek sequences required to access most of the monitor tables. It also contains an example program that uses many of the monitor tables to display a job and open files status.

Appendix C provides an example device driver.

Appendix D provides an example runtime system that doubles as a menu system for restricting specified users to a menu of options.

$95.00

SEND ORDERS TO: M SYSTEMS, INC., BOX 361, FORT WASHINGTON, PA 19034-0361
A COUPLE OF CUSP ENHANCEMENTS

By Michael H. Koplitz

There are still many RSTS/E installations that use the Digital spoolers, this installation being no exception to that rule. It has always been a pain to use the QUE.BAS program because when a Control-C is typed during the listing of a spooler, the program would go to "Ready" status. QUE.BAS should be like PIP which goes back to the prompt when a Control-C is entered during a listing of an account or file. The first enhancement shown here is to QUE.BAS. This enhancement will allow the user to type a Control-C during the listing of any of the spoolers while in QUE.BAS and control will return to the "#" prompt. If two Control-Cs are entered, QUE.BAS performs the operations as if an "E" command had been entered. If a Control-C is entered to the command line input the "E" command is executed.

None of the original lines of code in QUE.BAS were edited. All the changes given are new lines of code. They can be entered by any editor.

The code to make this enhancement is given below. Modified lines of code have an asterisk in front of the line number. These changes can be made with any editor.

```
1005  X$ = SYSCHR(6%) + CHR(7%))
       IF (ED% AND 16%) = 0%  
         ISET CONTROL.C TRAP IF USER IS LOGGED IN
10605  CONTROL.CEE.TRAP% = 0%
       ISET THE CONTROL.C TRAP COUNTER TO ZERO
19077  IF ERR = 28% THEN CONTROL.CEE.TRAP% = CONTROL.CEE.TRAP% + 1%
       COS = "E" IF CONTROL.CEE.TRAP% = 2%
       OR ERL = 10600
       RESUME 10610 IF CONTROL.CEE.TRAP% = 2%
       OR ERL < 10600
       X$ = SYSCHR(6%) + CHR(7%))
       RESUME 1050
       ITAKES CARE OF CONTROL.C TRAP ERROR.
```

The next enhancement is to MONEY.BAS. MONEY.BAS is a good utility to monitor the activity of the system. The only problem with MONEY.BAS is that the report does not indicate when the data was reset. Therefore it is impossible to know what time frame the MONEY report is referring to. The following enhancement creates a file named "$MONEY.DAT" which contains the date and time when the data was reset. To keep some integrity with this date, a user can not ask to reset data on selected accounts. The date in $MONEY.DAT therefore refers to the whole system.

```
9000  PRINT "Selected accounts can not be reset"
       IF R9%
       R9% = 0%
       ICHECK RESET CONDITION
9005  ON ERROR GOTO 9100
       INPUT "Account";M%(8%) . M%(7%)
       GOTO 9005 IF M%(8%) < 0% OR M%(8%) > 254% 
       OR M%(7%) < 0% OR M%(7%) > 254% 
       OR (M%(8%) = 0% AND M%(7%) < > 1%)
       ISELECTIVE ACCOUNT LISTING — ENDS WITH CTRL/Z.
       ICHECK GENERAL RANGE
       IALLOW ONLY [0 . 1] IF PROJECT NUMBER IS ZERO.
9020  PRINT "Data last reset or \.J'ST.DATES
         GOSUB 8100
         GOSUB 2000
         GOTO 9005
9060  PRINT "Cannot find that Account"
         GOTO 9005
9115  GOTO 32767
10000 LAST.DATES = "???????"
       RESUME 140
       IUNKNOWN LAST DATE
```

Until this new version of MONEY.BAS is run with the data being reset the date on which the data was reset will show as ????????.
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